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# Product Termination Notification



Product Group: SIL/Tuesday April 28, 2026/PTN-SIL-026-2026-REV-1

## Conversion to Copper (Cu) Wire – SQ2301ES-T1\_BE3

For further information, please contact your regional Vishay office.

### CONTACT INFORMATION

#### Americas

Vishay Siliconix  
2565 Junction Ave  
-  
San Jose CA United States 95134  
Phone: (408) 988-8000  
Fax:  
business-america@vishay.com

#### Europe

Vishay Electronic GmbH  
Dr.-Felix-Zandman-Platz 1  
-  
Selb Germany 95100  
Phone: 49-9287-71 0  
Fax: 49-9287-70435  
business-europe@vishay.com

#### Asia

Vishay Intertechnology Asia Pte. Ltd  
37A Tampines Street 92 #07-01  
-  
Singapore Singapore 528886  
Phone: 65 6788 6668  
Fax: 65 6788 0988  
business-asia@vishay.com

**Description of Change:** The affected part number listed in this notification will be converted from a Gold (Au) bond wire to a Copper (Cu) bond wire material set. The new ordering code is SQ2301CES-T1\_GE3 which has identical silicon technology and silicon die design as SQ2301ES. Small changes to the data sheet AC parameters are a consequence of lot to lot variation and/or updated characterization methods (reference: SQ2301CES Doc # 62454 Rev. A). Device performance in the application will not be impacted. There will be no change to the wafer fab location.

REV-1 PTN issued to correct new ordering part number to SQ2301CES-T1\_GE3.

**Reason for Change:** Standardization of materials

**Expected Influence on Quality/Reliability/Performance:** None

**Part Numbers/Series/Families Affected:** SQ2301ES-T1\_BE3

**Vishay Brand(S):** Vishay Siliconix

#### Time Schedule:

Last Time Buy Date: Sunday October 25, 2026

Last Time Ship Date: Friday April 23, 2027

**Sample Availability:** Qualified samples of replacement product are available on request

**Product Identification:** SQ2301CES-T1\_GE3

**Qualification Data:** AEC Q101 qualification data of replacement product is available. Qualification PPAP is available now.

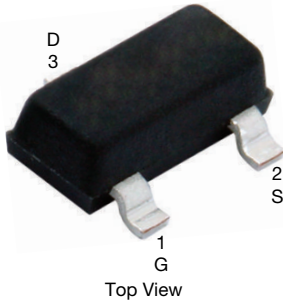
**This PTN is considered approved, without further notification, unless we receive specific customer concerns before Wednesday May 27, 2026 or as specified by contract.**

**Issued By:** Lance Gurrola, automostechsupport@vishay.com



# Automotive P-Channel 20 V (D-S) 175 °C MOSFET

SOT-23 (TO-236)

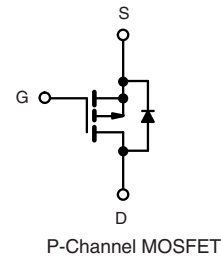


## FEATURES

- 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)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE



PRODUCT SUMMARY	
V <sub>DS</sub> (V)	-20
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -4.5 V	0.120
R <sub>DS(on)</sub> (Ω) at V <sub>GS</sub> = -2.5 V	0.180
I <sub>D</sub> (A)	-3.9
Configuration	Single

ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and halogen-free	SQ2301CES (for detailed order number please see <a href="http://www.vishay.com/doc?79771">www.vishay.com/doc?79771</a> )

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V <sub>DS</sub>	-20	V
Gate-source voltage		V <sub>GS</sub>	± 8	
Continuous drain current	T <sub>C</sub> = 25 °C	I <sub>D</sub>	-3.9	A
	T <sub>C</sub> = 125 °C		-2.2	
Continuous source current (diode conduction)		I <sub>S</sub>	-3.7	
Pulsed drain current <sup>a</sup>		I <sub>DM</sub>	-15	
Single pulse avalanche current	L = 0.1 mH	I <sub>AS</sub>	-9	mJ
Single pulse avalanche energy		E <sub>AS</sub>	4	
Maximum power dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	3	W
	T <sub>C</sub> = 125 °C		1	
Operating junction and storage temperature range		T <sub>J</sub> , T <sub>stg</sub>	-55 to + 175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient	PCB mount <sup>c</sup>	R <sub>thJA</sub>	166	°C/W
Junction-to-case (drain)		R <sub>thJF</sub>	50	

