

## P-Channel 60 V (D-S) MOSFET

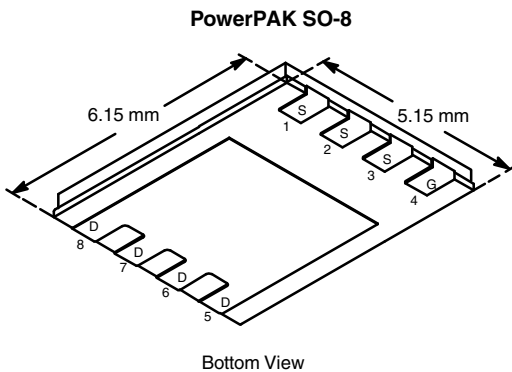
PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
-60	0.0145 at V <sub>GS</sub> = -10 V	-14.4
	0.019 at V <sub>GS</sub> = -4.5 V	-12.6

### FEATURES

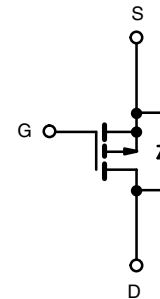
- TrenchFET® Power MOSFETs
- Low thermal resistance PowerPAK® package with low 1.07 mm profile
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available



Bottom View



P-Channel MOSFET

**Ordering Information:** Si7461DP-T1-E3 (Lead (Pb)-free)  
Si7461DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)				
PARAMETER	SYMBOL	10 s	STEADY STATE	UNIT
Drain-Source Voltage	V <sub>DS</sub>	-60		V
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	-14.4	-8.6
		T <sub>A</sub> = 70 °C	-11.5	-6.9
Pulsed Drain Current	I <sub>DM</sub>	-60		A
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	-4.5	-1.6	
Avalanche Current	I <sub>AS</sub>	50		
Single Pulse Avalanche Energy		E <sub>AS</sub>	125	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	5.4	1.9
		T <sub>A</sub> = 70 °C	3.4	1.2
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C
Soldering Recommendations (Peak Temperature) <sup>b, c</sup>	260			

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 10 s	18	23
		Steady State	52	65
Maximum Junction-to-Case (Drain)	R <sub>thJC</sub>	1	1.3	°C/W

### Notes

- Surface mounted on 1" x 1" FR4 board.
- See solder profile ([www.vishay.com/ppg?73257](http://www.vishay.com/ppg?73257)). 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.



SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1	-	-3	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -60\ \text{V}, V_{GS} = 0\ \text{V}$	-	-	-1	$\mu\text{A}$
		$V_{DS} = -60\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$	-	-	-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\ \text{V}, V_{GS} = -10\ \text{V}$	-40	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\ \text{V}, I_D = -14.4\ \text{A}$	-	0.0115	0.0145	$\Omega$
		$V_{GS} = -4.5\ \text{V}, I_D = -12.6\ \text{A}$	-	0.0150	0.0190	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\ \text{V}, I_D = -14.4\ \text{A}$	-	31	-	S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -4.5\ \text{A}, V_{GS} = 0\ \text{V}$	-	-0.8	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -30\ \text{V}, V_{GS} = -10\ \text{V}, I_D = -14.4\ \text{A}$	-	121	190	nC
Gate-Source Charge	$Q_{gs}$		-	20	-	
Gate-Drain Charge	$Q_{gd}$		-	32	-	
Gate Resistance	$R_g$		-	3	-	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -30\ \text{V}, R_L = 30\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -10\ \text{V}, R_g = 6\ \Omega$	-	20	30	ns
Rise Time	$t_r$		-	20	30	
Turn-Off Delay Time	$t_{d(off)}$		-	205	310	
Fall Time	$t_f$		-	90	135	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -4.5\ \text{A}, dI/dt = 100\ \text{A}/\mu\text{s}$	-	45	70	

