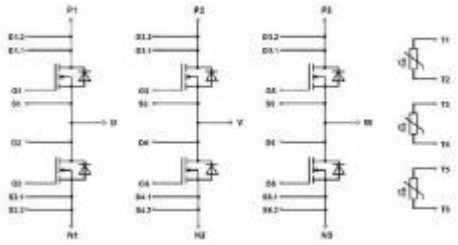
JX600N1200HPD

1200V, 600A, 2.7mΩ, Six-pack (Three-phase), Silicon Carbide MOSFET Module

Product Data Sheet JX-3T03-76A A/0

General Description

The JX-HPD module incorporates JX's 1200V Gen3 N-channel SiC MOSFET. NTC temperature sensor inside.



Features

- High Temperature, Humidity and Bias Operation
- Ultra Low Loss, L_{Stray}<10nH
- High-frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation
- Copper Baseplate and Silicon Nitride Insulator

Benefits

- Enables Compact, Lightweight, Efficient Systems
- Harsh Outdoor Environment Installation
- Mitigates Over-voltage Protection
- Reduced Thermal Requirements
- Reduced System Cost

Applications

- New Energy Vehicle Main Drive Inverter
- Photovoltaic Inverter
- Industrial Controller

Ordering Informations

Order Number / Marking	JX600N1200HPD
Package Type	HPD

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V_{DS}	Drain-source Voltage		1200		V	T_C=25°C
I_D	Drain Current (continuous)		600		A	T_C=25°C
T_J	Junction Temperature		175		oC	
Symbol	**Parameter**	**Min.**	**Typ.**	**Max.**	**Unit**	**Test Conditions**
Static characteristics						
$R_{DS(on)}$	Static Drain-source on Resistance	-	2.7	3.7	mΩ	V_{GS}=18V; I_D=300A; T_C=25°C
Dynamic characteristics						
Q_G	Total Gate Charge	-	1428	-	nC	V_{DD}=800V; V_{GS}=-5/+18V; I_D=300A; T_C=25°C
Q_{GD}	Gate-drain Charge	-	469	-		
Source-drain diode						
Q_{RR}	Reverse Recovery Charge	-	3679	-	nC	V_{GS}=-5/+18V; I_F=300A; V_R=800V; Load=100μH; T_J=25°C

Absolute Maximum Ratings (at T_C=25°C unless otherwise specified)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-source Voltage	1200	V
V_{GS}	Gate-source Voltage (dynamic)	-10/+22	V
I_D	Drain Current (continuous)	600	A
I_{DM}	Drain Current (pulsed)	1200	A
T_{op}; T_{stg}	Operating and Storage Temperature Range	-40 to +175	oC
T_J	Junction Temperature	175	oC
L_{Stray}	Stray Inductance	8.5	nH
V_{isol}	Isolation Test Voltage (DC; 2mA; t=10s)	4.2	kV
$R_{th\ Jh}$	Thermal Resistance, Junction-to-heatsink	0.085	oC/W
M	Mounting Torque for Module Mounting (Screw M4 baseplate to heatsink)	2.0	Nm

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T_C=25°C unless otherwise specified)						
BV_{DS}	Drain-source Breakdown Voltage	1200	-	-	V	V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current	-	-	300	μA	V_{DS}=1200V; V_{GS}=0V
I_{GSS}	Gate-body Leakage Current	-	-	3	μA	V_{GS}=-10/20V; V_{DS}=0V
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	V_{DS}=V_{GS}; I_D=60mA
$R_{DS(on)}$	Static Drain-source on Resistance	-	2.7	3.7	mΩ	V_{GS}=18V; I_D=300A
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	0.53	-	Ω	V_{AC}=25mV; f=1MHz
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
C_{iss}	Input Capacitance	-	41.3	-	nF	V_{DS}=800V; f=1MHz; V_{AC}=25mV
C_{oss}	Output Capacitance	-	1.7	-		
C_{rss}	Reverse Transfer Capacitance	-	78	-	pF	
E_{on}	Turn-on Energy	-	24.5	-	mJ	V_{DD}=800V; V_{GS}=-5/+18V; I_D=300A; Load=100μH, $R_{G(ext)}$=5.0Ω
E_{off}	Turn-off Energy	-	18.1	-		
Q_{GS}	Gate-source Charge	-	460	-	nC	V_{DD}=800V; V_{GS}=-5/+18V; I_D=300A
Q_{GD}	Gate-drain Charge	-	469	-		
Q_G	Total Gate Charge	-	1428	-		
$t_{d(on)}$	Turn-on Delay Time	-	102	-	ns	V_{DD}=800V; V_{GS}=-5/+18V; I_D=300A; $R_{G(ext)}$=5Ω; Load=100μH
t_r	Rise Time	-	82	-		
$t_{d(off)}$	Turn-off Delay Time	-	446	-		
t_f	Fall Time	-	98	-		

