



GT150TL170T2SH

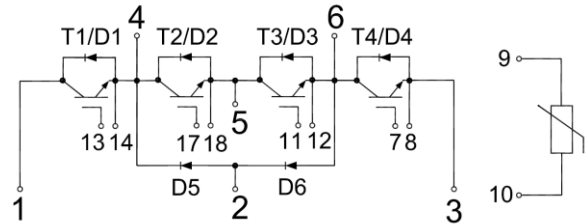
IGBT Module

Preliminary Data

Features:

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

Circuit Diagram



Applications:

- Solar Power
- 3-level-application
- UPS Systems

IGBT, T1/T2/T3/T4 Maximum Rated Values

V_{CES}	Collector-Emitter Blocking Voltage	$T_c=25^\circ\text{C}$	1700	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c=100^\circ\text{C}$	150	A
		$T_c=25^\circ\text{C}$	300	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	300	A
P_D	Maximum Power Dissipation (IGBT)	$T_c=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	1000	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1mA$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}C$	5.1	5.6	6.1	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150A$, $V_{GE}=15V$	$T_J=25^{\circ}C$	2.00	2.50	V
			$T_J=125^{\circ}C$	2.40		V
			$T_J=150^{\circ}C$	2.45		V
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	$V_{GE}=\pm 20V$, $V_{CE}=0V$, $T_J=25^{\circ}C$			± 400	nA
C_{ies}	Input Capacitance	$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$, $T_J=25^{\circ}C$		9.32		nF
C_{oes}	Output Capacitance			0.59		nF
C_{res}	Reverse Transfer Capacitance			0.34		nF

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =900V, I _C =150A, R _{Gon} =2Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		201		ns
			T _J =125℃		215		
			T _J =150℃		221		
t _r	Rise Time		T _J =25℃		66		ns
			T _J =125℃		73		
			T _J =150℃		74		
t _{d(off)}	Turn-off Delay Time	V _{CC} =900V, I _C =150A, R _{Goff} =2Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		178		ns
			T _J =125℃		253		
			T _J =150℃		253		
t _f	Fall Time		T _J =25℃		439		ns
			T _J =125℃		754		
			T _J =150℃		795		
E _{on}	Turn-on Switching Loss	V _{CC} =900V, I _C =150A, R _{Gon} =2Ω, V _{GE} =±15V, di/dt=1730A/μs(T _J =150℃), Inductive Load	T _J =25℃		8.8		mJ
			T _J =125℃		14.5		
			T _J =150℃		16.7		



E _{off}	Turn-off Switching Loss	V _{CC} =900V, I _C =150A, R _{Goff} =2Ω, V _{GE} =±15V, du/dt=2983A/μs(T _J =150°C), Inductive Load	T _J =25°C		23.4		mJ
			T _J =125°C		37.1		
			T _J =150°C		41.4		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		530		nC
R _{g internal}	Internal Gate Resistor		T _J =25°C		6		Ω
SCSOA	V _{CC} =900V, R _{Gon} =2Ω, R _{Goff} =2Ω, V _{GE} =+/-15V, T _J =125°C			10			μs
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case					0.15	°C/W

Diode, D1/D2/D3/D4 Maximum Rated Values

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1700	V
I _F	Diode Continuous Forward Current	T _C =100°C	150	A
I _{FM}	Peak FWD Current Repetitive	t _p =1ms	300	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =150A	T _J =25℃		2.15		V
			T _J =125℃		2.40		
			T _J =150℃		2.40		
I _{rr}	Peak Reverse Recovery Current	I _F =150A, -di _F /dt=2505A/μs(T _J =150℃), V _{rr} =900V, V _{GE} =-15V	T _J =25℃		160		A
			T _J =125℃		170		
			T _J =150℃		176		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		21.5		μC
			T _J =125℃		39.5		
			T _J =150℃		43.6		
E _{rec}	Reverse Recovery Energy		T _J =25℃		15.2		mJ
			T _J =125℃		27.9		
			T _J =150℃		30.8		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.23	℃/W



