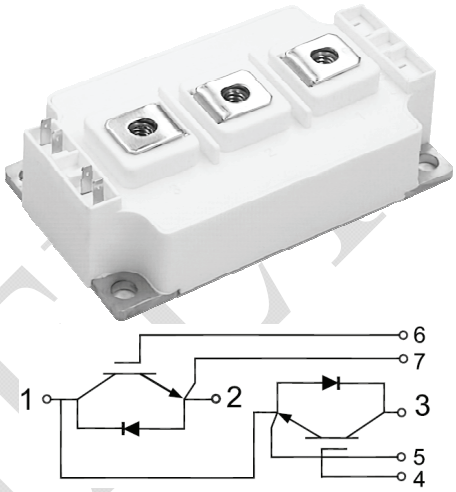
GT400HF170T2NH

IGBT Module

Preliminary Data

Features：



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

Applications：

- Matrix Inverter
- Bidirectional Switch

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		1700	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	400	A
		T_C=25℃	620	A
I_{CM}	Peak Collector Current Repetitive	T_J=175℃	800	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	2240	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=16mA, V_{CE}=V_{GE}		5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=400A, V_{GE}=15V	T_J=25℃		1.80		V
			T_J=125℃		2.20		V
			T_J=150℃		2.30		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			41.64		nF
C_{oes}	Output Capacitance				2.48		nF
C_{res}	Reverse Transfer Capacitance				0.48		nF

Switching Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=900V,I_C=400A, R_{Gon} =1Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		653		ns
			T_J=125℃		665		
			T_J=150℃		653		
t_r	Rise Time		T_J=25℃		244		ns
			T_J=125℃		279		
			T_J=150℃		292		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=900V,I_C=400A, R_{Goff} =1Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		540		ns
			T_J=125℃		607		
			T_J=150℃		614		
t_f	Fall Time		T_J=25℃		339		ns
			T_J=125℃		577		
			T_J=150℃		646		
E_{on}	Turn-on Switching Loss	V_{CC}=900V,I_C=400A, R_{Gon} =1Ω,V_{GE}=±15V, di/dt=1724A/μs (T_J=150℃) Inductive Load	T_J=25℃		102		mJ
			T_J=125℃		144		
			T_J=150℃		158		

E_{off}	Turn-off Switching Loss	V_{CC}=900V,I_C=400A, R_{Goff} =1Ω,V_{GE}= ±15V, du/dt=3274V/μs (T_J=150℃) Inductive Load	T_J=25℃		102		mJ
			T_J=125℃		139		
			T_J=150℃		149		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		3.06		uC
RBSOA	I_C=800A,V_{CC}=1620V,Vp=1700V, R_{Goff} =1Ω, V_{GE}=+15V to 0V, T_J=150°C			Trapezoid			
SCSOA	SCSOA	V_{CC} = 900V, V_{GE} = 15V, T_J = 150℃		10			us
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case(per leg)				0.067		℃/W

Diode, Inverter

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

V_{RRM}	Repetitive Peak Reverse Voltage	1700	V
I_F	Diode Continuous Forward Current	400	A
I_{FM}	Diode Maximum Forward Current	800	A

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F =400A	T_J=25℃		2.80		V
			T_J=125℃		3.00		
			T_J=150℃		3.00		
t_{rr}	Reverse Recovery Time	I_F=400A, -di_F/dt =2090A/μs(T_J=150℃), V_R = 900V, V_{GE} = -15V	T_J=25℃		674		ns
			T_J=125℃		936		
			T_J=150℃		1055		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		113		A
			T_J=125℃		159		
			T_J=150℃		167		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		25.1		μC
			T_J=125℃		60.8		
			T_J=150℃		74.1		

E_{rec}	Reverse Recovery Energy	I_F=400A, -diF/dt =2090/μs(T_J=150℃), V_R = 900V, V_{GE} = -15V	T_J=25℃		14.8		mJ
			T_J=125℃		32.7		
			T_J=150℃		41.0		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per leg)				0.114		℃/W

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f =50Hz, 1minute	2500			V
L_{sCE}	Stray Inductance Module			15		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)			0.03		℃/W
M	Power Terminals Screw:M6		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			300		g

