

P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A) ^a	Q_g (Typ.)
- 20	0.0320 at $V_{GS} = - 4.5$ V	- 5.9	13.8 nC
	0.0410 at $V_{GS} = - 2.5$ V	- 5.2	
	0.0675 at $V_{GS} = - 1.8$ V	- 4.3	

FEATURES

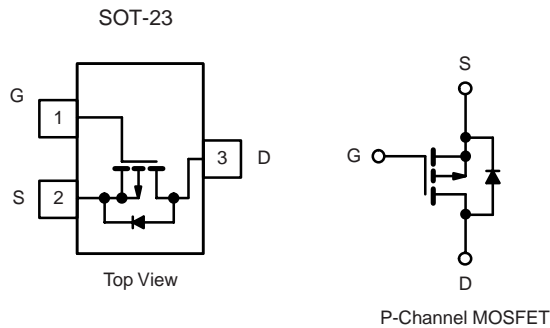
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Built-in ESD Protection
 - Typical ESD Performance 3000 V

APPLICATIONS

- Power Management for Portable and Consumer
 - Load Switches
 - DC/DC Converters



RoHS
 COMPLIANT
 HALOGEN
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ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 20	V
Gate-Source Voltage	V_{GS}	± 8	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	A
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Pulsed Drain Current ($t = 300$ μ s)	I_{DM}	- 20	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	
		$T_A = 25$ °C	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	W
		$T_C = 70$ °C	
		$T_A = 25$ °C	
		$T_A = 70$ °C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	100	130	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	60	75	

Notes:

- $T_C = 25$ °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under steady state conditions is 175 °C/W.

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 20			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 14		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			2.5			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.4		- 1	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 10	μA	
		V _{DS} = 0 V, V _{GS} = ± 4.5 V			± 1		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 20 V, V _{GS} = 0 V			- 1		
		V _{DS} = - 20 V, V _{GS} = 0 V, T _J = 55 °C			- 10		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 4.5 V	- 15			A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 4 A		0.0265	0.0320	Ω	
		V _{GS} = - 2.5 V, I _D = - 4 A		0.0340	0.0410		
		V _{GS} = - 1.8 V, I _D = - 2 A		0.0465	0.0675		
Dynamic ^b							
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 8 V, I _D = - 4.5 A		23.8	36	nC	
		V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 4.5 A		13.8	21		
Gate-Source Charge	Q _{gs}			1.9			
Gate-Drain Charge	Q _{gd}			3			
Gate Resistance	R _g	f = 1 MHz	2.2	11	22	Ω	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 2.8 Ω I _D ≅ - 3.6 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		22	33	ns	
Rise Time	t _r			21	32		
Turn-Off Delay Time	t _{d(off)}			62	93		
Fall Time	t _f			14	21		
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 2.8 Ω I _D ≅ - 3.6 A, V _{GEN} = - 8 V, R _g = 1 Ω		9	18		
Rise Time	t _r			6	12		
Turn-Off Delay Time	t _{d(off)}			65	98		
Fall Time	t _f			15	23		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 1.4	A	
Pulse Diode Forward Current	I _{SM}				- 20		
Body Diode Voltage	V _{SD}	I _S = - 3.6 A, V _{GS} = 0 V		- 0.8	- 1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 3.6 A, dI/dt = 100 A/μs, T _J = 25 °C		13	20	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			5	10	nC	
Reverse Recovery Fall Time	t _a			8		ns	
Reverse Recovery Rise Time	t _b			5			

