



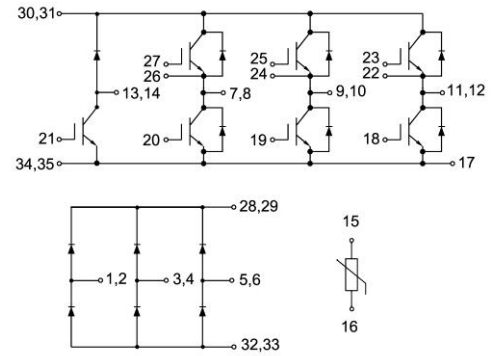
GT75PI120T6H

IGBT Module

Preliminary Data

Features:

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



Applications:

- Motor Drives
- Servo Drives
- Auxiliary Inverters

IGBT, Inverter

Maximum Rated Values (T_C=25°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°C	75	A
		T _C =25°C	150	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	150	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	523	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	$I_C=2.4\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.7	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.70	2.10	V
			$T_J=125^{\circ}\text{C}$	2.10		V
			$T_J=150^{\circ}\text{C}$	2.20		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		7.97		nF
C_{oes}	Output Capacitance			1.22		nF
C_{res}	Reveres Transfer Capacitance			0.54		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=75A,$ $R_{Gon}=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		118		ns
			$T_J=125^{\circ}C$		128		
			$T_J=150^{\circ}C$		134		
t_r	Rise Time		$T_J=25^{\circ}C$		44		ns
			$T_J=125^{\circ}C$		54		
			$T_J=150^{\circ}C$		54		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		302		ns
			$T_J=125^{\circ}C$		332		
			$T_J=150^{\circ}C$		340		
t_f	Fall Time	$T_J=25^{\circ}C$		166		ns	
		$T_J=125^{\circ}C$		260			
		$T_J=150^{\circ}C$		266			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=75A,$ $R_{Gon}=10\Omega, V_{GE}=\pm 15V,$ $di/dt=1251A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		4.5		mJ
			$T_J=125^{\circ}C$		6.8		
			$T_J=150^{\circ}C$		7.8		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =75A, R _{Goff} =10Ω, V _{GE} =±15V, du/dt=5221V/μs(T _J =150°C), Inductive Load	T _J =25°C		5.6		mJ
			T _J =125°C		7.7		
			T _J =150°C		8.1		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2892		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		6.0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =+/-15V, tp=10μs, T _J =150°C				320		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.29	°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	T _C =100°C	75	A
I _{FM}	Repetitive Peak Forward Current	tp=1ms	150	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 =75A	T _J =25℃		1.65		V
			T _J =125℃		1.75		
			T _J =150℃		1.75		
t _{rr}	Reverse Recovery Time	I _F =75A, -diF/dt=1558A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		160		ns
			T _J =125℃		244		
			T _J =150℃		282		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		92.8		A
			T _J =125℃		94.5		
			T _J =150℃		96.1		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		7.2		μC
			T _J =125℃		10.9		
			T _J =150℃		12.4		



E _{rec}	Reverse Recovery Energy	I _F =75A, -diF/dt=1558A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		2.64		mJ
			T _J =125°C		4.00		
			T _J =150°C		4.66		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.50	°C/W

IGBT, Brake-Chopper

Maximum Rated Values (T_C=25°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°C	50	A
		T _C =25°C	100	A
I _{CM}	Peak Collector Current Repetitive	t _P =1ms	100	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	391	W

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

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{GE(th)}	Gate-Emitter Threshold Voltage	I _C =1.7mA, V _{CE} =V _{GE}		5.0	5.6	6.5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =50A, V _{GE} =15V	T _J =25°C		1.75	2.10	V
			T _J =125°C		2.20		V
			T _J =150°C		2.30		V
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				200	nA
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=100kHz			5.32		nF
C _{oes}	Output Capacitance				0.81		nF
C _{res}	Reveres Transfer Capacitance				0.34		nF



Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =50A, R _{Gon} =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		58		ns	
			T _J =125℃		62			
			T _J =150℃		66			
t _r	Rise Time		T _J =25℃		36		ns	
			T _J =125℃		38			
			T _J =150℃		40			
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =50A, R _{Goff} =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		262		ns	
			T _J =125℃		288			
			T _J =150℃		302			
t _f	Fall Time		T _J =25℃		170		ns	
			T _J =125℃		218			
			T _J =150℃		244			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =50A, R _{Gon} =15Ω, V _{GE} =±15V, di/dt=1212A/μs(T _J =150℃), Inductive Load	T _J =25℃		2.7		mJ	
			T _J =125℃		3.8			
			T _J =150℃		3.9			
E _{off}	Turn-off Switching Loss		V _{CC} =600V, I _C =50A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=5557V/μs(T _J =150℃), Inductive Load	T _J =25℃		3.7		mJ
				T _J =125℃		5.1		
				T _J =150℃		5.3		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V		T _J =25℃		2850		nC
R _{G(int)}	Internal Gate Resistor			T _J =25℃		3.0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =+/- 15V, t _p =10μs, T _J =150℃				209		A	
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.38	℃/W	

