International IOR Rectifier IRFK2D054, IRFK2F054

Isolated Base Power HEX-pak™ Assembly - Half Bridge 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.D... for fast switching and IRFK.F... for oscillation sensitive applications.

V_{DS} = 60V

$R_{DS(on)}$ = 10mΩ

I_D = 120A

Absolute Maximum Rating

	Parameter	Max.	Units
I_D @ T_C=25°C	Continuous Drain Current	120	A
I_D @ T_C=100°C	Continuous Drain Current	76	A
I_{DM}	Pulse Drain Current	480	A ①
P_D @ T_C=25°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.

Electrical Characteristics @ T_J = 25°C (Unless otherwise specified)

	Parameter		Min.	Typ.	Max.	Units	Test Conditions
B_{VDSS}	Drain-to-Source Breakdown voltage		60	-	-	V	V_{GS}=0V, I_D=1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance		-	8	10	mΩ	V_{GS}=10V, I_D=76A
$I_{D(on)}$	On-State Drain Current		120	-	-	A	V_{DS} > $I_{D(on)}$ x $R_{DS(on)}$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		62	94	-	S	V_{DS} > 50V, I_D=76A
I_{DSS}	Zero Gate Voltage Drain Current		-	-	0.5	mA	V_{DS}=V_{DS}max, V_{GS}=0v
			-	-	2.0	mA	V_{GS}=10V, T_C=125°C, V_{DS}=V_{DS}max x 0.8
I_{GSS}	Gate-to-Source Leakage Forward		-	-	200	nA	V_{GS}=20V
I_{GSS}	Gate-to-Source Leakage Reverse		-	-	-200	nA	V_{GS}=-20V
Q_g	Total Gate Charge		-	260	300	nC	I_D=120A, V_{GS}=10V,
Q_{gs}	Gate-to-Source Charge		-	50	74	nC	V_{DS}=V_{DS}max x 0.8
Q_{gd}	Gate-to-Drain ("Miller") Charge		-	90	136	nC	
$t_{d(on)}$	Turn-on Delay Time	IRFK2D054	-	100	-	ns	V_{DD}=25V, I_D=76A,
		IRFK2F054	-	115	-	ns	
t_r	Rise Time	IRFK2D054	-	300	-	ns	V_{GS}=10V,
		IRFK2F054	-	380	-	ns	
$t_{d(off)}$	Turn-off Delay Time	IRFK2D054	-	320	-	ns	R_{SOURCE}=3.3Ω
		IRFK2F054	-	420	-	ns	
t_f	Fall Time	IRFK2D054	-	120	-	ns	
		IRFK2F054	-	200	-	ns	
L_{DS}	Drain-to-Source Inductance		-	18	-	nH	
C_{iss}	Input Capacitance		-	8.0	-	nF	V_{GS}=0V, V_{DS}=25V,
C_{oss}	Output Capacitance		-	2.0	-	nF	f=1.0MHz
C_{rss}	Reverse Transfer Capacitance		-	1.0	-	nF	
	Linear Derating Factor		-	-	4	K/W	

Source-Drain Diode Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	-	-	120	A	
I_{SM}	Pulsed Source Current (Body Diode)	-	-	310	A	
V_{SD}	Diode Forward Voltage	-	-	2.5	V	V_{GS}=0V, I_S= 120A, T_C=25°C
t_{rr}	Reverse Recovery Time	71	150	320	ns	di/dt=200A/µs, T_J=150°C
Q_{rr}	Reverse Recovered Charge	2.2	5.0	11.4	µC	I_S=120A

Notes:

④ - Pulse Width ≤ 300µs; Duty cycle ≤ 2%.

