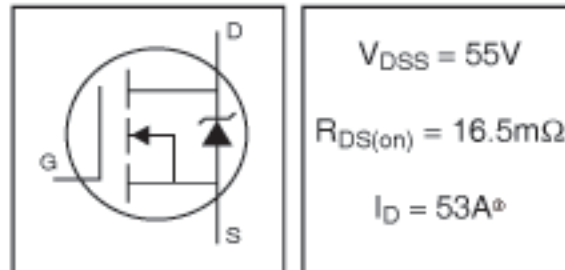


IRFZ46NPbF

HEXFET® Power MOSFET

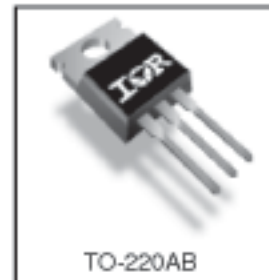
- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free



Description

Advanced HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

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
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	53 Φ	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	37	
I_{DM}	Pulsed Drain Current $\text{\textcircled{D}}$	180	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation	107	W
	Linear Derating Factor	0.71	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
I_{AR}	Avalanche Current $\text{\textcircled{D}}$	28	A
E_{AR}	Repetitive Avalanche Energy $\text{\textcircled{D}}$	11	mJ
dv/dt	Peak Diode Recovery dv/dt $\text{\textcircled{D}}$	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 screw	10 lb•in (1.1N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.4	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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International
IGR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.057	—	V/°C	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	16.5	m Ω	$V_{GS} = 10\text{V}$, $I_D = 28\text{A}$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$
g_{fs}	Forward Transconductance	19	—	—	S	$V_{DS} = 25\text{V}$, $I_D = 28\text{A}$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{GS} = 55\text{V}$, $V_{DS} = 0\text{V}$
		—	—	250		$V_{GS} = 44\text{V}$, $V_{DS} = 0\text{V}$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20\text{V}$
Q_g	Total Gate Charge	—	—	72	nC	$I_D = 28\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	11		$V_{DS} = 44\text{V}$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	26		$V_{GS} = 10\text{V}$, See Fig. 6 and 13
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 28\text{V}$
t_r	Rise Time	—	76	—		$I_D = 28\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	52	—		$R_G = 12\Omega$
t_f	Fall Time	—	57	—		$V_{GS} = 10\text{V}$, See Fig. 10 ④
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	1696	—	pF	$V_{GS} = 0\text{V}$
C_{oss}	Output Capacitance	—	407	—		$V_{DS} = 25\text{V}$
C_{riss}	Reverse Transfer Capacitance	—	110	—		$f = 1.0\text{MHz}$, See Fig. 5
E_{AS}	Single Pulse Avalanche Energy ⑤	—	583 ⑥	152 ⑦		mJ

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	53	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ⑧	—	—	180		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$, $I_S = 28\text{A}$, $V_{GS} = 0\text{V}$ ④
t_{rr}	Reverse Recovery Time	—	67	101	ns	$T_J = 25^\circ\text{C}$, $I_F = 28\text{A}$
Q_{rr}	Reverse Recovery Charge	—	208	312	nC	$di/dt = 100\text{A}/\mu\text{s}$ ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_G+L_D)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
 ② Starting $T_J = 25^\circ\text{C}$, $L = 389\mu\text{H}$, $R_G = 25\Omega$, $I_{AS} = 28\text{A}$. (See Figure 12).
 ③ $I_{SD} \leq 28\text{A}$, $di/dt \leq 220\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$.

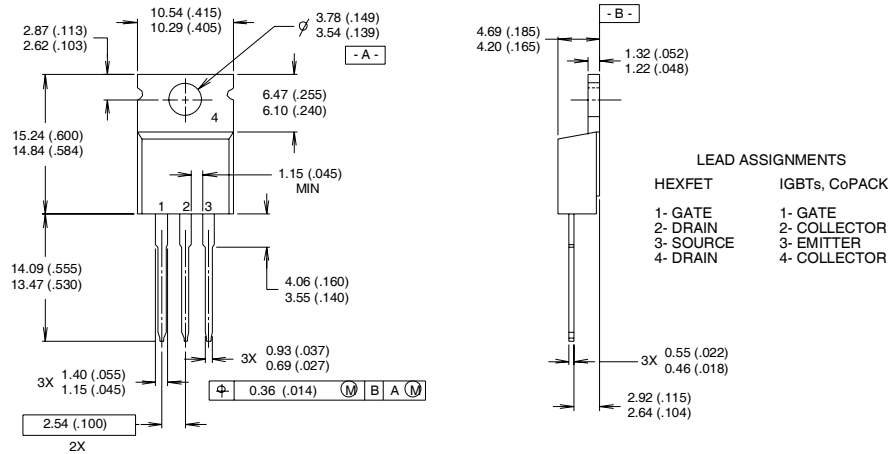
- ④ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
 ⑤ This is a typical value at device destruction and represents operation outside rated limits.
 ⑥ This is a calculated value limited to $T_J = 175^\circ\text{C}$.
 ⑦ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 39A.

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TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



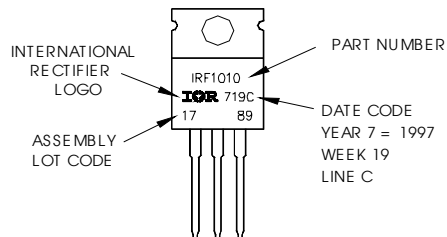
NOTES:

- 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"



Data and specifications subject to change without notice.
 This product has been designed and qualified for the automotive [Q101] market.

