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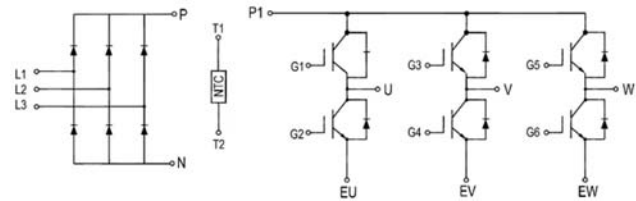
IGBT Module

Preliminary Data

Features:

- Field Stop Trench Gate IGBT
- 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:

- Industrial Inverters

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^\circ\text{C}$	15	A
		$T_C=25^\circ\text{C}$	30	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	30	A
P_D	Maximum Power Dissipation per IGBT	$T_C=25^\circ\text{C}$, $T_{Jmax}=175^\circ\text{C}$	199	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	$I_C=1\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.9	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=15\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.85	2.00	V
			$T_J=125^{\circ}\text{C}$	2.05		V
			$T_J=150^{\circ}\text{C}$	2.10		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	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			100	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		1.45		nF
C_{oes}	Output Capacitance			0.10		nF
C_{res}	Reverse Transfer Capacitance			0.06		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=15A,$ $R_{Gon}=36\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		85		ns
			$T_J=125^{\circ}C$		89		
			$T_J=150^{\circ}C$		92		
t_r	Rise Time		$T_J=25^{\circ}C$		50		ns
			$T_J=125^{\circ}C$		52		
			$T_J=150^{\circ}C$		53		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=15A,$ $R_{Goff}=36\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		137		ns
			$T_J=125^{\circ}C$		146		
			$T_J=150^{\circ}C$		151		
t_f	Fall Time		$T_J=25^{\circ}C$		222		ns
			$T_J=125^{\circ}C$		290		
			$T_J=150^{\circ}C$		428		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=15A,$ $R_{Gon}=36\Omega, V_{GE}=\pm 15V,$ $di/dt=232A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		2.35		mJ
			$T_J=125^{\circ}C$		3.03		
			$T_J=150^{\circ}C$		3.29		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =15A, R _{Goff} =36Ω, V _{GE} =±15V, du/dt=1984V/μs(T _J =150°C), Inductive Load	T _J =25°C		0.70		mJ
			T _J =125°C		1.23		
			T _J =150°C		1.28		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		354		nC
R _G	Internal Gate Resistance				0		Ω
RBSOA	I _C =30A, V _{CC} =1050V, V _p =1200V, R _G =36Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid			
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _{Gon} =36Ω, R _{Goff} =36Ω, T _J =125°C			10			μs
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.753	°C/W

Diode, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	15	A
I _{FM}	Diode Maximum Forward Current	30	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 =15A	T _J =25℃		1.90		V
			T _J =125℃		2.05		
			T _J =150℃		2.00		
t _{rr}	Reverse Recovery Time	I _F =15A, -diF/dt=344A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		154		ns
			T _J =125℃		159		
			T _J =150℃		206		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		7.8		A
			T _J =125℃		12.2		
			T _J =150℃		12.8		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		0.83		μC
			T _J =125℃		1.22		
			T _J =150℃		1.47		



E _{rec}	Reverse Recovery Energy	I _F =15A, -diF/dt=344A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		0.10		mJ
			T _J =125℃		0.15		
			T _J =150℃		0.17		
R _{θJC}	Thermal Resistance: Junction-To-Case (per Diode)					1.127	℃/W

Diode, Rectifier

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1600	V
I _F	Diode Continuous Forward Current	T _J =25°C	10	A
I _{FRMSM}	Maximum RMS Forward Current per Chip	T _J =80°C	20	A
I _{RMSM}	Maximum RMS Current at Rectifier Output	T _J =80°C	30	A
I _{FSM}	Surge Current @t _p =10ms	T _J =25°C	300	A
		T _J =150°C	250	
I ² t	I ² t - value	T _J =25°C	450	A ² s
		T _J =150°C	312	

