



GT10FF120A1H

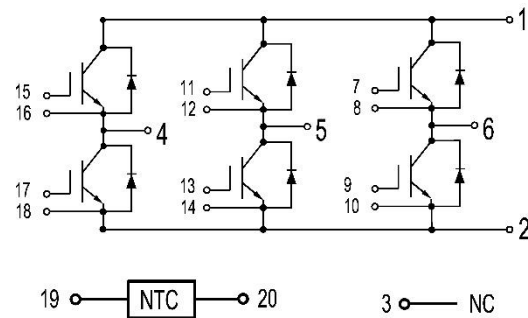
IGBT Module

Preliminary Data

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated $>10\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Motor Drives
- Air Conditioning
- Servo Drives
- UPS

IGBT, Inverter

Maximum Rated Values

V_{CES}	Collector-Emitter Blocking Voltage	$T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_C=100^{\circ}\text{C}$	10	A
		$T_C=25^{\circ}\text{C}$	20	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	20	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^{\circ}\text{C}$ $T_{Jmax}=175^{\circ}\text{C}$	158	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1mA, V_{CE}=V_{GE}, T_J=25^{\circ}C$	5.00	5.70	6.50	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=10A, V_{GE}=15V$	$T_J=25^{\circ}C$	1.85	2.10	V
			$T_J=125^{\circ}C$	2.10		
			$T_J=150^{\circ}C$	2.15		
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=V_{CES}, T_J=25^{\circ}C$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20V, V_{CE}=0V, T_J=25^{\circ}C$			± 100	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25^{\circ}C$		972		pF
C_{oes}	Output Capacitance			43		
C_{res}	Reverse Transfer Capacitance			12		

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =10A, R _{Gon} =68Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		101		ns
			T _J =125℃		84		
			T _J =150℃		93		
t _r	Rise Time		T _J =25℃		62		ns
			T _J =125℃		61		
			T _J =150℃		55		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =10A, R _{Goff} =68Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		166		ns
			T _J =125℃		172		
			T _J =150℃		172		
t _f	Fall Time		T _J =25℃		382		ns
			T _J =125℃		573		
			T _J =150℃		546		
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =10A, R _{Gon} =68Ω, V _{GE} =±15V, di/dt=145A/μs(T _J =150℃), Inductive Load	T _J =25℃		2.25		mJ
			T _J =125℃		2.55		
			T _J =150℃		2.61		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =10A, R _{Goff} =68Ω, V _{GE} =±15V, du/dt=1532V/μs(T _J =150°C), Inductive Load	T _J =25°C		0.31		mJ
			T _J =125°C		0.62		
			T _J =150°C		0.75		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		340		nC
R _{g internal}	Internal Gate Resistor		T _J =25°C		0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =±15V, tp=10us, R _{Gon} =68Ω, R _{Goff} =68Ω, T _J =125°C				53		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.952	°C/W

Diode, Inverter

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		10	A
I _{FM}	Peak FWD Current Repetitive	tp=1ms	20	A

Electrical Characteristics of FWD (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =10A	T _J =25°C		1.70		V
			T _J =125°C		1.80		
			T _J =150°C		1.80		
I _{rr}	Peak Reverse Recovery Current	I _F =10A, di/dt=208A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		6.6		A
			T _J =125°C		7.2		
			T _J =150°C		8.4		
t _{rr}	Reverse Recovery Time		T _J =25°C		279		ns
			T _J =125°C		305		
			T _J =150°C		392		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		1.05		μC
			T _J =125°C		1.46		
			T _J =150°C		1.91		



E _{rec}	Reverse Recovery Energy	I _F =10A, di/dt=208A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		0.18		mJ
			T _J =125°C		0.25		
			T _J =150°C		0.43		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					1.284	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Description	Min.	Typ.	Max.	Units.
R ₂₅	T _C =25°C		5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =465Ω	-5		5	%
P ₂₅	T _C =25°C			10	mW
B _{25/50}	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
B _{25/80}	$R_2=R_{25} \exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
B _{25/100}	$R_2=R_{25} \exp[B_{25/100}(1/T_2-1/(298.15K))]$		3545		K



Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{IOS}	Isolation Voltage (All Terminals Shorted)	AC Test Voltage, t=30s	4500			V
Internal Isolation			Al ₂ O ₃			
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+150	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.06	°C/W
M	Mounting Screw:M3		0.75		1.20	N·m
G	Weight			30		g

