

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^e	Q _g (Typ.)
20	0.015 at V _{GS} = 4.5 V	6.5 ^a	8.6nC
	0.020 at V _{GS} = 2.5 V	4.8 ^a	
	0.024 at V _{GS} = 1.8 V	3.9	

FEATURES

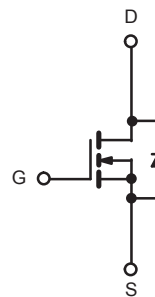
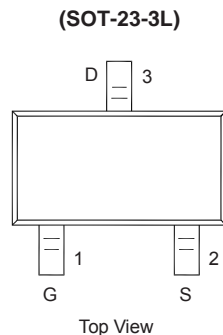
- DT-Trench Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT

APPLICATIONS

- DC/DC Converters
- Load Switch for Portable Applications



N-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)	I _D	T _C = 25 °C	6.5 ^a	A
		T _C = 70 °C	6	
		T _A = 25 °C	5.5 ^{b, c}	
		T _A = 70 °C	5 ^{b, c}	
Pulsed Drain Current	I _{DM}	24		
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	3.95	
		T _A = 25 °C	1.16 ^{b, c}	
Maximum Power Dissipation	P _D	T _C = 25 °C	2.5	W
		T _C = 70 °C	1.7	
		T _A = 25 °C	1.45 ^{b, c}	
		T _A = 70 °C	1.1 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	
Soldering Recommendations (Peak Temperature)		260		

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^{b, d}	R _{thJA}	70	100	°C/W	
Maximum Junction-to-Foot (Drain)	R _{thJF}	30	60		

Notes:

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

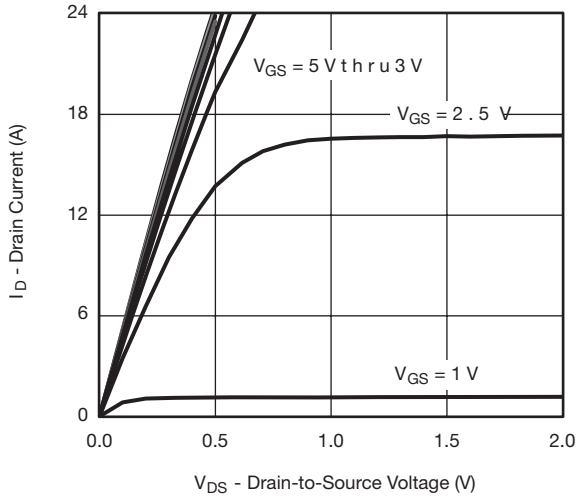
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		25		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.45		1.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		0.015	0.019	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 5\text{ A}$		0.020	0.024	
		$V_{GS} = 1.8\text{ V}, I_D = 4.5\text{ A}$		0.024	0.030	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 5.0\text{ A}$		25		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		860		μF
Output Capacitance	C_{oss}			95		
Reverse Transfer Capacitance	C_{rss}			59		
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 5\text{ V}, I_D = 5.0\text{ A}$		11	19	nC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		8.9	15	
Gate-Source Charge	Q_{gs}			1.1		
Gate-Drain Charge	Q_{gd}			0.7		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.5	2.3	4.9	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.2\text{ }\Omega$ $I_D \cong 4\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		8	17	ns
Rise Time	t_r			19	25	
Turn-Off Delay Time	$t_{d(off)}$			30	45	
Fall Time	t_f			9	19	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.2\text{ }\Omega$ $I_D \cong 4\text{ A}, V_{GEN} = 5\text{ V}, R_g = 1\text{ }\Omega$		6	10	
Rise Time	t_r			14	20	
Turn-Off Delay Time	$t_{d(off)}$			20	32	
Fall Time	t_f			7	12	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			6.5	A
Pulse Diode Forward Current	I_{SM}				24	
Body Diode Voltage	V_{SD}	$I_S = 4\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		13	21	ns
Body Diode Reverse Recovery Charge	Q_{rr}			6	10	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			5		

Notes:

