

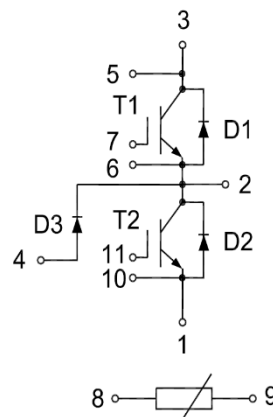
GT300MCR120T9H

Circuit Diagram

IGBT Module

Features:

- $V_{CES}=1200V$ $I_C=300A$ Trench & Field Stop IGBT Module
- Maximum Junction Temperature $-40 - +150^{\circ}C$
- Low Switching Loss
- 100% RBSOA Tested($2 \times I_C$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- 3-Level-Applications
- Energy Storage Application



Type	Package	Marking
GT300MCR120T9H	T9	GT300MCR120T9H

IGBT,(T1/T2)

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

Symbol	Description	Value	Units
V_{CES}	Collector-Emitter Blocking Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Continuous Collector Current, limited by T_{Jmax}	$T_C=90^{\circ}C$	300
		$T_C=25^{\circ}C$	600
I_{CM}	Peak Collector Current Repetitive	t_p limited by T_{Jmax}	600
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^{\circ}C, T_{Jmax}=150^{\circ}C$	1600

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

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Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=11.5mA$, $V_{CE}=V_{GE}$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=300A$, $V_{GE}=15V$	$T_J=25^{\circ}C$	2.10	2.50	V
			$T_J=125^{\circ}C$	2.88		V
			$T_J=150^{\circ}C$	3.02		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V$, $V_{CE}=1200V$, $T_J=25^{\circ}C$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=20V$, $V_{CE}=0V$, $T_J=25^{\circ}C$			400	nA
C_{ies}	Input Capacitance	$V_{CE}=25V$, $V_{GE}=0V$, $f=100kHz$		34.05		nF
C_{oes}	Output Capacitance			1.60		nF
C_{res}	Reverse Transfer Capacitance			0.03		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =300A, R _{Gon} =1Ω, R _{Goff} =2Ω V _{GE} =±15V, Inductive Load	T _J =25°C		134		ns
			T _J =125°C		149		
			T _J =150°C		152		
t _r	Rise Time		T _J =25°C		35		ns
			T _J =125°C		40		
			T _J =150°C		42		
t _{d(off)}	Turn-off Delay Time		T _J =25°C		183		ns
			T _J =125°C		211		
			T _J =150°C		217		
t _f	Fall Time	T _J =25°C		49		ns	
		T _J =125°C		67			
		T _J =150°C		72			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =300A, R _{Gon} =1Ω, R _{Goff} =2Ω V _{GE} =±15V, di/dt=5700A/μs(T _J =150°C) Inductive Load	T _J =25°C		13.5		mJ
		T _J =125°C		22.0			
		T _J =150°C		24.1			

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E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =300A, R _{Goff} =1Ω, R _{Goff} =2Ω V _{GE} =±15V, du/dt=9200V/μs(T _J =150°C) Inductive Load	T _J =25°C		10.8		mJ
			T _J =125°C		13.5		
			T _J =150°C		14.6		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		1.92		μC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		1.5		Ω
T _{SC}	V _{CC} =600V, V _{GE} =±15V, T _J =150°C ^{note1}					10	μs
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.078	°C/W
R _{θCS}	IGBT Thermal Resistance: Case-to-Sink (per IGBT) (per IGBT, λ _{grease} = 1 W/(m · K))				0.045		°C/W

note1: Short circuit withstand time cannot exceed 10μs under specified condition

Diode(D1/D2/D3)

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

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	t _p =1ms	600	A

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =300A	T _J =25°C		1.78	2.20	V
			T _J =125°C		1.93		
			T _J =150°C		1.93		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=7300A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		240		ns
			T _J =125°C		367		
			T _J =150°C		415		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		308		A
			T _J =125°C		316		
			T _J =150°C		320		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		25.7		μC
			T _J =125°C		39.9		
			T _J =150°C		44.5		

