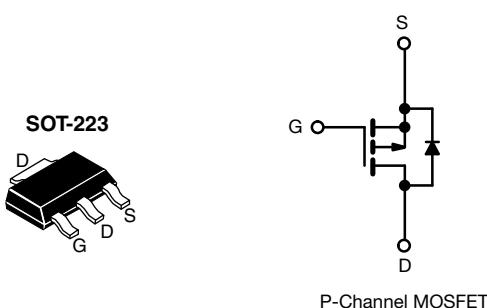


Power MOSFET



Marking code: FF

PRODUCT SUMMARY		
V_{DS} (V)	-100	
$R_{DS(on)}$ (Ω)	$V_{GS} = -10$ V	1.2
Q_g max. (nC)	8.7	
Q_{gs} (nC)	2.2	
Q_{gd} (nC)	4.1	
Configuration	Single	

ORDERING INFORMATION

Package	SOT-223
Lead (Pb)-free and halogen-free	SiHFL9110TR-GE3^a
Lead (Pb)-free	IRFL9110TRPbF-BE3^{a, b}
	IRFL9110TRPbF^a

Notes

- a. See device orientation
- b. "-BE3" denotes alternate manufacturing location

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{DS}	-100	V	
Gate-source voltage	V_{GS}	± 20		
Continuous drain current	V_{GS} at -10 V	I_D	A	
		$T_C = 25$ °C		
		-1.1		
		-0.69		
Pulsed drain current ^a	I_{DM}	-8.8		
Linear derating factor		0.025	W/°C	
Linear derating factor (PCB mount) ^e		0.017		
Single pulse avalanche energy ^b	E_{AS}	100	mJ	
Avalanche current ^a	I_{AR}	-1.1	A	
Repetitive avalanche energy ^a	E_{AR}	0.31	mJ	
Maximum power dissipation	$T_C = 25$ °C	P_D	W	
Maximum power dissipation (PCB mount) ^e		3.1		
Peak diode recovery dv/dt ^c	dv/dt	2.0		
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C	
Soldering recommendations (peak temperature) ^d	For 10 s	300		

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- b. $V_{DD} = -25$ V, starting $T_J = 25$ °C, $L = 7.7$ mH, $R_g = 25$ Ω , $I_{AS} = -4.4$ A (see fig. 12)
- c. $I_{SD} \leq -4.4$ A, $di/dt \leq -75$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C
- d. 1.6 mm from case
- e. When mounted on 1" square PCB (FR-4 or G-10 material)



RoHS
COMPLIANT
HALOGEN
FREE
Available

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum junction-to-ambient (PCB mount) ^a	R_{thJA}	-	-	60	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	-	40	

