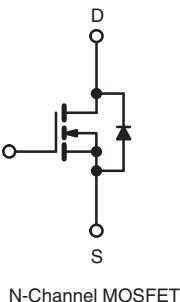
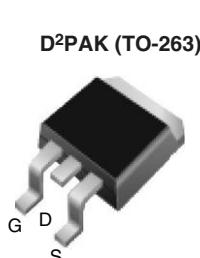


Power MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	100	
R _{DS(on)} (Ω)	V _{GS} = 10 V	0.54
Q _g (Max.) (nC)		8.3
Q _{gs} (nC)		2.3
Q _{gd} (nC)		3.8
Configuration		Single



FEATURES

- Halogen-free According to IEC 61249-2-21
- Definition
- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- 175 °C Operating Temperature
- Fast Switching
- Ease of Paralleling
- 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 (TO-263) 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 (TO-263) 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	SiHF510S-GE3	SiHF510STRL-GE3 ^a	SiHF510STRR-GE3 ^a
Lead (Pb)-free	IRF510SPbF	IRF510STRLPbF ^a	IRF510STRRPbF ^a
	SiHF510S-E3	SiHF510STL-E3 ^a	SiHF510STR-E3 ^a

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	100	
Gate-Source Voltage	V _{GS}	± 20	V
Continuous Drain Current	V _{GS} at 10 V	5.6	A
		4.0	
Pulsed Drain Current ^a	I _{DM}	20	
Linear Derating Factor		0.29	W/°C
		0.025	
Single Pulse Avalanche Energy ^b	E _{AS}	100	mJ
Avalanche Current ^a	I _{AR}	5.6	A
Repetitive Avalanche Energy ^a	E _{AR}	4.3	mJ
Maximum Power Dissipation	T _C = 25 °C	43	W
		3.7	
Peak Diode Recovery dV/dt ^c	dV/dt	5.5	V/ns
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 175	
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	°C

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 = 4.8 mH, R_g = 25 Ω, I_{AS} = 5.6 A (see fig. 12).

c. I_{SD} ≤ 5.6 A, dI/dt ≤ 75 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 175 °C.

d. 1.6 mm from case.

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

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

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	$^{\circ}\text{C}/\text{W}$
Maximum Junction-to-Ambient (PCB Mount) ^a	R_{thJA}	-	40	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	3.5	

Note

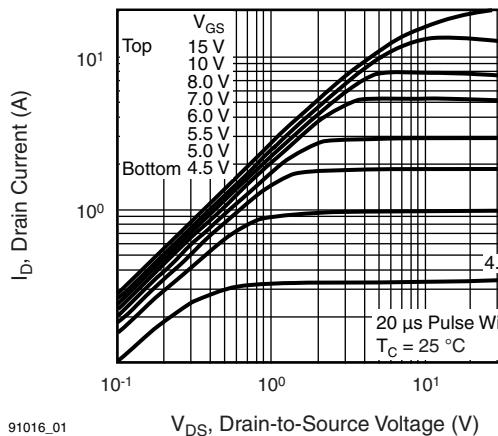
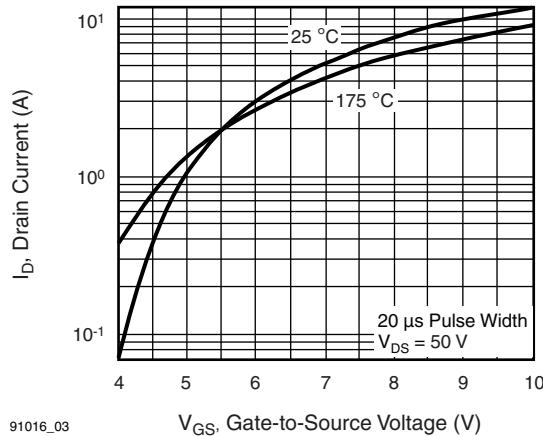
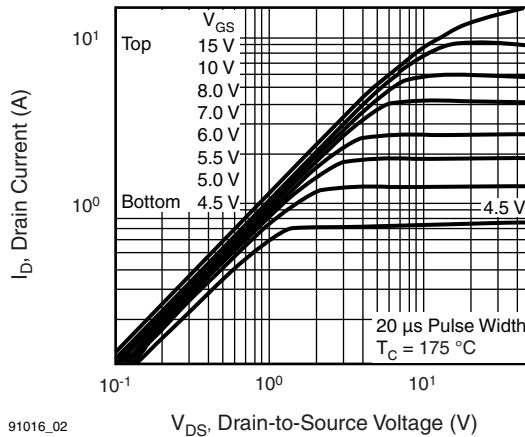
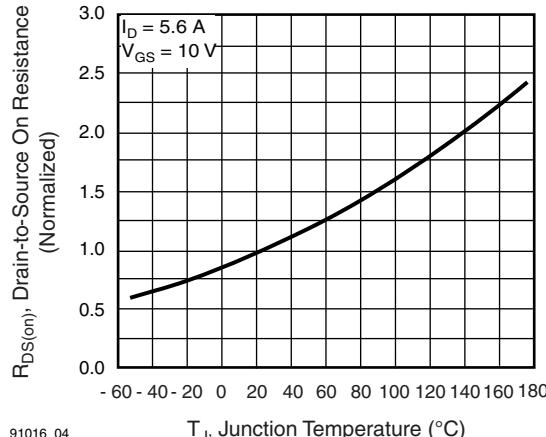
- a. When mounted on 1" square PCB (FR-4 or G-10 material).

