HMP300N15

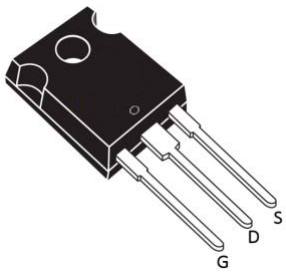
Silicon N-Channel Power MOSFET

$V_{DSS}(T_C=150℃)$	150	V
I_D	300	A
$P_D(T_C=25℃)$	600	W
$R_{DS(ON)MAX}$	4	mΩ

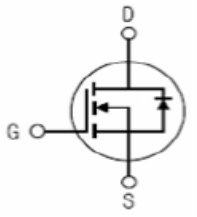
General Description :

HMP300N15 , the silicon N-channel Enhanced VDMOSFET, is obtained by the Super Trench 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.

TO-247



Inner Equivalent Principium Chart



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℃ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	150	V
I_D	Continuous Drain Current	300	A
	Continuous Drain Current T_C=100 °C	210	A
I_{DM}[a1]	Pulsed Drain Current	1200	A
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy	2600	mJ
E_{Ar}[a1]	Avalanche Energy ,Repetitive	200	mJ
I_{AR} [a1]	Avalanche Current	100	A
dv/dt[a2]	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	600	W
	Derating Factor above 25°C	4.8	W/℃
T_J , T_{stg}	Operating Junction and Storage Temperature Range	150 , –55 to 175	℃
T_L	Maximum Temperature for Soldering	300	℃

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

Thermal Characteristics

Symbol	Parameter	Rating	Units
R_{thJC}	Thermal Resistance, Junction-to-Case	0.21	℃/ W
R_{thcs}	Thermal Resistance, Case to heatsink	0.05	℃/ W

Electrical Characteristics (Tc= 25℃ 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	150	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS}=150V, V_{GS}=0V,T_a=25℃	--	--	20	μA
		V_{DS}=120V, V_{GS}=0V,T_a=125℃	--	--	1000	
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS}=+20V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS}=-20V	--	--	-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=150A	--	2.8	4.0	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2.0	--	4.0	V
g_{fs}	Forward Trans conductance	V_{DS}=10V,I_D=150A	140	--	--	S
Pulse width<380μs; duty cycle<2%.						

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=75V f=1.0MHz	--	12000	--	pF
C_{oss}	Output Capacitance		--	140	--	pF
C_{rss}	Reverse Transfer Capacitance		--	15	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D=100A,V_{DD}=75V V_{GS}=10V,R_g=4.7Ω	--	52	--	ns
t_r	Rise Time		--	75	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	86	--	
t_f	Fall Time		--	31	--	
Q_g	Total Gate Charge	I_D=100A,V_{DD}=75V V_{GS}=10V	--	160	--	nC
Q_{gs}	Gate to Source Charge		--	64	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	27	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	300	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	1200	A
V_{SD}	Diode Forward Voltage	I_S=150A,V_{GS}=0V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_S=50A,T_j=25℃	--	250	--	ns
Q_{rr}	Reverse Recovery Charge	dI_F/dt=100A/μs, V_{GS}=0V	--	650	--	nC

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

a2 : I_{SD}=150A,di/dt≤100A/us,V_{DD}≤BV_{DS}, Start T_J=25℃

Characteristics Curve :

