

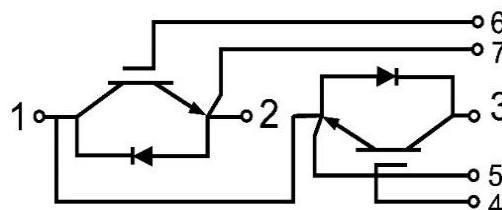
GT400HF170T2DH

IGBT Module

Circuit Diagram

Features:

- $V_{CES}=1700V$ $I_C=400A$ Trench & Field Stop IGBT Module
- Short Circuit Capability
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested($2 \times I_C$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- Industrial Inverters
- Servo Applications

Type	Package	Marking
GT400HF170T2DH	T2D	GT400HF170T2DH

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		1700	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current, Limited by T_{Jmax}	$T_C=90^\circ C$	400	A
		$T_C=25^\circ C$	700	A
I_{CM}	Peak Collector Current Repetitive	t_p limited by T_{Jmax}	800	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ C, T_{Jmax}=175^\circ C$	3000	W

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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	$I_C=16\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=400\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80	2.20	V
			$T_J=125^{\circ}\text{C}$	2.27		V
			$T_J=150^{\circ}\text{C}$	2.38		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}$, $V_{CE}=1700\text{V}$, $T_J=25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		36.15		nF
C_{oes}	Output Capacitance			2.00		nF
C_{res}	Reverse Transfer Capacitance			0.43		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=900V, I_C=400A,$ $R_{Gon}=1\Omega, V_{GE}=+15V/-15V,$ Inductive Load	$T_J=25^{\circ}C$		114		ns
			$T_J=125^{\circ}C$		130		
			$T_J=150^{\circ}C$		131		
t_r	Rise Time		$T_J=25^{\circ}C$		48		ns
			$T_J=125^{\circ}C$		49		
			$T_J=150^{\circ}C$		52		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=900V, I_C=400A,$ $R_{Goff}=1\Omega, V_{GE}=+15V/-15V,$ Inductive Load	$T_J=25^{\circ}C$		363		ns
			$T_J=125^{\circ}C$		417		
			$T_J=150^{\circ}C$		429		
t_f	Fall Time		$T_J=25^{\circ}C$		450		ns
			$T_J=125^{\circ}C$		483		
			$T_J=150^{\circ}C$		526		
E_{on}	Turn-on Switching Loss	$V_{CC}=900V, I_C=400A,$ $R_{Gon}=1\Omega, V_{GE}=+15V/-15V,$ $di/dt=6200A/\mu s(T_J=150^{\circ}C)$ Inductive Load	$T_J=25^{\circ}C$		41		mJ
			$T_J=125^{\circ}C$		70		
			$T_J=150^{\circ}C$		77		

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E _{off}	Turn-off Switching Loss	V _{CC} =900V, I _C =400A, R _{Goff} =1Ω, V _{GE} =+15V/-15V, du/dt=4800V/μs(T _J =150°C) Inductive Load	T _J =25°C		78		mJ
			T _J =125°C		96		
			T _J =150°C		98		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		3.06		uC
R _{G (int)}	Internal Gate Resistance		T _J =25°C		1.4		Ω
T _{SC}	V _{CC} =900V, V _{GE} =±15V, T _J =150°C ^{note1}					10	us
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.050	°C/W
R _{θCS}	IGBT Thermal Resistance: Case-to-Sink (per IGBT) (per IGBT, λ _{grease} = 1 W/(m · K))				0.045		°C/W

note1: Short circuit withstand time cannot exceed 10us under specified condition.

Diode, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1700	V
I _F	Diode Continuous Forward Current		400	A
I _{FM}	Diode Maximum Forward Current	t _p =1ms	800	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 =400A	T _J =25°C		2.15	2.60	V
			T _J =125°C		2.29		
			T _J =150°C		2.30		
t _{rr}	Reverse Recovery Time	I _F =400A, -diF/dt=10200A/μs(T _J =150°C), V _R =900V, V _{GE} =-15V	T _J =25°C		470		ns
			T _J =125°C		796		
			T _J =150°C		852		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		554		A
			T _J =125°C		529		
			T _J =150°C		525		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		250		μC
			T _J =125°C		456		
			T _J =150°C		461		

