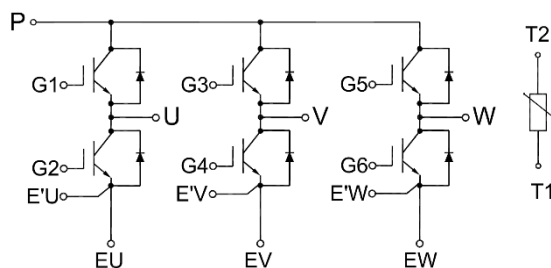




Features:

- ### Circuit Diagram



- Motor Drives
- UPS
- Air Conditioning
- Auxiliary Inverters

IGBT, Inverter Maximum Rated Values

V _{CES}	Collector-Emitter Blocking Voltage		1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	40	A
		T _C =25°C	80	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	80	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	355	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.5mA, V_{CE}=V_{GE}, T_J=25^{\circ}C$	5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=40A, V_{GE}=15V$				V
		$T_J=25^{\circ}C$		1.90	2.30	
		$T_J=125^{\circ}C$		2.40		
		$T_J=150^{\circ}C$		2.50		
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	$V_{GE}=20V, V_{CE}=0V, T_J=25^{\circ}C$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25^{\circ}C$		2.19		nF
C_{oes}	Output Capacitance			0.19		
C_{res}	Reverse Transfer Capacitance			0.04		

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=40A, R_{Gon}=36\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^{\circ}C$		114		ns
			$T_J=125^{\circ}C$		126		
			$T_J=150^{\circ}C$		130		
t_r	Rise Time	$V_{CC}=600V, I_C=40A, R_{Gon}=36\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^{\circ}C$		88		ns
			$T_J=125^{\circ}C$		96		
			$T_J=150^{\circ}C$		102		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=40A, R_{Goff}=36\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^{\circ}C$		338		ns
			$T_J=125^{\circ}C$		362		
			$T_J=150^{\circ}C$		364		
t_f	Fall Time	$V_{CC}=600V, I_C=40A, R_{Goff}=36\Omega, V_{GE}=\pm 15V, \text{Inductive Load}$	$T_J=25^{\circ}C$		90		ns
			$T_J=125^{\circ}C$		110		
			$T_J=150^{\circ}C$		114		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=40A, R_{Gon}=36\Omega, V_{GE}=\pm 15V, di/dt=385A/\mu s(T_J=150^{\circ}C), \text{Inductive Load}$	$T_J=25^{\circ}C$		3.7		mJ
			$T_J=125^{\circ}C$		4.1		
			$T_J=150^{\circ}C$		4.3		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =40A, R _{Goff} =36Ω, V _{GE} =±15V, du/dt=3855V/μs(T _J =150°C), Inductive Load	T _J =25°C		2.3		mJ
			T _J =125°C		2.5		
			T _J =150°C		2.9		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		457		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =±15V, t _p =10us, T _J =150°C				162		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.42	°C/W

FWD, Inverter Maximum Rated Values

Symbol	Description	Conditions	Values	Units
V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		40	A
I _{FM}	Peak FWD Current Repetitive	t _p =1ms	80	A

Electrical Characteristics of Diode

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =40A	T _J =25℃		1.70		V
			T _J =125℃		1.85		
			T _J =150℃		1.85		
I _{rr}	Peak Reverse Recovery Current	I _F =40A, di/dt=432A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		24.3		A
			T _J =125℃		25.4		
			T _J =150℃		25.8		
t _{rr}	Reverse Recovery Time		T _J =25℃		174		ns
			T _J =125℃		190		
			T _J =150℃		208		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.2		μC
			T _J =125℃		2.4		
			T _J =150℃		2.8		



E _{rec}	Reverse Recovery Energy	I _F =40A, di/dt=432A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		0.17		mJ
			T _J =125℃		0.18		
			T _J =150℃		0.20		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.68	℃/W

