

ASC600N1700MED

1700V, 600A, Half-Bridge, Silicon Carbide MOSFET Module

Product Data Sheet

ASTC-3T03-11A A/1

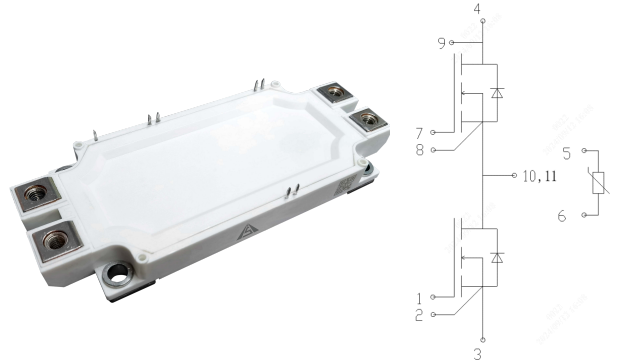


General Description

AST MED series Silicon Carbide MOSFET module with AST 1700V Gen3 N-channel SiC MOSFET, Aluminum Nitride Insulator, and Copper baseplate. 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
- Integrated NTC Temperature Sensor
- Copper Baseplate and Aluminum Nitride Insulator



Applications

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

Ordering Informations

Order Number / Marking	ASC600N1700MED
Package Type	MED

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V _{DS}	Drain-Source Voltage	1700			V	T _c =25°C
I _D	Drain Current(continuous)	600			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	-	4.3	5.0	mΩ	V _{GS} =20V; I _D =300A; T _c =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	1008	-	nC	V _{DD} =1200V; V _{GS} =-5/+20V; T _c =25°C
Q _{GD}	Gate-Drain Charge	-	300	-		
Source-drain diode						
Q _{RR}	Reverse Recovery Charge	-	5305	-	nC	V _{GS} =-5V; I _F =300A; V _R =1200V; R _{G/off} =5.0Ω; Load=100uH

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

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	1700	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	$^\circ\text{C}$
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 $T_J=25^\circ\text{C}$ unless otherwise specified)						
BV_{DS}	Drain-source Breakdown Voltage	1700	-	-	V	$V_{GS}=0V$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	300	μA	$V_{DS}=1700V; V_{GS}=0V$
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	-	4.3	5.0	m Ω	$V_{GS}=20V; I_D=300A$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	0.58	-	Ω	$V_{AC}=25mV; f=1MHz$
Dynamic characteristics (at $T_J=25^\circ\text{C}$ unless otherwise specified)						
C_{iss}	Input Capacitance	-	38.8	-	nF	$V_{DS}=1200V; f=100kHz; V_{AC}=25mV$
C_{oss}	Output Capacitance	-	1.19	-		
C_{rss}	Reverse Transfer Capacitance	-	96	-	pF	
E_{on}	Turn-on Energy Loss Per Pulse	-	36.6	-	mJ	$V_{DD}=1200V; V_{GS}=-5/+18V$ $I_D=300A; \text{Load}=100\mu H; R_{G(ext)}=5.0\Omega$
E_{off}	Turn-off Energy Loss Per Pulse	-	24.3	-		
Q_{GS}	Gate-Source Charge	-	312	-	nC	$V_{DD}=1200V; V_{GS}=-5/+20V; I_D=300A$
Q_{GD}	Gate-Drain Charge	-	300	-		
Q_G	Total Gate Charge	-	1008	-		
$t_{d(on)}$	Turn-on Delay Time	-	93.1	-	ns	$V_{DD}=1200V; V_{GS}=-5/+18V$ $I_D=300A; R_{G(ext)}=5\Omega; \text{Load}=100\mu H$
t_r	Rise Time	-	70.6	-		
$t_{d(off)}$	Turn-off Delay Time	-	353.6	-		
t_f	Fall Time	-	106.1	-		

