

## 1. Product Features

### 1.1 Electrical features

- $V_{CES}=1200V$
- $I_{C\ nom}=300A / I_{CRM}=600A$
- Low switching losses
- Low inductance
- Fast switching and short tail current
- Integrated NTC temperature sensor
- High power and thermal cycling capability

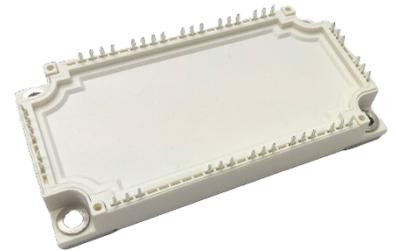


Figure1 IGBT Module

### 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

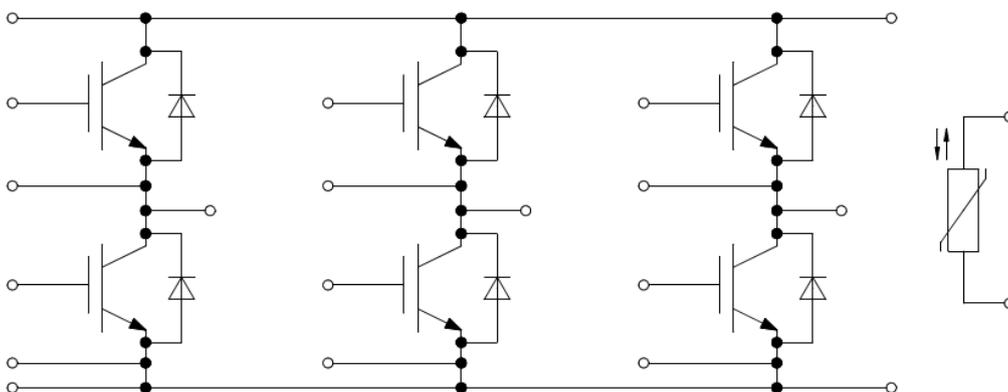


Figure 2 3 Phase Bridge

## 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	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Continuous DC collector current 连续集电极电流	$T_C = 90^{\circ}\text{C}, T_{vj\ max} = 150^{\circ}\text{C}$	$I_{C\ nom}$	300	A
Repetitive peak collector current 集电极峰值电流	$t_P = 1\ \text{ms}$	$I_{CRM}$	600	A
Total power dissipation 总功率损耗	$T_C = 25^{\circ}\text{C}, T_{vj\ max} = 175^{\circ}\text{C}$	$P_{tot}$	940	W
Gate-emitter peak voltage 栅极—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—发射极饱和电压	$I_C = 300\text{A}, V_{GE} = 15\text{V}$	$V_{CE,sat}$		$T_{vj} = 25^{\circ}\text{C}$	1.80	V
				$T_{vj} = 125^{\circ}\text{C}$	1.82	V
				$T_{vj} = 150^{\circ}\text{C}$	1.89	V
Gate threshold voltage 栅极阈值电压	$I_C = 11.4\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	$V_{GE,th}$	5.0	5.8	6.5	V
Gate charge 栅极电荷	$V_{GE} = -15\text{V} \dots +15\text{V}$	$Q_G$		3.59		$\mu\text{C}$
Internal gate resistor 内部栅极电阻	$T_{vj} = 25^{\circ}\text{C}$	$R_{Gint}$		2.00		$\Omega$
Input capacitance 输入电容	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$	$C_{ies}$		73.1		nF
Reverse transfer capacitance 反向传输电容	$f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}, V_{CE}=25\text{V}, V_{GE}=0\text{V}$	$C_{res}$		0.46		nF
Collector-emitter cut-off current 集电极-发射极截止电流	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}, T_{vj} = 25^{\circ}\text{C}$	$I_{CES}$			1	mA
Gate-emitter leakage current 栅极-发射极漏电流	$V_{CE} = 0\text{V}, V_{GE} = 20\text{V}, T_{vj} = 25^{\circ}\text{C}$	$I_{GES}$			100	nA
Turn-on delay time, inductive load 开通延迟时间	$I_C = 300\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = +15/-15\text{V}$ $R_{G,on} = 0.5\Omega$	$t_{d,on}$		$T_{vj} = 25^{\circ}\text{C}$	0.21	us
				$T_{vj} = 125^{\circ}\text{C}$	0.25	us
				$T_{vj} = 150^{\circ}\text{C}$	0.27	us
Rise time, inductive load 上升时间	$I_C = 300\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = +15/-15\text{V}$ $R_{G,on} = 0.5\Omega$	$t_r$		$T_{vj} = 25^{\circ}\text{C}$	0.06	us
				$T_{vj} = 125^{\circ}\text{C}$	0.09	us