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}	$V_{GS} = 0$, $I_D = 250 \mu\text{A}$		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	-	$^{\circ}\text{C}/\text{V}$	
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$		2.0	-	4.0	V	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100 \text{ V}$, $V_{GS} = 0 \text{ V}$		-	-	25	μA	
		$V_{DS} = 80 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 150 \text{ }^{\circ}\text{C}$		-	-	250		
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$	$I_D = 3.4 \text{ A}^b$	-	-	0.54	Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 50 \text{ V}$, $I_D = 3.4 \text{ A}^b$		1.3	-	-	S	
Dynamic								
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1.0 \text{ MHz}$, see fig. 5		-	180	-	pF	
Output Capacitance	C_{oss}			-	81	-		
Reverse Transfer Capacitance	C_{rss}			-	15	-		
Total Gate Charge	Q_g	$V_{GS} = 10 \text{ V}$	$I_D = 5.6 \text{ A}$, $V_{DS} = 80 \text{ V}$, see fig. 6 and 13 ^b	-	-	8.3	nC	
Gate-Source Charge	Q_{gs}			-	-	2.3		
Gate-Drain Charge	Q_{gd}			-	-	3.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50 \text{ V}$, $I_D = 5.6 \text{ A}$, $R_g = 24 \Omega$, $R_D = 8.4 \Omega$, see fig. 10 ^b		-	6.9	-	ns	
Rise Time	t_r			-	16	-		
Turn-Off Delay Time	$t_{d(off)}$			-	15	-		
Fall Time	t_f			-	9.4	-		
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	-		
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	5.6	A	
Pulsed Diode Forward Current ^a	I_{SM}			-	-	20		
Body Diode Voltage	V_{SD}	$T_J = 25 \text{ }^{\circ}\text{C}$, $I_S = 5.6 \text{ A}$, $V_{GS} = 0 \text{ V}^b$		-	-	2.5	V	
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25 \text{ }^{\circ}\text{C}$, $I_F = 5.6 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}^b$		-	100	200	ns	
Body Diode Reverse Recovery Charge	Q_{rr}			-	0.44	0.88	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 $\leq 300 \mu\text{s}$; duty cycle $\leq 2 \%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics, $T_C = 25$ °C

