

Electronic Components January 2012

For Your Creative Products ELECTRONIC COMPONENTS



http://sharp-world.com/products/device/

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Sharp Efforts Towards a Green Society

Based on its fiscal 2010 corporate vision of becoming an "Eco-Positive Company," the entire Sharp Group is working as one towards realizing a green society.

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 make efforts to further contribute to global environmental conservation by strengthening our development of proprietary technologies for protecting the global environment, and by carrying out 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 regional agreements, and make voluntary efforts to practice effective use and saving of resources and energy, in the recognition that global environmental conservation is an essential facet of corporate and individual pursuits.
- ② We will work aggressively to reduce greenhouse gas emissions in all business activities, in order to contribute to the prevention of global warming.
- ③ To deal with environmental issues on a global scale, we will promote the sharing and practical application of energy-saving actions and environmental conservation technologies among the Sharp Group companies in each country and work to contribute to reducing environmental load.
- ④ We recognize that maintaining an eco-system where diverse living organisms coexist brings about a rich environment in which both corporations and individuals can operate and live. To that end, we will work aggressively to conserve biodiversity and for its sustainable use.
- (5) In order to promote communication with local residents and other stakeholders, we will engage in acquiring environmental information at an international level, and providing internal reports thereof.

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

- ① We understand the importance of internal company systems and related details in maintaining third-party certification of our ISO environmental management systems, and we will observe relevant internal company rules.
- ② We will positively engage in the minimization of resource use, reduction in the size and weight of products, use of recycled materials, and the development of products and services that contribute to energy-saving, energy-creating and long life of products.
- ③ 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.
- ④ We will ensure proper use and control of chemical substances in our business activities, including research, development, and manufacturing, at levels meeting or exceeding those stipulated by laws and regulations.
- (5) We will, as a matter of policy, design recycling-conscious products with structures that are detachable and decomposable and will use recyclable materials wherever possible.
- (6) As to the resources needed for business activities (equipments, raw materials, subsidiary materials, tools, etc.), to the extent possible, we will work to conduct our business in such a way as to select and purchase such resources that have the least adverse effect on the global environment, the local residents and employees.
- ⑦ We realize that waste material is a valuable resource, and we will actively take part in maximizing the 3Rs (reduce, reuse, recycle) and minimizing the amount of final waste disposal.

For more information: http://sharp-world.com/corporate/eco/csr_report/index.html

Corporate Vision: Eco-Positive Company

Sharp aims to be an "Eco-Positive Company," a company that works with all stakeholders in creating solutions that have significantly more positive impact on the environment than negative impact caused by company operations.

To this end, Sharp will use the four aspects of its Eco-Positive Strategy to carry out advanced environmental efforts including spreading the use of solar power, improving the environmental performance of its products and devices, making plants more environmentally conscious, and developing one-of-a-kind environmental technologies.

Environmental burden such as greenhouse gas emissions from company operations Negative Impact **Environmental contribution**

such as greenhouse gas emission reductions through products and services **Positive Impact**

The Four Aspects of the Eco-Positive Strategy



Eco-Positive Technologies Generate new business through one-of-a-kind environmental technologies

Eco-Positive Products Expand contributions to protecting the environment through products and services

Eco-Positive Operations Reduce environmental impacts in product engineering and manufacturing

Eco-Positive Relationships Enhance corporate value through involvement with the community

EP = Eco-Positive

Developing Green Devices and Super Green Devices

Sharp calls its environmentally conscious devices Green Devices (GD). To define guidelines for development and design based on seven concepts, Sharp established the GD Guidelines, which it began applying at all device design departments in fiscal 2004. The device development process starts with the planning stage, in which Sharp uses the GD Standard Sheet, which was formulated based on the GD Guidelines, to set specific objectives. In the trial manufacture and mass production stages, Sharp determines how well the actual device has met these objectives, with those achieving the standards being certified as GD. In fiscal 2005, Sharp began certifying devices from among GD with the highest possible levels of environmental performance as Super Green Devices (SGD). GD and SGD have been accounting for an increasing share of Sharp's net sales with each year.

Green Device Concepts

Energy Efficiency	Devices with superior energy efficiency and that consume less energy Reduce power consumption during operation and in standby mode.
Resource Conservation	Devices designed to conserve resources Reduce device weight or volume.
Recyclability	Devices designed for recycling Use standard plastic and/or design devices that are easy to disassemble.
Safe Use and Disposal	Devices that can be used and disposed of safely Control usage of chemical substances contained in parts and materials.
Long Life	Devices that make products last longer Extend the life of the product with exchangeable parts and consumables (target: LCD devices).
Packaging	Devices that use packaging with enhanced environmental consciousness Reduce packaging.
Information Disclosure	Devices that give environmental information Provide information on chemical substances in devices.

Super Green Devices Example

High-Output, High-Color-Rendering*¹ LED Lighting Devices

Industry-leading 91 Im/W luminous efficacy*2 in the 25W-class achieved

GW5DMC30M04 is a high-output, high-color-rendering 25W-class LED lighting device that boasts an industry's highest luminous efficacy of 91 lm/W for light sources such as store spotlights. These 25W-class devices have achieved incredibly low energy consumption through the adoption of LED chips and phosphor, which both have excellent high-temperature properties. They provide a high 2 370-lm luminous flux and the industry's highest luminous efficacy of 91 lm/W. In addition, it achieved a high color rendering index (Ra)*³ of 83 by faithfully reproducing the colors of objects. Furthermore, the LED emitting area has been made circular to make designing lighting instruments easy.



GW5DMC30M04

Main Features

- Industry-leading luminous efficacy of 91 lm/W achieved within the 25W-class
- Faithfully reproduces natural colors, with its high color rendering index (Ra) of 83
- *1 Color rendering describes how colors are perceived depending on differences in the illuminating light source. The closer to natural light, the higher the color rendering capability.
- *2 The brightness per watt. As of February 9, 2011, for LED lighting devices with an input power of 25 W, a color temperature of 3,000 K, and a color rendering index (Ra) 83 (based on Sharp survey).
- *3 A numerical value expressing the level of color distortion compared to a reference light source. The closer the value to 100, the lower the color distortion.

Making More Factories Super Green Factories

Sharp defines factories with a high level of environmental consciousness as Green Factories (GF). The basic policies and operational know-how for achieving GF status have been formulated in line with 10 concepts in the GF Guidelines, which Sharp has been applying at all production bases in Japan since fiscal 1999 and overseas since fiscal 2001.

With construction of the Kameyama Plant, in fiscal 2003 Sharp established assessment criteria for Super Green Factories (SGF)—factories with exceptionally high levels of environmental performance—and launched efforts to award in-house certification. The Kameyama Plant was the first plant to achieve this certification. Sharp started GF certification in fiscal 2004 and overseas as well, and Sharp has achieved its mid-term objective of having all Sharp plants in Japan and overseas certified for GF status and all 10 Sharp Corporation plants in Japan certified for SGF status by fiscal 2007.

In fiscal 2008, Sharp stepped up its SGF efforts with the start of the SGF II initiative at plants certified for SGF status.

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

Green Factory Concepts

Development of GREEN FRONT SAKAI

In order to become a company that contributes to the environment, Sharp has been developing its business on the two pillars of energy-saving LCDs and energy-creating solar cells. In order to further these efforts, Sharp commenced operations at a new LCD panel plant in October 2009, followed by a new solar cell plant in March 2010, in Sakai, Osaka prefecture. We hope to propel our business forward by having companies in other fields with advanced technology join us, to help us achieve the goal of creating a "green society" suitable to today's environmentally conscious mindset.





Overview of GREEN FRONT SAKAI Location: 1-banchi, Takumi-cho, Sakai-ku, Sakai-shi, Osaka Site area: 1.27 million m² (approx. 28 times the size of Tokyo Dome) LCD Panel Plant Start of operations: October 2009 Mother glass size: 2,880 mm x 3,130 mm (10th generation) Mother glass input capacity: 72,000 substrates per month Solar Cell Plants ■ Thin-film solar cell plant Start of operations: March 2010 Production capacity: 160 MW per year (first production development) Glass substrate size: 1,000 mm x 1,400 mm Single-crystal solar cell plant Start of operations: March 2011 Production capacity: 200 MW per year (first production development) * The above information is current as of June 2011.

TFT

LCD MODULES

☆New product ★Under development RoHS

■ LCD Modules

<For industrial appliances>

Display size (cm) [″]	Model No.	Dot format H × V (dot)	Pixel pitch H × V (mm)	Active area H × V (mm)	Display colors	Lumi- nance (cd/m ²) (TYP.)	Interface	Power con- sumption (W) (TYP.)	Outline dimensions*1 W × H × D (mm) (TYP.)	Weight (g) (MAX.)	Remarks	
8.8 [3.5]	LQ035Q3DG03	320 × RGB × 240	0.2205 × 0.2205	70.56 × 52.92	16.77 M	450	CMOS 8-bit RGB	0.8	$76.9 \times 63.9 \\ \times 4.7$	TYP. 42	Long-life LED backlight	
	☆LQ043T3DW03				16.77 M	400	CMOS 8-bit RGB	1.2	105.5 × 67.2 × 7.7	85	Advanced Super V, Long-life LED backlight	
12 [4.3]	LQ043T3DG01	480 × RGB × 272	0.198 × 0.198	95.04 × 53.86	260 k	400	CMOS	0.6	$\begin{array}{c} 105.5 \times 67.2 \\ \times 5.05 \end{array}$	TYP. 65		
	LQ043T3DG02				200 K	480	6-bit RGB	0.0	$\begin{array}{c} 105.5 \times 67.2 \\ \times \ 3.95 \end{array}$	TYP. 55		
14	LQ057V3LG11	640 × RGB × 480	0.18 × 0.18	115.2 \		350	1ch LVDS 6-bit RGB	2.3	$\begin{array}{c} 144.0 \times 104.6 \\ \times 12.3 \end{array}$	190	Built-in LED backlight driver circuit	
[5.7]	★LQ057Q3DC03	$\begin{array}{c} 320 \times \text{RGB} \\ \times 240 \end{array}$	0.36 × 0.36	86.4	260 k	500	CMOS 6-bit RGB	2.5	144.0 × 104.6 × 12.3	210	Long-life LED backlight, Built-in LED backlight driver circuit	
	LQ070Y3LW01					360	1ch LVDS 8-bit RGB	2.6	170.0×110.0 ×9.0	TYP. 175	Advanced Super V, Long-life LED backlight	
	LQ070Y3DG3A					350	CMOS	2.0	$\begin{array}{c} 163.2 \times 104.0 \\ \times 3.9 \end{array}$	150		
18 [7.0]	LQ070Y3DG3B	800 × RGB × 480	0.1905 × 0.1905	152.4 × 91.4	16.19 M	280	6-bit + 2-bit FRC	2.0	$\begin{array}{c} 163.2\times104.0\\\times7.1\\ (\text{including}\\ \text{touch panel}) \end{array}$	185	With resistive touch panel	
	LQ070Y3LG4A					350	LVDS 6-bit + 2-bit FRC	2.1	$\begin{array}{c} 163.2\times104.0\\\times3.9\end{array}$	150		
21	☆LQ084S3LG03	800 × RGB × 600	0.213× 0.213	170.4 × 127.8	16.77 M	330	1ch LVDS 8-bit RGB	4.1	199.5 × 154.0 × 11.6	320	Long-life LED backlight, Built-in LED backlight driver circuit	
[8.4]	LQ084V3DG02	640 × RGB × 480	0.267 × 0.267	170.88 × 128.16	260 k	400	CMOS 6-bit RGB	4.6	199.5 × 149.5 × 11.6	400	Long-life LED backlight	
26 [10.4]	☆LQ104V1DG81/LG81	$640 \times \text{RGB} \\ \times 480$	0.33× 0.33	211.2 × 158.4	260 k	450	CMOS 6-bit RGB/ 1ch LVDS 6-bit RGB	5.6	246.5 × 179.4 × 12.5	TYP. 500	Strong LCD2, Long-life LED backlight, Built-in LED backlight driver circuit	
31	LQ121S1LG81	800 × RGB	800 × RGB	0.3075 ×	246.0 ×	260 k	450	LVDS	E 1	276.0 × 209.0	600	Long-life LED backlight, HV mode* ² , Built-in LED backlight driver circuit
[12.1]	☆LQ121S1LG84	× 600	0.3075	184.5	200 K	450	6-bit RGB	5.1	× 9.1	000	Long-life LED backlight, DE mode ^{*3} , Built-in LED backlight driver circuit	
38 [15.0]	LQ150X1LG91	1 024 × RGB × 768	0.297 × 0.297	304.1 × 228.1	16.19 M	350	LVDS 8-bit + 2-bit FRC	6.8	326.5 × 253.5 × 9.6	950	Long-life LED backlight, Built-in LED backlight driver circuit	
48	LQ190E1LX51	1 280 × RGB	0.294 ×	376.32 × 301.056	16.77 M _	1 000	2ch LVDS	75	404.2 × 330.0 × 34.0	2 600	Advanced Super V, Built-in LED backlight driver circuit	
[19.0]	★LQ190E1LW52	^ I U24	0.294			300		15.3	404.2 × 330.0 × 15.0	1 850	Advanced Super V, Long-life LED backlight	
59 [23.1]	LQ231U1LW32	1 600 × RGB × 1 200	0.294 × 0.294	470.4 × 352.8	16.77 M	500	LDI 8-bit RGB	65.5	$530.0 \times 431.5 \\ \times 23.9$	4 500	Advanced Super V, Built-in LED backlight driver circuit	

All products listed on this page are LED backlight models.

All products listed on this page are LED backlight models.

*1 Protrusions such as positioning bosses are not included.

*2 Hsync/Vsync mode

*3 Data enable mode
(Note) Please note that the specifications are subject to change without prior notice for product improvement.

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. For details, please inquire with SHARP. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

LCD MODULES

★Under development



<For large-size product applications>

	•	•	••												
Display size (cm) ["]	Model No.	Number of pixels*1	Dot format H × V (dot)	Active area H × V (mm)	Display colors	Lumi- nance (cd/m ²) (TYP.)	Interface	$\begin{array}{c} \text{Outline} \\ \text{dimensions}^{*2} \\ \text{W} \times \text{H} \times \text{D} \\ \text{(mm) (TYP.)} \end{array}$	Backlight	Remarks					
80.0 [31.5]	★LQ315D1LG91	8 294 400	3 840 × RGB × 2 160	697.92× 392.58	(1.06B) (10-bit)	(450)	(8ch-LVDS) ^{*3} (10-bit digital)	(733 × 428 × 33)*4	Direct-lit LED (built-in driver)	Super-high resolution and low power consumption (MAX. 150 W) achieved by using IGZO*5 LCD Wide viewing angle: L/R 176° U/D 176°, Response time [G to G]: 8 ms (Ave.)					
152.5	LK601R3LA19	8 294 400	3 840 × RGB × 2 160	1 330.56 × 748.44	1.06B (8-bit +	1.06B (8-bit +	1.06B (8-bit +	1.06B (8-bit +	1.06B (8-bit +	1.06B (8-bit +	450	8ch-LVDS* ³ (10-bit digital)	1 380.0 ×	Direct-lit LED	Ultraviolet-induced Multi-domain Vertical Alignment LCD, High color purity (78% of NTSC), Wide viewing angle: L/R 176°/ U/D 176°, High contrast: 4 000:1, High-speed response [G to G]: 6 ms (Ave.)
[60]	★LK600D3LB14	2 073 600	1 920 × RGB × 1 080	1 329.12 × 747.63	2-bit FRC)	2 000	2ch-LVDS* ³ (10-bit digital)	790.0 × 106.6	driver)	Ultraviolet-induced Multi-domain Vertical Alignment LCD, Wide viewing angle: L/R 176°/ U/D 176°, High contrast: 5 000:1 or higher, High-speed response [G to G]: 6 ms (Ave.)					
207.2 [81.6]	LK816D3LA19	2 073 600	1 080 × 1 920 × RGB	1 015.74 × 1 805.76	1.06B (8-bit + 2-bit FRC)	1 200	2ch-LVDS* ³ (10-bit digital)	1 094.0 × 1 879.0 × 81.9	Built-in CCFL	Portrait setting, Advanced Super V, Wide viewing angle: L/R 176°/ U/D 176°, High contrast: 2 000:1, 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
*4 Excluding the LED driver.
*5 IGZO: an oxide semiconductor consisting of In (Indium), Ga (Gallium), and Zn (Zinc).
(Note) Please note that the specifications are subject to change without prior notice for product improvement.

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CMOS CAMERA MODULES ROAD MAP

☆New product



■ CMOS Camera Modules Road Map

Image format	2009	2010	2011	2012
12M (HXGA)				☆ RJ63YC100 ↓ <tr< th=""></tr<>
8M (QUXGA)			RJ63VC200 1/3.2 type 0.42 cc Built-in auto focus 8.52 x 8.52 x 5.8	
5M (QSXGA)	RJ64SC100 The second s	RJ64SC200 1/4 type 0.36 cc Built-in auto focus s.5 x 8.5 x 5.0		
3M (QXGA)		RJ64PC800 With the second sec		
VGA			RJ6CBA100 Image: Stress of the stre	

Model No.

Optical format & volume Outline dimensions (D x W x H) TYP. (mm)

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.

CMOS CAMERA MODULES

☆New product



■ CMOS Camera Modules

LSI

Module configuration : CMOS image sensor, CDS/AGC/10-bit ADC, timing generator, DSP, lens : R, G, B primary color mosaic filters Color filter

Operating temperature : -20 to 60°C

							Lens				Davia																	
Optical format	Image format	Optical function	Model No.	Features	pixels (H x V) MAX.	F No.	Config- uration	Horizontal viewing angle (°)	Output signal	Supply voltage* ² (V) TYP.	consump- tion ^{*3} (mW) TYP.	Package*1																
	HXGA fu		☆RJ63YC100	HXGA to QVGA 19 fps at HXGA/60 fps at 1 080p 12.5x electronic zoom at QVGA size (MAX.)	4 016 x	F2.5	5 pcs.	61	RAW (Mini)	2.8/1.8/ 1.2 (I/O: 1.8	270 (at 18.6 fps)																	
1/3.2 type	1/3.2 type	☆RJ63YC200	 Image inversion function (top and bottom / right and left) 	3 016				(mp)	or 2.8)	(at 10.0 ips)																		
	QUXGA	XGA RJ63VC200		• QUXGA to SubQCIF 3 • 15 fps at QUXGA/60 fps at 720p 10.5x electronic zoom at QVGA size (MAX.) 2 • Image inversion function (right and left) 2		F2.4	5 pcs.	59	RAW (Mipi)		136 (at 7.5 fps)	FPC type																
	OSYGA	Auto focus function RJ64SC100 RJ64SC200	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		4 pcs	54	UYVY (Parallel)		270 (at 4.5 fps)																		
1/4 type QXGA	QSXGA		RJ64SC200	 QSXGA to SubQCIF 15 fps at QSXGA/30 fps at 720p 8x electronic zoom at QVGA size (MAX.) Image inversion function (right and left) 	1 944	50.0	4 pcs.	54	UYVY (Mipi)	2.8/1.8 (I/O: 1.8 or 2.8)	283 (at 4.5 fps)																	
	QXGA		RJ64PC800	 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	F2.8	3 pcs.	54	UYVY (Parallel)		190 (at 7.5 fps)																	
1/13			RJ6CBA200	VGA to SubQCIF 30 fps at VGA	640		1 000	50	UYVY (Parallel)		77 (at 30 fps)	25WL-CSP																
type VGA	VGA		_	-	_	-		-	_	_	_	_	—	_	_	_	_	-	RJ6CBA100	2x electronic zoom at QVGA size (MAX.) Image inversion function (right and left)			1 pcs.	. 53	UYVY (Mipi)		76 (at 30 fps)	21WL-CSP

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

*2 Additional supply voltage of 3.0 V is necessary for RJ64SC100/200 with a built-in AF driver.

Notice

^{*3} Actuator power consumption is
*4 OIS: Optical image stabilization Actuator power consumption is not included.

Outline Dimensions

Model No.	Package*1						
☆RJ63YC100	☆RJ63YC100 11.0 x 11.0 x 5.47						
☆RJ63YC200	8.5 x 8.5 x 5.47						
RJ63VC200	8.52 x 8.52 x 5.8	EDC turns					
RJ64SC100	0 E v 0 E v E 0	гго цуре					
RJ64SC200	0.5 X 0.5 X 5.0						
RJ64PC800	8.5 x 8.5 x 5.1						
RJ6CBA200	3.50 x 3.05 x 2.3	25WL-CSP					
RJ6CBA100	3.71 x 3.35 x 2.3	21WL-CSP					

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

System Configuration Example



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ROAD MAP FOR HIGH-RESOLUTION CCDs FOR DIGITAL CAMERAS

RoHS



■ Road Map for High-resolution CCDs for Digital Cameras



HIGH-RESOLUTION CCDs / 1/3-TYPE CCDs / 1/3.8-TYPE CCD / 1/4-TYPE CCDs

☆New product



■ High-resolution CCDs

Optical format	Total pixels	Color filter	Model No.	Movie function	Resolution Image pixels (H x V)	Pixel size H x V (µm²)	Sensitivity (mV) TYP.	Smear ratio (dB) TYP.	Package		
	40.550.1		RJ23W3EA0KT	VGA 30 fps	0.704 × 0.704	4.00 × 4.00	105	07	N-LCC040-S433A		
10 55	10 550 K		RJ23W3HA0LT	720p 30 fps	3704 X 2704	1.00 x 1.00	105	-07			
		R,G,B k primary color	RJ23Y3BC0LT	VCA 20 fpc	4 040 x 3 032	1.55 x 1.55	105	-86			
1/2.3 type	12 530 k		RJ23Y3EA0LT	VGA 30 Ips							
.76.5				mosaic filters	RJ23Y3HA0LT	720p 30 fps		1		-84	N-LCC040-K350
-	14 580 k		RJ23Z3BA0LT	720p 30 fps	4 360 x 3 272	1.43 x 1.43	105	-86			
	16 590 k		RJ23E3BA0LT	720p 30 fps	4 648 x 3 488	1.34 x 1.34	105	-86			

■ 1/3-type CCDs

Total pixala	Ston	dard	Model No.	Reso	lution	Pixel size	Sensitivity	Smear ratio	Pookogo				
	Stan	uaru	Model NO.	Horizontal TV lines	Image pixels (H x V)	Η x V (μm ²)	(mV) TYP.	(dB) TYP.	Раскаде				
070 1		NTOC	RJ2311DB0PB*1		E10 v 400	06775	3 200	105					
270 K		NI3C	RJ2315DB0PB*1	220	51∠ x 492	9.0 X 7.5	2 900	-135					
220 k	320 k		RJ2321DB0PB*1	330	E10 y E00	0.6 × 6.24	3 200	105					
320 K		PAL	RJ2325DB0PB*1		512 X 502	9.0 X 0.34	2 900	-135					
410 k	410 k Color	NTSC	RJ2351CA0PB*1					768 × 494 6.4	64775	2 000	-120		
410 K			RJ2355CA0PB*1	480	700 x 494	0.4 X 7.5	1 800	-130					
470 k		DAI	RJ2361CA0PB*1	400	750 v 590	6 52 x 6 20	2 000	-120	P-DIP016-0450				
470 K		PAL	RJ2365CA0PB*1		752 X 562	0.03 X 0.39	1 800	-130					
520 k		NTOC	☆RJ2331AA0PB*1		076 × 404	50×74	2 000	-120	-				
520 K		NISC	☆RJ3331AA0PB* ²	050	976 X 494	5.0 X 7.4	1 500	-120					
610 k	-				1	DAL	☆RJ2341AA0PB*1	050	076 × 592	50,462	2 000	-120	
					PAL	☆RJ3341AA0PB*2		970 X 582	5.0 X 6.3	1 500	-120		

*1 Suitable for intense light exposure.
*2 Progressive scan CCD, suitable for intense light exposure.

■ 1/3.8-type CCD

Total pixels	Standard		Model No.	Resolution		Pixel size	Sensitivity	Smear ratio	Package
			WOUEI NO.	Horizontal TV lines	Image pixels (H x V)	H x V (µm²)	TYP. (mV)	TYP. (dB)	Раскауе
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	Ston	dard	Model No	Reso	lution	Pixel size	Sensitivity	Smear ratio	Package
	Stari	uaru	WOUEI NO.	Horizontal TV lines	Image pixels (H x V)	H x V (µm²)	TYP. (mV)	TYP. (dB)	гаскауе
270 k			RJ2411EA0PB*				1 200		
		NTSC	RJ2411EB0PB	330	512 x 492	7.2 x 5.6	1 200	-130	
			RJ2411FA0PB*				1 800		-
200 //		PAL	RJ2421EB0PB		512 x 582	7 2 × 4 72	1 100	130	
320 K	Color		RJ2421FA0PB*			1.2 × 4.10	1 650		P-DIP014-0400A
410 k		NTSC	RJ2451CA0PB*	- 480	700 × 404	40 × 5 0	000	114	
410 K		NISC	RJ2455CA0PB*		700 X 494	4.9 X 5.0	900	-114	
470 k		PAL	RJ2461CA0PB*		752 x 582	5.0 x 4.77	900	-114	
			RJ2465CA0PB*						

* Suitable for intense light exposure.



☆New product



Description	Model No.		Features	Package	
V driver	LR366851	Vertical pulse driver for CCDs, 2 2-level output circuit for electron	P-level output x 2, 3-level output x 4, ic shutter	P-SSOP024-0275	
CDS/PGA/ADC	LR36B03A	Low power consumption [81 mW 12-bit ADC (25 MHz), mechanic	V (TYP.)], high-speed S/H circuit, high-gain PGA circuit, al iris control function, 12-bit digital output	P-HQFN036-0606	
V driver +	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 adc="" pga=""> 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</dsp></cds></v>	P-LFBGA171-0811	
CDS/PGA/ADC + DSP	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 adc="" pga=""> 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</dsp></cds></v>	P-LFBGA171-0811	
CDS/PGA/ADC +	LR36B14	For 270-k/320-k/410-k/	<cds adc="" pga=""> High-speed S/H circuit, high-gain PGA circuit, 12-bit ADC <dsp> 75-ohm video amplifier, mechanical iris control function, 10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, LED light control function, gamma transition function, lens shading correction function, auto white blemish compensation function, mirror image function, NTSC/PAL analog output</dsp></cds>	P-HQFN064-0909	
DSP	☆LR36B15	— 470-kpixei CCDS	<cds adc="" pga=""> High-speed S/H circuit, high-gain PGA circuit, 12-bit ADC <dsp> 75-ohm video amplifier, mechanical iris control function, 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, NTSC/PAL analog output</dsp></cds>		
	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	
DSP	LR38690A	For 270-k/320-k/410-k/ 470-kpixel CCDs	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, 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 compatible)* ²	P-LQFP100-1414	
Power supply IC for	IR3M59U	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-VQEN032-0505	
ICs/LSIs	IR3M63U	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	- F-VQFNU32-0505	

■ CCD Peripheral ICs/LSIs

*2 Support for only 410-k/470-kpixel CCD.

