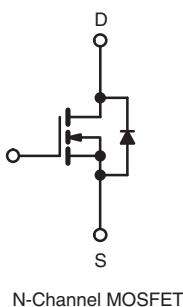
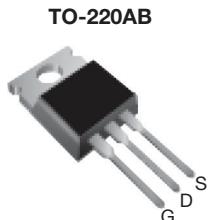


Power MOSFET

PRODUCT SUMMARY	
V _{DS} (V)	1000
R _{DSD(on)} (Ω)	V _{GS} = 10 V 11
Q _g (Max.) (nC)	38
Q _{gs} (nC)	4.9
Q _{gd} (nC)	22
Configuration	Single



FEATURES

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



RoHS*
COMPLIANT

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 TO-220AB package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 W. The low thermal resistance and low package cost of the TO-220AB contribute to its wide acceptance throughout the industry.

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRFBG20PbF SiHFBG20-E3
SnPb	IRFBG20 SiHFBG20

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	1000	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	I _D
		T _C = 100 °C	1.4 0.86
Pulsed Drain Current ^a	I _{DM}	5.6	A
Linear Derating Factor		0.43	W/°C
Single Pulse Avalanche Energy ^b	E _{AS}	200	mJ
Repetitive Avalanche Current ^a	I _{AR}	1.4	A
Repetitive Avalanche Energy ^a	E _{AR}	5.4	mJ
Maximum Power Dissipation	P _D	54	W
Peak Diode Recovery dV/dt ^c	dV/dt	1.0	V/ns
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	
Mounting Torque	6-32 or M3 screw	10	lbf · in
		1.1	N · m

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. V_{DD} = 50 V, starting T_J = 25 °C, L = 193 µH, R_G = 25 Ω, I_{AS} = 1.4 A (see fig. 12).

c. I_{SD} ≤ 1.4 A, dI/dt ≤ 60 A/µs, V_{DD} ≤ 600, T_J ≤ 150 °C.

d. 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}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	2.3	

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, $I_D = 250$ µA		1000	-	-	V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = 1$ mA		-	1.2	-	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}	$V_{GS} = \pm 20$ V		-	-	± 100	nA	
Zero Gate Voltage Drain Current	I_{BS}	$V_{DS} = 1000$ V, $V_{GS} = 0$ V		-	-	100	µA	
		$V_{DS} = 800$ V, $V_{GS} = 0$ V, $T_J = 125$ °C		-	-	500		
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10$ V	$I_D = 0.84$ A ^b	-	-	11	Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 50$ V, $I_D = 0.84$ A ^b		1.0	-	-	S	
Dynamic								
Input Capacitance	C_{iss}	$V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1.0$ MHz, see fig. 5		-	500	-	pF	
Output Capacitance	C_{oss}			-	52	-		
Reverse Transfer Capacitance	C_{rss}			-	17	-		
Total Gate Charge	Q_g	$V_{GS} = 10$ V	$I_D = 1.4$ A, $V_{DS} = 400$ V, see fig. 6 and 13 ^b	-	-	38	nC	
Gate-Source Charge	Q_{gs}			-	-	4.9		
Gate-Drain Charge	Q_{gd}			-	-	22		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 500$ V, $I_D = 1.4$ A, $R_g = 18$ Ω, $R_D = 370$ Ω, see fig. 10 ^b		-	9.4	-	ns	
Rise Time	t_r			-	17	-		
Turn-Off Delay Time	$t_{d(off)}$			-	58	-		
Fall Time	t_f			-	31	-		
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		-	-	1.4	A	
Pulsed Diode Forward Current ^a	I_{SM}			-	-	5.6		
Body Diode Voltage	V_{SD}	$T_J = 25$ °C, $I_S = 1.4$ A, $V_{GS} = 0$ V ^b		-	-	1.5	V	
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25$ °C, $I_F = 1.4$ A, $dI/dt = 100$ A/µs ^b		-	130	190	ns	
Body Diode Reverse Recovery Charge	Q_{rr}			-	0.46	0.69	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 ≤ 300 µs; duty cycle ≤ 2 %.

