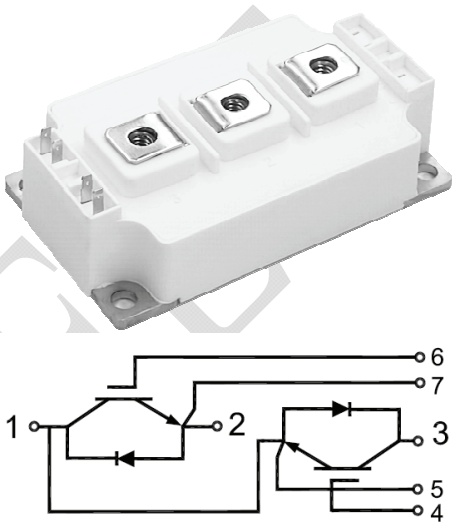
GT400HF120T2NH

IGBT Module

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



Applications：

- High power converters
- Motor drives
- UPS systems
- Wind turbines

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℃	400	A
		T_C=25℃	720	A
I_{CM}	Repetitive Peak Collector Current	tp=1ms	800	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C=25℃ T_{Jmax}=175℃	2445	W

Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=4mA, V_{CE}=V_{GE}, T_J=25℃		5.0	5.6	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=400A, V_{GE}=15V	T_J=25℃		1.70		V
			T_J=125℃		1.90		V
			T_J=150℃		2.00		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℃			33.02		nF
C_{oes}	Output Capacitance				2.42		nF
C_{res}	Reverse Transfer Capacitance				1.35		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V,I_C=400A, R_{Gon}=1Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.44		μs
			T_J=125℃		0.45		
			T_J=150℃		0.45		
t_r	Rise Time		T_J=25℃		0.15		μs
			T_J=125℃		0.16		
			T_J=150℃		0.16		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V,I_C=400A, R_{Goff}=1Ω,V_{GE}= ±15V, Inductive Load	T_J=25℃		0.43		μs
			T_J=125℃		0.46		
			T_J=150℃		0.47		
t_f	Fall Time		T_J=25℃		0.12		μs
			T_J=125℃		0.16		
			T_J=150℃		0.18		
E_{on}	Turn-on Switching Loss	V_{CC}=600V,I_C=400A, R_{Gon}=1Ω,V_{GE}= ±15V, di/dt=2056A/μs (T_J=150℃) Inductive Load	T_J=25℃		28		mJ
			T_J=125℃		39.8		
			T_J=150℃		42.7		

E_{off}	Turn-off Switching Loss	V_{CC}=600V,I_C=400A, R_{Goff}=1Ω,V_{GE}= ±15V, du/dt=3115V/μs (T_J=150℃) Inductive Load	T_J=25℃		39.1		mJ
			T_J=125℃		51.2		
			T_J=150℃		54.6		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		2.18		μC
$R_{g\ internal}$	Internal gate resistance		T_J=25℃		1.75		Ω
RBSOA	I_C=800A,V_{CC}=1050V,Vp=1200V, R_{Goff} = 1Ω, V_{GE}=+15V to 0V, T_J =150°C			Trapezoid			
I_{SC}	SC Data	V_{GE}=±15V,V_{CC}=600V, R_{Gon}=1Ω , R_{Goff}=1Ω , tp=10us ,Inductive Load, T_J=150℃			1931		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case(per leg)					0.061	℃/W

Maximum Rated Values of Diode

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current		400	A
I_{FM}	Diode Maximum Forward Current	tp=1ms	800	A

Electrical Characteristics of Diode

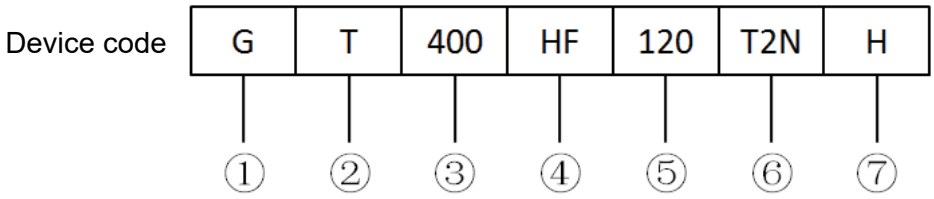
Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F =400A	T_J=25℃		1.40		V
			T_J=125℃		1.50		
			T_J=150℃		1.45		
t_{rr}	Reverse Recovery Time	I_F=400A, -diF/dt =2380A/μs(T_J=150℃), V_R=600V, V_{GE}=-15V	T_J=25℃		0.46		μs
			T_J=125℃		0.66		
			T_J=150℃		0.74		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		263		A
			T_J=125℃		300		
			T_J=150℃		306		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		64		μC
			T_J=125℃		101		
			T_J=150℃		115		

