

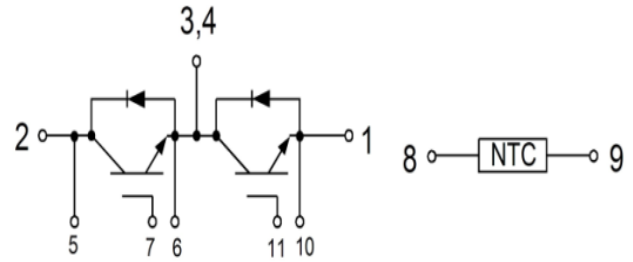


GT600HF65T9H

IGBT Module

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated >10 μ s
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2xIc)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- UPS Systems
- Servo Applications
- High Power Converters
- Motor Drives
- Wind Turbines

IGBT, Inverter

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

V _{CES}	Collector-Emitter Blocking Voltage		650	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	600	A
		T _C =25°C	1200	A
I _{CM}	Peak Collector Current Repetitive	T _J =175°C	1200	A
t _{sc}	Short Circuit Withstand Time		>10	μs
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	2450	W



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

Static Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=12\text{mA}$, $V_{CE}=V_{GE}$	5.00	5.90	6.80	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=600\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	1.50	1.70	V
			$T_J=125^\circ\text{C}$	1.70		V
			$T_J=150^\circ\text{C}$	1.70		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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^\circ\text{C}$			800	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		44		nF
C_{oes}	output Capacitance			3.38		nF
C_{res}	Reverse Transfer Capacitance			1.81		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=300\text{V}$, $I_C=600\text{A}$, $R_{Gon}=2\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	0.52		μs
			$T_J=125^\circ\text{C}$	0.52		
			$T_J=150^\circ\text{C}$	0.53		
t_r	Rise Time		$T_J=25^\circ\text{C}$	0.37		μs
			$T_J=125^\circ\text{C}$	0.38		
			$T_J=150^\circ\text{C}$	0.39		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^\circ\text{C}$	0.46		μs
			$T_J=125^\circ\text{C}$	0.47		
			$T_J=150^\circ\text{C}$	0.48		
t_f	Fall Time	$T_J=25^\circ\text{C}$	0.21		μs	
		$T_J=125^\circ\text{C}$	0.24			
		$T_J=150^\circ\text{C}$	0.25			
E_{on}	Turn-on Switching Loss	$V_{CC}=300\text{V}$, $I_C=600\text{A}$, $R_{Gon}=2\Omega$, $V_{GE}=\pm 15\text{V}$, $di/dt=1350\text{A}/\mu\text{s}$ ($T_J=150^\circ\text{C}$) Inductive Load	$T_J=25^\circ\text{C}$	14.8		mJ
			$T_J=125^\circ\text{C}$	17.5		
			$T_J=150^\circ\text{C}$	18.8		



E _{off}	Turn-off Switching Loss	V _{CC} =300V, I _C =600A, R _{Goff} =2Ω, V _{GE} =±15V, du/dt=1766V/μs (T _J =150°C) Inductive Load	T _J =25°C	58.1	mJ
			T _J =125°C	62.8	
			T _J =150°C	65.6	
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C	3.77	μC
RBSOA	I _C =1200A, V _{CC} =600V, V _p =650V, R _G =2Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid	
SCSOA	V _{CC} =300V, V _{GE} =15V, T _J =150°C			10	μs
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case(per leg)			0.061	°C/W

Diode, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage	650	V
I _F	Diode Continuous Forward Current	600	A
I _{FM}	Diode Maximum Forward Current	1200	A

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =600A	T _J =25°C	1.80		V
			T _J =125°C	1.75		
			T _J =150°C	1.70		
t _{rr}	Reverse Recovery Time		T _J =25°C	0.19		μs
			T _J =125°C	0.27		
			T _J =150°C	0.29		
I _{rr}	Peak Reverse Recovery Current	I _F =600A, -diF/dt =1490A/μs(T _J =125°C), V _R =300V, V _{GE} =-15V	T _J =25°C	84		A
			T _J =125°C	155		
			T _J =150°C	169		
Q _{rr}	Reverse Recovery Charge		T _J =25°C	9.96		μC
			T _J =125°C	25.58		
			T _J =150°C	30.6		