Internal NTC-Thermistor Characteristics

Symbol	Conditions	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



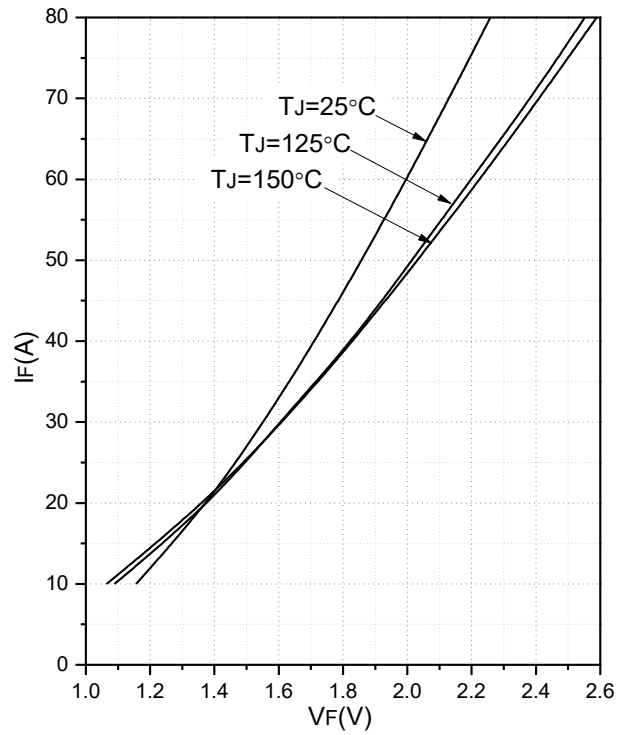
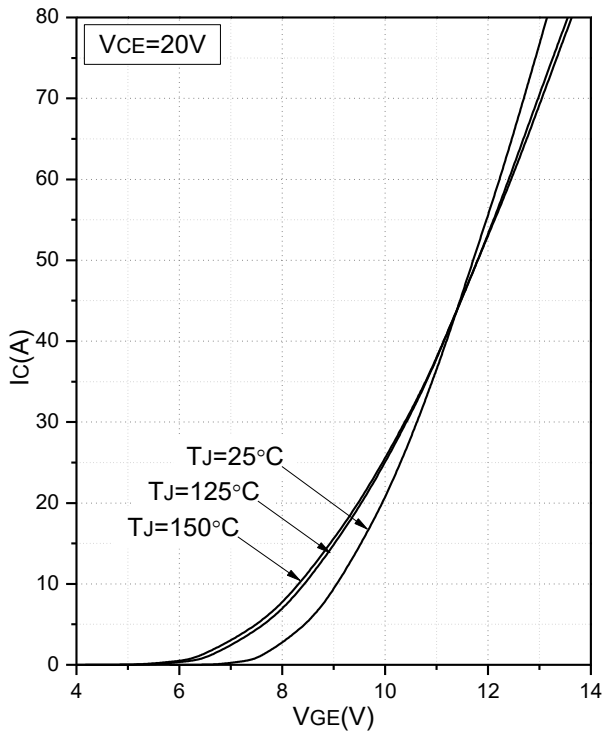
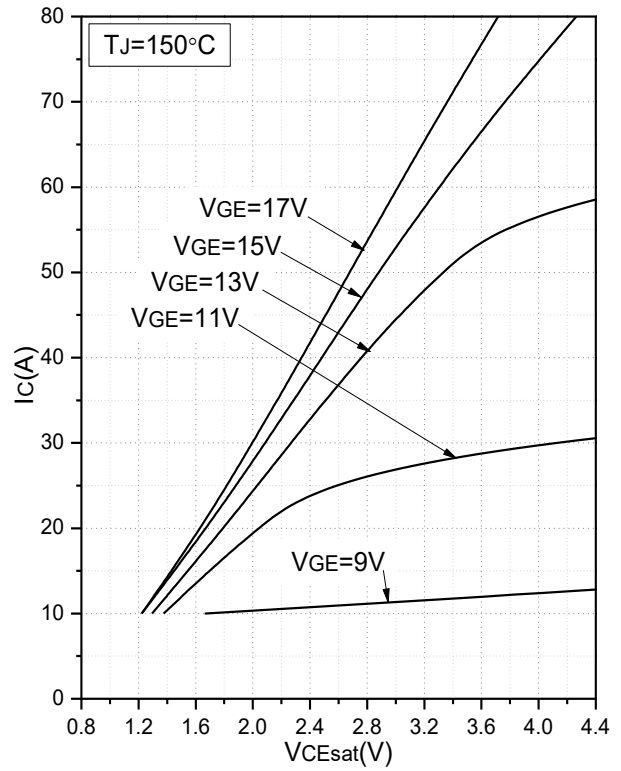
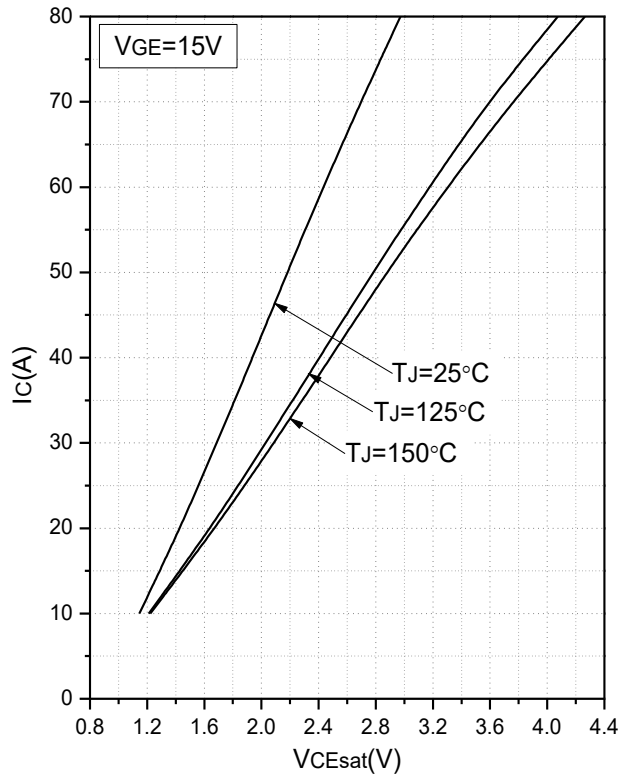
Module

