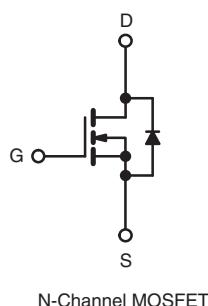
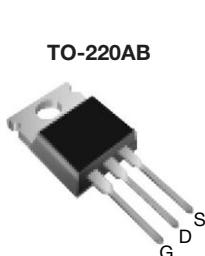


Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	400	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	0.55
Q_g (Max.) (nC)		36
Q_{gs} (nC)		9.9
Q_{gd} (nC)		16
Configuration	Single	



FEATURES

- Low Gate Charge Q_g Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Effective C_{oss} Specified
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptable Power Supply
- High Speed Power Switching

TYPICAL SMPS TOPOLOGIES

- Single Transistor Flyback Xfmr. Reset
- Single Transistor Forward Xfmr. Reset (Both for US Line Input Only)

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRF740APbF SiHF740A-E3
SnPb	IRF740A SiHF740A

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	400	
Gate-Source Voltage		V_{GS}	± 30	V
Continuous Drain Current	V_{GS} at 10 V	I_D	10	
			6.3	A
Pulsed Drain Current ^a		I_{DM}	40	
Linear Derating Factor			1.0	W/°C
Single Pulse Avalanche Energy ^b		E_{AS}	630	mJ
Repetitive Avalanche Current ^a		I_{AR}	10	A
Repetitive Avalanche Energy ^a		E_{AR}	12.5	mJ
Maximum Power Dissipation	$T_C = 25$ °C	P_D	125	W
Peak Diode Recovery dV/dt ^c		dV/dt	5.9	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

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50$ V, starting $T_J = 25$ °C, $L = 12.6$ mH, $R_g = 25$ Ω , $I_{AS} = 10$ A (see fig. 12).
- $I_{SD} \leq 10$ A, $dV/dt \leq 330$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °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}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	1.0	

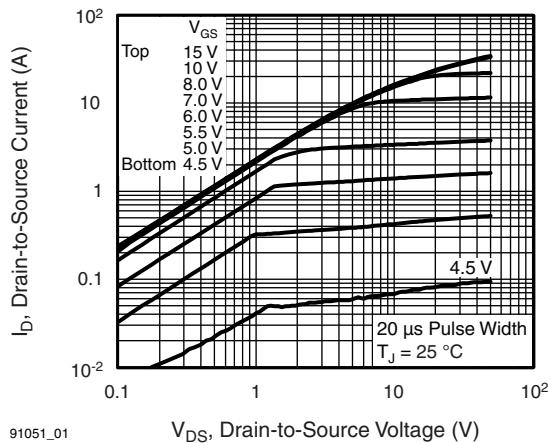
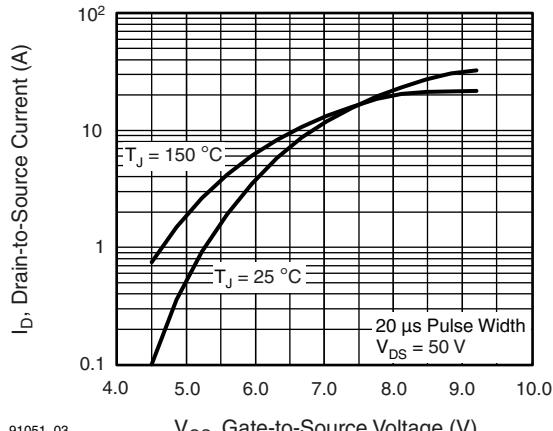
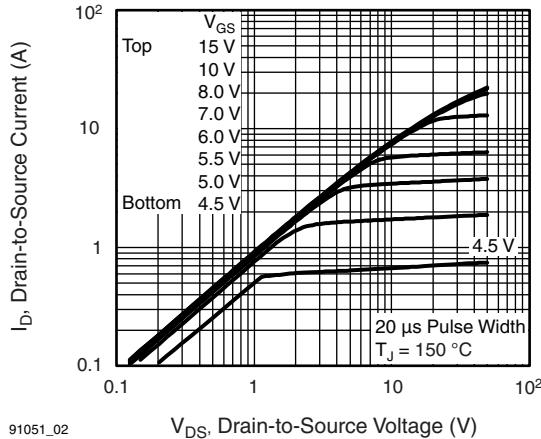
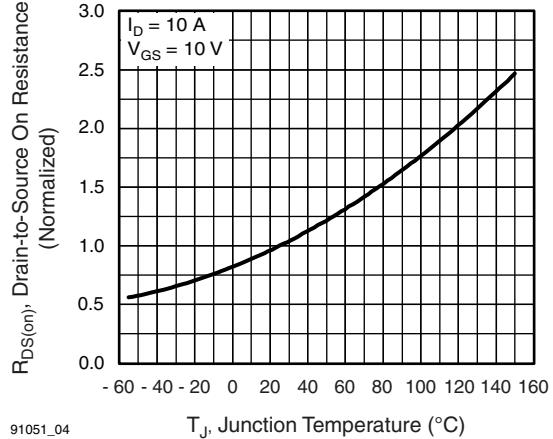
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