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E _{rec}	Reverse Recovery Energy	I _F =400A, -diF/dt=10200A/μs(T _J =150°C), V _R =900V, V _{GE} =-15V	T _J =25°C		40		mJ
			T _J =125°C		71		
			T _J =150°C		85		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.105	°C/W
R _{θCS}	Diode Thermal Resistance: Case-to-Sink (per Diode, λ _{grease} = 1 W/(m • K))				0.094		°C/W

Module

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s	3400			V
Internal Isolation			Al_2O_3			
T_J	Maximum Junction Temperature		-40		+175	$^{\circ}C$
T_{JOP}	Maximum Operating Junction Temperature Range ^{note1}		-40		+150	$^{\circ}C$
T_{stg}	Storage Temperature		-40		+125	$^{\circ}C$
CTI	Comparative Tracking Index		200			
M	Power Terminals Screw:M6		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			315		g

Note1: $T_{JOP} > 150^{\circ}C$ is only allowed for operation at overload conditions.

Ordering Information Table

Device code

G	T	400	HF	170	T2D	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (400=400A)
- ④ - Circuit Configuration (Half Bridge)
- ⑤ - Rated Voltage (170=1700V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Characteristic diagram

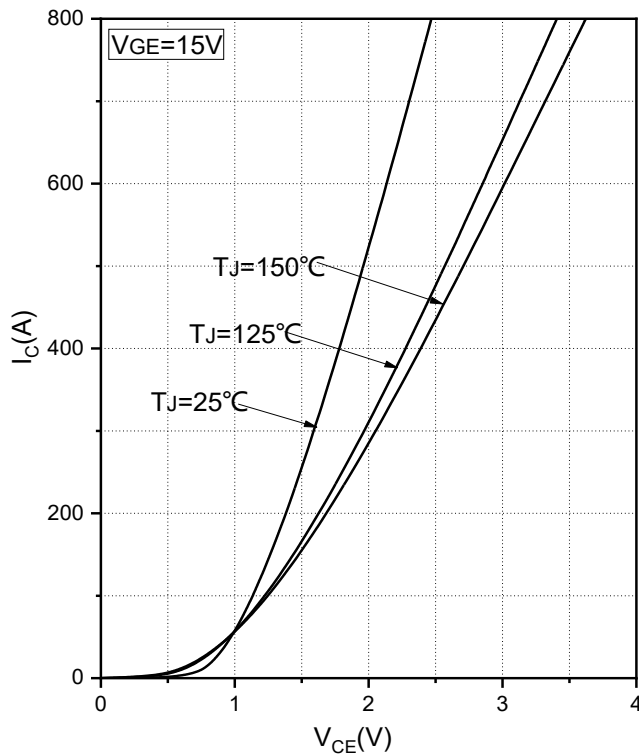


Fig.1 Typical Saturation Voltage Characteristics

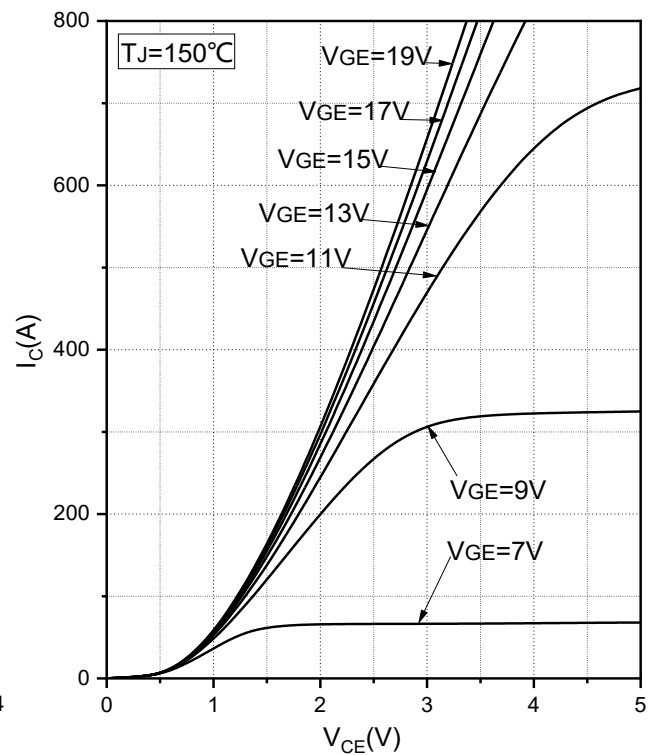


Fig.2 Typical Output Characteristics

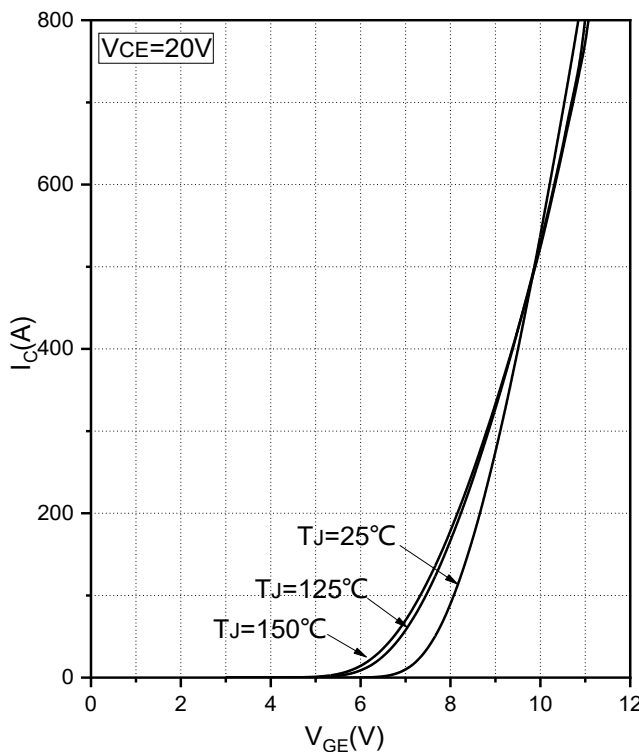


Fig.3 Transfer Characteristic

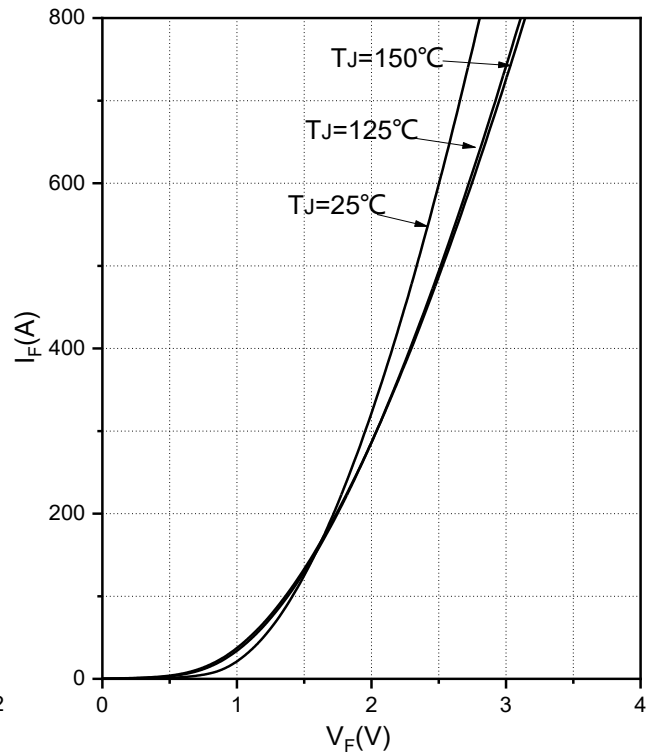


Fig.4 Forward Characteristics of Diode

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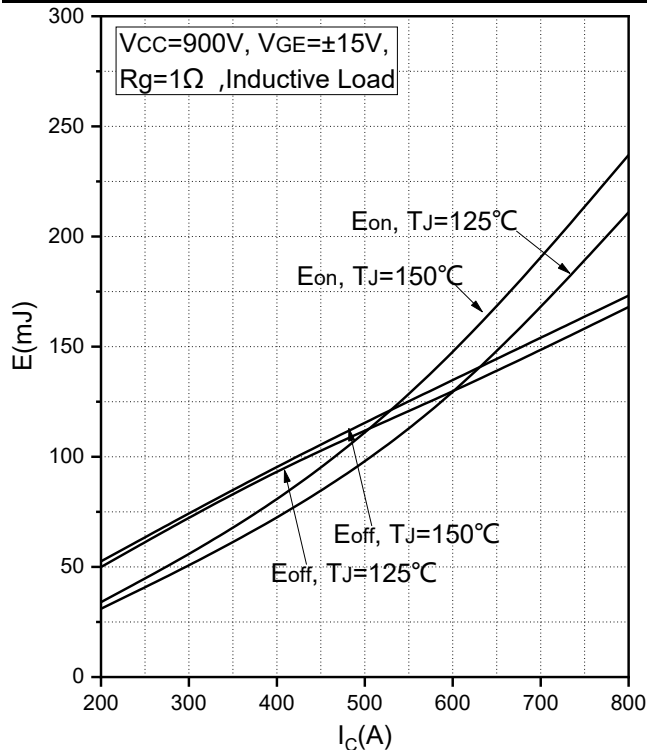


