



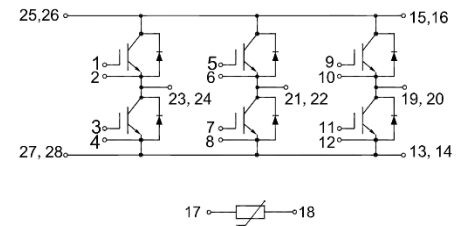
GT40FF120T5H

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



Applications:

- Auxiliary Inverters
- Motor Drives
- Servo Drives

IGBT, Inverter

Maximum Rated Values ($T_C=25^\circ\text{C}$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^\circ\text{C}$	40	A
		$T_C=25^\circ\text{C}$	80	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	80	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	300	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	$I_C=1.5\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=40\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.90	2.30	V
			$T_J=125^{\circ}\text{C}$	2.40		
			$T_J=150^{\circ}\text{C}$	2.50		
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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_J=25^{\circ}\text{C}$		2.19		nF
C_{oes}	Output Capacitance			0.19		
C_{res}	Reverse Transfer Capacitance			0.04		

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =40A, R _{Gon} =36Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		114		ns
			T _J =125℃		126		
			T _J =150℃		130		
t _r	Rise Time		T _J =25℃		88		ns
			T _J =125℃		96		
			T _J =150℃		102		
t _{d(off)}	Turn-off Delay Time		T _J =25℃		338		ns
			T _J =125℃		362		
			T _J =150℃		364		
t _f	Fall Time	T _J =25℃		90		ns	
		T _J =125℃		110			
		T _J =150℃		114			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =40A, R _{Gon} =36Ω, V _{GE} =±15V, di/dt=385A/μs(T _J =150℃), Inductive Load	T _J =25℃		3.7		mJ
		T _J =125℃		4.1			
		T _J =150℃		4.3			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =40A, R _{Goff} ≈36Ω, V _{GE} =±15V, du/dt=3855V/μs(T _J =150°C), Inductive Load	T _J =25°C		2.3		mJ
			T _J =125°C		2.5		
			T _J =150°C		2.9		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		457		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =±15V, t _p =10us, T _J =150°C				162		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.50	°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	T _C =100°C	40	A
I _{FM}	Peak Diode Current Repetitive	t _p =1ms	80	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 =40A	T _J =25℃		1.70		V
			T _J =125℃		1.85		
			T _J =150℃		1.85		
I _{rr}	Peak Reverse Recovery Current	I _F =40A, di/dt=432A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		24.3		A
			T _J =125℃		25.4		
			T _J =150℃		25.8		
t _{rr}	Reverse Recovery Time		T _J =25℃		174		ns
			T _J =125℃		190		
			T _J =150℃		208		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.2		μC
			T _J =125℃		2.4		
			T _J =150℃		2.8		



E _{rec}	Reverse Recovery Energy	I _F =40A, di/dt=432A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		0.17		mJ
			T _J =125°C		0.18		
			T _J =150°C		0.20		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.79	°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)	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)				0.04	°C/W
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			190		g



Ordering Information Table

Device code	G	T	40	FF	120	T5	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (40=40A)
- ④ - Circuit Configuration (Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

