N-Channel 100 V (D-S) MOSFET

MOSFET PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
100	0.250 at V_{GS} = 10 V	2.0	2.5 nC
	0.275 at V_{GS} = 4.5 V	1.3	

FEATURES

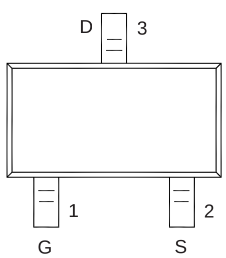
- DT-Trench Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Material categorization:

Pb-free
RoHS COMPLIANT

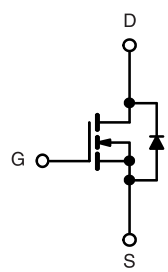
APPLICATIONS

- DC/DC Converters
- Load Switch
- LED Backlighting in LCD TVs

(SOT-23-3L)



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	2.0	A
	T_C = 70 °C		1.5	
	T_A = 25 °C		1.2[b, c]	
	T_A = 70 °C		1.0[b, c]	
Pulsed Drain Current (t = 300 µs)		I_{DM}	6.3	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	2.0	
	T_A = 25 °C		0.9[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	6.0	
Single Pulse Avalanche Energy		E_{AS}	1.21	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	2.2	W
	T_C = 70 °C		1.41	
	T_A = 25 °C		1.13[b, c]	
	T_A = 70 °C		0.72[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]	≤ 5 s	R_{thJA}	75	100	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	40	50	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. Maximum under steady state conditions is 166 °C/W.

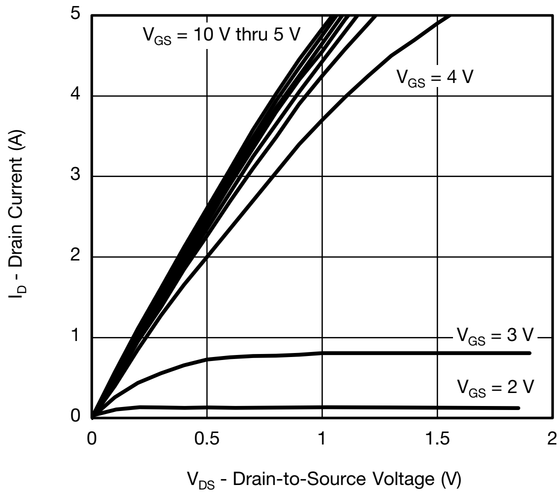
MOSFET SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{DS} = 0 V, I_D = 250 µA	100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		105		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			5.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.2		2.8	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80 V, V_{GS} = 0 V			1	µA
		V_{DS} = 80 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	2			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 1.2 A		0.250	0.310	Ω
		V_{GS} = 4.5 V, I_D = 0.5 A		0.275	0.355	
Forward Transconductance[a]	g_{fs}	V_{DS} = 20 V, I_D = 1.2 A		2.0		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		680		pF
Output Capacitance	C_{oss}			52		
Reverse Transfer Capacitance	C_{rss}			15		
Total Gate Charge	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 1.2 A		5.0	10	nC
		V_{DS} = 50 V, V_{GS} = 4.5 V, I_D = 0.5 A		2.5	5.3	
Gate-Source Charge	Q_{gs}			0.75		
Gate-Drain Charge	Q_{gd}			1.4		
Gate Resistance	R_g	f = 1 MHz	0.3	1.4	2.8	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 50 V, R_L = 39 Ω I_D = 0.5 A, V_{GEN} = 4.5 V, R_g = 1 Ω		33	48	ns
Rise Time	t_r			25	39	
Turn-Off Delay Time	$t_{d(off)}$			15	28	
Fall Time	t_f			10	20	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 50 V, R_L = 39 Ω I_D = 1.2 A, V_{GEN} = 10 V, R_g = 1 Ω		7	12	
Rise Time	t_r			11	22	
Turn-Off Delay Time	$t_{d(off)}$			10	20	
Fall Time	t_f			6	12	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			2.0	A
Pulse Diode Forward Current[a]	I_{SM}				6.3	
Body Diode Voltage	V_{SD}	I_S = 1.2 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 1.3 A, dI/dt = 100 A/µs, T_J = 25 °C		22	33	ns
Body Diode Reverse Recovery Charge	Q_{rr}			21	32	nC
Reverse Recovery Fall Time	t_a			16		ns
Reverse Recovery Rise Time	t_b			6		

