

APM1403SC-TRL-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

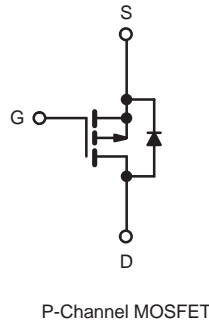
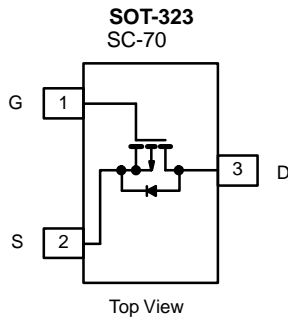
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch
- DC/DC Converters



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.

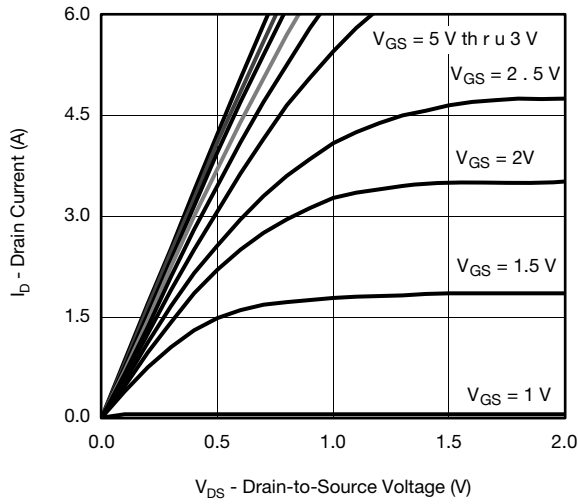
SPECIFICATIONS ($T_J = 25$ °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = -250$ μ A	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250$ μ A		- 14		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		2.4			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ μ A	- 0.45		- 1.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 8$ V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20$ V, $V_{GS} = 0$ V			- 1	μ A
		$V_{DS} = -20$ 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
				2.7	4.1	
Gate-Source Charge	Q_{gs}	$V_{DS} = -10$ V, $V_{GS} = -2.5$ V, $I_D = -1.4$ A		0.7		nC
Gate-Drain Charge	Q_{gd}			1.0		
Gate Resistance	R_g		$f = 1$ MHz	1.4	7	
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 Delay Time	$t_{d(off)}$		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	ns
Rise Time	t_r		10	20		
Turn-Off Delay Time	$t_{d(off)}$		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/ μ s, $T_J = 25$ °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:

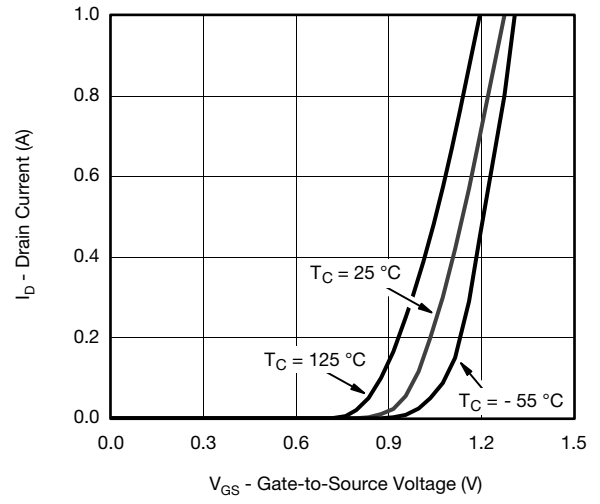
- a. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

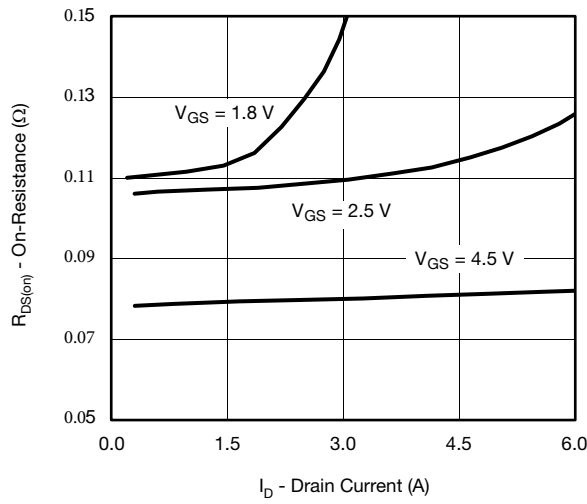
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