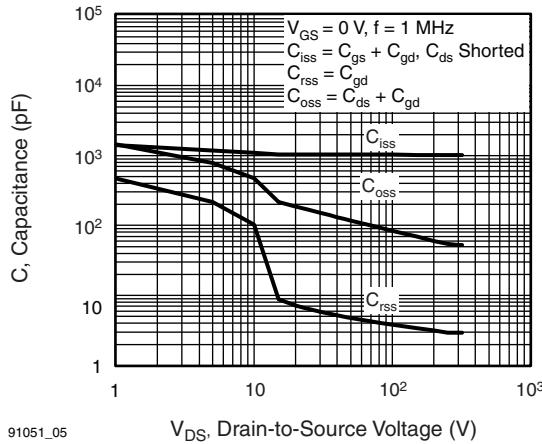
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$	$I_D = 250\text{ }\mu\text{A}$	400	-	-	V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25°C , $I_D = 1\text{ mA}$		-	0.48	-	$\text{V}/^\circ\text{C}$	
Gate-Source 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}	$V_{GS} = \pm 30\text{ V}$		-	-	± 100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 400\text{ V}$, $V_{GS} = 0\text{ V}$		-	-	25	μA	
		$V_{DS} = 320\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125^\circ\text{C}$		-	-	250		
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 6.0\text{ A}^b$	-	-	0.55	Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 6.0\text{ A}^b$		4.9	-	-	S	
Dynamic								
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5		-	1030	-	pF	
Output Capacitance	C_{oss}			-	170	-		
Reverse Transfer Capacitance	C_{rss}			-	7.7	-		
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 1.0\text{ V}$, $f = 1.0\text{ MHz}$		-	1490	-	nC	
		$V_{GS} = 0\text{ V}$, $V_{DS} = 320\text{ V}$, $f = 1.0\text{ MHz}$		-	52	-		
Effective Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 0\text{ V}$ to 320 V		-	61	-		
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 ^b	-	-	36	ns	
Gate-Source Charge	Q_{gs}			-	-	9.9		
Gate-Drain Charge	Q_{gd}			-	-	16		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200\text{ V}$, $I_D = 10\text{ A}$, $R_g = 10\text{ }\Omega$, $R_D = 19.5\text{ }\Omega$, see fig. 10 ^b		-	10	-	ns	
Rise Time	t_r			-	35	-		
Turn-Off Delay Time	$t_{d(off)}$			-	24	-		
Fall Time	t_f			-	22	-		
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	10	A	
Pulsed Diode Forward Current ^a	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}	$T_J = 25^\circ\text{C}$, $I_F = 10\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$		-	240	360	ns	
Body Diode Reverse Recovery Charge	Q_{rr}			-	1.9	2.9	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 $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