Fig. 3 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics, $T_C = 175$ °C

Fig. 4 - Normalized On-Resistance vs. Temperature

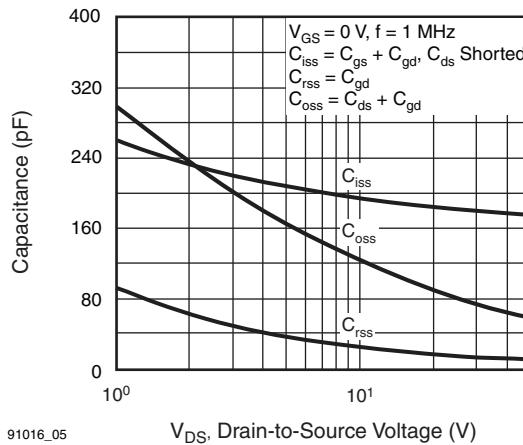


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

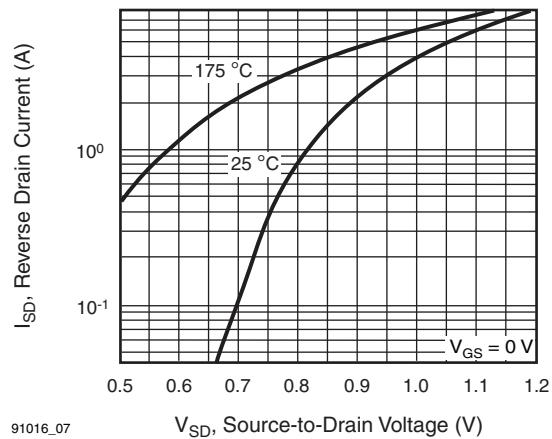


Fig. 7 - Typical Source-Drain Diode Forward Voltage

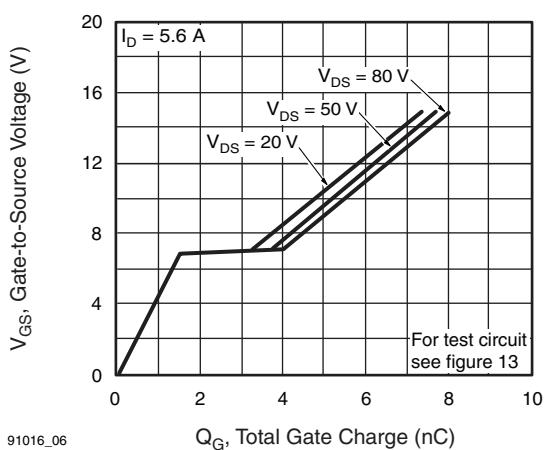


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

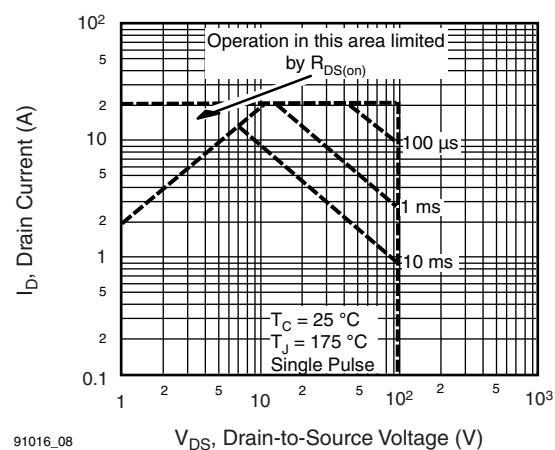
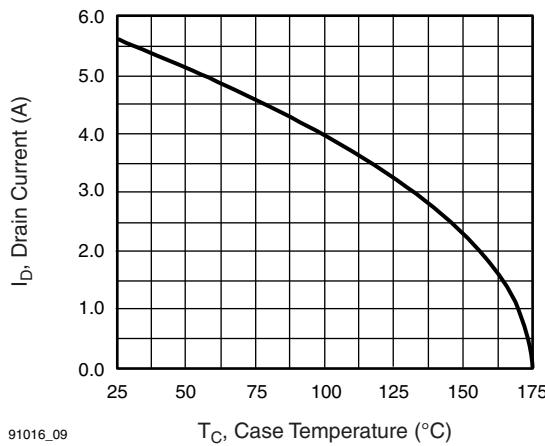
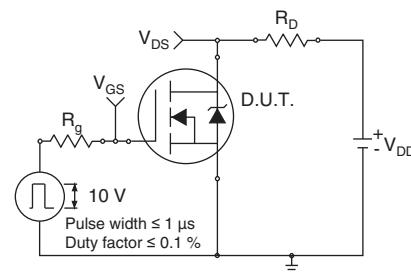
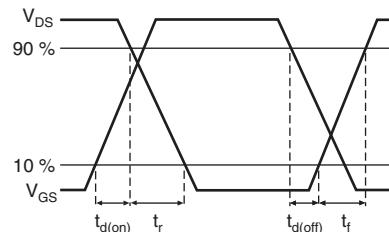
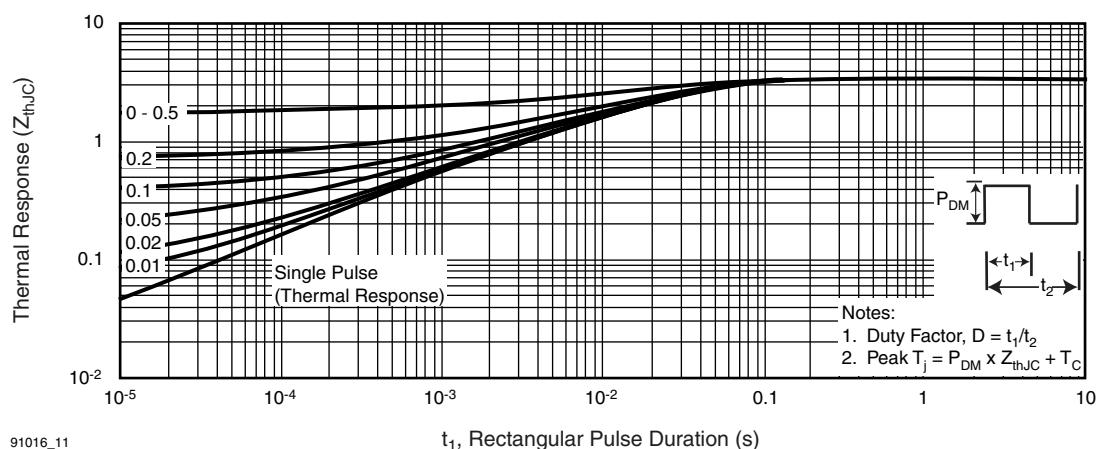


