

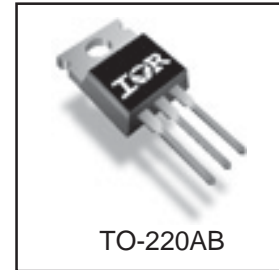
Applications

- Zero Voltage Switching SMPS
- Telecom and Server Power Supplies
- Uninterruptible Power Supplies
- Motor Control applications

V_{DSS}	R_{DS(on)} typ.	I_D
500V	0.28Ω	16A

Features and Benefits

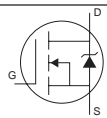
- SuperFast body diode eliminates the need for external diodes in ZVS applications.
- Lower Gate charge results in simpler drive requirements.
- Enhanced dv/dt capabilities offer improved ruggedness.
- Higher Gate voltage threshold offers improved noise immunity.



Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	16	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	11	
I _{DM}	Pulsed Drain Current ①	64	
P _D @ T _C = 25°C	Power Dissipation	220	W
	Linear Derating Factor	1.8	W/°C
V _{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	10	V/ns
T _J	Operating Junction and Storage Temperature Range	-55 to + 150	°C
T _{STG}			
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting Torque, 6-32 or M3 screw	10	lbf.in(N.m)

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	16	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	64		
V _{SD}	Diode Forward Voltage	—	—	1.5	V	T _J = 25°C, I _S = 16A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time	—	170	250	ns	T _J = 25°C
		—	220	330		T _J = 125°C
Q _{rr}	Reverse Recovery Charge	—	470	710	nC	T _J = 25°C
		—	810	1210		T _J = 125°C
I _{RRM}	Reverse Recovery Current	—	7.3	11	A	
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

IRFB17N50L

International
IR Rectifier

Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.6	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ Ⓞ
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.28	0.32	Ω	$V_{GS} = 10V, I_D = 9.9A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	5.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	50	μA	$V_{DS} = 500V, V_{GS} = 0V$
		—	—	2.0	mA	$V_{DS} = 400V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 30V$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS} = -30V$
R_G	Internal Gate Resistance	—	0.77	—	Ω	$f = 1\text{MHz}$, open drain

Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	11	—	—	S	$V_{DS} = 50V, I_D = 9.9A$
Q_g	Total Gate Charge	—	—	130	nC	$I_D = 16A$ $V_{DS} = 400V$ $V_{GS} = 10V$ ④
Q_{gs}	Gate-to-Source Charge	—	—	33		
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	59		
$t_{d(on)}$	Turn-On Delay Time	—	21	—	ns	$V_{DD} = 250V$ $I_D = 16A$ $R_G = 7.5\Omega$ $V_{GS} = 10V$ ④
t_r	Rise Time	—	51	—		
$t_{d(off)}$	Turn-Off Delay Time	—	50	—		
t_f	Fall Time	—	28	—		
C_{iss}	Input Capacitance	—	2760	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	—	325	—		
C_{riss}	Reverse Transfer Capacitance	—	37	—		
C_{oss}	Output Capacitance	—	3690	—		
C_{oss}	Output Capacitance	—	84	—		
$C_{oss \text{ eff.}}$	Effective Output Capacitance	—	200	—		

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche EnergyⓄ	—	390	mJ
I_{AR}	Avalanche Current①	—	16	A
E_{AR}	Repetitive Avalanche Energy①	—	22	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-CaseⓄ	—	0.56	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-AmbientⓄ	—	62	

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 3.0\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 16A$.
- ③ $I_{SD} \leq 16A$, $di/dt \leq 520A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ⑤ $C_{oss \text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
 $C_{oss \text{ eff.}}(ER)$ is a fixed capacitance that stores the same energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑥ R_{θ} is measured at T_J approximately 90°C

