

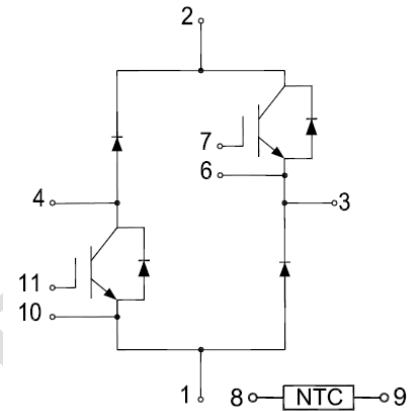


GT450CH120T9H-SD

IGBT Module

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated >10 μ s
- Low Switching Loss
- 100% RBSOA Tested(2xIc)
- Low Stray Inductance
- Copper Wire Bonding on Power Terminal
- Lead Free, Compliant with RoHS Requirement



Applications:

- UPS Systems
- Servo Applications
- Motor Drives
- Medical Applications
- High Frequency Switching Applications

Chopper IGBT

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

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^\circ\text{C}$	450	A
		$T_C=25^\circ\text{C}$	870	A
I_{CM}	Peak Collector Current Repetitive	$T_J=175^\circ\text{C}$	900	A
tsc	Short Circuit Withstand Time		>10	μ s
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	2940	W



Electrical Characteristics of Chopper IGBT ($T_C=25^\circ\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=6\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.5	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=450\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	1.70	1.90	V
			$T_J=125^\circ\text{C}$	1.90		V
			$T_J=150^\circ\text{C}$	1.90		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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^\circ\text{C}$			800	nA
C_{ies}	Input Capacitance			35.8		nF
C_{oes}	Output Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		2.63		nF
C_{res}	Reverse Transfer Capacitance			1.29		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600\text{V}$, $I_C=450\text{A}$, $R_{Gon}=1\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	0.45		μs
			$T_J=125^\circ\text{C}$	0.46		
			$T_J=150^\circ\text{C}$	0.47		
t_r	Rise Time		$T_J=25^\circ\text{C}$	0.15		μs
			$T_J=125^\circ\text{C}$	0.15		
			$T_J=150^\circ\text{C}$	0.16		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^\circ\text{C}$	0.46		μs
			$T_J=125^\circ\text{C}$	0.47		
			$T_J=150^\circ\text{C}$	0.48		
t_f	Fall Time	$T_J=25^\circ\text{C}$	0.12		μs	
		$T_J=125^\circ\text{C}$	0.15			
		$T_J=150^\circ\text{C}$	0.18			
E_{on}	Turn-on Switching Loss	$V_{CC}=600\text{V}$, $I_C=450\text{A}$, $R_{Gon}=1\Omega$, $V_{GE}=\pm 15\text{V}$, $di/dt=2420\text{A}/\mu\text{s}$ ($T_J=150^\circ\text{C}$) Inductive Load	$T_J=25^\circ\text{C}$	16.7		mJ
			$T_J=125^\circ\text{C}$	22.1		
			$T_J=150^\circ\text{C}$	24.8		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =450A, R _{Goff} =1Ω, V _{GE} = ±15V, du/dt=3120V/μs (T _J =150°C) Inductive Load	T _J =25°C	44.1	mJ
			T _J =125°C	56.1	
			T _J =150°C	61.1	
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C	2.41	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 =150°C			Trapezoid	
I _{sc}	SC Data	V _{CC} = 600V, V _{GE} = ± 15V, tp=10us R _{Gon} =6.8Ω, R _{Goff} = 6.8Ω, T _J = 150°C		2391	A
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case(per leg)				0.051 °C/W

Chopper Diode

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

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	450	A
I _{FM}	Diode Maximum Forward Current	900	A

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =450A	T _J =25°C	2.00		V
			T _J =125°C	2.00		
			T _J =150°C	1.90		
t _{rr}	Reverse Recovery Time	I _F =450A, -diF/dt=2680A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	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, -diF/dt=2680A/μs(T _J =150°C), V _R =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	I _F =450A, -diF/dt=2680A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	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 (per leg)			0.086	°C/W

Anti-parallel Diode

Maximum Rated Values of Anti-parallel Diode (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}	Diode Maximum Forward Current	600	A

Electrical Characteristics of Anti-parallel Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F =300A	T _J =25°C	1.80		V
			T _J =125°C	1.80		
			T _J =150°C	1.80		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt =2010A/μs(T _J =150°C), V _R =600V, V _{GE} = -15V	T _J =25°C	0.41		μs
			T _J =125°C	0.60		
			T _J =150°C	0.64		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C	150		A
			T _J =125°C	181		
			T _J =150°C	191		
Q _{rr}	Reverse Recovery Charge	T _J =25°C	29.7		μC	
		T _J =125°C	50.7			
		T _J =150°C	57.8			