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

V _F	Forward Voltage	I _F =10 A	T _J =25°C		1.05		V
			T _J =150°C		1.00		
I _R	Reverse Current	V _R =1600V	T _J =25°C			1	mA
R _{θJC}	Thermal Resistance: Junction-To-Case (per Diode)					0.944	°C/W



Internal NTC-Thermistor Characteristics

R ₂₅	T _C =25℃	5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =465Ω		±5	%
P ₂₅	T _C =25℃	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 _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 30s	4500			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)				0.08	℃/W
T	Mounting Screw:M4		1.5		1.8	N·m
G	Weight			23		g

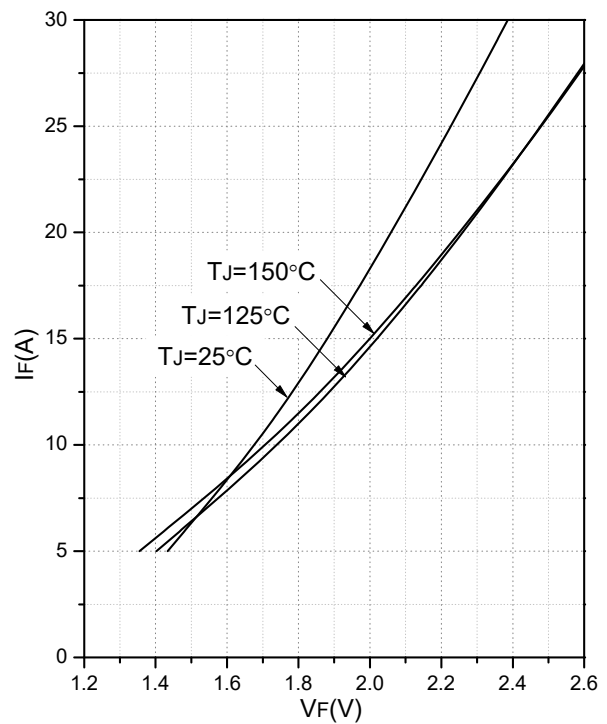
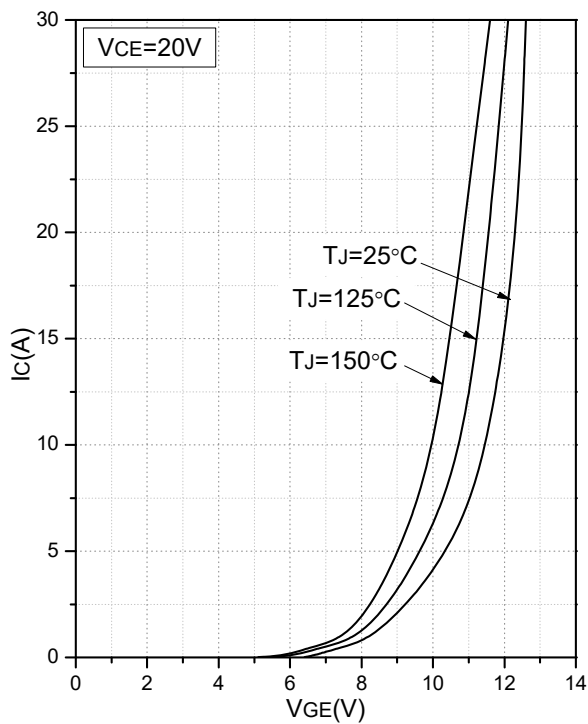
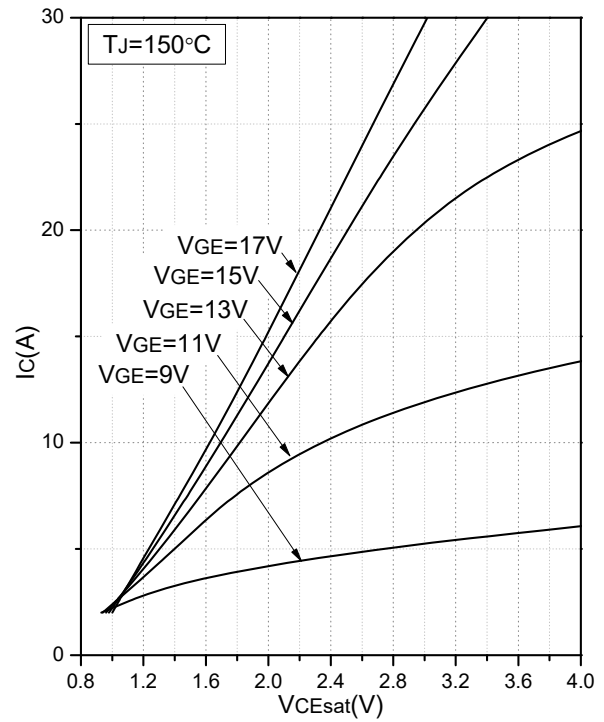
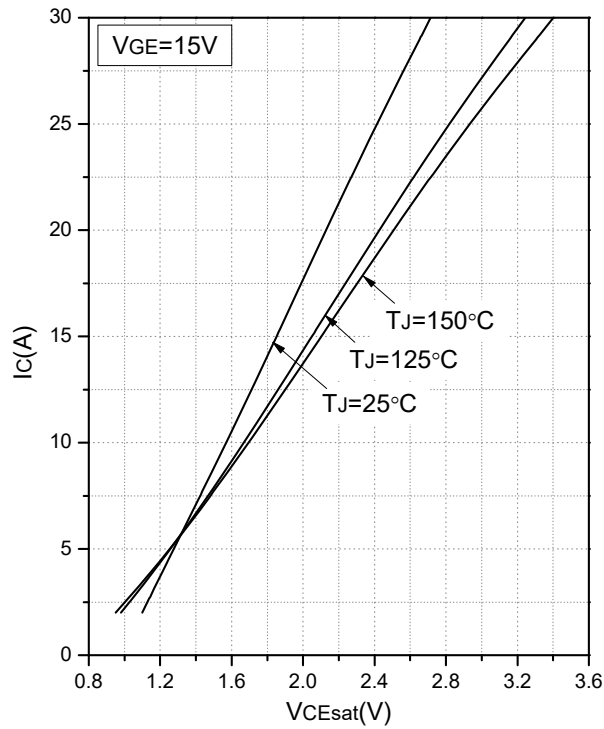


