

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



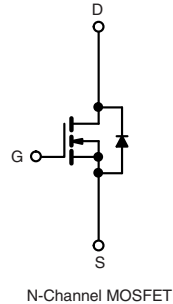
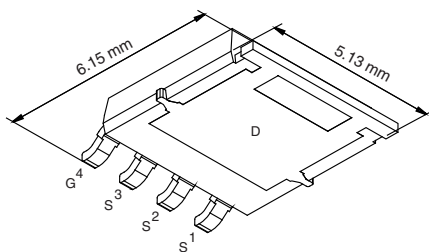
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

PRODUCT SUMMARY	
$V_{DS}$ (V)	30
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V	0.0039
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.0042
$I_D$ (A)	32
Configuration	Single

### FEATURES

- TrenchFET® Power MOSFET
- AEC-Q101 Qualified<sup>d</sup>
- 100 %  $R_g$  and UIS Tested
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

PowerPAK® SO-8L Single



ORDERING INFORMATION	
Package	PowerPAK SO-8L
Lead (Pb)-free and Halogen-free	SQJ410EP-T1-GE3

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_C = 25$ °C	$I_D$	32	A
	$T_C = 125$ °C		32	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	32	
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	128	
Single Pulse Avalanche Current	L = 0.1 mH	$I_{AS}$	58	
Single Pulse Avalanche Energy		$E_{AS}$	168	
Maximum Power Dissipation <sup>b</sup>	$T_C = 25$ °C	$P_D$	83	W
	$T_C = 125$ °C		27	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature) <sup>e, f</sup>			260	

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount <sup>c</sup>	$R_{thJA}$	65	°C/W
Junction-to-Case (Drain)		$R_{thJC}$	1.8	

### Notes

- Package limited.
- Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.
- See Solder Profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). The 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 ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$		30	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		1.5	2.0	2.5	
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	150	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	30	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 10.3\text{ A}$	-	0.0037	0.0039	$\Omega$
		$V_{GS} = 10\text{ V}$	$I_D = 10.3\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	0.0045	0.0060	
		$V_{GS} = 10\text{ V}$	$I_D = 10.3\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	0.0055	0.0070	
		$V_{GS} = 4.5\text{ V}$	$I_D = 8.7\text{ A}$	-	0.0035	0.0042	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 16\text{ A}$		-	93	-	S
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 15\text{ V}, f = 1\text{ MHz}$	-	4965	6210	$\mu\text{F}$
Output Capacitance	$C_{oss}$			-	806	1010	
Reverse Transfer Capacitance	$C_{rss}$			-	325	410	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = 10\text{ V}$	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$	-	73.5	110	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	12.8	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	8.2	-	
Gate Resistance	$R_g$	f = 1 MHz		0.6	1.0	1.4	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		-	15	23	ns
Rise Time <sup>c</sup>	$t_r$			-	11	17	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			-	40	60	
Fall Time <sup>c</sup>	$t_f$			-	9	14	
<b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b>							
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	128	A
Forward Voltage	$V_{SD}$	$I_F = 10\text{ A}, V_{GS} = 0$		-	0.75	1.2	V

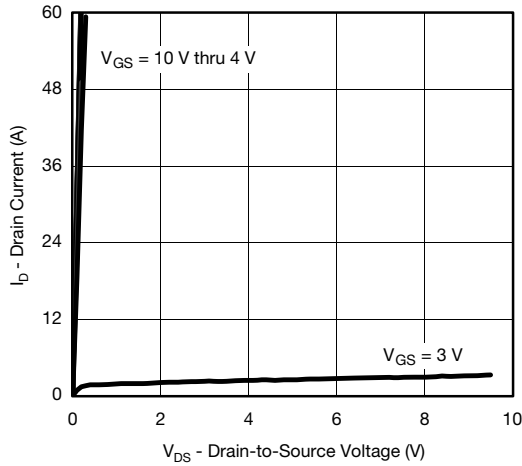
**Notes**

- 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.

