



电子元器件系列(中国.厦门) China.Xiamen
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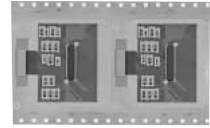
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SOF/TCP

SOE (System On Film)

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



Features

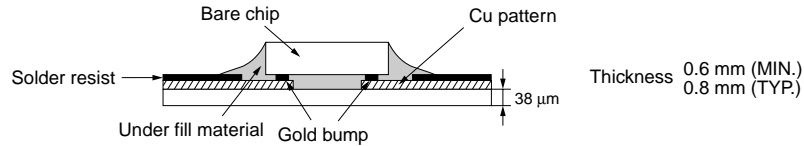
• **Highly flexible and thin film package**

By using highly flexible and thin film, SOE contributes to the design of thin and compact devices. It can also achieve finer terminal pitches and higher output pin counts easily, and flexible pattern design can be achieved by designing patterns on a film under the chip.

• **Multiple chip mounting**

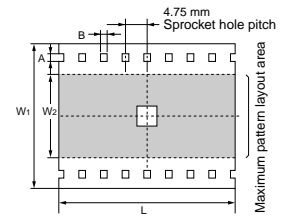
Enables mounting of plural bare chips and peripheral components, contributing to the realization of higher functions in applications.

Cross section example



Film specifications

Film width : W ₁	35 mm super wide	48 mm super wide	70 mm wide
Maximum pattern layout area : W ₂	28.6 mm	41.6 mm	59.0 mm
Maximum device pitch : L	15 sprockets		
Copper foil thickness	8 μm		
Copper foil type	Rolled or electrolytic		
Copper foil plating	tin (Sn)		
Minimum pattern pitch	0.030 mm		
Sprocket hole : A	1.981 mm (wide) / 1.42 mm (super wide)		
Sprocket hole : B	1.981 mm (wide) / 1.42 mm (super wide)		



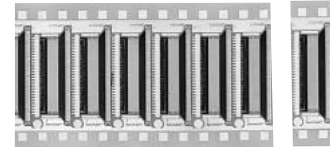
Other components

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

TCP (Tape Carrier Package)

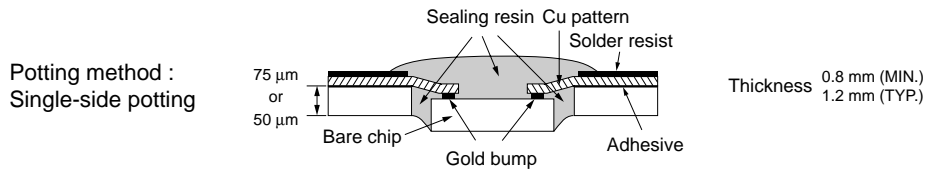
TCP is a package which can easily achieve higher terminal counts, finer terminal pitches and reduced dimensions. It allows flexible pattern design of outer lead shapes and pitches to accept different terminal connections.

This compact package, enabling direct connection of the LCD panel to printed circuit boards, is used in mounting the display drivers for notebook PCs, LCD TVs, etc.



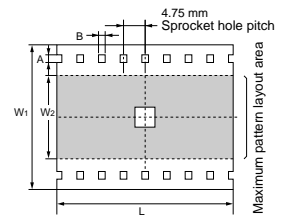
UST (Ultra Slim TCP)

Cross section example



Tape specifications

Film width : W ₁	35 mm wide	35 mm super wide	48 mm wide	48 mm super wide	70 mm wide
Maximum pattern layout area : W ₂	25.0 mm	28.6 mm	38.0 mm	41.6 mm	59.0 mm
Maximum device pitch : L	15 sprockets				
Copper foil thickness	15, 18, 25, 35 μm				
Copper foil type	Rolled or electrolytic				
Copper foil plating	tin (Sn)				
Minimum pattern pitch	0.045 mm				
Sprocket hole : A	1.981 mm (wide) / 1.42 mm (super wide)				
Sprocket hole : B	1.981 mm (wide) / 1.42 mm (super wide)				



Other components

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

Additional specifications

- Super-soft flexible TCP with excellent bending strength (The pattern of the bending section can be protected with flexible solder resist.)
- Solder-resist print (for micropattern protection)
- Partial gold (Au) plating (for connections where high reliability or reduced resistance is required.)
- Partial solder plating (correspond to lead free plating.)



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 hand-held consumer electronic devices such as personal digital assistants, cellular phones, camcorders and digital cameras.



