

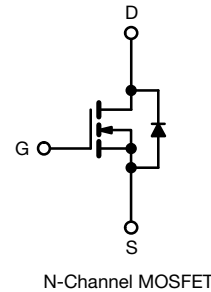
# Automotive N-Channel 60 V (D-S) 175 °C MOSFET

**PowerPAK® SO-8L**

**FEATURES**

- TrenchFET® power MOSFET
- AEC-Q101 qualified
- 100 % R<sub>g</sub> and UIS tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE GRADE


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


PRODUCT SUMMARY	
V <sub>DS</sub> (V)	60
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = 10 V	0.0029
I <sub>D</sub> (A)	293
Configuration	Single
Package	PowerPAK SO-8L

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V <sub>DS</sub>	60	V
Gate-source voltage		V <sub>GS</sub>	± 20	
Continuous drain current	T <sub>C</sub> = 25 °C <sup>a</sup>	I <sub>D</sub>	293	A
	T <sub>C</sub> = 125 °C		169	
Continuous source current (diode conduction) <sup>a</sup>		I <sub>S</sub>	454	
Pulsed drain current <sup>b</sup>		I <sub>DM</sub>	335	
Single pulse avalanche current	L = 0.1 mH	I <sub>AS</sub>	52	
Single pulse avalanche energy		E <sub>AS</sub>	135	mJ
Maximum power dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	500	W
	T <sub>C</sub> = 125 °C		166	
Operating junction and storage temperature range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C
Soldering recommendations (peak temperature) <sup>d</sup>			260	

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount <sup>c</sup>	R <sub>thJA</sub>	42	°C/W
Junction-to-case (drain)		R <sub>thJC</sub>	0.30	

**Notes**

- Package limited
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). 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



SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA	60	-	-	V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5	3.0	3.5	
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 60 V	-	-	1	μA
		V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 60 V, T <sub>J</sub> = 125 °C	-	-	50	
		V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 60 V, T <sub>J</sub> = 175 °C	-	-	250	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> ≥ 5 V	30	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A	-	0.00235	0.0029	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A, T <sub>J</sub> = 125 °C	-	-	0.0049	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A, T <sub>J</sub> = 175 °C	-	-	0.0060	
Forward transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10 A	-	23	-	S
<b>Dynamic <sup>b</sup></b>						
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz	-	4365	6111	pF
Output capacitance	C <sub>oss</sub>		-	1828	2560	
Reverse transfer capacitance	C <sub>rss</sub>		-	53	75	
Total gate charge <sup>c</sup>	Q <sub>g</sub>	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 30 V, I <sub>D</sub> = 40 A	-	54	81	nC
Gate-source charge <sup>c</sup>	Q <sub>gs</sub>		-	21	-	
Gate-drain charge <sup>c</sup>	Q <sub>gd</sub>		-	4	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	0.6	1.3	2.0	Ω
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 0.75 Ω I <sub>D</sub> ≅ 40 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	-	17	26	ns
Rise time <sup>c</sup>	t <sub>r</sub>		-	5	9	
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>		-	29	44	
Fall time <sup>c</sup>	t <sub>f</sub>		-	4	8	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>						
Pulsed current <sup>a</sup>	I <sub>SM</sub>		-	-	335	A
Forward voltage	V <sub>SD</sub>	I <sub>F</sub> = 15 A, V <sub>GS</sub> = 0 V	-	-	1.1	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 8 A, di/dt = 100 A/μs	-	50	100	ns
Body diode reverse recovery charge	Q <sub>rr</sub>		-	52	104	nC
Reverse recovery fall time	t <sub>a</sub>		-	22	-	ns
Reverse recovery rise time	t <sub>b</sub>		-	29	-	
Body diode peak reverse recovery current	I <sub>RM(REC)</sub>			-	1.8	-