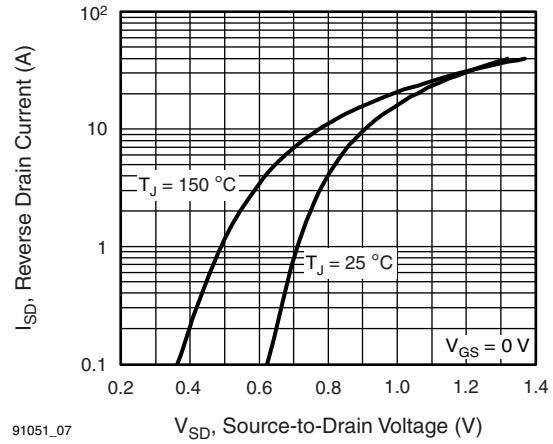
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

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



91051_05

 V_{DS} , Drain-to-Source Voltage (V)

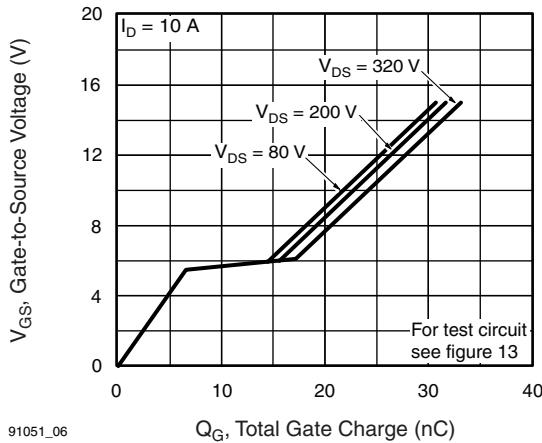
Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage



91051_07

 V_{SD} , Source-to-Drain Voltage (V)

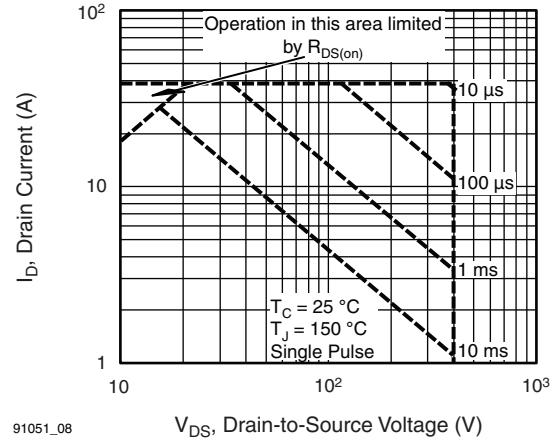
Fig. 7 - Typical Source-Drain Diode Forward Voltage



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 Q_G , Total Gate Charge (nC)

