



Advanced Power MOSFET

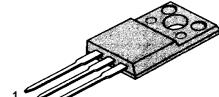
SFS9634

## 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.) @  $V_{DS} = -250V$
- Low  $R_{DS(ON)}$  : 0.876  $\Omega$  (Typ.)

 $BV_{DSS} = -250 V$  $R_{DS(on)} = 1.3 \Omega$  $I_D = -3.4 A$ 

TO-220F



1.Gate 2. Drain 3. Source

## Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	-250	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	-3.4	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	-2.6	
$I_{DM}$	Drain Current-Pulsed	① -14	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy	② 145	mJ
$I_{AR}$	Avalanche Current	① -3.4	A
$E_{AR}$	Repetitive Avalanche Energy	① 3.3	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$	③ -4.8	V/ns
$P_D$	Total Power Dissipation ( $T_C=25^\circ C$ )	33	W
	Linear Derating Factor	0.26	$W/\text{ }^\circ C$
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ C$
	Maximum Lead Temp. for Soldering Purposes, 1/8 " from case for 5-seconds	300	

## Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	3.79	$^\circ C/W$
	Junction-to-Ambient	--	62.5	

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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	-250	--	--	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.	--	-0.22	--	$^\circ\text{C}$	$\text{I}_D=-250\mu\text{A}$ 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	$\mu\text{A}$	$\text{V}_{\text{DS}}=-250\text{V}$
		--	--	-100		$\text{V}_{\text{DS}}=-200\text{V}, \text{T}_C=125^\circ\text{C}$
$\text{R}_{\text{DS(on)}}$	Static Drain-Source On-State Resistance	--	--	1.3	$\Omega$	$\text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-1.7\text{A}$ ④
$\text{g}_{\text{fs}}$	Forward Transconductance	--	3.2	--	$\Omega$	$\text{V}_{\text{DS}}=-40\text{V}, \text{I}_D=-1.7\text{A}$ ④
$\text{C}_{\text{iss}}$	Input Capacitance	--	750	975	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	--	110	165		
$\text{C}_{\text{rss}}$	Reverse Transfer Capacitance	--	45	65		
$t_{\text{d(on)}}$	Turn-On Delay Time	--	13	35	ns	$\text{V}_{\text{DD}}=-125\text{V}, \text{I}_D=-5.0\text{A},$ $\text{R}_G=12\Omega$ See Fig 13 ④ ⑤
$t_r$	Rise Time	--	20	50		
$t_{\text{d(off)}}$	Turn-Off Delay Time	--	40	90		
$t_f$	Fall Time	--	16	40		
$\text{Q}_g$	Total Gate Charge	--	29	37	nC	$\text{V}_{\text{DS}}=-200\text{V}, \text{V}_{\text{GS}}=-10\text{V},$ $\text{I}_D=-5.0\text{A}$ See Fig 6 & Fig 12 ④ ⑤
$\text{Q}_{\text{gs}}$	Gate-Source Charge	--	5.4	--		
$\text{Q}_{\text{gd}}$	Gate-Drain( " Miller " ) Charge	--	15.5	--		

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{I}_S$	Continuous Source Current	--	--	-3.4	A	Integral reverse pn-diode in the MOSFET
$\text{I}_{\text{SM}}$	Pulsed-Source Current ①	--	--	-14		
$\text{V}_{\text{SD}}$	Diode Forward Voltage ④	--	--	-5.0	V	$\text{T}_J=25^\circ\text{C}, \text{I}_S=-3.4\text{A}, \text{V}_{\text{GS}}=0\text{V}$
$t_{\text{rr}}$	Reverse Recovery Time	--	170	--	ns	$\text{T}_J=25^\circ\text{C}, \text{I}_F=-5.0\text{A}$ $d\text{I}/dt=100\text{A}/\mu\text{s}$ ④
$\text{Q}_{\text{rr}}$	Reverse Recovery Charge	--	1.17	--		

