



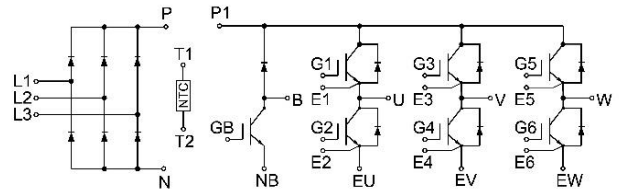
GT25PI120C7H

IGBT Module

Preliminary Data

Features:

- Trench & Field Stop 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



Applications:

- Industrial Inverters
- Industrial Drivers

IGBT, Inverter Maximum Rated Values

V_{CES}	Collector-Emitter Blocking Voltage	$T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^{\circ}\text{C}$	25	A
		$T_C=25^{\circ}\text{C}$	50	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	50	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^{\circ}\text{C}$ $T_{Jmax}=175^{\circ}\text{C}$	225	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1mA, V_{CE}=V_{GE}, T_J=25^{\circ}C$	5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25A, V_{GE}=15V$	$T_J=25^{\circ}C$	1.70	1.90	V
			$T_J=125^{\circ}C$	1.95		
			$T_J=150^{\circ}C$	2.00		
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	$V_{GE}=\pm 20V, V_{CE}=0V, T_J=25^{\circ}C$			± 100	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25^{\circ}C$		2.42		nF
C_{oes}	Output Capacitance			0.17		
C_{res}	Reverse Transfer Capacitance			0.02		

Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		102		ns
			T _J =125℃		99		
			T _J =150℃		99		
t _r	Rise Time		T _J =25℃		39		ns
			T _J =125℃		39		
			T _J =150℃		37		
t _{d(off)}	Turn-off Delay Time		T _J =25℃		138		ns
			T _J =125℃		147		
			T _J =150℃		145		
t _f	Fall Time	T _J =25℃		494		ns	
		T _J =125℃		723			
		T _J =150℃		728			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, di/dt=548A/μs (T _J =150℃) Inductive Load	T _J =25℃		2.14		mJ
		T _J =125℃		2.76			
		T _J =150℃		2.97			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =25A, R _{Goff} =20Ω, V _{GE} =±15V, du/dt=2299V/μs (T _J =150°C) Inductive Load	T _J =25°C		1.97		mJ
			T _J =125°C		3.22		
			T _J =150°C		3.54		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		129		nC
R _{g internal}	Internal Gate Resistor		T _J =25°C		0		Ω
RBSOA	I _C =50A, V _{CC} =1050V, V _P =1200V, R _G =20Ω, V _{GE} =+15V to 0V, T _J =150°C			Trapezoid			
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _G =20Ω, T _J =125°C			10			μs
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.667	°C/W

Diode, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		25	A
I _{FM}	Peak FWD Current Repetitive	t _p =1ms	50	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 =25A	T _J =25℃		1.65		V
			T _J =125℃		1.70		
			T _J =150℃		1.70		
I _{rr}	Peak Reverse Recovery Current	I _F =25A, -diF/dt=695A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		213		A
			T _J =125℃		441		
			T _J =150℃		458		
t _{rr}	Reverse Recovery Time		T _J =25℃		24.4		ns
			T _J =125℃		29.1		
			T _J =150℃		30.3		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.60		μC
			T _J =125℃		4.97		
			T _J =150℃		5.52		



E _{rec}	Reverse Recovery Energy	I _F =25A, -diF/dt=695A/μs(T _J =150°C), V _R =600V, V _{GE} =-15V	T _J =25°C		0.85		mJ
			T _J =125°C		1.95		
			T _J =150°C		2.18		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.853	°C/W

IGBT, Brake-Chopper

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

V _{CES}	Collector-Emitter Blocking Voltage	T _J =25°C	1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	25	A
		T _C =25°C	50	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	50	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	225	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°C		5.0	5.6	6.5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =25A, V _{GE} =15V	T _J =25°C		1.70	1.90	V
			T _J =125°C		1.95		
			T _J =150°C		2.00		
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V, V _{CE} =V _{CES} , T _J =25°C				1	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =±20V, V _{CE} =0V, T _J =25°C				±100	nA
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=100kHz, T _J =25°C			2.42		nF
C _{oes}	Output Capacitance				0.17		
C _{res}	Reverse Transfer Capacitance				0.02		



Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =25A, R _{Gon} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		102		ns	
			T _J =125℃		99			
			T _J =150℃		99			
t _r	Rise Time		T _J =25℃		39		ns	
			T _J =125℃		39			
			T _J =150℃		37			
t _{d(off)}	Turn-off Delay Time		V _{CC} =600V, I _C =25A, R _{Goff} =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		138		ns
				T _J =125℃		147		
				T _J =150℃		145		
t _f	Fall Time	T _J =25℃			494		ns	
		T _J =125℃			723			
		T _J =150℃			728			
E _{on}	Turn-on Switching Loss	T _J =25℃			2.14		mJ	
		T _J =125℃			2.76			
		T _J =150℃			2.97			
E _{off}	Turn-off Switching Loss	T _J =25℃		1.97		mJ		
		T _J =125℃		3.22				
		T _J =150℃		3.54				
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25℃		129		nC	
R _{g internal}	Internal Gate Resistor		T _J =25℃		0		Ω	
RBSOA	I _C =50A, V _{CC} =1050V, V _P =1200V, R _G =20Ω, V _{GE} =+15V to 0V, T _J =150℃			Trapezoid				
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _G =20Ω, T _J =125℃			10			μs	
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.667	℃/W	

Diode, Brake-Chopper

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

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	10	A
I_{FM}	Repetitive Peak Forward Current	20	A



Electrical Characteristics of Diode ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =10A	T _J =25℃		1.80		V
			T _J =125℃		1.90		
			T _J =150℃		1.85		
t _{rr}	Reverse Recovery Time	I _F =10A, -diF/dt=388A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		133		ns
			T _J =125℃		182		
			T _J =150℃		186		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		10.0		A
			T _J =125℃		14.0		
			T _J =150℃		14.7		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		1.12		μC
			T _J =125℃		1.43		
			T _J =150℃		1.57		
E _{rec}	Reverse Recovery Energy		T _J =25℃		0.3		mJ
			T _J =125℃		0.7		
			T _J =150℃		0.8		
R _{θJC}	Thermal Resistance: Junction-To-Case (per Diode)					1.568	℃/W

Diode, Rectifier

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

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^{\circ}\text{C}$	1800	V
I_F	Diode Continuous Forward Current	$T_J=25^{\circ}\text{C}$	16	A
I_{FRMSM}	Maximum RMS Forward Current per Chip	$T_J=80^{\circ}\text{C}$	25	A
I_{FSM}	Surge Current @ $t_p=10\text{ms}$	$T_J=25^{\circ}\text{C}$	320	A
		$T_J=125^{\circ}\text{C}$	240	
I^2t	I^2t - value	$T_J=25^{\circ}\text{C}$	512	A^2s
		$T_J=125^{\circ}\text{C}$	288	



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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =16A	T _J =25°C		1.05		V
			T _J =125°C		1.00		
I _R	Reverse Current	V _R =1200V	T _J =25°C			1	mA
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.970	°C/W

Internal NTC-Thermistor Characteristics

R ₂₅	T _C =25°C	5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =465Ω		±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 _{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 30s	4500			V
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+150	°C
CTI	Comparative Tracking Index		225			
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)				0.05	°C/W
T	Mounting Screw:M4		1.5		2.0	N·m
G	Weight			31		g



Ordering Information Table

Device code	G	T	25	PI	120	C7	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench & Field Stop IGBT IGBT
- ③ - Rated Current (25=25A)
- ④ - Circuit Configuration (Power Integrated)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

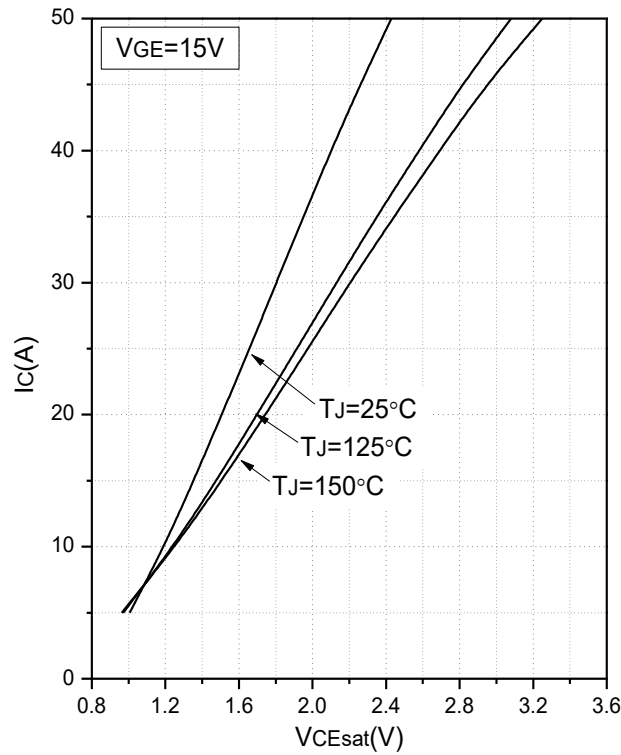


Fig.1 Typical Saturation Voltage Characteristics (Inverter)

