MQFP PowerQuad® 4

MQFP PowerQuad® 4 Packages

Systems and applications that operate at moderate levels of power need more power performance than QFP packages can deliver. Amkor has developed a low cost package system, available in QFP format, to better suit these applications. This solution provides improved power dissipation by using an exposed heat slug. This large, highly efficient Cu and/or Al heat slug readily extracts heat generated from the chip though the leadframe paddle attached to the IC. Thermal resistance improvements of approximately 80% (over a standard QFP) can be realized using this IC package without the need for external cooling aids.

In addition, the PowerQuad 4 heat slug has a built-in mechanical package-encapsulant "lock" feature to ensure package integrity and eliminate moisture penetration. The end result is a moderate power, IC package that enables more reliable solutions to the electronic marketplace.

Applications

PowerQuad 4 packages provide a solution for today's semiconductor ICs to operate at the speeds and power they were designed for. As a result, packaging engineers from major semiconductor manufacturers have made this the IC package of choice for Digital Signal Processors (DSP), PLDs, microprocessors, microcontrollers, high-speed logic/FPGAs, ASICs, automotive devices and other thin low airflow, high performance applications requiring moderate power management.

System designers and OEM product developers have used PowerQuad 4 packages to solve power/thermal/speed concerns while supporting system constraints (standard package outlines, cost, SMT capability, product availability, technical support) in applications such as: PCs, notebooks, high-end audio/video, power supplies, CPU board systems, workstations, RISC engine modules and similar applications.

Features

- Large, highly conductive Cu and Al heat slug options with standard (slug down) and inverted configurations available
- ~80% improvement in Theta JA over standard MQFP
- Available in JEDEC-standard packages
- 28 x 28 mm and 32 x 32 mm body size
- 120-256 lead counts
- Highly reliable material set
- 50% reduction in package self inductance (better electrical performance) due to "floating ground plane" effect of heat slug
- Capable of 25-30 watts thermal dissipation with external heat sink
- Replacement for Amkor discontinued PQ2 package for 28 mm & 32 mm JEDEC Standard MQFP outlines

Thermal Performance

Multi-layer PCB

Pkg	Body Size (mm)	Pad Size (mm)	ΘJA (°C/W) by Velocity (LFPM) with Cu Heat Slug		
			0	200	500
208 ld	28 x 28	11	13.3	10.8	9.4
240 ld	32 x 32	12.7	13.2	10.6	9.2

Pre-JEDEC Standard Test Boards

Electrical Performance

Pkg	Body Size (mm)	Pad Size (mm)	Lead	Self Inductance (nH)	Bulk Capacitance (pF)	Self Resistance (mΩ)
208 ld	28 x 28	9.5 x 9.5	Longest Shortest	12.000 6.850	1.730 1.470	95.5 81.0
240 ld	32 x 32	10.6 x 10.6	Longest Shortest	15.72 12.12	2.123 1.841	227.0 205.7

Simulated Results @ 100 MHz

Reliability Qualification

MQFP PowerQuad 4 packages are assembled in optimized package designs with proven reliable semiconductor materials and perform to industry standard JEDEC test methods.

- MRT/Autoclave — JEDEC Level 3, 245°C/121°C, 2 atm, 504 hours
- Temp/Humidity — 85°C/30% RH, 1000 hours
- Temp Cycle — -65°C/+150°C, 1000 cycles
- High Temp Storage — 150°C, 1000 hours

Visit Amkor Technology online for locations and to view the most current product information.

Data Sheet

MQFP PowerQuad® 4

Process Highlights

- Die thickness — 25 mils
- Strip solder plating — Matte Sn standard, 85/15 Sn/Pb option
- Marking — Laser
- Lead inspection — Laser/optical
- Pack/ship options — Bar code, dry pack

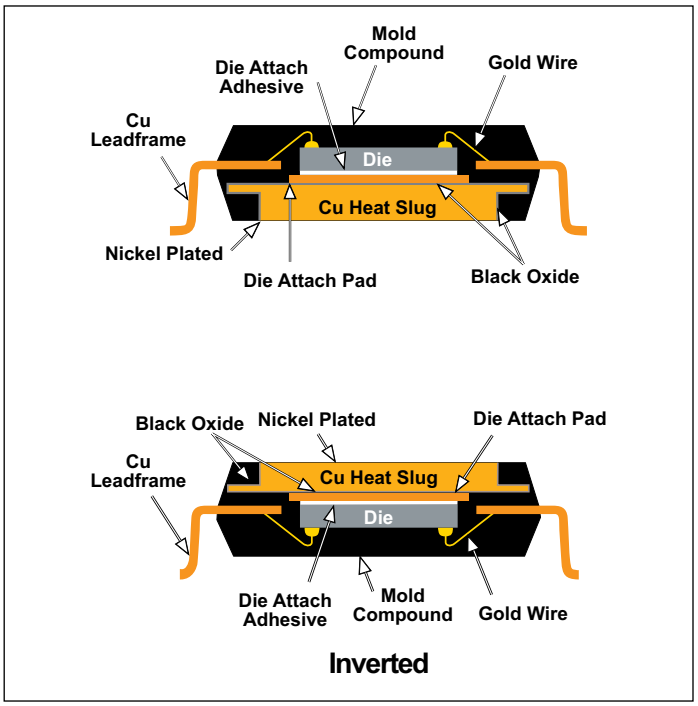
Test Services

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

Shipping

- JEDEC outline CS-004, low profile tray

Cross-sections MQFP PowerQuad® 4



Configuration Options

MQFP PowerQuad® 4 Nominal Package Dimensions (mm)

Lead Count	Body Size	Body Thickness	Lead Pitch	Lead Form	Standoff	Foot Length	Tip-to-Tip	JEDEC	Tray Matrix	Units Per Tray
120	28 x 28	3.37	0.80	1.30/1.60	0.13/0.33	0.56/0.88	30.6/31.2	MS-029/022	3 x 8	24
128	28 x 28	3.37	0.80	1.30/1.60	0.13/0.33	0.56/0.88	30.6/31.2	MS-029/022	3 x 8	24
144	28 x 28	3.37	0.65	1.30/1.60	0.13/0.33	0.56/0.88	30.6/31.2	MS-029/022	3 x 8	24
160	28 x 28	3.37	0.65	1.30/1.60	0.13/0.33	0.56/0.88	30.6/31.2	MS-029/022	3 x 8	24
208	28 x 28	3.37	0.50	1.30/1.60	0.13/0.33	0.56/0.88	30.6/31.2	MS-029/022	3 x 8	24
240	32 x 32	3.40	0.50	1.30	0.38	0.56	34.6	MS-029	3 x 8	24
256	28 x 28	3.37	0.40	1.30/1.60	0.13/0.33	0.56/0.88	30.6/31.2	MS-029/022	3 x 8	24

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