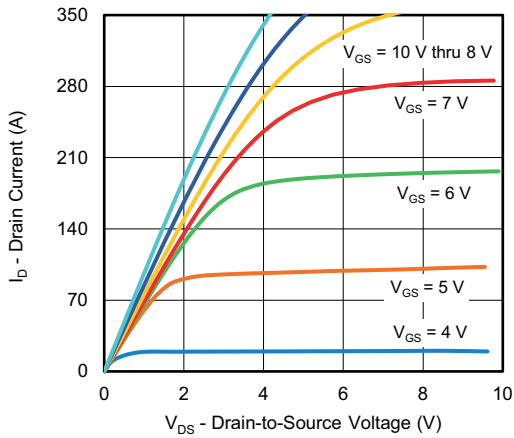
**Notes**

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %  
b. Guaranteed by design, not subject to production testing  
c. Independent of operating temperature

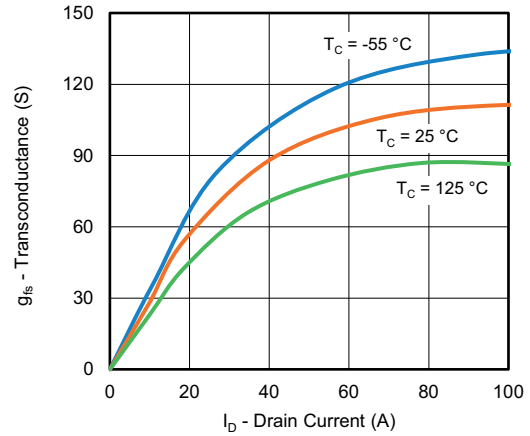
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



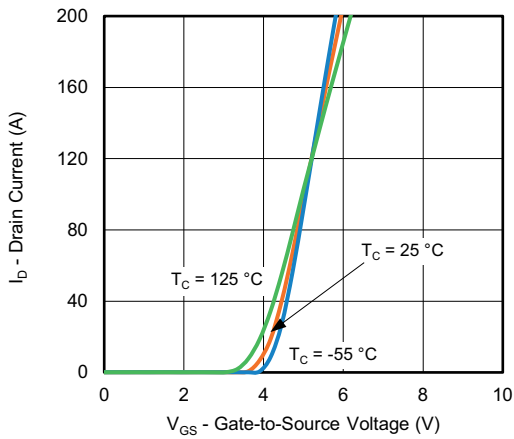
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise noted)