Body Diode Characteristics (at T_J=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{FSD}	Forward Voltage	-	-	6	V	V_{GS}=0V; I_F=300A
I_S	Continuous Diode Forward Current	-	300	-	A	V_{GS}=0V; T_C=25OC
t_{RR}	Reverse Recovery Time	-	86	-	ns	V_{GS}=-5/+18V; I_F=300A; V_R=800V; Load=100μH
Q_{RR}	Reverse Recovery Charge	-	3679	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	132	-	A	

NTC Thermistor Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R_{25}	Rated Resistance	-	5.00	-	kΩ	T_{NTC}=25OC
ΔR/R	Deviation of R_{100}	-5	-	5	%	T_{NTC}=100°C; R_{100}=493.3Ω
$B_{25/50}$	Beta Value for 25°C to 50°C	-	3375	-	K	$R_2=R_{25}\exp[B_{25/50}(1/T_2 - 1/(298.15K))]$
$B_{25/80}$	Beta Value for 25°C to 80°C	-	3414	-	K	$R_2=R_{25}\exp[B_{25/80}(1/T_2 - 1/(298.15K))]$
$B_{25/100}$	Beta Value for 25°C to 100°C	-	3436	-	K	$R_2=R_{25}\exp[B_{25/100}(1/T_2 - 1/(298.15K))]$

Typical Performance

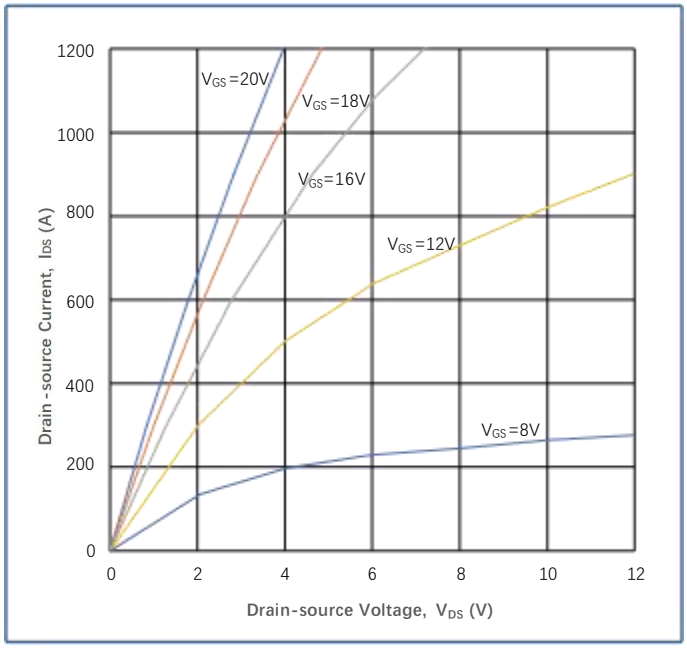


Figure 1
Output Characteristics (T_J = 25 °C)

