



GT450CU120T2NH

GT450CL120T2NH

IGBT Module

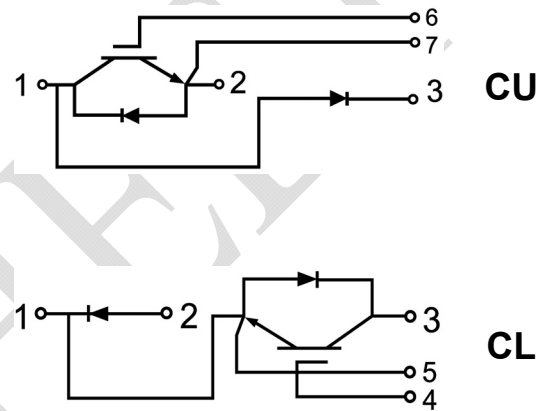
Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated >10 μ s
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested (2 \times I_c)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications:

- Welding
- HEV Inverter
- Industrial Motor Drives
- UPS

Circuit Diagram



IGBT, Brake-Chopper Maximum Rated Values of IGBT

V _{CES}	Collector-Emitter Blocking Voltage	T _J =25°C	1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =80°C	450	A
		T _C =25°C	735	A
I _{CM}	Repetitive Peak Collector Current	t _p =1ms	900	A
t _{SC}	Short Circuit Withstand Time		>10	μs
P _D	Maximum Power Dissipation per leg	T _C =25°C T _{Jmax} =175°C	2940	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=18mA, V_{CE}=V_{GE}, T_J=25^\circ C$	5.2	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=450A, V_{GE}=15V$	$T_J=25^\circ C$	2.00	2.40	V
			$T_J=125^\circ C$	2.50		
			$T_J=150^\circ C$	2.60		
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=V_{CES}, T_J=25^\circ C$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20V, V_{CE}=0V, T_J=25^\circ C$			800	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25^\circ C$		40.0		nF
C_{oes}	Output Capacitance			2.2		nF
C_{res}	Reverse Transfer Capacitance			1.1		nF

Switching Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=450A, R_{Gon}=1\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^\circ C$	0.48		μs
			$T_J=125^\circ C$	0.48		
			$T_J=150^\circ C$	0.48		
t_r	Rise Time		$T_J=25^\circ C$	0.13		μs
			$T_J=125^\circ C$	0.14		
			$T_J=150^\circ C$	0.14		
$t_{d(off)}$	Turn-off Delay Time	$T_J=25^\circ C$	0.33		μs	
		$T_J=125^\circ C$	0.33			
		$T_J=150^\circ C$	0.33			
t_f	Fall Time	$T_J=25^\circ C$	0.06		μs	
		$T_J=125^\circ C$	0.07			
		$T_J=150^\circ C$	0.07			
E_{on}	Turn-on Switching Loss	$T_J=25^\circ C$	10.4		mJ	
		$T_J=125^\circ C$	17.7			
		$T_J=150^\circ C$	19.0			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =450A, R _{Goff} =1Ω, V _{GE} =±15V, du/dt=6630V/μs(T _J =150°C), Inductive Load	T _J =25°C	33.2	mJ
			T _J =125°C	43.8	
			T _J =150°C	46.0	
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C	1.92	μC
R _{g internal}	Internal Gate Resistance		T _J =25°C	1.67	Ω
RBSOA	I _C =900A, V _{CC} =1050V, V _p =1200V, R _G =1Ω, V _{GE} =+15V to 0V, T _J =125°C			Trapezoid	
I _{SC}	V _{CC} =600V, V _{GE} =15V, T _J =150°C			10	us
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case				0.051 °C/W

Diode, Reverse Maximum Rated Values of Diode

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		300	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	600	A

Electrical Characteristics of Diode

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =300A	T _J =25°C	1.70		V
			T _J =125°C	1.80		
			T _J =150°C	1.80		
t _{rr}	Reverse Recovery Time		T _J =25°C	0.19		μs
			T _J =125°C	0.40		
			T _J =150°C	0.44		
I _{rr}	Peak Reverse Recovery Current	I _F =300A, -diF/dt=2970A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C	221		A
			T _J =125°C	263		
			T _J =150°C	277		
Q _{rr}	Reverse Recovery Charge		T _J =25°C	22.33		μC
			T _J =125°C	47.23		
			T _J =150°C	54.24		



