



GT400CU120T2NH

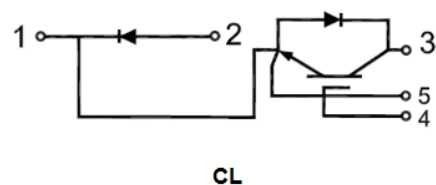
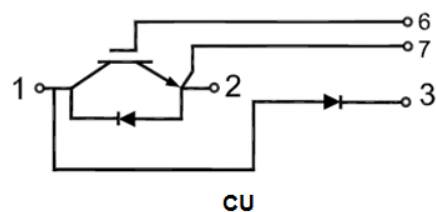
GT400CL120T2NH

IGBT Module

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated $>10\mu\text{s}$
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Industrial Inverters
- Motor Drives
- UPS Systems

IGBT, Chopper

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	$T_c=100^\circ\text{C}$	400	A
		$T_c=25^\circ\text{C}$	800	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	800	A
P_D	Maximum Power Dissipation (IGBT)	$T_c=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	2542	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	$I_C=16\text{mA}$, $V_{CE}=V_{GE}$	5.5	6.1	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=400\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.75	2.00	V
			$T_J=125^{\circ}\text{C}$	2.05		V
			$T_J=150^{\circ}\text{C}$	2.10		V
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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		44.24		nF
C_{oes}	Output Capacitance			2.37		nF
C_{res}	Reverse Transfer Capacitance			0.50		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =400A, R _G =2Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		665		ns
			T _J =125℃		657		
			T _J =150℃		659		
t _r	Rise Time		T _J =25℃		211		ns
			T _J =125℃		223		
			T _J =150℃		232		
t _{d(off)}	Turn-off Delay Time		T _J =25℃		472		ns
			T _J =125℃		507		
			T _J =150℃		514		
t _f	Fall Time	T _J =25℃		175		ns	
		T _J =125℃		313			
		T _J =150℃		326			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =400A, R _G =2Ω, V _{GE} =±15V, di/dt=1449A/μs (T _J =150℃) Inductive Load	T _J =25℃		44		mJ
		T _J =125℃		58			
		T _J =150℃		65			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =400A, R _G =2Ω, V _{GE} =±15V, du/dt=3566V/μs (T _J =150°C) Inductive Load	T _J =25°C		42.1		mJ
			T _J =125°C		60.4		
			T _J =150°C		64.3		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2.51		uC
R _{g internal}	Internal Gate Resistance		T _J =25°C		1.5		Ω
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _G =2Ω, tp=10μs, T _J =150°C				1703		A
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case (per IGBT)					0.059	°C/W

Diode, Reverse

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	300	A
I _{FM}	Peak FWD Current Repetitive	600	A

Electrical Characteristics of FWD (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =300A	T _J =25℃		1.75		V
			T _J =125℃		1.90		
			T _J =150℃		1.90		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=1612A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		353		ns
			T _J =125℃		538		
			T _J =150℃		597		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		153		A
			T _J =125℃		169		
			T _J =150℃		172		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		29.1		μC
			T _J =125℃		46.3		
			T _J =150℃		52.0		



E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt=1612A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		11.6		mJ
			T _J =125℃		18.7		
			T _J =150℃		19.0		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.129	℃/W

Diode, Chopper

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	400	A
I _{FM}	Peak FWD Current Repetitive	800	A

Electrical Characteristics of FWD (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =400A	T _J =25℃		1.65		V
			T _J =125℃		1.75		
			T _J =150℃		1.75		
t _{rr}	Reverse Recovery Time	I _F =400A, -diF/dt=1717A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		335		ns
			T _J =125℃		550		
			T _J =150℃		609		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		188		A
			T _J =125℃		231		
			T _J =150℃		238		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		38.1		μC
			T _J =125℃		69.3		
			T _J =150℃		78.5		



E _{rec}	Reverse Recovery Energy	I _F =400A, -diF/dt=1717A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		13.7		mJ
			T _J =125℃		26.0		
			T _J =150℃		29.5		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per Diode)					0.097	℃/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				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+150	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)				0.03	°C/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