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RoHS

•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		
	070 knivele	RJ2311DB0PB				
	270 kpixels	RJ2315DB0PB				
	220 knivele	RJ2321DB0PB		—		
1/2 h m a	520 kpixels	RJ2325DB0PB				
1/3 type	410 knivele	RJ2351CA0PB	LR30033/LR30034			
	410 kpixeis	RJ2355CA0PB				
	470 knivele	RJ2361CA0PB				
	470 kpixeis	RJ2365CA0PB				
1/3.8 type	290 kpixels	RJ2411CA0PB	LR38654			
		RJ2411EA0PB				
	270 kpixels	RJ2411EB0PB		ID 2M6211		
		RJ2411FA0PB		IKSINIOSO		
	220 knivele	RJ2421EB0PB				
1/4 type	520 kpixels	RJ2421FA0PB	LR38653/LR38654			
	110 knivele	RJ2451CA0PB				
	410 Kpixels	RJ2455CA0PB				
	470 knivele	RJ2461CA0PB				
	470 Kpixeis	RJ2465CA0PB				

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☆New product

RoHS

<Color Security Camera System with Three-chip Configuration>



Four-power-supply CCDs and peripheral ICs/LSIs

	CCD		CDS/PGA/ADC + DSP		
	270 knivels	RJ2311DB0PB			
	270 Kpixeis	RJ2315DB0PB			
	220 knivele	RJ2321DB0PB			
1/2 tupo	520 kpixels	RJ2325DB0PB			
1/3 type	410 knivele	RJ2351CA0PB			
	410 kpixeis	RJ2355CA0PB			
	470 knivele	RJ2361CA0PB			
	470 kpixeis	RJ2365CA0PB			
		RJ2411EA0PB	LR36B14/☆LR36B15		
	270 kpixels	RJ2411EB0PB			
		RJ2411FA0PB			
	220 knivele	RJ2421EB0PB			
1/4 type	520 Kpixels	RJ2421FA0PB			
	410 knivele	RJ2451CA0PB			
	410 kpixels	RJ2455CA0PB			
	470 knivels	RJ2461CA0PB			
		RJ2465CA0PB			

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Notice



RoHS

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



Four-power-supply CCDs and peripheral ICs/LSIs

	CCD		CDS/PGA/ADC	DSP			
	270 knivola	RJ2311DB0PB					
		RJ2315DB0PB					
	220 knivolo	RJ2321DB0PB					
1/2 tupo	SZU KPIXEIS	RJ2325DB0PB					
1/3 type	410 knivola	RJ2351CA0PB					
	410 KPIXEIS	RJ2355CA0PB					
	470 knivele	RJ2361CA0PB					
	470 KPIXEIS	RJ2365CA0PB					
		RJ2411EA0PB	LR36B03A	LR38627			
	270 kpixels	RJ2411EB0PB					
		RJ2411FA0PB					
	220 knivolo	RJ2421EB0PB					
1/4 type	SZU KPIXEIS	RJ2421FA0PB					
	410 knivola	RJ2451CA0PB					
	410 KPIXEIS	RJ2455CA0PB					
	470 knivolo	RJ2461CA0PB					
	470 KPIXEIS	RJ2465CA0PB					

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RoHS

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



Four-power-supply CCDs and peripheral ICs/LSIs

	CCD		CDS/PGA/ADC	DSP			
	270 knivele	RJ2311DB0PB					
		RJ2315DB0PB					
	220 knivele	RJ2321DB0PB					
1/2 1/20	520 kpixeis	RJ2325DB0PB					
1/3 type	410 knivele	RJ2351CA0PB					
	410 kpixels	RJ2355CA0PB					
	470 knivele	RJ2361CA0PB					
	470 Kpixeis	RJ2365CA0PB					
		RJ2411EA0PB	LR36B03A	LR38690A			
	270 kpixels	RJ2411EB0PB					
		RJ2411FA0PB					
	220 knivele	RJ2421EB0PB					
1/4 type	520 Kpixeis	RJ2421FA0PB					
	410 knivele	RJ2451CA0PB					
	410 kpixels	RJ2455CA0PB					
	470 knivele	RJ2461CA0PB					
	470 kpixeis	RJ2465CA0PB					

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■ 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 driver		LH16DD		630/642/		250			
	Dot	LH16DK	256 levels	684/720	16.5	380	071-00	Low EMI*1 driver using mini-LVDS interface,	SOF
	drive	LH16DH		804/840/ 912/960		330	2.7 10 3.6	R-DAC system	
		LH16DE	1 024 levels	630/642/ 684/720		250			
Gate driver		LH163Y	_	202/242/ 258/262/ 272	20 to 45	200	2.1 to 4.2	Output signal masking function, enables construction of module without printed circuit board	

*1 EMI: Electro-Magnetic Interference

•TFT-LCD Controller

Model No.	Image	Input interface	Output interface	Functions	Clock	Supply voltage (V)			Paakaga
	size			Functions	(MHz) MAX.	Core	Digital	Analog	Tackage
LR388H3	1 366 x 768 1 920 x 1 080	LVDS 4ch 8/10 bits	mini-LVDS 4ch 8/10 bits	Improves response speed of LCD image by original Quick Shoot technology (with a built-in frame memory) Register control by external EEPROM (SPI) and I ² C I/F Control gamma correction IC (SPI)	170	0.9 to 1.1	3.0 to 3.6	2.3 to 2.7	TFBGA421-1919

●LED Backlight Controller

Model No.	LED	Video input	Video output interface	LED output interface	Functions	Frame rate	Supply voltage (V)			Package
MOUELINO.	type	interface			Functions	(fps)	Core	LVDS	IO	Гаскауе
LR388H0	White LEDs	LVDS 2ch 8/10 bits	LVDS 2ch 8/10 bits	SPI	 LED backlight controller using area active technology (MAX. 32 x 16 areas) Support for 1 920 x 1 080 / 1 366 x 768 LCD panel Support for wide variety of backlight systems (Direct-type, edge-type, even/odd numbered area division, etc.) Register control by external EEPROM (SPI) and I²C I/F 	48/50/60	1.1 to 1.3	2.3 to 2.7/ 3.0 to 3.6	3.0 to 3.6	TFBGA164-1212

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Analog/LSI

FOR MOBILE DEVICES / **POWER SUPPLY ICs FOR TFT-LCDs**

RoHS

■ For Mobile Devices

●TFT-LCD Controllers

Madal Na	LCD	Display	Display RAM	Function	CPU	Supply voltage (V)		Package
woder no.	(pixel) MAX.	MAX.	(bit)	Function	interface	Core	Host I/F	Package
LR388J4	600 x 1 024		44 M (Flexibly meets the requirement depending on the panel size)	 Built-in 2D-3D image conversion function MDDI⁺¹ 1.1/1.2 type2-compliant MIPI*2-compliant Built-in IrSimple[™] and IrDA communications functions Main/sub LCD controller Graphic processing Built-in SDHC interface Built-in HDMI 1 080p/24 Hz, 1 080i/60 Hz output interface 	tt MDDI*1 for MSM series/ 80-family (8/16/18-bit parallel) MIPI*2 DSI type4		1.65 to 3.3	P-WFBGA385-0909
LR388G9		16 770 k colors	32 M (Flexibly meets the requirement depending on the panel size)	MDDI*1 1.1/1.2 type2-compliant MIPI*2-compliant Built-in IrSimple™ and IrDA communications functions Main/sub LCD controller Graphic processing Built-in SDHC interface Built-in HDMI 1 080p/24 Hz, 1 080i/60 Hz output interface		1.08 to 1.32		P-WFBGA261-0808
LR388D8	480 x 864		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 interface	MDDI* ¹ for MSM series/ 80-family			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	(8/9/16/ 18-bit parallel)	1.65 to 1.95		P-VFBGA144-0808

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

Notice

*2 MIPI: Mobile Industry Processor Interface

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

Power Supply ICs for TFT-LCDs

Input No. of Output Switching Switching Drive capacity voltage Switching Model No. voltage frequency current (mA) Package output System (pF) range transistor circuits (V) (Hz) [Built-in SW Tr] [External SW Tr] (V) Built-in Step-up (MAX. 20 V)/ (for step-up 400 step-down type PWM type PWM) P-QFP048-0707/ External 70 k to IR3M58M/U 3 4.5 to 28 1 0 0 0 setting Step-down type PWM 500 k P-VQFN036-0505 External _ Step-down, inverting type PWM External _

SYSTEM LSIs / **GRAPHIC DISPLAY MODULE WITH LCDs**

System LSIs

Model No.	Function	Features	Supply voltage (V)	Package
LR35501	One-chip graphic controller	 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 Bluetooth® HCI controller Built-in Sound generator (ADPCM/PSG) Built-in CMOS camera interface (9 MHz) CPU: Z80 compatible, 27 MHz Peripherals (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	 Digital LCD interface (6-bit RGB), QVGA (320 x 240) compliant 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 Peripherals (NAND flash I/F, PIO, SIO, UART, ADC, PWM, etc.) 	Core: 1.8±0.18 I/O: 3.3±0.3	P-LQFP144-2020

Bluetooth is a trademark of Bluetooth SIG, Inc. Z80 is a trademark of ZiLOG, Inc.

Graphic Display Module with LCDs

Model No.	Function	Features	Supply voltage (V)	Outline dimensions (W × D) (mm)
LR0G934	3.5" LCD graphic display module (incorporating LR35503)	 LED backlight, QVGA (320 x 240), built-in 3.5" color TFT LCD Built-in LR35503 (one-chip graphic controller with built-in 8-bit CPU) Built-in 64-Mbit NOR flash Video input (composite NTSC) Built-in real-time clock (RTC) External interface Video input, digital input/output (shared 2 ch UART), analog input (4 ch ADC), sound output, battery backup terminal (RTC use) 	5±0.5	87.4 × 69.2
LR0G938	3.5" LCD graphic display module with touch panel function (incorporating LR35503)	 LED backlight, QVGA (320 x 240), built-in 3.5" color TFT LCD Touch panel function Built-in LR35503 (one-chip graphic controller with built-in 8-bit CPU) Built-in 64-Mbit NOR flash Video input (composite NTSC) Built-in real-time clock (RTC) External interface Video input, digital input/output (shared 2 ch UART), analog input (4 ch ADC), sound output, battery backup terminal (RTC use) 	5±0.5	87.4 × 69.2

RoHS



ONE-CHIP GRAPHIC CONTROLLER



One-chip Graphic Controller <LR35501/LR35503>

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



Bluetooth is a trademark of Bluetooth SIG, Inc.

(MDDI*1/MIPI*2-compliant HXGA LCD controller for IrSimple™)

The LR388G9 can display on up to HXGA-sized LCD displays. For incorporating 32-Mbit embedded memory, FHD-sized

(1 920 x 1 080) external output is available with HDMI. Also, by

adding on MIPI*2 interface, the LR388G9 can be used in wide

(MDDI*1-compliant WQVGA LCD controller for IrSimple™)

Thanks to a built-in IrSimple[™] function in the LCD controller.

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.

the mounting area of a mobile phone can be decreased; thus it



■ IrSimple[™] Communications Series <LR388J4/LR388G9/LR388D8/LR388D1>

IrSimpleTM 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 IrSimpleTM 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.

LR388G9

• LR388D1

range of application systems.

Features

• LR388J4

(MDDI*¹/MIPI*²-compliant HXGA 3D LCD controller for IrSimple[™]) The 2D-3D image conversion function is incorporated into LR388G9.

The 3D-LCD system in smart phones or tablet-type devices can be achieved with a single chip.

• 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.

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

Application & System Configuration Example



*2 MIPI : Mobile Industry Processor Interface

LOW POWER-LOSS VOLTAGE REGULATORS / **REG** SURFACE MOUNT TYPE LOW POWER-LOSS VOLTAGE REGULATORS

RoHS

(Ta = 25°C)

Low Power-Loss Voltage Regulators

●TO-220 type

	/		ute max	kimum	ratings	Electrica	al characte	eristics		Built-	in func	tions				
Model No.	Features	Output current Io	Input voltage Vin	Po dissip (\	wer bation V)	Output voltage Vo*3	Output voltage precision	Dropout voltage VI-O*5	tt G	rent in	control	sipation at OFF state	output	ming	Pack	age
		(A)	(V)	Pd*1	Pd*2	(V) TYP.	. (%)	(V)	Overhea protectic	Overcuri	ON/OFF	Low diss current a	Variable voltage	Lead for available		Package shape type*7
PQxxxRDA1SZH series	ASO protection function,	1	24	1.4 15		3.3, 5, 8, 9, 12	±3	0.5	0	0	0	0				А
PQxxxRDA2SZH series	OFF state (lqs: 5 µA (MAX.))	2	20	1.4	15	3.3, 5, 9, 12	±2.5	1.0	0	0	0	0				A
PQ070XF01SZH	Minimum operating input voltage: 2.35 V (4 terminals)	1		1.4					0	0			0			A
PQ070VK01FZH	Minimum operating input	1	10		15	1.5 to 7	±2*4	0.5	0	0	0	0	0	0		Е
PQ070VK02FZH	voltage: 2.35 V (5 terminals)	2							0	0	0	0	0	0	TO-220	Е
PQ150RWA2SZH	ASO protection function	2	20	1.4	15	3.0 to 15	±2.5*4	1.0	0	0			0			A
PQ30RV11J00H	Variable output voltage	1		15	15				0	0	∆*6		0	0		В
PQ30RV21J00H		2	35	j 1.5 j 18	18	18 1.5 to 30	±2*4	0.5	0	0	∆*6		0	0		В
PQ30RV31J00H		3		2	20				0	0	∆*6		0	0		В

*1 At self-cooling

*2 With infinite heat sink attached

*3 The xxx in the model No. refer to the output voltage values of the model (e.g. 050 for 5 V, 120 for 12 V, 015 for 1.5 V).

*4 Reference voltage precision

*5 Current ratings are defined individually. \triangle : Available by adding circuit

*6 △ : Available by *7 Refer to page 41

■ Surface Mount Type Low Power-Loss Voltage Regulators

●SOT-89 type

●SOT-89 type												(Ta = 25°C)
		Abso	lute max ratings	imum	Electrica	l character	istics		Built-	in fund	ctions		
Model No.	Features	Output current Io (A)	Input voltage Vin (V)	Power dissipa- tion Pd* ¹ (W)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage VI-0* ³ (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Package
PQ1LAxx5MSPQ	Compact, high radiation package, ceramic capacitor compatible	- 0.5	15	0.0	1.2, 1.5, 1.8, 2.5, 3.3, 5.0	±2.0	0.7	0	0	0	0		SOT 90
PQ1LAX95MSPQ	Ceramic capacitor compatible, variable output voltage		15	0.9	1.5 to 9.0	±2.0*4	0.7	0	0	0	0	0	301-09

*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).

Notice

*3 Current ratings are defined individually.
*4 Reference voltage precision

SURFACE MOUNT TYPE LOW POWER-LOSS VOLTAGE REGULATORS

•SC-63 type (1) Output voltage fixed type

71 ()	1 0 11															(====;
		Abs	olut	e ma	aximum	ratings	Electrica	al charac	teristics		Built-i	in fund	ctions				
Model No.	Features	C c	Outpu urrei Io (A)	ut ht	Input voltage	Power dissi-	Output voltage Vo*2	Output voltage	Dropout voltage	_	ent	control	pation OFF state	output	ckage	Pack	age
		0.5	1	1.5	Vin (V)	Pd*1 (W)	(V) TYP.	sion (%)	(V)	Overheat protectior	Overcurre	ON/OFF	Low dissi current at	Variable o voltage	Taped pa		Package shape type*5
PQxxxDNA1ZPH series	Ceramic capacitor compatible, ASO protection function, low dissipation current at OFF state (lqs: 5 μ A (MAX.)), solder dip compatible lead shape		0		24	8	3.3, 5, 9, 12	±2.5	0.5	0	0	0	0	-	0		G
PQxxxENA1ZPH series	.		0		10	8	1.5, 1.8, 2.5, 3.3			0	0	0	0	Ι	0		G
PQxxxENB1ZPH series	2.35 V, ceramic capacitor compatible, solder din compatible lead shape		0			5	1.2, 1.5, 1.8, 2.5, 3.3	±2.0	0.3	0	0	0	0	Ι	0	SC-63	G
PQxxxENAHZPH series				0			1.5, 1.8, 2.5, 3.3		0.9	0	0	0	0	Ι	0		G
PQxxxGN01ZPH series	Minimum operating input voltage: I.7 V (Dual power supply type),	0			8	10 1 2	±30		0	0			-	0		G	
PQxxxGN1HZPH series	ceramic capacitor compatible, solder dip compatible lead shape	ramic capacitor compatible, Ider dip compatible lead shape		0	5.5	1.0, 1.2	mV	_	0	0			_	0		G	

*1 With infinite heat sink attached

*2 The xxx in the model No. refer to the ou
*3 The value is defined as ±50 mV in some
*4 Current ratings are defined individually.
*5 Refer to page 41 The xxx in the model No. refer to the output voltage values of the model (e.g. 033 for 3.3 V, 050 for 5 V, 120 for 12 V).

The value is defined as ±50 mV in some models.

SC-63 type (2) Output voltage variable type

	1		solut	e ma	aximum	ratings	Electrica	al charact	teristics		Built-	in fund	ctions				
Model No.	Features	C	Dutp urre Io (A)	ut nt	Input voltage	Power dissi-	Output voltage	Output voltage	Dropout voltage		int	control	bation OFF state	utput	ckage	Pack	kage
		0.5	1	1.5	Vin (V)	Pd*1 (W)	(V) TYP.	sion (%)	VI-0*3 (V)	Overheat protection	Overcurre protection	ON/OFF (Low dissip current at	Variable o voltage	Taped pad		Package shape type*4
PQ070XNA1ZPH			0						0.5	0	0	0	0	0	0		G
PQ070XNAHZPH	Minimum operating input voltage: 2.35 V,			0	10	8	1.5 to 7	. 2.0*2	0.9	0	0	0	0	0	0		G
PQ070XNA2ZPH	ceramic capacitor compatible, solder dip compatible lead shape			(2 A)				±2.0"2	0.5	0	0	0	0	0	0]	G
PQ070XNB1ZPH			0			5	1.2 to 7		0.3	0	0	0	0	0	0		G
PQ035ZN01ZPH	Reference voltage (Vref): 0.6 V, minimum operating input voltage:		0		5.5		0.8 to	±30	-	0	0			0	0		G
PQ035ZN1HZPH	ceramic capacitor compatible, solder dip compatible lead shape			0	5.5		3.5	mV	Ι	0	0			0	0	SC-63	G
PQ200WNA1ZPH	Minimum operating input voltage: 3.5 V, ASO protection function, low dissipation current at OFF state (Iqs: 5 μ A (MAX.)), ceramic capacitor compatible, solder dip compatible lead shape		0		24	8	3.0 to 20	.0 5*2	0.5	0	0	0	0	0	0		
PQ200WN3MZPH	Minimum operating input voltage: 5.5 V, low dissipation current at OFF state (lqs: 5 μ A (MAX.)), ceramic capacitor compatible, current limit: 800 mA	(0.3)			24	6.8	5.0 to 20	12.0 ²	0.5	0	0	0	0	0	0		6

*1 With infinite heat sink attached
*2 Reference voltage precision
*3 Current ratings are defined individually.

*4 Refer to page 41

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(Ta = 25°C)

RoHS

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SURFACE MOUNT TYPE LOW POWER-LOSS VOLTAGE REGULATORS

●TO-263 type

(Ta = 25°C)

RoHS

		Absolute	maximu	m ratings	Electri	cal charact	eristics		Built-	in fund	tions			
Model No.	Features	Output current lo (A)	Input voltage Vin (V)	Power dissipa- tion Pd*1 (W)	Output voltage Vo (V) TYP.	Output voltage precision (%)	Dropout voltage VI-0*3 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Taped package	Package
PQ070XHA2ZPH	2 A output (minimum operating input voltage: 2.35 V), ceramic capacitor compatible	2.0	10	35	1.5 to 7	±2.0*2	0.5	0	0	0	0	0	0	TO-263

*1 With infinite heat sink attached

*2 Reference voltage precision *3 Current ratings are defined individually.

SOP-8 type

SOP-8 type									((Ta = 25°C)
		Absolu	te maximum	ratings	Electrical charact	eristics	Built-in f	unctions	Je	
Model No.	Features	Output current lo (A)	Input voltage Vin (V)	Power dissipation Pd ^{*1} (W)	Output voltage Vo (V) TYP.	Output voltage precision* ² (mV)	Overheat protection	Overcurrent protection	Taped packaç	Package
PQ1DX095MZPQ	Built-in sink source function (For DDR II memory)	.0.9	6	0.6	Vdd x 1/2 (Vddq: 1.5 V (MIN.))	±25	0	0	0	SOD 9
PQ1DX125MZPQ	Built-in sink source function (For DDR memory)	±0.0	0	0.0	Vdd x 1/2 (Vddq: 2.3 V (MIN.))	±35	0	0	0	30P-0

*1 When mounted on a board

*2 Reference voltage precision

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

Surface wount Type Chopper Regulators (DC-DC Converters) Absolute Electrical characteristics													
		Abs maximu	solute Im ratings		Electrical	charact	eristics		Pack	kage			
Model No.	Features	Switch- ing current Isw (A)	Power dissipa- tion 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*4			
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	3-6W			
PQ1CN38M2ZPH	PWM chopper regulator (high oscillation frequency) Output ON/OFF control function Overcurrent/overheat protection circuits For light load	0.8	8		N	Step- down	300 k	0.9		G			
PQ1CN41H2ZPH	PWM chopper regulator (high oscillation frequency) Overcurrent/overheat protection circuits		8	4.5 to 40	VREF ^{*3} to 35 (step-down type)/ –VREF to –30 (inverting type)	Step- down	300 k	0.9	SC-63	G			
PQ1CZ21H2ZPH	 PWM chopper regulator Output ON/OFF control function Overcurrent/overheat protection circuits Low dissipation current at OFF state (Standby current <lsp>: 1 μA (MAX.))</lsp> 	1.5	8		(inverting type)	Step- down	100 k	0.9		F			
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 20	Step- down	400 k	RDSon TYP. 0.45Ω	SOP-8				
PQ1CX53H2MPQ	 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- down	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- down	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	VREF ^{*3} to 35 (step-down type)/ –VREF to –30 (inverting type)	Step- down	150 k	1.4	TO-263	3			

*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 Refer to page 41

RoHS

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CHOPPER REGULATORS / DC-DC CONVERTER MODULE WITH BUILT-IN COIL

☆New product



(Ta = 25°C)

Chopper Regulators (DC-DC Converters)

●TO-220 type

		Abs maximu	olute m ratings		Electrical of	characte	ristics		Pack	age
Model No.	Features	Switch- ing current Isw (A)	Power dissipa- tion 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	0.8*3					300	0.95		E
PQ1CG38M2RZH	For light load Output ON/OFF control function	0.0						0.33		D
PQ1CG21H2FZH	PWM chopper regulator Built-in overcurrent/overbeat protection circuits						100	1.0		E
PQ1CG21H2RZH	Output ON/OFF control function	1.5*3					100	1.0		D
PQ1CG41H2FZH	PWM chopper regulator (high oscillation frequency)	1.5 *	14	40	VREF*4 to 35 (step-down type)/	Step-	300	1.0	TO-220	E
PQ1CG41H2RZH	Built-in overcurrent/overheat protection circuits Output ON/OFF control function			-10	–VREF ^{*4} to –30 (inverting type)	down		1.0	10 220	D
PQ1CG2032FZH	PWM chopper regulator Built-in overcurrent/overbeat protection circuits						70			E
PQ1CG2032RZH	Output ON/OFF control function	- 3.5* ³						11		D
PQ1CG3032FZH	PWM chopper regulator (high oscillation frequency)						150	1.4		E
PQ1CG3032RZH	Built-in overcurrent/overheat protection circuits Output ON/OFF control function						150			D

*1 With infinite heat sink attached

*2 Output voltage variable range
*3 Peak current
*4 VREF nearly equal to 1.26 V (TYP.)
*5 Refer to page 41

■ DC-DC Converter Module with Built-in Coil

Notice

		Absolute max	kimum ratings		Electri	cal characteri	stics		
Model No.	Features	Output current Io (A)	Operating temperature Topr (°C)	Control system	Input voltage range Vin (V)	Oscillation frequency fo TYP. (MHz)	Output voltage Vo*1 (V)	Standby current Isd (μΑ) TYP.	Outline dimensions (W x D x H) mm
☆PQ5CM03P	DC-DC converter module with built-in coil for simplified power- supply design High efficiency thanks to synchronous rectification method (efficiency: 81%)	3.0	-10 to +85	PWM system	8.0 to 14	1.0	1.1 to 3.3	20	9.0 x 6.0 x 2.6

*1 Output voltage variable range

(Ta = 25°C)

Analog

POWER SUPPLY ICs FOR CCDs/CCD CAMERA MODULES

RoHS

■ 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
			15	Charge pump	200 k		12 (DC)	-	
IR3M63U	4	4 E to 10	-8	Negative charge pump	200 K	_	2.5 (DC)	-	
	4	4.5 to 10	3.3	Step-down type PWM + REG	1 14	Duilt in	120 (DC)	-	P-VQFINU32-0505
			1.8	Step-down type PWM + REG		Duilt-in	50 (DC)	_	
			15/12	Charge pump	200 k		12/20 (DC)	_	
IR3M59U	3	4.5 to 16	-8/-5	Negative charge pump	200 K	_	2.5/5 (DC)	-	P-VQFN032-0505
			3.3	Step-down type PWM + REG	1 M	Built-in	150 (DC)	_	

Power Devices/ Analog ICs

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Analog

LED DRIVERS

☆New product



■ LED Drivers

•Built-in step-up circuit (1)

Model No.	Function	Features		Number of LEDs	Booster method	Constant current circuit	Switching transistor	Input voltage range (V)	Output*3 current (mA) MAX.	Oscillation frequency (Hz) TYP.	Package
PQ6CB11X1CP		High voltage CMOS output: 30 V (MAX.) Output ON/OFF control function Overvoltage/overcurrent protection circuits Soft start function	1	6 (Series connection)		*1	0	2.7 to 5.5	250* ²	1.2 M	USB-6
PQ7L2020BP	for backlight (for small panels)	 High voltage CMOS output: 37 V (MAX.) Output ON/OFF control function Overvoltage/overcurrent protection circuits Soft start function Possible to use a low-capacity (0.1 µF) output capacitor 	1	9 (Series connection)	PWM	*1	0	2.9 to 5.5	500	1.0 M	USB-6
PQ7L3010QPF	White LED driver for flashlight	 Automatic-switching (between 1x/2x) charge pump system Non-external coil Built-in fail-safe function Short-circuit LED protection function/overheat protection function/soft start function 	1	1	Charge pump	*1	_	2.6 to 4.4	800	0.9 M	16QFN
IR2E49U/ IR2E49M	White LED driver for backlight	Capable of driving a maximum of 40 LEDs with 8 LEDs (in series) per channel Built-in step-up DC-DC controller Capable of controlling brightness using PWM control Step-up output control according to LED-Vf		40	PWM	0	External	6 to 28	150/ ch*4	100 k to 1 M* ⁵	P-VQFN036- 0606/ P-QFP048- 0707
IR2E63Yx	LED driver for backlight and call alert display (auto brightness adjustment)	Capable of driving 9 main-LEDs + 2 sub-LEDs (series) and 6 call alert LEDs (RGB) • Auto brightness adjustment and PWM brightness adjustment • Power supply for EL panel and LCD controller • LDO 4ch • Built-in input terminals for ambient light sensor and proximity sensor • L2C/SPL interface-compatible		15	PWM + charge pump	0	0	3 to 4.2 (for drive)/ 1.62 to 3.2 (for control)	Main 25.6/ch Call alert 12.8/ch	1 M	63WL-CSP*6
☆IR2E68Yx	LED driver for backlight and call alert display (auto brightness adjustment)	Capable of driving 10 main-LEDs + 2 sub- LEDs (series) and 6 call alert LEDs (RGB) Auto brightness adjustment and PWM brightness adjustment Power supply for EL panel and LCD controller LDO 4ch Built-in input terminals for ambient light sensor and proximity sensor		16	PWM + charge pump	0	0	3 to 4.2 (for drive)/ 1.62 to 3.2 (for control)	Main 25.6/ch Call alert 12.8/ch	1 M or 500 k	63WL-CSP*6
IR2E56U6	White LED driver for backlight	I ² C/SPI interface-compatible Capable of driving a maximum of 72 LEDs with 12 LEDs (in series) per channel Built-in step-up DC-DC controller High oscillation frequency (1.5 MHz) makes use of a small coil possible Capable of controlling brightness using PWM control Step-up output control according to LED-Vf Built-in sequential drive mode for output current		72	PWM	0	External	5 to 28	25/ch	200 k to 1.5 M	32VQFN
IR2E58U		 Capable of driving a maximum of 96 LEDs with 12 LEDs (in series) per channel Built-in step-up DC-DC converter High oscillation frequency (1.5 MHz) makes use of a small coil possible Capable of controlling brightness using PWM control Step-up output control according to LED-Vf 	8	96		0	0	4.5 to 28	40/ch	500 k to 1.5 M	24HQFN

*1 LED constant current value can be set by external resistors.