### Notes

- Package limited
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR-4 material)



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	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$		-20	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		-0.45	-	-1.5	
Gate-source leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$		-	-	$\pm 100$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}$	-	-	-1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	-50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-state drain current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = -4.5\text{ V}$	$V_{DS} \geq 5\text{ V}$	-8	-	-	A
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$	$I_D = -2.8\text{ A}$	-	0.080	0.120	$\Omega$
		$V_{GS} = -2.5\text{ V}$	$I_D = -2\text{ A}$	-	0.110	0.180	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -1.6\text{ V}, I_D = -2.8\text{ A}$		-	7	-	S
<b>Dynamic <sup>b</sup></b>							
Input capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = -10\text{ V}, f = 1\text{ MHz}$	-	369	425	$\text{pF}$
Output capacitance	$C_{oss}$			-	91	100	
Reverse transfer capacitance	$C_{rss}$			-	64	70	
Total gate charge <sup>c</sup>	$Q_g$	$V_{GS} = -4.5\text{ V}$	$V_{DS} = -10\text{ V}, I_D = -2.8\text{ A}$	-	5.4	8	$\text{nC}$
Gate-source charge <sup>c</sup>	$Q_{GS}$			-	0.81	-	
Gate-drain charge <sup>c</sup>	$Q_{gd}$			-	1.75	-	
Gate resistance	$R_g$	$f = 1\text{ MHz}$		3	6	14.5	$\Omega$
Turn-on delay time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		-	10	22	ns
Rise time <sup>c</sup>	$t_r$			-	17	21	
Turn-off delay time <sup>c</sup>	$t_{d(off)}$			-	23	45	
Fall time <sup>c</sup>	$t_f$			-	9	15	
<b>Source-Drain Diode Ratings and Characteristics <sup>b</sup></b>							
Pulsed current <sup>a</sup>	$I_{SM}$			-	-	-15	A
Forward voltage	$V_{SD}$	$I_F = -1.6\text{ A}, V_{GS} = 0$		-	-0.8	-1.2	V
Body diode reverse recovery time	$t_{rr}$	$I_F = -1.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		-	15	30	ns
Body diode reverse recovery charge	$Q_{rr}$			-	6.5	13	nC
Reverse recovery fall time	$t_a$			-	6	-	ns
Reverse recovery rise time	$t_b$			-	9	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$					-	-1

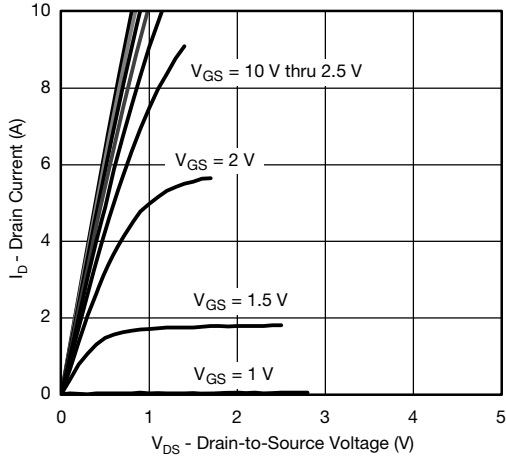
**Notes**

- 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

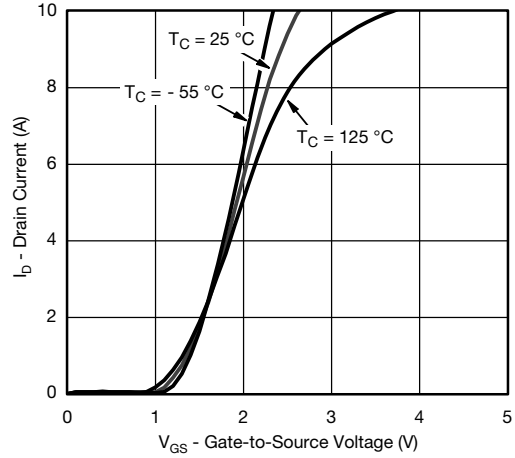
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



