

# SQJ946EP-T1\_GE3 Datasheet

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DiGi Electronics Part Number	SQJ946EP-T1_GE3-DG
Manufacturer	<a href="#">Vishay Siliconix</a>
Manufacturer Product Number	SQJ946EP-T1_GE3
Description	MOSFET 2N-CH 40V 15A PPAK SO8
Detailed Description	Mosfet Array 40V 15A (Tc) 27W Surface Mount PowerPAK® SO-8 Dual

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## Purchase and inquiry

Manufacturer Product Number:

SQJ946EP-T1\_GE3

Series:

TrenchFET®

Technology:

MOSFET (Metal Oxide)

FET Feature:

-

Current - Continuous Drain (Id) @ 25°C:

15A (Tc)

Vgs(th) (Max) @ Id:

2.5V @ 250µA

Input Capacitance (Ciss) (Max) @ Vds:

600pF @ 25V

Operating Temperature:

-55°C ~ 175°C (Tj)

Qualification:

AEC-Q101

Package / Case:

PowerPAK® SO-8 Dual

Base Product Number:

SQJ946

Manufacturer:

Vishay Siliconix

Product Status:

Active

Configuration:

2 N-Channel (Dual)

Drain to Source Voltage (Vdss):

40V

Rds On (Max) @ Id, Vgs:

33mOhm @ 7A, 10V

Gate Charge (Qg) (Max) @ Vgs:

20nC @ 10V

Power - Max:

27W

Grade:

Automotive

Mounting Type:

Surface Mount

Supplier Device Package:

PowerPAK® SO-8 Dual

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

ECCN:

EAR99

Moisture Sensitivity Level (MSL):

1 (Unlimited)

HTSUS:

8541.29.0095


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**SQJ946EP**

Vishay Siliconix

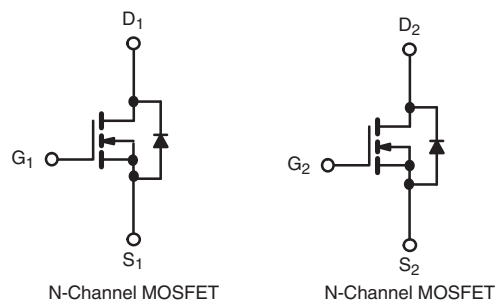
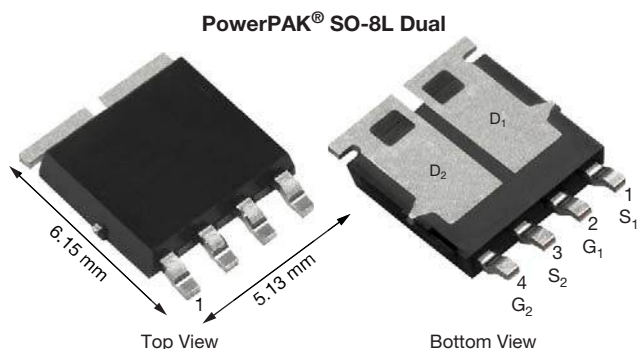
## Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET


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

PRODUCT SUMMARY	
$V_{DS}$ (V)	40
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V	0.033
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.039
$I_D$ (A) per leg	15
Configuration	Dual
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](http://www.vishay.com/doc?99912)



ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	$V_{DS}$	40	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current	$I_D$	$T_C = 25$ °C <sup>a</sup>	15	
		$T_C = 125$ °C	11	
Continuous Source Current (Diode conduction) <sup>a</sup>	$I_S$	15	A	
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	40		
Single Pulse Avalanche Current	$I_{AS}$	11		
Single Pulse Avalanche Energy	$E_{AS}$	L = 0.1 mH	6	mJ
Maximum Power Dissipation <sup>b</sup>			$P_D$	
		$T_C = 125$ °C		9
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +175	°C	
Soldering Recommendations (Peak temperature) <sup>d, e</sup>		260		

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	$R_{thJA}$	85	°C/W
Junction-to-Case (Drain)			

