



GT40FF120A1H-C

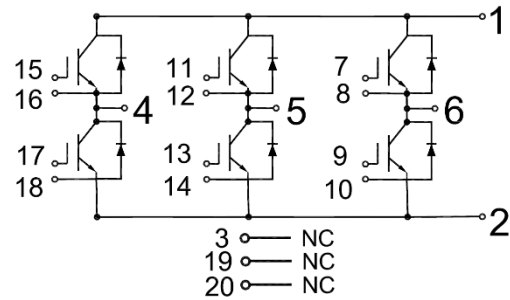
IGBT Module

Preliminary Data

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:

- Motor Drives
- Air Conditioning
- Servo Drives
- UPS

IGBT, Inverter

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

Symbol	Description	Conditions	Values	Units
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}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	80	A
P_D	Maximum Power Dissipation per Leg	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	358	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	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=40\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80	2.10	V
			$T_J=125^{\circ}\text{C}$	2.10		
			$T_J=150^{\circ}\text{C}$	2.20		
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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			± 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} =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		92		ns
			T _J =125℃		93		
			T _J =150℃		94		
t _r	Rise Time		T _J =25℃		46		ns
			T _J =125℃		50		
			T _J =150℃		50		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =40A, R _{Goff} =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		183		ns
			T _J =125℃		185		
			T _J =150℃		189		
t _f	Fall Time		T _J =25℃		258		ns
			T _J =125℃		310		
			T _J =150℃		315		
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =40A, R _{Gon} =15Ω, V _{GE} =±15V, di/dt=720A/μs(T _J =150℃), Inductive Load	T _J =25℃		3.29		mJ
			T _J =125℃		3.40		
			T _J =150℃		3.87		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =40A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=921V/μs(T _J =150°C), Inductive Load	T _J =25°C		3.01		mJ
			T _J =125°C		3.54		
			T _J =150°C		3.73		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		457		nC
R _{g internal}	Internal Gate Resistor		T _J =25°C		0		Ω
I _{SC}	V _{CC} =600V, V _{GE} = ±15V, tp=10us, R _{Gon} =56Ω, R _{Goff} =56Ω, T _J =25°C				175		A
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case					0.42	°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}	Diode Maximum Forward Current	tp=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=351A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		53.7		A
			T _J =125℃		62.5		
			T _J =150℃		63.8		
t _{rr}	Reverse Recovery Time		T _J =25℃		134		ns
			T _J =125℃		156		
			T _J =150℃		156		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		4.13		μC
			T _J =125℃		6.00		
			T _J =150℃		6.12		

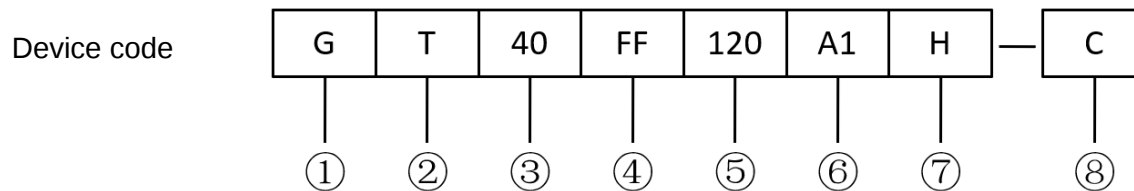


E _{rec}	Reverse Recovery Energy	I _F =40A, di/dt=351A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		1.04		mJ
			T _J =125°C		2.13		
			T _J =150°C		2.41		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.66	°C/W

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	$^{\circ}C$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	$^{\circ}C$
T_{stg}	Storage Temperature		-40		+125	$^{\circ}C$
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.06	$^{\circ}C/W$
T	Mounting Screw:M3		0.75		1.20	N·m
G	Weight			30		g

Ordering Information Table



- ① - IGBT Module
- ② - Trench, Low Switching Losses 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)
- ⑧ - Internal Code

