

ASR5P3N1200MEP2B-X

1200V, 5.3m Ω , Half-Bridge, Silicon Carbide MOSFET Module

Product Data Sheet

ASTC-3T03-197A A/0



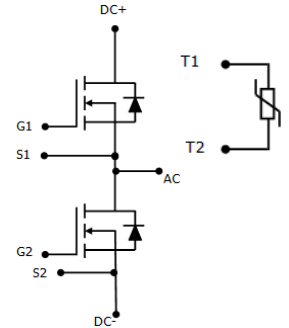
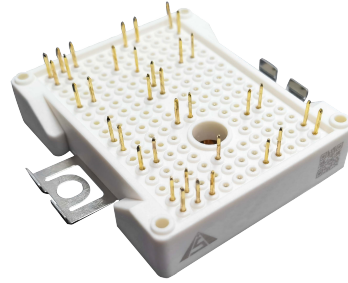
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General Description

The AST-MEP module incorporates AST's 1200V 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	ASR5P3N1200MEP2B-X
Marking	ASR5P3N1200MEP2B
Package Type	MEP

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)	300			A	T _c =25°C
		220				T _c =75°C
T _J ; MAX	Junction Temperature	150			°C	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
R _{DS(on)}	Static Drain-Source on Resistance	-	5.3	6.7	mΩ	V _{GS} =18V; I _D =150A; T _c =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	618	-	nC	V _{DD} =800V; V _{GS} =-5/+18V; I _D =150A; T _c =25°C
Q _{GD}	Gate-Drain Charge	-	147	-		
Source-drain diode						
Q _{RR}	Reverse Recovery Charge	-	1839	-	nC	V _{GS} =-5/+18V; I _F =150A; V _R =800V; R _{G(ext)} =5Ω; Load=50μH; 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	-10/+22	V
I_D	Continuous DC Drain Current ($T_c=25^\circ\text{C}$)	300	A
	Continuous DC Drain Current ($T_c=75^\circ\text{C}$)	220	
I_{DM}	Drain Current (pulsed)	440	A
V_{isol}	Isolation Test Voltage (DC; $t=10\text{s}$)	4.2	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	0.15	$^\circ\text{C/W}$
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	1200	-	-	V	$V_{GS}=0\text{V}$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	150	μA	$V_{DS}=1200\text{V}; V_{GS}=0\text{V}$
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	$V_{DS}=V_{GS}; I_D=30\text{mA}$
$R_{DS(on)}$	Static Drain-Source on Resistance	-	5.3	6.7	$\text{m}\Omega$	$V_{GS}=18\text{V}; I_D=150\text{A}; T_c=25^\circ\text{C}$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	2.3	-	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	-	9.15	-	nF	$V_{DS}=1000\text{V}; f=1\text{MHz}; V_{AC}=25\text{mV}$
C_{oss}	Output Capacitance	-	0.29	-		
C_{rss}	Reverse Transfer Capacitance	-	45	-	pF	
E_{on}	Turn-on Energy	-	7.1	-	mJ	$V_{DS}=800\text{V}; V_{GS}=-5/+18\text{V}; I_D=150\text{A}; R_{G(ext)}=5\Omega; \text{Load}=50\mu\text{H}$
E_{off}	Turn-off Energy	-	7.9	-		
Q_{GS}	Gate-Source Charge	-	174	-	nC	$V_{DD}=800\text{V}; V_{GS}=-5/+18\text{V}; I_D=150\text{A}$
Q_{GD}	Gate-Drain Charge	-	147	-		
Q_G	Total Gate Charge	-	618	-		
$t_{d(on)}$	Turn-on Delay Time	-	186	-	ns	$V_{DS}=800\text{V}; V_{GS}=-5/+18\text{V}; I_D=150\text{A}; R_{G(ext)}=5\Omega; \text{Load}=50\mu\text{H}$
t_r	Rise Time	-	42	-		
$t_{d(off)}$	Turn-off Delay Time	-	387	-		
t_f	Fall Time	-	86	-		

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	$V_{GS}=0V$; $I_F=150A$
I_S	Continuous Diode Forward Current	-	150	-	A	$V_{GS}=0V$; $T_C=25^\circ\text{C}$
t_{RR}	Reverse Recovery Time	-	96	-	ns	$V_{GS}=-5/+18V$; $I_F=150A$; $V_R=800V$; $R_{G(ext)}=5\Omega$; Load=50 μH
Q_{RR}	Reverse Recovery Charge	-	1839	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	141	-	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

