

General Description

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

Features

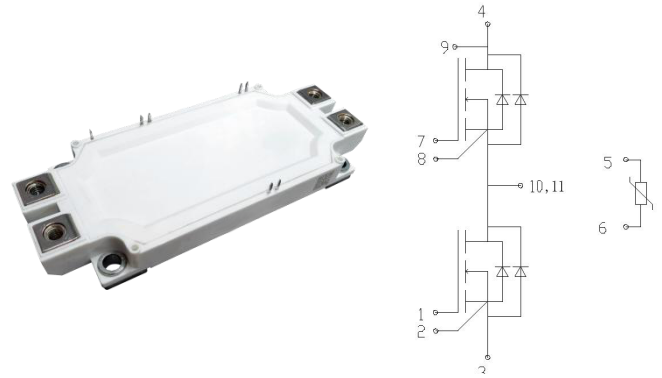
- High Temperature, Humidity, and Bias Operation
- Ultra Low Loss
- High-Frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-Safe Device Operation
- Copper Baseplate and Silicon Nitride Insulator

Applications

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

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V_{DS}	Drain-Source Voltage	1200			V	$T_C=25^{\circ}C$
I_D	Drain Current (continuous)	250			A	$T_C=25^{\circ}C$
		180				$T_C=90^{\circ}C$
T_J	Junction Temperature	175			$^{\circ}C$	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
$R_{DS(on)}$	Static Drain-Source on Resistance	-	7.5	8.7	m Ω	$V_{GS}=18V; I_D=180A; T_C=25^{\circ}C$
		-	13.5	-		$V_{GS}=18V; I_D=180A; T_C=175^{\circ}C$
Dynamic characteristics						
Q_G	Total Gate Charge	-	750	-	nC	$V_{DD}=800V; I_D=120A; V_{GS}=-5/+18V; T_C=25^{\circ}C$
Q_{GD}	Gate-Drain Charge	-	198	-		
Source-drain diode						
Q_{RR}	Reverse Recovery Charge	-	1.53	-	μC	$V_{GS}=-5V; I_F=120A; V_R=800V; T_C=25^{\circ}C$



Ordering Informations

Order Number / Marking	HMSMQ250HF12ED3F
Package Type	ED3

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) ($T_c=25^\circ\text{C}$)	250	A
	Drain Current (continuous) ($T_c=90^\circ\text{C}$)	180	
I_{DM}	Drain Current (pulsed)	500	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	0.12	$^\circ\text{C/W}$

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	-	-	60	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	-	7.5	8.7	m Ω	$V_{GS}=18V; I_D=180A; T_c=25^\circ\text{C}$
		-	13.5	-		$V_{GS}=18V; I_D=180A; T_c=175^\circ\text{C}$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	0.87	-	Ω	$V_{GS}=0V; f=1MHz$
Dynamic characteristics (at $T_J=25^\circ\text{C}$ unless otherwise specified)						
C_{iss}	Input Capacitance	-	15.4	-	nF	$V_{DS}=1000V; f=1MHz; V_{AC}=25mV$
C_{oss}	Output Capacitance	-	0.65	-		
C_{riss}	Reverse Transfer Capacitance	-	24	-	pF	
E_{on}	Turn-on Energy	-	6.0	-	mJ	$V_{DS}=800V; V_{GS}=-5/+18V; I_D=120A; R_{G(ext)}=5\Omega; Load=100\mu H$
E_{off}	Turn-off Energy	-	3.1	-		
Q_{GS}	Gate-Source Charge	-	192	-	nC	$V_{DD}=800V; V_{GS}=-5/+18V; I_D=120A$
Q_{GD}	Gate-Drain Charge	-	198	-		
Q_G	Total Gate Charge	-	750	-		
$t_{d(on)}$	Turn-on Delay Time	-	105	-	ns	$V_{DS}=800V; V_{GS}=-5/+18V; I_D=120A; R_{G(ext)}=5\Omega; Load=100\mu H$
t_r	Rise Time	-	42	-		
$t_{d(off)}$	Turn-off Delay Time	-	206	-		
t_f	Fall Time	-	79	-		

