



GT10RFF120B2H

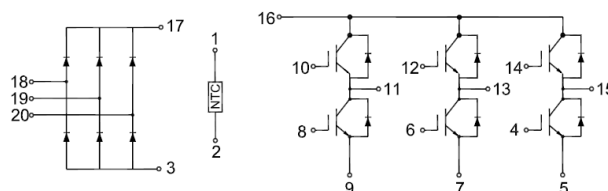
IGBT Module

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:

- Industrial Inverters
- Servo Applications

IGBT, Inverter

Maximum Rated Values ($T_c=25^\circ\text{C}$ unless otherwise specified)

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 per IGBT	$T_C=25^\circ\text{C}$, $T_{Jmax}=175^\circ\text{C}$	158	W



Electrical Characteristics of IGBT ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5.00	5.70	6.50	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=10\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.85	2.00	V
			$T_J=125^{\circ}\text{C}$	2.10		V
			$T_J=150^{\circ}\text{C}$	2.15		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}$, $V_{CE}=V_{CES}$, $T_J=25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_J=25^{\circ}\text{C}$		972		pF
C_{oes}	Output Capacitance			43		
C_{res}	Reverse Transfer Capacitance			12		

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=10A,$ $R_{Gon}=68\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		101		ns
			$T_J=125^{\circ}C$		84		
			$T_J=150^{\circ}C$		93		
t_r	Rise Time		$T_J=25^{\circ}C$		62		ns
			$T_J=125^{\circ}C$		61		
			$T_J=150^{\circ}C$		55		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=10A,$ $R_{Goff}=68\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		166		ns
			$T_J=125^{\circ}C$		172		
			$T_J=150^{\circ}C$		172		
t_f	Fall Time		$T_J=25^{\circ}C$		382		ns
			$T_J=125^{\circ}C$		573		
			$T_J=150^{\circ}C$		546		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=10A,$ $R_{Gon}=68\Omega, V_{GE}=\pm 15V,$ $di/dt=145A/\mu s (T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		2.25		mJ
			$T_J=125^{\circ}C$		2.55		
			$T_J=150^{\circ}C$		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
RBSOA	I _C =20A, V _{CC} =1050V, V _p =1200V, R _G =68Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid			
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _G =68Ω, T _J =150°C			10			μs
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}	Repetitive Peak Forward Current	tp=1ms	20	A

Electrical Characteristics of Diode (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		
t _{rr}	Reverse Recovery Time	I _F =10A, -diF/dt=208A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		279		ns
			T _J =125°C		305		
			T _J =150°C		392		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		6.6		A
			T _J =125°C		7.2		
			T _J =150°C		8.4		
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, -diF/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

Diode, Rectifier

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1600	V
I _F	Diode Continuous Forward Current	T _J =25°C	10	A
I _{FRMSM}	Maximum RMS Forward Current per Chip	T _J =80°C	20	A
I _{RMSM}	Maximum RMS Current at Rectifier Output	T _J =80°C	30	A
I _{FSM}	Surge Current @t _p =10ms	T _J =25°C	300	A
		T _J =125°C	250	
I ² t	I ² t - value	T _J =25°C	450	A ² s
		T _J =125°C	312	

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =10A	T _J =25°C		1.05		V
			T _J =150°C		1.00		
I _R	Reverse Current	V _R =1200V	T _J =25°C			1	mA
R _{θJC}	Thermal Resistance: Junction-To-Case (per Diode)					0.944	°C/W

Internal NTC-Thermistor Characteristics

R ₂₅	T _C =25°C	22.7		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =1481Ω		±3	%
P ₂₅	T _C =25°C	5		mW
B _{25/50}	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]	3950		K
B _{25/80}	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]	4000		K



Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 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)				0.09	°C/W
M	Mounting Screw:M4		1.0		1.2	N·m
G	Weight			25		g

Ordering Information Table

Device code	G	T	10	RFF	120	B2	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: (Rectifier + Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