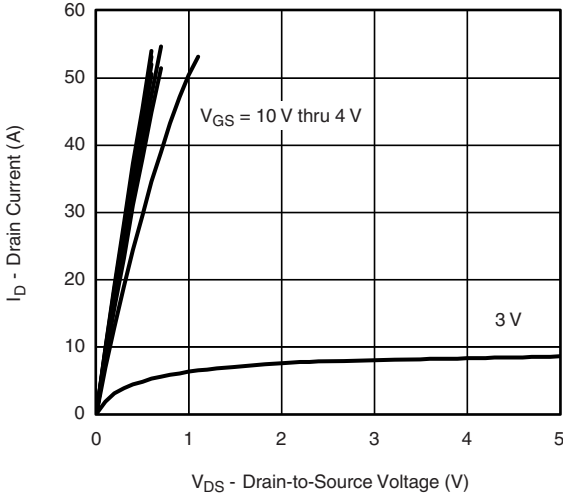
**Notes**

- a. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

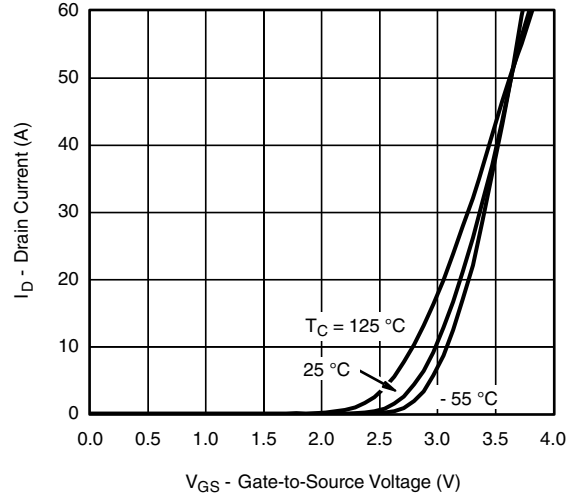
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



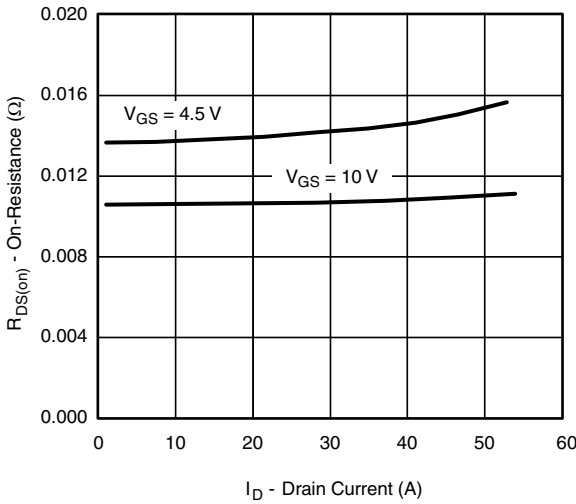
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



