



GT25RFF120T5H

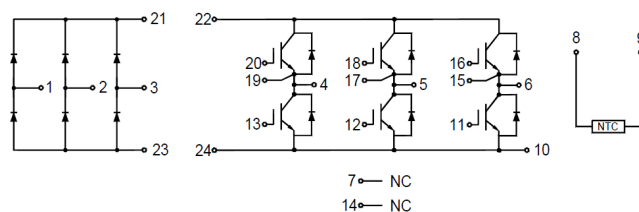
IGBT Module

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	$T_c=100^\circ\text{C}$	25	A
		$T_c=25^\circ\text{C}$	50	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	50	A
P_D	Maximum Power Dissipation per IGBT	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	237	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	5.60	6.50	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.65	1.90	V
			$T_J=125^{\circ}\text{C}$	1.95		V
			$T_J=150^{\circ}\text{C}$	2.00		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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			100	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_J=25^{\circ}\text{C}$		2.41		nF
C_{oes}	Output Capacitance			0.17		nF
C_{res}	Reverse Transfer Capacitance			0.02		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		101		ns
			T _J =125℃		99		
			T _J =150℃		99		
t _r	Rise Time		T _J =25℃		39		ns
			T _J =125℃		38		
			T _J =150℃		37		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =25A, R _{Goff} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		137		ns
			T _J =125℃		147		
			T _J =150℃		144		
t _f	Fall Time		T _J =25℃		494		ns
			T _J =125℃		723		
			T _J =150℃		728		
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, di/dt=548A/μs (T _J =150℃) Inductive Load	T _J =25℃		2.14		mJ
			T _J =125℃		2.76		
			T _J =150℃		2.97		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =25A, R _{Goff} =20Ω, V _{GE} =±15V, du/dt=2299V/μs (T _J =150°C) Inductive Load	T _J =25°C		1.97		mJ
			T _J =125°C		3.22		
			T _J =150°C		3.54		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		128		nC
R _{G(int)-C}	Internal Gate Resistance (chip)		T _J =25°C		0		Ω
RBSOA	I _C =50A, V _{CC} =1050V, V _p =1200V, R _G =20Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid			
I _{SC}	V _{CC} =600V, V _{GE} =±15V, R _G =20Ω, t _p =10μs, T _J =125°C				90		A
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case(per IGBT)					0.633	°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		25	A
I _{FM}	Repetitive Peak Forward Current	t _p =1ms	50	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 =25A	T _J =25°C		1.65	1.90	V
			T _J =125°C		1.70		
			T _J =150°C		1.70		
t _{rr}	Reverse Recovery Time	I _F =25A, -diF/dt=695A/μs(T _J =150°C) V _{rr} =600V, V _{GE} =-15V	T _J =25°C		213		ns
			T _J =125°C		441		
			T _J =150°C		458		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		24.4		A
			T _J =125°C		29.1		
			T _J =150°C		30.3		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		2.59		μC
			T _J =125°C		4.97		
			T _J =150°C		5.52		



E _{rec}	Reverse Recovery Energy	I _F =25A, -diF/dt=695A/μs(T _J =150°C) V _{rr} =600V, V _{GE} =-15V	T _J =25°C		0.85		mJ
			T _J =125°C		1.95		
			T _J =150°C		2.17		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.804	°C/W

Diode, Rectifier

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1800	V
I _{FRMSM}	Maximum RMS Forward Current per Chip	T _J =25°C	15	A
I _{RMSM}	Maximum RMS Current at Rectifier Output	T _J =80°C	25	A
I _{FSM}	Surge Current @t _p =10 ms	T _J =25°C	320	A
		T _J =125°C	240	
I ² t	I ² t - value	T _J =25°C	512	A ² s
		T _J =125°C	288	

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =15A	T _J =25°C		1.05		V
			T _J =125°C		1.00		
I _R	Reverse Current	V _R =1200V	T _J =25°C			1	mA
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.917	°C/W