Fig. 1. Output Characteristics
@ T_J = 25°C

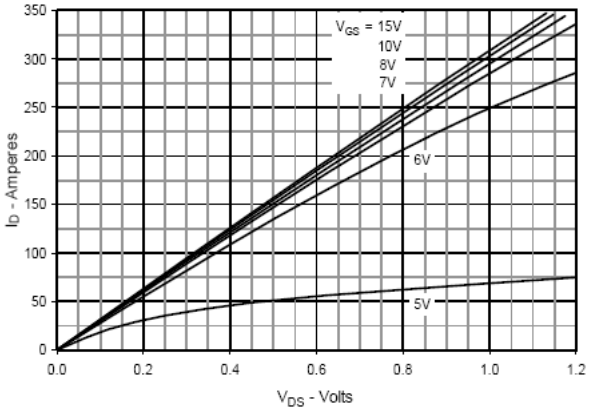


Fig. 2. Extended Output Characteristics
@ T_J = 25°C

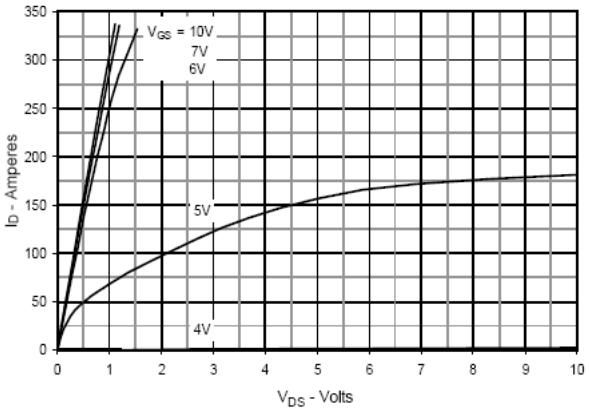


Fig. 3. Output Characteristics
@ T_J = 150°C

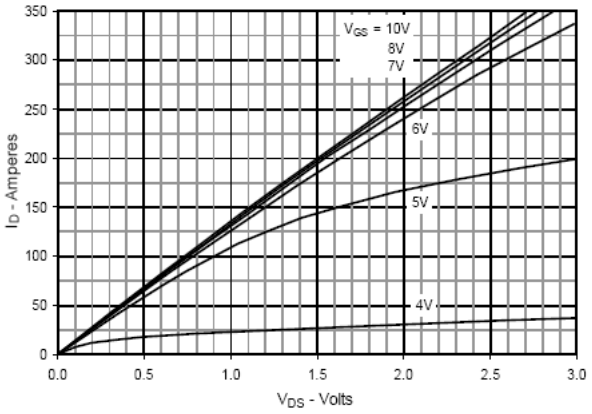


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 180A Value vs. Junction Temperature

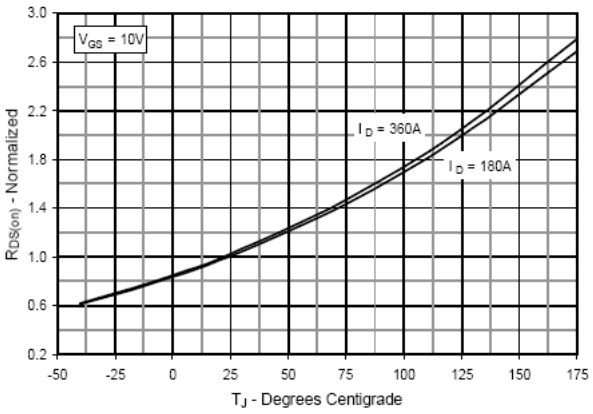


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 180A Value vs. Drain Current