E _{rec}	Reverse Recovery Energy	I _F =600A, -di _F /dt=1490A/μs(T _J =125°C), V _R =300V, V _{GE} =-15V	T _J =25°C	1.92	mJ
			T _J =125°C	5.12	
			T _J =150°C	6.64	
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per leg)			0.119	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Description		Min.	Typ.	Max.	Units.
R ₂₅	Rated Resistance	T _C =25°C		5		kΩ
ΔR/R	Deviation of R100	T _C =100°C, R ₁₀₀ =481Ω	-5		5	%
P ₂₅	Power Dissipation	T _C =25°C			10	mW
B _{25/50}	B-Value	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]		3380		K
B _{25/80}	B-Value	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]		3440		K

Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute		2500		V
Internal Isolation				Al ₂ O ₃		
Material of Module Baseplate				Copper		
L _{sCE}	Stray Inductance Module			20		nH
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)				0.02	°C/W
M	Terminals Connection Torque	Screw M6-Mounting according to valid application note	3.0		6.0	N·m
M	Mounting Torque for Module Mounting	Screw M5--Mounting according to valid application note	3.0		6.0	N·m
G	Weight			330		g



Ordering Information Table

Device code	G	T	600	HF	65	T9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (600=600A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (65=650V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

DATA SHEET

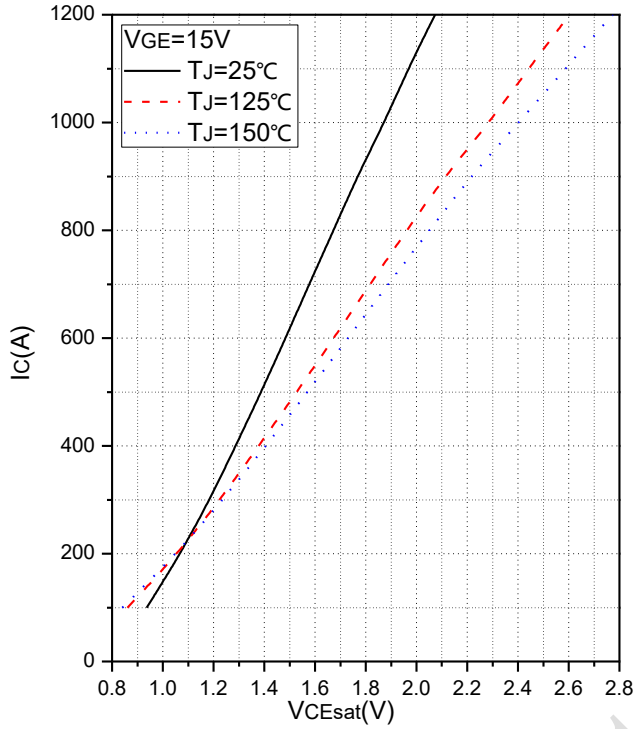


Fig.1 Typical Saturation Voltage Characteristics

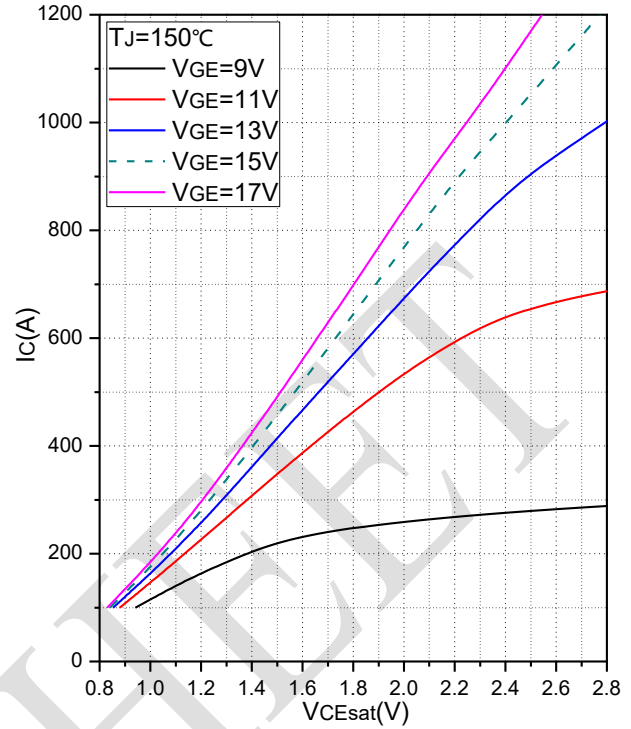


Fig.2 Typical Output Characteristics

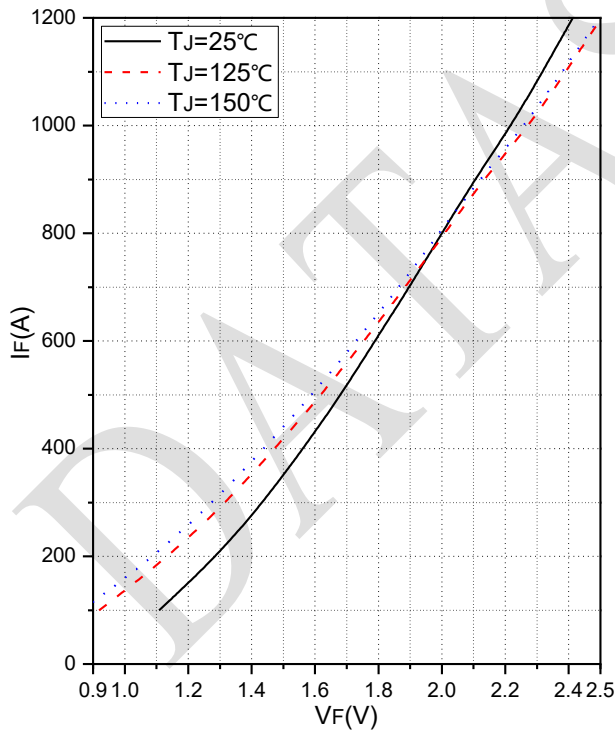


Fig.3 Forward Characteristics of Diode

