



GF400SD120T2ZH

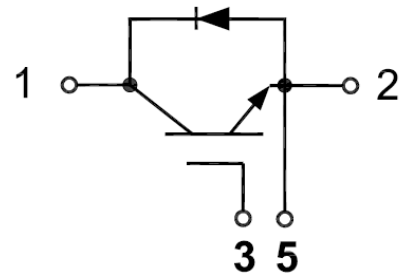
IGBT Module

Preliminary Data

Features:

- Non Punch Through (NPT) Technology
- 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:

- Switching Mode Power Supply
- Plating Power Supply
- Induction Heating
- Electronic Welder

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

V_{CES}	Collector-Emitter Blocking Voltage	$T_J=25^\circ\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c=100^\circ\text{C}$	400	A
		$T_c=25^\circ\text{C}$	800	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	800	A
P_D	Maximum Power Dissipation per leg	$T_c=25^\circ\text{C}$ $T_{Jmax}=150^\circ\text{C}$	3472	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	$I_C=16\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.5	6.2	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=400\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	3.35	3.70	V
			$T_J=125^{\circ}\text{C}$	4.30		
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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			± 400	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		31.52		nF
C_{oes}	Output Capacitance			2.73		
C_{res}	Reverse Transfer Capacitance			1.23		

Switching Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _c =400A, R _{Gon} =2Ω, V _{GE} =±15V, Inductive Load	T _J =25°C		798		ns
			T _J =125°C		816		
t _r	Rise Time		T _J =25°C		182		ns
			T _J =125°C		190		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _c =400A, R _{Goff} =2Ω, V _{GE} =±15V, Inductive Load	T _J =25°C		809		ns
			T _J =125°C		825		
t _f	Fall Time		T _J =25°C		95		ns
			T _J =125°C		112		
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _c =400A, R _{Gon} =2Ω, V _{GE} =±15V, di/dt=1772A/μs(T _J =125°C), Inductive Load	T _J =25°C		13.6		mJ
			T _J =125°C		20.0		
E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _c =400A, R _{Goff} =2Ω, V _{GE} =±15V, du/dt=3883V/μs(T _J =125°C), Inductive Load	T _J =25°C		29.6		mJ
			T _J =125°C		40.4		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		4.4		μC
R _g	Internal Gate Resistor				0.63		Ω



SCSOA	$V_{CC}=600V$, $V_{GE}=+/-15V$, $R_{Gon}=2\Omega$, $R_{Goff}=2\Omega$, $T_J=125^\circ C$	10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-to-Case(Per IGBT)			0.036	$^\circ C/W$

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

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ C$	1200	V
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	400	A
I_{FM}	Diode Maximum Forward Current	$t_p=1ms$	800	A

Electrical Characteristics of Diode ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units	
V _{FM}	Forward Voltage	I _F =400A	T _J =25°C		2.40		V	
			T _J =125°C		3.20			
t _{rr}	Reverse Recovery Time	I _F =400A, -diF/dt=2300/μs(T _J =125°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		150		ns	
			T _J =125°C		199			
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		128		A	
			T _J =125°C		170			
Q _{rr}	Reverse Recovery Charge		T _J =25°C		14.0		μC	
			T _J =125°C		21.9			
E _{rec}	Reverse Recovery Energy		T _J =25°C		7.2		mJ	
			T _J =125°C		9.6			
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (Per Diode)					0.102	°C/W	



Module

Symbol	Description	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 30s		4500	V
T _J	Maximum Junction Temperature			150	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+125	°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	Signal Terminals Screw:M4	1.1		2.0	N·m
T	Power Terminals Screw:M6	2.5		5.0	N·m
T	Mounting Screw:M6	3.0		6.0	N·m
G	Weight		320		g

Ordering Information Table

Device code

G	F	400	SD	120	T2Z	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - NPT, Fast IGBT
- ③ - Rated Current (400=400A)
- ④ - Circuit Configuration (Single Switch)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

