



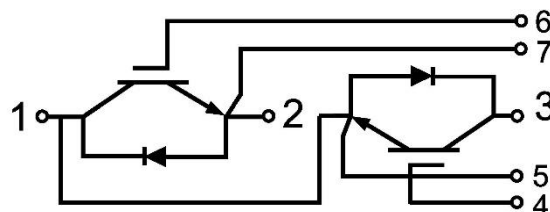
GF50HF120T1VH

IGBT Module

Preliminary Data

Features:

- Non Punch Through (NPT) Technology
- 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



Applications:

- Welding Machine、Cutting Machine
- Plating Power Supply、Induction Heating
- SMPS、UPS

IGBT, Inverter

Maximum Rated Values of 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	$T_c=80^\circ\text{C}$	50	A
		$T_c=25^\circ\text{C}$	70	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	100	A
P_D	Maximum Power Dissipation per IGBT	$T_c=25^\circ\text{C}$ $T_{Jmax}=150^\circ\text{C}$	477	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	$I_C=2\text{mA}$, $V_{CE}=V_{GE}$	4.8	5.7	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=50\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	3.50	4.00	V
			$T_J=125^{\circ}\text{C}$	4.20		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		3.77		nF
C_{oes}	Output Capacitance			0.34		nF
C_{res}	Reverse Transfer Capacitance			0.16		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=50A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		239		ns
			$T_J=125^{\circ}C$		258		
t_r	Rise Time		$T_J=25^{\circ}C$		58		ns
			$T_J=125^{\circ}C$		64		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=50A,$ $R_{Goff}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		337		ns
			$T_J=125^{\circ}C$		379		
t_f	Fall Time		$T_J=25^{\circ}C$		140		ns
			$T_J=125^{\circ}C$		173		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=50A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ $di/dt=630A/\mu s(T_J=125^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		3.0		mJ
			$T_J=125^{\circ}C$		3.9		
E_{off}	Turn-off Switching Loss	$V_{CC}=600V, I_C=50A,$ $R_{Goff}=15\Omega, V_{GE}=\pm 15V,$ $du/dt=4503V/\mu s(T_J=125^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		0.7		mJ
			$T_J=125^{\circ}C$		0.8		
Q_g	Total Gate Charge	$V_{GE}=+15V \dots -15V$	$T_J=25^{\circ}C$		509		nC
$R_{G(int)}$	Internal Gate Resistor		$T_J=25^{\circ}C$		0		Ω
I_{SC}	$V_{CC}=600V, V_{GE}=\pm 15V, t_p=10\mu s, T_J=125^{\circ}C$				480		A
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per IGBT)					0.26	$^{\circ}C/W$



Diode, Inverter

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

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^{\circ}\text{C}$	1200	V
I_F	Diode Continuous Forward Current	$T_C=80^{\circ}\text{C}$	50	A
I_{FM}	Diode Maximum Forward Current	$t_p=1\text{ms}$	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		2.85		V
			T _J =125°C		2.95		
t _{rr}	Reverse Recovery Time	I _F =50A, -diF/dt=1041A/μs(T _J =125°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		115		ns
			T _J =125°C		142		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C	28.1		A	
			T _J =125°C	39.1			
Q _{rr}	Reverse Recovery Charge		T _J =25°C	1.89		μC	
			T _J =125°C	3.80			
E _{rec}	Reverse Recovery Energy		T _J =25°C		0.57		mJ
			T _J =125°C		1.02		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.50	°C/W



Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature				150	°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)				0.07	°C/W
T	Power Terminals Screw:M5		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			165		g

Ordering Information Table

Device code	G	F	50	HF	120	T1V	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - NPT Technology, Fast IGBT
- ③ - Rated Current (50=50A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