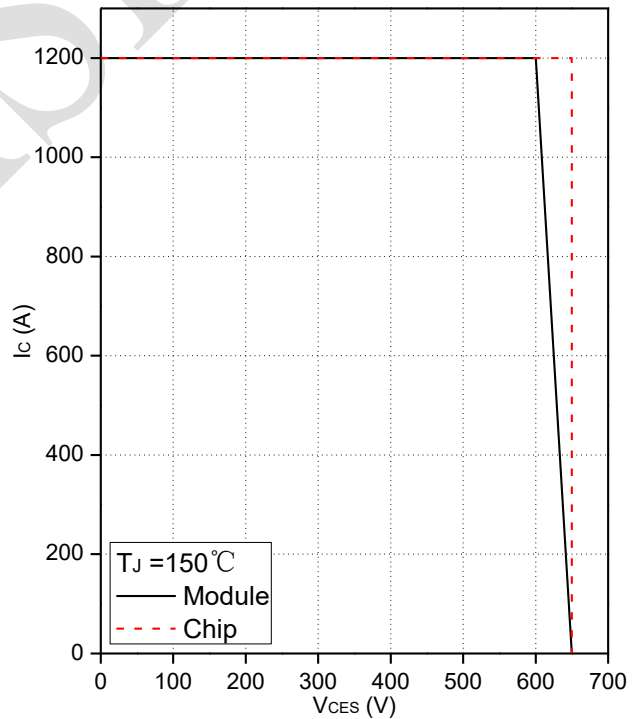


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

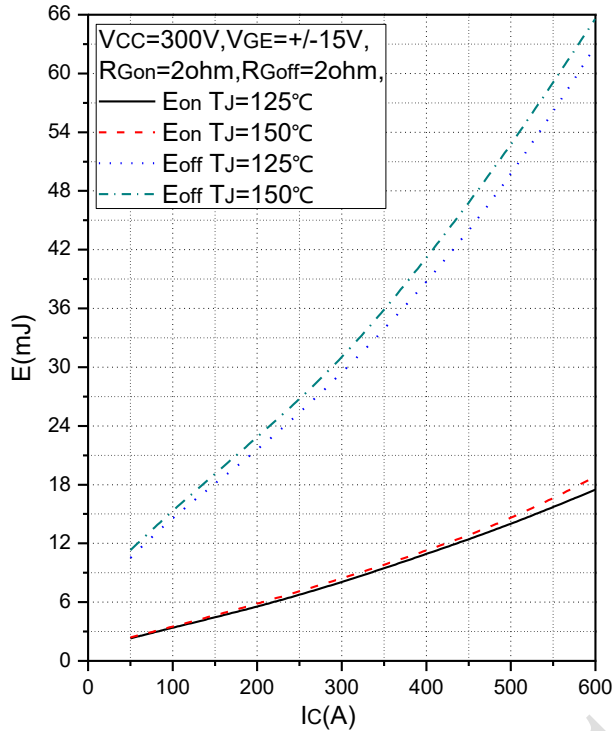


Fig.5 Typical Switching Loss vs. Collector Current

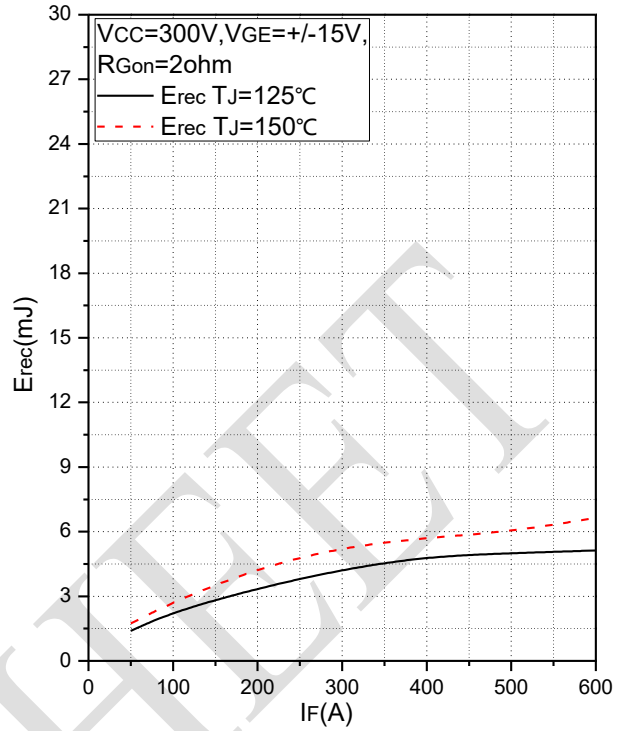


Fig.6 Typical Switching Loss vs. Forward Current

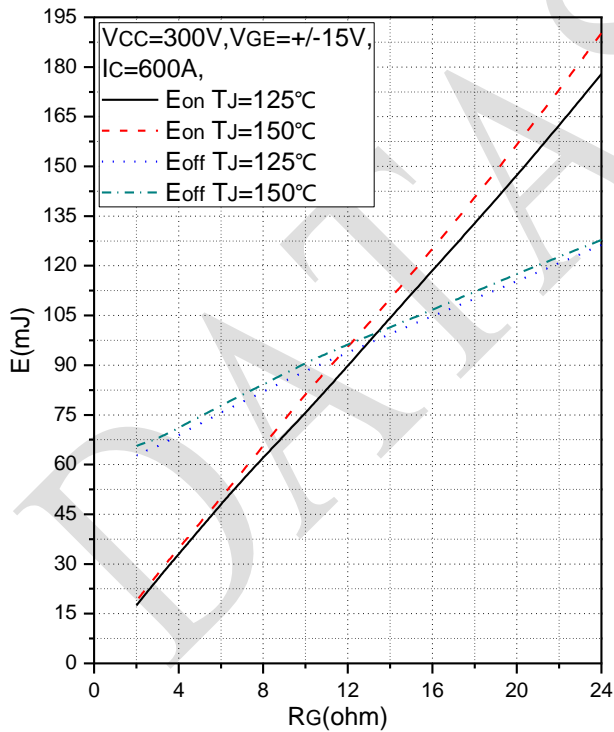


Fig.7 Typical Switching Loss vs. Gate Resistance

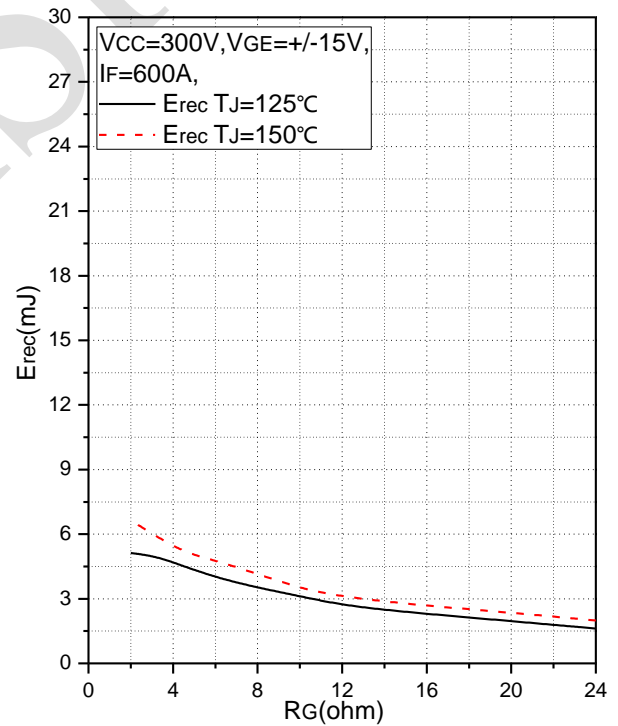


Fig.8 Typical Switching Loss vs. Gate Resistance

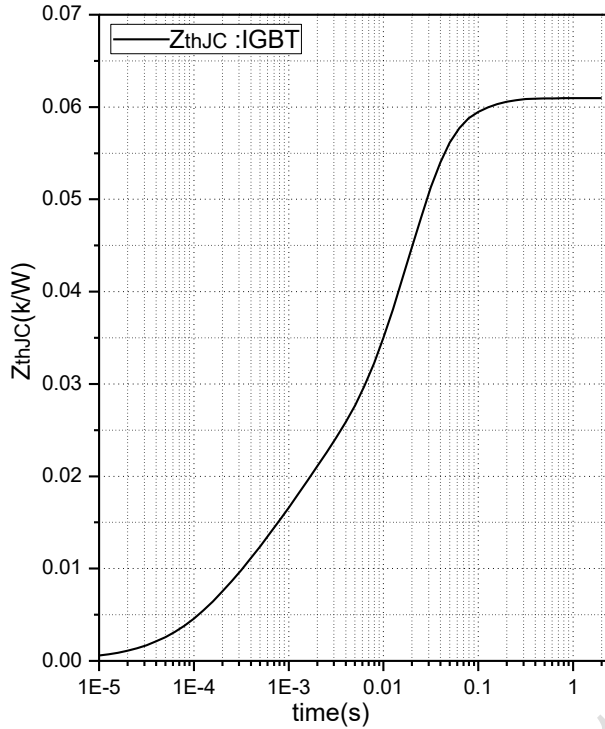


Fig.9 Transient Thermal Impedance (IGBT)

