



GT50FF120B9H

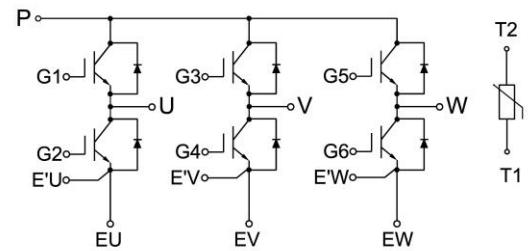
IGBT Module

Preliminary Data

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated >10 μ 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:

- Air Conditioning
- Motor Drives
- Servo Drives
- UPS Systems

IGBT, Inverter

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

V _{CES}	Collector-Emitter Blocking Voltage	T _J =25°C	1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	50	A
		T _C =25°C	100	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	100	A
P _D	Maximum Power Dissipation per IGBT	T _C =25°C T _{Jmax} =175°C	470	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	$I_C=1.7\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=50\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.75	2.10	V
			$T_J=125^{\circ}\text{C}$	2.20		V
			$T_J=150^{\circ}\text{C}$	2.30		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		5.32		nF
C_{oes}	Output Capacitance			0.81		nF
C_{res}	Reveres Transfer Capacitance			0.34		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=50A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		58		ns
			$T_J=125^{\circ}C$		62		
			$T_J=150^{\circ}C$		66		
t_r	Rise Time		$T_J=25^{\circ}C$		36		ns
			$T_J=125^{\circ}C$		38		
			$T_J=150^{\circ}C$		40		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=50A,$ $R_{Goff}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		262		ns
			$T_J=125^{\circ}C$		288		
			$T_J=150^{\circ}C$		302		
t_f	Fall Time		$T_J=25^{\circ}C$		170		ns
			$T_J=125^{\circ}C$		218		
			$T_J=150^{\circ}C$		244		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=50A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ $di/dt=1212A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		2.7		mJ
			$T_J=125^{\circ}C$		3.8		
			$T_J=150^{\circ}C$		3.9		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =50A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=5557V/μs(T _J =150°C), Inductive Load	T _J =25°C		3.7		mJ
			T _J =125°C		5.1		
			T _J =150°C		5.3		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2850		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		3.0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =+/-15V, t _P =10μs, T _J =150°C				209		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.32	°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	T _C =100°C	50	A
I _{FM}	Repetitive Peak Forward Current	t _p =1ms	100	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 =50A	T _J =25°C		1.75		V
			T _J =125°C		1.90		
			T _J =150°C		1.90		
t _{rr}	Reverse Recovery Time	I _F =50A, -diF/dt=953A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		270		ns
			T _J =125°C		474		
			T _J =150°C		482		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		45		A
			T _J =125°C		47		
			T _J =150°C		47		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		6.9		μC
			T _J =125°C		8.8		
			T _J =150°C		9.4		



E _{rec}	Reverse Recovery Energy	I _F =50A, -diF/dt=953A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		2.33		mJ
			T _J =125°C		3.22		
			T _J =150°C		3.43		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.62	°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 _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.05	°C/W
M	Mounting Screw:M4		1.5		1.8	N·m
G	Weight			40		g



Ordering Information Table

Device code	G	T	50	FF	120	B9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (50=50A)
- ④ - Circuit Configuration: FF (Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

