N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A) [c]	Q_g (TYP.)
20	0.270 at V_{GS} = 4.5 V	0.75	1.4 nC
	0.390 at V_{GS} = 2.5 V	0.70	

FEATURES

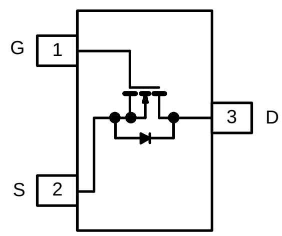
- TrenchFET® power MOSFET
- 100 % R_g tested

Pb-free
RoHS
COMPLIANT
HALOGEN
FREE

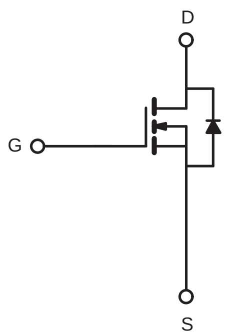
APPLICATIONS

- Smart phones, tablet PC's
  - DC/DC converters
    - Boost converters
  - Load switch, OVP switch

SC-75



Top View



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	0.85	A
	T_C = 70 °C		0.75	
	T_A = 25 °C		0.7 [a, b]	
	T_A = 70 °C		0.6 [a, b]	
Pulsed Drain Current (t = 300 μs)		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}	-55 to +150	°C
Soldering Recommendations (Peak Temperature)			260	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient [a, d]	t ≤ 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. t = 10 s.
c. Based on T_C = 25 °C.
d. Maximum under steady state conditions is 360 °C/W.

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

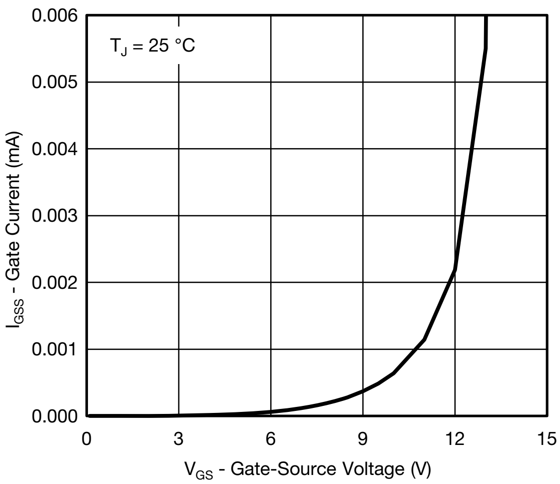
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	20	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	-	32	-	mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-	-3	-	
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.5	-	1.0	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = 4.5 V	-	-	0.1	µA
		V_{DS} = 0 V, V_{GS} = ± 12 V	-	-	± 20	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V	-	-	0.1	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 55 °C	-	-	10	
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	2	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 1 A	-	0.270	-	Ω
		V_{GS} = 2.5 V, I_D = 0.5 A	-	0.390	-	
Forward Transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 1.4 A	-	5	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	-	105	-	pF
Output Capacitance	C_{oss}		-	23	-	
Reverse Transfer Capacitance	C_{rss}		-	11	-	
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 1.4 A	-	2.7	4.1	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 1.4 A	-	1.4	2.1	
Gate-Source Charge	Q_{gs}		-	0.3	-	
Gate-Drain Charge	Q_{gd}		-	0.5	-	
Gate Resistance	R_g	f = 1 MHz	1.4	7	14	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 13.6 Ω I_D ≅ 1.1 A, V_{GEN} = 10 V, R_g = 1 Ω	-	2	4	ns
Rise Time	t_r		-	9	18	
Turn-Off Delay Time	$t_{d(off)}$		-	8	16	
Fall Time	t_f		-	8	16	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 13.6 Ω I_D ≅ 1.1 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	8	16	
Rise Time	t_r		-	13	20	
Turn-Off Delay Time	$t_{d(off)}$		-	15	23	
Fall Time	t_f		-	6	12	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	-	-	0.4	A
Pulse Diode Forward Current [a]	I_{SM}		-	-	6	
Body Diode Voltage	V_{SD}	I_F = 1.1 A	-	0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 1.1 A, dI/dt = 100 A/µs, T_J = 25 °C	-	8	16	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	3	6	nC
Reverse Recovery Fall Time	t_a		-	5	-	ns
Reverse Recovery Rise Time	t_b		-	3	-	