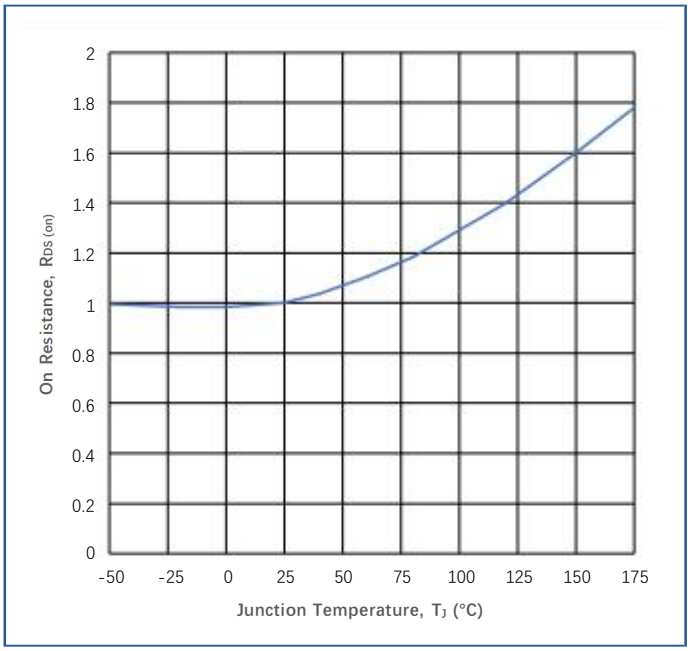


Figure 2
Normalized on-resistance vs. Temperature

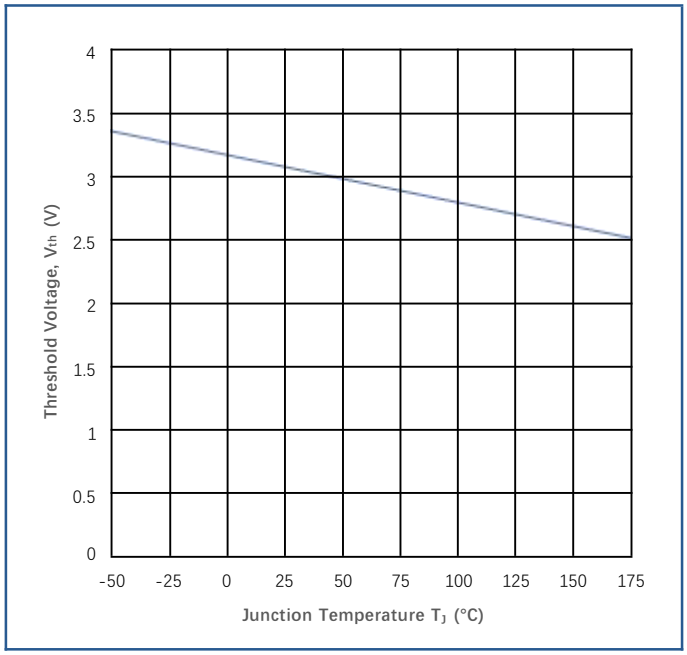


Figure 3
Threshold Voltage vs. Temperature

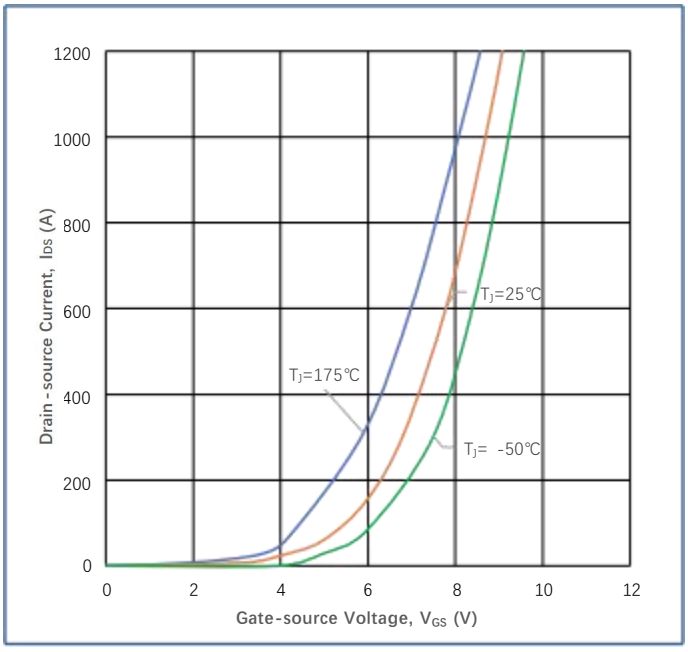