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{FSD}	Forward Voltage	-	3.6	6	V	$V_{GS}=0V$; $I_F=300A$
I_S	Continuous Diode Forward Current	-	300	-	A	$V_{GS}=0V$; $T_C=25^\circ\text{C}$
t_{RR}	Reverse Recovery Time	-	89.9	-	ns	$V_{GS}=-5V$; $I_F=300A$; $V_R=1200V$; $R_{G(off)}=5.0\Omega$; Load=100 μ H
Q_{RR}	Reverse Recovery Charge	-	5305	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	170	-	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	%	$T_{NTC}=100^\circ\text{C}$; $R_{100}=493.3\Omega$
$B_{25/50}$	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

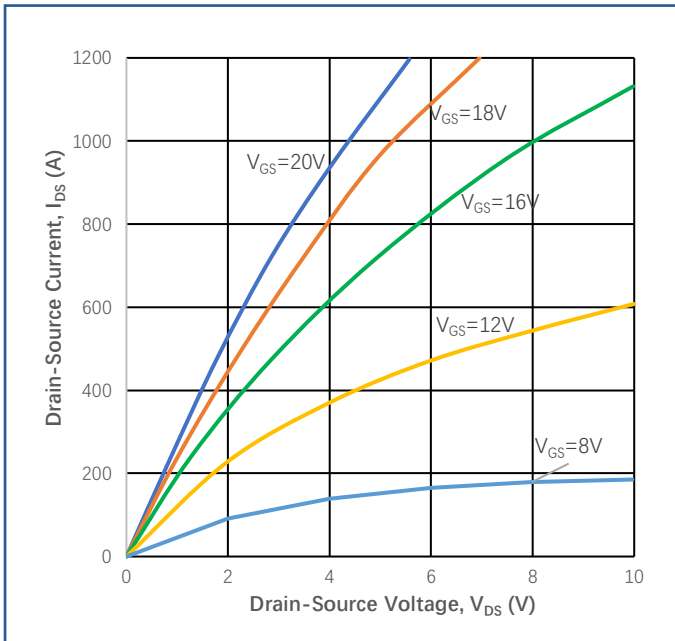


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

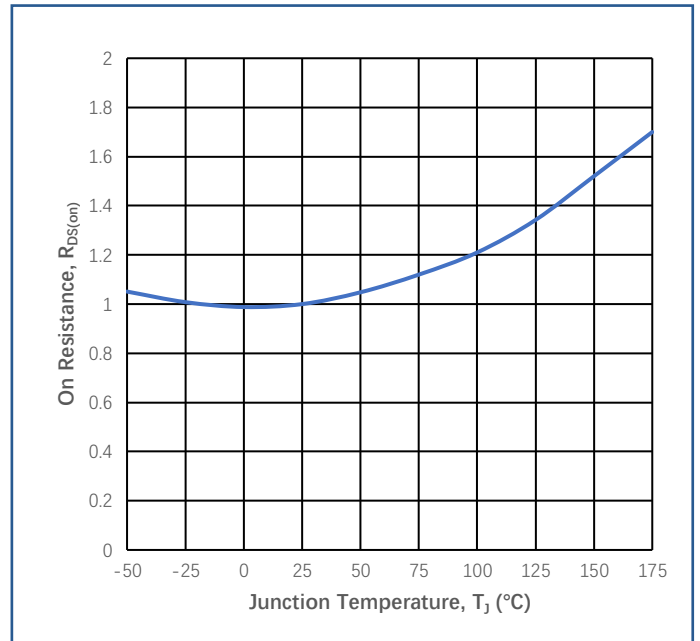


Figure 2
Normalized On-Resistance vs. Temperature

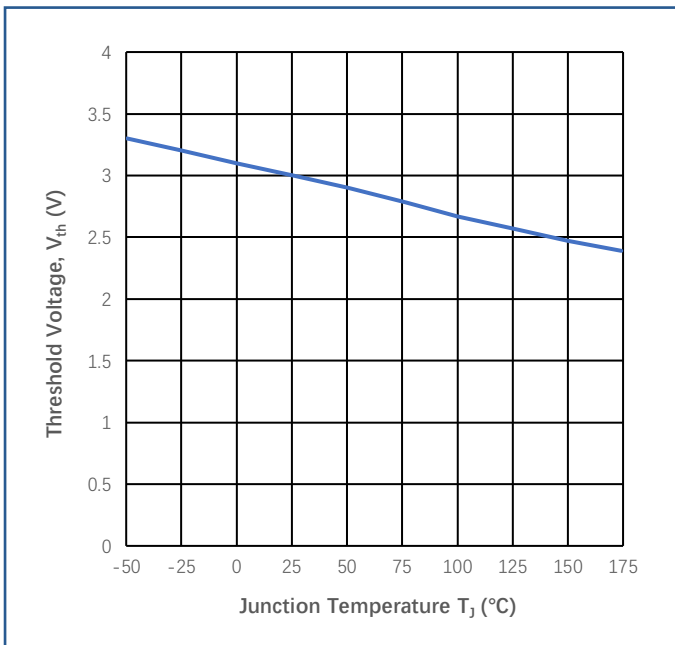


Figure 3
Threshold Voltage vs. Temperature

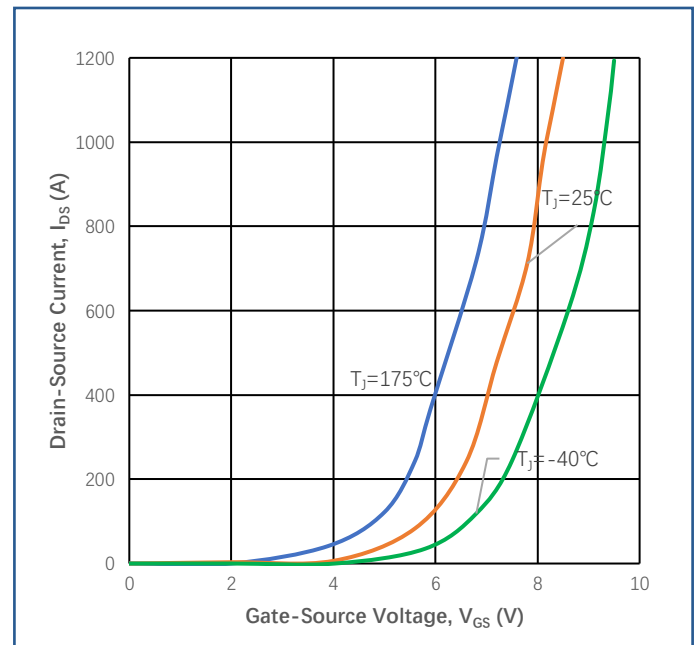


Figure 4
Transfer Characteristic for Various T_J

Typical Performance

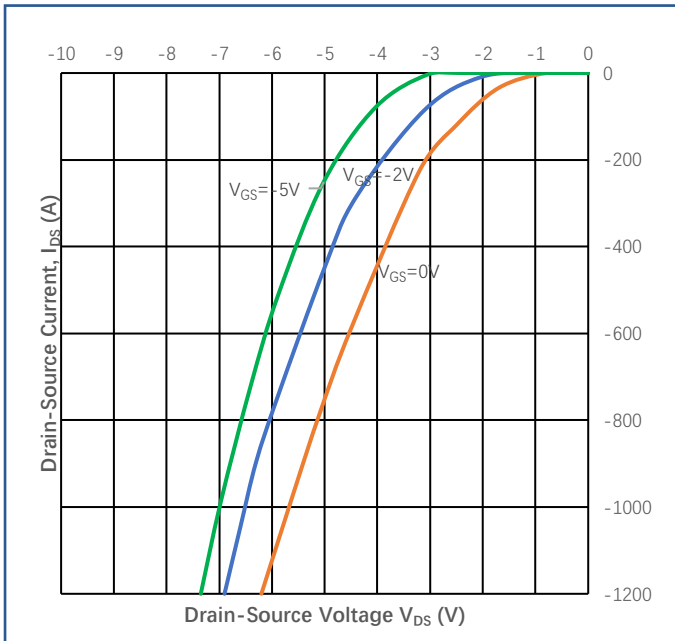


Figure 5
Diode Characteristic ($T_J = 25\text{ }^{\circ}\text{C}$)

