

Dual N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
20	0.198 at $V_{GS} = 4.5$ V	1.3 ^a	0.9 nC
	0.225 at $V_{GS} = 2.5$ V	1.3 ^a	
	0.263 at $V_{GS} = 1.8$ V	1.3 ^a	

FEATURES

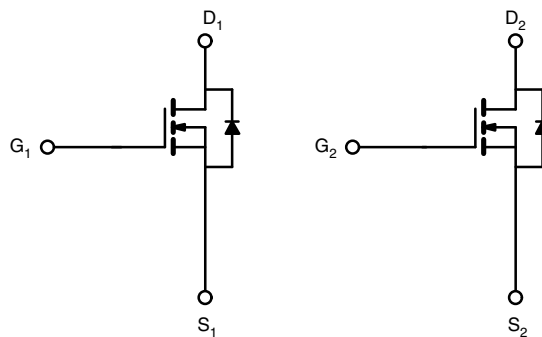
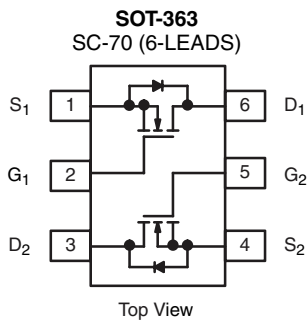
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- Typical ESD Protection 2100 V HBM
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch for Portable Applications



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	1.3 ^a
		$T_C = 70$ °C	1.3 ^a
		$T_A = 25$ °C	1.3 ^{a, b, c}
		$T_A = 70$ °C	1.2 ^{b, c}
Pulsed Drain Current	I_{DM}	4	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	
		$T_A = 25$ °C	0.61 ^{b, c}
Maximum Power Dissipation	P_D	$T_C = 25$ °C	1.25
		$T_C = 70$ °C	0.8
		$T_A = 25$ °C	0.74 ^{b, c}
		$T_A = 70$ °C	0.47 ^{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}	130	170	°C/W	
Maximum Junction-to-Foot (Drain)	R_{thJF}	80	100		

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under steady state conditions is 220 °C/W.

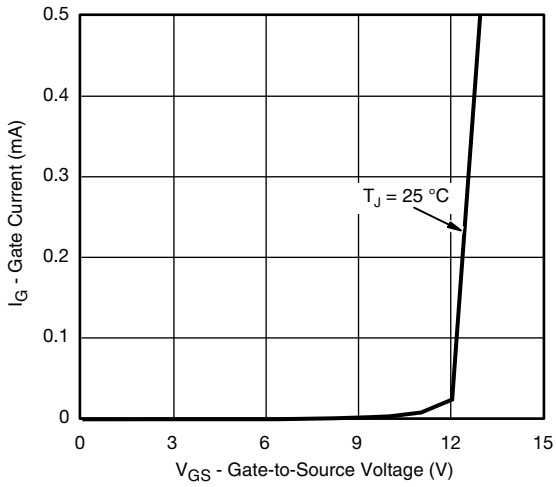
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		20		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-2.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.4		1	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 25	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			1	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 4.5\text{ V}$	4			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 1\text{ A}$		0.165	0.198	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 1\text{ A}$		0.187	0.225	
		$V_{GS} = 1.8\text{ V}, I_D = 0.2\text{ A}$		0.210	0.263	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 4\text{ V}, I_D = 1.5\text{ A}$		4		S
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 8\text{ V}, I_D = 1.5\text{ A}$		1.6	2.5	nC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 1.5\text{ A}$		0.9	1.8	
Gate-Source Charge	Q_{gs}			0.1		
Gate-Drain Charge	Q_{gd}			0.2		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.4	1.9	3.8	k Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 8.3\text{ }\Omega$ $I_D \cong 1.2\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		43	65	ns
Rise Time	t_r			80	120	
Turn-Off Delay Time	$t_{d(off)}$			480	720	
Fall Time	t_f			220	330	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 8.3\text{ }\Omega$ $I_D \cong 1.2\text{ A}, V_{GEN} = 8\text{ V}, R_g = 1\text{ }\Omega$		22	33	
Rise Time	t_r			46	70	
Turn-Off Delay Time	$t_{d(off)}$			645	968	
Fall Time	t_f			215	323	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			1	A
Pulse Diode Forward Current	I_{SM}				4	
Body Diode Voltage	V_{SD}	$I_S = 1.2\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 1.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		9	18	ns
Body Diode Reverse Recovery Charge	Q_{rr}			2	4	nC
Reverse Recovery Fall Time	t_a			5		ns
Reverse Recovery Rise Time	t_b			4		