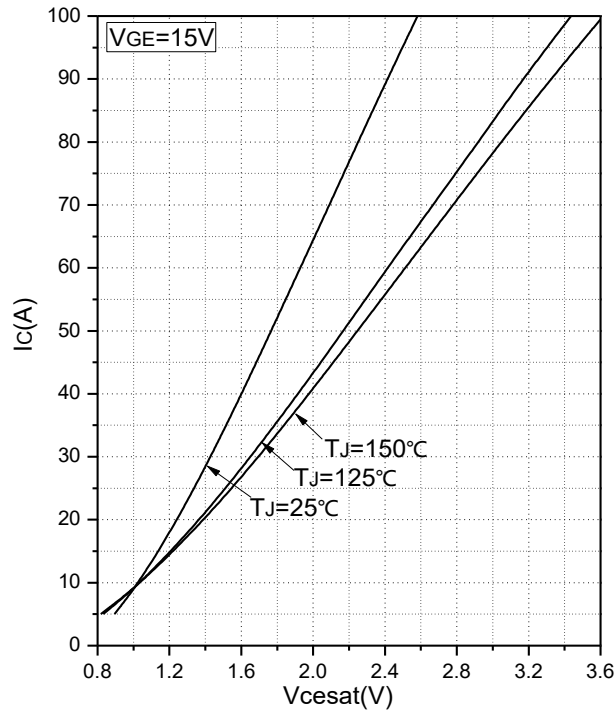


Fig.1 Typical Saturation Voltage Characteristics

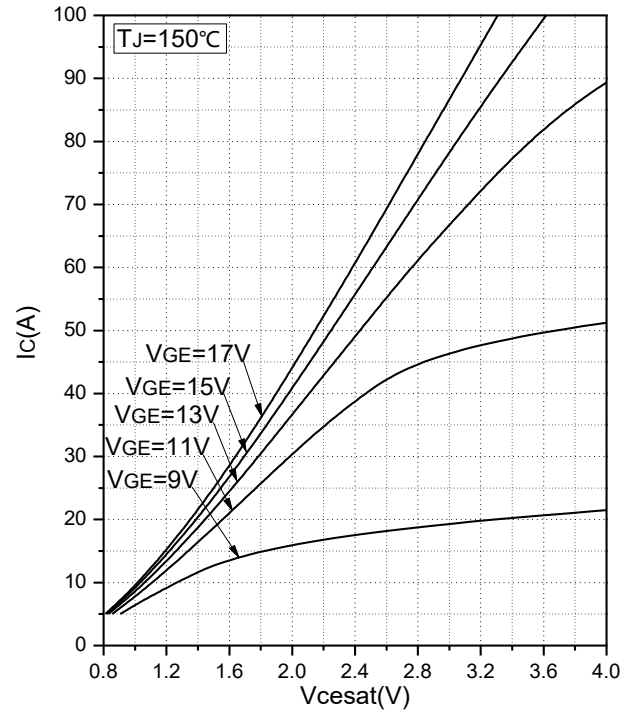


Fig.2 Typical Output Characteristics

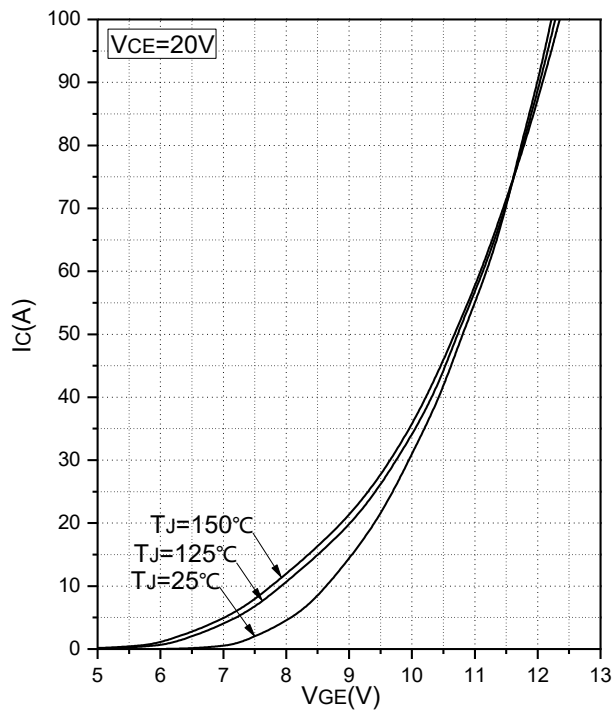