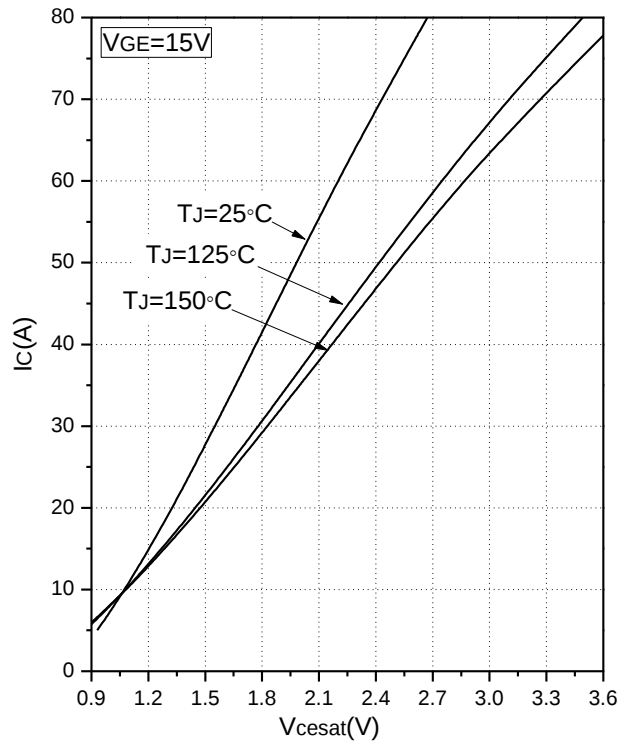


Fig.1 Typical Saturation Voltage Characteristics

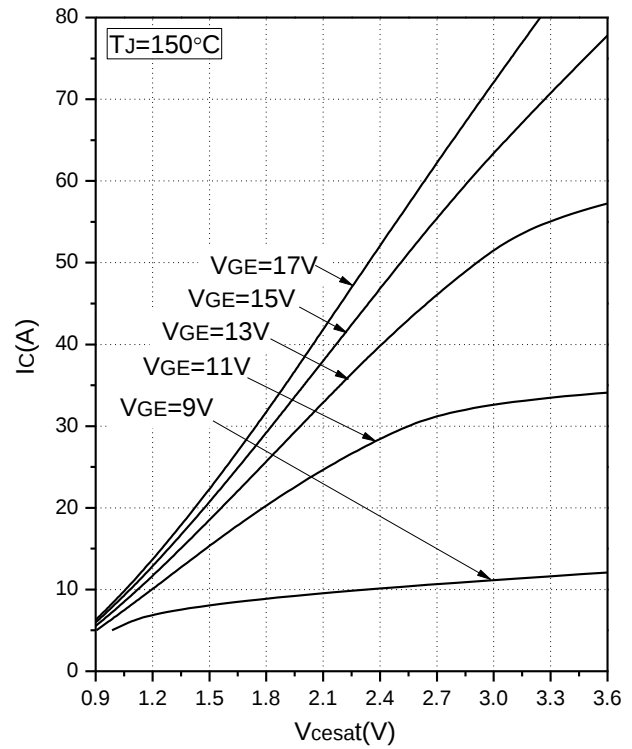


Fig.2 Typical Output Characteristics

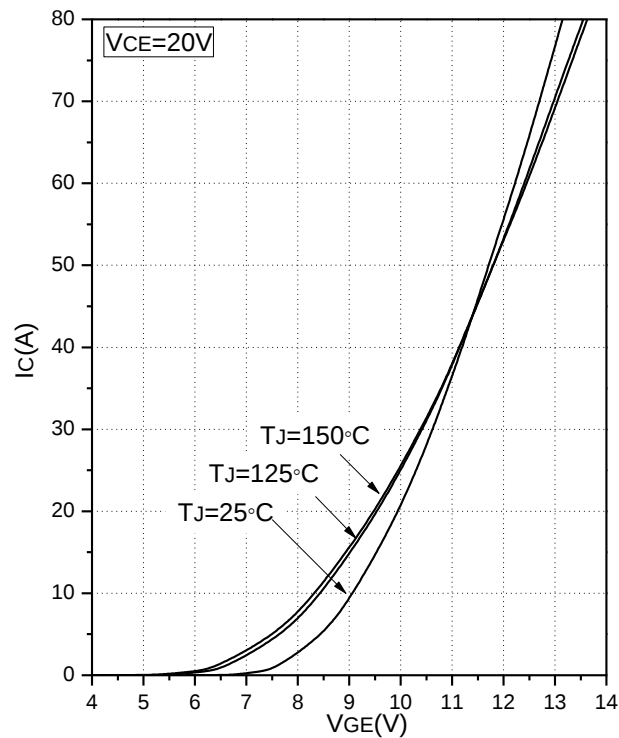