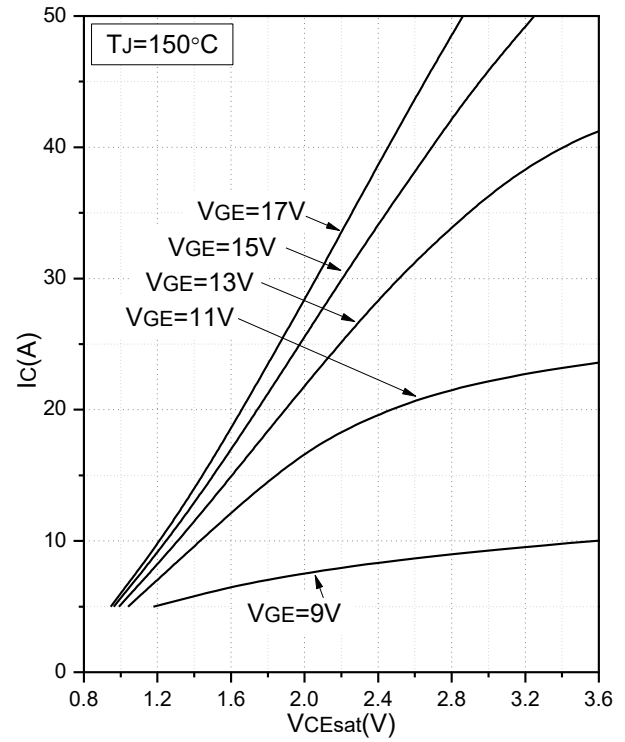


Fig.2 Typical Output Characteristics (Inverter)

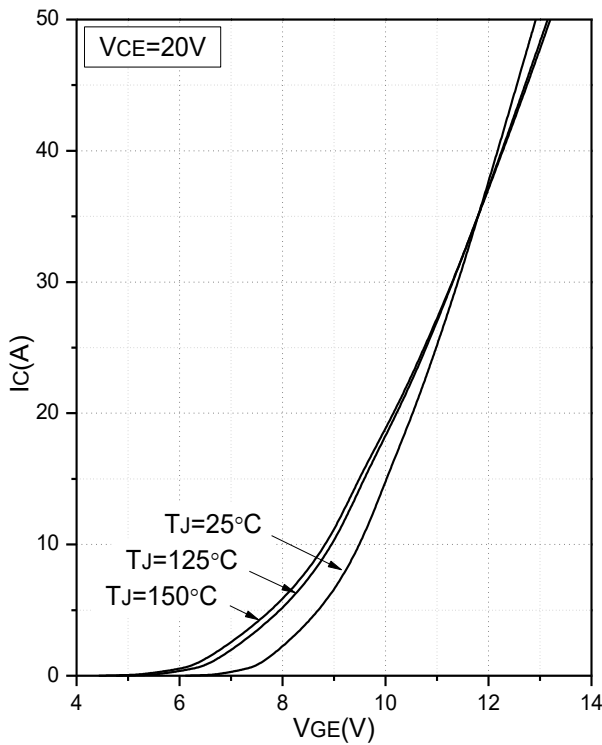


Fig.3 Transfer Characteristics (Inverter)

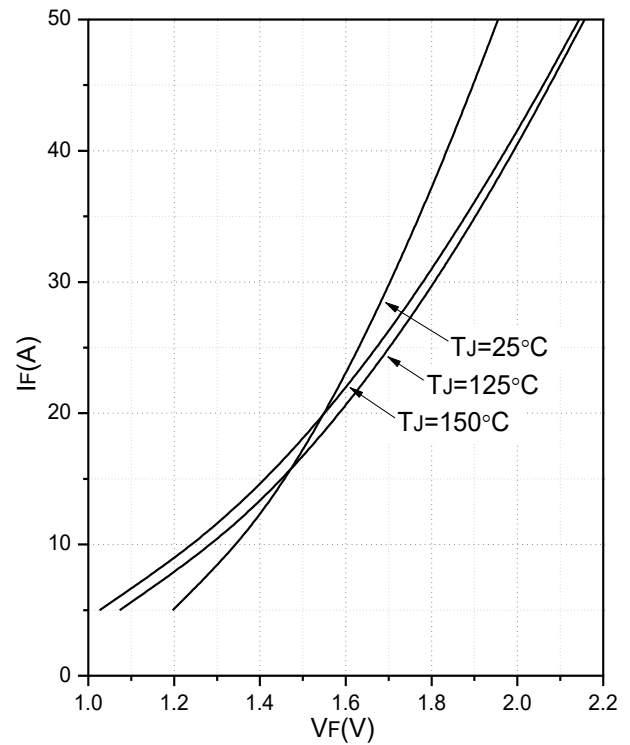


Fig.4 Forward Characteristics of Diode (Inverter)

