

General Description :

HMM420N10, 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 Sot-227B, which accords with the RoHS standard.

Features :

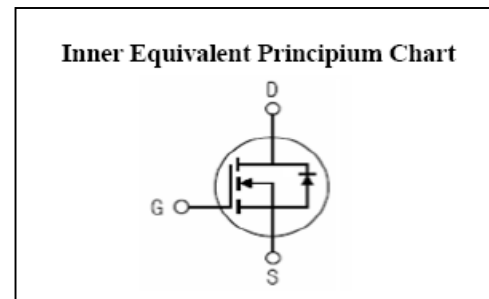
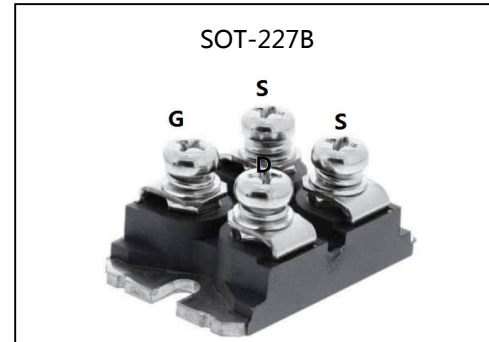
- Fast Switching
- ESD Improved Capability
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

- Power switch circuit of POWER

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

$V_{DSS}(T_c=150^\circ\text{C})$	100	V
I_D	435	A
$P_D(T_c=25^\circ\text{C})$	652	W
$R_{DS(ON)MAX}$	2.0	$\text{m}\Omega$



Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current	435	A
	Continuous Drain Current $T_c=100^\circ\text{C}$	300	A
I_{DM}^{a1}	Pulsed Drain Current(pulse width limited by T_{JM})	1130	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy	12500	mJ
E_{Ar}^{a1}	Avalanche Energy ,Repetitive	1200	mJ
I_{AR}^{a1}	Avalanche Current	48	A
dv/dt^{a2}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	520	W
	Derating Factor above 25°C	4.8	W/ $^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150 , -55 to 175	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$

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

Thermal Characteristics

Symbol	Parameter	Rating	Units
R_{thJC}	Thermal Resistance, Junction-to-Case	0.24	°C/ W
R_{thcs}	Thermal Resistance, Case to heatsink	0.1	°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	$V_{GS}=0V, I_D=250\mu A$	100	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=100V, V_{GS}=0V, T_a=25^{\circ}\text{C}$	--	--	1.0	μA
		$V_{DS}=80V, V_{GS}=0V, T_a=125^{\circ}\text{C}$	--	--	100	
$I_{GSS(F)}$	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	$V_{GS}=10V, I_D=200A$	--	1.1	2.0	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
g_{fs}	Forward Trans conductance	$V_{DS}=15V, I_D=40A$	--	100	--	S
Pulse width < 380 μ s; duty cycle < 2%.						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$	--	25	--	nF
C_{oss}	Output Capacitance		--	8000	--	pF
C_{rss}	Reverse Transfer Capacitance		--	600	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=200A, V_{DD}=50V$ $V_{GS}=10V, R_g=25\Omega$	--	78	--	ns
t_r	Rise Time		--	320	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	150	--	
t_f	Fall Time		--	145	--	
Q_g	Total Gate Charge	$I_D=200A, V_{DD}=50V$ $V_{GS}=10V$	--	420	--	nC
Q_{gs}	Gate to Source Charge		--	100	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	150	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	435	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	1130	A
V_{SD}	Diode Forward Voltage	$I_S = 200A, V_{GS} = 0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 50A, T_j = 25^\circ C$	--	350	--	ns
Q_{rr}	Reverse Recovery Charge	$dI_F/dt = 100A/\mu s, V_{GS} = 0V$	--	820	--	nC

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

a2 : $I_{SD} = 200A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS}, \text{ Start } T_j = 25^\circ C$

Characteristics Curve :

