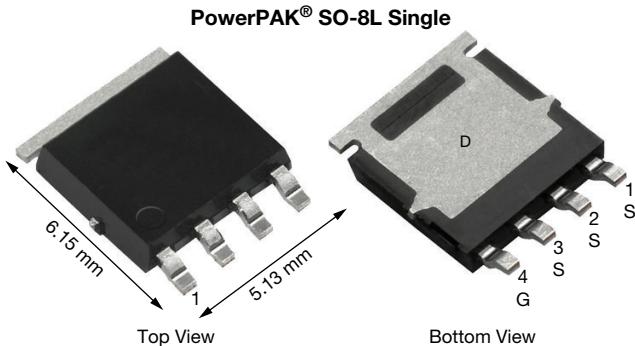


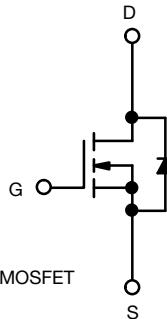
Automotive N-Channel 30 V (D-S) 175 °C MOSFET



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

AUTOMOTIVE GRADE


RoHS
COMPLIANT
HALOGEN
FREE


N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	30
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.0120
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.0170
I_D (A)	30
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK SO-8L
Lead (Pb)-free and halogen-free	SQJ414EP (for detailed order number please see www.vishay.com/doc?79771)

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	
Continuous drain current	$T_C = 25$ °C ^a	I_D	30	A
	$T_C = 125$ °C		25	
Continuous source current (diode conduction) ^a		I_S	30	A
Pulsed drain current ^b		I_{DM}	90	
Single pulse avalanche current	$L = 0.1$ mH	I_{AS}	22	mJ
Single pulse avalanche energy		E_{AS}	24.2	
Maximum power dissipation ^b	$T_C = 25$ °C	P_D	45	W
	$T_C = 125$ °C		15	
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}	70	°C/W
Junction to case (drain)		R_{thJC}	3.3	

