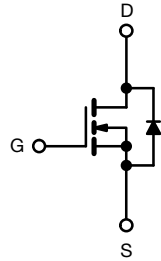


Power MOSFET



N-Channel MOSFET

FEATURES

- Surface-mount
- Available in tape and reel
- Dynamic dV/dt rating
- Repetitive avalanche rated
- Logic-level gate drive
- $R_{DS(on)}$ specified at $V_{GS} = 4\text{ V}$ and 5 V
- Fast switching
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
Available

Marking code: LB

PRODUCT SUMMARY	
V_{DS} (V)	100
$R_{DS(on)}$ (Ω)	$V_{GS} = 5.0\text{ V}$ 0.54
Q_g (Max.) (nC)	6.1
Q_{gs} (nC)	2.6
Q_{gd} (nC)	3.3
Configuration	Single

DESCRIPTION

Third generation power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The SOT-223 package is designed for surface-mounting using vapor phase, infrared, or wave soldering techniques. Its unique package design allows for easy automatic pick-and-place as with other SOT or SOIC packages but has the added advantage of improved thermal performance due to an enlarged tab for heatsinking. Power dissipation of greater than 1.25 W is possible in a typical surface mount application.

ORDERING INFORMATION	
Package	SOT-223
Lead (Pb)-free and halogen-free	SiHLL110TR-GE3
	IRLL110TRPbF-BE3 a, b
Lead (Pb)-free	IRLL110TRPbF ^a

Notes

- See device orientation
- "-BE3" denotes alternate manufacturing location

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	100	V
Gate-source voltage	V_{GS}	± 10	
Continuous drain current	V_{GS} at 5 V	$T_C = 25\text{ }^\circ\text{C}$	1.5
		$T_C = 100\text{ }^\circ\text{C}$	0.93
Pulsed drain current ^a	I_{DM}	12	A
Linear derating factor		0.025	
Linear derating factor (PCB mount) ^e		0.017	
Single pulse avalanche energy ^b	E_{AS}	50	mJ
Avalanche current ^a	I_{AR}	1.5	A
Repetitive avalanche energy ^a	E_{AR}	0.31	mJ
Maximum power dissipation	$T_C = 25\text{ }^\circ\text{C}$		3.1
		$T_A = 25\text{ }^\circ\text{C}$	2.0
Maximum power dissipation (PCB mount) ^e			W
Peak diode recovery dv/dt ^c	dV/dt	5.5	V/ns
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Soldering recommendations (peak temperature) ^d	For 10 s	300	

Notes

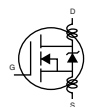

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- $V_{DD} = 25\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 25\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 1.5\text{ A}$ (see fig. 12)
- $I_{SD} \leq 5.6\text{ A}$, $dI/dt \leq 75\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$
- 1.6 mm from case

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

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	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 ($T_J = 25\text{ }^\circ\text{C}$, 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	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}, I_D = 1\text{ mA}$		-	0.12	-	V/ $^\circ\text{C}$
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		1.0	-	2.0	V
Gate-source leakage	I_{GSS}	$V_{GS} = \pm 10\text{ V}$		-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$		-	-	25	μA
		$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		-	-	250	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 5.0\text{ V}$	$I_D = 0.90\text{ A}^b$	-	-	0.54	Ω
		$V_{GS} = 4.0\text{ V}$	$I_D = 0.75\text{ A}$	-	-	0.76	
Forward transconductance	g_{fs}	$V_{DS} = 25\text{ V}, I_D = 0.90\text{ A}$		0.57	-	-	S
Dynamic							
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}, \text{ see fig. 5}$		-	250	-	pF
Output capacitance	C_{oss}			-	80	-	
Reverse transfer capacitance	C_{rss}			-	15	-	
Total gate charge	Q_g	$V_{GS} = 5.0\text{ V}$	$I_D = 5.6\text{ A}, V_{DS} = 80\text{ V}, \text{ see fig. 6 and 13}^b$	-	-	6.1	nC
Gate-source charge	Q_{gs}			-	-	2.6	
Gate-drain charge	Q_{gd}			-	-	3.3	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, I_D = 5.6\text{ A}, R_g = 12\text{ }\Omega, R_D = 8.4\text{ }\Omega$		-	9.3	-	ns
Rise time	t_r			-	47	-	
Turn-off delay time	$t_{d(off)}$			-	16	-	
Fall time	t_f			-	18	-	
Internal drain inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact 		-	4.0	-	nH
Internal source inductance	L_S			-	6.0	-	
Drain-Source Body Diode Characteristics							
Continuous source-drain diode current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	1.5	A
Pulsed diode forward current ^a	I_{SM}			-	-	12	
Body diode voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 1.5\text{ A}, V_{GS} = 0\text{ V}^b$		-	-	2.5	V
Body diode reverse recovery time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = 5.6\text{ A}, di/dt = 100\text{ A}/\mu\text{s}^b$		-	110	130	ns
Body diode reverse recovery charge	Q_{rr}			-	0.50	0.65	μC
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 $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