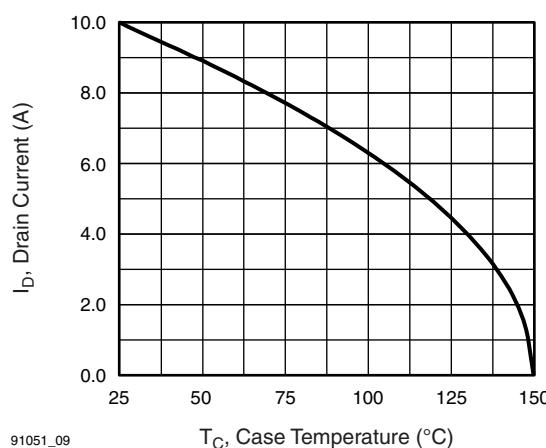
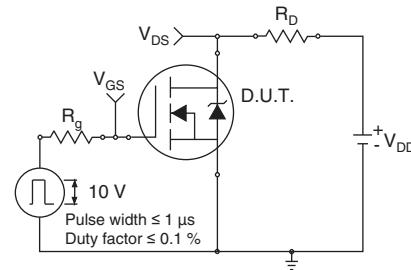
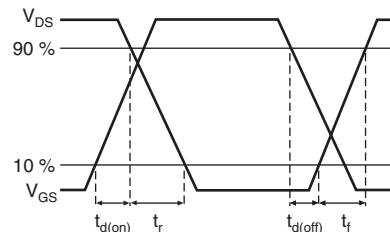
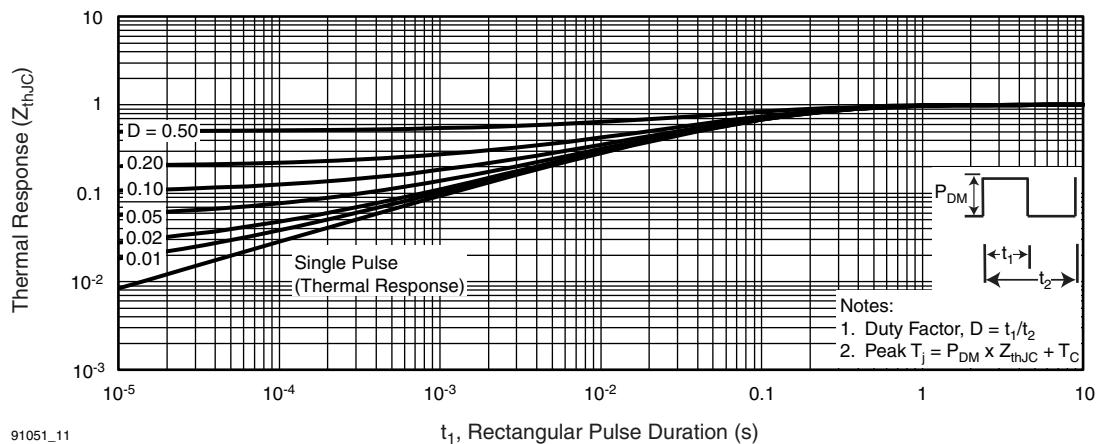
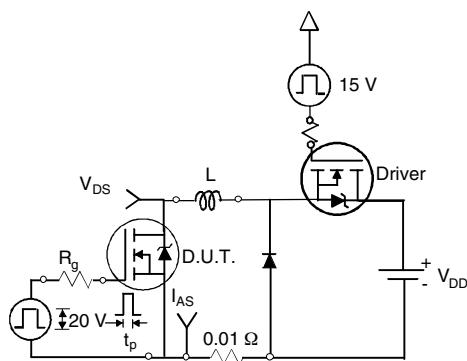
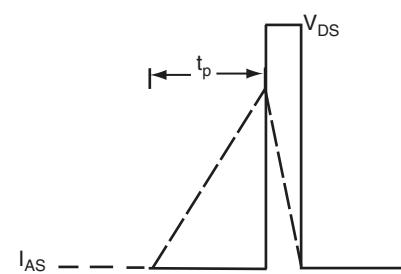
Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



91051_08

 V_{DS} , Drain-to-Source Voltage (V)