Notes

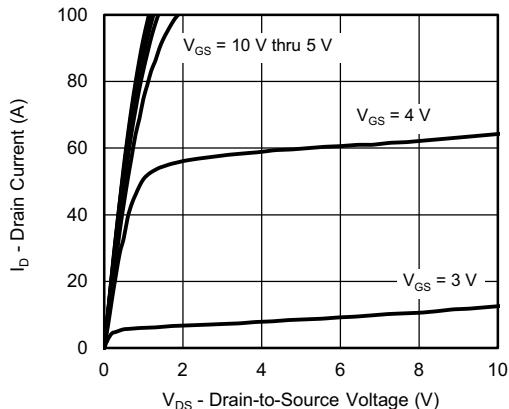
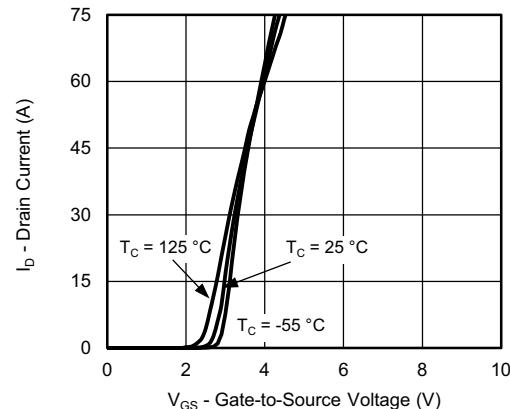
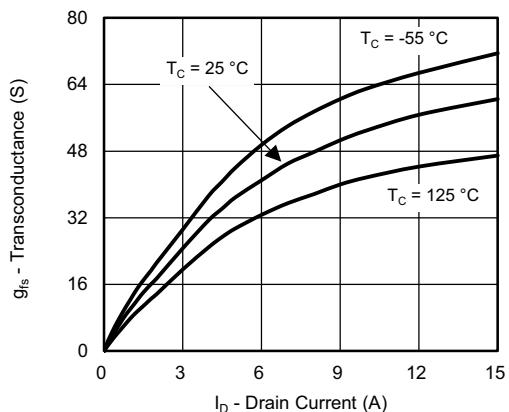
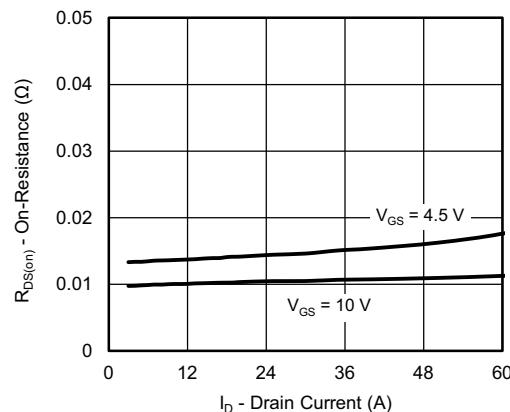
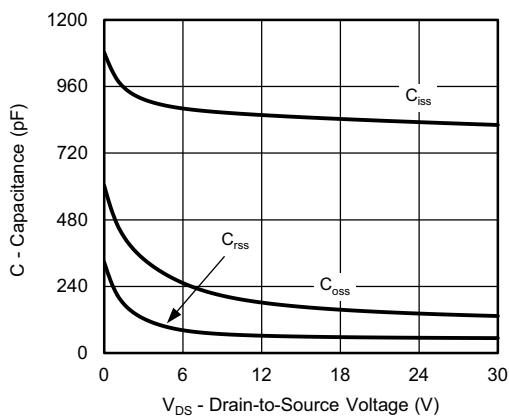
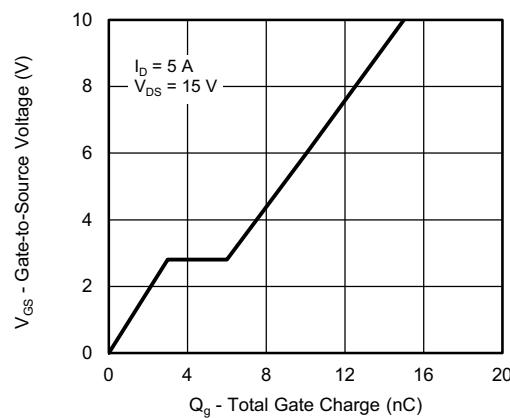
- Package limited
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8L is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation 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

