



GT150HF65T1VH

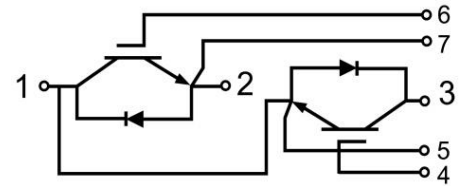
IGBT Module

Preliminary Data

Features:

- 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:

- High Power Converters
- Motor Drives
- UPS Systems
- Wind Turbines

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		650	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)	$T_c=25^\circ\text{C}$ $T_J=175^\circ\text{C}$	557	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	$I_C=2\text{mA}$, $V_{CE}=V_{GE}$	4.0	4.7	5.4	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.35	1.55	V
			$T_J=125^{\circ}\text{C}$	1.45		V
			$T_J=150^{\circ}\text{C}$	1.50		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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		10.4		nF
C_{oes}	Output Capacitance			0.62		nF
C_{res}	Reveres Transfer Capacitance			0.22		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=300V, I_C=150A,$ $R_G=6.8\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		276		ns
			$T_J=125^{\circ}C$		283		
			$T_J=150^{\circ}C$		307		
t_r	Rise Time		$T_J=25^{\circ}C$		131		ns
			$T_J=125^{\circ}C$		132		
			$T_J=150^{\circ}C$		142		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		314		ns
			$T_J=125^{\circ}C$		316		
			$T_J=150^{\circ}C$		331		
t_f	Fall Time		$T_J=25^{\circ}C$		137		ns
			$T_J=125^{\circ}C$		154		
			$T_J=150^{\circ}C$		157		
E_{on}	Turn-on Switching Loss	$V_{CC}=300V, I_C=150A,$ $R_G=6.8\Omega, V_{GE}=\pm 15V,$ $di/dt=968A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		2.5		mJ
		$T_J=125^{\circ}C$		2.8			
		$T_J=150^{\circ}C$		3.1			



E _{off}	Turn-off Switching Loss	V _{CC} =300V, I _C =150A, R _G =6.8Ω, V _{GE} =±15V, du/dt=2923V/μs(T _J =150°C), Inductive Load	T _J =25°C		4.0		mJ
			T _J =125°C		5.3		
			T _J =150°C		5.7		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		750		nC
R _{g internal}	Internal Gate Resistor				0		Ω
SCSOA	V _{CC} =300V, V _{GE} =+/-15V, R _G =6.8Ω, T _J =150°C			10			μs
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.27	°C/W

Diode, Inverter

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

V _{RRM}	Repetitive peak reverse voltage	T _J =25°C	650	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 FWD (T_C=25°C Unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =150A	T _J =25℃		1.85		V
			T _J =125℃		1.95		
			T _J =150℃		1.95		
t _{rr}	Reverse Recovery Time	I _F =150A, -diF/dt=1250A/μs(T _J =150℃), V _{rr} =300V, V _{GE} =-15V	T _J =25℃		124		ns
			T _J =125℃		158		
			T _J =150℃		171		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		45		A
			T _J =25℃		59		
			T _J =150℃		63		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		3.31		μC
			T _J =125℃		5.95		
			T _J =150℃		6.92		



E _{rec}	Reverse Recovery Energy	I _F =150A, -diF/dt=1250A/μs(T _J =150℃), V _{rr} =300V, V _{GE} =-15V	T _J =25℃		0.64		mJ
			T _J =125℃		1.05		
			T _J =150℃		1.19		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.48	℃/W

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				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T _{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.07	℃/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	T	150	HF	65	T1V	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (150=150A)
- ④ - Circuit Configuration: HF (Half Bridge)
- ⑤ - Rated Voltage (65=650V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