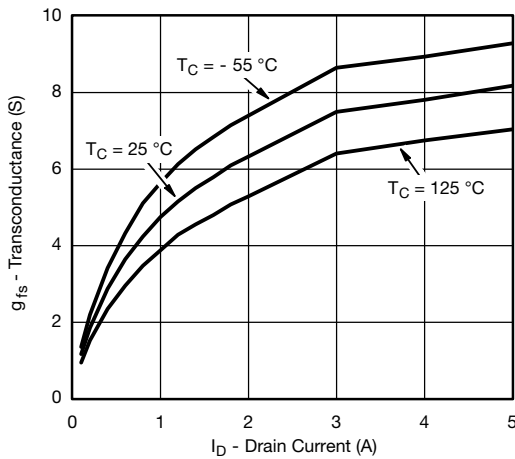
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



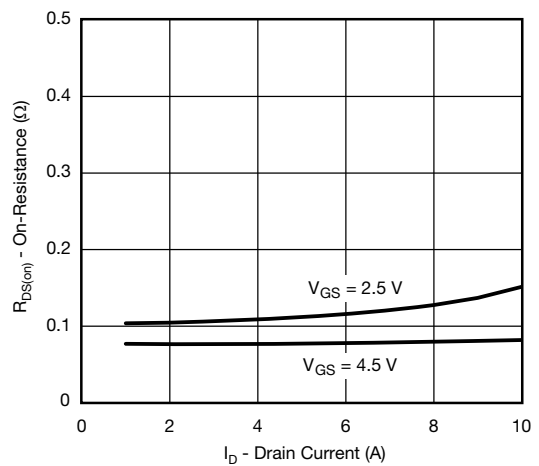
**Output Characteristics**



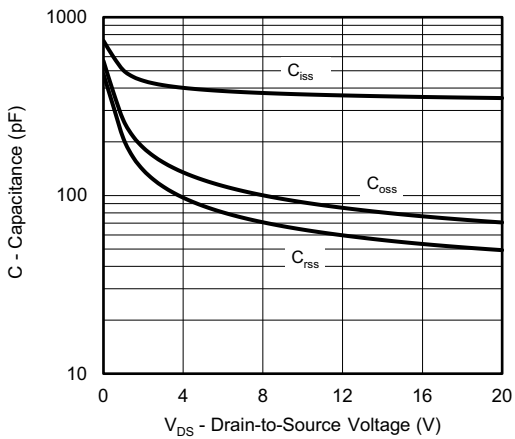
**Transfer Characteristics**



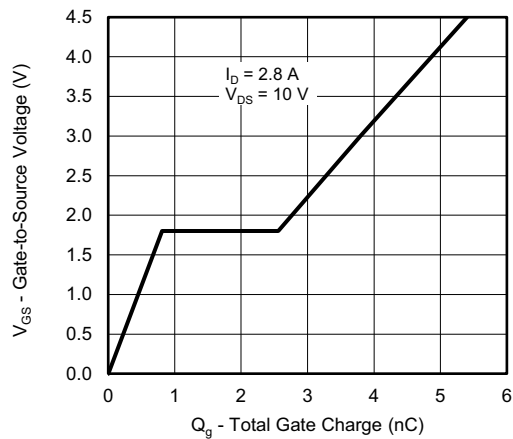
