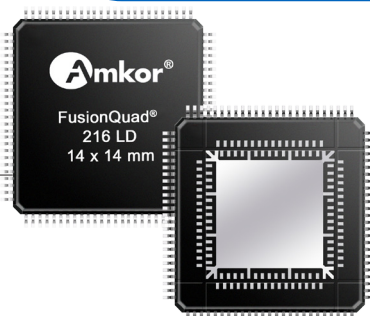




FusionQuad®:

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 leadcount. Additionally, FusionQuad® 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.

System architects, IC designers and packaging engineers will find that FusionQuad® technology offers 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 Gigahertz 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, FusionQuad® technology brings a new lower cost option to applications normally designed into thermally enhanced laminate packages. The 0.8mm 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. The unique footprint of FusionQuad® 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.

FusionQuad®

Features

Amkor's FusionQuad® VQFP/TQFP IC package portfolio provides:

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

Thermal Performance

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

JEDEC (TS2P) Standard Test Boards (Non-Thermally Optimized) Tested @ 1 W

Electrical Performance

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

Simulated Results @ 100 MHz

Reliability

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

Moisture Sensitivity Characterization	JEDEC Level 3 30 °C/60% RH, 192 hours
Temp cycle	-65/+150 °C, 1000 cycles
Temp/Humidity	85 °C/85% RH, 1000 hours
High temp storage	150 °C, 1000 hours

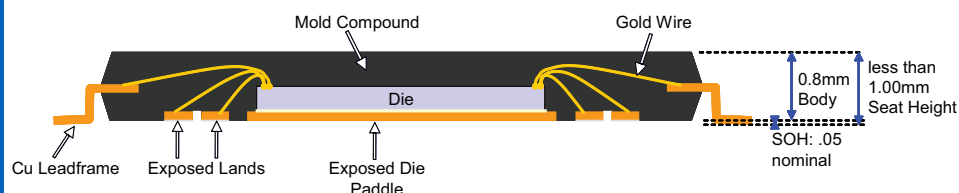
Applications:

Amkor's FusionQuad® technology provides an ideal package format for most IC semiconductor technologies including advanced mixed signal SoCs, motor drivers, MCUs, ASICs, DSPs and a variety of others.

FusionQuad® technology is particularly well suited for applications requiring superior electrical or thermal performance in a cost constrained environment including hard disk drives, laptop PCs, Ethernet communication, digital television, data conversion and many others.

FusionQuad®

FusionQuad® VQFP Cross-Sections



Dual Row Exposed Land Design



Single Row Exposed Land Design

Process Highlights

Die thickness	10.0 ± .5 mils
Strip solder plating	Matte Sn or NiPdAu
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

FusionQuad® Package Options Senario

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