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V _{FSD}	Forward Voltage	-	1.6	1.9	V	V _{GS} =0V; I _F =210A
I _S	Continuous Diode Forward Current	-	210	-	A	V _{GS} =0V; T _C =125°C
t _{RR}	Reverse Recovery Time	-	53	-	ns	V _R =800V; V _{GS} =-5/+18V; I _F =120A; R _{G(ext)} =5Ω; Load=100μH
Q _{RR}	Reverse Recovery Charge	-	1.53	-	uC	
I _{RRM}	Peak Reverse Recovery Current	-	69	-	A	

NTC Thermistor Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R ₂₅	Rated Resistance	-	5.00	-	kΩ	T _{NTC} =25°C
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

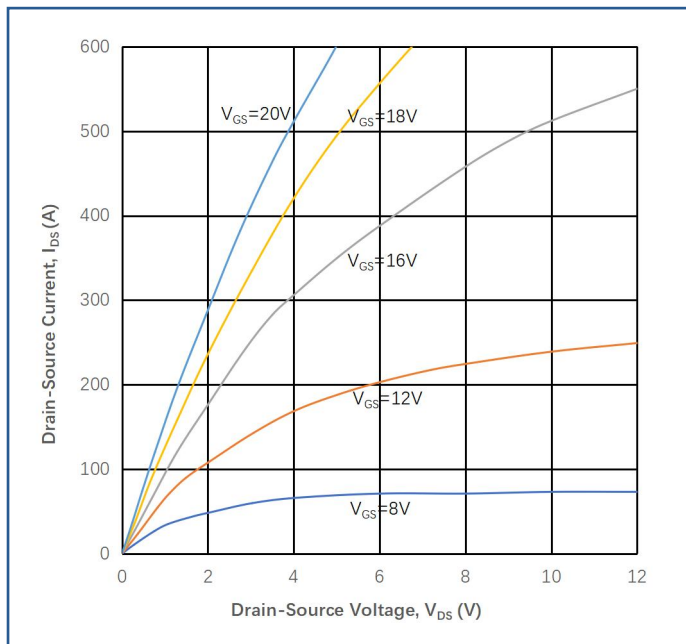


Figure 1
Output Characteristics ($T_j=25^\circ\text{C}$)

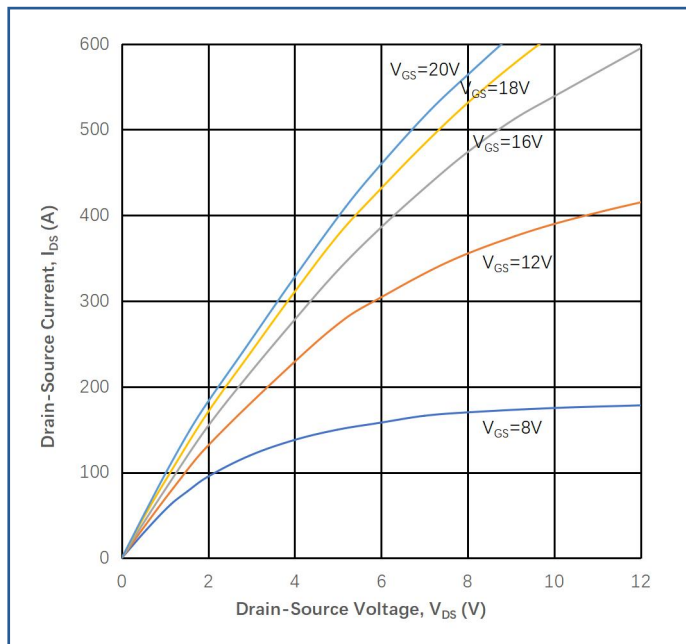


Figure 2
Output Characteristics ($T_j=175^\circ\text{C}$)