Diode, D5/D6

Maximum Rated Values

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^{\circ}\text{C}$	1700	V
I_F	Diode Continuous Forward Current	$T_C=100^{\circ}\text{C}$	150	A
I_{FM}	Peak FWD Current Repetitive	$t_p=1\text{ms}$	300	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =150A	T _J =25℃		2.15		V
			T _J =125℃		2.40		
			T _J =150℃		2.40		
I _{rr}	Peak Reverse Recovery Current	I _F =150A, -di _F /dt=2505A/μs(T _J =150℃), V _{rr} =900V, V _{GE} =-15V	T _J =25℃		160		A
			T _J =125℃		170		
			T _J =150℃		176		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		21.5		μC
			T _J =125℃		39.5		
			T _J =150℃		43.6		
E _{rec}	Reverse Recovery Energy		T _J =25℃		15.2		mJ
			T _J =125℃		27.9		
			T _J =150℃		30.8		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case					0.23	℃/W



Internal NTC-Thermistor Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Units
R ₂₅	T _C =25℃		5		kΩ
△R/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, 30s	4500			V
T _J	Maximum Junction Temperature				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		150	℃
T _{stg}	Storage Temperature		-40		150	℃
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.03	℃/W
M	Power Terminals Screw:M6		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			345		g



Ordering Information Table

Device code	G	T	150	TL	170	T2S	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Field Stop Trench Gate IGBT
- ③ - Rated Current (150=150A)
- ④ - Circuit Configuration: TL (Three Level)
- ⑤ - Rated Voltage (170=1700V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

