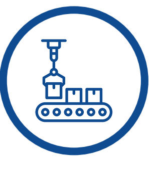
Product Line Card

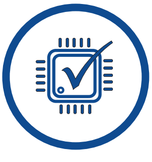
2022
amkor.com

Enabling the Future

As one of the world's largest suppliers of outsourced semiconductor packaging, design, assembly and test services; Amkor helps make next generation products a reality.



Assembly



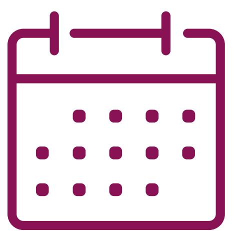
Test

Amkor Technology
by the Numbers

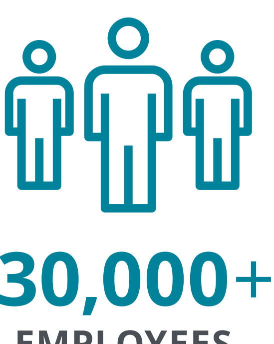
FOOTPRINT IN 11 COUNTRIES

SALES & CUSTOMER SUPPORT CENTERS

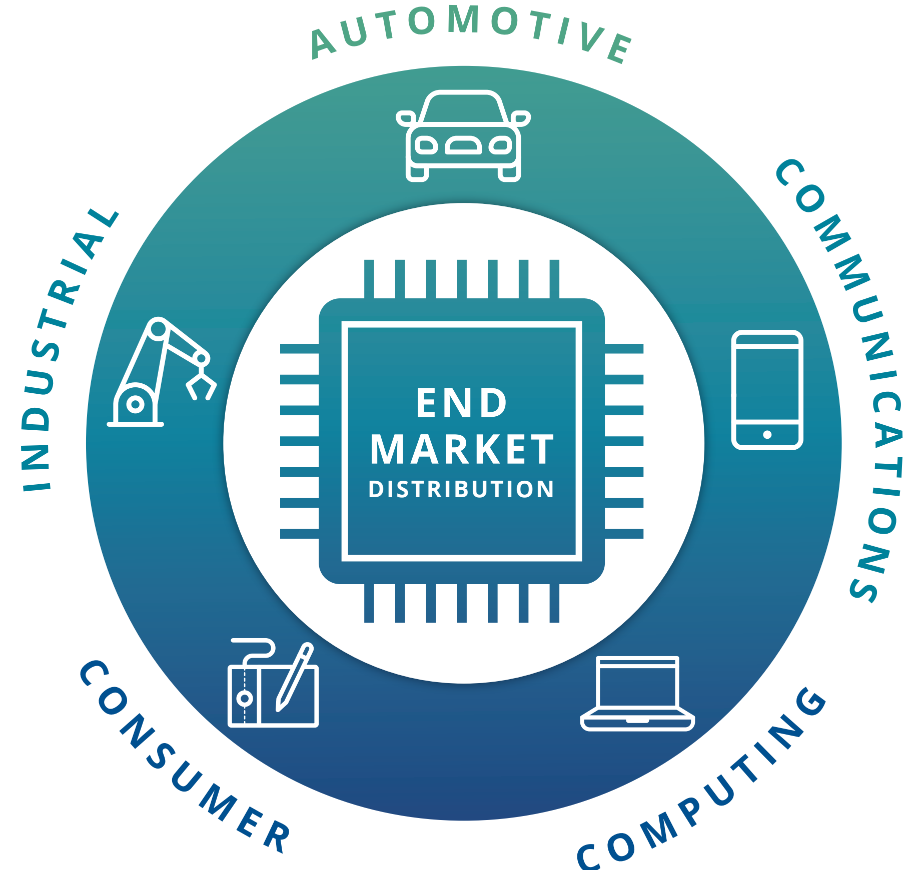
ASSEMBLY & TEST FACILITIES

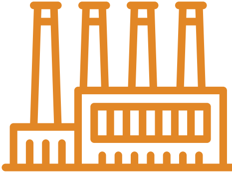


FOUNDED IN **1968**



30,000+ EMPLOYEES

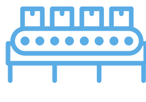


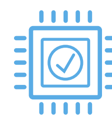


11,000,000 SQUARE FEET OF MANUFACTURING SPACE

3 TOP TURNKEY SERVICES

DESIGN


PACKAGING


TEST

$6.1B NET SALES*

3,162 PATENTS

*2021 RESULTS

Table of Contents

04 Technology Developments

05 Locations

06 Laminate

06....PBGA
06....CABGA
08....FCBGA
10....Stacked CSP
11....fcTMV®
11....Interposer PoP
12....fcCSP
15....fcSCSP

16 Leadframe

16....SSOP/QSOP
17....TSSOP/MSOP
17....SOIC
18....ExposedPad TSSOP/MSOP/SOIC/SSOP
19....LQFP
20....TQFP
21....ExposedPad LQFP
21....ExposedPad TQFP
22....MQFP
23....PLCC
24....MLF®/QFN/SON/DFN

26 Power

26....PSMC
26....SOD123-FL
26....SOD128-FL
26....TO-220FP
26....DPAK
26....D2PAK
26....HSON8
26....SO8-FL
26....TSON8-FL
26....TOLL
26....LFPAK
26....LFPAK8
26....eD2PAK
26....PQFN

27 Wafer Level

27....WLCSP Die Processing
27....WLFO
28....Wafer Bump (8" & 12")
29....Turnkey Process Flow

30 MEMS & Sensors

30....Cavity MEMS
30....Molded Cavity
30....Cavity LF

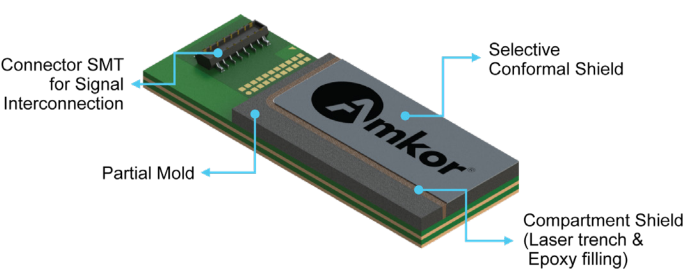
31 Test

31....Major IC Testers
31....Wafer Prober
32....Package Test Handler
32....Strip Test/Film Frame Handler
32....System Level Test
33....Discrete/Power Test
33....Burn-In Oven
33....End Of Line (EOL) Services

34 QualityFIRST

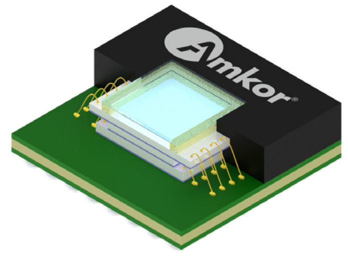
Technology Developments

AiP/AoP



Amkor's cutting-edge AiP and AoP technology has already been deployed and offers fully integrated 5G NR millimeter wave (mmWave) and sub-6 GHz RF modules for smartphones and other mobile devices. These mmWave antenna modules deliver capabilities across several spectrum bands, in a very compact footprint that is well suited for integration in mobile devices. In addition to its extensive System in Package (SiP) capacity and AiP/AoP technology, Amkor has developed an extensive toolset to maximize circuit density and address the sophisticated packaging formats required to productize 5G applications – such as double-sided assembly, embedded die in substrate, thin film RDL & dielectrics and various types of RF shielding. This toolset, combined with expertise in RF and antenna package design, uniquely positions Amkor to serve customers who want to outsource the challenges and high investment associated with combining multiple ICs with advanced package assembly and test technologies for 5G networks. As demand for packages that support 5G starts to ramp up, Amkor is already well underway with the successful implementation of AiP and AoP technology.

Optical Sensors

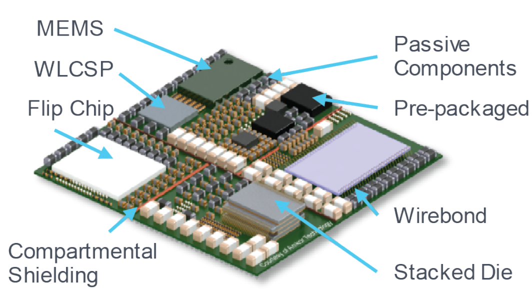


Amkor is the world leader in optical sensor packaging technology and the largest OSAT for sensor packages. As technology advances in society, we will increasingly rely on developments in optical sensors to enhance reliable and fast sensing applications for the future. Optical sensors convert various wavelengths into electrical signals for enhanced sensing applications.

Ambient, infrared (IR) and ultraviolet (UV) light are some wave types that optical sensors measure to create applications for autonomous cars, in-display fingerprint scanners, secure facial recognition and many others. The combination of multiple sensors and light sources are crucial to creating a reliable and cohesive sensing system. The adoption of many optical sensors is growing as we rely more on technology to sense the outside world for us. Amkor has extensive packaging technologies which allows our standardized packages to support flexible optical sensor applications.

System in Package

Semiconductor industry demands for higher levels of integration and lower costs coupled with a growing awareness of complete system configuration have continued to drive the popularity of System in Package (SiP) solutions. Amkor's SiP technology is an ideal solution in markets that demand smaller size with increased functionality.



By assembling, testing and shipping millions of SiP devices per day, Amkor Technology has a proven track record as the industry leader in SiP design, assembly and test. Millimeter wave radio design with beam forming and array antenna will be used in varieties of Advanced SiP products for 5G cellular system. Millimeter electromagnetic wave design is imposing a new challenge for the system designers, components and SiP packaging engineers. As part of its complete SiP design solution, Amkor has developed expertise in RF and digital testing, including test system software/hardware development and manufacturing test. Our internally developed, world-class test platform typically offers a 50% to 80% reduction in test time for common RF parts, including PAs, LNAs and combinations in Integrated Front Ends (IFEs). Contact Amkor today and let us add you to our growing list of customers enjoying success with SiP technology.

Amkor Worldwide Presence

Strategically Located Factories and Customer Support Centers

Amkor Headquarters | Sales/Customer Support Center | Assembly & Test Facility | Sales/Customer Support Center & Assembly & Test Facility

Factory Code Legend

Amkor has nineteen assembly and test manufacturing facilities worldwide.
The product tables indicate which facility manufactures different packages.

Greater China
C3 ....Shanghai

Japan
J3 ....Kumamoto
J4 ....Fukuoka, Kitakami
J5 ....Oita, Usuki
J6 ....Fukui
J7 ....Hakodate

Korea
K4 ....Gwangju
K3, K5.......Incheon

Malaysia
M1 ....Kuala Lumpur

Philippines
P1 ....Muntinlupa City
P3/P4 ....Binan Laguna

Portugal
E1 ....Porto

Taiwan
T1, T6 ....Taoyuan City
T3, T5 ....Hukou Township

Automotive capability available on most packages.
Packages are not shown actual size and are a representation of available packages. Contact Amkor sales for information on additional products offered.

Laminate Packages

The higher functional capabilities of Amkor's laminate package technology benefits high power and high speed ICs that require enhanced electrical and thermal performance.

Laminate packages employ a ball grid array design, which utilizes a plastic or tape laminate substrate rather than a leadframe substrate, and places the electrical connections on the bottom of the package rather than around the perimeter. A substrate is a laminate of multiple layers of epoxy resin, woven glass fibers and metal conductors. Bumps provide the electrical connection to the system board. The bumps are typically distributed evenly across the bottom surface of the substrate (called a "ball grid array" format). This allows greater distance between individual leads and a higher number of interconnects than leadframe packages.

Laminate packages are the ideal solution for high-performance applications such as microprocessors/controllers, gate arrays, chipsets, analog, Flash, SRAM, DRAM, ASICs, DSPs, RF devices and PLDs.

PBGA Packages – Package Dimensions (mm)

Sample	Body Size	Lead Count and Pitch			Factory	Data Sheet #
		0.8 mm	1.0 mm	1.27 mm		
PBGA	19 x 19, PGM	340, 360, 484, 529	276, 289, 292, 320, 324	–	K4	DS520
	19 x 19, CGM	–	240, 260, 320, 324	–	P3	DS520
	23 x 23, PGM	549, 569, 672, 676, 740	264, 318, 343, 376, 404 456, 484	–	K4	DS520
	23 x 23, CGM	–	316, 376, 420, 440, 448, 456, 484	169, 177, 208, 217, 225, 249, 289	P3	DS520
	27 x 27, PGM	637, 641	336, 416, 456, 484, 515, 596, 620, 672, 676	272, 292	K4	DS520
	27 x 27, CGM	–	388, 456, 544, 625, 672	256, 272, 316, 336, 356, 400	P3	DS520
	29 x 29, PGM	–	688, 780	–	K4	DS520
	31 x 31, CGM	–	632, 639, 744, 752, 757, 817, 896, 900	304	K4	DS520
	31 x 31, CGM	–	550, 640, 676, 900	329, 385, 409, 576	P3	DS520
	35 x 35, CGM	–	596, 1156	456, 672, 729, 985	P3	DS520

Legend: Max full array ball count shown – contact Amkor for custom BGA pattern availability

CABGA Packages – Package Dimensions (mm)

Sample	Body Size	Lead Count and Pitch						Factory	Data Sheet #
		0.4 mm	0.5 mm	0.65 mm	0.8 mm	1 mm	1.27 mm		
CABGA	2.5 x 2.5	36	–	–	–	–	–	P3	DS550
	3 x 3	49	25	20	–	–	–	K4, P3	DS550
	3.5 x 3.5	34, 49	36	–	–	–	–	C3, K4, P3, J3	DS550
	4 x 4	49, 64	40, 41, 48, 49	–	24	–	–	C3, K4, P3	DS550
	4.5 x 4.5	72, 81	–	–	–	–	–	J3	DS550
	5 x 5	97, 100	44, 48, 56, 57, 62, 64, 65, 66, 68, 72, 76, 80, 81	49	25	–	–	C3, K4, P3, J3	DS550
	5.5 x 5.5	–	78,99	–	–	–	–	J3	DS550
	6 x 6	76	48, 56, 64, 80, 84, 86, 88, 92	49, 58	36	–	–	C3, K4, P3, J3	DS550
	6 x 6	96, 140, 155	96, 97, 99, 100, 101, 105, 111, 112, 113, 120, 121	64	–	–	–	C3, K4, P3, J7, J3	DS550
	6.5 x 8	–	–	–	67	–	–	C3	–
	7 x 7	187, 191	64, 86, 100, 104, 107, 116	64, 80	48, 49, 64	–	–	C3, K4, P3, J3	DS550
	7 x 7	209, 211, 256	121, 128, 132, 137, 142, 143, 144, 154, 160	81, 84, 137	–	–	–	C3, K4, P3, J3	DS550
	8 x 8	121, 252	56, 80, 100, 108, 112, 113, 120	105	52, 64, 80, 81	–	–	C3, K4, P3	DS550
	8 x 8	308	124, 128, 132, 133, 144, 160, 161, 164, 176, 180	121, 140	–	–	–	C3, K4, P3, J7, J3	DS550
	8 x 8	–	195, 196, 208, 219, 225	–	–	–	–	C3, K4, P3	DS550

Automotive capability available on most packages.
Packages are not shown actual size and are a representation of available packages. Contact Amkor sales for information on additional products offered.