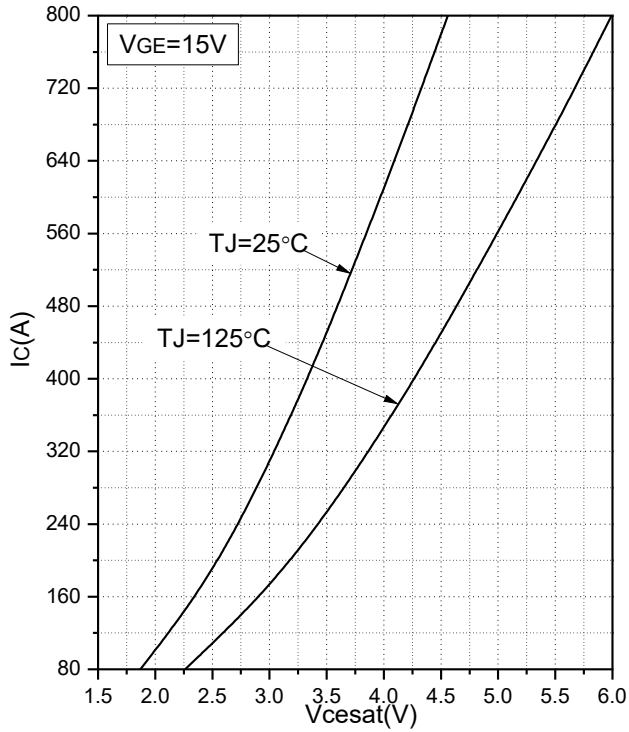


Fig.1 Typical Saturation Voltage Characteristics

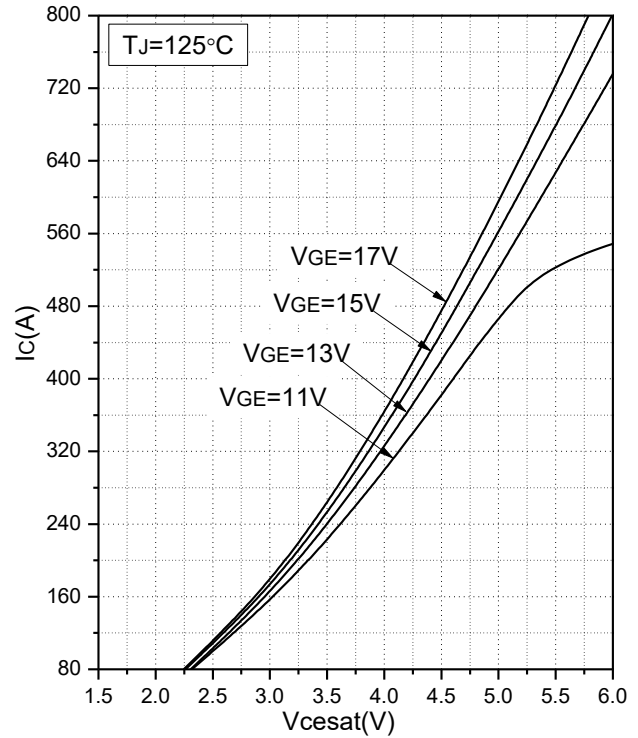


Fig.2 Typical Output Characteristics

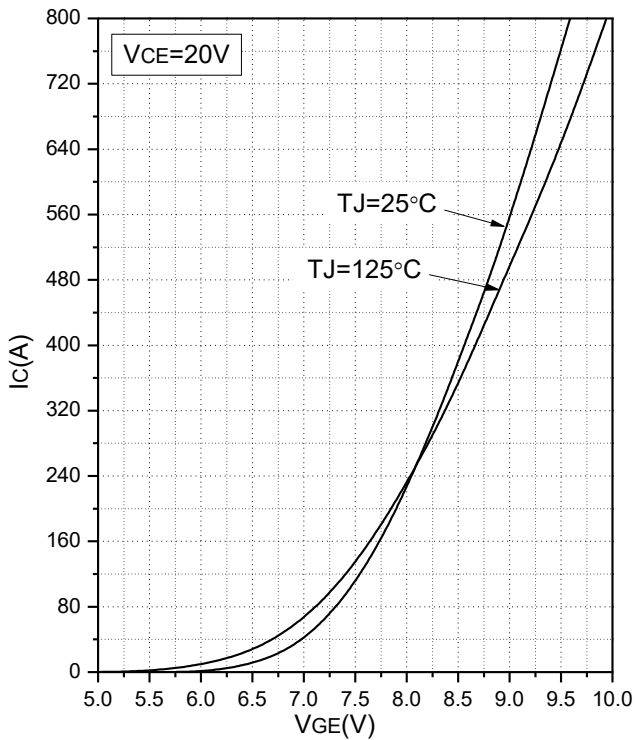