Fig.5 Typical Switching Loss vs. Collector Current

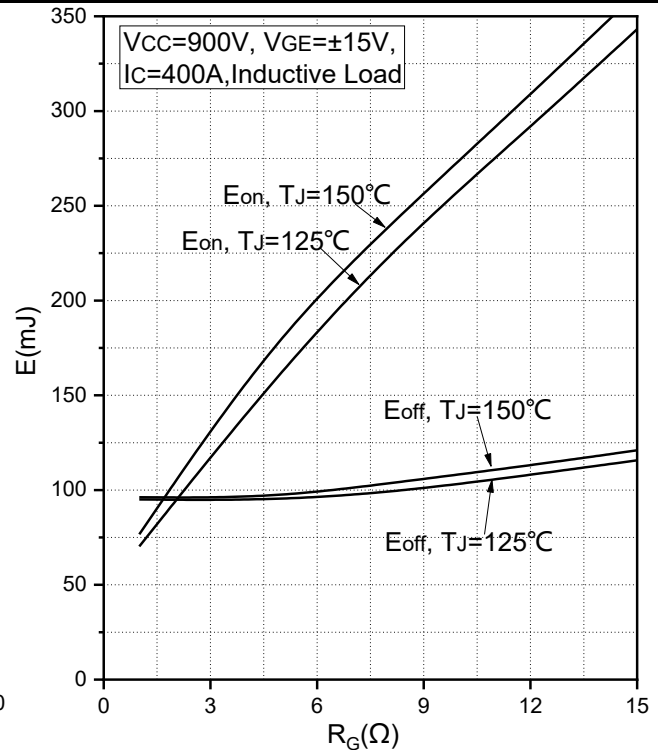


Fig.6 Typical Switching Loss vs. Gate Resistance

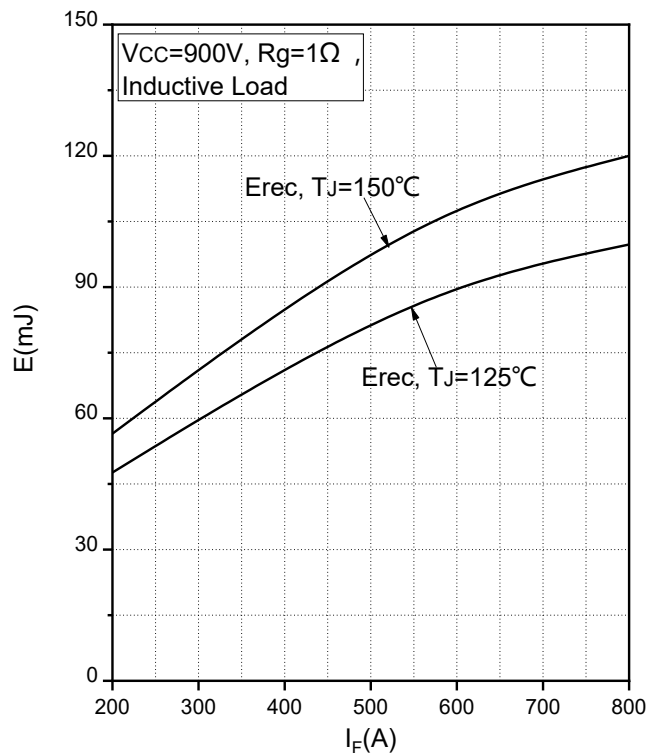


Fig.7 Typical Switching Loss vs. Forward Current

