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ELECTRONIC COMPONENTS



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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	Luminance (cd/m ²) (TYP.)	Interface	Power consumption (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	450	CMOS	0.8	76.9 × 63.9 × 4.7	TYP. 42	Long-life LED backlight
8.9 [3.5]	LQ035Q3DY01	240 × RGB × 320	0.2235 × 0.2235	53.64 × 71.52	260 k	600	CMOS	0.5	65.0 × 85.0 × 3.4	40	Advanced Super V, Low reflection technology
9.4 [3.7]	LS037V7DW05	480 × RGB × 640	0.117 × 0.117	56.16 × 74.88	16.77 M	250	CMOS	0.4	65.0 × 89.2 × 4.4	50	Advanced Super V, Transflective LCD, With resistive touch panel
	300					38				Advanced Super V, Transflective LCD	
11 [4.2]	LQ042T1DW01	480 × 272 × RGB	0.1935 × 0.1935	92.88 × 52.632	16.19 M	400	CMOS	2.5	109.5 × 69.0 × 9.6	85	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
11 [4.3]	LQ043T1DG28	480 × 272 × RGB	0.198 × 0.198	95.04 × 53.856	260 k	300	CMOS	0.6	105.5 × 67.2 × 4.2	60	With resistive touch panel
	LQ043T1DG29					360				45	
	LQ043Y1DY01	480 × RGB × 800	0.117 × 0.117	56.16 × 93.6	16.77 M	315				62.46 × 105.9 × 2.1	30
14 [5.7]	LQ057Q3DC03	320 × 240 × RGB	0.36 × 0.36	115.2 × 86.4	260 k	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	350	CMOS	3.0	161.3 × 117.0 × 12.0	TYP. 200	Long-life LED backlight, Built-in LED backlight driver circuit
	☆LQ064X3LW01	1 024 × RGB × 768	0.12675 × 0.12675	129.792 × 97.344	16.77 M	350	LVDS	5.3	153.4 × 122.0 × 9.9	220	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
18 [7.0]	LQ070Y3LW01	800 × 480 × RGB	0.1905 × 0.1905	152.4 × 91.44	16.19 M	380	LVDS	2.7	170.0 × 110.0 × 9.0	TYP. 175	Advanced Super V, Long-life LED backlight
	LQ070Y3LG01				260 k	350		1.8	164.9 × 104.0 × 3.9	140	
21 [8.4]	LQ084V1DG43	640 × RGB × 480	0.267 × 0.267	170.88 × 128.16	260 k	370	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	330	LVDS	4.1	199.5 × 154.0 × 11.6	320	Long-life LED backlight, Built-in LED backlight driver circuit
22 [8.5]	LQ085Y3DG18	800 × 480 × RGB	0.231 × 0.231	184.8 × 110.88	260 k	250	CMOS	4.1	222.7 × 133.6 × 10.0	TYP. 256	Built-in LED backlight driver circuit
23 [9.1]	LQ091B1LW01	822 × RGB × 260	0.267 × 0.267	219.474 × 69.42	16.77 M	380	LVDS	6.8	240.0 × 86.0 × 10.0	230	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
26 [10.1]	LQ101K1LY05	1 280 × RGB × 800	0.1695 × 0.1695	216.96 × 135.6	16.77 M	400	LVDS	4.2	230.7 × 152.5 × 8.7	270	Advanced Super V, Low reflection technology, Long-life LED backlight, Built-in LED backlight driver circuit
	LQ101W3LG01	1 024 × RGB × 600	0.2175 × 0.2088	222.72 × 125.28	260 K	350		5.1	235.3 × 143.0 × 7.9	350	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	450	CMOS/LVDS	5.6	246.5 × 179.3 × 12.5	TYP. 500	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ104S1DG2C	800 × RGB × 600	0.264 × 0.264			350	CMOS	4.5	246.5 × 179.3 × 11.0	550	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ104S1LG81					420	LVDS	6.1	246.5 × 179.3 × 12.5	500	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.

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■LCD Modules

<For industrial appliances> (cont'd)

