SHARP

Electronic Components

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March 2014

For Your Creative Products

ELECTRONIC COMPONENTS

2014-03

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■ 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/m²) (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	16.19 M 6-bit + 2-bit FRC	450	CMOS	0.8	76.9 × 63.9 × 4.7	TYP. 42	Long-life LED backlight
9.4 [3.7]	☆LS037V7DW05	480 × RGB × 640	0.117 × 0.117	56.16 × 74.88	16.77 M 8-bit RGB	250	CMOS	0.36	65.0 × 89.2 × 4.4	48	Advanced Super V, Advanced TFT-LCD, With resistive touch panel
	☆LS037V7DW06					300			65.0 × 89.2 × 3.6	38	Advanced Super V, Advanced TFT-LCD
11 [4.3]	LQ043T1DG28	480 × 272 × RGB	0.198 × 0.198	95.04 × 53.856	260 k 6-bit RGB	300	CMOS	0.63	105.5 × 67.2 × 4.2	51	With resistive touch panel
	LQ043T1DG29					360			105.5 × 67.2 × 3.1	36	
14 [5.7]	LQ057Q3DC03	320 × 240 × RGB	0.36 × 0.36	115.2 × 86.4	260 k 6-bit RGB	500	CMOS	2.5	144.0 × 104.6 × 12.3	210	Long-life LED backlight, Built-in LED backlight driver circuit
16 [6.4]	LQ064V3DG06	640 × 480 × RGB	0.204 × 0.204	130.56 × 97.92	260 k 6-bit RGB	350	CMOS	3.0	161.3 × 117.0 × 12.0	TYP. 200	Long-life LED backlight, Built-in LED backlight driver circuit
21 [8.4]	LQ084V1DG43	640 × RGB × 480	0.267 × 0.267	170.88 × 128.16	260 k 6-bit RGB	300	CMOS	4.7	221.0 × 152.4 × 9.3	340	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ084S3LG03	800 × RGB × 600	0.213 × 0.213	170.4 × 127.8	16.19 M 6-bit + 2-bit FRC	330	LVDS	4.1	199.5 × 154.0 × 11.6	320	Long-life LED backlight, Built-in LED backlight driver circuit
26 [10.4]	LQ104V1DG81/LG81	640 × RGB × 480	0.33 × 0.33	211.2 × 158.4	260 k 6-bit RGB	450	CMOS/ LVDS	5.6	246.5 × 179.3 × 12.5	TYP. 500	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ104S1LG81	800 × RGB × 600	0.264 × 0.264			420	LVDS	6.1		500	Long-life LED backlight, Built-in LED backlight driver circuit
31 [12.1]	LQ121S1LG81	800 × RGB × 600	0.3075 × 0.3075	246.0 × 184.5	260 k 6-bit RGB	450	LVDS	5.1	276.0 × 209.0 × 9.1	600	Long-life LED backlight, HV mode*2, Built-in LED backlight driver circuit
	LQ121S1LG84										Long-life LED backlight, DE mode*3, Built-in LED backlight driver circuit
	LQ121S1LG86					1 500		12.9			Long-life LED backlight, Built-in LED backlight driver circuit

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.

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☆New product
★Under development

RoHS

■ LCD Modules

<For industrial appliances> (cont'd)

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/m²) (TYP.)	Interface	Power con-sumption (W) (TYP.)	Outline dimensions*1 W × H × D (mm) (TYP.)	Weight (g) (MAX.)	Remarks
38 [15.0]	LQ150X1LG11	1 024 × RGB × 768	0.297 × 0.297	304.1 × 228.1	16.19 M 6-bit + 2-bit FRC	600	LVDS	8.2	331.6 × 254.7 × 9.3	950	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ150X1LG91					350		6.8	326.5 × 253.5 × 9.6		Long-life LED backlight, Built-in LED backlight driver circuit
	☆LQ150X1LX95				16.19 M 6-bit RGB + 2-bit FRC			12.414			Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
	LQ150X1LW12				10 M 6-bit + 2-bit FRC			10.2	331.6 × 254.7 × 9.3		Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
48 [19.0]	LQ190E1LX51	1 280 × RGB × 1 024	0.294 × 0.294	376.32 × 301.056	16.77 M 8-bit RGB	1 000	2ch LVDS	75	404.2 × 330.0 × 34.0	2 600	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
	LQ190E1LW52					300		15.3	404.2 × 330.0 × 15.0	1 850	Advanced Super V, Long-life LED backlight
	★LQ190E1LX75					(350)	2ch LVDS	(27.5)	396.0 × 323.7 × 11.5	(1 500)	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
	☆LQ190N1LW01	1 680 × RGB × 1 050	0.24375 × 0.24375	409.5 × 255.9375		300		20.2	444.0 × 283.3 × 15.5	1 600	
51 [20.1]	☆LQ201U1LW31	1 600 × XYZ × 1 200	0.255 × 0.255	408.0 × 306.0	256 gray scale 8-bit	1 000	2ch LVDS	T.B.D.	436.0 × 335.0 × 20.4	T.B.D.	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Monochrome
59 [23.1]	LQ231U1LW32	1 600 × RGB × 1 200	0.294 × 0.294	470.4 × 352.8	16.77 M 8-bit RGB	500	LDI	65.5	530.0 × 431.5 × 23.9	4 500	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit

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☆New product

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<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/m²) (TYP.)	Interface	Outline dimensions*2 W × H × D (mm) (TYP.)	Backlight	Remarks
80.0 [31.5]	☆LQ315D1LG9N	8 294 400	3 840 × RGB × 2 160	697.92 × 392.58	1.07B 10-bit	450	8ch-LVDS*3	733.0 × 428.6 × 57.0*4	Direct-lit LED (built-in driver)	Super-high resolution and low power consumption achieved by using IGZO*5 LCD: 90 W (Typ.), Wide viewing angle: L/R 176°/ U/D 176°, Response time [G to G]: 8 ms (Typ.)
152.5 [60]	LK601R3LA19	8 294 400	3 840 × RGB × 2 160	1 330.56 × 748.44	1.06B 8-bit + 2-bit FRC	450	8ch-LVDS*3	1 380.0 × 790.0 × 106.6	Direct-lit LED (built-in driver)	Ultraviolet-induced Multi-domain Vertical Alignment LCD, High resolution, 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 (Typ.)

*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).
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CMOS CAMERA MODULES ROAD MAP

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■ CMOS Camera Modules Road Map

Image format	~2012	2013	2014
13M		RJ63AC400: 1/3.06 type 0.75 cc; Built-in optical image stabilization and auto focus functions; 11.0 x 11.0 x 6.18 RJ63AC500: 1/3.06 type 0.45 cc; Built-in auto focus function; 8.5 x 8.5 x 6.18 RJ63AC100: 1/3.06 type 0.67 cc; Built-in optical image stabilization and auto focus functions; 11.0 x 11.0 x 5.53 RJ63AC200: 1/3.06 type 0.40 cc; Built-in auto focus function; 8.5 x 8.5 x 5.53	★RJ63ACL00: 1/3 type 0.47 cc; Built-in optical image stabilization and auto focus functions; 9.5 x 9.5 x 5.18
8M	RJ63VC200: 1/3.2 type 0.42 cc; Built-in auto focus function; 8.52 x 8.52 x 5.8 RJ64VC100: 1/4 type 0.23 cc; Built-in auto focus function; 7.0 x 7.0 x 4.7		★RJ64VC300: 1/4 type 0.29 cc; Built-in auto focus function; 8.5 x 8.5 x 4.05
2M		RJ67NA100: 1/7 type 0.07 cc; 4.5 x 5.0 x 2.96	☆RJ67NA300: 1/7 type 0.07 cc; 4.5 x 5.0 x 2.99
1.2M	RJ68JA100: 1/8 type 0.07 cc; 5.0 x 5.0 x 2.95		
VGA		RJ6CBA600: 1/13 type 0.03 cc; 3.5 x 3.1 x 2.7	

Model No.
Optical format & volume
Outline dimensions (D x W x H) TYP. (mm)

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★Under development

■ CMOS Camera Modules

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

Optical format	Image format	Optical function	Model No.	Video performance	Output pixels (H x V) MAX.	Lens			Output signal	Supply voltage (V) TYP.	Outline dimensions (D x W x H) TYP. (mm)	Package*1
						F No.	Configu-ration	Horizon-tal viewing angle (°)				
1/3.06 type	13M	OIS*2 function, auto focus function	★RJ63ACL00	30 fps at 13M (Normal/HDR) 60 fps at 1 080p (Normal/HDR)	4 208 x 3 120	F2.0	5 pcs.	64	RAW (Mipi, 4 lanes)	3.0/2.7/ 1.8/1.0	9.5 x 9.5 x 5.18	FPC type
			RJ63AC400	24 fps at 13M 60 fps at 1 080p	4 200 x 1 320	F1.9	6 pcs.	59		2.7/1.8/ 1.05	11.0 x 11.0 x 6.18	
		Auto focus function	RJ63AC500								8.5 x 8.5 x 6.18	
		OIS*2 function, auto focus function	RJ63AC100	15 fps at 13M 60 fps at 1 080p	4 224 x 3 136	F2.5	5 pcs.	64		2.7/1.8/ 1.2	11.0 x 11.0 x 5.53	
		Auto focus function	RJ63AC200								8.5 x 8.5 x 5.53	
1/3.2 type	8M	Auto focus function	RJ63VC200	15 fps at 8M 60 fps at 720p	3 280 x 2 464	F2.4	5 pcs.	59	RAW (Mipi, 2 lanes)	2.8/1.8 (I/O: 1.8 or 2.8)	8.52 x 8.52 x 5.8	
1/4 type	8M	Auto focus function	RJ64VC100	23 fps at 8M 30 fps at 1 080p	3 296 x 2 480	F2.4	4 pcs.	63	RAW (Mipi, 2 lanes)	2.7/1.8/ 1.2	7.0 x 7.0 x 4.7	
			★RJ64VC300	30 fps at 1 080p	3 264 x 2 448		5 pcs.	67		2.8/1.8/ 1.2	8.5 x 8.5 x 4.05	
1/7 type	2M	—	☆RJ67NA300	60 fps at 1 080p	1 976 x 1 200	F2.4	4 pcs.	80	RAW (Mipi, 2 lanes)	2.8/1.8/ 1.2	4.5 x 5.0 x 2.99	
			RJ67NA100				3 pcs.	61		2.8/1.8/ 1.2 (I/O: 1.8 or 2.8)	4.5 x 5.0 x 2.96	
1/8 type	1.2M		RJ68JA100	30 fps at 720p	1 280 x 960	F2.8	2 pcs.	47	UYVY (Mipi, 1 lane)		5.0 x 5.0 x 2.95	
1/13 type	VGA		RJ6CBA600	30 fps at VGA	640 x 480	F3.0	1 pcs.	48	UYVY (Parallel/ Mipi, 1 lane)	2.8/1.8 (I/O: 1.8 or 2.8)	3.5 x 3.1 x 2.7	25WL-CSP

*1 Contact a SHARP sales office regarding FPC type package.
*2 OIS: Optical image stabilization
Additional OIS driver and gyro sensor is necessary.

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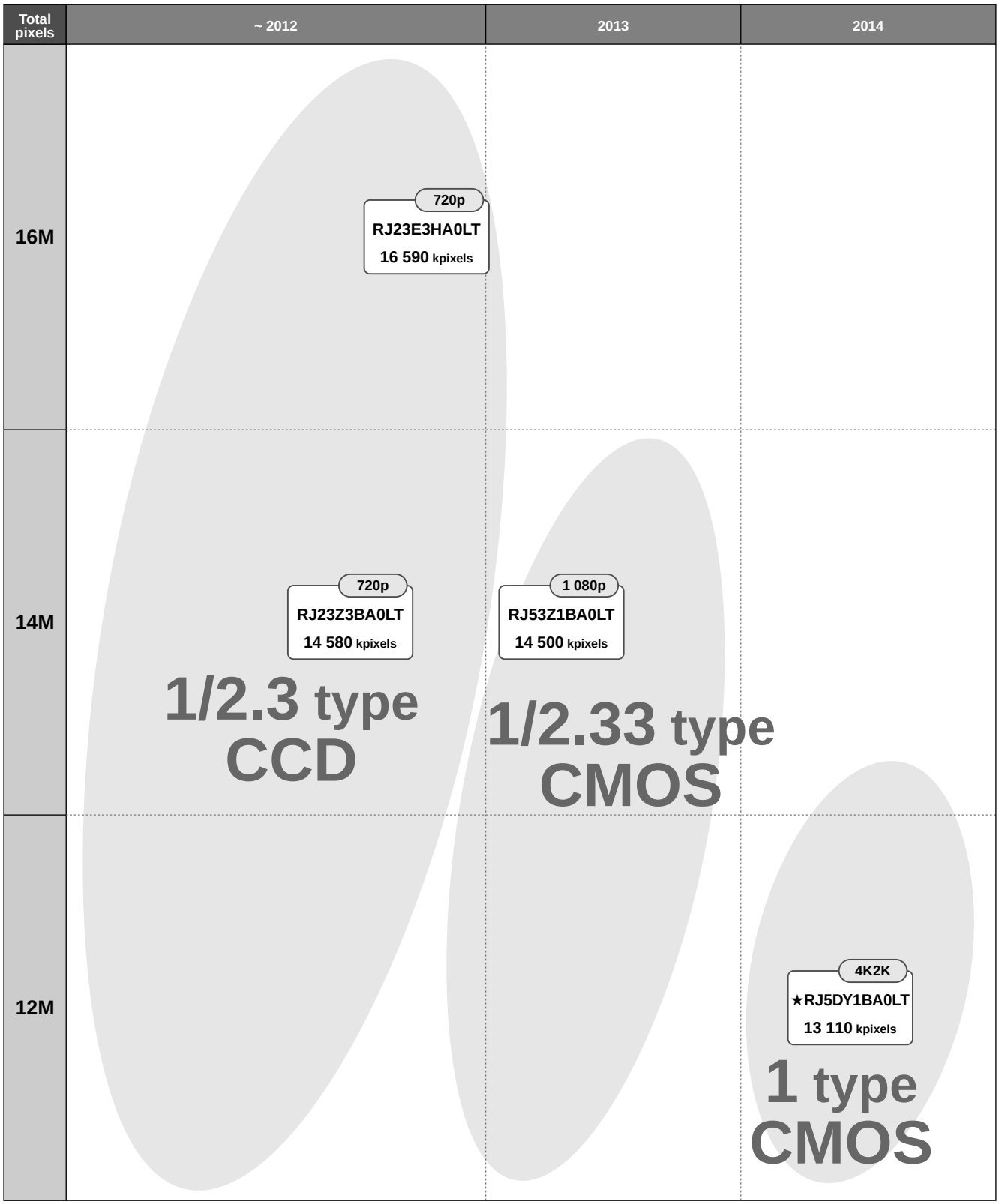
ROAD MAP FOR HIGH-RESOLUTION CCDs/CMOSs FOR DIGITAL CAMERAS/DIGITAL CAMCORDERS

★Under development

■ Road Map for High-Resolution CCDs/CMOSs for Digital Cameras/Digital Camcorders



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High-Resolution Image Sensors for Digital Cameras/Digital Camcorders

■ High-Resolution CCDs

Optical format	Total pixels	Color filter	Model No.	Video performance	Resolution Image pixels (H x V)	Pixel size H x V (μm²)	Sensitivity (mV) TYP.	Smear ratio (dB) TYP.	Package
1/2.3 type	14 580 k	R, G, B primary color mosaic filters	RJ23Z3BA0LT	720p 30 fps	4 360 x 3 272	1.43 x 1.43	105	–86	N-LCC040-R350
	16 590 k		RJ23E3HA0LT	720p 30 fps	4 648 x 3 488	1.34 x 1.34	125	–87	

■ High-Resolution CMOSs

Optical format	Total pixels	Color filter	Model No.	Video performance	Resolution Image pixels (H x V)	Pixel size H x V (μm²)	Sensitivity (mV/Lux-sec) TYP.	Package
1/2.33 type	14 500 k	R, G, B primary color mosaic filters	RJ53Z1BA0LT	1 080p 60 fps	4 352 x 3 264	1.4 x 1.4	380	P-LCC072-S394
1 type	13 110 k		★RJ5DY1BA0LT	4K2K 60 fps	4 144 x 3 096	3.1 x 3.1	1 170	N-LCC120-R898

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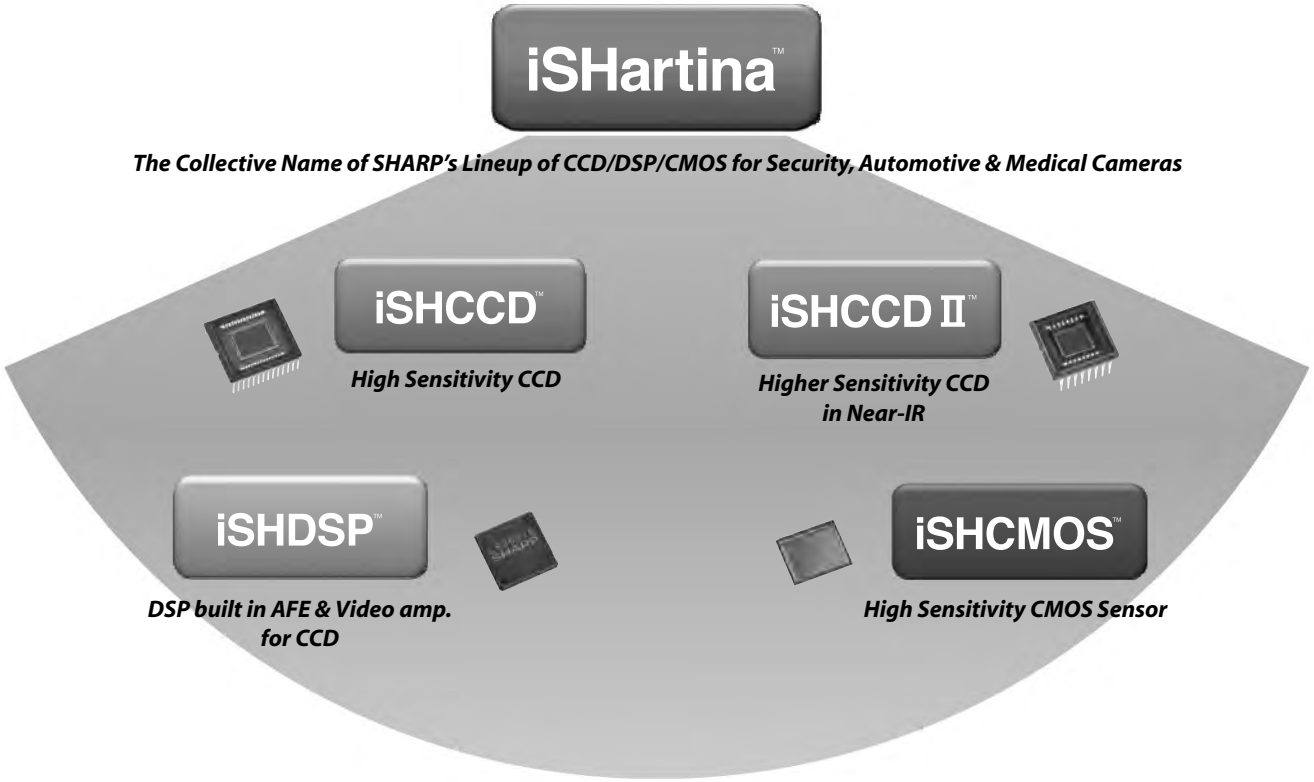
■ Image Sensor Related Devices for Security, Automotive and Medical Cameras

Sharp introduces a new line of image sensor related devices for security, automotive and medical cameras under the name of "iSHartina", hoping to provide safety and reassurance with our high-performance devices.

●Brand portfolio



iSHCCD

The "iSHCCD" is the CCD image sensor that introduced high-sensitivity and high-efficiency technologies developed by Sharp.

iSHCCD II

The "iSHCCD II" is an advanced CCD image sensor that drastically improves light efficiency by including the near-infrared light region as a basic structure of "iSHCCD".

iSHDSP

The "iSHDSP" provides outstanding image quality with high-performance video signal processing, and is suitable with "iSHCCD" and "iSHCCD II" developed by Sharp.

iSHCMOS

The "iSHCMOS" is a CMOS image sensor that has the advantage of a high-sensitivity and wide-dynamic range developed for security, automotive and medical cameras.

"iSHCCD", "iSHCCD II", "iSHDSP", "iSHCMOS" and "iSHartina" are trademarks of SHARP Corporation.