Notes

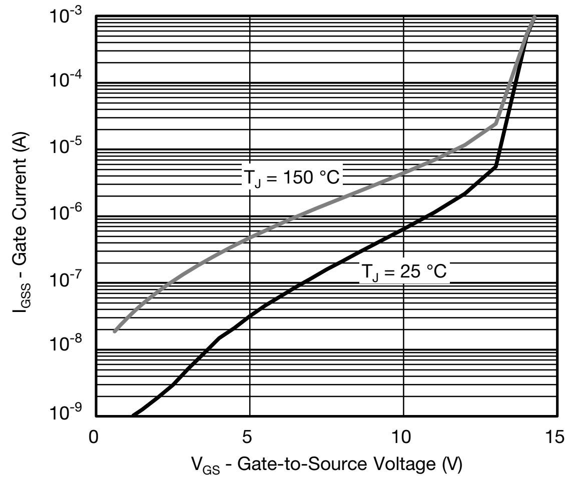
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

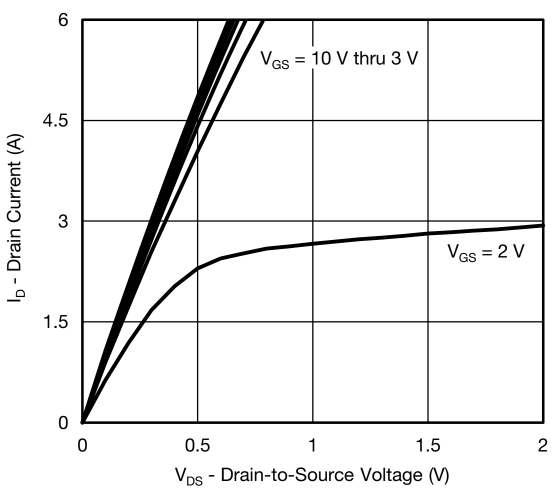
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