Ordering Information Table

Device code

G	T	400	CU	120	T2N	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (400=400A)
- ④ - Circuit Configuration CU Chooper(Diode on High Side)
CL Chooper(Diode on Lower Side)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

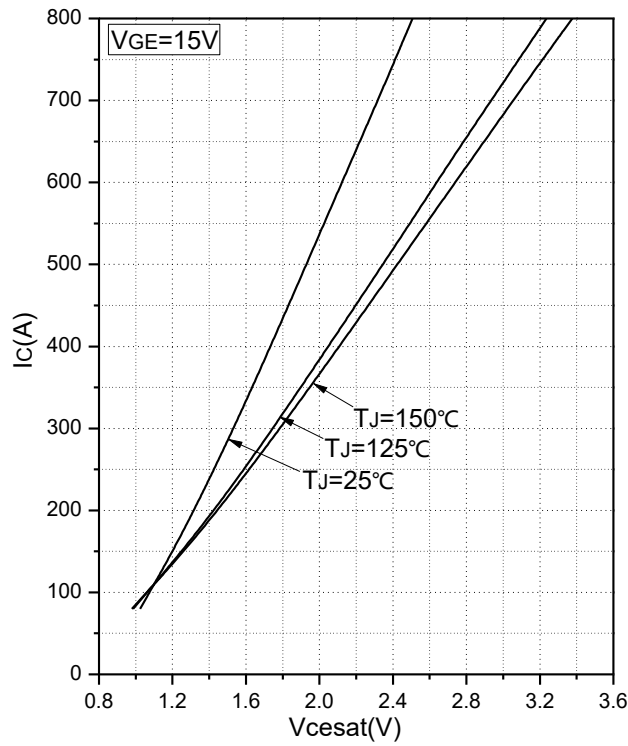