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High-Sensitivity Image Sensors for Security Usage

■ Progressive CCDs

Optical format	Total pixels	Model No.		Video function	Color filter	Resolution: Image pixels (H x V)	Pixel size H x V (μm²)	Sensitivity*1 (mV) TYP.	Smear ratio (dB) TYP.	Package
1/3 type	520 k	RJ3331AA0PB	—	NTSC 650 TV lines	Complementary color	976 x 494	5.0 x 7.4	1 500	–120	P-DIP016-0450
	610 k	RJ3341AA0PB		PAL 650 TV lines	Complementary color	976 x 582	5.0 x 6.3			
	1 350 k	RJ33J3BA0DT	iSHCCD	720p 30 fps	Primary color	1 320 x 976	3.75 x 3.75	790	–120	P-DIP024-0400
		☆RJ33J4BA0DT			B/W			1 190		
		☆RJ33J3CA0DT	iSHCCD II		Primary color			950		
		★RJ33J4CA0DT			B/W			1 430		
	2 170 k	★RJ33N3AA0LT		1 080p 25 fps	Primary color	1 928 x 1 088	2.8 x 2.8	470	–110	N-LCC040-R350B
		★RJ33N3AD0LT		1 080p 50 fps (2 ch output)	Primary color					
1/1.8 type	2 100 k	RJ31N3AA0DT	iSHCCD	2M 25 fps	Primary color	1 644 x 1 236	4.4 x 4.4	1 100	–120	P-DIP028-0566
		RJ31N4AA0DT			B/W			1 650		
	2 130 k	RJ31N3AD0DT		2M 50 fps (2 ch output)	Primary color			1 100		
		RJ31N4AD0DT			B/W			1 650		
2/3 type	5 240 k	☆RJ32S3AA0DT	iSHCCD	5M 9 fps	Primary color	2 456 x 2 058	3.45 x 3.45	530	–110	
		☆RJ32S4AA0DT			B/W			800		
		☆RJ32S3AD0DT		5M 15 fps (2 ch output)	Primary color			530		
		☆RJ32S4AD0DT			B/W			800		

*1 The average output voltage (G signal in the case of the primary color filter) when a 1,000-lux light source with a 90% reflector is imaged by a lens of F4, f50 mm at 1/30 sec (1/25 sec in the case of RJ3341AA0PB) frame accumulation.

iSHCCD: The "iSHCCD" is the CCD image sensor that introduced high-sensitivity and high-efficiency technologies developed by Sharp.
iSHCCD II: The "iSHCCD II" is an advanced CCD image sensor that drastically improves light efficiency by including the near-infrared light region as a basic structure of "iSHCCD".

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■ 1/3-type CCDs

Total pixels	Standard		Model No.		Resolution		Pixel size H x V (μm²)	Sensitivity*1 (mV) TYP.	Smear ratio (dB) TYP.	Package
					Horizontal TV lines	Image pixels (H x V)				
270 k	Color	NTSC	RJ2315DB0PB	—	330	512 x 492	9.6 x 7.5	2 900	–135	P-DIP016-0450
			RJ2315EA0PB	iSHCCD				4 200	–140	
320 k		PAL	RJ2325DB0PB	—		512 x 582	9.6 x 6.34	2 900	–135	
			RJ2325EA0PB	iSHCCD				4 200	–140	
410 k		NTSC	RJ2351CA0PB	—	480	768 x 494	6.4 x 7.5	2 000	–120	
			RJ2355CA0PB	—				1 800	–130	
			RJ2355DA0PB	iSHCCD				2 700	–135	
			☆RJ2355EA0PB	iSHCCD II				3 000	–135	
470 k		PAL	RJ2361CA0PB	—		752 x 582	6.53 x 6.39	2 000	–120	
			RJ2365CA0PB	—				1 800	–130	
			RJ2365DA0PB	iSHCCD				2 700	–135	
			☆RJ2365EA0PB	iSHCCD II				3 000	–135	
520 k		NTSC	RJ2331AA0PB	—	650	976 x 494	5.0 x 7.4	2 000	–120	
			RJ2331BA0PB	iSHCCD				2 400	–125	
			RJ2331CA0PB	iSHCCD II				2 600	–125	
610 k		PAL	RJ2341AA0PB	—		976 x 582	5.0 x 6.3	2 000	–120	
			RJ2341BA0PB	iSHCCD				2 400	–125	
			RJ2341CA0PB	iSHCCD II				2 600	–125	

*1 The average output voltage measured when imaging a 90% reflector illuminated by a 1,000-lux light source through an optical system set at an f number of F4.0.

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iSHCCD II: The “iSHCCD II” is an advanced CCD image sensor that drastically improves light efficiency by including the near-infrared light region as a basic structure of “iSHCCD”.

■ 1/3.8-type CCD

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

*1 The average output voltage measured when imaging a 90% reflector illuminated by a 1,000-lux light source through an optical system set at an f number of F4.0.

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■ 1/4-type CCDs

Total pixels	Standard		Model No.		Resolution		Pixel size H x V (μm²)	Sensitivity*1 TYP. (mV)	Smear ratio TYP. (dB)	Package
					Horizontal TV lines	Image pixels (H x V)				
270 k	Color	NTSC	RJ2411EB0PB	—	330	512 x 492	7.2 x 5.6	1 200	–130	P-DIP014-0400A
			RJ2411FA0PB	—				1 800		
320 k		PAL	RJ2421EB0PB	—		512 x 582	7.2 x 4.73	1 100	–130	
			RJ2421FA0PB	—				1 650		
410 k		NTSC	RJ2455CA0PB	—	480	768 x 494	4.9 x 5.6	900	–114	
			RJ2455DA0PB	iSHCCD				1 350	–120	
			☆RJ2455EA0PB	iSHCCD II				1 600		
470 k		PAL	RJ2461CA0PB	—		752 x 582	5.0 x 4.77	900	–114	
			RJ2465CA0PB	—						
			RJ2465DA0PB	iSHCCD				1 350	–120	
			☆RJ2465EA0PB	iSHCCD II				1 600		
520 k		NTSC	RJ2431AA0PB	iSHCCD	650	976 x 494	3.75 x 5.56	1 400	–120	
610 k		PAL	RJ2441AA0PB	iSHCCD		976 x 582	3.75 x 4.47			

*1 The average output voltage measured when imaging a 90% reflector illuminated by a 1,000-lux light source through an optical system set at an f number of F4.0.

iSHCCD: The “iSHCCD” is the CCD image sensor that introduced high-sensitivity and high-efficiency technologies developed by Sharp.
iSHCCD II: The “iSHCCD II” is an advanced CCD image sensor that drastically improves light efficiency by including the near-infrared light region as a basic structure of “iSHCCD”.

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■ DSPs for CCDs

Description	Model No.		Features		Package
V driver + CDS/PGA/ADC + DSP	LR38653	—	For 270-k/320-k/410-k/ 470-kpixel CCDs	<V driver> Vertical pulse driver for CCDs, 2-level output x 2, 3-level output x 2, 2-level output circuit for electronic shutter <CDS/PGA/ADC> 25 MHz, high-speed S/H circuit, high-gain PGA circuit, 12-bit ADC <DSP> 10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, lens shading correction function, auto white blemish compensation function, mirror image function, YUV digital output, NTSC/PAL analog output	P-LFBGA171-0811
	LR38654	—	For 270-k/290-k/320-k/410-k/ 470-kpixel CCDs	<V driver> Vertical pulse driver for CCDs, 2-level output x 2, 3-level output x 2, 2-level output circuit for electronic shutter <CDS/PGA/ADC> 25 MHz, high-speed S/H circuit, high-gain PGA circuit, 12-bit ADC <DSP> 10-bit DAC, synchronous signal generation circuit, CCD drive timing generator, AE control function, AWB control function, lens shading correction function, auto white blemish compensation function, mirror image function, electronic optical axis adjustment function*1, YUV digital output, NTSC/PAL analog output	P-LFBGA171-0811
CDS/PGA/ADC + DSP	LR36B15	iSHDSP™	For 270-k/320-k/410-k/ 470-kpixel CCDs	<CDS/PGA/ADC> 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	P-HQFN064-0909
	LR36B16	iSHDSP™	For 270-k/320-k/410-k/470-k/ 520-k/610-kpixel CCDs	<CDS/PGA/ADC> 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, DWDR (gamma transition function), lens shading correction function, auto white blemish compensation function, mirror image function, OSD function (5 languages: En., Ch., Fr., Por., Sp.), privacy mask function, highlight compensation, motion detection function, 2D noise reduction, high resolution function, AF detection value output, NTSC/PAL analog output, Y/C analog output, UYVY digital output (ITU-R BT656 compatible)	P-HQFN072-1010

*1 Support for only 290-kpixel CCD.

iSHDSP: The “iSHDSP” provides outstanding image quality with high-performance video signal processing, and is suitable with “iSHCCD” and “iSHCCD II” developed by Sharp.

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■ CCD Peripheral ICs/LSIs

Description	Model No.	Features		Package
Power supply IC for CCDs and peripheral ICs/LSIs	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-VQFN032-0505
	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	

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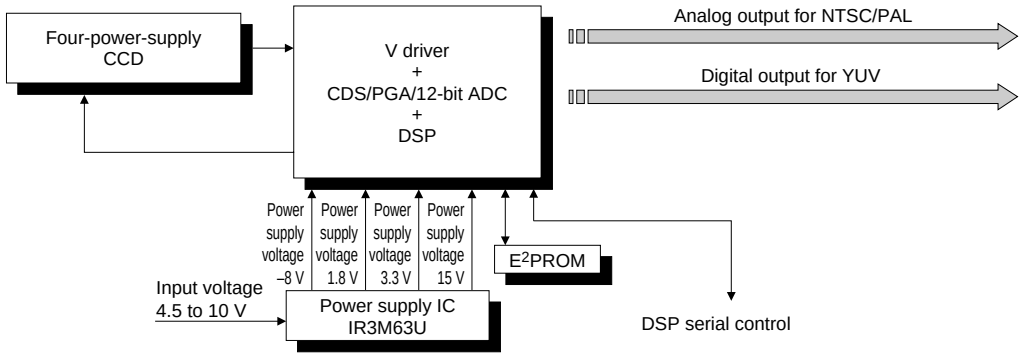
●System Configuration Examples

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



* This system shows the configuration example for LR38654 below.

Four-power-supply CCDs and peripheral IC/LSIs

CCD			V driver + CDS/PGA/ADC + DSP	Power supply IC
1/3 type	270 kpixels	RJ2315DB0PB	LR38653/LR38654	—
		RJ2315EA0PB		
	320 kpixels	RJ2325DB0PB		
		RJ2325EA0PB		
	410 kpixels	RJ2351CA0PB		IR3M63U
		RJ2355CA0PB		
		RJ2355DA0PB		
		☆RJ2355EA0PB		
	470 kpixels	RJ2361CA0PB		
		RJ2365CA0PB		
		RJ2365DA0PB		
		☆RJ2365EA0PB		
1/3.8 type	290 kpixels	RJ2411CA0PB	LR38654	
1/4 type	270 kpixels	RJ2411EB0PB	LR38653/LR38654	
		RJ2411FA0PB		
	320 kpixels	RJ2421EB0PB		
		RJ2421FA0PB		
	410 kpixels	RJ2455CA0PB		
		RJ2455DA0PB		
		☆RJ2455EA0PB		
	470 kpixels	RJ2461CA0PB		
		RJ2465CA0PB		
		RJ2465DA0PB		
		☆RJ2465EA0PB		

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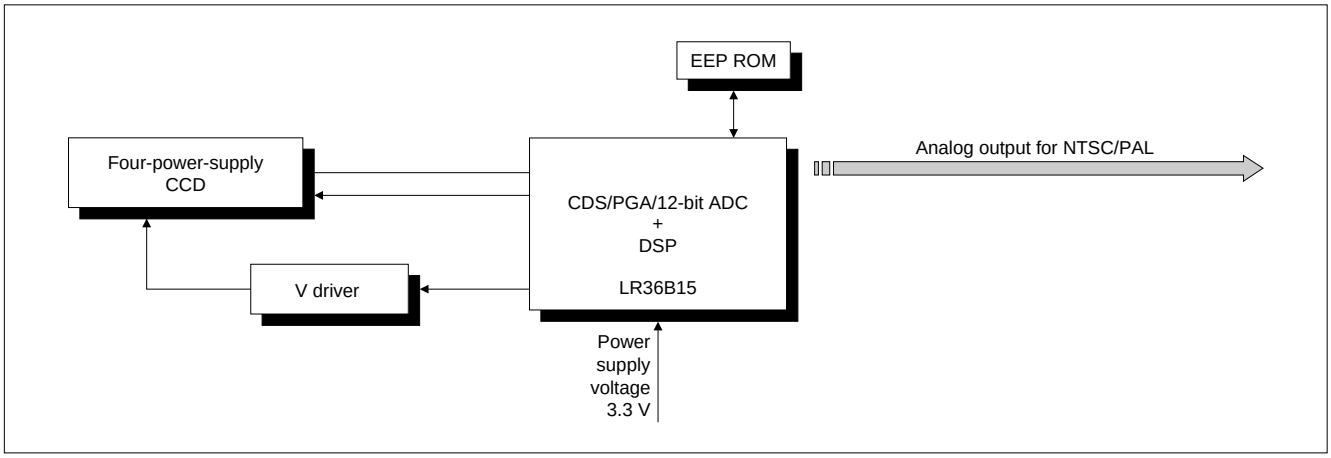
<Color Security Camera System with Three-chip Configuration (I)>



Four-power-supply CCDs and peripheral ICs/LSIs

CCD			CDS/PGA/ADC + DSP + Video amplifier
1/3 type	270 kpixels	RJ2315DB0PB	LR36B15
		RJ2315EA0PB	
	320 kpixels	RJ2325DB0PB	
		RJ2325EA0PB	
	410 kpixels	RJ2351CA0PB	
		RJ2355CA0PB	
		RJ2355DA0PB	
		☆RJ2355EA0PB	
	470 kpixels	RJ2361CA0PB	
		RJ2365CA0PB	
		RJ2365DA0PB	
		☆RJ2365EA0PB	
1/4 type	270 kpixels	RJ2411EB0PB	
		RJ2411FA0PB	
	320 kpixels	RJ2421EB0PB	
		RJ2421FA0PB	
	410 kpixels	RJ2455CA0PB	
		RJ2455DA0PB	
		☆RJ2455EA0PB	
	470 kpixels	RJ2461CA0PB	
		RJ2465CA0PB	
		RJ2465DA0PB	
		☆RJ2465EA0PB	

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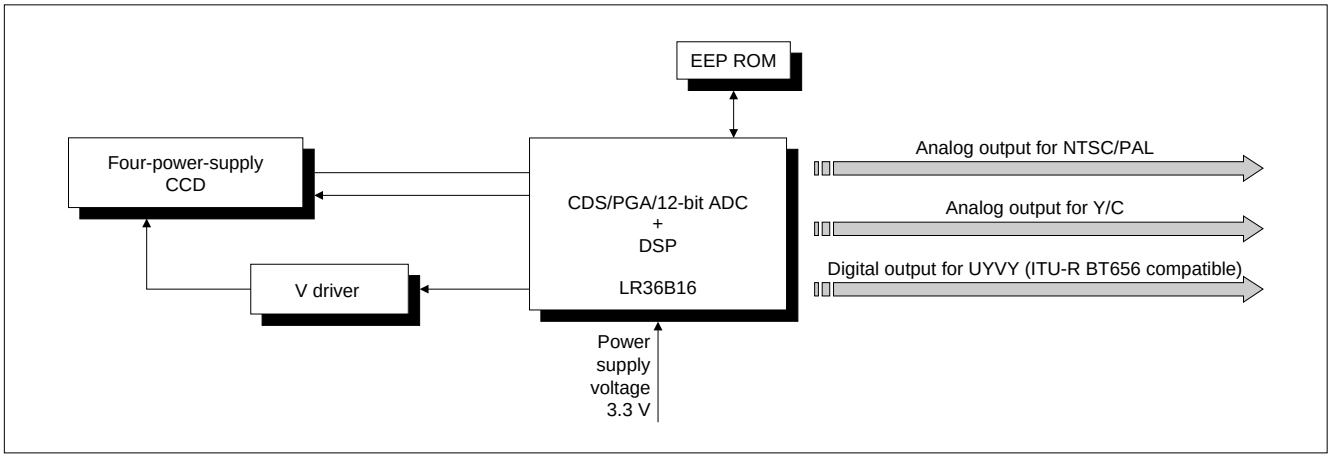
RoHS

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



Four-power-supply CCDs and peripheral ICs/LSIs

CCD			CDS/PGA/ADC + DSP + Video amplifier
1/3 type	270 kpixels	RJ2315DB0PB	LR36B16
		RJ2315EA0PB	
	320 kpixels	RJ2325DB0PB	
		RJ2325EA0PB	
	410 kpixels	RJ2351CA0PB	
		RJ2355CA0PB	
		RJ2355DA0PB	
		☆RJ2355EA0PB	
	470 kpixels	RJ2361CA0PB	
		RJ2365CA0PB	
		RJ2365DA0PB	
		☆RJ2365EA0PB	
	520 kpixels	RJ2331AA0PB	
		RJ2331BA0PB	
		RJ2331CA0PB	
	610 kpixels	RJ2341AA0PB	
		RJ2341BA0PB	
		RJ2341CA0PB	
1/4 type	270 kpixels	RJ2411EB0PB	
		RJ2411FA0PB	
	320 kpixels	RJ2421EB0PB	
		RJ2421FA0PB	
	410 kpixels	RJ2455CA0PB	
		RJ2455DA0PB	
		☆RJ2455EA0PB	
	470 kpixels	RJ2461CA0PB	
		RJ2465CA0PB	
		RJ2465DA0PB	
		☆RJ2465EA0PB	
	520 kpixels	RJ2431AA0PB	
	610 kpixels	RJ2441AA0PB	

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■ 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 color object detector • Built-in Bluetooth® HCI controller • Built-in sound generator (ADPCM/PSG) • Built-in CMOS camera interface (9 MHz) • CPU: Z80 compatible, 27 MHz • 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

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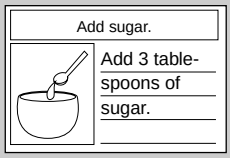
■ One-chip Graphic Controller <LR35501/LR35503>

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.

Common features

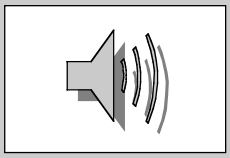
Built-in versatile graphic functions



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

Graphic expression with smooth movement is possible

Sound output



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

Warning using realistic alarm tone / audio is possible

CMOS camera interface

- CIF/QVGA UYVY input

CIF/QVGA CMOS imager can be connected

Bluetooth®

- Built-in HCI controller
- SPP, HID compliant

Smooth images transmission achieved by using Bluetooth®

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

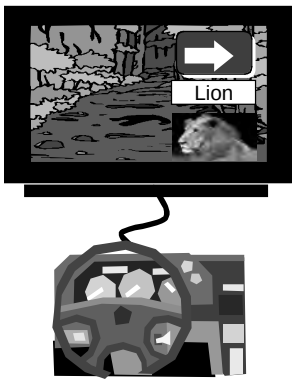
LR35501 features and functions

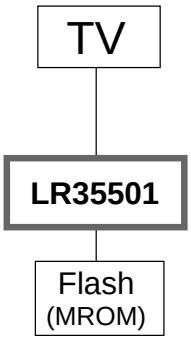
- Built-in video encoder (NTSC/PAL)
- Built-in analog RGB output
- Built-in composite video output

LR35503 features and functions

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

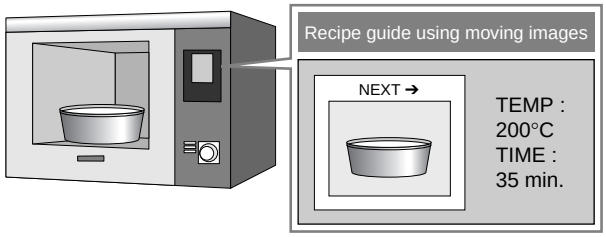
Intellectual training toy
(Driving game)



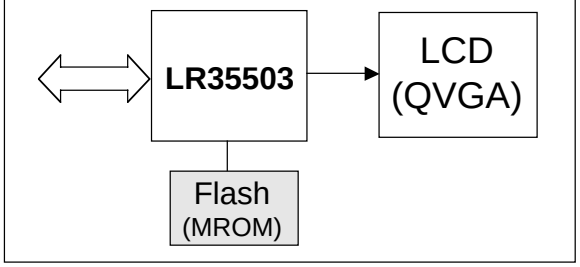


Directly connected to TV (composite) output

Household electrical appliance



Smooth graphics achieved by simple circuits



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System LSIs

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■ Touch Panel System

●Features

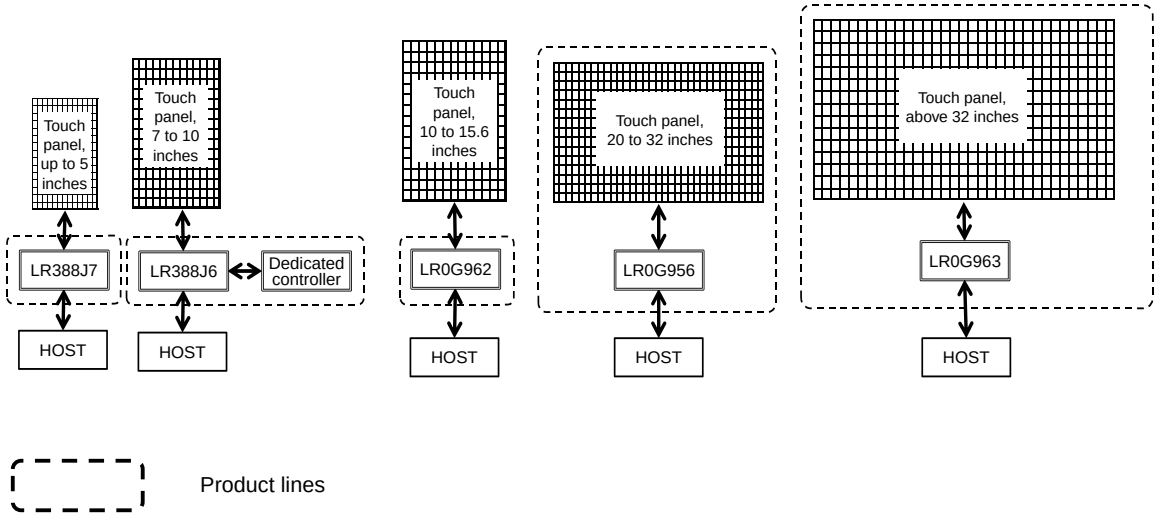
1. By adopting Sharp's proprietary method, approximately eight times more sensitivity (comparison by Sharp) has been achieved compared with the conventional sequential driving method.*
Capable of sensing a ϕ2 mm pen touch, multi-touch operation and touch operation using a glove.

