



GK75FF60B9H

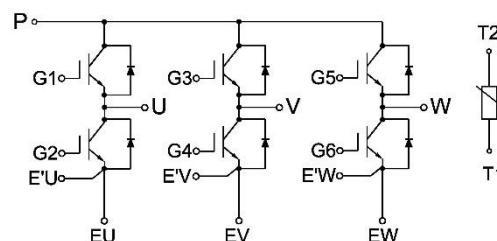
IGBT Module

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

Circuit Diagram



Applications:

- Hybrid Electrical Vehicles(H)EV
- Air Conditioning
- Motor Drives

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		600	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=80^\circ\text{C}$	75	A
		$T_C=25^\circ\text{C}$	105	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	150	A
P_D	Maximum Power Dissipation (per leg)	$T_C=25^\circ\text{C}$ $T_{Jmax}=150^\circ\text{C}$	445	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	$I_C=1.2\text{mA}$, $V_{CE}=V_{GE}$	4.5	5.2	5.9	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	2.15	2.50	V
			$T_J=125^{\circ}\text{C}$	2.40		V
			$T_J=150^{\circ}\text{C}$	2.50		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	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_J=25^{\circ}\text{C}$		2.85		nF
C_{oes}	Output Capacitance			0.50		nF
C_{res}	Reverse Transfer Capacitance			0.22		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=300V, I_C=75A,$ $R_{Gon}=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		19		ns
			$T_J=125^{\circ}C$		20		
			$T_J=150^{\circ}C$		21		
t_r	Rise Time	$V_{CC}=300V, I_C=75A,$ $R_{Gon}=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		30		ns
			$T_J=125^{\circ}C$		31		
			$T_J=150^{\circ}C$		31		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=300V, I_C=75A,$ $R_{Goff}=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		155		ns
			$T_J=125^{\circ}C$		167		
			$T_J=150^{\circ}C$		171		
t_f	Fall Time	$V_{CC}=300V, I_C=75A,$ $R_{Goff}=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		85		ns
			$T_J=125^{\circ}C$		112		
			$T_J=150^{\circ}C$		117		
E_{on}	Turn-on Switching Loss	$V_{CC}=300V, I_C=75A,$ $R_{Gon}=10\Omega, V_{GE}=\pm 15V,$ $di/dt=1935A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		1.7		mJ
			$T_J=125^{\circ}C$		2.1		
			$T_J=150^{\circ}C$		2.4		



E _{off}	Turn-off Switching Loss	V _{CC} =300V, I _C =75A, R _{Goff} =10Ω, V _{GE} =±15V, du/dt=6045V/μs(T _J =150°C), Inductive Load	T _J =25°C		1.3		mJ
			T _J =125°C		1.6		
			T _J =150°C		1.7		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		420		nC
R _{G(int)}	Internal Gate Resistance		T _J =25°C		0		Ω
I _{SC}	V _{CC} =300V, V _{GE} =±15V, t _p =10μs, T _J =150°C				358		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.28	°C/W

FWD, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	600	V
I _F	Diode Continuous Forward Current		75	A
I _{FM}	Diode Maximum Forward Current	t _p =1ms	150	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 =75A	T _J =25℃		1.75		V
			T _J =125℃		1.75		
			T _J =150℃		1.70		
I _{rr}	Peak Reverse Recovery Current	I _F =75A, -diF/dt=2500A/μs(T _J =150℃), V _{rr} =300V, V _{GE} =-15V	T _J =25℃		45		A
			T _J =125℃		52		
			T _J =150℃		54		
t _{rr}	Reverse Recovery Time		T _J =25℃		151		ns
			T _J =125℃		200		
			T _J =150℃		230		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.9		μC
			T _J =125℃		5.0		
			T _J =150℃		5.6		



E _{rec}	Reverse Recovery Energy	I _F =75A, -diF/dt=2500A/μs(T _J =150°C), V _{rr} =300V, V _{GE} =-15V	T _J =25°C		0.5		mJ
			T _J =125°C		0.9		
			T _J =150°C		1.1		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.52	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Description	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		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, 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)				0.05	°C/W
T	Mounting Screw:M4		1.8		2.0	N·m
G	Weight			40		g



