GT300TT120A8H

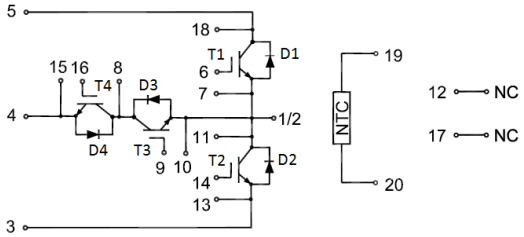
IGBT Module

Preliminary Data

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

Circuit Diagram



Applications：

- Solar Applications
- UPS Systems

IGBT, T1/T2
Maximum Rated Values of IGBT

V_{CES}	Collector-Emitter Blocking Voltage	T_J=25℃	1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	300	A
		T_C=25℃	495	A
I_{CM}	Repetitive Peak Collector Current	tp=1ms	600	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C =25℃ T_{Jmax}=175℃	1685	W

Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units.
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=12mA, V_{CE}=V_{GE}, T_J=25℃		5.0	5.9	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=300A, V_{GE}=15V	T_J=25℃		1.70	2.10	V
			T_J=125℃		2.10		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℃				400	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25℃			42.93		nF
C_{oes}	Output Capacitance				1.71		nF
C_{res}	Reverse Transfer Capacitance				1.06		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=300A, R_{Gon}=4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		732		ns
			T_J=125℃		735		
t_r	Rise Time		T_J=25℃		198		ns
			T_J=125℃		204		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=300A, R_{Goff}=4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		735		ns
			T_J=125℃		780		
t_f	Fall Time		T_J=25℃		161		ns
			T_J=125℃		177		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=300A, R_{Goff}=4.7Ω, V_{GE}=±15V, di/dt=1200A/μs (T_J=150℃) Inductive Load	T_J=25℃		36.7		mJ
			T_J=125℃		43.7		
E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=300A, R_{Goff}=4.7Ω, V_{GE}=±15V, du/dt=4210V/μs (T_J=150℃) Inductive Load	T_J=25℃		26.1		mJ
			T_J=125℃		30.5		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		2.90		μC
$R_{g\ internal}$	Internal Gate Resistor		T_J=25℃		1.5		Ω
RBSOA	I_C=600A, V_{CC}=1050V, Vp=1200V, R_G=4.7Ω, V_{GE}=+15V to 0V, T_J =150°C			Trapezoid			
SCSOA	V_{GE}=±15V, V_{CC}=600V, R_{Gon}=4.7Ω, R_{Goff}=4.7Ω, tp=10us, T_J=125℃				2100		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case (per IGBT)					0.089	℃/W

Diode D3/D4
Maximum Rated Values of Diode

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	650	V
I_F	Diode Continuous Forward Current		300	A
I_{FM}	Diode Maximum Forward Current	tp=1ms	600	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min.	Typ.	Max.	Units.
V_{FM}	Forward Voltage	I_F=300A	T_J=25℃		1.40		V
			T_J=125℃		1.40		
t_{rr}	Reverse Recovery Time	I_F=300A, -di_F/dt=1440A/μs(T_J=125℃), V_R=300V, V_{GE}= -15V	T_J=25℃		139		ns
			T_J=125℃		194		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		103		A
			T_J=125℃		138		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		8.56		μC
			T_J=125℃		16.3		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.25		mJ
			T_J=125℃		2.19		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.183	℃/W

IGBT, T3/T4
Maximum Rated Values of IGBT

V_{CES}	Collector-Emitter Blocking Voltage	T_J=25℃	650	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	300	A
		T_C=25℃	600	A
I_{CM}	Repetitive Peak Collector Current	tp=1ms	600	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C=25℃ T_{Jmax}=175℃	1360	W

Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units.
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=8mA, V_{CE}=V_{GE}, T_J=25℃		5.0	5.9	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=300A, V_{GE}=15V	T_J=25℃		1.50	1.70	V
			T_J=125℃		1.70		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℃				400	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz, T_J=25℃			26		nF
C_{oes}	Output Capacitance				1.5		nF
C_{res}	Reveres Transfer Capacitance				0.9		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=300V, I_C=300A, R_{Gon}=4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		408		ns
			T_J=125℃		404		
t_r	Rise Time		T_J=25℃		203		ns
			T_J=125℃		205		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=300V, I_C=300A, R_{Goff} =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		359		ns
			T_J=125℃		365		
t_f	Fall Time		T_J=25℃		98		ns
			T_J=125℃		121		
E_{on}	Turn-on Switching Loss	V_{CC}=300V, I_C=300A, R_{Gon}=4.7Ω, V_{GE}=±15V, di/dt=1250A/μs (T_J=125℃) Inductive Load	T_J=25℃		4.7		mJ
			T_J=125℃		5.3		
E_{off}	Turn-off Switching Loss	V_{CC}=300V, I_C=300A, R_{Goff} =4.7Ω, V_{GE}=±15V, du/dt=2570V/μs (T_J=125℃) Inductive Load	T_J=25℃		12.9		mJ
			T_J=125℃		15.5		
Q_g	Total Gate Charge	V_{GE}=-15V…+15V	T_J=25℃		1.82		μC
RBSOA	I_C=600A, V_{CC}=600V, Vp=650V, R_{Goff}=4.7Ω, V_{GE}=+15V to 0V, T_J=150°C			Trapezoid			
SCSOA	V_{CC}=300V, V_{GE}=15V, T_J=150℃			10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case (per IGBT)					0.110	℃/W