CABGA Packages (Cont.) – Package Dimensions (mm)

	Sample	Body Size	Lead Count and Pitch						Factory	Data Sheet #
			0.4 mm	0.5 mm	0.65 mm	0.8 mm	1 mm	1.27 mm		
CABGA		9 x 9	296, 383	128, 156, 188, 201, 220, 225, 265	109, 121, 141, 144	81, 100	–	–	C3, K4, P3, J3, J7	DS550
		10 x 10	216, 360, 384	173, 179, 180	164, 170	96, 100, 104, 120, 121, 128, 144	81	–	C3, K4, P3, J3	DS550
		10 x 10	387, 396, 409	181, 192, 200, 216, 221, 224, 225, 233, 235, 240	183	–	–	–	C3, K4, P3, J3, J7	DS550
		10 x 10	424, 454	244, 257, 267, 268, 273, 277, 284, 285, 289, 292, 296, 297, 328	196	–	–	–	C3, K4, P3	DS550
		10 x 10	456	336, 345, 346	–	–	–	–	C3, K4, P3	DS550
		11 x 11	432, 440, 452	204, 223	165, 177, 192, 196	128, 132, 144, 169	100	–	C3, K4, P3, J7, J3	DS550
		11 x 11	476, 576	256, 280, 289, 305, 321, 324, 337, 361, 416	200, 208, 225, 241	–	–	–	C3, K4, P3, J3	DS550
		12 x 12	216, 487, 547	236, 244, 260, 272, 291, 308, 337, 343	177	144, 160, 168, 179	121	–	C3, K4, P3, J7	DS550
		12 x 12	560, 569, 617	385, 388, 424	193, 208	180, 192, 196	–	–	C3, K4, P3, J7, J3	DS550
		12 x 12	697, 714, 745	–	213, 241	–	–	–	C3, K4, P3, J3	DS550
		13 x 13	–	276	240, 248, 273	–	–	–	C3, K4, P3	DS550
		13 x 13	–	281, 286, 289, 325, 337, 341, 345	280, 281, 282, 289, 294	145	–	–	C3, K4, P3, J7, J3	DS550
		13 x 13	–	356, 368, 385, 400, 401, 420, 424	328, 336, 348	177, 193, 201, 224, 225	144	–	C3, K4, P3, J7, J3	DS550
		13 x 13	–	505	361	256	–	–	C3, K4, P3, J7	DS550
		14 x 14	270	169, 220	304, 332, 645	233, 256	166, 169	–	C3, K4, P3	DS550
		14 x 14	683	409, 456, 480, 516, 521, 538, 562, 616	379, 387, 400	–	–	–	C3, K4, P3, J7	DS550
		15 x 15	418	393, 464, 543, 586, 603	339, 349, 351	208, 209, 217, 220, 228, 233, 240, 255, 260, 261, 265, 280, 288, 289	–	–	C3, K4, P3, J7, J3	DS550
		15 x 15	–	–	352, 368	319, 324	160, 176, 196	–	C3, K4, P3, J7	DS550
		16 x 16	–	430, 609, 624	304, 324, 360, 423, 426, 445, 477	280, 285	174, 225	–	C3, K4, P3, J7	DS550
		17 x 17	–	–	281, 457	256, 268, 272, 292, 293	199, 208, 224, 228, 252, 256	136, 164	C3, K4, P3, J3	DS550
		17 x 17	–	540, 604, 608	508, 521, 532, 600	308, 316, 318, 320, 324, 326, 358, 364, 399, 400	256	–	C3, K4, P3, J7, J3	DS550
		18 x 18	–	842, 906	–	–	–	–	J7	DS550
		19 x 19	–	–	–	–	321	–	J7	DS550
		21 x 21	–	–	–	449, 490, 537	–	–	J7	DS550
		23 x 23	–	–	–	552	324, 352, 484	–	J3	DS550
		25 x 25	–	–	–	516	–	–	K4	DS550
		27 x 27	–	–	–	–	416, 456, 484, 516	256	J3	DS550
		31 x 31	–	–	–	–	564, 613, 620, 640, 641, 704	421	J3	DS550
		35 x 35	–	–	–	–	814, 868, 1012	484	J3	–

Automotive capability available on most packages.
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FCBGA Packages – Package Dimensions (mm)

Sample	Body Size	Lead Count and Pitch							Factory	Data Sheet #
		0.4 mm	0.5 mm	0.65 mm	0.7 mm	0.8 mm	1 mm	1.27 mm		
FCBGA	11x11	–	–	212	–	–	–	–	T3	DS831
	12 x 12	550, 617, 841	529	289	–	196	121	–	K4, T3	DS831
	12 x 14	–	–	–	–	224	–	–	T3	DS831
	13 x 13	961	625	301, 283, 361	–	225	144	–	K4, T3	DS831
	13.5 x 25.2	–	–	588	–	–	–	–	T3	DS831
	14 x 14	1156	729	330, 400	–	220, 236, 256, 275, 282, 289	144, 158, 164, 169	–	K4, T3	DS831
	15 x 15	1032, 1084, 1296	841	249, 271, 367, 374, 431, 433, 484	–	260, 289, 324	164, 196	–	K4, T3	DS831
	15 x 20	1448	–	–	–	–	–	–	K4	DS831
	16 x 16	1521	961	489, 529	–	361	225	–	K4, T3	DS831
	17 x 17	–	–	488, 489, 516, 517, 558, 561, 566, 592, 621, 623, 625	–	301, 337, 344, 352, 392, 395, 400, 417	196, 244, 252, 254, 256	–	K4, T3	DS831
	18 x 18	–	–	–	–	–	437	–	K4	DS831
	19 x 19	–	–	458, 557, 629, 640, 662, 780, 784	–	409, 418,437, 441, 480, 481, 484, 497, 525, 529	244, 253, 260, 277, 320, 324	–	K4, T3	DS831
	20 x 20	–	–	–	–	440	–	–	K4	DS831
	21 x 21	–	–	818, 957, 961	729 (0.75 mm)	407, 437, 477, 484, 510, 519, 520, 521, 528, 538, 573, 595, 613, 614, 621, 623, 625	278, 368, 396, 399, 400	–	K4, T3, K5	DS831
	22 x 22	–	–	–	–	–	399, 503	244	K4	DS831
	23 x 23	–	–	834, 852, 860, 905, 911, 960, 1001, 1059, 1150, 1156	–	532, 533, 548, 561, 573, 596, 602, 605, 607, 617, 631, 635, 648, 656, 663, 664, 672, 676, 684, 729, 756, 760, 773, 780, 784	456, 480, 484	–	K4, T3, K5, J7	DS550
	24 x 24	–	–	–	–	697, 737, 827, 841	–	–	K4	DS550
	24.5 x 19.5	–	–	–	–	655	–	–	T3	DS550
	25 x 25	–	–	1031, 1313, 1369, 1372	–	632, 665, 676, 754, 818, 837, 896, 900	444, 490, 495, 529, 560, 564, 572, 576	360	K4, T3	DS550
	27 x 27	–	–	–	–	760, 777, 812, 836, 851, 871, 873, 889, 928,947, 957, 972, 994,1008, 1019, 1020, 1022, 1024, 1069, 1071, 1073, 1084, 1089	276, 479, 484, 512, 528, 544, 562, 563, 564, 572, 573, 575, 576, 582, 592, 596, 615, 625, 650, 665, 668, 672, 675, 676	256, 360	K4, T3, K5, J7, J3	DS550
	28 x 28	–	–	–	–	–	725	–	K4	DS831
	29 x 29	–	–	–	–	913, 962, 963, 1006, 1019, 1022, 1033, 1152, 1156, 1159, 1192, 1203, 1221, 1225	620, 692, 729, 738, 753, 762, 780, 783, 784	–	K4, T3, J7, J3	DS831
	31 x 31	–	–	–	–	1021, 1024, 1118, 1128, 1156, 1177, 1184, 1201, 1290, 1365,1369, 1408, 1417, 1440, 1443	500, 537, 636, 640, 672, 684, 692, 708, 713, 719, 736, 741, 744, 749, 754, 772, 788, 821, 829, 841, 880, 884, 888, 894, 896, 899, 900	304, 525	K4, T3, J7, J3	DS831
	31 x 41	–	–	–	–	1348	–	–	K5	DS831
	32 x 32	–	–	–	–	–	897	–	K4	DS831
	33 x 33	–	–	–	–	1292, 1600	780, 844, 880, 961, 982, 1004, 1020, 1023,1024	589, 613	K4, T3, K5, J7, J3	DS831
	35 x 35	–	–	–	–	1215, 1292, 1302, 1330, 1351, 1378, 1413, 1636, 1686, 1713, 1738, 1764, 1822, 1845	677, 777, 817, 825, 830, 836, 857, 869, 900, 924, 931, 960, 962, 972, 976, 1008, 1068, 1089,1106, 1112, 1122, 1136, 1144, 1147, 1148, 1152, 1153, 1155, 1156	388	K4, T3, J7, J3	DS831

Full array ball counts (ball count shown indicates maximum package size produced to date)

Automotive capability available on most packages.
Packages are not shown actual size and are a representation of available packages. Contact Amkor sales for information on additional products offered.

FCBGA Packages (Cont.) – Package Dimensions (mm)

Sample	Body Size	Lead Count and Pitch							Factory	Data Sheet #
		0.4 mm	0.5 mm	0.65 mm	0.7 mm	0.8 mm	1 mm	1.27 mm		
FCBGA	37.5 x 37.5	–	–	–	2152, 2228	1633, 2025	876, 900, 1089, 1112, 1148, 1211, 1256, 1262, 1274, 1284, 1288, 1292, 1295, 1296, 1311, 1365,1369, 1435	784	K4, T3, K5, J7	DS831
	40 x 25	–	–	–	–	–	932	–	T3	DS831
	40 x 40	–	–	–	2904	–	792, 1121, 1144, 1152, 1157, 1248, 1344, 1358, 1377, 1384, 1413, 1420, 1433, 1435, 1444,1445, 1497, 1508, 1509, 1510, 1513, 1517, 1520, 1521	717, 900, 956	K4, T3, K5, J7	DS831
	42.5 x 42.5	–	–	–	–	–	1152, 1189, 1208, 1244, 1252, 1308, 1357, 1433, 1461, 1517, 1521, 1605, 1608,1632, 1648, 1657, 1661, 1668, 1671, 1677, 1680, 1681, 1738, 1759, 1760, 1764	652, 1072, 1085	K4, T3, K5, J7	DS831
	44 x 44	–	–	–	–	–	1837	–	K4	DS831
	45 x 45	–	–	–	–	–	1041, 1517, 1680, 1713, 1724, 1728, 1747, 1760, 1762,1825, 1831, 1837, 1848, 1876, 1894, 1896, 1912, 1916, 1924, 1926, 1932, 1935, 1936	–	K4, T3	DS831
	47 x 47	–	–	–	–	–	2076	–	K4	DS831
	47.5 x 47.5	–	–	–	–	2824	2003, 2013, 2097, 2112, 2115, 2116	–	K4, T3, K5, J7	DS831
	50 x 50	–	–	–	–	–	1979, 2253, 2303, 2319, 2361, 2368, 2381, 2389, 2397, 2401	–	K4, T3	DS831
	52.5 x 45	–	–	–	–	–	–	1345, 1355	T3	DS831
	52.5 x 52.5	–	–	–	–	–	2511, 2572, 2577, 2589, 2597, 2601	–	K4, T3	DS831
	53 x 53	–	–	–	–	–	2700	–	K4	DS831
	55 x 55	–	–	–	–	–	2693, 2738, 2770,2782, 2796, 2797, 2798, 2809, 2816 2828, 2840, 2852, 2855, 2856, 2864, 2868, 2876, 2879, 2882, 2887, 2892, 2912, 2915, 2916	1668, 1764	K4, K5, T3	DS831
	57.5 x 57.5	–	–	–	–	–	3107, 3136	–	K4	DS831
	60 x 60	–	–	–	–	–	2460, 3291, 3342, 3389, 3439, 3441, 3452, 3477, 3481	–	K4, T3	DS831
	62.5 x 62.5	–	–	–	–	–	3582, 3629, 3645, 3746, 3806, 4016, 4140	–	K4	DS831
	65 x 65	–	–	–	–	–	4096	–	K4	DS831
	55 x 72	–	–	–	–	–	1929, 2079	–	K4	DS831
	56 x 66	–	–	–	–	–	3454	–	K4	DS831
	67.5 x 67.5	–	–	–	–	–	4344	–	K5	DS831
	77 x 67	–	–	–	–	4926 (0.87 mm; LGA)	–	–	K5	DS831
	85 x 85	–	–	–	–	–	–	2200	K4	DS831

FCBGA

Full array ball counts (ball count shown indicates maximum package size produced to date)

Automotive capability available on most packages.
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Stacked CSP (SCSP) Packages – Package Dimensions (mm)

