

**POWER MOSFET IRF3N25**

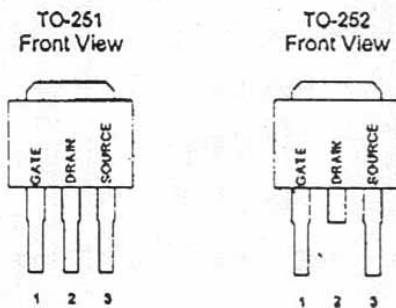
**GENERAL DESCRIPTION**

This advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for low voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

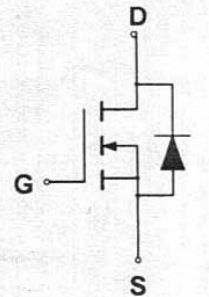
**FEATURES**

- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆  $I_{DS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature
- ◆ Surface Mount Package: TO-252

**PIN CONFIGURATION**



**SYMBOL**



N-Channel MOSFET

**ORDERING INFORMATION**

Part Number	Package
IRFU325	TO-251
IRFR325	TO-252

**ABSOLUTE MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain to Current – Continuous	$I_D$	3.0	A
– Pulsed	$I_{DM}$	9.0	
Gate-to-Source Voltage – Continue	$V_{GS}$	$\pm 20$	V
– Non-repetitive	$V_{GSM}$	$\pm 40$	V
Total Power Dissipation	$P_D$	40	W
Derate above 25°C		0.32	W/°C
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^\circ\text{C}$ ( $V_{DD} = 100\text{V}, V_{GS} = 10\text{V}, I_L = 20\text{A}, L = 10\text{mH}, R_G = 25\Omega$ )	$E_{AS}$	45	mJ
Thermal Resistance – Junction to Case	$\theta_{JC}$	3.13	°C/W
– Junction to Ambient	$\theta_{JA}$	100	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	260	°C

**POWER MOSFET IRF3N25**  
**ELECTRICAL CHARACTERISTICS**

Unless otherwise specified,  $T_J=25^{\circ}\text{C}$ .

Characteristic		Symbol	IRF3N25			Units
			Min	Typ	Max	
Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$ )		$V_{(BR)DSS}$	250			V
Drain-Source Leakage Current ( $V_{DS} = 250\text{ V}$ , $V_{GS} = 0\text{ V}$ ) ( $V_{DS} = 250\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125^{\circ}\text{C}$ )		$I_{DSS}$			10 100	$\mu\text{A}$
Gate-Source Leakage Current-Forward ( $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$ )		$I_{GSSF}$			100	nA
Gate-Source Leakage Current-Reverse ( $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$ )		$I_{GSSR}$			100	nA
Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$ )		$V_{GS(th)}$	2.0		4.0	V
Static Drain-Source On-Resistance ( $V_{GS} = 10\text{ V}$ , $I_D = 1.5\text{A}$ ) *		$R_{DS(on)}$		1.4	2.0	$\Omega$
Drain-Source On-Voltage ( $V_{GS} = 10\text{ V}$ ) ( $I_D = 3.0\text{ A}$ )		$V_{DS(on)}$		5.04	7.2	V
Forward Transconductance ( $V_{DS} = 15\text{ V}$ , $I_D = 1.5\text{A}$ ) *		$g_{FS}$		2.3		mhos
Input Capacitance	$(V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$		307	430	pF
Output Capacitance		$C_{oss}$		57	75	pF
Reverse Transfer Capacitance		$C_{rss}$		14	25	pF
Turn-On Delay Time	$(V_{DS} = 125\text{ V}$ , $I_D = 3.0\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{\theta} = 4.7\Omega$ ) *	$t_{d(on)}$		7.0	15	ns
Rise Time		$t_r$		5.0	15	ns
Turn-Off Delay Time		$t_{d(off)}$		15	30	ns
Fall Time		$t_f$		6.0	15	ns
Total Gate Charge	$(V_{DS} = 200\text{ V}$ , $I_D = 3.0\text{ A}$ , $V_{GS} = 10\text{ V}$ ) *	$Q_g$		9.8	15	nC
Gate-Source Charge		$Q_{gs}$		2.1		nC
Gate-Drain Charge		$Q_{gd}$		4.2		nC
Internal Drain Inductance (Measured from the drain lead 0.25 from package to center of die)		$L_D$		4.5		nH
Internal Drain Inductance (Measured from the source lead 0.25 from package to source bond pad)		$L_S$		7.5		nH
<b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>						
Forward On-Voltage(1)	$(I_S = 3.0\text{ A}$ , $dI_S/dt = 100\text{A}/\mu\text{s}$ )	$V_{SD}$		0.9	1.6	V
Forward Turn-On Time		$t_{on}$		**		ns
Reverse Recovery Time		$t_{rr}$		153		ns

