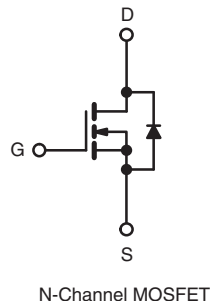
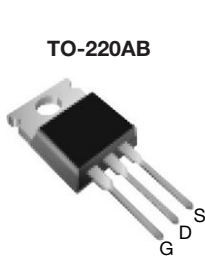


Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	400	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	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


 Available
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 ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	400	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25\text{ }^\circ\text{C}$	10
		$T_C = 100\text{ }^\circ\text{C}$	6.3
Pulsed Drain Current ^a	I_{DM}	40	A
Linear Derating Factor		1.0	W/ $^\circ\text{C}$
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	$T_C = 25\text{ }^\circ\text{C}$	P_D	125
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	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	
Mounting Torque	6-32 or M3 screw		10
			1.1

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 12.6\text{ mH}$, $R_{\theta} = 25\text{ }^\circ\text{C}$, $I_{AS} = 10\text{ A}$ (see fig. 12).
- $I_{SD} \leq 10\text{ A}$, $dV/dt \leq 330\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 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 ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	400	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$	-	0.48	-	V/°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
		$V_{DS} = 320\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	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}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}, \text{ see fig. 5}$	-	1030	-	μF
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	-	μF
		$V_{GS} = 0\text{ V}, V_{DS} = 320\text{ V}, f = 1.0\text{ MHz}$	-	52	-	
Effective Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}, V_{DS} = 0\text{ V to } 320\text{ V}$	-	61	-	μF
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}, V_{DS} = 320\text{ V}, \text{ see fig. 6 and 13}^b$	-	-	36	nC
Gate-Source Charge	Q_{gs}		-	-	9.9	
Gate-Drain Charge	Q_{gd}		-	-	16	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200\text{ V}, I_D = 10\text{ A}, R_g = 10\text{ }\Omega, R_D = 19.5\text{ }\Omega, \text{ see fig. 10}^b$	-	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}	$T_J = 25\text{ }^\circ\text{C}, I_S = 10\text{ A}, V_{GS} = 0\text{ V}^b$	-	-	2.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = 10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$	-	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)