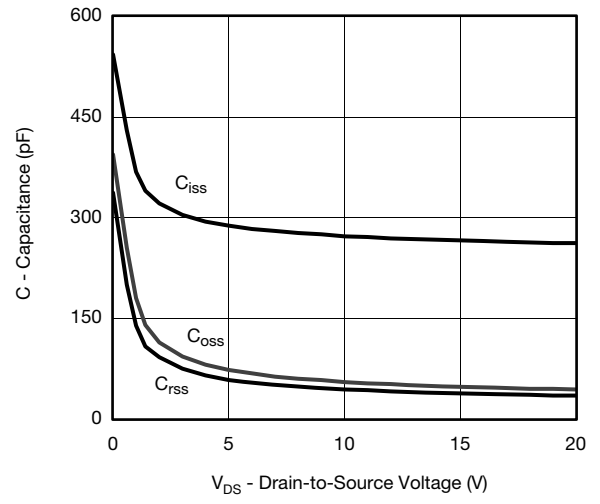
Output Characteristics



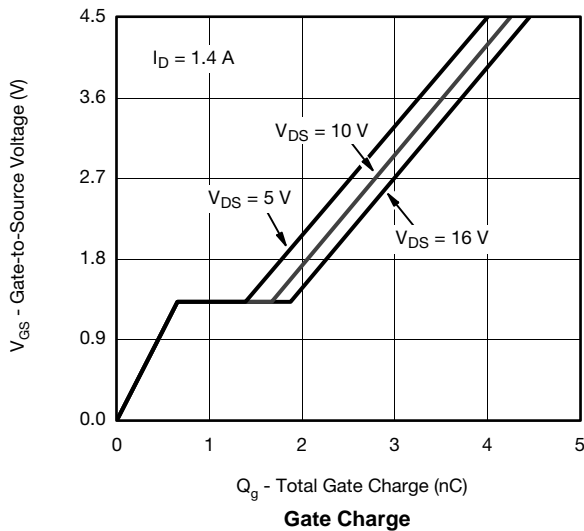
Transfer Characteristics



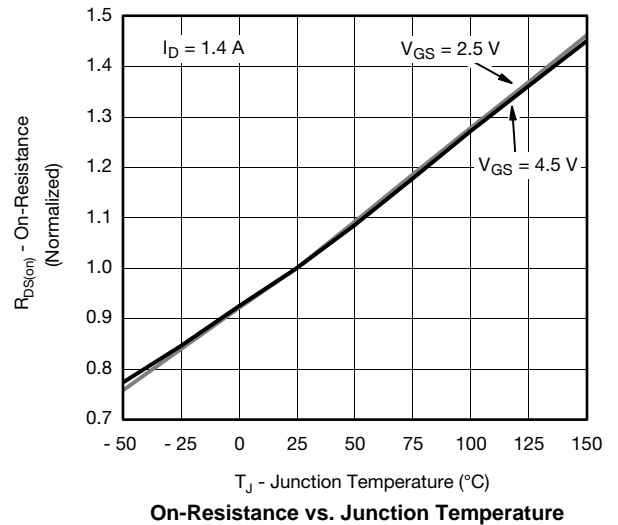
On-Resistance vs. Drain Current