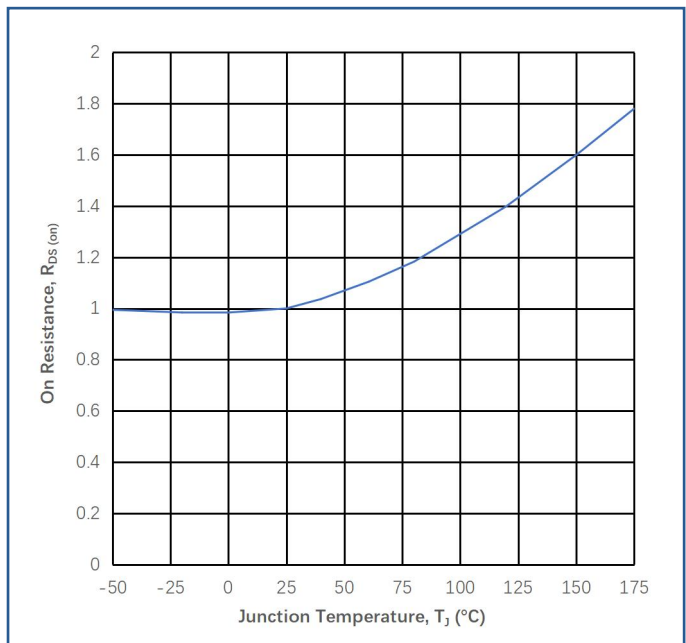


Figure 3
Normalized On-Resistance vs. Temperature

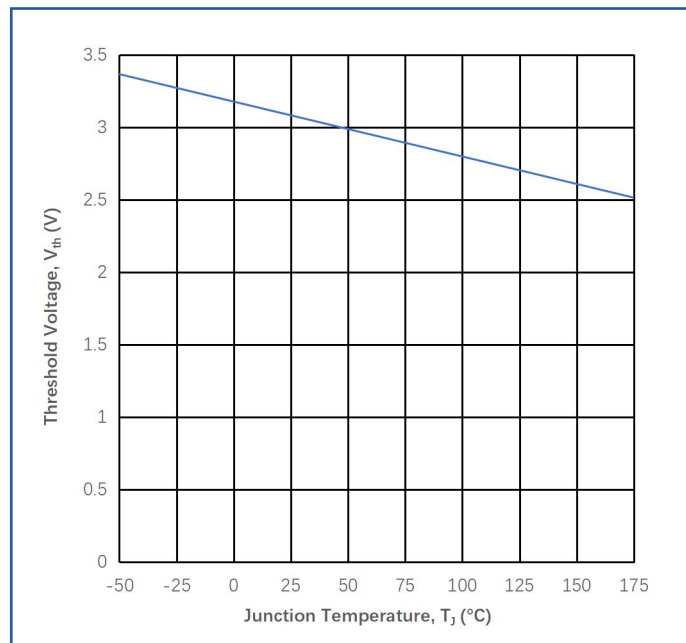


Figure 4
Threshold Voltage vs. Temperature

Typical Performance

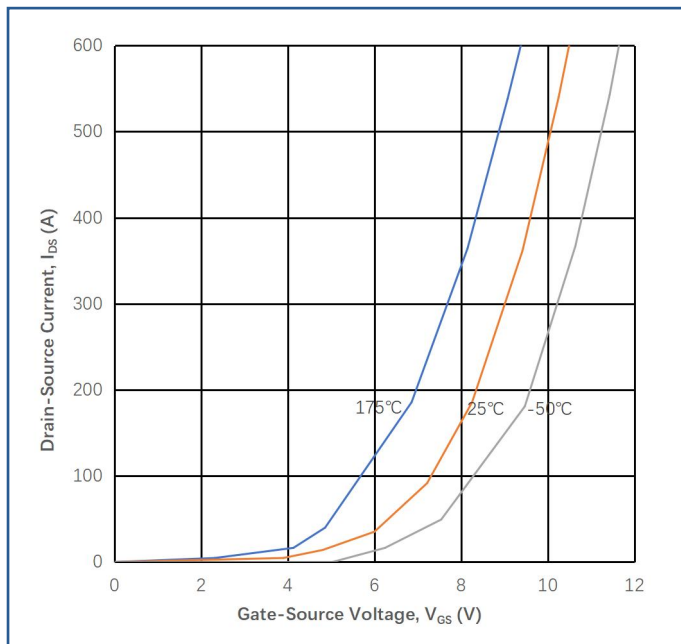


Figure 5

