

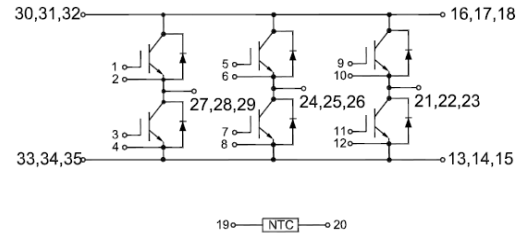


GT150FF120T6H-M

IGBT Module

Features:

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



Applications:

- Industrial Inverters
- Servo Applications

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	$T_C=100^{\circ}\text{C}$	150	A
		$T_C=25^{\circ}\text{C}$	300	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	300	A
t_{SC}	Short Circuit Withstand Time		> 10	μs
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^{\circ}\text{C}$ $T_{Jmax}=175^{\circ}\text{C}$	1085	W



Electrical Characteristics of IGBT

Static Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=4\text{ mA}, V_{CE}=V_{GE}, T_J=25^\circ\text{C}$	5.0	5.7	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V}$	$T_J=25^\circ\text{C}$	1.70	2.00	V
			$T_J=125^\circ\text{C}$	1.90		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	$V_{GE}=\pm 20\text{V}, V_{CE}=0\text{V}, T_J=25^\circ\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=100\text{kHz}, T_J=25^\circ\text{C}$		9.97		nF
C_{oes}	Output Capacitance			0.94		nF
C_{res}	Reveres Transfer Capacitance			0.64		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600\text{V}, I_C=150\text{A}, R_{Gon}=3.3\Omega, V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	245		ns
			$T_J=125^\circ\text{C}$	234		
t_r	Rise Time	$V_{CC}=600\text{V}, I_C=150\text{A}, R_{Gon}=3.3\Omega, V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	84		ns
			$T_J=125^\circ\text{C}$	85		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600\text{V}, I_C=150\text{A}, R_{Goff}=3.3\Omega, V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	263		ns
			$T_J=125^\circ\text{C}$	271		
t_f	Fall Time	$V_{CC}=600\text{V}, I_C=150\text{A}, R_{Goff}=3.3\Omega, V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	178		ns
			$T_J=125^\circ\text{C}$	213		
E_{on}	Turn-on Switching Loss	$V_{CC}=600\text{V}, I_C=150\text{A}, R_{Gon}=3.3\Omega, V_{GE}=\pm 15\text{V},$ $di/dt=1492\text{A}/\mu\text{s}(T_J=125^\circ\text{C}),$ Inductive Load	$T_J=25^\circ\text{C}$	10.1		mJ
			$T_J=125^\circ\text{C}$	12.5		
E_{off}	Turn-off Switching Loss	$V_{CC}=600\text{V}, I_C=150\text{A}, R_{Goff}=3.3\Omega, V_{GE}=\pm 15\text{V},$ $du/dt=4367\text{V}/\mu\text{s}(T_J=125^\circ\text{C}),$ Inductive Load	$T_J=25^\circ\text{C}$	8.4		mJ
			$T_J=125^\circ\text{C}$	13.5		
Q_g	Total Gate Charge	$V_{GE}=+15\text{V}\dots-15\text{V}$	$T_J=25^\circ\text{C}$	728		nC
R_{gint}	Internal Gate Resistor		$T_J=25^\circ\text{C}$	5		Ω
RBSOA	$I_C=300\text{A}, V_{CC}=1050\text{V}, V_p=1200\text{V}, R_G=3.3\Omega, V_{GE}=+15\text{V to }0\text{V}, T_J=150^\circ\text{C}$			Trapezoid		
SC data	$V_{CC}=600\text{V}, t_p=10\mu\text{s}, V_{GE}=\pm 15\text{V}, R_{Gon}=4.7\text{ohm}, R_{Goff}=4.7\text{ohm}, T_J=25^\circ\text{C}$			775		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.138	$^\circ\text{C}/\text{W}$



Diode, Inverter Maximum Rated Values

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ\text{C}$	1200	V
I_F	Diode Continuous Forward Current		150	A
I_{FM}	Peak FWD Current Repetitive	$t_p=1\text{ms}$	300	A