Capacitance

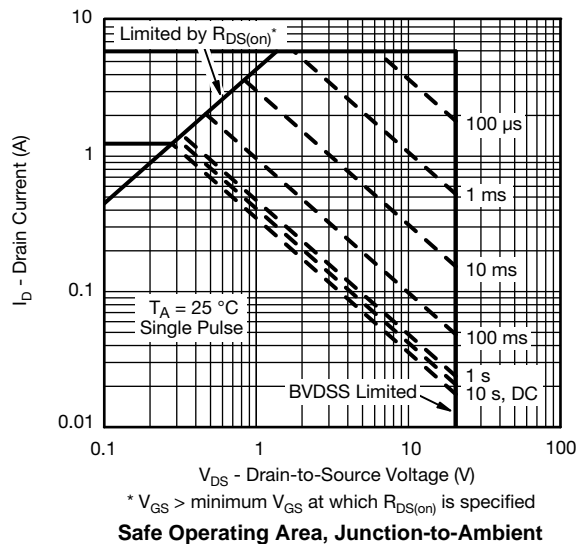
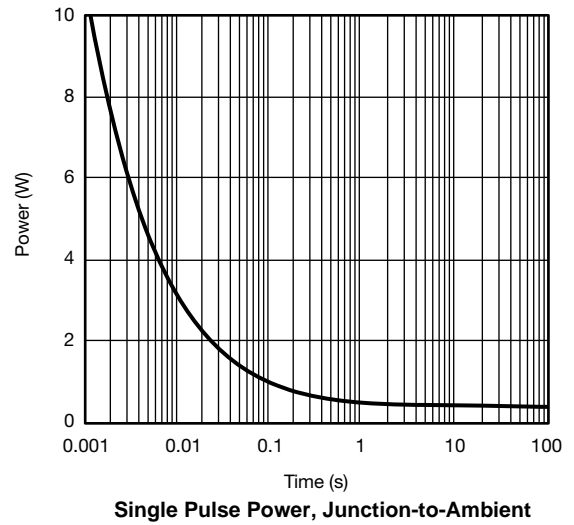
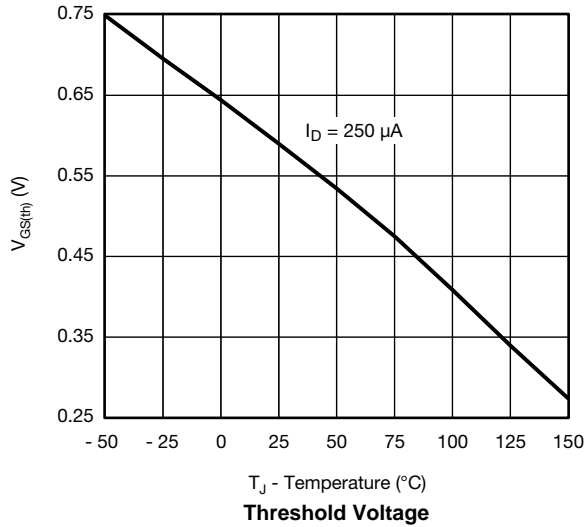
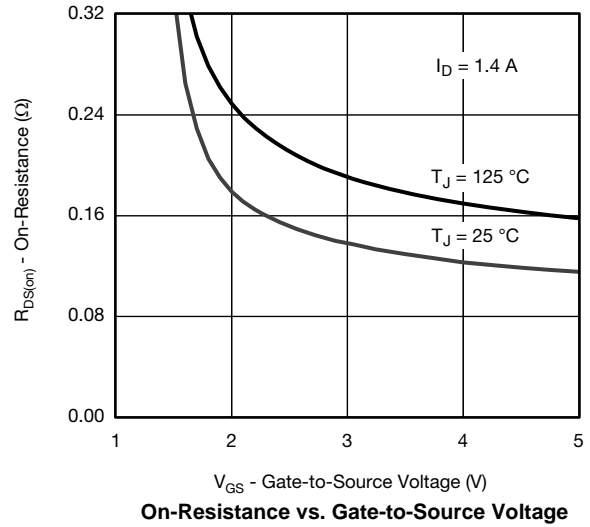
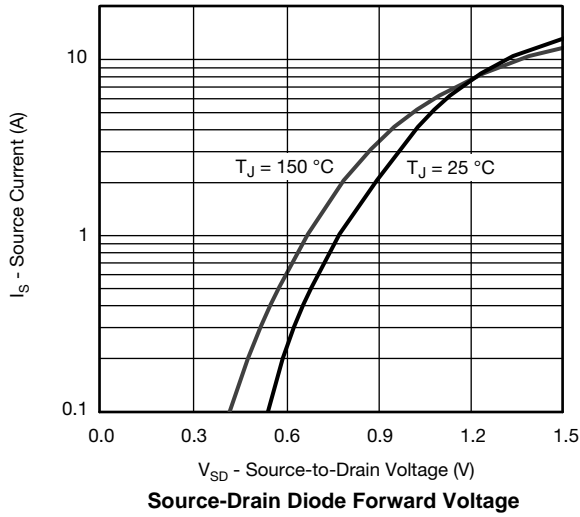