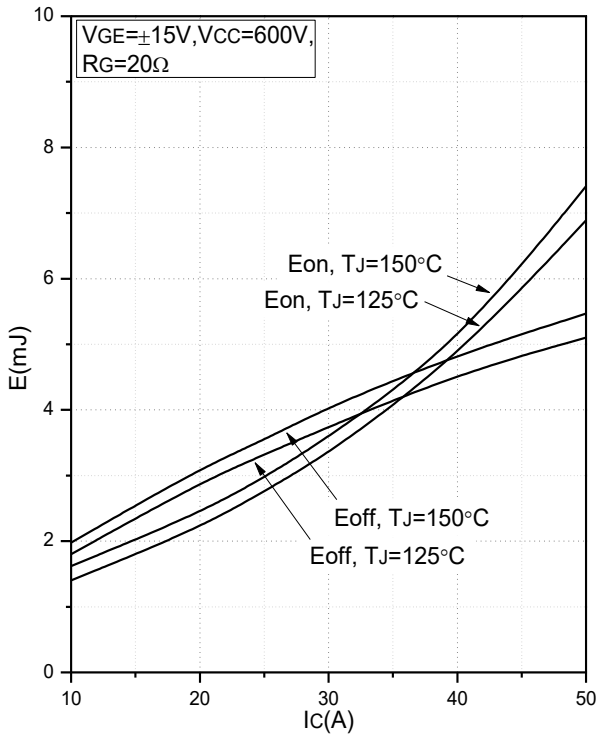


Fig.5 Typical Switching Loss vs. Collector Current (Inverter)

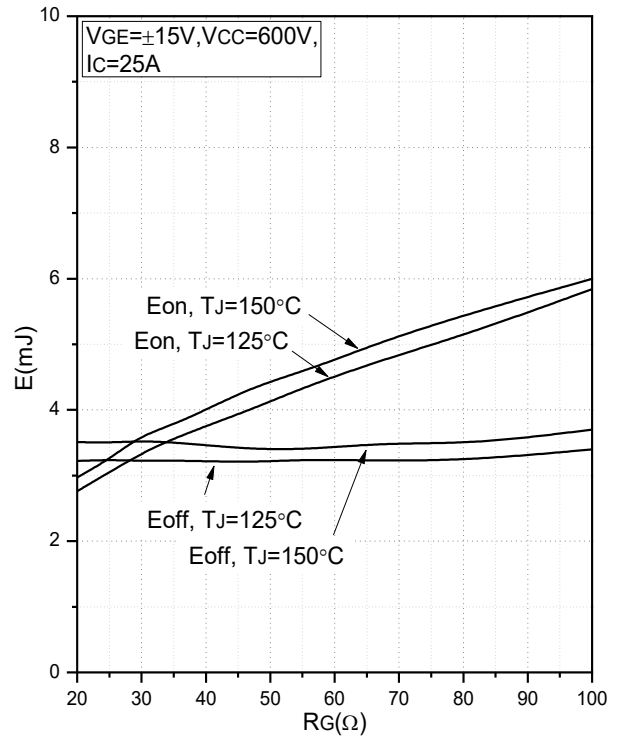


Fig.6 Typical Switching Loss vs. Gate Resistance (Inverter)

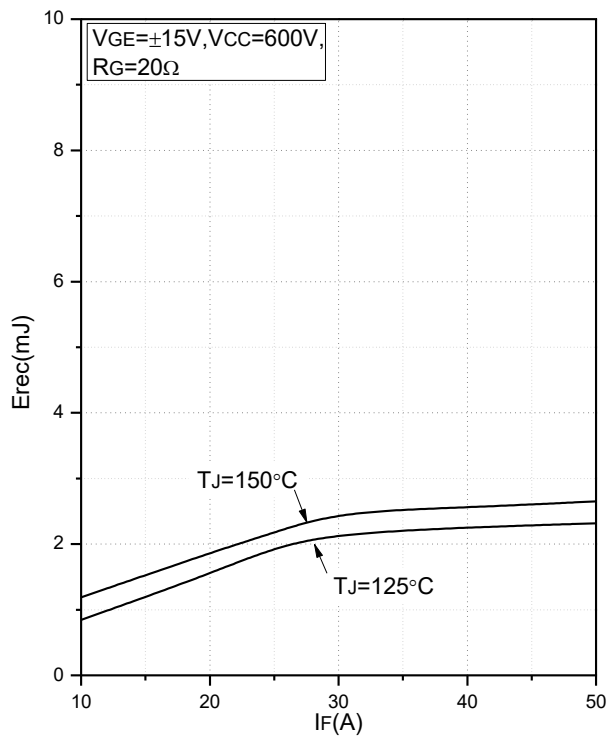


Fig.7 Typical Switching Loss vs. Forward Current (Inverter)