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

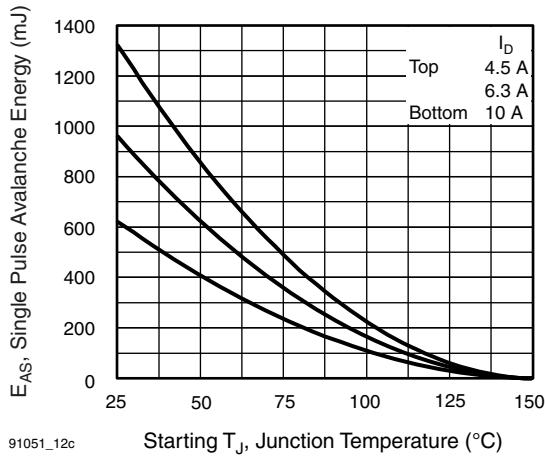


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

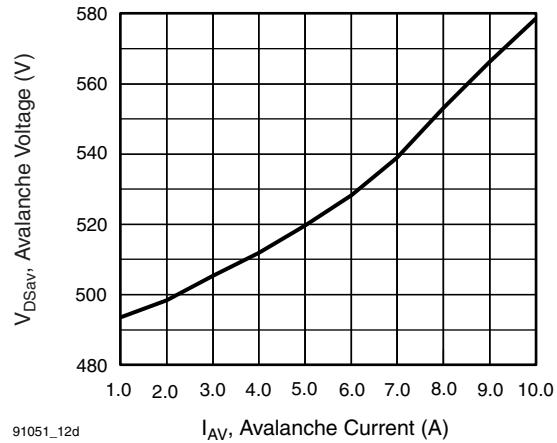


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

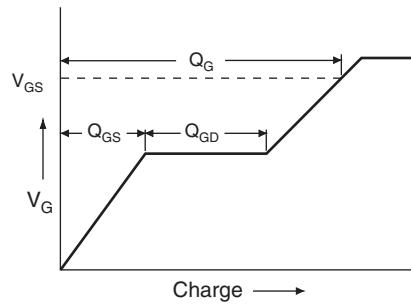


Fig. 13a - Basic Gate Charge Waveform

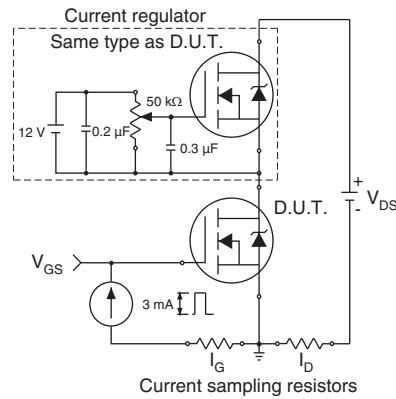
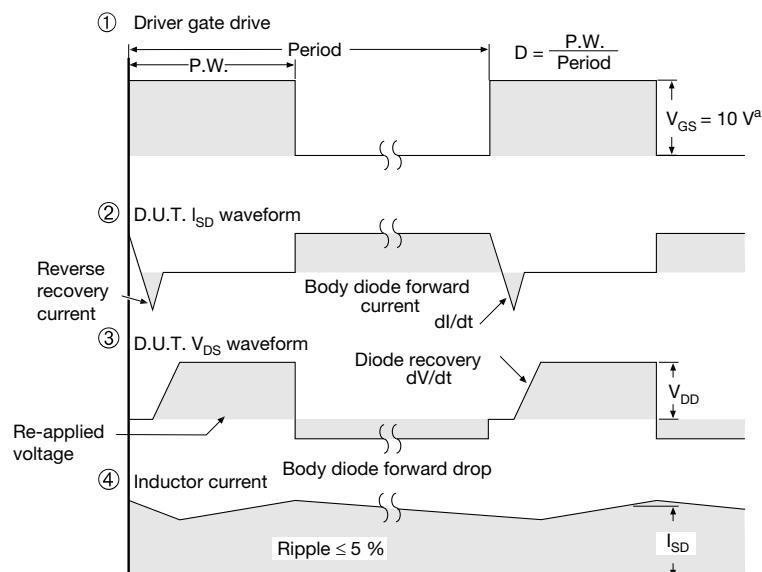
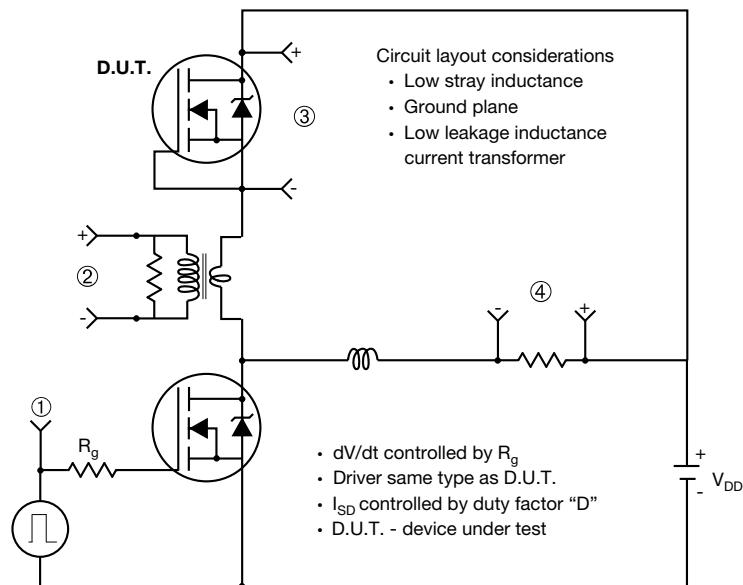


