



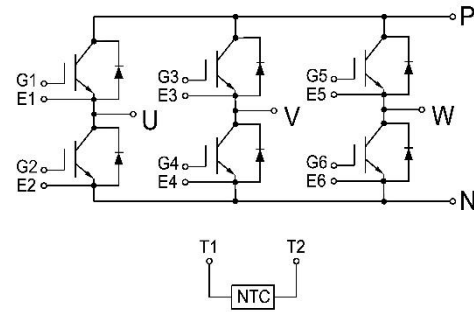
GT50FF120C7H

IGBT Module

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
- Power Generation
- UPS

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c=100^\circ\text{C}$	50	A
		$T_c=25^\circ\text{C}$	100	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	100	A
P_D	Maximum Power Dissipation (IGBT)	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	379	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.7mA, V_{CE}=V_{GE}$	5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=50A, V_{GE}=15V$	$T_J=25^{\circ}C$	1.75	2.10	V
			$T_J=125^{\circ}C$	2.20		V
			$T_J=150^{\circ}C$	2.30		V
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	$V_{GE}=\pm 20V, V_{CE}=0V, T_J=25^{\circ}C$			± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz$		5.32		nF
C_{oes}	Output Capacitance			0.81		nF
C_{res}	Reveres Transfer Capacitance			0.34		nF

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	$T_J=25^{\circ}C$		92		ns
			$T_J=125^{\circ}C$		92		
			$T_J=150^{\circ}C$		96		
t_r	Rise Time		$T_J=25^{\circ}C$		54		ns
			$T_J=125^{\circ}C$		56		
			$T_J=150^{\circ}C$		56		
$t_{d(off)}$	Turn-off Delay Time	$T_J=25^{\circ}C$		222		ns	
		$T_J=125^{\circ}C$		242			
		$T_J=150^{\circ}C$		256			
t_f	Fall Time	$T_J=25^{\circ}C$		152		ns	
		$T_J=125^{\circ}C$		192			
		$T_J=150^{\circ}C$		210			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_c=50A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ $di/dt=767A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		4.81		mJ
		$T_J=125^{\circ}C$		6.16			
		$T_J=150^{\circ}C$		7.48			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =50A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=4951V/μs(T _J =150°C), Inductive Load	T _J =25°C		3.76		mJ
			T _J =125°C		4.21		
			T _J =150°C		5.30		
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		3.4		Ω
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _{Gon} =15Ω, R _{Goff} =15Ω, T _J =25°C			10			μs
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.40	°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}	Peak Diode Current Repetitive	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℃		1.75		V
			T _J =125℃		1.85		
			T _J =150℃		1.85		
t _{rr}	Reverse Recovery Time	I _F =50A, -diF/dt=904A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		290		ns
			T _J =125℃		524		
			T _J =150℃		542		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		38.6		A
			T _J =125℃		45.5		
			T _J =150℃		48.8		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		5.7		μC
			T _J =125℃		10.3		
			T _J =150℃		11.1		



E _{rec}	Reverse Recovery Energy	I _F =50A, -diF/dt=904A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		1.86		mJ
			T _J =125°C		3.83		
			T _J =150°C		4.09		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.52	°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	Conditions	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 30s	4500			V
Internal Isolation			Al ₂ O ₃			
d _{creep}	Creepage Distance		12.7			mm
d _{clear}	Clearance		12.7			mm
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		225			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.05	°C/W
M	Mounting Screw:M4		1.5		2.0	N·m
G	Weight			31		g



Ordering Information Table

Device code	G	T	50	FF	120	C7	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)

