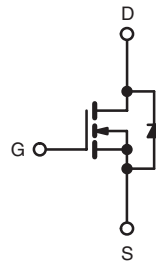
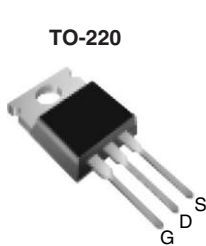


Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	500	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	0.26
Q_g (Max.) (nC)	120	
Q_{gs} (nC)	34	
Q_{gd} (nC)	54	
Configuration	Single	



N-Channel MOSFET

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
- Low $R_{DS(on)}$
- Lead (Pb)-free Available



RoHS*
COMPLIANT

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits

ORDERING INFORMATION	
Package	TO-220
Lead (Pb)-free	IRFB18N50KPbF
	SiHFB18N50K-E3
SnPb	IRFB18N50K
	SiHFB18N50K

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	500	V	
Gate-Source Voltage	V_{GS}	± 30		
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25$ °C	A	
		$T_C = 100$ °C		
Pulsed Drain Current ^a	I_{DM}	68		
Linear Derating Factor		1.8	W/°C	
Single Pulse Avalanche Energy ^b	E_{AS}	370	mJ	
Repetitive Avalanche Current ^a	I_{AR}	17	A	
Repetitive Avalanche Energy ^a	E_{AR}	22	mJ	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	220	W
Peak Diode Recovery dV/dt^c		dV/dt	7.8	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		

Notes


- Repetitive rating; pulse width limited by maximum junction temperature.
- Starting $T_J = 25$ °C, $L = 2.5$ mH, $R_G = 25$ Ω , $I_{AS} = 17$ A.
- $I_{SD} \leq 17$ A, $dI/dt \leq 376$ 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 ^a	R_{thJA}	-	58	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain) ^a	R_{thJC}	-	0.56	

Note

a. R_{th} is measured at T_J approximately 90 °C.

SPECIFICATIONS $T_J = 25\text{ °C}$, unless otherwise noted							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		500	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = 1\text{ mA}$		-	0.59	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		3.0	-	5.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$		-	-	50	μA
		$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ °C}$		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 10\text{ A}^b$	-	0.26	0.29	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}, I_D = 10\text{ A}$		6.4	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V},$ $V_{DS} = 25\text{ V},$ $f = 1.0\text{ MHz},$ see fig. 5		-	2830	-	pF
Output Capacitance	C_{oss}			-	330	-	
Reverse Transfer Capacitance	C_{rss}			-	38	-	
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}, f = 1.0\text{ MHz}$	-	3310	-	pF
			$V_{DS} = 400\text{ V}, f = 1.0\text{ MHz}$	-	93	-	
Effective Output Capacitance	$C_{oss\text{ eff.}}$	$V_{DS} = 0\text{ V to }400\text{ V}^c$		-	155	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 17\text{ A}, V_{DS} = 400\text{ V},$ see fig. 6 and 13 ^b	-	-	120	nC
Gate-Source Charge	Q_{gs}			-	-	34	
Gate-Drain Charge	Q_{gd}			-	-	54	
Turn-On Delay Time	$t_{d(on)}$		$V_{DD} = 250\text{ V}, I_D = 17\text{ A},$ $R_G = 7.5\text{ }\Omega,$ see fig. 10 ^b	-	22	-	ns
Rise Time	t_r			-	60	-	
Turn-Off Delay Time	$t_{d(off)}$	-		45	-		
Fall Time	t_f	-		30	-		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	17	A	
Pulsed Diode Forward Current ^a	I_{SM}		-	-	68		
Body Diode Voltage	V_{SD}	$T_J = 25\text{ °C}, I_S = 17\text{ A}, V_{GS} = 0\text{ V}^b$		-	-	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ °C}, I_F = 17\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$		-	520	780	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	5.3	8.0	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 $\leq 2\%$.
- c. $C_{oss\text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80 % V_{DS} .

