

N-Channel 30-V (D-S) Fast Switching MOSFET

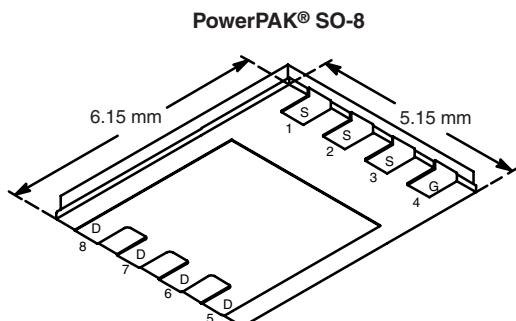
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
30	0.0075 at $V_{GS} = 10$ V	19
	0.010 at $V_{GS} = 4.5$ V	17

FEATURES

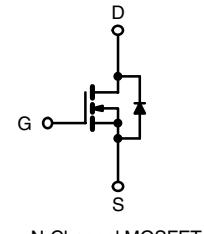
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



Bottom View



N-Channel MOSFET

Ordering Information: Si7446BDP-T1-E3 (Lead (Pb)-free)
Si7446BDP-T1-GE3 (Lead-(Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted						
Parameter		Symbol	10 s	Steady State	Unit	
Drain-Source Voltage		V_{DS}	30		V	
Gate-Source Voltage		V_{GS}	± 20			
Continuous Drain Current ($T_J = 150$ °C) ^a	$T_A = 25$ °C	I_D	19	12	A	
	$T_A = 70$ °C		15	9		
Pulsed Drain Current		I_{DM}	50			
Continuous Source Current (Diode Conduction) ^a		I_S	4.0	1.6		
Maximum Power Dissipation ^a	$T_A = 25$ °C	P_D	4.8	1.9	W	
	$T_A = 70$ °C		3.0	1.2		
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C	
Soldering Recommendations (Peak Temperature) ^{b, c}			260			

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 10$ s	R_{thJA}	21	26	°C/W
	Steady State		55	65	
Maximum Junction-to-Case (Drain)		Steady State	R_{thJC}	1.6	2.0

Notes

- Surface Mounted on 1" x 1" FR4 board.
- See Solder Profile (www.vishay.com/pbg273257). The PowerPAK SO-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

MOSFET SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

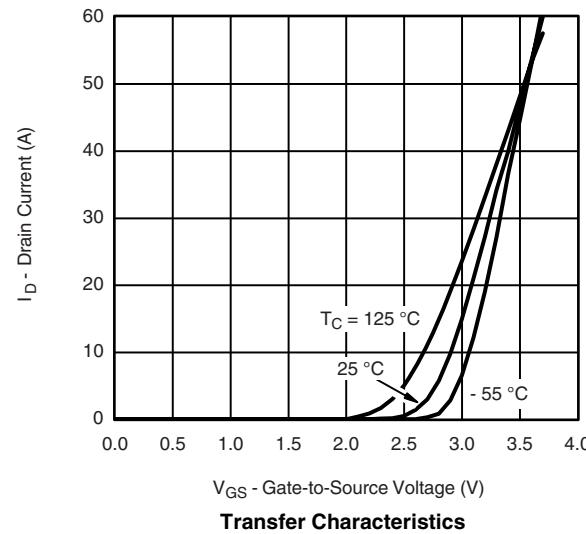
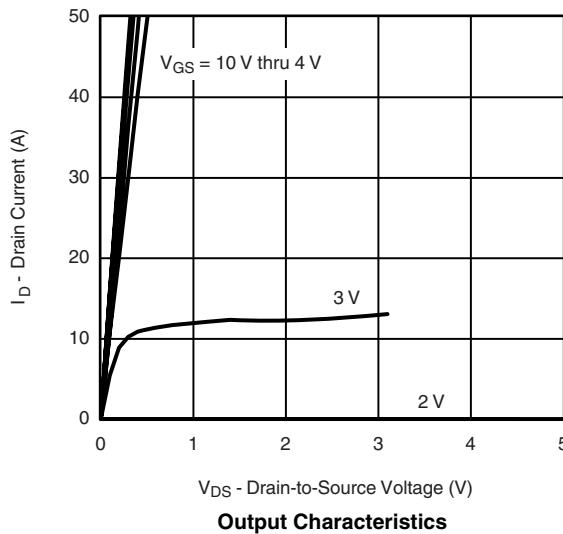
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	1.0		3.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0 \text{ V}$		1		μA
		$V_{DS} = 30 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 55^\circ\text{C}$		5		
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \geq 5 \text{ V}$, $V_{GS} = 10 \text{ V}$	40			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$		0.0064	0.0075	Ω
		$V_{GS} = 4.5 \text{ V}$, $I_D = 17 \text{ A}$		0.0084	0.010	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 19 \text{ A}$		60		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 4.0 \text{ A}$, $V_{GS} = 0 \text{ V}$		0.75	1.2	V
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$		3076		pF
Output Capacitance	C_{oss}			657		
Reverse Transfer Capacitance	C_{rss}			248		
Total Gate Charge	Q_g	$V_{DS} = 15 \text{ V}$, $V_{GS} = 5.0 \text{ V}$, $I_D = 19 \text{ A}$		22	33	nC
Gate-Source Charge	Q_{gs}			8.3		
Gate-Drain Charge	Q_{gd}			4.7		
Gate Resistance	R_g		0.4	0.8	1.2	Ω
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 15 \text{ V}$, $R_L = 15 \Omega$ $I_D \geq 1 \text{ A}$, $V_{GEN} = 10 \text{ V}$, $R_g = 6 \Omega$		20	30	ns
Rise Time	t_r			16	25	
Turn-Off Delay Time	$t_{d(\text{off})}$			120	180	
Fall Time	t_f			43	65	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 2.3 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$		40	80	