E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt=2970A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C	11.6	mJ
			T _J =125°C	25.0	
			T _J =150°C	28.5	
R _{θJC}	Diode Thermal Resistance: Junction-to-Case			0.111	°C/W

Diode, Brake-Chopper Maximum Rated Values

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		450	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	900	A

Electrical Characteristics of Diode

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =450A, V _{GE} =15V	T _J =25°C	2.00		V
			T _J =125°C	2.00		
			T _J =150°C	1.90		
t _{rr}	Reverse Recovery Time		T _J =25°C	0.23		μs
			T _J =125°C	0.42		
			T _J =150°C	0.46		
I _{rr}	Peak Reverse Recovery Current	I _F =450A, di/dt=2680A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C	234		A
			T _J =125°C	277		
			T _J =150°C	291		
Q _{rr}	Reverse Recovery Charge		T _J =25°C	32		μC
			T _J =125°C	57		
			T _J =150°C	67		
E _{rec}	Reverse Recovery Energy		T _J =25°C	15.4		mJ
			T _J =125°C	25.8		
			T _J =150°C	31.1		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case				0.086	°C/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	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+150	°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	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

Device Code	G	T	450	CU	120	T2N	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (450=450A)
- ④ - Circuit Configuration: Chopper, CU(Diode on High Side) / CL(Diode on Low Side)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