Internal NTC-Thermistor Characteristics

R ₂₅	T _C =25℃	5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =465Ω		±5	%
P ₂₅	T _C =25℃	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, 30s	4500			V
Material of Module Baseplate			Copper			
Internal Isolation			Al ₂ O ₃			
T _J	Maximum Junction Temperature				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T _{stg}	Storage Temperature		-40		+150	℃
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)				0.04	℃/W
M	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			200		g



Ordering Information Table

Device code

G	T	25	RFF	120	T5	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (25=25A)
- ④ - Circuit Configuration: RFF (Rectifier +Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

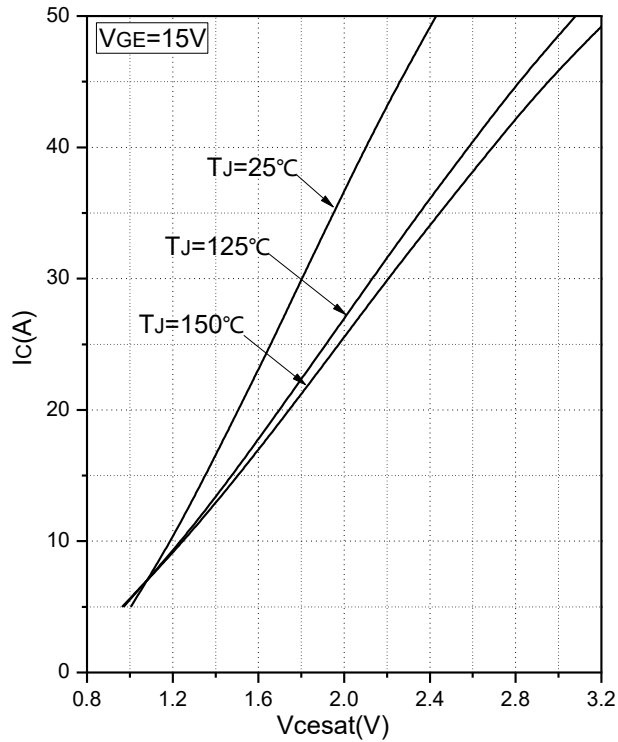


Fig.1 Typical Saturation Voltage Characteristics(Inverter)

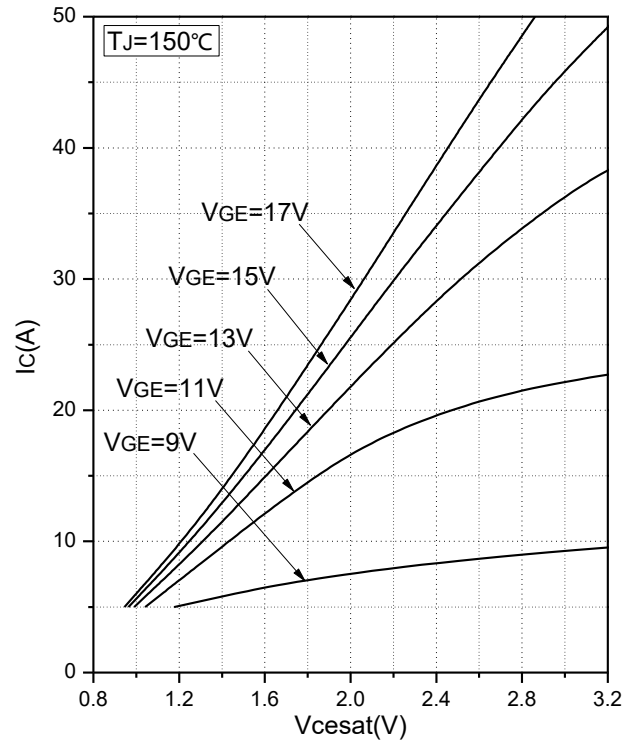


Fig.2 Typical Output Characteristics(Inverter)