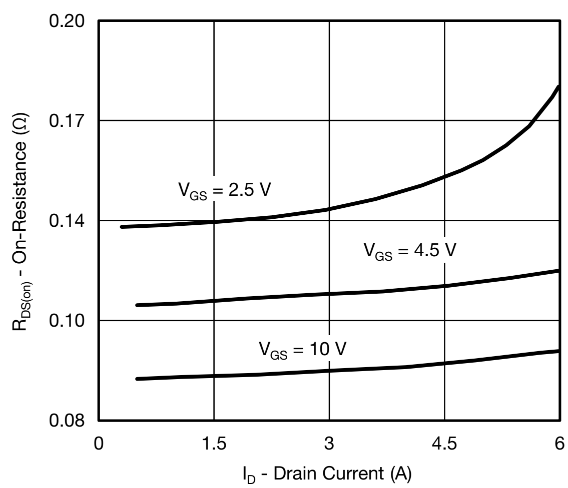
Gate Source Voltage vs. Gate Current



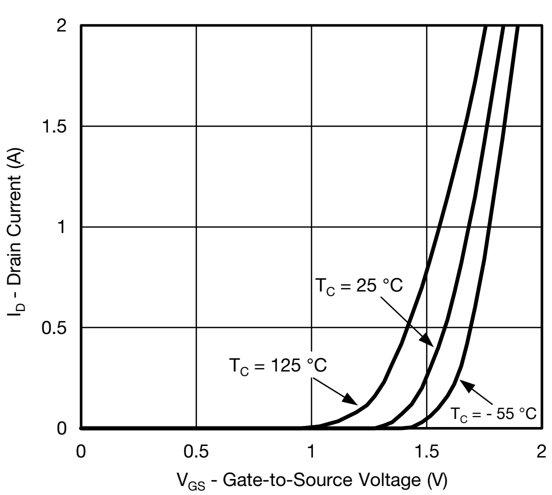
Gate Source Voltage vs. Gate Current



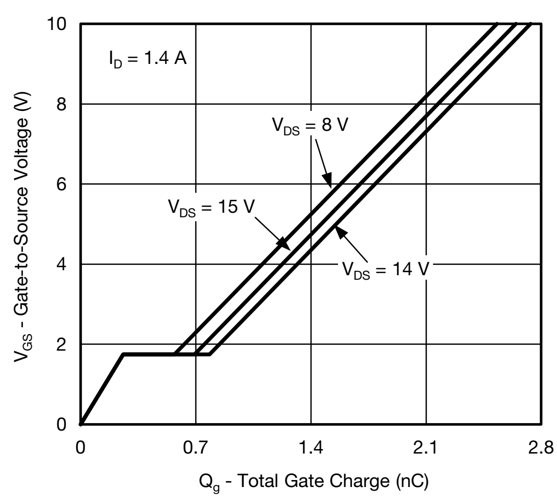
Output Characteristics



On-Resistance vs. Drain Current

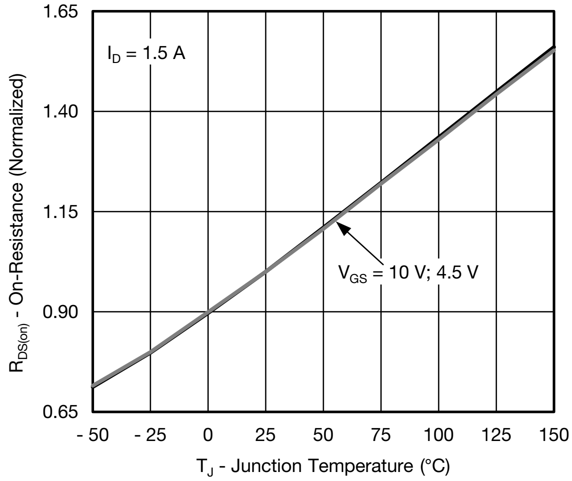


Transfer Characteristics

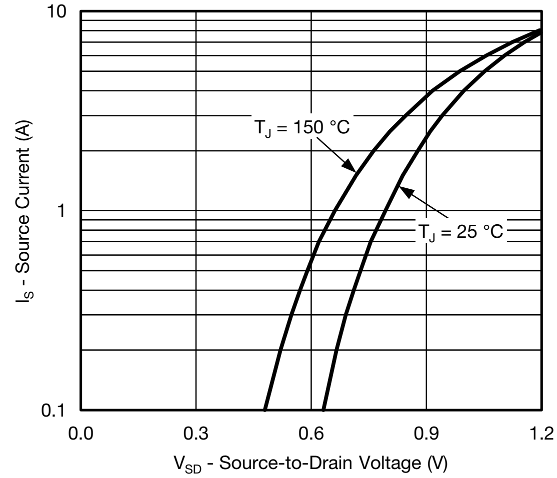


Gate Charge

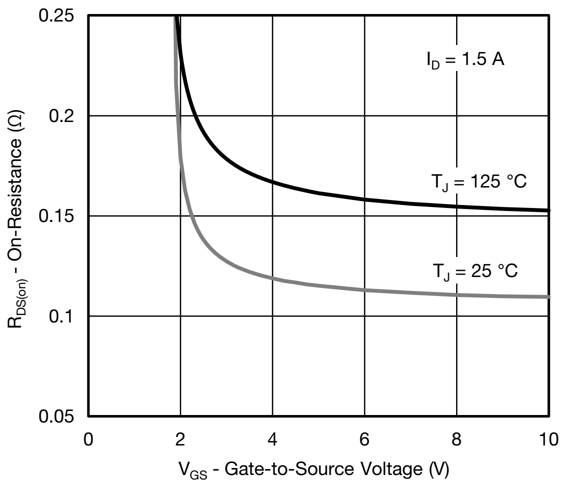
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



