

Automotive P-Channel 40 V (D-S) 175 °C MOSFET

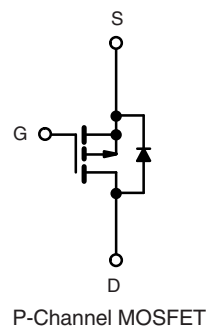
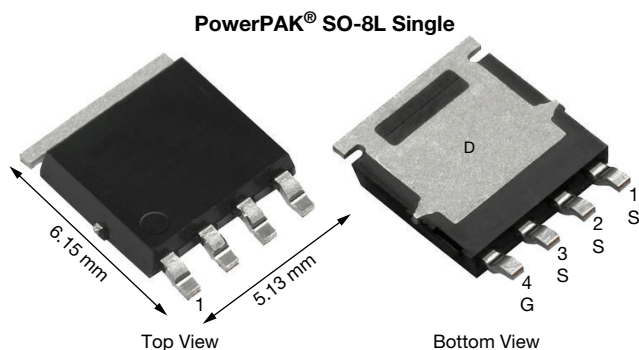
PRODUCT SUMMARY	
V_{DS} (V)	-40
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.014
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.023
I_D (A)	-55
Configuration	Single
Package	PowerPAK SO-8L

FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_C = 25$ °C	I_D	-55	A
	$T_C = 125$ °C		-31	
Continuous Source Current (Diode Conduction) ^a		I_S	-60	
Pulsed Drain Current ^b		I_{DM}	-100	
Single Pulse Avalanche Current		I_{AS}	-40	
Single Pulse Avalanche Energy		E_{AS}	80	mJ
Maximum Power Dissipation ^b	$T_C = 25$ °C	P_D	68	W
	$T_C = 125$ °C		22	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C
Soldering Recommendations (Peak Temperature) ^{d, e}			260	

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^c	R_{thJA}	68	°C/W
Junction-to-Case (Drain)		R_{thJC}	2.2	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- See solder profile (www.vishay.com/doc?73257). For PowerPAK SO-8L, 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 _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = -250 μA		-40	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA		-1.5	-2.0	-2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = -40 V	-	-	-1	μA
		V _{GS} = 0 V	V _{DS} = -40 V, T _J = 125 °C	-	-	-50	
		V _{GS} = 0 V	V _{DS} = -40 V, T _J = 175 °C	-	-	-150	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = -10 V	V _{DS} ≥ -5 V	-30	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -10 V	I _D = -10 A	-	0.011	0.014	Ω
		V _{GS} = -10 V	I _D = -10 A, T _J = 125 °C	-	-	0.021	
		V _{GS} = -10 V	I _D = -10 A, T _J = 175 °C	-	-	0.025	
		V _{GS} = -4.5 V	I _D = -5 A	-	0.018	0.023	
Forward Transconductance ^b	g _{fs}	V _{DS} = -15 V, I _D = -10 A		-	29	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = -25 V, f = 1 MHz	-	3300	4500	pF
Output Capacitance	C _{oss}			-	435	600	
Reverse Transfer Capacitance	C _{rss}			-	335	450	
Total Gate Charge ^c	Q _g	V _{GS} = -10 V	V _{DS} = -20 V, I _D = -5 A	-	80	130	nC
Gate-Source Charge ^c	Q _{gs}			-	10	-	
Gate-Drain Charge ^c	Q _{gd}			-	22	-	
Gate Resistance	R _g	f = 1 MHz		0.50	1.11	1.80	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -5 A, V _{GEN} = -10 V, R _g = 1 Ω		-	16	25	ns
Rise Time ^c	t _r			-	5	10	
Turn-Off Delay Time ^c	t _{d(off)}			-	50	80	
Fall Time ^c	t _f			-	7	12	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	-100	A
Forward Voltage	V _{SD}	I _F = -10 A, V _{GS} = 0 V		-	-0.80	-1.2	V