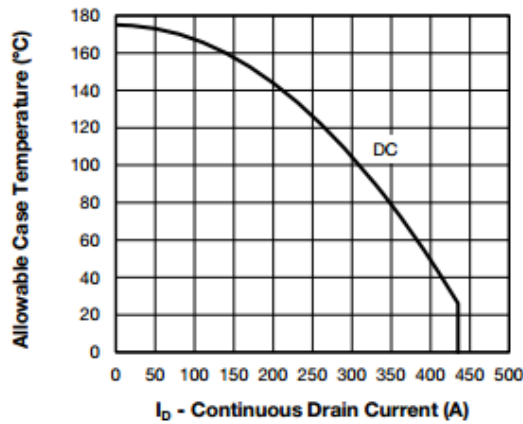


Fig. 1 - Maximum Continuous Drain Current vs. Case Temperature

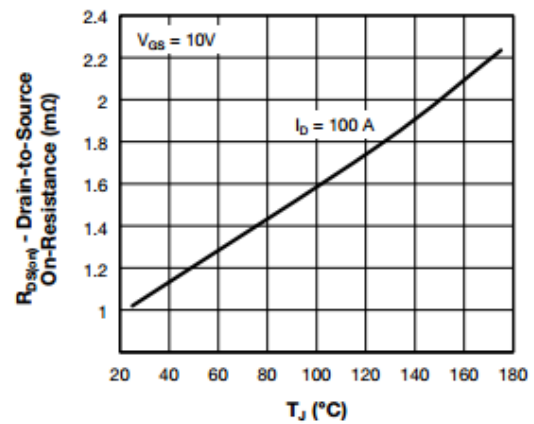


Fig. 4 - Typical Drain-to-Source On-Resistance vs. Temperature

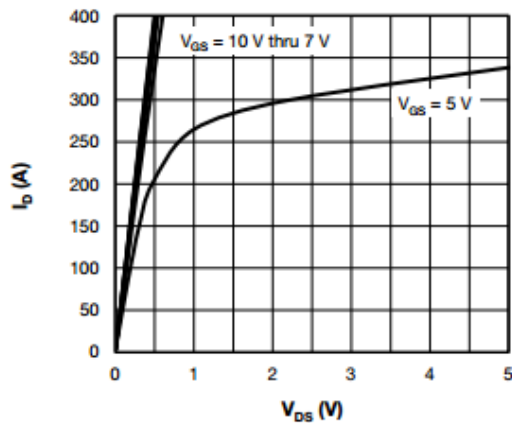


Fig. 2 - Typical Drain to Source Current Output Characteristics at $T_J = 25^\circ C$

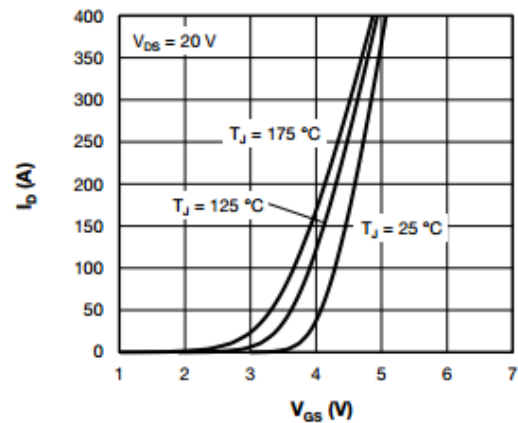


Fig. 5 - Typical Transfer Characteristics

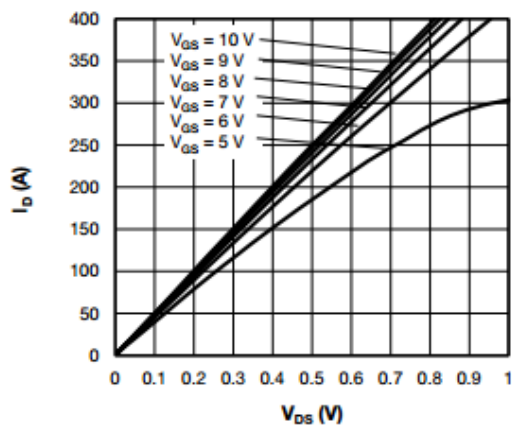


Fig. 3 - Typical Drain to Source Current Output Characteristics at $T_J = 125^\circ C$

