ExposedPad LQFP/TQFP

Amkor's ExposedPad LQFP/TQFP family of power IC packages significantly increases the thermal efficiency of power-constrained standard LQFP and TQFP packages. These packages can increase heat dissipation by as much as 110% over standard LQFP/TQFP packages, thereby expanding the margin of operating parameters. In addition, 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.

FEATURES

- 5 x 5 mm to 28 x 28 mm body size
- 32-256 lead counts
- Broad selection of die pad sizes
- Double down-set ground bond ring pad
- 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 – <1.2 mm 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 Performance

Multi-Layer PCB

Package	Body Size (mm)	Pad Size (mm)	θJA at (°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
JEDEC standard test boards
Tested @ 1W with die attach pad soldered to PCB

Electrical Performance

Package	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

JEDEC standard test boards
Tested @ 1W with die attach pad soldered to PCB

Amkor Technology®

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Applications

As increased end-application densities and shrinking product sizes demand more from IC packages, ExposedPad LQFP/TQFP packages give designers the needed margin for designing and producing high-performing products. Applications such as automotive (engine control units, powertrain and infotainment controllers), LCD/flat panel TVs and telecom benefit from this package. High-speed silicon technologies work especially well in ExposedPad LQFP/TQFP packages due to grounding capabilities.

Reliability Qualification

Amkor devices are assembled in optimized package designs with proven reliable semiconductor materials.

Commercial Reliability Test

- Moisture sensitivity characterization: JEDEC level 3, 30°C/60% RH, 192 hrs, 3x reflow – SAT
- uHAST w/ precon: 130°C/85% RH, 96 hours
- Temp cycle “C” w/ precon: -65°C/+150°C, 500 cycles
- High temp storage: 150°C, 1000 hours
- Qualified to automotive AECQ100 and AECQ006 standards at grade 1 and grade 0 level

Process Highlights

- Die thickness: 11.5 ± .5 mils, 14.5 ± 0.5 mils for LQFP
- Bond pad pitch: 0.050 mm
- Wire diameter: 0.8 mil Cu wire standard
- Lead finish: 100% Matte Sn standard, NiPD PPF frames available
- Marking: Laser
- Pack/Ship options: Barcode, dry pack
- Wafer backgrinding available

Test Services

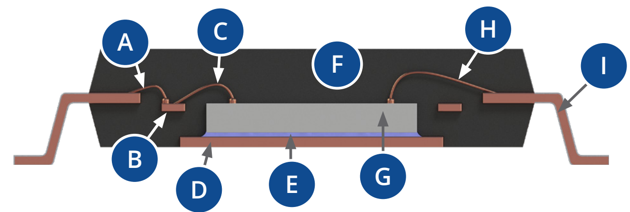
- Program generation/conversion
- Product engineering support
- Wafer sort
- -55°C to +165°C test available

Shipping

- JEDEC outline CS-007 low-profile tray
- Tape and reel

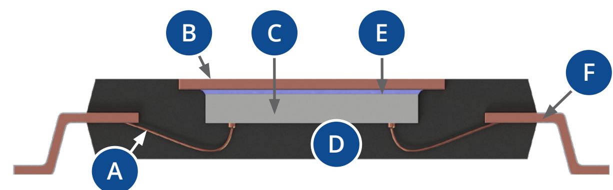
Cross Section ePad LQFP/TQFP

Standard Configuration



- A Ground bond
- B Ground ring
- C Down bond
- D Exposed pad
- E Die attach
- F Mold compound
- G Die
- H Wire
- I Cu leadframe

Inverted Pad Configuration



- A Wire
- B Exposed pad
- C Die
- D Mold compound
- E Die attach
- F Cu leadframe

ExposedPad LQFP/TQFP

Configuration Options

ExposedPad LQFP/TQFP Nominal Package Dimensions (mm)

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

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