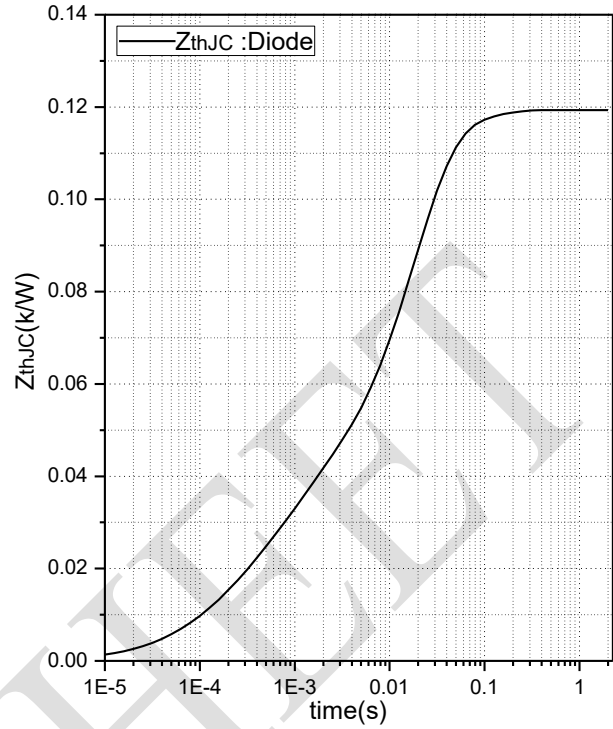


Fig.10 Transient Thermal Impedance (Diode)

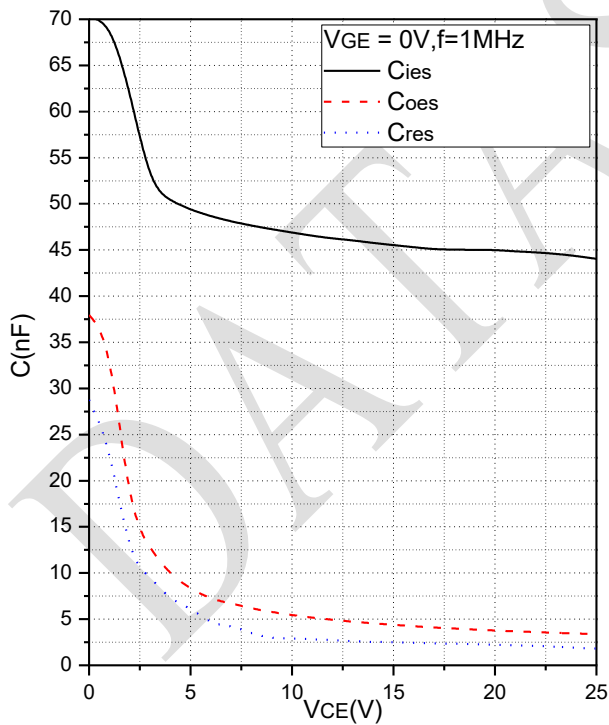


Fig.11 Capacitance Characteristics

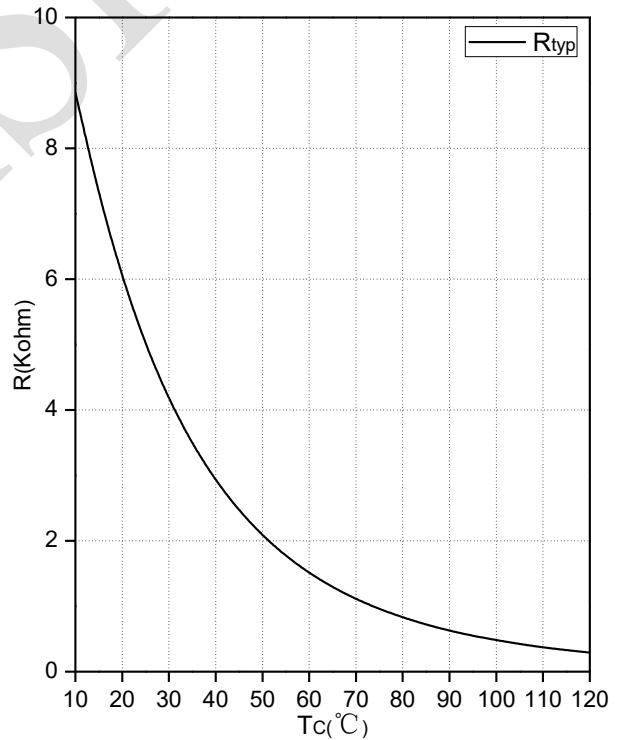
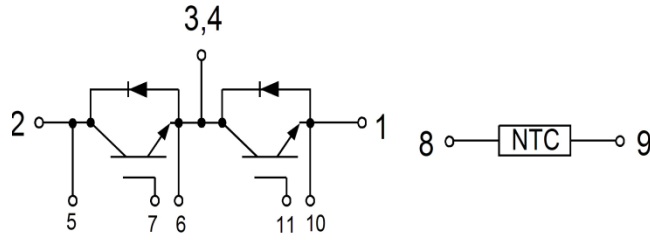


