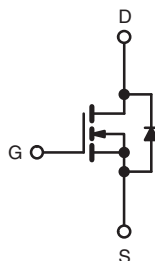
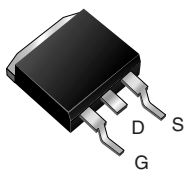


Power MOSFET

PRODUCT SUMMARY

V_{DS} (V)	200	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	0.40
Q_g (Max.) (nC)	43	
Q_{gs} (nC)	7.0	
Q_{gd} (nC)	23	
Configuration	Single	

D²PAK (TO-263)



N-Channel MOSFET

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT
HALOGEN
FREE
Available

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 D²PAK is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D²PAK is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0 W in a typical surface mount application.

ORDERING INFORMATION

Package	D ² PAK (TO-263)	D ² PAK (TO-263)	D ² PAK (TO-263)
Lead (Pb)-free and Halogen-free	SiHF630S-GE3	SiHF630STR-L-GE3 ^a	SiHF630STRR-GE3 ^a
Lead (Pb)-free	IRF630SPbF	IRF630STRLPbF ^a	IRF630STRRPbF ^a
	SiHF630S-E3	SiHF630STL-E3 ^a	SiHF630STR-E3 ^a

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V _{DS}	200	V
Gate-Source Voltage			V _{GS}	± 20	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	I _D	9.0	A
		T _C = 100 °C		5.7	
Pulsed Drain Current ^a			I _{DM}	36	W/°C
Linear Derating Factor				0.59	
Linear Derating Factor (PCB Mount) ^e				0.025	
Single Pulse Avalanche Energy ^b			E _{AS}	250	mJ
Repetitive Avalanche Current ^a			I _{AR}	9.0	A
Repetitive Avalanche Energy ^a			E _{AR}	7.4	mJ
Maximum Power Dissipation	T _C = 25 °C		P _D	74	W
Maximum Power Dissipation (PCB Mount) ^e	T _A = 25 °C			3.0	

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

Peak Diode Recovery dV/dt ^c	dV/dt	5.0	V/ns
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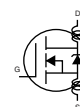
ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^{\circ}\text{C}$, $L = 4.6\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 9.0\text{ A}$ (see fig. 12).
- $I_{SD} \leq 9.0\text{ A}$, $dl/dt \leq 120\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^{\circ}\text{C}$.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	-	-	40	$^{\circ}\text{C}/\text{W}$
Maximum Junction-to-Ambient	R_{thJA}	-	-	62	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	-	1.7	

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, I _D = 250 μA		200	-	- V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.24	- V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0 V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100 nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V		-	-	25 μA
		V _{DS} = 160V, V _{GS} = 0 V, T _J = 125 °C		-	-	250
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 5.4 A ^b	-	-	0.40 Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 5.4 A ^b		3.8	-	- S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	800	- pF
Output Capacitance	C _{oss}			-	240	-
Reverse Transfer Capacitance	C _{rss}			-	76	-
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 5.9 A, V _{DS} = 160 V see fig. 6 and 13 ^b	-	-	43 nC
Gate-Source Charge	Q _{gs}			-	-	7.0
Gate-Drain Charge	Q _{gd}			-	-	23
Turn-On Delay Time	t _{d(on)}	V _{DD} = 100 V, I _D = 5.9 A R _g = 12 Ω, R _D = 16 Ω see fig. 10 ^b		-	9.4	- ns
Rise Time	t _r			-	28	-
Turn-Off Delay Time	t _{d(off)}			-	39	-
Fall Time	t _f			-	20	-
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	-



SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	9.0	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	36	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}$, $I_S = 9.0\text{ A}$, $V_{GS} = 0\text{ V}^b$	-	-	2.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}$, $I_F = 5.9\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$	-	170	340	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	1.1	2.2	μC
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 $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.
- When mounted on 1" square PCB (FR-4 or G-10 material).