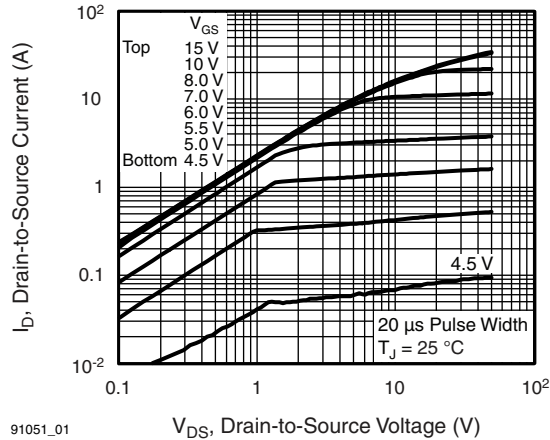


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^\circ\text{C}$

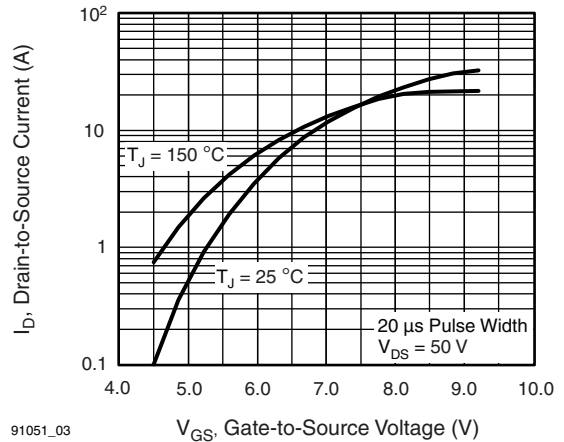


Fig. 3 - Typical Transfer Characteristics

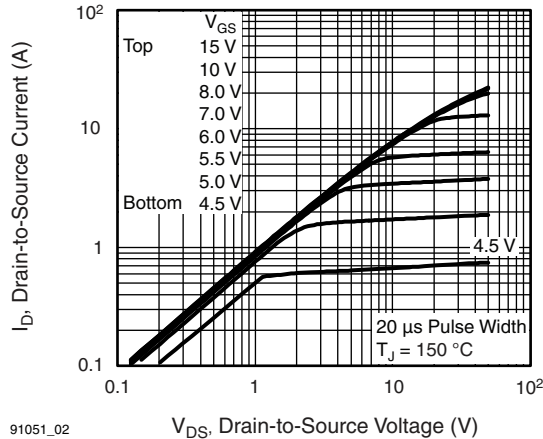


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$

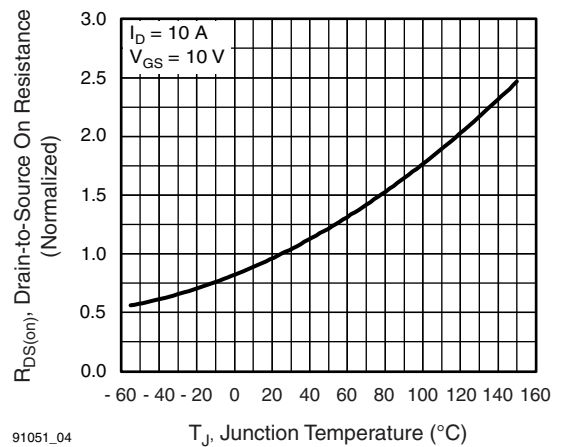
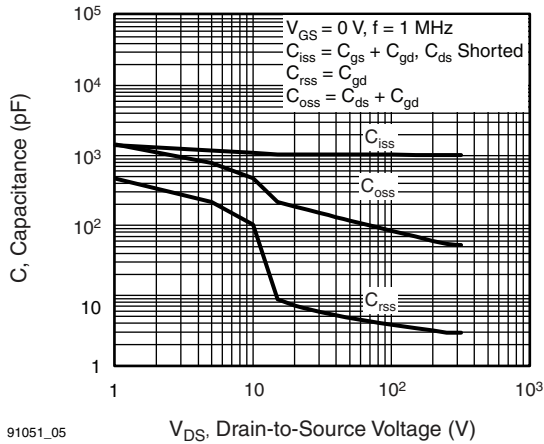
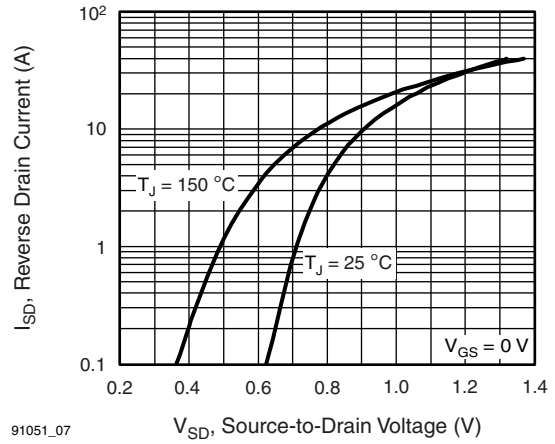


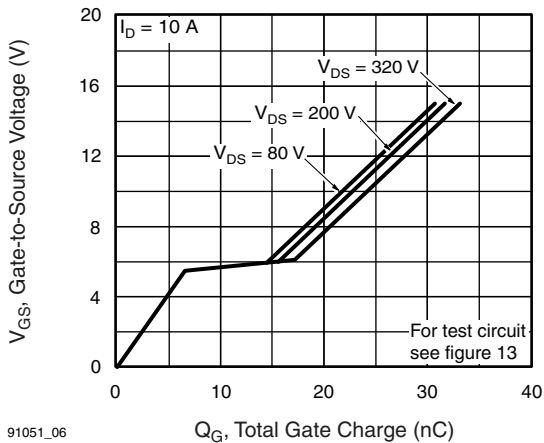
Fig. 4 - Normalized On-Resistance vs. Temperature



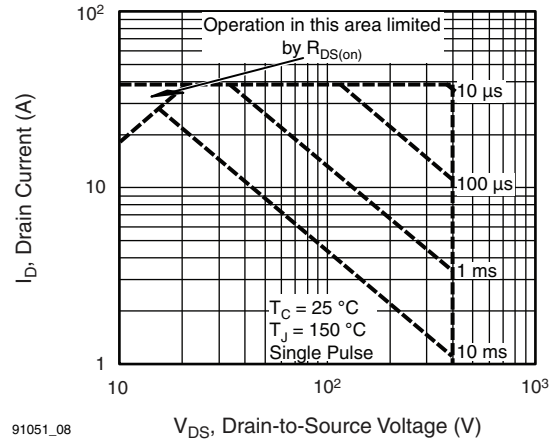
91051_05 **Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage**



