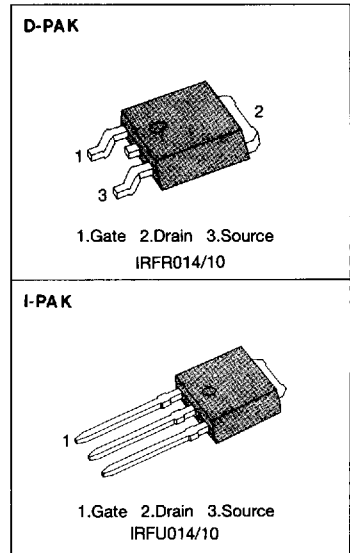


**FEATURES**

- Lower  $R_{DS(on)}$
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability

**PRODUCT SUMMARY**

Part Number	V <sub>DS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
IRFR014/U014	60V	0.20 $\Omega$	8.2A
IRFR010/U010	50V	0.20 $\Omega$	8.2A



**ABSOLUTE MAXIMUM RATINGS**

Characteristic	Symbol	IRFR014/U014	IRFR010/U010	Unit
Drain-Source Voltage (1)	V <sub>DSS</sub>	60	50	V <sub>dc</sub>
Drain-Gate Voltage (R <sub>GS</sub> =1.0M $\Omega$ )(1)	V <sub>DGR</sub>	60	50	V <sub>dc</sub>
Gate-Source Voltage	V <sub>GS</sub>	$\pm 20$		V <sub>dc</sub>
Continuous Drain Current T <sub>C</sub> =25 °C	I <sub>D</sub>	8.2		A <sub>dc</sub>
Continuous Drain Current T <sub>C</sub> =100 °C	I <sub>D</sub>	5.2		A <sub>dc</sub>
Drain Current - Pulsed (3)	I <sub>DM</sub>	33		A <sub>dc</sub>
Gate Current - Pulsed	I <sub>GM</sub>	$\pm 1.5$		A <sub>dc</sub>
Single Pulsed Avalanche Energy (4)	E <sub>AS</sub>	1.4		mJ
Avalanche Current	I <sub>AS</sub>	8.2		A
Total Power Dissipation at T <sub>C</sub> =25 °C	P <sub>D</sub>	25		Watts
Derate above 25 °C		0.20		W/ °C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150		°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T <sub>L</sub>	300		°C

- Notes : (1) T<sub>J</sub>=25 °C to 150 °C  
 (2) Pulse test : Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating : Pulse width limited by max. junction temperature  
 (4) L=50 $\mu H$ , V<sub>dd</sub>=25V, R<sub>G</sub>=25  $\Omega$  , Starting T<sub>J</sub>=25 °C

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**ELECTRICAL CHARACTERISTICS** ( $T_c=25^\circ\text{C}$  unless otherwise specified)

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage					
	IRFR014/U014	60	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250 $\mu$ A
	IRFR010/U010	50	-	-	V	
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	-	4.0	V	V <sub>D</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 $\mu$ A
I <sub>GSS</sub>	Gate-Source Leakage Forward	-	-	100	nA	V <sub>GS</sub> =20V
I <sub>GSS</sub>	Gate-Source Leakage Reverse	-	-	-100	nA	V <sub>GS</sub> =-20V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	-	-	250	$\mu$ A	V <sub>D</sub> =Max. Rating, V <sub>GS</sub> =0V
		-	-	1000	$\mu$ A	V <sub>D</sub> =0.8 Max. Rating, V <sub>GS</sub> =0V, T <sub>c</sub> =125 $^\circ$ C
R <sub>DS(on)</sub>	Static Drain-Source on Resistance(2)	-	-	0.20	$\Omega$	V <sub>GS</sub> =10V, I <sub>D</sub> =4.1A
g <sub>fs</sub>	Forward Transconductance (2)	2.1	-	-	$\text{S}$	V <sub>D</sub> $\geq$ 50V, I <sub>D</sub> =4.1A
C <sub>iss</sub>	Input Capacitance	-	358	-	pF	V <sub>GS</sub> =0V
C <sub>oss</sub>	Output Capacitance	-	134	-	pF	V <sub>D</sub> =25V
C <sub>rss</sub>	Reverse Transfer Capacitance	-	55	-	pF	f=1.0MHz
t <sub>d(on)</sub>	Turn-On Delay Time	-	-	17	ns	V <sub>D</sub> =0.5 BV <sub>DSS</sub> , I <sub>D</sub> =8.2A, Z <sub>o</sub> =24 $\Omega$ (MOSFET switching times are essentially independent of operating temperature)
t <sub>r</sub>	Rise Time	-	-	50	ns	
t <sub>d(off)</sub>	Turn-Off Delay Time	-	-	18	ns	
t <sub>f</sub>	Fall Time	-	-	35	ns	
Q <sub>g</sub>	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	13.0	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =8.2A, V <sub>D</sub> =0.8 Max. Rating (Gate charge is essentially independent of operating temperature)
Q <sub>gs</sub>	Gate-Source Charge	-	3.8	-	nC	
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	-	4.8	-	nC	