Electrical Characteristics of FWD

Symbol	Description	Conditions	Min	Typ	Max	Unit	
V_{FM}	Forward Voltage	$I_F=150\text{A}$	$T_J=25^\circ\text{C}$	2.05		V	
			$T_J=125^\circ\text{C}$	2.10			
t_{rr}	Reverse Recovery Time	$I_F=150\text{A},$ $-diF/dt = 1200\text{A}/\mu\text{s}(T_J=125^\circ\text{C}),$ $V_{rr} = 600\text{V},$ $V_{GE} = -15\text{V}$	$T_J=25^\circ\text{C}$	267		ns	
			$T_J=125^\circ\text{C}$	415			
I_{rr}	Peak Reverse Recovery Current		$T_J=25^\circ\text{C}$	78		A	
			$T_J=125^\circ\text{C}$	98			
Q_{rr}	Reverse Recovery Charge		$T_J=25^\circ\text{C}$	9.18		μC	
			$T_J=125^\circ\text{C}$	17.9			
E_{rec}	Reverse Recovery Energy		$T_J=25^\circ\text{C}$	3.2		mJ	
			$T_J=125^\circ\text{C}$	6.4			
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.212	$^\circ\text{C}/\text{W}$	

Internal NTC-Thermistor Characteristics

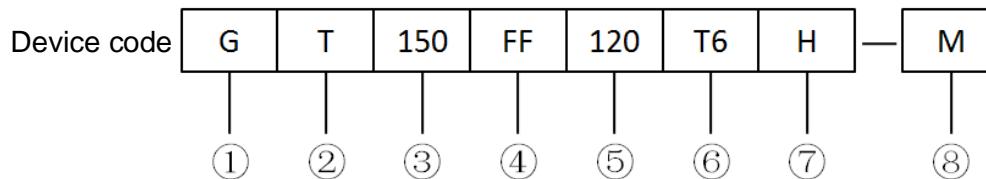
Symbol	Description	Conditions	Min.	Typ.	Max.	Units.
R_{25}	Rated Resistance	$T_C=25^\circ\text{C}$		5		k Ω
$\Delta R/R$	Deviation of R100	$T_C=100^\circ\text{C}, R_{100}=481\Omega$	-5		5	%
P_{25}	Power Dissipation	$T_C=25^\circ\text{C}$			10	mW
$B_{25/50}$	B-Value	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$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



Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, $f=50\text{Hz}$, 1minute	2500			V
L_{sCE}	Stray Inductance Module			21		nH
T_J	Maximum Junction Temperature				175	$^{\circ}\text{C}$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature		-40		+125	$^{\circ}\text{C}$
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.1		$^{\circ}\text{C/W}$
M	Mounting Torque for Module Mounting	Screw M5--Mounting according to valid application note	3.0		6.0	N·m
G	Weight			300		g

Ordering Information Table



- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (150=150A)
- ④ - Circuit Configuration: FF(Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)
- ⑧ - Internal Control Code