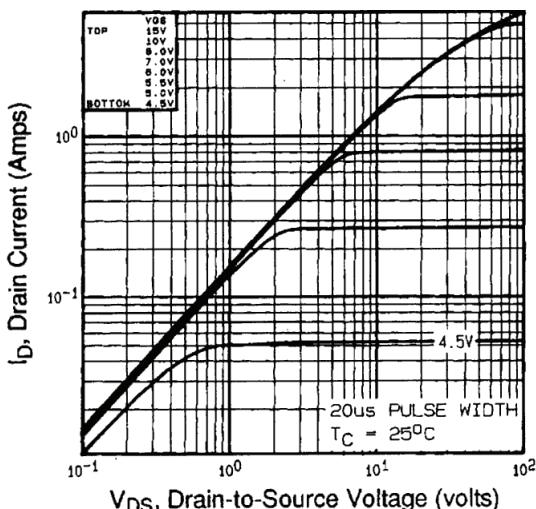
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


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

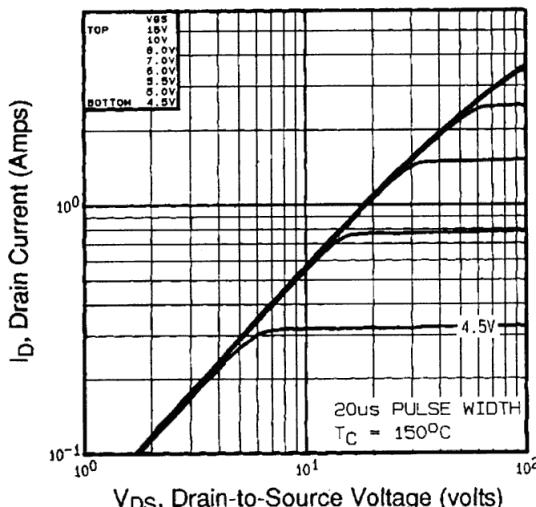
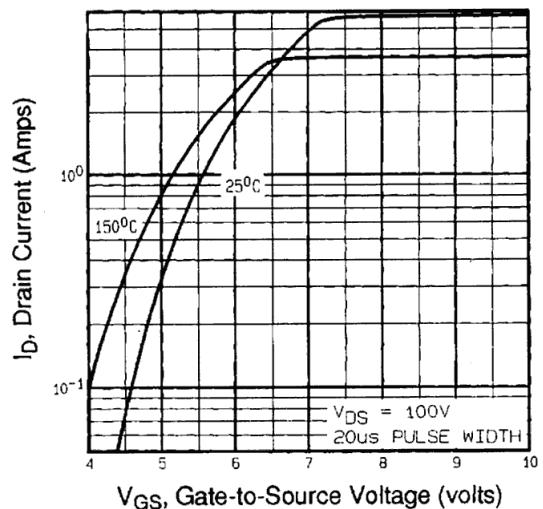
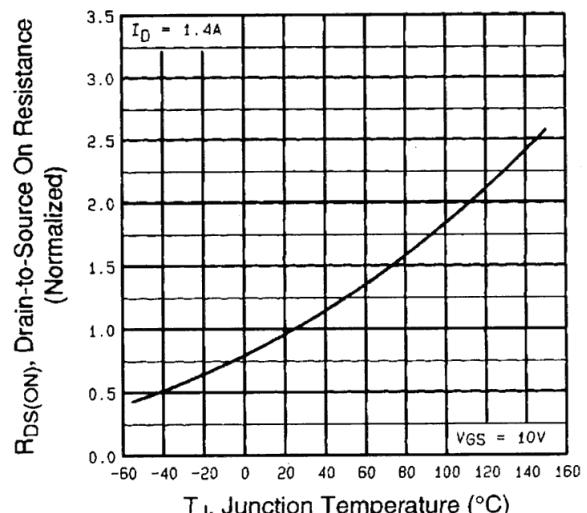


Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$



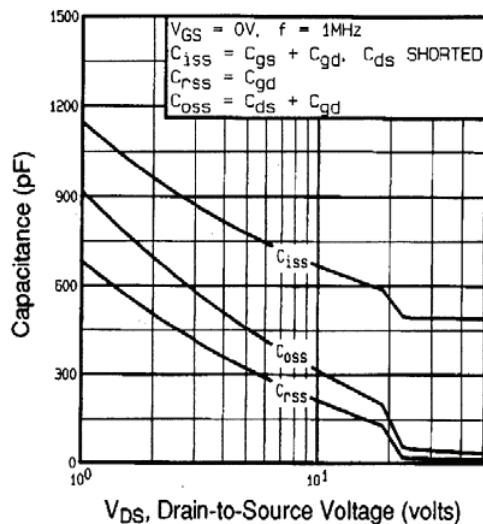


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

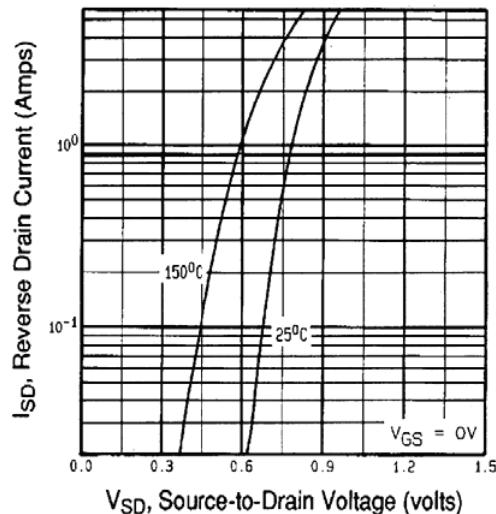


Fig. 7 - Typical Source-Drain Diode Forward Voltage

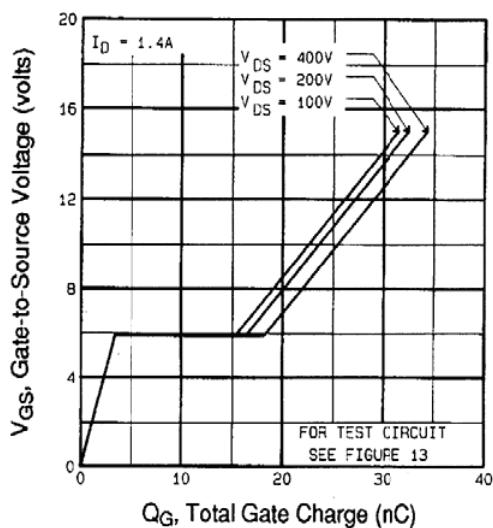


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

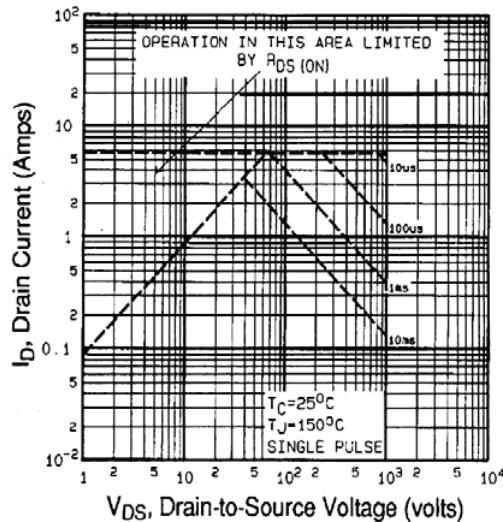


Fig. 8 - Maximum Safe Operating Area

