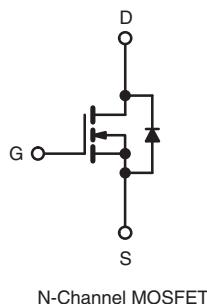
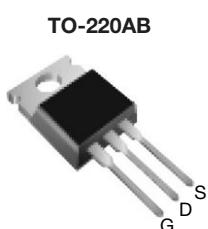


Power MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	500
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V 0.28
Q_g (Max.) (nC)	130
Q_{gs} (nC)	33
Q_{gd} (nC)	59
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
- Low t_{rr} and Soft Diode Recovery
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching
- ZVS and High Frequency Circuit
- PWM Inverters

ORDERING INFORMATION

Package	TO-220AB
Lead (Pb)-free	IRFB17N50LPbF SiHFB17N50L-E3
SnPb	IRFB17N50L SiHFB17N50L

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	I_D	16	A
		11	
Pulsed Drain Current ^a	I_{DM}	64	
Linear Derating Factor		1.8	W/°C
Single Pulse Avalanche Energy ^b	E_{AS}	390	mJ
Repetitive Avalanche Current ^a	I_{AR}	16	A
Repetitive Avalanche Energy ^a	E_{AR}	22	mJ
Maximum Power Dissipation	P_D	220	W
Peak Diode Recovery dV/dt ^c	dV/dt	13	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).
- Starting $T_J = 25$ °C, $L = 3.0$ mH, $R_g = 25$ Ω , $I_{AS} = 16$ A (see fig. 12).
- $I_{SD} \leq 16$ A, $dI/dt \leq 347$ 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

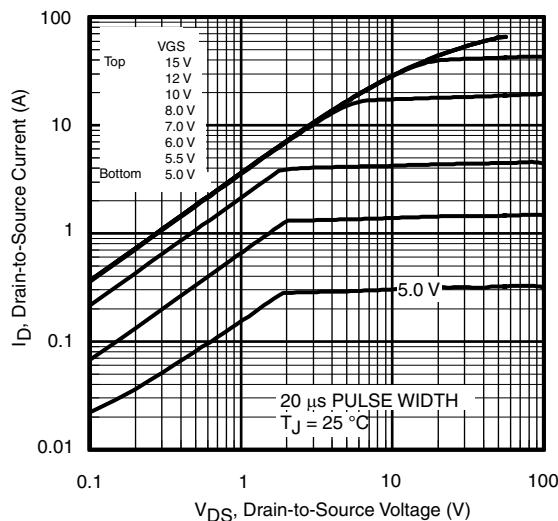
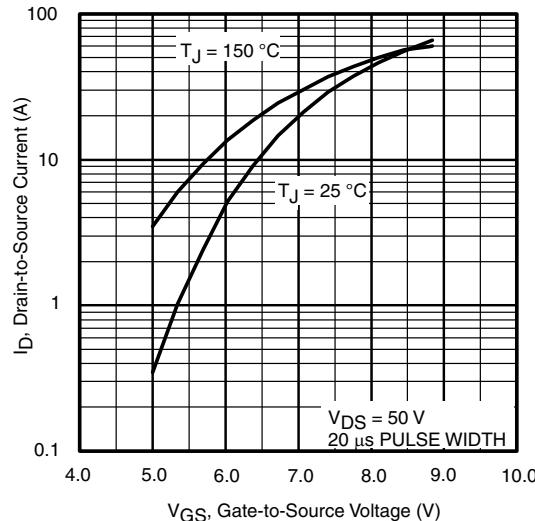
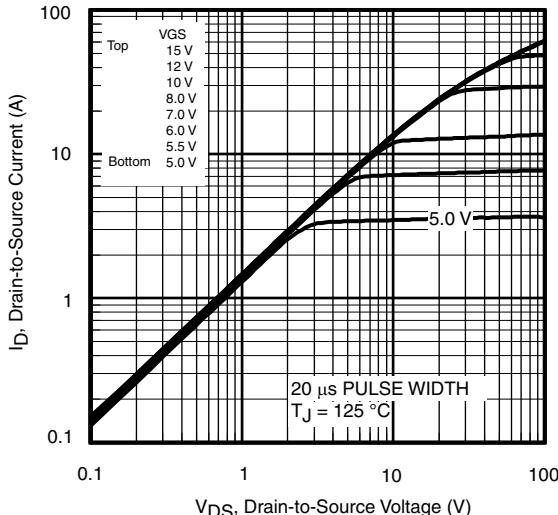
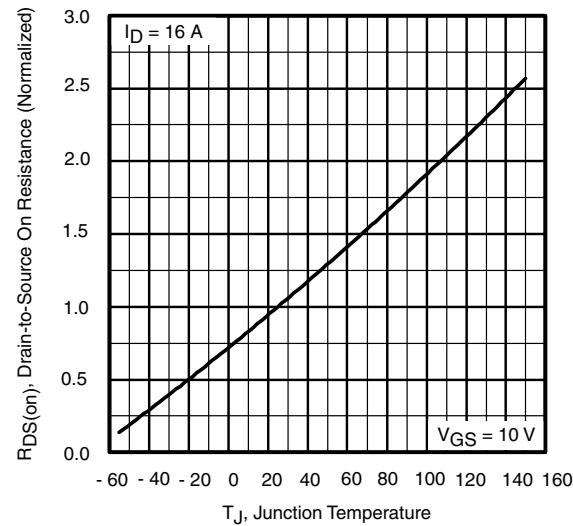
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.56	

