



GT200TL65T2SH

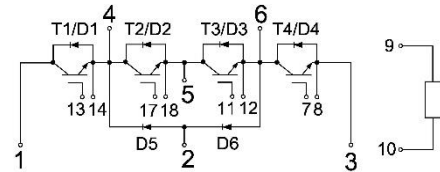
IGBT Module

Preliminary Data

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated $>6\mu\text{s}$
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- 3-Level-Applications

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c=100^\circ\text{C}$	200	A
		$T_c=25^\circ\text{C}$	237	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	400	A
P_D	Maximum Power Dissipation per IGBT	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	710	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	$I_C=3.2\text{mA}$, $V_{CE}=V_{GE}$	4.0	4.7	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=200\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.50	1.80	V
			$T_J=125^{\circ}\text{C}$	1.70		V
			$T_J=150^{\circ}\text{C}$	1.75		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		14.4		nF
C_{oes}	Output Capacitance			0.83		nF
C_{res}	Reveres Transfer Capacitance			0.29		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =300V, I _C =200A, R _G =4.7Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		171		ns
			T _J =125℃		177		
			T _J =150℃		185		
t _r	Rise Time		T _J =25℃		83		ns
			T _J =125℃		88		
			T _J =150℃		91		
t _{d(off)}	Turn-off Delay Time		T _J =25℃		181		ns
			T _J =125℃		184		
			T _J =150℃		189		
t _f	Fall Time		T _J =25℃		48		ns
			T _J =125℃		53		
			T _J =150℃		56		
E _{on}	Turn-on Switching Loss	V _{CC} =300V, I _C =200A, R _{Gon} =4.7Ω, V _{GE} =±15V, di/dt=813A/μs(T _J =150℃), Inductive Load	T _J =25℃		3.0		mJ
		T _J =125℃		3.3			
		T _J =150℃		3.5			



E _{off}	Turn-off Switching Loss	V _{CC} =300V, I _C =200A, R _{Goff} =4.7Ω, V _{GE} =±15V, du/dt=2124V/μs(T _J =150°C), Inductive Load	T _J =25°C		5.4		mJ
			T _J =125°C		6.0		
			T _J =150°C		6.2		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		988		nC
R _{G (int)}	Internal Gate Resistor				2		Ω
SCSOA	V _{CC} =300V, V _{GE} =±15V, T _J =150°C			6			μs
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.21	°C/W

Diode, Inverter (D1,D2,D3,D4)

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	650	V
I _F	Diode Continuous Forward Current	T _C =100°C	150	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	300	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 =150A	T _J =25℃		1.50		V
			T _J =125℃		1.50		
			T _J =150℃		1.50		
t _{rr}	Reverse Recovery Time	I _F =150A, -diF/dt=882A/μs(T _J =150℃), V _{rr} =300V, V _{GE} =-15V	T _J =25℃		123		ns
			T _J =125℃		166		
			T _J =150℃		178		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		45		A
			T _J =25℃		69		
			T _J =150℃		75		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		3.47		μC
			T _J =125℃		7.08		
			T _J =150℃		8.23		



E _{rec}	Reverse Recovery Energy	I _F =150A, -diF/dt=882A/μs(T _J =150°C), V _{rr} =300V, V _{GE} =-15V	T _J =25°C		0.64		mJ
			T _J =125°C		1.12		
			T _J =150°C		1.68		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.36	°C/W

Diode, 3-Level (D5,D6)

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	650	V
I _F	Diode Continuous Forward Current	T _C =100°C	200	A
I _{FM}	Diode Maximum Forward Current	tp=1ms	400	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 =200A	T _J =25℃		1.65		V
			T _J =125℃		1.70		
			T _J =150℃		1.70		
t _{rr}	Reverse Recovery Time	I _F =200A, -di _F /dt=1170A/μs(T _J =150℃), V _R =300V, V _{GE} =-15V	T _J =25℃		123		ns
			T _J =125℃		167		
			T _J =150℃		179		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		74		A
			T _J =125℃		97		
			T _J =150℃		105		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		5.44		μC
			T _J =125℃		10.03		
			T _J =150℃		11.66		
E _{rec}	Reverse Recovery Energy		T _J =25℃		0.96		mJ
			T _J =125℃		2.04		
			T _J =150℃		2.39		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.30	℃/W



