

## Silicon N-Channel Power MOSFET

### General Description :

HMM38N100, 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 Sot-227B, which accords with the RoHS standard.

### Features :

- Fast Switching
- ESD Improved Capability
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

### Applications:

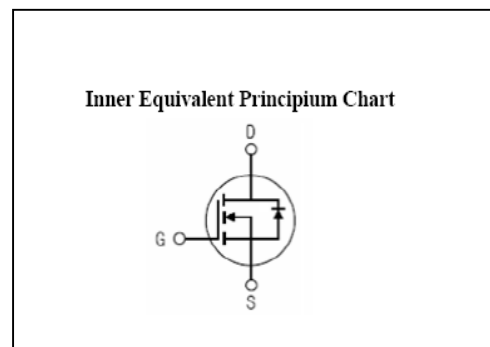
- Power switch circuit of POWER

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

Symbol	Parameter	Rating	Units
V <sub>DSS</sub>	Drain-to-Source Voltage	1000	V
I <sub>D</sub>	Continuous Drain Current	38	A
	Continuous Drain Current T <sub>C</sub> =100 °C	30	A
I <sub>DM</sub> <sup>a1</sup>	Pulsed Drain Current( pulse width limited by T <sub>JM</sub> )	152	A
V <sub>GS</sub>	Gate-to-Source Voltage	±40	V
E <sub>AS</sub>	Single Pulse Avalanche Energy	1200	mJ
E <sub>AR</sub> <sup>a1</sup>	Avalanche Energy ,Repetitive	60	mJ
I <sub>AR</sub> <sup>a1</sup>	Avalanche Current	38	A
dv/dt <sup>a2</sup>	Peak Diode Recovery dv/dt	5.0	V/ns
P <sub>D</sub>	Power Dissipation	890	W
	Derating Factor above 25°C	7.12	W/°C
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature Range	150 , -55 to 150	°C
T <sub>L</sub>	Maximum Temperature for Soldering	300	°C

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

V <sub>DSS</sub> (T <sub>C</sub> =150°C)	1000	V
I <sub>D</sub>	38	A
P <sub>D</sub> (T <sub>C</sub> =25°C)	890	W
R <sub>DS(ON)MAX</sub>	280	mΩ



**Thermal Characteristics**

Symbol	Parameter	Rating	Units
$R_{thJC}$	Thermal Resistance, Junction-to-Case	0.14	°C/ W
$R_{thcs}$	Thermal Resistance, Case to heatsink	0.05	°C/ W

**Electrical Characteristics (  $T_c = 25^\circ\text{C}$  unless otherwise specified ) :**

<b>OFF Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	1000	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=1000V, V_{GS}=0V, T_a=25^\circ\text{C}$	--	--	1.0	$\mu A$
		$V_{DS}=800V, V_{GS}=0V, T_a=125^\circ\text{C}$	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+30V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-30V$	--	--	-100	nA

<b>ON Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=19A$	--	240	280	m $\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=8mA$	3.0	--	6.0	V
$g_{fs}$	Forward Trans conductance	$V_{DS}=15V, I_D=19A$	--	40	--	S

Pulse width < 380 $\mu$ s; duty cycle < 2%.

<b>Dynamic Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0MHz$	--	13	--	nF
$C_{oss}$	Output Capacitance		--	1050	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	250	--	

<b>Resistive Switching Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=19A, V_{DD}=500V$ $V_{GS}=10V, R_g=25\Omega$	--	30	--	ns
$t_r$	Rise Time		--	30	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	60	--	
$t_f$	Fall Time		--	35	--	
$Q_g$	Total Gate Charge	$I_D=19A, V_{DD}=500V$ $V_{GS}=10V$	--	240	--	nC
$Q_{gs}$	Gate to Source Charge		--	40	--	
$Q_{gd}$	Gate to Drain ( "Miller" ) Charge		--	100	--	

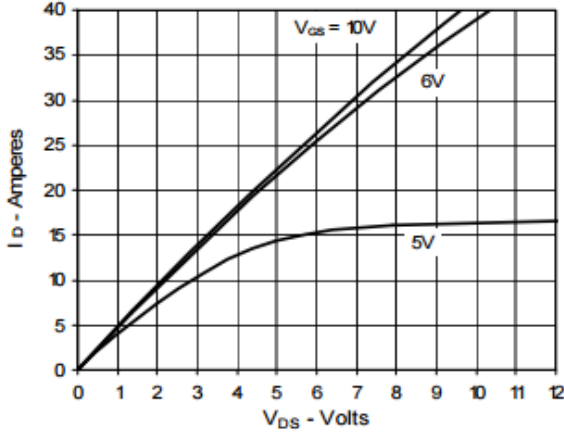
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_{SD}$	Continuous Source Current (Body Diode)		--	--	38	A
$I_{SM}$	Maximum Pulsed Current (Body Diode)		--	--	152	A
$V_{SD}$	Diode Forward Voltage	$I_S=38A, V_{GS}=0V$	--	--	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_S=38A, T_j=25^\circ C$	--	500	--	ns
$Q_{rr}$	Reverse Recovery Charge	$dI_F/dt=100A/\mu s,$ $V_{GS}=0V$	--	3.8	--	$\mu C$