 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		500	-	-	V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = 1$ mA		-	0.6	-	V/°C	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ µA		3.0	-	5.0	V	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30$ V		-	-	± 100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500$ V, $V_{GS} = 0$ V		-	-	50	µA	
		$V_{DS} = 400$ V, $V_{GS} = 0$ V, $T_J = 125$ °C		-	-	2.0	mA	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10$ V	$I_D = 9.9$ A ^b	-	0.28	0.32	Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 50$ V, $I_D = 9.9$ A ^b		11	-	-	S	
Dynamic								
Input Capacitance	C_{iss}	$V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1.0$ MHz, see fig. 5		-	2760	-	pF	
Output Capacitance	C_{oss}			-	325	-		
Reverse Transfer Capacitance	C_{rss}			-	37	-		
Output Capacitance	C_{oss}	$V_{GS} = 0$ V	$V_{DS} = 1.0$ V, $f = 1.0$ MHz	-	3690	-	pF	
		$V_{GS} = 0$ V	$V_{DS} = 400$ V, $f = 1.0$ MHz	-	84	-		
Effective Output Capacitance	$C_{oss\ eff.}$	$V_{GS} = 0$ V	$V_{DS} = 0$ V to 400 V ^c	-	159	-	pF	
Total Gate Charge	Q_g	$V_{GS} = 10$ V	$I_D = 16$ A, $V_{DS} = 400$ V, see fig. 6 and 13 ^b	-	-	130	nC	
Gate-Source Charge	Q_{gs}			-	-	33		
Gate-Drain Charge	Q_{gd}			-	-	59		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250$ V, $I_D = 16$ A, $R_g = 7.5$ Ω, see fig. 10 ^b		-	21	-	ns	
Rise Time	t_r		-	51	-			
Turn-Off Delay Time	$t_{d(off)}$		-	50	-			
Fall Time	t_f		-	28	-			
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	16	A	
Pulsed Diode Forward Current ^a	I_{SM}			-	-	64		
Body Diode Voltage	V_{SD}	$T_J = 25$ °C, $I_S = 16$ A, $V_{GS} = 0$ V ^b		-	-	1.5	V	
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25$ °C	$I_F = 16$ A, $dl/dt = 100$ A/µs ^b	-	170	250	ns	
		$T_J = 125$ °C		-	220	330		
Body Diode Reverse Recovery Charge	Q_{rr}	$T_J = 25$ °C		-	470	710	nC	
		$T_J = 125$ °C		-	810	1210		
Reverse Recovery Current	I_{RRM}			-	7.3	11	A	
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