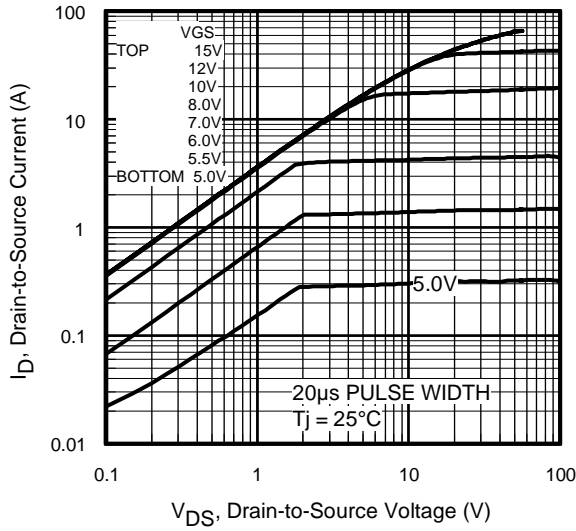


Fig 1. Typical Output Characteristics

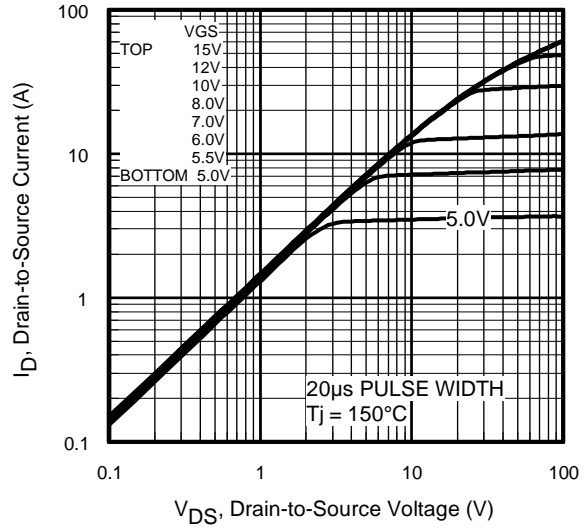


Fig 2. Typical Output Characteristics

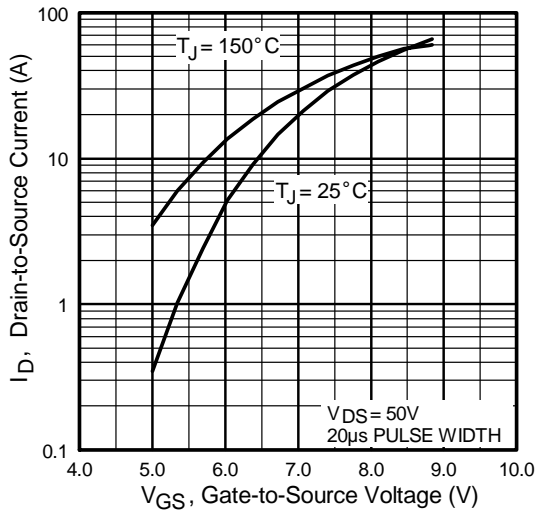


Fig 3. Typical Transfer Characteristics

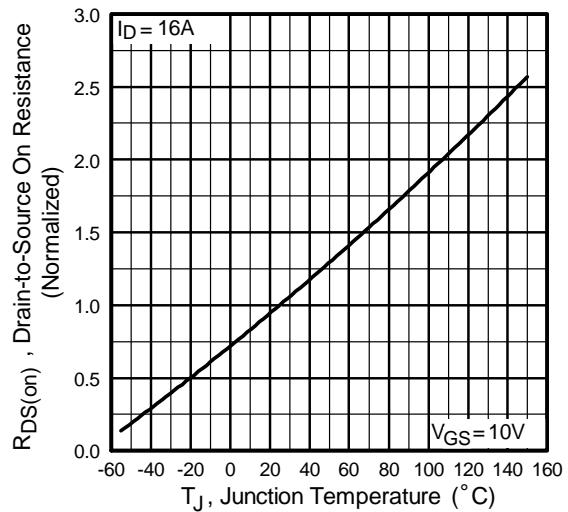


Fig 4. Normalized On-Resistance vs. Temperature

