SHARP

Electronic Components
January 2009

For Your Creative Products

ELECTRONIC COMPONENTS

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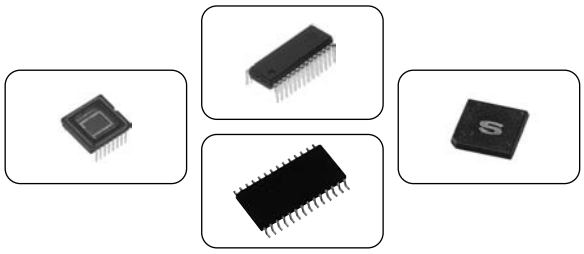
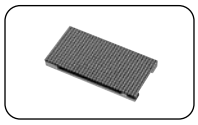


LED

LED

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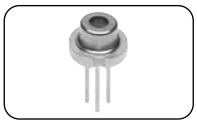

RF

RF COMPONENTS


IR

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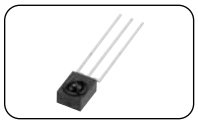

POWER

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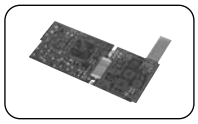
PCB

PRINTED CIRCUIT BOARDS



UNIT

PICKUP

Advanced Measures for Environmental Conservation

Sharp is constantly striving to develop new technologies and products to meet the needs of the future, as demonstrated with its development of the calculator and research and development of LCD technology.
In accordance with environmental guidelines established under Sharp's Basic Environmental Philosophy, the Sharp Group Charter of Corporate Behavior, and the Sharp Code of Conduct, Sharp is pursuing environmental conservation in all aspects of its business activities. Since fiscal 2004, when the medium-term brand objective of becoming an environmentally advanced company was first set, Sharp has been promoting the Super Green Strategy to achieve its corporate vision and to establish sustainable manufacturing systems.

● Basic Environmental Philosophy ●

Creating an Environmentally Conscious Company with Sincerity and Creativity

● The Sharp Group Charter of Corporate Behavior ●

Contribution to Conservation of the Global Environment

The Sharp Group will fulfill our responsibility for environmental conservation by promoting the creation of proprietary technologies that contribute to protection of the global environment, and by carrying out our product development and business activities in an environmentally conscious manner.

● The Sharp Code of Conduct ●

Contribution to Conservation of the Global Environment

1. To Conserve the Environment:

① We will comply with all applicable environmental laws, regulations and territorial agreements, and work to practice efficient use and conservation of resources and energy voluntarily, in the recognition that environmental conservation is an essential facet of corporate and individual pursuits.
② We will ensure proper use and control of chemical substances in our business activities, including research, development and manufacturing, meeting or exceeding levels determined by laws and regulations.
③ We will engage in the active acquisition, reporting and promotion of environmental information at an international level, as the Sharp Group companies promote communication with shareholders and local residents.
④ We understand the importance of internal company systems and related details in acquiring third-party certification and recertification of our ISO environmental management systems, and we will conduct our business operations in accordance with relevant internal guidelines.

2. To Develop Environmentally Conscious Products and Services, and Conduct Our Business Operations in an Environmentally Conscious Manner:

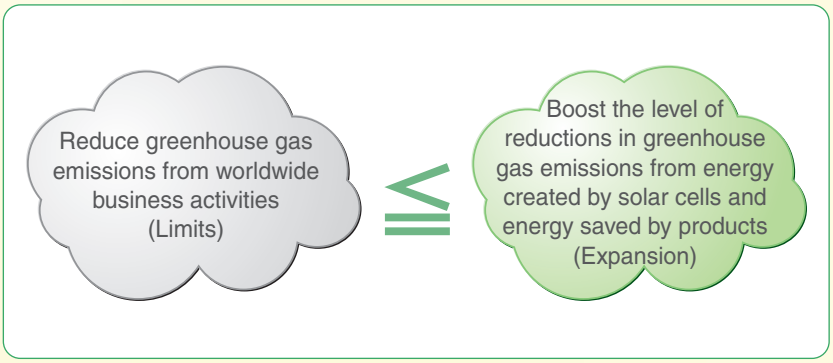
① We will engage positively in the minimization of resource use, reduction in the size and weight of products, use of recycled materials, and the development of long-lasting, energy-saving, energy-creating products.
② We will work to compile information related to harmful substances that might damage the environment or human health, and will not, as a matter of principle, make use of these harmful substances in our products, services and business activities.
③ We will use recyclable materials wherever possible, with product development focused as a matter of policy on structures that are detachable or capable of dismantling, and suited to recycling.
④ We will work aggressively to reduce greenhouse gas emissions in the full range of our business activities, in order to contribute to the prevention of global warming.
⑤ We will work to conduct our business in such a way as to select and purchase materials that are harmless to the global environment, and to local residents and employees, for the resources needed for business activities (equipment, raw materials, subsidiary materials, tools, etc.).
⑥ We realize that waste material is a valuable resource, and we will actively conduct our business operations in such a way as to maximize the 3Rs (reduce, recycle and reuse) and will contribute to minimizing the amount of waste sent for permanent landfill disposal.

* The Sharp Group Charter of Corporate Behavior and the Sharp Code of Conduct were instituted in May 2005 as a revised edition of the preceding Sharp Charter of Conduct (instituted in 2003). The section above is an excerpt from descriptions of Sharp's environmental conservation efforts.
For more information: http://sharp-world.com/corporate/eco/report/index.html

as Management Policy

Corporate Vision: Sharp's Energy-Creating and Energy-Saving Products Will More Than Balance Out Sharp's Greenhouse Gas Emissions.

Sharp will limit to the greatest extent possible the amount of the greenhouse gas emissions resulting from its business activities around the world, while at the same time, significantly help reduce greenhouse gas emissions based on the energy-creating effects of solar cells and the energy-saving effects of products. The idea is for the amount of greenhouse gas emissions reduced to exceed the amount emitted by fiscal 2010.

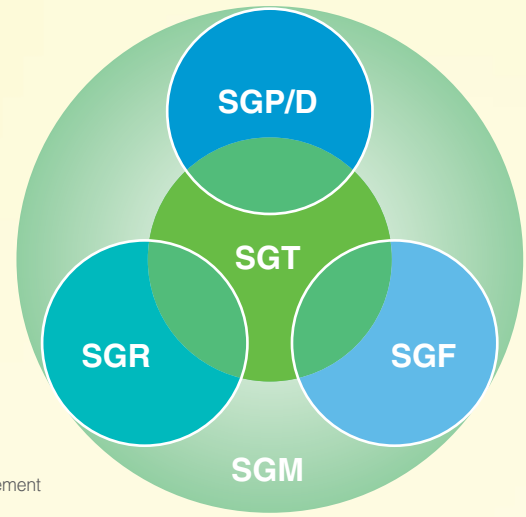


"Super Green Strategies" to Become an Environmentally Advanced Company

SGT
Super Green Technologies
Developing unique environmental technologies that contribute to environmental conservation

SGR
Super Green Recycling
Recycling used products to promote resource recycling

SGM
Super Green Management
Enhancing environmental sustainability management



SGP/D
Super Green Products and Devices
Creating products and devices with high environmental performance

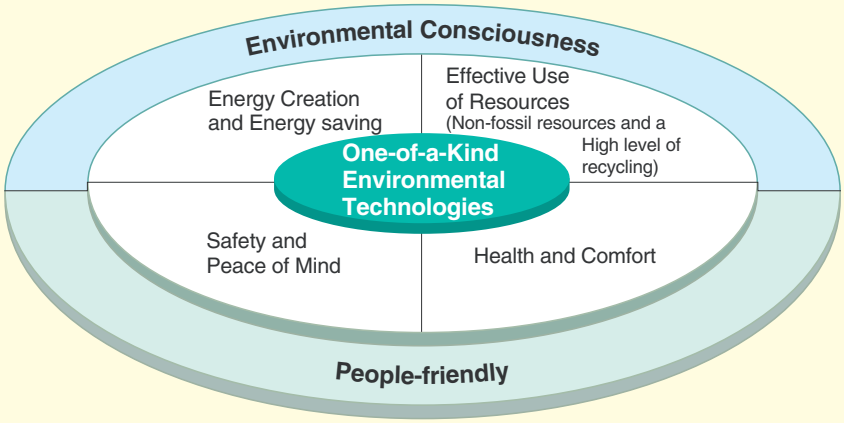
SGF
Super Green Factories
Factories with high environmental consciousness and trust from communities

Becoming an Environmentally Advanced Company

Developing Super Green Technologies

Sharp, under its company-wide Technology Development Strategy, is promoting the development of One-of-a-Kind environmental technologies with a focus on environmental consciousness. Specifically, in order to realize effective utilization of resources, reduction of the environmental burden of factories and improvement of the environmental performance of products and devices, research and development is being pursued in the four areas of energy creation and energy saving, effective use of resources, safety and peace of mind, and health and comfort. Super Green Technologies, with their special features, were created from these measures.

One-of-a-Kind environmental technological development fields that give birth to Super Green Technologies



Certification of Green Devices and Super Green Devices

Sharp calls its environmentally conscious devices “Green Devices,” and applies its “Green Device Guidelines,” an integrated development and design manual based on seven concepts. Further, based on the “Green Device Standard Sheet,” devices with high environmental performance are certified as “Green Devices,” and devices with significantly high environmental performance are certified as “Super Green Devices.”

The Green Device concept

Energy saving	Reduce total power consumption and reduce power consumed in standby mode compared to previous models
Recyclability	Use standard plastic or materials that are easy to separate and disassemble (target: LCD devices)
Resource saving	Reduce weight or volume compared to previous models
Green material	Control usage of chemical substances contained in parts and materials and use no substances prohibited under Sharp standards
Long life	Extend the life of the product with exchangeable parts and consumables (target: LCD devices)
Packaging	Reduce packaging materials
Information disclosure	Provide information on chemical substances

—Super Green Technologies, Devices and Factories

Achievement of a Super Green Factory

Sharp defines factories with a high level of environmental consciousness as “Green Factories.” The “Green Factory Guidelines” were drawn up integrating basic policies and know-how based on ten concepts. The guidelines were implemented at all domestic production sites from 1999 and all overseas production sites from 2001.
Since fiscal 2003, under proprietary assessment standards, plants with high environmental consciousness are certified as Green Factories (GF), and those with extremely high environmental consciousness are certified as Super Green Factories (SGF). In fiscal 2007, Sharp succeeded in achieving its medium-term plan of making all ten plants of Sharp Corporation Super Green Factories and both domestic and overseas plants of Sharp Group better than Green Factories.

The Green Factory concept

Greenhouse gases	Minimize emission of greenhouse gases	Atmosphere, water, soil	Minimize environmental burden on the atmosphere, water and soil
Energy	Minimize energy consumption	Harmony with nature	Endeavor to preserve nature both on and off site
Waste	Minimize discharge of waste	Harmony with the community	Encourage harmony with the local community
Resources	Minimize resource consumption	Environmental consciousness	High environmental awareness among employees
Chemical substances	Minimize risk of environmental pollution and accidents caused by chemical substances	Information disclosure	Disclose information on the environment

Production Model of a Low Carbon Society: Construction of a Manufacturing Complex for the 21st Century

Parallel establishment of the world’s first 10th generation LCD panel plant and the world’s largest thin-film solar cell plant

Sharp was one of the first companies to begin developing energy-saving LCD televisions and energy-creating solar power generation that lead to CO_2 reductions by replacing CRT-based televisions and thermal power generation. In recent years, all over the world, there has been a huge increase in demand for these technologies. In order to meet these active demands and to contribute to the realization of a “Low Carbon Society,” Sharp is presently constructing a Manufacturing Complex for the 21st Century in Sakai City, Osaka Prefecture.

Rendering of the Manufacturing Complex for the 21st Century (Sakai City, Osaka Prefecture)

General description of the new plant
Address: Sakaihama district, Sakai ward, Sakai City, Osaka Prefecture
Area: 1,270,000 m^2

LCD panel plant
Items to be produced: LCD panels for 40-, 50-, 60-inch large-screen televisions
Mother glass size: 10th generation (2,850 mm × 3,050 mm)
Input capacity: 72,000 sheets/ month (Start of operation 36,000 sheets/ month)
Investment: Approx. 380 billion yen (Including total land cost)
Start of operation: By March 2010

Thin-film solar cell plant
Items to be produced: Thin-film silicon solar cells
Glass substrate size: 1,000 mm × 1,400 mm
Plant scale: 1 GW (Gigawatt) First production development: 480 MW
Investment: Approx. 72 billion yen Start of operation: By March 2010

Achieving Super Green Factories

Sharp is systematically acting to enhance the environmental consciousness of its production sites worldwide. Sharp has established proprietary assessment standards to rank factories with high environmental consciousness as Green Factories, and those with extremely high environmental consciousness as Super Green Factories.

Sharp's First Super Green Factory Kameyama Plant

AVC Liquid Crystal Display Group (Kameyama, Mie Prefecture)

The Kameyama Plant is Sharp's first "Super Green Factory," a compilation of the company's environmental protection technologies.
In preparing for construction, we gave a great deal of careful consideration to protecting the environment, beginning at the initial design stage. Working in consultation with local governments and with nearby residents, we carefully selected the parameters that would be subject to environmental protection measures. We chose the standards that would apply, and confirmed them through evaluation by independent experts.
Also, when building Kameyama Plant No. 2, we took the opportunity to introduce the latest environmental technology to make it one of the world's most advanced "Super Green" factories.

The Kameyama Plant Receives Japan Sustainable Management Award
The Kameyama Plant in Japan was recognized for its outstanding environmental sustainability management by being chosen from among 125 applicants for the highest honor, the Sustainable Management Pearl Award, in the 2004 Japan Sustainable Management Awards* (sponsored by the Japan Sustainable Management Awards Committee and Mie Prefecture). This award shows the high esteem for the environmental measures—including 100% recycling of manufacturing process wastewater, the introduction of a cogeneration system and the installation of a photovoltaic power system—taken by the Kameyama Plant, Sharp's first Super Green Factory.
The Kameyama Plant received the first Minister of Economy, Trade and Industry Award in the 8th Japan Water Prize (2006), the Energy Saving Encouraging Prize in the 4th Excellent Cogeneration System Commendation (FY 2005) sponsored by the Japan Cogeneration Center, and the Minister of the Environment's Award for Activities to Fight Global Warming (FY2007).

* The Japan Sustainable Management Awards honor all organizations across the nation, no matter what their size or type of business—including private companies, NPOs and schools—that demonstrate outstanding results of their environmental sustainability management efforts.

An Efficient and Environment-Friendly Integrated Production System
The entire process is carried out in a single plant—from fabricating the LCD panels to final assembly. This system makes it possible to consolidate technical departments and strengthen our development capabilities, as well as shorten the lead-time from order to shipping. Eliminating the need to ship sub-assemblies between distant plants has also enabled us to slash the amount of packaging materials required for shipping and reduce emissions such as carbon dioxide (CO_2).

Countering Global Warming by Unifying Diverse Power Sources Distributed over a Wide Area
The Kameyama plant generates one-third of its annual electricity consumption and has reduced CO_2 emissions to about 40% lower than previous levels by means of a cogeneration system* using liquefied natural gas (LNG) (approx. 26,400 kW), as well as one of the largest fuel cell systems in Japan (approx. 1,000 kW), and one of the world's largest photovoltaic (PV) power generation systems (5,210 kW).

* Cogeneration system: A system designed to save energy by using city gas to generate electricity. The waste heat generated is then used in applications such as air conditioning, hot water supply and steam electricity generation.

Creating Energy at the Factory for Energy-Saving Products, Using One of the World's Largest* PV Power Generation Systems
In addition to the existing 60-kW photovoltaic (PV) power generation system, new PV power generation systems, in a total area of approx. 47,000 m^2 and with a total output of 5,150 kW, have been installed. Located at the large-screen LCD TV factory, the distribution building, and on the roof and curtain wall of the Kameyama Plant No. 2, these systems generate an annual electricity output that would power 1,300 average Japanese households.

* As a building-installed system. Survey by Sharp.

Water Purifying System—100% Water Recycling in the Production Process
The plant collects all the wastewater from the production process of liquid crystal panels, etc. (max. 48,300 tons a day) and recycles it 100% with water purification techniques using microorganism treatment. Malodorous wastewater containing chemicals is deodorized using peat moss* from Ishikari River, Hokkaido.

* Bog moss decomposed and piled up for several thousands of years.

Mie Plant Becomes First Existing Factory to Achieve Super Green Status

Mobile Liquid Crystal Display Group (Taki, Mie Prefecture)

The results described below are major efforts in upgrading to a Super Green Factory.

Fluoric Acid Effluent Recycling System Honored at 2004 WASTEC Award
The Mie Plant No. 3 uses fluoric acid in its continuous grain silicon production process. The plant developed this system and has been using it since 2004 to recover and recycle the fluoric acid effluent. This system was recognized for its excellence and won the Business Activity Category Prize at the 2004 WASTEC (Waste Control and Recycling Technology Exhibition) Awards in Japan in November 2004. Prior to the introduction of this system, the fluoric acid from the effluent was used to make cement. Now it can be used repeatedly at the production site, while the distilled water from the effluent can be used as pure water.

Waste Reduction Efforts
In 2004, we achieved zero discharge to landfill, eliminating waste by recycling all possible waste materials. Efforts are being made to further reduce emission of waste products by expanding the sale of valuable materials for reuse.

Energy-Saving Efforts
Since its completion, the Mie Plant has been strongly focused on energy conservation. In fiscal 2006 our efforts were recognized with an Agency for Natural Resources and Energy Director-General Prize for energy-efficient plant management. In addition, three members of the Mie Environmental Safety Promotion Center, who have been engaged in energy-saving efforts for many years, received prizes in recognition of their achievements in energy management. These awards are a testament to Sharp's energy management and energy-saving efforts.

CO_2 Emissions Reduced through PV Power System Installation
The Mie Plant No. 3 installed a 180-kW photovoltaic power system on its south exterior wall. The system began generating electricity in March 2005. Used mainly to provide lighting for all non-manufacturing rooms, the system generated 141,000 kWh of power in fiscal 2006 and contributed to the reduction of about 60 tons of CO_2 emissions.

Participation in Environmental Education Programs at Local Schools
As part of our community outreach program, we have been cooperating with eight local schools in the town of Taki (one senior high, two junior high, and five elementary schools) on various educational projects, including factory tours, classes taught by visiting lecturers, and joint environmental activities.

Participation in Local Environmental Activities
The Mie Plant is actively involved in mitigating the impact of the plant on the surrounding environment, and is also engaged in local environmental preservation activities focused on the area's mountains, rivers, and roads. We have received acclaim from local people for our participation in these activities, including the upkeep of the local forest as a water source, the maintenance of the neighboring forests and mountains, the cleaning of the Sanagawa River as the plant's effluent stream, and the planting of flowers on National Route 42.

Green Factory Activities at Key Electronic Device Factories

Advanced Development & Planning Center/ Corporate Research & Development Group/ Production Technology Development Group (Tenri, Nara Prefecture)

ISO 14001 certification: December 3, 1996

Adoption of a Cogeneration System*
About 26% of facility power is provided through private power generation. Waste heat is used for heating or cooling and also supplied to a steam generator for power generation. This cuts facility CO_2 emissions by about 13%.
* An energy-saving system that generates power using municipal gas and uses the produced waste heat for heating or cooling, hot water supply and steam electricity generation, etc.

Installation of a Solar Generation System
Installation of solar panels with a generating capacity of 40 kW.

Waste Fluid Processing System based on Natural Purification*
Waste and the pollution load of released water are reduced by using a waste fluid treatment system for waste water containing alcohol or other organic components.
After treatment, water is given further high-level treatment and used as intermediate factory water, to ensure more effective use of water resources.
* A natural purification system based on micro-organisms, developed independently by Sharp. (Patented)

Promotion of Zero Emissions*
Zero emissions were achieved in fiscal 2002 through reclamation of waste into useful resources for other business fields. Efforts will continue to further reduce waste emissions.

Installation of Environmental Equipment
In fiscal 2007, equipment for the safe disposal of PFC gas and gases subject to the Pollutant Release and Transfer Register (PRTR) Law was installed and factory wastewater was converted to sewerage, with the objective of minimizing environmental impact.

Relations with the Local Community
As the only Sharp establishment that has an ancient burial mound on its grounds, the center's employees are actively involved in the maintenance of the mound. In August of each year, the center invites employees and their families and local people to a "Sharp Festa." An environmental exhibition space is prepared to showcase the environmental activities of the center. Furthermore, the company hosts parent-child tours during the spring and summer breaks at its Sharp Memorial Technology Hall.

Solar Systems Group Electronic Components & Devices Group (Katsuragi, Nara Prefecture)

ISO 14001 certification: June 25, 1996

Prevention of Water Pollution
All waste water from production processes and laboratories is purified at a waste water treatment facility within the factory. Water is released into the sewer only after treatment based on voluntary standards stricter than water emission standards of the Sewerage Law.

Prevention of Air Pollution
Waste gases from acids and organic solvents produced by production processes and laboratories are purified with two types of waste gas treatment equipment, depending on the properties of the chemical substances. Nine acid scrubbers and 17 solvent scrubbers are installed on the roof of the Katsuragi Plant, and these keep atmospheric emissions of chemical substances below 1/10th of regulatory levels.

Promotion of Zero Emissions*
In fiscal 2001, the factory achieved zero emissions through recycling of all materials. It is now working to reduce waste volume and promote the recycling of waste materials as resource materials, with the goal of a final disposal rate of 0.2% or less.

Installation of Solar Generation System
In fiscal 2003, solar panels were installed at the solar park on the roof of the No. 3 Plant and on the employee recreation building. At present the solar generation system has a total capacity of 194.5 kW, and this electricity is used for tasks such as air conditioning.

Relations with the Local Community
In October of each year, the factory holds a "Katsuragi Festa" to improve relations with the local community and showcase the site's environmental activities.

Super Green Factory Achievement
With the aim of becoming a Super Green Factory in fiscal 2007, the site worked to reduce emissions of harmful chemical substances used in processes and to recycle cleaning water used in production, and achieved the rank of Super Green Factory.

Electronic Components & Devices Group (Fukuyama, Hiroshima Prefecture)

ISO 14001 certification: September 24, 1996

Inauguration of a non-dilution Nitrogen Treatment Plant
The Group built a new plant that uses the world's first non-dilution treatment technology on the nitrogen contained in semiconductor plant wastewater. The technology combines "micro-nanobubble technology" with a unique microorganism treatment technology Sharp developed in June 2005. Operation of the plant began in July 2006.

Promotion of Zero Emissions*
Zero emissions were achieved in 2001 through ongoing efforts such as in-house treatment of developing fluid by means of our own micro-organism treatment technology, reduction of the volume of process sludge produced, and recycling of waste into useful material. To this day a final disposal level of less than 0.01% is maintained.

Prevention of Global Warming
An energy conservation committee has been formed to promote energy conservation efforts involving the entire Group. Efforts such as building a unique energy-saving outer air treatment system have been highly regarded, and the Group received a "2005 Excellent Energy Conservation Factory & Building (electricity category)" award from the Director-general of the Agency for Natural Resources and Energy.

Relations with the Local Community
In August of each year, employees and their families and local people are invited to the "Family Day in Sharp (Summer Festival)." At this festival, an environmental exhibition space is prepared to provide an opportunity for people to experience nature and to introduce the environmental protection efforts of the facility.
The plant also implemented the semiconductor industry's first full-scale risk communication system (July 2005), and holds meetings with local residents once a year in order to provide a better understanding of them. Furthermore, the plant jointly produced a large communication panel (4 m x 6 m) called "Daimoncho—Yesterday and Today" in cooperation with the local residents who approved and supported our efforts. The panel is on display at our premises and is being used to introduce our business and Daimoncho to visitors.
Communication activities such as these have been highly evaluated, and the Group received the "2005 PRTR Prize" sponsored by the Center for Environmental Information Science.

Electronic Components & Devices Group (Mihara, Hiroshima Prefecture)

ISO 14001 certification: November 17, 2003

Prevention of Global Warming
The precise air-conditioning necessary for production activities is maintained by operating coolers and boilers on municipal gas, which produces little CO_2.
The turbo coolers provided in air-conditioning equipment use a waste heat recovery system. A remover optimized for greenhouse gases is provided to suppress emission of such gases and prevent global warming.

Installation of a Solar Generation System
In February 2007, solar panels with a generating capacity of 20 kW were installed on the roof of the No. 2 Plant.

Promotion of Zero Emissions*
Zero waste emission has been achieved through active efforts to reduce and reclaim waste, instituted from the beginning of the facility. In recognition of these efforts, Sharp was awarded the Clean Japan Center's 2008 chairperson's award in recognition of distinguished persons promoting the principle of "Reduce, Reuse, and Recycle" (sponsored by the Ministry of Economy, Trade and Industry).

Efforts to Prevent Pollution
After treatment at an in-house facility, all process waste water is discharged into the public sewer only after clearing voluntary standards stricter than waste water standards. Sludge produced in waste water treatment is sorted by type and reclaimed.
Measures are taken such as installing equipment indoors to prevent noise escaping to the surrounding area from noisy equipment, such as large fans and large compressors. Noise levels at the site boundary are within regulation values.
The plant is working to improve management of chemical substances, prevent accidents and environmental disasters, and reduce environmental impact.

Efforts to Contribute to the Local Community
Through efforts such as inviting local people to festivals and activities to protect forests, the plant aims to deepen relations with people in the local area and protect the environment.
Efforts are being made to beautify the area by participating in greenification activities in the Mihara Western Industrial District where this facility is located.

* Sharp defines this as bringing the amount of buried waste (final disposal amount) as close to zero as to be negligible. In figures, a final disposal rate of less than 0.5% (final disposal rate = buried amount / total discharged amount x 100) is taken to be zero emissions.

☆New product/Under development

■ LCD Modules

<For industrial appliances> (1)

	Display size	Model No.	Number of pixels (dot) H × V	Pixel pitch (mm) H × V	Display colors	Lumi-nance (cd/m²)	Input video signal	Power con-sumption (W)	Outline dimensions (mm) W × H × D	Weight (g)	Backlight	Remarks
TFT	28.3″ (72cm)	LQ283G1TW11	2 560 × RGB × 2 048	0.219 × 0.219	16.77 M	225	4ch TMDS	103.2	640.0 × 530.0 × 60.0	Max. 15 000	18CCFT	Built-in inverter
	28.1″ (71cm)	LQ281L1LW14	2 048 × RGB × 2 048	0.246 × 0.246	16.77 M	225	4ch LVDS	96.0	594.0 × 594.0 × 83.0	15 000	18CCFT	Built-in inverter
	23.1″ (59cm)	LQ231U1LW01	1 600 × RGB × 1 200	0.294 × 0.294	16.77 M	250	LDI	54.9	530.0 × 432.8 × 32.5	Max. 5 500	6CCFT	Built-in inverter
		LQ231U1LW21										Expanded backlight brightness adjustment area
	20.1″ (51cm)	LQ201U1LW11Z	1 600 × XYZ × 1 200	0.255 × 0.255	256 (gray scales)	700	2ch LVDS 8 bit XYZ	32.9	436.0 × 335.0 × 27.5	Max. 3 800	6CCFT	
		LQ201U1LW21	1 600 × RGB × 1 200		16.77 M	250	2ch LVDS 8 bit RGB	33.8	432.0 × 331.5 × 25.0	3 200		
	19.0″ (48cm)	LQ190E1LW02	1 280 × RGB × 1 024	0.294 × 0.294	16.77 M	300	2ch LVDS 8 bit RGB	(25.5)	404.2 × 330.0 × 20.0	Max. 2 800	4CCFT	
		LQ190E1LW42				450		(38.3)	404.2 × 330.0 × 22.0	Max. 3 200	6CCFT	
	15.0″ (38cm)	LQ150X1LGB1	1 024 × RGB × 768	0.297 × 0.297	16 M	600	1ch LVDS 8 bit RGB (6 bit + 2FRC)	16.0	331.6 × 254.76 × 12.5	1 200±50	4CCFT	
		LQ150X1LG45				250		9.6	326.5 × 253.5 × 11.2	Max. 1 000	2CCFT	Compliant with the PSWG standard
		LQ150X1LG55				350						
		LQ150X1LG71				250		9.8	326.0 × 252.0 × 11.2			
		LQ150X1LG81				350						
		☆LQ150X1LG82						10.8	326.0 × 252.0 × 13.7	1 200	LED	Super-Longevity LED backlight
		LQ150X1LW71N				250		18.1	331.6 × 254.76 × 12.5	Max. 1 300	4CCFT	Advanced Super V
		LQ150X1LW72				350				Max. 1 350		
	12.1″ (31cm)	☆LQ121K1LG11	1 280 × RGB × 800	0.204 × 0.204	16 M	370 TYP.	1ch LVDS 8 bit RGB	7.7	278.0 × 184.0 × 11.3 TYP.	640	2CCFT	12.1″ wide XGA
		LQ121S1DG41/42	800 × RGB × 600	0.3075 × 0.3075	260 k	370	Digital 6 bit RGB	8.3	276.0 × 209.0 × 11.0	Max. 660		
		LQ121S1DG61				450				Max. 800		Strong LCD2
		LQ121S1LG41/42				370	LVDS 6 bit RGB			Max. 660		
		LQ121S1LG61				450				Max. 800		Strong LCD2
		LQ121S1LW01				250		8.5		Max. 800		Advanced Super V
		LQ121S7LY01				200				Max. 800		Super Mobile LCD
	10.4″ (26cm)	LQ104S1DG21/DG2A	800 × RGB × 600	0.264 × 0.264	260 k	350	Digital 6 bit RGB	6.5	246.5 × 179.4 × 15.5	Max. 620	2CCFT	
		LQ104S1DG31						6.6	243.0 × 183.8 × 11.5	Max. 600		
		LQ104S1DG61				420		8.0	246.5 × 179.4 × 13.7	Max. 620		Strong LCD2
		LQ104S1LG21/LG2A				350	LVDS 6 bit RGB	6.6	246.5 × 179.4 × 15.5			
		LQ104S1LG31				350		6.9	243.0 × 183.8 × 11.5	Max. 600		
		LQ104S1LG61				420		8.0	246.5 × 179.4 × 13.7	Max. 620		Strong LCD2

☆New product/Under development

<For industrial appliances> (2)

	Display size	Model No.	Number of pixels (dot) H × V	Pixel pitch (mm) H × V	Display colors	Lumi-nance (cd/m²)	Input video signal	Power con-sumption (W)	Outline dimensions (mm) W × H × D	Weight (g)	Backlight	Remarks
TFT	10.4″ (26cm)	LQ104V1DG21	640 × RGB × 480	0.330 × 0.330	260 k	350	Digital 6 bit RGB	6.4	265.0 × 195.0 × 11.5	Max. 700	2CCFT	
		LQ104V1DG51/ DG5A							246.5 × 179.4 × 15.5	Max. 620		
		LQ104V1DG61				450		6.3	246.5 × 179.4 × 13.7			Strong LCD2
		☆LQ104V1DG62				550		5.2	246.5 × 179.4 × 12.5	Max. 580	LED	Strong LCD2 Super-Longevity LED backlight
		LQ104V1LG61				450	LVDS 6 bit RGB	6.3	246.5 × 179.4 × 13.7	Max. 620	2CCFT	
	8.5″ (22cm)	☆LQ085Y3DG06	800 × RGB × 480	0.231 × 0.231	260 k	260	Digital 6 bit RGB	5.79	212.0 × 134.0 × 12.5	370 TYP.	1CCFT	Wide
	8.4″ (21cm)	LQ084S3DG01	800 × RGB × 600	0.213 × 0.213	260 k	350	Digital 6 bit RGB	6.0	199.5 × 149.5 × 11.6	Max. 405	2CCFT	
		LQ084S3LG01	800 × RGB × 600		16 M	400	LVDS 6 bit + 2FRC RGB	5.9				Strong LCD2
		LQ084V3DG01	640 × RGB × 480	0.270 × 0.270	260 k		Digital 6 bit RGB	5.7		Max. 400		
		☆LQ084V3DG02		0.267 × 0.267				4.6			LED	Super-Longevity LED backlight
		☆LQ084V1DG41				300		4.9	216.0 × 152.4 × 12.0	Max. 430	1CCFT	
	7.5″ (19cm)	LQ075V3DG01	640 × RGB × 480	0.237 × 0.237		400	Digital 6 bit RGB	5.7	179.0 × 139.5 × 12.7	Max. 365	1CCFT	
	6.4″ (16cm)	LQ064V3DG01	640 × RGB × 480	0.204 × 0.204		350	Digital 6 bit RGB	4.7	161.3 × 117.0 × 12.0	Max. 280	2CCFT	
		LQ064V3DG04				290						Best viewing angle: 3 o'clock direction Ideal for portrait style
	5.7″ (14cm)	LQ057V3DG01	640 × RGB × 480	0.180 × 0.180		400	Digital 6 bit RGB	4.1	144.0 × 104.6 × 12.3*	Max. 250	1CCFT	Strong LCD2
		☆LQ057V3DG02				400		4.5	144.0 × 104.6 × 13.0		LED	Super-Longevity LED backlight
		LQ057Q3DC12	320 × RGB × 240	0.360 × 0.360		500		3.9	144.0 × 104.6 × 13.0	Max. 240	1CCFT	
	4.3″ (12cm)	☆LQ043T3DG01	480 × RGB × 272	0.198 × 0.198		400	6 bit RGB	0.6	105.5 × 67.2 × 5.05	65	LED	LED backlight
		☆LQ043T3DG02				480			105.5 × 67.2 × 3.95	55		
	3.8″ (10cm)	LQ038Q3DC01	320 × RGB × 240	0.240 × 0.240		240	Digital 6 bit RGB	0.7	90.6 × 79.9 × 9.9	Max. 105		
	3.5″ (9cm)	LQ035Q3DG01		0.2205 × 0.2205		450		0.48	76.9 × 63.9 × 3.5	33		
		☆LQ035Q3DW02					6 bit RGB	0.5	76.9 × 63.9 × Max. 3.5			Advanced Super V LED backlight
	2.5″ (6cm)	LQ025Q3DW02		0.156 × 0.156		350 TYP.		0.28	56.8 × 48.8 × Max. 3.5	Max. 25		LED backlight 2.5″ QVGA

* Protrusions such as backlight harnesses and positioning bosses are not included.

<For Information display>

	Display size (cm) [″]	Model No.	Number of pixels*1	Dot format H × V (dot)	Active area H × V (mm)	Number of colors (color)	Outline dimensions*2 W × H × D (TYP.) (mm)	Backlight	Interface (Input signal)	Remarks
TFT	163.9 [64.5]	LK645D3LZ2U	2 073 600	1 080 × 1 920 × RGB	803.5 × 1 428.5	16.77M	907.0 × 1 555.3 × 100.0	Built-in	2ch-LVDS*3 (8-bit digital)	Portrait model Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 2 000:1 High-speed response [G to G]: 6 ms (Ave.)
		LK645D3LZ69		1 920 × RGB × 1 080	1 428.5 × 803.5		1 555.3 × 907.0 × 100.0			Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 2 000:1 High-speed response [G to G]: 6 ms (Ave.)
	132.2 [52]	LK520D3LA19			1 152.0 × 648.0		1 219.0 × 706.7 × 64.6			Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 2 000:1 High-speed response [G to G]: 6 ms (Ave.)
	116.8 [46]	LK460D3LZ19			1 018.1 × 572.7		1 083.0 × 627.0 × 65.7			Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 1 800:1 High-speed response [G to G]: 6 ms (Ave.)

*1 Pixel means a set of each RGB dot.
*2 Excluding FPC for connection and other protruding parts.
*3 LVDS: Low Voltage Differential Signaling
(Note) Please note that the specifications are subject to change without prior notice for production improvement.

<For LCD TVs>

	Display size (cm) [″]	Model No.	Number of pixels*1	Dot format H × V (dot)	Active area H × V (mm)	Number of colors (color)	Outline dimensions*2 W × H × D (TYP.) (mm)	Backlight	Interface (Input signal)	Remarks
TFT	132.2 [52]	LK520D3LA27	2 073 600	1 920 × RGB × 1 080	1 152.0 × 648.0	1.06B (8-bit + 2FRC)	1 219.0 × 706.7 × 64.6	Built-in	4ch-LVDS*3 (10-bit digital)	Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 2 000:1 120 Hz drive compatible
		LK520D3LA17	2 073 600						2ch-LVDS*3 (10-bit digital)	Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 2 000:1 High-speed response [G to G]: 6 ms (Ave.)
	80.0 [31.5]	LK315T3LA31	1 049 088	1 366 × RGB × 768	697.7 × 392.3	16.77M	760.0 × 450.0 × 50.0		1ch-LVDS*3 (8-bit digital)	Advanced Super V High luminance: 450 cd/m2 Wide viewing angle: L/R 176°/ U/D 176° High contrast: 2 000:1 High-speed response [G to G]: 7 ms (Ave.)

*1 Pixel means a set of each RGB dot.
*2 Excluding FPC for connection and other protruding parts.
*3 LVDS: Low Voltage Differential Signaling
(Note) Please note that the specifications are subject to change without prior notice for production improvement.

★Under development

<For automotive applications> (1)

- LQ065T9DZ03/LQ088H9DZ03: operating temperature (panel surface temperature) –40 to +85°C / storage temperature –40 to +95°C
- LQ070Y5DG06/LQ080Y5DG03: operating temperature (panel surface temperature) –30 to +85°C / storage temperature –40 to +95°C
- Other models: operating temperature (panel surface temperature) –30 to +85°C / storage temperature –40 to +85°C

	Display size (cm) [″]	Model No.	Dot format H × V (dot)	Pixel pitch H × V (mm)	Active area H × V (mm)	Input signal system	Input video signal	Back-light	Lumi-nance (cd/m²) (TYP.)	Power consump-tion (mW) (TYP.)	Outline dimensions*8 W × H × D (mm) (TYP.)	Weight (g) (TYP.)	Remarks
TFT	8.9 [3.5]	LQ035Q5DG02	320 × RGB × 240*1	0.222 × 0.222	71.0 × 53.3	6-bit digital RGB	6-bit digital	Built-in LED	500	T.B.D.	86.4 × 84 × 6.7	65	"Compact LCD" suitable for display in meter, LED backlight, High lumi-nance, Thin, High-speed response (low tempera-ture), 260K-color display, Wide viewing angle, RoHS compliant
	11 [4.3]	★LQ043T5DGXX	400 × RGB × 234*3	0.2385 × 0.2275	95.4 × 53.24	6-bit digital RGB	6-bit digital	Built-in LED	500	T.B.D.	107.7 × 65.5 × 8.15	T.B.D.	Wide QVGA (16:9), LED backlight, Digital I/F, 260K-color display, High luminance, Wide viewing angle, RoHS compliant
	15 [5.8]	LQ058Y5DG01	800 × RGB × 480*5	0.1605 × 0.1505	128.4 × 72.24	6-bit digital RGB	6-bit digital	Built-in LED	450	3 100	141.1 × 82.9 × 7.2	140 (Max.)	High resolution (wide VGA/16:9), LED backlight, Thin, Digital I/F, 260K-color display, Wide viewing angle, RoHS compliant
	15 [6.1]	LQ061T5GG01	480 × RGB × 234*2	0.284 × 0.308	136.1 × 72.0	NTSC/ PAL*9	TFT specific analog RGB*10	Built-in 1CCFT	500	3 200	149 × 82.9 × 7.2	160 (Max.)	Wide QVGA (17:9), Thin, High luminance, Wide viewing angle, RoHS compliant
	16 [6.5]	LQ065T5GG61	400 × RGB × 234*3	0.359 × 0.339	143.4 × 79.3	NTSC/ PAL*9	TFT specific analog RGB*10	Built-in 1CCFT	400	3 300	155 × 89.2 × 8.8	175 (Max.)	Wide QVGA (16:9), Thin, Wide viewing angle, RoHS compliant
		LQ065T5DG02	400 × RGB × 240*4	0.359 × 0.331	143.4 × 79.3	6-bit digital RGB	6-bit digital	Built-in 1CCFT	620	4 100	155 × 89.2 × 9.1	170	Wide QVGA (16:9), Digital I/F, 260K-color display, High luminance, Wide viewing angle, RoHS compliant
		LQ065T9DZ03	400 × RGB × 240*4	0.359 × 0.331	143.4 × 79.3	6-bit digital RGB	6-bit digital	Built-in 1CCFT	250	5 200	155 × 89.2 × 12.5	205 (Max.)	"Super Mobile LCD" with high visibility under bright ambient light, Wide QVGA (16:9), Wide viewing angle, Gray-scale inver-sion free, 260K-color dis-play, RoHS compliant
		LQ065Y5DG03	800 × RGB × 480*5	0.18 × 0.165	144.0 × 79.2	6-bit digital RGB	6-bit digital	Built-in 1CCFT	500	3 600	157.4 × 89.7 × 7.5	180 (Max.)	High resolution (wide VGA/16:9), digital I/F, 260K-color display, High luminance, Wide viewing angle, RoHS compliant

*1 Number of pixels: 76 800 *2 Number of pixels: 112 320 *3 Number of pixels: 93 600 *4 Number of pixels: 96 000
*5 Number of pixels: 384 000 *6 Number of pixels: 115 200 *7 Number of pixels: 153 600
*8 Excluding FPC for connection and other protruding parts.
*9 MBK-PAL system is adopted as PAL. The LCD panel has 234 (240) scanning lines, and displays a picture of 273 (274) virtual scanning lines.
*10 Video interface: External (Device specific external video interface IC is available.)
(Note) Please refer to the latest relevant specificaiont sheets before using these devices.

☆New product
★Under development

<For automotive applications> (2)

- LQ065T9DZ03/LQ088H9DZ03: operating temperature (panel surface temperature) –40 to +85°C / storage temperature –40 to +95°C
- LQ070Y5DG06/LQ080Y5DG03: operating temperature (panel surface temperature) –30 to +85°C / storage temperature –40 to +95°C
- Other models: operating temperature (panel surface temperature) –30 to +85°C / storage temperature –40 to +95°C

	Display size (cm) [″]	Model No.	Dot format H × V (dot)	Pixel pitch H × V (mm)	Active area H × V (mm)	Input signal system	Input video signal	Back-light	Lumi-nance (cd/m²) (TYP.)	Power consump-tion (mW) (TYP.)	Outline dimensions*8 W × H × D (mm) (TYP.)	Weight (g) (TYP.)	Remarks
TFT	18 [7]	LQ070T5GG21	480 × RGB × 234*2	0.326 × 0.352	156.2 × 82.4	NTSC/ PAL*9	TFT specific analog RGB*10	Built-in 1CCFT	500	3 500	167 × 93 × 6.9	195 (Max.)	Wide QVGA (17:9), Thin, High luminance, Wide viewing angle, RoHS compliant
		LQ070T5DR05	480 × RGB × 240*6	0.321 × 0.363	154.1 × 87.0	6-bit digital RGB	6-bit digital	Built-in 2CCFT	400	5 100	170.1 × 103.4 × 14.2	280 (Max)	Wide QVGA (16:9), Digital I/F, 260K-color display, Wide viewing angle
		☆LQ070Y5DG20	800 × RGB × 480*5	0.195 × 0.1725	156.0 × 82.8	6-bit digital RGB	6-bit digital	Built-in 1CCFT	500	3 600	167 × 93 × 7.2	196 (Max)	High resolution (wide VGA/17:9), Thin, W-QVGA (GG21) vertical/horizontal compatible, 260K-color display, Wide viewing angle, RoHS compliant
		LQ070Y5DG06	800 × RGB × 480*5	0.191 × 0.191	152.4 × 91.4	6-bit digital RGB	6-bit digital	Built-in LED	430	4 900	170 × 104 × 8.0	210	High resolution (wide VGA/15:9), High color purity (65% of NTSC), High-speed response (low temperature), LED back-light, Thin, 260K-color dis-play, Wide viewing angle, RoHS compliant, * Luminosity at eye point
		LQ070Y5DE02	800 × RGB × 480*5	0.195 × 0.1725	156.0 × 82.8	6-bit digital RGB	6-bit digital	Built-in LED	320	5 200	167.5 × 93.2 × 6.5 to 9.0	215 (Max.)	Dual directional viewing LCD, Wide screen (17:9), LED backlight, Thin, 260K-color display, Wide viewing angle, RoHS compliant, * DV luminosity at eye point
	20 [8]	☆LQ080Y5DG03	800 × RGB × 480*5	0.2175 × 0.2175	174.0 × 104.4	6-bit digital RGB	6-bit digital	Built-in LED	430	6 200	190 × 120 × 8.0	270	High resolution (wide VGA/15:9), High color purity (65% of NTSC), High-speed response (low temperature), LED back-light, Thin, 260K-color dis-play, Wide viewing angle, RoHS compliant, * Luminosity at eye point
		LQ080Y5DG04	800 × RGB × 480*5	0.2175 × 0.2175	174.0 × 104.4	6-bit digital RGB	6-bit digital	Built-in 2CCFT	625	5 900	190 × 120 × 13	392	High resolution (wide VGA/15:9), High-speed response (low tempera-ture), High luminance, 260K-color display, Wide viewing angle
		★LQ080Y5CGXX	800 × RGB × 480*5	0.222 × 0.207	177.6 × 99.4	NTSC/ PAL/ PAL (60)	Composite	Built-in 1CCFT	400	10 400	198 × 117 × 17.9	391	High resolution (wide VGA/16:9), All-in-one, Wide viewing angle, RoHS compliant
	22 [8.8]	LQ088H9DZ03	640 × RGB × 240*7	0.327 × 0.327	209.3 × 78.5	6-bit digital RGB	6-bit digital	Built-in 2CCFT	250	7 100	231.6 × 103.25 × 14.4	370 (Max.)	"Super Mobile LCD" with high visibility under bright ambient light, Wide screen (8:3), Wide viewing angle, Gray-scale inversion free, 260K-color display, RoHS compliant

*1 Number of pixels: 76 800 *2 Number of pixels: 112 320 *3 Number of pixels: 93 600 *4 Number of pixels: 96 000
*5 Number of pixels: 384 000 *6 Number of pixels: 115 200 *7 Number of pixels: 153 600
*8 Excluding FPC for connection and other protruding parts.
*9 MBK-PAL system is adopted as PAL. The LCD panel has 234 (240) scanning lines, and displays a picture of 273 (274) virtual scanning lines.
*10 Video interface: External (Device specific external video interface IC is available.)
(Note) Please refer to the latest relevant specificaiont sheets before using these devices.
The Tenri site NF3 (JQA-AU0121-1) and plants No. 1 and No. 2 (JQA-AU0121-2) at the Mie site of the Mobile Liquid Crystal Display Group have been certified under the ISO/TS 16949:2002 Quality Management System. [Certifying organization: Japan Quality Assurance Organization (JQA)]

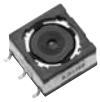
<For mobile phones>

	Display size (cm) [″]	Model No.	Dot format H × V (dot)	Pixel pitch H × V (mm)	Active area H × V (mm)	Input video signal	Back-light	Contrast ratio (Transmissive/ Reflective)	Luminance (cd/m^2) (TYP.)	Outline dimensions*2 W × H × D (mm) (TYP.)	Weight (g) (TYP.)	Remarks
CG Silicon	5.6 [2.2]	LS022Q8UX05	240 × RGB × 320*1	0.1395 × 0.1395	33.48 × 44.64	16-bit parallel CPU	Built-in LED	400 : 1 (Transmissive)/ 10 : 1 (Reflective)	300	39.2 × 58.35 × 2.3	T.B.D.	"Super Mobile LCD" with high outdoor visibility due to transflectivity, Top/bottom and left/right angle of view 160° (CR≧5), High contrast, 260K-color display, RoHS compliant
TFT	7.2 [2.8]	LQ028Q3UX01	240 × RGB × 320*1	0.18 × 0.18	43.2 × 57.6	16-bit parallel CPU		500 : 1	250	50.2 × 69.3 × 3.6	T.B.D.	