### Notes

- Package limited.
- Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- When mounted on 1" square PCB (FR4 material).
- See solder profile ([www.vishay.com/doc?73257](http://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 ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$		40	-	-	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	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$	-	-	150	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	10	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 7\text{ A}$	-	0.027	0.033	$\Omega$
		$V_{GS} = 10\text{ V}$	$I_D = 7\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	0.056	
		$V_{GS} = 10\text{ V}$	$I_D = 7\text{ A}$ , $T_J = 175\text{ }^\circ\text{C}$	-	-	0.070	
		$V_{GS} = 4.5\text{ V}$	$I_D = 4\text{ A}$	-	0.032	0.039	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}$ , $I_D = 5\text{ A}$		-	29	-	S
<b>Dynamic <sup>b</sup></b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	-	395	600	$\mu\text{F}$
Output Capacitance	$C_{oss}$			-	60	85	
Reverse Transfer Capacitance	$C_{rss}$			-	25	40	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = 10\text{ V}$	$V_{DS} = 20\text{ V}$ , $I_D = 4\text{ A}$	-	10	20	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	1.4	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	2.2	-	
Gate Resistance	$R_g$	f = 1 MHz		2	4.2	6.5	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 20\text{ V}$ , $R_L = 5\text{ }\Omega$ $I_D = 4\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\text{ }\Omega$		-	7	15	ns
Rise Time <sup>c</sup>	$t_r$			-	3	10	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			-	14	30	
Fall Time <sup>c</sup>	$t_f$			-	2	5	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>							
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	40	A
Forward Voltage	$V_{SD}$	$I_F = 7\text{ A}$ , $V_{GS} = 0\text{ V}$		-	0.88	1.2	V

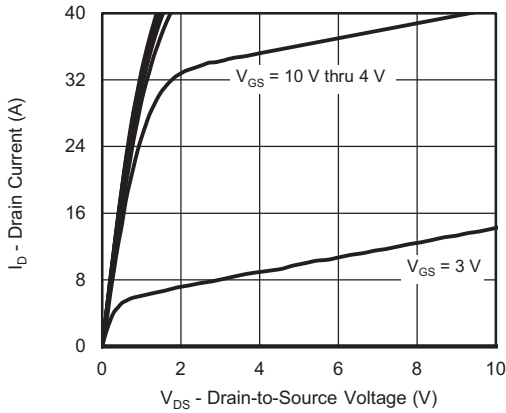
**Notes**

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

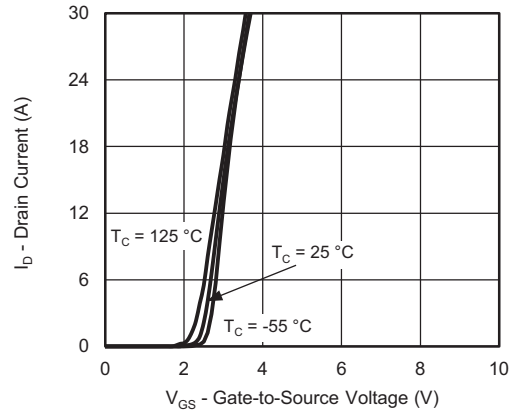
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



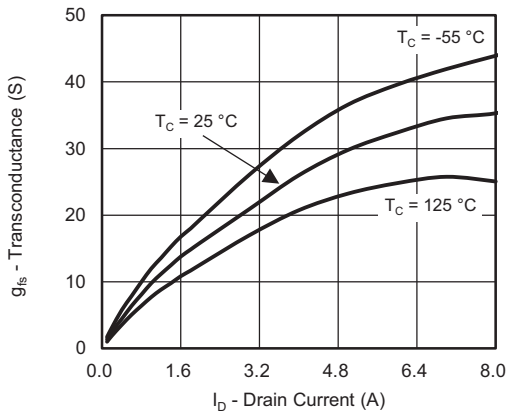
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



