

Dual N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω) MAX.	I _D (A)	Q _g (nC) TYP.
60	1.0 at V _{GS} = 10 V	0.55	1.5
	1.4 at V _{GS} = 4.5 V	0.37	

FEATURES

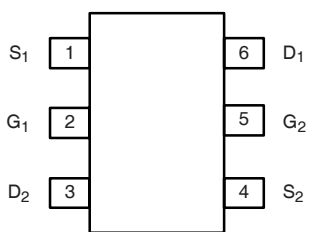
- DT-Trench Power MOSFET
- 100 % R_g tested
- PWM Optimized
- Compliant to RoHS Directive 2002/95/EC



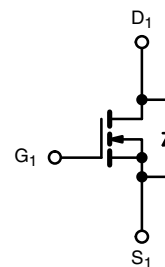
APPLICATIONS

- LED Inverter Circuits
- DC/DC Conversion Circuits
- Motor drives
- Low power load switch

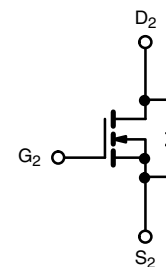
SOT-323-6



Top View



N-Channel MOSFET



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	60	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	0.55
		T _C = 70 °C	0.42
		T _A = 25 °C	0.34 ^{b, c}
		T _A = 70 °C	0.27 ^{b, c}
Pulsed Drain Current	I _{DM}	1.7	A
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	
		T _A = 25 °C	0.32 ^{b, c}
Maximum Power Dissipation	P _D	T _C = 25 °C	0.73
		T _C = 70 °C	0.47
		T _A = 25 °C	0.45 ^{b, c}
		T _A = 70 °C	0.29 ^{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}	R _{thJA}	300	400	°C/W
Maximum Junction-to-Foot (Drain)	R _{thJF}	210	300	

Notes

- Based on T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 400 °C/W.

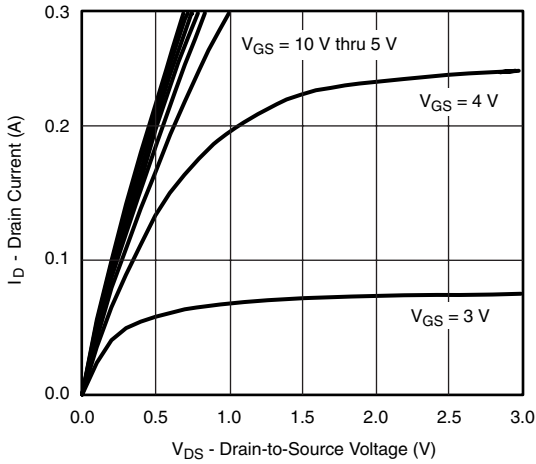
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		56.7		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	0.55			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 0.2\text{ A}$		1.0	1.5	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 0.2\text{ A}$		1.4	2.0	
Forward Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 0.2\text{ A}$		195		ms
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		48.5		pF
Output Capacitance	C_{oss}			16		
Reverse Transfer Capacitance	C_{rss}			8		
Total Gate Charge	Q_g	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 0.2\text{ A}$		1.9	3.4	nC
				1.5	2.5	
Gate-Source Charge	Q_{gs}	$V_{DS} = 30\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 0.2\text{ A}$		0.3		
Gate-Drain Charge	Q_{gd}			0.25		
Gate Resistance	R_g	$f = 1\text{ MHz}$		160		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 100\text{ }\Omega,$ $I_D \cong 0.2\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		6.5		ns
Rise Time	t_r			12		
Turn-Off Delay Time	$t_{d(off)}$			13		
Fall Time	t_f			14		
Drain-Source Body Diode Characteristics						
Continuous Sorce-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			0.55	A
Pulse Diode Forward Current ^a	I_{SM}				1.7	
Body Diode Voltage	V_{SD}	$I_S = 0.2\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 0.2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		16.5	25	ns
Body Diode Reverse Recovery Charge	Q_{rr}			13	20	nC
Reverse Recovery Fall Time	t_a			13.5		ns
Reverse Recovery Rise Time	t_b			3		