FBGA (CSP)

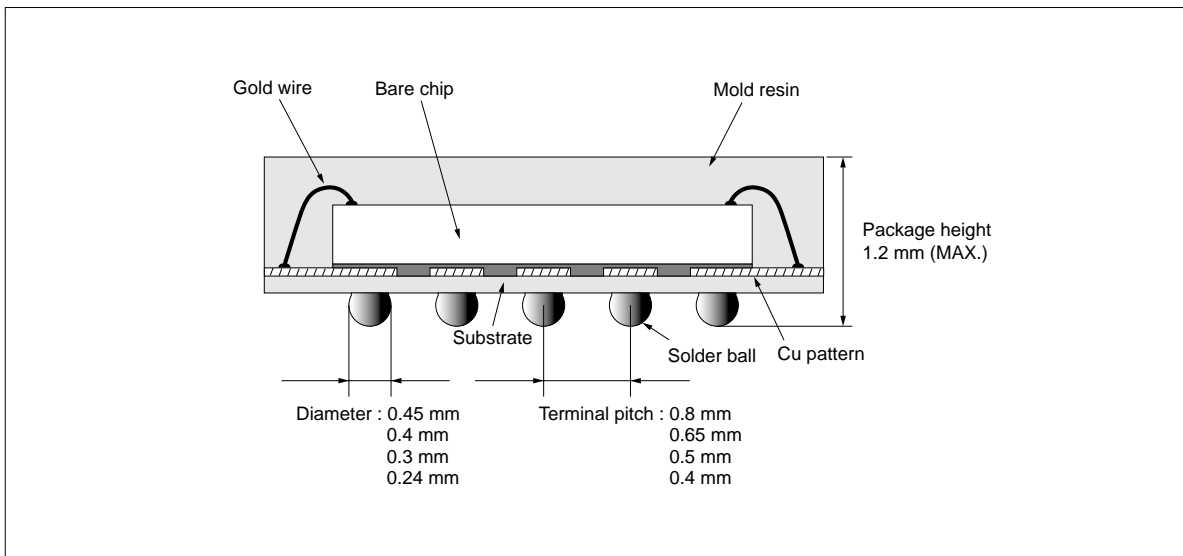
Features

- Compact and lightweight**
 Approximately one-chip size and lighter in weight in comparison with conventional plastic packages.
- High reliability**
 Comparable with conventional plastic packages.
- Mountability**
 Can be mounted using conventional moulder. Can be mix-mounted with SOP and QFP.

Terminal pitch	0.8 mm	0.65 mm	0.5 mm	0.4 mm
Maximum terminal count*	280	352	372	264
Nominal dimensions	6 mm x 6 mm to 16 mm x 16 mm			5 mm x 5 mm to 10 mm x 10 mm

* Nominal dimensions : 16 mm x 16 mm
 The lineup of standard packages, see pages 61 to 64.

Cross section example



Flash Memories
System-Flash

CCDs
CMOS Image Sensors

LSIs for LCDs

Analog ICs

Smart Card System

System LSIs

Special-Function LSIs

Packages

Index
(Model No.)

SiP (System in Package)

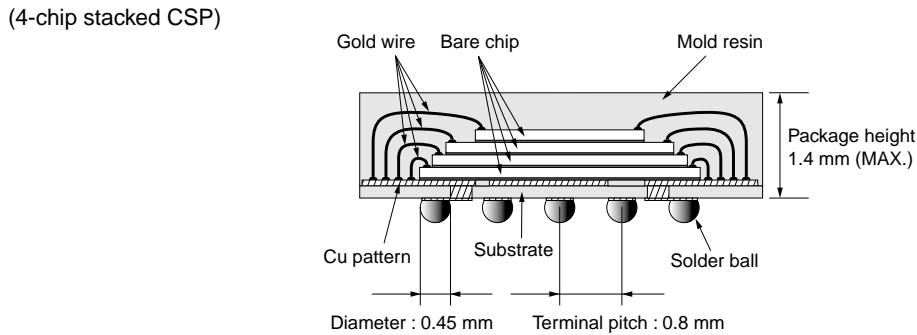
A chip-stacked package is a high-density package with types of FBGA (CSP), TSOP, QFP*1, VQFN and HQFN in which plural bare chips are stacked by using SHARP's original mounting technology. Package stacking technology makes it easy to create stacked packages of over 5 chips, by stacking multiple packages in which 1 to 2 chips are stacked. Such packages make it possible to stack multiple devices, such as plural memory chips (e.g. flash memory and SRAM), and to allow multiple functions, such as ASICs with memories. They contribute to higher functionality of applications such as cellular phones and personal digital assistants, as well as to a reduction in size and weight.

Chip stacked CSP

Features

- An abundant lineup**
 We can provide a wide lineup of stacked CSPs, including 2-chip, 3-chip and 4-chip stacked CSPs, to respond to customer needs.
 - Compact and thinner size**
 Encapsulating multiple bare chips into a current plastic package decreases the mounting area, and using SHARP's thinner wafer technology makes possible a maximum package height of 1.4 mm.
 - Multiple functions**
 Multiple bare chips of different sizes and functions, such as logic LSIs and memories, can be incorporated in a single package, making possible multiple functions.
 - Same-size chip stacking technology**
 SHARP's stacking technology enables stacking of multiple same-size bare chips, contributing to higher memory density, etc.
- (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-chip stacked CSPs or a three-chip stacked CSP and a conventional CSP.