E_{rec}	Reverse Recovery Energy	I_F=400A, -diF/dt =2380A/μs(T_J=15℃0), V_R=600V, V_{GE}=-15V	T_J=25℃		28.9		mJ
			T_J=125℃		44.8		
			T_J=150℃		51.4		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per leg)					0.103	℃/W

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500			V
Material of Module Baseplate			Copper			
Internal Isolation			Al2O3			
L_{SCE}	Stray Inductance Module			14		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
T	Power Terminals Screw:M6		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			300		g

Ordering Information Table



①-IGBT Module
②-Field Stop Trench Gate IGBT
③-Rated Current (400=400A)
④-Circuit Configuration: HF (Half Bridge)
⑤-Rated Voltage (120=1200V)
⑥-Package Type
⑦-Test Level (Pass the Important Reliability Test-Industrial Grade)

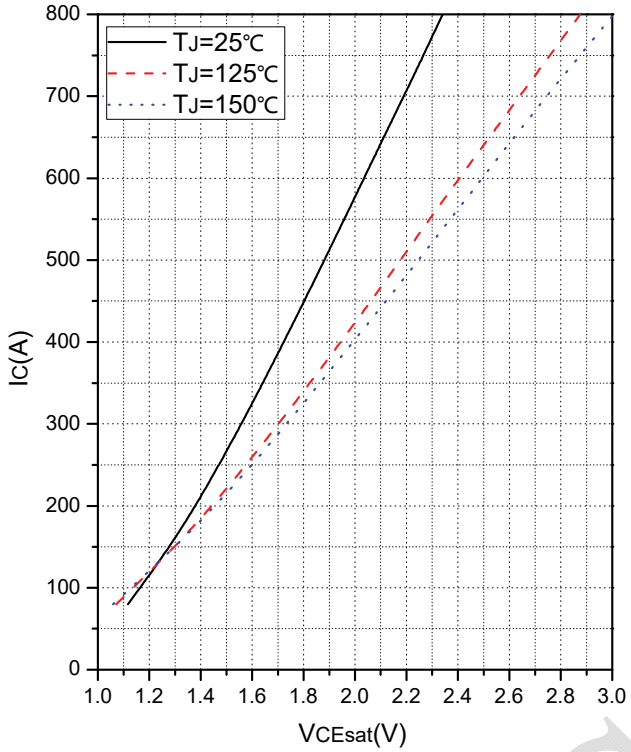


Fig.1 Typical Saturation Voltage Characteristics

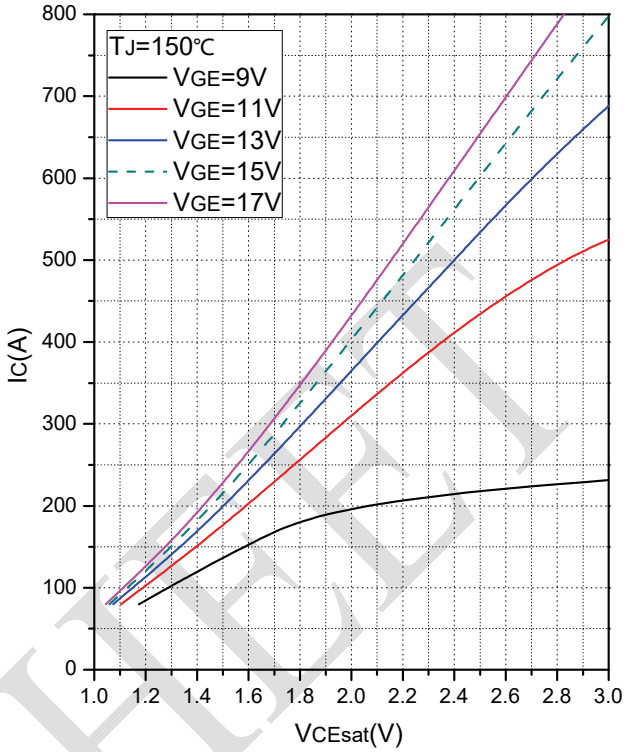


Fig.2 Typical Output Characteristics

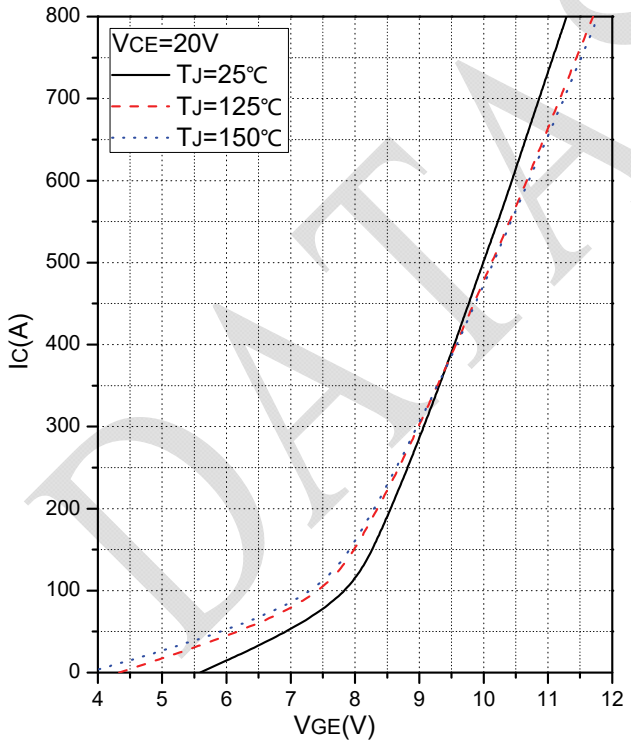


Fig.3Transfer Characteristic

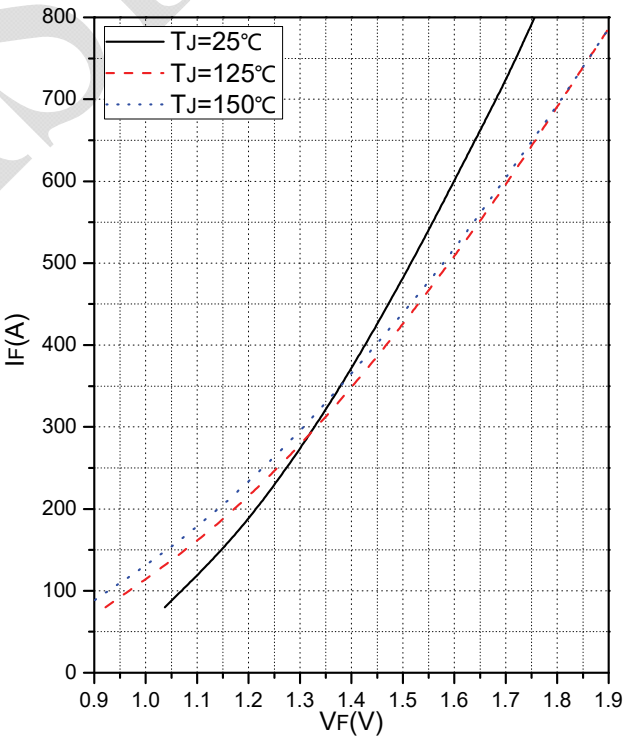


Fig.4 Forward Characteristics of Diode

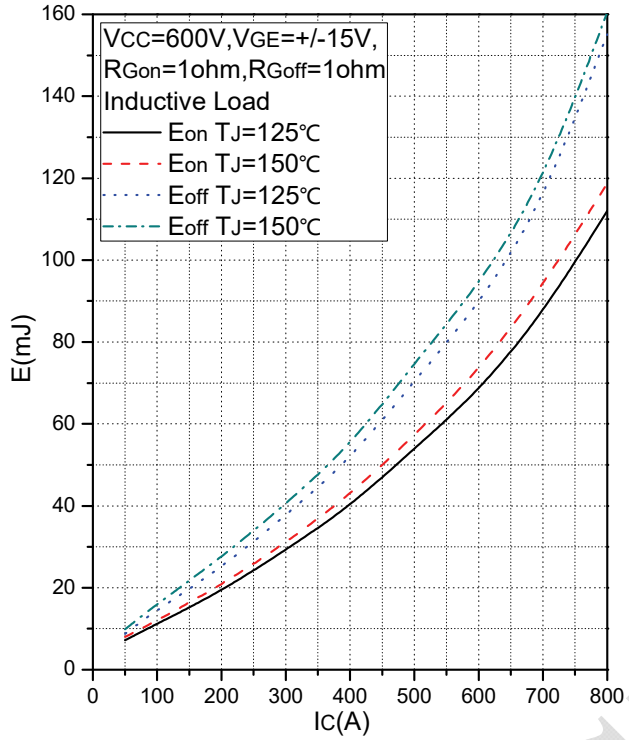


