

## Silicon N-Channel Power MOSFET

### General Description :

HMP25N60, 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.

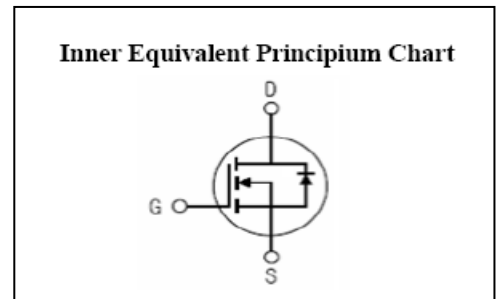
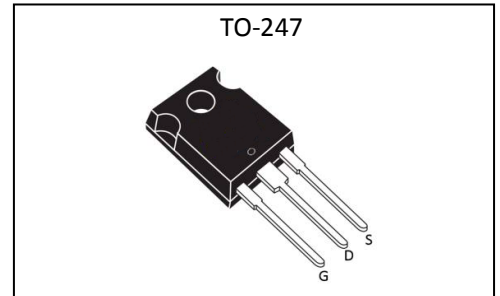
### Features :

- Fast Switching
- Low ON Resistance(Typical Data:0.175Ω)
- Low Gate Charge Minimize Switching loss
- Fast Recovery Body Diode
- 100% Single Pulse avalanche energy Test

### Applications :

- Adaptor
- Charger
- SMPS Standby Power

$V_{DSS}$	600	V
$I_D$	25	A
$P_D(T_C=25^\circ C)$	230	W
$R_{DS(ON).type.}$	175	mΩ



### Absolute ( $T_c= 25^\circ C$ unless otherwise specified ) :

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	600	V
$I_D$	Continuous Drain Current	25	A
$I_{DM}$	Pulsed Drain Current at $V_{GS}=10V$	100	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy	2500	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$	5.0	V/ns
$P_D$	Power Dissipation	230	W
	Derating Factor above $25^\circ C$	1.84	W/ $^\circ C$
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ C$
$T_L$	Maximum Temperature for Soldering	300	$^\circ C$
$T_{PAK}$	Leads at 0.63 in(1.6mm) from Case for 10 seconds, Package Body for 10 seconds	260	$^\circ C$

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

## Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.54	$^{\circ}\text{C} / \text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	$^{\circ}\text{C} / \text{W}$

## 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	$V_{GS}=0V, I_D=250\mu\text{A}$	600	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=600V, V_{GS}=0V, T_a=25^{\circ}\text{C}$	--	--	10	$\mu\text{A}$
		$V_{DS}=480V, V_{GS}=0V, T_a=125^{\circ}\text{C}$	--	--	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	$V_{GS}=10V, I_D=12.5\text{A}$	--	175	200	$\text{m}\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.0	--	4.0	V
$g_{fs}$	Forward Transconductance	$V_{DS}=15V, I_D=12.5\text{A}$	--	20	--	S

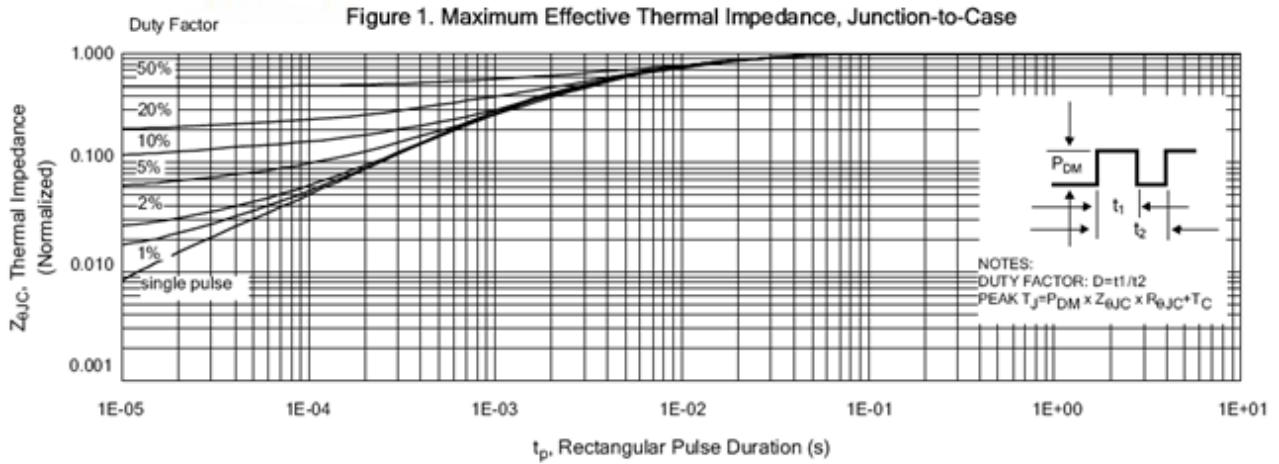
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$	--	4900	--	pF
$C_{oss}$	Output Capacitance		--	410	--	
$C_{rss}$	Reverse Transfer Capacitance		--	44	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=25\text{A}, V_{DD}=300V$ $V_{GS}=10V, R_g=25\Omega$	--	55	--	ns
$t_r$	Rise Time		--	121	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	315	--	
$t_f$	Fall Time		--	140	--	
$Q_g$	Total Gate Charge	$I_D=25\text{A}, V_{DD}=300V$	--	101	--	nC
$Q_{gs}$	Gate to Source Charge	$V_{GS}=10V$	--	18	--	