Display size (cm) ["]	Model No.	Dot format H x V (dot)	Pixel pitch H x V (mm)	Active area H x V (mm)	Display colors	Luminance (cd/m ²) (TYP.)	Interface	Power consumption (W) (TYP.)	Outline dimensions*1 W x H x D (mm) (TYP.)	Weight (g) (MAX.)	Remarks
31 [12.1]	LQ121S1DG81	800 x RGB x 600	0.3075 x 0.3075	246.0 x 184.5	260 k	450	CMOS	6.2	276.0 x 209.0 x 11.0	650	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ121S1LG84				260 k	450	LVDS	5.1	276.0 x 209.0 x 9.1	600	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ121S1LG86					1 500		12.9			Long-life LED backlight, Built-in LED backlight driver circuit
	LQ121K1LG52	1 280 x RGB x 800	0.204 x 0.204	261.1 x 163.2	16.19 M	430	LVDS	6.0	278.0 x 184.0 x 8.6	550	Long-life LED backlight, Built-in LED backlight driver circuit
	☆LQ121K1LW56				16.77 M	320		5.2	278.0 x 184.0 x 10.2		Wide Viewing Angle Long-life LED backlight, Built-in LED backlight driver circuit
	☆LQ121K1LG58				16.19 M	700		5.8	278.0 x 184.0 x 8.6		Long-life LED backlight, Built-in LED backlight driver circuit
	LQ121X3LG02				260 k	1 200		9.7	259.0 x 205.0 x 7.5		Long-life LED backlight
38 [15.0]	LQ150X1LG11	1 024 x RGB x 768	0.297 x 0.297	304.1 x 228.1	16.19 M	600	LVDS	8.2	331.6 x 254.7 x 9.3	950	Long-life LED backlight, Built-in LED backlight driver circuit
	LQ150X1LG91					350		6.8			Long-life LED backlight, Built-in LED backlight driver circuit
	LQ150X1LG96					1 050		14.8			Built-in LED backlight driver circuit
	LQ150X1LX92				16.19 M	270	10.0	326.5 x 253.5 x 9.6	950	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Haze value 3%	
	LQ150X1LX95					400				Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Haze value 3%	
	LQ150X1LX96				16.19 M	500	10.2	331.6 x 254.7 x 9.3	950	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Haze value 3%	
	☆LQ150X1LX9K					400				Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Polarized sunglasses supported	
	LQ150X1LW12				10 M	350	10.2	331.6 x 254.7 x 9.3	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit		
	LQ150X1LW95				16.19 M	400	10.0	326.5 x 253.5 x 9.6	950	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit	
	LQ150X1LW96					500				Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit	

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■LCD Modules

<For industrial appliances> (cont'd)

Display size (cm) ["]	Model No.	Dot format H x V (dot)	Pixel pitch H x V (mm)	Active area H x V (mm)	Display colors	Luminance (cd/m ²) (TYP.)	Interface	Power consumption (W) (TYP.)	Outline dimensions*1 W x H x D (mm) (TYP.)	Weight (g) (MAX.)	Remarks
40 [15.6]	☆LQ156T3LW03	1 366 x RGB x 768	0.252 x 0.252	344.232 x 193.536	16.77 M	400	LVDS	16.9	363.8 x 215.9 x 10.8	950	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
	LQ156M1LG21	1 920 x RGB x 1 080	0.17925 x 0.17925	344.16 x 193.59	16.19 M	300/350/400/600	2ch LVDS	13.6 (600cd/m ²)	370.0 x 217.0 x 9.3		Long-life LED backlight, Built-in LED backlight driver circuit, With brightness control switch
	LQ156M3LW01				16.77 M	400		17.9	363.8 x 215.9 x 10.8		Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
47 [18.5]	☆LQ185M3LW01	1 920 x RGB x 1 080	0.213 x 0.21300	408.96 x 230.04	16.77 M	400	2ch LVDS	17.5	430.4 x 254.6 x 10.8	TYP. 1 120	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
48 [19.0]	LQ190E1LW52	1 280 x RGB x 1 024	0.294 x 0.294	376.32 x 301.056	16.77 M	450	2ch LVDS	21.7	404.2 x 330.0 x 15.0	1 850	Advanced Super V, Long-life LED backlight
	LQ190E1LW72					350		19.6	396.0 x 323.6 x 11.5	1 300	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
	LQ190E1LX75/T					350		19.6			Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Haze value 3%
	LQ190N1LW01	1 680 x RGB x 1 050	0.24375 x 0.24375	409.5 x 255.9375		300		20.2	444.0 x 283.3 x 15.5	1 600	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
51 [20.1]	LQ201U1LW31	1 600 x XYZ x 1 200	0.255 x 0.255	408.0 x 306.0	256 gray scale	1 000	2ch LVDS	25.7	436.0 x 335.0 x 20.4	2 400	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit, Monochrome
	LQ201U1LW32	1 600 x RGB x 1 200			16.77 M	330					Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
59 [23.1]	LQ231U1LW32	1 600 x RGB x 1 200	0.294 x 0.294	470.4 x 352.8	16.77 M	500	2ch LVDS	65.5	530.0 x 431.5 x 23.9	4 500	Advanced Super V, Long-life LED backlight, Built-in LED backlight driver circuit
69 [27.0]	★LQ270M1LX01	1 920 x RGB x 1 080	0.303 x 0.303	581.76 x 363.6	16.77 M	500	2ch LVDS	43.5	620.0 x 407.6 x 22.0	3 800	Advanced Super V, Long-life LED backlight

All products listed on this page are LED backlight models.