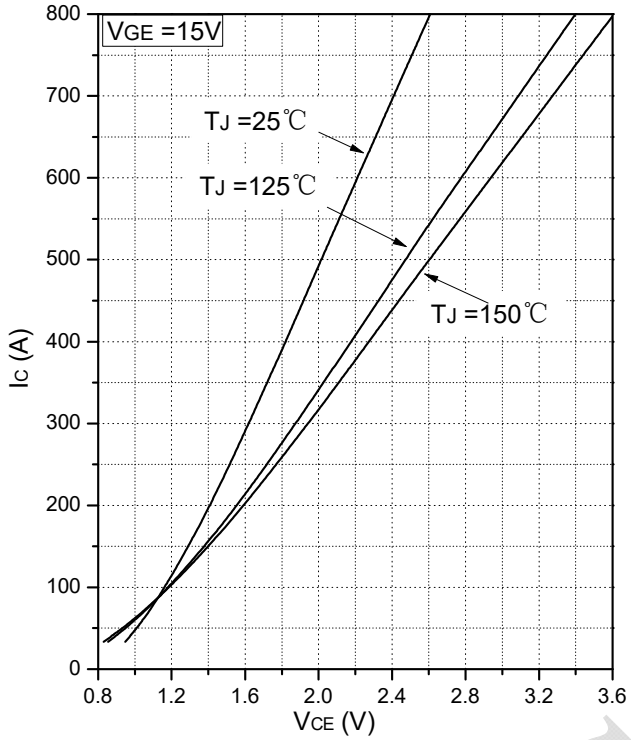


Fig.1 Typical Saturation Voltage Characteristics

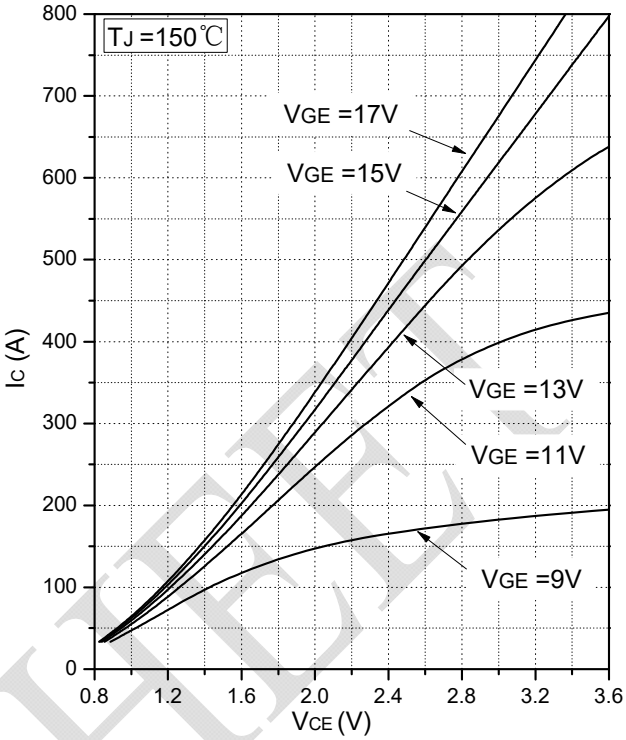


Fig.2 Typical Output Characteristics

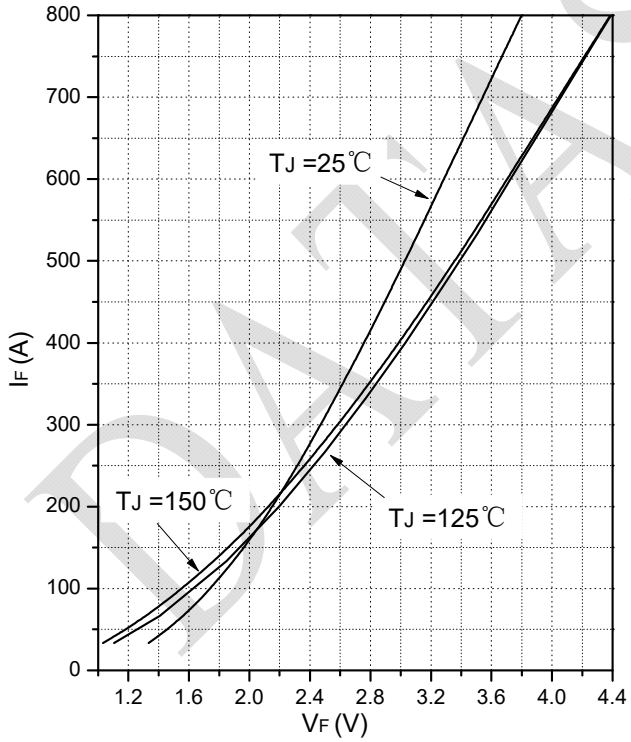


Fig.3 Forward Characteristics

