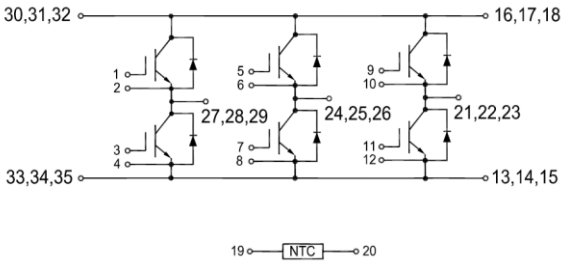
SYMT200FF120T6H-M

IGBT Module

Features：

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



Applications：

- Industrial Inverters
- Servo Applications

IGBT, Inverter

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage	T_J=25℃	1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	200	A
		T_C=25℃	385	A
I_{CM}	Peak Collector Current Repetitive	tp=1ms	400	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	1305	W

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

Static Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C = 3mA, V_{CE} = V_{GE}		5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 200 A, V_{GE} = 15V	T_J=25℃		1.70		V
			T_J=125℃		1.90		V
			T_J=150℃		2.00		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE} = 0V, V_{CE} = V_{CES}, T_J = 25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±20V, V_{CE} = V_{CES}, T_J = 25℃				200	nA
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V, f ＝1MHz			17		nF
C_{res}	Reveres Transfer Capacitance				0.57		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V,I_C = 200A, R_{Gon} = 1Ω,V_{GE} = ±15V, Inductive Load	T_J=25℃		254		ns
			T_J=125℃		260		
			T_J=150℃		266		
t_r	Rise Time		T_J=25℃		87		ns
			T_J=125℃		92		
			T_J=150℃		95		
$t_{d(off)}$	Turn-off Delay Time	V_{CC} = 600V,I_C = 200A, R_{Goff} = 1Ω,V_{GE} = ±15V, Inductive Load	T_J=25℃		252		ns
			T_J=125℃		281		
			T_J=150℃		289		
t_f	Fall Time		T_J=25℃		155		ns
			T_J=125℃		199		
			T_J=150℃		226		
E_{on}	Turn-on Switching Loss	V_{CC} = 600V,I_C = 200A, R_{Gon} = 1Ω,V_{GE} = ±15V, di/dt =1851A/μs(T_J=150℃) Inductive Load	T_J=25℃		8.4		mJ
			T_J=125℃		12.9		
			T_J=150℃		14.2		

E_{off}	Turn-off Switching Loss	V_{CC} = 600V,I_C = 200A, R_{Goff} = 1Ω,V_{GE} = ±15V, du/dt =4407V/μs(T_J=150℃) Inductive Load	T_J=25℃		11.7		mJ
			T_J=125℃		19.3		
			T_J=150℃		21.5		
Q_g	Total Gate Charge	V_{GE}=-15…+15V	T_J = 25℃		960		nC
$R_{g\ internal}$	Internal Gate Resistance		T_J = 25℃		3.3		Ω
RBSOA	I_C=400A, V_{CC}=1050V,Vp=1200V, R_G= 1Ω, V_{GE}=+15V to 0V, T_J =150°C			Trapezoid			
I_{SC}	SC Data	Vcc=600V, tp=10us, V_{GE}=±15V, R_{Gon}=4.7ohm, R_{Goff}=4.7ohm, Tj=150℃			1044		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case					0.115	℃/W

Diode, Inverter

Maximum Rated Values (T_C = 25℃unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current		200	A
I_{FM}	Peak FWD Current Repetitive	tp=1ms	400	A

Electrical Characteristics of FWD (T_C=25℃unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F = 200A	T_J=25℃		1.80		V
			T_J=150℃		1.95		
t_{rr}	Reverse Recovery Time	I_F=200A, -di$_F$/dt =1300A/μs(T_J=150℃), V_R = 600V, V_{GE} = -15V	T_J=25℃		286		ns
			T_J=125℃		456		
			T_J=150℃		522		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		145		A
			T_J=125℃		172		
			T_J=150℃		178		
Q_{rr}	Reverse Recovery Charge	I_F=200A, -di$_F$/dt =1300A/μs(T_J=125℃), V_R = 600V, V_{GE} = -15V	T_J=25℃		21.4		μC
			T_J=125℃		35.8		
			T_J=150℃		41.3		

E_{rec}	Reverse Recovery Energy		T_J=25℃		10.2		mJ
			T_J=125℃		17.2		
			T_J=150℃		19.7		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case					0.199	℃/W