				$T_{vj} = 150^{\circ}\text{C}$	0.09	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	$I_C = 300A, V_{CE} = 600V$ $V_{GE} = +15/-15V$ $R_{G,off} = 0.5\Omega$	$T_{vj} = 25^\circ C$	$t_{d,off}$		0.25		us
		$T_{vj} = 125^\circ C$			0.38		us
		$T_{vj} = 150^\circ C$			0.40		us
Fall time, inductive load 下降时间	$I_C = 300A, V_{CE} = 600V$ $V_{GE} = +15/-15V$ $R_{G,off} = 0.5\Omega$	$T_{vj} = 25^\circ C$	$t_f$		0.18		us
		$T_{vj} = 125^\circ C$			0.29		us
		$T_{vj} = 150^\circ C$			0.32		us
Turn-on energy loss per pulse 开通损耗能量	$I_C = 300A, V_{CE} = 600V, L_s = 100nH$ $V_{GE} = +15/-15V, di/dt = 2810 A/\mu s$ $R_{G,on} = 0.5\Omega (T_{vj} = 150^\circ C)$	$T_{vj} = 25^\circ C$	$E_{on}$		36.2		mJ
		$T_{vj} = 125^\circ C$			61.4		mJ
		$T_{vj} = 150^\circ C$			68.1		mJ
Turn-off energy loss per pulse 关断损耗能量	$I_C = 200A, V_{CE} = 600V, L_s = 30nH$ $V_{GE} = +15/-15V, dv/dt = 4950 V/\mu s$ $R_{G,off} = 0.5\Omega (T_{vj} = 150^\circ C)$	$T_{vj} = 25^\circ C$	$E_{off}$		22.0		mJ
		$T_{vj} = 125^\circ C$			32.5		mJ
		$T_{vj} = 150^\circ C$			34.7		mJ
SC data 短路数据	$V_{GE} \leq 15V, V_{CC} = 600V, t_P \leq 8 \mu s, T_{vj} = 150^\circ C,$ $C_{GE} = 0.0\mu F, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$		$I_{sc}$		1344		A
Thermal resistance, junction to case 结-外壳热阻	Per IGBT		$R_{th,jc}$			0.16	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	$T_{vj} = 25^\circ C$	$V_{RRM}$	1200	V
Continuous DC forward current 连续正向直流电流		$I_F$	300	A
Repetitive peak forward current 正向重复峰值电流	$t_P = 1 ms$	$I_{FRM}$	600	A

### 5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage 正向电压	$I_F = 600 A, V_{GE} = 0 V$	$T_{vj} = 25^\circ C$	$V_F$		1.41		V
		$T_{vj} = 125^\circ C$			1.71		V
		$T_{vj} = 150^\circ C$			1.68		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	$I_F = 300A, V_R = 600V$ $V_{GE} = -15V, -di_F/dt = 2190A/\mu s$ ( $T_{vj}=150^\circ C$ )	$T_{vj} = 25^\circ C$	$I_{RM}$		271		A
		$T_{vj} = 125^\circ C$			291		A
		$T_{vj} = 150^\circ C$			276		A
Recovered charge 恢复电荷	$I_F = 300A, V_R = 600V$ $V_{GE} = -15V, -di_F/dt = 2190A/\mu s$ ( $T_{vj}=150^\circ C$ )	$T_{vj} = 25^\circ C$	$Q_r$		36.6		$\mu C$
		$T_{vj} = 125^\circ C$			68.4		$\mu C$
		$T_{vj} = 150^\circ C$			78.4		$\mu C$
Reverse recovery energy 反向恢复损耗 (每脉冲)	$I_F = 300A, V_R = 600V$ $V_{GE} = -15V, -di_F/dt = 2190A/\mu s$ ( $T_{vj}=150^\circ C$ )	$T_{vj} = 25^\circ C$	$E_{rec}$		14.0		mJ
		$T_{vj} = 125^\circ C$			27.5		mJ
		$T_{vj} = 150^\circ C$			31.7		mJ
Thermal resistance, junction to case 结—外壳热阻	Per diode		$R_{th,jc}$			0.27	K/W