IRFB17N50L

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IR Rectifier

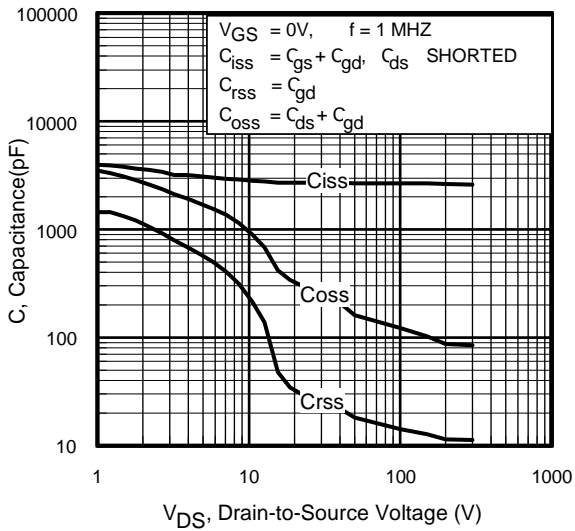


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

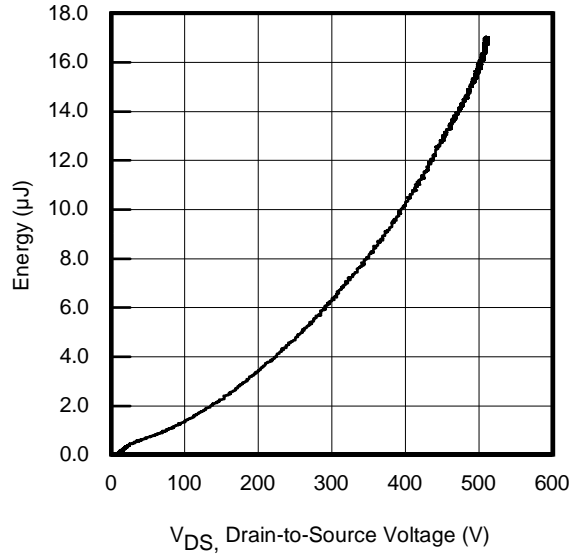


Fig 6. Typ. Output Capacitance Stored Energy vs. V_{DS}

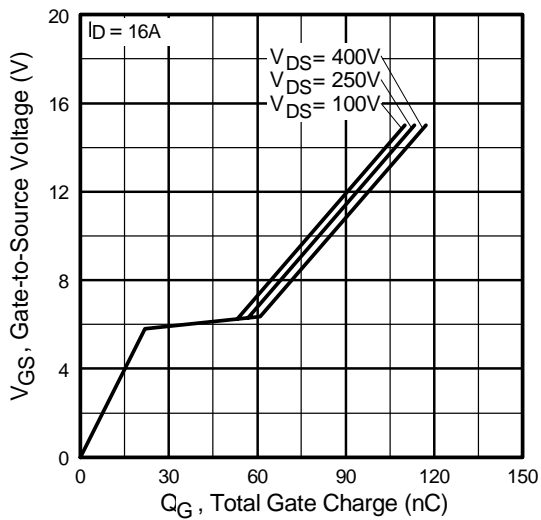