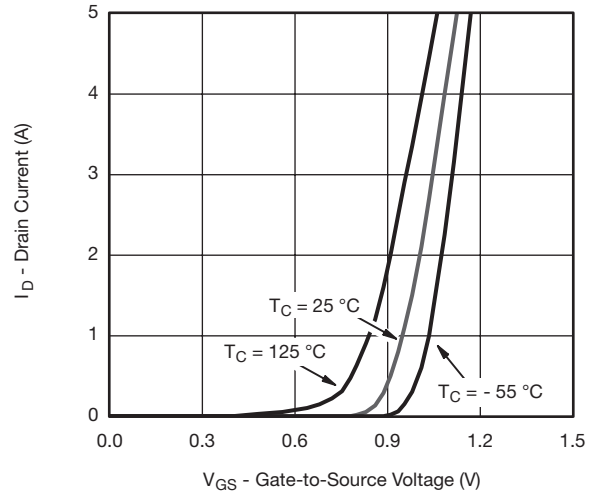
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production testing.

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.

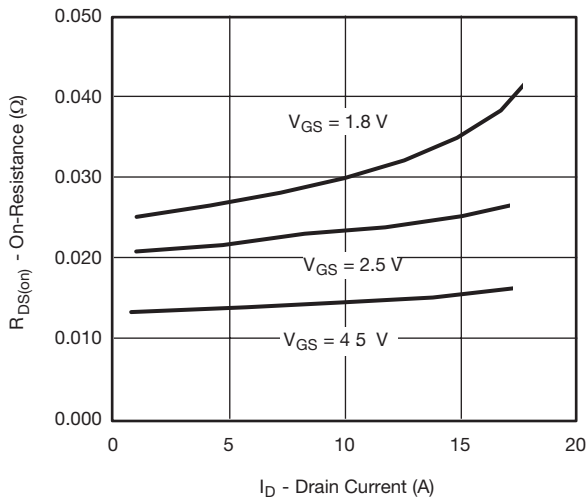
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



