

International **IR** Rectifier IRFK4H250, IRFK4J250

Isolated Base Power HEX-pak™ Assembly - Parallel Chip Configuration

- High Current Capability.
- UL recognised E78996.
- Electrically Isolated Base Plate.
- Easy Assembly into Equipment.



Description

The HEX-pak™ utilises the well-proven HEXFET™ die, combining low on-state resistance with high transconductance. These superior technology die are assembled by state of the art techniques into the TO-240 package, featuring 2.5kV rms isolation and solid M5 screw connections. The small footprint means the package is highly suited to power applications where space is a premium. Available in two versions, IRFK.H... for fast switching and IRFK.J... for oscillation sensitive applications.

$$V_{DS} = 200V$$

$$R_{DS(on)} = 21m\Omega$$

$$I_D = 108A$$

Absolute Maximum Rating

	Parameter	Max.	Units
$I_D @ T_C=25^\circ C$	Continuous Drain Current	108	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current	68	A
I_{DM}	Pulse Drain Current	432	A ①
$P_D @ T_C=25^\circ C$	Maximum Power Dissipation	500	W
V_{GS}	Gate-to-Source Voltage	20	V
V_{INS}	R.M.S. Isolation Voltage, circuit to base	2.5	kV
T_J	Operating Junction Temperature Range	-40 to 150	°C
T_{STG}	Storage Temperature Range	-40 to 150	°C

Thermal and Mechanical Specifications

	Parameter	Min.	Typ.	Max.	Units
R_{thJC}	Junction-to-Case	-	-	0.25	K/W ②
R_{thCS}	Case-to-Sink, smooth & greased surface	-	0.1	-	K/W
T	Mounting Torque +10%	-	-	-	③
	HEXpak to Heatsink	-	5	-	Nm
	Busbar to HEXpak	-	3	-	Nm
wt	Approximate Weight	-	140	-	g
		-	5	-	oz

Notes:

① - Repetitive Rating: Pulse width limited by maximum junction temperature see figure 8.

② - Per Module.

③ - A mounting compound is recommended and the torque should be rechecked after a period of three hours to allow for the spread of the compound.



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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
B_{VDSS}	Drain-to-Source Breakdown voltage	200	-	-	V	$V_{GS}=0V, I_D=1.0mA$
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	-	18	21	m Ω	$V_{GS}=10V, I_D=34A$
$I_{D(on)}$	On-State Drain Current	108	-	-	A	$V_{DS} > I_{D(on)} \times R_{DS(on)}^{max}, V_{GS}=10V$
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=1.0mA$
g_{fs}	Forward Transconductance ④	46	75	-	S	$V_{DS} > 50V, I_D=68A$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	1.0	mA	$V_{DS}=V_{DS}^{max}, V_{GS}=0V$
		-	-	4.0	mA	$V_{GS}=10V, T_C=125^\circ\text{C}, V_{DS}=V_{DS}^{max} \times 0.8$
I_{GSS}	Gate-to-Source Leakage Forward	-	-	400	nA	$V_{GS}=20V$
I_{GSS}	Gate-to-Source Leakage Reverse	-	-	-400	nA	$V_{GS}=-20V$
Q_g	Total Gate Charge	-	350	500	nC	$I_D=108A, V_{GS}=10V,$
Q_{gs}	Gate-to-Source Charge	-	50	85	nC	$V_{DS}=V_{DS}^{max} \times 0.8$
Q_{gd}	Gate-to-Drain ("Miller") Charge	-	175	260	nC	
$t_{d(on)}$	Turn-on Delay Time	IRFK4H250 IRFK4J250	- - 65	- - 75	- - ns	$V_{DD}=95V, I_D=68A,$
t_r	Rise Time	IRFK4H250 IRFK4J250	- - 200	- - 250	- - ns	$V_{GS}=10V,$
$t_{d(off)}$	Turn-off Delay Time	IRFK4H250 IRFK4J250	- - 230	- - 300	- - ns	$R_{SOURCE}=3.3\Omega$
t_f	Fall Time	IRFK4H250 IRFK4J250	- - 75	- - 100	- - ns	
L_{DS}	Drain-to-Source Inductance	-	18	-	nH	
C_{iss}	Input Capacitance	-	13.0	-	nF	$V_{GS}=0V, V_{DS}=25V,$
C_{oss}	Output Capacitance	-	3.6	-	nF	$f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	-	1.0	-	nF	
	Linear Derating Factor	-	-	4	W/K	

