SI1307DL-T1-GE3-VB Datasheet

P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[c]	Q_g (Typ.)
- 20	0.080 at V_{GS} = - 4.5 V	- 3.1	4.3 nC
	0.100 at V_{GS} = - 2.5 V	- 2.3	

FEATURES

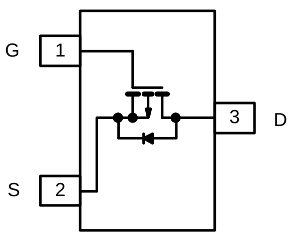
- **Halogen-free According to IEC 61249-2-21 Definition**
- Trench Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE

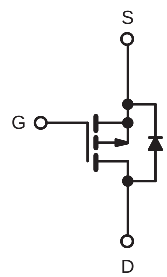
APPLICATIONS

- Load Switch
- DC/DC Converters

SOT-323
SC-70



Top View



P-Channel MOSFET

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)	T_C = 25 °C	I_D	- 3.1	A
	T_C = 70 °C		- 2.1	
	T_A = 25 °C		- 1.4[a, b]	
	T_A = 70 °C		- 1.1[a, b]	
Pulsed Drain Current		I_{DM}	- 6	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 0.4	
	T_A = 25 °C		- 0.3	
Maximum Power Dissipation	T_C = 25 °C	P_D	0.5	W
	T_C = 70 °C		0.3	
	T_A = 25 °C		0.4[a, b]	
	T_A = 70 °C		0.3[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 50 to 150	°C
Soldering Recommendations (Peak Temperature)			260	

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 10 s.
c. Based on T_C = 25 °C.

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a, b]	$t \leq 10$ s	R_{thJA}	250	300	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	225	270	

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. Maximum under steady state conditions is 360 °C/W.

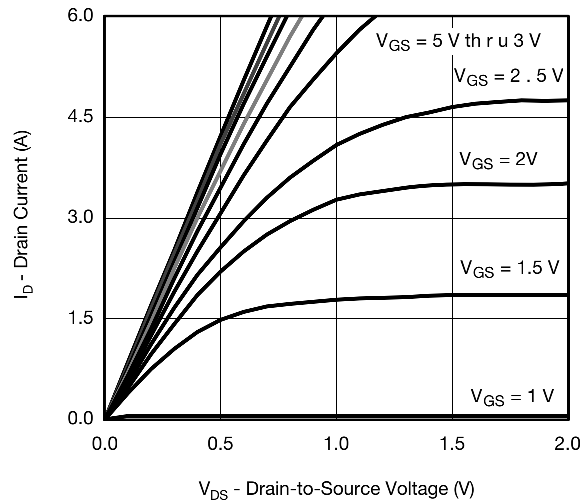
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

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	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 14		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.4		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = - 250 µA	- 0.45		- 1.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 20 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 20 V, V_{GS} = 0 V, T_J = 55 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 5 V, V_{GS} = - 4.5 V	- 2			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 1.4 A		0.080		Ω
		V_{GS} = - 2.5 V, I_D = - 1.2 A		0.100		
		V_{GS} = - 1.8 V, I_D = - 0.3 A		0.140		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 5 V, I_D = - 1.4 A		5		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 10 V, V_{GS} = 0 V, f = 1 MHz		272		pF
Output Capacitance	C_{oss}			55		
Reverse Transfer Capacitance	C_{rss}			44		
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 1.4 A		4.3	6.5	nC
		V_{DS} = - 10 V, V_{GS} = - 2.5 V, I_D = - 1.4 A		2.7	4.1	
Gate-Source Charge	Q_{gs}			0.7		
Gate-Drain Charge	Q_{gd}			1.0		
Gate Resistance	R_g	f = 1 MHz	1.4	7	14	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 9.1 Ω $I_D \cong$ - 1.1 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		12	20	ns
Rise Time	t_r			20	30	
Turn-Off DelayTime	$t_{d(off)}$			23	35	
Fall Time	t_f			9	18	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 9.1 Ω $I_D \cong$ - 1.1 A, V_{GEN} = - 8 V, R_g = 1 Ω		5	10	
Rise Time	t_r			10	20	
Turn-Off DelayTime	$t_{d(off)}$			18	27	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 2.4	A
Pulse Diode Forward Current[a]	I_{SM}				- 6	
Body Diode Voltage	V_{SD}	I_F = - 0.7 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 0.7 A, dI/dt = 100 A/µs, T_J = 25 °C		18	27	ns
Body Diode Reverse Recovery Charge	Q_{rr}			7	14	nC
Reverse Recovery Fall Time	t_a			7		ns
Reverse Recovery Rise Time	t_b			11		