Fig 7. Typical Gate Charge vs. Gate-to-Source Voltage

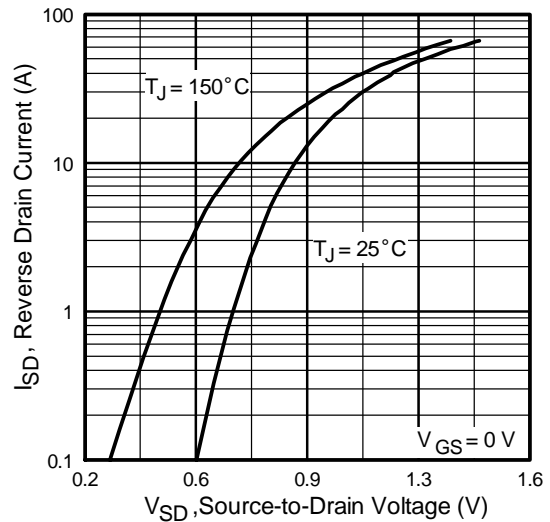


Fig 8. Typical Source-Drain Diode Forward Voltage

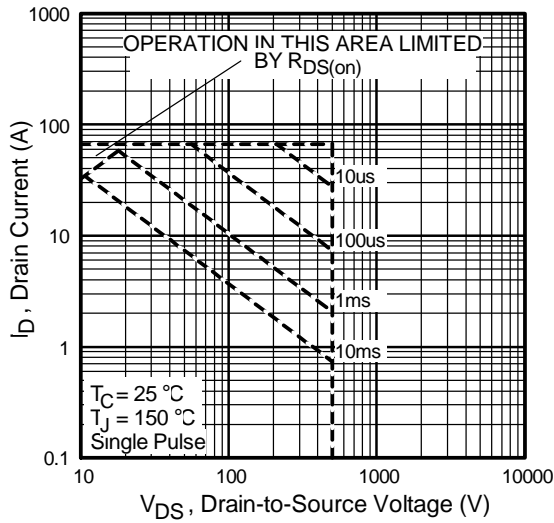


Fig 9. Maximum Safe Operating Area

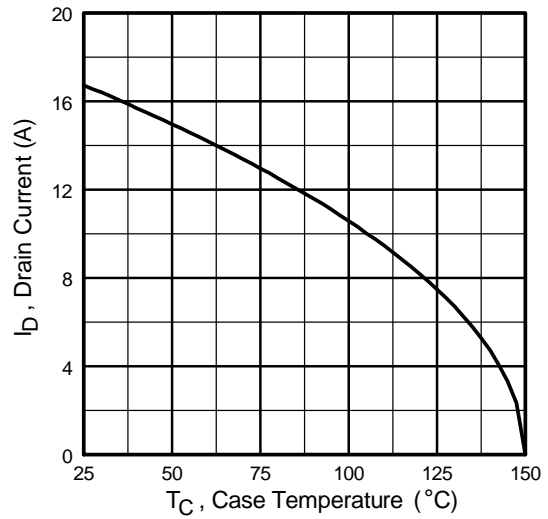


Fig 10. Maximum Drain Current vs. Case Temperature

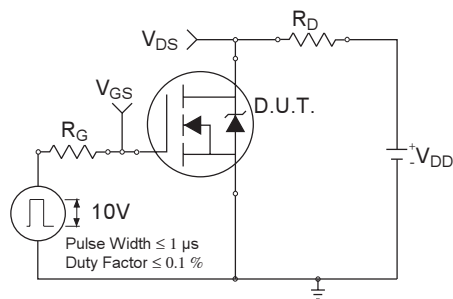