E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt =2010/μs(T _J =150°C), V _R =600V, V _{GE} = -15V	T _J =25°C	12.9	mJ
			T _J =125°C	22.0	
			T _J =150°C	25.4	
R _{θJC}	Diode Thermal Resistance: Junction-To-Case (per leg)			0.134	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Description		Min.	Typ.	Max.	Units.
R ₂₅	Rated Resistance	T _C =25°C		5		kΩ
ΔR/R	Deviation of R100	T _C =100°C, R ₁₀₀ =481Ω	-5		5	%
P ₂₅	Power Dissipation	T _C =25°C			10	mW
B _{25/50}	B-Value	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]		3380		K
B _{25/80}	B-Value	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]		3440		K

Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute		2500		V
L _{sCE}	Stray Inductance Module			20		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)				0.02	°C/W
M	Terminals Connection Torque	Screw M6-Mounting according to valid application note	3.0		6.0	N·m
M	Mounting Torque for Module Mounting	Screw M5--Mounting according to valid application note	3.0		6.0	N·m
G	Weight			330		g

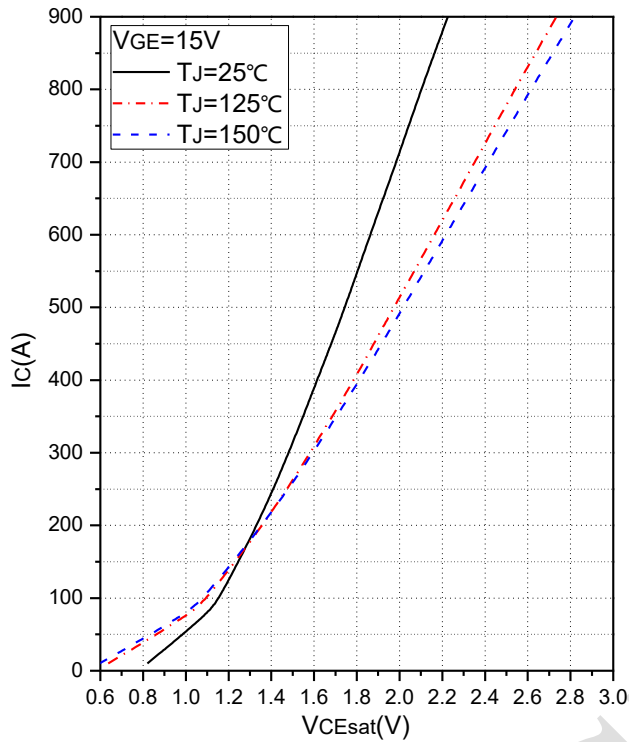


Fig.1 Typical Saturation Voltage Characteristics

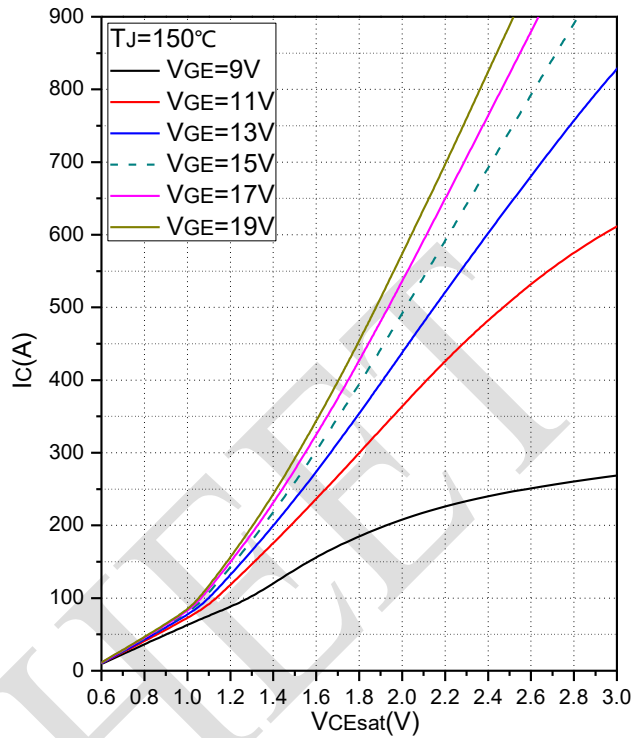


Fig.2 Typical Output Characteristics

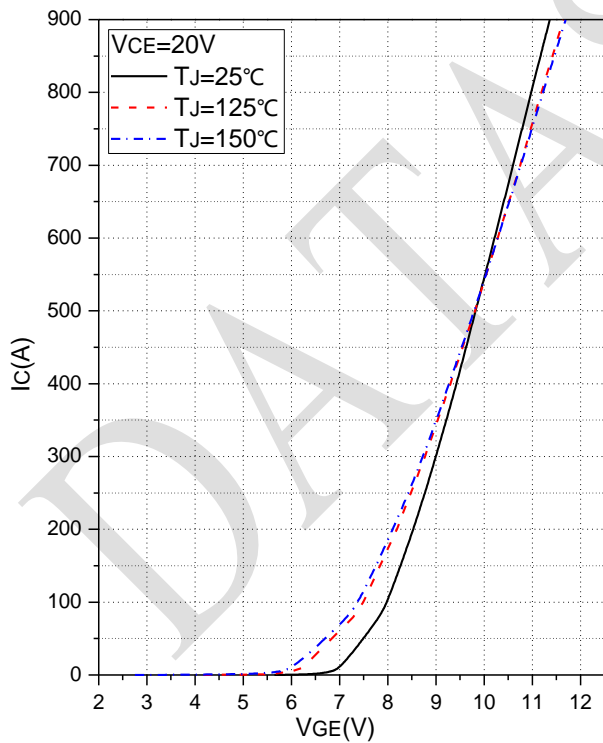


Fig.3 Transfer Characteristics

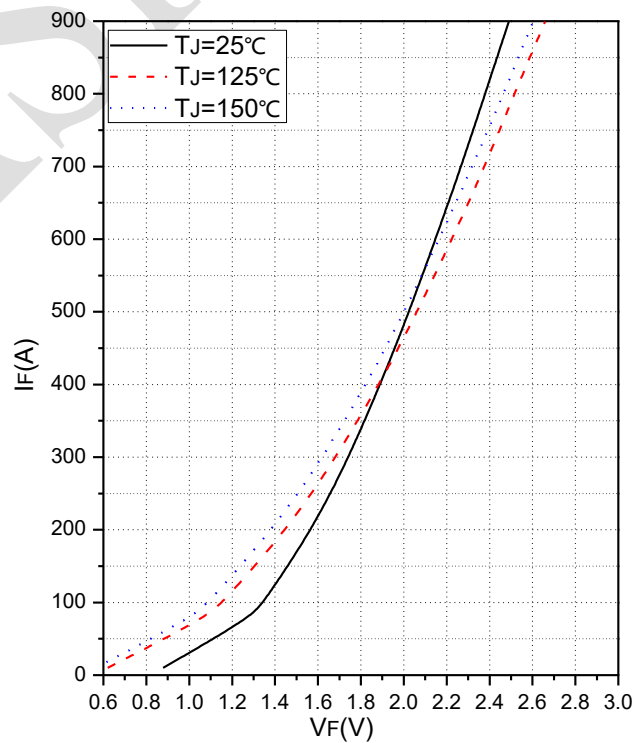


Fig.4 Forward Characteristics of Brake-chopper Diode

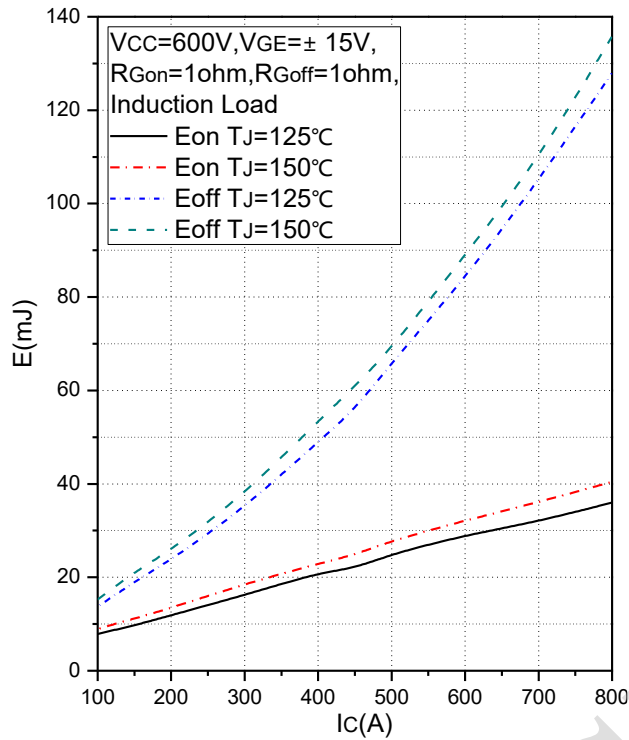


