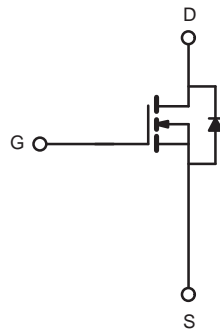
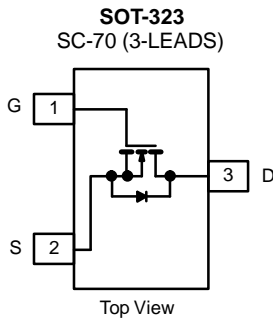


N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
20	0.036 at V _{GS} = 10 V	4	4 nC
	0.040 at V _{GS} = 4.5 V	3.8	
	0.048 at V _{GS} = 2.5 V	3.6	



FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- Typical ESD Protection 2000 V HBM
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Portable Devices
 - Load Switch
 - Battery Switch
- Load Switch for Motors, Relays and Solenoids

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}	± 12		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	4 ^a	
		T _C = 70 °C	3.6 ^a	
		T _A = 25 °C	4 ^{a, b, c}	
		T _A = 70 °C	3.7 ^{b, c}	
Pulsed Drain Current (t = 300 μs)	I _{DM}	20	A	
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C		
		T _A = 25 °C	1.3 ^{b, c}	
Maximum Power Dissipation	P _D	T _C = 25 °C	2.8	
		T _C = 70 °C	1.8	
		T _A = 25 °C	1.56 ^{b, c}	
		T _A = 70 °C	1.0 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	60	80	°C/W	
Maximum Junction-to-Foot (Drain)	R _{thJF}	34	45		

Notes:

- Package limited, T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 125 °C/W.

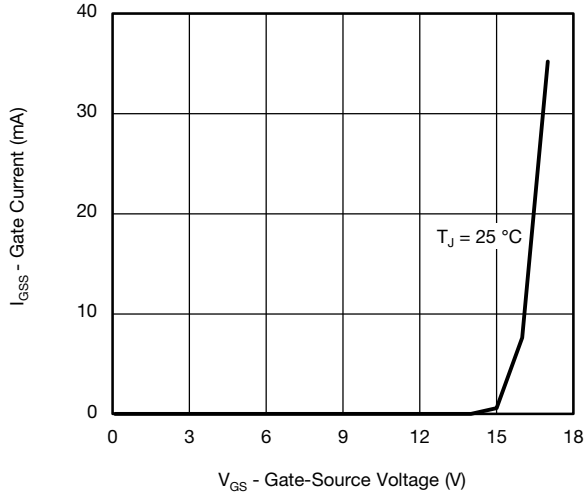
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		23		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			-3.2		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.6		1.3	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 4.5 V			± 0.5	μA
		V _{DS} = 0 V, V _{GS} = ± 12 V			± 25	
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} = 10 V, I _D = 3.7 A		0.036		Ω
		V _{GS} = 4.5 V, I _D = 3.6 A		0.040		
		V _{GS} = 2.5 V, I _D = 1.5 A		0.048		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 3.7 A		17		S
Dynamic^b						
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 3.7 A		8.8	13.5	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 3.7 A		4	6	
Gate-Source Charge	Q _{gs}			0.9		
Gate-Drain Charge	Q _{gd}		1.1			
Gate Resistance	R _g	f = 1 MHz	0.4	2	4	kΩ
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 4.1 Ω I _D ≈ 3.7 A, V _{GEN} = 4.5 V, R _g = 1 Ω		0.29	0.58	μs
Rise Time	t _r			0.4	0.8	
Turn-Off Delay Time	t _{d(off)}			1.9	3.8	
Fall Time	t _f			0.75	1.5	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 4.1 Ω I _D ≈ 3.7 A, V _{GEN} = 10 V, R _g = 1 Ω		0.1	0.2	
Rise Time	t _r			0.15	0.3	
Turn-Off Delay Time	t _{d(off)}			3	6	
Fall Time	t _f			0.75	1.5	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			2.3	A
Pulse Diode Forward Current	I _{SM}				20	
Body Diode Voltage	V _{SD}	I _S = 3.7 A, V _{GS} = 0 V		0.85	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 3.7 A, di/dt = 100 A/μs, T _J = 25 °C		12	25	ns
Body Diode Reverse Recovery Charge	Q _{rr}			5	10	nC
Reverse Recovery Fall Time	t _a			6.5		ns
Reverse Recovery Rise Time	t _b			5.5		