*1 Number of Pixels: 76 800
*2 Excluding FPC for connection and other protruding parts.
※ CG Silicon ... Continuous grain silicon technology developed jointly with Semiconductor Energy Laboratory Co. Ltd. is used.
(Note) Please refer to the latest relevant specification sheets before using these devices.

★Under development

■ CMOS Camera Modules Road Map

Image format	2007	2008	2009
5 M (QSXGA)		RJ63SC100  1/3.2 type 0.60 cc Built-in auto focus function 9.5 x 9.5 x 6.6	★RJ63SC400  1/3.2 type 0.53 cc Built-in auto focus function 9.5 x 9.5 x 5.9
3 M (QXGA)	RJ64PC200  1/4 type 0.38 cc Built-in auto focus function 8.5 x 8.5 x 5.3		★RJ64PC500  1/4 type 0.33 cc Built-in auto focus function 8.5 x 8.5 x 4.6
2 M (UXGA)	LZ0P39DR  1/4 type 0.36 cc Built-in auto focus function 8.5 x 8.5 x 5.0	RJ65NC100  1/5 type 0.20 cc Built-in auto focus function 7.0 x 7.0 x 4.0	
VGA		RJ6ABA103  1/10 type 0.05 cc 5.0 x 5.0 x 1.95	

Model No.

Optical format & volume

Outline dimensions (D x W x H) TYP. (mm)

★Under development

■ CMOS Camera Modules

Module configuration : CMOS image sensor, CDS/AGC/10-bit ADC, timing generator, DSP, lens
Color filter : R, G, B primary color mosaic filters
Operating temperature : –20 to 60°C

Optical format	Image format	Optical function	Model No.	Features	Output pixels (H x V) MAX.	Lens			Output signal	Supply voltage (V)	Power consumption (mW) TYP.	Package*1
						F No.	Configu-ration	Horizontal viewing angle (°)				
1/3.2 type	QSXGA	Auto focus function	RJ63SC100	• QSXGA to SubQCIF • 5 fps at QSXGA/ 30 fps at VGA • 8x electronic zoom at QVGA size (MAX.) • Image inversion function (right and left)	2 592 x 1 944	F2.8	4 pcs.	61	UYVY	2.8/1.8 (I/O: 1.8 or 2.8)	240 (at 5 fps)	30FPC type*2
		Auto focus function	★RJ63SC400									
1/4 type	QXGA	Auto focus function	RJ64PC200	• QXGA to SubQCIF • 7.5 fps at QXGA/ 30 fps at XGA • 6.4x electronic zoom at QVGA size (MAX.) • Image inversion function (right and left)	2 048 x 1 536		3 pcs.	53			230 (at 7.5 fps)	
		Auto focus function	★RJ64PC500	• QXGA to SubQCIF • 15 fps at QXGA/ 30 fps at XGA • 6.4x electronic zoom at QVGA size (MAX.) • Image inversion function (right and left)				54			T.B.D.	
	UXGA	Auto focus function	LZ0P39DR	• UXGA to SubQCIF • 15 fps at UXGA/ 30 fps at SVGA • 5x electronic zoom at QVGA size (MAX.) • Image inversion function (right and left)	1 600 x 1 200			53			200 (at 15 fps)	
1/5 type	UXGA	Auto focus function	RJ65NC100	• UXGA to SubQCIF • 10 fps at UXGA/ 30 fps at SXGA • 5x electronic zoom at QVGA size (MAX.) • Image inversion function (right and left)				54			220 (at 10 fps)	
1/10 type	VGA	—	RJ6ABA103	• VGA to SubQCIF • 30 fps at VGA • 2x electronic zoom at QVGA size (MAX.) • Image inversion function (right and left)	640 x 480		2 pcs.				70 (at 30 fps)	20LCC type (Socket mounted only)

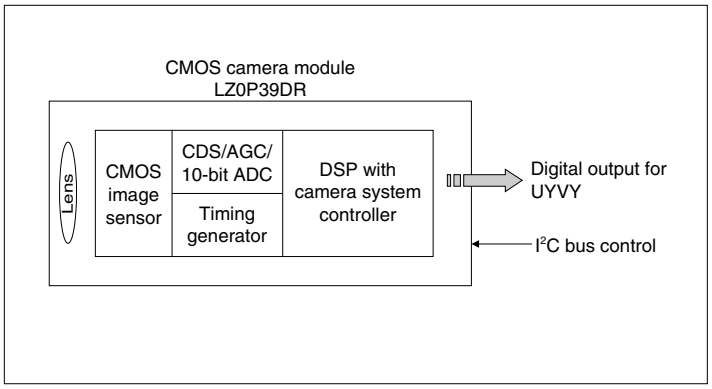
*1 Contact a SHARP sales office regarding socket availability. *2 Contact a SHARP sales office regarding FPC type package.

●Outline Dimensions

Model No.	Outline dimensions (D x W x H) TYP. (mm)	Package*1
RJ63SC100	9.5 x 9.5 x 6.6	30FPC type*2
★RJ63SC400	9.5 x 9.5 x 5.9	
RJ64PC200	8.5 x 8.5 x 5.3	
★RJ64PC500	8.5 x 8.5 x 4.6	
LZ0P39DR	8.5 x 8.5 x 5.0	
RJ65NC100	7.0 x 7.0 x 4.0	
RJ6ABA103	5.0 x 5.0 x 1.95	20LCC type (Socket mounted only)

*1 Contact a SHARP sales office regarding socket availability.
*2 Contact a SHARP sales office regarding FPC type package.

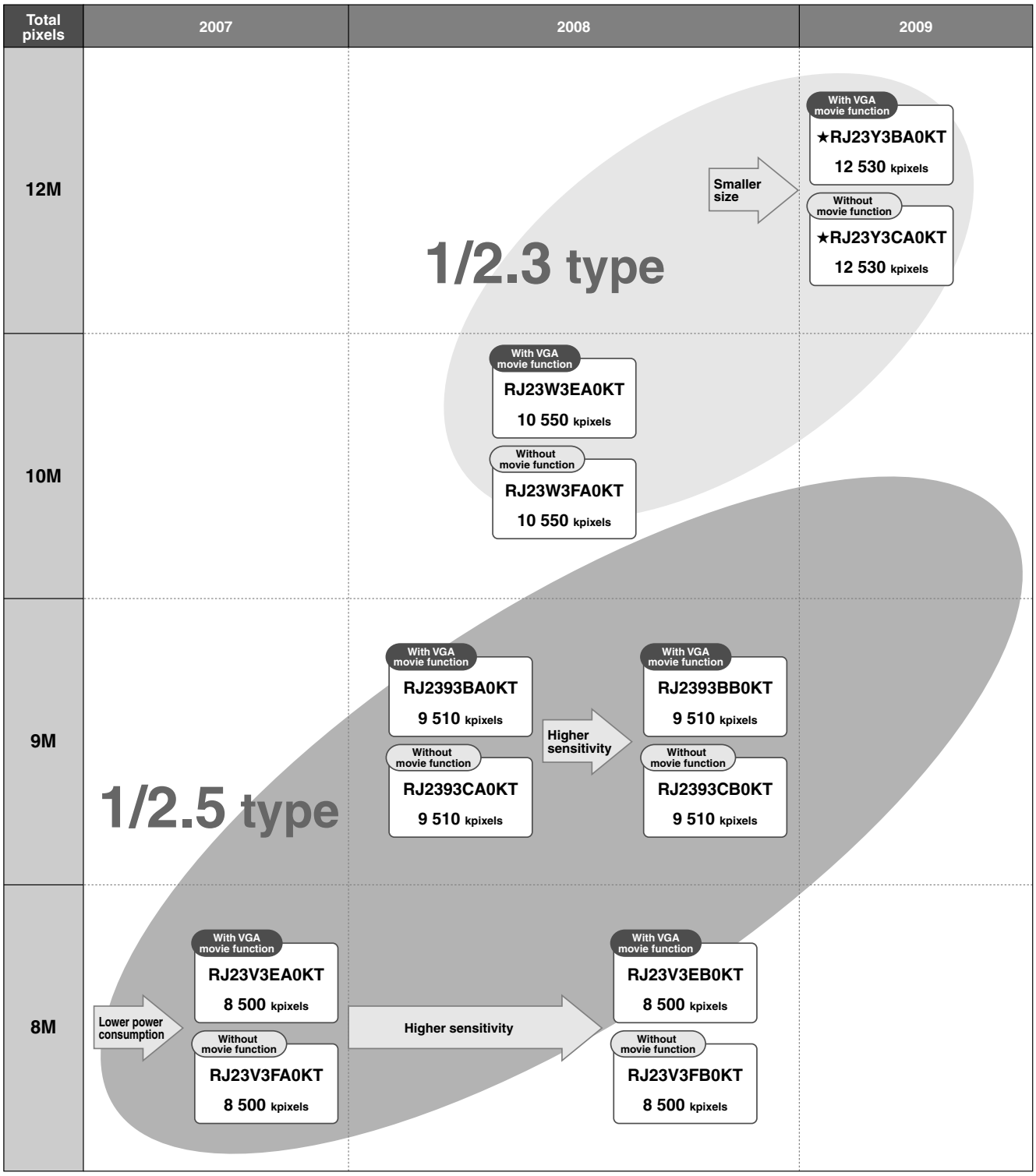
●System Configuration Example



ROAD MAP FOR HIGHER-RESOLUTION CCDs FOR DIGITAL CAMERAS

★Under development

■ Road Map for Higher-resolution CCDs for Digital Cameras



★Under development

■ Higher-resolution CCDs

Optical format	Total pixels	Color filter	Model No.	30 fps VGA movie	Resolution Image pixels (H x V)	Pixel size H x V (μm²)	Sensitivity TYP. (mV)	Smear ratio TYP. (dB)	Package
1/2.3 type	10 550 k	R,G,B primary color mosaic filters	RJ23W3EA0KT	○	3 704 x 2 784	1.68 x 1.68	105	–87	N-LCC040-S433A
			RJ23W3FA0KT	–					
	12 530 k		★RJ23Y3BA0KT	○	4 040 x 3 032	1.55 x 1.55	100	–85	
			★RJ23Y3CA0KT	–					
1/2.5 type	8 500 k		RJ23V3EA0KT	○	3 320 x 2 496	1.75 x 1.75	90	–85	
			RJ23V3FA0KT	–					
			RJ23V3EB0KT	○	3 320 x 2 496	1.75 x 1.75	100	–85	
			RJ23V3FB0KT	–					
	9 510 k		RJ2393BA0KT	○	3 512 x 2 640	1.66 x 1.66	80	–83	
			RJ2393CA0KT	–					
			RJ2393BB0KT	○	3 512 x 2 640	1.66 x 1.66	100	–85	
			RJ2393CB0KT	–					

★Under development

■ 1/3-type CCDs

Total pixels	Standard		Model No.	Resolution		Pixel size H x V (μm²)	Sensitivity TYP. (mV)	Smear ratio TYP. (dB)	Package
				Horizontal TV lines	Image pixels (H x V)				
270 k	Color	NTSC	RJ2311BA0PB	330	512 x 492	9.6 x 7.5	2 000	–130	P-DIP016-0500C
			RJ2311CB0PB				3 200		P-DIP016-0450
320 k		PAL	RJ2321BA0PB		512 x 582	9.6 x 6.34	2 000	–130	P-DIP016-0500C
			RJ2321CB0PB				3 200		P-DIP016-0450
410 k		NTSC	RJ2351BA0AB	480	768 x 494	6.4 x 7.5	1 500	–120	N-DIP016-0450
			RJ2351CA0PB				2 000		P-DIP016-0450
			★RJ2352CA0PB				2 000		
470 k		PAL	RJ2361BA0AB		752 x 582	6.5 x 6.3	1 500	–120	N-DIP016-0450
			RJ2361CA0PB				2 000		P-DIP016-0450
			★RJ2362CA0PB				2 000		

■ 1/3.8-type CCD

Total pixels	Standard		Model No.	Resolution		Pixel size H x V (μm²)	Sensitivity TYP. (mV)	Smear ratio TYP. (dB)	Package
				Horizontal TV lines	Image pixels (H x V)				
290 k	Color	NTSC	RJ2411CA0PB*	330	532 x 512	7.2 x 5.6	1 200	–120	P-DIP014-0400A

* Suitable for intense light exposure.

■ 1/4-type CCDs

Total pixels	Standard		Model No.	Resolution		Pixel size H x V (μm²)	Sensitivity TYP. (mV)	Smear ratio TYP. (dB)	Package
				Horizontal TV lines	Image pixels (H x V)				
270 k	Color	NTSC	RJ2411BA0PB*	330	512 x 492	7.2 x 5.6	1 200	–120	P-DIP014-0400A
			RJ2411BB0PB						
			RJ2411DA0PB				1 800		
320 k		PAL	RJ2421BB0PB		512 x 582	7.2 x 4.73	1 100	–120	
			RJ2421DA0PB				1 650		
410 k		NTSC	RJ2451BA0PB	480	768 x 494	4.9 x 5.6	600	–114	
			★RJ2451CA0PB				900		
470 k		PAL	RJ2461BA0PB		752 x 582	5.0 x 4.77	600	–114	
			★RJ2461CA0PB				900		

* Suitable for intense light exposure.

★Under development

■ CCD Peripheral ICs/LSIs

Description	Model No.	Features		Package
V driver	LR36689U	Vertical pulse driver for CCDs, 2-level output x 4, 3-level output x 8, 2-level output circuit for electronic shutter		P-VQFN036-0505
CDS/PGA/ADC	IR3Y48B1	Low power consumption [80 mW (TYP.)], high-speed S/H circuit, high-gain PGA circuit, 10-bit ADC (18 MHz), 10-bit digital output		P-QFP048-0707
	IR3Y60U6	Low power consumption [69 mW (TYP.)], high-speed S/H circuit, high-gain PGA circuit, 10-bit ADC (20 MHz), 10-bit digital output		P-VQFN032-0505
	IR3Y50U6	Low power consumption [75 mW (TYP.)], high-speed S/H circuit, high-gain PGA circuit, 12-bit ADC (25 MHz), 12-bit digital output		P-VQFN036-0606
	LR36B03	Low power consumption [81 mW (TYP.)], high-speed S/H circuit, high-gain PGA circuit, 12-bit ADC (25 MHz), mechanical iris control function, 12-bit digital output		P-VQFN036-0606
Timing generator + V driver + CDS/PGA/ADC	★LR36B11A	For 1/2.3-type 10 550-kpixel, 12 530-kpixel, 1/2.5-type 8 500-kpixel, 9 510-kpixel CCDs with/without movie function	<Timing generator> Programmable timing generator <V driver> Vertical pulse driver for CCDs, 2-level output x10, 3-level output x10 2-level output circuit for electronic shutter <CDS/PGA/ADC> 40 MHz, high-speed S/H circuit, high-gain PGA circuit, 22-bit ADC, 16-bit digital output	P-LFBGA140-0909
V driver + CDS/PGA/ADC + DSP	LR38653	For 270-k/320-k/410-k/ 470-kpixel CCDs	<V driver> Vertical pulse driver for CCDs, 2-level output x 2, 3-level output x 2, 2-level output circuit for electronic shutter <CDS/PGA/ADC> 25 MHz, high-speed S/H circuit, high-gain PGA circuit, 12-bit ADC <DSP> 10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, lens shading correction function, auto white blemish compensation function, mirror image function, YUV digital output, NTSC/PAL analog output	P-LFBGA171-0811
	LR38654	For 270-k/290-k/320-k/410-k/ 470-kpixel CCDs	<V driver> Vertical pulse driver for CCDs, 2-level output x 2, 3-level output x 2, 2-level output circuit for electronic shutter <CDS/PGA/ADC> 25 MHz, high-speed S/H circuit, high-gain PGA circuit, 12-bit ADC <DSP> 10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, lens shading correction function, auto white blemish compensation function, mirror image function, electronic optical axis adjustment function*1, YUV digital output, NTSC/PAL analog output	P-LFBGA171-0811
DSP	LR386032	For 270-k/320-k/410-k/ 470-kpixel CCDs	9-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, mirror image function, YUV digital output, NTSC/PAL analog output	P-LQFP080-1212
	LR38627		10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, lens shading correction function, auto white blemish compensation function, mirror image function, YUV digital output, NTSC/PAL analog output	P-TQFP128-1414
	LR38690		10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, lens shading correction function, auto blemish compensation function, mirror image function, mechanical iris control function, privacy masking function, Day/Night control function, color rolling suppression function, high resolution function, NTSC/PAL analog output, Y/C analog output, UYVY digital output (ITU-R BT656 compliant)*3	P-LQFP100-1414
Buffer IC for CCD output circuit	IR3T47G ▲	For 5 190-kpixel to 12 520-kpixel CCDs	Input voltage range: 11.5 to 16 V, Constant current range: 1 to 5.75 mA, ON/OFF control for constant current	B-VQFN8 (1.50 mm x 1.50 mm)

■ CCD Peripheral ICs/LSIs (cont'd)

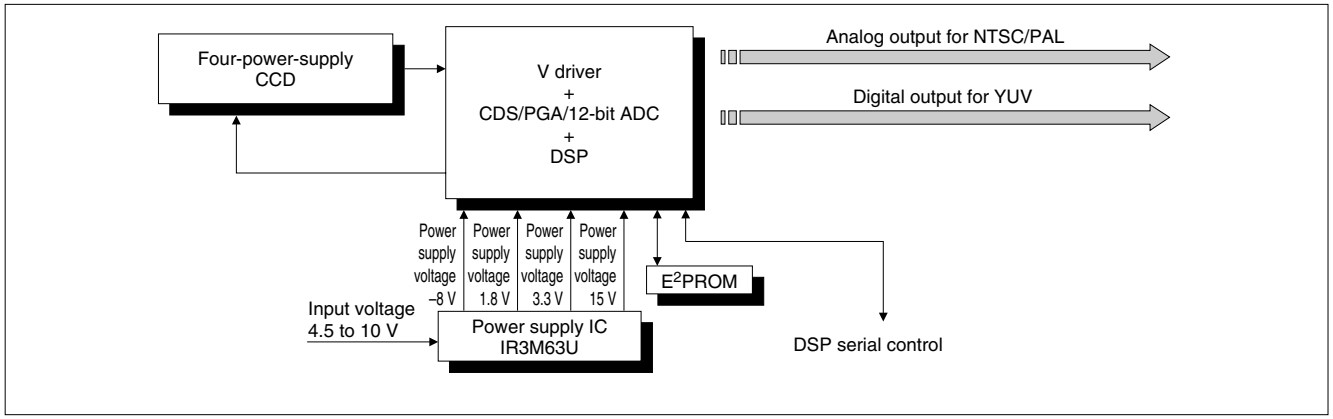
Description	Model No.	Features		Package
Power supply IC for CCDs and peripheral ICs/LSIs	IR3M55U ▲*2	For 270-k/320-kpixel CCDs	Input voltage range: 4.5 to 16 V, PWM control + charge pump system, output voltage: three outputs (15 V/12 V, –8 V/–5 V, 3.3 V), power sequencing circuit, overcurrent protection circuit	P-VQFN032-0505
	IR3M59U ▲			
	IR3M61U ▲*2	For 270-k/290-k/320-k/410-k/ 470-kpixel CCDs	Input voltage range: 4.5 to 10 V, PWM control + charge pump system, output voltage: four outputs (15 V, –8 V, 3.3 V, 1.8 V), power sequencing circuit, overcurrent protection circuit	
	IR3M63U ▲			

*1 Support for only 290-kpixel CCD.
*2 For automotive use
*3 Support for only 410-k/470-kpixel CCDs.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

★Under development

●System Configuration Examples

• Color Security Camera System with Two-chip Configuration [Low Power Consumption Type]

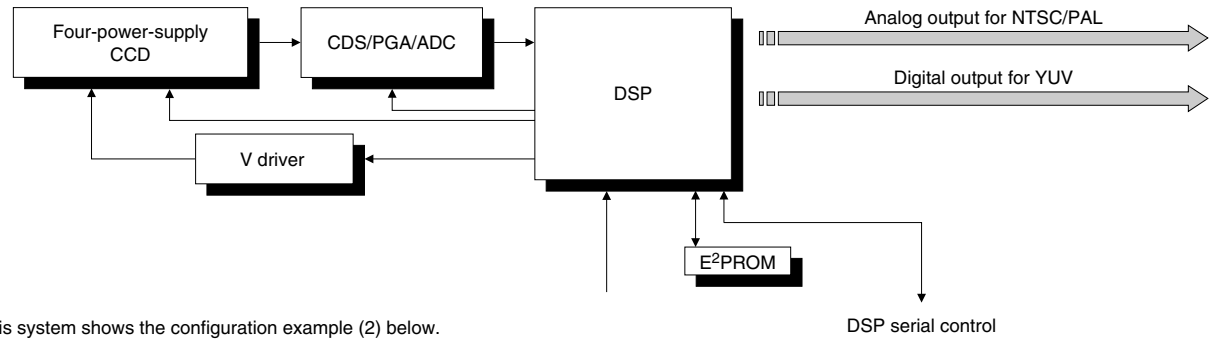


Four-power-supply CCDs and peripheral IC/LSIs

CCD			V driver + CDS/PGA/ADC + DSP	Power supply IC
1/3 type	270 kpixels	RJ2311BA0PB	LR38653/LR38654	—
		RJ2311CB0PB		
	320 kpixels	RJ2321BA0PB		
		RJ2321CB0PB		
	410 kpixels	RJ2351BA0AB		IR3M63U
		RJ2351CA0PB		
		★RJ2352CA0PB		
	470 kpixels	RJ2361BA0AB		
		RJ2361CA0PB		
		★RJ2362CA0PB		
1/3.8 type	290 kpixels	RJ2411CA0PB	LR38654	
1/4 type	270 kpixels	RJ2411BA0PB	LR38653/LR38654	
		RJ2411BB0PB		
		RJ2411DA0PB		
	320 kpixels	RJ2421BB0PB		
		RJ2421DA0PB		
	410 kpixels	RJ2451BA0PB		
		★RJ2451CA0PB		
	470 kpixels	RJ2461BA0PB		
		★RJ2461CA0PB		

★Under development

• Color Security Camera System with Four-chip Configuration (I)



* This system shows the configuration example (2) below.

Four-power-supply CCDs and peripheral ICs/LSIs (1)

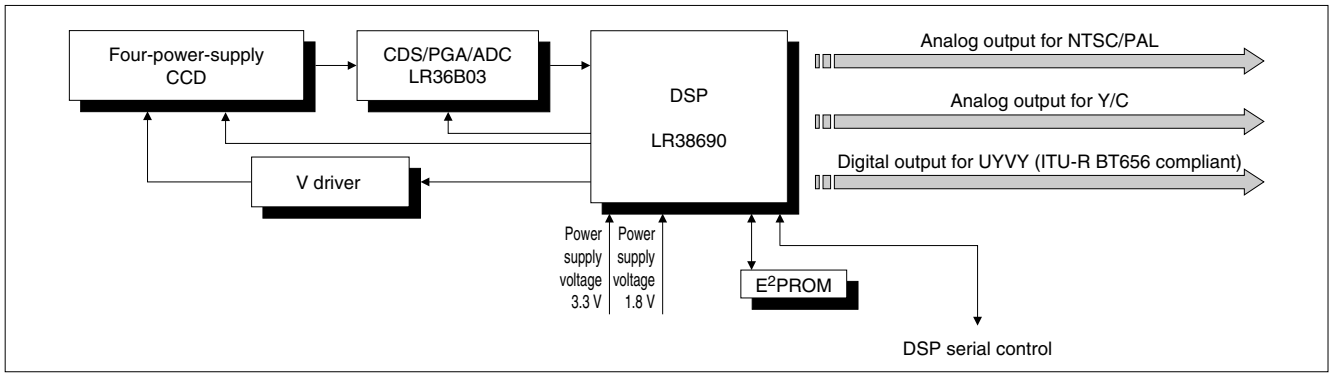
CCD			CDS/PGA/ADC	DSP
1/3 type	270 kpixels	RJ2311BA0PB	IR3Y48B1	LR386032
		RJ2311CB0PB		
	320 kpixels	RJ2321BA0PB		
		RJ2321CB0PB		
	410 kpixels	RJ2351BA0AB		
		RJ2351CA0PB		
		★RJ2352CA0PB		
	470 kpixels	RJ2361BA0AB		
		RJ2361CA0PB		
		★RJ2362CA0PB		
1/4 type	270 kpixels	RJ2411BB0PB		
		RJ2411DA0PB		
	320 kpixels	RJ2421BB0PB		
		RJ2421DA0PB		
	410 kpixels	RJ2451BA0PB		
		★RJ2451CA0PB		
	470 kpixels	RJ2461BA0PB		
		★RJ2461CA0PB		

Four-power-supply CCDs and peripheral ICs/LSIs (2)

CCD			CDS/PGA/ADC	DSP
1/3 type	270 kpixels	RJ2311BA0PB	LR36B03	LR38627
		RJ2311CB0PB		
	320 kpixels	RJ2321BA0PB		
		RJ2321CB0PB		
	410 kpixels	RJ2351BA0AB		
		RJ2351CA0PB		
		★RJ2352CA0PB		
	470 kpixels	RJ2361BA0AB		
		RJ2361CA0PB		
		★RJ2362CA0PB		
1/4 type	270 kpixels	RJ2411BB0PB		
		RJ2411DA0PB		
	320 kpixels	RJ2421BB0PB		
		RJ2421DA0PB		
	410 kpixels	RJ2451BA0PB		
		★RJ2451CA0PB		
	470 kpixels	RJ2461BA0PB		
		★RJ2461CA0PB		

★Under development

• Color Security Camera System with Four-chip Configuration (II)



Four-power-supply CCDs and peripheral ICs/LSIs

CCD			CDS/PGA/ADC	DSP
1/3 type	270 kpixels	RJ2311BA0PB	LR36B03	LR38690
		RJ2311CB0PB		
	320 kpixels	RJ2321BA0PB		
		RJ2321CB0PB		
	410 kpixels	RJ2351BA0AB		
		RJ2351CA0PB		
		★RJ2352CA0PB		
	470 kpixels	RJ2361BA0AB		
		RJ2361CA0PB		
		★RJ2362CA0PB		
1/4 type	270 kpixels	RJ2411BB0PB		
		RJ2411DA0PB		
	320 kpixels	RJ2421BB0PB		
		RJ2421DA0PB		
	410 kpixels	RJ2451BA0PB		
		★RJ2451CA0PB		
	470 kpixels	RJ2461BA0PB		
		★RJ2461CA0PB		

★Under development

■ For Notebook PCs, PC Monitors and LCD TVs

●TFT-LCD Drivers

Drive function		Model No.	Gray scale	No. of LCD drive outputs	Display voltage (V) MAX.	Clock frequency (MHz) MAX.	Supply voltage (V)	Description	Package
Source driver	Dot inversion drive	LH16AM	64 levels	384	13.5	85	2.7 to 3.6	Low EMI*1 driver using RSDS™*2 interface, built-in reference voltage generation circuit, R-DAC system	SOF
		LH16B6		402/414/420/432			2.3 to 3.6		
		LH16AD		480/504/516/528			2.7 to 3.6		
		LH16B5		630/642			2.3 to 3.6		
		LH16B9		684/690/702/720					
		★LH16D1			16.5		2.7 to 3.6		
		★LH16D5		822/840/864/960	13.5	172	2.5 to 3.6	Low EMI*1 driver using mini-LVDS interface, R-DAC system	
		LH16B4	256 levels	384	15	85	2.7 to 3.6	Low EMI*1 driver using RSDS™*2 interface, built-in reference voltage generation circuit, R-DAC system	
		LH16BZ		384/414/420	16				
		LH16AF		480	15				
		LH16D6		630/642/684/720	16	172		Low EMI*1 driver using mini-LVDS interface, R-DAC system	
		★LH16D7	1 024 levels						
		LH16D0A		414		215		Low EMI*1 driver using PPDS™*3 interface, C-DAC system	

*1 EMI: Electro-Magnetic Interference
*2 RSDS™: Reduced Swing Differential Signaling
*3 PPDS™: Point to Point Differential Signaling

●TFT-LCD Controller

Model No.	Image size	Input interface	Output interface	Function	Clock frequency (MHz) MAX.	Supply voltage (V)			Package
						Core	Digital	Analog	
LR388F5A	1 366 x 768	LVDS 1ch 10/8 bits	RSDS 8/6 bits 2/1ch mini-LVDS 8 bits 2/1ch	• Improves response speed of LCD image by original Quick Shoot technology (with a built-in frame memory) • Register control by external EEPROM (SPI) and I²C I/F • Control by gamma correction IC (SPI)	85	1.1 to 1.3	3.0 to 3.6	2.3 to 2.7	TFBGA204-1212

RSDS and PPDS are trademarks of National Semiconductor Corporation.

■ For Mobile Phones

●TFT-LCD Controllers

Model No.	LCD interface (pixel) MAX.	Display colors MAX.	Display RAM capacity (bit)	Function	CPU interface	Supply voltage (V)		Package
						Core	Host I/F	
LR388D8	480 x 864	16 770 k colors	16 M (Flexibly meets the requirement depending on the panel size)	• MDDI*1-compliant • Built-in IrSimple™ and IrDA communications functions • Main/sub LCD controller • Graphic processing • Built-in SDHC	MDDI*1 for MSM series/ 80-family (8/9/16/ 18-bit parallel)	1.08 to 1.32	1.65 to 3.6	P-WFBGA205-0808
LR388D1	240 x 400	262 144 colors	240 x 400 x 18	• MDDI*1-compliant • Built-in IrSimple™ and IrDA communications functions • Main/sub LCD controller • Graphic processing		1.65 to 1.95		P-VFBGA144-0808
LR38869A				• MDDI*1-compliant • Main/sub LCD controller • Graphic processing • Parallel bus host interface				P-TFBGA176-0909
LR388692				• MDDI*1-compliant • Main/sub LCD controller • Graphic processing	MDDI*1 for MSM series			P-VFBGA100-0606

*1 MDDI (Mobile Display Digital Interface): The serial interface standard developed by QUALCOMM

IrSimple™ is a trademark of Infrared Data Association.
QUALCOMM and MSM are trademarks of QUALCOMM Incorporated.

☆New product
★Under development

■ Video Interface ICs for TFT-LCDs

Model No.	Input signal					Color decode system	LCD panel				Serial data control	Supply voltage (V) TYP.	Power consumption (mW) TYP.	Package
	Com-posite video	Y/color differ-ence	Analog RGB	Digital RGB	OSD (Digital)		±power source driver	+power source driver	Low voltage source driver	Digital input driver				
IR3Y26A2 ▲/A6 ▲			○*3			–			○			5/7.5	140	P-QFP048-1010/ P-QFP048-0707
IR3Y29A1 ▲/B1	○		○			NTSC/PAL			○				190	P-QFP048-0707
RB5P006AM2 ▲	○		○			NTSC/PAL			○		○	3/5/13	120	P-QFP048-1010
RB5P0090M ▲	○		○*3			NTSC/PAL (automatic identification)			○		○	5/13	250	P-QFP048-1010
★IR3Y66M*2				○		NTSC/PAL			○		○*4	1.8/3/5	130	P-QFP072-1010
☆IR3Y67M*1, 2, 7/ ☆IR3Y70M*1, 2	○	○	○	○	○*6	NTSC/PAL/ SECAM				○	○*5	1.8/3	400	P-TQFP100-1414
☆IR3Y68M*2/ ★IR3Y69M*2, 7	○	○	○		○ (Built-in)	NTSC/PAL/ SECAM			○		○*4	1.8/3/5	250	P-TQFP100-1414

*1 For digital signal input panels
*2 Built-in timing generator
*3 Two inputs
*4 Both 3-wire and I²C are available.
*5 Only for I²C
*6 Both built-in OSD and external OSD are available.
*7 For automotive use
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Power Supply ICs for TFT-LCDs

Model No.	No. of output circuits	Input voltage range (V)	Output voltage (V)	System	Switching frequency (Hz)	Switching transistor	Switching current (mA) [Built-in SW Tr]	Drive capacity (pF) [External SW Tr]	Package
IR3M58M ▲/U ▲	3	4.5 to 28	External setting	Step-up (MAX. 20 V)/ step-down type PWM	70 k to 500 k	Built-in	400	1 000	P-QFP048-0707/ P-VQFN032-0505
				Step-down type PWM		External	–		
				Step-down, inverting type PWM		External	–		
IR3M81U ▲	5	10 to 14	External setting	Step-up type PWM	200 k to 1 M	External	–	1 000	P-HQFN052-0707
				Step-down type PWM		External	–		
				Synchronous rectification step-down PWM		External	–		
				Charge pump	1/2 of the above	–	50 (DC)	–	
				Negative charge pump		–	50 (DC)	–	

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

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■ System LSIs

Model No.	Function	Features	Supply voltage (V)	Package
LR35501	One chip graphic controller IC	• Built-in video encoder (NTSC/PAL) • Composite signal output • Analog RGB signal output • Capable of moving picture transmission/play, thanks to real-time image compression and extension technology • Real images, backgrounds and sprites can be superimposed • Built-in sprite graphic processor • Built-in color object detector • Built-in Bluetooth® HCI controller • Built-in sound generator (ADPCM/PSG) • Built-in CMOS camera interface (9 MHz) • CPU: Z80 compatible, 27 MHz • Peripheral (NAND flash I/F, PIO, SIO, UART, ADC, PWM, etc.)	Core: 1.8 ± 0.18 I/O: 3.3 ± 0.3	P-QFP128-1420
LR35503	One chip graphic controller IC	• Digital LCD interface (6 bit RGB) • 27 MHz digital YUV video input • Capable of moving picture transmission/play, thanks to real-time image compression and extension technology • Real images, backgrounds and sprites can be superimposed • Built-in sprite graphic processor • Built-in color object detector (Only for CMOS camera input) • Built-in Bluetooth® HCI controller • Built-in sound generator (ADPCM/PSG) • Built-in CMOS camera interface (9 MHz) • CPU: Z80 compatible, 27 MHz • Peripheral (NAND flash I/F, PIO, SIO, UART, ADC, PWM, etc.)	Core: 1.8 ± 0.18 I/O: 3.3 ± 0.3	P-LQFP144-2020
LR388D8	MDDI*1-compliant WVGA LCD controller for IrSimple™ and IrDA communications	• Built-in video memory: Flexibly meets the requirement depending on the panel size (16 Mbits) • MDDI*1 TYPE I compliant • 7500 MSM compliant • Supports 80-family CPU bus (8/9/16/18 bits) • Built-in modulation and demodulation IP for IrSimple™, IrDA, and IR remote controller • Built-in graphic engine (built-in zoom, scroll functions, etc.) • SVDI (Sharp Video Display Interface) x 2 ports • Built-in SDHC	Core: 1.2 (TYP.) I/O: 1.8 to 3.3	P-WFBGA205-0808
LR388D1	MDDI*1-compliant WQVGA LCD controller for IrSimple™ and IrDA communications	• Built-in video memory: 240 x 400 pixels, 260 k colors (18 bits) • MDDI*1 TYPE I compliant • Supports 80-family CPU bus (8/9/16/18 bits) • Built-in modulation and demodulation IP for IrSimple™, IrDA, and IR remote controller • Built-in graphic engine (built-in zoom, scroll functions, etc.) • Supports dual displays for both main WQVGA and Sub CPU panels	Core: 1.8 (TYP.) I/O: 1.8 to 3.3	P-VFBGA144-0808
LR388B62	Control LSI for IrSimple™ and IrDA communications	• Transmitting function based on IrSimple™ and IrDA specifications • Built-in 4-kbyte buffer for both sending and receiving • Sending function for IR remote controller • Matches SHARP optical modules	Core: 1.8 (TYP.) I/O: 1.8 to 3.3	P-VFBGA057-0505
LR38888A	H. 264 decoder for one-seg digital terrestrial TV broadcasting	• Built-in video (H. 264) and audio (MPEG2-AAC + SBR) decoding functions • Built-in fast play function • Built-in memory (DRAM) • Input signal: MPEG2-TS • Image size: QVGA • Frame rate: 15 frames/s • Output signal format: Image UYVY/RGB for video, I^2S for audio • Output interface: CPU bus, camera interface	Core: 1.3 (TYP.) I/O: 1.8/3.3	P-TFBGA208-1010
LR38886	Image detection engine	• High-speed image processing: 960 MOPS (MAX.) • Built-in camera interface: 8-bit digital input (UYVY etc.), Can be connected to a camera directly, up to 4-million pixel camera • Built-in SDRAM interface: 512 Mbits (MAX.) • Universal I/O: 15 ports (MAX.) • Serial interface (SPI) • Bus interface (Bus Master) • Built-in PLL (200 MHz (MAX.)) • Automatic control of power consumption according to amount of data processed	Core: 1.8 (TYP.) I/O: 3.3 (TYP.)	P-LQFP176-2424

*1 MDDI (Mobile Display Digital Interface): The serial interface standard developed by QUALCOMM

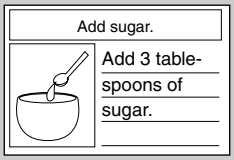
Bluetooth is a trademark of Bluetooth SIG, Inc.
Z80 is a trademark of ZiLOG, Inc.
IrSimple™ is a trademark of Infrared Data Association.
QUALCOMM and MSM are trademarks of QUALCOMM Incorporated.

■ One-chip Graphic Controller IC <LR35501/LR35503>

LR35501/LR35503 are the system LSIs which enable smooth graphic display by graphic controller ICs with built-in microcomputers and device control and graphic display with one chip due to the microcomputers and various I/Os.

Common features

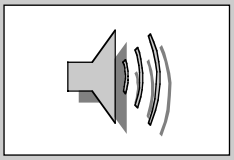
Built-in versatile graphic functions



- Smooth imaging using sprite processor
- Capable of moving picture transmission/play, thanks to real-time image compression technology
- Real images, backgrounds and sprites can be superimposed

Graphic expression with smooth movement is possible

Sound output



Built-in stereo sound circuit
- ADPCM decoder
- Programmable sound generator

Warning using realistic alarm tone / audio is possible

CMOS camera interface

- CIF/QVGA UYVY input

CIF/QVGA CMOS imager can be connected

Bluetooth®

- Built-in HCI controller
- SPP, HID compliant

Smooth images transmission achieved by using Bluetooth®

General purpose I/O built-in PIO/UART/SIO/NAND flash interface/ADC/PWM/SPI, etc.

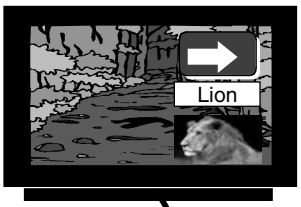
LR35501 features and functions

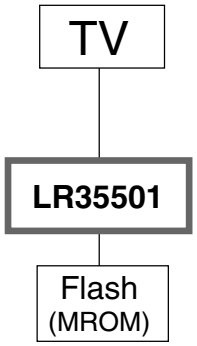
- Built-in video encoder (NTSC/PAL)
- Built-in analog RGB output
- Built-in composite video output

LR35503 features and functions

- Built-in digital LCD interface (6-bit RGB QVGA [320 x 240])
- Built-in 27 MHz YUV digital video input

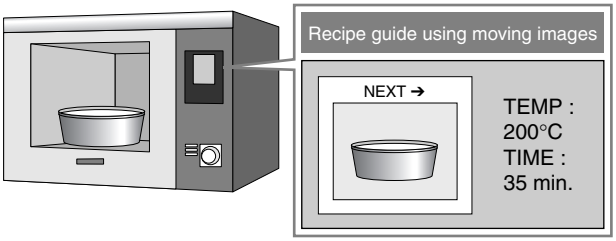
Intellectual training toy
(Driving game)



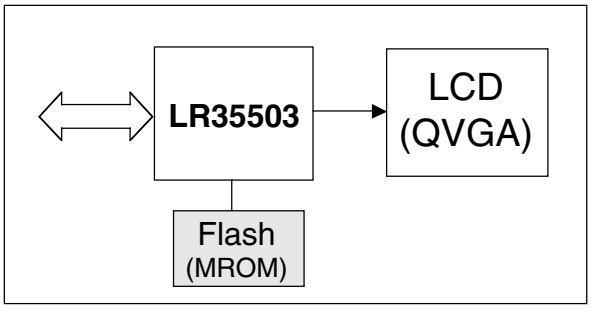


Directly connected to TV (composite) output

Household electrical appliance



Smooth graphics achieved by simple circuits



Bluetooth is a trademark of Bluetooth SIG, Inc.

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■ IrSimple™ Communications Series <LR388D8/LR388D1/LR388B62>

IrSimple™ communications is a communications protocol which makes the Ir communication standard employed in mobile terminals such as mobile phones, IrDA protocol, more efficient. Compared with IrDA, since the data transfer time can be significantly reduced to approximately 1/4th to 1/10th, higher volumes of data can be sent and received. In addition, by incorporating a controller for IrSimple™ communications into mobile equipment or digital home appliances, high-quality image data taken with a digital camera or a mobile phone camera can be readily transferred to a TV or a printer at high speed with a simple operation such as with a remote controller. The image data captured from the camera can be enjoyed on full HD-TV, or by printing the data out.

●Features

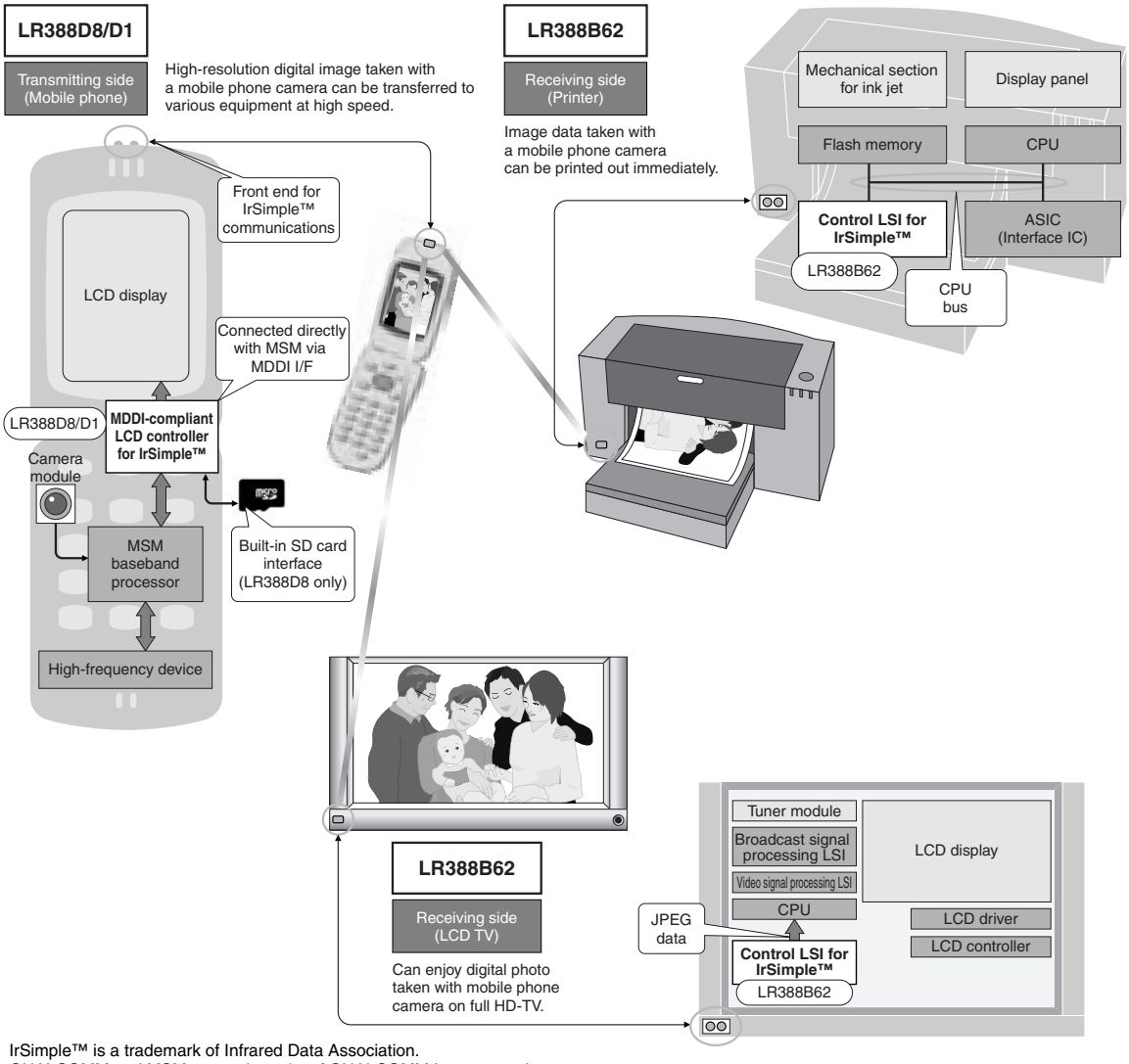
● LR388D8
(MDDI*1-compliant WVGA LCD controller for IrSimple™)
The LR388D1 has been made compatible with full-WVGA LCD displays, with internal memory (16 Mbits) that can hold two screens of data (main and sub). High-resolution display and low power consumption have been realized. Furthermore, a built-in SD card interface supports a reduction in the number of chips.

● LR388D1
(MDDI*1-compliant WQVGA LCD controller for IrSimple™)
Thanks to a built-in IrSimple™ function in the LCD controller, the mounting area of a mobile phone can be decreased; thus it contributes to size reduction in mobile phones. Also, a higher volume of data can be transferred at high speed with 4 fewer signal lines due to the incorporation of an MDDI*1 interface.

*1 MDDI (Mobile Display Digital Interface) : The serial interface standard developed by QUALCOMM

● LR388B62
(Control LSI for IrSimple™)
High-quality image data taken with a digital camera or a mobile phone camera can be readily transferred to a TV or a printer at high speed with a simple operation such as with a remote controller.

●Application & System Configuration Example



IrSimple™ is a trademark of Infrared Data Association.
QUALCOMM and MSM are trademarks of QUALCOMM Incorporated.

■ H.264 Decoder for One-Seg Digital Terrestrial TV Broadcasting <LR38888A>

The LR38888A is an H.264 decoder for one-seg digital terrestrial TV broadcasting, which started in April 2006 .
For example, simple connection to the camera interface of an existing mobile phone system readily enables one-seg TV.