Diode, Brake-Chopper

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

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ C$	1200	V
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	25	A
I_{FM}	Peak Diode Current Repetitive	$t_p=1ms$	50	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 =25A	T _J =25℃		1.70		V
			T _J =125℃		1.85		
			T _J =150℃		1.85		
I _{rr}	Peak Reverse Recovery Current	I _F =25A, -diF/dt=346A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		13.6		A
T _J =125℃			16.8				
T _J =150℃			17.9				
t _{rr}	Reverse Recovery Time		T _J =25℃		350		ns
			T _J =125℃		403		
			T _J =150℃		430		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.43		μC
			T _J =125℃		3.58		
			T _J =150℃		4.26		
E _{rec}	Reverse Recovery Energy		T _J =25℃		0.65		mJ
		T _J =125℃		1.32			
		T _J =150℃		1.46			
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					1.14	℃/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_{FRMSM}	Maximum RMS Forward Current Per Chip	$T_C=80^{\circ}\text{C}$	78	A
I_{RMSM}	Maximum RMS Current At Rectifier Output	$T_C=80^{\circ}\text{C}$	136	A
I_{FSM}	Surge Current @ $t_p=10\text{ ms}$	$T_J=25^{\circ}\text{C}$	900	A
		$T_J=150^{\circ}\text{C}$	705	
I^2t	I^2t - Value	$T_J=25^{\circ}\text{C}$	4050	A^2s
		$T_J=150^{\circ}\text{C}$	2485	



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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =75A	T _J =25°C		1.20		V
			T _J =125°C		1.15		
I _R	Reverse Current	V _R =1600V	T _J =25°C			1	mA
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.46	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Description	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