Fig.3 Transfer Characteristic

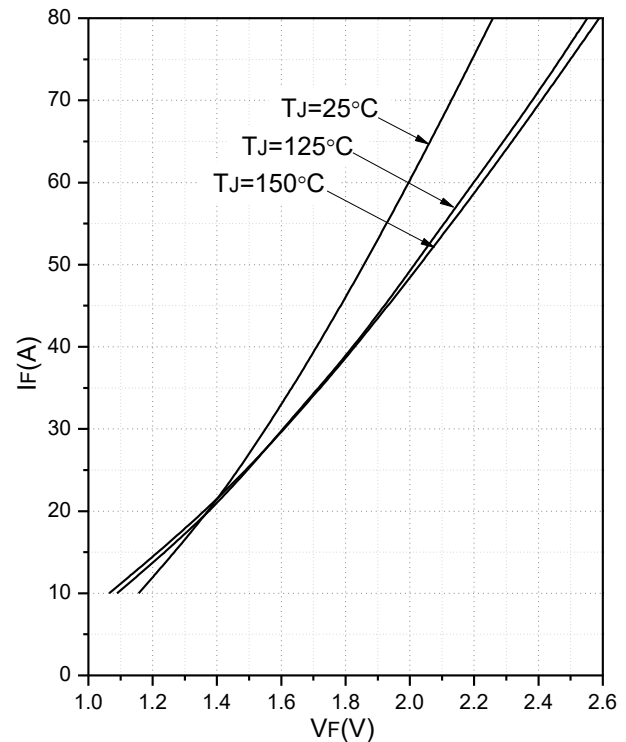


Fig.4 Forward Characteristics of Diode

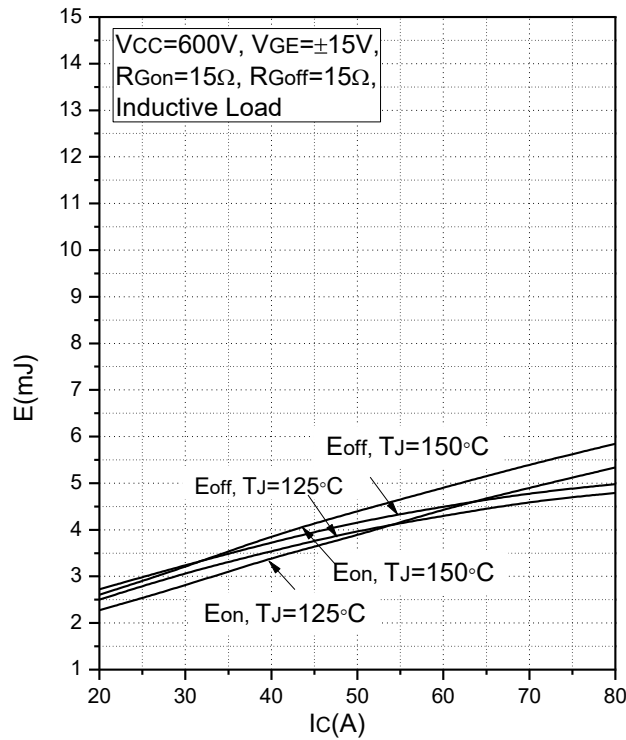


Fig.5 Typical Switching Loss vs. Collector Current

