

## General Description :

HMM100N50 the silicon N-channel Enhanced VDMOSFETS, is obtained by the self-aligned Super-junction 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
- Low Gate Charge and  $R_{ds(on)}$
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

## Applications :

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply(UPS)
- Power Factor Correction(PFC)

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

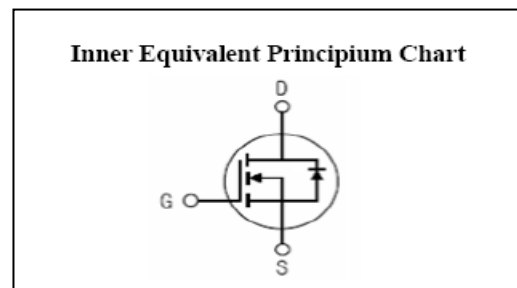
Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	500	V
$I_D$	Continuous Drain Current	94	A
$I_{DM}^{a1}$	Pulsed Drain Current (Pulse Width Limited by T <sub>JM</sub> )	240	A
$V_{GS}$	Gate-to-Source Voltage	±30	V
$E_{AS}^{a2}$	Single Pulse Avalanche Energy	3.5	J
$P_D$	Power Dissipation	780	W
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
$T_L$	Maximum Temperature for Soldering	300	°C

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

## Thermal Characteristics

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	0.16	°C/W

$V_{DSS}$	500	V
$I_D$	94	A
$P_D(T_C=25^\circ C)$	780	W
$R_{DS(ON)TYP}$	42	mΩ



**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	$V_{GS}=0V, I_D=250\mu A$	500	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=500V, V_{GS}=0V, T_a=25^{\circ}\text{C}$	--	--	10	$\mu A$
		$V_{DS}=400V, V_{GS}=0V, T_a=150^{\circ}\text{C}$	--	--	1000	
$I_{GSS(F)}$	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.	
$R_{DS(ON)}^{a3}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	42	55	$m\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	--	4.5	V

<b>Dynamic Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$g_{fs}^{a3}$	Forward Transconductance	$V_{DS}=10V, I_D=47A$	--	58	--	S
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_D=50V$ $f=1.0\text{MHz}$	--	16000	--	pF
$C_{oss}$	Output Capacitance		--	1410	--	
$C_{rss}$	Reverse Transfer Capacitance		--	120	--	

<b>Resistive Switching Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=400V, I_D=47A,$ $V_{GS}=10V, R_g=1.7\Omega$	--	68	--	ns
$t_r$	Rise Time		--	120	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	500	--	
$t_f$	Fall Time		--	150	--	
$Q_g$	Total Gate Charge	$I_D=40A, V_{DD}=500V$ $V_{GS}=0$ to $10V$	--	280	--	nC
$Q_{gs}$	Gate to Source Charge		--	44	--	
$Q_{gd}$	Gate to Drain ( "Miller" ) Charge		--	96	--	

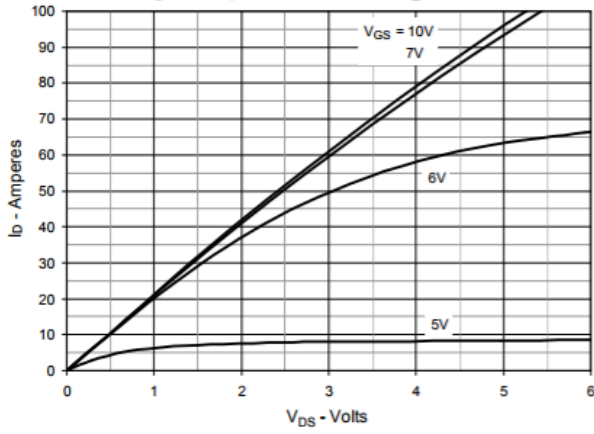
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_S$	Continuous Source Current (Body Diode)		--	--	94	A
$I_{SM}$	Maximum Pulsed Current (Body Diode)		--	--	240	A
$V_{SD}$	Diode Forward Voltage	$I_S=68A, V_{GS}=0V$	--	--	1.5	V
$t_{rr}$	Reverse Recovery Time	$V_R=500V, V_{GS}=0V$	--	600	--	ns
$Q_{rr}$	Reverse Recovery Charge	$I_S=I_F, d_i/d_t=100A/us$	--	3.5	--	uC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

<sup>a1</sup> : Repetitive rating; pulse width limited by maximum junction temperature

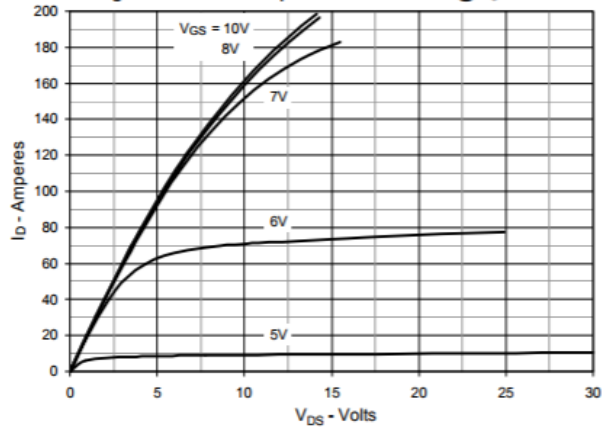
<sup>a2</sup> :  $I_{AS}=94A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J= 25^\circ C$