Internal NTC-Thermistor Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
R ₂₅	T _C =25℃		5		kΩ
ΔR/R	T _C =100℃, R ₁₀₀ =465Ω	-5		5	%
P ₂₅	T _C =25℃			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		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T _{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.03	℃/W
T	Power Terminals Screw:M6		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			345		g

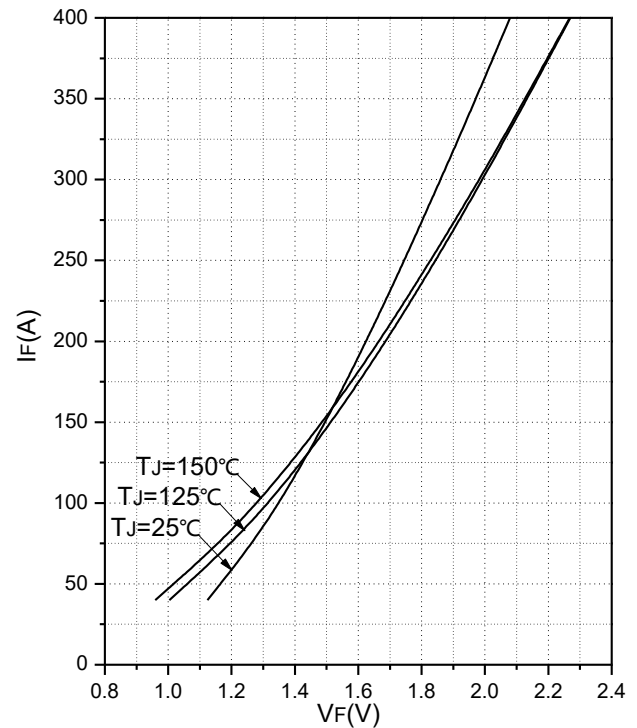
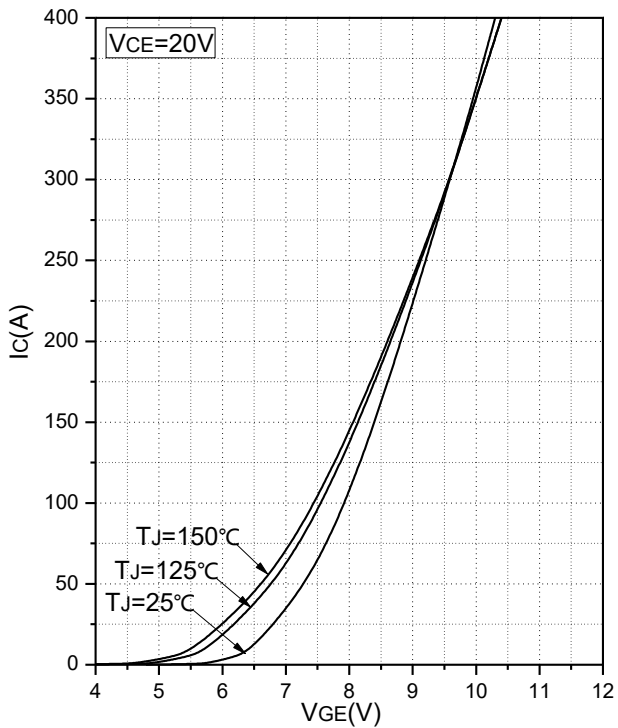
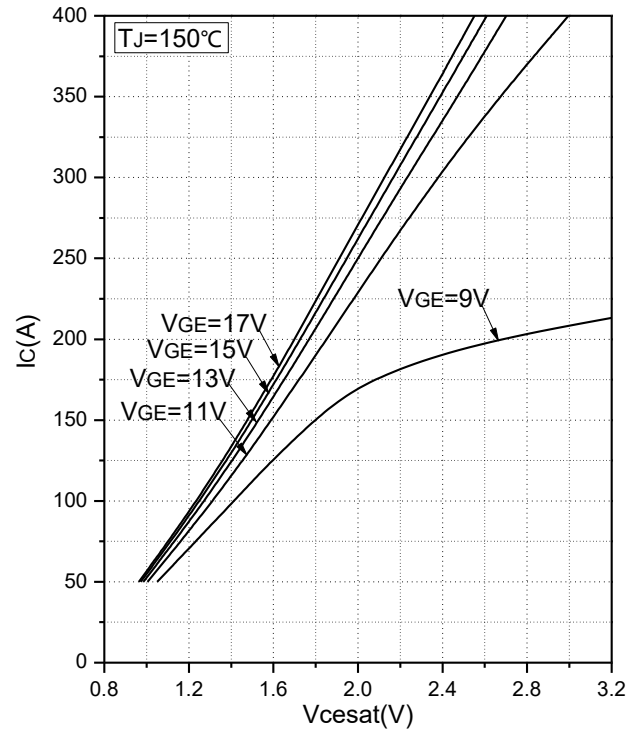
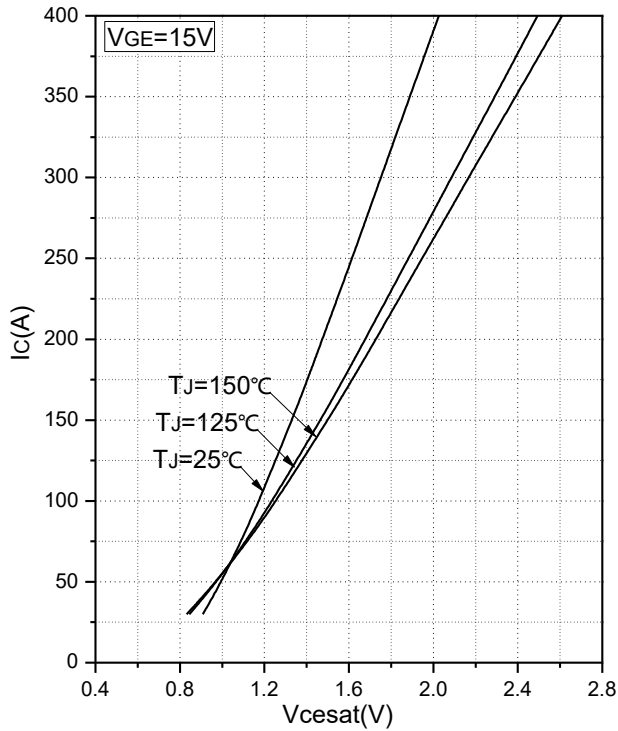


