



RD200RCU180T5H

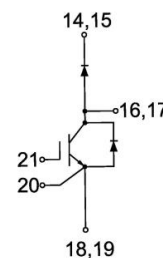
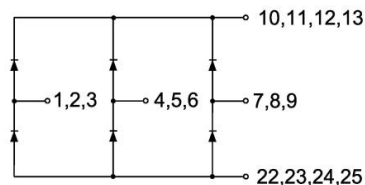
Rectifier Module

Preliminary Data

Features:

- Small Temperature Coefficient
- High Surge Capacity
- Heat Transfer Through Aluminum Oxide DBC Ceramic Isolated Metal Baseplate
- Low Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Input Bridge Rectifier
- AC/DC Motor Control
- Power Supply

Diode, Rectifier

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

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^{\circ}\text{C}$	1800			V
I_D	Average Forward Current	Three Phase, Full Wave, $T_C=80^{\circ}\text{C}$			200	A
I_{FSM}	Surge Current @ $t_p=10$ ms	$t_p=10\text{ms}$, $T_J=25^{\circ}\text{C}$			2340	A
I^2t	I^2t - value	$t_p=10\text{ms}$, $T_J=25^{\circ}\text{C}$			27378	A^2s
V_F	Forward Voltage	$I_F=200\text{A}$, $T_J=25^{\circ}\text{C}$		1.23	1.40	V
		$I_F=200\text{A}$, $T_J=125^{\circ}\text{C}$			1.35	V
I_R	Reverse Current	$V_{RD}=1600\text{V}$, $T_J=25^{\circ}\text{C}$			100	μA



Thermal Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Diode Thermal Resistance: Junction-to-Case			0.23	$^{\circ}\text{C}/\text{W}$

IGBT, Brake-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	$T_C=100^{\circ}\text{C}$	100	A
		$T_C=25^{\circ}\text{C}$	200	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	200	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^{\circ}\text{C}$ $T_{Jmax}=175^{\circ}\text{C}$	722	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	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$		5.0	5.5	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=100\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$		1.70	2.10	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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$				± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$			8.03		nF
C_{oes}	Output Capacitance				1.22		nF
C_{res}	Reveres Transfer Capacitance				0.59		nF



Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =100A, R _{Gon} =4.7Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		248		ns	
			T _J =125℃		253			
			T _J =150℃		262			
t _r	Rise Time		T _J =25℃		107		ns	
			T _J =125℃		114			
			T _J =150℃		115			
t _{d(off)}	Turn-off Delay Time		V _{CC} =600V, I _C =100A, R _{Goff} =4.7Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		275		ns
				T _J =125℃		288		
				T _J =150℃		303		
t _f	Fall Time	T _J =25℃			187		ns	
		T _J =125℃			297			
		T _J =150℃			357			
E _{on}	Turn-on Switching Loss	T _J =25℃			4.00		mJ	
		T _J =125℃			6.01			
		T _J =150℃			7.01			
E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =100A, R _{Goff} =4.7Ω, V _{GE} =±15V, du/dt=3620V/μs(T _J =150℃), Inductive Load	T _J =25℃		5.80		mJ	
		T _J =125℃		8.70				
		T _J =150℃		9.50				
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25℃		745		nC	
R _{g internal}	Internal Gate Resistance		T _J =25℃		7.5		Ω	
I _{SC}	Vcc=600V, tp=10us, Vge=+/-15V, T _J =25℃				575		A	
RθJC	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.21	℃/W	

Diode, Brake-Chopper

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ C$	1200	V
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	50	A
I_{FM}	Repetitive Peak Forward Current	$t_p=1ms$	100	A



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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =50A	T _J =25°C		1.70		V
			T _J =125°C		1.80		
			T _J =150°C		1.80		
t _{rr}	Reverse Recovery Time	I _F =50A, -diF/dt=1046A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		278		ns
			T _J =125°C		422		
			T _J =150°C		463		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		35.6		A
			T _J =125°C		42.5		
			T _J =150°C		43.1		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		4.4		μC
			T _J =125°C		8.0		
			T _J =150°C		9.2		
E _{rec}	Reverse Recovery Energy		T _J =25°C		1.56		mJ
			T _J =125°C		2.96		
			T _J =150°C		3.60		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per leg)					0.51	°C/W

