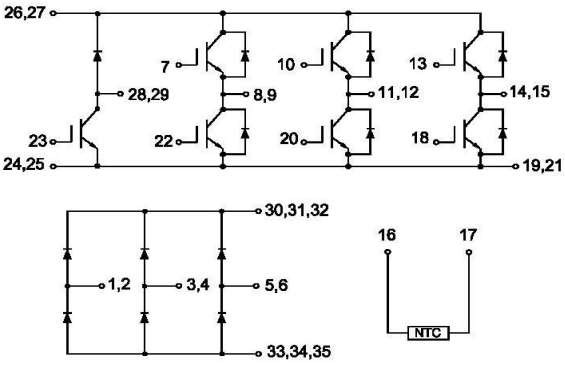
GT100PI120T6H-T4M

IGBT Module

Features：

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



Applications：

- Industrial Inverters
- Servo Applications

IGBT, Inverter

Maximum Rated Values(T_C=25℃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℃	100	A
		T_C=25℃	200	A
I_{CM}	Peak Collector Current Repetitive	T_J=175℃	200	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	714	W

Electrical Characteristics of IGBT (T_C=25℃unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1mA, V_{CE}=V_{GE}		5.0	5.5	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=100A, V_{GE} =15V	T_J=25℃		1.70	2.00	V
			T_J=125℃		1.90		V
			T_J=150℃		1.90		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}= ±20V, V_{CE}=0V, T_J=25℃				200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz			8.03		nF
C_{oes}	Output Capacitance				1.22		nF
C_{res}	Reveres Transfer Capacitance				0.59		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=100A, R_{Gon}=1Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		228		ns
			T_J=125℃		250		
			T_J=150℃		254		
t_r	Rise Time		T_J=25℃		63		ns
			T_J=125℃		67		
			T_J=150℃		69		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=100A, R_{Goff}=1Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		269		ns
			T_J=125℃		279		
			T_J=150℃		284		
t_f	Fall Time		T_J=25℃		184		ns
			T_J=125℃		291		
			T_J=150℃		317		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=100A, R_{Gon}=1Ω, V_{GE}=±15V, di/dt=1387A/μs(T_J=150℃), Inductive Load	T_J=25℃		3.1		mJ
			T_J=125℃		4.3		
			T_J=150℃		4.8		

E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=100A, R_{Goff}=1Ω, V_{GE}=±15V, du/dt=4448V/μs(T_J=150℃), Inductive Load	T_J=25℃		5.28		mJ
			T_J=125℃		8.33		
			T_J=150℃		9.30		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		745		nC
$R_{g\ internal}$	Internal Gate Resistance		T_J=25℃		7.5		Ω
RBSOA	I_C=200A, V_{CC}=1050V, Vp=1200V, R_{Goff}=1Ω, V_{GE}=+15V to 0V, T_J=150°C				Trapezoid		
SC data	V_{CC}=600V, tp=10us, V_{GE}=+/-15V, R_{Gon} =1ohm, R_{Goff} =1ohm,T_J=25℃				575		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.21		℃/W

Diode, Inverter

Maximum Rated Values (T_C = 25℃unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Peak FWD Current Repetitive	200	A

Electrical Characteristics of FWD (T_C=25℃unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F=100A	T_J=25℃		1.70		V
			T_J=125℃		1.80		
			T_J=150℃		1.80		
t_{rr}	Reverse Recovery Time	I_F=100A, -diF/dt =1911A/μs(T_J=150℃), V_R=600V, V_{GE}=-15V	T_J=25℃		260		ns
			T_J=125℃		396		
			T_J=150℃		454		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		92		A
			T_J=125℃		104		
			T_J=150℃		105		

Q_{rr}	Reverse Recovery Charge	I_F=100A, -diF/dt =1911A/μs(T_J=150℃), V_R=600V, V_{GE}=-15V	T_J=25℃		10.2		μC
			T_J=125℃		16.8		
			T_J=150℃		19.2		
E_{rec}	Reverse Recovery Energy	I_F=100A, -diF/dt =1911A/μs(T_J=150℃), V_R=600V, V_{GE}=-15V	T_J=25℃		4.83		mJ
			T_J=125℃		7.92		
			T_J=150℃		9.13		
$R_{θJC}$	Diode Thermal Resistance: Junction-To-Case				0.34		℃/W

IGBT, Brake-Chopper
Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage	T_C=25℃	1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	50	A
		T_C=25℃	100	A
$I_{CM(1)}$	Peak Collector Current Repetitive	T_J=150℃	100	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	398	W

Electrical Characteristics of IGBT (T_C=25℃ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1 mA, V_{CE}=V_{GE}		5.0	5.6	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=50A, V_{GE}=15V	T_J=25℃		1.70	2.00	V
			T_J=125℃		1.90		V
			T_J=150℃		1.90		
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=±20V, V_{CE}=0V, T_J=25℃				100	nA