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E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt=7300A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		10.3		mJ
			T _J =125°C		16.4		
			T _J =150°C		18.5		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.163	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.093		°C/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R ₂₅	T _C =25°C		5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =465Ω	-5		+5	%
P ₂₅	T _C =25°C			10	mW
B _{25/50}	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]		3380		K
B _{25/80}	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]		3440		K
B _{25/100}	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ -1/(298.15K))]		3545		K

Module

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s	3400			V
T _J	Maximum Junction Temperature		-40		150	°C
T _{JOP}	Maximum Operating Junction Temperature Range ^{note1}		-40		150	°C
T _{stg}	Storage Temperature		-40		125	°C
CTI	Comparative Tracking Index		200			
M	Power Terminals Screw:M6		4		5	N·m
M	Mounting Screw:M5		3		6	N·m
G	Weight			330		g

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IGBT Module Datasheet



Ordering Information Table

Device code

G	T	300	MCR	120	T9	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (300=300A)
- ④ - Circuit Configuration: MCR(Emitter Controlled HE Diode)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Characteristic diagram

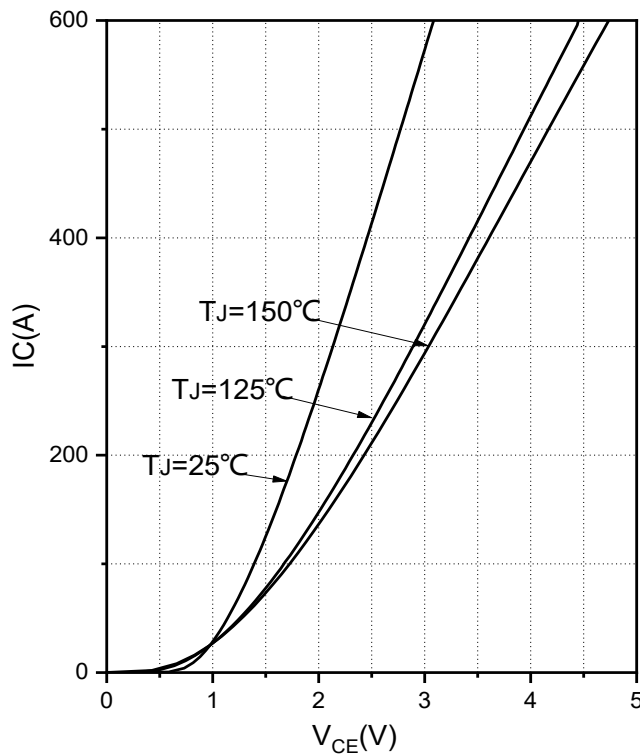


Fig.1 Typical Saturation Voltage Characteristics(T1,T2)

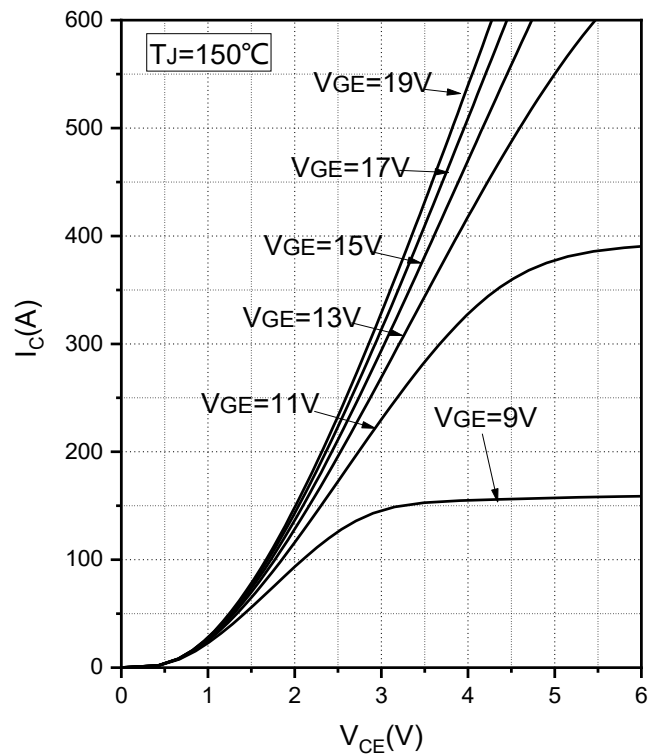


Fig.2 Typical Output Characteristics(T1,T2)