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

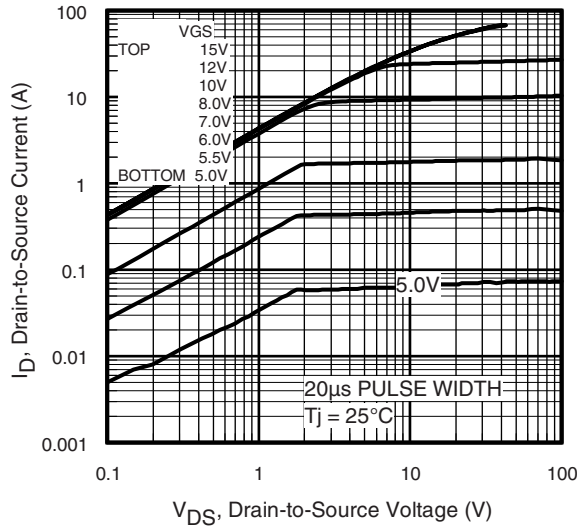


Fig. 1 - Typical Output Characteristics

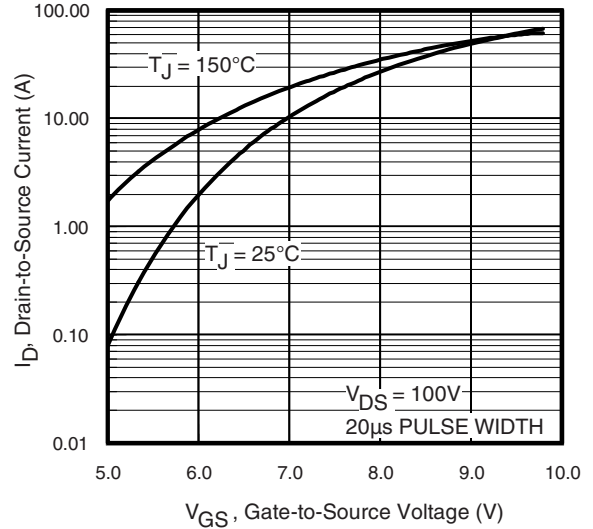


Fig. 3 - Typical Transfer Characteristics

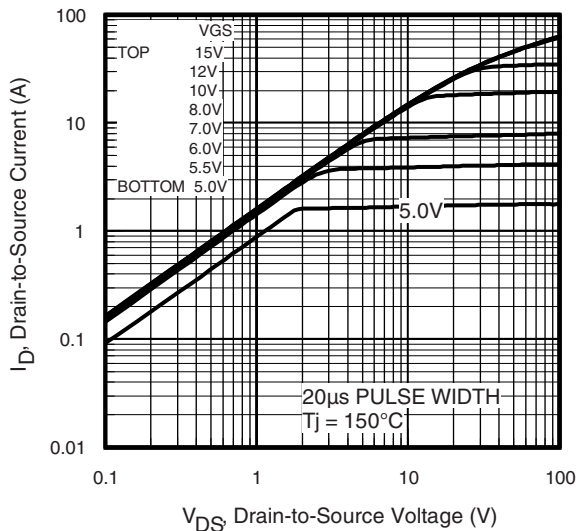


Fig. 2 - Typical Output Characteristics

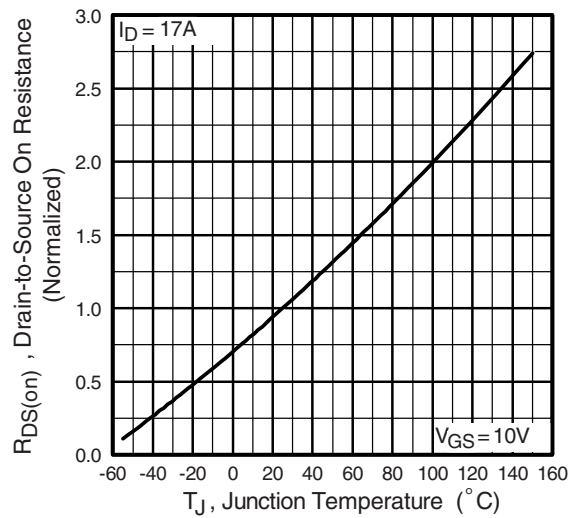


Fig. 4 - Normalized On-Resistance vs. Temperature