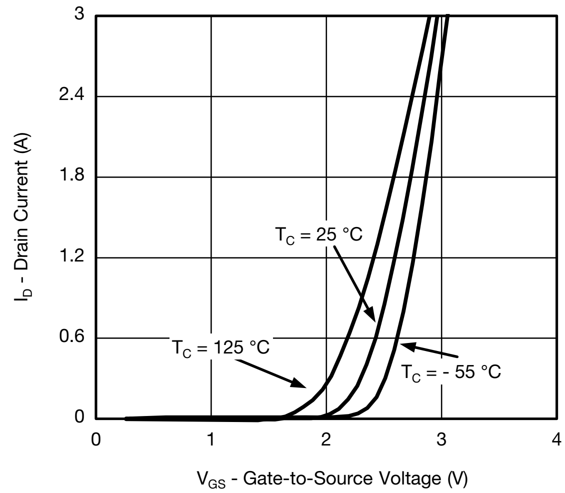
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

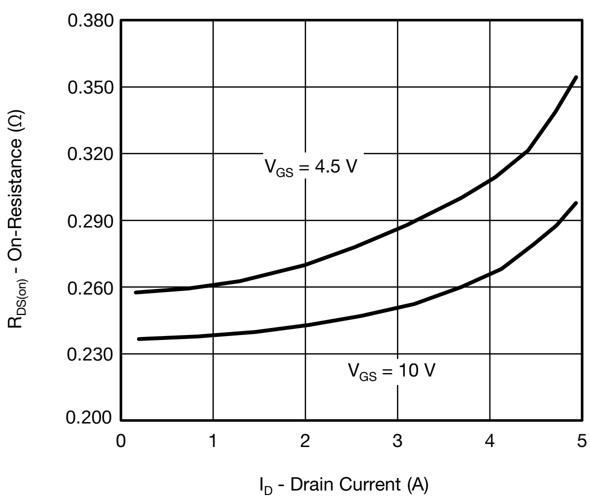
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



