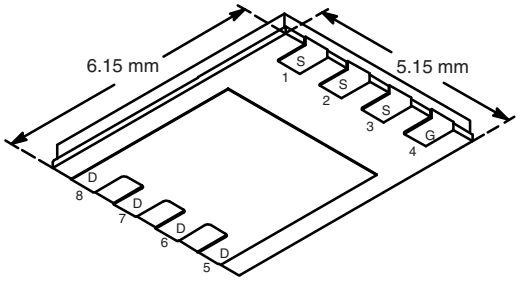
P-Channel 200 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)I	D (A)	Q_g (Typ.)
- 200	0.174 at V_{GS} = - 10 V	- 3.8	88
	0.180 at V_{GS} = - 6 V	- 3.6	

PowerPAK SO-8



Bottom View

Ordering Information: Si7431DP-T1-E3 (Lead (Pb)-free)
Si7431DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

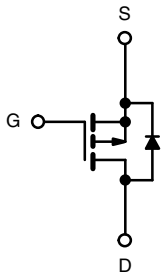
FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFETs
- Ultra-Low On-Resistance Critical for Application
- Low Thermal Resistance PowerPAK® Package with Low 1.07 mm Profile
- 100 % R_g and Avalanche Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

APPLICATIONS

- Active Clamp in Intermediate DC/DC Power Supplies



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)					
Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 200		V
Gate-Source Voltage		V_{GS}	± 20		
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25 °C	I_D	- 3.8	- 2.2	A
	T_A = 70 °C		- 3.0	- 1.8	
Pulsed Drain Current		I_{DM}	- 30		
Continuous Source Current (Diode Conduction)[a]		I_S	- 4.2	- 1.6	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	- 30		
Single Pulse Avalanche Energy		E_{AS}	45		mJ
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	5.4	1.9	W
	T_A = 70 °C		3.4	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 Symb		ol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 s	R_{thJA}	18	23	°C/W
	Steady State		50	65	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.0	1.5	

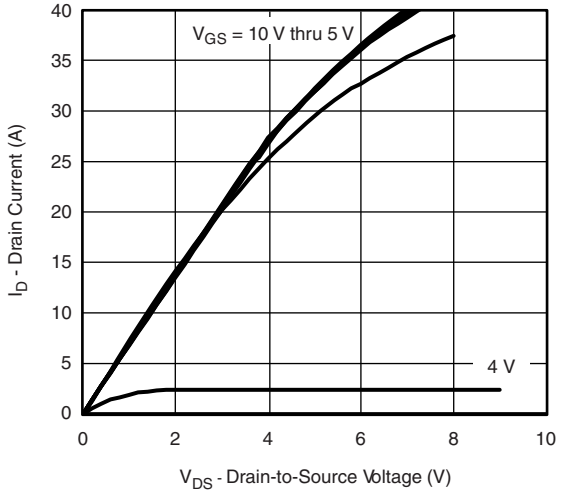
Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. See solder profile (www.vishay.com/ppg?73257). The PowerPAK SO-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
c. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter S	**ymbol**	**Test Condition**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 2.0		- 4.0	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 200 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 200 V, V_{GS} = 0 V, T_J = 70 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$ V	$_{DS}$ = - 10 V, V_{GS} = - 10 V	- 20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 3.8 A		0.145	0.174	Ω
		V_{GS} = - 6 V, I_D = - 3.6 A		0.147	0.180	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = - 3.8 A		17		S
Diode Forward Voltage[a]	V_{SD}	I_S = - 4.2 A, V_{GS} = 0 V		- 0.78	- 1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = - 75 V, V_{GS} = - 10 V, I_D = - 5.2 A		88	135	nC
Gate-Source Charge	Q_{gs}			16.5		
Gate-Drain Charge	Q_{gd} 25					
Gate Resistance	R_g		1.534		.5	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 75 V, R_L = 15.5 Ω $I_D \cong$ - 4.8 A, V_{GEN} = - 10 V, R_g = 6 Ω		23	40	ns
Rise Time	t_r			49	75	
Turn-Off Delay Time	$t_{d(off)}$ 110				180	
Fall Time	t_f			66	100	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = - 2.9 A, dI/dt = 100 A/µs		75	120	