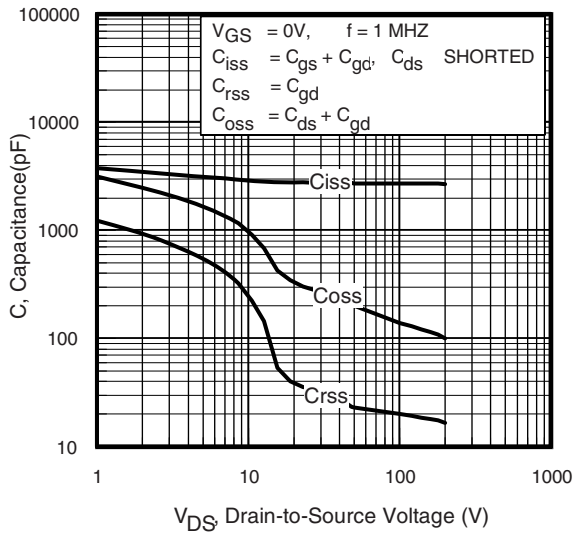


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

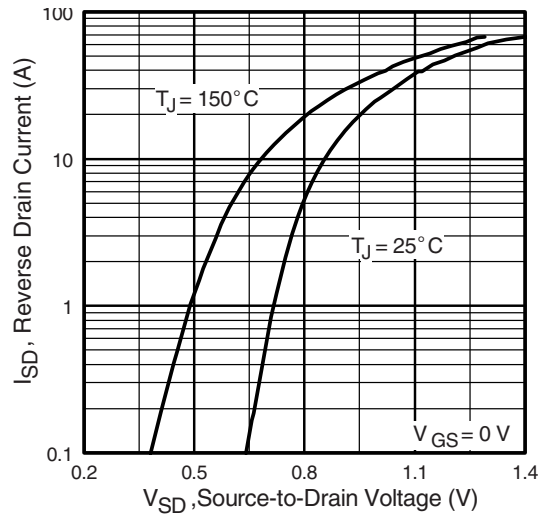


Fig. 7 - Typical Source-Drain Diode Forward Voltage

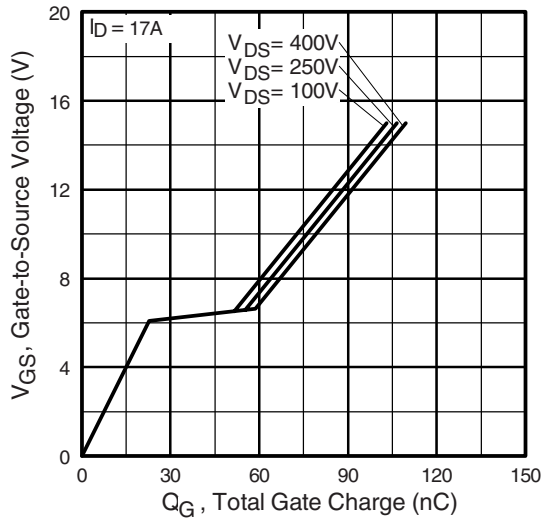


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

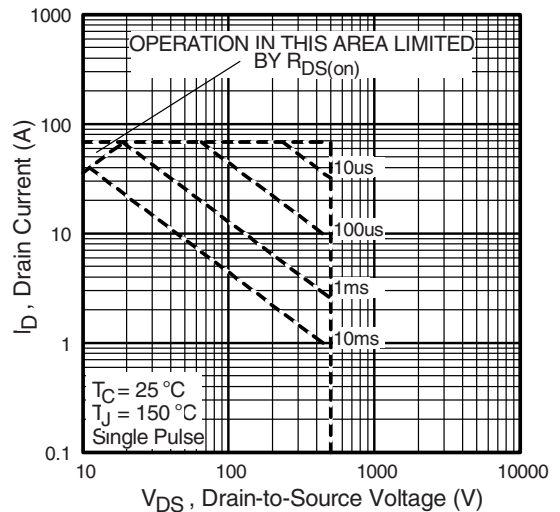


Fig. 8 - Maximum Safe Operating Area

