1. Product Features

1.1 Electrical features

- V_{CES}=1200V
- $I_{C\,nom}$=900A / I_{CRM}=1800A
- Low switching losses
- Low inductance
- Fast switching and short tail current
- Integrated NTC temperature sensor
- High power and thermal cycling capability

1.2 Mechanical features

- Al_2O_3 substrate with low thermal resistance
- Copper base plate

Figure 1 IGBT Module

2. Typical Applications

- Switching mode power supply
- Motor drives
- Servo drives
- Uninterruptible power supply
- AC and DC servo drive amplifier

3. Description

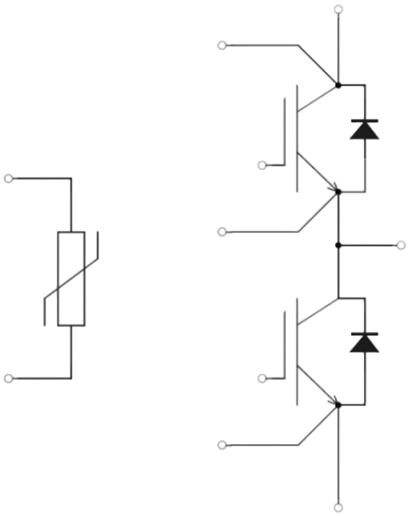


Figure 2 Half Bridge

4. IGBT, Inverter

4.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Collector-emitter voltage —	T_{vj} = 25°C	V_{CES}	1200	V
Implemented collector current		I_{CN}	900	A
Continuous DC collector current	T_C = 90°C, $T_{vj\ max}$ = 175°C	I_{CDC}	580	A
Repetitive peak collector current	t_P limited by $T_{vj\ op}$ 1 ms	I_{CRM}	1800	A
Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	2170	W
Gate-emitter peak voltage		V_{GES}	+/- 20	V

4.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	I_C =900 A, V_{GE} = 15 V	T_{vj} = 25°C	$V_{CE,sat}$		1.80	1.9	V
		T_{vj} = 125°C			1.82		V
		T_{vj} = 150°C			1.90		V
Gate threshold voltage	I_C = 34.2mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	6.0	6.5	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		10.78		µC
Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0.67		Ω
Input capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		219.3		nF
Reverse transfer capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		1.37		nF
Collector-emitter cut-off current -	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1	mA
Gate-emitter leakage current -	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			300	nA
Turn-on delay time, inductive load	I_C = 900A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,on}$		0.24		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.29		us
	$R_{G,on}$ = 0.5Ω	T_{vj} = 175°C			0.32		us
Rise time, inductive load	I_C = 900A, V_{CE} = 600V	T_{vj} = 25°C	t_r		0.12		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.14		us
	$R_{G,on}$ = 0.5Ω	T_{vj} = 175°C			0.16		us

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Turn-off delay time, inductive load	I_C = 900A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,off}$		0.53		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.59		us
	$R_{G,off}$ = 0.5Ω	T_{vj} = 175°C			0.63		us
Fall time, inductive load	I_C = 900A, V_{CE} = 600V	T_{vj} = 25°C	t_f		0.13		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.23		us
	$R_{G,off}$ = 0.5Ω	T_{vj} = 175°C			0.28		us
Turn-on energy loss per pulse	I_C = 900A, V_{CE} = 600V, L_s=35nH	T_{vj} = 25°C	E_{on}		62.1		mJ
	V_{GE} = +15/-15V, di/dt =4700A/µs	T_{vj} = 125°C			118.5		mJ
	$R_{G,on}$ = 0.5Ω (T_{vj} = 175°C)	T_{vj} = 175°C			182.7		mJ
Turn-off energy loss per pulse	I_C = 900A, V_{CE} = 600V, L_s=35nH	T_{vj} = 25°C	E_{off}		87.3		mJ
	V_{GE} = +15/-15V, dv/dt =3500V/µs	T_{vj} = 125°C			114.9		mJ
	$R_{G,off}$ = 0.5Ω (T_{vj} = 175°C)	T_{vj} = 175°C			134.5		mJ
SC data	V_{GE} ≤15V, V_{CC} =800 V, V_{CEmax} = V_{CES} - L_{sCE} ·di/dt	t_P ≤ 8 µs, T_{vj} ≤ 150 °C	I_{SC}		3800		A
		t_P ≤ 6 µs, T_{vj} ≤ 175 °C			3500		A
Thermal resistance, junction to case	Per IGBT		$R_{th,JC}$			0.069	K/W

5. Diode, Inverter

5.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
Continuous DC forward current		I_F	900	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	1800	A

5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F = 900 A, V_{GE} = 0 V	T_{vj} = 25°C	V_F		1.68	2.20	V
		T_{vj} = 125°C			1.70		V
		T_{vj} = 150°C			1.70		V

(table continues...)