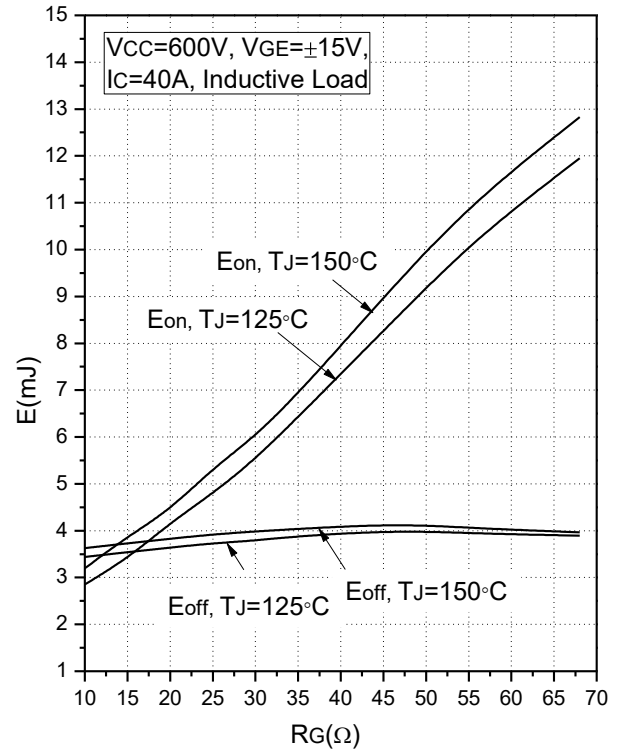


Fig.6 Typical Switching Loss vs. Gate Resistance

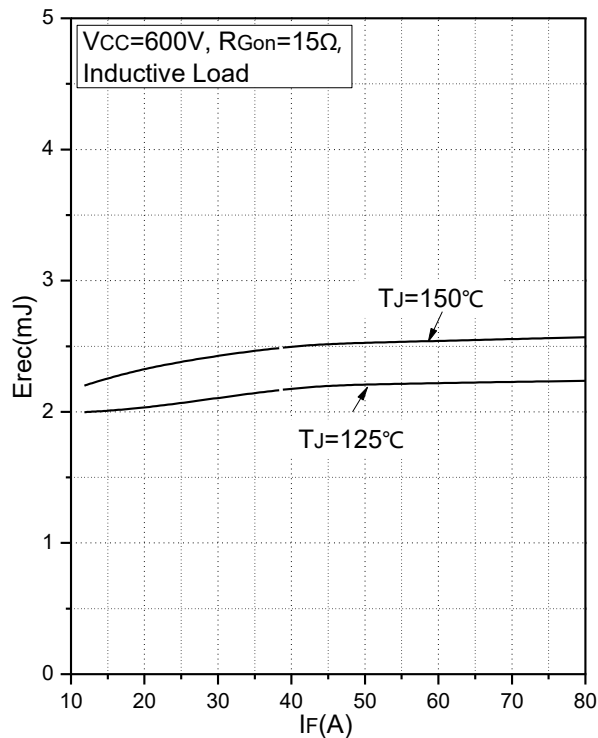


Fig.7 Typical Switching Loss vs. Forward Current