Cross section example

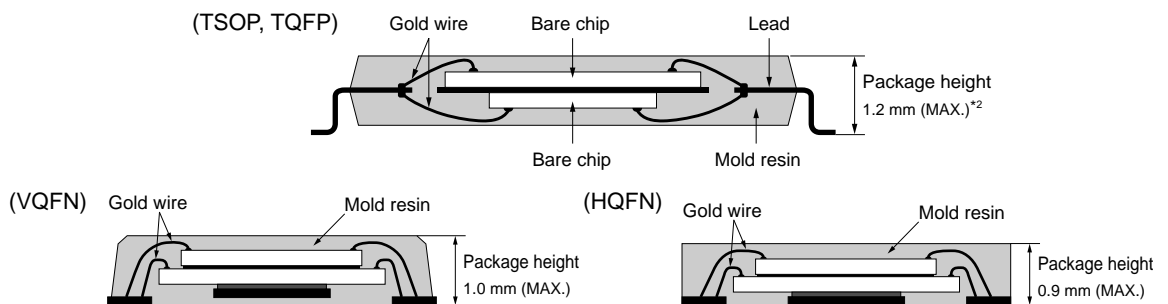


Chip stacked TSOP/QFP*1/ VQFN/ HQFN

Features

- Decreased mounting area**
 Encapsulating two identical or different types of bare chips into a single conventional plastic package decreases the mounting area of the package.
- Multiple functions**
 Multiple bare chips of different sizes and functions, such as logic LSIs and memories, can be incorporated in a single package, making possible multiple functions.
- Higher memory density**
 When combining two identical memory bare chips into a single package, memory density doubles on the same mounting area.

Cross section example



*1 Including TQFP and LQFP.
 *2 In case of TSOP and TQFP.



Package Stacked

Features	<ul style="list-style-type: none"> Multi-stacking By stacking multiple 1 to 2-chip, 0.5 mm thick packages in three dimensions, it is possible to stack more than 5 chips in the package. Decreased mounting area and height Mounting area can be reduced by approx. 1/2 because the two combination memories (Stacked CSP) and the baseband LSI (CSP) can be replaced by a SiP in a cellular phone. Also, the SiP makes possible a 1.4 mm (MAX.) package height with a 5-chip stack, and 1.5 mm (MAX.) package height with a 6-chip stack, compared to the 1.4 mm (MAX.) package height of a stacked CSP in a 4-chip stack. Multiple functions Since it is easier to make a combination package which carries various kinds of LSI, such as a memory and ASIC, it is ideal for advanced system features and multi-functionality.
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Cross section example	<div style="text-align: center;"> <p>Diameter : 0.375 mm Terminal pitch : 0.5 mm</p> </div> <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px 0;"> Examples of package stack composition </div> <ul style="list-style-type: none"> Hige-density combination memory (Memory : 6-chip) <p>6-chip 1.5 mm (MAX.)</p> <p>Memory : 2-chip x 3 layer</p> System LSI (ASIC : 1-chip + Memory : 4-chip) <p>5-chip 1.7 mm (MAX.)</p> <p>ASIC : 1-chip Memory : 2-chip x 2 layer</p> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>1.5 mm (MAX.)</p> <p>Memory : 2-chip Memory : 2-chip Memory : 2-chip</p> </div> <div style="text-align: center;"> <p>1.7 mm (MAX.)</p> <p>Memory : 2-chip Memory : 2-chip ASIC : 1-chip</p> </div> </div>
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Flash Memories
System-Flash

CCDs
CMOS Image Sensors

LSIs for LCDs

Analog ICs

Smart Card System

System LSIs


Special-Function LSIs

Packages

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(Model No.)