Symbol	Description	Min.	Typ.	Max.	Units
V _{IOS}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute		2500	V
T _J	Maximum Junction Temperature			175	°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 Torque:M4	1.5		1.8	N·m
G	Weight		40		g

Ordering Information Table

Device code	G	T	40	FF	120	B9	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop 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)



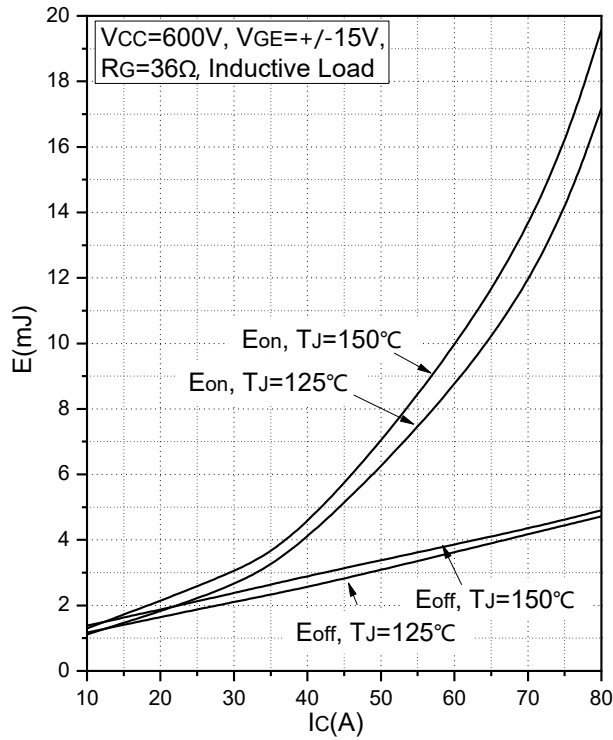


Fig.5 Typical Switching Loss vs. Collector Current(Inverter)

