

General Description

The H&M-ED3 module incorporates H&M 's 1200V Gen3 N-channel SiC MOSFET. NTC temperature sensor inside.

Features

- High Temperature, Humidity, and Bias Operation
- Ultra Low Loss
- High-frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation
- Copper Baseplate and Aluminum Nitride Insulator



Applications

- High Power Converters
- Motor Drives
- Servo Drives
- UPS Systems
- Wind Turbines

Ordering Informations

Order Number / Marking	HMSMQ400HF12ED3
Package Type	ED3

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)	400			A	T _c =25°C
T _J	Junction Temperature	175			°C	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
R _{DS(on)}	Static Drain-source on Resistance	-	4.0	5.5	mΩ	V _{GS} =18V; I _D =200A; T _c =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	952	-	nC	V _{DD} =800V; V _{GS} =-5/+18V; I _D =200A; T _c =25°C
Q _{GD}	Gate-drain Charge	-	312.9	-		
Source-drain diode						
Q _{RR}	Reverse Recovery Charge	-	2452	-	nC	V _{GS} =-5/+18V; I _F =200A; V _R =900V; Load=100μH; T _J =25°C

Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ 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)	400	A
I_{DM}	Drain Current (pulsed)	800	A
T_{op}, T_{stg}	Operating and Storage Temperature Range	-40 to +175	$^\circ\text{C}$
T_J	Junction Temperature	175	$^\circ\text{C}$
L_{Stray}	Stray Inductance	20	nH
V_{isol}	Isolation Test Voltage (DC; 2mA; t=10s)	4.2	kV
$R_{th Jh}$	Thermal Resistance, Junction-to-heatsink	0.13	$^\circ\text{C/W}$

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at $T_c=25^\circ\text{C}$ unless otherwise specified)						
BV_{DS}	Drain-source Breakdown Voltage	1200	-	-	V	$V_{GS}=0V$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	200	μA	$V_{DS}=1200V$; $V_{GS}=0V$
I_{GSS}	Gate-body Leakage Current	-	-	2.0	μA	$V_{GS}=-10/20V$; $V_{DS}=0V$
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}$; $I_D=40mA$
$R_{DS(on)}$	Static Drain-source on Resistance	-	4.0	5.5	m Ω	$V_{GS}=18V$; $I_D=200A$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	0.8	-	Ω	$V_{GS}=0V$; $f=1MHz$
Dynamic characteristics (at $T_c=25^\circ\text{C}$ unless otherwise specified)						
C_{iss}	Input Capacitance	-	27.5	-	nF	$V_{DS}=1000V$; $f=1MHz$; $V_{AC}=25mV$
C_{oss}	Output Capacitance	-	1.15	-		
C_{rss}	Reverse Transfer Capacitance	-	52	-	pF	
E_{on}	Turn-on Switching Energy	-	16.9	-	mJ	$V_{DS}=900V$; $V_{GS}=-5/+18V$; $I_D=200A$; Load=100 μH
E_{off}	Turn-off Switching Energy	-	9.7	-		
Q_{GS}	Gate-source Charge	-	306.7	-	nC	$V_{DD}=800V$; $V_{GS}=-5/+18V$; $I_D=200A$
Q_{GD}	Gate-drain Charge	-	312.9	-		
Q_G	Total Gate Charge	-	952	-		
$t_{d(on)}$	Turn-on Delay Time	-	112	-	ns	$V_{DD}=900V$; $V_{GS}=-5/+18V$; $I_D=200A$; $R_{G(ext)}=5\Omega$; Load=100 μH
t_r	Rise Time	-	66	-		
$t_{d(off)}$	Turn-off Delay Time	-	322	-		
t_f	Fall Time	-	82	-		

Body Diode Characteristics (at $T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{FSD}	Forward Voltage	-	-	6	V	$V_{GS}=0V$; $I_F=200A$
I_S	Continuous Diode Forward Current	-	200	-	A	$V_{GS}=0V$; $T_C=25^{\circ}\text{C}$
t_{RR}	Reverse Recovery Time	-	63	-	ns	$V_{GS}=-5/+18V$; $I_F=200A$; $V_R=900V$; Load=100 μH
Q_{RR}	Reverse Recovery Charge	-	2452	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	89	-	A	