Ordering Information Table

Device code

G	T	200	TL	65	T2S	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (200=200A)
- ④ - Circuit Configuration: (Three Level, I Type)
- ⑤ - Rated Voltage (65=650V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



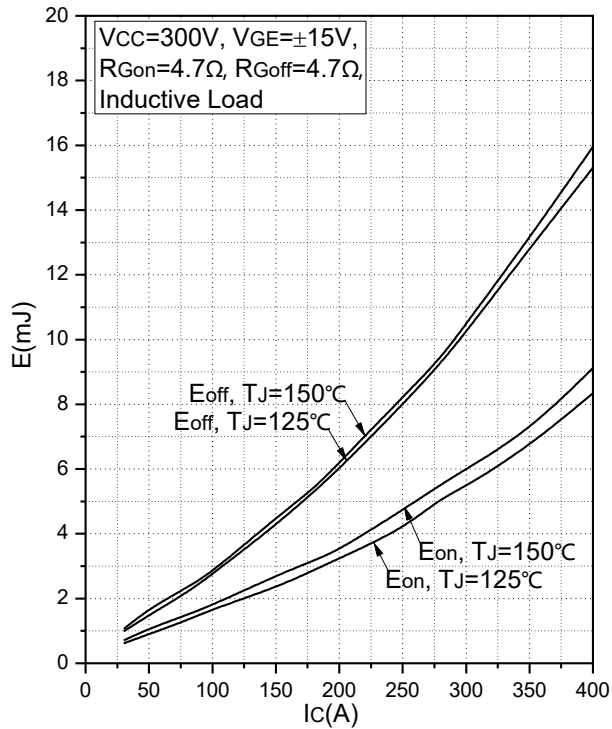


Fig.5 Typical Switching Loss vs. Collector Current (T1-T4)