Fig.5 Typical Switching Loss vs. Collector Current

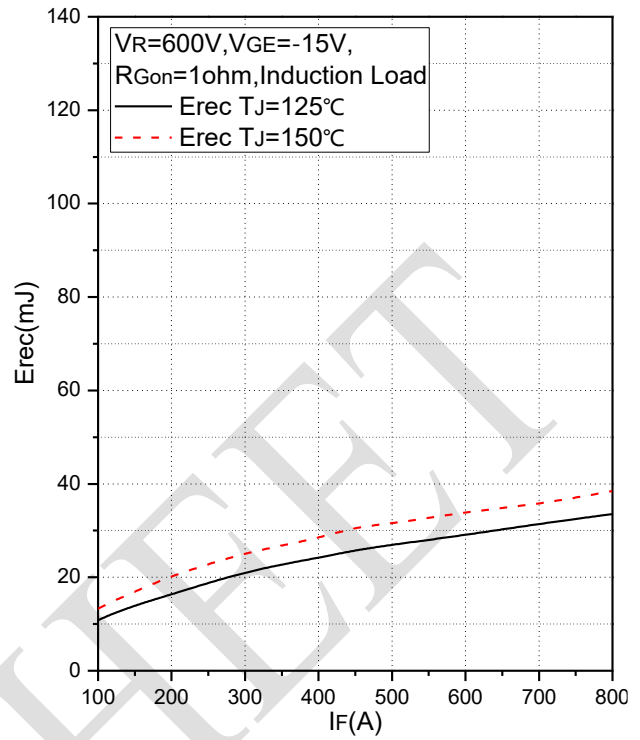


Fig.6 Typical Switching Loss vs. Forward Current

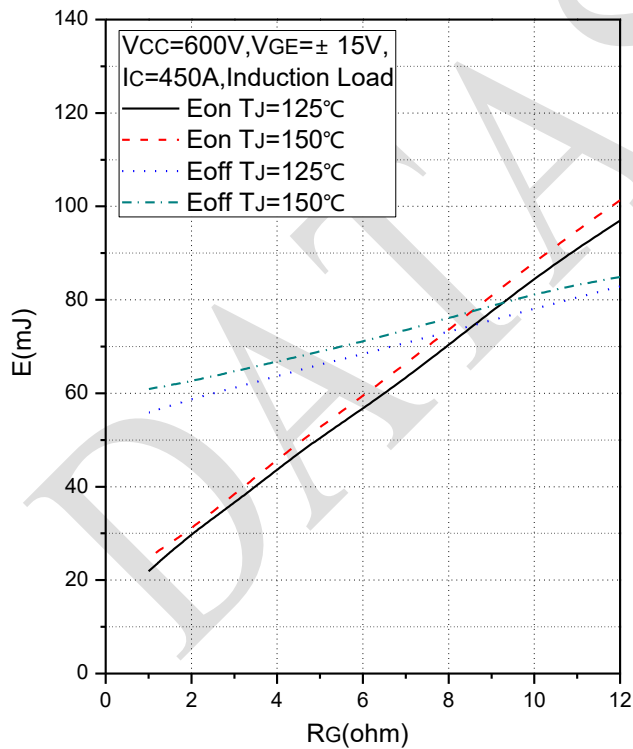


Fig.7 Typical Switching Loss vs. Gate Resistance

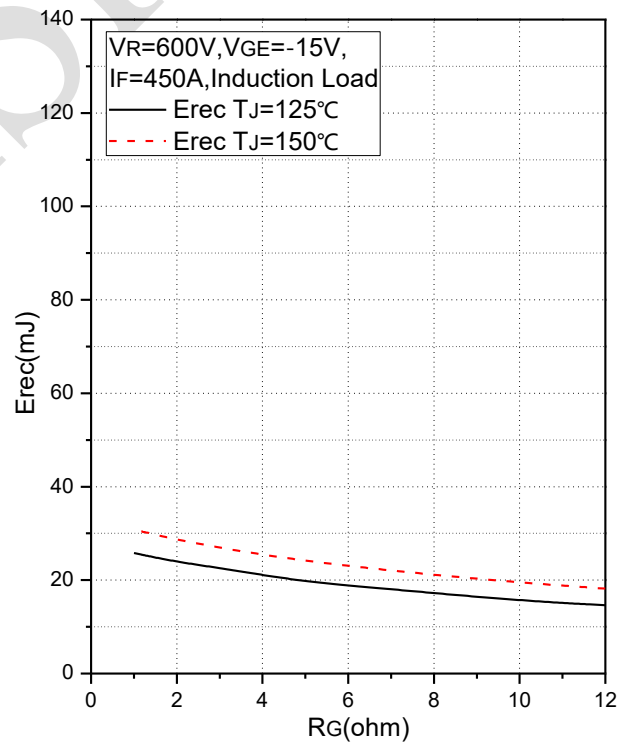


Fig.8 Typical Switching Loss vs. Gate Resistance

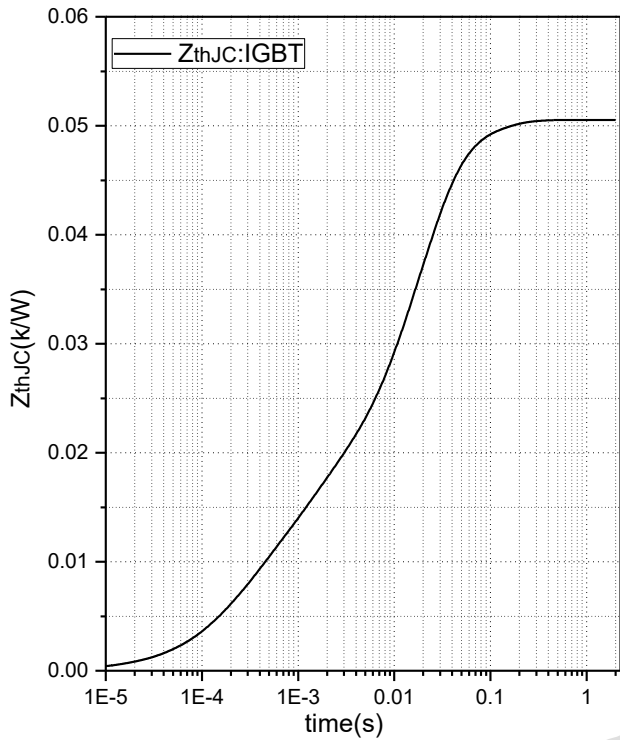


Fig.9 Transient Thermal Impedance (IGBT)

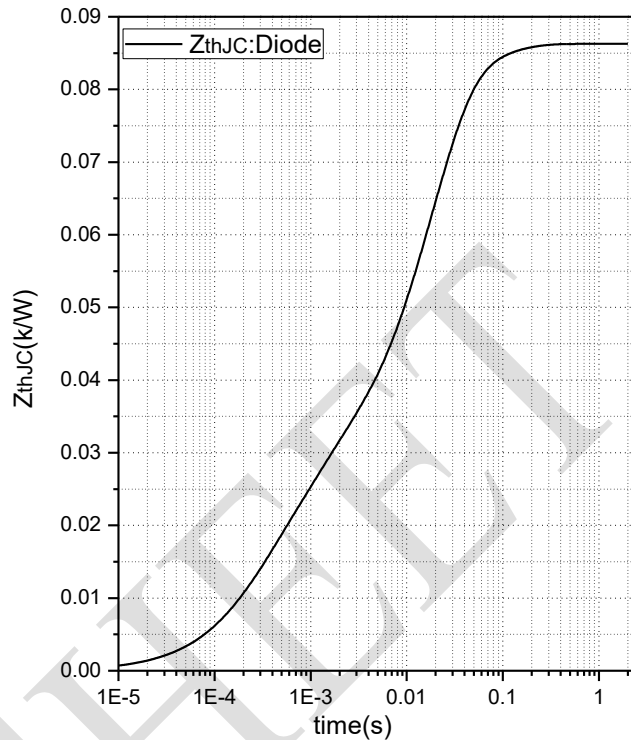


Fig.10 Transient Thermal Impedance (Diode)