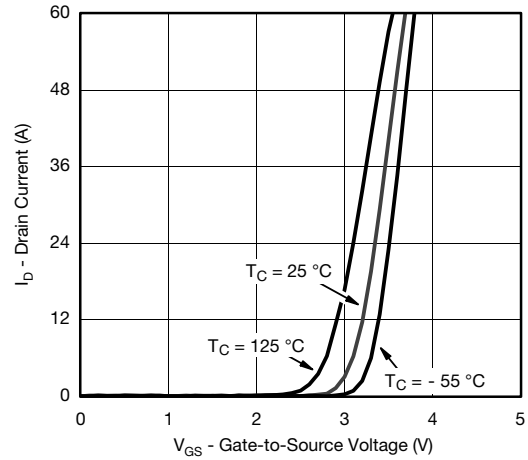
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



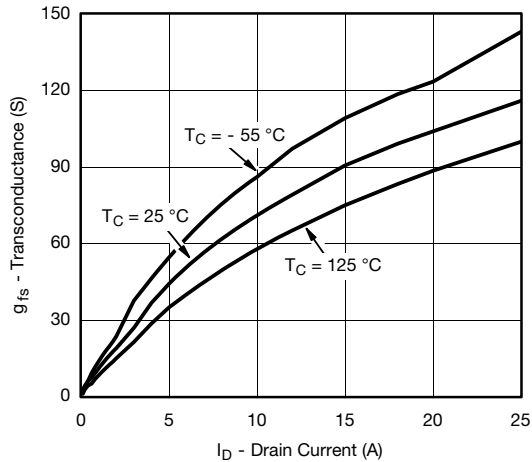
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