Ordering Information Table

Device code	G	K	75	FF	60	B9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - NPT, Standard IGBT
- ③ - Rated Current (75=75A)
- ④ - Circuit Configuration: (Full Bridge)
- ⑤ - Rated Voltage (60=600V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

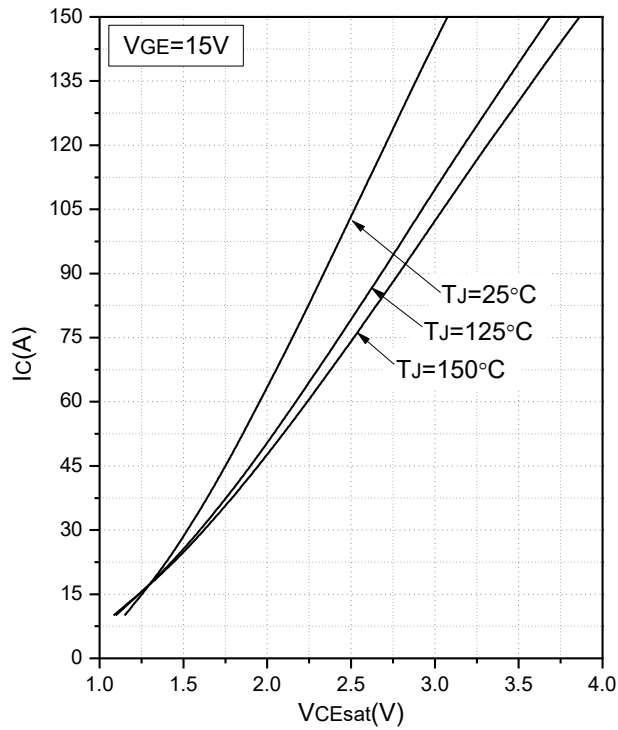


Fig.1 Typical Saturation Voltage Characteristics

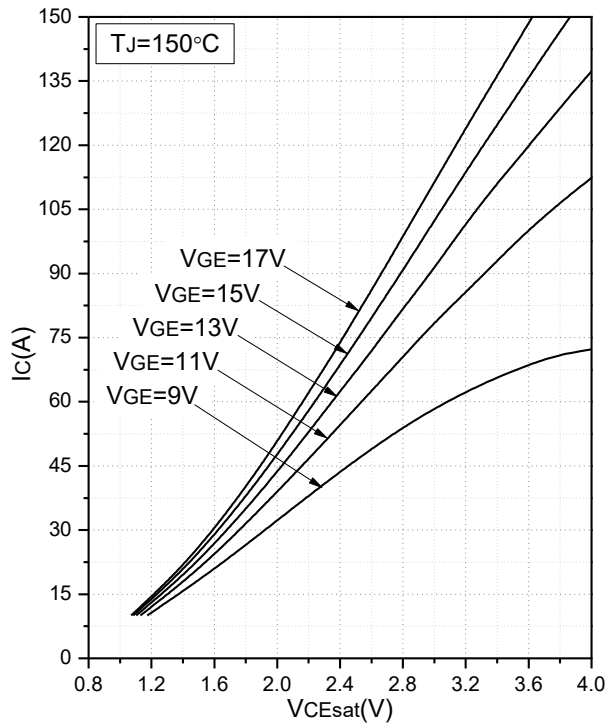


Fig.2 Typical Output Characteristics

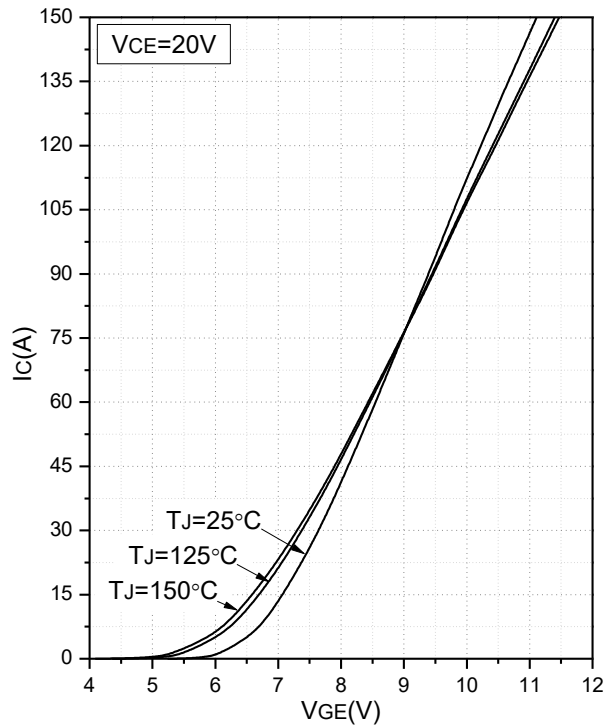


Fig. 3 Transfer Characteristic

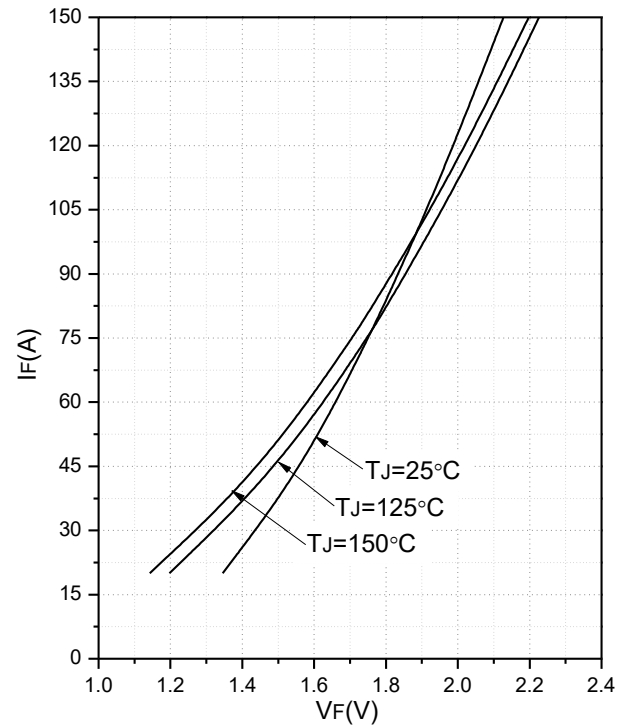


