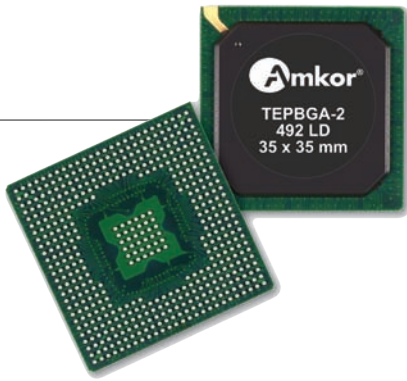


data sheet



Thermally Enhanced Plastic Ball Grid Array (TEPBGA):

Amkor's TEPBGA's feature a drop-in heat spreader (TEPBGA-2) and are designed for low inductance. This advanced IC package technology allows application and design engineers to optimize innovations while maximizing the performance characteristics of semiconductors (silicon). Amkor's PBGAs are designed for low inductance, improved thermal operation and enhanced SMT-ability. Custom performance enhancements, such as ground and power planes, are available for significant improvements in electrical response demanded by advancing electronics.

Additionally, these PBGAs utilize industry proven, semiconductor grade materials for reliable, long-term operation.

Applications:

Semiconductor technologies find enhanced performance by using the integrated design features of Amkor's PBGAs. Microprocessors / controllers, ASICs, Gate Arrays, memory, DSPs, PLDs, graphics and PC chip sets find Amkor's PBGA family to be an ideal package. Applications requiring improved portability, form-factor/size and high-performance such as cellular, wireless telecommunications, PCMCIA cards, global positioning systems (GPS), laptop PCs, video cameras, disc drives, PLDs, graphics and other similar products benefit from Amkor's PBGA attributes.

TEPBGA

Features:	<p>Innovative designs and expanding package offerings provide a platform from prototype-to-production.</p> <ul style="list-style-type: none"> • Open tool and custom ball counts up to 1521 • 17 mm to 40 mm body sizes • Optimized package structure which maximizes IC power dissipation • 4-Layer substrate construction • Internal copper plane thickness increased from 36μm to 72μm for improved heat transfer to the perimeter balls • Thermal vias and thermal balls are added to improve heat conduction to the printed circuit board • 1.0, 1.27 & 1.5 mm ball pitch available • Perimeter, stagger and full ball arrays • Special packaging for memory available • Multi-layer, ground / power • Full in-house design capability • JEDEC MS-034 standard outlines • Thermally Enhanced PCB 																									
Thermal Resistance:	<p>Multi layer PCB, 0 air flow</p> <table border="1"> <thead> <tr> <th>Pkg</th> <th>Body Size</th> <th>PCB Layer</th> <th>Cu Thickness</th> <th>Theta JA ($^{\circ}$C/W)</th> </tr> </thead> <tbody> <tr> <td>356* TE</td> <td>27.0 x 27.0</td> <td>4</td> <td>72 μm</td> <td>16</td> </tr> <tr> <td>452* TE</td> <td>35.0 x 35.0</td> <td>4</td> <td>72 μm</td> <td>14</td> </tr> <tr> <td>356**TE-2</td> <td>27.0 x 27.0</td> <td>4</td> <td>72 μm</td> <td>13.5</td> </tr> <tr> <td>452**TE-2</td> <td>35.0 x 35.0</td> <td>4</td> <td>72 μm</td> <td>12</td> </tr> </tbody> </table> <p>*TEPBGA **TEPBGA-2</p> <p>Results dependent on body size, die size, and PCB design.</p>	Pkg	Body Size	PCB Layer	Cu Thickness	Theta JA ($^{\circ}$ C/W)	356* TE	27.0 x 27.0	4	72 μ m	16	452* TE	35.0 x 35.0	4	72 μ m	14	356**TE-2	27.0 x 27.0	4	72 μ m	13.5	452**TE-2	35.0 x 35.0	4	72 μ m	12
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Reliability:	<p>Amkor assures you reliable performance by continuously monitoring key indices:</p> <table border="1"> <tbody> <tr> <td>• Moisture sensitivity characterization</td> <td>JEDEC Level 3 30 $^{\circ}$C/60% RH/192 hours</td> </tr> <tr> <td>• Autoclave or unbiased hast</td> <td>130 $^{\circ}$C/85% RH/96 hours</td> </tr> <tr> <td>• High temp storage</td> <td>150 $^{\circ}$C, 1000 hours</td> </tr> <tr> <td>• Temp cycle</td> <td>-55/+125 $^{\circ}$C, 1000 cycles</td> </tr> </tbody> </table>	• Moisture sensitivity characterization	JEDEC Level 3 30 $^{\circ}$ C/60% RH/192 hours	• Autoclave or unbiased hast	130 $^{\circ}$ C/85% RH/96 hours	• High temp storage	150 $^{\circ}$ C, 1000 hours	• Temp cycle	-55/+125 $^{\circ}$ C, 1000 cycles																	
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TEPBGA

TEPBGA Cross Section



Process Highlights

Die thickness (max)	13 mils
Bond pad pitch (min)	45 μ m
Marking	Laser
Ball inspection	Optical
Pack / Ship options	JEDEC trays, Dry pack
Wafer backgrinding	Available

Standard Materials

Package Substrate:	CCL-HL832NX-A
Die attach:	Ablestik 2300
Au wire:	0.7 - 1 mil wire
Mold compound:	Nitto GE100LFCS*
Solder balls:	Pb-free Sn3.5Ag

* Nitto GE100LFCS is not suitable for Asahi polyimide; alternate is available upon request.