Fig.3 Transfer Characteristics

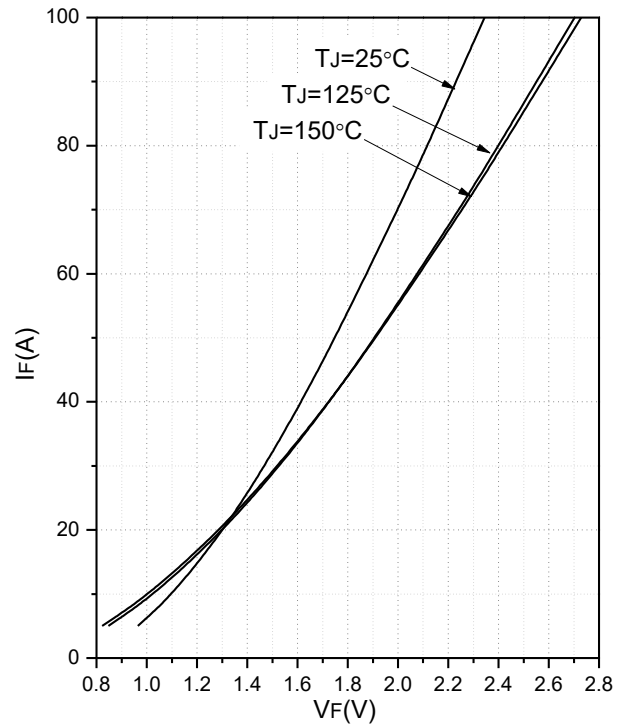


Fig.4 Forward Characteristics of Diode

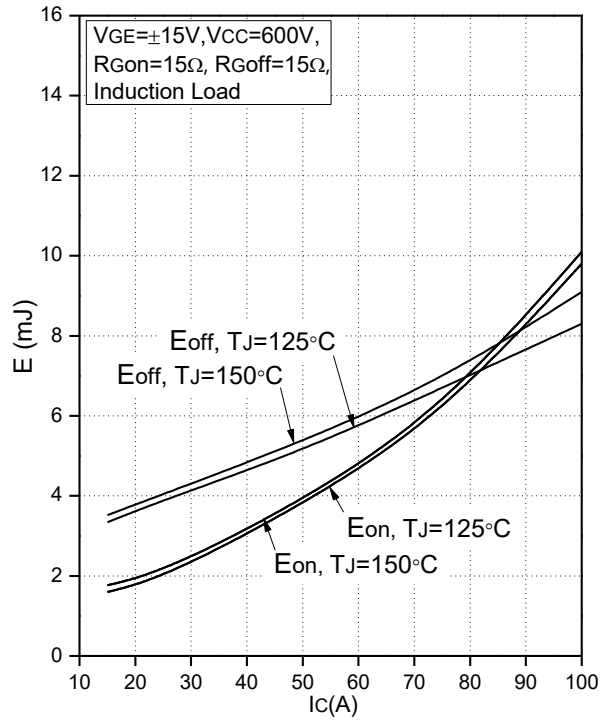


Fig.5 Typical Switching Loss vs. Collector Current