2. Contributes to a thinner design of a touch panel display.
A thinner design is achievable because the design is insusceptible to the noise effect, which makes space for the sensor sheets and the display modules unnecessary.

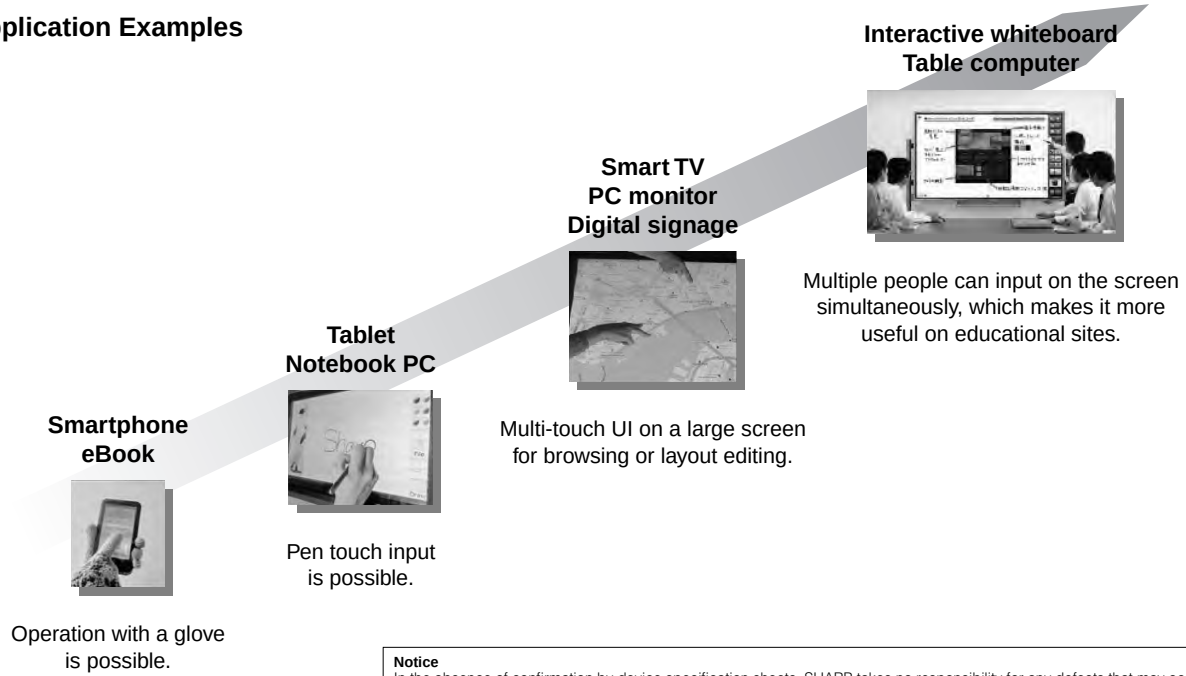
3. Common user interface from small to large screens allows for a reduction in software development cost.

* When comparing an S/N ratio of 3.58 determined through the conventional sequential driving method using pen-touch writing on a 20-inch screen with an S/N ratio of 30.65 determined through Sharp's proprietary parallel driving method (measured by Sharp).

●System Configuration



●Application Examples



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★Under development RoHS

■ Touch Panel System / System LSIs

Model No.	Function	Features	Supply voltage (V)	Package
★LR388J7	Touch panel controller for small-size screens (up to 6 inches)	• 5-finger multi-touch detection • Scanning speed: 120 Hz • Capable of sensing a ϕ2 mm pen touch • I²C/SPI interface	I/O: 1.8±0.18 Analog: 2.6 to 3.6	P-VFBGA96P-0606
LR388J6	Touch panel controller for tablets (up to 10 inches)	• 10-finger multi-touch detection • Scanning speed: 120 Hz • Capable of sensing a ϕ2 mm pen touch • I²C/SPI interface • Use with dedicated controller (LR0P751)	Core: 1.8±0.15 I/O: 3.3±0.3 Analog: 3.3±0.3	P-VFBGA176P-0909

■ Touch Panel System / Touch Panel Controller Module

Model No.	Function	Features	Supply voltage (V)	Outline dimensions (W × D) (mm)
LR0G962	Touch panel controller module for midium-size screens (10 to 15.6 inches)	• 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a ϕ2 mm pen touch • Built-in palm cancellation feature • I²C/USB interface • Built-in power supply circuit	5	150 × 10
LR0G956	Touch panel controller module for midium-size screens (15 to 32 inches)	• 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a ϕ2 mm pen touch • Built-in palm cancellation feature • USB interface • Built-in power supply circuit	5	60 × 80
LR0G963	Touch panel controller module for large-size screens (Over 32 inches)	• 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a ϕ2 mm pen touch • Built-in palm cancellation feature • USB interface • Built-in power supply circuit	5	130 × 130 (Main) 220 × 100 (AFE)

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■ Touch Panel System / Sensor Sheets

Model No.	Function	Features
LR0P759	19.5″ sensor sheet (with cover glass)	• Original sensor pattern allows visibility suppression of moire patterns and electrode lines • Suitable for larger screen sizes thanks to lower resistance • Capable of ultra-slim frame design
LR0P779	31.5″ sensor sheet (with cover glass)	
LR0P760	70″ sensor sheet (with cover glass)	
T.B.D.	80″ sensor sheet (with cover glass)	

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■ Low Power-Loss Voltage Regulators

●TO-220 Type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings				Electrical characteristics			Built-in functions						Package	
		Output current Io (A)	Input voltage Vin (V)	Power dissipation (W) Pd*1	Power dissipation (W) Pd*2	Output voltage Vo*3 (V) TYP.	Output voltage precision (%)	Dropout voltage V_{I-O}*5 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Lead forming available		Package shape type*7
PQxxxRDA1SZH series	ASO protection function, low dissipation current at OFF state (Iqs: 5 µA (MAX.))	1	24	1.4	15	3.3, 5, 9, 12	±3	0.5	○	○	○	○			TO-220	A
PQxxxRDA2SZH series		2	20			3.3, 5, 9, 12	±2.5	1.0	○	○	○	○				A
PQ070VK01FZH	Minimum operating input voltage: 2.35 V (5 terminals)	1	10	1.4	15	1.5 to 7	±2*4	0.5	○	○	○	○	○	○		E
PQ150RWA2SZH	ASO protection function	2	20	1.4	15	3.0 to 15	±2.5*4	1.0	○	○			○			A
PQ30RV11J00H	Variable output voltage	1	35	1.5	15	1.5 to 30	±2*4	0.5	○	○	△*6		○	○		B
PQ30RV21J00H		2			18				○	○	△*6		○	○		B
PQ30RV31J00H		3		2	20				○	○	△*6		○	○		B

*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.
*6 △ : Available by adding circuit
*7 Refer to page 38

■ Surface Mount Type Low Power-Loss Voltage Regulators

●SOT-89 Type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings			Electrical characteristics			Built-in functions					Package
		Output current Io (A)	Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage V_{I-O}*3 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	
PQ1LAxx5MSPQ	Compact, high radiation package, ceramic capacitor compatible	0.5	15	0.9	1.2, 1.5, 1.8, 2.5, 3.3, 5.0	±2.0	0.7	○	○	○	○		SOT-89
PQ1LAX95MSPQ	Ceramic capacitor compatible, variable output voltage				1.5 to 9.0	±2.0*4		○	○	○	○	○	

*1 When mounted on a board
*2 The xx in the model No. refer to the output voltage values of the model (e.g. 25 for 2.5 V, 50 for 5.0 V).
*3 Current ratings are defined individually.
*4 Reference voltage precision

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●SC-63 Type (1) Output Voltage Fixed Type

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings					Electrical characteristics			Built-in functions						Package	
		Output current Io (A)			Input voltage Vin (V)	Power dissipation Pd*1 (W)	Output voltage Vo*2 (V) TYP.	Output voltage precision (%)	Dropout voltage VI-O*4 (V)	Overheat protection	Overcurrent protection	ON/OFF control	Low dissipation current at OFF state	Variable output voltage	Taped package		Package shape type*5
		0.5	1	1.5													
PQxxxDNA1ZPH series	Ceramic capacitor compatible, ASO protection function, low dissipation current at OFF state (Iqs: 5 µA (MAX.)), solder dip compatible lead shape		○		24	8	3.3, 5, 9, 12	±2.5	0.5	○	○	○	○	–	○	SC-63	G
PQxxxENA1ZPH series	Minimum operating input voltage: 2.35 V, ceramic capacitor compatible, solder dip compatible lead shape		○		10	8	1.5, 1.8, 2.5, 3.3	±2.0		○	○	○	○	–	○		G
PQxxxENB1ZPH series			○			5	1.2, 1.5, 1.8, 2.5, 3.3		0.3	○	○	○	○	–	○		G
PQxxxENAHZPH series				○		8	1.5, 1.8, 2.5, 3.3		0.9	○	○	○	○	–	○		G
PQxxxGN01ZPH series	Minimum operating input voltage: 1.7 V (Dual power supply type), ceramic capacitor compatible, solder dip compatible lead shape		○		5.5		1.0, 1.2	±30 mV	–	○	○			–	○		G
PQxxxGN1HZPH series				○						○	○			–	○		G

*1 With infinite heat sink attached
*2 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).
*3 The value is defined as ±50 mV in some models.
*4 Current ratings are defined individually.
*5 Refer to page 38

●SC-63 Type (2) Output Voltage Variable Type

(Ta = 25°C)

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

*1 With infinite heat sink attached
*2 Reference voltage precision
*3 Current ratings are defined individually.
*4 Refer to page 38

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●SOP-8 Type

(Ta = 25°C)

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

*1 When mounted on a board
*2 Reference voltage precision

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

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electrical characteristics					Package	
		Switching current Isw (A)	Power dissipation Pd*1 (W)	Input voltage range Vin (V)	Output voltage*2 Vo (V)	Output type	Oscillation frequency fo (Hz) TYP.	Output saturation voltage Vsat (V) TYP.		Outline shape type*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-23-6W	
PQ1CN38M2ZPH	• PWM chopper regulator (high oscillation frequency) • Output ON/OFF control function • Overcurrent/overheat protection circuits • For light load	0.8	8	4.5 to 40	V_{REF}*3 to 35 (step-down type)/ –V_{REF} to –30 (inverting type)	Step-down	300 k	0.9	SC-63	G
PQ1CN41H2ZPH	• PWM chopper regulator (high oscillation frequency) • Overcurrent/overheat protection circuits	1.5	8			Step-down	300 k	0.9		G
PQ1CZ21H2ZPH▲	• PWM chopper regulator • Output ON/OFF control function • Overcurrent/overheat protection circuits • Low dissipation current at OFF state (Standby current <I_{SD}>: 1 µA (MAX.))		8			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	

*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 V_{REF} nearly equal to 1.26 V
*4 Refer to page 38
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

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■ Chopper Regulators (DC-DC Converters)

●TO-220 Type

(Ta = 25°C)

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

*1 With infinite heat sink attached
*2 Output voltage variable range
*3 Peak current
*4 V_{REF} nearly equal to 1.26 V (TYP.)
*5 Refer to page 38

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

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■ LED Drivers

●Built-in Step-up Circuit (1)

Model No.	Function	Features	No. of output circuits	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	White LED driver for backlight (for small panels)	• High voltage CMOS output: 30 V (MAX.) • Output ON/OFF control function • Overvoltage/overcurrent protection circuits • Soft start function	1	6 (Series connection)	PWM	*1	○	2.7 to 5.5	250*2	1.2 M	USB-6
PQ7L2020BP		• 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)		*1	○	2.9 to 5.5	500	1.0 M	USB-6
IR2E69Y	LED driver for backlight and call alert display (auto brightness adjustment)	• 2 ch (11 LEDs x 1 ch or 6 LEDs x 2 ch) LED driver for backlight • Auto brightness adjustment backlight LED • 3 ch RGB LED driver for illumination • Built-in step-up DC-DC controller and switching transistor • Built-in LCD power supply (+5.95 V / -5.95 V MAX.) • LDO 1 ch • Interface for digital-output proximity sensor • Interface for analog-output ambient light sensor	Backlight 2 RGB 3	Backlight 12 RGB 3	PWM	○	○	3 to 4.2	Back-light 25.7/ch RGB 12.7/ch	500 k to 1 M	35WL-CSP
IR2E56U6	White LED driver for backlight	• 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	6	72	PWM	○	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		○	○	4.5 to 28	40/ch	500 k to 1.5 M	24HQFN
IR2E65U		• 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		○	External	10 to 28	100/ch	500 k to 1.5 M	52HQFN

*1 LED constant current value can be set by external resistors.
*2 Peak switching current
*3 Constant current (MAX.)

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●Built-in Step-up Circuit (2)

Model No.	Function	Features	No. of output circuits	Number of LEDs	Booster method	Constant current circuit	Switching transistor	Input voltage range (V)	Output*1 current (mA) MAX.	Oscillation frequency (Hz) TYP.	Package
IR2E67M	White LED driver 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	External	4.5 to 5.5	*5	–	80LQFP-1420
IR2E70N	White LED driver for backlight	• Built-in step-up DC-DC controller for 2 ch individual control • Capable of 2 ch individual PWM brightness control • LED current value adjustable by external signal (voltage input / PWM signal) • Brightness control possible at high contrast ratio 3000:1 • Step-up output control according to LED-Vf	2	*2	PWM	*6	External	4.5 to 5.5 8 to 28	*5	100 k to 500 k	24SSOP

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

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■ AC-DC Conversion Type ICs for LED Lighting

Model No.	Features	Operating temperature range (°C)	Supply voltage range (V)	Dissipation current (mA)	Switching frequency (kHz)	Load driving capacity (Ω)		System	Package
						LO	HI		
☆IR3M92N4	Overvoltage/overheat/overcurrent circuits, high-speed activation, stand-by feature, PWM brightness control	–30 to +100	10 to 18	1	160	15	60	Flyback Step-down	SOP-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 (IEEE802.11b/g/n)	3.3	2.8	18	115	27	○	Built-in (IN)	HQFN6 pin (1.5 × 1.5 × 0.4 mm)
QM2A1UA003				20	150	28	○	Built-in (IN)	
IRM053U7	For 5 GHz single-band wireless LAN (IEEE802.11a/n)			18	170	30	○	Built-in (IN/OUT)	HQFN10 pin (2 × 2 × 0.4 mm)
QM2A1UA004				20	225	31	○	Built-in (IN/OUT)	
IRM065U7	For 2.4/5 GHz dual-band wireless LAN (IEEE802.11a/b/g/n)			18	130	30	○	Built-in (IN/OUT)	HQFN16 pin (3 × 3 × 0.4 mm)
				18	160	30			
IRM067U6			2.9	17	100	28	○	Built-in (IN/OUT)	
				17	140	30			

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

■ Front-End Modules for Wireless LAN

Model No.	Application	Features	Supply voltage (V) TYP.	Control voltage (V) TYP.	Transmitter section			Receiver section		Package
					EVM (%)/ Output power (dBm)	Dissipation current (mA)/ Output power (dBm)	Gain (dB) TYP.	Noise figure (dB) TYP.	Gain: Normal/ Bypass (dB) TYP.	
QM2A1UB015	Front-end IC for 2.4 GHz wireless LAN (802.11b/g/n) (SP3T SW + PA + LNA)	• Built-in detection circuit, high efficiency / high linear-output power amplifier • Low-noise amplifier with bypass mode • Built-in input/output matching circuit • Compact and thin package	3.6	3.3/2.9	2.5/18*1	150/18	27	2	12/-5	HQFN16 pin (2.5 × 2.5 × 0.4 mm)
QM2A1UB011	Front-end IC for 5 GHz wireless LAN (802.11a/n) (SPDT SW + PA + LNA)			3.3	2.5/18*1	195/18	28	2.5	12/-5	
QM2A1UB028	Front-end IC for 2.4 GHz wireless LAN (802.11b/g/n/ac) (SP3T SW + PA + LNA)	• Built-in detection circuit, high efficiency / high linear-output power amplifier • .11ac-compliant low EVM design • Low-noise amplifier with bypass mode • Built-in input/output matching circuit • Compact and thin package	3.6	3.3	2/19*2	200/19	27	2	13/-5.5	
QM2A1UB029	Front-end IC for 5 GHz wireless LAN (802.11a/n/ac) (SPDT SW + PA + LNA)				2/18*3	180/18	28	2.5	13/-7	

*1 OFDM 54 Mpps at 64QAM input
*2 MCS7 HT20 at 64QAM input
*3 MCS7 HT40 at 64QAM input

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■ CSP

●CSP (Chip Size Package)

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

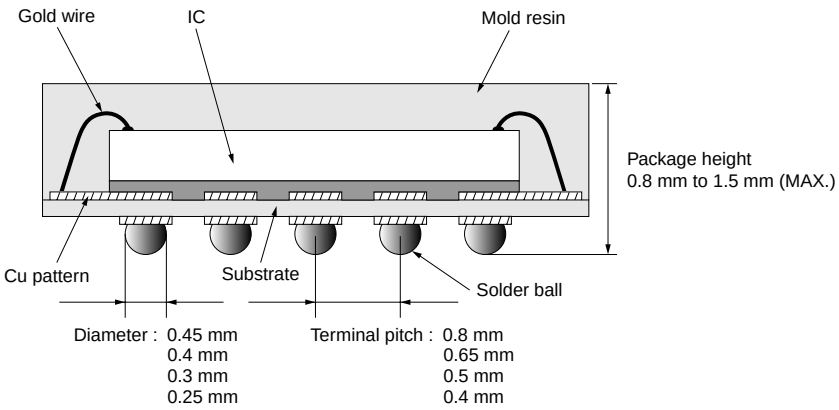
FBGA (CSP)

Features

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

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

Cross section example



●Wafer-level CSP

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

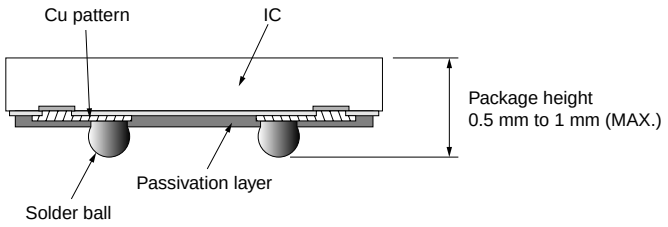
Features

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

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

* Rectangular chip form is also available.

Cross section example



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■ 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

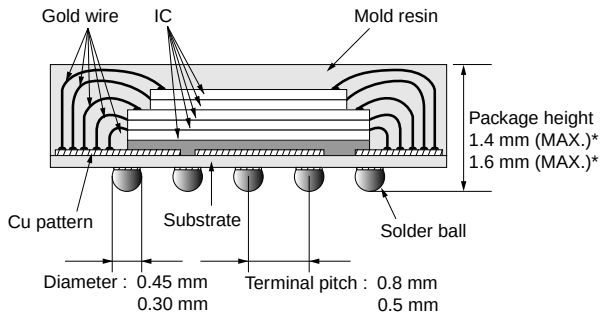
Features

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

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

Cross section example

(5-chip stacked CSP)



* At 0.8 mm terminal pitch

Packages

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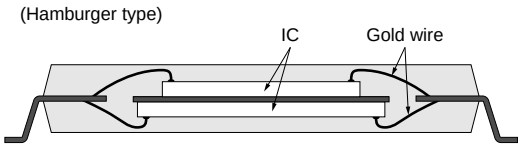
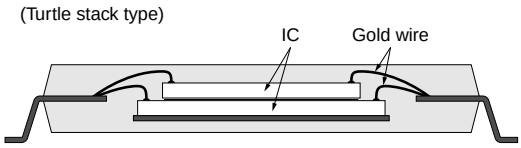
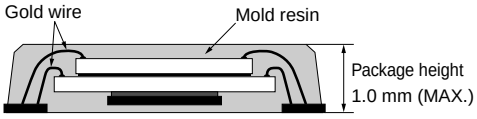
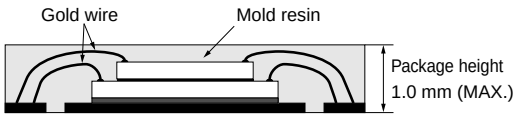
●Chip Stacked TSOP/QFP*/VQFN/HQFN

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

* Including TQFP and LQFP.