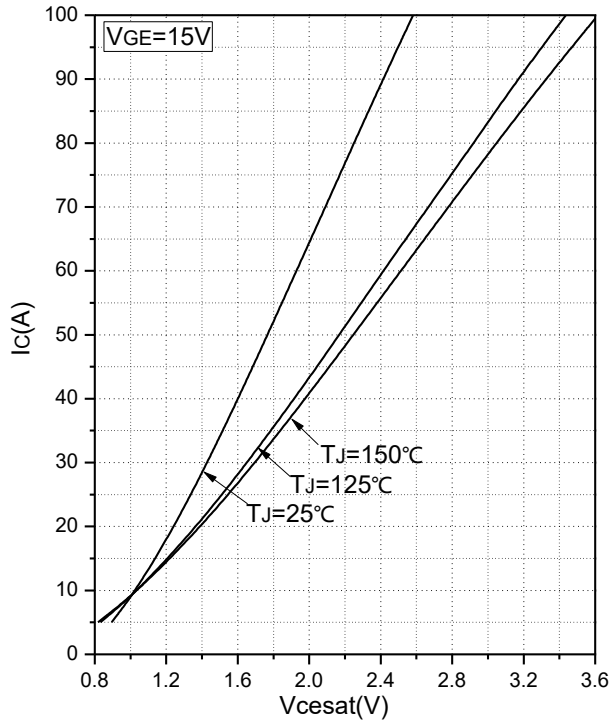


Fig.1 Typical Saturation Voltage Characteristics

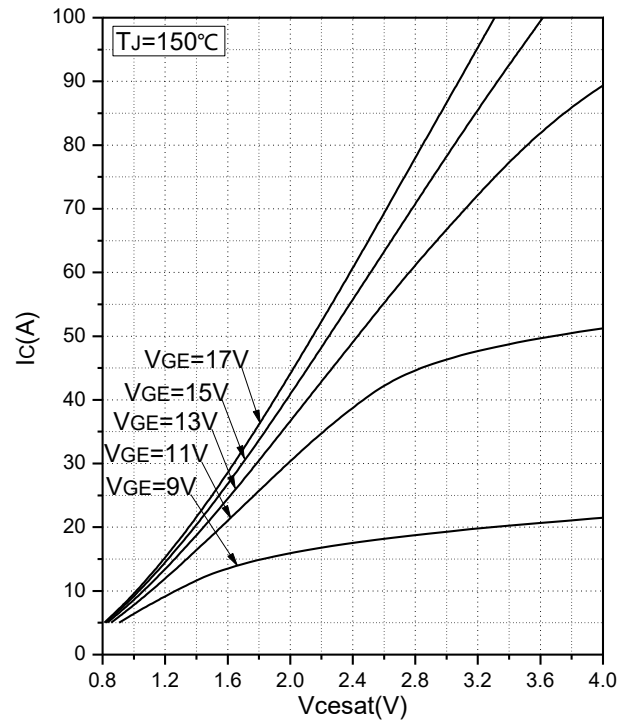


Fig.2 Typical Output Characteristics

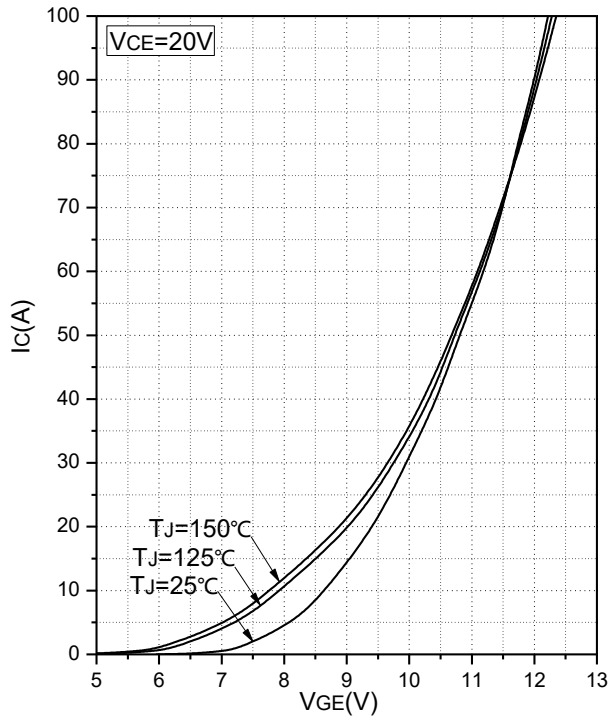