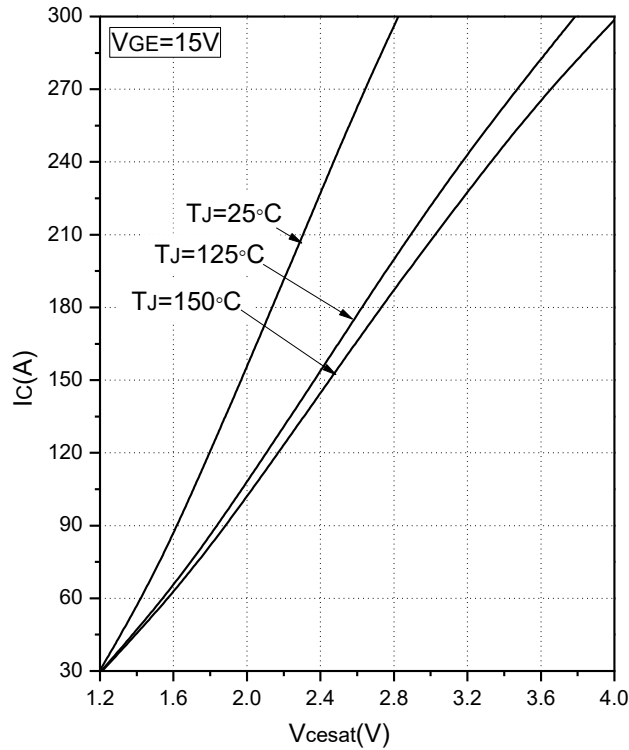


Fig.1 Typical Saturation Voltage Characteristics

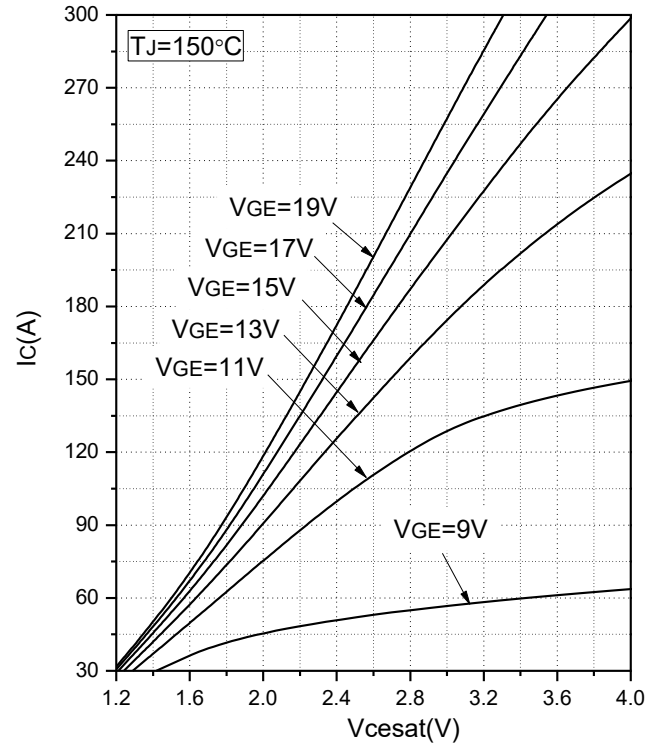


Fig.2 Typical Output Characteristics

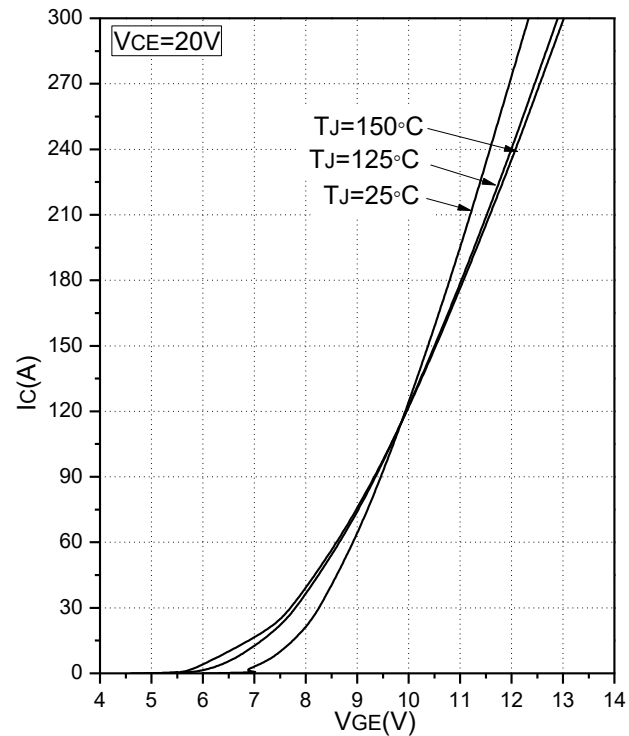


Fig.3 Transfer Characteristic