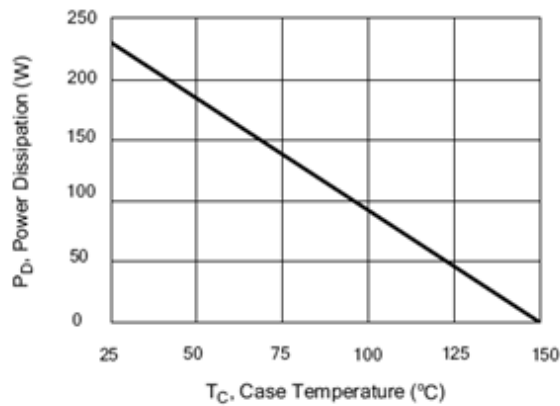
Q <sub>gd</sub>	Gate to Drain ( "Miller" )Charge		--	43	--	
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Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I <sub>SD</sub>	Continuous Source Current (Body Diode)		--	--	25	A
I <sub>SM</sub>	Maximum Pulsed Current (Body Diode)		--	--	100	A
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =25A, V <sub>GS</sub> =0V	--	--	1.5	V
trr	Reverse Recovery Time	I <sub>S</sub> =25A, T <sub>j</sub> =25°C	--	650	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs, V <sub>GS</sub> =0V	--	6.5	--	uC
*Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

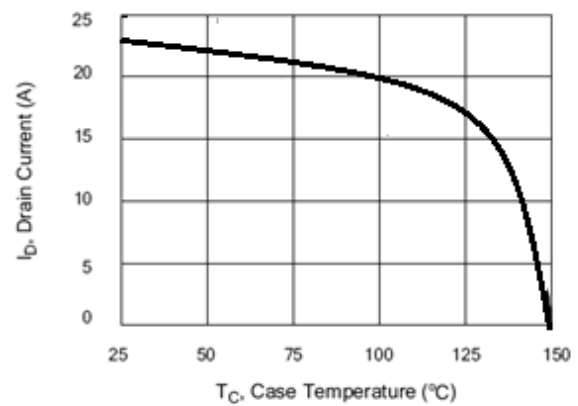
## Characteristics Curve :



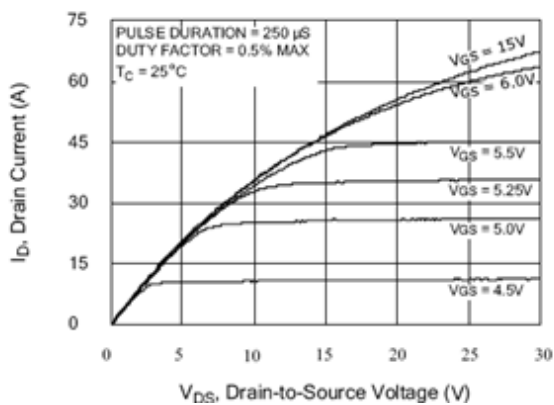
**Figure 2. Maximum Power Dissipation vs Case Temperature**



