

2SK601-VB Datasheet

N-Channel 100 V (D-S) MOSFET

MOSFET PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω) Typ.	I _D (A) ^a	Q _g (Typ.)
100	0.102 at V _{GS} = 10 V	4.2	2.9 nC
	0.120 at V _{GS} = 6 V	3.8	
	0.125 at V _{GS} = 4.5 V	3.6	

FEATURES

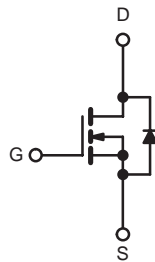
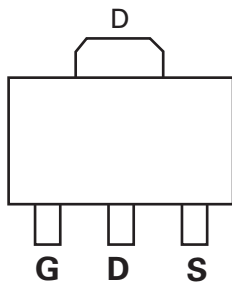
- TrenchFET[®] Power MOSFET
- 100 % R_g and UIS Tested



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- DC/DC Converters / Boost Converters
- Load Switch
- LED Backlighting in LCD TVs
- Power Management for Mobile Computing



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)	I _D	T _C = 25 °C	4.2	A
		T _C = 70 °C	3.5	
		T _A = 25 °C	3.2 ^{b,c}	
		T _A = 70 °C	2.8 ^{b,c}	
Pulsed Drain Current (t = 300 μs)	I _{DM}	15		
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	2.1	
		T _A = 25 °C	1 ^{b,c}	
Single Pulse Avalanche Current	I _{AS}	3		
Single Pulse Avalanche Energy	E _{AS}	0.45	mJ	
Maximum Power Dissipation	P _D	T _C = 25 °C	2.5	W
		T _C = 70 °C	1.6	
		T _A = 25 °C	1.25 ^{b,c}	
		T _A = 70 °C	0.8 ^{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:

- Based on T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 166 °C/W.

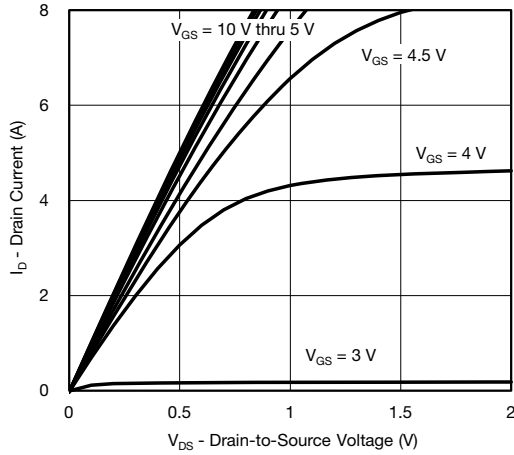
MOSFET SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		59		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 4.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.2		3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	5			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 2\text{ A}$		0.102		Ω
		$V_{GS} = 6\text{ V}, I_D = 1\text{ A}$		0.120		
		$V_{GS} = 4.5\text{ V}, I_D = 1\text{ A}$		0.125		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 20\text{ V}, I_D = 2\text{ A}$		5		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		196		μF
Output Capacitance	C_{oss}			67		
Reverse Transfer Capacitance	C_{rss}			14		
Total Gate Charge	Q_g	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 2.2\text{ A}$		5.2	10.4	nC
				2.9	5.8	
Gate-Source Charge	Q_{gs}	$V_{DS} = 50\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 2.2\text{ A}$		1		
Gate-Drain Charge	Q_{gd}			1.4		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.9	4.3	8.6	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 27.7\text{ }\Omega$ $I_D = 1.8\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		40	60	ns
Rise Time	t_r			68	102	
Turn-Off Delay Time	$t_{d(off)}$			14	21	
Fall Time	t_f			20	30	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 27.7\text{ }\Omega$ $I_D = 1.8\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		8	16	
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			10	20	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 2.1	A
Pulse Diode Forward Current ^a	I_{SM}				- 8	
Body Diode Voltage	V_{SD}	$I_S = 1.8\text{ A}$		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 1.8\text{ A}, di/dt = 100\text{ A}/\mu\text{s},$ $T_J = 25\text{ }^\circ\text{C}$		23	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}			21	32	nC
Reverse Recovery Fall Time	t_a			17		ns
Reverse Recovery Rise Time	t_b			6		

Notes:

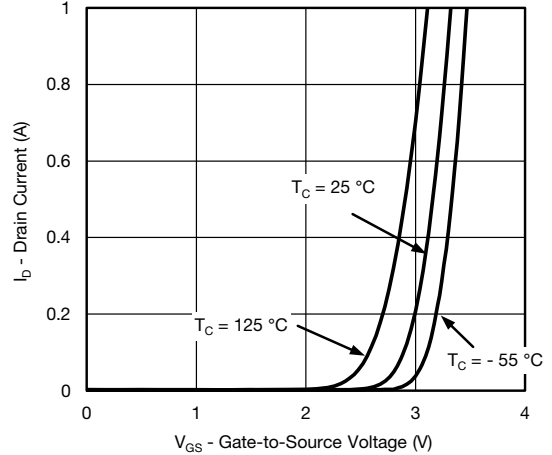
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

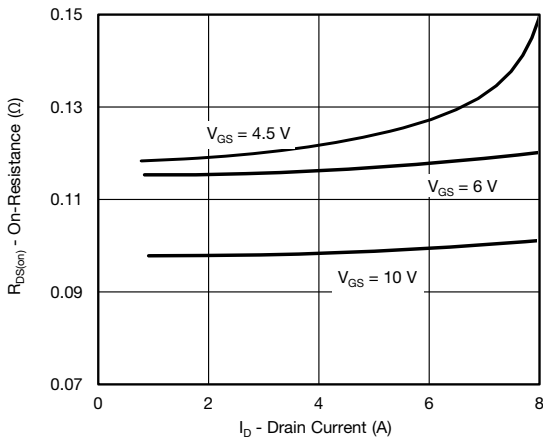
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



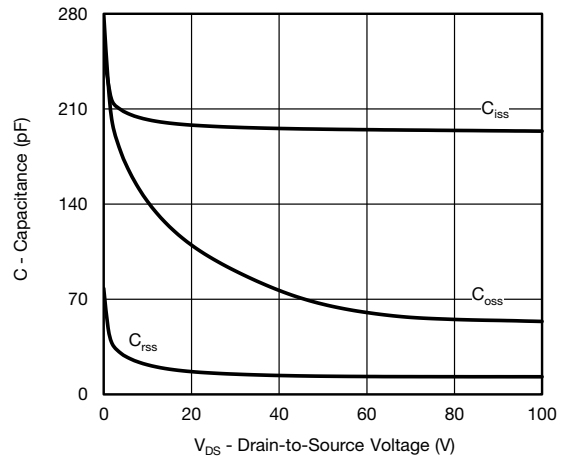
Output Characteristics



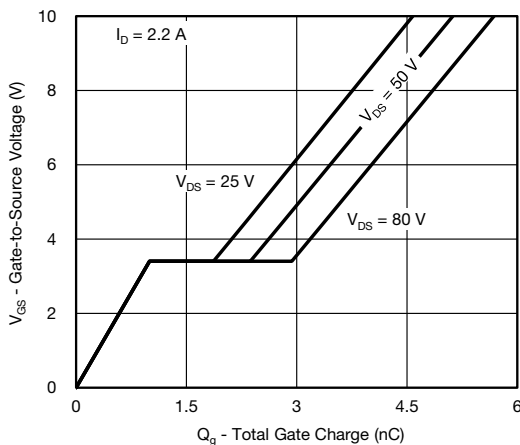
Transfer Characteristics



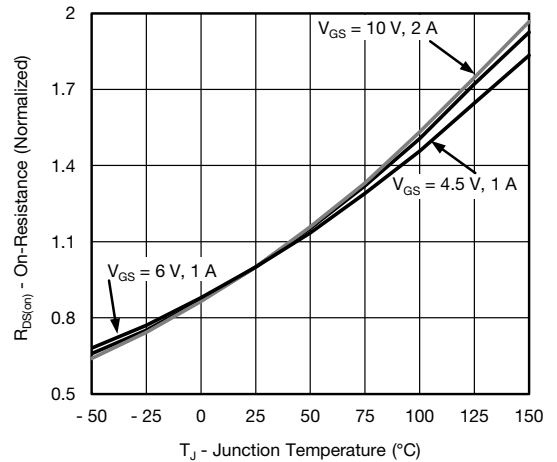
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