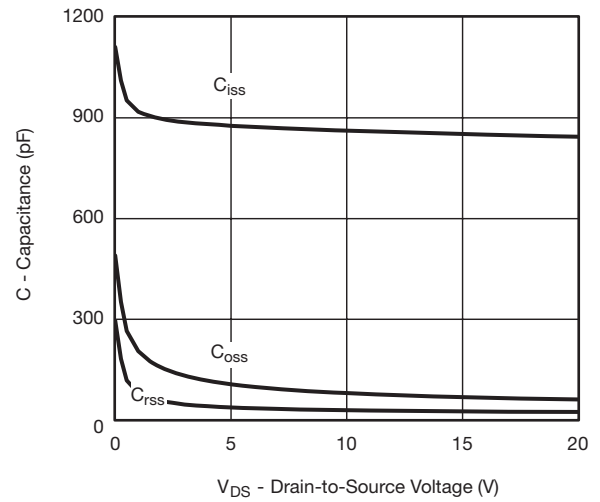
Output Characteristics



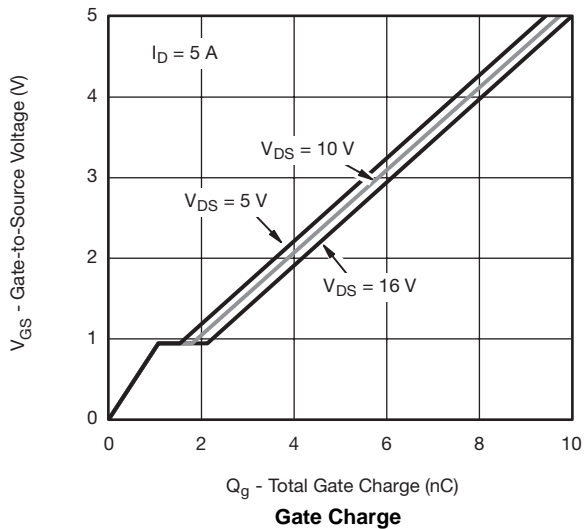
Transfer Characteristics



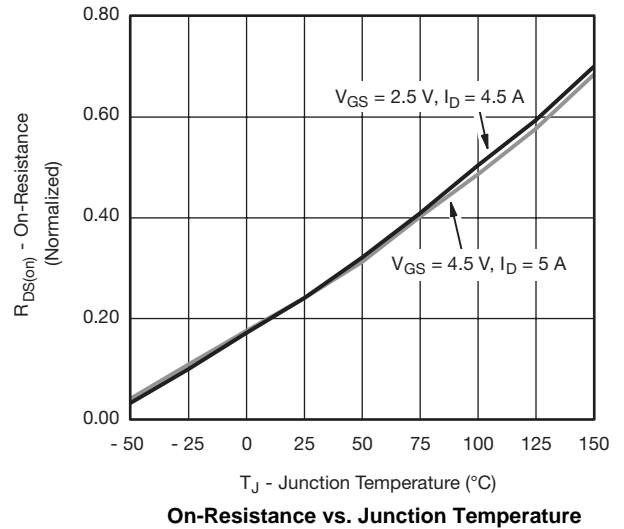
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

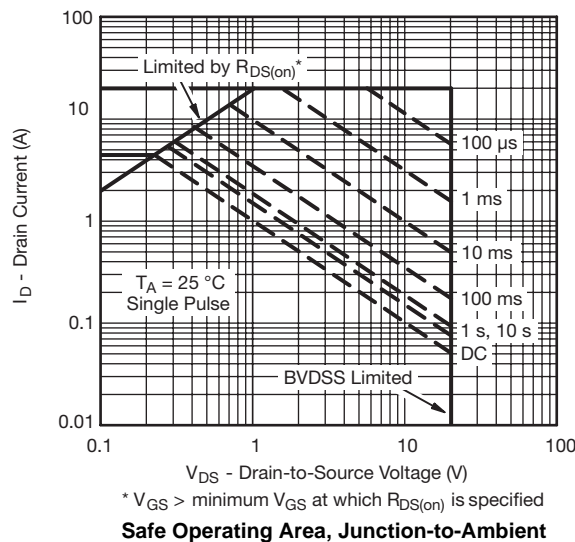
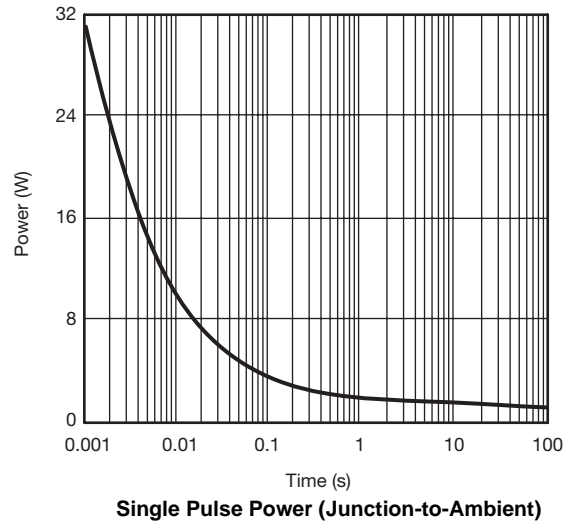
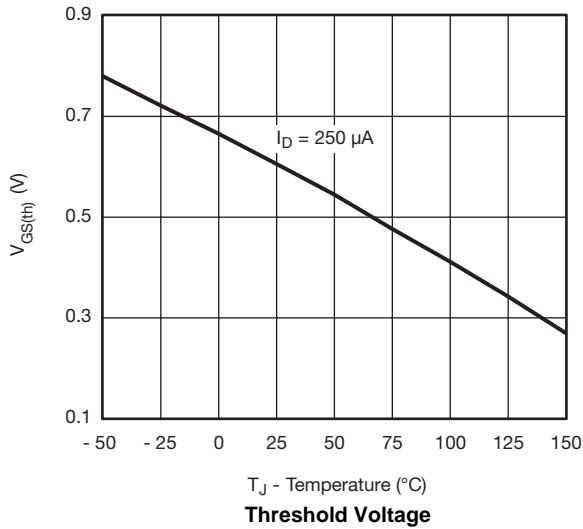
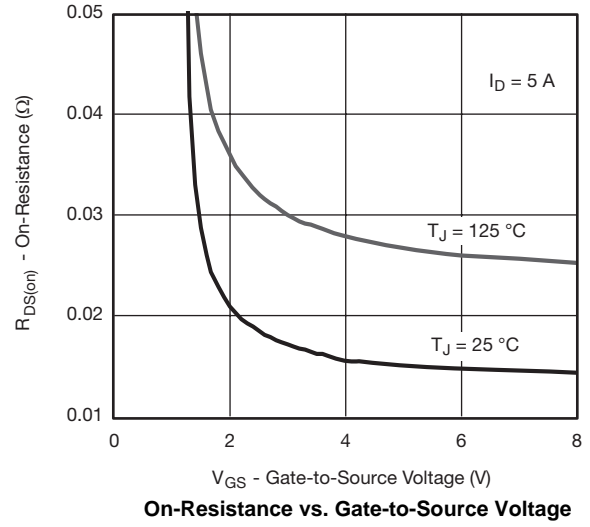
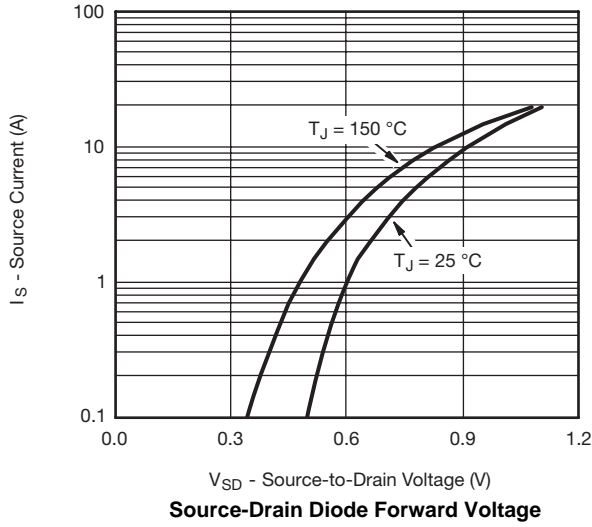