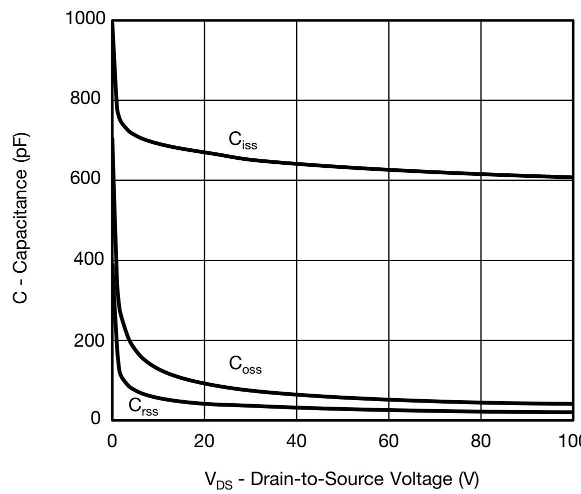
Output Characteristics



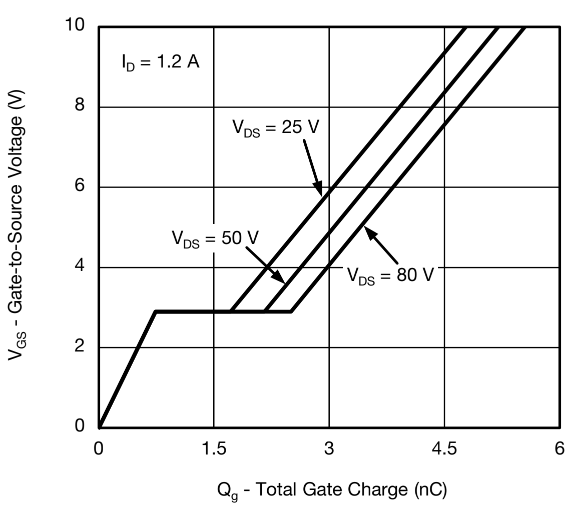
Transfer Characteristics



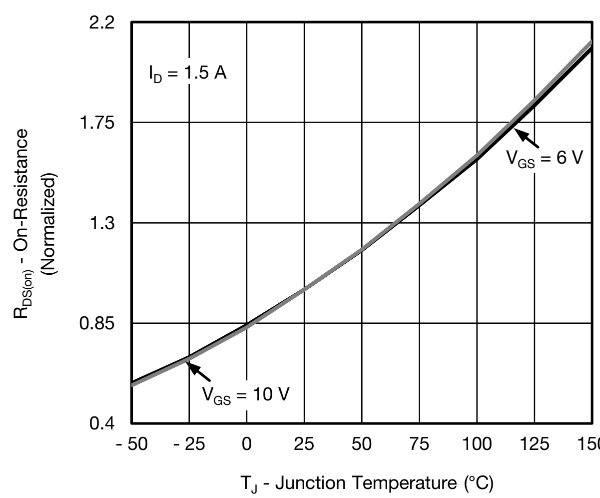
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

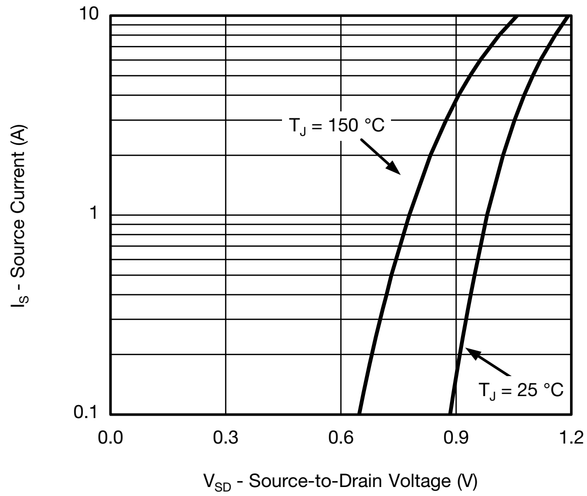


Gate Charge

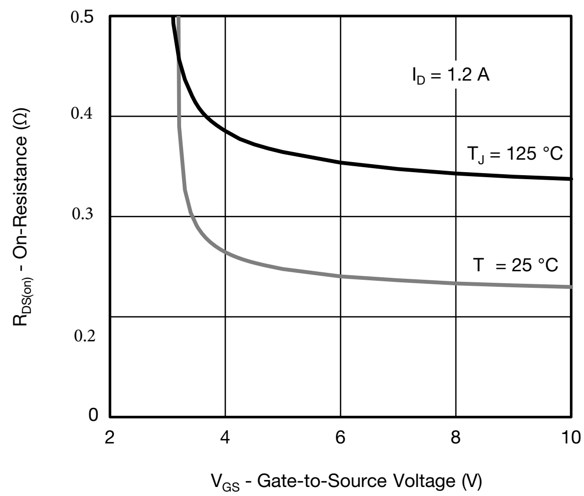


On-Resistance vs. Junction Temperature

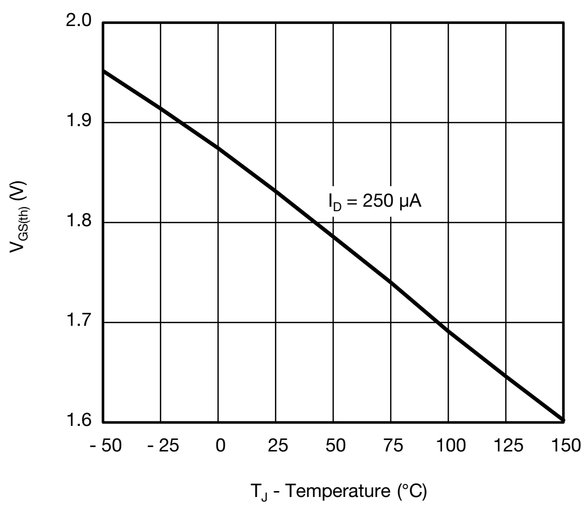
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