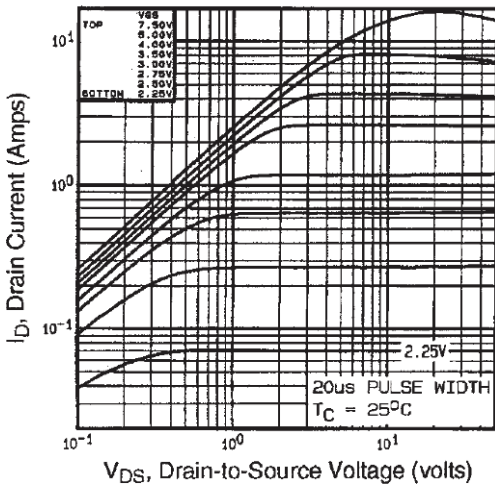


Fig. 1 - Typical Output Characteristics

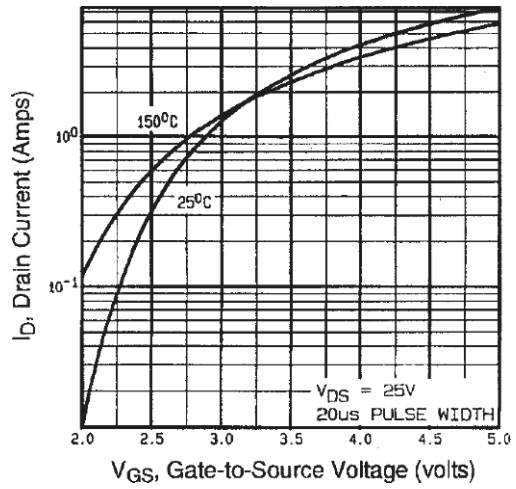


Fig. 3 - Typical Transfer Characteristics

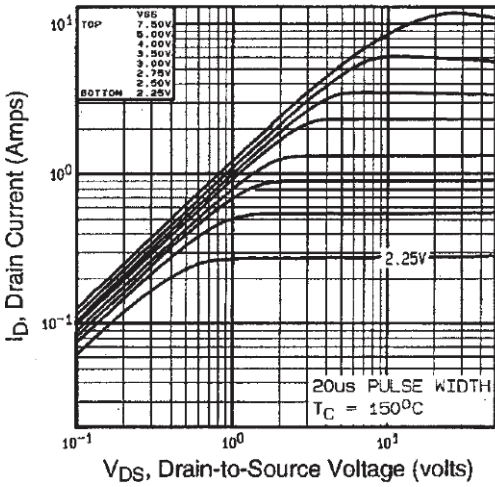


Fig. 2 - Typical Output Characteristics

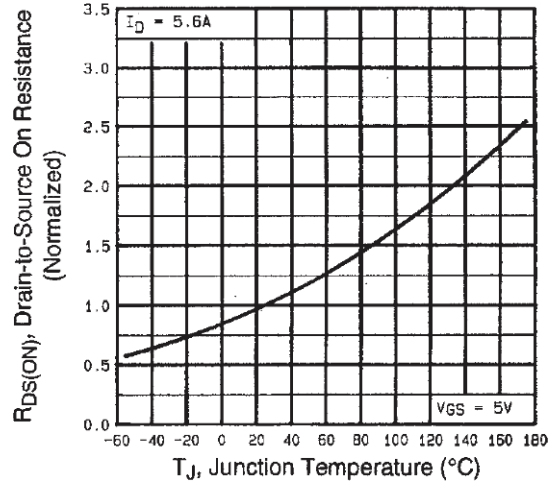


Fig. 4 - Normalized On-Resistance vs. Temperature

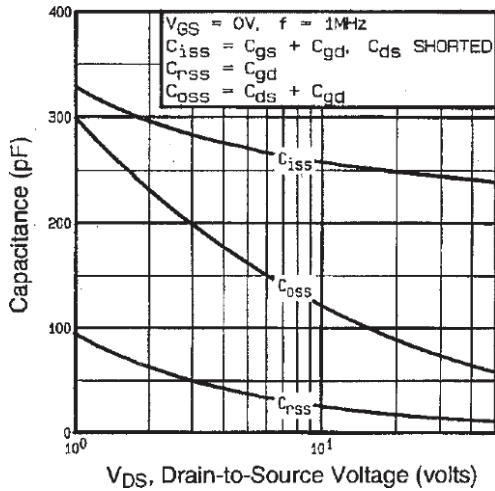


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