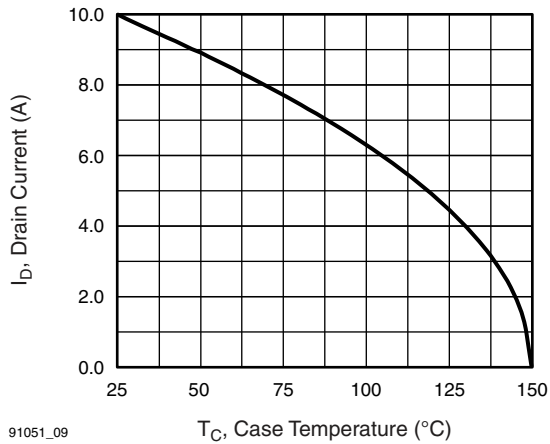
91051_07 **Fig. 7 - Typical Source-Drain Diode Forward Voltage**



91051_06 **Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage**



91051_08 **Fig. 8 - Maximum Safe Operating Area**



91051_09

Fig. 9 - Maximum Drain Current vs. Case Temperature

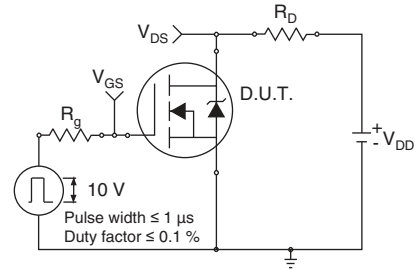
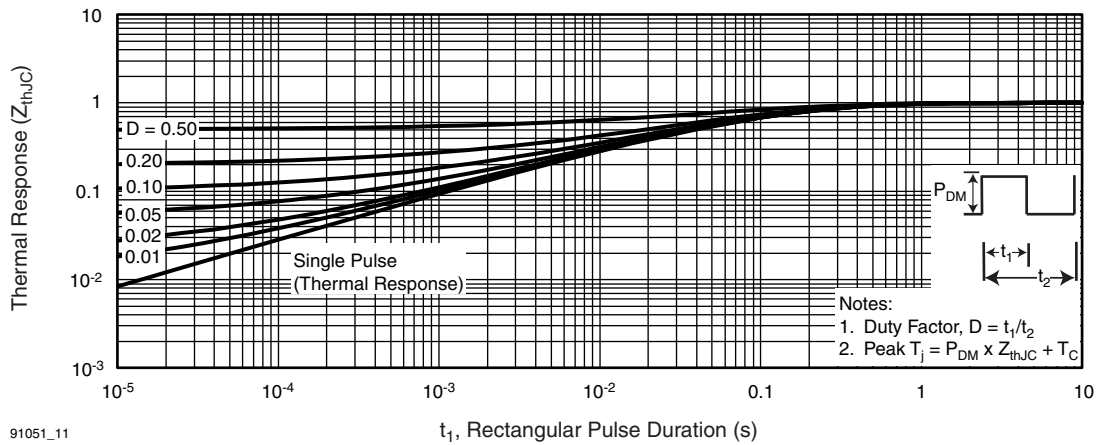