Fig.4 Forward Characteristics of FWD

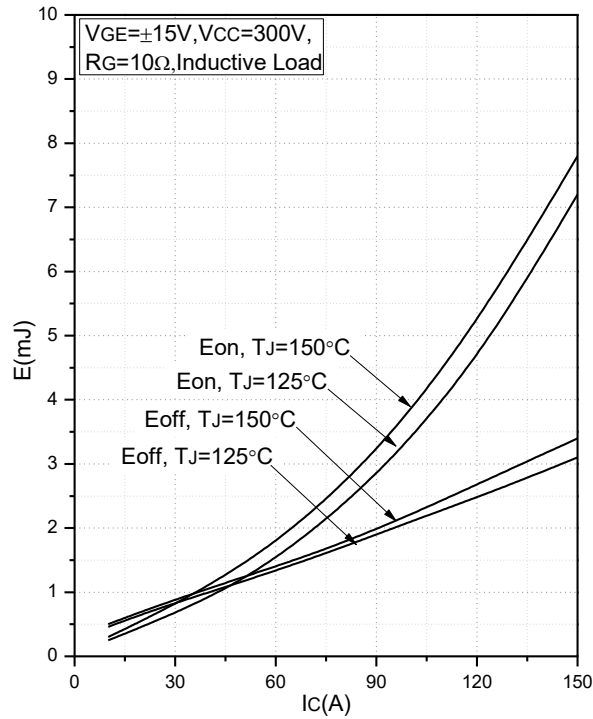


Fig.5 Typical Switching Loss vs. Collector Current

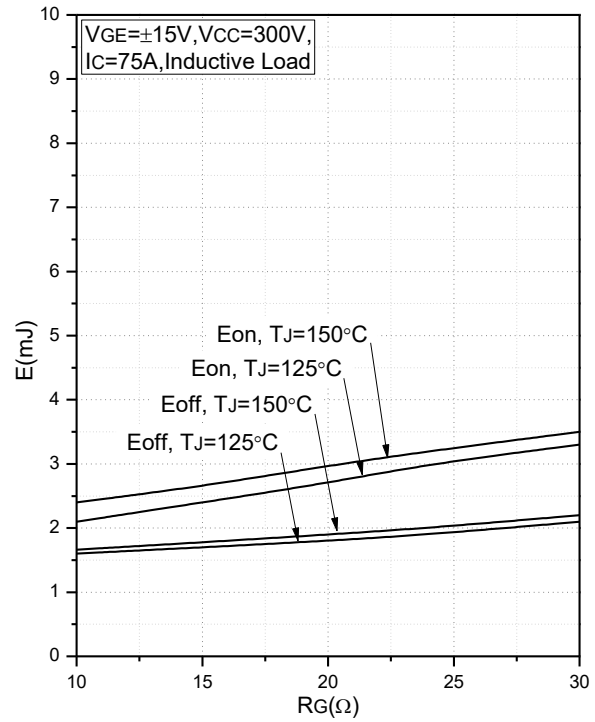


Fig.6 Typical Switching Loss vs. Gate Resistance

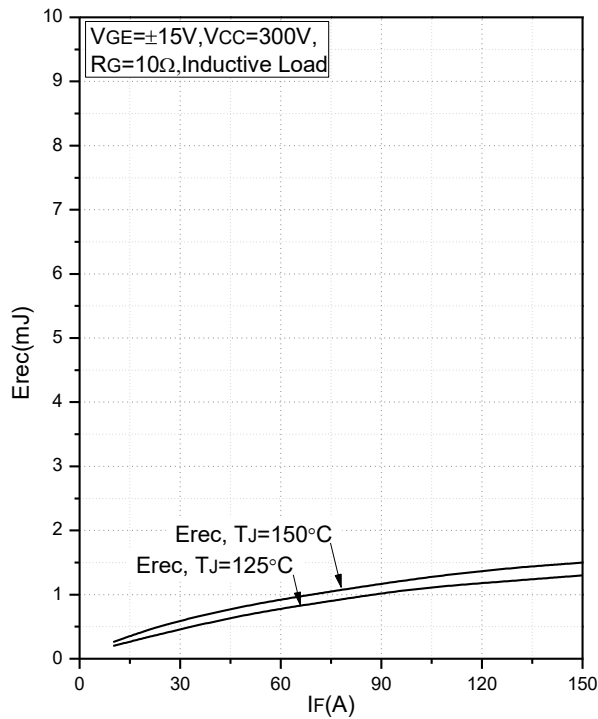