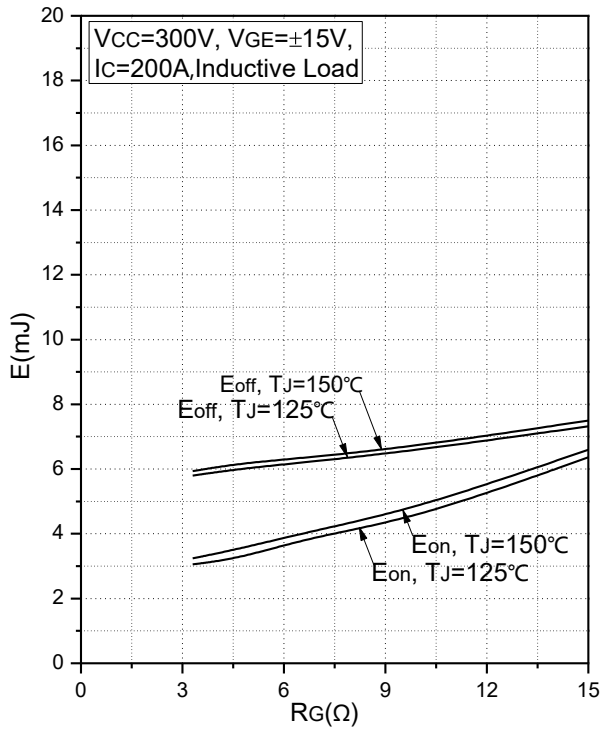


Fig.6 Typical Switching Loss vs. Gate Resistance (T1-T4)

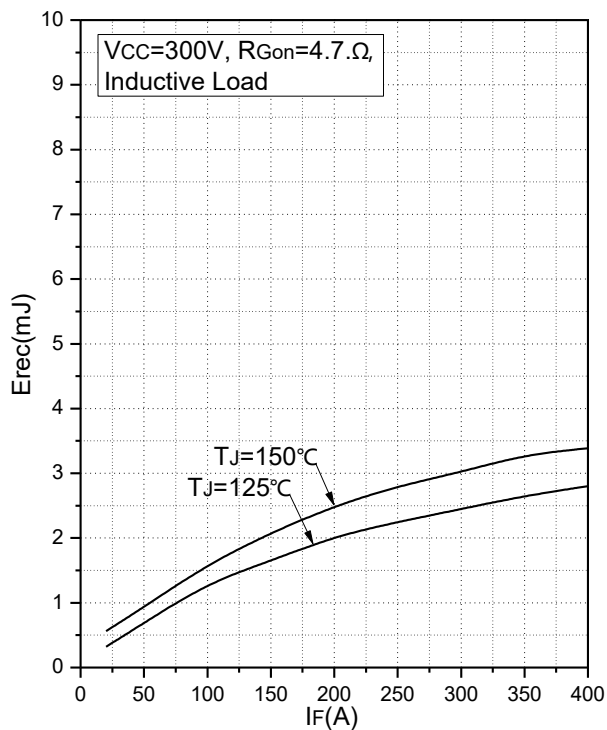


Fig.7 Typical Switching Loss vs. Forward Current (D5,D6)