Notes:

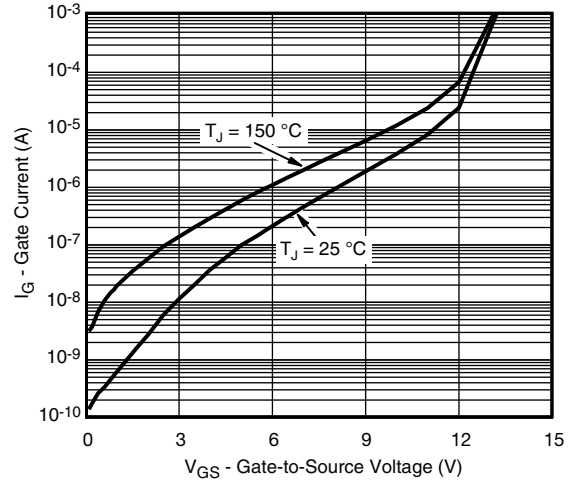
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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.

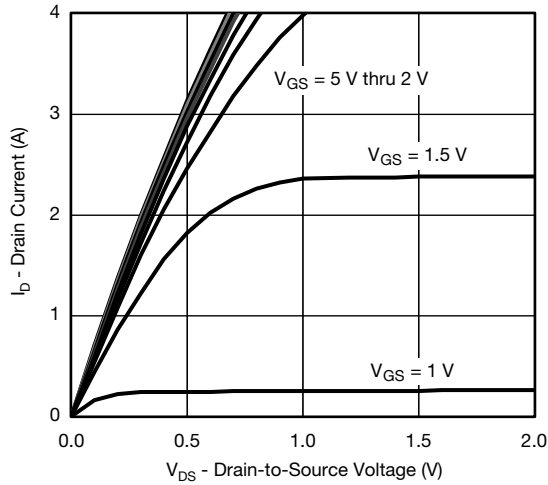
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