C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz		3.65		nF
C_{oes}	Output Capacitance			0.50		nF
C_{res}	Reveres Transfer Capacitance			0.31		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=50A, R_{Gon}=15Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		154		ns
			T_J=125℃		169		
			T_J=150℃		174		
t_r	Rise Time		T_J=25℃		51		ns
			T_J=125℃		54		
			T_J=150℃		56		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=50A, R_{Goff}=15Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		202		ns
			T_J=125℃		216		
			T_J=150℃		225		
t_f	Fall Time		T_J=25℃		220		ns
			T_J=125℃		379		
			T_J=150℃		407		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=50A, R_{Gon}=15Ω, V_{GE}=±15V, di/dt=791A/μs(T_J=150℃), Inductive Load	T_J=25℃		3.37		mJ
			T_J=125℃		5.10		
			T_J=150℃		5.53		
E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=50A, R_{Goff}=15Ω, V_{GE}=±15V, du/dt=3488V/μs(T_J=150℃), Inductive Load	T_J=25℃		2.42		mJ
			T_J=125℃		4.09		
			T_J=150℃		4.52		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		504		nC
$R_{g\ internal}$	Internal Gate Resistance		T_J=25℃		4		Ω
RBSOA	I_C=100A, V_{CC}=1050V, Vp=1200V, R_{Goff}=15Ω, V_{GE}=+15V to 0V, T_J=150°C			Trapezoid			
SC data	V_{CC}=600V, tp=10us, V_{GE}=+/-15V, R_{Gon}=15ohm, R_{Goff}=15ohm, T_J=25℃				297		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.38		℃/W

Diode, Brake-Chopper

Maximum Rated Values (T_C=25℃unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	35	A
I_{FM}	Peak FWD Current Repetitive	70	A

Electrical Characteristics of FWD (T_C=25℃unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F=35A	T_J=25℃		1.90		V
			T_J=125℃		2.00		
t_{rr}	Reverse Recovery Time	I_F=35A, -di_F/dt=816A/μs(T_J=125℃), V_{rr}=600V, V_{GE}=-15V	T_J=25℃		137		ns
			T_J=125℃		269		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		20		A
			T_J=125℃		25		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		3.15		μC
			T_J=125℃		5.05		
E_{rec}	Reverse Recovery Energy		T_J=25℃		1.24		mJ
			T_J=125℃		2.12		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.70		℃/W

Diode, Rectifier

Maximum Rated Values (T_C=25℃unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1800	V
I_{FRMSM}	Maximum RMS Forward Current Per Chip	T_J=80℃	130	A
I_{RMSM}	Maximum RMS Current At Rectifier Output	T_J=80℃	180	A
I_{FSM}	Surge Current @t_p=10 ms	T_J=25℃	1500	A
		T_J=150℃	1150	
I^2t	I²t - Value	T_J=25℃	11560	A^2s
		T_J=150℃	6610	

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_F	Forward Voltage	I_F=85 A	T_J=25℃		1.00		V
			T_J=125℃		0.90		
			T_J=150℃		0.90		
I_R	Reverse Current	V_R=1800V	T_J=25℃			1	mA
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.29		℃/W

Internal NTC-Thermistor Characteristics

R_{25}	T_C=25℃	5		kΩ
△R/R	T_C=100℃，R_{100} =481Ω		±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

Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500			V
L_{sCE}	Stray Inductance Module			40		nH
T_J	Maximum Junction Temperature				175	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)				0.02	℃/W
M	Power Terminals Screw:M5		3.0		6.0	N·m
G	Weight			300		g

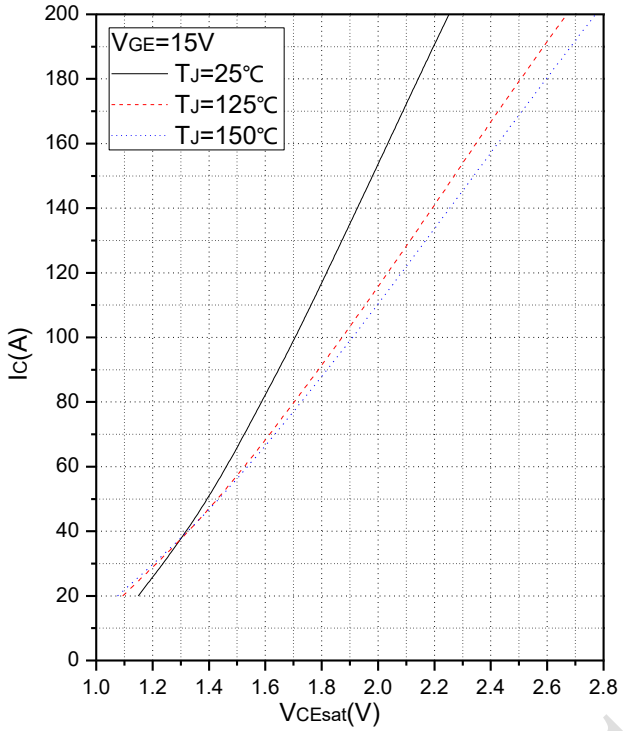


Fig.1 Typical Saturation Voltage Characteristics (Inverter)