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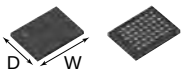
RoHS

■ Package Lineup

●Surface-Mount Type

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

* Figures in brackets indicate available terminal counts.

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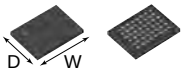
●Surface-Mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package depth & width (D x W) x (seated height [MAX.]) mm
FBGA (CSP)	 (Plastic)	P-VFBGA057-0505	57	0.5	5 x 5	5.0 x 5.0 x (0.9)
		P-VFBGA075-0505	75			
		P-TFBGA064-0606	64		6 x 6	6.0 x 6.0 x (1.1)
		P-TFBGA068-0606	68			
		P-VFBGA081-0606	81			6.0 x 6.0 x (0.9)
		P-TFBGA084-0606	84			6.0 x 6.0 x (1.1)
		P-VFBGA100-0606	100			6.0 x 6.0 x (0.9)
		P-VFBGA100-0707			7 x 7	7.0 x 7.0 x (0.9)
		P-TFBGA100-0707				7.0 x 7.0 x (1.1)
		P-VFBGA108-0707	108			7.0 x 7.0 x (0.9)
		P-TFBGA108-0707				7.0 x 7.0 x (1.1)
		P-VFBGA120-0707	120			7.0 x 7.0 x (0.9)
		P-TFBGA120-0707				7.0 x 7.0 x (1.1)
		P-TFBGA132-0707	132			
		P-TFBGA133-0808	133		8 x 8	8.0 x 8.0 x (1.1)
		P-VFBGA144-0808	144			8.0 x 8.0 x (0.9)
		P-LFBGA144-0808				8.0 x 8.0 x (1.3) / (1.5)
		P-LFBGA144-0811			8 x 11	8.0 x 11.0 x (1.3)
		P-TFBGA152-0808	152		8 x 8	8.0 x 8.0 x (1.1)
		P-VFBGA171-0811	171		8 x 11	8.0 x 11.0 x (0.9)
		P-LFBGA171-0811				8.0 x 11.0 x (1.3) / (1.5)
		P-VFBGA176-0909	176		9 x 9	9.0 x 9.0 x (0.9)
		P-TFBGA176-0909				9.0 x 9.0 x (1.1)
		P-TFBGA180-0909	180			
		P-TFBGA188-0909	188			
		P-VFBGA188-1111			11 x 11	11.0 x 11.0 x (0.9)
		P-VFBGA208-1010	208		10 x 10	10.0 x 10.0 x (0.9)
		P-TFBGA208-1010				10.0 x 10.0 x (1.1)
		P-TFBGA245-1010	245			
		P-LFBGA245-1010				10.0 x 10.0 x (1.3)
		P-FBGA424-1414	424		14 x 14	14.0 x 14.0 x (1.8)
		P-WFBGA144-0606	144	0.4	6 x 6	6.0 x 6.0 x (0.75)
		P-WFBGA121-0606	121			6.0 x 6.0 x (0.8)
		P-WFBGA145-0606	145			
		P-TFBGA168-0707	168		7 x 7	7.0 x 7.0 x (1.0)
		P-TFBGA204-0808	204		8 x 8	8.0 x 8.0 x (1.0)
		P-WFBGA205-0808	205			8.0 x 8.0 x (0.8)
		P-WFBGA261-0808	261			

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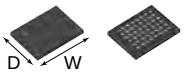
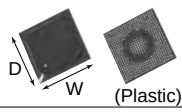
●Surface-Mount Type (cont'd)

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

XXX: Terminal counts

BGA is a trademark of Motorola Nippon Ltd.

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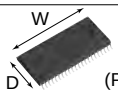
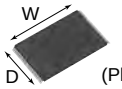
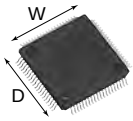
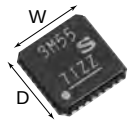
●Surface-Mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm (mil)	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [MAX.]) mm	Lead frame material	
							Alloy42	Copper alloy
SSOP	 (Plastic)	P-SSOP008-0150	8	0.65	4.5 (150)	3.0 x 3.0 x (1.1)	–	○
		P-SSOP024-0275	24		7.0 (275)	6.0 x 7.8 x (1.27)	–	○
TSOP	 (Plastic)	P-TSOP048-1220	48	0.5	12 x 20	12.0 x 18.4 x (1.2)	○	○
		P-TSOP056-1420	56		14 x 20	14.0 x 18.4 x (1.2)	○	○
QFP	 (Plastic)	P-QFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.65)	○	○
		P-QFP072-1010	72		10 x 10	10.0 x 10.0 x (1.8)	○	–
LQFP		P-LQFP080-1212	80	0.5	12 x 12	12.0 x 12.0 x (1.7)	○	–
		P-LQFP100-1414	100		14 x 14	14.0 x 14.0 x (1.7)	○	–
TQFP		P-TQFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.2)	○	–
		P-TQFP100-1414	100		14 x 14	14.0 x 14.0 x (1.2)	○	–
		P-TQFP128-1414	128	0.4			○	–
VQFN	 (Plastic)	P-VQFN020-0404	20	0.5	4 x 4	4.2 x 4.2 x (1.0)	–	○
		P-VQFN024-0404	24				–	○
		P-VQFN028-0505	28		5 x 5	5.2 x 5.2 x (1.0)	–	○
		P-VQFN032-0505	32				–	○
		P-VQFN036-0606	36		6 x 6	6.2 x 6.2 x (1.0)	–	○
		P-VQFN048-0707	48		7 x 7	7.2 x 7.2 x (1.0)	–	○
		P-VQFN036-0505	36	0.4	5 x 5	5.2 x 5.2 x (1.0)	–	○
		P-VQFN052-0707	52		7 x 7	7.2 x 7.2 x (1.0)	–	○
HQFN*		P-HQFN020-0404	20	0.5	4 x 4	4.0 x 4.0 x (1.0)	–	○
		P-HQFN024-0404	24			4.0 x 4.0 x (0.85)	–	○
						4.2 x 4.2 x (1.0)	–	○
		P-HQFN028-0505	28		5 x 5	5.0 x 5.0 x (1.0)	–	○
		P-HQFN052-0707	52	0.4	7 x 7	7.2 x 7.2 x (1.0)	–	○

* HQFN is a higher heat dissipation package of VQFN.

100 mil = 2.54 mm

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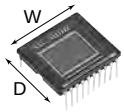
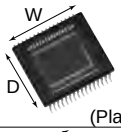
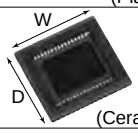
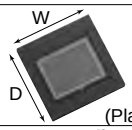
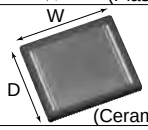
●For CCDs

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [TYP.]) mm
DIP	 (Plastic)	P-DIP014-0400A	14	1.27	10.16 (400)	10.0 x 10.0
		P-DIP016-0450	16	1.27	11.43 (450)	11.4 x 12.2
		P-DIP016-0500C		1.78	12.7 (500)	12.4 x 14.0
		P-DIP024-0400	24	0.80	10.16 (400)	10.0 x 10.0
		P-DIP028-0566	28	1.11	14.4 (566)	14.2 x 16.0
SOP	 (Plastic)	P-SOP014-0400A	14	1.27	12 (470)	10.0 x 10.0 x (4.1)
		P-SOP028-0400	28	0.69	10.16 (400)	10.0 x 10.0 x (3.5)
		P-SOP032-0525	32	0.78	13.3 (525)	12.0 x 13.8 x (3.92)
LCC	 (Ceramic)	N-LCC040-R350 (B)	40	0.65	8.9	8.3 x 8.9 x (1.52)
		N-LCC040-S433A		0.80	11.0	11.0 x 11.0 x (1.62)

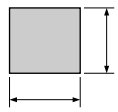
100 mil = 2.54 mm

●For CMOSs

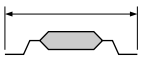
Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [TYP.]) mm
LCC	 (Plastic)	P-LCC072-S394	72	0.6	10 (394)	10.0 x 10.0 x (1.48)
LCC	 (Ceramic)	N-LCC120-R898	120	0.65	22.8 (898)	20.0 x 22.8 x (2.67)

100 mil = 2.54 mm

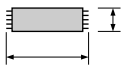
Nominal dimensions



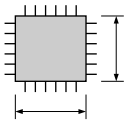
FBGA (CSP)
PBGA (BGA)



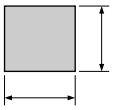
SOP
SSOP
MFP



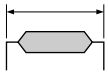
TSOP



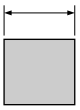
QFP
LQFP
TQFP



VQFN
HQFN



DIP



LCC

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

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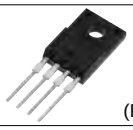
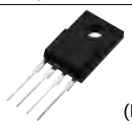
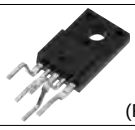
●Lead-Inserting Type Packages [For regulators: PQ series]

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

*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
F 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

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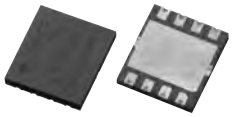
●Surface-Mount Type Packages [For regulators/LED drivers: PQ series] (cont'd)

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		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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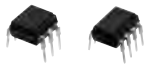
■ Photocoupler Lineup

<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 / PC451J00000F	41
	Darlington phototransistor		Low input current	PC367NJ0000F	41
		AC input response		PC354NJ0000F	41
		High sensitivity, High collector-emitter voltage	Low input current	PC364NJ0000F	41
				PC355NJ0000F / PC452J00000F	41
			Low input current	PC365NJ0000F	41
Compact, Half pitch (lead space), SMT type	Single phototransistor	General purpose, High resistance to noise, etc.		PC3Hx series	42
	Darlington phototransistor		Reinforced insulation	PC3HU7xYIP0B	42
			Low input current	PC3H71xNIP0F	42
		AC input response		PC3H3J00000F / PC3H4J00000F	42
			Low input current	PC3H41xNIP0F	42
		High sensitivity		PC3H5J00000F	42
			Low input current	PC3H510NIP0F	42
DIP type (4-pin)	Single phototransistor	Reinforced insulation		PC123XNNSZ0F	43
(4-pin, DIP type)	Darlington phototransistor	General purpose, High collector-emitter voltage, etc.	Low input current	PC1231xNSZ0X	43
				PC817XNNSZ0F / PC851XNNSZ0F	43
			Low input current	PC8171xNSZ0X	43
		High sensitivity, High collector-emitter voltage		PC815XNNSZ0F / PC852XNNSZ0F / PC853XNNSZ0F	43
			Low input current	PC81510NSZ0X	43
DIP type (6-pin)	Single phototransistor	General purpose, High collector-emitter voltage, etc.		PC7xxV0NSZXF	44
	Darlington phototransistor	High sensitivity, High collector-emitter voltage, etc.		PC7x5V0NSZXF	44

<OPIC output type>

Package type	Output type	Features	Model No. (series)	Page
Compact, SMT type	Digital output	General purpose, High response speed, 2ch, etc.	PC400J00000F / PC456L0NIP0F▲ / PC410S0NIP0F / PC410L0NIP0F / PC4D10SNIP0F	45
	Analog/Digital output	High CMR	PC457S0NIP0F / PC457L0NIP0F	45
DIP type, SMT type	Digital output	General purpose	PC900V0NSZXF	46
	Built-in base amplifier	For inverter control, Built-in short-circuit protection circuit	PC925LxNSZ0F / PC942J00000F▲ / PC928J00000F / PC929J00000F	46

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

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■ Photocouplers

◆Phototransistor Output Type <Compact, SMT type>

○: Approved

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*2 UL	Package	Absolute maximum ratings: Forward current IF (mA)	Absolute maximum ratings: Isolation voltage (AC) Viso (rms) (kV)	Absolute maximum ratings: Collector-emitter voltage VCEO (V)	Electro-optical characteristics: Current transfer ratio CTR (%) MIN.	Current transfer ratio: IF (mA)	Current transfer ratio: VCE (V)	Response time: tr (μs) TYP.	Response time: IC (mA)	Response time: RL (Ω)	Response time: VCE (V)
Single phototransistor output	PC357NJ0000F		General purpose	○*	Mini-flat 4-pin	50	3.75	80	50	5	5	4	2	100	2
	PC352NJ0000F▲		General purpose, high resistance to noise*1	○		50	3.75	80	90	5	5	4	2	100	2
	PC451J00000F		High collector-emitter voltage	○*		50	3.75	350	40	5	5	4	2	100	2
	PC367NJ0000F		Low input current, high resistance to noise*1	○		10	3.75	80	100	0.5	5	4	2	100	2
	PC354NJ0000F		AC input response	○*		±50	3.75	80	20	±1	5	4	2	100	2
	PC364NJ0000F		Low input current, AC input response, high resistance to noise*1	○		±10	3.75	80	50	±0.5	5	4	2	100	2
Darlington photo-transistor output	PC355NJ0000F		High sensitivity	○*		50	3.75	35	600	1	2	60	2	100	2
	PC365NJ0000F		High sensitivity, low input current	○		10	3.75	35	600	0.5	2	60	10	100	2
	PC452J00000F		High collector-emitter voltage	○*		50	3.75	350	1 000	1	2	100	20	100	2

*1 CMR: MIN.10 kV/μs
*2 Please refer to Specification Sheets for model numbers approved by safety standards.
* A VDE approved type is optionally available.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

PC357NJ0000F
(Mini-flat 4-pin)

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

○: Approved

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*3	Package	Absolute maximum ratings			Electro-optical characteristics						
						Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	Collector-emitter voltage V_{CEO} (V)	Current transfer ratio			Response time			
				UL					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
Single phototransistor output	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
	PC3H7J00000F		Standard	○*6	Mini-flat 4-pin	50	2.5	80	20	1	5	4	2	100	2
	PC3H71xNIP0F		High resistance to noise*1, low input current	○		10	2.5	80	100	0.5	5	4	2	100	2
	PC3H3J00000F		AC input response, high resistance to noise*1	○		±50	2.5	80	20	±1	5	4	2	100	2
	PC3H4J00000F		AC input response	○*2, 6		±50	2.5	80	20	±1	5	4	2	100	2
	PC3H41xNIP0F		AC input response, high resistance to noise*1, low input current	○		±10	2.5	80	50	±0.5	5	4	2	100	2
Darlington photo-transistor output	PC3H5J00000F		High sensitivity	○	Mini-flat 4-pin	50	2.5	35	600	1	2	60	2	100	2
	PC3H510NIP0F		High sensitivity, low input current	○		10	2.5	35	600	0.5	2	60	2	100	2

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

PC3HU7xYIP0B

PC3H7J00000F
(Mini-flat 4-pin)

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

○: Approved

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards*8			Package	Absolute maximum ratings			Electro-optical characteristics			
				UL	VDE *2	Others *3		Forward current IF (mA)	Isolation voltage (AC) Viso (rms) (kV)	Collector-emitter voltage VCEO (V)	Current transfer ratio CTR (%) MIN.	IF (mA)	Response time tr (μs) TYP.	RL (Ω)
Single phototransistor output	PC123XNNSZ0F*1, *5, *6, *7		High isolation voltage, reinforced insulation	○	○	○	4-pin DIP	50	5.0	70	50	5	4	100
	PC1231xNSZ0X*1		High isolation voltage, reinforced insulation, low input current, high resistance to noise*4	○	○	○		10	5.0	70	50	0.5	4	100
	PC817XNNSZ0F*5, *6, *7		High isolation voltage	○	–	○*9		50	5.0	80	50	5	4	100
	PC8171xNSZ0X*5, *6		High isolation voltage, low input current, high resistance to noise*4	○	–	–		10	5.0	80	100	0.5	4	100
	PC851XNNSZ0F*5, *6		High isolation voltage, high collector-emitter voltage	○	–	–		50	5.0	350	40	5	4	100
Darlington phototransistor output	PC815XNNSZ0F*5, *6		High isolation voltage, high sensitivity	○	–	–		50	5.0	35	600	1	60	100
	PC81510NSZ0X		High isolation voltage, high sensitivity, low input current	○	–	–		10	5.0	35	600	0.5	60	100
	PC852XNNSZ0F*5, *6		High isolation voltage, high collector-emitter voltage	○	○	–		50	5.0	350	1 000	1	100	100
	PC853XNNSZ0F*5, *6		High isolation voltage, high collector-emitter voltage	○	○	–		50	5.0	350	1 000	1	100	100

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

PC817XNNSZ0F
(4-pin DIP)

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

○: Approved, △: Under application

(Ta = 25°C)

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

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

PC713V0NSZXF
(6-pin DIP)

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◆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, SMT type> (1-1)

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*2		Package	Absolute maximum ratings		Electro-optical characteristics*1						
								Low level output voltage				Threshold input current		
			UL	VDE*3		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	V_{OL} (V) MAX.	Ta (°C)	I_{OL} (mA)	I_F (mA)	I_{FHL} (mA) MAX.	I_{FLH} (mA) MAX.	R_L (Ω)
PC400J00000F		Digital output, normal-off operation	○	–	Mini-flat 5-pin	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	○	○		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	○	○		20	3.75	0.6	–40 to +85	13	5	5.0	–	350
PC410S0NIP0F		High speed (10 Mb/s), high CMR (10 kV/μs), for flow soldering, Solder heat resistance: 270°C	○	○	SOP 8-pin	20	3.75	0.6	–40 to +85	13	5	5.0	–	350
PC4D10SNIP0F		High speed (10 Mb/s), for flow soldering, Solder heat resistance: 270°C 2ch output	○	–	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.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

<Compact, SMT type> (1-2)

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*1		Package	Absolute maximum ratings		Electro-optical characteristics							
								Current transfer ratio				Propagation delay time			
			UL	VDE*2		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	CTR (%) MIN.	I_F (mA)	V_O (V)	V_{CC} (V)	t_{PHL} (μs) TYP.	t_{PLH} (μs) TYP.	R_L (Ω)	I_F (mA)
PC457L0NIP0F		High speed (1 Mb/s), high CMR (15 kV/μs), for flow soldering	○	○	Mini-flat 5-pin	25	3.75	19	16	0.4	4.5	0.2	0.4	1 900	16
PC457S0NIP0F		High speed (1 Mb/s), high CMR (15 kV/μs), for flow soldering, Solder heat resistance: 270°C	○	○	SOP 8-pin	25	3.75	19	16	0.4	4.5	0.2	0.3	1 900	16

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

PC400J00000F
(Mini-flat 5-pin)

PC410S0NIP0F
(SOP 8-pin)

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<DIP type, digital output>

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*5		Package	Absolute maximum ratings		Electro-optical characteristics*1						
			UL	VDE *4		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	Low level output voltage				Threshold input current		
								V_{OL} (V) MAX.	Ta (°C)	I_{OL} (mA)	I_F (mA)	I_{FHL} (mA) MAX.	I_{FLH} (mA) MAX.	R_L (Ω)
PC900V0NSZXF*2, *3		Digital output, normal-off operation	○	○	6-pin DIP	50	5.0	0.4	0 to +70	16	4	2.0	–	280

A: Rated voltage circuit
*1 Each item is measured at Vcc=5V.
*2 Lead forming type is also available for surface mounting.
*3 Taped package of lead forming type for surface mounting is also available.
*4 Optionally available.
*5 Please refer to Specification Sheets for model numbers approved by safety standards.