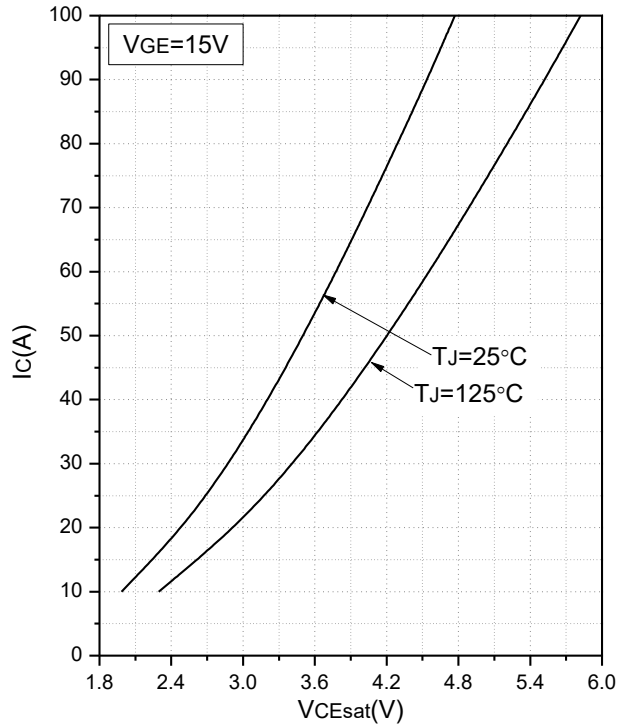


Fig.1 Typical Saturation Voltage Characteristics

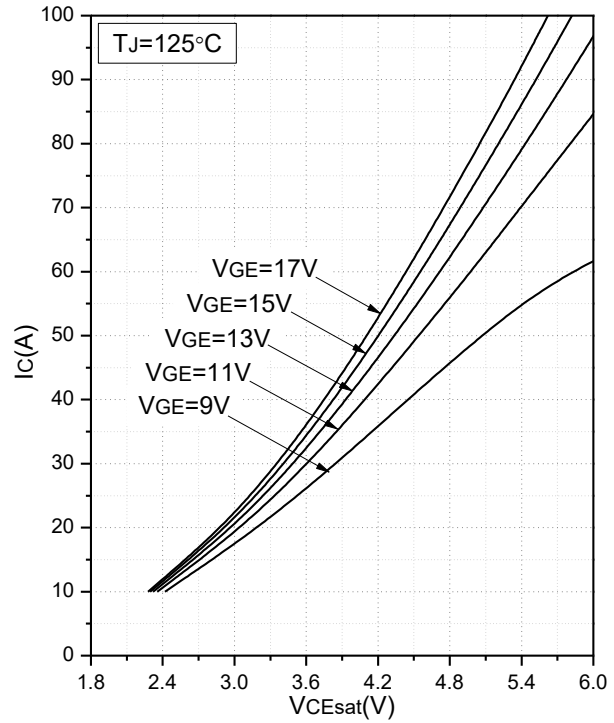


Fig.2 Typical Output Characteristics

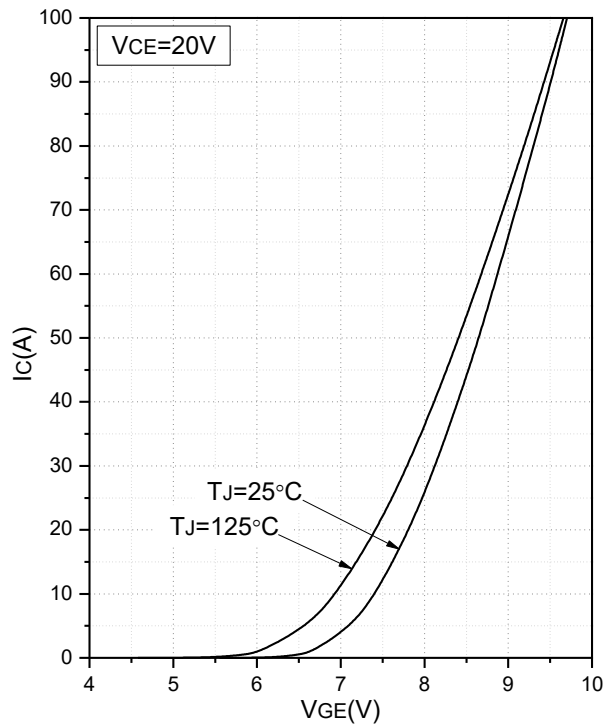


Fig.3 Transfer Characteristics