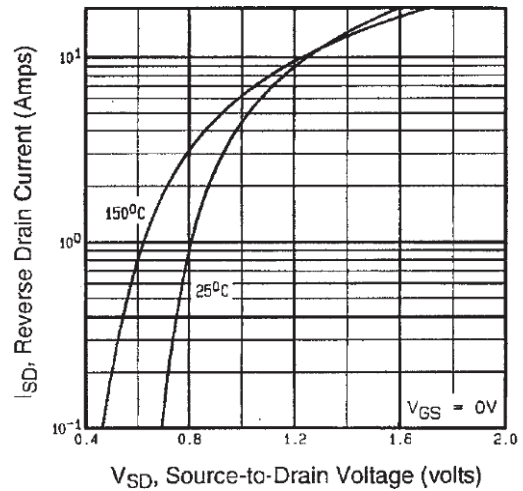


Fig. 7 - Typical Source-Drain Diode Forward Voltage

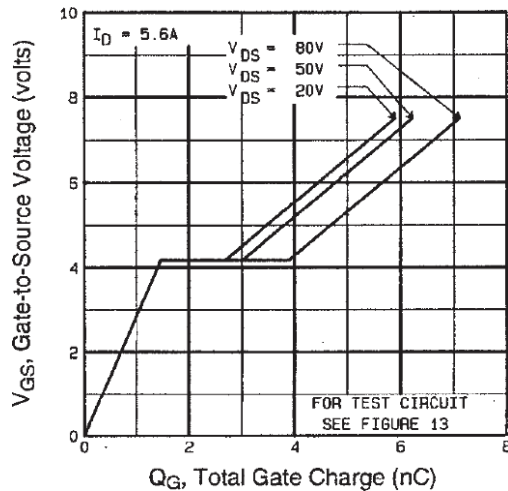


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

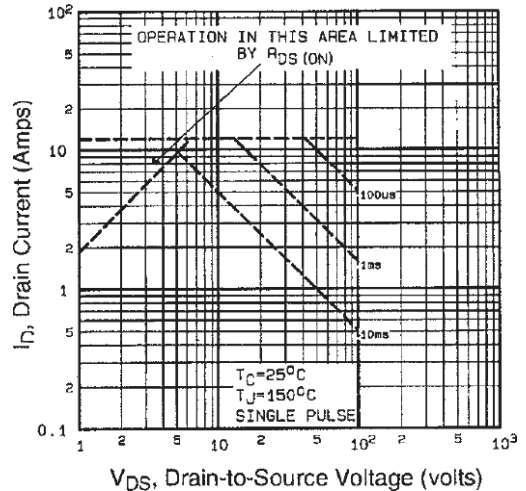


Fig. 8 - Maximum Safe Operating Area

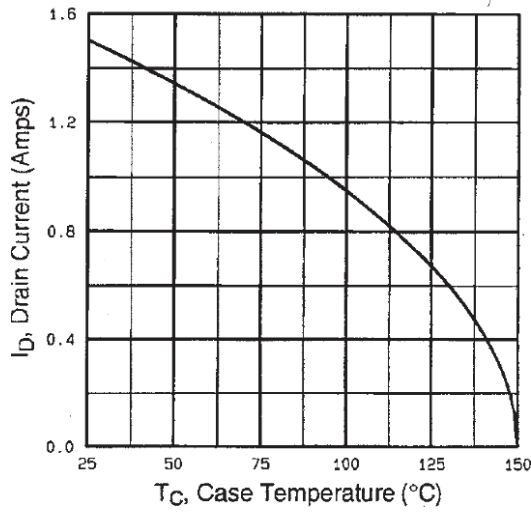


Fig. 9 - Maximum Drain Current vs. Case Temperature

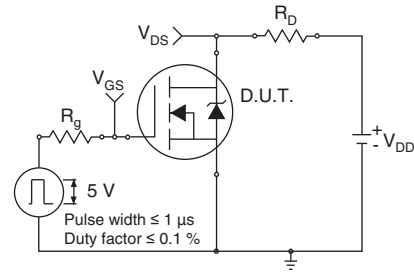