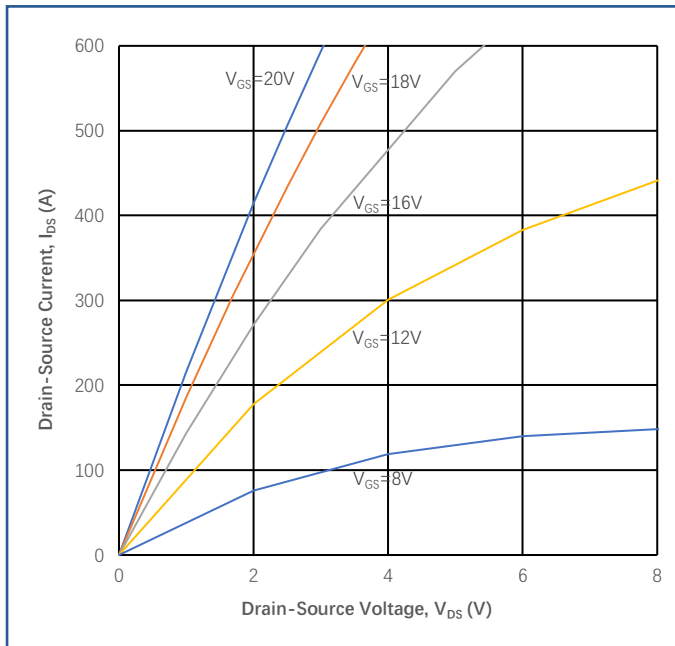


Figure 1

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

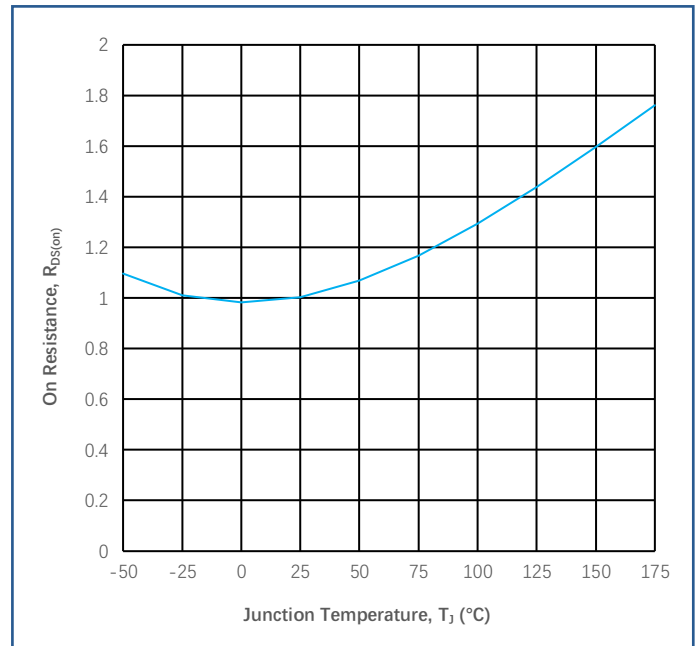


Figure 2

Normalized On-Resistance vs. T_J