Fig.5 Typical Switching Loss vs. Collector Current

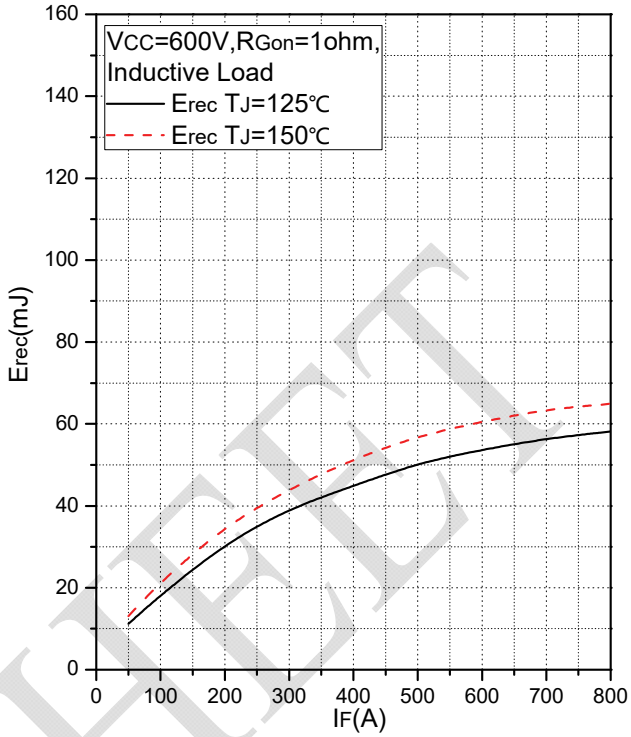


Fig.6 Typical Switching Loss vs. Forward Current

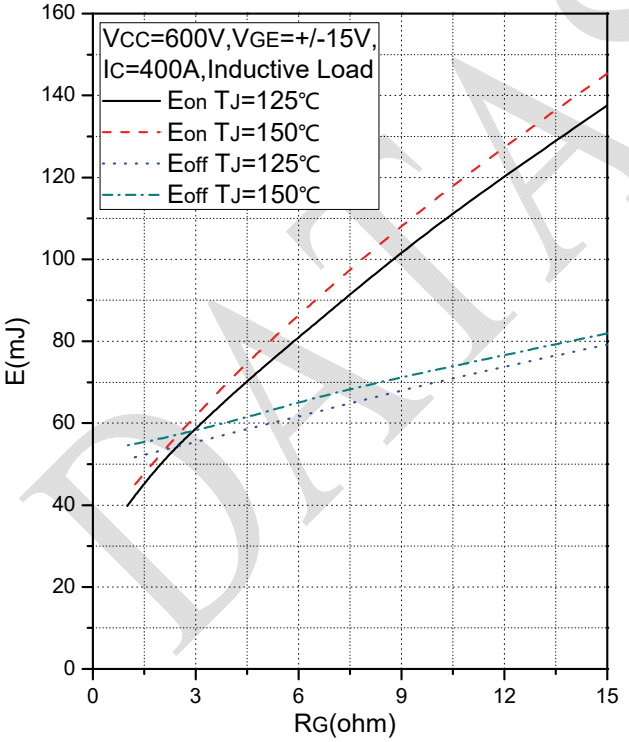


Fig.7 Typical Switching Loss vs. Gate Resistance

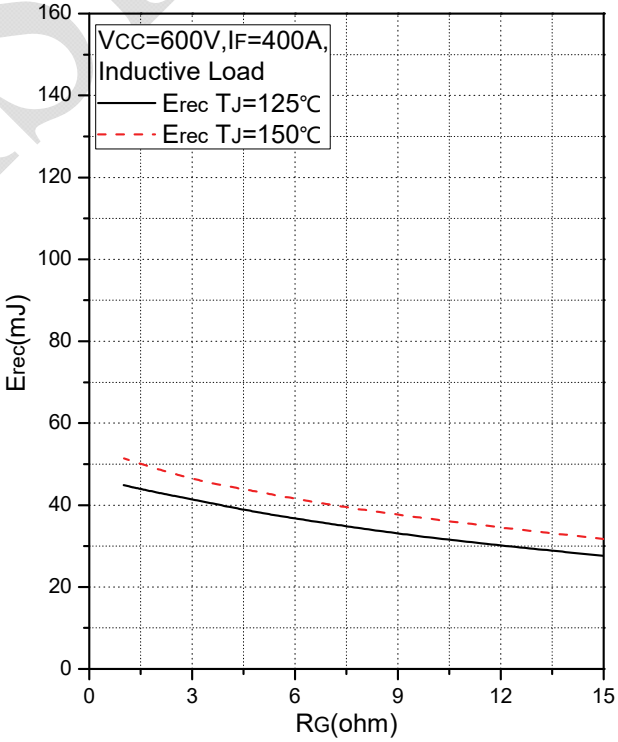


Fig.8 Typical Switching Loss vs. Gate Resistance

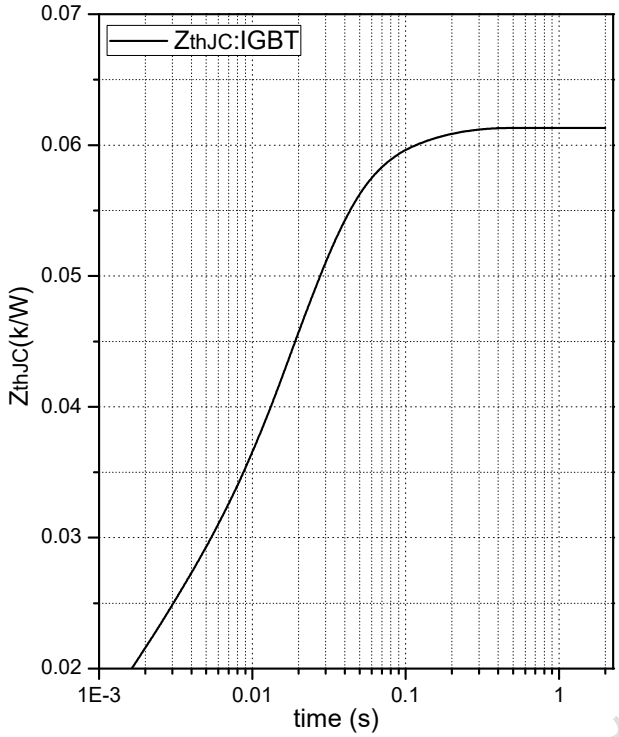


Fig.9 Transient Thermal Impedance (IGBT)

