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
- High power and thermal cycling capability

Figure1 IGBT Module

1.2 Mechanical features

- High power and thermal cycling capability
- Al_2O_3 substrate with low thermal resistance
- Copper base plate

2. Typical Applications

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

3. Description

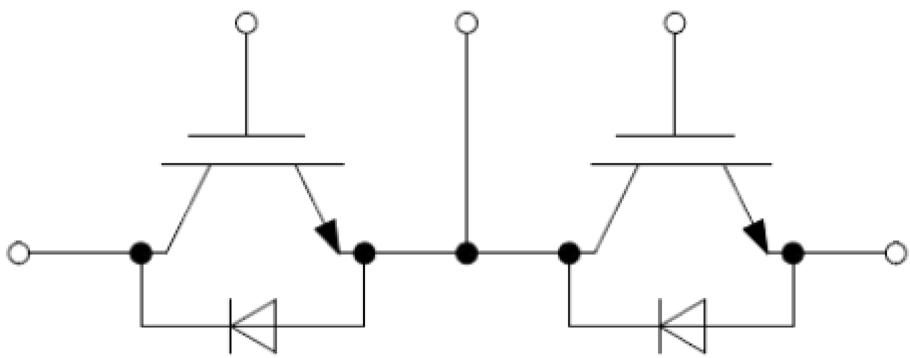


Figure 2 Half Bridge

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
Continuous DC collector current	T_C = 100°C, $T_{vj,max}$ = 150°C	$I_{C\,nom}$	300	A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	600	A
Total power dissipation	T_C = 25°C, $T_{vj,max}$ = 175 °C	P_{tot}	1070	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 = 300 A, V_{GE} = 15 V	T_{vj} = 25°C	$V_{CE,sat}$		1.45	1.90	V
		T_{vj} = 125°C			1.60		V
		T_{vj} = 150°C			1.65		V
Gate threshold voltage	I_C = 11.4mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	5.8	6.5	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		3.45		μC
Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1.05		Ω
Input capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		43		nF
Reverse transfer capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.3		nF
Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			2	mA
Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			200	nA
Turn-on delay time, inductive load	I_C = 300A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,on}$		0.20		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.23		us
	$R_{G,on}$ = 3.3Ω	T_{vj} = 150°C			0.23		us
Rise time, inductive load	I_C = 300A, V_{CE} = 600V	T_{vj} = 25°C	t_r		0.07		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.09		us
	$R_{G,on}$ = 3.3Ω	T_{vj} = 150°C			0.09		us

(table continues...)

Parameter	Note or test condition		Symbol	Values Min.	Values Typ.	Values Max.	Unit
Turn-off delay time, inductive load	I_C = 300A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,off}$		0.48		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.54		us
	$R_{G,off}$ = 3.3Ω	T_{vj} = 150°C			0.55		us
Fall time, inductive load	I_C = 300A, V_{CE} = 600V	T_{vj} = 25°C	t_f		0.25		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.39		us
	$R_{G,off}$ = 3.3Ω	T_{vj} = 150°C			0.41		us
Turn-on energy loss per pulse	I_C = 300A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C	E_{on}		27.4		mJ
	V_{GE} = +15/-15V, di/dt =2600A/µs	T_{vj} = 125°C			48.6		mJ
	$R_{G,on}$ = 3.3Ω (T_{vj} = 150°C)	T_{vj} = 150°C			55.8		mJ
Turn-off energy loss per pulse	I_C = 300A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C	E_{off}		27.7		mJ
	V_{GE} = +15/-15V, dv/dt =3550V/µs	T_{vj} = 125°C			37.0		mJ
	$R_{G,off}$ = 3.3Ω (T_{vj} = 150°C)	T_{vj} = 150°C			39.8		mJ
SC data	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}		1400		A
Thermal resistance, junction to case	Per IGBT		R_{thJC}			0.12	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	300	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	600	A

5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values Min.	Values Typ.	Values Max.	Unit
Forward voltage	I_F = 300 A, V_{GE} = 0V	T_{vj} = 25°C	V_F		2.00	2.40	V
		T_{vj} = 125°C			1.65		V
		T_{vj} = 150°C			1.60		V

(table continues...)