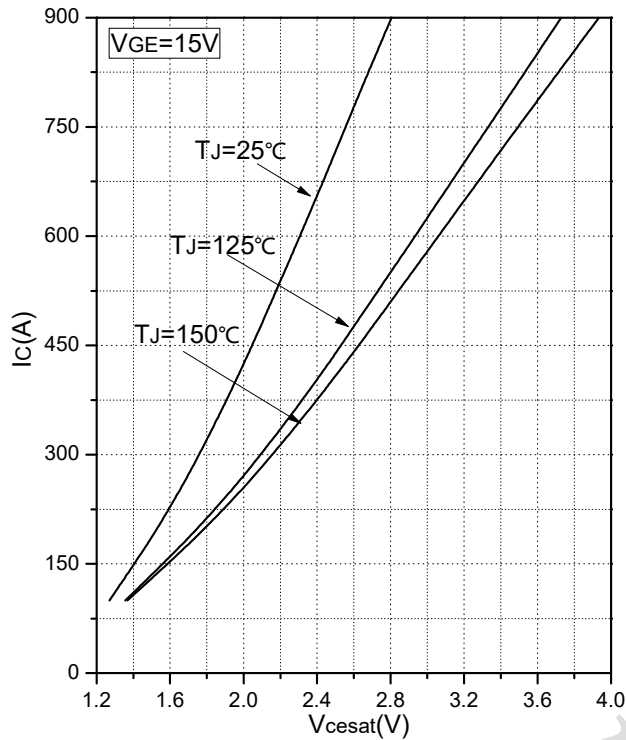


Fig.1 Typical Saturation Voltage Characteristics

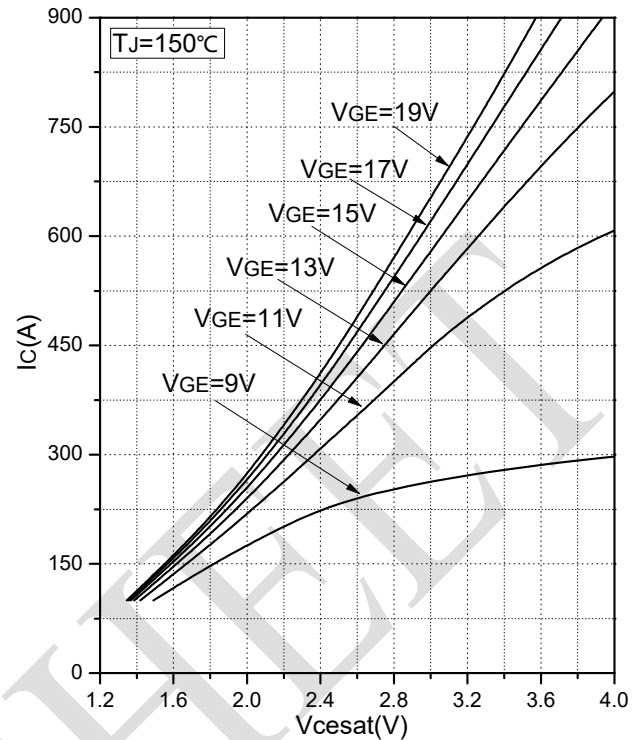


Fig.2 Typical Output Characteristics

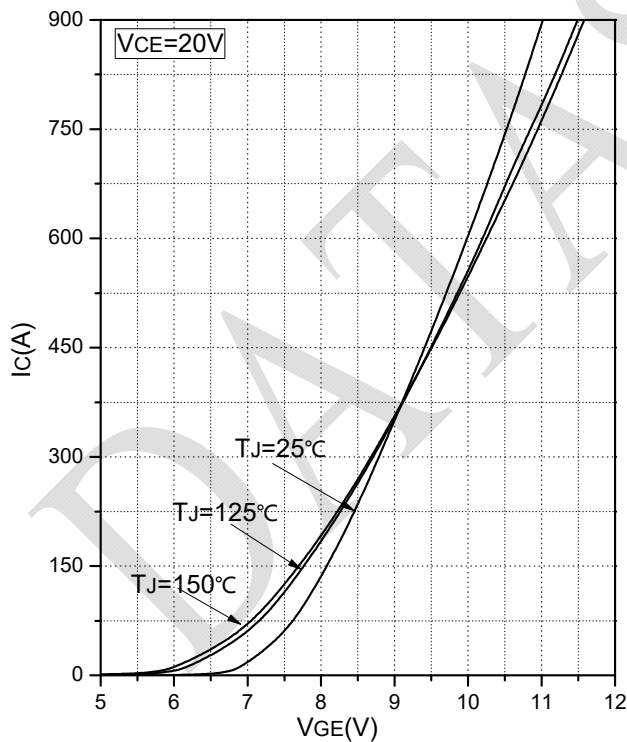


Fig.3 Transfer Characteristic

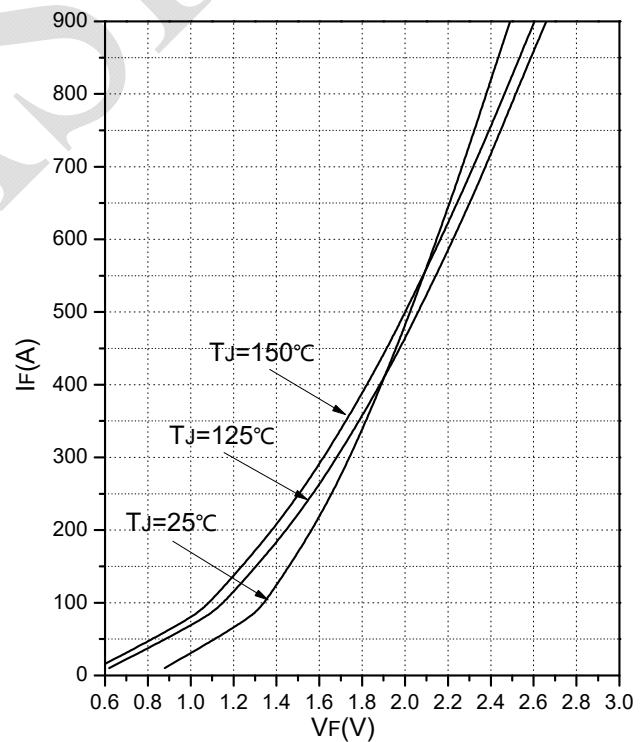


Fig.4 Forward Characteristics of Diode (Diode, Chopper)

