RoHS

■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*2 (D x W x H) TYP. (mm)	Package*1
						F No.	Configu-ration	Horizon-tal viewing angle (°)				
1/2.4 type	21M	OIS function, auto focus function	RJ63GC600	21M 24 fps 4K2K 30 fps 1 080p 60 fps (Normal/HDR)	5 344 x 4 016	F2.0	6 pcs.	64	RAW (Mipi, 4 lanes)	3.0/2.5/ 1.8/1.1	12.0 x 12.0 x 6.52	FPC type
		Auto focus function	RJ63GCE00			F2.2		74.5			10.6 x 10.8 x 5.125	

*1 Contact a SHARP sales office regarding FPC type package.
*2 Height (H) includes the protruding lens section.

RJ63GC600

RJ63GCE00

■CMOS Image Sensors for Digital Cameras/Digital Camcorders

Optical format	Total pixels	Color filter	Model No.	Video performance	Resolution Image pixels (H × V)	Pixel size H × V (μm)	Sensitivity (mV/Lux-sec) TYP.	Package
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	

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

RoHS

High-Sensitivity Image Sensors for Security Usage

■Progressive CCDs

Optical format	Total pixels	Model No.	Video performance	Color filter	Resolution Image pixels (H x V)	Pixel size H x V (μm)	Sensitivity*1 (mV) TYP.	Smear ratio (dB) TYP.	Package
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			
	1 350 k	RJ33J3BA0DT	1.3M 30 fps 720p 30 fps (1 ch output)	Primary color	1 320 x 976	3.75 x 3.75	790	–120	P-DIP024-0400
		RJ33J4BA0DT		B/W			1 190		
		RJ33J3CA0DT*2		Primary color			950		
		RJ33J4CA0DT*2		B/W			1 430		
	2 170 k	RJ33N3AA0LT*2	1 080p 25 fps (1 ch output)	Primary color	1 928 x 1 088	2.8 x 2.8	470	–110	N-LCC040-R350B
		RJ33N4AA0LT*2		B/W			650		
		RJ33N3AD0LT*2	1 080p 50 fps (2 ch output)	Primary color			470		
		RJ33N4AD0LT*2		B/W			650		
1/2 type	2 170 k	RJ31N3EA0DT*2	1 080p 25 fps (1 ch output)	Primary color	1 928 x 1 088	3.65 x 3.65	750	–115	P-DIP028-0566
		RJ31N4EA0DT*2		B/W			1 150		
		RJ31N3ED0DT*2	1 080p 50 fps (2 ch output)	Primary color			750		
		RJ31N4ED0DT*2		B/W			1 150		
1/1.8 type	2 100 k	RJ31N3AA0DT	2M 25 fps (1 ch output)	Primary color	1 644 x 1 236	4.4 x 4.4	1 100	–120	
		RJ31N4AA0DT		B/W			1 650		
	2 130 k	RJ31N3AD0DT	2M 50 fps (2 ch output)	Primary color			1 100		
		RJ31N4AD0DT		B/W			1 650		
	2 960 k	RJ31P3AA0DT*2	2.8M 17 fps (1 ch output)	Primary color	1 940 x 1 460	3.69 x 3.69	750	–115	
		RJ31P4AA0DT*2		B/W			1 150		
		RJ31P3AD0DT*2	2.8M 30 fps (2 ch output)	Primary color			750		
		RJ31P4AD0DT*2		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.

★Under development

■Progressive CCDs (cont'd)

Optical format	Total pixels	Model No.	Video performance	Color filter	Resolution Image pixels (H x V)	Pixel size H x V (μm)	Sensitivity*1 (mV) TYP.	Smear ratio (dB) TYP.	Package
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	2 456 x 2 056		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.

RoHS

■ 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	Color	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	Color	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		NTSC	RJ2455DA0PB	480	768 x 494	4.9 x 5.6	1 350	–120	
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			