Diode, Reverse Maximum Rated Values ($T_C=25^\circ\text{C}$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ\text{C}$	1200	V
I_F	Diode Continuous Forward Current	$T_C=100^\circ\text{C}$	10	A
I_{FM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	20	A



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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =10A	T _J =25°C		1.80		V
			T _J =125°C		1.90		
			T _J =150°C		1.90		
t _{rr}	Reverse Recovery Time	I _F =10A, -diF/dt=252A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		280		ns
			T _J =125°C		390		
			T _J =150°C		405		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		9.02		A
			T _J =125°C		10.43		
			T _J =150°C		11.52		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		1.34		μC
			T _J =125°C		2.12		
			T _J =150°C		2.58		
E _{rec}	Reverse Recovery Energy		T _J =25°C		0.47		mJ
			T _J =125°C		0.85		
			T _J =150°C		0.92		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per leg)					1.28	°C/W

Module

Symbol	Description	Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	2500			V
T_J	Maximum Junction Temperature	RMS, $f=50\text{Hz}$, 1minute			
		Chopper		+175	$^{\circ}\text{C}$
		Rectifier		+150	$^{\circ}\text{C}$
T_{JOP}	Maximum Operating Junction Temperature Range	-40		+150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-40		+125	$^{\circ}\text{C}$
CTI	Comparative Tracking Index	200			



R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.04	°C/W
T	Mounting Torque for Module Mounting	Screw M5--Mounting according to valid application note	3.0		6.0	N·m
G	Weight			200		g

Ordering Information Table

Device code

RD	200	RCU	180	T5	H
①	②	③	④	⑤	⑥

- ① - Rectifier Module
- ② - Rated Current (200=200A)
- ③ - Circuit Configuration (RCU=Rectifier+Chopper)
- ④ - Rated Voltage (180=1800V)
- ⑤ - Package Type
- ⑥ - Test Level (Pass the Important Reliability Test-Industrial Grade)

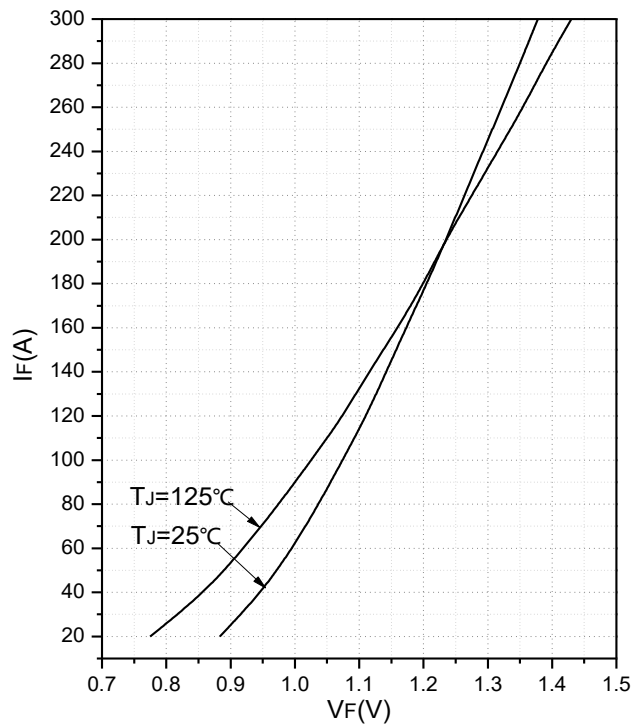


Fig.1 Forward Characteristics
(Rectifier Diode)