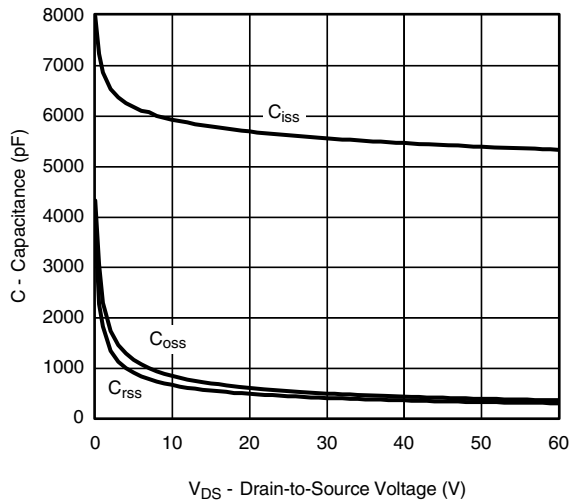
Output Characteristics



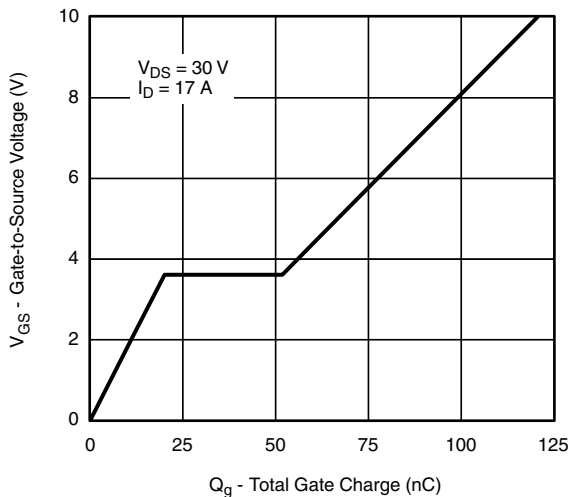
Transfer Characteristics



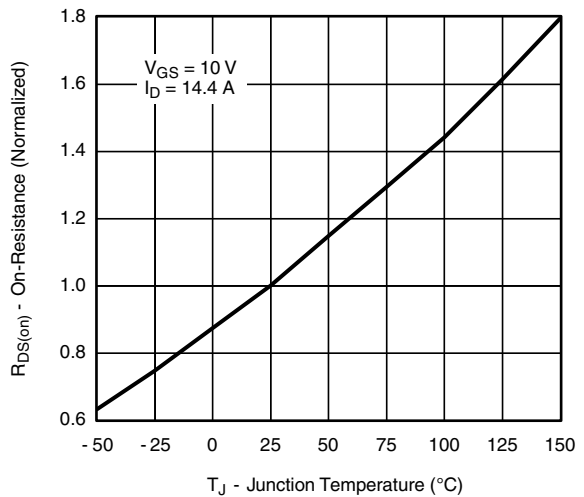
On-Resistance vs. Drain Current



Capacitance



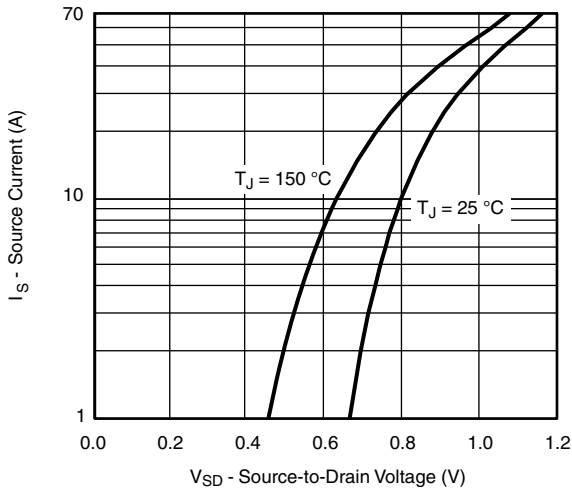
Gate Charge



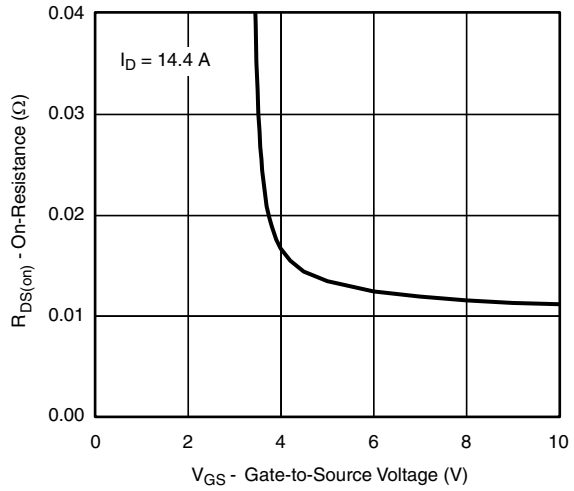
On-Resistance vs. Junction Temperature



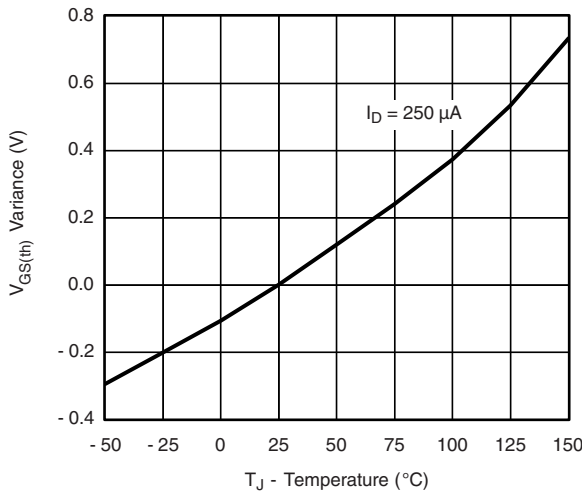
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