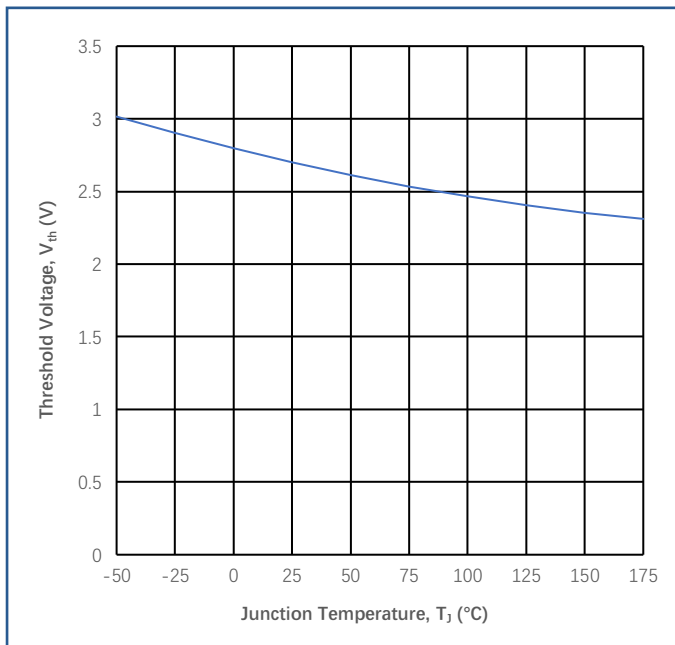


Figure 3

Threshold Voltage vs. Temperature

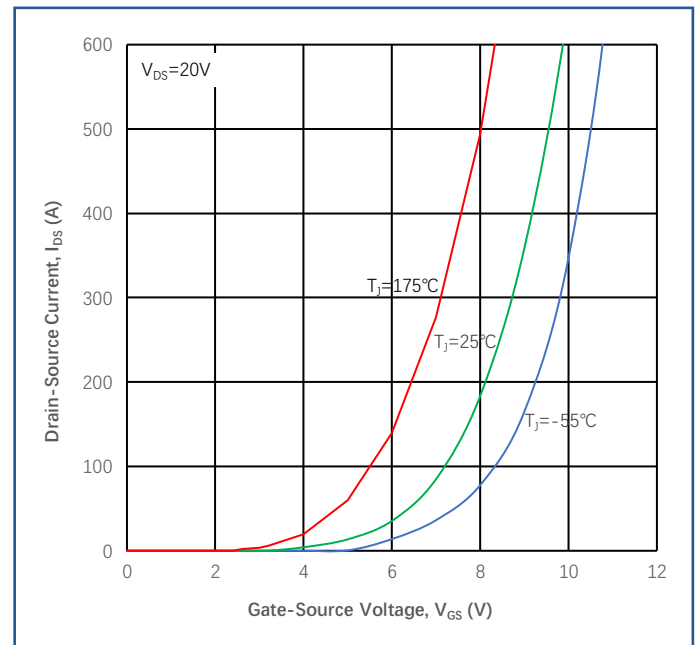
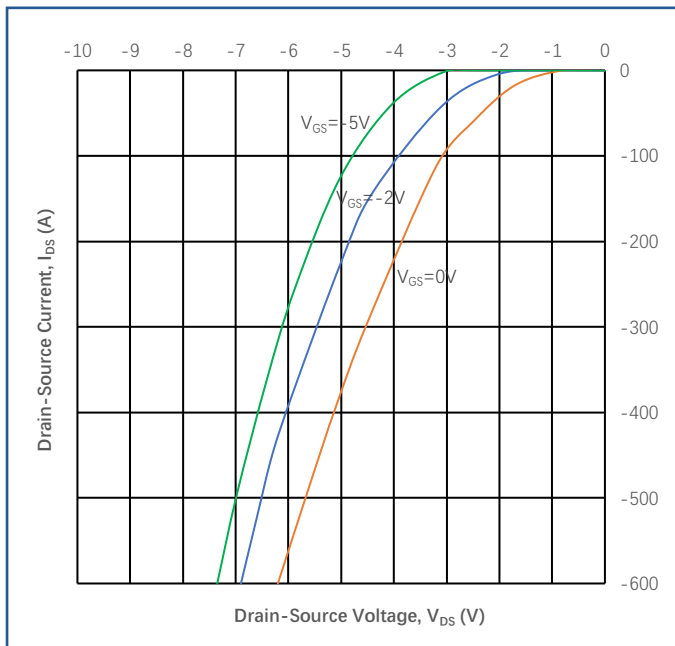