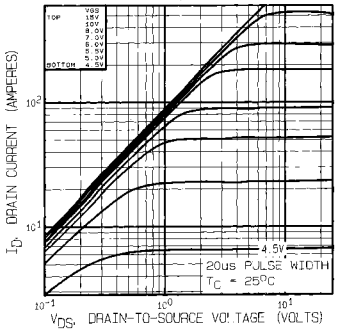


Fig 1. Typical Output Characteristics, T_C=25°C

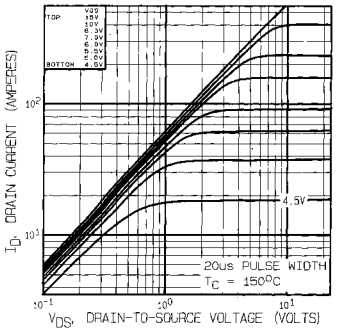


Fig 2. Typical Output Characteristics, T_C=150°C

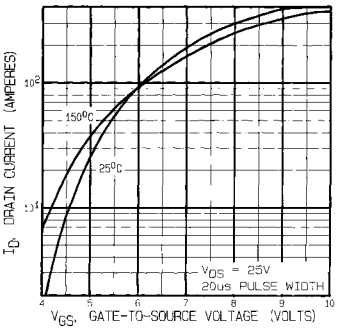


Fig 3. Typical Transfer Characteristics

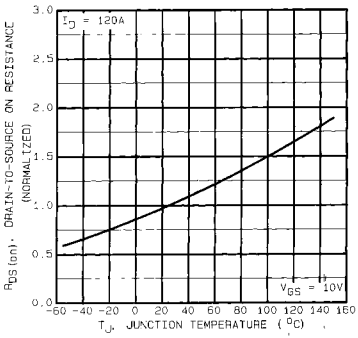


Fig 4. Normalized On-Resistance Vs. Temperature

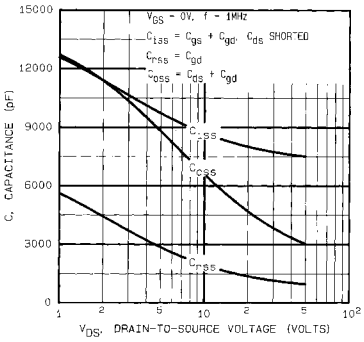


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

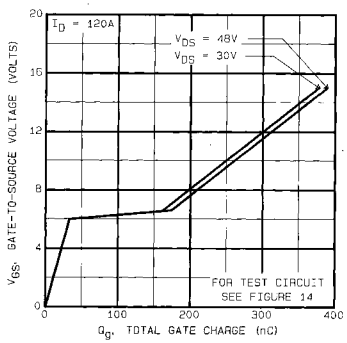


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

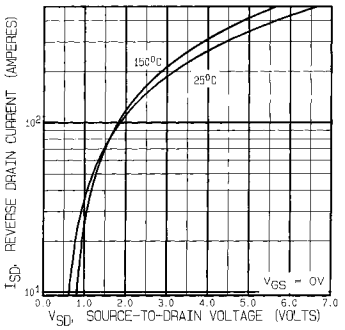


Fig 7. Typical Source-Drain Diode Forward Voltage

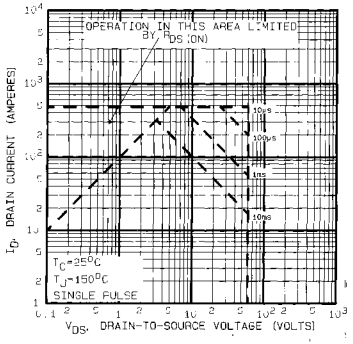


Fig 8. Maximum Safe Operating Area

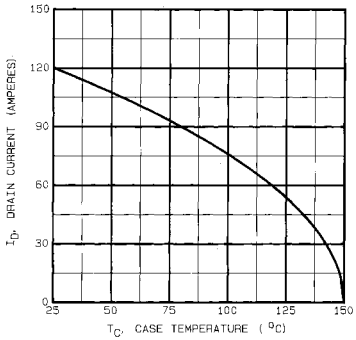


Fig 9. Maximum Drain Current Vs. Case Temperature

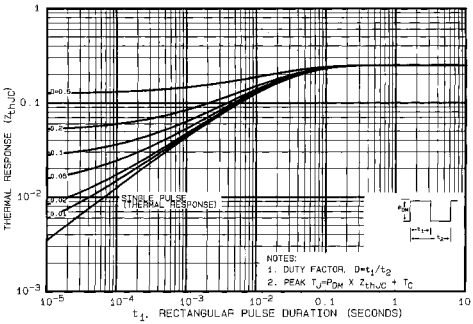
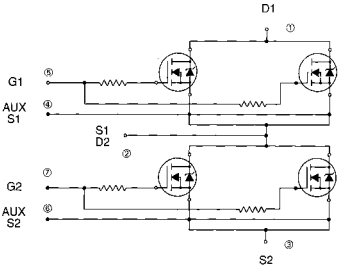
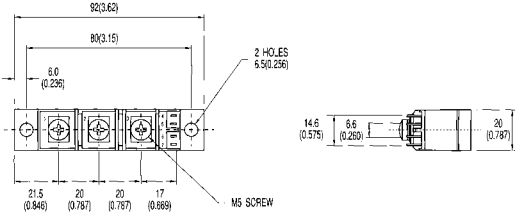
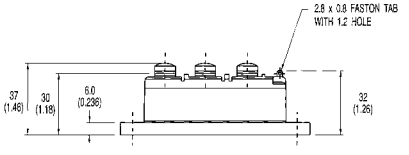