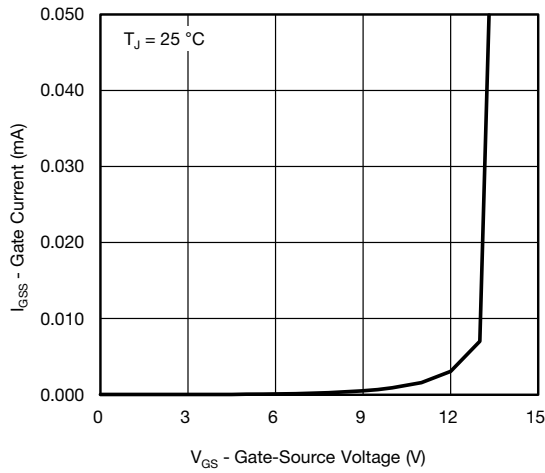
Notes:

 a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

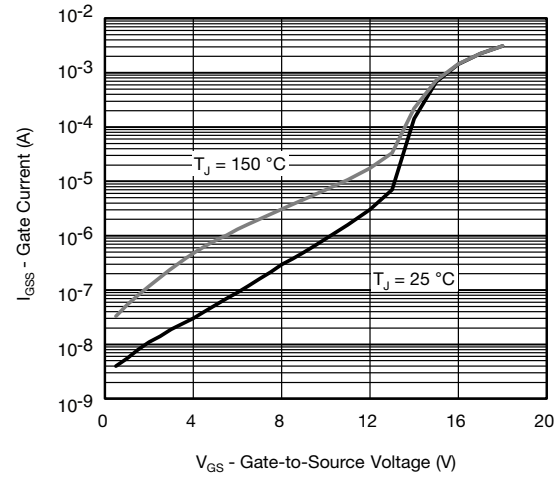
b. Guaranteed by design, not subject to production testing.

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.

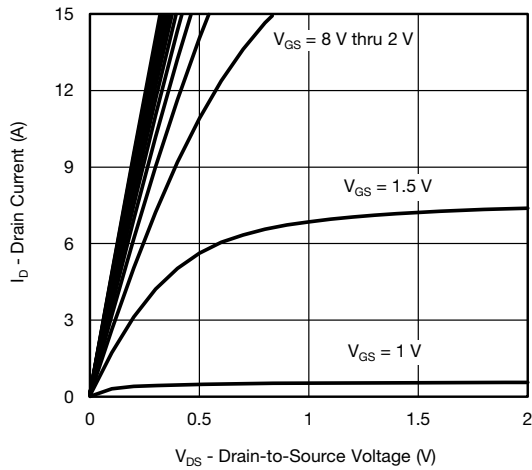
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