Fig. 8 - Maximum Safe Operating Area


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

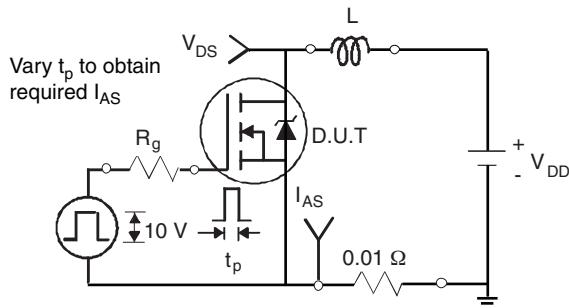


Fig. 12a - Unclamped Inductive Test Circuit

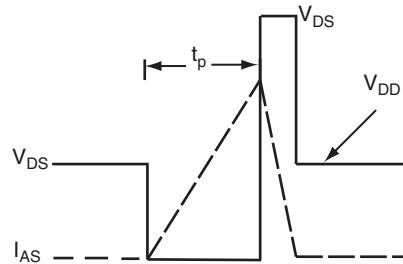


Fig. 12b - Unclamped Inductive Waveforms

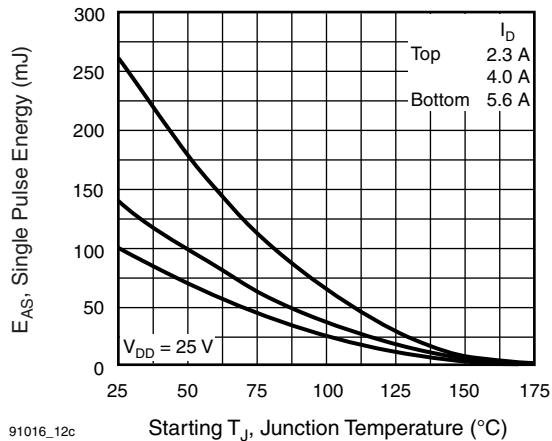