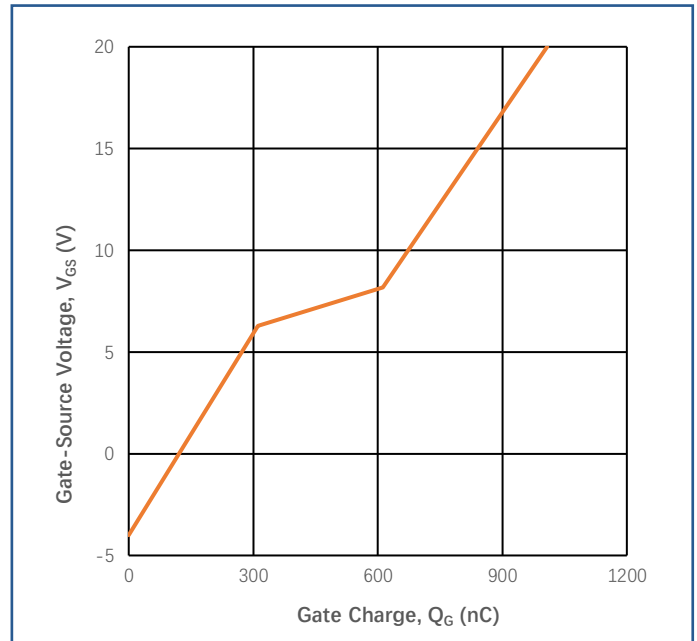


Figure 6
Typical Gate Charge Characteristics

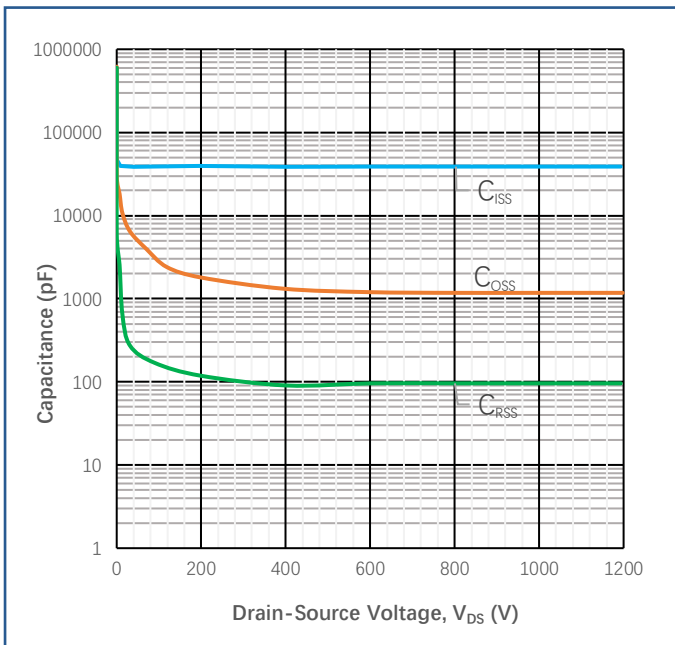


Figure 7
Typical Capacitances vs. Drain-Source Voltage

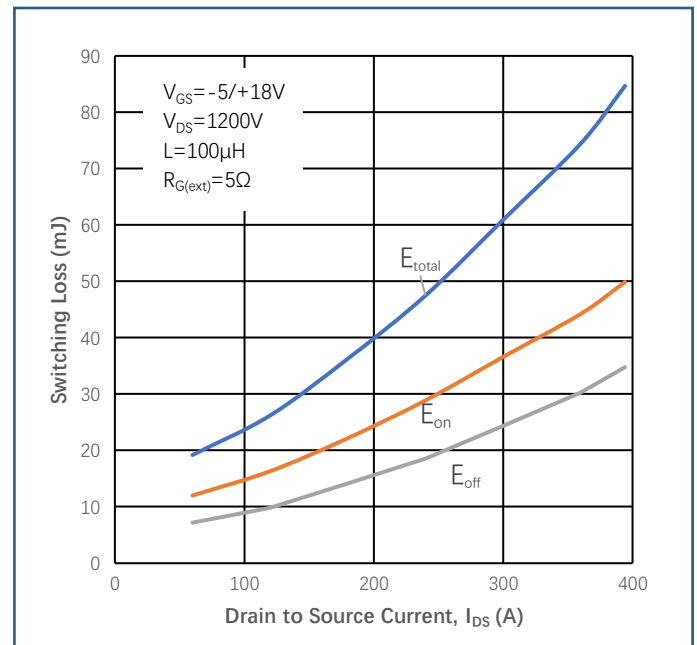