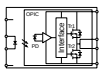
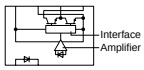
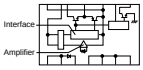
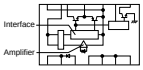
PC900V0NSZXF
(6-pin DIP)

◆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 type>

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*3		Package	Absolute maximum ratings		Electro-optical characteristics					
			UL	VDE *2		Forward current I_F (mA)	Isolation voltage (AC) Viso (rms) (kV)	Propagation delay time					
								t_{PHL} (µs) TYP.	t_{PLH} (µs) TYP.	V_{CC} (V)	I_F (mA)	R_{L1} (Ω)	R_{L2} (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)	○	○	8-pin DIP	25	5.0	MAX. 0.5	MAX. 0.5	15 to 30	7 to 16	R_G = 10	–
PC942J00000F▲		For controlling inverter-controlled air-conditioner	○	○		25	5.0	2.0	2.0	6	5	5	10
PC928J00000F		For driving inverter IGBT, built-in short protection circuit	○	○	14-pin SMT (Half pitch lead)	25	4.0	1.0	1.0	24	10	R_G = 47	–
PC929J00000F		For driving inverter IGBT, high speed, built-in short protection circuit	○	○		20	4.0	0.3	0.3	24	5	R_G = 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.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

PC925LENSZ0F, PC942J00000F▲
(8-pin DIP)

PC928J00000F
(PC929J00000F)

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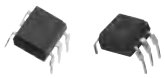
■ Phototriac Coupler Lineup

Package	Applied voltage	ON-state current (rms)	Features		Model No.	Page
Mini-flat (SMD)	AC 200 V lines (V_{DRM} = 600V)	0.05 A	General purpose		S2S3000F*3 / S2S5A00F*3 / S2S5FA0F*3	48
				Built-in zero-cross circuit	S2S4000F*3	49
DIP type	AC 200 V lines (V_{DRM} = 600V)	0.1 A	General purpose		PC3ST11NSZAX*3	48
(4-pin)				Built-in zero-cross circuit	PC3ST21NSZBX*2	49
			Reinforced isolation		PC3SH11YFZAX*3 / PC3SH13YFZAX*3	48
				Built-in zero-cross circuit	PC3SH21YFZBX*2	49
DIP type	AC 100 V lines (V_{DRM} = 400V)	0.1 A	General purpose		PC2SD11NTZAF*3 / PC1S3021NTZF*4	48
(6-pin package, 5th-pin cut)	AC 200 V lines (V_{DRM} = 600V)	0.1 A	General purpose		PC3SD12NTZAF*3 / PC3SD12NTZBF*2 / PC3SD12NTZCF*1 / PC1S3052YTZF*3 / PC3SD11NTZCF*1 / PC3SD13NTZBF*2	48
				Built-in zero-cross circuit	PC3SD21NTZAF*3 / PC3SD21NTZBF*2 / PC3SD21NTZCF*1 / PC3SD21NTZDF*5 / PC3SD23YTZCF*1 / PC1S3063YTZF*1	49
			Reinforced isolation		PC3SF11YVZAF*3 / PC3SF11YVZBF*2 / PC3SF13YVZBF*2	48
				Built-in zero-cross circuit	PC3SF21YVZAF*3 / PC3SF21YVZBF*2 / PC3SF23YVZSF*2	49
	AC 200 V lines (V_{DRM} = 800V)	0.1 A	General purpose		PC4SD11NTZBF*2 / PC4SD11NTZCF*1	48
				Built-in zero-cross circuit	PC4SD21NTZCF*1 / PC4SD21NTZDF*5	49
			Reinforced isolation		PC4SF11YVZAF*3 / PC4SF11YVZBF*2	48
				Built-in zero-cross circuit	PC4SF21YVZBF*2 / PC4SF21YVZCF*1 / PC4SF21YWPSF*2	49

Minimum trigger current: *1 I_{FT} ≦ 5 mA, *2 I_{FT} ≦ 7 mA, *3 I_{FT} ≦ 10 mA, *4 I_{FT} ≦ 15 mA, *5 I_{FT} ≦ 3 mA

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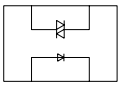
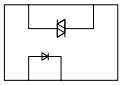
■ Phototriac Couplers

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*4			Package	Absolute maximum ratings			Electro-optical characteristics
			UL, CSA	VDE	Others		ON-state current I_T (rms) (A)	Repetitive peak OFF-state voltage V_{DRM} (V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current I_{FT} (mA) MAX. V_D = 6 V, R_L = 100Ω
S2S3000F		200 V lines, compact	○	○*6	–	Mini-flat 4-pin	0.05	600	3.75	10
S2S5A00F		200 V lines, compact	○	○*6	–					10
S2S5FA0F		High impulse noise product	○	○*6	–					10
PC3ST11NSZAX		200 V lines, compact	○	○*6	–	4-pin DIP	0.1		5.0	10
PC3SH11YFZAX		200 V lines, compact, reinforced isolation	○	○	○*2					10
PC3SH13YFZAX		200 V lines, compact, reinforced isolation, high noise resistance	○	○	○*2					10
PC2SD11NTZAF		100 V lines	○	–	–	6-pin DIP*1, 3	0.1	400	5.0	10
PC1S3021NTZF		100 V lines	○	–	○*2					10
PC3SD12NTZAF		200 V lines	○	○*6	–			600		10
PC1S3052YTZF		200 V lines	○	○*6	○*2					10
PC3SD12NTZBF		200 V lines	○	○*6	–					7
PC3SD13NTZBF		High impulse noise product	○	○*6	–					7
PC3SD12NTZCF		200 V lines	○	○*6	–					5
PC4SD11NTZBF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–			800		7
PC3SD11NTZCF		200 V lines	○	○*6	–			600		5
PC4SD11NTZCF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–			800		5
PC3SF11YVZAF		200 V lines, reinforced isolation	○	○	○*2			600		10
PC3SF11YVZBF		200 V lines, reinforced isolation	○	○	○*2					7
PC3SF13YVZBF		200 V lines, reinforced isolation, high noise resistance	○	○	○*2					7
PC4SF11YVZAF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2			800		10
PC4SF11YVZBF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2					7

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

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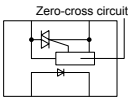
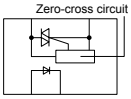
■ Phototriac Couplers
(Built-in zero-cross circuit type)

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*4			Package	Absolute maximum ratings			Electro-optical characteristics
			UL, CSA	VDE	Others		ON-state current IT (rms) (A)	Repetitive peak OFF-state VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current IFT (mA) MAX. VD = 4 V, RL = 100Ω
S2S4000F		200 V lines, compact	○	○*6	–	Mini-flat 4-pin	0.05	600	3.75	10*5
PC3ST21NSZBX		200 V lines, compact	○	○*6	–	4-pin DIP	0.1	600	5.0	7
PC3SH21YFZBX		200 V lines, compact, reinforced isolation	○	○	○*2					7
PC3SD21NTZAF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–	6-pin DIP*1, 3	0.1	600	5.0	10
PC3SD21NTZBF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–					7
PC3SD21NTZCF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–					5
PC1S3063YTZF		100 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	○*2					5
PC3SD23YTZCF		200 V lines, high pulse/noise resistance (TYP. 2 kV)	○	○	–					5
PC3SD21NTZDF		200 V lines, low zero-cross voltage: MAX. 20 V	○	○*6	–					3
PC4SD21NTZCF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–			800		5
PC4SD21NTZDF		200 V lines, repetitive peak-OFF-state voltage	○	○*6	–					3
PC3SF21YVZAF		200 V lines, reinforced isolation	○	○	○*2			600		10
PC3SF21YVZBF		200 V lines, reinforced isolation	○	○	○*2					7
PC3SF23YVZSF		High impulse noise product	○	○	○*2					7
PC4SF21YVZBF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2			800		7
PC4SF21YVZCF		200 V lines, reinforced isolation, repetitive peak-OFF-state voltage	○	○	○*2					5
PC4SF21YWPSF		High impulse noise product	○	○	○*2	6-pin DIP*3				7

*1 Lead forming type for surface mounting is also available.
*2 In conformance with BSI, SEMKO, DEMKO, and FIMKO
*3 These are molded pin No. 5.
*4 Please refer to Specification Sheets for model numbers approved by safety standards.
*5 VD = 6 V, RL = 100Ω
*6 Optionally available


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)

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■ Solid State Relay Lineup

Package	Applied voltage	ON-state current (rms)	Features	Model No.	Page
DIP 6-pin	AC 100 V lines	0.15 A	General purpose	PR22MA11NTZF	51
	AC 200 V lines	0.06 A	General purpose	PR31MA11NTZF	51
		0.15 A	General purpose	PR32MA11NTZF	51
		0.3 A	General purpose	PR33MA series	51
DIP 8-pin	AC 100 V lines	0.3/0.6/0.9 A	General purpose	PR23MF11NSZF / PR26MF series / PR29MF series	51
		0.6/0.9 A	Built-in zero-cross circuit	PR26MF21NSZF / PR29MF21NSZF	51
	AC 200 V lines	0.3/0.6/0.9/1.2 A	General purpose	PR33MF5 series / PR39MF5 series / PR36MF5 series / PR3BMF5 series	51
		0.6/0.9/1.2 A	Built-in zero-cross circuit	PR36MF2 series / PR39MF2 series / PR3BMF21NSZF	51
SIP 4-pin	AC 100 V lines	2/8 A 3 to 16 A	General purpose	S102T01F*1 / S108T01F*1 / S101S05F / S102S01F / S112S01F / S116S01F	52
 Low profile		2/8 A 3 to 16 A	Built-in zero-cross circuit	S102T02F*1 / S108T02F*1 / S101S06F / S102S02F / S116S02F	52
		8 A	Built-in snubber circuit	S102S11F	52
		3/8 A	Built-in snubber circuit/ zero-cross circuit	S101S16F / S102S12F	52
	AC 200 V lines		General purpose	S202T01F*1 / S208T01F*1 / S202S01F / S212S01F / S216S01F	52
		2/8 A 3 to 16 A	Built-in zero-cross circuit	S202T02F*1 / S208T02F*1 / S201S06F / S202S02F / S216S02F	52/53
		8/8 A	Built-in snubber circuit	S202S15F / S202S11F	53
		8 A	Built-in snubber circuit/ zero-cross circuit	S202S12F	53

*1 Low profile

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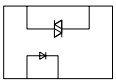
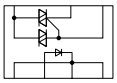
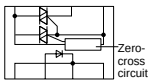
☆New product

■ Solid State Relays

<DIP type>

○: Approved

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Approved by safety standards*1			Package	Absolute maximum ratings			Electrical characteristics
			UL	CSA	VDE*2		ON-state current IT (rms) (A)	Repetitive peak OFF-state voltage VDRM (V)	Isolation voltage (AC) Viso (rms) (kV)	Min. trigger current IFT (mA) MAX. VD = 6 V, RL = 100Ω
PR22MA11NTZF		100 V lines, 150 mA model in a small package	○	○	○	6-pin DIP	0.15	400	5.0	10
PR31MA11NTZF		200 V lines, compact	○	○	○		0.06	600		10
PR32MA11NTZF		200 V lines, 150 mA model in a small package	○	○	○		0.15			10
☆PR33MA series		200 V lines, 300 mA model in a small package	○	○	○		0.3			15
PR23MF11NSZF		100 V lines, compact	○	○	–	8-pin DIP	0.3	400	4.0	10
PR26MF11NSZF		100 V lines, compact	○	○	–		0.6			10
PR26MF12NSZF		100 V lines, compact, low input current	○	○	–					5
PR29MF11NSZF		100 V lines, compact	○	○	–		0.9			10
PR29MF12NSZF		100 V lines, compact, low input current	○	○	–					5
PR33MF51NSLF		200 V lines, compact	○	○	○		0.3	600		10
PR33MF52NSLF		200 V lines, compact	○	○	○					10
PR36MF51NSLF		200 V lines, compact	○	○	○		0.6			10
PR36MF12NSZF		200 V lines, compact, low input current	○	○	○					5
PR39MF51NSLF		200 V lines, compact	○	○	○		0.9			10
PR39MF12NSZF		200 V lines, compact, low input current	○	○	○					5
PR3BMF51NSLF		200 V lines, compact	○	○	○		1.2			10
PR3BMF52NSZF		200 V lines, compact, low input current	○	○	○					5
PR26MF21NSZF		100 V lines, compact (built-in zero-cross circuit)	○	○	–		0.6	400		10
PR29MF21NSZF		100 V lines, compact (built-in zero-cross circuit)	○	○	–		0.9			10
PR36MF21NSZF		200 V lines, compact (built-in zero-cross circuit)	○	○	○		0.6	600		10
PR36MF22NSZF		200 V lines, compact (built-in zero-cross circuit), low input current	○	○	○					5
PR39MF21NSZF		200 V lines, compact (built-in zero-cross circuit)	○	○	○		0.9			10
PR39MF22NSZF		200 V lines, compact (built-in zero-cross circuit), low input current	○	○	○					5
PR3BMF21NSZF		200 V lines, compact (built-in zero-cross circuit)	○	○	○		1.2			10

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

PR22MA11NTZF
(6-pin DIP)

PR26MF21NSZF
(8-pin DIP)

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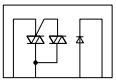
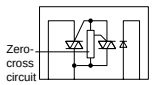
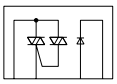
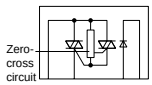
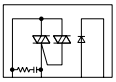
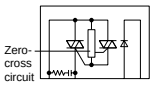
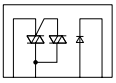
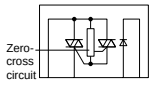
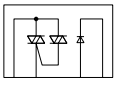
<SIP type> (1)

○: Approved

(Ta = 25°C)

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

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

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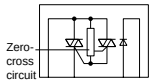
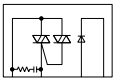
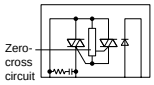
<SIP type> (2)

○: Approved

(Ta = 25°C)

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

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

S102T01F series
(Low profile 4-pin SIP)

S102S02F series
(4-pin SIP)

Optoelectronics

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■ Photointerrupter Lineup

<Transmissive type>

Output type	Package type	Outline	Mounting method	Model No. (series)	Page
Single phototransistor	Compact	High resolution	PWB mounting type	GP1S396HCP0F / GP1S09xHCZ0F / GP1S19xHCZ0F	55
High response speed			Surface-mount type/ Soldering reflow	GP1S396HCPSF / GP1S296HCPSF / GP1S092HCPIF / GP1S19xHCxSF	55
	Case type	High resolution	PWB mounting type, etc.	GP1S5x series	56
		Horizontal slit, High resolution	PWB mounting type	GP1S59J0000F	56
	With connector	General purpose	Snap-in	GP1S173LCS2F / GP1S273LCS1F	56
Darlington phototransistor	Case type	General purpose	PWB mounting type, etc.	GP1L5x series	57
High sensitivity		Wide gap	PWB mounting type	GP1L57J0000F	57
Digital output	Compact	High voltage	PWB mounting type	GP1A98HCZ0F	57
(OPIC output)			Surface-mount type	GP1A98HCPSF	57
	Case type	High resolution	With screw hole/ PWB mounting type	GP1A5x series	58
		Wide gap	PWB mounting type	GP1A57HRJ00F	58
	With connector	General purpose	Screw mounting type/Snap-in	GP1A173LCS3F / GP1A173LCS2F / GP1A173LCSVF / GP1A273LCS1F	59

<Reflective type>

Output type	Package type	Outline	Mounting method	Model No. (series)	Page
Single phototransistor	Leadless	Long focal distance	Surface-mount type	GP2S700HCP	59
High response speed	Compact, thin (leadless)	General purpose	Surface-mount type	GP2S60	59
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 / GP2A230LRSAF / GP2A240LCS0F / GP2A250LCS0F	60

<Application-specific photointerrupter lineup>

Detection type	Outline (Output 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	61
		Resolution: 150 LPI Linear scale slit pitch: 0.17 mm	PWB mounting type	GP1A057RBKLF	61
		Resolution: 180 LPI Linear scale slit pitch: 0.14 mm	With screw hole/ PWB mounting type	GP1A058SCK0F	61
		Resolution: 300 LPI Linear scale slit pitch: 0.0847 mm	With screw hole/ PWB mounting type	GP1A054RDKLF	61
	Case type With encoder function Digital 2 output (Multiplying output)	Resolution for reading: 180 LPI Pitch: 0.14 mm Output resolution: 360 LPI	With screw hole/ PWB mounting type	GP1A101C2KSF	61
	For amusement use		Screw mounting	GP1A204HCS0	61
Reflective type	Injection For prism system (Single phototransistor)		Screw mounting	GP2S29SVJ00F	61
	For amusement use (Pachinko ball sensor)		–	GP2A222HCKA	62

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■ Photointerrupters

<Transmissive type>

◆Single Phototransistor Output

<Compact type>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (μs) TYP.	I_C (mA)	R_L (kΩ)	V_{CE} (V)
GP1S092HCPIF		Wide gap, for soldering reflow, surface mount compatible, with positioning boss (4.5 × 2.6 × 2.9 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5
GP1S093HCZ0F		Wide gap (4.5 × 2.6 × 2.9 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5
GP1S094HCZ0F		Wide gap, with positioning pin, (5.5 × 2.6 × 4.8 [height] mm)	3.0	0.3	0.8	5	5	50	0.1	1	5
GP1S096HCZ0F		Narrow gap (3.5 × 2.6 × 2.9 [height] mm)	1.0	0.3	2.0	5	5	50	0.1	1	5
GP1S194HCZ0F		Compact, wide gap, size: 3.6 × 2.0 × 2.7 (height) mm	1.7	0.3	3.0	5	5	50	0.1	1	5
GP1S195HCZSF GP1S195HCPSF		Compact, wide gap, surface mount compatible, size: 3.4 × 2.0 × 2.7 (height) mm	1.5	0.3	3.0	5	5	50	0.1	1	5
GP1S196HCZ0F		Compact, low profile (3.1 × 2.0 × 2.7 [height] mm)	1.1	0.3	2.0	5	5	50	0.1	1	5
GP1S196HCZSF GP1S196HCPSF		Surface mount, for soldering reflow, compact, low profile (3.1 × 2.0 × 2.7 [height] mm)	1.1	0.3	2.0	5	5	50	0.1	1	5
GP1S296HCPSF		Surface mount, for soldering reflow, compact, low profile (2.5 × 1.8 × 1.9 [height] mm)	1.0	0.2	3.0	5	5	50	0.1	1	5
GP1S396HCP0F		Straight lead type, compact, low profile (2.26 × 1.4 × 1.6 [height] mm)	1.2	0.12	2.0	5	5	30	0.1	1	5
GP1S396HCPSF		Surface mount, for soldering reflow, compact, low profile (2.26 × 1.4 × 1.6 [height] mm)	1.2	0.12	2.0	5	5	30	0.1	1	5
GP1S097HCZ0F		High resolution, wide gap, with mounting hole (4.5 × 2.6 × 4.5 [height] mm)	2.0	0.3	2.0	5	5	50	0.1	1	5

※ Topr: –25 to +85°C

※※ GP1SxxxHCZxF: Sleeve package, GP1SxxxHCPxF: Taped package


GP1S092HCPIF


GP1S093HCZ0F


GP1S094HCZ0F


GP1S096HCZ0F


GP1S194HCZ0F


GP1S195HCPSF/ GP1S195HCZSF


GP1S196HCZ0F


GP1S196HCZSF/ GP1S196HCPSF


GP1S296HCPSF


GP1S396HCPSF


GP1S396HCP0F


GP1S097HCZ0F

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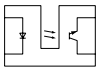
<Case type>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (µs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
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


GP1S50J0000F


GP1S51VJ000F


GP1S52VJ000F


GP1S53VJ000F


GP1S54J0000F

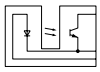

GP1S56TJ000F


GP1S58VJ000F


GP1S59J0000F

<With connector>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics						
					Current transfer ratio			Response time			
					CTR (%) MIN.	I_F (mA)	V_{CE} (V)	tr (µs) TYP.	I_C (mA)	R_L (Ω)	V_{CE} (V)
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)


GP1S173LCS2F


GP1S273LCS1F

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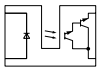
◆Darlington Phototransistor Output

<Case type>

(Ta = 25°C)

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

※ Topr: –25 to +85°C


GP1L50J0000F


GP1L51J0000F


GP1L52VJ000F


GP1L53VJ000F

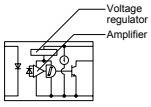

GP1L57J0000F

◆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 type>

(Ta = 25°C)

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

※ Topr = –25 to +85°C


GP1A98HCZ0F


GP1A98HCPSF

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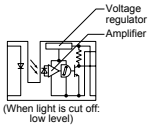
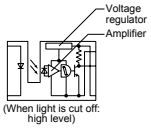
RoHS

<Case type>

(Ta = 25°C)

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

※ Topr = –25 to +85°C

GP1A50HRJ00F

GP1A51HRJ00F

GP1A52LRJ00F
(GP1A52HRJ00F)

GP1A53HRJ00F
{GP1A58HRJ00F with positioning pin}

GP1A57HRJ00F

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☆New product

◆OPIC Type

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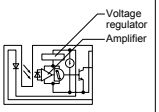
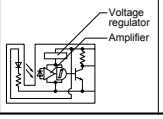
<With 3-pin connector terminal>

(Ta = 25°C)

Model No.	Internal connection diagram	Features		Detecting and emitting gap (mm)	Slit width (mm)	Electro-optical characteristics					
						Supply voltage V_{CC} (V)		Low level output voltage			
						MIN.	MAX.	V_{OL} (V) MAX.	Light cut-off	I_{OL} (mA)	V_{CC} (V)
☆GP1A173LCS3F		with 3-pin connector	Snap-in mounting integrated connector type*1	5.0	0.5	2.7	5.5	0.35	No	4	3.3
GP1A173LCS2F			Snap-in mounting integrated connector type*1	5.0	0.5	4.5	5.5	0.35	No	4	5
GP1A173LCSVF			Snap-in mounting integrated connector type*1, enforced electrostatic discharge (ESD) type	5.0	0.5	4.5	5.5	0.35	No	4	5
GP1A273LCS1F			Integrated connector, compatible with 1.5 mm pitch connector, snap-in mounting type*1	5.0	0.7	4.5	5.5	0.35	No	4	5
GP1A75EJ000F▲			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 (GP1A173LCS3F, GP1A173LCS2F, GP1A173LCSVF, GP1A273LCS1F)
*1 Applicable to 3 kinds of thickness of mounting boards.
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.