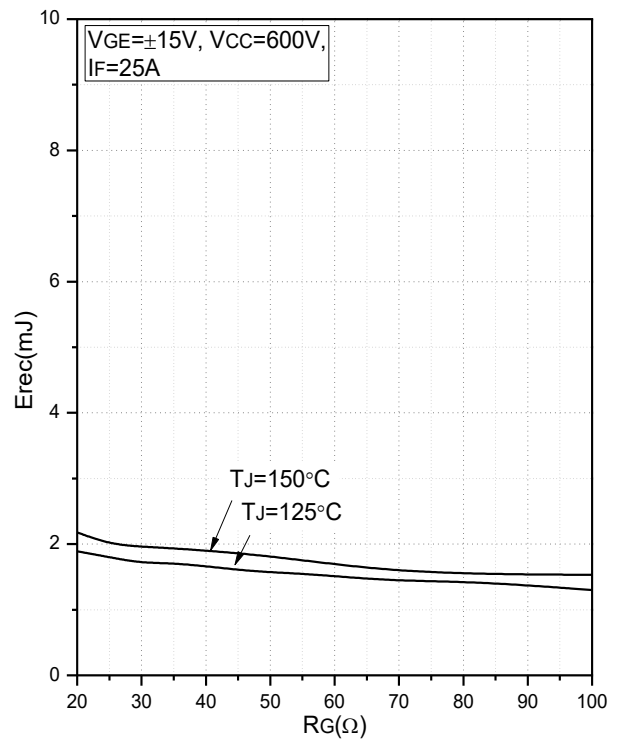


Fig.8 Typical Switching Loss vs. Gate Resistance (Inverter)

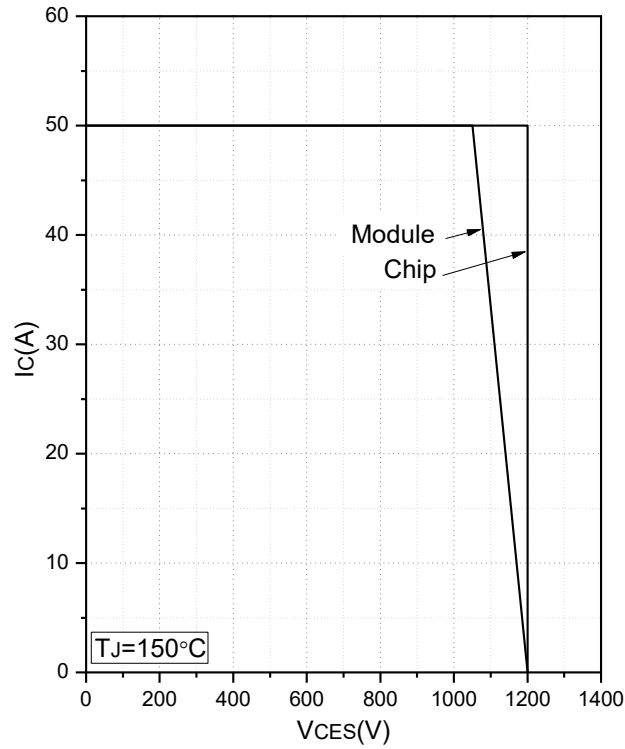


Fig.9 Reverse Bias Safe Operation Area (RBSOA)