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

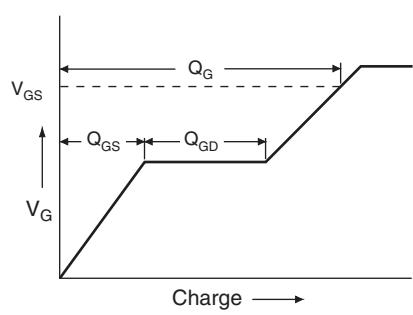


Fig. 13a - Basic Gate Charge Waveform

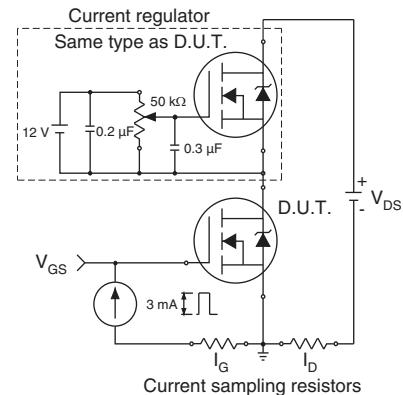


Fig. 13b - Gate Charge Test Circuit

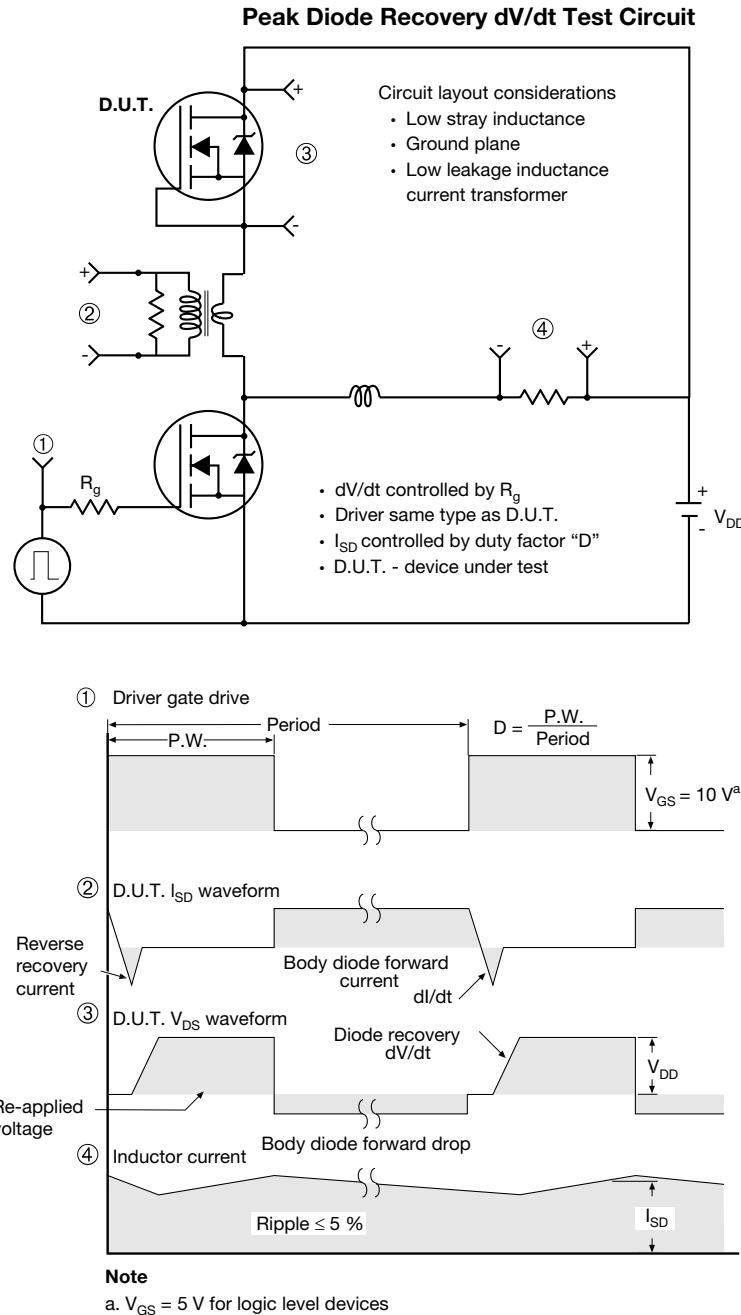
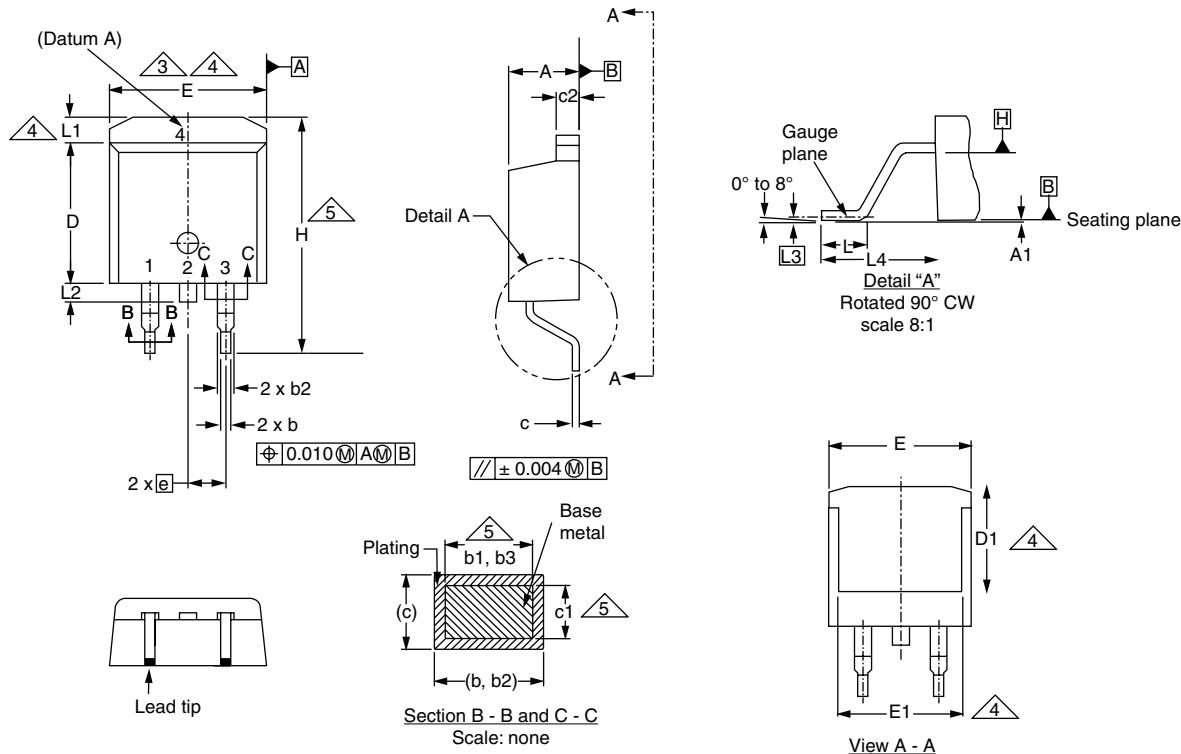


