1. Product Features

1.1 Electrical features

- V_{CES}=1200V
- $I_{C\ nom}$=75A / I_{CRM}=150A
- Low switching losses
- Low inductance
- Fast switching and short tail current
- Integrated NTC temperature sensor
- High power and thermal cycling capability

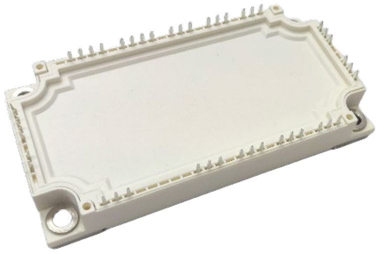


Figure1 IGBT Module

1.2 Mechanical features

- Al_2O_3 substrate with low thermal resistance
- Copper base plate

2. Typical Applications

- Switching mode power supply
- Drive inverters
- Uninterruptible power supply
- AC and DC servo drive amplifier

3. Description

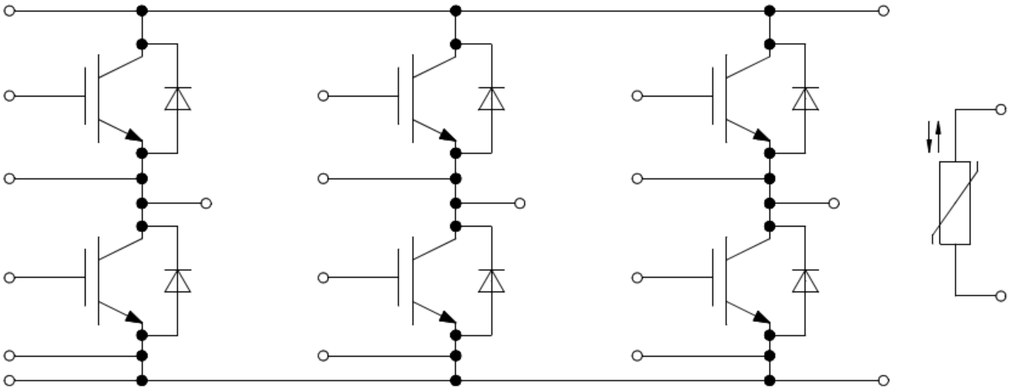


Figure 2 3 Phase Bridge

4. IGBT

4.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Collector-emitter voltage 集电极—发射极间电压	T_{vj} = 25°C	V_{CES}	1200	V
Continuous DC collector current 连续集电极电流	T_C = 100°C, $T_{vj\ max}$ = 150°C	$I_{C\ nom}$	75	A
Repetitive peak collector current 集电极峰值电流	t_P = 1 ms	I_{CRM}	150	A
Total power dissipation 总功率损耗	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	395	W
Gate-emitter peak voltage 栅极一发射极峰值电压		V_{GES}	+/- 20	V

4.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage 集电极一发射极饱和电压	I_C = 75 A, V_{GE} = 15 V	T_{vj} = 25°C	$V_{CE,sat}$		1.54		V
		T_{vj} = 125°C			1.65		V
		T_{vj} = 150°C			1.70		V
Gate threshold voltage 栅极阈值电压	I_C = 1.5mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	6.0	6.5	V
Gate charge 栅极电荷	V_{GE} = -15 V ... +15 V		Q_G		0.81		µC
Internal gate resistor 内部栅极电阻	T_{vj} = 25°C		R_{Gint}		2.70		Ω
Input capacitance 输入电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		9.80		nF
Reverse transfer capacitance 反向传输电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.12		nF
Collector-emitter cut-off current 集电极-发射极截止电流	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1	mA
Gate-emitter leakage current 栅极-发射极漏电流	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			100	nA
Turn-on delay time, inductive load 开通延迟时间	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,on}$		0.06		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.07		us
	$R_{G,on}$ = 1.6Ω	T_{vj} = 150°C			0.07		us
Rise time, inductive load 上升时间	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C	t_r		0.02		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.02		us
	$R_{G,on}$ = 1.6Ω	T_{vj} = 150°C			0.02		us