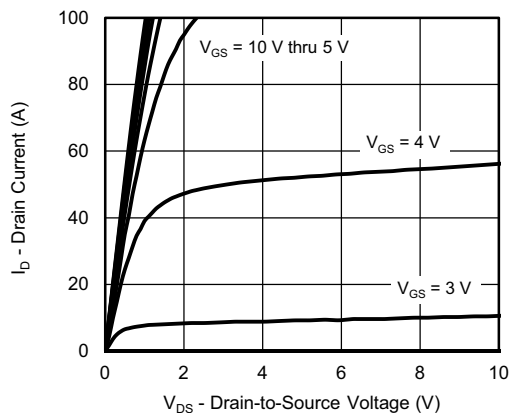
Notes

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

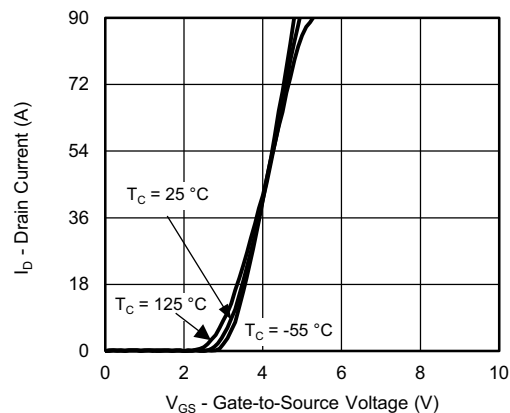
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



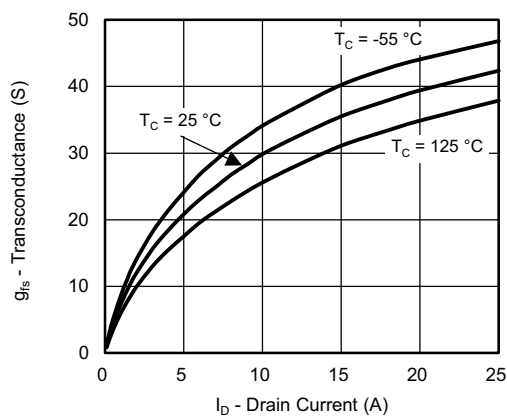
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



