



GF150HF120A5H GF150CC120A5H GF150CE120A5H IGBT Module

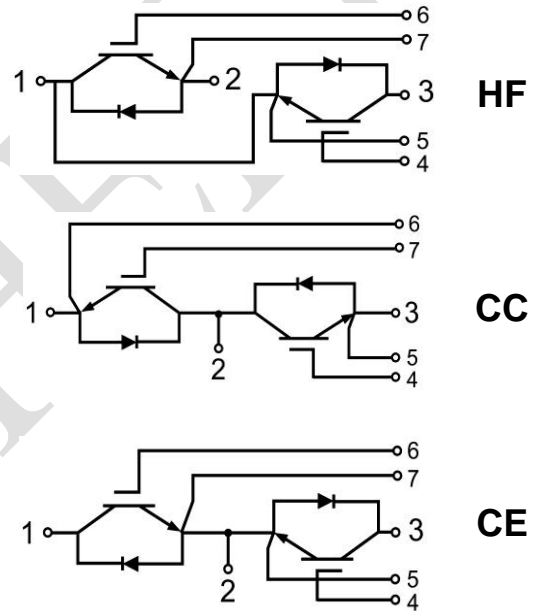
Features:

- NPT IGBT Technology
- Short Circuit Rated $>10\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2xIc)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications:

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

Circuit Diagram



IGBT, Inverter Maximum Rated Values

V_{CES}	Collector-Emitter Blocking Voltage	$T_J=25^\circ\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=80^\circ\text{C}$	150	A
		$T_C=25^\circ\text{C}$	300	A
I_{CM}	Repetitive Pulse Collector Current	$t_p=1\text{ms}$	300	A
t_{sc}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per Leg	$T_C=25^\circ\text{C}$ $T_{Jmax}=150^\circ\text{C}$	1470	W



Electrical Characteristics

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=2mA, V_{CE}=V_{GE}, T_J=25^{\circ}C$	5.0	5.6	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150A, V_{GE}=15V$	$T_J=25^{\circ}C$	3.25	3.60	V
			$T_J=125^{\circ}C$	4.05		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	$V_{GE}=\pm 20V, V_{CE}=0V, T_J=25^{\circ}C$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25^{\circ}C$		13.4		nF
C_{oes}	Output Capacitance			1.24		nF
C_{oes}	Reverse Transfer Capacitance			0.54		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=150A, R_{Gon}=6.8\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^{\circ}C$	639		ns
			$T_J=125^{\circ}C$	620		
t_r	Rise Time		$T_J=25^{\circ}C$	126		ns
			$T_J=125^{\circ}C$	123		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=150A, R_{Goff}=6.8\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^{\circ}C$	619		ns
			$T_J=125^{\circ}C$	624		
t_f	Fall Time		$T_J=25^{\circ}C$	150		ns
			$T_J=125^{\circ}C$	177		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=150A, R_{Gon}=6.8\Omega, V_{GE}=\pm 15V, di/dt=1040A/\mu s(T_J=125^{\circ}C) \text{ Inductive Load}$	$T_J=25^{\circ}C$	12.4		mJ
			$T_J=125^{\circ}C$	15.4		
E_{off}	Turn-off Switching Loss		$T_J=25^{\circ}C$	7.2		mJ
			$T_J=125^{\circ}C$	9.5		
Q_g	Total Gate Charge	$V_{GE}=\pm 15V \dots -15V$	$T_J=25^{\circ}C$	1.81		μC
$R_{g \text{ internal}}$	Internal Gate Resistor		$T_J=25^{\circ}C$	1.25		Ω
RBSOA	Reverse Bias Safe Operation Area	$I_C=300A, V_{CC}=1050V, V_p=1200V, R_G=6.8\Omega, V_{GE}=\pm 15V \text{ to } 0V, T_J=150^{\circ}C$	Trapezoid			
I_{SC}	$V_{CC}=600V, t_p=10\mu s, V_{GE}=\pm 15V, R_G=6.8\Omega, T_J=125^{\circ}C$			1566		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-to-Case				0.085	$^{\circ}C/W$