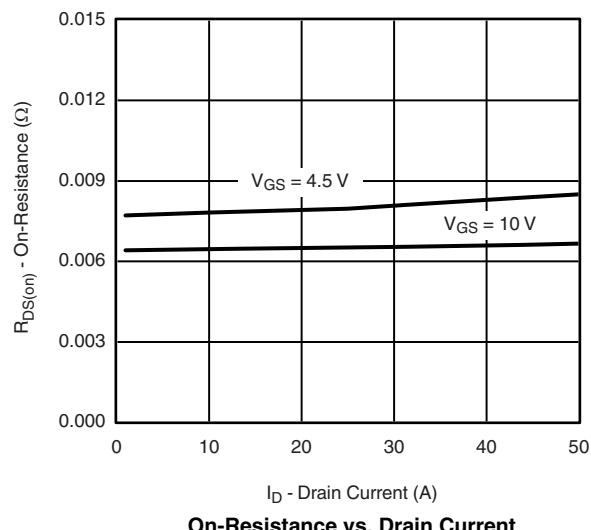
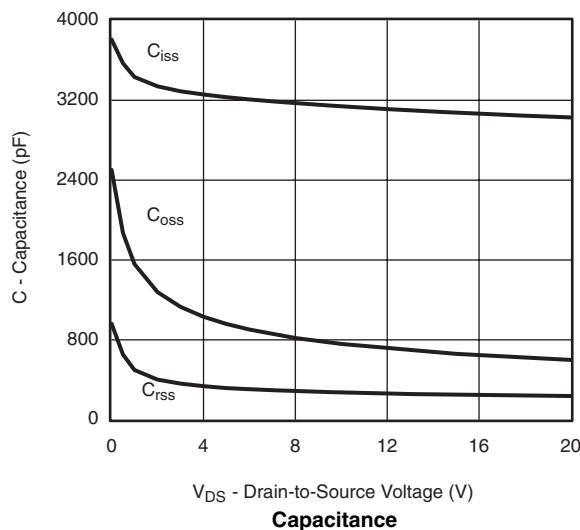
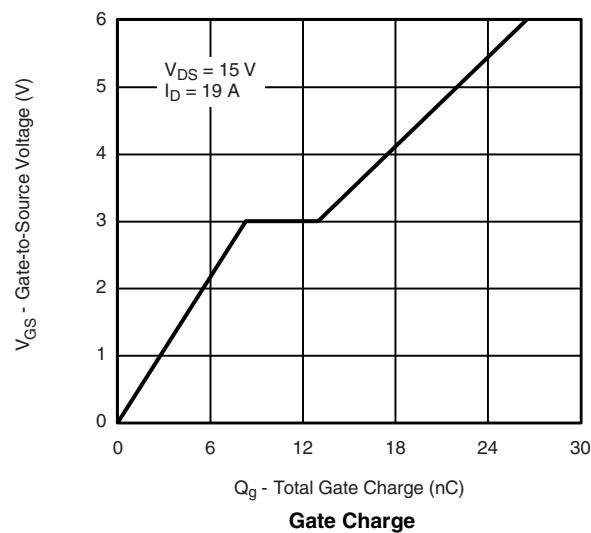
