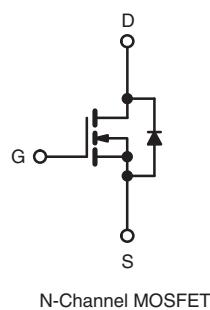
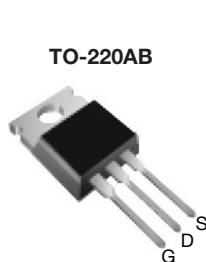


## Power MOSFET

PRODUCT SUMMARY	
V <sub>DS</sub> (V)	400
R <sub>DS(on)</sub> (Ω)	V <sub>GS</sub> = 10 V 0.55
Q <sub>g</sub> (Max.) (nC)	63
Q <sub>gs</sub> (nC)	9.0
Q <sub>gd</sub> (nC)	32
Configuration	Single



ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRF740PbF SiHF740-E3
SnPb	IRF740 SiHF740

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V <sub>DS</sub>	400	
Gate-Source Voltage		V <sub>GS</sub>	± 20	V
Continuous Drain Current	V <sub>GS</sub> at 10 V	I <sub>D</sub>	10	
	T <sub>C</sub> = 25 °C		6.3	A
Pulsed Drain Current <sup>a</sup>		I <sub>DM</sub>	40	
Linear Derating Factor			1.0	W/°C
Single Pulse Avalanche Energy <sup>b</sup>		E <sub>AS</sub>	520	mJ
Repetitive Avalanche Current <sup>a</sup>		I <sub>AR</sub>	10	A
Repetitive Avalanche Energy <sup>a</sup>		E <sub>AR</sub>	13	mJ
Maximum Power Dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	125	W
Peak Diode Recovery dV/dt <sup>c</sup>		dV/dt	4.0	V/ns
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)	for 10 s		300 <sup>d</sup>	
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<sub>DD</sub> = 50 V, starting T<sub>J</sub> = 25 °C, L = 9.1 mH, R<sub>g</sub> = 25 Ω, I<sub>AS</sub> = 10 A (see fig. 12).

c. I<sub>SD</sub> ≤ 10 A, dI/dt ≤ 120 A/μs, V<sub>DD</sub> ≤ V<sub>DS</sub>, T<sub>J</sub> ≤ 150 °C.

d. 1.6 mm from case.

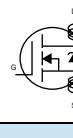
\* Pb containing terminations are not RoHS compliant, exemptions may apply



**THERMAL RESISTANCE RATINGS**

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	62	$^{\circ}\text{C}/\text{W}$
Case-to-Sink, Flat, Greased Surface	$R_{thCS}$	0.50	-	
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	1.0	

