

ASC300N650MEP2B

650V, 300A, 4mΩ, Half-Bridge, Silicon Carbide MOSFET Module

Product Data Sheet

ASTC-3T03-168A A/0



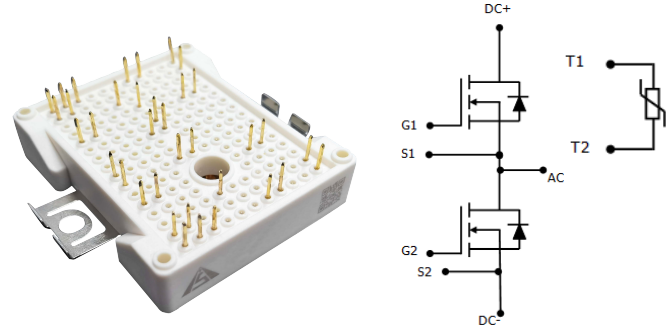
爱仕特科技
AST TECHNOLOGY

General Description

The AST-MEP module incorporates AST's 650V Gen3 N-channel SiC MOSFET and solder pin type. NTC temperature sensor inside.

Features

- High Current Density
- Low Inductive Design
- Low Switching Losses
- High-Frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-Safe Device Operation
- Silicon Nitride Internal Isolation



Applications

- High Frequency Switching Application
- DC/DC Converter
- Motor Drives
- Servo Drives
- UPS Systems
- PV

Ordering Informations

Order Number / Marking	ASC300N650MEP2B
Package Type	MEP

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V _{DS}	Drain-Source Voltage	650			V	T _C =25°C
I _D	Drain Current (continuous)	300			A	T _C =25°C
T _J	Junction Temperature	150			°C	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
R _{DS(on)}	Static Drain-Source on Resistance	-	4.0	6.7	mΩ	V _{GS} =18V; I _D =150A; T _{VJ} =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	708	-	nC	V _{DD} =400V; V _{GS} =-5/+18V; I _D =100A; T _C =25°C
Q _{GD}	Gate-Drain Charge	-	192	-		
Source-drain diode						
Q _{RR}	Reverse Recovery Charge	-	2040	-	nC	V _{GS} =-5/+18V; I _F =150A; V _R =400V; T _i =25°C

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

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	-10/+22	V
I_D	Drain Current (continuous)	300	A
I_{DM}	Drain Current (pulsed)	600	A
V_{isol}	Isolation Test Voltage (f=50Hz; t=1min)	3.0	kV
L_{Stray}	Stray Inductance	10	nH
T_J, T_{stg}	Junction and Storage Temperature Range	-40 to +150	$^\circ\text{C}$
M_s	Mounting Force Per Clamp	40 - 80	N
$R_{th Jh}$	Thermal Resistance, Junction to Heatsink	0.13	$^\circ\text{C}/\text{W}$
M	Weight	39	g