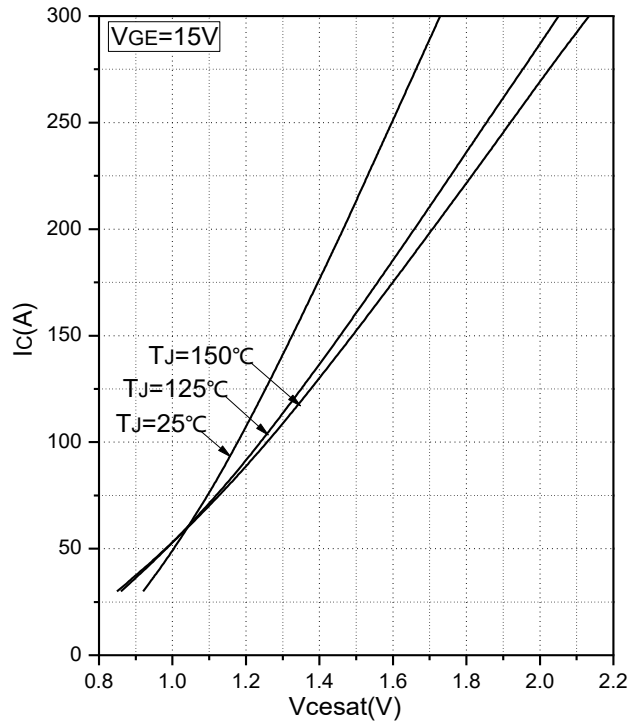


Fig.1 Typical Saturation Voltage Characteristics

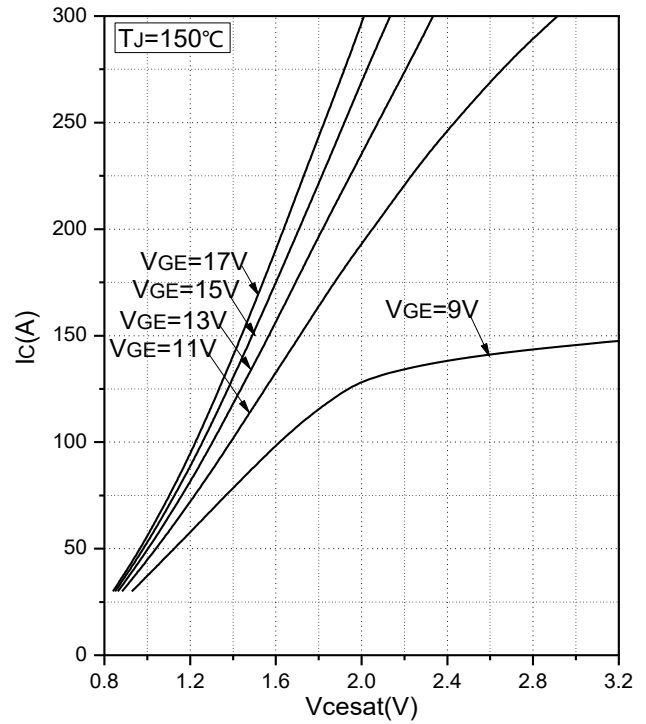


Fig.2 Typical Output Characteristics

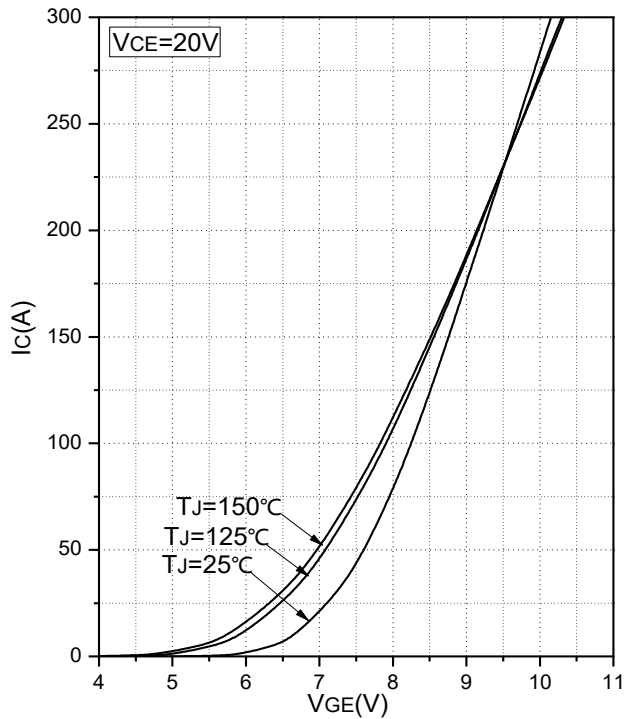


Fig.3 Transfer Characteristic