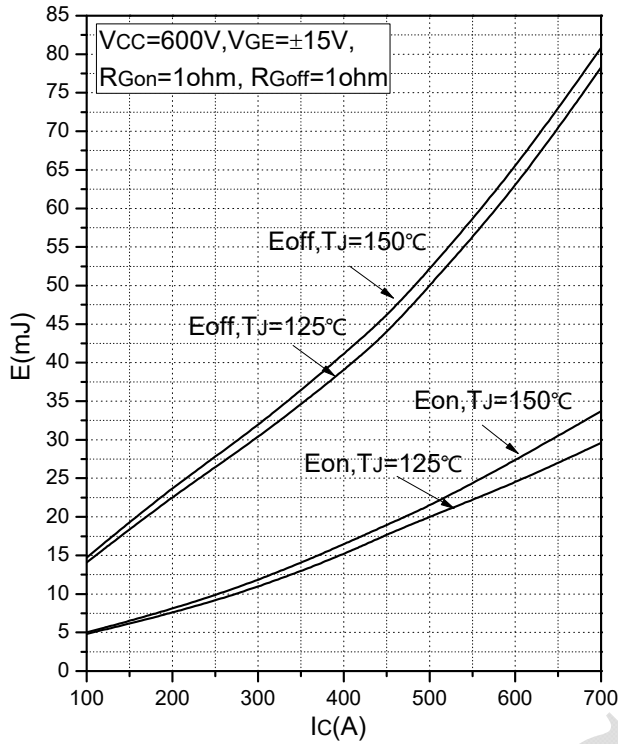


Fig. 5 Typical Switching Loss vs. Collector Current

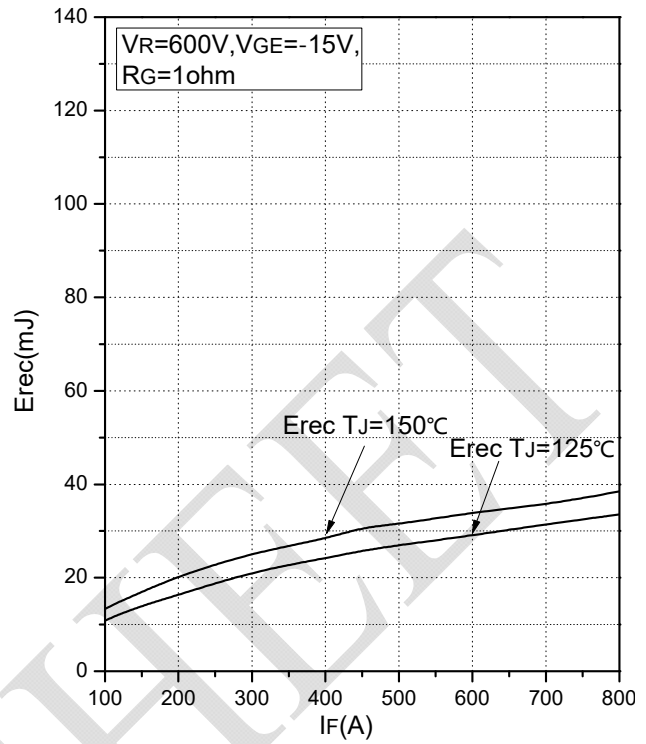


Fig. 6 Typical Switching Loss vs. Forward Current (Diode, Chopper)