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	650	-	-	V	$V_{GS}=0\text{V}$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	150	μA	$V_{DS}=650\text{V}; V_{GS}=0\text{V}$
I_{GSS}	Gate-Body Leakage Current	-	-	1.5	μA	$V_{GS}=-10/20\text{V}; V_{DS}=0\text{V}$
$V_{GS(th)}$	Gate Threshold Voltage	2	-	4	V	$V_{DS}=V_{GS}; I_D=20\text{mA}$
$R_{DS(on)}$	Static Drain-Source on Resistance	-	4.0	6.7	m Ω	$V_{GS}=18\text{V}; I_D=150\text{A}; T_{VJ}=25^\circ\text{C}$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	1.1	-	Ω	$V_{GS}=0\text{V}; f=1\text{MHz}$
Dynamic characteristics (at $T_c=25^\circ\text{C}$ unless otherwise specified)						
C_{iss}	Input Capacitance	-	2.15	-	nF	$V_{DS}=400\text{V}; f=1\text{MHz}; V_{AC}=25\text{mV}$
C_{oss}	Output Capacitance	-	0.98	-		
C_{rss}	Reverse Transfer Capacitance	-	93	-	pF	
E_{on}	Turn-on Energy	-	2.8	-	mJ	$V_{DD}=400\text{V}; V_{GS}=-5/+18\text{V}; I_D=150\text{A};$ $\text{Load}=100\mu\text{H}; R_{G(ext)}=5\Omega$
E_{off}	Turn-off Energy	-	3.8	-		
Q_{GS}	Gate-Source Charge	-	168	-	nC	$V_{DD}=400\text{V}; V_{GS}=-5/+18\text{V}; I_D=100\text{A}$
Q_{GD}	Gate-Drain Charge	-	192	-		
Q_G	Total Gate Charge	-	708	-		
$t_{d(on)}$	Turn-on Delay Time	-	86.8	-	ns	$V_{DD}=400\text{V}; V_{GS}=-5/+18\text{V}; I_D=150\text{A};$ $R_{G(ext)}=5\Omega; \text{Load}=100\mu\text{H}$
t_r	Rise Time	-	64.2	-		
$t_{d(off)}$	Turn-off Delay Time	-	251.3	-		
t_f	Fall Time	-	74.3	-		

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 =150A
I _S	Continuous Diode Forward Current	-	150	-	A	V _{GS} =0V; T _C =25°C
t _{RR}	Reverse Recovery Time	-	42.8	-	ns	V _{GS} =-5/+18V; I _F =150A; V _R =400V; R _{G(ext)} =5Ω; Load=100μH
Q _{RR}	Reverse Recovery Charge	-	2040	-	nC	
I _{RRM}	Peak Reverse Recovery Current	-	62.9	-	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