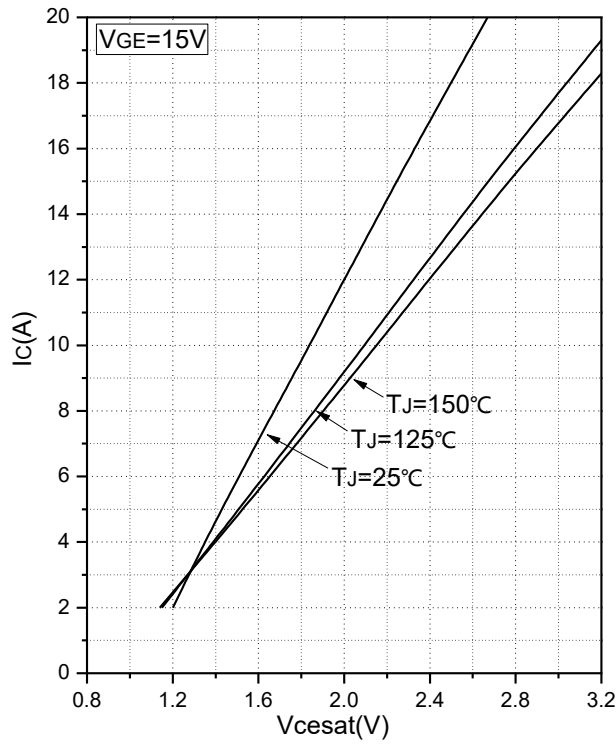


Fig.1 Typical Saturation Voltage Characteristics

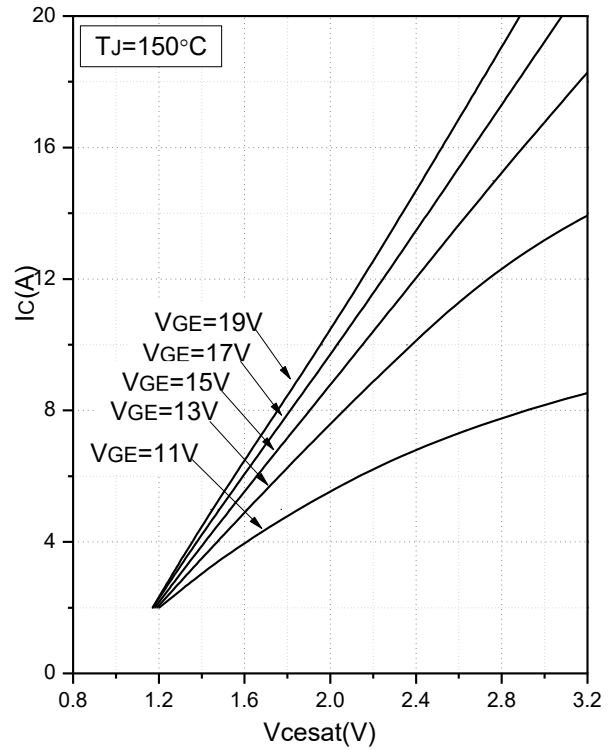


Fig.2 Typical Output Characteristics

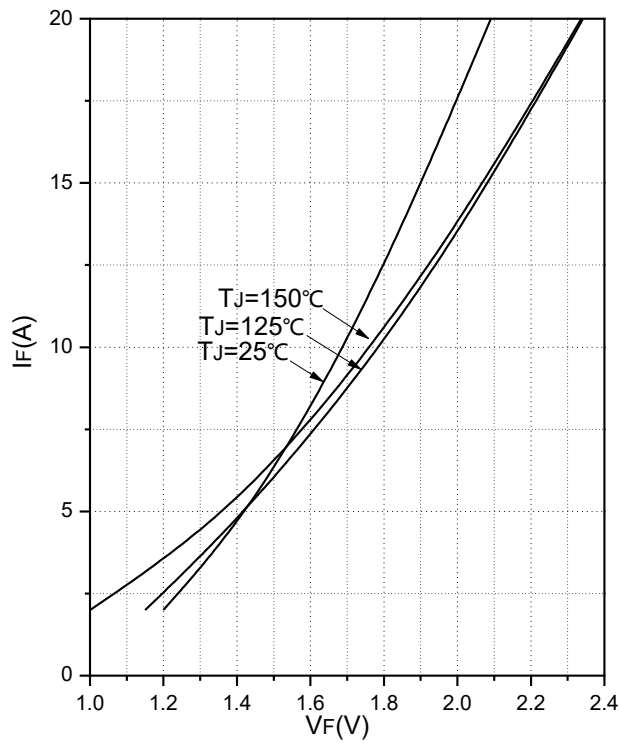


Fig.3 Forward Characteristics of Diode