Fig 11a. Switching Time Test Circuit

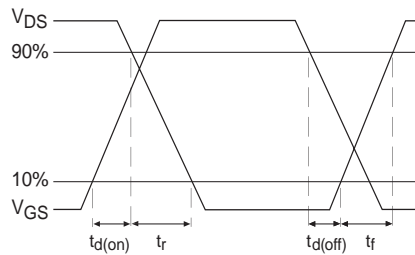


Fig 11b. Switching Time Waveforms

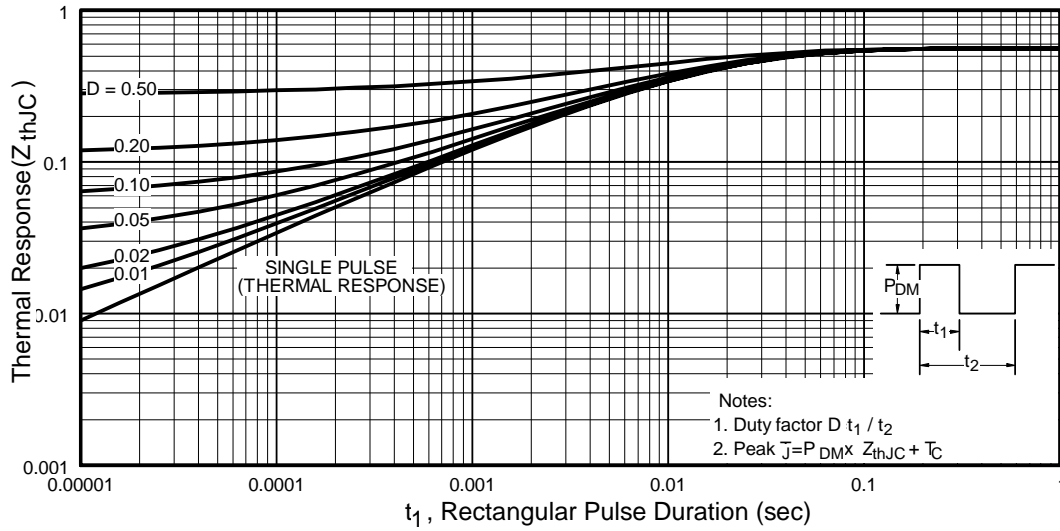


Fig 12. Maximum Effective Transient Thermal Impedance, Junction-to-

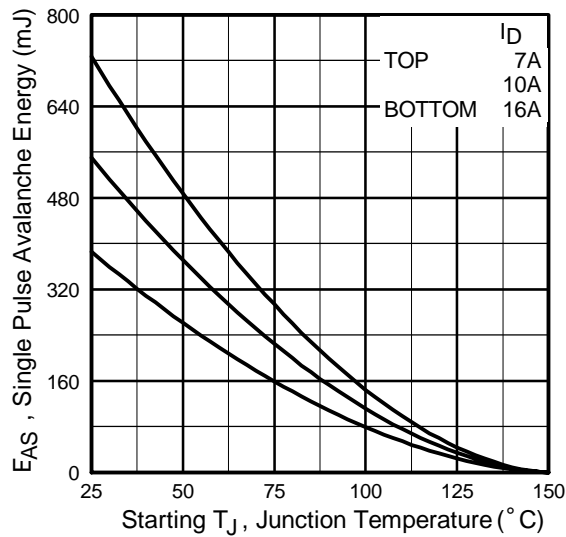


Fig 13. Maximum Avalanche Energy vs. Drain Current

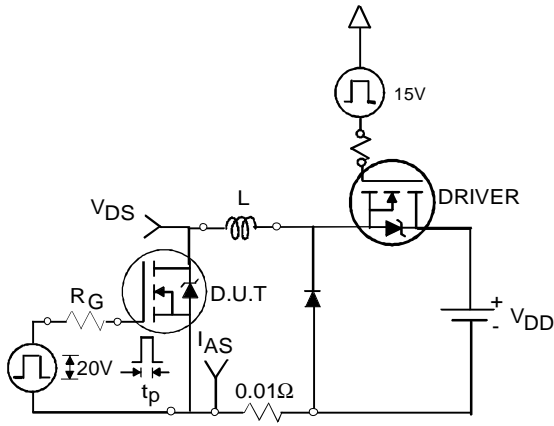


