

Silicon N-Channel Power MOSFET

General Description:

HMP13N90 the silicon N-channel Enhanced VDMOSFETS, is obtained by the self-aligned HV-MOS 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-247, which accords with the RoHS standard.

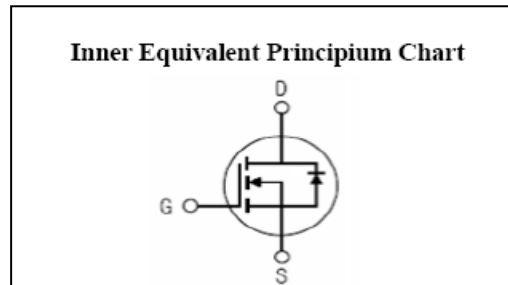
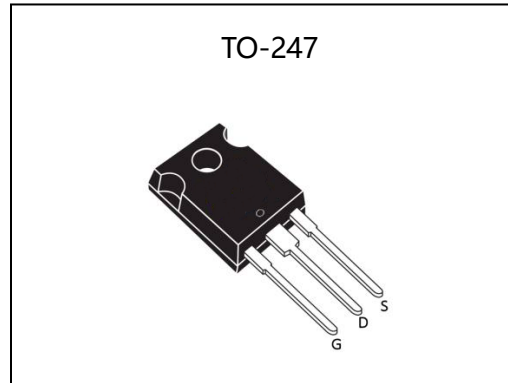
V_{DSS}	900	V
I_D	13	A
$P_D(T_C=25^\circ C)$	300	W
$R_{DS(ON)TYP}$	0.70	Ω

Features:

- Fast Switching
- Low Gate Charge and Rdson
- 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	900	V
I_D	Continuous Drain Current	13	A
I_{DM}^{a1}	Pulsed Drain Current	52	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	630	mJ
P_D	Power Dissipation	300	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ C$
T_L	Maximum Temperature for Soldering	300	$^\circ C$

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	2.4	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	55	$^\circ C/W$

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 =250μA	900	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} =900V, V _{GS} =0V, T _a = 25°C	--	--	1.0	μA
		V _{DS} =720V, V _{GS} =0V, T _a =150°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)} ^{a3}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =7A	--	0.70	0.85	Ω
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.0	--	4.5	V

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g _{fs} ^{a3}	Forward Transconductance	V _{DS} =10V, I _D =7A	--	12	--	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _D =25V f=1.0MHz	--	3500	--	pF
C _{oss}	Output Capacitance		--	300	--	
C _{rss}	Reverse Transfer Capacitance		--	150	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =350V, I _D =13A, V _{GS} =10V R _g =25Ω	--	45	--	ns
t _r	Rise Time		--	90	--	
t _{d(OFF)}	Turn-Off Delay Time		--	66	--	
t _f	Fall Time		--	74	--	
Q _g	Total Gate Charge	I _D =7A, V _{DD} =480V V _{GS} =0 to 10V	--	130	--	nC
Q _{gs}	Gate to Source Charge		--	50	--	
Q _{gd}	Gate to Drain ("Miller")Charge		--	28	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	13	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	52	A
V_{SD}	Diode Forward Voltage	$I_S=13A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=13A, V_{GS}=0V$	--	500	--	ns
Q_{rr}	Reverse Recovery Charge	$I_S=I_F, d_i/d_t=100A/us$	--	2.2	--	μC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