**THERMAL RESISTANCE**

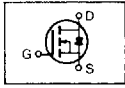
Symbol	Characteristics		All	Units	Remark
R <sub>thJC</sub>	Junction-to-Case	MAX	5.0	K/W	
R <sub>thCS</sub>	Case-to-Sink	TYP	1.7	K/W	Mounting surface flat, smooth and greased
R <sub>thJA</sub>	Junction-to-Ambient	MAX	110	K/W	Free Air Operation

Notes : (1) T<sub>J</sub>=25 $^\circ$ C to 150 $^\circ$ C

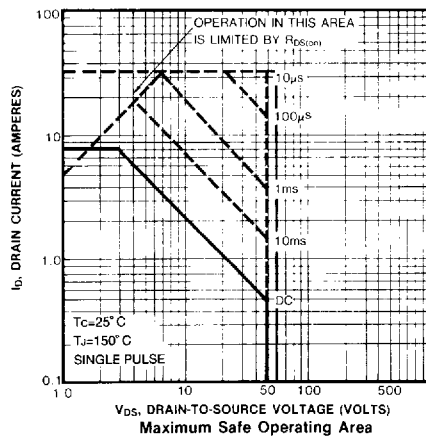
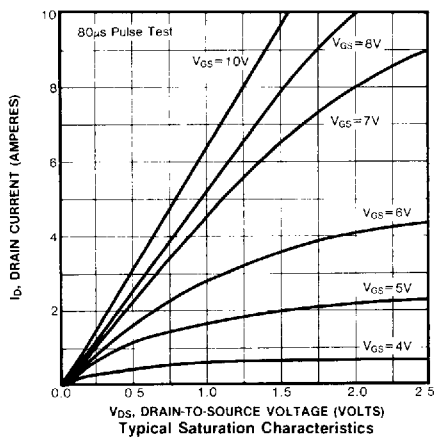
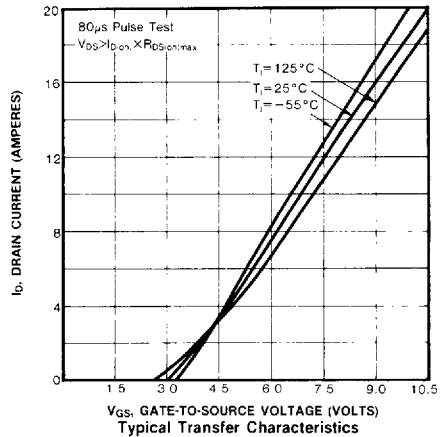
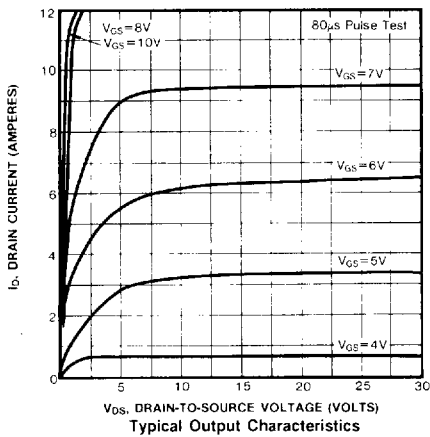
(2) Pulse test : Pulse width  $\leq$ 300 $\mu$ s, Duty Cycle  $\leq$ 2%