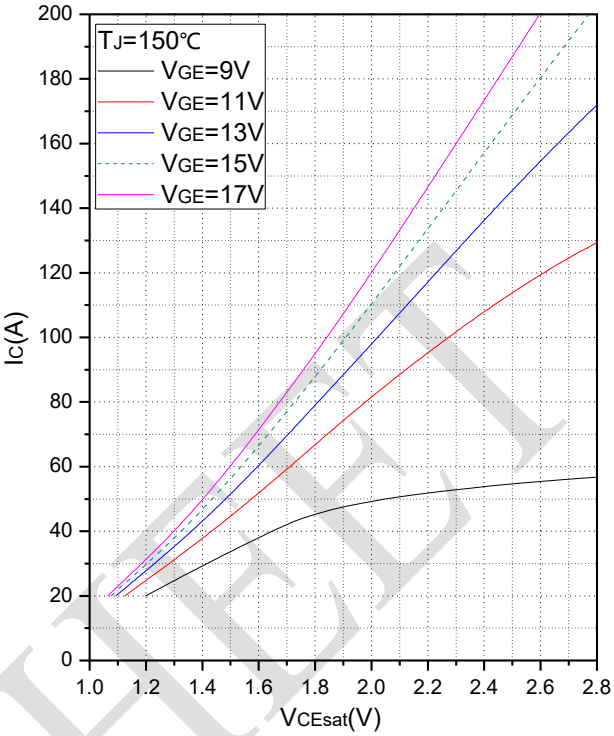


Fig.2 Typical Output Characteristics (Inverter)

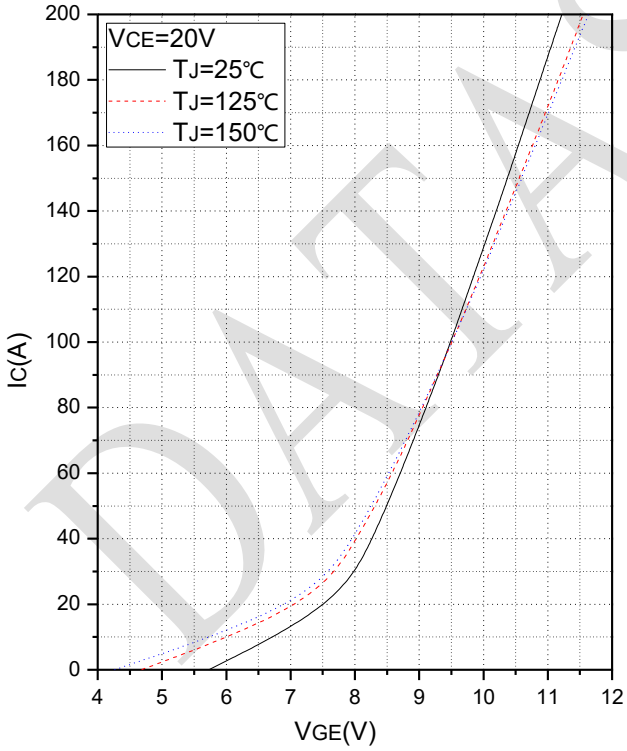


Fig.3 Transfer Characteristic (Inverter)

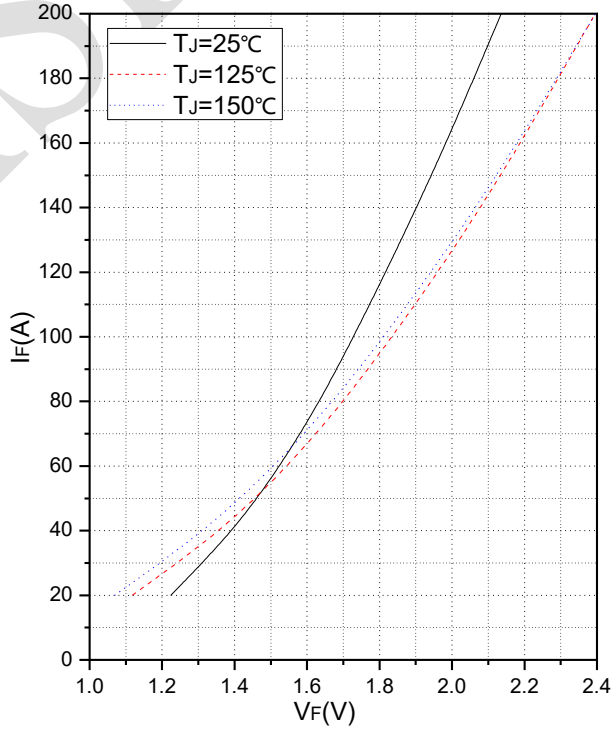


Fig.4 Forward Characteristics of FWD (Inverter)