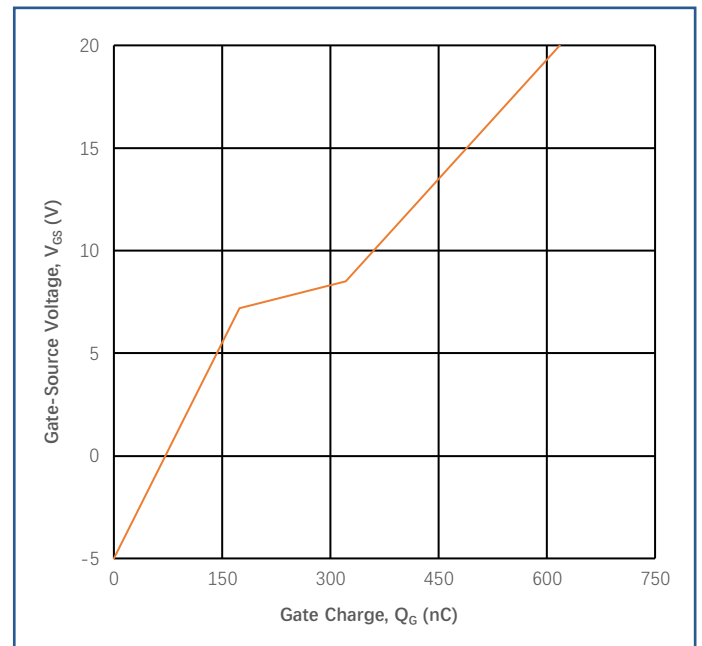
Figure 4

Transfer Characteristic for Various T_J

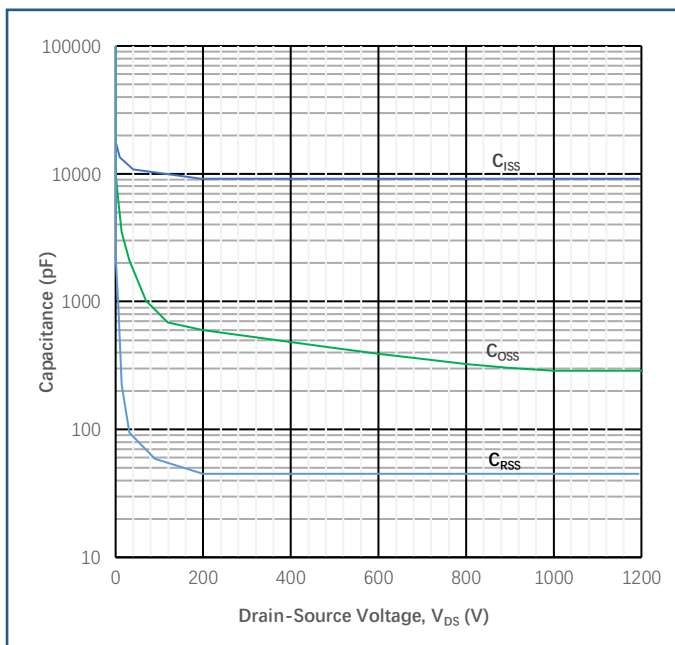
Typical Performance


Figure 5

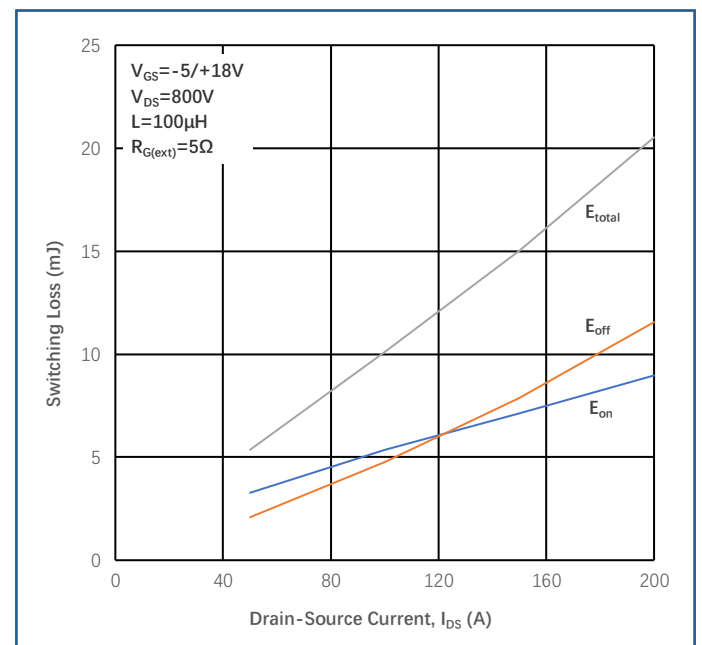
Diode Characteristic at 25°C


Figure 6

Typical Gate Charge Characteristics


Figure 7