Internal NTC-Thermistor Characteristics

Symbol	Description		Min.	Typ.	Max.	Units.
R_{25}	Rated Resistance	T_C=25℃		5		kΩ
△R/R	Deviation of R100	T_C=100℃，R_{100}=481Ω	-5		5	%
P_{25}	Power Dissipation	T_C=25℃			10	mW
$B_{25/50}$	B-Value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
$B_{25/80}$	B-Value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
$B_{25/100}$	B-Value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3545		K

Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 1minute	2500			V
L_{sCE}	Stray Inductance Module			21		nH
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			
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.1		℃/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

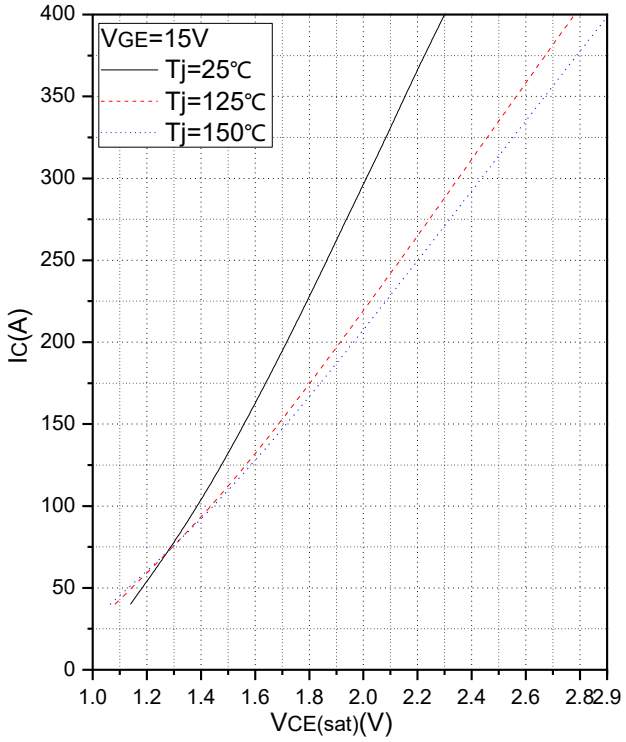


Fig.1 Typical Saturation Voltage Characteristics

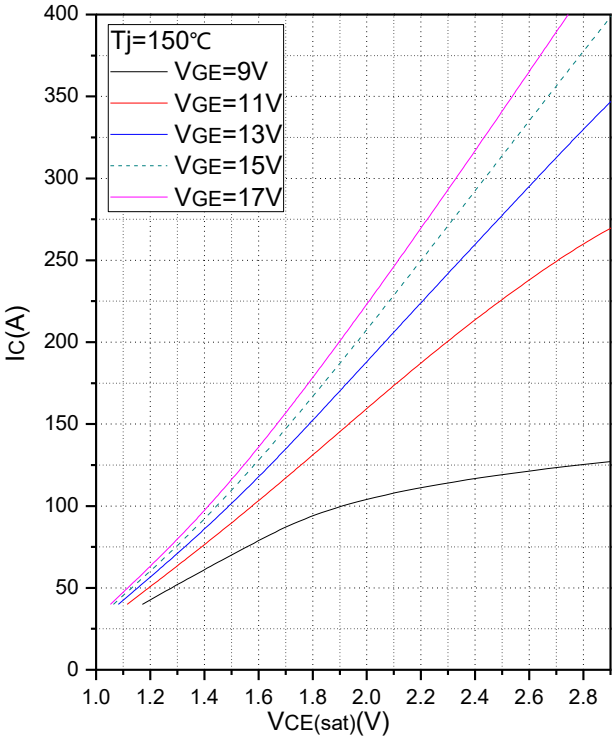


Fig.2 Typical Output Characteristics