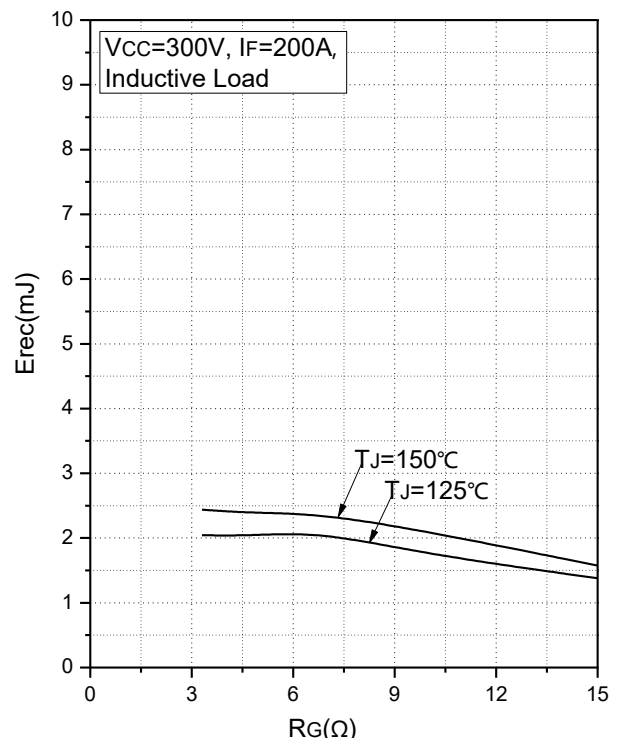


Fig.8 Typical Switching Loss vs. Gate Resistance (D5,D6)

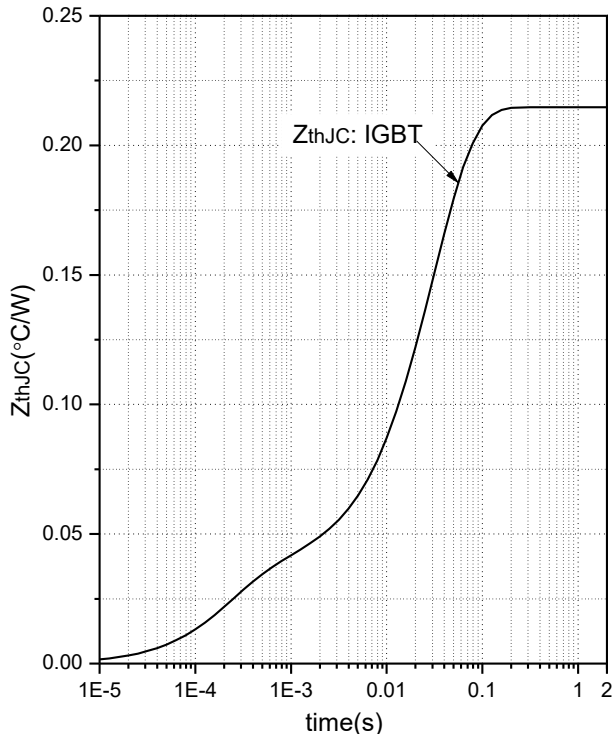


Fig.9 Transient Thermal Impedance(T1-T4)

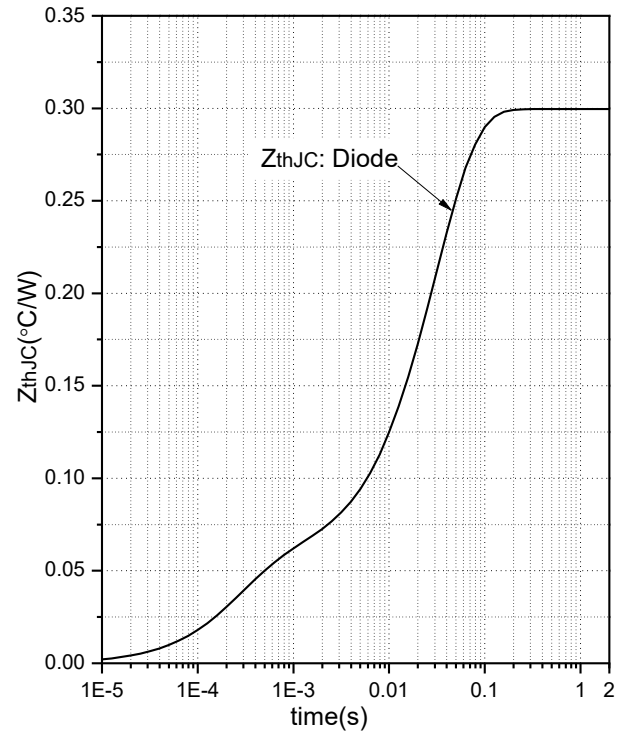


Fig.10 Transient Thermal Impedance (D5,D6)