Notes:

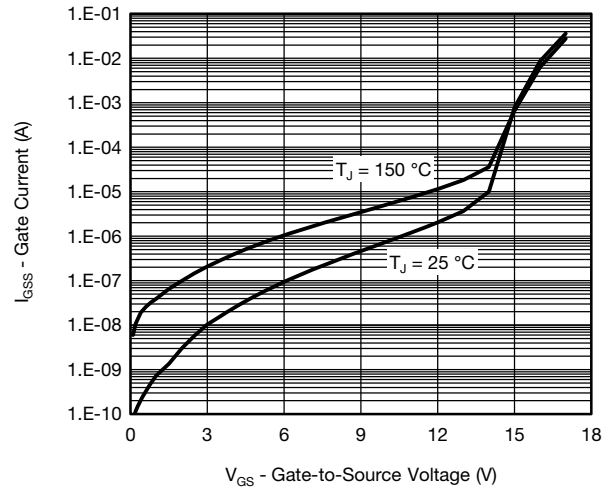
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.

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.

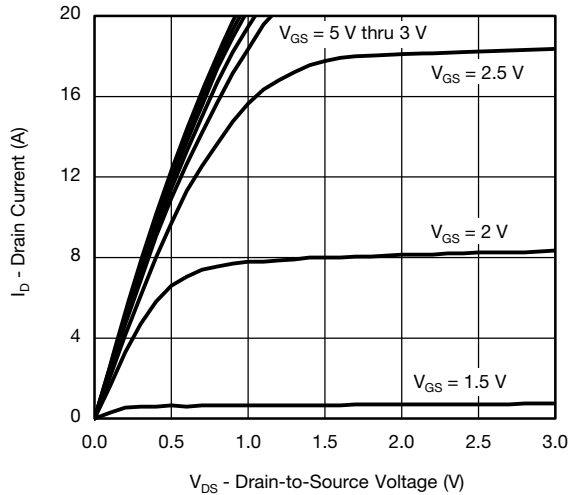
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