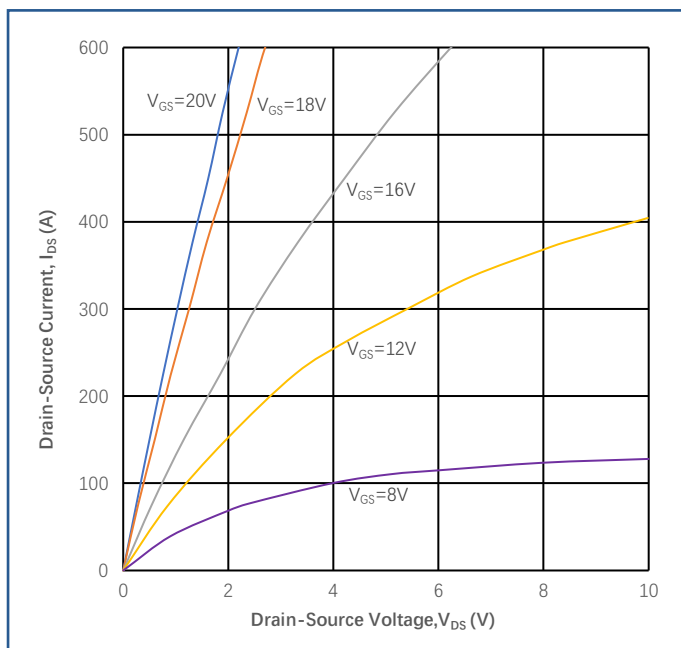


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

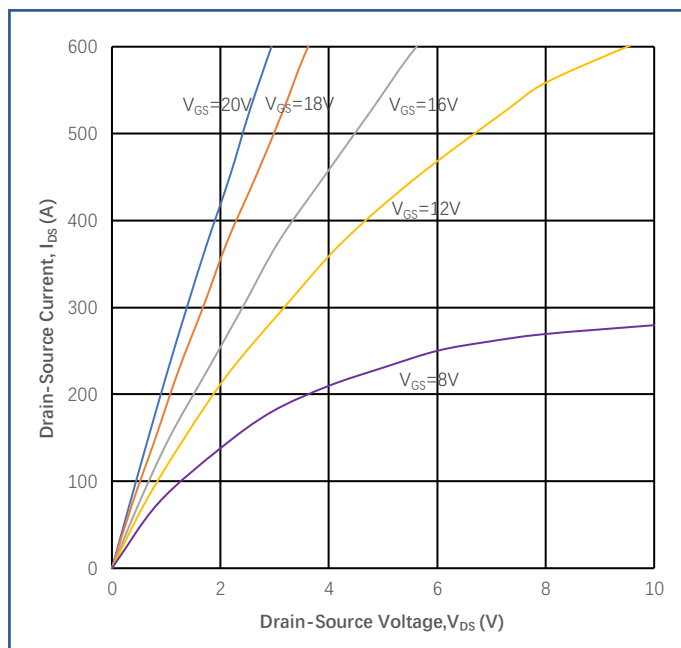


Figure 2
Typical Output Characteristics ($T_J = 150^\circ\text{C}$)