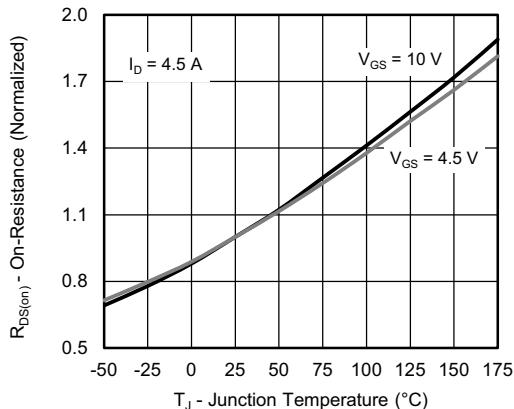
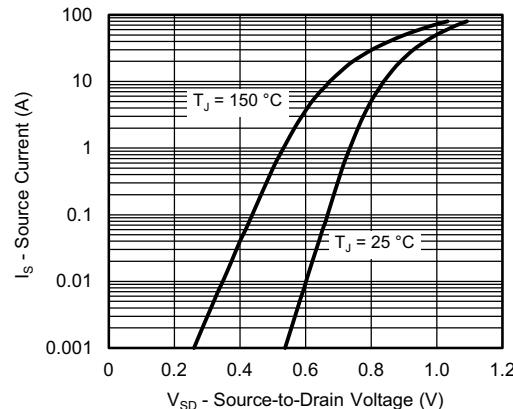
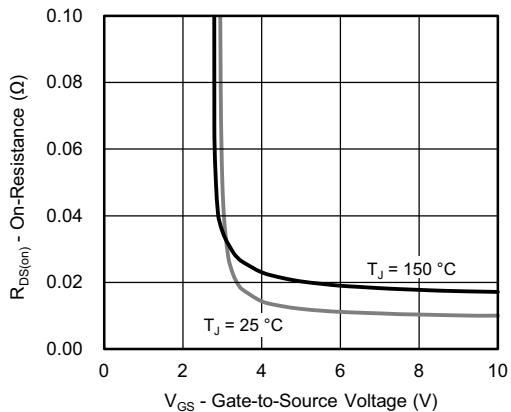
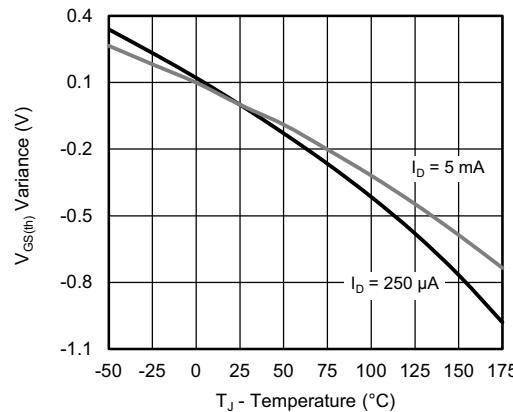
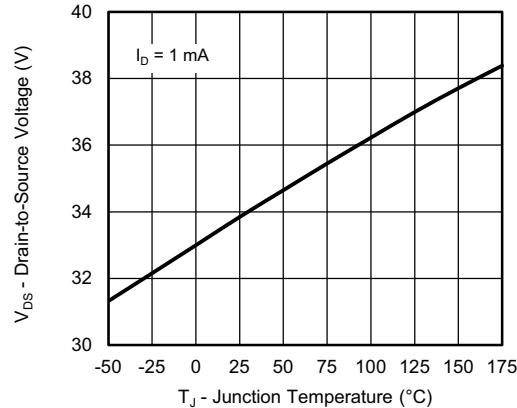
SPECIFICATIONS ($T_C = 25^\circ\text{C}$, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0$, $I_D = 250 \mu\text{A}$		30	-	-	V	
Gate-source threshold voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$		1.5	2.0	2.5		
Gate-source leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA	
Zero gate voltage drain current	I_{DSS}	$V_{GS} = 0 \text{ V}$	$V_{DS} = 30 \text{ V}$	-	-	1	μA	
		$V_{GS} = 0 \text{ V}$	$V_{DS} = 30 \text{ V}$, $T_J = 125^\circ\text{C}$	-	-	50		
		$V_{GS} = 0 \text{ V}$	$V_{DS} = 30 \text{ V}$, $T_J = 175^\circ\text{C}$	-	-	250		
On-state drain current ^a	$I_{D(\text{on})}$	$V_{GS} = 10 \text{ V}$	$V_{DS} \geq 5 \text{ V}$	15	-	-	A	
Drain-source on-state resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$	$I_D = 4.5 \text{ A}$	-	0.0098	0.0120	Ω	
		$V_{GS} = 4.5 \text{ V}$	$I_D = 3 \text{ A}$	-	0.0139	0.0170		
		$V_{GS} = 10 \text{ V}$	$I_D = 4.5 \text{ A}$, $T_J = 125^\circ\text{C}$	-	-	0.0188		
		$V_{GS} = 10 \text{ V}$	$I_D = 4.5 \text{ A}$, $T_J = 175^\circ\text{C}$	-	-	0.0227		
Forward transconductance ^b	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 4 \text{ A}$		-	31	-	S	
Dynamic^b								
Input capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$	$V_{DS} = 15 \text{ V}$, $f = 1 \text{ MHz}$	-	850	1110	pF	
Output capacitance	C_{oss}			-	167	220		
Reverse transfer capacitance	C_{rss}			-	60	80		
Total gate charge ^c	Q_g	$V_{GS} = 10 \text{ V}$	$V_{DS} = 15 \text{ V}$, $I_D = 5 \text{ A}$	-	15	25	nC	
Gate-source charge ^c	Q_{gs}			-	3	-		
Gate-drain charge ^c	Q_{gd}			-	3	-		
Gate resistance	R_g	$f = 1 \text{ MHz}$		0.7	1.5	2.3	Ω	
Turn-on delay time ^c	$t_{d(\text{on})}$	$V_{DD} = 15 \text{ V}$, $R_L = 3.8 \Omega$ $I_D \geq 4 \text{ A}$, $V_{GEN} = 10 \text{ V}$, $R_g = 1 \Omega$		-	11	20	ns	
Rise time ^c	t_r			-	5	10		
Turn-off delay time ^c	$t_{d(\text{off})}$			-	21	40		
Fall time ^c	t_f			-	5	10		
Source-Drain Diode Ratings and Characteristics^b								
Pulsed current ^a	I_{SM}			-	-	90	A	
Forward voltage	V_{SD}	$I_F = 4 \text{ A}$, $V_{GS} = 0$		-	0.79	1.2	V	
Body diode reverse recovery time	t_{rr}	$I_F = 3 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$		-	22	50	ns	
Body diode reverse recovery charge	Q_{rr}			-	18	40		
Reverse recovery fall time	t_a			-	14	-		
Reverse recovery rise time	t_b			-	8	-		
Body diode peak reverse recovery current	$I_{RM(\text{REC})}$			-	-1.5	-	A	