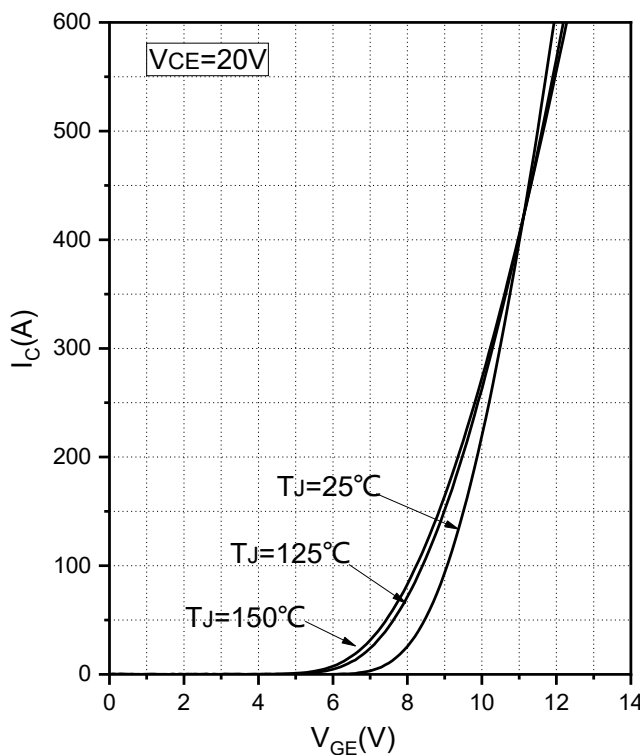


Fig.3 Transfer Characteristic(T1,T2)

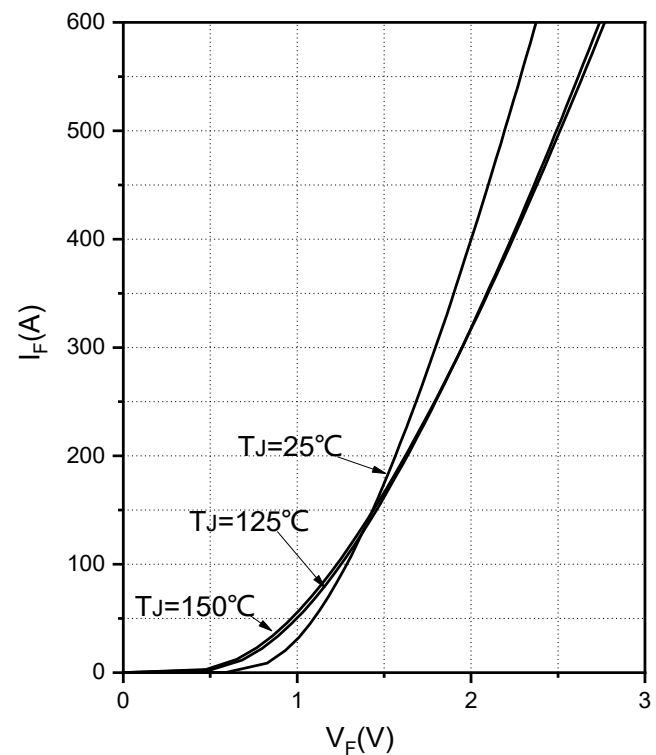


Fig.4 Forward Characteristics of Diode(D1,D2,D3)

