



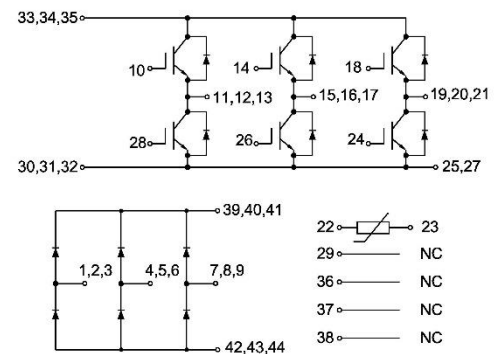
GT150RFF120T6H-T4

IGBT Module

Features:

- Field Stop Trench Gate 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 of IGBT ($T_C=25^\circ\text{C}$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^\circ\text{C}$	150	A
		$T_C=25^\circ\text{C}$	289	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	300	A
P_D	Maximum Power Dissipation (per IGBT)	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	955	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	$I_C=5.3\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.65	2.00	V
			$T_J=125^{\circ}\text{C}$	1.90		V
			$T_J=150^{\circ}\text{C}$	1.95		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		16.8		nF
C_{oes}	Output Capacitance			0.79		nF
C_{res}	Reverse Transfer Capacitance			0.19		nF

Switching Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =150A, R _{Gon} =6.8Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		153		ns
			T _J =125℃		162		
			T _J =150℃		165		
t _r	Rise Time		T _J =25℃		64		ns
			T _J =125℃		74		
			T _J =150℃		78		
t _{d(off)}	Turn-off Delay Time	T _J =25℃		392		ns	
		T _J =125℃		440			
		T _J =150℃		446			
t _f	Fall Time	T _J =25℃		186		ns	
		T _J =125℃		264			
		T _J =150℃		288			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =150A, R _{Gon} =6.8Ω, V _{GE} =±15V, di/dt=1655A/μs(T _J =150℃), Inductive Load	T _J =25℃		6.5		mJ
		T _J =125℃		10.1			
		T _J =150℃		10.9			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =150A, R _{Goff} =6.8Ω, V _{GE} =±15V, du/dt=5316V/μs(T _J =150°C), Inductive Load	T _J =25°C		13.2		mJ
			T _J =125°C		17.3		
			T _J =150°C		18.2		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2860		nC
R _{g internal}	Internal Gate Resistor				3.0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =+/-15V, t _p =10μs, T _J =150°C				880		A
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.16	°C/W

FWD, Inverter

Maximum Rated Values of Diode (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		150	A
I _{FM}	Peak FWD Current Repetitive	t _p =1ms	300	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 =150A	T _J =25°C		1.85		V
			T _J =125°C		2.00		
			T _J =150°C		2.05		
t _{rr}	Reverse Recovery Time	I _F =150A, -diF/dt=2085A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		160		ns
			T _J =125°C		290		
			T _J =150°C		322		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		130		A
			T _J =125°C		131		
			T _J =150°C		135		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		12.4		μC
			T _J =125°C		20.3		
			T _J =150°C		22.8		



E _{rec}	Reverse Recovery Energy	I _F =150A, -diF/dt=2085A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		4.6		mJ
			T _J =125°C		7.0		
			T _J =150°C		7.4		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.33	°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 _C =80°C	150	A
I _{RMSM}	Maximum RMS Current at Rectifier Output	T _C =80°C	150	A
I _{FSM}	Surge Current @t _p =10ms	T _J =25°C	1800	A
		T _J =150°C	1575	
I ² t	I ² t - value	T _J =25°C	16200	A ² s
		T _J =150°C	12400	

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =150A	T _J =25°C		1.20		V
			T _J =125°C		1.15		
I _R	Reverse Current	V _R =1600V	T _J =25°C			1	mA
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.23	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	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