Fig. 10a - Switching Time Test Circuit

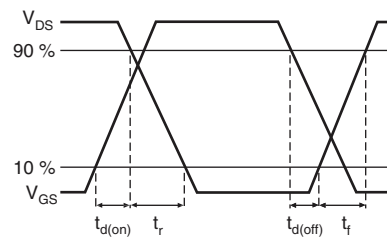


Fig. 10b - Switching Time Waveforms

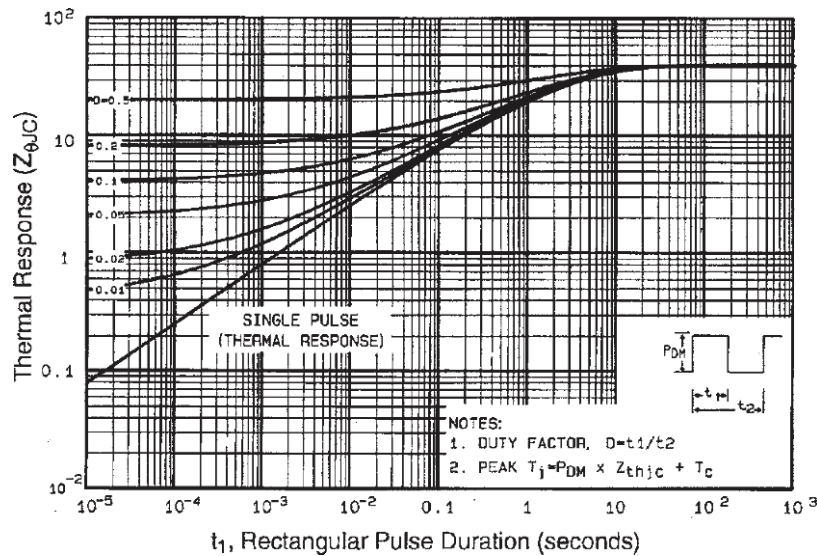


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

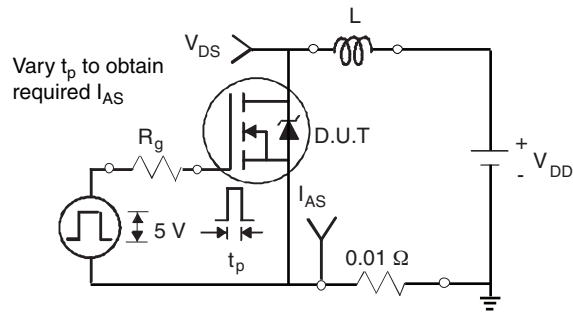


Fig. 12a - Unclamped Inductive Test Circuit



Fig. 12b - Unclamped Inductive Waveforms

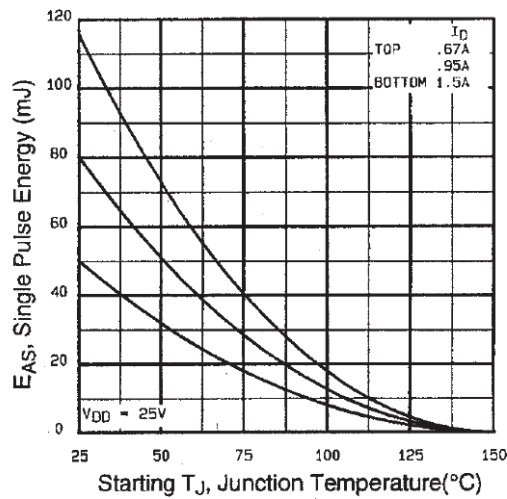


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