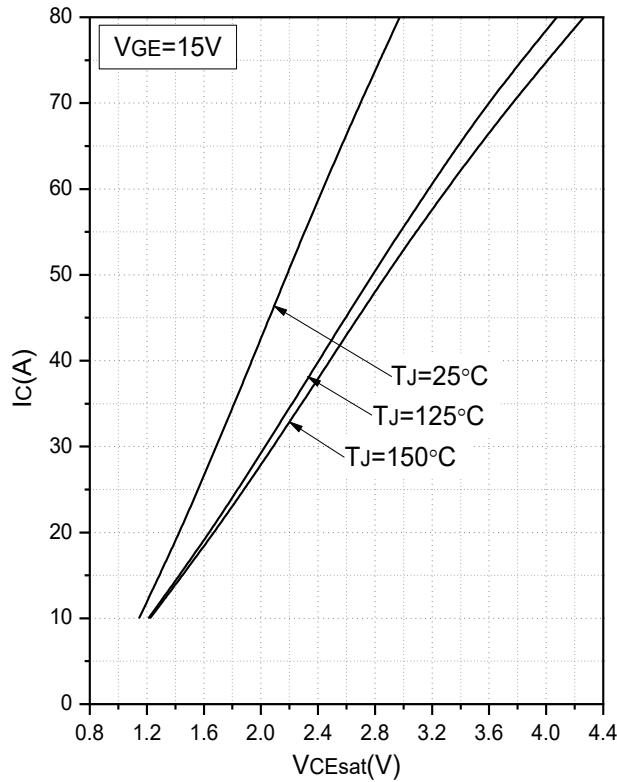


Fig.1 Typical Saturation Voltage Characteristics

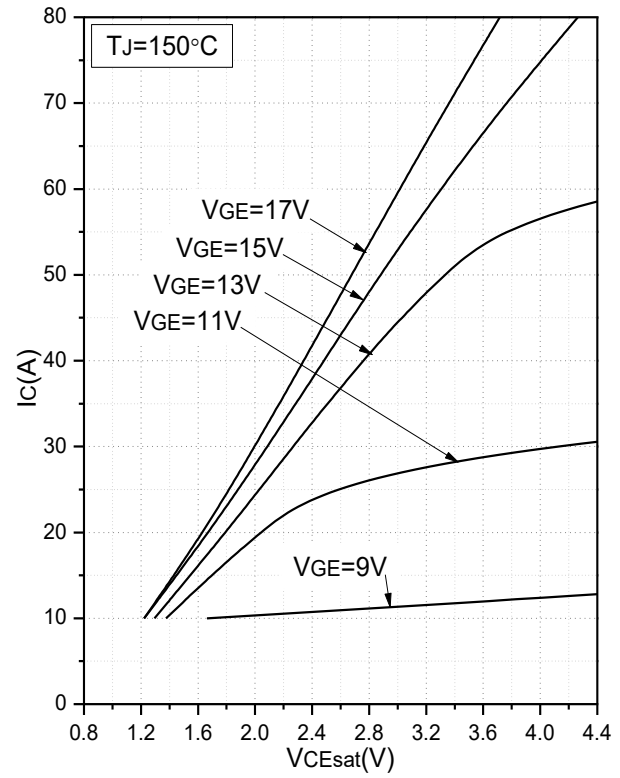


Fig.2 Typical Output Characteristics

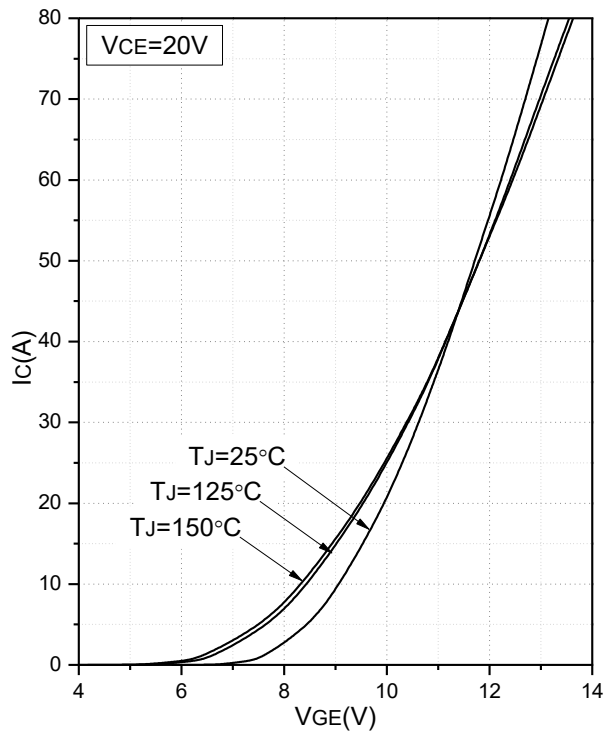