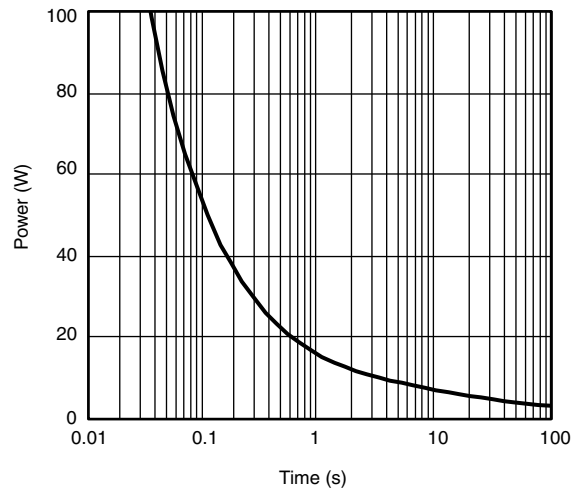
**Source-Drain Diode Forward Voltage**



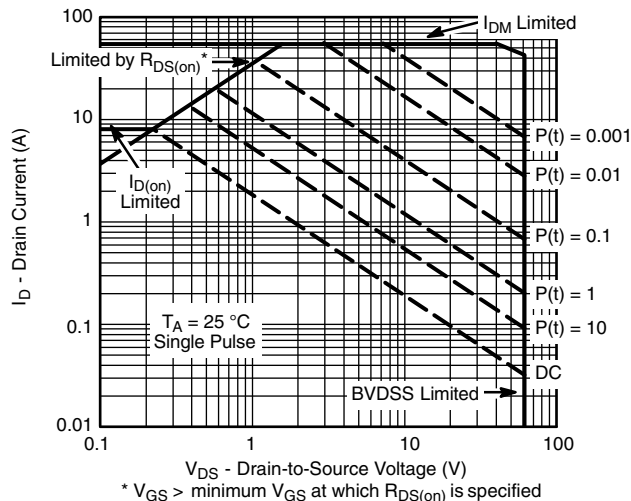
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



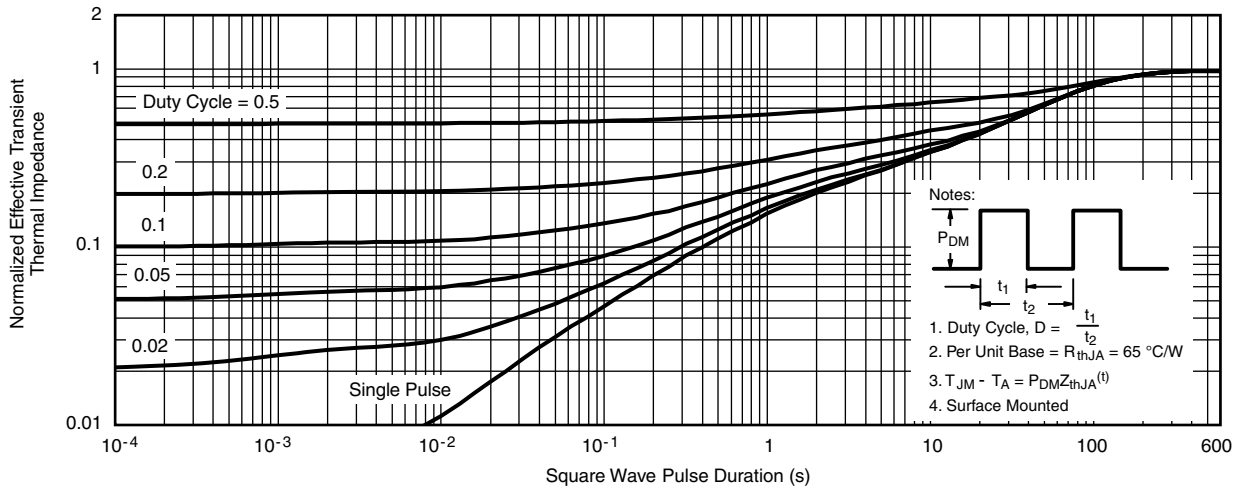
**Single Pulse Power, Junction-to-Ambient**