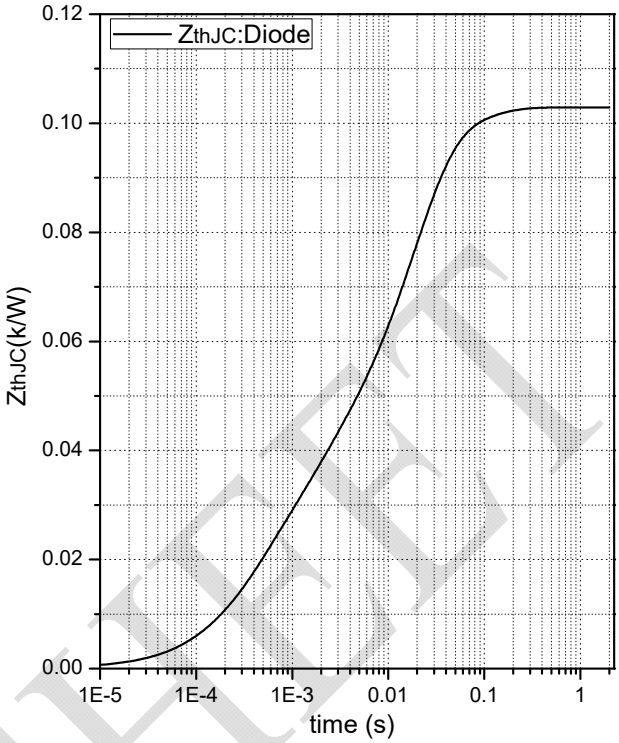


Fig.10 Transient Thermal Impedance (Diode)