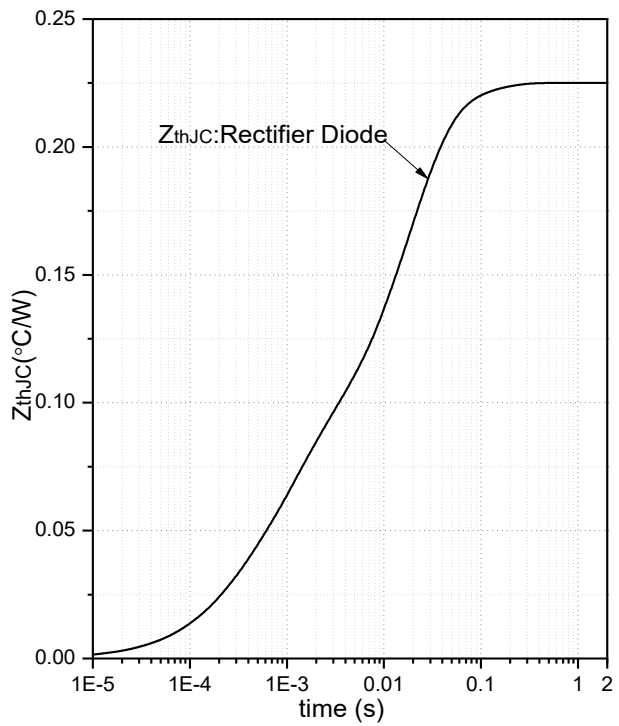


Fig.2 Transient Thermal Impedance
(Rectifier Diode)

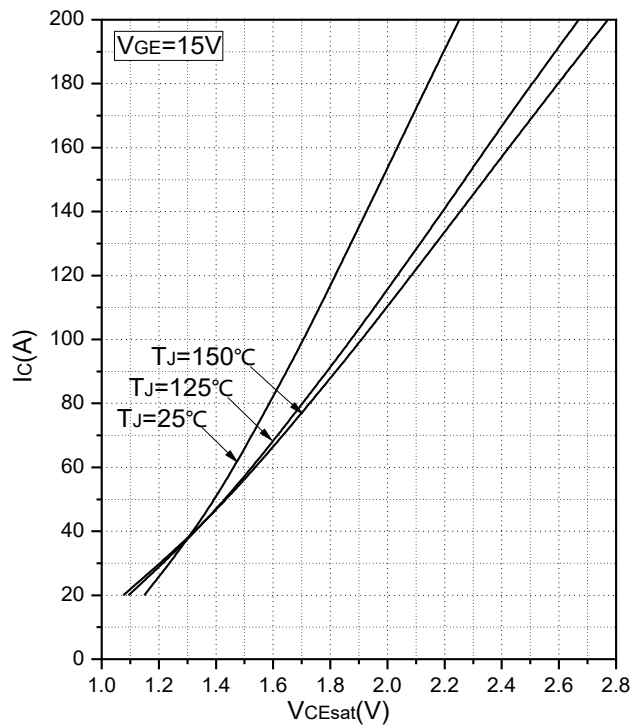


Fig.3 Typical Saturation Voltage Characteristics
(Brake-Chopper-IGBT)

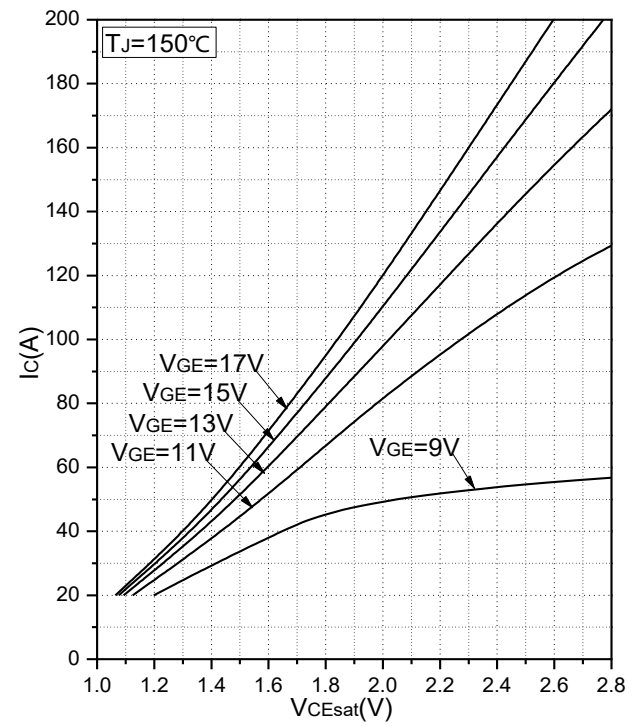


Fig.4 Typical Output Characteristics
(Brake-Chopper-IGBT)