Ordering Information Table

Device code	G	T	10	FF	120	A1	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (10=10A)
- ④ - Circuit Configuration (FF=Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

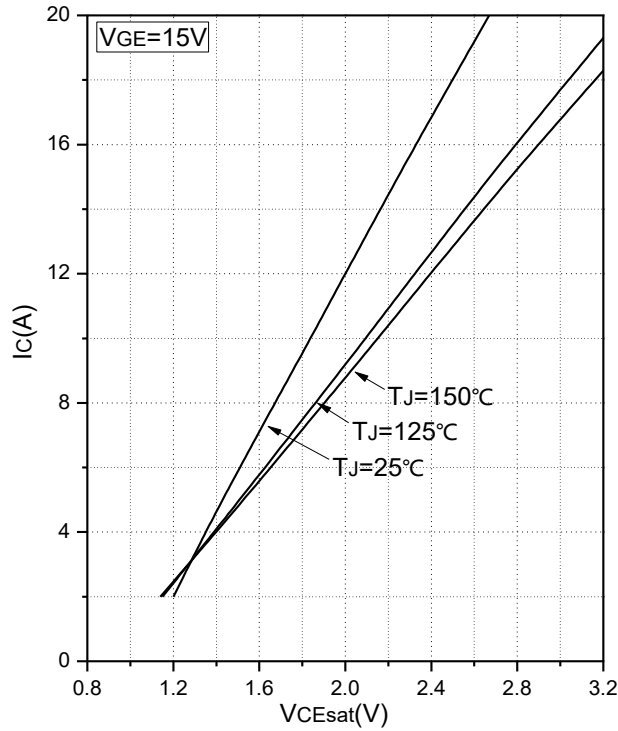


Fig.1 Typical Saturation Voltage Characteristics