Source-Drain Diode Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	-	-	108	A	
I_{SM}	Pulsed Source Current (Body Diode)	-	-	380	A	
V_{SD}	Diode Forward Voltage	-	-	2.0	V	$V_{GS}=0V, I_S=108A, T_C=25^\circ\text{C}$
t_{rr}	Reverse Recovery Time	140	300	630	ns	$di/dt=400A/\mu s, T_J=150^\circ\text{C}$
Q_{rr}	Reverse Recovered Charge	7.2	16.0	34.0	μC	$I_S=108A$

Notes:

④ - Pulse Width $\leq 300\mu s$; Duty cycle $\leq 2\%$.



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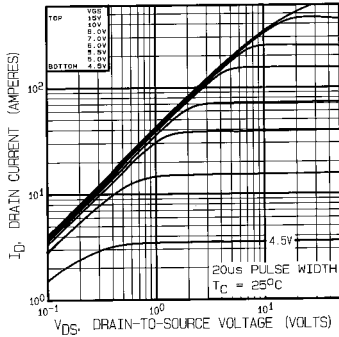


Fig 1. Typical Output Characteristics,
 $T_C = 25^\circ\text{C}$

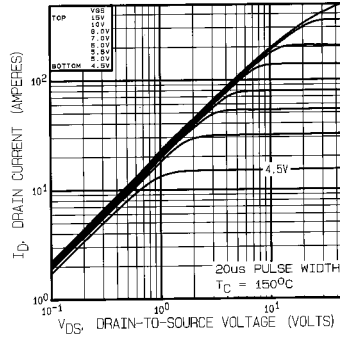


Fig 2. Typical Output Characteristics,
 $T_C = 150^\circ\text{C}$

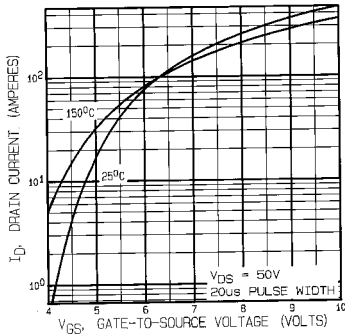


Fig 3. Typical Transfer Characteristics

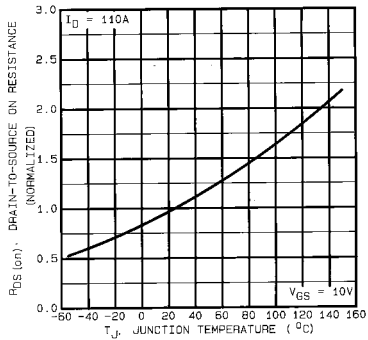


Fig 4. Normalized On-Resistance Vs.
Temperature

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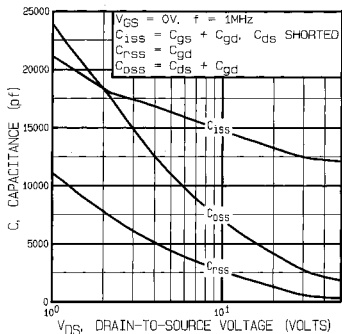