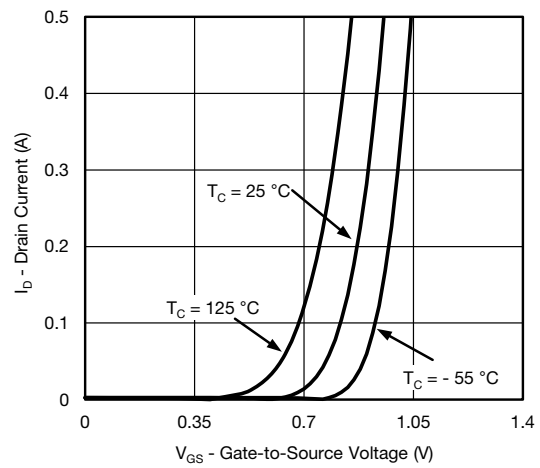
Gate Current vs. Gate-Source Voltage



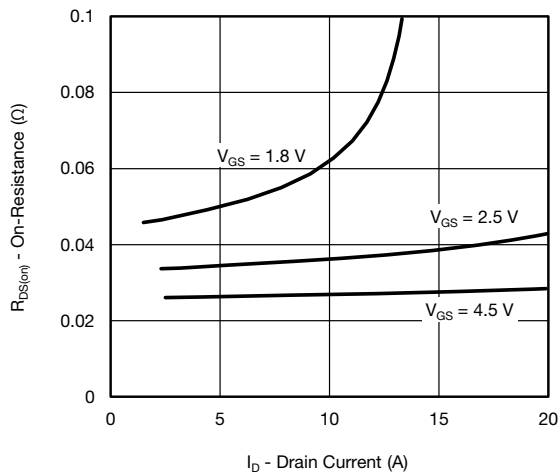
Gate Current vs. Gate-Source Voltage



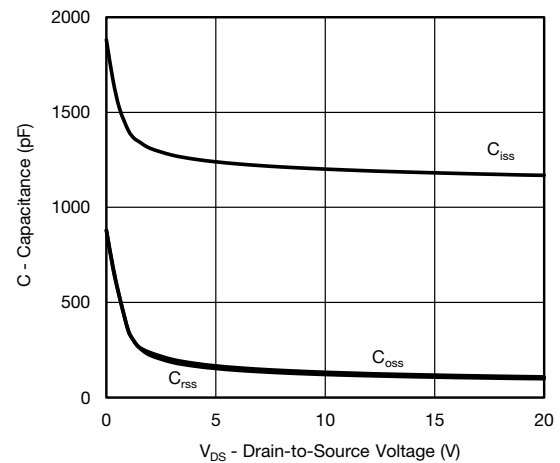
Output Characteristics



Transfer Characteristics

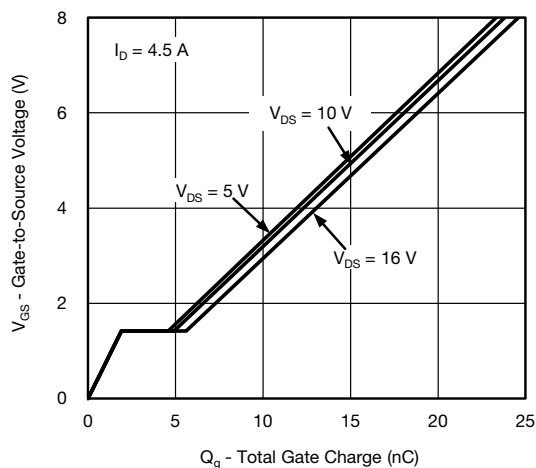


On-Resistance vs. Drain Current

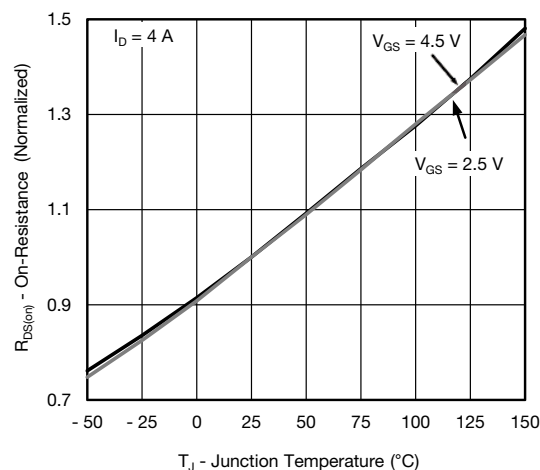


Capacitance

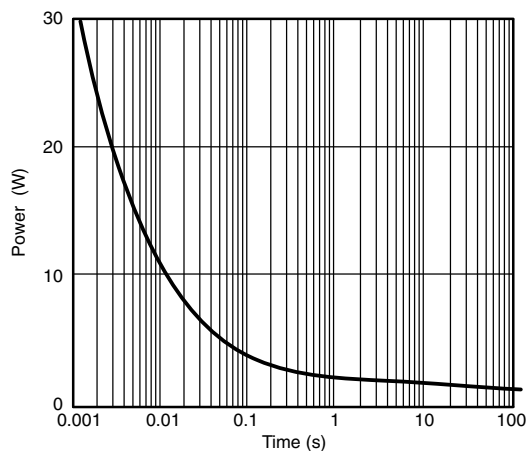
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



