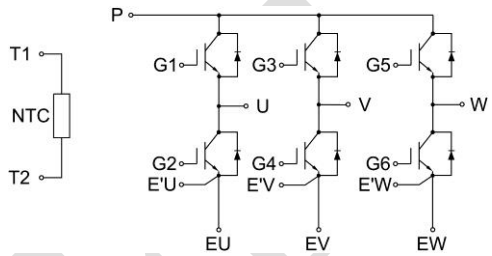
GT40FF120B3H

IGBT Module

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated >10μs
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2×Ic)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Motor Drives
- Air Conditioning
- Servo Drives
- UPS

IGBT, Inverter
Maximum Rated Values

V_{CES}	Collector-Emitter Blocking Voltage	T_J=25℃	1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	40	A
		T_C=25℃	80	A
I_{CM}	Peak Collector Current Repetitive	tp=1ms	80	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	360	W

Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1mA, V_{CE}=V_{GE}, T_J=25℃		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=40A, V_{GE}=15V	T_J=25℃		1.80	2.10	V
			T_J=125℃		2.10		
			T_J=150℃		2.20		
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=±20V, V_{CE}=0V, T_J=25℃				200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25℃			3.44		nF
C_{oes}	Output Capacitance				0.51		
C_{res}	Reverse Transfer Capacitance				0.32		

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=40A, R_{Gon}=15Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		92		ns
			T_J=125℃		93		
			T_J=150℃		94		
t_r	Rise Time		T_J=25℃		46		ns
			T_J=125℃		50		
			T_J=150℃		50		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=40A, R_{Goff}=15Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		183		ns
			T_J=125℃		185		
			T_J=150℃		189		
t_f	Fall Time		T_J=25℃		258		ns
			T_J=125℃		310		
			T_J=150℃		315		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=40A, R_{Gon}=15Ω, V_{GE}=±15V, di/dt=720A/μs(T_J=150℃), Inductive Load	T_J=25℃		2.48		mJ
			T_J=125℃		2.68		
			T_J=150℃		3.05		

E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=40A, R_{Goff}=15Ω, V_{GE}=±15V, du/dt=2880V/μs(T_J=150℃), Inductive Load	T_J=25℃		3.21		mJ
			T_J=125℃		3.77		
			T_J=150℃		3.97		
Q_g	Total Gate Charge	V_{GE}=-15V…+15V	T_J=25℃		457		nC
RBSOA	I_C=80A, V_{CC}=1050V, V_P=1200V, R_G=15Ω, V_{GE}=+15V to 0V, T_J=150℃			Trapezoid			
I_{SC}	V_{CC}=600V, V_{GE} = ±15V, tp=10us, R_{Gon}=56Ω, R_{Goff}=56Ω, T_J=25℃				175		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-to-Case					0.417	℃/W

Diode, Inverter

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current		40	A
I_{FM}	Peak FWD Current Repetitive	tp=1ms	80	A

Electrical Characteristics of FWD (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F=40A	T_J=25℃		1.80	2.10	V
			T_J=125℃		1.90		
			T_J=150℃		1.90		
I_{rr}	Peak Reverse Recovery Current	I_F=40A, di/dt=830A/μs(T_J=150℃), V_{rr}=600V, V_{GE}=-15V	T_J=25℃		53.7		A
			T_J=125℃		62.5		
			T_J=150℃		63.8		
t_{rr}	Reverse Recovery Time		T_J=25℃		164		ns
			T_J=125℃		186		
			T_J=150℃		186		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		4.53		μC
			T_J=125℃		6.31		
			T_J=150℃		6.54		

E_{rec}	Reverse Recovery Energy	I_F=40A, di/dt=830A/μs(T_J=150℃), V_{rr}=600V, V_{GE}=-15V	T_J=25℃		1.56		mJ
			T_J=125℃		2.14		
			T_J=150℃		2.45		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-to-Case					0.584	℃/W

Internal NTC-Thermistor Characteristics

Symbol	Description		Min.	Typ.	Max.	Units.
R_{25}	Rated Resistance	T_C=25℃		5		kΩ
△R/R	Deviation of R100	T_C=100℃，R_{100}=481Ω	-5		5	%
P_{25}	Power Dissipation	T_C=25℃			10	mW
$B_{25/50}$	B-Value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
$B_{25/80}$	B-Value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K