Package Lineup

■ Surface-mount Type

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package width & length x (seated height) mm [design value]	
FBGA (CSP)		TFBGA028-0606	28	0.8	6 x 6	6.0 x 6.0 x (1.05)	
		TFBGA032-0608	32		6 x 8	6.0 x 8.0 x (1.05)	
		TFBGA032-0610	32		6 x 10	6.0 x 10.0 x (1.05)	
		TFBGA036-0610	36(32)* ¹				
		TFBGA048-0608	48		6 x 8	6.0 x 8.0 x (1.05)	
		TFBGA048-0610	48		6 x 10	6.0 x 10.0 x (1.05)	
		TFBGA048-0808	48		8 x 8	8.0 x 8.0 x (1.05)	
		TFBGA048-0810	48		8 x 10	8.0 x 10.0 x (1.05)	
		TFBGA052-0610	52(48)* ¹		6 x 10	6.0 x 10.0 x (1.05)	
		TFBGA056-0810	56(48)* ¹		8 x 10	8.0 x 10.0 x (1.05)	
		LFBGA056-0810* ²	56(48)* ¹				
		TFBGA060-0811	60(48)* ¹		8 x 11	8.0 x 11.0 x (1.05)	
		LFBGA064-0808* ²	64		8 x 8	8.0 x 8.0 x (1.25)	
		TFBGA064-0811	64		8 x 11	8.0 x 11.0 x (1.05)	
		TFBGA072-0808	72		8 x 8	8.0 x 8.0 x (1.05)	
		TFBGA072-0811	72(64)* ¹		8 x 11	8.0 x 11.0 x (1.05)	
		LFBGA072-0811* ²	72(64)* ¹				
		TFBGA080-0818	80(64)* ¹		8 x 18	8.0 x 18.0 x (1.05)	
		TFBGA081-0808	81		8 x 8	8.0 x 8.0 x (1.05)	
		LFBGA087-0811* ²	87		8 x 11	8.0 x 11.0 x (1.25)/(1.45)	
		TFBGA096-1010	96		10 x 10	10.0 x 10.0 x (1.05)	
		TFBGA112-1010	112				
		LFBGA115-0914* ²	115		9 x 14	9.0 x 14.0 x (1.25)	
		LFBGA116-1010* ²	116		10 x 10	10.0 x 10.0 x (1.25)	
		TFBGA121-1010	121				
		TFBGA160-1212	160		12 x 12	12.0 x 12.0 x (1.05)	
		LFBGA168-1212* ²	168				
		TFBGA180-1212	180				
		TFBGA184-1212	184				
		TFBGA220-1414	220		14 x 14	14.0 x 14.0 x (1.05)	
		TFBGA240-1414	240				
		TFBGA280-1616	280		16 x 16	16.0 x 16.0 x (1.05)	
		LFBGA160-1010* ²	160		0.65	10 x 10	10.0 x 10.0 x (1.25)
		LFBGA208-1212* ²	208				
		LFBGA224-1313* ²	224				
		TFBGA260-1313	260				
		★LFBGA308-1313* ²	308		0.5	13 x 13	13.0 x 13.0 x (1.25)
		TFBGA068-0606	68				
		TFBGA084-0606	84				
		TFBGA152-0808	152				
★LFBGA164-0808* ²	164						
LFBGA171-0811* ²	171						
TFBGA176-0909	176						
TFBGA328-1414	328						
WFBGA144-0606	144	0.4	6 x 6	6.0 x 6.0 x (0.75)			
TFBGA204-0808	204						


*1 Figures in brackets indicate available terminal count.

*2 Stacked package

(Plastic)

- Flash Memories System-Flash
- CCDs CMOS Image Sensors
- LSIs for LCDs
- Analog ICs
- Smart Card System
- System LSIs
- Special-Function LSIs
- Packages
- Index (Model No.)