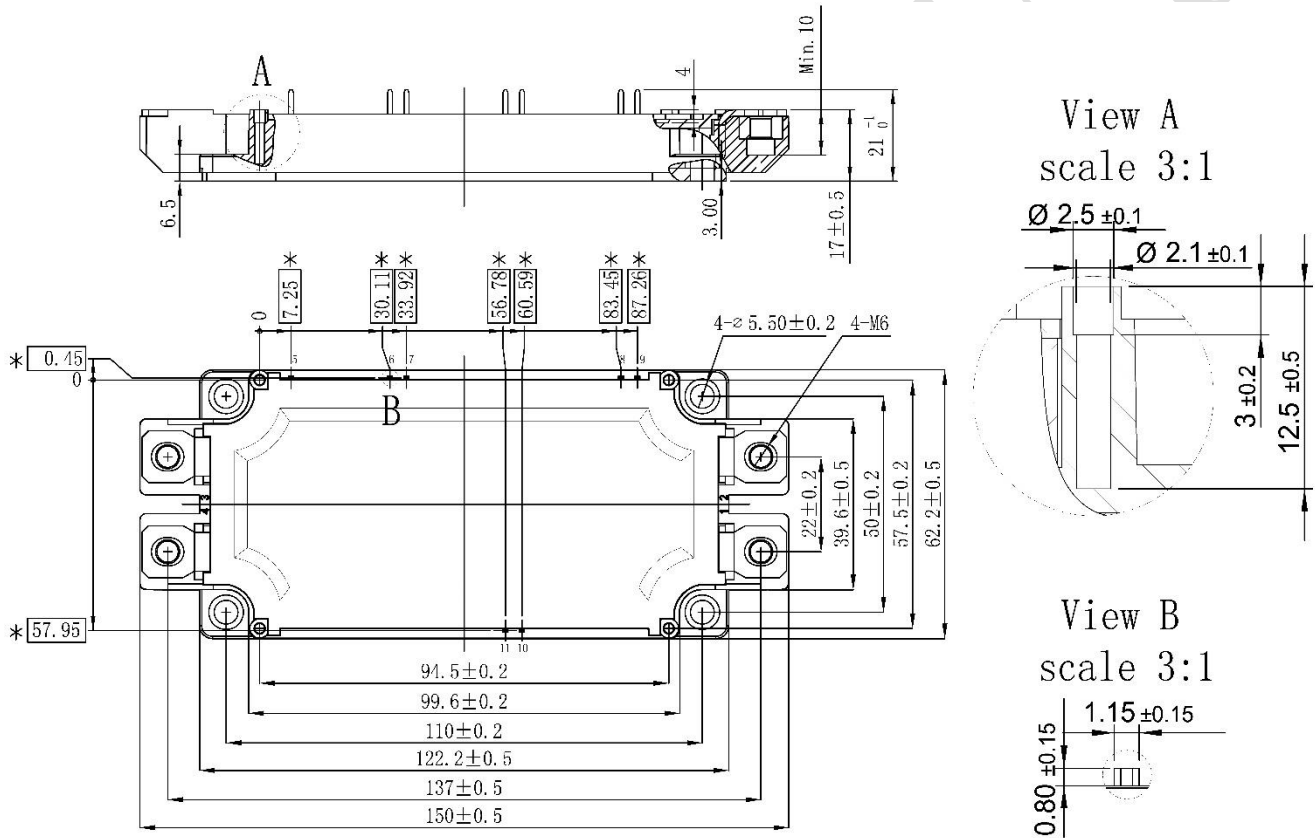
Fig.12 NTC Temperature Characteristics



Internal Circuit



Package Outline (Unit: mm):





Date	Revision	Notes
01/25/2022	01	Initial Release

Announcement

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