Module

Symbol	Description		Min.	Typ.	Max.	Units
V_{IOS}	Isolation Voltage (All Terminals Shorted)	AC Test Voltage, t=30s	4500			V
Internal Isolation				Al_2O_3		
d_{creep}	Creepage Distance: Terminal to Heatsink			11.5		mm
	Creepage Distance: Terminal to Terminal			6.3		
d_{clear}	Clearance: Terminal to Heatsink			10.0		mm
	Clearance: Terminal to Terminal			5.0		
L_{SCE}	Stray Inductance Module			25		nH
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			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.08	℃/W
M	Mounting Torque for solder pins Module Mounting	Screw M4--Mounting according to valid application note	1.5		1.8	N·m
	Mounting Torque for press-fit pins Module Mounting	Screw M4--Mounting according to valid application note	1.0		1.5	N·m
G	Weight			23		g

Ordering Information Table

Device code

G	T	40	FF	120	B3	H
①	②	③	④	⑤	⑥	⑦

① - IGBT Module
② - Trench, Low Switching Losses IGBT
③ - Rated Current (40=40A)
④ - Circuit Configuration (FF=Full Bridge)
⑤ - Rated Voltage (120=1200V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

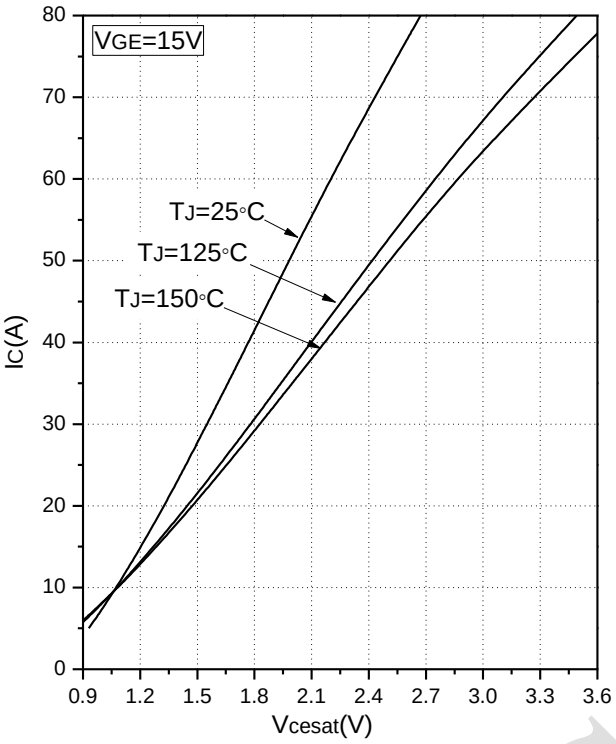


Fig.1 Typical Saturation Voltage Characteristics

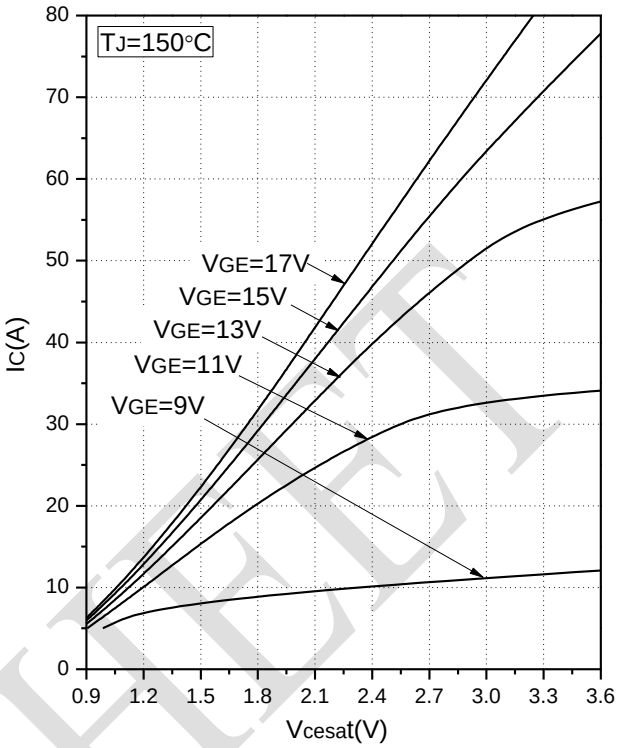


Fig.2 Typical Output Characteristics

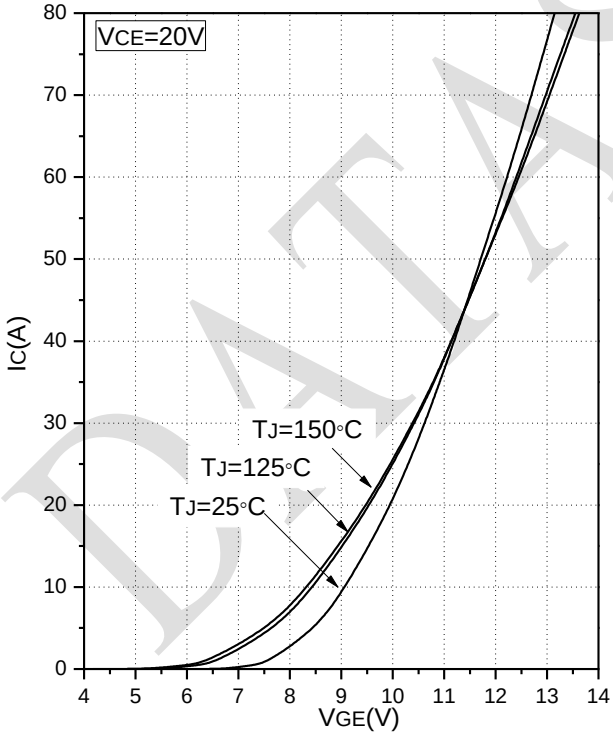