Fig.1 Typical Saturation Voltage Characteristics

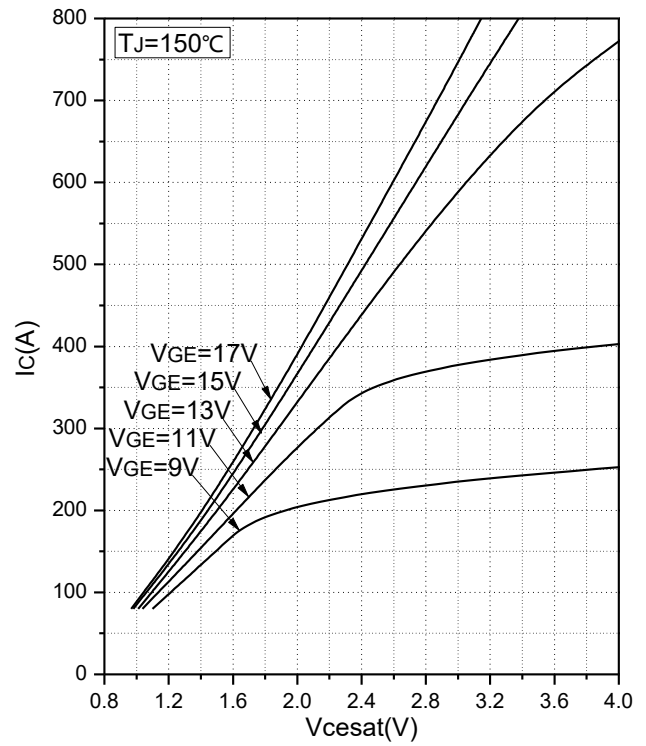


Fig.2 Typical Output Characteristics

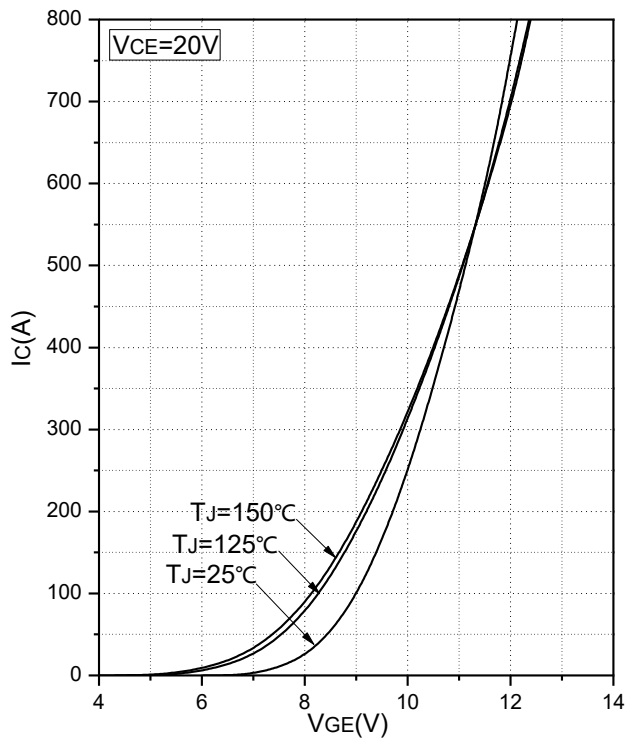


Fig.3 Transfer Characteristic

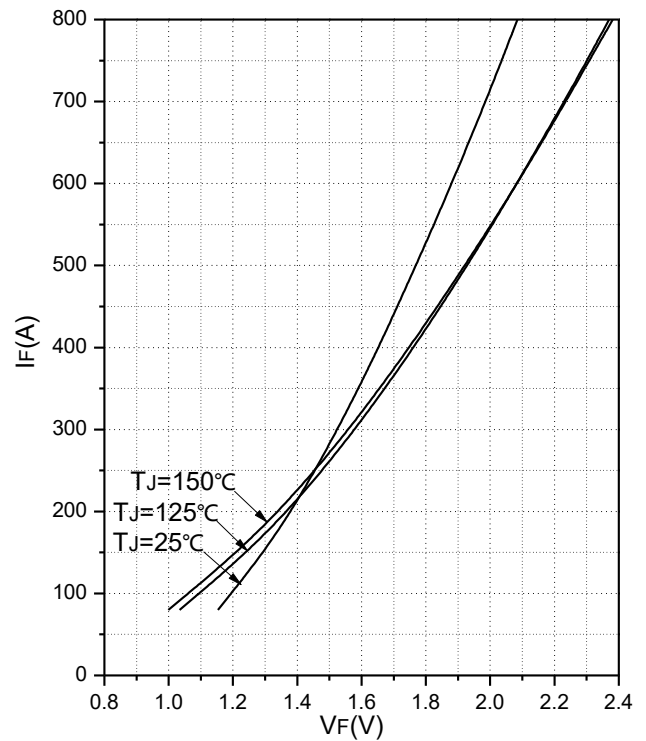


Fig.4 Forward Characteristics of Diode (Chopper)