Gate Charge

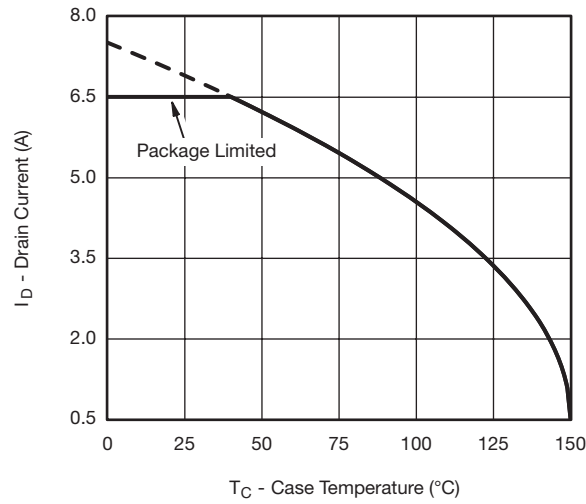


On-Resistance vs. Junction Temperature

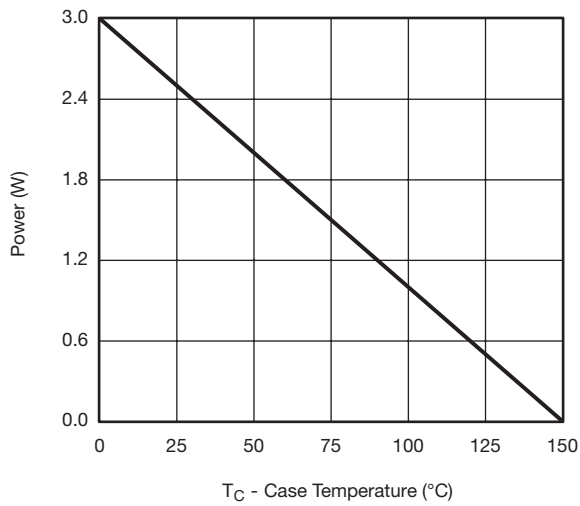
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



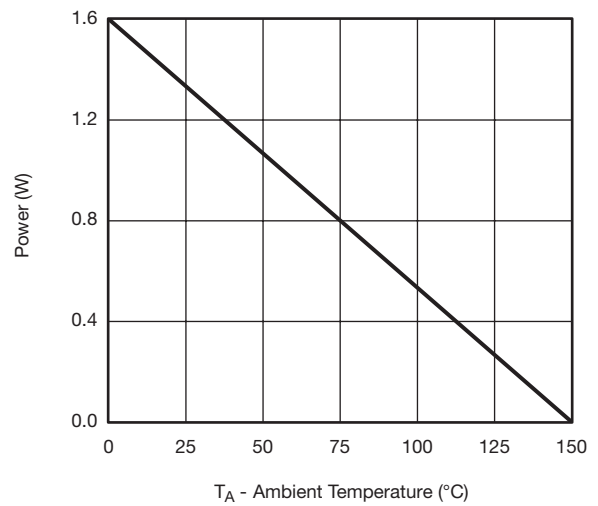
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