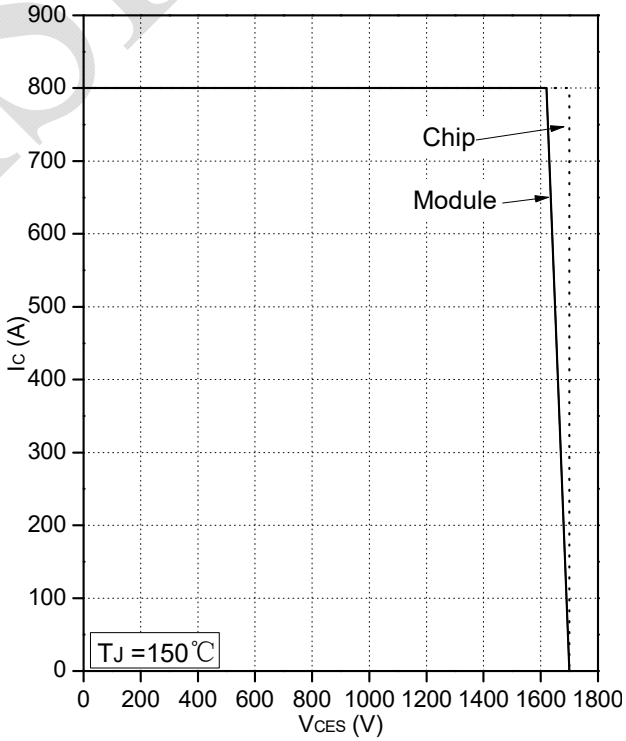


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

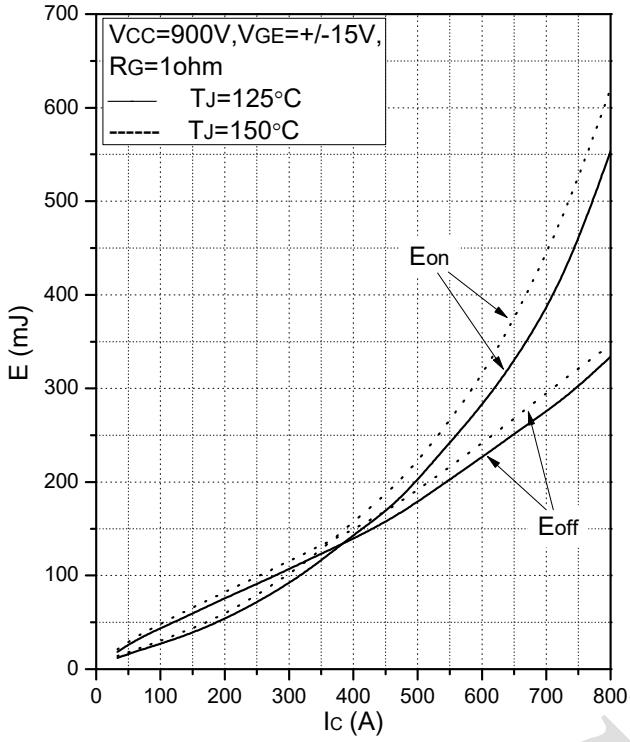


Fig.5 Typical Switching Loss vs. Collector Current

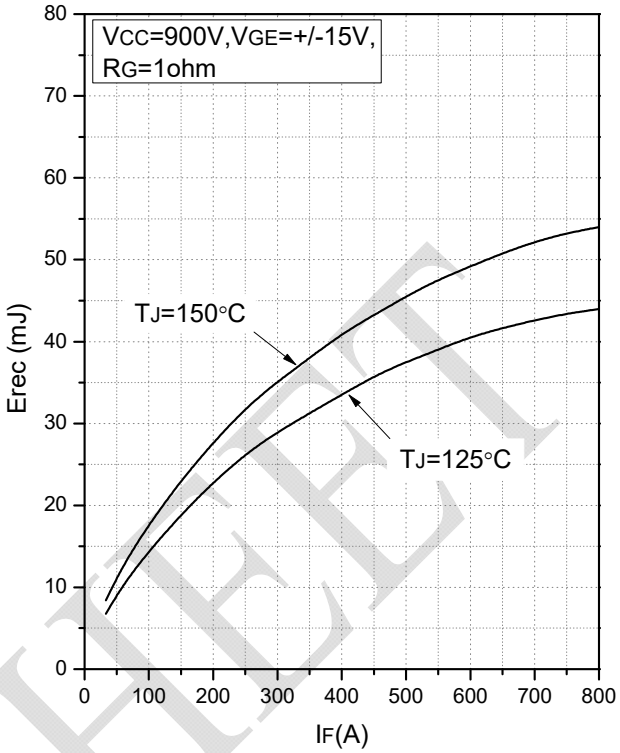


Fig.6 Typical Switching Loss vs. Forward Current