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☆New product
 ★Under development



<For monitors>

Display size (cm) ["]	Model No.	Number of pixels*1	Dot format H x V (dot)	Active area H x V (mm)	Display colors	Luminance (cd/m ²) (TYP.)	Interface	Outline dimensions*2 W x H x D (mm) (TYP.)	Backlight	Remarks
80.0 [31.5]	☆LQ315D1JG95	8 294 400	3 840 x RGB x 2 160	697.92 x 392.58	1.07B 10-bit	350	V-by-One	734.8 x 430.0 x 12.0 (26.5*3)	Edge-lit LED (without driver)	Super-high resolution and High color purity (AdobeRGB100%) by using IGZO*4 LCD, Wide viewing angle: L/R 178°/ U/D 178°, Response time [G to G]: 8 ms (Typ.)
	700									

*1 Pixel means a set of each RGB dot.

*2 Excluding FPC for connection and other protruding parts.

*3 The thickness of the control board section.

*4 IGZO: an oxide semiconductor consisting of In (Indium), Ga (Gallium), and Zn (Zinc).

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<For digital signage displays>

Display size (cm) ["]	Model No.	Dot format H x V (dot)	Pixel pitch H x V (mm)	Active area H x V (mm)	Display colors	Luminance (cd/m ²) (TYP.)	Interface	Interface Outline dimensions*1 W x H x D (mm) (TYP.)	Weight (kg)	Remarks
176.56 [69.5]	☆LQ695D3LG03	1 920 x RGB x 1 080	0.802 x 0.802	1 538.88 x 865.62	1.07B 8-bit + 2-bit FRC	350	LVDS	1 559.4 x 893.0 x 27.5	26.5±1.5	Backlight type: edge-lit LED (built-in driver) SFR (60 Hz input–60 Hz output) Viewing angle (L/R / U/D): 176° / 176° Orientation: portrait / landscape
	☆LQ695D3LG06					500				
	★LQ695D3LG07					700				
	★LQ695D1VG03	3 840 x RGB x 2 160	0.401 x 0.401	1 538.88 x 865.62	1.07B 8-bit + 2-bit FRC	350	V-by-One	1 559.4 x 893.0 x 27.5	27.5±1.5	
	★LQ695D1VG04					500				
	203.21 [80]	LK800D3LA28	1 920 x RGB x 1 080	0.9225 x 0.9225	1 771.20 x 996.30	1.07B 8-bit + 2-bit FRC	350	LVDS	1 820.2 x 1 045.3 x 34.4	
LK800D3LA38		500								
LK800D3LA48		700								
226.66 [90]	LQ900D3LA01	1 920 x RGB x 1 080	1.038 x 1.038	1 992.96 x 1 121.04	1.07B 8-bit + 2-bit FRC	350	LVDS	2 032.0 x 1 168.0 x 80.0	46.5±1.0	Backlight type: direct-lit LED (built-in driver) DFR (120 Hz input–120 Hz output) Viewing angle (L/R / U/D): 176° / 176° Orientation: landscape (LA01) : portrait / landscape (LA03)
	★LQ900D3LA03					500				

*1 Excluding FPC for connection and other protruding parts.

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<For wearable & mobile terminal device (low power consumption LCD)>

Display size (cm) ["]	Model No.	Dot format H × V (dot)	Pixel pitch H × V (mm)	Active area H × V (mm)	Display colors	Luminance (cd/m ²) (TYP.)	Interface	Power consumption ^{*1} (μW) (TYP.)	Outline dimensions ^{*2} W × H × D (mm) (TYP.)	Weight (g) (MAX.)	Remarks
2.4 [0.96]	☆LS010B7DH05	192 × 192	0.127 × 0.127	ø24.384	B/W	No B/L	Serial	40	29.7 × 30.5 × 1.645 (Octagonal)	3.0	
3.05 [1.2]	LS012B7DH02	240 × 240	0.127 × 0.127	ø30.48	B/W	No B/L	Serial	50	35.78 × 36.53 × 1.605 (Octagonal)	4.4	
3.2 [1.26]	LS013B7DH05	144 × 168	0.145 × 0.145	20.88 × 24.36	B/W	No B/L	Serial	35	24.68 × 30.00 × 0.745	1.1	
3.3 [1.28]	LS013B7DH03	128 × 128	0.180 × 0.180	23.04 × 23.04	B/W	No B/L	Serial	50	26.6 × 30.3 × 0.741	1.3	
3.4 [1.33]	LS013B7DH06	128 × RGB × 128	0.186 × 0.186	23.808 × 23.808	8 colors	No B/L	Serial	60	26.82 × 31.3 × 0.745	1.5	
6.9 [2.7]	LS027B7DH01	400 × 240	0.1470 × 0.1470	58.8 × 35.28	B/W	No B/L	Serial	175	62.8 × 42.82 × 1.64	10.6	
11.2 [4.4]	LS044Q7DH01	320 × 240	0.280 × 0.280	89.6 × 67.2	B/W	No B/L	Serial	600	94.8 × 75.2 × 1.64	29.3	

*1 Data update mode (Display pattern: Vertical stripe display)

*2 Protrusion such as positioning bosses are not included.

