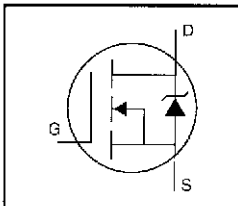


HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



$$V_{DS} = 60V$$

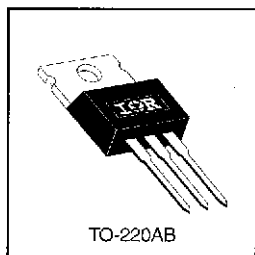
$$R_{DS(on)} = 0.20\Omega$$

$$I_D = 10A$$

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.



TO-220AB

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10 V	10	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10 V	7.2	
I_{DM}	Pulsed Drain Current ①	40	
P_D @ $T_C = 25^\circ C$	Power Dissipation	43	W
	Linear Derating Factor	0.29	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	47	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.5	V/ns
T_J	Operating Junction and Storage Temperature Range	-55 to +175	°C
T_{STG}	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lb-in (1.1 N·m)	

Thermal Resistance

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

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	60	—	—	V	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.063	—	$^\circ\text{C}^{-1}$	Reference to 25°C , $I_D=1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.20	Ω	$V_{GS}=10\text{V}$, $I_D=6.0\text{A}$ ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$
g_{fs}	Forward Transconductance	2.4	—	—	S	$V_{DS}=25\text{V}$, $I_D=6.0\text{A}$ ③
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$
		—	—	250		$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$, $T_J=150^\circ\text{C}$
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	—	—	11	nC	$I_D=10\text{A}$
Q_{gs}	Gate-to-Source Charge	—	—	3.1		$V_{DS}=48\text{V}$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	5.8		$V_{GS}=10\text{V}$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	10	—	ns	$V_{DD}=30\text{V}$
t_r	Rise Time	—	50	—		$I_D=10\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	13	—		$R_G=24\Omega$
t_f	Fall Time	—	19	—		$R_D=2.7\Omega$ See Figure 10 ④
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	—	300	—	pF	$V_{GS}=0\text{V}$
C_{oss}	Output Capacitance	—	160	—		$V_{DS}=25\text{V}$
C_{rss}	Reverse Transfer Capacitance	—	29	—		$f=1.0\text{MHz}$ See Figure 5



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	10	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	40		
V_{SD}	Diode Forward Voltage	—	—	1.6	V	$T_J=25^\circ\text{C}$, $I_S=10\text{A}$, $V_{GS}=0\text{V}$ ②
t_{rr}	Reverse Recovery Time	—	70	140	ns	$T_J=25^\circ\text{C}$, $I_F=10\text{A}$
Q_{rr}	Reverse Recovery Charge	—	0.20	0.40	μC	$di/dt=100\text{A}/\mu\text{s}$ ③
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)
- ② $V_{DD}=25\text{V}$, starting $T_J=25^\circ\text{C}$, $L=548\mu\text{H}$, $R_G=25\Omega$, $I_{AS}=10\text{A}$ (See Figure 12)
- ③ $I_{SD}\leq 10\text{A}$, $di/dt\leq 90\text{A}/\mu\text{s}$, $V_{DD}\leq V_{(BR)DSS}$, $T_J<175^\circ\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.