LED Constant current value can be set 2, 1 and 4
 Peak switching current
 Constant current (MAX.)
 Use this IC within the range of power dissipation.
 Selectable oscillation frequency range
 3.57 mm x 3.57 mm x 0.585 mm (TYP.)

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Analog

☆New product

LED DRIVERS



•Built-in step-up circuit (2)

		.,									
Model No.	Function	Features c		Number of LEDs	Booster method	Constant current circuit	Switching transistor	Input voltage range (V)	Output*1 current (mA) MAX.	Oscillation frequency (Hz) TYP.	Package
IR2E65U	White LED driver	 Capable of driving a maximum of 120 LEDs with 12 LEDs (in series) per channel Built-in step-up DC-DC controller High oscillation frequency (1.5 MHz) makes use of a small coil possible Wider range of PWM brightness control possible, from simultaneous total output control to local dimming Step-up output control according to LED-Vf 	10	120	PWM	0	External	10 to 28	100/ch	500 k to 1.5 M	52HQFN
☆IR2E67M	for backlight	 Built-in 10 ch. constant-current control amplifier (external output transistor) Enables driving LEDs up to external transistor voltage limit Built-in timing controller for lighting Wider range of PWM brightness control possible, from simultaneous total output control to local dimming Step-up output control according to LED-Vf 	10	*2	*3	*4	_	4.5 to 5.5	*5	_	80LQFP- 1420

*1 Constant current (MAX.)
*2 Determined by external transistor
*3 Built-in feedback voltage-genera
*4 Built-in constant-current control a
*5 Determined by external resistor. Determined by external transistor voltage limit. Built-in feedback voltage-generating circuit for external power supply. Built-in constant-current control amplifier (external output transistor)

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.) fcLk: 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.) fcLk: 20 MHz (MAX.)/16.6 MHz (MAX.) (at cascade connection) 	3.0 to 5.5	P-SDIP028-0400

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AC-DC CONVERSION TYPE ICS FOR LED LIGHTING / AC DIRECT TYPE ICS FOR LED LIGHTING / POWER SUPPLY MODULES FOR LED LIGHTING / POWER AMPLIFIERS FOR WIRELESS LAN

☆New product ★Under development RoHS

■ AC-DC Conversion Type ICs for LED Lighting

Model No.	Features	Absolute maximum ratings							
		Vcc (V)	Topr (°C)	Drive voltage Vcc (V) MIN.	Dissipation current lcc (mA) TYP.	Low level output current loL (mA) MIN.	High level output current Iон (mA) MAX.	Switching frequency Fsw (kHz) TYP.	Package
PQ1DC15C0P	• Use of forward type allows	22	20 to 1100	20	2	45	45	68	SOT-23
PQ1DC15F1P	No electrolytic capacitor	23	-30 10 +100	20	3	15	-15		SOP-8

■ AC Direct Type ICs for LED Lighting

		Absolute max	kimum ratings					
Model No.	Features	VIN1 (V)	Topr (°C)	VS terminal voltage VS (V) TYP.	Dissipation current lcc (mA) TYP.	Low level output current for DG terminal IDG2 (µA) MIN.	High level output current for DG terminal IDG1 (μΑ) MAX.	Package
☆IR3M85N4	 Compatible with existing dimmers No electrolytic capacitor 	395	0 to +85	20	1	40	-50	SOP-14

■ Power Supply Modules for LED Lighting

		Absolute maximum ratings								
Model No.	Features	Vac (V)	Topr (°C)	Input voltage VAC (V) TYP.	Output voltage Vout (V) TYP.	Output current lout (mA) TYP.	Output power Po (W) TYP.	Efficiency η (%) TYP.	Power factor PF TYP.	Outline dimensions (mm)
★PQ1AS1D01	Step-down type	110		100	24	000	6.2	80	0.9	23 × 42 × 23.6
★PQ1AS1D01A	Compatible with existing dimmers High efficiency	132	-10 to +80	120	31	200		82	0.8	
★PQ1AS2D01		253]	230	62	100		85	0.8	

Power Amplifiers for Wireless LAN

Model No.	Application	Supply voltage Vcc (V) TYP.	Control voltage Vbb (V) TYP.	Linear output power*1 (dBm)	Dissipation current (mA) TYP.	Gain (dB) TYP.	Detection circuit	Matching circuit	Package (mm)	
IRM068U7	For 2.4 GHz single-band wireless LAN			18	115	27	⊜*2	Built-in (IN)	HQFN6 pin	
QM2A1UA003	(IEEE802.11b/g/n)			20	150	28	0	Built-in (IN)	$(1.5 \times 1.5 \times 0.4 \text{ mm})$	
IRM053U7	For 5 GHz single-band wireless LAN		2.8	18	170	30	0	Built-in (IN/OUT)	HQFN10 pin	
QM2A1UA004	(IEEE802.11a/n)	3.3		20	225	31	0	Built-in (IN/OUT)	$(2 \times 2 \times 0.4 \text{ mm})$	
				18	130	30	0	Built-in	1	
	For 2.4/5 GHz dual-band wireless LAN			18	160	30		(IN/OUT)	HQFN16 pin	
IRM067U6	(IEEE802.11a/b/g/n)		2.0	17	100	28	*2	Built-in	$(3 \times 3 \times 0.4 \text{ mm})$	
			2.9	17	140	30		(IN/OUT)		

Notice

*1 At time of OFDM 64QAM modulating wave input.

*2 Load fluctuation stabilization and detection output type

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Analog

FAIL SAFE ICs / SOLAR MODULES FOR MOBILE DEVICES

☆New product



■ Fail Safe ICs

Model No.	Eastures	Op	erating volta	ige	Dissipation current	Operating temp.	Package	
	Features	VBAT (V)	VBAC (V)	VIO (V)	(µA) TYP.	(°C)		
IR3T46U6	 Malfunction detection Built-in 8-bit ADC Built-in timer circuit Built-in key detection output OR gate 			2.6 to 3.0	10	00 kr + 05	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	3.2 10 4.5	3.0 10 3.3	1.6 to 3.0	10	-20 10 +85	35WL-CSP*	

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

■ Solar Modules for Mobile Devices

Model No.	Features	Maximum output power* Pmax (mW) TYP.	Maximum output voltage* Vpm (V) TYP.	Maximum output current* Ipm (mA) TYP.	Outline dimensions (mm)	
☆LR0GC023	Module thickness: 0.8 mm	365	4.9	75	$67.5 \times 41.0 \times 0.8$	
☆LR0GC05	Module thickness: 1.0 mm	160	4.6	35	41.0 × 33.0 × 1.0	

* Measuring conditions: AM 1.5; irradiance: 1 000 W/m² \pm 50 mW; module temperature: at 25°C



Notice

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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.



• 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 Features 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) 6 mm x 6 mm to 16 mm x 16 mm Nominal dimensions 5 mm x 5 mm to 10 mm x 10 mm



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.



■ SiP (System in Package)

System in Package is SHARP's original high-density mounting technology that achieves high-density memory capacity and multiple functions by stacking multiple ICs or multiple packages. The System in Package technology means chip-stacked package technology that can achieve up to 5-chip mounting by stacking ICs in a single package. 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

 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 Features 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. (5-chip stacked CSP) Mold resin Gold wire IC Cross Package height 1.4 mm (MAX.)* section 1.6 mm (MAX.)* example Cu pattern Substrate Solder ball Diameter 0 45 mm Terminal pitch: 0.8 mm * At 0.8 mm terminal pitch 0.30 mm 0.5 mm

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Notice

Chip Stacked TSOP/QFP*/VQFN/HQFN



SiP

RoHS

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Notice


SOF

■ 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.





Notice

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RoHS

■ Package Lineup

•Surface-mount Type

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch	Nominal dimensions	Package depth & width (D x W) x
.,,,,,,					00	
		P-LFBGA048-0606	40		6 X 6	6.0 X 6.0 X (1.4)
		P-1FBGA048-0608	48		бХ 8	6.0 X 8.0 X (1.2)
		P-1FBGA048-0808		-	8 x 8	8.0 x 8.0 x (1.2)
		P-1FBGA056-0808	56	-		
		P-TFBGA060-0811	60 (48)*	-		
		P-IFBGA064-0811	64	-	8 x 11	8.0 x 11.0 x (1.2)
		P-IFBGA072-0811	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	-		
		P-LFBGA087-0811	87	-	8 x 11	8.0 x 11.0 x (1.4) / (1.6)
		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	0.8	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	$10.0 \times 10.0 \times (1.2)$
ERCA		P-TFBGA112-1010	112			10.0 x 10.0 x (1.2)
(CSP)		P-LFBGA115-0914	115		9 x 14	9.0 x 14.0 x (1.4) / (1.6)
	DV W	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			12.0 x 12.0 x (1.2)
		P-LFBGA168-1212	168		10 v 10	12.0 x 12.0 x (1.4) / (1.6)
		P-TFBGA180-1212	180		12 X 12	$12.0 \times 12.0 \times (1.2)$
		P-TFBGA184-1212	184			12.0 x 12.0 x (1.2)
		P-TFBGA240-1414	240		14 x 14	14.0 x 14.0 x (1.2)
		P-LFBGA280-1616	280		16 v 16	16 0 v 16 0 v (1 E)
		P-LFBGA352-1616	352		10 X 10	10.0 x 10.0 x (1.5)
		P-TFBGA064-0606	64		6x 6	6.0 x 6.0 x (1.2)
		P-LFBGA140-0909	140		9x 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	0.05	13 x 13	13.0 x 13.0 x (1.2)
		P-LFBGA192-1010	192	0.65	10 x 10	10.0 x 10.0 x (1.4) / (1.6)
		P-LFBGA208-1212	208	1	12 x 12	12.0 x 12.0 x (1.4) / (1.6)
		P-LFBGA224-1313	224	1	40.40	13.0 x 13.0 x (1.4) / (1.6)
	(Plastic)	P-TFBGA260-1313	260]	13 X 13	13.0 x 13.0 x (1.2)

* Figures in brackets indicate available terminal counts.

RoHS

•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
		P-VFBGA057-0505	57			
		P-VFBGA075-0505	75	-	5x 5	5.0 x 5.0 x (0.9)
		P-TFBGA064-0606	64	-		
		P-TFBGA068-0606	68	-		6.0 x 6.0 x (1.1)
		P-VFBGA081-0606	81	-	6x 6	6.0 x 6.0 x (0.9)
		P-TFBGA084-0606	84	-		6.0 x 6.0 x (1.1)
		P-VFBGA100-0606		-		6.0 x 6.0 x (0.9)
		P-VFBGA100-0707	100			7.0 x 7.0 x (0.9)
		P-TFBGA100-0707	-			7.0 x 7.0 x (1.1)
		P-VFBGA108-0707				7.0 x 7.0 x (0.9)
		P-TFBGA108-0707	108		7 x 7	7.0 x 7.0 x (1.1)
		P-VFBGA120-0707				7.0 x 7.0 x (0.9)
		P-TFBGA120-0707	120			
		P-TFBGA132-0707	132	-		7.0 x 7.0 x (1.1)
		P-TFBGA133-0808	133	-		8.0 x 8.0 x (1.1)
		P-VFBGA144-0808		-	8 x 8	8.0 x 8.0 x (0.9)
		P-LFBGA144-0808	144	0.5		8.0 x 8.0 x (1.3) / (1.5)
		P-LFBGA144-0811			8 x 11	8.0 x 11.0 x (1.3)
FBGA		P-TFBGA152-0808	152		8 x 8	8.0 x 8.0 x (1.1)
	DW	P-VFBGA171-0811	474		011	8.0 x 11.0 x (0.9)
		P-LFBGA171-0811	1/1		8 X 11	8.0 x 11.0 x (1.3) / (1.5)
		P-VFBGA176-0909	470			9.0 x 9.0 x (0.9)
		P-TFBGA176-0909	1/6		00	
		P-TFBGA180-0909	180		9 X 9	9.0 x 9.0 x (1.1)
		P-TFBGA188-0909	400			
		P-VFBGA188-1111	100		11 x 11	11.0 x 11.0 x (0.9)
		P-VFBGA208-1010	208			10.0 x 10.0 x (0.9)
		P-TFBGA208-1010	200		10 v 10	10 0 x 10 0 x (1 1)
		P-TFBGA245-1010	245		10 x 10	10.0 x 10.0 x (1.1)
		P-LFBGA245-1010	245			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			6.0 x 6.0 x (0.75)
		P-WFBGA121-0606	121		6x 6	
		P-WFBGA145-0606	145			0.0 x 0.0 x (0.0)
		P-TFBGA168-0707	168	0.4	7 x 7	7.0 x 7.0 x (1.0)
		P-TFBGA204-0808	204			8.0 x 8.0 x (1.0)
		P-WFBGA205-0808	205		8 x 8	80x 80x (09)
	(Plastic)	P-WFBGA261-0808	261			0.0 x 0.0 x (0.0)

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RoHS

•Surface-mount Type (cont'd)

Package	Appearance	De che se ce de		Terminal pitch	Nominal dimensions	Package depth & width
type	(Package material)	Раскаде соде	No. of terminals	mm	mm	(seated height [MAX.]) mm
		P-TFBGAXXX-0606	to 36		6x 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		9x 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	0.8	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			14 x 14	14.0 x 14.0 x (1.2)
		P-TFBGAXXX-1515	to 240		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		6x 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		9x 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	0.65	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)
FBGA		P-TFBGAXXX-1414	to 304		14 x 14	14.0 x 14.0 x (1.2)
(CSF)	DW	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		6x 6	6.0 x 6.0 x (1.1)
		P-TFBGAXXX-0707	to 132		7x 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		9x 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	0.5	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		5x 5	5.0 x 5.0 x (1.0)
		P-TFBGAXXX-0606	to 144		6x 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	0.4	8 x 8	8.0 x 8.0 x (1.0)
		P-TFBGAXXX-0909	to 228		9x 9	9.0 x 9.0 x (1.0)
	(Plastic)	P-TFBGAXXX-1010	to 264		10 x 10	10.0 x 10.0 x (1.0)
		P-BGA0356-2121	356	1.0	21 x 21	21.0 x 21.0 x (2.2)
PBGA (BGA)		P-BGA0476-3535	476	1.27	25 × 25	25 0 x 25 0 x (2 62)
(BGA)	W (Plastic)	P-BGA0528-3535	528	1.21	55 X 55	55.0 × 55.0 × (2.05)

XXX: Terminal counts

BGA is a trademark of Motorola Nippon Ltd.

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B	Ø
Ro	HS

Package	Appoarance		No. of	Terminal pitch	Nominal dimensions	Package depth & width	Lead frame	e material
type	(Package material)	Package code	terminals	mm (mil)	mm (mil)	(D x W) x (seated height [MAX.]) mm	Alloy42	Copper alloy
SSOP	W	P-SSOP008-0150	8	0.65	4.5 (150)	3.0 x 3.0 x (1.1)	-	
0001	D (Plastic)	P-SSOP024-0275	24	0.00	7.0 (275)	6.0 x 7.8 x (1.27)	-	
	W	P-TSOP040-1020	40		10 x 20	10.0 x 18.4 x (1.2)		
TSOP		P-TSOP048-1220	48	0.5	12 x 20	12.0 x 18.4 x (1.2)		
	D (Plastic)	P-TSOP056-1420	56		14 x 20	14.0 x 18.4 x (1.2)		
OED		P-QFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.65)		
QFF	W	P-QFP072-1010	72	0.5	10 x 10	10.0 x 10.0 x (1.8)		-
		P-LQFP080-1212	80	0.5	12 x 12	12.0 x 12.0 x (1.7)		-
LQFF		P-LQFP100-1414	100	0.5	14 x 14	14.0 x 14.0 x (1.7)		-
TQFP	D	P-TQFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.2)		-
	1 2 - (III)	P-TQFP100-1414	100	0.5	14 × 14	14 0 x 14 0 x (1 2)		-
	(Plastic)	P-TQFP128-1414	128	0.4	14 X 14	14.0 X 14.0 X (1.2)	[]	-
		P-VQFN020-0404	20		4 x - 4	$4.2 \times 4.2 \times (1.0)$	-	
		P-VQFN024-0404	24]	4 X 4	4.2 X 4.2 X (1.0)	-	
		P-VQFN028-0505	28	0.5	Бу Б	5 2 x 5 2 x (1 0)	-	
		P-VQFN032-0505	32	0.5	5 X 5	5.2 X 5.2 X (1.0)	-]	
VQFN	W	P-VQFN036-0606	36		6x 6	6.2 x 6.2 x (1.0)	-	
	34559	P-VQFN048-0707	48		7 x 7	7.2 x 7.2 x (1.0)	-	
	1122	P-VQFN036-0505	36	0.4	5x 5	5.2 x 5.2 x (1.0)	-	
	D	P-VQFN052-0707	52	0.4	7 x 7	7.2 x 7.2 x (1.0)	-	
	,	P-HQFN020-0404	20			4.0 x 4.0 x (1.0)	-	
			24	0.5	4 x 4	4.0 x 4.0 x (0.85)	_	
HQFN*		P-FIQFN024-0404	24	0.5		4.2 x 4.2 x (1.0)	- 1	
		P-HQFN028-0505	28		5x 5	5.0 x 5.0 x (1.0)	-	
	(Plastic)	P-HQFN052-0707	52	0.4	7 x 7	7.2 x 7.2 x (1.0)	_	

•Surface-mount Type (cont'd)

* HQFN is a higher heat dissipation package of VQFN.

100 mil = 2.54 mm

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LSI

RoHS

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
	W	P-DIP014-0400A	14	1.27	10.16 (400)	10.0 x 10.0
DIP		P-DIP016-0450	40	1.27	11.43 (450)	11.4 x 12.2
	(Plastic)	P-DIP016-0500C	10	1.78	12.7 (500)	12.4 x 14.0
	(Plastic)	P-SOP014-0400A	14	1.27	12 (470)	10.0 x 10.0 x (4.1)
SOP		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)
100	W	N-LCC040-R350	40	0.65	8.9	8.3 x 8.9 x (1.52)
LCC	D (Ceramic)	N-LCC040-S433A	40	0.80	11.0	11.0 x 11.0 x (1.62)

100 mil = 2.54 mm



LCC : leadless chip carrier

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

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RoHS

●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
ТО-220	(Plastic)	4	2.54	10.2 (MAX.) x 4.5 x 29.1* ²	Cu
TO-220 (Full mold)	(Plastic)	4	2.54	10.2 (MAX.) x 4.5 x 29.1* ²	Cu
TO-220 (Full mold) [Lead forming type]	(Plastic)	5	(1.7)*1	10.2 (MAX.) x 4.5 x 24.6*²	Cu
TO-220 [Lead forming type]	(Plastic)	5	(1.7)*1	10.2 (MAX.) x 4.5 x 24.6* ²	Cu
TO-220 [Lead forming type]	(Plastic)	5	(1.7)*1	10.2 (MAX.) x 4.5 x 24.6* 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
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
SOT-89	(Plastic)	6	1.5	4.5 x 4.3* ² x 1.5	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-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	and and	9 (Including radiating fin)	1.0	5.0 x 4.5 x 0.75 (MAX.)	Cu

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

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PHOTOCOUPLER LINEUP

RoHS

■ Photocoupler Lineup

<Phototransistor output type>

Package type	Output type	Features		Model No. (series)	Page
Mini-flat 4-pin Compact_SMT type	Single phototransistor	General purpose, High collector-emitter voltage, etc.		PC35x series/PC451.100000F	44
			Low input current	PC367NJ0000F	44
		AC input response		PC354N.10000F	44
*			Low input current	PC364N 10000F	44
	Darlington phototransistor	High sensitivity, High collector-emitter voltage	Low input ourient	PC355N 10000E/PC452 100000E	44
	Bunngton phototranoiotor		Low input current	PC365N 10000E	
Compact, Half pitch	Single phototransistor	General purpose,	Low input ourient		45
(leau space), Sivir type			Painforced inculation		40
-					40
			Low input current		40
		AC Input response		PC3H3J00000F/PC3H4J00000F	45
			Low input current	PC3H41XNIP0F	45
	Darlington phototransistor	High sensitivity		PC3H5J00000F	45
			Low input current	PC3H510NIP0F	45
DIP type (4-pin)	Single phototransistor	Reinforced insulation		PC123XNNSZ0F	46
(4-pin, DIP type)		General purpose	Low input current	PC1231xNSZ0X	46
		High collector-emitter voltage, etc.		PC817XNNSZ0F/PC851XNNSZ0F	46
			Low input current	PC8171xNSZ0X	46
7,	Darlington phototransistor	High sensitivity, High collector-emitter voltage		PC815XNNSZ0F/PC852XNNSZ0F/ PC853XNNSZ0F	46
	<u> </u>		Low input current	PC81510NSZ0X	46
DIP type (6-pip)	Single phototransistor	General purpose, High collector-emitter voltage, etc.	·	PC7xx\/0NS7XF	47
		High sensitivity,			<u> </u>
1.	Darlington phototransistor	High collector-emitter voltage, etc.		PC7x5V0NSZXF	47
<opic output="" t<="" td=""><td>vpe></td><td></td><td></td><td></td><td></td></opic>	vpe>				
Package type		Easturas		Model No. (series)	Dage
гаскаде туре	Output type	reatures			гауе
Compact, SMT type	Digital output	General purpose, High response s	peed, 2ch, etc.	PC400J00000F/PC456L0NIP0F/ PC410S0NIP0F/PC410L0NIP0F/ PC4D10SNIP0F	48
	Analog/Digital output	High CMR	• • •	PC457S0NIP0F/PC457L0NIP0F	48





RoHS

■ Photocouplers

Phototransistor Output Type Compact SMT types

<(<compact, swit="" type=""></compact,>											Ta = 2	5°C)		
				Approved		Absolute	maximur	m ratings		Electro	o-optica	al char	acteris	stics	
type		Internal		standards*2		Forward	Forward voltage	Collector-	Curren	t transfe	er ratio	R	espon	se time	e I
Output	Model No.	connection diagram	Features	UL	Package	current IF (mA)	(AC) Viso (rms) (kV)	emitter voltage Vceo (V)	CTR (%) MIN.	lF (mA)	Vce (V)	tr (µs) TYP.	Ic (mA)	R∟ (Ω)	Vce (V)
	PC357NJ0000F		General purpose	0*		50	3.75	80	50	5	5	4	2	100	2
utput	PC352NJ0000F		General purpose, high resistance to noise*1	0		50	3.75	80	90	5	5	4	2	100	2
phototransistor o	PC451J00000F		High collector-emitter voltage	0*		50	3.75	350	40	5	5	4	2	100	2
	PC367NJ0000F		Low input current, high resistance to noise*1	0		10	3.75	80	100	0.5	5	4	2	100	2
Singl	PC354NJ0000F		AC input response	⊖*	Mini-flat 4-pin	±50	3.75	80	20	±1	5	4	2	100	2
	PC364NJ0000F		Low input current, AC input response, high resistance to noise*1	0		±10	3.75	70	50	±0.5	5	4	2	100	2
oto-	PC355NJ0000F		High sensitivity	0*		50	3.75	35	600	1	2	60	2	100	2
lington pho sistor out	PC365NJ0000F		High sensitivity, low input current	0		10	3.75	35	600	0.5	2	60	2	100	2
Darlin transi	PC452J00000F		High collector-emitter voltage	0*		50	3.75	350	1 000	1	2	100	20	100	2

O: Approved

*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.