Fig.3 Transfer Characteristics

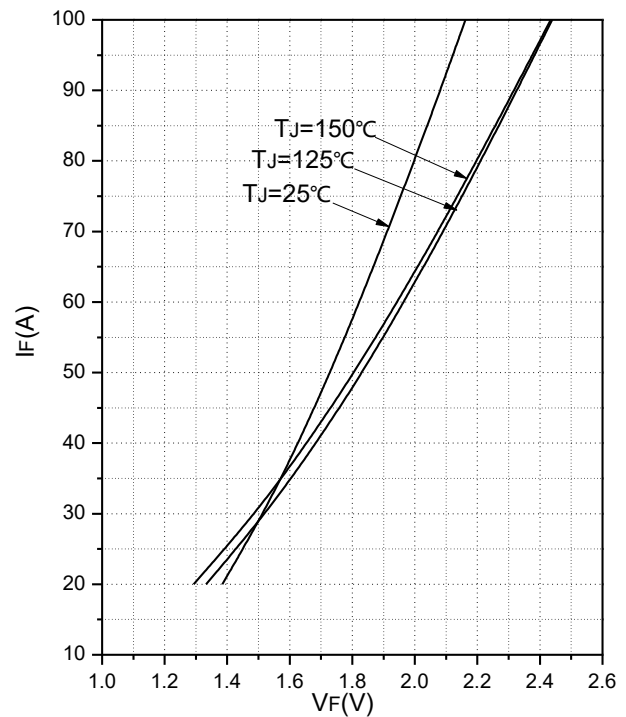


Fig.4 Forward Characteristics of Diode

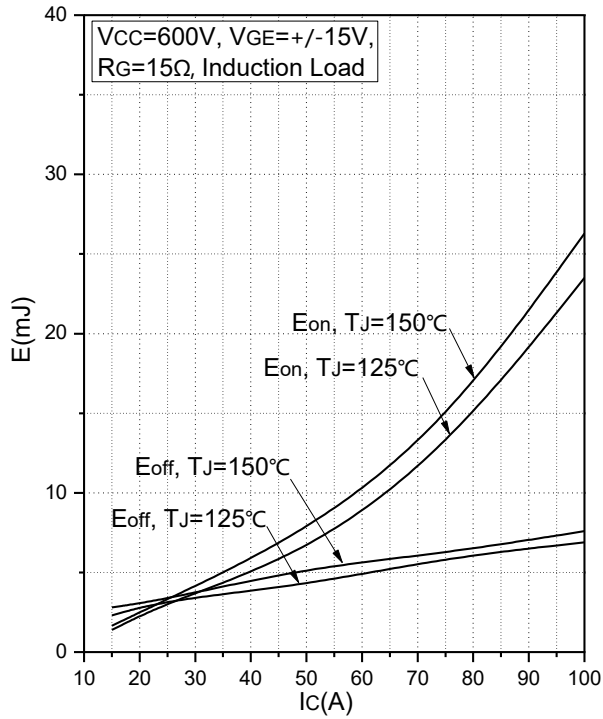


Fig.5 Typical Switching Loss vs. Collector Current

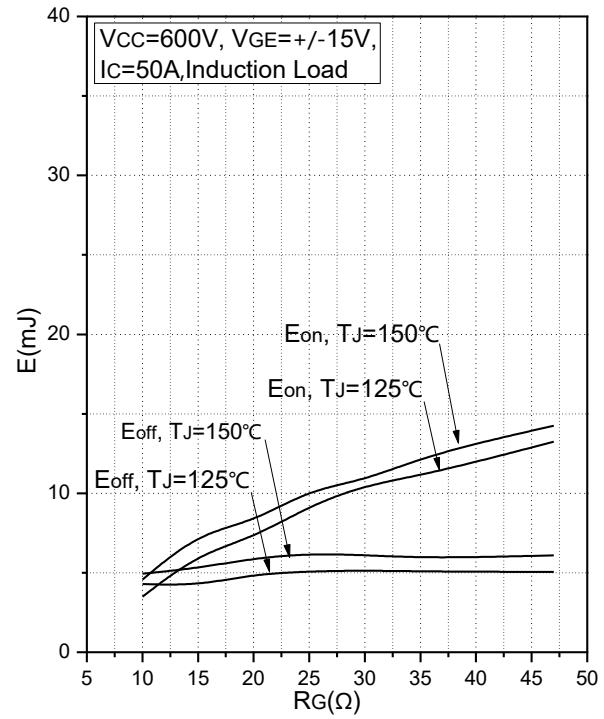