●Features

● Low-power technology facilitates long viewing times for digital terrestrial TV broadcasting on mobile equipment

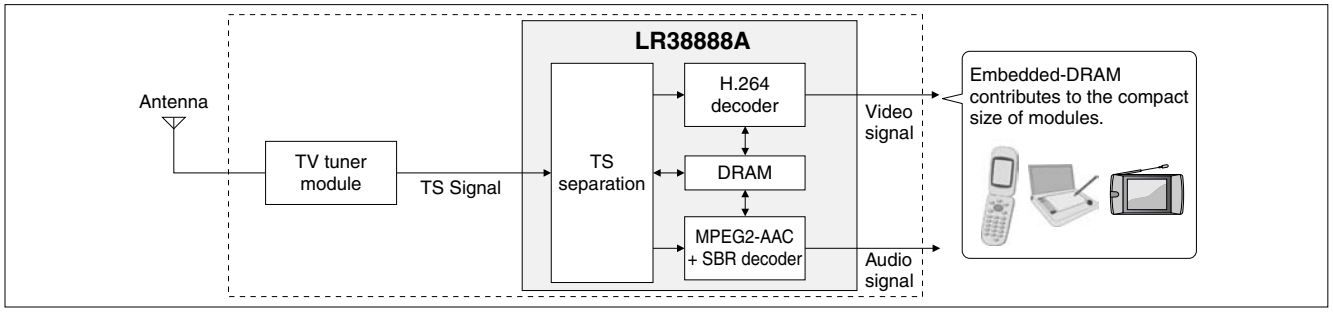
The LR38888A features low power consumption when viewing TV, based on a proprietary embedded media processing accelerator* and on-chip memory, making it possible to view TV for extended lengths of time on battery power.

*Hardware and software to improve functions and processing capabilities.

● Contributes to shorter development times for mobile equipment with a one-seg TV receiver

Built-in video and audio output interfaces enable this LSI to be readily designed into an existing mobile phone system, to provide TV viewing functions by supplying the firmware needed to view digital terrestrial TV broadcasting, contributing to shorter development times for mobile equipment with TV reception functions.

●Application & System Configuration Example



■ Smart Cards/LSI Modules for Smart Cards

Type		Communication standards	Protocol	Transmission speed (kbps) MAX.	Nonvolatile memory capacity	Cycling capability	CPU	Security system
SJCard 211	Contact	ISO/IEC7816	T = 1	19.2	1 Mbyte (Flash memory)	100 000 times	16 bits	RSA, DES, T-DES, etc. high-speed cryptographic authentication with built-in coprocessor, hardware-based random number generator
	Contactless	ISO/IEC14443 Type B	ISO/IEC14443-4	424				
SJCard 222	Contact	ISO/IEC7816	T = 1	38.4	1 Mbyte (Flash memory)	100 000 times	16 bits	
	Contactless	ISO/IEC14443 Type B	ISO/IEC14443-4	424				

SJCard 211
- Java Card™ 2.1.1 compliance
- Capable of developing applications using Java language

SJCard 222
- Java Card™ 2.2.2 compliance
- Capable of developing applications using Java language

■ SDK (Software Development Kit) for Smart Cards

SDK type	Contents	Remarks
For SJCard 211	Development kit CD for SJCard SJCard simulator	The sample card is not included in the kit.
For SJCard 222	Development kit CD for SJCard SJCard simulator	The sample card is not included in the kit.

Java and Java Card are trademarks of Sun Microsystems, Inc.

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■ Highly Functional Flash Memories

●Boot Block Type 3 V Page Mode Flash Memories: LH28FXXXBF Series

Capacity (bit)	Bit configuration	Erasable block size	Operating temp. (°C)	Model No.	Remarks
64 M	x 16	4 Kwords x 8, 32 Kwords x 127	Top boot	–40 to 85	LH28F640BFH-PTTL	• Built-in dual work function • Built-in OTP function [4 words (factory area) + 4 words (user area)]
			Bottom boot	–40 to 85	LH28F640BFH-PBTL	
128 M	x 16	4 Kwords x 8, 32 Kwords x 255	Top boot	–40 to 85	LH28F128BFH-PTTL	
			Bottom boot	–40 to 85	LH28F128BFH-PBTL	

■ Standard Flash Memories

●Boot Block Type 3 V Flash Memories: LH28FXXXBJ Series

Capacity (bit)	Bit configuration	Erasable block size	Operating temp. (°C)	Model No.	Remarks
8 M	x 8/ x 16	4 Kwords x 8, 32 Kwords x 15 (or 8 Kbytes x 8, 64 Kbytes x 15)	Top boot	0 to 70	LH28F800BJ-PTTL	• Built-in OTP function [4 words (factory area) + 3 963 words (user area)]
				–40 to 85	LH28F800BJH-PTTL	
			Bottom boot	0 to 70	LH28F800BJ-PBTL	
				–40 to 85	LH28F800BJH-PBTL	
16 M	x 8/ x 16	4 Kwords x 8, 32 Kwords x 31 (or 8 Kbytes x 8, 64 Kbytes x 31)	Top boot	–40 to 85	LH28F160BJH-TTL	–
			Bottom boot	–40 to 85	LH28F160BJH-BTL	

■ System-Flash for Amusement Products

Capacity (bit)	Bit configuration	Erasable block size	Operating temp. (°C)	Model No.	Remarks
64 M	x 16	4 Kwords x 8, 32 Kwords x 127	Top boot	0 to 70	LH28F640BF-PTTL	• 44 SOP industry standard package
256 M	x 16	16 Kwords x 4, 64 Kwords x 255	Top boot	0 to 85	LH28F256BF-PTSL	• 70 SSOP industry standard package
512 M	x 16	(16 Kwords x 4, 64 Kwords x 255) x 2	Top/Top boot	0 to 85	LH28F512BFND-PTSL	• 70 SSOP industry standard package

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■ System-Flash for Automotive Use

●3 V models

Capacity (bit)	Bit configuration	Erasable block size	Operating temp. (°C)	Model No.	Remarks
32 M	x 16	4 Kwords x 8, 32 Kwords x 63	Top boot	–40 to 85	LH28F320BFH-PTTL	• Employs copper frame
64 M	x 16	4 Kwords x 8, 32 Kwords x 127	Top boot	–40 to 85	LH28F640BFH-PTTL	
			Bottom boot		LH28F640BFH-PBTL	
128 M	x 16	4 Kwords x 8, 32 Kwords x 255	Top boot	–40 to 85	LH28F128BFH-PTTL	
	x 16	(4 Kwords x 8, 32 Kwords x 127) x 2	Top/Bottom boot		LH28F128BFH-PWTL	
256 M	x 16	(4 Kwords x 8, 32 Kwords x 255) x 2	Top/Top boot	–40 to 85	LH28F256BFH-PTTL	

●1.8 V models with 3 V I/O voltage

Capacity (bit)	Bit configuration	Erasable block size	Operating temp. (°C)	Model No.	Remarks
32 M	x 16	8 Kwords x 4, 32 Kwords x 63	Top boot	–40 to 85	LH28F320BFH-PTLF	• Employs copper frame
			Bottom boot		LH28F320BFH-PBLF	
64 M	x 16	8 Kwords x 4, 32 Kwords x 127	Top boot	–40 to 85	LH28F640BFH-PTLF	
			Bottom boot		LH28F640BFH-PBLF	

■ System-Flash for Network Equipment

Capacity (bit)	Bit configuration	Erasable block size	Operating temp. (°C)	Model No.	Remarks
64 M	x 8/ x 16	64 Kwords x 64 or 128 Kbytes x 64	Symmetrical block	–40 to 85	LH28F640SPH-PL	• 56 TSOP industry standard package
128 M	x 8/ x 16	64 Kwords x 128 or 128 Kbytes x 128	Symmetrical block	–40 to 85	LH28F128SPH-PTL	• 56 TSOP industry standard package

■ Highly Functional Flash Memories
Boot Block Type 3 V Page Mode Flash Memories: LH28FXXXBF Series

Supply voltage	64 M: V_{CC} = 2.7 to 3.6 V 128 M: V_{CC} = 2.7 to 3.6 V

Capacity (bit)	Bit configuration	Erasable block size		Model No.	Access time (ns) MAX.	Page mode access time (ns) MAX.	Read current (mA) MAX. f = 5 MHz (CMOS)	Standby current (µA) MAX. (CMOS)	Operating temp. (°C)	Package
64 M	x 16	Parameter: 4 Kwords x 8 Main: 32 Kwords x 127	Top boot	LH28F640BFHE-PTTLHFA	70	30	25	20	–40 to 85	P-TSOP048-1220 (Normal bend)
				LH28F640BFHG-PTTL70A						P-TFBGA048-0808
			Bottom boot	LH28F640BFHE-PBTLHGA	70	30	25	20		P-TSOP048-1220 (Normal bend)
				LH28F640BFHG-PBTL70A						P-TFBGA048-0808
128 M	x 16	Parameter: 4 Kwords x 8 Main: 32 Kwords x 255	Top boot	LH28F128BFHT-PTTL75A	75	25	35	40		P-TSOP056-1420 (Normal bend)
			Bottom boot	LH28F128BFHT-PBTL75A	75	25	35	40		

Contact a SHARP sales office for other packages and top boot/bottom boot models other than those listed above.

■ Standard Flash Memories
Boot Block Type 3 V Flash Memories: LH28FXXXBJ Series

Supply voltage	V_{CC} = 2.7 to 3.6 V

Capacity (bit)	Bit configuration	Erasable block size		Model No.	Access time (ns) MAX.	Read current (mA) MAX. f = 5 MHz (CMOS)	Standby current (µA) MAX. (CMOS)	Operating temp. (°C)	Package
8 M	x 8/ x 16	Boot: 4 Kwords (8 Kbytes) x 2 Parameter: 4 Kwords (8 Kbytes) x 6 Main: 32 Kwords (64 Kbytes) x 15	Top boot	LH28F800BJE-PTTL90	90	25	15	0 to 70	P-TSOP048-1220 (Normal bend)
				LH28F800BJHE-PTTL90				–40 to 85	
			Bottom boot	LH28F800BJE-PBTL90	90	25	15	0 to 70	
				LH28F800BJHE-PBTL90				–40 to 85	
16 M	x 8/ x 16	Boot: 4 Kwords (8 Kbytes) x 2 Parameter: 4 Kwords (8 Kbytes) x 6 Main: 32 Kwords (64 Kbytes) x 31	Top boot	LH28F160BJHE-TTL90	90	25	15	–40 to 85	P-TSOP048-1220 (Normal bend)
			Bottom boot	LH28F160BJHE-BTL90	90	25	15	–40 to 85	

Contact a SHARP sales office for other packages and top boot/bottom boot models other than those listed above.

■ System-Flash for Amusement Products

Supply voltage	64 M: V_{CC} = 2.7 to 3.6 V 256 M/512 M: V_{CC} = 1.7 to 1.95 V, V_{CCQ} = 2.7 to 3.6 V

Capacity (bit)	Bit configuration	Erasable block size		Model No.	Access time (ns) MAX.	Page mode access time (ns) MAX.	Read current (mA) MAX. f = 5 MHz (CMOS)	Standby current (µA) MAX. (CMOS)	Operating temp. (°C)	Package
64 M	x 16	Parameter: 4 Kwords x 8 Main: 32 Kwords x 127	Top boot	LH28F640BFN-PTTLZ1A	90	35	25	25	0 to 70	P-SOP044-0600
256 M	x 16	Parameter: 16 Kwords x 4 Main: 64 Kwords x 255	Top boot	LH28F256BFN-PTSLZ2	100	25	22	60	0 to 85	P-SSOP070-0500
512 M	x 16	(Parameter: 16 Kwords x 4 Main: 64 Kwords x 255) x2	Top/ Top boot	LH28F512BFND-PTSLZ1	100	25	22	120	0 to 85	P-SSOP070-0500

Contact a SHARP sales office for other packages and top boot/bottom boot models other than those listed above.

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■ System-Flash for Automotive Use

●3 V models

Supply voltage	V_{CC} = 2.7 to 3.6 V, V_{CCQ} = 2.7 to 3.6 V

Capacity (bit)	Bit configuration	Erasable block size		Model No.	Access time (ns) MAX.	Page mode access time (ns) MAX.	Read current (mA) MAX. f = 5 MHz (CMOS)	Standby current (µA) MAX. (CMOS)	Operating temp. (°C)	Package
32 M	x 16	Parameter: 4 Kwords x 8 Main: 32 Kwords x 63	Top boot	LH28F320BFHE-PTTLE0	70	25	25	20	–40 to 85	P-TSOP048-1220 (Normal bend)
64 M	x 16	Parameter: 4 Kwords x 8 Main: 32 Kwords x 127	Top boot	LH28F640BFHE-PTTLH1A	70	30	25	20	–40 to 85	P-TSOP048-1220 (Normal bend)
		Parameter: 4 Kwords x 8 Main: 32 Kwords x 127	Bottom boot	LH28F640BFHE-PBTLHK	70	30	25	20	–40 to 85	
128 M	x 16	Parameter: 4 Kwords x 8 Main: 32 Kwords x 255	Top boot	LH28F128BFHT-PTTLT1A	75	25	35	40	–40 to 85	P-TSOP056-1420 (Normal bend)
		(Parameter: 4 Kwords x 8 Main: 32 Kwords x 127) x2	Top/ Bottom boot	LH28F128BFHED-PWTLT2	70	30	25	40	–40 to 85	P-TSOP048-1220 (Normal bend)
256 M	x 16	(Parameter: 4 Kwords x 8 Main: 32 Kwords x 255) x2	Top/ Top boot	LH28F256BFHTD-PTTLZ3	75	25	40	80	–40 to 85	P-TSOP056-1420 (Normal bend)

●1.8 V models with 3 V I/O voltage

Supply voltage	V_{CC} = 1.7 to 1.95 V, V_{CCQ} = 2.7 to 3.6 V

Capacity (bit)	Bit configuration	Erasable block size		Model No.	Access time (ns) MAX.	Page mode access time (ns) MAX.	Read current (mA) MAX. f = 5 MHz (CMOS)	Standby current (µA) MAX. (CMOS)	Operating temp. (°C)	Package
32 M	x 16	Parameter: 8 Kwords x 4 Main: 32 Kwords x 63	Top boot	LH28F320BFHT-PTLF10S	85	35	22	70	–40 to 85	P-TSOP056-1420 (Normal bend)
		Parameter: 8 Kwords x 4 Main: 32 Kwords x 63	Bottom boot	LH28F320BFHT-PBLF10S	85	35	22	70	–40 to 85	
64 M	x 16	Parameter: 8 Kwords x 4 Main: 32 Kwords x 127	Top boot	LH28F640BFHT-PTLF10S	85	35	22	70	–40 to 85	P-TSOP056-1420 (Normal bend)
		Parameter: 8 Kwords x 4 Main: 32 Kwords x 127	Bottom boot	LH28F640BFHT-PBLF10S	85	35	22	70	–40 to 85	

■ System-Flash for Network Equipment

Supply voltage	V_{CC} = 2.7 to 3.6 V

Capacity (bit)	Bit configuration	Erasable block size		Model No.	Access time (ns) MAX.	Page mode access time (ns) MAX.	Read current (mA) MAX. f = 5 MHz (CMOS)	Standby current (µA) MAX. (CMOS)	Operating temp. (°C)	Package
64 M	x 8/ x 16	64 Kwords x 64 or 128 Kbytes x 64	Symmetrical block	LH28F640SPHT-PL12B	120	25	35	120	–40 to 85	P-TSOP056-1420 (Normal bend)
128 M	x 8/ x 16	64 Kwords x 128 or 128 Kbytes x 128	Symmetrical block	LH28F128SPHT-PTL12B	120	25	35	120	–40 to 85	P-TSOP056-1420 (Normal bend)

■ Boot Block Type Flash Memory + Pseudo SRAM

●1.8 V models with 1.8 V I/O voltage

Model No.	Flash memory block configuration	Capacity (bit) [Bit configuration]		Access time (ns) MAX.				Supply voltage (V)			Package
		Flash memory	Pseudo SRAM	Flash memory		Pseudo SRAM		Flash memory core voltage	Pseudo SRAM core voltage	I/O voltage	
				Random mode	Page mode	Random mode	Page mode				
LRS18CP	Bottom boot	128 M [x 16]	64 M [x 16]	85	25	70	20	1.7 to 1.95	1.7 to 1.95	1.7 to 1.95	P-LFBGA072-0811

●1.8 V models with 3 V I/O voltage

Model No.	Flash memory block configuration	Capacity (bit) [Bit configuration]		Access time (ns) MAX.				Supply voltage (V)			Package
		Flash memory	Pseudo SRAM	Flash memory		Pseudo SRAM		Flash memory core voltage	Pseudo SRAM core voltage	I/O voltage	
				Random mode	Page mode	Random mode	Page mode				
LRS18D3	Top boot	64 M [x 16]	16 M [x 16]	85	25	85	–	1.7 to 1.95	2.7 to 3.1	2.7 to 3.1	P-LFBGA072-0811
LRS18CKG	Bottom boot										
LRS18D1	Top boot	128 M [x 16]	32 M [x 16]	85	25	65	20	1.7 to 1.95	2.7 to 3.1	2.7 to 3.1	P-LFBGA072-0811
LRS18C8G	Bottom boot										
LRS18DW			64 M [x 16]								
LRS18B0*		256 M [x 16]	64 M [x 16]	85	25	65	20	1.7 to 1.95	2.7 to 3.1	2.7 to 3.1	P-LFBGA072-0811

* This flash memory is divided into two banks, each including an enable signal.

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■ Low Power-Loss Voltage Regulators

●TO-220 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings				Electrical characteristics			Built-in functions						Package	
		Output current Io (A)	Input voltage Vin (V)	Power dissipation (W) Pd*1	Power dissipation (W) Pd*2	Output voltage Vo*3 (V) TYP.	Output voltage precision (%)	Dropout voltage VI-O*5 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Lead forming available		Package shape type*7
PQxxRD08J00H series	ASO protection function	0.8	20	1.25	10	5, 9, 12	±3	0.5	○	○	○				TO-220	A
PQ3RD083J00H						3.3			○	○	○					A
PQ6RD083J00H						6.3			○	○	○					A
PQxxRA11J00H series	Low dissipation current at OFF state (Iqs: 1 μA (MAX.))	1	35	1.5	15	5, 9, 12	±2.5		○	○	○	○				B
PQ3RD13J000H	ASO protection function		20	1.4		3.3	±3		○	○	○					A
PQxxRD11J00H series	ASO protection function					5, 9, 12			○	○	○			○		A
PQxxxRDA1SZH series	ASO protection function, low dissipation current at OFF state (Iqs: 5 μA (MAX.))		24			3.3, 5, 8, 9, 12	±3		○	○	○	○				A
PQxxxRDA2SZH series		2	20	1.4	15	3.3, 5, 9, 12	±2.5	1.0	○	○	○	○				A
PQxxxEF01SZH series	Minimum operating input voltage: 2.35 V (4 terminals)	1	10	1.4	15	1.5, 1.8, 2.5, 3.3	±2.5	0.5	○	○	○	○				A
PQxxxEF02SZH series		2							○	○	○	○				A
PQxxRF11J00H series	General purpose	1	35	1.5		5, 9, 12			○	○	○			○		B
PQxxRH11J00H series		1.5			18				○	○	○					B
PQ3RD23J000H	ASO protection function	2	20	1.4	15	3.3	±3		○	○	○					A
PQxxRD21J00H series						5, 9, 12			○	○	○					A
PQxxRF21J00H series	General purpose		35	1.5	18		±2.5		○	○	○			○		B
PQ3RF23J000H	General purpose					3.3			○	○	○					B
PQ3RF33J000H	High output current	3.5		1.8					○	○	○					B
PQ070XF01SZH	Minimum operating input voltage: 2.35 V (4 terminals)	1	10	1.4	15	1.5 to 7	±2*4		○	○			○			A
PQ070XF02SZH		2							○	○			○			A
PQ070VK01FZH	Minimum operating input voltage: 2.35 V (5 terminals)	1							○	○	○	○	○	○		E
PQ070VK02FZH		2							○	○	○	○	○	○		E
PQ15RW08J00H	ASO protection function, minimum operating input voltage: 3.5 V	0.8	20	1.25	10	3.0 to 15	±2.5*4		○	○			○			A
PQ15RW11J00H		1		1.4	15				○	○			○			A
PQ15RW21J00H		2							○	○			○			A
PQ150RWA2SZH	ASO protection function			1.4	15			1.0	○	○			○			A
PQ20RX05J00H	Variable output voltage, output ON/OFF control	0.5	24	1.25	10	3.0 to 20		0.5	○	○	○	○	○	○		C
PQ20RX11J00H		1		1.5	15				○	○	○	○	○	○		C
PQ150VB01FZH	Overheat shutdown circuit, minimum operating input voltage: 2.35 V (5 terminals)		17	1.25	12.5	1.5 to 15				○	○	○	○	○		E
PQ150VB02FZH		2								○	○	○	○	○		E
PQ30RV11J00H	Variable output voltage	1	35	1.5	15	1.5 to 30	±2*4		○	○	△*6		○	○		B
PQ30RV21J00H		2			18				○	○	△*6		○	○		B
PQ30RV31J00H		3		2	20				○	○	△*6		○	○		B
PQ7RV4J0000H		4.6	10	1.8	18	1.5 to 7			○	○	△*6		○			B

*1 At self-cooling
*2 With infinite heat sink attached
*3 The xx/xxx in the model No. refer to the output voltage values of the model (e.g. 05/050 for 5 V, 12/120 for 12 V, 015 for 1.5 V).
*4 Reference voltage accuracy
*5 Current ratings are defined individually.
*6 △ : Available by adding circuit
*7 Refer to page 60

Notice
In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc.
Except where specially indicated, models listed on this page comply with the RoHS Directive*. For details, please contact SHARP.
*RoHS Directive: Prohibits use of lead, cadmium, hexavalent chromium, mercury and specific brominated flame retardants (PBBs and PBDEs), with certain exceptions.
Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

●High output current type [TO-220 high heat radiation type]

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings				Electrical characteristics			Built-in functions				Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation (W) Pd*1	Power dissipation (W) Pd*2	Output voltage Vo (V)	Output voltage precision (%)	Dropout voltage V_{I-O}*4 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Variable output voltage	
PQ5EV3J0000H▲	High output current, minimum operating input voltage: 2.35 V	3.5	7	1.6	45	1.5 to 5	±1*3	0.5	○	○	○	○	TO-220 (heat sink exposure)
PQ5EV5J0000H▲		5							○	○	○	○	
PQ5EV7J0000H▲		7.5							○	○	○	○	

*1 At self-cooling
*2 With infinite heat sink attached
*3 Reference voltage accuracy
*4 Current ratings are defined individually.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

●Low output current type [TO-92 type]

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions		Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output voltage Vo (V) TYP.	Output voltage precision (%)	Dropout voltage V_{I-O} (V)	Overheat protection	Overcurrent protection	
PQ033ES1MXPQ	Low output current type with general purpose TO-92 package (for auxiliary power supply)	0.15	16	0.52	3.3	±2	0.4 (Io = 150 mA)	○	○	TO-92
PQ050ES1MXPQ					5					
PQ033ES3MXPQ		0.3	9		3.3		0.7 (Io = 300 mA)	○	○	
PQ050ES3MXPQ					5					

*1 At self-cooling

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■ Surface Mount Type Low Power-Loss Voltage Regulators

●SOT-23-5 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics				Built-in functions				Package
		Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output current Io (A)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage VI-O (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	
PQ1Uxx1M2ZPH series	Compact, low output current	16	0.35	0.18	1.8, 2.5, 2.8, 3.0, 3.3, 3.5, 5.0	±2.0 (3.0 V output)	0.26 (Io = 60 mA)	○	○	○	○	SOT-23-5
PQ1Xxx1M2ZPH series ▲	Compact, ceramic capacitor compatible	9			*3			○	○	○	○	
PQ1XAxx1MZPH series ▲	Compact, ceramic capacitor compatible, high reliability				*4	±2.0		○	○	○	○	

*1 When mounted on a board
*2 The xx in the model No. refer to the output voltage values of the model (e.g. 50 for 5.0 V, 18 for 1.8 V).
*3 1.5, 1.8, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.3, 3.5, 3.7, 4.0, 4.5, 5.0
*4 1.5, 1.8, 2.5, 3.0, 3.3, 5.0
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

●SOT-23L type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics				Built-in functions				Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output current Io (A)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage VI-O (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	
PQ1RxxJ0000H series	Compact, surface mount type, low dissipation current at OFF state (Iqs: 0.1 µA (MAX.))	–	16	0.4	0.18	*3	±2.7 (3.0 V output)	0.26 (Io = 60 mA)	○	○	○	○	SOT-23L
PQ1Kxx3M2ZPH series	Compact, surface mount type, high ripple rejection, output current of up to 300 mA	0.3	9		–	1.8, 2.5, 3.0, 3.3, 3.6, 5.0	±2.0 (3.0 V output)	0.7 (Io = 300 mA)	○	○	○	○	
PQ1KAxx3MZPH series ▲	Compact, surface mount type, output current of up to 300 mA, ceramic capacitor compatible		15			1.5, 1.8, 2.5, 3.3, 5.0, 9.0			○	○	○	○	

*1 When mounted on a board
*2 The xx in the model No. refer to the output voltage values of the model (e.g. 25 for 2.5 V, 47 for 4.7 V, 50 for 5.0 V).
*3 1.8, 2.0, 2.3, 2.5, 2.7, 2.8, 2.9, 3.0, 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 4.0, 4.2, 4.4, 4.7, 4.9, 5.0, 5.2
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

●SOT-89 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions					Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage V_{I-O}*3 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	
PQ1Lxx3M2SPQ	Compact, high radiation package, low dissipation current at OFF state (Iqs: 1 µA (MAX.))	0.3	16	0.9	1.5, 1.8, 2.5, 3.0, 3.2, 3.3, 5.0	±2.0 (3.0 V output)	0.7	○	○	○	○		SOT-89
PQ1LAxx3MSPQ ▲	Compact, high radiation package, low dissipation current at OFF state (Iqs: 1 µA (MAX.)), ceramic capacitor compatible		15		1.5, 1.8, 2.5, 3.3, 5.0, 9.0			○	○	○	○		
PQ1LAxx5MSPQ	Compact, high radiation package, ceramic capacitor compatible	0.5			1.2, 1.5, 1.8, 2.5, 3.3, 5.0	±2.0		○	○	○	○		
PQ1LAX95MSPQ	Ceramic capacitor compatible, variable output voltage				1.5 to 9.0	±2.0*6		○	○	○	○	○	
PQ1LBxx5MSPQ ▲	Compact, high radiation package, ceramic capacitor compatible		12		1.5, 1.8, 2.5, 3.3, 5.0	±2.0	0.4	○	○	○	○		
PQ1Mxx5M2SPQ	Compact, high output current, ceramic capacitor compatible		9		1.5, 1.8, 2.5, 3.3, 5.0	±2.0 (5.0 V output)	0.7	○	○	○	○		
PQ1MX55M2SPQ	Ceramic capacitor compatible, variable output voltage				1.3 to 5.0	±2.0*6		○	○	○	○	○	
PQ1Nxx3MxSPQ	Reset signal output function*4, ceramic capacitor compatible	0.35			2.5, 3.3	±2.0		○	○				
PQ1MGxx8MSPQ ▲	Compact, ceramic capacitor compatible	0.8	6		0.8, 1.0, 1.2	±2.0	0.3	○	○				
PQ1MGX38MSPQ ▲	Compact, ceramic capacitor compatible, variable output type				0.5 to 3.5			○	○			○	
PQ2Lxxx2MSPQ	Compact, high radiation package, 2 outputs	0.25/ch	9		*5	–	0.4	○	○				

*1 When mounted on a board
*2 The xx in the model No. refer to the output voltage values of the model (e.g. 25 for 2.5 V, 50 for 5.0 V). [Except PQ2Lxxx2MSPQ]
*3 Current ratings are defined individually.
*4 Reset detection voltage: 4.2 V, 3.8 V
*5 Output voltage combination: 3.3/3.3 V, 3.3/2.5 V, 3.3/1.8 V, 3.3/1.5 V, 2.5/1.8 V, 2.5/1.5 V
*6 Reference voltage accuracy
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

RoHS Pb FREE

●SC-63 type (1)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings: Output current Io (A) 0.5	1	1.5	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Electrical characteristics: Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage VI-O*5 (V)	Built-in functions: Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Taped package	Package	Package shape type*6
PQ07VR5MAZPH series	Reset signal generation function (input voltage drop detection)	○			10	8	1.5 to 7	±2.0*3	0.5	○	○			○	○	SC-63	F
PQ3DZ53J000H	ASO protection function, low dissipation current at OFF state (Iqs: 5 µA (MAX.))	○			24	8	3.3	±3.0	0.5	○	○	○	○		○	SC-63	F
PQ3DZ13J000H			○							○	○	○	○		○	SC-63	F
PQxxDZ51J00H series		○					5, 9, 12			○	○	○	○		○	SC-63	F
PQxxDZ11J00H series			○							○	○	○	○		○	SC-63	F
PQxxxDNA1ZPH series	Ceramic capacitor compatible, ASO protection function, low dissipation current at OFF state (Iqs: 5 µA (MAX.)), solder dip compatible lead shape		○				3.3, 5, 8, 9, 12	±2.5		○	○	○	○		○	SC-63	G
PQxxxDZ01ZPH series	Low dissipation current at OFF state (Iqs: 5 µA (MAX.))		○		9, 10	5	3.3, 5	±3.0		○	○	○	○		○	SC-63	F
PQxxxEZ5MZPH series	Minimum operating input voltage: 2.35 V	○				8	1.5, 1.8, 2.5, 3.0, 3.3	±2.5*4		○	○	○	○		○	SC-63	F
PQxxxEZ01ZPH series			○							○	○	○	○		○	SC-63	F
PQxxxEN01ZPH series	Minimum operating input voltage: 2.35 V, solder dip compatible lead shape		○							○	○	○	○		○	SC-63	G
PQxxxENA1ZPH series	Minimum operating input voltage: 2.35 V, ceramic capacitor compatible, solder dip compatible lead shape		○				1.5, 1.8, 2.5, 3.3	±2.0		○	○	○	○		○	SC-63	G
PQxxxENB1ZPH series			○		10	5	1.2, 1.5, 1.8, 2.5, 3.3		0.3	○	○	○	○		○	SC-63	G
PQxxxENAHZPH series				○		8	1.5, 1.8, 2.5, 3.3		0.9	○	○	○	○		○	SC-63	G
PQxxxEZ1HZPH series	Minimum operating input voltage: 2.35 V			○			1.5, 1.8, 2.5, 3.0, 3.3	±2.5*4	1.0	○	○	○	○		○	SC-63	F
PQxxxEZ02ZPH series				○ (2 A)			1.5, 1.8, 2.5		0.5	○	○	○	○		○	SC-63	F
PQxxxENS2ZPH series ▲	2A output (Minimum operating input voltage: 2.35 V), built-in soft start function			○ (2 A)			1.2, 1.5, 1.8, 2.5, 3.3, 5.0	±2.0		○	○	○	○		○	SC-63	G
PQxxxFZ5MZPH series	Minimum operating input voltage: 1.7 V (Dual power supply type)	○			3.7		1.0, 1.2	±30 mV	–	○	○	○	○		○	SC-63	F
PQxxxGN01ZPH series	Minimum operating input voltage: 1.7 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape		○		5.5		0.8, 1.0, 1.2			○	○				○	SC-63	G
PQxxxGN1HZPH series				○						○	○				○	SC-63	G
PQxxxGM02ZPH ▲	Minimum operating input voltage: 1.1 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape			○ (2 A)	5			±3.0 (1 V output)	0.3	○	○				○	SC-63	G

*1 With infinite heat sink attached
*2 The xx/xxx in the model No. refer to the output voltage values of the model (e.g. 033 for 3.3 V, 05/050 for 5 V, 12/120 for 12 V).
*3 Reference voltage accuracy
*4 The value is defined as ±50 mV in some models.
*5 Current ratings are defined individually.
*6 Refer to page 60
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

RoHS Pb FREE

●SC-63 type (2)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings: Output current Io (A) 0.5	1	1.5	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Electrical characteristics: Output voltage Vo (V) TYP.	Output voltage precision (%)	Dropout voltage VI-O*3 (V)	Built-in functions: Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Taped package	Package	Package shape type*4
PQ070XZ5MZPH	Minimum operating input voltage: 2.35 V	○			10	8	1.5 to 7	±2.0*2	0.5	○	○	○	○	○	○	SC-63	F
PQ070XZ01ZPH			○							○	○	○	○	○	○		F
PQ070XN01ZPH	Minimum operating input voltage: 2.35 V, solder dip compatible lead shape		○							○	○	○	○	○	○		G
PQ070XNA1ZPH	Minimum operating input voltage: 2.35 V, ceramic capacitor compatible, solder dip compatible lead shape		○							○	○	○	○	○	○		G
PQ070XNAHZPH				○					0.9	○	○	○	○	○	○		G
PQ070XNA2ZPH				○ (2 A)					0.5	○	○	○	○	○	○		G
PQ070XNB1ZPH			○			5	1.2 to 7		0.3	○	○	○	○	○	○		G
PQ070XZ1HZPH	Minimum operating input voltage: 2.35 V			○		8	1.5 to 7		1.0	○	○	○	○	○	○		F
PQ070XZ02ZPH				○ (2 A)					0.5	○	○	○	○	○	○		F
PQ015YZ5MZPH	Reference voltage (Vref): 1.0 V, minimum operating input voltage: 1.7 V (Dual power supply type)	○			3.7		1.0 to 1.5	±3.0*2	–	○	○			○	○		F
PQ035ZN01ZPH	Reference voltage (Vref): 0.6 V, minimum operating input voltage: 1.7 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape		○		5.5		0.8 to 3.5	±30 mV		○	○			○	○		G
PQ035ZN1HZPH				○						○	○			○	○		G
PQ035ZM02ZPH ▲	Minimum operating input voltage: 1.1 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape			○ (2 A)	5			±2.0*2	0.3	○	○			○	○		G
PQ20VZ51J00H	Minimum operating input voltage: 4.5 V	○			24		1.5 to 20		0.5	○	○	○	○	○	○		F
PQ20VZ11J00H			○							○	○	○	○	○	○		F
PQ20WZ51J00H	Minimum operating input voltage: 3.5 V, ASO protection function, low dissipation current at OFF state (Iqs: 5 µA (MAX.))	○					3.0 to 20	±2.5*2		○	○	○	○	○	○		F
PQ20WZ11J00H			○							○	○	○	○	○	○		F
PQ200WNA1ZPH	Minimum operating input voltage: 3.5 V, ASO protection function, low dissipation current at OFF state (Iqs: 5 µA (MAX.)), ceramic capacitor compatible, solder dip compatible lead shape		○							○	○	○	○	○	○		G
PQ200WN3MZPH	Minimum operating input voltage: 5.5 V, low dissipation current at OFF state (Iqs: 5 µA (MAX.)), ceramic capacitor compatible, current limit: 800 mA	○ (0.3)				6.8	5.0 to 20			○	○	○	○	○	○		

*1 With infinite heat sink attached
*2 Reference voltage accuracy
*3 Current ratings are defined individually.
*4 Refer to page 60
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

RoHS Pb FREE

●TO-263 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions					Taped package	Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage V_{I-O}*4 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage		
PQxxxY053ZPH	High output current (minimum operating input voltage: 2.35 V)	5.0	7	35	1.5, 2.5, 3.3	±1.0	0.5	○	○	○			○	TO-263
PQ05VY053ZPH					1.5 to 5	±1.0*3		○	○	○		○	○	
PQxxxY3H3ZPH		3.5			1.5, 2.5, 3.3	±1.0		○	○	○			○	
PQ05VY3H3ZPH					1.5 to 5	±1.0*3		○	○	○		○	○	
PQxxxEH02ZPH	2 A output (minimum operating input voltage: 2.35 V)	2.0	10		1.5, 1.8, 2.5	±2.5*5		○	○	○	○		○	
PQxxxEHS2ZPH ▲	2 A output (minimum operating input voltage: 2.35 V), built-in soft start function				1.2, 1.5, 1.8, 2.5, 3.3	±2.0		○	○	○	○		○	
PQ070XH02ZPH	2 A output (minimum operating input voltage: 2.35 V)				1.5 to 7	±2.0*3		○	○	○	○	○	○	
PQxxxEHA2ZPH ▲	2 A output (minimum operating input voltage: 2.35 V), ceramic capacitor compatible				1.5, 1.8, 2.5, 3.3	±2.0		○	○	○	○		○	
PQ070XHA2ZPH ▲					1.5 to 7	±2.0*3		○	○	○	○	○	○	
PQxxxEH01ZPH	1 A output (minimum operating input voltage: 2.35 V)	1.0			1.5, 1.8, 2.5	±2.5*5		○	○	○	○		○	
PQ070XH01ZPH					1.5 to 7	±2.0*3		○	○	○	○	○	○	

*1 With infinite heat sink attached
*2 The xxx in the model No. refer to the output voltage values of the model (e.g. 015 for 1.5 V, 025 for 2.5 V, 033 for 3.3 V).
*3 Reference voltage accuracy
*4 Current ratings are defined individually.
*5 The value is defined as ±50 mV in some models.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

●SOP-8 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics		Built-in functions		Taped package	Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output voltage Vo (V) TYP.	Output voltage precision*2 (mV)	Overheat protection	Overcurrent protection		
PQ1DX095MZPQ ▲	Built-in sink source function (For DDR II memory)	±0.8	6	0.6	V_{DD} x 1/2 (V_{DDQ}: 1.5 V (MIN.))	±25	○	○	○	SOP-8
PQ1DX125MZPQ ▲	Built-in sink source function (For DDR memory)				V_{DD} x 1/2 (V_{DDQ}: 2.3 V (MIN.))	±35	○	○	○	

*1 When mounted on a board
*2 Reference voltage accuracy
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

☆New product
★Under development

■ Surface Mount Type Chopper Regulators (DC-DC Converters) (1)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics					Package	
		Switching current Isw (A)	Power dissipation Pd*1 (W)	Input voltage range Vin (V)	Output voltage*2 Vo (V)	Output type	Oscillation frequency fo (Hz) TYP.	Output saturation voltage Vsat (V) TYP.		Outline shape type*7
PQ6CU12X2APQ	• High switching voltage: 40 V (MAX.) • For tuner power supply • Variable oscillation frequency • Ceramic capacitor compatible	0.25	0.35	3.0 to 5.5	up to 36	Step-up	300 k to 800 k	Ron TYP. 1.7Ω	SOT-23-6W	
PQ1CN38M2ZPH	• PWM chopper regulator (high oscillation frequency) • Output ON/OFF control function • Overcurrent/overheat protection circuits • For light load	0.8	8	4.5 to 40	*3 VREF to 35 (step-down type)/ –VREF to –30 (inverting type)	Step-down	300 k	0.9	SC-63	G
PQ1CN41H2ZPH	• PWM chopper regulator (high oscillation frequency) • Overcurrent/overheat protection circuits	1.5	8			Step-down	300 k	0.9		G
PQ1CZ21H2ZPH	• PWM chopper regulator • Output ON/OFF control function • Overcurrent/overheat protection circuits • Low dissipation current at OFF state (Standby current <ISD>: 1 µA (MAX.))		8			Step-down	100 k	0.9		F
PQ1CX12H2ZPQ	• Bootstrap system for high efficiency (Efficiency 88% (TYP.)) • Low dissipation current	2.5	0.9 When mounted on board	4.5 to 30	*3 VREF to 24	Step-down	150 k	0.25	SOP-8	
PQ1CX22H2ZPQ	• Bootstrap system for high efficiency (Efficiency 88% (TYP.)) • Low dissipation current • Low voltage output: 1.2 V (MIN.)				*4 VREF to 24 (step-down type)			0.25		
PQ1CX41H2ZPQ	• Bootstrap system for high efficiency (Efficiency 90% (TYP.)) • Low voltage output: 0.8 V (MIN.) • Ceramic capacitor compatible	1.5	0.8 When mounted on board	4.75 to 27	0.8 to 2.0	Step-up	400 k	RDSon TYP. 0.45Ω		
★PQ1CX53H2ZPQ	• Bootstrap system for high efficiency (Efficiency 89% (TYP.)) • Low voltage output: 0.8 V (MIN.) • Ceramic capacitor compatible	3.5	2 When mounted on board	4.75 to 27	0.8 to 16	Step-up	400 k	RDSon TYP. 0.15Ω	USB-8	
☆PQ1CX61H1ZPQ	• Bootstrap system for high efficiency (Efficiency 88% (TYP.)) • Low voltage output: 1.0 V (MIN.) • Ceramic capacitor compatible	1.5	0.8 When mounted on board	4.75 to 28	1.0 to 18.9	Step-up	900 k	RDSon TYP. 0.55Ω	SOP-8	
PQ1CY1032ZPH	• PWM chopper regulator • Output ON/OFF control function • Overheat protection/overcurrent shutdown circuits • High output current type	3.5	35	4.5 to 40	*3 VREF to 35 (step-down type)/ –VREF to –30 (inverting type)	Step-down	150 k	1.4	TO-263	
PQ1CYxx3HZPH series PQ1CYxx3LZPH series	• PWM chopper regulator • Fixed output voltage: 3.3 V or 5 V • Overheat protection circuit • Output ON/OFF control function		35		5/3.3	Step-up		1.4		

*1 With infinite heat sink attached or when mounted on a board listed in the specification sheets.
*2 Output variable range (step-down/inversion).
*3 VREF nearly equal to 1.26 V
*4 VREF nearly equal to 1 V
*5 Models are available in the range 0.8 V to 5.0 V in 0.1 V increments.
*6 PQ1CYxx3HZPH series is "H" active, and PQ1CYxx3LZPH series is "L" active.
*7 Refer to page 60

■Surface Mount Type Chopper Regulators (DC-DC Converters) (2)

Model No.	No. of output circuits	Input voltage range (V)	Output voltage (V)	System	Switching frequency (Hz)	Switching transistor	Switching current (mA) [Built-in SW Tr]	Drive capacity (pF) [External SW Tr]	Package
IR3M58M ▲/U ▲	3	4.5 to 28	External setting	Step-up (MAX. 20 V)/ step-down type PWM	70 k to 500 k	Built-in	400	1 000	P-QFP048-0707/ P-VQFN032-0505
				Step-down type PWM		External	–		
				Step-down, inverting type PWM		External	–		
IR3M81U ▲	5	10 to 14	External setting	Step-up type PWM	200 k to 1 M	External	–	1 000	P-HQFN052-0707
				Step-down type PWM		External	–		
				Synchronous rectification step-down PWM		External	–		
				Charge pump	1/2 of the above	–	50 (DC)	–	
				Negative charge pump		–	50 (DC)	–	

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Chopper Regulators (DC-DC Converters)

●TO-220 type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics					Package	
		Switching current Isw (A)	Power dissipation Pd*1 (W)	Input voltage range Vin (V)	Output voltage Vo*2 (V)	Output type	Oscillation frequency fo (kHz) TYP.	Output saturation voltage Vsat (V) TYP.		Outline shape type*5
PQ1CG38M2FZH	• PWM chopper regulator (high oscillation frequency) • Built-in overcurrent/overheat protection circuits • For light load • Output ON/OFF control function	0.8*3	14	40	V_{REF}*4 to 35 (step-down type)/ $-V_{REF}$*4 to –30 (inverting type)	Step-down	300	0.95	TO-220	E
PQ1CG38M2RZH										D
PQ1CG21H2FZH	• PWM chopper regulator • Built-in overcurrent/overheat protection circuits • Output ON/OFF control function	1.5*3					100	1.0		E
PQ1CG21H2RZH										D
PQ1CG41H2FZH	• PWM chopper regulator (high oscillation frequency) • Built-in overcurrent/overheat protection circuits • Output ON/OFF control function						300	1.0		E
PQ1CG41H2RZH										D
PQ1CG2032FZH	• PWM chopper regulator • Built-in overcurrent/overheat protection circuits • Output ON/OFF control function	3.5*3					70	1.4		E
PQ1CG2032RZH										D
PQ1CG3032FZH	• PWM chopper regulator (high oscillation frequency) • Built-in overcurrent/overheat protection circuits • Output ON/OFF control function						150			E
PQ1CG3032RZH										D
PQ2CF1J0000H	• PWM chopper regulator • Built-in overcurrent/overheat protection circuits	2.5*3	15	35	4.5 to 35 (step-up type)	Step-up	50	0.6		E

*1 With infinite heat sink attached
*2 Output voltage variable range
*3 Peak current
*4 V_{REF} nearly equal to 1.26 V (TYP.)
*5 Refer to page 60

■ Power Supply ICs for CCDs/CCD Camera Modules

Model No.	No. of output circuits	Input voltage range (V)	Output voltage (V)	System	Switching frequency (Hz)	Switching transistor	Switching current (mA) [Built-in SW Tr]	Drive capacity (pF) [External SW Tr]	Package
IR3M61U ▲*1/63U ▲	4	4.5 to 10	15	Charge pump	200 k	–	12 (DC)	–	P-VQFN032-0505
			–8	Negative charge pump			2.5 (DC)	–	
			3.3	Step-down type PWM + REG	1 M	Built-in	120 (DC)	–	
			1.8	Step-down type PWM + REG			50 (DC)	–	
IR3M55U ▲*1/59U ▲	3	4.5 to 16	15/12	Charge pump	200 k	–	12/20 (DC)	–	P-VQFN032-0505
			–8/–5	Negative charge pump			2.5/5 (DC)	–	
			3.3	Step-down type PWM + REG	1 M	Built-in	150 (DC)	–	

*1 For automotive use
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Power Supply ICs for TFT-LCDs

Model No.	No. of output circuits	Input voltage range (V)	Output voltage (V)	System	Switching frequency (Hz)	Switching transistor	Switching current (mA) [Built-in SW Tr]	Drive capacity (pF) [External SW Tr]	Package
IR3M58M ▲/U ▲	3	4.5 to 28	External setting	Step-up (MAX. 20 V)/ step-down type PWM	70 k to 500 k	Built-in	400	1 000	P-QFP048-0707/ P-VQFN032-0505
				Step-down type PWM		External	–		
				Step-down, inverting type PWM		External	–		
IR3M81U ▲	5	10 to 14	External setting	Step-up type PWM	200 k to 1 M	External	–	1 000	P-HQFN052-0707
				Step-down type PWM		External	–		
				Synchronous rectification step-down PWM		External	–		
				Charge pump	1/2 of the above	–	50 (DC)	–	
				Negative charge pump		–	50 (DC)	–	