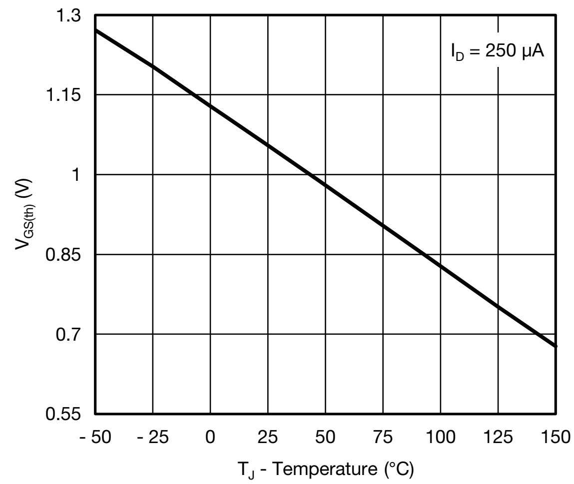
On-Resistance vs. Junction Temperature



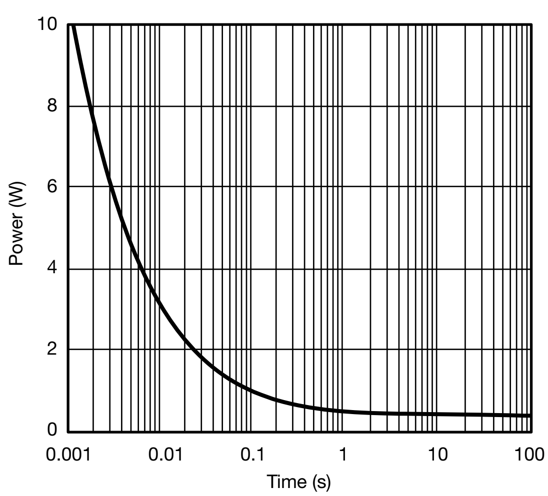
Source-Drain Diode Forward Voltage



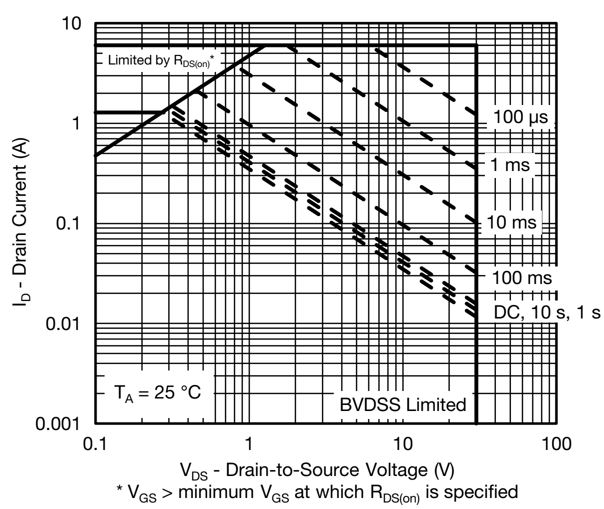
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