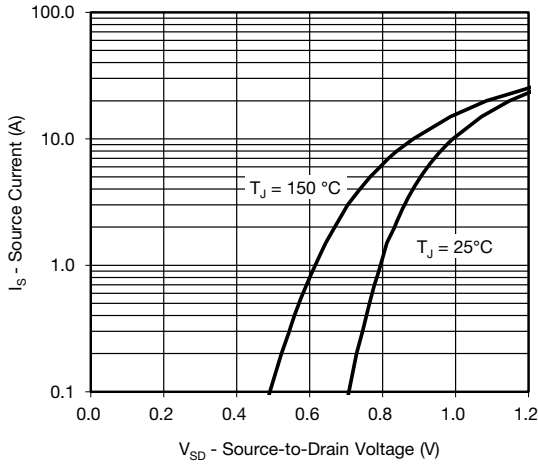


Gate Charge

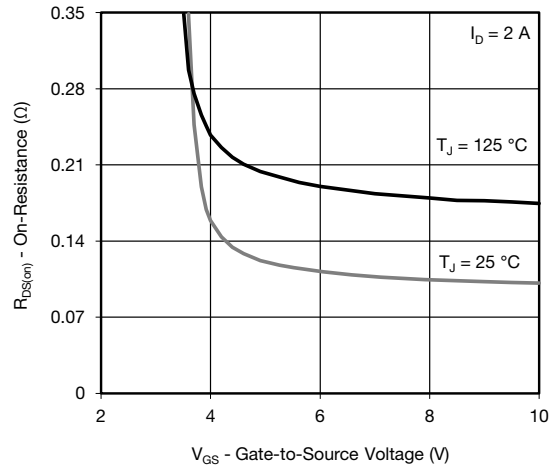


On-Resistance vs. Junction Temperature

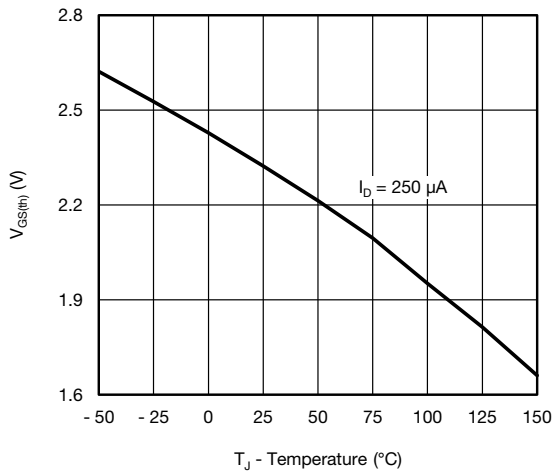
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



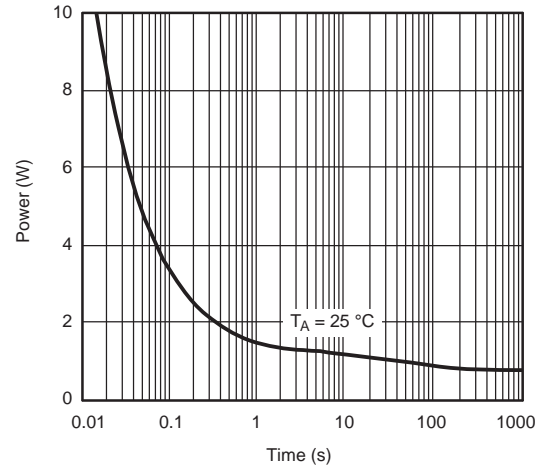
Source-Drain Diode Forward Voltage



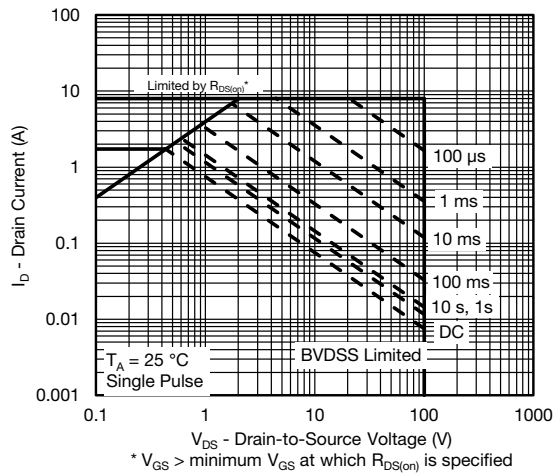
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