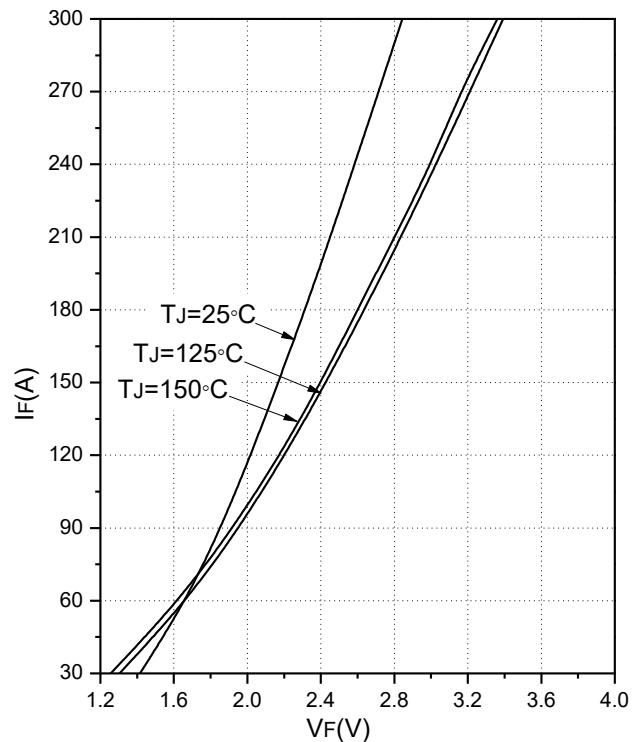


Fig.4 Forward Characteristics of Diode

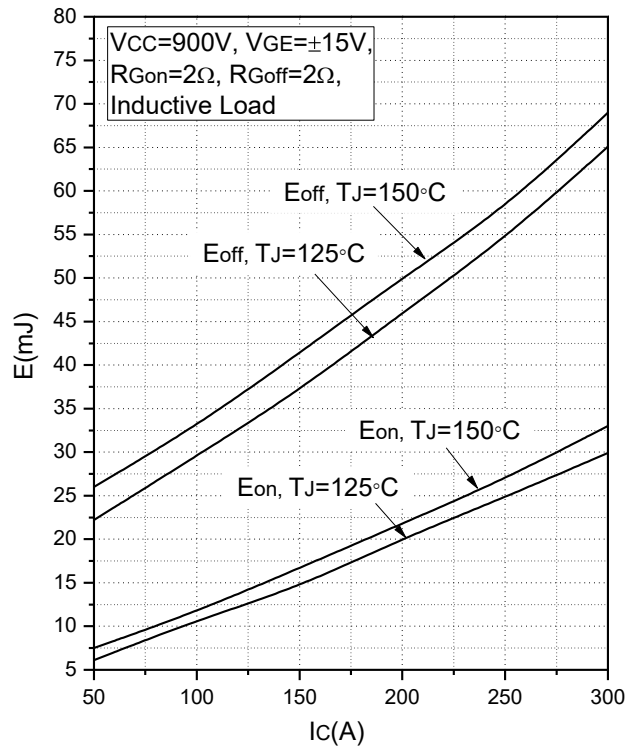


Fig.5 Typical Switching Loss vs. Collector Current

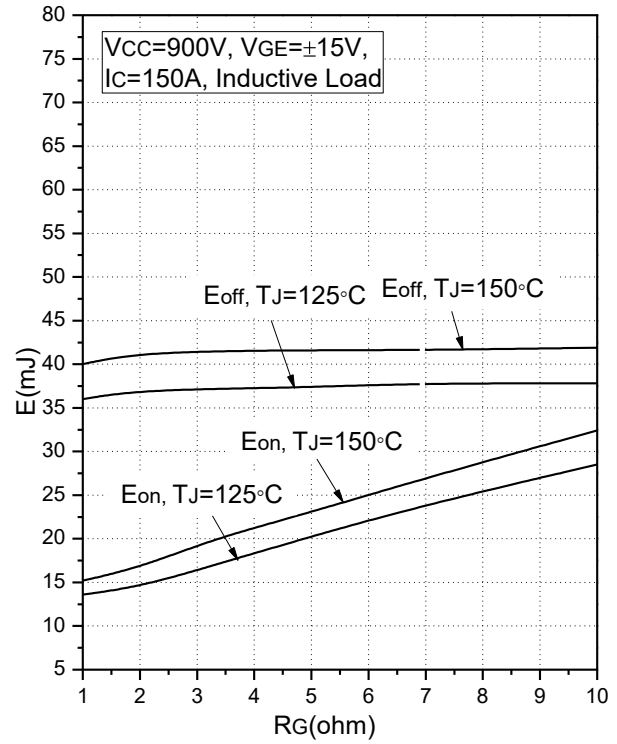


Fig.6 Typical Switching Loss vs. Gate Resistance