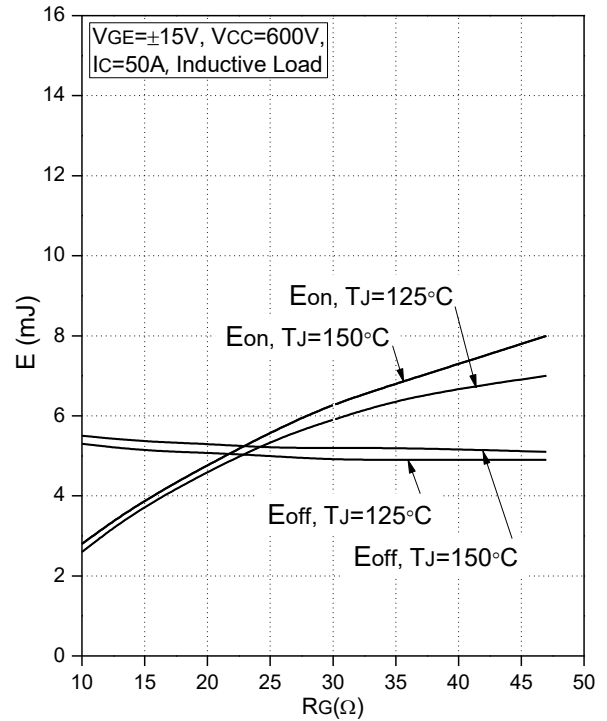


Fig.6 Typical Switching Loss vs. Gate Resistance

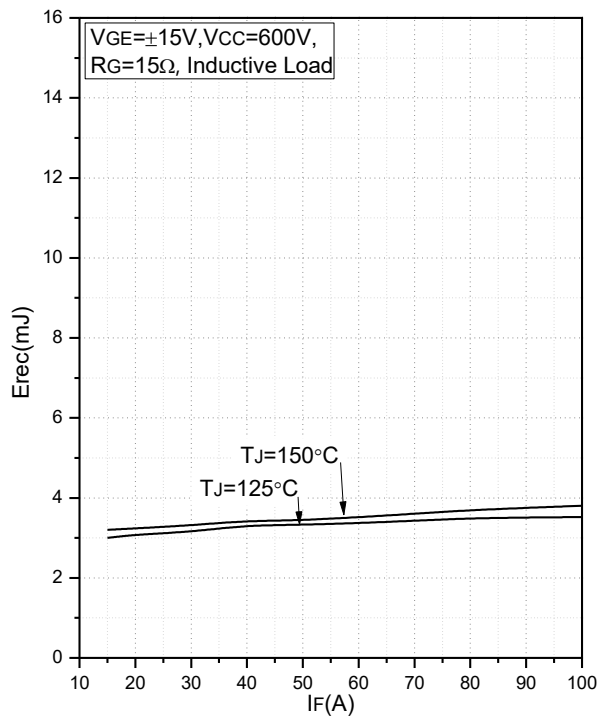


Fig.7 Typical Switching Loss vs. Forward Current

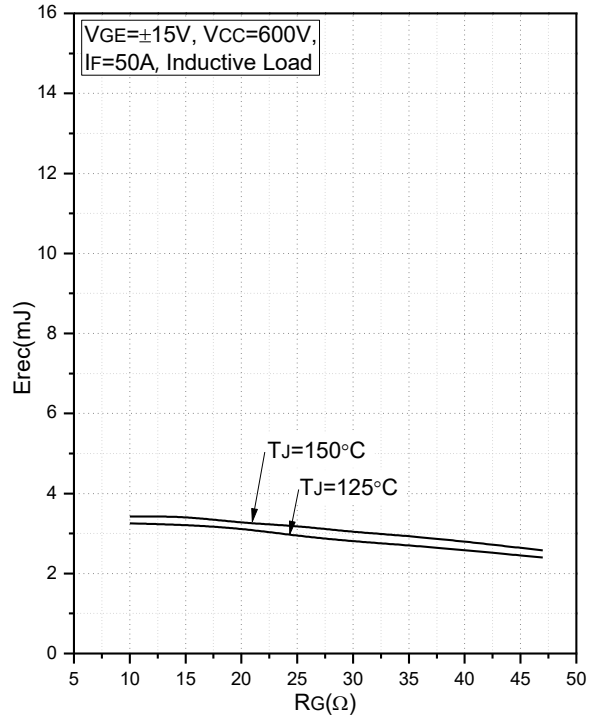