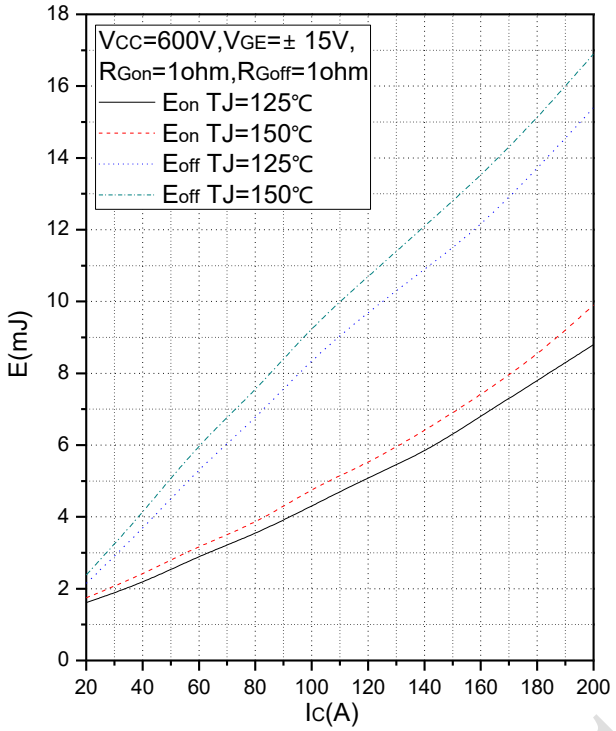


Fig.5 Typical Switching Loss vs. Collector Current (Inverter)

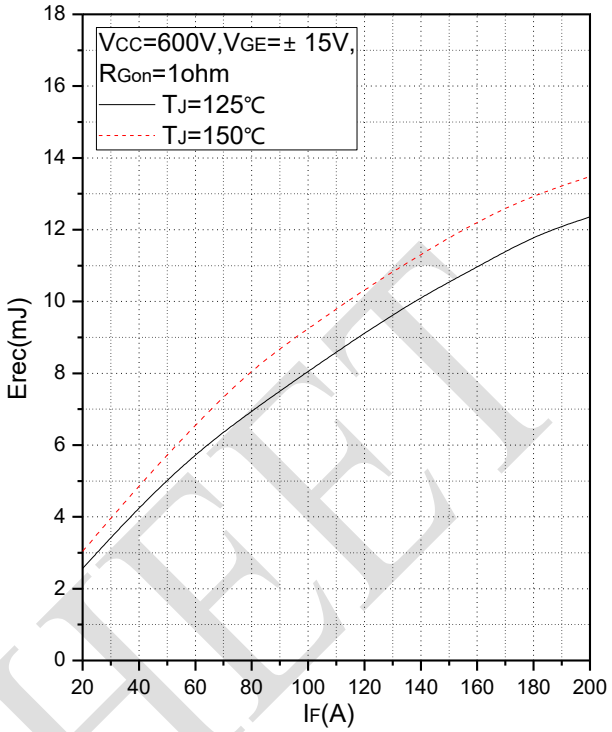


Fig.6 Typical Switching Loss vs. Forward Current (Inverter)

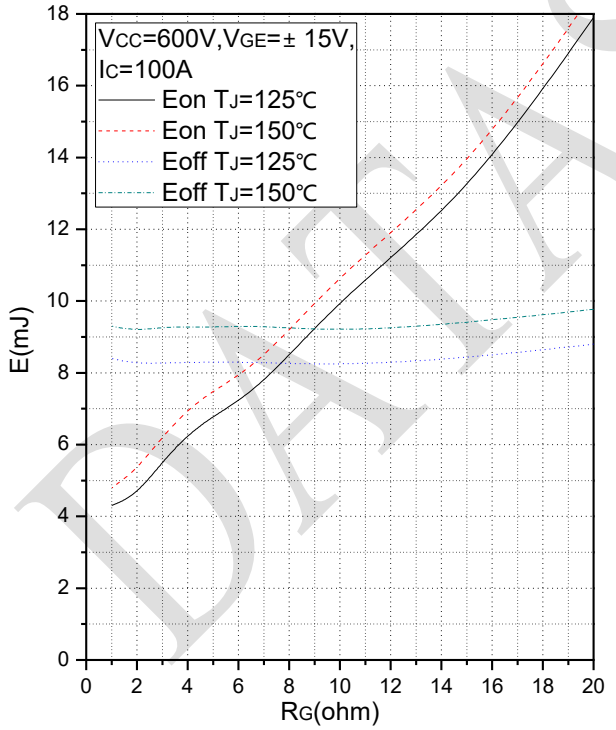


Fig.7 Typical Switching Loss vs. Gate Resistance (Inverter)