Diode, Inverter Maximum Rated Values

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^{\circ}\text{C}$	1200	V
I_F	Diode Continuous Forward Current		150	A
I_{FM}	Diode Maximum Forward Current	$t_p=1\text{ms}$	300	A

Electrical Characteristics of Diode

Symbol	Description	Conditions	Min.	Typ.	Max.	Units	
V_{FM}	Forward Voltage	$I_F=150\text{A}$	$T_J=25^{\circ}\text{C}$	2.40		V	
			$T_J=125^{\circ}\text{C}$	2.50			
t_{rr}	Reverse Recovery Time	$I_F=150\text{A},$ $di/dt = 1540\text{A}/\mu\text{s}(T_J=125^{\circ}\text{C}),$ $V_{rr}=600\text{V},$ $V_{GE} = -15\text{V}$	$T_J=25^{\circ}\text{C}$	172		ns	
			$T_J=125^{\circ}\text{C}$	365			
I_{rr}	Peak Reverse Recovery Current		$T_J=25^{\circ}\text{C}$	65.6		A	
			$T_J=125^{\circ}\text{C}$	90.6			
Q_{rr}	Reverse Recovery Charge		$T_J=25^{\circ}\text{C}$	6.54		μC	
			$T_J=125^{\circ}\text{C}$	14.7			
E_{rec}	Reverse Recovery Energy		$T_J=25^{\circ}\text{C}$	1.96		mJ	
			$T_J=125^{\circ}\text{C}$	5.16			
$R_{\theta JC}$	Diode Thermal Resistance: Junction-to-Case					0.205	$^{\circ}\text{C}/\text{W}$



Module

Symbol	Description	Min	Typ	Max	Unit
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	Power Terminals Screw:M5	3.0		5.0	N·m
T	Mounting Screw:M6	4.0		6.0	N·m
G	Weight		200		g

Ordering Information Table

Device code	G	F	150	HF	120	A5	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - NPT, Fast IGBT
- ③ - Rated Current (150=150A)
- ④ - Circuit Configuration: HF(Half Bridge)
CC(Common Collector)
CE(Common Emitter)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

