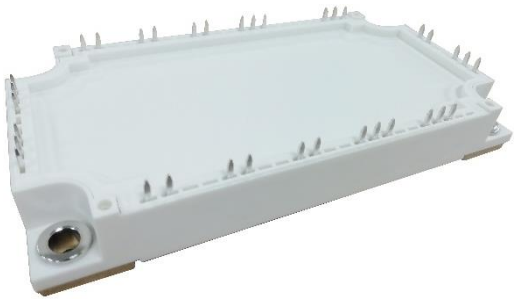
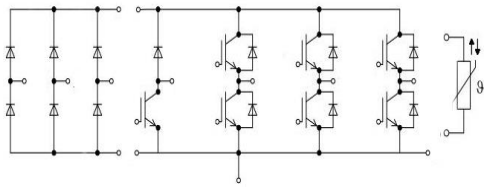
1200V/50A PIM



Features：

- 1200V50A,VCE(sat)(typ.)=2.10V
- Lower losses and higher energy
- Excellent short circuit ruggedness
- 62mm PIM module



Equivalent Circuit Schematic

General Applications：

Daxin's IGBTs offer lower losses and higher energy for application such as motor drive , inverter and other soft switching applications.

IGBT,Inverter

Absolute Maximum Ratings of IGBT				
V_{CES}	Collector to Emitter Voltage		1200	V
V_{GES}	Continuous Gate to Emitter Voltage		±30	V
I_C	Continuous Collector Current	T_C = 25°C	100	A
		T_C = 100°C	50	
I_{CM}	Pulse Collector Current	T_J = 150°C	100	A
P_D	Maximum Power Dissipation (IGBT)	T_C = 25°C, T_J = 150°C	365	W
t_{sc}	Short Circuit Withstand Time		> 10	μs
T_J	Maximum IGBT Junction Temperature		150	°C
T_{JOP}	Maximum Operating Junction Temperature Range		-40 to +150	°C
T_{stg}	Storage Temperature Range		-40 to +125	°C
Absolute Maximum Ratings of Freewheeling Diode				
V_{RRM}	Repetitive Peak Reverse Voltage Preliminary Data		1200	V
I_F	Diode Continuous Forward Current	T_C = 25°C	100	A
	Diode Continuous Forward Current	T_C = 100°C	50	
I_{FM}	Diode Maximum Forward Current		100	A

Parameter		Test Conditions		Min	Typ	Max	Unit
Electrical Characteristics of IGBT at T_J = 25°C (Unless Otherwise Specified)							
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 1mA		1200			V
I_{CES}	Collector to Emitter Leakage Current	V_{GE} = 0V,V_{CE} = V_{CES}				1	mA
I_{GES}	Gate to Emitter Leakage Current	V_{GE} = ±30V, V_{CE} = 0V				100	nA
$V_{GE(th)}$	Gate Threshold Voltage	I_C = 1mA, V_{CE} = V_{GE}		4.5		5.7	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Module Level)	I_C = 50A, V_{GE} = 15V	T_J = 25°C		2.10	2.30	V
			T_J = 125°C		2.50		
Switching Characteristics of IGBT							
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V I_C = 50A R_G = 10Ω V_{GE} = ±15V Inductive Load	T_J = 25°C		20		ns
t_r	Turn-on Rise Time		T_J = 25°C		35		ns
$t_{d(off)}$	Turn-off Delay Time		T_J = 25°C		250		ns
t_f	Turn-off Fall Time		T_J = 25°C		330		ns
E_{on}	Turn-on Switching Loss		T_J = 25°C		3.90		mJ
E_{off}	Turn-off Switching Loss		T_J = 25°C		2.20		mJ
Q_g	Total Gate Charge		T_J = 25°C		430		nC
R_{gint}	Integrated gate resistor	f = 1M; Vpp = 1V	T_J = 25°C		2.2		Ω
C_{ies}	Input Capacitance	V_{CE} = 25V V_{GE} = 0V f = 1MHz	T_J = 25°C		3.80		nF
C_{oes}	Output Capacitance		T_J = 25°C		0.51		
C_{res}	Reverse Transfer Capacitance		T_J = 25°C		0.33		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (IGBT)					0.343	°C/W
Electrical and Switching Characteristics of Freewheeling Diode							
V_F	Diode Forward Voltage	I_F = 50A , V_{GE} = 0V	T_J = 25°C		1.90	2.20	V
			T_J = 125°C		1.90		
t_{rr}	Diode Reverse Recovery Time	I_F = 50A, di/dt = 890A/μs, V_{rr} = 600V,	T_J = 25°C		110		ns
I_{rr}	Diode Peak Reverse Recovery Current		T_J = 25°C		55		A
Q_{rr}	Diode Reverse Recovery Charge		T_J = 25°C		3.00		uC
E_{rr}	Diode Reverse Recovery Energy		T_J = 25°C		0.8		mJ
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Diode)					0.652	°C/W