Sample	Body Size	Lead Count and Pitch											Factory	Data Sheet #
		0.4 mm	0.5 mm	0.6 mm	0.65 mm	0.75 mm	0.8 mm	0.9 mm	1 mm	1.20 mm	1.27 mm	2 mm		
Stacked CSP	3 x 3	–	25	–	–	–	–	–	–	–	–	–	K4	DS573
	3.5 x 3.5	–	48, 49	–	–	–	–	–	–	–	–	–	K4	DS573
	4 x 4	81	41, 48	–	–	–	–	–	–	–	–	–	K4	DS573
	4.5 x 4.5	–	40, 60	–	–	–	–	–	–	–	–	–	K4	DS573
	5 x 5	97	56, 64, 65, 72, 76, 77, 81	–	49	–	–	–	–	–	–	–	K4	DS573
	5 .7 x 9.3			–		–	26	–	–	–	–	–	C3	DS573
	6 x 6	140	64, 76, 84, 96, 97, 100, 121		49, 64	–	–	–	–	–	–	–	K4	DS573
	6 x 8	181	–	–	–	54	63	–	48	–	–	–	K4	DS573
	6.2 x 7.2	–	96	–	–	–	–	–	–	–	–	–	K4	DS573
	6.5 x 8	–	–	–	–	–	67	–	–	–	–	–	C3	–
	6.5 x 11	–	–	–	–	–	67	–	–	–	–	–	C3	DS573
	6.6 x 6.9	–	105	–	–	–	–	–	–	–	–	–	K4	DS573
	7 x 7	209, 211	84, 117, 121, 143, 144, 160, 169	98	64, 81, 84	81	49	–	–	–	–	–	C3, K4	DS573
	7 x 10	–	52, 210	–	–	–	81	–	–	–	–	–	C3	DS573
	7.5 x 7.5	210	–	–	–	–	–	–	–	–	–	–	K4	DS573
	8 x 8	252	113, 120, 128, 160, 161, 176,196, 208, 225	–	105, 140	92, 100	64	–	–	–	–	–	C3, K4	DS573
	8 x 9	–	153	–	130	–	–	–	–	–	–	–	K4	DS573
	8 x 9.2	–	44	–	–	–	–	–	–	–	–	–	K4	DS573
	8 x 10	–	–	–	130	–	–	–	–	–	–	–	–	–
	8 x 11	–	–	–	–	–	56, 88	–	–	–	–	–	C3, K4	DS573
	8 x 11.6	–	–	–	–	–	73	–	–	–	–	–	K4	DS573
	8 x 12	–	–	–	–	–	66,67 ,74	–	44	–	–	–	K4	DS573
	9 x 7	–	–	–	–	–	56	–	–	–	–	–	K4	DS573
	9 x 9	296	128, 204, 216, 225, 236	–	124, 144, 160	121	81, 100	–	–	–	–	–	K4	DS573
	9 x 11	–	–	–	165	–	63, 103, 105	–	–	–	–	–	C3, K4	DS573
	9 x 12	–	–	–	132, 192	–	107, 130	–	–	–	–	–	–	–
	9 x 13.3	–	315	–	–	–	–	–	–	–	–	–	–	DS573
	10 x 10	360, 387	173, 180, 216, 259, 268, 328, 345	–	196	144	100, 121, 128, 144	–	409	–	–	–	C3, K4	DS573
	10 x 11	–	153	–	–	–	63	–	–	–	–	–	–	–
	10 x 12	–	–	–	–	–	79, 88	–		–	–	–	K4	DS573
	10 x 13	–	–	–	–	–	63	–	64	–	–	–	C3	DS573
	10 x 13.5	–	–	–	–	–	149	–	–	–	–	–	J3	DS573
	10 x 14	–	–	–	–	–	96	–	–	–	–	–	K4	DS573
	10.5 x 10.5	–	316	–	–	–	–	–	–	–	–	–	K4	DS573
	10.5 x 13	–	–	–	–	–	107, 137	–	–	–	–	–	C3, K4	DS573
	11 x 8	–	133	–	–	–	72, 88, 107, 133	–	–	–	–	–	K4	DS573
	11 x 10	–	153	–	–	–	–	–	–	–	–	–	C3	DS573
	11 x 11	432	225, 256	–	200	–	144, 169	–	468	–	–	–	K4	DS573
	11 x 11.5	–	–	–	134	–	–	–	–	–	–	–	K4	DS573
	11 x 13	–	153	–	–	–	105, 135	–	–	–	–	–	C3, K4	DS573
	11 x 13.5	–	–	–	162	–	–	–	–	–	–	–	K4	DS573
	11 x 14	–	–	–	225	–	–	–	–	–	–	–	–	DS573
	11.5 x 11.5	–	–	–	134	–	–	–	–	–	–	–	K4	DS573
	11.5 x 13	–	153, 162, 221	–	134	–	–	–	–	–	–	–	C3, K4	DS573
	11.5 x 13.04	–	153	–	–	–	–	–	–	–	–	–	C3	DS573
	11.8 x 14.6	–	–	–	–	–	110	70	–	–	–	–	C3	DS573

Stacked CSP

Automotive capability available on most packages.
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Stacked CSP (SCSP) Packages (Cont.) – Package Dimensions (mm)

Sample	Body Size	Lead Count and Pitch											Factory	Data Sheet #
		0.4 mm	0.5 mm	0.6 mm	0.65 mm	0.75 mm	0.8 mm	0.9 mm	1 mm	1.20 mm	1.27 mm	2 mm		
Stacked CSP	12 x 12	216	168, 228, 260, 272, 277, 289, 318, 385	–	208	–	117, 128, 144, 160, 161, 168, 179, 196	–	–	–	–	–	C3, K4	DS573
	12 x 16	–	132, 169	–	–	–	224	–	–	–	–	–	K4	DS573
	12 x 17	–	–	–	–	–	–	–	–	–	–	60	K4	DS573
	12 x 17	–	–	–	–	–	–	–	60	–	–	–	C3	DS573
	12 x 17	–	–	–	–	–	110	–	–	–	–	–	C3	DS573
	12 x 18	–	169	–	199	–	100, 224	–	132	–	–	–	K4	DS573
	12 x 18	–	–	–	–	–	252	–	–	–	–	–	C3	DS573
	13 x 13	–	289, 325, 341, 401, 417	–	294	–	225	–	144	–	–	–	K4	DS573
	14 x 14	270	220, 240, 348, 409, 516	–	151, 152, 300	–	134	–	–	–	–	–	C3, K4	DS573
	14 x 17.2	–	–	–	–	–	–	–	–	16	–	–	C3	DS573
	14 x 18	–	169	–	–	–	52, 53, 152	–	100, 152	–	–	52	K4	DS573
	14 x 18	–	–	–	–	–	272	–	–	–	–	–	C3	DS573
	14 x 22	–	–	–	–	–	–	–	–	–	119	–	K4	DS573
	15 x 15	–	543	–	160, 272	–	208, 255, 289	–	196	–	–	–	K4	DS573
	16 x 20	–	–	–	–	–	291	–	–	–	–	–	C3	DS573
	17 x 17	–	–	–	–	–	208, 256	–	256	–	–	–	K4	DS573
	19 x 19	–	–	–	–	–	361, 484	–	260, 324	–	–	–	K4	DS573

fcTMV® Packages – Nominal Package Dimensions (mm)

Sample	Body Size	TMV® Qty	BGA Qty	TMV® Diameter	BGA Diameter	Pitch – TMV®/BGA	Package Height	Factory	Data Sheet #
fcTMV®	10 x 6	136	180	0.23	0.25	0.40/0.50	0.66	K4	–
	12 x 13	320	858	0.27	0.21	0.40/0.40	0.60	K4	–
	12 x 12	216	569	0.25	0.25	0.40/0.40	1.15	K4	–
	12 x 12	216	745	0.27	0.25	0.40/0.57	0.78	K4	–
	14 x 14	256	1031	0.25	0.25	0.40/0.40	0.73	K4	–
	17 x 17	42	272 (LGA)	0.80	0.35 (LGA)	1.10/0.77 (LGA)	0.82	K4	–
	12 x 12	168	263	0.33	0.25	0.50/0.65	0.70	K4	–
	12 x 12	168	515	0.28	0.26	0.50/0.40	0.71	K4	–
	14 x 14	152	515	0.30	0.30	0.65/0.50	0.99	K4	–
	12 x 12	216	547	0.25	0.26	0.40/0.40	0.9	K4	–

*Simulated results @ 100 MHz

Interposer PoP Packages – Nominal Package Dimensions (mm)

Sample	Body Size	Memory Lead Qty	CCB Qty	BGA Qty	BGA Raw Diameter	Package Height (max)	Pitch – Memory Interface/ CCB/BGA	Factory	Data Sheet #
Interposer PoP	16 x 16	216	216 (solder ball to solder ball)	1400	0.22	1.25	0.40/0.40/0.40	K4	DS840
	12.4 x 14	496	314	1099	0.205	0.56	0.40/ 0.27/0.35	K4	DS840
	12.4 x 12.7	556	276	1017	0.205	0.56	0.40/0.27/0.35	K4	DS840
	12.4 x 12.4	556	278	893	0.22	0.58	0.40/0.27/0.35	K4	DS840
	12.4 x 12.4	556	276	914	0.22	0.58	0.40/0.27/0.35	K4	DS840
	12 x 12.7	366	258	885	0.22	0.63	0.40/0.27/0.35	K4	DS840
	15.6 x 15	387	356	994	0.24	0.64	0.50/0.27/0.40	K4	DS840
	15.6 x 15	387	283	1044	0.24	0.67	0.50/0.27/0.40	K4	DS840
	15.2 x 15	527	408	994	0.24	0.67	0.50/0.27/0.50	K4	DS840

Automotive capability available on most packages.
Packages are not shown actual size and are a representation of available packages. Contact Amkor sales for information on additional products offered.

fcCSP Packages – Nominal Package Dimensions (mm)

fcCSP

Sample	Body Size	Lead Count	BGA Size	Ball Count	Package Height	Ball Pitch	Tray Matrix	Units Per Tray	Factory	Package Outline Drawing #	Data Sheet #
	2 x 2.8	24	0.3	24	0.17	0.4	14 x 35	490	C3, K4	744167PO0C	DS577
	2 x 4	32	0.3	32	0.17	0.4	14 x 35	490	C3, K4	718064PO0B	DS577
	2.21 x 3.05	17	N/A	17	N/A	0.5	14 x 35	490	C3, K4	No POD	DS577
	3 x 3	40	0.25	40	1.15 max.	0.4	14 x 35	490	C3, K4	652316PO	DS577
	3 x 7.5	53	0.5	53	1.2	0.5	14 x 26	364	C3, K4	607973PO0A	DS577
	3 x 8	48	0.5	48	1.15	0.65	14 x 26	364	C3, K4	610538PO	DS577
	3.2 x 2.8	21	LGA	21	0.88	0.4	14 x 35	490	C3, K4	421994PO	DS577
	4 x 4	21	LGA	21	0.9	0.5	14 x 35	490	C3, K4	480926PO	DS577
	4.2 x 3.3	44	0.3	44	0.93	0.4	14 x 26	364	C3, K4	N7170-1	DS577
	5 x 5	32	LGA	32 LGA	0.72	0.4	14 x 35	490	P3	795863PO	DS577
	5 x 5	33	LGA	33	0.9	0.5	14 x 35	490	C3, K4	463062PO0A	DS577
	5 x 5	36	LGA	36 LGA	0.72	0.4	14 x 35	490	P3	787208PO	DS577
	5 x 5	39	LGA	36	0.72	0.4	14 x 35	490	C3, K4	6439789PO	DS577
	5 x 5	64	0.3	64	0.88	0.7	N/A	N/A	C3, K4	500693PO0B	DS577
	5 x 5	44	LGA	44	0.72	0.4	14 x 35	490	P3	787184PO	DS577
	5 x 6	53	LGA	53	1.1	0.4	14 x 35	490	C3, K4	411115PO	DS577
	5 x 6	102	0.3	102	0.74	0.5	N/A	N/A	C3, K4	434380PO0A	DS577
	5 x 6	102	0.25	102	0.73	0.452 min.	13 x 31	403	C3, K4	437557PO	DS577
	5 x 7	97	0.25	97	1.00 max.	0.5	14 x 26	364	C3, K4	568933PO	DS577
	5 x 7	136	0.3	136	0.88	0.4	14 x 26	364	C3, K4	VN041-1	DS577
	5.3 x 5.25	36	LGA	36	0.72	0.5	N/A	N/A	C3, K4	477833PO0A	DS577
	5.4 x 6.2	152	0.3	152	0.9	0.4	14 x 26	364	C3, K4	637713PO	DS577
	5.5 x 6.51	NA	0.15	216	0.52	216	12 x 34	408	C3	NT90-PB420-1	DS577
	6 x 6	81	0.3	81	0.85	0.5	13 x 33	429	C3, K4	568993PO	DS577
	6 x 6	105	0.2	105	0.889 max.	0.46/0.65	12 x 29	348	C3, K4	684126PO	DS577
	6 x 6	105	0.3	105	0.92	0.5	14 x 35	490	C3, K4	VN346-1	DS577
	6 x 6	121	0.3	121	0.73	0.5	14 x 35	490	C3, K4	412011PO	DS577
	6 x 6.6	364	NA	NA	1	NA	14 x 26	364	C3, K4	N9650-1	DS577
	6.12 x 6.43	NA	0.22	253	0.6	0.35	11 x 28	308	K4	NT90-PB315-1	DS577
	6.2 x 7.8	196	0.25	196	1.00 max.	0.4	12 x 25	300	C3, K4	358233PO	DS577
	6.5 x 6.5	97	0.25	97	0.77	0.4	10 x 26	260	C3, K4	488013PO	DS577
	6.5 x 6.5	144	0.3	144	1	0.5	N/A	N/A	C3, K4	429130PO0A	DS577
	6.6 x 5.8	56	0.5	56	1.17	0.8	12 x 28	336	C3, K4	656455PO	DS577
	6.6 x 6.6	195	0.3	195	0.8	0.4	N/A	N/A	C3, K4	442617PO0A	DS577
	6.7 x 8	136	0.3	136	1.49	0.5	12 x 25	300	C3, K4	607179PO	DS577
	6.8 x 6.2	90	0.3	90	0.88	0.7	10 x 26	260	C3, K4	481017PO0A	DS577
	6.9 x 7.8	326	0.2	326	0.82 max.	0.4	10 x 26	260	C3, K4	742710PO	DS577
	7 x 7	40	LGA	40	0.97	0.5	10 x 26	260	P3	766847PO	DS577
	7 x 7	64	0.5	64	1.11	0.8	N/A	N/A	C3, K4	487086PO	DS577
	7 x 7	64	0.5	64	1.596	0.8	N/A	N/A	C3, K4	495076PO	DS577
	7 x 7	64	0.5	64	1.506	0.8	N/A	N/A	C3, K4	496907PO	DS577
	7 x 7	191	0.3	191	0.95	0.4	10 x 26	260	C3, K4	VK575-1	DS577
	7 x 7	196	0.3	196	0.88	0.5	10 x 26	260	C3, K4	577133PO	DS577
	7 x 7	256	0.3	256	0.93	0.4	N/A	N/A	C3, K4	429501PO0A	DS577

fcCSP

*Simulated results @ 100 MHz

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fcCSP Packages (Cont.) – Nominal Package Dimensions (mm)