Fig.3 Transfer Characteristics

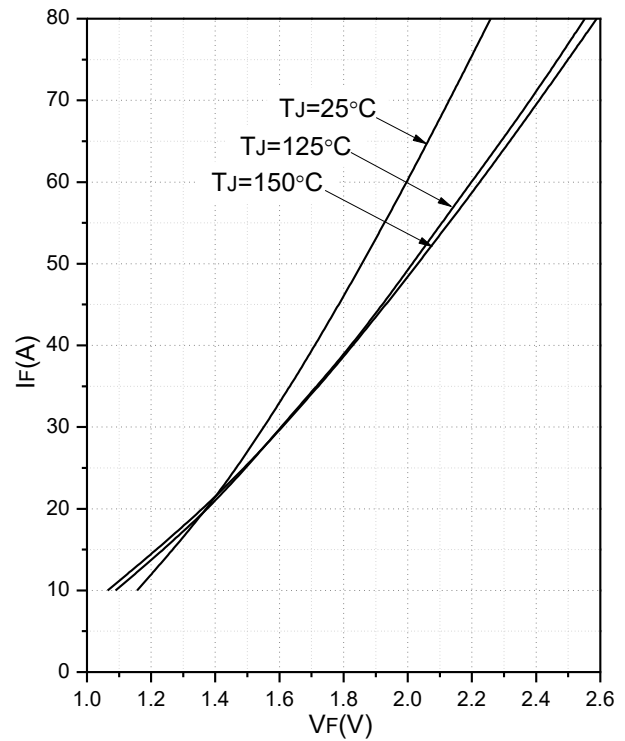


Fig.4 Forward Characteristics of Diode

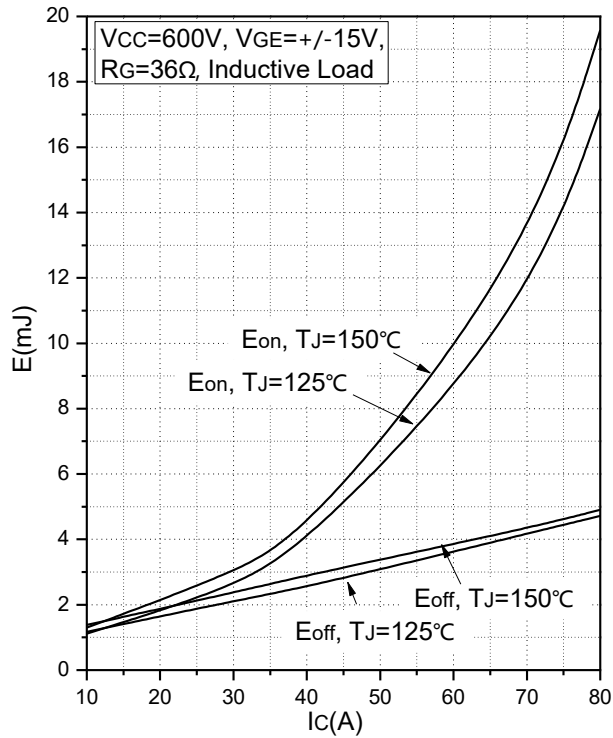


Fig.5 Typical Switching Loss vs. Collector Current

