International
IOR Rectifier

IRF8010PbF

SMPS MOSFET

HEXFET® Power MOSFET

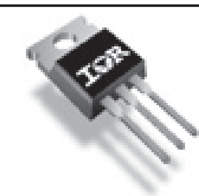
Applications

- High frequency DC-DC converters
- UPS and Motor Control
- Lead-Free

V_{DSS}	$R_{DS(on)}$ max	I_D
100V	15mΩ	80A ⑥

Benefits

- Low Gate-to-Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C_{OSS} to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current
- Typical $R_{DS(on)}$ = 12mΩ



TO-220AB

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	80⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	57	
I_{DM}	Pulsed Drain Current ①	320	
P_D @T_C = 25°C	Power Dissipation	260	W
	Linear Derating Factor	1.8	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ③	16	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting torque, 6-32 or M3 screw	1.1(10)	N•m (lbf•in)

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	–––	0.57	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	–––	
$R_{\theta JA}$	Junction-to-Ambient	–––	62	

Notes ① through ⑥ are on page 8

07/06/04

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	100	——	——	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.11	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	12	15	mΩ	V_{GS} = 10V, I_D = 45A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	——	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	20	µA	V_{DS} = 100V, V_{GS} = 0V
		——	——	250		V_{DS} = 100V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -20V

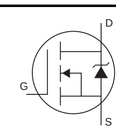
Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	82	——	——	V	V_{DS} = 25V, I_D = 45A
Q_g	Total Gate Charge	——	81	120		I_D = 80A
Q_{gs}	Gate-to-Source Charge	——	22	——	nC	V_{DS} = 80V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	26	——		V_{GS} = 10V ④
$t_{d(on)}$	Turn-On Delay Time	——	15	——		V_{DD} = 50V
t_r	Rise Time	——	130	——		I_D = 80A
$t_{d(off)}$	Turn-Off Delay Time	——	61	——	ns	R_G = 39Ω
t_f	Fall Time	——	120	——		V_{GS} = 10V ④
C_{iss}	Input Capacitance	——	3830	——		V_{GS} = 0V
C_{oss}	Output Capacitance	——	480	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	59	——	pF	f = 1.0MHz
C_{oss}	Output Capacitance	——	3830	——		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	——	280	——		V_{GS} = 0V, V_{DS} = 80V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	——	530	——		V_{GS} = 0V, V_{DS} = 0V to 80V ③

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②⑥	——	310	mJ
I_{AR}	Avalanche Current ①	——	45	A
E_{AR}	Repetitive Avalanche Energy ①	——	26	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	80	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	——	——	320		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 80A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	99	150	ns	T_J = 150°C, I_F = 80A, V_{DD} = 50V
Q_{rr}	Reverse RecoveryCharge	——	460	700	nC	di/dt = 100A/µs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