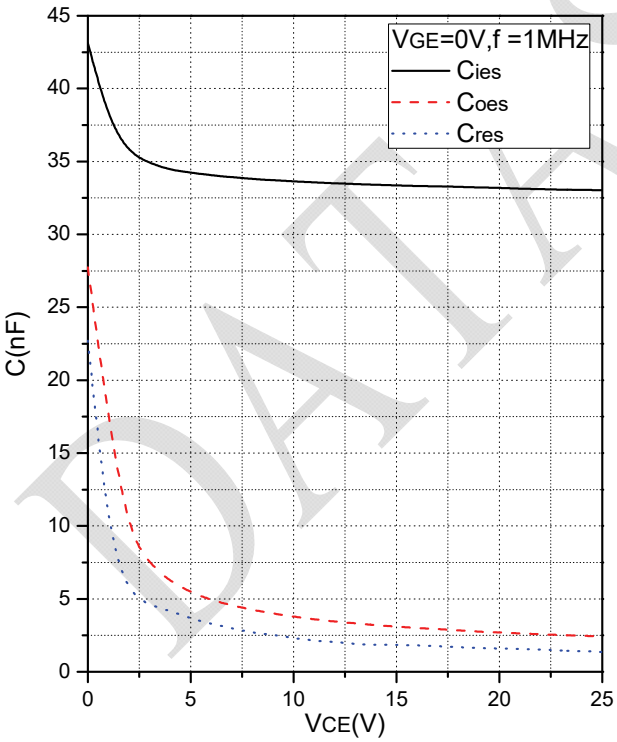


Fig.11 Capacitance Characteristics

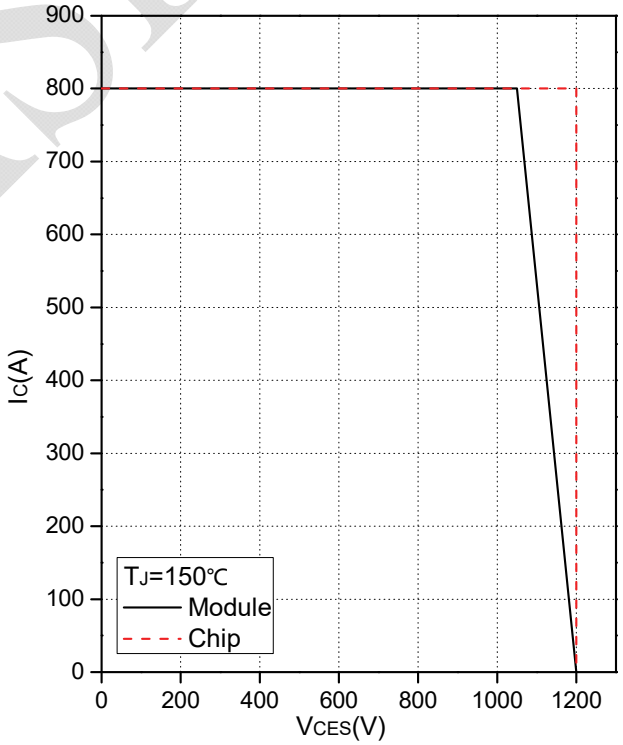
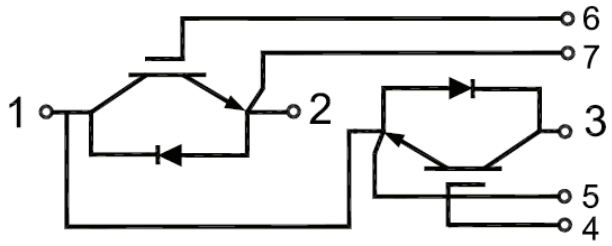
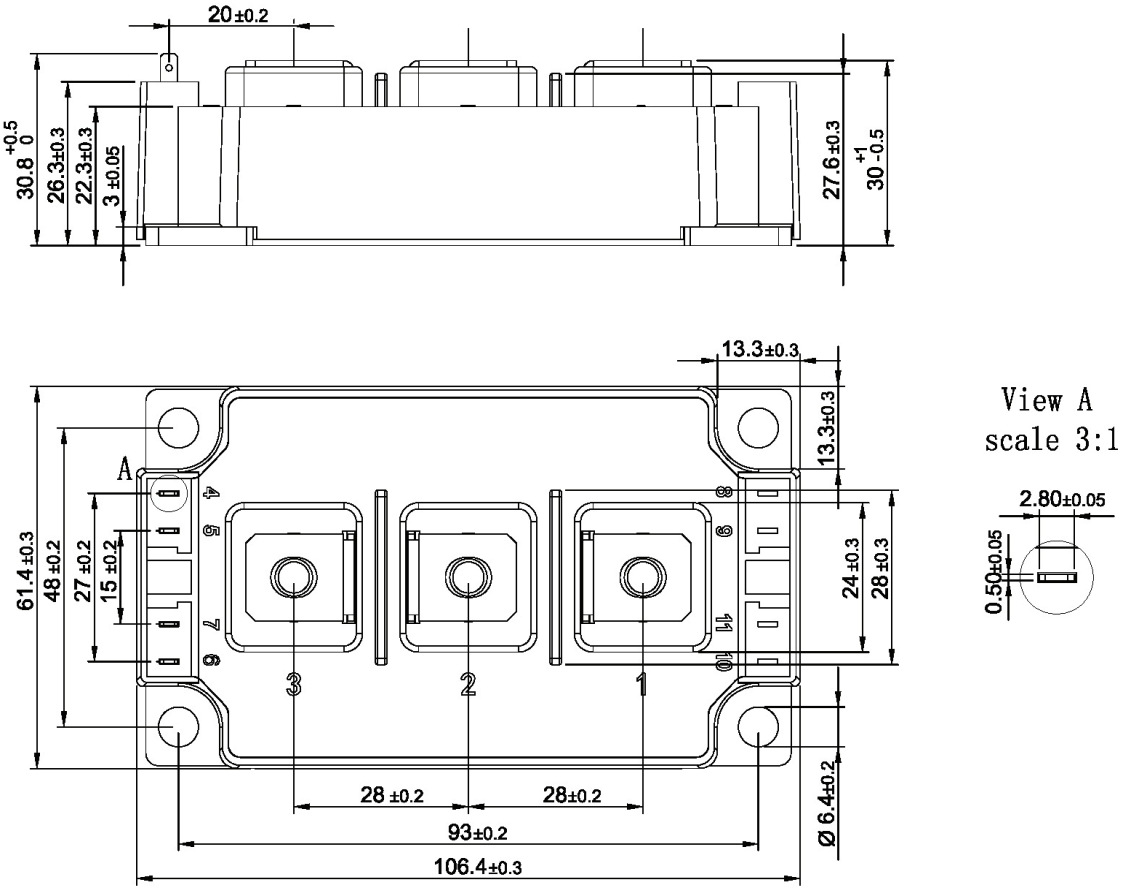


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

Internal Circuit



Package Outline (Unit: mm):



Date	Revision	Notes
07/27/2020	A	Final Version

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