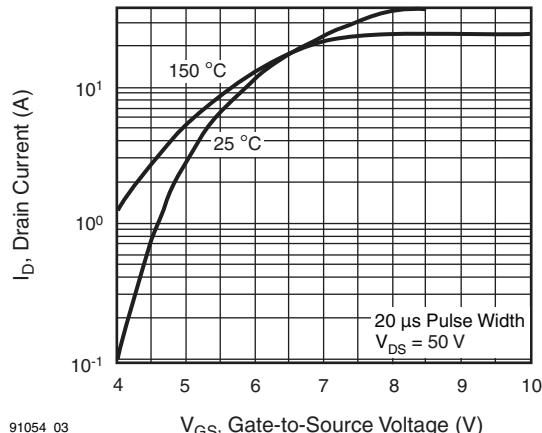
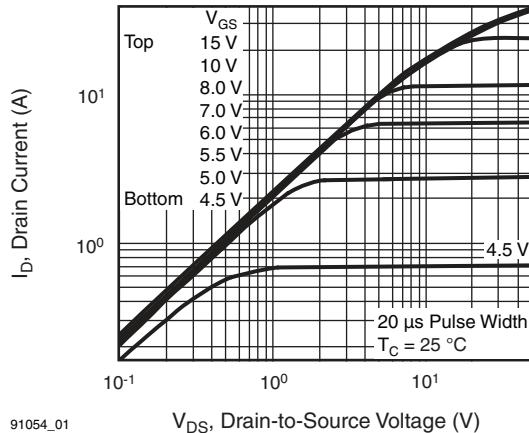
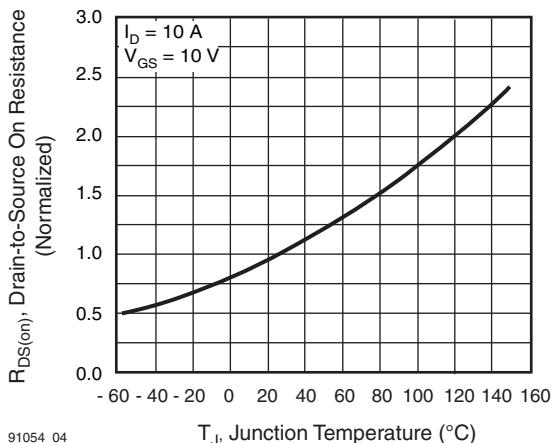
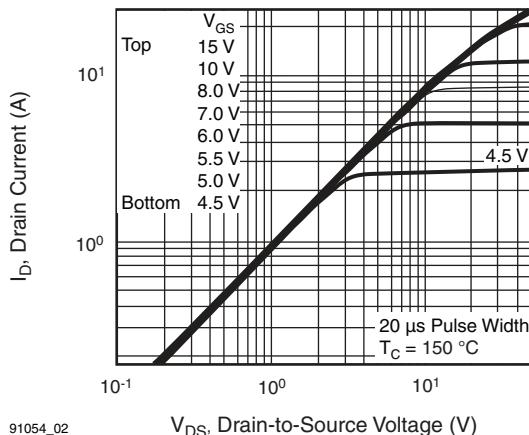
**SPECIFICATIONS** ( $T_J = 25^{\circ}\text{C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$		400	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25^{\circ}\text{C}$ , $I_D = 1\text{ mA}$		-	0.49	-	$^{\circ}\text{C}/\text{C}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$		2.0	-	4.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 400\text{ V}$ , $V_{GS} = 0\text{ V}$		-	-	25	$\mu\text{A}$
		$V_{DS} = 320\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125^{\circ}\text{C}$		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 6.0\text{ A}^b$	-	-	0.55	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\text{ V}$	$I_D = 6.0\text{ A}^b$	5.8	-	-	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		-	1400	-	pF
Output Capacitance	$C_{oss}$			-	330	-	
Reverse Transfer Capacitance	$C_{rss}$			-	120	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$	$I_D = 10\text{ A}$ , $V_{DS} = 320\text{ V}$ , see fig. 6 and 13 <sup>b</sup>	-	-	63	nC
Gate-Source Charge	$Q_{gs}$			-	-	9.0	
Gate-Drain Charge	$Q_{gd}$			-	-	32	
Turn-On Delay Time	$t_{d(on)}$			-	14	-	
Rise Time	$t_r$	$V_{DD} = 200\text{ V}$ , $I_D = 10\text{ A}$ $R_g = 9.1\text{ }\Omega$ , $R_D = 20\text{ }\Omega$ , see fig. 10 <sup>b</sup>		-	27	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	50	-		
Fall Time	$t_f$		-	24	-		
Internal Drain Inductance	$L_D$		-	4.5	-	nH	
Internal Source Inductance	$L_S$	Between lead, 6 mm (0.25") from package and center of die contact		-	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		-	-	10	A
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$			-	-	40	
Body Diode Voltage	$V_{SD}$	$T_J = 25^{\circ}\text{C}$ , $I_S = 10\text{ A}$ , $V_{GS} = 0\text{ V}^b$		-	-	2.0	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25^{\circ}\text{C}$ , $I_F = 10\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}^b$		-	370	790	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			-	3.8	8.2	$\mu\text{C}$
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$ and $L_D$ )					

**Notes**

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,  $T_C = 25 \text{ }^\circ\text{C}$** 
**Fig. 3 - Typical Transfer Characteristics**

**Fig. 2 - Typical Output Characteristics,  $T_C = 150 \text{ }^\circ\text{C}$** 
**Fig. 4 - Normalized On-Resistance vs. Temperature**