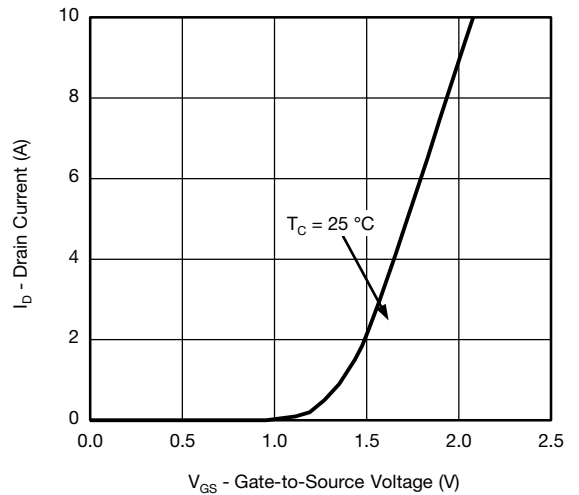
Gate Current vs. Gate-to-Source Voltage



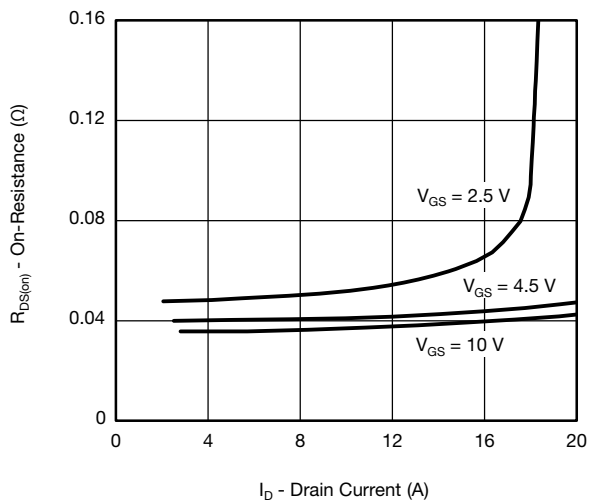
Gate Current vs. Gate-to-Source Voltage



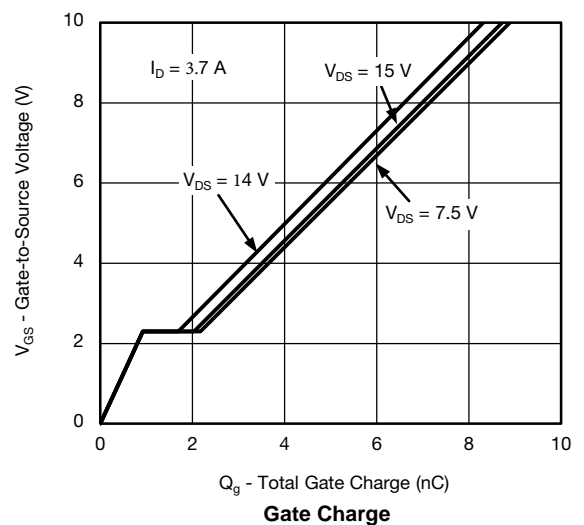
Output Characteristics



Transfer Characteristics

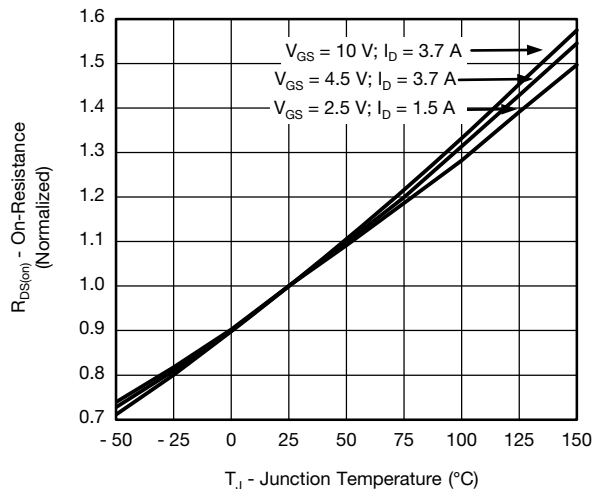


On-Resistance vs. Drain Current

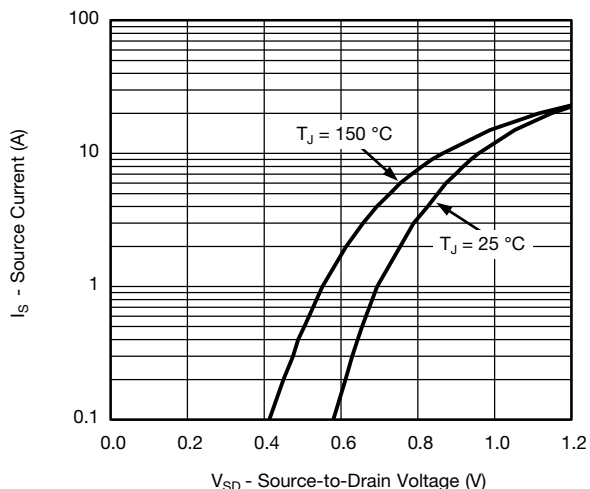