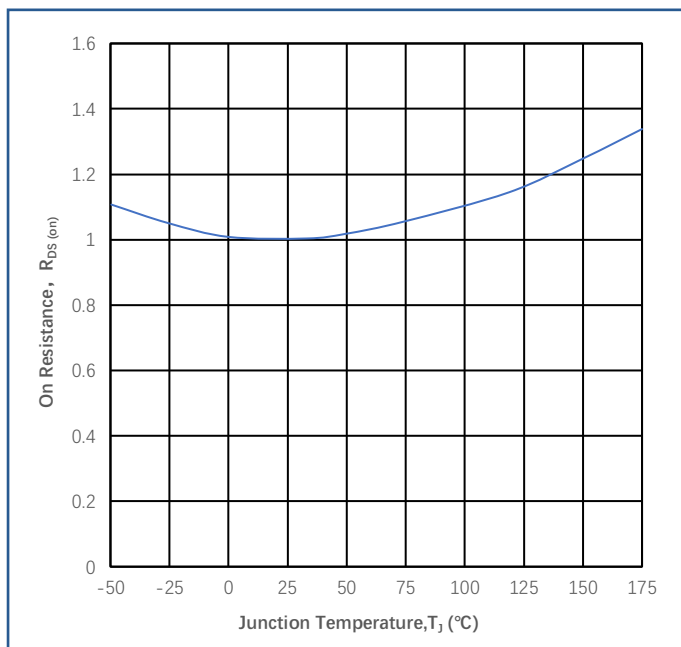


Figure 3
Normalized on-resistance vs. T_J

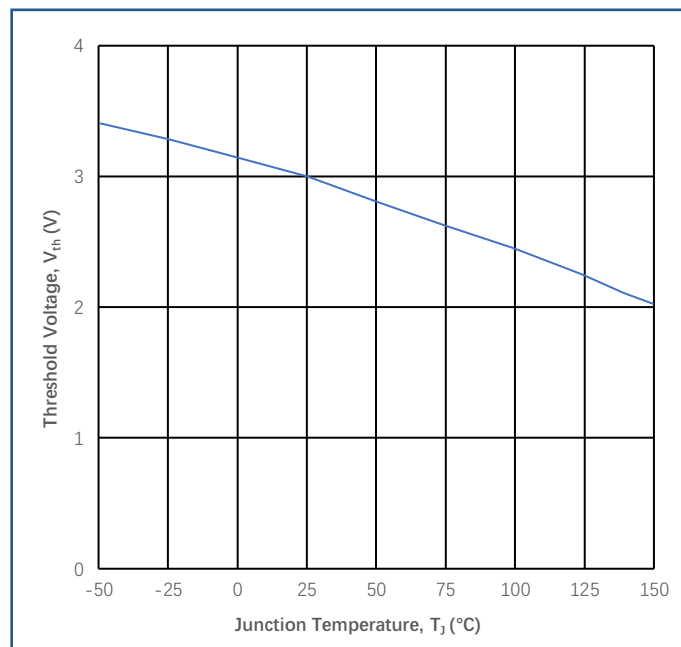
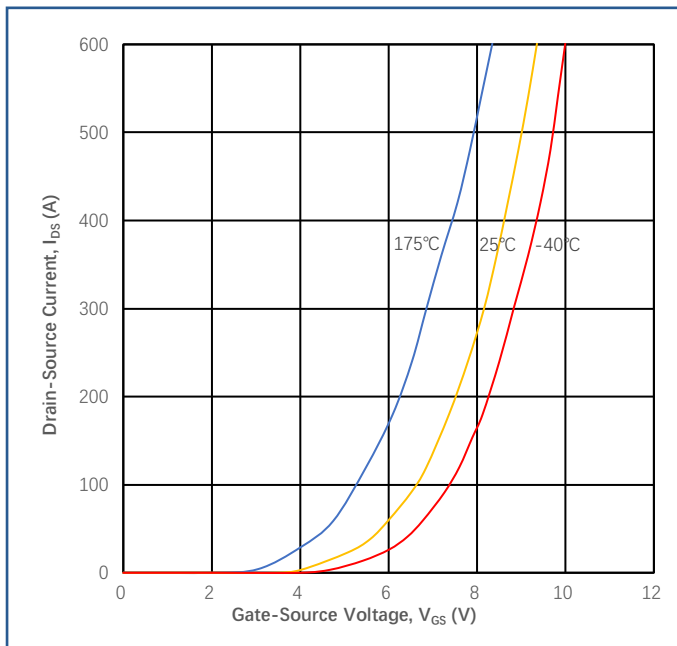