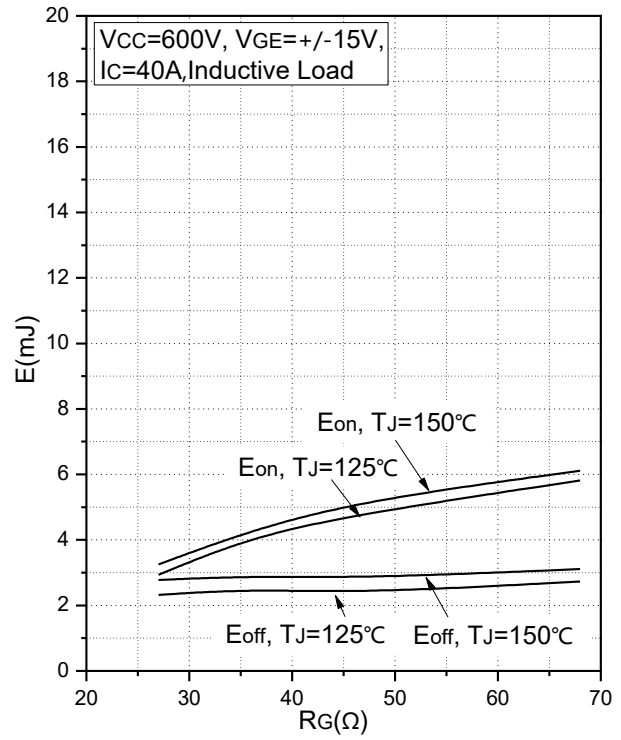


Fig.6 Typical Switching Loss vs. Gate Resistance(Inverter)

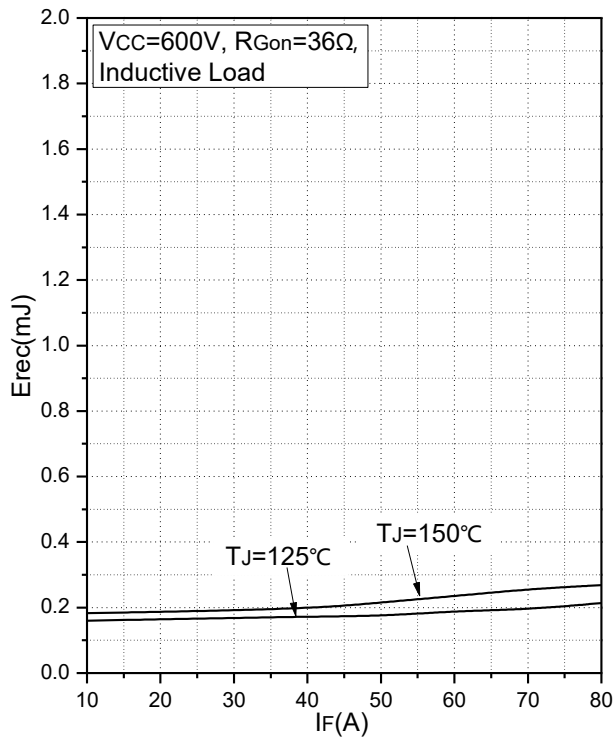


Fig.7 Typical Switching Loss vs. Forward Current(Inverter)