Figure 4
Transfer Characteristic for Various T_j

Typical Performance

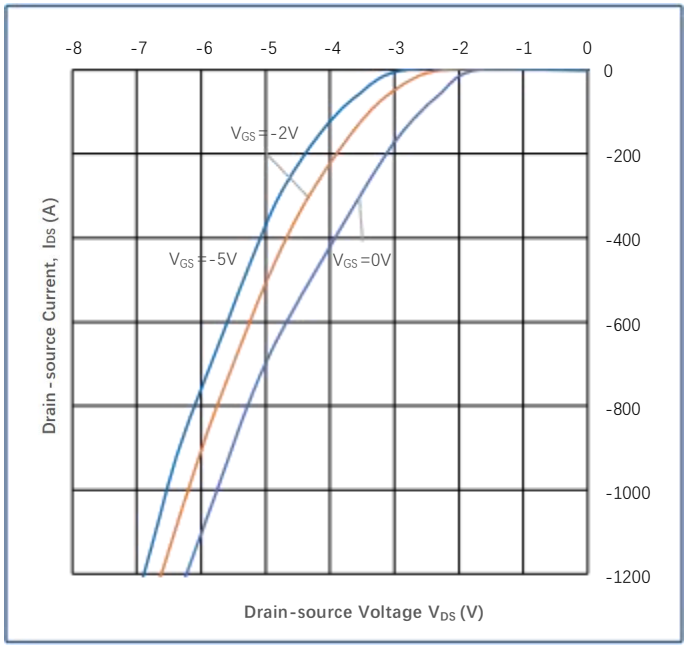


Figure 5

Diode Characteristic at 25 ˚C

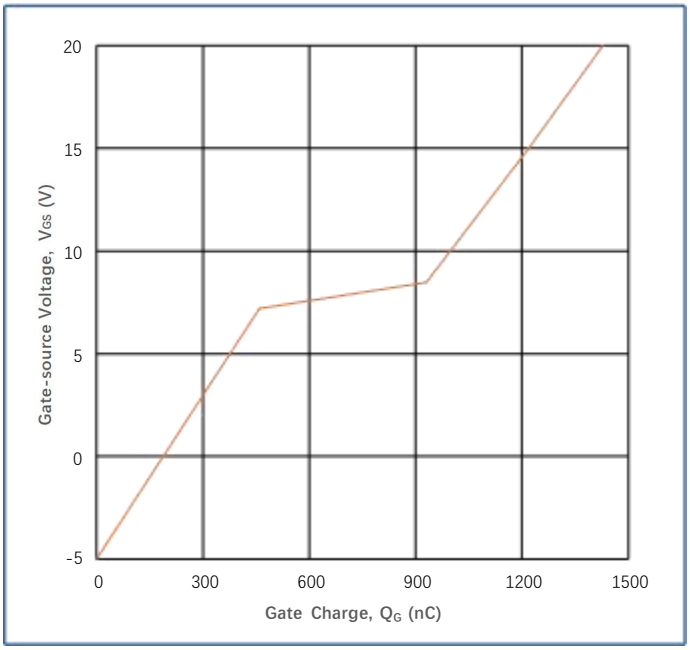