Fig.3 Forward Characteristics of FWD

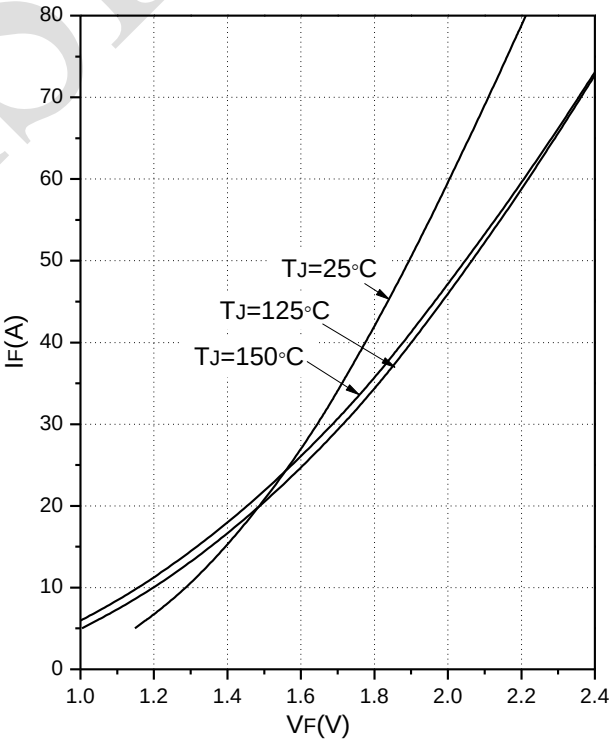


Fig.4 Forward Characteristics of FWD

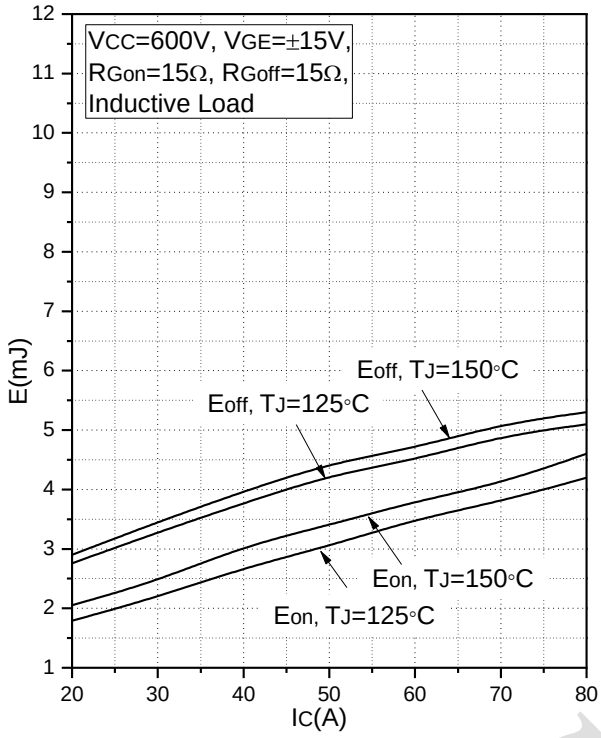


Fig.5 Typical Switching Loss vs. Collector Current

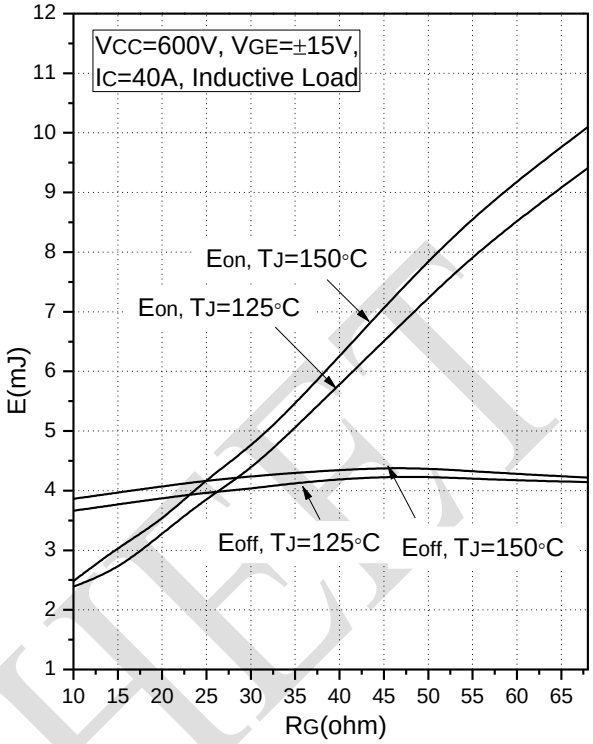


Fig.6 Typical Switching Loss vs. Gate Resistance

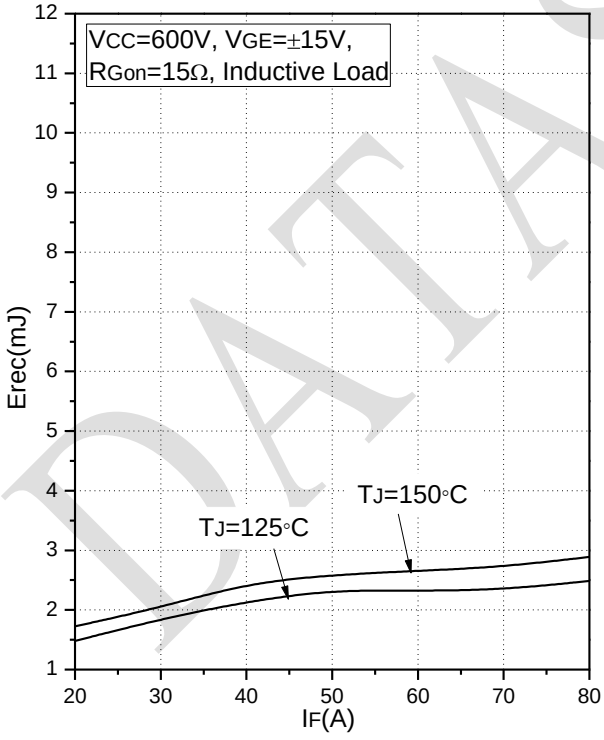


Fig.7 Typical Switching Loss vs. Forward Current