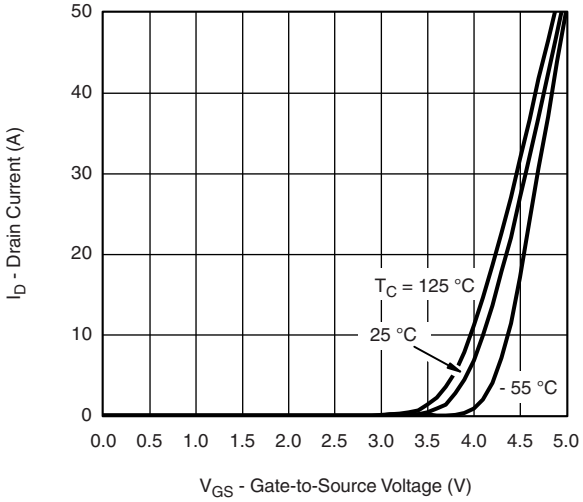
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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)

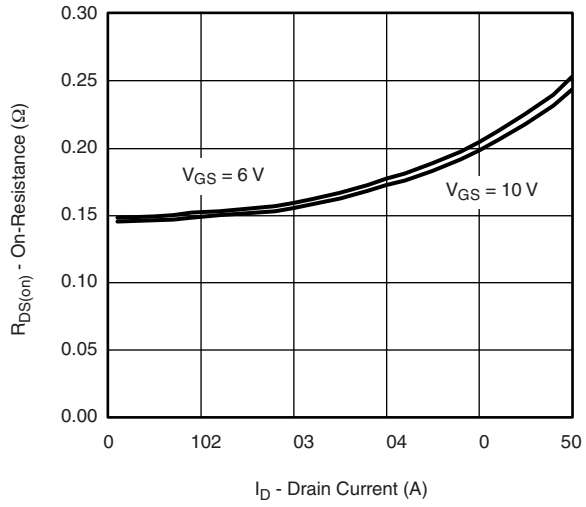


Output Characteristics

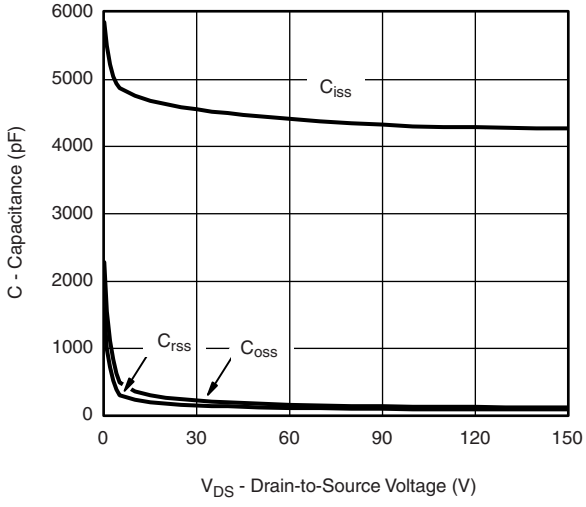


Transfer Characteristics

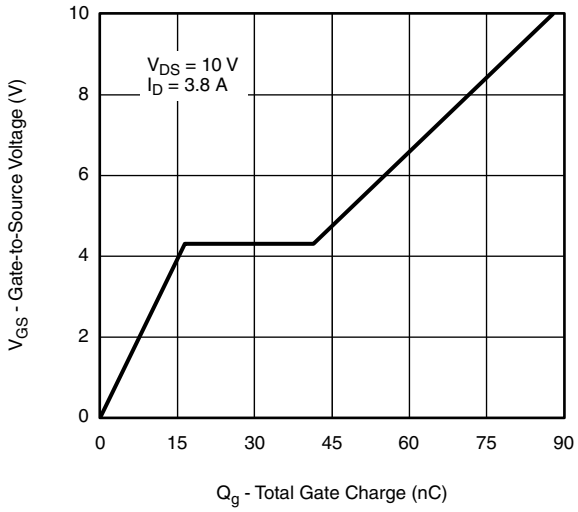
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