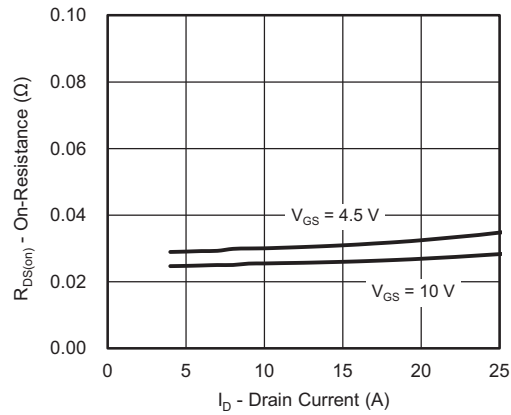
**Output Characteristics**



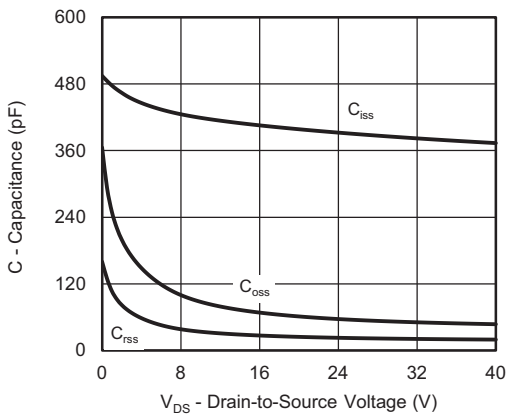
**Transfer Characteristics**



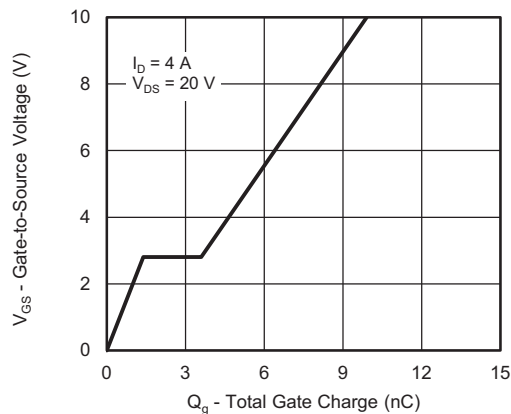
**Transconductance**



**On-Resistance vs. Drain Current**



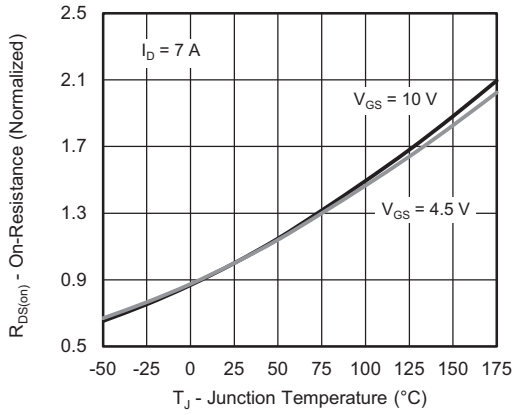
**Capacitance**



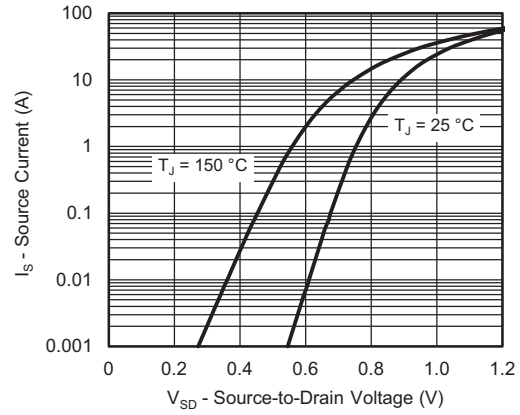
**Gate Charge**



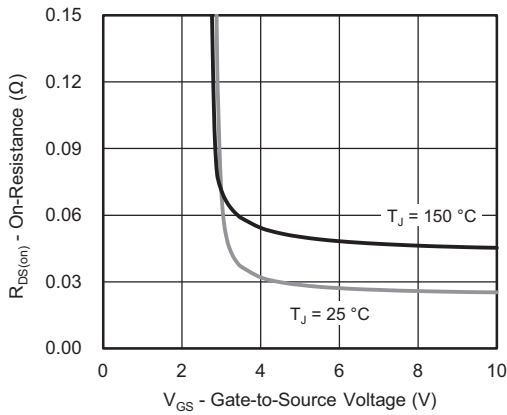
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