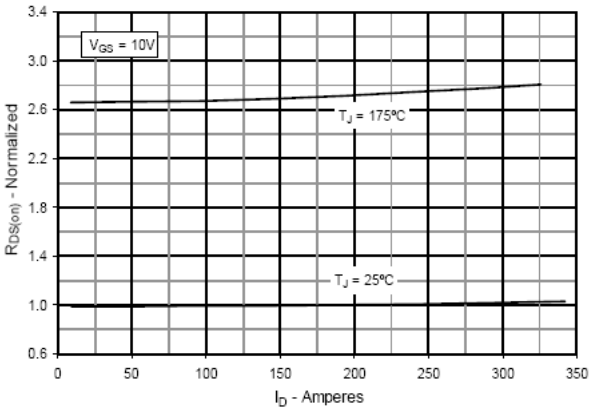


Fig. 6. Drain Current vs. Case Temperature

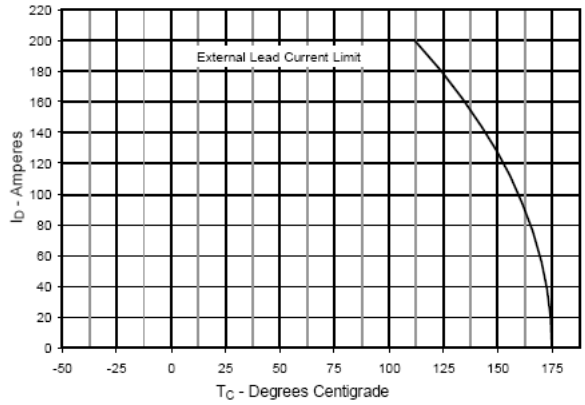


Fig. 7. Input Admittance

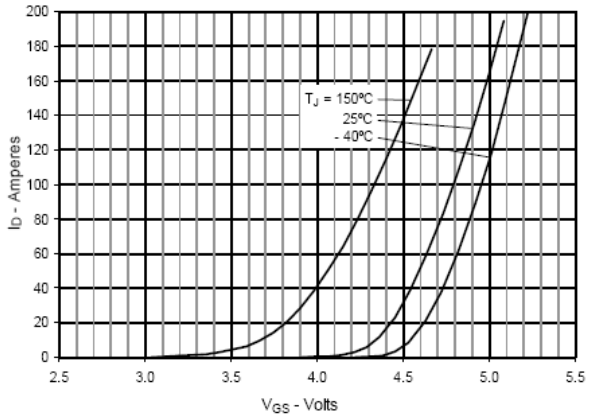


Fig. 8. Transconductance

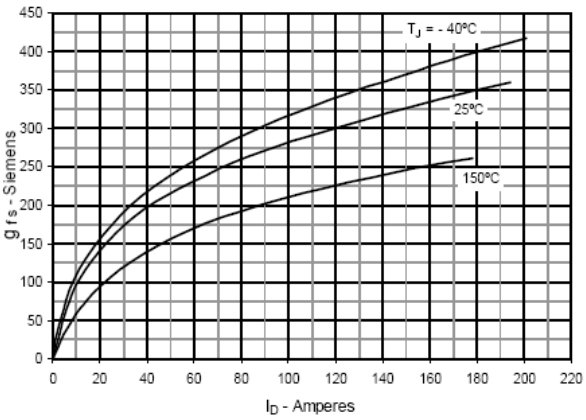


Fig. 9. Forward Voltage Drop of Intrinsic Diode

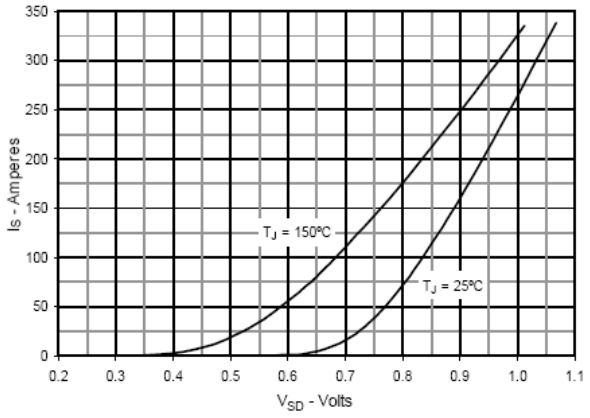


Fig. 10. Gate Charge

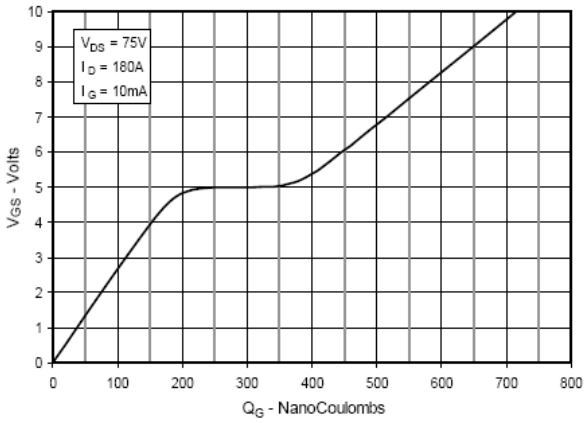


