



## Advanced Power MOSFET IRFP250A

### FEATURES

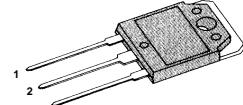
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10  $\mu$ A (Max.) @  $V_{DS} = 200V$
- Low  $R_{DS(ON)}$  : 0.071  $\Omega$ (Typ.)

$BV_{DSS} = 200 V$

$R_{DS(on)} = 0.085 \Omega$

$I_D = 32 A$

TO-3P



1.Gate 2. Drain 3. Source

### Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	200	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	32	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	20.3	
$I_{DM}$	Drain Current-Pulsed	130	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy	683	mJ
$I_{AR}$	Avalanche Current	32	A
$E_{AR}$	Repetitive Avalanche Energy	20.4	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$	5.0	V/ns
$P_D$	Total Power Dissipation ( $T_C=25^\circ C$ )	204	W
	Linear Derating Factor	1.63	$W/\text{ }^\circ C$
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to + 150	$^\circ C$
$T_L$	Maximum Lead Temp. for Soldering Purposes, 1/8 " from case for 5-seconds	300	

### Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{JC}$	Junction-to-Case	--	0.61	$^\circ C/W$
$R_{CS}$	Case-to-Sink	0.24	--	
$R_{JA}$	Junction-to-Ambient	--	40	

# IRFP250A

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## Electrical Characteristics ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	200	--	--	V	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=250\mu\text{A}$
$\Delta \text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.24	--	$\text{V}/^\circ\text{C}$	$\text{I}_D=250\mu\text{A}$ See Fig 7
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	2.0	--	4.0	V	$\text{V}_{\text{DS}}=5\text{V}, \text{I}_D=250\mu\text{A}$
$\text{I}_{\text{GSS}}$	Gate-Source Leakage , Forward	--	--	100	nA	$\text{V}_{\text{GS}}=30\text{V}$
	Gate-Source Leakage , Reverse	--	--	-100		$\text{V}_{\text{GS}}=-30\text{V}$
$\text{I}_{\text{DSS}}$	Drain-to-Source Leakage Current	--	--	10	$\mu\text{A}$	$\text{V}_{\text{DS}}=200\text{V}$
		--	--	100		$\text{V}_{\text{DS}}=160\text{V}, \text{T}_C=125^\circ\text{C}$
$\text{R}_{\text{DS(on)}}$	Static Drain-Source On-State Resistance	--	--	0.085	$\Omega$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_D=16\text{A}$ ④
$\text{g}_{\text{fs}}$	Forward Transconductance	--	18.98	--	$\Omega$	$\text{V}_{\text{DS}}=40\text{V}, \text{I}_D=16\text{A}$ ④
$\text{C}_{\text{iss}}$	Input Capacitance	--	2300	3000	pF	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=25\text{V}, f=1\text{MHz}$ See Fig 5
$\text{C}_{\text{oss}}$	Output Capacitance	--	410	475		
$\text{C}_{\text{rss}}$	Reverse Transfer Capacitance	--	200	230		
$t_{\text{d(on)}}$	Turn-On Delay Time	--	21	50	ns	$\text{V}_{\text{DD}}=100\text{V}, \text{I}_D=32\text{A}, \text{R}_G=6.2\Omega$ See Fig 13 ④ ⑤
$t_r$	Rise Time	--	20	50		
$t_{\text{d(off)}}$	Turn-Off Delay Time	--	77	160		
$t_f$	Fall Time	--	38	90		
$\text{Q}_g$	Total Gate Charge	--	95	123	nC	$\text{V}_{\text{DS}}=160\text{V}, \text{V}_{\text{GS}}=10\text{V}, \text{I}_D=32\text{A}$ See Fig 6 & Fig 12 ④ ⑤
$\text{Q}_{\text{gs}}$	Gate-Source Charge	--	18	--		
$\text{Q}_{\text{gd}}$	Gate-Drain("Miller") Charge	--	45.3	--		

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{I}_S$	Continuous Source Current	--	--	32	A	Integral reverse pn-diode in the MOSFET
$\text{I}_{\text{SM}}$	Pulsed-Source Current ①	--	--	130		
$\text{V}_{\text{SD}}$	Diode Forward Voltage ④	--	--	1.5	V	$\text{T}_J=25^\circ\text{C}, \text{I}_S=32\text{A}, \text{V}_{\text{GS}}=0\text{V}$
$\text{t}_{\text{rr}}$	Reverse Recovery Time	--	203	--	ns	$\text{T}_J=25^\circ\text{C}, \text{I}_F=32\text{A}$ $d\text{I}_F/dt=100\text{A}/\mu\text{s}$ ④
$\text{Q}_{\text{rr}}$	Reverse Recovery Charge	--	1.52	--		