Note

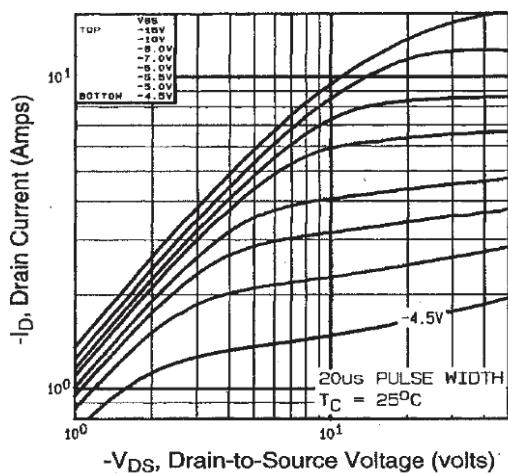
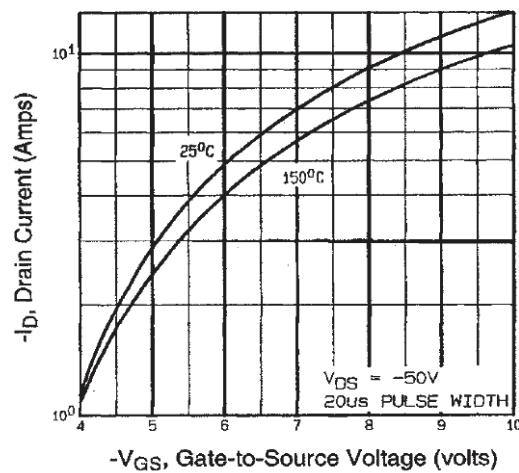
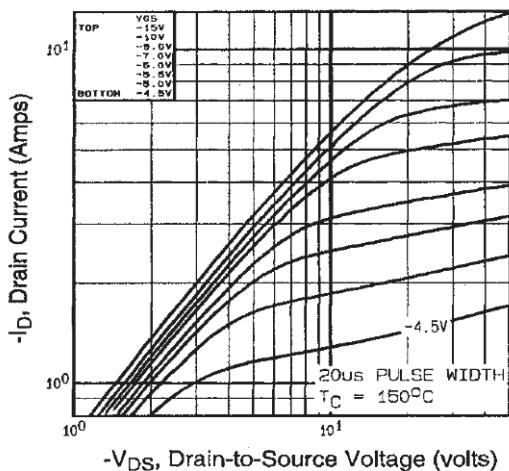
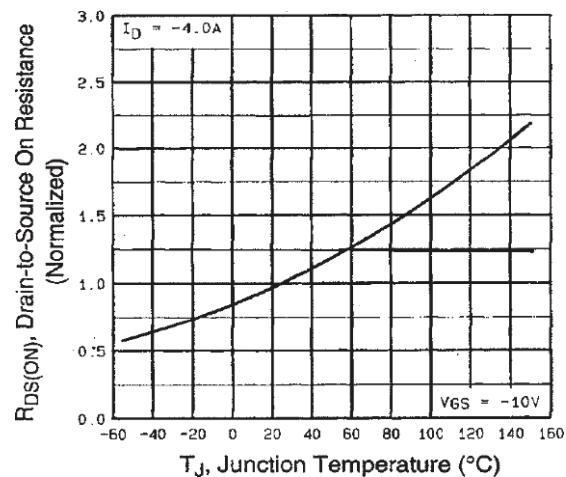
a. When mounted on 1" square PCB (FR-4 or G-10 material)

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, $I_D = -250$ μ A		-100	-	-	V	
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = -1$ mA		-	-0.091	-	V/°C	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ μ A		-2.0	-	-4.0	V	
Gate-source leakage	I_{GSS}	$V_{GS} = \pm 20$ V		-	-	± 100	nA	
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -100$ V, $V_{GS} = 0$ V		-	-	-100	μ A	
		$V_{DS} = -80$ V, $V_{GS} = 0$ V, $T_J = 125$ °C		-	-	-500		
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = -10$ V	$I_D = -0.66$ A ^b	-	-	1.2	Ω	
Forward transconductance	g_{fs}	$V_{DS} = -50$ V, $I_D = -0.66$ A		0.82	-	-	S	
Dynamic								
Input capacitance	C_{iss}	$V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1.0$ MHz, see fig. 5		-	200	-	pF	
Output capacitance	C_{oss}			-	94	-		
Reverse transfer capacitance	C_{rss}			-	18	-		
Total gate charge	Q_g	$V_{GS} = -10$ V	$I_D = -4.0$ A, $V_{DS} = -80$ V, see fig. 6 and 13 ^b	-	-	8.7	nC	
Gate-source charge	Q_{gs}			-	-	2.2		
Gate-drain charge	Q_{gd}			-	-	4.1		
Turn-on delay time	$t_{d(on)}$			-	10	-		
Rise time	t_r	$V_{DD} = -50$ V, $I_D = -4.0$ A, $R_g = 24$ Ω , $R_D = 11$ Ω , see fig. 10 ^b		-	27	-	ns	
Turn-off delay time	$t_{d(off)}$			-	15	-		
Fall time	t_f			-	17	-		
Internal drain inductance	L_D			-	4.0	-		
Internal source inductance	L_S	Between lead, 6 mm (0.25") from package and center of die contact		-	6.0	-	nH	
Drain-Source Body Diode Characteristics								
Continuous source-drain diode current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	-1.1	A	
Pulsed diode forward current ^a	I_{SM}			-	-	-8.8		
Body diode voltage	V_{SD}	$T_J = 25$ °C, $I_S = -1.1$ A, $V_{GS} = 0$ V ^b		-	-	-5.5	V	
Body diode reverse recovery time	t_{rr}	$T_J = 25$ °C, $I_F = -4.0$ A, $dI/dt = 100$ A/ μ s ^b		-	80	160	ns	
Body diode reverse recovery charge	Q_{rr}			-	0.15	0.30	μ C	
Forward turn-on time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)						