TYPICAL CHARACTERISTICS (25°C , unless otherwise noted)

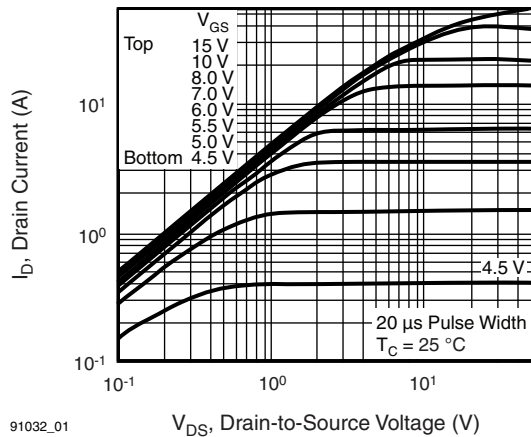


Fig. 1 - Typical Output Characteristics, $T_C = 25^\circ\text{C}$

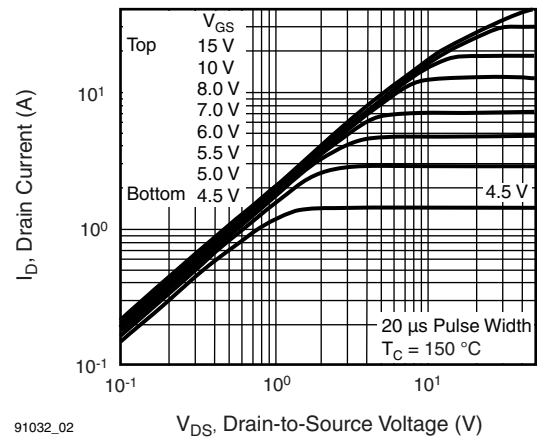


Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$

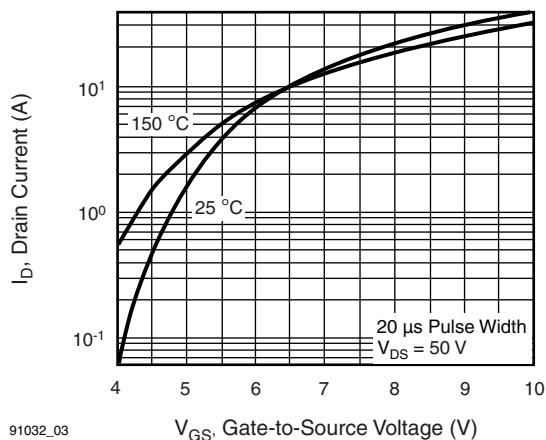


Fig. 3 - Typical Transfer Characteristics

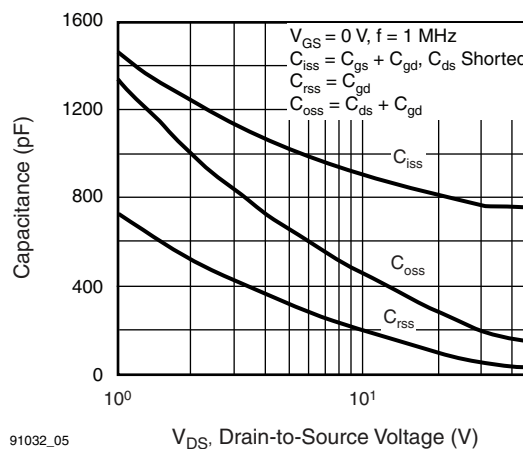


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

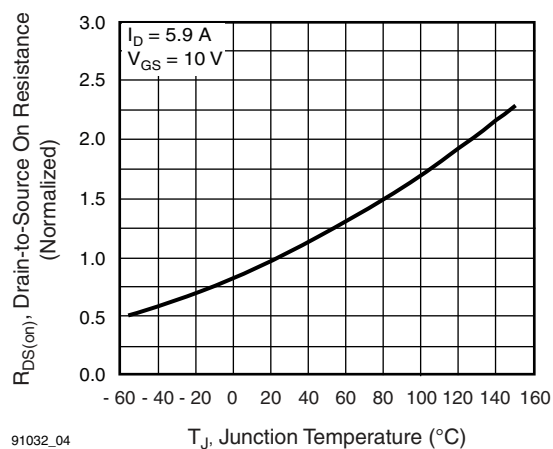