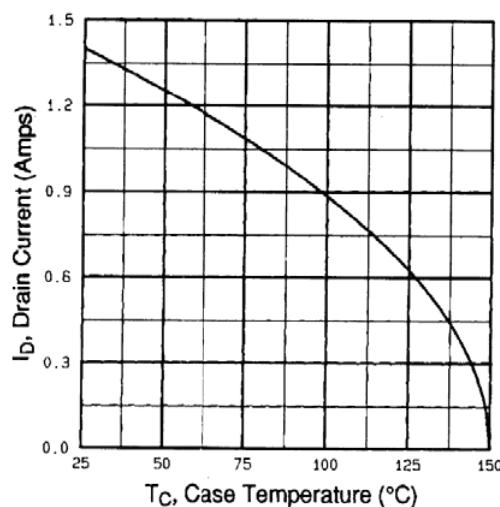


Fig. 9 - Maximum Drain Current vs. Case Temperature

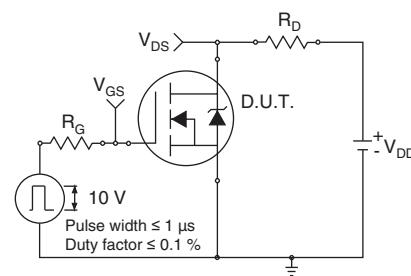


Fig. 10a - Switching Time Test Circuit

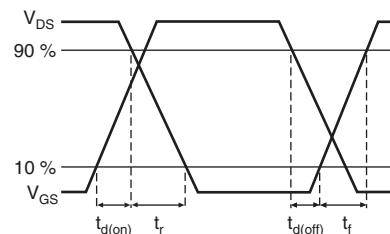


Fig. 10b - Switching Time Waveforms

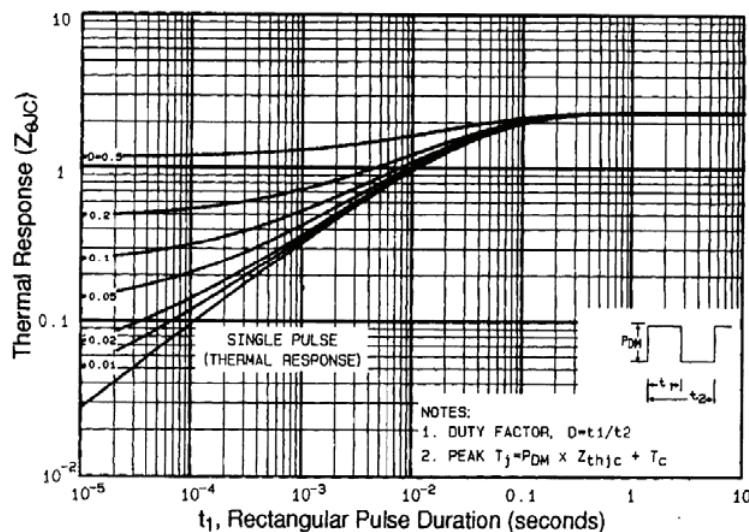


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

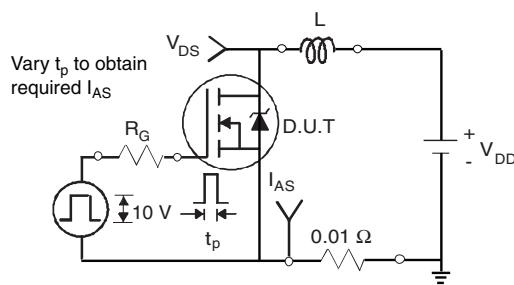