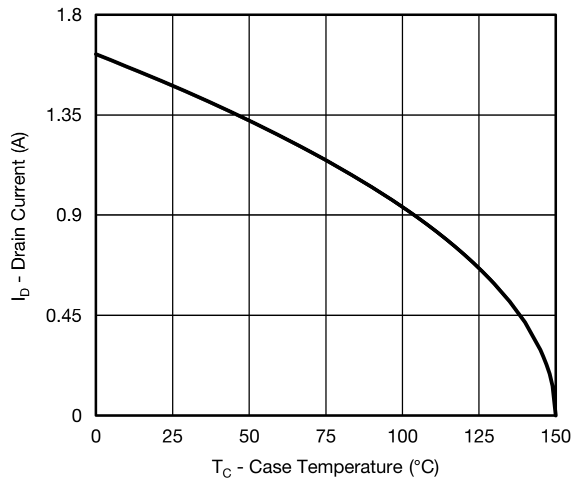


Single Pulse Power, Junction-to-Ambient

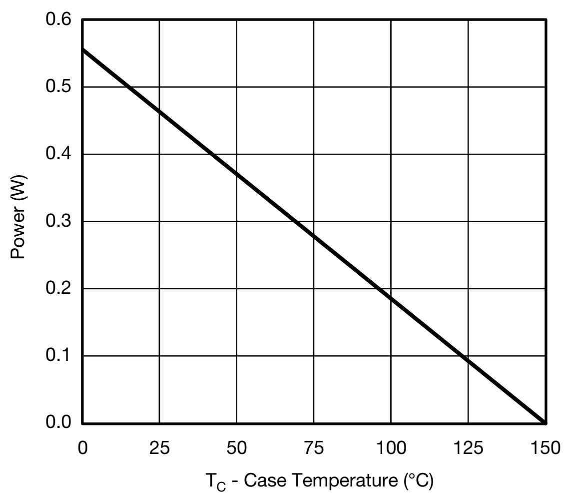


Safe Operating Area, Junction-to-Ambient

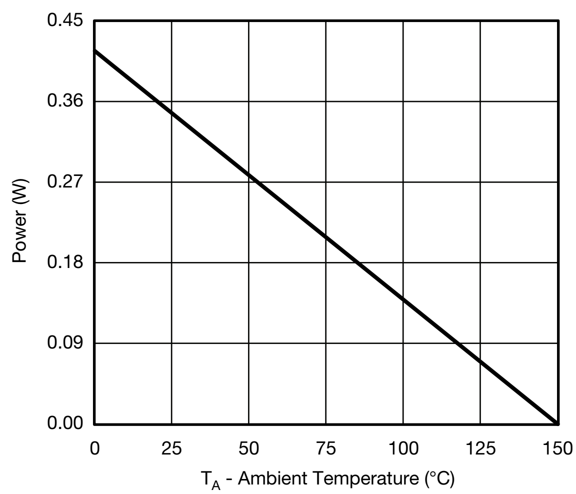
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