TEPBGA Standard Package Offering (mm)

BODY SIZE	BALL COUNT	BALL PITCH	BALL MATRIX	BALL DIAM.	PCB THICKNESS 4 LYR	CAP	MOLD THICKNESS THK	TOTAL PACKAGE	
								2 LYR	4LYR
17.0 x 17.0	192/208	1.00	16 x 16 P	0.51	0.56	0.80	1.52	1.76	
	256	1.00	16 x 16 F	0.51	0.56	0.80	1.52	1.76	
19.0 x 19.0	240	1.00	18 x 18 P	0.51	0.56	0.80	1.52	1.76	
	289	1.00	17 x 17 P	0.51	0.56	0.80	1.52	1.76	
	324	1.00	18 x 18 P	0.51	0.56	0.80	1.52	1.76	
23.0 x 23.0	169	1.50	13 x 13 F	0.76	0.56	1.17	2.09	2.33	
	208/217	1.27	17 x 17 P	0.76	0.56	1.17	2.09	2.33	
	240/249	1.27	17 x 17 P	0.76	0.56	1.17	2.09	2.33	
	289	1.27	17 x 17 F	0.76	0.56	1.17	2.09	2.33	
	288/324	1.00	22 x 22 P	0.63	0.56	1.17	1.99	2.23	
	484	1.00	22 x 22 F	0.63	0.56	1.17	1.99	2.23	
27.0 x 27.0	225	1.50	15 x 15 F	0.76	0.56	1.17	2.09	2.33	
	256/272	1.27	20 x 20 P	0.76	0.56	1.17	2.09	2.33	
	300/316	1.27	20 x 20 P	0.76	0.56	1.17	2.09	2.33	
	356	1.27	20 x 20 P	0.76	0.56	1.17	2.09	2.33	
	400	1.27	20 x 20 F	0.76	0.56	1.17	2.09	2.33	
	416	1.00	26 x 26 P	0.63	0.56	1.17	1.99	2.23	
	676	1.00	26 x 26 F	0.63	0.56	1.17	1.99	2.23	
31.0 x 31.0	304/329	1.27	23 x 23 P	0.76	0.56	1.17	2.29	2.33	
	360/385	1.27	23 x 23 P	0.76	0.56	1.17	2.29	2.33	
	529	1.27	23 x 23 F	0.76	0.56	1.17	2.29	2.33	
	516	1.00	30 x 30 P	0.63	0.56	1.17	2.19	2.23	
	900	1.00	30 x 30 F	0.63	0.56	1.17	2.19	2.23	
35.0 x 35.0	313	1.27	25 x 25 S	0.76	0.56	1.17	2.29	2.33	
	352/388	1.27	26 x 26 P	0.76	0.56	1.17	2.29	2.33	
	420/456	1.27	26 x 26 P	0.76	0.56	1.17	2.29	2.33	
	452	1.27	26 x 26 P	0.76	0.56	1.17	2.29	2.33	
	809	1.27	26 x 26 F	0.76	0.56	1.17	2.29	2.33	
	580	1.00	34 x 34 P	0.63	0.56	1.17	2.19	2.23	
	680	1.00	34 x 34 P	0.63	0.56	1.17	2.19	2.23	
1,156	1.00	34 x 34 F	0.63	0.56	1.17	2.19	2.23		
37.5 x 37.5	524	1.27	28 x 28 P	0.76	0.56	1.17	2.29	2.33	
	784	1.27	28 x 28 F	0.76	0.56	1.17	2.29	2.33	
40.0 x 40.0	564	1.27	30 x 30 P	0.76	0.56	1.17	2.29	2.33	
	900	1.27	30 x 30 F	0.76	0.56	1.17	2.29	2.33	

Test Services

- Program generation/conversion
- Product engineering
- Wafer sort
- 256 Pin x 20 MHz test system available
- 55 °C to + 125 °C test available
- Tape and Reel services
- Burn-in

Shipping

Low profile tray (JEDEC Outline CO-029)

NOTE: All measurements in mm.
P = Perimeter F = Full Array S = Stagger

■ = Maximum possible ball count (may not be tooled). Additional depopulated options are available. Contact account manager for additional tooling.