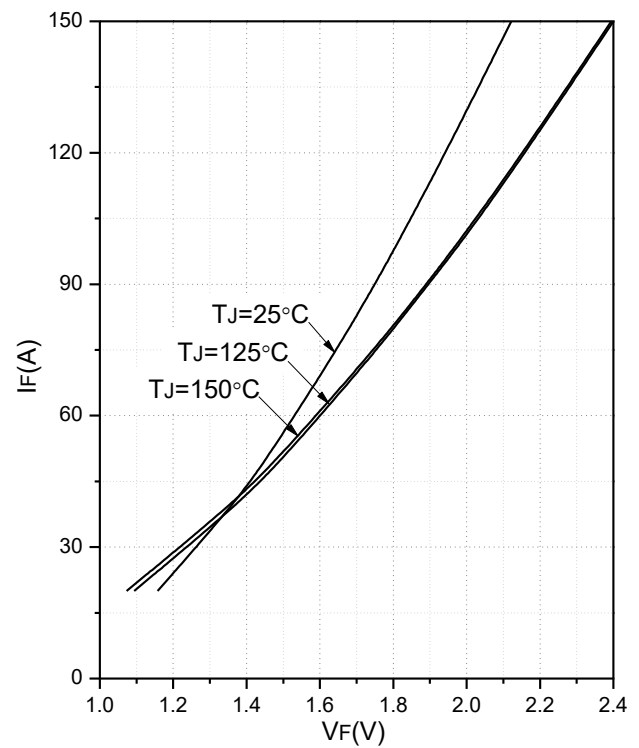
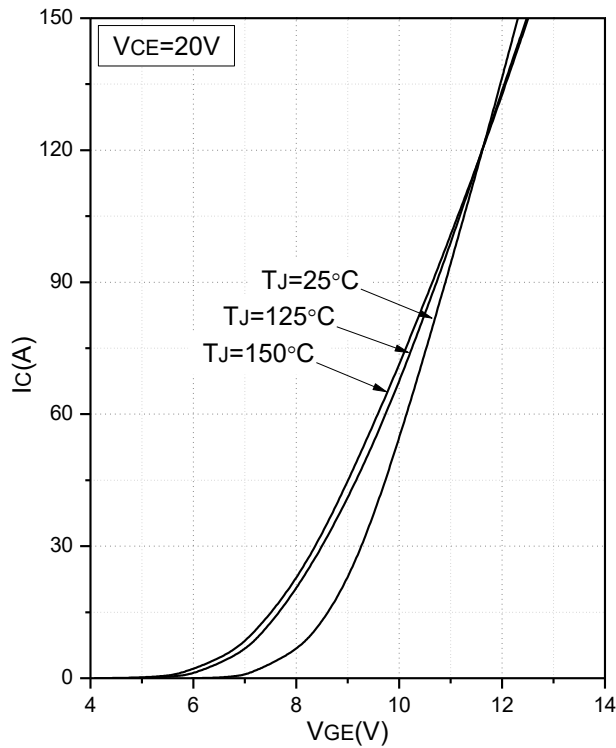
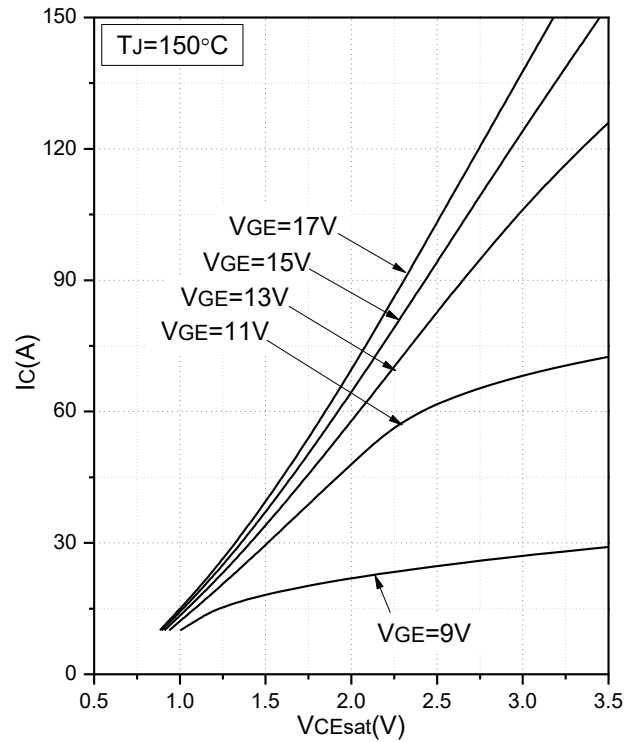
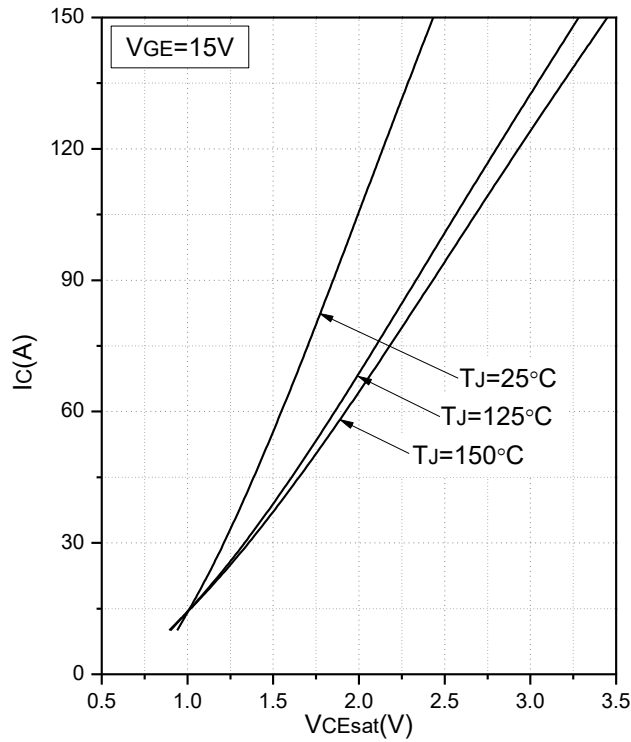
Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.03	°C/W
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			300		g



Ordering Information Table

Device code	G	T	75	PI	120	T6	H
	①	②	③	④	⑤	⑥	⑦

- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (75=75A)
- ④ - Circuit Configuration PI (Power Integrated)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