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Circuit Configuration and Outline







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

All dimensions in millimetres (inches)

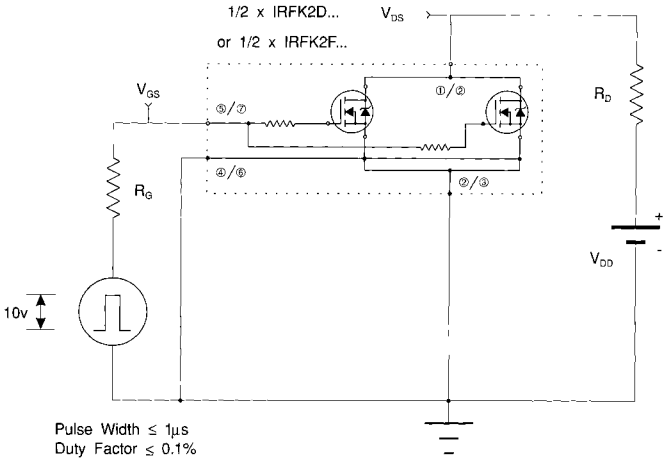


Fig 11a. Switching Time Test Circuit

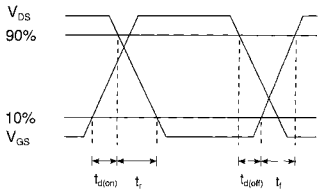
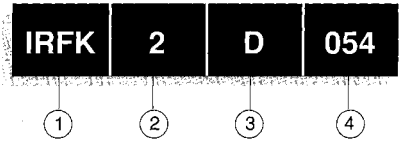


Fig 11b. Switching Time Waveforms

Part Numbering



1. - HEX-pak Module.
2. - Number of arms of bridge.
3. - D - Fast switching.
   - F - 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:06-966-650. Fax:(416)475-8801
CZECHOSLOVAKIA: Macurova 19/1565, Box 30, 149 00 **PRAGUE**. Tel:(2) 792 6831. Fax:(2) 792 6831.
DENMARK: P.O. Box 70, Krogshoejvej 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)64.54.83.29. Tlx:600943. Fax:(1)64.54.83.30.
FINLAND: **Billskogsvägen** 19, 02580 Sjundeå St. Tel:(0) 262 8144. Fax.(0) 262 8150.
GERMANY: Saalburgstr. 157, D-6380 **BAD HOMBURG**. Tel:(61)72 37066. Tlx:410404. Fax:(61)72 37065.
HUNGARY: Szent Istvan Park 15, H-1137 **BUDAPEST**. Tel:(1) 1298 822. Fax:(1) 1298 822.
HONG KONG: 202 Peter Budling, 80 Queens Road Central, **HONG KONG**. Tel:(85) 252 36355. Fax: (85) 284 52908.
ITALY: Via Liguria 49, 10071 Borgaro, **TORINO**. Tel:(011)470 14 84. Tlx:221257. Fax:(011)470 42 90.
Via Zucca 8, 20017 Rho **MILANO**. Tel:(02)93 50 36 50. Fax:(02)93 50 36 55.
Via Arno 1, 40139 **BOLOGNA**. Tel:(05149 33 07. Fax:(051)49 54 80.
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)338 3922/337 4695/336 6286. Fax: (65)337 4692.
SWEDEN: Box: 86, S-162 12 Vallingby 1, **STOCKHOLM**. Tel:(08)870035. Fax:(08)874242.
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**, NJ07650. Tel:(201)943-4554. 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.

Sales Offices, Agents and Distributors in Major Cities throughout the World.