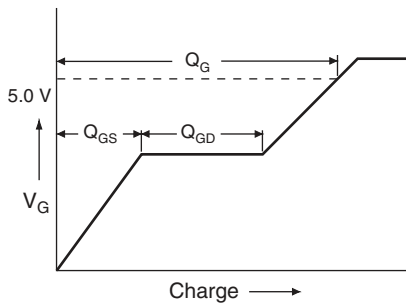


Fig. 13a - Basic Gate Charge Waveform

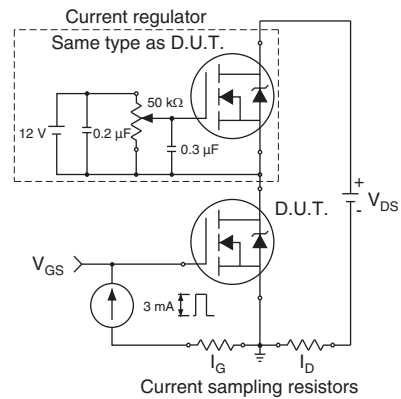
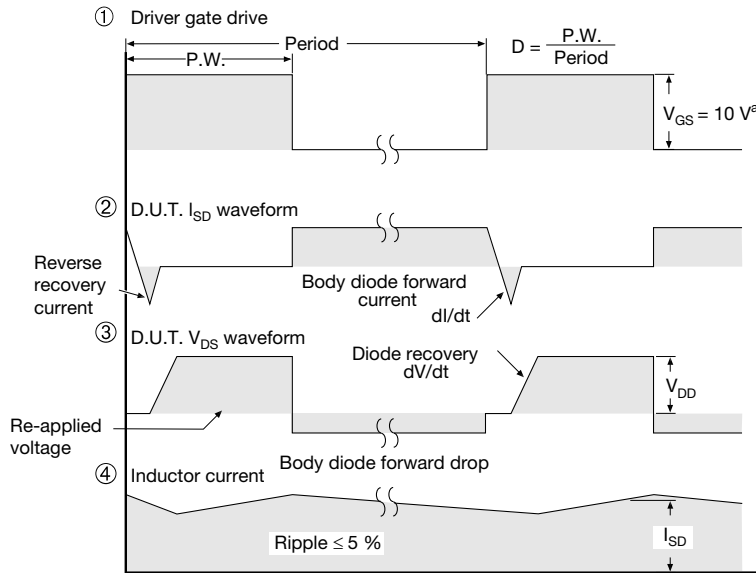
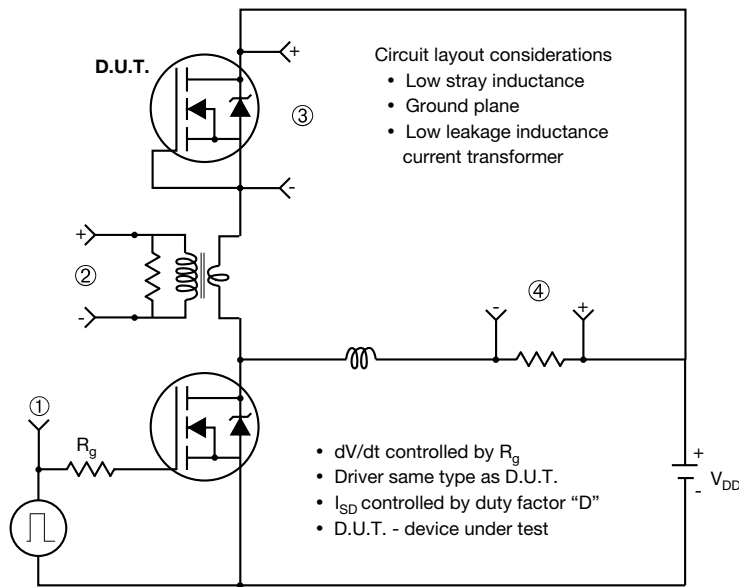


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



Note

a. $V_{GS} = 5 V$ for logic level devices

Fig. 14 - For N-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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