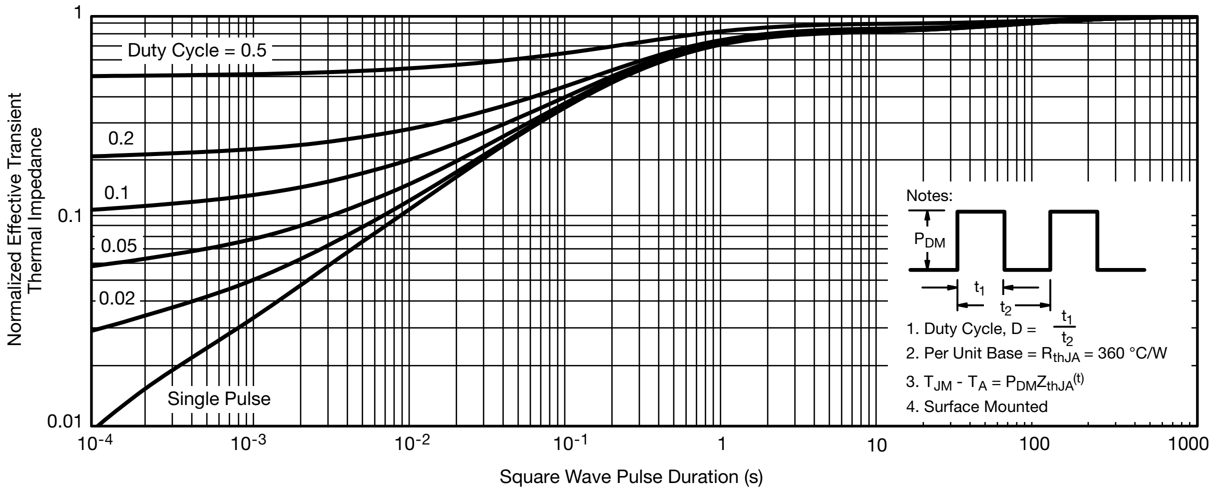
Power, Junction-to-Case



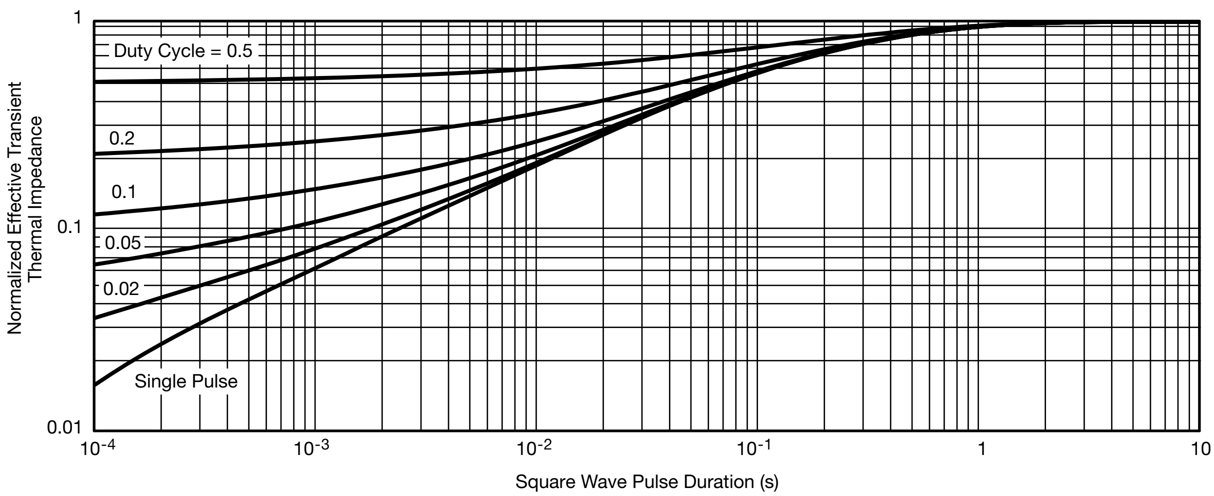
Power, Junction-to-Ambient

* 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)