Ordering Information Table

Device code

G	T	15	RFF	120	B3	H
①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (15=15A)
- ④ - Circuit Configuration RFF (Rectifier + Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



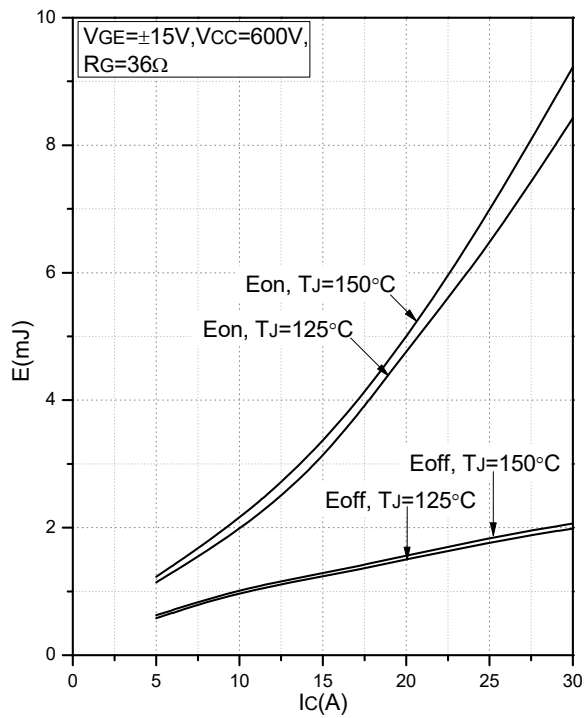