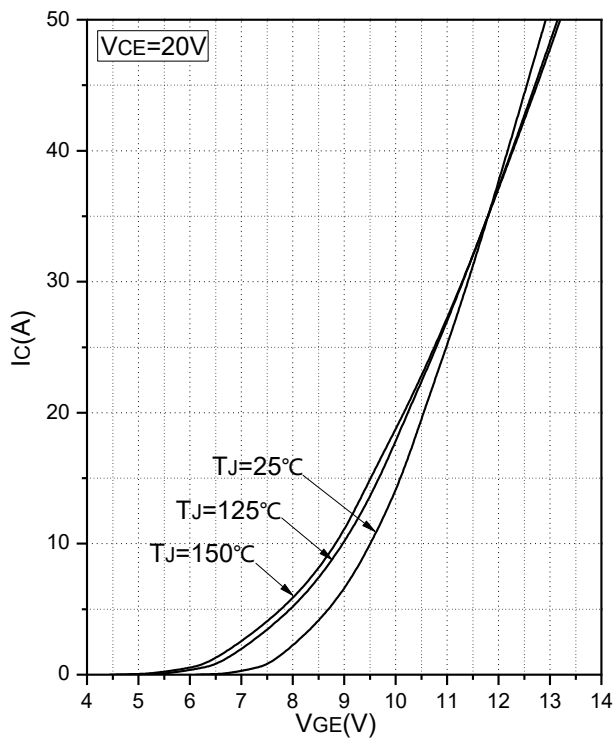


Fig.3 Transfer Characteristic (Inverter)

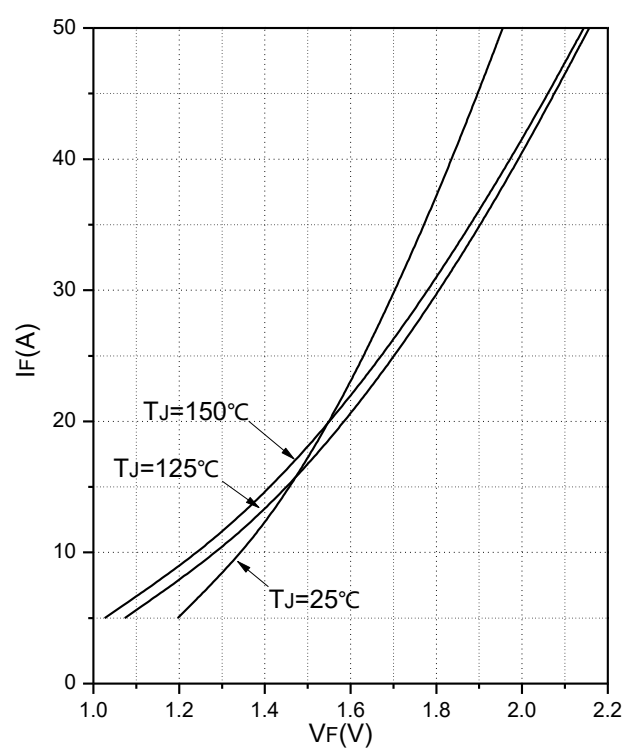


Fig.4 Forward Characteristics of Diode (Inverter)

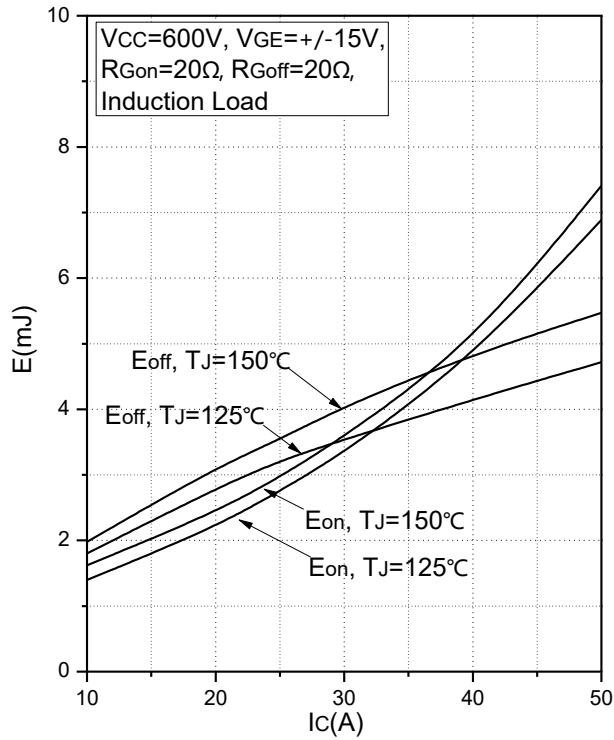


Fig.5 Typical Switching Loss vs. Collector Current (Inverter)