<sup>a3</sup> : Pulse Test: Pulse width  $\leq 380us$ , Duty Cycle  $\leq 2\%$

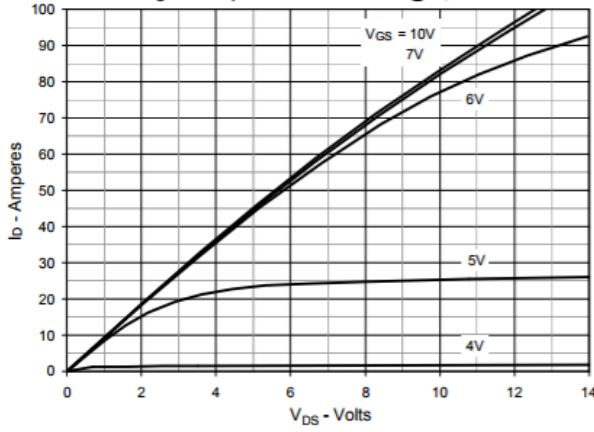
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



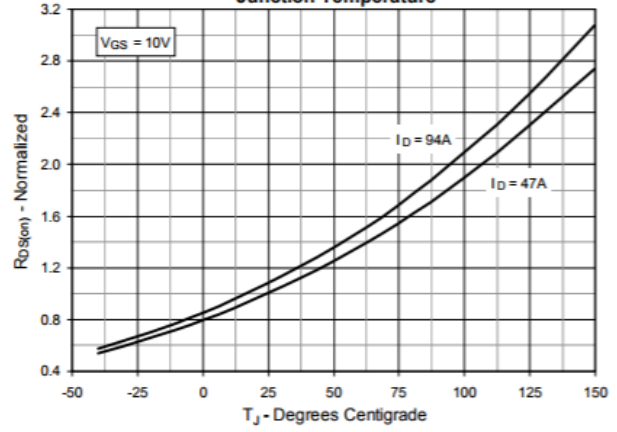
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



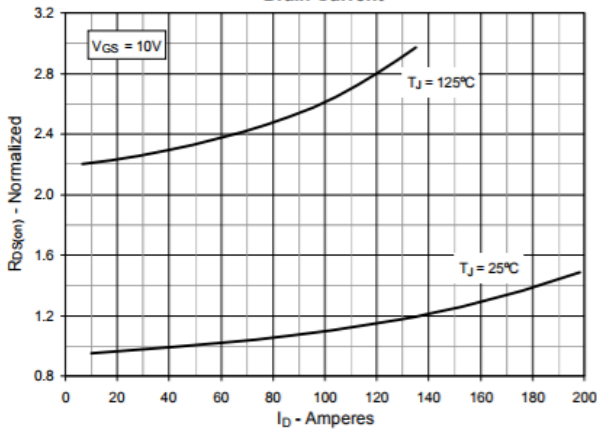
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



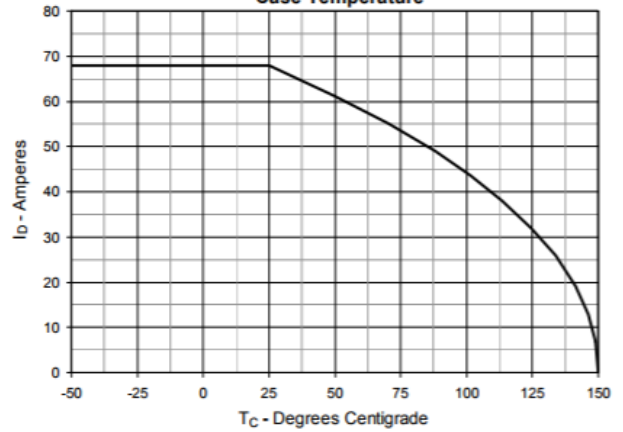
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 47\text{A}$  Value vs. Junction Temperature**



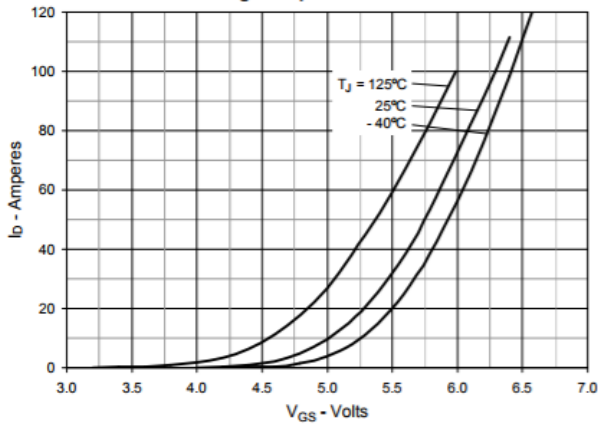
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 47\text{A}$  Value vs. Drain Current**