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current	I_F = 900A, V_R = 600V	T_{vj} = 25°C	I_{RM}		520		A
	V_{GE} = -15V, - di_F/dt = 900 A/µs	T_{vj} = 125°C			620		A
	(T_{vj}=175°C)	T_{vj} = 175°C			630		A
Recovered charge	I_F = 900A, V_R = 600V	T_{vj} = 25°C	Q_r		102.3		µC
	V_{GE} = -15V, - di_F/dt = 900 A/µs	T_{vj} = 125°C			191.5		µC
	(T_{vj}=175°C)	T_{vj} = 175°C			254.8		µC
Reverse recovery energy	I_F = 900A, V_R = 600V	T_{vj} = 25°C	E_{rec}		44.0		mJ
	V_{GE} = -15V, - di_F/dt = 900 A/µs	T_{vj} = 125°C			78.9		mJ
	(T_{vj}=175°C)	T_{vj} = 175°C			102.9		mJ
Thermal resistance, junction to case	Per diode		$R_{th,JC}$			0.076	K/W

6. NTC-Thermistor

6.1 Characteristic value

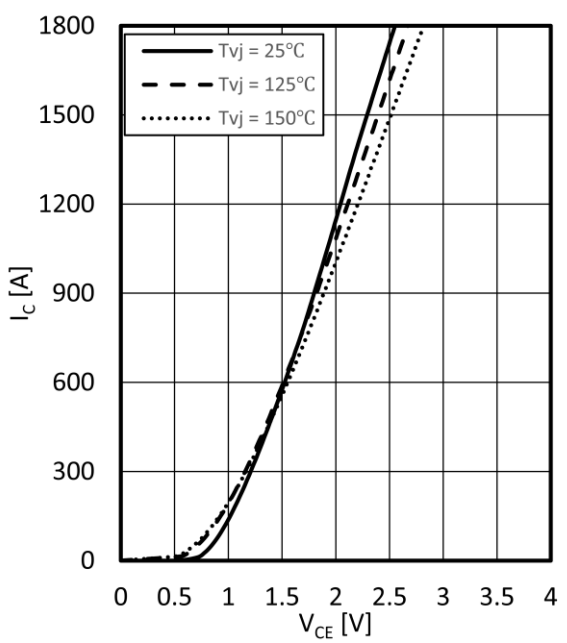
Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	Tc = 25°C	R_{25}		5.00		KΩ
Power dissipation	Tc = 25°C	P_{25}			20	mW
B-value B-Z	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298,15K))]$	B_{25}/B_{50}		3375		K
B-value B-Z	$R_2=R_{25}\exp[B_{25/75}(1/T_2-1/(298,15K))]$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

7. Module

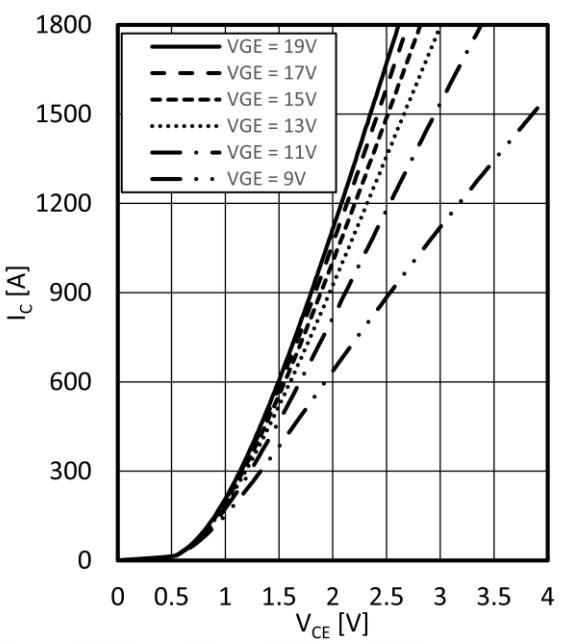
7.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage	RMS, f=50HZ,1min	V_{ISOL}			3500	V
Stray inductance module		L_{sCE}		20		nH
Operation Junction Temperature		T_{jop}	-40		150	˚C
Storage Temperature Range		T_{stg}	-40		125	˚C
Mounting Torque	Screw M5	M	3		6	N.m
Weight of Module		G		350		g