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
b. Pulse width ≤ 300 μ s; duty cycle ≤ 2 %

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics

Fig. 3 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics

Fig. 4 - Normalized On-Resistance vs. Temperature

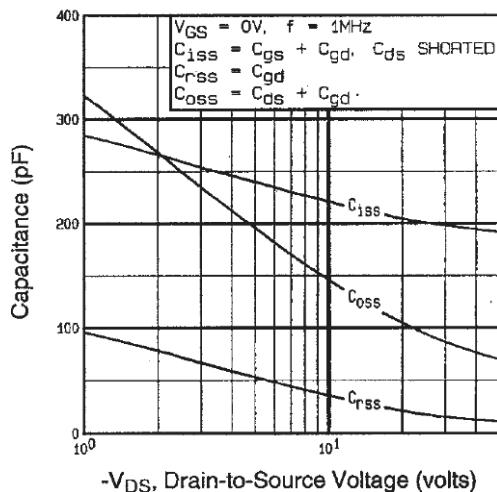


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

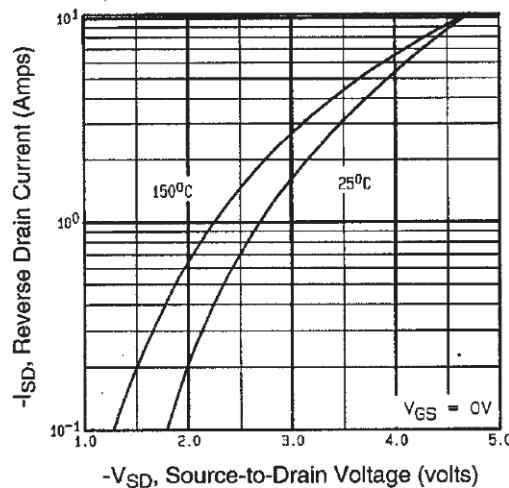


