

BSP321P-VB Datasheet

P-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 100	0.200 at $V_{GS} = -10$ V	- 3.0	13.2 nC
	0.230 at $V_{GS} = -6$ V	- 2.4	

FEATURES

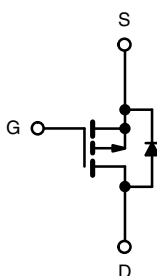
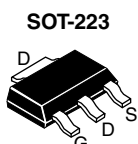
- Trench Power MOSFET
- 100% R_g and UIS Tested

APPLICATIONS

- Active Clamp in Intermediate DC/DC Power Supplies
- H-Bridge High Side Switch for Lighting Application



RoHS
COMPLIANT
HALOGEN
FREE
Available



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	- 3.0	A
	$T_C = 70^\circ\text{C}$		- 2.1	
	$T_A = 25^\circ\text{C}$		- 2 ^{a, b}	
	$T_A = 70^\circ\text{C}$		- 1.6 ^{a, b}	
Pulsed Drain Current		I_{DM}	- 12	
Continuous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	I_S	- 4.9	A
	$T_A = 25^\circ\text{C}$		- 2.5 ^{a, b}	
Avalanche Current		I_{AS}	- 15	mJ
Single-Pulse Avalanche Energy		E_{AS}	11.25	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	6.5	W
	$T_C = 70^\circ\text{C}$		4.8	
	$T_A = 25^\circ\text{C}$		3.1 ^{a, b}	
	$T_A = 70^\circ\text{C}$		2 ^{a, b}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. $t = 10$ s.

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, b}	$t \leq 10$ s	R_{thJA}	33	40	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	17	21	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. Maximum under steady state conditions is 80°C/W .