Gate Charge

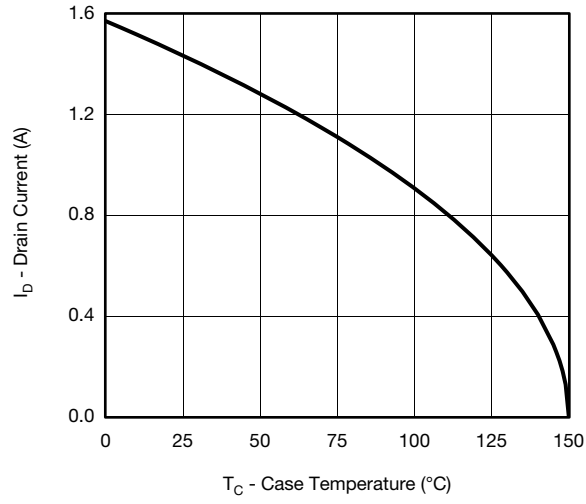


On-Resistance vs. Junction Temperature

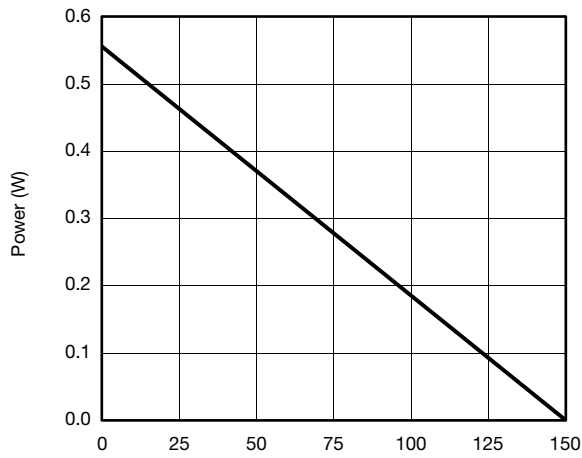
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



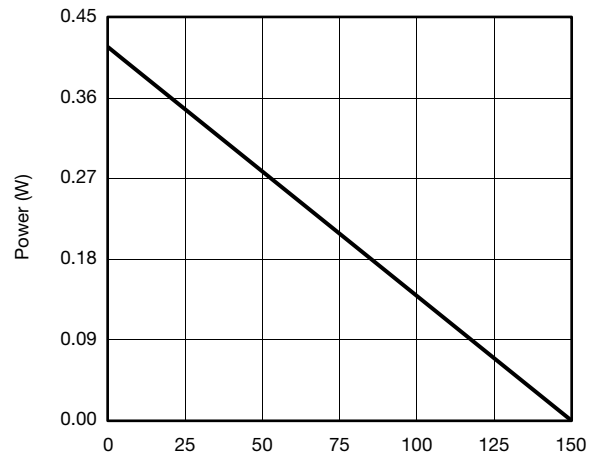
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