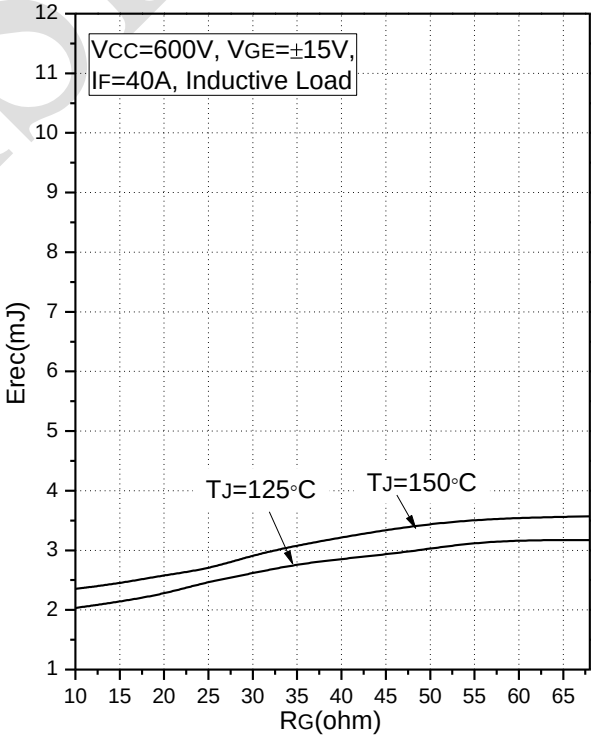


Fig.8 Typical Switching Loss vs. Gate Resistance

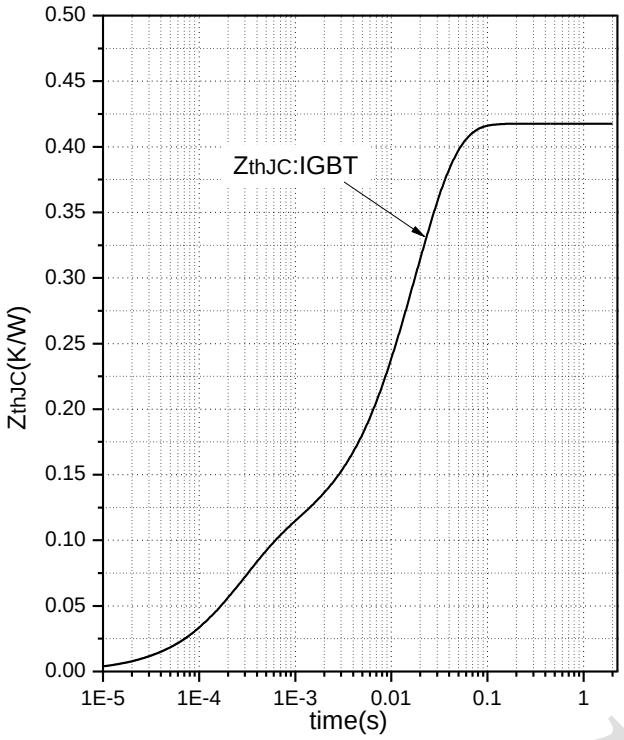


Fig.9 Transient Thermal Impedance

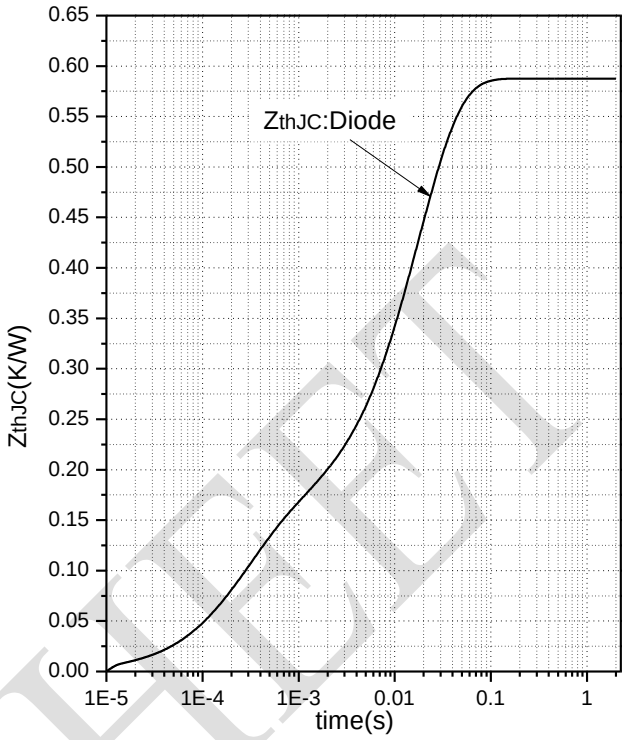


Fig.10 Transient Thermal Impedance

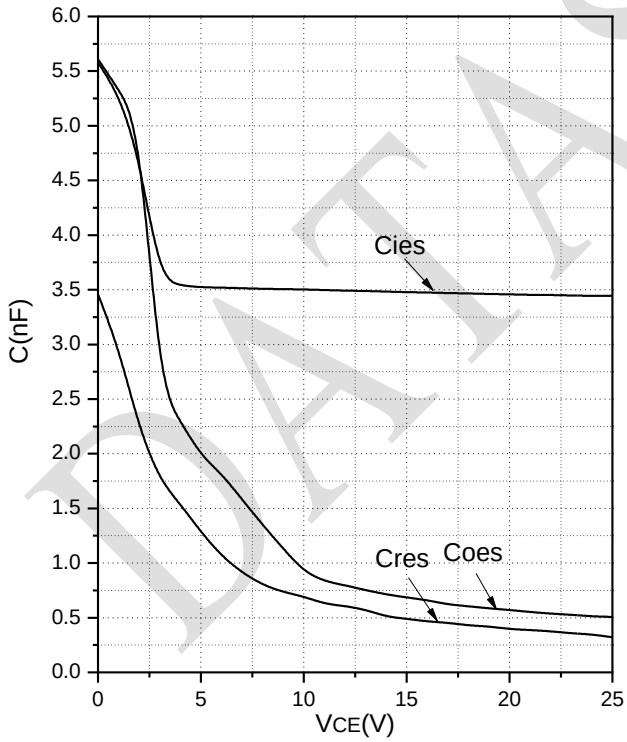


Fig.11 Capacitance Characteristics

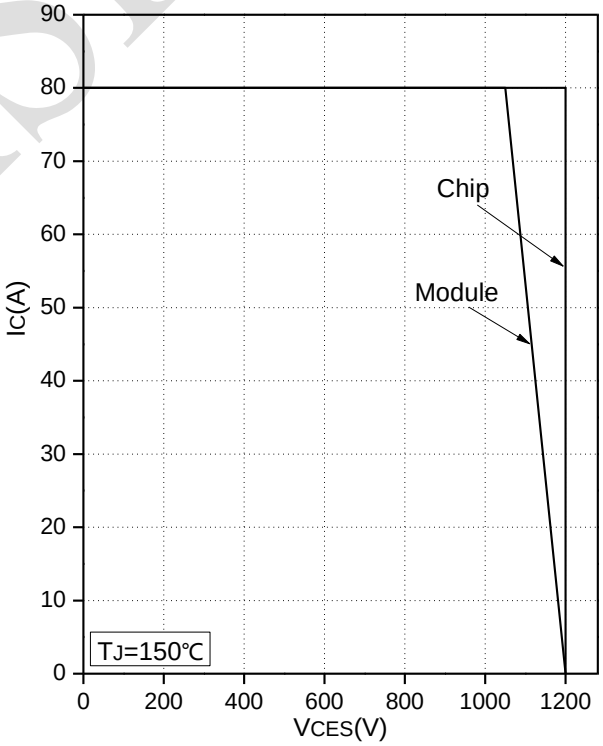


Fig.12 Reverse Bias Safe Operation Area (RBSOA)