Fig. 3 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics

Fig. 4 - Normalized On-Resistance vs. Temperature

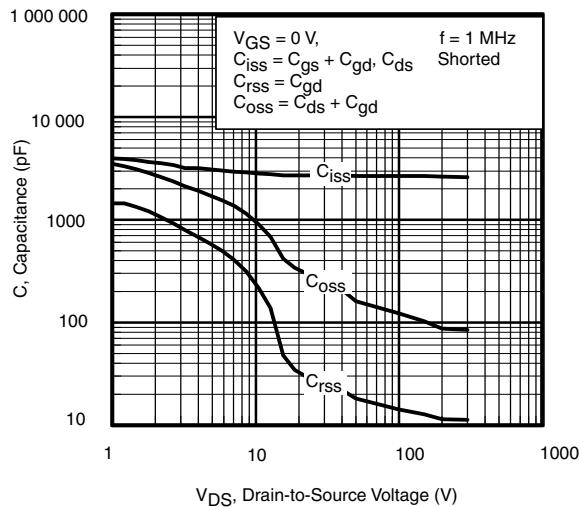


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

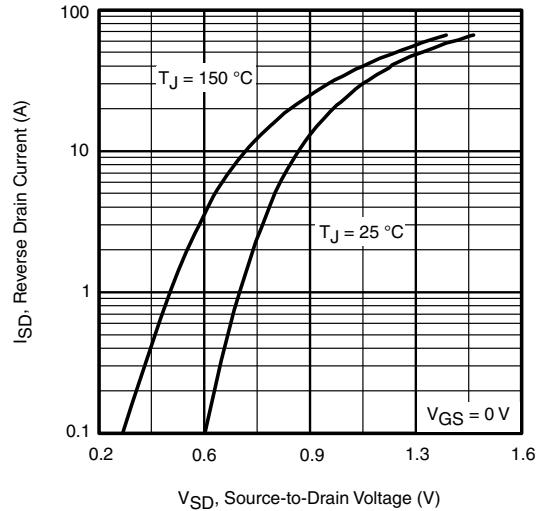


Fig. 7 - Typical Source-Drain Diode Forward Voltage

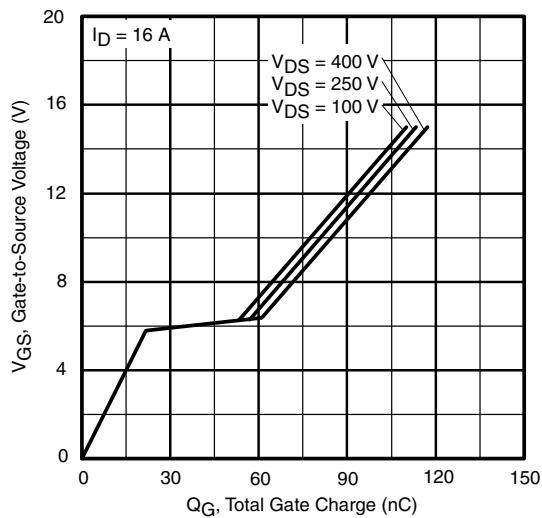


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

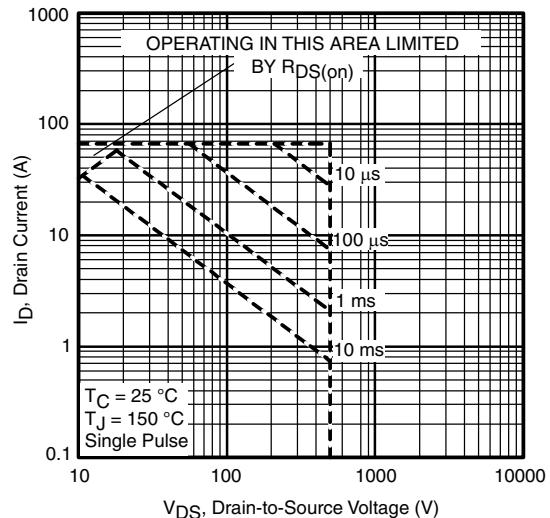