(table continues...) 待续

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Turn-off delay time, inductive load 关断延迟时间	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,off}$		0.20		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.23		us
	$R_{G,off}$ = 1.6Ω	T_{vj} = 150°C			0.24		us
Fall time, inductive load 下降时间	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C	t_f		0.24		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.37		us
	$R_{G,off}$ = 1.6Ω	T_{vj} = 150°C			0.39		us
Turn-on energy loss per pulse 开通损耗能量	I_C = 75A, V_{CE} = 600V, L_s=30nH	T_{vj} = 25°C	E_{on}		2.54		mJ
	V_{GE} = +15/-15V, di/dt =2900A/µs	T_{vj} = 125°C			3.66		mJ
	$R_{G,on}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			4.08		mJ
Turn-off energy loss per pulse 关断损耗能量	I_C = 75A, V_{CE} = 600V, L_s=30nH	T_{vj} = 25°C	E_{off}		5.53		mJ
	V_{GE} = +15/-15V, dv/dt =4390V/µs	T_{vj} = 125°C			8.21		mJ
	$R_{G,off}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			8.80		mJ
SC data 短路数据	V_{GE} ⩽15V, V_{CC} =600 V, t_P ⩽ 8 µs, T_{vj} = 150°C , C_{GE} = 0.0uF , V_{CEmax} = V_{CES} - L_{sCE} · di/dt		I_{SC}		548		A
Thermal resistance, junction to case 结一外壳热阻	Per IGBT		$R_{th,JC}$			0.38	K/W

5. Diode

5.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Repetitive peak reverse voltage 反向重复峰值电压	T_{vj} = 25°C	V_{RRM}	1200	V
Continuous DC forward current 连续正向直流电流		I_F	75	A
Repetitive peak forward current 正向重复峰值电流	t_P = 1 ms	I_{FRM}	150	A

5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage 正向电压	I_F = 75 A, V_{GE} = 0 V	T_{vj} = 25°C	V_F		1.83		V
		T_{vj} = 125°C			1.83		V
		T_{vj} = 150°C			1.77		V

(table continues...) 待续

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current 反向恢复峰值电流	I_F = 75A, V_R = 600V	T_{vj} = 25°C	I_{RM}		148		A
	V_{GE} = -15V , - di_F/dt = 4750 A/µs	T_{vj} = 125°C			176		A
	$R_{G,off}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			183		A
Recovered charge 恢复电荷	I_F = 75A, V_R = 600V	T_{vj} = 25°C	Q_r		5.71		µC
	V_{GE} = -15V , - di_F/dt = 4750 A/µs	T_{vj} = 125°C			10.0		µC
	$R_{G,off}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			11.7		µC
Reverse recovery energy 反向恢复损耗（每脉冲）	I_F = 75A, V_R = 600V	T_{vj} = 25°C	E_{rec}		1.01		mJ
	V_{GE} = -15V , - di_F/dt = 4750 A/µs	T_{vj} = 125°C			2.67		mJ
	$R_{G,off}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			3.21		mJ
Thermal resistance, junction to case 结一外壳热阻	Per diode		$R_{th,JC}$			0.45	K/W

6. NTC-Thermistor

6.1 Characteristic value

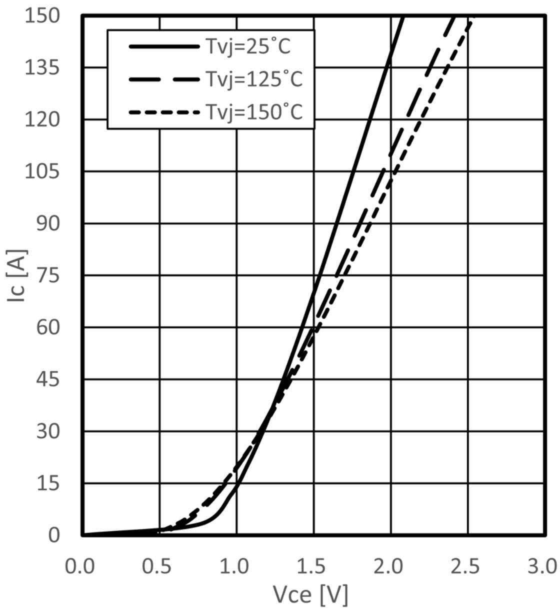
Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Rated resistance 额定电阻值	Tc = 25°C	R_{25}		5.00		KΩ
Power dissipation 耗散功耗	Tc = 25°C	P_{25}			20	mW
B-value B-Z 值	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298, 15K))]$	B_{25}/B_{50}		3375		K
B-value B-Z 值	$R_2=R_{25}\exp[B_{25/75}(1/T_2-1/(298, 15K))]$	B_{25}/B_{75}		3408		K
B-value B-Z 值	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298, 15K))]$	B_{25}/B_{100}		3436		K