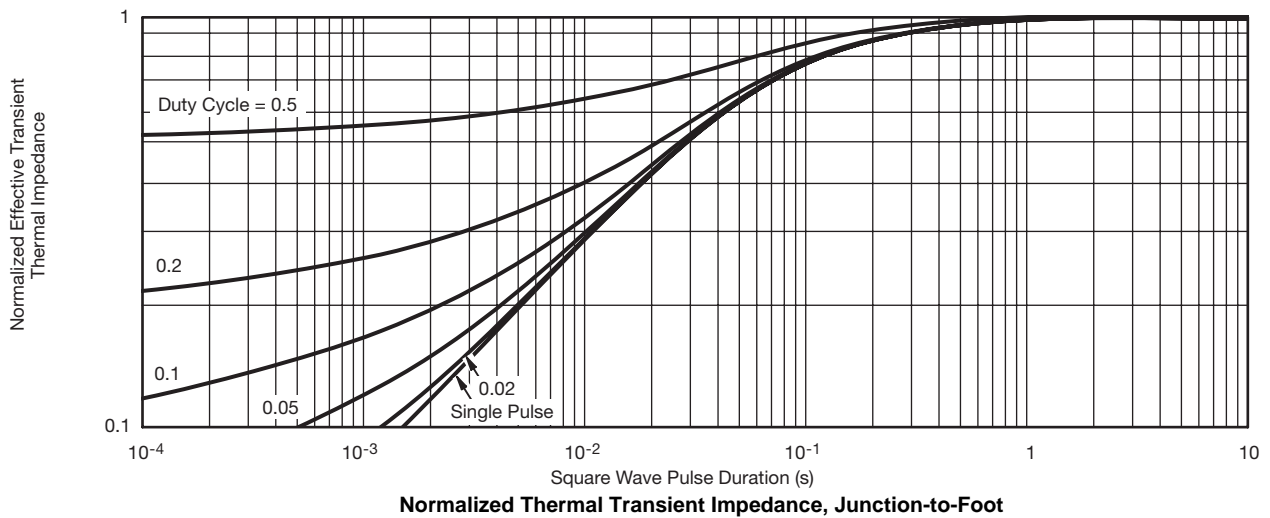
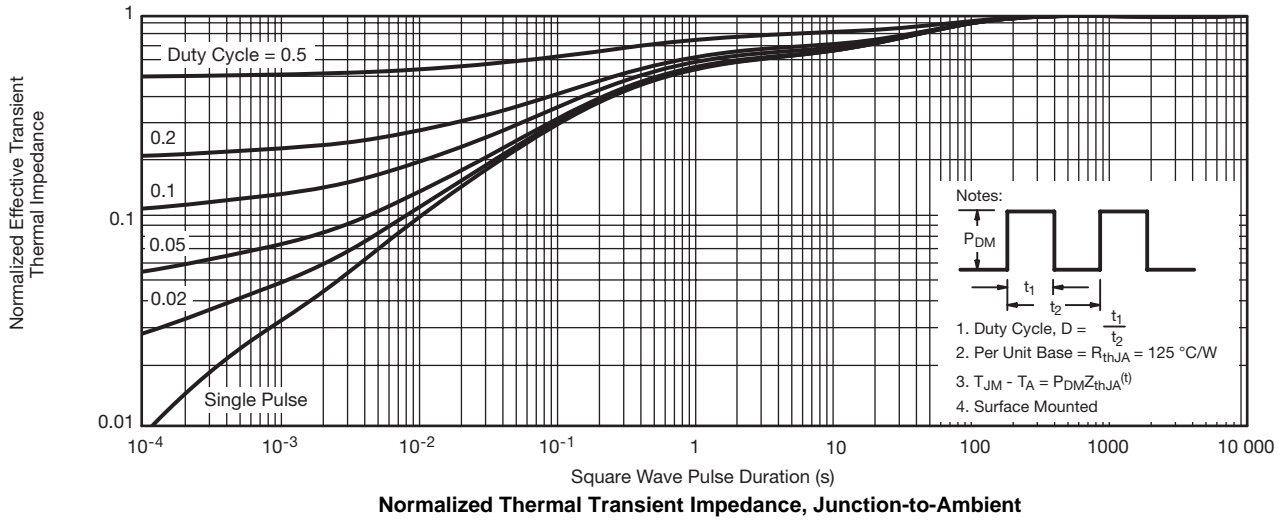
Power Derating, Junction-to-Foot