■ Surface-mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package width & length x (seated height) mm [design value]
FBGA (CSP)		TFBGA ^{*1} XXX-0606	to 36	0.8	6 x 6	6.0 x 6.0 x (1.05)
		TFBGA ^{*1} XXX-0707	to 49		7 x 7	7.0 x 7.0 x (1.05)
		TFBGA ^{*1} XXX-0808	to 81		8 x 8	8.0 x 8.0 x (1.05)
		TFBGA ^{*1} XXX-0909	to 100		9 x 9	9.0 x 9.0 x (1.05)
		TFBGA ^{*1} XXX-1010	to 121		10 x 10	10.0 x 10.0 x (1.05)
		TFBGA ^{*1} XXX-1111	to 144		11 x 11	11.0 x 11.0 x (1.05)
		TFBGA ^{*1} XXX-1212	to 196		12 x 12	12.0 x 12.0 x (1.05)
		TFBGA ^{*1} XXX-1313	to 216		13 x 13	13.0 x 13.0 x (1.05)
		TFBGA ^{*1} XXX-1414	to 240		14 x 14	14.0 x 14.0 x (1.05)
		TFBGA ^{*1} XXX-1515	to 240		15 x 15	15.0 x 15.0 x (1.05)
		TFBGA ^{*1} XXX-1616	to 280	16 x 16	16.0 x 16.0 x (1.05)	
		TFBGA ^{*2} XXX-0606	to 49	0.65	6 x 6	6.0 x 6.0 x (1.05)
		TFBGA ^{*2} XXX-0707	to 81		7 x 7	7.0 x 7.0 x (1.05)
		TFBGA ^{*2} XXX-0808	to 121		8 x 8	8.0 x 8.0 x (1.05)
		TFBGA ^{*2} XXX-0909	to 144		9 x 9	9.0 x 9.0 x (1.05)
		TFBGA ^{*2} XXX-1010	to 196		10 x 10	10.0 x 10.0 x (1.05)
		TFBGA ^{*2} XXX-1111	to 224		11 x 11	11.0 x 11.0 x (1.05)
		TFBGA ^{*2} XXX-1212	to 256		12 x 12	12.0 x 12.0 x (1.05)
		TFBGA ^{*2} XXX-1313	to 272		13 x 13	13.0 x 13.0 x (1.05)
		TFBGA ^{*2} XXX-1414	to 304		14 x 14	14.0 x 14.0 x (1.05)
		TFBGA ^{*2} XXX-1515	to 320		15 x 15	15.0 x 15.0 x (1.05)
		TFBGA ^{*2} XXX-1616	to 352	16 x 16	16.0 x 16.0 x (1.05)	
		TFBGA ^{*3} XXX-0606	to 100	0.5	6 x 6	6.0 x 6.0 x (1.05)
		TFBGA ^{*3} XXX-0707	to 132		7 x 7	7.0 x 7.0 x (1.05)
		TFBGA ^{*3} XXX-0808	to 164		8 x 8	8.0 x 8.0 x (1.05)
		TFBGA ^{*3} XXX-0909	to 192		9 x 9	9.0 x 9.0 x (1.05)
		TFBGA ^{*3} XXX-1010	to 216		10 x 10	10.0 x 10.0 x (1.05)
		TFBGA ^{*3} XXX-1111	to 244		11 x 11	11.0 x 11.0 x (1.05)
		TFBGA ^{*3} XXX-1212	to 268		12 x 12	12.0 x 12.0 x (1.05)
		TFBGA ^{*3} XXX-1313	to 296		13 x 13	13.0 x 13.0 x (1.05)
		TFBGA ^{*3} XXX-1414	to 320		14 x 14	14.0 x 14.0 x (1.05)
		TFBGA ^{*3} XXX-1515	to 348		15 x 15	15.0 x 15.0 x (1.05)
TFBGA ^{*3} XXX-1616	to 372	16 x 16	16.0 x 16.0 x (1.05)			
TFBGA ^{*4} XXX-0505	to 100	0.4	5 x 5	5.0 x 5.0 x (1.05)		
TFBGA ^{*4} XXX-0606	to 144		6 x 6	6.0 x 6.0 x (1.05)		
TFBGA ^{*4} XXX-0707	to 168		7 x 7	7.0 x 7.0 x (1.05)		
TFBGA ^{*4} XXX-0808	to 204		8 x 8	8.0 x 8.0 x (1.05)		
TFBGA ^{*4} XXX-0909	to 228		9 x 9	9.0 x 9.0 x (1.05)		
TFBGA ^{*4} XXX-1010	to 264		10 x 10	10.0 x 10.0 x (1.05)		

*1 XXX : Terminal count (See page 61. For further details, contact SHARP.)







*2 XXX : Terminal count (See page 62. For further details, contact SHARP.)

*3 XXX : Terminal count (See page 63. For further details, contact SHARP.)

*4 XXX : Terminal count (See page 64. For further details, contact SHARP.)


(Plastic)

