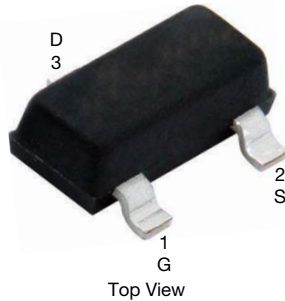


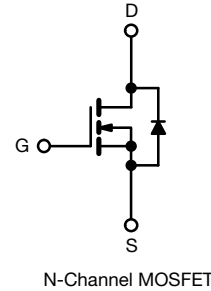
## N-Channel 30 V (D-S) MOSFET

**SOT-23 (TO-236)**

**FEATURES**

- TrenchFET® power MOSFET
- 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**  
Available



PRODUCT SUMMARY	
V <sub>DS</sub> (V)	30
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = 10 V	0.047
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = 4.5 V	0.065
Q <sub>g</sub> typ. (nC)	3.0
I <sub>D</sub> (A)	4.0
Configuration	Single

ORDERING INFORMATION	
Package	SOT-23 (TO-236)
Lead (Pb)-free	Si2306BDS-T1-E3
Lead (Pb)-free and halogen-free	Si2306BDS-T1-GE3

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V <sub>DS</sub>	30	V	
Gate-source voltage	V <sub>GS</sub>	± 20		
Continuous drain current (T <sub>J</sub> = 150 °C) <sup>a, b</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	4.0 <sup>c</sup>	A
		T <sub>A</sub> = 70 °C	3.5 <sup>c</sup>	
		T <sub>A</sub> = 25 °C	3.16 <sup>d</sup>	
		T <sub>A</sub> = 70 °C	2.7 <sup>d</sup>	
Pulsed drain current	I <sub>DM</sub>	20		
Continuous source-drain diode current <sup>a, b</sup>	I <sub>S</sub>		1.04 <sup>c</sup>	
			0.62 <sup>d</sup>	
Maximum power dissipation <sup>a, b</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.25 <sup>c</sup>	W
		T <sub>A</sub> = 70 °C	0.8 <sup>c</sup>	
		T <sub>A</sub> = 25 °C	0.75 <sup>d</sup>	
		T <sub>A</sub> = 70 °C	0.48 <sup>d</sup>	
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C	

**Notes**

- Surface mounted on 1" x 1" FR4 board, t ≤ 5 s
- Pulse width limited by maximum junction temperature
- t = 5 s
- Steady state



THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient <sup>a</sup>	t ≤ 5 s	R <sub>thJA</sub>	60	100	°C/W
	Steady state		130	166	
Maximum junction-to-foot (drain)	Steady state	R <sub>thJF</sub>	60	75	

**Note**

a. Surface mounted on 1" x 1" FR4 board

SPECIFICATIONS (T <sub>A</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30	-	-	V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0	-	3.0	V
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	-	-	0.5	μA
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	10	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 4.5 V, V <sub>GS</sub> = 10 V	6	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.5 A	-	0.038	0.047	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 2.8 A	-	0.052	0.065	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 4.5 V, I <sub>D</sub> = 2.5 A	-	7.0	-	S
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1.25 A	-	0.8	1.2	V
<b>Dynamic</b>						
Gate charge	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 5 V, I <sub>D</sub> = 2.5 A	-	3.0	4.5	nC
Total gate charge	Q <sub>gt</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 2.5 A	-	6	9	
Gate-source charge	Q <sub>gs</sub>		-	1.6	-	
Gate-drain charge	Q <sub>gd</sub>		-	0.6	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	2.0	5.0	7.5	Ω
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	305	-	pF
Output capacitance	C <sub>oss</sub>		-	65	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	29	-	
<b>Switching</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 15 Ω, I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 0 V, R <sub>g</sub> = 6 Ω	-	7	11	ns
Rise time	t <sub>r</sub>		-	12	18	
Turn-off delay time	t <sub>d(off)</sub>		-	14	25	
Fall time	t <sub>f</sub>		-	6	10	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 1.25 A, di/dt = 100 A/μs	-	14	21	nC
Body diode reverse recovery charge	Q <sub>rr</sub>		-	6	10	