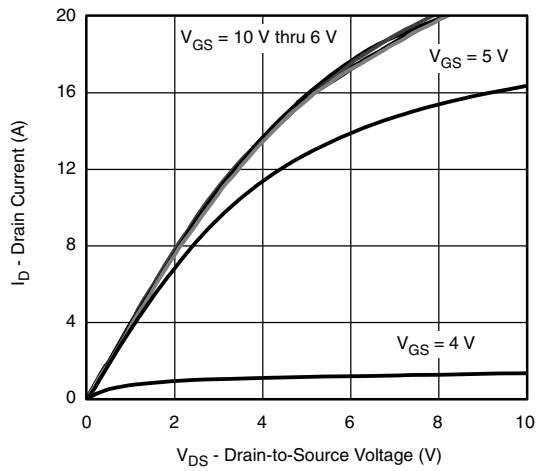
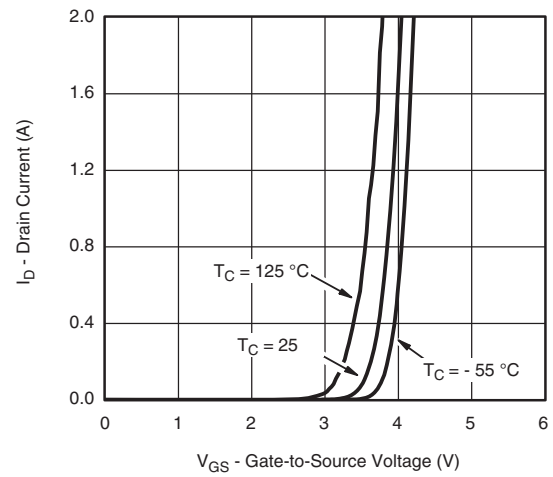
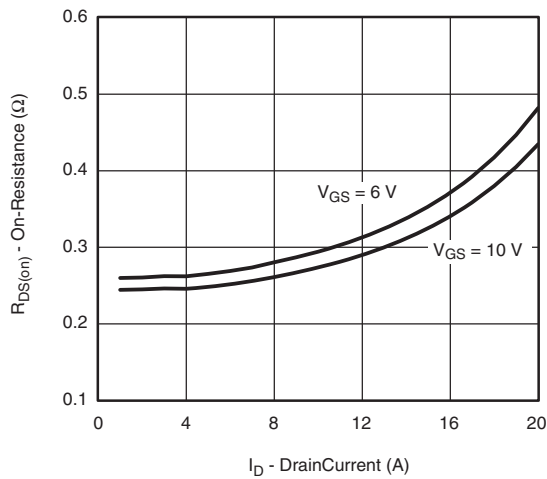
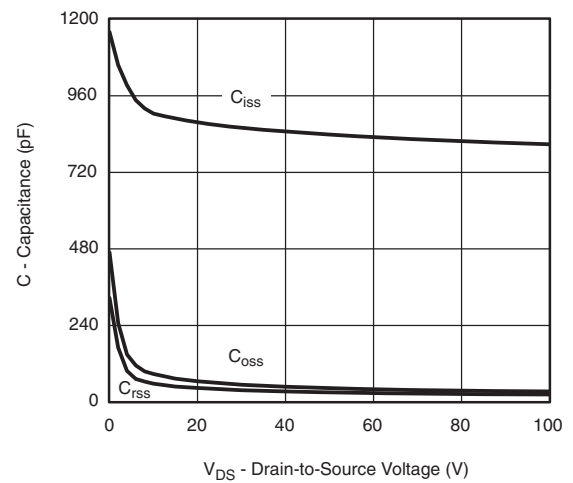
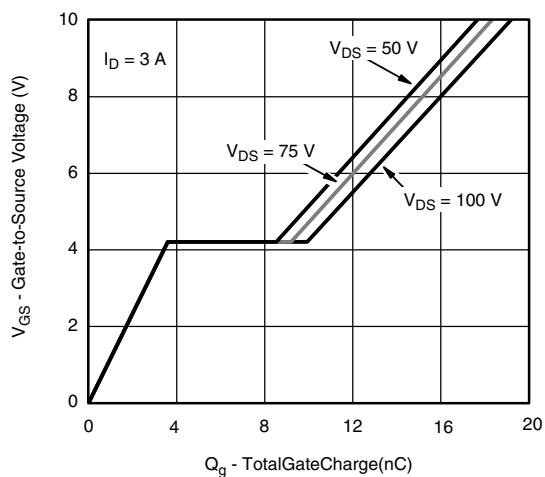
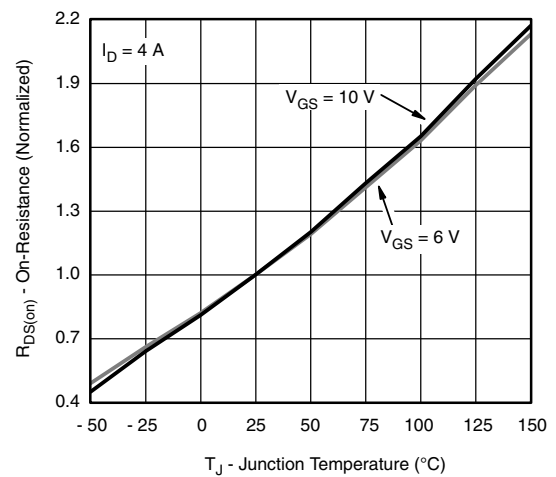
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 100			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 165		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6.6		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 2		- 4	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} = - 100 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 100 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	- 8			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 3 A		0.200		Ω
		V _{GS} = - 6 V, I _D = - 2 A		0.230		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = 3 A		12		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 35 V, V _{GS} = 0 V, f = 1 MHz		819		pF
Output Capacitance	C _{oss}			51		
Reverse Transfer Capacitance	C _{rss}			32		
Total Gate Charge	Q _g	V _{DS} = - 50 V, V _{GS} = - 10 V, I _D = - 3 A		17.5	32	nC
Gate-Source Charge	Q _{gs}	V _{DS} = - 50 V, V _{GS} = - 6 V, I _D = - 3 A		13.2	25	
Gate-Drain Charge	Q _{gd}			3.4		
Gate Resistance	R _g			6.4		
Gate Resistance	R _g	f = 1 MHz		6.1	9.2	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 50 V, R _L = 25 Ω I _D ≅ - 3 A, V _{GEN} = - 6 V, R _g = 1 Ω		10	20	ns
Rise Time	t _r			55	95	
Turn-Off DelayTime	t _{d(off)}			20	40	
Fall Time	t _f			15	30	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 50 V, R _L = 25 Ω I _D ≅ - 3 A, V _{GEN} = - 10 V, R _g = 1 Ω		11	18	
Rise Time	t _r			18	32	
Turn-Off DelayTime	t _{d(off)}			32	58	
Fall Time	t _f			20	35	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 13	A
Pulse Diode Forward Current ^a	I _{SM}				- 15	
Body Diode Voltage	V _{SD}	I _S = - 3 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 3 A, di/dt = 100 A/μs, T _J = 25 °C		65	90	ns
Body Diode Reverse Recovery Charge	Q _{rr}			180	270	nC
Reverse Recovery Fall Time	t _a			45		ns
Reverse Recovery Rise Time	t _b			20		