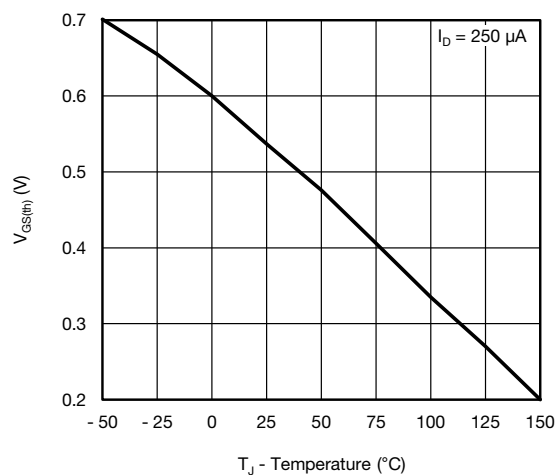
Gate Charge



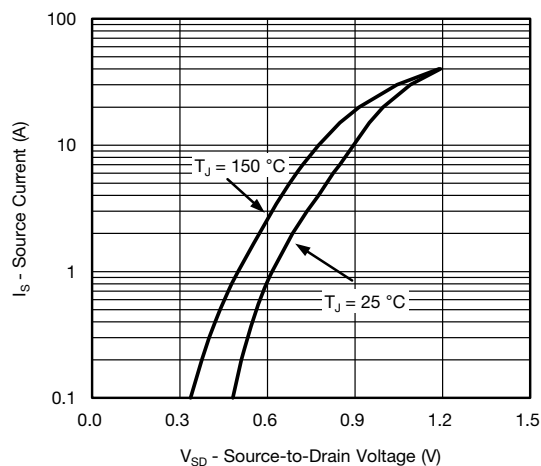
On-Resistance vs. Junction Temperature



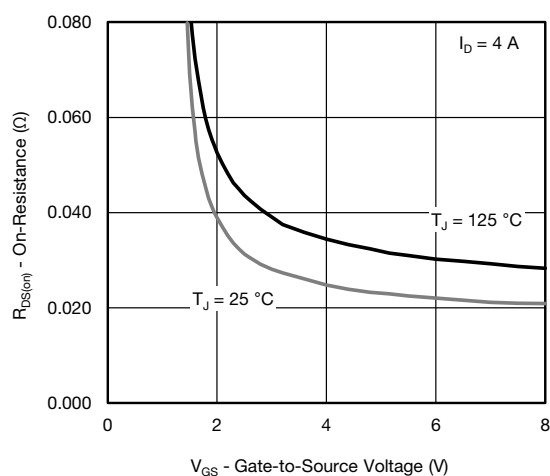
Single Pulse Power, Junction-to-Ambient



Threshold Voltage

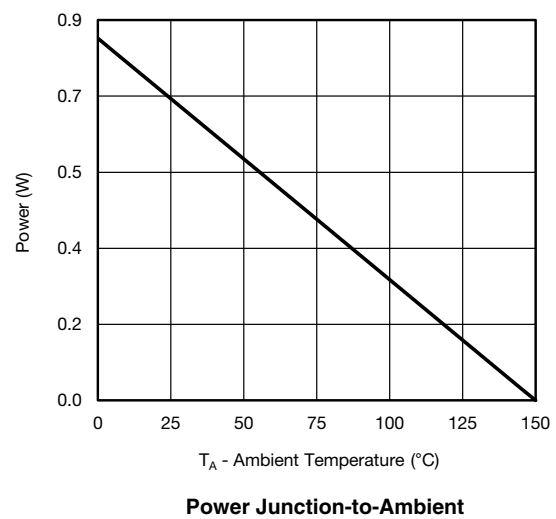
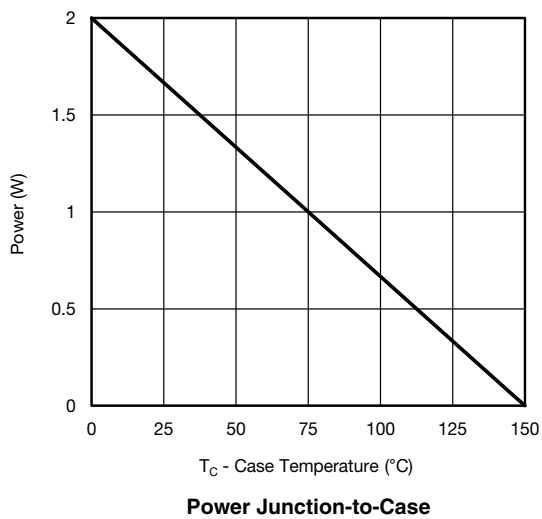
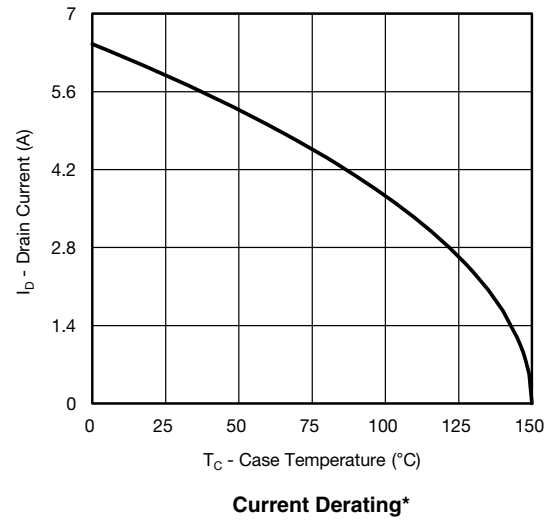
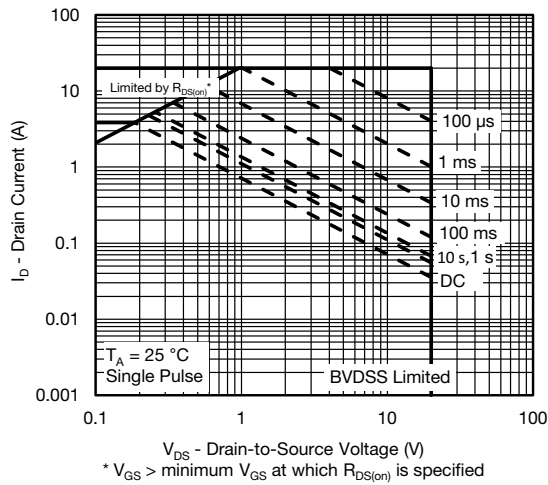