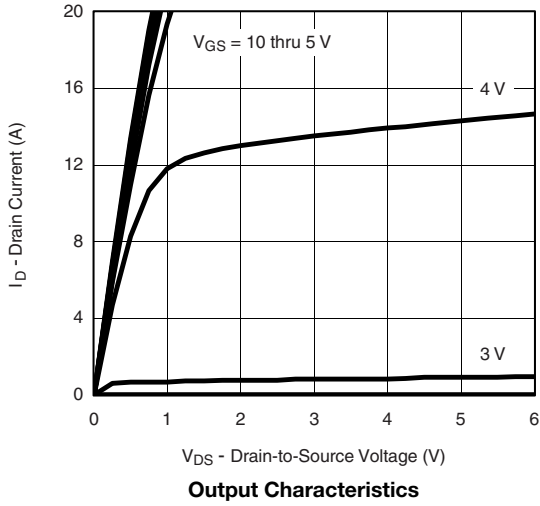
**Notes**

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %

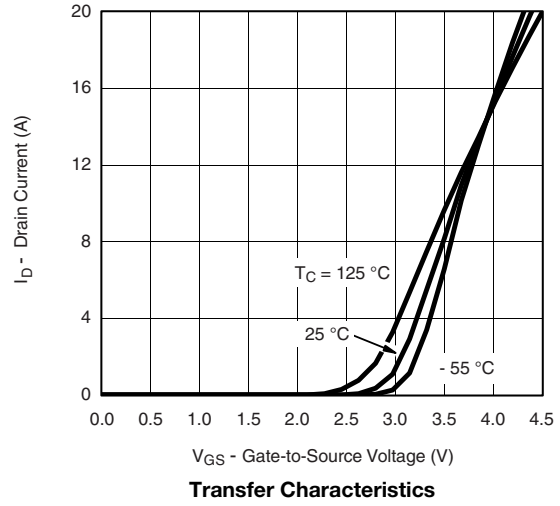
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



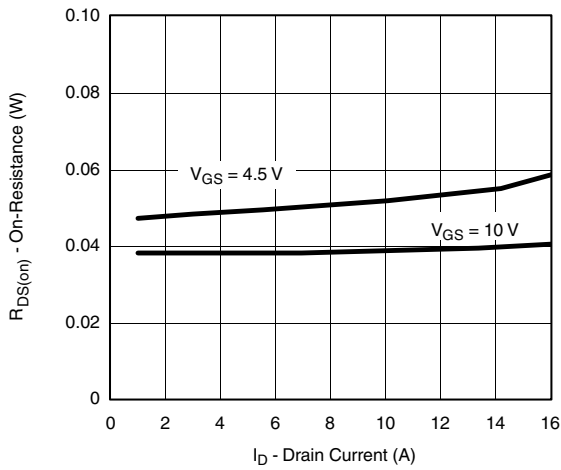
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