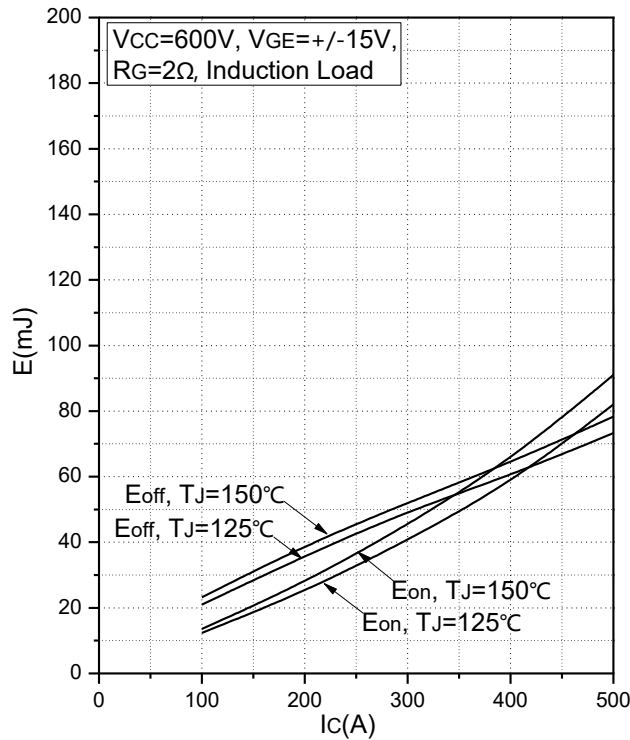


Fig.5 Typical Switching Loss vs. Collector Current

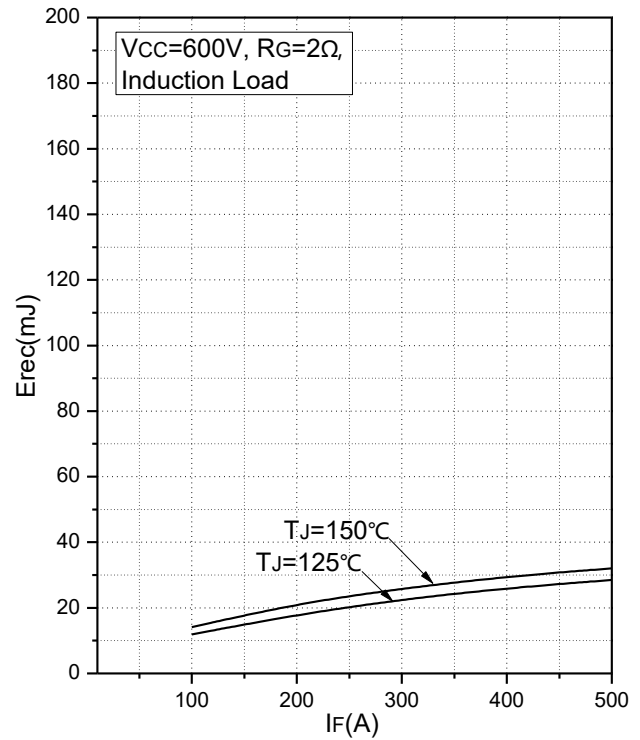


Fig.6 Typical Switching Loss vs. Forward Current (Chopper)