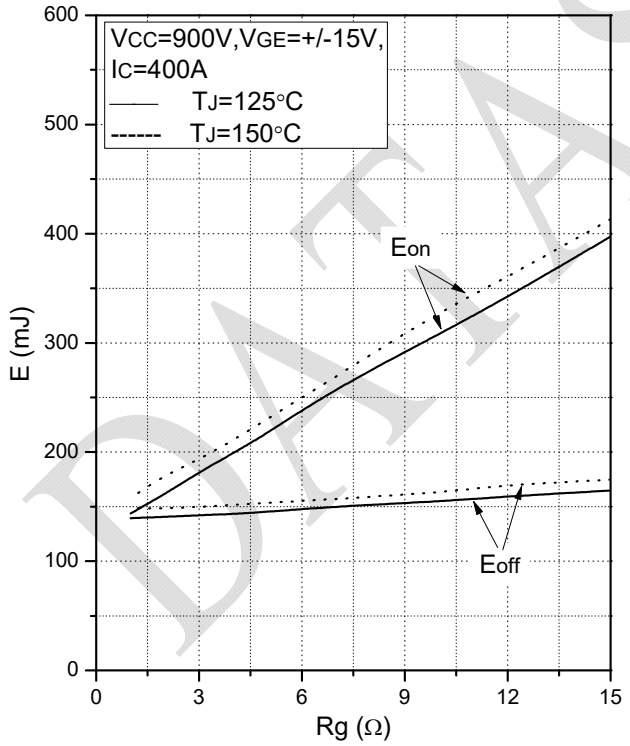


Fig.7 Typical Switching Loss vs. Gate Resistance

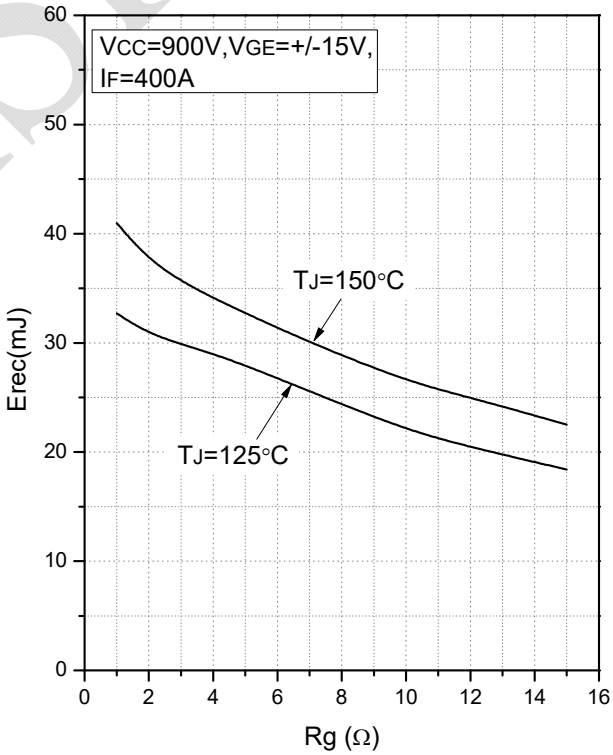


Fig.8 Typical Switching Loss vs. Gate Resistance

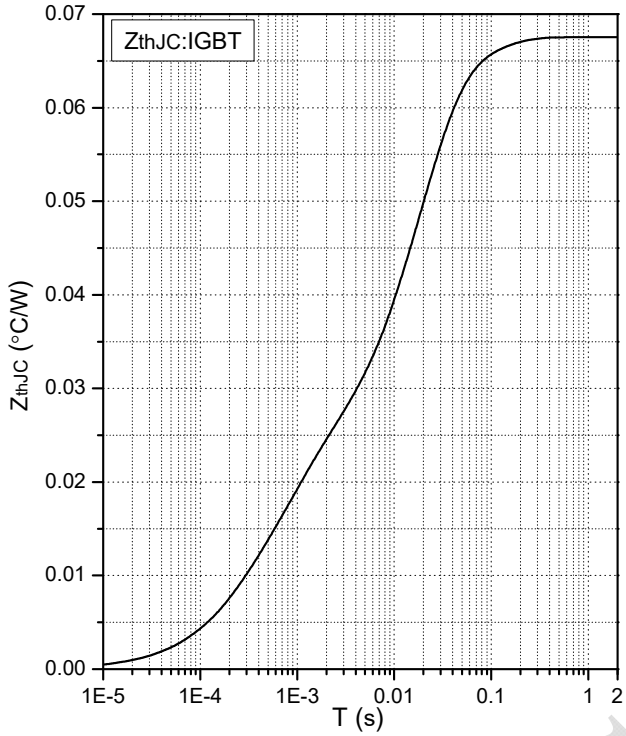


Fig.9 Transient Thermal Impedance(IGBT)