Transfer Characteristic for Various T_j

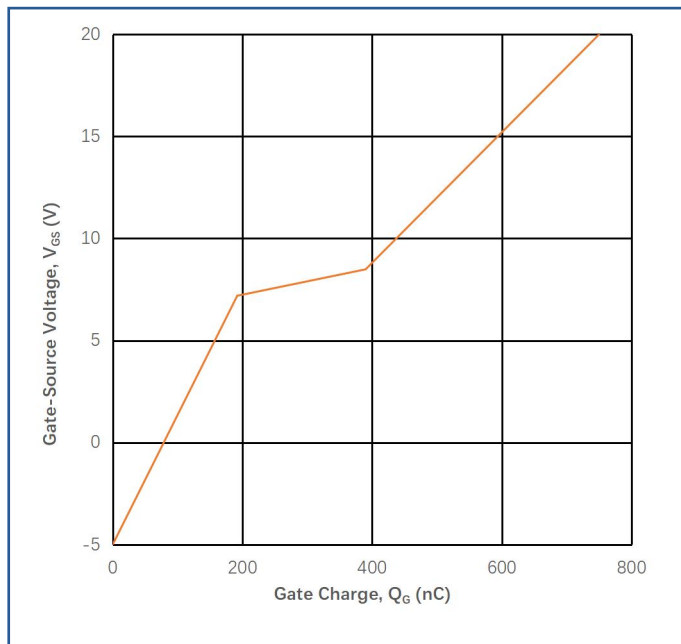


Figure 6

Typical Gate Charge Characteristics

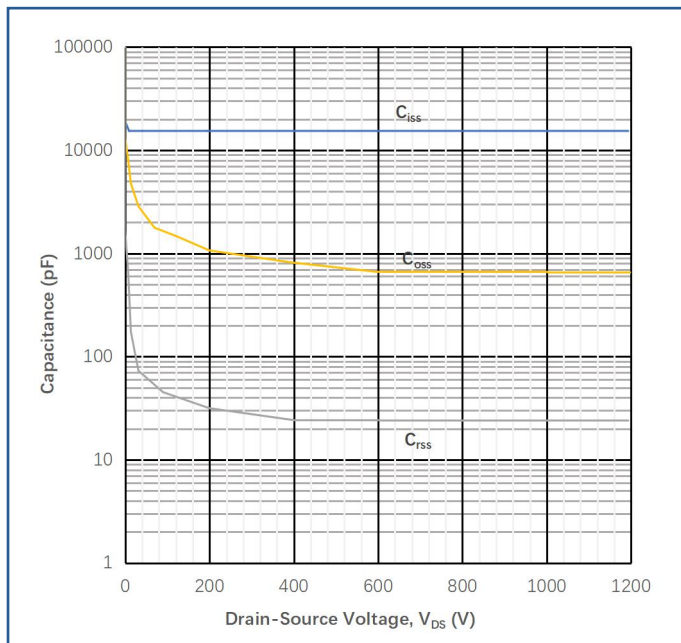


Figure 7

Typical Capacitances vs. Drain-Source Voltage

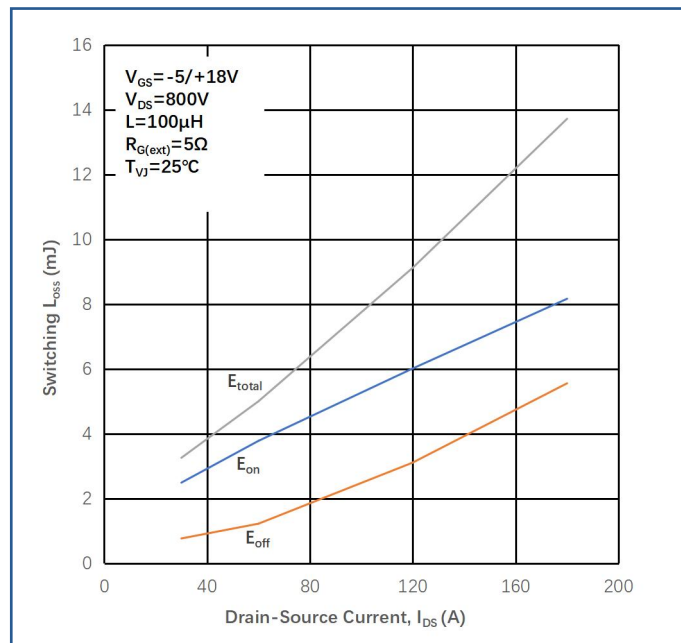