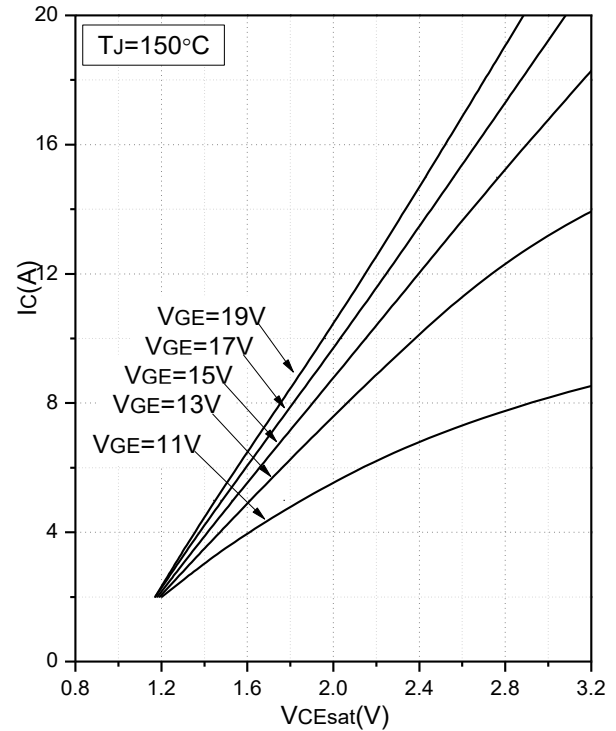


Fig.2 Typical Output Characteristics

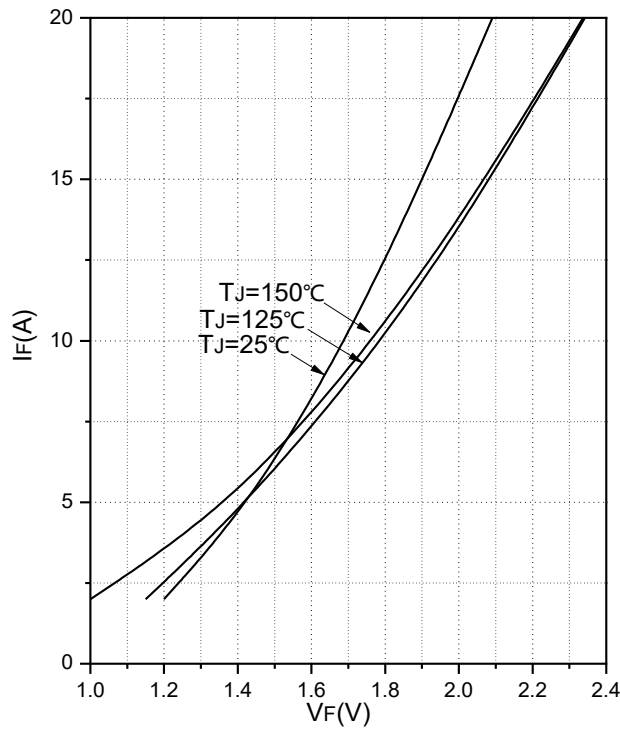


Fig.3 Forward Characteristics of FWD

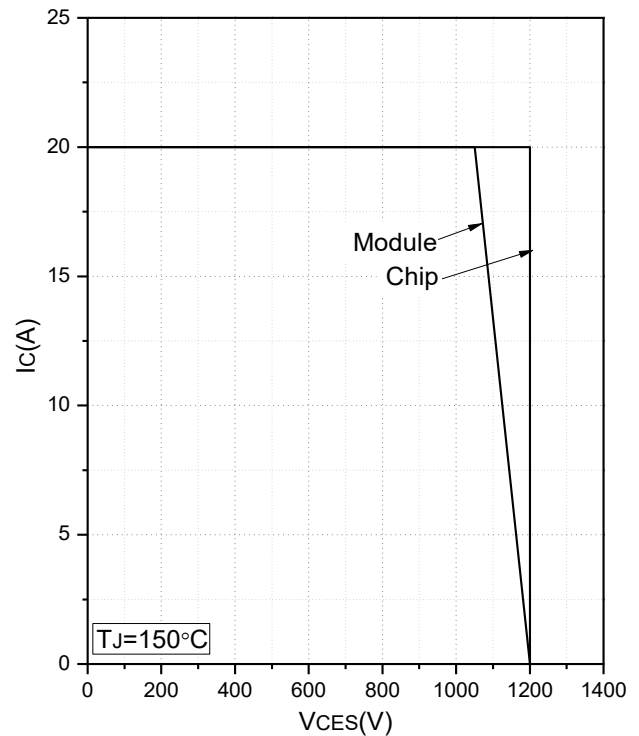


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

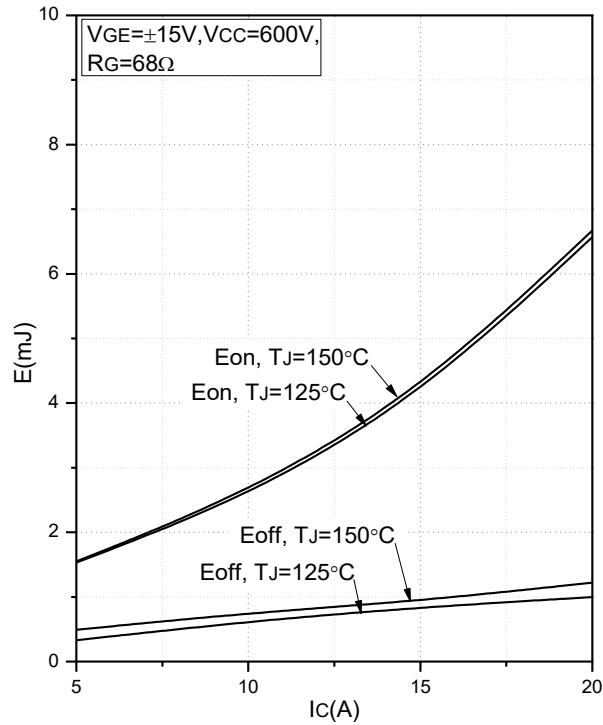


