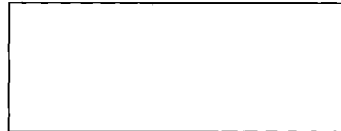


# International Rectifier **IRFK4H350, IRFK4J350**

## 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.

**$V_{DS} = 400V$**

**$R_{DS(on)} = 75m\Omega$**

**$I_D = 50A$**

### Absolute Maximum Rating

	Parameter	Max.	Units
$I_D$ @ $T_C=25^\circ C$	Continuous Drain Current	50	A
$I_D$ @ $T_C=100^\circ C$	Continuous Drain Current	32	A
$I_{DM}$	Pulse Drain Current	200	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	$^\circ C$
$T_{STG}$	Storage Temperature Range	-40 to 150	$^\circ C$

### 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.

# IRFK4H350, IRFK4J350



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

Parameter	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
$V_{DS}$	Drain-to-Source Breakdown voltage	400	-	-	V	$V_{GS}=0\text{V}$ , $I_D=1.0\text{mA}$	
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	-	63	75	m $\Omega$	$V_{GS}=10\text{V}$ , $I_D=16\text{A}$	
$I_{D(on)}$	On-State Drain Current	50	-	-	A	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ max, $V_{GS}=10\text{V}$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}$ , $I_D=1.0\text{mA}$	
$g_{fs}$	Forward Transconductance ④	32	50	-	S	$V_{DS} > 50\text{V}$ , $I_D=32\text{A}$	
$I_{DSS}$	Zero Gate Voltage Drain Current	-	-	1.0	mA	$V_{DS}=V_{DSmax}$ , $V_{GS}=0\text{V}$	
		-	-	4.0	mA	$V_{GS}=10\text{V}$ , $T_C=125^\circ\text{C}$ , $V_{DS}=V_{GSmax} \times 0.8$	
$I_{GSS}$	Gate-to-Source Leakage Forward	-	-	400	nA	$V_{GS}=20\text{V}$	
$I_{GSS}$	Gate-to-Source Leakage Reverse	-	-	-400	nA	$V_{GS}=-20\text{V}$	
$Q_g$	Total Gate Charge	-	400	550	nC	$I_D=50\text{A}$ , $V_{GS}=10\text{V}$ .	
$Q_{gs}$	Gate-to-Source Charge	-	60	80	nC	$V_{DS}=V_{DSmax} \times 0.8$	
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	-	175	250	nC		
$t_{d(on)}$	Turn-on Delay Time	IRFK4H350	-	50	-	ns	$V_{DD}=180\text{V}$ , $I_D=32\text{A}$ , $V_{GS}=10\text{V}$ ,
		IRFK4J350	-	60	-	ns	
$t_r$	Rise Time	IRFK4H350	-	55	-	ns	$R_{SOURCE}=3.3\Omega$
		IRFK4J350	-	70	-	ns	
$t_{d(off)}$	Turn-off Delay Time	IRFK4H350	-	230	-	ns	$R_{SOURCE}=3.3\Omega$
		IRFK4J350	-	300	-	ns	
$t_f$	Fall Time	IRFK4H350	-	50	-	ns	$R_{SOURCE}=3.3\Omega$
		IRFK4J350	-	70	-	ns	
$L_{DS}$	Drain-to-Source Inductance	-	18	-	nH		
$C_{iss}$	Input Capacitance	-	17.5	-	nF	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ ,	
$C_{oss}$	Output Capacitance	-	11.2	-	nF	$f=1.0\text{MHz}$	
$C_{rfs}$	Reverse Transfer Capacitance	-	8.0	-	nF		
	Linear Derating Factor	-	-	4	W/K		

## Source-Drain Diode Ratings and Characteristics

Parameter	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	-	-	50	A	
$I_{SM}$	Pulsed Source Current (Body Diode)	-	-	190	A	
$V_{SD}$	Diode Forward Voltage	-	-	1.6	V	$V_{GS}=0\text{V}$ , $I_S=50\text{A}$ , $T_C=25^\circ\text{C}$
$t_{rr}$	Reverse Recovery Time	180	400	880	ns	$di/dt=400\text{A}/\mu\text{s}$ , $T_j=150^\circ\text{C}$
$Q_{rr}$	Reverse Recovered Charge	8.0	20.0	52.0	$\mu\text{C}$	$I_S=50\text{A}$