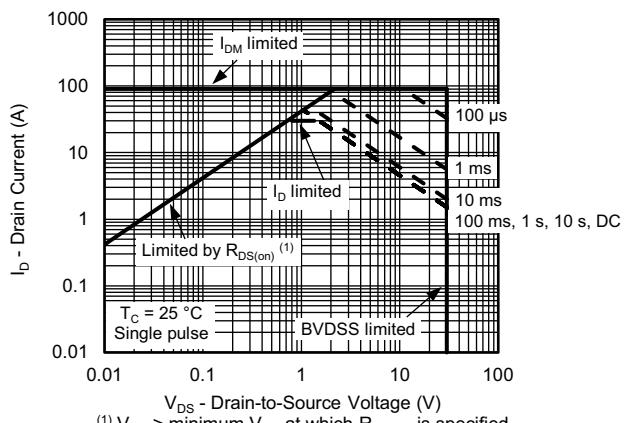
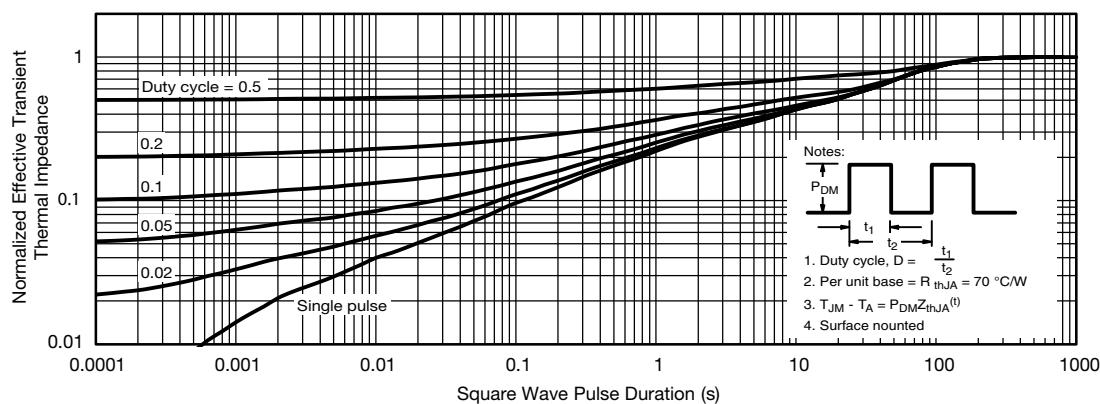
Notes