Fig.5 Typical Switching Loss vs. Collector Current

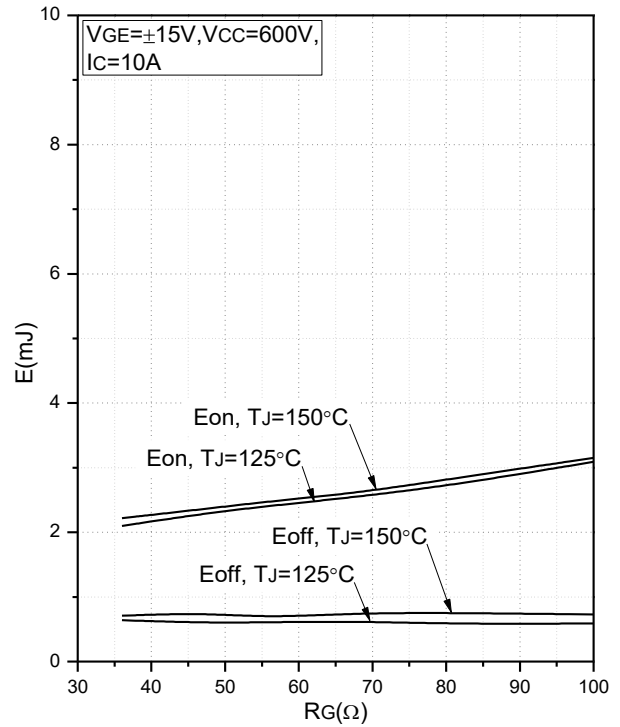


Fig.6 Typical Switching Loss vs. Gate Resistance

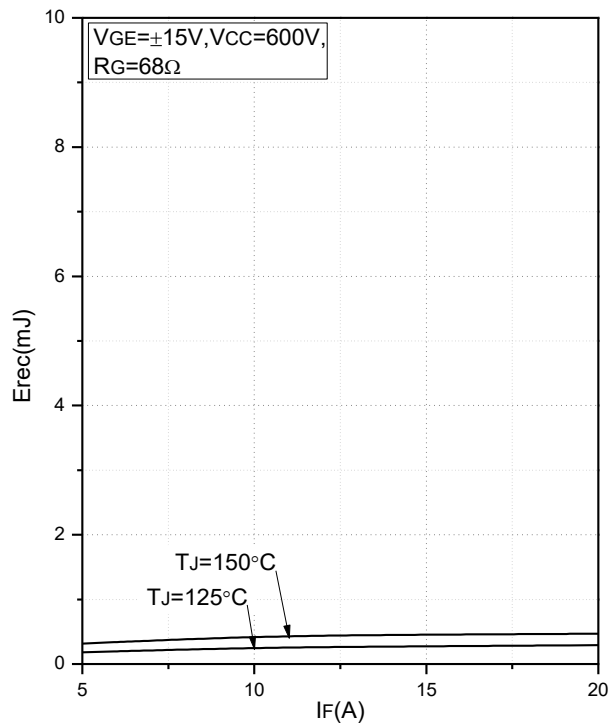


Fig.7 Typical Switching Loss vs. Forward Current

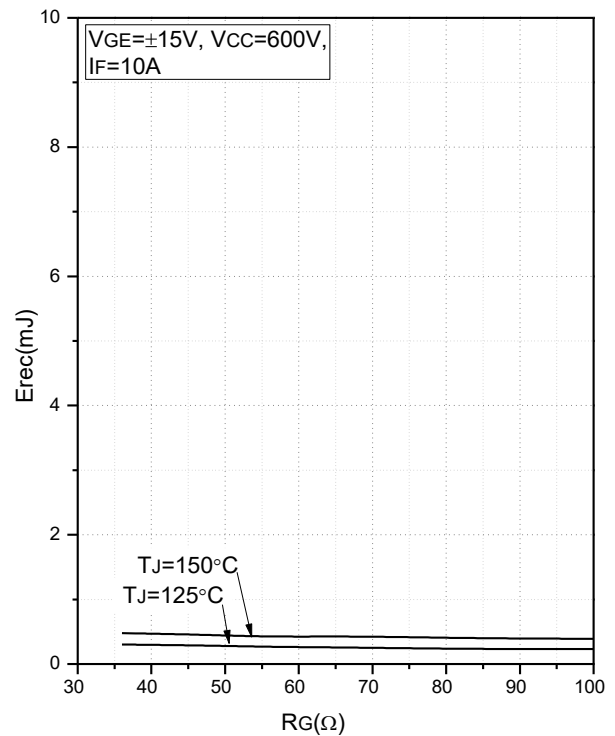