NTC Thermistor Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R_{25}	Rated Resistance	-	5.00	-	k Ω	$T_{NTC}=25^{\circ}\text{C}$
$\Delta R/R$	Deviation of R_{100}	-5	-	5	%	$T_{NTC}=25^{\circ}\text{C}$; $R_{100}=493.3\Omega$
$B_{25/50}$	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

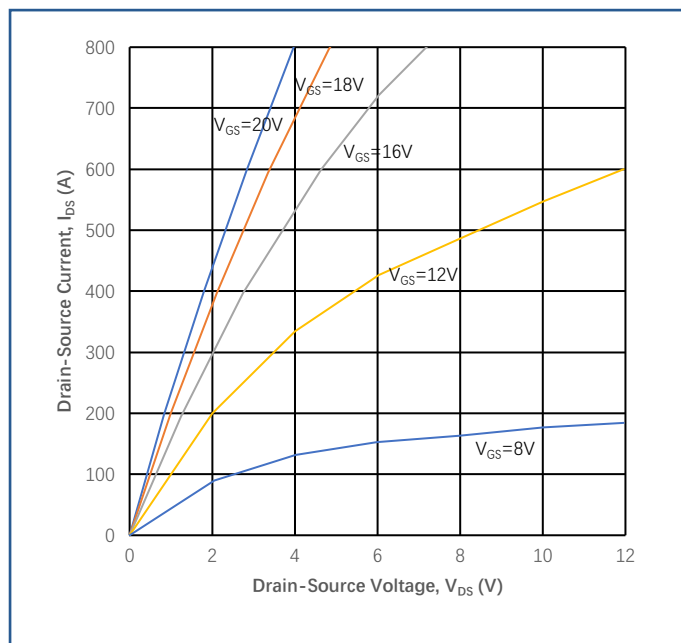


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

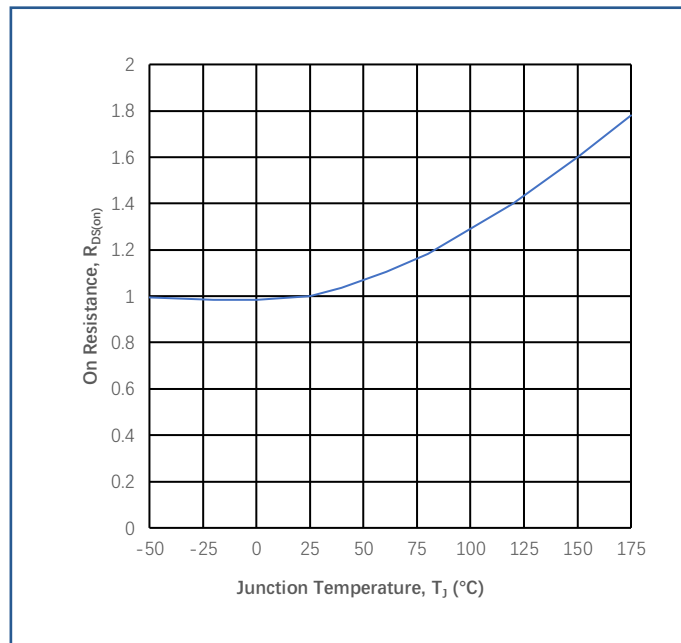


Figure 2
Normalized on-resistance vs. Temperature

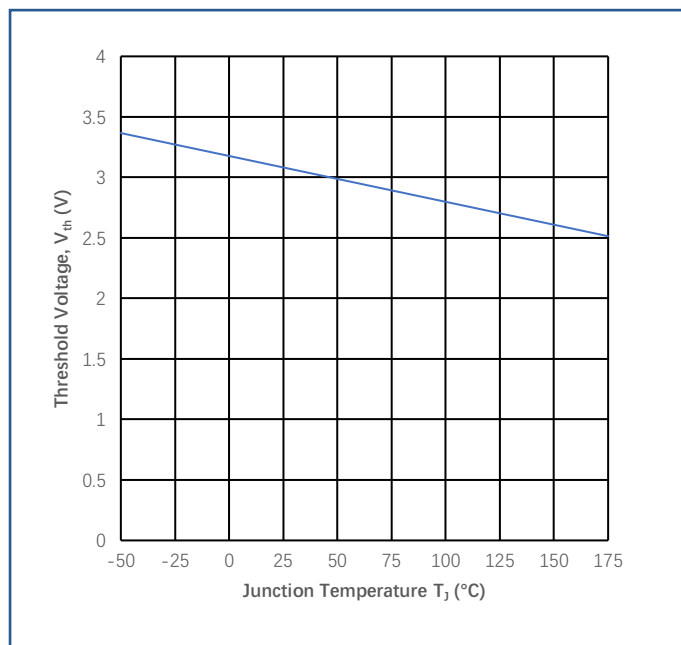


Figure 3
Threshold Voltage vs. Temperature