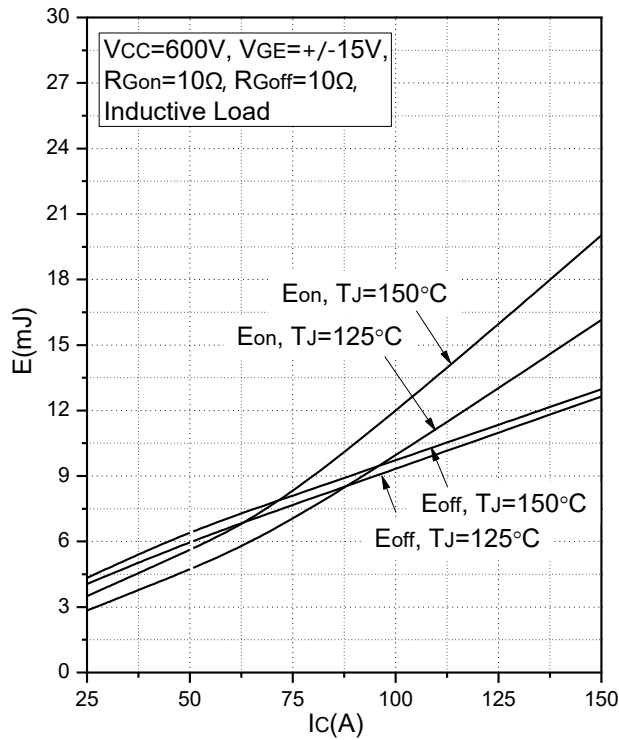


Fig.5 Typical Switching Loss vs. Collector Current (Inverter)

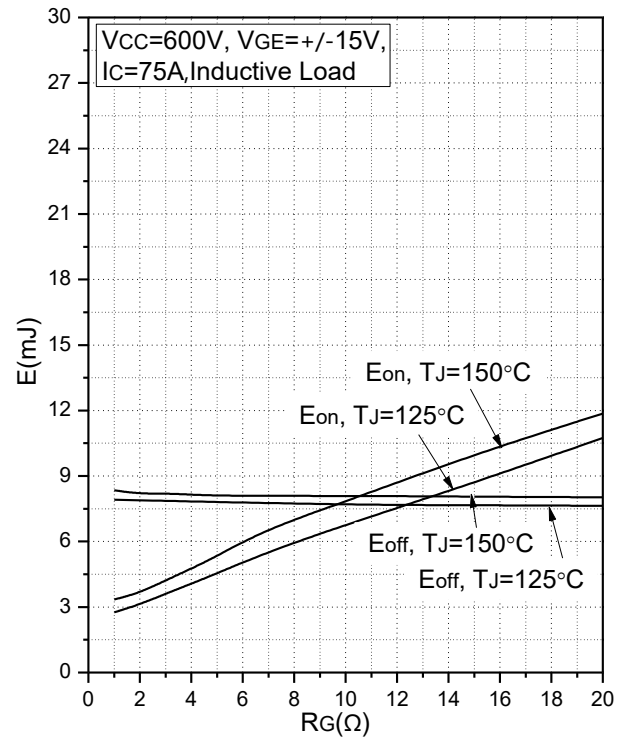


Fig.6 Typical Switching Loss vs. Gate Resistance (Inverter)

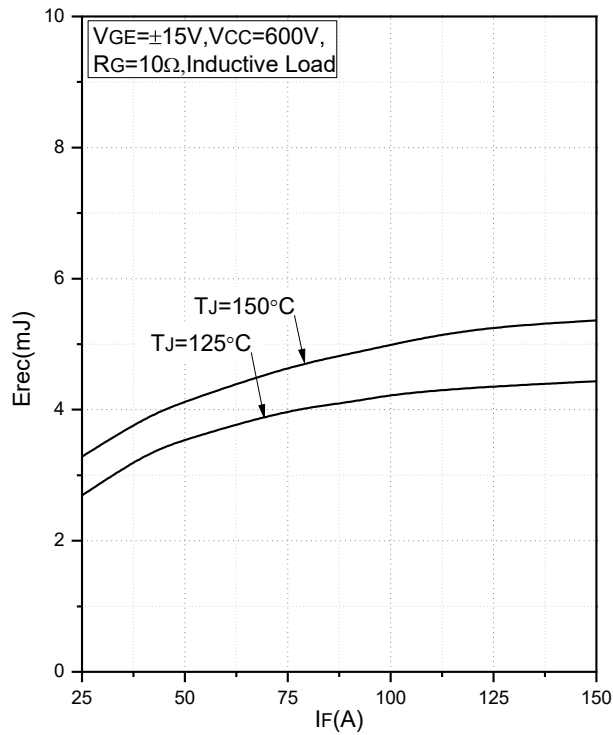


Fig.7 Typical Switching Loss vs. Forward Current (Inverter)