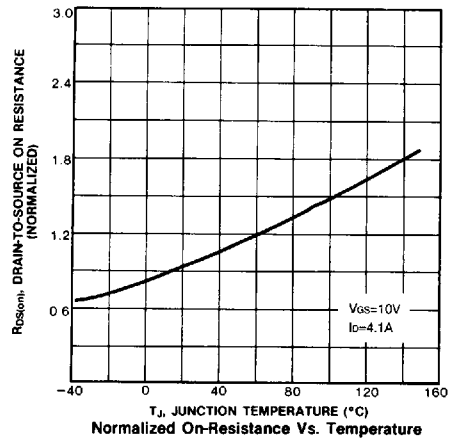
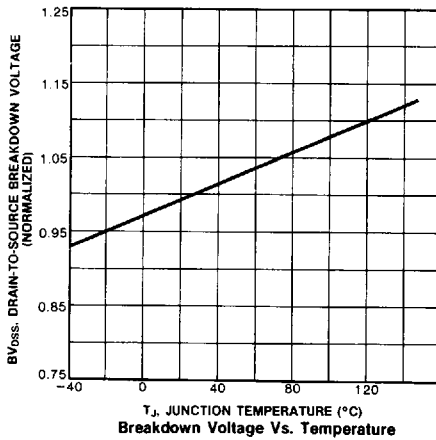
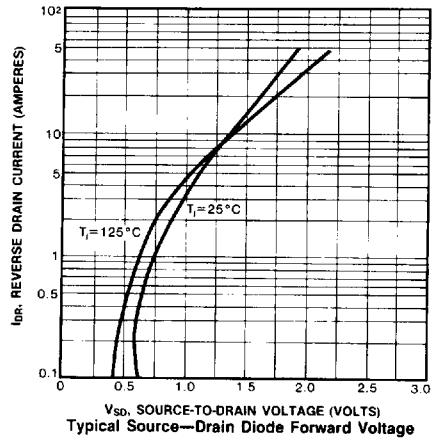
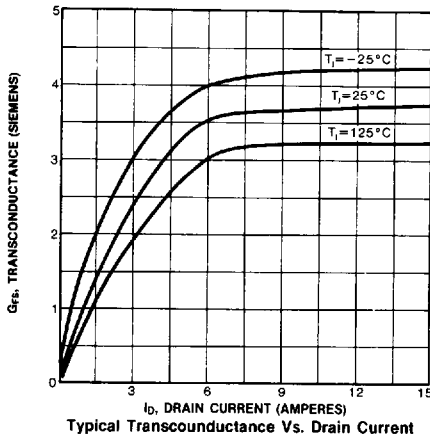
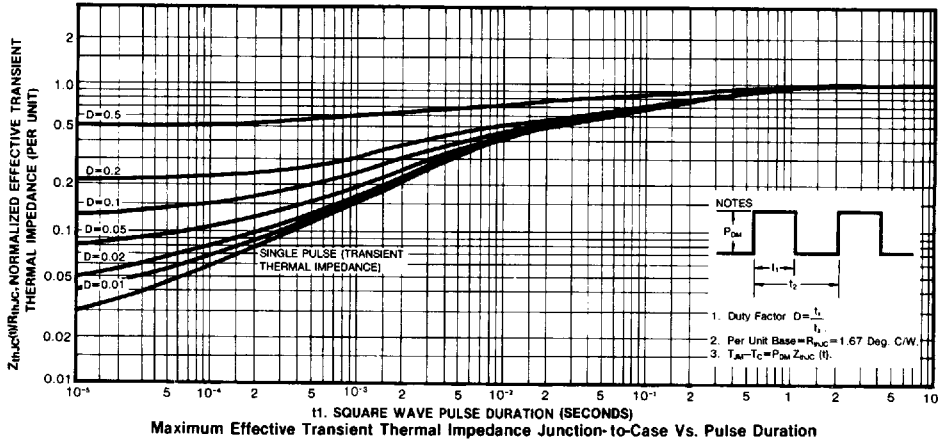
(3) Repetitive rating : Pulse width limited by max. junction temperature