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■ CMOS Image Sensors for Digital Cameras/Digital Camcorders

Optical format	Total pixels	Color filter	Model No.	Video performance	Resolution	Pixel size H × V (μm)	Sensitivity (mV/Lux-sec) TYP.	Package
					Image pixels (H × V)			
1 type	13 110 k	R, G, B primary color mosaic filters	RJ5DY1BA0LT	4K2K 60 fps	4 144 × 3 096	3.1 × 3.1	1 420	N-LCC120-R898
		B/W	RJ5DY2BA0LT				2 390	
2/3 type	2 320 k	R, G, B primary color mosaic filters	RJ52N1BA0LT	1 080p 120 fps	1 984 × 1 116	5.0 × 5.0	3 240	N-LCC120-R898A
		B/W	RJ52N2BA0LT				6 080	

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High-Sensitivity Image Sensors for Security Usage

■ Progressive CCDs

Optical format	Total pixels	Model No.	Video performance	Color filter	Resolution	Pixel size H x V (μm)	Sensitivity*1 (mV) TYP.	Smear ratio (dB) TYP.	Package
					Image pixels (H x V)				
1/3 type	350 k	RJ33B3AA0DT*2	VGA 120 fps (1 ch output)	Primary color	660 x 494	7.4 x 7.4	3 000	-125	P-DIP024-0400
		RJ33B4AA0DT*2		B/W			4 500		
		RJ33B3AD0DT*2	VGA 200 fps (2 ch output)	Primary color			3 000		
		RJ33B4AD0DT*2		B/W			4 500		
	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	950	-120	P-DIP024-0400
	1 350 k	RJ33J3CA0DT*2	1.3M 30 fps 720p 30 fps (1 ch output)	Primary color	1 320 x 976	3.75 x 3.75			
		RJ33J4CA0DT*2		B/W			1 430		
	2 170 k	1 080p 25 fps (1 ch output)	RJ33N3AA0LT*2	Primary color	1 928 x 1 088	2.8 x 2.8	470	-110	N-LCC040-R350B
			RJ33N4AA0LT*2	B/W			650		
		1 080p 50 fps (2 ch output)	RJ33N3AD0LT*2	Primary color			470		
			RJ33N4AD0LT*2	B/W			650		
1/2 type	2 170 k	1 080p 25 fps (1 ch output)	Primary color	1 928 x 1 088	3.65 x 3.65	750	-115		
			B/W			1 150			
		1 080p 50 fps (2 ch output)	Primary color			750			
			B/W			1 150			
1/1.8 type	2 100 k	2M 25 fps (1 ch output)	Primary color	1 644 x 1 236	4.4 x 4.4	1 100	-120	P-DIP028-0566	
			B/W			1 650			
	2 130 k	2M 50 fps (2 ch output)	Primary color			1 100			
			B/W			1 650			
	2 960 k	2.8M 17 fps (1 ch output)	Primary color	1 940 x 1 460	3.69 x 3.69	750	-115		
			B/W			1 150			
		2.8M 30 fps (2 ch output)	Primary color			750			
			B/W			1 150			

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

*2 This model is the next-generation model. Light efficiency including the near-infrared light region has been drastically improved by our process technology.

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Progressive CCDs (cont'd)

Optical format	Total pixels	Model No.	Video performance	Color filter	Resolution	Pixel size H x V (μm)	Sensitivity*1 (mV) TYP.	Smear ratio (dB) TYP.	Package	
					Image pixels (H x V)					
2/3 type	5 240 k	RJ32S3AA0DT	5M 9 fps (1 ch output)	Primary color	2 456 x 2 058	3.45 x 3.45	530	-110	P-DIP028-0566	
		RJ32S4AA0DT		B/W			800			
		RJ32S3AD0DT	5M 15 fps (2 ch output)	Primary color			530			
		RJ32S4AD0DT		B/W			800			
		RJ32S3AF0DT*2	5M 30 fps (4 ch output)	Primary color			580			P-DIP064-1000
		RJ32S4AF0DT*2		B/W			870			
1/1 type	6 090 k	RJ3DT3AA0DT*2	6M 8 fps (1 ch output)	Primary color	2 758 x 2 208	4.54 x 4.54	1 150	-125	P-DIP064-1000	
		RJ3DT4AA0DT*2		B/W			1 750			
		RJ3DT3AD0DT*2	6M 15 fps (2 ch output)	Primary color			1 150			
		RJ3DT4AD0DT*2		B/W			1 750			
		RJ3DT3AF0DT*2	6M 30 fps (4 ch output)	Primary color			1 150			
		RJ3DT4AF0DT*2		B/W			1 750			
	8 290 k	RJ3DV3AF0DT*2	8M 25 fps (4 ch output)	Primary color	3 320 x 2 496	3.88 x 3.88	750	-120		
		RJ3DV4AF0DT*2		B/W			1 100			
	4/3 type	8 340 k	☆RJ3EV3EF0DT*2	8M 25 fps (4 ch output)	Primary color	3 848 x 2 168	5.14 x 5.14	1 500	-125	P-DIP064-1000B
			☆RJ3EV4EF0DT*2		B/W			2 250		

*1 The average G signal output voltage when a 1,000-lux light source with a 90% reflector is imaged by a lens of F4 at 1/30 sec frame accumulation.

