

ASC200N1700MEP05

1700V, 13mΩ, H-Bridge, Silicon Carbide MOSFET Module

Product Data Sheet

ASTC-3T03-225A A/0



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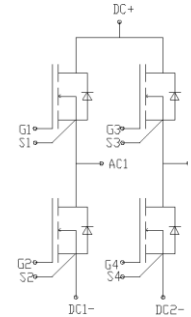
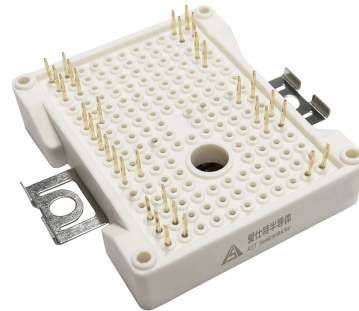
AST Semiconductor

General Description

The AST-MEP module incorporates AST's 1700V Gen3 N-channel SiC MOSFET, solder pin type. NTC temperature sensor inside.

Features

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



Applications

- High Frequency Switching Application
- DC/DC Converter
- Welding
- DC Charger for EV

Ordering Informations

Order Number	ASC200N1700MEP05
Marking	ASC200N1700MEP05
Package Type	MEP

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)	200			A	T _c =25°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	-	13.0	16.5	mΩ	V _{GS} =18V; I _D =200A; T _c =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	336	-	nC	V _{DD} =1200V; V _{GS} =-5/+18V; I _D =200A; T _c =25°C
Q _{GD}	Gate-Drain Charge	-	100	-		
Source-drain diode						
Q _{RR}	Reverse Recovery Charge	-	1436	-	nC	V _{GS} =-5/+18V; I _F =200A; V _R =900V; R _{Gate} =50Ω; 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	1700	V
V_{GS}	Gate-Source Voltage	-10/+22	V
I_D	Continuous DC Drain Current ($T_c=25^{\circ}\text{C}$)	200	A
	Continuous DC Drain Current ($T_c=85^{\circ}\text{C}$)	145	
I_{DM}	Drain Current (pulsed)	290	A
V_{isol}	Isolation Test Voltage ($f=50\text{Hz}$; $t=1\text{min}$)	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	0.15	$^{\circ}\text{C/W}$
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	1700	-	-	V	$V_{GS}=0\text{V}$
I_{DSS}	Zero Gate Voltage Drain Current	-	-	20	μA	$V_{DS}=1700\text{V}$; $V_{GS}=0\text{V}$
I_{GSS}	Gate-Body Leakage Current	-	-	1.0	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	-	13.0	16.5	$\text{m}\Omega$	$V_{GS}=18\text{V}$; $I_D=200\text{A}$
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-		
R_G	Gate Resistance	-	1.3	-	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	-	12.9	-	nF	$V_{DS}=1200\text{V}$; $f=1\text{MHz}$; $V_{AC}=25\text{mV}$
C_{oss}	Output Capacitance	-	0.4	-		
C_{rss}	Reverse Transfer Capacitance	-	32	-	pF	
E_{on}	Turn-on Energy	-	9.69	-	mJ	$V_{DS}=900\text{V}$; $V_{GS}=-5/+18\text{V}$; $I_D=200\text{A}$; $R_{G(ext)}=5\Omega$; Load=100 μH
E_{off}	Turn-off Energy	-	8.77	-		
Q_{GS}	Gate-Source Charge	-	104	-	nC	$V_{DD}=1200\text{V}$; $V_{GS}=-5/+18\text{V}$; $I_D=200\text{A}$
Q_{GD}	Gate-Drain Charge	-	100	-		
Q_G	Total Gate Charge	-	336	-		
$t_{d(on)}$	Turn-on Delay Time	-	102	-	ns	$V_{DS}=900\text{V}$; $V_{GS}=-5/+18\text{V}$; $I_D=200\text{A}$; $R_{G(ext)}=5\Omega$; Load=100 μH
t_r	Rise Time	-	37	-		
$t_{d(off)}$	Turn-off Delay Time	-	156	-		
t_f	Fall Time	-	40	-		

