

Silicon N-Channel Power MOSFET

General Description:

HMF3N120, the silicon N-channel Enhanced VDMOSFET, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220F, which accords with the RoHS standard.

Features:

- Fast Switching
- Low ON Resistance
- Low Gate Charge Minimize Switching loss
- Fast Recovery Body Diode
- 100% Single Pulse avalanche energy Test

Applications:

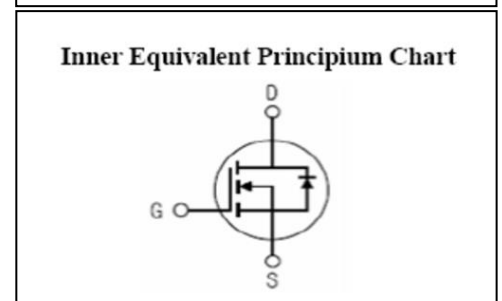
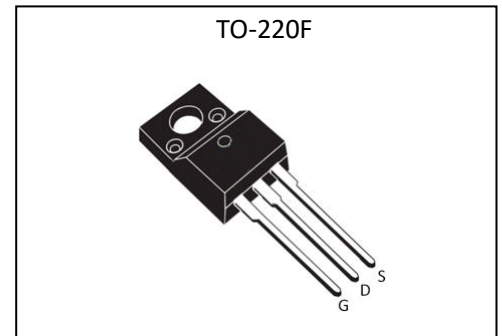
- Adaptor
- Charger
- SMPS Standby Power

Absolute (Tc= 25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V _{DSS}	Drain-to-Source Voltage	1200	V
I _D	Continuous Drain Current	3	A
I _{DM}	Pulsed Drain Current at V _{GS} = 10V	12	A
V _{GS}	Gate-to-Source Voltage	±30	V
E _{AS}	Single Pulse Avalanche Energy	100	mJ
dv/dt	Peak Diode Recovery dv/dt	5.0	V/ns
P _D	Power Dissipation	30	W
	Derating Factor above 25°C	0.24	W/°C
T _J , T _{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T _L	Maximum Temperature for Soldering	300	°C

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

V _{DSS}	1200	V
I _D	3	A
P _D (T _C =25°C)	30	W
R _{DS(ON).type.}	6	Ω



Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.17	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics (Tc= 25°C unless otherwise specified) :

OFF Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu\text{A}$	1200	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=1200V, V_{GS}=0V, T_a=25^{\circ}\text{C}$	--	--	10	μA
		$V_{DS}=960V, V_{GS}=0V, T_a=125^{\circ}\text{C}$	--	--	250	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+30V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-30V$	--	--	-100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=1.5A$	--	--	7	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.5	--	4.5	V
g_{fs}	Forward Transconductance	$V_{DS}=20V, I_D=2A$	--	4	--	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$	--	860	--	pF
C_{oss}	Output Capacitance		--	60	--	
C_{rss}	Reverse Transfer Capacitance		--	22	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=3A, V_{DD}=600V$ $V_{GS}=10V, R_g=4.7\Omega$	--	17	--	ns
t_r	Rise Time		--	6	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	23	--	
t_f	Fall Time		--	11	--	
Q_g	Total Gate Charge	$I_D=3A, V_{DD}=600V$ $V_{GS}=10V$	--	17.5	--	nC
Q_{gs}	Gate to Source Charge		--	5.0	--	
Q_{gd}	Gate to Drain ("Miller")Charge		--	5.5	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	3	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	12	A
V_{SD}	Diode Forward Voltage	$I_S = 3A, V_{GS} = 0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 3A, T_j = 25^\circ C$	--	200	--	ns
Q_{rr}	Reverse Recovery Charge	$di/dt = 100A/\mu s, V_{GS} = 0V$	--	760	--	nC

*Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$

Characteristics Curve:

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

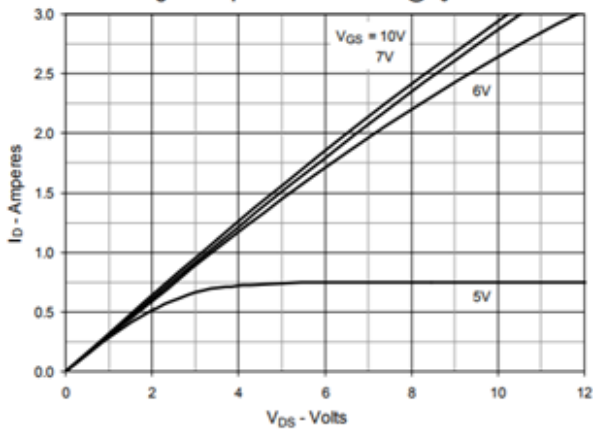


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

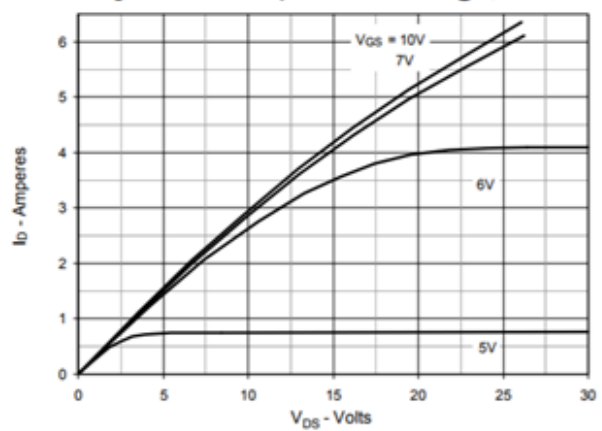


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

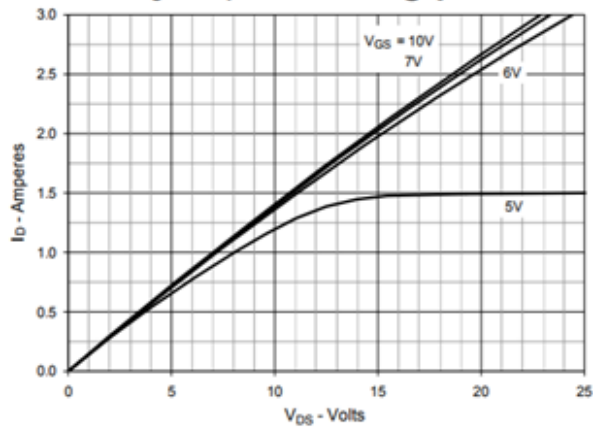


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 1.5\text{A}$ Value vs. Junction Temperature

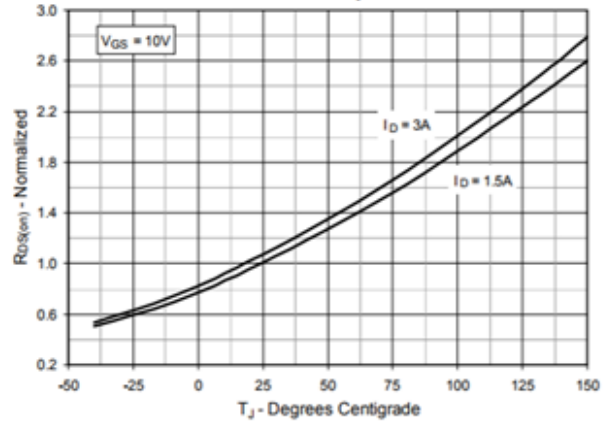


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 1.5\text{A}$ Value vs. Drain Current