### Notes:

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



# IRFK4H350, IRFK4J350

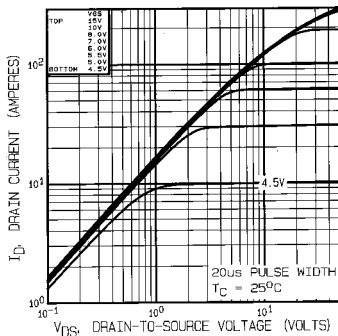


Fig 1. Typical Output Characteristics,  
 $T_c = 25^\circ\text{C}$

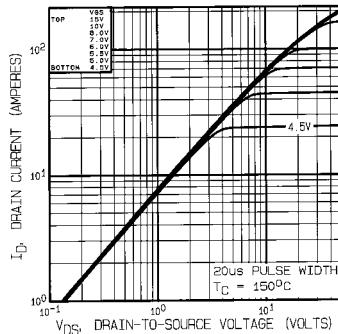


Fig 2. Typical Output Characteristics,  
 $T_c = 150^\circ\text{C}$

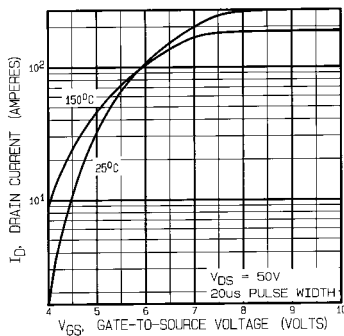


Fig 3. Typical Transfer Characteristics

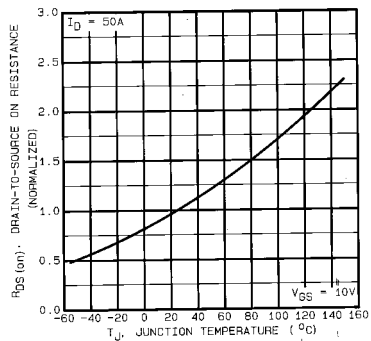
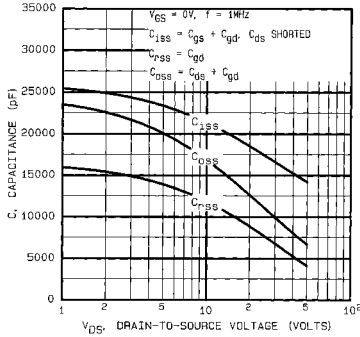
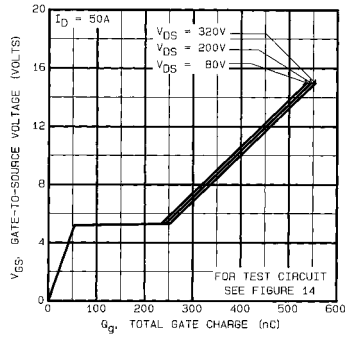


Fig 4. Normalized On-Resistance Vs.  
Temperature

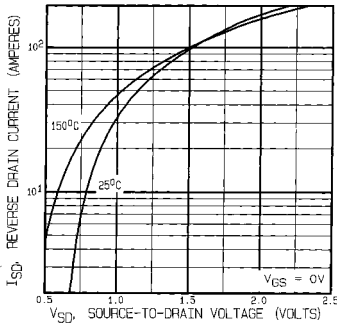
# IRFK4H350, IRFK4J350



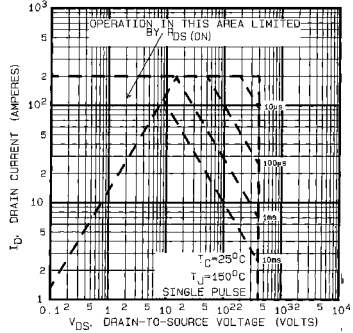
**Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage**