**Transconductance**



**On-Resistance vs. Drain Current**



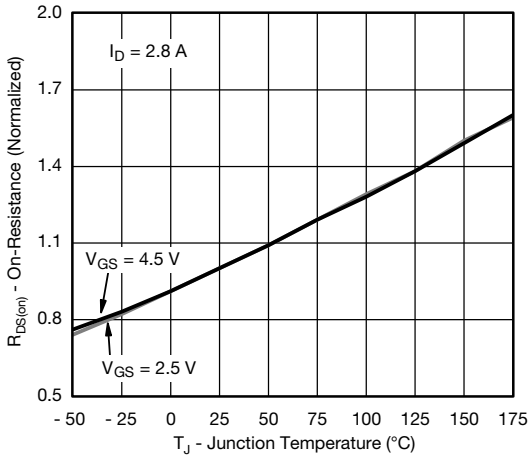
**Capacitance**



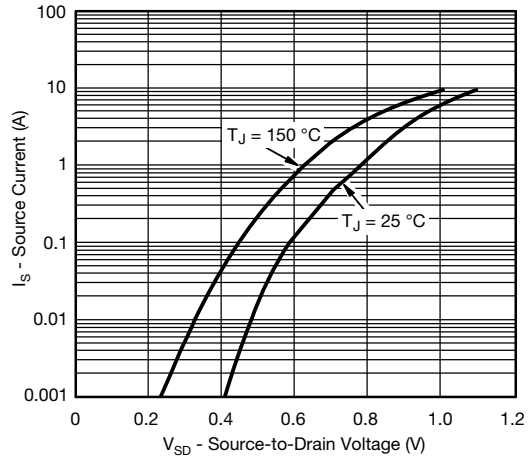
**Gate Charge**



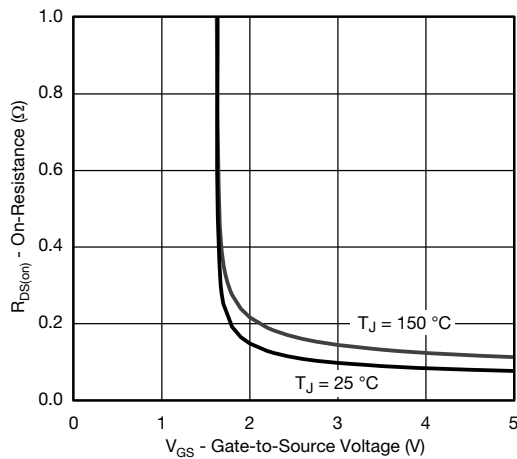
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



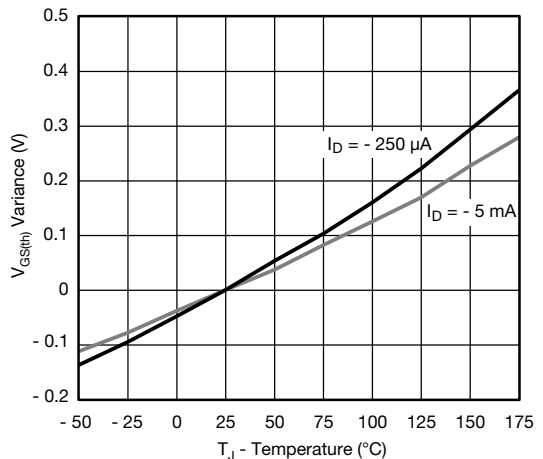
**On-Resistance vs. Junction Temperature**