*2 This model is the next-generation model. Light efficiency including the near-infrared light region has been drastically improved by our process technology.

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■ 1/3-type CCDs

Total pixels	Standard		Model No.	Resolution		Pixel size H x V (μm)	Sensitivity* ¹ (mV) TYP.	Smear ratio (dB) TYP.	Package
				Horizontal TV lines	Image pixels (H x V)				
270 k		NTSC	RJ2315EA0PB	330	512 x 492	9.6 x 7.5	4 200	-140	P-DIP016-0450
			RJ2315FA0PB* ²				4 500		
320 k	PAL	RJ2325EA0PB	512 x 582		9.6 x 6.34	4 200			
		RJ2325FA0PB* ²				4 500			
410 k	NTSC	RJ2355DA0PB	480	768 x 494	6.4 x 7.5	2 700	-135		
		RJ2355EA0PB* ²				3 000			
470 k	PAL	RJ2365DA0PB		752 x 582	6.53 x 6.39	2 700			
		RJ2365EA0PB* ²				3 000			
520 k	NTSC	RJ2331BA0PB	650	976 x 494	5.0 x 7.4	2 400	-125		
		RJ2331CA0PB* ²				2 600			
610 k	PAL	RJ2341BA0PB		976 x 582	5.0 x 6.3	2 400			
		RJ2341CA0PB* ²				2 600			

*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.

*2 This model is the next-generation model. Light efficiency including the near-infrared light region has been drastically improved by our process technology.

■ 1/4-type CCDs

Total pixels	Standard		Model No.	Resolution		Pixel size H x V (μm)	Sensitivity* ¹ TYP. (mV)	Smear ratio TYP. (dB)	Package
				Horizontal TV lines	Image pixels (H x V)				
270 k		NTSC	RJ2411FA0PB	330	512 x 492	7.2 x 5.6	1 800	-130	P-DIP014-0400A
320 k		PAL	RJ2421FA0PB		512 x 582	7.2 x 4.73	1 650		
410 k	Color	NTSC	RJ2455DA0PB	480	768 x 494	4.9 x 5.6	1 350		
470 k		PAL	RJ2465DA0PB		752 x 582	5.0 x 4.77			
520 k		NTSC	RJ2431AA0PB	650	976 x 494	3.75 x 5.56	1 400		
610 k		PAL	RJ2441AA0PB		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.

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■ DSPs for CCDs

Description	Model No.	Features		Package
CDS/PGA/ADC + DSP	LR36B16	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

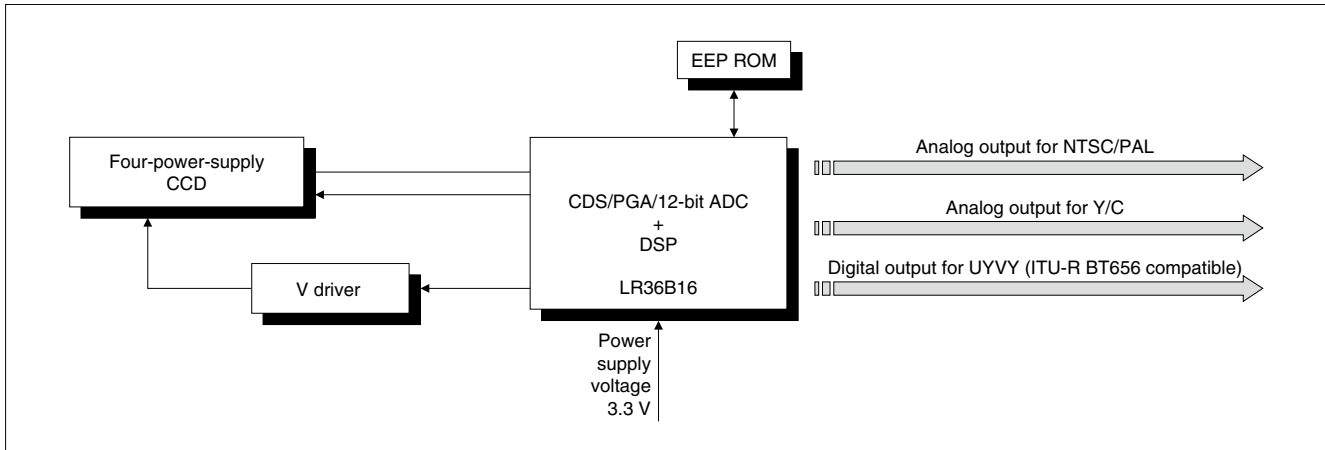
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●System Configuration Examples