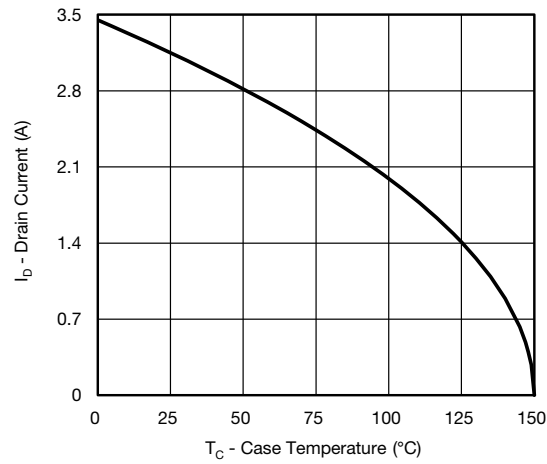


Single Pulse Power

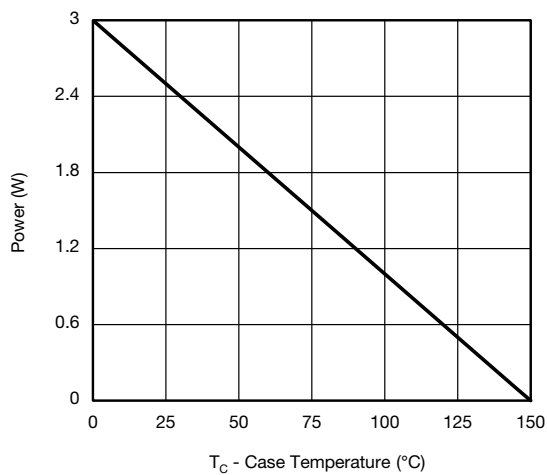


Safe Operating Area

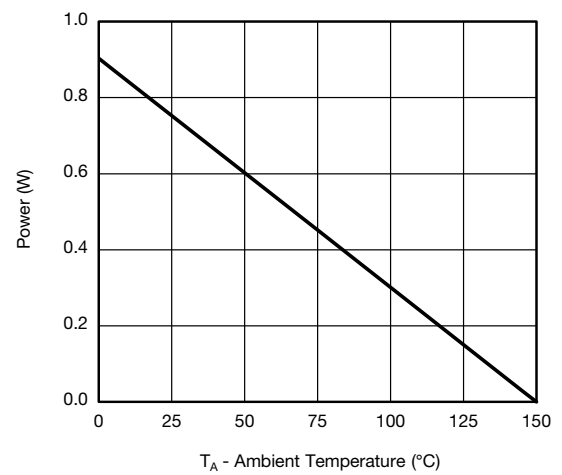
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