Fig. 4 - Normalized On-Resistance vs. Temperature

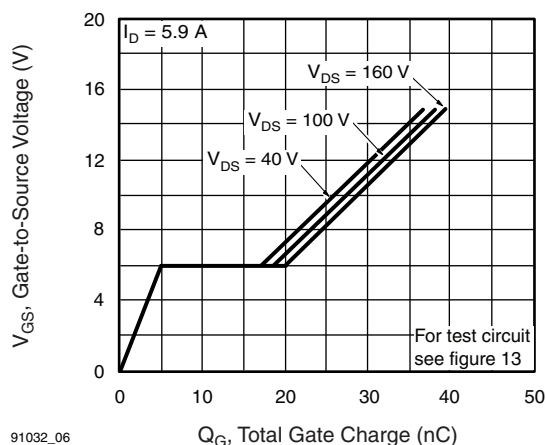


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

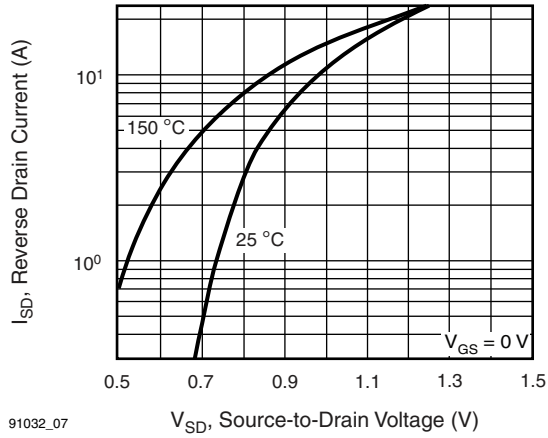


Fig. 7 - Typical Source-Drain Diode Forward Voltage

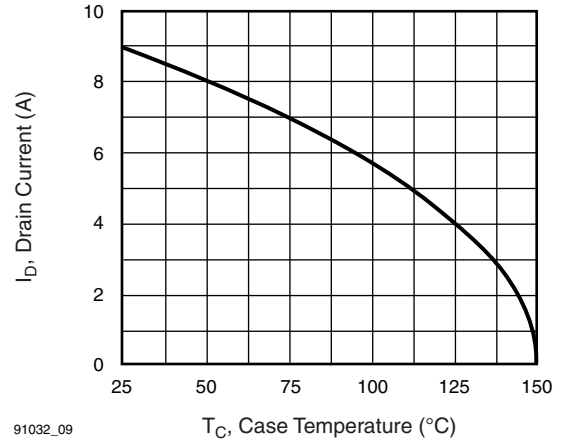


Fig. 9 - Maximum Drain Current vs. Case Temperature

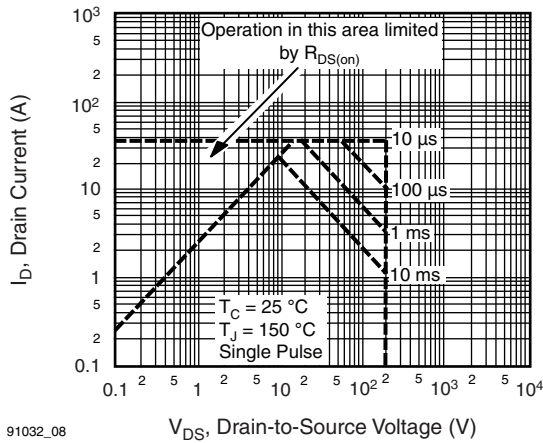


Fig. 8 - Maximum Safe Operating Area

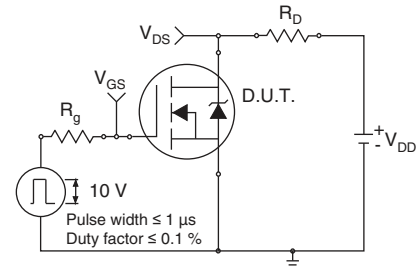


Fig. 10a - Switching Time Test Circuit