■ Surface-mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm (mil)	Nominal dimensions mm (mil)	Package width & length x (seated height) mm [design value]	Lead frame material			
							Alloy42	Copper alloy		
SOP		P-SOP008-0225	8	1.27(50)	5.72(225)	4.4 x 5.0 x (1.55)	○	—		
		P-SOP014-0225	14			4.4 x 10.0 x (1.55)	○	—		
		P-SOP016-0225	16		7.62(300)	—	○	—		
		P-SOP024-0300	24			5.8 x 15.2 x (1.9)	—	○		
		P-SOP024-0450	24			8.6 x 15.4 x (2.3)	○	—		
		P-SOP028-0450	28			8.6 x 18.0 x (2.3)	○	—		
		P-SOP032-0525	32			11.3 x 20.6 x (2.8)	○	—		
		P-SOP040-0525	40			11.3 x 26.3 x (2.8)	○	—		
P-SOP044-0600	44	15.2(600)	13.2 x 28.2 x (2.85)	○	○					
SSOP		P-SSOP008-0175	8	0.65	4.5(175)	3.0 x 3.0 x (1.0)	—	○		
		P-SSOP012-0225	12	0.75	5.7(225)	4.4 x 5.0 x (1.55)	○	—		
		P-SSOP024-0275	24	0.65	7.0(275)	6.0 x 7.8 x (1.15)	—	○		
		P-SSOP040-0300	40		7.6(300)	6.3 x 13.5 x (1.55)	—	○		
		P-SSOP056-0600	56	0.8	15.2(600)	13.3 x 23.7 x (1.8)	—	○		
		P-SSOP064-0525	64		13.3(525)	11.3 x 26.3 x (2.8)	○	—		
		P-SSOP070-0500	70		12.7(500)	12.7 x 28.6 x (2.8)	—	○		
HTSSOP		P-HTSSOP008-0175	8	0.65	4.5(175)	3.0 x 3.0 x (1.0)	—	○		
		P-HTSSOP016-0225	16	0.65	5.0(225)	5.5 x 6.4 x (1.1)	—	○		
MFP	(Plastic)	P-MFP018	18	0.8	—	6.0 x 7.5 x (1.55)	○	—		
		P-MFP020	20	0.75	—	—	○	—		
TSOP(1)		P-TSOP028-0813	28	0.55	8 x 13.4	8.0 x 11.8 x (1.1)	○	—		
		P-TSOP032-0813	32			8.0 x 18.4 x (1.1)	○	—		
		P-TSOP032-0820	32	0.4	8 x 20	8.0 x 18.4 x (1.1)	○	—		
		P-TSOP040-0813	40			8.0 x 11.8 x (1.1)	○	—		
		P-TSOP040-1014	40	0.5	10 x 14	10.0 x 12.4 x (1.1)	○	—		
		P-TSOP040-1020	40			10.0 x 18.4 x (1.1)	○	○		
		P-TSOP048-1014	48	0.4	10 x 14	10.0 x 12.4 x (1.1)	○	—		
		P-TSOP048-1218	48			12.0 x 16.4 x (1.1)	○	—		
		P-TSOP048-1220	48	0.5	12 x 20	12.0 x 18.4 x (1.1)	○	★		
P-TSOP056-1420	56	14.0 x 18.4 x (1.1)	○			★				
QFP		P-QFP032-0707	32	0.8	7 x 7	7.0 x 7.0 x (1.55)	○	—		
		P-QFP036-1010	36			10 x 10	10.0 x 10.0 x (1.55)	○	—	
		P-QFP044-1010	44				10.0 x 10.0 x (1.55)	○	—	
		P-QFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.55)	○	—		
		P-QFP048-1010	48	0.75	10 x 10	10.0 x 10.0 x (1.55)	○	—		
		P-QFP056-1010	56	0.65	14 x 14	14.0 x 14.0 x (2.0)	○	—		
		P-QFP060-1414	60	0.8		14.0 x 14.0 x (2.0)	○	—		
		P-QFP064-1010	64	0.5	10 x 10	10.0 x 10.0 x (1.55)	○	—		
		P-QFP064-1420	64	1.0	14 x 20	14.0 x 20.0 x (2.85)/(2.05)	○	—		
		P-QFP072-1010	72	0.5	10 x 10	10.0 x 10.0 x (1.55)	○	—		
		P-QFP080-1420	80	0.8	14 x 20	14.0 x 20.0 x (2.85)/(2.05)	○	—		
		P-QFP100-1420	100	0.65	14 x 20	14.0 x 20.0 x (2.85)/(2.05)	○	—		
		P-QFP112-2020	112		20 x 20	20.0 x 20.0 x (2.8)	○	—		
		P-QFP128-1420	128	0.5	14 x 20	14.0 x 20.0 x (2.05)	○	—		
		P-QFP128-2828	128	0.8	28 x 28	28.0 x 28.0 x (3.55)	○	—		
		P-QFP156-1420	156	0.4	14 x 20	14.0 x 20.0 x (2.05)	○	—		
		P-QFP160-2828	160	0.65	28 x 28	28.0 x 28.0 x (3.55)	○	—		
P-QFP208-2828	208	0.5	28.0 x 28.0 x (3.45)	○		—				
LQFP		P-LQFP052-1414	52	1.0	14 x 14	14.0 x 14.0 x (1.5)	○	—		
		P-LQFP080-1212	80	0.5	12 x 12	12.0 x 12.0 x (1.5)	○	—		
		P-LQFP080-1414	80	0.65	14 x 14	14.0 x 14.0 x (1.5)	—	○		
		P-LQFP100-1414	100	0.5			○	—		
		P-LQFP120-1414	120	0.4			○	—		
		P-LQFP128-1414	128				○	—		
		P-LQFP144-2020	144	0.5			20 x 20	20.0 x 20.0 x (1.5)	—	○
		P-LQFP176-2424	176				24 x 24	24.0 x 24.0 x (1.5)	—	○
TQFP	(Plastic)	P-TQFP048-0707	48	0.5	7 x 7	7.0 x 7.0 x (1.1)	○	—		
		P-TQFP100-1414	100			—	○	—		
		P-TQFP128-1414	128	0.4	14 x 14	14.0 x 14.0 x (1.2)	○	—		




100 mil = 2.54 mm

■ Surface-mount Type (cont'd)