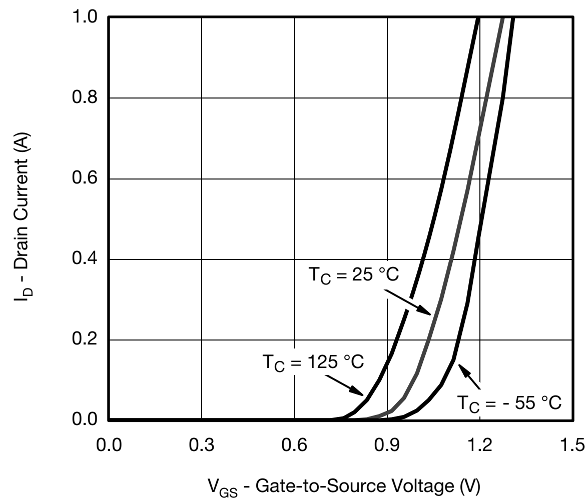
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

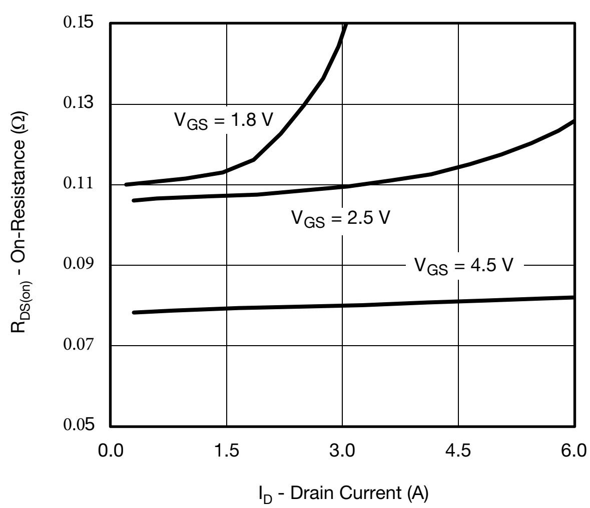
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