Figure 8
Inductive Switching Energy vs. Drain Current

Typical Performance

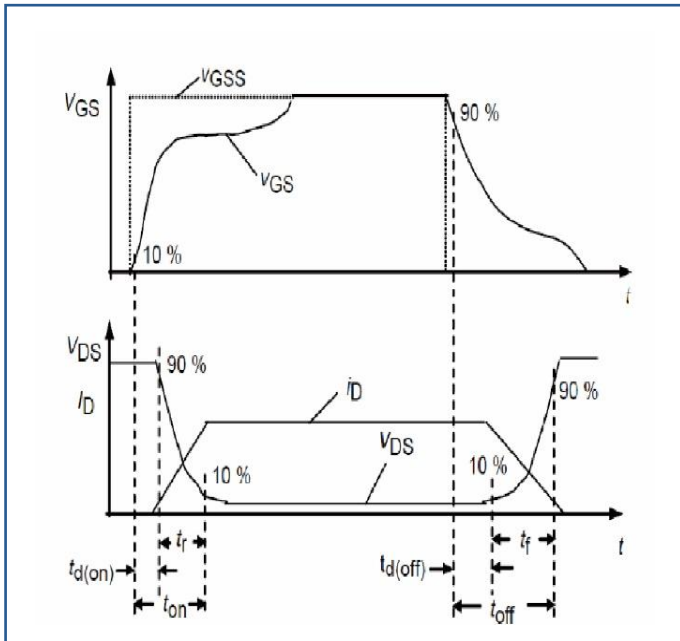


Figure 9
Switching Time Description

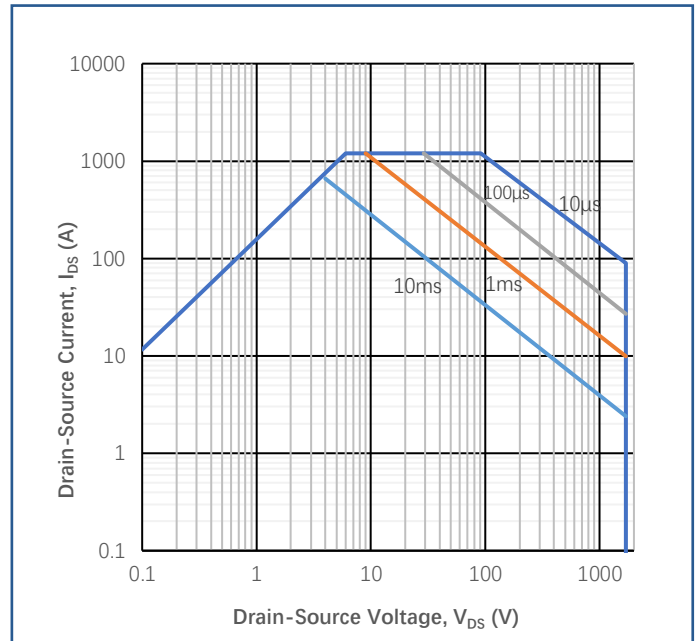
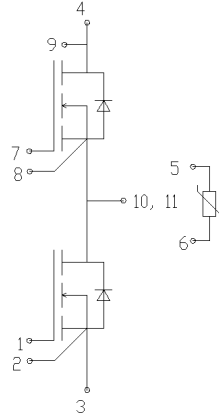