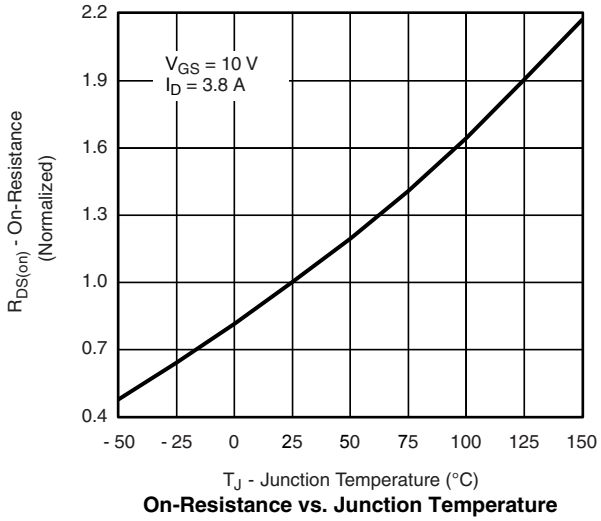
On-Resistance vs. Drain Current



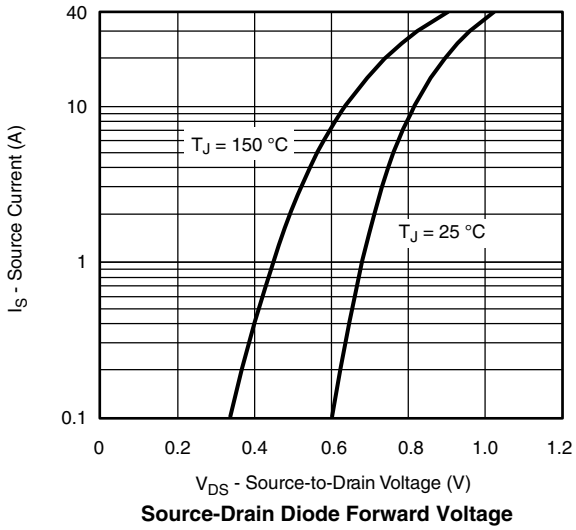
Capacitance



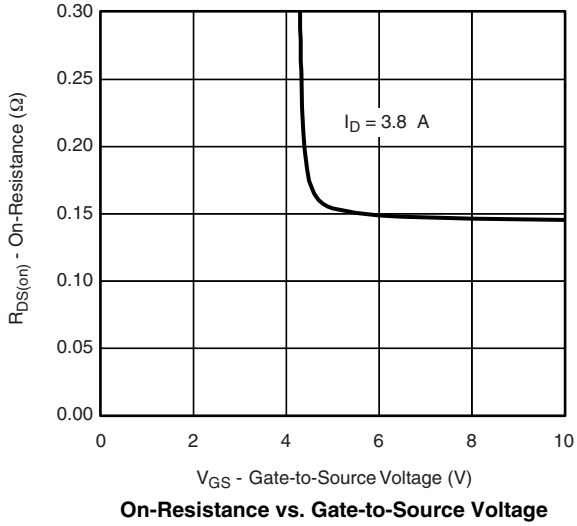
Gate Charge



On-Resistance vs. Junction Temperature

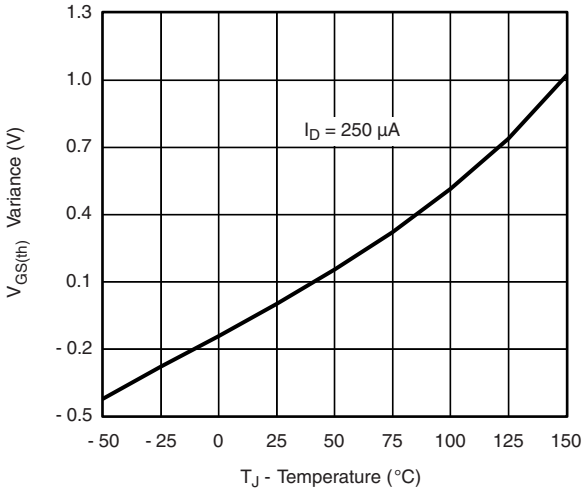


Source-Drain Diode Forward Voltage

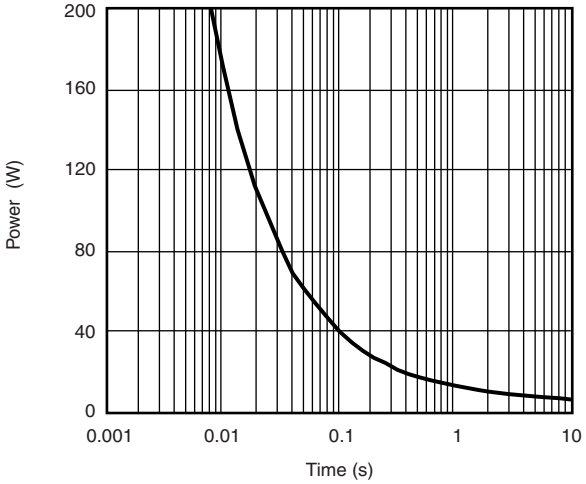