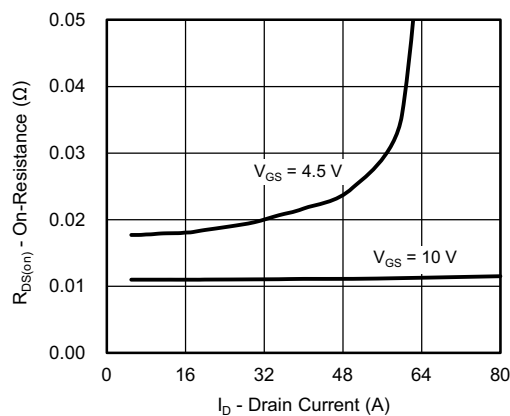
Output Characteristics



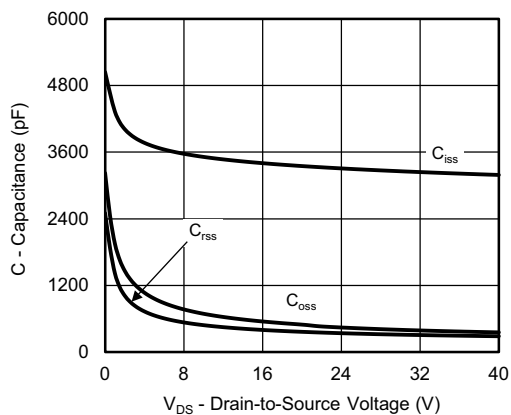
Transfer Characteristics



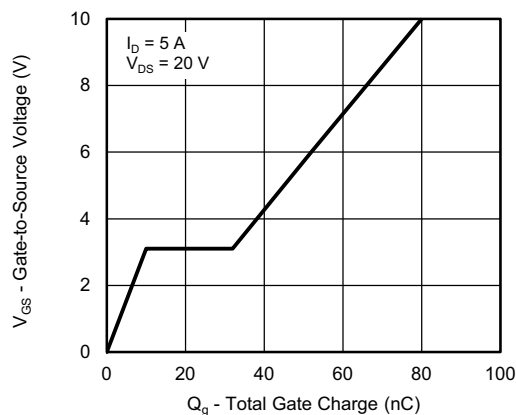
Transconductance



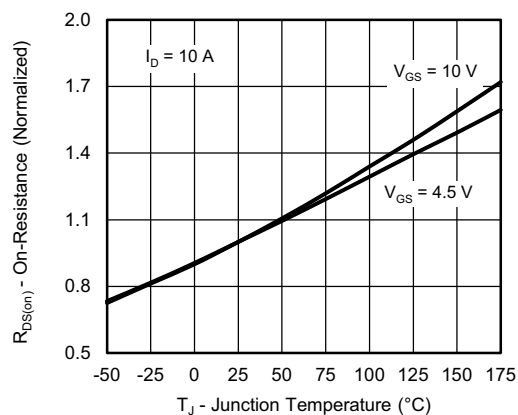
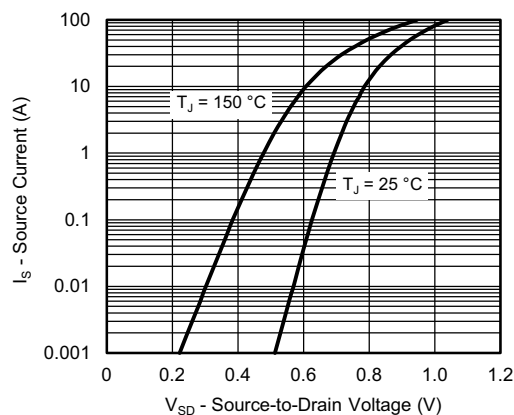
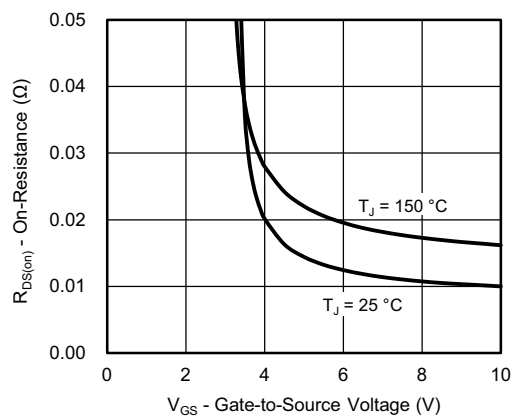
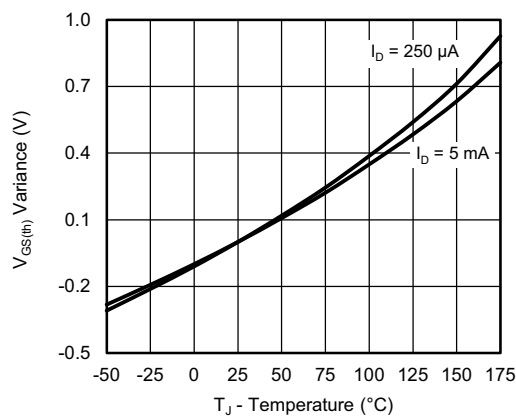
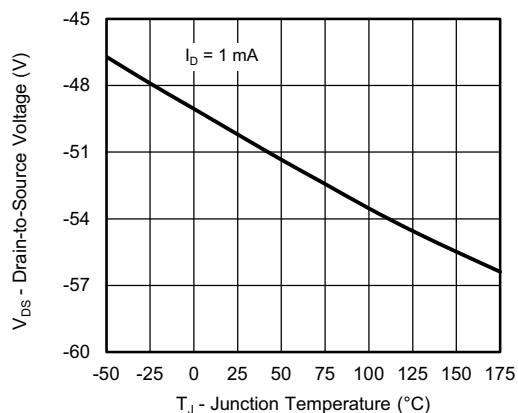
On-Resistance vs. Drain Current