RoHS

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

<0	Compact, half	pitch (lead	l space) SMT type>		- O: Appr	oved							Τ)	ā = 2	5°C)
				Approved		Absolute maximum ratings				Electro	-optica	al characteristics			
t type	Madel No	Internal	Fastura	by safety standards*3	3 Dookogo	Forward	Isolation voltage	Collector-	Curr	ent trar ratio	nsfer	. Response time			e
Outpu	Model No.	diagram	reatures	UL	Раскауе	current IF (mA)	(AC) Viso (rms) (kV)	voltage Vceo (V)	CTR (%) MIN.	lF (mA)	Vce (V)	tr (µs) TYP.	lc (mA)	RL (Ω)	Vce (V)
	PC3HU7xYIP0B		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
out	PC3H2J00000F		High resistance to noise*1	0	Mini-flat 4-pin	50	2.5	80	20	1	5	4	2	100	2
istor outp	PC3H7J00000F		Standard	⊖*6		50	2.5	80	20	1	5	4	2	100	2
lototrans	PC3H71xNIP0F		High resistance to noise*1, low input current	0		10	2.5	80	100	0.5	5	4	2	100	2
Single ph	PC3H3J00000F		AC input response, high resistance to noise*1	0		±50	2.5	80	20	±1	5	4	2	100	2
	PC3H4J00000F		AC input response	⊖*2, 6		±50	2.5	80	20	±1	5	4	2	100	2
	PC3H41xNIP0F		AC input response, high resistance to noise*1, low input current	0		±10	2.5	80	50	±0.5	5	4	2	100	2
n photo- r output	PC3H5J00000F	[[] ¥]	High sensitivity	0	Mini-flat	50	2.5	35	600	1	2	60	2	100	2
Darlington transistor o	PC3H510NIP0F		High sensitivity, low input current	0	O International Appin	10	2.5	35	600	0.5	2	60	2	100	2

*1 CMR: MIN.10 kV/µs

CMR: MIN. 10 KV/JS
 A VDE approved type is optionally available.
 Please refer to Specification Sheets for model numbers approved by safety standards.
 VDE, CSA approved
 In conformance with BSI, SEMKO, DEMKO, NEMKO, and FIMKO
 UL, CSA approved







RoHS

Phototransistor Output Type

	<dip (4-pin)="" type=""></dip>					— O: A	Approve	d					(Ta = 2	25°C)
d)				Ap	oprove	d by		Absolu	te maximu	im ratings	Electro-	optical ch	aracter	istics
type		Internal		safet	y stan	dards*8		Forward	Isolation	Collector-	Current tra	ansfer ratio	Respons	se time
Output	Model No.	connection diagram	Features	UL	VDE *2	Others	Package	current IF (mA)	(AC) Viso (rms) (kV)	voltage VCEO (V)	CTR (%) MIN.	lF (mA)	tr (µs) TYP.	R∟ (Ω)
ıt	PC123XNNSZ0F*1, *5, *6, *7		High isolation voltage, reinforced insulation	0	0	0		50	5.0	70	50	5	4	100
gle phototransistor output	PC1231xNSZ0X*1		High isolation voltage, reinforced insulation, low input current, high resistance to noise ^{*4}	0	0	0		10	5.0	70	50	0.5	4	100
	PC817XNNSZ0F*5, *6, *7		High isolation voltage	0	_	O*9		50	5.0	80	50	5	4	100
single pho	PC8171xNSZ0X* ^{5, *6}		High isolation voltage, low input current, high resistance to noise *4	0	_	_		10	5.0	80	100	0.5	4	100
Single	PC851XNNSZ0F*5, *6		High isolation voltage, high collector-emitter voltage	0	_	_	4-pin DIP	50	5.0	350	40	5	4	100
r output	PC815XNNSZ0F* ^{5, *6}		High isolation voltage, high sensitivity	0	_	_		50	5.0	35	600	1	60	100
ototransisto	PC81510NSZ0X		High isolation voltage, high sensitivity, low input current	0	_	-		10	5.0	35	600	0.5	60	100
ngton photc	PC852XNNSZ0F* ^{5, *6}		High isolation voltage, high collector-emitter voltage	0	0	_		50	5.0	350	1 000	1	100	100
Darli	PC853XNNSZ0F*5, *6		High isolation voltage, high collector-emitter voltage	0	0	_		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 UIL CSA approved

*9 UL, CSA approved







RoHS

Phototransistor Output Type

<	DIP type (6-pin))>			○: Approved, △: Under application							(Ta = 25°C)		
t type	Madal No	Internal	Factures	Appr by s stand	roved afety ards* ²	Dookogo	Absolut Forward	te maximun Isolation voltage	n ratings Collector- emitter	Electro Current rat	-optical c transfer tio	haracte: Resp tin	ristics onse ne	
Outpu	Wodel No.	diagram	realules	UL	VDE*1	Раскаде	current IF (mA)	(AC) Viso (rms) (kV)	voltage Vceo (V)	CTR (%) MIN.	lf (mA)	tr (µs) TYP.	RL (Ω)	
or output	PC714V0NSZXF		High isolation voltage	0	0		50	5.0	80	50	5	4	100	
gle phototransisto	PC724V0NSZXF		High isolation voltage, large input current	0	_		150	5.0	35	20	100	4	100	
Single ph	PC713V0NSZXF		High isolation voltage, with base terminal	0	0		50	5.0	80	50	5	4	100	
transistor output	PC715V0NSZXF		High isolation voltage, high sensitivity	0	0	6-pin DIP	50	5.0	35	600	1	60	100	
Darlington photo	PC725V0NSZXF		High isolation voltage, high sensitivity, high collector-emitter voltage, high power	0	0		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.



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PHOTOCOUPLERS



RoHS

♦ 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.)

<compact, s<="" th=""><th>SMT type:</th><th></th><th colspan="7">O: Approved</th><th></th><th colspan="5">(Ta = 25°C)</th></compact,>	SMT type:		O: Approved								(Ta = 25°C)				
			Appro sa	ved by fety		Absolute rati	maximum ngs		Electro	o-optica	al char	acteristics*1			
	Internal	-	stand	ards*2		Forward	Isolation	Lo	w level outpu	ut volta	ge	Thresho	ld input	current	
Model No.	connection diagram	Features	UL	VDE*3	Package	current IF (mA)	voltage (AC) Viso (rms) (kV)	Vol (V) MAX.	Ta (°C)	lo∟ (mA)	IF (mA)	IFHL (mA) MAX.	IFLH (mA) MAX.	Rι (Ω)	
PC400J00000F		Digital output, normal-off operation	0	-		50	3.75	0.4	0 to +70	16	4	2.0	-	280	
PC456L0NIP0F		Built-in preamplifier, high speed transmission (2 Mb/s), for flow soldering	0	0	Mini-flat 5-pin	25	3.75	0.6	-40 to +85	2.4	10	5.0	-	20 k	
PC410L0NIP0F		High speed (10 Mb/s), High CMR (10 kV/µs), For flow soldering	0	0		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	0	0	SOP 8-pin	20	3.75	0.6	-40 to +85	13	5	5.0	_	350	
PC4D10SNIP0F		High speed (10 Mb/s), for flow soldering, Solder heat resistance: 270°C 2ch output	0	_	SOP 8-pin	20	3.75	0.6	-40 to +85	13	5	5.0	-	350	

A: Rated voltage circuit

*1 Each item is measured at Vcc=5V. (PC400)
*2 Please refer to Specification Sheets for model numbers approved by safety standards.
*3 Optionally available.

<compact,< th=""><th></th><th colspan="9">C: Approved</th><th colspan="5">(Ta = 25°C)</th></compact,<>		C: Approved									(Ta = 25°C)				
			Appro sat	ved by fety		Absolute rati	olute maximum ratings			Electro	o-optica	al chara	cteristic	xs	
	Internal		stand	ards*1		Forward	Isolation	Cur	rent tra	insfer r	atio	Prop	pagatior	1 delay f	time
Model No.	diagram	realures	UL	VDE*2		current IF (mA)	voltage (AC) Viso (rms) (kV)	CTR (%) MIN.	lF (mA)	Vo (V)	Vcc (V)	t₽н∟ (µs) TYP.	tpLн (µs) TYP.	RL (Ω)	l⊧ (mA)
PC457L0NIP0F		High speed (1 Mb/s), high CMR (15 kV/µs), for flow soldering	0	0	Mini-flat 5-pin	25	3.75	19	16	0.4	4.5	0.2	0.4	1 900	16
PC457S0NIP0F		High speed (1 Mb/s), high CMR (15 kV/µs), for flow soldering, Solder heat resistance: 270°C	0	0	SOP 8-pin	25	3.75	19	16	0.4	4.5	0.2	0.3	1 900	16

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

*2 Optionally available.



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<dip digit<="" th="" type,=""><th>•</th><th></th><th></th><th>): Approve</th><th>ed</th><th></th><th colspan="7">(Ta = 25°C)</th></dip>	•): Approve	ed		(Ta = 25°C)							
			Appro	ved by		Abso maximur	olute m ratings		Electro-	optical	charac	teristics	*1	
Model No.	Internal connection diagram	Features	standards*5		Package	Forward	rward Isolation voltage		Low level output voltage			Threshold input current		
			UL	VDE *4		IF (mA)	(AC) Viso (rms) (kV)	Vol (V) MAX.	Ta (°C)	lo∟ (mA)	lF (mA)	IFHL (mA) MAX.	Iflh (mA) MAX.	Rι (Ω)
PC900V0NSZXF*2, *3		Digital output, normal-off operation	0	0	6-pin DIP	50	5.0	0.4	0 to +70	16	4	2.0	_	280

A: Rated voltage circuit *1 Each item is measured at Vcc=5V. *2 Lead forming type is also available for surface mounting.

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

*4 Optionally available.

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

PC900V0NSZXF (6-pin DIP)

♦ 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.)

DIP type Gate drive types

	<dip e<="" th="" type,=""><th>ale unve lyp</th><th><i>Je></i></th><th></th><th>_0</th><th>: Approved</th><th></th><th></th><th></th><th></th><th></th><th></th><th>(Ta =</th><th>: 25°C)</th></dip>	ale unve lyp	<i>Je></i>		_0	: Approved							(Ta =	: 25°C)
Model No. PC925LxNSZ0F*1 PC942J00000F PC928J00000F		Internal	Appro sat	ved by fety		Abs maximu	olute m ratings		Electro	-optical	charact	eristics		
		Internal		stand	ards*3		Forward	Isolation		Prop	pagatior	delay t	lime	
	Model No.	connection diagram	Features	UL	VDE *2	Package	current IF (mA)	voltage (AC) Viso (rms) (kV)	t₽н∟ (µs) TYP.	tpLн (µs) TYP.	Vcc (V)	lF (mA)	RL1 (Ω)	RL2 (Ω)
	PC925LxNSZ0F*1		 Built-in drive circuit directly connectable to MOS-FET and IGBT Peak output current: 2.5 A Low dissipation current (Icc = TYP. 2.5 mA) High resistance to noise (CMR: MIN. 15 kV/µs) 	0	0	8-pin DIP	25	5.0	MAX. 0.5	MAX. 0.5	15 to 30	7 to 16	Rg = 10	_
	PC942J00000F	Interface Amplifier	For controlling inverter- controlled air-conditioner	0	0		25	5.0	2.0	2.0	6	5	5	10
	PC928J00000F	Interface	For driving inverter IGBT, built-in short protection circuit	0	0	14-pin SMT	25	4.0	1.0	1.0	24	10	Rg = 47	_
	PC929J00000F		For driving inverter IGBT, high speed, built-in short pro- tection circuit	0	0	lead)	20	4.0	0.3	0.3	24	5	Rg = 47	_

*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.



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PHOTOTRIAC COUPLER LINEUP

RoHS

■ Phototriac Coupler Lineup

Package	Applied voltage	ON-state current (rms)		Features	Model No.	Page
Mini-flat (SMD)	AC 200 V lines (VDRM = 600V)	0.05 A	General purpose		S2S3000F*3 / S2S5A00F*3	51
. A				Built-in zero-cross circuit	S2S4000F*3	52
DIP type	AC 200 V lines (VDRM = 600V)	0.1 A	General purpose		PC3ST11NSZAX* ³	51
(4-pin)				Built-in zero-cross circuit	PC3ST21NSZBX*2	52
			Reinforced isolation	on	PC3SH11YFZAX*3 / PC3SH13YFZAX*3	51
				Built-in zero-cross circuit	PC3SH21YFZBX*2	52
DIP type	AC 100 V lines (VDRM = 400V)	0.1 A	General purpose		PC2SD11NTZAF*3	51
(6-pin package, 5th-pin cut)	AC 200 V lines (VDRM = 600V)	0.1 A	General purpose		PC3SD12NTZAF*3 / PC3SD12NTZBF*2 / PC3SD11NTZCF*1	51
				Built-in zero-cross circuit	PC3SD21NTZAF*3 / PC3SD21NTZBF*2 / PC3SD21NTZCF*1 / PC3SD21NTZDF / PC3SD23YTZCF*1	52
1. <i>1</i> ,			Reinforced isolation	on	PC3SF11YVZAF*3 / PC3SF11YVZBF*2 / PC3SF13YVZBF*2	51
				Built-in zero-cross circuit	PC3SF21YVZAF*3 / PC3SF21YVZBF*2	52
	AC 200 V lines (VDRM = 800V)	0.1 A	General purpose		PC4SD11NTZBF*2 / PC4SD11NTZCF*1	51
				Built-in zero-cross circuit	PC4SD21NTZCF*1 / PC4SD21NTZDF	52
			Reinforced isolation	on	PC4SF11YVZAF*3 / PC4SF11YVZBF*2	51
				Built-in zero-cross circuit	PC4SF21YVZBF*2 / PC4SF21YVZCF*1	52

Minimum trigger current: *1 IFT \leq 5 mA, *2 IFT \leq 7 mA, *3 IFT \leq 10 mA



PHOTOTRIAC COUPLERS

B	Æ
Ro	HS

Phototriac	Couplers				- (): Ap	proved				(Ta = 25°C)
			Ap safet	proved y standa	by ards*4		Absolut	e maximum	n ratings	Electro-optical characteristics
Model No.	Internal connection diagram	Features	UL, CSA	VDE	Others	Package	ON-state current I⊤ (rms) (A)	Repetitive peak OFF-state voltage VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	$\begin{array}{l} \text{Min. trigger} \\ \text{current} \\ \text{IFT} \\ \text{(mA) MAX.} \\ \text{VD} = 6 \text{ V,} \\ \text{RL} = 100\Omega \end{array}$
S2S3000F		200 V lines, compact	0	○*6	-	Mini-flat	0.05	600	2 75	10
S2S5A00F		200 V lines, compact	0	○*6	-	4-pin	0.05	000	3.75	10
PC3ST11NSZAX		200 V lines, compact	0	○*6	-					10
PC3SH11YFZAX		200 V lines, compact, reinforced isolation	0	0	O*2	4-pin DIP	0.1	600	5.0	10
PC3SH13YFZAX		200 V lines, compact, reinforced isolation, high noise resistance	0	0	O*2					10
PC2SD11NTZAF*7		100 V lines	0	-	-			400		10
PC3SD12NTZAF*8		200 V lines	0	○*6	-			600		10
PC3SD12NTZBF		200 V lines	0	⊖*6	-			000		7
PC4SD11NTZBF		200 V lines, repetitive peak-OFF-state voltage	0	○*6	-			800		7
PC3SD11NTZCF		200 V lines	0	○*6	-			600		5
PC4SD11NTZCF		200 V lines, repetitive peak-OFF-state voltage	0	⊖*6	-	6-pin DIP* ^{1, 3}	0.1	800	5.0	5
PC3SF11YVZAF		200 V lines, reinforced isolation	0	0	O*2					10
PC3SF11YVZBF		200 V lines, reinforced isolation	0	0	O*2			600		7
PC3SF13YVZBF		200 V lines, reinforced isolation, high noise resistance	0	0	O*2					7
PC4SF11YVZAF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	0	0	○*2			800		10
PC4SF11YVZBF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	0	0	O*2			000		7

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

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PHOTOTRIAC COUPLERS

RoHS

■ Phototriac Couplers

(Built-in zero	o-cross circu	uit type)			– (): Ap	proved				(Ta = 25°C)	
			Ap safet	proved y standa	by ards*4		Absolut	e maximum	n ratings	Electro-optical characteristics	
Model No.	Internal connection dia- gram	Features	UL, CSA	VDE	Others	Package	ON-state current I⊤ (rms) (A)	Repetitive peak OFF-state VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	$\begin{array}{c} \text{Min. trigger} \\ \text{current} \\ \text{IFT} \\ \text{(mA) MAX.} \\ \text{VD} = 4 \text{ V,} \\ \text{RL} = 100\Omega \end{array}$	
S2S4000F	Zero-cross circuit	200 V lines, compact	0	○*6	-	Mini-flat 4-pin	0.05	600	3.75	10* ⁵	
PC3ST21NSZBX		200 V lines, compact	0	○*6	-	4-pin	0.1	600	5.0	7	
PC3SH21YFZBX		200 V lines, compact, reinforced isolation	0	0	O*2	DIP	0.1	600	5.0	7	
PC3SD21NTZAF		200 V lines, low zero-cross voltage: MAX. 20 V	0	○*6	-					10	
PC3SD21NTZBF		200 V lines, low zero-cross voltage: MAX. 20 V	0	⊖*6	-					7	
PC3SD21NTZCF*9		200 V lines, low zero-cross voltage: MAX. 20 V	0	⊖*6	-			600		5	
PC3SD23YTZCF		200 V lines, high pulse/noise resistance (TYP. 2 kV)	0	0	-					5	
PC3SD21NTZDF	Zero-cross circuit	200 V lines, low zero-cross voltage: MAX. 20 V	0	⊖*6	-	0 a ia				3	
PC4SD21NTZCF		200 V lines, repetitive peak-OFF-state voltage	0	○*6	-	6-pin DIP* ^{1, 3}	0.1	800	5.0	5	
PC4SD21NTZDF			200 V lines, repetitive peak-OFF-state voltage	0	○*6	-			800		3
PC3SF21YVZAF		200 V lines, reinforced isolation	0	0	O*2			600		10	
PC3SF21YVZBF		200 V lines, reinforced isolation	0	0	O*2			000		7	
PC4SF21YVZBF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	0	0	O*2	2			800		7
PC4SF21YVZCF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	0	0	O*2			000		5	

An equivalent model (IFT MAX.: 15 mA) with overseas brand compatibility is also available. (PC1S3021NTZF)

 1 Lead forming type for surface mounting is also available.
 *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 Vb = 6 V, RL = 100Ω
 *6 Optionally available
 *7 An equivalent model (IFT MAX.: 15 mA) with overseas brand compatibility is also available. (PC1S3052NT
 *9 An equivalent model with overseas brand compatibility is also available. (PC1S3063NT An equivalent model with overseas brand compatibility is also available. (PC1S3052NTZF) 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)



PC3ST series (4-pin DIP)



PC3SH series (4-pin DIP)

 Notice

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OPTO

SOLID STATE RELAY LINEUP

RoHS

■ Solid State	Relay Lineup				
Package	Applied voltage	ON-state current (rms)	Features	Model No.	Page
DIP 6-pin	AC 100 V lines	0.06 A	General purpose	PR22MA11NTZF	54
	AC 200 V lines	0.15 A	General purpose	PR31MA11NTZF / PR32MA11NTZF	54
DIP 8-pin	AC 100 V lines	0.3/0.6/0.9 A	General purpose	PR23MF11NSZF / PR26MF series / PR29MF series	54
		0.6/0.9 A	Built-in zero-cross circuit	PR26MF21NSZF / PR29MF21NSZF	54
	AC 200 V lines	0.3/0.6/0.9/1.2 A	General purpose	PR33MF51NSZF / PR36MF series / PR39MF series / PR3BMF51NSKF	54
		0.6/0.9/1.2 A	Built-in zero-cross circuit	PR36MF2 series / PR39MF2 series / PR3BMF21NSZF	54
SIP 4-pin	AC 100 V lines	2/8 A 3 to 16 A	General purpose	S102T01F*1 / S108T01F*1 / S101S05F / S102S01F / S112S01F / S116S01F	55
100		2/8 A 3 to 16 A	Built-in zero-cross circuit	S102T02F*1 / S108T02F*1 / S101S06F / S102S02F / S116S02F	55
Low profile		8 A	Built-in snubber circuit	S102S11F	55
		3/8 A	Built-in snubber circuit/ zero-cross circuit	S101S16F / S102S12F	55
, A	AC 200 V lines		General purpose	S202T01F*1 / S208T01F*1 / S202S01F / S212S01F / S216S01F	55
24 -		2/8 A 3 to 16 A	Built-in zero-cross circuit	S202T02F*1 / S208T02F*1 / S201S06F / S202S02F / S216S02F	55/56
		8/8 A	Built-in snubber circuit	S202S15F / S202S11F	56
		8 A	Built-in snubber circuit/ zero-cross circuit	S202S12F	56

*1 Low profile

Optoelectronics



SOLID STATE RELAYS

RoHS

■ Solid State Relays

<dip type=""></dip>): Appro	oved				(Ta = 25°C)
	Approved by safety standards*1 Absolute maximum r						ratings	Electrical characteristics		
Model No.	Internal connection diagram	Features	UL	CSA	VDE*2	Package	ON-state current I⊤ (rms) (A)	Repetitive peak OFF-state voltage VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	
PR31MA11NTZF		200 V lines, compact	0	0	0		0.06	600		10
PR22MA11NTZF		100 V lines, 150 mA model in a small package	0	0	0	6-pin DIP	0.45	400	5.0	10
PR32MA11NTZF		200 V lines, 150 mA model in a small package	0	0	0		0.15	600		10
PR23MF11NSZF		100 V lines, compact	0	0	-			400		10
PR33MF51NSZF		200 V lines, compact	0	0	0	-	0.3	600		10
PR26MF11NSZF		100 V lines, compact	0	0	-		0.0	400		10
PR26MF12NSZF		100 V lines, compact, low input current	0	0	-	-	0.6		-	5
PR29MF11NSZF		100 V lines, compact	0	0	-		0.0	400		10
PR29MF12NSZF		100 V lines, compact, low input current	0	0	-	-	0.9			5
PR36MF51NSZF		200 V lines, compact	0	0	0		0.6			10
PR36MF12NSZF		200 V lines, compact, low input current	0	0	0					5
PR39MF12NSZF		200 V lines, compact, low input current	0	0	0	8-pin		600	4.0	5
PR39MF51NSZF		200 V lines, compact	0	0	0	DIP	0.9			10
PR3BMF51NSKF		200 V lines, compact	0	0	0		1.2			10
PR26MF21NSZF		100 V lines, compact (built-in zero-cross circuit)	0	0	-	-	0.6	400		10
PR29MF21NSZF		100 V lines, compact (built-in zero-cross circuit)	0	0	-		0.9	400		10
PR36MF22NSZF		200 V lines, compact (built-in zero- cross circuit), low input current	0	0	0		0.6			5
PR39MF22NSZF	Zero- cross	200 V lines, compact (built-in zero- cross circuit), low input current	0	0	0		0.9			5
PR36MF21NSZF	Circuit	200 V lines, compact (built-in zero- cross circuit)	0	0	0		0.6	600		10
PR39MF21NSZF]	200 V lines, compact (built-in zero- cross circuit)	0	0	0		0.9			10
PR3BMF21NSZF		200 V lines, compact (built-in zero- cross circuit)	0	0	0		1.2			10

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



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OPTO

SOLID STATE RELAYS

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Ro	HS

<sip type=""></sip>	(1)			O: A	pproved,	∆: Under	application			(Ta =	25°C)
			Appro safety sta	ved by andards ^{*6}		Absolu	te maximum	n ratings	E cha	Electrica	al stics
Model No	Internal	Features			Package	ON-state	Repetitive	Isolation	Min. ti	rigger c	urrent
model No.	diagram	i ealures	UL	CSA	rackaye	current IT (rms) (A)	OFF-state voltage VDRM(V)	(AC) Viso (rms) (kV)	IFT (mA) MAX.	Vd (V)	R∟ (Ω)
S102T01F		100 V lines, low profile	0	0		2			8	12	30
S108T01F		100 V lines, low profile	-	-	Low profile	8*2			8	12	30
S102T02F		100 V lines, low profile (built-in zero-cross circuit)	0	0	4-pin SIP	2		3.0	8	12	30
S108T02F	Zero- cross circuit	100 V lines, low profile (built-in zero-cross circuit)	_	_		8*2			8	12	30
S101S05F		100 V lines	0	0		3* ³			15	12	30
S102S01F		100 V lines	0	0		8* ²			8	12	30
S112S01F		100 V lines	0	0		12*4		4.0	8	12	30
S116S01F		100 V lines	0	0		16* ⁵	400		8	12	30
S101S06F		100 V lines (built-in zero-cross circuit)	0	0	4-pin SIP	3* ³		3.0	15	6	30
S102S02F		100 V lines (built-in zero-cross circuit)	0	0		8* ²			8	6	30
S116S02F	circuit	100 V lines (built-in zero-cross circuit)	0	0		16* ⁵	-	4.0	8	6	30
S102S11F		100 V lines (built-in snubber circuit)	0	0	-	8* ¹			8	12	30
S101S16F		100 V lines (built-in snubber circuit, built-in zero-cross circuit)	0	0		3* ³		3.0	15	6	30
S102S12F	Zero- cross circuit	100 V lines (built-in snubber circuit, built-in zero-cross circuit)	0	0		8*1		4.0	8	6	30
S202T01F		200 V lines, low profile	0	0		2			8	12	30
S208T01F		200 V lines, low profile	-	_	Low profile	8*2		2.0	8	12	30
S202T02F		200 V lines, low profile (built-in zero-cross circuit)	0	0	4-pin SIP	2		3.0	8	12	30
S208T02F	Zero-	200 V lines, low profile (built-in zero-cross circuit)	-	_		8*2	600		8	12	30
S202S01F		200 V lines	0	0		8*2]		8	12	30
S212S01F		200 V lines	_	_	4-pin SIP	12*4]	4.0	8	12	30
S216S01F		200 V lines	-	-		16* ⁵			8	12	30

For the notes *1 to *6, see next page.