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	$V_{GS}=0\text{V}$; $I_F=100\text{A}$
I_S	Continuous Diode Forward Current	-	100	-	A	$V_{GS}=0\text{V}$; $T_C=25^{\circ}\text{C}$
t_{RR}	Reverse Recovery Time	-	61.3	-	ns	$V_{GS}=-5/+18\text{V}$; $I_F=200\text{A}$; $V_R=900\text{V}$; $R_{G(\text{ext})}=5\Omega$; Load=100 μH
Q_{RR}	Reverse Recovery Charge	-	1436	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	217	-	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	$R_2=R_{25}\exp [B_{25/50}(1/T_2-1/(298.15\text{K}))]$
$B_{25/80}$	Beta Value for 25°C to 80°C	-	3414	-	K	$R_2=R_{25}\exp [B_{25/80}(1/T_2-1/(298.15\text{K}))]$
$B_{25/100}$	Beta Value for 25°C to 100°C	-	3436	-	K	$R_2=R_{25}\exp [B_{25/100}(1/T_2-1/(298.15\text{K}))]$

Typical Performance

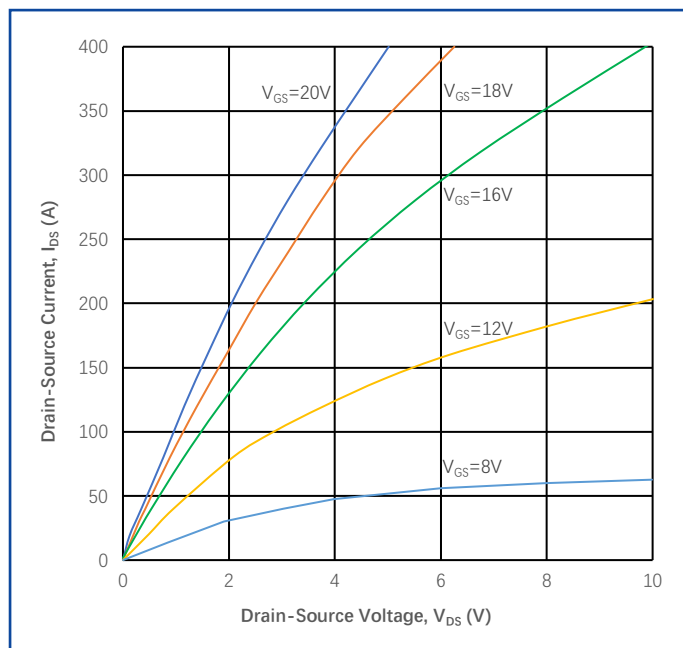


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

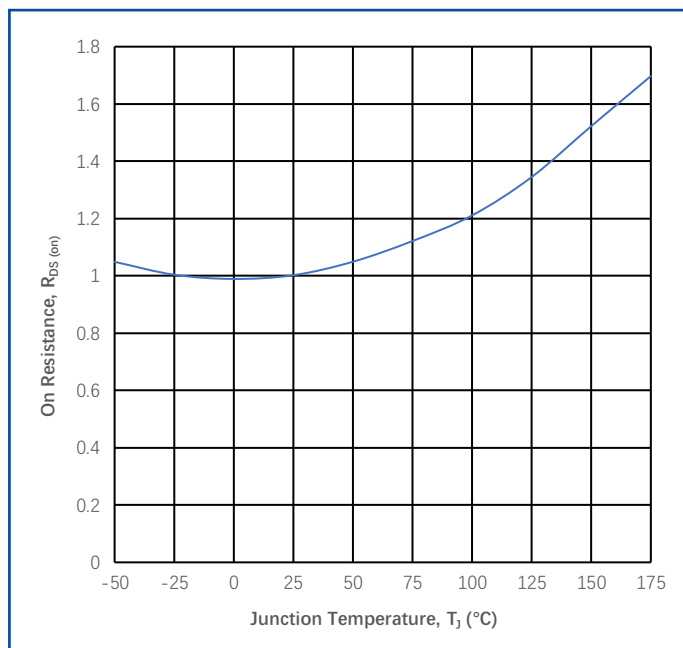


Figure 2
Normalized On-Resistance vs. Temperature

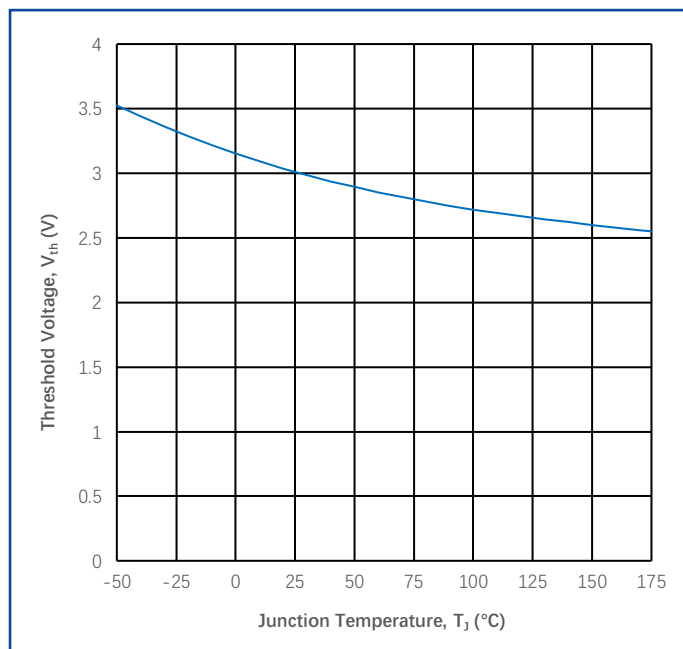


Figure 3
Threshold Voltage vs. Temperature

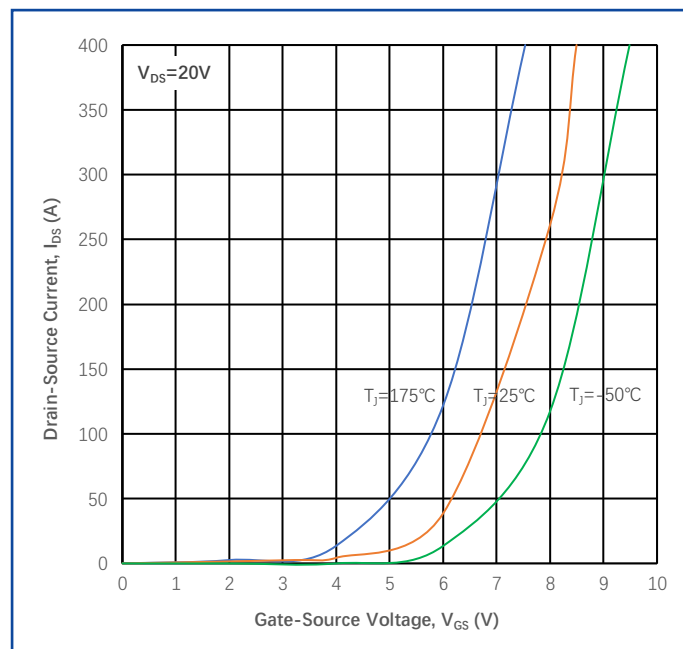


Figure 4