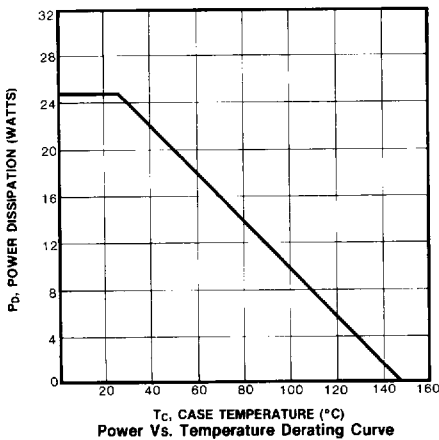
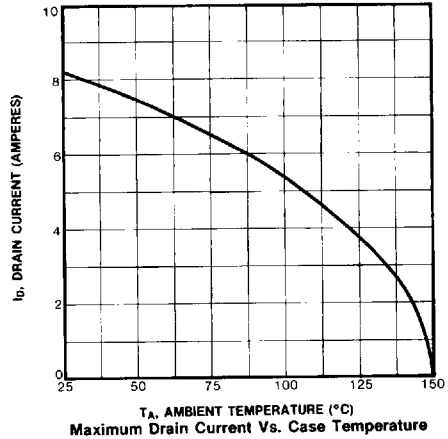
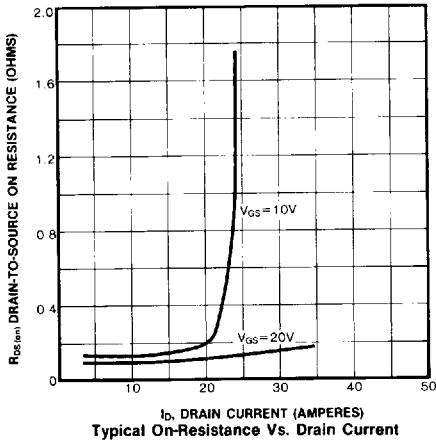
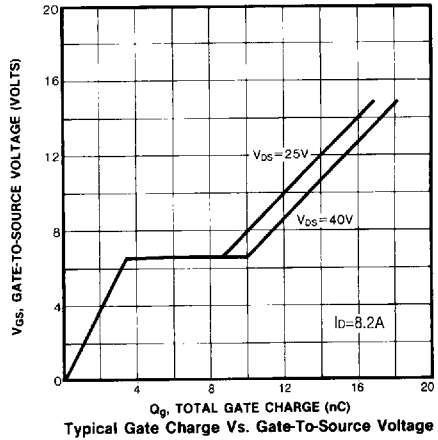
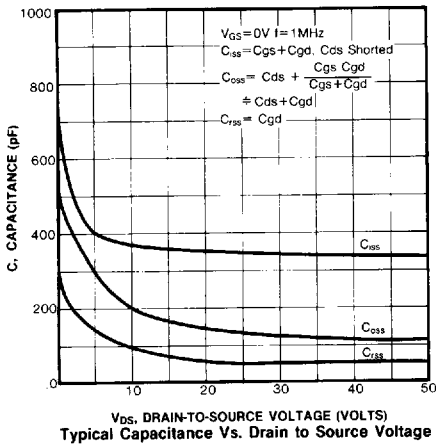
**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	-	-	8.2	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
$I_{SM}$	Pulse Source Current (Body Diode) (3)	-	-	33	A	
$V_{SD}$	Diode Forward Voltage	-	-	1.6	V	$T_J=25^\circ\text{C}$ , $I_S=8.2\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	-	-	190	ns	$T_J=25^\circ\text{C}$ , $I_F=8.2\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{S}$

- Notes : (1)  $T_J=25^\circ\text{C}$  to  $150^\circ\text{C}$   
 (2) Pulse test : Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 (3) Repetitive rating : Pulse width limited by max. junction temperature







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