

## General Description :

HMP25N50, 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-247, which accords with the RoHS standard.

## Features :

- Fast Switching
- Low ON Resistance(Typical Data:0.166Ω)
- Low Gate Charge Minimize Switching loss
- Fast Recovery Body Diode
- 100% Single Pulse avalanche energy Test

## Applications:

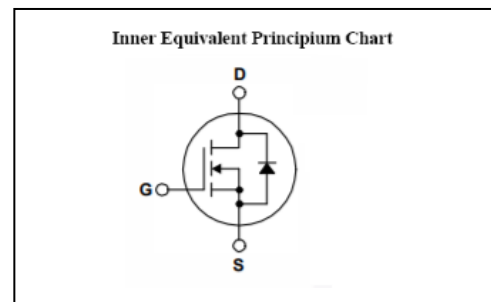
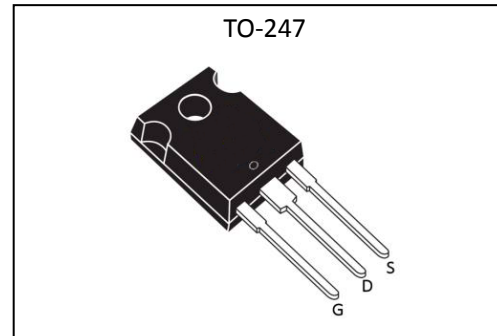
- Adaptor
- Charger
- SMPS Standby Power

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

Symbol	Parameter	Rating	Units
V <sub>DSS</sub>	Drain-to-Source Voltage <sup>*1</sup>	500	V
I <sub>D</sub>	Continuous Drain Current	25	A
I <sub>DM</sub>	Pulsed Drain Current at V <sub>GS</sub> =10V <sup>*2</sup>	100	A
V <sub>GS</sub>	Gate-to-Source Voltage	±30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy	1800	mJ
I <sub>AS</sub>	Avalanche Current	8.8	A
dv/dt	Peak Diode Recovery dv/dt <sup>*3</sup>	5.0	V/ns
P <sub>D</sub>	Power Dissipation	270	W
	Derating Factor above 25°C	2.16	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)	500	V
I <sub>D</sub>	25	A
P <sub>D</sub> (T <sub>C</sub> =25°C)	270	W
R <sub>DS(ON).type.</sub>	166	mΩ



## Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.46	°C/ W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	°C/ W

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

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	500	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=500V, V_{GS}=0V, T_a=25^\circ\text{C}$	--	--	1.0	$\mu A$
		$V_{DS}=400V, V_{GS}=0V, T_a=125^\circ\text{C}$	--	--	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

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance*4	$V_{GS}=10V, I_D=12.5 A$	--	166	190	m $\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
$g_{fs}$	Forward Transconductance*4	$V_{DS}=15V, I_D=15A$	--	25	--	S

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$	--	4650	--	pF
$C_{oss}$	Output Capacitance		--	400	--	
$C_{rss}$	Reverse Transfer Capacitance		--	40	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=25A, V_{DD}=250V$ $V_{GS}=10V, R_g=25\Omega$	--	50	--	ns
$t_r$	Rise Time		--	115	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	301	--	
$t_f$	Fall Time		--	125	--	
$Q_g$	Total Gate Charge	$I_D=25A, V_{DD}=250V$ $V_{GS}=10V$	--	85	--	nC
$Q_{gs}$	Gate to Source Charge		--	14	--	
$Q_{gd}$	Gate to Drain ( "Miller" )Charge		--	37	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_{SD}$	Continuous Source Current (Body Diode)		--	--	25	A
$I_{SM}$	Maximum Pulsed Current (Body Diode)		--	--	100	A
$V_{SD}$	Diode Forward Voltage	$I_S=25A, V_{GS}=0V$	--	--	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_S=25A, T_j=25^\circ C$	--	530	--	ns
$Q_{rr}$	Reverse Recovery Charge	$dI_F/dt=100A/\mu s, V_{GS}=0V$	--	5.26	--	uC

\*1:  $T_j = +25^\circ C$  to  $+150^\circ C$

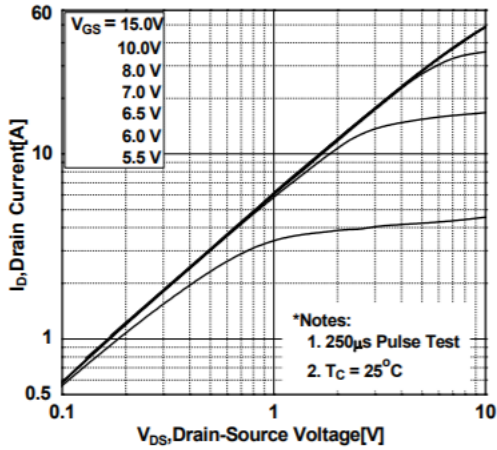
\*2: Repetitive rating; pulse width limited by maximum junction temperature.