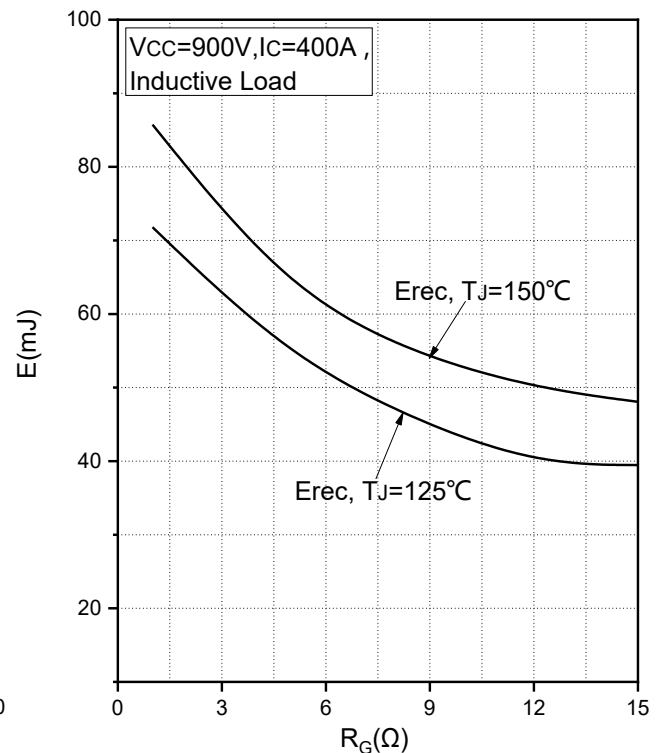


Fig.8 Typical Switching Loss vs. Gate Resistance

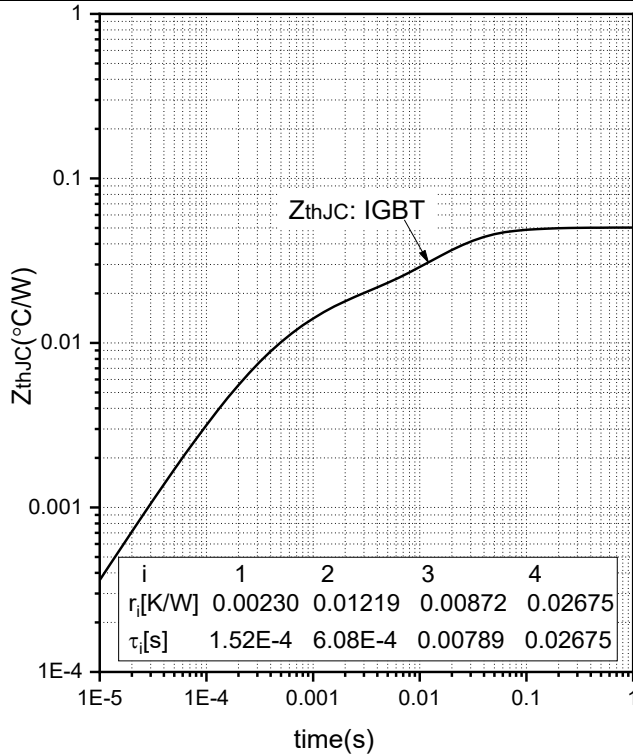


Fig.9 Transient Thermal Impedance (IGBT)

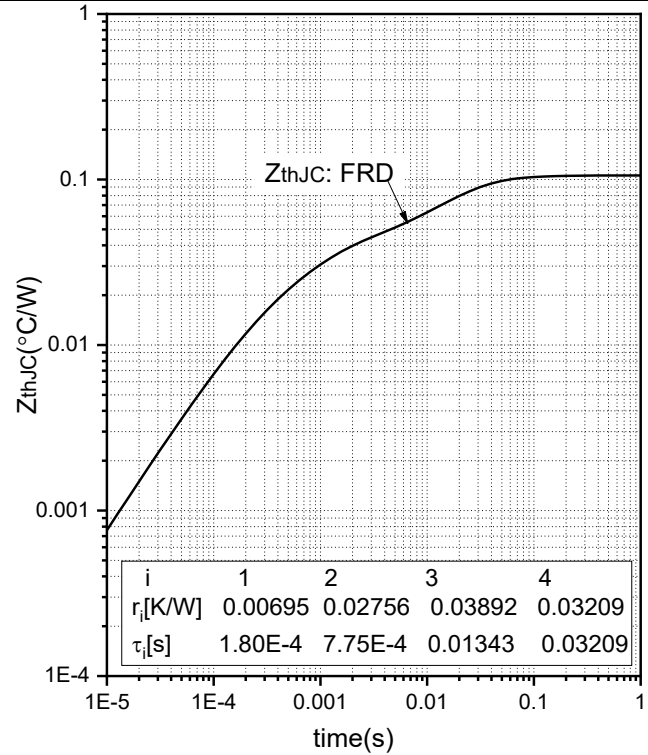


Fig.10 Transient Thermal Impedance (Diode)