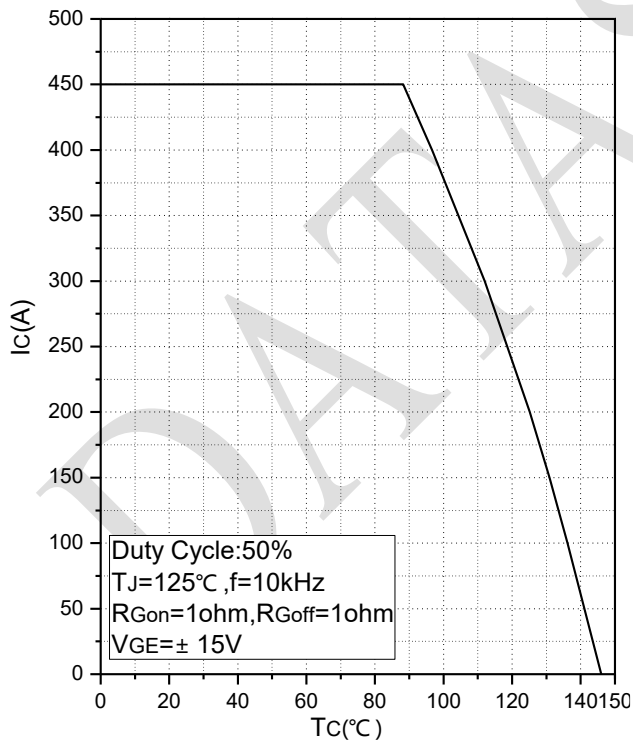


Fig.11 Rated Current vs. Temperature

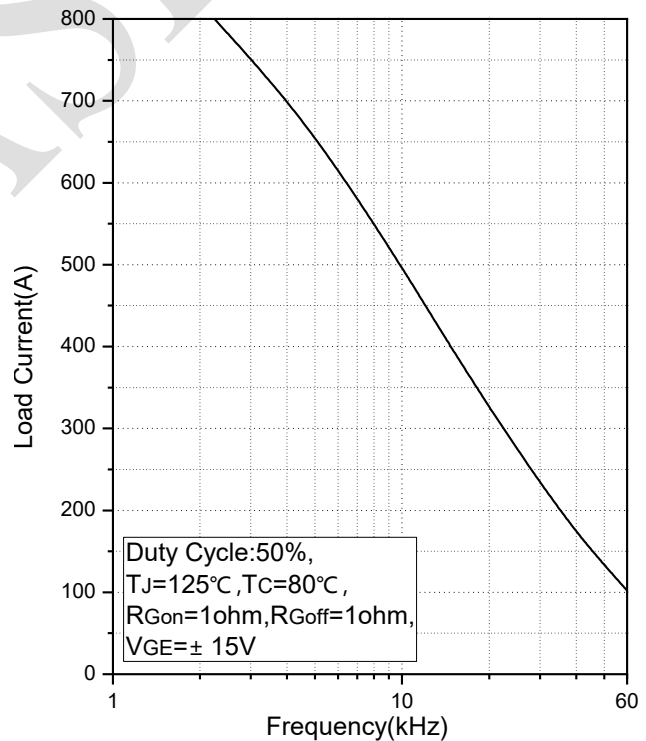


Fig.12 Typical Load Current vs. Frequency

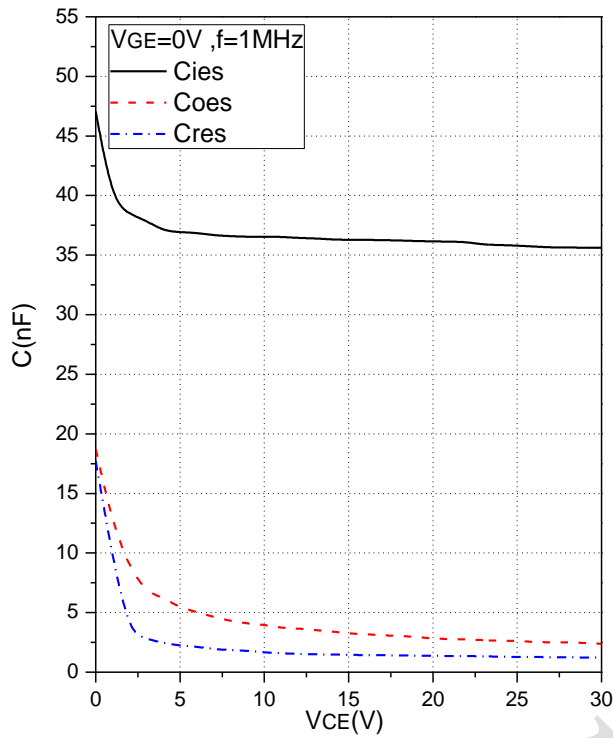


Fig.13 Capacitance Characteristics