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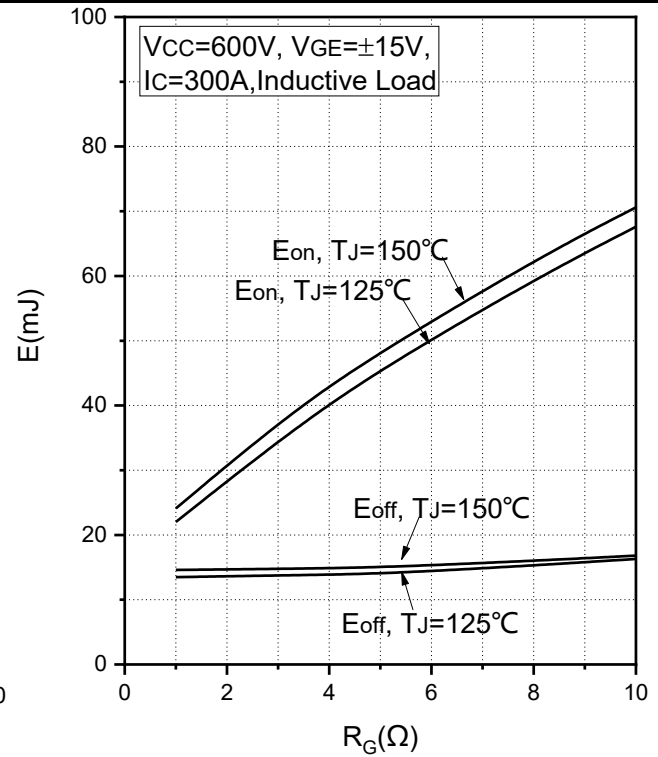
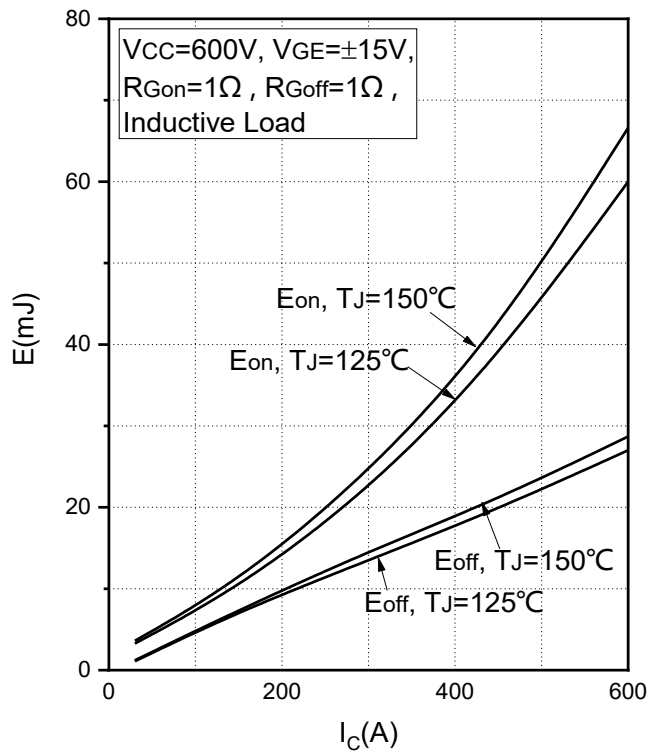


Fig.5 Typical Switching Loss vs. Collector Current (T1, T2)

Fig.6 Typical Switching Loss vs. Gate Resistance (T1/T2)