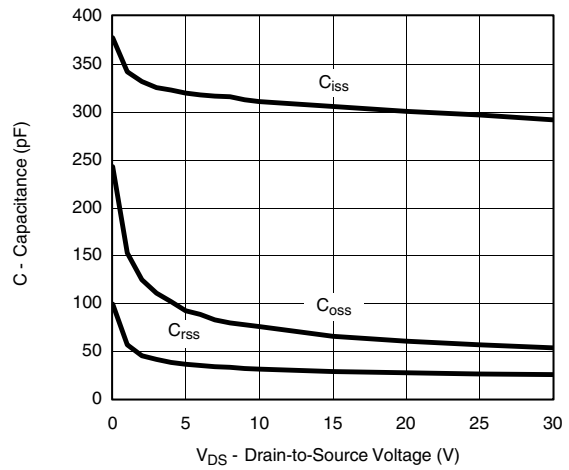
**Output Characteristics**



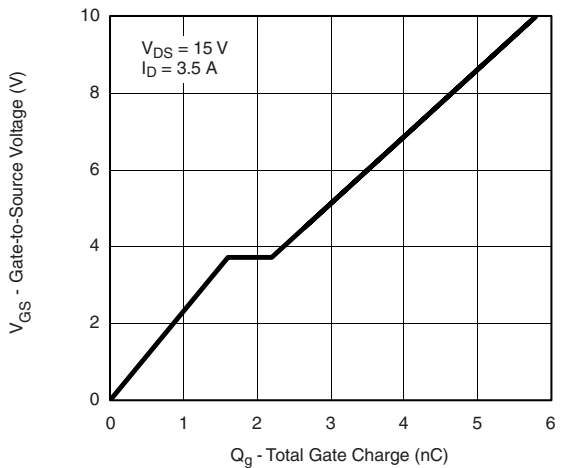
**Transfer Characteristics**



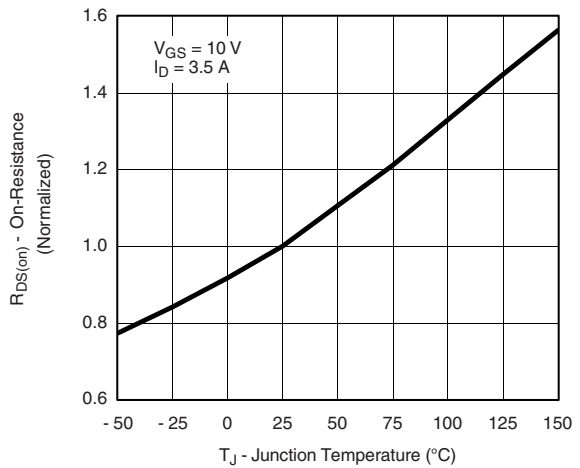
**On-Resistance vs. Drain Current**



**Capacitance**



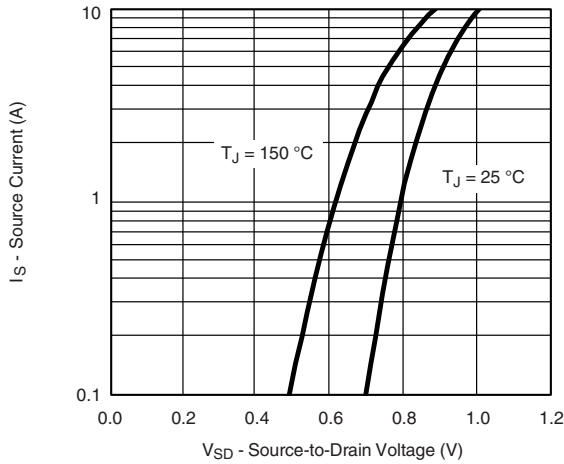
**Gate Charge**



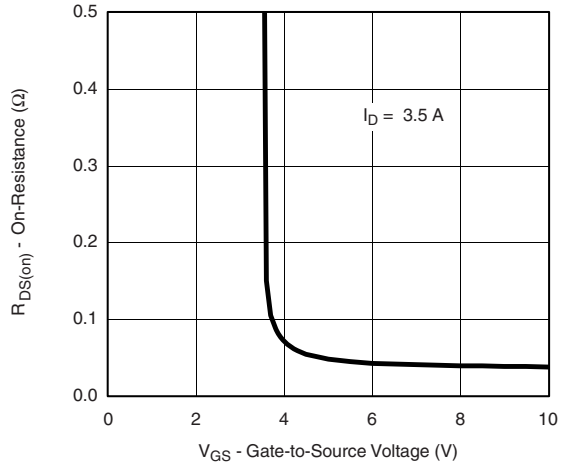
**On-Resistance vs. Junction Temperature**



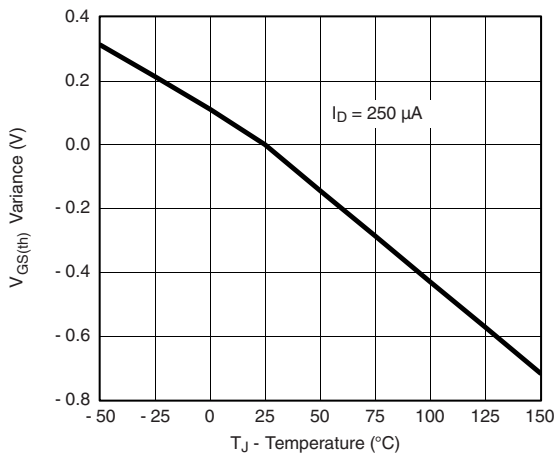
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