Gate Charge

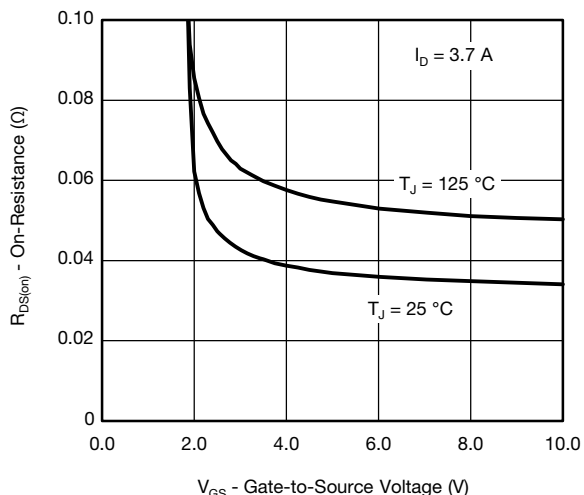
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



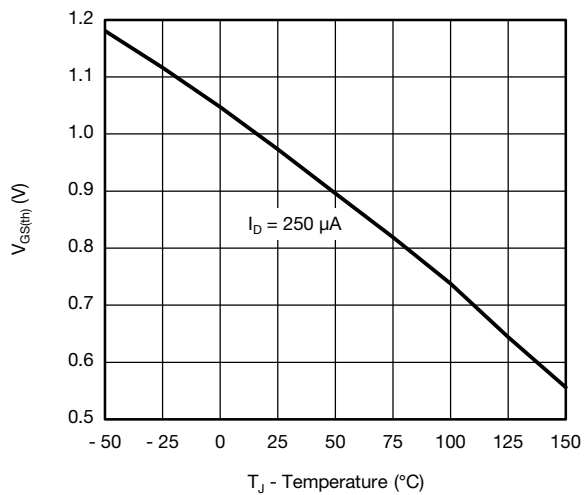
Normalized On-Resistance vs. Junction Temperature



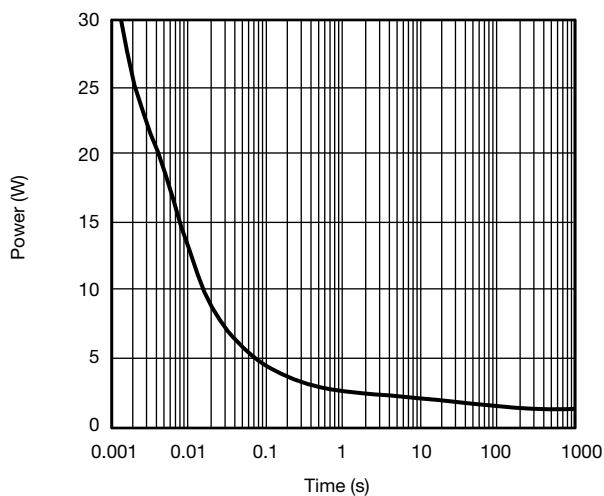
Source-Drain Diode Forward Voltage



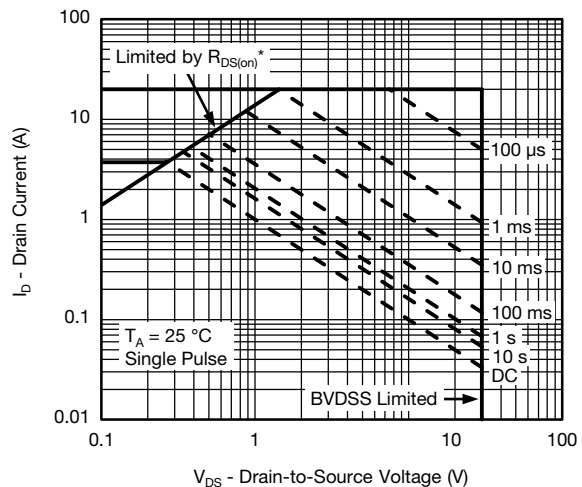
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