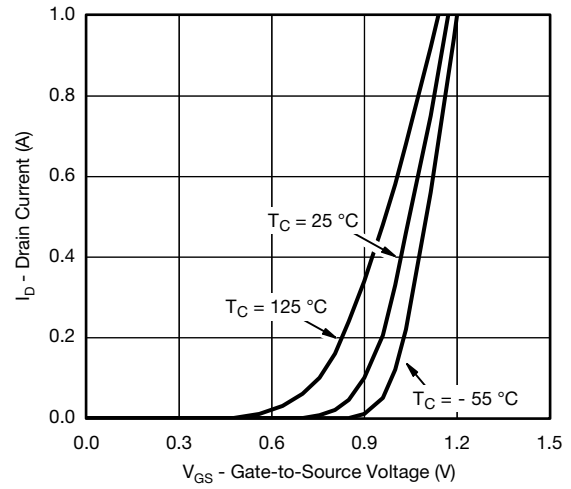
Gate Current vs. Gate-to-Source Voltage



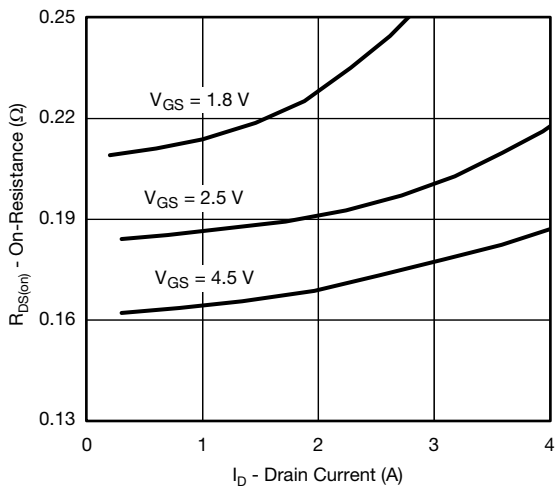
Gate Current vs. Gate-to-Source Voltage



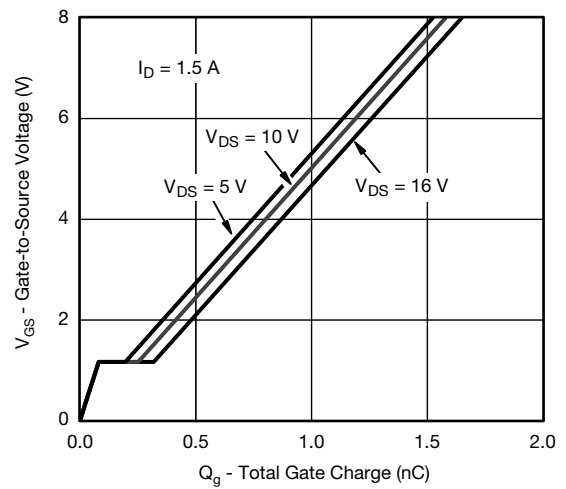
Output Characteristics



Transfer Characteristics

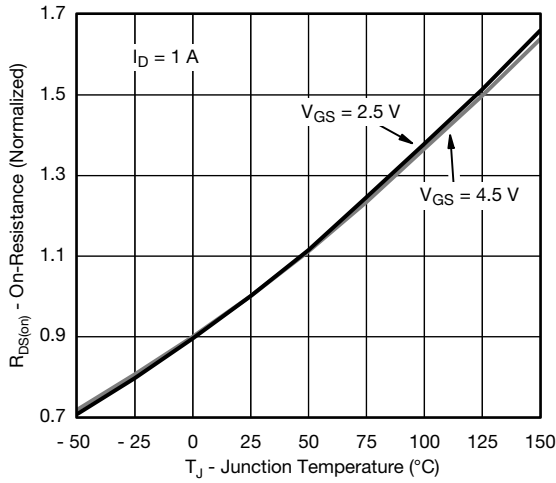


On-Resistance vs. Drain Current

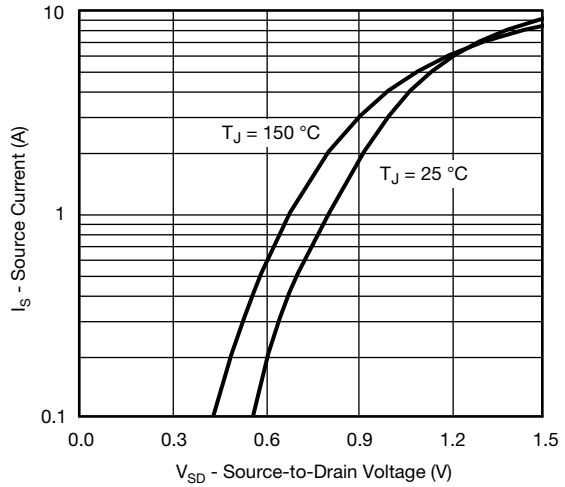


Gate Charge

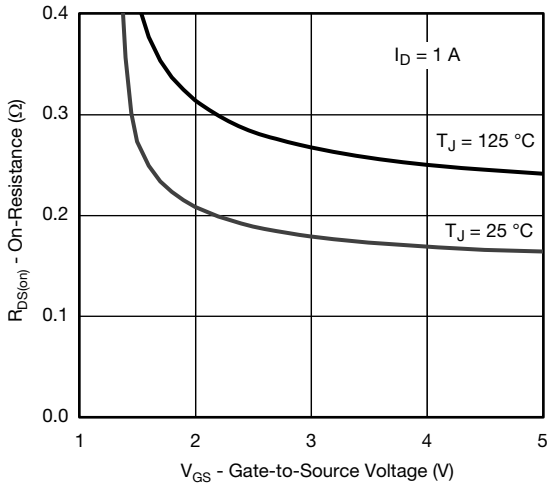
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