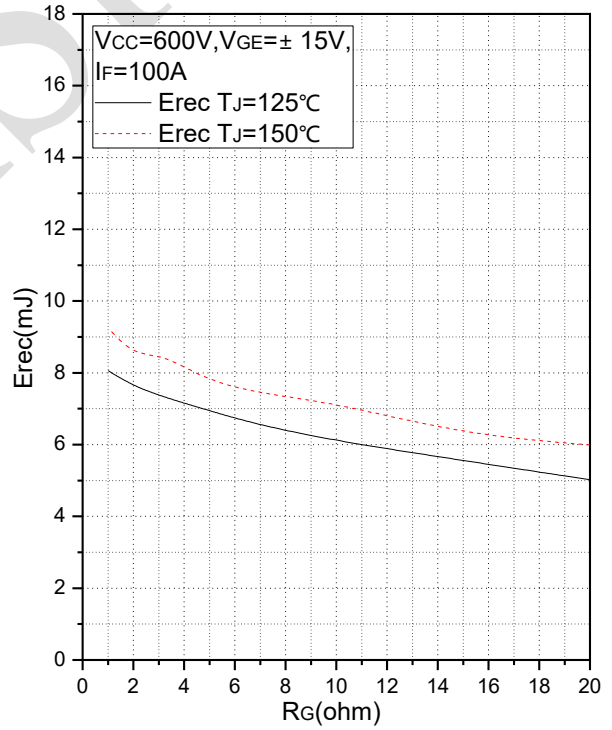


Fig.8 Typical Switching Loss vs. Gate Resistance (Inverter)

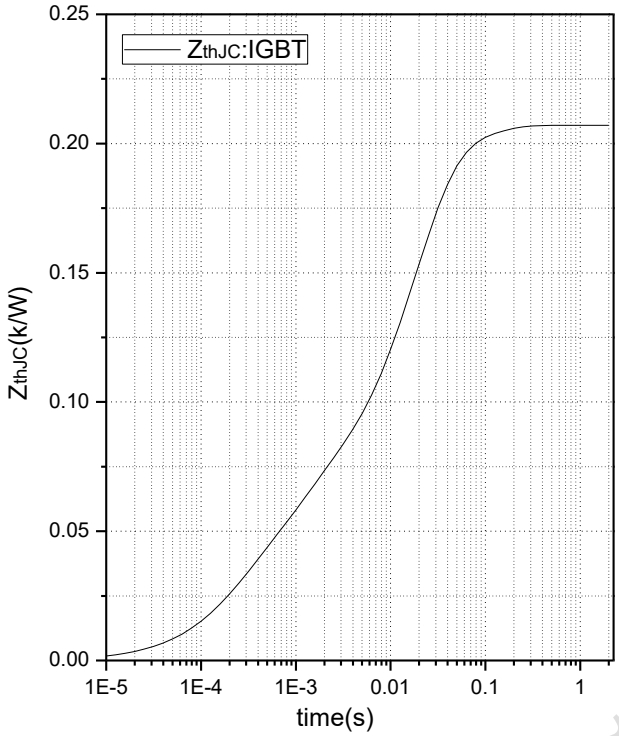


Fig.9 Transient Thermal Impedance (Inverter- IGBT)

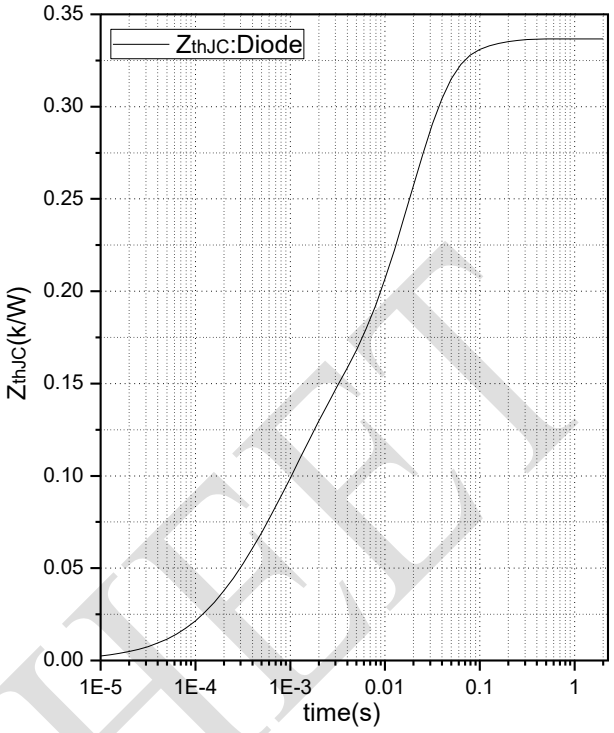


Fig.10 Transient Thermal Impedance (Inverter- Diode)