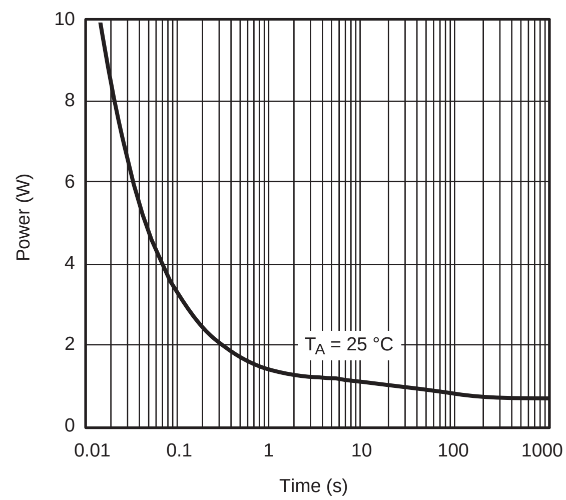
Source-Drain Diode Forward Voltage



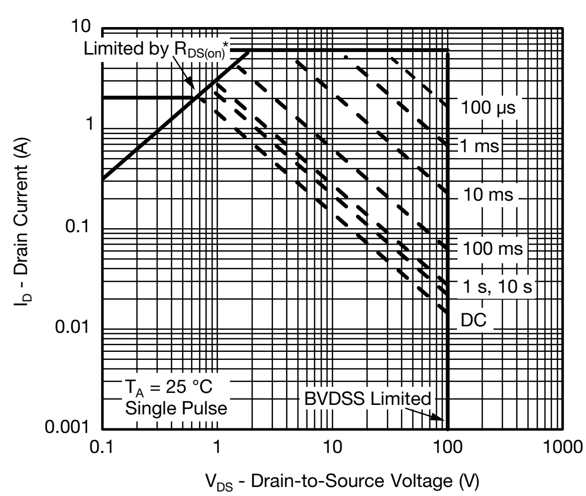
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



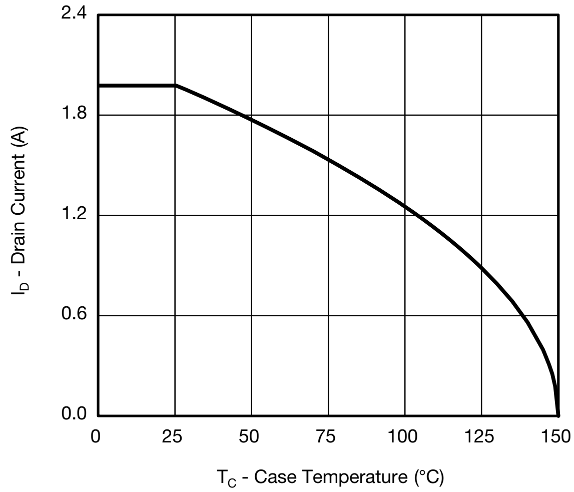
Single Pulse Power



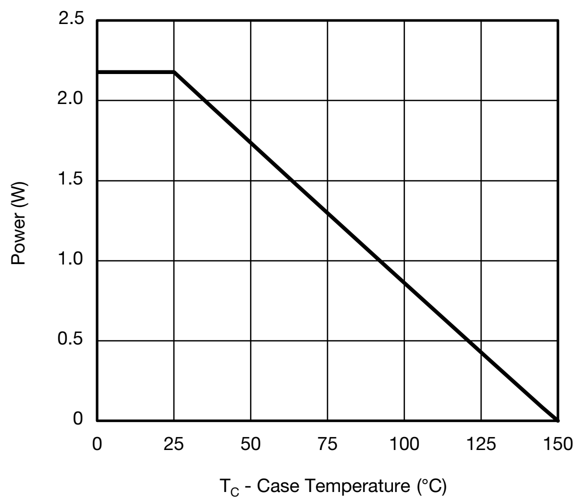
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