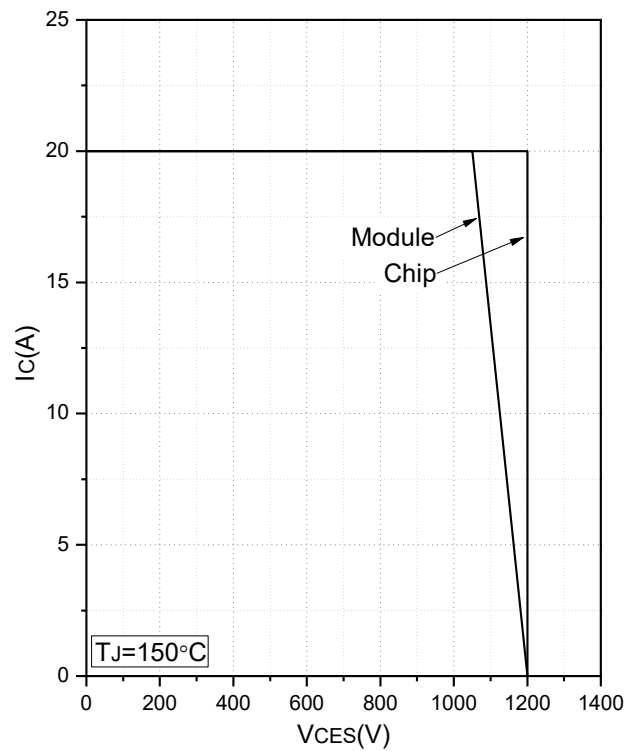


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

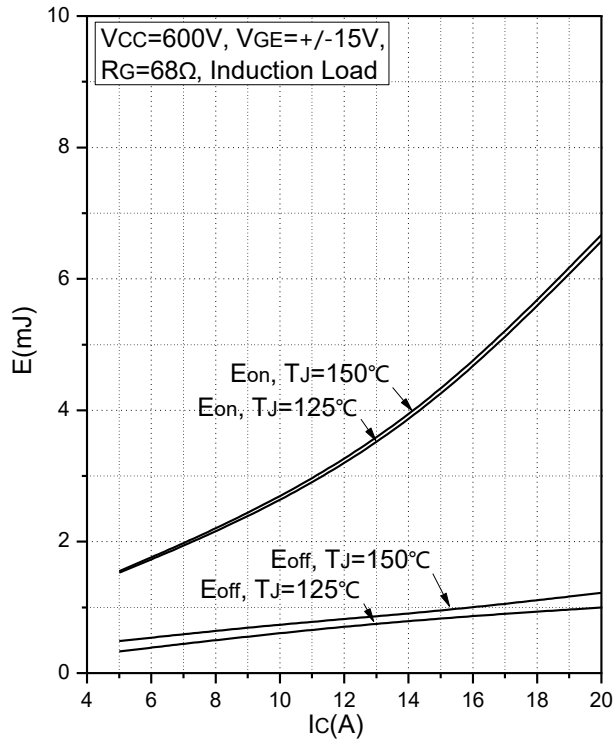


Fig.5 Typical Switching Loss vs. Collector Current

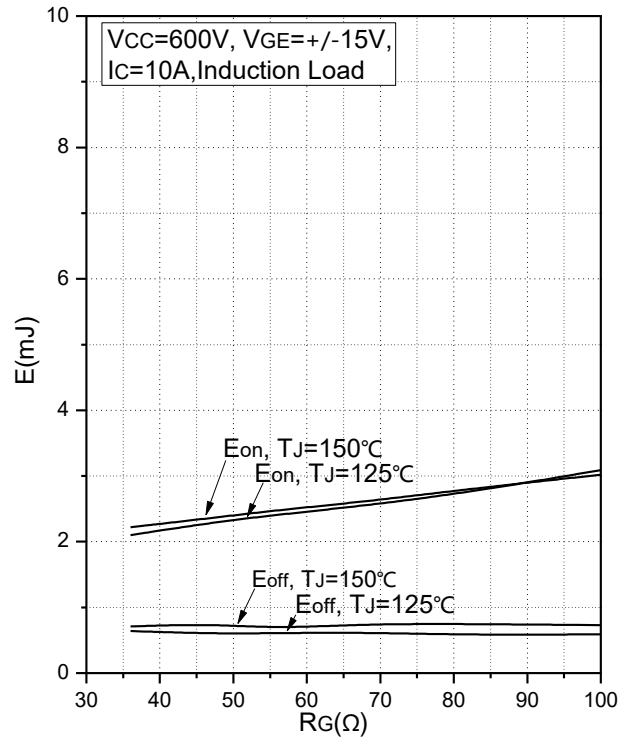


Fig.6 Typical Switching Loss vs. Gate Resistance