Fig.8 Typical Switching Loss vs. Gate Resistance

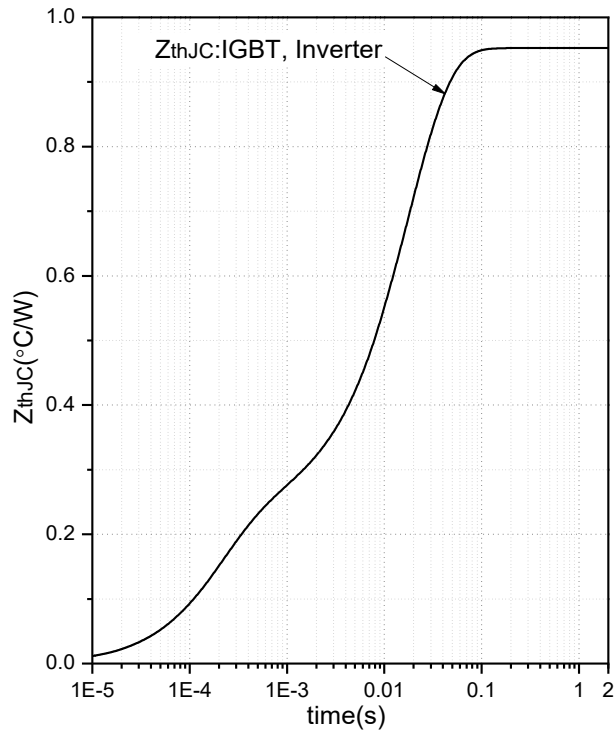


Fig.9 Transient Thermal Impedance

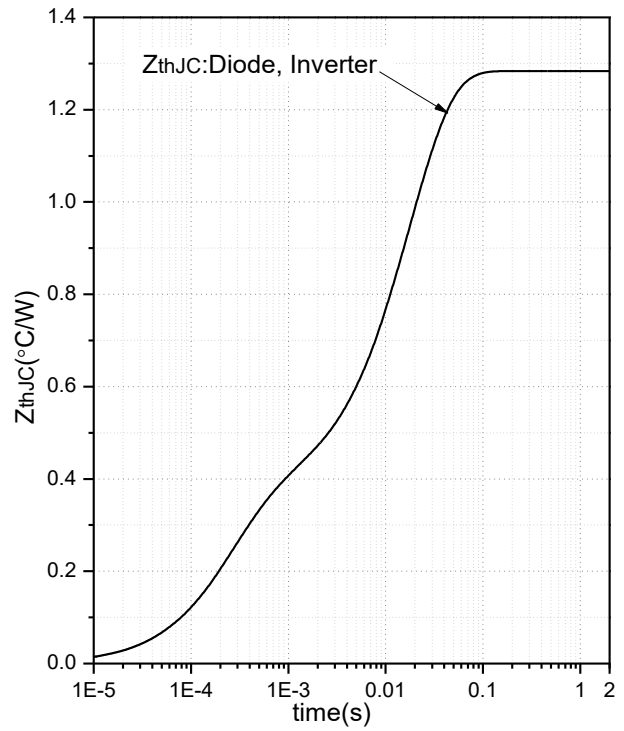


Fig.10 Transient Thermal Impedance

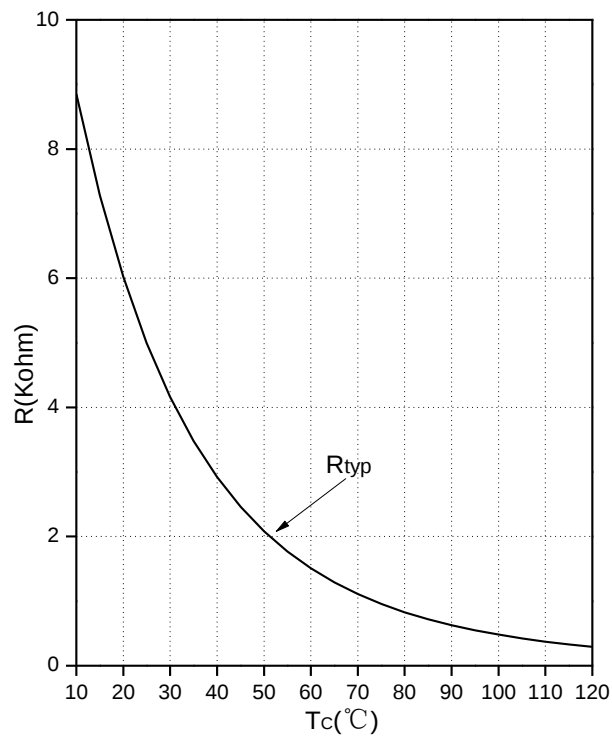
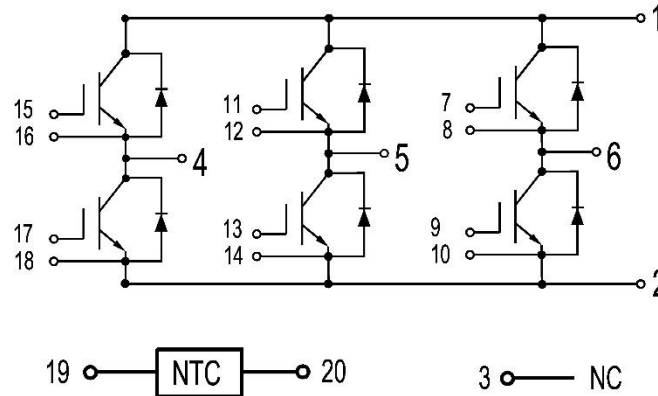