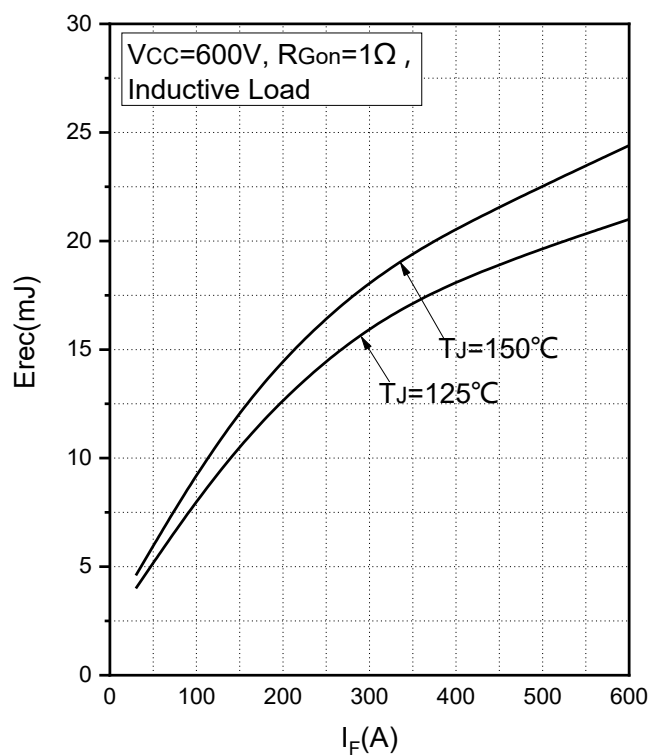


Fig.7 Typical Switching Loss vs. Forward Current (D1/D2/D3)

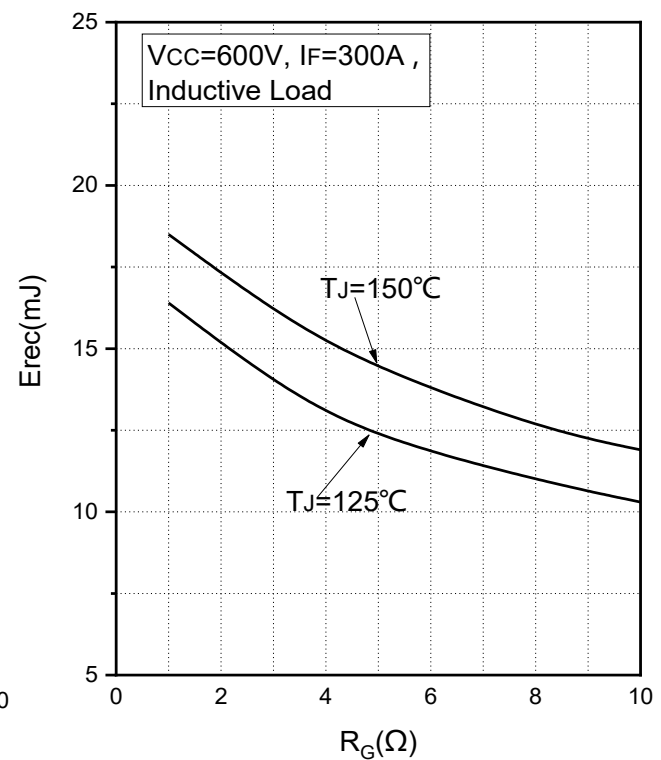


Fig.8 Typical Switching Loss vs. Gate Resistance (D1/D2/D3)

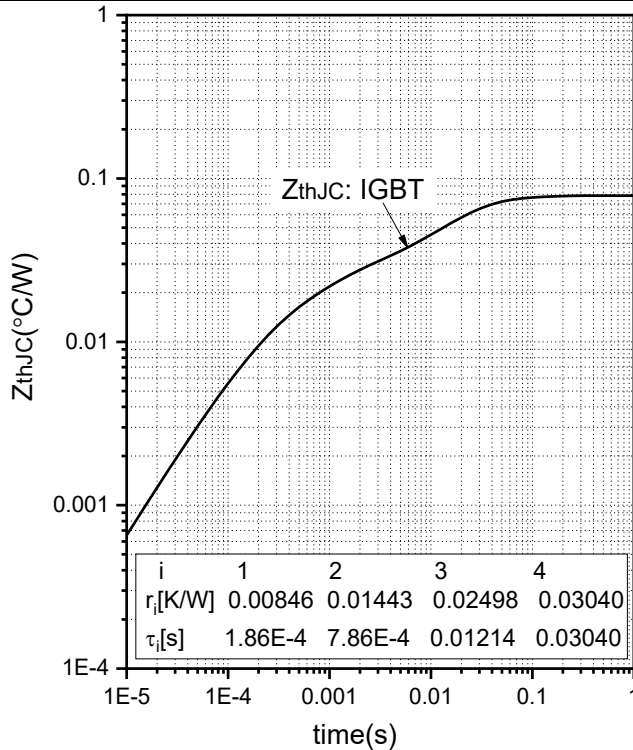


Fig.9 Transient Thermal Impedance (IGBT)(T1/T2)