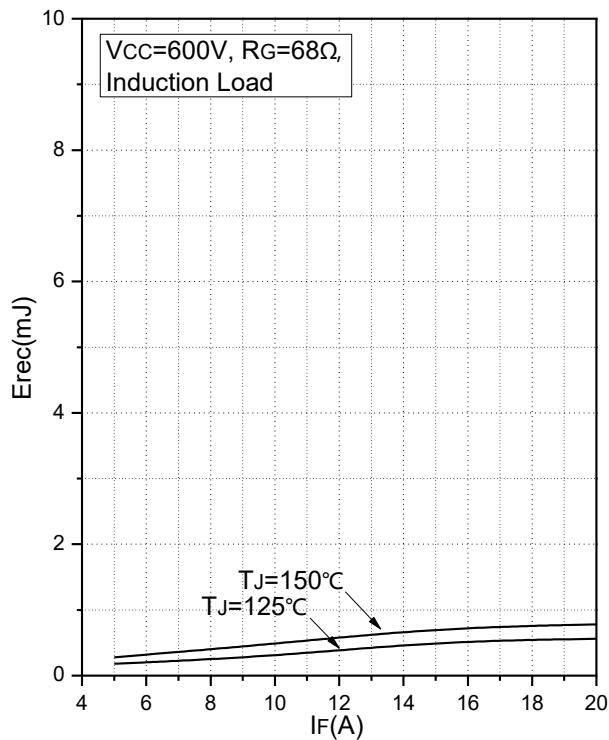


Fig.7 Typical Switching Loss vs. Forward Current

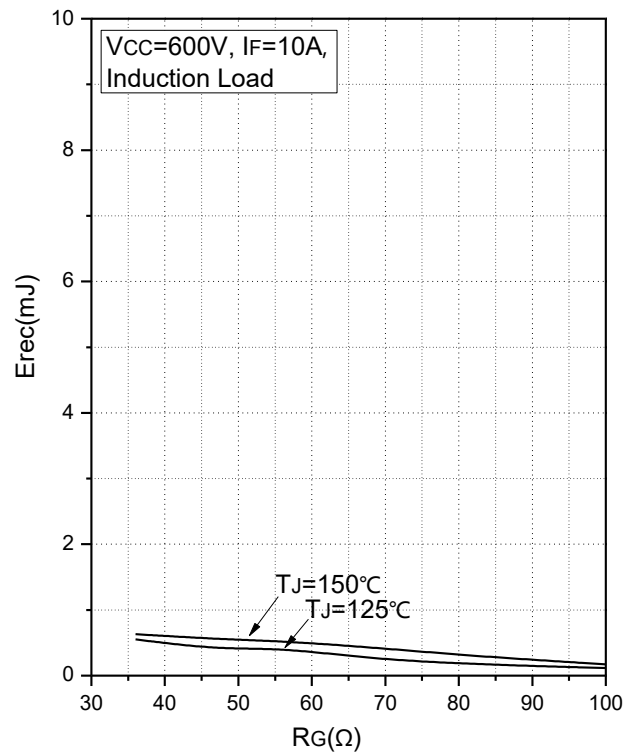


Fig.8 Typical Switching Loss vs. Gate Resistance

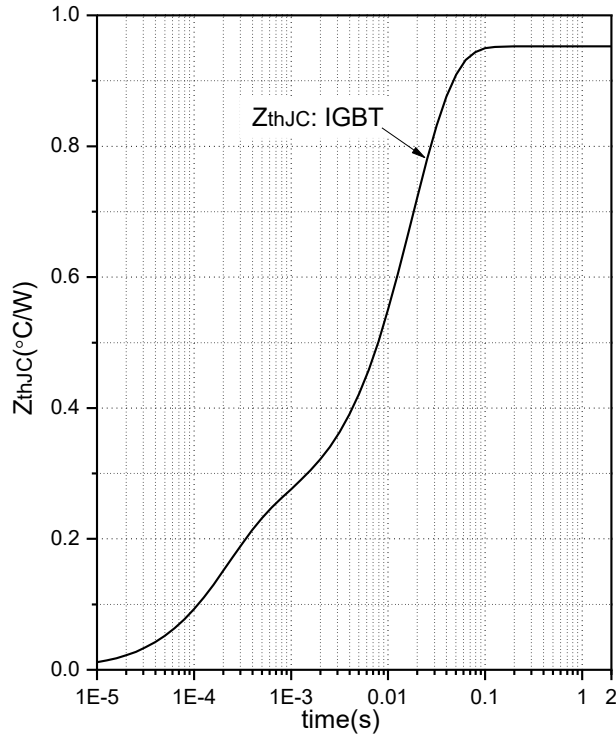


Fig.9 Transient Thermal Impedance (IGBT)