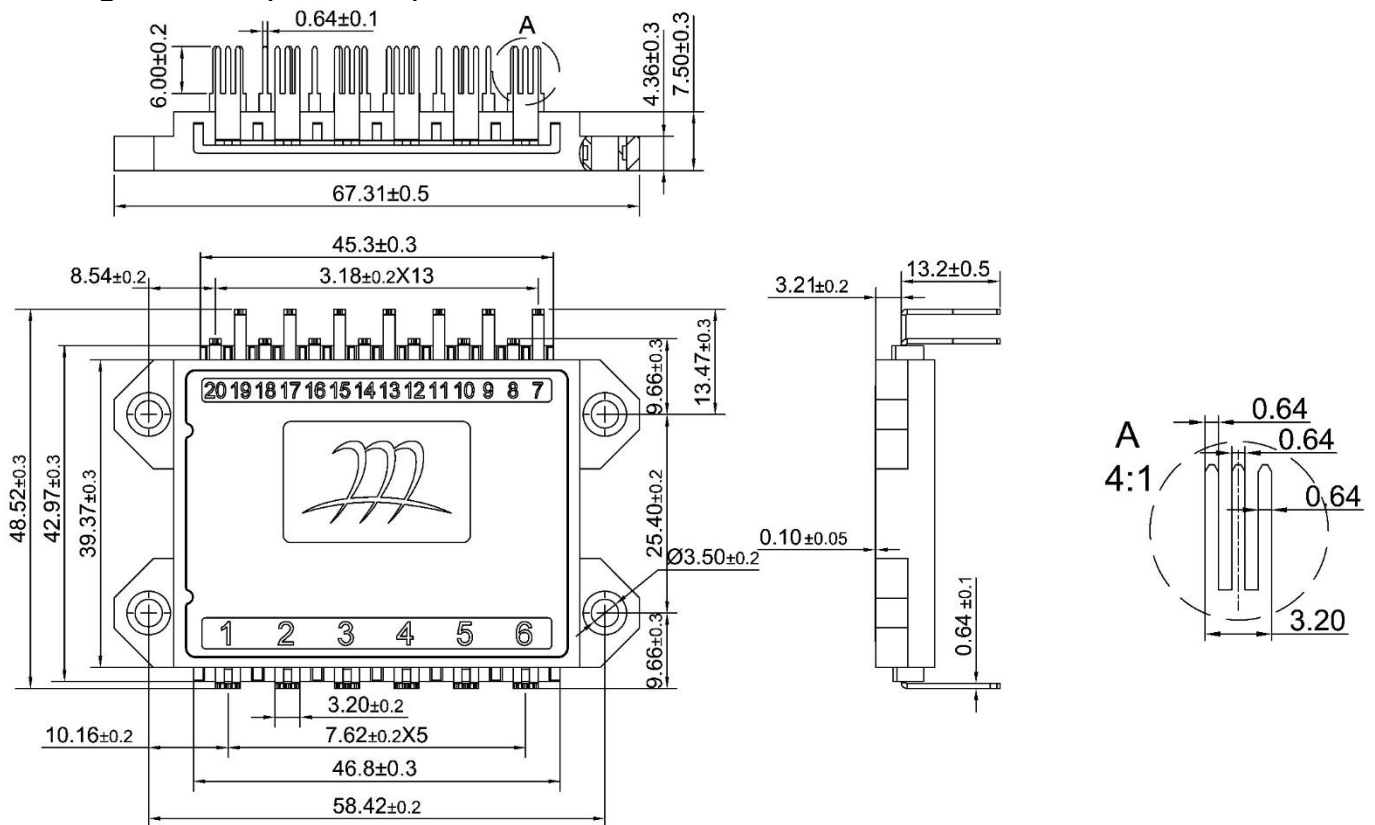
Fig.11 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
01/03/2024	01	Initial Release
05/15/2024	02	Update Outlines

Announcements

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