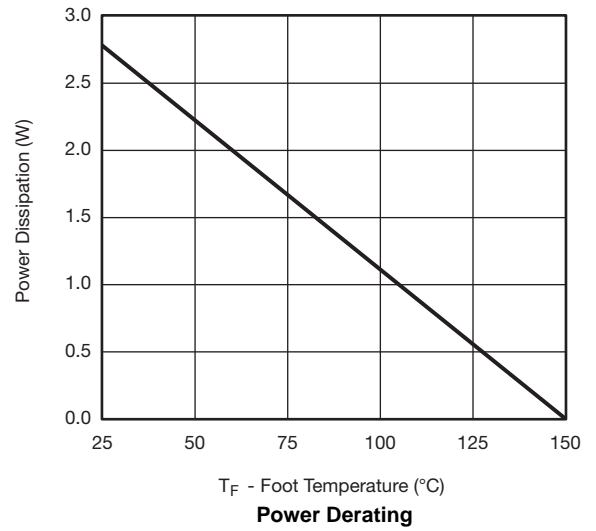
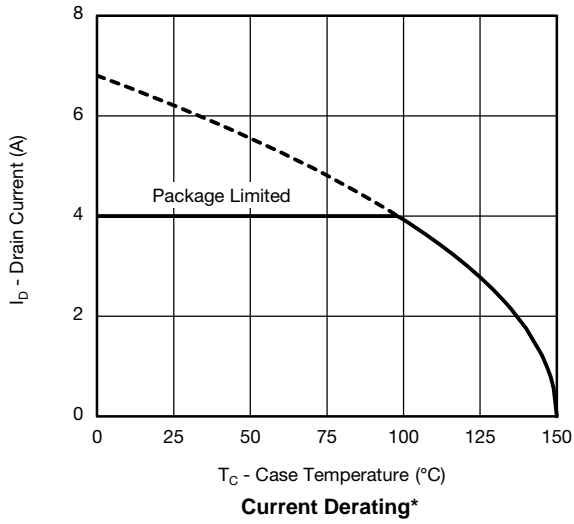


Single Pulse Power, Junction-to-Ambient



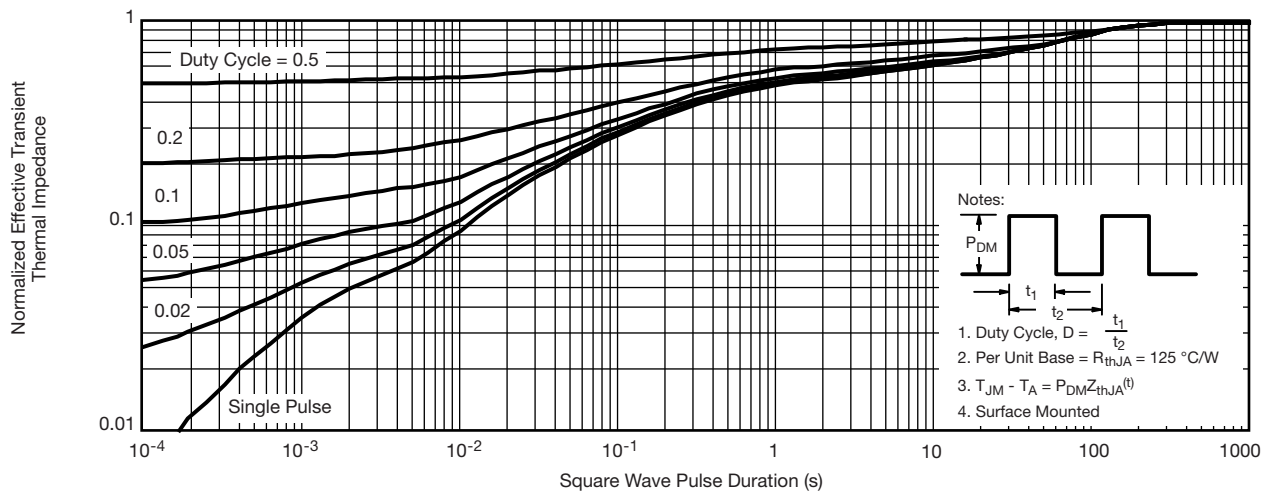
Safe Operating Area, Junction-to-Ambient
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