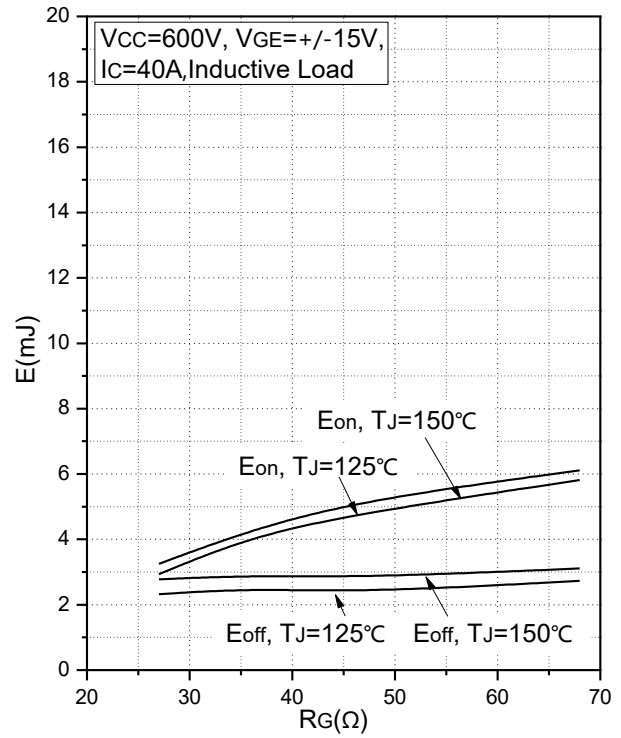


Fig.6 Typical Switching Loss vs. Gate Resistance

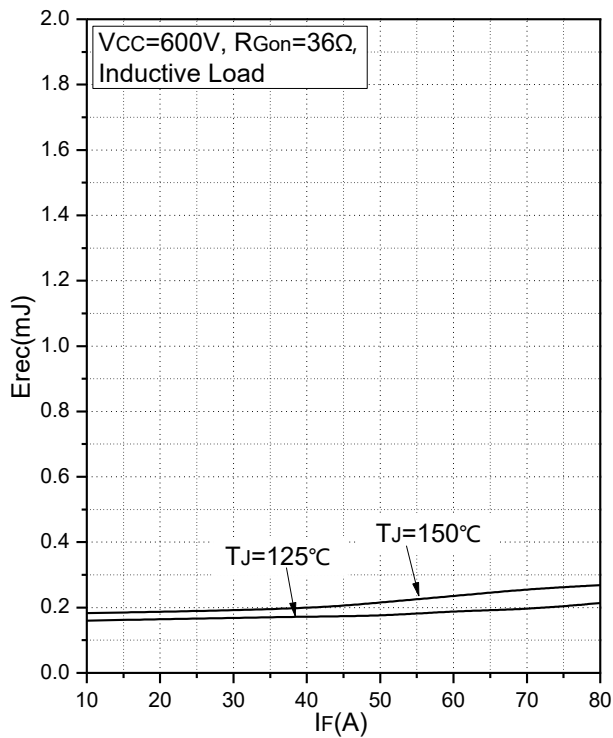


Fig.7 Typical Switching Loss vs. Forward Current