Fig.7 Typical Switching Loss vs. Forward Current

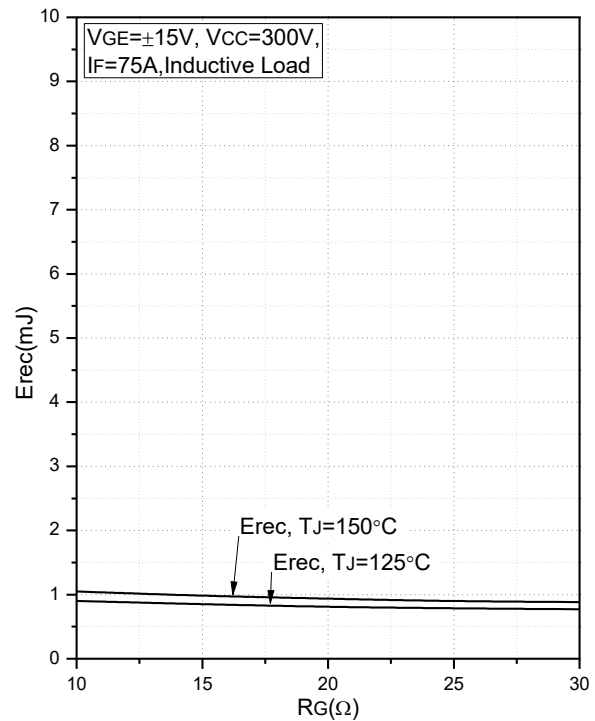


Fig.8 Typical Switching Loss vs. Gate Resistance

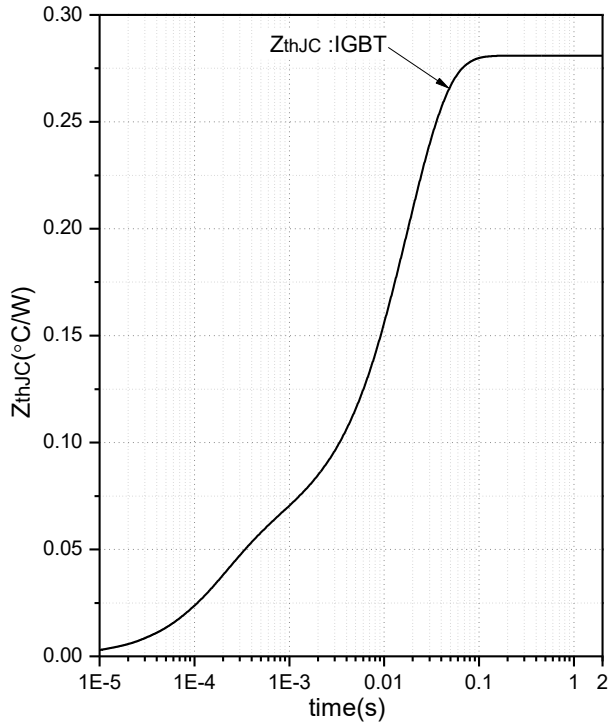


Fig.9 Transient Thermal Impedance of IGBT

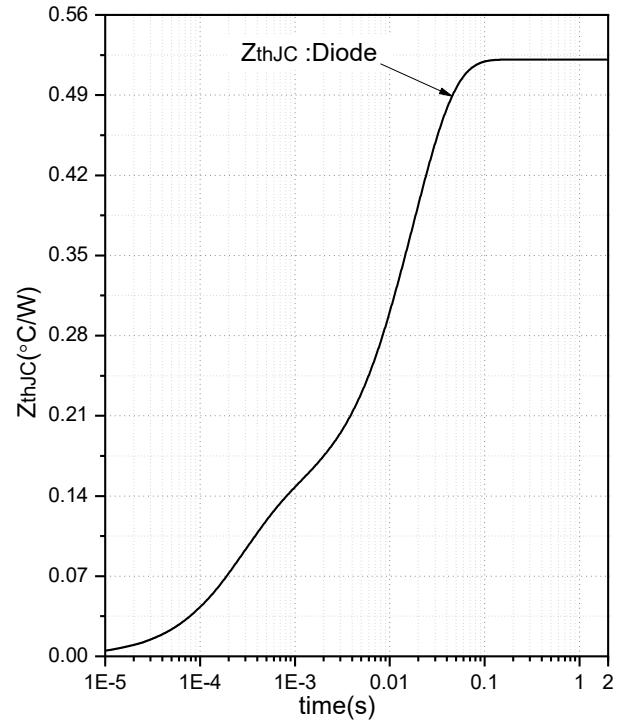