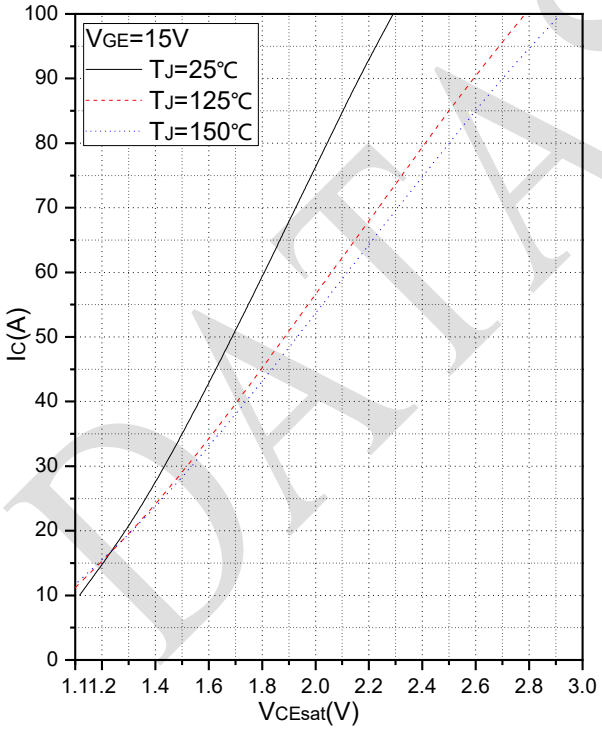


Fig.11 Typical Saturation Voltage Characteristics
（Brake-Chopper）

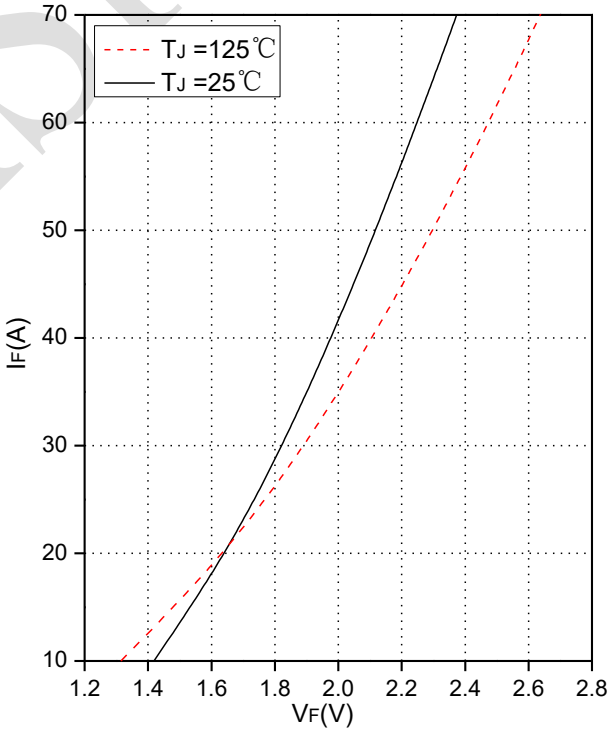


Fig.12 Forward Characteristics of FWD
（Brake-Chopper）

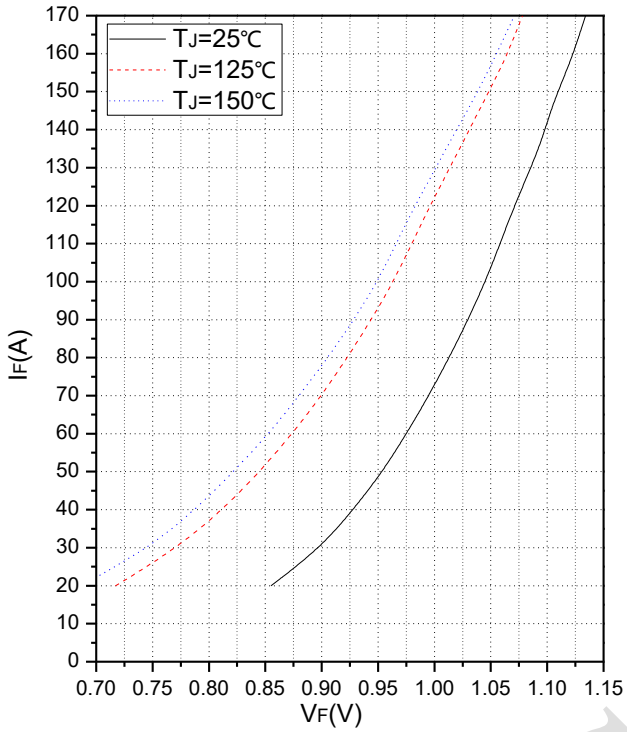


Fig.13 Forward Characteristics of Diode (Rectifier)