Diode, D1/D2
Maximum Rated Values of Diode

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current		300	A
I_{FM}	Diode Maximum Forward Current	tp=1ms	600	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min.	Typ.	Max.	Units.
V_{FM}	Forward Voltage	I_F=300A	T_J=25℃		1.70	2.20	V
			T_J=125℃		1.70		
t_{rr}	Reverse Recovery Time	I_F=300A, -diF/dt =1515A/μs(T_J=150℃), V_R=600V, V_{GE}=-15V	T_J=25℃		307		ns
			T_J=125℃		475		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		141		A
			T_J=125℃		175		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		24.5		μC
			T_J=125℃		44.3		
E_{rec}	Reverse Recovery Energy		T_J=25℃		8.1		mJ
			T_J=125℃		16.0		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.131	℃/W

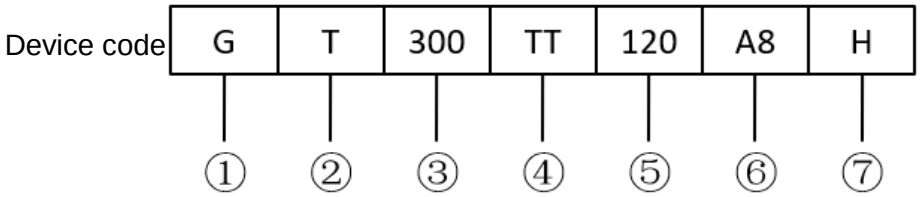
NTC-Thermistor Characteristic Values

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		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 30s	4500			V
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			V
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)				0.02	℃/W
M	Power Terminals Screw:M6		3.0		6.0	N·m
M	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			390		g

Ordering Information Table



① - IGBT Module
② - Trench & Field Stop IGBT
③ - Rated Current (300=300A)
④ - Circuit Configuration: TT=Three Level (T Type)
⑤ - Rated Voltage (120=1200V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

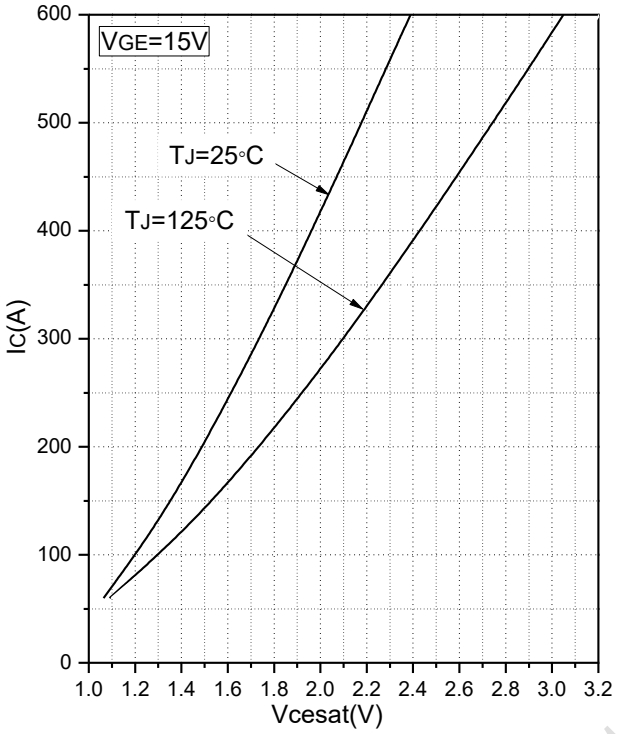


Fig.1 Typical Saturation Voltage Characteristics (IGBT T1/T2)

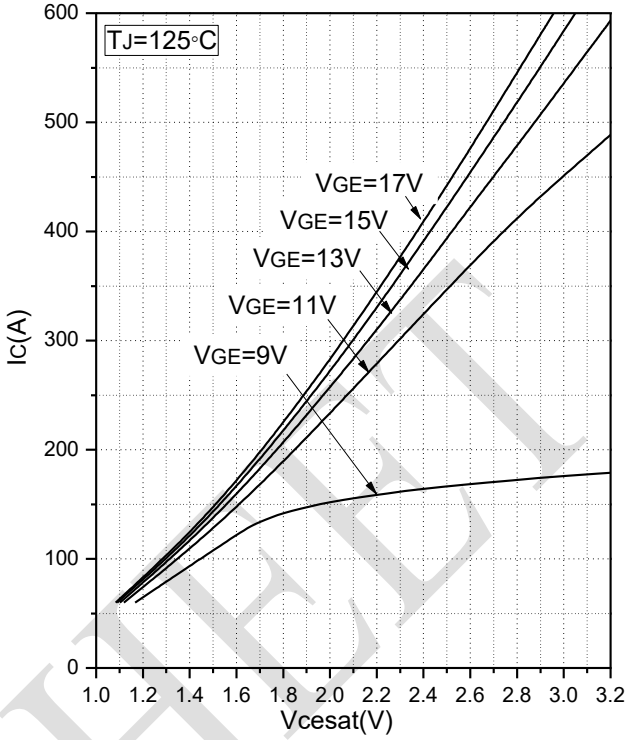


Fig.2 Typical Output Characteristics (IGBT T1/T2)

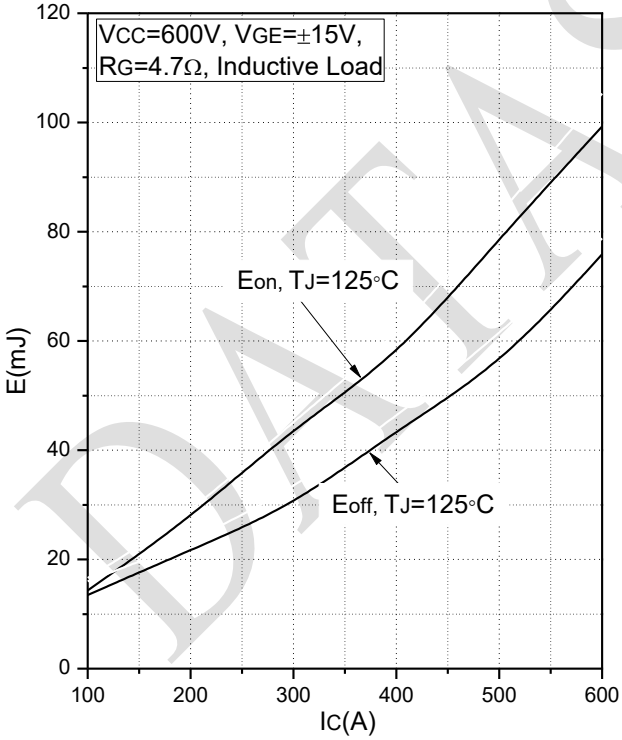


Fig.3 Typical Switching Loss vs. Collector Current (IGBT T1/T2)