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

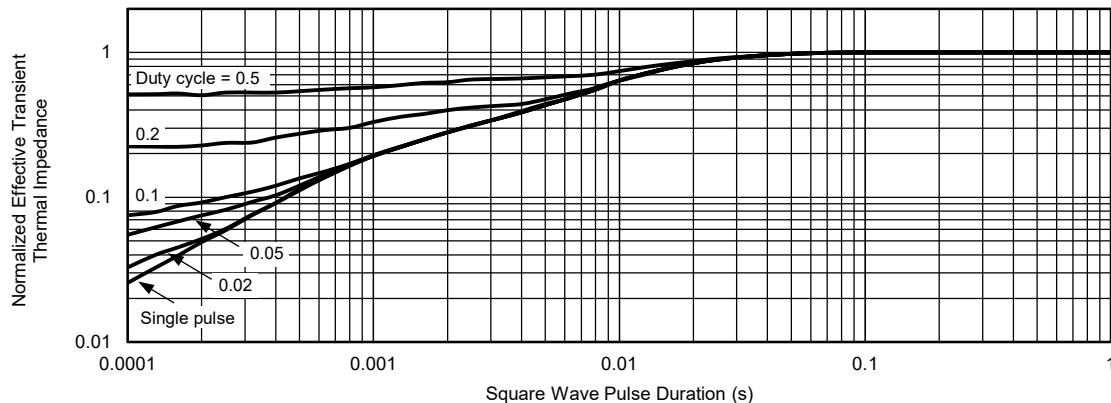
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure 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 ($T_A = 25^\circ\text{C}$, 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 ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Safe Operating Area

Normalized Thermal Transient Impedance, Junction-to-Ambient

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



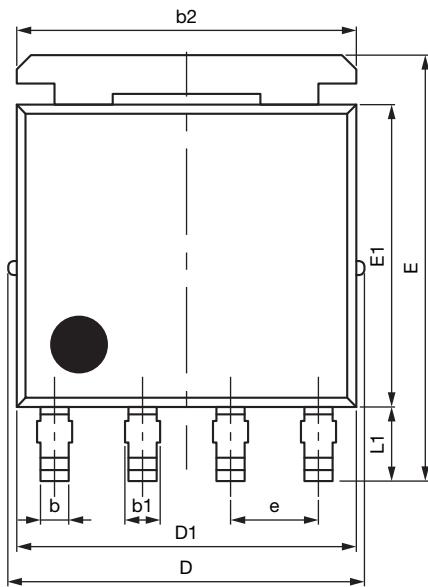
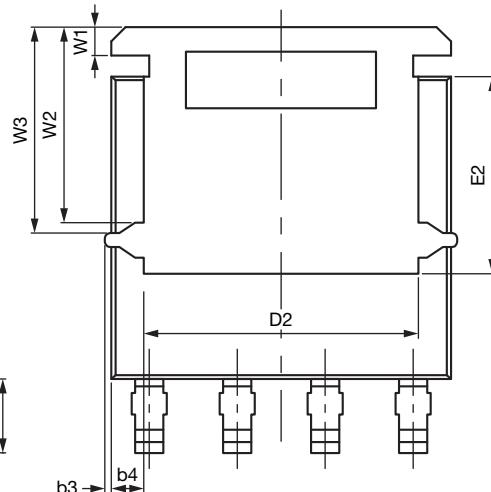
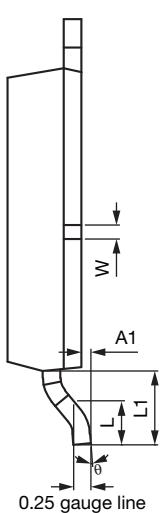
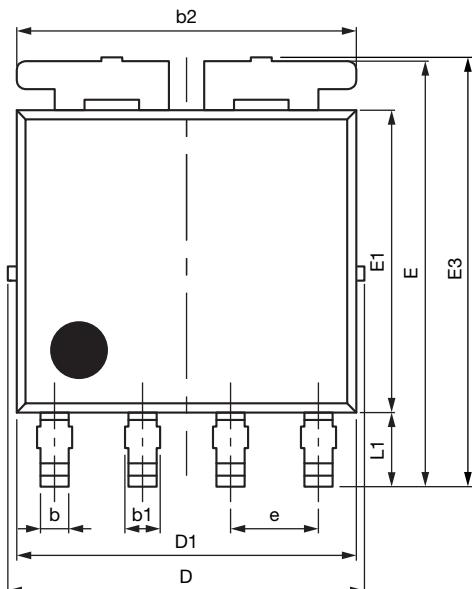
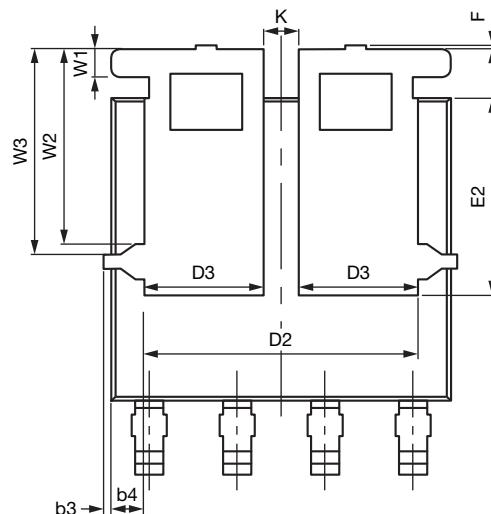
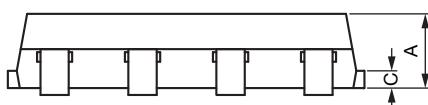
Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)

