

# MQFP



## FEATURES

- ▶ 10 x 10 mm to 32 x 32 mm body size
- ▶ 44-240 lead counts
- ▶ Custom leadframe design available
- ▶ Die up and down configurations
- ▶ High conductivity copper leadframes
- ▶ JEDEC standard compliant package outlines
- ▶ Integrated thermal enhancement available with heat spreader
- ▶ Fine pitch wirebond capability
- ▶ Pb-free material sets

## APPLICATIONS

Amkor's MQFP line is adapted to meet the increasing challenges of advanced Digital Signal Processors (DSP), microcontrollers, ASIC, gate arrays (FPGA/PLD), and other technologies. These packages fill application needs in commercial, office, industrial and other product areas.

Amkor's MQFP (Metric Quad Flat Pack) packages allow IC packaging engineers and systems designers the flexibility of growing or shrinking IC package size based upon application need. Amkor uses the most up-to-date materials and processes along with advanced equipment, to ensure successful, reliable performance of our IC devices. A complete line of MQFP packages are available to provide security, convenience and success.

## Thermal Enhancement

Some designs and applications require an added margin of thermal performance (power). Amkor's easy and cost-effective solution is a heat spreader. This optional embedded thermal aid improves Theta JA by as much as 15% (without external heat sinks or fans) by supplementing the heat dissipation path from the IC chip to the PCB.

## Thermal Performance

### Multi-Layer PCB

| Package | Body Size (mm) | Pad Size (mm) | θJA at (°C/W) by Velocity (LFPM) |      |      |
|---------|----------------|---------------|----------------------------------|------|------|
|         |                |               | 0                                | 200  | 500  |
| 32 Ld   | 7 x 7          | 5 x 5         | 67.8                             | 55.9 | 50.1 |
| 100 Ld  | 14 x 14        | 8 x 8         | 41.5                             | 33.4 | 29.5 |
| 144 Ld  | 20 x 20        | 8.5 x 8.5     | 38.0                             | 31.2 | 28.1 |
| 176 Ld  | 24 x 24        | 8 x 8         | 38.3                             | 31.9 | 29.0 |

JEDEC standard test boards

\*Pre-JEDEC Standard Test Boards, Tested @ 1W

## Electrical Performance

### Simulated Results @ 100 MHz

| Package | Body Size (mm) | Pad Size (mm) | Lead     | Inductance (nH) | Capacitance (pF) | Resistance (mΩ) |
|---------|----------------|---------------|----------|-----------------|------------------|-----------------|
| 32 Ld   | 7 x 7          | 5 x 5         | Longest  | 0.904           | 0.211            | 9.2             |
|         |                |               | Shortest | 0.799           | 0.202            | 7.8             |
| 48 Ld   | 7 x 7          | 5 x 5         | Longest  | 1.110           | 0.225            | 13.8            |
|         |                |               | Shortest | 0.962           | 0.200            | 12.0            |
| 100 Ld  | 14 x 14        | 8 x 8         | Longest  | 2.300           | 0.419            | 26.3            |
|         |                |               | Shortest | 1.520           | 0.322            | 17.8            |
| 144 Ld  | 20 x 20        | 8.5 x 8.5     | Longest  | 6.430           | 1.100            | 62.9            |
|         |                |               | Shortest | 4.230           | 1.070            | 52.6            |
| 176 Ld  | 24 x 24        | 8 x 8         | Longest  | 9.510           | 1.270            | 89.0            |
|         |                |               | Shortest | 5.200           | 1.340            | 64.0            |

# MQFP

## 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 hours
- ▶ Temp cycle: -65°C/+150°C, 1000 cycles
- ▶ Temp/Humidity: 85°C/85% RH, 1000 hours
- ▶ High temp storage: 150°C, 1000 hours

## Process Highlights

- ▶ Die thickness: Target 18-20 mils (13 min to 25 max)
- ▶ Wirebond: 0.8 mil, 1.0 mil PCC Std
- ▶ Solder plating: Matte Sn
- ▶ Marking: Laser
- ▶ Lead inspection: Laser/optical
- ▶ Pack/Ship options: Barcode, dry pack