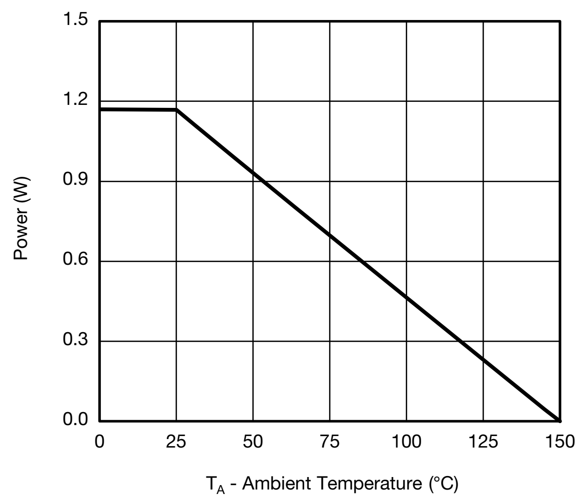
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



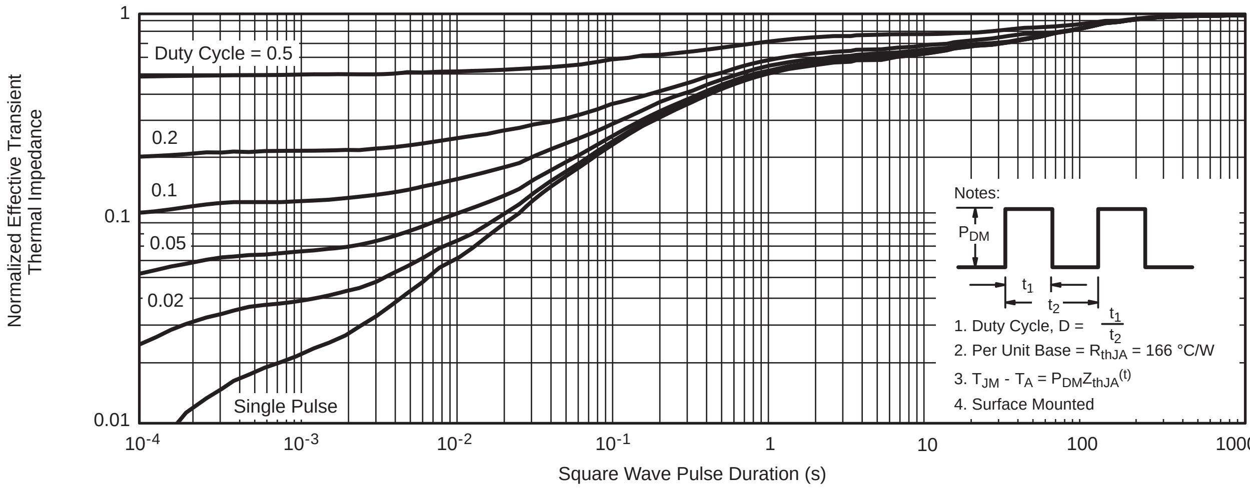
Power, Junction-to-Foot



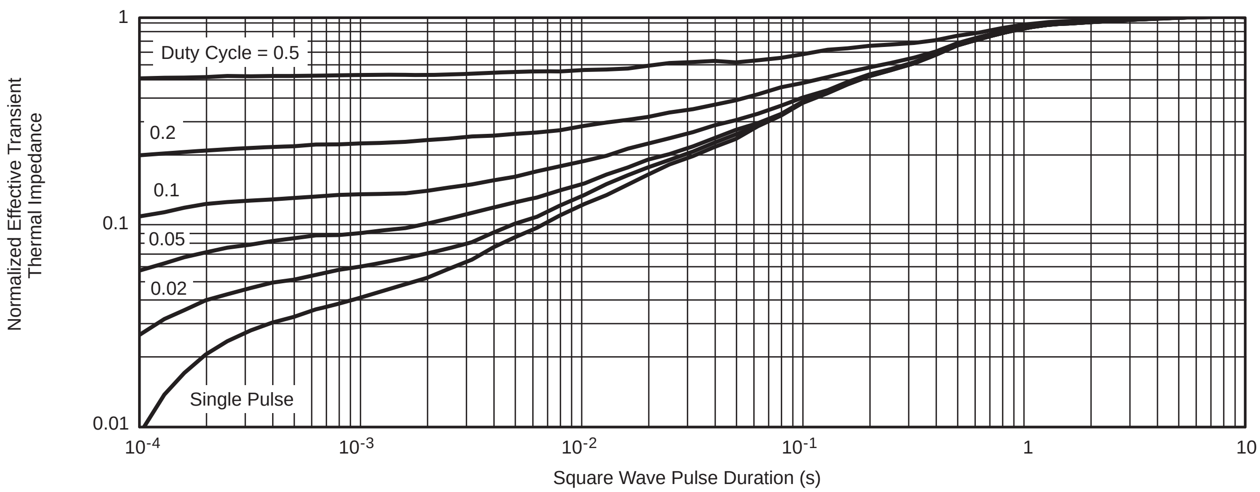
Power, Junction-to-Ambient

* 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.