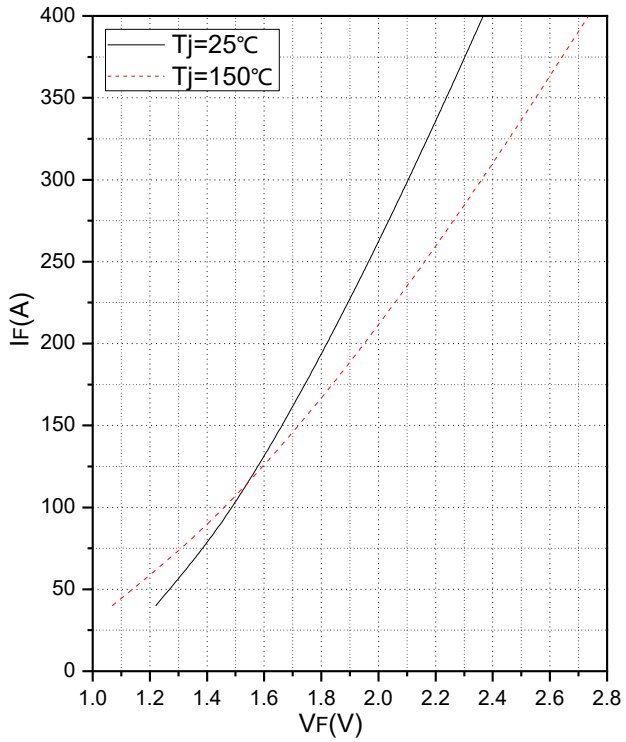


Fig.3 Forward Characteristics of FWD

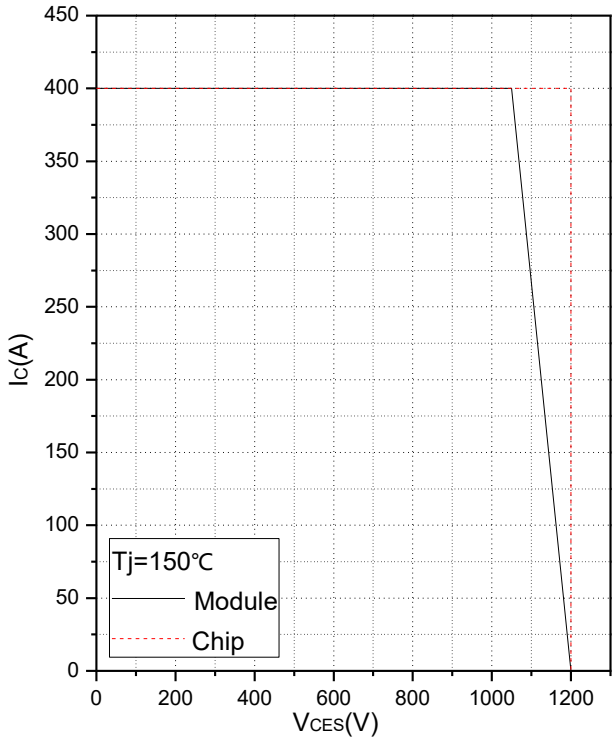


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

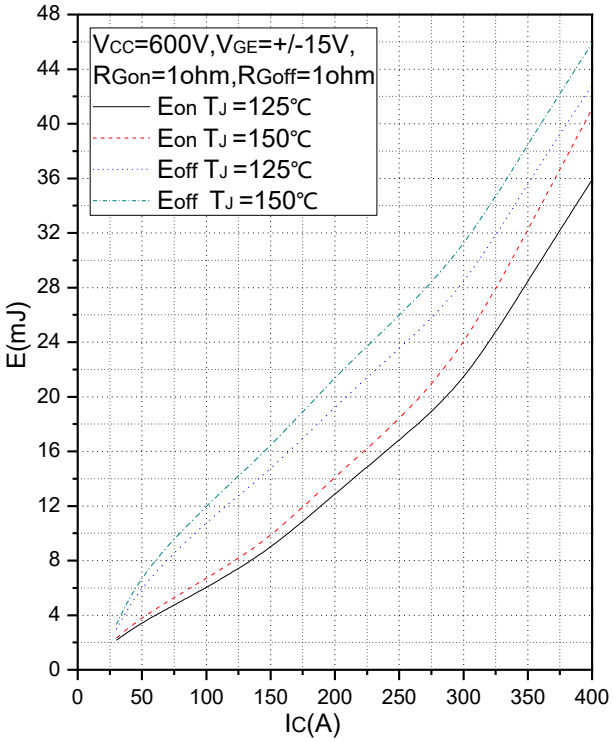


Fig.5 Typical Switching Loss vs. Collector Current

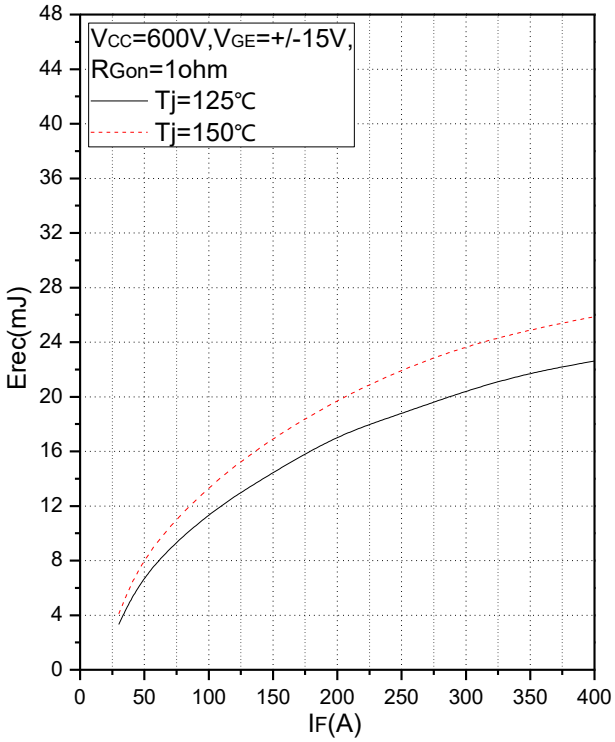


Fig.6 Typical Switching Loss vs. Forward Current

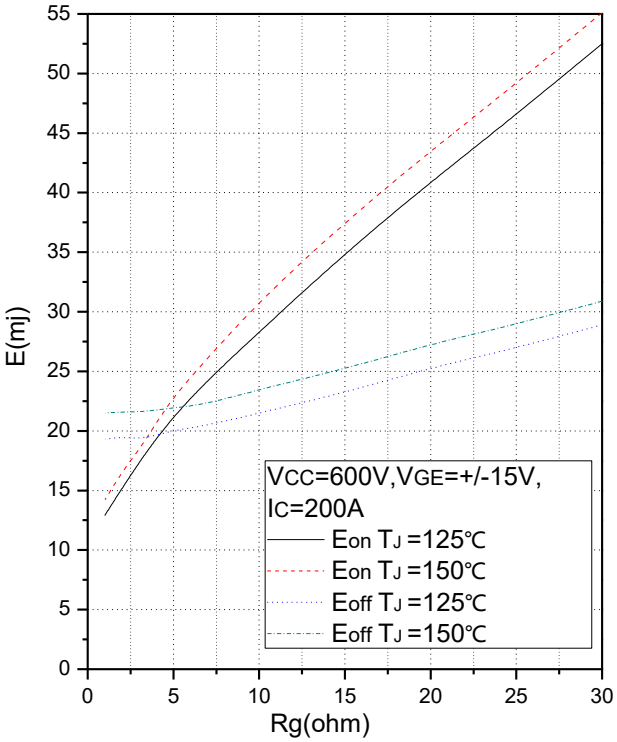


Fig.7 Typical Switching Loss vs. Gate Resistance