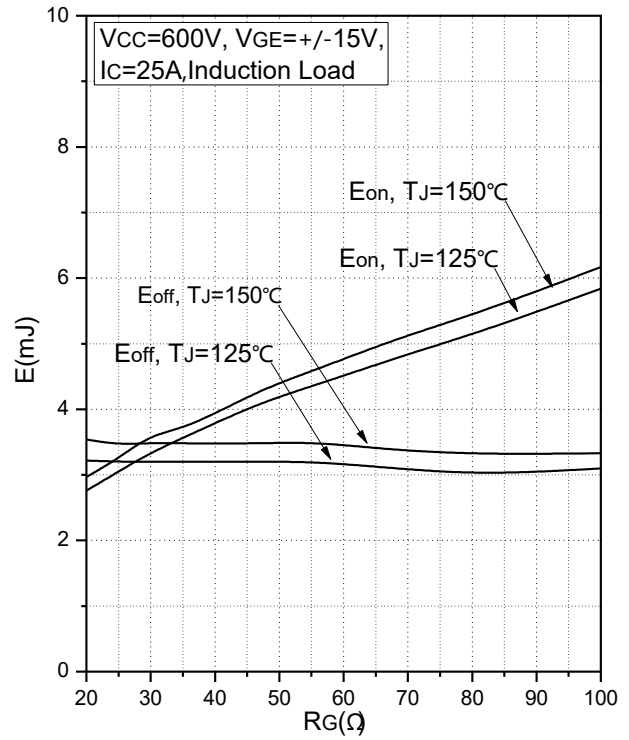


Fig.6 Typical Switching Loss vs. Gate Resistance (Inverter)

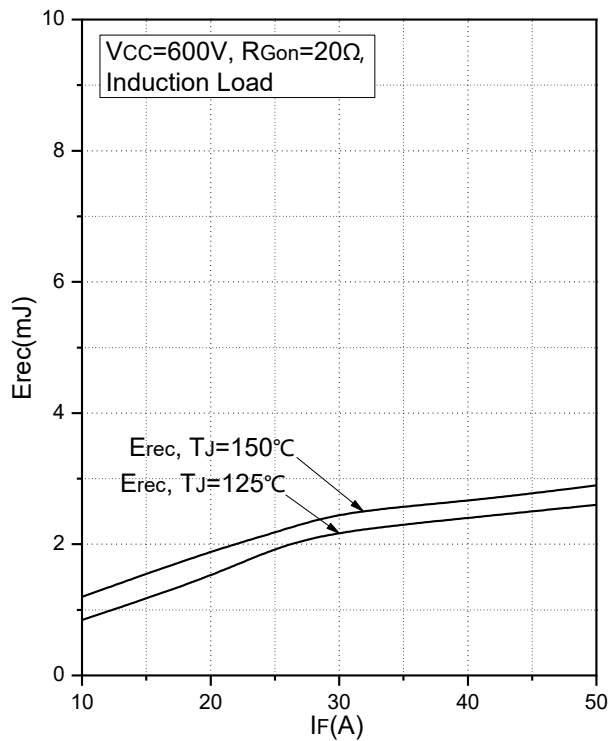


Fig.7 Typical Switching Loss vs. Forward Current (Inverter)