Diode, Rectifier

Maximum Rated Values				
V_{RRM}	Repetitive Peak Reverse Voltage	T_J = 25°C	1800	V
I_{FRMSM}	Maximum RMS forward current per chip	T_C =80℃	50	A
I_{RMSM}	Maximum RMS current at rectifier output	T_C =80℃	100	
I_{FSM}	Surge Current @t_p=10 ms	T_J =25℃	420	A
I^2t	I^2t - value	T_J =25℃	880	A^2s

Electrical Characteristics of Diode							
Parameter		**Test Conditions**		**Min**	**Typ**	**Max**	**Unit**
V_F	Diode Forward Voltage	I_F = 50A	T_J = 25°C		1.05		V
			T_J = 125°C		0.85		
I_R	Reverse current	T_J = 125°C			1.0		mA
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Diode)					0.85	°C/W

IGBT,Brake-Chopper

Maximum Ratings of IGBT				
V_{CES}	Collector to Emitter Voltage		1200	V
V_{GES}	Continuous Gate to Emitter Voltage		±30	V
I_C	Continuous Collector Current	T_C = 25°C	50	A
		T_C = 100°C	25	
I_{CM}	Pulse Collector Current	T_J = 150°C	50	A
P_D	Maximum Power Dissipation (IGBT)	T_C = 25°C, T_J = 150°C	280	W
t_{sc}	Short Circuit Withstand Time		> 10	μs
T_J	Maximum IGBT Junction Temperature		150	°C
T_{JOP}	Maximum Operating Junction Temperature Range		-40 to +150	°C
T_{stg}	Storage Temperature Range		-40 to +125	°C

Electrical Characteristics of IGBT at T_J = 25°C (Unless Otherwise Specified)

Parameter		Test Conditions		Min	Typ	Max	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 1mA		1200			V
I_{CES}	Collector to Emitter Leakage Current	V_{GE} = 0V, V_{CE}=V_{CES}				1	mA
I_{GES}	Gate to Emitter Leakage Current	V_{GE} = ±30V, V_{CE} = 0V				100	nA
$V_{GE(th)}$	Gate Threshold Voltage	I_C = 1mA, V_{CE} = V_{GE}		4.5		5.7	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Module Level)	I_C = 25A, V_{GE} = 15V	T_J = 25°C		2.10	2.30	V
			T_J = 125°C		2.50		
Switching Characteristics of IGBT							
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V I_C = 25A R_G = 13Ω V_{GE} = ±15V Inductive Load	T_J = 25°C		20		ns
t_r	Turn-on Rise Time		T_J = 25°C		40		ns
$t_{d(off)}$	Turn-off Delay Time		T_J = 25°C		280		ns
t_f	Turn-off Fall Time		T_J = 25°C		210		ns
E_{on}	Turn-on Switching Loss		T_J = 25°C		1.80		mJ
E_{off}	Turn-off Switching Loss		T_J = 25°C		1.70		mJ
Q_g	Total Gate Charge		T_J = 25°C		140		nC
R_{gint}	Integrated gate resistor	f = 1M; Vpp = 1V	T_J = 25°C		8.0		Ω
C_{ies}	Input Capacitance	V_{CE} = 25V V_{GE} = 0V f = 1MHz	T_J = 25°C		1.08		nF
C_{oes}	Output Capacitance		T_J = 25°C		0.17		
C_{res}	Reverse Transfer Capacitance		T_J = 25°C		0.12		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (IGBT)					0.45	°C/W

Diode,Brake-Chopper

Maximum Rated Values				
V_{RRM}	Repetitive Peak Reverse Voltage Preliminary Data		1200	V
I_F	Diode Continuous Forward Current	T_C = 25°C	50	A
		T_C = 100°C	25	
I_{FM}	Diode Maximum Forward Current		50	A