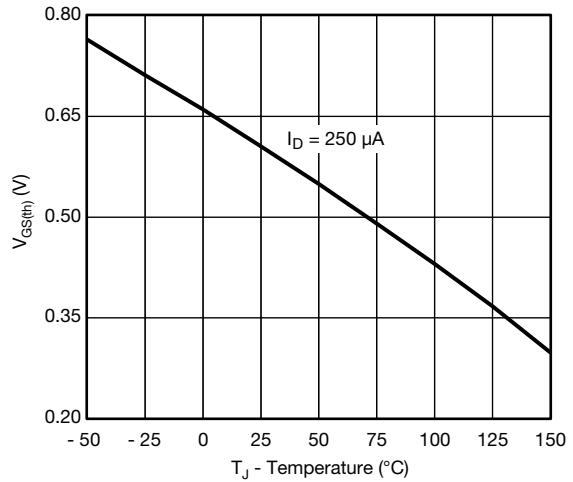
On-Resistance vs. Junction Temperature



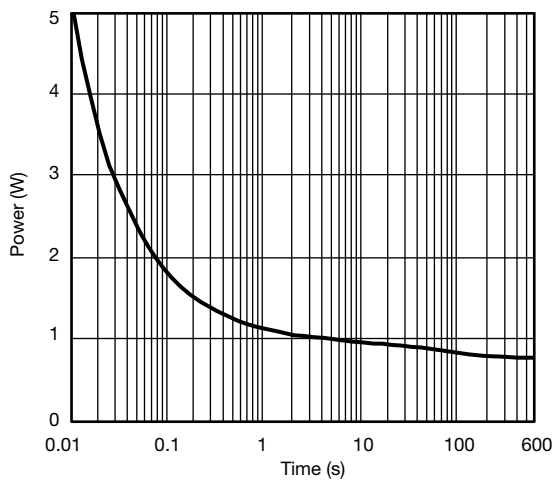
Source-Drain Diode Forward Voltage



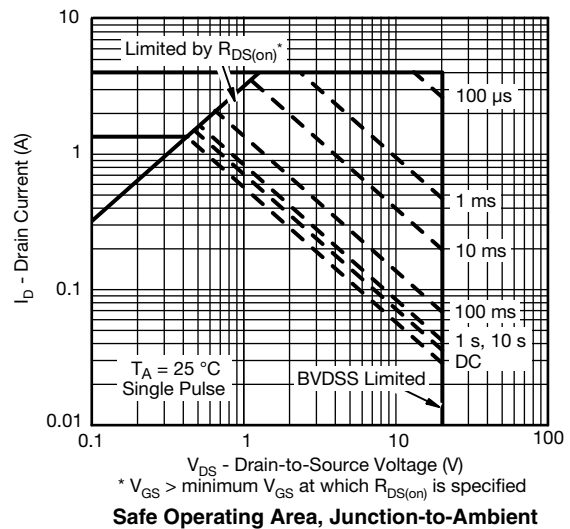
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



