



## Thin Shrink Small Outline Package, Micro Small Outline Package (TSSOP/MSOP)

TSSOP and MSOP 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. A green BOM is standard, allowing devices to meet applicable Pb-free and RoHS standards.

### 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

### New Developments

- Stealth dicing (narrow saw streets)
- Larger/higher density leadframe strips
- Leadframe roughening for improved MSL capability

### Services and Support

Amkor has a broad base of resources available to help customers bring quality new 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

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

[www.amkor.com](http://www.amkor.com)

## TSSOP/MSOP

### Thermal Performance

Forced Convection, Single-layer PCB

Pkg	Body Size (mm)	$\Theta_{JA}$ (°C/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
48 ld	6.1 x 12.5	82.6	70.3	63.7

Forced Convection, Multi-layer PCB

Pkg	Body Size (mm)	$\Theta_{JA}$ (°C/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
48 ld	6.1 x 12.5	58.3	52.3	49.9

JEDEC Standard Test Boards

### Electrical Performance

Pkg	Body Size (mm)	Lead	Inductance (nH)	Capacitance (pF)	Resistance (mΩ)
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
56 ld	6.1 x 14.0	Longest Shortest	4.040 1.380	0.631 0.213	36.5 16.2

Simulated Results @ 100 MHz

### 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 | JEDEC Level 1, 85°C/85% RH, 168 hrs |
| • uHAST                                 | JEDEC Level 3, 30°C/60% RH, 192 hrs |
| • Temp Cycle                            | 130°C/85% RH, No Bias, 96 hrs       |
| • High Temp Storage                     | -65°C/+150°C, 500 cycles            |
|   | 150°C, 1000 hours                   |

### Process Highlights

- Pcc wire bonding standard, Ag wire available
- Wafer backgrinding services available
- Multiple die and die stacking capability
- NiPdAu (PPF) or Matte Sn lead finish options
- Laser mark on package body



DS350P  
Rev Date: 4/16

Questions? Contact us: [marketing@amkor.com](mailto:marketing@amkor.com)

## TSSOP/MSOP

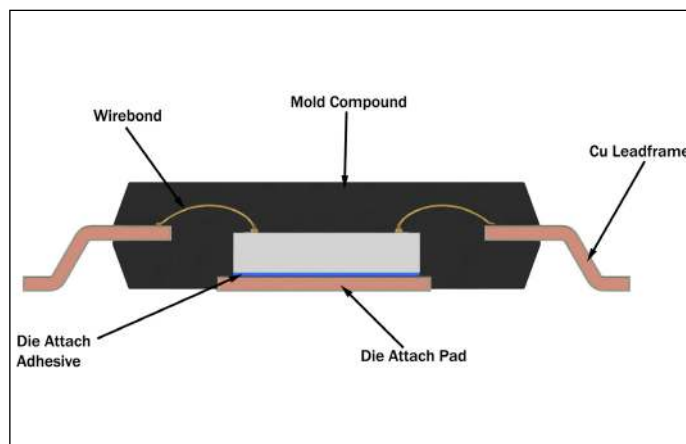
### Test Services

- 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



### 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
	24	4.4	7.8	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
	48	6.1	12.5	0.90	0.10	1.00	0.50	8.1	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

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



With respect to the information in this document, Amkor makes no guarantee or warranty of its accuracy or that the use of such information will not infringe upon the intellectual rights of third parties. Amkor shall not be responsible for any loss or damage of whatever nature resulting from the use of, or reliance upon it and no patent or other license is implied hereby. This document does not in any way extend or modify Amkor's warranty on any product beyond that set forth in its standard terms and conditions of sale. Amkor reserves the right to make changes in its product and specifications at any time and without notice. The Amkor name and logo are registered trademarks of Amkor Technology, Inc. All other trademarks mentioned are property of their respective companies. © 2016, Amkor Technology Incorporated. All Rights Reserved.

DS350P  
Rev Date: 4/16