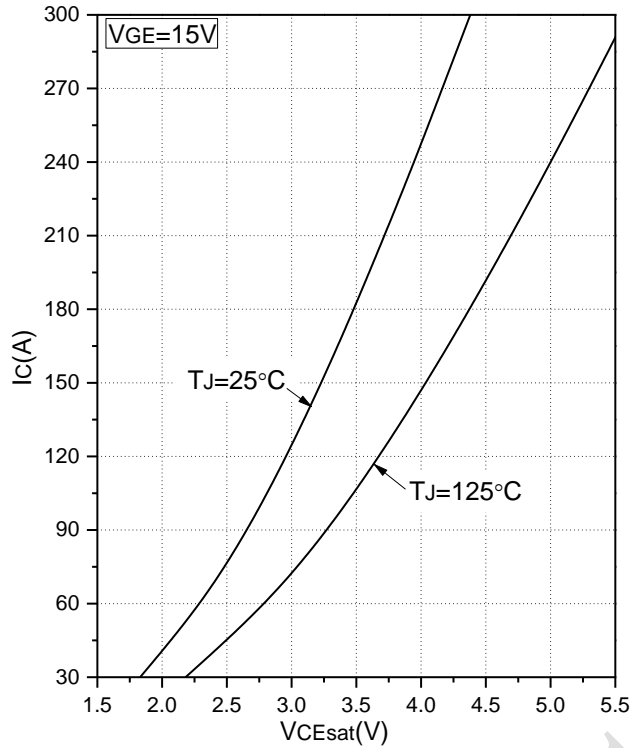


Fig.1 Typical Saturation Voltage Characteristics

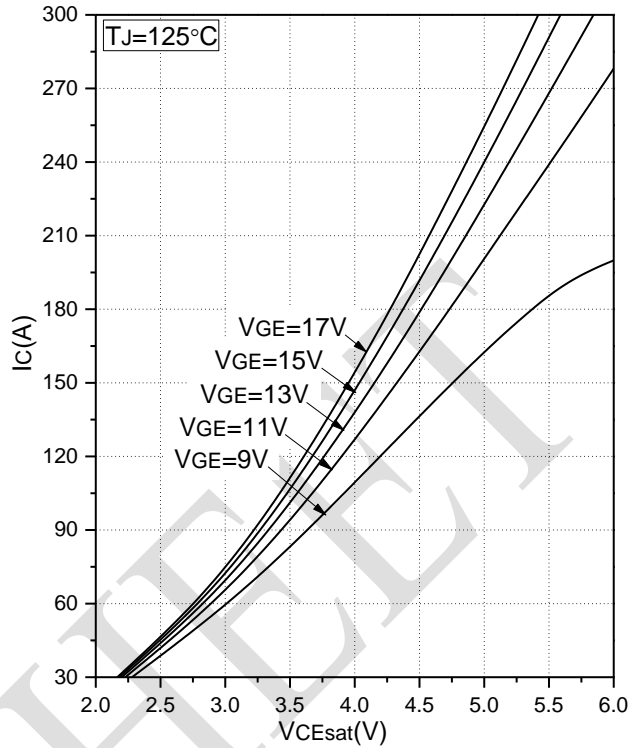


Fig.2 Typical Output Characteristics

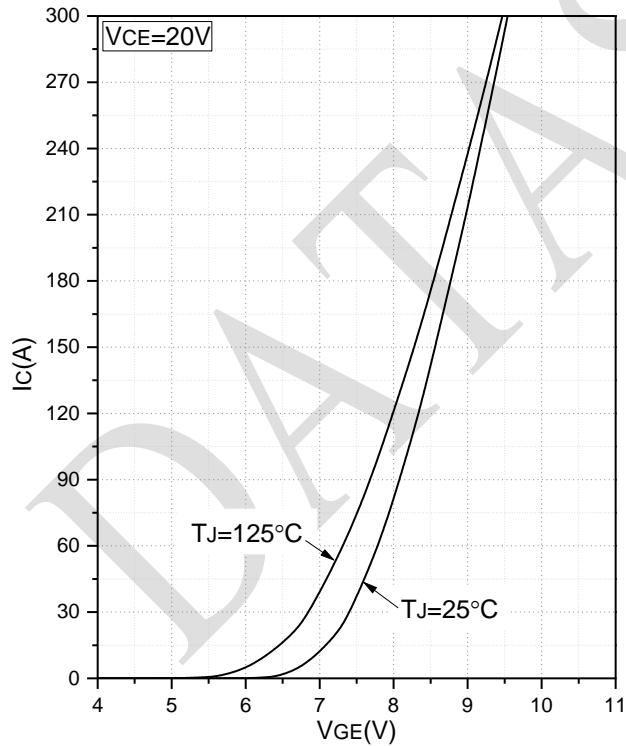


Fig.3 Transfer Characteristic