Fig. 13b - Gate Charge Test Circuit

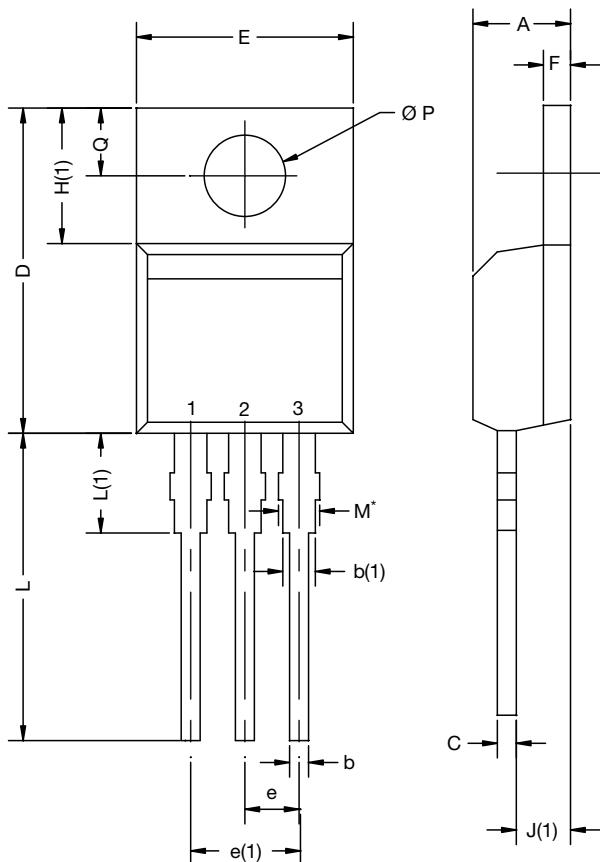
Peak Diode Recovery dV/dt Test Circuit

Note

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

Fig. 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

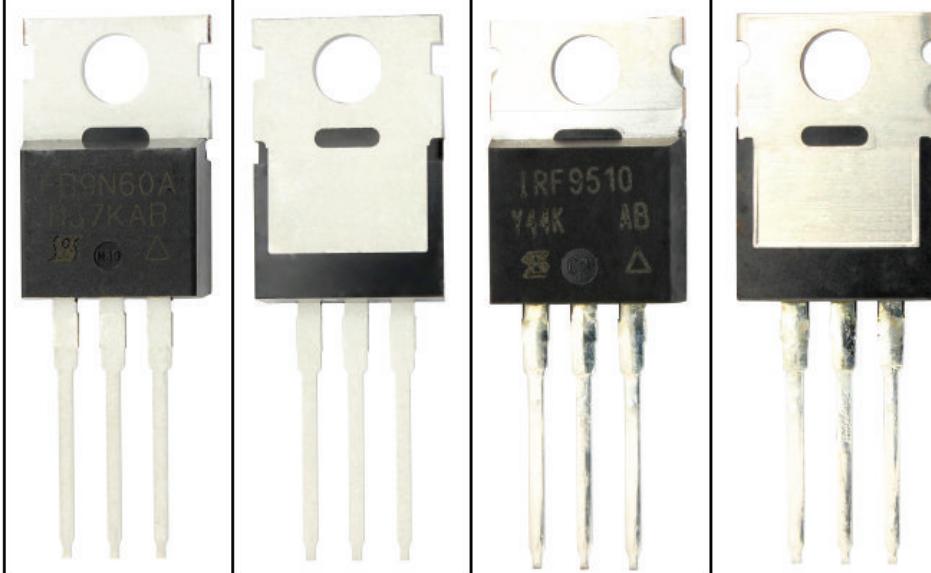
Note

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

Package Picture

ASE

Xi'an



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