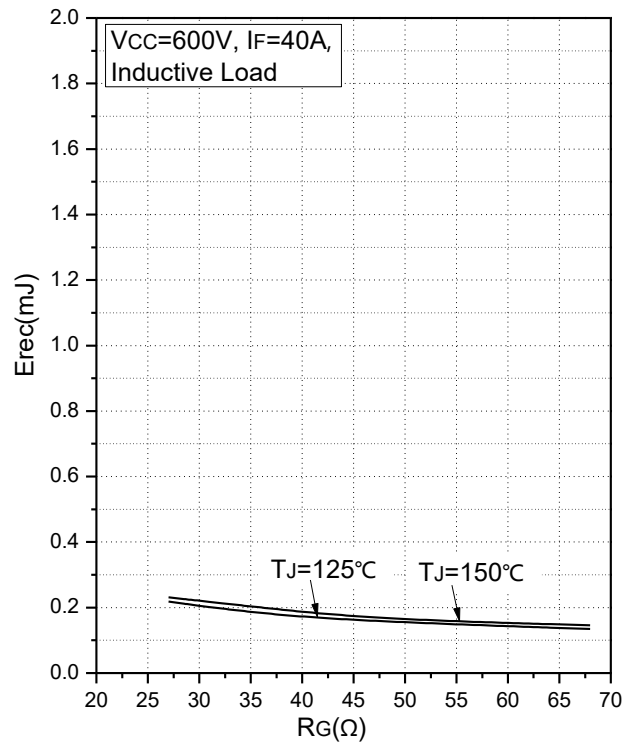
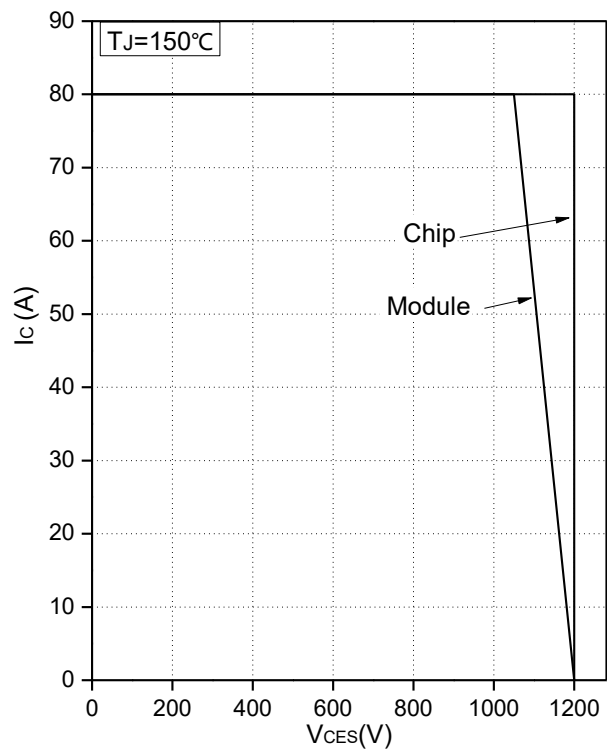
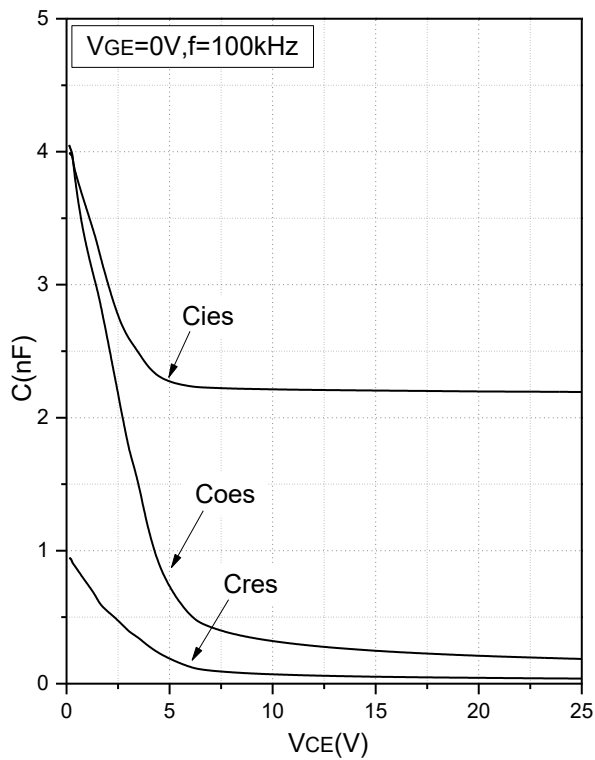
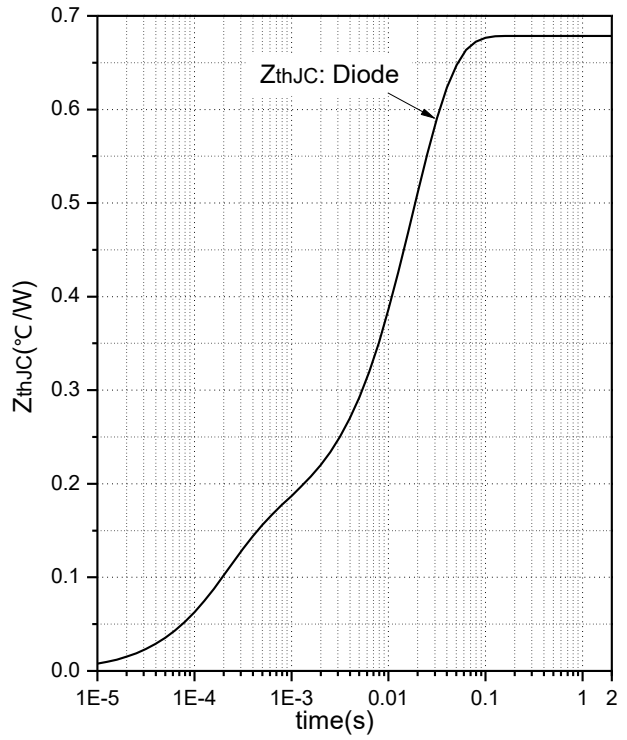
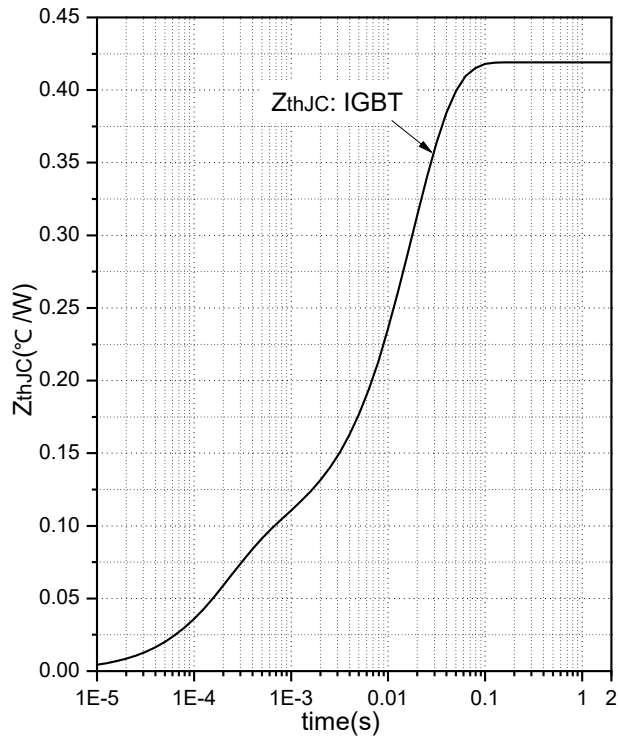