Notes:

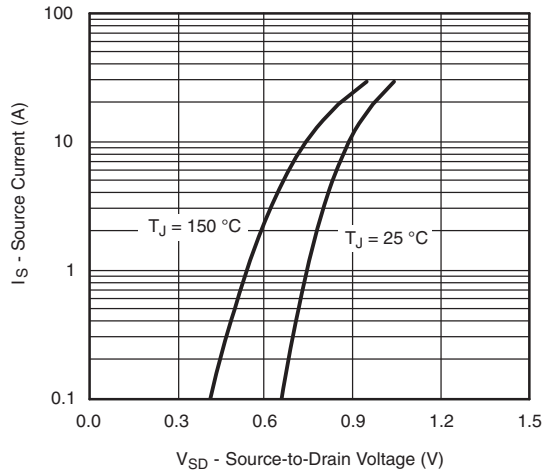
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

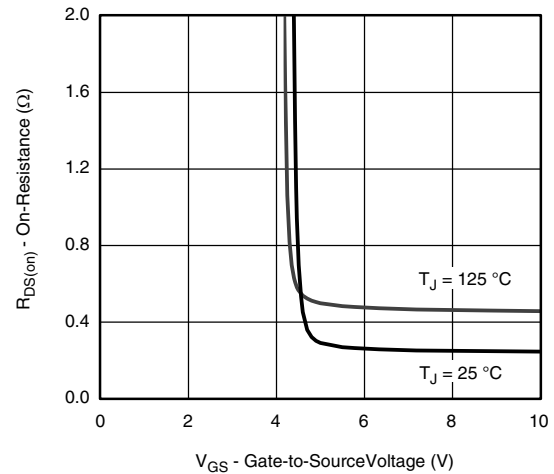
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure 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

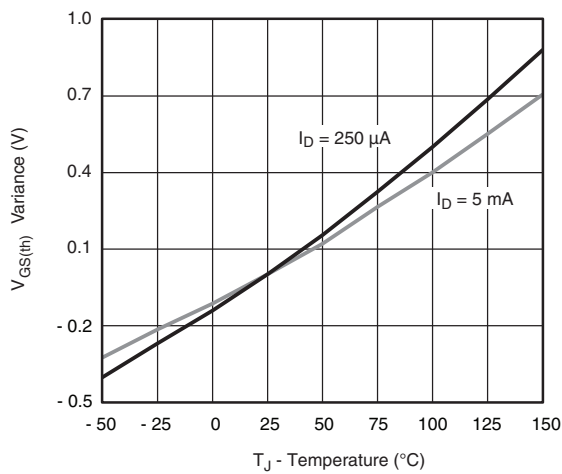
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



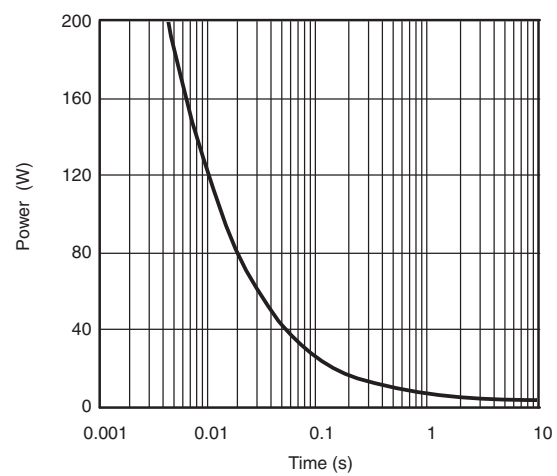
Source-Drain Diode Forward Voltage



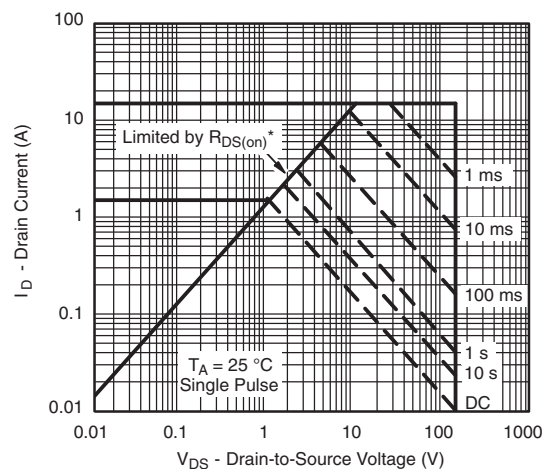
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