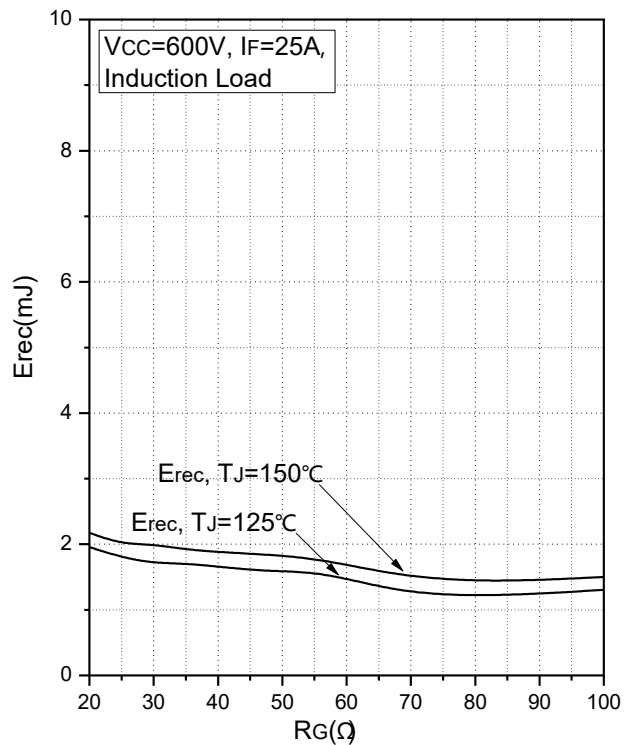


Fig.8 Typical Switching Loss vs. Gate Resistance (Inverter)

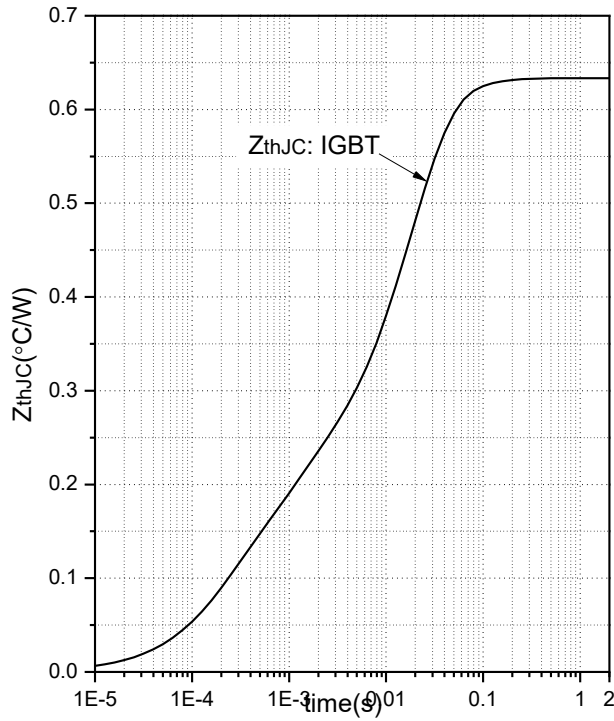


Fig.9 Transient Thermal Impedance (Inverter-IGBT)

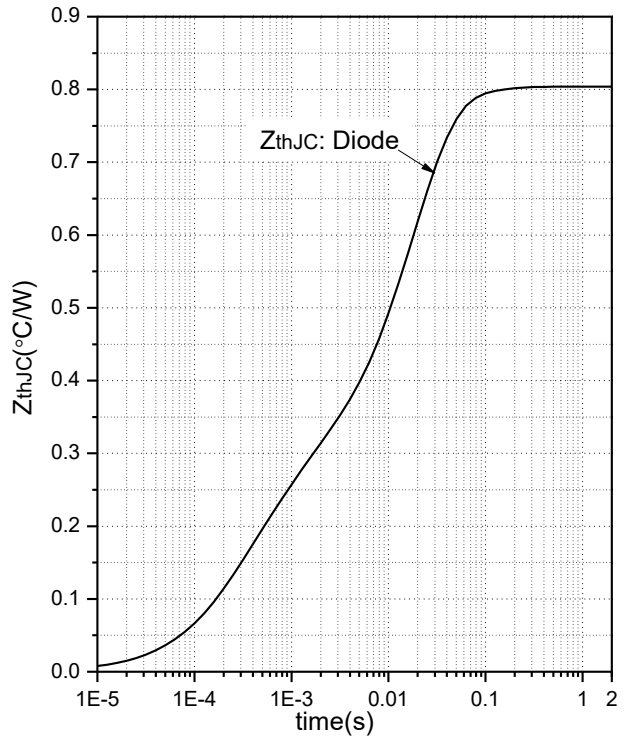


Fig.10 Transient Thermal Impedance (Inverter-Diode)