Figure 8

Inductive Switching Energy vs. Drain Current

Typical Performance

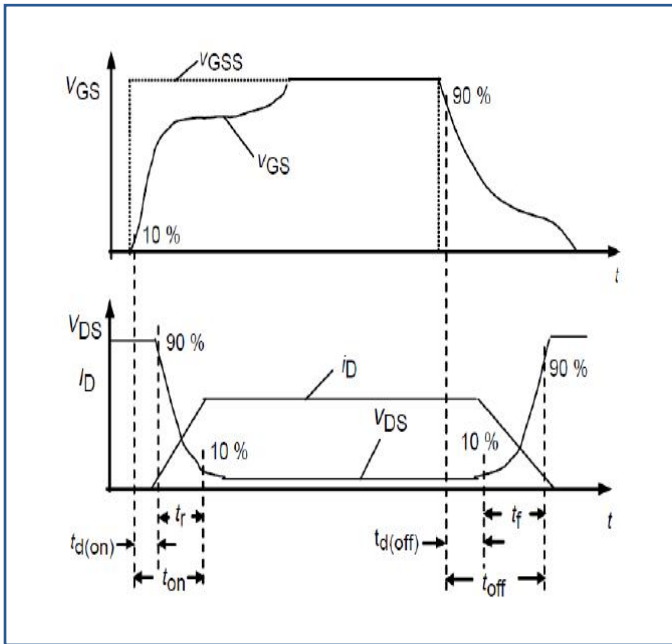


Figure 9
Switching Time Description

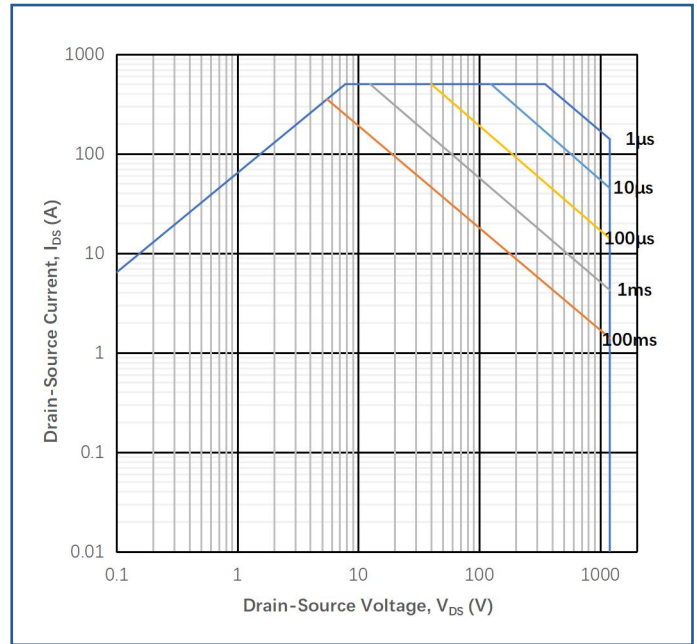
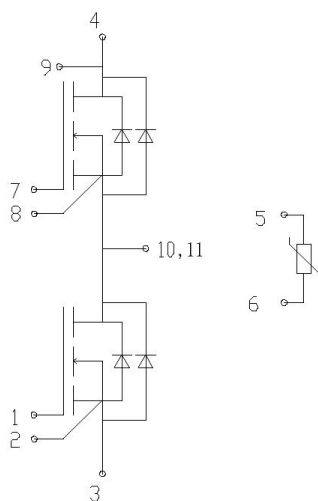