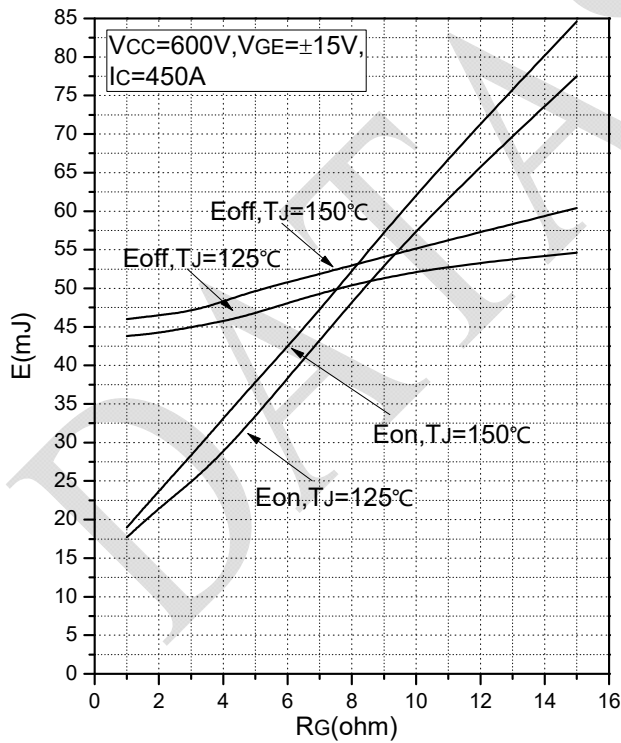


Fig. 7 Typical Switching Loss vs. Gate Resistance

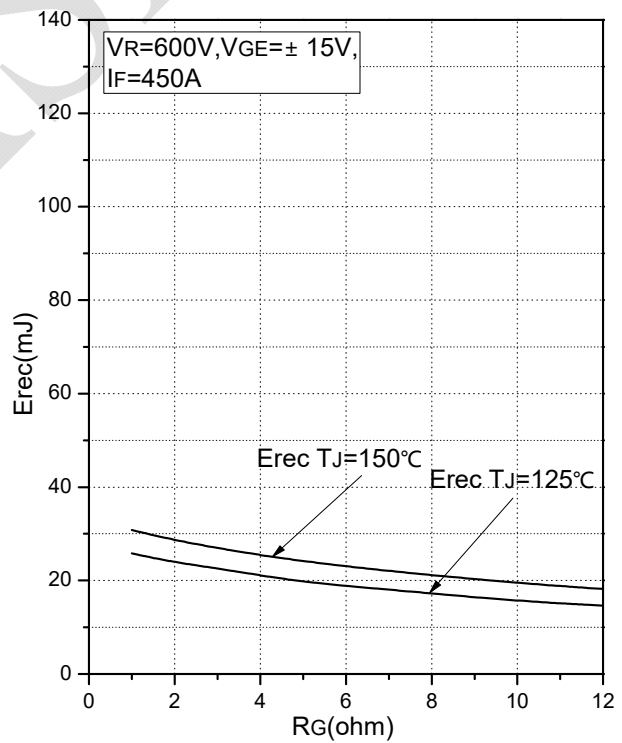


Fig. 8 Typical Switching Loss vs. Gate Resistance (Diode, Chopper)

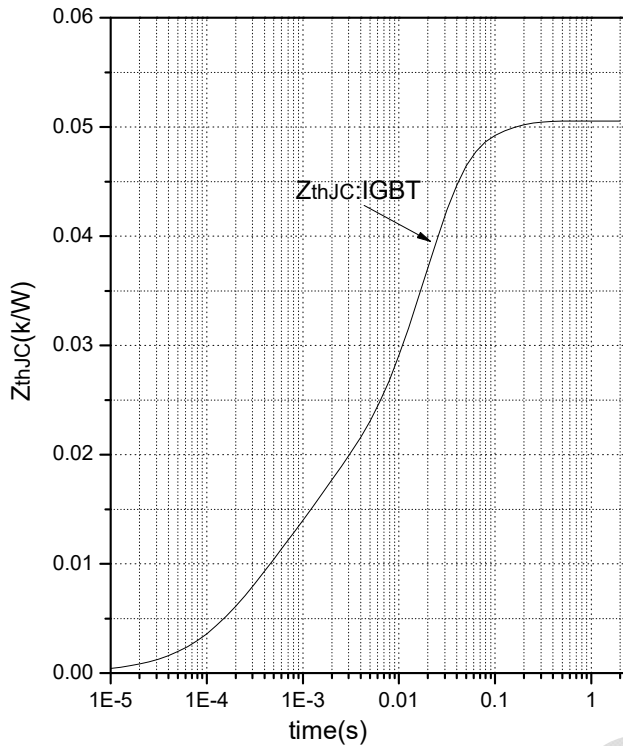


Fig.9 Transient Thermal Impedance (IGBT)

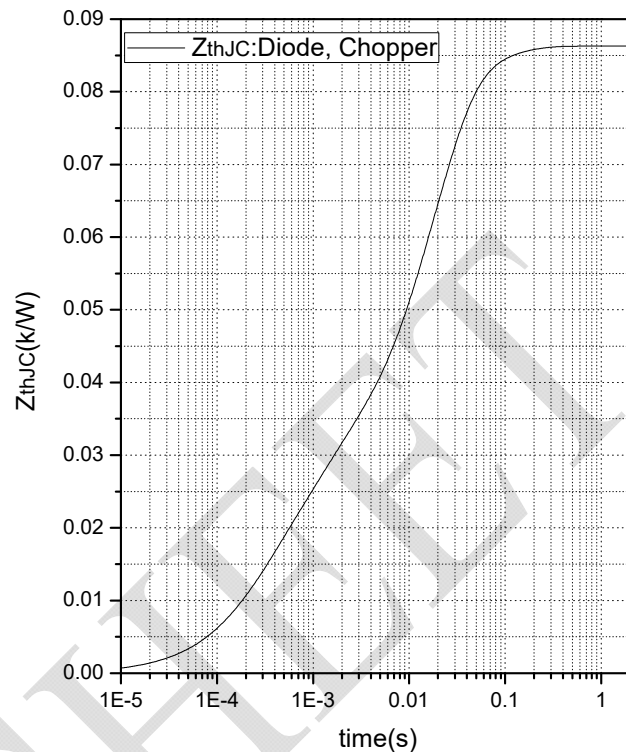


Fig.10 Transient Thermal Impedance (Diode, Chopper)