Fig. 7 - Typical Source-Drain Diode Forward Voltage

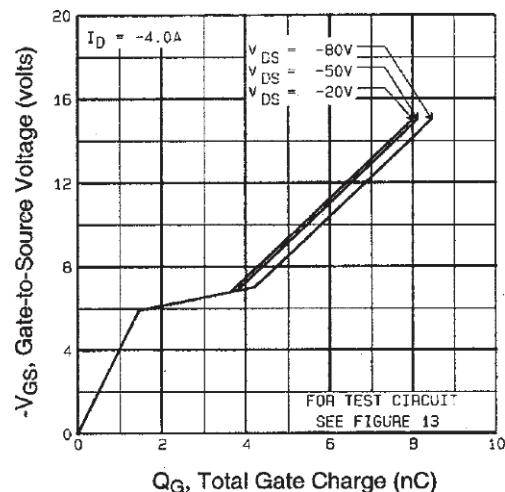


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

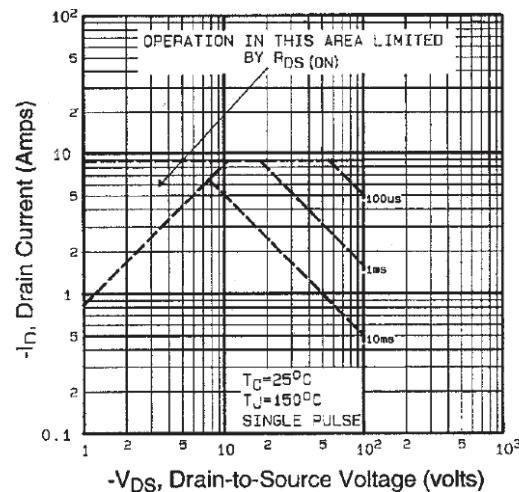


Fig. 8 - Maximum Safe Operating Area

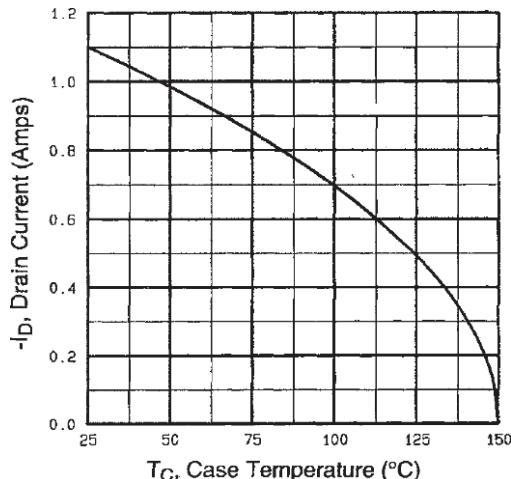


Fig. 9 - Maximum Drain Current vs. Case Temperature

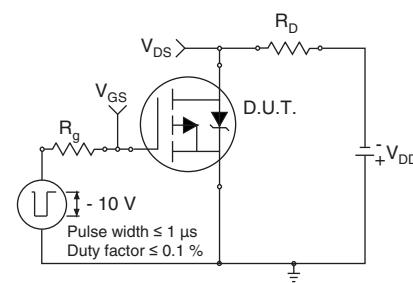


Fig. 10a - Switching Time Test Circuit