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SOLID STATE RELAYS

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l	Ro	HS

<sip type=""> (2)</sip>				\square \bigcirc : Approved, \triangle : Under application						(Ta = 25°C)			
			Approved by safety standards*6			Absolut	te maximum	ratings	Electrical characteristics				
Model No.	Internal connection diagram	Features	UL	CSA	Package	ON-state current I⊤ (rms) (A)	Repetitive peak OFF-state voltage VDRM(V)	Isolation voltage (AC) Viso (rms) (kV)	Min. tr IFT (mA) MAX.	VD (V)	urrent RL (Ω)		
S201S06F		200 V lines (built-in zero-cross circuit)	0	0		3* ³		3.0	15	6	30		
S202S02F	Zero-	200 V lines (built-in zero-cross circuit)	0	0		8* ²		4.0	8	6	30		
S216S02F	circuit	200 V lines (built-in zero-cross circuit)	-	-		16* ⁵			8	6	30		
S202S15F		200 V lines (built-in snubber circuit)	-	-	4-pin SIP	8* ²	600		15	12	30		
S202S11F	e-wile	200 V lines (built-in snubber circuit)	0	0		8*1			8	12	30		
S202S12F	Zero- cross circuit	200 V lines (built-in snubber circuit, built-in zero-cross circuit)	0	0		8*1		4.0	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.



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PHOTOINTERRUPTER LINEUP

RoHS

■ Photointerrupter Lineup

<Transmissive type>

Output type	Package type	Outline	Mounting method	Model No. (series)	Page
Single phototransistor	Compact	High resolution	PWB mounting type	GP1S396HCP0F/GP1S09xHCZ0F/ GP1S19xHCZ0F	58
High response speed			Surface-mount type/ Soldering reflow	GP1S396HCPSF/GP1S296HCPSF/ GP1S092HCPIF/GP1S19xHCxSF	58
	Case type	High resolution	PWB mounting type, etc.	GP1S5x series	59
		Horizontal slit, High resolution	PWB mounting type	GP1S59J0000F	59
	With connector	General purpose	Snap-in	GP1S173LCS2F/GP1S74PJ000F/ GP1S273LCS1F	59
Darlington phototransistor	Case type	General purpose	PWB mounting type, etc.	GP1L5x series	60
High sensitivity		Wide gap	PWB mounting type	GP1L57J0000F	60
Digital output	Compact	High voltage	PWB mounting type	GP1A98HCZ0F	60
(OPIC output)			Surface-mount type	GP1A98HCPSF	60
	Case type	High resolution	With screw hole/ PWB mounting type	GP1A5x series	61
		Wide gap	PWB mounting type	GP1A57HRJ00F	61
	With connector	General purpose	Screw mounting type/Snap-in	GP1A173LCS2F/GP1A173LCSVF/ GP1A273LCS1F/GP1A7x series/ GP1A07x series	62

<Reflective type>

Output type	Package type	Outline	Mounting method	Model No. (series)	Page
Single phototransistor	Leadless	Long focal distance	Surface-mount type	GP2S700HCP	62
High response speed	Compact, thin (leadless)	General purpose	Surface-mount type	GP2S60	62
OPIC output	With connector	Light modulation type, Sensitivity adjusted	Screw mounting type/ Compact snap-in/ Inverter light countermeasures	GP2A25 series/GP2A28 series/ GP2A200LCS0F/GP2A230LRS0F/ GP2A231LRSAF/ GP2A240LCS0F/GP2A250LCS0F	63

<Application-specific photointerrupter lineup>

Detection type	Outline (O	utput type etc.)	Mounting method	Model No. (series)	Page
Transmissive type	Case type With encoder function Digital 2 output (phase A/B)	Resolution: 45 LPI Linear scale slit pitch: 0.56 mm	PWB mounting type	GP1A057SGKLF	64
		Resolution: 150 LPI Linear scale slit pitch: 0.17 mm	PWB mounting type/	GP1A057RBKLF	64
	Resolution: 180 LPI Linear scale slit pitch: 0.14 mm		Screw mounting type	GP1A058SCK0F	64
		Resolution: 300 LPI Linear scale slit pitch: 0.0847 mm	PWB mounting type	GP1A054RDKLF	64
	Case type With encoder function Digital 2 output	Resolution for reading: 180 LPI Pitch: 0.14 mm	DMP mounting type	CD14104C2KSE	64
	For amusement use		Screw mounting	GP1A204HCS0	64
	Injection		g		
Reflective type	For prism system (Single	phototransistor)	Screw mounting	GP2S29SVJ00F	64
	For amusement use (Pag	chinko ball sensor)	-	GP2A222HCKA	65



PHOTOINTERRUPTERS (TRANSMISSIVE TYPE)

☆New product



(Ta = 25°C)

Photointerrupters

<Transmissive type>

Single phototransistor output

<Compact type>

						Elect	tro-optic	al char	acteris	tics	
	Internal	Features e	and	Slit width	Currer	nt transf	er ratio	Response time			
Model No.	connection diagram		emitting gap (mm)	(mm)	CTR (%) MIN.	lF (mA)	Vce (V)	tr (µs) TYP.	Ic (mA)	RL (kΩ)	Vce (V)
GP1S092HCPIF		Wide gap, for soldering reflow, surface mount compatible, with positioning boss $(4.5 \times 2.6 \times 2.9 \text{ [height] mm})$	2.0	0.3	2.0	5	5	50	0.1	1	5
GP1S093HCZ0F		Wide gap (4.5 \times 2.6 \times 2.9 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5
GP1S094HCZ0F		Wide gap, with positioning pin, $(5.5 \times 2.6 \times 4.8 \text{ [height] mm})$	3.0	0.3	0.8	5	5	50	0.1	1	5
GP1S096HCZ0F		Narrow gap ($3.5 \times 2.6 \times 2.9$ [height] mm)	1.0	0.3	2.0	5	5	50	0.1	1	5
GP1S194HCZ0F		Compact, wide gap, size: $3.6 \times 2.0 \times 2.7$ (height) mm	1.7	0.3	3.0	5	5	50	0.1	1	5
GP1S195HCZSF GP1S195HCPSF		Compact, wide gap, surface mount compatible, size: $3.4 \times 2.0 \times 2.7$ (height) mm	1.5	0.3	3.0	5	5	50	0.1	1	5
GP1S196HCZ0F		Compact, low profile (3.1 \times 2.0 \times 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 $(2.5 \times 1.8 \times 1.9 \text{ [height] mm})$	1.0	0.2	3.0	5	5	50	0.1	1	5
☆GP1S396HCP0F		Straight lead type, compact, low profile $(2.26 \times 1.4 \times 1.6 \text{ [height] mm})$	1.2	0.12	2.0	5	5	50	0.1	1	5
☆GP1S396HCPSF		Surface mount, for soldering reflow, compact, low profile (2.26 \times 1.4 \times 1.6 [height] mm)	1.2	0.12	2.0	5	5	50	0.1	1	5
GP1S097HCZ0F		High resolution, wide gap, with mounting hole $(4.5 \times 2.6 \times 4.5 \text{ [height] mm})$	2.0	0.3	2.0	5	5	50	0.1	1	5

* Topr: -25 to +85°C *** GP1SxxxHCZxF: Sleeve package, GP1SxxxHCPxF: Taped package



PHOTOINTERRUPTERS (TRANSMISSIVE TYPE)

RoHS

(Ta = 2	25°C)
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<case type=""></case>										(Ta = 2	25°C)		
			Detecting	Slit width (mm)	Electro-optical characteristics								
Model No.	Internal	Features e	and		Currer	nt transf	er ratio	Response time					
	diagram		emitting gap (mm)		CTR (%) MIN.	IF (mA)	Vce (V)	tr (µs) TYP.	Ic (mA)	R∟ (Ω)	Vce (V)		
GP1S50J0000F		High resolution, both-side mounting type	3.0	0.5	2.5	20	5	3	2	100	2		
GP1S51VJ000F		High resolution, side mounting type	3.0	0.5	2.5	20	5	3	2	100	2		
GP1S52VJ000F		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



<With connector>

		ſ			Electro-optical characteristics									
Model No.	Internal	Features er	and	Slit width (mm)	Currer	nt transf	er ratio	Response time						
	diagram		gap (mm)		CTR (%) MIN.	lF (mA)	Vce (V)	tr (µs) TYP.	Ic (mA)	Rι (Ω)	Vce (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)



(Ta = 25°C)

PHOTOINTERRUPTERS (TRANSMISSIVE TYPE)

RoHS

Darlington phototransistor output

<case type=""></case>										(Ta = 2	25°C)	
			Detecting and	Slit width	Electro-optical characteristics							
	Internal	Fastures			Currer	nt transf	er ratio	Response time				
	connection diagram	Features		(mm)	CTR (%) MIN.	lF (mA)	Vce (V)	tr (µs) TYP.	Ic (mA)	R∟ (Ω)	Vce (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	│ ▲ E < Ĺ	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

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



♦ OPIC type ("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.)

<compact th="" ty<=""><th>pe></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>(Ta =</th><th>25°C)</th></compact>	pe>										(Ta =	25°C)		
			Detecting	Slit width (mm)	Electro-optical characteristics									
	Internal	Features	and		Threshold input current			Propagation delay time						
Model No.	connection diagram		emitting gap (mm)		IFLH (mA) MAX.	IFHL (mA) MAX.	Vcc (V)	tpLH (µs) TYP.	tрн∟ (µs) TYP.	lF (mA)	R∟ (kΩ)	Vcc (V)		
GP1A98HCZ0F	Voltage regulator Amplifier	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		
GP1A98HCPSF		Compact, surface mount	3.2	0.5	8	-	3.3 to 24	2.0	10.0	10	3.9 to 20	3.3 to 24		

Common of themes



<Case type>

Model No.

GP1A50HRJ00F

GP1A51HRJ00F

GP1A52HRJ00F

GP1A53HRJ00F

GP1A57HRJ00F

GP1A58HRJ00F

GP1A52LRJ00F

PHOTOINTERRUPTERS (TRANSMISSIVE TYPE)

									(Ta = 2	5°C)			
	Detecting	Slit width (mm)	Electro-optical characteristics										
Features	and emitting gap (mm)		Thresho	old input c	urrent	Propagation delay time							
			IFLH (mA) MAX.	IFHL (mA) MAX.	Vcc (V)	tplh (µs) TYP.	t₽н∟ (µs) TYP.	lf (mA)	R∟ (Ω)	Vcc (V)			
Both-side mounting, with screw hole	3.0	0.5	5	_	5	3	5	5	280	5			
Side mounting, with screw hole	3.0	0.5	5	-	5	3	5	5	280	5			

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ŧ	Topr	= -25	to	+85°	°C



Voltage regulato

Internal

connection

diagram

PWB mounting type

PWB mounting type

PWB mounting type,

with positioning pin PWB mounting type,

with positioning pin

PWB mounting type

Notice



GP1A52LRJ00F (GP1A52HRJ00F)

3.0

5.0

10.0

5.0

3.0

0.5

0.5

1.8

0.5

0.5

5

8

7

8

_

GP1A53HRJ00F GP1A58HRJ00F with positioning pin



RoHS

GP1A57HRJ00F

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PHOTOINTERRUPTERS (TRANSMISSIVE TYPE)/(REFLECTIVE TYPE)

RoHS

(Ta = 25°C)

◆OPIC type ("OPIC" (light-det

(Optical IC) is a trademark of SHARP Corporation. An OPIC co	onsists of a	۱
ecting element and signal-processing circuit integrated onto a	single chip.	/

<With 3-pin connector terminal>

				Detecting		Electro-optical characteristics								
	Internal			and	Slit width	Supply voltage		Lo	Low level output voltage					
Model No. connection diagram		Features		emitting gap (mm)	(mm)	VCC (V) MIN. MAX.		Vol (V) MAX.	Light cut-off	lo∟ (mA)	Vcc (V)			
GP1A173LCS2F			Snap-in mounting integrated connector type*1	5.0	0.5	4.5	5.5	0.35	No	4	5			
GP1A173LCSVF	Voltage		Snap-in mounting integrated connector type*1	5.0	0.5	4.5	5.5	0.35	No	4	5			
GP1A273LCS1F	Amplifier	nector	Integrated connector, compatible with 1.5 mm pitch connector, snap- in mounting type*1	5.0	0.7	4.5	5.5	0.35	No	4	5			
GP1A73AJ000F		oin con	Compact, snap-in mounting type*1	5.0	0.5	4.5	5.5	0.35	No	4	5			
GP1A073LCS		vith 3-	Compact, snap-in mounting type*1, low voltage operation	5.0	0.5	2.7	5.5	0.35	No	4	3			
GP1A75EJ000F	Voltage regulator Amplifier		Either-side mounting type Screw mounting type	5.0	0.5	4.5	5.5	0.35	Yes	16	5			

* Topr: -20 to +75°C, -30 to +95°C (GP1A173LCS2F, GP1A173LCSVF, GP1A273LCS1F)

*1 Applicable to 3 kinds of thickness of mounting boards.



Photointerrupters

<Reflective type>

Single phototransistor output

<Compact>

	<compact></compact>			_						(Ta =	25°C)		
				Standard	d Electro-optical characteristics								
	Model No	Internal	Features	detecting	Curre	ent transfe	Response time						
	d	diagram			CTR (%)	IF	VCE	tr (µs)	Ic	RL	VCE		
_		-		(((((((((((((((((((((((((((((((((((((((MIN.	(mA)	(V)	TYP.	(mA)	(kΩ)	(V)		
	GP2S700HCP	* 5	Compact (4 \times 3 \times 2 [height] mm), long focal distance, surface mounting leadless type	3	1.5	4	2	20	0.1	1	2		
	GP2S60	<u> </u>	Thin (3.2 \times 1.7 \times 1.1 [height] mm), surface mounting leadless type	0.5	1.0	4	2	20	0.1	1	2		

* Topr: -25 to +85°C



Notice

PHOTOINTERRUPTERS (REFLECTIVE TYPE)

RoHS

♦OPIC output	("OPIC" (Optical IC) is a trademark of SHARP Corporation. An OPIC consists of a
• Of 10 output	 Ignt-detecting element and signal-processing circuit integrated onto a single chip.

<With 3-pin connector terminal>

<with 3-pin="" c<="" th=""><th>onnecto</th><th>r terminal></th><th></th><th></th><th></th><th></th><th></th><th>Τ)</th><th>ā = 25°C)</th></with>	onnecto	r terminal>						Τ)	ā = 25°C)		
			Ontimum	Electro-optical characteristics							
	Internal		detecting	Supply voltage		Dissipatio	on current	Low level output voltage			
Model No.	connection diagram	reatures c		(V) (V) MIN. MAX.		Icc (mA) MAX.	Vcc (V)	Vol (V) MAX.	Vcc (V)		
GP2A200LCS0F		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	(Following	Applicable to inverter fluorescent lamp, light modulation type, with connector, sensitivity adjusted	5 to 15	4.75	5.25	30* ¹	5	0.4	5		
GP2A250LCS0F	diagram [A])	Static electricity resistant, applicable to inverter fluorescent lamp, light modulation type, with connector, sensitivity adjusted	2.5 to 12.5	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		
GP2A230LRS0F	(Following	Compact, hook type (GP2A231LRSAF),	2 40 7	4.75	5.05	20*1	F	0.4	-		
GP2A231LRSAF	diagram [B])	with connector	3 10 7	4.75	5.25	2011	5	0.4	5		
GP2A25NJJ00F	(F _1),	Multi types of paper detectable, light modulation type, sensitivity adjusted, improved light-resistance characteristic for inverter lighting, built-in visible light cut filter	3 to 7	4.75	5.25	30* ¹	5	0.4	5		
GP2A25DJ000F	diagram [A])	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, GP2A230LRS0F, GP2A231LRSAF)

*1 Smoothing value R L = ∞



PIO PHOTOINTERRUPTERS FOR SPECIFIC APPLICATIONS

Photointerrupters for Specific Applications

♦Transmissive type

<Case type, with encoder function>

	Absolute m	aximum ratings		Electro-optical characteristics									
Madal Na		_	Operating		Response								
Model No.	Vcc (V)	Topr (°C)	voltage Vcc (V) TYP.	Output signal	Resolution	f (kHz) MAX.	IF (mA)	current (output side) Icc (mA) MAX.					
GP1A057RBKLF	6	-10 to +70	3.3		Linear scale slit pitch 0.17 (mm) (150LPI)	60	20	7					
GP1A054RDKLF	6	-10 to +70	3.3	Digital 2 output	Linear scale slit pitch 0.0847 (mm) (300LPI)	40	20	5.5					
GP1A057SGKLF	6	-10 to +70	3.3	(Phase A/B)	(Phase A/B)	(Phase A/B)	(Phase A/B)	(Phase A/B)	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					
GP1A101C2KSF	6.5	-10 to +70	3.3	Digital 2 output (Multiplying output)	Resolution for reading: 180 LPI (Pitch: 0.14 mm) Output resolution: 360 LPI	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°



GP1A054RDKLF





GP1A101C2KSF



GP1A058SCK0F

(Ta = 25°C)

RoHS

(Ta = 25°C)

<For amusement use>

			Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics							
Model No.	Internal connection diagram	Features			Operating voltage Vcc (V)		Low level output voltage					
					MIN.	MAX.	Vol (V) MAX.	Light cut-off	lo∟ (mA)	Vcc (V)		
GP1A204HCS0	Voltage regulator	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		



♦Reflective type <Case type, phototransistor output>

 $(Ta = 25^{\circ}C)$

Model No. Internal connection diagram Features Peak photocurrent Response time ICP (mA) IF VCE (tr (μs)) IC (mA) (kΩ) GP2S29SVJ00F I Long focal distance (with prism system*1), compared pergeumpering time time. 0.4 to compared pergeumpering time. 20 5 38 0.5 1				Electro-optical characteristics								
Index rectified I control of the co	Model No.	Internal	Features	Pea	k photocur	rent	Response time					
GP2S29SVJ00F Long focal distance (with prism system*1), 0.4 to 20 5 38 0.5 1		diagram		Iср (mA)	lF (mA)	Vce (V)	tr (µs) TYP.	Ic (mA)	R∟ (kΩ)	Vce (V)		
ty compact, screw mounting type 5.0 °	GP2S29SVJ00F	₩ 4	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.





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PHOTOINTERRUPTERS FOR SPECIFIC APPLICATIONS / PROXIMITY SENSOR

RoHS

(Ta = 25°C)

<For amusement use>

		Electro-optical characteristics					
Model No.	Features	Supply voltage Vcc (V)	Dissipation current Icc (mA)	Response frequency f (Hz)			
GP2A222HCKA	Employs reflective type, pinball detector, connector with lock In conjunction with an IC, detects beam interruption*1	4.5 to 16.5	MAX. 10	MAX. 500			

*1 Used together with interface IC for control (IR3N184)



■ Proximity Sensor

•	•							(20 0)	
		Absolute max	kimum ratings	Electro-optical characteristics					
Model No.	Features	Vcc (V)	Topr (°C)	Dissipation current Icc (µA) TYP.	Detecting distance Lon (mm) MIN.	Non- detecting distance Loff (mm) MAX.	Maximum acceptable illuminance Ev (lx) MIN.	Peak emission wavelength λp (nm)	
GP2AP002S00F	Compact size $(4.0 \times 2.0 \times 1.25 \text{ t mm})$ Disparities in detecting distance results are greatly reduced using a built-in circuit for reduction of light-detecting sensitivity disparities Built-in LEDs for simple optical design and I ² C output	3.8	-25 to +85	240	25	150	3 000	940	

 Notice

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OPTO PROXIMITY SENSOR WITH INTEGRATED AMBIENT LIGHT SENSOR

☆New product

RoHS

Proximity Sensor with Integrated Ambient Light Sensor

(Ta = 25°C)

		Absolute maxi- mum ratings		Electro-optical characteristics									
			Topr (°C)	Dissipa- tion current Icc (µA) TYP.	Proximity sensor portion Ambient light sensor portion								
Model No	Features				Detecting	Non-	Maximum	Peak	Recom-	Peak	Output current		
Model No.		Vcc (V)			distance Lon (mm) MIN.	detecting distance Loff (mm) MAX.	acceptable illuminance Ev (lx) MIN.	emission wave- length λp (nm)	illuminance range Ev (lx) MIN.	sensitivity wave- length λp (nm)	lo1 (μΑ) TYP.	lo2 (μΑ) MAX.	
GP2AP002A00F	LED and ambient light sensor combined in a single package $(5.6 \times 2.1 \times 1.25 \text{ tmm})$ Disparities in detecting distance results are greatly reduced using a built-in circuit for reduction of light-detecting sensitivity disparities Built-in LEDs for simple optical design Proximity sensor: I ² C output Ambient light sensor: logarith- mic current output	3.8	-25 to +85	270	25	150	3 000	940	3 to 55 000	555	30 (at Ev = 1 000 lx)	1 (at Ev = 0 lx)	

									(Ta = 25°C)	
		Absolute maximum ratings		Electro-optical characteristics						
					Proximity se	nsor portion	Ambien	t light sensor	portion	
Model No.	Features	Vcc (V)	Topr (°C)	Dissipation current lcc (µA) TYP.	Detecting distance Lon (mm) MIN.	Peak emission wavelength λp (nm)	Recom- mended illuminance range Ev (lx)	Output resolution (bit)	ADC conversion time Tint (ms) TYP.	
☆GP2AP020A00F	LED and ambient light sensor combined in a single package $(4.0 \times 2.0 \times 1.25 \text{ t mm})$ Built-in LEDs for simple optical design Illuminance output: digital 16-bit output (Minimum detectable illuminance: 0.02 lx) I ² C output compatible (proximity sensor, ambient light sensor)	3.8	-35 to +85	70	45.5	940	0.2 to 131 072	16	100	



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AMBIENT LIGHT SENSORS

■ Ambient Light Sensors

Ambient	TAMBIENT LIGHT SENSORS (Ta = 25°C)										
			Absolute	maximu	m ratings		Electro-	optical chara	acteristics		
Model No.	Туре	Package	Vcc (V)	lo (mA)	Topr (°C)	Recommended supply voltage Vcc (V)	Recommended illuminance range Ev (Ix)	Dissipation current Icc (µA) TYP.	Peak sensitivity wavelength λp (nm)	Output Io1 (µA) TYP.	lo2 (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	$\begin{array}{l} \text{Compact SMD} \\ (2.0 \times 1.6 \\ \times 0.6 \text{ mm}) \\ \text{Leadless} \end{array}$	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	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Logarithmic current output for illuminance Thin type	Compact SMD (2.0×1.6 $\times 0.42$ 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)
GA1A1S204WP	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Logarithmic current output for illuminance Back-mount-available type	$\begin{array}{l} \text{Compact SMD} \\ (3.3 \times 2.0 \\ \times \ 0.6 \text{ mm}) \\ \text{Back-mount} \\ \text{available,} \\ \text{leadless} \end{array}$	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 SMD ($2.0 \times 1.6 \times 0.6 \text{ mm}$) Leadless	7.0	10	-40 to +85	2.7 to 3.6	10 to 5 000	1 460	555	1 420 (at Ev = 1 000 lx)	142 (at Ev = 100 lx)

GA1A2S100SS



GA1A2S100LY



GA1A1S202WP (GA1A1S100WP)



GA1A1S203WP

GA1A1S204WP





OPIC LIGHT DETECTORS

RoHS

 $(Ta = 25^{\circ}C)$



■ OPIC Light Detectors ("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.) (Ta = 2													= 25°C)	
			Absol	ute max	kimum ra	atings	Electro-optical characteristics							
Model No.	Туре	Package	Vcc (V)	P (mW)	lo (mA)	Toor	EVLH	EVHL		tplh tphl				
						(°C)	(lx) MAX.	(Ix) MAX.	Vcc (V)	(µs) TYP.	(µs) TYP.	Vcc (V)	E∨ (Ix)	RL (Ω)
IS485E	Built-in schmidt trigger	Transparent	-0.5 to +17	175	50	-25 to +85	-	35	5	5	3	5	50	280
IS486E circuit, amplifier a voltage regulator	GE circuit, amplifier and solution of the second se	nd epoxy resin with condenser (lens)	-0.5 to +17	175	50	-25 to +85	35	_	5	3	5	5	50	280



<Low-voltage operation>

	• •												(,
			Absolute maximum ratings			Electro-optical characteristics								
Model No.	Type	Package	ь	10	Toor	Operating	EVLH EVHL		t PHL	t PLH				
	iype		(mW)	(mA)	(°C)	supply voltage (V)	(Ix) MAX.	(lx) MAX.	Vcc (V)	(µs) TYP.	(µs) TYP.	Vcc (V)	E∨ (Ix)	RL (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



<Model employing a light modulation system>

<model a="" employing="" light="" modulation="" system=""></model>											(Ta = 25°C)			
		Package	Absolute maximum ratings				Electro-optical characteristics*2					External		
Model No	Type		Vcc (V)	Б	/) Io (mA)	Topr (°C)	Vol	Vон	t PLH	t PHL			disturbing light	
	туре			(mW)			(V) MAX.	(V) MIN.	(µs) TYP.	(µs) TYP.	Vcc (V)	RL (Ω)	illuminance Evox(Ix) TYP.	
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	

 $\mathsf{IS471FE}$ is less susceptible to disturbing effects thanks to the light modulation system