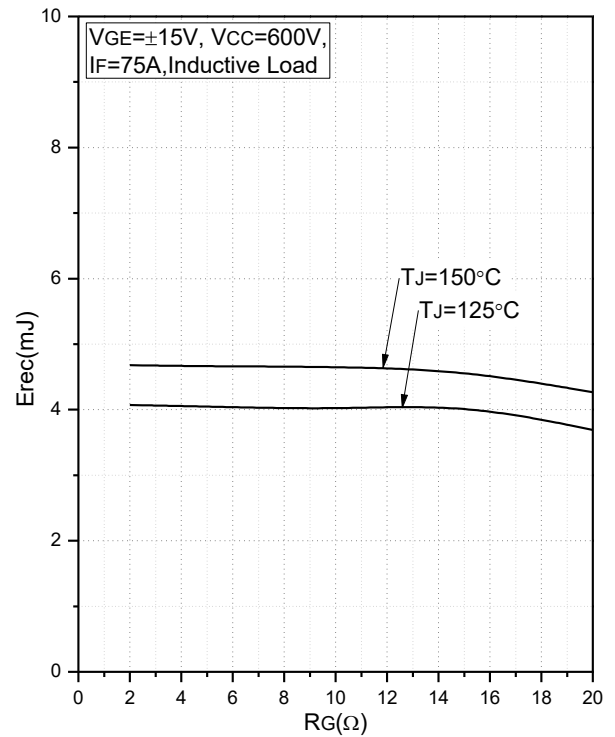


Fig.8 Typical Switching Loss vs. Gate Resistance (Inverter)

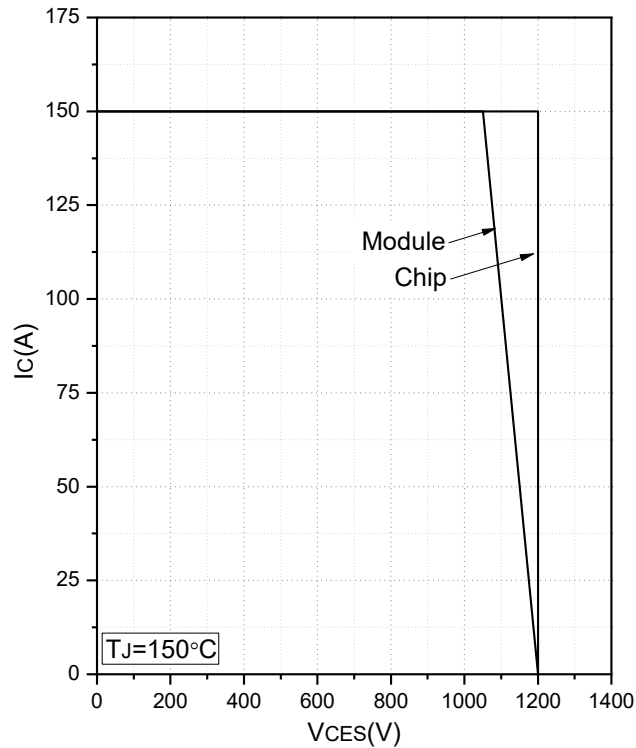


Fig.9 Reverse Bias Safe Operation Area (RBSOA)