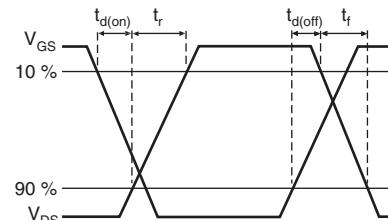


Fig. 10b - Switching Time Waveforms

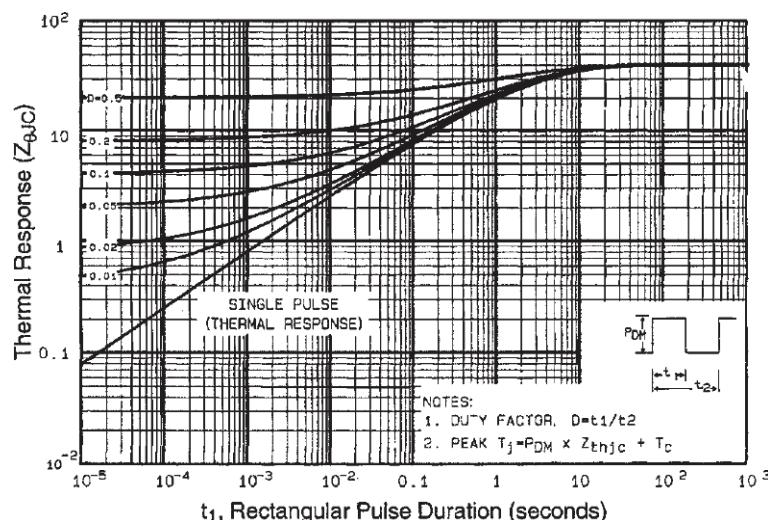
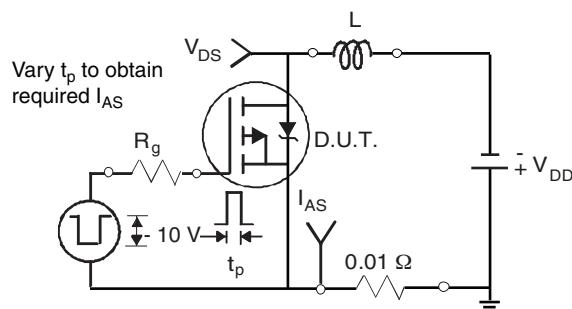
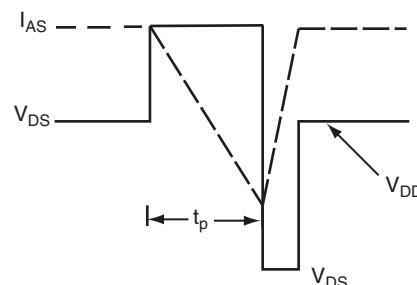
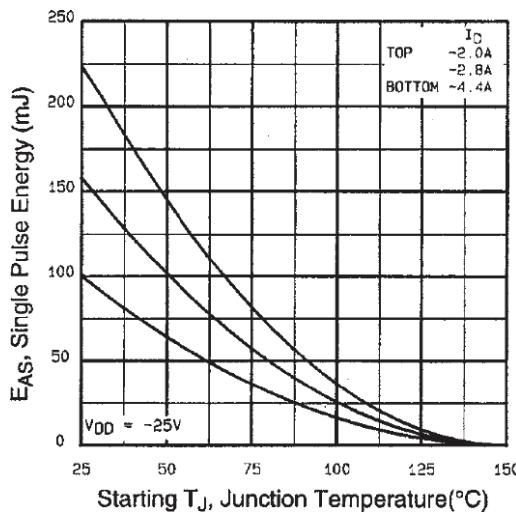
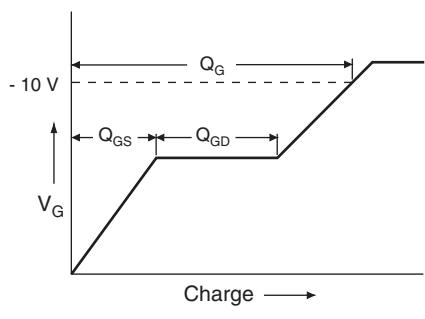
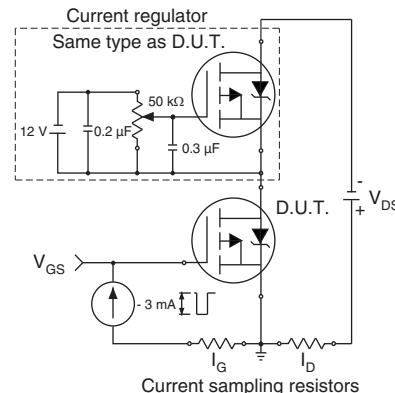
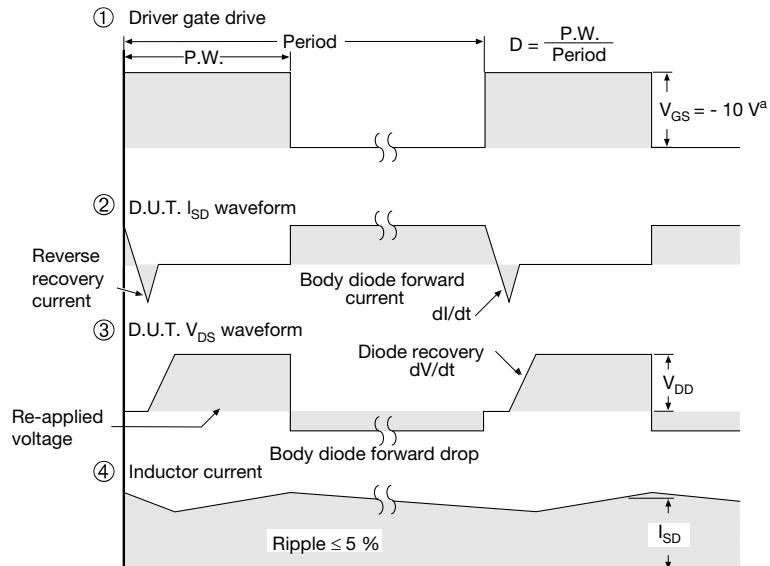
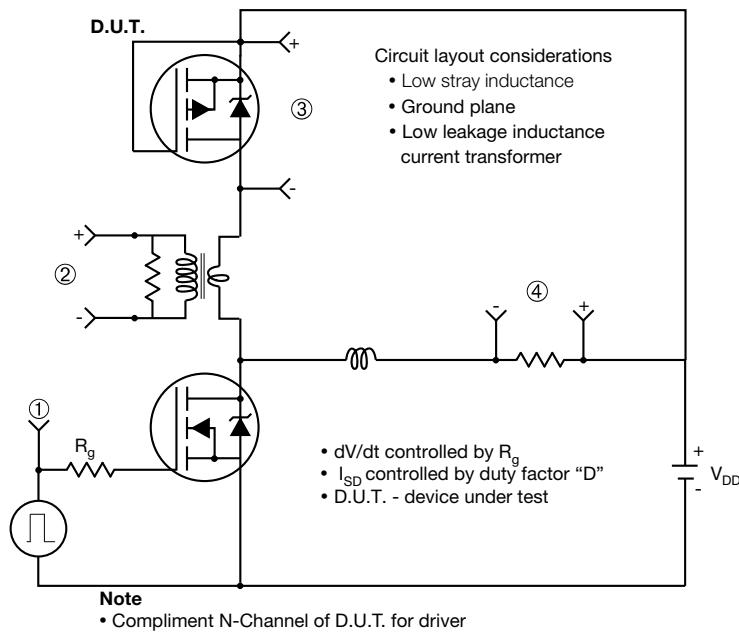