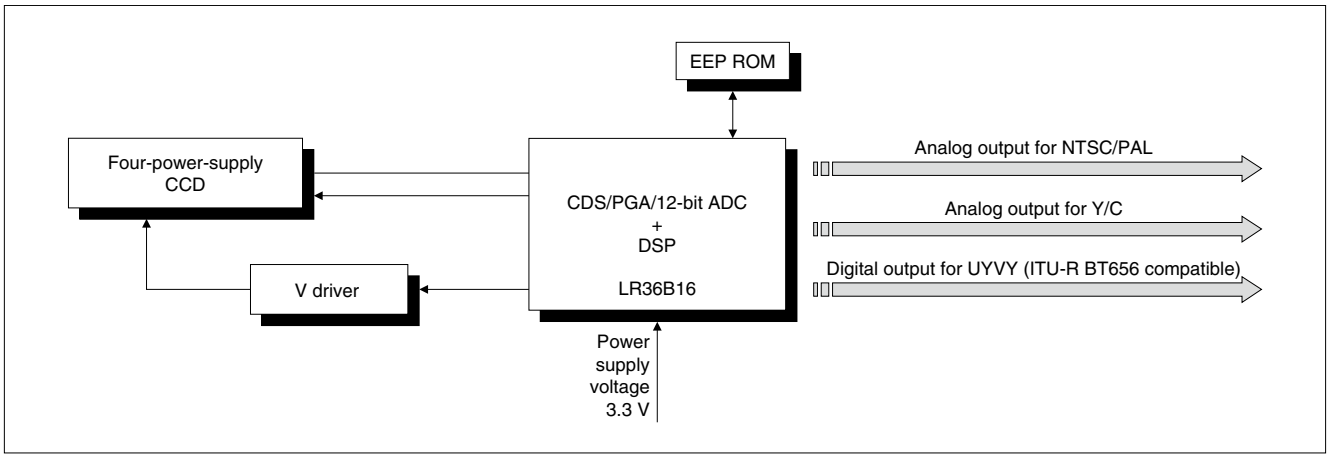
*1 The average output voltage measured when imaging a 90% reflector illuminated by a 1,000-lux light source through an optical system set at an f number of F4.0.

■ 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

●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	

☆New product

RoHS

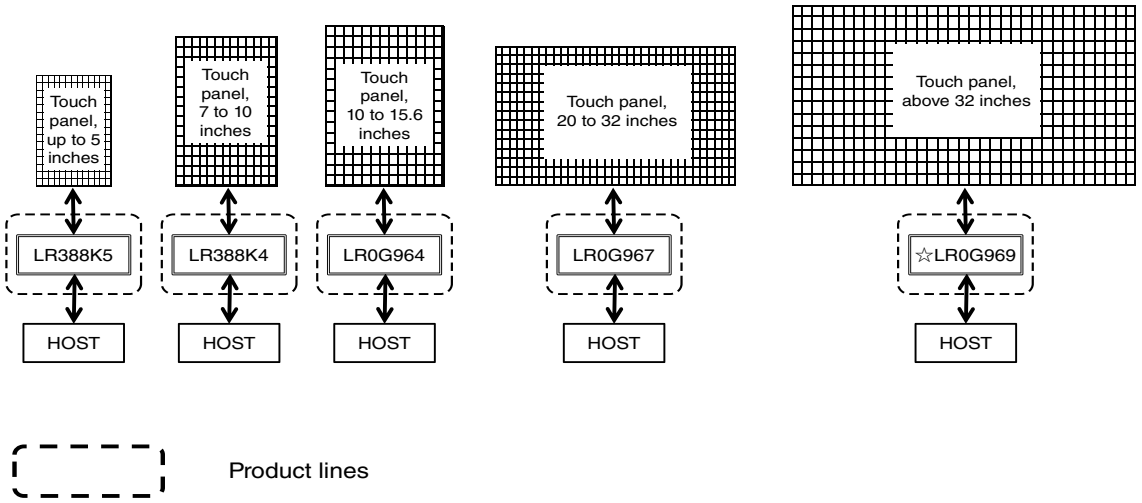
■Touch Panel System

●Features

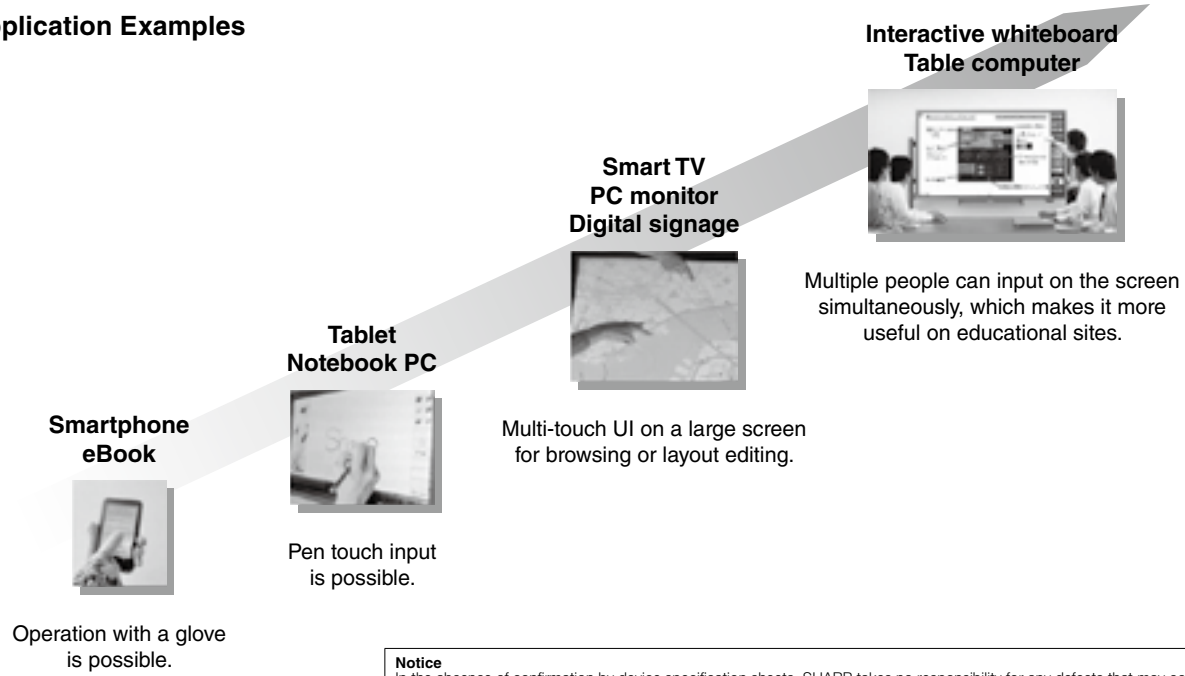
1. **By adopting Sharp's proprietary method, approximately eight times more sensitivity (comparison by Sharp) has been achieved compared with the conventional sequential driving method.***
   Capable of sensing a ϕ2 mm pen touch, multi-touch operation and touch operation using a glove.
2. **Contributes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