GP1A173LCS3F, GP1A173LCS2F, GP1A173LCSVF


GP1A273LCS1F


GP1A75EJ000F▲

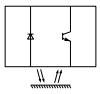
■ Photointerrupters

<Reflective type>

◆Single Phototransistor Output

<Compact>

(Ta = 25°C)

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

※ Topr: –25 to +85°C


GP2S700HCP


GP2S60

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

<With 3-pin connector terminal>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Optimum detecting distance (mm)	Electro-optical characteristics					
				Supply voltage V_{CC} (V)		Dissipation current		Low level output voltage	
				MIN.	MAX.	I_{CC} (mA) MAX.	V_{CC} (V)	V_{OL} (V) MAX.	V_{CC} (V)
GP2A200LCS0F	(Following diagram [A])	Multi types of paper detectable, light modulation type, with connector, sensitivity adjusted	5 to 15	4.75	5.25	30*1	5	0.4	5
GP2A240LCS0F		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		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 diagram [B])	Compact, hook type (GP2A231LRSAF), multi types of paper detectable, light modulation type, with connector	3 to 7	4.75	5.25	20*1	5	0.4	5
GP2A230LRSAF									
GP2A231LRSAF▲									
GP2A25NJJ00F	(Following diagram [A])	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		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

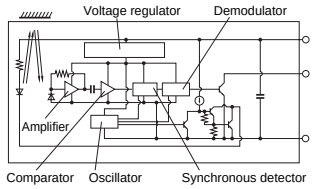
✻ Topr: –10 to +60°C (GP2A25J0000F, etc.)
–10 to +70°C (GP2A200LCS0F, GP2A240LCS0F, GP2A250LCS0F, GP2A230LRS0F, GP2A230LRSAF, GP2A231LRSAF)

*1 Smoothing value $R_L = \infty$

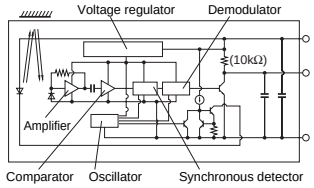
The model marked with ▲ may not be available in the near future. Contact with SHARP for details before use.

[Internal connection diagram]

[A]



[B]

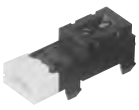


GP2A25J0000F
(GP2A25NJJ00F, GP2A200LCS0F, GP2A240LCS0F)

GP2A250LCS0F

GP2A25DJ000F

GP2A230LRS0F



GP2A231LRSAF▲

GP2A28AJ000F

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■ Photointerrupters for Specific Applications

◆Transmissive Type

<Case type, with encoder function>

(Ta = 25°C)

Model No.	Absolute maximum ratings		Electro-optical characteristics					
	Vcc (V)	Topr (°C)	Operating voltage Vcc (V) TYP.	Output signal	Resolution	Response frequency f (kHz) MAX.	Response frequency IF (mA)	Dissipation current (output side) Icc (mA) MAX.
GP1A057RBKLF	6	–10 to +70	3.3	Digital 2 output (Phase A/B)	Linear scale slit pitch 0.17 (mm) (150LPI)	60	20	7
GP1A054RDKLF	6	–10 to +70	3.3		Linear scale slit pitch 0.0847 (mm) (300LPI)	60	20	5.5
GP1A057SGKLF	6	–10 to +70	3.3		Linear scale slit pitch 0.56 (mm) (45LPI)	25	20	5.5
GP1A058SCK0F	6	–10 to +70	3.3		Linear scale slit pitch 0.14 (mm) (180LPI)	60	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

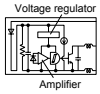

GP1A057RBKLF
(GP1A057SGKLF)


GP1A058SCK0F


GP1A101C2KSF

<For amusement use>

(Ta = 0 to +40°C)

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


GP1A204HCS0

◆Reflective Type

<Case type, phototransistor output>

(Ta = 25°C)

Model No.	Internal connection diagram	Features	Electro-optical characteristics: Peak photocurrent ICP (mA)	Peak photocurrent IF (mA)	Peak photocurrent VCE (V)	Response time tr (µs) TYP.	Response time IC (mA)	Response time RL (kΩ)	Response time VCE (V)
GP2S29SVJ00F		Long focal distance (with prism system*1), compact, screw mounting type	0.4 to 3.0*1	20	5	38	0.5	1	2

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


GP2S29SVJ00F

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<For amusement use>

(Ta = 25°C)

Model No.	Features	Electro-optical characteristics		
		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. 12	MAX. 500

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

GP2A222HCKA

■ Proximity Sensor

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics			
		Vcc (V)	Topr (°C)	Dissipation current Icc (μA) TYP.	Detecting distance Lon (mm) MIN.	Non-detecting distance Loff (mm) MAX.	Peak emission wavelength λp (nm)
GP2AP002S00F	Compact size (4.0 × 2.0 × 1.25 t mm) Drastically reduced LED current consumption by employing a light modulation system Built-in LEDs for simple optical design and I^2C output	3.8	–25 to +85	240	25	150	940

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☆New product

RoHS

■ Proximity Sensor with Integrated Ambient Light Sensor

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics								
					Proximity sensor portion			Ambient light sensor portion				
										Output current		
		V_{CC} (V)	Topr (°C)	Dissipation current Icc (μA) TYP.	Detecting distance Lon (mm) MIN.	Non-detecting distance Loff (mm) MAX.	Peak emission wavelength λp (nm)	Recommended illuminance range Ev (lx) MIN.	Peak sensitivity wavelength λp (nm)	I_{O1} (μA) TYP.	I_{O2} (μA) MAX.
GP2AP002A00F▲	LED and ambient light sensor combined in a single package (5.6 × 2.1 × 1.25 t mm) Drastically reduced LED current consumption by employing a light modulation system Built-in LEDs for simple optical design Proximity sensor: I²C output Ambient light sensor: logarithmic current output	3.8	–25 to +85	270	25	150	940	3 to 55 000	555	30 (at Ev = 1 000 lx)	1 (at Ev = 0 lx)

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

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics					
					Proximity sensor portion		Ambient light sensor portion		
		V_{CC} (V)	Topr (°C)	Dissipation current Icc (μA) TYP.	Detecting distance Lon (mm) TYP.	Peak emission wavelength λp (nm)	Recommended illuminance range Ev (lx)	Output resolution (bit)	ADC conversion time Tint (ms) TYP.
☆GP2AP030A00F	LED and ambient light sensor combined in a single package (4.0 × 2.1 × 1.25 t mm) Built-in LEDs for simple optical design Illuminance output: digital 16-bit output (Minimum detectable illuminance: 0.02 lx) I²C output compatible (proximity sensor, ambient light sensor)	5.5	–35 to +85	65	100	940	0.02 to 10 000	16	100

GP2AP002S00F

GP2AP002A00F▲

GP2AP030A00F

Optoelectronics

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☆New product

■ Proximity/Gesture Sensor with Integrated Ambient Light Sensor

(Ta = 25°C)

Model No.	Features	Absolute maximum ratings		Electro-optical characteristics						
						Proximity/gesture sensor portion		Ambient light sensor portion		
		V_{CC} (V)	Topr (°C)	Dissipation current Icc (μA) TYP.	Dissipation current Icc (Gesture) (μA) TYP.	Detecting distance Lon (mm) TYP.	Peak emission wavelength λp (nm)	Recommended illuminance range Ev (lx)	Output resolution (bit)	ADC conversion time Tint (ms) TYP.
☆GP2AP052A00F	LED and ambient light sensor combined in a single package (5.6 × 2.1 × 1.25 t mm) Built-in LEDs for simple optical design Illuminance output: digital 16-bit output (Minimum detectable illuminance: 0.02 lx) I^2C output compatible Gesture recognition: directional hand movements detected without touching the screen	5.5	–35 to +85	65	200	100	940	0.02 to 10 000	16	100

GP2AP052A00F

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■ Ambient Light Sensors

(Ta = 25°C)

Model No.	Type	Package	Absolute maximum ratings			Electro-optical characteristics					
			V_{CC} (V)	I_O (mA)	Topr (°C)	Recommended supply voltage V_{CC} (V)	Recommended illuminance range Ev (lx)	Dissipation current Icc (μA) TYP.	Peak sensitivity wavelength λp (nm)	Output current I_{O1} (μA) TYP.	Output current I_{O2} (μA) TYP.
GA1A2S100SS	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Linear current output for illuminance Lead frame (straight) type	Transparent epoxy resin (3 × 4 mm)	7.0	5	–40 to +85	2.7 to 3.6	10 to 10 000	500	555	480 (at Ev = 1 000 lx)	48 (at Ev = 100 lx)
GA1A2S100LY	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Linear current output for illuminance Lead frame (L bend) type		7.0	5	–40 to +85	2.7 to 3.6	10 to 10 000	500	555	480 (at Ev = 1 000 lx)	48 (at Ev = 100 lx)
GA1A1S202WP	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Logarithmic current output for illuminance	Compact SMD (2.0 × 1.6 × 0.6 mm) Leadless	7.0	1	–40 to +85	2.3 to 3.2	3 to 55 000	70	555	20 (at Ev = 100 lx)	30 (at Ev = 1 000 lx)
GA1A1S203WP▲	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 × 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	Compact SMD (3.3 × 2.0 × 0.6 mm) Back-mount available, leadless	7.0	1	–40 to +85	2.3 to 3.2	3 to 55 000	70	555	20 (at Ev = 100 lx)	30 (at Ev = 1 000 lx)
GA1A1S100WP	Built-in amplification circuit Peak sensitivity characteristic close to human visual sensitivity Output characteristic: Linear current output for illuminance	Compact SMD (2.0 × 1.6 × 0.6 mm) Leadless	7.0	10	–40 to +85	2.7 to 3.6	10 to 5 000	1 460	555	1 420 (at Ev = 1 000 lx)	142 (at Ev = 100 lx)

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

GA1A2S100SS

GA1A2S100LY

GA1A1S202WP
(GA1A1S100WP)

GA1A1S203WP▲

GA1A1S204WP

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RoHS

■ 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 = 25°C)

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

IS485E
(IS486E)

<Low-voltage operation>

(Ta = 25°C)

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

IS489E

<Model employing a light modulation system>

(Ta = 25°C)

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

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

IS471FE

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

(Ta = 25°C)

Model No.	Type	Package	Electro-optical characteristics			
			Recommended supply voltage V_{CC} (V)	V_{OH} (V) MIN.	V_{OL} (V) MAX.	H → L delay time variation Δt_{PHL} (ns) MAX.
GA220T2L2IZ▲	2-PD, differential type	Transparent epoxy resin 18-pin	4.5 to 5.5	4.9	0.6	±8.5

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

GA220T2L2IZ▲

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RoHS

■ Phototransistor Lineup

Package	Output type	Features	Half sensitivity angle	Model No.	
				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/Intermediate acceptance	±40°	—	PT491FE0000F
Surface mounting leadless type	Single phototransistor	Compact (side view/top view mounting possible)	±15°	PT100MC0MP	PT100MF0MP
	Darlington phototransistor	Compact (side view/top view mounting possible)	±15°	—	PT100MF1MP

■ Phototransistors

Type	Model No.	Package	Absolute maximum ratings			Ic (mA)				I_{CEO}(A)		Δθ (°)	λp (nm)
			V_{CEO} (V)	P_C (mW)	Topr (°C)	MIN.	MAX.	V_{CE} (V)	Ee (mW/cm²)	MAX.	V_{CE} (V)	TYP.	TYP.
Single	PT100MC0MP	Surface mounting leadless type with lens	35	75	–30 to +85	1.7	5.1	5	1	1×10^{-7}	20	±15	900
	PT100MF0MP*1		35	75	–30 to +85	1.15	3.45	5	1	1×10^{-7}	20	±15	910
	PT480E00000F	Epoxy resin with lens	35	75	–25 to +85	0.4	TYP. 1.7	5	1	1×10^{-7}	20	±13	800
	PT480FE0000F*1		35	75	–25 to +85	0.25	TYP. 0.8	5	1	1×10^{-7}	20	±13	860
	PT4800E0000F		35	75	–25 to +85	0.12	TYP. 0.4	5	1	1×10^{-7}	20	±35	800
	PT4800FE000F*1		35	75	–25 to +85	0.08	TYP. 0.25	5	1	1×10^{-7}	20	±35	860
	PT4850FE000F*1		35	75	–25 to +85	0.12	0.56	5	1	1×10^{-7}	20	±35	860
Darlington	PT481E00000F	Epoxy resin with lens	35	75	–25 to +85	1.5	25	2	0.1	1×10^{-6}	10	±13	800
	PT481FE0000F*1		35	75	–25 to +85	0.9	27	2	0.1	1×10^{-6}	10	±13	860
	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
	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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PT100MF0MP
(PT100MF1MP, PT100MC0MP: Transparent resin)

PT480E00000F
(PT480FE0000F, PT481E00000F, PT481FE0000F)

PT4800E0000F
(PT4800FE000F, PT4810E0000F, PT4850FE000F)

PT483F1E000F▲

PT491FE0000F

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RoHS

■ PIN Photodiodes

(Ta = 25°C)

Model No.	Features	Package (Material)	Active area (mm^2)	Topr (°C)	Isc (μA) MIN.	Ev (lx)	Id (A) MAX.	V_R (V)	tr, tf (μs) TYP.	V_R (V)	R_L (kΩ)	λp (nm) TYP.
PD410PI2E00F	PIN type	Visible light cut-off epoxy resin with condenser (lens)	3.31	–25 to +85	2.5	100	1×10^{-8}	10	0.2	10	1	1 000
PD411PI2E00F		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)

Optoelectronics

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■ Infrared Emitting Diode Lineup

Type	Package	Features	Half intensity angle	Model No.
Single-end lead	Epoxy resin with lens	General purpose/Narrow beam angle	±13°	GL480E00000F
(Side view type)		Compact and thin	±30°	GL4800E0000F
Surface mount type	Epoxy resin with lens/ 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

■ Infrared Emitting Diodes

(Ta = 25°C)

Model No.	Package, features	Absolute maximum ratings				Radiant flux Φe (mW)			V_F (V)			Δθ (°)	λp (nm)
		I_F (mA)	V_R (V)	P (mW)	Topr (°C)	MIN.	TYP.	I_F (mA)	TYP.	MAX.	I_F (mA)	TYP.	TYP.
GL480E00000F	Epoxy resin with lens	50	6	75	–25 to +85	0.7	–	20	1.2	1.4	20	±13	950
GL4800E0000F		50	6	75	–25 to +85	0.7	1.6	20	1.2	1.4	20	±30	950
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

GL480E00000F

GL4800E0000F

GL100MN0MP
(GL100MN1MP, GL100MD1MP1)

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■ Distance Measuring Sensor Lineup

Output	Detected distance	Features	Model No.
1-bit digital output according to distance measuring	1.5 cm	Battery drive compatible, compact, 1-bit digital output	
		Capable of operation at high temperature (–30 to +105°C)	GP2Y5D91S00F
	5 cm	Battery drive compatible, compact, 1-bit digital output	GP2Y0D805Z0F
	10 cm	Battery drive compatible, compact, 1-bit digital output	GP2Y0D810Z0F
		Wide operating temperature type (–40 to +85°C)	GP2Y0D810Z1F
	15 cm	Battery drive compatible, compact, 1-bit digital output	GP2Y0D815Z0F
	13 cm	1-bit digital output	GP2Y0D413K0F
	24 cm	1-bit digital output	GP2Y0D21YK0F
	80 cm	1-bit digital output	GP2Y0D02YK0F

Output	Range of distance measuring	Features	Model No.
Analog voltage output according to distance measuring (Including I^2C output)	1.5 to 15 cm	Analog output	GP2Y0AF15 series
	2 to 15 cm	Analog output	GP2Y0A51SK0F
	4 to 30 cm	Analog output	GP2Y0A41SK0F / GP2Y0AF30 series
	4 to 50 cm	CMOS type Analog output	GP2Y0E02A
		I^2C output	GP2Y0E02B
		Analog, I^2C output	GP2Y0E03
	10 to 80 cm	Analog output	GP2Y0A21YK0F
	10 to 150 cm	Compact (22 × 8 × 7.2 [T] mm), Analog output	GP2Y0A60SZ0F / GP2Y0A60SZLF
	20 to 150 cm	Analog output	GP2Y0A02YK0F
	100 to 550 cm	Analog output	GP2Y0A710K0F

■ 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.
Analog output	Pulse analog output, single-shot detection of house dust, general purpose	GP2Y1010AU0F

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■ Distance Measuring Sensors (1)

◆Digital Output

(Ta = 25°C)

Model No.	Detected distance (cm)	Features	Absolute maximum ratings		Electro-optical characteristics*1			
			Vcc (V)	Topr (°C)	VOH (V) MIN.	VOL (V) MAX.	Dissipation current	
							Operating (mA)	Standby (μA)
GP2Y5D91S00F	1.5	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	Vcc –0.6	0.6	TYP. 7	–
GP2Y0D805Z0F	5	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	Vcc –0.6	0.6	MAX. 6.5	MAX. 8
GP2Y0D810Z0F	10	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	Vcc –0.6	0.6	MAX. 6.5	MAX. 8
GP2Y0D810Z1F	10	Light detector, infrared LED and signal processing circuit, short distance measuring type, battery drive compatible (operating power supply: 2.7 to 6.2 V), wide operating temperature type	–0.3 to +7	–40 to +85	Vcc –0.6	0.6	TYP. 5	MAX. 8
GP2Y0D815Z0F	15	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	Vcc –0.6	0.6	MAX. 6.5	MAX. 8
GP2Y0D413K0F	13	Distance measuring sensor united with PSD※, infrared LED and signal processing circuit, digital voltage output according to the measured distance	–0.3 to +7	–10 to +60	Vcc –0.3	0.6	–	–
GP2Y0D21YK0F	24	Distance measuring sensor united with PSD※, infrared LED and signal processing circuit, digital voltage output according to the measured distance	–0.3 to +7	–10 to +60	Vcc –0.3	0.6	MAX. 40	–
GP2Y0D02YK0F	80	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	Vcc –0.3	0.6	MAX. 50	–

*1 Vcc = 5 V

※ PSD: Position Sensitive Detector

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☆New product
★Under development

■ Distance Measuring Sensors (2)

◆Analog Output (Including I²C output)

(Ta = 25°C)

Model No.	Distance measuring range (cm)	Features	Absolute maximum ratings		Electro-optical characteristics*1		
			Vcc (V)	Topr (°C)	VOH (V) MIN.	VOL (V) MAX.	Dissipation current Operating (mA)
★GP2Y0AF15 series	1.5 to 15	Distance measuring sensor united with PSD✳, infrared LED and signal processing circuit, short measuring cycle (16.5 ms), compact, lineup of various connector shapes	–0.3 to +7	–10 to +60	VO (TYP.) = 0.4 V (at L = 15 cm), ΔVO (TYP.) = 2.3 V (at L = 15 cm → 1.5 cm)		TYP. 17
GP2Y0A51SK0F	2 to 15	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	VO (TYP.) = 0.4 V (at L = 15 cm), ΔVO (TYP.) = 2.25 V (at L = 15 cm → 2 cm)		TYP. 12
★GP2Y0AF30 series	4 to 30	Distance measuring sensor united with PSD✳, infrared LED and signal processing circuit, short measuring cycle (16.5 ms), compact, lineup of various connector shapes	–0.3 to +7	–10 to +60	VO (TYP.) = 0.4 V (at L = 30 cm), ΔVO (TYP.) = 2.3 V (at L = 30 cm → 4 cm)		TYP. 17
GP2Y0A41SK0F	4 to 30	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	VO (TYP.) = 0.4 V (at L = 30 cm), ΔVO (TYP.) = 2.25 V (at L = 30 cm → 4 cm)		MAX. 22
☆GP2Y0E02A	4 to 50	Infrared LED and CMOS image sensor with built-in signal processing circuit, compact size (18.9 × 8 × 5.2 mm), high-precision measurement, analog output	–0.3 to +3.6	–10 to +60	VOUT (A) 1 = 0.3 to 0.8 V (at L = 50 cm), VOUT (A) 3 = 2.1 to 2.3 V (at L = 4 cm)		MAX. 36
☆GP2Y0E02B	4 to 50	Infrared LED and CMOS image sensor with built-in signal processing circuit, compact size (18.9 × 8 × 5.2 mm), high-precision measurement, I²C output	–0.3 to +3.6	–10 to +60	D1 = 45 to 50 cm (at L = 50 cm), D3 = 3 to 5 cm (at L = 4 cm)		MAX. 36
☆GP2Y0E03	4 to 50	Infrared LED and CMOS image sensor with built-in signal processing circuit, compact size (16.7 × 11 × 5.2 mm), high-precision measurement, analog / I²C output both compatible	–0.3 to +5.5	–10 to +60	VOUT (A) 1 = 0.3 to 0.8 V, D1 = 45 to 50 cm (at L = 50 cm), VOUT (A) 3 = 2.1 to 2.3 V, D3 = 3 to 5 cm (at L = 4 cm)		MAX. 36
GP2Y0A21YK0F	10 to 80	Distance measuring sensor united with PSD✳, infrared LED and signal processing circuit, linear voltage output	–0.3 to +7	–10 to +60	VO (TYP.) = 0.4 V (at L = 80 cm), ΔVO (TYP.) = 1.9 V (at L: 80 cm → 10 cm)		MAX. 40
*2 GP2Y0A60SZ0F/ GP2Y0A60SZLF	10 to 150	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	VO (TYP.) = 0.65 V *3 (at L = 150 cm), ΔVO (TYP.) = 3.0 V (at L = 150 cm → 20 cm)		MAX. 50
GP2Y0A02YK0F	20 to 150	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	VO (TYP.) = 0.4 V (at L = 150 cm), ΔVO (TYP.) = 2.05 V (at L = 150 cm → 20 cm)		MAX. 50
GP2Y0A710K0F	100 to 550	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	VO (TYP.) = 2.5 V (at L = 100 cm), ΔVO (TYP.) = 0.7 V (at L = 100 cm → 200 cm)		TYP. 30