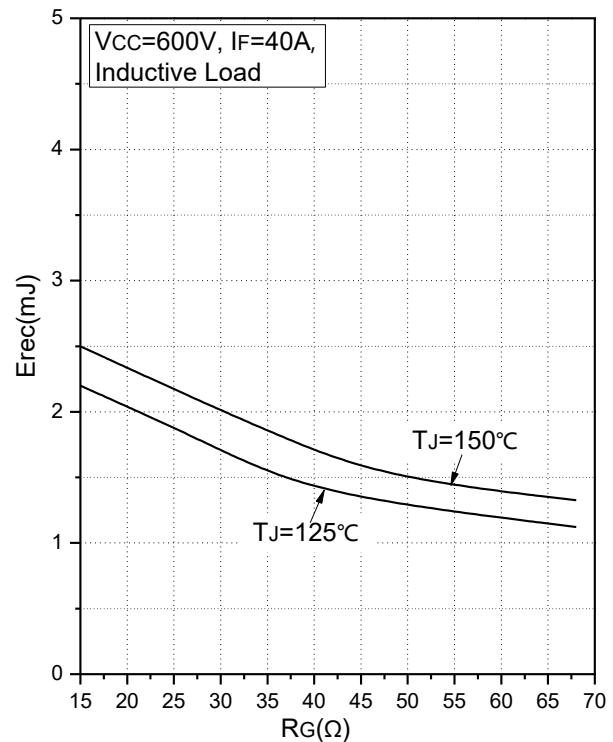


Fig.8 Typical Switching Loss vs. Gate Resistance

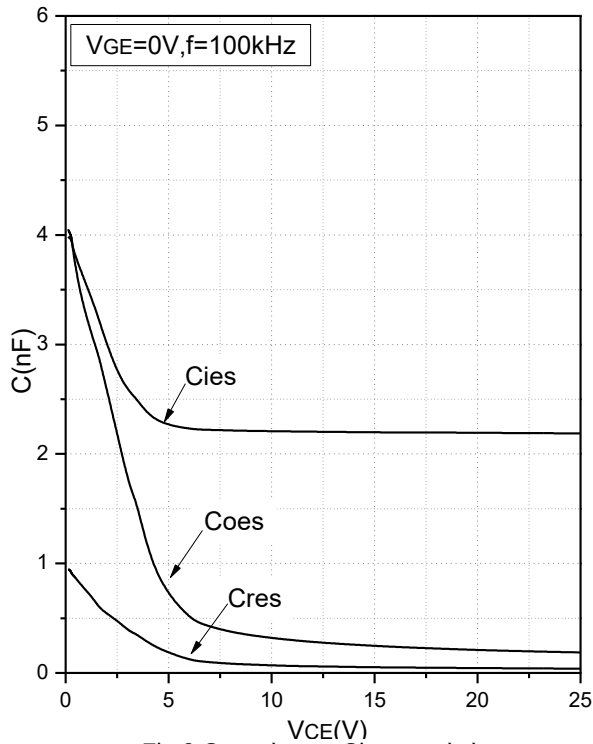


Fig.9 Capacitance Characteristics

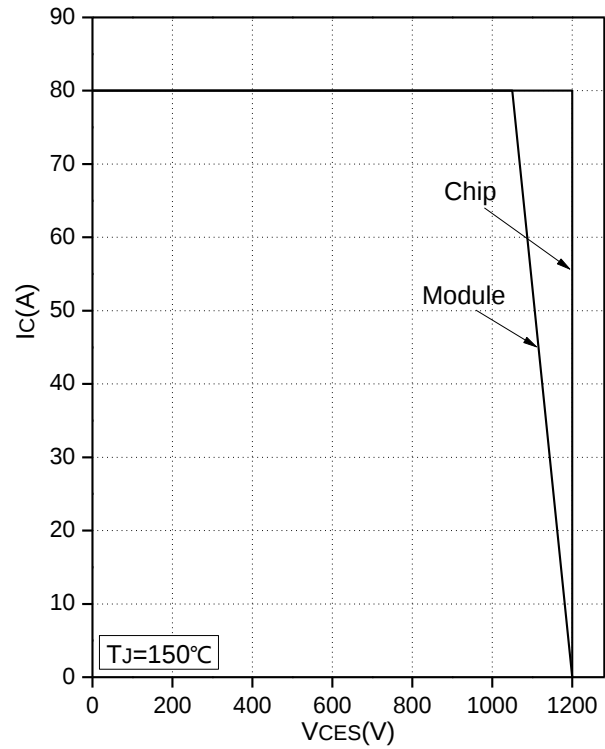