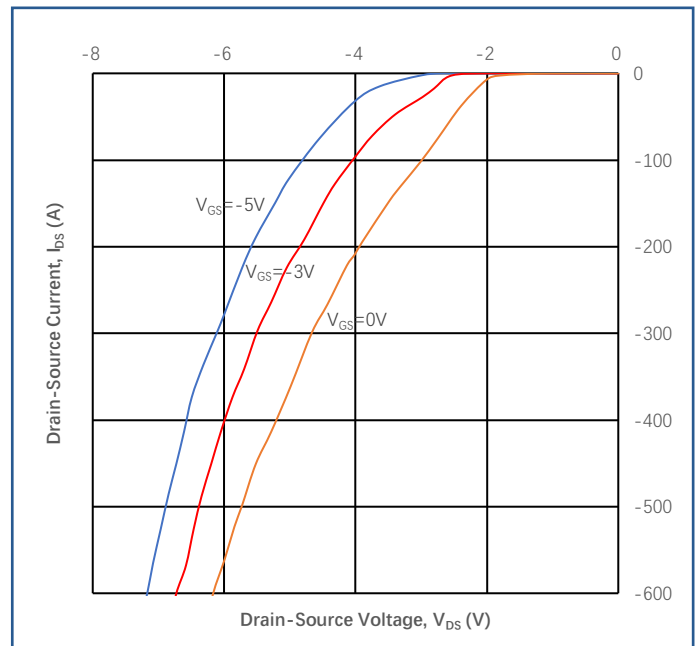


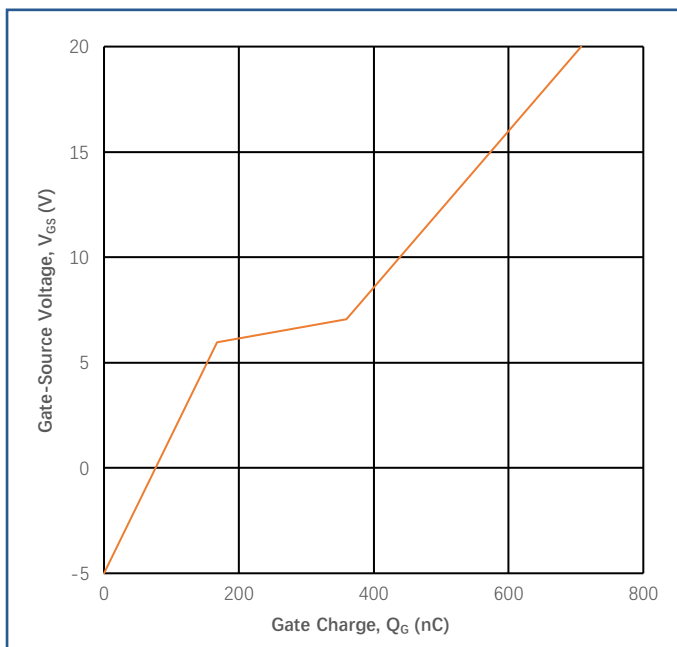
Figure 4
Threshold Voltage vs. Temperature