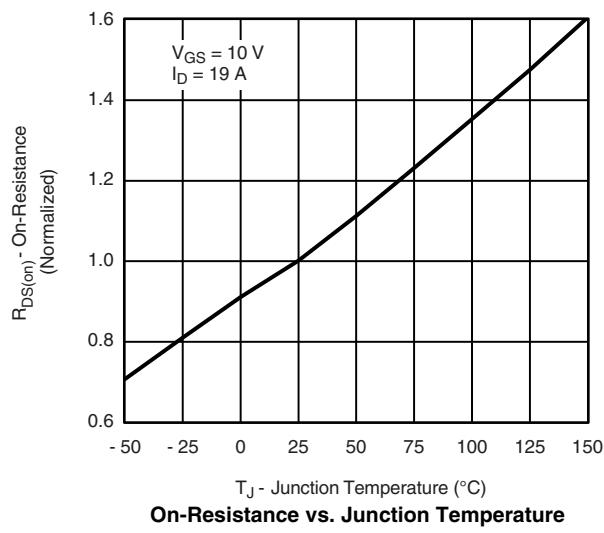
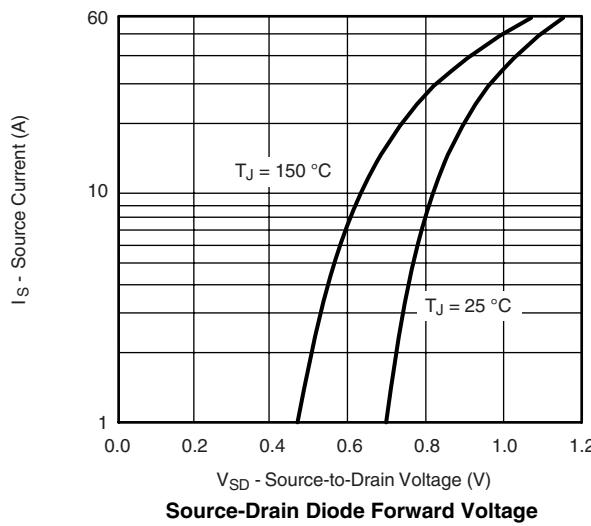
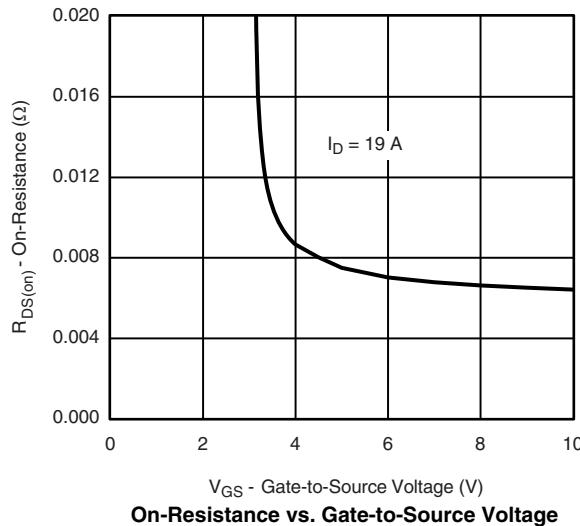
Notes:

a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$.

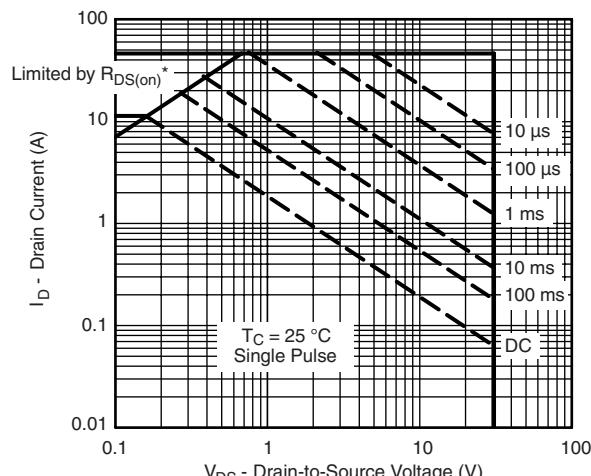
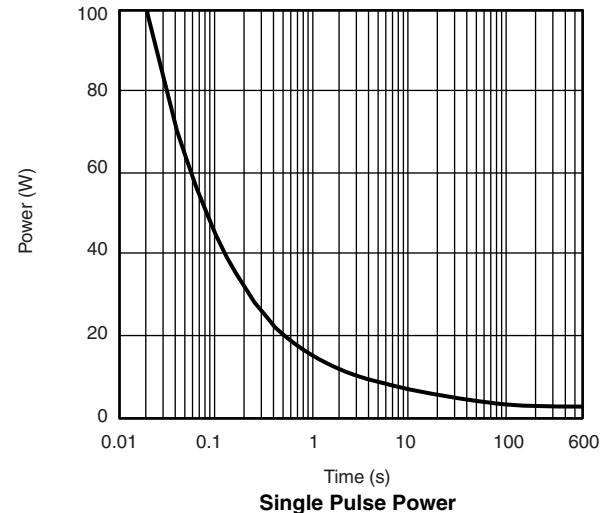
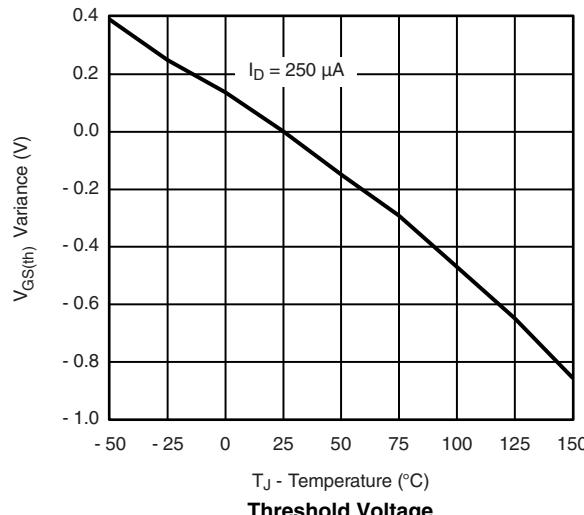
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS 25°C , unless otherwise noted


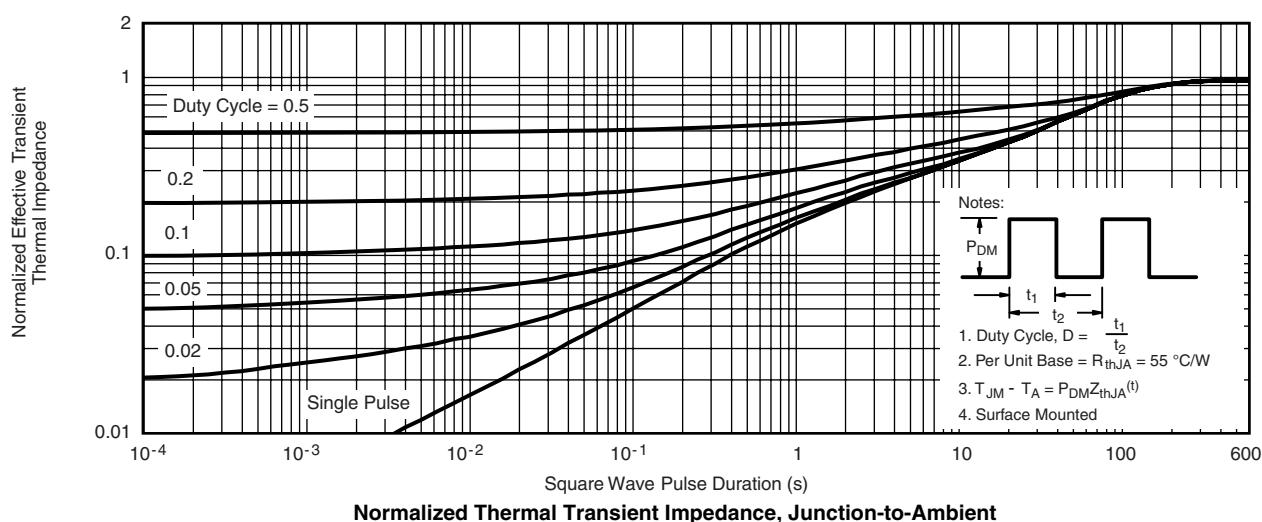
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