Fig.5 Typical Switching Loss vs. Collector Current

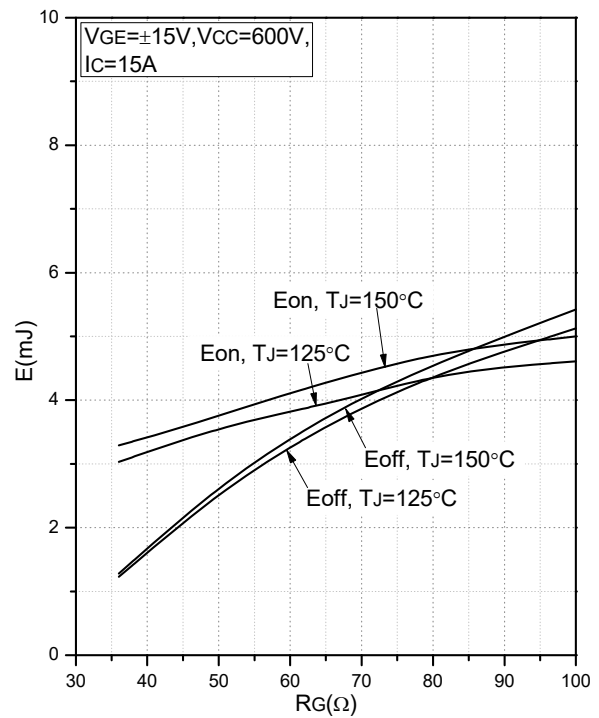


Fig.6 Typical Switching Loss vs. Forward Current

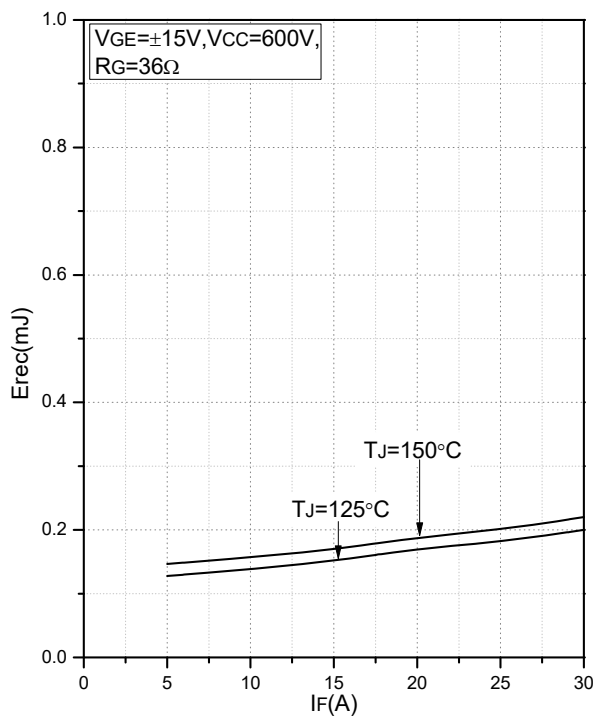


Fig.7 Typical Switching Loss vs. Gate Resistance

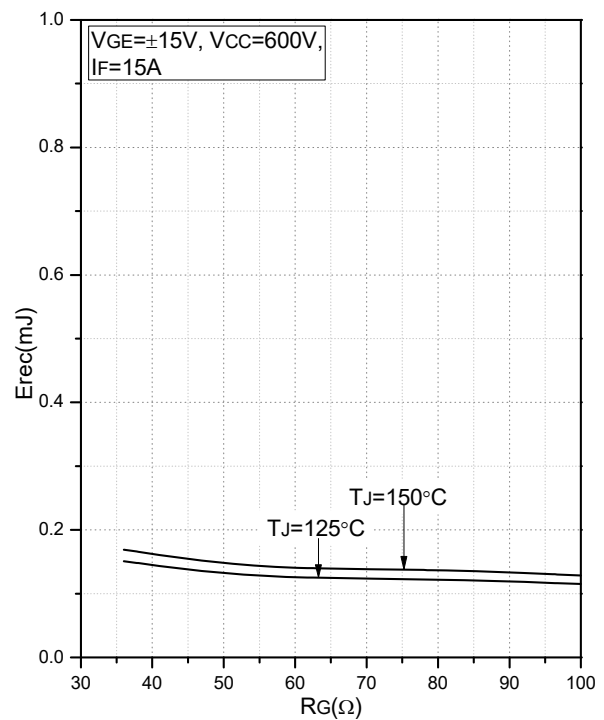


Fig.8 Typical Switching Loss vs. Gate Resistance