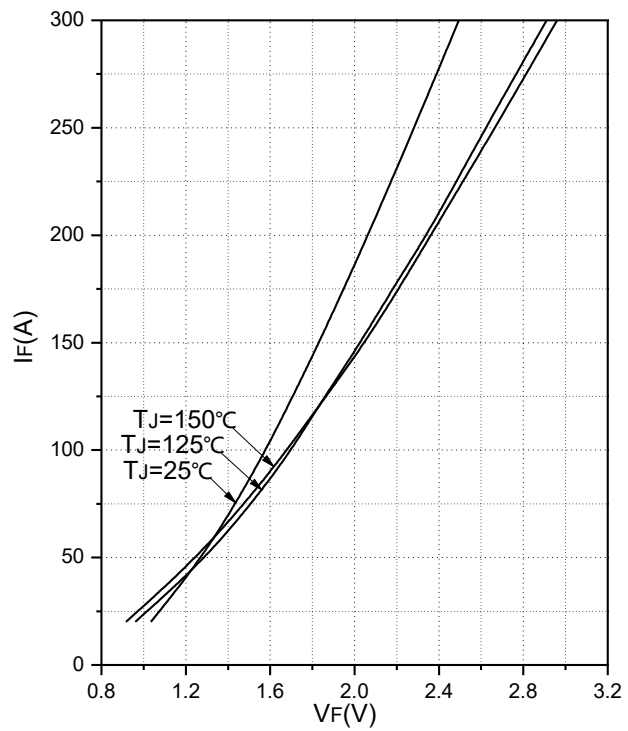
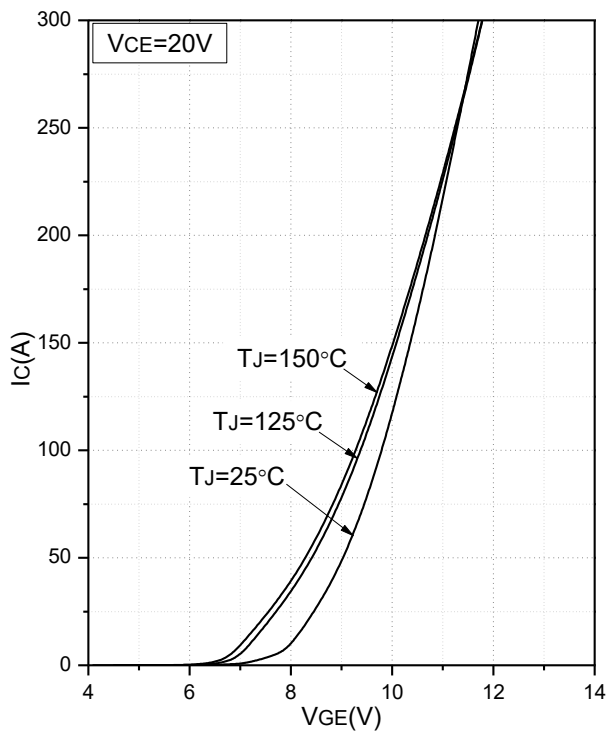
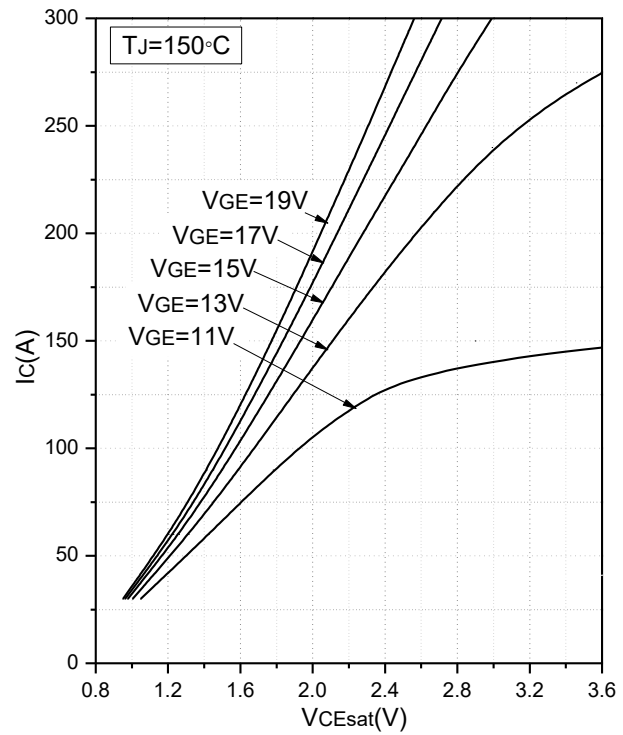
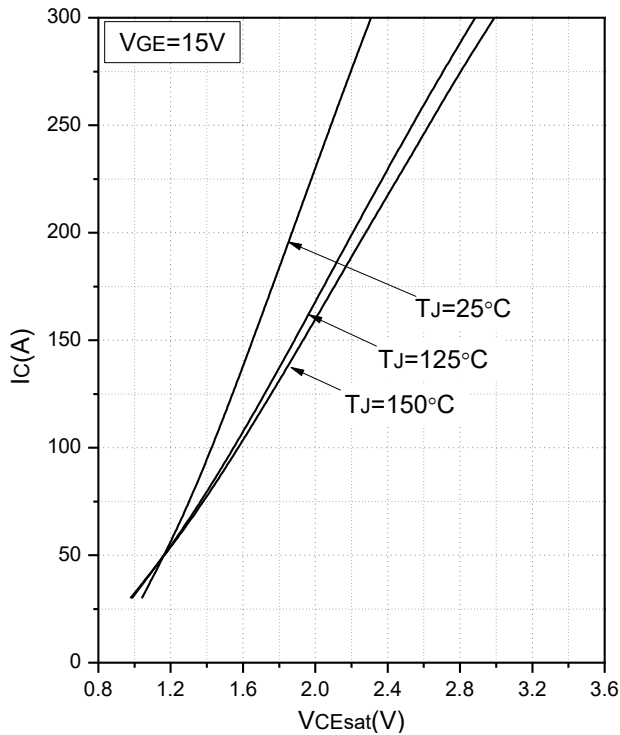
Symbol	Description	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute 2500			V
T _J	Maximum Junction Temperature			175	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+150	°C
T _{stg}	Storage Temperature	-40		+125	°C
CTI	Comparative Tracking Index	200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)			0.03	°C/W
T	Mounting Screw:M5	3.0		6.0	N·m
G	Weight		300		g