On-Resistance vs. Gate-to-Source Voltage

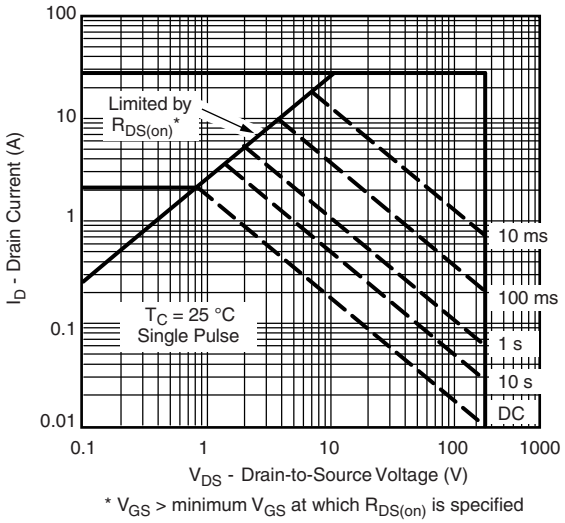
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Threshold Voltage

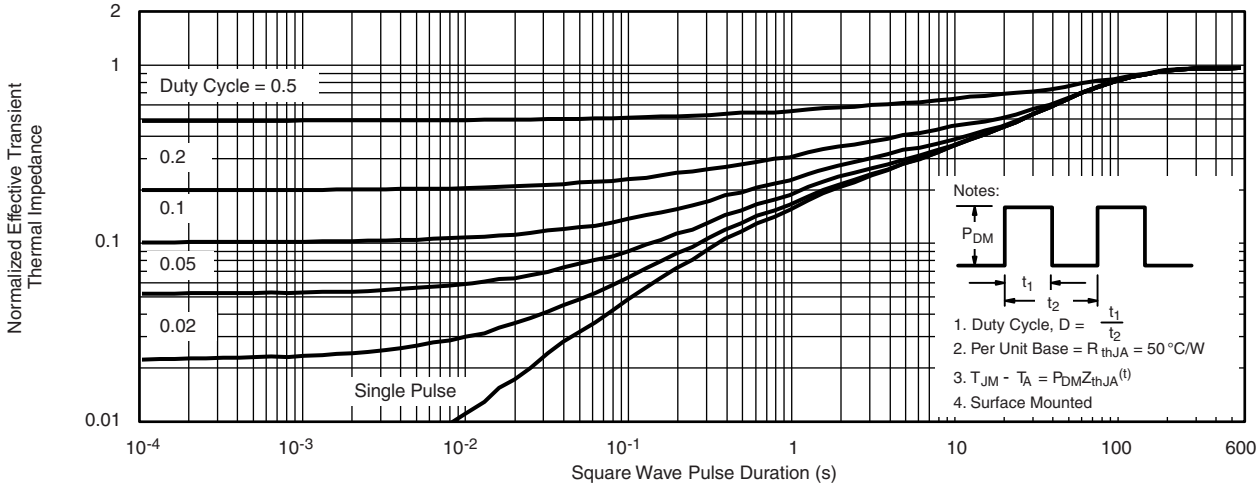


Single Pulse Power



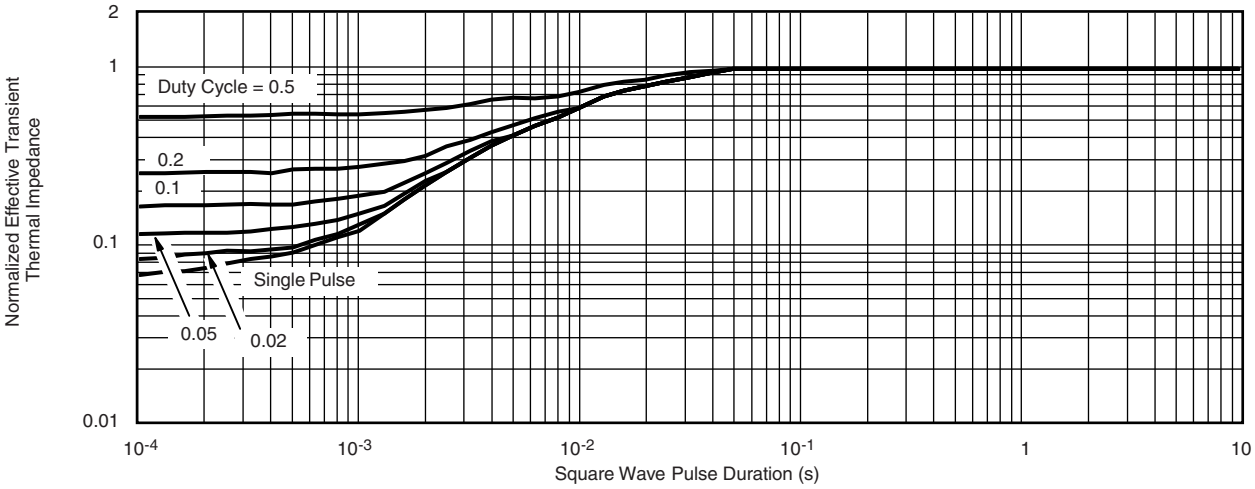
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