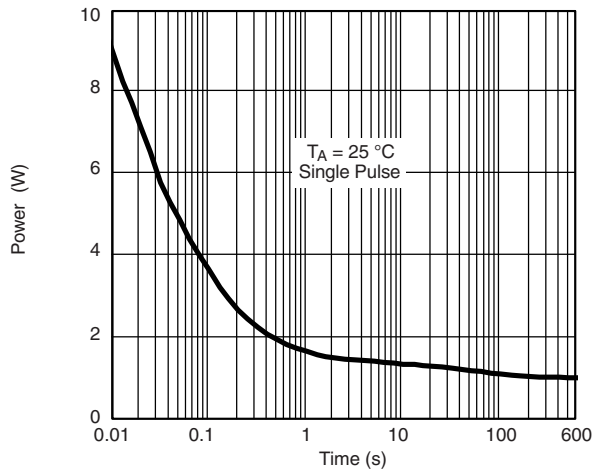
Source-Drain Diode Forward Voltage



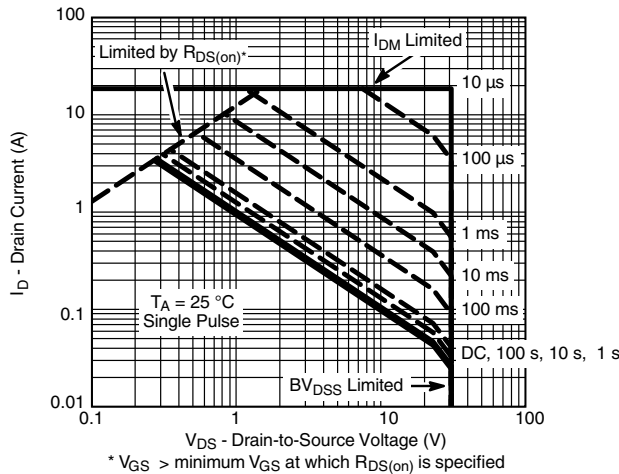
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



