

Automotive N-Channel 30 V (D-S) 175 °C MOSFET

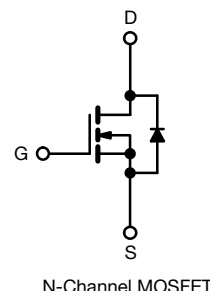
PowerPAK® SO-8L


FEATURES

- TrenchFET® Gen IV power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Q_{gd}/Q_{gs} ratio < 1 optimizes switching characteristics
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	30
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00094
I_D (A)	500
Configuration	Single
Package	PowerPAK SO-8L

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	30	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current	I_D	$T_C = 25$ °C	500
		$T_C = 125$ °C	288
Continuous source current (diode conduction)	I_S	454	A
Pulsed drain current ^a	I_{DM}	776	A
Single pulse avalanche current	I_{AS}	53.5	A
Single pulse avalanche energy	E_{AS}	143	mJ
Maximum power dissipation ^a	P_D	$T_C = 25$ °C	500
		$T_C = 125$ °C	166
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^c		260	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	42	°C/W
Junction-to-case (drain)	R_{thJC}	0.3	°C/W

Notes

- 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). 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

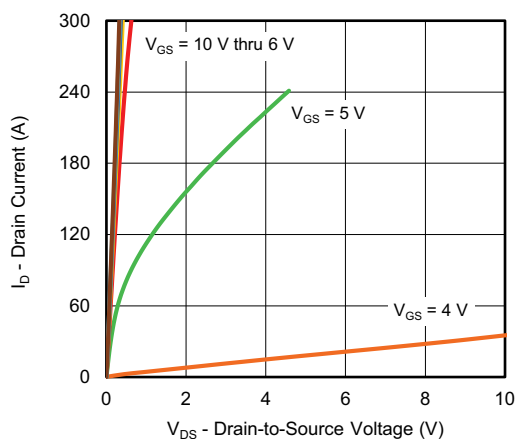
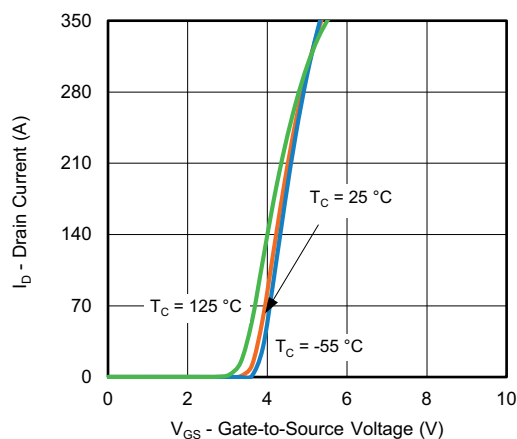
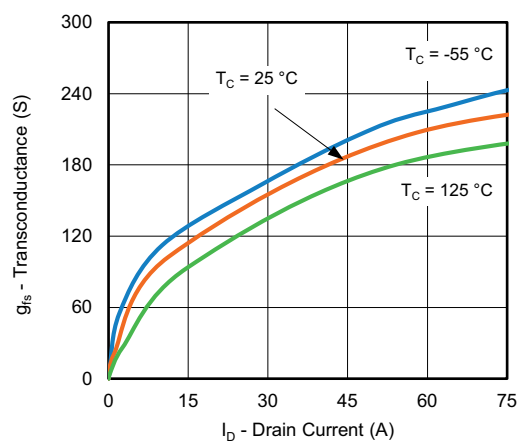
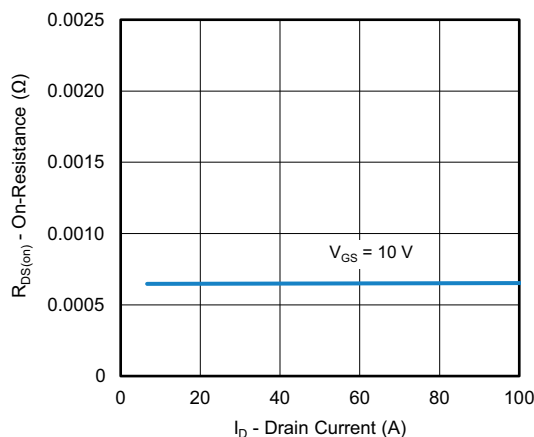
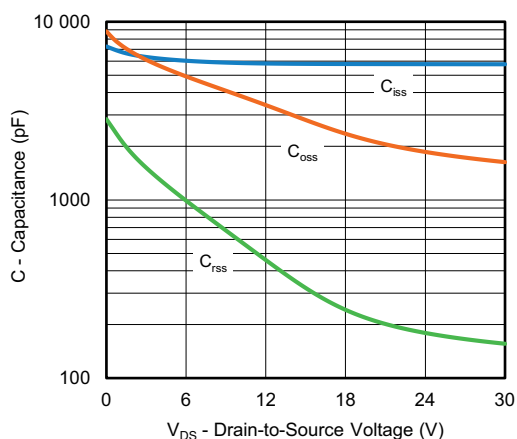
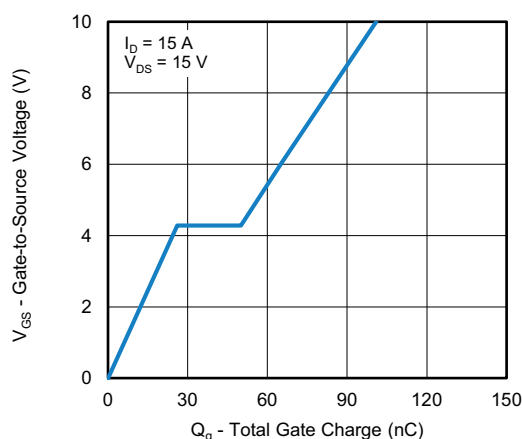


SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		30	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3.0	3.5	
Gate-source 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} = 30 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 30 V, T _J = 175 °C	-	-	250	
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 = 15 A	-	0.0007	0.00094	Ω
		V _{GS} = 10 V	I _D = 15 A, T _J = 125 °C	-	-	0.00165	
		V _{GS} = 10 V	I _D = 15 A, T _J = 175 °C	-	-	0.0020	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 10 A		-	100	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	5782	8095	pF
Output capacitance	C _{oss}			-	1812	2537	
Reverse transfer capacitance	C _{rss}			-	174	244	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 15 V, I _D = 15 A	-	101	152	nC
Gate-source charge ^c	Q _{gs}			-	26	-	
Gate-drain charge ^c	Q _{gd}			-	24	-	
Gate resistance	R _g	f = 1 MHz		0.8	1.6	2.4	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 15 V, R _L = 0.5 Ω I _D ≅ 15 A, V _{GEN} = 10 V, R _g = 1 Ω		-	17	26	ns
Rise time ^c	t _r			-	18	27	
Turn-off delay time ^c	t _{d(off)}			-	39	59	
Fall time ^c	t _f			-	17	26	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	1816	A
Forward voltage	V _{SD}	I _F = 15 A, V _{GS} = 0 V		-	-	1.1	V
Body diode reverse recovery time	t _{rr}	I _F = 10 A, di/dt = 100 A/μs		-	59	118	ns
Body diode reverse recovery charge	Q _{rr}			-	66	132	nC
Reverse recovery fall time	t _a			-	-	-	ns
Reverse recovery rise time	t _b			-	33	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	2	-	A

Notes

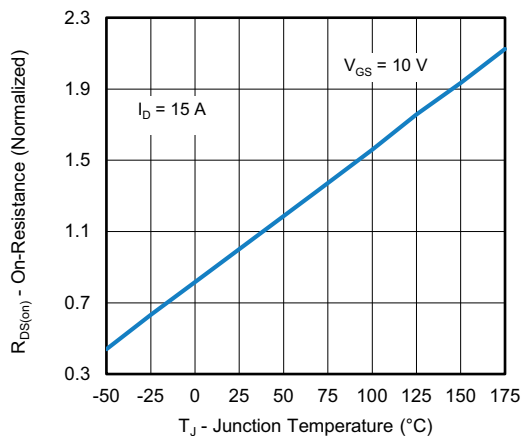
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