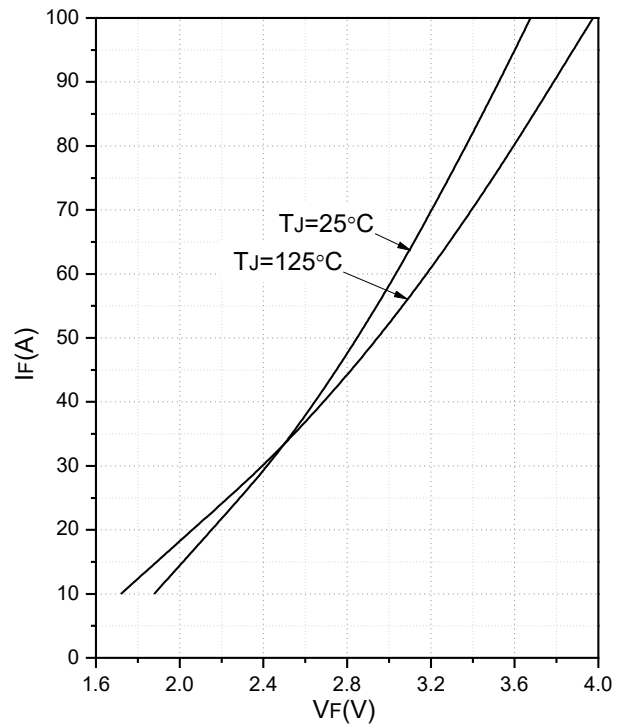


Fig.4 Forward Characteristics of Diode

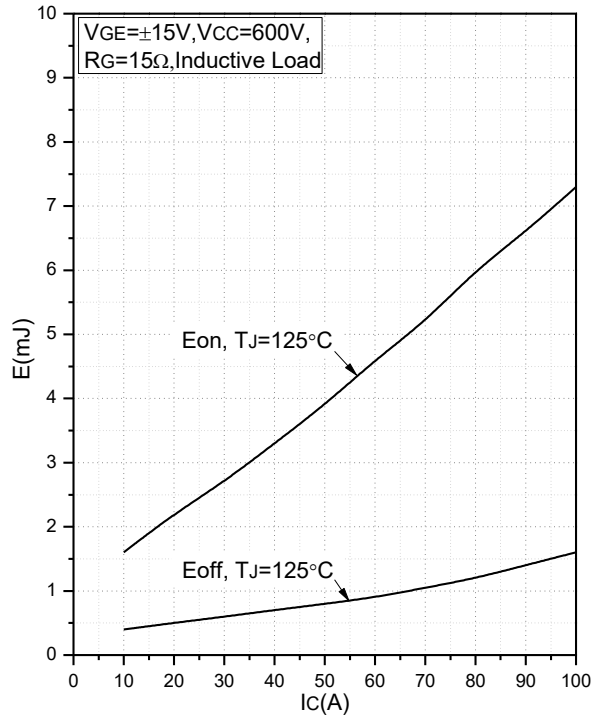


Fig.5 Typical Switching Loss vs. Collector Current

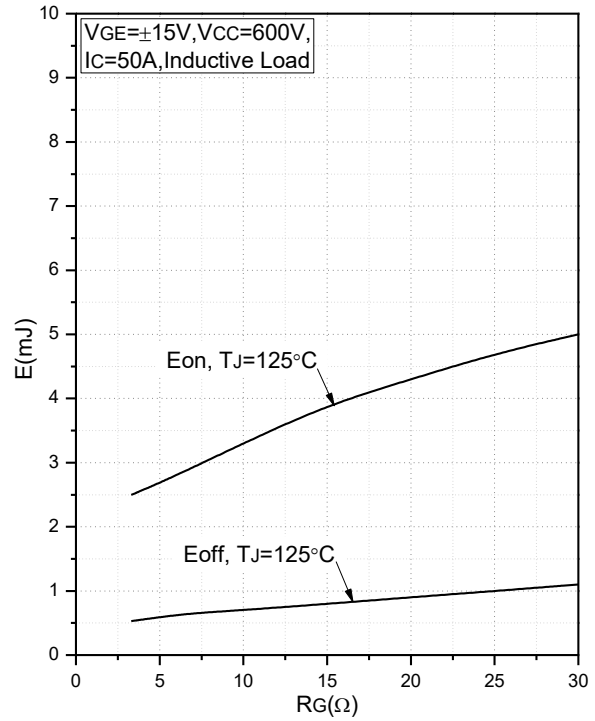


Fig.6 Typical Switching Loss vs. Gate Resistance