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package width & length x (seated height) mm [design value]	Lead frame material	
							Alloy42	Copper alloy
VQFN		P-VQFN020-0404	20	0.5	4 x 4	4.2 x 4.2 x (0.92)	-	○
		P-VQFN028-0505	28		5 x 5	5.2 x 5.2 x (0.92)	-	○
		P-VQFN032-0505	32		5 x 6	5.2 x 6.2 x (0.92)	-	○
		P-VQFN036-0606	36			6.2 x 6.2 x (0.92)	-	○
		P-VQFN048-0707	48	0.4	7 x 7	7.2 x 7.2 x (0.92)	-	○
		P-VQFN036-0505	36		5 x 5	5.2 x 5.2 x (0.92)	-	○
		P-VQFN052-0707	52		7 x 7	7.2 x 7.2 x (0.92)	-	○
		P-VQFN064-0808	64		8 x 8	8.2 x 8.2 x (0.92)	-	○
HQFN*	(Plastic)	★P-HQFN016-0303	16	0.5	3 x 3	3.0 x 3.0 x (0.8)	-	○
		P-HQFN016-0404	20	0.65	4 x 4	4.0 x 4.0 x (0.9)	-	○
		P-HQFN020-0404		0.5		4.0 x 4.0 x (0.75)	-	○
		P-HQFN024-0404	24	0.5	5 x 5	4.2 x 4.2 x (0.92)	-	○
		P-HQFN028-0505	28			5.0 x 5.0 x (0.9)	-	○

* HQFN is a higher thermal performance version package of VQFN.

■ Pin-inserting Type

Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm (mil)	Nominal dimensions mm (mil)	Package width & length mm [design value]	Lead frame material	
							Alloy42	Copper alloy
SIP	 (Plastic)	P-SIP009-0240	9	2.54(100)	6.10(240)	2.95 x 21.7	-	○
DIP	 (Plastic)	P-DIP008-0300	8	2.54(100)	7.62(300)	6.35 x 9.1	-	○
		P-DIP016-0300	16			6.45 x 19.25	-	○
		P-DIP018-0300	18			6.35 x 23.0	○	-
		P-DIP024-0300	24		7.62(300)	6.85 x 29.6	○	-
		P-DIP024-0600	24		15.24(600)	13.2 x 31.0	○	-
		P-DIP028-0300	28		7.62(300)	6.85 x 34.7	○	○
		P-DIP028-0600	28		15.24(600)	13.2 x 36.0	○	-
		P-DIP032-0600	32			13.2 x 41.0	○	-
		P-DIP040-0600	40			13.2 x 52.0	○	-
P-DIP042-0600	42	13.2 x 53.8	○	-				
SDIP	 (Plastic)	P-SDIP024-0300	24	1.778(70)	7.62(300)	6.35 x 22.0	-	○
		P-SDIP028-0400	28		10.16(400)	8.6 x 25.5	○	○
		P-SDIP030-0400	30		8.6 x 27.2	-	○	
		P-SDIP042-0600	42		15.24(600)	13.2 x 38.2	-	○
		P-SDIP064-0750	64		19.05(750)	17.0 x 58.0	○	-

100 mil = 2.54 mm

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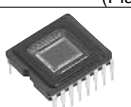
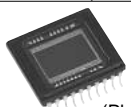
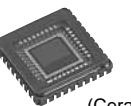
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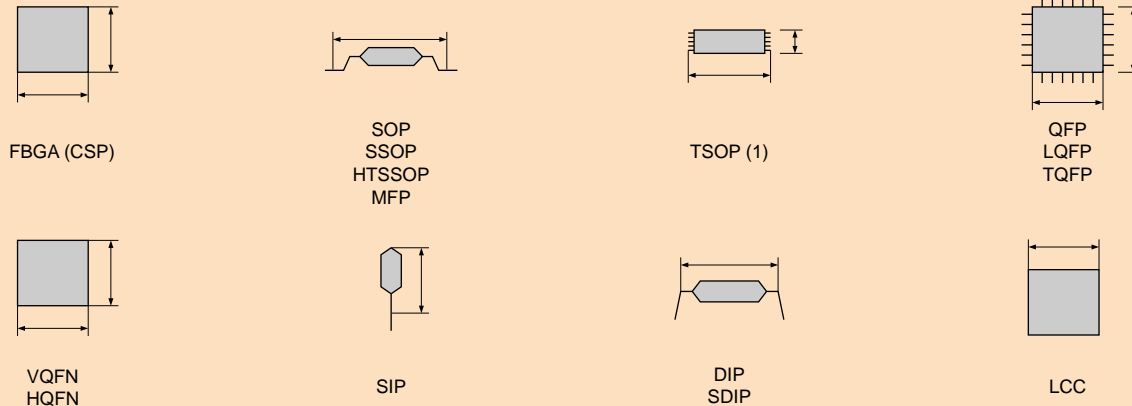
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Package type	Appearance (Package material)	Package code	No. of terminals	Terminal pitch mm	Nominal dimensions mm	Package width & length x (seated height) mm [design value]
DIP	 (Plastic)	P-DIP014-0400A	14	1.27	10.16	10.0 x 10.0
		P-DIP016-0500C	16	1.78	12.7	12.4 x 14.0
		P-DIP020-0400	20	1.00	10.16	10.0 x 10.0
		P-DIP020-0500		1.27	12.2	12.0 x 13.8
	 (Ceramic)	N-DIP016-0450	16	1.27	11.43	11.4 x 12.2
		N-DIP016-0500C		1.78	12.7	12.4 x 14.0
SOP	 (Plastic)	P-SOP020-0525	20	1.27	13.3	12.0 x 13.8 x (3.9)
		★P-SOP028-0400	28	0.69	11.3	10.0 x 10.0 x (3.5)
LCC	 (Ceramic)	N-LCC036-S425A	36	1.00	10.8	10.8 x 10.8 x (1.9)
	★N-LCC036-S425B					