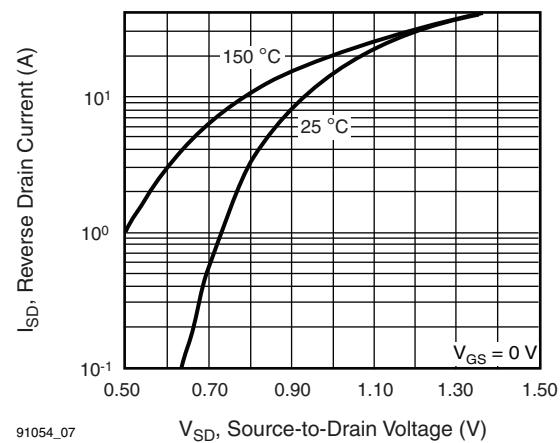
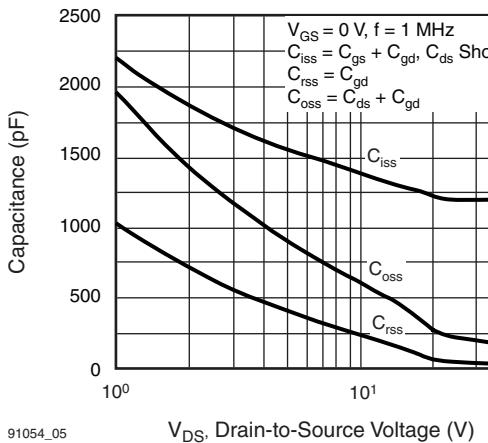


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

Fig. 7 - Typical Source-Drain Diode Forward Voltage

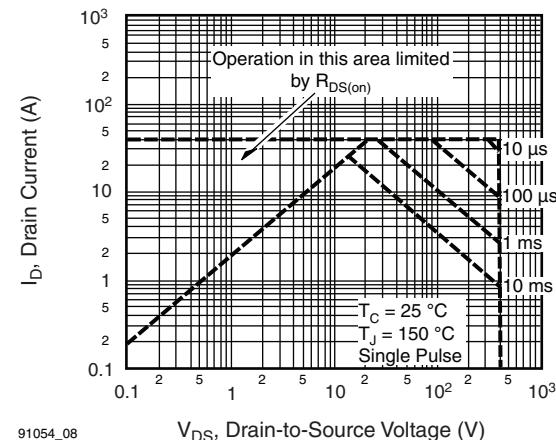
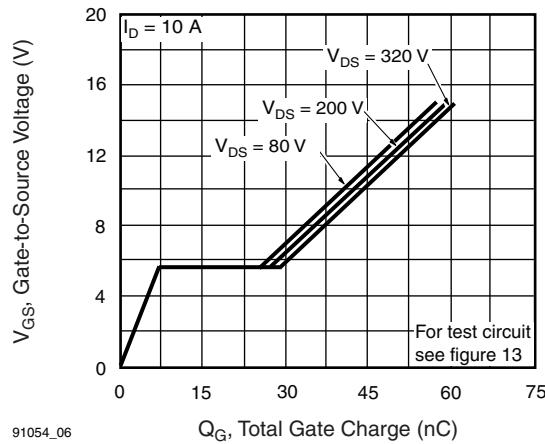
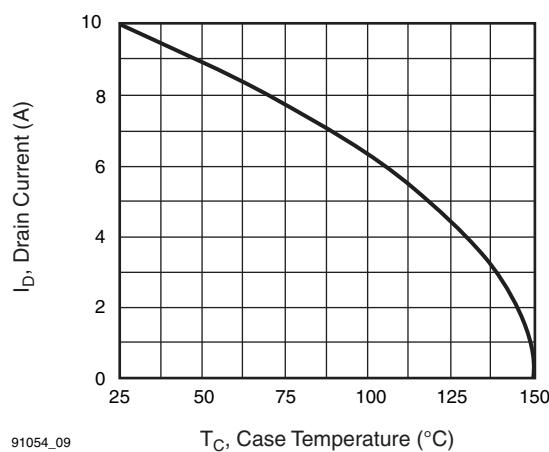
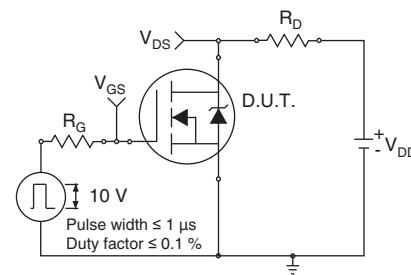
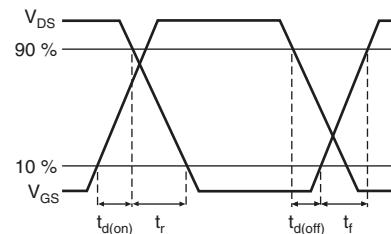
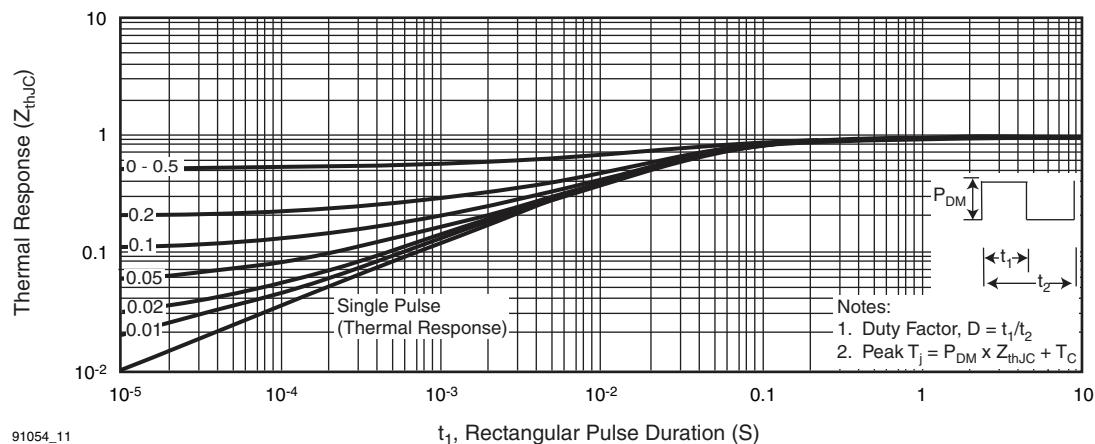