7. Module

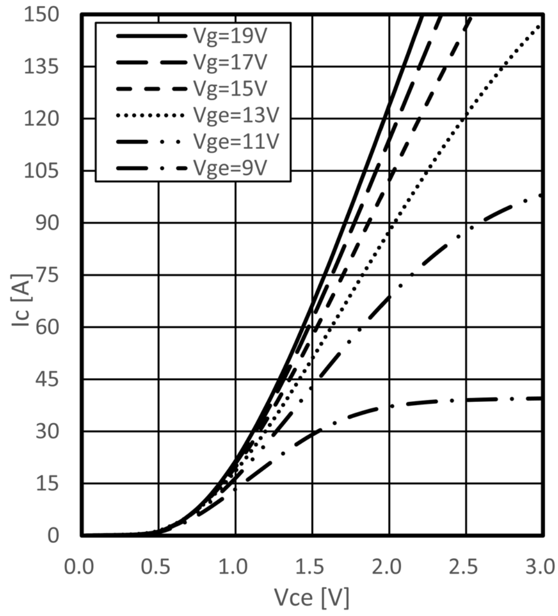
7.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage 隔离电压	RMS, f=50HZ,1min	V_{ISOL}			2500	V
Stray inductance module 杂散电感		L_{sCE}		30		nH
Operation Junction Temperature 结温		T_{jop}	-40		150	˚C
Storage Temperature Range 存储温度范围		T_{stg}	-40		125	˚C
Mounting Torque 安装扭矩	Screw M5	M	3		6	N.m
Weight of Module 重量		G		300		g

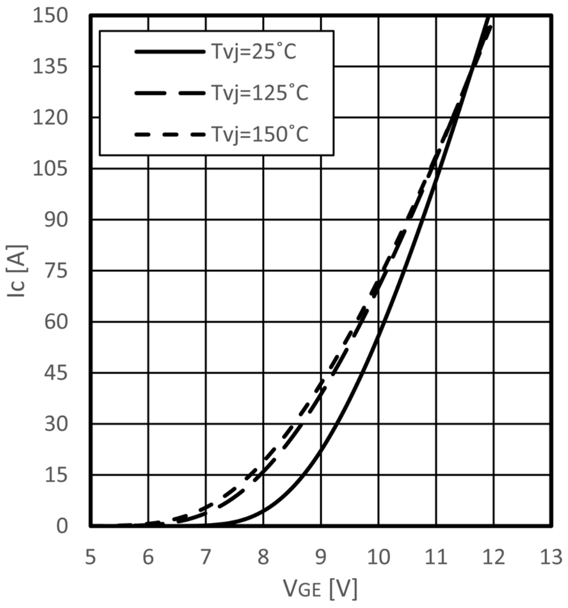
8. Characteristics diagrams



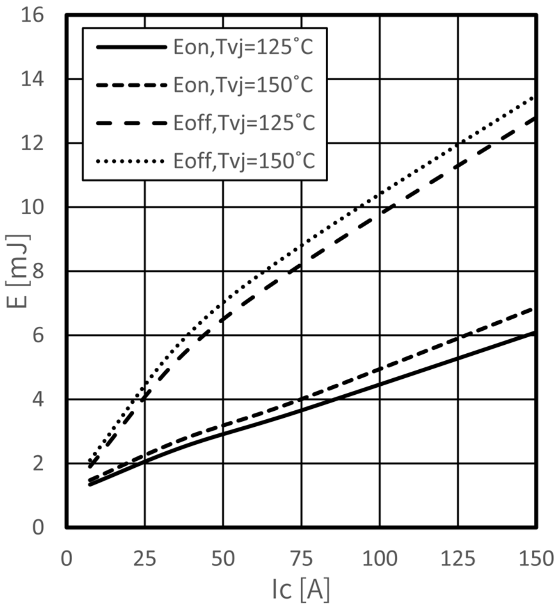
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15V$