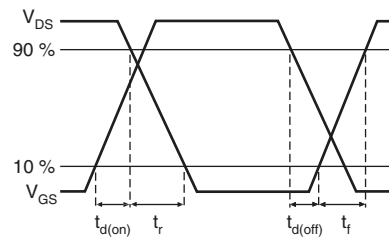


Fig. 10b - Switching Time Waveforms

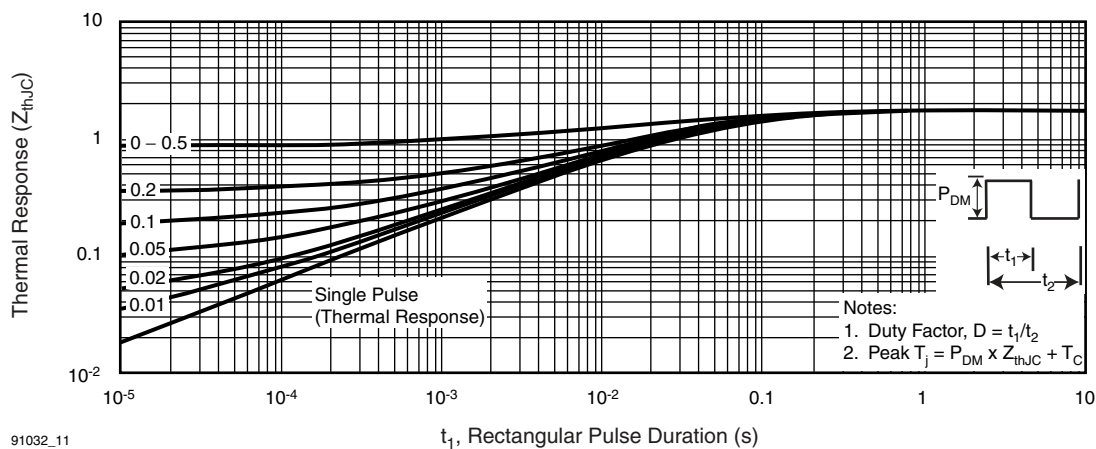


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

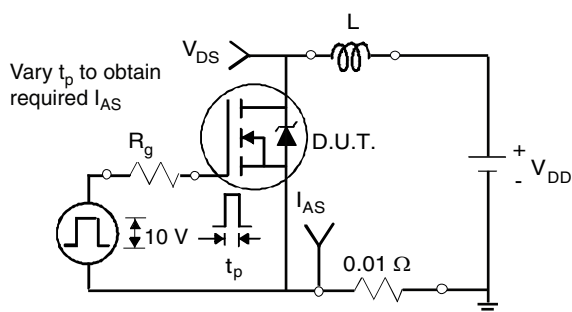


Fig. 12a - Unclamped Inductive Test Circuit

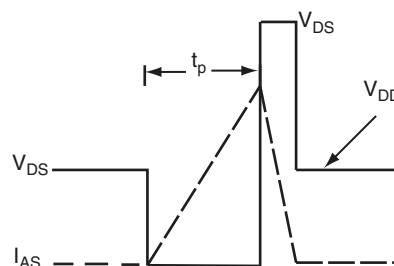


Fig. 12b - Unclamped Inductive Waveforms

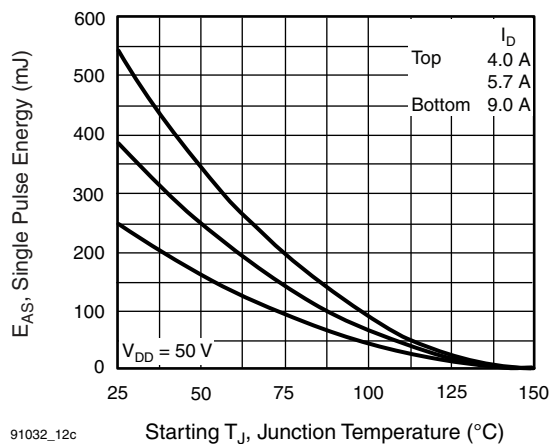


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

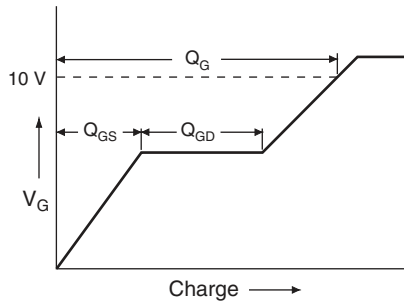