- Normalized Transient Thermal Impedance Junction-to-Case (25 °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.

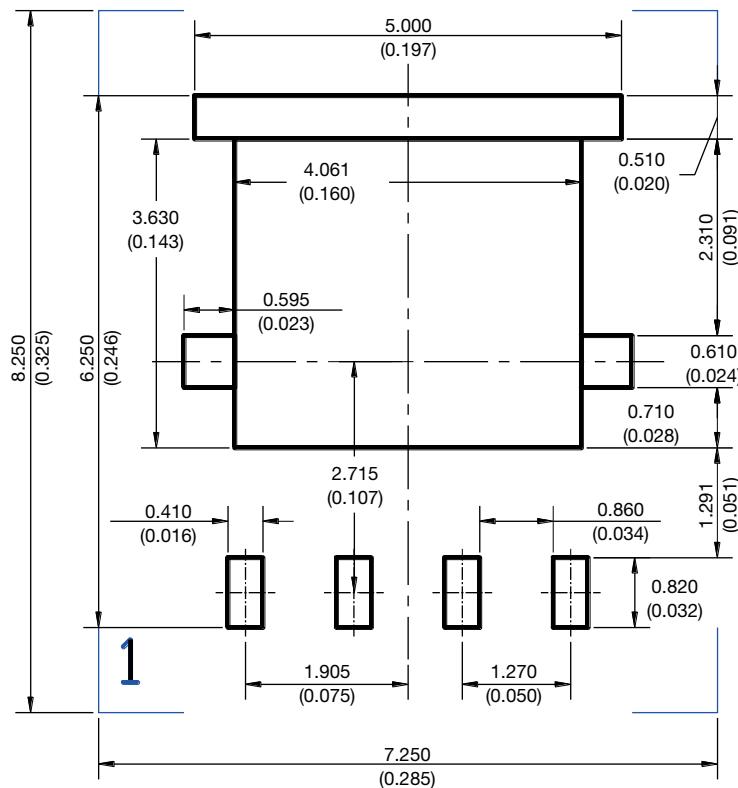
PowerPAK® SO-8L Case Outline 2


Topside view (single)

Backside view (single)

Topside view (dual)

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
E3	6.05	6.22	6.40	0.238	0.245	0.252
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		
θ	0°	-	10°	0°	-	10°
ECN: C23-1026-Rev. D, 25-Sep-2023						
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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