Fig.3 Transfer Characteristic

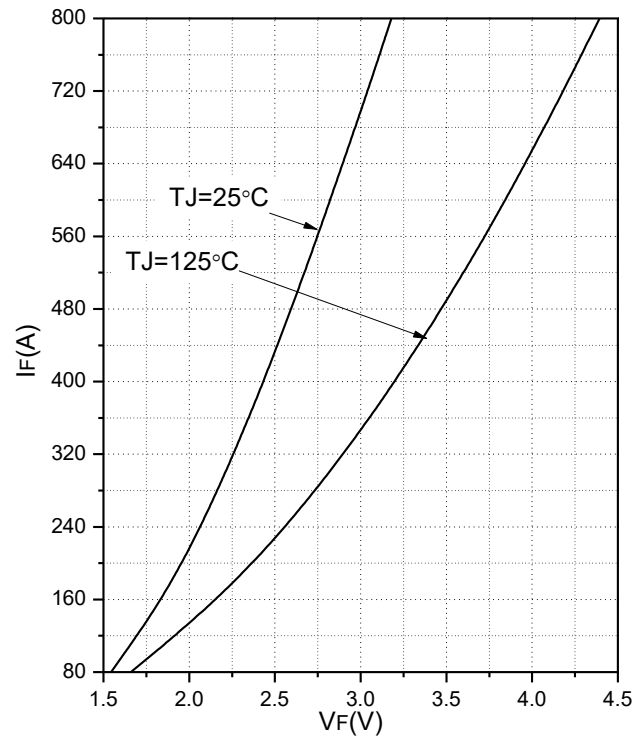


Fig.4 Forward Characteristics of Diode

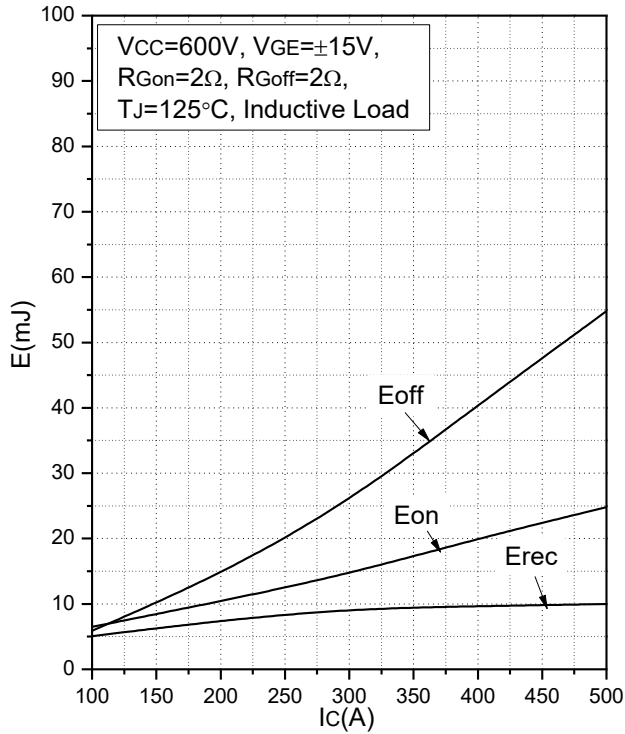


Fig.5 Typical Switching Loss vs. Collector Current