Fig. 12a - Unclamped Inductive Test Circuit

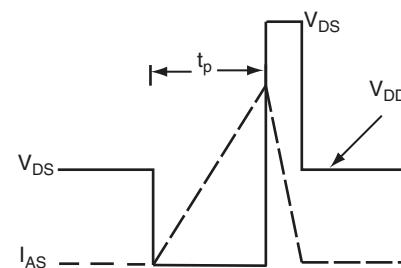


Fig. 12b - Unclamped Inductive Waveforms

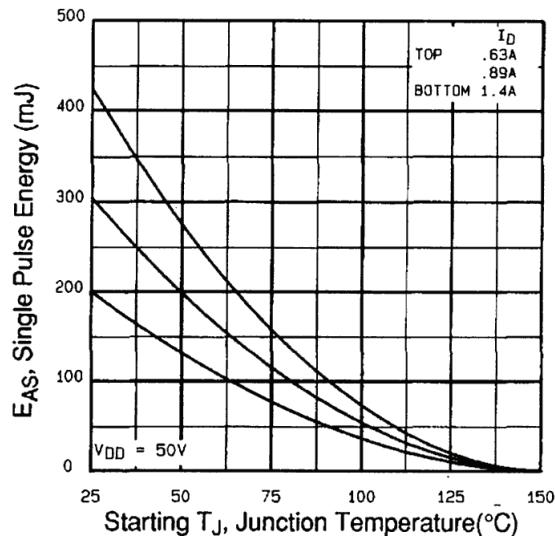


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

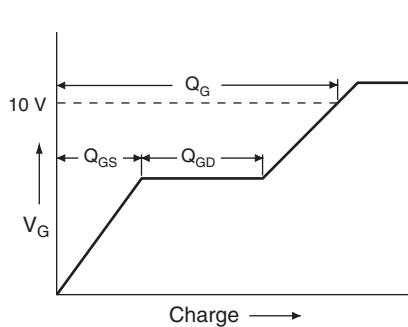


Fig. 13a - Basic Gate Charge Waveform

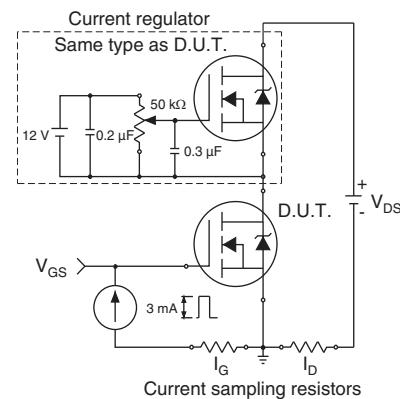
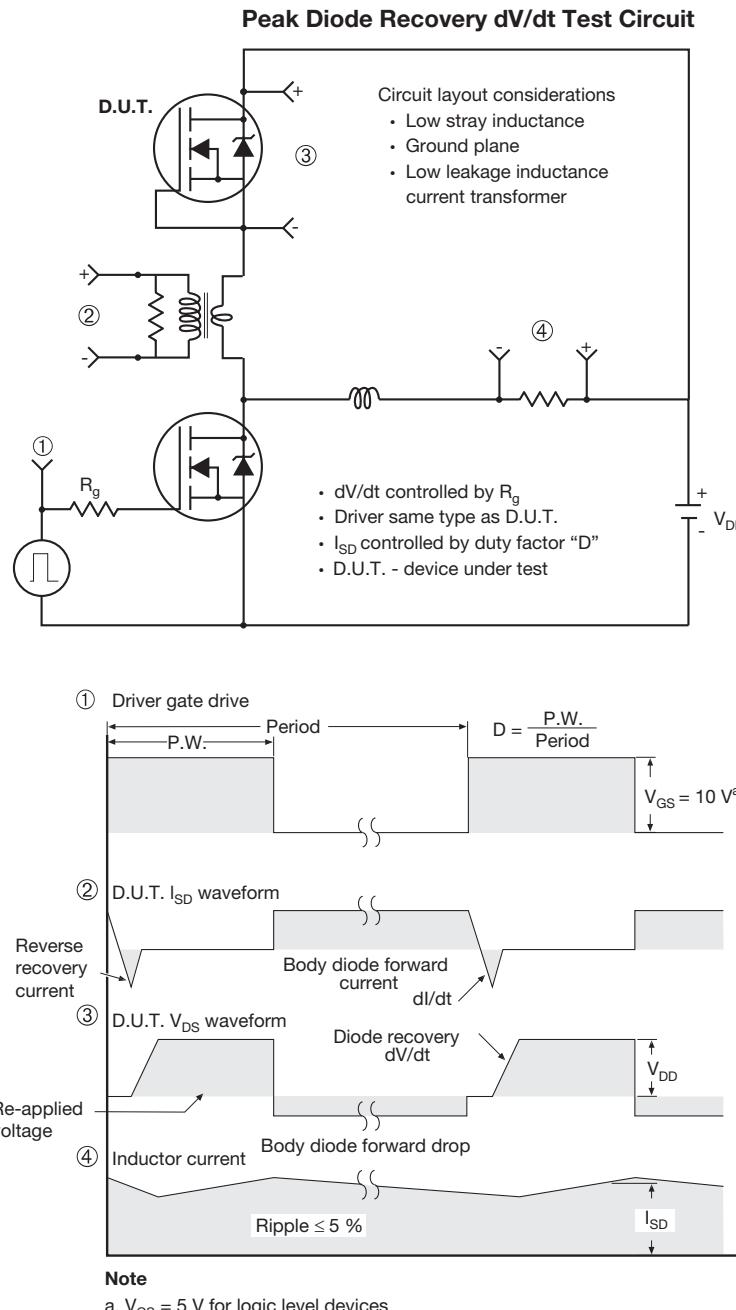
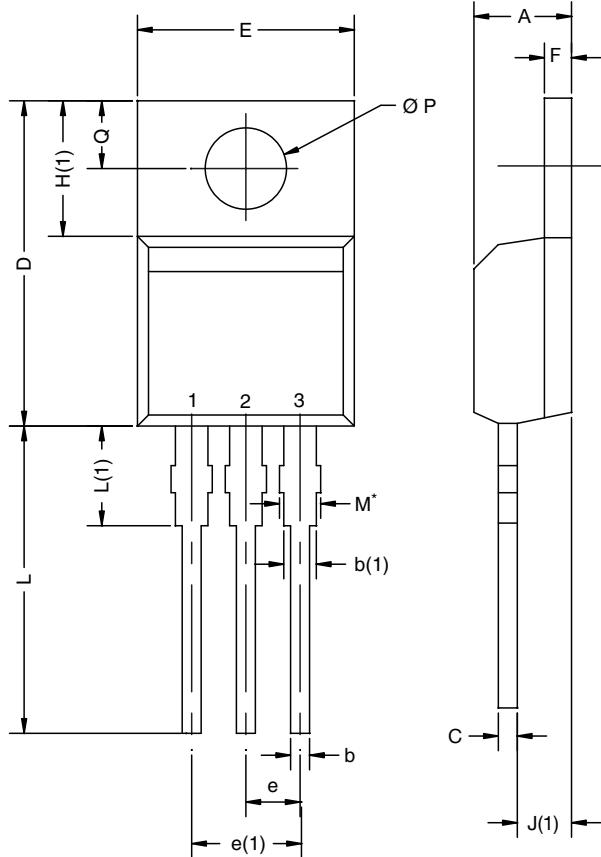