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

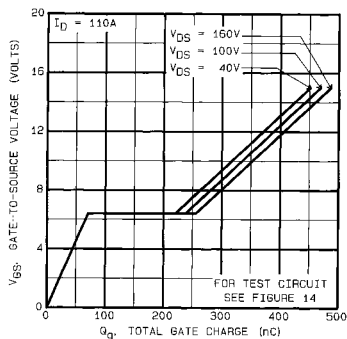


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

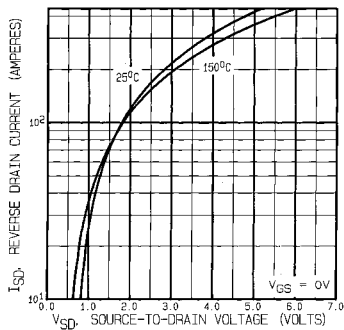


Fig 7. Typical Source-Drain Diode Forward Voltage

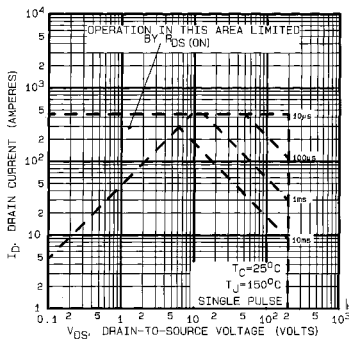


Fig 8. Maximum Safe Operating Area



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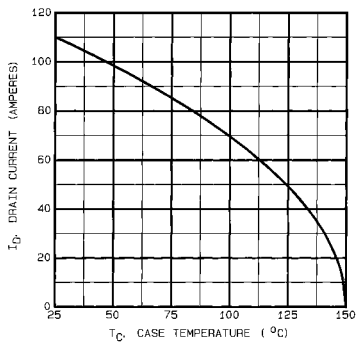


Fig 9. Maximum Drain Current Vs. Case Temperature

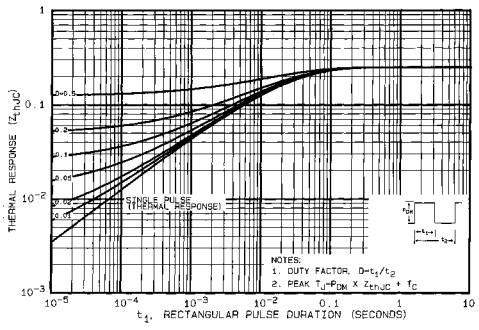


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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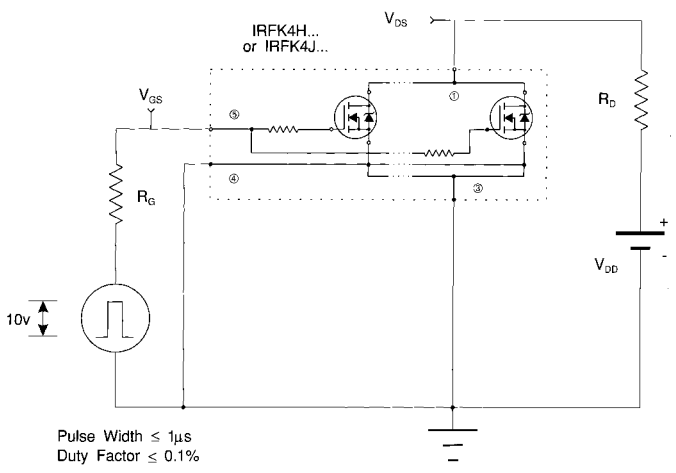


Fig 11a. Switching Time Test Circuit

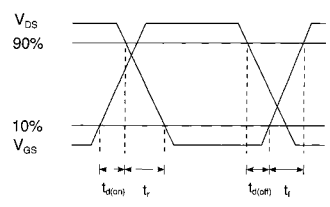
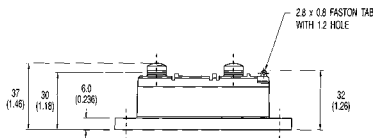
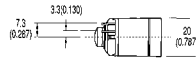
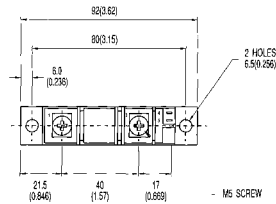
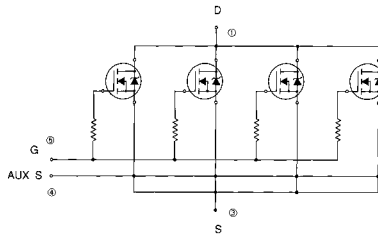