<Color Security Camera System with Three-chip Configuration>



Four-power-supply CCDs and peripheral ICs/LSIs

CCD		CDS/PGA/ADC + DSP + Video amplifier	
1/3 type	270 kpixels	RJ2315EA0PB	LR36B16
		RJ2315FA0PB	
	320 kpixels	RJ2325EA0PB	
		RJ2325FA0PB	
	410 kpixels	RJ2355DA0PB	
		RJ2355EA0PB	
	470 kpixels	RJ2365DA0PB	
		RJ2365EA0PB	
	520 kpixels	RJ2331BA0PB	
		RJ2331CA0PB	
610 kpixels	RJ2341BA0PB		
	RJ2341CA0PB		
1/4 type	270 kpixels	RJ2411FA0PB	
	320 kpixels	RJ2421FA0PB	
	410 kpixels	RJ2455DA0PB	
	470 kpixels	RJ2465DA0PB	
	520 kpixels	RJ2431AA0PB	
	610 kpixels	RJ2441AA0PB	

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■ Touch Panel Controller

● 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.***

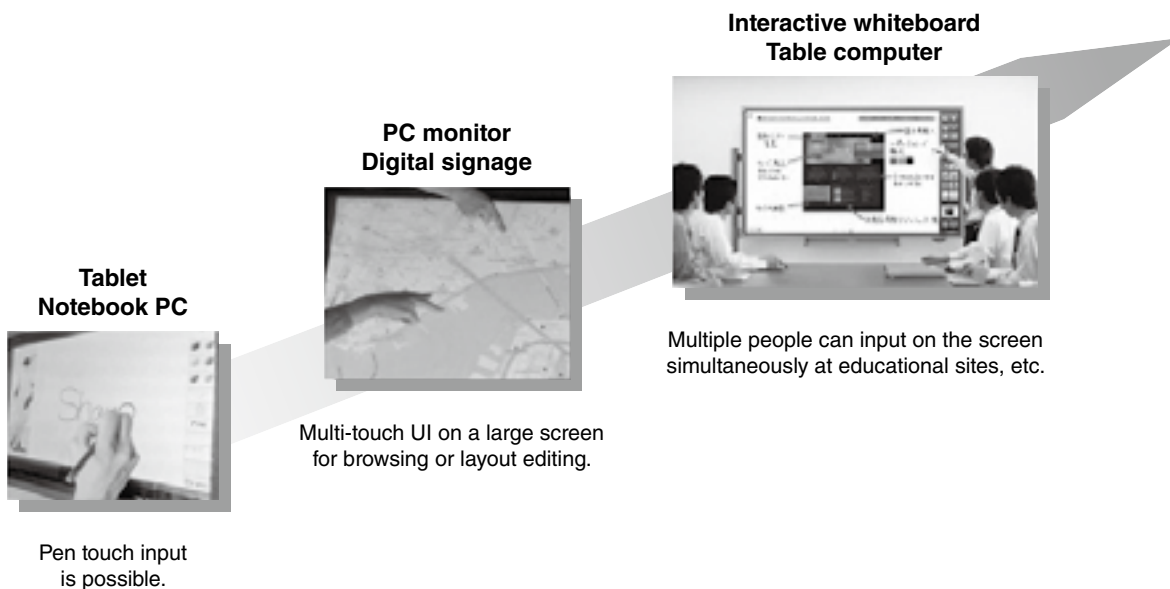
Capable of sensing a $\phi 2$ mm pen touch, multi-touch operation and touch operation using a glove.

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.

* 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).

● Application Examples



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■ System LSIs



Model No.	Function	Features	Supply voltage (V)	Package
LR388K4	Touch panel controller for tablets (7 to 10 inches)	<ul style="list-style-type: none"> • 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a $\phi 2$ mm pen touch • USB/I²C/SPI interface • Built-in palm cancellation feature 	Core: 1.2±0.12 I/O: 3.3±0.3 Analog: 3.3±0.3	P-VFBGA360P-0613