Notes

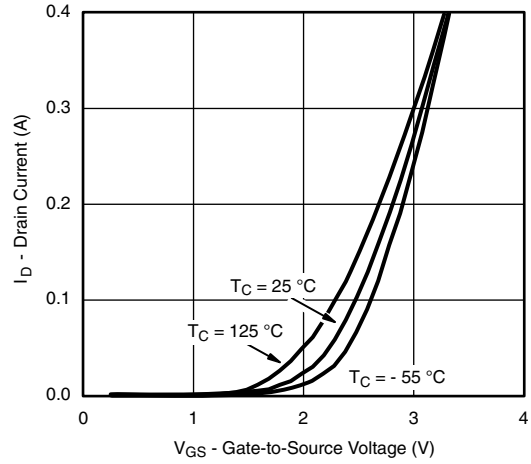
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

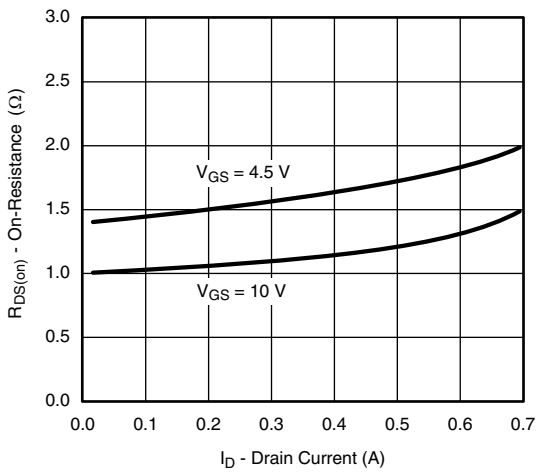
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



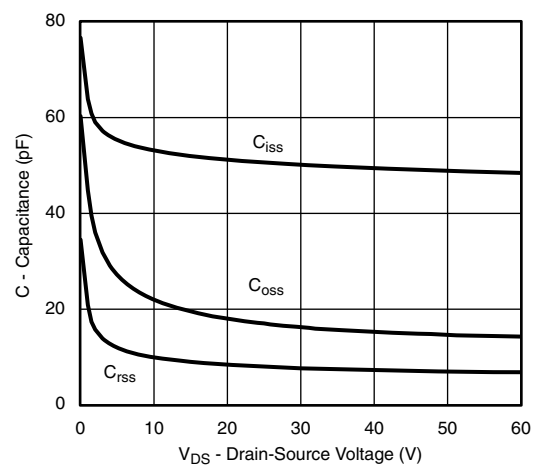
Output Characteristics



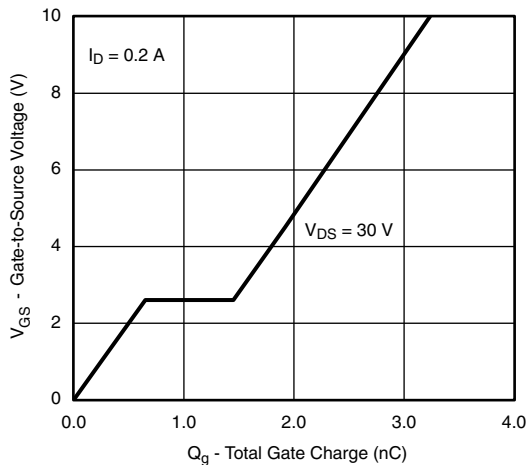
Transfer Characteristics Curves vs. Temperature