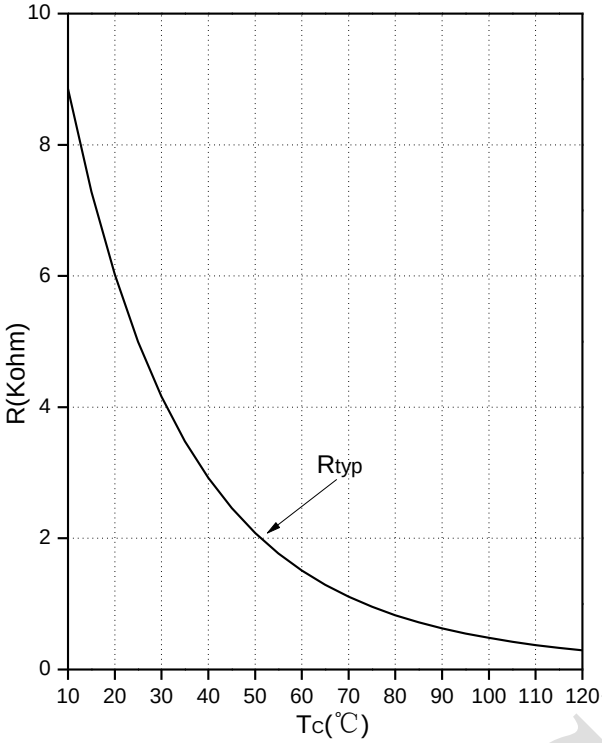
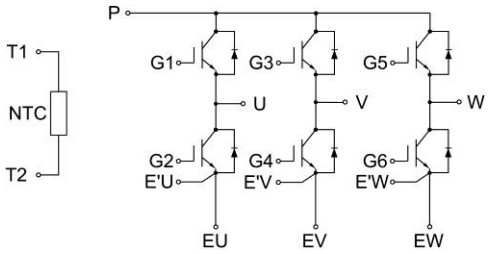