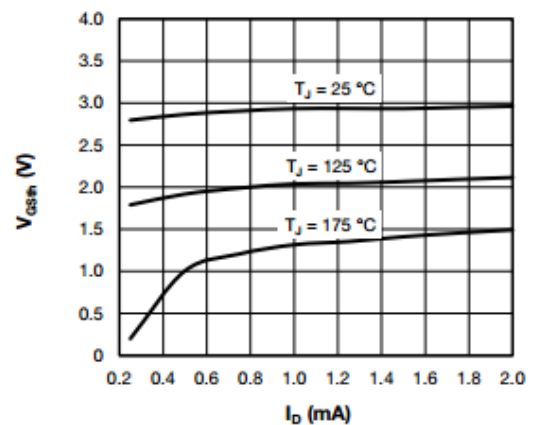


Fig. 6 - Typical Gate Threshold Voltage Characteristics

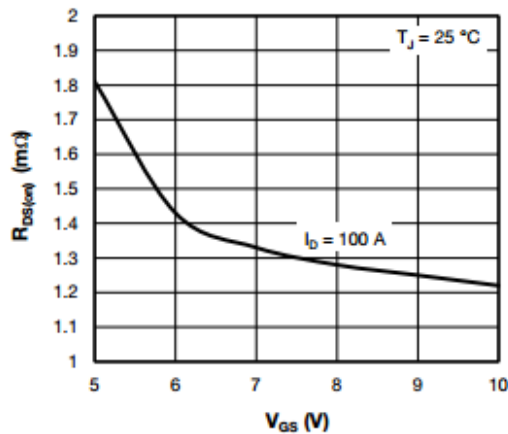


Fig. 7 - Typical Drain-State Resistance vs. Gate-to-Source Voltage

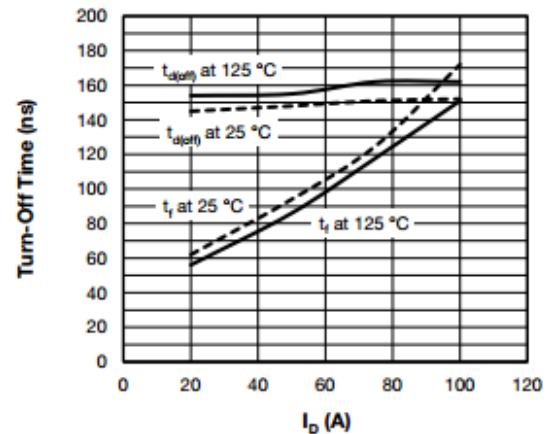


Fig. 10 - Typical Turn off Switching Time vs. I_D
 $V_{DD} = 50 V$, $R_g = 1.2 \Omega$, $V_{GS} = \pm 10 V$, $L = 500 \mu H$

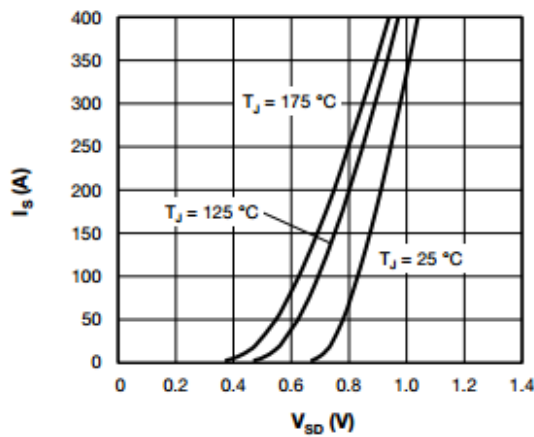


Fig. 8 - Typical Body Diode Source-to-Drain Current Characteristics

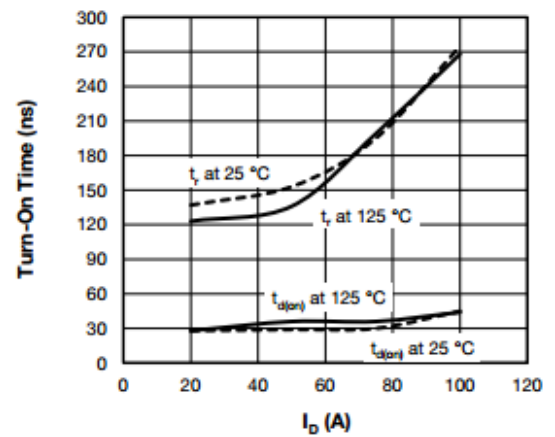


Fig. 11 - Typical Turn-on Switching Time vs. I_D
 $V_{DD} = 50 V$, $R_g = 1.2 \Omega$, $V_{GS} = \pm 10 V$, $L = 500 \mu H$