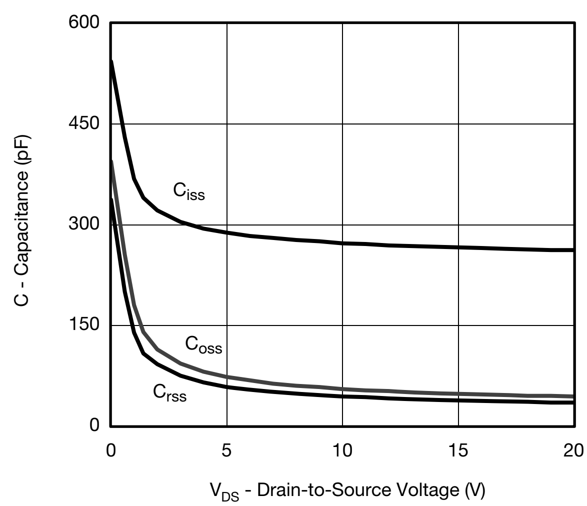
Output Characteristics



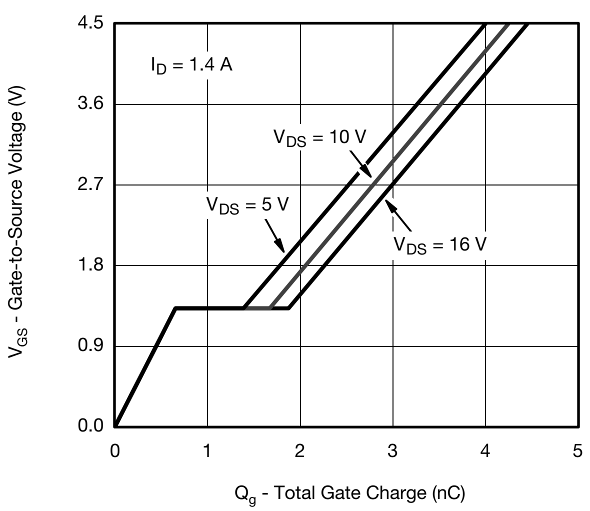
Transfer Characteristics



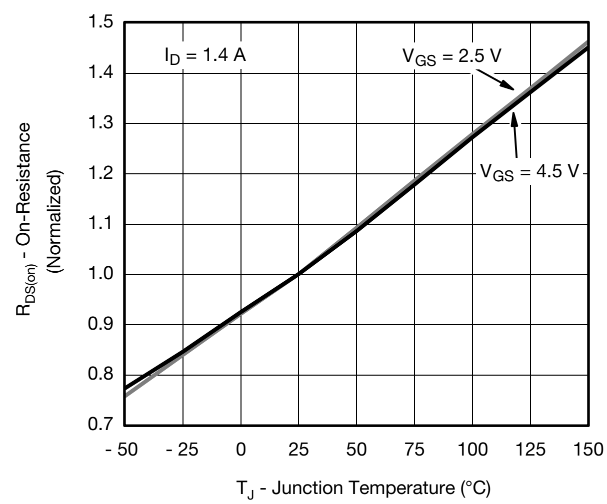
On-Resistance vs. Drain Current



Capacitance

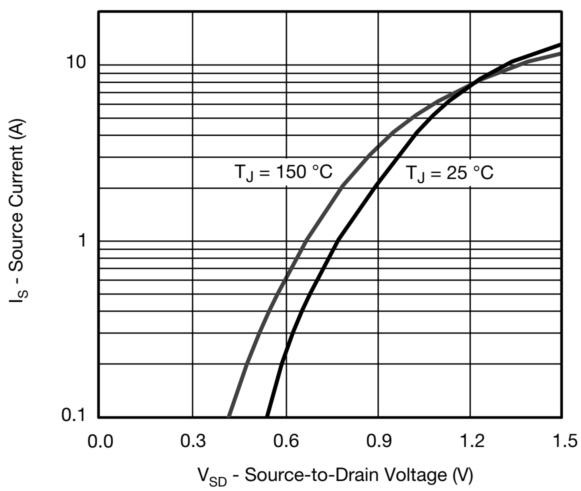


Gate Charge

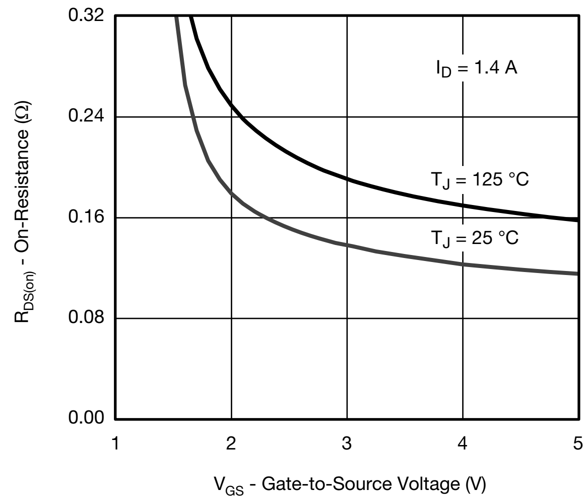


On-Resistance vs. Junction Temperature

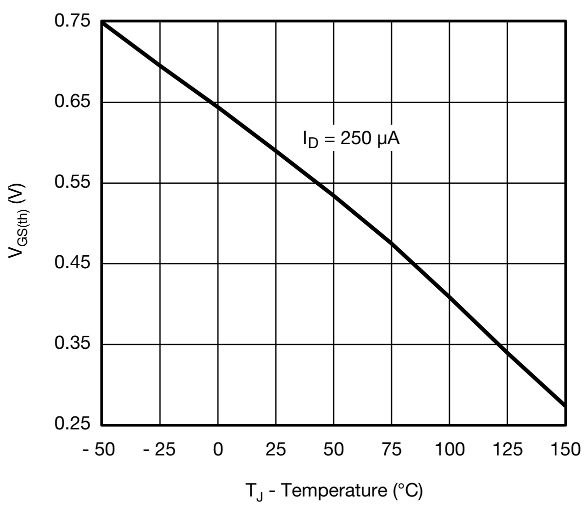