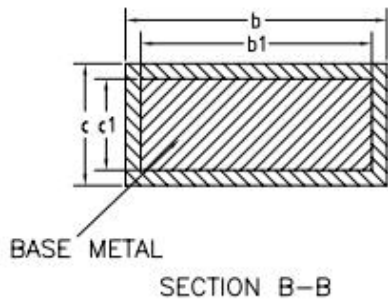
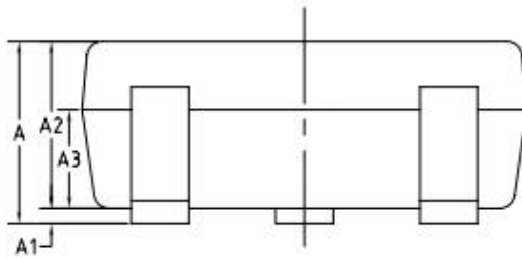
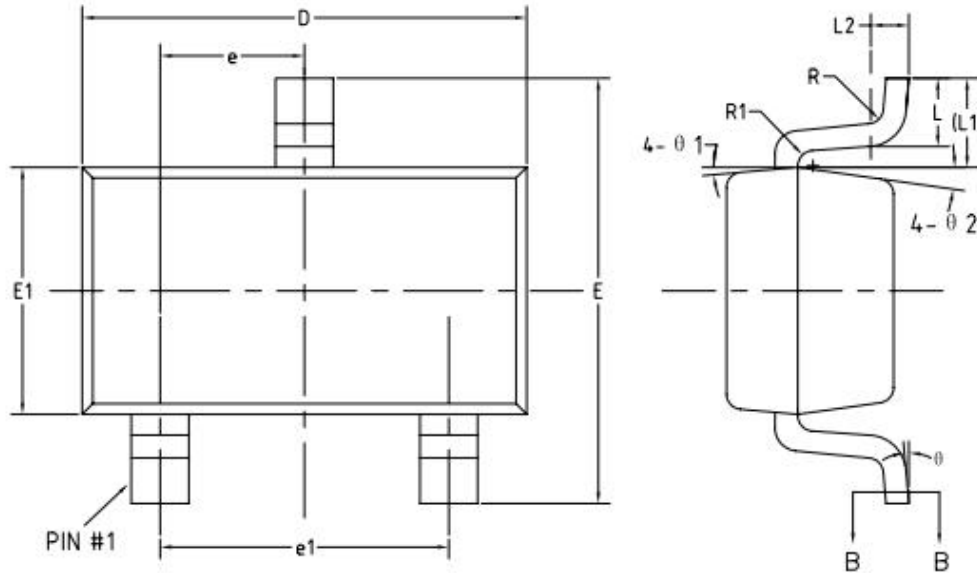
Power Derating, Junction-to-Ambient

* 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



SOT-23-3L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	-	-	1.50
A1	0.00	-	0.18
A2	0.85	1.10	1.35
A3	0.58	0.65	0.72
b	0.23	-	0.53
b1	0.20	0.40	0.50
c	0.09	-	0.22
c1	0.08	0.13	0.21
D	2.78	2.95	3.10
E	2.58	2.80	3.03
E1	1.55	1.65	1.78
e	0.83	0.95	1.07
e1	1.78	1.90	2.02
L	0.28	0.45	0.62
L1	0.59REF		
L2	0.25BSC		
R	0.04	-	-
R1	0.04	-	0.21
θ	0°	-	8°
θ1	8°	10°	12°
θ2	8°	10°	12°

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