Figure 6

Typical Gate Charge Characteristics

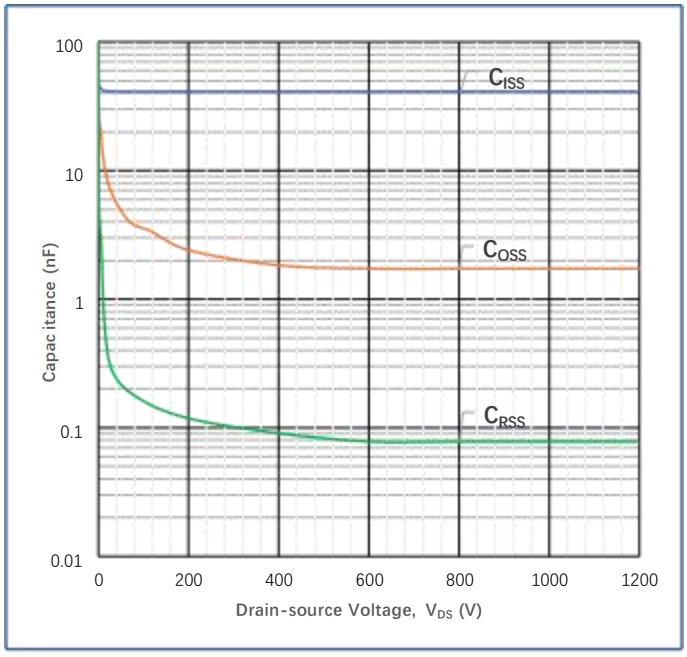


Figure 7

Typical Capacitances vs. Drain-source Voltage

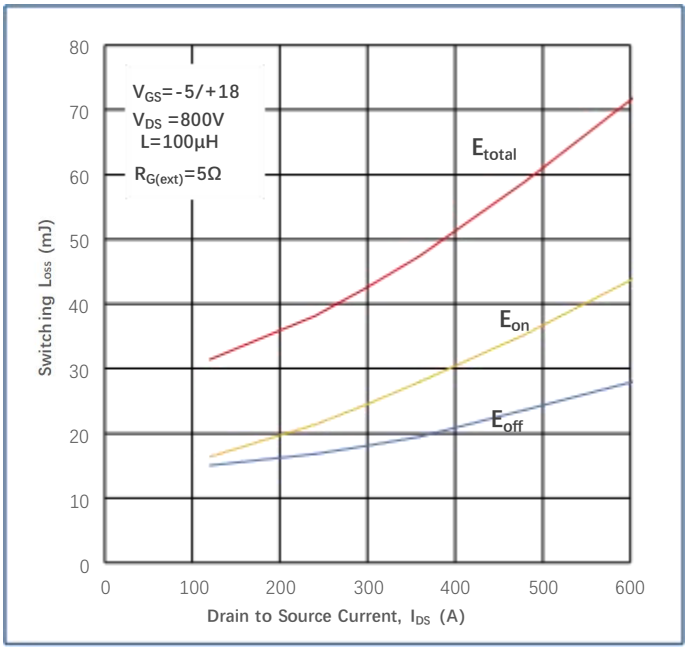


Figure 8