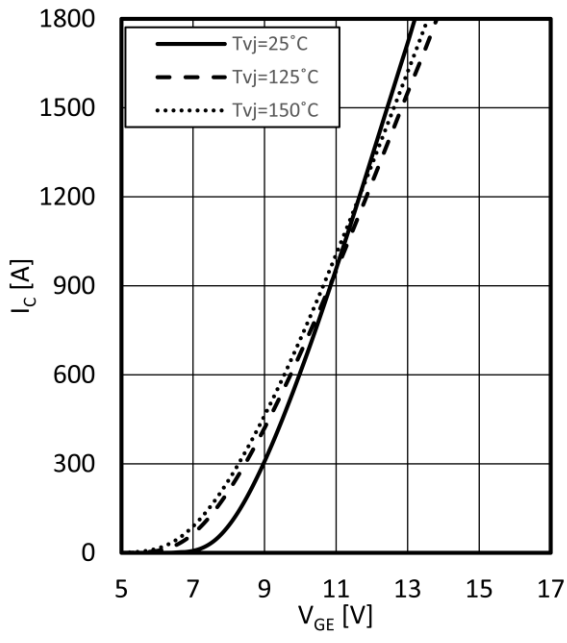
8. Characterstic Diagrams



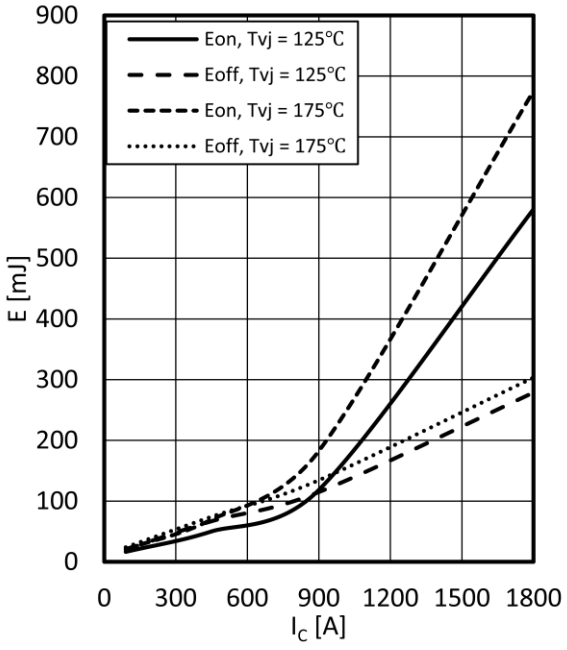
Output characteristic IGBT, Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15V



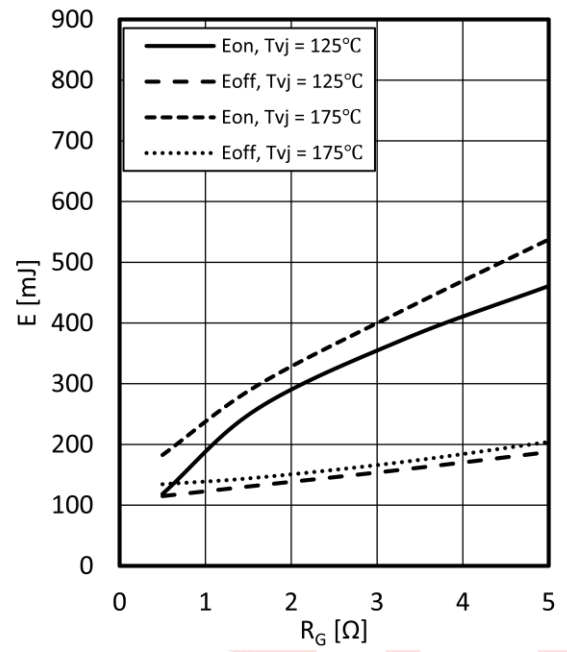
Output characteristic IGBT, Inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