**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



**Figure 4. Typical Output Characteristics**



**Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current**

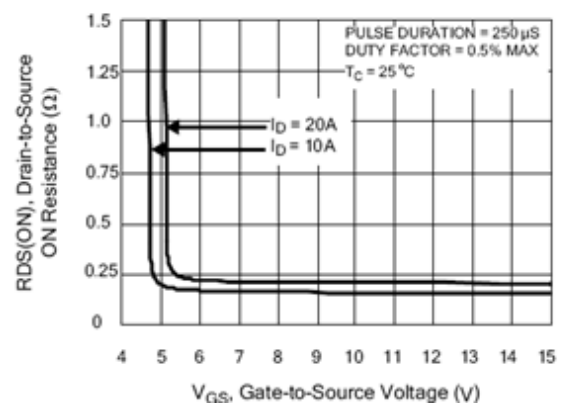


Figure 6. Maximum Peak Current Capability

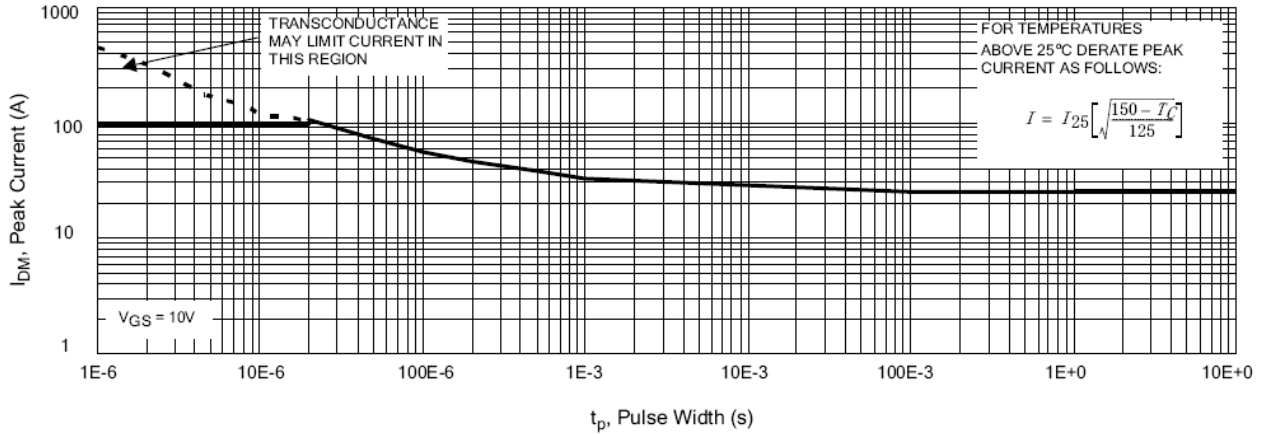


Figure 7. Typical Transfer Characteristics

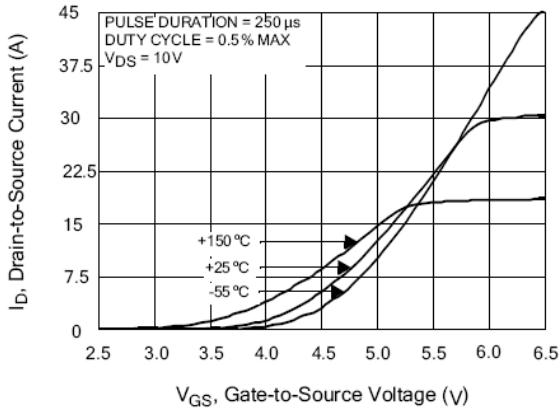


Figure 8. Unclamped Inductive Switching Capability

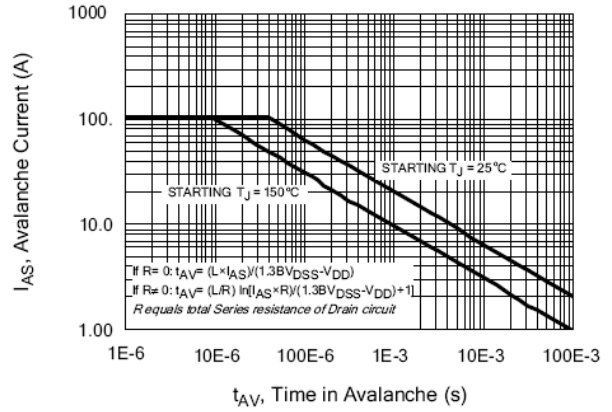


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

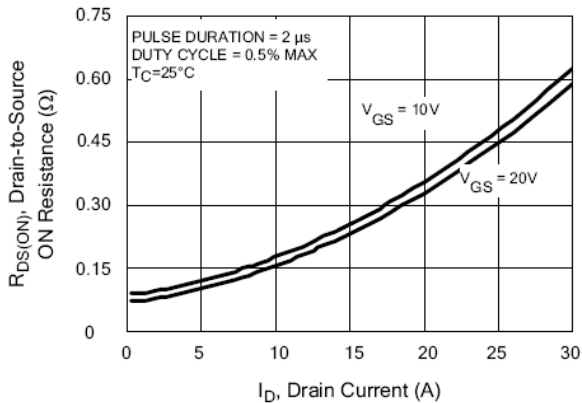