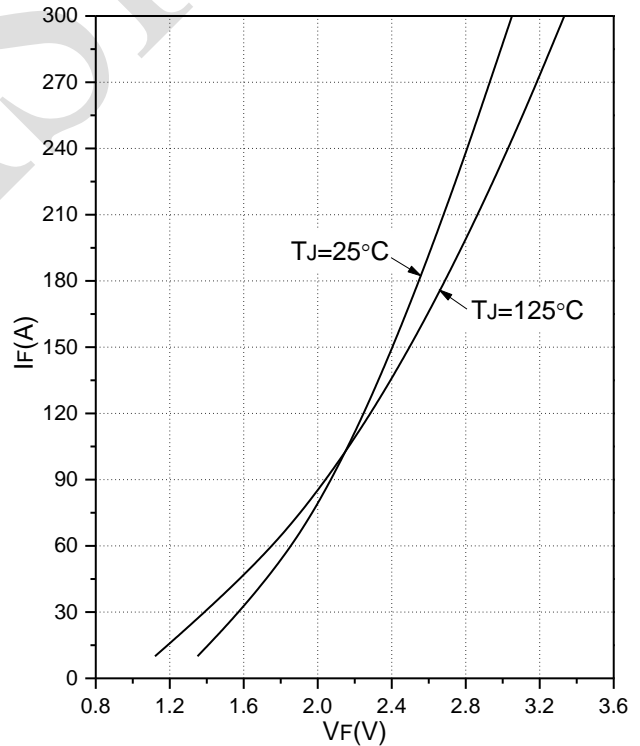


Fig.4 Forward Characteristics of Diode

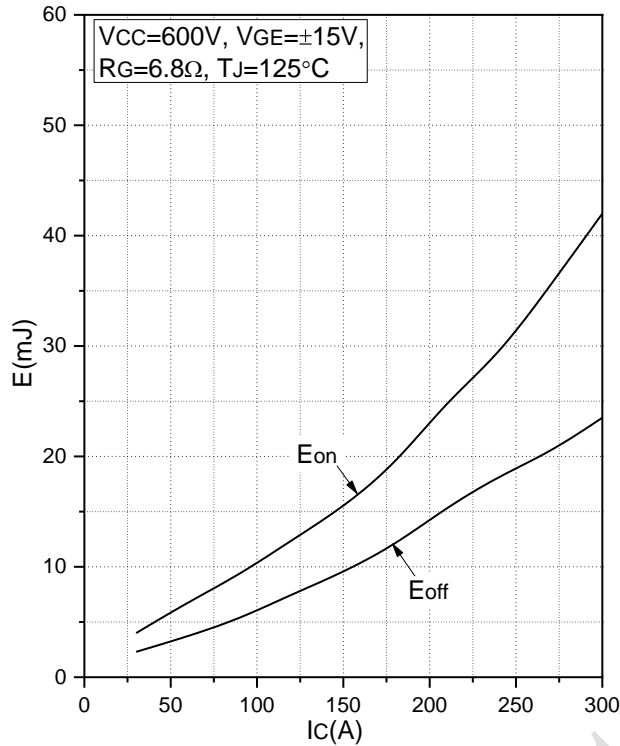


Fig.5 Typical Switching Loss vs. Collector Current

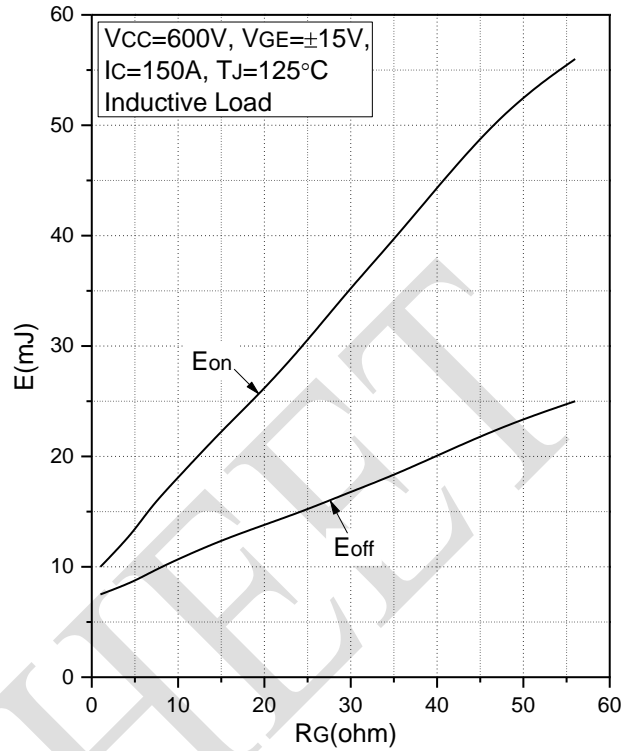


Fig.6 Typical Switching Loss vs. Gate Resistance