Fig. 14 - For N-Channel

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TO-263AB (HIGH VOLTAGE)

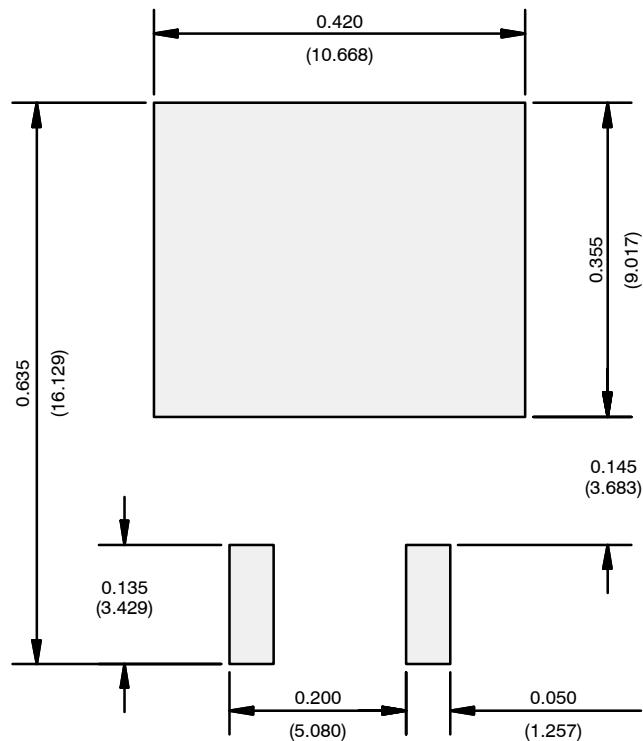


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

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

Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994.
- Dimensions are shown in millimeters (inches).
- 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.
- Thermal PAD contour optional within dimension E, L1, D1 and E1.
- Dimension b1 and c1 apply to base metal only.
- Datum A and B to be determined at datum plane H.
- Outline conforms to JEDEC outline to TO-263AB.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead

Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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