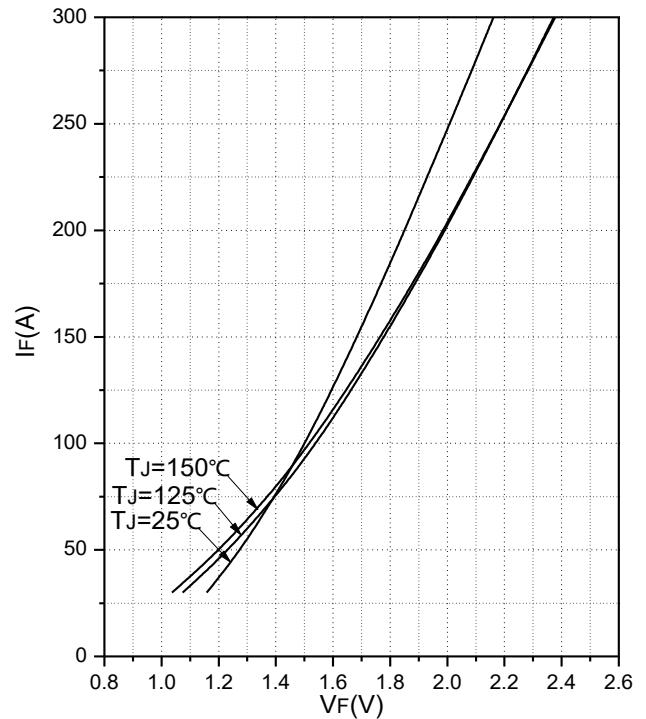


Fig.4 Forward Characteristics of Diode

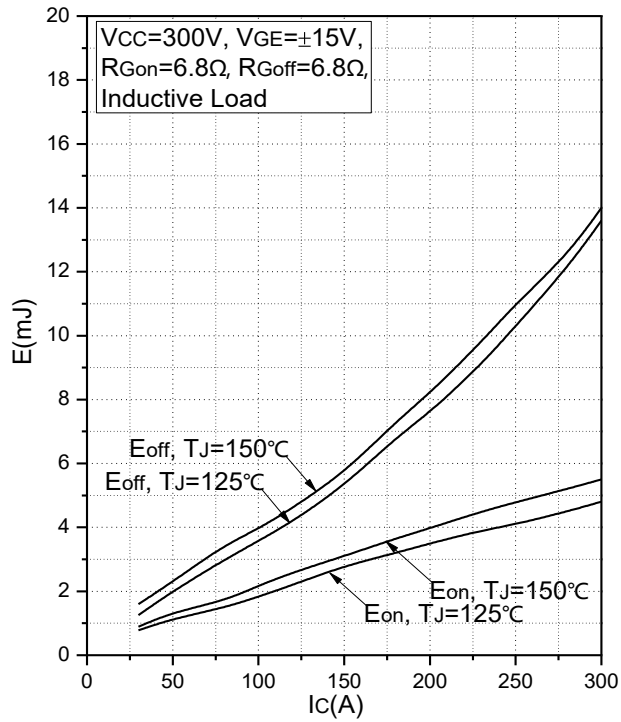


Fig.5 Typical Switching Loss vs. Collector Current

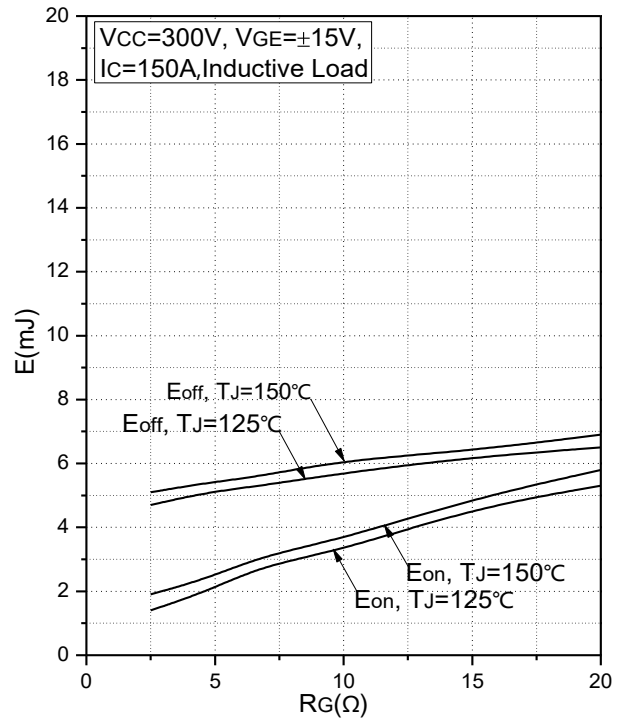


Fig.6 Typical Switching Loss vs. Gate Resistance