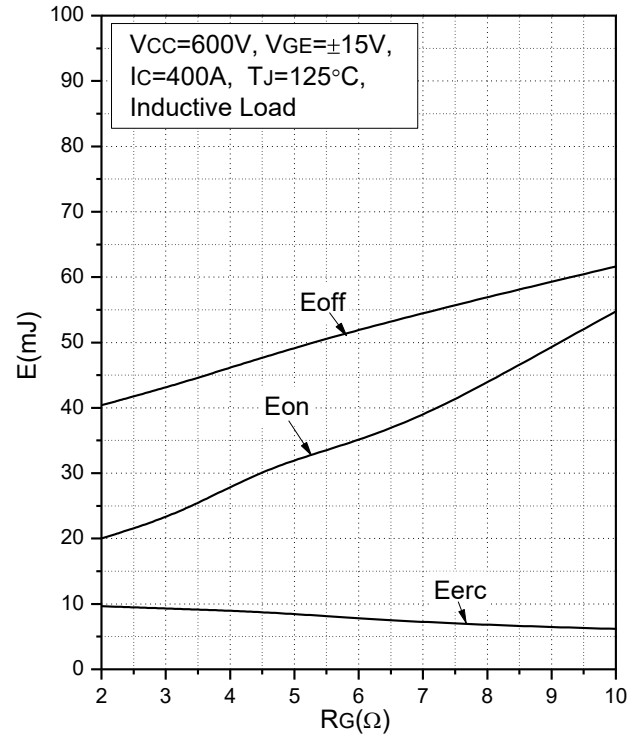


Fig.6 Typical Switching Loss vs. Gate Resistance

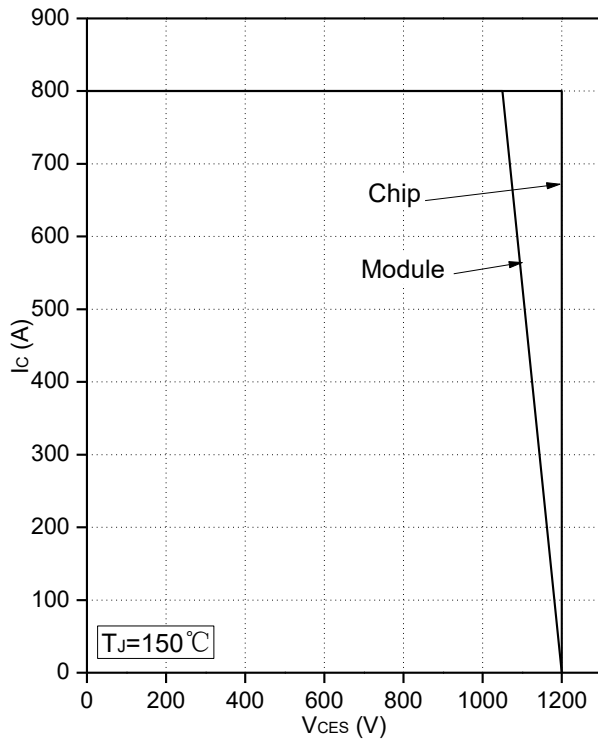


Fig.7 Reverse Bias Safe Operation Area (RBSOA)