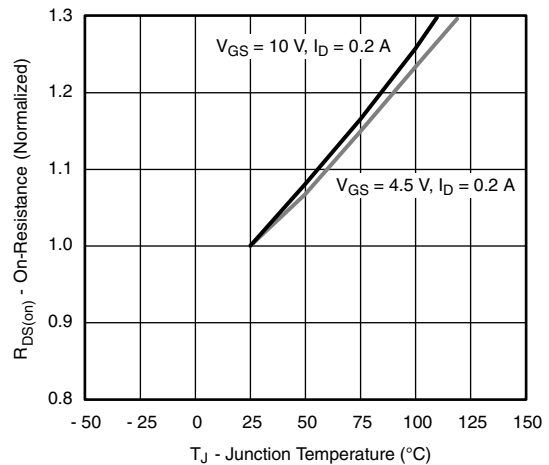
On-Resistance vs. Drain Current



Capacitance

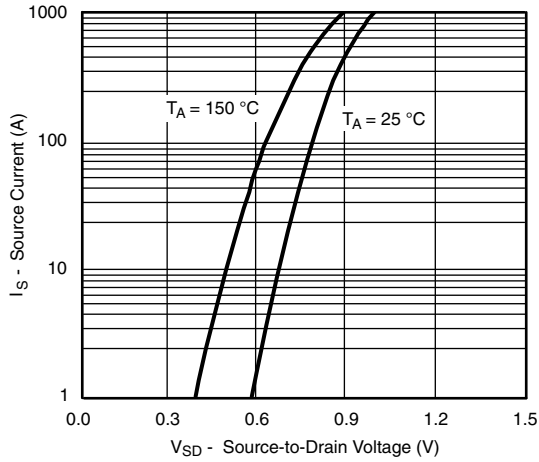


Gate Charge

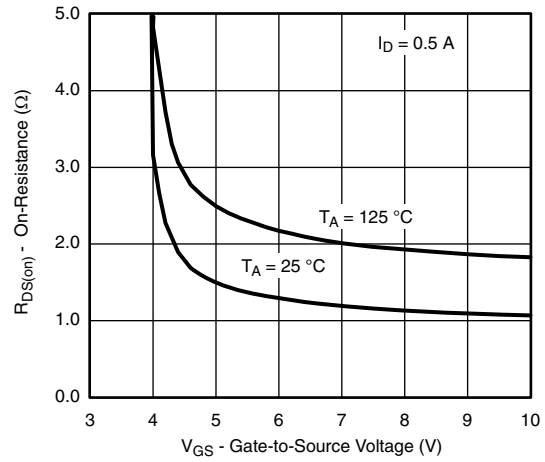


On-Resistance vs. Junction Temperature

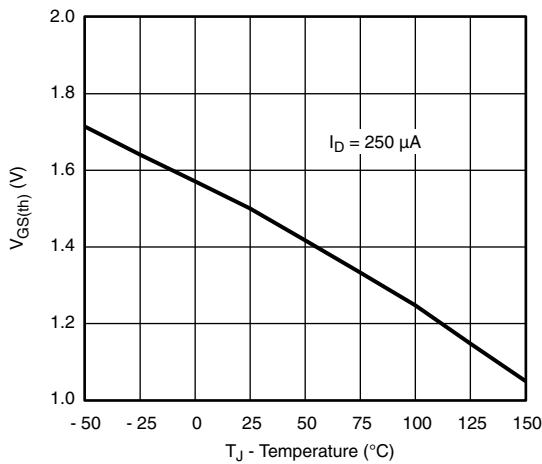
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