Source-Drain Diode Forward Voltage



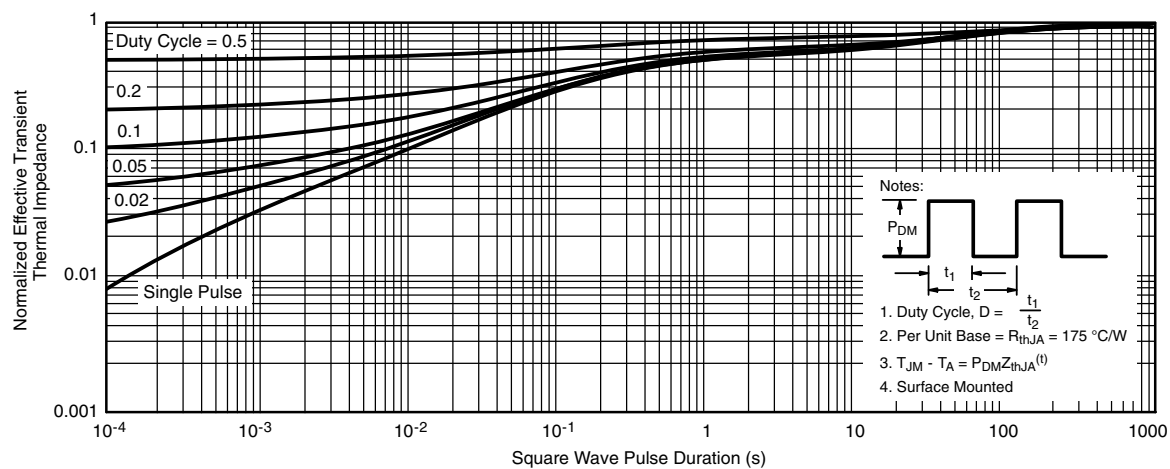
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