*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); ΔVo (TYP.) = 1.6 V (at L = 150 cm → 20 cm)

✳ PSD: Position Sensitive Detector

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GP2Y5D91S00F


GP2Y0D805Z0F
GP2Y0D810Z0F,
GP2Y0D815Z0F,
GP2Y0D810Z1F


GP2Y0E02A
(GP2Y0E02B)


GP2Y0E03


GP2Y0A60SZ0F


GP2Y0A60SZLF


GP2Y0AF15 series


GP2Y0AF30 series


GP2Y0A21YK0F
GP2Y0D21YK0F,
GP2Y0A41SK0F
GP2Y0D413K0F:
without mounting
hole


GP2Y0A51SK0F


GP2Y0D02YK0F
(GP2Y0A02YK0F)


GP2Y0A710K0F

■ High-Precision Displacement Sensor

(Ta = 25°C)

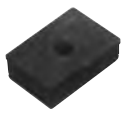
Model No.	Features	Topr (°C)	Operating supply voltage (V)	Dissipation current (mA)	Distance measuring range (mm)	Distance characteristic of output
GP2Y0AH01K0F	Resolution: 50 µm	–10 to +60	4.5 to 5.5	TYP. 20	4.5 to 6.0	TYP. 1.70 V Variation in output over range (4.5 to 6.0 mm)


GP2Y0AH01K0F

■ Dust Sensor Unit

(Ta = 25°C)

Model No.	Features	Topr (°C)	Electro-optical characteristics				
			Operating supply voltage (V)	Dissipation current (mA)	Detection sensitivity V/(0.1 mg/m^3)	Output voltage at no dust Voc (V)	Output voltage range VOH (V)
GP2Y1010AU0F	Built-in infrared emitting diode, photodiode and signal processing circuit, compact, single-shot detection of house dust	–10 to +65	4.5 to 5.5	TYP. 11	TYP. 0.5	TYP. 0.9	MIN. 3.4


GP2Y1010AU0F

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■ Fiber Optics Lineup for Audio Equipment

Connector type	Type	Outline	Features		High speed signal transmission	Model No.	
						Supply voltage 3 to 5 V	Supply voltage 5 V
Square connector (EIAJ RC-5720B)	Fiber optic transmitter	Without mounting hole	With shutter	Horizontal mounting type	MAX. 13.2 Mb/s		GP1FMV51TK0F
					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

GP1FMV31 series
(GP1FMV51 series)

GP1FAV50TK0F
(GP1FAV50RK0F,
GP1FAV30TK0F,
GP1FAV30RK0F)

GP1FAV51TK0F
(GP1FAV31TK0F,
GP1FAV55TK0F,
GP1FAV51RK0F,
GP1FAV31RK0F)

GP1FSB31TK0F

GP1FSV31TK0F
(GP1FSV51TK0F)

Optoelectronics

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RoHS

■ Fiber Optic Transmitters (Square Connector)

(Ta = 25°C)

Model No.	Appearance		Features	Absolute maximum ratings		Electro-optical characteristics					
	Mounting hole	Shutter		Vcc (V)	Topr (°C)	Supply voltage (V)	Propagation delay time t_{PLH} (ns) MAX.	Propagation delay time t_{PHL} (ns) MAX.	Dissipation current Icc (mA) MAX.	Pulse width distortion Δtw (ns)	Transmission speed T (Mb/s) MAX.
GP1FMV31TK0F	No	Yes	Compact	–0.5 to +7	–20 to +70	2.7 to 5.25	180	180	12	±15	15.5
GP1FMV51TK0F	No	Yes	Compact	–0.5 to +7	–20 to +70	4.75 to 5.25	180	180	13	±15	13.2
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

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

■ Fiber Optic Receivers (Square Connector)

(Ta = 25°C)

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

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RoHS

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

Type	Package		Features	Operating voltage	Model No.	
	Form	Detection position*5 (from PCB)				
IR detecting unit for remote control	Compact, thin type SMD (4.5 × 5.0 × 1.35 t mm)			3 to 5 V General type	GP1USC3xXP series	
	Compact type SMD (6.8 × 2.1 × 2.35 t mm)			3 to 5 V	GP1UF31 series	
	Lead L bend with shield case (holder)	16.0 mm*1	Compact size	3 to 5 V	GP1UE28XK0VF series	
				5 V	GP1UM28XK0VF series	
				3 to 5 V General type	GP1UE28xXKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	3 to 5 V	GP1UE28RK0VF series	
				5 V	GP1UM28RK0VF series	
				3 to 5 V General type	GP1UE28xRKC4 series	
		12.0 mm*2	Compact size	3 to 5 V	GP1UE27XK0VF series	
				5 V	GP1UM27XK0VF series	
				3 to 5 V General type	GP1UE27xXKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	3 to 5 V	GP1UE27RK0VF series	
				5 V	GP1UM27RK0VF series	
				3 to 5 V General type	GP1UE27xRKC4 series	
		6.8 mm*3	Compact size	3 to 5 V	GP1UE26XK0VF series	
				5 V	GP1UM26XK0VF series	
				3 to 5 V General type	GP1UE26xXKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	3 to 5 V	GP1UE26RK0VF series	
				5 V	GP1UM26RK0VF series	
				3 to 5 V General type	GP1UE26xRKC4 series	
	Lead straight with shield case (holder)	19.0 mm	Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	3 to 5 V	GP1UE29QK0VF series	
				5 V	GP1UM29QK0VF series	
				3 to 5 V General type	GP1UE29xQKC4 series	
		9.6 mm	Compact size	3 to 5 V	GP1UE28YK0VF series	
				5 V	GP1UM28YK0VF series	
				3 to 5 V General type	GP1UE28xYKC4 series	
			Compact size, Strengthened resistance to electromagnetic induction noise (Mesh type)	3 to 5 V	GP1UE28QK0VF series	
				5 V	GP1UM28QK0VF series	
				3 to 5 V General type	GP1UE28xQKC4 series	
	Holderless	Lead straight 6.0 mm		3 to 5 V	GP1UX31QS series	
				5 V	GP1UX51QS series	
				3 to 5 V General type	GP1UXC4xQS series	
		Lead L bend*4 5.3 mm		3 to 5 V	GP1UX31RK series	
				5 V	GP1UX51RK series	
				3 to 5 V General type	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

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RoHS

■ IR Detecting Units for Remote Control

(Ta = 25°C)

Type	Series No.	Absolute maximum ratings		Operating voltage (V)	Electrical characteristics				Size (mm)	Terminal layout	
		Vcc (V)	Topr (°C)		Icc (mA)*1 MAX.	VOH (V) MIN.	VOL (V) MAX.	fo (kHz) TYP.			
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 × 2.1 × 2.35	–	
	GP1USC3xXP	0 to 6.0	–30 to +85	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5 × 4.5 × 1.3	–	
With shield case (holder), 3 to 5 V drive (New type)	GP1UE26xXKC4	0 to 6.0	–10 to +70	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5.6 × 9.6 × 6.8	Center Vcc	
	GP1UE27xXKC4	0 to 6.0	–10 to +70	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5.6 × 9.6 × 12.0		
	GP1UE28xXKC4	0 to 6.0	–10 to +70	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5.6 × 9.6 × 16.0		
	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		
With shield case (holder), 3 to 5 V drive, Strengthened resistance to electromagnetic induction noise (New type)	GP1UE26xRKC4	0 to 6.0	–10 to +70	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5.6 × 9.6 × 7.2		
	GP1UE27xRKC4	0 to 6.0	–10 to +70	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5.6 × 9.6 × 12.4		
	GP1UE28xRKC4	0 to 6.0	–10 to +70	2.7 to 5.5	0.6	Vcc–0.5	0.45	*3	5.6 × 9.6 × 16.4		
	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		
With shield case (holder), 5 V drive	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 × 9.6 × 6.8		
	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 × 9.6 × 12.0		
	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 × 9.6 × 16.0		
	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		
With shield case (holder), 5 V drive, Strengthened resistance to electromagnetic induction noise	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		
	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		
	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		
	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		
With shield case (holder), 3 to 5 V drive	GP1UE26XK0VF	0 to 6.0	–10 to +70	2.7 to 5.5	0.4	Vcc–0.5	0.45	*3	5.6 × 9.6 × 6.8		
	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		
	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		
With shield case (holder), 3 to 5 V drive, Strengthened resistance to electromagnetic induction noise	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		
	GP1UE27RK0VF	0 to 6.0	–10 to +70	2.7 to 5.5	0.4	Vcc–0.5	0.45	*3	5.6 × 9.6 × 12.4		
	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		
	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 × 5.3 × 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	GP1UX51QS	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		
	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		
Holderless, 3 to 5 V drive, Strengthened resistance to electromagnetic induction noise	GP1UX31QS	0 to 6.0	–10 to +70	4.5 to 5.5	0.4	Vcc–0.5	0.45	*3	5.5 × 5.3 × 7.5		
	GP1UX31RK	0 to 6.0	–10 to +70	4.5 to 5.5	0.4	Vcc–0.5	0.45	*3	5.5 × 5.3 × 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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HIGH-LUMINOSITY WHITE SURFACE MOUNT LEDs / HIGH-LUMINOSITY SURFACE MOUNT LEDs (RGB 3-COLOR)

☆New product
★Under development

RoHS

■ High-Luminosity White Surface Mount LEDs

(Tc = 25°C)

Outline dimensions (mm)	Model No.	Color coordinates (x, y) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP	Luminous intensity (mcd) TYP.
3.2 × 3.1 (t = 0.65)	☆GM5BN98310A*1	(0.29, 0.28)	3.05	20	2 300
	☆GM5BN98320A*1		3.05	40	4 500
	☆GM5BN98330A*1		2.95	45	5 000
3.2 × 2.8 (t = 1.9)	★GM5BN96312A	(0.31, 0.31)	(3.05)	(20)	(2 500)
	★GM5BN96317A	(0.29, 0.28)	(3.05)	(20)	(2 300)

*1 Protection elements are embedded in each chips of GM5BN98310A, GM5BN98320A and GM5BN98330A.

GM5BN98310A
GM5BN98320A
GM5BN98330A

GM5BN96312A
GM5BN96317A

■ High-Luminosity Surface Mount LEDs (RGB 3-Color)

(Tc = 25°C)

Outline dimensions (mm)	Model No.	Radiation color	Forward voltage (V) TYP.	Forward current (mA) TYP	Mixed color luminous intensity	
					(mcd) TYP.	IF (mA)
3.2 × 3.1 (t = 0.65)	GM5WA98330A*1 ☆GM5WA98332A*1	Blue	3.2	20	2 300	10
		Green	3.2	20		20
		Red	2.2	20		20

*1 Protection elements are embedded in the blue and green chips of GM5WA98330A, and in the blue, green and red chips of GM5WA98332A.

GM5WA98330A
GM5WA98332A

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■ Pico ZENIGATA LEDs

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<0.2W 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.
2.8 × 2.8 (t = 1.9)	GM2BB27QT1C	2 700	2.95	50	16.5	83
	GM2BB30QT1C	3 000			17.5	
	GM2BB35QT1C	3 500			18.0	
	GM2BB40QT1C	4 000			19.0	
	GM2BB50QT1C	5 000			20.0	
	GM2BB57QT1C	5 700			20.0	
	GM2BB65QT1C	6 500			19.0	
	GM2BB50GT1C	5 000			22.5	70

<0.3W 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.
2.8 × 2.8 (t = 1.9)	GM2BB27QB2C	2 700	2.95	100	32.5	83
	GM2BB30QB2C	3 000			34.0	
	GM2BB35QB2C	3 500			35.5	
	GM2BB40QB2C	4 000			37.0	
	GM2BB50QB2C	5 000			39.0	
	GM2BB57QB2C	5 700			39.0	
	GM2BB65QB2C	6 500			37.0	

<0.5W 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.
2.8 × 2.8 (t = 1.9)	GM2BB27QS1C	2 700	3.15	150	48.0	83
	GM2BB30QS1C	3 000			50.0	
	GM2BB35QS1C	3 500			52.0	
	GM2BB40QS1C	4 000			54.0	
	GM2BB50QS1C	5 000			57.0	
	GM2BB57QS1C	5 700			57.0	
	GM2BB65QS1C	6 500			54.0	

Pico ZENIGATA LEDs
0.2 to 0.6W class

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<0.6W class>

(Tc = 25°C)

Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (lm) TYP.	Average color rendering index Ra TYP.
2.8 × 2.8 (t = 1.9)	GM2BB27QT4C	2 700	5.90	100	58.0	83
	GM2BB30QT4C	3 000			61.0	
	GM2BB35QT4C	3 500			63.5	
	GM2BB40QT4C	4 000			66.5	
	GM2BB50QT4C	5 000			70.0	
	GM2BB57QT4C	5 700			70.0	
	GM2BB65QT4C	6 500			66.5	
	GM2BB50GT4C	5 000			80.0	70
	GM2BB27QT4E	2 700	11.80	50	58.0	83
	GM2BB30QT4E	3 000			61.0	
	GM2BB35QT4E	3 500			63.5	
	GM2BB40QT4E	4 000			66.5	
	GM2BB50QT4E	5 000			70.0	
	GM2BB57QT4E	5 700			70.0	
	GM2BB65QT4E	6 500			66.5	
	GM2BB50GT4E	5 000			80.0	70

<0.9W class>

(Tc = 25°C)

Outline dimensions (mm)	Model No.	Color temperature (K) TYP.	Forward voltage (V) TYP.	Forward current (mA) TYP.	Total luminous flux (lm) TYP.	Average color rendering index Ra TYP.
3.2 × 3.2 (t = 2.1)	GM2AA27QV6F	(2 700)	(5.95)	(150)	(89.0)	83
	GM2AA30QV6F	(3 000)			(93.0)	
	GM2AA35QV6F	(3 500)			(97.5)	
	GM2AA40QV6F	(4 000)			(102.0)	
	GM2AA50QV6F	(5 000)			(107.0)	
	GM2AA50GV6F	(5 000)			(120.0)	70

Pico ZENIGATA LEDs
0.2 to 0.6W class

Pico ZENIGATA LEDs
0.9W class

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☆New product

■ Pico ZENIGATA (TAB Type) LEDs

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<1W 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.
2.8 × 2.8 (t = 1.45)	☆GM2BT27QU2☐ (☐ = 3,4)	2 700	6.4	150	103	83
	☆GM2BT30QU2☐ (☐ = 3,4)	3 000			106	
	☆GM2BT35QU2☐ (☐ = 3,4)	3 500			110	
	☆GM2BT40QU2☐ (☐ = 3,4)	4 000			114	
	☆GM2BT50QU2☐ (☐ = 3,4)	5 000			119	
	☆GM2BT57QU2☐ (☐ = 3,4)	5 700			119	
	☆GM2BT65QU2☐ (☐ = 3,4)	6 500			114	

Pico ZENIGATA (TAB type) **LEDs**

■ Petit ZENIGATA LEDs

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<3W 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.
12.0 × 8.0 (t = 1.8)	GW5SMB27P0C	2 700	10.3	350	260	82
	GW5SMB30P0C	3 000			280	
	GW5SMB40P0C	4 000			300	
	GW5SMB50P0C	5 000			310	

<5W 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.
12.0 × 8.0 (t = 1.8)	GW5SMC27P0C	2 700	10.3	500	350	82
	GW5SMC30P0C	3 000			380	
	GW5SMC40P0C	4 000			400	
	GW5SMC50P0C	5 000			410	
	GW5SMM27P0C	2 700	30.5	170	375	
	GW5SMM30P0C	3 000			405	
	GW5SMM40P0C	4 000			435	
	GW5SMM50P0C	5 000			450	

Petit ZENIGATA LEDs

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RoHS

■ Mini ZENIGATA LEDs

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<6W class>

(Tj = 90°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.
15.0 × 12.0 (t = 1.8)	GW6BMG27HED	2 700	36	160	495	82
	GW6BMG30HED	3 000			520	
	GW6BMG40HED	4 000			555	
	GW6BMG50HED	5 000			575	

<8W class>

(Tj = 90°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.
15.0 × 12.0 (t = 1.8)	GW6BMW27HED	2 700	36	240	740	82
	GW6BMW30HED	3 000			780	
	GW6BMW40HED	4 000			840	
	GW6BMW50HED	5 000			860	

<11W class>

(Tj = 90°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.
15.0 × 12.0 (t = 1.8)	GW6BMR27HED	2 700	36	320	970	82
	GW6BMR30HED	3 000			1 030	
	GW6BMR40HED	4 000			1 110	
	GW6BMR50HED	5 000			1 130	

<15W class>

(Tj = 90°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.
15.0 × 12.0 (t = 1.8)	GW6BMS27HED	2 700	36	400	1 180	82
	GW6BMS30HED	3 000			1 250	
	GW6BMS40HED	4 000			1 340	
	GW6BMS50HED	5 000			1 370	

<17W class>

(Tj = 90°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.
15.0 × 12.0 (t = 1.8)	☆GW6BMR27JEC	2 700	35.5	500	1 610	82
	☆GW6BMR30JEC	3 000			1 700	
	☆GW6BMR40JEC	4 000			1 810	
	☆GW6BMR50JEC	5 000			1 820	

Mini ZENIGATA LEDs

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RoHS

■ Mega ZENIGATA LEDs

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<15W class>

(Tj = 90°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.
24.0 × 20.0 (t = 1.8)	GW6DMA27NFC	2 700	37	400	1 380	83
	GW6DMA30NFC	3 000			1 450	
	GW6DMA40NFC	4 000			1 580	82
	GW6DMA50NFC	5 000			1 600	
	GW6DGA27NFC	2 700			1 150	93
	GW6DGA30NFC	3 000			1 210	
	GW6DGA40NFC	4 000			1 270	92
	GW6DGA50NFC	5 000			1 300	90

<25W class>

(Tj = 90°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.
24.0 × 20.0 (t = 1.8)	GW6DMC27NFC	2 700	37	700	2 330	83
	GW6DMC30NFC	3 000			2 450	
	GW6DMC40NFC	4 000			2 650	82
	GW6DMC50NFC	5 000			2 700	
	GW6DGC27NFC	2 700			1 920	93
	GW6DGC30NFC	3 000			2 020	
	GW6DGC40NFC	4 000			2 120	92
	GW6DGC50NFC	5 000			2 160	90

<50W class>

(Tj = 90°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.
24.0 × 20.0 (t = 1.8)	GW6DME27NFC	2 700	50	950	4 130	83
	GW6DME30NFC	3 000			4 350	
	GW6DME40NFC	4 000			4 650	82
	GW6DME50NFC	5 000			4 780	
	GW6DGE27NFC	2 700			3 410	93
	GW6DGE30NFC	3 000			3 590	
	GW6DGE40NFC	4 000			3 770	92
	GW6DGE50NFC	5 000			3 820	90

Mega ZENIGATA LEDs

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ZENIGATA LEDs FOR LIGHTING / SURFACE LIGHT SOURCE LEDs

☆New product

■ Giga ZENIGATA LEDs

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(Tj = 90°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.
75.0 × 65.0 (t = 3.9)	GW7GAP50FGC	5 000	140	700	13 000	70
	GW7GMP30FGC	3 000			10 500	82
	GW7GMP50FGC	5 000			11 800	

■ TIGER ZENI LEDs

(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.
24.0 × 20.0 (t = 1.8)	GW6TGCBG40C	2 700	37	700	1 840	96
		5 700			2 170	90

Giga ZENIGATA LEDs

TIGER ZENI LEDs

■ Surface Light Source LEDs

(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)	☆GM2BB8CH10E	(0.273, 0.244)	3.44	310	82.0
4.2 × 1.4 (t = 0.8)	☆GM5FS0CP10A	(0.300, 0.280)	3.2	130	38.5
7.0 × 3.0 (t = 0.8)	☆GM5FU2CP20A	(0.261, 0.224)	6.4	130	79.0

GM2BB8CH10E

GM5FS0CP10A

GM5FU2CP20A

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★Under development

■ Laser Diodes

◆Model Configurations

• For applications other than optical discs

Wavelength (nm)		Absolute maximum ratings (mW)*1		Oscillation transverse mode*3	Package		
		CW (Continuous wave)	Pulse		 ø5.6 mm Can type	 ø3.8 mm Can type	 ø3.3 mm Can type
638 band		125	–	SM	★GH0631CA2C	–	–
				SM	★GH0631CA2G	★GH0631CA5G	–
642 band		155	–	SM	★GH0641FA2C	–	–
				SM	GH0641FA2G	★GH0641FA5G	–
		250	–	MM	GH0642FA2x	–	–
660 band		10	–	SM	GH06510F2B	–	GH06510F4A
		120	300	SM	GH06P30C1C	–	–
785 band		15	–	SM	GH07815D2K	–	–
		25	–	SM	GH07825D2K	–	–
		155	280	SM	GH07P28F1C	–	GH07P28F4C
	2ch*2	15	–	SM	GH3S215D2B	–	–
		25	–	SM	GH3S225D2B	–	–
830 band		60	–	SM	GH08360A2A	–	–
		210	–	SM	GH0832BA2C	–	★GH0832BA4C
		300	1 W	MM	★GH0831WA2x	–	–
		–	5 W to 20 W	MM	★GH083xWA2x series	–	–
905 band		200	–	SM	★GH0902AA2C	–	–
		300	1 W	MM	★GH0901WA2x	–	–
		–	5 W to 20 W	MM	★GH090xWA2x series	–	–
940 band		200	–	MM	GH0942IA2C series	–	–
		300	1 W	MM	★GH0941WA2x	–	–
		–	5 W to 20 W	MM	★GH094xWA2x series	–	–

*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.
*2 4-pin type package
*3 SM: Single Mode
MM: Multi Mode

*2 

• For optical disc use*3

Wavelength (nm)		Absolute maximum ratings (mW)*1	Package  1.8 mm t Frame type
660/785 band	Dual-wavelength	320/350*2	GH33235A8C
		350/400*2	GH33540D8C

*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.
*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.