Fig.6 Typical Switching Loss vs. Gate Resistance

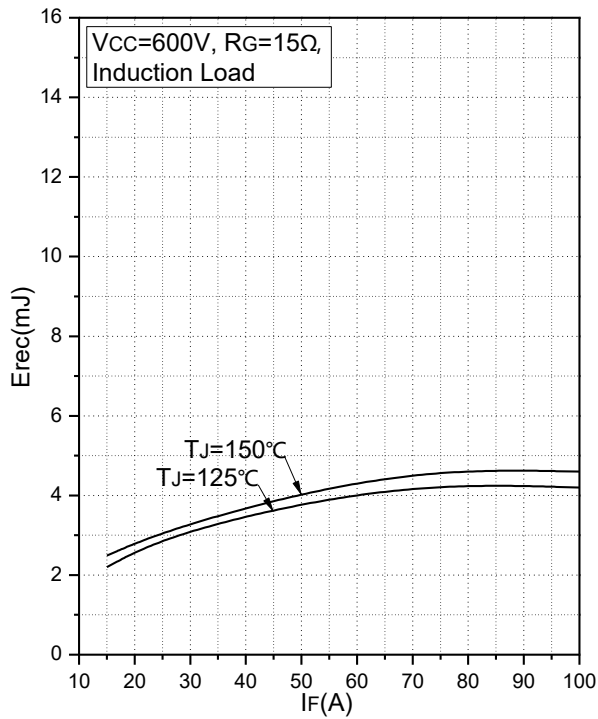


Fig.7 Typical Switching Loss vs. Forward Current

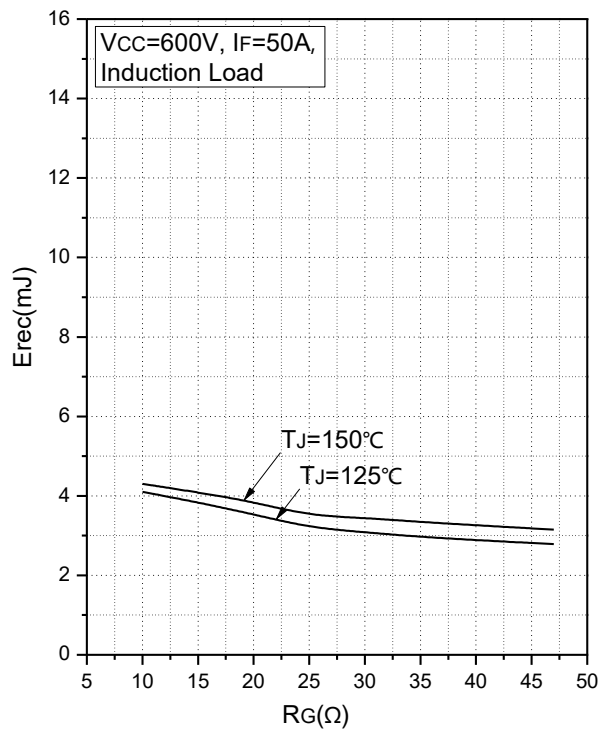