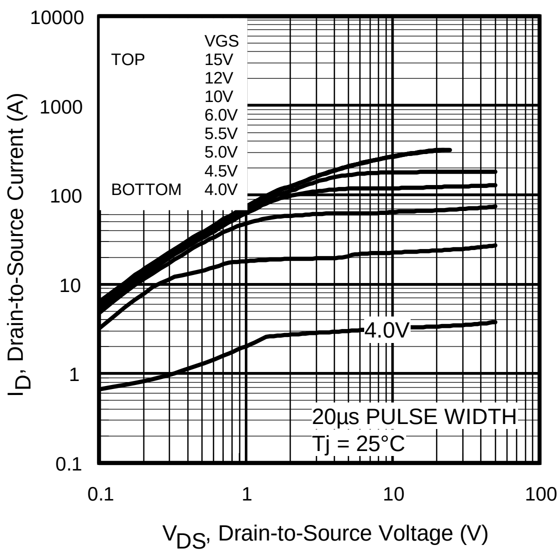


Fig 1. Typical Output Characteristics

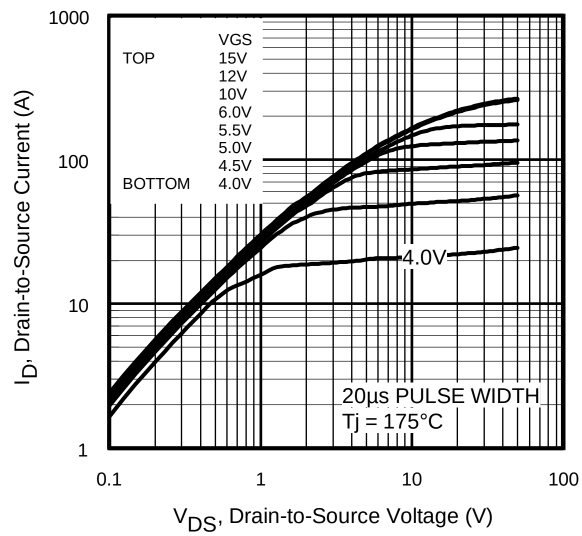


Fig 2. Typical Output Characteristics

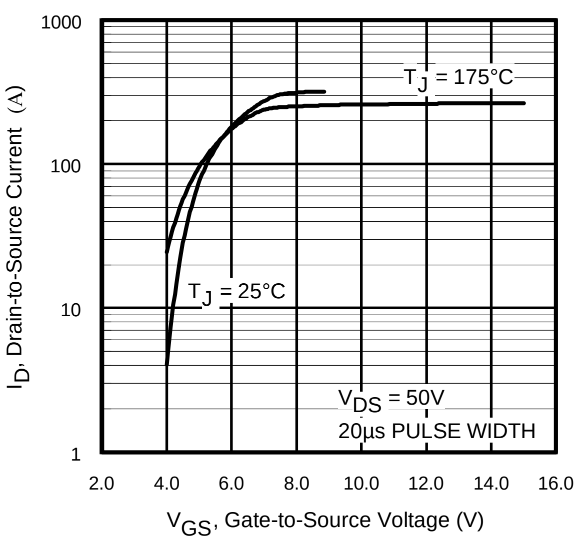


Fig 3. Typical Transfer Characteristics

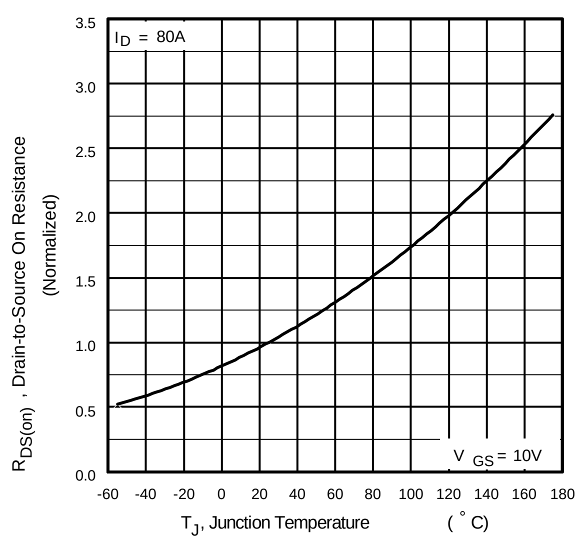


Fig 4. Normalized On-Resistance
Vs. Temperature

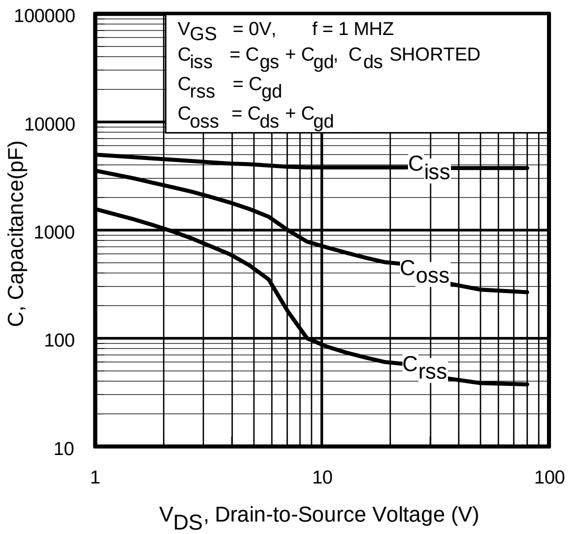


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

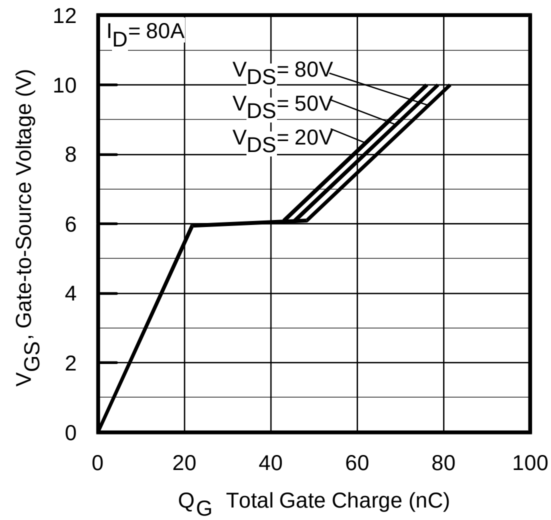


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