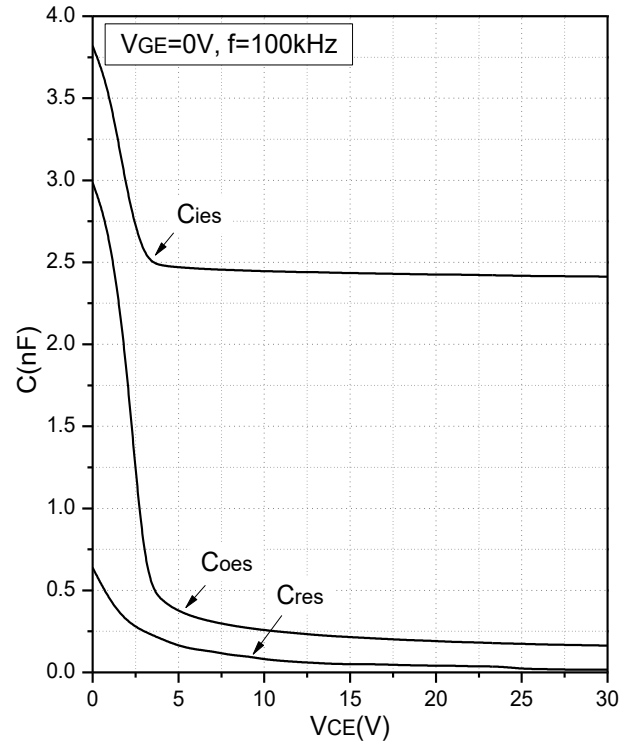


Fig.10 Capacitance Characteristics

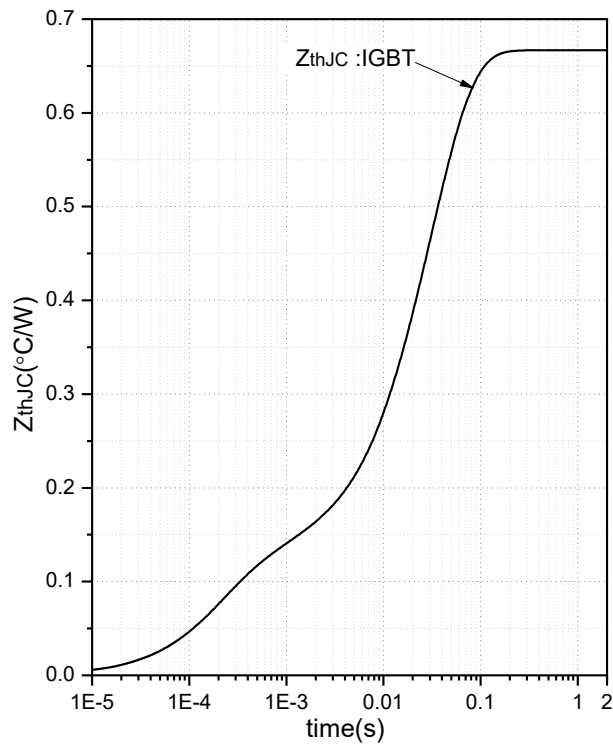


Fig.11 Transient Thermal Impedance (Inverter-IGBT)

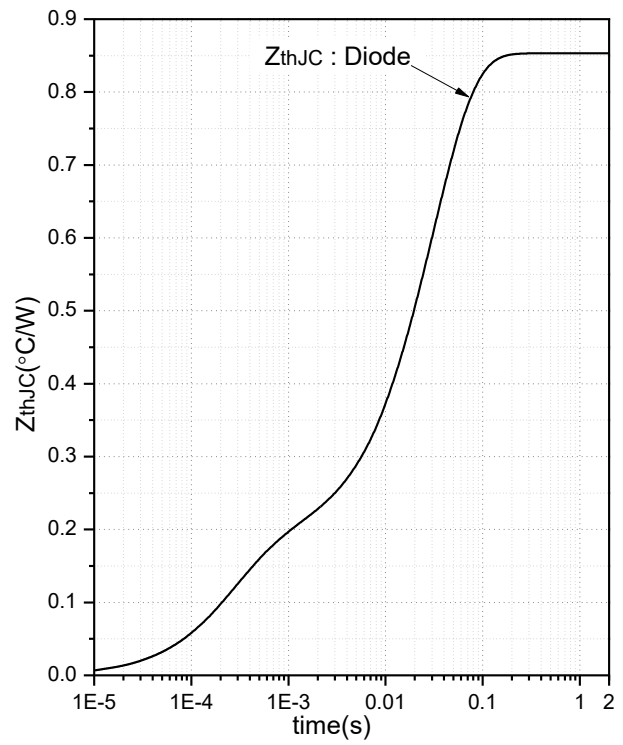


Fig.12 Transient Thermal Impedance (Inverter-Diode)

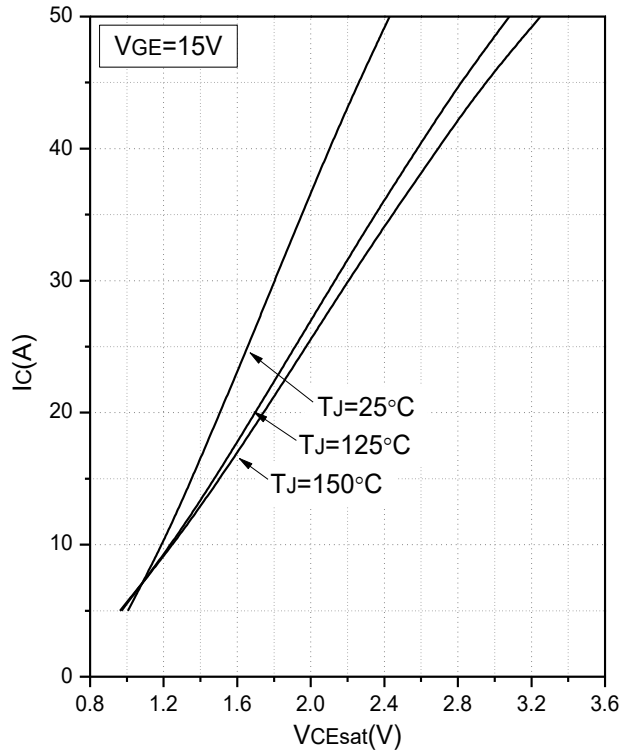


Fig.13 Typical Saturation Voltage Characteristics (Brake-Chopper)