\*3:  $I_{SD}=25A, di/dt < 100A/\mu s, V_{DD} < BV_{DSS}, T_j = +150^\circ C$ .

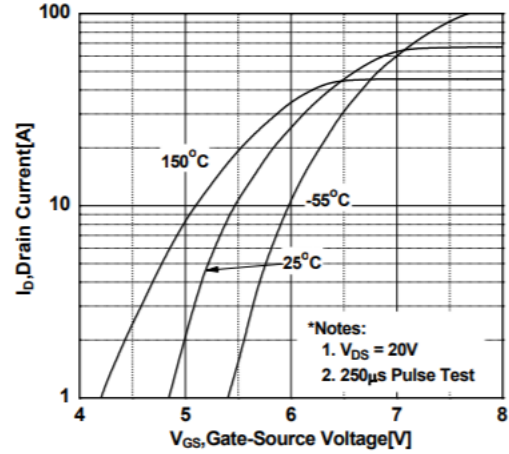
\*4: Pulse width  $< 380\mu s$ ; duty cycle  $< 2\%$ .

## Characteristics Curve :

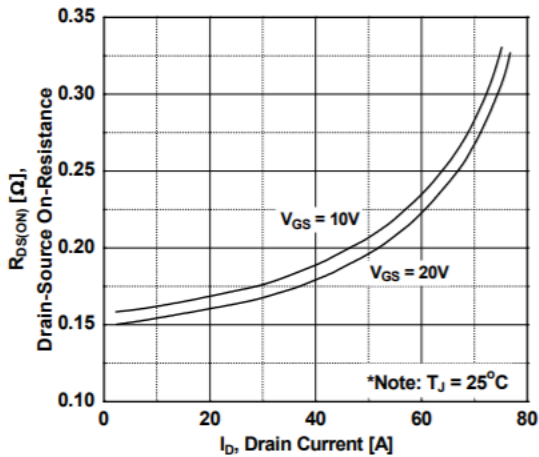
**Figure 1. On-Region Characteristics**



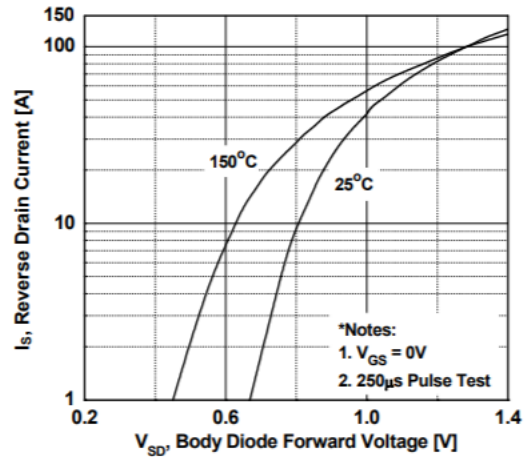
**Figure 2. Transfer Characteristics**



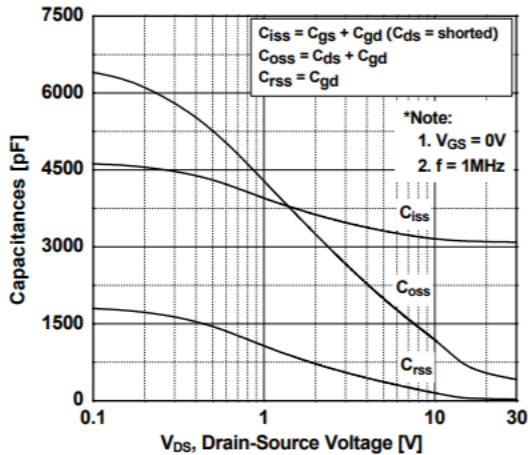
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



