



PowerSOP® Packages: (PSOP)

This Amkor-developed family of power IC packages significantly increases the thermal efficiency of power constrained standard SOIC packages. The PowerSOP (PSOP) improves Theta JA up to 50% over a standard SOIC thereby expanding the margin of operating parameters. The large integrated exposed copper heat-slug to which the IC chip is directly attached results in an increased ability to dissipate heat. The leadframe and heat-slug are mechanically attached, leaving the leads electrically isolated. The PSOP 3 package is compliant to JEDEC outline MO-166. The PSOP 2 packages are essentially compliant to JEDEC standards MS-012 or MS-013, except for the heat-slug exposure on the bottom of the package and the low stand-off height. These design features allow maximum thermal management by directly soldering the slug to the PCB. Furthermore, there are two types of PSOPs (2 and 3) available with various features and benefits to address different market application needs.

Applications:

Increased end-application densities and shrinking product sizes demand more from IC packages. PSOPs give designers the needed margin for designing and producing high performing products such as telecom, disk drives, wireless, CATV/RF modules, radio, automotive/industrial and other similar applications. GaAs, SiGe and hi-speed silicon technologies work especially well in PSOP packages due to added shielding and grounding capabilities.

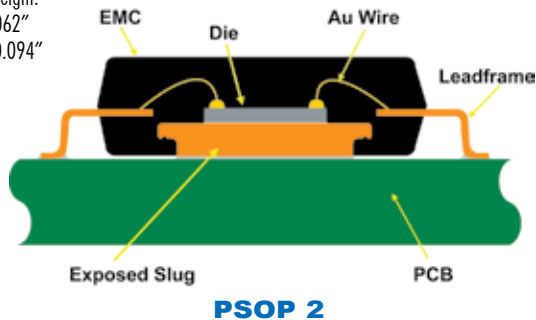
PowerSOP® 2&3

Features:	Exceptional performance through the innovative design of PSOPs offer: <ul style="list-style-type: none"> • Up to 50% improvement in Theta JA when heat-slug soldered to board • Highly conductive copper heat-slug and leadframes • PSOP3 has optional soft solder die attach for enhanced power capability 																																																																																								
Thermal Resistance:	Single Layer PCB <table border="1"> <thead> <tr> <th rowspan="2">Pkg</th> <th rowspan="2">Body Size</th> <th rowspan="2">Pad Size</th> <th colspan="3">Theta JA (°C/W) by Velocity (LFPM)</th> </tr> <tr> <th>0 S/NS</th> <th>200 S/NS</th> <th>500 S/NS</th> </tr> </thead> <tbody> <tr> <td colspan="7">PSOP 2</td> </tr> <tr> <td>8</td> <td>3.8 x 4.9</td> <td>2.3 x 3.1</td> <td>144.1/157.6</td> <td>120.2/131.1</td> <td>104.2/112.8</td> </tr> <tr> <td>16</td> <td>3.8 x 9.9</td> <td>2.3 x 4.9</td> <td>91.2/95.9</td> <td>72.2/75.2</td> <td>61.8/64.4</td> </tr> <tr> <td colspan="7">PSOP 3</td> </tr> <tr> <td>20</td> <td>11 x 15.9</td> <td>7.5 x 7.9</td> <td>50.8/52.4</td> <td>35.7/37.6</td> <td>27.8/28.8</td> </tr> </tbody> </table> Multi-Layer PCB <table border="1"> <thead> <tr> <th rowspan="2">Pkg</th> <th rowspan="2">Body Size</th> <th rowspan="2">Pad Size</th> <th colspan="3">Theta JA (°C/W) by Velocity (LFPM)</th> </tr> <tr> <th>0 S/NS</th> <th>200 S/NS</th> <th>500 S/NS</th> </tr> </thead> <tbody> <tr> <td colspan="7">PSOP 2</td> </tr> <tr> <td>8</td> <td>3.8 x 4.9</td> <td>2.3 x 3.1</td> <td>51.8/95.3</td> <td>45.5/86.5</td> <td>42.6/80.6</td> </tr> <tr> <td>16</td> <td>3.8 x 9.9</td> <td>2.3 x 4.9</td> <td>30.2/51.6</td> <td>25.0/45.3</td> <td>23.0/42.3</td> </tr> <tr> <td colspan="7">PSOP 3</td> </tr> <tr> <td>20</td> <td>11 x 15.9</td> <td>7.5 x 7.9</td> <td>19.2/25.7</td> <td>14.2/20.4</td> <td>12.2/17.8</td> </tr> </tbody> </table> JEDEC Standard Test Boards S - Slug Soldered to Test Board N/S - Slug Not Soldered to Test Board							Pkg	Body Size	Pad Size	Theta JA (°C/W) by Velocity (LFPM)			0 S/NS	200 S/NS	500 S/NS	PSOP 2							8	3.8 x 4.9	2.3 x 3.1	144.1/157.6	120.2/131.1	104.2/112.8	16	3.8 x 9.9	2.3 x 4.9	91.2/95.9	72.2/75.2	61.8/64.4	PSOP 3							20	11 x 15.9	7.5 x 7.9	50.8/52.4	35.7/37.6	27.8/28.8	Pkg	Body Size	Pad Size	Theta JA (°C/W) by Velocity (LFPM)			0 S/NS	200 S/NS	500 S/NS	PSOP 2							8	3.8 x 4.9	2.3 x 3.1	51.8/95.3	45.5/86.5	42.6/80.6	16	3.8 x 9.9	2.3 x 4.9	30.2/51.6	25.0/45.3	23.0/42.3	PSOP 3							20	11 x 15.9	7.5 x 7.9	19.2/25.7	14.2/20.4	12.2/17.8
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Reliability:	IC chips are assembled in optimized package designs with proven reliable semiconductor materials. <ul style="list-style-type: none"> • High temp storage: 150 °C, 1000 hrs. • HAST: 130 °C/85% RH, no bias, 96 hours • Temp cycle: -65/150 °C, 500 cycles 																																																																																								