☆New product

■Touch Panel System / System LSIs

Model No.	Function	Features	Supply voltage (V)	Package
LR388K5	Touch panel controller for small-size screens (up to 5 inches)	• 10-finger multi-touch detection • Scanning speed: 120 Hz • Capable of sensing a ϕ2 mm pen touch • I²C/SPI interface	I/O: 1.62 to 3.6 Analog: 2.7 to 3.6	P-VFBGA96P-0606
LR388K4	Touch panel controller for tablets (7 to 10 inches)	• 10-finger multi-touch detection • Scanning speed: 240 Hz • Capable of sensing a ϕ2 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 System / Touch Panel Controller Module

Model No.	Function	Features	Supply voltage (V)	Outline dimensions (W × D) (mm)
LR0G964	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 • USB interface • Built-in power supply circuit	5	74 × 46
LR0G967	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
☆LR0G969	Touch panel controller module for large-size screens (Over 32 inches)	• 50-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 × 100 (Main) 220 × 100 (AFE)

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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.

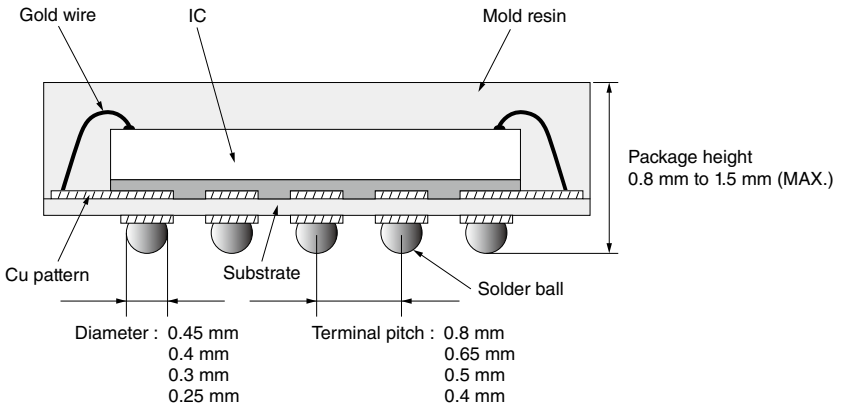
FBGA (CSP)

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.