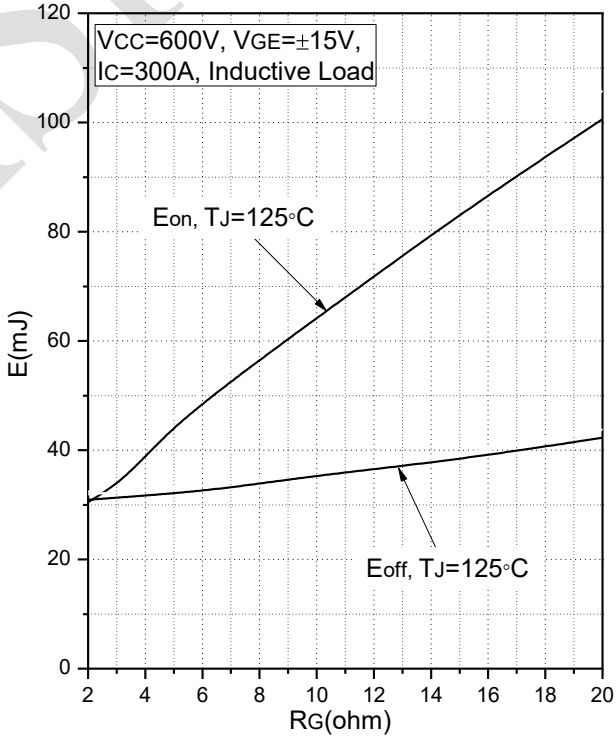


Fig.4 Typical Switching Loss vs. Gate Resistance (IGBT T1/T2)

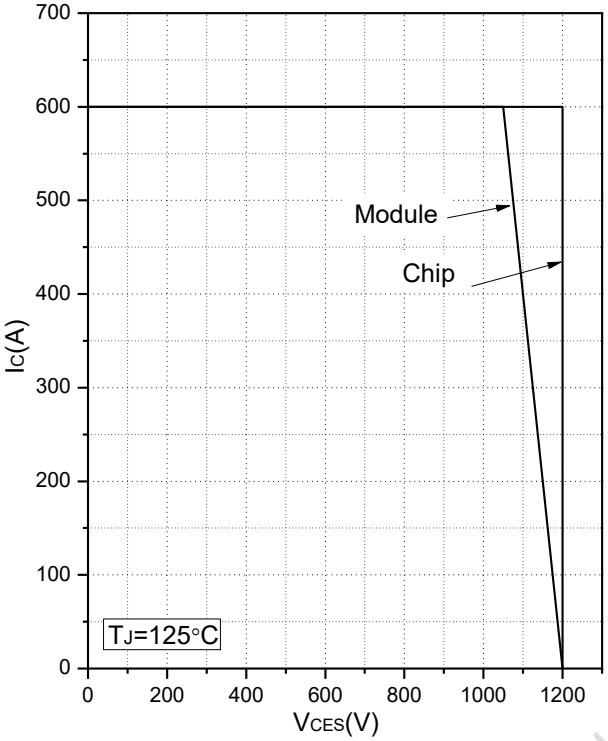


Fig.5 Reverse Bias Safe Operation Area (RBSOA)
(IGBT T1/T2)

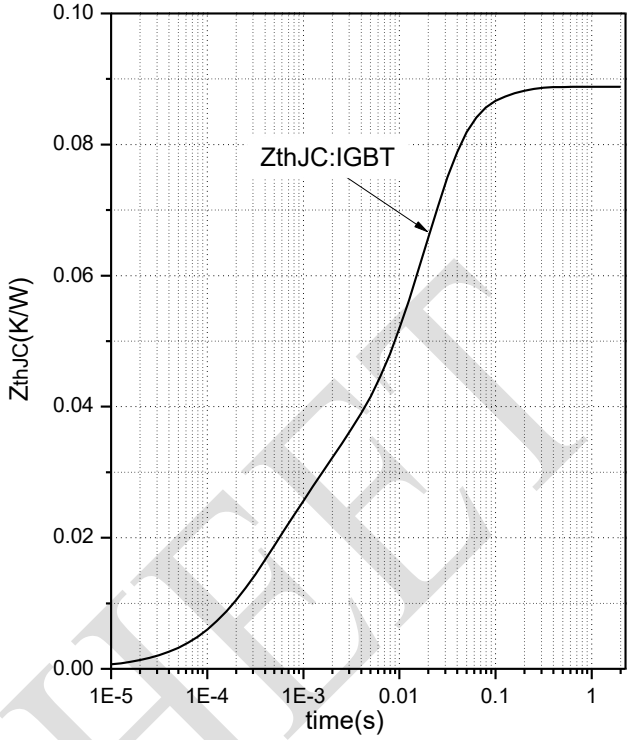


Fig.6 Transient Thermal Impedance (IGBT T1/T2)