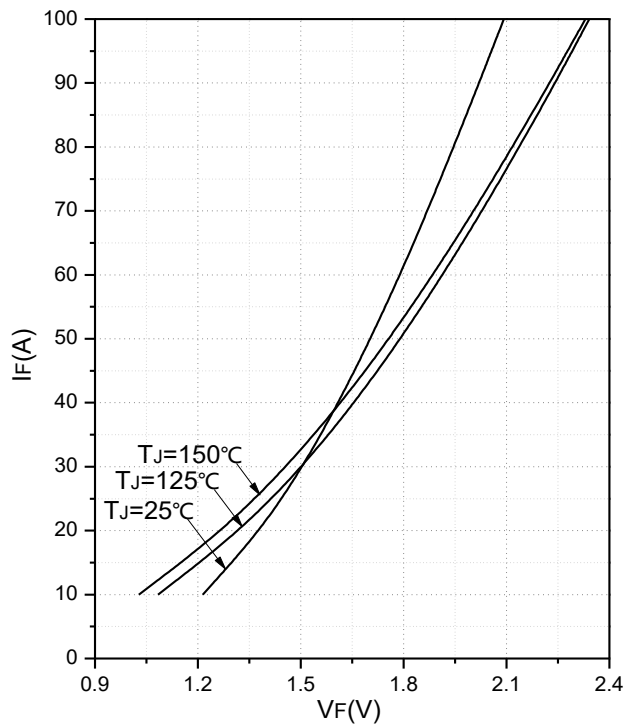


Fig.5 Forward Characteristics of Diode
(Brake-Chopper-Diode)

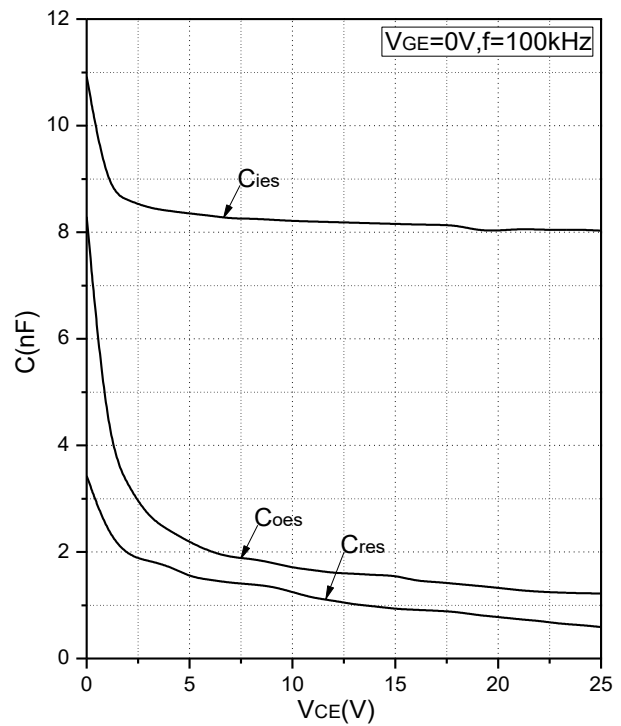


Fig.6 Capacitance Characteristics
(Brake-Chopper-IGBT)

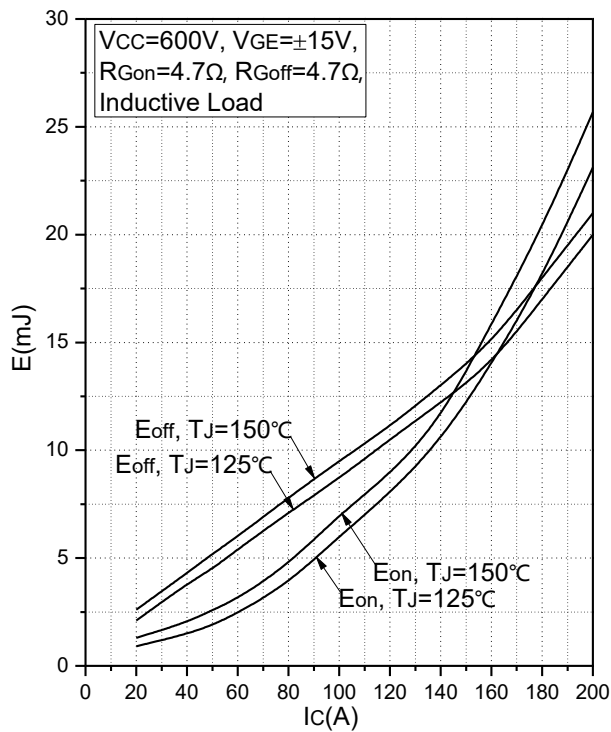


Fig.7 Typical Switching Loss vs. Collector Current
(Brake-Chopper-IGBT)