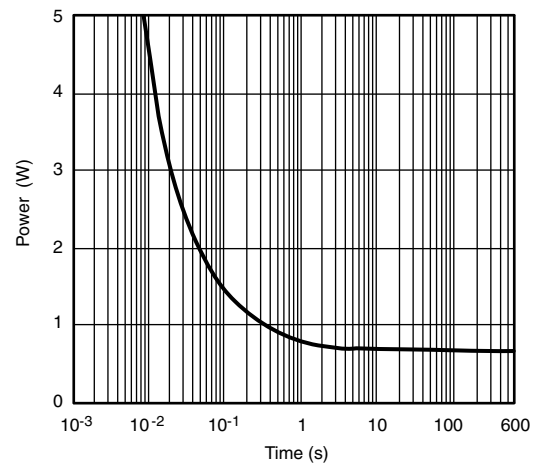
Source-Drain Diode Forward Voltage



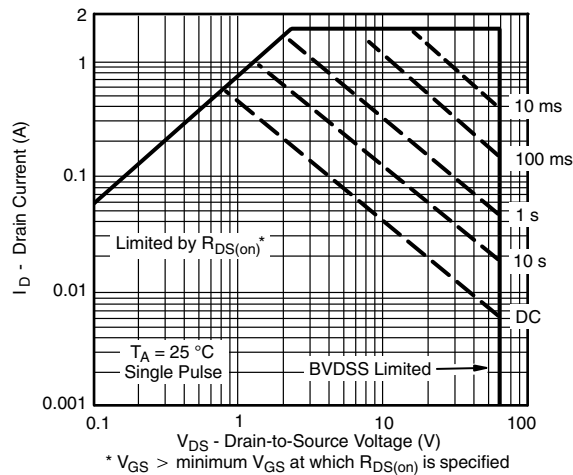
$R_{DS(on)}$ vs. V_{GS} vs. Temperature



Threshold Voltage

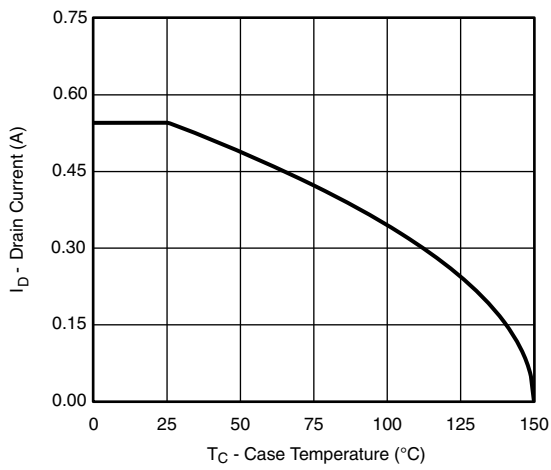


Single Pulse Power

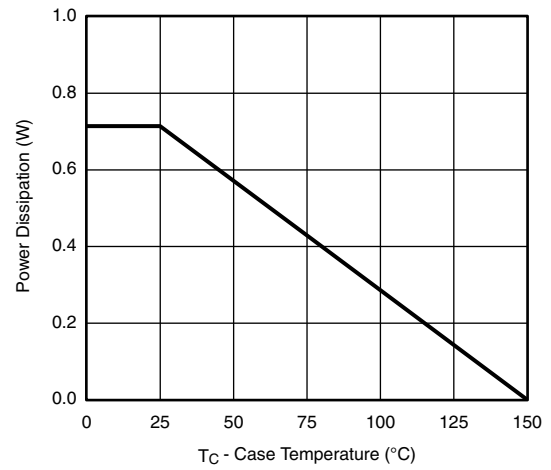


Safe Operating Area

TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Current Derating ^a

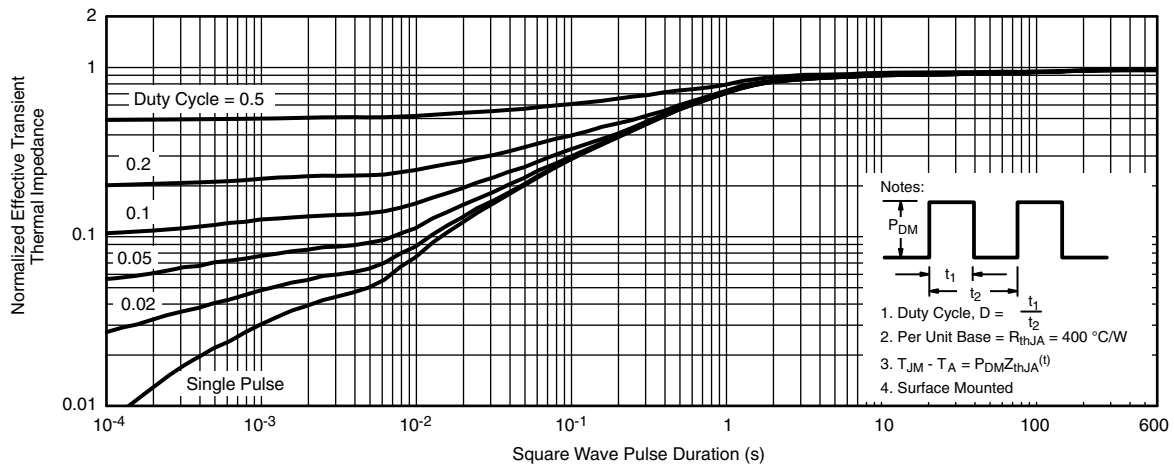


Power Derating

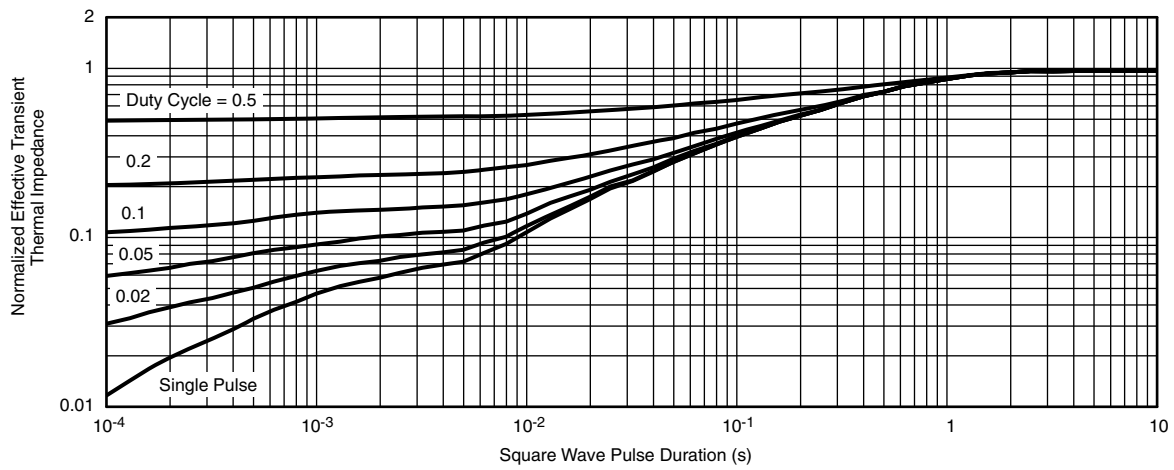
Note