Fig.10 Transient Thermal Impedance of FWD

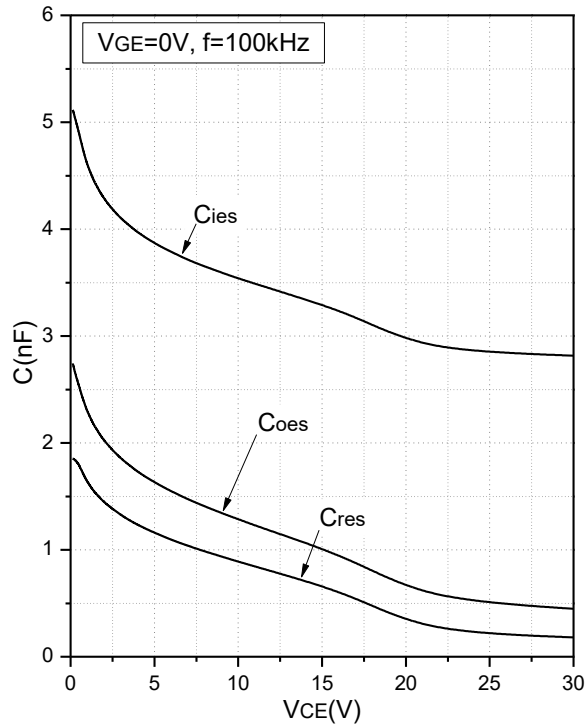


Fig.11 Capacitance Characteristics

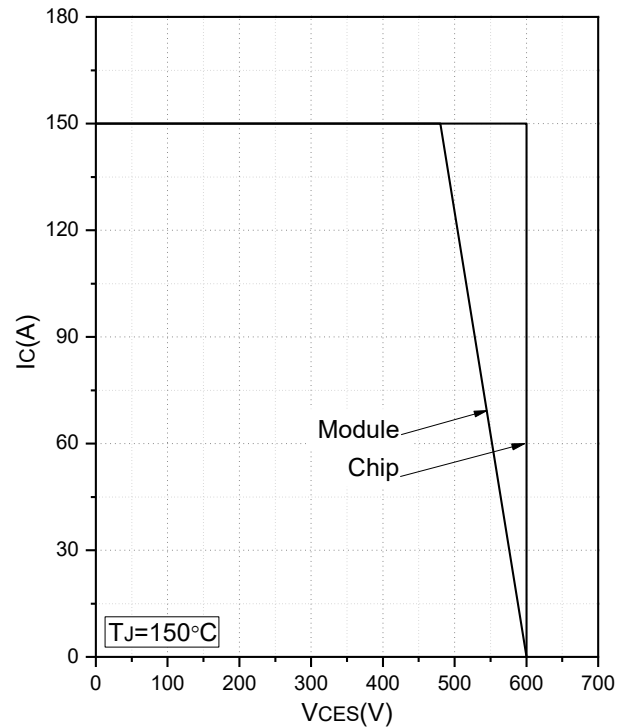


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

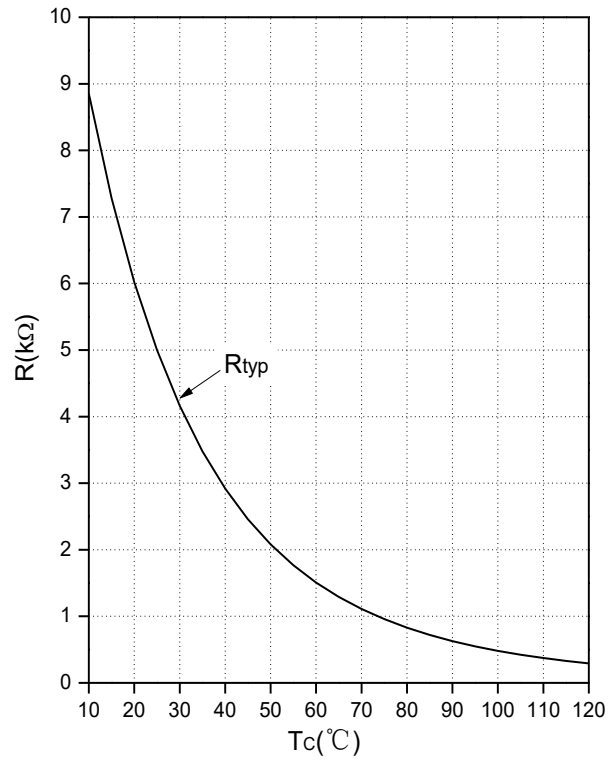
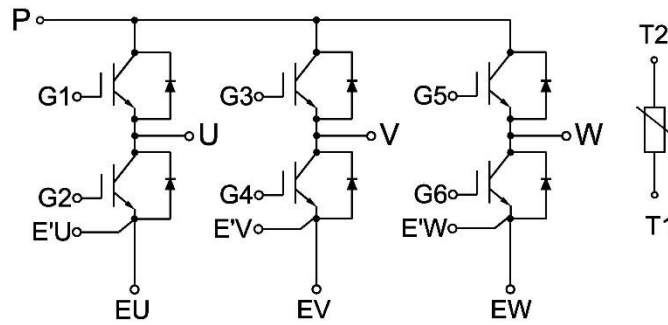