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

☆New product

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■ LED Drivers

●Built-in step up circuit

Model No.	Function	Features	No. of output circuits	Number of LEDs	Booster method	Constant current circuit	Switching transistor	Input voltage range (V)	Output current (mA) MAX.	Oscillation frequency (Hz) TYP.	Package
PQ6CU11X1APQ ▲	White LED driver for backlight (for small panels)	• High voltage CMOS output: 30 V (MAX.) • Output ON/OFF control function • Overvoltage/overcurrent protection circuits • Softstart function	1	3 (Series connection)	PWM	*1	○	to 5.5	250*2	1.2 M	SOT-23-6
PQ6CB11X1AP ▲				4 (Series connection)		*1	○	2.7 to 5.5			USB-6
PQ6CB11X1CP				6 (Series connection)		*1	○				
PQ7L2010BP ▲		• Possible to correspond also to operation in the minute lighting mode • High frequency PWM control for brightness adjustment • Output ON/OFF control function		4 (Series connection)		*1	○			2.0 M	USB-10
IR2E49U/ ☆IR2E49M	White LED driver for backlight (for medium panels)	• Built-in 150 mA driver for each channel • Step-up DC-DC output short-circuit protection function • Current driver output open detection • Capable of external brightness adjustment using PWM input signal • Overcurrent/overvoltage/undervoltage/ overheat protection circuits	5	40	PWM	○	External	6 to 28	150/ ch*3, 4	100 k to 1 M*5	P-VQFN036-0606/ P-QFP048-0707
IR2E51Y6 ▲	LED driver for backlight and call alert display (auto brightness adjustment)	• Capable of direct connection of ambient light sensor • Brightness adjustment by ambient illuminance feedback (16-step ambient illuminance/ 128-level illuminance) (for main LCDs) • Non-external coil thanks to charge pump drive • Capable of driving 4 main-LEDs, 2 sub-LEDs, and 3 call alert LEDs with a single device. • I²C interface-compatible • Standby function/power on reset function/ soft start function	9	4 + 2 + 3	Charge pump	○	–	3.0 to 4.5 (for drive)/ 2.3 to 3.2 (for control)	27.4/ ch*3	660 k	35WL-CSP*6
IR2E53Yx ▲	Multi-channel output LED driver	• Capable of controlling up to 6 RGB LEDs or 18 LEDs • Diversified illumination without imposing a burden on the CPU • External coils unnecessary due to use of the charge pump method • I²C interface-compatible • Standby function/power on reset function/ soft start function	18 (Matrix)	18	Charge pump	○	–	3 to 4.5 (for drive)/ 2.3 to 3.2 (for control)	25.9/ ch*3	660 k	35WL-CSP*6
☆IR2E55Yx	LED driver for backlight and call alert display (auto brightness adjustment)	• Capable of driving 7 main-LEDs (series) and 6 call alert LEDs • Auto brightness adjustment and PWM brightness adjustment • Power supply for EL panel and LCD controller • LDO 2ch • Built-in GPIO interface • I²C/SPI interface-compatible	7	13	PWM + charge pump	○	○	3 to 4.2 (for drive)/ 2.7 to 3.2 (for control)	Main 25.6/ ch*3 Call alert 12.8/ ch*3	1 M	48WL-CSP*7
IR2E56U6 ▲	LED driver for backlight	• Built-in 25 mA driver for each channel • Capable of driving a maximum of 12 white LEDs (per channel) with high withstand voltage (45 V) output • Capable of external brightness adjustment using PWM input signal • Capable of controlling lights one by one or simultaneously	6	72	PWM	○	External	5 to 28	25/ ch*3	200 k to 1.5 M	P-VQFN032-0505

*1 LED constant current value can be set by external resistors.
*2 Peak switching current
*3 Constant current (MAX.)
*4 Use this IC within the range of power dissipation.
*5 Selectable oscillation frequency range
*6 3.57 mm x 3.57 mm x 0.82 mm (TYP.)
*7 3.57 mm x 3.57 mm x 0.65 mm (TYP.)
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

☆New product
★Under development

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●External power supply for LEDs

Model No.	Function	Features	Supply voltage (V)	Package
IR2D20U ▲	24-dot LED panel driver with constant-current sink outputs	• Output current (constant current sink output): 30 mA (MAX.) (setup by external resistor) • Gradation function (clock cycle setting or external synchronization) • Independent current control for three systems (for RGB LED) • LED drive voltage: 15 V • Rated output voltage: 20 V (MAX.) • f_{CLK}: 20 MHz (MAX.)/16.6 MHz (MAX.) (at cascade connection)	4.5 to 5.5	P-HQFN052-0707
IR2D071	16-dot LED panel driver with constant current sink outputs	• Output current (constant-current sink output): 60 mA (MAX.) (setup by external resistor) • Rated output voltage: 7 V (MAX.) • f_{CLK}: 20 MHz (MAX.)/16.6 MHz (MAX.) (at cascade connection)	3.0 to 5.5	P-SDIP028-0400

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Video Interface ICs for TFT-LCDs

Model No.	Input signal					Color decode system	LCD panel				Serial data control	Supply voltage (V) TYP.	Power consumption (mW) TYP.	Package
	Com-posite video	Y/color differ-ence	Analog RGB	Digital RGB	OSD (Digital)		±power source driver	+power source driver	Low voltage source driver	Digital input driver				
IR3Y26A2 ▲/A6 ▲			○*3			–			○			5/7.5	140	P-QFP048-1010/ P-QFP048-0707
IR3Y29A1 ▲/B1	○		○			NTSC/PAL			○				190	P-QFP048-0707
RB5P006AM2 ▲	○		○			NTSC/PAL			○		○	3/5/13	120	P-QFP048-1010
RB5P0090M ▲	○		○*3			NTSC/PAL (automatic identification)			○		○	5/13	250	P-QFP048-1010
★IR3Y66M*2				○		NTSC/PAL			○		○*4	1.8/3/5	130	P-QFP072-1010
☆IR3Y67M*1, 2, 7/ ☆IR3Y70M*1, 2	○	○	○	○	○*6	NTSC/PAL/ SECAM				○	○*5	1.8/3	400	P-TQFP100-1414
☆IR3Y68M*2/ ★IR3Y69M*2, 7	○	○	○		○ (Built-in)	NTSC/PAL/ SECAM			○		○*4	1.8/3/5	250	P-TQFP100-1414

*1 For digital signal input panels
*2 Built-in timing generator
*3 Two inputs
*4 Both 3-wire and I²C are available.
*5 Only for I²C
*6 Both built-in OSD and external OSD are available.
*7 For automotive use
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Power Amplifiers for Wireless LAN

Model No.	Application	Operating frequency (GHz)	Supply voltage Vcc (V) TYP.	Control voltage Vbb (V) TYP.	Linear output power*1 (dBm)	Current consumption (mA) TYP.	Gain (dB) TYP.	Detection function	Matching circuit	Package (W × D × H mm)
IRM046U7	For 2.4/5 GHz dual-band wireless LAN (IEEE802.11a/b/g/n)	2.4 to 2.5	3.3	2.8	18	105	30	○	–	P-HQFN024-0404 (4.2 × 4.2 × 1.0)
		4.9 to 5.9			18	140	25		–	
IRM065U7	For 2.4/5 GHz dual-band wireless LAN (IEEE802.11a/b/g/n)	2.4 to 2.5		2.8	18	130	30	○	Built-in (IN/OUT)	P-HQFN016-0303 (3 × 3 × 0.4)
		4.9 to 5.9			18	160	30		Built-in (IN/OUT)	
IRM067U6	For 2.4/5 GHz dual-band wireless LAN (IEEE802.11a/b/g/n)	2.4 to 2.5		3.3	17	110	29	○*2	Built-in (IN/OUT)	P-HQFN016-0303 (3 × 3 × 0.4)
		4.9 to 5.9			17	150	31.5		Built-in (IN/OUT)	
IRM047U7	For 2.4 GHz single-band wireless LAN (IEEE802.11b/g/n)	2.4 to 2.5		2.8	18	105	30	○	–	P-HQFN024-0404 (4.2 × 4.2 × 1.0)
IRM060U7	For 2.4 GHz single-band wireless LAN (IEEE802.11b/g/n)	2.4 to 2.5		2.8	16	80	28	○*2	Built-in (IN/OUT)	P-HQFN010-0202A (2 × 2 × 0.4)
IRM063U7	For 2.4 GHz single-band wireless LAN (IEEE802.11b/g/n)	2.4 to 2.5		2.8	18	130	30	○	Built-in (IN/OUT)	P-HQFN010-0202A (2 × 2 × 0.4)
IRM068U7	For 2.4 GHz single-band wireless LAN (IEEE802.11b/g/n)	2.4 to 2.5		2.8	18	105	27	○*2	Built-in (IN)	HSON06-P-1515 (1.5 × 1.5 × 0.36)
IRM053U7	For 5 GHz single-band wireless LAN (IEEE802.11a/n)	4.9 to 5.9		2.8	18	170	30	○	Built-in (IN/OUT)	P-HQFN010-0202A (2 × 2 × 0.4)

*1 At time of OFDM 64QAM modulating wave input.
*2 Load fluctuation stabilization and detection output type

■ Fail Safe ICs

Model No.	Features	Operating voltage			Dissipation current (μA) TYP.	Operating temp. (°C)	Package
		VBAT (V)	VBAC (V)	VIO (V)			
IR3T46U6	• Malfunction detection • Built-in 8-bit ADC • Built-in timer circuit • Built-in key detection output OR gate	3.2 to 4.5	3.0 to 3.3	2.6 to 3.0	10	–20 to +85	P-HQFN024-0404
IR3T48Y6	• Small package • Built-in 3-STATE buffer • Malfunction detection • Built-in 8-bit ADC • Built-in timer circuit • Built-in key detection output OR gate			1.6 to 3.0			35WL-CSP*

* 3.0 (W) x 3.0 (D) x 0.975 (H) mm (TYP.)

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■ CSP

●CSP (Chip Size Package)

The FBGA (commonly known as CSP) has an area array terminal structure with solder balls on the bottom, to give it a near chip-size footprint. This high-density, compact and low-profile package technology will greatly help in the design of compact mobile equipment, such as mobile phones and digital cameras.

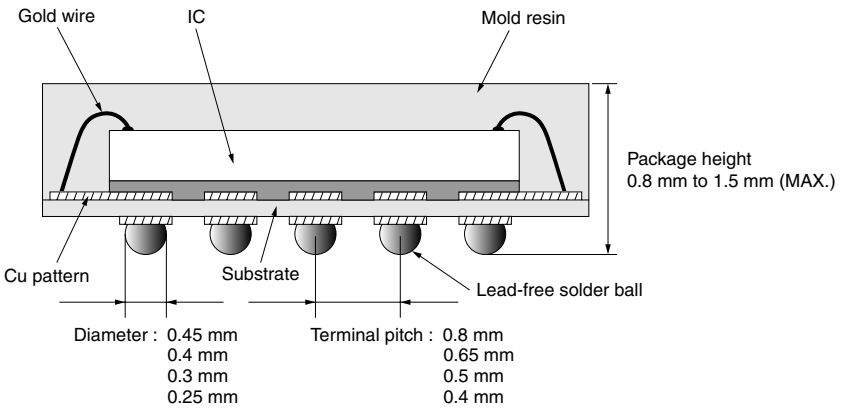
FBGA (CSP)

Features

- **Compact and lightweight**
  Ability to create a near-chip size and lighter-weight package in comparison with conventional plastic packages.
- **High reliability**
  Comparable high reliability with that of conventional plastic packages.
- **Mountability**
  Conventional mounting system is available for CSP. SOP and QFP can be mounted together with CSP.

Terminal pitch	0.8 mm	0.65 mm	0.5 mm	0.4 mm
Maximum terminal counts	352 (16 mm x 16 mm)	352 (16 mm x 16 mm)	372 (16 mm x 16 mm)	264 (10 mm x 10 mm)
Nominal dimensions	6 mm x 6 mm to 16 mm x 16 mm			5 mm x 5 mm to 10 mm x 10 mm

Cross section example



●Wafer-level CSP

The wafer-level CSP (WL-CSP) is a kind of chip-size package which is manufactured by assembling directly onto the finished wafer.

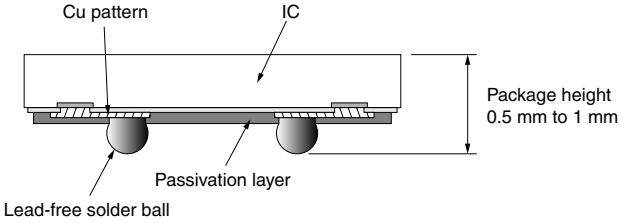
Features

- **Compact and thinner size**
  It makes it possible to create an almost IC-size and lighter-weight package.
- **Mountability**
  The conventional CSP mounting system can be also used in that of wafer-level CSP, which facilitates chip mounting more than bare-chip mounting does. It can be mounted together with other existing packages and passive components. (The use of underfill is recommended to improve the reliability of assembly.)

Chip size*	4 mm x 4 mm		3.5 mm x 3.5 mm		3 mm x 3 mm		2.5 mm x 2.5 mm	
Pad pitch	0.5 mm	0.4 mm	0.5 mm	0.4 mm	0.5 mm	0.4 mm	0.5 mm	0.4 mm
Maximum terminal counts	49 (7 x 7)	81 (9 x 9)	36 (6 x 6)	49 (7 x 7)	25 (5 x 5)	36 (6 x 6)	16 (4 x 4)	25 (5 x 5)

* Rectangular chip form is also available.

Cross section example



■ SiP (System in Package)

System in Package is an original SHARP high-density mounting technology that achieves high-density memory capacity and multiple functions by stacking multiple ICs or multiple packages. This technology has two major streams. One method refers to a chip-stacked package technology that can achieve up to 5-chip mounting by stacking ICs in a single package. The other method refers to a package stack technology with which it is possible to stack a package of over 5 chips, by stacking multiple packages in which 1 to 2 chips are stacked. The System in Package technology contributes to higher functionality of applications, such as mobile phones and digital cameras, as well as to reduction in size and weight.

●Chip Stacked CSP

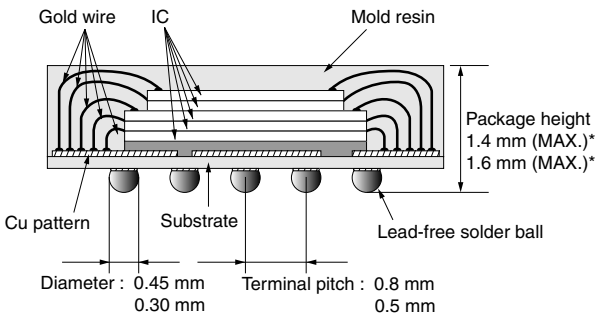
Features

- **Wide variety of lineup**
  It is possible to provide a wide lineup of stacked CSPs, including 2-chip, 3-chip, 4-chip and 5-chip stacked CSPs, to respond to customer needs.
- **Compact and thinner size**
  Encapsulating multiple ICs into an existing plastic package contributes to decreasing the mounting area. In addition, SHARP's wafer thinning technology makes it possible to achieve 1.4 mm (MAX.) package height.
- **Multiple functions**
  Multiple ICs of different sizes and functions, such as logic LSIs and memories, can be incorporated in a single package, making possible multiple functions.
- **Same-size IC stacking technology**
  SHARP's stacking technology enables stacking of multiple same-size ICs, contributing to higher memory density.

(4-chip stacked CSP)
When using a SHARP four-chip stacked CSP, the mounting area and weight of a package can be decreased by half in comparison with using two 2-chip stacked CSPs, or a 3-chip stacked CSP and a conventional CSP.

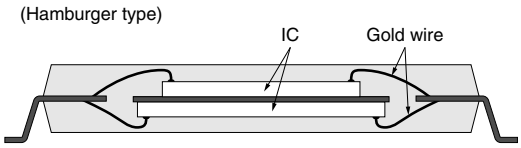
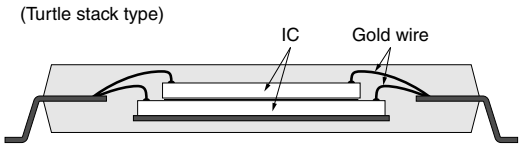
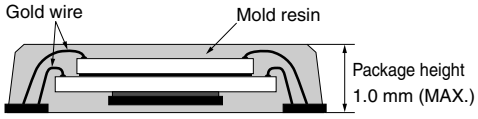
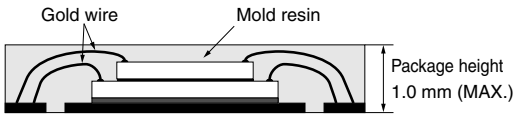
Cross section example

(5-chip stacked CSP)



* At 0.8 mm terminal pitch

●Chip Stacked TSOP/QFP*/VQFN/HQFN

Features	● **Decreased mounting area** By encapsulating two identical or different types of ICs into a single conventional plastic package, the mounting area of the package can be decreased. ● **Multiple functions** Thanks to the incorporation of different sizes and functions of multiple ICs, such as logic LSIs and memories, the functionality increases. ● **Higher memory density** When incorporating two identical memory ICs into a single package, memory density doubles on the same mounting area.
Cross section example	(TSOP, QFP*) (Hamburger type)  (Turtle stack type)  (VQFN)  (HQFN) 

* Including TQFP and LQFP.

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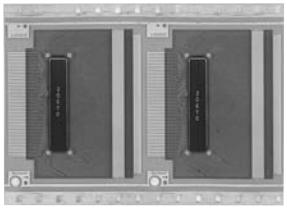
■ SOF

●SOF (System On Film)

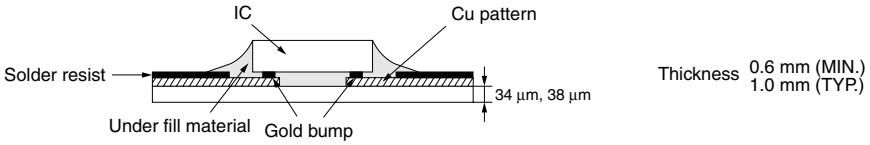
SOF is a highly flexible thin film package, created from SHARP's TCP technologies.
It can be easily bent, and contributes to thin and compact design of products.
Peripheral circuit components can also be mounted.



Features

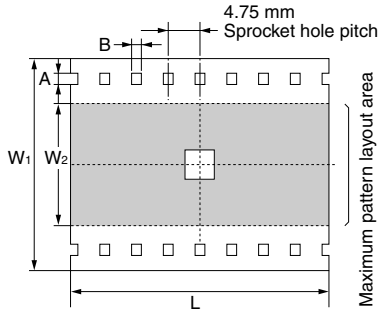
- **Highly flexible and thin film package**
  By using highly flexible and thin film, SOF contributes to creating thin and compact products.
  It can also achieve finer terminal pitches and multiple outputs easily, and pattern layout on a film under the chip makes it possible to improve the flexibility of the pattern layout.
- **Multiple chip mounting**
  Plural bare chip mounting and incorporation of peripheral components contribute to the higher functionality of products.

Cross section example



Film specifications

Film width : W_1	35 mm super wide	48 mm super wide	70 mm wide
Maximum pattern layout area : W_2	28.6 mm	41.6 mm	59.0 mm
Maximum device pitch : L	15 sprockets		
Copper foil thickness	8 µm		
Copper foil type	Rolled or electrolytic		
Copper foil plating	Tin (Sn)		
Minimum pattern pitch	0.025 mm		
Sprocket hole : A	1.981 mm (wide) /1.42 mm (super wide)		
Sprocket hole : B	1.981 mm (wide) /1.42 mm (super wide)		



Other components

Bare chips and peripheral circuit components can be mounted on the film.

In addition to the SOF described above, a conventional TCP (Tape Carrier Package) is also available.

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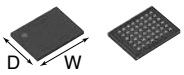
■ Package Lineup

●Surface-mount Type

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package depth & width (D x W) x (seated height [MAX.]) mm
FBGA (CSP)	 (Plastic)	P-LFBGA048-0606	48	0.8	6 x 6	6.0 x 6.0 x (1.4)
		P-TFBGA048-0608			6 x 8	6.0 x 8.0 x (1.2)
		P-TFBGA048-0808			8 x 8	8.0 x 8.0 x (1.2)
		P-TFBGA056-0808	56			
		P-TFBGA060-0811	60 (48)*		8 x 11	8.0 x 11.0 x (1.2)
		P-TFBGA064-0811	64			
		P-TFBGA072-0811	72 (64)*			
		P-LFBGA072-0811				8.0 x 11.0 x (1.4) / (1.6)
		P-TFBGA081-0808	81		8 x 8	8.0 x 8.0 x (1.2)
		P-LFBGA085-0811	85		8 x 11	8.0 x 11.0 x (1.4) / (1.6)
		P-LFBGA087-0811	87			
		P-LFBGA088-0811	88			
		P-LFBGA088-0912			9 x 12	9.0 x 12.0 x (1.4) / (1.6)
		P-LFBGA090-0811	90		8 x 11	8.0 x 11.0 x (1.4) / (1.6)
		P-TFBGA096-1010	96		10 x 10	10.0 x 10.0 x (1.2)
		P-LFBGA107-0912	107		9 x 12	9.0 x 12.0 x (1.4) / (1.6)
		P-TFBGA111-1010	111		10 x 10	10.0 x 10.0 x (1.2)
		P-TFBGA112-1010	112			
		P-LFBGA115-0914	115		9 x 14	9.0 x 14.0 x (1.4) / (1.6)
		P-LFBGA116-1010	116		10 x 10	10.0 x 10.0 x (1.4) / (1.6)
		P-LFBGA130-1013	130		10 x 13	10.0 x 13.0 x (1.4) / (1.6)
		P-TFBGA144-1111	144		11 x 11	11.0 x 11.0 x (1.2)
		P-TFBGA160-1212	160		12 x 12	12.0 x 12.0 x (1.2)
		P-LFBGA168-1212	168			12.0 x 12.0 x (1.4) / (1.6)
		P-TFBGA180-1212	180			12.0 x 12.0 x (1.2)
		P-TFBGA184-1212	184			
		P-TFBGA240-1414	240		14 x 14	14.0 x 14.0 x (1.2)
		P-LFBGA280-1616	280		16 x 16	16.0 x 16.0 x (1.5)
		P-LFBGA352-1616	352			
		P-TFBGA064-0606	64	0.65	6 x 6	6.0 x 6.0 x (1.2)
		P-LFBGA140-0909	140		9 x 9	9.0 x 9.0 x (1.4)
		P-LFBGA160-1010	160		10 x 10	10.0 x 10.0 x (1.4) / (1.6)
		P-TFBGA180-1313	180		13 x 13	13.0 x 13.0 x (1.2)
		P-LFBGA192-1010	192		10 x 10	10.0 x 10.0 x (1.4) / (1.6)
		P-LFBGA208-1212	208		12 x 12	12.0 x 12.0 x (1.4) / (1.6)
		P-LFBGA224-1313	224		13 x 13	13.0 x 13.0 x (1.4) / (1.6)
		P-TFBGA260-1313	260			13.0 x 13.0 x (1.2)

* Figures in brackets indicate available terminal counts.

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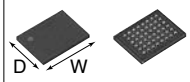
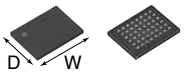
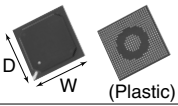
●Surface-mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package depth & width (D x W) x (seated height [MAX.]) mm
FBGA (CSP)	 (Plastic)	P-VFBGA057-0505	57	0.5	5 x 5	5.0 x 5.0 x (0.9)
		P-VFBGA075-0505	75			
		P-TFBGA064-0606	64		6 x 6	6.0 x 6.0 x (1.1)
		P-TFBGA068-0606	68			
		P-VFBGA081-0606	81			6.0 x 6.0 x (0.9)
		P-TFBGA084-0606	84			6.0 x 6.0 x (1.1)
		P-VFBGA100-0606	100			6.0 x 6.0 x (0.9)
		P-VFBGA100-0707			7 x 7	7.0 x 7.0 x (0.9)
		P-TFBGA100-0707				7.0 x 7.0 x (1.1)
		P-VFBGA108-0707	108			7.0 x 7.0 x (0.9)
		P-TFBGA108-0707				7.0 x 7.0 x (1.1)
		P-VFBGA120-0707	120			7.0 x 7.0 x (0.9)
		P-TFBGA120-0707				7.0 x 7.0 x (1.1)
		P-TFBGA132-0707	132			
		P-TFBGA133-0808	133		8 x 8	8.0 x 8.0 x (1.1)
		P-VFBGA144-0808	144			8.0 x 8.0 x (0.9)
		P-LFBGA144-0808				8.0 x 8.0 x (1.3) / (1.5)
		P-LFBGA144-0811			8 x 11	8.0 x 11.0 x (1.3)
		P-TFBGA152-0808	152		8 x 8	8.0 x 8.0 x (1.1)
		P-VFBGA171-0811	171		8 x 11	8.0 x 11.0 x (0.9)
		P-LFBGA171-0811				8.0 x 11.0 x (1.3) / (1.5)
		P-VFBGA176-0909	176		9 x 9	9.0 x 9.0 x (0.9)
		P-TFBGA176-0909				9.0 x 9.0 x (1.1)
		P-TFBGA180-0909	180			
		P-TFBGA188-0909	188			
		P-VFBGA188-1111			11 x 11	11.0 x 11.0 x (0.9)
		P-VFBGA208-1010	208		10 x 10	10.0 x 10.0 x (0.9)
		P-TFBGA208-1010				10.0 x 10.0 x (1.1)
		P-TFBGA245-1010	245			
		P-LFBGA245-1010				10.0 x 10.0 x (1.3)
		P-FBGA424-1414	424		14 x 14	14.0 x 14.0 x (1.8)
		P-WFBGA144-0606	144	0.4	6 x 6	6.0 x 6.0 x (0.75)
		P-WFBGA121-0606	121			6.0 x 6.0 x (0.8)
		P-WFBGA145-0606	145			
		P-TFBGA168-0707	168		7 x 7	7.0 x 7.0 x (1.0)
		P-TFBGA204-0808	204		8 x 8	8.0 x 8.0 x (1.0)
		P-WFBGA205-0808	205			8.0 x 8.0 x (0.8)

RoHS Pb FREE

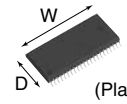
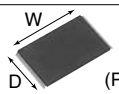
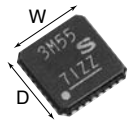
●Surface-mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package depth & width (D x W) x (seated height [MAX.]) mm
FBGA (CSP)	 D W (Plastic)	P-TFBGAXXX-0606	to 36	0.8	6 x 6	6.0 x 6.0 x (1.2)
		P-TFBGAXXX-0707	to 49		7 x 7	7.0 x 7.0 x (1.2)
		P-TFBGAXXX-0808	to 81		8 x 8	8.0 x 8.0 x (1.2)
		P-TFBGAXXX-0909	to 100		9 x 9	9.0 x 9.0 x (1.2)
		P-TFBGAXXX-1010	to 121		10 x 10	10.0 x 10.0 x (1.2)
		P-TFBGAXXX-1111	to 144		11 x 11	11.0 x 11.0 x (1.2)
		P-TFBGAXXX-1212	to 196		12 x 12	12.0 x 12.0 x (1.2)
		P-TFBGAXXX-1313	to 216		13 x 13	13.0 x 13.0 x (1.2)
		P-TFBGAXXX-1414	to 240		14 x 14	14.0 x 14.0 x (1.2)
		P-TFBGAXXX-1515			15 x 15	15.0 x 15.0 x (1.2)
		P-TFBGAXXX-1616	to 352		16 x 16	16.0 x 16.0 x (1.2)
		P-TFBGAXXX-0606	to 49	0.65	6 x 6	6.0 x 6.0 x (1.2)
		P-TFBGAXXX-0707	to 81		7 x 7	7.0 x 7.0 x (1.2)
		P-TFBGAXXX-0808	to 121		8 x 8	8.0 x 8.0 x (1.2)
		P-TFBGAXXX-0909	to 144		9 x 9	9.0 x 9.0 x (1.2)
		P-TFBGAXXX-1010	to 196		10 x 10	10.0 x 10.0 x (1.2)
		P-TFBGAXXX-1111	to 224		11 x 11	11.0 x 11.0 x (1.2)
		P-TFBGAXXX-1212	to 256		12 x 12	12.0 x 12.0 x (1.2)
		P-TFBGAXXX-1313	to 272		13 x 13	13.0 x 13.0 x (1.2)
		P-TFBGAXXX-1414	to 304		14 x 14	14.0 x 14.0 x (1.2)
		P-TFBGAXXX-1515	to 320		15 x 15	15.0 x 15.0 x (1.2)
		P-TFBGAXXX-1616	to 352		16 x 16	16.0 x 16.0 x (1.2)
		P-TFBGAXXX-0606	to 100	0.5	6 x 6	6.0 x 6.0 x (1.1)
		P-TFBGAXXX-0707	to 132		7 x 7	7.0 x 7.0 x (1.1)
		P-TFBGAXXX-0808	to 164		8 x 8	8.0 x 8.0 x (1.1)
		P-TFBGAXXX-0909	to 192		9 x 9	9.0 x 9.0 x (1.1)
		P-TFBGAXXX-1010	to 216		10 x 10	10.0 x 10.0 x (1.1)
		P-TFBGAXXX-1111	to 244		11 x 11	11.0 x 11.0 x (1.1)
		P-TFBGAXXX-1212	to 268		12 x 12	12.0 x 12.0 x (1.1)
		P-TFBGAXXX-1313	to 296		13 x 13	13.0 x 13.0 x (1.1)
		P-TFBGAXXX-1414	to 320		14 x 14	14.0 x 14.0 x (1.1)
		P-TFBGAXXX-1515	to 348		15 x 15	15.0 x 15.0 x (1.1)
		P-TFBGAXXX-1616	to 372		16 x 16	16.0 x 16.0 x (1.1)
		P-TFBGAXXX-0505	to 100	0.4	5 x 5	5.0 x 5.0 x (1.0)
		P-TFBGAXXX-0606	to 144		6 x 6	6.0 x 6.0 x (1.0)
		P-TFBGAXXX-0707	to 168		7 x 7	7.0 x 7.0 x (1.0)
		P-TFBGAXXX-0808	to 204		8 x 8	8.0 x 8.0 x (1.0)
		P-TFBGAXXX-0909	to 228		9 x 9	9.0 x 9.0 x (1.0)
		P-TFBGAXXX-1010	to 264		10 x 10	10.0 x 10.0 x (1.0)
PBGA (BGA)	 D W (Plastic)	P-BGA0356-2121	356	1.0	21 x 21	21.0 x 21.0 x (2.2)
		P-BGA0476-3535	476	1.27	35 x 35	35.0 x 35.0 x (2.63)
		P-BGA0528-3535	528			

XXX: Terminal counts

BGA is a trademark of Motorola Nippon Ltd.

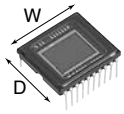
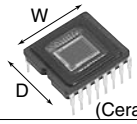
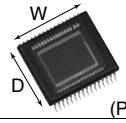
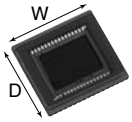
●Surface-mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm (mil)	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [MAX.]) mm	Lead frame material	
							Alloy42	Copper alloy
SSOP	 (Plastic)	P-SSOP008-0150	8	0.65	4.5 (150)	3.0 x 3.0 x (1.1)	–	○
		P-SSOP024-0275	24		7.0 (275)	6.0 x 7.8 x (1.27)	–	○
MFP		P-MFP018	18	0.8	–	6.0 x 7.5 x (1.8)	○	–
		P-MFP020	20	0.75			○	–
TSOP	 (Plastic)	P-TSOP040-1020	40	0.5	10 x 20	10.0 x 18.4 x (1.2)	○	○
		P-TSOP048-1220	48		12 x 20	12.0 x 18.4 x (1.2)	○	○
		P-TSOP056-1420	56		14 x 20	14.0 x 18.4 x (1.2)	○	○
QFP	 (Plastic)	P-QFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.65)	○	○
		P-QFP072-1010	72		10 x 10	10.0 x 10.0 x (1.8)	○	–
LQFP		P-LQFP080-1212	80	0.5	12 x 12	12.0 x 12.0 x (1.7)	○	–
		P-LQFP100-1414	100		14 x 14	14.0 x 14.0 x (1.7)	○	–
TQFP		P-TQFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.2)	○	–
		P-TQFP100-1414	100		14 x 14	14.0 x 14.0 x (1.2)	○	–
		P-TQFP128-1414	128	0.4			○	–
VQFN	 (Plastic)	P-VQFN020-0404	20	0.5	4 x 4	4.2 x 4.2 x (1.0)	–	○
		P-VQFN024-0404	24				–	○
		P-VQFN028-0505	28		5 x 5	5.2 x 5.2 x (1.0)	–	○
		P-VQFN032-0505	32				–	○
		P-VQFN036-0606	36		6 x 6	6.2 x 6.2 x (1.0)	–	○
		P-VQFN048-0707	48		7 x 7	7.2 x 7.2 x (1.0)	–	○
		P-VQFN036-0505	36	0.4	5 x 5	5.2 x 5.2 x (1.0)	–	○
		P-VQFN052-0707	52		7 x 7	7.2 x 7.2 x (1.0)	–	○
HQFN*		P-HQFN020-0404	20	0.5	4 x 4	4.0 x 4.0 x (1.0)	–	○
		P-HQFN024-0404	24			4.0 x 4.0 x (0.85)	–	○
						4.2 x 4.2 x (1.0)	–	○
		P-HQFN028-0505	28		5 x 5	5.0 x 5.0 x (1.0)	–	○

* HQFN is a higher heat dissipation package of VQFN.

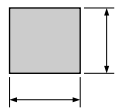
100 mil = 2.54 mm

●For CCDs

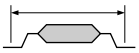
Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [TYP.]) mm
DIP	 (Plastic)	P-DIP014-0400A	14	1.27	10.16 (400)	10.0 x 10.0
		P-DIP016-0450	16	1.27	11.43 (450)	11.4 x 12.2
		P-DIP016-0500C		1.78	12.7 (500)	12.4 x 14.0
		P-DIP020-0400	20	1.00	10.16 (400)	10.0 x 10.0
	 (Ceramic)	N-DIP016-0450	16	1.27	11.43 (450)	11.4 x 12.2
		N-DIP016-0500C		1.78	12.7 (500)	12.4 x 14.0
SOP	 (Plastic)	P-SOP028-0400	28	0.69	10.16 (400)	10.0 x 10.0 x (3.5)
		P-SOP032-0525	32	0.78	13.3 (525)	12.0 x 13.8 x (3.92)
LCC	 (Ceramic)	N-LCC028-S450A	28	0.80	11.5	11.5 x 11.5 x (1.62)
		N-LCC032-R543	32	0.80	13.8	12.9 x 13.8 x (1.35)
		N-LCC040-S433A	40	0.80	11.0	11.0 x 11.0 x (1.62)

100 mil = 2.54 mm

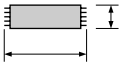
Nominal dimensions



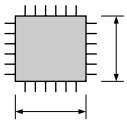
FBGA (CSP)
PBGA (BGA)



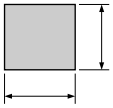
SOP
SSOP
MFP



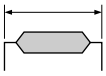
TSOP



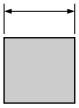
QFP
LQFP
TQFP



VQFN
HQFN



DIP

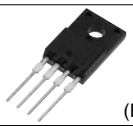
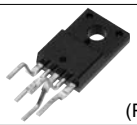


LCC

FBGA : fine-pitch ball grid array package
PBGA : plastic ball grid array package
SOP : small outline package
SSOP : shrink small outline package
MFP : mini flat package
TSOP : thin small outline package
QFP : quad flat package
LQFP : low profile quad flat package
TQFP : thin quad flat package
VQFN : very thin quad flat non-leaded package
HQFN : heat sink quad flat non-leaded package
DIP : dual inline package
LCC : leadless chip carrier

Ball Grid Array and BGA are trademarks of Motorola Nippon Ltd.

●Lead-inserting Type Packages [For regulators: PQ series]

Package type	Appearance (Package material)	No.of terminals	Terminal pitch mm	Outline dimensions (Width x Thickness x Height) mm	Lead frame material
TO-220 (Heat sink exposure) [Lead forming type]	 (Plastic)	5	(1.7)*1	10.2 (MAX.) x 3.5 x 25.2*2	Cu
A TO-220	 (Plastic)	4	2.54	10.2 (MAX.) x 4.5 x 29.1*2	Cu
B TO-220 (Full mold)	 (Plastic)	4	2.54	10.2 (MAX.) x 4.5 x 29.1*2	Cu
C TO-220 (Full mold) [Lead forming type]	 (Plastic)	5	(1.7)*1	10.2 (MAX.) x 4.5 x 24.6*2	Cu
D TO-220 [Lead forming type]	 (Plastic)	5	(1.7)*1	10.2 (MAX.) x 4.5 x 24.6*2	Cu
E TO-220 [Lead forming type]	 (Plastic)	5	(1.7)*1	10.2 (MAX.) x 4.5 x 24.6*2	Cu
TO-92	 (Plastic)	3	2.5	5.2 (MAX.) x 4.2 (MAX.) x 18.2 (MAX.)*2	Cu

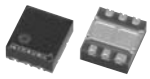
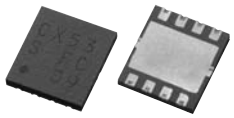
*1 The figure in parentheses indicates reference value.
*2 Including lead length

●Surface-mount Type Packages [For regulators/LED drivers: PQ series]

Package type	Appearance (Package material)	No.of terminals	Terminal pitch mm	Outline dimensions (Width x Height x Thickness) mm	Lead frame material
TO-263	 (Plastic)	5 (Heat sink not included)	(1.7)*1	10.6 (MAX). x 13.7 (MAX.)*2 x 3.5	Cu
F SC-63	 (Plastic)	5 (Heat sink not included)	(1.27)*1	6.6 (MAX.) x 9.7 (MAX.)*2 x 2.3	Cu
G SC-63	 (Plastic)	5 (Heat sink included)	(1.27)*1	6.6(MAX.) x 9.7 (MAX.)*2 x 2.1	Cu
SOP-8	 (Plastic)	8	1.27	5 x 6.2*2 x 1.55*2	Cu

*1 The figure in parentheses indicates reference value.
*2 Including lead length

●Surface-mount Type Packages [For regulators/LED drivers: PQ series] (cont'd)

Package type	Appearance (Package material)	No.of terminals	Terminal pitch mm	Outline dimensions (Width x Height x Thickness) mm	Lead frame material
SOT-89	 (Plastic)	6	1.5	4.5 x 4.3*2 x 1.5	Cu
SOT-23-6	 (Plastic)	6	0.95	2.9 x 2.8*2 x 1.3	Cu
SOT-23-6W	 (Plastic)	6	0.95	2.9 x 2.8*2 x 1.3	Cu
SOT-23-L	 (Plastic)	6	(0.95)*1	(3.4)*1 x 3.3*2 x 1.4 (MAX.)	Cu
SOT-23-5	 (Plastic)	5	(0.95)*1	(2.9)*1 x 2.8*2 x 1.3 (MAX.)	Cu
USB-6		6	0.5	2.0 x 1.8 x 0.8	Cu (Terminal material)/ Au plating (Terminal finish)
USB-8		9 (Including radiating fin)	1.0	5.0 x 4.5 x 0.75 (MAX.)	Cu
USB-10		10	0.5	2.8 x 2.0 x 0.8	—

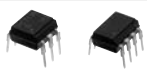
*1 The figure in parentheses indicates reference value.
*2 Including lead length

■ Photocoupler Lineup

<Phototransistor output type>

Package type	Output type	Features		Model No. (series)	Page
4-pin SOP Compact, SMT type	Single phototransistor	General purpose, High collector-emitter voltage, etc.		PC35x series/PC451J00000F	63
			Low input current	PC367NJ0000F	63
		AC input response		PC354NJ0000F	63
			Low input current	PC364NJ0000F	63
	Darlington phototransistor	High sensitivity, High collector-emitter voltage		PC355NJ0000F	63
			Low input current	PC365NJ0000F	63
Compact, Half pitch (lead space), SMT type	Single phototransistor	General purpose, High collector-emitter voltage, etc.		PC3Hx series	64
			Reinforced insulation	PC3HU7NYIP0F	64
			Low input current	PC3H71xNIP0F	64
		High collector-emitter voltage		PC4H510NIP0F	64
		AC input response		PC3H3J00000F/PC3H4J00000F	64
			Low input current	PC3H41xNIP0F	64
	Darlington phototransistor	General purpose		PC3H5J00000F	64
			Low input current	PC3H510NIP0F	64
DIP type (4/16-pin)	Single phototransistor	Reinforced insulation		PC123J00000F series	65
(4/16-pin, DIP type)			Low input current	PC1231xNSZ0F	65
		General purpose, High collector-emitter voltage, etc.		PC817XJ0000F/PC847XJ0000F/ PC851XJ0000F	65
			Low input current	PC817xxNSZ0F	65
		AC input response		PC814XJ0000F/PC844XJ0000F	65
			Low input current	PC8141xNSZ0F	65
		Built-in SBD/High response speed		PC81100NSZ0F	65
	Darlington phototransistor	General purpose, High collector-emitter voltage		PC815XJ0000F/PC845XJ0000F/ PC852XJ0000F/PC853XJ0000F	65
			Low input current	PC81510NSZ0F	65
DIP type (6-pin)	Single phototransistor	General purpose, High collector-emitter voltage, etc.		PC7xxV0NSZXF	66
	Darlington phototransistor	General purpose, High collector-emitter voltage, etc.		PC7x5V0NSZXF	66

<OPIC output type>

Package type	Output type	Features	Model No. (series)	Page
Compact, SMT type	Digital output	General purpose, High response speed, 2ch, etc.	PC4xxJ00000F/PC456L0NIP0F/ PC41xS0NIP0F/PC410L0NIP0F/ PC411L0NIP0F/PC4D10SNIP0F	67
	Analog/Digital output	High CMR	PC457S0NIP0F/PC457L0NIP0F	68
DIP type, SMT type	Digital output	General purpose, High response speed, etc.	PC9xxV0NSZXF/PC956L0NSZ0F/ PC910L0NSZ0F/PC911L0NSZ0F	68
	Built-in base amplifier	For inverter control/For inverter control, Built-in short-circuit protection circuit	PC942J00000F/ PC92xL0NSZ0F series	69
	Analog/Digital output	High speed, High CMR, etc.	PC957L0NSZ0F	69

RoHS Pb FREE

■ Photocouplers

◆Phototransistor Output Type
<Compact, SMT type>

○: Approved, △: Under application

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*2 UL	Package	Absolute maximum ratings: Forward current IF (mA)	Absolute maximum ratings: Isolation voltage (AC) Viso (rms) (kV)	Absolute maximum ratings: Collector-emitter voltage VCEO (V)	Electro-optical characteristics: Current transfer ratio CTR (%) MIN.	Current transfer ratio: IF (mA)	Current transfer ratio: VCE (V)	Response time: tr (μs) TYP.	Response time: IC (mA)	Response time: RL (Ω)	Response time: VCE (V)
Single phototransistor output	PC357NJ0000F		General purpose	○*	Mini-flat 4-pin	50	3.75	80	50	5	5	4	2	100	2
	PC352NJ0000F		General purpose, high resistance to noise*1	○		50	3.75	80	90	5	5	4	2	100	2
	PC451J00000F		High collector-emitter voltage	○*		50	3.75	350	40	5	5	4	2	100	2
	PC367NJ0000F		Low input current, high resistance to noise*1	○		10	3.75	80	100	0.5	5	4	2	100	2
	PC354NJ0000F		AC input response	○*		±50	3.75	80	20	±1	5	4	2	100	2
	PC364NJ0000F		Low input current, AC input response, high resistance to noise*1	○		±10	3.75	70	50	±0.5	5	4	2	100	2
Darlington photo-transistor output	PC355NJ0000F		High sensitivity	○*		50	3.75	35	600	1	2	60	2	100	2
	PC365NJ0000F		High sensitivity, low input current	○		10	3.75	35	600	0.5	2	60	2	100	2

*1 CMR: MIN.10 kV/μs
*2 Please refer to Specification Sheets for model numbers approved by safety standards.
* A VDE approved type is optionally available.

PC357NJ0000F
(Mini-flat 4-pin)

Optoelectronics

◆Phototransistor Output Type
<Compact, half pitch (lead space) SMT type>

○: Approved, △: Under application

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*3	Package	Absolute maximum ratings			Electro-optical characteristics						
									Current transfer ratio			Response time			
				UL		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	Collector-emitter voltage V_{CEO} (V)	CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
Single phototransistor output	PC3HU7NYIP0F		Reinforced insulation (internal insulation distance: MIN. 0.4 mm), low-profile package	○*4, 5	Low-profile mini-flat 4-pin	50	3.75	80	50	5	5	4	2	100	2
	PC3H2J00000F		High resistance to noise*1	○	Mini-flat 4-pin	50	2.5	80	20	1	5	4	2	100	2
	PC3H7J00000F		Standard	○*2		50	2.5	80	20	1	5	4	2	100	2
	PC3H71xNIP0F		High resistance to noise*1, low input current	○		10	2.5	80	100	0.5	5	4	2	100	2
	PC3H3J00000F		AC input response, high resistance to noise*1	○		±50	2.5	80	20	±1	5	4	2	100	2
	PC3H4J00000F		AC input response	○*2		±50	2.5	80	20	±1	5	4	2	100	2
	PC3H41xNIP0F		AC input response, high resistance to noise*1, low input current	○		±10	2.5	80	50	±0.5	5	4	2	100	2
	PC4H510NIP0F		High collector-emitter voltage	○		50	2.5	350	40	5	5	4	2	100	2
Darlington photo-transistor output	PC3H5J00000F		High sensitivity	○*2	Mini-flat 4-pin	50	2.5	35	600	1	2	60	2	100	2
	PC3H510NIP0F		High sensitivity, low input current	○		10	2.5	35	600	0.5	2	60	2	100	2

*1 CMR: MIN.10 kV/μs
*2 A VDE approved type is optionally available.
*3 Please refer to Specification Sheets for model numbers approved by safety standards.
*4 VDE, CSA approved
*5 In conformance with BSI, SEMKO, DEMKO, NEMKO, and FIMKO

PC3HU7NYIP0F

PC3H2J00000F
(Mini-flat 4-pin)

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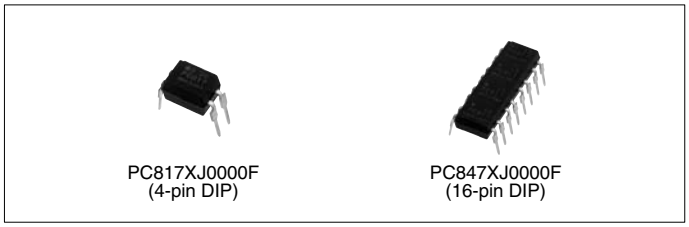
◆Phototransistor Output Type
<DIP type (4/16-pin)>

○: Approved, △: Under application

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*8 UL	VDE *2	Others *3	Package	Absolute maximum ratings: Forward current IF (mA)	Isolation voltage (AC) Viso (rms) (kV)	Collector-emitter voltage VCEO (V)	Electro-optical characteristics: Current transfer ratio CTR (%) MIN.	IF (mA)	Response time tr (μs) TYP.	RL (Ω)
Single phototransistor output	PC123J00000F*1		High isolation voltage, reinforced insulation	○	○	○	4-pin DIP	50	5.0	70	50	5	4	100
	PC1231xNSZ0F		High isolation voltage, reinforced insulation, low input current, high resistance to noise*4	○	○	○		10	5.0	70	50	0.5	4	100
	PC817XJ0000F*5, *6, *7		High isolation voltage	○	○	–		50	5.0	80	50	5	4	100
	PC847XJ0000F*5, *9		High isolation voltage (4-ch)	○	○	–	16-pin DIP	50	5.0	80	50	5	4	100
	PC8171xNSZ0F		High isolation voltage, low input current, high resistance to noise*4	○	–	–	4-pin DIP	10	5.0	70	100	0.5	4	100
	PC851XJ0000F		High isolation voltage, high collector-emitter voltage	○	–	–		50	5.0	350	40	5	4	100
	PC814XJ0000F*5, *6		High isolation voltage, AC input response	○	○	–		±50	5.0	80	20	±1	4	100
	PC844XJ0000F		High isolation voltage, AC input response (4-ch)	○	○	–	16-pin DIP	±50	5.0	80	20	±1	4	100
	PC8141xNSZ0F		High isolation voltage, AC input response, low input current, high resistance to noise*4	○	–	–	4-pin DIP	±10	5.0	80	50	±0.5	4	100
	PC81100NSZ0F	Schottky barrier diode	Built-in schottky barrier diode, toff: 35μs TYP. (In saturation, RL = 100kΩ)	○	–	–		50	5.0	70	50	5	ton: TYP. 9	100
Darlington phototransistor output	PC815XJ0000F		High isolation voltage, high sensitivity	○	–	–	4-pin DIP	50	5.0	35	600	1	60	100
	PC845XJ0000F		High isolation voltage, high sensitivity (4-ch)	○	–	–	16-pin DIP	50	5.0	35	600	1	60	100
	PC81510NSZ0F		High isolation voltage, high sensitivity, low input current	○	–	–	4-pin DIP	10	5.0	35	600	0.5	60	100
	PC852XJ0000F*5, *6		High isolation voltage, high collector-emitter voltage	○	○	–		50	5.0	350	1 000	1	100	100
	PC853XJ0000F*5, *6		High isolation voltage, high collector-emitter voltage	○	○	–		50	5.0	350	1 000	1	100	100

*1 Wide lead spacing type is also available. Creepage distance: 6.4 mm or more, wide lead spacing type: 8 mm or more.
*2 Optionally available.
*3 BSI, SEMKO, DEMKO, NEMKO, FIMKO, CSA
*4 CMR: 10 kV/μs MIN.
*5 Lead forming type is also available for surface mounting.
*6 Taped package of lead forming type for surface mounting is also available.
*7 Wide lead spacing type is also available. Compatible with wide lead spacing type lead-forming models for surface-mount use. Also compatible with taped packages for wide lead spacing type lead-forming models for surface-mount use.
*8 Please refer to Specification Sheets for model numbers approved by safety standards.
*9 Approved by UL as multi-channel type of PC817.