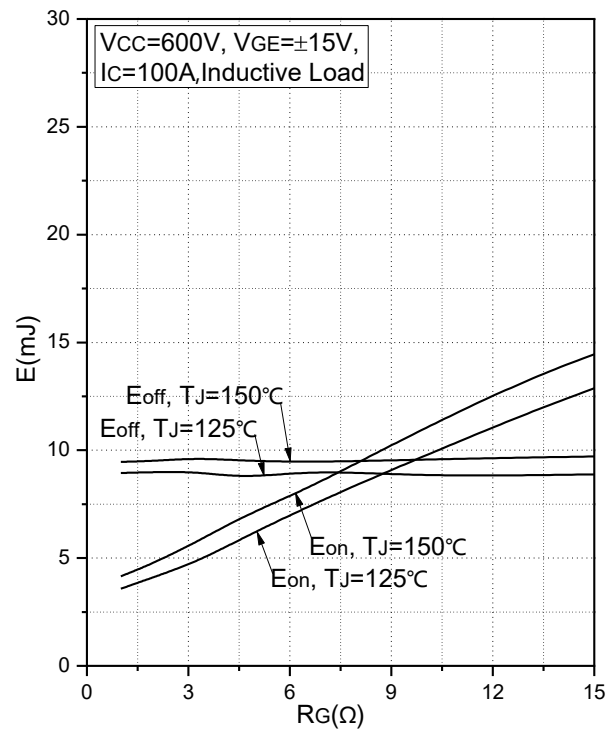


Fig.8 Typical Switching Loss vs. Gate Resistance
(Brake-Chopper-IGBT)

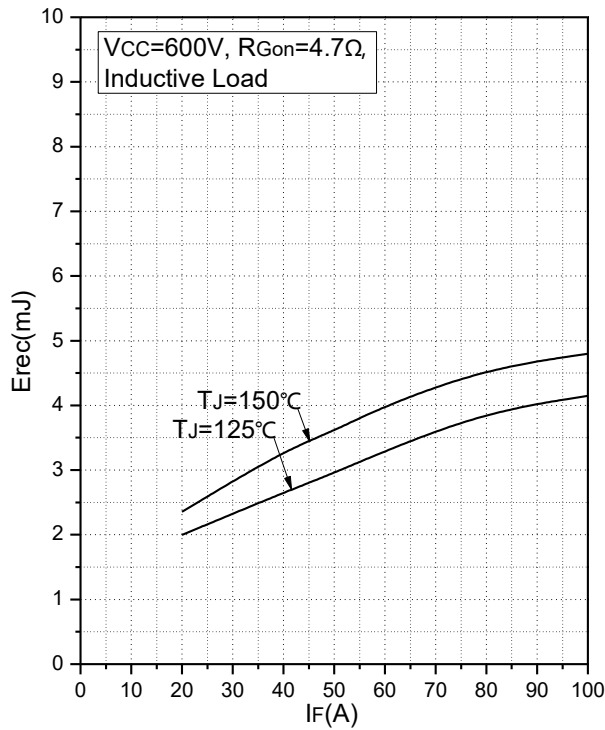


Fig.9 Typical Switching Loss vs. Forward Current (Brake-Chopper-Diode)

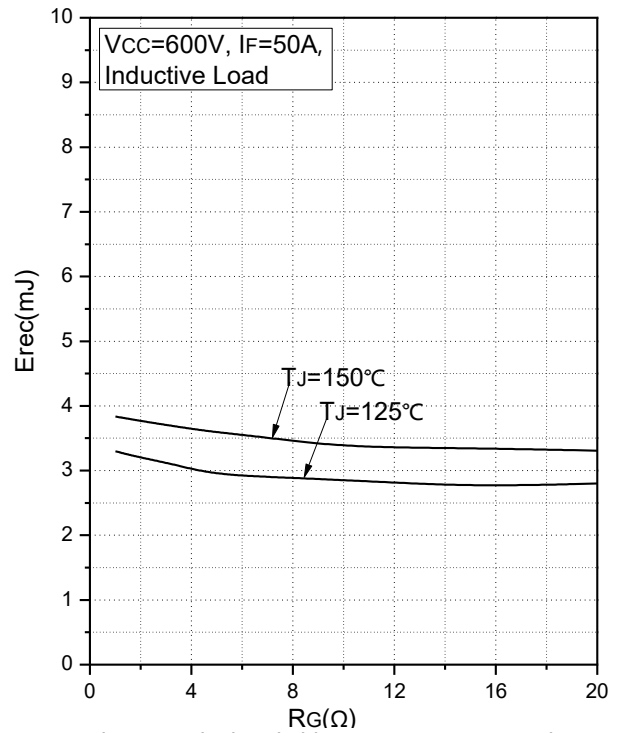


Fig.10 Typical Switching Loss vs. Gate Resistance (Brake-Chopper-Diode)