Typical Performance

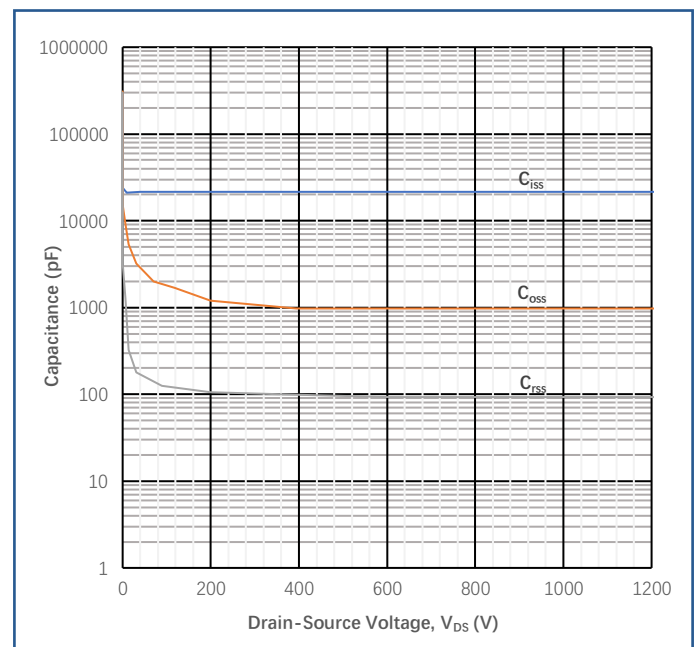

Figure 5

 Transfer Characteristic for Various T_j

Figure 6

Body Diode Characteristic


Figure 7

Gate Charge Characteristics


Figure 8

 Capacitances vs. V_{DS}

Typical Performance

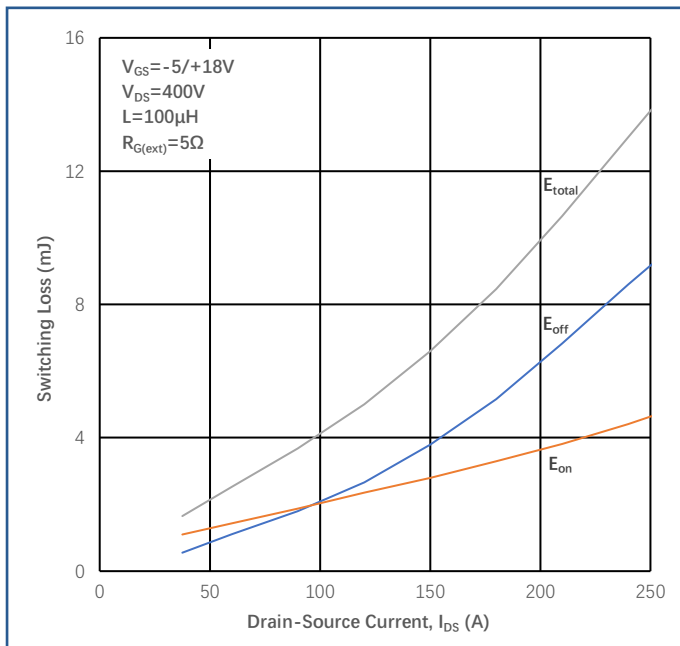


Figure 9

Inductive Switching Energy vs. Drain Current

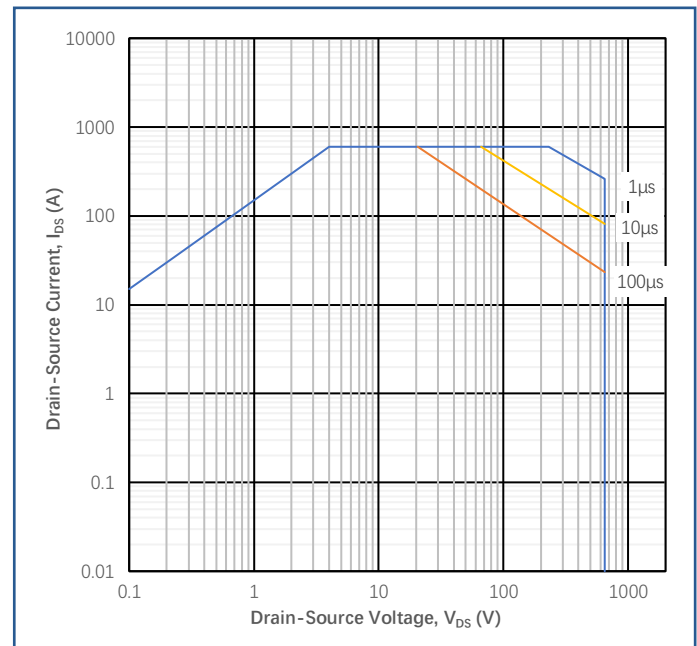
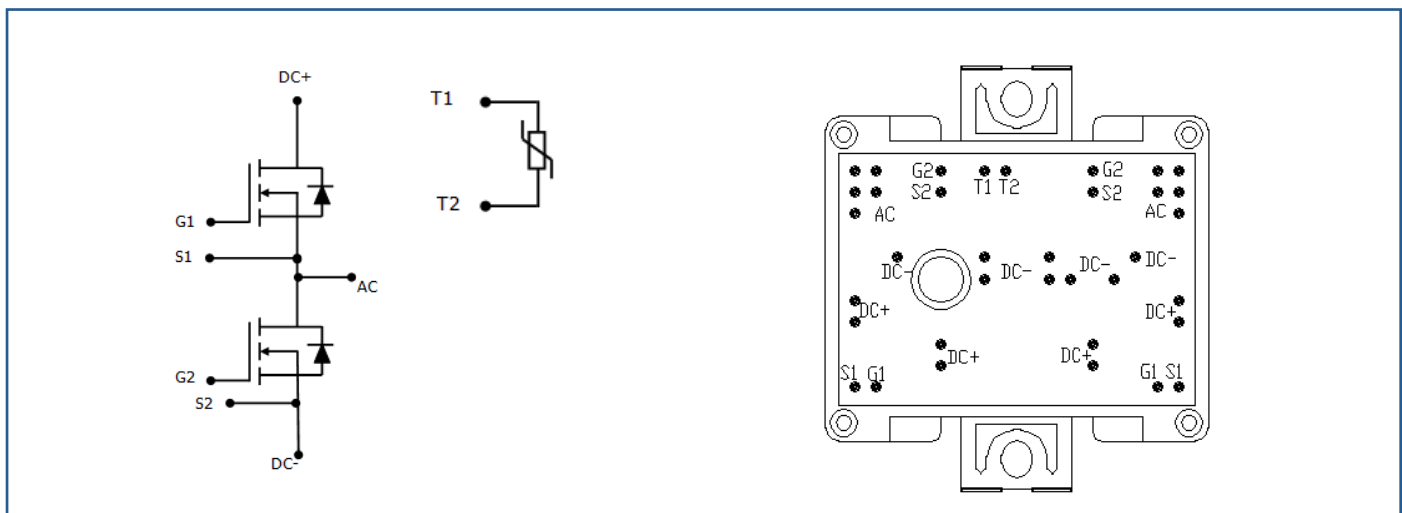