PC817XJ0000F (4-pin DIP)

PC847XJ0000F (16-pin DIP)

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◆Phototransistor Output Type
<DIP type (6-pin)>

○: Approved, △: Under application

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*2		Package	Absolute maximum ratings			Electro-optical characteristics			
										Current transfer ratio		Response time	
				UL	VDE*1		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	Collector-emitter voltage V_{CEO} (V)	CTR (%) MIN.	I_F (mA)	tr (μs) TYP.	R_L (Ω)
Single phototransistor output	PC714V0NSZXF		High isolation voltage	○	○	6-pin DIP	50	5.0	80	50	5	4	100
	PC724V0NSZXF		High isolation voltage, large input current	○	–		150	5.0	35	20	100	4	100
	PC713V0NSZXF		High isolation voltage, with base terminal	○	○		50	5.0	80	50	5	4	100
Darlington phototransistor output	PC715V0NSZXF		High isolation voltage, high sensitivity	○	○		50	5.0	35	600	1	60	100
	PC725V0NSZXF		High isolation voltage, high sensitivity, high collector-emitter voltage, high power	○	○		50	5.0	300	1 000	1	100	100

*1 Optionally available.
*2 Please refer to Specification Sheets for model numbers approved by safety standards.

PC713V0NSZXF
(6-pin DIP)

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<Compact, SMT type> (1-1)

○: Approved, △: Under application

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*2		Package	Absolute maximum ratings		Electro-optical characteristics*1						
								Low level output voltage				Threshold input current		
			UL	VDE*3		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	V_{OL} (V) MAX.	Ta (°C)	I_{OL} (mA)	I_F (mA)	I_{FHL} (mA) MAX.	I_{FLH} (mA) MAX.	RL (Ω)
PC400J00000F		Digital output, normal-off operation	○	–	Mini-flat 5-pin	50	3.75	0.4	0 to +70	16	4	2.0	–	280
PC401J00000F		Digital output, normal-on operation	○	–		50	3.75	0.4	0 to +70	16	0	–	2.0	280
PC456L0NIP0F		Built-in preamplifier, high speed transmission (2 Mb/s), For flow soldering	○	○		25	3.75	0.6	–40 to +85	4.4	10	5.0	–	20 k
PC410L0NIP0F		High speed (10 Mb/s), High CMR (10 kV/μs), For flow soldering	○	○		20	3.75	0.6	–40 to +85	13	5	5.0	–	350
PC410S0NIP0F		High speed (10 Mb/s), High CMR (10 kV/μs), For flow soldering, Solder heat resistance: 270°C	○	○	SOP 8-pin	20	3.75	0.6	–40 to +85	13	5	5.0	–	350
PC412S0NIP0F ▲		High speed (25 Mb/s), High CMR (10 kV/μs), For flow soldering, Solder heat resistance: 270°C	○	–		–*4	3.75	1	–40 to +85	4	V_{IN} = V_{IL}	–	–	–
PC411L0NIP0F ▲		High speed (15 Mb/s), High CMR (10 kV/μs), For flow soldering	○	○	Mini-flat 5-pin	20	3.75	0.1	–40 to +85	0.02	12	6.0	–	–
PC411S0NIP0F ▲		High speed (15 Mb/s), High CMR (10 kV/μs), For flow soldering, Solder heat resistance: 270°C	○	○	SOP 8-pin	20	3.75	0.1	–40 to +85	0.02	12	6.0	–	–
PC4D10SNIP0F		High speed (10 Mb/s), For flow soldering, Solder heat resistance: 270°C 2ch output	○	–		20	3.75	0.6	–40 to +85	13	5	5.0	–	–

A: Rated voltage circuit
*1 Each item is measured at Vcc=5V. (PC400, PC401)
*2 Please refer to Specification Sheets for model numbers approved by safety standards.
*3 Optionally available.
*4 No forward current rating for voltage input (rated input voltage: –0.5 to 6.0 V).
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

<Compact, SMT type> (1-2)

○: Approved, △: Under application

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*1		Package	Absolute maximum ratings		Electro-optical characteristics							
								Current transfer ratio				Propagation delay time			
			UL	VDE*2		Forward current IF (mA)	Isolation voltage (AC) Viso (rms) (kV)	CTR (%) MIN.	IF (mA)	VO (V)	VCC (V)	tPHL (µs) TYP.	tPLH (µs) TYP.	RL (Ω)	IF (mA)
PC457L0NIP0F		High speed (1 Mb/s), high CMR (15 kV/µs), For flow soldering	○	○	Mini-flat 5-pin	25	3.75	19	16	0.4	4.5	0.2	0.6	1 900	16
PC457S0NIP0F		High speed (1 Mb/s), high CMR (15 kV/µs), For flow soldering, Solder heat resistance: 270°C	○	○	SOP 8-pin	25	3.75	19	16	0.4	4.5	0.2	0.6	1 900	16

*1 Please refer to Specification Sheets for model numbers approved by safety standards.

*2 Optionally available.

PC400J00000F
(Mini-flat 5-pin)

PC412S0NIP0F ▲
(SOP 8-pin)

◆OPIC Output

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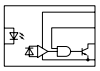
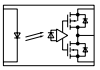
<DIP type, digital output>

○: Approved, △: Under application

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*5		Package	Absolute maximum ratings		Electro-optical characteristics*1						
								Low level output voltage				Threshold input current		
			UL	VDE *4		Forward current IF (mA)	Isolation voltage (AC) Viso (rms) (kV)	VOL (V) MAX.	Ta (°C)	IOL (mA)	IF (mA)	IFHL (mA) MAX.	IFLH (mA) MAX.	RL (Ω)
PC900V0NSZXF*2, *3		Digital output, normal-off operation	○	○	6-pin DIP	50	5.0	0.4	0 to +70	16	4	2.0	–	280
PC901V0NSZXF*2, *3		Digital output, normal-on operation	○	○		50	5.0	0.4	0 to +70	16	0	–	2.0	280
PC956L0NSZ0F*2, *3		Built-in preamplifier, high speed transmission (2 Mb/s) For soldering flow	○	○	8-pin DIP	25	5.0	0.6	–40 to +85	2.4	10	5.0	–	20 k
PC910L0NSZ0F*2, *3		Digital output, High speed (10 Mb/s), high CMR (20 kV/µs) For soldering flow	○	○		20	5.0	0.6	–40 to +85	13	5	5.0	–	350
PC911L0NSZ0F ▲*2, *3		High speed (15 Mb/s), high CMR (10 kV/µs), For soldering flow	○	○		20	5.0	0.1	–40 to +85	0.02	12	6.0	–	–

A: Rated voltage circuit

*1 Each item is measured at Vcc=5V.

*2 Lead forming type is also available for surface mounting.

*3 Taped package of lead forming type for surface mounting is also available.

*4 Optionally available.

*5 Please refer to Specification Sheets for model numbers approved by safety standards.

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

PC90xV0NSZXF series
(6-pin DIP)

PC910L0NSZ0F
(8-pin DIP)

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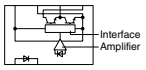
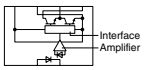
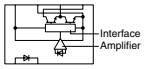
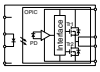
<DIP type, Gate drive type>

○: Approved, △: Under application

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*3		Package	Absolute maximum ratings			Electro-optical characteristics					
			UL	VDE *2		Forward current I_F (mA)	Isolation voltage (AC) V_{iso} (rms) (kV)	Output current I_{O1} (A)	Propagation delay time t_{PHL} (µs) TYP.	Propagation delay time t_{PLH} (µs) TYP.	V_{CC} (V)	I_F (mA)	R_{L1} (Ω)	R_{L2} (Ω)
PC942J00000F		For controlling inverter-controlled air-conditioner	○	○	8-pin DIP	25	5.0	0.5	2.0	2.0	6	5	5	10
PC923L0NSZ0F*1		• Built-in drive circuit directly connectable to MOS-FET and IGBT • Low dissipation current (I_{CC} = TYP. 1.3 mA) • High resistance to noise (CMR: MIN. 15 kV/µs)	○	○		20	5.0	0.1	0.3	0.3	24	5	R_G = 47	–
PC924L0NSZ0F*1		• Built-in drive circuit directly connectable to MOS-FET and IGBT • Low dissipation current (I_{CC} = TYP. 1.3 mA) • High resistance to noise (CMR: MIN. 15 kV/µs)	○	○		25	5.0	0.1	1.0	1.0	24	10	R_G = 47	–
PC925L0NSZ0F*1		• Built-in drive circuit directly connectable to MOS-FET and IGBT • Peak output current: 2.5 A • Low dissipation current (I_{CC} = TYP. 5 mA) • High resistance to noise (CMR: MIN. 15 kV/µs)	○	○		25	5.0	2.5	MAX. 0.5	MAX. 0.5	24	10	R_G = 10	–

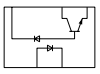
*1 Lead forming type is also available for surface mounting. Taped package of lead forming type for surface mounting is also available.
*2 A VDE approved type is optionally available.
*3 Please refer to Specification Sheets for model numbers approved by safety standards.

◆OPIC Output

<DIP type, analog/digital output>

○: Approved, △: Under application

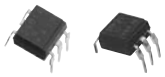
(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*3		Package	Absolute maximum ratings		Electro-optical characteristics							
			UL	VDE*2		Forward current I_F (mA)	Isolation voltage (AC) V_{iso} (rms) (kV)	Current transfer ratio CTR (%) MIN	I_F (mA)	V_O (V)	V_{CC} (V)	Propagation delay time*1 t_{PHL} (µs) TYP.	Propagation delay time*1 t_{PLH} (µs) TYP.	R_L (Ω)	I_F (mA)
PC957L0NSZ0F		High speed (1 Mb/s), high CMR (15 kV/µs), for flow soldering	○	○	8-pin DIP	25	5.0	19	16	0.4	4.5	0.2	0.6	1 900	16

*1 Vcc = 5V
*2 Optionally available.
*3 Please refer to Specification Sheets for title(s) of safety standards.

PC92xL0NSZ0F
(8-pin DIP)

■ Phototriac Coupler Lineup

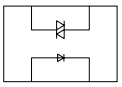
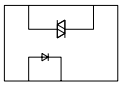
Package	Applied voltage	ON-state current (rms)	Features		Model No.	Page
Mini-flat (SMD)	AC 200 V lines (V_{DRM} = 600V)	0.05 A	General purpose		S2S3000F*4 / S2S5A00F*4	71
				Built-in zero-cross circuit	S2S4000F*4	72
DIP type	AC 200 V lines (V_{DRM} = 600V)	0.1 A	General purpose		PC3ST11NSZAF*4	71
(4-pin)				Built-in zero-cross circuit	PC3ST21NSZBF*3	72
			Reinforced isolation		PC3SH11YFZAF*4 / PC3SH13YFZAF*4	71
				Built-in zero-cross circuit	PC3SH21YFZBF*3	72
DIP type	AC 100 V lines (V_{DRM} = 400V)	0.1 A	General purpose		PC2SD11NTZAF*4	71
(6-pin package, 5th-pin cut)	AC 200 V lines (V_{DRM} = 600V)	0.1 A	General purpose		PC3SD12NTZAF*4 / PC3SD11NTZBF*3 / PC3SD11NTZCF*2 / PC3SD11YTZDF*1 / PC3SD21YTZEF*5	71/72
				Built-in zero-cross circuit	PC3SD21NTZAF*4 / PC3SD21NTZBF*3 / PC3SD21NTZCF*2 / PC3SD21NTZDF*1 / PC3SD23YTZCF*2	72
			Reinforced isolation		PC3SF11YVZAF*4 / PC3SF11YVZBF*3 / PC3SF13YVZBF*3	71
				Built-in zero-cross circuit	PC3SF21YVZAF*4 / PC3SF21YVZBF*3 / PC3SF23YVZSF*3	72
	AC 200 V lines (V_{DRM} = 800V)	0.1 A	General purpose		PC4SD11NTZBF*3 / PC4SD11NTZCF*2	71
				Built-in zero-cross circuit	PC4SD21NTZCF*2 / PC4SD21NTZDF*1	72
			Reinforced isolation		PC4SF11YVZAF*4 / PC4SF11YVZBF*3	71
				Built-in zero-cross circuit	PC4SF21YVZBF*3 / PC4SF21YVZCF*2	72

Minimum trigger current: *1 I_{FT} ≦ 3 mA, *2 I_{FT} ≦ 5 mA, *3 I_{FT} ≦ 7 mA, *4 I_{FT} ≦ 10 mA, *5 I_{FT} ≦ 2 mA

■ Phototriac Couplers

○: Approved, △: Under application

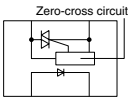
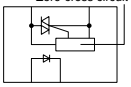
(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*4			Package	Absolute maximum ratings			Electro-optical characteristics
			UL, CSA	VDE	Others		ON-state current I_T (rms) (A)	Repetitive peak OFF-state voltage V_{DRM} (V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current I_{FT} (mA) MAX. V_D = 6 V, R_L = 100Ω
S2S3000F		200 V lines, compact	○	○*6	–	Mini-flat 4-pin	0.05	600	3.75	10
S2S5A00F		200 V lines, compact	○	○*6	–					10
PC3ST11NSZAF		200 V lines, compact	○	○*6	–	4-pin DIP*1	0.1	600	5.0	10
PC3SH11YFZAF		200 V lines, compact, reinforced isolation	○	○	○*2					10
PC3SH13YFZAF		200 V lines, compact, reinforced isolation, high noise resistance	○	○	○*2					10
PC2SD11NTZAF*7		100 V lines	○	–	–	6-pin DIP*1, 3	0.1	400	5.0	10
PC3SD12NTZAF*8		200 V lines	○	○*6	–			600		10
PC3SD11NTZBF		200 V lines	○	○*6	–					7
PC4SD11NTZBF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–			800		7
PC3SD11NTZCF		200 V lines	○	○*6	–			600		5
PC3SD11YTZDF		200 V lines, low input drive	○	○	–					3
PC4SD11NTZCF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–			800		5
PC3SF11YVZAF		200 V lines, reinforced isolation	○	○	○*2			600		10
PC3SF11YVZBF		200 V lines, reinforced isolation	○	○	○*2					7
PC3SF13YVZBF		200 V lines, reinforced isolation, high noise resistance	○	○	○*2					7
PC4SF11YVZAF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2			800		10
PC4SF11YVZBF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2					7

For the notes *1 to *9, see next page.

■ Phototriac Couplers
(Built-in zero-cross circuit type)

○: Approved, △: Under application (Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*4			Package	Absolute maximum ratings			Electro-optical characteristics
			UL, CSA	VDE	Others		ON-state current IT (rms) (A)	Repetitive peak OFF-state VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current IFT (mA) MAX. VD = 4 V, RL = 100Ω
S2S4000F		200 V lines, compact	○	○*6	–	Mini-flat 4-pin	0.05	600	3.75	10*5
PC3ST21NSZBF		200 V lines, compact	○	○*6	–	4-pin DIP*1	0.1	600	5.0	7
PC3SH21YFZBF		200 V lines, compact, reinforced isolation	○	○	○*2		0.1	600	5.0	7
PC3SD21NTZAF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–	6-pin DIP*1, 3	0.1	600	5.0	10
PC3SD21NTZBF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–		0.1	600	5.0	7
PC3SD21NTZCF*9		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–		0.1	600	5.0	5
PC3SD23YTZCF		200 V lines, high pulse/noise resistance (TYP. 2 kV)	○	○	–		0.1	600	5.0	5
PC3SD21NTZDF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–		0.1	600	5.0	3
PC3SD21YTZEF		200 V lines, Low input drive	○	○	–		0.1	600	5.0	2
PC4SD21NTZCF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–		0.1	800	5.0	5
PC4SD21NTZDF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–		0.1	800	5.0	3
PC3SF21YVZAF		200 V lines, reinforced isolation	○	○	○*2		0.1	600	5.0	10
PC3SF21YVZBF		200 V lines, reinforced isolation	○	○	○*2		0.1	600	5.0	7
PC3SF23YVZSF		200 V lines, reinforced isolation, high pulse/noise resistance (TYP. 2 kV)	○	○	○*2		0.1	600	5.0	7
PC4SF21YVZBF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2		0.1	800	5.0	7
PC4SF21YVZCF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2		0.1	800	5.0	5

*1 Lead forming type for surface mounting is also available.
*2 In conformance with BSI, SEMKO, DEMKO, and FIMKO
*3 These are molded pin No. 5.
*4 Please refer to Specification Sheets for model numbers approved by safety standards.
*5 VD = 6 V, RL = 100Ω
*6 Optionally available
*7 An equivalent model (IFT MAX.: 15 mA) with overseas brand compatibility is also available. (PC1S3021NTZF)
*8 An equivalent model with overseas brand compatibility is also available. (PC1S3052NTZF)
*9 An equivalent model with overseas brand compatibility is also available. (PC1S3063NTZF)


S2S3000F
(Mini-flat 4-pin)


PC2SD series
(PC3SD series, PC4SD series)
(6-pin DIP)


PC3SF series
(PC4SF series)
(6-pin DIP)


PC3ST11NSZAF
(PC3ST21NSZBF)
(4-pin DIP)


PC3SH11YFZAF
PC3SH21YFZBF,
PC3SH13YFZAF
(4-pin DIP)

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Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

■ Solid State Relay Lineup

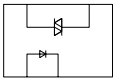
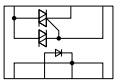
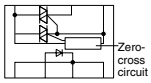
Package	Applied voltage	Features	Model No.	Page
DIP 6-pin	AC 100 V lines	General purpose	PR22MA11NTZF	74
	AC 200 V lines	General purpose	PR31MA11NTZF / PR32MA11NTZF	74
DIP 8-pin	AC 100 V lines	General purpose	PR23MF11NSZF / PR26MF series / PR29MF series	74
		Built-in zero-cross circuit	PR26MF21NSZF / PR29MF21NSZF	74
	AC 200 V lines	General purpose	PR33MF51NSZF / PR36MF series / PR39MF series / PR3BMF51NSKF	74
		Built-in zero-cross circuit	PR36MF series / PR39MF series / PR3BMF21NSZF	74
SIP 4-pin	AC 100 V lines	General purpose	S102T01F / S108T01F / S101S05F / S102S01F / S112S01F / S116S01F	75
 Low profile		Built-in zero-cross circuit	S102T02F / S108T02F / S101S06F / S102S02F / S116S02F	75
		Built-in snubber circuit	S102S11F	75
		Built-in zero-cross circuit	S101S16F / S102S12F	75
	AC 200 V lines	General purpose	S202T01F / S208T01F / S202S01F / S212S01F / S216S01F	75
		Built-in zero-cross circuit	S202T02F / S208T02F / S201S06F / S202S02F / S216S02F	75/76
		Built-in snubber circuit	S202S15F / S202S11F	76
		Built-in zero-cross circuit	S202S12F	76

Optoelectronics

■ Solid State Relays

<DIP type>

○: Approved, △: Under application (Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*1			Package	Absolute maximum ratings			Electrical characteristics
			UL	CSA	VDE*2		ON-state current IT (rms) (A)	Repetitive peak OFF-state voltage VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current IFT (mA) MAX. VD = 6 V, RL = 100Ω
PR31MA11NTZF		200 V lines, compact	○	○	○	6-pin DIP	0.06	600	5.0	10
PR22MA11NTZF		100 V lines, 150 mA output in a small package	○	○	○		0.15	400		10
PR32MA11NTZF		200 V lines, 150 mA output in a small package	○	○	○			600		10
PR23MF11NSZF		100 V lines, compact	○	○	–	8-pin DIP	0.3	400	4.0	10
PR33MF51NSZF		200 V lines, compact	○	○	○			600		10
PR26MF11NSZF		100 V lines, compact	○	○	–		0.6	400		10
PR26MF12NSZF		100 V lines, compact, low input current	○	○	–					5
PR29MF11NSZF		100 V lines, compact	○	○	–		0.9			10
PR29MF12NSZF		100 V lines, compact, low input current	○	○	–					5
PR36MF51NSZF		200 V lines, compact	○	○	○		0.6	600		10
PR36MF12NSZF		200 V lines, compact, low input current	○	○	○					5
PR39MF12NSZF		200 V lines, compact, low input current	○	○	○		0.9			5
PR39MF51NSZF		200 V lines, compact	○	○	○					10
PR3BMF51NSKF		200 V lines, compact	○	○	○		1.2			10
PR26MF21NSZF		100 V lines, compact (built-in zero-cross circuit)	○	○	–		0.6	400		10
PR29MF21NSZF		100 V lines, compact (built-in zero-cross circuit)	○	○	–		0.9			10
PR36MF22NSZF		200 V lines, compact (built-in zero-cross circuit), low input current	○	○	○		0.6	600		5
PR39MF22NSZF		200 V lines, compact (built-in zero-cross circuit), low input current	○	○	○		0.9			5
PR36MF21NSZF		200 V lines, compact (built-in zero-cross circuit)	○	○	○		0.6			10
PR39MF21NSZF		200 V lines, compact (built-in zero-cross circuit)	○	○	○		0.9			10
PR3BMF21NSZF		200 V lines, compact (built-in zero-cross circuit)	○	○	○		1.2			10

*1 Please refer to Specification Sheets for model numbers approved by safety standards.
*2 Optionally available.


PR22MA11NTZF
(6-pin DIP)


PR26MF21NSZF
(8-pin DIP)

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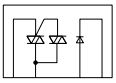
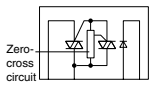
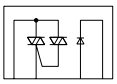
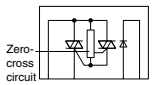
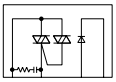
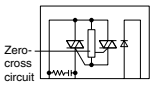
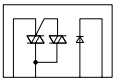
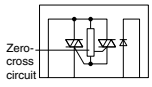
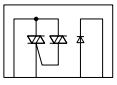
<SIP type> (1)

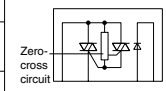
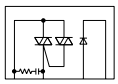
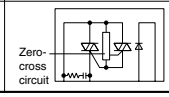
○: Approved, △: Under application (Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*6		Package	Absolute maximum ratings			Electrical characteristics		
			UL	CSA		ON-state current I_T (rms) (A)	Repetitive peak OFF-state voltage V_{DRM}(V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current I_{FT} (mA) MAX.	V_D (V)	R_L (Ω)
S102T01F		100 V lines, low profile	○	○	Low profile 4-pin SIP	2	400	3.0	8	12	30
S108T01F		100 V lines, low profile	–	–		8*2			8	12	30
S102T02F		100 V lines, low profile (built-in zero-cross circuit)	○	○		2			8	12	30
S108T02F		100 V lines, low profile (built-in zero-cross circuit)	–	–		8*2			8	12	30
S101S05F		100 V lines	○	○	4-pin SIP	3*3			15	12	30
S102S01F		100 V lines	○	○		8*2		4.0	8	12	30
S112S01F		100 V lines	○	○		12*4			8	12	30
S116S01F		100 V lines	○	○		16*5			8	12	30
S101S06F		100 V lines (built-in zero-cross circuit)	○	○		3*3		3.0	15	6	30
S102S02F		100 V lines (built-in zero-cross circuit)	○	○		8*2		4.0	8	6	30
S116S02F		100 V lines (built-in zero-cross circuit)	○	○		16*5			8	6	30
S102S11F		100 V lines (built-in snubber circuit)	○	○		8*1			8	12	30
S101S16F		100 V lines (built-in snubber circuit, built-in zero-cross circuit)	○	○		3*3		3.0	15	6	30
S102S12F		100 V lines (built-in snubber circuit, built-in zero-cross circuit)	○	○		8*1		4.0	8	6	30
S202T01F		200 V lines, low profile	○	○	Low profile 4-pin SIP	2	600	3.0	8	12	30
S208T01F		200 V lines, low profile	–	–		8*2			8	12	30
S202T02F		200 V lines, low profile (built-in zero-cross circuit)	○	○		2			8	12	30
S208T02F		200 V lines, low profile (built-in zero-cross circuit)	–	–		8*2			8	12	30
S202S01F		200 V lines	○	○	4-pin SIP	8*2		4.0	8	12	30
S212S01F		200 V lines	–	–		12*4			8	12	30
S216S01F		200 V lines	–	–		16*5			8	12	30

*1 to *6: Please refer to the next page.

<SIP type> (2)

○: Approved, △: Under application (Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*6		Package	Absolute maximum ratings			Electrical characteristics		
			UL	CSA		ON-state current I_T (rms) (A)	Repetitive peak OFF-state voltage V_{DRM}(V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current I_{FT} (mA) MAX.	V_D (V)	R_L (Ω)
S201S06F		200 V lines (built-in zero-cross circuit)	○	○	4-pin SIP	3*3	600	3.0	15	6	30
S202S02F		200 V lines (built-in zero-cross circuit)	○	○		8*2		4.0	8	6	30
S216S02F		200 V lines (built-in zero-cross circuit)	–	–		16*5			8	6	30
S202S15F		200 V lines (built-in snubber circuit)	–	–		8*2		3.0	15	12	30
S202S11F		200 V lines (built-in snubber circuit)	○	○		8*1		4.0	8	12	30
S202S12F		200 V lines (built-in snubber circuit, built-in zero-cross circuit)	○	○		8*1			8	6	30

*1 Tc ≦ 88°C *2 Tc ≦ 80°C *3 Tc ≦ 100°C *4 Tc ≦ 70°C *5 Tc ≦ 60°C
*6 Please refer to Specification Sheets for model numbers approved by safety standards.

S102T01 series
(Low profile 4-pin SIP)

S102S01 series
(4-pin SIP)

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■ Photointerrupter Lineup

<Transmissive type>

Output type	Package type	Outline	Mounting method	Model No. (series)	Page
Single phototransistor	Compact	High resolution	PWB mounting type/ Soldering reflow	GP1S296HCPSF/GP1S092HCPIF/ GP1S09xHCZ0F series/ GP1S19xHCZ0F/GP1S19xHCxSF	78
High response speed	Case type	General purpose	Snap-in	GP1S566VJ00F▲	79
		High resolution	PWB mounting type, etc.	GP1S5x series	79
		Horizontal slit, High resolution	PWB mounting type	GP1S59J0000F	79
	With connector	General purpose	Snap-in	GP1S173LCS2F/GP1S74PJ000F/ GP1S273LCS1F	80
Darlington phototransistor	Case type	General purpose	PWB mounting type, etc.	GP1L5x series	80
High sensitivity		Wide gap	PWB mounting type	GP1L57J0000F	80
Digital output	Compact	High voltage	PWB mounting type	GP1A98HCZ0F	81
(OPIC output)	Case type	High resolution	With screw hole/ PWB mounting type	GP1A5x series	81
		Wide gap	PWB mounting type	GP1A57HRJ00F	81
	With connector	General purpose	Screw mounting type/Snap-in	GP1A05 series▲/GP1A173LCS2F/ GP1A273LCS1F/GP1A7x series/ GP1A07x series	82

<Reflective type>

Output type	Package type	Outline	Mounting method	Model No. (series)	Page
Single phototransistor	Leadless	Long focal distance	Surface-mount type	GP2S700HCP	82
High response speed	Compact, thin (leadless)	General purpose	Surface-mount type	GP2S60	82
OPIC output	With connector	Light modulation type, Sensitivity adjusted	Screw mounting type/ Compact snap-in/ Inverter light countermeasures	GP2A2x series/GP2A200LCS0F/ GP2A231LRSAF/GP2A240LCS0F/ GP2A250LCS0F	83

<Application-specific photointerrupter lineup>

Detection type	Outline (Output type etc.)		Mounting method	Model No. (series)	Page
Transmissive type	With connector With actuator (Phototransistor output)		Snap-in	GP1S44S1J00F▲	84
	With connector With actuator (OPIC output)		Snap-in	GP1A44E1J00F▲	84
	Case type With encoder function Digital output (phase A/B)	Resolution: 45 LPI Linear scale slit pitch: 0.56 mm	PWB mounting type	GP1A057SGKLF	85
		Resolution: 150 LPI Linear scale slit pitch: 0.17 mm	PWB mounting type/ Screw mounting type	GP1A038RBK0F/GP1A046RBZLF/ GP1A047RBZLF/GP1A057RBKLF	85
		Resolution: 180 LPI Linear scale slit pitch: 0.14 mm	PWB mounting type/ Screw mounting type	GP1A038RCK0F/GP1A054RCKLF/ GP1A058SCK0F	85
		Resolution: 300 LPI Linear scale slit pitch: 0.0847 mm	PWB mounting type	GP1A057RDKLF	85
	Case type With encoder function Digital output (Capable of multiplying output)	Resolution: 150 LPI Linear scale slit pitch: 0.17 mm	PWB mounting type	GP1A101B2KSF	85
		Resolution: 180 LPI Linear scale slit pitch: 0.14 mm	PWB mounting type	GP1A101C2KSF	85
	For amusement use		Screw mounting	GP1A204HCS0	85
Reflective type	Injection For prism system (Single phototransistor)		Screw mounting	GP2S29SVJ00F	86

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

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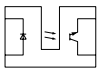
■ Photointerrupters

<Transmissive type>

◆Single phototransistor output

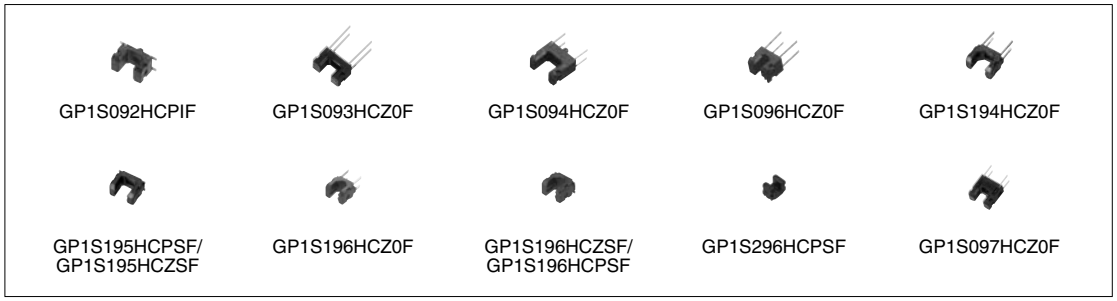
<Compact type>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (kΩ)	V_{CE} (V)
GP1S092HCPIF		Wide gap, for soldering reflow, surface mount compatible, with positioning boss (4.5 × 2.6 × 2.9 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5
GP1S093HCZ0F		Wide gap (4.5 × 2.6 × 2.9 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5
GP1S094HCZ0F		Wide gap, with positioning pin, (5.5 × 2.6 × 4.8 [height] mm)	3.0	0.3	0.8	5	5	50	0.1	1	5
GP1S096HCZ0F		Narrow gap (3.5 × 2.6 × 2.9 [height] mm)	1.0	0.3	2.0	5	5	50	0.1	1	5
GP1S194HCZ0F		Compact, wide gap, size: 3.6 × 2.0 × 2.7 (height) mm	1.7	0.3	3.0	5	5	50	0.1	1	5
GP1S195HCZSF GP1S195HCPSF		Compact, wide gap, surface mount compatible, size: 3.4 × 2.0 × 2.7 (height) mm	1.5	0.3	3.0	5	5	50	0.1	1	5
GP1S196HCZ0F		Compact, Low profile (3.1 × 2.0 × 2.7 [height] mm)	1.1	0.3	2.0	5	5	50	0.1	1	5
GP1S196HCZSF GP1S196HCPSF		Surface mount, for soldering reflow, compact, low profile (3.1 × 2.0 × 2.7 [height] mm)	1.1	0.3	2.0	5	5	50	0.1	1	5
GP1S296HCPSF		Surface mount, for soldering reflow, compact, Low profile (2.5 × 1.8 × 1.9 [height] mm)	1.0	0.2	3.0	5	5	50	0.1	1	5
GP1S097HCZ0F		High resolution, wide gap, with mounting hole (4.5 × 2.6 × 4.5 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5

✳ Topr: –25 to +85 °C

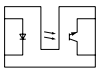
✳✳ GP1SxxxHCZxF: Sleeve package, GP1SxxxHCPxF: Taped package



RoHS Pb FREE

<Case type>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
GP1S566VJ00F▲		Long case, snap-in mounting type	3.0	0.5	2.5	20	5	3	2	100	2
GP1S50J0000F		High resolution, both-side mounting type	3.0	0.5	2.5	20	5	3	2	100	2
GP1S51VJ000F*1		High resolution, side mounting type	3.0	0.5	2.5	20	5	3	2	100	2
GP1S52VJ000F*1		High resolution, PWB mounting type	3.0	0.5	2.5	20	5	3	2	100	2
GP1S53VJ000F		High resolution, PWB mounting type	5.0	0.5	2.5	20	5	3	2	100	2
GP1S54J0000F		High resolution, with positioning pin, PWB mounting type	3.0	0.5	2.5	20	5	3	2	100	2
GP1S56TJ000F		High resolution, with positioning pin, PWB mounting type	2.0	0.15	2.0	20	5	38	0.5	1 000	2
GP1S58VJ000F		High resolution, with positioning pin, PWB mounting type	5.0	0.5	2.5	20	5	3	2	100	2
GP1S59J0000F		High resolution, horizontal slit, with positioning pin, PWB mounting type	4.2	0.5	2.5	20	5	3	2	100	2

⁂ Topr: –25 to +85 °C
*1 Highly reliable types: GP1SQ51VJ00F, GP1SQ52J000F, and GP1SQ53VJ00F are also available.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.


GP1S566VJ00F ▲


GP1S50J0000F


GP1S51VJ000F


GP1S52VJ000F


GP1S53VJ000F


GP1S54J0000F


GP1S56TJ000F


GP1S58VJ000F


GP1S59J0000F

Optoelectronics

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☆New product

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<With connector>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
GP1S74PJ000F		Snap-in mounting type with connector Applicable to 3 kinds of thickness of mounting boards	5.0	0.5	2.5	20	5	3	2	100	2
GP1S173LCS2F		Snap-in mounting integrated connector type Applicable to 3 kinds of thickness of mounting boards	5.0	0.5	2.5	20	5	3	2	100	2
☆GP1S273LCS1F		Snap-in mounting integrated connector type Applicable to 3 kinds of thickness of mounting boards Compact (Compatible with 1.5 mm pitch connector)	5.0	0.7	2.5	20	5	3	2	100	2

✳ Topr: –25 to +85 °C, –30 to +95 °C (GP1S173LCS2F, GP1S273LCS1F)


GP1S74PJ000F


GP1S173LCS2F


GP1S273LCS1F

◆Darlington phototransistor output

<Case type>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
GP1L50J0000F		High sensitivity, both-side mounting type	3.0	0.5	50	1	2	80	2	100	2
GP1L51J0000F		High sensitivity, side mounting type	3.0	0.5	50	1	2	80	2	100	2
GP1L52VJ000F		High sensitivity, PWB mounting type	3.0	0.5	50	1	2	80	2	100	2
GP1L53VJ000F		High sensitivity, PWB mounting type	5.0	0.5	30	1	2	80	2	100	2
GP1L57J0000F		High sensitivity, wide gap, PWB mounting type	10.0	1.8	70	1	2	130	2	100	2

✳ Topr: –25 to +85 °C


GP1L50J0000F


GP1L51J0000F


GP1L52VJ000F


GP1L53VJ000F


GP1L57J0000F

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◆OPIC type

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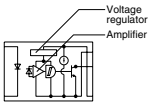
<Compact type>

(Ta = 25°C)

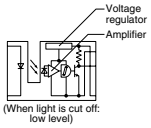
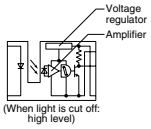
Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics							
					Threshold input current			Propagation delay time				
					I_{FLH} (mA) MAX.	I_{FHL} (mA) MAX.	V_{CC} (V)	t_{PLH} (µs) TYP.	t_{PHL} (µs) TYP.	I_F (mA)	R_L (kΩ)	V_{CC} (V)
GP1A98HCZ0F		Compact, PWB mounting	3.2	0.5	8	–	3.3 to 24	2.0	10.0	10	3.9 to 20	3.3 to 24

✻ Topr = –25 to +85°C

GP1A98HCZ0F

<Case type>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics							
					Threshold input current			Propagation delay time				
					I_{FLH} (mA) MAX.	I_{FHL} (mA) MAX.	V_{CC} (V)	t_{PLH} (µs) TYP.	t_{PHL} (µs) TYP.	I_F (mA)	R_L (Ω)	V_{CC} (V)
GP1A50HRJ00F	 (When light is cut off: low level)	Both-side mounting, with screw hole	3.0	0.5	5	–	5	3	5	5	280	5
GP1A51HRJ00F		Side mounting, with screw hole	3.0	0.5	5	–	5	3	5	5	280	5
GP1A52HRJ00F		PWB mounting type	3.0	0.5	5	–	5	3	5	5	280	5
GP1A53HRJ00F		PWB mounting type	5.0	0.5	8	–	5	3	5	8	280	5
GP1A57HRJ00F		PWB mounting type, with positioning pin	10.0	1.8	7	–	5	3	5	7	280	5
GP1A58HRJ00F		PWB mounting type, with positioning pin	5.0	0.5	8	–	5	3	5	8	280	5
GP1A52LRJ00F	 (When light is cut off: high level)	PWB mounting type	3.0	0.5	–	5	5	5	3	5	280	5

✻ Topr = –25 to +85°C

GP1A50HRJ00F

GP1A51HRJ00F

GP1A52LRJ00F
(GP1A52HRJ00F)

GP1A53HRJ00F
(GP1A58HRJ00F with positioning pin)

GP1A57HRJ00F

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☆New product

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◆OPIC type

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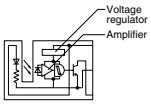
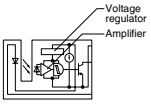
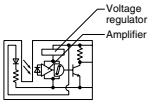
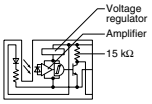
<With 3-pin connector terminal>

(Ta = 25°C)

Model No.	Internal connection diagram	Features		Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics					
						Supply voltage Vcc (V)		Low level output voltage			
						MIN.	MAX.	VOL (V) MAX.	Light cut-off	IOL (mA)	Vcc (V)
GP1A05AJ000F▲		with 3-pin connector	Either-side mounting type	5.0	0.5	4.5	5.5	0.35	No	16	5
GP1A05A2J00F▲			Either-side mounting type	5.0	0.5	4.5	5.5	0.35	No	16	5
GP1A05A5J00F▲			Either-side mounting type	5.0	0.5	4.5	5.5	0.35	No	16	5
GP1A173LCS2F			Snap-in mounting integrated connector type	5.0	0.5	4.5	5.5	0.35	No	4	5
☆GP1A273LCS1F			Integrated connector, compatible with 1.5 mm pitch connector, snap-in mounting type	5.0	0.7	4.5	5.5	0.35	No	4	5
GP1A73AJ000F			Compact, snap-in mounting type	5.0	0.5	4.5	5.5	0.35	No	4	5
GP1A073LCS			Compact, snap-in mounting type, low voltage operation	5.0	0.5	2.7	5.5	0.35	No	4	5
GP1A75EJ000F			Either-side mounting type	5.0	0.5	4.5	5.5	0.35	Yes	16	5
GP1A05EJ000F▲			Either-side mounting type Screw mounting type	5.0	0.5	4.5	5.5	0.4	Yes	16	5
GP1A05E2J00F▲				5.0	0.5	4.5	5.5	0.4	Yes	16	5

✻ Topr: –20 to +75°C, –30 to +95 °C (GP1A173LCS2F)

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

GP1A05AJ000F ▲ (GP1A05EJ000F ▲)

GP1A05A2J00F ▲ (GP1A05E2J00F ▲)

GP1A05A5J00F ▲

GP1A73AJ000F, GP1A073LCS

GP1A173LCS2F

GP1A273LCS1F

GP1A75EJ000F

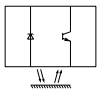
■ Photointerrupters

<Reflective type>

◆Single phototransistor output

<Compact>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Standard detecting distance (mm)	Electro-optical characteristics						
				Current transfer ratio			Response time			
				CTR (%) MIN.	IF (mA)	VCE (V)	tr (μs) TYP.	IC (mA)	RL (kΩ)	VCE (V)
GP2S700HCP		Compact (4 × 3 × 2 [height] mm), long focal distance, surface mounting leadless type	3	1.5	4	2	20	0.1	1	2
GP2S60		Thin (3.2 × 1.7 × 1.1 [height] mm), surface mounting leadless type	0.5	1.0	4	2	20	0.1	1	2

✻ Topr: –25 to +85°C

GP2S700HCP

GP2S60

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◆OPIC output

("OPIC" (Optical IC) is a trademark of SHARP Corporation. An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.)

<With 3-pin connector terminal>

(Ta = 25°C)

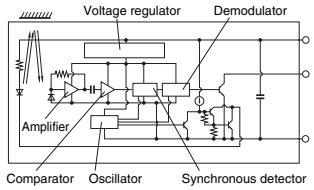
Model No.	Internal connection diagram	Features	Optimum detecting distance (mm)	Electro-optical characteristics					
				Supply voltage V_{CC} (V)		Dissipation current		Low level output voltage	
				MIN.	MAX.	I_{CC} (mA) MAX.	V_{CC} (V)	V_{OL} (V) MAX.	V_{CC} (V)
GP2A200LCS0F	(Following diagram [A])	Multi types of paper detectable, light modulation type, with connector, sensitivity adjusted	5 to 15	4.75	5.25	30*1	5	0.4	5
GP2A240LCS0F		Improved light-resistance characteristic for inverter lighting, light modulation type, with connector, sensitivity adjusted	5 to 15	4.75	5.25	30*1	5	0.4	5
GP2A250LCS0F		Static electricity resistant, improved light-resistance characteristic for inverter lighting, light modulation type, with connector, sensitivity adjusted	5 to 15	4.75	5.25	30*1	5	0.4	5
GP2A25J0000F		Multi types of paper detectable, light modulation type, with connector, sensitivity adjusted	3 to 7	4.75	5.25	30*1	5	0.4	5
GP2A231LRSAF	(Following diagram [B])	Compact, hook type, multi types of paper detectable, light modulation type, with connector, sensitivity adjusted	3 to 7	4.75	5.25	20*1	5	0.4	5
GP2A25NJJ00F	(Following diagram [A])	Multi types of paper detectable, light modulation type, sensitivity adjusted, applicable to inverter fluorescent lamp, built-in visible light cut filter	3 to 7	4.75	5.25	30*1	5	0.4	5
GP2A25DJ000F		Multi types of paper detectable, light modulation type, with connector, sensitivity adjusted	3 to 7	4.75	5.25	30*1	5	0.4	5
GP2A28AJ000F		Multi types of paper detectable, light modulation type, with connector, sensitivity adjusted, hook type	3 to 7	4.75	5.25	30*1	5	0.4	5

✻ Topr: −10 to +60°C (GP2A25J0000F, etc.)
−10 to +70°C (GP2A200LCS0F, GP2A240LCS0F, GP2A250LCS0F)

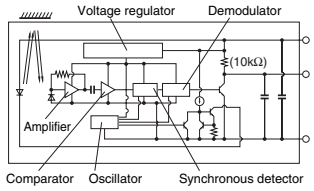
*1 Smoothing value $R_L = \infty$

[Internal connection diagram]

[A]



[B]



GP2A25J0000F
(GP2A25NJJ00F, GP2A200LCS0F, GP2A240LCS0F)

GP2A250LCS0F

GP2A25DJ000F

GP2A231LRSAF

GP2A28AJ00F

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■ Photointerrupters for Specific Applications

◆Transmissive type

<Single phototransistor output type with actuator and 3-pin connector terminal>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Actuator lever starting torque (Initial)	Electro-optical characteristics*1									
				Light beam interrupted					Light beam uninterrupted				
				Dissipation current		Collector current			Dissipation current		Collector current		
				I_{CC1} (mA)	V_{CC} (V)	I_{C1} (μA)	V_{CC} (V)	V_O (V)	I_{CC2} (mA)	V_{CC} (V)	I_{C2} (mA)	V_{CC} (V)	V_O (V)
GP1S44S1J00F▲		Spring lever type actuator United with connector	1×10^{-4} N•m or less	20 MAX.	5	50 MAX.	5	5	20 MAX.	5	0.25 MIN.	5	5

※ Topr: –25 to +75 °C
*1 Operating voltage: 4.5 to 5.5 V
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

GP1S44S1J00F ▲

<OPIC type with actuator and 3-pin connector terminal>

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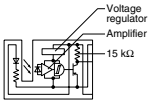
(Ta = 25°C)

Model No.	Internal connection diagram	Features	Actuator lever starting torque	Electro-optical characteristics*1									
				Light beam interrupted					Light beam uninterrupted				
				Dissipation current		Low level output voltage			Dissipation current		High level output voltage		
				I_{CCL} (mA)	V_{CC} (V)	V_{OL} (V)	V_{CC} (V)	I_{OL} (mA)	I_{CCH} (mA)	V_{CC} (V)	V_{OH} (V)	V_{CC} (V)	R_L (kΩ)
GP1A44E1J00F▲		Spring lever type actuator, united with connector	1×10^{-4} N•m or less	20 MAX.	5	0.4 MAX.	5	16	20 MAX.	5	Vcc × 0.9 MIN.	5	47

※ Topr: –25 to +75 °C
*1 Operating voltage: 4.5 to 5.5 V
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

GP1A44E1J00F ▲

☆New product

RoHS Pb FREE

<Case type, with encoder function>

(Ta = 25°C)

Model No.	Absolute maximum ratings		Electro-optical characteristics					
	Vcc (V)	Topr (°C)	Operating voltage Vcc (V) TYP.	Output signal	Resolution	Response frequency (kHz) MAX.	Response frequency IF (mA)	Dissipation current (output side) Icc (mA) MAX.
GP1A038RBK0F▲	7	−10 to +70	5	Digital output (Phase A/B)	Linear scale slit pitch 0.17 (mm) (150LPI)	20	11	5
GP1A038RCK0F▲	7	−10 to +70	5		Linear scale slit pitch 0.14 (mm) (180LPI)	20	11	5
GP1A046RBZLF▲	6	0 to +60	3.3		Linear scale slit pitch 0.17 (mm) (150LPI)	50	15	7
GP1A047RBZLF▲	6	0 to +60	3.3		Linear scale slit pitch 0.17 (mm) (150LPI)	60	20	7
GP1A054RCKLF	6	−10 to +70	3.3		Linear scale slit pitch 0.14 (mm) (180LPI)	40	20	5.5
GP1A057RBKLF	6	−10 to +70	3.3		Linear scale slit pitch 0.17 (mm) (150LPI)	60	20	7
GP1A057RDKLF	6	−10 to +70	3.3		Linear scale slit pitch 0.0847 (mm) (300LPI)	60	20	5.5
GP1A057SGKLF	6	−10 to +70	3.3		Linear scale slit pitch 0.56 (mm) (45LPI)	25	20	5.5
GP1A058SCK0F	6	−10 to +70	3.3		Linear scale slit pitch 0.14 (mm) (180LPI)	40	20	5.5
GP1A101B2KSF	6.5	−10 to +70	3.3	Digital output (Capable of multiplying output)	Linear scale slit pitch 0.17 (mm) (150LPI)	120	20	20
GP1A101C2KSF	6.5	−10 to +70	3.3		Linear scale slit pitch 0.14 (mm) (180LPI)	120	20	20

* High precision read and low affection of angle error from vibration thanks to the multi-segment PD system.
Duty ratio: 50±15%, phase difference: 90±45°
Duty ratio: 50±13.9%, phase difference: 90±30° (GP1A046RBZLF only)
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.