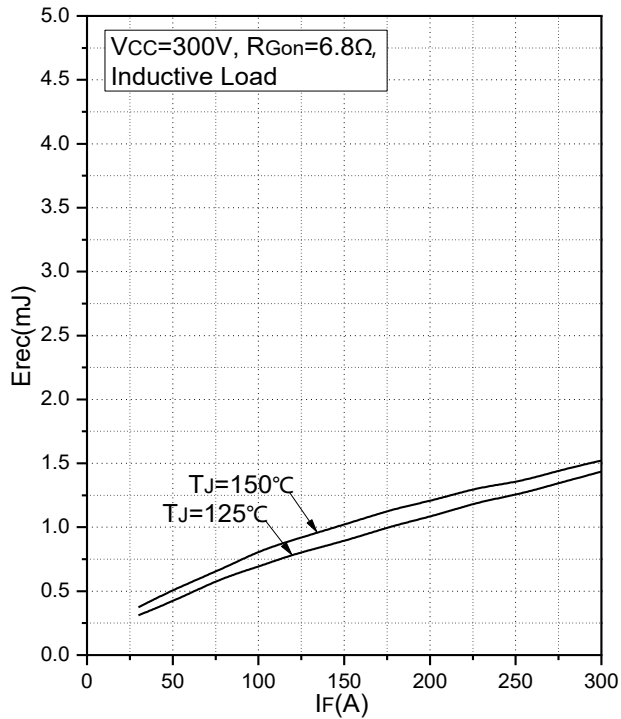


Fig.7 Typical Switching Losses vs. Forward Current

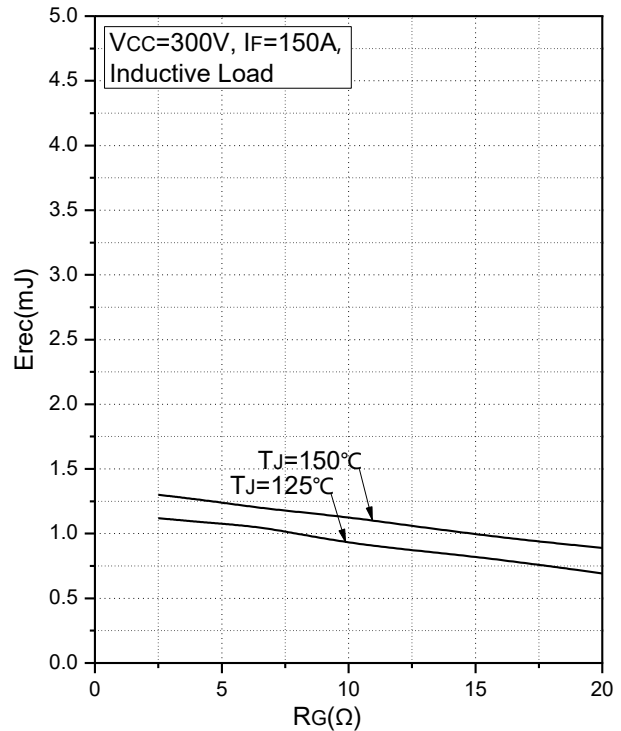


Fig.8 Typical Switching Loss vs. Gate Resistance

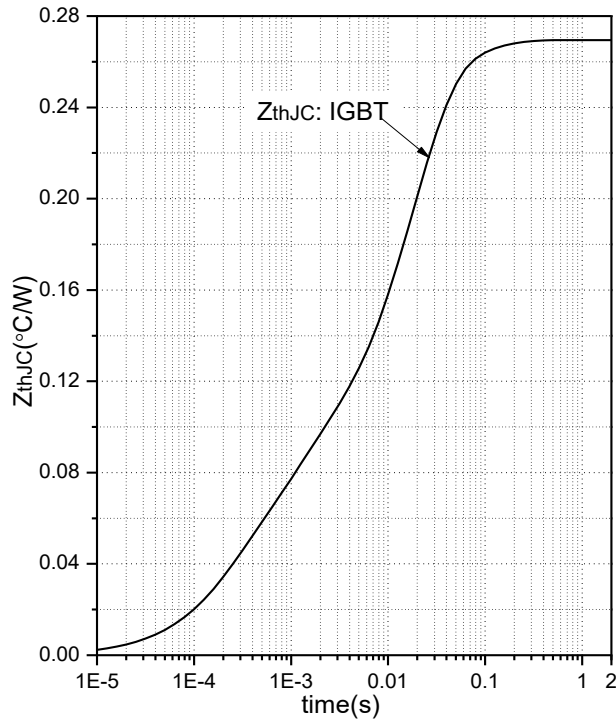


Fig.9 Transient Thermal Impedance (IGBT)