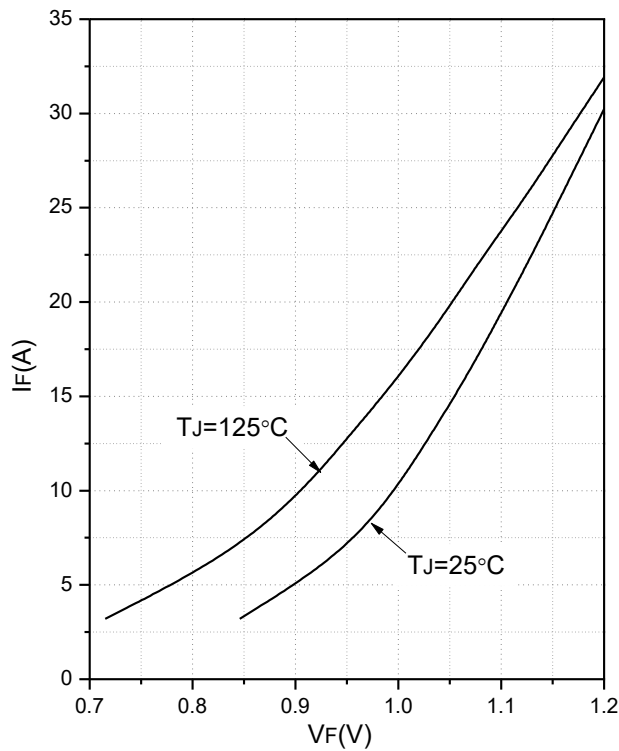


Fig.11 Forward Characteristics of Diode (Rectifier)