■ Touch Panel Controller Module



Model No.	Function	Features	Supply voltage (V)	Outline dimensions (W × D) (mm)
LR0G964	Touch panel controller module for medium-size screens (10 to 15.6 inches)	<ul style="list-style-type: none"> • 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a $\phi 2$ mm pen touch • Built-in palm cancellation feature • USB interface • Built-in power supply circuit 	5	74 × 46
☆LR0G970	Touch panel controller module for medium-size screens (15.6 to 27 inches)	<ul style="list-style-type: none"> • 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a $\phi 2$ mm pen touch • Built-in palm cancellation feature • USB interface • Built-in power supply circuit • Compatible with active pen 	5	50 × 90
LR0G967	Touch panel controller module for medium-size screens (15 to 32 inches)	<ul style="list-style-type: none"> • 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a $\phi 2$ mm pen touch • Built-in palm cancellation feature • USB interface • Built-in power supply circuit 	5	60 × 80
☆LR0G971	Touch panel controller module for large-size screens (Over 42 inches)	<ul style="list-style-type: none"> • 50-finger multi-touch detection • Scanning speed: 120 Hz • Capable of sensing a $\phi 2$ mm pen touch • Built-in palm cancellation feature • USB interface • Built-in power supply circuit 	5	100 × 220

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LED Drivers

Built-in Step-up Circuit

Model No.	Function	Features	No. of output circuits	Number of LEDs	Booster method	Constant current circuit	Switching transistor	Input voltage range (V)	Output current (mA) MAX.	Oscillation frequency (Hz) TYP.	Package
IR2E58U	White LED driver for backlight	<ul style="list-style-type: none"> 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	PWM	○	○	4.5 to 28	40/ch	500 k to 1.5 M	24HQFN
IR2E71Y	LED driver for backlight and call alert display (auto brightness adjustment)	<ul style="list-style-type: none"> 2 ch (11 LEDs x 2 ch) LED driver for backlight Auto brightness adjustment backlight LED 6 ch RBG LED driver for illumination Built-in switching regulator for LCD backlight Built-in LCD controller power supply (+5.8 V / -5.8 V MAX.) LDO 1 ch Interface for digital-output proximity sensor with ambient light sensor Built-in general purpose input/output port (7 ch MAX.) 	Backlight 2 RGB 6	Backlight 22 RGB 6	PWM	○	○	3.0 to 4.5	Backlight 25.5/ch RGB 12.7/ch	10 k to 1 M	35WL-CSP
IR2E67M	White LED driver for backlight	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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) TYP.	Switching frequency (kHz) ^{*1} TYP.	Gate driver capacity		System	Package
						Low (Ω)	High (mA)		
IR3M92N4	Overvoltage/overheat/overcurrent circuits, high-speed activation, stand-by feature, PWM brightness control	-30 to +100	10 to 18	1	160	MAX. 15	MIN. 40	Flyback Step-down	SOP-8

*1 When operating a flyback converter

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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	<ul style="list-style-type: none"> ● 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. 															
	<table border="1"> <tr> <td>Terminal pitch</td> <td>0.8 mm</td> <td>0.65 mm</td> <td>0.5 mm</td> <td>0.4 mm</td> </tr> <tr> <td>Maximum terminal counts</td> <td>352 (16 mm x 16 mm)</td> <td>352 (16 mm x 16 mm)</td> <td>372 (16 mm x 16 mm)</td> <td>264 (10 mm x 10 mm)</td> </tr> <tr> <td>Nominal dimensions</td> <td colspan="3">6 mm x 6 mm to 16 mm x 16 mm</td> <td>5 mm x 5 mm to 10 mm x 10 mm</td> </tr> </table>	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
	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	
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● 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	<ul style="list-style-type: none"> ● 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. 																					
	<table border="1"> <tr> <td>Chip size*</td> <td colspan="2">4 mm x 4 mm</td> <td colspan="2">3.5 mm x 3.5 mm</td> <td colspan="2">3 mm x 3 mm</td> </tr> <tr> <td>Pad pitch</td> <td>0.5 mm</td> <td>0.4 mm</td> <td>0.5 mm</td> <td>0.4 mm</td> <td>0.5 mm</td> <td>0.4 mm</td> </tr> <tr> <td>Maximum terminal counts</td> <td>49 (7 x 7)</td> <td>81 (9 x 9)</td> <td>36 (6 x 6)</td> <td>49 (7 x 7)</td> <td>25 (5 x 5)</td> <td>36 (6 x 6)</td> </tr> </table>	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)
	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)																
<p>* Rectangular chip form is also available.</p>																						

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	<ul style="list-style-type: none"> ● 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. <p>(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.</p>
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Cross section example	<p>(5-chip stacked CSP)</p> <p style="text-align: right;">* At 0.8 mm terminal pitch</p>
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●Chip Stacked TSOP/QFP*/VQFN/HQFN

<p>Features</p>	<ul style="list-style-type: none"> ● 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.
<p>Cross section example</p>	<p>(TSOP, QFP*) (Hamburger type)</p> <p>(Turtle stack type)</p> <p>(VQFN)</p> <p>(HQFN)</p> <p>Package height 1.0 mm (MAX.)</p>

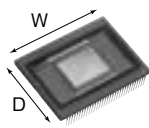
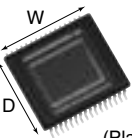
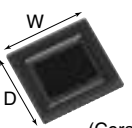
* Including TQFP and LQFP.