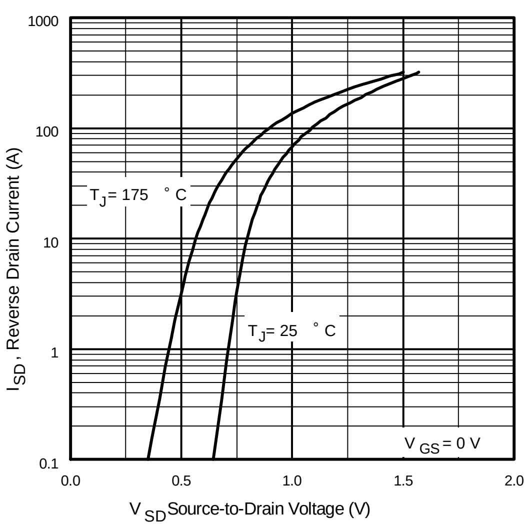


Fig 7. Typical Source-Drain Diode Forward Voltage

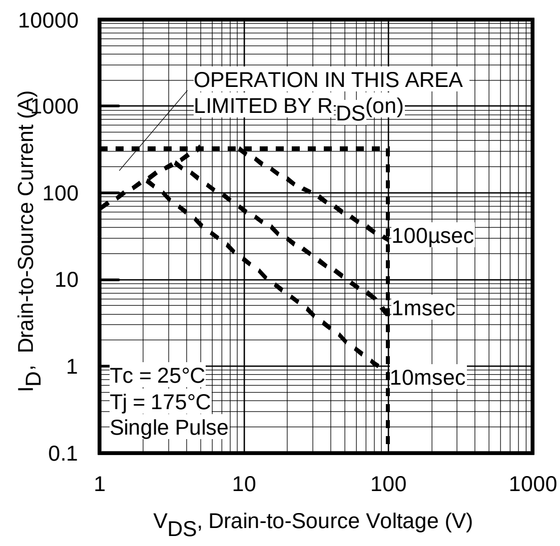


Fig 8. Maximum Safe Operating Area

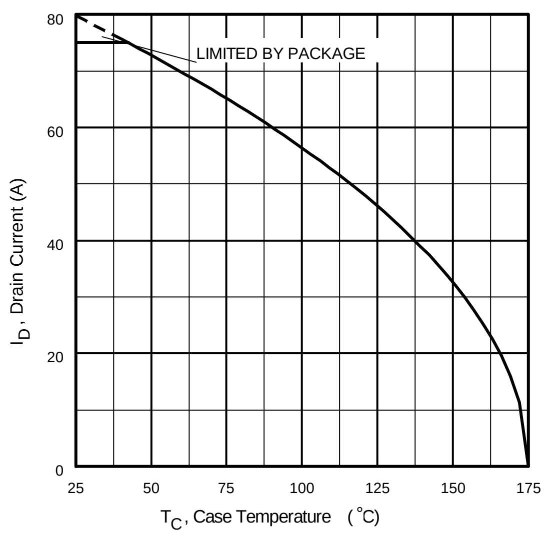


Fig 9. Maximum Drain Current Vs. Case Temperature

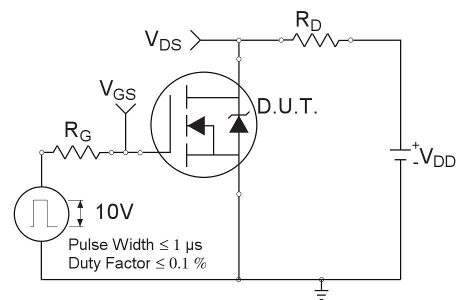


Fig 10a. Switching Time Test Circuit

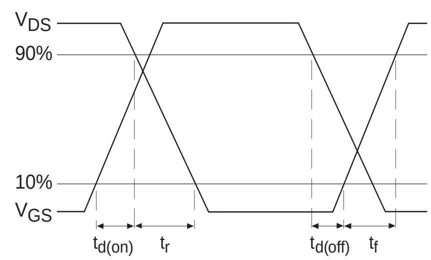


Fig 10b. Switching Time Waveforms

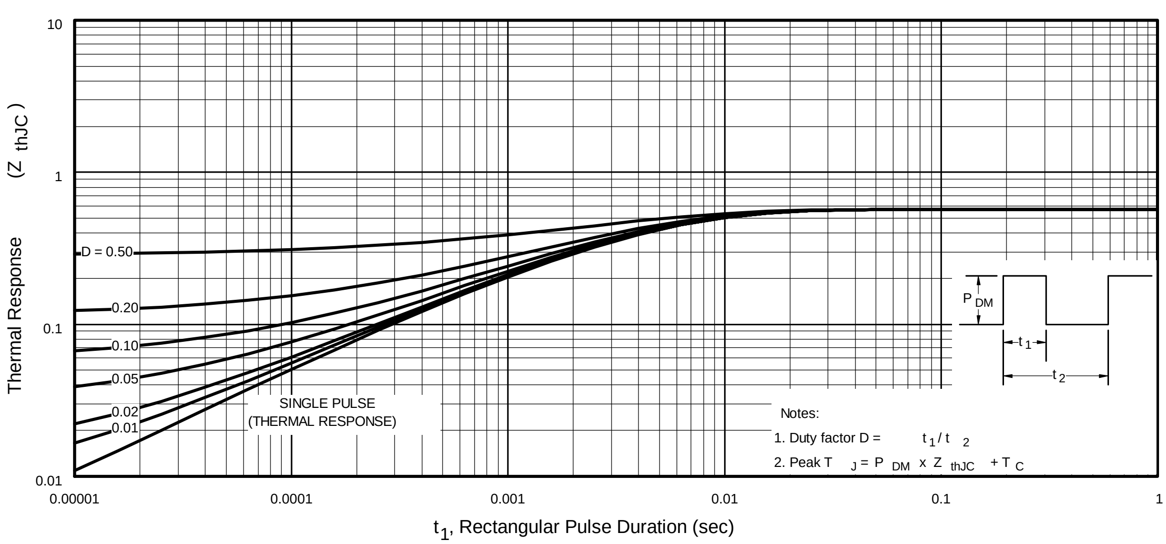


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

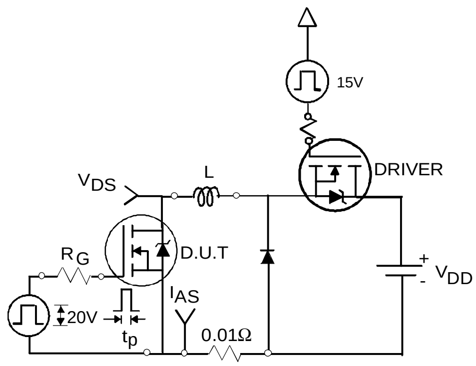