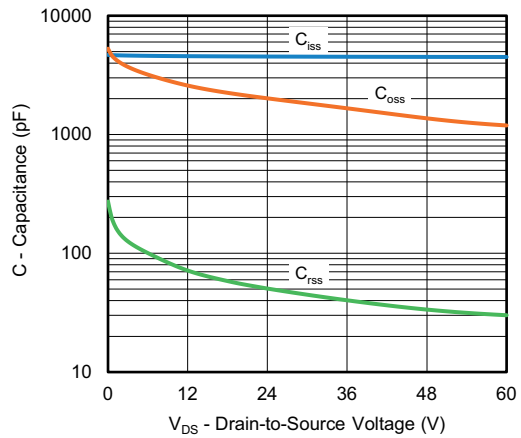
Output Characteristics



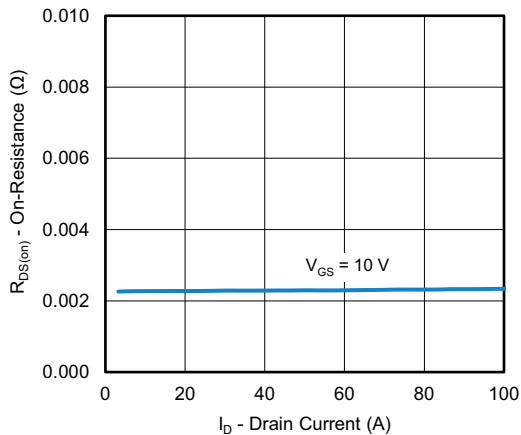
Transconductance



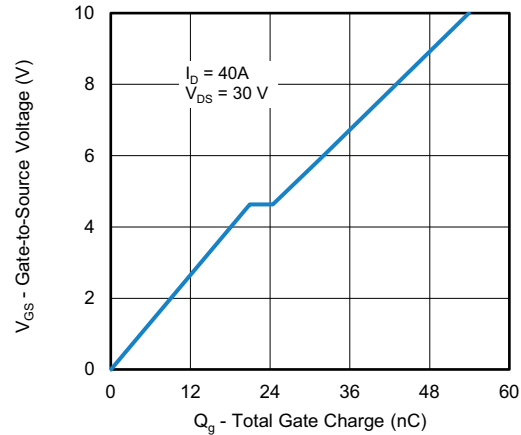
Transfer Characteristics



Capacitance



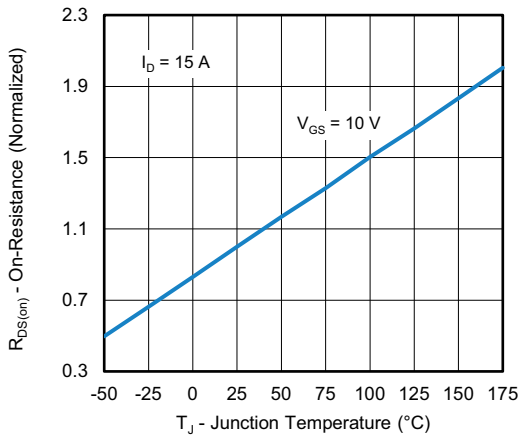
On-Resistance vs. Drain Current



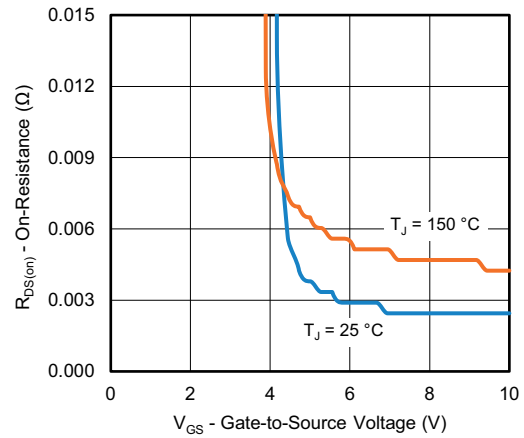
Gate Charge



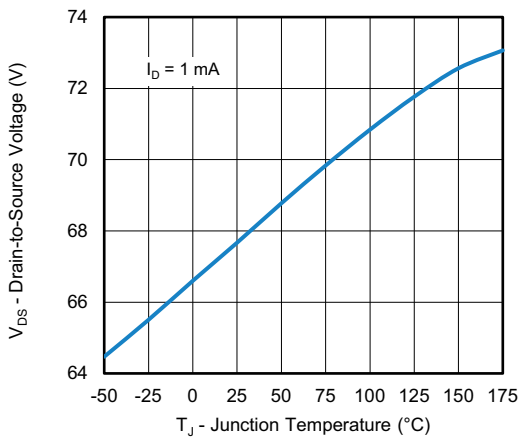
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise noted)



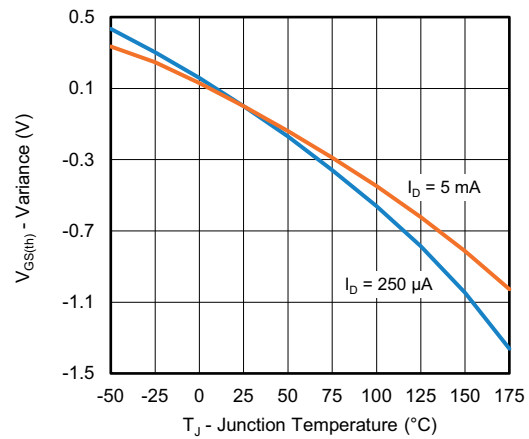
On-Resistance vs. Junction Temperature



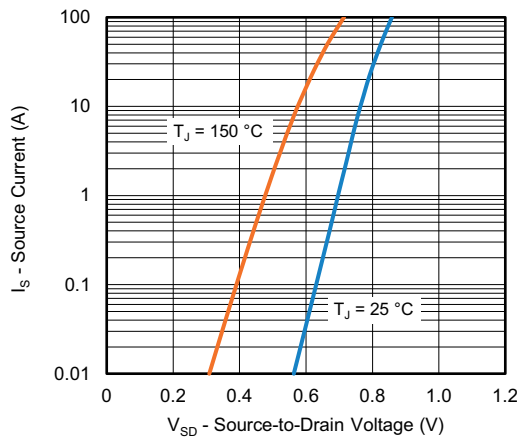
On-Resistance vs. Gate to Source Voltage