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



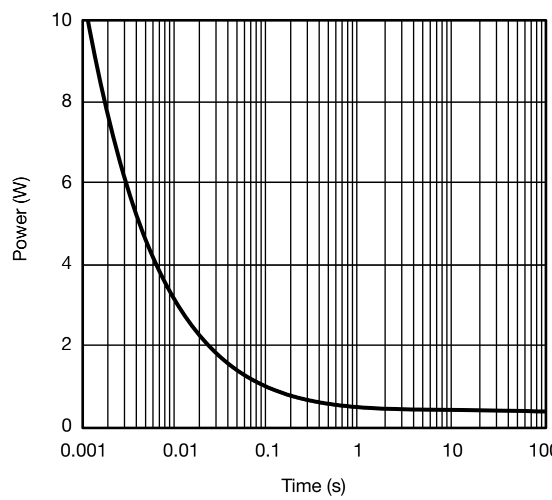
Source-Drain Diode Forward Voltage



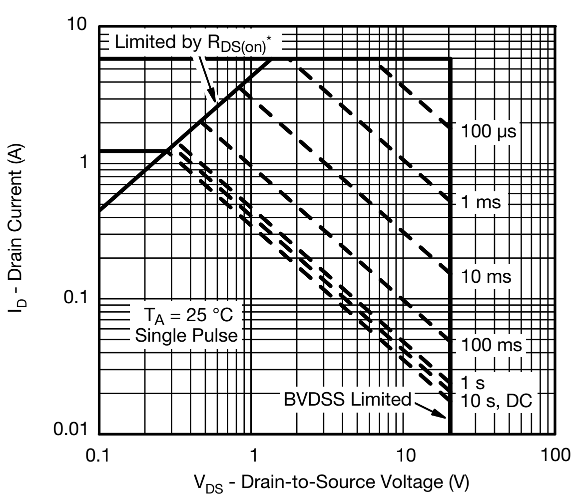
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



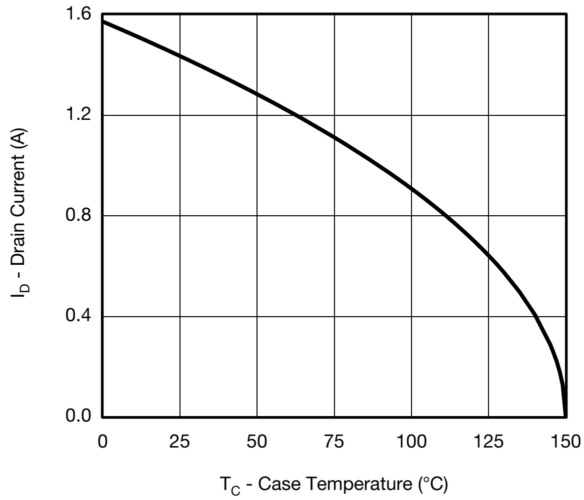
Single Pulse Power, Junction-to-Ambient



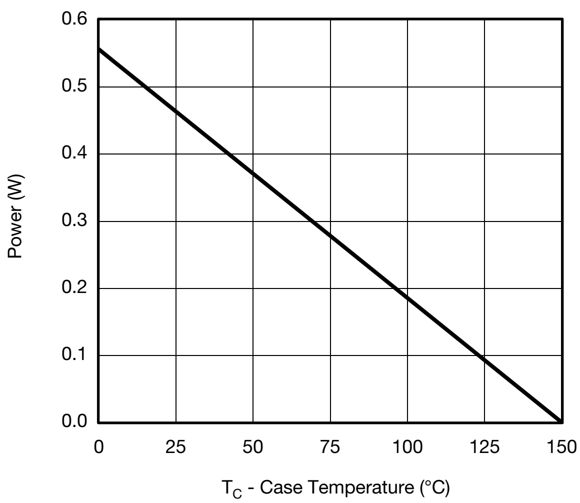
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