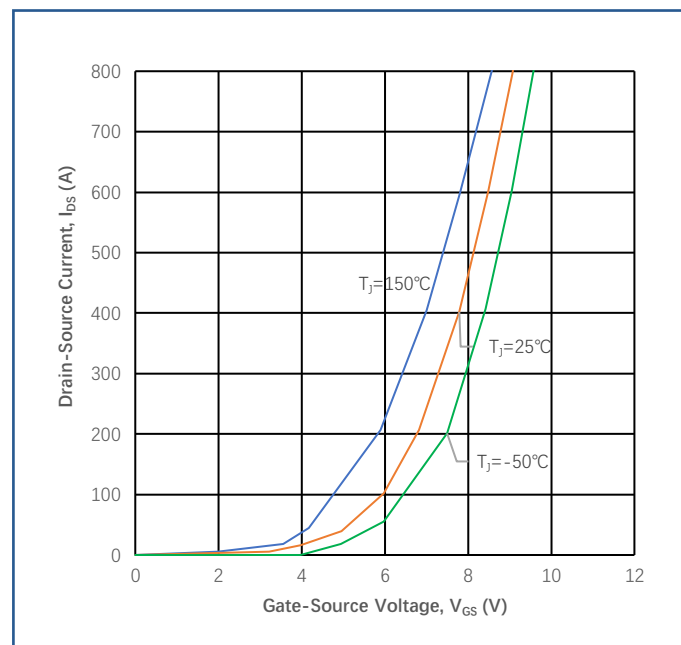


Figure 4
Transfer Characteristic for Various T_J

Typical Performance

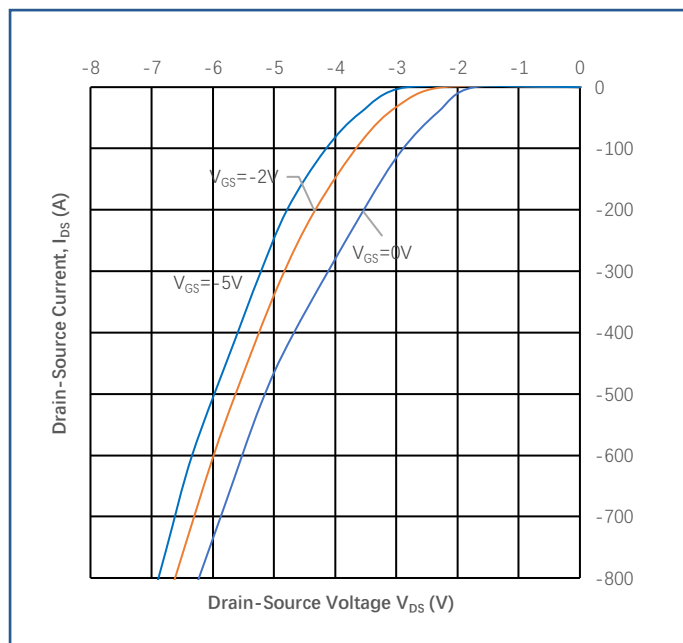


Figure 5
Diode Characteristic at 25 °C

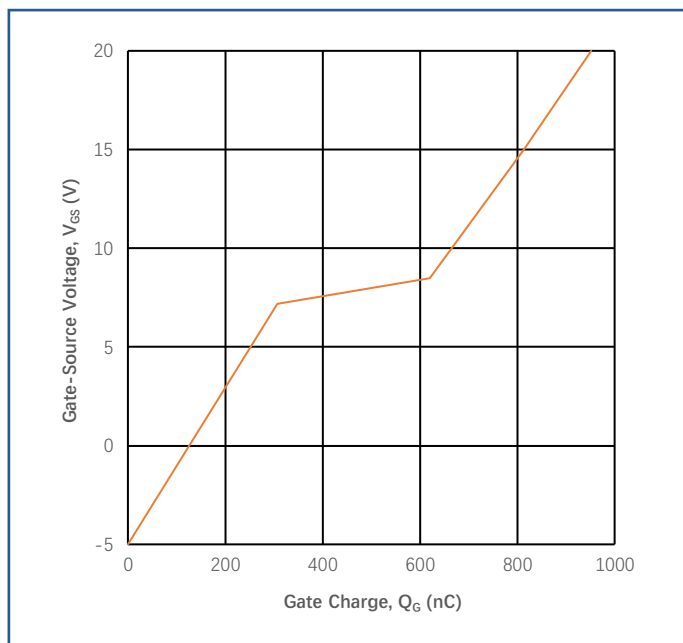


Figure 6
Typical Gate Charge Characteristics