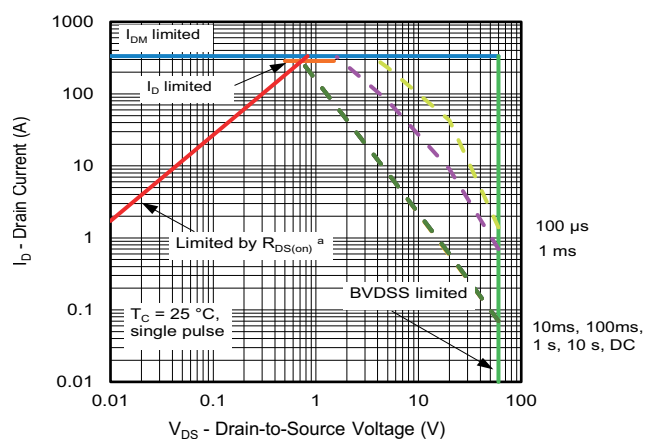
Drain Source Breakdown vs. Junction Temperature



Threshold Voltage



Source Drain Diode Forward Voltage



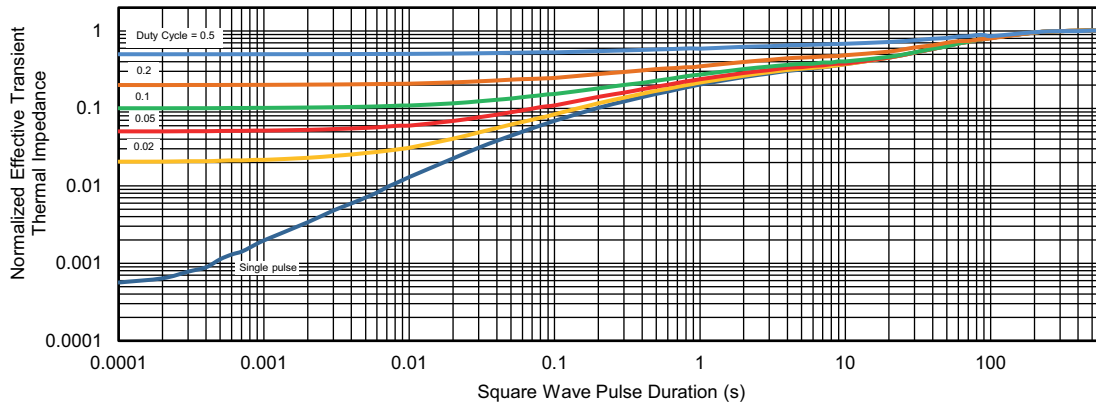
Safe Operating Area

Note

- a. V<sub>GS</sub> > minimum V<sub>GS</sub> at which R<sub>DS(on)</sub> is specified



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



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

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?63077](http://www.vishay.com/ppg?63077).



### PowerPAK® SO-8L (PPKS08LWLA) Case Outline 3



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.05	1.10	0.039	0.041	0.043
A1	0.00	---	0.127	0.000	---	0.005
b	0.33	0.41	0.49	0.013	0.016	0.019
b1	0.43	0.51	0.59	0.017	0.020	0.023
b2	4.00	4.10	4.20	0.157	0.161	0.165
c	0.15	0.20	0.25	0.006	0.008	0.010
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
D5	0.51	0.61	0.71	0.020	0.024	0.028
D6	2.64	2.74	2.84	0.104	0.108	0.112
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	3.18	3.28	3.38	0.125	0.129	0.133
E3	3.48	3.58	3.68	0.137	0.141	0.145
E4	2.72	2.82	2.92	0.107	0.111	0.115
E5	0.71	0.81	0.91	0.028	0.032	0.036
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
W1	0.31	0.41	0.51	0.012	0.016	0.020
W4	0.31	0.36	0.41	0.012	0.014	0.016
z1	0.37	0.47	0.57	0.015	0.019	0.022
z2	0.99	1.09	1.19	0.039	0.043	0.047
θ	0°	---	5°	0°	---	5°