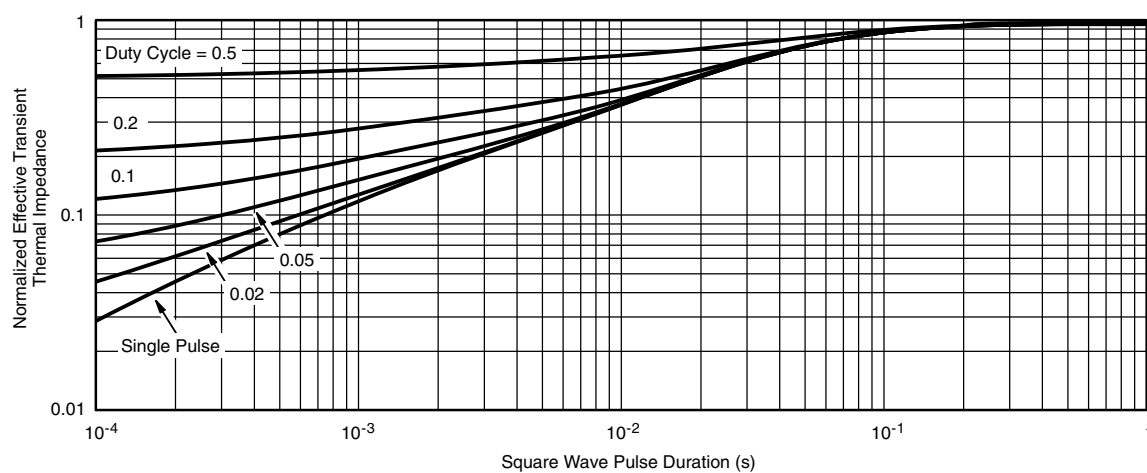


* The power dissipation P_D is based on $T_{J(max.)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

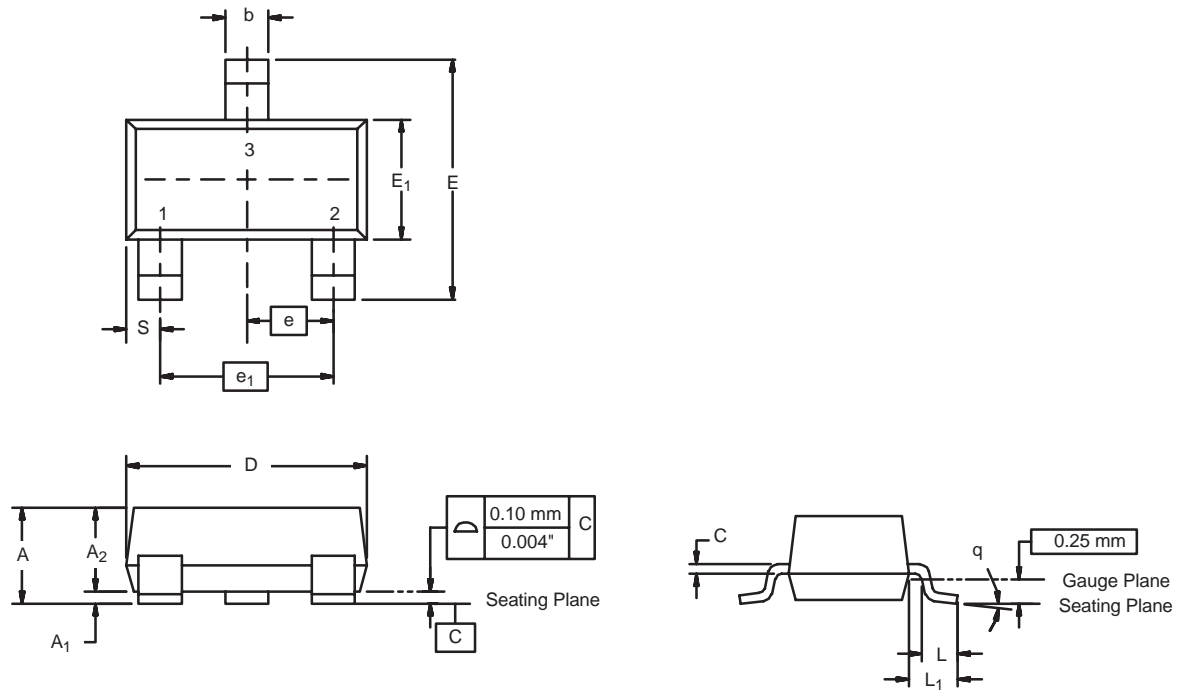


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A ₁	0.01	0.10	0.0004	0.004
A ₂	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 ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	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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