Electrical and Switching Characteristics of Freewheeling Diode

Parameter		**Test Conditions**		**Min**	**Typ**	**Max**	**Unit**
V_F	Diode Forward Voltage	I_F = 25A , V_{GE} = 0V	T_J = 25°C		1.90	2.20	V
			T_J = 125°C		1.90		
t_{rr}	Diode Reverse Recovery Time	I_F = 25A, di/dt = 1200A/μs, V_{rr} = 600V	T_J = 25°C		120		ns
I_{rr}	Diode Peak Reverse Recovery Current		T_J = 25°C		17		A
Q_{rr}	Diode Reverse Recovery Charge		T_J = 25°C		1.30		uC
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Diode)					1.31	°C/W

NTC - Thermistor

Characteristic Values

R_{25}	T_C = 25°C	5		KΩ
△R/R	T_C = 100°C,R_{100}=493Ω		±5	%
P_{25}	T_C = 25°C	50		mW
$B_{25/50}$	$R_2 = R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K)]$	3375		K
$B_{25/80}$	$R_2 = R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K)]$	3410		K

Module Characteristics

Parameter		**Min.**	**Typ.**	**Max.**	**Unit**
V_{iso}	Isolation Voltage (All Terminals Shorted),f = 50Hz, 1minute			2500	V
$R_{\theta CS}$	Case-To-Sink(Conductive Grease Applied)		0.1		°C/W
M	Mounting Screw: M5	3.0		6.0	N·m
G	Weight		300		g