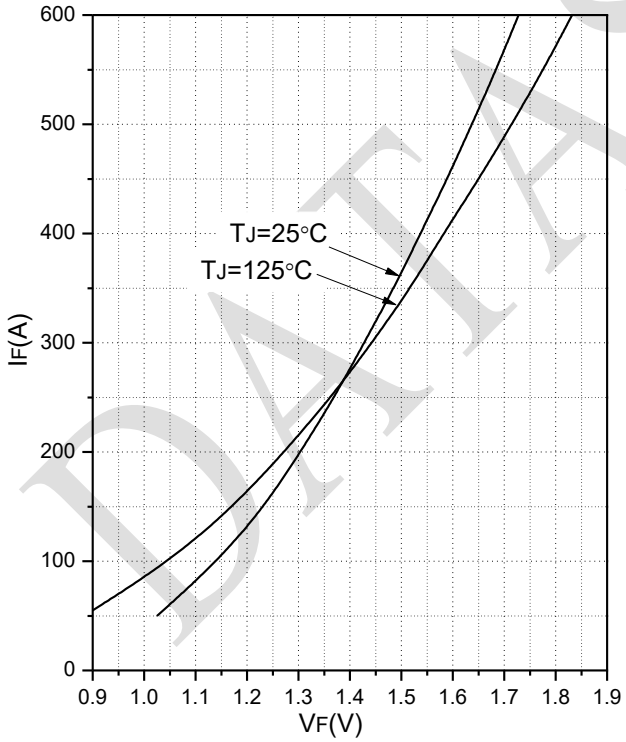


Fig.7 Forward Characteristics of FWD
(Diode D3/D4)

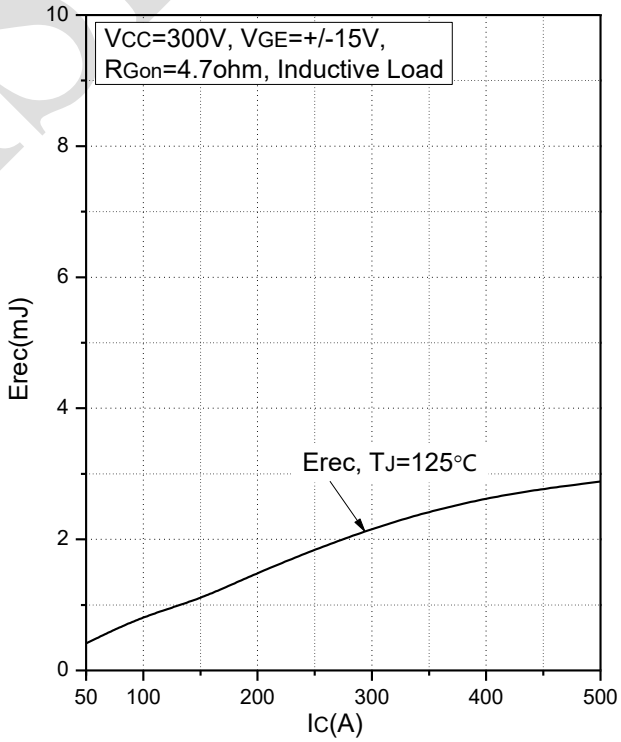


Fig.8 Typical Switching Loss vs. Collector Current
(Diode D3/D4)

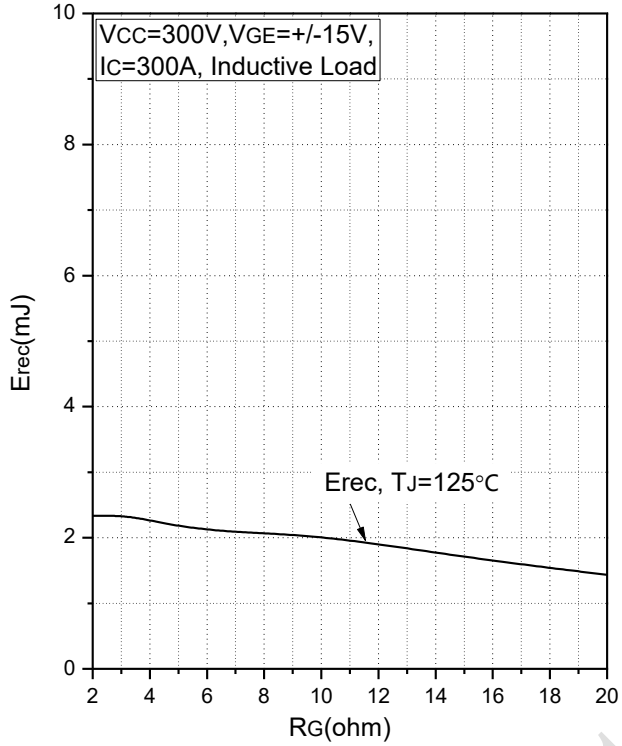


Fig.9 Typical Switching Loss vs. Gate Resistance (Diode D3/D4)

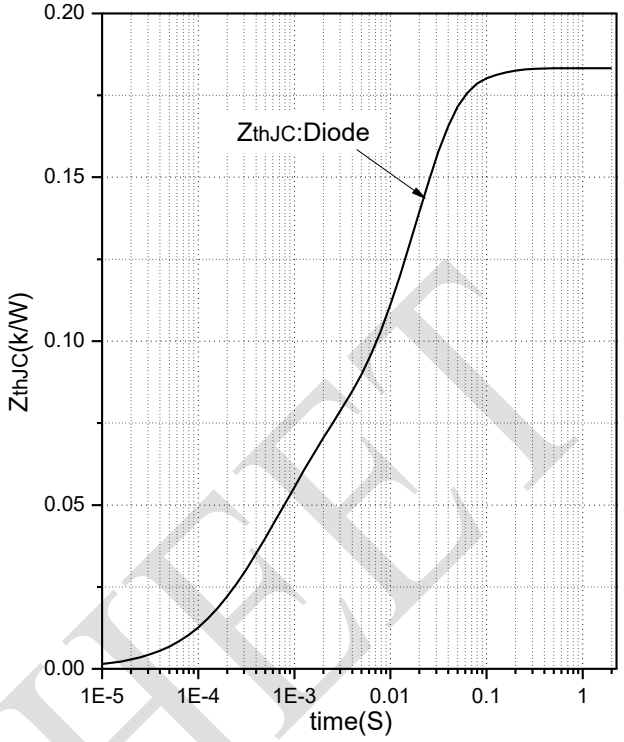


Fig.10 Transient Thermal Impedance (Diode D3/D4)