Fig 12a. Unclamped Inductive Test Circuit

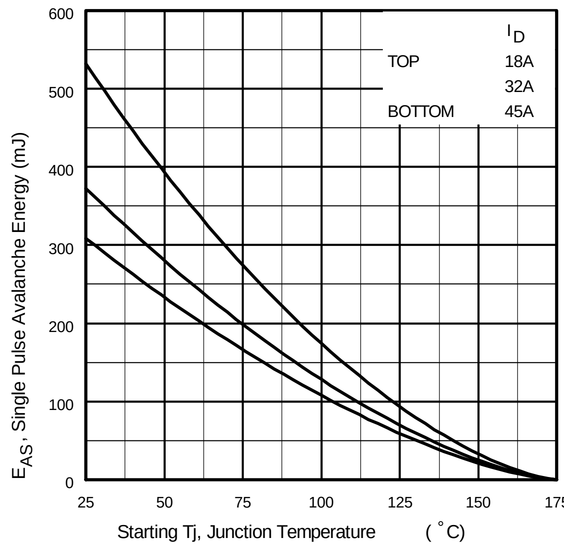


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

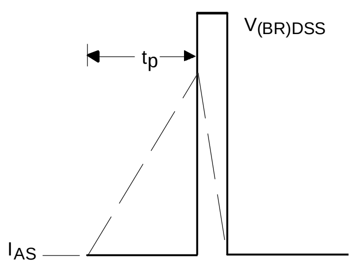


Fig 12b. Unclamped Inductive Waveforms

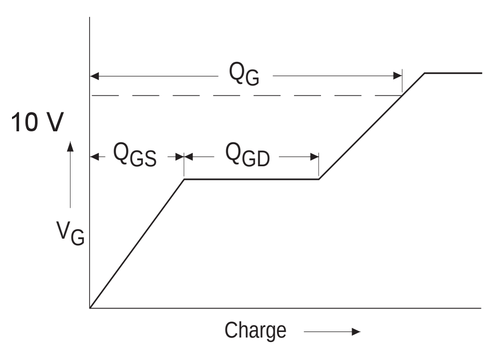


Fig 13a. Basic Gate Charge Waveform

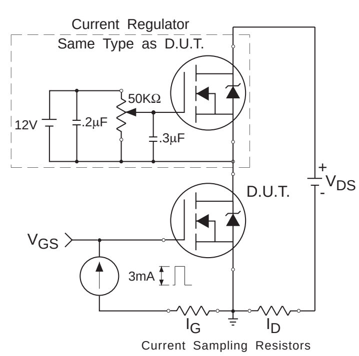
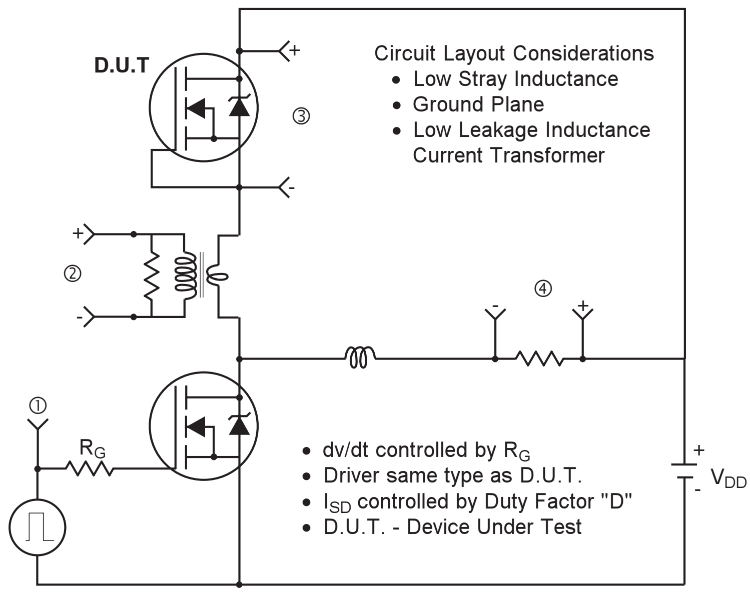
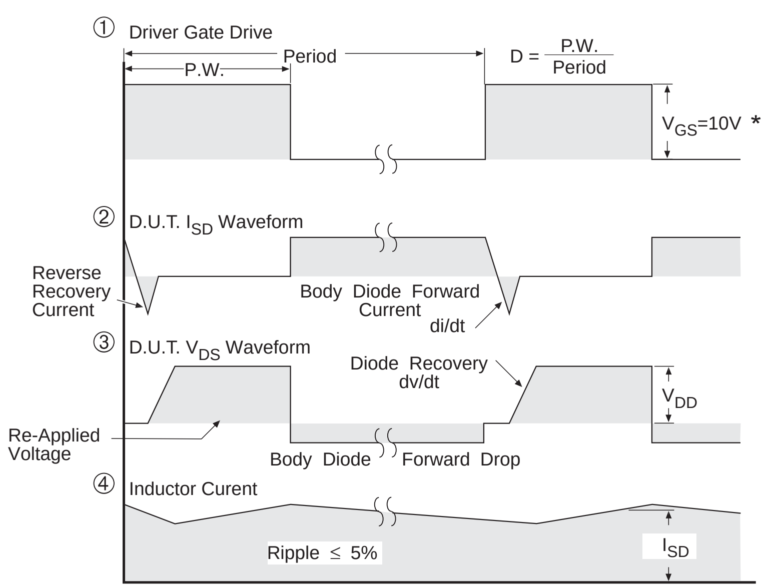


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



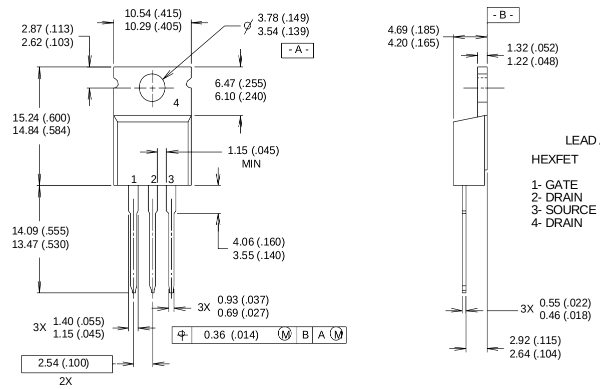


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



LEAD ASSIGNMENTS

HEXFET	IGBTs, CoPACK
1- GATE	1- GATE
2- DRAIN	2- COLLECTOR
3- SOURCE	3- EMITTER
4- DRAIN	4- COLLECTOR

NOTES:

1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.

2 CONTROLLING DIMENSION : INCH

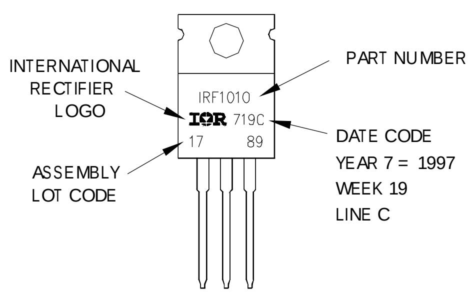
3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.

4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

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"



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 0.31mH, R_G = 25Ω, I_{AS} = 45A.

③ $I_{SD} \leq$ 45A, di/dt ≤ 110A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C.

④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ C_{oss} 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}.

⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

TO-220 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.

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Note: For the most current drawings please refer to the IR website at:
http://www.irf.com/package/

IMPORTANT NOTICE

WARNINGS