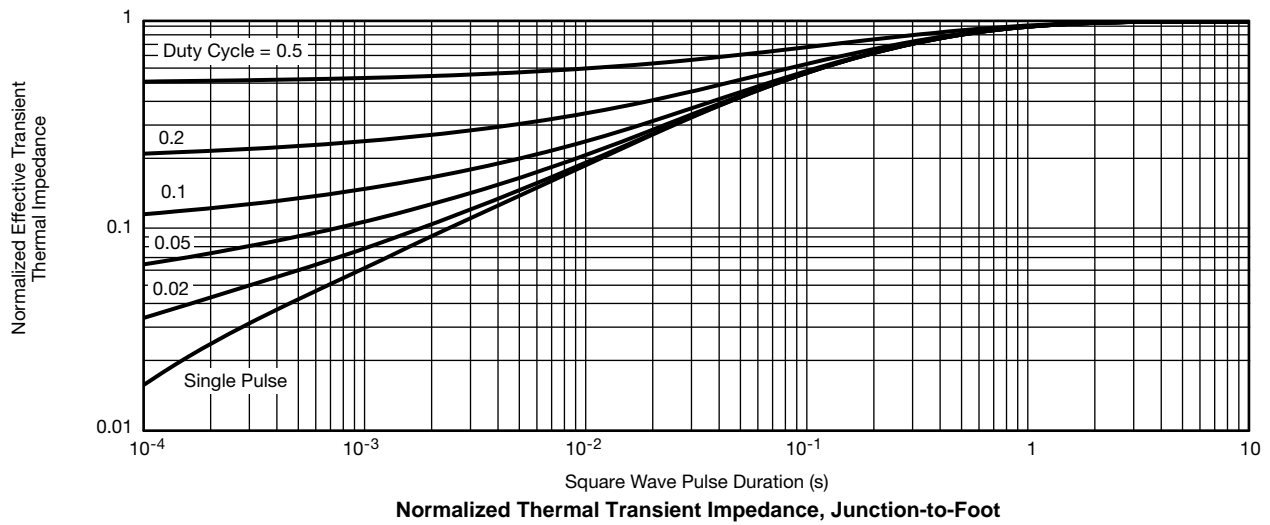
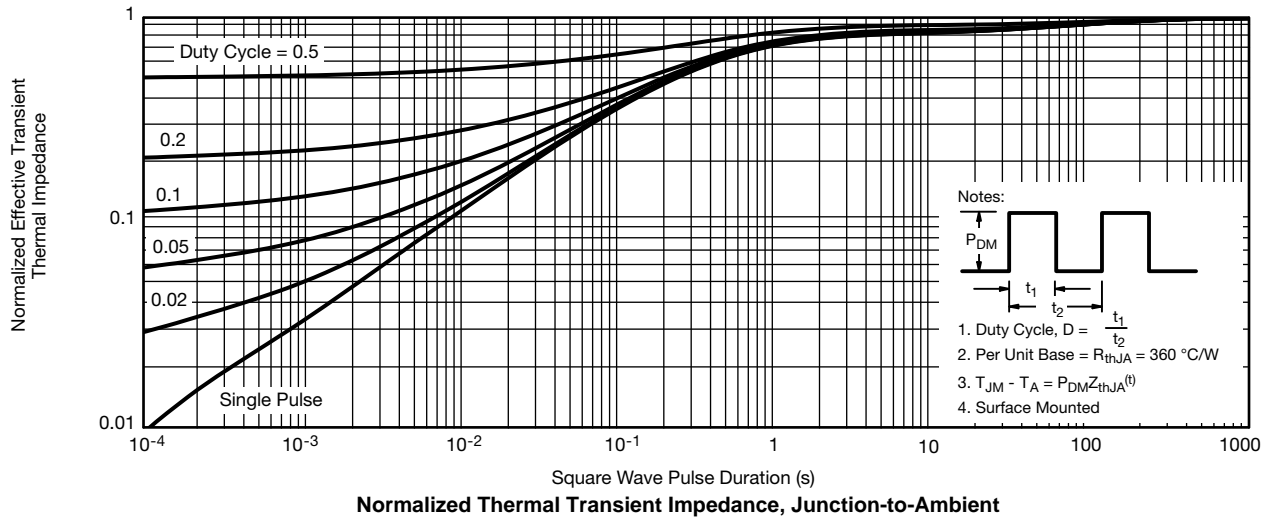
Power, Junction-to-Case



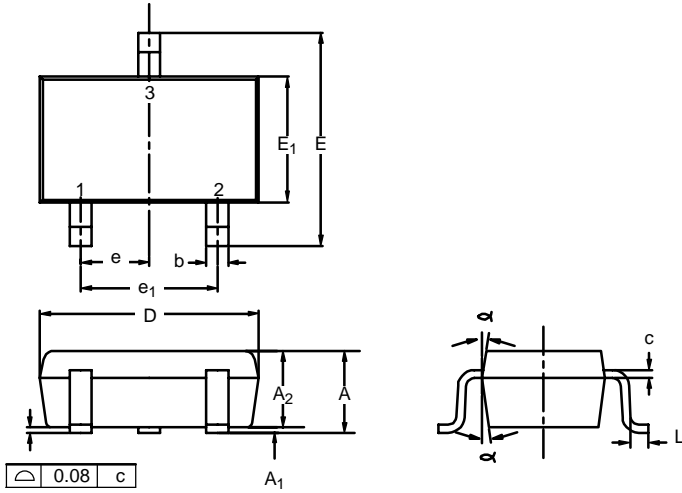
Power, Junction-to-Ambient

* 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)



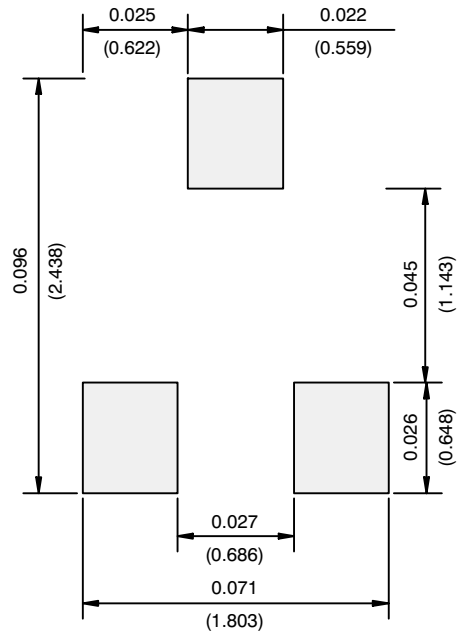
SC-70: 3-LEADS



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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