Nominal dimensions



- FBGA : Fine pitch Ball Grid Array package
- SOP : Small Outline Package
- SSOP : Shrink Small Outline Package
- HTSSOP : Heat sink Thin 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
- SIP : Single Inline Package
- DIP : Dual Inline Package
- SDIP : Shrink Dual Inline Package
- LCC : Leadless Chip Carrier



Standard FBGA (CSP) Lineup and Maximum Terminal Count : 0.8 mm Terminal Pitch

Nominal dimensions (mm)	Lineup						
	Matrix	2 rows	3 rows	4 rows	5 rows	6 rows	MAX.
6 x 6	(6 x 6)	32					36
7 x 7	(7 x 7)	40	48				49
8 x 8	(9 x 9)	56	72	80			81
9 x 9	(10 x 10)	64	84	96			100
10 x 10	(11 x 11)	72	96	112	120		121
11 x 11	(12 x 12)	80	108	128	140		144
12 x 12	(14 x 14)	96	132	160	180	192	196
13 x 13	(15 x 15)	104	144	176	200	216	
14 x 14	(16 x 16)	112	156	192	220	240	
15 x 15	(17 x 17)	120	168	208	240		
16 x 16	(19 x 19)	136	192	240	280		

Figures below drawings indicate the maximum terminal count.
Some packages in the above table require development cost and time. For further details, please consult SHARP.

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Standard FBGA (CSP) Lineup and Maximum Terminal Count : 0.65 mm Terminal Pitch

Nominal dimensions (mm)	Matrix	Lineup					
		2 rows	3 rows	4 rows	5 rows	6 rows	MAX.
6 x 6	(7 x 7)	 40	 48				 49
7 x 7	(9 x 9)	 56	 72	 80			 81
8 x 8	(11 x 11)	 72	 96	 112	 120		 121
9 x 9	(12 x 12)	 80	 108	 128	 140		 144
10 x 10	(14 x 14)	 96	 132	 160	 180	 192	 196
11 x 11	(15 x 15)	 104	 144	 176	 200	 216	 224
12 x 12	(17 x 17)	 120	 168	 208	 240		 256
13 x 13	(18 x 18)	 128	 180	 224	 260		 272
14 x 14	(20 x 20)	 144	 204	 256	 300		 304
15 x 15	(21 x 21)	 152	 216	 272	 320		 320
16 x 16	(23 x 23)	 168	 240	 304			 352

Figures below drawings indicate the maximum terminal count.
Some packages in the above table require development cost and time. For further details, please consult SHARP.



Standard FBGA (CSP) Lineup and Maximum Terminal Count : 0.5 mm Terminal Pitch

Nominal dimensions (mm)	Lineup								
	Matrix	2 rows	3 rows	4 rows (Decrease of 1 row)		5 rows (Decrease of 1 row)			MAX.
6 x 6	(10 x 10)	64	84	68	76	72	80	88	100
7 x 7	(12 x 12)	80	108	92	100	104	112	120	132
8 x 8	(14 x 14)	96	132	116	124	136	144	152	164
9 x 9	(16 x 16)	112	156	140	148	168	176	184	192
10 x 10	(18 x 18)	128	180	164	172	200	208	216	216
11 x 11	(20 x 20)	144	204	188	196	232	240		244
12 x 12	(22 x 22)	160	228	212	220	264			268
13 x 13	(24 x 24)	176	252	236	244	296			296
14 x 14	(26 x 26)	192	276	260	268				320
15 x 15	(28 x 28)	208	300	284	292				348
16 x 16	(30 x 30)	224	324	308	316				372

Figures below drawings indicate the maximum terminal count.
Some packages in the above table require development cost and time. For further details, please consult SHARP.

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









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■ Standard FBGA (CSP) Lineup and Maximum Terminal Count : 0.4 mm Terminal Pitch

Nominal dimensions (mm)	Matrix	Lineup			
		2 rows	3 rows	4 rows	MAX.
5 x 5 (10 x 10)		64	84	96	100
			88	120	144
6 x 6 (13 x 13)		104	144	168	
			128	180	204
7 x 7 (15 x 15)		144	204	228	
			168	240	264
8 x 8 (18 x 18)		204	240	264	
			228	288	312
9 x 9 (20 x 20)		264	312	336	
			312	360	384
10 x 10 (23 x 23)		336	384	408	
			384	432	456

Figures below drawings indicate the maximum terminal count.
Some packages in the above table require development cost and time. For further details, please consult SHARP.

Contact a Sharp sales office regarding lead-free packages.

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