Fig.10 Reverse Bias Safe Operation Area

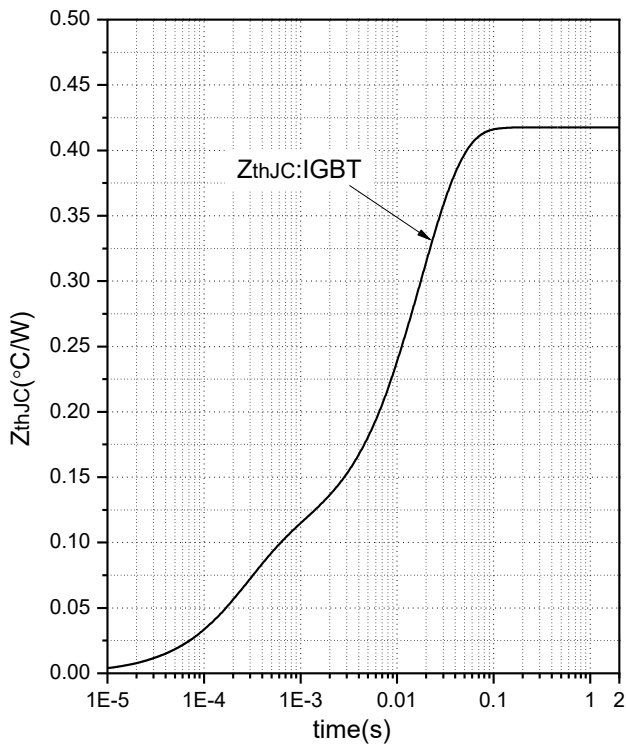


Fig.11 Transient Thermal Impedance (IGBT)

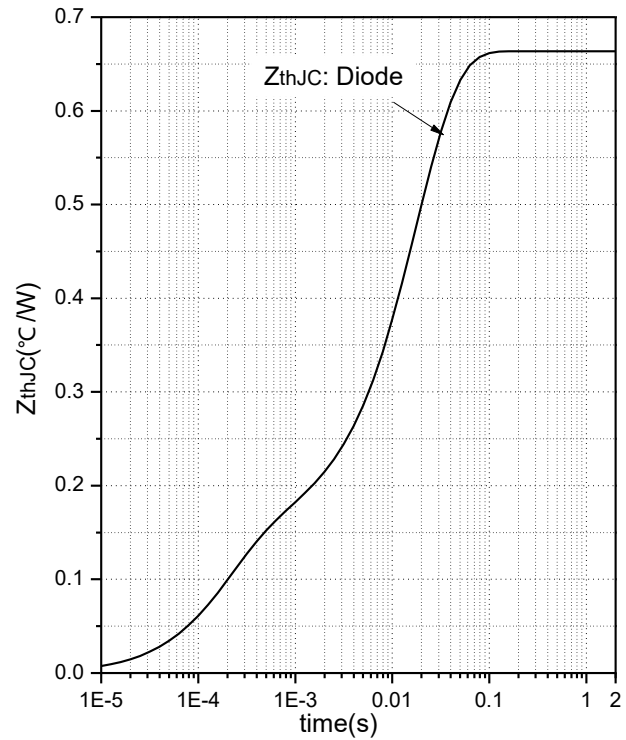
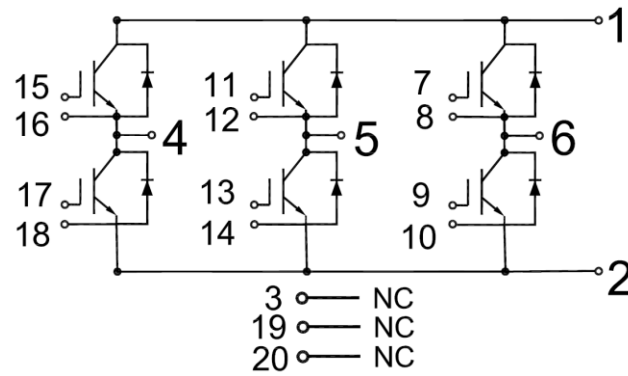