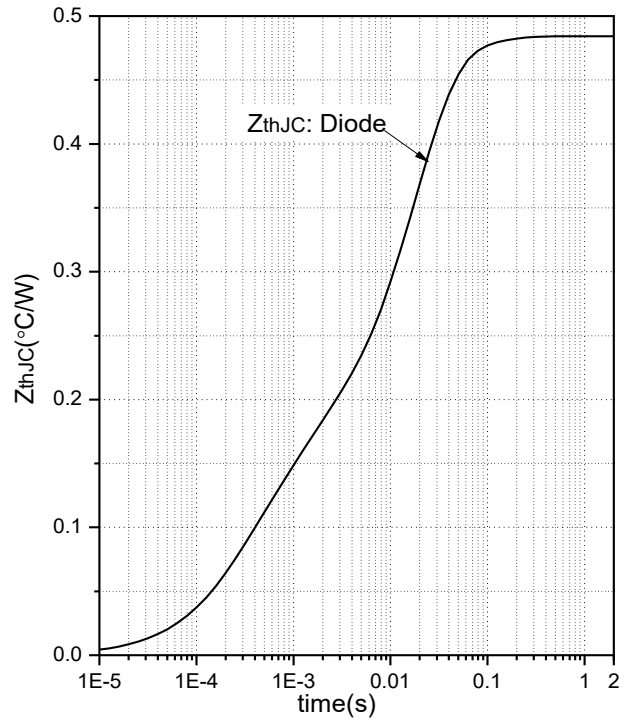


Fig.10 Transient Thermal Impedance (Reverse Diode)

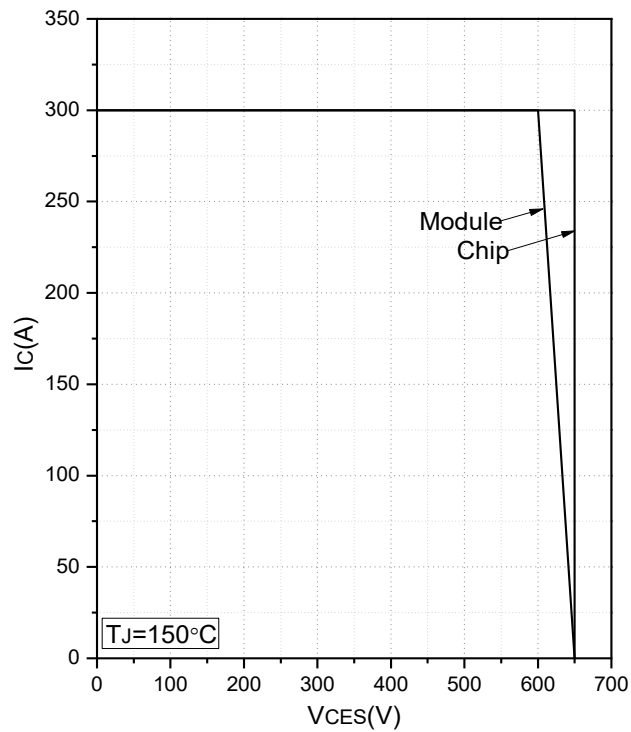


Fig.11 Reverse Bias Safe Operation Area (RBSOA)