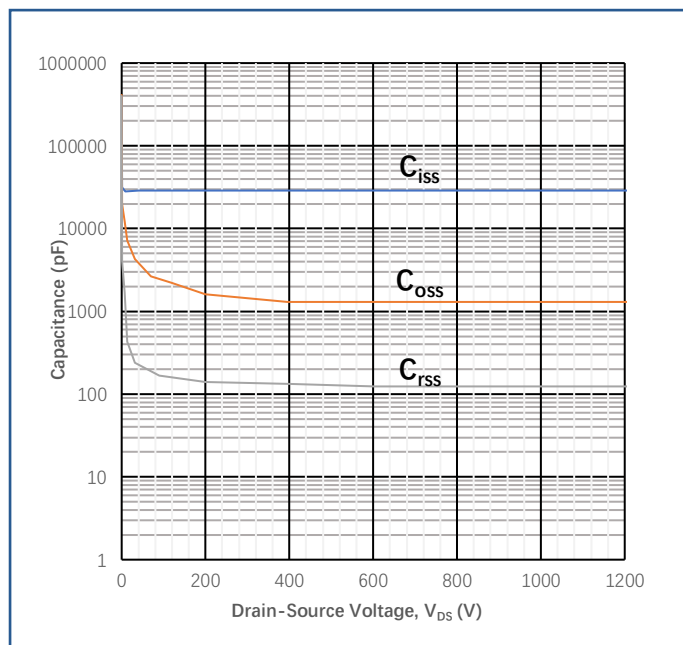


Figure 7
Typical Capacitances vs. Drain-source Voltage

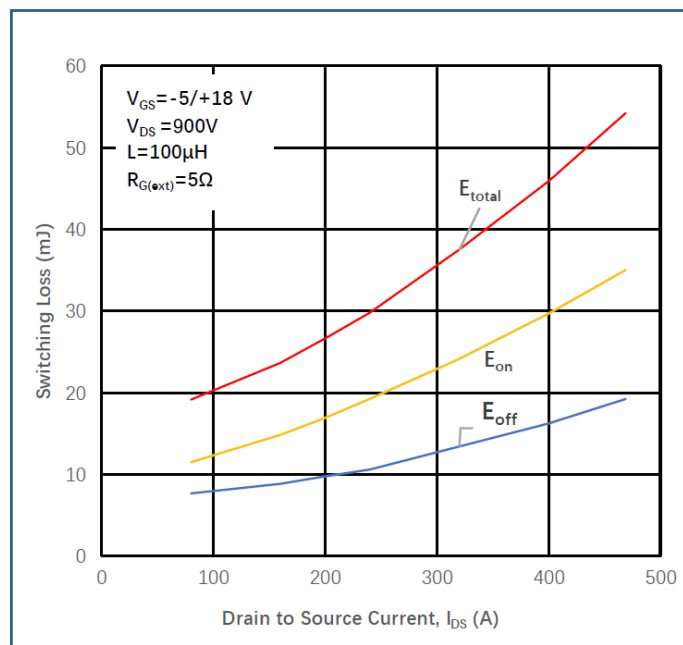


Figure 8
Inductive Switching Energy vs. Drain Current

Typical Performance

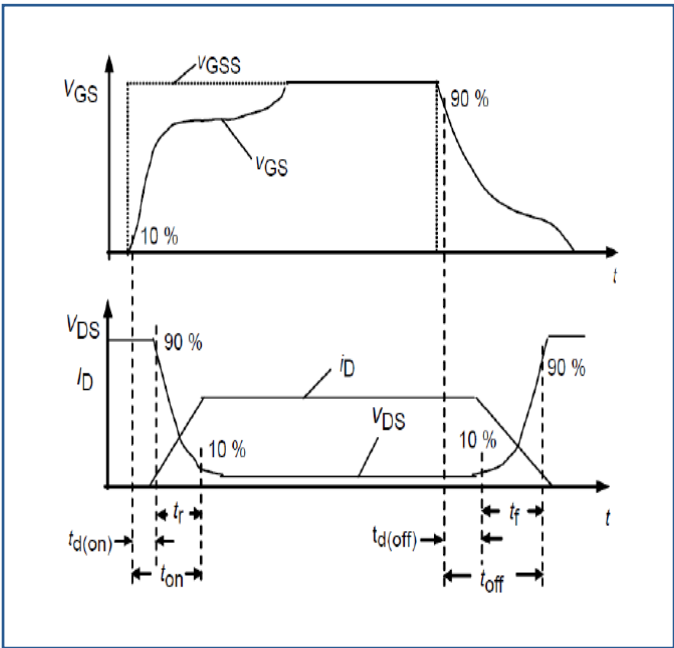


Figure 9