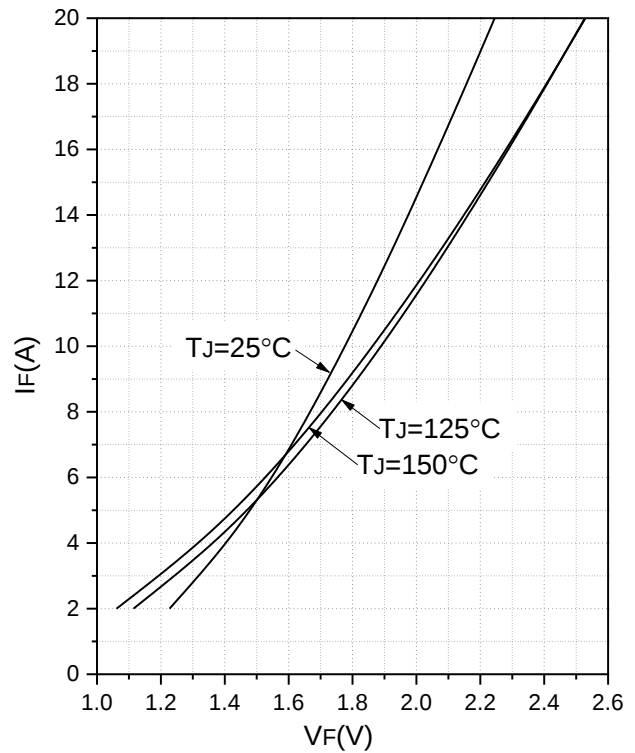


Fig.14 Forward Characteristics of Diode (Brake-Chopper)

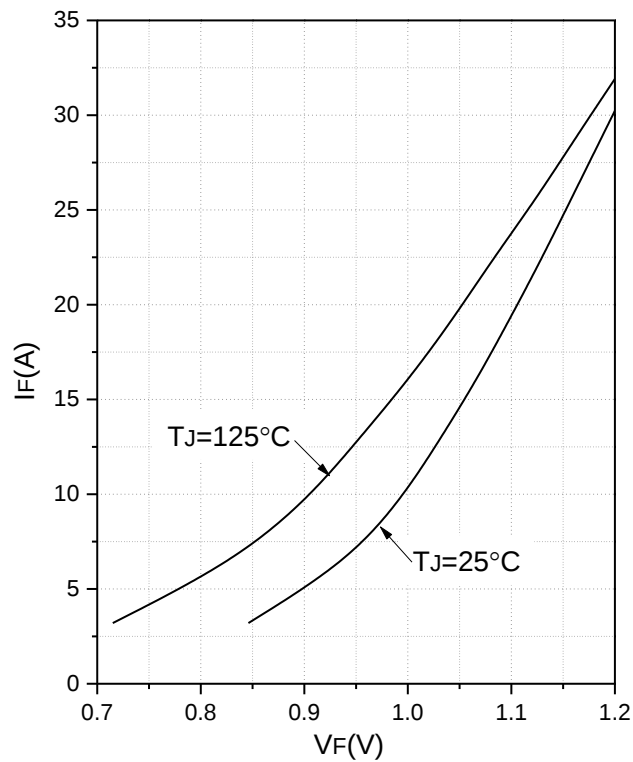


Fig.15 Forward Characteristics of Diode (Rectifier)

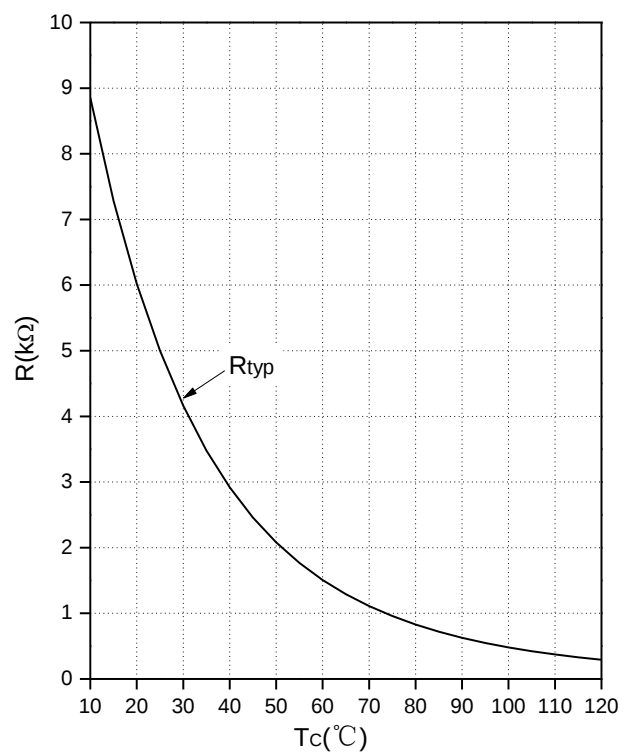
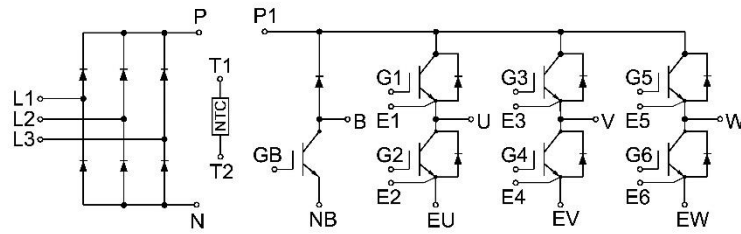