Sample	Body Size	Lead Count	BGA Size	Ball Count	Package Height	Ball Pitch	Tray Matrix	Units Per Tray	Factory	Package Outline Drawing #	Data Sheet #
	7 x 7.5	277	0.3	277	0.82	0.4	12 x 29	348	C3, K4	438217PO	DS577
	7 x 9	208	0.3	208	1	0.4	N/A	N/A	C3, K4	445259PO0A	DS577
	7 x 9	252	0.3	252	0.92	0.5	13 x 25	325	C3, K4	675144PO	DS577
	7.4 x 8.2	302	0.2	302	0.79	0.4	10 x 26	260	C3, K4	757705PO	DS577
	7.5 x 7.5	221	0.3	221	0.82	0.4	10 x 26	260	C3, K4	409303PO	DS577
	7.5 x 8.5	324	0.3	324	0.82	0.4	10 x 26	260	C3, K4	562538PO	DS577
	7.8 x 7.8	251	0.3	251	0.88	0.4	10 x 26	260	C3, K4	N2703-1	DS577
	8 x 6.5	53	LGA	50	1.1	0.4	10 x 26	260	C3, K4	476666PO	DS577
	8 x 8	69	0.8	69	2.91	0.8	10 x 26	260	C3, K4	87180PO	DS577
	8 x 8	165	0.3	165	0.76	0.5	12 x 29	348	C3, K4	638236PO	DS577
	8 x 8	188	0.3	188	0.9	0.5	N/A	N/A	C3, K4	492338PO	DS577
	8 x 13	135	0.46	135	2.36	0.8	N/A	N/A	C3, K4	670744PO	DS577
	8 x 13.5	253	0.5	253	1.32	0.5/0.6	10 x 17	170	C3, K4	468833PO	DS577
	8.1 x 8.1	157	0.3	157	0.99	0.5	10 x 26	260	C3, K4	604909PO	DS577
	8.4 x 9.2	NA	0.22	506	0.81	0.35	9 x 24	216	K4	734426PO	DS577
	8.5 x 10.5	479	0.2	479	0.8	0.4	22 x 10	220	C3, K4	647400PO	DS577
	8.5 x 11	269	0.3	269	0.84	0.5	10 x 21	210	C3, K4	497854PO	DS577
	8.6 x 7.7	76	0.4	76	0.94	0.8	12 x 28	336	C3, K4	559715PO	DS577
	8.8 x 8.8	176	0.3	176	0.88	0.7	10 x 26	26	C3, K4	NT90-Y5378-1	DS577
	9 x 9	256	0.3	256	0.90	0.5	10 x 26	260	P3	613775PO	DS577
	9.5 x 7.5	314	0.3	314	0.84 ± 0.10	0.4	10 x 21	210	C3, K4	472295PO0D	DS577
	10 x 10	69	0.5	69	1.16	1	8 x 23	184	C3, K4	443458PO	DS577
	10 x 10	69	1	69	2.91	1	8 x 23	184	C3, K4	303399PO	DS577
	10 x 10	116	0.3	116	1.05	0.8	N/A	N/A	C3, K4	406269PD0A	DS577
	10 x 10	144	0.46	144	1.91	0.8	8 x 21	168	C3, K4	464793PO	DS577
	10 x 10	144	0.5	144	1.4	0.8	8 x 23	184	C3, K4	686544PO	DS577
	10 x 10	235	0.3	235	0.86 ± 0.10	0.5	8 x 23	184	C3, K4	431863PO0A	DS577
	10 x 10	284	0.3	284	0.98	0.5	8 x 21	168	C3, K4	344519PO	DS577
	10 x 10	297	0.3	297	1	0.5	8 x 21	168	C3, K4	N3944-1	DS577
	10 x 10	391	0.3	391	1	0.4	8 x 23	184	C3, K4	611696PO	DS577
	10 x 10	424	0.25	424	0.95 max.	0.4	8 x 21	168	C3, K4	438402PO	DS577
	10 x 10	454	N/A	454	N/A	0.4	8 x 21	168	C3, K4	No POD	DS577
	10 x 10	521	0.3	521	0.86 ± 0.10	0.4	8 x 21	168	C3, K4	451777PO0B	DS577
	10 x 10.5	268	0.3	268	0.86 ± 0.10	0.5	8 x 20	160	C3, K4	461677PO0A	DS577
	10.6 x 10.6	54	0.45	54	0.85	0.65	8 x 21	168	C3, K4	715264PO	DS577
	10.7 x 10.7	337	0.2	337	0.889 max.	0.46/0.65	9 x 21	189	C3, K4	617598PO	DS577
	10.9 x 10.9	469	0.3	469	0.9	0.4	8 x 21	168	C3, K4	636373PO	DS577
	10.9 x 10.9	469	0.3	469	0.9	0.4	8 x 21	168	C3, K4	710371PO	DS577
	11 x 8	300	0.3	300	0.84	0.4	N/A	N/A	C3, K4	439355PO0A	DS577
	11 x 11	169	0.4	169	0.85	0.8	8 x 22	176	C3, K4	679034PO	DS577
	11 x 11	325	0.3	325	0.91	0.5	8 x 22	176	C3, K4	583696PO	DS577
	11 x 11	361	0.3	361	0.89	0.5	8 x 22	176	C3, K4	695725PO	DS577
	11 x 11	576	0.3	576	1.05	0.4	8 x 22	176	C3, K4	N2970-1	DS577

*Simulated results @ 100 MHz

Automotive capability available on most packages.
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fcCSP Packages (Cont.) – Nominal Package Dimensions (mm)

Sample	Body Size	Lead Count	BGA Size	Ball Count	Package Height	Ball Pitch	Tray Matrix	Units Per Tray	Factory	Package Outline Drawing #	Data Sheet #
	11 x 11.8	599	0.25	599	0.90 max.	0.4	8 x 21	168	K4	850159PO	DS577
	11 x 11.8	566	0.25	599	0.90 max.	0.4	8 x 21	168	K4	824554PO	DS577
	11 x 13.5	325	0.3	325	1.06	0.5	8 x 17	136	C3, K4	606183PO	DS577
	11.7 x 11.6	539	0.3	539	0.9	0.4	9 x 21	189	C3, K4	558280PO	DS577
	11.7 x 11.7	492	0.3	492	0.9	0.4	9 x 21	189	C3, K4	640560PO	DS577
	11.8 x 11	491	0.25	491	0.90 max.	0.4	8x21	168	K4	816866PO	DS577
	11.8 x 12.2	680	0.25	680	0.90 max.	0.4	8x19	152	K4	814369PO0A	DS577
	12 x 12	121	0.5	121	1.51	1	8 x 21	168	C3, K4	339265PO	DS577
	12 x 12	121	0.6	121	1.82	1	8 x 19	152	C3, K4	408392PO	DS577
	12 x 12	121	0.6	121	2.09 max.	1	9 x 21	189	C3, K4	613853PO	DS577
	12 x 12	121	0.64	121	2.57	1	8 x 20	160	C3, K4	585453PO	DS577
	12 x 12	288	0.3	288	1.30 max.	0.67	8 x 20	160	C3, K4	434097PO	DS577
	12 x 12	424	0.3	424	1.05	0.5	9 x 21	189	C3, K4	VB699-2	DS577
	12 x 12	424	0.3	424	1.05	0.5	9 x 21	189	C3, K4	VB699-5	DS577
	12 x 12	425	0.3	425	1.05	0.5	N/A	N/A	C3, K4	491076PO	DS577
	12 x 12	488	0.3	488	0.96	0.4	8 x 21	168	C3, K4	697685PO	DS577
	12 x 14	821	0.3	821	0.94	0.4	7 x 20	140	C3, K4	685510PO	DS577
	12.1 x 13.3	597	0.3	597	0.9	0.4	7 x 17	117	C3, K4	629993PO	DS577
	12.2 x 9.8	486	0.25	486	1.00 max.	0.4	8 x 24	192	C3, K4	360006PO	DS577
	12.6 x 12.6	669	0.25	669	1.00 max.	0.4	8 x 19	152	C3, K4	359715PO	DS577
	13 x 10	517	0.3	517	1.673	0.5	8 x 24	192	C3, K4	548093PO	DS577
	13 x 13	144	0.5	144	1.51	1	8 x 20	160	C3, K4	452287PO	DS577
	13 x 13	225	0.46	225	1.89 max.	0.8	8 x 20	160	C3, K4	481847PO	DS577
	13 x 13	357	0.4	357	1.62	0.7	7 x 17	119	C3, K4	500908PO0C	DS577
	13 x 13.4	771	0.25	771	0.90 max.	0.4	7 x 17	119	K4	802710PO0B	DS577
	13 x 13.4	873	0.25	873	0.90 max.	0.4	7 x 17	119	C3, K4	751666PO	DS577
	13.3 x 12.1	570	0.3	570	0.9	0.4	7 x 20	140	C3, K4	591657PO	DS577
	13.3 x 12.1	570	0.3	570	0.9	0.4	7 x 20	140	C3, K4	654178PO	DS577
	13.3 x 12.1	600	0.3	600	0.9	0.4	7 x 20	140	C3, K4	710373PO	DS577
	13.8 x 13.8	288	0.5	288	1.62	0.7	7 x 17	119	C3, K4	NT90-NH568-1	DS577
	13.9 x 12.3	255	0.4	255	1.29 max.	0.8	7 x 17	119	C3, K4	446695PO	DS577
	14 x 12	720	0.3	720	0.15	0.4	8 x 17	136	C3, K4	769163PO0A	DS577
	14 x 12	727	0.3	727	0.15	0.4	8 x 17	136	C3, K4	NT90-P1720-1-rev-A	DS577
	14 x 12	760	0.3	760	0.96	0.4	8 x 17	136	C3, K4	700025PO	DS577
	14 x 14	617	0.3	617	1.21	0.5	7 x 17	119	C3, K4	465801PO	DS577
	14 x 14	617	0.3	617	0.91	0.5	7 x 17	119	C3, K4	473925PO	DS577
	14 x 14	625	0.3	625	0.98	0.5	7 x 17	119	C3, K4	751921PO	DS577
	15 x 15	195	0.6	195	1.8	1	7 x 18	126	C3, K4	607829PO	DS577
	15 x 15	484	0.4	484	1.22 max.	0.65	7 x 17	119	C3, K4	617815PO	DS577
	15 x 15	990	N/A	990	N/A	0.4/0.5	7 x 18	126	C3, K4	No POD	DS577
	15 x 15	992	N/A	992	N/A	0.4	7 x 17	119	C3, K4	No POD	DS577
	16 x 16	536	0.3	536	1.35	0.5	6 x 15	90	C3, K4	637699PO	DS577
	17 x 17	358	0.46	358	1.7 max.	0.8	N/A	N/A	C3, K4	358903PO	DS577

fcCSP

*Simulated results @ 100 MHz

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fcSCSP Packages – Nominal Package Dimensions (mm)

	Sample	Body Size	Lead Count	BGA Size	Ball Count	Package Height	Ball Pitch	Tray Matrix	Units Per Tray	Factory	Package Outline Drawing #	Data Sheet #	
fcSCSP	Amkor fcSCSP	6.7 x 4	110	0.25	110	1.26	0.4	11 x 35	385	C3, K4	658535PO	DS577	fcSCSP
		7.2 x 7.2	736	0.135	736	0.6	0.35	10 x 24	240	K4	NT90-PC105-1	DS577	
		7.2 x 7.4	347	0.135	347	0.6	0.35	10 x 26	260	K4	NT90-P6103-1	DS577	
		7.6 x 7.8	385	0.135	385	0.65	0.35	10 x 24	240	K4	NT90-P0194-1	DS577	
		8.6 x 8.2	333	0.25	333	1.00 max.	0.4	10 x 26	260	C3, K4	487887PO	DS577	
		9 x 9	383	0.25	383	1.11 max.	0.4	10 x 26	260	C3, K4	446263PO	DS577	
		9 x 8.2	441	N/A	441	N/A	0.35	10 x 26	260	C3, K4	No POD	DS577	
		8.6 x 8.4	443	0.195	443	0.75 max.	0.35	9 x 23	207	C3, K4	638413PO	DS577	
		9.9 x 8.6	460	0.25	460	0.65 max.	0.4	8 x 22	176	C3, K4	612182PO	DS577	
		11 x 11.4	852	0.18	852	0.66	0.35	8 x 20	160	K4	0850865PO	DS577	
		12 x 12	640	0.25	640	1.08	0.4	9 x 21	189	C3, K4	690104PO	DS577	
		13 x 11.5	775	N/A	775	N/A	0.35/0.65	8 x 21	168	C3, K4	No POD	DS577	

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Leadframe Packages

Leadframe packages have been an industry standard for many years. Two of Amkor's most popular traditional leadframe package types are Small Outline Integrated Circuit (SOIC) and Quad Flat Package (QFP), also commonly known as "dual" and "quad" products, respectively, based upon the number of sides from which the leads extend.

Leadframe packages use wirebond or flip chip technology to interconnect a die to a leadframe package carrier. Leadframe packages are used in many electronic devices and remain the most practical and cost-effective solution for many low to medium pin count applications.

Dual packages are common in memory, analog ICs and microcontrollers found in consumer and automotive products. These packages provide an assortment of packaging capabilities, especially in low pin count devices, at competitive manufacturing costs.

Quad packages are extensively used in ASICs, DSPs, microcontrollers and memory ICs. A wide range of open and closed tools in quad packages offer low cost and reliable solutions for moderate and low pin count ICs.

*Micro*LeadFrame® QFN packages are near CSP plastic encapsulated packages with a copper leadframe substrate. This package uses perimeter leads on the bottom of the package to provide electrical contact to the PWB and offers ExposedPad technology as a thermal enhancement. In addition to excellent thermal and electrical performance, MLF® packages are an ideal choice for any application where size, weight and package performance are a factor.

To further improve the robustness of the MLF® package design, Edge Protection™ technology has been developed that protects the edges of the device during handling operations such as test and Surface Mount Assembly (SMA).