Inductive Switching Energy vs. Drain Current

Typical Performance

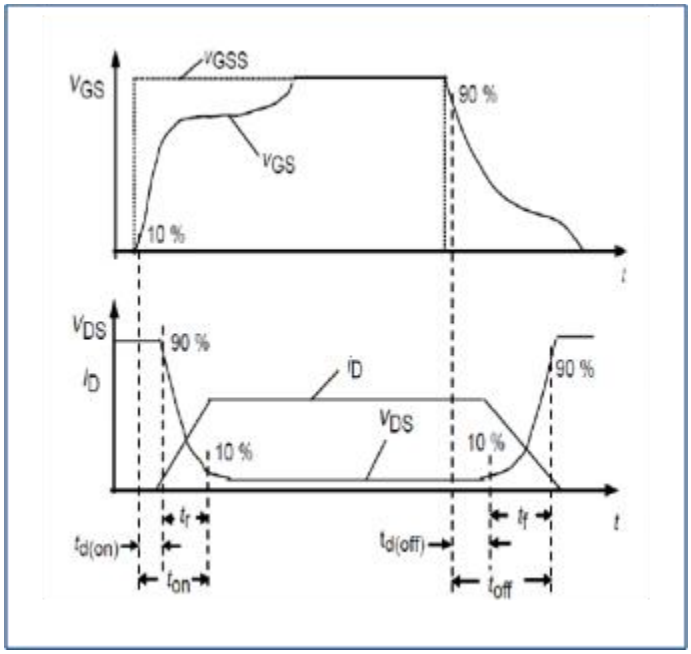


Figure 9
Switching Time Description

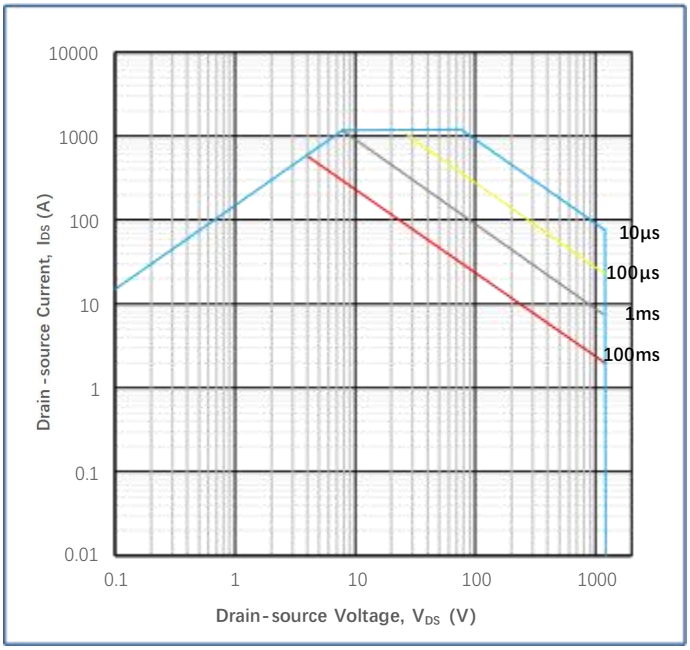
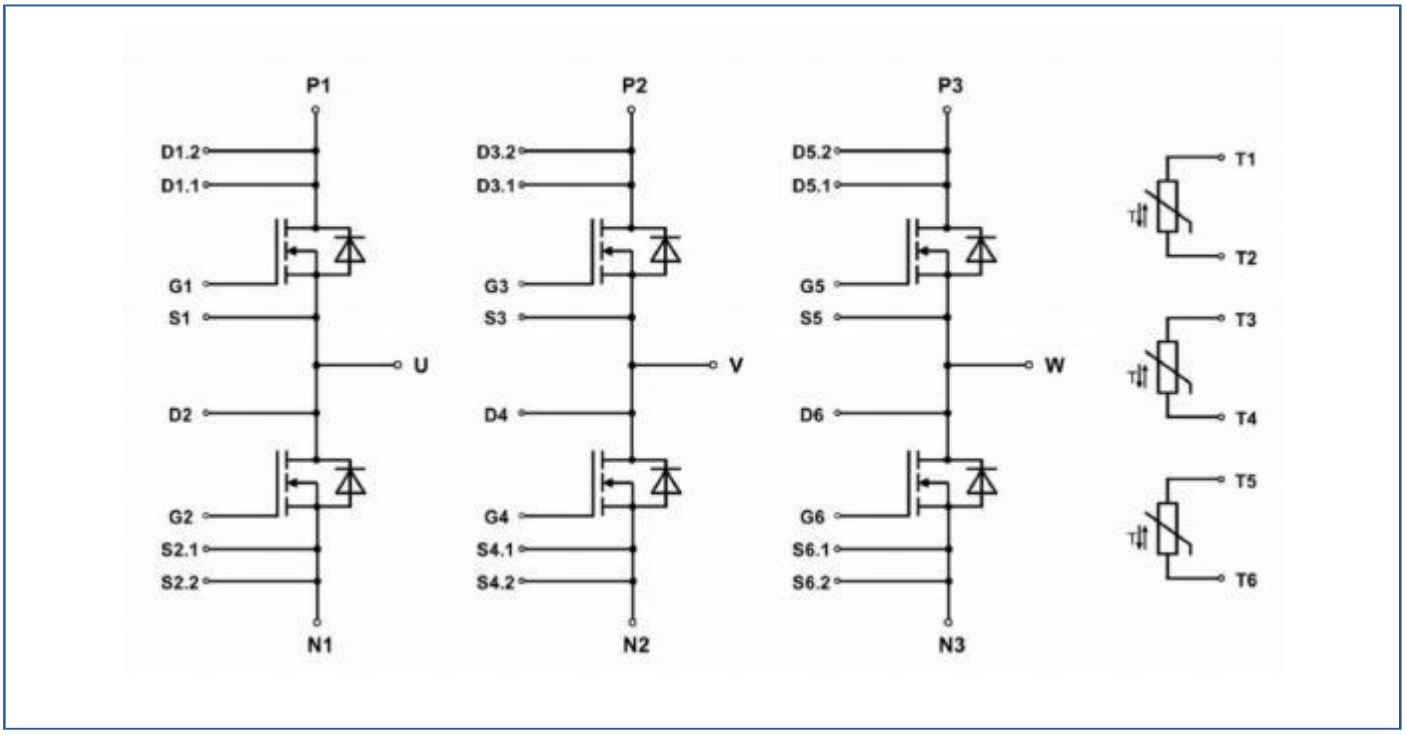