Typical Capacitances vs. Drain-Source Voltage


Figure 8

Inductive Switching Energy vs. Drain Current

Typical Performance

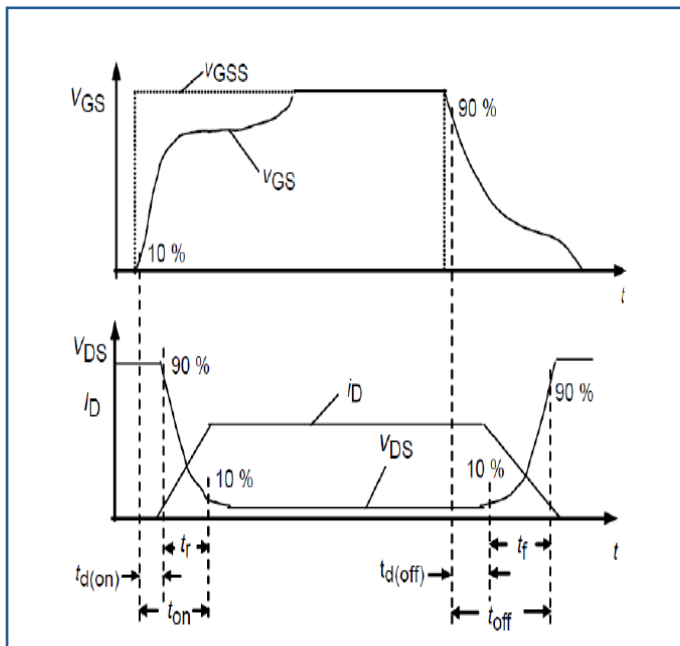


Figure 9

Switching Time Description

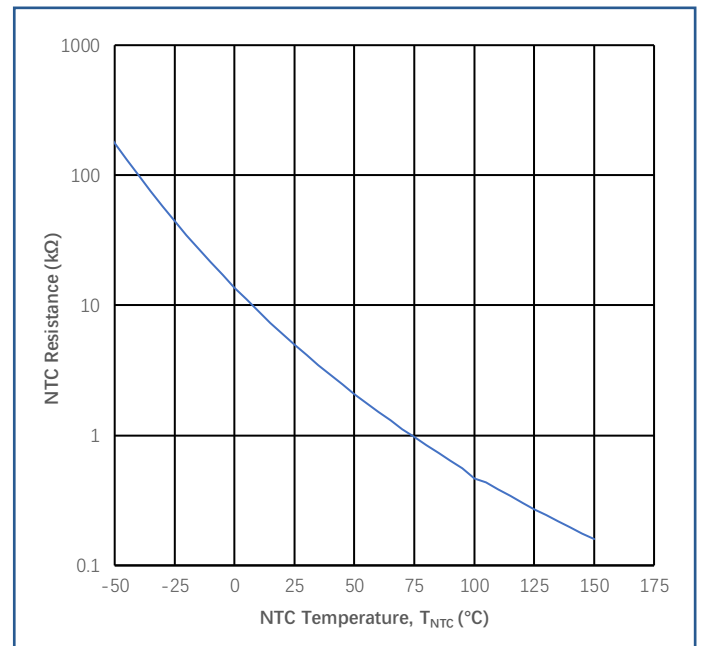
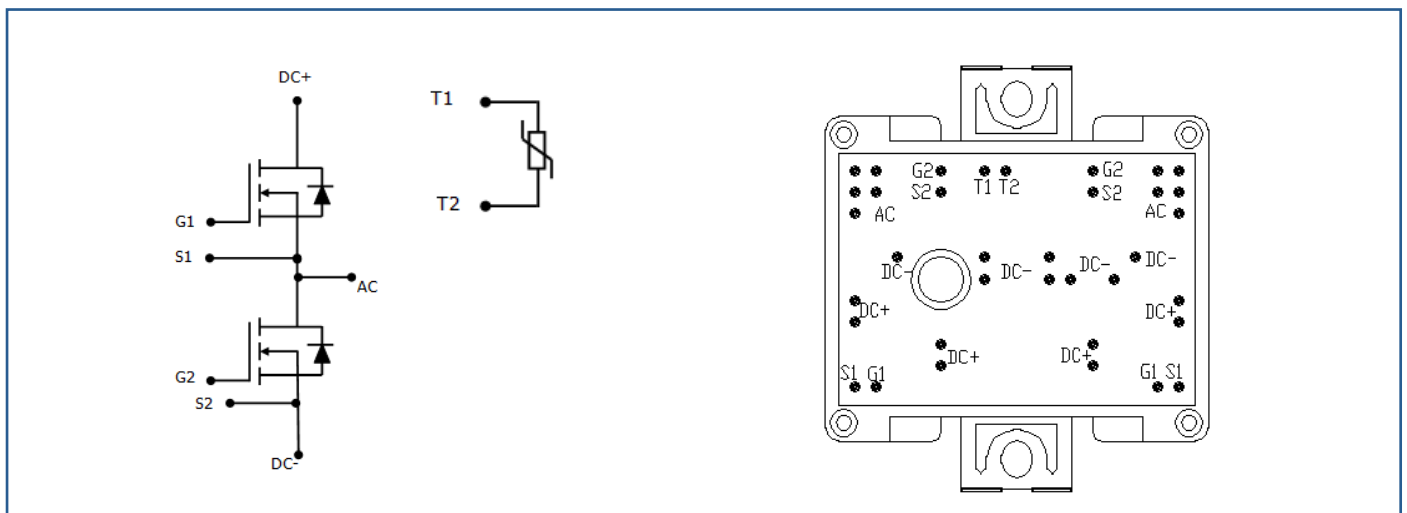