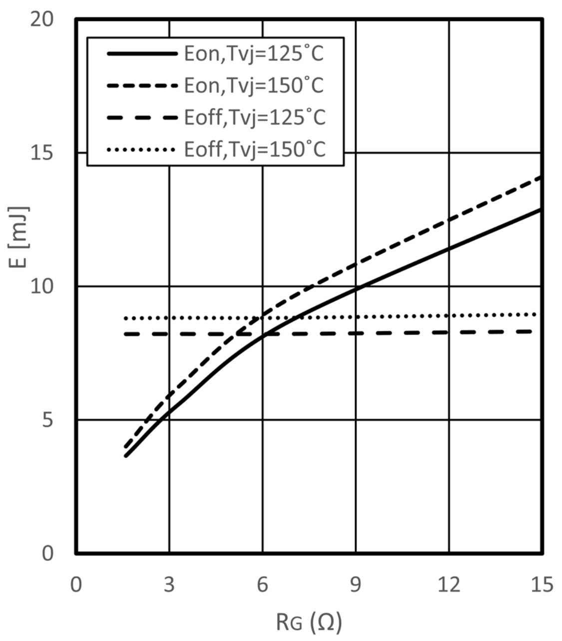
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



Transfer characteristic IGBT (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20V$



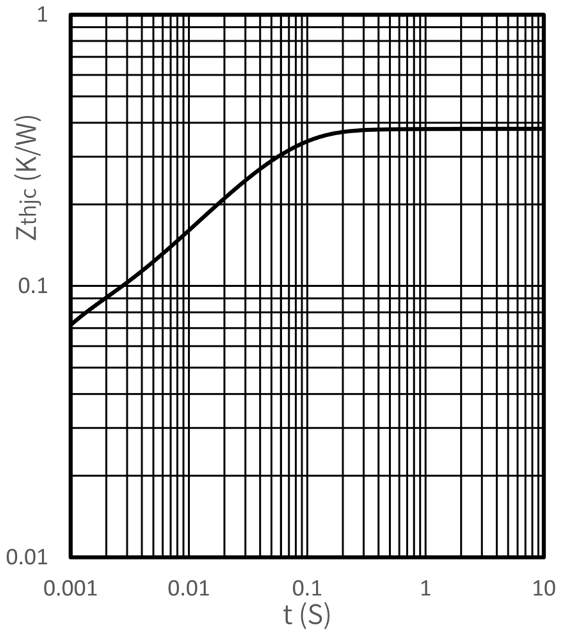
Switching losses IGBT, Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$R_{Goff} = 1.6\ \Omega$, $R_{Gon} = 1.6\ \Omega$, $V_{CE} = 600\ V$, $V_{GE} = \pm 15\ V$



Switching losses IGBT (typical)

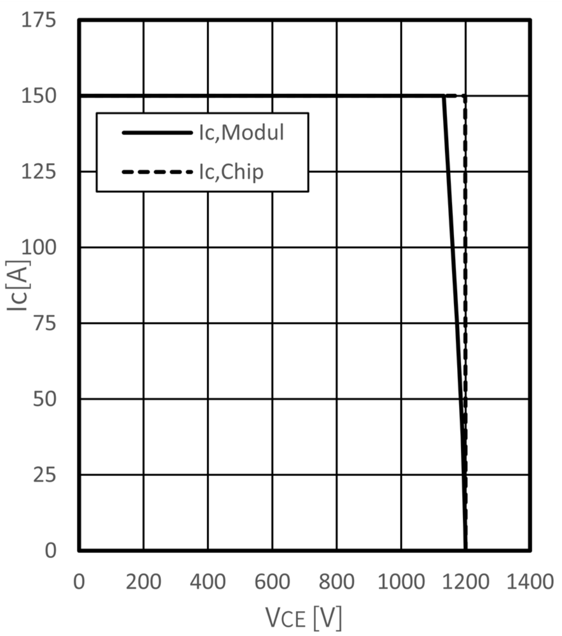
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$I_C = 75$ A, $V_{CE} = 600$ V, $V_{GE} = \pm 15$ V