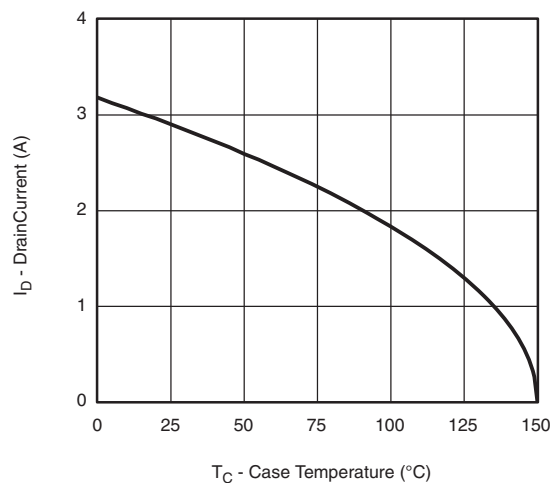
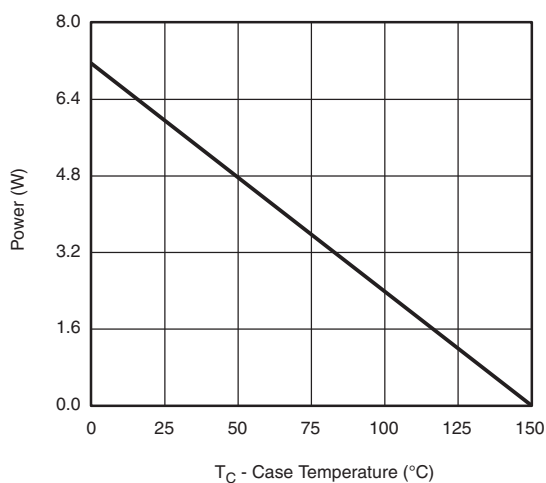
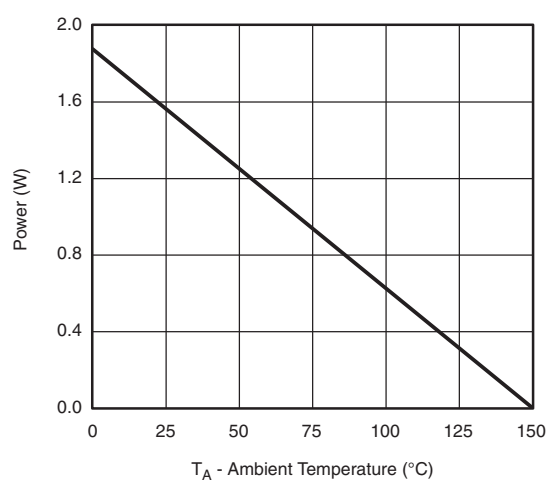


Single Pulse Power, Junction-to-Ambient



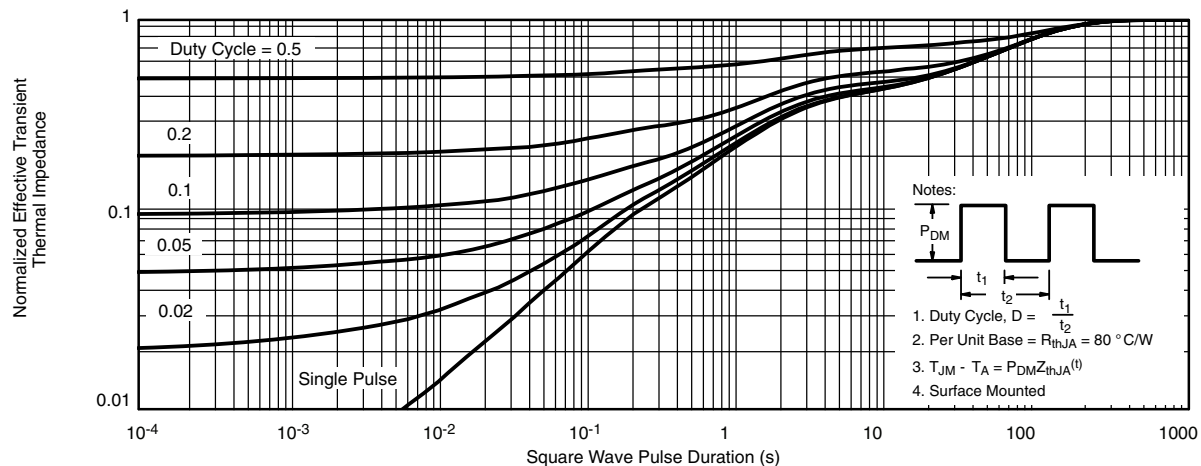
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