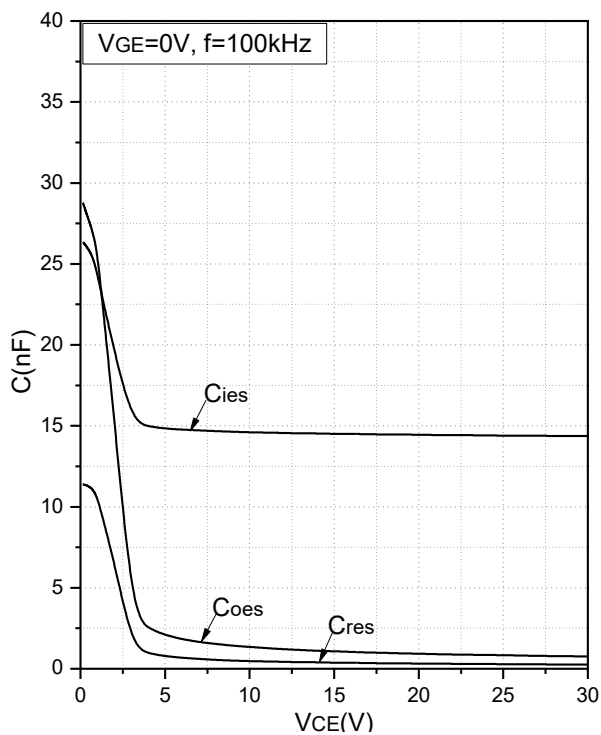


Fig.11 Capacitance Characteristics

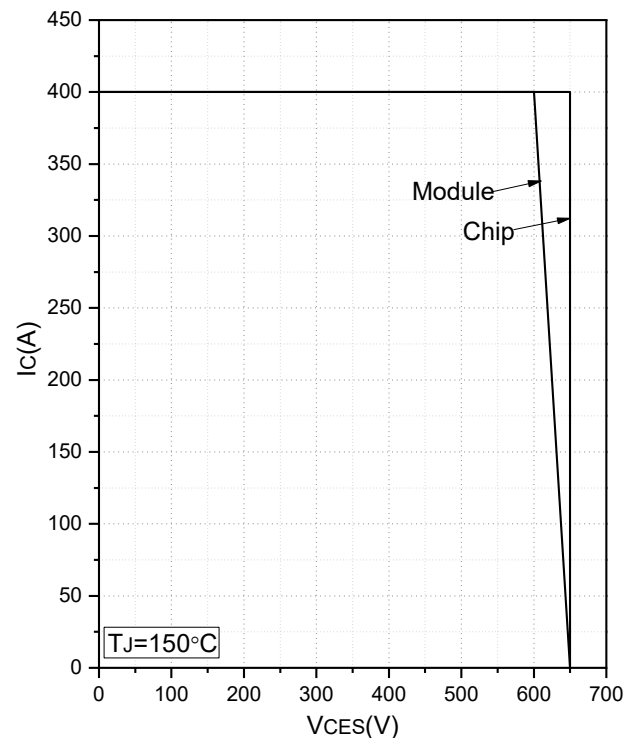


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

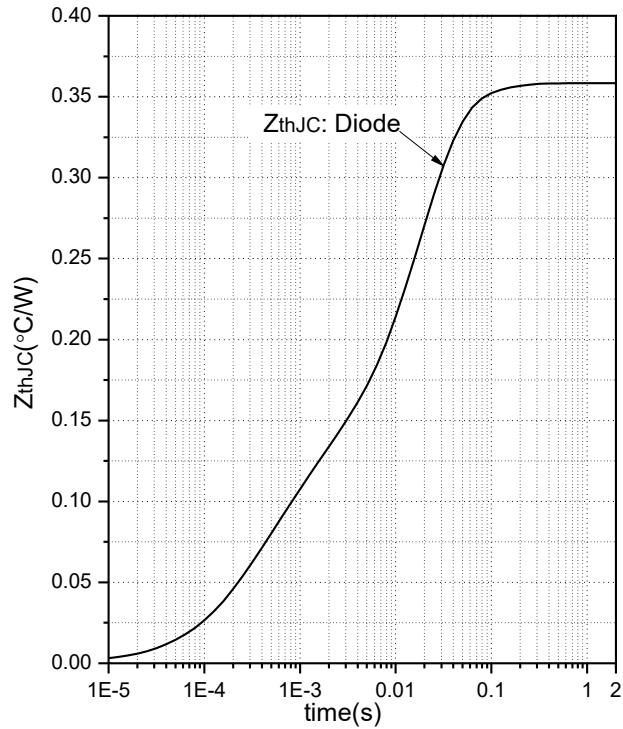


Fig.13 Transient Thermal Impedance (D1-D4)

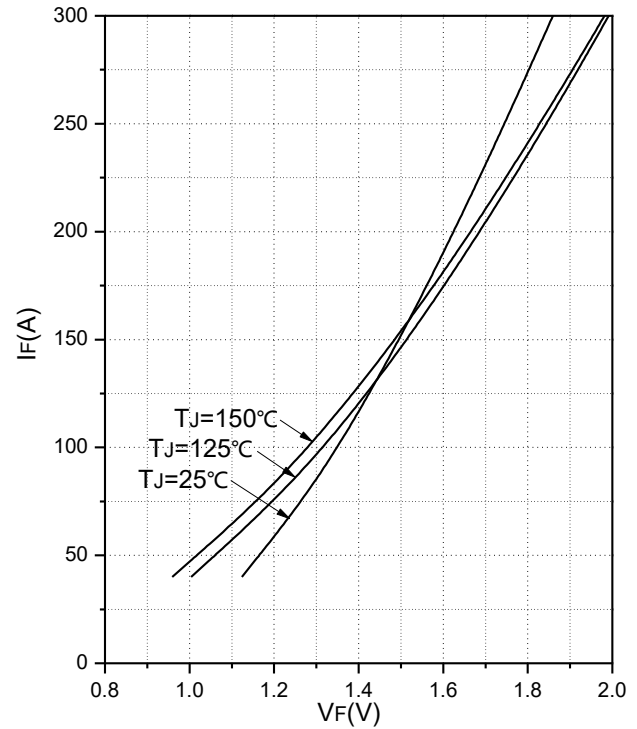