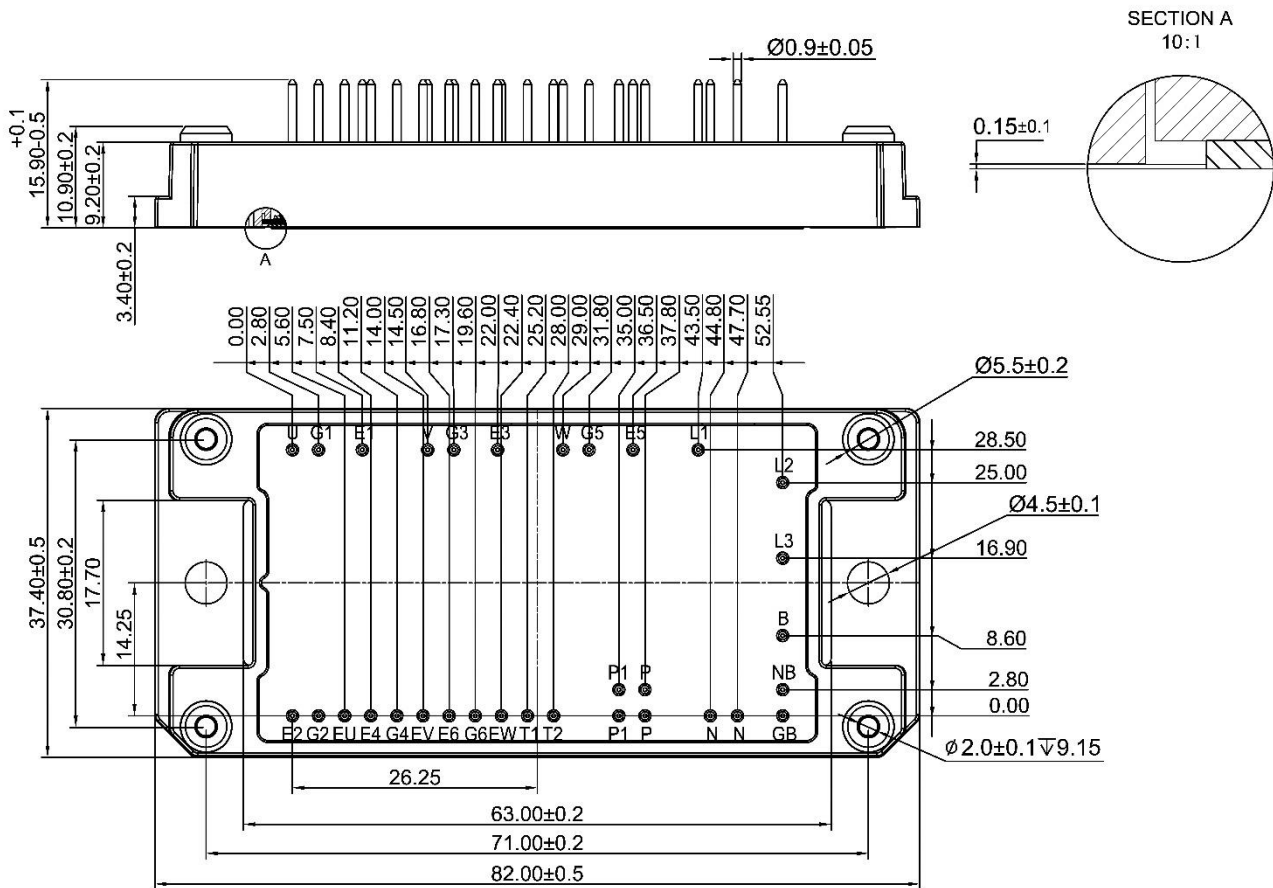
Fig.16 Forward Characteristics of Diode



Internal Circuit



Package Outline (Unit: mm):





Date	Revision	Notes
03/12/2024	01	Initial Release

Announcement

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