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



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OPIC LIGHT DETECTORS

RoHS

(Ta = 25°C)

<for beam="" laser="" printers<="" th=""><th>(laser beam origin dete</th><th>ection)></th></for>	(laser beam origin dete	ection)>
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			Electro-optical characteristics							
Model No.	Tura	Deskawa	Recommended supply	Vон	Voi	$H \rightarrow L$ delay time variation				
	Туре	Раскаде	voltage Vcc (V)	(V) MIN.	(V) MAX.	∆tphl (ns) MAX.				
GA220T2L2IZ	2-PD, differential type	Transparent epoxy resin 18-pin	4.5 to 5.5	4.9	0.6	±8.5				



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PHOTOTRANSISTOR LINEUP



■ Phototransistor Lineup

			Half	Mod	el No.
Package	Output type	Features	sensitivity angle	Standard	Visible light cut-off
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		Compact			
leadless type	Single phototransistor	(side view/top view mounting possible)	±15°	PT100MC0MP	PT100MF0MP
	Darlington	Compact			
	phototransistor	(side view/top view mounting possible)	±15°	—	PT100MF1MP

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

RoHS

Phototransistors

a)			Absolu	ute maxin	num ratings		lc (ı	mA)		ICEO(A)		Δθ	λρ
Type	Model No.	Package	Vceo (V)	Pc (mW)	Topr (°C)	MIN.	MAX.	Vce (V)	Ee (mW/cm ²)	MAX.	Vce (V)	(°) TYP.	(nm) TYP
-	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		35	75	-25 to +85	0.4	TYP. 1.7	5	1	1 × 10 ⁻⁷	20	±13	800
Single	PT480FE0000F*1	Epoxy resin with lens	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
	PT481E00000F	_	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
ngton	PT4810FJE00F*1▲	Epoxy resin with lens	35	75	-25 to +85	0.27	6.0	2	0.1	1 × 10 ⁻⁶	10	±35	860
Darlir	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
	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

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PIN	PHO	TOD	IODES

RoHS

■ PIN Photodiodes

Ta = 25°C)												
Model No.	Features	Package (Material)	Active area (mm ²)	Topr (°C)	lsc (μΑ) MIN.	Ev (lx)	ld (A) MAX.	Vr (V)	tr, tf (μs) TYP.	Vr (V)	RL (kΩ)	λp (nm) TYP.
PD410PI2E00F		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	PIN type	Transparent epoxy resin with condenser (lens)	3.31	-25 to +85	5.0	100	1 × 10 ⁻⁸	10	0.2	10	1	960
PD412PI2E00F		Transparent epoxy resin with condenser (lens)	3.31	-25 to +85	3.5	100	1 × 10 ⁻⁸	10	0.25	10	1	800
PD413PI2E00F	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
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	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

PD410PI2E00F PD411PI2E00F: transparent; PD412PI2E00F: transparent, PD413PI2E00F



PD100MC0MP (PD100MF0MP: black)

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INFRARED EMITTING DIODE LINEUP / INFRARED EMITTING DIODES

RoHS

■ Infrared Emitting Diode Lineup

Туре	Package	Feat	ures	Half intensity angle	Model No.
Single-end lead	Epoxy resin with lens	General purpose/Narrow bear	m angle	±13°	GL480E00000F
(Side view type)					
		Compact and thin		±30°	GL4800E0000F
	Flat epoxy resin	Wide beam angle		±90°	GL4100E0000F▲
	Enour rooin with long/				
Surface mount type	leadless	Compact/Narrow beam angle		±10°	GL100MN0MP
	(Mountable for Top view/				
	Side view type)		High output type	±10°	GL100MN1MP
		Compact/Wide beam angle		±80°	GL100MD1MP1

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

■ Infrared Emitting Diodes

	mitting Diodes											(Ta :	= 25°C)
	Package, features	Absolute maximum ratings			Radia	nt flux Фе	e (mW)		VF (V)		Δθ	λρ	
Model No.		l⊧ (mA)	Vr (V)	P (mW)	Topr (°C)	MIN.	TYP.	IF (mA)	TYP.	MAX.	IF (mA)	(°) TYP.	(nm) TYP.
GL480E00000F	novy resin with lens	50	6	75	-25 to +85	0.7	-	20	1.2	1.4	20	±13	950
GL4800E0000F	Epoxy resin with tens	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
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
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

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

GL100MN0MP (GL100MN1MP, GL100MD1MP1) GL480E00000F GL4800E0000F GL4100E0000F▲

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OPTICAL-ELECTRIC SENSOR LINEUP

RoHS

■ 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 d	cm)	GP2Y0D21YK0F
	20 to 150 cm	1-bit digital output (detected distance: 80 d	cm)	GP2Y0D02YK0F
		Battery drive compatible, compact, 1-bit digital output (detected distance: 5/10) cm)	GP2Y0D805Z0F/GP2Y0D810Z0F
			Wide operating temperature type (-40 to +85°C) (detected distance: 10 cm)	GP2Y0D810Z1F
		Compact, thin 1-bit digital output (detected distance: 10/4	40 cm)	GP2Y0D310K/GP2Y0D340K
		Battery drive compatible, compact, 1-bit digital output (detected distance: 1.5 Capable of operation at high temperature	cm) (–30 to +105°C)	GP2Y5D91S00F
Analog voltage output according to distance				
measuring	2 to 15 cm	Analog output		GP2Y0A51SK0F
	4 to 30 cm	Analog output		GP2Y0A41SK0F
	10 to 80 cm	Analog output		GP2Y0A21YK0F
	10 to 150 cm	Compact (22 \times 8 \times 7.2 [T] mm), Analog output		GP2Y0A60SZ0F/GP2Y0A60SZLF
	20 to 150 cm	Analog output		GP2Y0A02YK0F
	100 to 550 cm	Analog 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

■ 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

■ 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

■ Dust Sensor Unit Lineup

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

DISTANCE MEASURING SENSORS

■ Distance Measuring Sensors (1)

♦Digital output

		Absolute max	kimum ratings	Electro-optical characteristics*1					
Model No.	Features	Vcc (V)	Topr (°C)	Detected distance (cm)	Distance measuring range (cm)	Voн (V) MIN.	Vol (V) MAX.	Dissipatio Operating (mA)	n current Standby (µA)
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	24	10 to 80	Vcc -0.3	0.6	MAX. 40	-
GP2D150AJ00F	Distance measuring sensor united with PSD*, infrared LED and signal processing circuit, digital voltage output	-0.3 to +7	-10 to +60	15	4 to 30	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	13	4 to 30	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	80	20 to 150	Vcc -0.3	0.6	MAX. 50	-

* PSD: Position Sensitive Detector

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(Ta = 25°C)

DISTANCE MEASURING SENSORS

RoHS

(Ta = 25°C)

■ Distance Measuring Sensors (2)

Analog output

		Absolute max	kimum ratings	E	Electro-optical cl	naracteristics*1	
Model No.	Features	Vcc (V)	Topr (°C)	Distance measuring range	Voн (V) MIN	Vol (V) MAX	Dissipation current Operating
				(cm)			(mA)
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	Vo (TYP:) (at L = 8) ∆Vo (TYP) (at L: 80 cm) = 0.4 V 80 cm), 2) = 1.9 V n → 10 cm)	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	Vo (TYP.) (at L = 3 ∆Vo (TYP.) (at L = 30 c) = 0.4 V 80 cm),) = 2.25 V m → 4 cm)	MAX. 22
GP2Y0A51SK0F	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	2 to 15	Vo (TYP.) (at L = 1 ∆Vo (TYP.) (at L = 15 c) = 0.4 V 15 cm),) = 2.25 V m → 2 cm)	TYP. 12
2 GP2Y0A60SZ0F/ GP2Y0A60SZLF	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	Vo (TYP.) (at L = 1 ∆Vo (TYP (at L = 150 ct	= 0.65 V *3 50 cm), !) = 3.0 V m \rightarrow 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	Vo (TYP.) (at L = 1 ∆Vo (TYP.) (at L = 150 c) = 0.4 V 50 cm),) = 2.05 V m → 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	Vo (TYP.) (at L = 1 ∆Vo (TYP (at L = 100 cn) = 2.5 V 00 cm), !) = 0.7 V n → 200 cm)	TYP. 30
*1 Vcc = 5 V					* PS	D: Position Sen	sitive Detector

*1 Vcc = 5 V

*2 GP2Y0A60SZ0F: Surface mount type

GP2Y0A60SZLF: Board insertion type

*3 When Vcc = 3 V: Vo (TYP.) = 0.35 V (at L = 150 cm); Δ Vo (TYP.) = 1.6 V (at L = 150 cm \rightarrow 20 cm)



WIDE ANGLE SENSORS / PAPER SIZE SENSORS / **HIGH-PRECISION DISPLACEMENT SENSOR**

Wide Angle Sensors

		Absolute max	timum ratings	Electro-optical characteristics					
			_	Distance	Output	Output	Input vo	tage (V)	
Model No.	Features	Vcc	c Topr measuring terminal voltage (°C) range voltage difference VINH LEDL (cm) (V) (V)						
		(V)		range	voltage	difference	VINH	LEDL	
				(only	(•)	(•)			
GP2Y3A001K0F	Distance measuring sensor united with PSD*,	-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	infrared LED and signal processing circuit, distance measuring sensor application product.	-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	wide range (field of view) detection using 5 infrared beams	-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 = 4 cm *4 Change in output voltage from L = 4 cm to 10 cm L = 20 cm *5 Change in output voltage from L = 20 cm to 80 cm

- *1 L = 4 cm
- *2 L = 20 cm *3 L = 40 cm

 - *6 Change in output voltage from L = 40 cm to 100 cm





GP2Y3A002K0F



Paper Size Sensors

•								(14 - 20 0)
Model No.	Features	Operating temperature	Supply voltage	Paper detection height	LED beam pitch	Approved value of paper position sliding	Paper detection density	Dissipation current
		Topr (°C)	Vcc (V)	H (mm)	Lp (mm)	Δx (mm)	OD	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



High-Precision Displacement Sensor

■ nign-Pre	Inigh-Precision Displacement Sensor										
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)					



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 $(T_2 - 25^{\circ}C)$

L = Reflector - Sensor distance

RoHS



DUST SENSOR UNIT / COLOR TONER CONCENTRATION SENSORS

(Ta = 25°C)

Dust Sensor Unit

			Electro-optical characteristics							
Model No.	Features	Topr (°C)	Operating supply voltage (V)	Dissipation current (mA)	Detection sensitivity V/(0.1 mg/m ³)	Output voltage at no dust Voc (V)	Output voltage range Voн (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			



Color Toner Concentration (Deposition Amount) Sensors

(Ta = 25°C)

	Topr _	Electro-optical characteristics					
Model No.	Features	(°C)	Dissipation current*1 (mA)	Output voltage*2 Vo1 (V)	Output voltage*2 Vo2 (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		

*1 Dissipation current with LED current of IFM = 0 mA

*2 With reflection object A (Reflectance: 15.6%)







FIBER OPTICS LINEUP FOR AUDIO EQUIPMENT

RoHS

Fiber Optics Lineup for Audio Equipment

					High speed signal transmission 'izontal unting type MAX. 13.2 Mb/s MAX. 15.5 Mb/s MAX. 15.5 Mb/s 'izontal unting type MAX. 13.2 Mb/s MAX. 15.5 Mb/s MAX. 15.5 Mb/s tical unting type MAX. 13.2 Mb/s unting type MAX. 13.2 Mb/s MAX. 15.5 Mb/s MAX. 13.2 Mb/s tical unting type MAX. 13.2 Mb/s rizontal unting type MAX. 13.2 Mb/s mAX. 15.5 Mb/s MAX. 13.2 Mb/s rizontal unting type MAX. 13.2 Mb/s MAX. 15.5 Mb/s MAX. 15.5 Mb/s	Mod	el No.
Connector type	Туре	Outline	Featu	ires	transmission	Model N Supply voltage 3 to 5 V GP1FSV31TK0F GP1FSV31TK0F (mounting height: 15 mm) GP1FSB31TK0F (mounting height: 8.5 mm) K. 13.2 Mb/s GP (mounting height: 8.5 mm) K. 13.2 Mb/s GP (S. 13.2 Mb/s) GP (S. 13.2 Mb/s) GP1FAV30TK0F GP (K. 13.2 Mb/s) GP (S. 13.2 Mb/s) GP1FAV30TK0F GP (K. 13.2 Mb/s) GP (S. 13.2 Mb/s) GP1FAV31RK0F GP (K. 13.2 Mb/s) GP (S. 13.2 Mb/s) GP1FAV31RK0F GP (K. 13.2 Mb/s) GP (S. 13.2 Mb/s)	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	
		With mounting hole	With shutter	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV51TK0F*1
					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) GP1FSB31TK0F (mounting height: 8.5 mm)	
			With protection cap	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV50TK0F*1
					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	
			With protection cap	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FAV50RK0F
					MAX. 15.5 Mb/s	GP1FAV30RK0F	

*1 TTL drive compatible

				High speed signal	Model No.
Connector type	Туре	Outline	Features	transmission	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. 25 Mb/s	GP1FD320TP0F

(JIS C 6650)



FIBER OPTIC TRANSMITTERS (Square Connector) / FIBER OPTIC TRANSMITTERS (ø3.5 mm Optical Mini-jack) / FIBER OPTIC RECEIVERS (Square Connector)

(Ta = 25°C)

RoHS

■ Fiber Optic Transmitters (Square Connector)

	Appea	arance		Absolute max	kimum ratings		Electr	o-optic	al characte	eristics	
Model No.	Mounting	-	Features	Vcc	Topr	Supply	Propa delay	gation time	Dissipation current	Pulse width	Transmis- sion speed
	hole	Shutter		(V)	(°C)	voltage (V)	tPLH (ns) MAX.	tPHL (ns) MAX.	Icc (mA) MAX.	distortion ∆tw (ns)	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
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)	-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)	-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
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

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

Notice

(Ta = 25°C)

(Ta = 25°C)

		Abs	olute maximum rat	ings	Electro-optical characteristics					
Model No.	Features	Vcc (V)	Vin (V)	Topr (°C)	Supply voltage (V)	Propagation delay time tPLH tPHL (ns) (ns) MAX MAX		Dissipation current Icc (mA) MAX.	Pulse width distortion ∆tw (ns)	Transmis- sion speed T (Mb/s) MAX.
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

■ Fiber Optic Receivers (Square Connector)

	Appea	arance		Absolute r	maxim	um ratings		Elec	tro-opti	ical charac	teristics	
Model No	Mounting		Features			Topr	Supply	Propagatic delay time		Dissipation current	Pulse width	Transmis- sion speed
	hole	Shutter		Vcc (V)	(mA)	(°C)	voltage (V)	tPLH (ns) MAX.	tPHL (ns) MAX.	Icc (mA) MAX.	distortion ∆tw (ns)	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

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SURFACE MOUNT LEDs

RoHS

■ High	High-Luminosity (AlGaInP) Surface Mount LEDs (Taped Models Only)													
_	R	esin	typ ∑	e	JE		ZVJV	′	JS		JJ		ZRJF	2
Outline dimensions (mm)	Colored diffusion	Colored transparenc	Colorless transparer	Milky diffusion	Yellow-green	Luminous intensity (mcd) TYP.	Amber	Luminous intensity (mcd) TYP.	Sunset orange	Luminous intensity (mcd) TYP.	Orange	Luminous intensity (mcd) TYP.	Red	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	13	GM1JV55200AE*1	16.8	GM1JS55200AE	20.9	GM1JJ55200AE	19	GM1JR55200AE	15
3.2 × 2.8 (t = 1.9)			•		-	-	GM5ZV96270A	600	-	-	-	-	GM5ZR96270A	600

*1 GM1JV35200AE series, GM1JV55200AE series: IF = 5 mA

High-Luminosity (InGaN) Surface Mount LEDs (Taped Models Only)



Notice

Surface Mount LEDs (Taped Models Only)



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HIGH-LUMINOSITY WHITE SURFACE MOUNT LEDs / HIGH-LUMINOSITY SURFACE MOUNT LEDs (RGB 3-COLOR)

☆New product



 $(Ta = 25^{\circ}C^{*5})$

■ High-Luminosity White Surface Mount LEDs (Taped Models Only)

Outling	Color	E	BW		BN			
dimensions	coordinates	V V	/hite		High rendering color			
(mm)	TYP.		Luminous intensity (mcd) TYP.	Color temperature (K) TYP.		Luminous intensity (mcd) TYP.	Color temperature (K) TYP.	
2.8 × 1.2 (t = 0.8)	(0.20, 0.20)	GM4BW853A0A*1	1 900	-	_	-	-	
Side view type	(0.30, 0.29)	GM4BW853B0A*1	2 200	-	_	intensity (mcd) TYP. temperat (K) TYP - - - - - - - - - - - - - - - - - - - - - - - - 653C0A*1.4 1 700 - - - - - - -	-	
3.85 × 1.0 (t = 0.6) Side view type	(0.20, 0.20)	GM4BW653A0A*1	1 900	-	_	-	-	
	(0.30, 0.29)	GM4BW653B0A*1	2 200	-	_	-	-	
	(0.29, 0.28)	-	-	-	GM4BN653C0A*1, 4	1 700	-	
	(0.31, 0.31)	GM5BW96382A*1	2 300	-	_	-	-	
	(0.34, 0.36)	GM5BW96385A*1	2 600	-	_	-	-	
	(0.29, 0.28)	GM5BW96387A*1	2 000	-	_	-	-	
3.2 × 2.8 (t = 1.9)	(0.338, 0.365)	GM5BW97330A*2	6 400	5 300	_	-	-	
	(0.312, 0.311)	GM5BW97332A*2	5 800	6 700	_	-	-	
-	(0.283, 0.262)	GM5BW97333A*2	5 100	11 500	_	-	-	
	(0.3398, 0.3472)	-	-	-	GM5BN97330A*2, 4	6 000	5 200	
3.2 × 2.8 (t = 1.4)	(0.32, 0.33)	GM5BW94370A*3	5 200	-	_	-	-	

GM4BW853A0A series, GM4BW653A0A series, GM4BN653C0A, GM5BW96382A, GM5BW96385A, GM5BW96387A: IF = 20 mA

*2 GM5BW97330A series, GM5BN97330A: IF = 20 mA/chip

*3 GM5BW94370A: IF = 25 mA/chip

*4 GM4BN653C0A and GM5BN97330A are high-NTSC-ratio products.

*5 GM5BW96382A, GM5BW96385A, GM5BW96387A, GM5BW97330A series, GM5BW94370A, GM5BN97330A: Tc = 25°C







GM4BW853A0A series



■ High-Luminosity Surface Mount LEDs (RGB 3-color) (Taped Models Only) $(Tc = 25^{\circ}C)$

• •						()	
	Resin type						
Outline dimensions	ed on ed arency		ess arency	L.	Red + Green + Blue		
(mm)	Colore	Colore transp	Colorle transp	Milky diffusio		Luminous intensity (mcd) TYP.	
1.6 × 1.6 (t = 0.55)				•	GM1WA55311A*1	20/70/23	
3.2 × 2.8 (t = 1.4)				•	☆GM5WA94320A* ²	(2 300) [Mixed color]	
5.0 × 2.5 (t = 2.5)				•	GM4WA25300A*3	2 200 [Mixed color]	
*1 GM1WA55311A: IF = 5 mA (Red, Green, Blue)							

*2 GM5WA94320A: IF = 20 mA (Red), IF = 20 mA (Green), IF = 7 mA (Blue)

*3 GM4WA25300A: IF = 21 mA (Red), IF = 25 mA (Green), IF = 7 mA (Blue)



Notice

ZENIGATA LEDs FOR LIGHTING

RoHS

ZENIGATA LEDs for Lighting (ZENIGATA is a registered trademark or a trademark of Sharp Corporation) (in Japan, the United States and/or other countries.

<4W class>						(Tc = 25°C)
Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (Im) TYP.	Average color rendering index Ra TYP.
15.0 × 12.0 (t = 1.6)	GW5BMC27KG4	2 700	9.6	400	300	82
	GW5BMC30KG4	3 000			310	
	GW5BMC40KG4	4 000			330	
	GW5BMC50KG4	5 000			340	
	GW5BMC65KG4	6 500			340	

<6W class>

<6W class>						(Tc = 25°C)
Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (Im) TYP.	Average color rendering index Ra TYP.
	GW5BMF27K04	2 700			520	
	GW5BMF30K04	3 000			535	
15.0×12.0 (t = 1.6)	GW5BMF40K04	4 000	12.3	520	570	82
((= 1.0)	GW5BMF50K04	5 000			585	
	GW5BMF65K04	6 500			585	

<9W class>

<9W class>						(Tc = 25°C)
Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (Im) TYP.	Average color rendering index Ra TYP.
	GW5BMJ27K04	2 700			720	
	GW5BMJ30K04	3 000			740	
15.0 × 12.0 (t = 1.6)	GW5BMJ40K04	4 000	18.6	480	780	82
	GW5BMJ50K04	5 000			800	
	GW5BMJ65K04	6 500			800	

<15W class>	•					(Tc = 25°C)
Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (lm) TYP.	Average color rendering index Ra TYP.
	GW5DMA27M04	2 700	-		1 350	00
	GW5DMA30M04	3 000			1 400	03
	GW5DLA40M04	4 000			1 520	82
	GW5DLA50M04	5 000		100	1 550	
24.0×20.0	GW5DLA65M04	6 500			1 550	
(t = 1.8)	GW5DGA27M04	2 700	37	400	1 150	02
	GW5DGA30M04	3 000			1 170	93
	GW5DGA40M04	4 000			1 230	92
	GW5DGA50M04	5 000			1 250	90
	GW5DGA65M04	6 500	1		1 250	

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ZENIGATA LEDs FOR LIGHTING

☆New product



<25W class>						(Tc = 25°C)
Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (Im) TYP.	Average color rendering index Ra TYP.
	GW5DMC27M04	2 700			2 300	00
	GW5DMC30M04	3 000			2 370	03
	GW5DLC40M04	4 000			2 550	82
	GW5DLC50M04	5 000		700	2 600	
24.0×20.0	GW5DLC65M04	6 500			2 600	
(t = 1.8)	GW5DGC27M04	2 700	57		1 910	02
	GW5DGC30M04	3 000			1 950	33
	GW5DGC40M04	4 000			2 050	92
	GW5DGC50M04	5 000			2 080	
	GW5DGC65M04	6 500			2 080	90

<50W class>

<50W class:	>					(Tc = 25°C)
Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (Im) TYP.	Average color rendering index Ra TYP.
-	☆GW5DME27MR5	2 700			4 300	02
	☆GW5DME30MR5	3 000	- 50		4 430	00
	☆GW5DLE40MR5	4 000		950	4 770	82
	☆GW5DLE50M05	5 000			4 880	
24.0×20.0	☆GW5DLE65M05	6 500			4 880	
(t = 1.8)	☆GW5DGE27MR5	2 700			3 590	93
	☆GW5DGE30MR5	3 000			3 670	
	☆GW5DGE40MR5	4 000			3 850	92
	☆GW5DGE50M05	5 000			3 900	00
	☆GW5DGE65M05	6 500			3 900	90









GW5DMC27M04 series GW5DGC27M04 series



GW5DME27MR5 series GW5DGE27MR5 series



GW5BMF27K04 series

GW5BMJ27K04 series

GW5DMA27M04 series GW5DGA27M04 series



SURFACE MOUNT LEDs FOR LIGHTING / SURFACE MOUNT LEDs FOR LIGHTING (RGB 3-COLOR)

■ Surface Mount LEDs for Lighting (Taped Models Only)

Average color rendering index Ra TYP.	Total luminous flux (lm) TYP.	Forward current (mA) TYP.	Forward voltage (V) TYP.	Color temperature (K) TYP.	Model No.	Outline dimensions (mm)
	29.5			2 700	GM2BB27QKAC	
	31			3 000	GM2BB30QKAC	
	32	400		3 500	GM2BB35QKAC	(
83	33.5		2.95	4 000	GM2BB40QKAC	
	34.5	100		4 500	GM2BB45QKAC	
	35.5			5 000	GM2BB50QKAC	G
	35			5 700	GM2BB57QKAC	
	33.5			6 500	GM2BB65QKAC	2.8×2.8
	44			2 700	GM2BB27QK0C	(t = 1.9)
	46			3 000	GM2BB30QK0C	
	48			3 500	GM2BB35QK0C	
	50	150		4 000	GM2BB40QK0C	
	51	150		4 500	GM2BB45QK0C	
	53			5 000	GM2BB50QK0C	GM2BB50QK0C GM2BB57QK0C
	52			5 700	GM2BB57QK0C	
	50			6 500	GM2BB65QK0C	

Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Luminous intensity (mcd) TYP.	Average color rendering index Ra TYP.
	GM5SAE27P0A	2 700	3.2	20	2 000	85
	GM5SAE30P0A	3 000			1 900	85
	GM5SAE35P0A	3 500			2 100	83
3.2×2.8	GM5SAE40P0A	4 000			2 100	83
(t = 1.9)	GM5SAE45P0A	4 500			2 200	83
	GM5SAE50P0A	5 000			2 200	83
	GM5SAE57P0A	5 700			2 200	80
	GM5SAE65P0A	6 500			2 200	80

■ Surface Mount LEDs for Lighting (RGB 3-color) (Taped Models Only) $(I = 20 \text{ mA/chip}, Tc = 25^{\circ}C)$

Outline dimensions (mm)	Model No.	Radiation color	Luminous intensity (mcd) TYP.
3.2×2.8 (t = 1.4)		Red	680
	GM5WA94315A	Green	1 500
		Blue	450



RoHS





LEDs FOR LCD BACKLIGHT

☆New product



■ LEDs for LCD Backlight

LEDS for L	(Tc = 25°C)								
Outline dimensions (mm)	Model No.	Color coordinates (x, y) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (lm) TYP.				
2.8 × 2.8 (t = 1.9)	☆GM2BB0CH10A	(0.273, 0.244)	3.5	150	36.9				
4.2 × 1.4 (t = 0.8)	☆GM5FM0CP10A	(0.260, 0.235)	3.2	130	36				



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LASER DIODES

★Under development

RoHS

■ Laser Diodes

Model Configurations

		Pack	kage
Wavelength (nm)	Absolute maximum ratings (mW)*1	0)	
		ø5.6 mm Metal type	ø3.3 mm Metal type
660 band	10	GH06510F2B	GH06510F4A
	15	GH07815D2K	-
785 band	15	GH3S215D2B	-
	25	GH07825D2K	-
	25	GH3S225D2B	_

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

• For optical disc use*3

	Absolute maximum ratings (mW)*1		Package			
Wavelength (nm)		0)				
		ø5.6 mm Metal type	ø3.3 mm Metal type	1.8 mm t Resin type		
	20	GH04020D2A	GH04020C4A	-		
405 band	320* ²	GH04P32A2G	GH04P32A4G	-		
	430* ²	GH04P43A2G	GH04P43A4G	-		
CCO band	300* ²	★GH06P30C1C	-	-		
660 band	350* ²	-	-	GH16P35A8C		
785 band	280* ²	★GH07P28F1C	GH07P28F4C	-		
Dual-wavelength 660/785 band	350/400* ²	-	_	GH33540A8C		

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

*2 Optical pulse power output MAX. (mW) *3

New models for optical disc use are introduced frequently, and it is possible the model you wish to order may no longer be in production.