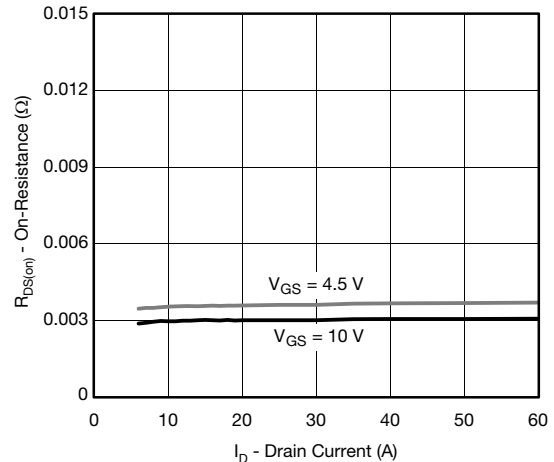
**Output Characteristics**



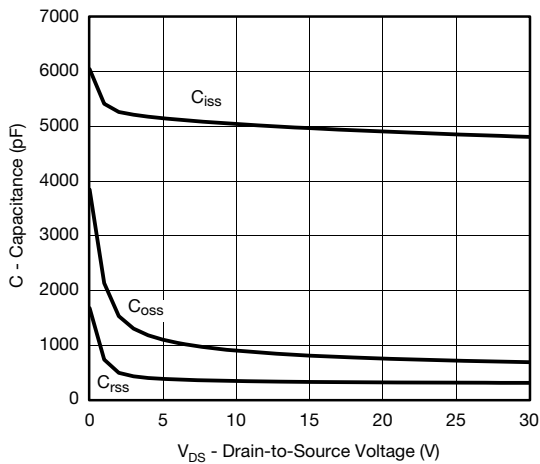
**Transfer Characteristics**



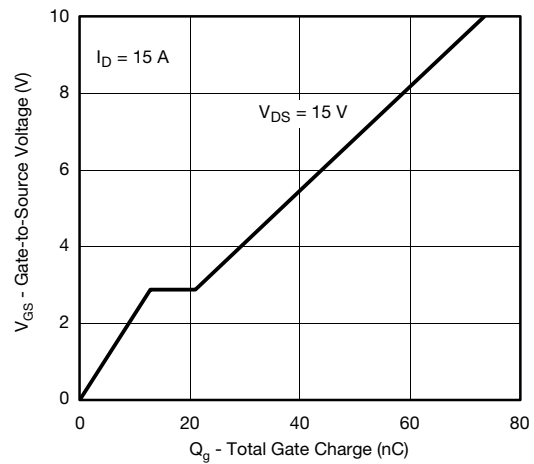
**Transconductance**



**On-Resistance vs. Drain Current**



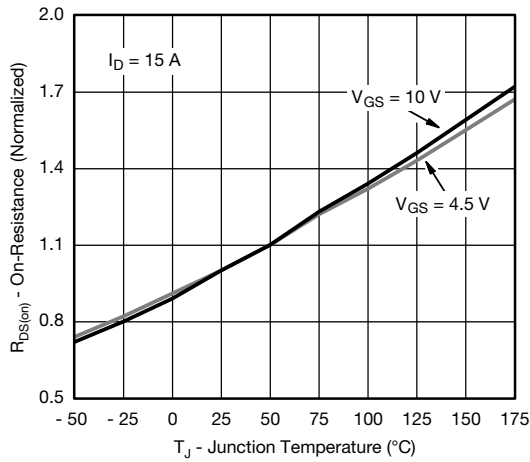
**Capacitance**



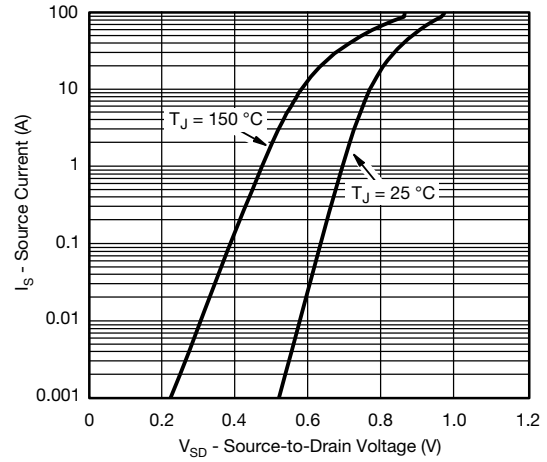
**Gate Charge**



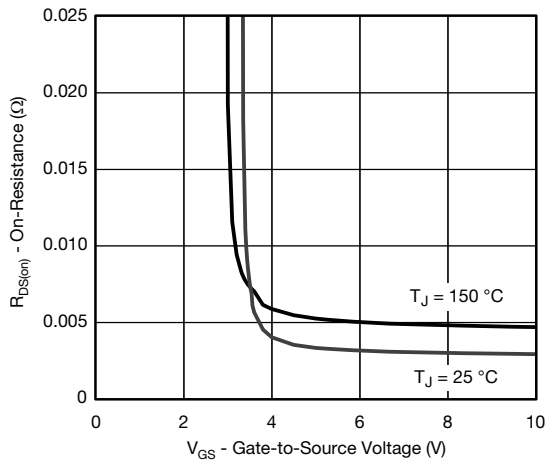
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



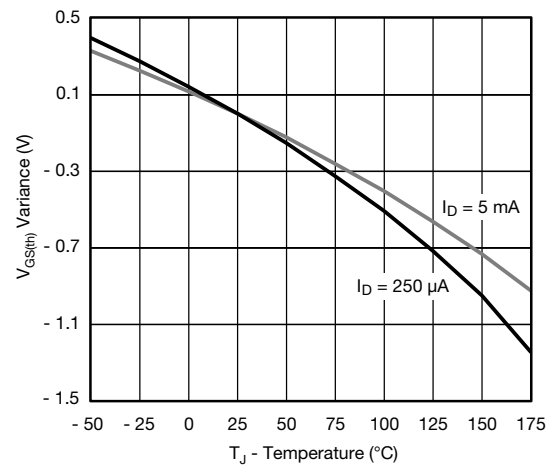
**On-Resistance vs. Junction Temperature**