Fig. 10a - Switching Time Test Circuit



Fig. 10b - Switching Time Waveforms



91051_11

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

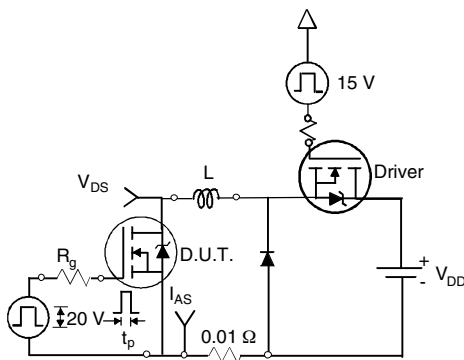


Fig. 12a - Unclamped Inductive Test Circuit

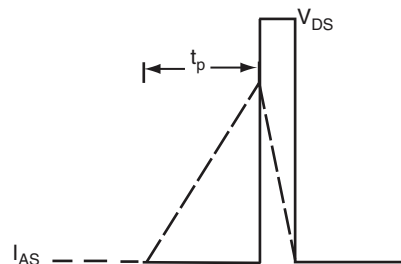


Fig. 12b - Unclamped Inductive Waveforms

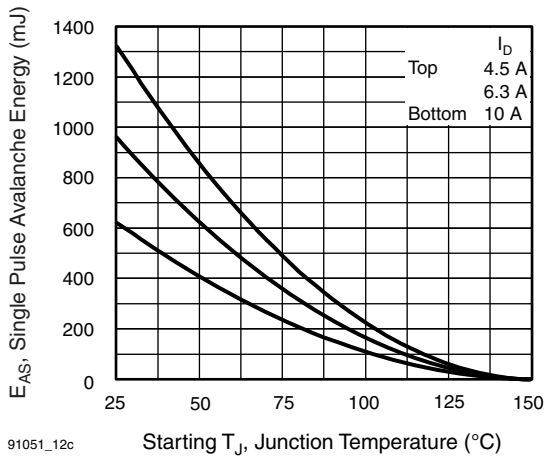


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

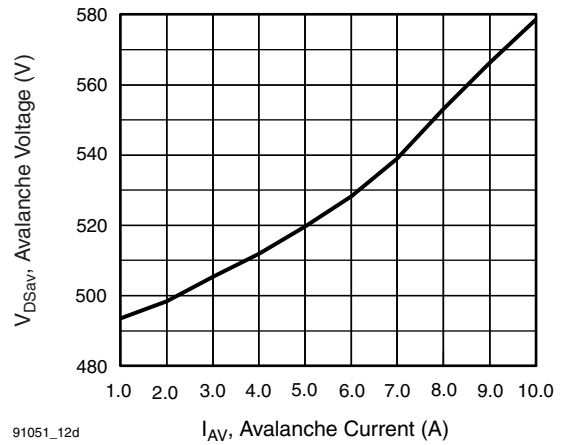


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

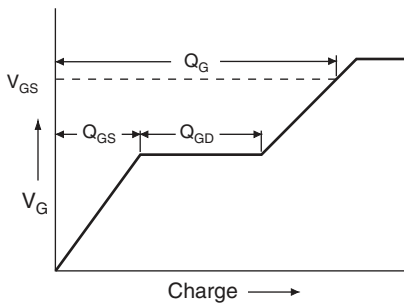


Fig. 13a - Basic Gate Charge Waveform

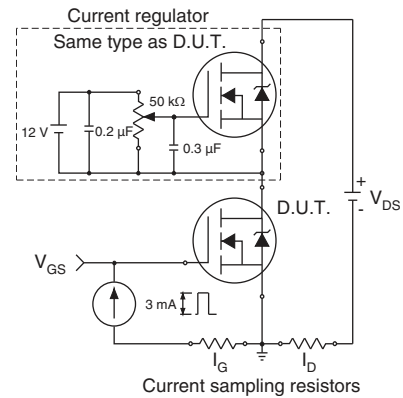
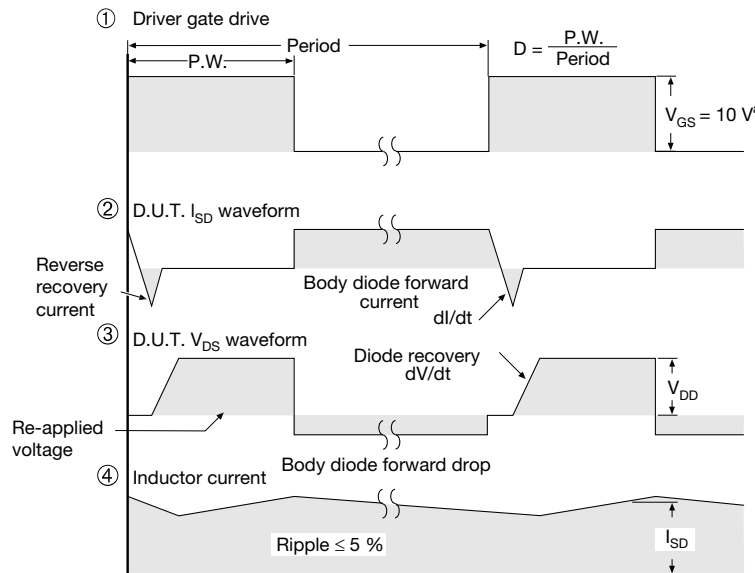
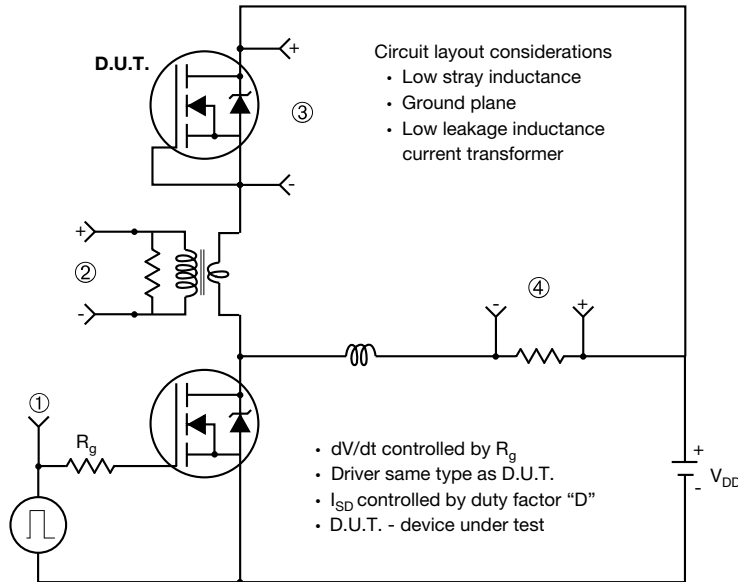