GP1A038RBK0F ▲
(GP1A038RCK0F ▲)


GP1A046RBZLF ▲


GP1A047RBZLF ▲


GP1A054RCKLF

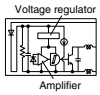

GP1A057RBKLF
(GP1A057RDKLF
GP1A057SGKLF)


GP1A058SCK0F


GP1A101B2KSF
(GP1A101C2KSF)

<For amusement use>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics					
					Operating voltage Vcc (V)		Low level output voltage			
					MIN.	MAX.	VOL (V) MAX.	Light cut-off	IOL (mA)	VCC (V)
☆GP1A204HCS0		Connector with lock, screw mounting type, high resistant to noise	4.0	0.5	10.8	24	0.4	Yes	5	10.8 to 24


GP1A204HCS0

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☆New product

◆Reflective type

<Case type, phototransistor output>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Electro-optical characteristics						
			Peak photocurrent			Response time			
			I_{CP} (mA)	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (kΩ)	V_{CE} (V)
☆GP2S29SVJ00F		Long focal distance (with prism system*1), compact, screw mounting type	0.4 to 3.0*1	20	5	38	0.5	1	2

✻ Topr: –25 to +85°C *1 Space between prism and sensor is 8 mm.

GP2S29SVJ00F

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■ Phototransistor Lineup

Package	Output type	Features	Half sensitivity angle	Model No.	
				Standard	Visible light cut-off
Epoxy resin with lens (ø3 mm)	Single phototransistor	General purpose	±20°	PT380	PT380F
	Darlington phototransistor	High sensitivity	±20°	PT381	PT381F
Epoxy resin with lens	Single phototransistor	General purpose/Narrow acceptance	±13°	PT480E00000F	PT480FE0000F
		Compact, thin	±35°	PT4800E0000F	PT4800FE000F / PT4850FE000F
	Darlington phototransistor	High sensitivity/Narrow acceptance	±13°	PT481E00000F	PT481FE0000F
		High sensitivity/Narrow acceptance/Long lead	±13°	—	PT483F1E000F
		High sensitivity/Compact, thin	±35°	PT4810E0000F	PT4810FJE00F
		High sensitivity/Intermediate acceptance	±40°	—	PT491FE0000F
		High sensitivity/Intermediate acceptance/Long lead	±40°	—	PT493FE0000F
Surface mounting leadless type	Single phototransistor	Compact	±60°	PT600T	—
		Compact (surface mounting type)	±70°	PT200MC0NP	—
		Compact (infrared cut type)	±60°	PT202MR0MP1	—
		Compact (side view/top view mounting possible)	±15°	PT100MC0MP	PT100MF0MP
	Darlington phototransistor	Compact	±60°	PT601T	—
		Compact (side view/top view mounting possible)	±15°	—	PT100MF1MP

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■ Phototransistors

Type	Model No.	Package	Absolute maximum ratings			Ic (mA)				ICEO(A)		Δθ (°)	λp (nm)
			VCEO (V)	PC (mW)	Topr (°C)	MIN.	MAX.	VCE (V)	Ee (mW/cm²)	MAX.	VCE (V)	TYP.	TYP.
Single	PT380*3	ø3 epoxy resin	35	50	–25 to +85	0.16	1.17	5	Ev, 100 lx	1×10^{-7}	20	±20	800
	PT380F*1, 3		35	50	–25 to +85	0.095	0.9	5	Ev, 100 lx	1×10^{-7}	20	±20	860
	PT600T*3	Surface mounting leadless type	35	50	–25 to +85	0.7	TYP. 3.5	5	5	1×10^{-7}	20	±60	880
	PT200MC0NP*3		50	50	–25 to +85	0.016	0.059	5	0.1	1×10^{-7}	20	±70	930
	PT202MR0MP1*2, 3		5	5	–30 to +85	—	TYP. 0.043	1.5	Ev, 100 lx	1×10^{-7}	1.5	±60	620
	PT100MC0MP	Surface mounting leadless type with lens	35	75	–30 to +85	1.7	5.1	5	1	1×10^{-7}	20	±15	900
	PT100MF0MP*1		35	75	–30 to +85	1.15	3.45	5	1	1×10^{-7}	20	±15	910
	PT480E00000F	Epoxy resin with lens	35	75	–25 to +85	0.4	TYP. 1.7	5	1	1×10^{-7}	20	±13	800
	PT480FE0000F*1		35	75	–25 to +85	0.25	TYP. 0.8	5	1	1×10^{-7}	20	±13	860
	PT4800E0000F		35	75	–25 to +85	0.12	TYP. 0.4	5	1	1×10^{-7}	20	±35	800
	PT4800FE000F*1		35	75	–25 to +85	0.08	TYP. 0.25	5	1	1×10^{-7}	20	±35	860
	PT4850FE000F*1		35	75	–25 to +85	0.12	0.56	5	1	1×10^{-7}	20	±35	860
Darlington	PT381*3	ø3 epoxy resin	35	50	–25 to +85	0.12	1.5	10	Ev, 2 lx	1×10^{-6}	10	±20	800
	PT381F*1, 3		35	50	–25 to +85	0.07	1.08	10	Ev, 2 lx	1×10^{-6}	10	±20	860
	PT481E00000F	Epoxy resin with lens	35	75	–25 to +85	1.5	25	2	0.1	1×10^{-6}	10	±13	800
	PT481FE0000F*1		35	75	–25 to +85	0.9	27	2	0.1	1×10^{-6}	10	±13	860
	PT4810E0000F		35	75	–25 to +85	0.45	7.0	2	0.1	1×10^{-6}	10	±35	800
	PT4810FJE00F*1		35	75	–25 to +85	0.27	6.0	2	0.1	1×10^{-6}	10	±35	860
	PT483F1E000F*1		35	75	–25 to +85	1.5	4.0	2	0.1	1×10^{-6}	10	±13	860
	PT491FE0000F*1		35	75	–25 to +85	0.2	0.8	2	Ev, 2 lx	1×10^{-6}	10	±40	860
	PT493FE0000F*1		35	75	–25 to +85	0.2	0.8	2	Ev, 2 lx	1×10^{-6}	10	±40	860
	PT601T*3	Leadless chip type	35	50	–25 to +85	0.03	0.3	10	0.01	1×10^{-6}	10	±60	880
	PT100MF1MP*1	Surface mounting leadless type with lens	35	75	–30 to +85	0.2	1.2	5	0.01	1×10^{-6}	10	±15	860

*1 Visible light cut-off type *2 Infrared cut-off type *3 Handled by the LED division.

PT600T
(PT601T)

PT200MC0NP

PT202MR0MP1

PT100MF0MP
(PT100MF1MP, PT100MC0MP: Transparent resin)

PT380
(PT380F, PT381 PT381F)

PT480E00000F
(PT480FE0000F, PT481E00000F, PT481FE0000F)

PT4800E0000F
(PT4800FE000F, PT4810E0000F, PT4810FJ00F, PT4810FJE00F, PT4850FE000F)

PT483F1E000F

PT491FE0000F

PT493FE0000F

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■ PIN Photodiodes

(Ta = 25°C)

Model No.	Features	Package (Material)	Active area (mm^2)	Topr (°C)	Isc (μA) MIN.	Ev (lx)	Id (A) MAX.	V_R (V)	tr, tf (μs) TYP.	V_R (V)	R_L (kΩ)	λp (nm) TYP.
PD410PI2E00F*1	PIN type	Visible light cut-off epoxy resin with condenser (lens)	3.31	–25 to +85	2.5	100	1×10^{-8}	10	0.2	10	1	1 000
PD411PI2E00F		Epoxy resin with transparent condenser (lens)	3.31	–25 to +85	5.0	100	1×10^{-8}	10	0.2	10	1	960
PD412PI2E00F		Epoxy resin with transparent condenser (lens)	3.31	–25 to +85	3.5	100	1×10^{-8}	10	0.25	10	1	800
PD413PI2E00F*1	PIN type IrDA1.0	Visible light cut-off epoxy resin with condenser (lens)	3.31	–25 to +85	MIN. 4.5 (TYP. 5.4)	100	1×10^{-8}	10	0.2	10	1	960
PD60T*2	Chip device type	Transparent resin	–	–25 to +85	TYP. 4	1 000	1×10^{-8}	10	0.1	10	1	960
PD100MC0MP	Surface mounting leadless type	Transparent epoxy resin board with lens	–	–30 to +85	0.6	100	1×10^{-8}	10	0.01	15	0.18	820
PD100MF0MP*1	Surface mounting leadless type	Visible light cut-off epoxy resin board with lens	–	–30 to +85	0.4	100	1×10^{-8}	10	0.01	15	0.18	850

*1 Visible light cut-off type *2 Handled by the LED division.

PD410PI2E00F
(PD411PI2E00F: transparent; PD412PI2E00F: transparent, PD413PI2E00F)

PD60T

PD100MC0MP
(PD100MF0MP: black)

■ Blue Sensitive Photodiode

(Ta = 25°C)

Model No.	Features	Package (Material)	Active area (mm^2)	Topr (°C)	Isc (μA) MIN.	Ev (lx)	Id (A) MAX.	V_R (V)	λp (nm) TYP.
BS520E0F▲	Planer type	Resin (black)	5.34	–20 to +60	0.4	100	1×10^{-11}	1	560

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

BS520E0F ▲
(with filter)

■ Laser Power Monitoring Photodiodes for Optical Disc System

(Ta = 25°C)

Model No.	Features	Package (Material)	Active area (mm)	Topr (°C)	Isc (mA) TYP.	Ev (lx)	Id (A) MAX.	V_R (V)	λp (nm) TYP.
PD101SC0SS1F	High response speed (cut-off frequency: 400 MHz)	Transparent epoxy resin	ø0.8	–25 to +85	450	100	1×10^{-9}	5	820
PD102TS0MP0F	High response speed (cut-off frequency: 400 MHz) For blue-violet laser diode (Light receiving sensitivity: TYP. 0.25 A/W at λ = 405 nm)	Silicon resin	ø0.7	–40 to +80	217	Ee = 54 μW/cm^2	1.5×10^{-9}	5	760

PD101SC0SS1F

PD102TS0MP0F

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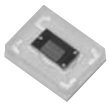
■ RGB Color Sensor

(Ta = 25°C)

Model No.	Features	Package	Peak sensitivity wavelength (nm)			Light receiving sensitivity (A/W) TYP.			Topr (°C)
			Blue	Green	Red	Blue	Green	Red	
PD30CMC31MZ	RGB 3-color LED compatible 3-PD structure Filter-on chip structure allows for both infrared light reducing characteristics and a more compact size (1.1 mm thick)	Surface mounting 3 x 4 mm	460	540	620	0.18	0.23	0.16	–40 to +85



PD30CMC31MZ

■ OPIC Light Detectors

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(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings				Electro-optical characteristics							
			V_{CC} (V)	P (mW)	I_O (mA)	Topr (°C)	E_{VLH} (lx) MAX.	E_{VHL} (lx) MAX.	V_{CC} (V)	t_{PLH} (µs) TYP.	t_{PHL} (µs) TYP.	V_{CC} (V)	E_V (lx)	R_L (Ω)
IS485E	Built-in schmidt trigger circuit, amplifier and voltage regulator	Transparent epoxy resin with condenser (lens)	–0.5 to +17	175	50	–25 to +85	–	35	5	5	3	5	50	280
IS486E			–0.5 to +17	175	50	–25 to +85	35	–	5	3	5	5	50	280

IS485E
(IS486E)

<Low-voltage operation>

(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings			Electro-optical characteristics								
			P (mW)	I_O (mA)	Topr (°C)	Operating supply voltage (V)	E_{VLH} (lx) MAX.	E_{VHL} (lx) MAX.	V_{CC} (V)	t_{PHL} (µs) TYP.	t_{PLH} (µs) TYP.	V_{CC} (V)	E_V (lx)	R_L (Ω)
IS489E	Built-in Schmidt trigger circuit and amplifier	Transparent epoxy resin with condenser (lens)	80	2	–25 to +85	1.4 to 7.0	–	15	3	1.3	8.5	3	125	3 000

IS489E

<Model employing a light modulation system>

(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings				Electro-optical characteristics*2						External disturbing light illuminance E_{VDX}(lx) TYP.
			V_{CC} (V)	P (mW)	I_O (mA)	Topr (°C)	V_{OL} (V) MAX.	V_{OH} (V) MIN.	t_{PLH} (µs) TYP.	t_{PHL} (µs) TYP.	V_{CC} (V)	R_L (Ω)	
IS471FE*1, *3	Built-in pulse driver circuit at the emitter side, synchronous detector circuit, amplifier circuit and demodulator circuit	Visible light cut-off epoxy resin	–0.5 to +16	250	50	–25 to +60	0.35	4.97	400	400	5	280	7 000

*1 IS471FE is less susceptible to disturbing effects thanks to the light modulation system
*2 Vcc = 5 V
*3 Straight lead type (IS471FSE) is also available.

IS471FE

<For laser beam printers (laser beam origin detection)>

(Ta = 25°C)

Model No.	Type	Package	Electro-optical characteristics			
			Recommended supply voltage V_{CC} (V)	V_{OH} (V) MIN.	V_{OL} (V) MAX.	H → L delay time variation Δt_{PHL} (ns) MAX.
GA220T2L1IZ	2-PD, differential type	Transparent epoxy resin 18-pin	4.5 to 5.5	4.9	0.6	±8.5

GA220T2L1IZ

Optoelectronics

☆New product

<Ambient light sensors>

(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings			Electro-optical characteristics					
			V_{CC} (V)	I_O (mA)	Topr (°C)	Recommended supply voltage V_{CC} (V)	Recommended illuminance range Ex (lx)	Dissipation current Icc (μA) TYP.	Peak sensitivity wavelength λp (nm)	Output current I_{O1} (μA) TYP.	Output current I_{O2} (μA) TYP.
GA1A2S100SS	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Linear current output for illuminance Lead frame (straight) type	Transparent epoxy resin (3 × 4 mm)	7.0	5	–40 to +85	2.7 to 3.6	10 to 10 000	500	555	480 (at Ev = 1 000 lx)	48 (at Ev = 100 lx)
GA1A2S100LY	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Linear current output for illuminance Lead frame (L bend) type		7.0	5	–40 to +85	2.7 to 3.6	10 to 10 000	500	555	480 (at Ev = 1 000 lx)	48 (at Ev = 100 lx)
GA1A1S202WP	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Logarithmic current output for illuminance	Compact (2.0 × 1.6 × 0.6 mm) Leadless	7.0	1	–40 to +85	2.3 to 3.2	3 to 55 000	70	555	20 (at Ev = 100 lx)	30 (at Ev = 1 000 lx)
☆GA1A1S203WP		Compact (2.0 × 1.6 × 0.42 mm) Leadless	7.0	1	–40 to +85	2.3 to 3.2	3 to 55 000	70	555	20 (at Ev = 100 lx)	30 (at Ev = 1 000 lx)
GA1A1S100WP	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Linear current output for illuminance	Compact (2.0 × 1.6 × 0.6 mm) Leadless	7.0	10	–40 to +85	2.7 to 3.6	10 to 5 000	1 460	555	1420 (at Ev = 1 000 lx)	142 (at Ev = 100 lx)

<Ambient light sensors>

(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings		Electro-optical characteristics					
			V_{CC} (V)	Topr (°C)	Recommended supply voltage V_{CC} (V)	Illuminance range Ex (lx)	Dissipation current Icc (μA) TYP.	Peak sensitivity wavelength λp (nm)	Output voltage High VOH (V) MIN.	Output voltage Low VOL (V) MAX.
☆GA1A3S300CP	Built-in brightness adjustment function I^2C interface Capable of 16-level luminosity set up Spectral sensitivity characteristics close to human visual sensitivity Output characteristic: digital voltage output (PWM output)	Compact CSP (1.25 × 1.75 × 0.65 mm)	7.0	–20 to +60	2.3 to 3.6	3 to 55 000	120	555	Vcc-0.5	0.5

GA1A2S100SS

GA1A2S100LY

GA1A1S202WP
(GA1A1S100WP)

GA1A1S203WP

GA1A3S300CP

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<Optical disk devices for RF signal detection>

(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings			Electro-optical characteristics					
			Vcc (V)	P (mW)	Topr (°C)	Icc (mA) TYP.	Vcc (V)	Response frequency fc*1 (MHz) TYP.	Vcc (V)	Output noise level Vn Main Ch. (dBm) TYP.	f (Hz)
GA202TXV17K▲ GA202TXV17M▲	For 2-wavelength laser (For DVD player), 10-division PD pattern (GA202TXV17M: Moisture-proof package)	Transparent 12-pin package (3.0 x 4.0 mm)	6.0	–	–30 to +80	MAX. 19	5	–	–	–	–

*1 (RF/main) ... 650 nm, RF/main ... 780 nm

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

GA202TXV17K ▲

■ Infrared Emitting Diode Lineup

Type	Package	Features		Half intensity angle	Model No.
Single-end lead	Epoxy resin with lens (ø3 mm type)	General purpose		±13°	GL380
(Top view type)		High output type		±13°	GL381
		High speed signal transmission (12 MHz)		±17°	GL382
	Epoxy resin (Arch type)	General purpose		±18°	GL390 ▲
		Low forward voltage type		±18°	GL390V ▲
Single-end lead	Epoxy resin with lens	General purpose/Narrow beam angle		±13°	GL480E00000F
(Side view type)		Compact and thin		±30°	GL4800E0000F
	Flat epoxy resin	Wide beam angle		±90°	GL4100E0000F
	Epoxy resin with lens	Compact package, bi-directional emitting type		Bidirectional	GL453E00000F ▲
Single-end lead	Epoxy resin with lens (ø5 mm type)	Low forward voltage type		±21°	GL560
(Top view type)		Low forward voltage type/Narrow beam angle		±13°	GL561
		High output type		±25°	GL537
		High output type/Narrow beam angle		±13°	GL538
Surface mount type	Leadless	Compact		±60°	GL610T
	Epoxy resin with lens/ leadless	Compact/Narrow beam angle		±10°	GL100MN0MP
	(Mountable for Top view/ Side view type)		High output type (Output: radiant flux/ radiant intensity indicated)	±10°/ ±9°	GL100MN1MP / GL100MN3MP
		Compact/Wide beam angle		±80°	GL100MD1MP1

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■ Infrared Emitting Diodes

(Ta = 25°C)

Model No.	Package, features	Absolute maximum ratings				Radiant flux Φe (mW)			V_F (V)			Δθ (°)	λp (nm)
		I_F (mA)	V_R (V)	P (mW)	Topr (°C)	MIN.	TYP.	I_F (mA)	TYP.	MAX.	I_F (mA)	TYP.	TYP.
GL380*2	ø3 epoxy resin	60	6	150	–25 to +85	4.5*1	11*1	50	1.3	1.5	50	±13	950
GL381*2		60	6	150	–25 to +85	8.5*1	20*1	50	1.3	1.5	50	±13	950
GL382*2	ø3 epoxy resin, for high speed signal transmission:12 MHz	60	4	–	–25 to +85	6	18	50	1.5	1.7	50	±17	880
GL390 ▲*2	Arch type	60	6	150	–25 to +85	7*1	13*1	50	1.3	1.5	50	±18	950
GL390V ▲*2		60	6	150	–25 to +85	9*1	16*1	50	1.3	1.5	50	±18	950
GL453E00000F ▲	Epoxy resin with bidirectional lens	50	6	75	–25 to +85	0.85	1.3	20	1.2	1.5	20	(Bidirectional)	950
GL480E00000F	Epoxy resin with lens	50	6	75	–25 to +85	0.7	–	20	1.2	1.4	20	±13	950
GL4800E0000F		50	6	75	–25 to +85	0.7	1.6	20	1.2	1.4	20	±30	950
GL4100E0000F	Side-view flat type, epoxy resin	50	6	75	–25 to +85	1.0	–	20	1.2	1.4	20	±90	950
GL560*2	ø5 epoxy resin	100	6	150	–25 to +85	5*1	14*1	50	1.25	1.37	50	±21	940
GL561*2		100	6	150	–25 to +85	12*1	25*1	50	1.25	1.37	50	±13	940
GL537*2		100	6	150	–25 to +85	6*1	13*1	50	1.3	1.5	50	±25	950
GL538*2		100	6	150	–25 to +85	15*1	30*1	50	1.3	1.5	50	±13	950
GL610T*2	Leadless chip type	50	6	150	–25 to +85	0.7	2	20	1.3	1.5	50	±60	950
GL100MN0MP	Surface mounting leadless type, epoxy resin board with lens	50	6	75	–30 to +85	1.0	3.0 (MAX.)	20	1.2	1.4	20	±10	940
GL100MN1MP	Surface mounting leadless type, epoxy resin board with lens, high output type	50	6	75	–30 to +85	2.0	6.0 (MAX.)	20	1.2	1.5	20	±10	940
GL100MN3MP	Surface mounting leadless type, epoxy resin board with lens, high output type	50	6	75	–30 to +85	3.0*1	6.0*1	20	1.25	1.5	20	±9	940
GL100MD1MP1	Surface mounting leadless type, epoxy resin board with lens, wide beam angle	50	6	75	–30 to +85	–	6.0 (MAX.)	20	–	1.5	20	±80	940

*1 Radiant intensity mW/sr *2 Handled by the LED division.
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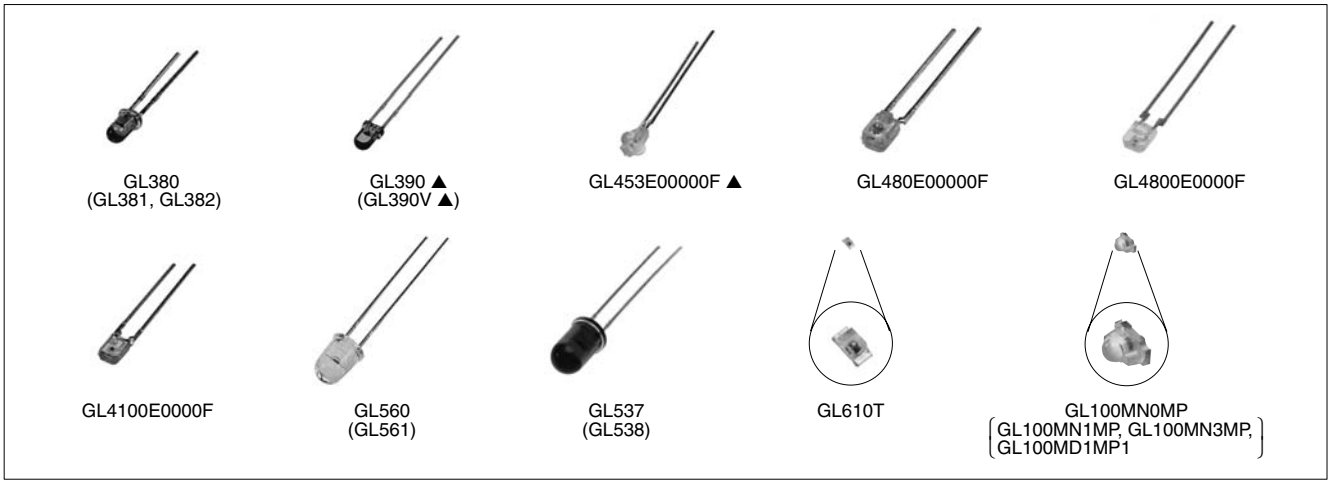

■ Distance Measuring Sensor Lineup

Output	Range of distance measuring	Features	Model No.
1-bit digital output according to distance measuring	4 to 30 cm	1-bit digital output (detected distance: 15/13 cm)	GP2D150AJ00F/GP2Y0D413K0F
	10 to 80 cm	1-bit digital output (detected distance: 24 cm), General purpose	GP2Y0D21YK0F
	20 to 150 cm	1-bit digital output (detected distance: 80 cm)	GP2Y0D02YK0F
		Battery drive compatible, compact, operating supply voltage (2.7 V to 6.2 V), 1-bit digital output (detected distance: 5/10 cm)	GP2Y0D805Z0F/GP2Y0D810Z0F
		Wide operating temperature type (–40 to +85°C)	GP2Y0D810Z1F
		Compact, thin 1-bit digital output (detected distance: 10/40 cm)	GP2Y0D310K/GP2Y0D340K
		Compact, operating supply voltage (2.7 V to 6.2 V), 1-bit digital output (detected distance: 1.5 cm) Capable of operation at high temperature (–30 to +105°C)	GP2Y5D91S00F
Voltage output according to distance measuring	4 to 30 cm	Analog voltage output	GP2D120XJ00F/GP2Y0A41SK0F
	10 to 80 cm	Analog voltage output, General purpose	GP2Y0A21YK0F
	10 to 150 cm	Compact (22 × 8 × 7.2 [T] mm), Analog voltage output	GP2Y0A60SZ0F
	20 to 150 cm	Analog voltage output	GP2Y0A02YK0F
	100 to 550 cm	Analog voltage output	GP2Y0A710K0F

■ Wide Angle Sensor Lineup

Output	Range of distance measuring	Detection angle of view	Model No.
Voltage output according to distance measuring	4 to 30 cm	25° (When using 5 beams)	GP2Y3A001K0F
	20 to 150 cm	25° (When using 5 beams)	GP2Y3A002K0F
	40 to 300 cm	25° (When using 5 beams)	GP2Y3A003K0F

■ High-Precision Displacement Sensor

Output	Range of distance measuring	Features	Model No.
Voltage output according to distance measuring	4.5 to 6.0 mm	Resolution: 50 µm	GP2Y0AH01K0F

■ Paper Size Sensor (Using Optical Distance Measuring Method) Lineup

Output	Features		Model No.
1-bit output	1-beam (detection height: 60 mm)	Thin type (T: 11.5 mm)	GP2Y2D160K0F
Analog output relative to measuring distance	1-beam (detection height: 80 mm)	Thin type (T: 11.5 mm)	GP2Y2A180K0F
	2-beam (detection height: 80 mm)	Thin type (T: 11.5 mm)	GP2Y2A280K0F

■ Dust Sensor Unit Lineup

Output	Features	Model No.
Analog output	Pulse analog output, single-shot detection of house dust, general purpose	GP2Y1010AU0F

■ Color Toner Concentration (Deposition Amount) Sensor Lineup

Output	Features	Model No.
Analog output	Employs diffuse reflection system + mirror reflection system	GP2TC2J0000F
	Employs diffuse reflection system + mirror reflection system	GP2Y40010K0F
	Mirror reflection system	GP2Y40020K0F

■ Smoke Sensor Module (For Fire Alarms) Lineup

Features	Model No.
Built-in microcomputer	GP2Y6001AK0F

☆New product

■ Distance Measuring Sensors (1)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics*1					
		Vcc (V)	Topr (°C)	Distance measuring range (cm)	Judged distance (cm)	V_{OH} (V) MIN.	V_{OL} (V) MAX.	Dissipation current	
								Operating (mA)	Standby (μA)
GP2Y0A21YK0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, linear voltage output	–0.3 to +7	–10 to +60	10 to 80	–	V_O (TYP.) = 0.4 V (at L = 80 cm), ΔV_O (TYP.) = 1.9 V (at L: 80 cm → 10 cm)		MAX. 40	–
GP2D120XJ00F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, linear voltage output	–0.3 to +7	–10 to +60	4 to 30	–	V_O (TYP.) = 0.4 V (at L = 30 cm), ΔV_O (TYP.) = 2.25 V (at L = 30 cm → 4 cm)		MAX. 50	–
GP2Y0D805Z0F	Light detector, infrared LED and signal processing circuit, short distance measuring type, battery drive compatible (operating power supply: 2.7 to 6.2 V)	–0.3 to +7	–10 to +60	–	5	Vcc –0.6	0.6	MAX. 6.5	MAX. 8
GP2Y0D810Z0F	Light detector, infrared LED and signal processing circuit, short distance measuring type, battery drive compatible (operating power supply: 2.7 to 6.2 V)	–0.3 to +7	–10 to +60	–	10	Vcc –0.6	0.6	MAX. 6.5	MAX. 8
☆GP2Y0D810Z1F	Light detector, infrared LED and signal processing circuit, short distance measuring type, battery drive compatible (operating power supply: 2.7 to 6.2 V)	–0.3 to +7	–40 to +85	–	10	Vcc –0.6	0.6	TYP. 5	MAX. 8
GP2Y5D91S00F	Light detector, infrared LED and signal processing circuit, short distance measuring type, battery drive compatible (operating power supply: 2.7 to 6.2 V), capable of operation at high temperature	–0.3 to +7	–30 to +105	–	1.5	Vcc –0.6	0.6	TYP. 7	–
GP2Y0D310K	Digital voltage output according to the measured distance of GP2Y0D340K	–0.3 to +7	–10 to +60	–	10	Vcc –0.3	0.6	MAX. 35	–
GP2Y0D340K	Compact, thin type (15 x 9.6 x 8.7 mm: sensor part), Light detector, infrared LED and signal processing circuit, digital voltage output according to the measured distance	–0.3 to +7	–10 to +60	–	40	Vcc –0.3	0.6	MAX. 35	–
GP2Y0D21YK0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, digital voltage output	–0.3 to +7	–10 to +60	10 to 80	24	Vcc –0.3	0.6	MAX. 40	–
GP2Y0A41SK0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, short measuring cycle (16.5 ms)	–0.3 to +7	–10 to +60	4 to 30	–	V_O (TYP.) = 0.4 V (at L = 30 cm), ΔV_O (TYP.) = 2.25 V (at L = 30 cm → 4 cm)		MAX. 22	–
GP2D150AJ00F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, digital voltage output	–0.3 to +7	–10 to +60	4 to 30	15	Vcc –0.3	0.6	MAX. 50	–
GP2Y0D413K0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, digital voltage output	–0.3 to +7	–10 to +60	4 to 30	13	Vcc –0.3	0.6	–	–
GP2Y0D02YK0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, long distance measuring type (No external control signal required), digital voltage output according to the measured distance	–0.3 to +7	–10 to +60	20 to 150	80	Vcc –0.3	0.6	MAX. 50	–

*1 Vcc = 5 V

* PSD: Position Sensitive Detector

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■ Distance Measuring Sensors (2)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics*1					
		Vcc (V)	Topr (°C)	Distance measuring range (cm)	Measured distance (cm)	V_{OH} (V) MIN.	V_{OL} (V) MAX.	Dissipation current	
								Operating (mA)	Standby (μA)
GP2Y0A60SZ0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, compact type (22 x 8 x 7.2 mm), long distance measuring type (No external control signal required)	–0.3 to +5.5	–10 to +60	10 to 150	–	V_O (TYP.) = 0.4 V (at L = 150 cm), ΔV_O (TYP.) = 2.0 V (at L = 150 cm → 20 cm)		MAX. 50	–
GP2Y0A02YK0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, long distance measuring type (No external control signal required)	–0.3 to +7	–10 to +60	20 to 150	–	V_O (TYP.) = 0.4 V (at L = 150 cm), ΔV_O (TYP.) = 2.05 V (at L = 150 cm → 20 cm)		MAX. 50	–
GP2Y0A710K0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, long distance measuring type (No external control signal required)	–0.3 to +7	–10 to +60	100 to 550	–	V_O (TYP.) = 2.5 V (at L = 100 cm), ΔV_O (TYP.) = 0.7 V (at L = 100 cm → 200 cm)		TYP. 30	–

*1 Vcc = 5 V

* PSD: Position Sensitive Detector

GP2Y5D91S00F

GP2Y0D805Z0F
(GP2Y0D810Z0F, GP2Y0D810Z1F)

GP2Y0D340K
(GP2Y0D310K)

GP2Y0A60SZ0F

GP2Y0A21YK0F
(GP2D120XJ00F, GP2D150AJ00F, GP2Y0D21YK0F, GP2Y0A41SK0F GP2Y0D413K: without mounting hole)

GP2Y0D02YK0F
(GP2Y0A02YK0F)

GP2Y0A710K0F

■ Wide Angle Sensors

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics				
		Vcc (V)	Topr (°C)	Distance measuring range (cm)	Output terminal voltage (V)	Output voltage difference (V)	Input voltage (V)	
							V_{INH}	LEDL
GP2Y3A001K0F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, distance measuring sensor application product, wide range (field of view) detection using 5 infrared beams	–0.3 to +7	–10 to +60	4 to 30	TYP. 2.85*1	TYP. 1.6*4	MIN. 4.5	MAX. 0.5
GP2Y3A002K0F		–0.3 to +7	–10 to +60	20 to 150	TYP. 2.3*2	TYP. 1.6*5	MIN. 4.5	MAX. 0.5
GP2Y3A003K0F		–0.3 to +7	–10 to +60	40 to 300	TYP. 2.3*3	TYP. 1.2*6	MIN. 4.5	MAX. 0.5

* PSD: Position Sensitive Detector
Reflector used: White paper (Gray chart R-27/white surface, made by Kodak Corp., reflectance 90%)

L = Reflector - Sensor distance

*1 L = 4 cm
*2 L = 20 cm
*3 L = 40 cm
*4 Change in output voltage from L = 4 cm to 10 cm
*5 Change in output voltage from L = 20 cm to 80 cm
*6 Change in output voltage from L = 40 cm to 100 cm

GP2Y3A001K0F

GP2Y3A002K0F

GP2Y3A003K0F

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■ Paper Size Sensors

(Ta = 25°C)

Model No.	Features	Operating temperature Topr (°C)	Supply voltage Vcc (V)	Paper detection height H (mm)	LED beam pitch Lp (mm)	Approved value of paper position sliding Δx (mm)	Paper detection density OD	Dissipation current Icc (mA)
GP2Y2D160K0F	Thin type (T: 11.5 mm), using optical distance measuring method (1-beam), digital output (1-bit)	−10 to +65	5 ±0.5	TYP. 60	–	MIN. ±7.5	0.7 or less*1	MAX. 40
GP2Y2A180K0F	Thin type (T: 11.5 mm), analog output using optical distance measuring method (1-beam)	−10 to +65	5 ±0.5	TYP. 80	–	–	–	MAX. 25
GP2Y2A280K0F	Thin type (T: 11.5 mm), analog output using optical distance measuring method (2-beam)	−10 to +65	5 ±0.5	TYP. 80	TYP. 21	–	–	MAX. 50

※ This table shows the characteristics when configured in the paper size sensor system.
*1 Reflectivity: 18% or more, OD = log (1/T), T: Reflectivity


GP2Y2D160K0F


GP2Y2A180K0F


GP2Y2A280K0F

■ High-Precision Displacement Sensor

(Ta = 25°C)

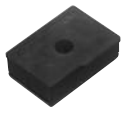
Model No.	Features	Topr (°C)	Operating supply voltage (V)	Dissipation current (mA)	Distance measuring range (mm)	Distance characteristic of output
GP2Y0AH01K0F	Resolution: 50 µm	−10 to +60	4.5 to 5.5	TYP. 20	4.5 to 6.0	TYP. 1.70 V Variation in output over range (4.5 to 6.0 mm)


GP2Y0AH01K0F

■ Dust Sensor Unit

(Ta = 25°C)

Model No.	Features	Topr (°C)	Electro-optical characteristics				
			Operating supply voltage (V)	Dissipation current (mA)	Detection sensitivity V/(0.1 mg/m³)	Output voltage at no dust Voc (V)	Output voltage range VOH (V)
GP2Y1010AU0F	Built-in infrared emitting diode, photodiode and signal processing circuit, compact, single-shot detection of house dust	−10 to +65	4.5 to 5.5	TYP. 11	TYP. 0.5	TYP. 0.9	MIN. 3.4


GP2Y1010AU0F

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■ Smoke Sensor Module (For Fire Alarms)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics	
		Topr (°C)	Supply voltage (V)	Average dissipation current (μA)	Output voltage when no smoke (V)
☆GP2Y6001AK0F	• Thin, compact module integrating sensors and microcomputer • Low current consumption • Can be made to order with custom functions.	–10 to +50	–0.3 to +3.8	TYP. 16	TYP. 1.25

GP2Y6001AK0F

■ Color Toner Concentration (Deposition Amount) Sensors

(Ta = 25°C)

Model No.	Features	Topr (°C)	Electro-optical characteristics		
			Dissipation current*1 (mA)	Output voltage*2 V_{O1} (V)	Output voltage*2 V_{O2} (V)
GP2TC2J0000F	Employs diffuse reflection system + mirror reflection system, high-precision detection of toner concentration on photo-sensitive drum, 2-line analog output (2-PD)	0 to +60	TYP. 4	TYP. 1.17	TYP. 2.81
GP2Y40010K0F	Employs diffuse reflection system + mirror reflection system, high-precision detection of toner concentration on transfer belt, 2-line analog output (2-PD)	0 to +60	TYP. 4	TYP. 1.27	MAX. 3.5 TYP. 2.87
☆GP2Y40020K0F	Mirror reflection system, high-precision detection of toner concentration on transfer belt, 1-line analog output (1-PD)	0 to +60	TYP. 4	–	TYP. 2.81

*1 Dissipation current with LED current of I_{FM} = 0 mA
*2 With reflection object A (Reflectance: 15.6%)

GP2TC2J0000F

GP2Y40010K0F
(GP2Y40020K0F)

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■ Fiber Optics Lineup for Audio Equipment

Connector type	Type	Outline	Features		High speed signal transmission	Model No.	
						Supply voltage 3 to 5 V	Supply voltage 5 V
Square connector	Fiber optic transmitter	Without mounting hole	With shutter	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FMV51TK0F
(EIAJ RC-5720B)					MAX. 15.5 Mb/s	GP1FMV31TK0F	
					MAX. 50 Mb/s		GP1FM55HTZ0F
		With mounting hole	With shutter	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV51TK0F*2
					MAX. 15.5 Mb/s	GP1FAV31TK0F	
					MAX. 50 Mb/s		GP1FAV55TK0F
				Vertical mounting type	MAX. 13.2 Mb/s		GP1FSV51TK0F
					MAX. 15.5 Mb/s	GP1FSV31TK0F (mounting height: 15 mm) GP1FSA31TK0F (mounting height: 10 mm) GP1FSB31TK0F (mounting height: 8.5 mm)	
			With protection cap	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV50TK0F*2
					MAX. 15.5 Mb/s	GP1FAV30TK0F	
	Fiber optic receiver	Without mounting hole	With shutter	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FMV51RK0F
					MAX. 15.5 Mb/s	GP1FMV31RK0F	
		With mounting hole	With shutter	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV51RK0F
					MAX. 15.5 Mb/s	GP1FAV31RK0F	
					MAX. 25 Mb/s		GP1FAV53RK0F
			With protection cap	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV50RK0F
					MAX. 15.5 Mb/s	GP1FAV30RK0F	

*2 TTL drive compatible

Connector type	Type	Outline	Features	High speed signal transmission	Model No.	
					Supply voltage 2.5 V	Supply voltage 3 V
Optical mini-jack ø3.5 mm	Fiber optic transmitter	Thin type (t: 4.2 mm)	Capable of detection/transmission of optical/electrical signals	MAX. 8 Mb/s	GP1FD210TP0F	GP1FD310TP0F
(JIS C 6650)				MAX. 25 Mb/s		GP1FD320TP0F
	Fiber optic receiver	Thin type (t: 4.2 mm)	Capable of detection/transmission of optical/electrical signals	MAX. 8 Mb/s	GP1FD210RP0F	

■ Transmitters/Receivers Lineup for MOST*1 Compatible Optical Fiber

Connector type	Type	Features	Transmission speed	Operating voltage	Model No.
MOST ver1.1 standard compatible	Optical transmitter	Wide operating temperature range (–40°C to +105°C)	25Mb/s as optic fiber link (Biphase)	5 V	GP5FM5T01AZ
				3.3 V	GP5FM3T01AZ/ GP5FM3T01BZ (Long-lead type)
	Optical receiver	Wide operating temperature range (–40°C to +105°C)	25Mb/s as optic fiber link (Biphase)	5 V	GP5FM5R01AZ
				3.3 V	GP5FM3R01AZ/ GP5FM3R01BZ (Long-lead type)

*1 "MOST" is a registered trademark of MOST Cooperation.

■ Fiber Optic Transmitters (Square Connector)

(Ta = 25°C)

Model No.	Appearance		Features	Absolute maximum ratings		Electro-optical characteristics					
	Mounting hole	Shutter		Vcc (V)	Topr (°C)	Supply voltage (V)	Propagation delay time t_{PLH} (ns) MAX.	Propagation delay time t_{PHL} (ns) MAX.	Dissipation current Icc (mA) MAX.	Pulse width distortion Δtw (ns)	Transmission speed T (Mb/s) MAX.
GP1FMV31TK0F	No	Yes	Compact	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	12	±15	15.5
GP1FMV51TK0F	No	Yes	Compact	–0.5 to +7	–20 to +70	4.75 to 5.25	180	180	13	±15	13.2
GP1FM55HTZ0F ▲	No	Yes	Compact, high response speed	–0.5 to +7	–20 to +70	4.75 to 5.25	180	180	13	±15	50
GP1FAV30TK0F	Yes	No	Low voltage drive, with protection cap	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	12	±15	15.5
GP1FAV50TK0F	Yes	No	TTL drive compatible, with protection cap	–0.5 to +7	–20 to +70	4.75 to 5.25 Input voltage: MIN. 2.0 V	180	180	13	±15	13.2
GP1FAV51TK0F	Yes	Yes	TTL drive compatible	–0.5 to +7	–20 to +70	4.75 to 5.25	180	180	13	±15	13.2
GP1FSV51TK0F	No	Yes	Vertical mounting (mounting height: 15 mm), low voltage drive	–0.5 to +7	–20 to +70	4.75 to 5.25	180	180	13	±15	13.2
GP1FAV31TK0F	Yes	Yes	Low voltage drive	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	12	±15	15.5
GP1FSV31TK0F	No	Yes	Vertical mounting (mounting height: 15 mm), low voltage drive	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	13	±15	15.5
GP1FAV55TK0F	Yes	Yes	High response speed	–0.5 to +7	–20 to +70	4.75 to 5.25	180	180	13	±15	50
GP1FSA31TK0F	No	Yes	Vertical mounting (mounting height: 10 mm)	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	13	±15	15.5
GP1FSB31TK0F	No	Yes	Vertical mounting (mounting height: 8.5 mm)	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	13	±15	15.5

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Fiber Optic Transmitters (ø3.5 mm Optical Mini-jack)

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electro-optical characteristics					
		Vcc (V)	Vin (V)	Topr (°C)	Supply voltage (V)	Propagation delay time t_{PLH} (ns) MAX.	Propagation delay time t_{PHL} (ns) MAX.	Dissipation current Icc (mA) MAX.	Pulse width distortion Δtw (ns)	Transmission speed T (Mb/s) MAX.
GP1FD210TP0F ▲	Compact, thin type (t: 4.2 mm), optical mini-jack (low voltage type)	–0.5 to +7	–0.5 to Vcc + 0.5	–20 to +70	2.2 to 3.0	180	180	10	±30	8
GP1FD310TP0F	Compact, thin type (t: 4.2 mm), optical mini-jack (low voltage type)	–0.5 to +7	–0.5 to Vcc + 0.5	–20 to +70	2.7 to 3.6	180	180	12	±30	8
GP1FD320TP0F	Compact, thin type (t: 4.2 mm), high speed, optical mini-jack (low voltage type)	–0.5 to +7	–0.5 to Vcc + 0.5	–20 to +70	2.3 to 5.5	180	180	12	±11	25

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

■ Fiber Optic Receivers (Square Connector)

(Ta = 25°C)

Model No.	Appearance		Features	Absolute maximum ratings			Electro-optical characteristics					
	Mounting hole	Shutter		Vcc (V)	I_{OL} (mA)	Topr (°C)	Supply voltage (V)	Propagation delay time t_{PLH} (ns) MAX.	Propagation delay time t_{PHL} (ns) MAX.	Dissipation current Icc (mA) MAX.	Pulse width distortion Δtw (ns)	Transmission speed T (Mb/s) MAX.
GP1FMV31RK0F	No	Yes	Compact, low voltage drive	–0.5 to +7	10	–20 to +70	2.7 to 3.6	180	180	15	±20	15.5
GP1FMV51RK0F	No	Yes	Compact	–0.5 to +7	10	–20 to +70	4.75 to 5.25	180	180	25	±20	13.2
GP1FAV30RK0F	Yes	No	Low voltage drive, with protection cap	–0.5 to +7	10	–20 to +70	2.7 to 3.6	180	180	15	±20	15.5
GP1FAV50RK0F	Yes	No	With protection cap	–0.5 to +7	10	–20 to +70	4.75 to 5.25	180	180	25	±20	13.2
GP1FAV51RK0F	Yes	Yes		–0.5 to +7	10	–20 to +70	4.75 to 5.25	180	180	25	±20	13.2
GP1FAV31RK0F	Yes	Yes	Low voltage drive	–0.5 to +7	10	–20 to +70	2.7 to 3.6	180	180	15	±20	15.5
GP1FAV53RK0F	Yes	Yes	High response speed (up to 4x)	–0.5 to +7	10	–20 to +70	4.75 to 5.25	180	180	25	±20	25

■ Fiber Optic Receiver (ø3.5 mm Optical Mini-jack)

(Ta = 25°C)

Model No.	Jack	Features	Absolute maximum ratings			Electro-optical characteristics					
			Vcc (V)	I_{OL} (mA)	Topr (°C)	Supply voltage (V)	Propagation delay time t_{PLH} (ns) MAX.	Propagation delay time t_{PHL} (ns) MAX.	Dissipation current Icc (mA) MAX.	Pulse width distortion Δtw (ns)	Transmission speed T (Mb/s) MAX.
GP1FD210RP0F ▲	ø3.5	Thin (thickness: 4.2 mm), optical mini-jack (low voltage drive)	–0.5 to +7	4	–20 to +70	2.4 to 3.0	180	180	7.5	±30	8

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

GP1FM55HTZ0F ▲

GP1FMV31 series
(GP1FMV51 series)

GP1FAV50TK0F
{GP1FAV50RK0F, GP1FAV30TK0F, GP1FAV30RK0F}

GP1FAV51TK0F
{GP1FAV31TK0F, GP1FAV55TK0F, GP1FAV51RK0F, GP1FAV31RK0F, GP1FAV53RK0F}

GP1FSA31TK0F

GP1FSB31TK0F

GP1FSV31TK0F
(GP1FSV51TK0F)

GP1FD210TP0F ▲
{GP1FD210RP0F ▲, GP1FD310TP0F (Black), GP1FD320TP0F (Black)}

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■ Optical Transmitters

(Ta = 25°C)

Model No.	Features	Operating temperature (°C)	Optic output (dBm)	Dissipation current		Operating voltage (V)	Transmission speed T (Mb/s)
				Operating (mA)	Standby (μA)		
GP5FM5T01AZ ▲	• MOST standard compatible • Wide operating temperature range	–40 to +105	–7.5 to –2	MAX. 20	MAX. 2.5	4.75 to 5.25	25 (Biphase)
GP5FM3T01AZ ▲	• MOST standard compatible • Wide operating temperature range	–40 to +105	–7.5 to –2	MAX. 20	MAX. 2.5	3.3±5%	25 (Biphase)
GP5FM3T01BZ ▲	• MOST standard compatible • Wide operating temperature range • Long-lead type	–40 to +105	–7.5 to –2	MAX. 20	MAX. 2.5	3.3±5%	25 (Biphase)

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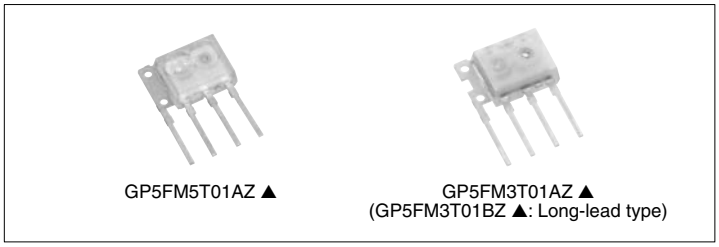


GP5FM5T01AZ ▲

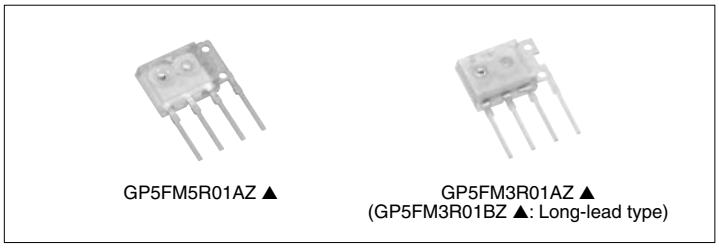
GP5FM3T01AZ ▲
(GP5FM3T01BZ ▲: Long-lead type)

■ Optical Receivers

(Ta = 25°C)

Model No.	Features	Operating temperature (°C)	Optic output (dBm)	Dissipation current		Operating voltage (V)	Transmission speed T (Mb/s)
				Operating (mA)	Standby (μA)		
GP5FM5R01AZ ▲	• MOST standard compatible • Wide operating temperature range	–40 to +105	–24 to –2	MAX. 20	MAX. 5	4.75 to 5.25	25 (Biphase)
GP5FM3R01AZ ▲	• MOST standard compatible • Wide operating temperature range	–40 to +105	–24.5 to –2	MAX. 20	MAX. 5	3.3±5%	25 (Biphase)
GP5FM3R01BZ ▲	• MOST standard compatible • Wide operating temperature range • Long-lead type	–40 to +105	–24.5 to –2	MAX. 20	MAX. 5	3.3±5%	25 (Biphase)

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.