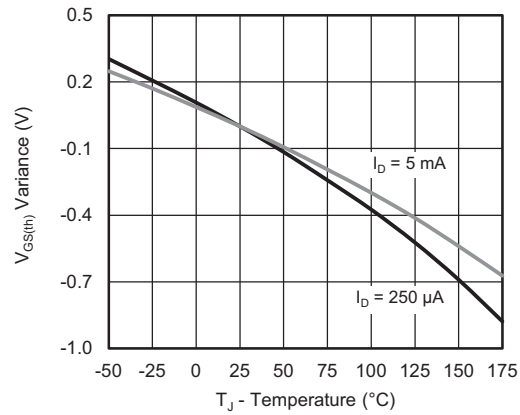
**On-Resistance vs. Junction Temperature**



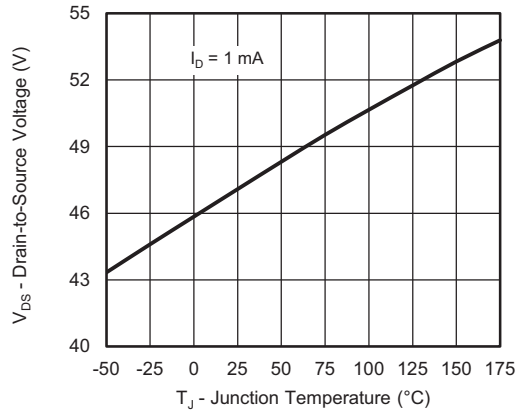
**Source Drain Diode Forward Voltage**



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



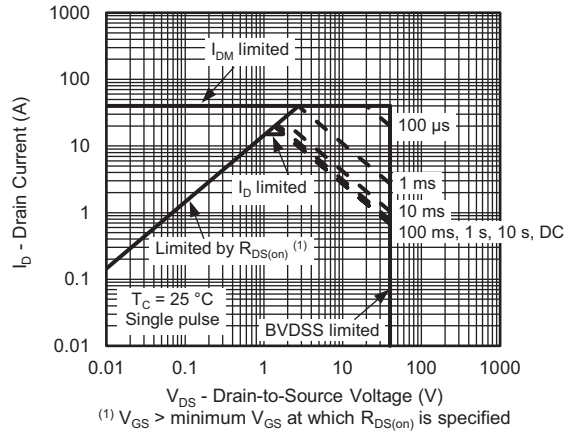
**Threshold Voltage**



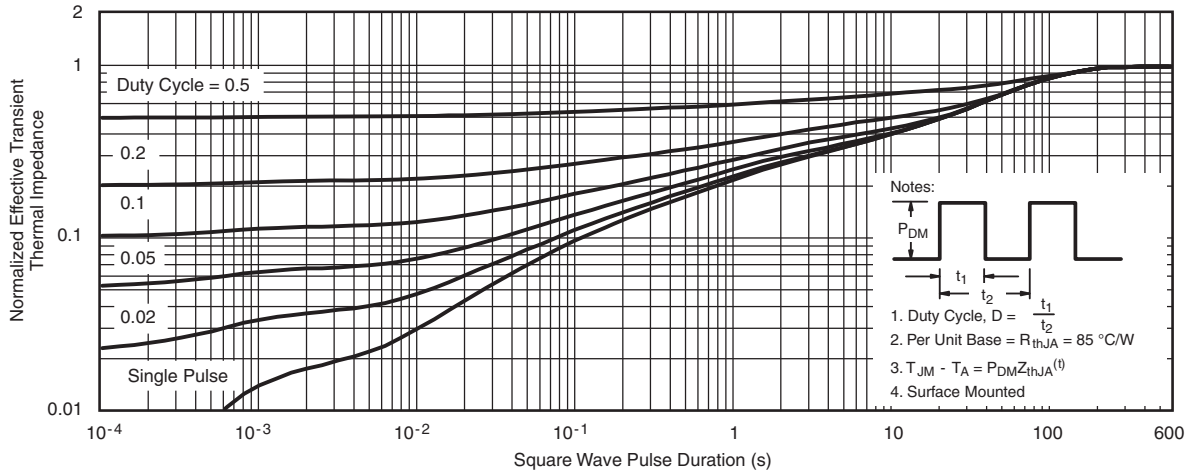
**Drain Source Breakdown vs. Junction Temperature**