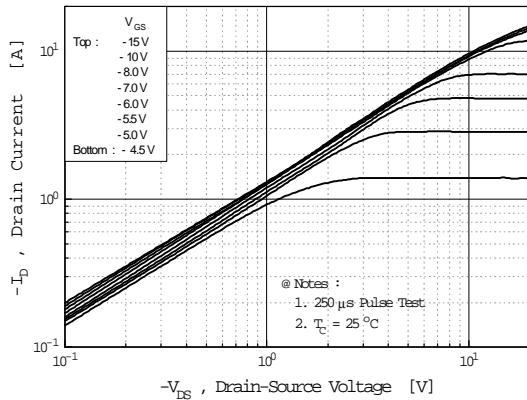
### Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=20\text{mH}, \text{I}_{\text{AS}}=-3.4\text{A}, \text{V}_{\text{DD}}=-50\text{V}, \text{R}_G=27\Omega^*, \text{Starting } \text{T}_J=25^\circ\text{C}$
- ③  $\text{I}_{\text{SD}} \leq -5.0\text{A}, d\text{I}/dt \leq 400\text{A}/\mu\text{s}, \text{V}_{\text{DD}} \leq \text{BV}_{\text{DSS}}, \text{Starting } \text{T}_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width = 250  $\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

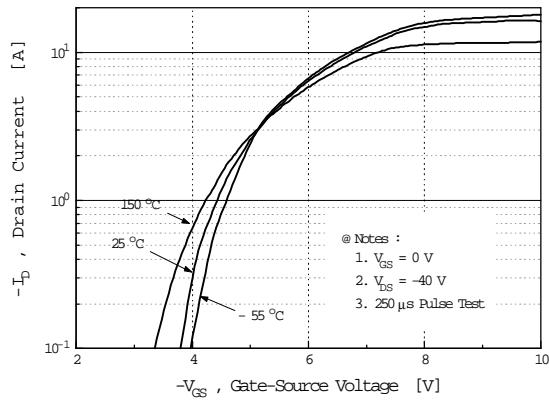
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## POWER MOSFET

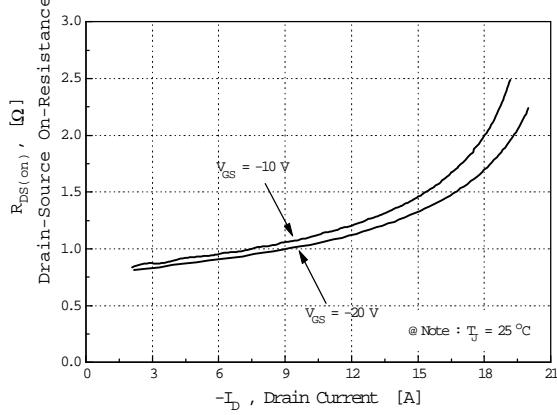
**Fig 1. Output Characteristics**



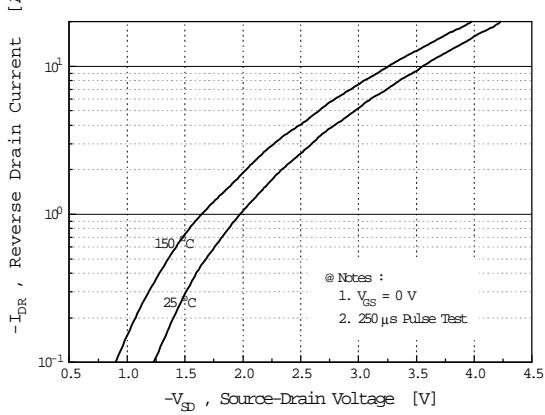
**Fig 2. Transfer Characteristics**



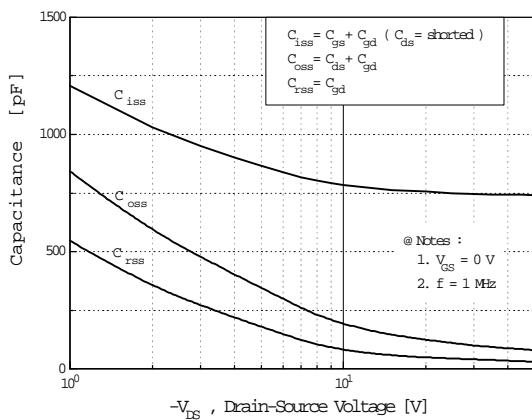
**Fig 3. On-Resistance vs. Drain Current**



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



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



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