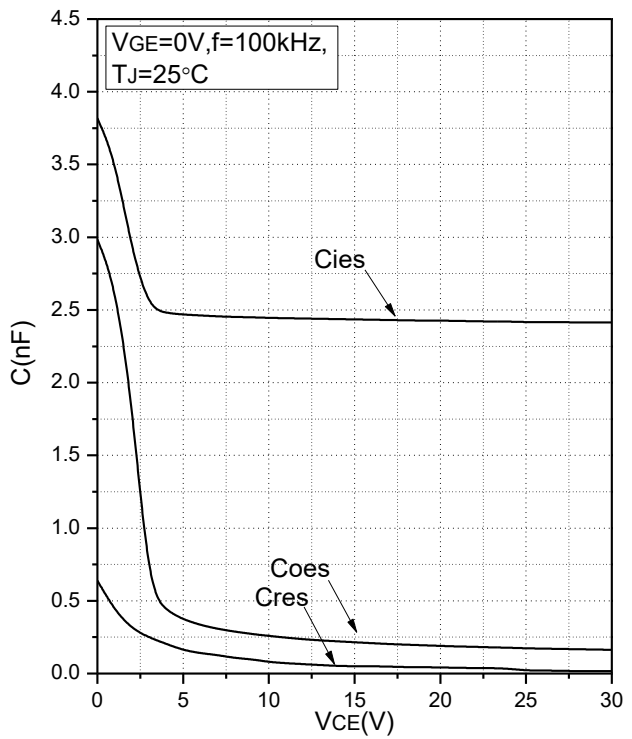


Fig.12 Capacitance Characteristics

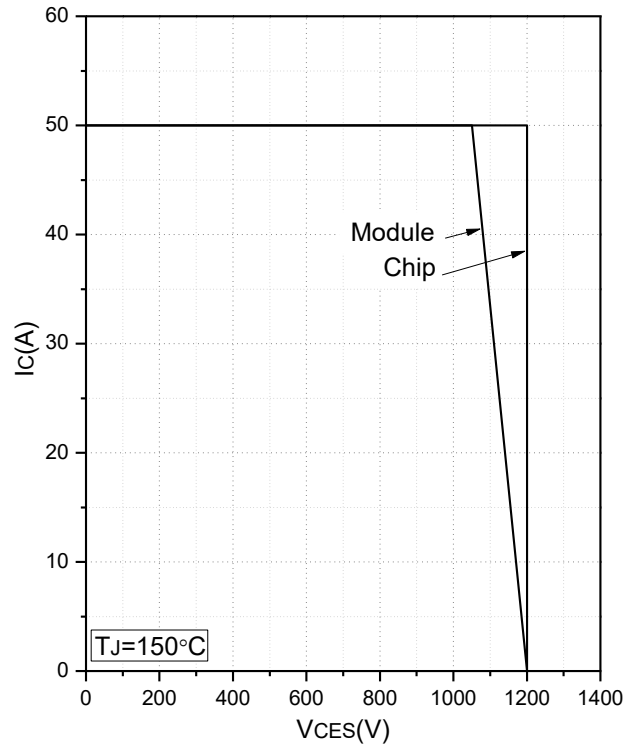


Fig.13 Reverse Bias Safe Operation Area (RBSOA)

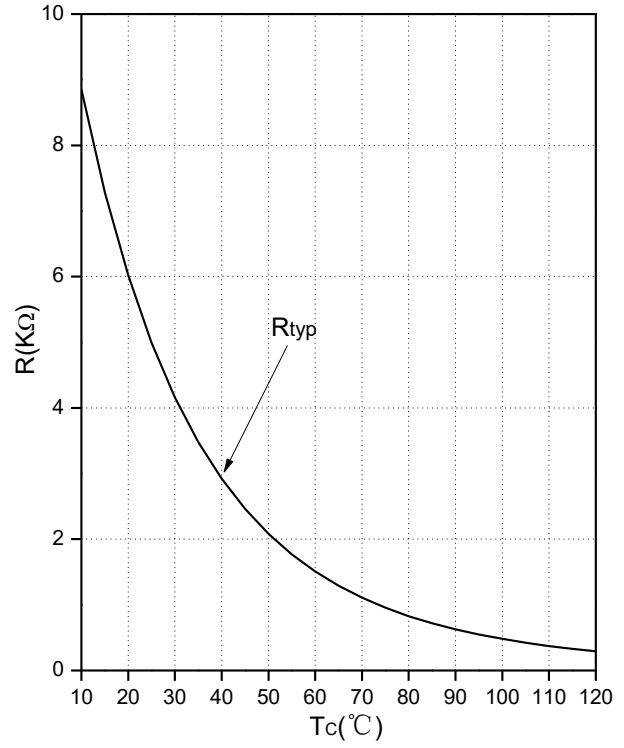
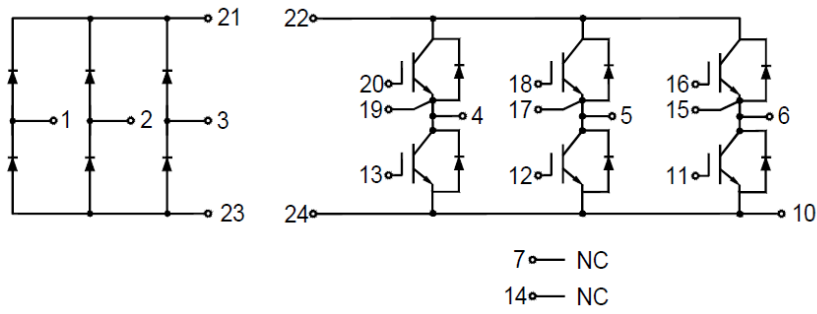