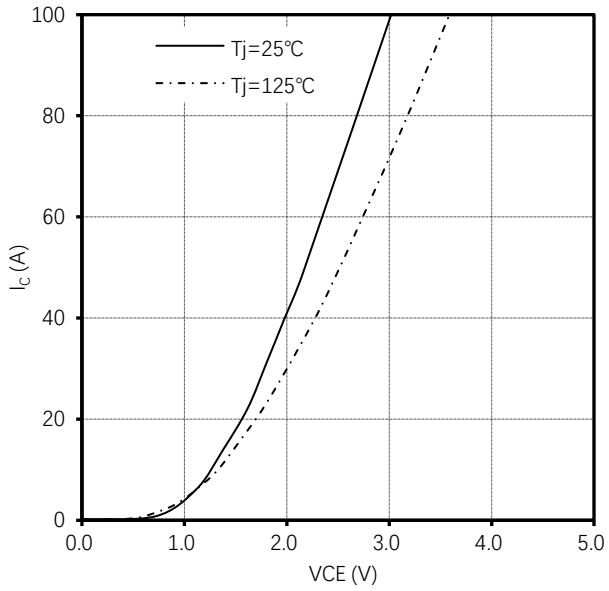


Fig 1. Output characteristic IGBT，
$I_C=f(V_{CE})$,VGE=15V

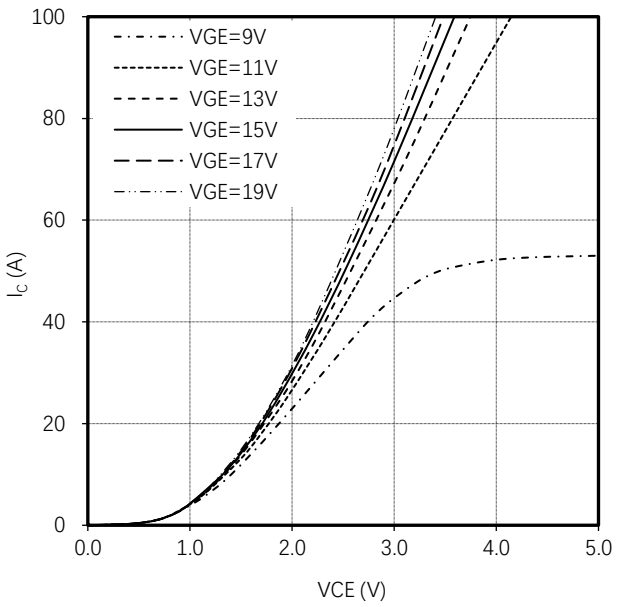


Fig 2. Output characteristic IGBT，
$I_C=f(V_{CE})$,T_j=125℃

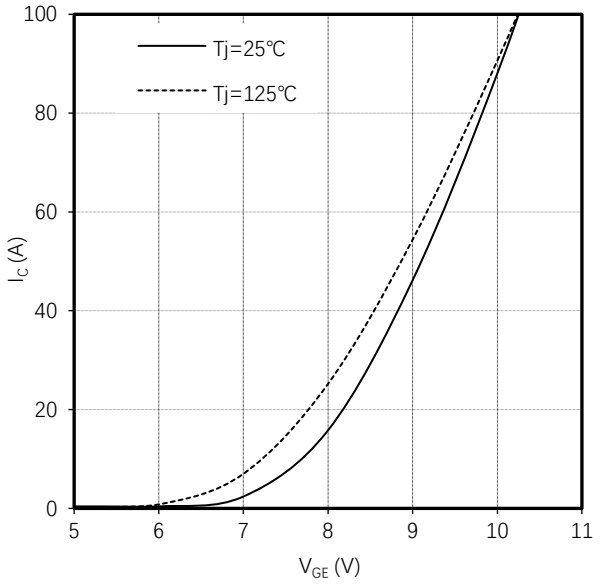


Fig 3. Transfer characteristic IGBT
$I_C=f(V_{GE})$,V_{CE}=20V

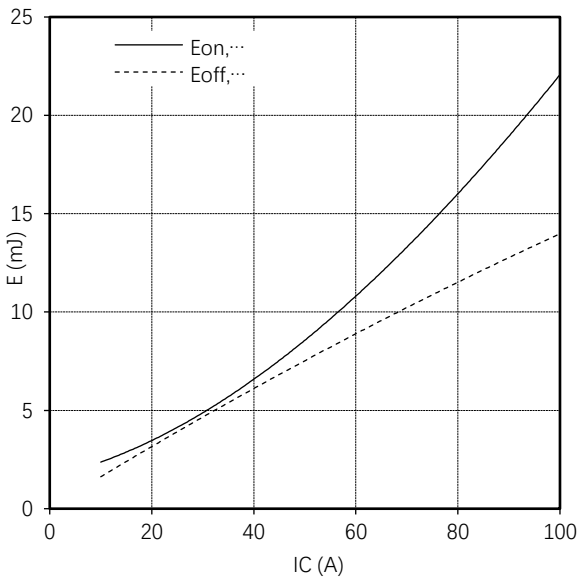


Fig 4. Switching losses IGBT, $E_{on}=f(Ic)$,$E_{off}=f(I_c)$,
V_{GE}=±15V,R_{Gon}=18Ω,R_{Goff}=18Ω,V_{CE}=600V

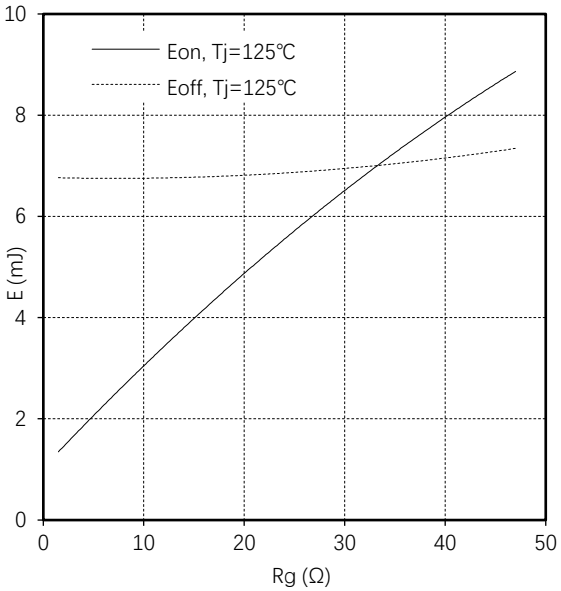


Fig 5. Switching losses IGBT, $E_{on}=f(R_G)$,$E_{off}=f(R_G)$, $V_{GE}=\pm15V$,$I_C=50A$,$V_{CE}=600V$