Fig. 6 - Typical Gate Charge vs. Drain-to-Source Voltage

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**

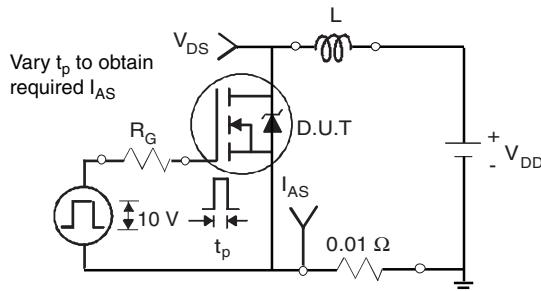


Fig. 12a - Unclamped Inductive Test Circuit

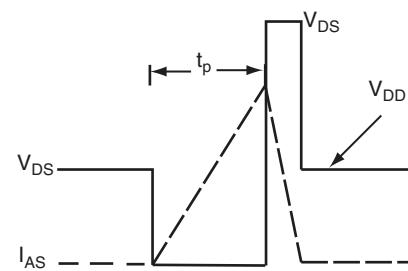


Fig. 12b - Unclamped Inductive Waveforms

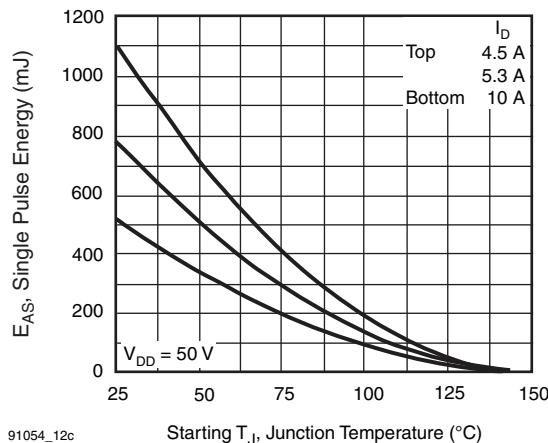


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

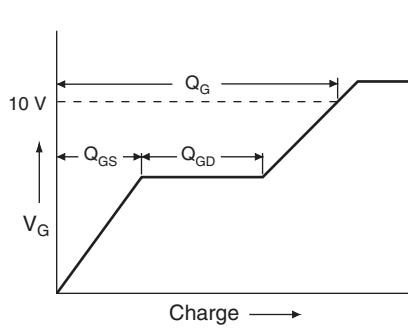


Fig. 13a - Basic Gate Charge Waveform

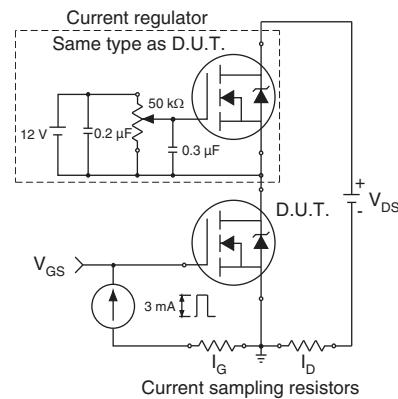
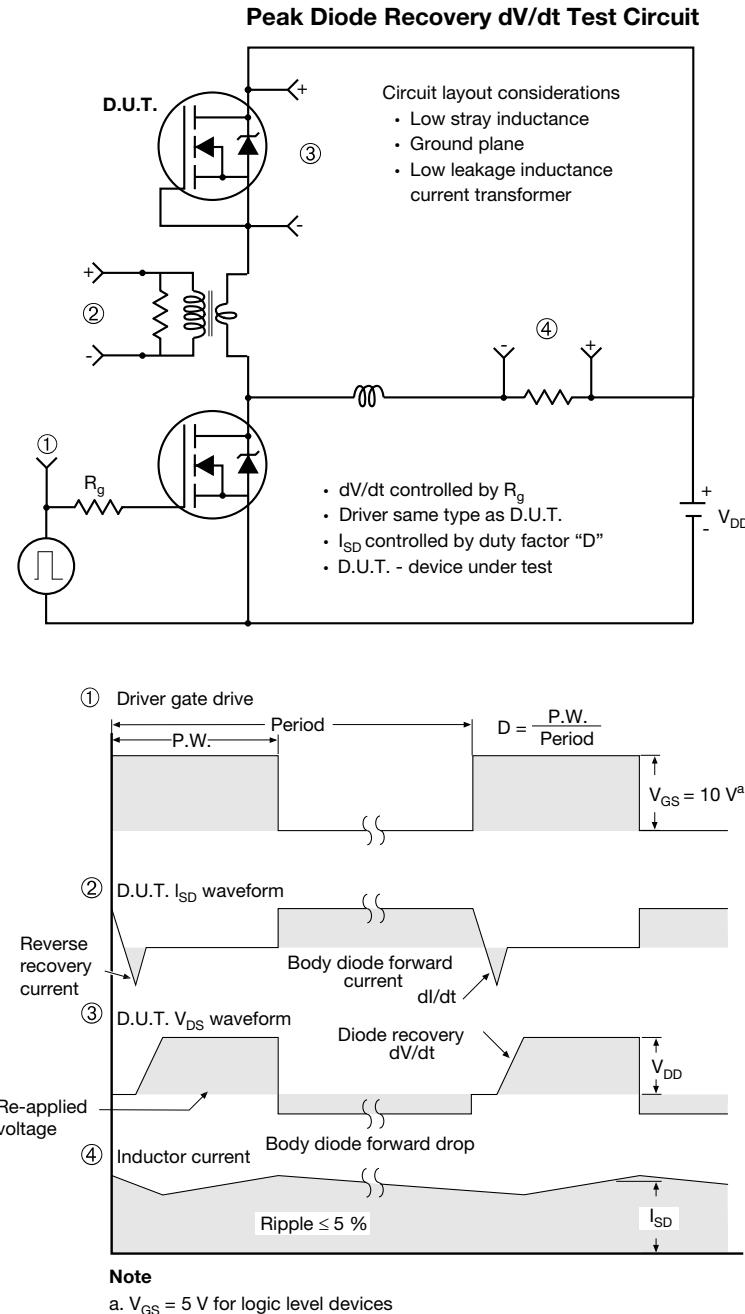
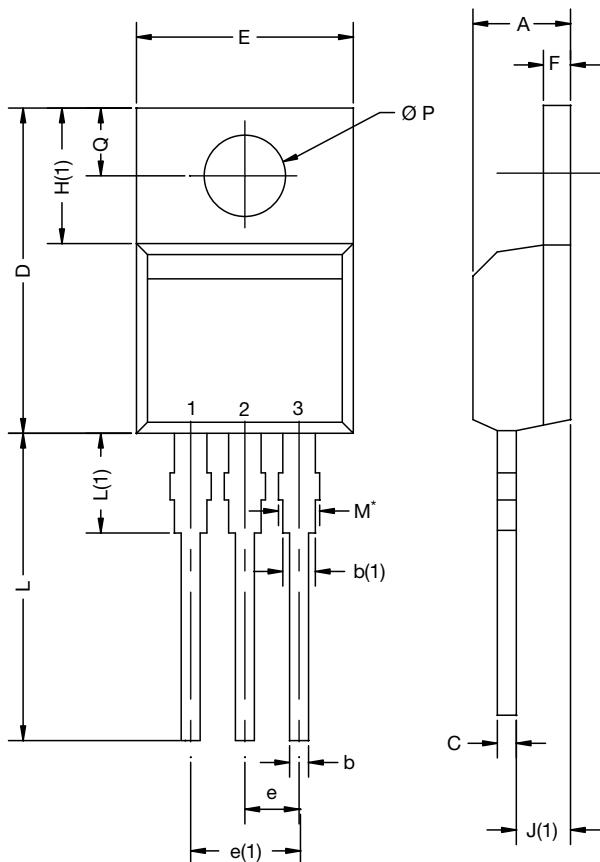