Fig.8 Typical Switching Loss vs. Gate Resistance

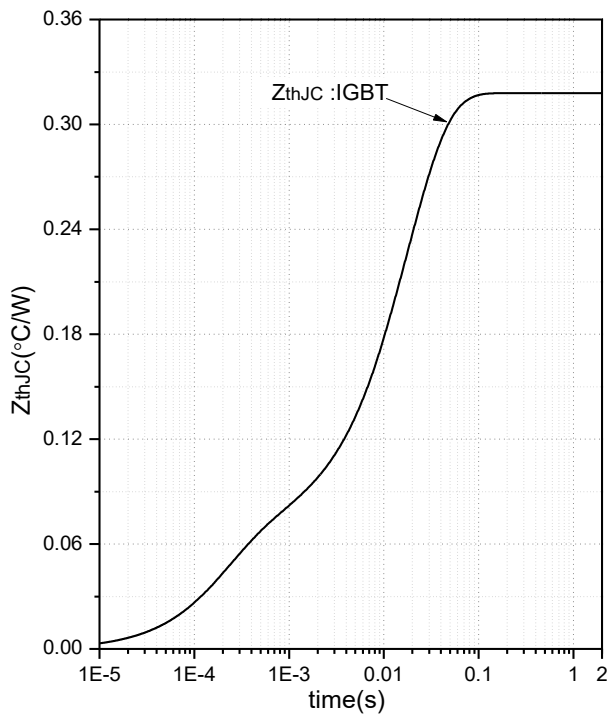


Fig.9 Transient Thermal Impedance (IGBT)

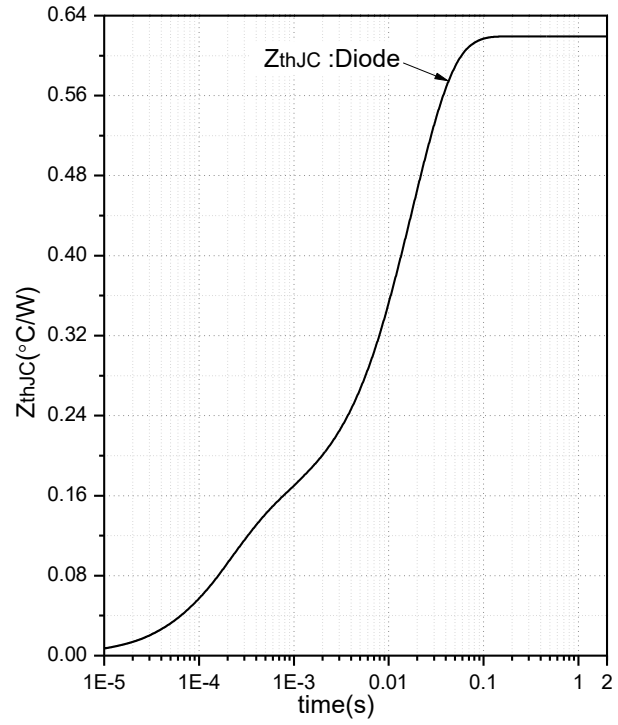


Fig.10 Transient Thermal Impedance (Diode)