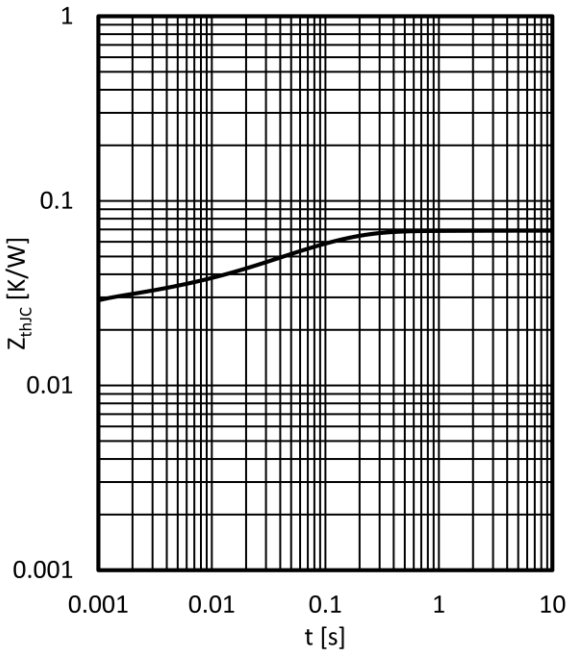
Transfer characteristic IGBT, Inverter (typical)
$I_C = f(V_{GE})$
V_{CE} = 20V



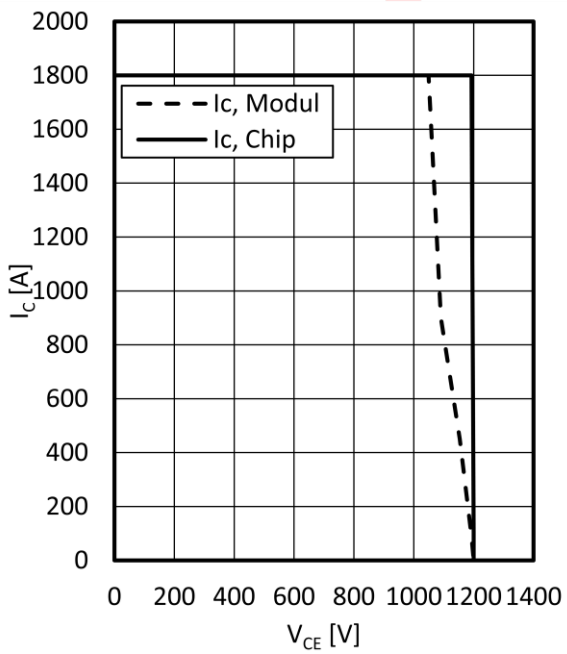
Switching losses IGBT, Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
R_{Goff} = 0.5 Ω, R_{Gon} = 0.5 Ω, V_{CE} = 600 V, V_{GE} = ± 15 V



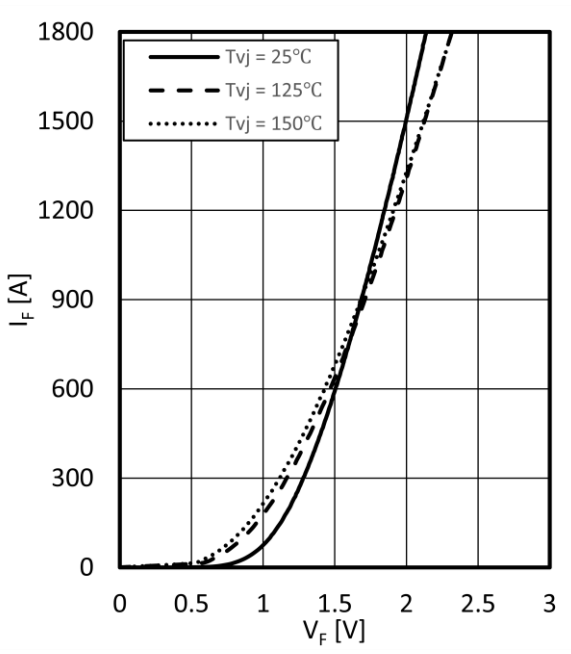
Switching losses IGBT, Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
I_C = 900 A, V_{CE} = 600 V, V_{GE} = ± 15 V