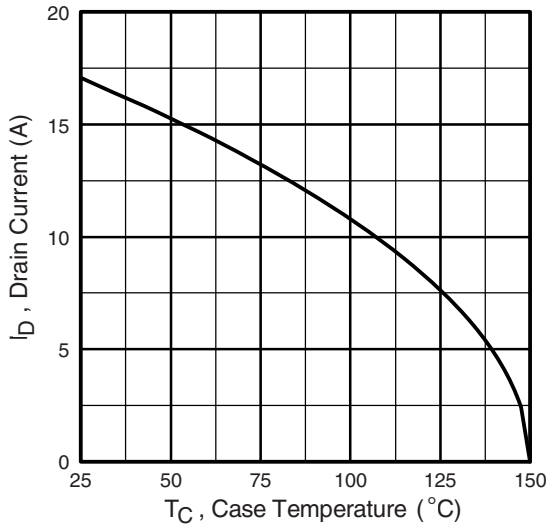


Fig. 9 - Maximum Drain Current vs. Case Temperature

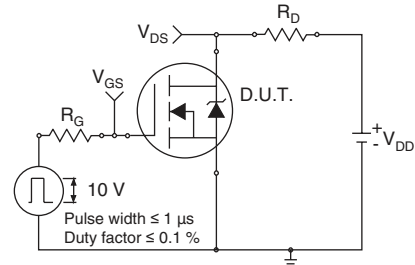


Fig. 10a - Switching Time Test Circuit



Fig. 10b - Switching Time Waveforms

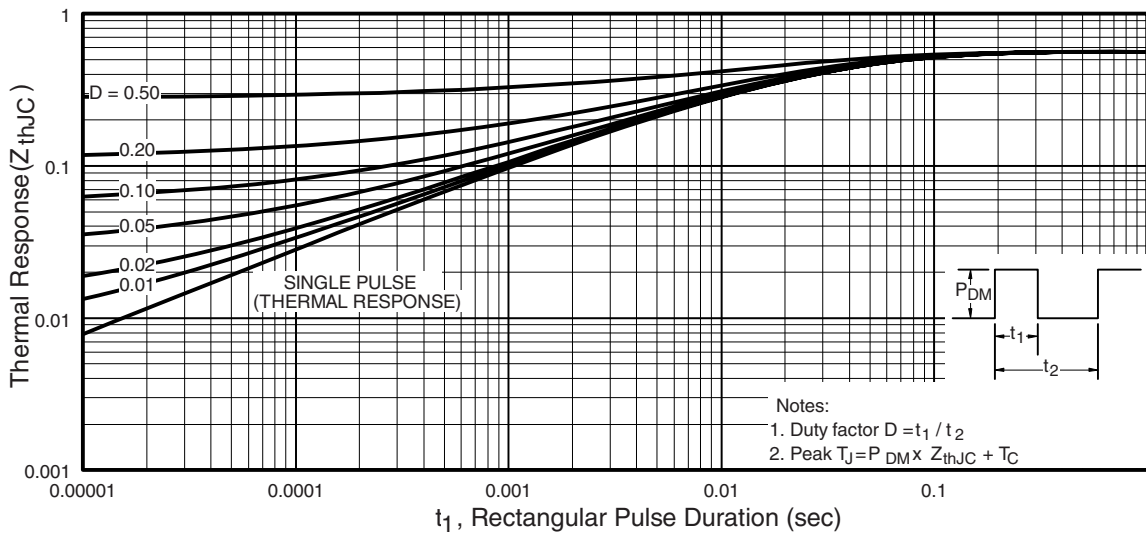


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

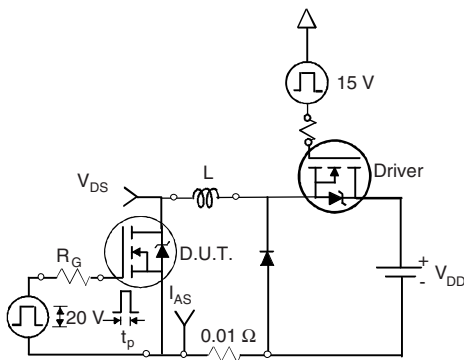


Fig. 12a - Unclamped Inductive Test Circuit