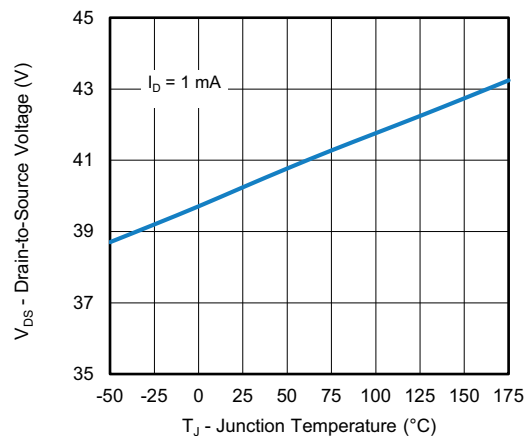
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge



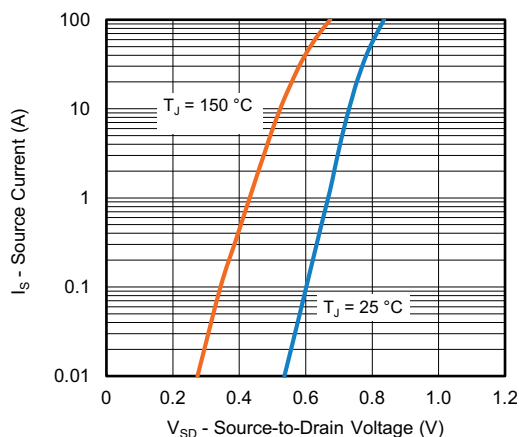
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



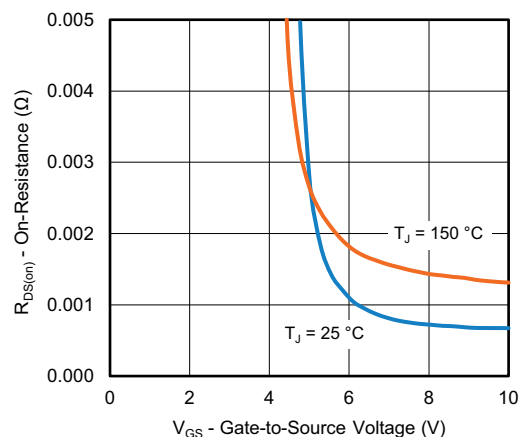
On-Resistance vs. Junction Temperature



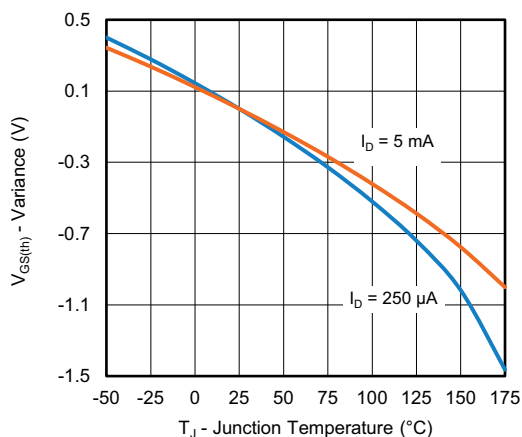
Drain Source Breakdown vs. Junction Temperature



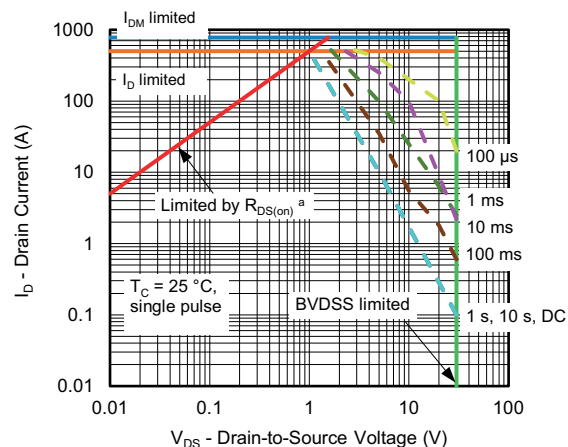
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to Source Voltage