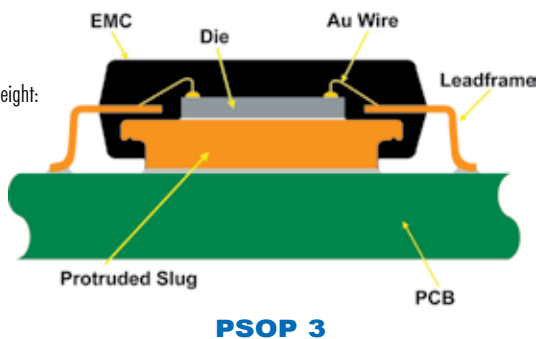
PowerSOP® 2&3

Cross-sections PSOP 2&3

PSOP2 Mounted Height:
0.150" body - 0.062"
0.300" body = 0.094"



PSOP3 Mounted Height:
3.35 mm



Process Highlights

Leadframes	High conductive Copper Alloy
Die thickness (max)	.150" PSOP 2 - 15 mil .300" PSOP 2 - 18 mil 11 mm PSOP 3 - 26 mil
Solder plating	Matte Sn standard NiPdAu (PPF), SnPb optional
Marking	Laser
Pack/ship options	Bar code, dry pack

Test Services

Contact Amkor Test Services for more details.

- Program generation/conversion
- Product engineering support
- Wafer sort
- Burn-in
- Tape and reel services
- Ambient to +165 °C test available
- 256 pin x 20 MHz test system available

Shipping

Clear anti-static tube (20 inch)

PowerSOP® 2 and 3 Nominal Package Dimensions

Package	Body Size	Lead Pitch	Lead Count	Body Length	Lead Length	Tip to Tip	Body Thck	Stand-off	Mounted Height	JEDEC	Units per tube
PSOP 2 (units in inches unless otherwise stated)											
PSOP 2	.150" (3.9 mm)	0.050	8	0.194	0.041	0.236	0.060	.002	.062	MS-012*	97
PSOP 2	.150" (3.9 mm)	0.050	16	0.391	0.041	0.236	0.060	.002	.062	MS-012*	48
PSOP 2	.300" (7.5 mm)	0.050	16	0.407	0.055	0.406	0.092	.002	.094	MS-013*	46
PSOP 2	.300" (7.5 mm)	0.050	20	0.505	0.055	0.406	0.092	.002	.094	MS-013*	37
PSOP 3 (units in mm unless otherwise stated)											
PSOP 3	11.0 mm (.433")	1.270	20	15.9	1.60	14.2	3.15	0.20	3.35	MO-166	30
PSOP 3	11.0 mm (.433")	1.000	24	15.9	1.60	14.2	3.15	0.20	3.35	MO-166	30
PSOP 3	11.0 mm (.433")	0.800	30	15.9	1.60	14.2	3.15	0.20	3.35	MO-166	30
PSOP 3	11.0 mm (.433")	0.650	36	15.9	1.60	14.2	3.15	0.20	3.35	MO-166	30
PSOP 3	11.0 mm (.433")	0.650	44	15.9	1.60	14.2	3.15	0.20	3.35	MO-166	30

*JEDEC outline does not include the heat-slug feature or the reduced standoff height that facilitates board mounting of the exposed heat-slug