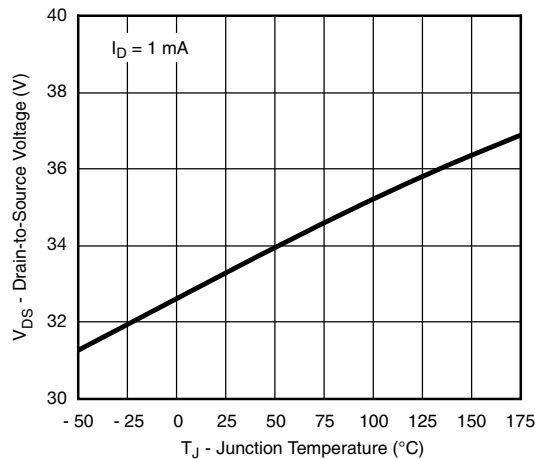
**Source Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



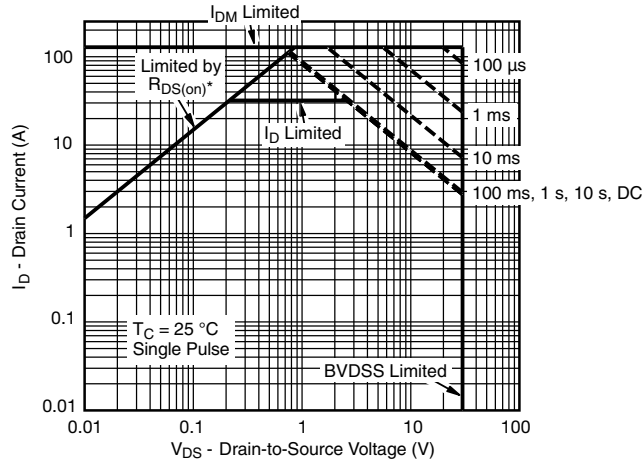
**Threshold Voltage**



**Drain Source Breakdown vs. Junction Temperature**

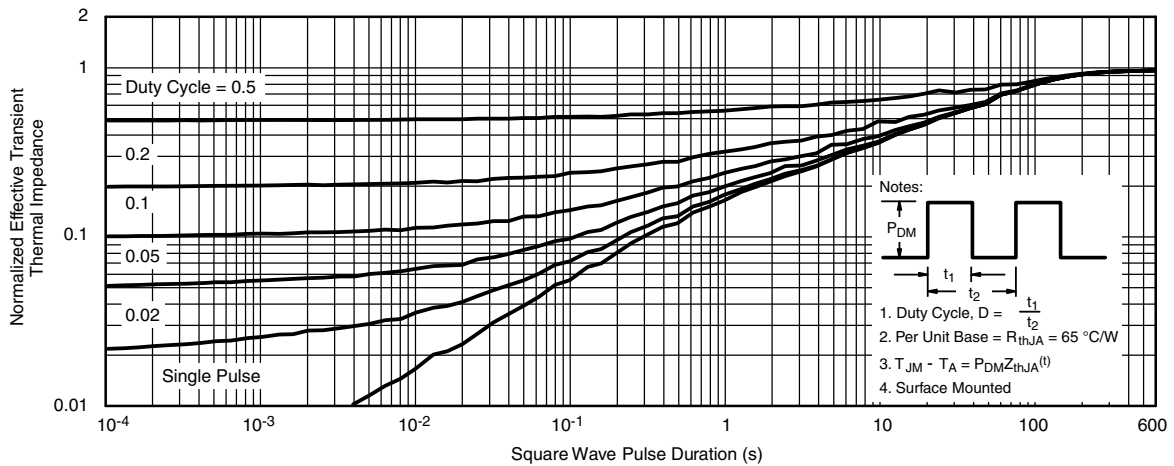


**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



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

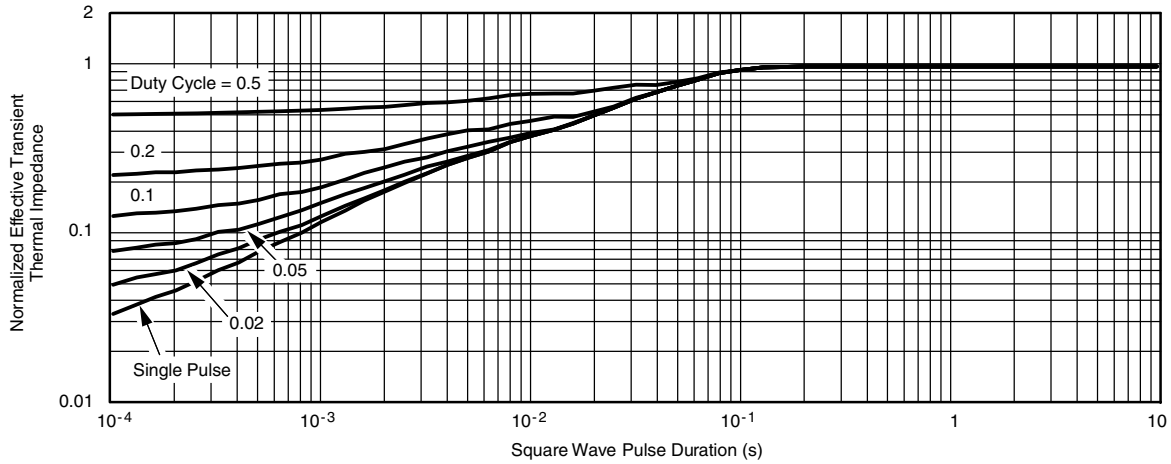
**Safe Operating Area**



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



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



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

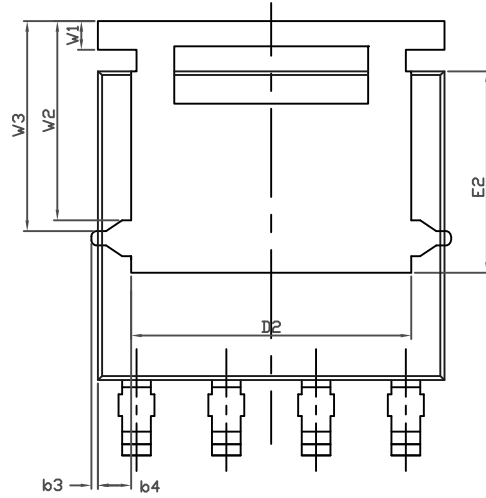
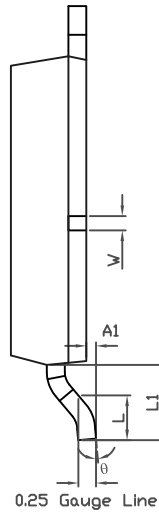
**Note**

- 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)
 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.

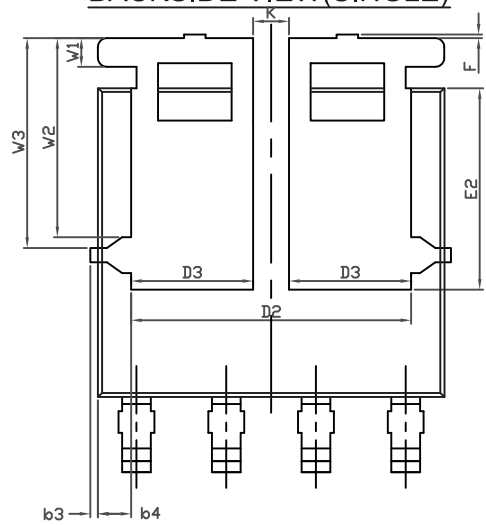
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# PowerPAK® SO-8L Case Outline



TOPSIDE VIEW





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 (for Al product)	2.75	2.85	2.95	0.108	0.112	0.116
E2 (for other product)	3.18	3.28	3.38	0.125	0.129	0.133
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: C12-0026-Rev. B, 27-Aug-12 DWG: 5976						

**Note**

- Millimeters will govern





## RECOMMENDED MINIMUM PAD FOR PowerPAK® SO-8L SINGLE



Recommended Minimum Pads  
Dimensions in mm (inches)



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
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- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
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## JONHON

«JONHON» (основан в 1970 г.)

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(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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