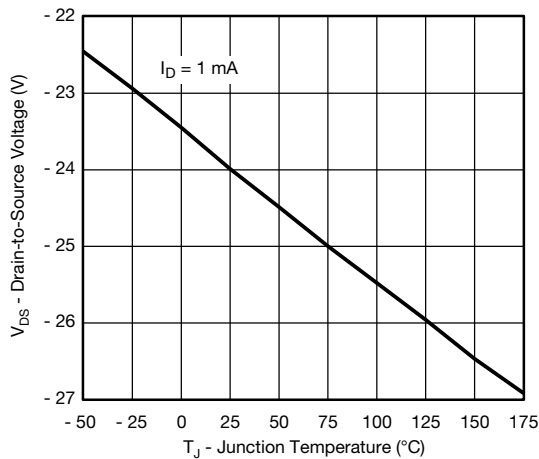
**Source-Drain Diode Forward Voltage**



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



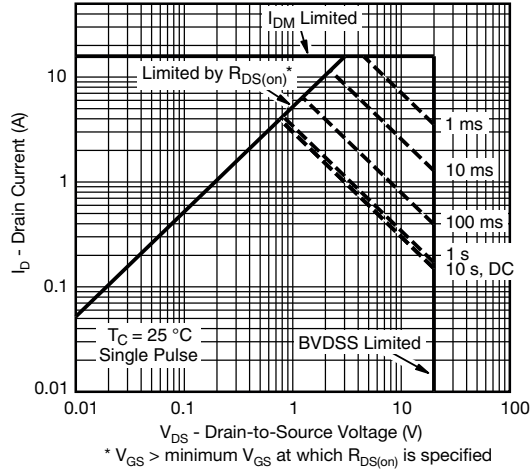
**Threshold Voltage**



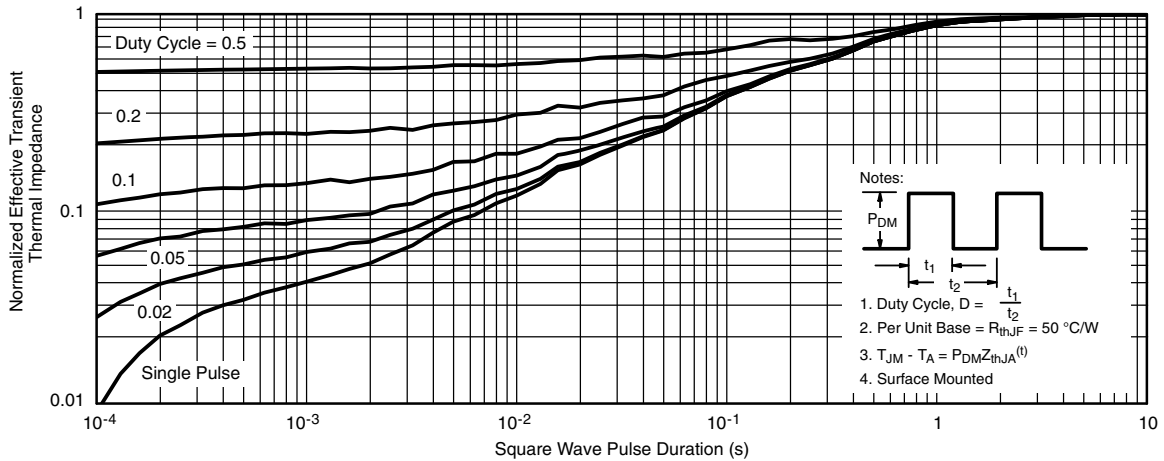
**Drain Source Breakdown vs. Junction Temperature**



