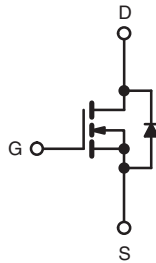
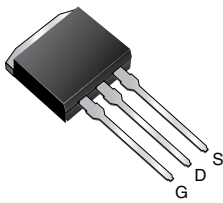


## Power MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	500	
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10$ V	0.55
$Q_g$ (Max.) (nC)	51	
$Q_{gs}$ (nC)	12	
$Q_{gd}$ (nC)	23	
Configuration	Single	

I<sup>2</sup>PAK  
(TO-262)



N-Channel MOSFET

### FEATURES

- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC



### 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.

ORDERING INFORMATION	
Package	I <sup>2</sup> PAK (TO-262)
Lead (Pb)-free	IRFSL11N50APbF
	SiHFSL11N50A-E3

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	$V_{DS}$	500	V	
Gate-Source Voltage	$V_{GS}$	$\pm 30$		
Continuous Drain Current	$V_{GS}$ at 10 V	$T_C = 25$ °C	A	
		$T_C = 100$ °C		
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	44		
Linear Derating Factor		1.3	W/°C	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	390	mJ	
Repetitive Avalanche Current <sup>a</sup>	$I_{AR}$	11	A	
Repetitive Avalanche Energy <sup>a</sup>	$E_{AR}$	19	mJ	
Maximum Power Dissipation	$T_C = 25$ °C	$P_D$	190	W
Peak Diode Recovery dV/dt <sup>c</sup>		dV/dt	4.1	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$		- 55 to + 175	°C
Soldering Recommendations (Peak Temperature)	for 10 s		300 <sup>d</sup>	

#### Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting  $T_J = 25$  °C,  $L = 6.4$  mH,  $R_G = 25$   $\Omega$ ,  $I_{AS} = 11$  A (see fig. 12).
- $I_{SD} \leq 11$  A,  $di/dt \leq 185$  A/ $\mu$ s,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 175$  °C.
- 1.6 mm from case.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS						
PARAMETER	SYMBOL	TYP.	MAX.	UNIT		
Maximum Junction-to-Ambient	$R_{thJA}$	-	40	°C/W		
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	0.75			

## SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0, I_D = 250\ \mu\text{A}$	500	-	-	V	
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$ , $I_D = 1\ \text{mA}$	-	0.57	-	V/°C	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	-	4.0	V	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30\ \text{V}$	-	-	$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500\ \text{V}, V_{GS} = 0\ \text{V}$	-	-	25	$\mu\text{A}$	
		$V_{DS} = 400\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 150\text{ }^\circ\text{C}$	-	-	250		
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\ \text{V}, I_D = 6.6\ \text{A}^b$	-	-	0.55	$\Omega$	
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\ \text{V}, I_D = 6.6\ \text{A}^b$	6.0	-	-	S	
<b>Dynamic</b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\ \text{V}$ $V_{DS} = 25\ \text{V}$ $f = 1.0\ \text{MHz}$ , see fig. 5	-	1426	-	pF	
Output Capacitance	$C_{oss}$		-	208	-		
Reverse Transfer Capacitance	$C_{riss}$		-	9.6	-		
Output Capacitance	$C_{oss}$	$V_{GS} = 0\ \text{V}$	$V_{DS} = 1.0\ \text{V}, f = 1.0\ \text{MHz}$	-	1954	-	
Effective Output Capacitance	$C_{oss\ eff.}$		$V_{DS} = 400\ \text{V}, f = 1.0\ \text{MHz}$	-	53	-	
			$V_{DS} = 0\ \text{V to } 400\ \text{V}^c$	-	110	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\ \text{V}$	$I_D = 11\ \text{A}, V_{DS} = 400\ \text{V}$ see fig. 6 and 13 <sup>b</sup>	-	-	51	nC
Gate-Source Charge	$Q_{GS}$			-	-	12	
Gate-Drain Charge	$Q_{GD}$			-	-	23	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\ \text{V}, I_D = 11\ \text{A}$ $R_G = 9.1\ \Omega, R_D = 22\ \Omega$ , see fig. 10 <sup>b</sup>	-	14	-	ns	
Rise Time	$t_r$		-	34	-		
Turn-Off Delay Time	$t_{d(off)}$		-	32	-		
Fall Time	$t_f$		-	27	-		
Internal Drain Inductance	$L_D$	Between lead, 6 mm (0.25") from package and center of die contact		-	4.5	-	nH
Internal Source Inductance	$L_S$			-	7.5	-	
<b>Drain-Source Body Diode Characteristics</b>							
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode		-	-	11	A
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$			-	-	44	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}, I_S = 11\ \text{A}, V_{GS} = 0\ \text{V}^b$		-	-	1.5	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}, I_F = 11\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}^b$		-	530	790	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			-	3.4	5.1	$\mu\text{C}$
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$ and $L_D$ )					

### Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Pulse width  $\leq 300\ \mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- $C_{oss\ eff.}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 % to 80%  $V_{DS}$ .

## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

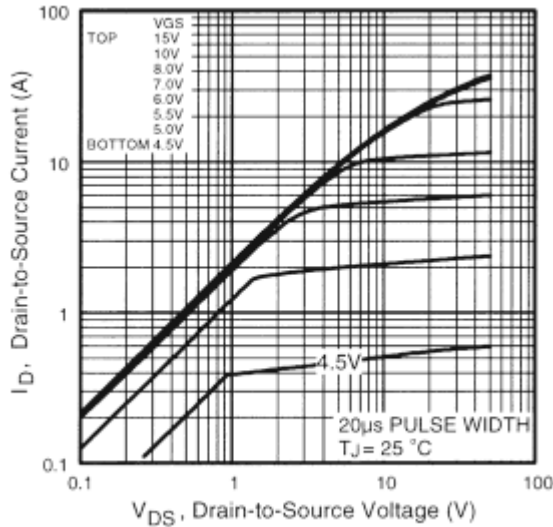


Fig. 1 - Typical Output Characteristics

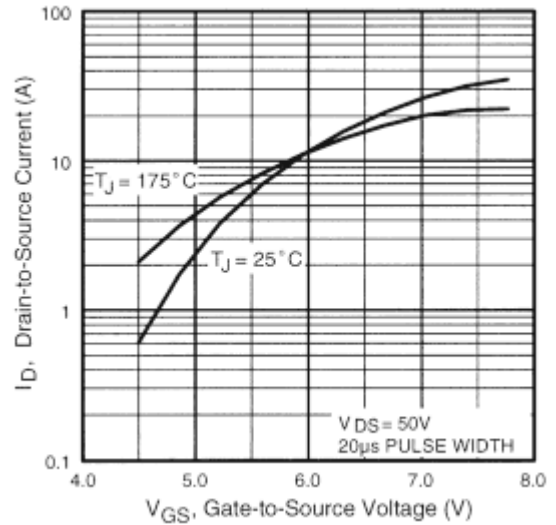


Fig. 3 - Typical Transfer Characteristics

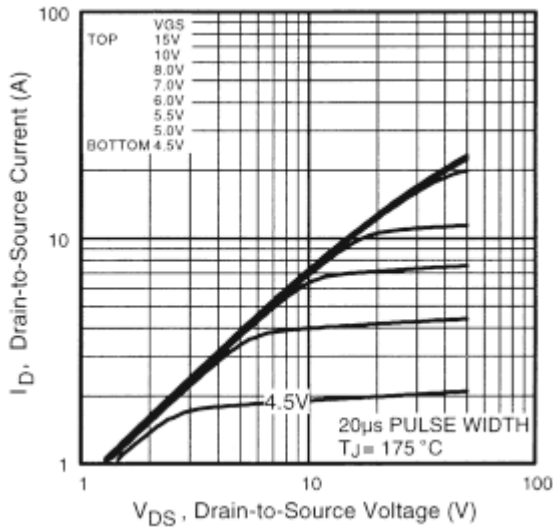


Fig. 2 - Typical Output Characteristics

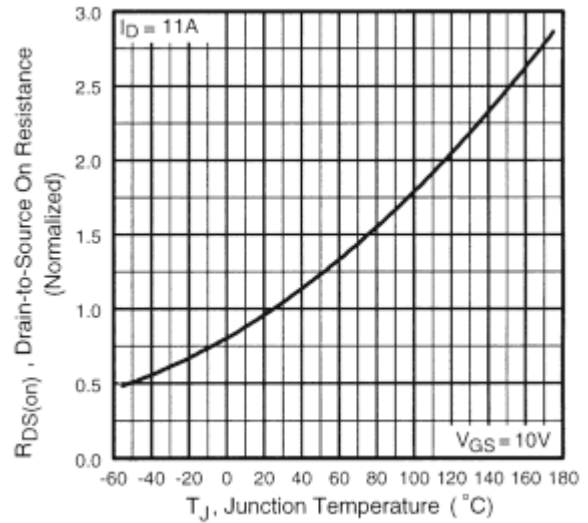


Fig. 4 - Normalized On-Resistance vs. Temperature