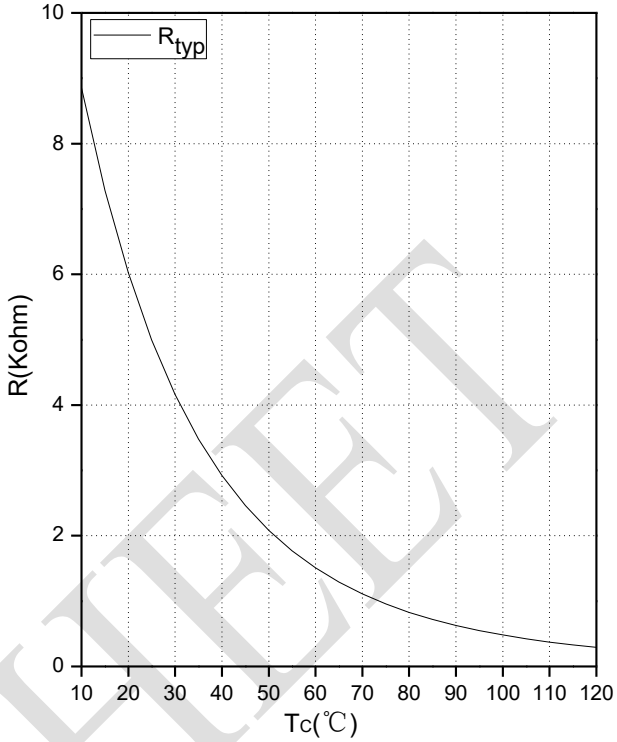


Fig.14 NTC Temperature Characteristics

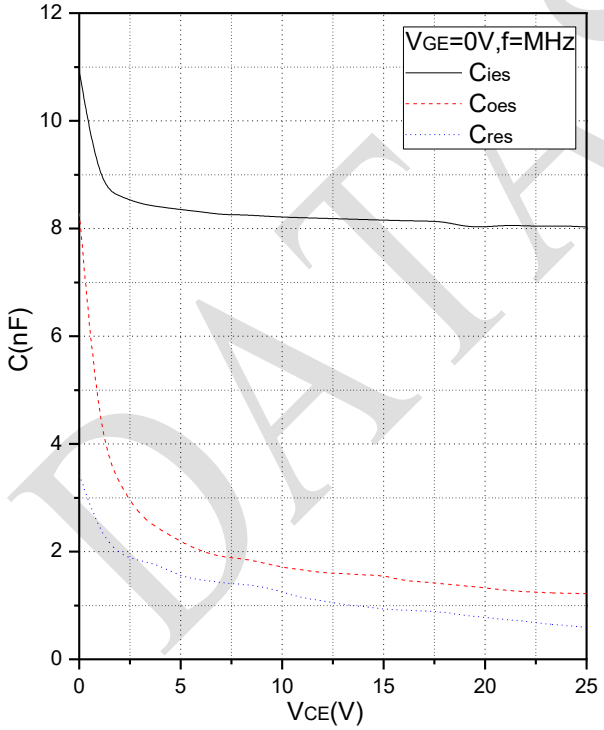


Fig.15 Capacitance Characteristics (Inverter- IGBT)