a1 : Repetitive rating; pulse width limited by maximum junction temperature

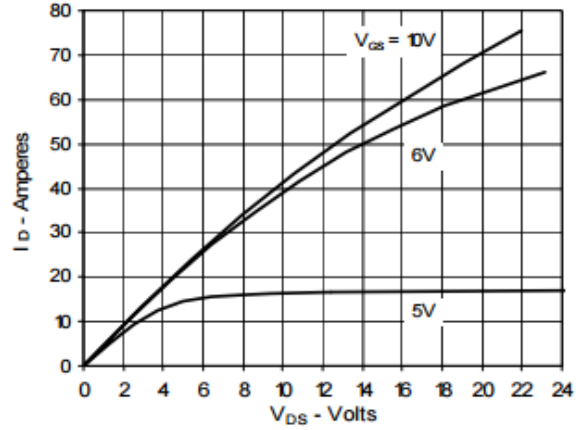
a2 :  $I_{SD}=38A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS},$  Start  $T_j=25^\circ C$

## Characteristics Curve :

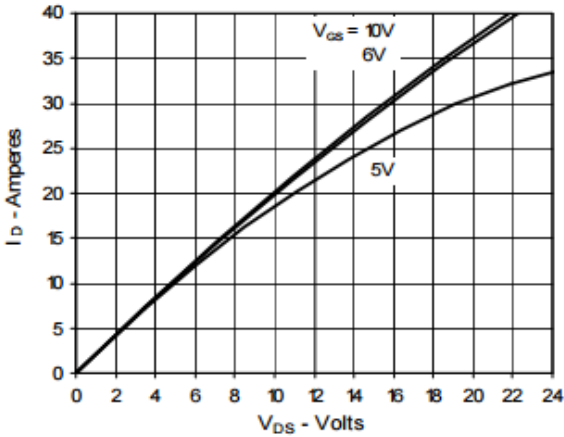
**Fig. 1. Output Characteristics @ 25°C**



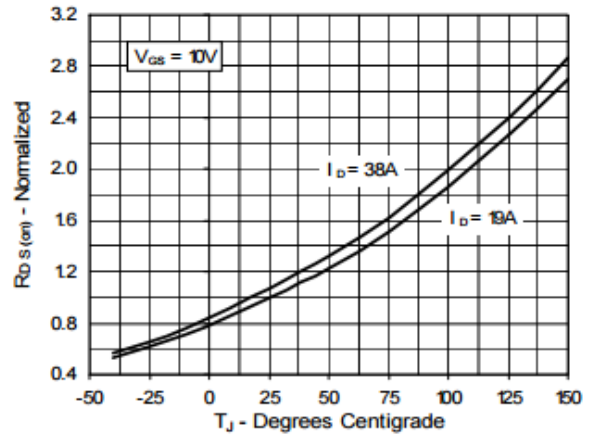
**Fig. 2. Extended Output Characteristics @ 25°C**



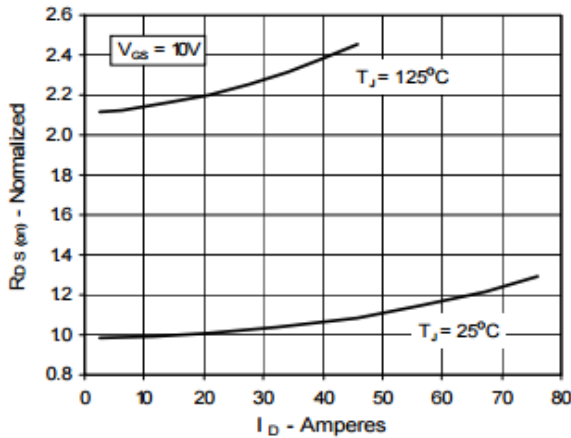
**Fig. 3. Output Characteristics @ 125°C**



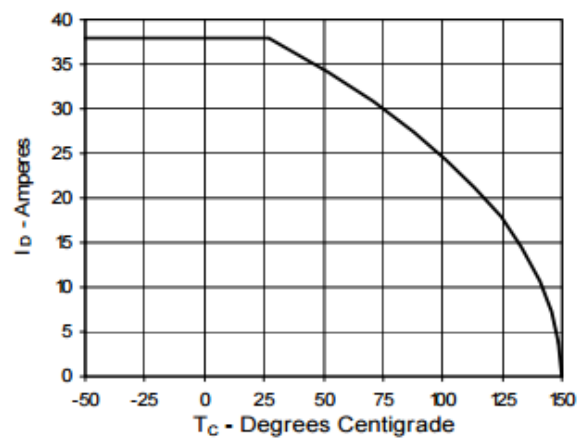
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 19A$  Value vs. Junction Temperature**