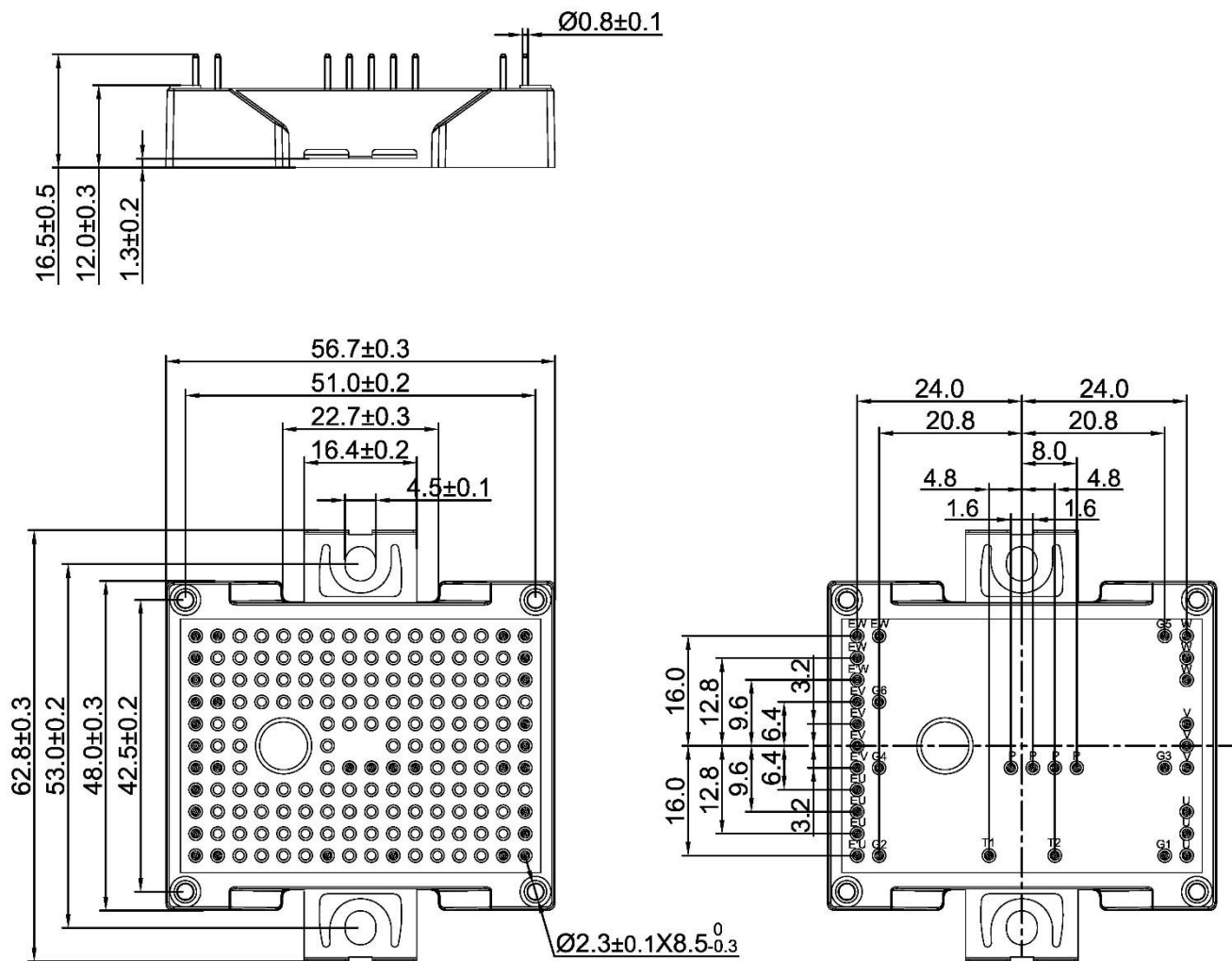
Fig.13 NTC Temperature Characteristics



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcements

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