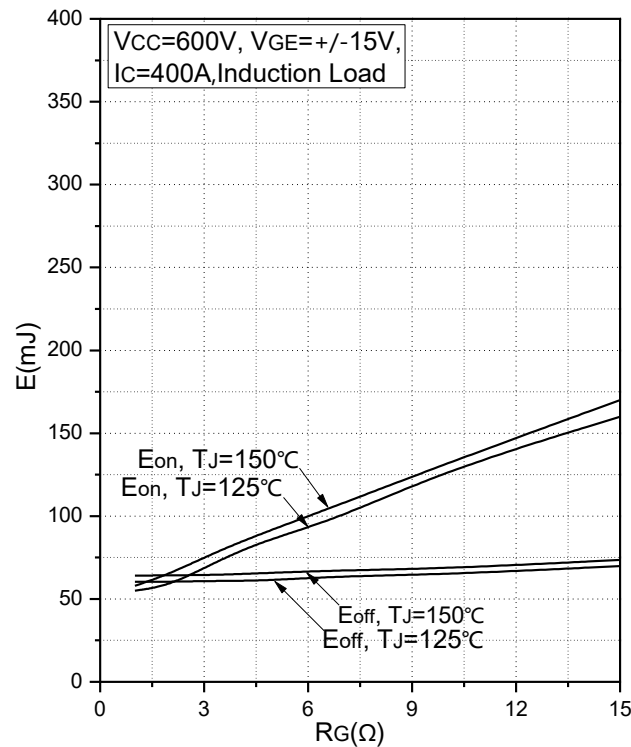


Fig.7 Typical Switching Loss vs. Gate Resistance

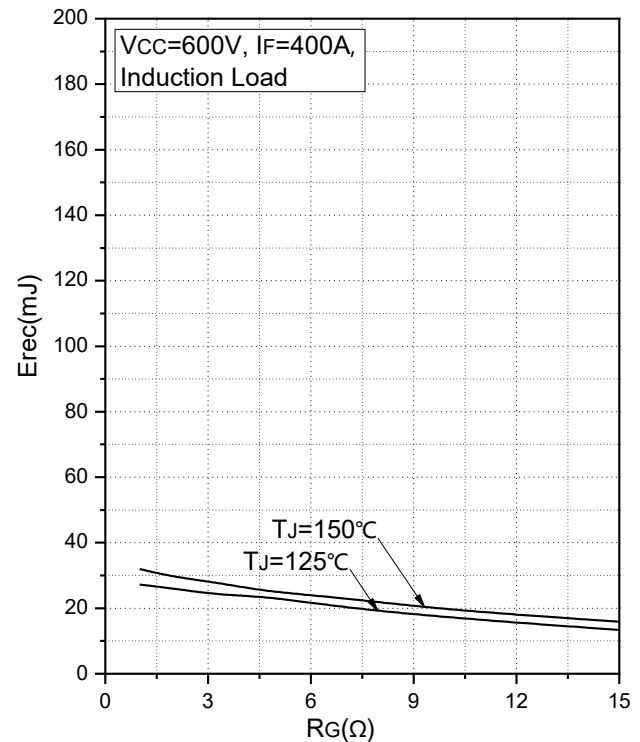


Fig.8 Typical Switching Loss vs. Gate Resistance (Chopper)

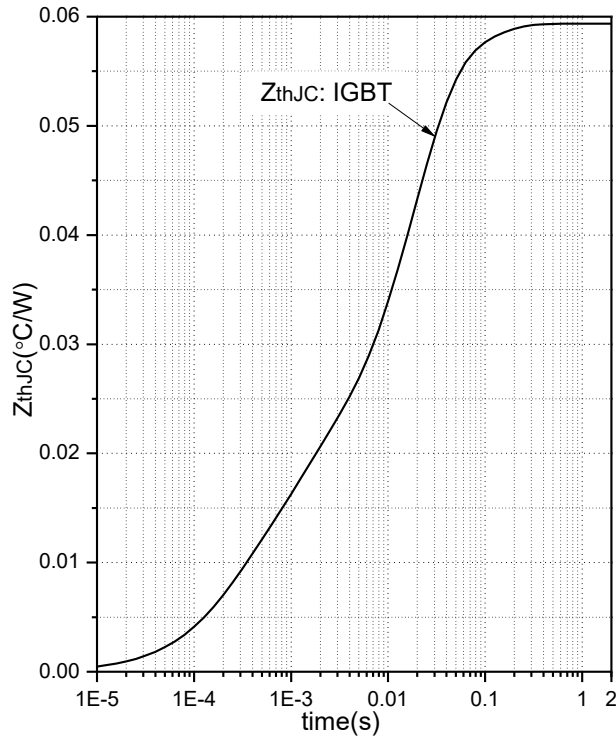


Fig.9 Transient Thermal Impedance (IGBT, Chopper)

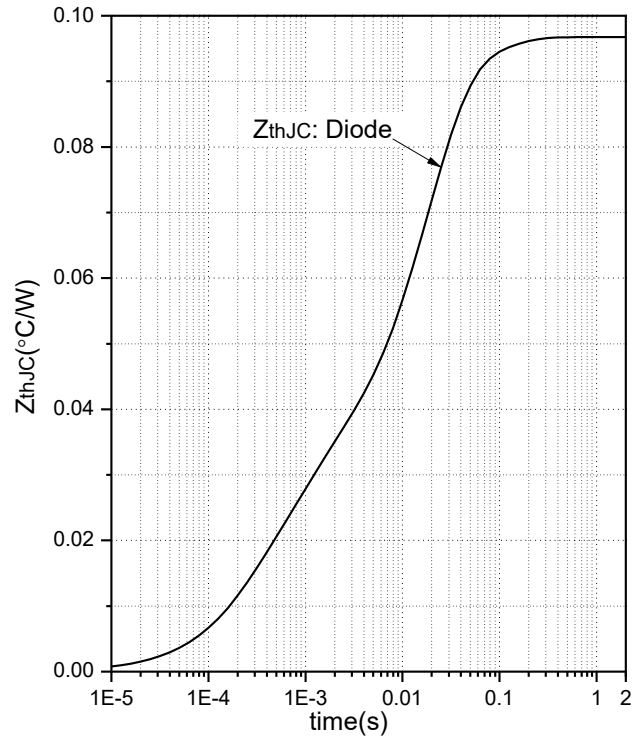


Fig.10 Transient Thermal Impedance (Diode, Chopper)