## 6. NTC-Thermistor

### 6.1 Characteristic value

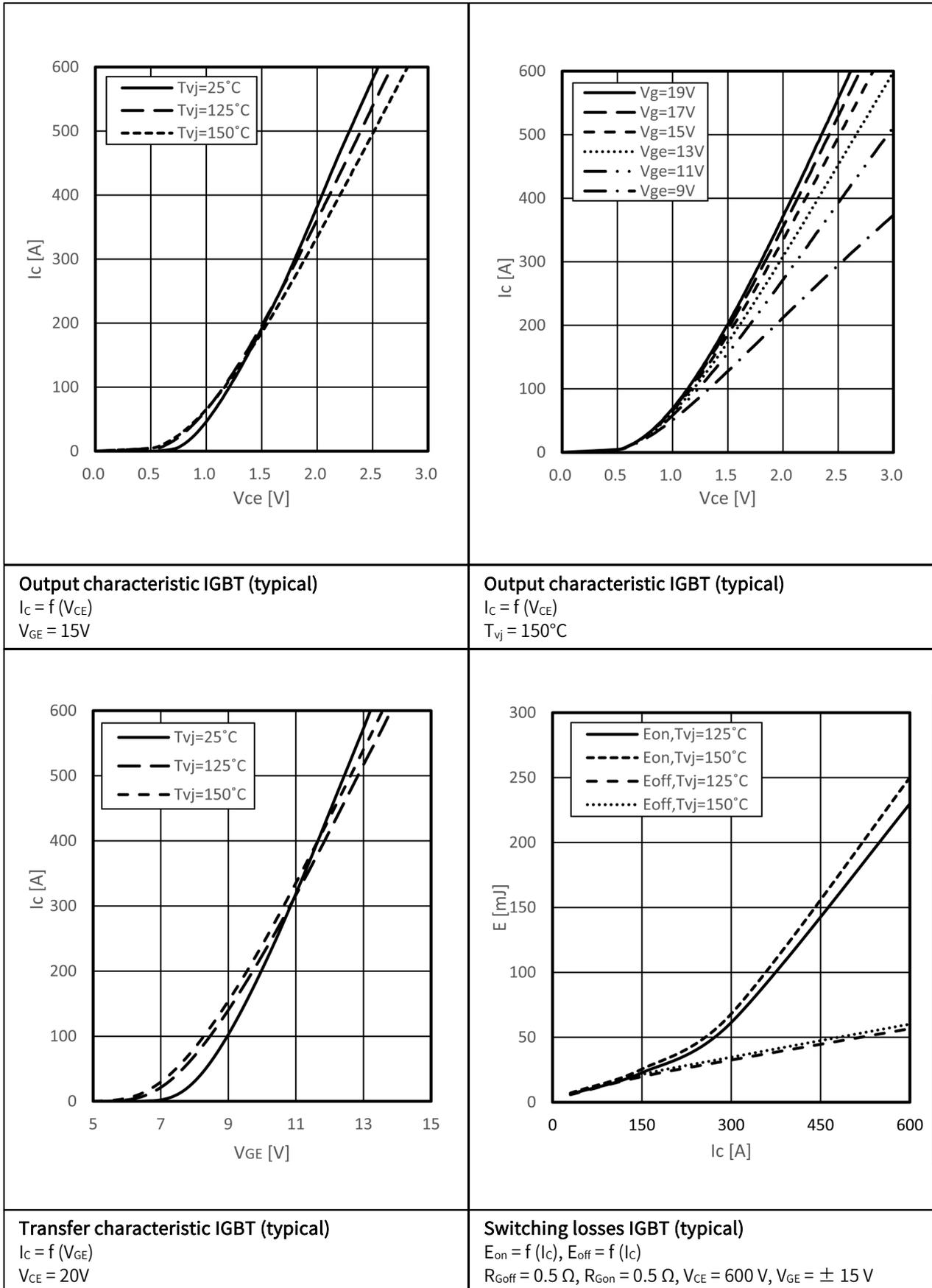
Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Rated resistance 额定电阻值	$T_c = 25^\circ C$	$R_{25}$		5.00		K $\Omega$
Power dissipation 耗散功耗	$T_c = 25^\circ C$	$P_{25}$			20	mW
B-value B-Z 值	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298, 15K))]$	$B_{25}/B_{50}$		3375		K
B-value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