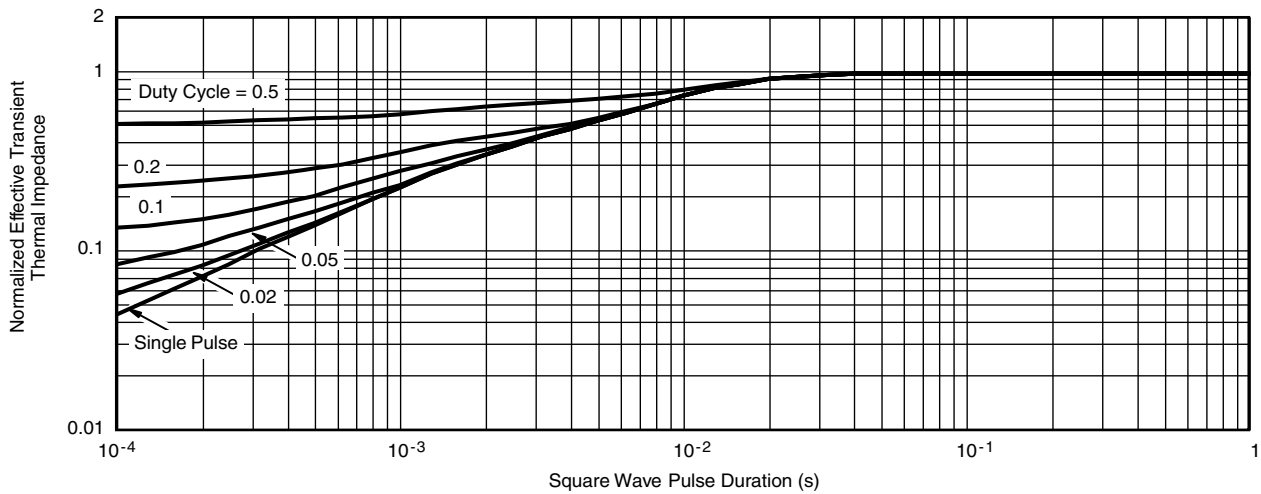
**Safe Operating Area**



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

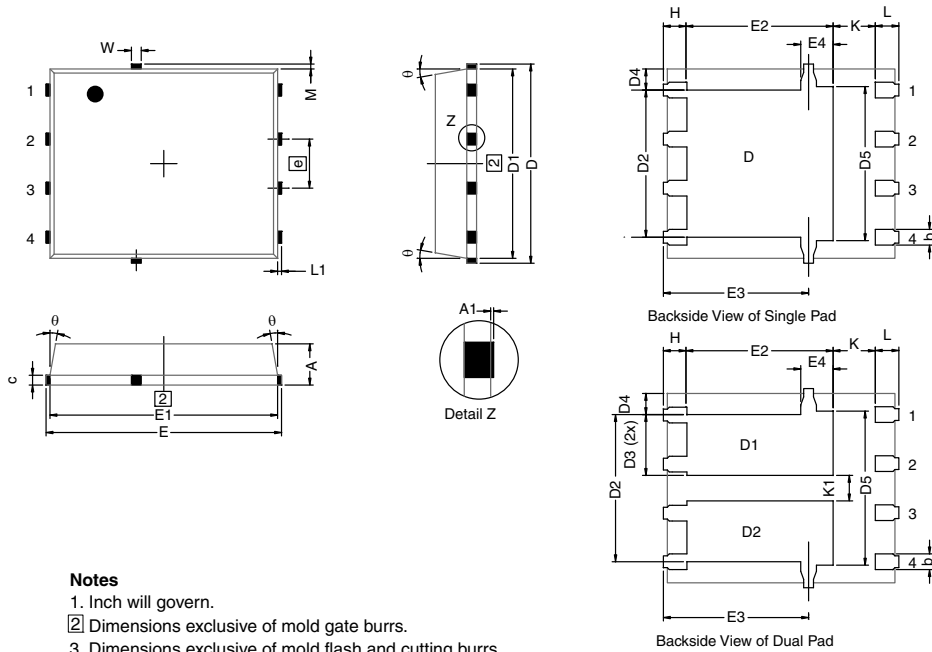


Normalized Thermal Transient Impedance, Junction-to-Case

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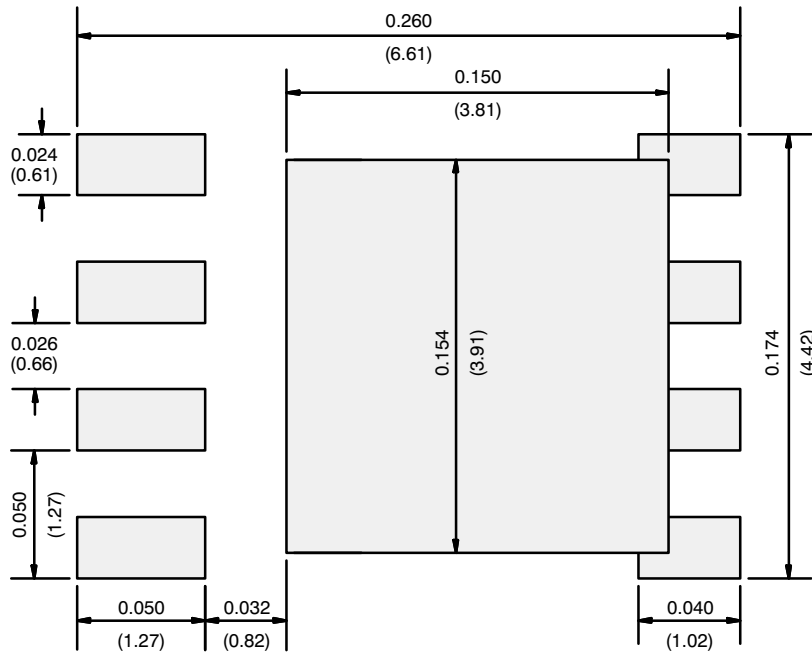
# PowerPAK<sup>®</sup> SO-8, (Single/Dual)



- 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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