Fig. 13a - Basic Gate Charge Waveform

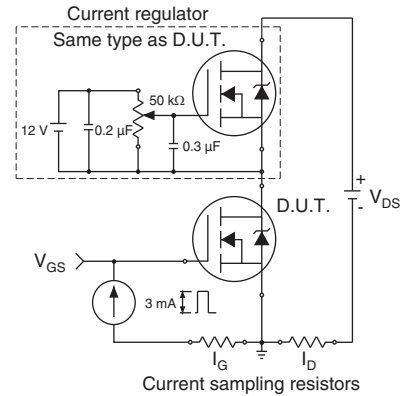
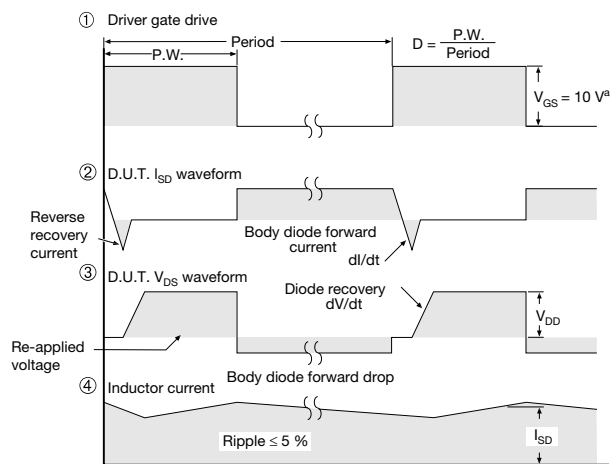
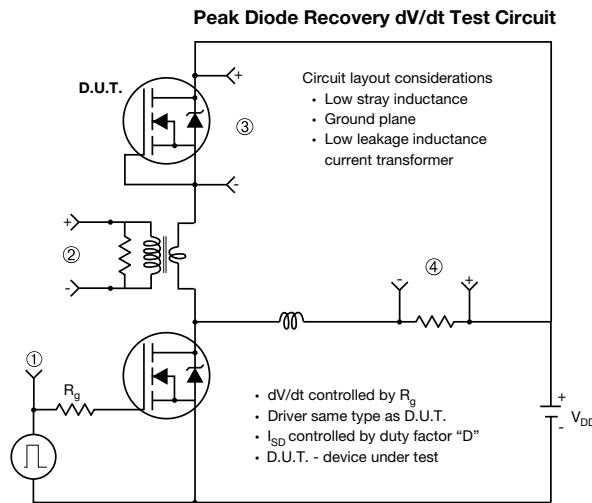


Fig. 13b - Gate Charge Test Circuit

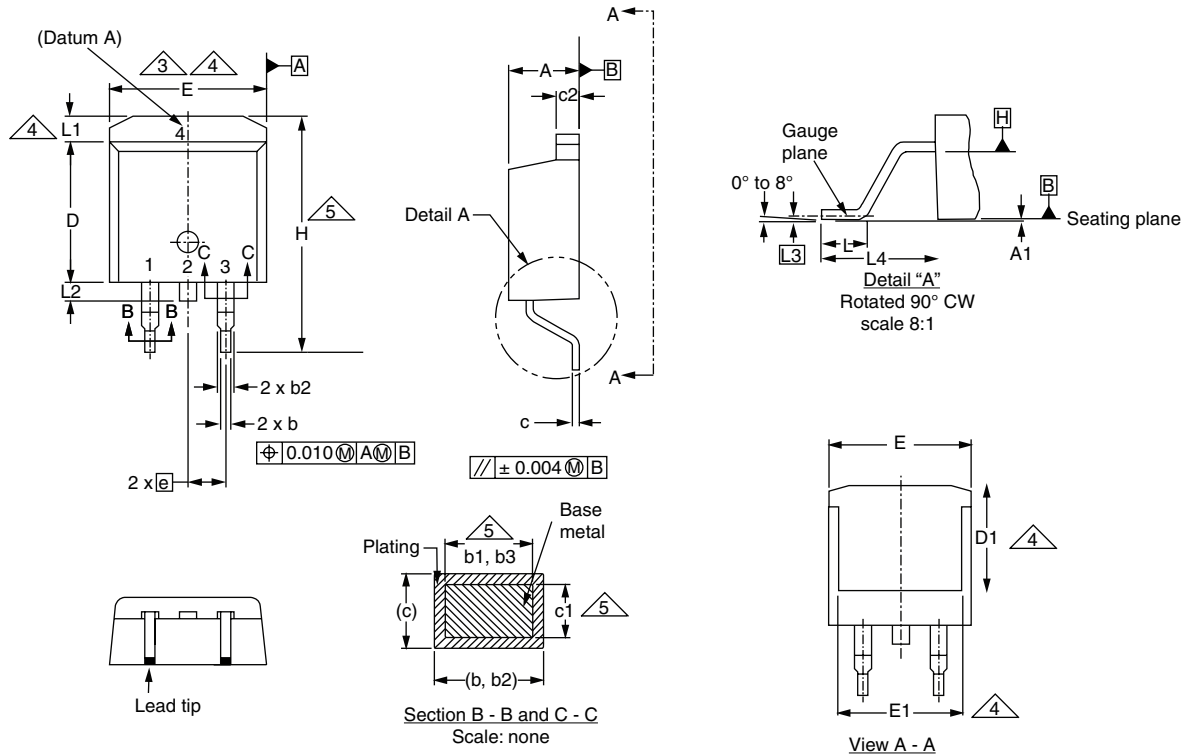


Note
a. $V_{GS} = 5 \text{ V}$ for logic level devices

Fig. 14 - For N-Channel

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?91032.

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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