Threshold Voltage



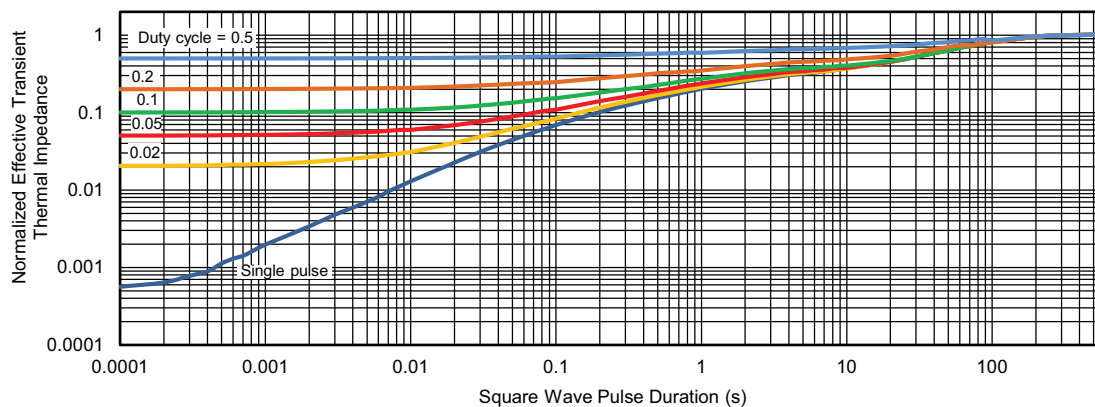
Safe Operating Area

Note

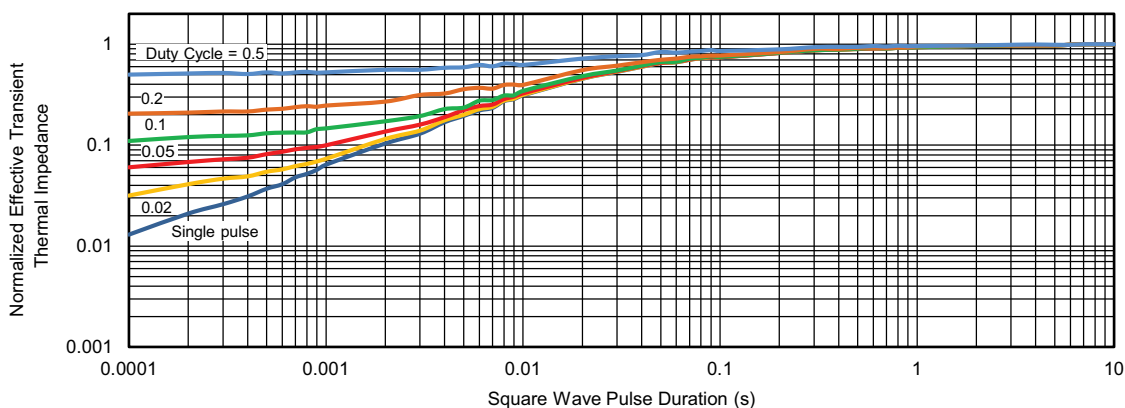
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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