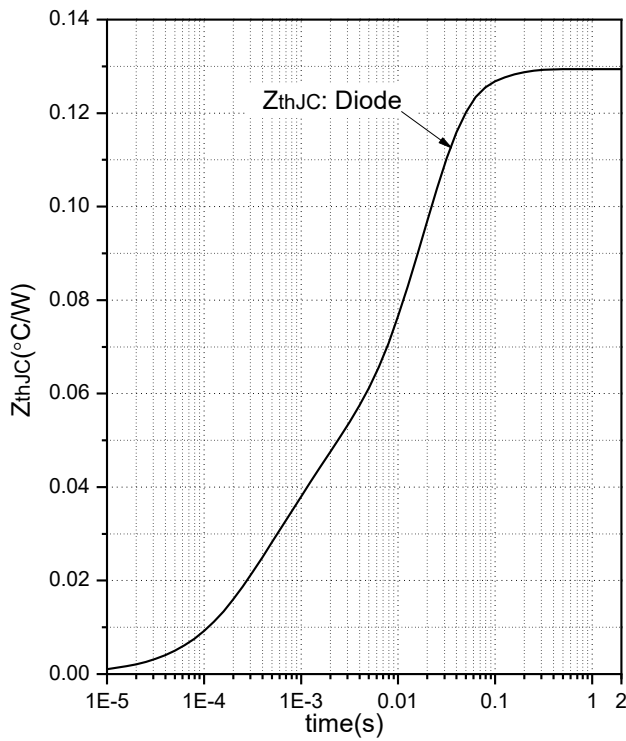


Fig.11 Transient Thermal Impedance (Diode, Reverse)