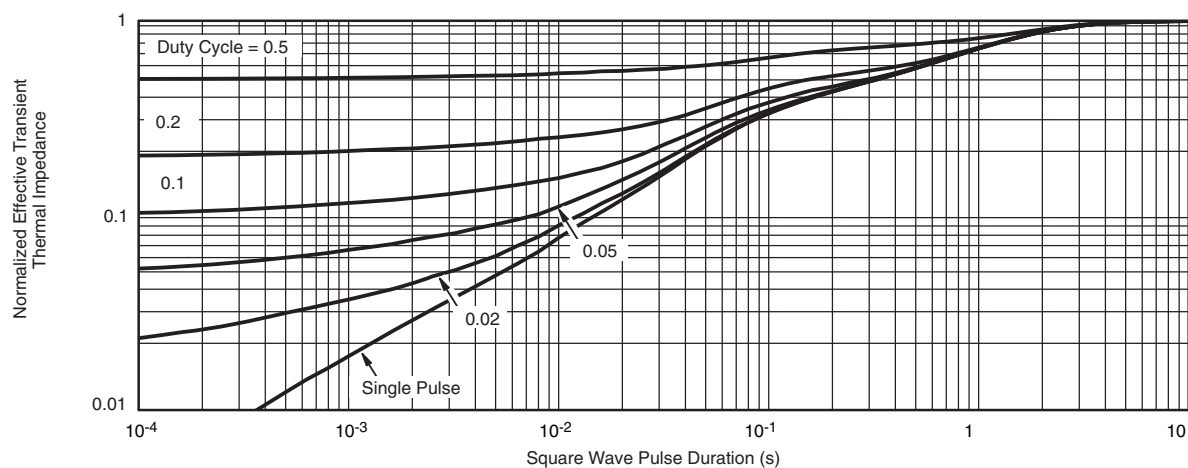
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

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.

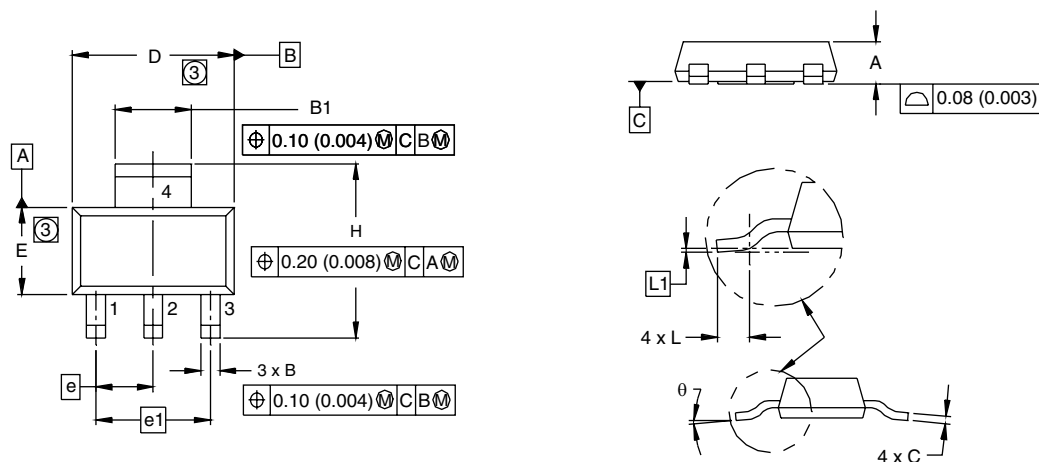
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

SOT-223 (HIGH VOLTAGE)

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.55	1.80	0.061	0.071
B	0.65	0.85	0.026	0.033
B1	2.95	3.15	0.116	0.124
C	0.25	0.35	0.010	0.014
D	6.30	6.70	0.248	0.264
E	3.30	3.70	0.130	0.146
e	2.30 BSC		0.0905 BSC	
e1	4.60 BSC		0.181 BSC	
H	6.71	7.29	0.264	0.287
L	0.91	-	0.036	-
L1	0.061 BSC		0.0024 BSC	
θ	-	10°	-	10°
ECN: S-82109-Rev. A, 15-Sep-08				
DWG: 5969				

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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