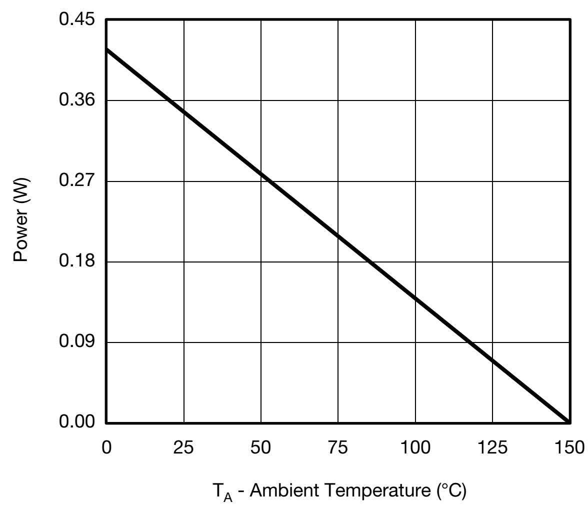
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



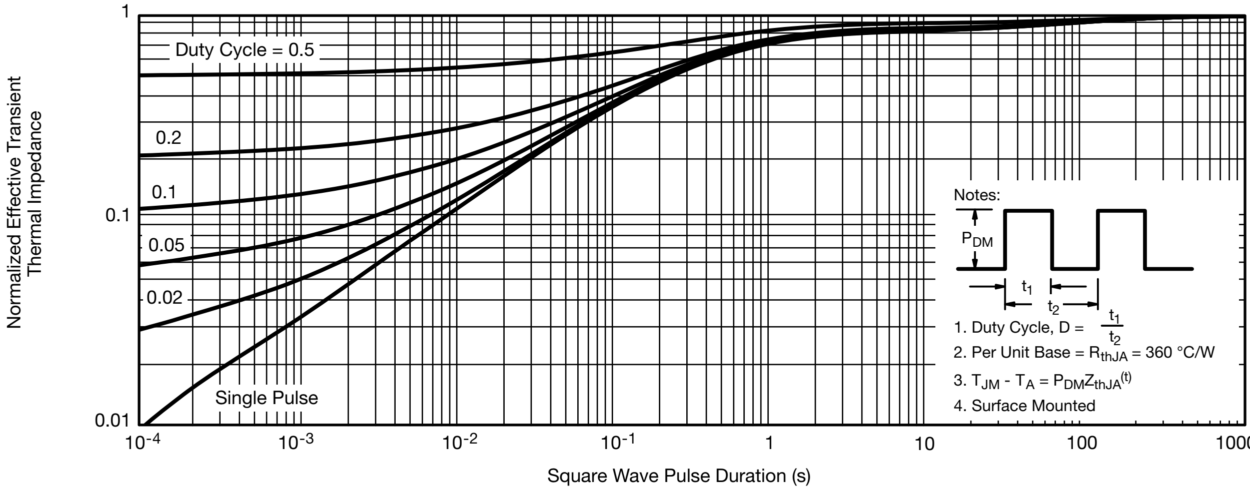
Power, Junction-to-Case



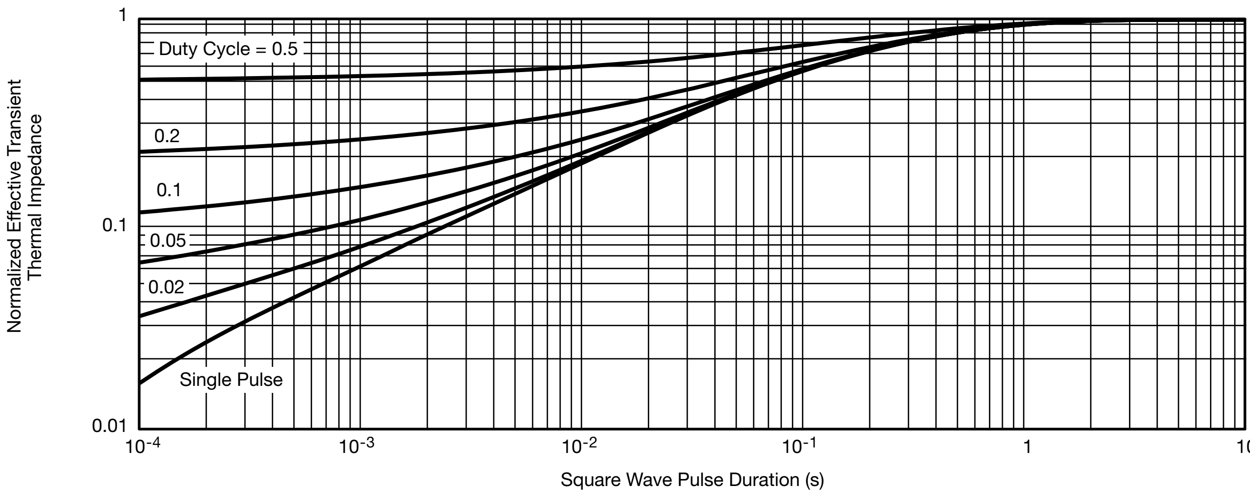
Power, Junction-to-Ambient

* 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)