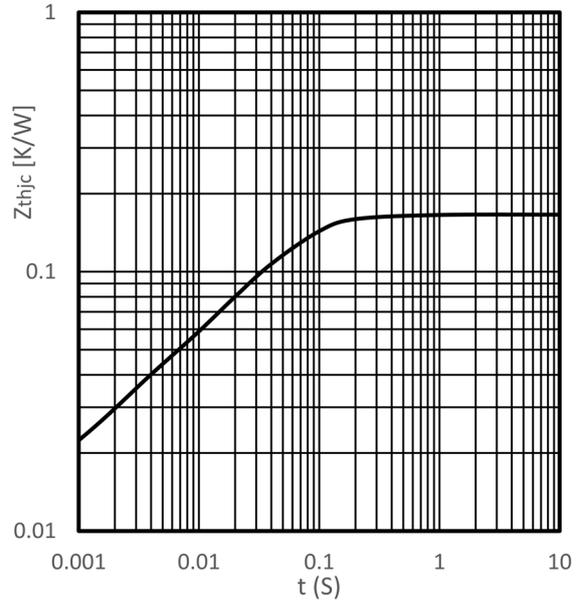
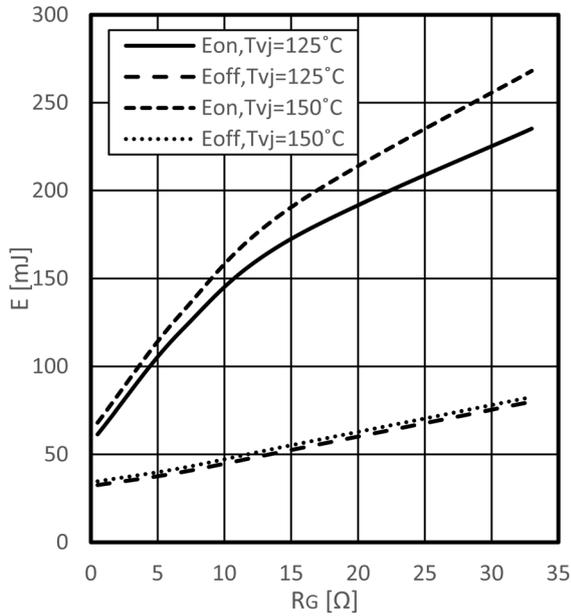
## 7. Module

### 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





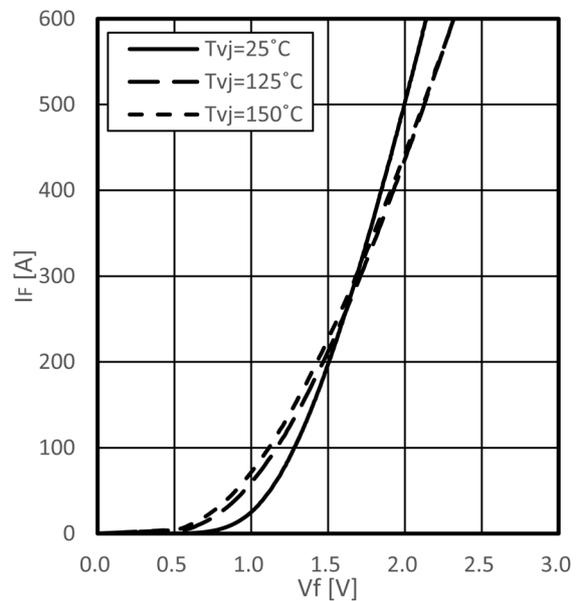
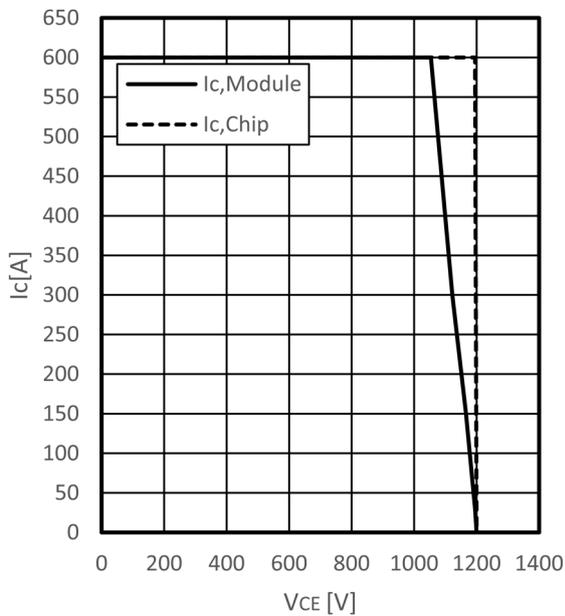
**Switching losses IGBT (typical)**