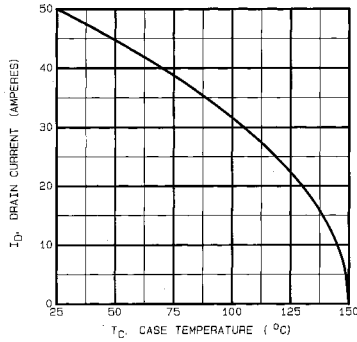
**Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage**



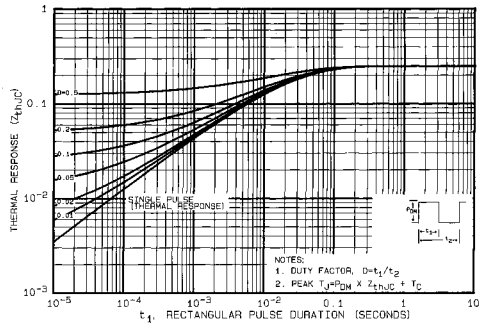
**Fig 7. Typical Source-Drain Diode Forward Voltage**



**Fig 8. Maximum Safe Operating Area**



**Fig 9. Maximum Drain Current Vs. Case Temperature**



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

# IRFK4H350,IRFK4J350

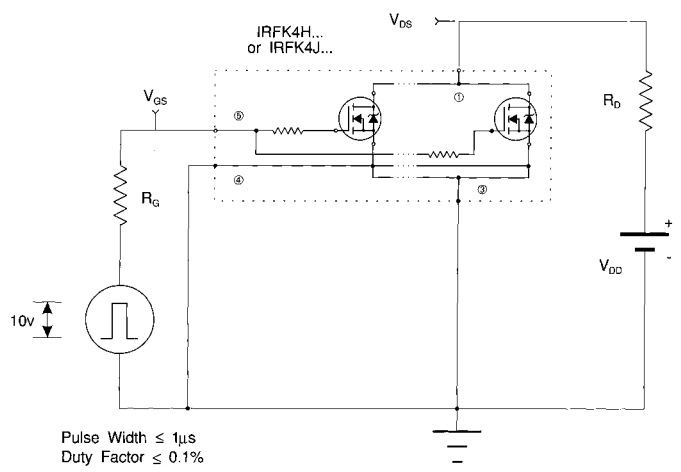


Fig 11a. Switching Time Test Circuit

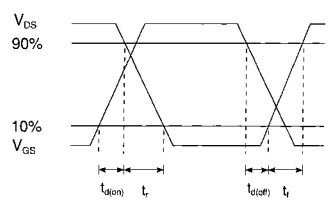
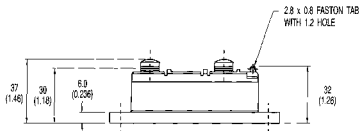
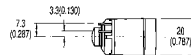
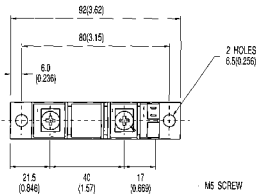
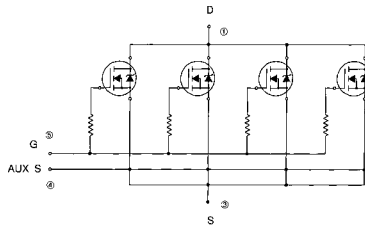


Fig 11b. Switching Time Waveforms



# IRFK4H350, IRFK4J350

## Circuit Configuration and Outline



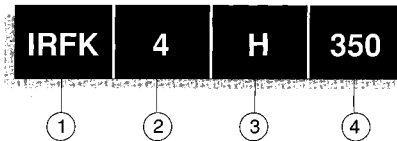
NOTE:  
DEVICE IS SUPPLIED WITH  
AUXILIARY LEADS 200(7.87) LONG

All dimensions in millimetres (inches)

# IRFK4H350,IRFK4J350



## 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

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MJW/1/82