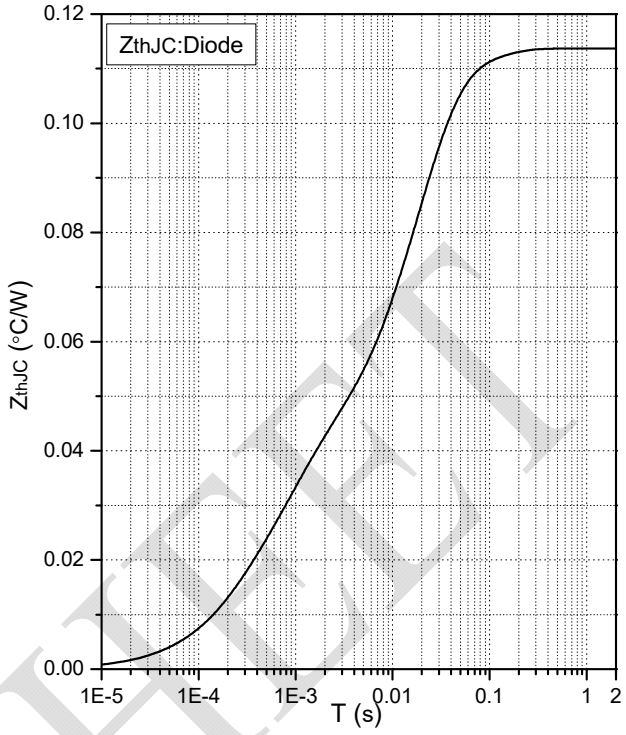
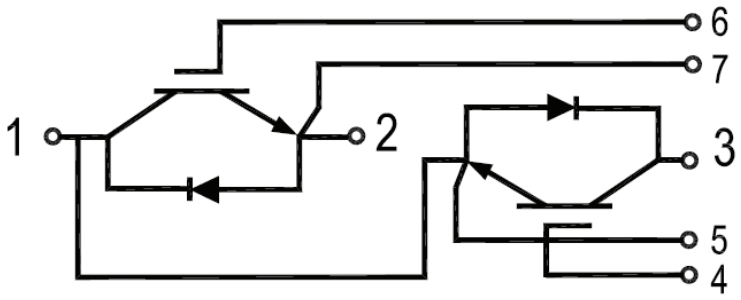
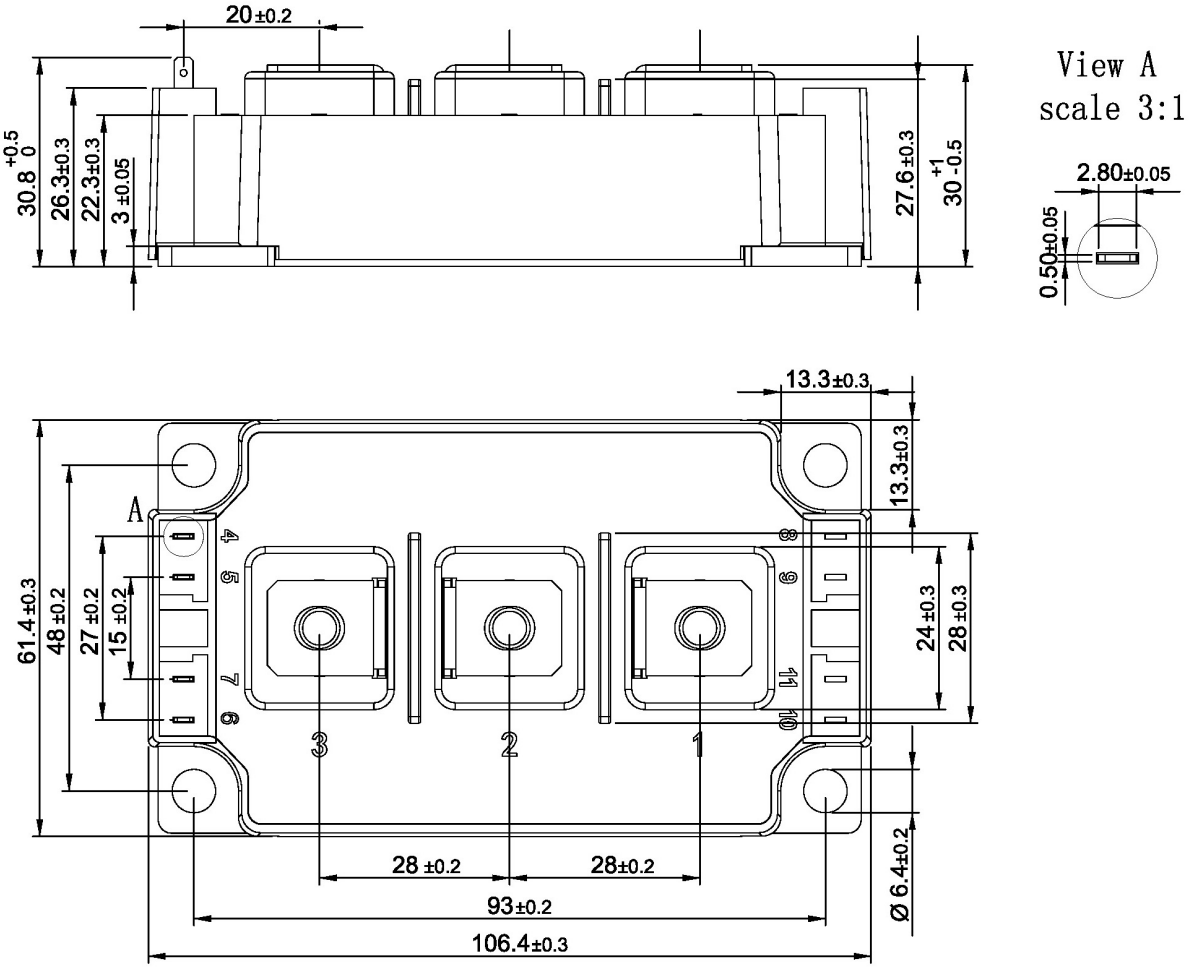


Fig.10 Transient Thermal Impedance(FWD)

Internal Circuit:



Package Outline (Unit: mm):



Date	Revision	Notes
12/08/2020	01	Initial Release

Announcement

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