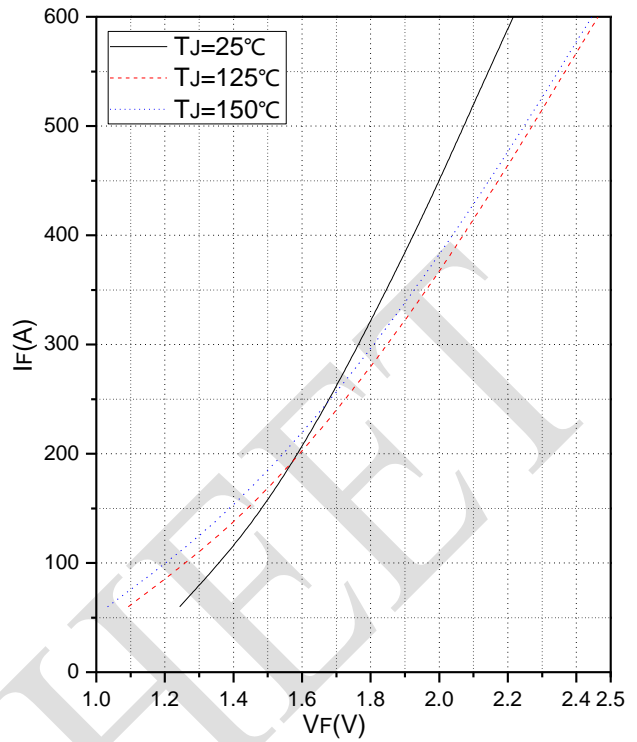


Fig.14 Forward Characteristics of Anti-parallel Diode

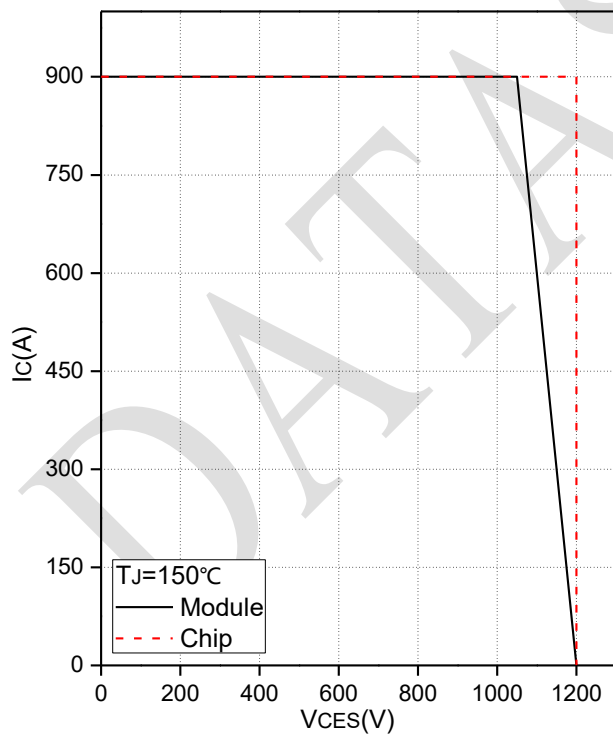


Fig.15 Reverse Bias Safe Operation Area (RBSOA)

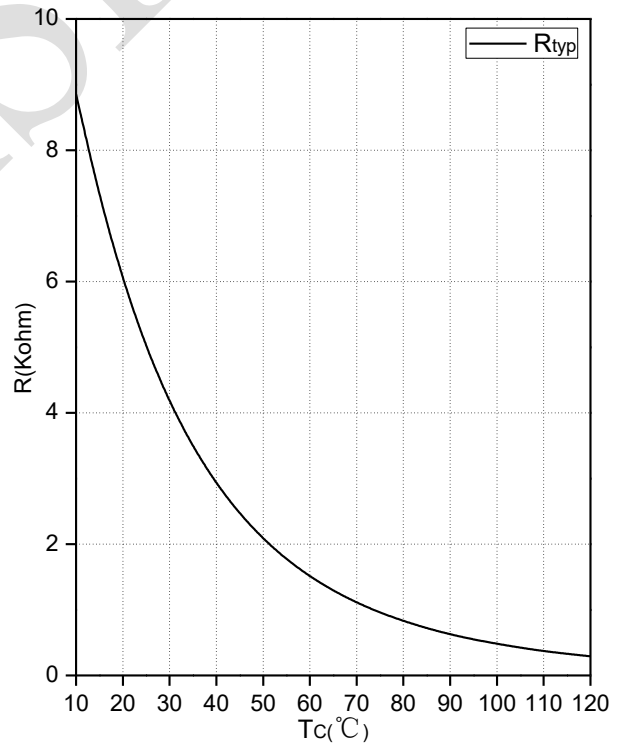
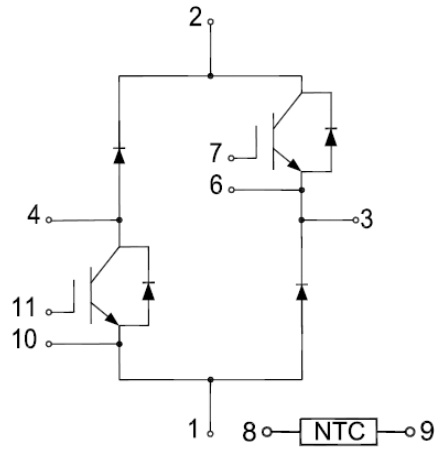