Fig.8 Typical Switching Loss vs. Gate Resistance

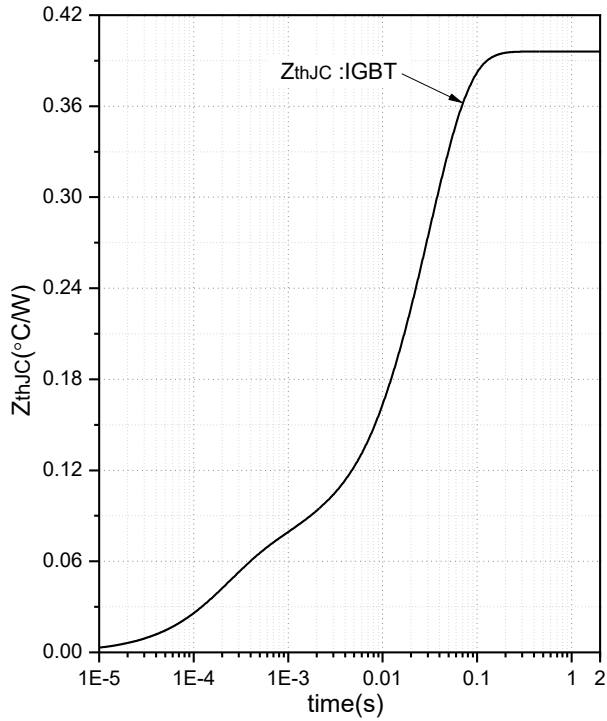


Fig.9 Transient Thermal Impedance

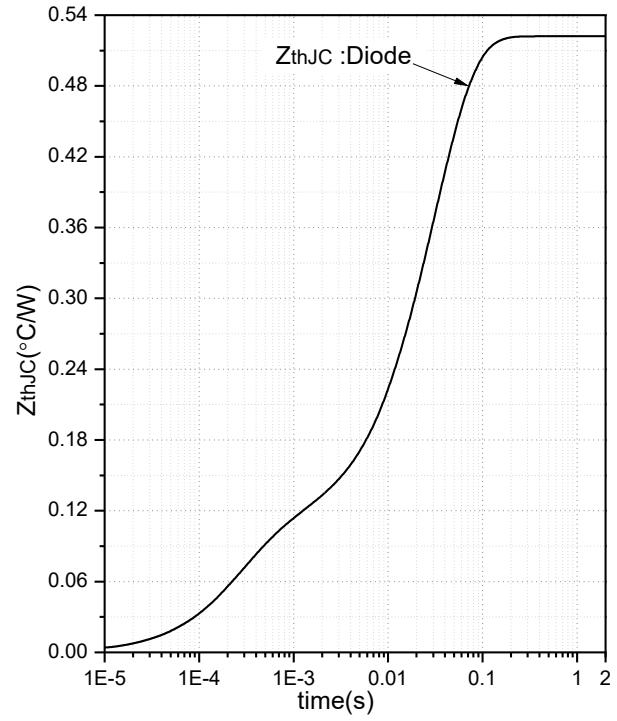


Fig.10 Transient Thermal Impedance

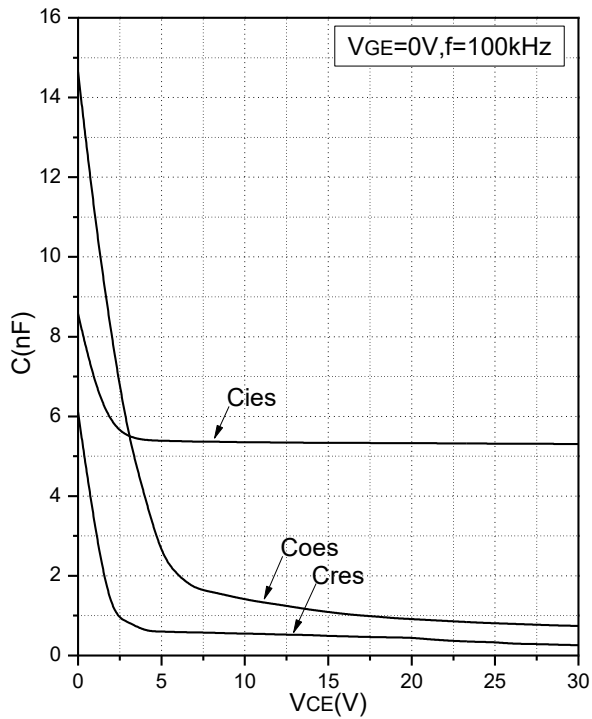