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

$I_C = 300\text{ A}, V_{CE} = 600\text{ V}, V_{GE} = \pm 15\text{ V}$

**Transient thermal impedance IGBT**

$Z_{thjc} = f(t)$



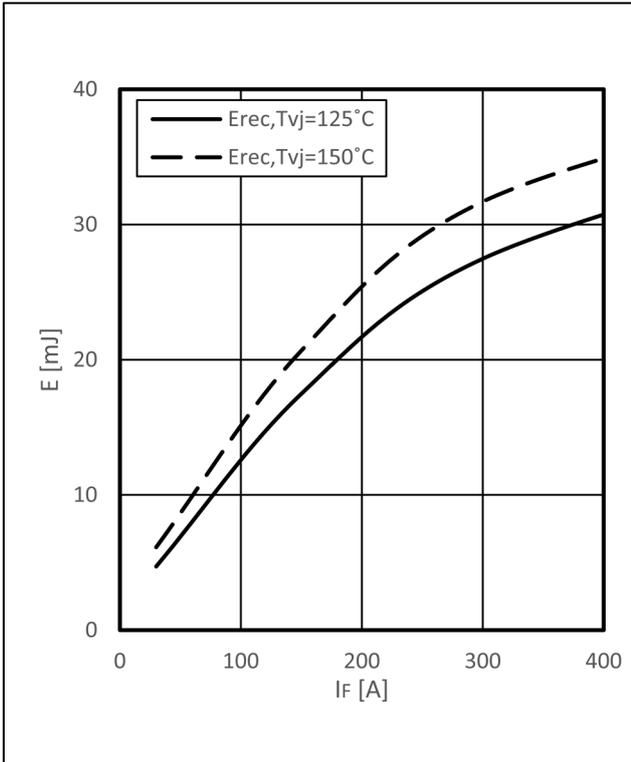
**Reverse bias safe operating area IGBT (RBSOA)**

$I_C = f(V_{CE})$

$V_{GE} = 15\text{ V}, R_{Goff} = 0.5\ \Omega, T_{vj} = 150^\circ C$

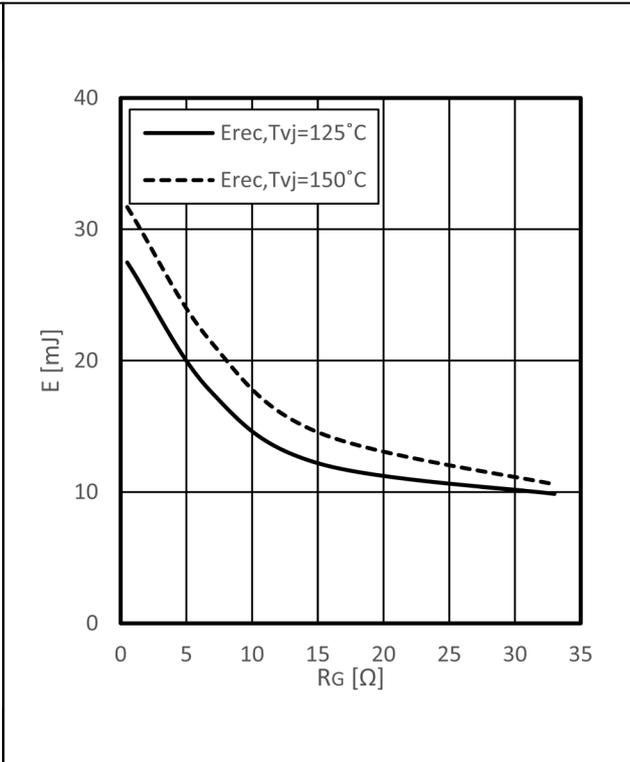
**Forward characteristic of Diode (typical)**