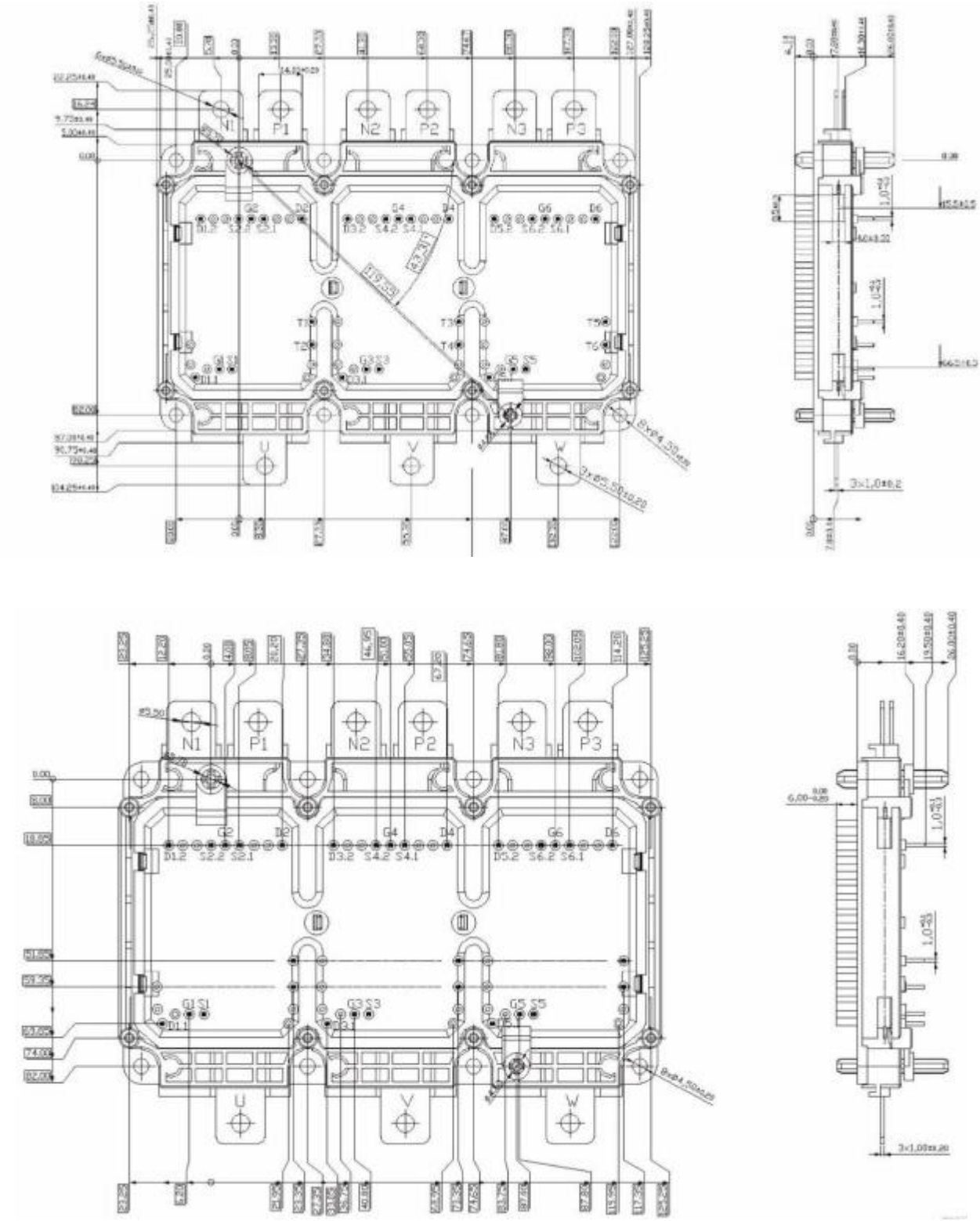
Figure 10
Safe Operating Area

Circuit Diagram Headline



Package Dimensions (mm)

Package Type： HPD



未标注线性公差按 GB/1804-2000c 级执行	公差分段	0.5-3	3-6	6-30	30-120	120-400
	c 级	±0.2	±0.3	±0.5	±0.8	±1.2

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