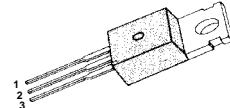


## FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- 175°C Opereting Temperature
- Extended Safe Operating Area
- Lower Leakage Current : -10 µA (Max.) @  $V_{DS} = -100V$
- Low  $R_{DS(ON)}$  : 0.444 Ω (Typ.)

$BV_{DSS} = -100 V$   
 $R_{DS(on)} = 0.6 \Omega$   
 $I_D = -6 A$

TO-220



1.Gate 2. Drain 3. Source

## Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	-100	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	-6	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	-4	
$I_{DM}$	Drain Current-Pulsed ①	-24	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy ②	144	mJ
$I_{AR}$	Avalanche Current ①	-6	A
$E_{AR}$	Repetitive Avalanche Energy ①	4.9	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ ③	-6.5	V/ns
$P_D$	Total Power Dissipation ( $T_C=25^\circ C$ )	49	W
	Linear Derating Factor	0.33	$W/\text{ }^\circ C$
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ C$
	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	--	3.06	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink	0.5	--	
$R_{\theta JA}$	Junction-to-Ambient	--	62.5	

# SFP9520

P-CHANNEL  
POWER MOSFET

## 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	-100	--	--	V	$V_{\text{GS}}=0\text{V}, I_D=-250\mu\text{A}$
$\Delta \text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	-0.1	--	$\text{V}^\circ\text{C}$	$I_D=-250\mu\text{A}$ See Fig 7
$V_{\text{GS(th)}}$	Gate Threshold Voltage	-2.0	--	-4.0	V	$V_{\text{DS}}=-5\text{V}, I_D=-250\mu\text{A}$
$I_{\text{GSS}}$	Gate-Source Leakage , Forward	--	--	-100	nA	$V_{\text{GS}}=-20\text{V}$
	Gate-Source Leakage , Reverse	--	--	100		$V_{\text{GS}}=20\text{V}$
$I_{\text{DSS}}$	Drain-to-Source Leakage Current	--	--	-10	$\mu\text{A}$	$V_{\text{DS}}=-100\text{V}$
		--	--	-100		$V_{\text{DS}}=-80\text{V}, T_C=150^\circ\text{C}$
$R_{\text{DS(on)}}$	Static Drain-Source On-State Resistance	--	--	0.6	$\Omega$	$V_{\text{GS}}=-10\text{V}, I_D=-3\text{A}$ ④
$g_{\text{fs}}$	Forward Transconductance	--	3.6	--	S	$V_{\text{DS}}=-40\text{V}, I_D=-3\text{A}$ ④
$C_{\text{iss}}$	Input Capacitance	--	425	550	pF	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=-25\text{V}, f=1\text{MHz}$ See Fig 5
$C_{\text{oss}}$	Output Capacitance	--	90	135		
$C_{\text{rss}}$	Reverse Transfer Capacitance	--	31	45		
$t_{\text{d(on)}}$	Turn-On Delay Time	--	11	30	ns	$V_{\text{DD}}=-50\text{V}, I_D=-6\text{A}, R_G=18\Omega$ See Fig 13 ④⑤
$t_r$	Rise Time	--	21	50		
$t_{\text{d(off)}}$	Turn-Off Delay Time	--	34	80		
$t_f$	Fall Time	--	18	45		
$Q_g$	Total Gate Charge	--	16	20	nC	$V_{\text{DS}}=-80\text{V}, V_{\text{GS}}=-10\text{V}, I_D=-6\text{A}$ See Fig 6 & Fig 12 ④⑤
$Q_{\text{gs}}$	Gate-Source Charge	--	3.1	--		
$Q_{\text{gd}}$	Gate-Drain("Miller") Charge	--	6.3	--		

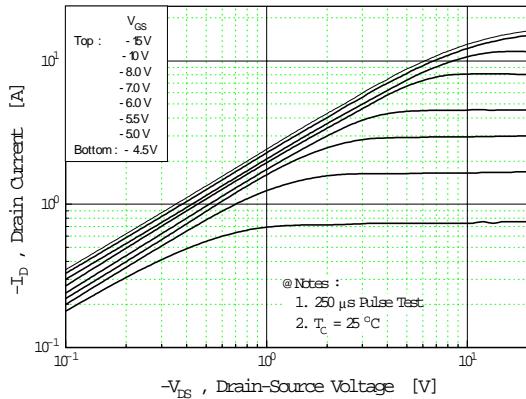
## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$I_s$	Continuous Source Current	--	--	-6	A	Integral reverse pn-diode in the MOSFET
$I_{\text{SM}}$	Pulsed-Source Current ①	--	--	-24	A	
$V_{\text{SD}}$	Diode Forward Voltage ④	--	--	-3.8	V	$T_J=25^\circ\text{C}, I_s=-6\text{A}, V_{\text{GS}}=0\text{V}$
$t_{\text{rr}}$	Reverse Recovery Time	--	105	--	ns	$T_J=25^\circ\text{C}, I_F=-6\text{A}$
$Q_{\text{rr}}$	Reverse Recovery Charge	--	0.4	--	$\mu\text{C}$	$dI_F/dt=100\text{A}/\mu\text{s}$ ④