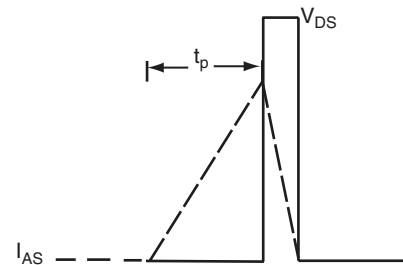


Fig. 12b - Unclamped Inductive Waveforms

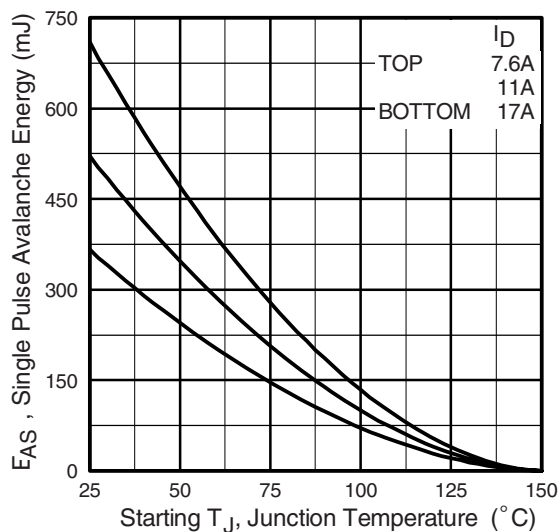


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

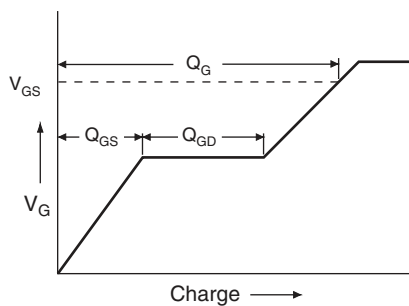


Fig. 13a - Basic Gate Charge Waveform

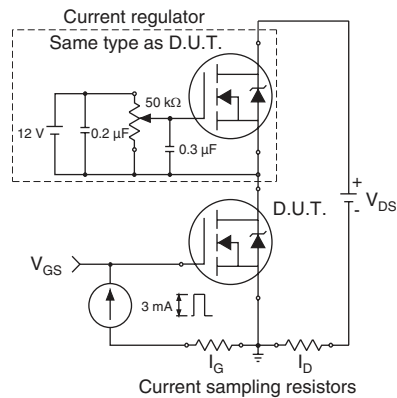
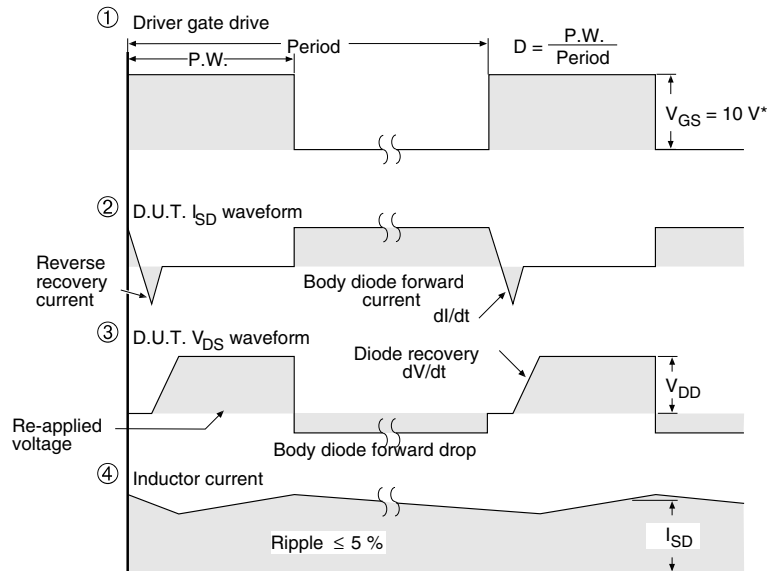
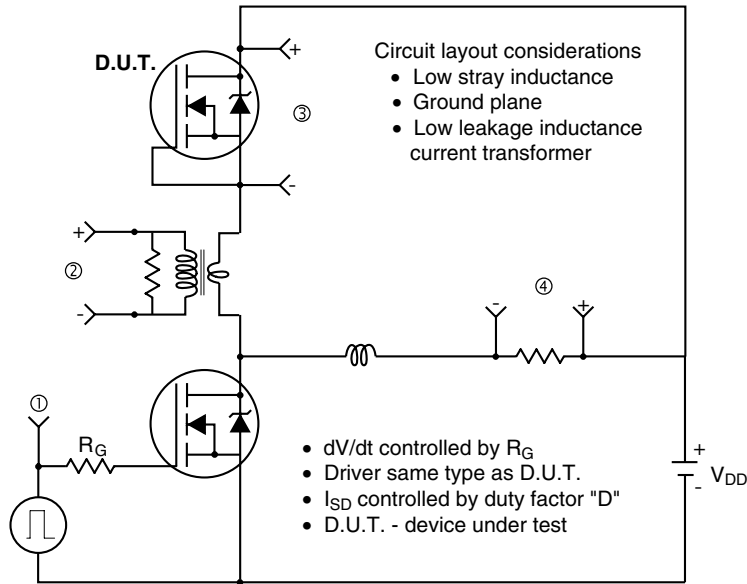