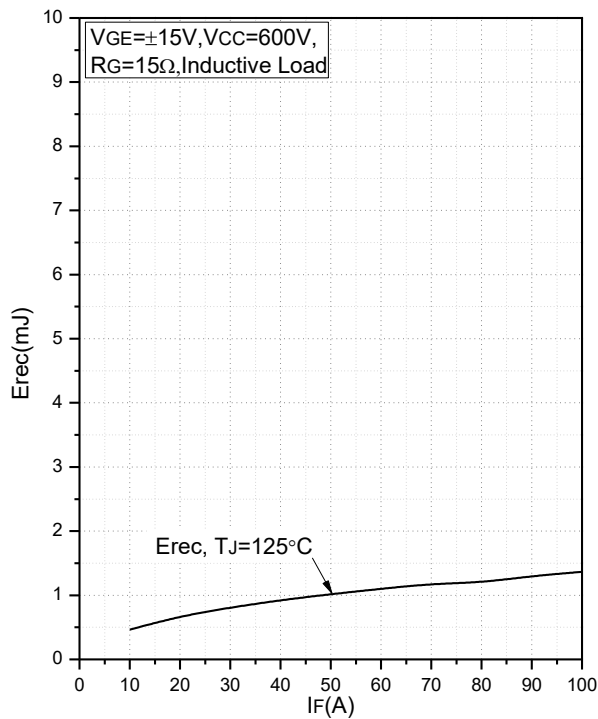


Fig.7 Typical Switching Loss vs. Forward Current

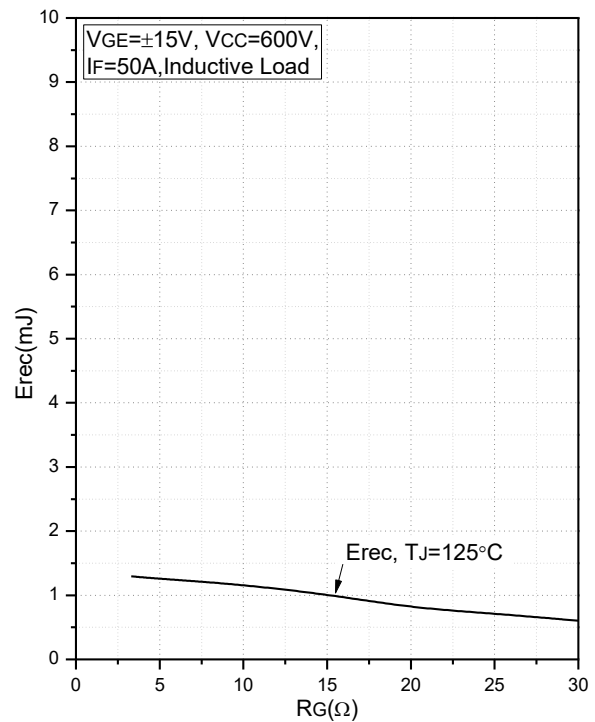


Fig.8 Typical Switching Loss vs. Gate Resistance

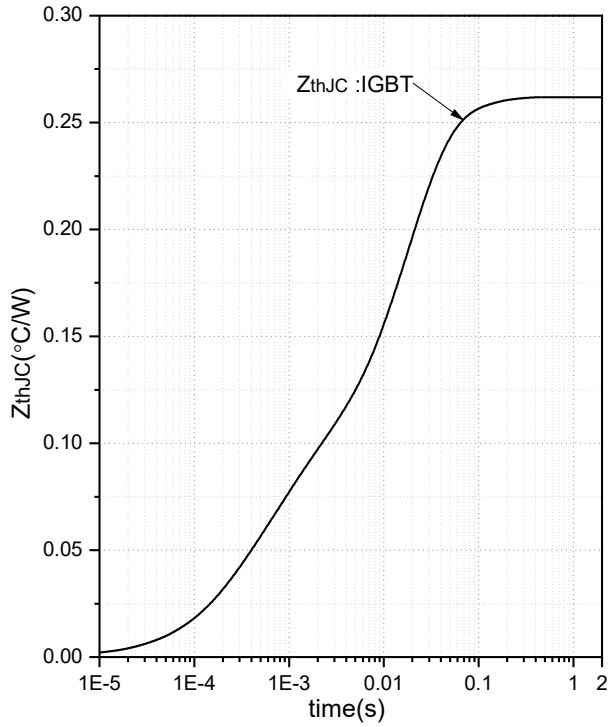


Fig.9 Transient Thermal Impedance (IGBT)