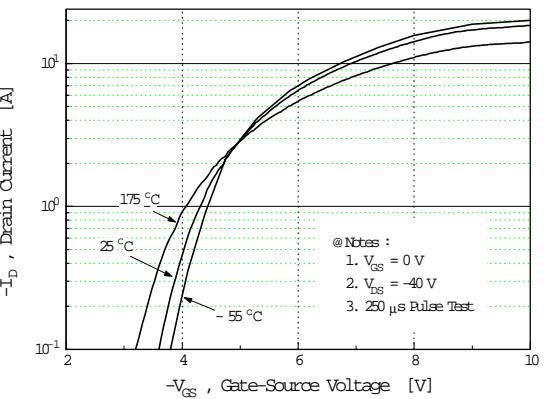
### Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=6.0\text{mH}$ ,  $I_{AS}=-6\text{A}$ ,  $V_{DD}=-25\text{V}$ ,  $R_G=27\Omega^*$ , Starting  $T_J=25^\circ\text{C}$
- ③  $I_{SD} \leq -6\text{A}$ ,  $di/dt \leq 350\text{A}/\mu\text{s}$ ,  $V_{DD} \leq \text{BV}_{\text{DSS}}$ , Starting  $T_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width =  $250\mu\text{s}$ , Duty Cycle  $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

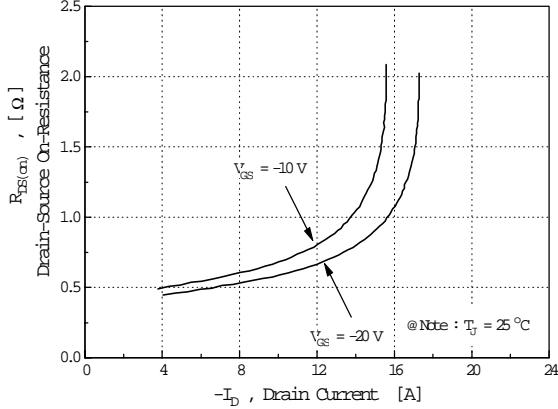
**Fig 1. Output Characteristics**



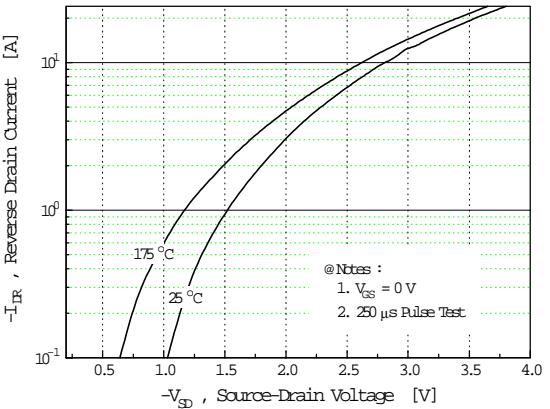
**Fig 2. Transfer Characteristics**



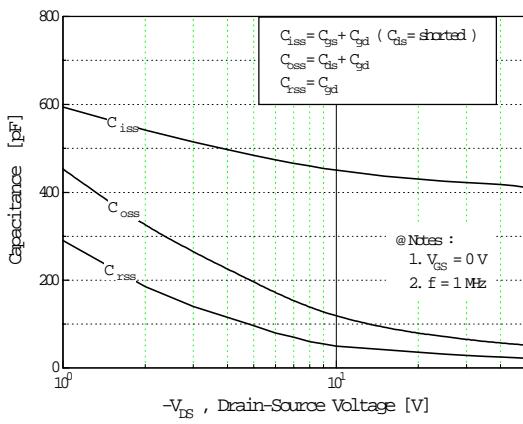
**Fig 3. On-Resistance vs. Drain Current**



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



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



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