Transient thermal impedance IGBT

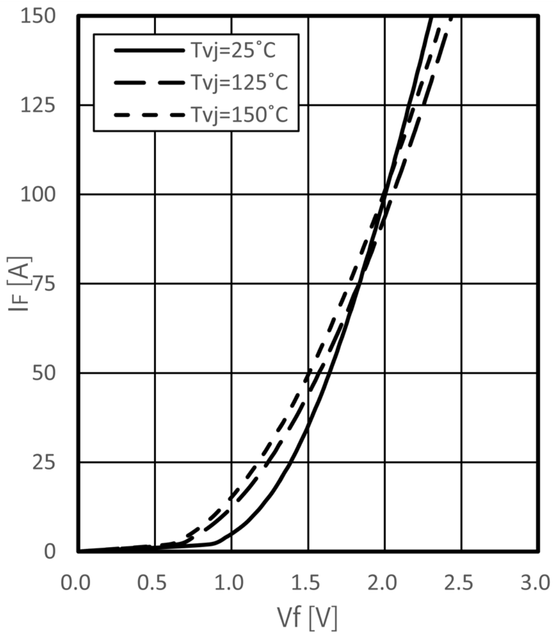
$Z_{thJC} = f(t)$



Reverse bias safe operating area IGBT (RBSOA)

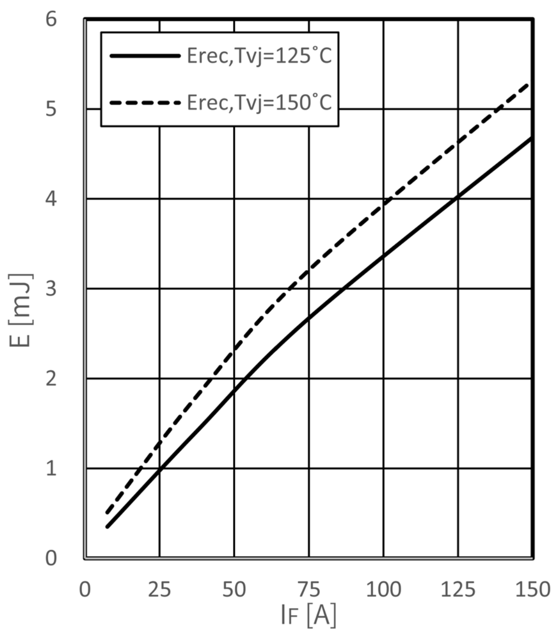
$I_C = f(V_{CE})$

$V_{GE} = 15$ V, $R_{Goff} = 1.6$ Ω, $T_{vj} = 150$ °C



Forward characteristic of Diode (typical)

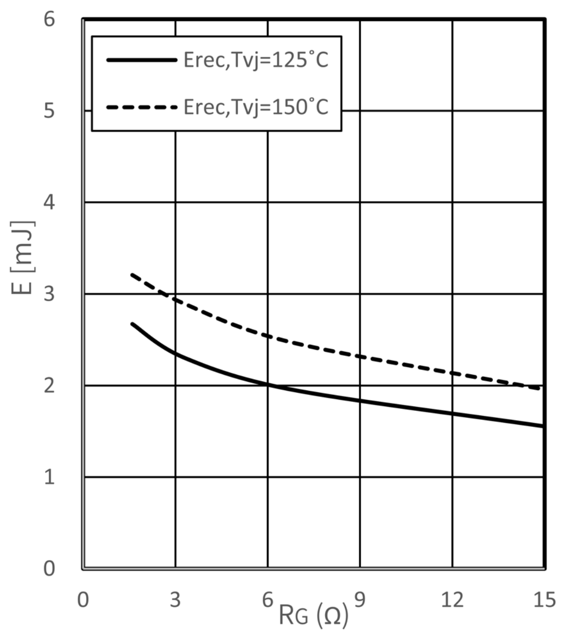
$I_F = f(V_F)$



Switching losses Diode (typical)