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

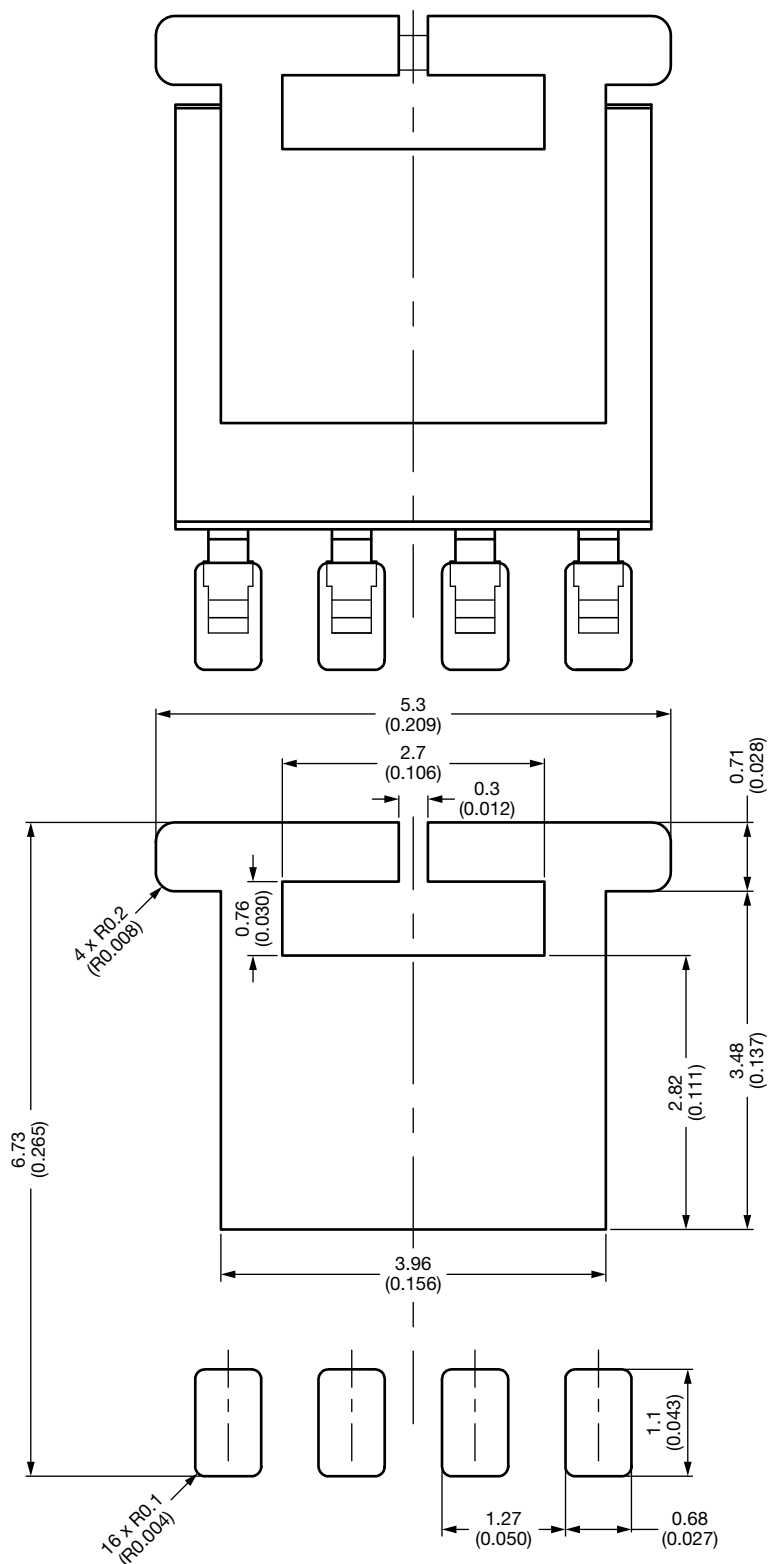


DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.05	1.10	0.039	0.041	0.043
A1	0.00	---	0.127	0.000	---	0.005
b	0.33	0.41	0.49	0.013	0.016	0.019
b1	0.43	0.51	0.59	0.017	0.020	0.023
b2	4.00	4.10	4.20	0.157	0.161	0.165
c	0.15	0.20	0.25	0.006	0.008	0.010
D1	4.80	4.90	5.00	0.189	0.193	0.197
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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