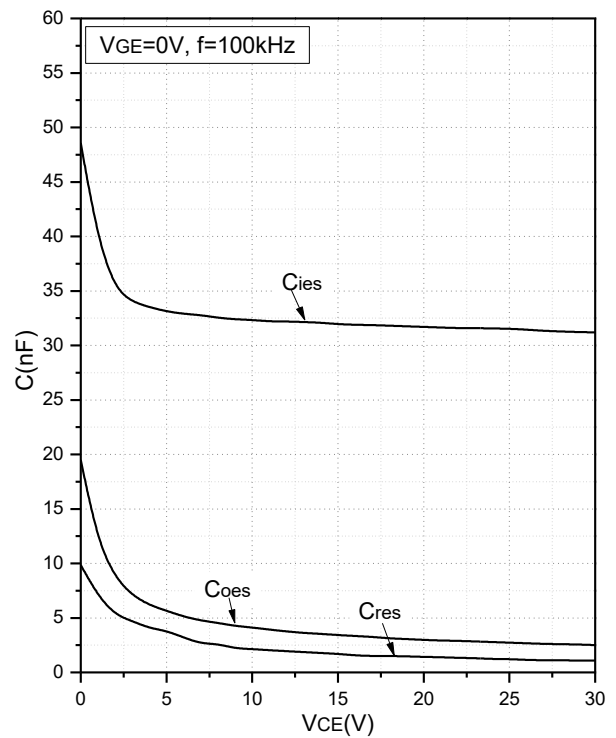


Fig.8 Capacitance Characteristics

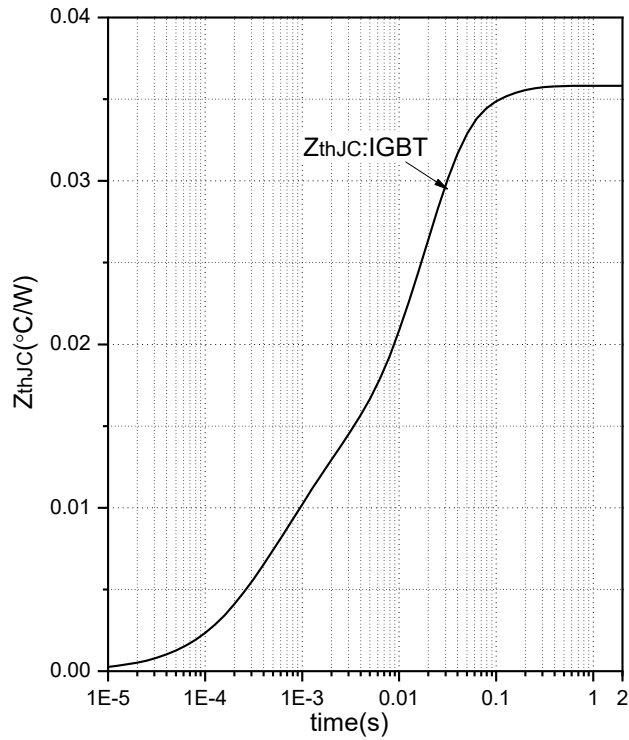


Fig.9 Transient Thermal Impedance (IGBT)

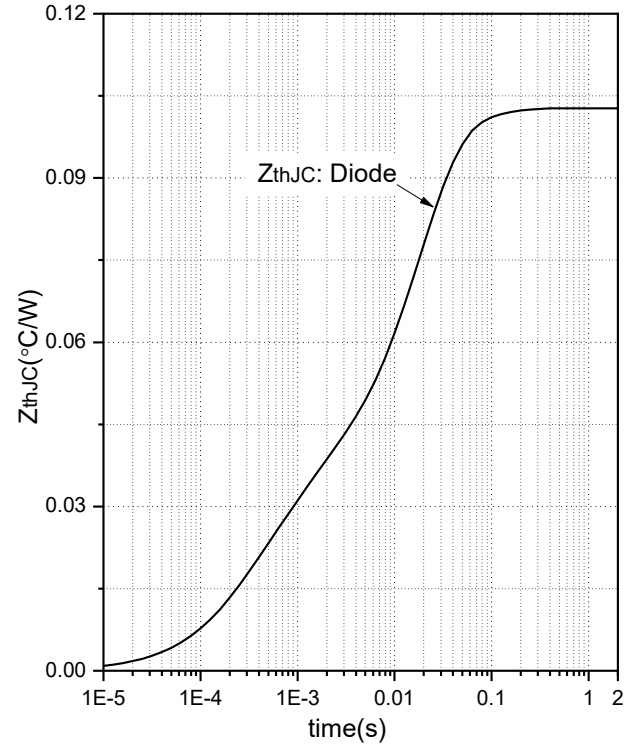
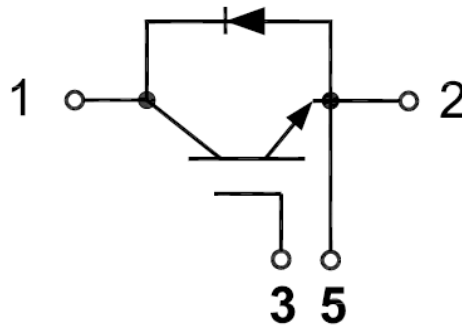