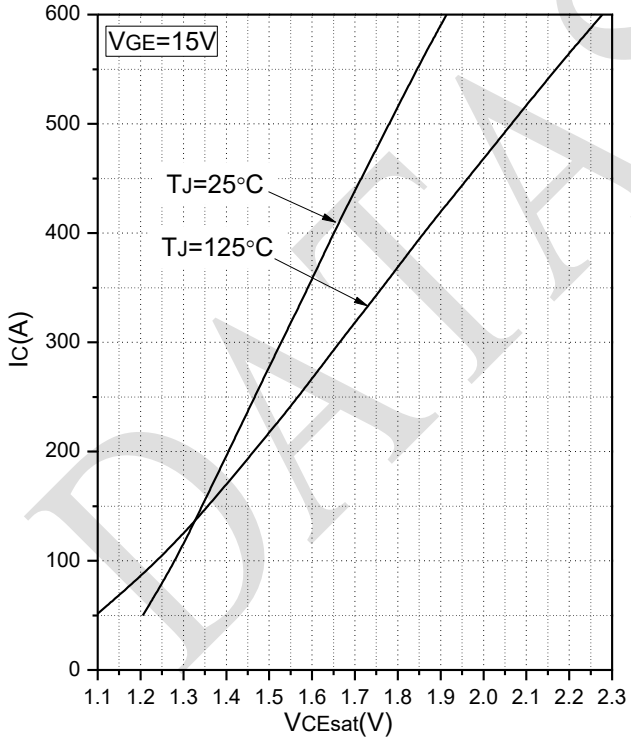


Fig.11 Typical Saturation Voltage Characteristics (IGBT T3/T4)

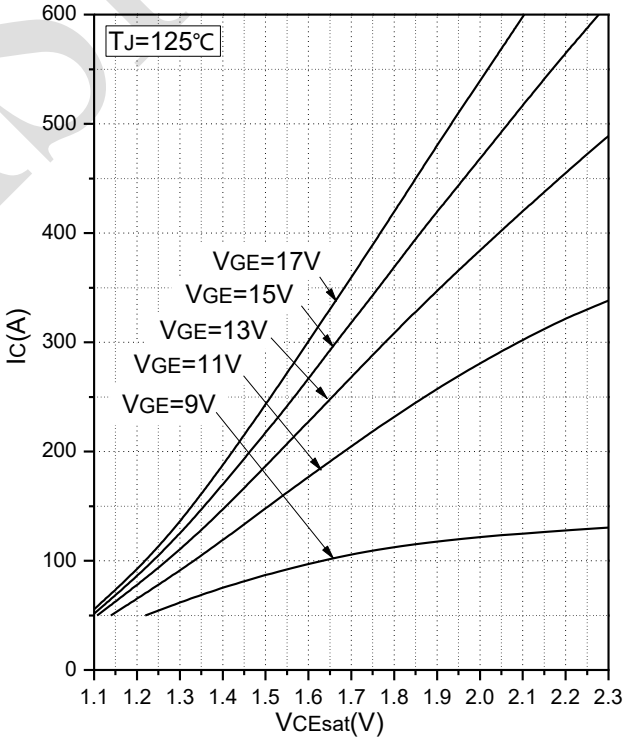


Fig.12 Typical Output Characteristics (IGBT T3/T4)

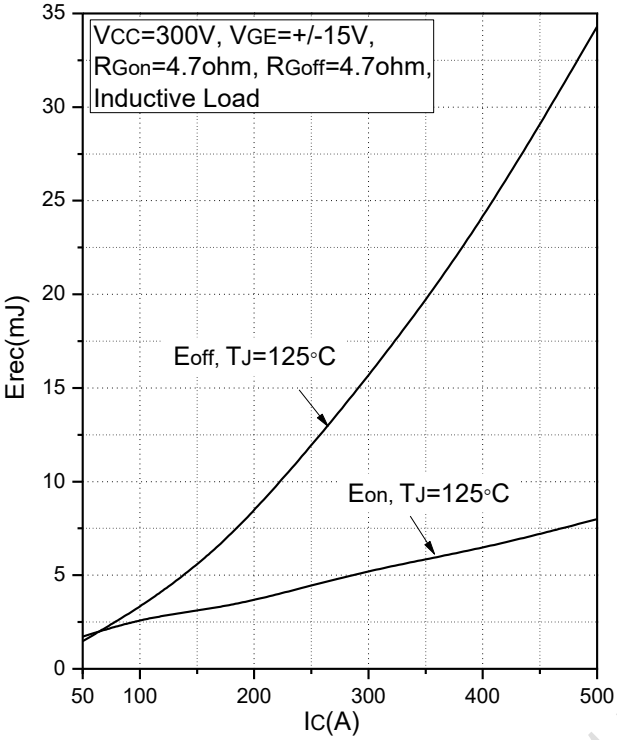


Fig.13 Typical Switching Loss vs. Collector Current (IGBT T3/T4)