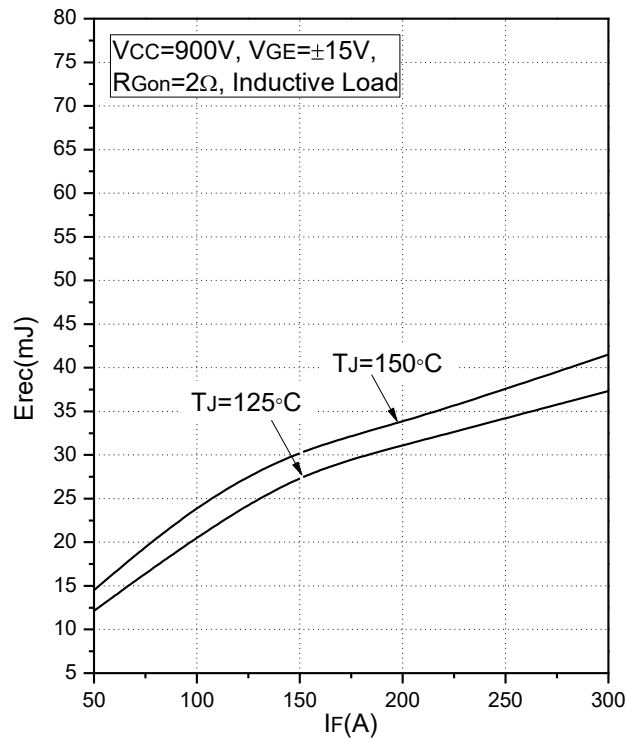


Fig.7 Typical Switching Loss vs. Forward Current

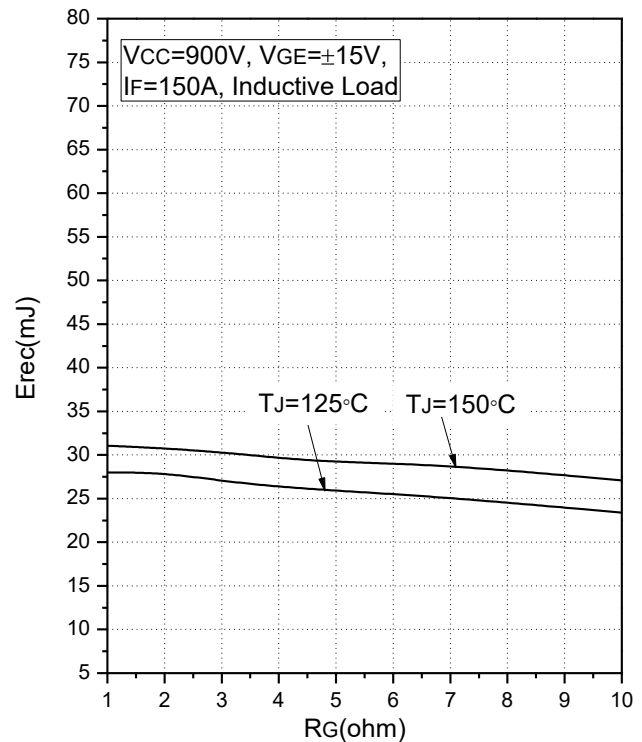


Fig.8 Typical Switching Loss vs. Gate Resistance

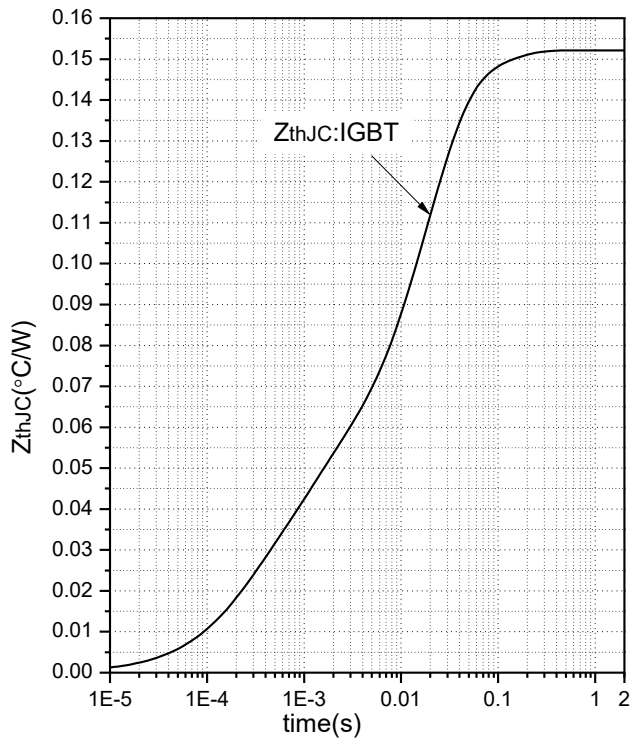


Fig.9 Transient Thermal Impedance (IGBT)