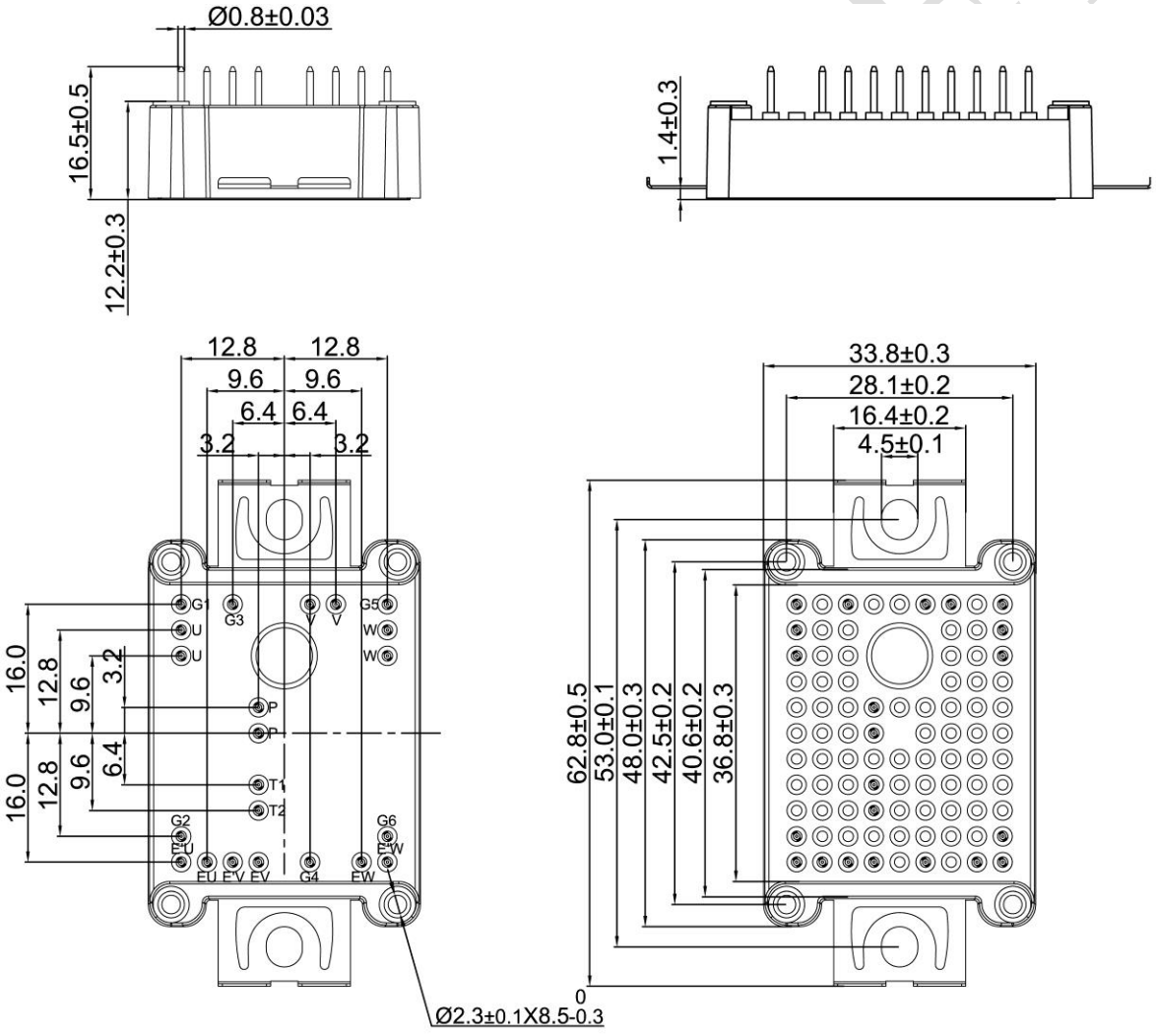
Fig.13 NTC Temperature Characteristics

Internal Circuit:



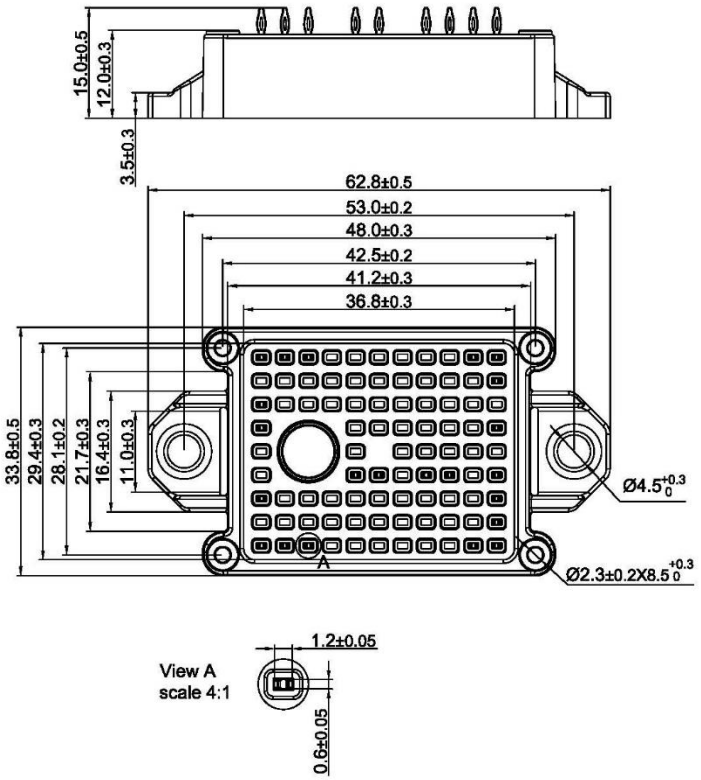
Package Outline (Unit: mm):

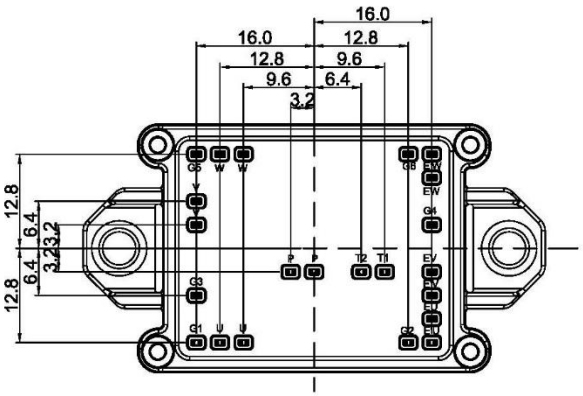
Pins type Ⅰ--Solder pins



Pinpositions with tolerance of ⌖ Ø 0.4

Pins type Ⅱ--Press-fit pins





Date	Revision	Notes
05/31/2023	01	Initial Release

Announcements

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