In addition, a saw step cut process for enabling wettable flanks is available and flexible in application to the MLF®/QFN/DFN body size variations. With multiple wettable flank options to choose from, all will enable the formation of a solder fillet suitable for automotive Automated Optical Inspection (AOI) post-PCB assembly.

SSOP/QSOP Packages – Nominal Package Dimensions (inches unless otherwise specified)

	Sample	Lead Count	Body Width	Body Length	Body Thickness	Standoff	Overall Height	Lead Pitch	Tip-to-Tip	JEDEC	Electrical Performance*					Factory	Package Outline Drawing #	Data Sheet #	
											Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)				
SSOP		14/16	5.3 mm (209 mil)	6.2 mm	1.73 mm	0.13 mm	1.86 mm	0.65 mm	7.80 mm	MO-150	–	–	–	–	–	P1	32289	DS360	SSOP
SSOP		20	5.3 mm (209 mil)	7.2 mm	1.73 mm	0.13 mm	1.86 mm	0.65 mm	7.80 mm	MO-150	3.9 x 5.4	Longest Shortest	2.260 0.958	0.395 0.209	19.0 9.10	P1	32289	DS360	SSOP
SSOP		24	5.3 mm (209 mil)	8.2 mm	1.73 mm	0.13 mm	1.86 mm	0.65 mm	7.80 mm	MO-150	–	–	–	–	–	P1	32289	DS360	SSOP
SSOP		28	5.3 mm (209 mil)	10.2 mm	1.73 mm	0.13 mm	1.86 mm	0.65 mm	7.80 mm	MO-150	3.9 x 5.1	Longest Shortest	2.510 0.928	0.463 0.206	21.5 9.57	P1	32289	DS360	SSOP
QSOP		16	0.150	0.194	0.058	0.006	0.064	0.025	0.236	MO-137	–	–	–	–	–	P1	32864	DS360	QSOP

*Simulated results @ 100 MHz

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TSSOP/MSOP Packages – Nominal Package Dimensions (mm)

	Sample	Lead Count	Body Width	Body Length	Body Thickness	Standoff	Overall Height	Lead Pitch	Tip-to-Tip	JEDEC	Electrical Performance*					Factory	Package Outline Drawing #	Data Sheet #
											Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)			
TSSOP		8	4.4	3.0	0.90	0.10	1.00	0.65	6.4	MO-153	–	Longest Shortest	1.470 0.725	0.224 0.177	13.7 7.5	P1	38118	DS350
TSSOP		14	4.4	5.0	0.90	0.10	1.00	0.65	6.4	MO-153	–	–	–	–	–	P1	38118	DS350
TSSOP		16	4.4	5.0	0.90	0.10	1.00	0.65	6.4	MO-153	–	–	–	–	–	P1	38118	DS350
TSSOP		20	4.4	6.5	0.90	0.10	1.00	0.65	6.4	MO-153	–	–	–	–	–	P1	38118	DS350
TSSOP		28	4.4	9.7	0.90	0.10	1.00	0.65	6.4	MO-153	–	Longest Shortest	2.100 0.713	0.368 0.180	16.1 6.8	P1	38118	DS350
TSSOP		38	4.4	9.7	0.90	0.10	1.00	0.50	6.4	MO-153	–	–	–	–	–	P1	38118	DS350
MSOP		8	3.0	3.0	0.85	0.10	0.95	0.65	5.0	MO-187	–	–	–	–	–	P1	37830	DS350
MSOP		10	3.0	3.0	0.85	0.10	0.95	0.50	5.0	MO-187	–	–	–	–	–	P1	37830	DS350

*Simulated results @ 100 MHz

SOIC Packages – Nominal Package Dimensions (inches)

	Sample	Lead Count	Body Width	Body Length	Body Thickness	Standoff	Overall Height	Lead Pitch	Tip-to-Tip	JEDEC	Electrical Performance*					Factory	Package Outline Drawing #	Data Sheet #
											Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)			
SOIC Narrow		8	0.150	0.194	0.058	0.006	0.064	0.050	0.236	MS-012	–	–	–	–	–	P1	00019	DS370
SOIC Narrow		14	0.150	0.342	0.058	0.006	0.064	0.050	0.236	MS-012	–	–	–	–	–	P1	00019	DS370
SOIC Narrow		16	0.150	0.391	0.058	0.006	0.064	0.050	0.236	MS-012	–	–	–	–	–	P1	00019	DS370
SOIC Wide		16	0.300	0.407	0.092	0.009	0.101	0.050	0.406	MS-013	–	–	–	–	–	P1	00020	DS370
SOIC Wide		20	0.300	0.505	0.092	0.009	0.101	0.050	0.406	MS-013	–	–	–	–	–	P1	00020	DS370

*Simulated results @ 100 MHz

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ExposedPad TSSOP/MSOP/SOIC/SSOP Packages – Nominal Package Dimensions (mm)

	Sample	Lead Count	Body Width	Body Length	Body Thickness	Standoff	Overall Height	Lead Pitch	Tip-to-Tip	JEDEC	Electrical Performance*			Factory	Package Outline Drawing #	Data Sheet #
											Pad Size (mm)	Center Inductance (nH)	Corner Inductance (nH)			
ePad TSSOP		8	4.4	3.0	0.90	0.10	1.00	0.65	6.40	MO-153	–	–	–	P1	38118	DS571
ePad TSSOP		14	4.4	5.0	0.90	0.10	1.00	0.65	6.40	MO-153	–	–	–	P1	38118	DS571
ePad TSSOP		16	4.4	5.0	0.90	0.10	1.00	0.65	6.40	MO-153	3.0 x 3.0	1.58	2.28	P1	38118	DS571
ePad TSSOP		20	4.4	6.5	0.90	0.10	1.00	0.65	6.40	MO-153	3.0 x 4.2	1.68	2.45	P1	38118	DS571
ePad TSSOP		28	4.4	9.7	0.90	0.10	1.00	0.65	6.40	MO-153	3.0 x 5.5	1.70	2.65	P1	38118	DS571
ePad TSSOP		38	4.4	9.7	0.90	0.10	1.00	0.50	6.40	MO-153	–	–	–	P1	38118	DS571
ePad MSOP		8	3.0	3.0	0.85	0.10	0.95	0.65	5.00	MO-187	1.73 x 2.39	1.50	2.20	P1	37830	DS571
ePad MSOP		10	3.0	3.0	0.85	0.10	0.95	0.50	5.00	MO-187	–	–	–	P1	37830	DS571
ePad SOIC		8	3.9	4.9	1.47	0.05	1.52	1.27	6.00	MS-012	–	–	–	P1	50396	DS571
ePad SOIC		16	3.9	9.9	1.47	0.05	1.52	1.27	6.00	MS-012	–	–	–	P1	50396	DS571
ePad SSOP		36	7.6	10.3	2.28	0.05	2.45	0.50	10.40	MO-271	–	–	–	P1	469970	DS571

*Simulated results @ 100 MHz

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LQFP Packages – Nominal Package Dimensions (mm)

Sample	Body Size	Lead Count	Body Thickness	Lead Pitch	Lead Form	Standoff	Foot Length	Tip-to-Tip	JEDEC	Tray Matrix	Units Per Tray	Electrical Performance* Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)	Factory	Package Outline Drawing #	Data Sheet #
	7 x 7	32	1.4	0.8	1	0.1	0.6	9	MS-026	10 x 25	250	5 x 5	Longest Shortest	0.904 0.799	0.211 0.202	9.2 7.8	P1, J3	34604/ JMD3S072286	DS232
	7 x 7	48	1.4	0.5	1	0.1	0.6	9	MS-026	10 x 25	250	5 x 5	Longest Shortest	1.110 0.962	0.225 0.200	13.8 12.0	P1, J3, J5	34604/ JMD4S071223	DS232
	7 x 7	64	1.4	0.4	1	0.1	0.6	9	MS-026	10 x 25	250	–	–	–	–	–	P1, J5	34604/ JMD3S072288	DS232
	10 x 10	44	1.4	0.8	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1, J5	34607/ JMD3S072296	DS232
	10 x 10	52	1.4	0.65	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1, J5	34607/ JMD3S072289	DS232
	10 x 10	64	1.4	0.5	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1, J3, J5	34607/ JMD4S071225	DS232
	10 x 10	80	1.4	0.4	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	J3	34607/ JMD3S072302	DS232
	12 x 12	64	1.4	0.65	1	0.1	0.6	14	–	7 x 17	119	–	–	–	–	–	J5	JMD3S072290	DS232
	12 x 12	80	1.4	0.5	1	0.1	0.6	14	MS-026	7 x 17	119	–	–	–	–	–	P1, J3, J5	51023/ JMD3S072297	DS232
	12 x 12	100	1.4	0.4	1	0.1	0.6	14	–	7 x 17	119	–	–	–	–	–	J5	51023	DS232
	14 x 14	52	1.4	1	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1	–	DS232
	14 x 14	64	1.4	0.8	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1	473945	DS232
	14 x 14	80	1.4	0.65	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1, J5	473945/ JMD3S072292	DS232
	14 x 14	100	1.4	0.5	1	0.1	0.6	16	MS-026	6 x 15	90	8 x 8	Longest Shortest	2.300 1.520	0.419 0.322	26.3 17.8	P1, J3, J5	473945/ JMD4S072050	DS232
	14 x 14	120	1.4	0.4	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1, J3, J5	473945/ JMD3S072293/ JMD3S072298	DS232
	14 x 14	128	1.4	0.4	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1, J5	473945/ JMD3S072293/ JMD3S072298	DS232
	16 x 16	120	1.4	0.5	1	0.1	0.6	18	–	6 X 15	90	–	–	–	–	–	J5	JMD3S072294	DS232
	16 x 16	144	1.4	0.4	1	0.1	0.6	18	–	6 X 15	90	–	–	–	–	–	J5	JMD3S072295	DS232
	14 x 20	128	1.4	0.5	1	0.1	0.6	16.0 x 22.0	MS-026	6 x 12	72	–	–	–	–	–	J3	JMD3S072304	DS232
	20 x 20	128	1.4	0.5	1	0.1	0.6	22	MS-026	5 x 12	60	–	–	–	–	–	P1	473996	DS232
	20 x 20	144	1.4	0.5	1	0.1	0.6	22	MS-026	5 x 12	60	8.5 x 8.5	Longest Shortest	6.430 4.230	1.100 1.070	62.9 52.6	P1, J4, J3, J5	473996/ JMD3S072299	DS232
	20 x 20	176	1.4	0.4	1	0.1	0.6	22	MS-026	5 x 12	60	–	–	–	–	–	P1, J3, J5	473996/ JMD3S072300	DS232
	24 x 24	160	1.4	0.5	1	0.1	0.6	26	MS-026	4 x 10	40	–	–	–	–	–	P1	32780	DS232
	24 x 24	176	1.4	0.5	1	0.1	0.6	26	MS-026	4 x 10	40	8 x 8	Longest Shortest	9.510 5.200	1.270 1.340	89.0 64.0	P1, J4, J3, J5	32780/ JMD3S072301	DS232
	24 x 24	216	1.4	0.4	1	0.1	0.6	26	MS-026	4 x 10	40	–	–	–	–	–	P1, J4, J3	32780/ JMD3S072310	DS232
	28 x 28	208	1.4	0.5	1	0.1	0.6	30	MS-026	4 x 9	36	11 x 11	Longest Shortest	9.670 6.190	1.380 1.210	86.2 64.8	P1, J4	34514/ JMD3S072311	DS230, DS232
	28 x 28	256	1.4	0.4	1	0.1	0.6	30	MS-026	4 x 9	36	–	–	–	–	–	P1, J4	34514/ JMD3S072312	DS230, DS232

*Simulated results @ 100 MHz

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TQFP Packages – Nominal Package Dimensions (mm)

Package	Sample	Body Size	Lead Count	Body Thickness	Lead Pitch	Lead Form	Standoff	Foot Length	Tip-to-Tip	JEDEC	Tray Matrix	Units Per Tray	Electrical Performance*: Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)	Factory	Package Outline Drawing #	Data Sheet #
TQFP		5 x 5	32	1.0	0.5	1	0.1	0.6	7	MS-026	12 x 30	360	–	–	–	–	–	P1	40138	DS230
TQFP		7 x 7	32	1.0	0.8	1	0.1	0.6	9	MS-026	10 x 25	250	5 x 5	Longest Shortest	0.904 0.799	0.211 0.202	9.2 7.8	P1	32770	DS230
TQFP		7 x 7	48	1.0	0.5	1	0.1	0.6	9	MS-026	10 x 25	250	5 x 5	Longest Shortest	1.110 0.962	0.225 0.200	13.8 12.0	P1, J4	32770	DS230
TQFP		7 x 7	64	1.0	0.4	1	0.1	0.6	9	MS-026	10 x 25	250	–	–	–	–	–	P1	32770	DS230
TQFP		10 x 10	44	1.0	0.8	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1	32772	DS230
TQFP		10 x 10	52	1.0	0.65	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1	32772	DS230
TQFP		10 x 10	64	1.0	0.5	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1, J4	32772	DS230
TQFP		10 x 10	80	1.0	0.4	1	0.1	0.6	12	MS-026	8 x 20	160	–	–	–	–	–	P1	32772	DS230
TQFP		12 x 12	80	1.0	0.5	1	0.1	0.6	14	MS-026	7 x 17	119	–	–	–	–	–	P1	32774	DS230
TQFP		12 x 12	100	1.0	0.4	1	0.1	0.6	14	–	7 x 17	119	–	–	–	–	–	J3	JMD3S061011	DS230
TQFP		14 x 14	52	1.0	1	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1	–	DS230
TQFP		14 x 14	64	1.0	0.8	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1	473943	DS230
TQFP		14 x 14	80	1.0	0.65	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1	473943	DS230
TQFP		14 x 14	100	1.0	0.5	1	0.1	0.6	16	MS-026	6 x 15	90	8 x 8	Longest Shortest	2.300 1.520	0.419 0.322	26.3 17.8	P1, J5	473943	DS230
TQFP		14 x 14	120	1.0	0.4	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1	473943/ JMD3S072280	DS230
TQFP		14 x 14	128	1.0	0.4	1	0.1	0.6	16	MS-026	6 x 15	90	–	–	–	–	–	P1, J3, J5	473943/ JMD3S072280	DS230
TQFP		16 x 16	144	1.0	0.4	1	0.1	0.6	18	MS-026	6 x 15	90	–	–	–	–	–	P1, J3, J5	335487/ JMD3S072281	DS230
TQFP		20 x 20	144	1.0	0.5	1	0.1	0.6	22	MS-026	5 x 12	60	8.5 x 8.5	Longest Shortest	6.430 4.230	1.100 1.070	62.9 52.6	P1	473979	DS230
TQFP		20 x 20	176	1.0	0.4	1	0.1	0.6	22	MS-026	5 x 12	60	–	–	–	–	–	P1	473979	DS230