$I_F = f(V_f)$



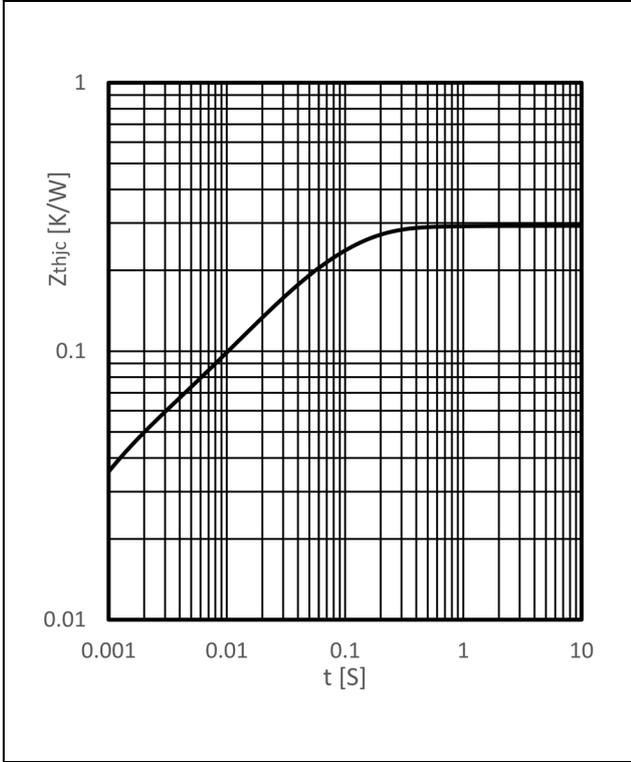
**Switching losses Diode (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 0.5 \Omega, V_{CE} = 600 V$



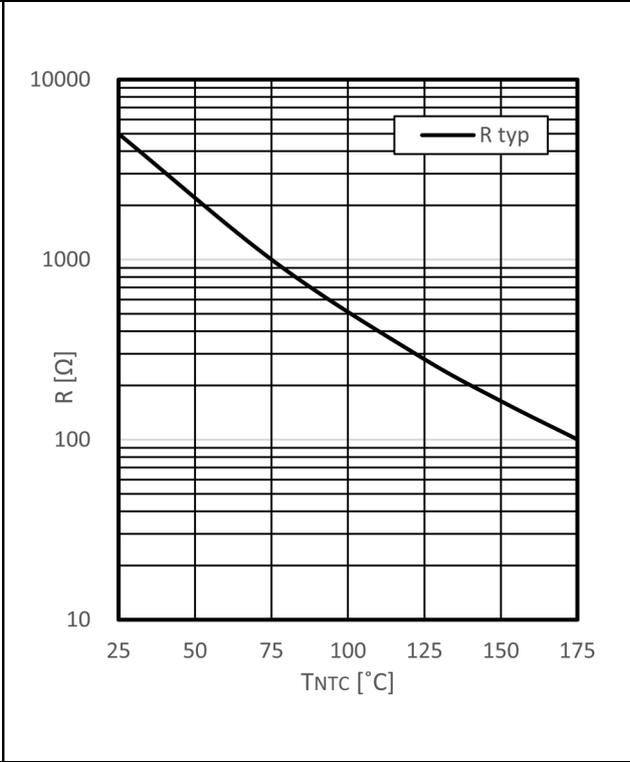
**Switching losses Diode (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 300 A, V_{CE} = 600 V$