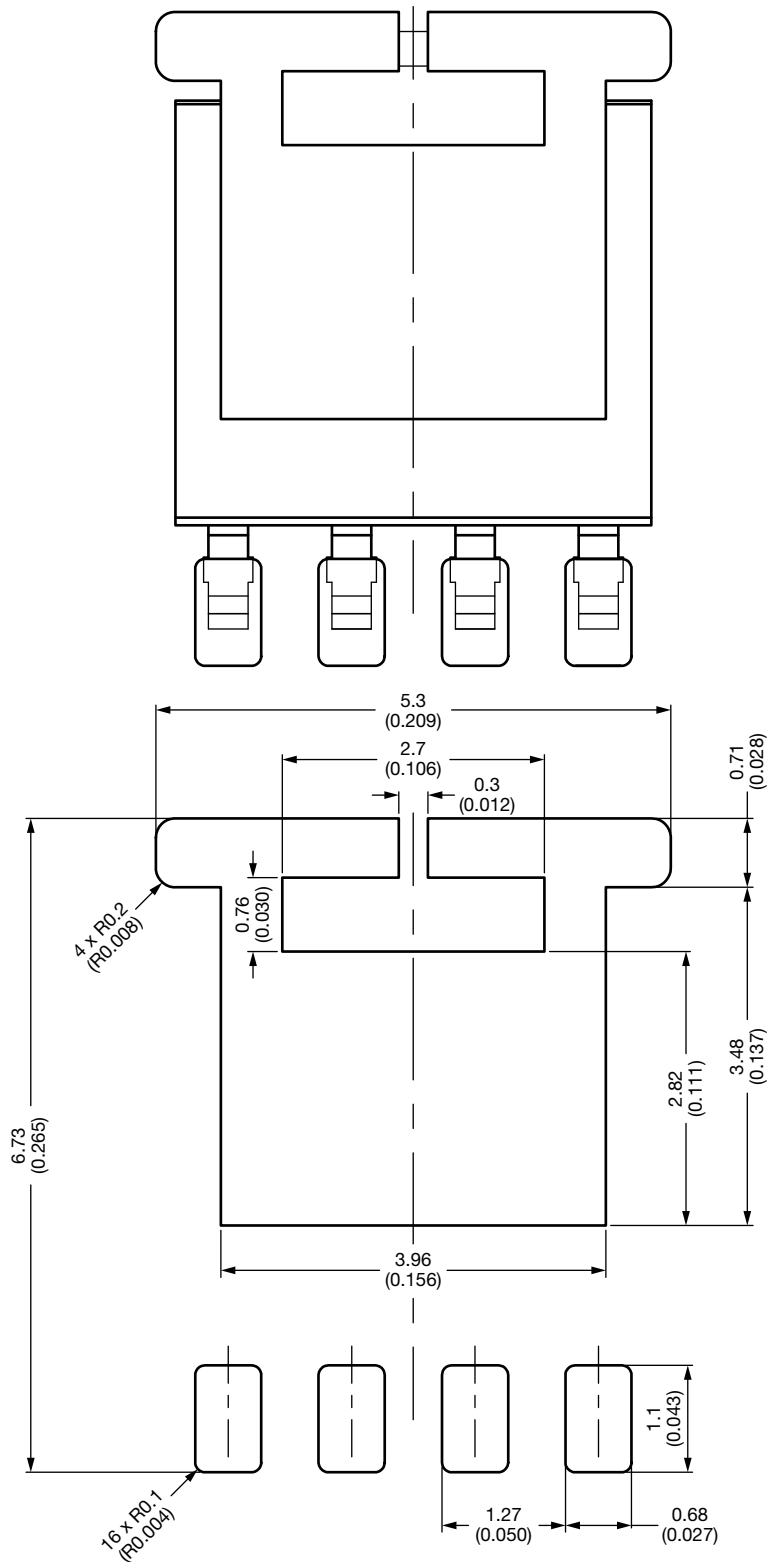
ECN: C23-1016-Rev. D, 18-Sep-2023  
DWG: 6067

**Note**

- Millimeter will govern



# Recommended Land Pattern PowerPAK® SO-8L Single Short Ear



Dimensions in Millimeters (Inches)



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