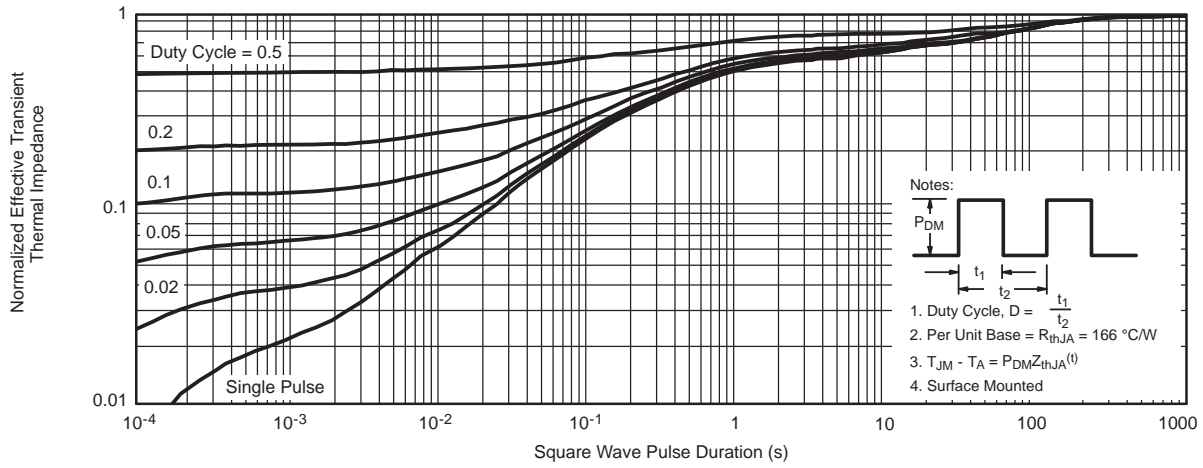
Power, Junction-to-Foot



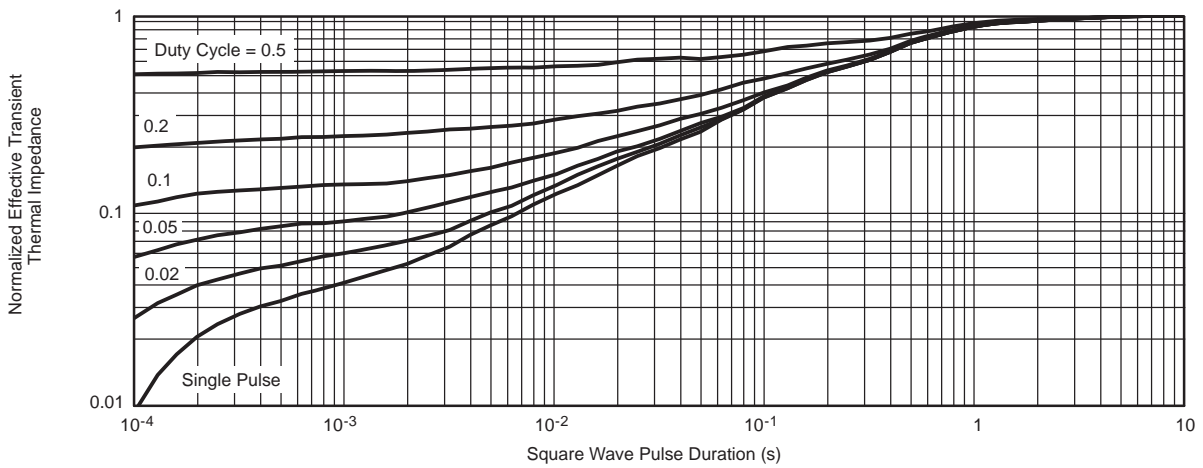
Power, Junction-to-Ambient

* 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.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

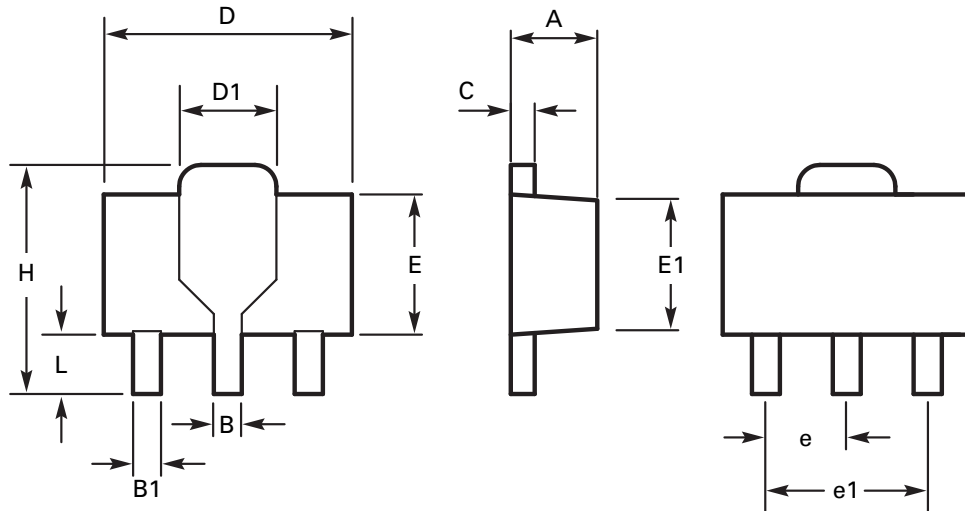


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

Package outline - SOT89



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	1.40	1.60	0.550	0.630	E	2.29	2.60	0.090	0.102
B	0.44	0.56	0.017	0.022	E1	2.13	2.29	0.084	0.090
B1	0.36	0.48	0.014	0.019	e	1.50 BSC		0.059 BSC	
C	0.35	0.44	0.014	0.017	e1	3.00 BSC		0.118 BSC	
D	4.40	4.60	0.173	0.181	H	3.94	4.25	0.155	0.167
D1	1.62	1.83	0.064	0.072	L	0.89	1.20	0.035	0.047

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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