*Simulated results @ 100 MHz

Automotive capability available on most packages.
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ExposedPad LQFP Packages – Nominal Package Dimensions (mm)

ExposedPad LQFP

Body Size	Lead Count	Body Thickness	Lead Pitch	Lead Form	Standoff	Foot Length	Tip-to-Tip	JEDEC	Tray Matrix	Units Per Tray	Electrical Performance*			Factory	Package Outline Drawing #	Data Sheet #
											Pad Size (mm)	Loop Inductance (nH) Center	Loop Inductance (nH) Corner			
7 x 7	48	1.4	0.5	1	0.1	0.6	9	–	10 x 25	250	–	–	–	J5	–	DS231
10 x 10	44	1.4	0.8	1	0.1	0.6	12	–	8 x 20	160	–	–	–	P1	430273	DS231
10 x 10	52	1.4	0.65	1	0.1	0.6	12	–	8 x 20	160	–	–	–	P1	430273	DS231
10 x 10	64	1.4	0.5	1	0.1	0.6	12	–	8 x 20	160	7.5 x 7.5	3.04	3.78	P1	430273	DS231
14 x 14	52	1.4	1.0	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	–	DS231
14 x 14	64	1.4	0.8	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	–	DS231
14 x 14	80	1.4	0.65	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	473945	DS231
14 x 14	100	1.4	0.5	1	0.1	0.6	16	–	6 x 15	90	10.3 x 10.3	2.57	3.32	P1	473945	DS231
14 x 14	128	1.4	0.4	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	473945	DS231
20 x 20	128	1.4	0.5	1	0.1	0.6	22	–	5 x 12	60	–	–	–	P1	473996	DS231
20 x 20	144	1.4	0.5	1	0.1	0.6	22	–	5 x 12	60	7 x 7	4	5	P1, J4, J3	473996/JMD3S072329	DS231
20 x 20	176	1.4	0.4	1	0.1	0.6	22	–	5 x 12	60	–	–	–	P1	473996	DS231
24 x 24	160	1.4	0.5	1	0.1	0.6	26	–	4 x 10	40	–	–	–	P1	32780	DS231
24 x 24	176	1.4	0.5	1	0.1	0.6	26	–	4 x 10	40	10 x 10	5	6	P1, J4, J3	32780/JMD4S060056	DS231
24 x 24	216	1.4	0.4	1	0.1	0.6	26	–	4 x 10	40	–	–	–	P1, J4	32780/JMD4S061374	DS231
28 x 28	208	1.4	0.5	1	0.1	0.6	30	–	4 x 9	36	11 x 11	6	7	P1, J4	34514/JMD4S040721	DS231
28 x 28	256	1.4	0.4	1	0.1	0.6	30	–	4 x 9	36	–	–	–	P1, J4	34514/JMD4S071468	DS231

*JEDEC standard test boards – tested @ 1W with die attach pad soldered to PCB

ExposedPad TQFP Packages – Nominal Package Dimensions (mm)

ExposedPad TQFP

Body Size	Lead Count	Body Thickness	Lead Pitch	Lead Form	Standoff	Foot Length	Tip-to-Tip	JEDEC	Tray Matrix	Units Per Tray	Electrical Performance*			Factory	Package Outline Drawing #	Data Sheet #
											Pad Size (mm)	Loop Inductance (nH) Center	Loop Inductance (nH) Corner			
5 x 5	32	1.0	0.5	1	0.1	0.6	7	–	12 x 30	360	–	–	–	P1	40579	DS231
7 x 7	32	1.0	0.8	1	0.1	0.6	9	–	10 x 25	250	–	–	–	P1	32770	DS231
7 x 7	48	1.0	0.5	1	0.1	0.6	9	–	10 x 25	250	5 x 5	2.29	2.81	P1, J4, J3	32770/JMD3S072313	DS231
7 x 7	64	1.0	0.4	1	0.1	0.6	9	–	10 x 25	250	–	–	–	P1	32770	DS231
10 x 10	44	1.0	0.8	1	0.1	0.6	12	–	8 x 20	160	–	–	–	P1	32772	DS231
10 x 10	52	1.0	0.65	1	0.1	0.6	12	–	8 x 20	160	–	–	–	P1	32772	DS231
10 x 10	64	1.0	0.5	1	0.1	0.6	12	–	8 x 20	160	7.5 x 7.5	3.04	3.78	P1, J4	32772/JMD3S072314	DS231
10 x 10	80	1.0	0.4	1	0.1	0.6	12	–	8 x 20	160	–	–	–	P1	32772	DS231
12 x 12	80	1.0	0.5	1	0.1	0.6	14	–	7 x 17	119	–	–	–	P1, J4	JMD3S072315	–
14 x 14	52	1.0	1.0	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	–	DS231
14 x 14	64	1.0	0.8	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	–	DS231
14 x 14	80	1.0	0.65	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	473943	DS231
14 x 14	100	1.0	0.5	1	0.1	0.6	16	–	6 x 15	90	10.3 x 10.3	2.57	3.32	P1, J4, J3, J5	473943/JMD3S072316	DS231
14 x 14	120	1.0	0.4	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1	473943	DS231
14 x 14	128	1.0	0.4	1	0.1	0.6	16	–	6 x 15	90	–	–	–	P1, J3	JMD3S072319	–
16 x 16	144	1.0	0.4	1	0.1	0.6	18	–	6 x 15	90	–	–	–	P1, J3	335487/JMD3S072320	DS231
20 x 20	128	1.0	0.5	1	0.1	0.6	22	–	5 x 12	60	–	–	–	P1	473979	DS231
20 x 20	144	1.0	0.5	1	0.1	0.6	22	–	5 x 12	60	7 x 7	4	5	P1	473979	DS231
20 x 20	176	1.0	0.4	1	0.1	0.6	22	–	5 x 12	60	–	–	–	P1, J3	473979/JMD3S072321	DS231

*JEDEC standard test boards – tested @ 1W with die attach pad soldered to PCB

Automotive capability available on most packages.
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MQFP Packages – Nominal Package Dimensions (mm)

Body Size	Lead Count	Body Thickness	Lead Pitch	Lead Form	Standoff	Tip-to-Tip	JEDEC	Tray Matrix	Units Per Tray	Electrical Performance*					Factory	Package Outline Drawing #	Data Sheet #
										Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)			
10 x 10	44	2.00	0.8	1.60	0.15	13.2	MS-022	6 x 16	96	7.4 x 7.4	Longest Shortest	1.660 1.460	0.322 0.342	19.8 17.0	P1	–	DS232
10 x 10	52	2.00	0.65	1.60	0.15	13.2	MS-022	6 x 16	96	–	–	–	–	–	P1	–	DS232
10 x 10	64	2.00	0.5	1.60	0.15	13.20	MS-022	6 x 16	96	–	–	–	–	–	P1	–	DS232
10 x 10	44	2.00	0.8	1.95	0.15	13.90	MS-112	6 x 16	96	–	–	–	–	–	P1	–	DS232
10 x 10	52	2.00	0.65	1.95	0.15	13.90	MS-112	6 x 16	96	–	–	–	–	–	P1	–	DS232
10 x 10	64	2.00	0.5	1.95	0.15	13.90	MS-112	6 x 16	96	–	–	–	–	–	P1	–	DS232
14 x 14	52	2.67	1.0	1.60	0.15	17.20	MS-022	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 14	64	2.67	0.8	1.60	0.15	17.20	MS-022	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 14	80	2.67	0.65	1.60	0.15	17.20	MS-022	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 14	100	2.67	0.5	1.60	0.15	17.20	MS-022	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 14	52	2.67	1.0	1.95	0.15	17.90	MS-112	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 14	64	2.67	0.8	1.95	0.15	17.90	MS-112	6 x 14	84	–	–	–	–	–	P1, J5	–	DS232
14 x 14	80	2.67	0.65	1.95	0.15	17.90	MS-112	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 14	100	2.67	0.5	1.95	0.15	17.90	MS-112	6 x 14	84	–	–	–	–	–	P1	–	DS232
14 x 20	64	2.71	1.0	1.60	0.33	17.2 x 23.2	MS-022	6 x 11	66	–	–	–	–	–	P1	–	DS232
14 x 20	80	2.71	0.8	1.60	0.33	17.2 x 23.2	MS-022	6 x 11	66	–	–	–	–	–	P1	–	DS232
14 x 20	100	2.71	0.65	1.60	0.33	17.2 x 23.2	MS-022	6 x 11	66	–	–	–	–	–	P1	–	DS232
14 x 20	128	2.71	0.50	1.60	0.33	17.2 x 23.2	MS-022	6 x 11	66	11.0 x 11.0	Longest Shortest	9.29 1.694	1.227 0.501	200.0 0.150	P1	–	DS232
14 x 20	64	2.71	1.0	1.95	0.23	17.9 x 23.9	MS-112	6 x 11	66	–	–	–	–	–	P1	–	DS232
14 x 20	80	2.71	0.8	1.95	0.23	17.9 x 23.9	MS-112	6 x 11	66	–	–	–	–	–	P1	–	DS232
14 x 20	100	2.71	0.65	1.95	0.23	17.9 x 23.9	MS-112	6 x 11	66	–	–	–	–	–	P1	–	DS232
14 x 20	128	2.71	0.5	1.95	0.23	17.9 x 23.9	MS-112	6 x 11	66	–	–	–	–	–	P1	–	DS232
28 x 28	120	3.37	0.8	1.30	0.13	30.6	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	128	3.37	0.8	1.30	0.13	30.6	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	144	3.37	0.65	1.30	0.13	30.6	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	160	3.37	0.65	1.30	0.13	30.6	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	208	3.37	0.5	1.30	0.13	30.60	MS-029	3 x 8	24	–	Longest Shortest	9.86 3.723	7.945 2.948	0.937 0.325	P1	–	DS232
28 x 28	256	3.37	0.4	1.30	0.13	30.60	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	120	3.37	0.8	1.30	0.33	30.6	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	128	3.37	0.8	1.30	0.33	30.6	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	208	3.37	0.5	1.60	0.33	31.20	MS-022	3 x 8	24	–	–	–	–	–	P1	–	DS232
28 x 28	256	3.37	0.4	1.60	0.33	31.20	MS-022	3 x 8	24	–	–	–	–	–	P1	–	DS232
32 x 32	240	3.40	0.5	1.30	0.38	34.60	MS-029	3 x 8	24	12.7 x 12.7	Longest Shortest	16.84 7.87	9.480 1.513	217.5 0.543	P1	–	DS232
32 x 32	240	3.40	0.5	1.30	0.32	34.60	MS-029	3 x 8	24	–	–	–	–	–	P1	–	DS232

*Simulated Results @ 100 MHz

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PLCC Packages – Nominal Package Dimensions (inches unless otherwise specified)

	Sample	Pkg Type	Lead Count	Body Size (mm)	Body Size (inches)	Body Thickness (inches)	Lead Pitch (inches)	JEDEC	Qty Per Tube	Electrical Performance*					Factory	Package Outline Drawing #	Data Sheet #
										Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)			
PLCC		Square	20	8.9 x 8.9	.352 x .352	0.152	0.05	MS-018	46	3.7 x 3.7	Longest Shortest	2.110 1.780	0.596 0.583	13.5 11.1	P1	00060	DS232
			28	11.5 x 11.5	.452 x .452	0.152	0.05	MS-018	37	6.6 x 6.6	–	–	–	–	P1	00060	DS232
			44	16.6 x 16.6	.652 x .652	0.152	0.05	MS-018	26	8.89 x 8.89	Longest Shortest	2.900 2.140	0.893 0.681	17.8 13.7	P1	00060	DS232
			52	–	.752 x .752	0.152	0.05	MS-018	23	–	–	–	–	–	P1	00060	DS232
			68	–	.952 x .952	0.150	0.05	MS-018	18	–	–	–	–	–	P1	00060	DS232
			84	29.3 x 29.3	1.152 x 1.152	0.150	0.05	MS-018	15	10.8 x 10.8	Longest Shortest	10.900 6.840	1.780 1.750	57.6 43.2	P1	00060	DS232
		Rectangular	32	–	.452 x .552	0.109	0.05	MS-016	30	–	–	–	–	–	P1	00061	DS232

*Simulated results @ 100 MHz

Automotive capability available on most packages.
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*Micro*LeadFrame®/MLF®/QFN/SON/DFN Packages – Nominal Package Dimensions (mm)

*Micro*LeadFrame®/MLF®/QFN/SON/DFN

Body Size	MLF®/QFN/SON/DFN Leads	Pitch (mm)	Dual Row Lead Count Pitch (mm)	Electrical Performance*: Lead	Electrical Performance*: Self Inductance (nH)	Electrical Performance*: Bulk Capacitance (pF)	Electrical Performance*: Self Resistance (mΩ)	Factory	Data Sheet #
1 x 1	4, 6	0.35, 0.65	–	–	0.052	0.078	2.4	P3	DS572
2 x 2	4, 6, 8, 10, 12	0.50, 0.65	–	–	0.46	0.134	2	P3	DS572
2 x 3	8, 10, 12	0.4, 0.5, 0.65	–	–	–	–	–	P3	DS572
3 x 3	4, 6, 8, 10, 12	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	Longest Shortest	0.564 0.531"	0.203 0.220	141.8 138.9	C3, P1, P3	DS572
3 x 3	16	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
3 x 3	20, 24	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
4 x 4	8, 10, 12, 14	1.00, 0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	0.044	0.189	1.9	C3, P1, P3, J4	DS572
4 x 4	16, 18	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
4 x 4	20	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
4 x 4	24, 28	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
4 x 4	32	0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
4 x 4	40	0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
5 x 5	8, 10, 16	1.00, 0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
5 x 5	20, 24	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	0.048	0.144	2.2	C3, P1, P3, J4	DS572
5 x 5	28	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
5 x 5	32, 36	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
5 x 5	40	0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
5 x 5	44	–	0.5	–	–	–	–	C3, P3	DS572
5 x 5	52	–	0.5	–	–	–	–	C3, P3	DS572
6 x 5	18, 24	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P3	DS572
6 x 5	36	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P3	DS572
6 x 5	42	0.4, 0.35, 0.3	–	–	–	–	–	C3, P3	DS572
6 x 6	16, 20	1.00, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
6 x 6	26, 28	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
6 x 6	30, 32, 36, 40, 44	0.5, 0.4, 0.35, 0.3	–	–	0.052	0.175	2.5	C3, P1, P3, J4	DS572
6 x 6	52	0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
6 x 6	56, 60, 64	0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
6 x 6	44, 60, 68	–	0.5	–	–	–	–	C3, P3	DS572
6 x 8	8	1.27	–	–	–	–	–	P3, J7	DS572
7 x 7	24, 32	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
7 x 7	36	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
7 x 7	44, 48	0.5, 0.4, 0.35, 0.3	–	Longest Shortest	1.766 1.194	0.326 0.289"	315.1 234.5	C3, P1, P3	DS572
7 x 7	56	0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3, J4	DS572
7 x 7	68	0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
7 x 7	80	0.3	–	–	–	–	–	C3, P1, P3	DS572
7 x 7	76	–	0.5	–	–	–	–	C3, P3	DS572
7 x 7	84	–	0.5	–	–	–	–	C3, P3	DS572