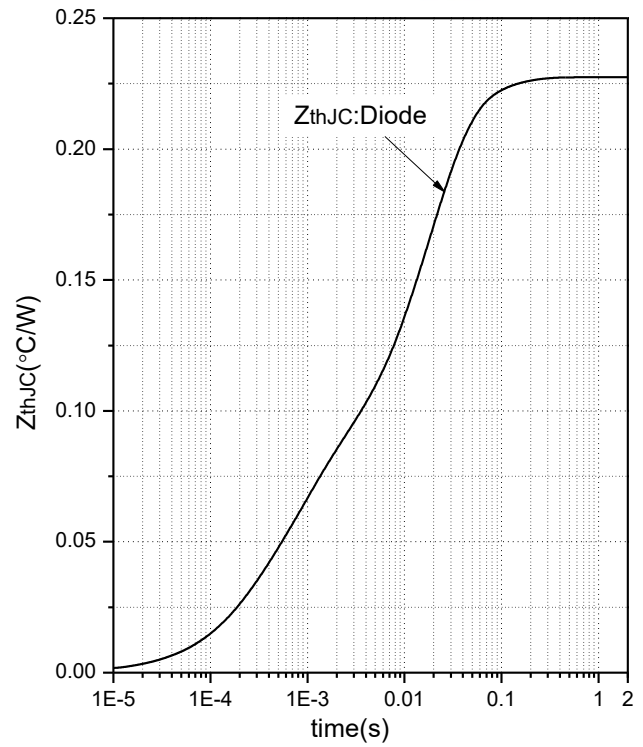


Fig.10 Transient Thermal Impedance (Diode)

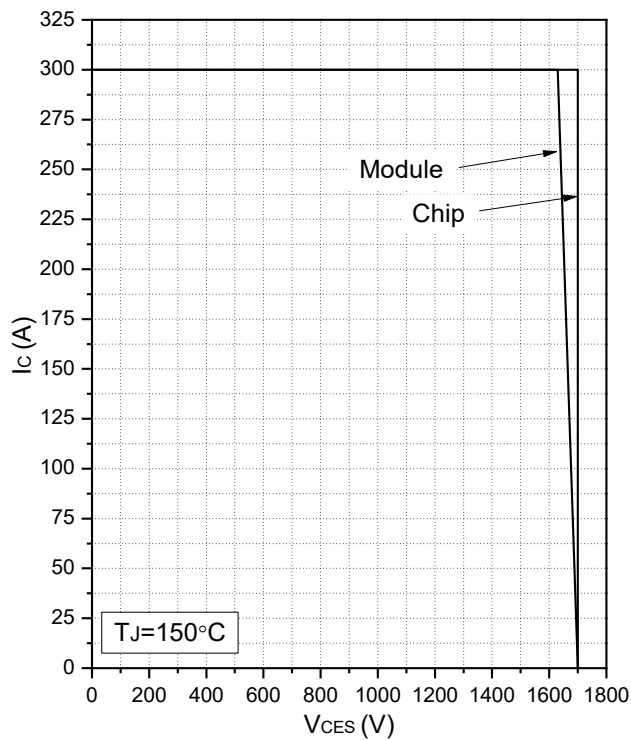


Fig.11 Reverse Bias Safe Operation Area (RBSOA)

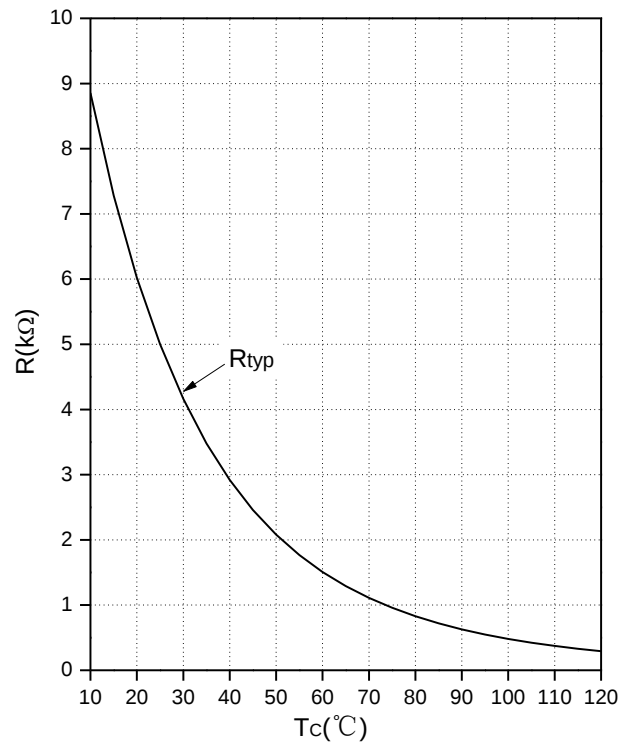


Fig.12 NTC Temperature Characteristics



Revision	Notes
01	Initial Release

Announcement

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