$E_{rec} = f\ (I_F)$

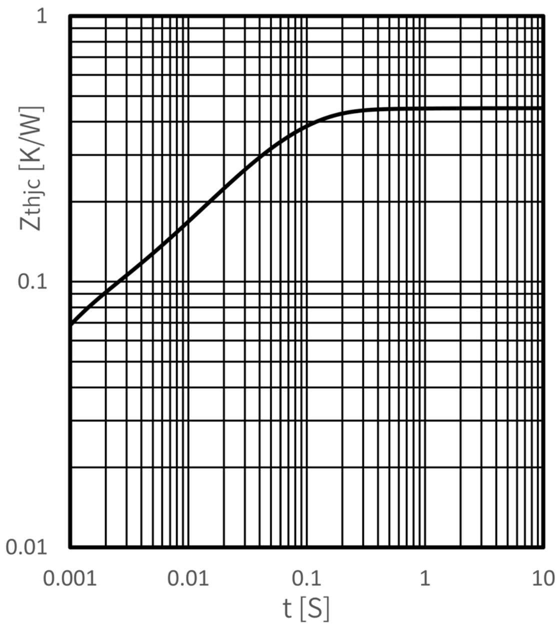
$R_{Gon} = 1.6\ \Omega$, $V_{CE} = 600$ V



Switching losses Diode (typical)

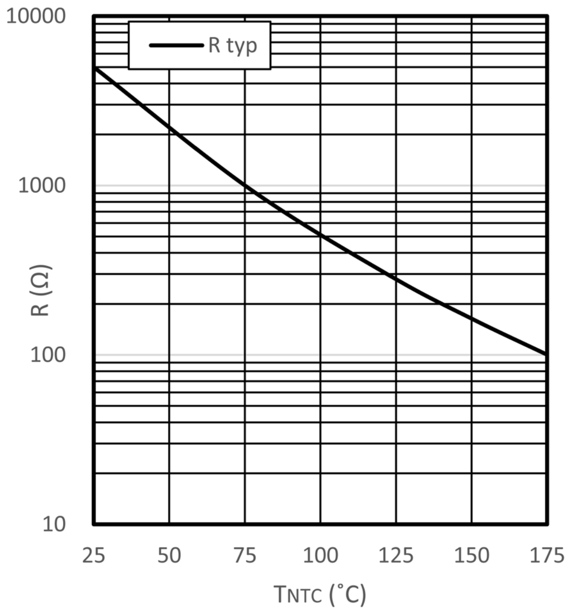
$E_{rec} = f\ (R_G)$

$I_F = 75$ A, $V_{CE} = 600$ V



Transient thermal impedance Diode

$Z_{thJC} = f\ (t)$



NTC-Thermistor-temperature characteristic (typical)