GP5FM5R01AZ ▲

GP5FM3R01AZ ▲
(GP5FM3R01BZ ▲: Long-lead type)

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■ High-Luminosity (AlGaInP) LED Series

(Ta = 25°C)

Radiation color	Green	Yellow-green	Amber	Sunset orange	Orange	Red	
Series	ZG, JG	ZE, JE	ZV, JV, YV	ZS, JS, YS	ZJ, JJ, YJ	ZR, JR	JU
Dominant emission wavelength (nm)	(564)	(572)	(588)	(605)	(618)	(630)	(638)
Radiation material	AlGaInP on GaAs						

■ High-Luminosity (InGaN) LED Series

(Ta = 25°C)

Radiation color	Blue	Green
Series	BC	GC
Dominant emission wavelength (nm)	(470)	(525)
Radiation material	InGaN	

■ White Type LED Series

(Ta = 25°C)

Radiation color	White
Series	BW
Color range (x, y)	(0.31, 0.31)
Radiation material	InGaN + Fluorescent powder

■ Pastel Color LED Series

(Ta = 25°C)

Radiation color	Light blue	Lemon yellow	Purple
Series	CA	CY	CV
Color range (x, y)	(0.17, 0.20)	(0.42, 0.48)	(0.35, 0.15)
Radiation material	InGaN + Fluorescent powder		

■ LED Series

(Ta = 25°C)

Radiation color	Green	Yellow-green	Yellow-green (High-luminosity)	Yellow	Sunset orange	Red	Red (High-luminosity)	Red (High-luminosity)	Red
Series	KG, K	EG, E, C*	FG, F	HY, H	HS, S	HD, D	TR, T	UR, U	PR, P
Peak emission wavelength (nm)	555	565	565	585	610	635	660	660	695
Radiation material	GaP	GaP	GaP	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaAlAs on GaAs Single hetero	GaAlAs on GaAlAs Double hetero	GaP

* C is the opposite polarity of EG's.

■ High-Luminosity (AlGaInP) LED Lamps

(I_F = 20 mA, Ta = 25°C)

Appearance	Radiation shape (mm)	Resin type				High-luminosity											
						JG, ZG (Green)		JE, ZE (Yellow-green)		JV, ZV (Amber)		JS, ZS (Sunset orange)		ZJ, JJ (Orange)		ZR, JR, JU (Red)	
		Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.
Cylinder	ø3			●						GL3ZV402B0SE	400	GL3ZS402B0SE	400	GL3ZJ402B0SE	400	GL3ZR402B0SE	250
				●		GL3JG402B0SE	85	GL3JE402B0SE	200							GL3JR402B0S3	200
				●						GL3ZV802B0SE	200	GL3ZS802B0SE	210	GL3ZJ802B0SE	230	GL3ZR802B0SE	150
			●							GL3JV404B0SE	280	GL3JS404B0SE	280	GL3JJ404B0SE	200		
			●							GL3JV804B0SE	110	GL3JS804B0SE	120	GL3JJ804B0SE	100		
	ø5			●						GL5ZV152B0SE	2 700	GL5ZS152B0SE	3 000	GL5ZJ152B0SE	3 000	GL5ZR152B0SE	2 000
				●						GL5ZV302B0SE	900	GL5ZS302B0SE	1 000	GL5ZJ302B0SE	900	GL5ZR302B0SE	600
				●						GL5JV302B0SE	640	GL5JS302B0SE	680	GL5JJ302B0SE	570		
	ø10			●						GL0ZV042B0S	16 900	GL0ZS042B0S	22 600	GL0ZJ042B0S	18 500		
Oval	Long: 5.8 Short: 4.6			●						GL6ZV27	750	GL6ZS27	850	GL6ZJ27	750	GL6ZR27	360
				●						GL5JV7D2D0SE	210	GL5JS7D2D0SE	230	GL5JJ7D2D0SE	190		

Taped model is also available.

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■ High-Luminosity LED Lamps

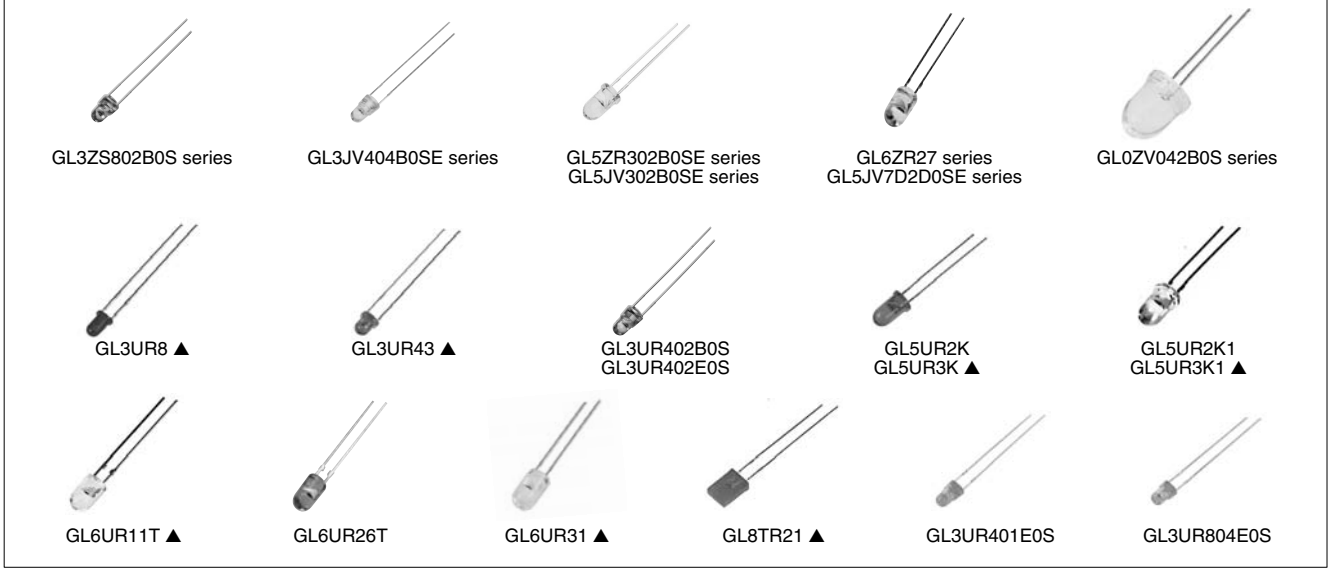
(I_F = 20 mA, Ta = 25°C)

Appearance	Radiation shape (mm)	Resin type				High-luminosity							
						BC (Blue)		GC (Green)		TR, T (Red)		UR, U (Red)	
		Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.	Model No.	Luminous intensity (mcd) TYP.
Cylinder	ø3	●								GL3TR8 ▲	60	GL3UR8 ▲	300
		●										☆GL3UR401E0S	250
				●						GLTR44 ▲	110	GL3UR44 ▲	250
				●								☆GL3UR402E0S	300
			●							GL3TR43 ▲	20	GL3UR43 ▲	100
			●									☆GL3UR804E0S	150
				●		GL3BC302B0S2	900					☆GL3UR404E0S	250
				●								GL3UR402B0S	350
				●		GL3B2402B0SC	650	GL3G2402B0SC	2 800				
	ø5	●								GL5TR8 ▲	80		
				●								GL5UR44	850
			●									GL5UR2K	2 000
			●									GL5UR3K ▲	3 000
				●						GL5TR43 ▲	500	GL5UR2K1	2 000
				●								GL5UR3K1 ▲	3 000
				●								GL6UR11T*1 ▲	300
				●								GL6UR31 ▲	950
Oval	Long: 5.8 Short: 4.6		●									GL6UR26T*1	400
Rectangle	2.5 × 5.0	●								GL8TR21 ▲	4	GL8UR21	16
	1.8 × 3.9	●								GL8TR42 ▲	4		

*1 With tie-bar

Taped model is also available.

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.



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■ LED Lamps (1)

(I_F = 20 mA*1, Ta = 25°C)

Appearance	Radiation shape (mm)	Resin type: Colored diffusion	Resin type: Colored transparency	Resin type: Colorless transparency	Resin type: Milky diffusion	KG Green (555 nm)	Luminous intensity (mcd) TYP.	JG Green (564 nm)	Luminous intensity (mcd) TYP.	EG Yellow-green (565 nm)	Luminous intensity (mcd) TYP.	FG Yellow-green (HL) (565 nm)	Luminous intensity (mcd) TYP.
Cylinder	ø3	●				GL3KG8 ▲	30			GL3EG8 ▲	60		
		●						☆GL3JG401E0S	80	☆GL3EG401E0S	80		
			●							GL3EG41 ▲	130		
				●		GL3KG44 ▲	60			GL3EG44 ▲	130		
				●				☆GL3JG402E0S	85	☆GL3EG402E0S	85		
			●			GL3KG43 ▲	20			GL3EG43 ▲	38		
			●					☆GL3JG804E0S	40	☆GL3EG804E0S	40		
			●			GL3KG62 ▲	22			GL3EG62 ▲	65		
			●					☆GL3JG404E0S	80	☆GL3EG404E0S	80		
		●				GL3KG63 ▲	6			GL3EG63 ▲	18		
		●								LT3E31W*2 ▲	18		
			●							LT3E65W*2 ▲	25		
	ø4	●				GL4KG8 ▲	30	☆GL4JG8	85	GL4EG8	100		
	ø5	●								GL5EG4 ▲	20		
		●				GL5KG8 ▲	60	☆GL5JG8	140	GL5EG8	150		
			●			GL5KG41 ▲	70	☆GL5JG41	160	GL5EG41	160		
				●		GL5KG44 ▲	70	☆GL5JG44	160	GL5EG44	160		
			●							GL5EG40	250		
				●		GL5KG43 ▲	120	☆GL5JG43	360	GL5EG43	300	GL5FG43 ▲	600
					●					GL5EG60 ▲	23		
				●						GL6EG11T*3 ▲	120		
	ø5 (Inverted cone)		●							GL5EG47 ▲	15		
Oval	Long: 5.8 Short: 4.6		●							GL6EG26T*3	140		
Convex	ø2	●								GL2EG6 ▲	15		
Arch	2.5 × 5.0	●								GL8EG2 ▲	30		
	2.0 × 3.1		●							GL8EG4 ▲	50		
Rectangle	1.8 × 3.9	●				GL8KG42 ▲	1.5			GL8EG42 ▲	5		
	1.9 × 3.9		●							GL8EG5 ▲	28		
	2.0 × 3.2		●			GL8KG25 ▲	9			GL8EG25 ▲	12		
	2.0 × 3.2	●				GL8KG29 ▲	5			GL8EG29 ▲	12		
	2.0 × 4.5	●								GL8EG23	6		
	2.0 × 5.0	●				GL8KG21 ▲	4	☆GL8JG21	7	GL8EG21	8		
		●				GL8KG26 ▲	4			GL8EG26 ▲	8		
Square	5.0 × 5.0	●				GL8KG22 ▲	3.5	☆GL8JG22	8	GL8EG22	6		
Triangle	Isosceles triangle	●											

*1 PR series (Red): I_F = 5 mA (GL8PR25, GL8PR29: I_F = 10 mA)

Taped model is also available.

*2 Taped model

*3 With tie-bar

HL: High-luminosity

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

☆New product

RoHS Pb FREE

■ LED Lamps (2)

(I_F = 20 mA*1, Ta = 25°C)

Appearance	Radiation shape (mm)	Resin type: Colored diffusion	Resin type: Colored transparency	Resin type: Colorless transparency	Resin type: Milky diffusion	HY Yellow (585 nm)	Luminous intensity (mcd) TYP.	HS Sunset orange (610 nm)	Luminous intensity (mcd) TYP.	HD Red (635 nm)	Luminous intensity (mcd) TYP.	PR Red (695 nm)	Luminous intensity (mcd) TYP.
Cylinder	ø3	●				GL3HY8 ▲	55	GL3HS8 ▲	60	GL3HD8 ▲	40	GL3PR8 ▲	8
		●				☆GL3HY401E0S	60	☆GL3HS401E0S	60	☆GL3HD401E0S	60		
			●										
				●		GL3HY44 ▲	100	GL3HS44 ▲	100	GL3HD44 ▲	110	GL3PR44 ▲	12
				●		☆GL3HY402E0S	70	☆GL3HS402E0S	70	☆GL3HD402E0S	70		
			●			GL3HY43 ▲	25	GL3HS43 ▲	25	GL3HD43 ▲	25	GL3PR43 ▲	3
			●			☆GL3HY804E0S	30	☆GL3HS804E0S	30	☆GL3HD804E0S	30		
			●			GL3HY62 ▲	40	GL3HS62 ▲	40	GL3HD62 ▲	50		
			●			☆GL3HY404E0S	60	☆GL3HS404E0S	60	☆GL3HD404E0S	60		
		●				GL3HY63 ▲	16	GL3HS63 ▲	15	GL3HD63 ▲	17	GL3PR63 ▲	2
		●				LT3H31W*2 ▲	15			LT3D31W*2 ▲	15	LT3P31W*2 ▲	1.5
			●			LT3H65W*2 ▲	25	LT3S65W*2 ▲	25	LT3D65W*2 ▲	25	LT3P65W*2 ▲	3
	ø4	●				GL4HY8	110	GL4HS8	80	GL4HD8	110	GL4PR8 ▲	15
	ø5	●								GL5HD4 ▲	25	GL5PR4 ▲	3
		●				GL5HY8	120	GL5HS8	80	GL5HD8	80	GL5PR8 ▲	15
			●			GL5HY41	100	GL5HS41	100	GL5HD41	150	GL5PR41 ▲	15
				●		GL5HY44	100	GL5HS44	100	GL5HD44	100	GL5PR44 ▲	15
			●			GL5HY40	250	GL5HS40	200	GL5HD40	250	GL5PR40 ▲	35
				●		GL5HY43	250	GL5HS43	250	GL5HD43	300		
					●					GL5HD60 ▲	8		
				●									
	ø5 (Inverted cone)		●					GL5HS47 ▲	6	GL5HD47 ▲	8		
Oval	Long: 5.8 Short: 4.6		●										
Convex	ø2	●				GL2HY6 ▲	12			GL2HD6 ▲	12	GL2PR6 ▲	1.5
Arch	2.5 × 5.0	●								GL8HD2 ▲	30		
	2.0 × 3.1		●							GL8HD4 ▲	40		
Rectangle	1.8 × 3.9	●				GL8HY42 ▲	6			GL8HD42 ▲	5	GL8PR42 ▲	0.7
	1.9 × 3.9		●			GL8HY5 ▲	25			GL8HD5 ▲	22		
	2.0 × 3.2		●			GL8HY25 ▲	12	GL8HS25 ▲	10	GL8HD25 ▲	12	GL8PR25 ▲	1.5
	2.0 × 3.2	●				GL8HY29 ▲	10	GL8HS29 ▲	7			GL8PR29 ▲	3
	2.0 × 4.5	●				GL8HY23	8			GL8HD23	6		
	2.0 × 5.0	●				GL8HY21	8	GL8HS21	8	GL8HD21	8	GL8PR21 ▲	0.7
		●				GL8HY26 ▲	8			GL8HD26 ▲	8	GL8PR26 ▲	0.7
Square	5.0 × 5.0	●				GL8HY22	5	GL8HS22	5	GL8HD22	8	GL8PR22 ▲	1.2
Triangle	Isosceles triangle	●										GL8PR28 ▲	0.9

*1 PR series (Red): I_F = 5 mA (GL8PR25, GL8PR29: I_F = 10 mA)

Taped model is also available.

*2 Taped model

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

LED LAMPS

RoHS Pb FREE

Cylinder


GL3EG401E0S series


GL3EG402E0S series


GL3EG404E0S series


GL3EG804E0S series


GL3PR8 series ▲


GL3PR44 series ▲


GL3HY43 series ▲


GL3KG62 series ▲


LT3E31W series ▲


GL3PR63 series ▲


LT3E65W series ▲


GL4EG8 series


GL5PR4 series ▲


GL5HS8 series


GL5EG41 series


GL5EG44 series


GL5EG40 series


GL5HY43 series


GL5EG60 series ▲


GL6EG11T ▲


GL5HD47 series ▲

Oval

Convex

Arch


GL6EG26T


GL2HY6 ▲


GL8EG2 series ▲


GL8HD4 series ▲

Rectangle


GL8KG42 series ▲


GL8KG25 series ▲


GL8HY29 series ▲


GL8HD23 series


GL8HS21 series


GL8HY26 series ▲

Square


GL8HD22 series

Triangle


GL8PR28 ▲

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■ Dichromatic LED Lamps

(The values in luminous intensity are radiation color order) (I_F = 20 mA*1, Ta = 25°C)

Appearance	Radiation shape (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	E JJ Yellow-green + Orange (HL)	Luminous intensity (mcd) TYP.	C U ✳ Yellow-green + Red (HL)	Luminous intensity (mcd) TYP.	E P Yellow-green + Red	Luminous intensity (mcd) TYP.	E D Yellow-green + Red	Luminous intensity (mcd) TYP.	E H Yellow-green + Yellow	Luminous intensity (mcd) TYP.	H P Yellow + Red	Luminous intensity (mcd) TYP.
Cylinder	ø3				●							GL3ED8	20/15				
	ø5					GL5EJJ502C0X*2	110/170			GL5EP5 ▲	40/9	GL5ED5	40/25			GL5HP5 ▲	15/9
								GL5CU44 ▲	100/240			GL5ED44	80/50				
												GL5ED60 ▲	11/8				
								GL6CU7 ▲	120/250								
Rectangle	1.9 × 3.9											GL8ED5 ▲	10/6.5			GL8HP5 ▲	3/1.5
	2.0 × 5.0											GL9ED2	8/3	GL9EH2 ▲	6/2	GL9HP2 ▲	1/0.8
	5.0 × 5.0											GL9ED4	7/4				

✳ CU series: Common anode pin connection *1 P (Red) and H (yellow): I_F = 10 mA *2 Taped model HL: High-luminosity

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.


GL3ED8


GL5EJJ502C0X


GL5ED5 series


GL5ED44 series


GL5ED60 ▲


GL6CU7 ▲


GL8HP5 series ▲


GL9ED2


GL9ED4

☆New product

RoHS Pb FREE

■ High-Luminosity (AlGaInP) Chip LEDs (Taped Models Only)

(I_F = 20 mA, Ta = 25°C*3)

Outline dimensions (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	JG Green	JG Luminous intensity (mcd) TYP.	JE SE Yellow-green	JE SE Luminous intensity (mcd) TYP.	ZV JV Amber	ZV JV Luminous intensity (mcd) TYP.	ZS JS Sunset orange	ZS JS Luminous intensity (mcd) TYP.	ZJ JJ SJ Orange	ZJ JJ SJ Luminous intensity (mcd) TYP.	ZR JR Red	ZR JR Luminous intensity (mcd) TYP.
1.6 × 0.8 (T: 0.35)			●				GM1JE35200AE*1	13	GM1JV35200AE*1	18.8	GM1JS35200AE*1	19	GM1JJ35200AE*1	19	GM1JR35200AE*1	13
1.6 × 0.8 (T: 0.55)			●				GM1JE55200AE*1	13	GM1JV55200AE*1	16.8	GM1JS55200AE*1	20.9	GM1JJ55200AE*1	19		
1.6 × 0.8 (T: 0.8)				●					GM1ZV80300AE	75	GM1ZS80300AE	75	GM1ZJ80300AE	75	GM1ZR80300AE	55
				●	☆GM1JG80300AE	15	☆GM1JE80300AE	(15)	LT1JV67A*1	16.5	LT1JS67A*1	14.1			☆LT1JR67A	10
2.0 × 1.25 (T: 0.8)				●					GM1ZV40300AE	60	GM1ZS40300AE	78	GM1ZJ40300AE	60	GM1ZR40300AE	55
				●	☆LT1JG40A	15			GM1JV40300AE	11	GM1JS40300AE	12	GM1JJ40300AE	9.5	☆LT1JR40A	9
3.2 × 2.8 (T: 1.9)			●						GM5ZV96270A	600					GM5ZR96270A	600
			●						GM5ZV96260AE	320					GM5ZR96260AE	300
6.0 × 5.0 (T: 2.5)			●						GM5ZV01200A*2	500	GM5ZS01200A*2	700	GM5ZJ01200A*2	500	GM5ZR01200A*2	400
			●				GM5SE01200A*2	400					GM5SJ01250AL*2	1 050		
6.0 × 5.0 (T: 2.3) (board insertion type)			●						GM5ZV03200Z*2	500	GM5ZS03200Z*2	700	GM5ZJ03200Z*2	500	GM5ZR03200Z*2	400
2.8 × 1.2 (T: 0.8) (Side emitting)			●												☆GM4ZR83200AE	(120)

*1 LT1JS67A, LT1JV67A, GM1JV55200AE series, GM1JV35200AE series, GM1JV40300AE series: I_F = 5 mA
*2 GM5ZR01200A series, GM5ZR03200Z series: IF = 60 mA
*3 GM5ZV96260AE series, GM5ZV96270A series, GM5ZV01200A series, GM5ZV03200Z series: Tc= 25°C

■ High-Luminosity (InGaN) Chip LEDs (Taped Models Only)

(I_F = 10 mA, Ta = 25°C*5)

Outline dimensions (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	BC Blue	BC Luminous intensity (mcd) TYP.	GC Green	GC Luminous intensity (mcd) TYP.
1.6 × 0.8 (T: 0.35)				●	GM1BC35370AC*1	23		
1.6 × 0.8 (T: 0.55)			●		GM1BC55255AC*1	23	GM1GC55310AC*4	100
3.2 × 2.8 (T: 1.9)			●		GM5BC96270A*2	500	GM5GC96270A	1 300
			●		GM5BC96260AC*2	300	GM5GC96260AC*2	700
6.0 × 5.0 (T: 2.5)			●		GM5BC01250AC*3	400	GM5GC01250AC*3	1 200
6.0 × 5.0 (T: 2.3) board insertion type			●		GM5BC03210Z*3	400	GM5GC03210Z*3	1 200
2.8 × 1.2 (T: 0.8) Side emitting			●		☆GM4BC83211AC*2	(120)		

*1 GM1BC35370AC, GM1BC55255AC: I_F = 5 mA
*2 GM5BC96260AC series, GM5BC96270A series, GM4BC83211AC: I_F = 20 mA
*3 GM5BC01250AC series, GM5BC03210Z series: I_F = 50 mA
*4 GM1GC55310AC: I_F = 10 mA
*5 GM5BC96260AC series, GM5BC96270A series, GM5BC01250AC series, GM5BC03210Z series: Tc= 25°C

■ Chip LEDs (Taped Models Only)

(I_F = 20 mA*1, Ta = 25°C)

Outline dimensions (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	K: Green	Luminous intensity (mcd) TYP.	EFEG: Yellow-green	Luminous intensity (mcd) TYP.	HHY: Yellow	Luminous intensity (mcd) TYP.
1.6 × 0.8 (T: 0.35)			●				GM1EG35200A	19		
1.6 × 0.8 (T: 0.55)			●				GM1EG55200A	19	GM1HY55200A	11.5
1.6 × 0.8 (T: 0.8)				●	LT1K67A ▲	3.8	LT1E67A LT1F67A LT1F67AF	23	LT1H67A	8.3
2.0 × 1.25 (T: 0.8)				●	LT1K40A ▲	5	LT1E40A	19	LT1H40A	10.8

Outline dimensions (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	SHS: Sunset orange	Luminous intensity (mcd) TYP.	DHD: Red	Luminous intensity (mcd) TYP.	UUR: Red (HL)	Luminous intensity (mcd) TYP.	P: Red	Luminous intensity (mcd) TYP.
1.6 × 0.8 (T: 0.55)			●		GM1HS55200A	11.4	GM1HD55200A	12.5	GM1UR55200A	29.7		
1.6 × 0.8 (T: 0.8)				●	LT1S67A	6.9	LT1D67A	8.8	LT1U67A	29.7	LT1P67A ▲	1.3
2.0 × 1.25 (T: 0.8)				●	LT1S40A	9.4	LT1D40A	11.9	LT1U40A	35.6	LT1P40A ▲	1.3

*1 P (Red) series: I_F = 5 mA

HL: High-luminosity

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

LT1D67A series
LT1JS67A series
GM1ZV80300AE series

GM1EG55200A series
GM1JV55200AE series
GM1BC55255AC series

LT1E40A series
GM1JV40300AE series
GM1ZV40300AE series

GM1JV35200AE series
GM1EG35200A
GM1BC35370AC

GM4BC83211AC series

GM5ZV96260AE series,
GM5ZV96270A series,
GM5BC96260AC series,
GM5BC96270A series

GM5ZR01200A series
GM5BC01250AC series

GM5ZV03200Z series
GM5BC03210Z series

Taped model

■ High-Luminosity Dichromatic Type Chip LEDs (Taped Models Only)

(I_F = 40 mA, Tc = 25°C)

Outline dimensions (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	BCGC: Blue + Green	Luminous intensity (mcd) TYP.	BCZR: Blue + Red	Luminous intensity (mcd) TYP.	GCZR: Green + Red	Luminous intensity (mcd) TYP.
6.0 × 5.0 (T: 2.5)			●		GM5BG01210A	300/860	GM5ZRB01210A	300/580	GM5ZRG01210A	860/580

☆New product
★Under development

■ Dichromatic Type Chip LEDs (Taped Models Only)

(I_F = 20 mA, Ta = 25°C)

Outline dimensions (mm)	Resin type				EH Yellow-green + Yellow		ED Yellow-green + Red		KS Green + Sunset orange	
	Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion		Luminous intensity (mcd) TYP.		Luminous intensity (mcd) TYP.		Luminous intensity (mcd) TYP.
1.6 × 1.6 (T: 0.8)				●	LT1EH67A	19/8.3	LT1ED67A	19/8.3	LT1KS67A ▲	3.8/6.9

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

GM5BG01210A series

LT1ED67A series

■ High-Luminosity White Chip LEDs (Taped Models Only)

(Ta = 25°C*5)

Outline dimensions (mm)	Color coordinates (x, y)	Radiation color	BW White	
				Luminous intensity (mcd) TYP.
1.6 × 0.8 (T: 0.2)	(0.27, 0.23)	White	☆GM1BW20300A*1	50
2.8 × 1.2 (T: 0.8) Side view type	(0.30, 0.29)	White	GM4BW84310A*1	1 550
			☆GM4BW853A0A*1	1 900
			☆GM4BW853B0A*1	2 200
3.85 × 1.0 (T: 0.6) Side view type	(0.30, 0.29)	White	GM4BW64310A*1	1 500
			☆GM4BW653A0A*1	1 900
			☆GM4BW653B0A*1	2 200
3.85 × 1.0 (T: 0.5) Side view type	(0.30, 0.29)	White	GM4BW53340A*1	1 800
2.64 × 1.64 (T: 0.7)	(0.31, 0.31)	White	★GM1BW78140A*4	(9 000)
3.2 × 2.8 (T: 1.9)	(0.31, 0.31)	White	★GM5BW96381A*1	(2 250)
	(0.34, 0.36)	White	★GM5BW96380A*1	(2 450)
3.2 × 2.8 (T: 1.4)	(0.31, 0.31)	White	GM5BW94320A*6	3 800
			★GM5BW94370A*6	(5 200)
5.0 × 5.0 (T: 1.5)	(0.31, 0.31)	White	GM5BW05340A*1	10 000
6.0 × 5.0 (T: 1.5) 6-terminal leadless	(0.31, 0.31)	White	GM5BW01300A*2	4 200
6.0 × 5.0 (T: 2.5) 4-terminal leadless	(0.31, 0.31)	White	GM5BW01301A*3	1 800
			GM5BW01311A*3	3 300

*1 GM1BW20300A, GM4BW84310A series, GM4BW64310A series, GM4BW53340A, GM5BW96380A series, GM5BW05340A: I_F = 20 mA
*2 GM5BW01300A: I_F = 35 mA/chip
*3 GM5BW01301A series: I_F = 40 mA
*4 GM1BW78140A series: I_F = 150 mA
*5 GM5BW96380A series, GM5BW01300A, GM5BW01301A series: Tc = 25°C
*6 GM5BW94320A, GM5BW94370A: I_F = 25 mA

☆New product
★Under development

■ Pastel Color Chip LEDs (Taped Models Only)

(I_F = 20 mA, Tc = 25°C)

Outline dimensions (mm)	CA Light blue			CY Lemon yellow			CV Purple		
		Color coordinates (x, y)	Luminous intensity (mcd) TYP.		Color coordinates (x, y)	Luminous intensity (mcd) TYP.		Color coordinates (x, y)	Luminous intensity (mcd) TYP.
3.2 × 2.8 (T: 1.9)	GM5CA96320A	(0.17, 0.20)	1 000	☆GM5CY96320A	(0.42, 0.48)	1 500	☆GM5CV96320A	(0.35, 0.15)	500


GM1BW20300A


GM1BW78140A


GM5BW96380A series
GM5CA96320A series


GM5BW01300A


GM5BW01301A
GM5BW01311A


GM4BW84310A series


GM4BW53340A


GM5BW05340A


GM4BW64310A series

■ High-Luminosity Dichromatic Type Chip LEDs (RGB 3-color) (Taped Models Only)

(Ta = 25°C*9)

Outline dimensions (mm)	Resin type: Colored diffusion	Colored transparency	Colorless transparency	Milky diffusion	WA Red + Green + Blue	Luminous intensity (mcd) TYP.
1.6 × 1.6 (T: 0.55)				●	GM1WA55311A*4	20/70/23
3.2 × 2.8 (T: 1.4)				●	☆GM5WA94300A*6	1 800 [Mixed color]
5.0 × 2.5 (T: 2.5)				●	★GM4WA25300A*7	(2 200) [Mixed color]
6.0 × 5.0 (T: 2.5) 6-terminal leadless			●		GM5WA06256A*5	1 500 [Mixed color]
				●	★GM5WA06310A*1	(3 500) [Mixed color]
6.0 × 5.0 (T: 2.4) 6-terminal leadless			●		GM5WA06270A*2, 3	3 000 [Mixed color]
6.0 × 5.0 (T: 2.3 [resin part]) 6-terminal lead type			●		GM5WA06256Z*5	1 500 [Mixed color]

*1 GM5WA06310A: I_F = 35 mA (Red), I_F = 40 mA (Green), I_F = 10 mA (Blue)
*2 GM5WA06270A: I_F = 35 mA (Red, Green, Blue)
*3 GM5WA06270A: T: 2.4 mm
*4 GM1WA55311A: I_F = 5 mA (Red, Green, Blue)
*5 GM5WA06256A: I_F = 22 mA (Red), I_F = 35 mA (Green), I_F = 13 mA (Blue)
*6 GM5WA94300A: I_F = 20 mA (Red), I_F = 20 mA (Green), I_F = 7 mA (Blue)
*7 GM4WA25300A: I_F = 21 mA (Red), I_F = 25 mA (Green), I_F = 7 mA (Blue)
*8 GM1WA55311A, GM5WA94300A, GM4WA25300A, GM5WA06256A series: Tc = 25°C


GM1WA55311A


GM5WA06256A


GM5WA06310A


GM5WA06256Z


GM5WA06270A


GM5WA94300A


GM4WA25300A

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☆New product

■ LED Module for Lighting

◆ Features

(1) Size: 18 mm × 18 mm, 1.5 mm thickness* Square module for light source.
(2) 1 module (30 LEDs): White type 280 lm (3.6 W)
(3) Luminous efficiency: White type 78 lm/W
(4) No interconnection substrate necessary and is directly installable to heat sink.

*Excluding emitting parts

GW5BWC15L02 series

(I_F = 360 mA, Tc = 25°C)

BW White				BD Light bulb color				BN High color rendering			
	Color coordinates (x, y)	Color temp. (K) TYP.	Luminous flux (lm) TYP.		Color coordinates (x, y)	Color temp. (K) TYP.	Luminous flux (lm) TYP.		Color coordinates (x, y)	Color temp. (K) TYP.	Luminous flux (lm) TYP.
☆GW5BWC15L02	(0.35, 0.36)	5 000	280	☆GW5BDC15L02	(0.45, 0.41)	2 800	200	☆GW5BNC15L02	(0.35, 0.35)	5 000	190
								☆GW5BNC15L12	(0.31, 0.32)	6 500	190

☆New product
★Under development

RoHS Pb FREE

■ Laser Diodes

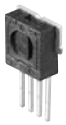
◆Model Configurations

• For applications other than optical discs

Wavelength (nm)	Absolute maximum ratings (mW)*1	Package	
		 ø5.6 mm Metal type	 ø3.3 mm Metal type
405 band	25	☆GH04020B2AE	
	25	GH04020A2GE	
	150	☆GH04125A2AE	
	130	GH04P21A2GE	
660 band	10		GH06510F4A
785 band	10	GH07810C2K	
	25	GH07825C2K	

*1 The absolute maximum ratings are not to be exceeded under any conditions whatsoever, whether in testing or actual use.

• For optical disc use*3

Wavelength (nm)	Absolute maximum ratings (mW)*1	Package		
		 ø5.6 mm Metal type	 ø3.3 mm Metal type	 1.8 mm t Resin type
405 band	20	GH04020A2G	GH04020A4G	
	210*2	GH04P21A2G		
	250*2	☆GH04P25A2G	☆GH04P25A4G	
660 band	240*2	GH06P24A2C		GH16P24A8C
	350*2			GH16P35A8C
	400*2			☆GH16P40A8C
785 band	240*2	GH07P24C1C	GH07P24C4C	
	280*2	★GH07P28F1C	★GH07P28F4C	

*1 The absolute maximum ratings are not to be exceeded under any conditions whatsoever, whether in testing or actual use.
*2 Optical power output MAX. (mW)
*3 Models for optical disc use can change considerably, so depending on the time it takes to contact us, there is the possibility that production will have stopped for a specific model. For this reason, we ask for your understanding, as sample sales may be impossible.

☆New product
★Under development

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◆Specifications

• Laser diodes lineup for applications other than optical discs

(Tc = 25°C)

Model No.	Wavelength (nm)	Absolute maximum ratings*1 CW (Continuous wave)	Features	Applications	Terminal connections
☆GH04020B2AE	405 band	25	ø5.6 mm CAN package, operating temperature: 70°C MAX., with built-in monitor PD	Laser displacement gauge, light sources, etc.	A
☆GH04125A2AE	405 band	150	ø5.6 mm CAN package, operating temperature: 70°C MAX., with built-in monitor PD	Laser displacement gauge, light sources, etc.	A
GH04020A2GE	405 band	25	ø5.6 mm CAN package, operating temperature: 70°C MAX.	Laser displacement gauge, light sources, etc.	E
GH04P21A2GE	405 band	130	ø5.6 mm CAN package, operating temperature: 70°C MAX.	Laser displacement gauge, light sources, etc.	E
GH06510F4A	660 band	10	ø3.3 mm CAN package, operating temperature: 70°C MAX., with built-in monitor PD	Bar code reader, laser displacement gauge, etc.	A
GH07810C2K	785 band	10	ø5.6 mm CAN package, operating temperature: 60°C MAX., with built-in monitor PD	Printer, copier, complex machine	D
GH07825C2K	785 band	25	ø5.6 mm CAN package, operating temperature: 60°C MAX., with built-in monitor PD	Printer, copier, complex machine	D

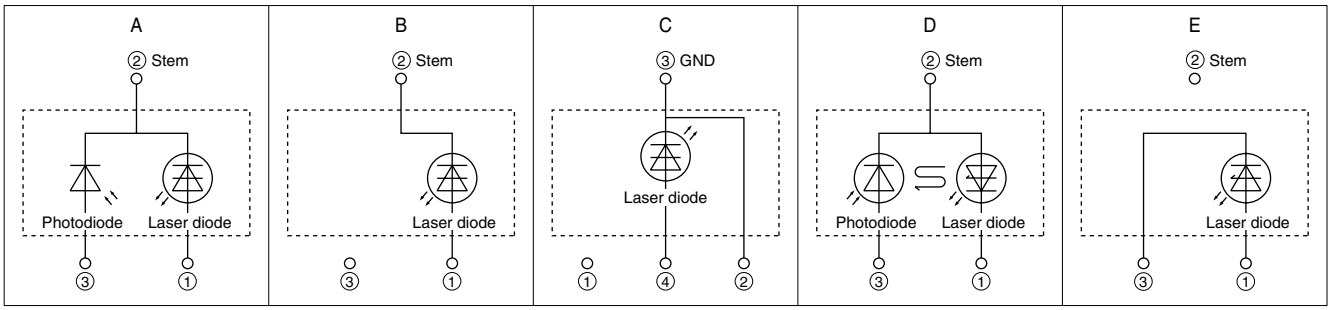
• Laser diodes lineup for optical disc use*2

(Tc = 25°C)

Model No.	Wavelength (nm)	Absolute maximum ratings*1 CW (Continuous wave)	Absolute maximum ratings*1 Pulse	Features	Applications	Terminal connections
GH04020A2G	405 band	20	—	ø5.6 mm CAN package, operating temperature: 70°C MAX.	Blu-ray disc playback	E
GH04020A4G	405 band	20	—	ø3.3 mm CAN package, operating temperature: 70°C MAX.	Blu-ray disc playback	E
GH04P21A2G	405 band	105	210	ø5.6 mm CAN package, operating temperature: 70°C MAX. (pulse drive)	Blu-ray disc recording	E
☆GH04P25A2G	405 band	125	250	ø5.6 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	Blu-ray disc recording	E
☆GH04P25A4G	405 band	125	250	ø3.3 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	Blu-ray disc recording	E
GH06P24A2C	660 band	100	240	ø5.6 mm CAN package, operating temperature: 75°C MAX. (pulse drive)	Double-layer DVD 4× writing	B
GH16P24A8C	660 band	100	240	1.8 mm frame package, operating temperature: 80°C MAX. (pulse drive)	Double-layer DVD 4× writing	C
GH16P35A8C	660 band	125	350	1.8 mm frame package, operating temperature: 80°C MAX. (pulse drive)	Double-layer DVD 8× to 16× recording	C
☆GH16P40A8C	660 band	135	400	1.8 mm frame package, operating temperature: 80°C MAX. (pulse drive)	Double-layer DVD 8× to 16× recording	C
GH07P24C1C	785 band	120	240	ø5.6 mm CAN package, operating temperature: 75°C MAX. (pulse drive)	CD-R/RW (MAX. 48× to 52× writing)	B
★GH07P28F1C	785 band	150	280	ø5.6 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	CD-R/RW (MAX. 48× to 52× writing)	B
GH07P24C4C	785 band	120	240	ø3.3 mm CAN package, operating temperature: 75°C MAX. (pulse drive)	CD-R/RW (H/H, slim dual-purpose) (MAX. 48× to 52× writing)	B
★GH07P28F4C	785 band	150	280	ø3.3 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	CD-R/RW (H/H, slim dual-purpose) (MAX. 48× to 52× writing)	B

*1 The absolute maximum ratings are not to be exceeded under any conditions whatsoever, whether in testing or actual use. For recommended optical power output, consult the specification sheet or data sheet for each model.
*2 Models for optical disc use can change considerably, so depending on the time it takes to contact us, there is the possibility that production will have stopped for a specific model. For this reason, we ask for your understanding, as sample sales may be impossible.

• Terminal Connections



Notice
In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc.
Except where specially indicated, models listed on this page comply with the RoHS Directive*. For details, please contact SHARP.
*RoHS Directive: Prohibits use of lead, cadmium, hexavalent chromium, mercury and specific brominated flame retardants (PBBs and PBDEs), with certain exceptions.
Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

RoHS Pb FREE

■ Europe: LNBs for Satellite Broadcast

◆ Features

(1) Wide band type receiving all broadcasting channels (analog & digital) of Europe. [Universal LNB]

(2) Originally developed feed-horn waveguide makes the wide-band, low-noise characteristics possible.

(3) One of the industry's most compact and lightweight package

(4) Low consumption current design for energy saving [80 mA (TYP.): BS1R9EL100A]

◆ Specifications

Destination		Europe, Astra/Eutelsat Satellite etc.			
Receiving polarization		Horizontal/Vertical polarization			
Model No. <Type>		BS1R8EL500A <4 output>	BS1R8EL400A <4 output>	BS1R8EL200A <2 output>	BS1R9EL100A <1 output>
Input frequency (GHz)		10.7 to 11.7 [Low band], 11.7 to 12.75 [High band]			
Output frequency (MHz)		950 to 1 950 [Low band], 1 100 to 2 150 [High band]			
Local oscillation frequency (GHz)		9.75 [Low band], 10.6 [High band]			
NF (dB)		0.7 (TYP.)			0.4 (TYP.)
Conversion gain (dB)		56 (TYP.)			58 (TYP.)
Phase noise		–55 dBc/Hz @1 kHz (TYP.)			
Cross-polar discrimination (dB)		25 (TYP.)			
Supply voltage (V DC) (Polarization switching)	Vertical polarization	11.5 to 14.0 (0/22 kHz)			
	Horizontal polarization	16.0 to 19.0 (0/22 kHz)			
Current consumption (mA)		210 (TYP.)/250 (MAX.)	310 (TYP.)/350 (MAX.)	190 (TYP.)/250 (MAX.)	80 (TYP.)/120 (MAX.)
Waveguide		Feed-horn (F/D = 0.6)			
Output impedance (Ω)		75			
Output connector (F-type)		4-output (H/H, H/L, V/H, V/L)	4-output (H/V, High and low switching)	2-output (H/V, High and low switching)	1-output (H/V, High and low switching)
Outline dimensions (W) × (D) × (H) (mm)		133.0 × 103.6 × 60.0	133.0 × 103.6 × 60.0	123.5 × 97.0 × 60.0	98.0 × 49.5 × 42.7
Weight (g)		Approx. 255	Approx. 256	Approx. 215	Approx. 80

BS1R8EL500A

BS1R8EL400A

BS1R8EL200A

BS1R9EL100A

RF Components

■ Japan/Asia/Australia: LNBs for CS Digital Satellite Broadcast

◆ Specifications

Destination		Japan, Asia, Australia, CS Satellite
Receiving polarization		Horizontal/Vertical polarization
Model No. <Type>		BS1R8AR100A
Input frequency (GHz)		11.70 to 12.75
Output frequency (MHz)		1 000 to 2 050
Local oscillation frequency (GHz)		10.7
NF (dB)		0.7 (TYP.) / 0.9 (MAX.)
Conversion gain (dB)		55 to 64
Phase noise		–75 dBc/Hz @1 kHz (TYP.)
Cross-polar discrimination (dB)		25 (TYP.)
Supply voltage (V DC) (Polarization switching)	Vertical polarization	11.5 to 14.0
	Horizontal polarization	16.0 to 19.0
Current consumption (mA)		80 (TYP.)/120 (MAX.)
Waveguide		Feed-horn (F/D = 0.6)
Output impedance (Ω)		75
Output connector (F-type)		1-output (H/V switching)
Outline dimensions (mm)		107.3 (W) × 60 (D) × 60 (H)
Weight (g)		Approx. 110

BS1R8AR100A

■ Japan: LNBs for BS/CS 110° Satellite Broadcast

◆ Features

(1) Can receive 2 satellite broadcasts of 110° BS/CS digital
[Employs wide-band (1 GHz) circular' linear polarization conversion technology (septum waveguide structure)]

(2) Outstanding noise figure (NF) characteristics enabling compact design of antenna diameter. [NF: 0.45 dB (TYP.)/BS1F6JU300A]

(3) Low current consumption design for improved energy saving. [80 mA (TYP.)]