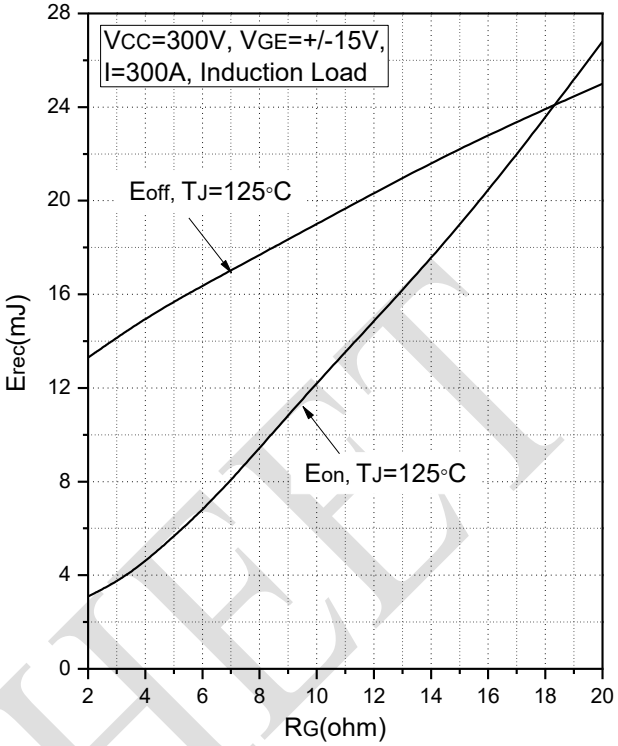


Fig.14 Typical Switching Loss vs. Gate Resistance (IGBT T3/T4)

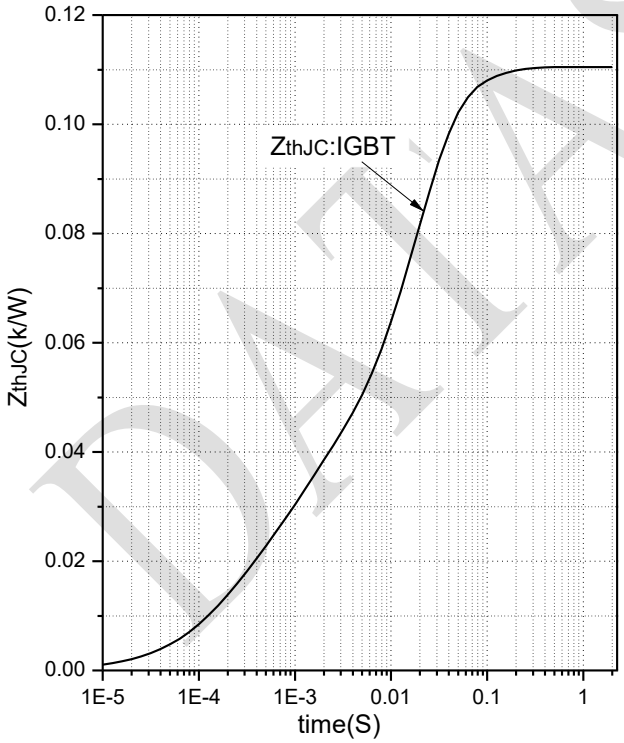


Fig.15 Transient Thermal Impedance (IGBTT3/T4)

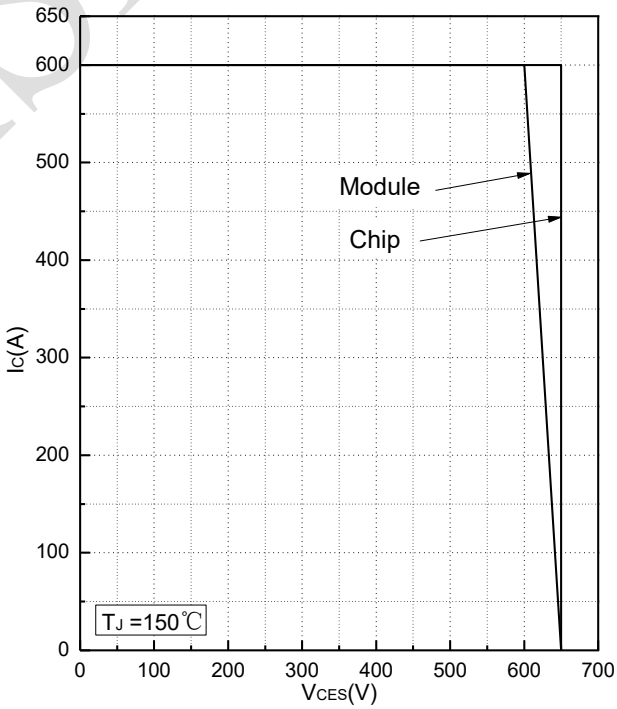


Fig.16 Reverse Bias Safe Operation Area (RBSOA) (IGBTT3/T4)

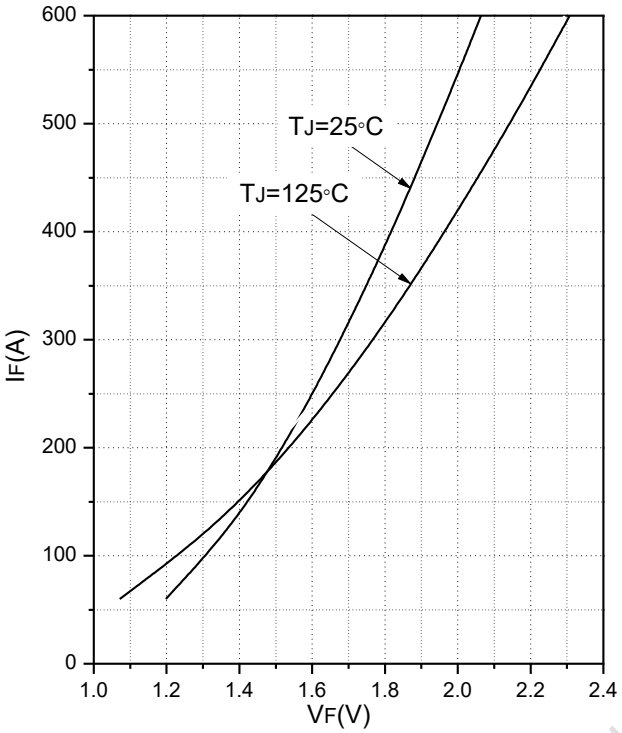


Fig.17 Forward Characteristics (Diode D1/D2)