Fig. 13b - Gate Charge Test Circuit


**Fig. 14 - For N-Channel**

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### TO-220-1



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.24	4.65	0.167	0.183
b	0.69	1.02	0.027	0.040
b(1)	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.33	15.85	0.564	0.624
E	9.96	10.52	0.392	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)	6.10	6.71	0.240	0.264
J(1)	2.41	2.92	0.095	0.115
L	13.36	14.40	0.526	0.567
L(1)	3.33	4.04	0.131	0.159
Ø P	3.53	3.94	0.139	0.155
Q	2.54	3.00	0.100	0.118

ECN: X15-0364-Rev. C, 14-Dec-15  
DWG: 6031

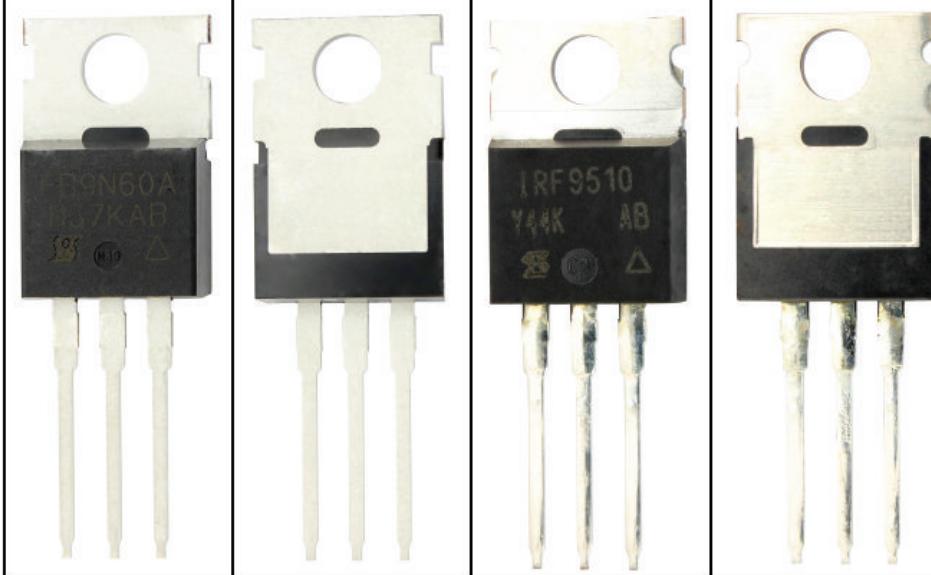
#### Note

- $M^* = 0.052$  inches to  $0.064$  inches (dimension including protrusion), heatsink hole for HVM

Package Picture

ASE

Xi'an



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