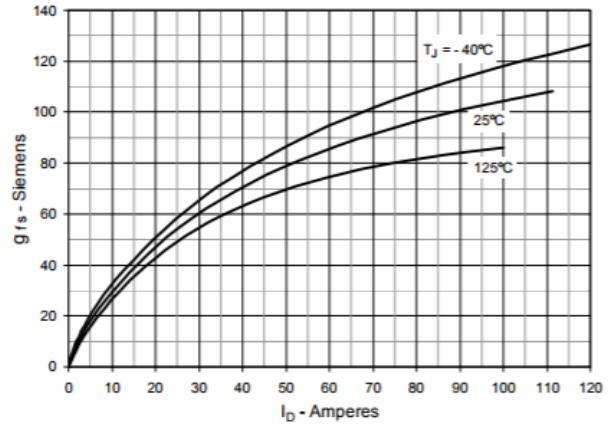
**Fig. 6. Maximum Drain Current vs. Case Temperature**



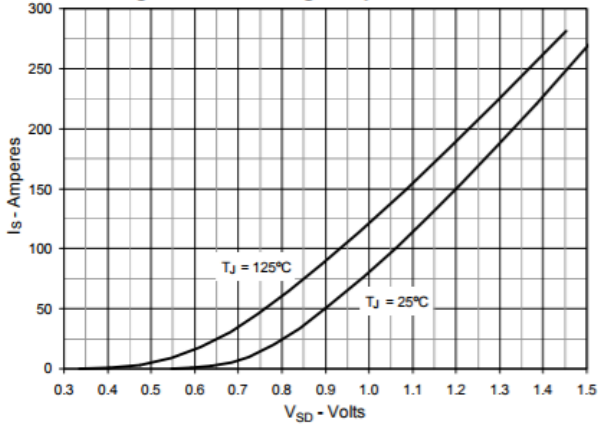
**Fig. 7. Input Admittance**



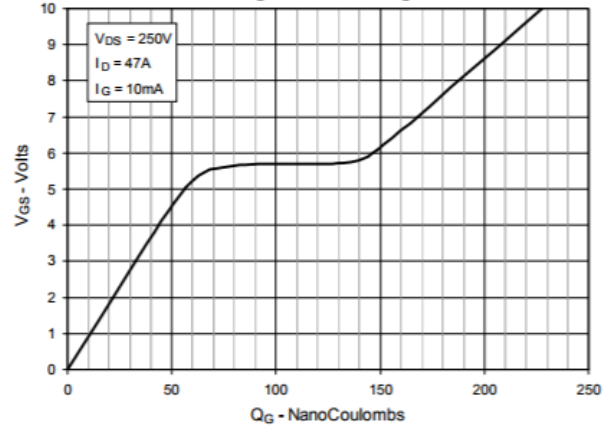
**Fig. 8. Transconductance**



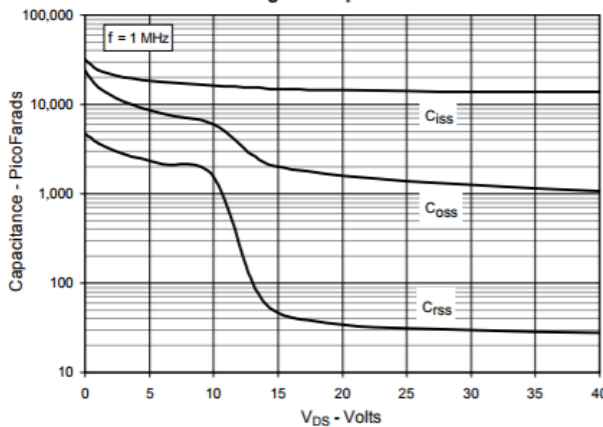
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

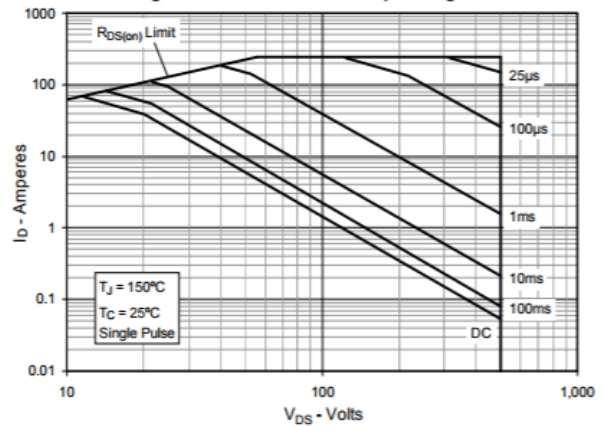


Fig. 13. Maximum Transient Thermal Impedance