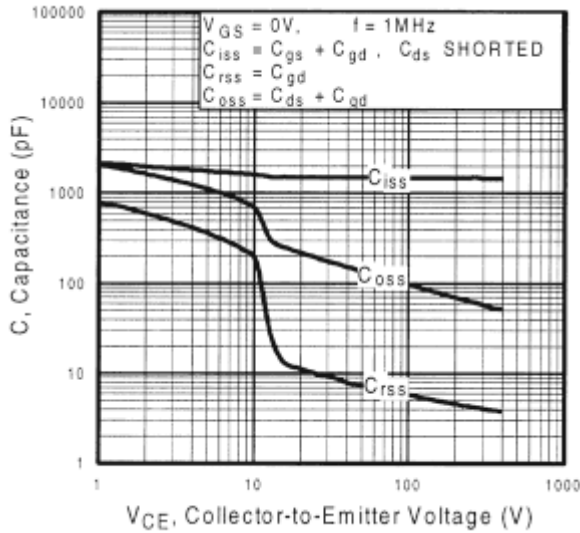


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

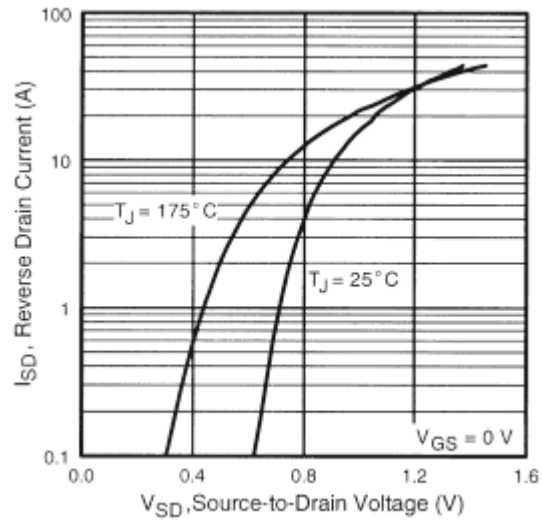


Fig. 7 - Typical Source-Drain Diode Forward Voltage

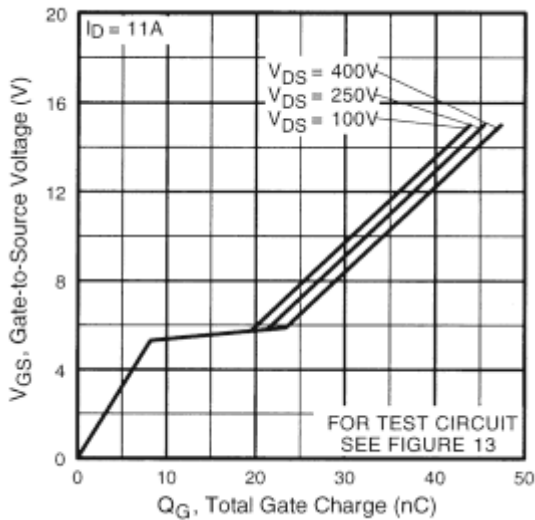


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

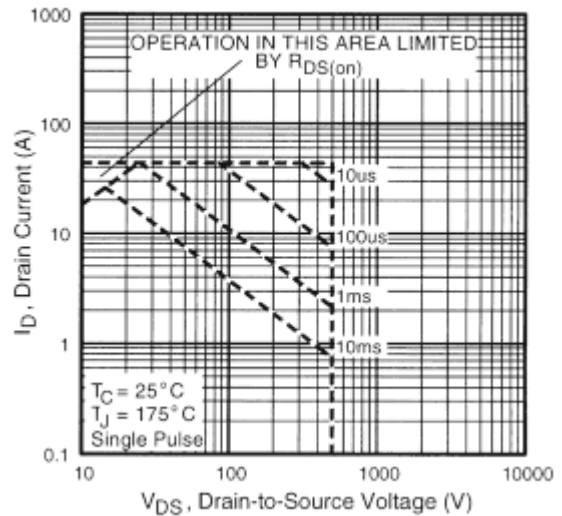


Fig. 8 - Maximum Safe Operating Area

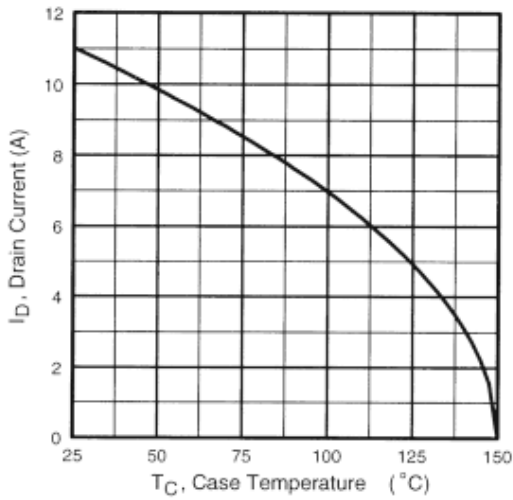


Fig. 9 - Maximum Drain Current vs. Case Temperature

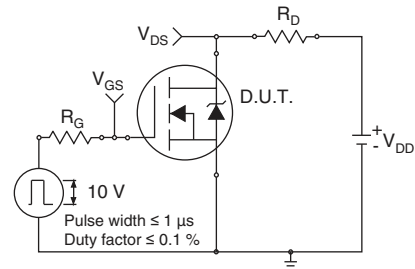


Fig. 10a - Switching Time Test Circuit

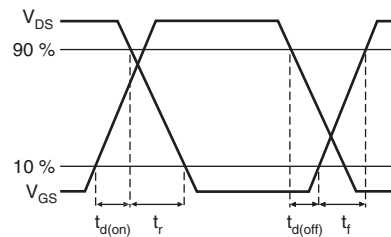


Fig. 10b - Switching Time Waveforms

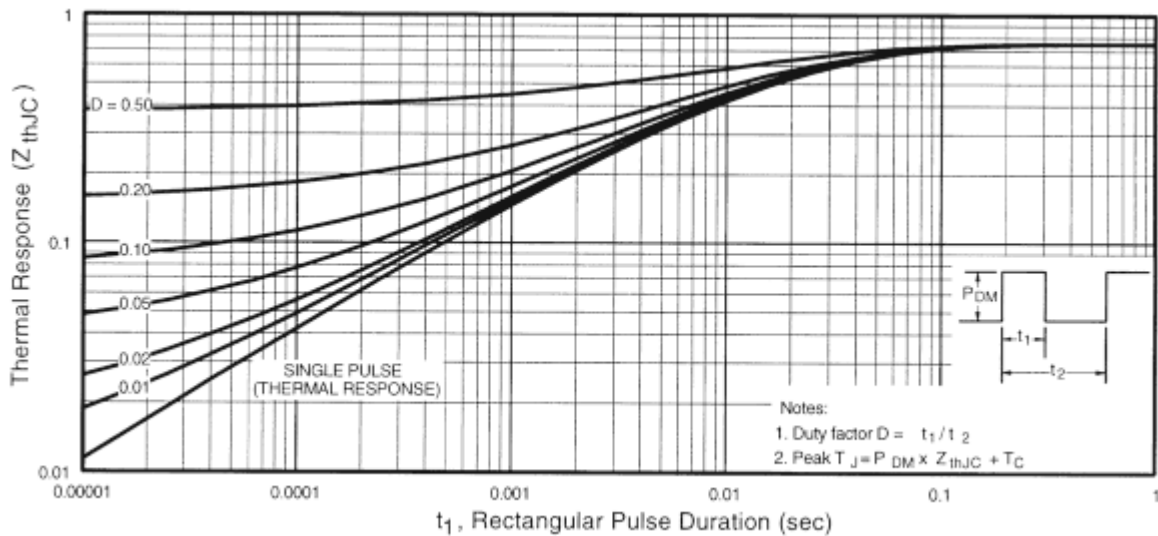