Transfer Characteristic for Various T_J

Typical Performance

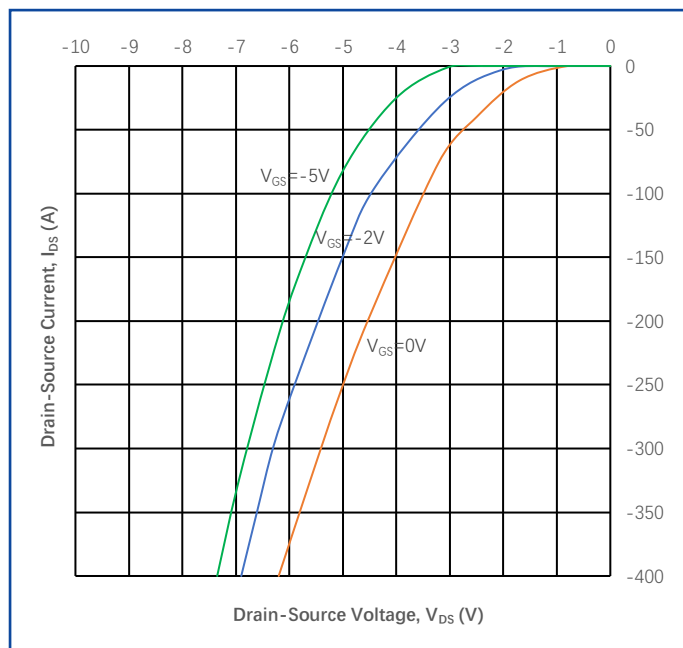


Figure 5
Diode Characteristic at 25°C

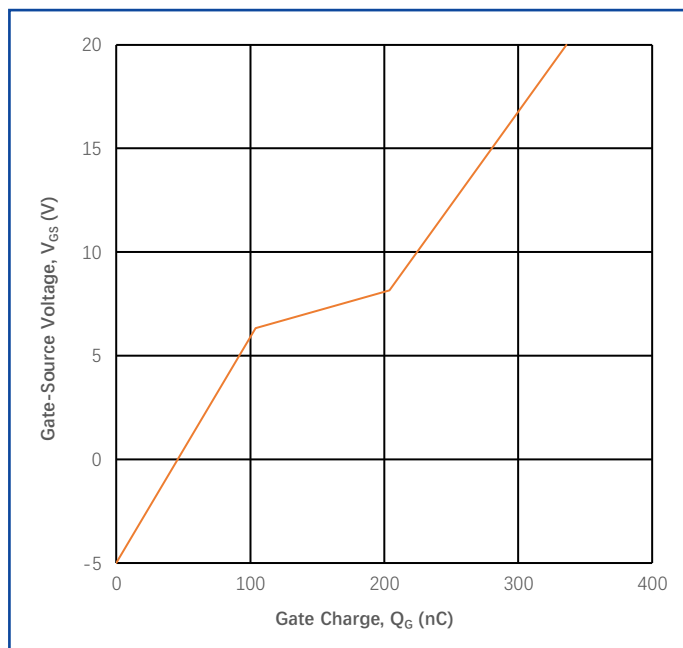


Figure 6
Typical Gate Charge Characteristics

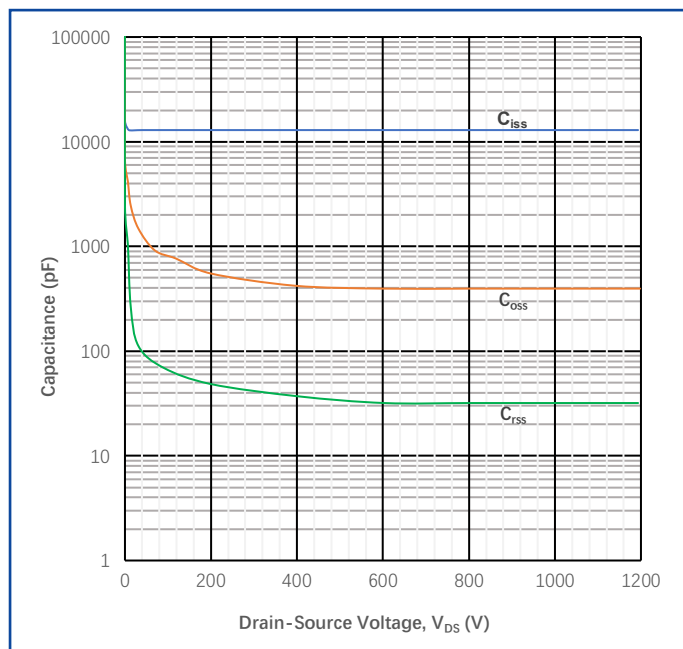


Figure 7
Typical Capacitances vs. Drain-Source Voltage

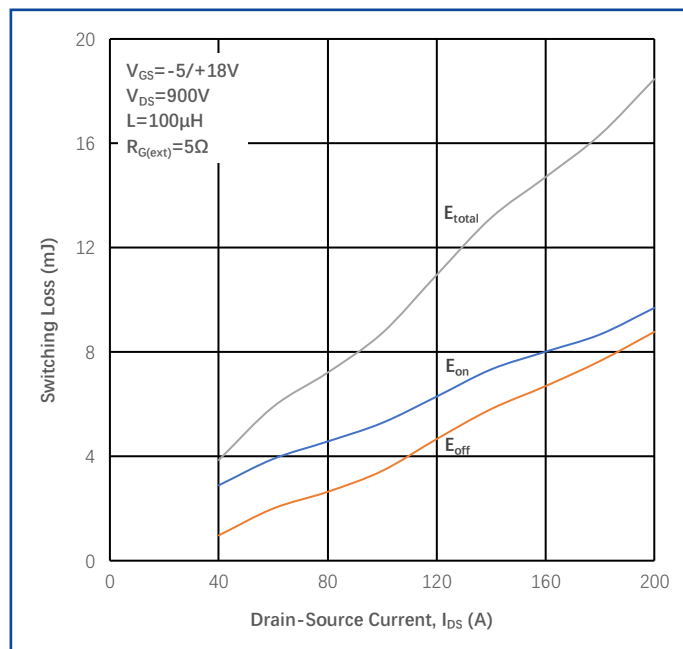