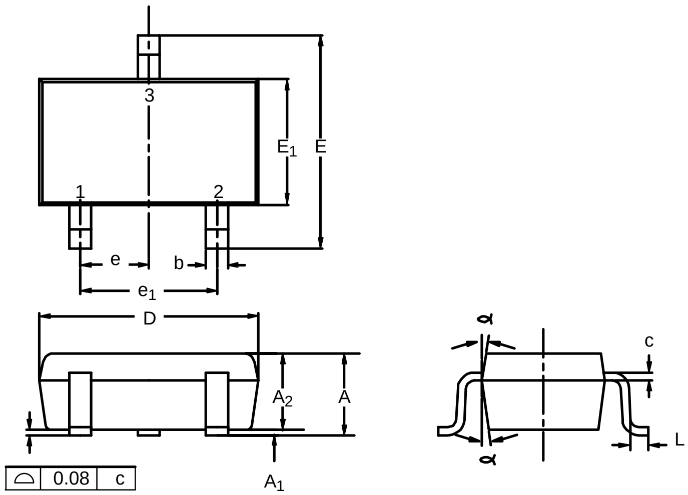


Normalized Thermal Transient Impedance, Junction-to-Ambient



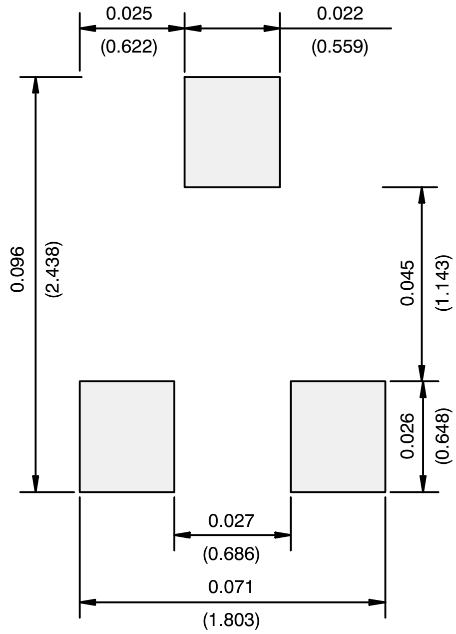
Normalized Thermal Transient Impedance, Junction-to-Foot

SC-70: 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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