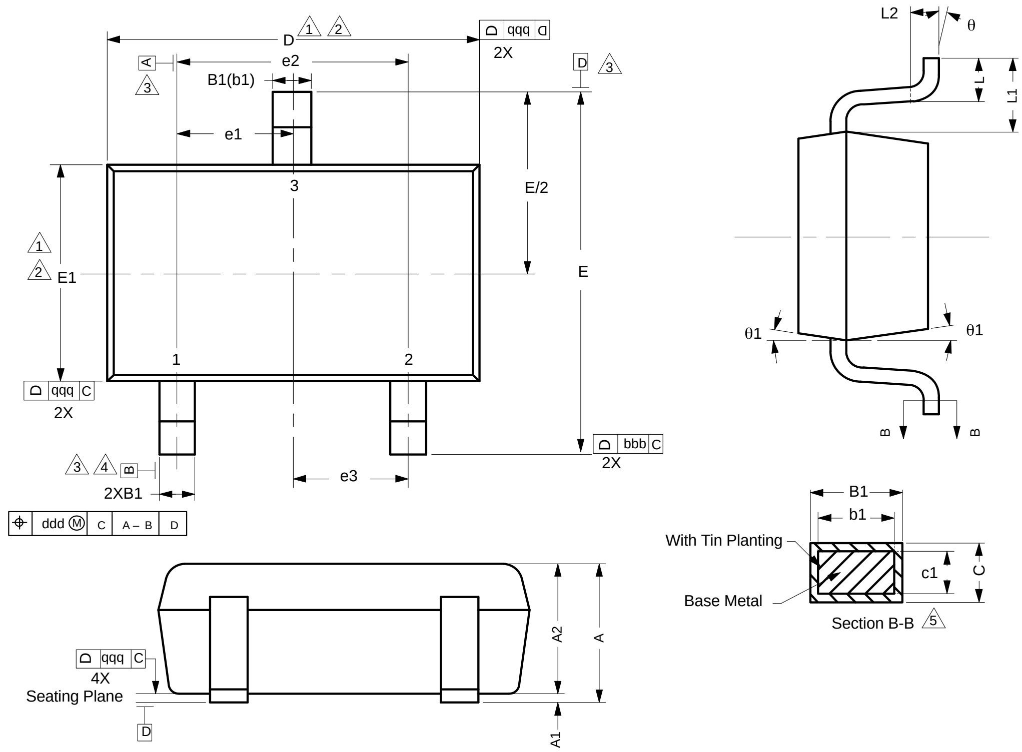


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

SC-75A: 3 Leads



Notes

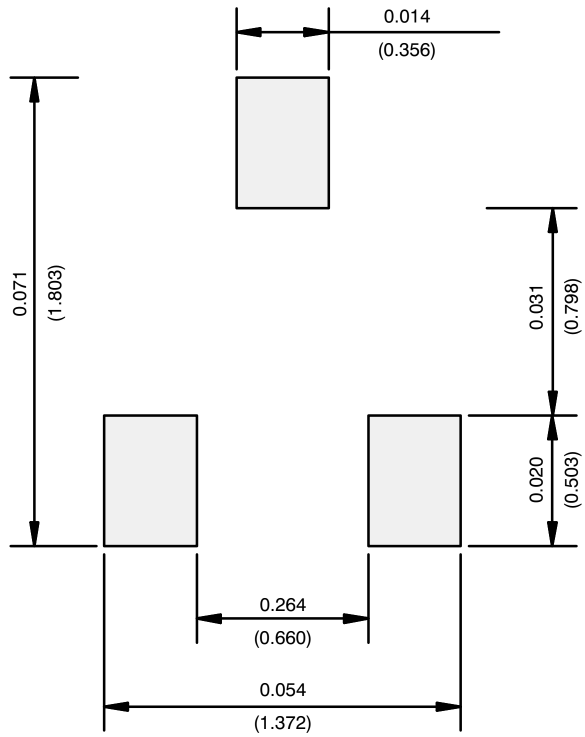
Dimensions in millimeters will govern.

1. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash protrusions or gate burrs shall not exceed 0.10 mm per end. Dimension E1 does not include Interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.10 mm per side.
2. Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interelead flash, but including any mismatch between the top and bottom of the plastic body.
3. Datums A, B and D to be determined 0.10 mm from the lead tip.
4. Terminal positions are shown for reference only.
5. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

DIMENSIONS	TOLERANCES
aaa	0.10
bbb	0.10
ccc	0.10
ddd	0.10

DIM.	MILLIMETERS			NOTE
	MIN.	NOM.	MAX.	
A	-	-	0.80	
A_1	0.00	-	0.10	
A_2	0.65	0.70	0.80	
B_1	0.19	-	0.24	5
b_1	0.17	-	0.21	
c	0.13	-	0.15	5
c_1	0.10	-	0.12	5
D	1.48	1.575	1.68	1, 2
E	1.50	1.60	1.70	
E_1	0.66	0.76	0.86	1, 2
e_1	0.50 BSC			
e_2	1.00 BSC			
e_3	0.50 BSC			
L	0.15	0.205	0.30	
L_1	0.40 ref.			
L_2	0.15 BSC			
θ	0°	-	8°	
$θ_1$	4°	-	10°	

RECOMMENDED MINIMUM PADS FOR SC-75A: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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