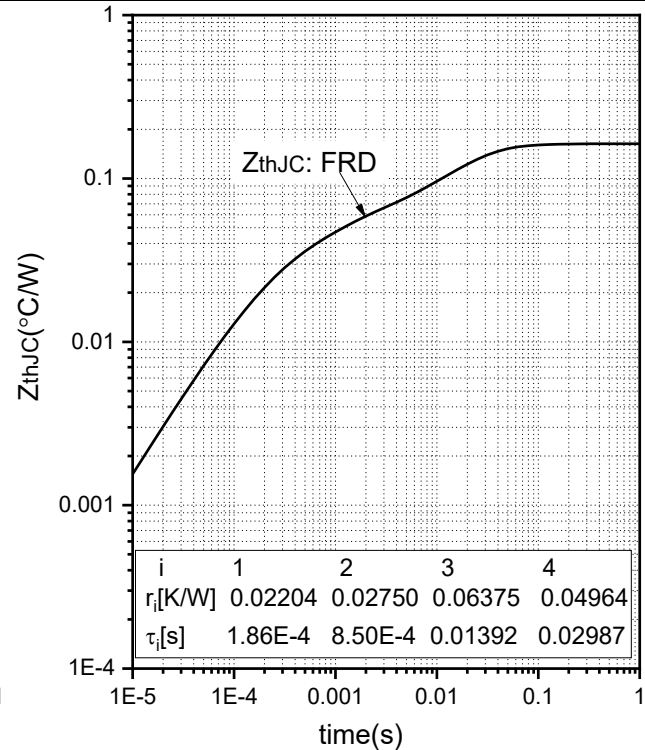


Fig.10 Transient Thermal Impedance (Diode)(D1/D2/D3)

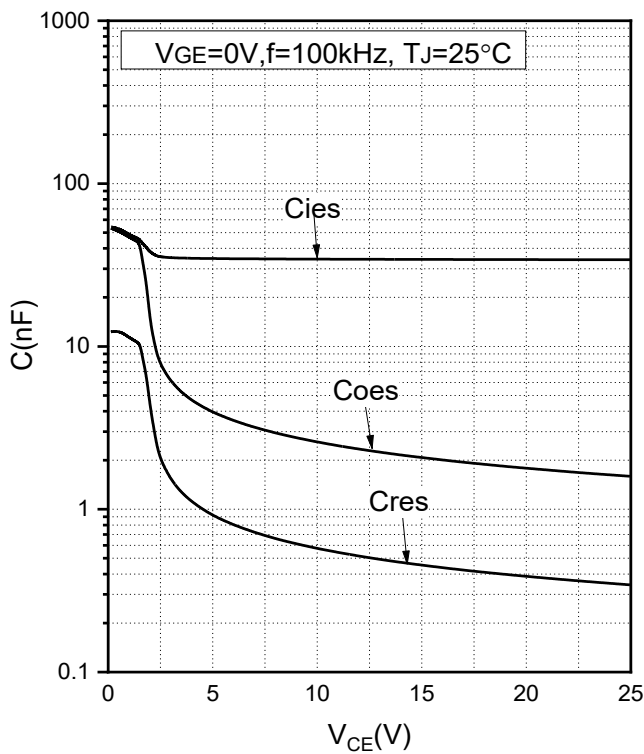


Fig.11 Capacitance Characteristics(T1/T2)