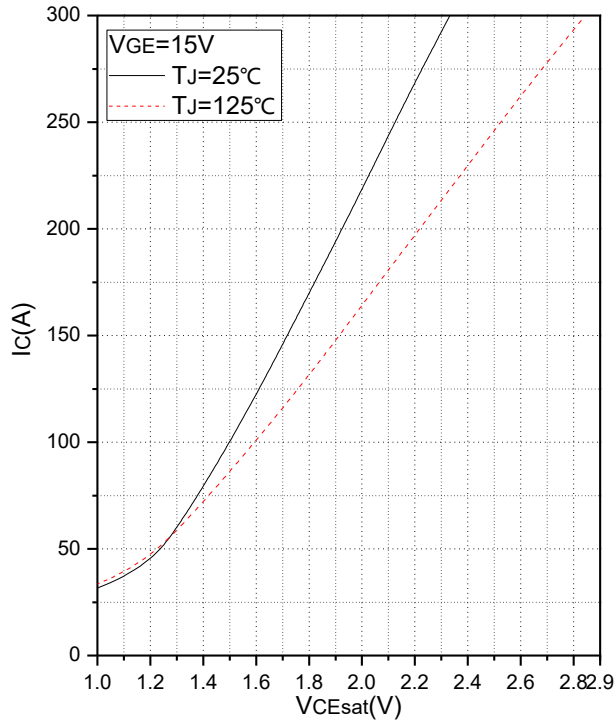


Fig.1 Typical Saturation Voltage Characteristics

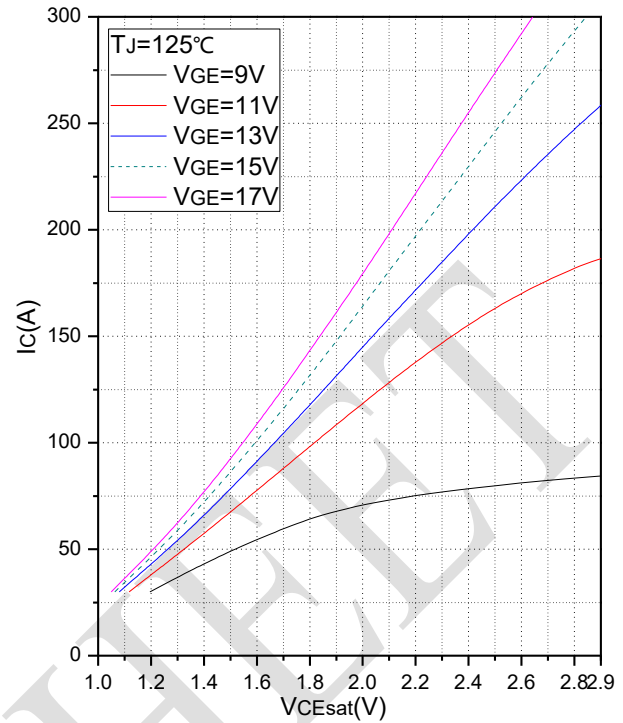


Fig.2 Typical Output Characteristics

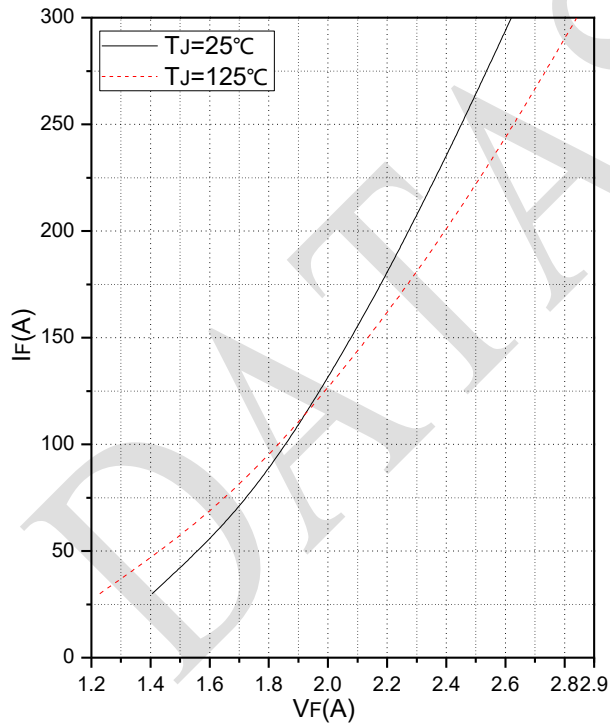


Fig.3 Forward Characteristics of Diode

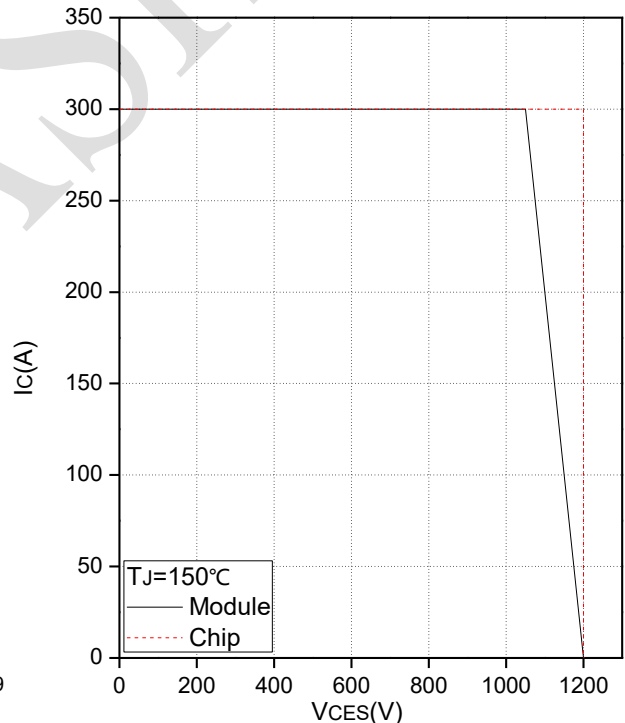