Figure 10
Safe Operating Area

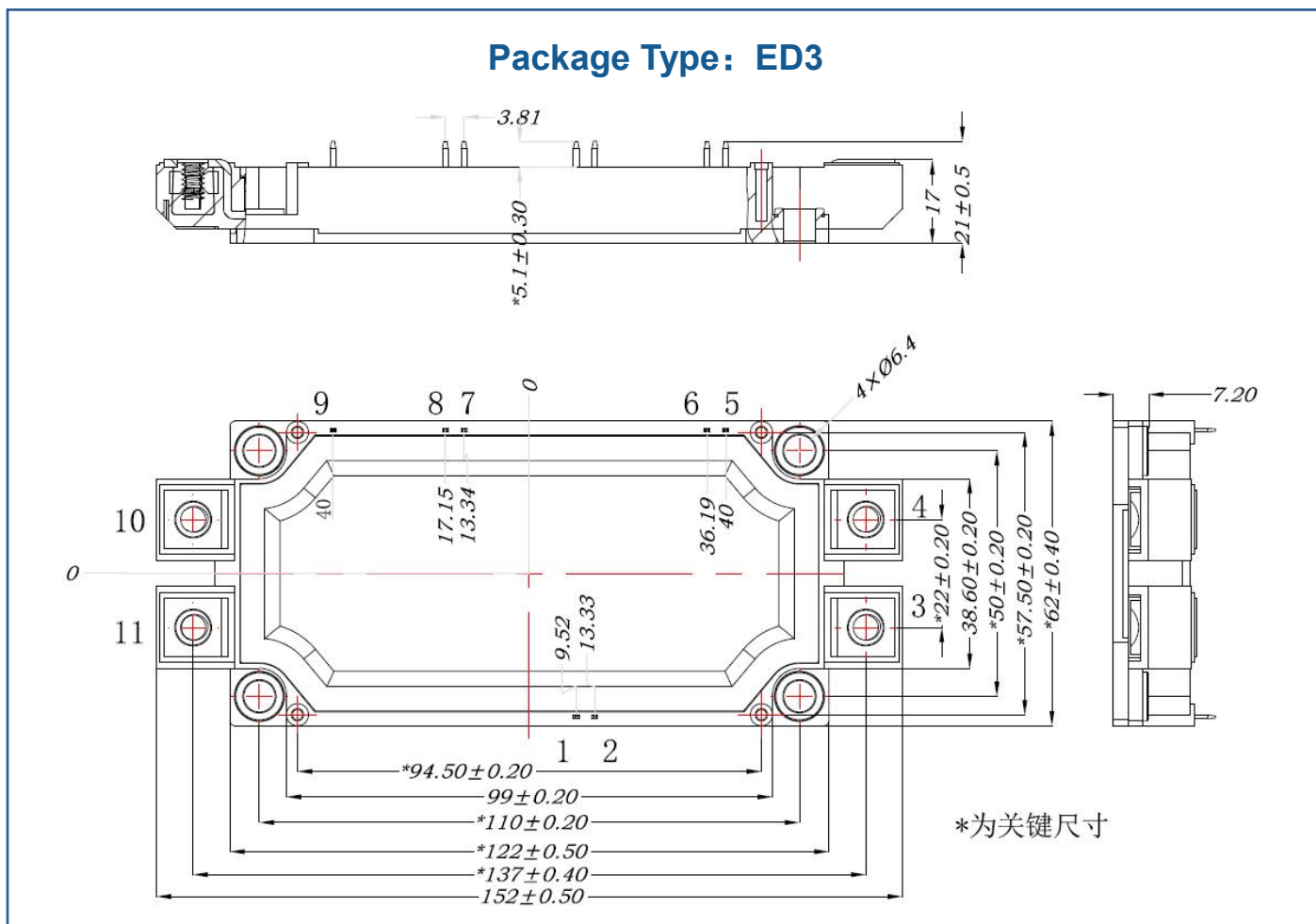
Circuit

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