## Test Services

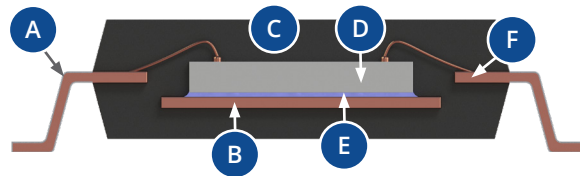
- ▶ Program generation/conversion
- ▶ Product engineering support
- ▶ Wafer sort
- ▶ Final test
- ▶ Tri-temp test capability

## Shipping

- ▶ JEDEC outline CS-004 low-profile tray
  - ▷ Bakable (125°C and 150°C)
  - ▷ Non-bakable

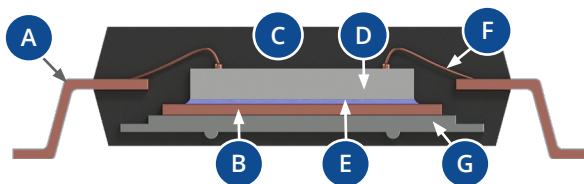
## Cross Section MQFP

### Standard MQFP



- |                         |                              |
|-------------------------|------------------------------|
| <b>A</b> Cu leadframe   | <b>D</b> Die                 |
| <b>B</b> Die attach pad | <b>E</b> Die attach adhesive |
| <b>C</b> Mold compound  | <b>F</b> Au or Cu wire       |

### MQFP With Drop-In Al Heat Spreader



- |                         |                              |
|-------------------------|------------------------------|
| <b>A</b> Cu leadframe   | <b>E</b> Die attach adhesive |
| <b>B</b> Die attach pad | <b>F</b> Au or Cu wire       |
| <b>C</b> Mold compound  | <b>G</b> Al heat spreader    |
| <b>D</b> Die            |                              |

# MQFP

## Configuration Options

### MQFP Nominal Package Dimensions (mm)

| Lead Count              | Body Size | Body Thickness | Lead Form | Standoff | Tip-to-Tip  | JEDEC  | Tray Matrix | Units Per Tray |
|-------------------------|-----------|----------------|-----------|----------|-------------|--------|-------------|----------------|
| 44/52/64                | 10 x 10   | 2.00           | 1.60      | 0.15     | 13.2        | MO-022 | 6 x 16      | 96             |
| 44/52/64                | 10 x 10   | 2.00           | 1.95      | 0.15     | 13.9        | MS-112 | 6 x 16      | 96             |
| 52/64/80/100            | 14 x 14   | 2.67           | 1.60      | 0.15     | 17.2        | MS-022 | 6 x 14      | 84             |
| 52/64/80/100            | 14 x 14   | 2.67           | 1.95      | 0.15     | 17.9        | MS-112 | 6 x 14      | 84             |
| 64/80/100/128           | 14 x 20   | 2.71           | 1.60      | 0.33     | 17.2 x 23.2 | MS-022 | 6 x 11      | 66             |
| 64/80/100/128           | 14 x 20   | 2.71           | 1.95      | 0.23     | 17.9 x 23.9 | MS-012 | 6 x 11      | 66             |
| 120/128/144/160/208/256 | 28 x 28   | 3.37           | 1.30      | 0.13     | 30.6        | MS-029 | 3 x 8       | 24             |
| 120/128/144/160/208/256 | 28 x 28   | 3.37           | 1.30      | 0.33     | 30.6        | MS-029 | 3 x 8       | 24             |
| 120/128/144/160/208/256 | 28 x 28   | 3.37           | 1.60      | 0.33     | 31.2        | MS-022 | 3 x 8       | 24             |
| 240                     | 32 x 32   | 3.40           | 1.30      | 0.38     | 34.6        | MS-029 | 3 x 8       | 24             |
| 240                     | 32 x 32   | 3.40           | 1.30      | 0.32     | 34.6        | MS-029 | 3 x 8       | 24             |



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