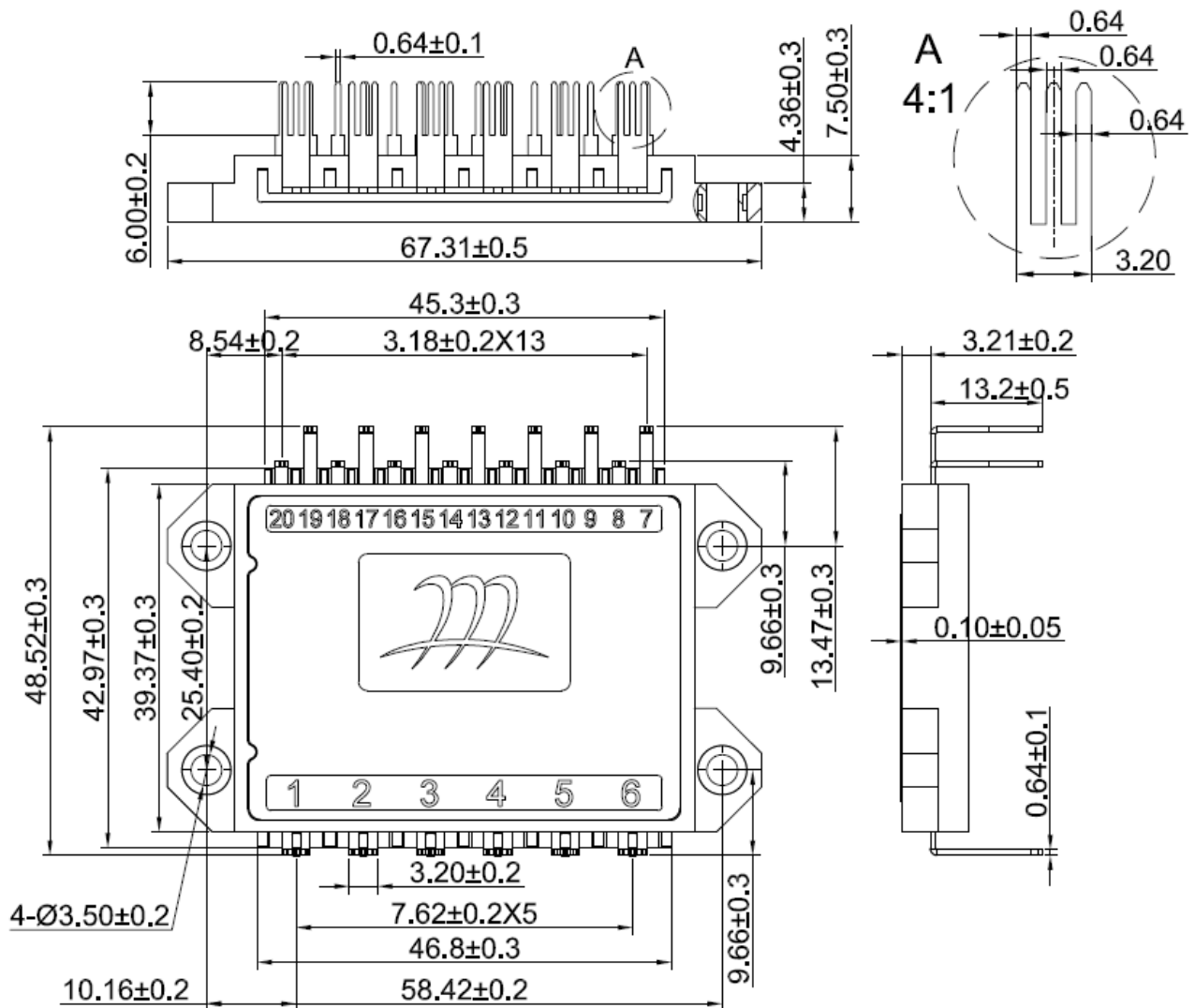
Fig.12 Transient Thermal Impedance (Diode)



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcements

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