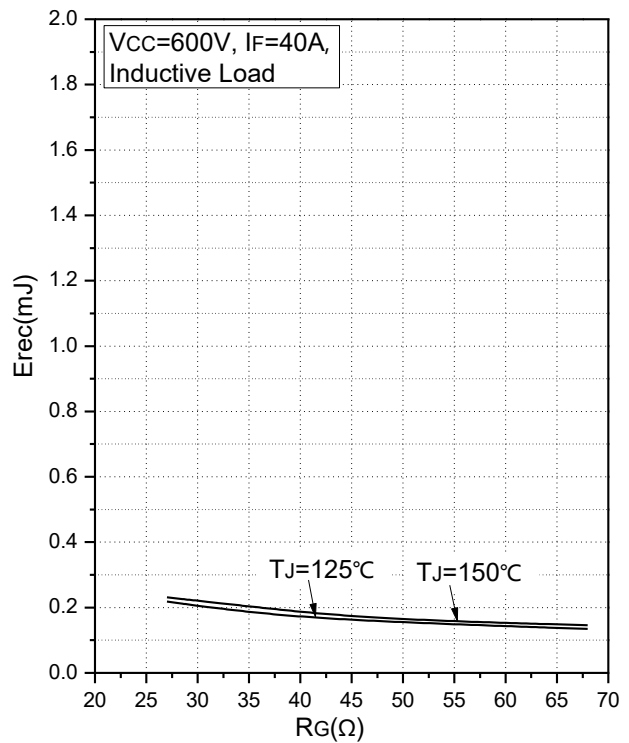
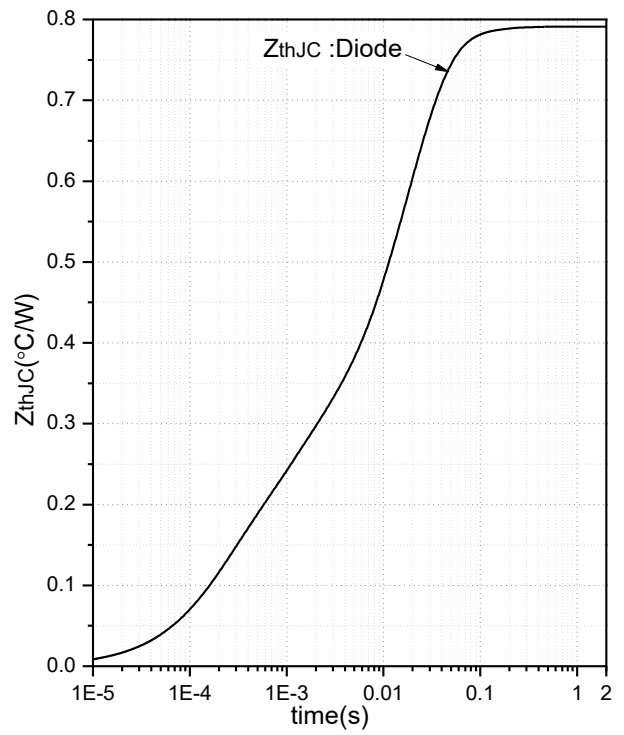
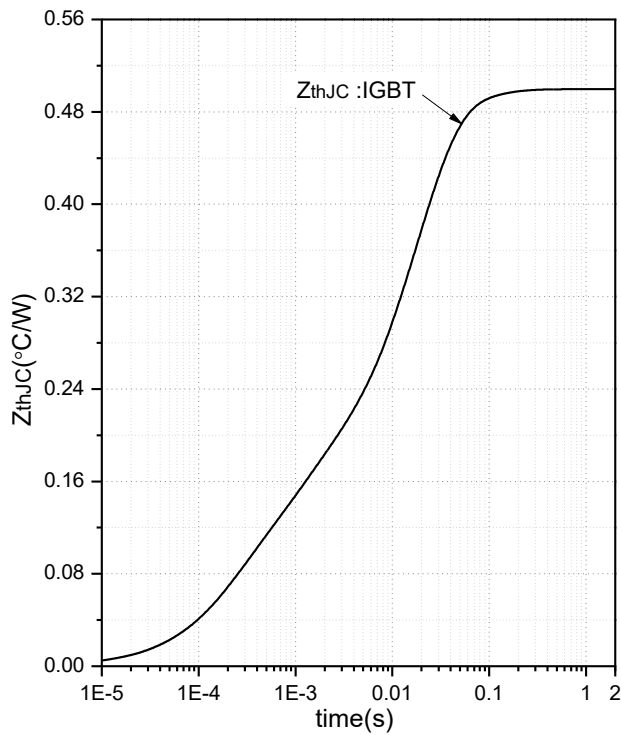
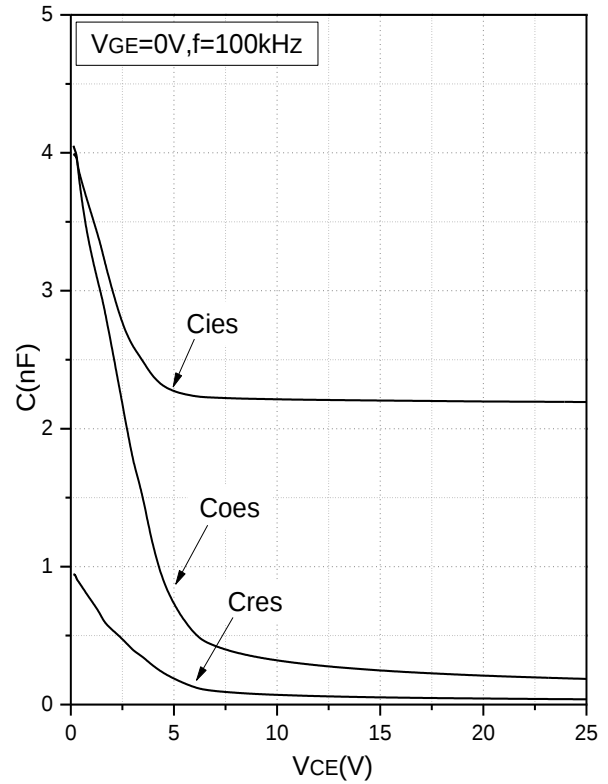
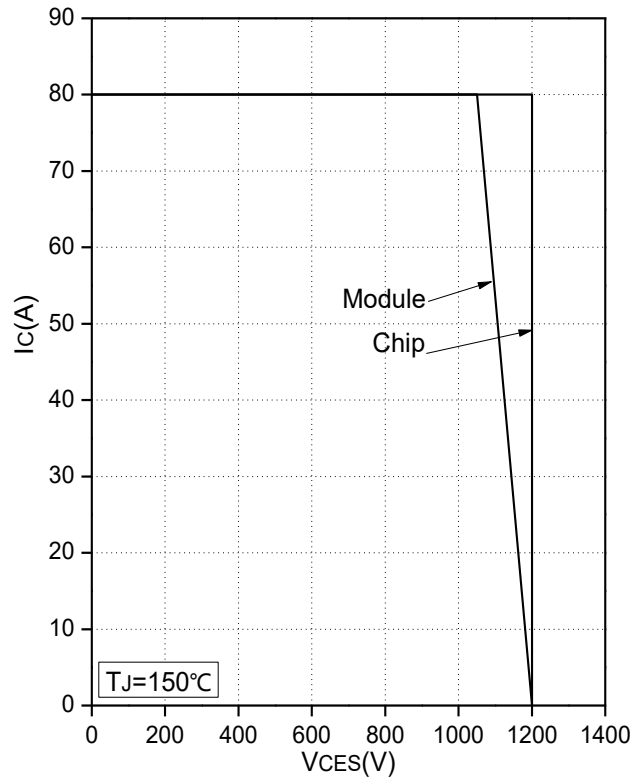