Fig 14. Unclamped Inductive Test Circuit

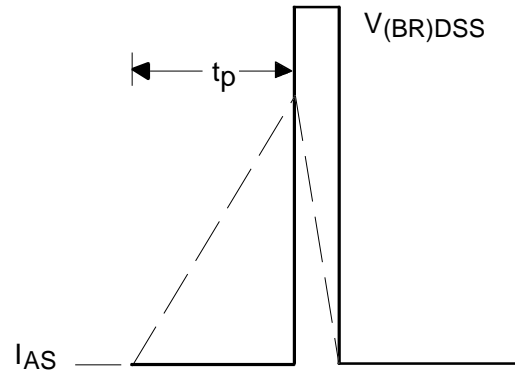


Fig 15. Unclamped Inductive Waveforms

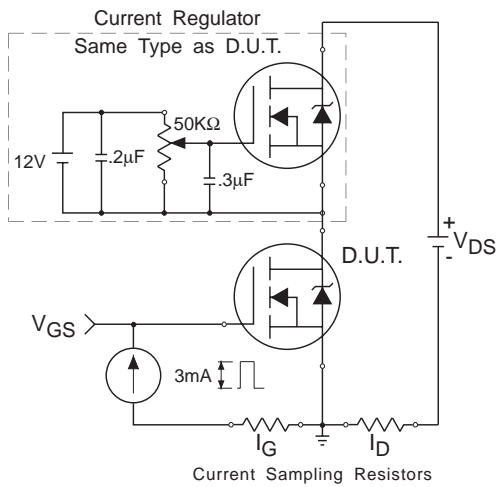


Fig 16. Gate Charge Test Circuit

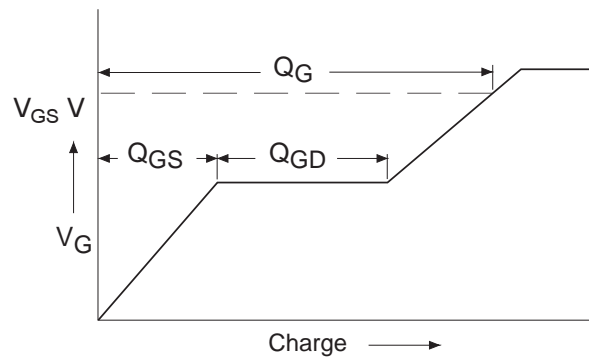
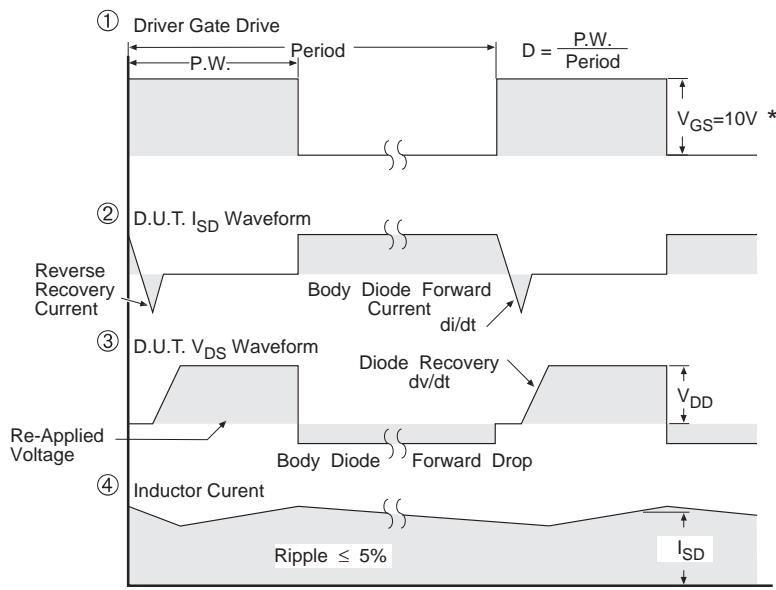
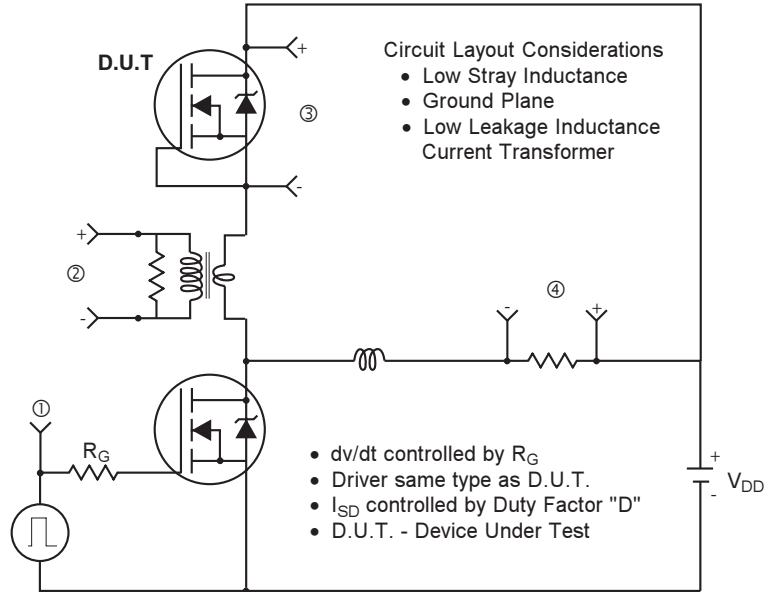