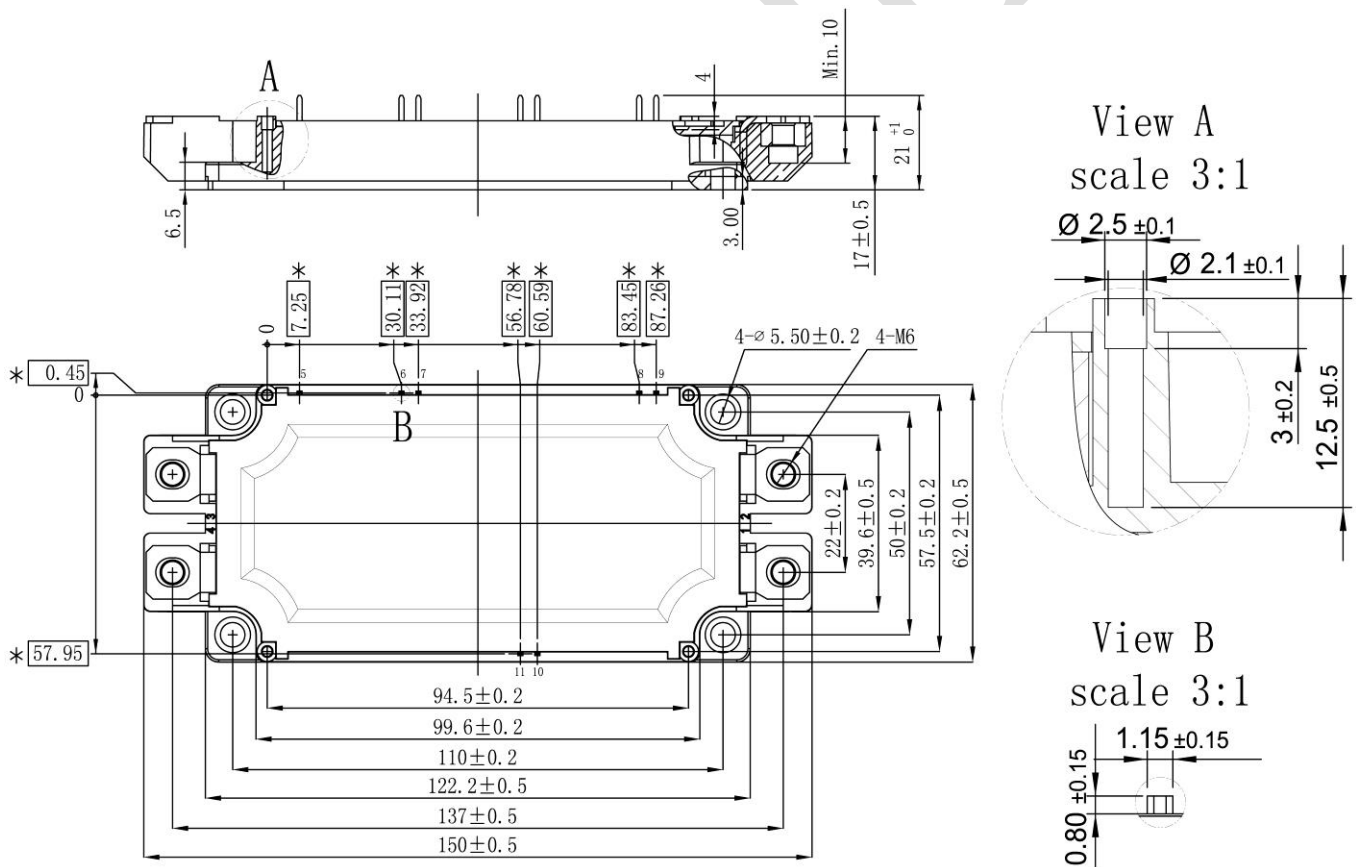
Fig.16 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
03/23/2020	01	Initial Release
05/20/2020	02	Update Outline

Announcement

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DATA SHEET