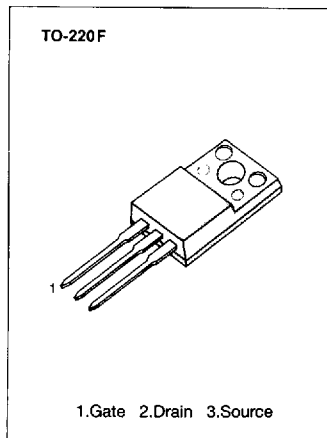


FEATURES

- 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_{DSS}	$R_{DS(on)}$	I_D
IRFS644	250V	0.28Ω	8.5A



ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	IRFS644	Unit
Drain-Source Voltage (1)	V_{DSS}	250	Vdc
Drain-Gate Voltage ($R_{GS}=1.0\text{Mohm}$) (1)	V_{DGR}	250	Vdc
Gate-Source Voltage	V_{GS}	± 20	Vdc
Continuous Drain Current $T_c=25^\circ\text{C}$	I_D	8.5	Adc
Continuous Drain Current $T_c=100^\circ\text{C}$	I_D	6.0	Adc
Drain Current - Pulsed (3)	I_{DM}	56	Adc
Gate Current - Pulsed	I_{GM}	± 15	Adc
Single Pulsed Avalanche Energy (4)	EAS	177	mJ
Avalanche Current	IAS	8.5	A
Total Power Dissipation at $T_c=25^\circ\text{C}$	P_D	40	Watts
Derate above 25°C		0.32	W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	300	$^\circ\text{C}$

Notes : (1) $T_J=25^\circ\text{C}$ to 150°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

(4) $L=4\text{mH}$, $V_{dd}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

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

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	250	-	-	V	$V_{GS}=0V, I_D=250\mu A$
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
I_{GSS}	Gate-Source Leakage Forward	-	-	100	nA	$V_{GS}=20V$
I_{GSS}	Gate-Source Leakage Reverse	-	-	-100	nA	$V_{GS}=-20V$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	250	μA	$V_{DS}=\text{Max. Rating}, V_{GS}=0V$
		-	-	1000	μA	$V_{DS}=0.8 \text{ Max. Rating}, V_{GS}=0V, T_c=125^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On Resistance(2)	-	-	0.28	Ω	$V_{GS}=10V, I_D=7A$
g_{fs}	Forward Transconductance (2)	6.7	10.2	-	Ω	$V_{DS} \geq 50V, I_D=7A$
C_{iss}	Input Capacitance	-	1472	-	pF	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{MHz}$
C_{oss}	Output Capacitance	-	190	-	pF	
C_{rss}	Reverse Transfer Capacitance	-	69	-	pF	
$t_{d(on)}$	Turn-On Delay Time	-	16	20	ns	$V_{DD}=0.5 BV_{DSS}, I_D=14A, Z_{\theta}=9.1\Omega$ (MOSFET switching times are essentially independent of operating temperature)
t_r	Rise Time	-	67	100	ns	
$t_{d(off)}$	Turn-Off Delay Time	-	53	80	ns	
t_f	Fall Time	-	49	74	ns	
Q_g	Total Gate Charge (Gate-Source Plus Gate-Drain)	-	-	65	nC	$V_{GS}=10V, I_D=14A, V_{DS}=0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature)
Q_{gs}	Gate-Source Charge	-	13	-	nC	
Q_{gd}	Gate-Drain ("Miller") Charge	-	26	-	nC	

THERMAL RESISTANCE

Symbol	Characteristics		IRFS644	Units	Remark
R_{thJC}	Junction-to-Case	MAX	3.12	K/W	
R_{thCS}	Case-to-Sink	TYP	0.5	K/W	Mounting surface flat, smooth and greased
R_{thJA}	Junction-to-Ambient	MAX	62.5	K/W	Free Air Operation

Notes : (1) $T_J=25^\circ\text{C}$ 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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	-	-	14	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier
I_{SM}	Pulse Source Current (Body Diode) (3)	-	-	56	A	
V_{SD}	Diode Forward Voltage (2)	-	-	1.8	V	$T_J=25^\circ\text{C}$, $I_S=14\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	-	300	-	ns	$T_J=25^\circ\text{C}$, $I_F=14\text{A}$, $dI_F/dt=100\text{A}/\mu\text{S}$

- Notes : (1) $T_J=25^\circ\text{C}$ to 150°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