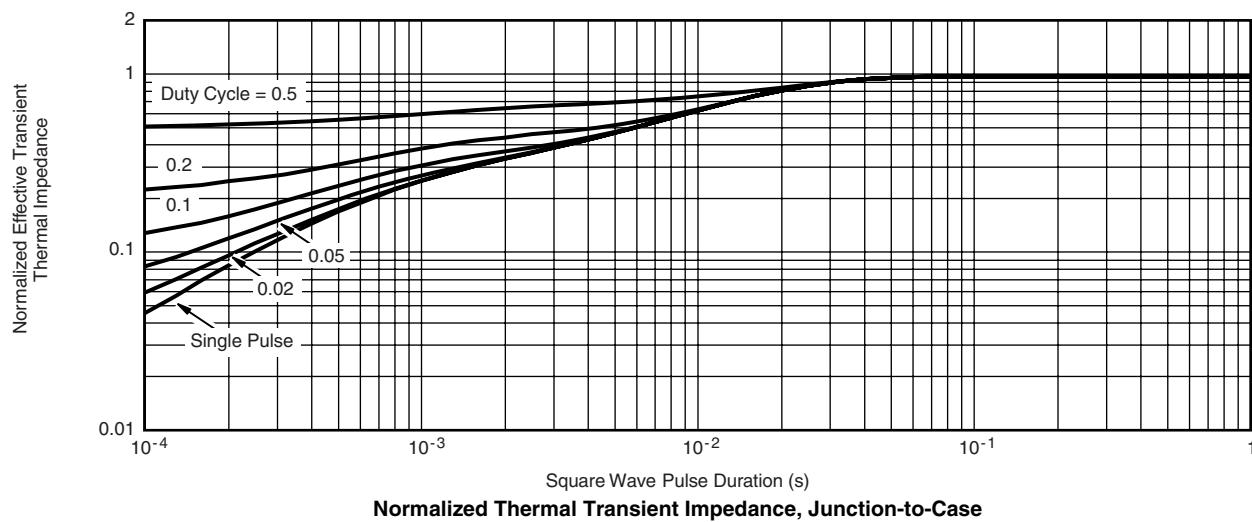
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

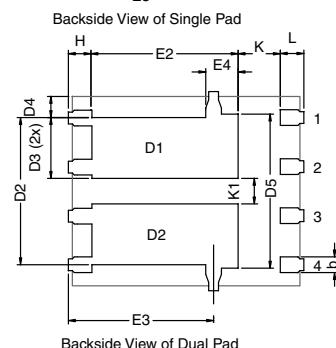
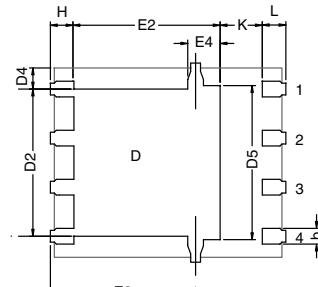
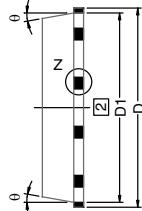
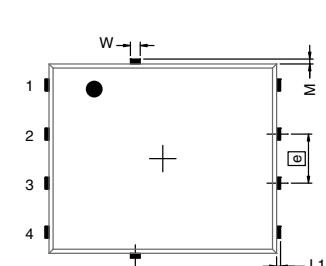
Safe Operating Area, Junction-to-Case



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?72554.