Ordering Information Table

Device code

G	T	150	RFF	120	T6	H	-	T4
①	②	③	④	⑤	⑥	⑦		⑧

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (150=150A)
- 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)
- ⑧ - Internal Code



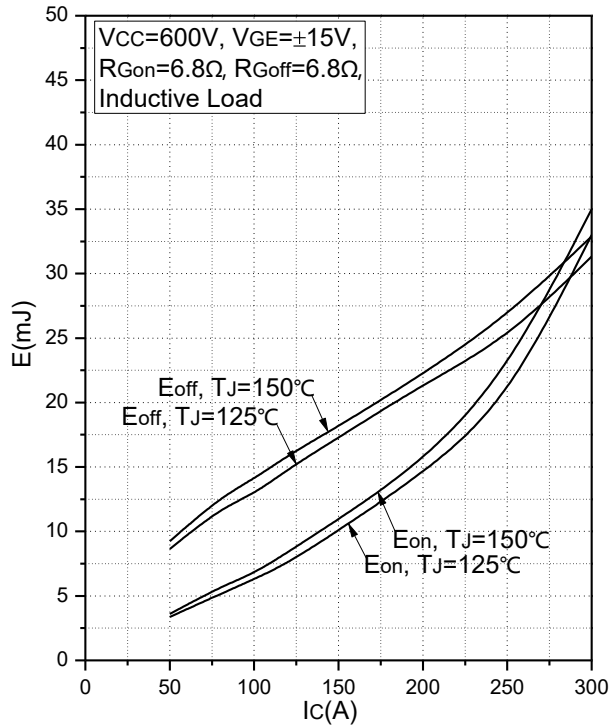