Fig.8 Typical Switching Loss vs. Gate Resistance(Inverter)



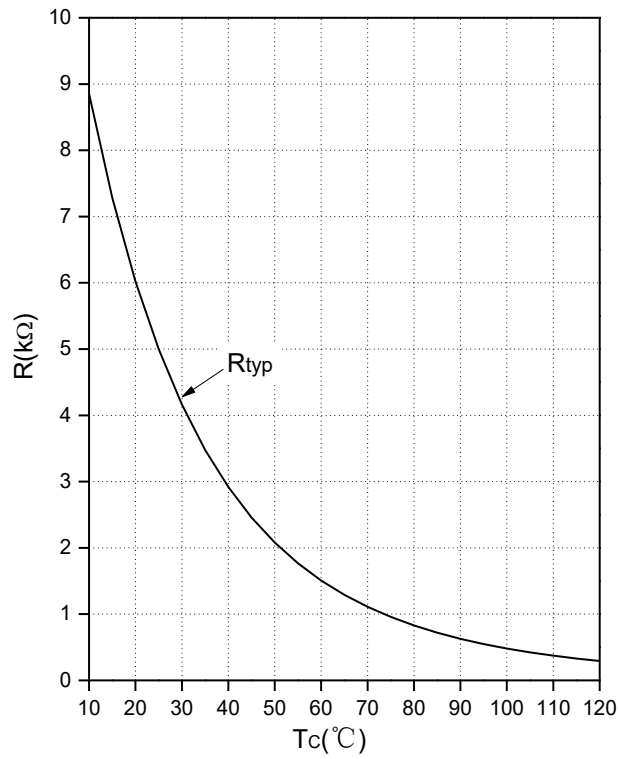
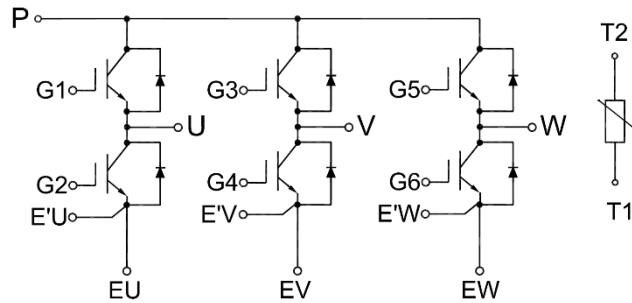


