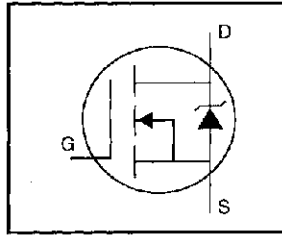


IRL510PbF

HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Logic-Level Gate Drive
- $R_{DS(on)}$ Specified at $V_{GS}=4V$ & $5V$
- $175^{\circ}C$ Operating Temperature
- Fast Switching
- Ease of Paralleling
- Lead-Free



$$V_{DSS} = 100V$$

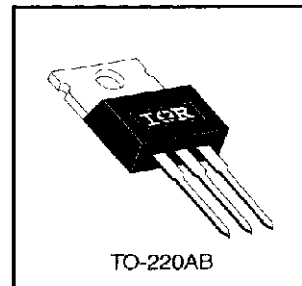
$$R_{DS(on)} = 0.54\Omega$$

$$I_D = 5.6A$$

Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^{\circ}C$	Continuous Drain Current, V_{GS} @ 5.0 V	5.6	A
I_D @ $T_C = 100^{\circ}C$	Continuous Drain Current, V_{GS} @ 5.0 V	4.0	
I_{DM}	Pulsed Drain Current ①	18	
P_D @ $T_C = 25^{\circ}C$	Power Dissipation	43	W
	Linear Derating Factor	0.29	W/ $^{\circ}C$
V_{GS}	Gate-to-Source Voltage	± 10	V
E_{AS}	Single Pulse Avalanche Energy ②	100	mJ
I_{AR}	Avalanche Current ③	5.6	A
E_{AR}	Repetitive Avalanche Energy ①	4.3	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.5	V/ns
T_J	Operating Junction and	-55 to +175	$^{\circ}C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	

Thermal Resistance

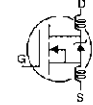
	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	3.5	$^{\circ}C/W$
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	62	

IRL510PbF

International
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	100	—	—	V	$V_{GS}=0V$, $I_D=250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.12	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D=1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.54	Ω	$V_{GS}=5.0V$, $I_D=3.4A$ ①
		—	—	0.78		$V_{GS}=4.0V$, $I_D=2.8A$ ①
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu A$
g_{fs}	Forward Transconductance	1.9	—	—	S	$V_{DS}=50V$, $I_D=3.4A$ ①
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS}=100V$, $V_{GS}=0V$
		—	—	250		$V_{DS}=80V$, $V_{GS}=0V$, $T_J=150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS}=10V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS}=-10V$
Q_g	Total Gate Charge	—	—	6.1	nC	$I_D=5.6A$
Q_{gs}	Gate-to-Source Charge	—	—	2.6		$V_{DS}=80V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	3.3		$V_{GS}=5.0V$ See Fig. 6 and 13 ②
$t_{d(on)}$	Turn-On Delay Time	—	9.3	—	ns	$V_{DD}=50V$
t_r	Rise Time	—	47	—		$I_D=5.6A$
$t_{d(off)}$	Turn-Off Delay Time	—	16	—		$R_G=12\Omega$
t_f	Fall Time	—	18	—		$R_D=8.4\Omega$ See Figure 10 ②
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	250	—	pF	$V_{GS}=0V$
C_{oss}	Output Capacitance	—	80	—		$V_{DS}=25V$
C_{rss}	Reverse Transfer Capacitance	—	15	—		$f=1.0MHz$ See Figure 5



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	5.6	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	18		
V_{SD}	Diode Forward Voltage	—	—	2.5	V	$T_J=25^\circ\text{C}$, $I_S=5.6A$, $V_{GS}=0V$ ④
t_{rr}	Reverse Recovery Time	—	110	130	ns	$T_J=25^\circ\text{C}$, $I_F=5.6A$
Q_{rr}	Reverse Recovery Charge	—	0.50	0.65	μC	$di/dt=100A/\mu s$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)

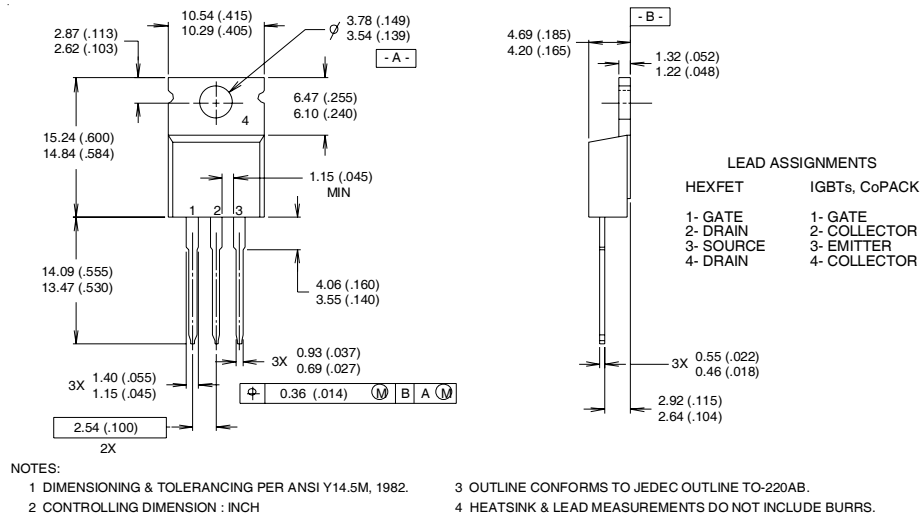
③ $I_{SD} \leq 5.6A$, $di/dt \leq 75A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$

② $V_{DD}=25V$, starting $T_J=25^\circ\text{C}$, $L=4.8mH$, $R_G=25\Omega$, $I_{AS}=5.6A$ (See Figure 12)

④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



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"