Fig.5 Typical Switching Loss vs. Collector Current

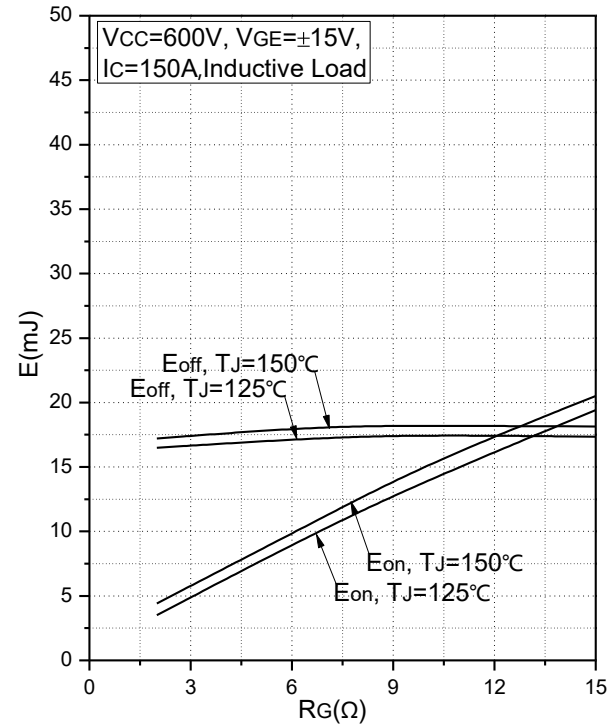


Fig.6 Typical Switching Loss vs. Gate Resistance

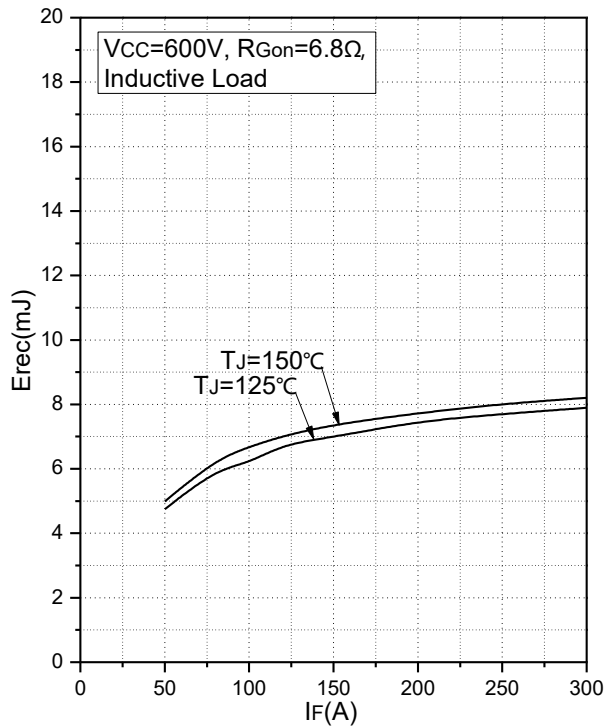


Fig.7 Typical Switching Loss vs. Forward Current

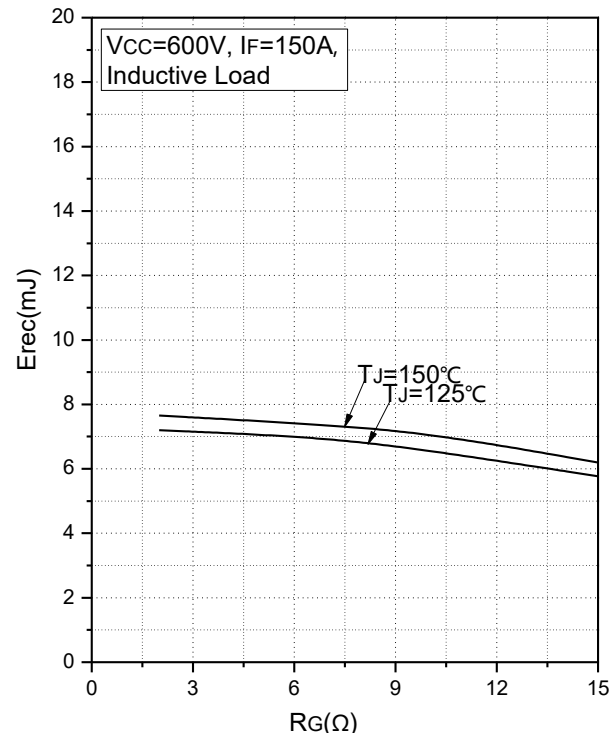


Fig.8 Typical Switching Loss vs. Gate Resistance