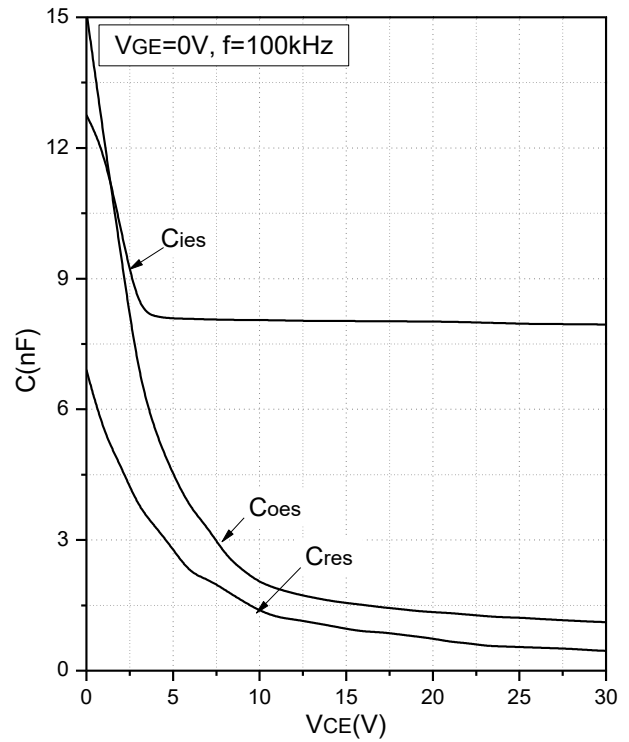


Fig.10 Capacitance Characteristics

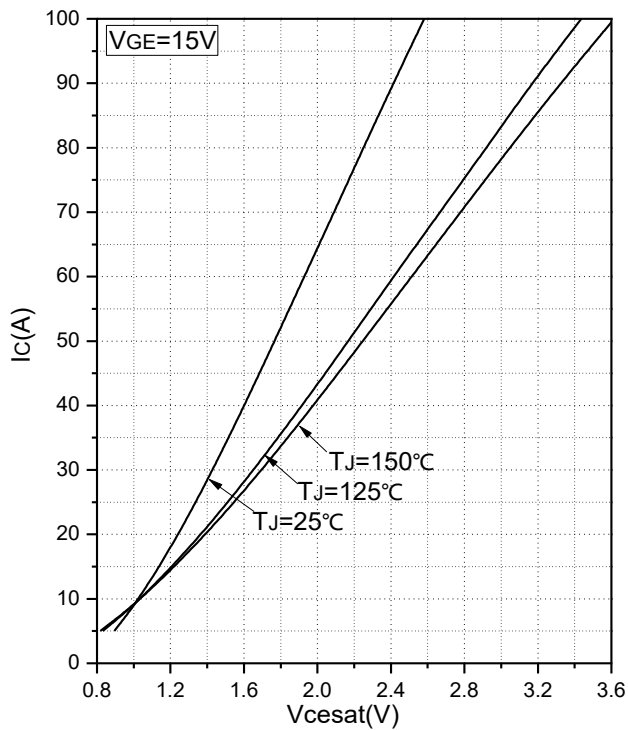


Fig.11 Typical Saturation Voltage Characteristics (Brake-Chopper)

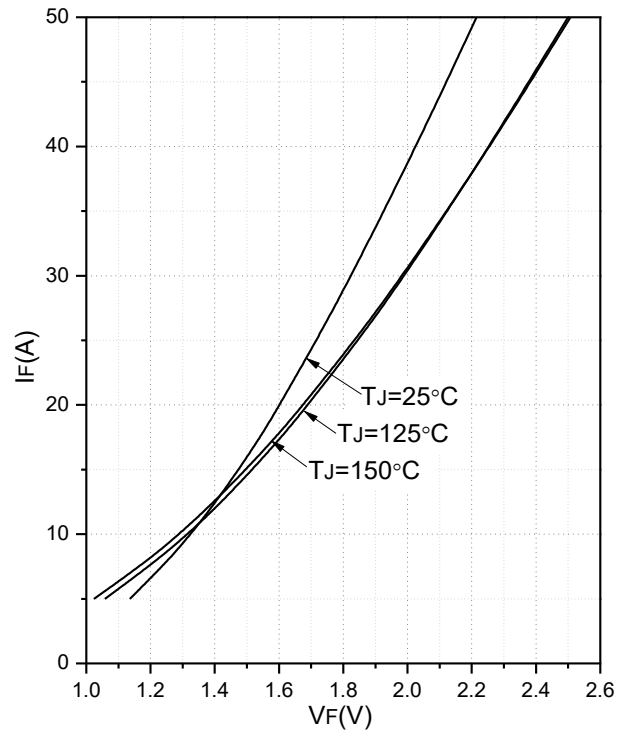


Fig.12 Forward Characteristics of Diode (Brake-Chopper)

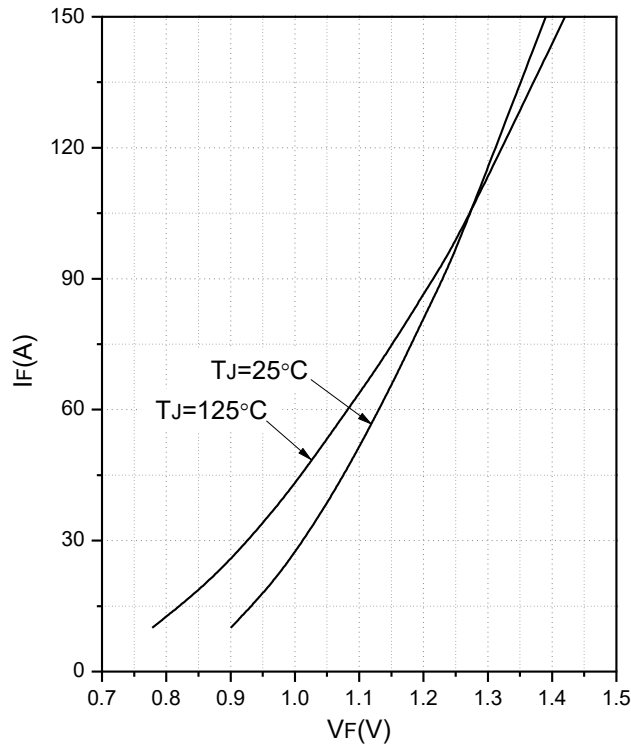


Fig.13 Forward Characteristics of Diode (Rectifier)