Figure 8
Inductive Switching Energy vs. Drain Current

Typical Performance

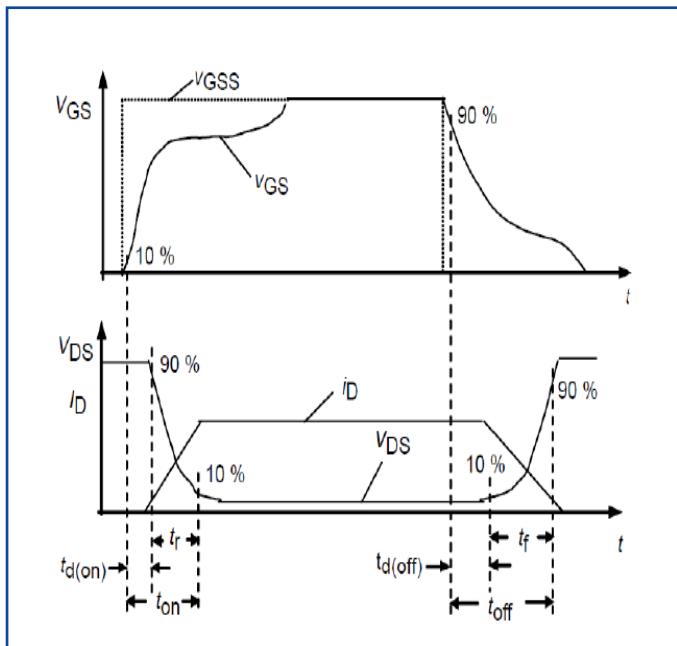


Figure 9
Switching Time Description

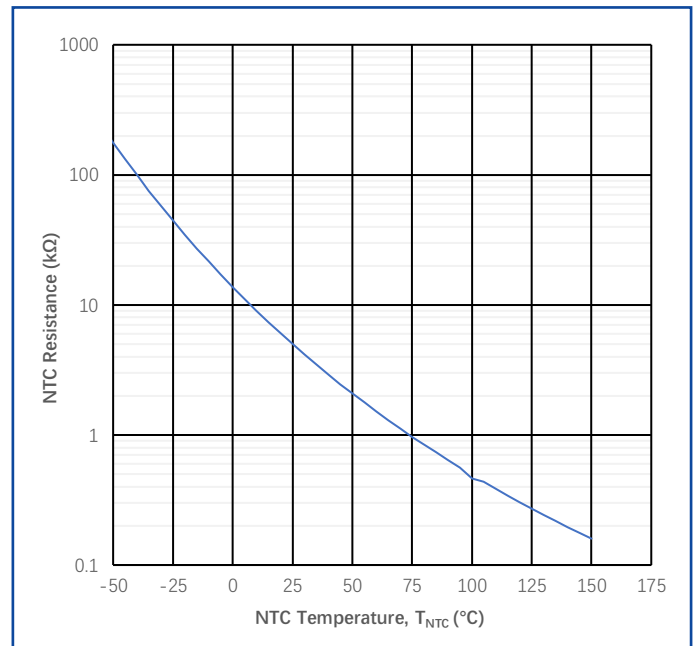
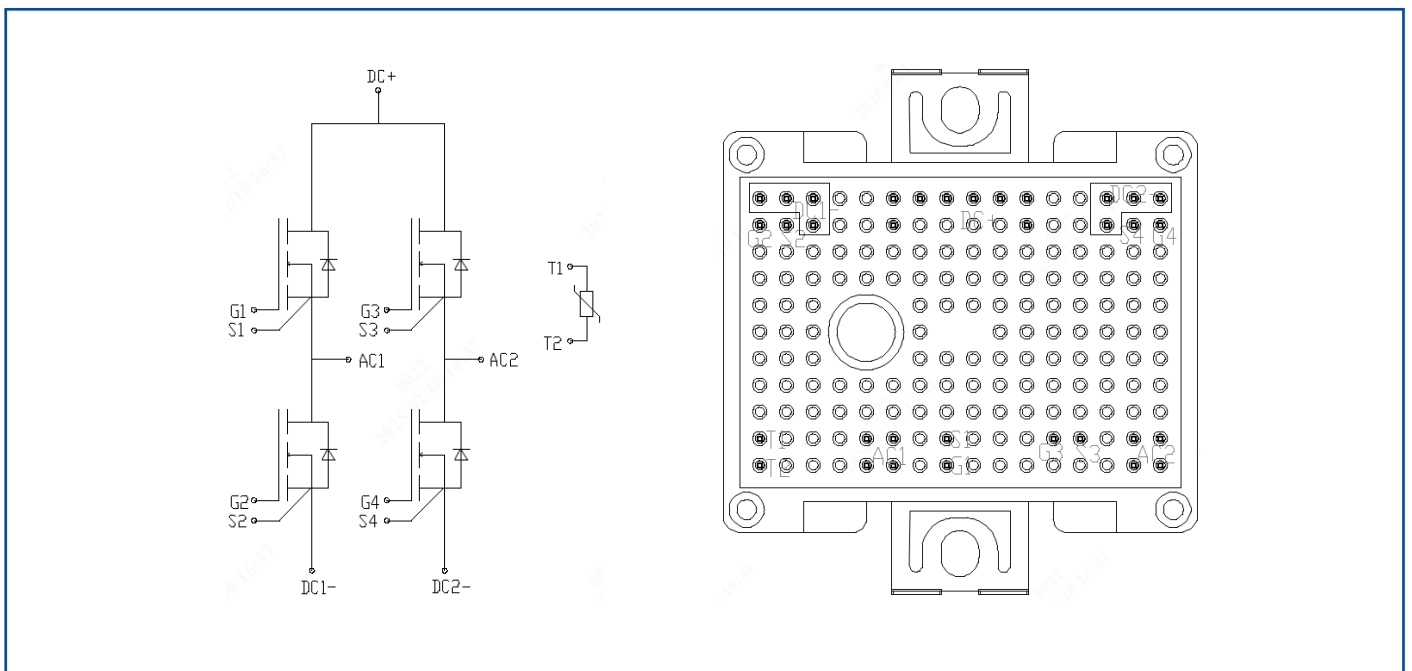


Figure 10
NTC-Temperature Characteristic (Typical)

Circuit Diagram Headline



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