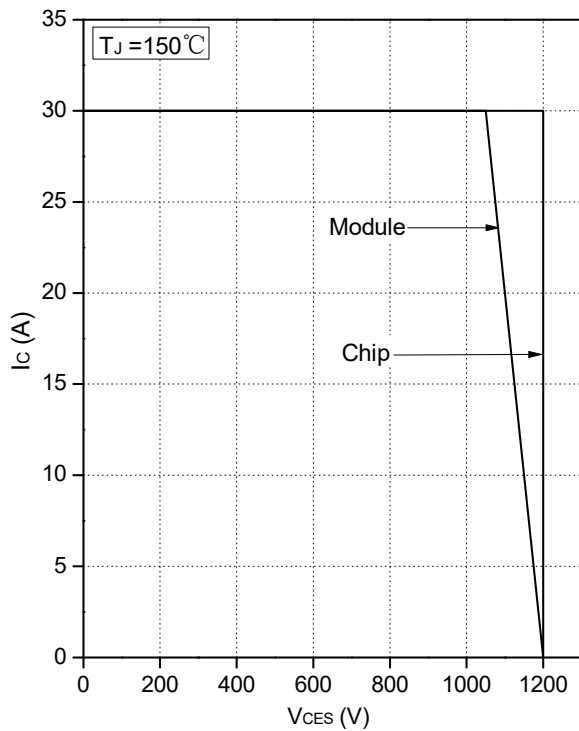


Fig.9 Reverse Bias Safe Operation Area (RBSOA)

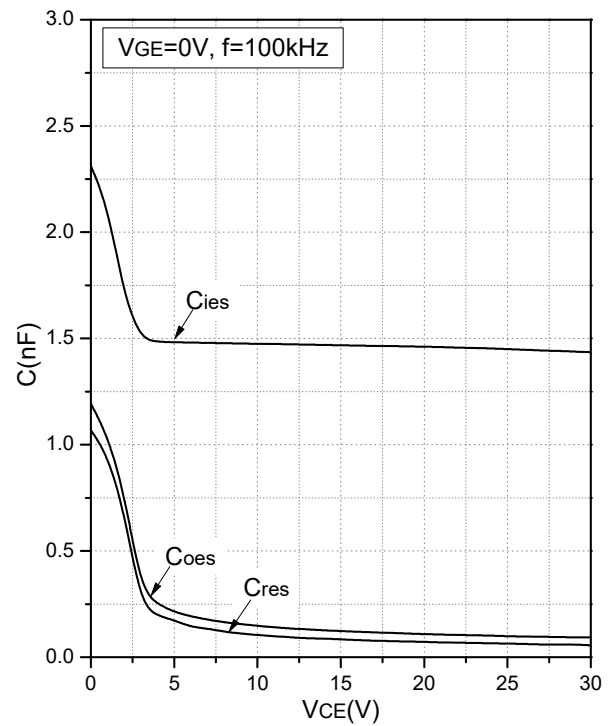


Fig.10 Capacitance Characteristics

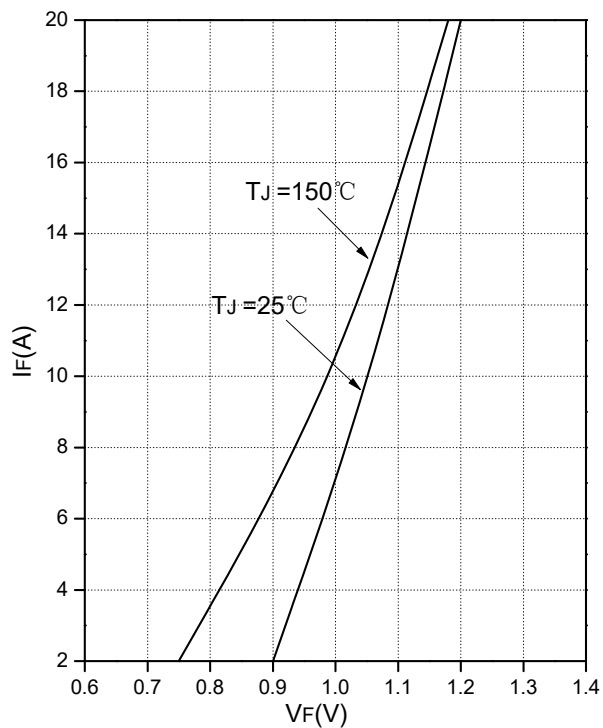


Fig.11 Forward Characteristics of Diode (Rectifier Diode)