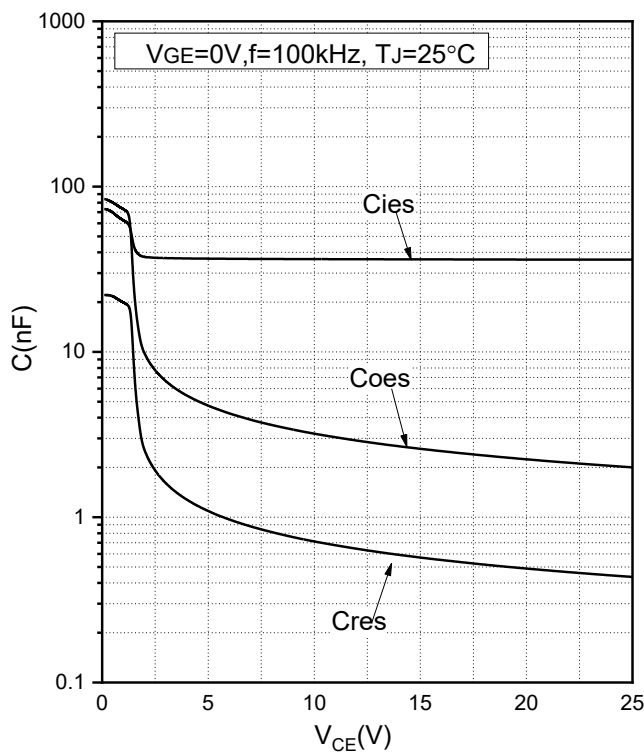


Fig.11 Capacitance Characteristics

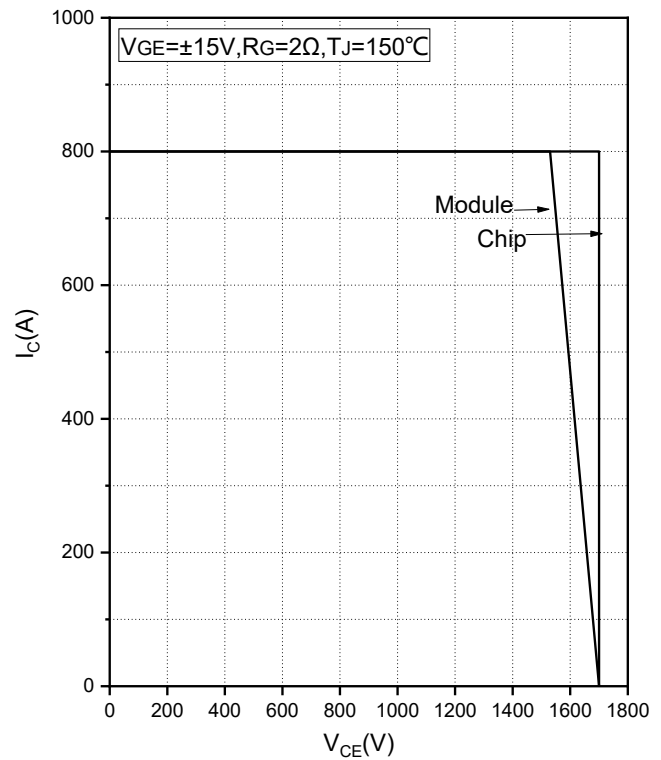


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

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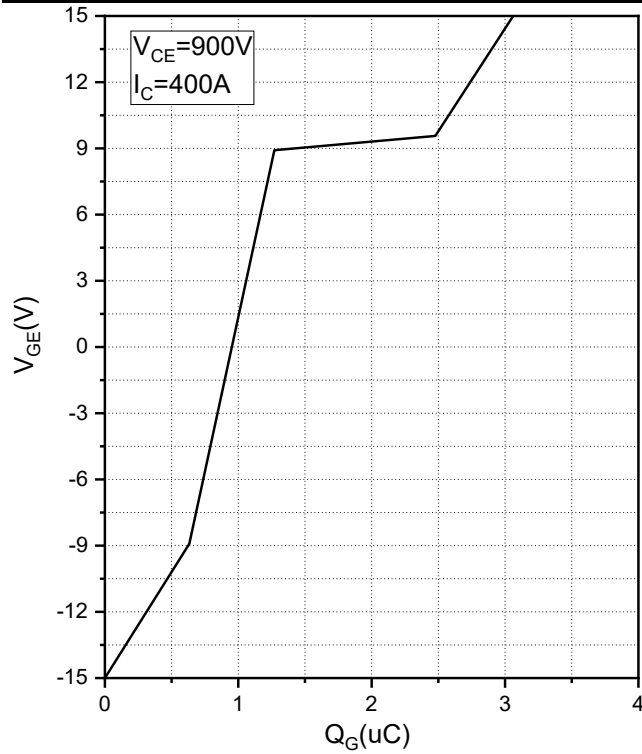


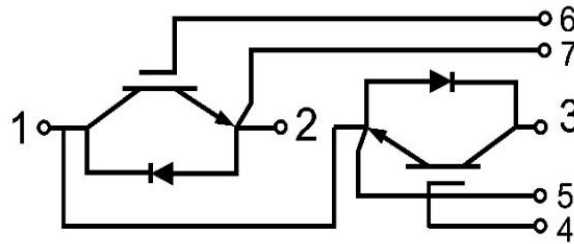
Fig.13 Gate Charge Characteristics