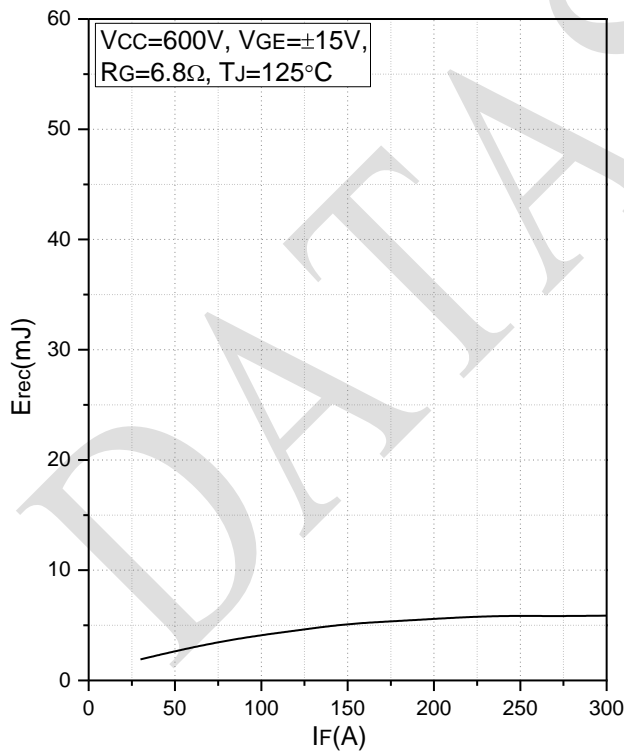


Fig.7 Typical Switching Loss vs. Forward Current

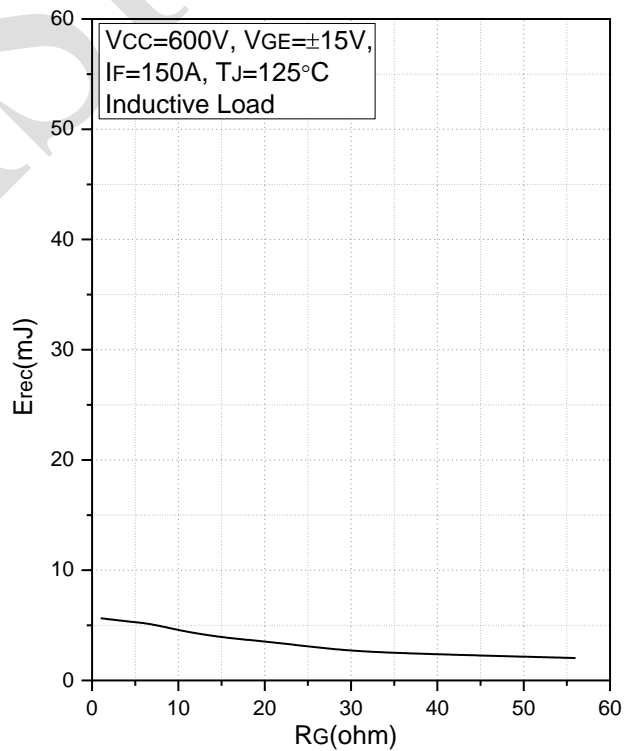


Fig.8 Typical Switching Loss vs. Gate Resistance

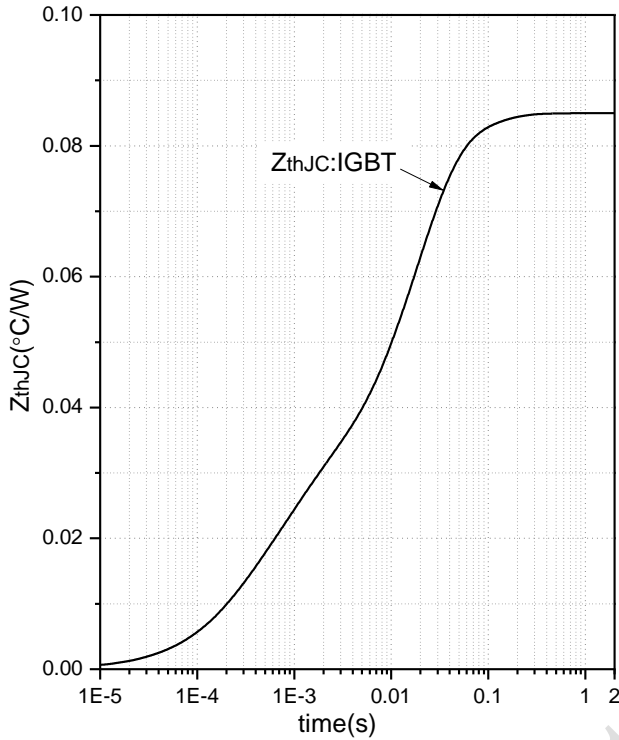


Fig.9 Transient Thermal Impedance (IGBT)