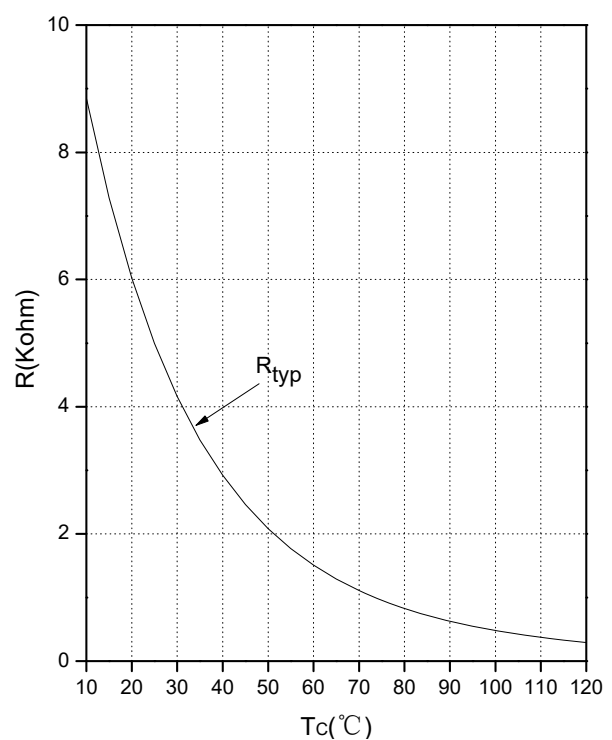


Fig.12 NTC Temperature Characteristics

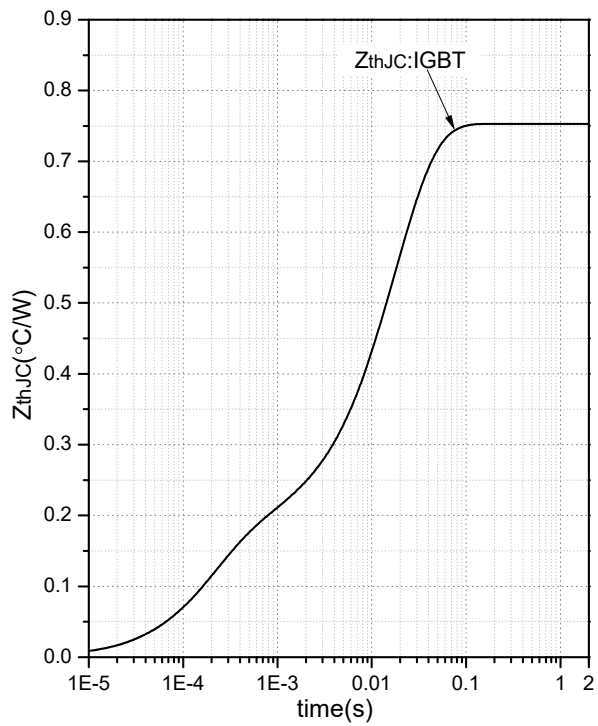


Fig.13 Transient Thermal Impedance (IGBT)

