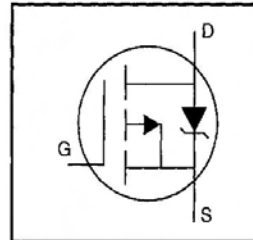


IRFI9Z14GPbF

- Isolated Package
- High Voltage Isolation= 2.5KVRMS ⑤
- Sink to Lead Creepage Dist.= 4.8mm
- P-Channel
- 175°C Operating Temperature
- Dynamic dv/dt Rating
- Low Thermal Resistance
- Lead-Free



$$V_{DSS} = -60V$$

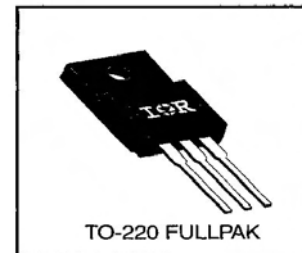
$$R_{DS(on)} = 0.50\Omega$$

$$I_D = -5.3A$$

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 Fullpak eliminates the need for additional insulating hardware in commercial-industrial applications. The moulding compound used provides a high isolation capability and a low thermal resistance between the tab and external heatsink. This isolation is equivalent to using a 100 micron mica barrier with standard TO-220 product. The Fullpak is mounted to a heatsink using a single clip or by a single screw fixing.



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ -10 V	-5.3	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ -10 V	-3.8	
I_{DM}	Pulsed Drain Current ①	-21	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	27	W
	Linear Derating Factor	0.18	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②	120	mJ
I_{AR}	Avalanche Current ①	-5.3	A
E_{AR}	Repetitive Avalanche Energy ①	2.7	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-4.5	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	10 lbf•in (1.1 N•m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	5.5	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	—	65	

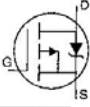
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Rectifier

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	-60	—	—	V	$V_{GS}=0V$, $I_D=-250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.060	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D=-1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.50	Ω	$V_{GS}=-10V$, $I_D=-3.2A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	-2.0	—	-4.0	V	$V_{DS}=V_{GS}$, $I_D=-250\mu A$
g_{fs}	Forward Transconductance	1.6	—	—	S	$V_{DS}=-25V$, $I_D=-3.2A$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	-100	μA	$V_{DS}=-60V$, $V_{GS}=0V$
		—	—	-500		$V_{DS}=-48V$, $V_{GS}=0V$, $T_J=150^\circ\text{C}$
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	—	—	12	nC	$I_D=-6.7A$
Q_{gs}	Gate-to-Source Charge	—	—	3.8		$V_{DS}=-48V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	5.1		$V_{GS}=-10V$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	11	—	ns	$V_{DD}=-30V$
t_r	Rise Time	—	63	—		$I_D=-6.7A$
$t_{d(off)}$	Turn-Off Delay Time	—	9.6	—		$R_G=24\Omega$
t_f	Fall Time	—	31	—		$R_D=4.0\Omega$ 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	—	270	—	pF	$V_{GS}=0V$
C_{oss}	Output Capacitance	—	170	—		$V_{DS}=-25V$
C_{rss}	Reverse Transfer Capacitance	—	31	—		$f=1.0MHz$ See Figure 5
C	Drain to Sink Capacitance	—	12	—	pF	$f=1.0MHz$

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-5.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-21		
V_{SD}	Diode Forward Voltage	—	—	-5.5	V	$T_J=25^\circ\text{C}$, $I_S=-5.3A$, $V_{GS}=0V$ ④
t_{rr}	Reverse Recovery Time	—	80	160	ns	$T_J=25^\circ\text{C}$, $I_F=-6.7A$
Q_{rr}	Reverse Recovery Charge	—	0.096	0.19	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 $I_{SD} \leq 6.7A$, $di/dt \leq 90A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$