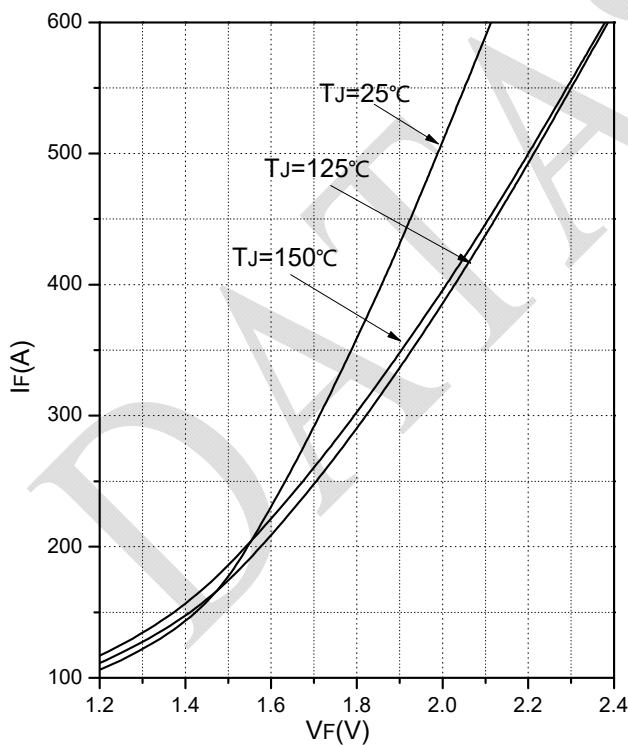


Fig.11 Forward Characteristics of Diode (Diode, Reverse)

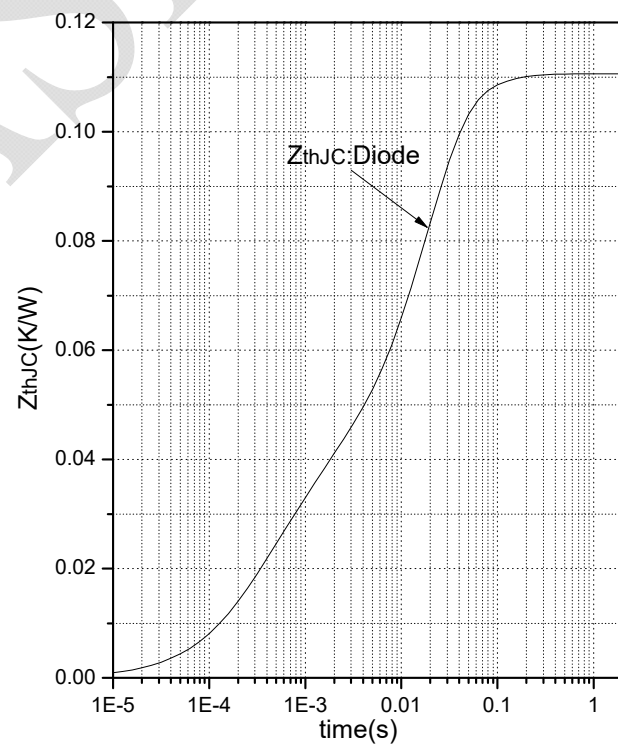


Fig.12 Transient Thermal Impedance (Diode, Reverse)