Fig. 8 - Maximum Safe Operating Area

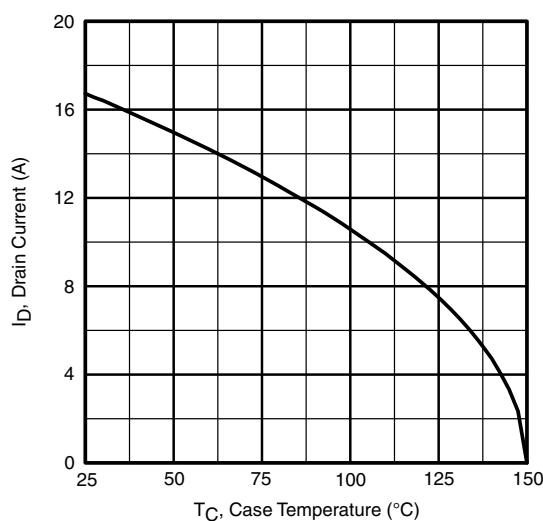


Fig. 9 - Maximum Drain Current vs. Case Temperature

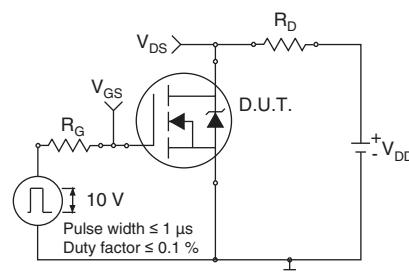


Fig. 10a - Switching Time Test Circuit

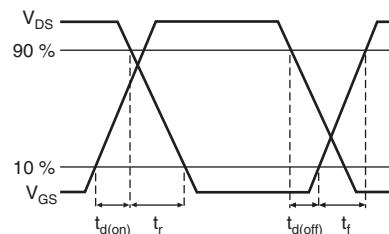


Fig. 10b - Switching Time Waveforms

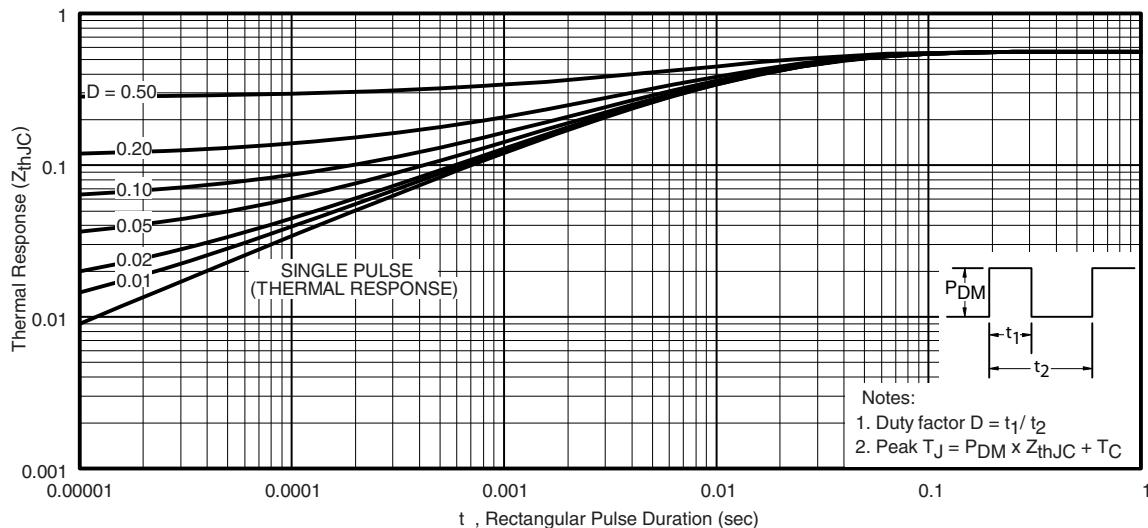


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

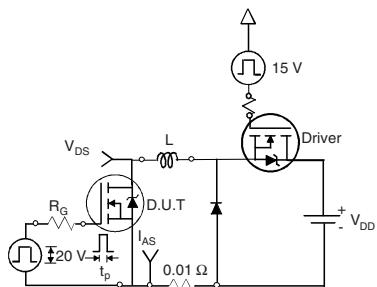