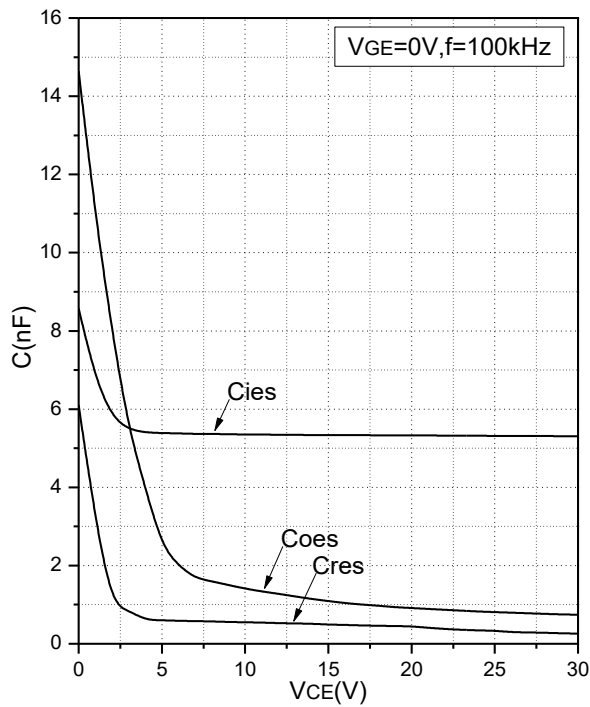


Fig.11 Capacitance Characteristics

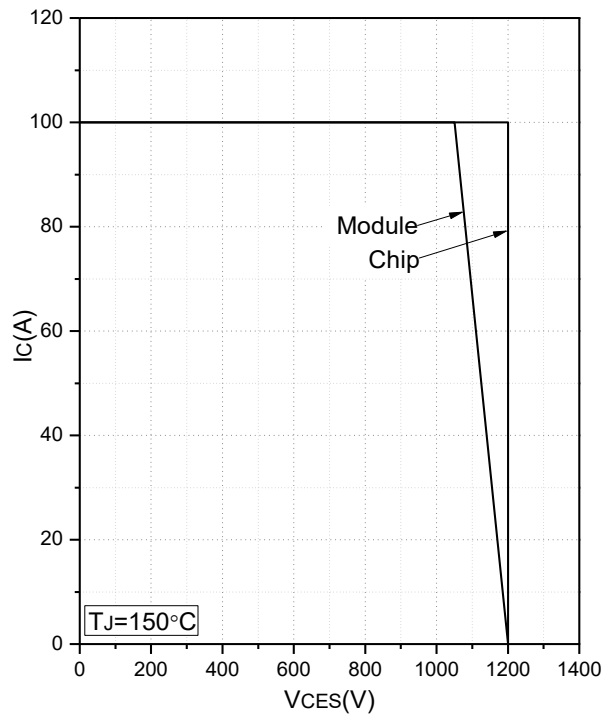


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

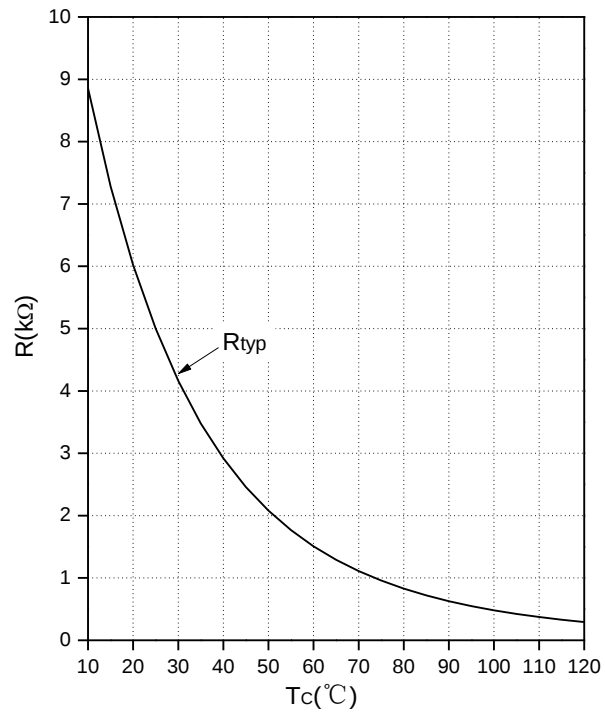
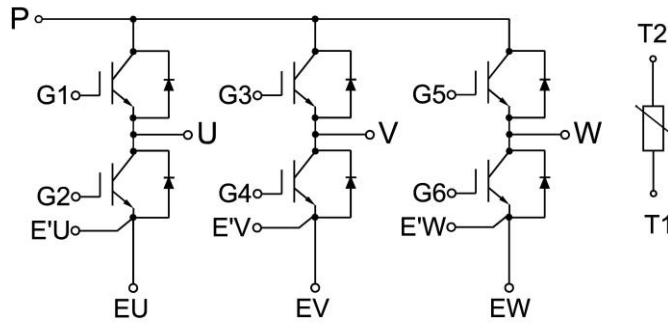