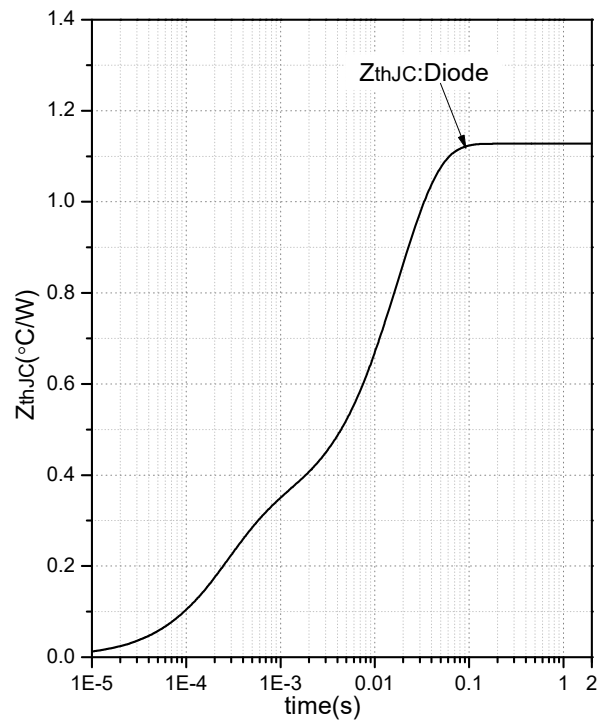
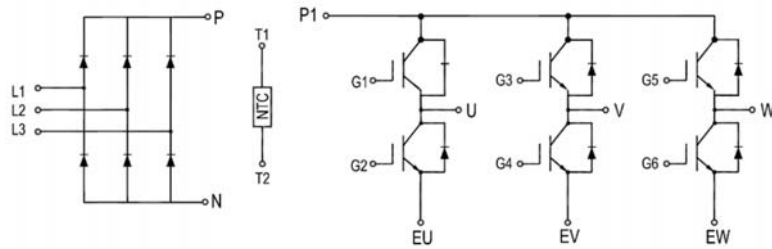


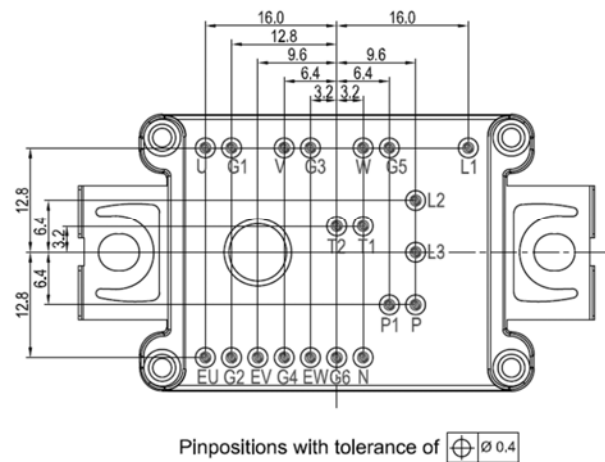
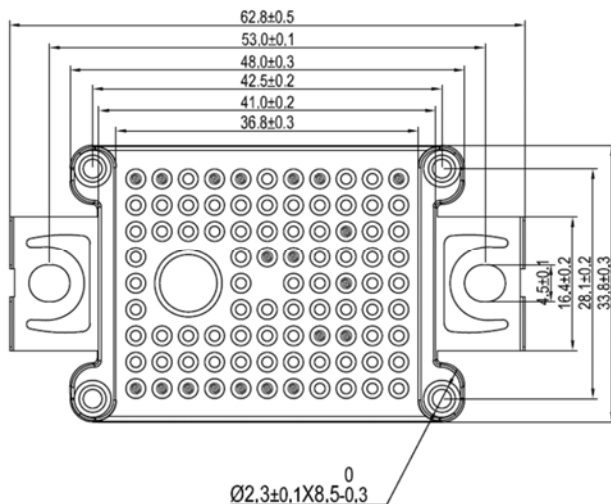
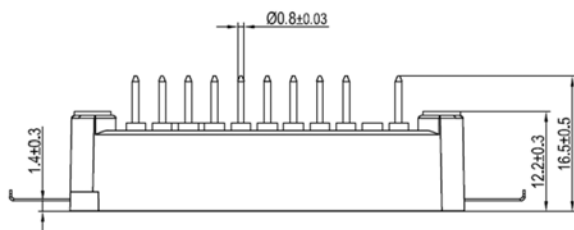
Fig.14 Transient Thermal Impedance (Diode)



Internal Circuit



Package Outline (Unit: mm):





Date	Revision	Notes
11/23/2023	01	Initial Release

Announcement

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