Fig. 11. Capacitance

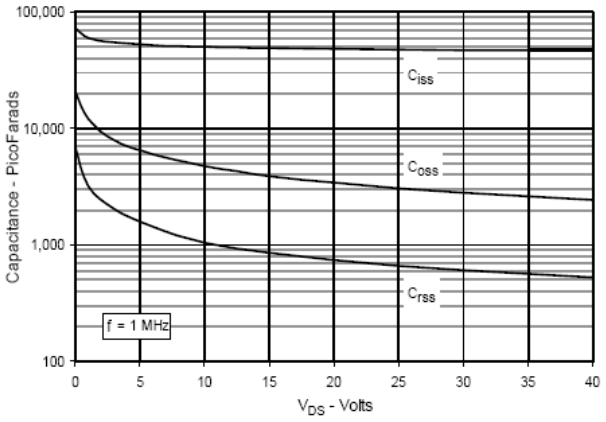


Fig. 12. Forward-Bias Safe Operating Area

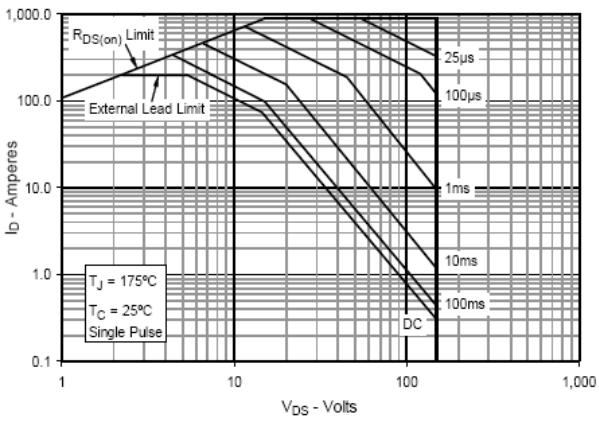


Fig. 13. Resistive Turn-on
Rise Time vs. Junction Temperature

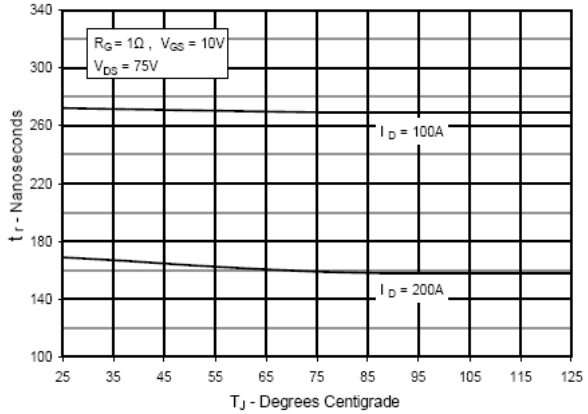


Fig. 14. Resistive Turn-on
Rise Time vs. Drain Current

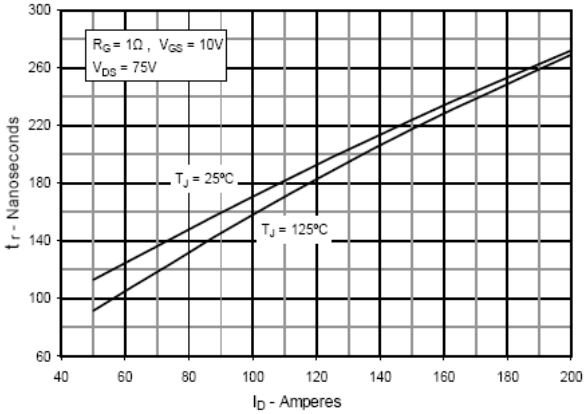


Fig. 15. Resistive Turn-on
Switching Times vs. Gate Resistance