Fig 11b. Switching Time Waveforms



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Circuit Configuration and Outline



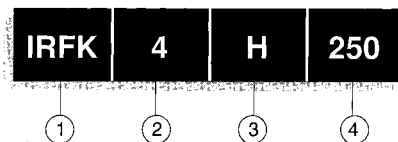
NOTE:
DEVICE IS SUPPLIED WITH
AUXILIARY LEADS 200(7.87) LONG

All dimensions in millimetres (inches)

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Part Numbering



1. - HEX-pak Module.
2. - Number of HEXFETs in parallel.
3. - H - Fast switching.
 - J - Oscillation resistant for sensitive applications.
4. - Voltage code:-
 - 054 - 60V
 - 150 - 100V
 - 250 - 200V
 - 350 - 400V
 - 450 - 500V
 - C50 - 600V

WORLD HEADQUARTERS: 233 Kansas St., EL SEGUNDO, California 90245, USA. Tel:(213) 772-2000. Tlx:664464, Fax:(213) 772-9028
EUROPEAN HEADQUARTERS: Hurst Green, OXTED, Surrey RH8 9BB, UK. Tel:(0883) 713215. Tlx:95219. Fax:(0883)714234.

CANADA: 101 Bentley St., Markham, ONTARIO L3R 3L1 Tel:(416)475-1897. Tlx:06-986-660. Fax:(416)475-8801
MACROSOVAKIA: Macurova 19/1565, Box 30, 149 00 PRAGUE. Tel:(2) 792 6831. Fax:(2) 792 6831.
DENMARK: P.O. Box 70, Kroghshøjvej 51, DK-2880 BAGSVAERD. Tel: (45) 44 37 71 50. Fax: (45) 44 37 71 52.
FRANCE: 123 Rue de Petit Vaux, 91360 EPINAY sur ORGE. Tel:(1)84 54 63 29. Tlx:600943. Fax:(1)84 54 83 30.
FINLAND: Biiskopsvägen 19, 02590 Siuntia St. Tel:(0) 262 8144. Fax:(0) 262 8150.
GERMANY: Saalburgstr. 157, D-6380 BAD HOMBURG. Tel:(6)172 37666. Tlx:410404. Fax:(6)172 37695.
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HONG KONG: 202 Peter Building, 60 Queens Road Central, HONG KONG. Tel:(85) 252 36355. Fax: (85) 284 52908.
ITALY: Via Liguna 49, 10071 Borgaro, TORINO. Tel:(011)470 14 84. Tlx:221267. Fax:(011)470 42 90.
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INDIA: 31 Greenacre, 5 Union Park, Khar (W), BOMBAY 400 052. Tel:(022)535026/533779/540242. Tlx:011-71481.
JAPAN: K & H Bldg. 2F, 3-30-4 Nishi-ikebukuro, Toshima-ku, TOKYO, Japan 171. Tel:(03)983 0641. Fax:(03)983 0642.
SINGAPORE: HEX 10 01 Fortune Centre, 190 Middle Road, SINGAPORE 0718. Tel:(65)336 3922/337 4695/336 6286. Fax: (65)337 4692.
SWEDEN: Box: 86, S-162 18 Vällingby 1, STOCKHOLM. Tel:(08)670035. Fax:(08)674242.
SWITZERLAND: CH-8032 ZURICH, Kirchenweg 5. Tel:(01)386 8702/8686. Fax:(01)383 5108/2379.
U.S.A.:
Central Zone: 2401 Plum Grove Road, Suite 111, PALATINE, IL60067. Tel:(312)397-0002. Fax:(312)397-0114.
Eastern Zone: 71 Grand Avenue, PALISADES PARK, NJ07950. Tel:(201)940-4554. Fax:(201)943 5754.
Southern Zone: 800 Office Plaza Blvd., Suite 401, KISSIMMEE, FL32743. Tel:(407)933-2383. Fax:(407)933-2293.
Western Zone: 222 Kansas Street, EL SEGUNDO, CA90245. Tel:(213)607-8886. Fax:(213)640-6533.

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