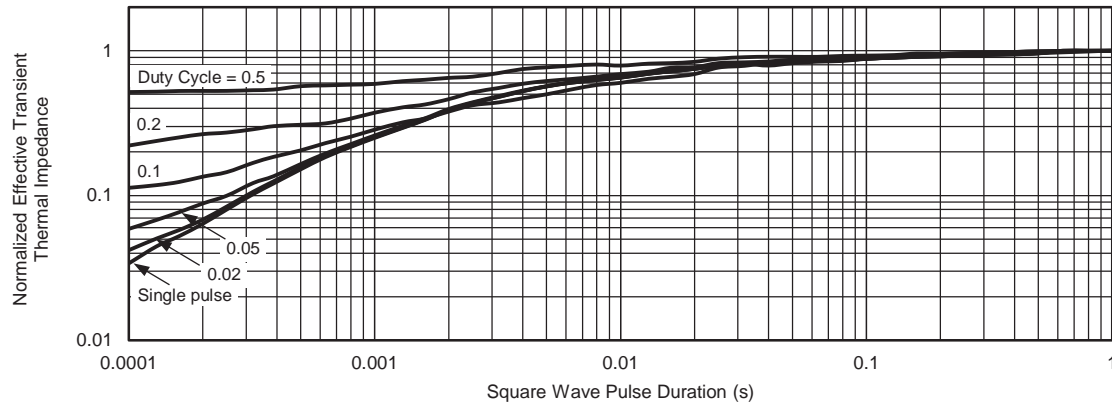
**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**Safe Operating Area**