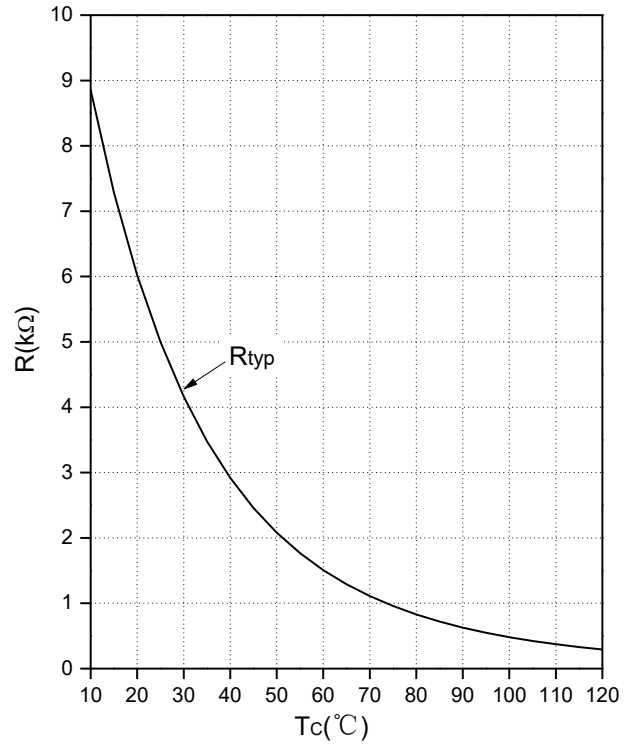


Fig.14 NTC Temperature Characteristics

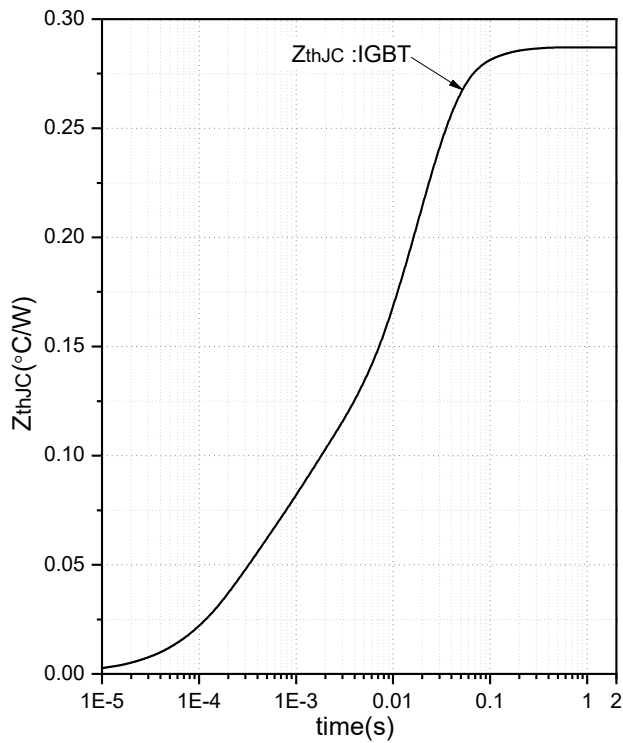


Fig.15 Transient Thermal Impedance (Inverter-IGBT)