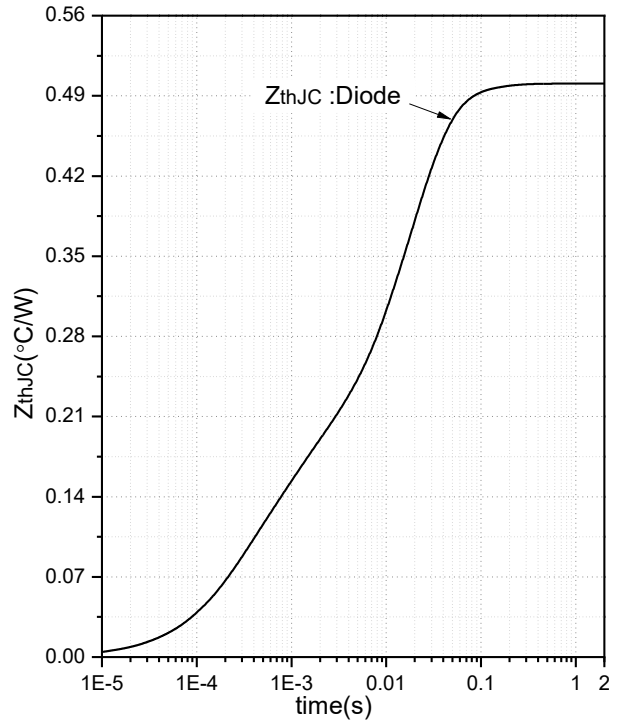


Fig.10 Transient Thermal Impedance (Diode)

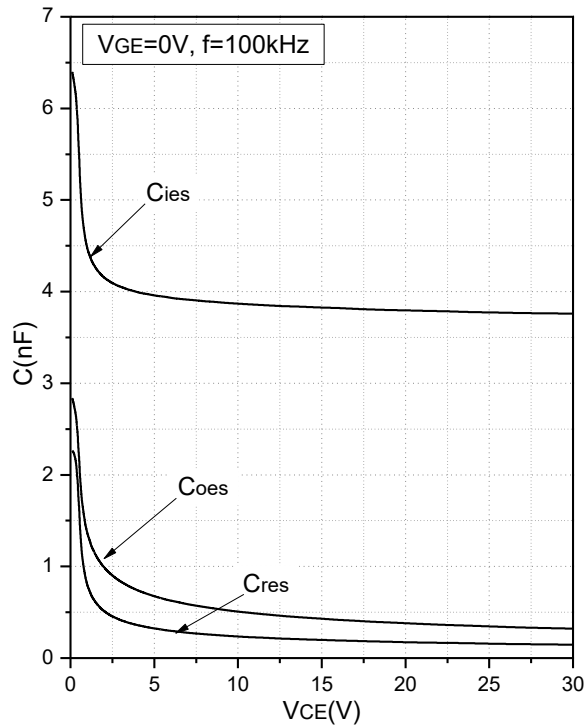


Fig.11 Capacitance Characteristics

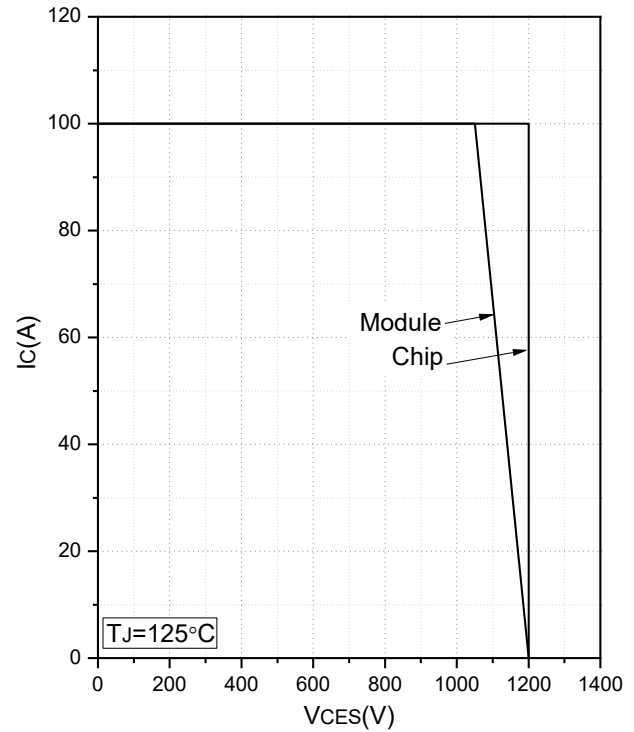


Fig.12 Reverse Bias Safe Operation Area (RBSOA)



Revision	Notes
01	Initial Release

Announcements

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