Fig.14 Forward Characteristics of Diode(D1-D4)

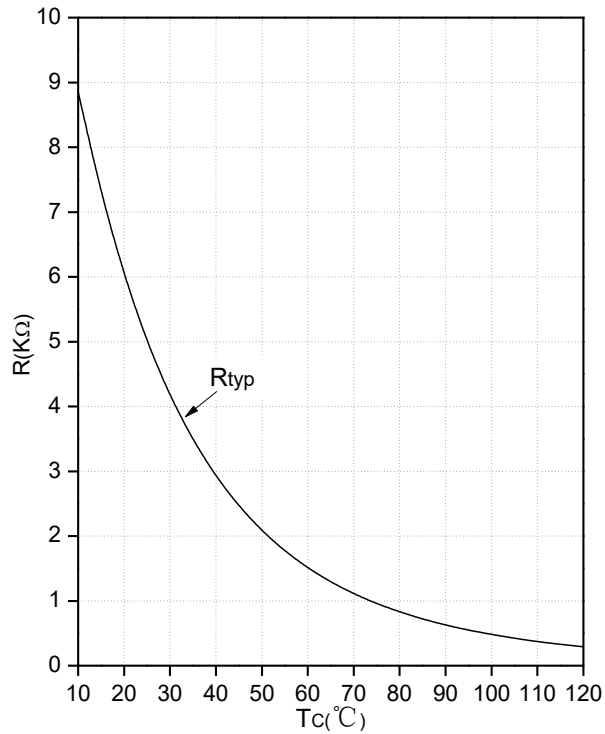


Fig.15 NTC Temperature Characteristics



Revision	Notes
01	Initial Release
02	Update Electrical Characteristics

Announcements

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The released datasheet would be issued with “REV.” + “alphabet characters”.