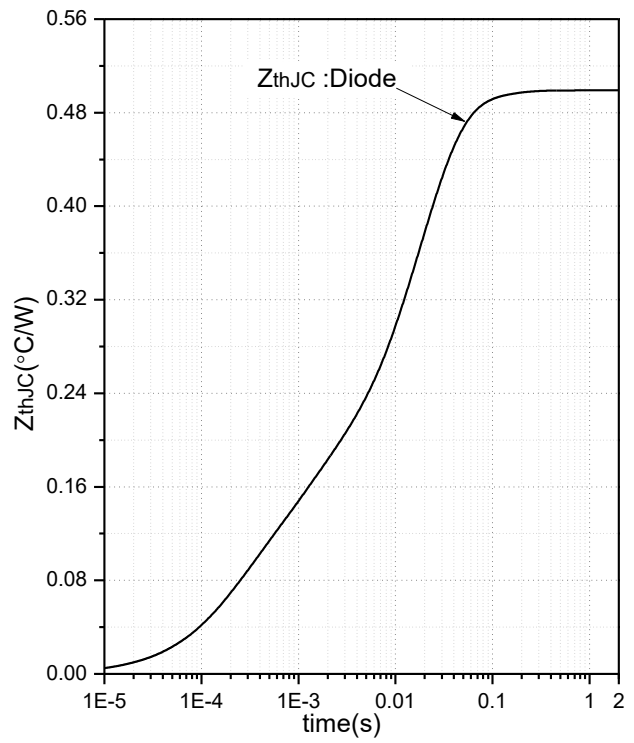
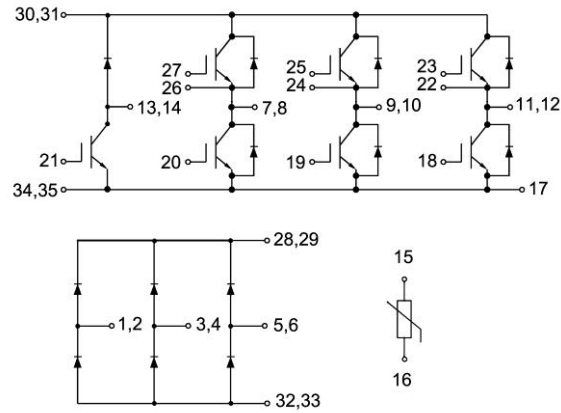


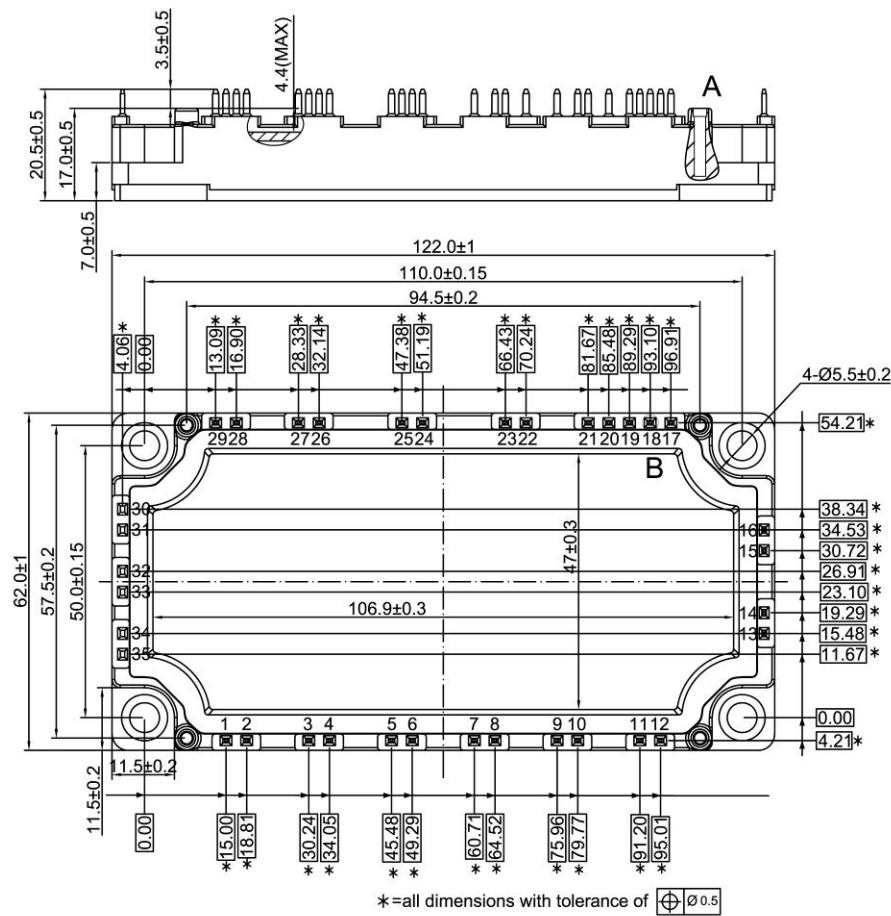
Fig.16 Transient Thermal Impedance (Inverter-Diode)



Internal Circuit:



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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