$R = f\ (T_{NTC})$

9. Circuit Diagram

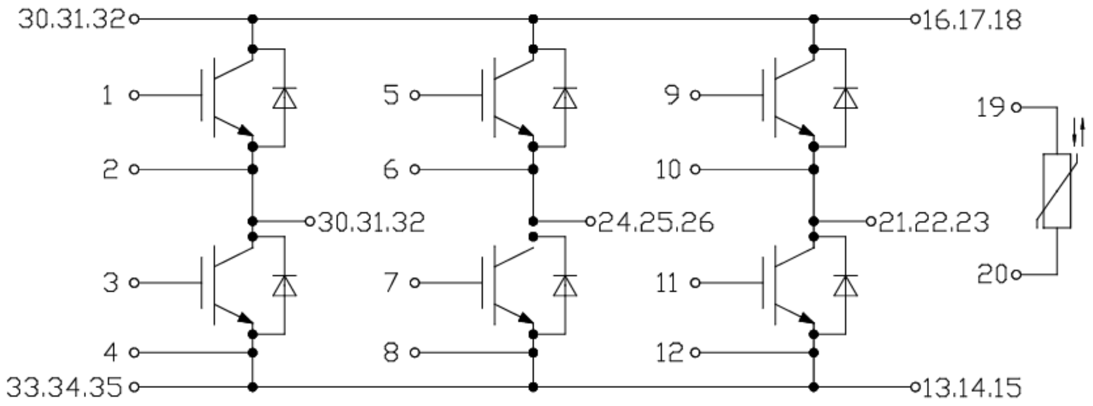


Figure 3

10. Package Outlines

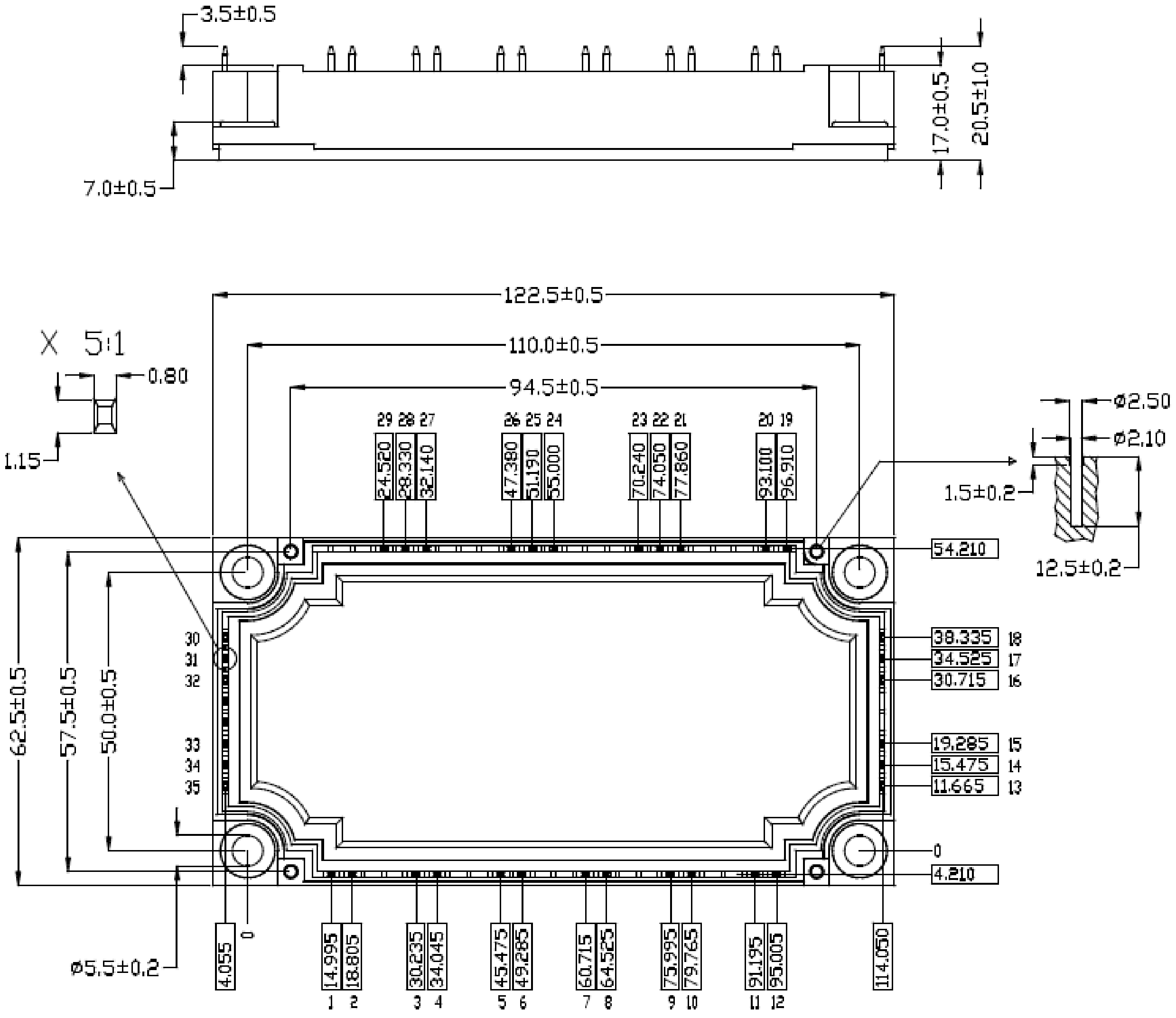


Figure 4