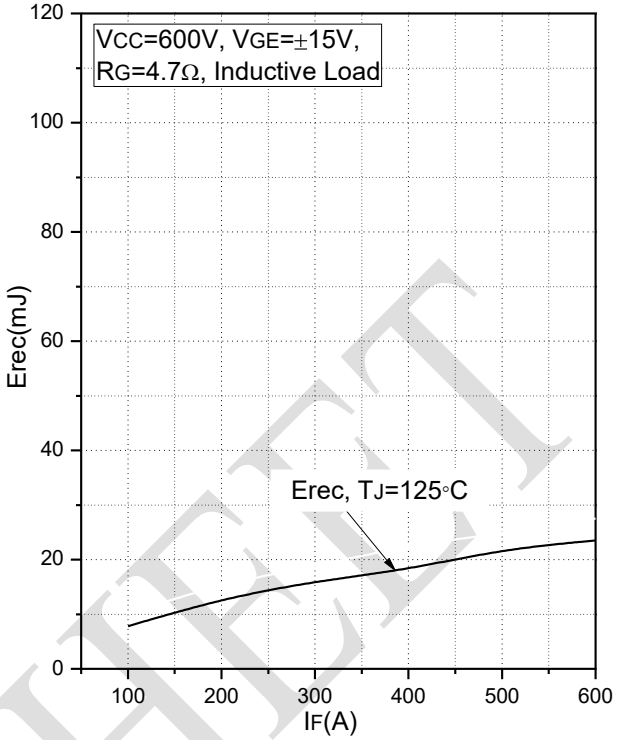


Fig.18 Typical Switching Loss vs. Collector Current (Diode D1/D2)

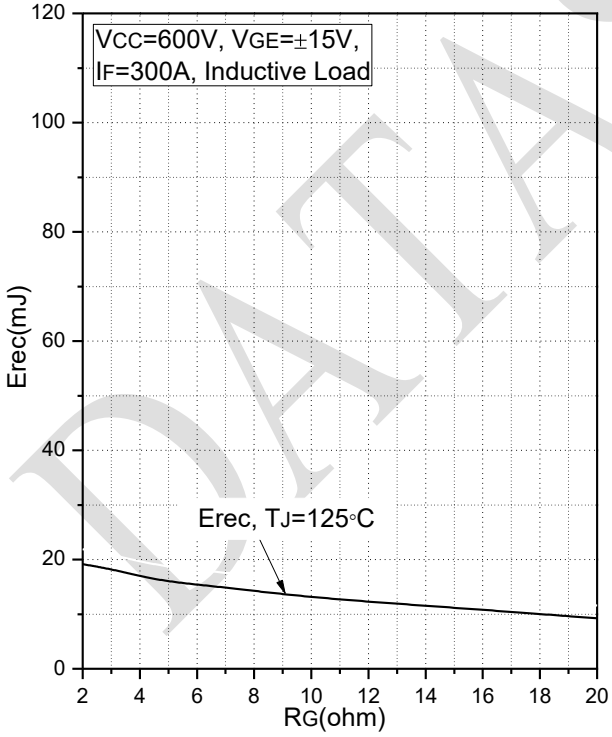


Fig.19 Typical Switching Loss vs. Gate Resistance (Diode D1/D2)

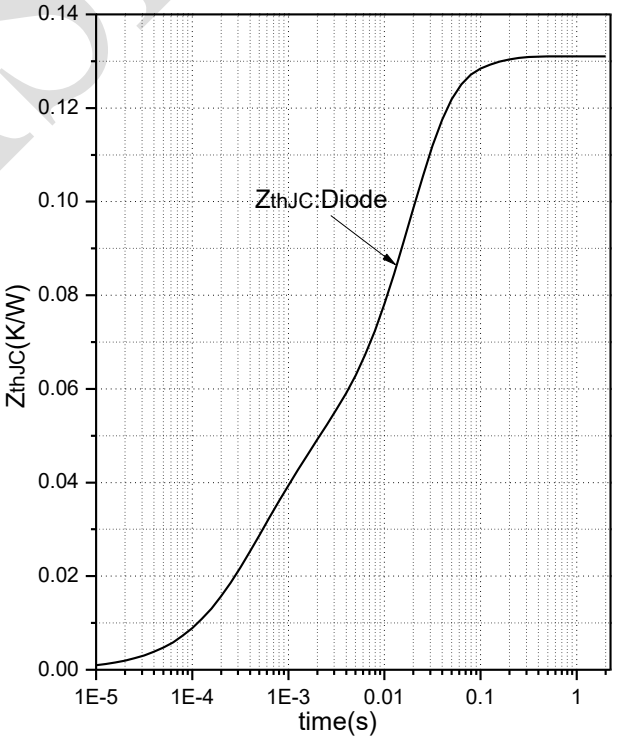


Fig.20 Transient Thermal Impedance (Diode D1/D2)