*Simulated results @ 12 GHz – values dependent on specific die and wire configurations

Automotive capability available on most packages.
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*Micro*LeadFrame®/MLF®/QFN/SON/DFN Packages (Cont.) – Nominal Package Dimensions (mm)

Sample	Body Size	MLF®/QFN/ SON/DFN Leads	Pitch (mm)	Dual Row Lead Count Pitch (mm)	Electrical Performance* Lead	Electrical Performance* Self Inductance (nH)	Electrical Performance* Bulk Capacitance (pF)	Electrical Performance* Self Resistance (mΩ)	Factory	Data Sheet #
	8 x 8	4	2.00, 1.42, 0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	16	1.42, 0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	32, 36	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	40	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	52, 56	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	64	0.4, 0.35, 0.3	–	–	–	–	–	P3, J3	DS572
	8 x 8	68, 76	0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	88, 92	0.3	–	–	–	–	–	C3, P1, P3	DS572
	8 x 8	84, 92, 100	–	0.5	–	–	–	–	C3, P1, P3	DS572
	9 x 9	36	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	9 x 9	44, 48	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	9 x 9	60, 64	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	9 x 9	76	0.4, 0.35, 0.3	–	–	0.051	0.129	2.4	C3, P1, P3, J4	DS572
	9 x 9	88	0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	9 x 9	104	0.3	–	–	–	–	–	C3, P1, P3	DS572
	9 x 9	100, 108, 116	–	0.5	–	–	–	–	C3, P3	DS572
	10 x 10	44	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	10 x 10	52, 56	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	10 x 10	64, 68, 72	0.5, 0.4, 0.35, 0.3	–	Longest Shortest	2.179 1.475	0.518 0.409	337.5 250.8	C3, P1, P3	DS572
	10 x 10	88	0.4, 0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	10 x 10	100	0.35, 0.3	–	–	–	–	–	C3, P1, P3	DS572
	10 x 10	116, 120	0.3	–	–	–	–	–	C3, P1, P3	DS572
	10 x 10	132	–	0.5	–	–	–	–	C3, P3	DS572
	12 x 12	48	0.8, 0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1	DS572
	12 x 12	60	0.65, 0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1	DS572
	12 x 12	84, 88	0.5, 0.4, 0.35, 0.3	–	–	–	–	–	C3, P1	DS572
	12 x 12	100, 108	0.4, 0.35, 0.3	–	–	–	–	–	C3, P1	DS572
	12 x 12	124	0.35, 0.3	–	–	–	–	–	C3, P1	DS572
	12 x 12	144	0.3	–	–	–	–	–	C3, P1	DS572
	12 x 12	148	–	0.5	Longest Shortest	0.802 0.279	0.479 0.342	30.5 9.4	C3	DS572
	12 x 12	156, 164	–	0.5	Longest Shortest	0.787 0.276	0.468 0.332	30.4 9.8	C3	DS572
	13 x 13	164, 172, 180	–	0.5	Longest Shortest	0.497 0.208	0.325 0.318	20.0 7.7	C3	DS572

*Simulated results @ 12 GHz – values dependent on specific die and wire configurations

*Micro*LeadFrame®/MLF®/QFN/SON/DFN

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Power Packages

Amkor's portfolio of power packages serves diversified markets and applications, including automotive, communications and industrial.

Optimized for power sensitive and mobile applications, Amkor's high performance power devices use a leadframe as the package carrier and primarily use wirebond interconnect technology. A majority of packages will use a Cu clip interconnect, which provides the best known electrical properties for power devices. With technology focused on electrical and thermal improvement, products include advanced power packaging, advance copper clip attached and modules.

Power Packages – Nominal Package Dimensions (mm)

	Sample	Package	Lead Count	Body Width	Body Length	Body Thickness	Overall Height	Lead Pitch	Tip-to-Tip	JEDEC/JEITA	Factory	Package Outline Drawing #	Data Sheet #	
Power		PSMC	3	4.4	6.1	1.1	1.1	2.13	6.5	JEDEC	M1	816867PO	DS617	Power
		SOD123-FL	2	1.6	2.6	0.98	0.98	–	3.5	JEDEC	M1	798980PO	DS614	
		SOD128-FL	2	2.4	3.8	0.98	0.98	–	4.7	JEDEC	M1	798800PO	DS613	
		TO-220FP	3	10	15	4.5	–	2.54	28	–	M1	0850289PO	DS610	
		DPAK	3	6.5	6.1	2.3	2.3	2.3	9.8	JEDEC	J6	JMD4S071870	DS414	
		D2PAK	3	10	9.25	4.4	4.4	2.54	15.5	JEDEC	J6	JMD3S073456	DS619	
		D2PAK	7	10	9.25	4.4	4.4	1.27	15.5	JEDEC	J6	JMD3S072779	DS619	
		HSON8	8	5	5.4	1	1	1.27	5.15 x 6.0	–	J6	JMD4S071908	DS407	
		SO8-FL	6	4.9	5.75	1	1	1.27	6.1	JEDEC	M1	746796PO	DS611	
		SO8-FL	8	5	5	0.95	0.95	1.27	6	JEITA	M1	–	DS611	
		SO8-FL	8	4.9	5.75	1	1	1.27	6.1	JEDEC	M1	808389PO	DS611	
		TSON8-FL	8	3.1	3.1	0.85	0.85	0.65	3.3	JEDEC	M1	815788PO	DS612	
		TSON8-FL	8	3.1	3.1	0.75	0.75	0.65	3.3	JEDEC	M1	817927PO	DS612	
		TOLL	8	9.9	10.4	2.3	2.3	1.2	11.7	JEDEC	M1	777240PO, 0851402PO (w/ Kelvin pin) 777275PO (w/o Kelvin pin)	DS618	
		LFPAK	4	5	4.1	1.1	1.1	1.27	6	JEDEC	J6	JMD4S072407	DS415	
		LFPAK8	8	4.9	4.8	1.15	1.2	1.27	6.15	JEDEC	M1	0853466PO	–	
		eD2PAK	7	14	11.8	3.5	3.5	1.27	18.58	–	J6	Under registration	–	

PQFN Power Packages – Nominal Package Dimensions (mm)

	Sample	Package	Lead Count	Body Width	Body Length	Body Thickness	Overall Height	Lead Pitch	Tip-to-Tip	JEDEC/JEITA	Factory	Data Sheet #	
Power		PQFN	8	3.3	3.3	1.05	1.05	0.65	3.3	JEDEC	M1, P3	DS416	Power
		PQFN	8	5	6	1.05	1.05	1.27	6	JEDEC	M1, P3	DS416	
		PQFN	8	8	8	1.05	1.05	–	8	JEDEC	M1, P3	DS416	
		PQFN	22	5	6	1.05	1.05	–	6	JEDEC	M1, P3	DS416	
		PQFN	22	3.5	4.5	0.75	0.75	–	4.5	JEDEC	M1, P3	DS416	
		PQFN	31	5	5	0.75	0.75	–	5	JEDEC	M1, P3	DS416	
		PQFN	39	5	6	0.75	0.75	–	6	JEDEC	M1, P3	DS416	
		PQFN	40	6	6	0.75	0.75	0.5	6	JEDEC	M1, P3	DS416	

Package layout and design are flexible to customer and application requirements

Automotive capability available on most packages.
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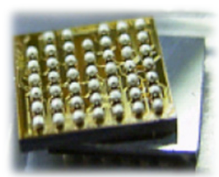
Wafer Level



Amkor offers high-tech capabilities in electroplated solder, Cu pillar technologies and Wafer Level Chip Scale Packaging (WLCSP) in multiple strategic locations (China, Korea, Portugal/Europe and Taiwan). Our factories are uniquely situated adjacent to major foundries to enable customers a reduced time-to-market with integrated factory logistics.

The electrical and mechanical connection between a die and substrate is one of the most critical elements of any flip chip package structure. Cu pillar, lead-tin and lead-free solders are used to form these connections – or bumps – and must exhibit superior adhesion to the die, minimal resistance and result in high assembly yields. Solder bumps and Cu pillar are formed by using either thin film metal deposition, plating or ball loading techniques.

Amkor offers Wafer Level Chip Scale Packaging (WLCSP) providing a solder interconnection directly between a device and substrate or the motherboard of the end product. WLCSP includes wafer bumping (with or without pad layer redistribution or RDL), wafer level final test, device singulation and packing in tape & reel to support a full turnkey solution. Amkor's robust Under Bump Metallurgy (UBM) over PBO or PI dielectric layers on the die active surface provide a reliable interconnect solution able to survive harsh board level conditions and meet the demands of the growing global consumer market for portable electronics.

The WLCSP package family is applicable for a wide range of semiconductor device types while leveraging the smallest form factor and high performance from high end RF WLAN combo chips, to FPGAs, power management, Flash/EEPROM, integrated passive networks and standard analog.

WLCSP Die Processing Services (8" & 12")

	Sample	Product Type	Factory	UBM Type	Solder Composition	Repassivation	Ball Count	Body Size	Pitch/Sphere Diameter	Die Thickness	Bump Height	RDL Trace/Space	Available Option	
WLCSP	BoR (2 mask)	CSP^{nl} BoR (Bump on Repassivation)	8": K4, T5, C3 12": K5, T1, C3, E1	Thick copper UBM	Pb-free SAC alloys (Plated) Sn/Ag Pb-free Cu pillar	PBO, PI, Low cure polymers	4~300	0.49~100 mm^2	0.50 mm/0.30 mm 0.40 mm/0.25 mm 0.35 mm/0.22 mm 0.30 mm/0.15 mm (0.15 mm sphere diameter is available)	150 µm to 450 µm	0.5 mm Pitch: 250 µm 0.4 mm Pitch: 198 µm 0.35 mm Pitch: 166 µm 0.3 mm Pitch: 114 µm	CSP^{nl}: 12/12 µm CSP^{n3}: 15/15 µm	Backside lamination Carrier Tape: 7" or 13" reels	WLCSP
	CSP^{nl} (4 mask)	CSP^{nl} + RDL (Bump on Redistribution)												
	CSP^{n3} (3 mask)	CSP^{n3} + RDL (Bump on Redistribution)												
Reliability	Package Level	• Preconditioning at Level 1: 85°C/85% RH, 168 hours, reflow @ 260°C peak • Temp Cycle -55°C/+125°C, 2 cy/hr, 1000 cycles • High Temp Storage 150°C, 1000 hours • Unbiased HAST (uHAST): 130°C/85% RH, 96 hrs												Reliability
	Board Level	• Temp Cycle -40°C/+125°C, 1 cy/hr, 1000x • Drop Test JEDEC condition B (1500G), 100 drops												

WLFO Wafer Bump

	Sample	Product Type	Factory	Seed Layer	RDL Trace/Space	UBM Type	Repassivation	Solder Composition	Pitch/Sphere Diameter	Bump Height	Min. Die Thickness	Body Size	Available Option	
WLFO	Without UBM 3 mask process	WLFO^{n3}	K5, E1	Ti/Cu, TiW/Cu	12/12 µm	N/A	Low cure polymers	Pb-free SAC alloys	0.50 mm/0.30 mm 0.40 mm/0.25 mm 0.35 mm/0.22 mm	0.5 mm Pitch: 236 µm 0.4 mm Pitch: 194 µm 0.35 mm Pitch: 175 µm	300 µm	1.21 ~ 144 mm^2	Overmold, Exposed Die, Backside Lamination	WLFO
	With UBM 4 mask process	WLFO^{nL}	K5, E1	Ti/Cu, TiW/Cu	12/12 µm	Thick copper UBM, Ni/Au	Low cure polymers	Pb-free SAC alloys	0.50 mm/0.30 mm 0.40 mm/0.25 mm 0.35 mm/0.22 mm	0.5 mm Pitch: 236 µm 0.4 mm Pitch: 194 µm 0.35 mm Pitch: 175 µm	300 µm	1.21 ~ 144 mm^2	Overmold, Exposed Die, Backside Lamination	
Reliability	Package Level	• Preconditioning at Level 1: 85°C/85% RH, 168 hours, reflow @ 260°C peak • Temp Cycle -55°C/+125°C, 2 cy/hr, 1000 cycles • High Temp Storage 150°C, 1000 hours • Unbiased HAST (uHAST): 130°C/85% RH, 96 hrs												Reliability
	Board Level	• Temp Cycle -40°C/+125°C, 1 cy/hr, 1000x • Drop Test JEDEC condition B (1500G), 100 drops												

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Wafer Bump (8" & 12")