Fig. 13b - Gate Charge Test Circuit


Fig. 14 - For N-Channel

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?91123.

TO-220AB



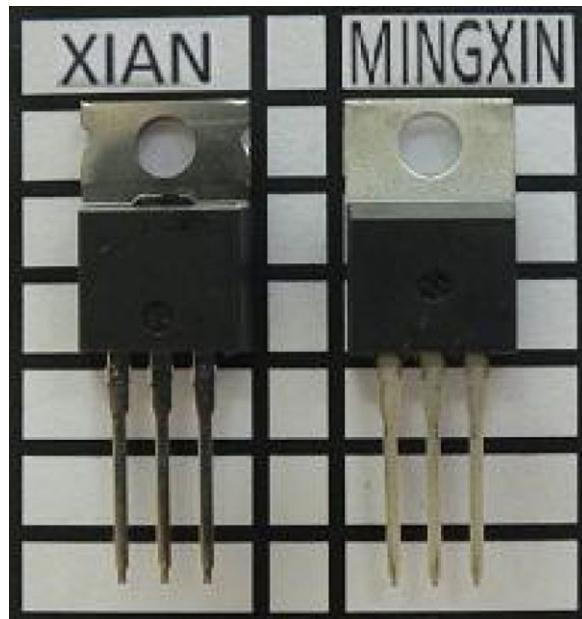
DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

- Xi'an and Mingxin actual photo





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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
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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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