Sample sales may not be available, either. We ask for your understanding in this matter.

♦ Specifications

• Laser diodes lineup for applications other than optical discs

• L	• Laser diodes lineup for applications other than optical discs (Tc = 25°C)						
Model No.	Wave-	Absolute maximum ratings*1	_		Terminal		
	length (nm)	CW (Continuous wave)	Features	Applications	connec- tions		
Gŀ	106510F4A	660	10	ø3.3 mm CAN package, operating temperature: 70°C MAX., with built-in monitor PD	Bar code reader, laser displacement gauge, etc.	A	
Gŀ	106510F2B	band	10	ø5.6 mm CAN package, operating temperature: 75°C MAX., with built-in monitor PD	Bar code reader, laser displacement gauge, etc.	G	
Gŀ	107815D2K		15	ø5.6 mm CAN package, operating temperature: $60^{\circ}C$ MAX., with built-in monitor PD	Printer, copier, complex machine	D	
Gŀ	107825D2K	785	25	ø5.6 mm CAN package, operating temperature: $60^{\circ}C$ MAX., with built-in monitor PD	Printer, copier, complex machine		
Gŀ	13S225D2B	band	25	ø5.6 mm CAN package, operating temperature: 60°C MAX., with built-in monitor PD	Printer, copier, complex machine	F	
Gŀ	13S215D2B		15	ø5.6 mm CAN package, operating temperature: 60°C MAX., with built-in monitor PD	Printer, copier, complex machine	F	

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

Notice 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.



★Under development

RoHS

• Laser diodes lineup for optical disc use*2

LASER

• Laser diodes lineup for optical disc use ^{*2} (Tc = 25°C)							
Model No.	Wavelength	Absolute maximum ratings*1		Featuree	Applications	Terminal	
woder no.	(nm)	CW (Contin- uous wave)	Pulse	realules	Applications	tions	
GH04020D2A		20	_	ø5.6 mm CAN package, operating temperature: 75°C MAX.	Blu-ray disc playback	А	
GH04020C4A		20	_	ø3.3 mm CAN package, operating temperature: 75°C MAX.	Blu-ray disc playback	А	
GH04P32A2G	405 hand	160	320	ø5.6 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	Blu-ray disc recording	E	
GH04P32A4G	- 405 band	160	320	ø3.3 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	Blu-ray disc recording	Е	
GH04P43A2G		160	320	ø5.6 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	Blu-ray disc recording	E	
GH04P43A4G		160	320	ø3.3 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	Blu-ray disc recording	E	
★GH06P30C1C	000 h an d	100	250	ø5.6 mm CAN package, operating temperature: 75°C MAX. (pulse drive)	Double-layer DVD 8× to 16× recording	В	
GH16P35A8C	- 660 band	125	350	1.8 mm frame package, operating temperature: 80°C MAX. (pulse drive)	Double-layer DVD 8× to 16× recording	С	
★GH07P28F1C	705 h an d	150	280	ø5.6 mm CAN package, operating temperature: 80°C MAX. (pulse drive)	CD-R/RW (MAX. 48× to 52× writing)		
GH07P28F4C	785 band 7P28F4C		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)	В	
01100540400	Dual- wavelength	125	350	1.8 mm frame package operating temperature: 80°C MAX recording	Double-layer DVD 8× to 16× recording		
GH33540A8C	GH33540A8C	660/785 band	200	400	(pulse drive)	CD-R/RW (H/H, slim dual-purpose) (MAX. 48× to 52× writing)	

*1 The absolute maximum ratings are the limits that are not to be exceeded under any condition whatsoever, whether in testing or in actual use. For recommended optical power output, consult the specification sheet or data sheet for each model.

*2 New models for optical disc use are introduced frequently, and it is possible the model you wish to order may no longer be in production.

Sample sales may not be available, either. We ask for your understanding in this matter.

• Terminal Connections



Notice

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RoHS

■ Europe: LNBs for Satellite Broadcast

♦ Features

- (1) Wide band type receiving all broadcasting channels (analog & digital) in 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 dissipation current design for energy saving [80 mA (TYP.): BS1K0EL150A]

♦ Specifications

Destination		Europe, Astra/Eutelsat Satellite etc.					
Receiving polarization		Horizontal/Vertical polarization					
Model No. <type></type>		BS1R8EL500A <4 output>	BS1R8EL400A <4 output>	BS1K0EL250A <2 output>	BS1K0EL150A <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], 7	1 100 to 2 150 [High band]			
Local oscillation frequent	cy (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 at 1 kHz (TYP.)					
Cross-polar discrimination (dB)		25 (TYP.)					
Supply voltage (V DC)	Vertical polarization	11.5 to 14.0 (0/22 kHz)					
(Polarization switching)	Horizontal polarization	16.0 to 19.0 (0/22 kHz)					
Dissipation current (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)	\times (D) \times (H) (mm)	$133.0\times103.6\times60.0$	$133.0\times103.6\times60.0$	$135.0\times90.0\times58.0$	$103.0\times60.0\times60.0$		
Weight (g)		Approx. 255	Approx. 256	Approx. 245	Approx. 90		



JAPAN/ASIA/AUSTRALIA: LNBs FOR CS DIGITAL SATELLITE BROADCAST / JAPAN: LNBs FOR BS/CS 110° SATELLITE BROADCAST

RoHS

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

♦ Specifications

Destination		Japan, Asia, Australia, CS Satellite			
Receiving polarization		Horizontal/Vertical polarization			
Model No. <type></type>		BS1R8AR100A			
Input frequency (GHz)		11.70 to 12.75			
Output frequency (MHz)		1 000 to 2 050			
Local oscillation frequen	cy (GHz)	10.7			
NF (dB)		0.7 (TYP.) / 0.9 (MAX.)			
Conversion gain (dB)		55 to 64			
Phase noise		–75 dBc/Hz at 1 kHz (TYP.)			
Cross-polar discrimination	on (dB)	25 (TYP.)			
Supply voltage (V DC)	Vertical polarization	11.5 to 14.0			
(Polarization switching)	Horizontal polarization	16.0 to 19.0			
Dissipation current (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)	BS1R8AR100A		
Weight (g)		Approx. 110			

■ 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 dissipation current 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.		BS1F9JU300A	BS1F6JU300A	BS1F6JP100A	
Input frequency (GHz)			11.71023 to 12.751	•	
Output frequency (MHz)			1 032.23 to 2 073		
Local oscillation frequency (GI	Hz)		10.678		
NF (dB)		0.45 (TYP.)	/ 0.6 (MAX.)	0.7 (TYP.) / 1.1 (MAX.)	
Conversion gain (dB)		48 to 58		the state of the s	
Phase noise		–65 dBc/Hz at 1 kHz (TYP.)		Dimon	
Cross-polar discrimination (dB	3)	25 (TYP.)/20 (MIN.)			
Supply voltage (V DC) Righ	nt circular polarization	9.5 to	18.0	13.5 to 16.5	
(Polarization switching) Left	circular polarization	-	_	9.5 to 12.0	
Dissipation current (mA)		80 (TYP.)/110 (MAX.)			
Waveguide		Feed-horn (F/D = 0.5)			
Output impedance (Ω)		75			
Output connector (F-type)		1-οι	itput	1-output (R/L switching)	BS1F9JU300A
Outline dimensions (mm)		96 (W) × 47	(D) × 71 (H)	96 (W) × 53.07 (D) × 71 (H)	
Weight* (g)		Appro	x. 100	Approx. 130	* Outer cabinet is made upon request.

* Not including outer cabinet





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 (ISDB-S/		
Input type	1-input/1-loop through output	1-input	
Model No.	BS2S7HZ7903	BS2S7HZ6903	
Input frequency (MHz)	950 to	2 150	
Input signal level (dBm)	-65 te	o –25	
The 1st intermediate frequency (MHz)	Zero-IF (Direc	ct conversion)	Lange -
Base band frequency bandwidth (MHz)	10 to 30, 2.0 MH	В	
RF input local leak (dBm)	-68 and		
Output type	/		
Noise figure (dB)	8 (T	1	
Tuning voltage (V DC)	Shared with a 3.3		
Supply voltage (V DC)	3.	brand the	
LNB power supply	DC 25 V, 400		
Input impedance (Ω)	7		
Outline dimensions (mm)	32.6 (W) × 28.0) (D) × 13.0 (H)	В





BS2S7HZ6903

* Contact SHARP for custom design product.

Standard Specifications <NIM type>

Destination	Europe (DVB-S2)		
Input type	1-input, 1-loop through output	1-input		
Model No.	BS2F7VZ7702	BS2F7HZ1266		
Input frequency (MHz)	950 to	2 150		
Input signal level (dB m)	-65 t	0 –25		
The 1st intermediate frequency (MHz)	Zero-IF (Dired	ct 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	Transport stream (parallel/serial)			
Symbol rate (M baud)	45 (N	IAX.)		
Noise figure (dB)	8 (TYP.)	5 (TYP.)		
Tuning voltage (V DC)	Shared with a 3.3	3 V power source		
Supply voltage (V DC)	3.3, 1.2	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)	56.0 (W) × 34.9 (D) × 10.0 (H)		
	inn nundunt			



BS2F7HZ1266

* Contact SHARP for custom design product.

Notice





■ Front-End Units for ISDB-T/DVB-T/CTTB/CATV and Digital Satellite

♦ Features

(1) Low phase noise characteristics, high elimination of adjacent channel interference.

(2) Compact, low power consumption.

Standard Specifications

Destination	Japan (ISDB-T/S)					
Model No.	VA4M5JC2116		VA4M6JC2103			
	Digital terrestrial	Digital satellite	Digital terrestrial	Digital satellite		
Number of tuners	1	1	2	2		
Input frequency (MHz)	93 to 767	950 to 2 150	93 to 767	950 to 2 150		
Output type	Low-IF	I,Q	Low-IF	I,Q		
Noise figure (dB)	6 (TYP.)					
Phase noise (dBc/Hz)	–90 (TYP.) at 10 kHz offset	–85 (TYP.) at 10 kHz offset	–90 (TYP.) at 10 kHz offset	-85 (TYP.) at 10 kHz offset		
Supply voltage (V DC)	1.8, 3.3	3.3	1.8, 3.3	3.3		
Power consumption (W)	0.5	0.6	1	1.1		
Outline dimensions (mm)	50.0 (W) × 45.0 (D) × 5.8 (H)					





Front-End Units for ISDB-T/DVB-T/CTTB/CATV

♦ Features

- (1) Low phase noise characteristics, high elimination of adjacent channel interference.
- (2) Compact, low power consumption.
- (3) Other types are available with various chassis forms (vertical or horizontal type) and input connectors (F or DIN type), etc.

Standard Specifications

Destination	Europe/Asi	a (DVB-T2)	China (DTMB) Brazil (ISDB-TB)		
Madal Na	Terrestrial	Terrestrial/Satellite	Terrestrial	Terrestrial	
	VA4M1EX6158	VA4S5DC5072	VA4N1CD1136	VA4N1BD1108	
Input frequency (MHz)	47 to 868	47 to 868 950 to 2 150	47 to 868 54 to 868		
Output type	TS	DIF I/Q	DIF		
	—	CVBS/SIF	A	AIF	
Noise figure (dB)	Terrestrial: 6 (MAX.)	Terrestrial: 6 (MAX.) Satellite: 6 (TYP.)	Terrestrial: 6 (MAX.)		
Phase noise (dBc/Hz)	Terrestrial: -90	Terrestrial: –90 Satellite: –85	Terrestrial: -90		
Power consumption (W)	1.1	Terrestrial: 1.0 Satellite: 0.5	Terrestrial: 1.26 Terrestrial: 1.16		
Supply voltage (V DC)	3.3, 1.8, 1.2	3.3, 1.8	3.3		
Outline dimensions (mm)	47 (W) \times 30 (D) \times 13 (H)	32 (W) $ imes$ 40 (D) $ imes$ 6.7 (H)	32 (W) $ imes$ 36 (D) $ imes$ 6.7 (H)	34 (W) $ imes$ 37 (D) $ imes$ 6.7 (H)	





FRONT-END UNITS FOR DIGITAL TERRESTRIAL AND ANALOG TERRESTRIAL BROADCASTING



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		Brazil*1	China		
Model No.		VA4A1BC5038	VA1P1CD8402		
Input frequency (MHz)		47 to 866	47 to 870		
Analog intermediate	Video	45.75	38.0		
frequency (MHz)	Audio	41.25	D/K: 31.5, I: 32.0, B/G: 32.5, M/N: 33.5		
Digital intermediate frequent	cy (MHz)	44	36		
Digital IF bandwidth (MHz)		6	8		
Phase noise (dBc/Hz)		-90 (TYP.) at 10 kHz offset	-85 (TYP.) at 10 kHz offset		
Supply voltage (V DC)		1.8, 3.3	5.0		
Noise figure (dB)		6 (T	TYP.)		
Channel selection system		PLL (I ²	C-bus)*2		
Outline dimensions (W) × (D) × (H) (mm)	40 × 36.6 × 5	70.0 × 37.0 × 10.0		

*1 Transport stream output front-end units with built-in OFDM demodulation IC

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



♦ Features

Universal specifications compatible with various broadcasting systems all over the world

Digital: DVB-T/T2, DVB-C, ATSC, ISDB-T, DTMB

Analog: NTSC-M/N, PAL-B/G/I/DK, SECAM-L, L'

Standard Specifications

Destination		Japan	Global
Model No.	Nodel No.		VA4M1DA5167
Input frequency (MHz)		93 to 767	47 to 868
Output turo	Digital terrestrial		IF
Oulpul lype	Analog terrestrial	-	AIF
Noise figure (dB)		6 (MAX.)	4 (TYP.)
Phase noise (dBc/Hz)		-90 (TYP.)
Supply voltage (V)		1.8, 3.3	3.3
Power concumption (M/)	Digital terrestrial	0.5	T.B.D.
	Analog terrestrial	-	T.B.D.
Outline dimensions (W) \times (D)	× (H) (mm)	32.0×2	2.0 × 6.7



* Contact SHARP for custom design product.

(For connector shape or facing side, analog output format, etc.)

Notice

FULL-SEG TUNER MODULE FOR DIVERSITY RECEPTION / **MPEG MODULE**

Full-Seg Tuner Module for Diversity Reception

♦ Features

Compact package, enabling 4-diversity reception $(35.0 \times 31.0 \times 2.95 \text{ mm})$

Standard Specifications

Destination		Japan	
Model No.		VA3D5JZ705	
Туре		Built-in diversity demodulator for four signal reception	
Input frequency (MH	łz)	470 to 770	
IF frequency (MHz)		4	
Output type		Transport stream	:::
Input sensitivity	During diversity reception	-88 (TYP.) (64QAM, CR = 3/4)	
(dBm)	During single reception	-82 (TYP.) (64QAM, CR = 3/4)	
Supply voltage (V)		Vcc1: 1.2, Vcc2: 3.3 (IO: 3.3)	L
Power consumption (W)		1.24 (TYP.)	
Operating temperature (°C)		-40 to 85	
Control interface		I ² C-bus ^{*1}	VA3D5JZ705
Outline dimensions	$(W) \times (D) \times (H) (mm)$	35.0 × 31.0 × 2.95	

Diversity demodulator for two signal reception is also available.

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

MPEG 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."

Compatible also with full HD output.

(3) Optional One-seg broadcasting compatibility is available for diversity-reception and integrated-RF types.

Notice

Standard Specifications

Туре	For digital terrestrial	For digital terrestrial/BS/CS	For digital terrestrial Compatible with diversity reception	For digital terrestrial only Integrated RF		
Model No.	DU6N4JZxxxx	DU6U4JZxxxx	DU6U4JZxxxx	DU6F4JZxxxx		
Circuit configuration	[RF	(separate body) +] OFDM + MP	EG	RF + OFDM + MPEG		
CATV (pass-through)	(C	-	0		
Video output		Componen	t (Full HD)*			
Audio output		Analog ste	ereo (L/R)			
B-CAS		Built-in cont	rol software			
EPG		Built-in sir	nple EPG			
ES (Engineering service)		()			
Firm ware upgrades		()			
Supply voltage (V)		3.3/1.8/1.0				
Power consumption (W)	1.1 (TYP.) 1.5 (TYP.)					
Outline dimensions (mm)	58 (W) \times 60 (D) \times 7 (H)) 60 (W) × 70 (D) × 7 (H)		78 (W) × 55.5 (D) × 7 (H)		
Recommended front-end	VA4D1JA2160	VA1N5JF8627	VA3D5JZ705	_		

* Switchable between S-Video (Y/C) and component (SD or HD).





MPEG MODULE WITH VIDEO RECORDING FUNCTION / ONE-SEG TUNER MODULE

■ MPEG Module with Video Recording Function

♦ Features

- (1) Comes with built-in USB interface for recording. Capable of recording a counter program if a double tuner is installed on the device as well.
- (2) Fully compliant with ARIB standard. Compatible with interactive data broadcasting.



Standard Specifications

Time	For digital terrestrial/BS/CS				
туре	Double type	Single type			
Model No.	DU6R4	JZxxxx			
CATV (pass-through)	()			
Video output / Audio output	Component (Full HD)* / Analog stereo (L/R)				
B-CAS	Built-in control software				
EPG	Built-in EPG				
ES (Engineering service)	0				
Firm ware upgrades	(C			
Supply voltage (V)	5/3.3/1.8	/1.2/1.05			
Power consumption (W)	2.9				
Outline dimensions (mm)	65 (W) $ imes$ 80 (D) $ imes$ 7 (H)	65 (W) $ imes$ 70 (D) $ imes$ 7 (H)			
Recommended front-end	VA4M6JC2103	VA4M5JC2116			

* Switchable between S-Video (Y/C) and component (SD or HD).

One-Seg Tuner Module

♦ Features

(1) High sensitivity: -100 dBm (13 seg, QPSK CR: 2/3)

(2) Compact and thin design: $5.4 \times 5.4 \times 1.0$ mm

- (3) Low power consumption: 41 mW (with software power control)
- (4) Output interface: TS serial output



Standard Specifications

Destination	Janan
Destination	oupun
Model No.	VA3A5JZ967
Input frequency (MHz)	470 to 770 (UHF: 13 to 62)
Input signal level (dBm)	-100 (13 seg, QPSK CR: 2/3)
Outline dimensions (mm)	5.4 (W) × 5.4 (D) × 1.0 (H)
Supply voltage (V DC)	1.2 (RF) 1.2 (OFDM Core) 1.62 to 3.6 (I/O)
Power consumption (mW)	41 (TYP.)
Operating temperature (degree C)	-20 to 65
Control I/F	I ² C-bus*1

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

Notice

RoHS

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) Compact and thin design $9.0 \times 9.0 \times 1.25$ mm

*EDR: Enhanced Data Rate



Standard Specifications

Model No.	DC2K1DZ172					
Wireless communication standard	WLAN (IEEE802.11b/g)	Bluetooth v2.1+EDR				
Outline dimensions (mm)	9.0 (W) × 9.0 (D) × 1.25 (H) (LTCC)					
Frequency (MHz)	2 400 to 2 483.5	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				
Transmission output (dBm)	11g: +14/11b: +18	Class 2				
Receiving sensitivity (dBm)	TYP.: -84 (11 Mbps, PER 8%) TYP.: -71 (54 Mbps, PER 10%)	TYP.: -70 (1 Mbps, BER 0.1%) TYP.: -70 (2 Mbps, BER 0.01%) TYP.: -70 (3 Mbps, BER 0.01%)				
Security	WEP TKIP AES	by driver software				
Interface	SPI/SDIO	PCM (64 kbps), SPI/UART				

Consult separately regarding driver software.

Notice

RoHS

■ 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	100/20 cm	I P/MP/HP mode switching function	27 to 55 \/	
		35/21 cm	LP/HP mode switching function, remote control transmission function, 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	GP2W3176XP0F
			LP/HP mode switching and remote control transmission functions	2.6 to 3.6 V	GP2W3120YP0F
		21 cm	LP/HP mode switching function	2.6 to 3.6 V	GP2W1320YP0F
		70/21 cm	LP/MP/HP mode switching and remote control transmission functions	2.6 to 3.3 V	GP2W3106YP0F
	SIR 115.2 kb/s (Integrated receiver and transmitter type)	100 cm	Compact, low dissipation current	2.4 to 5.5 V	GP2W0004YP0F▲/ GP2W0004XP0F▲
	SIR LP 115.2 kb/s (Integrated receiver and transmitter type)	21 cm	Built-in LED constant current circuit, 3-state output	2.0 to 3.6 V 1.7 to 2.5 V	GP2W0110VY GP2W0112VY

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

■ 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	$20.96\times6.68\times7.1$
GP2W4010YP0F	Uni-directional communication (receiving only)	9.6 k to 4 Mb/s	IrSS™-compliant, receiving-only type	150	3 to 3.6	$10\times3.93\times4.53$

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



♦ 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	$7.88 \times 2.76 \times 1.5$
GP2W3176XP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	With remote control transmission function, top-view, LP/HP mode switching function	21/35	2.7 to 3.6	8.72 × 2.53 × 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
GP2W1001YP0F▲	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	LP/MP/HP mode switching function	20/100	2.7 to 5.5	10.01 × 4.38 × 3.53
GP2W1320YP0F	Bi-directional (half-duplex) communication	9.6 k to 4 Mb/s	Compact, thin, low dissipation current (Icc: TYP. 0.45 mA)	21	2.6 to 3.6	7.16 × 2.73 × 1.82
GP2W3106YP0F	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	$7.9 \times 2.85 \times 2.5$

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













GP2W1320YP0F

RoHS



GP2W3176XP0F

GP2W3120YP0F

GP2W3106YP0F

GP2W1001YP0F

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RoHS

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.), top-view	100	2.4 to 5.5	$9.21 \times 3.35 \times 3.8$

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



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)
GP2W0110VY	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Low dissipation current (Icc: 120 µA MAX.)	21	2.0 to 3.6	$6.8\times2.35\times2.1$
GP2W0112VY	Bi-directional (half-duplex) communication	2.4 k to 115.2 kb/s	Low dissipation current (Icc: 120 µA MAX.)	21	1.7 to 2.5	6.8 × 2.35 × 2.1



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RoHS

■ IR Detecting Unit for Remote Control Lineup (Classified by Form)

Package			Model No.				
Туре	Form	Detection position*5 (from PCB)	Features	Operating voltage: 3 to 5 V	Operating voltage: 5 V	Operating voltage: 3 to 5 V	
IR detecting unit for remote control	Compact, thin typ SMD (4.5 × 5.0 >	pe < 1.35 t mm)				GP1USC3xXP series	
	Compact type SMD (6.8 × 2.1 >	(2.35 t mm)				GP1UF31 series	
	with shield case (holder)	16.0 mm* ¹	Compact size	GP1UF28XK0VF series	GP1UM28XK0VF series	GP1UF28xXKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	GP1UE28RK0VF series	GP1UM28RK0VF series	GP1UE28xRKC4 series	
		12.0 mm*2	Compact size	GP1UE27XK0VF series	GP1UM27XK0VF series	GP1UE27xXKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	GP1UE27RK0VF series	GP1UM27RK0VF series	GP1UE27xRKC4 series	
		6.8 mm* ³	Compact size	GP1UE26XK0VF series	GP1UM26XK0VF series	GP1UE26xXKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	GP1UE26RK0VF series	GP1UM26RK0VF series	GP1UE26xRKC4 series	
	Lead straight with shield case (holder)	19.0 mm	Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	GP1UE29QK0VF series	GP1UM29QK0VF series	GP1UE29xQKC4 series	
		9.6 mm	Compact size	GP1UE28YK0VF series	GP1UM28YK0VF series	GP1UE28xYKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	GP1UE28QK0VF series	GP1UM28QK0VF series	GP1UE28xQKC4 series	
	Holderless	Lead straight 6.0 mm		GP1UX31QS series	GP1UX51QS series	GP1UXC4xQS series	
		Lead L bend ^{*4} 5.3 mm		GP1UX31RK series	GP1UX51RK series	GP1UXC4xRK 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 							
ſ					ŕ	N.	
GP1U (GP1UE26XK0\	IE26xXKC4 /F, GP1UM26XK0	G OVF) (GP1UE27)	P1UE27xXKC4 KK0VF, GP1UM27XK0VF)(GP1UE28xXKC4 GP1UE28XK0VF, GP1UM	GP1 28XK0VF) (GP1UE28YK	UE28xYKC4 0VF, GP1UM28YK0VF)	
f					ŕ	2ª	

GP1UE26xRKC4 GP1UE28xRKC4 GP1UE28xQKC4 GP1UE28xQKC4 (GP1UE26RK0VF, GP1UM26RK0VF) (GP1UE27RK0VF, GP1UM27RK0VF) (GP1UE28RK0VF, GP1UM28RK0VF) (GP1UE28QK0VF, GP1UM28QK0VF)



GP1UE29xQKC4 (GP1UE29QK0VF, GP1UM29QK0VF) GP1UXC4xQS (GP1UX31QS, GP1UX51QS)



(GP1UF31xYP0F)



GP1USC3xXP

IR DETECTING UNITS FOR REMOTE CONTROL

RoHS

(Ta = 25°C)