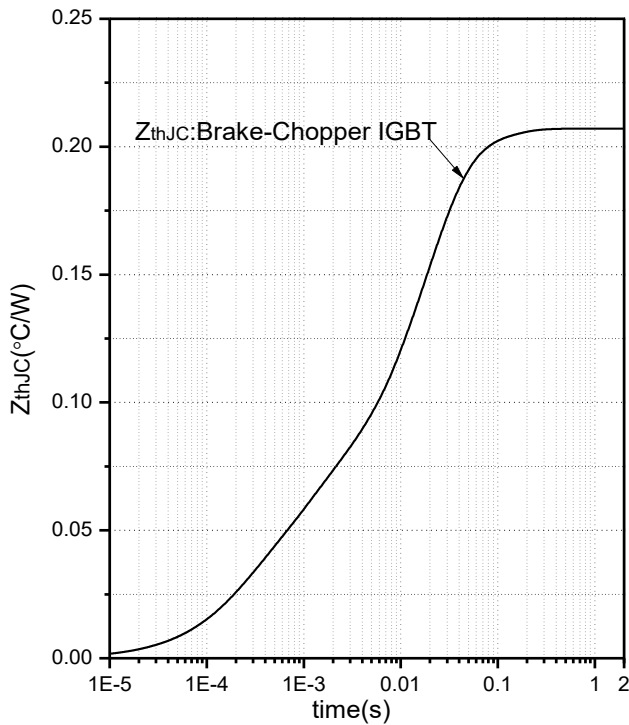


Fig.11 Transient Thermal Impedance (Brake-Chopper-IGBT)

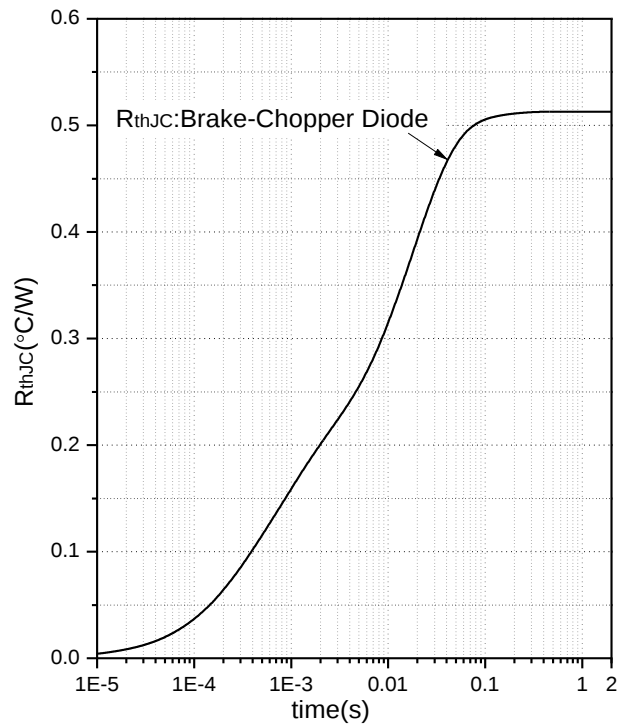


Fig.12 Transient Thermal Impedance (Brake-Chopper-Diode)