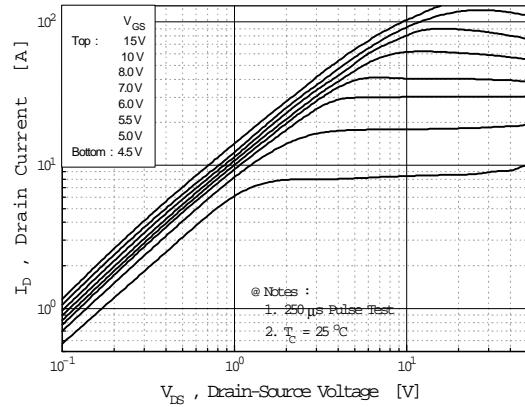
### Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=1\text{mH}, \text{I}_{AS}=32\text{A}, \text{V}_{DD}=50\text{V}, \text{R}_G=27\Omega$ , Starting  $\text{T}_J=25^\circ\text{C}$
- ③  $\text{I}_{SD} \leq 32\text{A}, d\text{I}/dt \leq 320\text{A}/\mu\text{s}, \text{V}_{DD} \leq \text{BV}_{DSS}$ , Starting  $\text{T}_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width =  $250\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

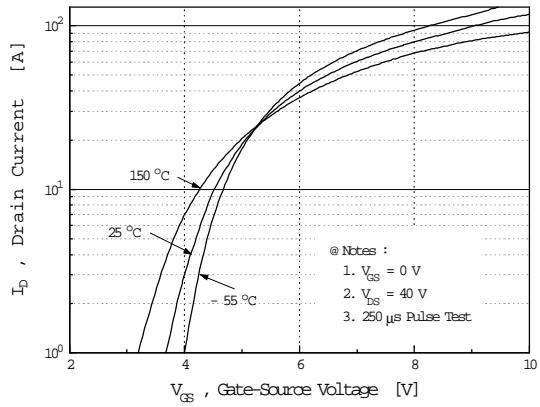
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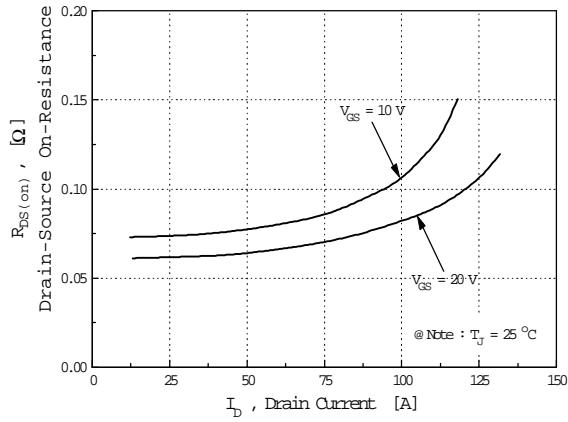
**Fig 1. Output Characteristics**



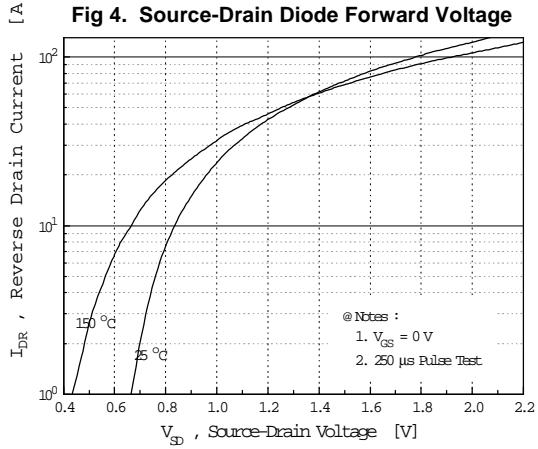
**Fig 2. Transfer Characteristics**



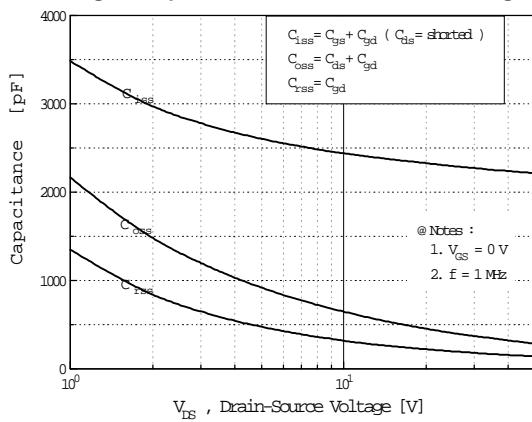
**Fig 3. On-Resistance vs. Drain Current**



**Fig 4. Source-Drain Diode Forward Voltage**



**Fig 5. Capacitance vs. Drain-Source Voltage**



**Fig 6. Gate Charge vs. Gate-Source Voltage**