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

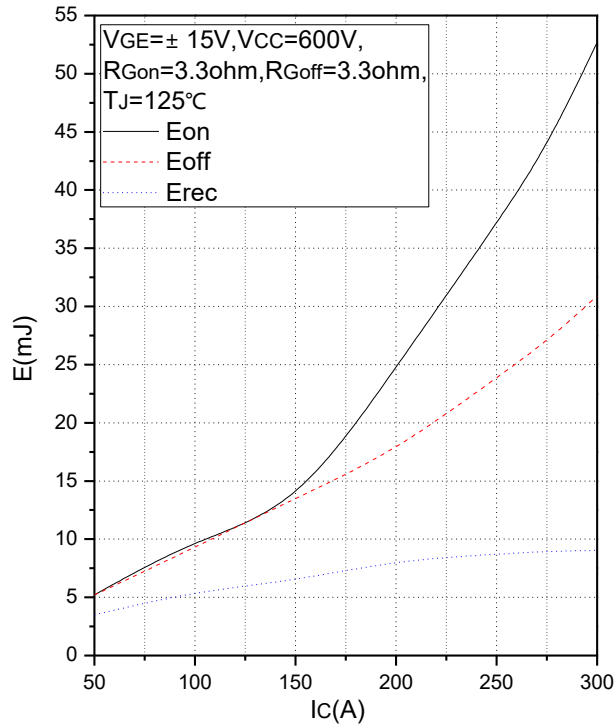


Fig.5 Typical Switching Loss vs. Collector Current

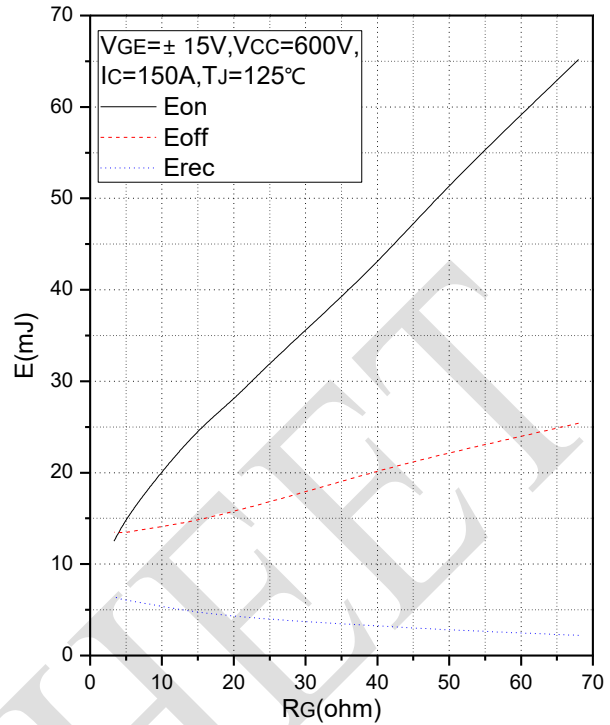


Fig.6 Typical Switching Loss vs. Gate Resistance

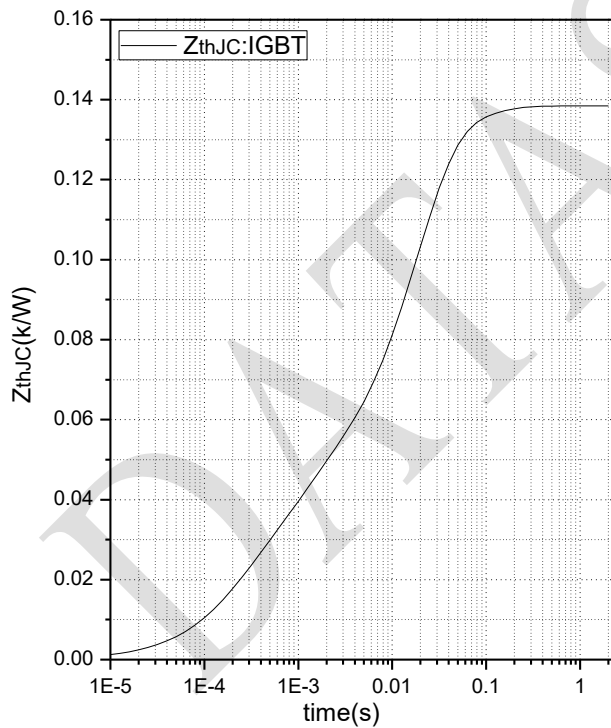


Fig.7 Transient Thermal Impedance (IGBT)

