

TSSOP/MSOP



FEATURES

- ▶ Cu wire interconnect for lowest cost
- ▶ Standard JEDEC package outlines
- ▶ Multi-die production capability
- ▶ Turnkey test services, including strip test options
- ▶ Available in ExposedPad configuration (Ref: DS571)
- ▶ Green materials are standard – Pb-free and RoHS compliant
- ▶ Stealth dicing (narrow saw streets)
- ▶ Larger/Higher density leadframe strips
- ▶ Leadframe roughening for improved MSL capability

PROCESS HIGHLIGHTS

- ▶ Au plated PCC wire is standard, Au and Ag wire available
- ▶ Wafer backgrinding services available
- ▶ Multiple die and die stacking capability
- ▶ NiPdAu (PPF) lead finish is standard, matte Sn is optional
- ▶ Laser mark on package body

TSSOP (Thin Shrink Small Outline Package) and MSOP (Mini Small Outline Package) are leadframe based, plastic encapsulated packages that are well suited for applications requiring less than 1 mm mounted height. These industry standard packages run in very high volume and provide a value added, low-cost solution for a wide range of applications.

Thermal Performance

Forced Convection, Single-Layer PCB

| Package | Body Size (mm) | θ_{JA} at ($^{\circ}\text{C}/\text{W}$) by Velocity (LFPM) | | |
|---------|----------------|---|-------|-------|
| | | 0 | 200 | 500 |
| 16 Ld | 4.4 x 5.0 | 137.1 | 118.2 | 106.8 |
| 20 Ld | 4.4 x 6.5 | 114.5 | 98.0 | 88.0 |

Forced Convection, Multi-Layer PCB

| Package | Body Size (mm) | θ_{JA} at ($^{\circ}\text{C}/\text{W}$) by Velocity (LFPM) | | |
|---------|----------------|---|------|------|
| | | 0 | 200 | 500 |
| 16 Ld | 4.4 x 5.0 | 89.0 | 81.8 | 78.1 |
| 20 Ld | 4.4 x 6.5 | 73.2 | 66.6 | 63.5 |

JEDEC standard test boards

Electrical Performance

Simulated Results @ 100 MHz

| Package | Body Size (mm) | Lead | Inductance (nH) | Capacitance (pF) | Resistance ($\text{m}\Omega$) |
|---------|----------------|---------------------|-----------------|------------------|---------------------------------|
| 8 Ld | 4.4 x 3.0 | Longest Shortest | 1.470 0.725 | 0.224 0.177 | 13.7 7.5 |
| 28 Ld | 4.4 x 9.7 | Longest Shortest | 2.100 0.713 | 0.368 0.180 | 16.1 6.8 |

Reliability Qualification

Amkor package qualification uses three independent production lots and a minimum of 77 units per test group. All testing includes JSTD-020 moisture preconditioning.

- ▶ Moisture sensitivity characterization
 - ▷ 3 x 3 mm/4.4 mm, 8/10L: JEDEC level 1, 85°C/85% RH, 168 hours
 - ▷ Other than 8/10L: JEDEC level 3, 30°C/60% RH, 192 hours
- ▶ uHAST: 130°C/85% RH, no bias, 96 hours
- ▶ Temp cycle: -65°C/+150°C, 500 cycles
- ▶ High temp storage: 150°C, 1000 hours

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Services And Support

Amkor has a broad base of resources available to help customers bring quality products to market quickly and at the lowest possible cost.

- ▶ Full package characterization
- ▶ Thermal, mechanical stress and electrical performance modeling
- ▶ Turnkey assembly, test and drop ship
- ▶ World-class reliability testing and failure analysis

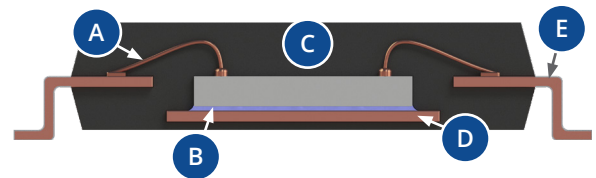
Test Services

- ▶ Program generation/conversion
- ▶ Wafer probe
- ▶ Burn-in capabilities
- ▶ -55°C to +165°C test available
- ▶ Strip test available

Shipping

- ▶ Clear anti-static tube, 20 inch
- ▶ Tape and reel
- ▶ Dry pack
- ▶ Drop ship

Cross Section TSSOP/MSOP



- A** Wirebond
- B** Die attach adhesive
- C** Mold compound
- D** Die attach pad
- E** Cu leadframe

Configuration Options

TSSOP/MSOP Nominal Package Dimensions (mm)

| Package Type | Lead Count | Body Width | Body Length | Body Thickness | Standoff | Overall Height | Lead Pitch | Tip-to-Tip | JEDEC |
|--------------|------------|------------|-------------|----------------|----------|----------------|------------|------------|--------|
| TSSOP | 8 | 4.4 | 3.0 | 0.90 | 0.10 | 1.00 | 0.65 | 6.4 | MO-153 |
| | 14 | 4.4 | 5.0 | 0.90 | 0.10 | 1.00 | 0.65 | 6.4 | MO-153 |
| | 16 | 4.4 | 5.0 | 0.90 | 0.10 | 1.00 | 0.65 | 6.4 | MO-153 |
| | 20 | 4.4 | 6.5 | 0.90 | 0.10 | 1.00 | 0.65 | 6.4 | MO-153 |
| | 28 | 4.4 | 9.7 | 0.90 | 0.10 | 1.00 | 0.65 | 6.4 | MO-153 |
| | 38 | 4.4 | 9.7 | 0.90 | 0.10 | 1.00 | 0.50 | 6.4 | MO-153 |
| MSOP | 8 | 3.0 | 3.0 | 0.85 | 0.10 | 0.95 | 0.65 | 5.0 | MO-187 |
| | 10 | 3.0 | 3.0 | 0.85 | 0.10 | 0.95 | 0.50 | 5.0 | MO-187 |



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