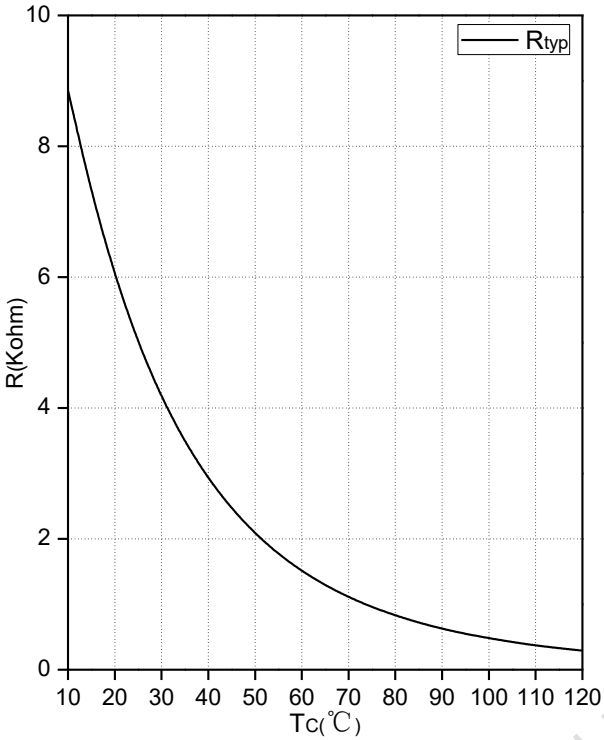
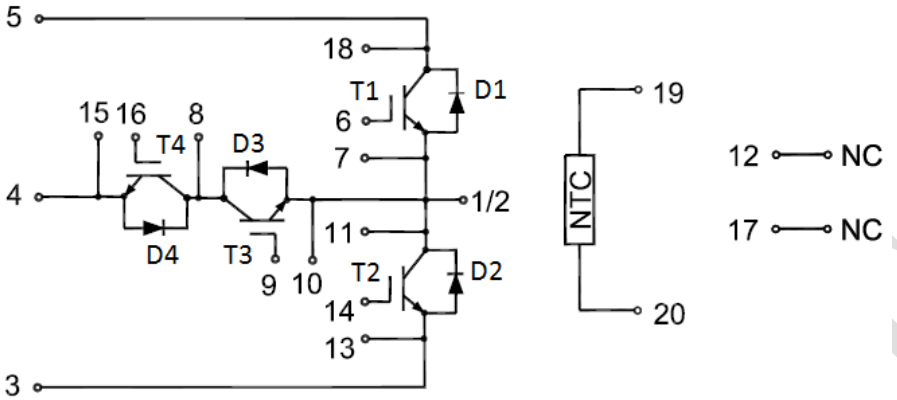
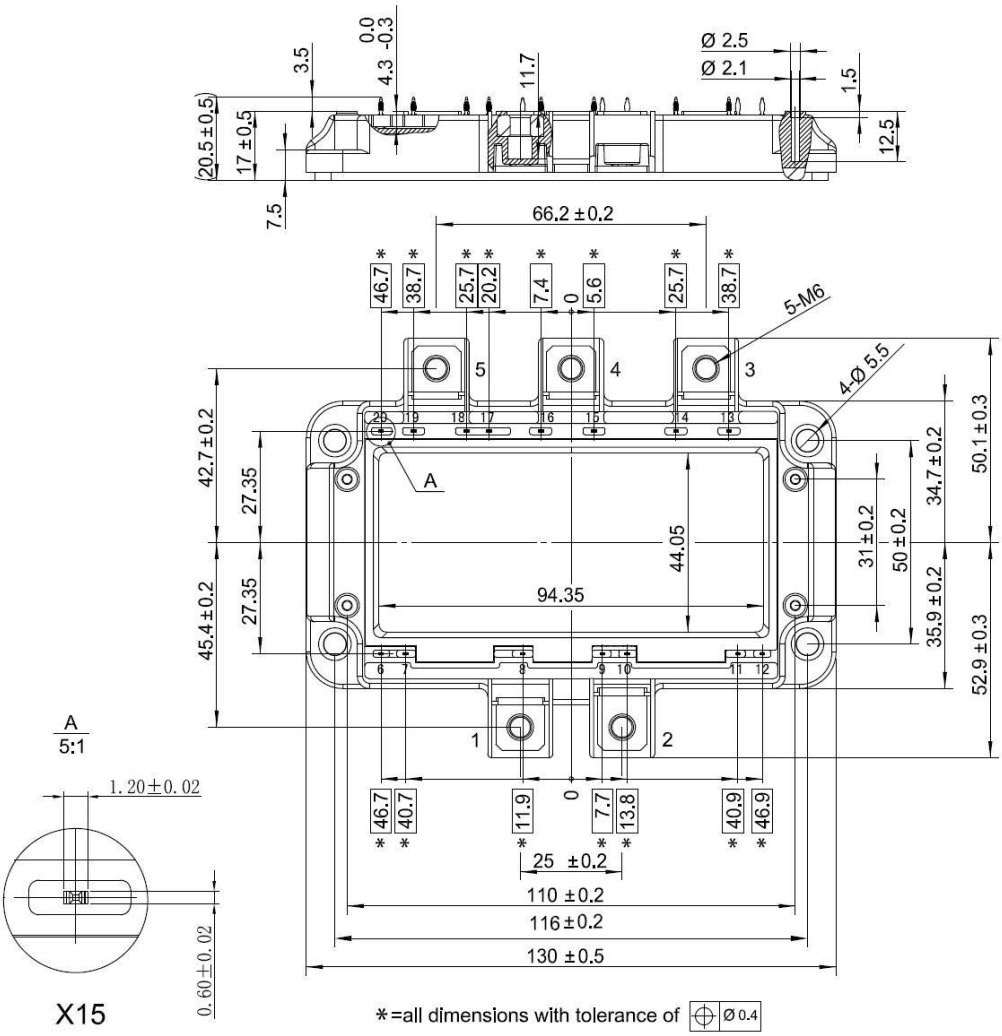


Fig.21 NTC Temperature Characteristics

Internal Circuit



Package Outline (Unit: mm):



Date	Revision	Notes
04/20/2023	01	Initial release

Announcement

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