Fig.8 Typical Switching Loss vs. Gate Resistance



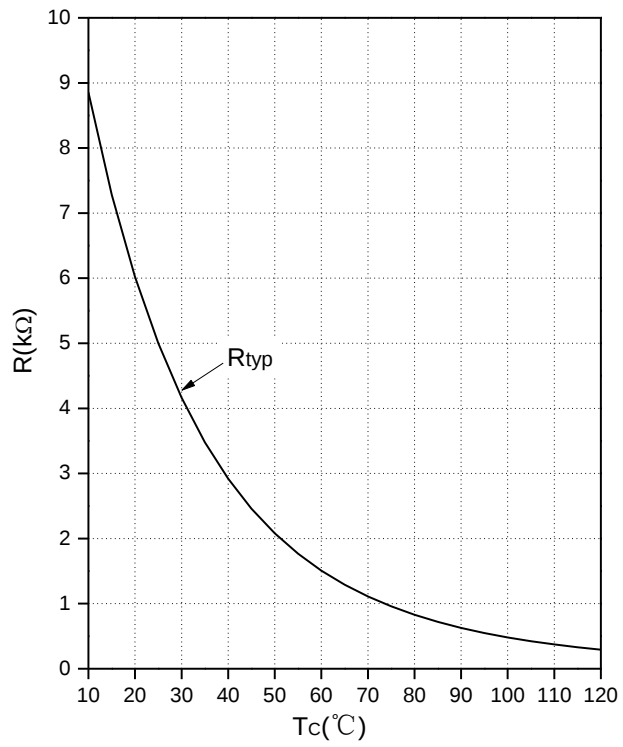
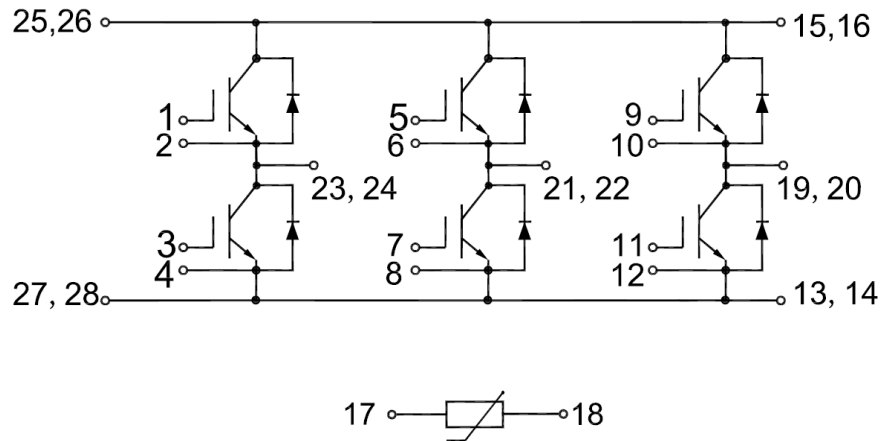


