



(ExposedPad LQFP/TQFP) Packages:

This Amkor-developed family of power IC packages significantly increases the thermal efficiency of power constrained standard LQFP and TQFP packages. The ExposedPad LQFP / TQFP can increase heat dissipation by as much as 110% over a standard LQFP / TQFP, thereby expanding the margin of operating parameters. Additionally, the ExposedPad can be connected to ground, thereby reducing loop inductance for high frequency applications. The ExposedPad should be soldered directly to the PCB to realize the thermal and electrical benefits. 3D packaging with die stack process are also provided in this package for MCP solution.

Applications:

Increased end-application densities and shrinking product sizes demand more from IC packages. ExposedPad LQFP / TQFPs give designers the needed margin for designing and producing high performing products such as telecom, magnetic/optical disk drives, pagers, wireless, CATV/RF modules, LCD/flat panel TVs, radio and other similar applications. GaAs and hi-speed silicon technologies work especially well in ExposedPad LQFP / TQFP packages due to added shielding and grounding capabilities.

ExposedPad LQFP / TQFP

Features:

Amkor's ExposedPad LQFP / TQFP IC package portfolio provides:

- 5 x 5 mm to 28 x 28 mm body size
- 32 to 256 lead counts
- Broad selection of die pad sizes
- Double down-set ground bond ring pad
- Copper leadframes
- 1.0 mm body thickness for TQFP
- 1.4 mm body thickness for LQFP
- Custom leadframe design available
- ExposedPad is easily inverted for heat sink attach
- Low Profile - < 1.2mm max mounted height
- Electrical - very low loop inductance with use of paddle as ground path, more pins available for signal and allows for operating frequencies of up to 2.4 GHz

Thermal Resistance:

Multi-Layer PCB, JEDEC Standard Test Boards, Tested @ 1 W with die attach pad soldered to PCB

Pkg	Body Size (mm)	Pad Size (mm)	Theta JA (°C/W) by Velocity (LFPM)		
			0	200	500
32 ld	5 x 5	3.4 x 3.4	34.6	29.1	27.2
48 ld	7 x 7	5 x 5	27.6	22.6	20.7
64 ld	10 x 10	7.5 x 7.5	22.3	17.2	15.1
100 ld	14 x 14	10.3 x 10.3	20.6	15.3	13.4
144 ld	20 x 20	7 x 7	20.0	15.4	13.5
*176 ld	24 x 24	10 x 10	19.0	15.4	13.5
*208 ld	28 x 28	11 x 11	18.7	15.5	14.0

*Estimates

Electrical:

JEDEC Standard Test Boards, Tested @ 1 W with die attach pad soldered to PCB

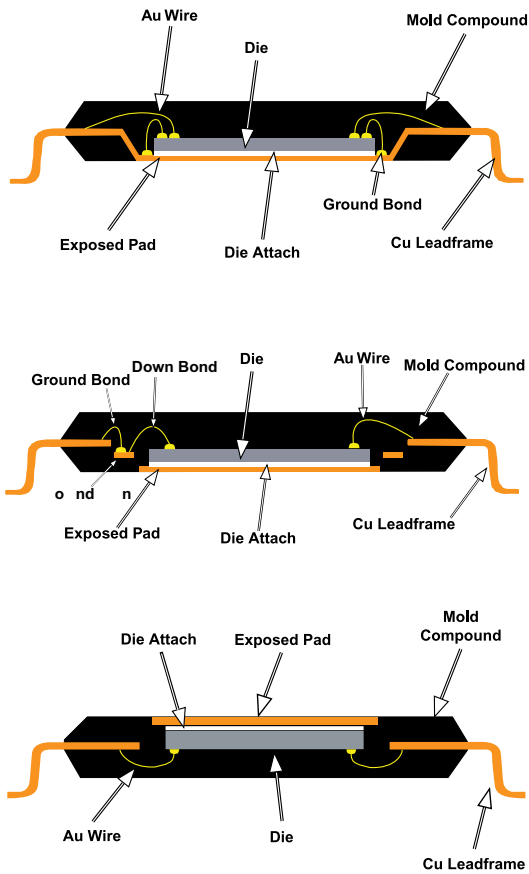
Pkg	Body Size (mm)	Pad Size mm	Loop Inductance (nH)	
			Center	Corner
32 ld	5 x 5	3.4 x 3.4	1.97	2.38
48 ld	7 x 7	5 x 5	2.29	2.81
64 ld	10 x 10	7.5 x 7.5	3.04	3.78
100 ld	14 x 14	10.3 x 10.3	2.57	3.32
144 ld	20 x 20	7 x 7	4.00	5.00
176 ld	24 x 24	10 x 10	5.00	6.00
208 ld	28 x 28	11 x 11	6.00	7.00

Reliability:

IC chips are assembled in optimized package designs with proven reliable semiconductor materials.

- Moisture Sensitivity Characteristics: JEDEC Level 3, 30 °C/60% RH, 192 hours - 3x reflow - SAT
- Temp cycle w/precon: -65 to + 150 °C, 1000 cycles
- HAST w/precon: 130 °C/85% RH, 96 hours
- Temp/Humidity: 85 °C/85% RH, 1000 hours
- High temp storage: 150 °C, 1000 hours

Cross-sections ExposedPad LQFP / TQFP



ExposedPad LQFP / TQFP

Process Highlights

Die thickness	11.5 ± 0.5 mils for TQFP 14.5 ± 0.5 mils for LQFP
Bond pad pitch	0.050 mm
Wire diameter	0.8 mil Standard
Lead Finish	100% Matte Sn Standard Pre-Plated leadframe capa is selectively available
Marking	Laser
Pack/ship options	Bar code, dry pack
Wafer backgrinding	Available

Test Services

- Program generation/conversion
- Product engineering
- Wafer sort
- 256 pin x 20 MHz test system available
- -55 °C to +165 °C test available
- Burn-in
- Tape and reel services

Shipping

JEDEC outline CS-007 low profile tray

Configuration Options:

ExposedPad LQFP / TQFP Nominal Package Dimensions (mm)

Body Size	Body Tkns	Lead Form	Standoff	Foot Length	Tip To Tip	Lead Count	Tray Matrix	Units Per Tray
5 x 5	1.00	1.00	0.10	0.60	7.0	32	12 x 30	360
7 x 7	1.00	1.00	0.10	0.60	9.0	32/48/64	10 x 25	250
10 x 10	1.0 / 1.4	1.00	0.10	0.60	12.0	44/52/64/80	8 x 20	160
12 x 12	1.0 / 1.4	1.00	0.10	0.60	14.0	80	7 x 17	119
14 x 14	1.0 / 1.4	1.00	0.10	0.60	16.0	52/64/80/100/120/128	6 x 15	90
16 x 16	1.00	1.00	0.10	0.60	18.0	144	6 x 15	90
14 x 20	1.40	1.00	0.10	0.60	16.0 x 22.0	100/128	6 x 12	72
20 x 20	1.0 / 1.4	1.00	0.10	0.60	22.0	128/144/176	5 x 12	60
24 x 24	1.40	1.00	0.10	0.60	26.0	160/176/216	4 x 10	40
28 x 28	1.40	1.00	0.10	0.60	30.0	208/256	4 x 9	36

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