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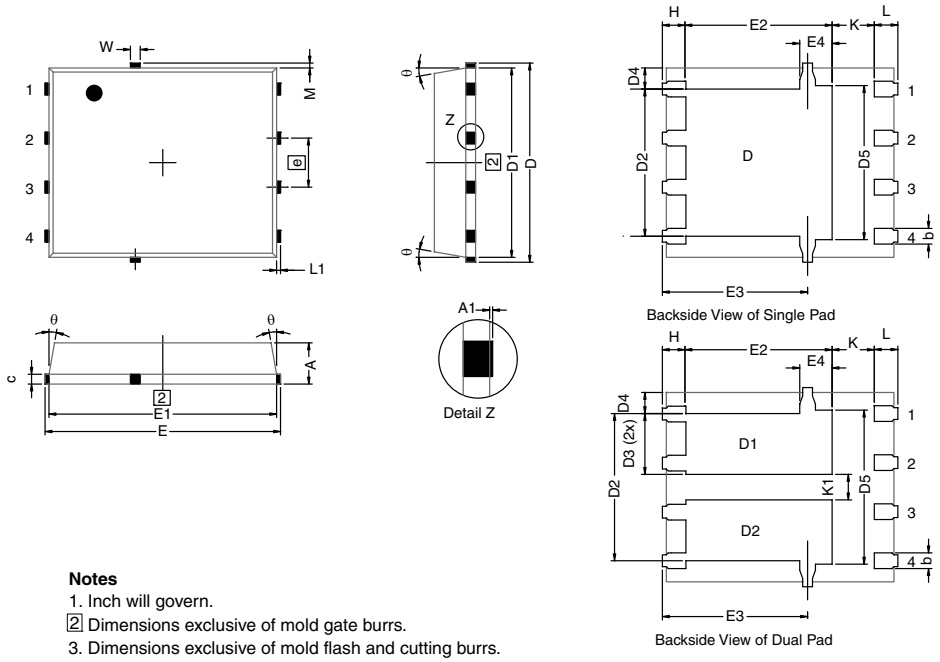
PowerPAK® SO-8, (Single/Dual)

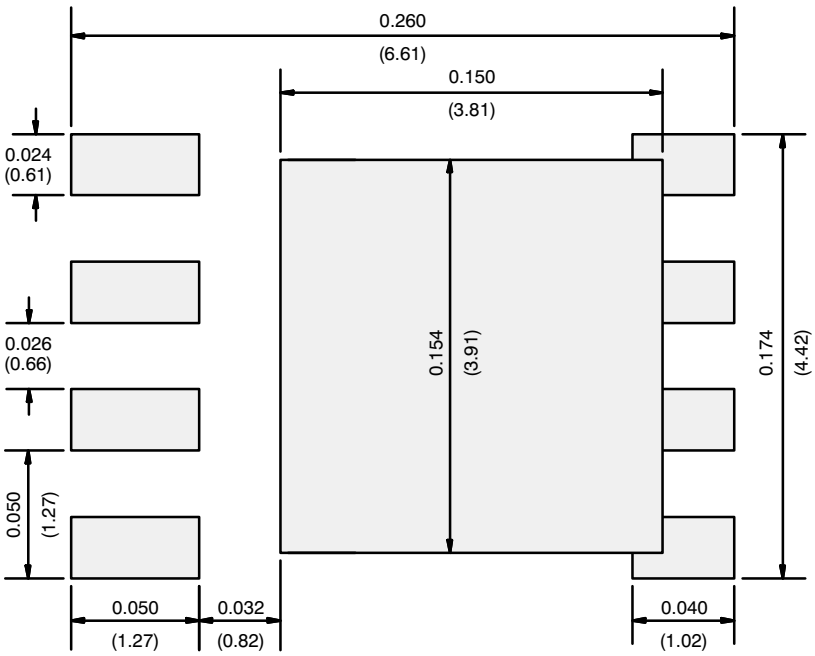


Notes

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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