Figure 10

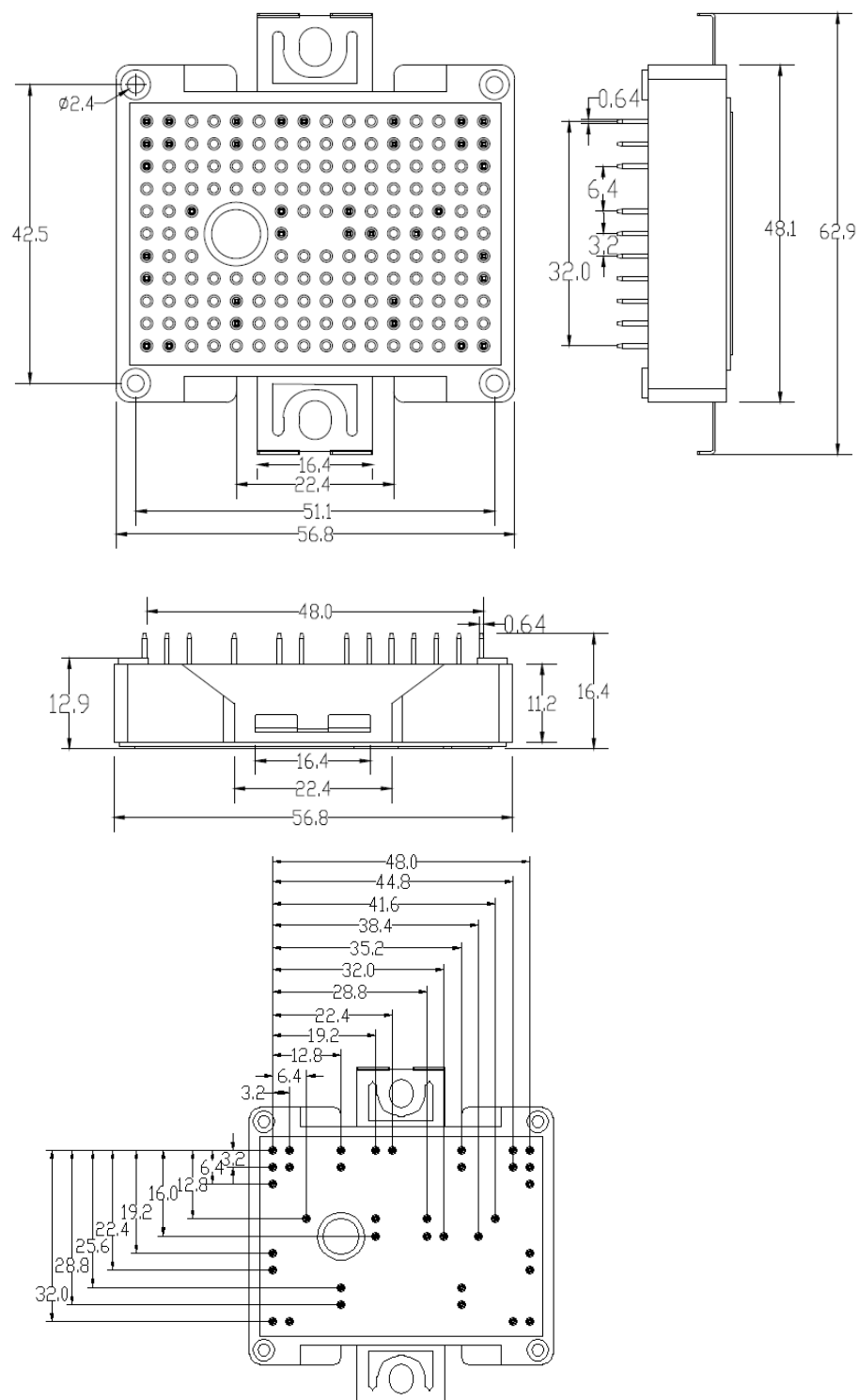
Safe Operating Area

Circuit Diagram Headline



Package Dimensions (mm)

Package Type: MEP



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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