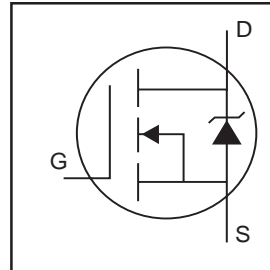


- Advanced Process Technology
- Dynamic dv/dt Rating
- 175 °C Operating Temperature
- Fast Switching
- Fully Avalanche Rated

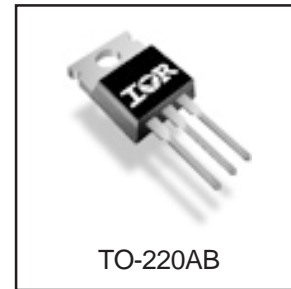


$V_{DSS} = 55V$
$R_{DS(on)} = 0.027\Omega$
$I_D = 41A\text{⑤}$

Description

Fifth Generation 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 device for use in a wide variety of applications.

The TO-220 package is universally preferred for all commercial 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, $V_{GS} @ 10V$	41⑤	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	29⑤	
I_{DM}	Pulsed Drain Current ①	164	
$P_D @ T_C = 25^\circ C$	Power Dissipation	83	W
	Linear Derating Factor	0.56	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	190	mJ
I_{AR}	Avalanche Current①	25	A
E_{AR}	Repetitive Avalanche Energy①	8.3	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°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 (1.1N•m)	

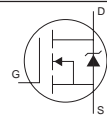
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.8	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

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	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.05	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.027	Ω	$V_{GS} = 10V, I_D = 25A$ ④⑥
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Transconductance	13	—	—	S	$V_{DS} = 25V, I_D = 25A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 55V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	50	nC	$I_D = 25A$
Q_{gs}	Gate-to-Source Charge	—	—	10		$V_{DS} = 44V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	21		$V_{GS} = 10V$ ④⑥
$t_{d(on)}$	Turn-On Delay Time	—	9.9	—	ns	$V_{DD} = 28V$
t_r	Rise Time	—	44	—		$I_D = 25A$
$t_{d(off)}$	Turn-Off Delay Time	—	34	—		$R_G = 9.1\Omega$
t_f	Fall Time	—	35	—		$R_D = 1.1\Omega$ ④ ⑥
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact ⑥ ⑥
L_S	Internal Source Inductance	—	7.5	—		
C_{iss}	Input Capacitance	—	1200	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	390	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	140	—		$f = 1.0\text{MHz}$ ⑥

Source-Drain Ratings and Characteristics

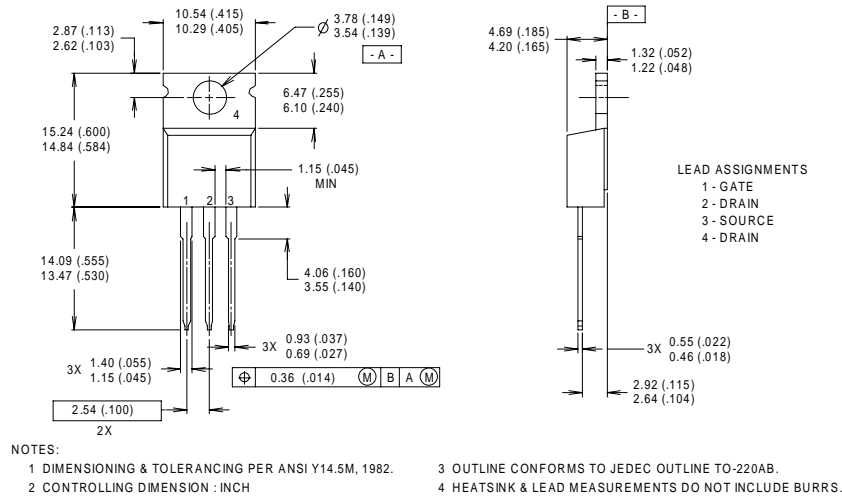
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	41 ⑤	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	—	—	164		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 25A, V_{GS} = 0V$ ④⑥
t_{rr}	Reverse Recovery Time	—	63	94	ns	$T_J = 25^\circ\text{C}, I_F = 25A$
Q_{rr}	Reverse Recovery Charge	—	140	210	nC	$di/dt = 100A/\mu s$ ④ ⑥
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.
- ② $V_{DD} = 25V$, Starting $T_J = 25^\circ\text{C}$, $L = 610\mu H$, $R_G = 25\Omega$, $I_{AS} = 25A$
- ③ $I_{SD} \leq 25A$, $di/dt \leq 220A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- ⑤ Calculated continuous current based on maximum allowable junction temperature: Package limitation current = 20A
- ⑥ Use IRFR/U1205 Data and Test conditons.

TO-220AB Package Outline

Dimensions are shown in millimeters (inches)



TO-220AB Part Marking Information

EXAMPLE : THIS IS AN IRF1010
 WITH ASSEMBLY
 LOT CODE 9B1M