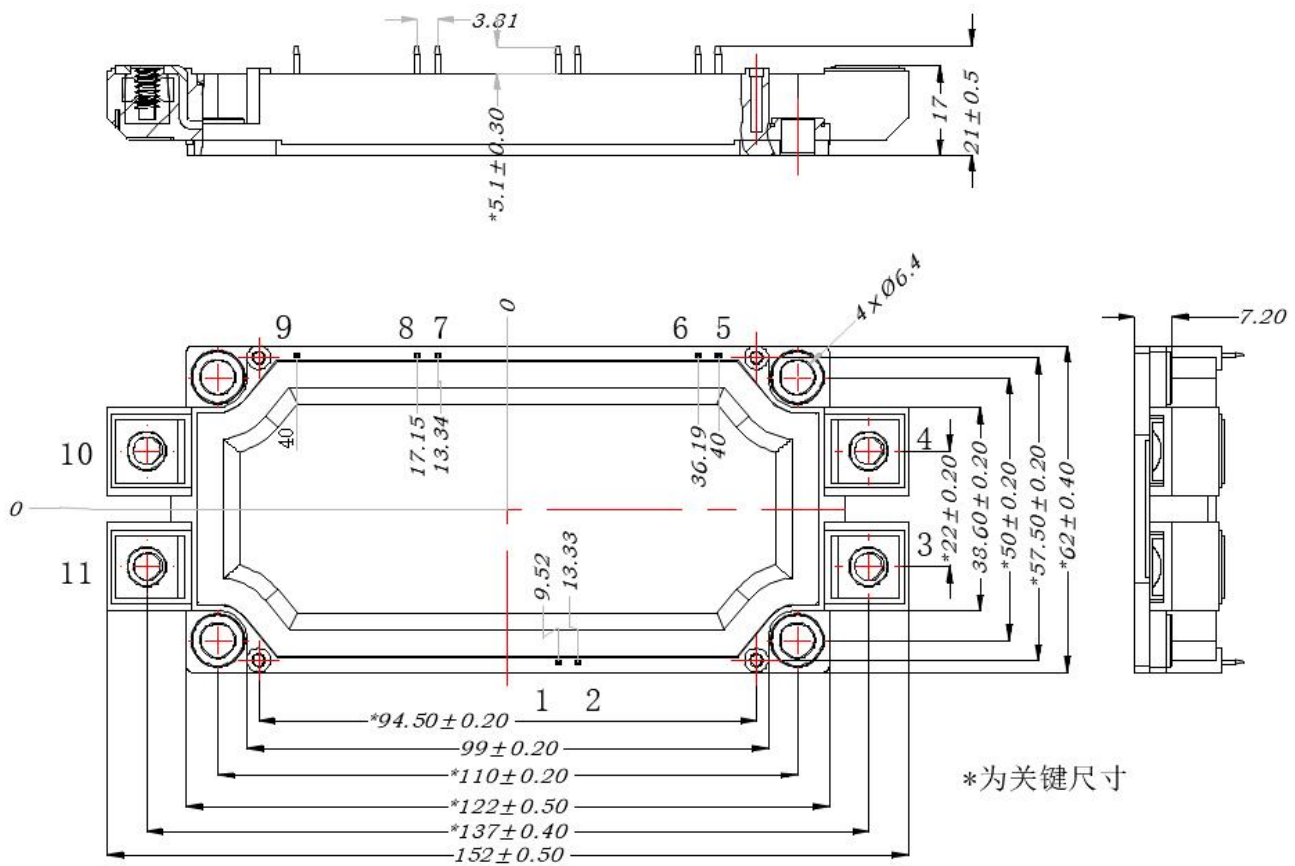
Figure 10
Safe Operating Area

Circuit Diagram Headline



Package Dimensions (mm)

Package Type: MED



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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