Switching Time Description

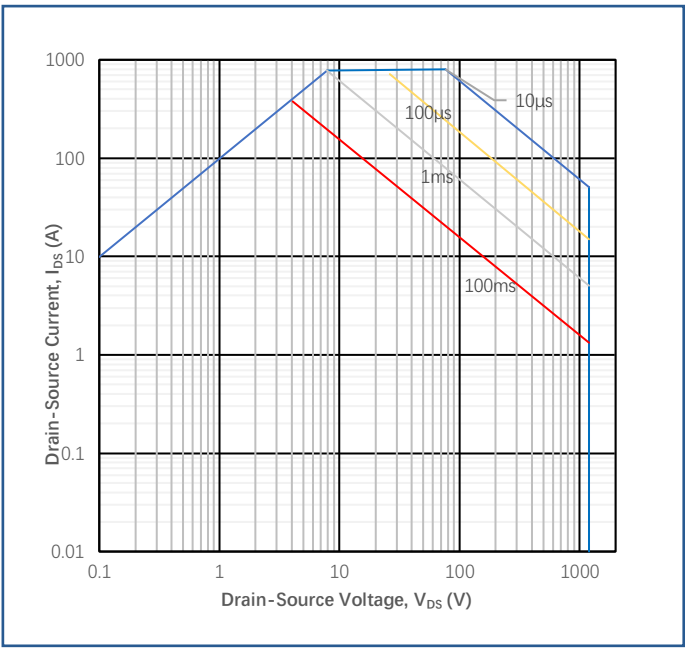
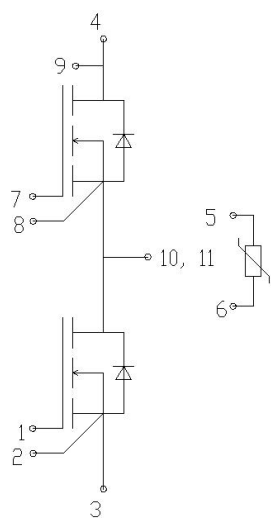
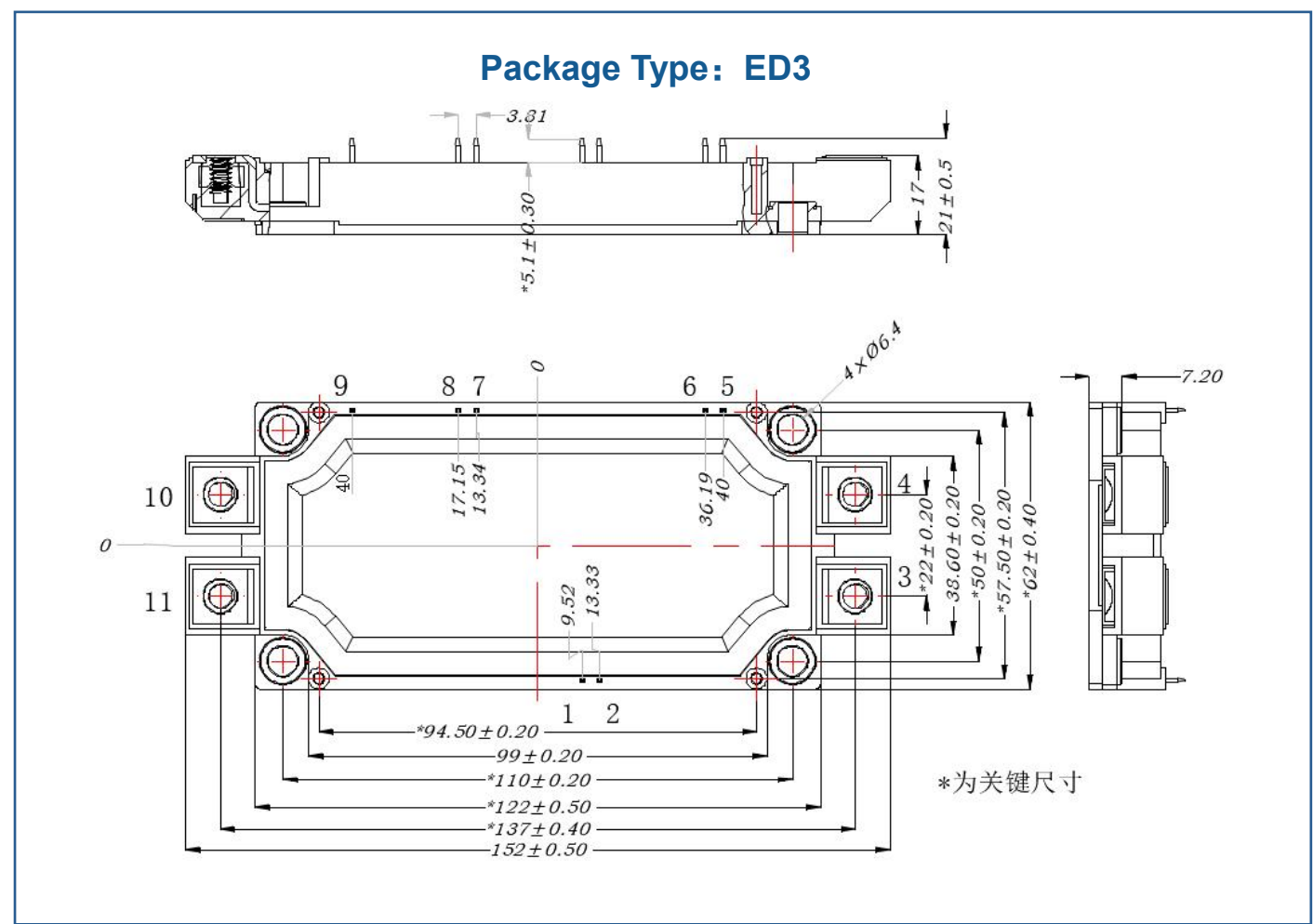


Figure 10
Safe Operating Area

Circuit Diagram Headline



Package Dimensions (mm)



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