⑤ $t=60s$, $f=60Hz$

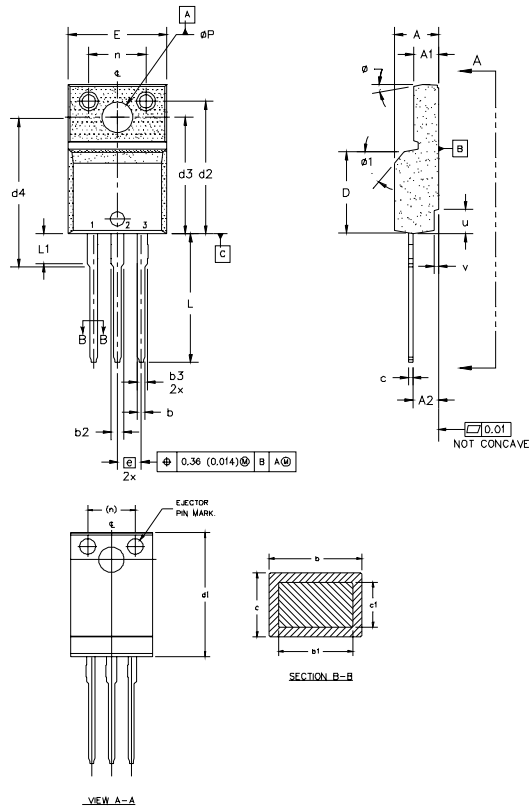
② $V_{DD}=-25V$, starting $T_J=25^\circ\text{C}$, $L=5.0mH$, $R_G=25\Omega$, $I_{AS}=-5.3A$ (See Figure 12)

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

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TO-220 Full-Pak Package Outline (Dimensions are shown in millimeters (inches))



NOTES:

- 1.0 DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
- 2.0 DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
- 3.0 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 5.0 DIMENSION b1 APPLY TO BASE METAL ONLY.
- 6.0 STEP OPTIONAL ON PLASTIC BODY DEFINED BY DIMENSIONS u & v.
- 7.0 CONTROLLING DIMENSION : INCHES.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.57	4.83	0.180	0.190	5
A1	2.57	2.83	0.101	0.114	
A2	2.51	2.85	0.099	0.112	
b	0.622	0.89	0.024	0.035	
b1	0.622	0.838	0.024	0.033	
b2	1.229	1.400	0.048	0.055	4
b3	1.229	1.400	0.048	0.055	
c	0.440	0.629	0.017	0.025	
c1	0.440	0.584	0.017	0.023	
D	8.65	9.80	0.341	0.386	
d1	15.80	16.12	0.622	0.635	4
d2	13.97	14.22	0.550	0.560	
d3	12.30	12.92	0.484	0.509	
d4	8.64	9.91	0.340	0.390	
E	10.36	10.63	0.408	0.419	
e	2.54 BSC		0.100 BSC		3
L	13.20	13.73	0.520	0.541	
L1	3.10	3.50	0.122	0.138	
n	6.05	6.15	0.238	0.242	
øP	3.05	3.45	0.120	0.136	
u	2.40	2.50	0.094	0.098	6
v	0.40	0.50	0.016	0.020	6
ø	3"	7"	3"	7"	
ø1		45°		45°	

LEAD ASSIGNMENTS

HEXFET

- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE

IGBTs, CoPACK

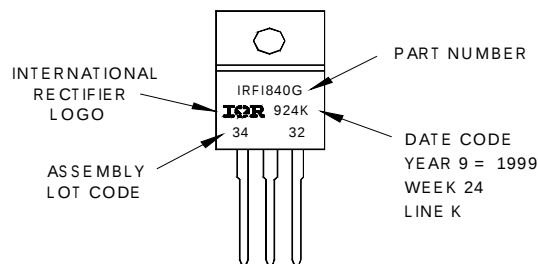
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER

VIEW A-A

TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE 3432
ASSEMBLED ON WW 24 1999
IN THE ASSEMBLY LINE "K"

Note: "P" in assembly line
position indicates "Lead-Free"



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