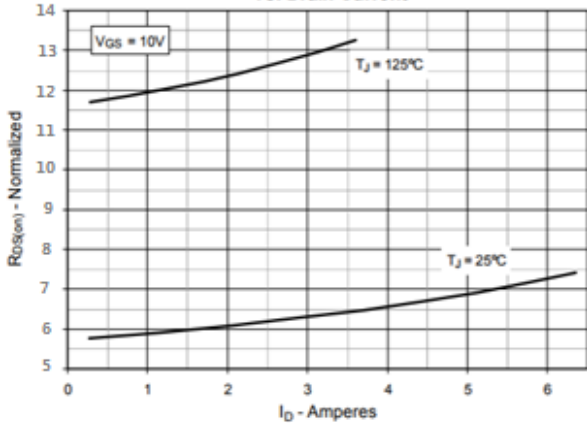


Fig. 6. Maximum Drain Current vs. Case Temperature

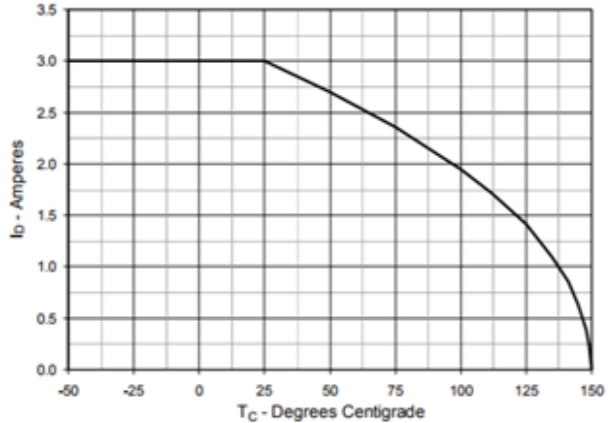


Fig. 7. Input Admittance

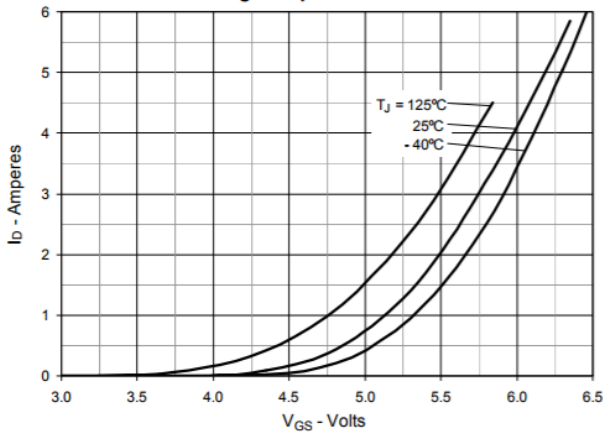


Fig. 8. Transconductance

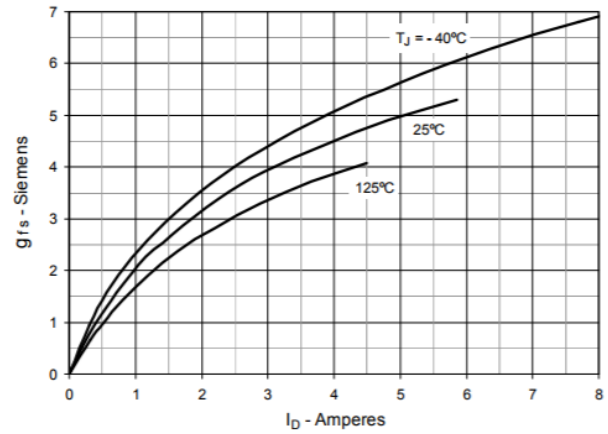


Fig. 9. Forward Voltage Drop of Intrinsic Diode

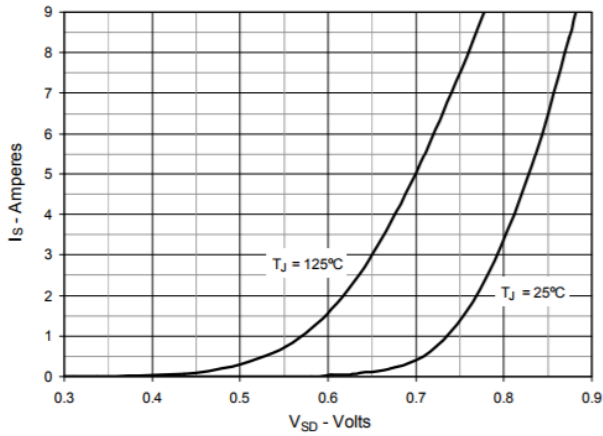


Fig. 10. Gate Charge

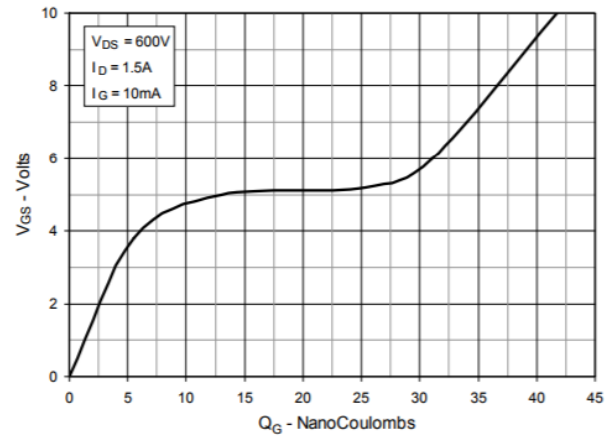


Fig. 11. Capacitance

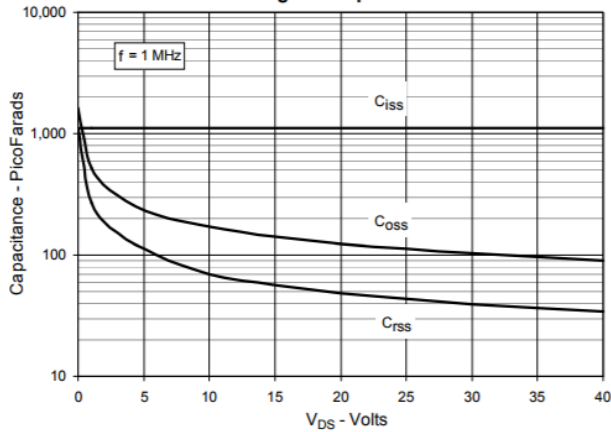


Fig.12. Forward-Bias Safe Operating Area

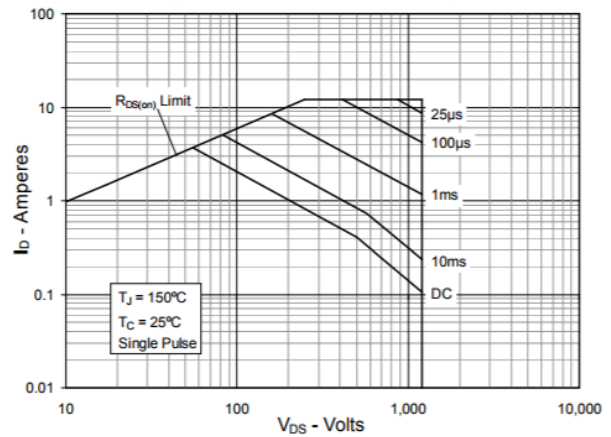


Fig. 13. Maximum Transient Thermal Impedance

