Data Sheet

FusionQuad® Technology

Amkor's FusionQuad technology represents a breakthrough in leadframe-based plastic packaging through the effective integration of ExposedPad TQFP and MLF technologies. The novel integration of bottom lands in a QFP provides a cost-effective platform for increased lead count in a small form factor. FusionQuad technology not only extends the I/O range of classic leadframe packaging to nearly 400 unique pins, it also delivers an approximate 50% reduction in package size for a given lead count. Additionally, this technology provides excellent RF electrical performance characteristics with short signal paths to the bottom lands and high power dissipation capability with the solderable exposed die attach paddle.

FusionQuad technology offers system architects, IC designers and packaging engineers a unique blend of excellent electrical and thermal performance in a miniaturized cost-effective leadframe plastic package. Applications requiring increased data rates or RF communications will benefit from the low insertion loss up to 10 GHz when utilizing the bottom lands for high speed signals.

The FusionQuad technology structure also allows the design of multiple segmented power and ground rings typically found in many laminate packages today. Along with the thermal performance advantage of the ExposedPad TQFP, this technology brings a new lower cost option to applications normally designed into thermally enhanced laminate packages. The unique footprint of this technology allows for the use of low cost printed circuit boards in the end application due to the space available for coarse routing vias between the bottom lands and the outer peripheral leads. The 0.8 mm package thickness allows FusionQuad technology to be applied to end products requiring thin profiles such as mobile hard disk drives, notebook computers and other consumer electronics.

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

FusionQuad®

Applications

Amkor's FusionQuad technology provides an ideal package format for most IC semiconductor technologies including advanced mixed signal SoCs, motor drivers, microcontrollers, ASICs, Digital Signal Processors (DSP), and a variety of others.

This technology is particularly well suited for applications requiring superior electrical or thermal performance in a cost constrained environment, such as: hard disk drives, laptop PCs, Ethernet communication, digital television and data conversion.

Features

- 10 x 10 mm to 24 x 24 mm body sizes
- 0.8 mm & 1.0 mm body thickness
- Increased I/O (116 to 356) in smaller package footprints
- Copper leadframe based
- Integrated exposed die attach pad
- Pb-free/Green
- Flexible designs for optimal electrical and thermal performance

Thermal Performance

Pkg	Body Size (mm)	Exposed Pad Size (mm)	ΘJA (°C/W) by Velocity (m/s)		
			0	1.0	2.5
176 ld	14 x 14	6.5 x 6.5	24.6	19.9	17.9

JEDEC Standard Test Boards (non-thermally optimized)
Tested @ 1W

Electrical Performance

Pkg	Body Size (mm)	Pad Size (mm)	Lead	Inductance (nH)	Capacitance (pF)	Resistance (mΩ)
176 ld	14 x 14	6.5 x 6.5	Longest	5.99	0.82	209
–	–	–	Shortest	1.42	0.23	81

Simulated Results @ 100 MHz

Reliability Qualification

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

- Moisture Sensitivity Characterization — JEDEC Level 3, 30°C/60% RH, 192 hrs
- Temp Cycle — -65°C/+150°C, 1000 cycles
- Temp/Humidity — 85°C/85% RH, 1000 hours
- High Temp Storage — 150°C, 1000 hours

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Process Highlights

- Die thickness — 10.0 ± .5 mils
- Strip solder plating — Matte Sn or Ni/Pd/Au
- Strip marking — Laser
- Lead inspection — Laser/optical
- Pack/ship options — Bar code, dry pack
- Wafer backgrinding — Available

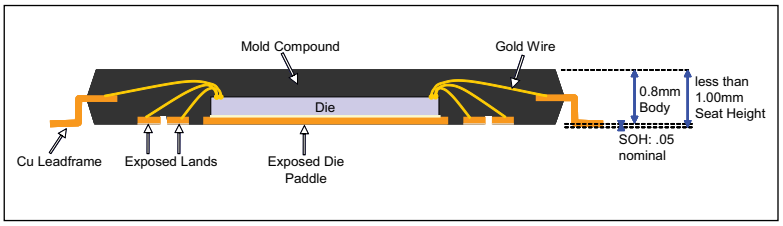
Test Services

- Program generation/conversion
- Product engineering support
- Wafer sort
- Available test/handling technology
- Burn-in capabilities

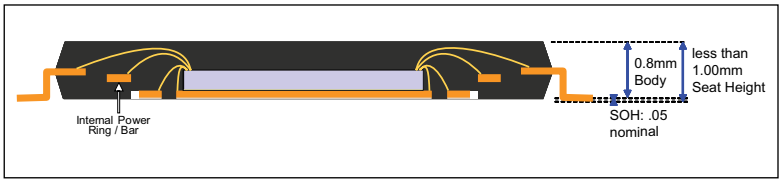
Shipping

- JEDEC outline CS-007 low profile tray

Cross-sections FusionQuad® VQFP



Dual Row Exposed Land Design



Single Row Exposed Land Design

Configuration Options

FusionQuad® Package Options (mm)

Body Size (mm)	Total Max IO Number Possible				Peripheral Lead		Max Die Pad Size (mm)	
	Dual Row Land		Single Row Land					
	0.4 pitch	0.5 pitch	0.4 pitch	0.5 pitch	0.4 pitch	0.5 pitch	0.4 pitch	0.5 pitch
10 x 10	164	132	148	116	88	64	5.3	5.3
12 x 12	200	164	176	140	108	80	6.5	6.5
14 x 14	228	192	204	168	128	100	7.3	7.5
16 x 16	264	224	236	196	148	120	8.5	8.7
20 x 20	316	264	280	228	184	144	9.7	10
24 x 24	356	296	320	260	224	176	9.7	10

Note: Above are estimates only.
Detailed designs have not yet been implemented for all options.
Actual pin counts are pad size dependent.

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