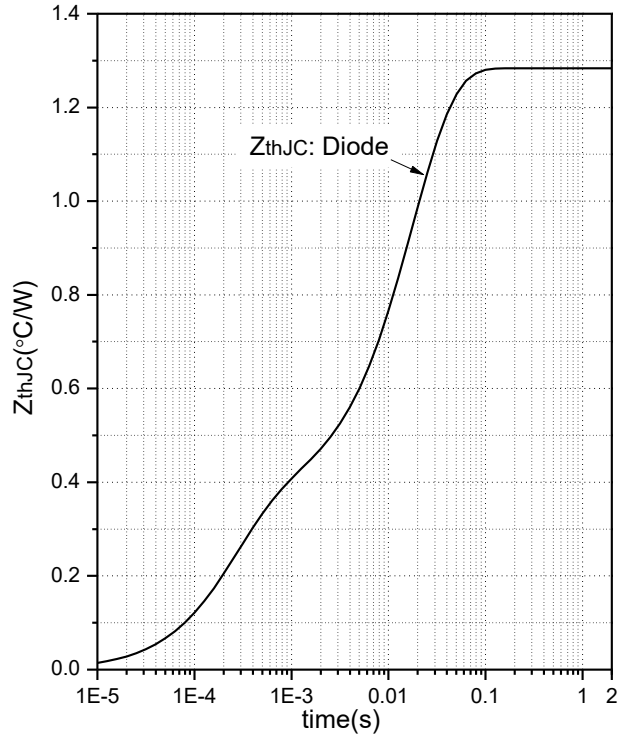


Fig.10 Transient Thermal Impedance (Diode)

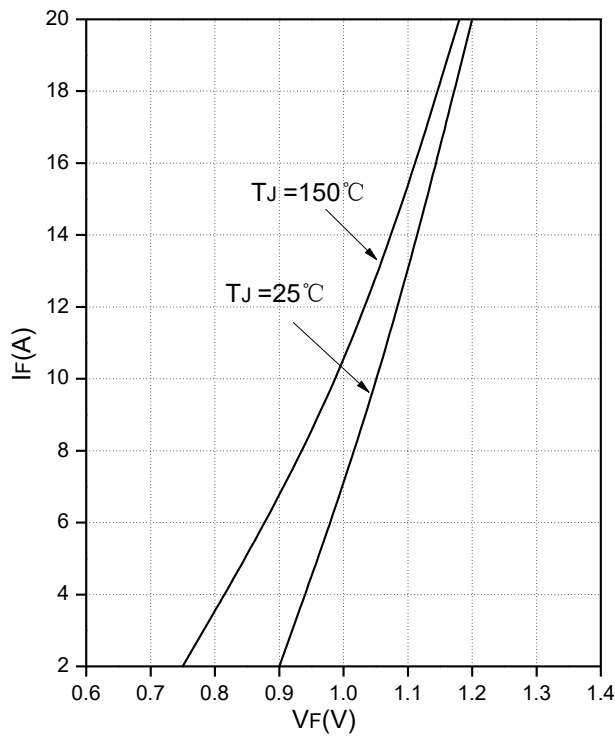


Fig.11 Forward Characteristics of Diode (Rectifier)