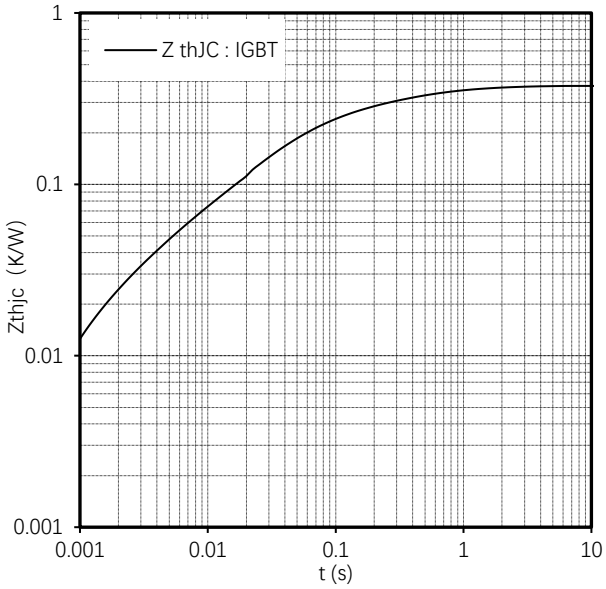


Fig 6. Transient thermal impedance IGBT , Zthjc=f(t)

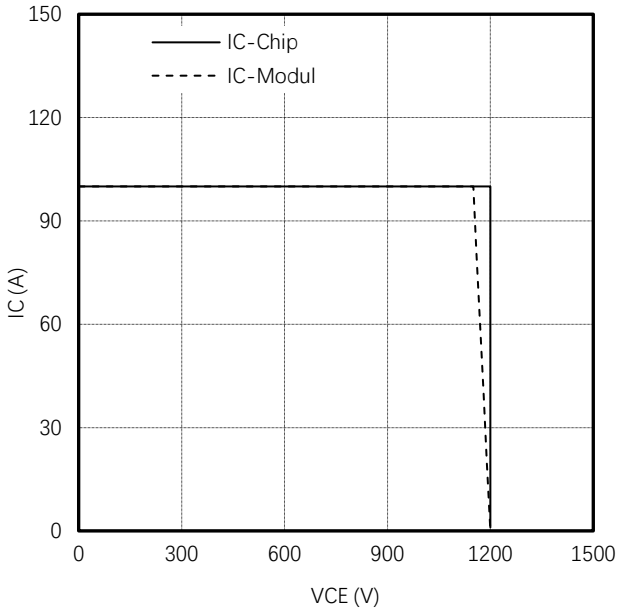


Fig 7.Rreverse bias safe operating area IGBT, $I_C=f(V_{CE})$,$V_{GE}=\pm15V$,$R_{Goff}=18\Omega$，Tvj=125℃