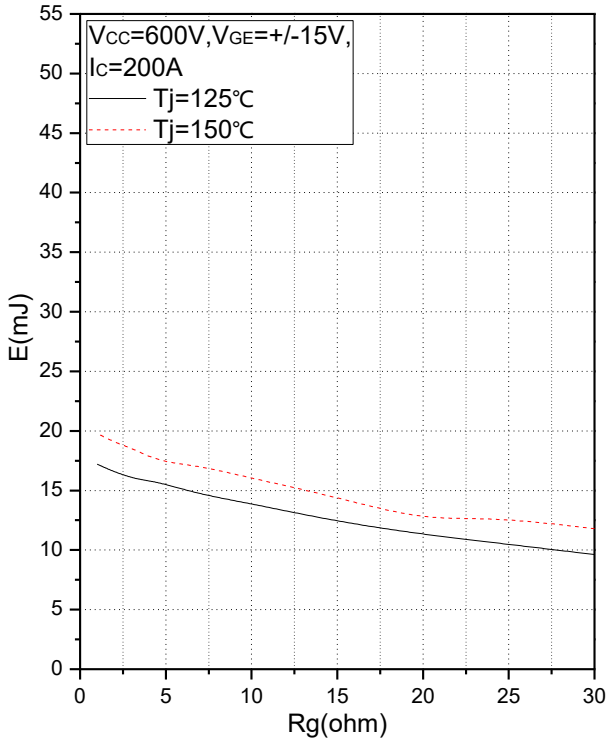


Fig.8 Typical Switching Loss vs. Gate Resistance

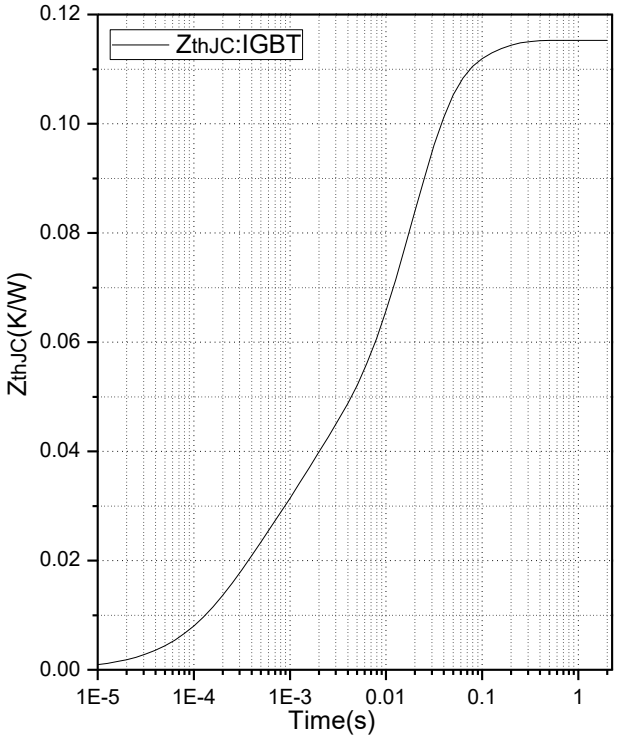


Fig.9 Transient Thermal Impedance (IGBT)

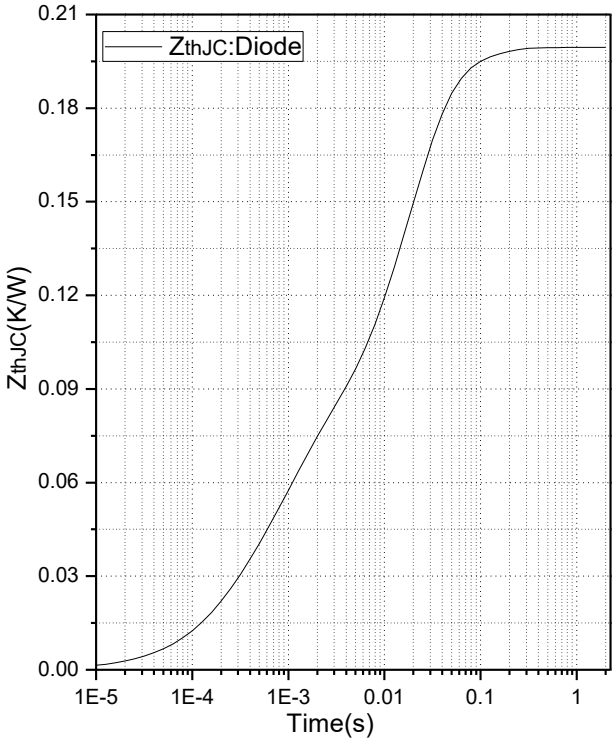


Fig.10 Transient Thermal Impedance (Diode)

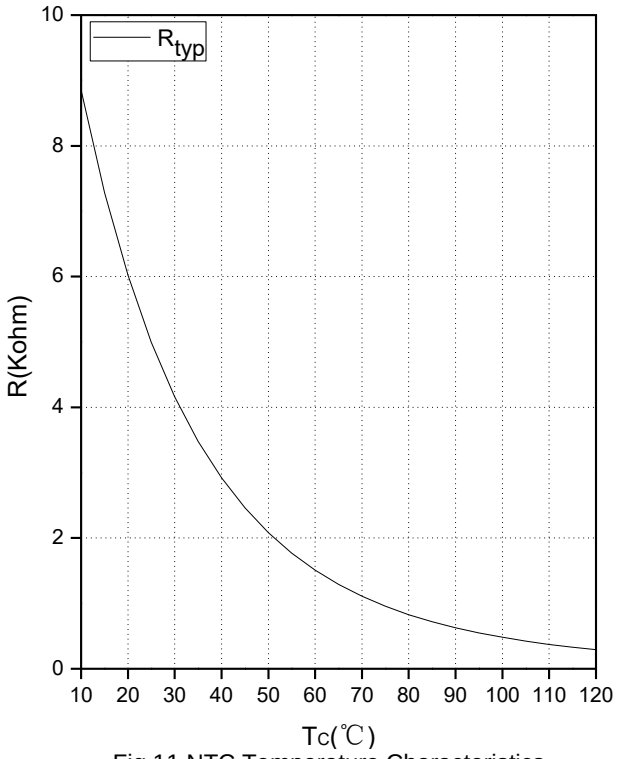
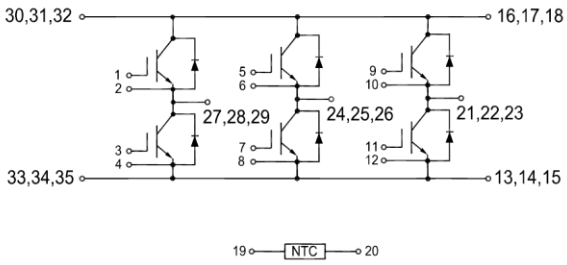


Fig.11 NTC Temperature Characteristics

Internal Circuit:



Package Outline (Unit: mm):