Capacitance

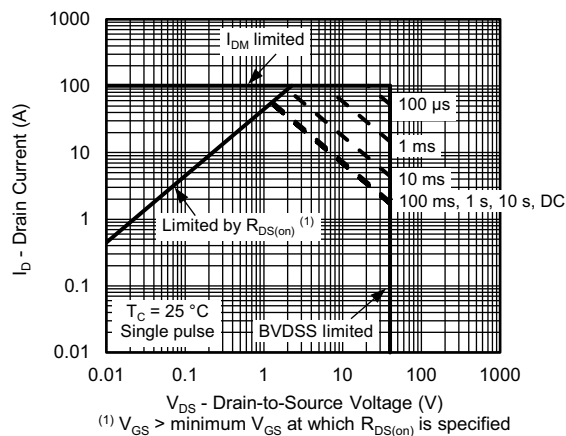


Gate Charge

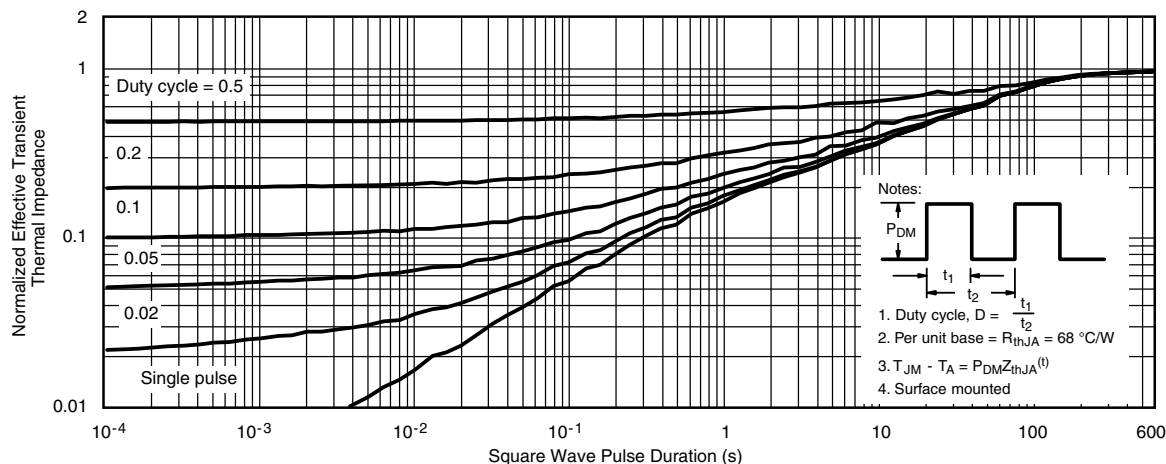
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Drain-Source Breakdown vs. Junction Temperature