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

\*\* Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

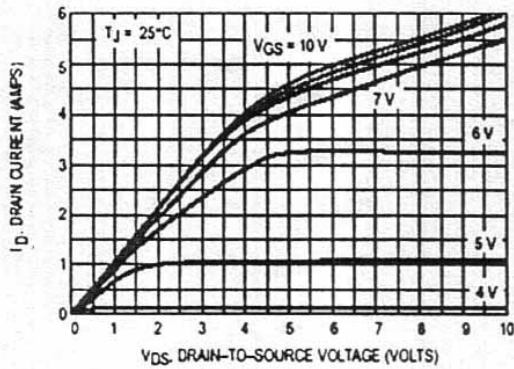


Figure 1. On-Region Characteristics

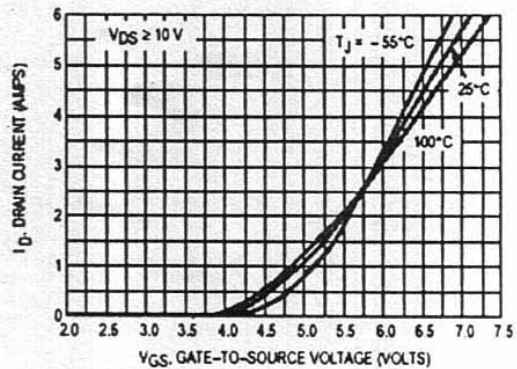


Figure 2. Transfer Characteristics

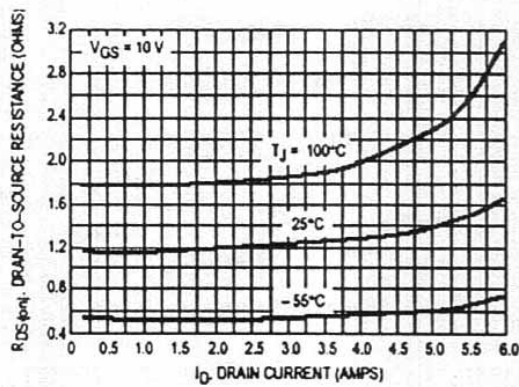


Figure 3. On-Resistance versus Drain Current and Temperature

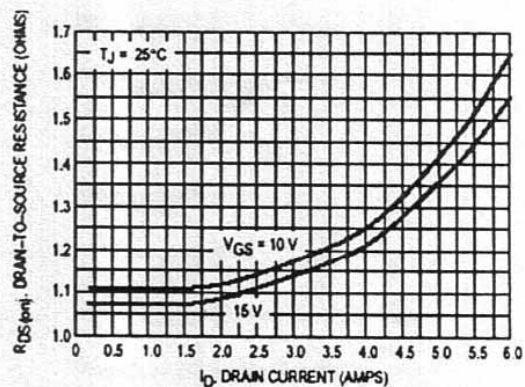


Figure 4. On-Resistance versus Drain Current and Gate Voltage

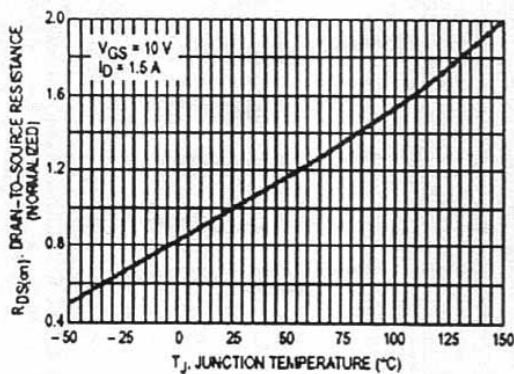


Figure 5. On-Resistance Variation with Temperature

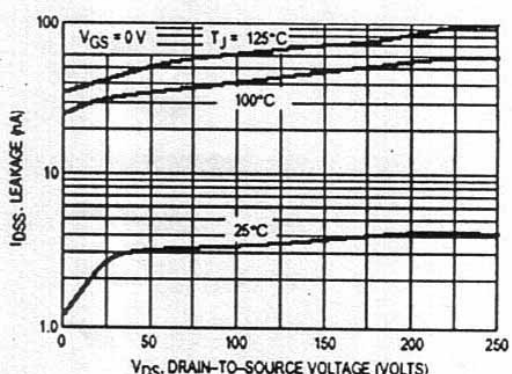


Figure 6. Drain-to-Source Leakage Current versus Voltage