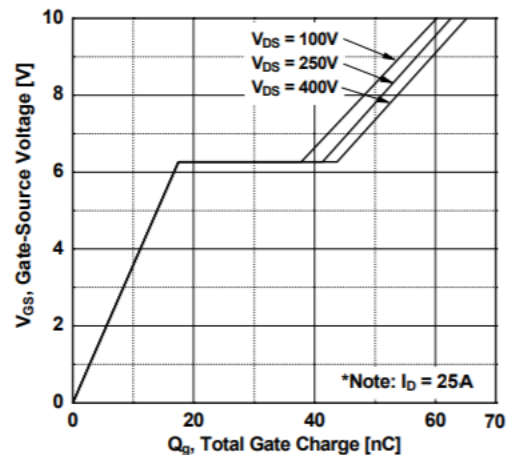
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



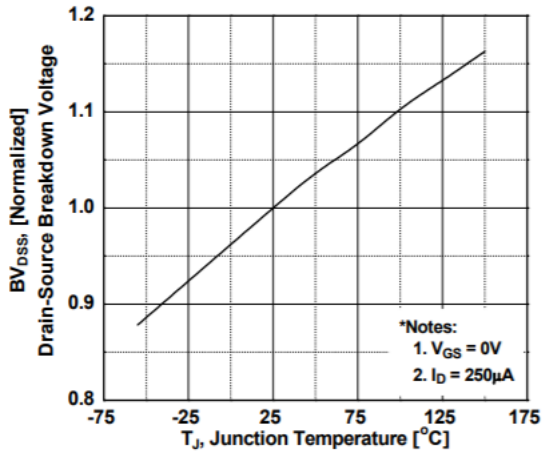
**Figure 5. Capacitance Characteristics**



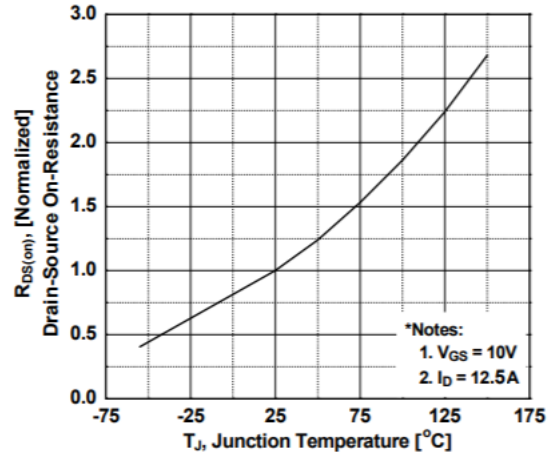
**Figure 6. Gate Charge Characteristics**



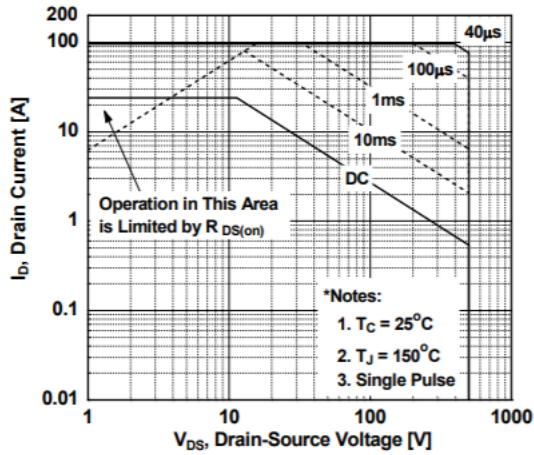
**Figure 7. Breakdown Voltage Variation vs. Temperature**



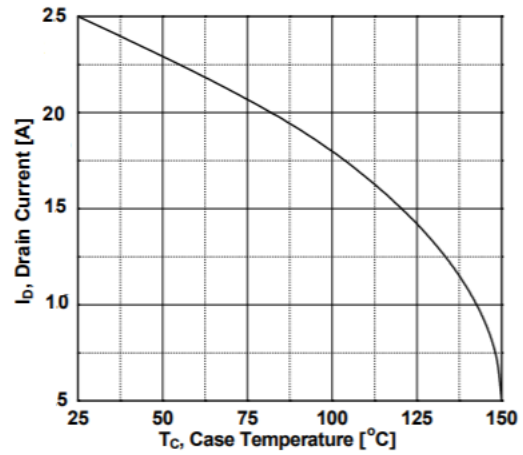
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**