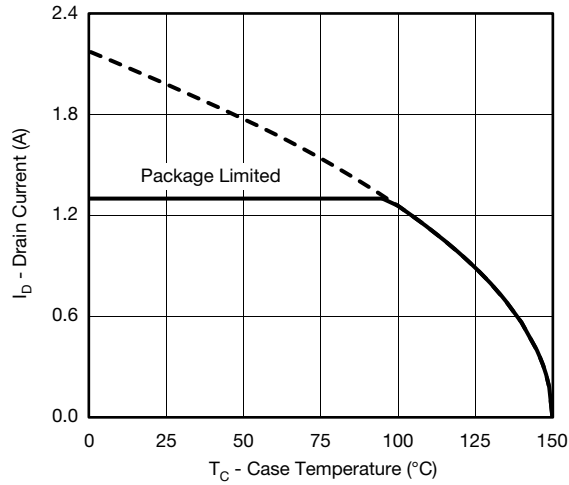
Single Pulse Power, Junction-to-Ambient



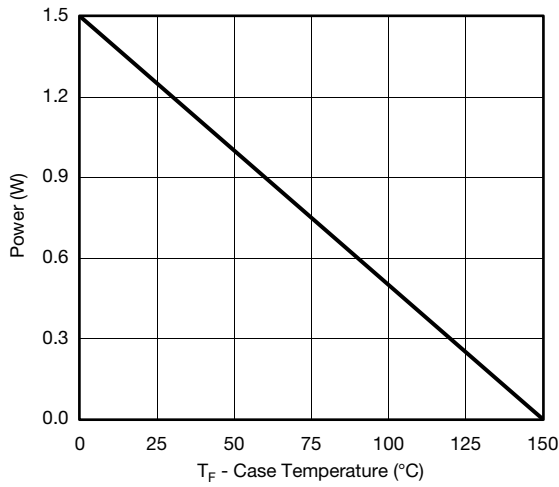
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

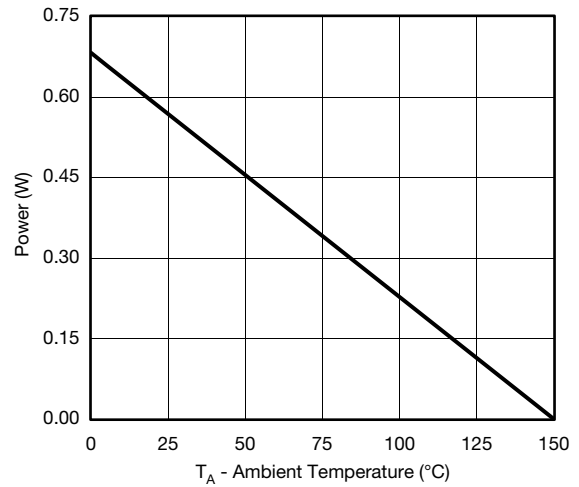
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