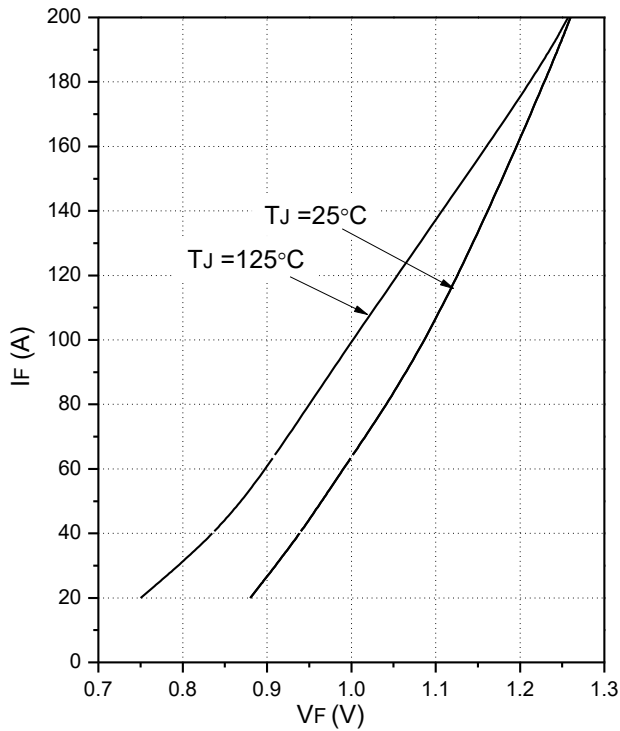


Fig.9 Forward Characteristics of Diode (Rectifier)

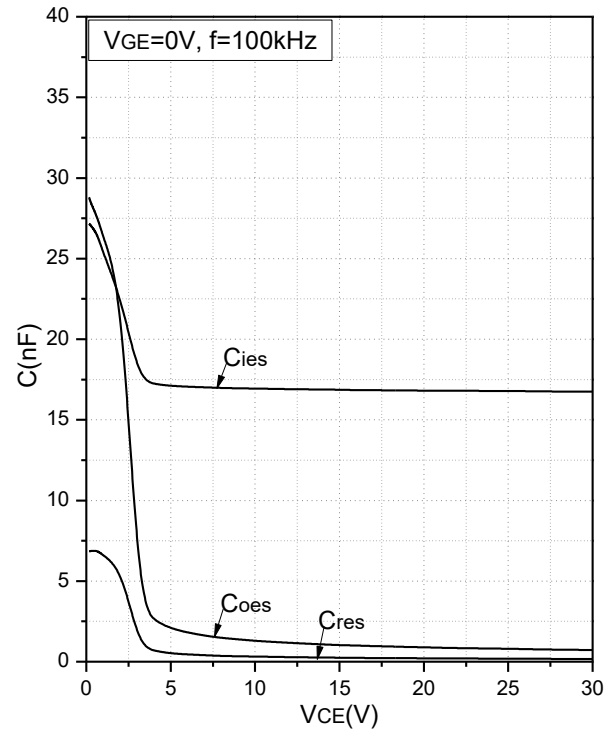


Fig.10 Capacitance Characteristics

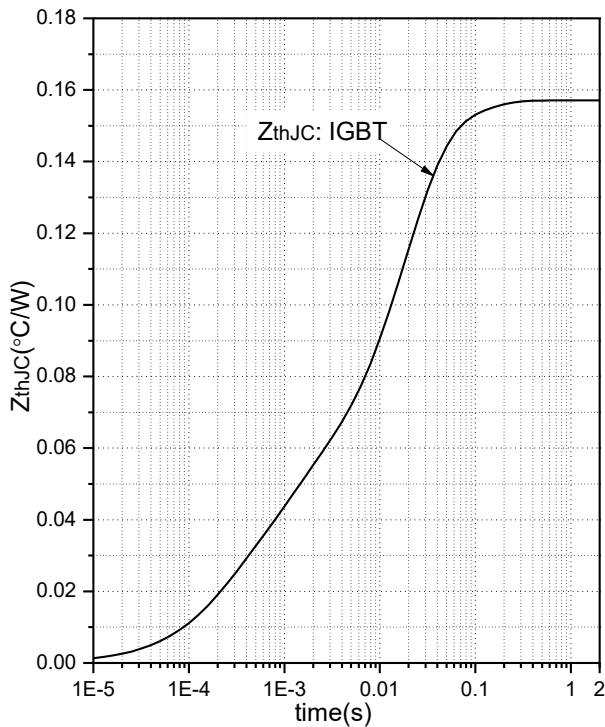


Fig.11 Transient Thermal Impedance (Inverter IGBT)