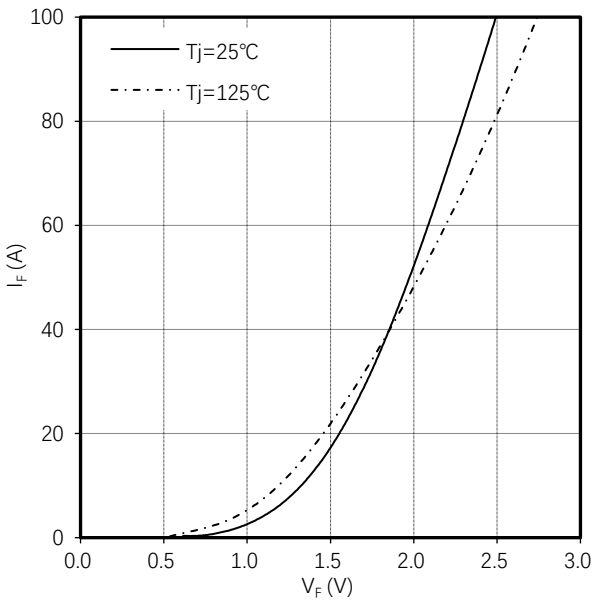


Fig 8. Forward characteristic of Diode， $I_F=f(V_F)$

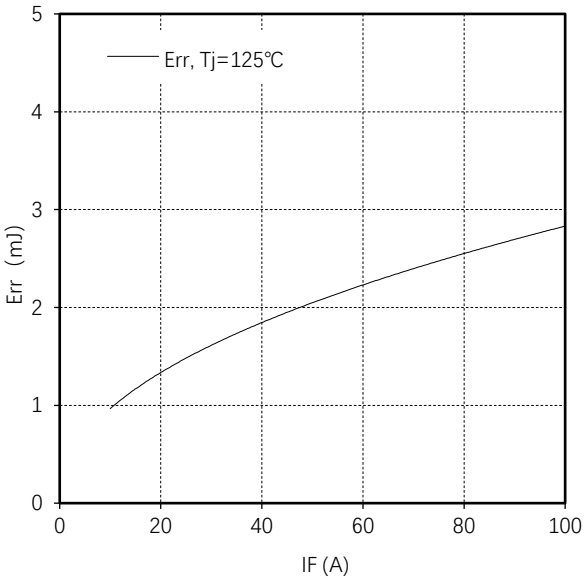


Fig 9. Switching losses Diode,
$E_{rr}=f(I_F)$,,$R_{Gon}=18\Omega$,$V_{CE}=600V$

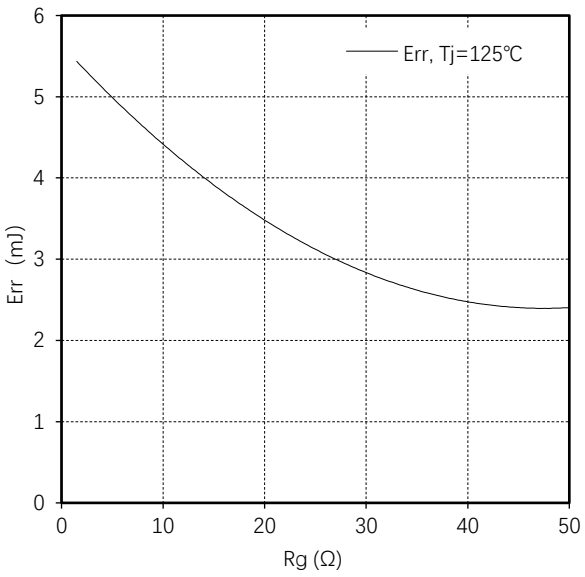


Fig 10. Switching losses Diode,
$E_{rr}=f(R_G)$,$I_F=50A$,$V_{CE}=600V$

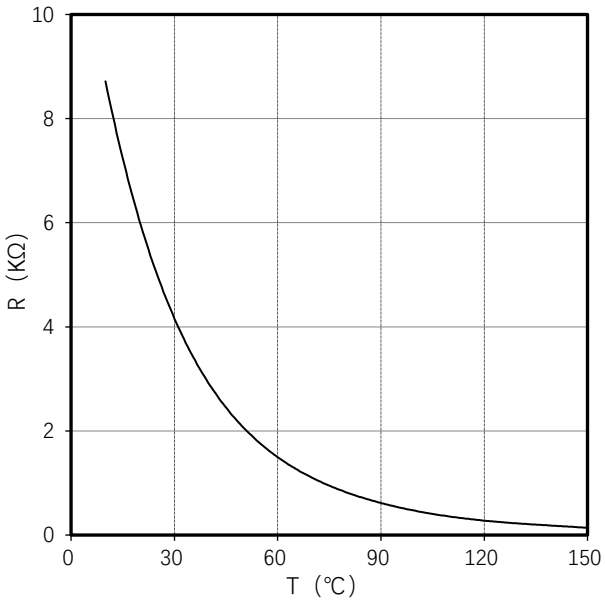
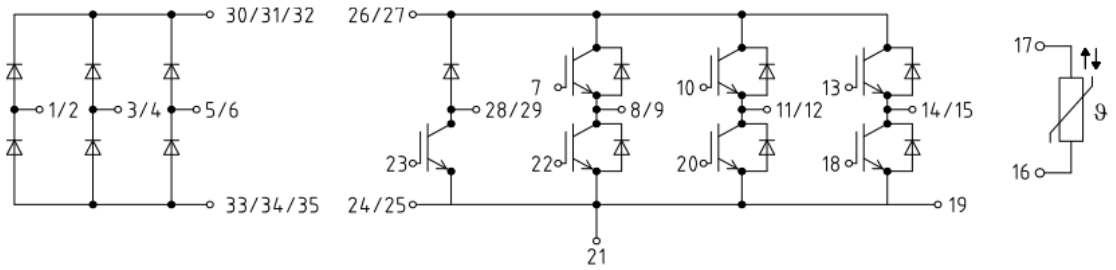


Fig 11.NTC-Thermistor-temperature characteristic(typical)

Internal Circuit:



Package Dimension
Dimensions in Millimeters