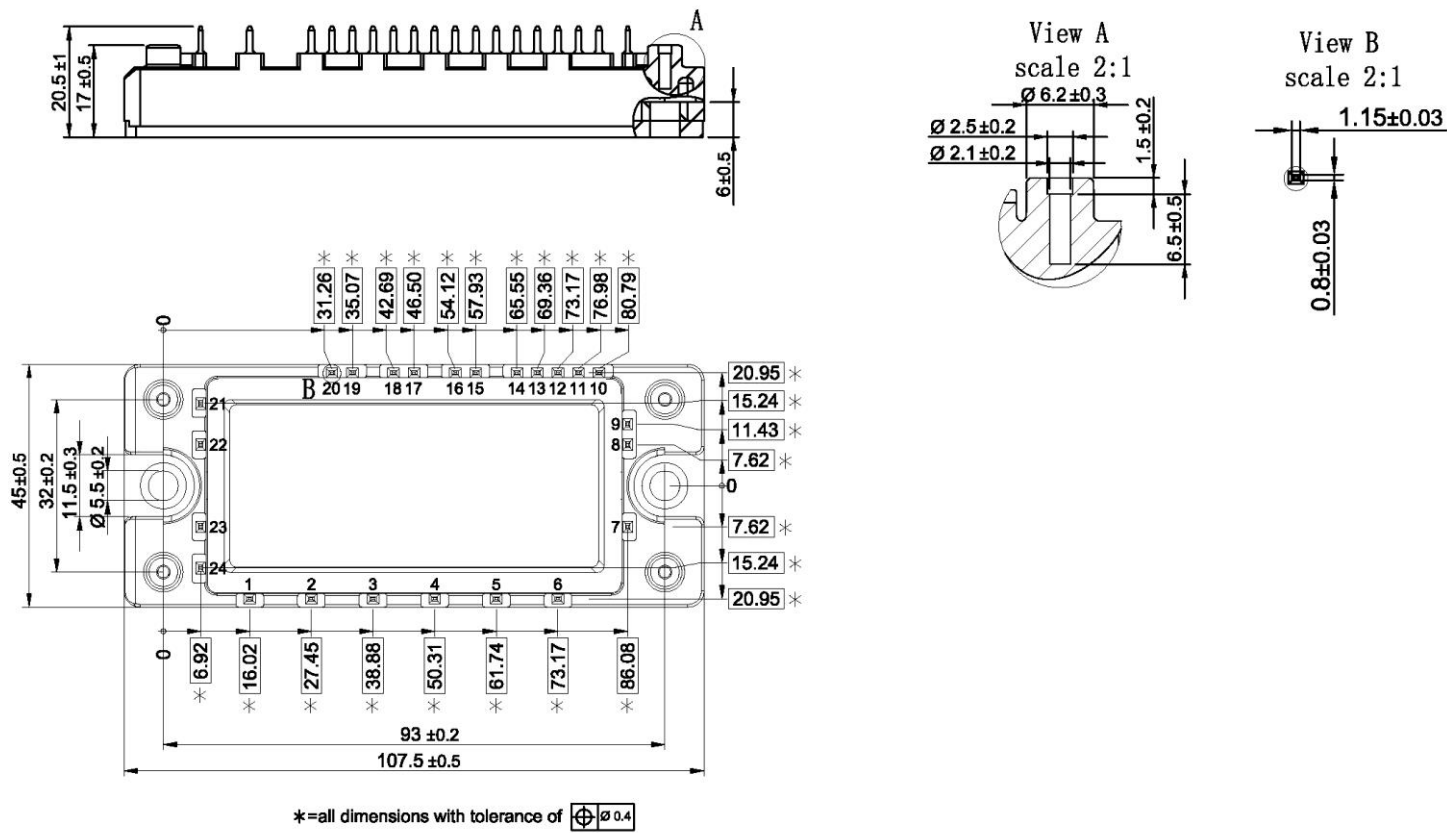
Fig.14 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
03/08/2024	01	Initial Release
03/29/2024	02	Update Package Outline

Announcement

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