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

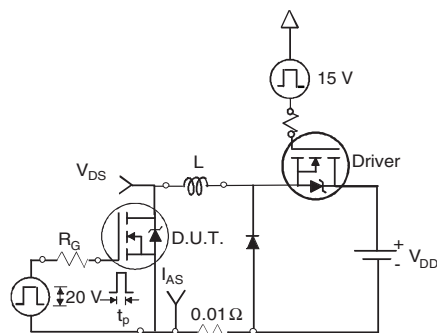


Fig. 12a - Unclamped Inductive Test Circuit

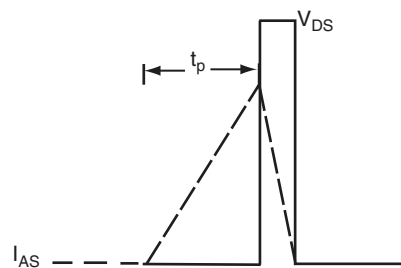


Fig. 12b - Unclamped Inductive Waveforms

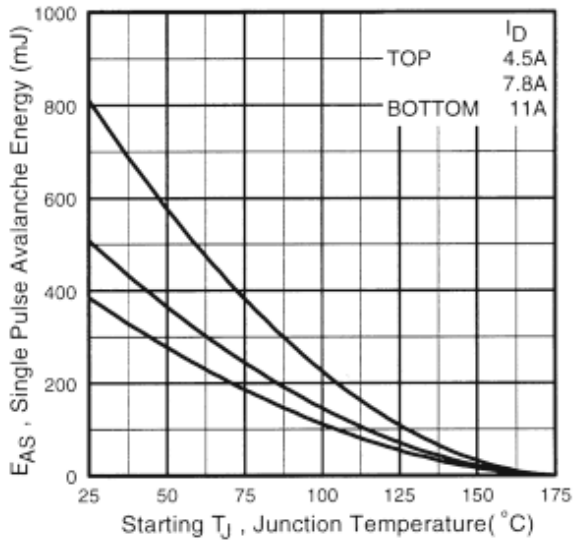


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

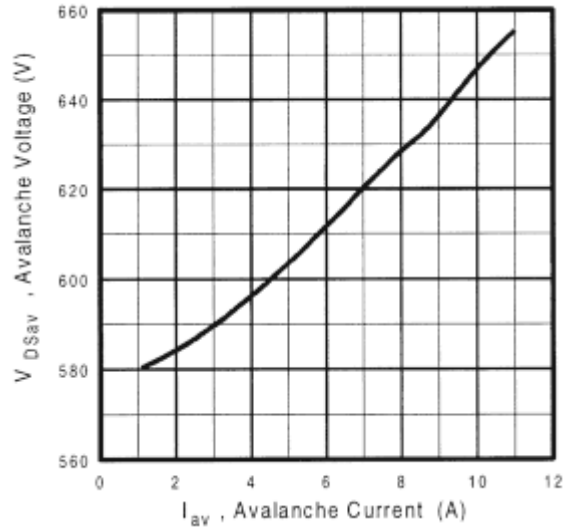


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

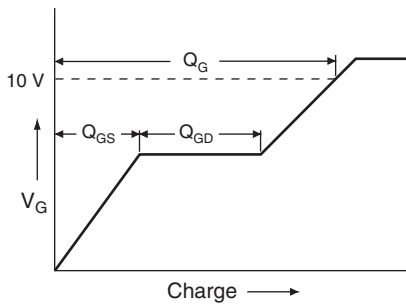


Fig. 13a - Basic Gate Charge Waveform

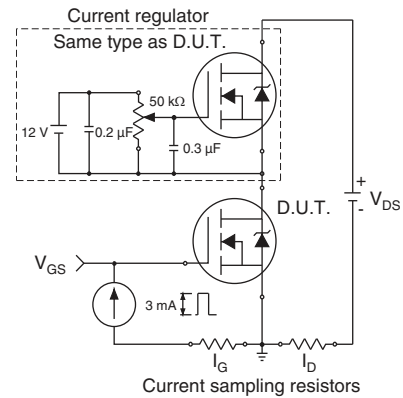


Fig. 13b - Gate Charge Test Circuit

### Peak Diode Recovery dV/dt Test Circuit



**Note**

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

**Fig. 11 - For N-Channel**

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### TO-263AB (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08  
DWG: 5970

#### Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.





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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
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- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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**Факс:** 8 (812) 320-02-42

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