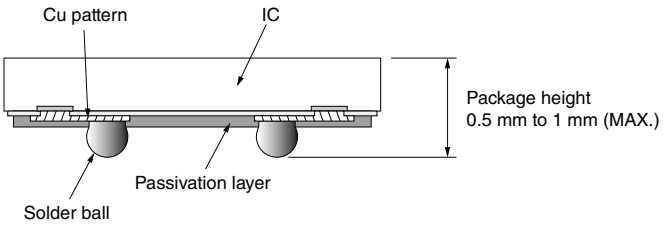
Features

- **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



Packages

RoHS

■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

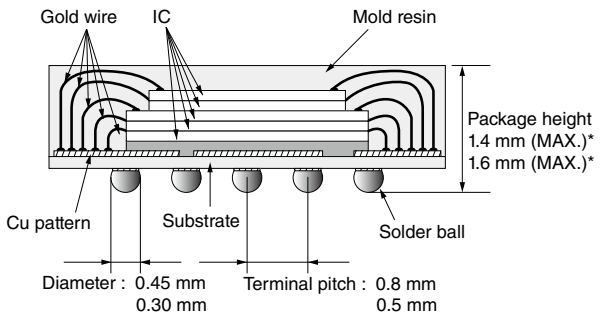
Features

- **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

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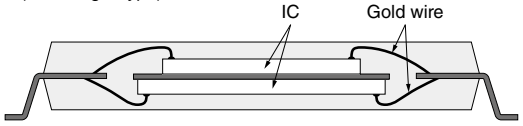
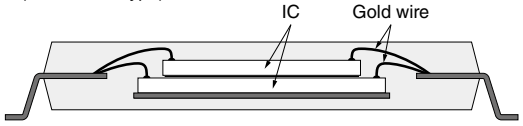
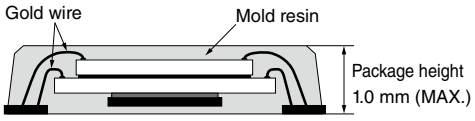
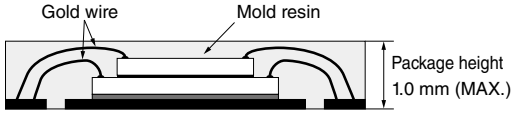
●Chip Stacked TSOP/QFP*/VQFN/HQFN

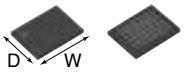
Features	● **Decreased mounting area** By encapsulating two identical or different types of ICs into a single conventional plastic package, the mounting area of the package can be decreased. ● **Multiple functions** Thanks to the incorporation of different sizes and functions of multiple ICs, such as 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.

RoHS

■ Package Lineup

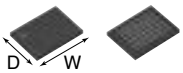
●Surface-Mount Type

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.

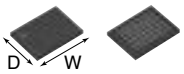
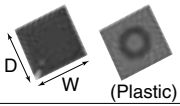
RoHS

●Surface-Mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package depth & width (D x W) x (seated height [MAX.]) mm
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			

RoHS

●Surface-Mount Type (cont'd)

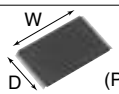
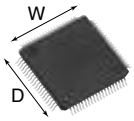
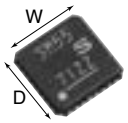
Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package depth & width (D x W) x (seated height [MAX.]) mm
FBGA (CSP)	 (Plastic)	P-TFBGAXXX-0606	to 36	0.8	6 x 6	6.0 x 6.0 x (1.2)
		P-TFBGAXXX-0707	to 49		7 x 7	7.0 x 7.0 x (1.2)
		P-TFBGAXXX-0808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

RoHS

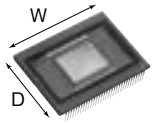
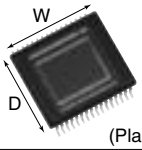
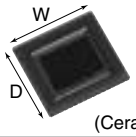
●Surface-Mount Type (cont'd)

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
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		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)	○	–
	(Plastic)	P-TQFP128-1414	128	0.4			○	–
VQFN		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)	–	○
	(Plastic)	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.

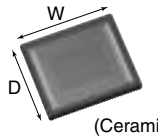
100 mil = 2.54 mm

●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	1.00	25.48 (1 000)	36.1 x 25.4
		P-DIP064-1000B				
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)

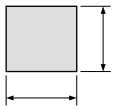
100 mil = 2.54 mm

●For CMOSs

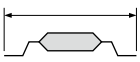
Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm (mil)	Package depth & width (D x W) x (seated height [TYP.]) mm
LCC	 (Ceramic)	N-LCC120-R898	120	0.65	22.8 (898)	20.0 x 22.8 x (2.67)
		N-LCC120-R898A				

100 mil = 2.54 mm

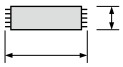
Nominal dimensions



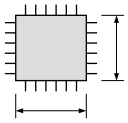
FBGA (CSP)
PBGA (BGA)



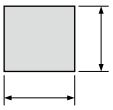
SOP
SSOP
MFP



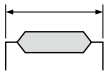
TSOP



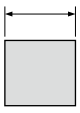
QFP
LQFP
TQFP



VQFN
HQFN



DIP



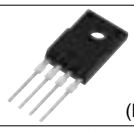
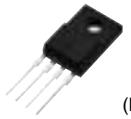
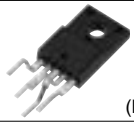
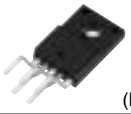
LCC

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.

RoHS

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

Package type	Appearance (Package material)	No. of terminals	Terminal pitch mm	Outline dimensions (Width x Thickness x Height) mm	Lead frame material
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

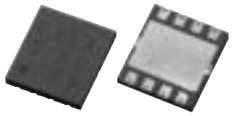
●Surface-Mount Type Packages [For regulators/LED drivers: PQ series]

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

RoHS

●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-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

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