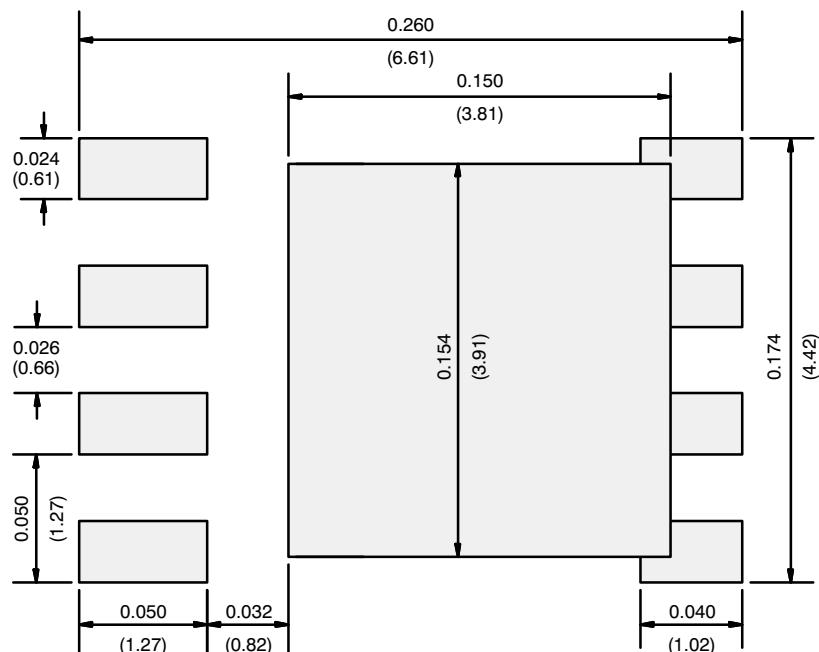
PowerPAK® SO-8, (Single/Dual)


Notes

1. Inch will govern.
2. Dimensions exclusive of mold gate burrs.
3. Dimensions exclusive of mold flash and cutting burrs.

DIM.	MILLIMETERS			INCHES			
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	0.97	1.04	1.12	0.038	0.041	0.044	
A1		-	0.05	0	-	0.002	
b	0.33	0.41	0.51	0.013	0.016	0.020	
c	0.23	0.28	0.33	0.009	0.011	0.013	
D	5.05	5.15	5.26	0.199	0.203	0.207	
D1	4.80	4.90	5.00	0.189	0.193	0.197	
D2	3.56	3.76	3.91	0.140	0.148	0.154	
D3	1.32	1.50	1.68	0.052	0.059	0.066	
D4	0.57 typ.			0.0225 typ.			
D5	3.98 typ.			0.157 typ.			
E	6.05	6.15	6.25	0.238	0.242	0.246	
E1	5.79	5.89	5.99	0.228	0.232	0.236	
E2 (for AL product)	3.30	3.48	3.66	0.130	0.137	0.144	
E2 (for other product)	3.48	3.66	3.84	0.137	0.144	0.151	
E3	3.68	3.78	3.91	0.145	0.149	0.154	
E4 (for AL product)	0.58 typ.			0.023 typ.			
E4 (for other product)	0.75 typ.			0.030 typ.			
e	1.27 BSC			0.050 BSC			
K (for AL product)	1.45 typ.			0.057 typ.			
K (for other product)	1.27 typ.			0.050 typ.			
K1	0.56	-	-	0.022	-	-	
H	0.51	0.61	0.71	0.020	0.024	0.028	
L	0.51	0.61	0.71	0.020	0.024	0.028	
L1	0.06	0.13	0.20	0.002	0.005	0.008	
θ	0°	-	12°	0°	-	12°	
W	0.15	0.25	0.36	0.006	0.010	0.014	
M	0.125 typ.			0.005 typ.			

ECN: C13-0702-Rev. K, 20-May-13
DWG: 5881

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single

Recommended Minimum Pads
Dimensions in Inches/(mm)

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