- a. The power dissipation P_D is based on $T_{J(\text{max.})} = 150\text{ }^\circ\text{C}$, 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 ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

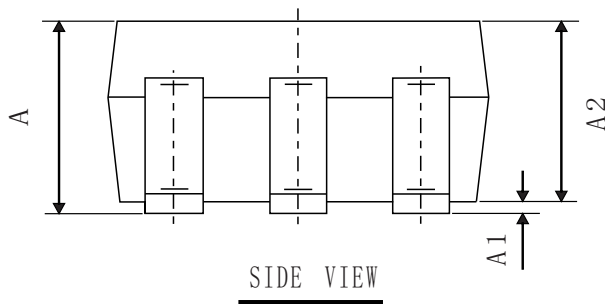
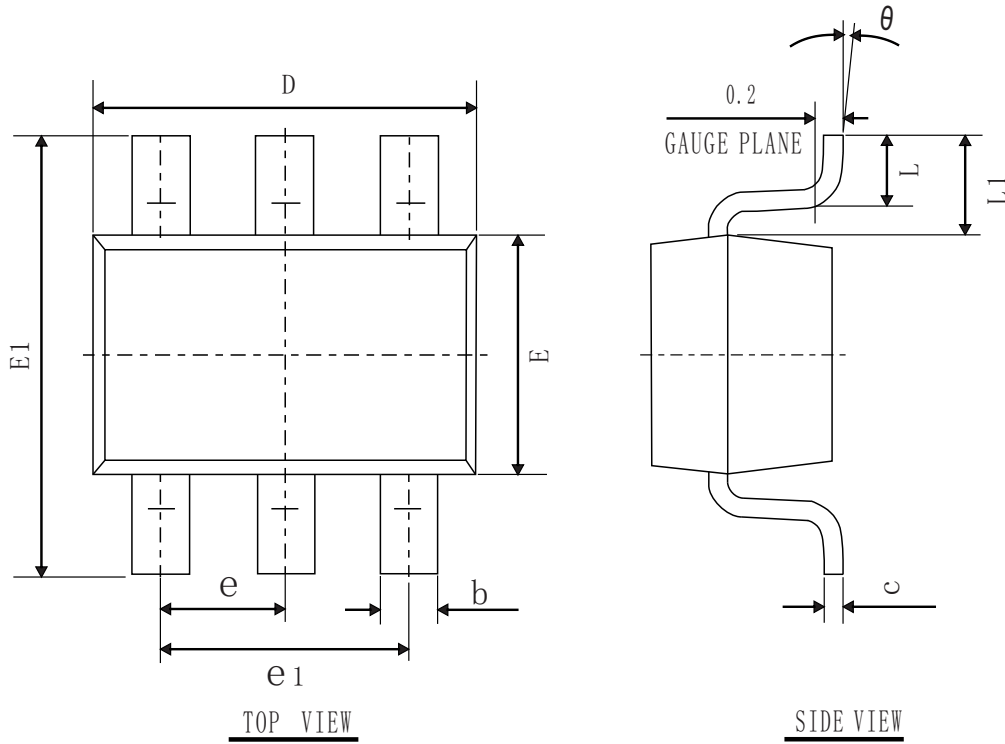


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

SOT-323-6L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	0.05	0.10
A2	0.90	0.95	1.00
b	0.20	0.25	0.30
c	0.08	0.10	0.15
e1	1.20	1.30	1.40
D	2.00	2.10	2.20
E	1.15	1.25	1.35
E1	2.15	2.30	2.45
L	0.26	0.36	0.46
θ	0°	4°	8°
L1	0.525 REF		
e	0.65 TYP		

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