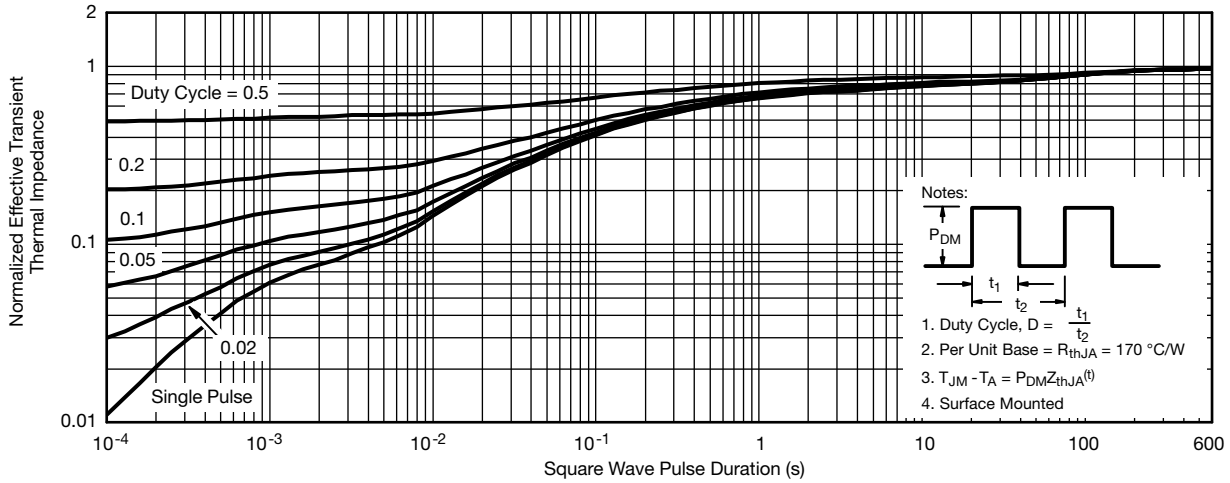
Power, Junction-to-Foot



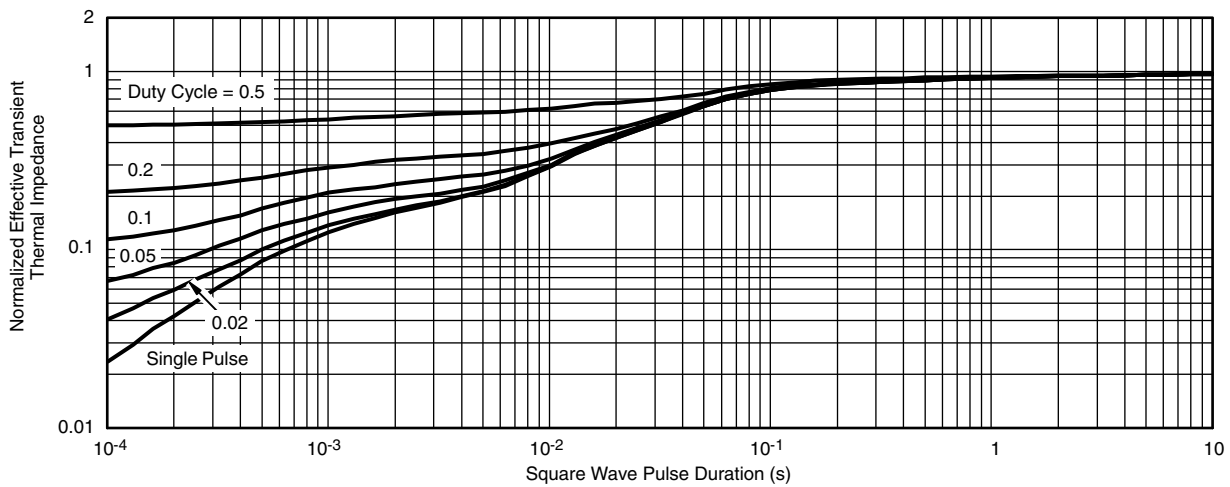
Power, Junction-to-Ambient

* 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)

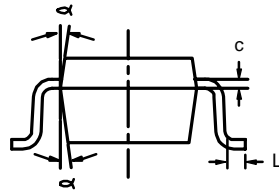
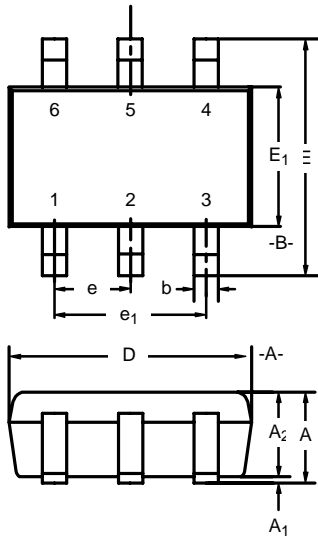


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

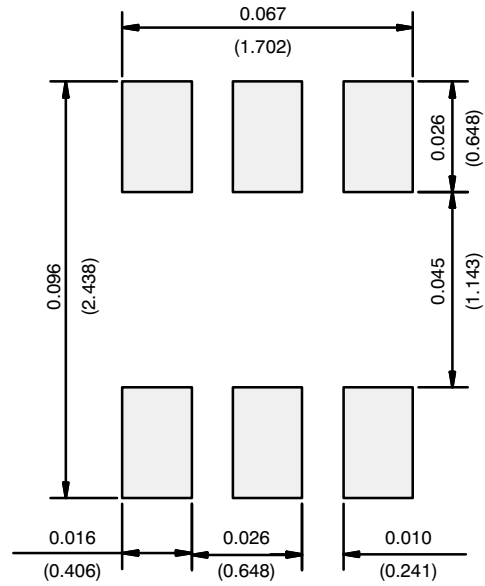
SC-70: 6-LEADS



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	0.15	-	0.30	0.006	-	0.012
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. B, 09-Jul-01
 DWG: 5550

RECOMMENDED MINIMUM PADS FOR SC-70: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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