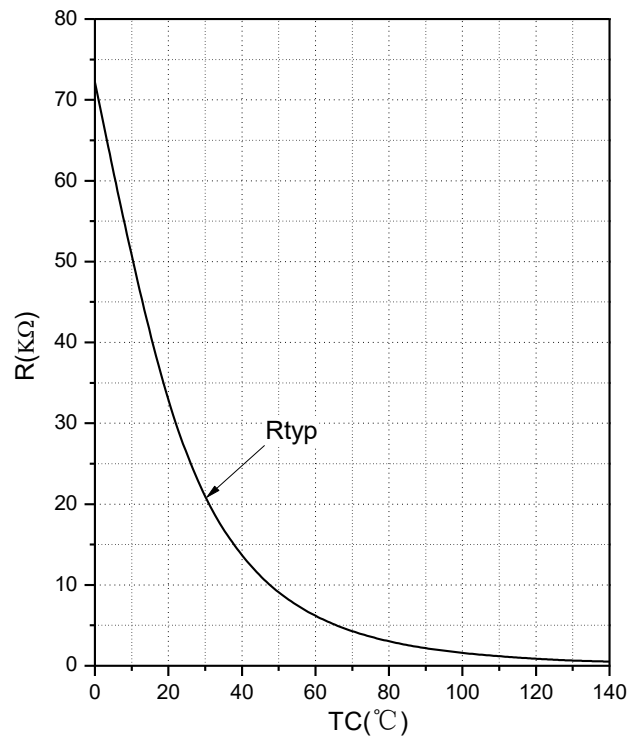
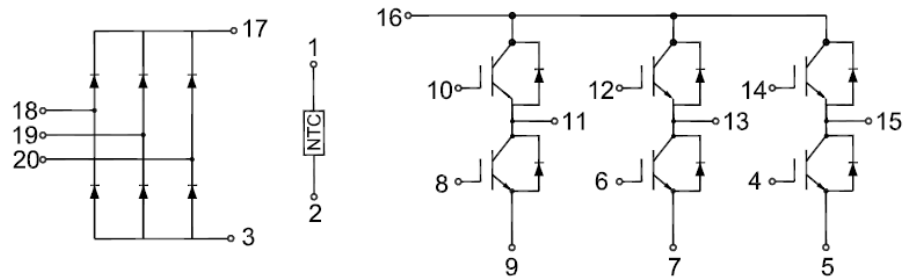


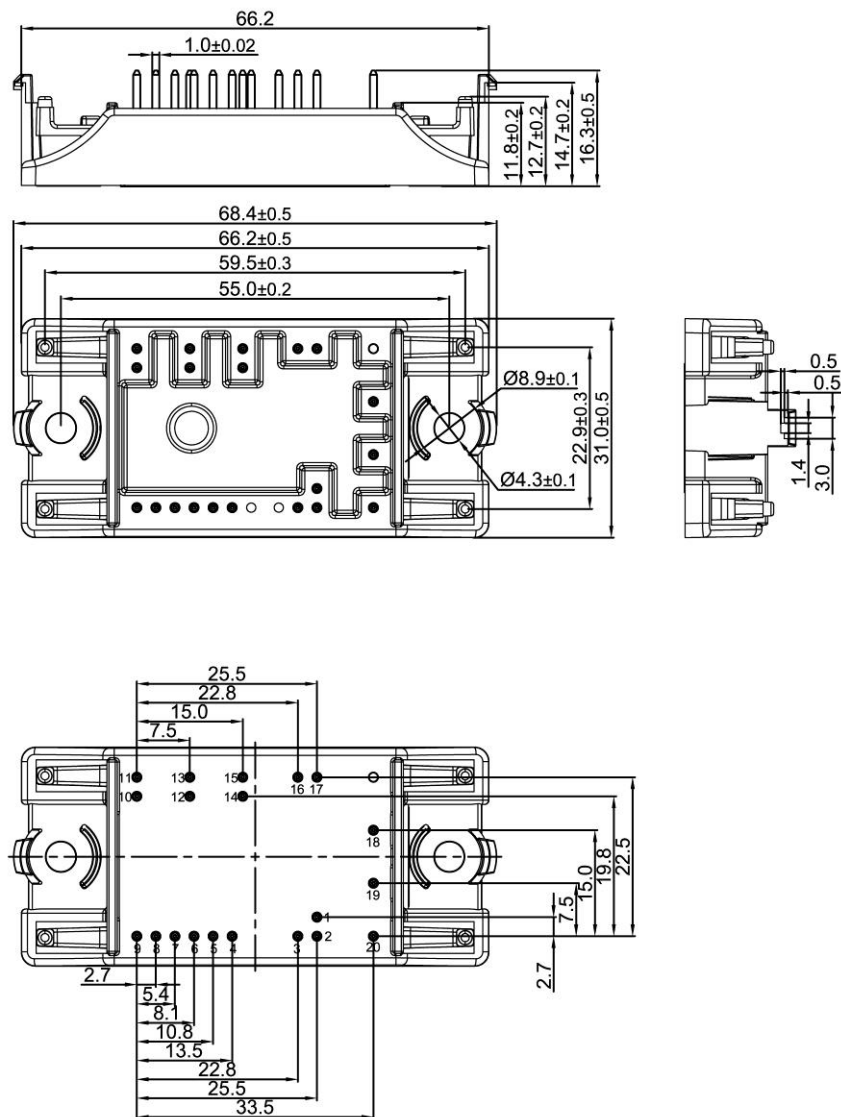
Fig.12 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
12/26/2023	01	Initial Release

Announcement

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