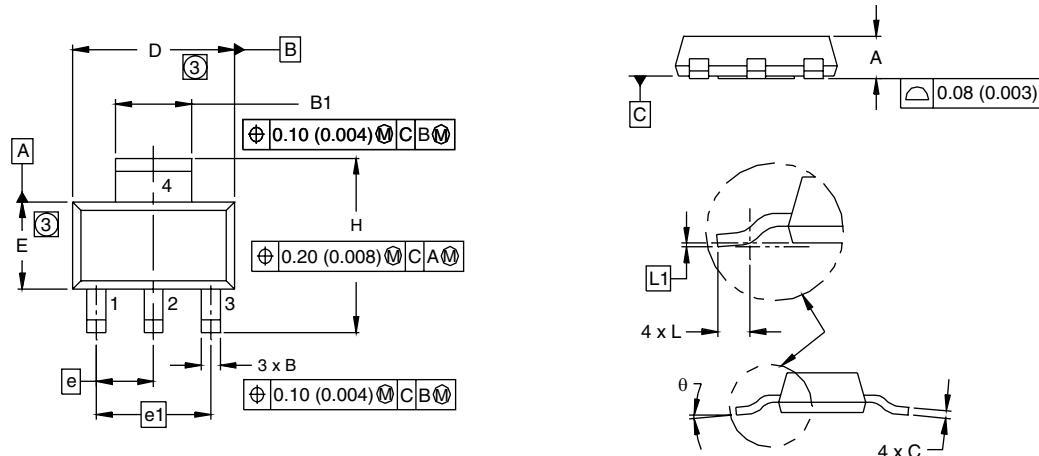
Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case


Fig. 12a - Unclamped Inductive Test Circuit

Fig. 12b - Unclamped Inductive Waveforms

Fig. 12c - Maximum Avalanche Energy vs. Drain Current

Fig. 13a - Basic Gate Charge Waveform

Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

Fig. 14 - For P-Channel

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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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