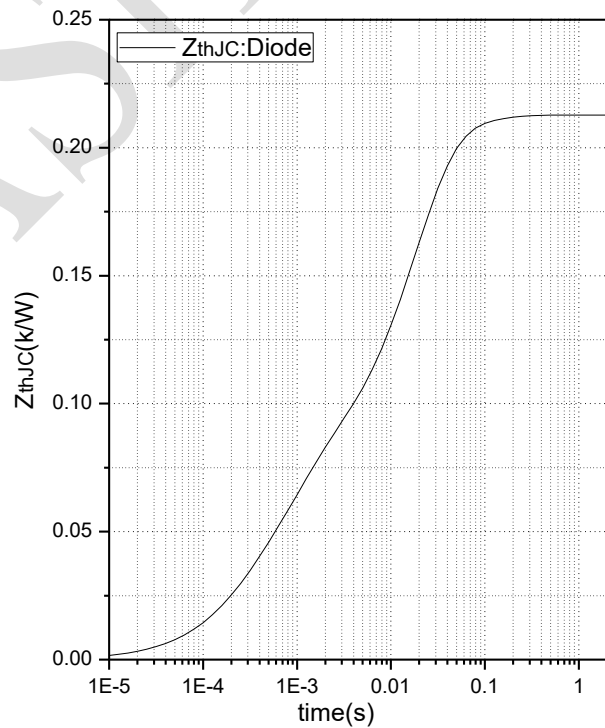


Fig.8 Transient Thermal Impedance (Diode)

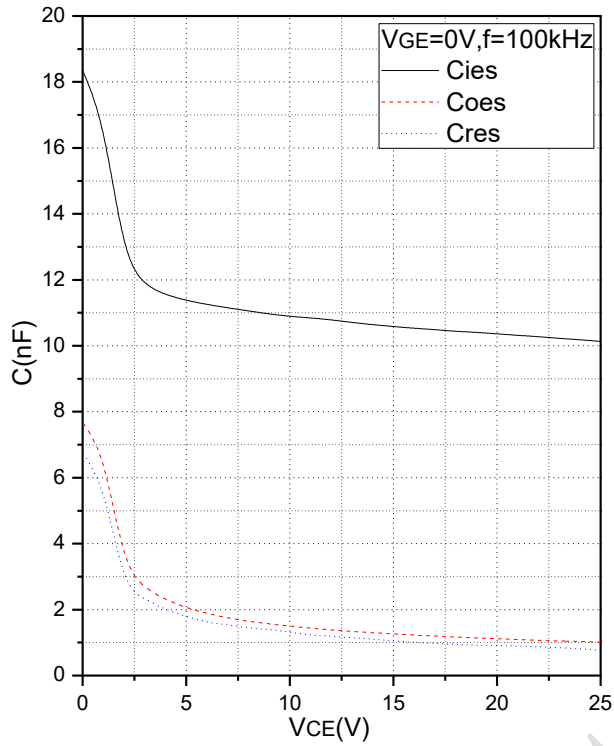


Fig.9 Capacitance Characteristics

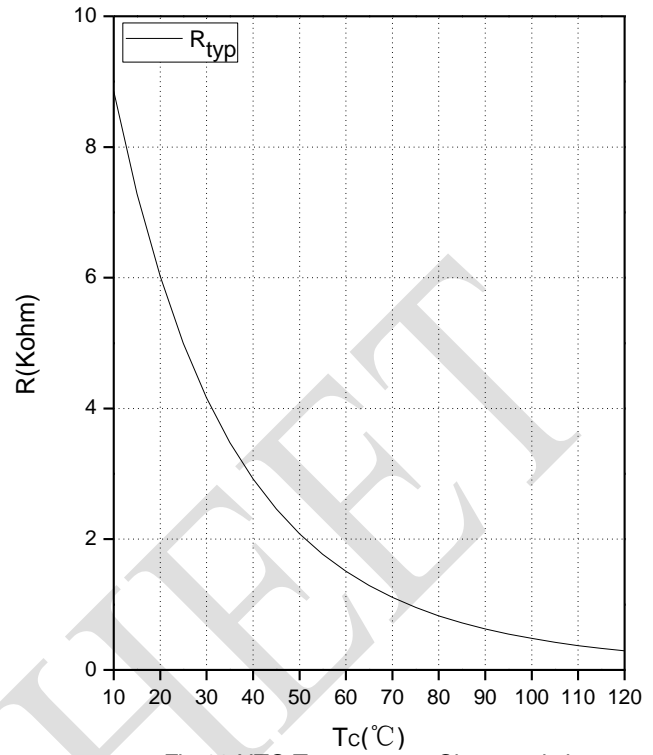
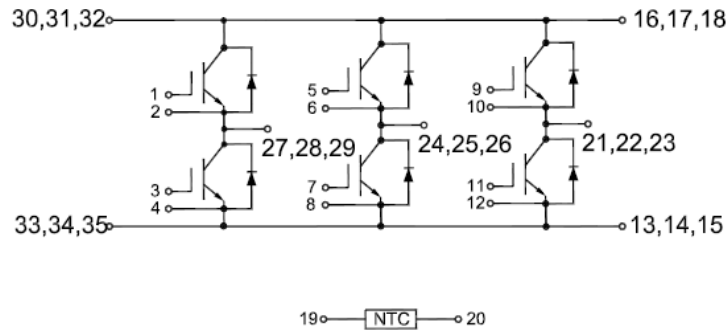