Fig 17. Basic Gate Charge Waveform

Peak Diode Recovery dv/dt Test Circuit

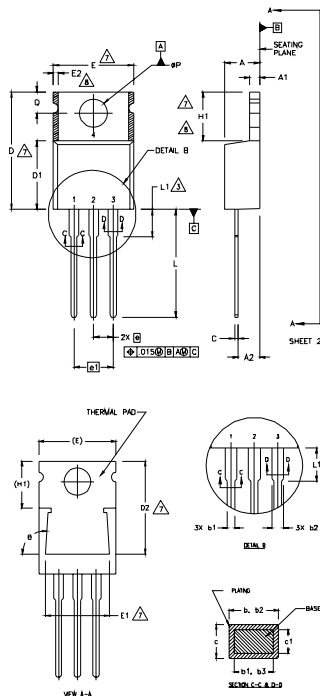


* $V_{GS} = 5V$ for Logic Level Devices

Fig 18. For N-Channel HEXFET® Power MOSFETs

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



- NOTES:
- 1 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
 - 2 DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
 - 3 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
 - 4 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
 - 5 DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
 - 6 CONTROLLING DIMENSION - INCHES.
 - 7 THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1 AND SINGULATION IRREGULARITIES ARE ALLOWED.
 - 8 DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING

LEAD ASSIGNMENTS

HERFET

- 1.- CATE
- 2.- DRAIN
- 3.- SOURCE

IRFBL CAPACK

- 1.- CATE
- 2.- COLLECTOR
- 3.- EMITTER

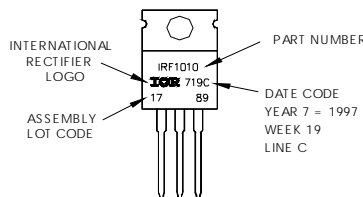
DIODES

- 1.- ANODE/OPEN
- 2.- CATHODE
- 3.- ANODE

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.04	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.96	.015	.038	5
b2	1.15	1.77	.045	.070	
b3	1.15	1.73	.045	.068	
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	12.19	12.88	.480	.507	7
E	9.66	10.66	.380	.420	4,7
E1	8.38	8.89	.330	.350	7
e	2.54 BSC		.100 BSC		
e1	5.08		.200 BSC		
H1	5.85	6.55	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	-	6.35	-	.250	3
øP	3.54	4.08	.139	.161	
O	2.54	3.42	.100	.135	
ø	90°-93°		90°-93°		

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
 LOT CODE 1789
 ASSEMBLED ON WW 19, 1997
 IN THE ASSEMBLY LINE "C"
Note: "P" in assembly line position indicates "Lead-Free"



TO-220AB package is not recommended for Surface Mount Application.

Data and specifications subject to change without notice.
 This product has been designed and qualified for the industrial market.
 Qualification Standards can be found on IR's Web site.