Figure 10

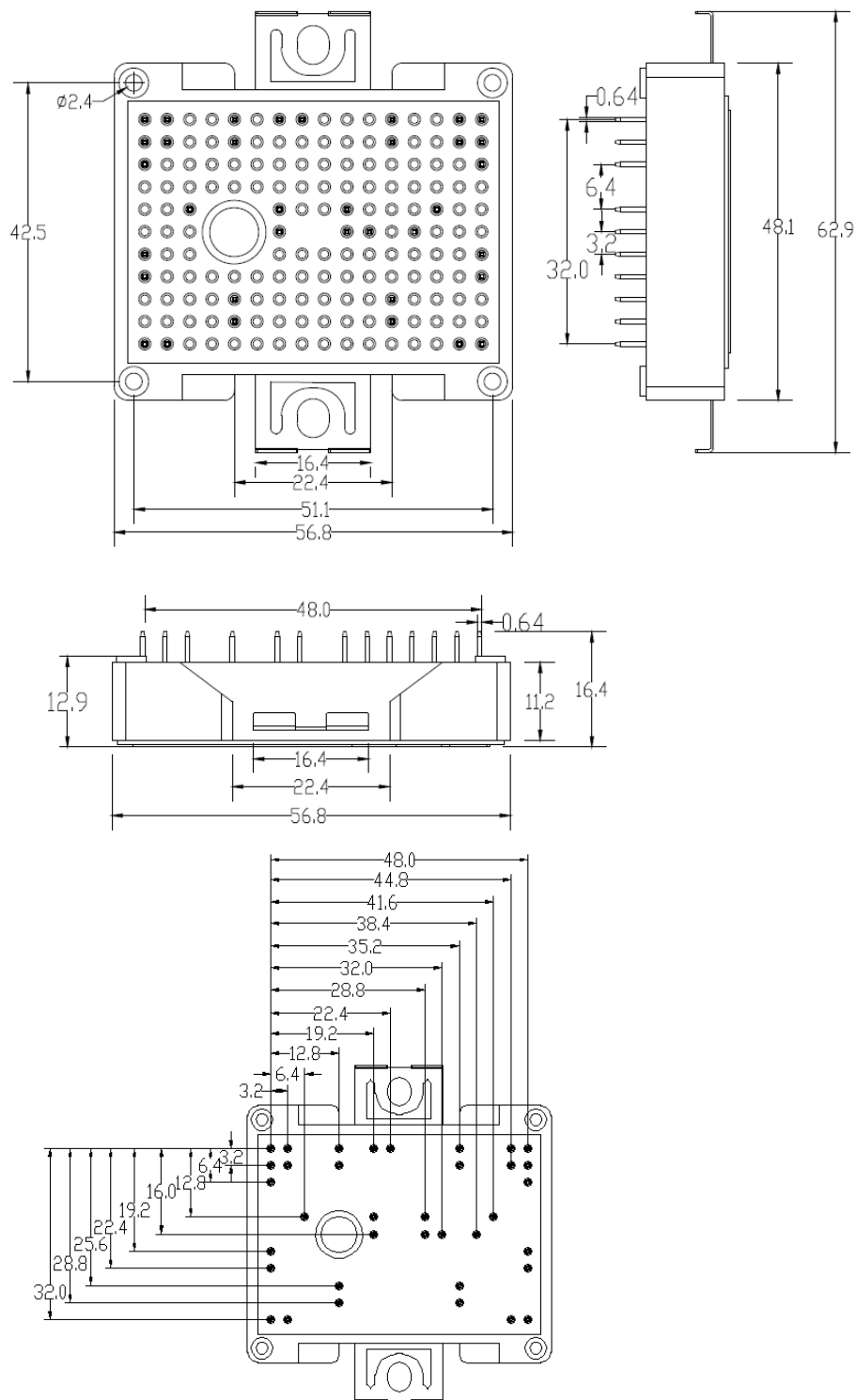
NTC-Temperature Characteristic (typical)

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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