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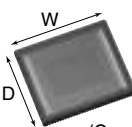


●For CCDs

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-DIP020-0500	20	1.27	12.2 (500)	12.0 x 13.8	
		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	
		P-DIP064-1000	64	P-DIP064-1000B	1.00	25.48 (1 000)	36.1 x 25.4
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 (350)	8.3 x 8.9 x (1.52)	
		N-LCC040-S433A		0.80	11.0 (433)	11.0 x 11.0 x (1.62)	

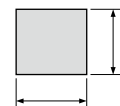
100 mil = 2.54 mm

●For CMOSs

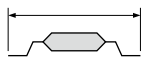
Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [TYP.]) mm
LCC	 (Ceramic)	N-LCC120-R898 ----- N-LCC120-R898A	120	0.65	22.8 (898)	20.0 x 22.8 x (2.67)

100 mil = 2.54 mm

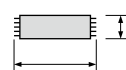
Nominal dimensions



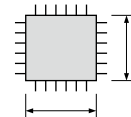
FBGA (CSP)
PBGA (BGA)



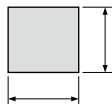
SOP
SSOP
MFP



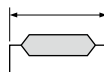
TSOP



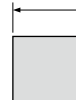
QFP
LQFP
TQFP



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

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

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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	PC357NJ0000F / PC451J00000F	22	
		AC input response	Low input current PC367NJ0000F	22	
	Darlington phototransistor	High sensitivity, High collector-emitter voltage	PC354NJ0000F	22	
		High sensitivity, High collector-emitter voltage	Low input current PC364NJ0000F	22	
		High sensitivity, High collector-emitter voltage	PC355NJ0000F / PC452J00000F	22	
Compact, Half pitch (lead space), SMT type 	Single phototransistor	General purpose, High resistance to noise, etc.	PC3H7J00000F	23	
		Reinforced insulation	PC3HU7xYIP0B	23	
	Darlington phototransistor	AC input response	Low input current PC3H71xNIP0F	23	
		AC input response	PC3H3J00000F / PC3H4J00000F	23	
		High sensitivity	Low input current PC3H41xNIP0F	23	
	Darlington phototransistor	High sensitivity	PC3H5J00000F	23	
		High sensitivity	Low input current PC3H510NIP0F	23	
	DIP type (4-pin) (4-pin, DIP type) 	Single phototransistor	Reinforced insulation	PC123XNNSZ0F	24
			General purpose, High collector-emitter voltage, etc.	Low input current PC1231xNSZ0X	24
		Darlington phototransistor	High collector-emitter voltage, etc.	PC817XNNSZ0F / PC851XNNSZ0F	24
High sensitivity, High collector-emitter voltage			Low input current PC8171xNSZ0X	24	
High sensitivity, High collector-emitter voltage			PC815XNNSZ0F▲ / PC852XNNSZ0F	24	

<OPIC output type>

Package type	Output type	Features	Model No. (series)	Page
Compact, SMT type 	Digital output	General purpose, High response speed	PC400J00000F	25
	Analog/Digital output	High CMR	PC457L0NIP0F	25
DIP type, SMT type 	Digital output	General purpose	PC900V0NSZXF▲	26
	Built-in drive circuit	For inverter control	PC925LENSZ0F▲	26

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



■ Photocouplers

◆ Phototransistor Output Type

<Compact, SMT type>

○: Approved

(Ta = 25°C)

Output type	Model No.	Internal connection diagram	Features	Approved by safety standards ^{*2}	Package	Absolute maximum ratings			Electro-optical characteristics						
				UL		Forward current I _F (mA)	Isolation voltage (AC) V _{iso} (rms) (kV)	Collector-emitter voltage V _{CEO} (V)	Current transfer ratio			Response time			
									CTR (%) MIN.	I _F (mA)	V _{CE} (V)	t _r (μs) TYP.	I _C (mA)	R _L (Ω)	V _{CE} (V)
Single phototransistor output	PC357NJ0000F		General purpose	○	Mini-flat 4-pin	50	3.75	80	50	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.



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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						
				UL		Forward current I _F (mA)	Isolation voltage (AC) V _{iso} (rms) (kV)	Collector-emitter voltage V _{CE0} (V)	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)
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		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}	○	Mini-flat 4-pin	±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

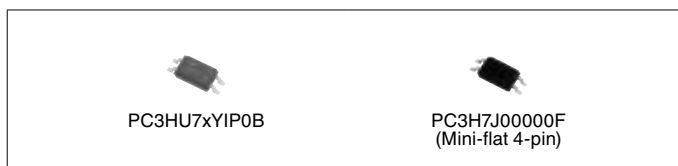
*2 A VDE approved type is optionally available.

*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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