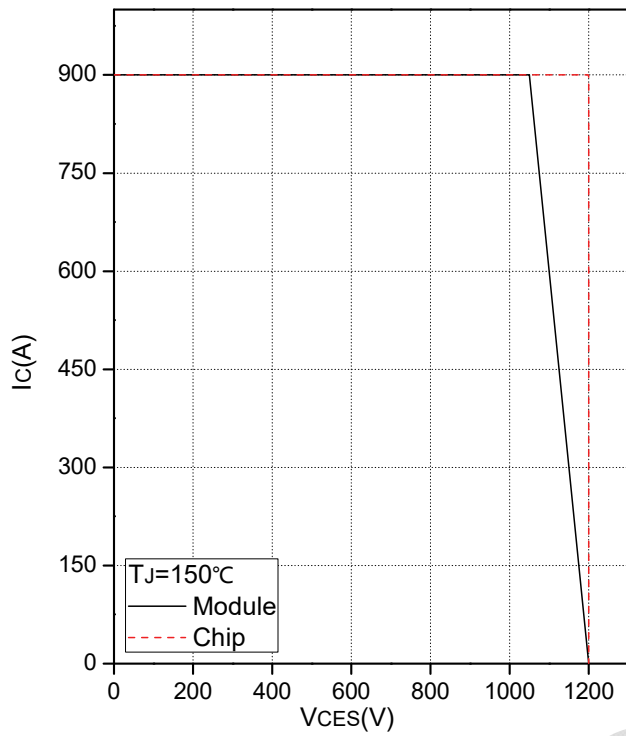
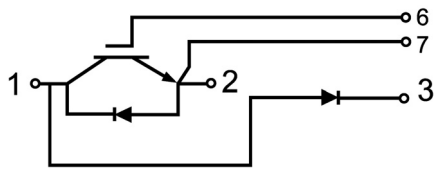


Fig.13 Reverse Bias Safe Operation Area (RBSOA)

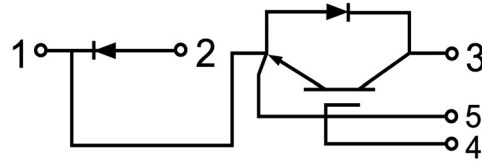
DATA SHEET



Internal Circuit

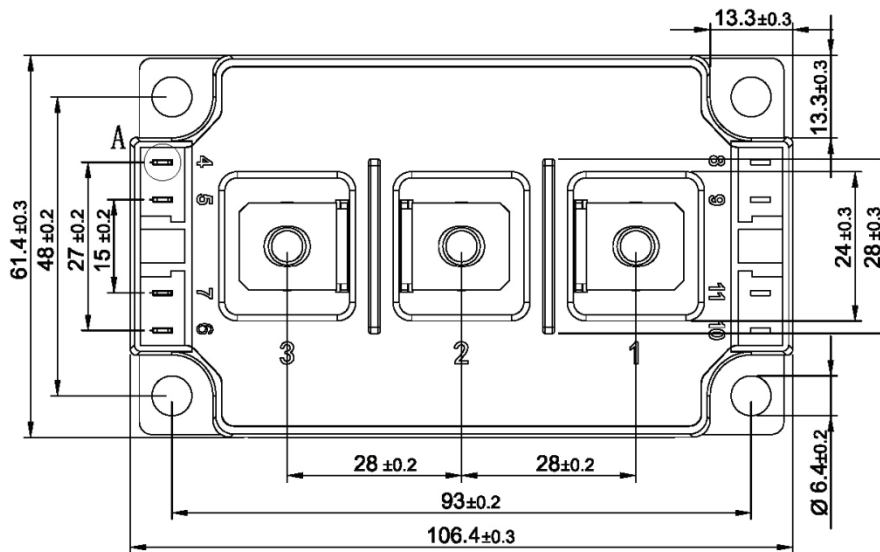
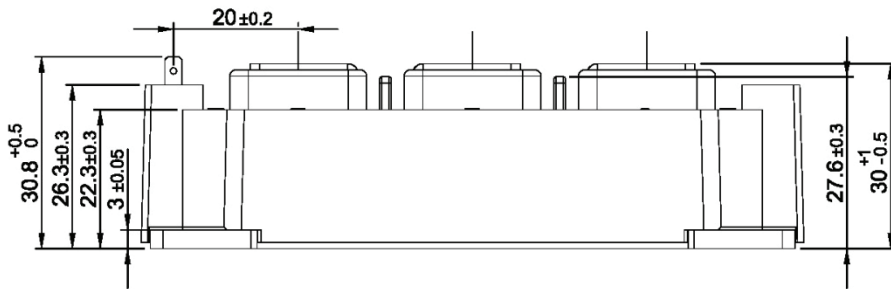


CU

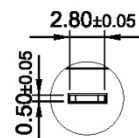


CL

Package Outline (Unit: mm):



View A
scale 3:1





Date	Revision	Notes
06/20/2022	A	Final Version

Announcements

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