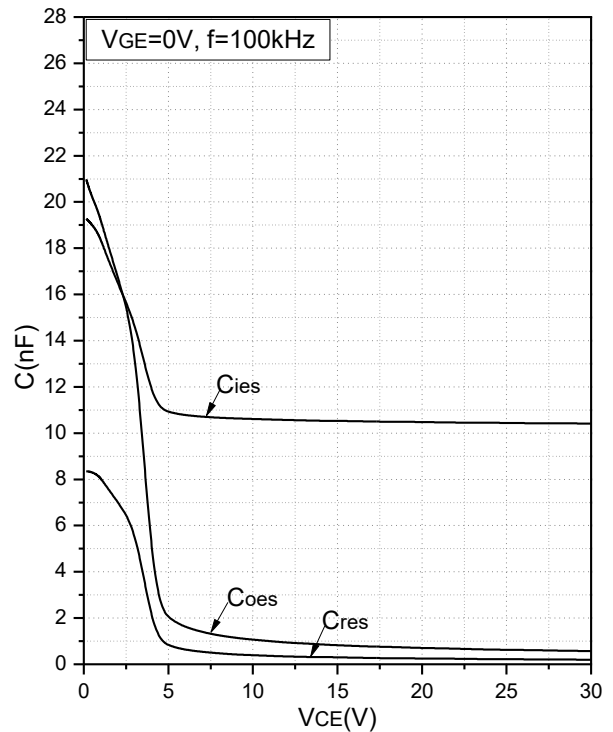
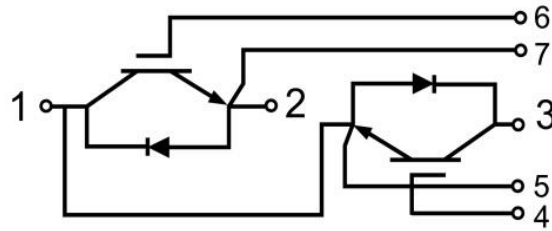


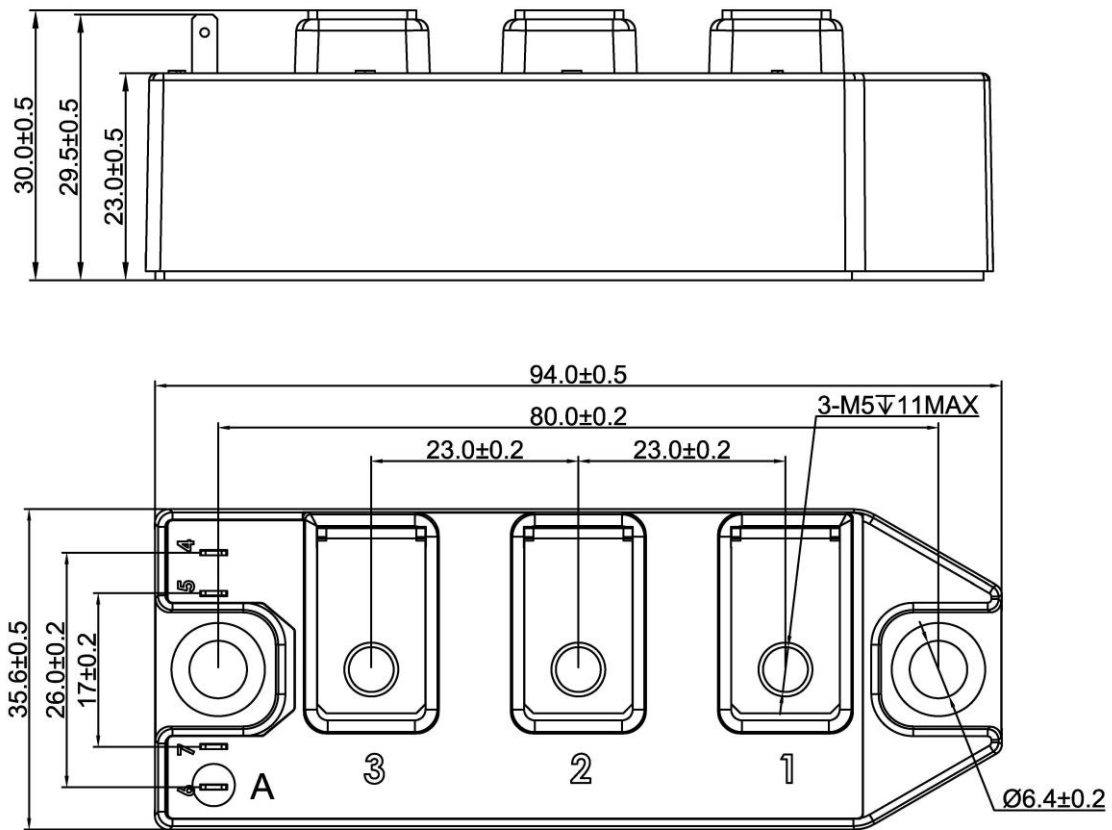
Fig.12 Capacitance Characteristics



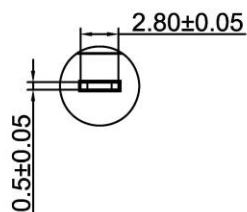
Internal Circuit



Package Outline (Unit: mm):



View A
scale 3:1





Revision	Notes
01	Initial Release

Announcements

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