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

^{a2}: $I_{AS}=10A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ C$

^{a3}: Pulse Test: Pulse width $\leq 380\mu s$, Duty Cycle $\leq 2\%$

Typical Characteristics

Fig. 1. Output Characteristics

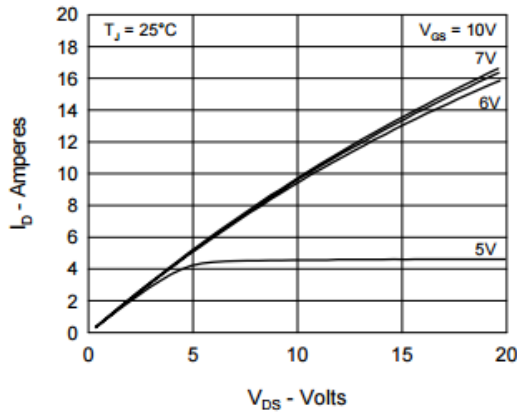


Fig. 2. Input Admittance

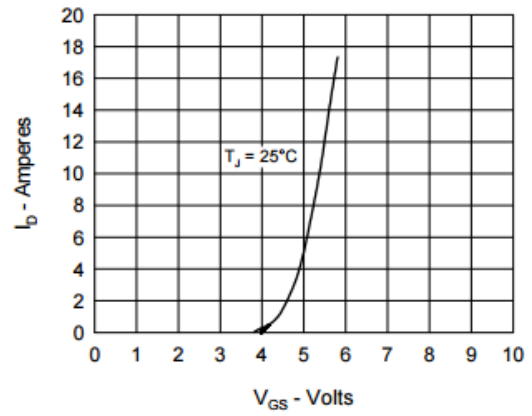


Fig. 3. $R_{DS(on)}$ vs. Drain Current

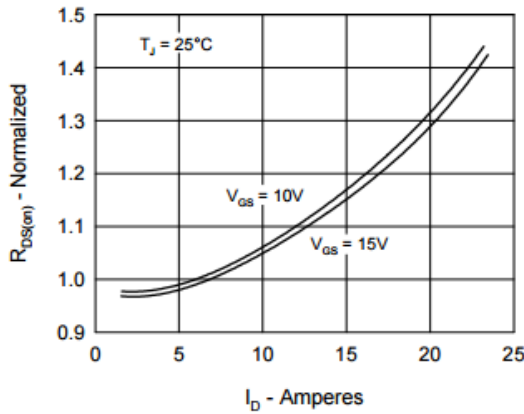


Fig. 4. Temperature Dependence of Drain to Source Resistance

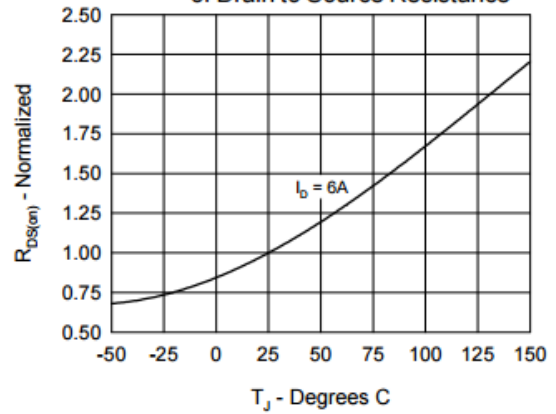


Fig. 5. Drain Current vs. Case Temperature

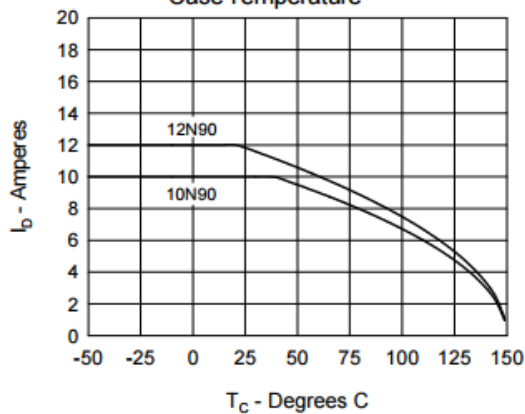


Fig. 6. Temperature Dependence of Breakdown and Threshold Voltage

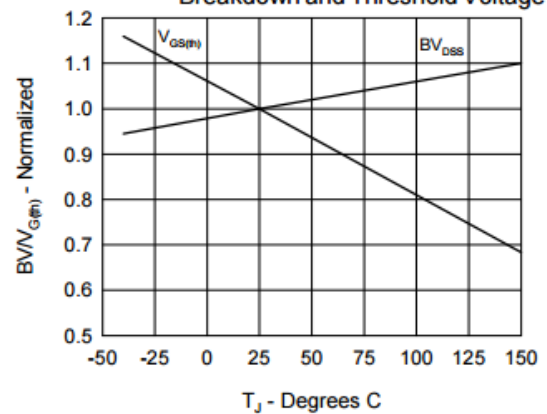


Fig.7. Gate Charge Characteristic Curve

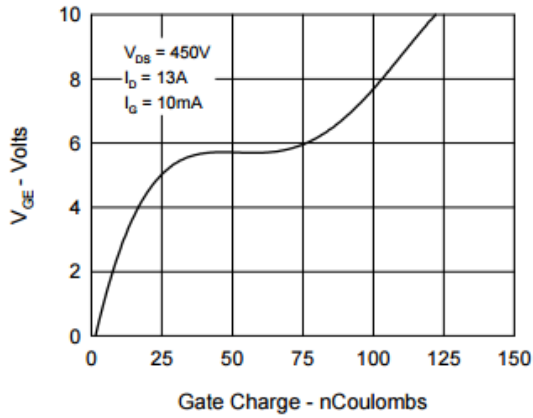


Fig.8. Capacitance Curves

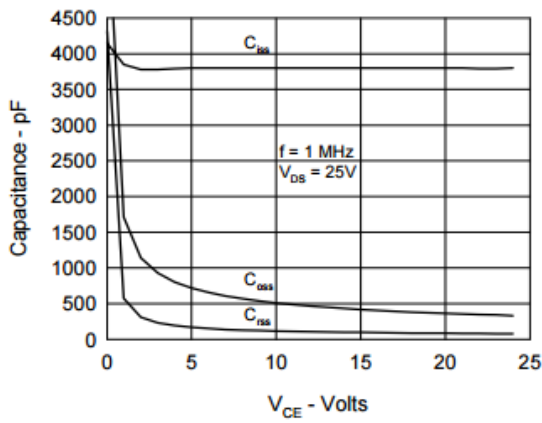


Fig.9. Source Current vs. Source to Drain Voltage

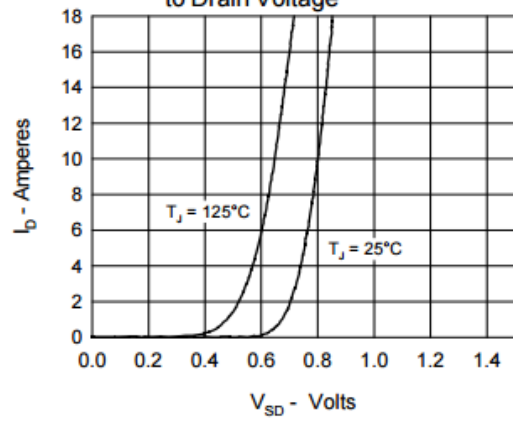


Fig.10. Transient Thermal Impedance