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

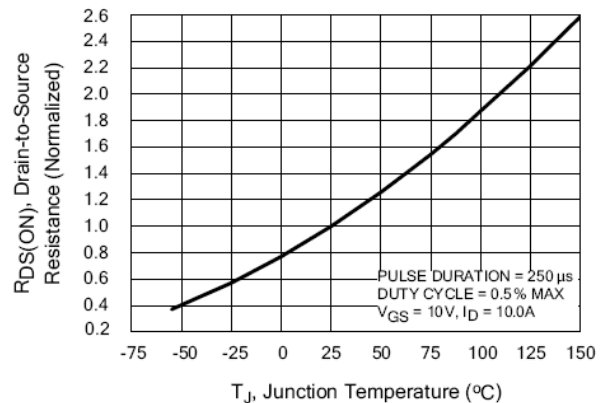


Figure 11. Typical Breakdown Voltage vs Junction Temperature

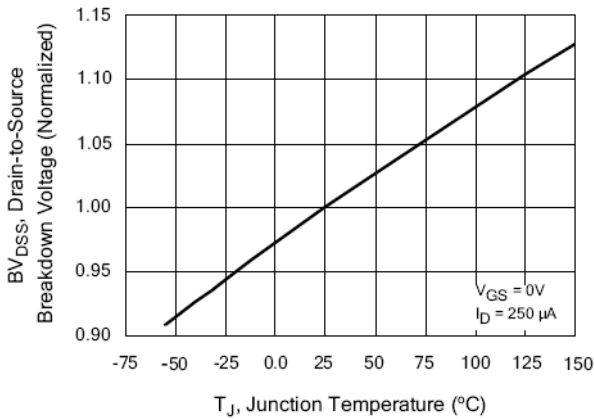


Figure 12. Typical Threshold Voltage vs Junction Temperature

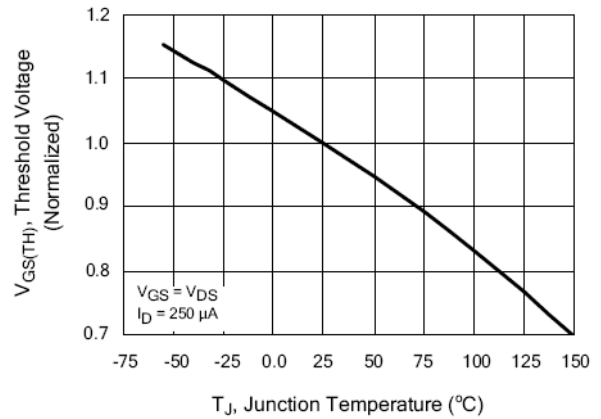


Figure 13. Maximum Forward Bias Safe Operating Area

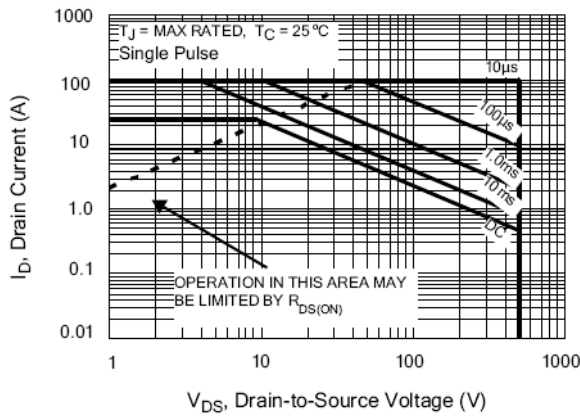


Figure 14. Typical Capacitance vs

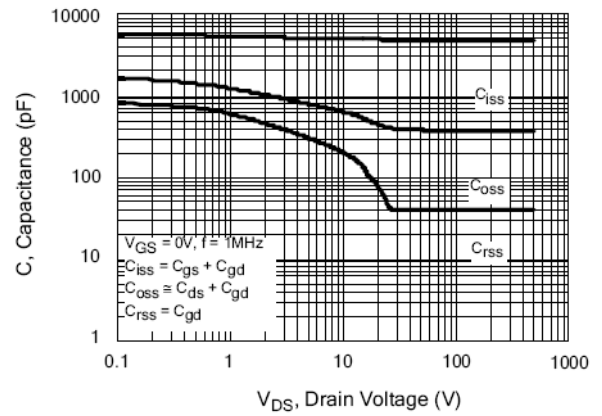


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

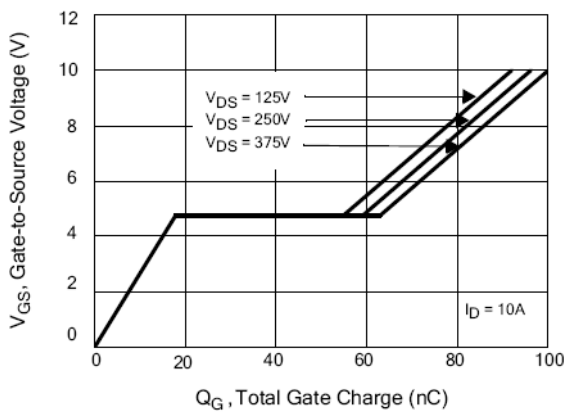


Figure 16. Typical Body Diode Transfer Characteristics