Fig.11 Capacitance Characteristics

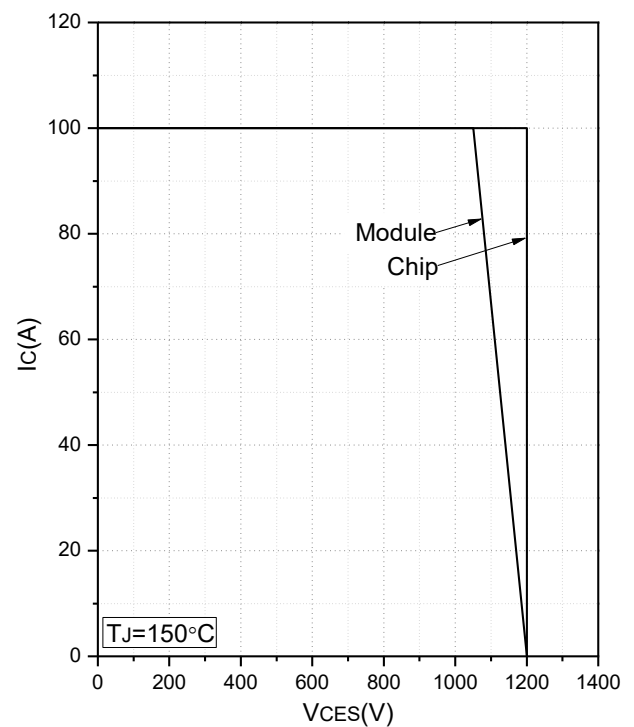


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

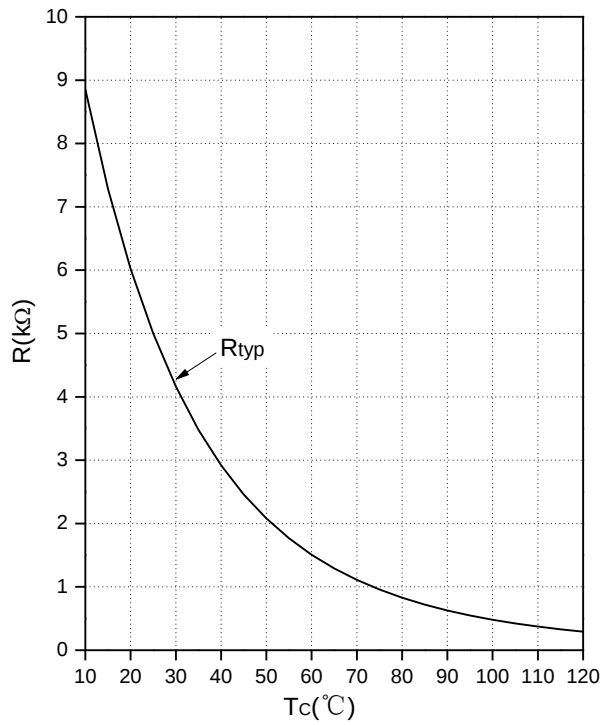
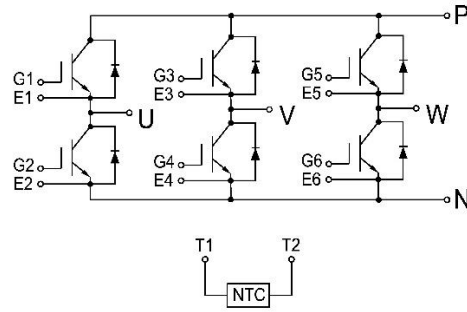