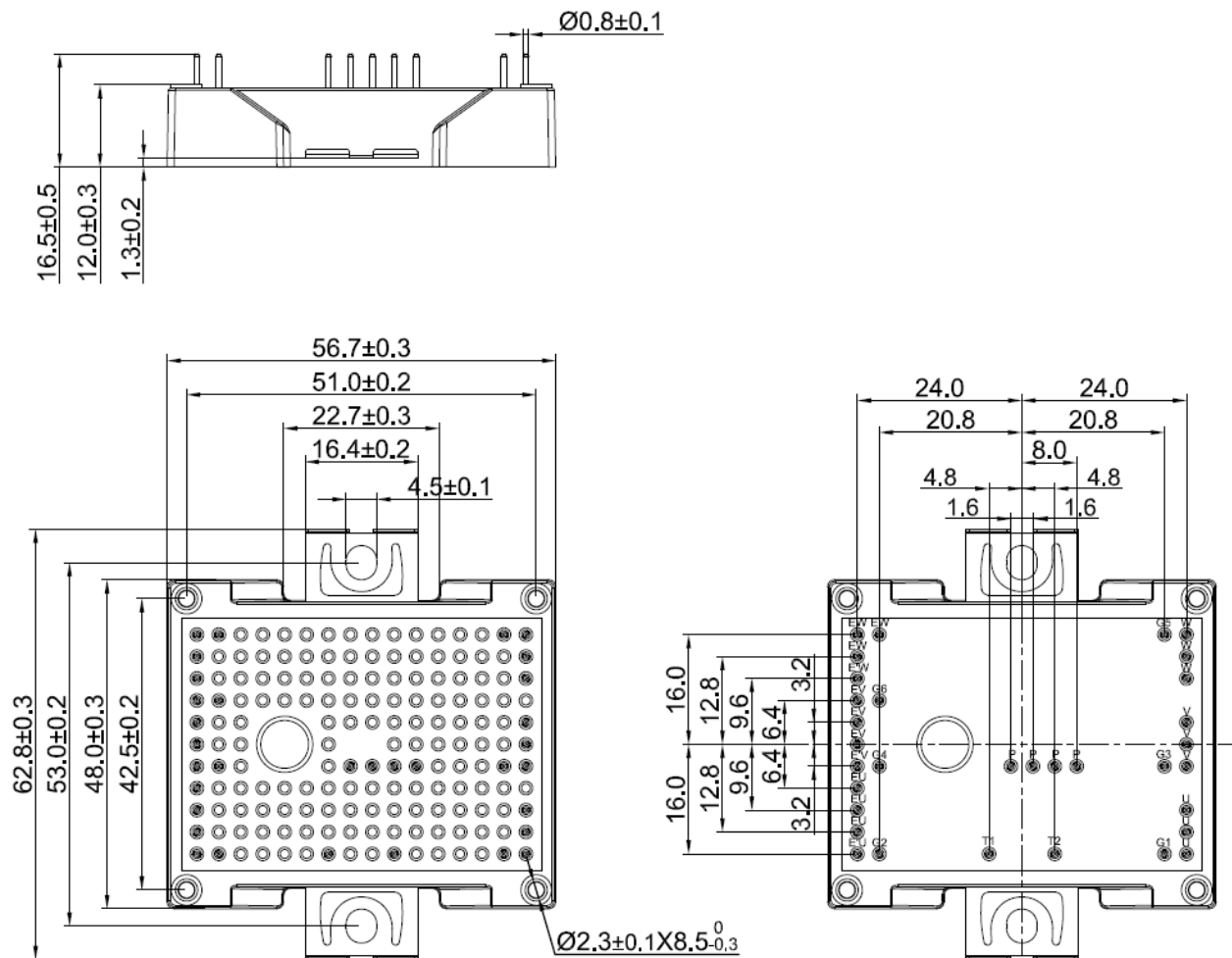
Fig.13 NTC Temperature Characteristics



Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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