THERMAL RATINGS ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



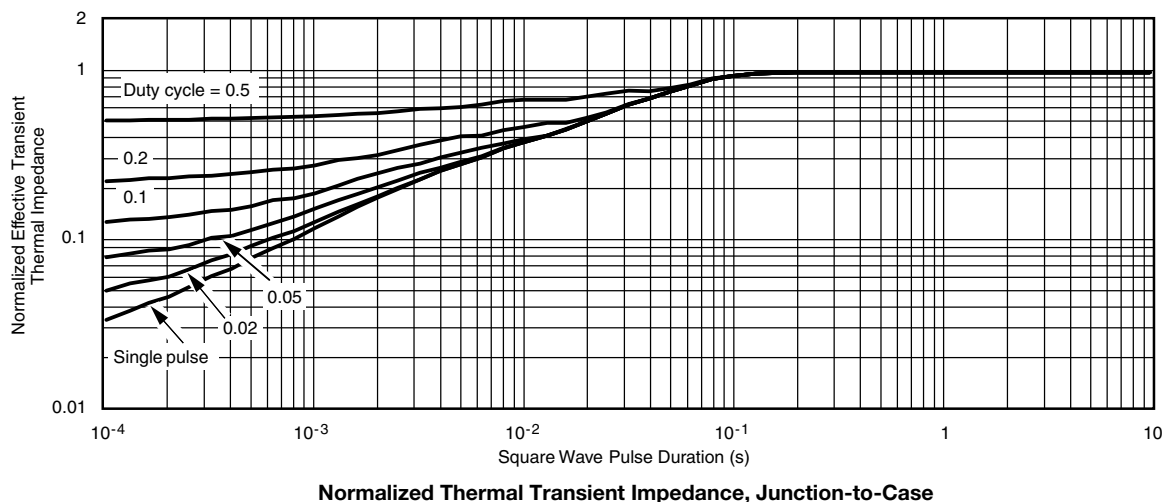
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



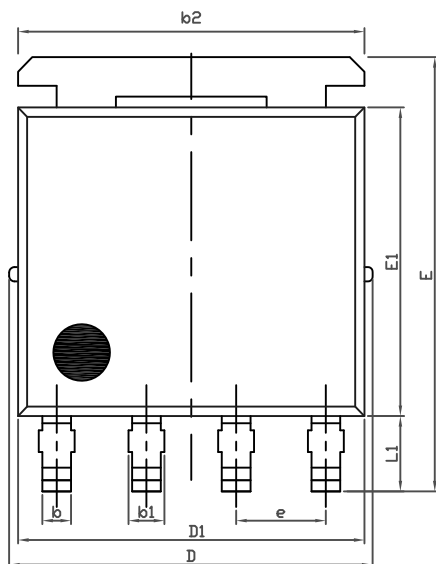
Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

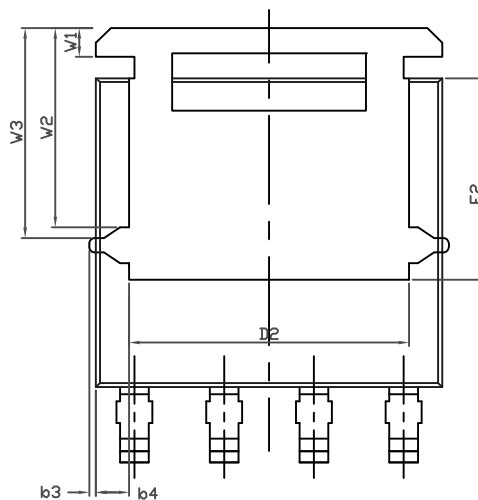
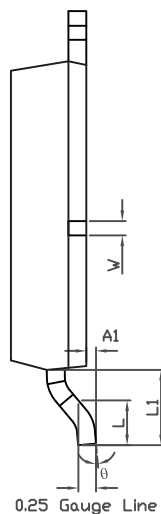
Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?75357.



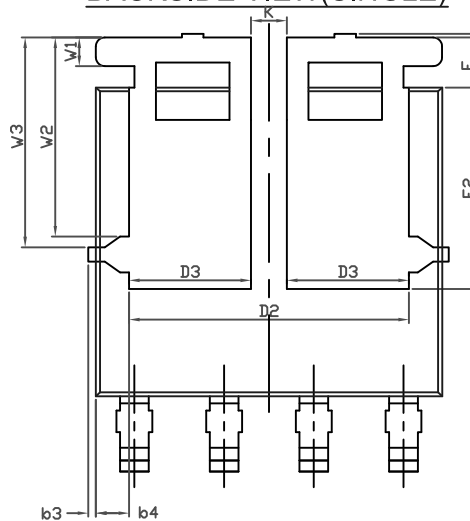
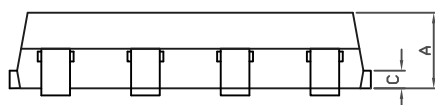
PowerPAK® SO-8L Case Outline for Al Parts