Fig. 12a - Unclamped Inductive Test Circuit

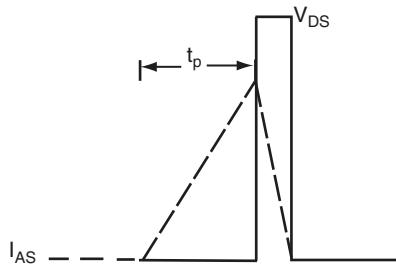


Fig. 12b - Unclamped Inductive Waveforms

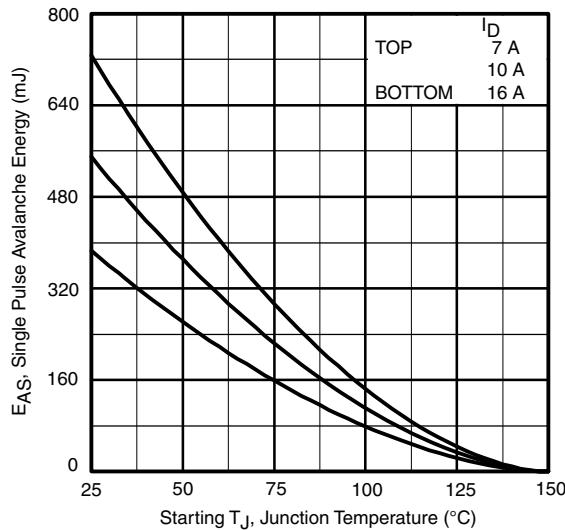


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

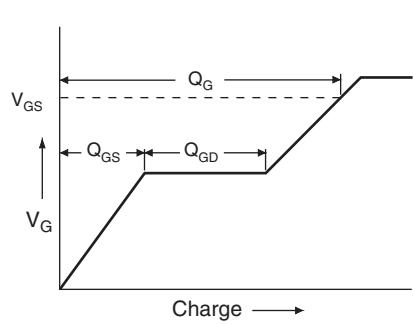


Fig. 13a - Basic Gate Charge Waveform

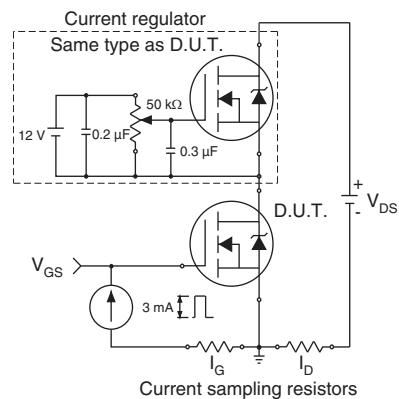
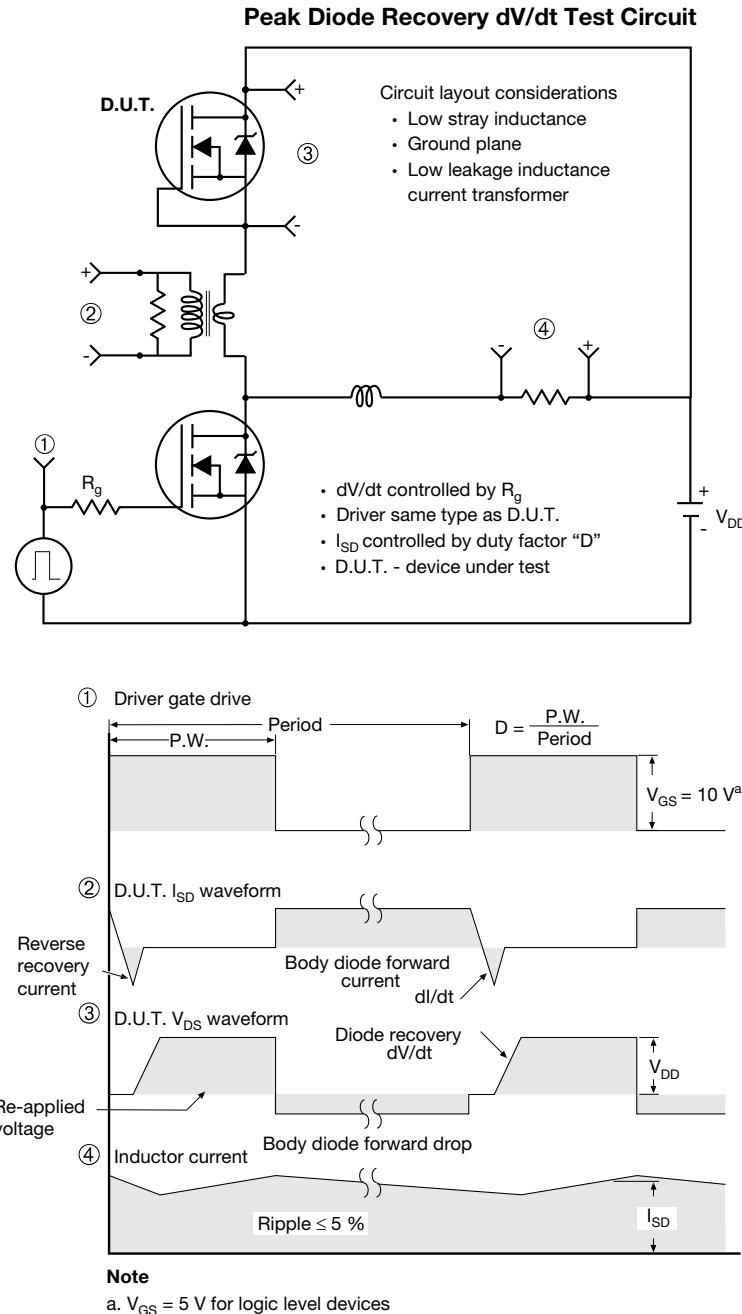
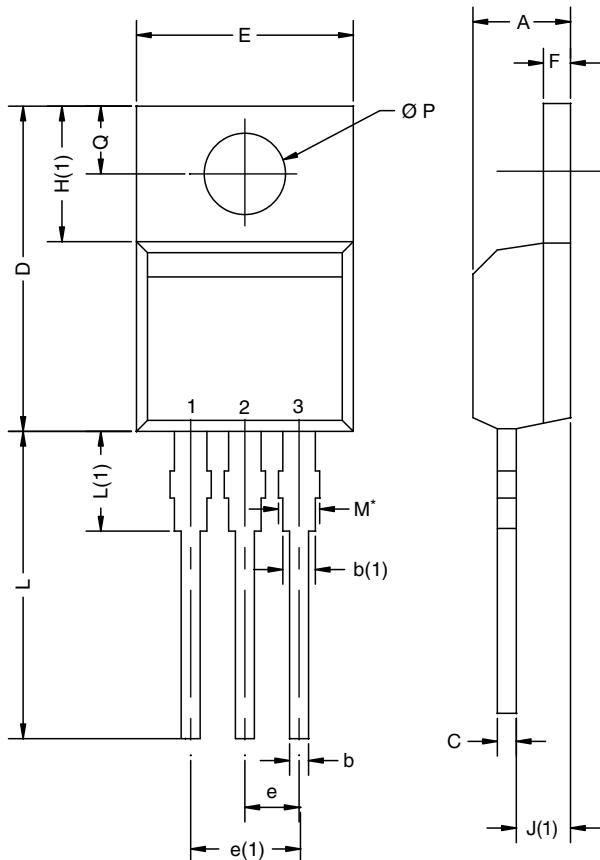


Fig. 13b - Gate Charge Test Circuit


Fig. 14 - For N-Channel

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TO-220AB

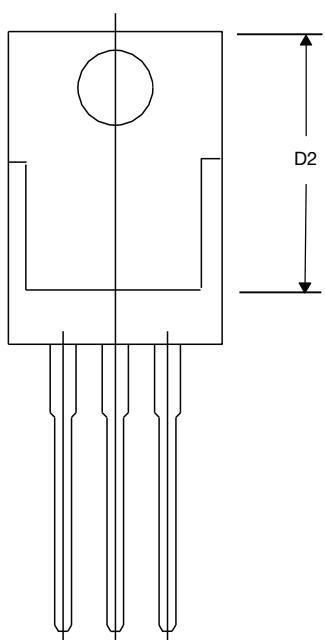


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	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: T14-0413-Rev. P, 16-Jun-14
DWG: 5471

Note

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



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