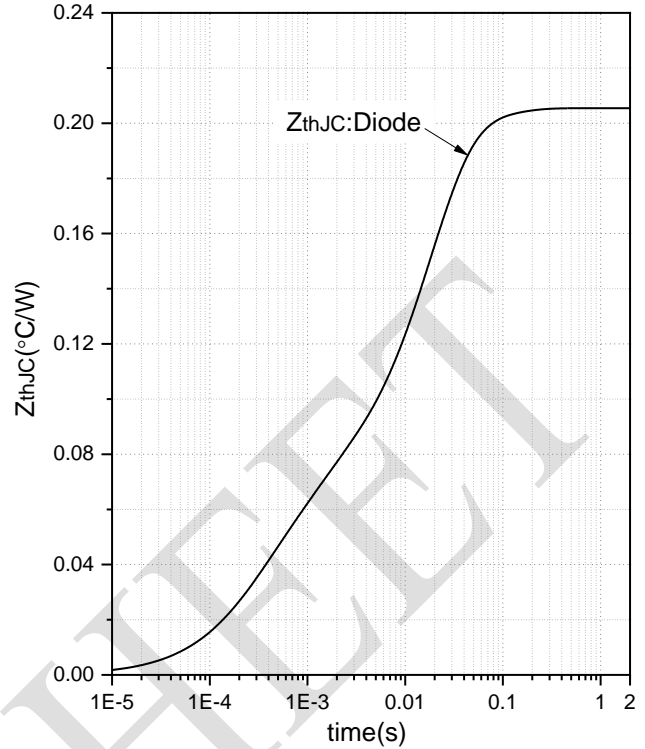


Fig.10 Transient Thermal Impedance (Diode)