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★Under development

◆Specifications

• Laser diodes lineup for applications other than optical discs

(Tc = 25°C)

Model No.	Wave-length (nm)	Absolute maximum ratings*1 (mW)		Features	Applications	Built-in monitor PD	Terminal connec-tions
		CW (Continu-ous wave)	Pulse				
★GH0631CA2C	638 band	125	–	ø5.6 mm CAN package, operating temperature: 60°C MAX.	Display, etc.	No	3
★GH0631CA2G						No	8
★GH0631CA5G				ø3.8 mm CAN package, operating temperature: 60°C MAX.		No	8
GH0641FA2C	642 band	155	–	ø5.6 mm CAN package, operating temperature: 60°C MAX.	Display, etc.	No	3
GH0641FA2G						No	8
★GH0641FA5G				ø3.8 mm CAN package, operating temperature: 60°C MAX.		No	8
★GH0642FA2x		250	–	ø5.6 mm CAN package, operating temperature: 40°C MAX.		No	T.B.D.
GH06510F2B	660 band	10	–	ø5.6 mm CAN package, operating temperature: 75°C MAX.	Bar code reader, laser displacement gauge, etc.	Yes	2
GH06510F4A				ø3.3 mm CAN package, operating temperature: 70°C MAX.		Yes	1
GH06P30C1C		120	300	ø5.6 mm CAN package, operating temperature: 75°C MAX.	Various types of sensors, etc.	No	3
GH07815D2K	785 band	15	–	ø5.6 mm CAN package, operating temperature: 60°C MAX.	Printer, copier, complex machine	Yes	4
GH07825D2K		25	–			Yes	4
GH07P28F1C		155	280	ø5.6 mm CAN package, operating temperature: 75°C MAX.	Various types of sensors, etc.	No	3
GH07P28F4C				ø3.3 mm CAN package, operating temperature: 75°C MAX.		No	3
GH3S215D2B		15 (×2ch)	–	ø5.6 mm CAN package, operating temperature: 60°C MAX.	Printer, copier, complex machine	Yes	5
GH3S225D2B		25 (×2ch)	–			Yes	5
GH08360A2A	830 band	60	–	ø5.6 mm CAN package, operating temperature: 100°C MAX.	Various types of sensors, etc.	Yes	1
GH0832BA2C		210				No	3
★GH0832BA4C				ø3.3 mm CAN package, operating temperature: 80°C MAX.		No	3
★GH0831WA2x		300	1 W	ø5.6 mm CAN package		No	T.B.D.
★GH083xWA2x series		–	5 W to 20 W			No	T.B.D.
★GH0902AA2C	905 band	200	–	ø5.6 mm CAN package	Various types of sensors, etc.	No	3
★GH0901WA2x		300	1 W			No	T.B.D.
★GH090xWA2x series		–	5 W to 20 W			No	T.B.D.
GH0942IA2C series	940 band	200	–	ø5.6 mm CAN package	Various types of sensors, etc.	No	3
★GH0941WA2x		300	1 W			No	T.B.D.
★GH094xWA2x series		–	5 W to 20 W			No	T.B.D.

*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.

• Laser diodes lineup for optical disc use*2

(Tc = 25°C)

Model No.	Wave-length (nm)	Absolute maximum ratings*1 (mW)		Features	Applications	Built-in monitor PD	Terminal connec-tions
		CW (Contin-uous wave)	Pulse				
GH33235A8C	660 band	90	320	1.8 mm frame package, operating temperature: 85°C MAX. (pulse drive)	Double-layer DVD 8× to 16× recording	No	7
	785 band	160	350		CD-R/RW (MAX. 48× to 52× recording)		
GH33540D8C	660 band	125	350	1.8 mm frame package, operating temperature: 80°C MAX. (pulse drive)	Double-layer DVD 8× to 16× recording	No	7
	785 band	200	400		CD-R/RW (MAX. 48× to 52× recording)		

*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.

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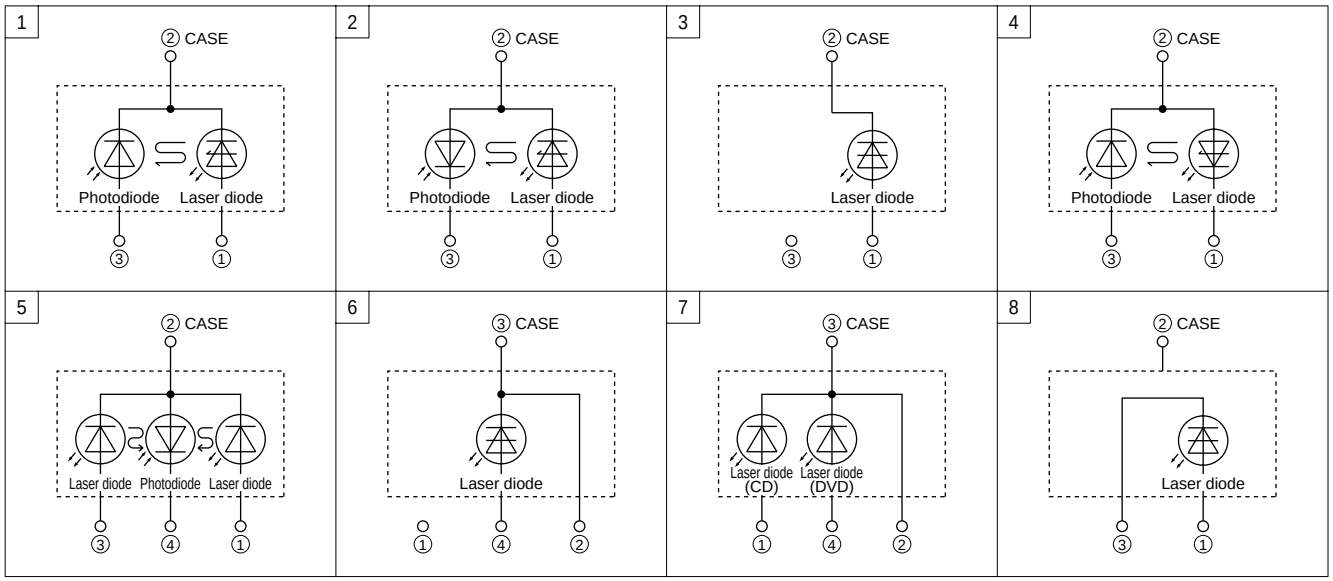
RoHS

• Terminal Connections



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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 [95 mA (TYP.): BS1K2EL100A]

◆ Specifications

Destination		Europe, Astra/Eutelsat Satellite etc.			
Receiving polarization		Horizontal/Vertical polarization			
Model No. <Type>		BS1K1EL500A <4 output>	BS1K1EL400A <4 output>	BS1K1EL200A <2 output>	BS1K2EL100A <1 output>
Input frequency (GHz)		10.7 to 11.7 [Low band], 11.7 to 12.75 [High band]			
Output frequency (MHz)		950 to 1 950 [Low band], 1 100 to 2 150 [High band]			
Local oscillation frequency (GHz)		9.75 [Low band], 10.6 [High band]			
NF (dB)		0.4 (TYP.)			
Conversion gain (dB)		56 (TYP.)		58 (TYP.)	
Phase noise		–55 dBc/Hz at 1 kHz (TYP.)		–80 dBc/Hz at 1 kHz (TYP.)	
Cross-polar discrimination (dB)		25 (TYP.)			
Supply voltage (V DC) (Polarization switching)	Vertical polarization	11.5 to 14.0 (0/22 kHz)			
	Horizontal polarization	16.0 to 19.0 (0/22 kHz)			
Dissipation current (mA)		200 (TYP.)/250 (MAX.)	150 (TYP.)/300 (MAX.)	190 (TYP.)/250 (MAX.)	95 (TYP.)/120 (MAX.)
Waveguide		Feed-horn (F/D = 0.6)			
Output impedance (Ω)		75			
Output connector (F-type)		4-output (H/H, H/L, V/H, V/L)	4-output (H/V, High and low switching)	2-output (H/V, High and low switching)	1-output (H/V, High and low switching)
Outline dimensions (W) × (D) × (H) (mm)		150 × 70 × 60	150 × 70 × 60	142 × 60 × 60	80 × 55 × 55
Weight (g)		Approx. 190	Approx. 190	Approx. 145	Approx. 60


BS1K1EL500A/BS1K1EL400A


BS1K1EL200A


BS1K2EL100A

RF Components

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RoHS

■ 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.)]

(3) Low dissipation current design for improved energy saving. [75 mA (TYP.)]

◆ Standard Specifications

Destination	Japan BS/CS 110° Satellite
Receiving polarization	Right circular polarization
Model No.	BS1G4JU300A
Input frequency (GHz)	11.71023 to 12.751
Output frequency (MHz)	1 032.23 to 2 073
Local oscillation frequency (GHz)	10.678
NF (dB)	0.45 (TYP.) / 0.6 (MAX.)
Conversion gain (dB)	48 to 58
Phase noise	–80 dBc/Hz at 1 kHz (TYP.)
Cross-polar discrimination (dB)	25 (TYP.)/20 (MIN.)
Supply voltage (V DC)	9.5 to 18.0
Dissipation current (mA)	75 (TYP.)/100 (MAX.)
Waveguide	Feed-horn (F/D = 0.5)
Output impedance (Ω)	75
Output connector (F-type)	1-output
Outline dimensions (mm)	105 (W) × 46 (D) × 46 (H)
Weight* (g)	Approx. 100

* Not including outer cabinet

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■ Digital DBS Front-End Units

◆ Features

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

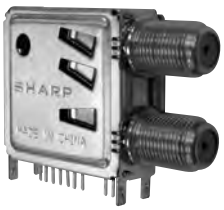
(2) Wide-band reception design also covering CS broadcast band. [Reception frequency: 950 to 2 150 MHz]

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

◆ Standard Specifications <IQ output type>

Destination	Global (ISDB-S/DVB-S2/ABS-S)	
Input type	1-input/1-loop through output	1-input
Model No.	BS2S7VZ7A03	BS2S7VZ6A02
Input frequency (MHz)	950 to 2 150	
Input signal level (dBm)	–65 to –25	
The 1st intermediate frequency (MHz)	Zero-IF (Direct conversion)	
Base band frequency bandwidth (MHz)	5 to 40, 2 MHz step (BB LPF)	
RF input local leak (dBm)	–68 and below	
Output type	I/Q	
Noise figure (dB)	6 (TYP.)	
Phase noise (dBc/Hz)	–88 at 10 kHz offset (TYP.)	
Supply voltage (V DC)	3.3	
LNB power supply	DC 25 V, 400 mA (MAX.)	
Input impedance (Ω)	75	
Outline dimensions (mm)	30.4 (W) × 29.4 (D) × 12.9 (H)	25.2 (W) × 17.4 (D) × 8.7 (H)

※ Low-profile type is also available.



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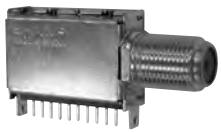

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RF Components

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RoHS

■ Front-End Units for ISDB-T/S

◆ 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.	VA4M5JD2272		VA4M6JC2290	
	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	DIF	I , Q	DIF	I , Q
Noise figure (dB)	4 (TYP.)	6 (TYP.)	4 (TYP.)	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)	3.3	3.3	1.8, 3.3	3.3
Power consumption (W)	0.6	0.5	0.9	1.0
Outline dimensions (mm)	40 (W) × 34 (D) × 7.8 (H)			

VA4M5JD2272

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■ Front-End Units for DVB-T2/DTMB

◆ 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/Asia (DVB-T2), China (DTMB)		
Model No.	VA4M1DX2331	VA4M1DX2323	VA4M2DX2194
Input frequency (MHz)	51 to 868		47 to 868
Output type	DIF	DIF (Off through)	DIF (Dual output)
Noise figure (dB)	5 (TYP.)		
Phase noise (dBc/Hz)	–90		
Power consumption (W)	0.49		1.13
Supply voltage (V DC)	3.3, 1.8		5, 3.3, 1.8
Outline dimensions (mm)	24.2 (W) × 25.8 (D) × 8 (H)		41.3 (W) × 37.5 (D) × 12.3 (H)

VA4M1DX2331

VA4M2DX2194

RF Components

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

◆ Features

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

◆ Standard Specifications

Destination	Brazil	China*1
Model No.	VA4M1BC1228	VA4M1CA1309
Input frequency (MHz)	47 to 866	
Output type	IF	
Digital IF bandwidth (MHz)	6	8
Phase noise (dBc/Hz)	–90 (TYP.) at 10 kHz offset	
Supply voltage (V DC)	3.3	
Noise figure (dB)	4 (TYP.)	
Channel selection system	PLL (I^2C-bus)*2	
Outline dimensions (W) × (D) × (H) (mm)	30 × 28 × 7.5	26.2 × 20 × 10.6

*1 Built-in isolator type
*2 I^2C-bus is a trademark of Philips Corporation.

VA4M1BC1228

VA4M1CA1309

◆ 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	Global
Model No.	VA4M1DB1261
Input frequency (MHz)	47 to 862
Output type	IF
Noise figure (dB)	4 (TYP.)
Phase noise (dBc/Hz)	–90 (TYP.)
Supply voltage (V)	3.3
Outline dimensions (W) × (D) × (H) (mm)	27 × 14 × 7.5

※ Contact SHARP for custom design product.
(For connector shape or facing side, analog output format, etc.)

VA4M1DB1261

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FULL-SEG TUNER MODULE FOR DIVERSITY RECEPTION / MPEG MODULE

■ Full-Seg Tuner Module for Diversity Reception

◆ Features

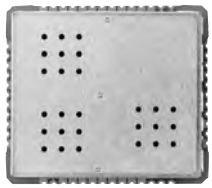
Compact package, enabling 4-diversity reception (35.0 × 31.0 × 2.95 mm)

◆ Standard Specifications

Destination		Japan
Model No.		VA3D5JZ705
Type		Built-in diversity demodulator for four signal reception
Input frequency (MHz)		470 to 770
IF frequency (MHz)		4
Output type		Transport stream
Input sensitivity (dBm)	During diversity reception	–88 (TYP.) (64QAM, CR = 3/4)
	During single reception	–82 (TYP.) (64QAM, CR = 3/4)
Supply voltage (V)		Vcc1: 1.2, Vcc2: 3.3 (IO: 3.3)
Power consumption (W)		1.24 (TYP.)
Operating temperature (°C)		–40 to 85
Control interface		I²C-bus*1
Outline dimensions (W) × (D) × (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.



VA3D5JZ705

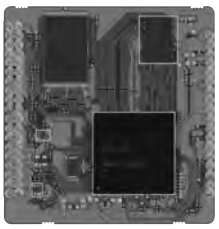
■ MPEG Module

◆ 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.



DU6N4JZ0xxx

◆ Standard Specifications

Type	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 + MPEG			RF + OFDM + MPEG
CATV (pass-through)	○		–	○
Video output	Component (Full HD)*			
Audio output	Analog stereo (L/R)			
B-CAS	Built-in control software			
EPG	Built-in simple 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) × 60 (D) × 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).

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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.

DU6R4JZxxxx

◆ Standard Specifications

Type	For digital terrestrial/BS/CS	
	Double type	Single type
Model No.	DU6R4JZxxxx	
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)	○	
Firm ware upgrades	○	
Supply voltage (V)	5/3.3/1.8/1.2/1.05	
Power consumption (W)	2.9	
Outline dimensions (mm)	65 (W) × 80 (D) × 7 (H)	65 (W) × 70 (D) × 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 × 5.4 × 1.0 mm

(3) Low power consumption: 41 mW (with software power control)

(4) Output interface: TS serial output

VA3A5JZ967

◆ Standard Specifications

Destination	Japan
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	I²C-bus*1

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

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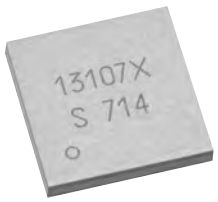
■ Tuner Module for Multimedia Broadcast Reception

◆ Features

(1) Compact and thin design: 6.7 × 6.7 × 1.0 mm
(2) Capable of receiving digital terrestrial broadcasts such as One-seg or Full-seg.
(3) Output interface: TS or SPI output



VA3D5JZ714

◆ Standard Specifications

Destination	Japan
Model No.	VA3D5JZ714
Input frequency (MHz)	90 to 108 207.5 to 222 470 to 710
Outline dimensions (mm)	6.7 × 6.7 × 1.0
Supply voltage (V)	1.1, 1.8, I/O: 1.8
Power consumption (mW)	80 (When receiving One-seg broadcasting) 135 (When receiving V-High multimedia broadcasting) 145 (When receiving Full-seg broadcasting)
Operating temperature (°C)	–20 to 65
Control I/F	I^2C-bus*1

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

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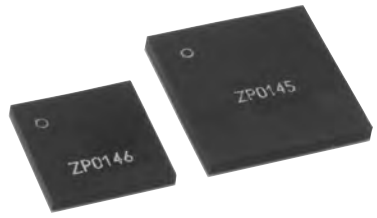
EMERGENCY WARNING BROADCASTING RECEIVER MODULE / IONIZING RADIATION SENSOR MODULE

■ Emergency Warning Broadcasting Receiver Module

◆ Features

(1) Drastically reduced power consumption with use of One-Seg broadcasting system*
(2) One-Seg tuner and microcontroller in one package, compact size for simple assembly
(3) The built-in acceleration sensor detects falling and turns off the device power automatically <DU6J9ZP0145>

*Basic television and data broadcasting services are not supported.



DU6J9ZP0146/DU6J9ZP0145

◆ Standard Specifications

Product name	Emergency warning broadcasting receiver module	
Destination	Japan	Global
Model No.	DU6J9ZP0146	DU6J9ZP0145
Outline dimensions (mm)	8 × 8 × 1.2	11 × 11 × 1.4
Reception bandwidth (MHz)	6	6/7/8
Reception frequency range (MHz)	UHF (470 to 770)	UHF (470 to 862)
Standby power consumption (mW)	10	88
Acceleration sensor	–	Built in
Communication system	UART	
Power supply	2 systems (3.3 V, 1.2 V)	

■ Ionizing Radiation Sensor Module

◆ Features

(1) Low-noise amplifier to efficiently amplify weak currents
(2) Built-in circuit to eliminate noise caused by vibration and shock
(3) Compact module size thanks to a newly developed dedicated IC (25 × 20 × 2.5 mm)
(4) Low power consumption (7.5 mW at normal operation)

QM1H0M0058

◆ Specifications

Model No.	QM1H0M0058
Object to be detected	Gamma ray (γ-ray) (Detector: PIN photodiode)
Measuring range (μSv/h)	0.05 to 20
Output interface	I^2C output
Power supply voltage	DC 5 V (Photodiode), 2.75 V (Analog), 1.8 V (Digital)
Power consumption (mW)	7.5 (at normal operation)
Outline dimensions (mm)	25 × 20 × 2.5

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■ One-Seg 8 Tuner Module

◆ Features

(1) Up to 8 simultaneously receivable TV channels (Industry's first)
(2) Compact module size (board space): Smaller than 30 × 60 mm
(3) Simultaneous recording and tuning of up to 8 TV channels

◆ Specifications

Mounting method	MoM unit (Module ×8 units installed)
Reception frequency (MHz)	470 to 710
Number of receiving channels	8 (MAX.)
Distribution method	8 power dividers for digital terrestrial broadcasting only
Receiving sensitivity (dBm)	-84 (TYP.) (QPSK CR: 2/3 BW: 13 seg)
Dispersion of receiving sensitivity	No
Module size (mm)	30 × 60

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SHARP CORPORATION
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Facility	Certificate No.	Date of Registration	Scope of Registered Activities
Electronic Components and Devices Group (Fukuyama)	EC99J2016	September 24, 1996	Design, development and manufacture of electronic devices
Advanced Development and Planning Center	EC99J2038	December 3, 1996	Research and development, production technology development, and manufacture of LCD panels The manufacture of compact LCD panels
Mie Plant	EC99J2051	January 28, 1997	Development, design and manufacture of LCDs
Kameyama Plant	EC04J0284	October 12, 2004	Development and production of LCD
Electronic Components and Devices Group (Mihara)	20002660 UM	November 17, 2003	Design, development and manufacture of laser diodes, hologram laser and LED devices Design and development of printed wiring boards

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

Group	Certificate No.	Scope of Registered Activities
Electronic Components and Devices Division	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 (outsourcing) of power control equipment The design / development and manufacture of LEDs The design / development and manufacture of LED units The design / development and manufacture of laser diodes, hologram laser The design / development and manufacture of optical pick-ups
General Manager, Display Device Business	JQA-QM3776	Design, development, and manufacture of LCD panels and modules

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