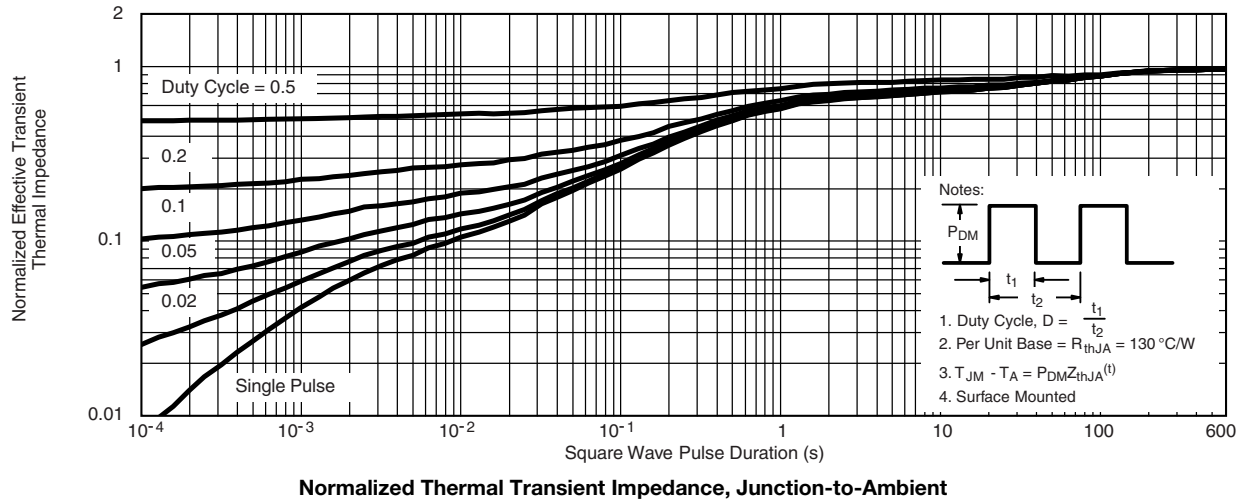
Single Pulse Power



Safe Operating Area

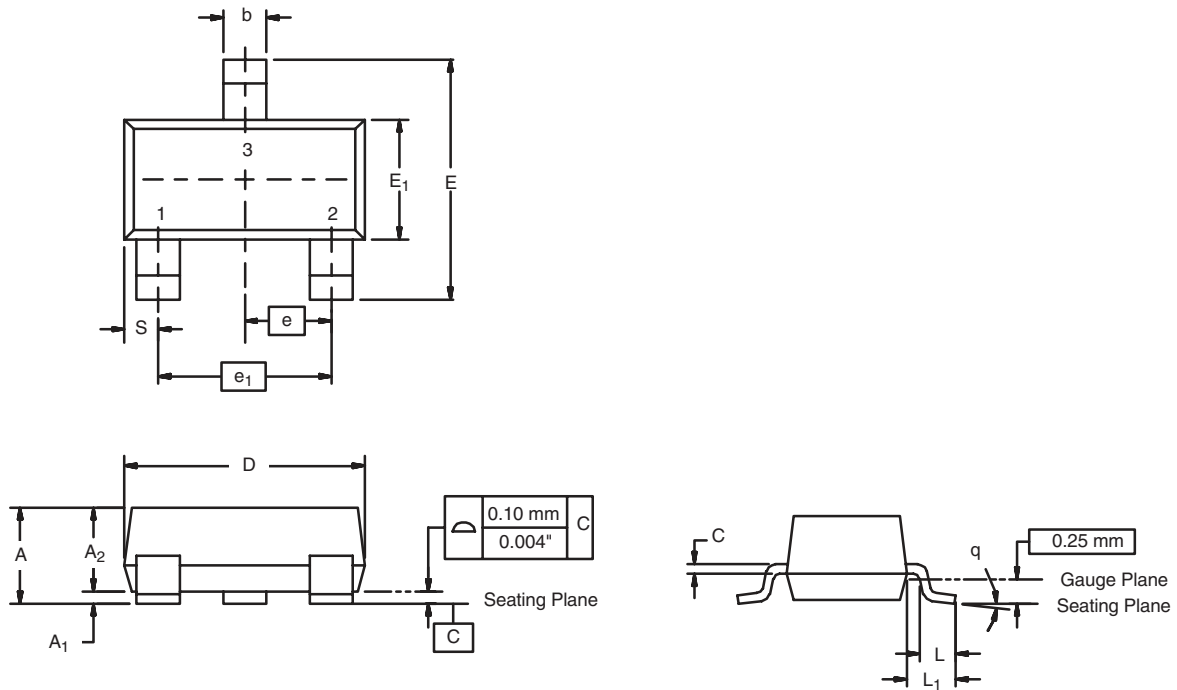


**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



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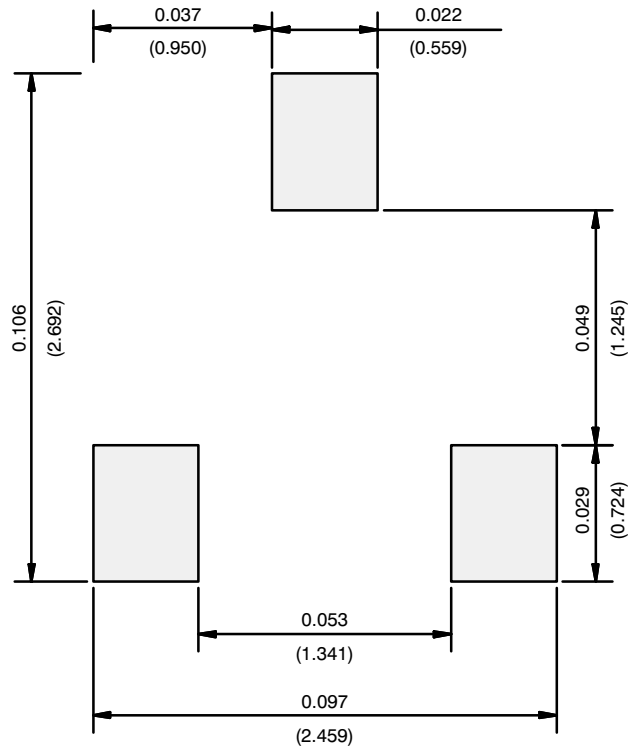
## SOT-23 (TO-236): 3-LEAD



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)

[Return to Index](#)



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