**Transient thermal impedance Diode**

$Z_{thjC} = f(t)$



**NTC-Thermistor-temperature characteristic (typical)**

$R = f(T_{NTC})$

## 9. Circuit Diagram

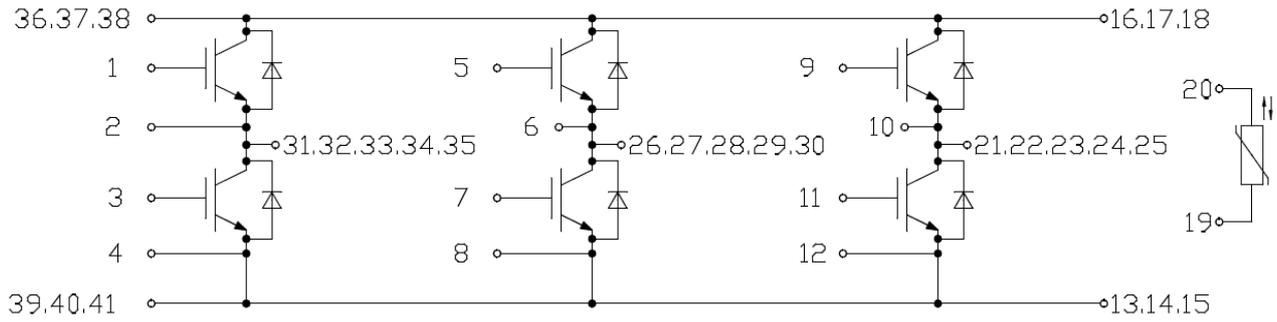


Figure 3

## 10. Package Outlines

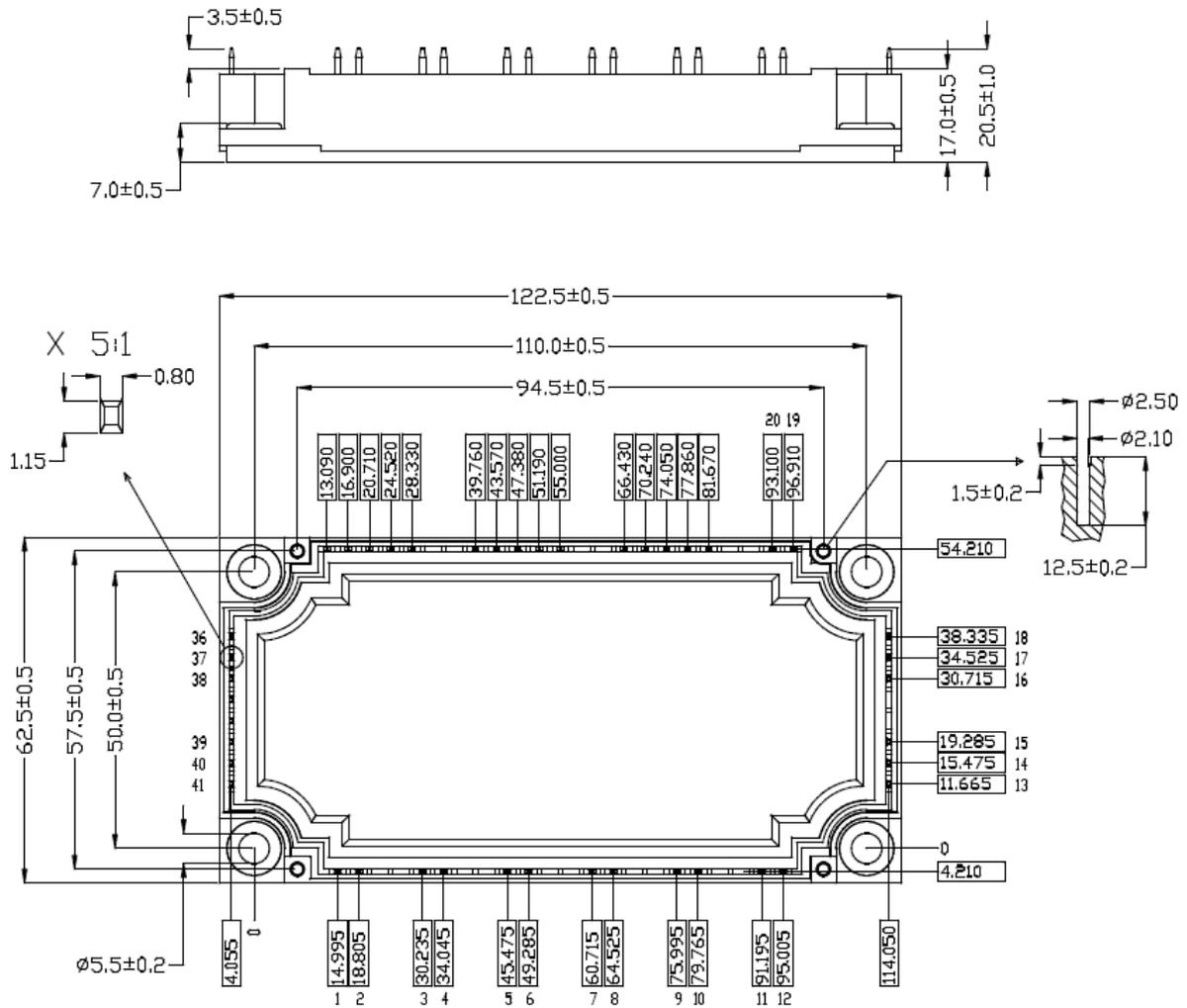


Figure 4