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

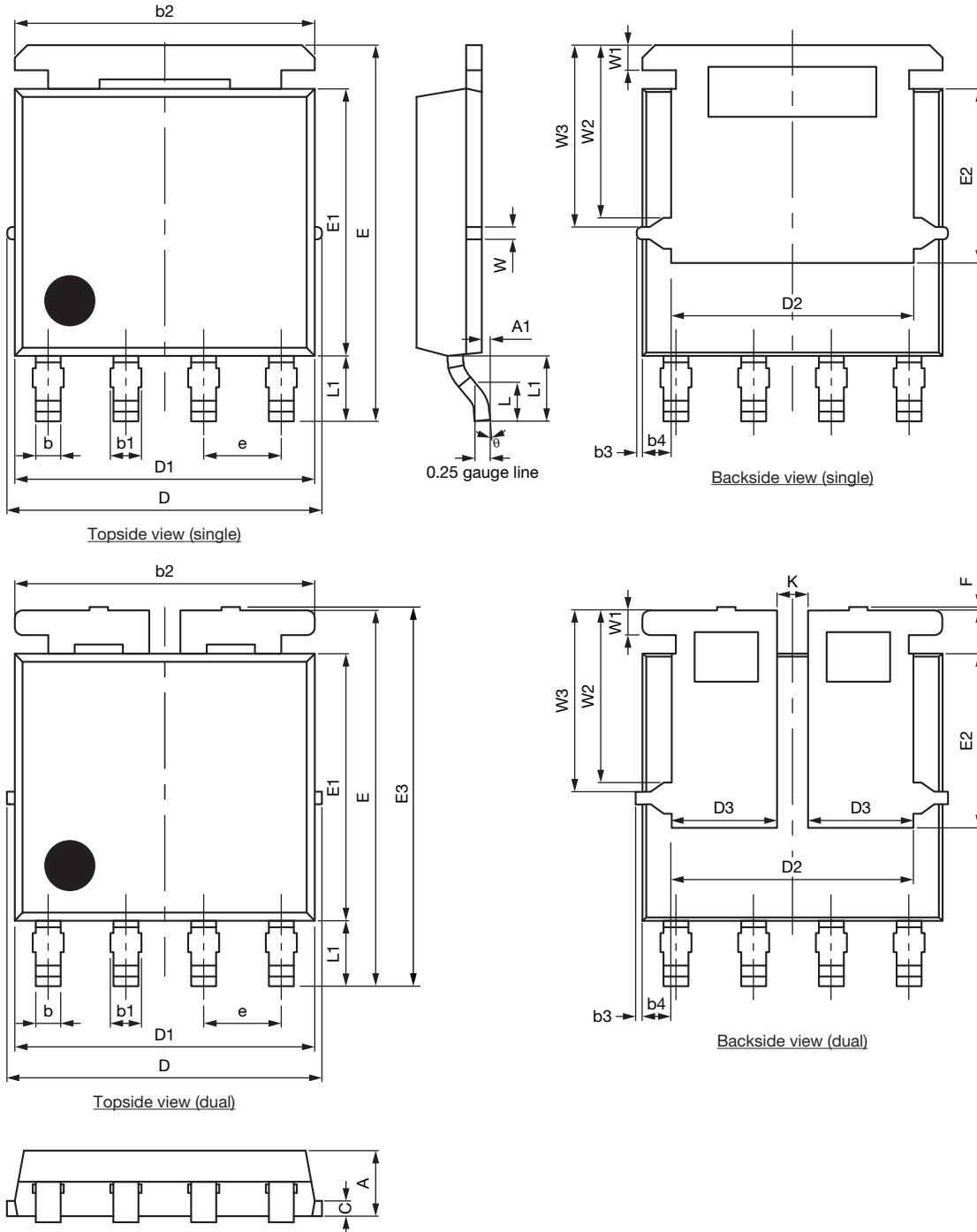

**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)

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

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient ( $25\text{ }^\circ\text{C}$ )
  - 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?75159](http://www.vishay.com/ppg?75159).



PowerPAK® SO-8L Case Outline 2




[www.vishay.com](http://www.vishay.com)

# Package Information

Vishay Siliconix

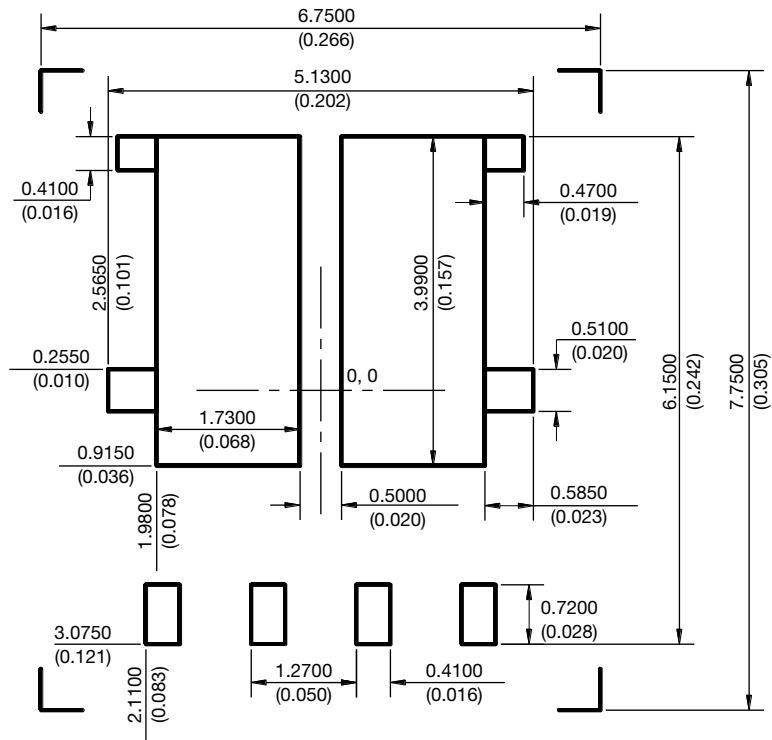
DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.07	1.14	0.039	0.042	0.045
A1	0.00	-	0.127	0.00	-	0.005
b	0.33	0.41	0.48	0.013	0.016	0.019
b1	0.44	0.51	0.58	0.017	0.020	0.023
b2	4.80	4.90	5.00	0.189	0.193	0.197
b3	0.094			0.004		
b4	0.47			0.019		
c	0.20	0.25	0.30	0.008	0.010	0.012
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 DUAL**



Recommended Minimum Pads  
Dimensions in mm (inches)  
Keep-out 6.75 (0.266) x 7.75 (0.305)



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