Fig.10 NTC Temperature Characteristics

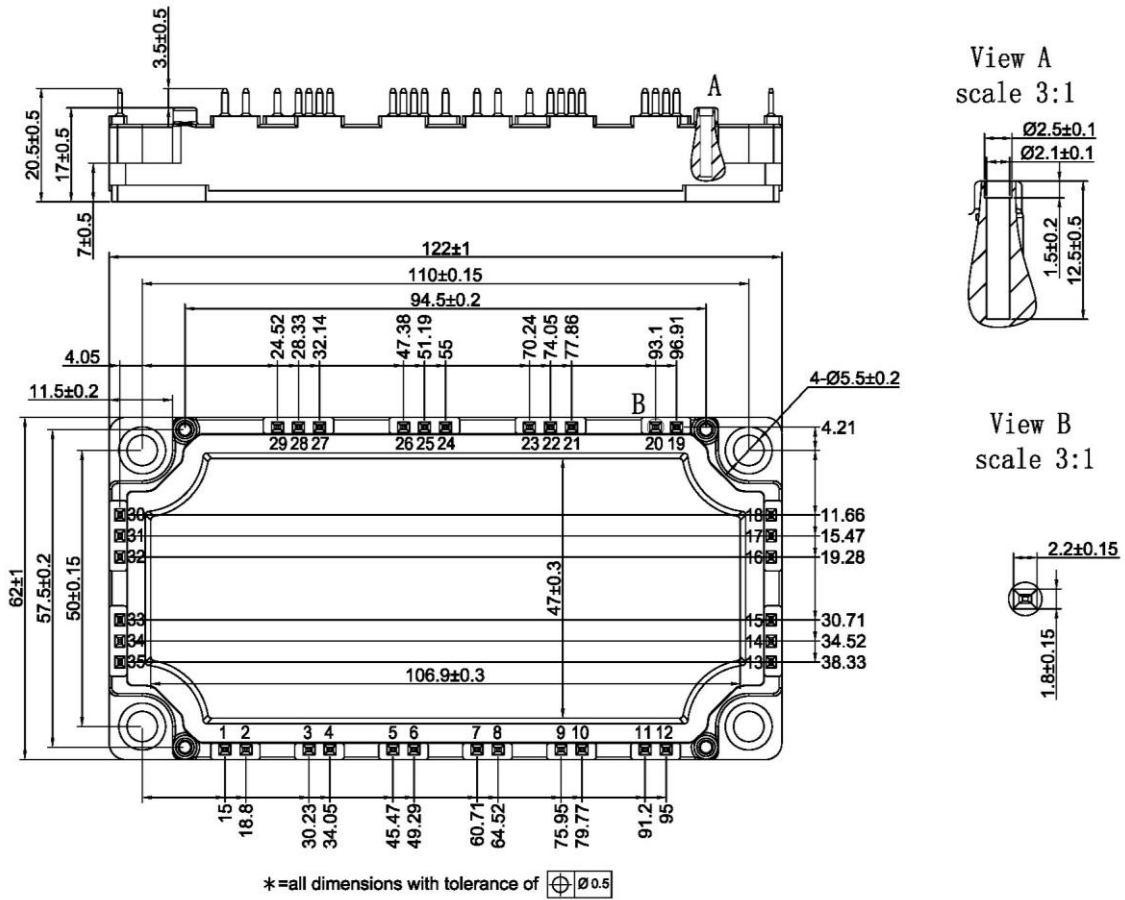
DATA SHEET



Internal Circuit:



Package Outline (Unit: mm):





Date	Revision	Notes
03/13/2019	01	Initial Release
09/12/2019	A	Final Version

Announcement

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