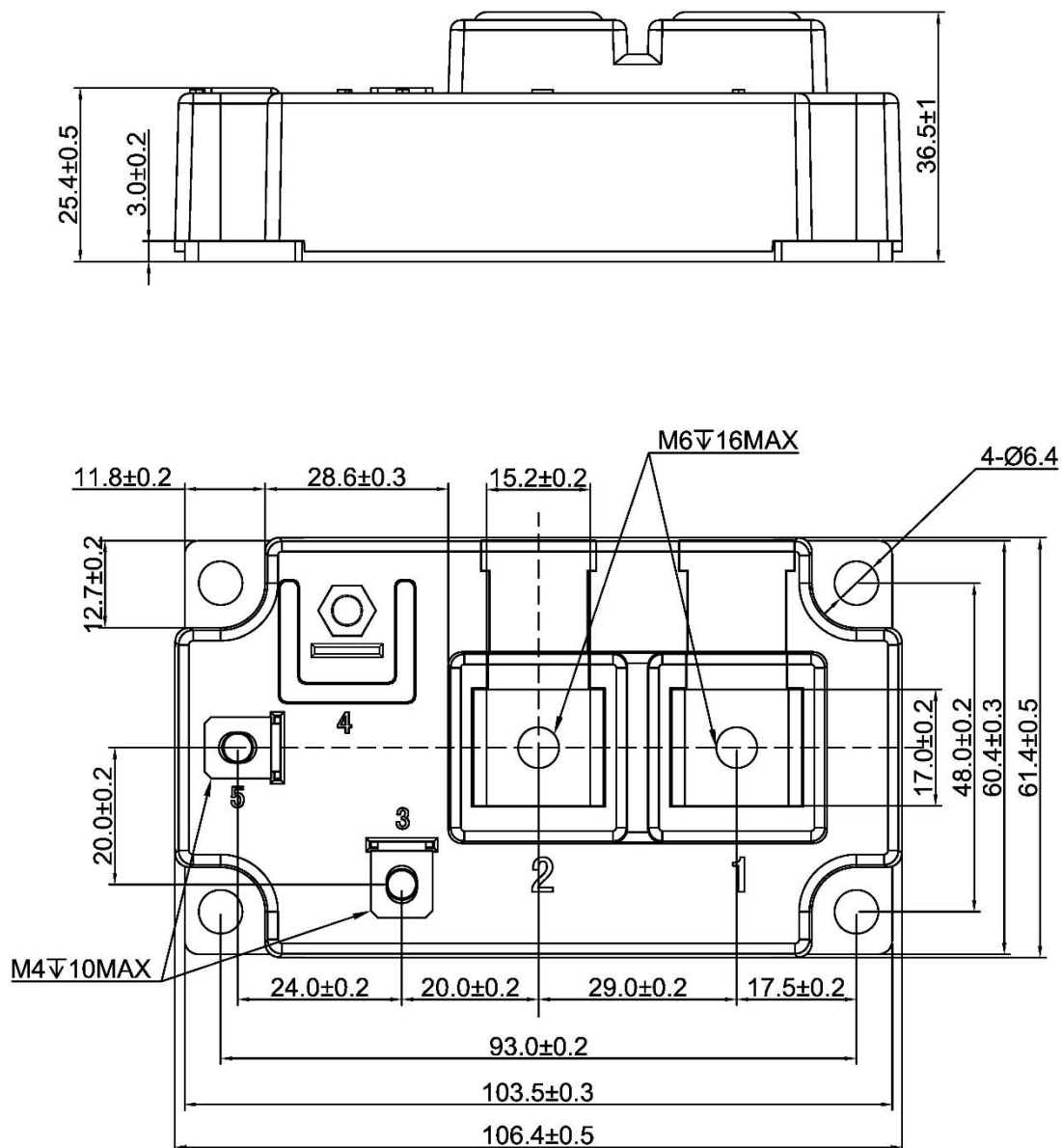
Fig.10 Transient Thermal Impedance (Diode)



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release.
02	Update Package Outline

Announcements

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