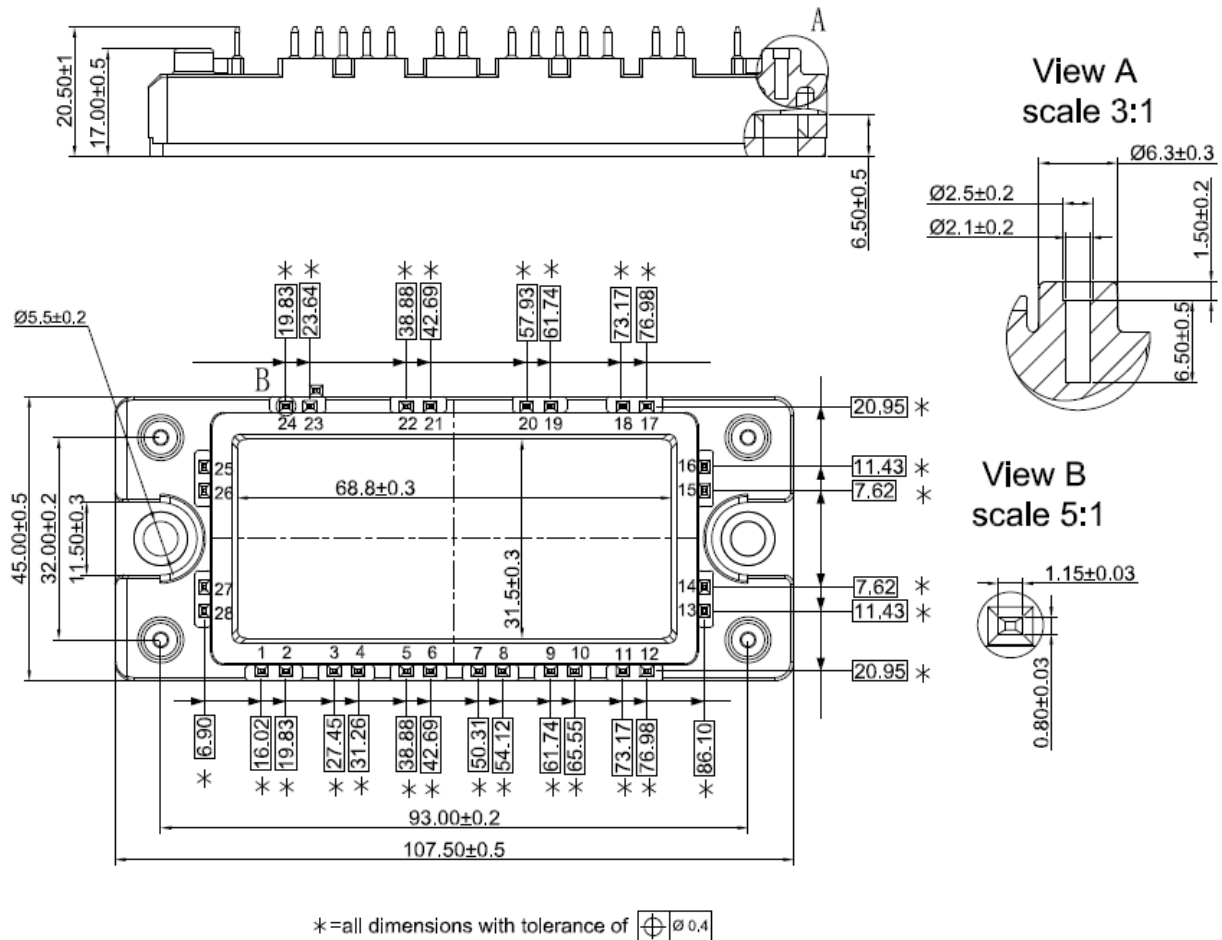
Fig.13 NTC Temperature Characteristics



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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