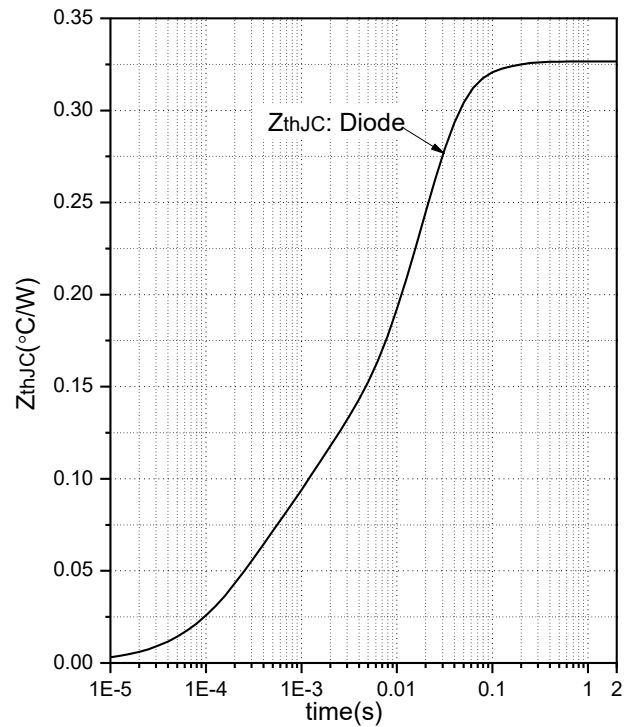


Fig.12 Transient Thermal Impedance (Inverter Diode)

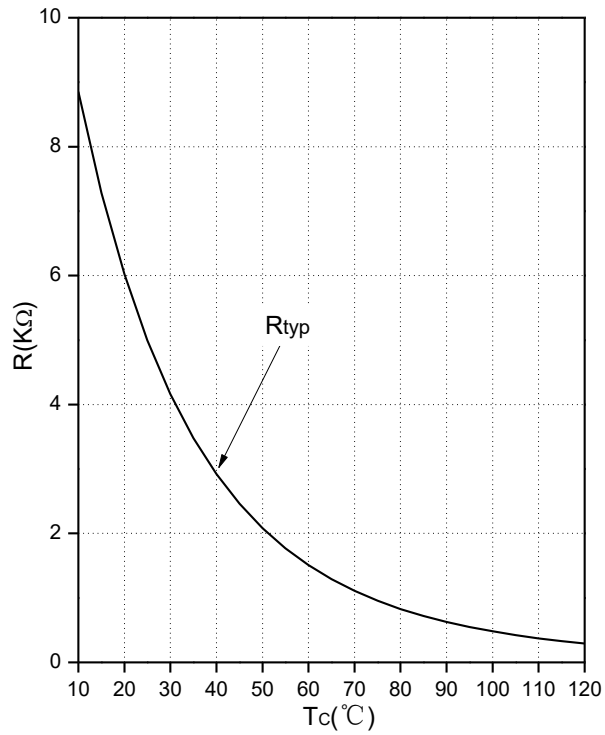


Fig.13 NTC Temperature Characteristics

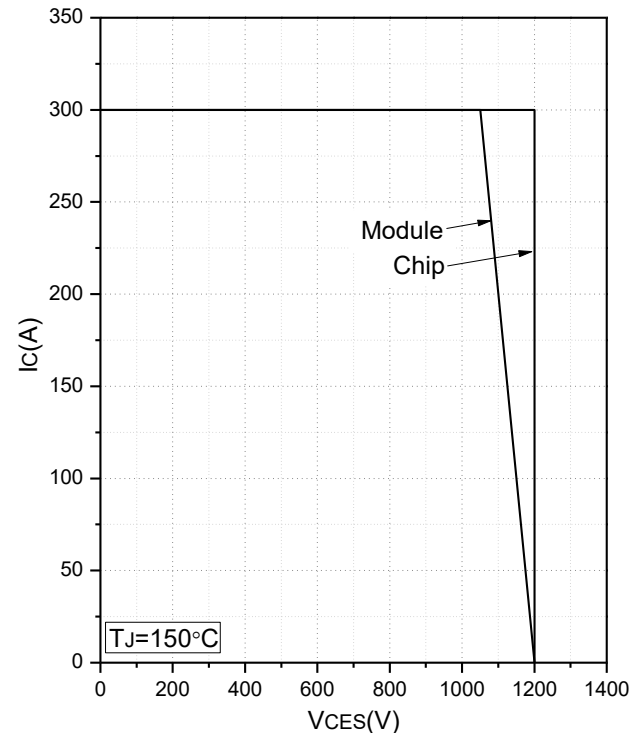


Fig.14 Reverse Bias Safe Operation Area (RBSOA)



Revision	Notes
01	Initial Release
02	Update Package Outline

Announcements

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The released datasheet would be issued with “REV.” + “alphabet characters”.