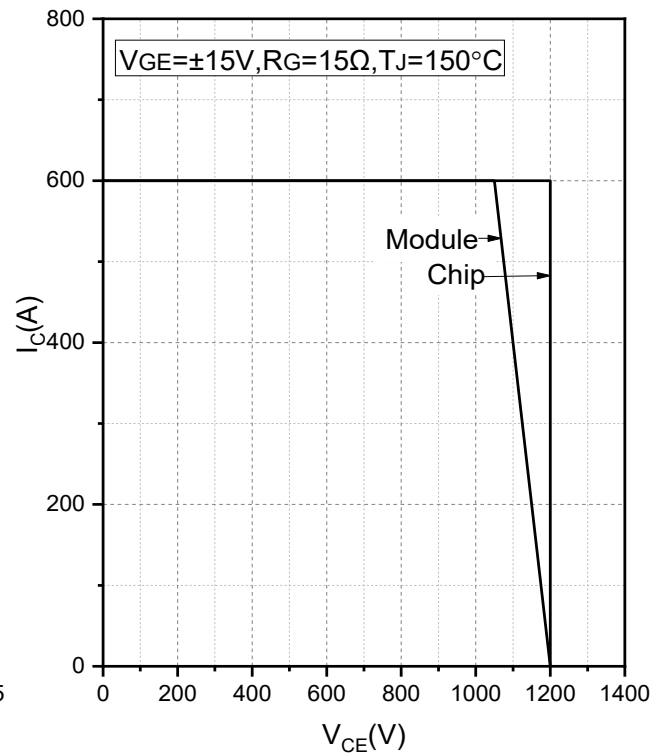


Fig.12 Reverse Bias Safe Operation Area (RBSOA)(T1/T2)

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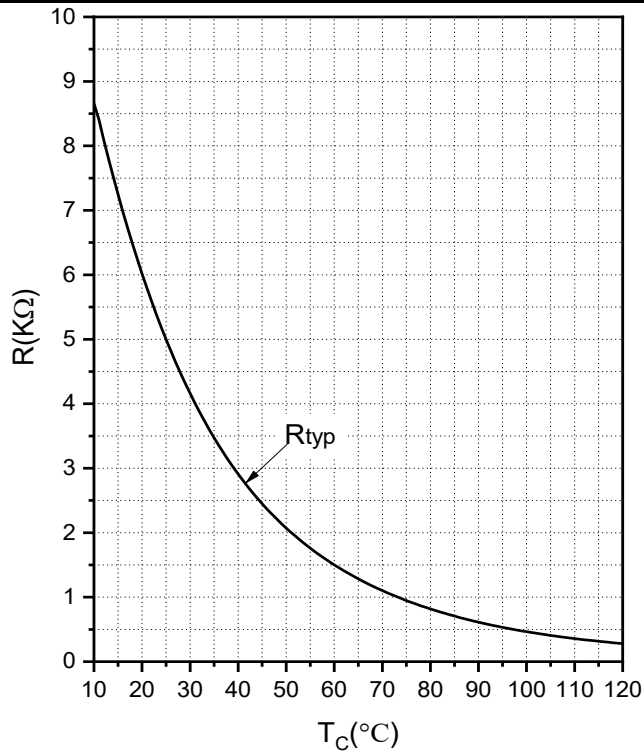