◆ Standard Specifications

Destination		Japan BS/CS 110° Satellite		
Receiving polarization		Right circular polarization		Right/Left circular polarization
Model No.		BS1F6JU300A	BS1F6JP300A	BS1F6JP100A
Input frequency (GHz)		11.71023 to 12.751		
Output frequency (MHz)		1 032.23 to 2 073		
Local oscillation frequency (GHz)		10.678		
NF (dB)		0.45 (TYP.) / 0.6 (MAX.)	0.7 (TYP.) / 1.1 (MAX.)	
Conversion gain (dB)		48 to 60		
Phase noise		–65 dBc/Hz @1 kHz (TYP.)		
Cross-polar discrimination (dB)		25 (TYP.)/20 (MIN.)		
Supply voltage (V DC) (Polarization switching)	Right circular polarization	9.5 to 18.0		13.5 to 16.5
	Left circular polarization	—		9.5 to 12.0
Current consumption (mA)		80 (TYP.)/110 (MAX.)		
Waveguide		Feed-horn (F/D = 0.5)		
Output impedance (Ω)		75		
Output connector (F-type)		1-output		1-output (R/L switching)
Outline dimensions (mm)		96 (W) × 53.07 (D) × 71 (H)		
Weight (g)		Approx. 130 (not including outer cabinet)		

BS1F6JP300A

* Outer cabinet is made upon request.

■ Digital DBS Front-End Units

◆ Features

(1) Equipped with a direct conversion IC developed by Sharp. Reliability is improved by reducing power consumption and component counts.

(2) Wide-band reception design also covering CS broadcast band. [Reception frequency: 950 to 2 150 MHz]

(3) Wide product line-up of LINK integrated types for contributing to set development time reduction. [Compatible with DVB-S/DVB-S2/ISDB-S/ABS-S demodulation]

(4) User support tools can be provided. [Sample/evaluation boards and software are available.]

◆ Standard Specifications <IQ output type>

Destination	Global	
Demodulator system	DVB-S	ISDB-S/DVB-S2/ABS-S
Input type	1-input/1-loop through output	1-input
Model No.	BS2S7HZ0502	BS2S7HZ6306
Input frequency (MHz)	950 to 2 150	
Input signal level (dBm)	–65 to –25	
The 1st intermediate frequency (MHz)	Zero-IF (Direct conversion)	
Base band frequency bandwidth (MHz)	10 to 30, 2.0 MHz step (BB LPF)	
RF input local leak (dBm)	–70 and below	
Output type	I/Q	
Channel selection system	PLL (I²C-bus)*1	
Noise figure (dB)	7 (TYP.)	
Tuning voltage (V DC)	Shared with a 3.3 V power source	
Supply voltage (V DC)	3.3	
LNB power supply	DC 25 V, 400 mA (MAX.)	
Input impedance (Ω)	75	
Outline dimensions (mm)	29.6 (W) × 29.4 (D) × 13.0 (H)	30.6 (W) × 25.0 (D) × 13.0 (H)

BS2S7HZ0502

BS2S7HZ6306

※ Contact SHARP for custom design product.
*1 I²C-bus is a trademark of Philips Corporation.

RF Components

■ Digital DBS Front-End Unit

◆ Standard Specifications <IQ dual output type>

Destination	Global
Input type	1-input
Model No.	BS2S7HZ7302
Input frequency (MHz)	950 to 2 150
Input signal level (dB m)	–65 to –25
The 1st intermediate frequency (MHz)	Zero-IF (Direct conversion)
Base band frequency bandwidth (MHz)	10 to 30, 2.0 MHz step (BB LPF)
RF input local leak (dB m)	–70 and below
Output type	I/Q × 2
Channel selection system	PLL (I²C-bus)*1
Noise figure (dB)	7 (TYP.)
Tuning voltage (V DC)	Shared with a 3.3 V power source
Supply voltage (V DC)	3.3
LNB power supply	25 V DC, 400 mA (MAX.)
Input impedance (Ω)	75
Outline dimensions (mm)	55.1 (W) × 29.6 (D) × 13.2 (H)

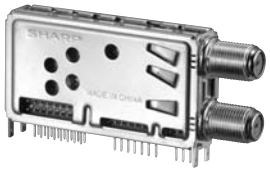
BS2S7HZ7302

※ Contact SHARP for custom design product.
*1 I²C-bus is a trademark of Philips Corporation.

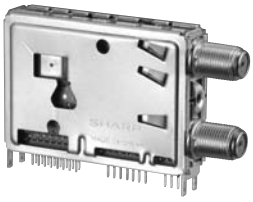
■ Digital DBS Front-End Units

◆ Standard Specifications

Destination	Global (DVB-S)	Europe (DVB-S2)
Input type/Features	1-input, 1-loop through output	1-input, 1-loop through output
Model No.	BS2F7VZ7395	BS2S7VZ0169
Input frequency (MHz)	950 to 2 150	
Input signal level (dB m)	–65 to –25	
The 1st intermediate frequency (MHz)	Zero-IF (Direct conversion)	
Base band frequency bandwidth (MHz)	10 to 30, 2.0 MHz step (BB LPF)	10 to 30
RF input local leak (dB m)	–70 and below	
Output type	Transport stream (parallel/serial)	
Symbol rate (M baud)	45 (MAX.)	10 to 30
Channel selection system	PLL (I²C-bus)*1	
Noise figure (dB)	7 (TYP.)	
Tuning voltage (V DC)	Shared with a 3.3 V power source	
Supply voltage (V DC)	3.3, 2.5	3.3, 1.0
LNB power supply	25 V DC, 400 mA (MAX.)	
Input impedance (Ω)	75	
Outline dimensions (mm)	57.5 (W) × 29.6 (D) × 13.2 (H)	55.1 (W) × 37.9 (D) × 13.2 (H)



BS2F7VZ7395



BS2F7VZ0169

※ Contact SHARP for custom design product.
*1 I²C-bus is a trademark of Philips Corporation.

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■ Combination Front-End Units for Digital Terrestrial, Analog Terrestrial and Digital Satellite Broadcasting

◆ Features

(1) Enables simultaneous reception of digital terrestrial and digital satellite broadcasting.

(2) Contributes to making LCD TVs, etc. thinner.

◆ Standard Specifications

Destination	Japan (ISDB-T/S/NTSC)		
Model No.	VA1R5JF7012		
	Digital terrestrial	Analog terrestrial	Digital DBS
Input frequency (MHz)	VHF, UHF, CATV VHF Low: 93 to 167 VHF High: 173 to 399 UHF: 405 to 767		950 to 2 150
Input signal level*1 (dBm)	–75 to –20	–	–65 to –25
Output type	Transport stream (Serial)	CVBS/SIF	Transport stream (Serial)
IF bandwidth (MHz)	6		–
Base band frequency bandwidth	–		10 MHz to 30 MHz, 2.0 MHz step (BB LPF)
Noise figure (dB)	6 (TYP.)		6 (TYP.)
Phase noise (dBc/Hz)	–90 (TYP.) at 10 kHz offset		–80 (TYP.) at 10 kHz offset
Image rejection (dB)	–65 (TYP.)		–
Channel selection system	PLL (I^2C-bus)*2		
Supply voltage (V DC)	1.2, 2.5, 3.3, 5.0		
Outline dimensions (mm)	85.5 (W) × 45.2 (D) × 12.7 (H)		

*1 It conforms to the ARIB standard.
*2 I^2C-bus is a trademark of Philips Corporation.

VA1R5JF7012

RF Components

■ Front-End Units for ISDB-T/DVB-T/DTMB/CATV

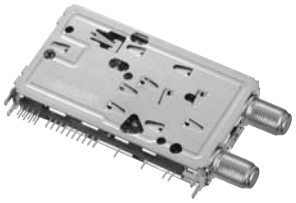
◆ Features

(1) Low phase noise characteristics, high elimination of adjacent channel interference.
(2) Transport stream output front-end units with built-in OFDM demodulation IC.
(3) Compact, low power consumption.
(4) Other types are available with various forms of chassis (vertical or horizontal type) and input connectors (F or DIN type), etc.

◆ Standard Specifications

Destination	Japan (ISDB-T/S)		Europe (DVB-T)/Asia (DVB-T)	
Model No.	VA1J5JF7007*1		VA1T1ED5065	VA1K5ED5255
	Digital terrestrial	Digital satellite		
Input frequency (MHz)	VHF, UHF, CATV VHF Low: 93 to 167 VHF High: 173 to 399 UHF: 405 to 767	950 to 2 150	VHF: 143.5 to 430 UHF: 430 to 862	VHF: 146 to 430 UHF: 430 to 862
Output type	Transport stream (Serial)		Direct IF	Transport stream (Serial)
IF bandwidth (MHz)	6	—	7, 8, selectable	8
Noise figure (dB)	6 (TYP.)	8 (TYP.)	6 (TYP.)	
Phase noise	–90 dBc/Hz (TYP.) at 10 kHz offset	–80 dBc/Hz (TYP.) at 10 kHz offset	–90 dBc/Hz (TYP.) at 10 kHz offset	
Image rejection (dB)	–65 (TYP.)	—	–55 (TYP.)	—
Channel selection system	PLL (I²C-bus)*2			
Power consumption (W)	2.0*3		0.75	1.33
Supply voltage (V DC)	1.2, 2.5, 3.3, 5		5 (DC-DC converter)	5, 3.3, 1.8 (DC-DC converter)
Outline dimensions (mm)	70.0 (W) x 40.0 (D) x 12.7 (H)		52.0 (W) x 35.9 (D) x 13.4 (H)	70.0 (W) x 29.6 (D) x 13.2 (H)

*1 Enables simultaneous reception of digital terrestrial and digital satellite broadcasting.
*2 I²C-bus is a trademark of Philips Corporation.
*3 During simultaneous OFDM/8PSK demodulation operation.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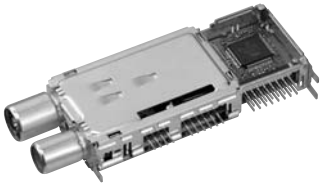
VA1K5ED5255

FRONT-END UNITS FOR ISDB-T/DVB-T/DTMB/CATV

◆ Standard Specifications

Destination	Brazil (SBTVD-T)	China (DTMB)	Europe/China/India (DVB-C)
Model No.	VA1J5BF6009	VA1T1EF2096	VA1K5CD5405
	Digital terrestrial	Digital terrestrial	CATV
Input frequency (MHz)	54 to 864	47 to 862	
Output type	Transport stream (Serial)	Direct IF	Transport stream (Parallel/serial)
IF frequency/IF bandwidth (MHz)	44/6	36/8	
Noise figure (dB)	6 (TYP.)		
Phase noise	–90 dBc/Hz (TYP.) at 10 kHz offset	–87 dBc/Hz (TYP.) at 10 kHz offset	
Image rejection (dB)	–65 (TYP.)	–55 (TYP.)	
Channel selection system	PLL (I^2C-bus)*1		
Power consumption (W)	2.0	0.75	1.3
Supply voltage (V DC)	1.2, 2.5, 3.3, 5	5	2.5, 3.3, 5
Outline dimensions (mm)	70.0 (W) x 37.0 (D) x 12.5 (H)	68.2 (W) x 35.9 (D) x 14.1 (H)	70.0 (W) x 29.4 (D) x 13.0 (H)

*1 I^2C-bus is a trademark of Philips Corporation.

VA1J5BF6009

VA1T1EF2096

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■ Front-End Units for Digital Terrestrial and Analog Terrestrial Broadcasting

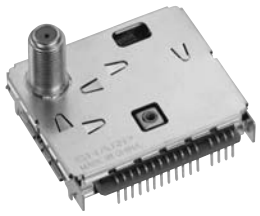
◆ Features

Contributing to the development of thinner LCD TVs and similar products by combining compatibility with digital and analog terrestrial broadcasts into a single unit.

◆ Standard Specifications

Destination		North America	Europe	Brazil*2	China/Asia
Model No.		VA1Y2UF2446	VA1Y2ED2001	VA1G5BF8010	VA1Y2CD2001
Input frequency		Low: 54 to 160.9 MHz Mid: 161 to 425.9 MHz High: 426 to 864 MHz	VHF: 47 to 430 MHz UHF: 430 to 862 MHz	VHF Low: 54 to 160.9 MHz VHF High: 161 to 425.9 MHz UHF: 426 to 864 MHz	47 to 870 MHz
Analog intermediate frequency (MHz)	Video	45.75	B/G, I, D/K, L: 38.9 L': 33.9	45.75	38.0
	Audio	41.25	D/K, L: 32.4 I: 32.9 B/G: 33.4 L': 40.4	41.25	D/K: 31.5, I: 32.0, B/G: 32.5, M/N: 33.5
Digital intermediate frequency (MHz)		44	36.167	44	36
Digital IF bandwidth (MHz)		6	7/8 (switchable)	6	8
Phase noise		–85 dBc/Hz (TYP.) at 20 kHz offset	–85 dBc/Hz (TYP.) at 10 kHz offset	–90 dBc/Hz (TYP.) at 10 kHz offset	–85 dBc/Hz (TYP.) at 10 kHz offset
Supply voltage (V DC)		5.0	5.0	1.2, 2.5, 3.3, 5	5.0
Noise figure (dB)		TYP. 6 (54 to 806 MHz), TYP. 7 (806 to 861 MHz)	TYP. 6		
Channel selection system		PLL (I²C-bus)*1			
Image rejection (dB)		Low: –65.0, Mid: –65.0, High: –60.0	TYP. –65		
Outline dimensions (W) × (D) × (H) (mm)		52.6 × 38.1 × 10	61.5 × 35.0 × 10.9	70.0 × 37.0 × 10.0	62.0 × 39.0 × 10.9

*1 I²C-bus is a trademark of Philips Corporation.
*2 Transport stream output front-end units with built-in OFDM demodulation IC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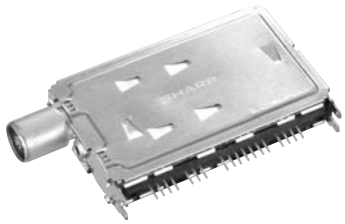
VA1Y2ED2001


VA1G5BF8010

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■ RF-separation Type Digital Terrestrial Compound Receiver Module

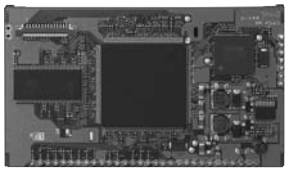
◆ Features

(1) An OFDM demodulator, MPEG decoder, and video encoder circuit are combined into a single package for reception of ISDB-T.

(2) Comes with built-in standard reception software, with a simple EPG included, based on the ARIB standard.
Compatible with Ministry of Internal Affairs and Communications specifications for a "simple tuner."

(3) The tuner (RF) section is separate, making it possible to select between digital/analog and digital tuners.

Recommended tuner { Digital terrestrial: VA1T1JF2091
Analog terrestrial/Digital terrestrial: VA1W2JF2008



DU6M4JZ00xx

◆ Standard Specifications

Model No.	DU6M4JZ00xx
Circuit configuration	[RF (separate body) +] OFDM + MPEG
Receiving channel (ch)	[VHF] 1 to 13, [UHF] 14 to 62, [CATV] C13 to C63
Video output	Component (Half HD)*
Audio output	Analog stereo (L/R)
B-CAS	Built-in control software
EPG	Built-in simple EPG
ES (Engineering service)	Compatible
Firm ware upgrades	Compatible (USB)
Supply voltage	DC 5 V single power supply
Power consumption (W)	Approx. 2.75
Outline dimensions (mm)	93 (W) × 53 (D) × 17.6 (H)

* Composite video output (SD) is also supported.

■ One-Seg Tuner Module

◆ Features

(1) High sensitivity: -109 dBm [TYP.] (QPSK, CR1/2 ch13)

(2) Compact and thin design: 5.9 × 5.9 × 1.05 mm

(3) Low power consumption: 80 mW

(4) Output interface: TS serial output

VA3A5JZ922

◆ Standard Specifications

Destination	Japan
Model No.	VA3A5JZ922
Input frequency (MHz)	470 to 770 (UHF: 13 to 62)
Input signal level (dBm)	–109 [TYP.] (QPSK, CR1/2, ch13)
Outline dimensions (mm)	5.9 (W) × 5.9 (D) × 1.05 (H)
Supply voltage (V DC)	1.8 (RF) 2.8 (RF OSC) 1.2 (OFDM Core) 1.7 to 2.8 (I/O)
Power consumption (mW)	80
Operating temperature (degree C)	–20 to 85
Control I/F	I²C-bus*1

*1 I²C-bus is a trademark of Philips Corporation.

★Under development

■ Embedded Wireless LAN Module

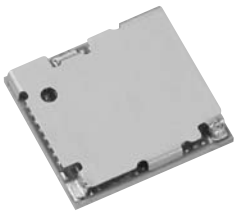
◆ Features

(1) LSI implementation of MAC functionality for reduced load on host CPU and high throughput
Transmission: 8.0 Mbps
Reception: 10.7 Mbps
Test environment: Xscale platform + SDIO I/F base (PXA270 + 520 MHz clock)

(2) Low power consumption
Continuous transmission: 530 mW (11g: +10 dBm output)
Continuous reception: 326 mW
Sleep mode: 81 μW

(3) Wake on WLAN support

(4) LSI implementation of encryption function for reduced load on host CPU



DC2J1DZ150

◆ Standard Specifications

Standard	IEEE802.11b/g
Model No.	★DC2J1DZ150
Operating frequency (MHz)	2 400 to 2 484
Data rate (Mbps)	1/2/5.5/11 & 6/9/12/18/24/36/48/54
Number of channels	13
Demodulator system	CCK/DQPSK/DBPSK (11b) OFDM (11g)
Transmission output (dBm)	13/10
Receiving sensitivity (dBm)	TYP.: –87 (11 Mbps CCK) TYP.: –70 (54 Mbps OFDM)
Channel selection system	PLL (I^2C)
Security	WEP TKIP AES
Outline dimensions (mm)	7.9 (W) × 8.5 (D) × 1.4 (H)

Driver software consults separately.

EMBEDDED WIRELESS LAN-BLUETOOTH COMBO MODULE

★Under development

■ Embedded Wireless LAN-Bluetooth Combo Module

◆ Features

(1) A two-in-one module compliant with the latest Bluetooth standard (v2.1)
Wireless LAN: 11b/g, Bluetooth: v2.1+EDR* (3 Mbps)

(2) Compatible with IEEE802.15.2 standard compliant wireless LAN and Bluetooth coexistence functions.

(3) Thin, compact configuration—the smallest class in the industry.
10.0 x 10.0 x 1.4 mm

*EDR: Enhanced Data Rate

DC2K1DZ145

◆ Standard Specifications

Model No.	★DC2K1DZ145	
Standard	WLAN (IEEE802.11b/g)	Bluetooth v2.1+EDR; HCI
Outline dimensions (mm)	10.0 (W) × 10.0 (D) × 1.4 (H)	
Supply voltage (V DC)	VCCIF_WLAN 1.7 to 1.9 or 2.3 to 2.7 VCCPA 2.7 to 3.6 VCC285 2.7 to 2.9 VCC120 1.1 to 1.3	VCCIF_BT 1.7 to 1.9 or 2.3 to 2.7 Vcc275_BT 2.65
Input frequency (MHz)	2,400 to 2,484	2,402 to 2,480
Data rate (Mbps)	1/2/5.5/11 & 6/9/12/18/24/36/48/54	1/2/3
Number of channels	13	79
Modulation system	CCK/DQPSK/DBPSK (11b) OFDM (11g)	GFSK (1 Mbps) DQPSK (2 Mbps) 8-DPSK (3 Mbps)
Transmission output (dBm)	13/10	Class 2 4 (Max.)
Receiving sensitivity (dBm)	TYP.: –87 (11 Mbps, PER 8%) TYP.: –70 (54 Mbps, PER 10%)	TYP.: –82 (1 Mbps, BER 0.1%) TYP.: –84 (2 Mbps, BER 0.01%) TYP.: –76 (3 Mbps, BER 0.01%)
Security	WEP TKIP AES	by driver software
Interface	SPI/SDIO	PCM (64 kbps), SPI/UART

Driver software consults separately.

■ Infrared Data Communication Device Lineup

Communication system	Transmission speed	Transmission distance	Features		Operating supply voltage	Model No.
IrDA data	FIR 4 Mb/s (Receiver only)	250 cm			3.0 to 3.6 V	GP2W4020XPMF
(IrDA 1.x)		150 cm			3.0 to 3.6 V	GP2W4010YP0F
	FIR 4 Mb/s (Integrated receiver and transmitter type)	100 cm	Compact, thin (height: 2.5 mm), low voltage operation type, LP/HP mode switching function		2.7 to 3.6 V	GP2W1004YP0F
			LP/MP/HP mode switching function		2.7 to 5.5 V	GP2W1001YP0F
		70 cm	LP/HP mode switching function		2.4 to 3.6 V	GP2W1010YP0F
		50/20 cm	LP/HP mode switching function, remote control transmission function, compact, thin (height: 1.5 mm)		2.6 to 3.6 V	GP2W3152YP0F
			LP/HP mode switching function, remote control transmission function, top view type (height: 1.75 mm)		2.6 to 3.6 V	GP2W3172XP0F
		50/20 cm	LP/HP mode switching and remote control transmission functions		2.4 to 3.6 V	GP2W3120YP0F
		50/20 cm	LP/HP mode switching function		2.7 to 3.6 V	GP2W1320YP0F
		70/20 cm	LP/MP/HP mode switching and remote control transmission functions		2.6 to 3.3 V	GP2W3104YP0F
	SIR 115.2 kb/s (Integrated receiver and transmitter type)	100 cm	Compact, low dissipation current		2.4 to 5.5 V	GP2W0004YP0F/ GP2W0004XP0F
		80 cm	Remote control transmission function, compact, low dissipation current		2.4 to 5.5 V	GP2W3020YP
	SIR LP 115.2 kb/s (Integrated receiver and transmitter type)	20 cm	Built-in LED constant current circuit, 3-state output		2.0 to 3.6 V	GP2W0110VX/ GP2W0110VY
				(Height: 1.5 mm)	2.4 to 3.6 V	GP2W0150YP0F
				(Height: 2.1 mm) Top view type	2.4 to 3.6 V	GP2W0150XP0F
			Remote control transmission function (built-in drive circuit) λp: 890 nm (Height: 1.5 mm)		2.4 to 3.6 V	GP2W3270YP0F
				Top view type	2.4 to 3.6 V	GP2W3270XP0F

☆New product

RoHS Pb FREE

■ Infrared Data Communication Devices

◆FIR Compliant Devices (Receiver Only)

Model No.	Communication system	Transmission speed	Description	Maximum reception distance*1 (cm)	Supply voltage (V DC)	Outline dimensions (mm)
☆GP2W4020XPMF	Uni-directional communication (receiving only)	4 Mb/s	IrSS™-compliant, receiving-only type	250	3 to 3.6	21 × 7 × 7.1
☆GP2W4010YP0F	Uni-directional communication (receiving only)	9.6 k to 4 Mb/s	IrSS™-compliant, receiving-only type	150	3 to 3.6	10 × 4 × 4.5

*1 Radiant intensity at transmitting side: 100 mW/sr

GP2W4020XPMF

GP2W4010YP0F

◆FIR Compliant Devices (Integrated Receiver and Transmitter Type)

Model No.	Communication system	Transmission speed	Description	Transmission distance (cm)	Supply voltage (V DC)	Outline dimensions (mm)
☆GP2W3152YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	With remote control transmission function, LP/HP mode switching function	21/35	2.6 to 3.6	7.9 × 2.8 × 1.5
☆GP2W3172XP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	With remote control transmission function, LP/HP mode switching function	21/35	2.6 to 3.6	8.8 × 2.5 × 1.75
GP2W3120YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	With remote control transmission function, LP/HP mode switching function	21/35	2.6 to 3.6	7.16 × 2.73 × 1.82
GP2W1010YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	LP/HP mode switching function	21/70	2.4 to 3.6	7.9 × 2.85 × 2.15
GP2W1004YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	LP/HP mode switching function	21/100	2.4 to 3.6	7.9 × 2.85 × 2.5
GP2W1001YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	LP/MP/HP mode switching function	21/100	2.7 to 5.5	10.01 × 4.4 × 3.5
GP2W1320YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	Compact, thin, low dissipation current during shutdown (Icc: TYP. 0.45 mA)	21/35	2.7 to 3.6	7.16 × 2.73 × 1.82
GP2W3104YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	With remote control transmission function, LP/MP/HP mode switching function	21/70	2.6 to 3.3	7.9 × 2.85 × 2.5

GP2W3152YP0F

GP2W3172XP0F

GP2W3120YP0F

GP2W1010YP0F

GP2W1004YP0F
(GP2W3104YP0F)

GP2W1001YP0F

GP2W1320YP0F

IR Device

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RoHS Pb FREE

◆SIR Compliant Devices (Integrated Receiver and Transmitter Type)

Model No.	Communication system	Transmission speed	Description	Transmission distance (cm)	Supply voltage (V DC)	Outline dimensions (mm)
GP2W0004YP0F	Bi-directional (half-duplex) communication	9.6 k to 115.2 kb/s	Low dissipation current (Icc: 130 µA MAX.)	100	2.4 to 5.5	9.21 × 3.76 × 2.71
GP2W0004XP0F	Bi-directional (half-duplex) communication	9.6 k to 115.2 kb/s	Low dissipation current (Icc: 130 µA MAX.)	100	2.4 to 5.5	9.2 × 3.35 × 2.95
GP2W3020YP	Bi-directional (half-duplex) communication	9.6 k to 115.2 kb/s	With remote control transmission function (Transmission distance TYP. 7 m, I_F = 350 mA) Low dissipation current during shutdown (Icc: 130 µA MAX.)	80	2.4 to 5.5	7.9 × 2.85 × 2.15


GP2W0004YP0F


GP2W0004XP0F


GP2W3020YP

◆SIR LP Compliant Devices (Integrated Receiver and Transmitter Type)

Model No.	Communication system	Transmission speed	Description	Transmission distance (cm)	Supply voltage (V DC)	Outline dimensions (mm)
GP2W0110VX/VY	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Top-view and side view compatible (Model name is prescribed based on the packaging status.), lead-free type available	20	2.0 to 3.6	6.8 × 2.35 × 2.1
GP2W0150YP0F ▲	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Compact, thin, low dissipation current (Icc: 100 µA MAX.)	20	2.4 to 3.6	7.6 × 2.4 × 1.5
GP2W0150XP0F ▲	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Compact, thin, low dissipation current (Icc: 100 µA MAX.) Top view type	20	2.4 to 3.6	8.3 × 2.1 × 1.7
GP2W3270YP0F ▲	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Remote control transmission function, shared IR communication section (λp = 890 nm)	20	2.4 to 3.6	7.6 × 2.4 × 1.5
GP2W3270XP0F ▲	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Remote control transmission function, shared IR communication section (λp = 890 nm) Top view type	20	2.4 to 3.6	8.3 × 2.1 × 1.7

The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.


GP2W0110VX
(GP2W0110VY)


GP2W0150YP0F ▲
(GP2W3270YP0F ▲)


GP2W0150XP0F ▲
(GP2W3270XP0F ▲)

■ IR Detecting Unit for Remote Control Lineup

Type	Package		Features	Model No.	
	Form	Detection position*5 (from PCB)		Operating voltage: 5 V	Operating voltage: 3 to 5 V
IR detecting unit for remote control	Lead L bend with holder	16.0 mm*1	Compact size	GP1UM28XK0VF series	GP1UE28xXKCx series
			Compact size, Strengthened resistance toelectromagnetic induction noise (Mesh type)	GP1UM28RK0VF series	GP1UE28xRKCx series
		12.0 mm*2	Compact size	GP1UM27XK0VF series	GP1UE27xXKCx series
			Compact size, Strengthened resistance toelectromagnetic induction noise (Mesh type)	GP1UM27RK0VF series	GP1UE27xRKCx series
		6.8 mm*3	Compact size	GP1UM26XK0VF series	GP1UE26xXKCx series
			Compact size, Strengthened resistance toelectromagnetic induction noise (Mesh type)	GP1UM26RK0VF series	GP1UE26xRKCx series
	Lead straight with holder	19.0 mm	Compact size, Strengthened resistance toelectromagnetic induction noise (Mesh type)	GP1UM29QK0VF series	GP1UE29xQKCx series
		9.6 mm	Compact size	GP1UM28YK0VF series	GP1UE28xYKCx series
			Compact size, Strengthened resistance toelectromagnetic induction noise (Mesh type)	GP1UM28QK0VF series	GP1UE28xQKCx series
	Compact, thin type SMD (4.5 × 5.0 × 1.3 t mm)				GP1USC3xXP series
	Compact type SMD (6.8 × 2.1 × 2.35 t mm)				GP1UF31 series
	Holderless	Lead straight 6.0 mm		GP1UX51QS series	GP1UXCxxQS series
		Lead L bend*4 5.3 mm		GP1UX51RK series	GP1UXCxxRK series

*1 Mesh type (strengthened resistance to electromagnetic induction noise): 16.4 mm
*2 Mesh type: 12.4 mm
*3 Mesh type: 7.2 mm
*4 Mesh type: 5.3 mm
*5 Lead straight: Distance from lens center to mounting board upper surface
No mesh lead L bend: Distance from tip of lens to mounting board upper surface
Mesh-type lead L bend: Distance from tip of mesh to mounting board upper surface

☆New product

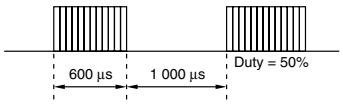
■ IR Detecting Units for Remote Control

(Ta = 25°C)

Series No.	Absolute maximum ratings		Electrical characteristics				Size (mm)	Remarks
	Vcc (V)	Topr (°C)	Icc (mA) *1 MAX.	VOH (V) MIN.	VOL (V) MAX.	fo (kHz) TYP.		
☆GP1UE26xXKCx*7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*8	0.45*8	40*14	5.6 × 9.6 × 6.8	*5, CMOS type
☆GP1UE27xXKCx*7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*8	0.45*8	40*14	5.6 × 9.6 × 12.0	*5, CMOS type
☆GP1UE28xXKCx*7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*8	0.45*8	40*14	5.6 × 9.6 × 16.0	*5, CMOS type
☆GP1UE28xYKCx*7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*8	0.45*8	40*14	5.6 × 8.6 × 12.5(9.6)*2	*5, CMOS type
☆GP1UE26xRKCx*4, 7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.6 × 9.6 × 7.2	*5, CMOS type
☆GP1UE27xRKCx*4, 7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.6 × 9.6 × 12.4	*5, CMOS type
☆GP1UE28xRKCx*4, 7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.6 × 9.6 × 16.4	*5, CMOS type
☆GP1UE28xQKCx*4, 7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.6 × 9.0 × 12.5(9.6)*2	*5, CMOS type
☆GP1UE29xQKCx*4, 7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.6 × 16.2 × 21.9(19)*2	*5, CMOS type
GP1UM26XK0VF*11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*9	0.45*9	40*3	5.6 × 9.6 × 6.8	*5
GP1UM27XK0VF*11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*9	0.45*9	40*3	5.6 × 9.6 × 12.0	*5
GP1UM28XK0VF*11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*9	0.45*9	40*3	5.6 × 9.6 × 16.0	*5
GP1UM28YK0VF*11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*9	0.45*9	40*3	5.6 × 8.6 × 12.5(9.6)*2	*5
GP1UM26RK0VF*4, 11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*10	0.45*10	40*3	5.6 × 9.6 × 7.2	*5
GP1UM27RK0VF*4, 11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*10	0.45*10	40*3	5.6 × 9.6 × 12.4	*5
GP1UM28RK0VF*4, 11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*10	0.45*10	40*3	5.6 × 9.6 × 16.4	*5
GP1UM28QK0VF*4, 11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*10	0.45*10	40*3	5.6 × 9.0 × 12.5(9.6)*2	*5
GP1UM29QK0VF*4, 11	0 to 6.0	–10 to +70	0.6 (0.65)*15	Vcc–0.5*10	0.45*10	40*3	5.6 × 16.2 × 21.9(19)*2	*5
☆GP1UXCxxQS*7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.5 × 5.3 × 7.5	*5, CMOS type, Pin configuration (Pin No. 2: GND)
☆GP1UXCxxRK*7	0 to 6.0	–10 to +70	0.5	Vcc–0.5*12	0.45*12	40*14	5.5 × 5.3 × 7.5	*5, CMOS type, Pin configuration (Pin No. 2: GND), Folded lead
GP1UX51QS*11	0 to 6.0	–10 to +70	0.6	Vcc–0.5*10	0.45*10	40*13	5.5 × 5.3 × 7.5	*5, Pin configuration (Pin No. 2: GND)
GP1UX51RK*11	0 to 6.0	–10 to +70	0.6	Vcc–0.5*10	0.45*10	40*13	5.5 × 5.3 × 7.5	*5, Pin configuration (Pin No. 2: GND), Folded lead
GP1UF31xXP0F/ GP1UF31xYP0F*7, 17	0 to 6.0	–30 to +85	0.4	Vcc–0.5*16	0.45*16	40*6	6.8 × 2.1 × 2.35	*5, Surface mount compatible, reflow soldering compatible
GP1USC3xXP*7	0 to 6.0	–30 to +85	0.6	Vcc–0.5	0.5	40*14	5 × 4.5 × 1.3	*5, Surface mount compatible, reflow soldering compatible

*1 When no signal is input (during input light).
*2 Figures in parentheses indicate the distance to the light detection center.
*3 In addition to the fo = 40kHz type, types fo = 36, 38, 36.7, 56.8, and 32.75 kHz are also available.
*4 Type with strengthened resistance to electromagnetic induction noise.
*5 A voltage regulator circuit is built-in but may be affected by the usage environment. Install with an externally mounted C and R as a power supply filter.
*6 In addition to the fo = 40 kHz type, types fo = 36, 38, and 36.7 kHz are also available.
*7 Operating voltage: 2.7 to 5.5 V
*8 Distance to transmitter on optical axis is 0.2 to 10.0 m. Ev < 10 lx when burst wave is input as shown in the right figure.
*9 Distance to transmitter on optical axis is 0.2 to 10.5 m. Ev < 10 lx when burst wave is input as shown in the right figure. (fo = 56.8 kHz: 0.2 to 9.0 m)
*10 Distance to transmitter on optical axis is 0.2 to 8.5 m. Ev < 10 lx when burst wave is input as shown in the right figure. (fo = 56.8 kHz: 0.2 to 7.0 m, fo = 32.75 kHz: 0.2 to 6.5 m)
*11 Operating voltage: 4.5 to 5.5 V
*12 Distance to transmitter on optical axis is 0.2 to 8.0 m. Ev < 10 lx when burst wave is input as shown in the right figure.
*13 Distance to transmitter on optical axis is 0.2 to 6.5 m. Ev < 10 lx when burst wave is input as shown in the right figure.
*14 In addition to the fo = 40 kHz type, types fo = 32.75, 36, 36.7, and 38 kHz are also available.
*15 fo = 56.8 kHz
*16 Distance to transmitter on optical axis is 0.2 to 5.0 m. Ev < 10 lx when burst wave is input as shown in the right figure.
*17 GP1UF31xXP0F: Top view taped package, GP1UF31xYP0F: Side view taped package

<Burst wave>



GP1UM series, GP1UE series have different fo values for each model.

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IR DETECTING UNITS FOR REMOTE CONTROL

GP1UM26XK0VF
(GP1UE26xXKCx)

GP1UM27XK0VF
(GP1UE27xXKCx)

GP1UM28XK0VF
(GP1UE28xXKCx)

GP1UM28YK0VF
(GP1UE28xYKCx)

GP1UM26RK0VF
(GP1UE26xRKCx)

GP1UM27RK0VF
(GP1UE27xRKCx)

GP1UM28RK0VF
(GP1UE28xRKCx)

GP1UM28QK0VF
(GP1UE28xQKCx)

GP1UM29QK0VF
(GP1UE29xQKCx)

GP1UX51QS
(GP1UXC1xQS)

GP1UF31xXP0F
(GP1UF31xYP0F)

GP1USC3xXP

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■ Switching Power Supplies (Custom)

◆ Features

(1) Satisfies energy saving regulations thanks to the high conversion efficiency
(2) Compact and high reliability thanks to the modulated main switching and chopper circuits
(3) EMI filter built-in, low noise design
(4) Environmentally safe types are also available. [RoHS, Pb-free]

◆ Specification examples

Applications	LCD TV (20 to 22″)	LCD TV (26 to 37″)
Input voltage (V AC)	90 to 110	90 to 264
Input frequency (Hz)	50/60	50/60
Output voltage (V) (Current capacity)	+24 (1.9 A) +12 (3.5 A)	+24 (5.0 A) +12 (4.0 A) +5 (5.5 A) +5 (1.5 A) +3.3 (3.0 A)
Rated output power (W)	87.6	213
Stand-by power loss (W)	0.07 (without load)	0.1
Protection circuit	Overcurrent and overvoltage protection	
Configuration	On-board	
Outline dimensions (mm)	118 (W) × 208 (D) × 36 (H)	140 (W) × 244 (D) × 35.6 (H)

* Types with input voltage of AC 100 V, 120 V, 200 V are also available. Types with other specification are also available upon request.
For LCD TVs (20″ to 22″), an integrated power source with an inverter circuit for backlights is also available.

■ Advanced Flex Printed Circuit Boards

The advanced flex printed circuit board is a multilayered composite wiring board comprised of flexible printed circuits (FPC) laminated into a multilayer configuration. The PWBs and FPCs are connected to each other via copper-plated through holes. It is ideal for compact, light-weight equipment design.

◆ Features

(1) For selecting optimal specifications to suit specific applications, special specifications such as for mobile phones are available.
- Minimum thickness in multi-layer part: 0.26 mm (4-layer), 0.33 mm (6-layer)
- Minimum pattern width/pitch: 0.06/0.07 mm
- Flexibility of single/double sided FPC part (dedicated for hinge): More than 200 000 times 180-degree bending of radius 3 mm

(2) Capable of board-to-board connection without connectors, which enables space-saving and 3-dimensional equipment assembly.

(3) Through hole plating connection of multi-layer (3 to 8) part to flexible part significantly improves reliability.

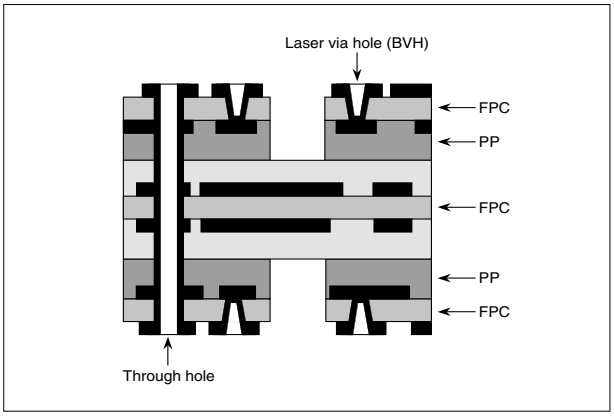
(4) Blind Via Hole (BVH) forming with laser via drilling of small diameter.

(5) Sheet design provides excellent mountability, equivalent to that of PWB.

◆ Outline Specifications

Type		Folding type/Flying tail type
Min. base thickness (mm)		0.26 (4-layer), 0.33 (6-layer), 0.40 (8-layer)
Min. line width/spacing (mm)		0.06/0.07
Min. through hole diameter (mm)		ø0.25
Min. via hole land diameter	Through hole (mm)	Outer layer: ø0.5, Inner layer: ø0.5
	Blind via hole (mm)	ø0.09
	Inner via hole (mm)	ø0.30
Solder resist		Multi layer: Liquid photo solder resist, FPC: Film cover ray
Surface finish		Heat-resistant preflux, Ni-Au plating (Ni-Au plating for flying tail)
Safety standard (UL approval)		94V-0

■ Construction of Advanced Flex Board (example of 6-layer BVH)



■ Flexible Build-Up Multilayer PCBs

<Flex-rigid specifications>

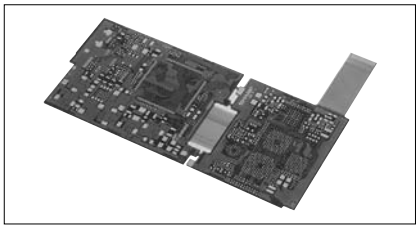
Advanced flex specifications are used for the inner layer core material of this build-up multilayer PCB, so the board can handle finer mounting patterns and achieve connectorless between-board connections using an inner layer flexible printed circuit (FPC). This facilitates greater equipment design flexibility and ultra-compact designs.

◆ Features

(1) Multiple build-up layers are connected internally with an FPC, thereby improving connection reliability between multilayer boards and reducing both connection space and connector weight.

(2) Enables narrow pitch (0.4 mm) CSP and bare chip mounting, and thus greater equipment compactness through ultra-high density mounting.

(3) Enables via-on-IVH (inner-via-hole) configurations, and makes it possible to achieve ultra-high density wiring designs.
(Facilitates a diverse range of designs for greater compactness and thinness.)

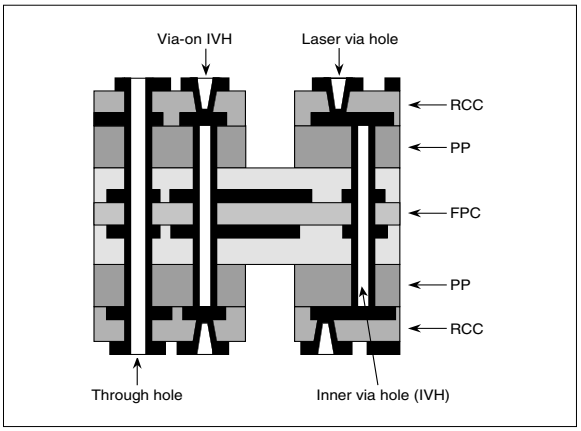


◆ Outline Specifications

Type		F1 (6- to 8-layer)
No. of build-up layers		1 for each side of core layer
Core layer configuration		3 to 6 layers (Polyimide, FR-4)
Min. board thickness*1 (mm)		0.57 (6-layer), 0.77 (8-layer)
Via hole diameter Land hole diameter	Conformal via hole (mm)	ø0.09/ø0.30
	Stacked via hole	–
Via-on IVH		Available
Inner via hole diameter (mm)		ø0.2
Min. line width/spacing*2 (mm)		0.09/0.09
CSP mountable pitch (mm)		0.4
Safety standard		UL (94V-0)

*1 Consult with SHARP if a thinner type is required for special designs.
*2 Values are measured at build-up portion.

■ Construction of Flexible Build-Up Multilayer PCBs (example of 6-layer IVH)



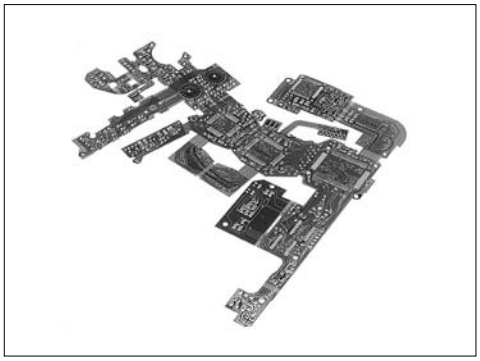
■ Flexible Printed Circuit Boards

The flexible printed circuit board is designed for high space efficiency and product design flexibility, which are now aiming at more compact and higher density mounting. It also contributes to the reduction of assembly process and to the enhancement of the reliability.

◆ Features

(1) High density mounting circuit, SMT and other most suitable flexible PCB are available.

(2) High precision type for COF with flip chip mounting and wire bonding capabilities and other connector mounting type are available.



◆ Standard specifications

Number of layers	One side	Both-side through-hole
Substrate materials	Polyimido film, non-adhesive polyimido	
Design pattern width (mm)	0.02 (MIN.)	0.05 (MIN.)
Design pattern spacing (mm)	0.04 (MIN.)	0.05 (MIN.)
Through-hole / land diameter (mm)	–	ø0.1/ø0.3 (MIN.)
Cover lay	Polyimido film, heat resistant ink, liquid soldering resist	
Safety standard	UL (94V-0)	

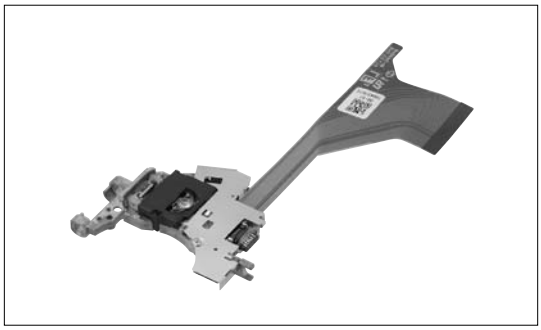
◆ Line-up

Multi-layer flexible PCB	Both-side flexible PCB	
Single-layer flexible PCB	Flex-rigid PCB	
Single-side high precision flexible PCB	Both-side high precision flexible PCB	

Other line-up

Bonding Ni-Au plating
Highly flexible (bending capacity)
High density SMT

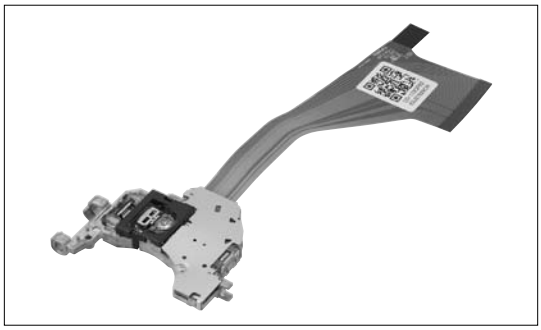
■ Slim Combo Drive Pickup <DD-57>



◆ **Features**

- Thin type pickup compatible with half-inch-height drive (12.7 mm thickness)
- Playback speed: 8× (DVD-ROM), 24× (CD-ROM)
- Recording speed: 24× (CD-R), 24× (CD-RW)
- DVD-RAM readable
- Outline dimensions: W 38.6 × H 7.3 × D 48.7 (mm)
- Weight: Approx. 11 g

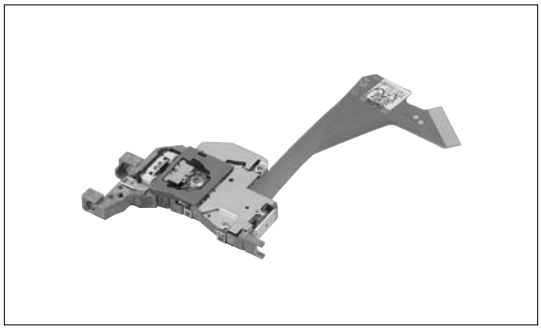
■ Slim DVD Super-Multi Drive Pickup <DD-115>



◆ **Features**

- Thin type pickup compatible with half-inch-height drive (12.7 mm thickness)
- Playback speed: 8× (DVD-ROM), 24× (CD-ROM)
- Recording speed: 8× (DVD±R, +RW, ±R/+RW(DL))
  6× (DVD-RW, -RW(DL))
  5× (DVD-RAM)
  24× (CD-R/RW)
- Outline dimensions: W 35.6 × H 7.3 × D 48.7 (mm)
- Weight: Approx. 13.5 g

■ DVD Pickup for Automotive Use <HPD-61>



◆ **Features**

- Compact, thin (7.3 mm) pickup
- Playable disk: DVD-ROM, CD-ROM
- Operating temperature: –20 to +80°C
- Outline dimensions: W 30.2 × H 7.3 × D 48.7 (mm)
- Weight: Approx. 13.5 g

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