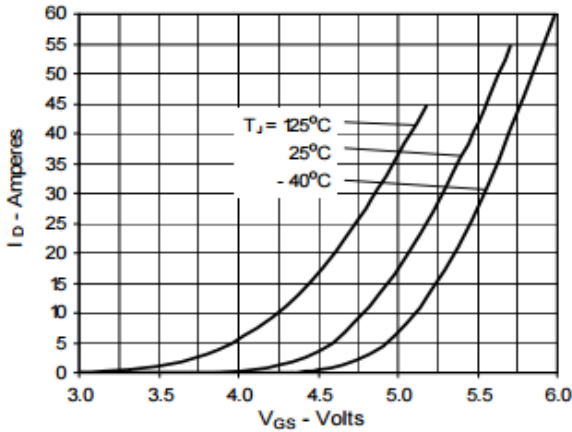
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 19A$  Value vs. Drain Current**



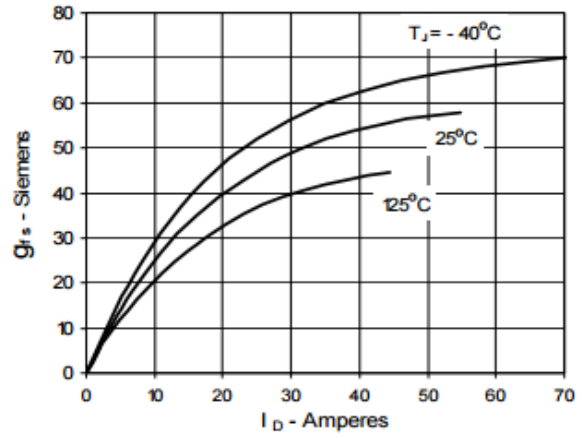
**Fig. 6. Drain Current vs. Case Temperature**



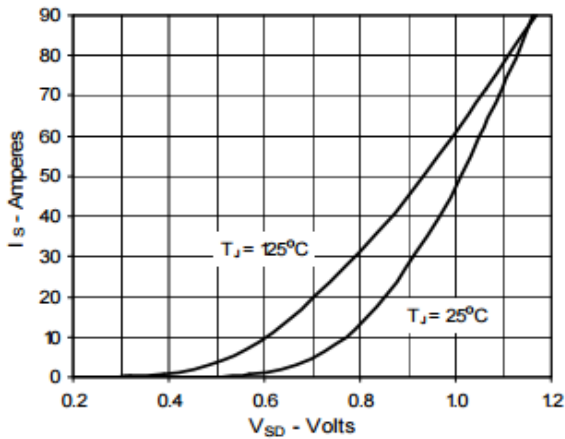
**Fig. 7. Input Admittance**



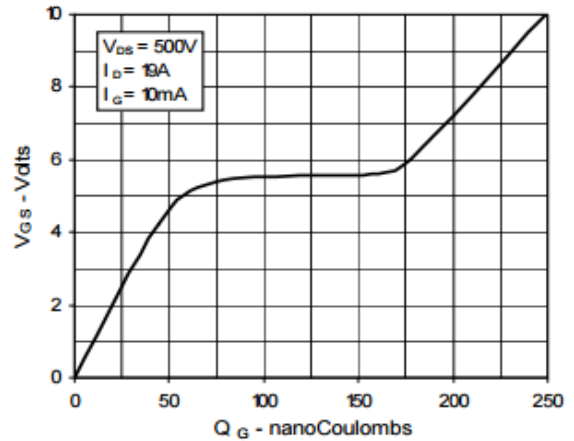
**Fig. 8. Transconductance**



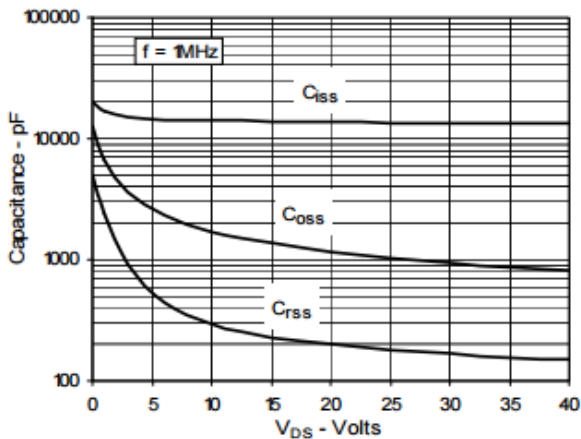
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Impedance**