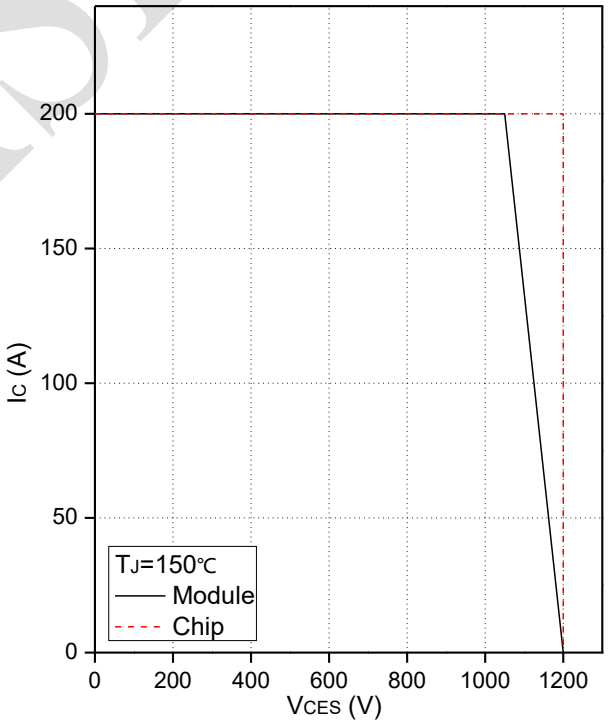
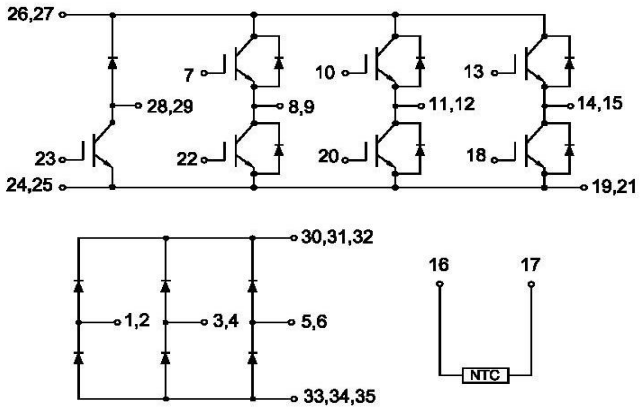
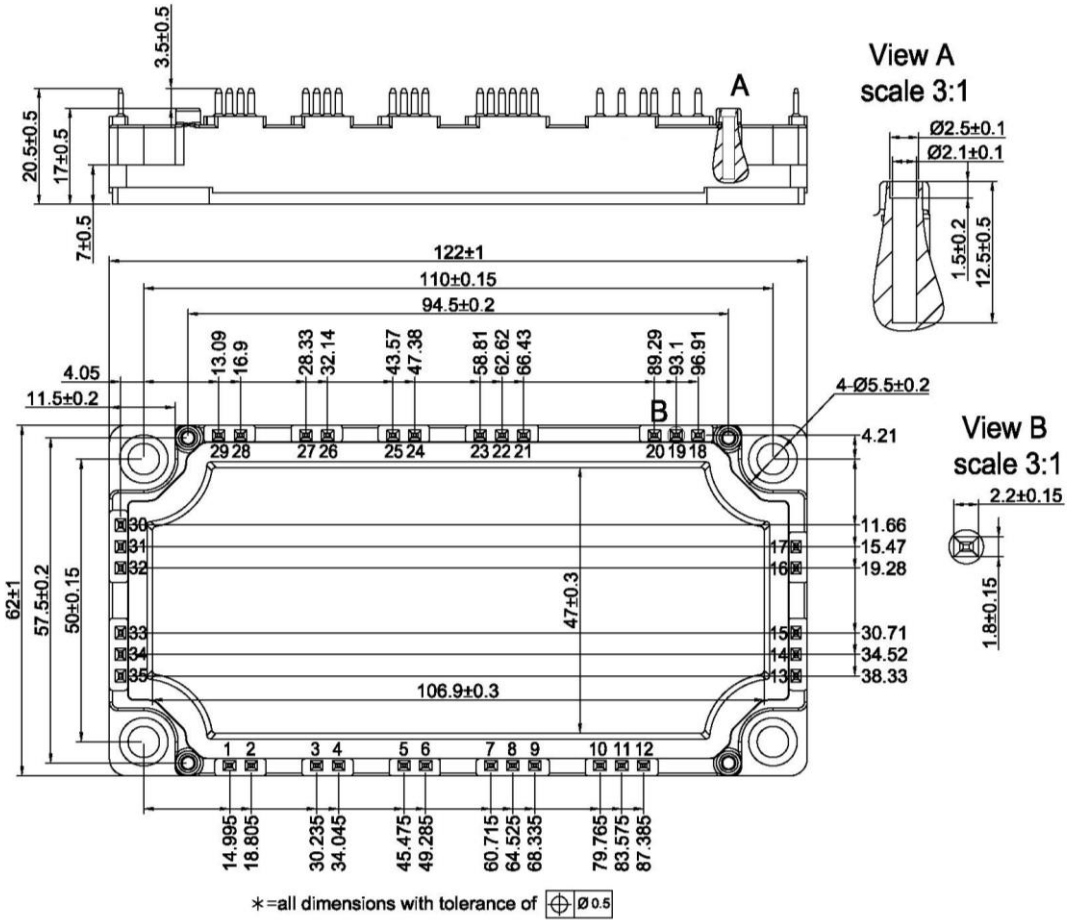


Fig.16 Reverse Bias Safe Operation Area (RBSOA)

Internal Circuit:



Package Outline (Unit: mm):



Date	Revision	Notes
05/09/2019	A	Final Version
09/12/2019	B	Add $R_{g\ internal}$
07/29/2021	C	Update the outline

Announcement

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The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

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