	Sample	Product Type	Factory	Low Alpha	Repassivation	Repassivation Opening	Typical Production Bump Height	Seed Layer	Pad Pitch Lower Limit	Wafer Example	
Wafer Bump	Solder Bumping RP Cu Pillar BOP	SnAg Plating Bump with or without Redistribution	8": K4, T5, C3 12": K5, T1, C3	All available as ultra low alpha <0.002 cts/hr/cm^2)	PBO, PI, Low cure polymers	PBO/LTPI: Min. 15 µm PI: Min. 25 µm	150 µm array: 70 µm 125 µm peripheral: 75 µm	Ti/Cu, TiW/Cu	Solder bump: Array 150 µm pitch/ 75 µm UBM (min) Micro bump: Array 40 µm pitch/ 20 µm UBM (min)		Wafer Bump
	Solder Bumping BOP	Cu Pillar Plating Bump with or without Redistribution	8": K4, T5, C3 12": K5, T1, C3						Cu pillar bump: Staggered 25/50 µm pitch/25 µm UBM (min)		
	Cu Pillar RDL Solder Bumping RDL	63Sn/37Pb Plating Bump with or without Redistribution	12": T1	Available as low alpha	PI	PI: Min. 25 µm			Solder bump: Array 150 µm pitch/ 75 µm UBM (min) Micro bump: Array 40 µm pitch/ 20 µm UBM (min)		

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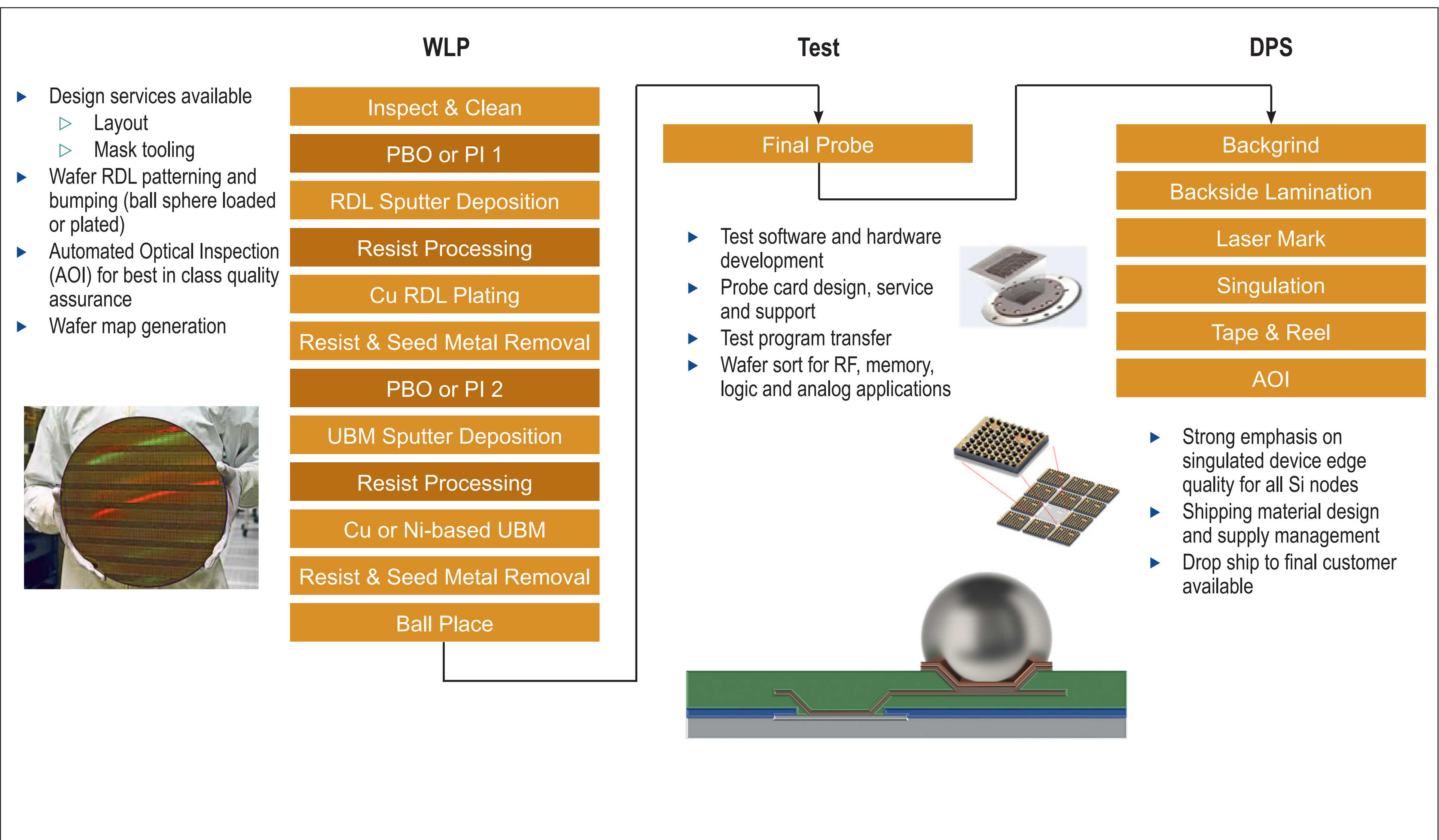
Turnkey Process Flow – CSPnl WLCSP



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MEMS & Sensors

Amkor Technology is the world's leader in microelectronic packaging technologies and the world's largest outsource provider of MEMS and MOEMS (Micro Optical Electronic Mechanical Systems). Microelectromechanical Systems (MEMS) are micron-size devices that can sense or manipulate the physical world. MEMS are created using micro machining processes, similar to those used to produce integrated circuit (IC) devices. While the devices look similar, standard IC package solutions are not often compatible. Amkor has a broad range of cavity, non-cavity and hybrid solutions across all package platforms including wafer level. The package configuration and material selections provided for any product can play an integral role in functionality and performance of the total sensing solution.

Cavity MEMS Packages

	Open Tool Available (Sample Builds)	Lead Count	Body Width (mm)	Body Length (mm)	Body Thickness (mm)	Pkg Type	Lid Type	Die Qty	Interconnect	Factory	POD Dwg	Unit Dwg	
MEMS		8	2	2	0.8	Cavity LGA	Metal	Multi-die	WB	P3	TBD	–	MEMS
		8	4	4	0.9	Cavity LGA	Metal	Multi-die	WB	P3	643113PO	–	
		8	5	5	1	Cavity LGA	Metal	Multi-die	WB	P3	TBD	–	
		8	7	7	1	Cavity LGA	Metal	Multi-die	WB	P3	647876PO	647874UD	
		8	4	3	1	Cavity LGA	L2L	Multi-die	WB	P3	698505P0	698275UD	
		8	5	2	1	Molded Cavity LGA/BGA	Glass/Filter	Single die	WB	C3	TBD	–	
		22	6.8	4.9	1.2	Molded Cavity LGA/BGA	Glass/Filter	Single die	WB	C3	TBD	–	
		20	6	6	1.9	Cavity LF	Polymer	Multi-die	WB	P3	610182PO	640993UD	
		18	15	25	0.45	Molded Cavity LGA/BGA	Microlens	Single die	WB	C3	TBD	–	

MEMS/Sensor Package Standards

Package Type	Overmolded	Exposed Die Surface	Cavity Package	Molded Cavity Package
Leadframe SOIC/MLF®				
ChipArray® LGA/FPBGA				

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Test Services

Amkor Technology provides complete semiconductor test services including:

1. Test Processes – wafer probe, final test, system level test, strip test, burn-in, complete end-of-line services and drop ship
2. Products – discrete power, digital, analog, mixed signal, memory, SOC, RF, power management, MEMS, silicon photonics, automotive, sensors
3. Packages – conventional leadframe and substrate packages, also WLCSP, MCM, SiP, Stacked, 2.5D, SLIM™, SWIFT®
4. Test Engineering – HW and SW development, tester to tester conversions, test time reduction, throughput and yield improvement, FA

Major IC Testers

Manufacturer	Tester Model	Application			
		Digital	Mixed	RF	Memory
Advantest	T2000	✓	✓	✓	–
	T5XXX (Memory)	✓	–	–	✓
	T65XX (SoC)	✓	✓	–	–
	V93000 Series (SmartScale & ExaScale)	✓	✓	✓	–
Teradyne	Eagle Series (including ETS800)	✓	✓	–	–
	Flex/UFlex/UFlex+ Series	✓	✓	✓	✓
	J750 Series	✓	✓	✓	–
	Magnum	✓	✓	–	✓
Cohu	X-Series, Diamond	✓	✓	✓	–
	PAx	✓	✓	✓	–
Yokogawa	TS6XXX Series	✓	✓	–	–
National Instrument	STS	✓	✓	✓	–
Chroma	3650	✓	✓	✓	–

Wafer Prober

Type	Wafer Size	Prober	Temp Range (°C)	Pin to Pad Accuracy	Min. Pad Size/Pitch	Docking
Wafer Probe	200 mm	TEL P8XL	Ambient ~ 150°C	±4 µm	50 µm/75 µm	Direct or Soft Dock
		TEL Precio Octo	Ambient ~ 150°C	±2 µm	40 µm/60 µm	Direct or Soft Dock
		EG 4090µ, 4090µ+	Ambient ~ 130°C	±4 µm/± 3 µm	50 µm/75 µm, 48 µm/72 µm	Direct or Soft Dock
		TSK UF200/200A	Ambient ~ 150°C	±4 µm	50 µm/75 µm	Direct or Soft Dock
	300 mm	TEL P12XLn+	-40°C ~ 150°C	±1.8 µm	38 µm/58 µm	Direct or Soft Dock
		TEL Precio/Precio Nano	-55°C ~ 150°C	±1.8 µm/±0.8 µm	38 µm/58 µm, 27 µm/41 µm	Direct or Soft Dock
		EG 6000	Ambient ~ 150°C	±2.5 µm	45 µm/67 µm	Direct or Soft Dock
		TSK UF3000ex (lx)	-55°C ~ 200°C	±1 µm	30 µm/45 µm	Direct or Soft Dock
		Semics OPUS3/OPUS3 SP	-55°C ~ 200°C	±1.5 µm/±1.0 µm	37 µm/56 µm, 30 µm/45 µm	Direct or Soft Dock
Film Frame	300 mm	TSK FP3000	-40°C ~ 150°C	±1.5 µm	37 µm/56 µm	–
		TEL WDF12DP+	Ambient ~ 150°C	±1.8 µm	38 µm/58 µm	–
		Semics OPUS3 FD12	Ambient	±1.5 µm	37 µm/56 µm	–

New test capabilities are introduced periodically to meet customer demands.
Please contact Amkor's Global Test Services to check for specific capabilities not listed on the table.

Package Test Handler

Type of Handler	Manufacturer	Pkg Size (mm)		Pkg Type	Temp	Input/Output	Docking
		Min	Max				
Pick & Place	Hontech, Seiko Epson, Cohu (cold), Advantest, Techwing	2.5 x 2.5	55 x 72	BGA/CSP/LGA/ MLF®/POP/TQFP/TSV	Ambient/Hot/Cold	Tray	Direct or Soft Dock
Gravity	Cohu, Xceltron	2 x 2	21 x 21	MLF®/SOIC/TQFP/ TSSOP	Ambient/Hot/Cold	Tube, Bowl/Tube, TNR	Direct or Soft Dock
Turret	Cohu, SRM ASM	1 x 0.6	12 x 12	BGA/MLF®/QFP/ SOIC/	Ambient/Hot	Bulk, Bowl/Canister, TNR	Soft Dock
Strip Test	MCT, Cohu	Not limited; below 1 mm with 130 µm pad size & 0.25 mm pitch		Leaded Pkg	Ambient/Hot/Cold	Strip/Singulated	Direct
Film Frame	MCT	Not limited; below 1 mm with 150 µm x 250 µm pad size & 0.3 mm pitch		sMLF®	Ambient	Film Frame	Direct

Strip Test/Film Frame Handler

Assembly Format	Handler	Temp Range (°C)	Contact Force	Packages
HDLF/FXDLF up to 100 x 300 mm	MCT H5000	-50 to +150 (±3)	77 kgf (option 194 kgf)	TQFP up to 64 lead, 10 x 10 mm
				SOIC-N 150 mil, SOIC-W 300 mil, SOIC std 208 mil
	Cohu SO3000			TSSOP up to 28 lead (3.0 and 4.4 mm body sizes)
HDLF/VHDLF 70 x 250 mm	MCT FFC (Film Frame) FH1200	Ambient	77 kgf (option 194 kgf)	Saw MLF® up to 11 x 6 mm

System Level Test

System in Package(SiP)/System on Chip (SOC) Test Content: Logic, Memory, Analog, RF Application: Industrial, Commercial, Automotive	
Manufacturer	**Equipment Model**
Teradyne	Titan, Magnus
Chroma	3260
Hontech	3216H
Techwing	TW301(N)

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Discrete/Power Test

Major Test Items	Test Handler
DC, Rg, VDSX(SUS), VCEX(SUS), Trr, Trr/Vsurge, ΔVDS/ΔVBE, Switching (trr/Irr/t off/t on/Latch), UIS, IC, Transient Test	Gravity, Turret, Strip Frame

Burn-In Oven

Memory	SOC	MCU	Analog	Logic/Automotive
Advantest, AEHR, STK	STK	Shikino Hightech	Shikino Hightech	MCC (LC2, HPB-4, HPB-5C)

End Of Line (EOL) Services

EOL Services	Available Package	Features
Laser Mark	CABGA, Cavity MEMS, fcCSP, fcSCSP, fpfcBGA, fpfcCSP, Hermetic, MLF®, PBGA, PLCC, PSSOP, QFP, SBGA, SC70, SCSP, SOIC, SSOP, TQFP, TSOP, TSSOP	Infra-red & Green Laser Marking, Arc Lamp
Scan		Package Size: Max. 60 x 60 mm
Bake		Temperature Range: Max. 200°C
Tape & Reel		Package Size: Bowl Type Min. 1 x 1 mm, Tray Type Min. 2.5 x 2.5 mm
Dry Pack		Vacuum Chamber Packing
Drop Ship		Warehouse Management

Please contact Amkor's Global Test Services for production site availability

New test capabilities are introduced periodically to meet customer demands.
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Amkor delivers defect-free products and provides flawless service beyond customer expectations.

Enabling our business to be competitive by providing the same quality mindset across all Amkor departments

ZERO DEFECT MINDSET

CONTINUOUS IMPROVEMENT

SERVICE BEYOND EXPECTATIONS

EMPLOYEE COMMITMENT

QualityFIRST

MISSION & VISION

NO COMPROMISE ON QUALITY

NO DEVIATION FROM OUR COMMITMENTS

AWARENESS OF ABNORMALITY

FAST REACTION TO CUSTOMER VOICES

Amkor Worldwide Sales Offices

CORPORATE HEADQUARTERS

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