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



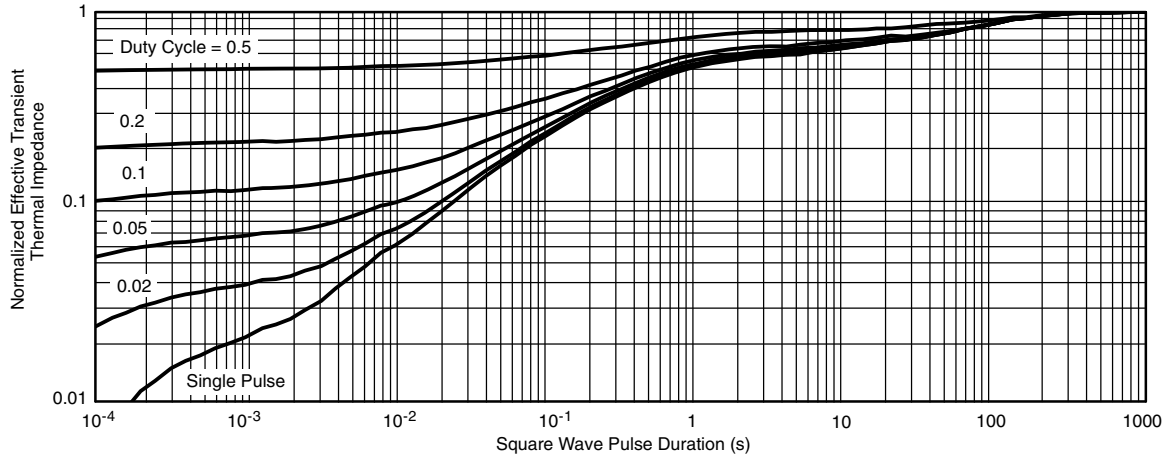
**Safe Operating Area**



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



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



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

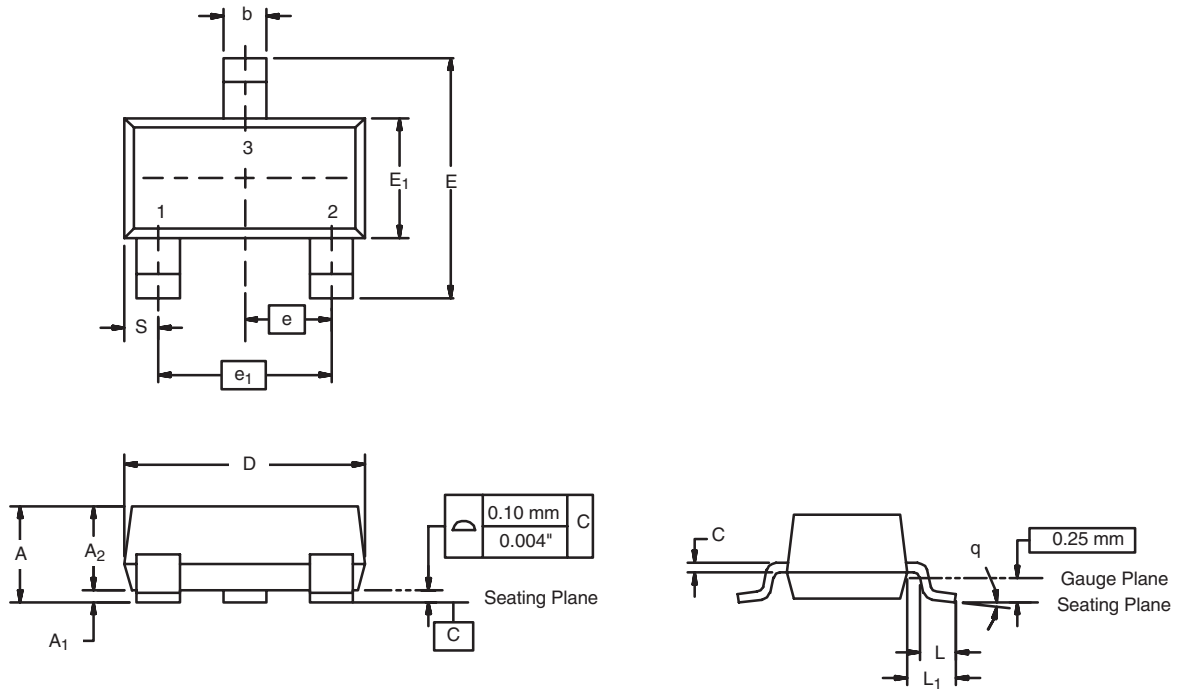
**Note**

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Foot (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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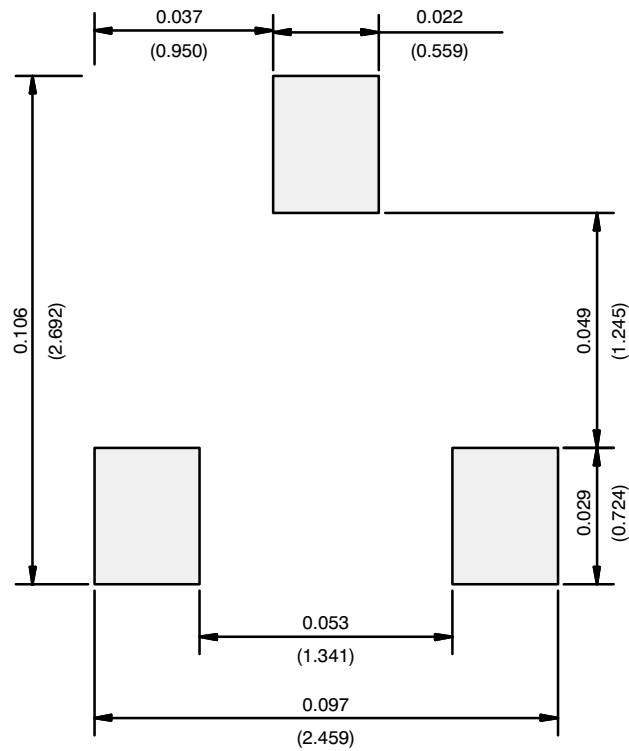
**SOT-23 (TO-236): 3-LEAD**



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A <sub>1</sub>	0.01	0.10	0.0004	0.004
A <sub>2</sub>	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E <sub>1</sub>	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e <sub>1</sub>	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L <sub>1</sub>	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°

ECN: S-03946-Rev. K, 09-Jul-01  
 DWG: 5479

## RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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Vishay Material Code	Customer Material	Location
SQ2301ES-T1_BE3	SLNSQ2301ES-T1-BE3	Ft Worth