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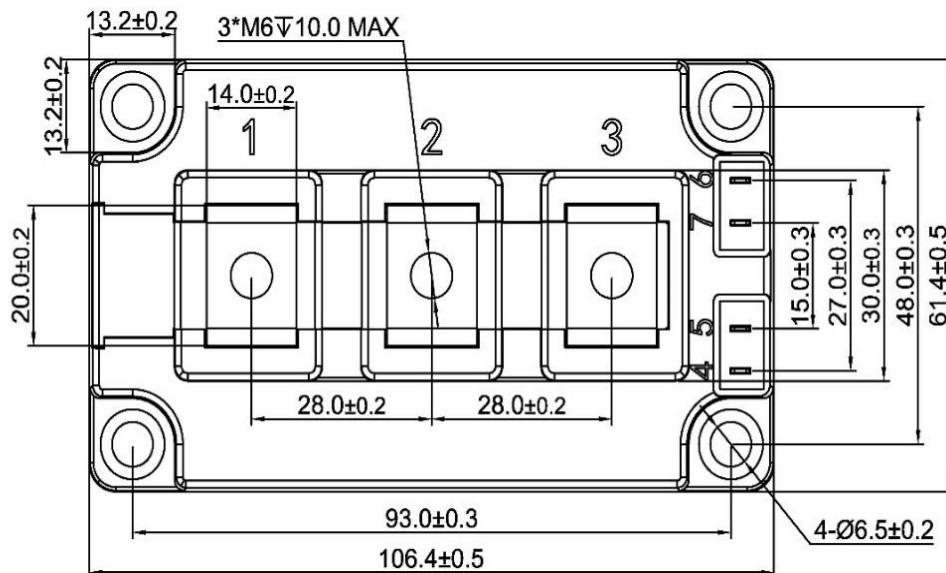
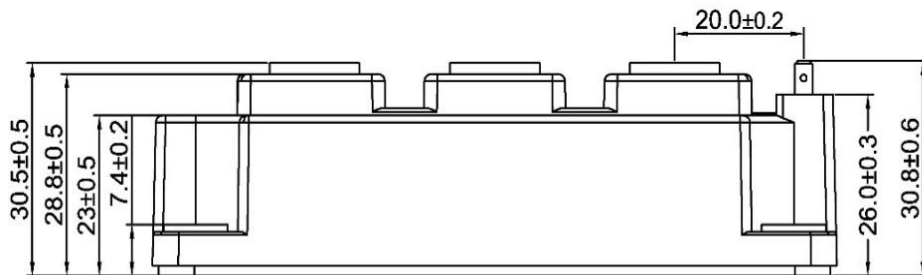
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Internal Circuit:



Package Outline (Unit: mm):



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Revision	Notes
02	Engineering Sample Datasheet

Announcement

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