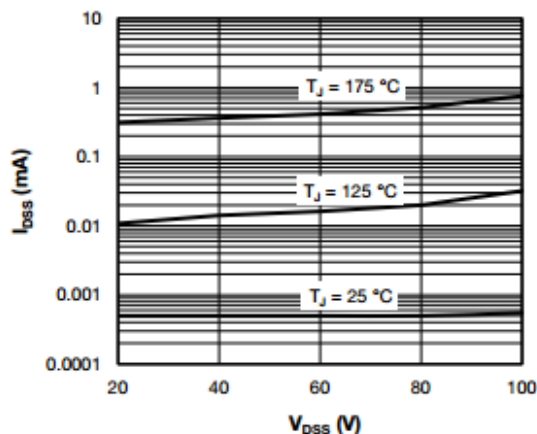


Fig. 9 - Typical Zero Gate Voltage Drain Current

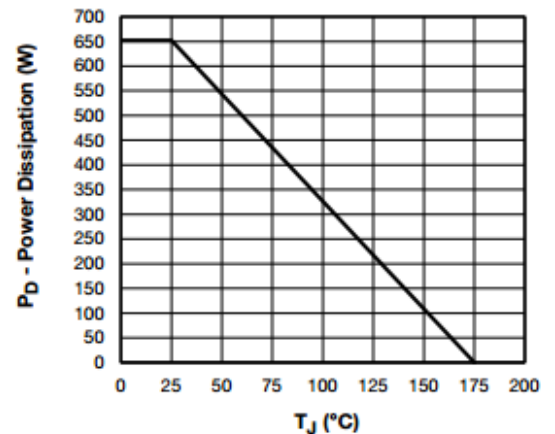


Fig. 12 - Power Dissipation Curve

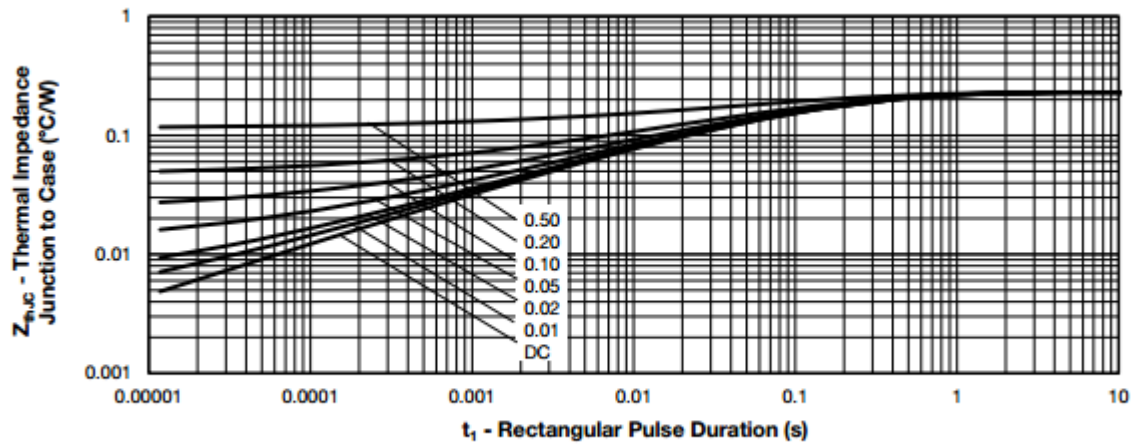


Fig. 13 - Maximum Thermal Impedance Junction-to-Case Characteristics

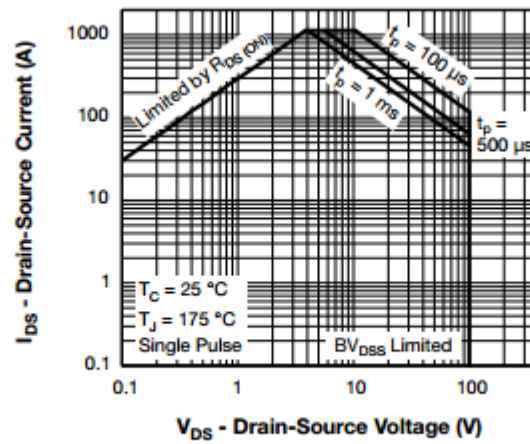


Fig. 14 - Safe Operating Area