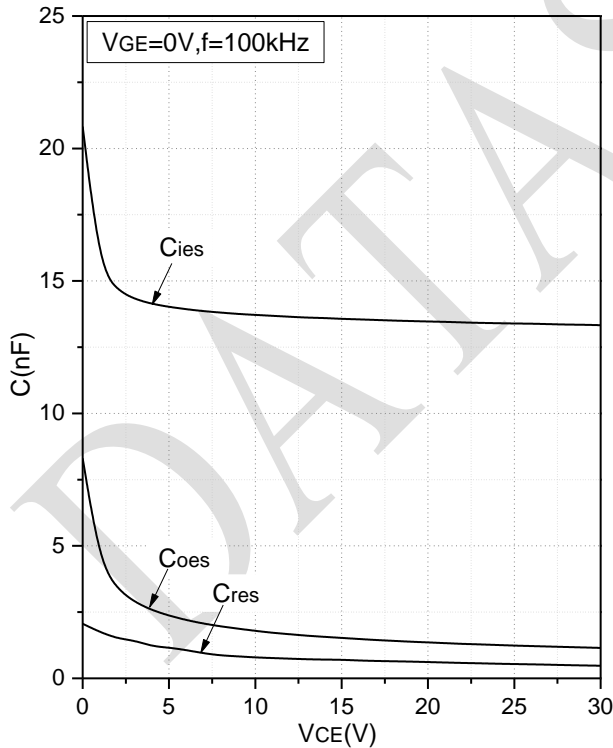


Fig.11 Capacitance Characteristics

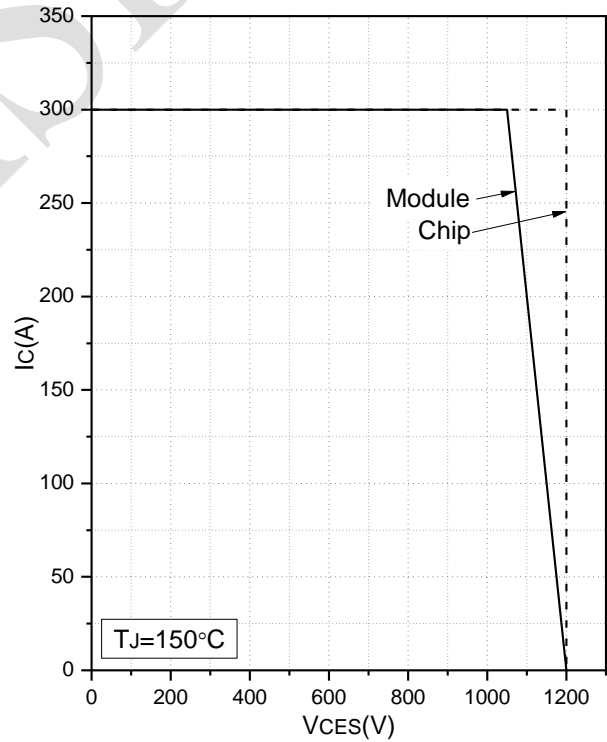
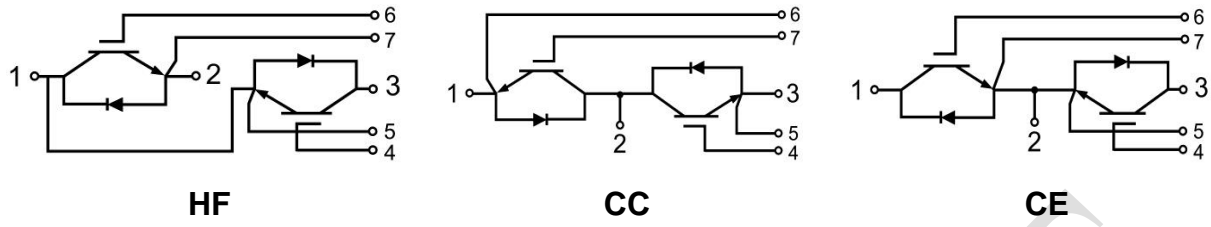


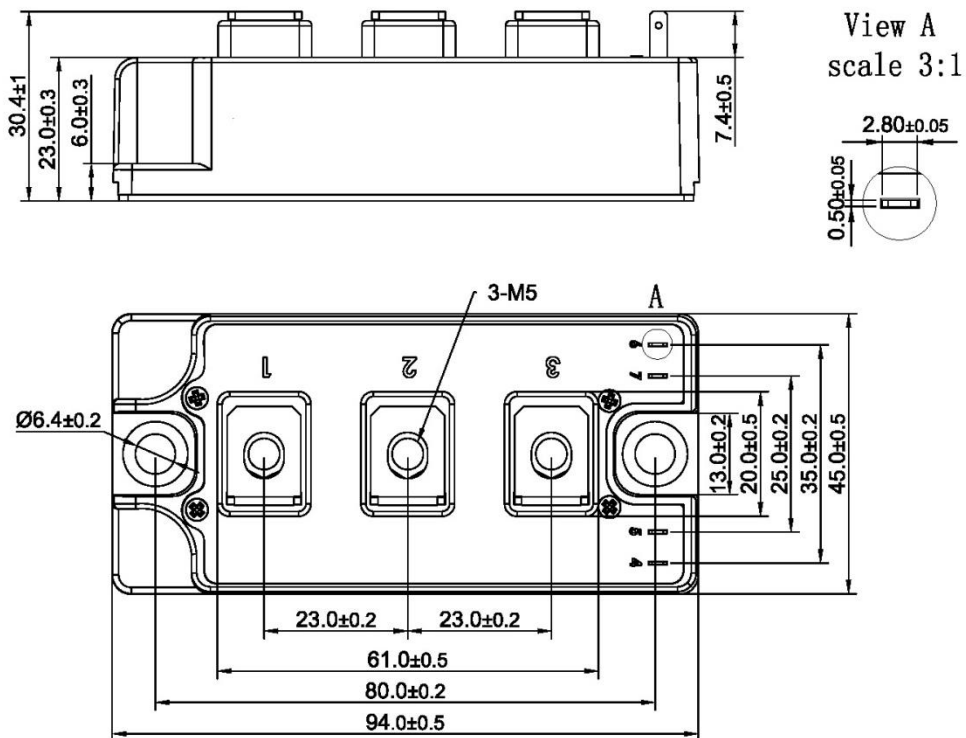
Fig.12 Reverse Bias Safe Operation Area (RBSOA)



Internal Circuit



Package Outline (Unit: mm):





Date	Revision	Notes
02/22/2022	A	Final Version

Announcement

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DATA SHEET