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

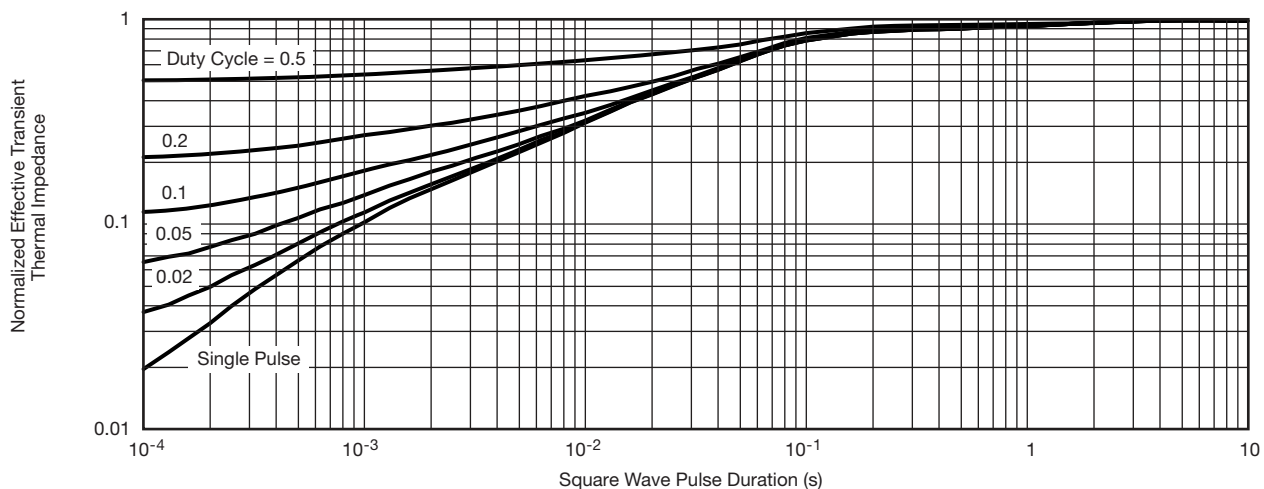


* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below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

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

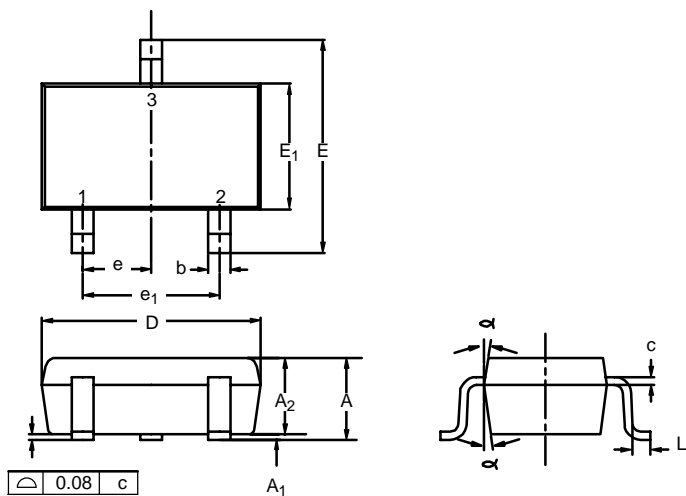


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

SC-70: 3-LEADS



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.90	-	1.10	0.035	-	0.043
A ₁	-	-	0.10	-	-	0.004
A ₂	0.80	-	1.00	0.031	-	0.039
b	0.25	-	0.40	0.010	-	0.016
c	0.10	-	0.25	0.004	-	0.010
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.80	2.10	2.40	0.071	0.083	0.094
E ₁	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65BSC			0.026BSC		
e ₁	1.20	1.30	1.40	0.047	0.051	0.055
L	0.10	0.20	0.30	0.004	0.008	0.012
α	7°Nom			7°Nom		

ECN: S-03946—Rev. C, 09-Jul-01
DWG: 5549

RECOMMENDED MINIMUM PADS FOR SC-70: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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