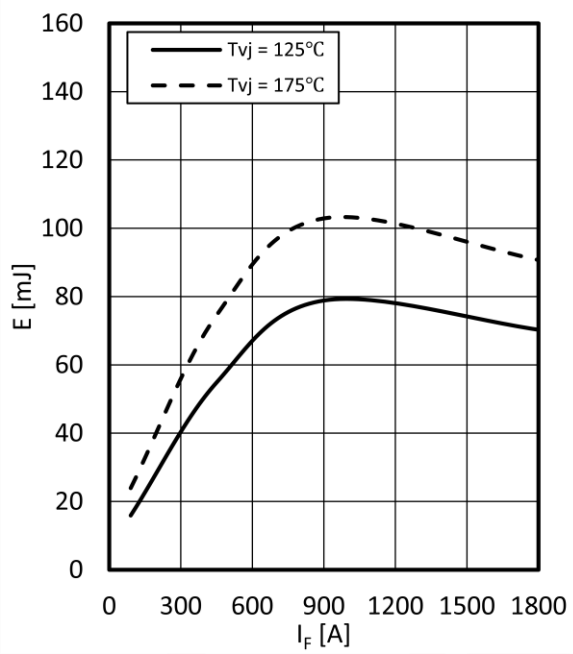
Transient thermal impedance IGBT, Inverter
$Z_{thJC} = f(t)$



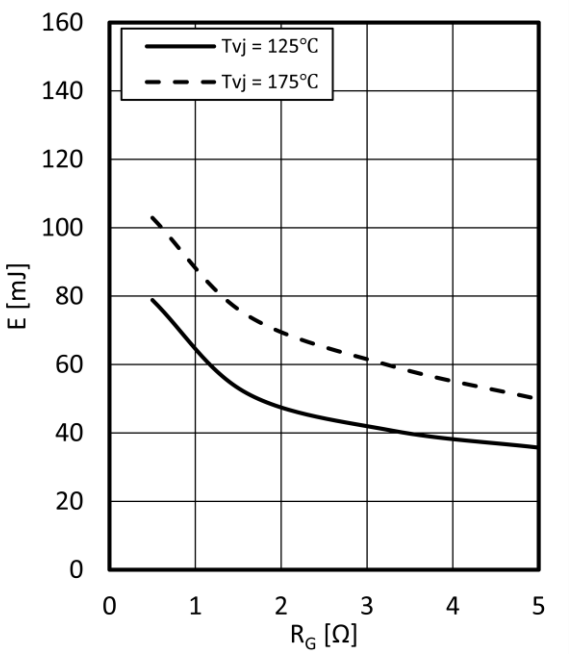
Reverse bias safe operating area IGBT, Inverter (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = 15 V, R_{Goff} = 0.5 Ω, T_{vj} = 175 °C



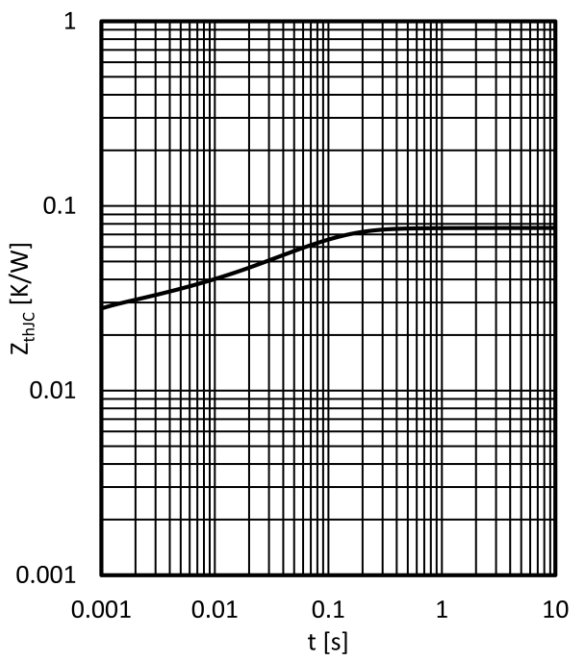
Forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