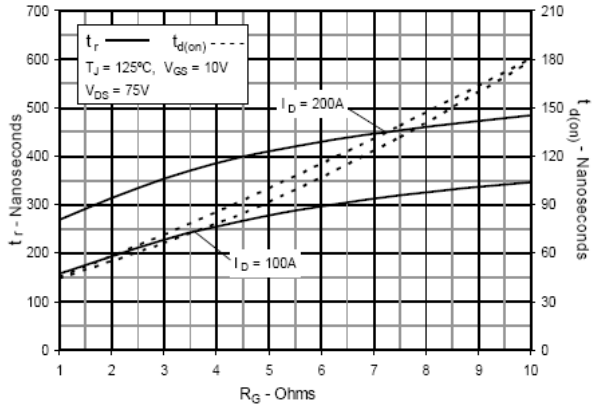


Fig. 16. Resistive Turn-off
Switching Times vs. Junction Temperature

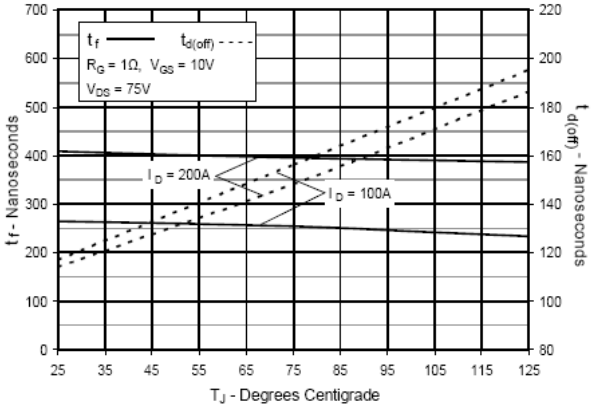


Fig. 17. Resistive Turn-off
Switching Times vs. Drain Current

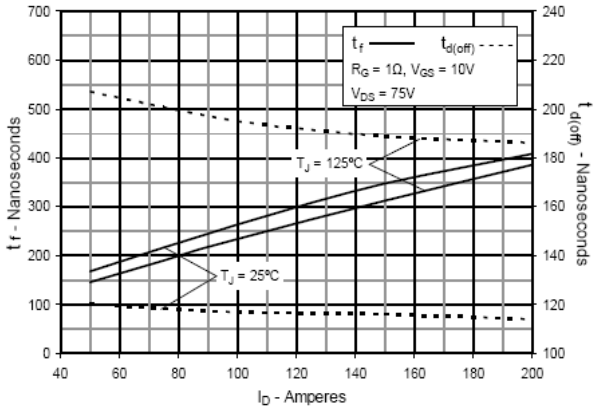


Fig. 18. Resistive Turn-off
Switching Times vs. Gate Resistance

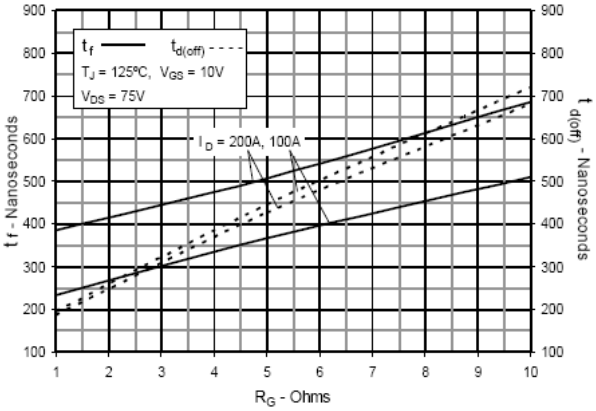


Fig. 19. Maximium Transient Thermal Impedance