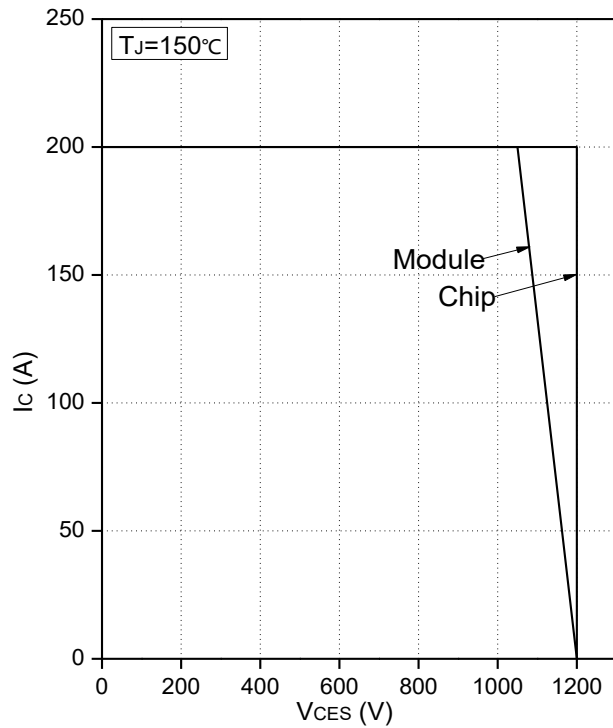


Fig.13 Reverse Bias Safe Operation Area (RBSOA)
(Brake-Chopper-IGBT)

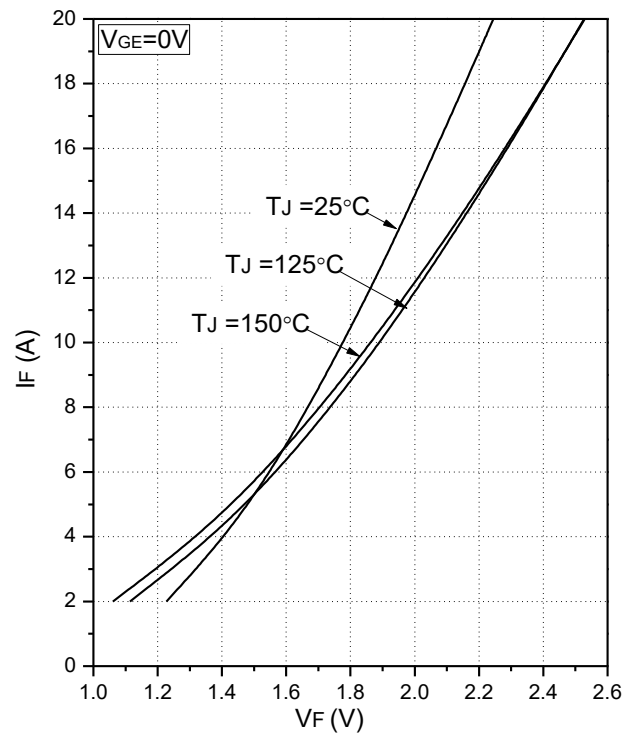


Fig.14 Forward Characteristics of Diode
(Reverse Diode)

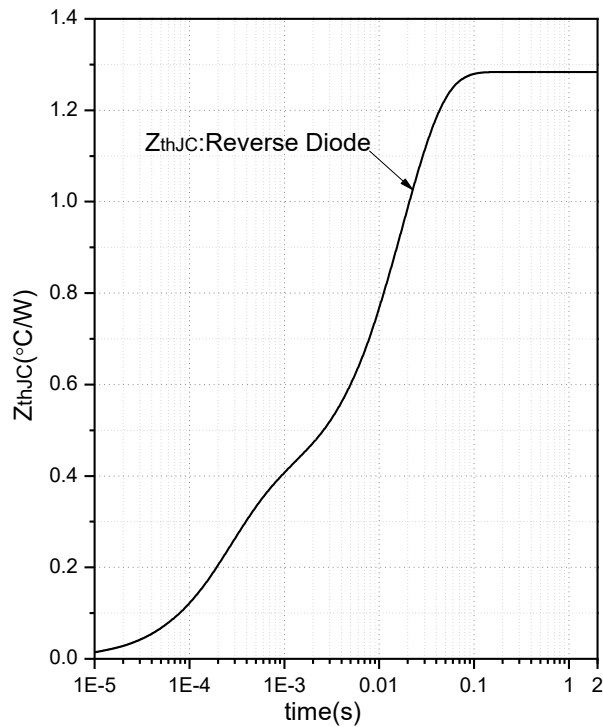
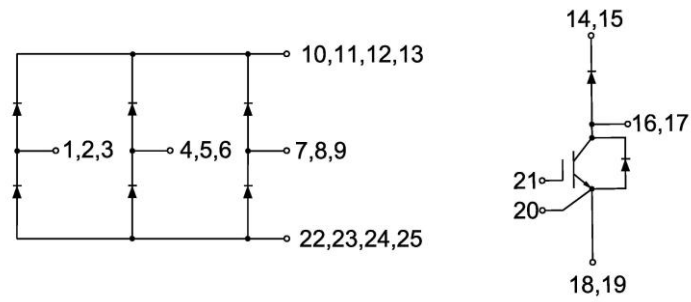