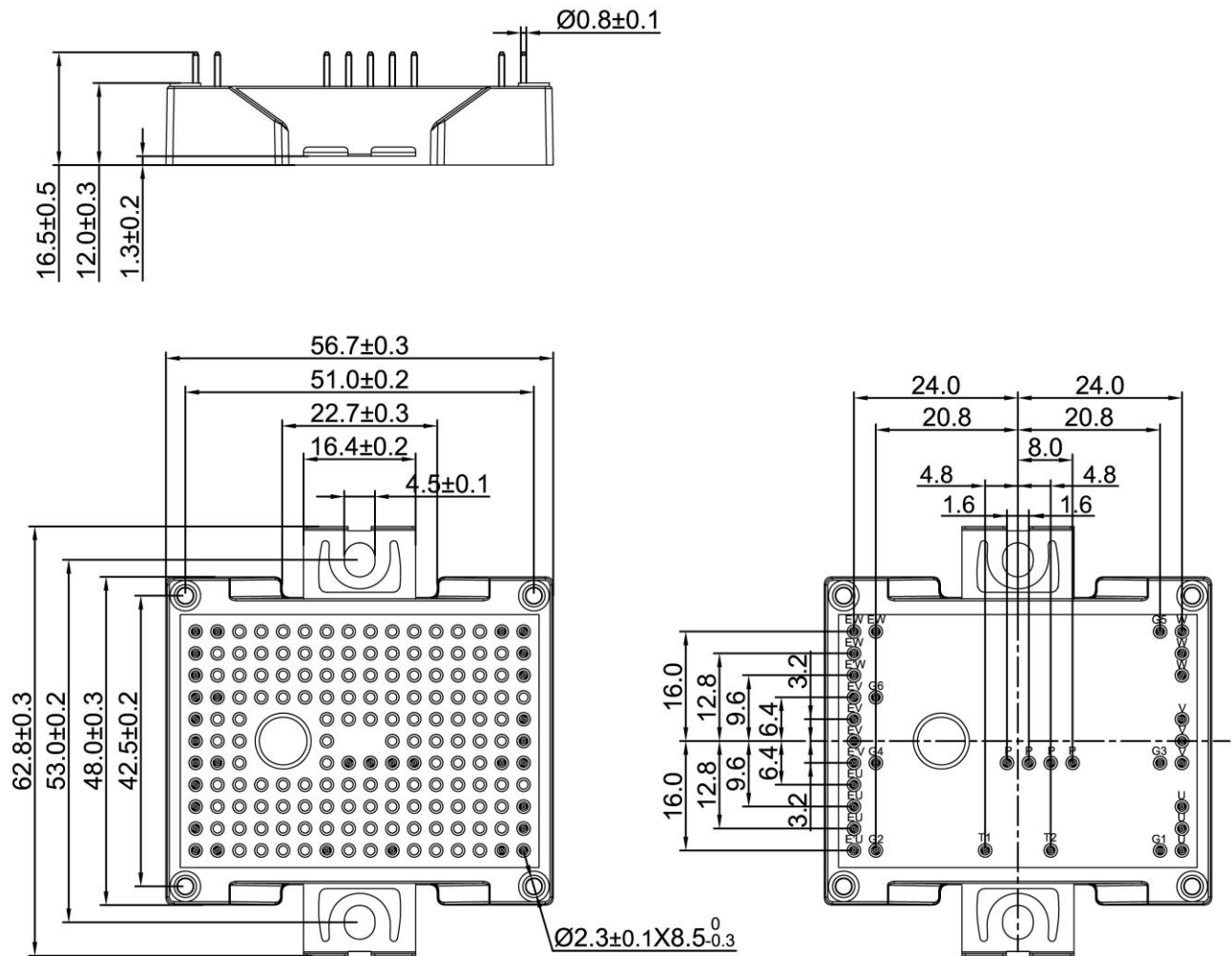
Fig.13 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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