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



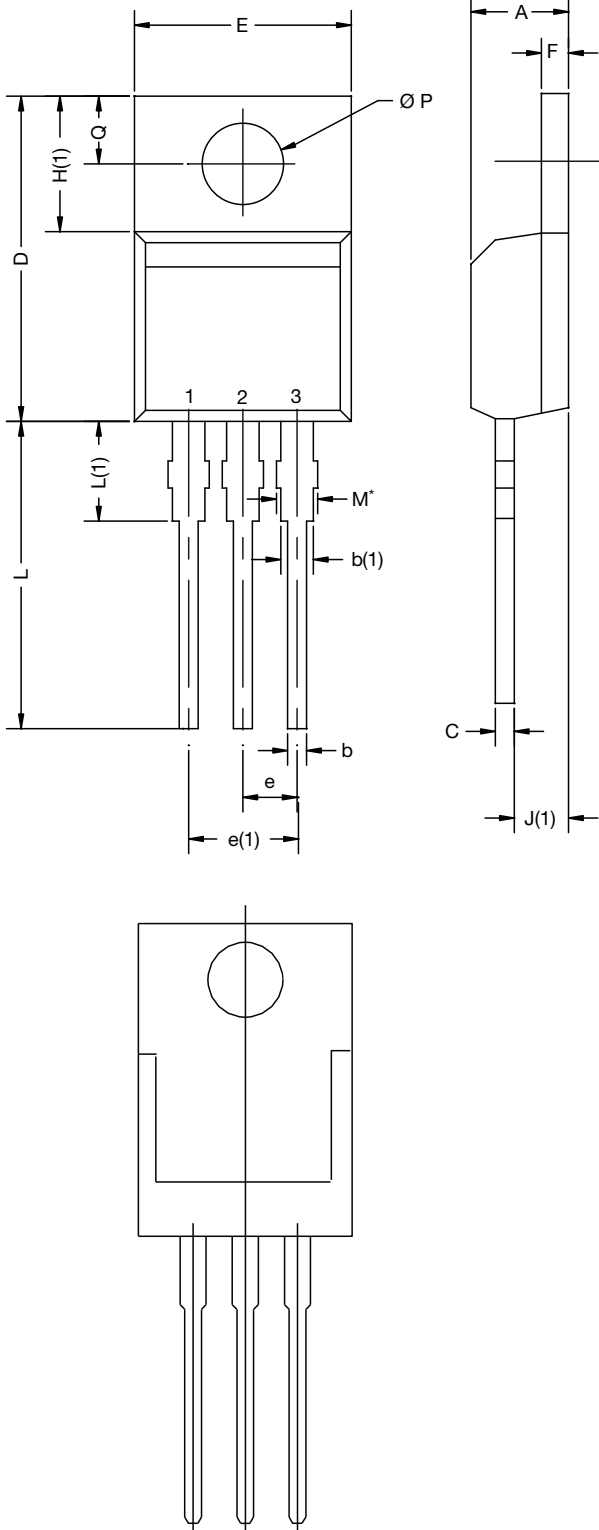
* $V_{GS} = 5\text{ V}$ for logic level devices

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	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.32	15.86	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	0.51	1.40	0.020	0.055
H(1)	6.10	6.70	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	4.05	0.131	0.159
$\varnothing P$	3.53	3.94	0.139	0.155
Q	2.54	3.00	0.100	0.118

ECN: X15-0339-Rev. B, 02-Nov-15
DWG: 6031

Note

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



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