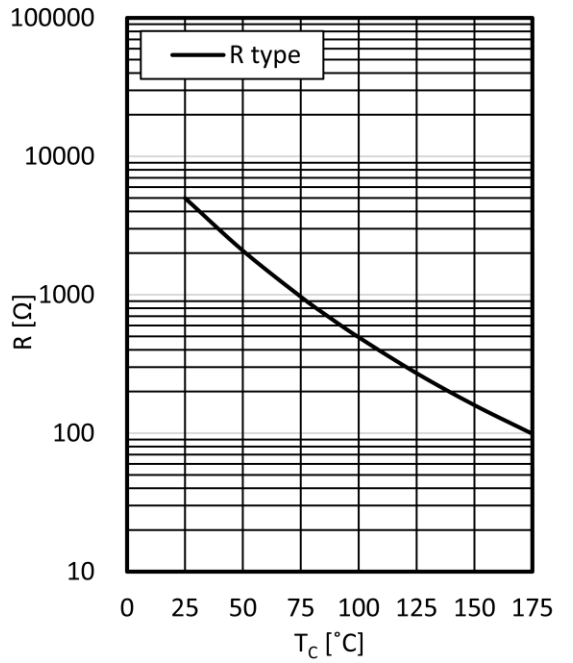
Switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
R_{Gon} = 15 Ω, V_{CE} = 600 V



Switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G$
I_F = 900 A, V_{CE} = 600 V



Transient thermal impedance Diode, Inverter
$Z_{thJC} = f(t)$



NTC-Thermistor-temperature characteristic (typical)
$R = f(T_{NTC})$

G. Circuit Diagram

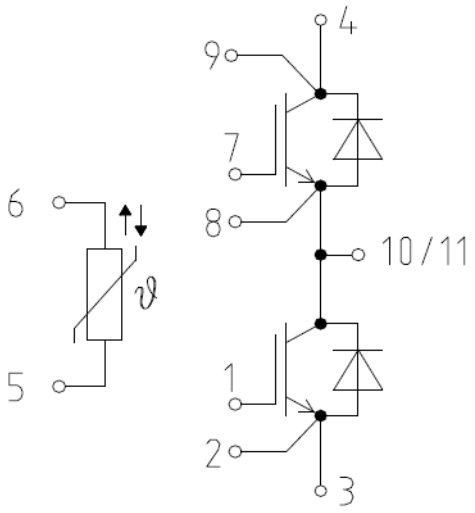


Figure 3

10. Package Outlines

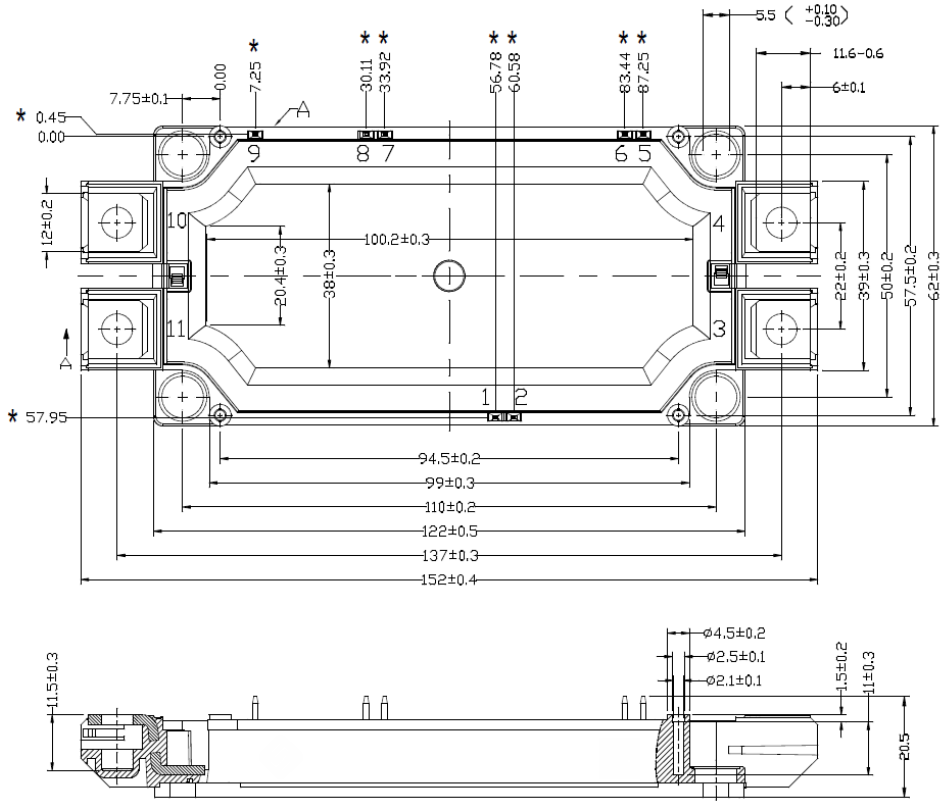


Figure 4