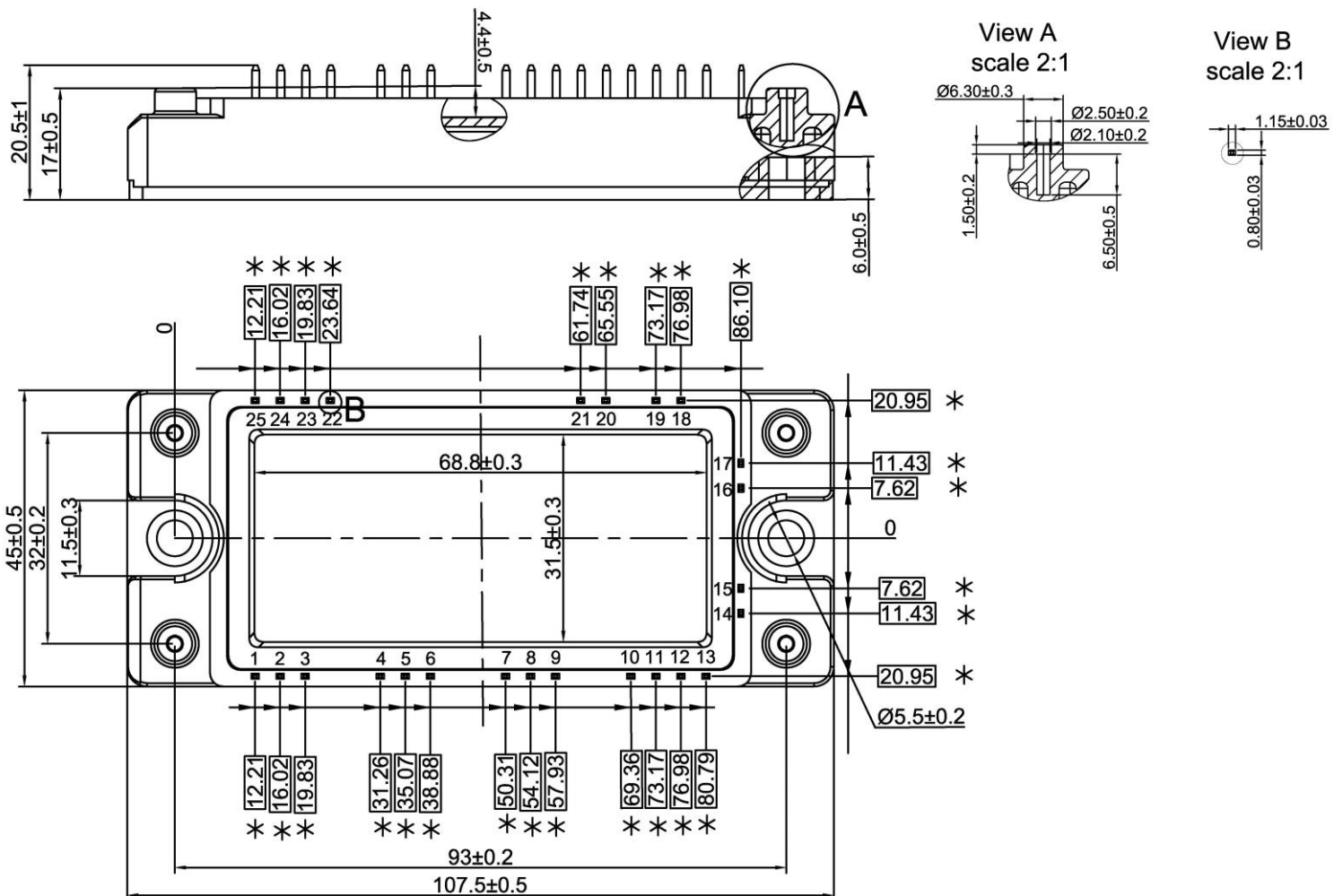
Fig.15 Transient Thermal Impedance
(Reverse Diode)



Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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