■ IR Detecting Units for Remote Control

		Absolute maximum ratings		Operating	Electrical characteristics				- · ·	
Туре	Series No.	Vcc (V)	Topr (°C)	voltage (V)	Icc (mA) *1 MAX.	Voн (V) MIN.	Vol (V) MAX.	fo (kHz) TYP.	Size (mm)	lerminal layout
Surface-mount type, Reflow soldering compatible	GP1UF31xXP0F/ *5 GP1UF31xYP0F	0 to 6.0	-30 to +85	2.7 to 5.5	0.4	Vcc-0.5	0.45	*4	$6.8 \times 2.1 \times 2.35$	-
	GP1USC3xXP	0 to 6.0	-30 to +85	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	5 imes 4.5 imes 1.3	-
	GP1UE26xXKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	$5.6\times9.6\times6.8$	-
With shield case (holder), 3 to 5 V drive (New type)	GP1UE27xXKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	$5.6\times9.6\times12.0$	
	GP1UE28xXKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	$5.6\times9.6\times16.0$	
	GP1UE28xYKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	5.6 × 8.6 × 12.5(9.6)*2	
	GP1UE26xRKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	$5.6\times9.6\times7.2$	
With shield case (holder),	GP1UE27xRKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	$5.6\times9.6\times12.4$	
Strengthened resistance to	GP1UE28xRKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	$5.6\times9.6\times16.4$	
electromagnetic induction noise (New type)	GP1UE28xQKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	5.6 × 9.0 × 12.5(9.6)*2	
	GP1UE29xQKC4	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	5.6 × 16.2 × 21.9(19)*2	
	GP1UM26XK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	$5.6 \times 9.6 \times 6.8$	
With shield case (holder).	GP1UM27XK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	$5.6\times9.6\times12.0$	Center Vcc
5 V drive	GP1UM28XK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 imes9.6 imes16.0	
	GP1UM28YK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 × 8.6 × 12.5(9.6)*2	
	GP1UM26RK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 × 9.6 × 7.2	
With shield case (holder),	GP1UM27RK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 × 9.6 × 12.4	
5 V drive, Strengthened resistance to	GP1UM28RK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 × 9.6 × 16.4	
electromagnetic induction noise	GP1UM28QK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 × 9.0 × 12.5(9.6)*2	
	GP1UM29QK0VF	0 to 6.0	-10 to +70	4.5 to 5.5	0.6 (0.65)	Vcc-0.5	0.45	*3	5.6 × 16.2 × 21.9(19)*2	
	GP1UE26XK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 imes9.6 imes6.8	
With shield case (holder).	GP1UE27XK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 9.6 × 12.0	
3 to 5 V drive	GP1UE28XK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 9.6 × 16.0	
	GP1UE28YK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 8.6 × 12.5(9.6)*2	
	GP1UE26RK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 9.6 × 7.2	
With shield case (holder),	GP1UE27RK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 imes9.6 imes12.4	
Strengthened resistance to	GP1UE28RK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 9.6 × 16.4	
electromagnetic induction noise	GP1UE28QK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 9.0 × 12.5(9.6)*2	
	GP1UE29QK0VF	0 to 6.0	-10 to +70	2.7 to 5.5	0.4	Vcc-0.5	0.45	*3	5.6 × 16.2 × 21.9(19)*2	
Holderless, 3 to 5 V drive, Strengthened resistance to electromagnetic induction noise (New type)	GP1UXC4xQS	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	5.5 imes 5.3 imes 7.5	- Center GND
	GP1UXC4xRK	0 to 6.0	-10 to +70	2.7 to 5.5	0.6	Vcc-0.5	0.45	*3	5.5 × 5.3 × 7.5	
Holderless, 5 V drive, Strengthened resistance to electromagnetic induction noise Holderless, 3 to 5 V drive, Strengthened resistance to electromagnetic induction noise	GP1UX51QS	0 to 6.0	-10 to +70	4.5 to 5.5	0.6	Vcc-0.5	0.45	*3	5.5 imes 5.3 imes 7.5	
	GP1UX51RK	0 to 6.0	-10 to +70	4.5 to 5.5	0.6	Vcc-0.5	0.45	*3	5.5 × 5.3 × 7.5	
	GP1UX31QS	0 to 6.0	-10 to +70	4.5 to 5.5	0.4	Vcc-0.5	0.45	*3	$5.5\times5.3\times7.5$	
	GP1UX31RK	0 to 6.0	-10 to +70	4.5 to 5.5	0.4	Vcc-0.5	0.45	*3	5.5 imes 5.3 imes 7.5	

* 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. *1 When no signal is input (during input light).

*2 Figures in parentheses indicate the distance to the light detection center.
*3 fo = 32.75/36/36.7/38/40 kHz
*4 fo = 36/36.7/38/40 kHz
*5 GP1UF31xXP0F: Top view taped package, GP1UF31xYP0F: Side view taped package

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ADVANCED FLEX PRINTED CIRCUIT BOARDS



Advanced Flex Printed Circuit Boards <Multilayer FPC specifications>

The advanced flex printed circuit board is a multilayered wiring board comprising 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, lightweight equipment design.

♦ Features

- (1) For selecting optimal specifications to suit specific applications, special specifications such as for mobile phones are also available.
 - Minimum thickness in multi-layer part: 0.19 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

Туре		Folding type/Flying tail type			
Min. base thickness (mm)		0.19 (4-layer), 0.33 (6-layer), 0.40 (8-layer)			
Min. line width/spacing (mm)		0.05/0.05			
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)			

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



Notice



ADVANCED FLEX PRINTED CIRCUIT BOARDS



Advanced Flex Printed Circuit Boards <Flex-rigid specifications>

With rigid materials used for the build-up multilayer, this board can handle finer mounting patterns and achieve connectorless betweenboard connections using an inner layer flexible printed circuit (FPC). This facilitates greater equipment design flexibility and ultracompact 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 stacked-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

Туре		6- to 8-layer, flex-rigid		
FPC core layer configur	ation	2 to 6 layers (Polyimide)		
No. of build-up layers		1 to 2 layers for each side of core layer		
Min. board thickness (mm)		0.4 (6-layer), 0.53 (8-layer)		
Min. via hole diameter/	Conformal via hole (mm)	Hole: Ø0.09 / Land: Ø0.25		
Land hole diameter	Stacked via hole (mm)	Hole: ø0.09 / Land: ø0.25		
Min. inner via hole diameter (mm)		Hole: Ø0.09 / Land: Ø0.25		
Via-on IVH		Available		
Min. line width/spacing (mm)		0.05/0.05		
CSP mountable pitch (n	nm)	0.4		





Notice



FLEXIBLE PRINTED CIRCUITS BOARDS



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 also available.

Standard specifications

Layers	Single side	Both-side through-hole		
Substrate materials	Polyimido film, non-adhesive polyimido			
Design pattern width (mm)	0.04 (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, liquid soldering resist			
Safety standard	UL (94V-0)			

* Other specifications available are as follows.

Bonding Ni-Au plating

High density SMT



Notice



■ DVD Pickup for Automotive Use <HPD-61>

- ♦ Features
 - Compact, thin (7.3 mm) pickup
 - Playable disk: DVD-ROM, CD-ROM
 - Operating temperature: -20 to $+80^{\circ}$ C
 - Outline dimensions: W $30.2 \times H 7.3 \times D 48.7 \text{ (mm)}$
 - Weight: Approx. 13.5 g




	GH04P32A2G87/88	GM1JR55200AE81	GM5BW94370A 82
BS	GH04P32A4G87/88	GM1JS35200AE81	GM5BW96382A82
BS1F6JP100A90	GH04P43A2G87/88	GM1JS55200AE81	GM5BW96385A82
BS1F6JU300A90	GH04P43A4G87/88	GM1JV35200AE81	GM5BW96387A 82
BS1F9JU300A90	GH06510F2B87	GM1JV55200AE81	GM5BW97330A 82
BS1K0EL150A 89	GH06510F4A87	GM1WA55311A82	GM5BW97332A 82
BS1K0EL250A 89	GH06P30C1C 87/88		GM5BW97333A 82
BS1R8AR100A90	GH07815D2K87	GM2	GM5FM0CP10A 86
BS1R8EL400A 89	GH07825D2K87	GM2BB0CH10A86	GM5SAE27P0A85
BS1R8EL500A 89	GH07P28F1C87/88	GM2BB27QK0C85	GM5SAE30P0A85
BS2F7HZ126691	GH07P28F4C87/88	GM2BB27QKAC85	GM5SAE35P0A 85
BS2F7VZ770291	GH16P35A8C87/88	GM2BB30QK0C85	GM5SAE40P0A85
BS2S7HZ690391	GH33540A8C87/88	GM2BB30QKAC85	GM5SAE45P0A85
BS2S7HZ790391	GH3S215D2B87	GM2BB35QK0C85	GM5SAE50P0A 85
	GH3S225D2B87	GM2BB35QKAC85	GM5SAE57P0A 85
DC		GM2BB40QK0C85	GM5SAE65P0A85
DC2K1DZ172 97	GL	GM2BB40QKAC85	GM5WA94315A 85
	GL100MD1MP173	GM2BB45QK0C85	GM5WA94320A 82
DU	GL100MN0MP73	GM2BB45QKAC85	GM5ZR96270A81
DU6F4JZxxxx	GL100MN1MP73	GM2BB50QK0C85	GM5ZV96270A81
DU6N4JZxxxx	GL4100E0000F73	GM2BB50QKAC85	
DU6R4JZxxxx	GL4800E0000F73	GM2BB57QK0C85	GP1
DU6U4JZxxxx	GL480E00000F73	GM2BB57QKAC85	GP1A054RDKLF 64
		GM2BB65QK0C85	GP1A057RBKLF64
GA	GM1	GM2BB65QKAC85	GP1A057SGKLF 64
GA1A1S100WP67	GM1BC35372AC81		GP1A058SCK0F64
GA1A1S202WP67	GM1EG55200A81	GM4	GP1A073LCS 62
GA1A1S203WP67	GM1GC35370AC81	GM4BN653C0A82	GP1A101C2KSF64
GA1A1S204WP67	GM1HD55200A81	GM4BW653A0A82	GP1A173LCS2F62
GA1A2S100LY67	GM1HS55200A81	GM4BW653B0A82	GP1A173LCSVF 62
GA1A2S100SS67	GM1HY55200A81	GM4BW853A0A82	GP1A204HCS064
GA220T2L2IZ69	GM1JE35200AE81	GM4BW853B0A82	GP1A273LCS1F62
	GM1JE55200AE81	GM4WA25300A82	GP1A50HRJ00F61
GH	GM1JJ35200AE81		GP1A51HRJ00F61
GH04020C4A 87/88	GM1JJ55200AE81	GM5	GP1A52HRJ00F61
GH04020D2A 87/88	GM1JR35200AE81	GM5BN97330A82	GP1A52LRJ00F 61



GP1A53HRJ00F61	GP1S195HCPSF58	GP1UF31xXP0F102	GP2S700HCP 62
GP1A57HRJ00F61	GP1S195HCZSF58	GP1UF31xYP0F102	GP2TC2J0000F78
GP1A58HRJ00F61	GP1S196HCPSF58	GP1UM26RK0VF102	GP2W0004XP0F 100
GP1A73AJ000F62	GP1S196HCZ0F58	GP1UM26XK0VF102	GP2W0004YP0F 100
GP1A75EJ000F62	GP1S196HCZSF58	GP1UM27RK0VF102	GP2W0110VY 100
GP1A98HCPSF60	GP1S273LCS1F59	GP1UM27XK0VF102	GP2W0112VY 100
GP1A98HCZ0F 60	GP1S296HCPSF58	GP1UM28QK0VF102	GP2W1001YP0F99
GP1FAV30RK0F 80	GP1S396HCP0F58	GP1UM28RK0VF102	GP2W1320YP0F99
GP1FAV30TK0F 80	GP1S396HCPSF58	GP1UM28XK0VF102	GP2W3106YP0F99
GP1FAV31RK0F 80	GP1S50J0000F59	GP1UM28YK0VF102	GP2W3120YP0F99
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GP1FAV50RK0F 80	GP1S52VJ000F59	GP1USC3xXP102	GP2W3176XP0F99
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GP1FMV31TK0F 80	GP1UE26RK0VF 102		GP2Y0A60SZ0F76
GP1FMV51RK0F 80	GP1UE26XK0VF 102	GP2	GP2Y0A60SZLF76
GP1FMV51TK0F 80	GP1UE26xRKC4 102	GP2A200LCS0F63	GP2Y0A710K0F76
GP1FSB31TK0F 80	GP1UE26xXKC4102	GP2A222HCKA65	GP2Y0AH01K0F77
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GP1FSV51TK0F 80	GP1UE27XK0VF 102	GP2A231LRSAF63	GP2Y0D21YK0F75
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GP1L51J0000F 60	GP1UE27xXKC4102	GP2A250LCS0F63	GP2Y0D340K75
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GP1L57J0000F 60	GP1UE28XK0VF 102	GP2A25NJJ00F63	GP2Y0D810Z0F75
GP1S092HCPIF 58	GP1UE28xQKC4 102	GP2A28AJ000F63	GP2Y0D810Z1F75
GP1S093HCZ0F 58	GP1UE28xRKC4 102	GP2AP002A00F66	GP2Y1010AU0F78
GP1S094HCZ0F 58	GP1UE28xXKC4102	GP2AP002S00F65	GP2Y2A180K0F77
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GP1S173LCS2F59	GP1UE29QK0VF 102	GP2S29SVJ00F64	GP2Y3A001K0F77
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N	D	E	X

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GW	GW5DLC65M0484
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GW5BMF50K04 83	GW5DME30MR584
GW5BMF65K04 83	
GW5BMJ27K0483	HPD
GW5BMJ30K0483	HPD-61 106
GW5BM.I40K04 83	
GW5BMJ50K04	IR2
GW5BMJ50K04	IR2
GW5BMJ50K04	IR2 IR2D07129 IR2D20U29
GW5BMJ50K04	IR2D07129 IR2D07129 IR2D20U29 IR2E49M
GW5BMJ50K04	IR2 IR2D071
GW5BMJ50K04	IR2 IR2D071
GW5BMJ50K04	IR2 IR2D071
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GW5BMJ50K04 83 GW5BMJ65K04 83 GW5DGA27M04 83 GW5DGA30M04 83 GW5DGA40M04 83 GW5DGA65M04 83 GW5DGC27M04 84 GW5DGC30M04 84 GW5DGC40M04 84 GW5DGC50M04 84 GW5DGC50M04 84	IR2 IR2D071 29 IR2D20U 29 IR2E49M 28 IR2E49U 28 IR2E56U6 28 IR2E58U 28 IR2E63Yx 28 IR2E65U 29 IR2E66Yx 28 IR2E68Yx 28
GW5BMJ50K04 83 GW5BMJ65K04 83 GW5DGA27M04 83 GW5DGA30M04 83 GW5DGA40M04 83 GW5DGA50M04 83 GW5DGA65M04 83 GW5DGC27M04 84 GW5DGC30M04 84 GW5DGC50M04 84	IR2 IR2D071 29 IR2D20U 29 IR2E49M 28 IR2E49U 28 IR2E56U6 28 IR2E63Yx 28 IR2E65U 29 IR2E65V 29 IR2E68Yx 28 IR2E68Yx 28 IR2E68Yx 28 IR2E68Yx 28
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GW5BMJ50K04 83 GW5BMJ65K04 83 GW5DGA27M04 83 GW5DGA30M04 83 GW5DGA40M04 83 GW5DGA50M04 83 GW5DGA65M04 83 GW5DGC27M04 84 GW5DGC30M04 84 GW5DGC50M04 84 GW5DGC50M04 84 GW5DGC65M04 84 GW5DGC65M04 84 GW5DGC65M04 84 GW5DGC65M04 84 GW5DGC65M04 84 GW5DGE27MR5 84 GW5DGE30MR5 84	IR2 IR2D071 29 IR2D20U 29 IR2D20U 29 IR2E49M 28 IR2E49U 28 IR2E56U6 28 IR2E63Yx 28 IR2E65U 29 IR2E66Vx 28 IR2E68Yx 28 IR2E68Yx 28 IR3M58M 18 IR3M58U 18
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84	IRM053U730
84	IRM065U730
84	IRM067U630
84	IRM068U730
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83	IS
84	IS471FE68
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84	IS486E68
	IS489E68
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	LH163Y17
	LH16DD17
	LH16DE17
29	LH16DH17
29	LH16DK17
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28	LK
28	LK600D3LB147
28	LK601R3LA197
28	LK816D3LA197
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29	LQ0
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	LQ043T3DG016
	LQ043T3DG026
18	LQ043T3DW036
18	LQ057Q3DC036
	LQ057V3LG116
	LQ070Y3DG3A6

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	LQ0841/3DG02 6
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	LQ231U1LW326
	LQ3
17	LQ315D1LG917
17	
17	LR0
	LR0G934 19
	LR0G938 19
7	LR0GC023
7	LR0GC05
7	
	LR3
	LR35501 19/20
36	LR35503 19/20
l6	LR366851 12
26	LR36B03A 12/15/16
36	LR36B14

LQ070Y3DG3B6

0Y3LG4A 6	
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4V3DG026	
4V1DG816	
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1S1LG816	

LQ231U1LW32	6
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Q315D1LG91	 7

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_R0G938	19
_R0GC023	31
_R0GC05	31

LR35501	19/20
LR35503	19/20
LR366851	12
LR36B03A	12/15/16
LR36B14	12/14
LR36B15	12
LR38627	12/15
LR38653	12/13
LR38654	12/13



LR38690A	12/16
LR388D1	18/21
LR388D8	18/21
LR388G9	18/21
LR388H0	17
LR388H3	17
LR388J4	18/21

PC1	
PC1231xNSZ0X	46
PC123XNNSZ0F	46
PC1S3021NTZF	52
PC1S3052NTZF	52
PC1S3063NTZF	52

Ρ	C2
-	

PC2SD11NTZAF	 51

PC3
PC352NJ0000F 44
PC354NJ0000F44
PC355NJ0000F44
PC357NJ0000F 44
PC364NJ0000F 44
PC365NJ0000F44
PC367NJ0000F44
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PC3H71xNIP0F45
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PC3HU7xYIP0B 45
PC3SD11NTZCF 51

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PC3SF21YVZBF	52
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PC3SH13YFZAX	51
PC3SH21YFZBX	52
PC3ST11NSZAX	51
PC3ST21NSZBX	52

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PC400J00000F	48
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PC410S0NIP0F	48
PC451J00000F4	14
PC452J00000F4	44
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PC457L0NIP0F	48
PC457S0NIP0F	48
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PC4SF21YVZCF	52

PC7
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PC817XNNSZ0F46
PC851XNNSZ0F46
PC852XNNSZ0F46
PC853XNNSZ0F46

PC9

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PC925LxNSZ0F	49
PC928J00000F	49
PC929J00000F	49
PC942J00000F	49

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PD100MF0MP72	
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PD411PI2E00F72	
PD412PI2E00F72	
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PQ035ZN1HZPH23	3
PQ070VK01FZH22	2

PQ070VK02FZH	22
PQ070XF01SZH	22
PQ070XHA2ZPH	24
PQ070XNA1ZPH	23
PQ070XNA2ZPH	23
PQ070XNAHZPH	23
PQ070XNB1ZPH	23

PQ1

PQ150RWA2SZH 22 PQ1CG2032RZH......26 PQ1CG3032RZH......26 PQ1CG38M2FZH 26 PQ1CG38M2RZH......26 PQ1CG41H2FZH 26 PQ1CN41H2ZPH25 PQ1CX41H2ZPQ25 PQ1CX53H2MPQ......25 PQ1CX61H1ZPQ25 PQ1CY1032ZPH25 PQ1CZ21H2ZPH......25 PQ1DC15C0P 30 PQ1DC15F1P...... 30 PQ1LAX95MSPQ 22 PQ1LAxx5MSPQ.....22



	PR26MF21NSZF54		RJ63YC100	8/9
PQ2	PR29MF11NSZF54	QM	RJ63YC200	
PQ200WN3MZPH 23	PR29MF12NSZF54	QM2A1UA00330	RJ64PC800	
PQ200WNA1ZPH 23	PR29MF21NSZF54	QM2A1UA00430	RJ64SC100	
	PR31MA11NTZF54		RJ64SC200	
PQ3	PR32MA11NTZF54	RJ	RJ6CBA100	
PQ30RV11J00H 22	PR33MF51NSZF54	RJ2311DB0PB11/13/14/15/16	RJ6CBA200	
PQ30RV21J00H 22	PR36MF12NSZF54	RJ2315DB0PB11/13/14/15/16		
PQ30RV31J00H 22	PR36MF21NSZF54	RJ2321DB0PB11/13/14/15/16	S1	
	PR36MF22NSZF54	RJ2325DB0PB11/13/14/15/16	S101S05F	55
PQ5	PR36MF51NSZF54	RJ2331AA0PB11	S101S06F	55
PQ5CM03P 26	PR39MF12NSZF54	RJ2341AA0PB11	S101S16F	55
	PR39MF21NSZF54	RJ2351CA0PB11/13/14/15/16	S102S01F	55
PQ6	PR39MF22NSZF54	RJ2355CA0PB11/13/14/15/16	S102S02F	55
PQ6CB11X1CP 28	PR39MF51NSZF54	RJ2361CA0PB11/13/14/15/16	S102S11F	55
PQ6CU12X2APQ 25	PR3BMF21NSZF54	RJ2365CA0PB11/13/14/15/16	S102S12F	55
	PR3BMF51NSKF54	RJ23E3BA0LT10/11	S102T01F	55
PQ7		RJ23W3EA0KT10/11	S102T02F	55
PQ7L2020BP 28	РТ	RJ23W3HA0LT10/11	S108T01F	55
PQ7L3010QPF 28	PT100MC0MP71	RJ23Y3BC0LT10/11	S108T02F	55
	PT100MF0MP71	RJ23Y3EA0LT10/11	S112S01F	55
PQx	PT100MF1MP71	RJ23Y3HA0LT10/11	S116S01F	55
PQxxxDNA1ZPH series	PT4800E0000F71	RJ23Z3BA0LT10/11	S116S02F	55
PQxxxENA1ZPH series	PT4800FE000F71	RJ2411CA0PB11/13		
PQxxxENAHZPH series 23	PT480E00000F71	RJ2411EA0PB11/13/14/15/16	S2	
PQxxxENB1ZPH series	PT480FE0000F71	RJ2411EB0PB11/13/14/15/16	S201S06F	
PQxxxGN01ZPH series	PT4810E0000F71	RJ2411FA0PB11/13/14/15/16	S202S01F	55
PQxxxGN1HZPH series 23	PT4810FJE00F71	RJ2421EB0PB11/13/14/15/16	S202S02F	
PQxxxRDA1SZH series	PT481E00000F71	RJ2421FA0PB11/13/14/15/16	S202S11F	
PQxxxRDA2SZH series	PT481FE0000F71	RJ2451CA0PB11/13/14/15/16	S202S12F	
	PT483F1E000F71	RJ2455CA0PB11/13/14/15/16	S202S15F	
PR	PT4850FE000F71	RJ2461CA0PB11/13/14/15/16	S202T01F	55
PR22MA11NTZF 54	PT491FE0000F71	RJ2465CA0PB11/13/14/15/16	S202T02F	55
PR23MF11NSZF54	PT493FE0000F71	RJ3331AA0PB11	S208T01F	55
PR26MF11NSZF 54		RJ3341AA0PB11	S208T02F	55
PR26MF12NSZF 54		RJ63VC2008/9	S212S01F	



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S216S02F	56
S2S3000F	51
S2S4000F	52
S2S5A00F	51

VA

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VA1P1CD840294
VA3A5JZ96796
VA3D5JZ70595
VA4A1BC503894
VA4D1JA2160 94/95
VA4M1DA516794
VA4M1EX6158 93
VA4M5JC211692/96
VA4M6JC210392/96
VA4N1BD110893
VA4N1CD1136 93
VA4S5DC5072

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Facility	Certificate No.	Date of Registration	Scope of Registered Activities
Headquarters and Associated Companies Group	EC97J1037	June 24, 1997	Research and development of electronic and electric products and general electronic components, sales and service activities, and general administration within the registered organization
Katsuragi Works	EC99J2006	June 25, 1996	Development, design and production of photovoltaic cells and electronic devices
Electronic Components and Devices Group (Fukuyama)	EC99J2016	September 24, 1996	The manufacture of IC (Memory, Logic, etc.)
Advanced Development and Planning Center	EC99J2038	December 3, 1996	Research and development, production engineering development and promotion, design and manufacture of electronic devices The manufacture of compact LCD panels
Mie Plant	EC99J2051	January 28, 1997	Development, design and manufacture of LCDs
Kameyama Plant	EC04J0284	October 12, 2004	Production and development of Large LCD TVs
Electronic Components and Devices Group (Mihara)	20002660 UM	November 17, 2003	Design, development and manufacture of laser diodes, hologram laser and LED devices and printed wiring board, design of optical pick-up units



The following groups of Sharp Corporation have been certified under the ISO 9001:2008 international standard for quality management systems.

Certifying organization: Japan Quality Assurance Organization (JQA) [JAB certified]

Group	Certificate No.	Scope of Registered Activities
Electronic Components and Devices Group*1	JQA-QM8688	The design / development and manufacture of integrated circuits The design / development and manufacture of RF devices The design / development and manufacture of Opto-electronic devices The design / development and manufacture of module The design / development and manufacture of printed circuit board The design / development and manufacture of LEDs The design / development and manufacture of laser diodes, hologram laser The design / development and manufacture of optical pick-ups
Liquid Crystal Display Group	JQA-QMA11778	 Design, development and manufacture of LCD panels Design and development of LCD modules
General Manager, Display Device Business*2	JQA-QM3776	Design, development, and manufacture of LCD panels and modules

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*1 This Group designates Sharp Takaya Electronics Industry Co., Ltd. (JQA-AU0212) as an ISO/TS16949: 2009 management system registered facility with regard to design, development and manufacture of camera units for vehicle use, with registration as a management system support division.

*2 The Group name has been changed from Liquid Crystal Display Group as of April 1, 2011 (The above information is current as of June 2011.)





The contents of this catalog are current as of December 2011.



Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;

- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);

- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;

- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком):

- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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