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



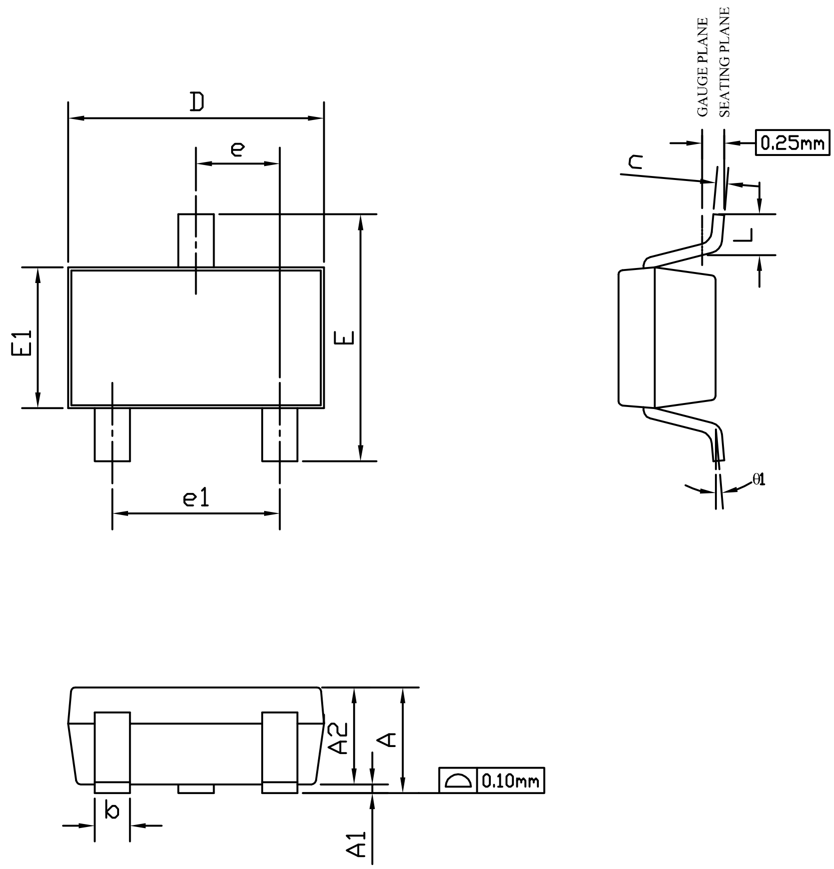
Normalized Thermal Transient Impedance, Junction-to-Foot

Note

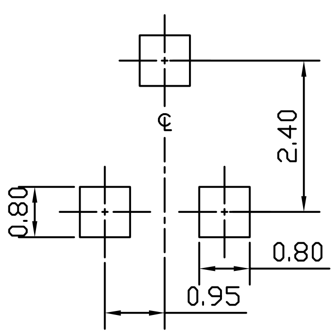
- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Foot (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

SOT-23-3L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	——	1.25	0.033	——	0.049
A1	0.00	——	0.13	0.000	——	0.005
A2	0.70	1.00	1.15	0.028	0.039	0.045
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.08	0.13	0.20	0.003	0.005	0.008
D	2.80	2.90	3.10	0.110	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.40	1.60	1.80	0.055	0.063	0.071
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	——	0.60	0.012	——	0.024
θ1	0°	5°	8°	0°	5°	8°

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH OR GATE BURRS.
   MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 5 MILS EACH.
2. TOLERANCE ±0.100 mm (4 mil) UNLESS OTHERWISE SPECIFIED.
3. DIMENSION L IS MEASURED IN GAUGE PLANE.
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS
   ARE NOT NECESSARILY EXACT.
5. ALL DIMENSIONS ARE IN MILLIMETERS.

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