TOPSIDE VIEW



BACKSIDE VIEW(SINGLE)



BACKSIDE VIEW(DUAL)



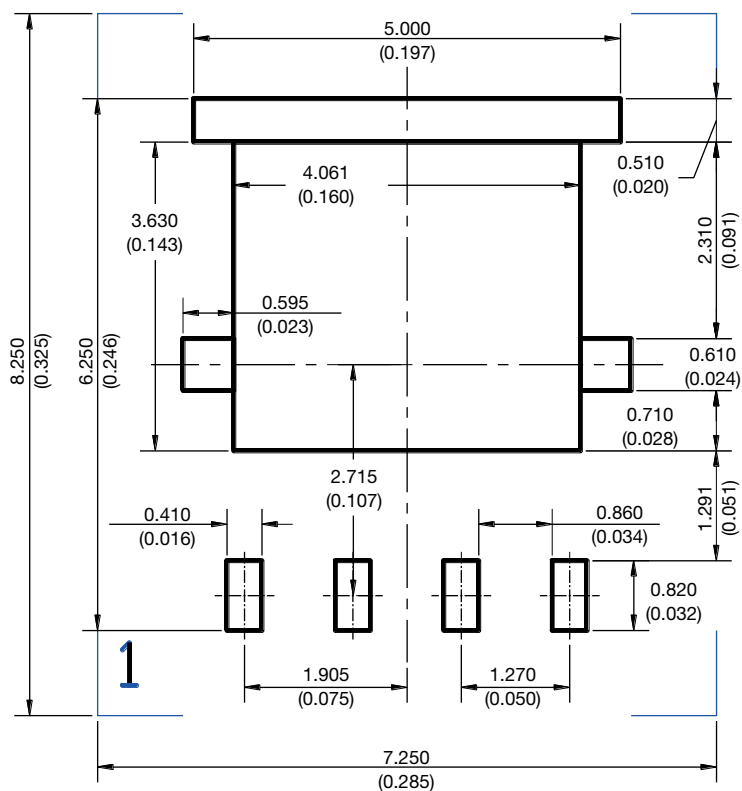
DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.07	1.14	0.039	0.042	0.045
A1	0.00	-	0.127	0.00	-	0.005
b	0.33	0.41	0.48	0.013	0.016	0.019
b1	0.44	0.51	0.58	0.017	0.020	0.023
b2	4.80	4.90	5.00	0.189	0.193	0.197
b3	0.094			0.004		
b4	0.47			0.019		
c	0.20	0.25	0.30	0.008	0.010	0.012
D	5.00	5.13	5.25	0.197	0.202	0.207
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.86	3.96	4.06	0.152	0.156	0.160
D3	1.63	1.73	1.83	0.064	0.068	0.072
e	1.27 BSC			0.050 BSC		
E	6.05	6.15	6.25	0.238	0.242	0.246
E1	4.27	4.37	4.47	0.168	0.172	0.176
E2	2.75	2.85	2.95	0.108	0.112	0.116
F	-	-	0.15	-	-	0.006
L	0.62	0.72	0.82	0.024	0.028	0.032
L1	0.92	1.07	1.22	0.036	0.042	0.048
K	0.51			0.020		
W	0.23			0.009		
W1	0.41			0.016		
W2	2.82			0.111		
W3	2.96			0.117		
q	0°	-	10°	0°	-	10°
ECN: C15-1203-Rev. A, 07-Sep-15 DWG: 6044						

Note

- Millimeters will govern



RECOMMENDED MINIMUM PAD FOR PowerPAK® SO-8L SINGLE



Recommended Minimum Pads
Dimensions in mm (inches)



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