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



Note

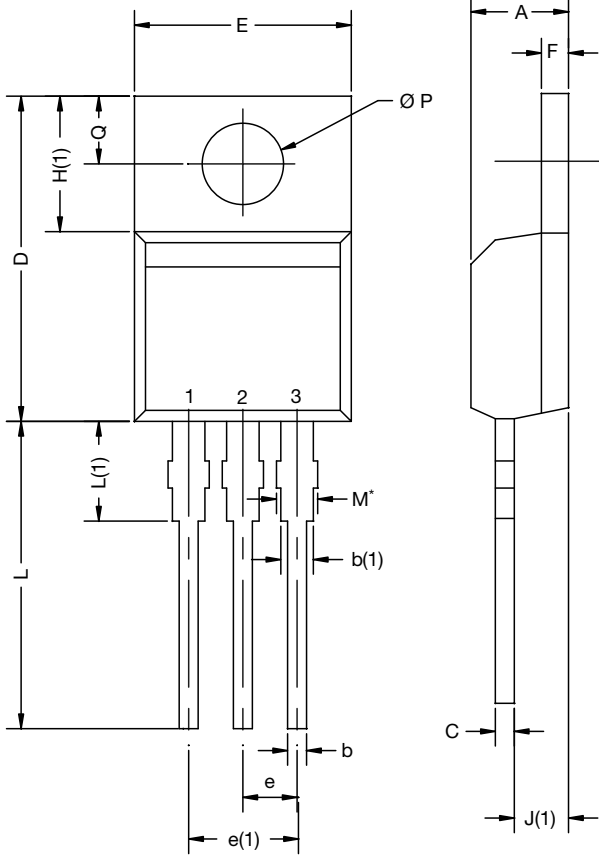
a. $V_{GS} = 5\text{ V}$ for logic level devices

Fig. 14 - For N-Channel

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TO-220-1

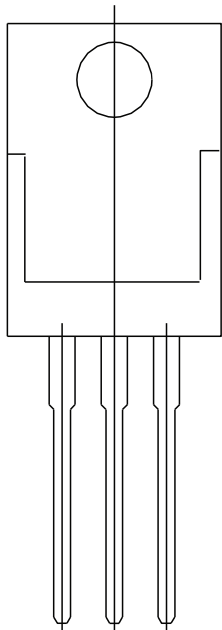


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.14	4.70	0.163	0.185
b	0.69	1.02	0.027	0.040
b(1)	1.14	1.73	0.045	0.068
c	0.36	0.61	0.014	0.024
D	14.33	15.85	0.564	0.624
E	9.96	10.52	0.392	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	0.43	1.40	0.017	0.055
H(1)	6.10	6.48	0.240	0.255
J(1)	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
$\varnothing P$	3.53	3.94	0.139	0.155
Q	2.59	3.00	0.102	0.118

ECN: X15-0003-Rev. A, 19-Jan-15
DWG: 6031

Notes

- M^* = 0.052 inches to 0.064 inches (dimension including protrusion), heatsink hole for HVM
- Outline conforms to JEDEC® outline TO-220AB with exception of dimension F





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