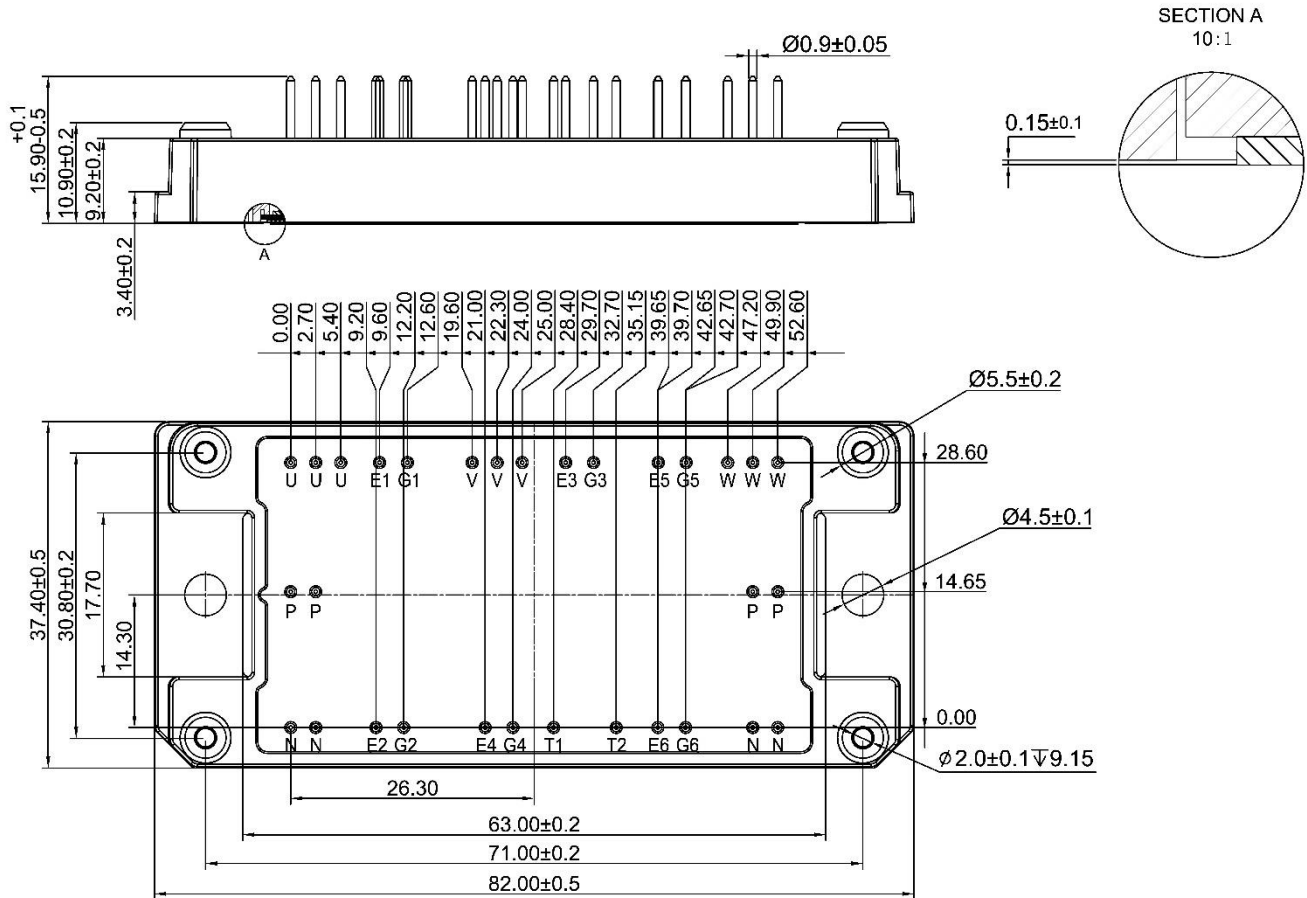
Fig.13 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
08/31/2024	A	Final Version

Announcements

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