Fig.13 NTC Temperature Characteristics

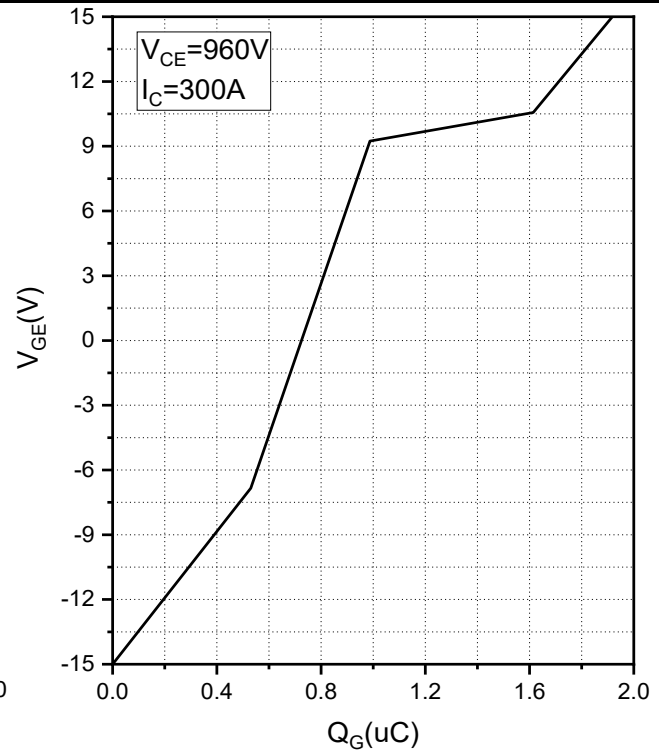
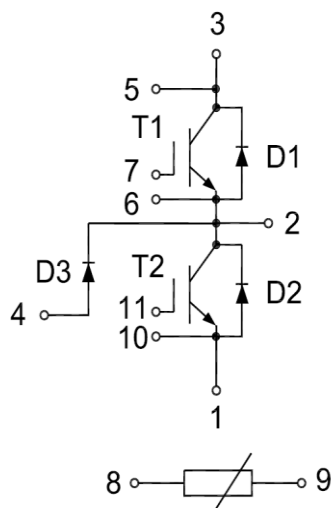


Fig.14 Gate Charge Characteristics(T1/T2)

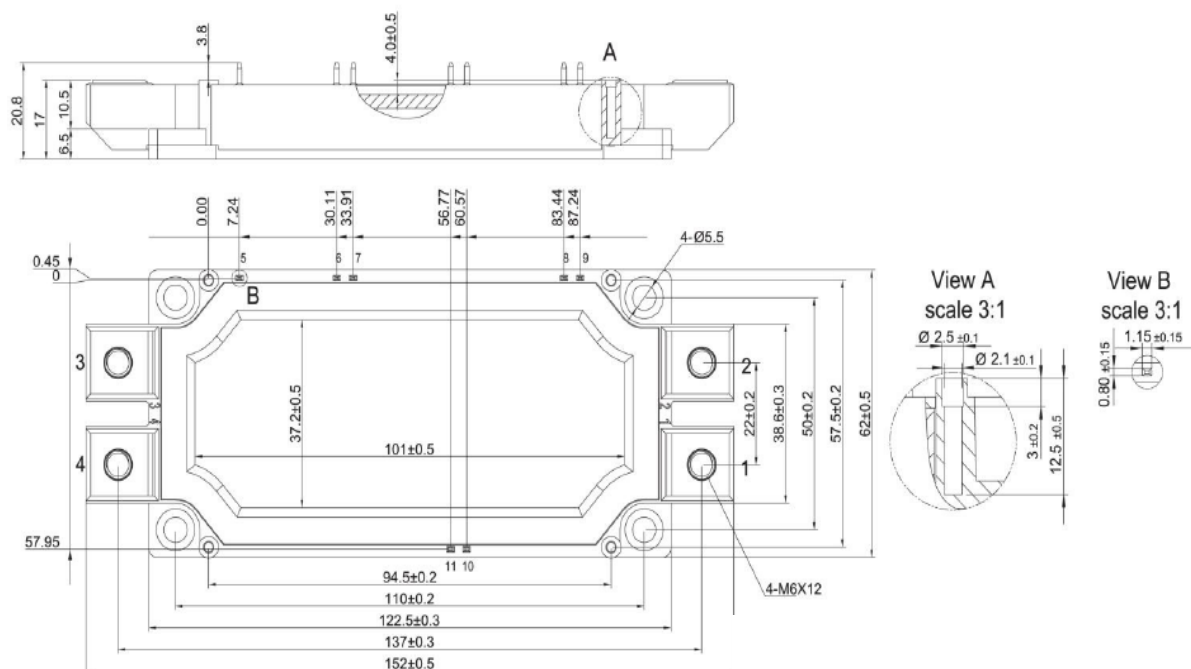
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Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
02	Engineering Sample Datasheet

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