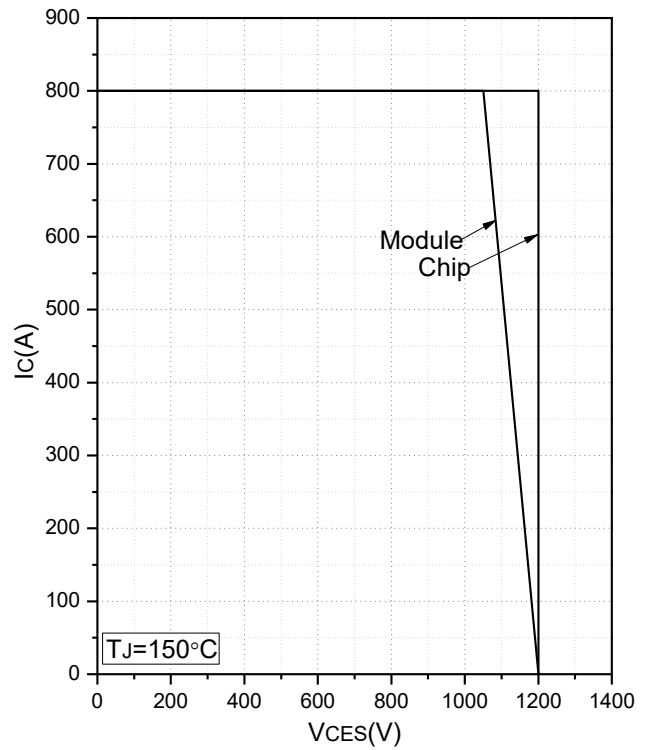


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

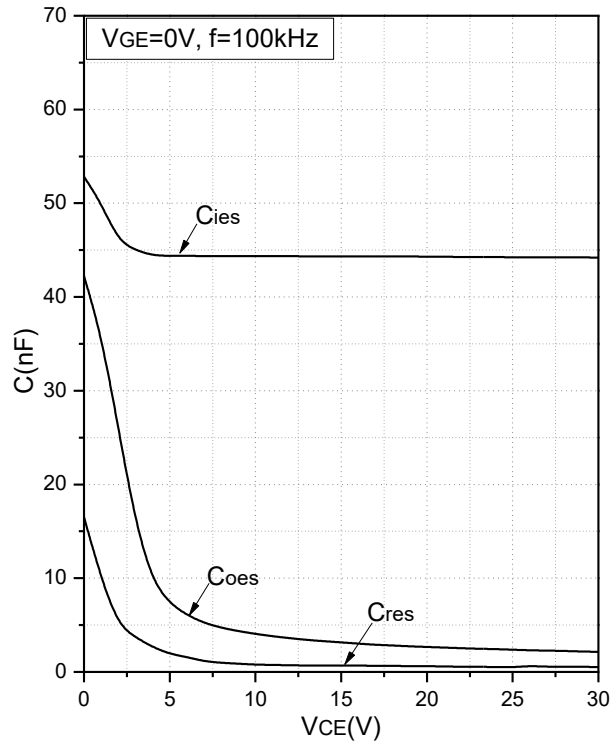
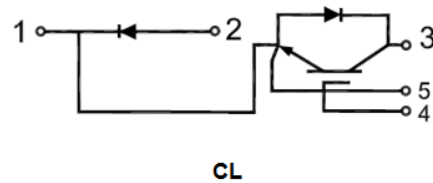
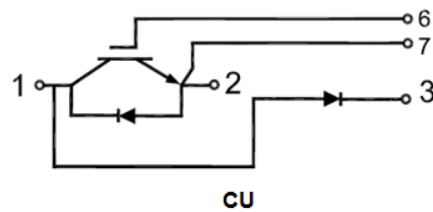


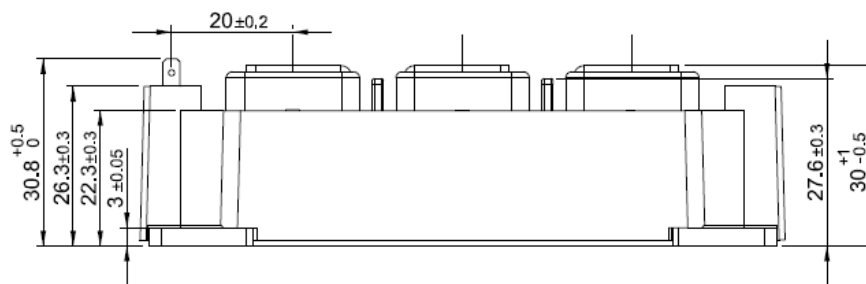
Fig.13 Capacitance Characteristics



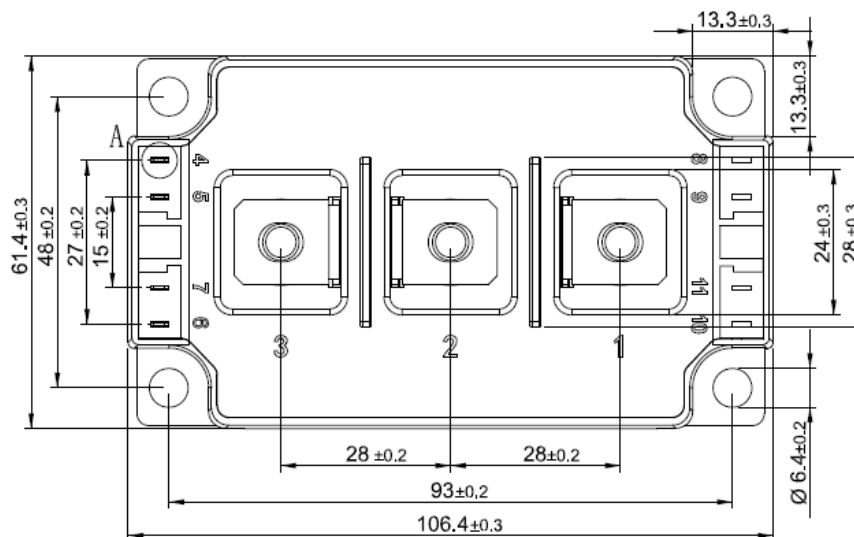
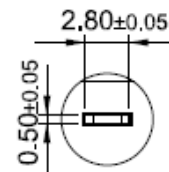
Internal Circuit



Package Outline (Unit: mm):



View A
scale 3:1



*Notes:

CU: No 4/5 terminal

CL: No 6/7 terminal



Date	Revision	Notes
06/14/2024	A	Final Version

Announcement

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