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current	I_F = 300A, V_R = 600V	T_{vj} = 25°C	I_{RM}		210		A
	V_{GE} = -15V, - di_F/dt = 1150 A/µs	T_{vj} = 125°C			300		A
	(T_{vj}=150°C)	T_{vj} = 150°C			320		A
Recovered charge	I_F = 300A, V_R = 600V	T_{vj} = 25°C	Q_r		20		µC
	V_{GE} = -15V, - di_F/dt = 1150 A/µs	T_{vj} = 125°C			50		µC
	(T_{vj}=150°C)	T_{vj} = 150°C			61		µC
Reverse recovery energy	I_F = 300A, V_R = 600V	T_{vj} = 25°C	E_{rec}		4.0		mJ
	V_{GE} = -15V, - di_F/dt = 1150 A/µs	T_{vj} = 125°C			11.5		mJ
	(T_{vj}=150°C)	T_{vj} = 150°C			14.7		mJ
Thermal resistance, junction to case	Per diode		$R_{th,JC}$			0.2	K/W

6. Module

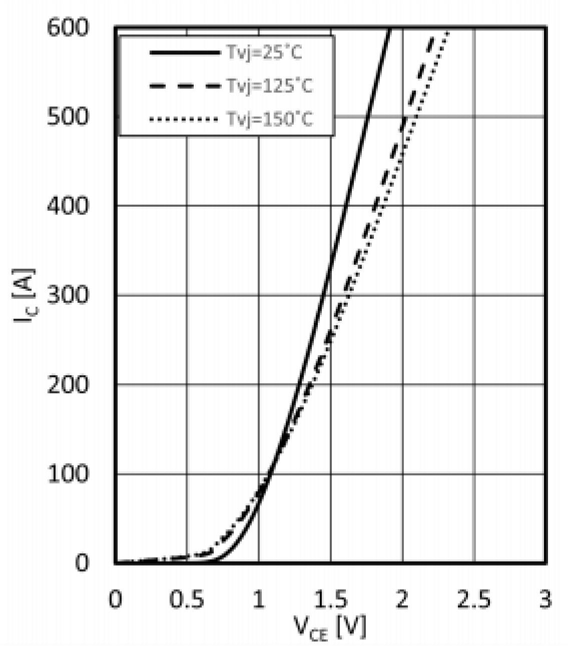
6.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage	RMS, f=50HZ,1min	V_{ISOL}			2500	V
Stray inductance module		L_{sCE}		20		nH

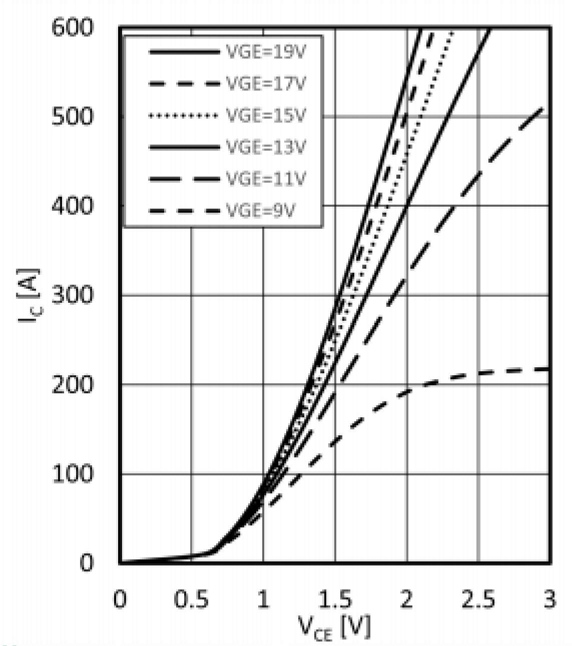
(table continues...)

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Operation Junction Temperature		T_{jop}	-40		150	C
Storage Temperature Range		T_{stg}	-40		125	C
Mounting Torque	Screw M6	M	3		6	N.m
Terminal Connection Torque	Screw M6	M	2.5		5	N.m
Weight of Module		G		340		g

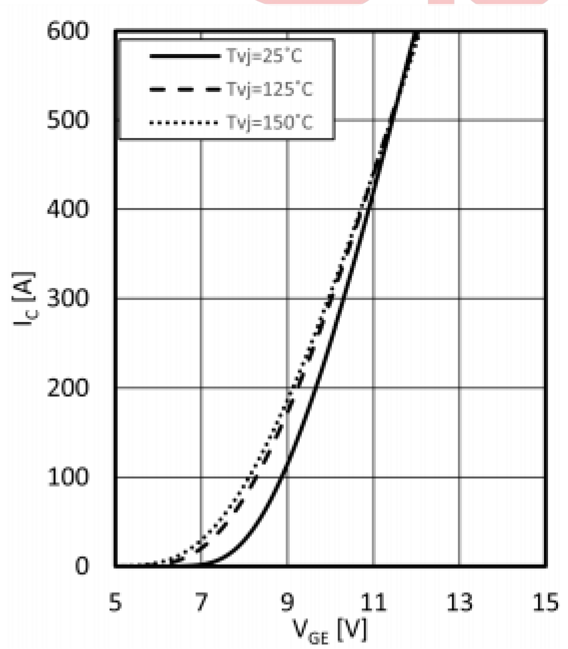
7. Characteristics diagrams



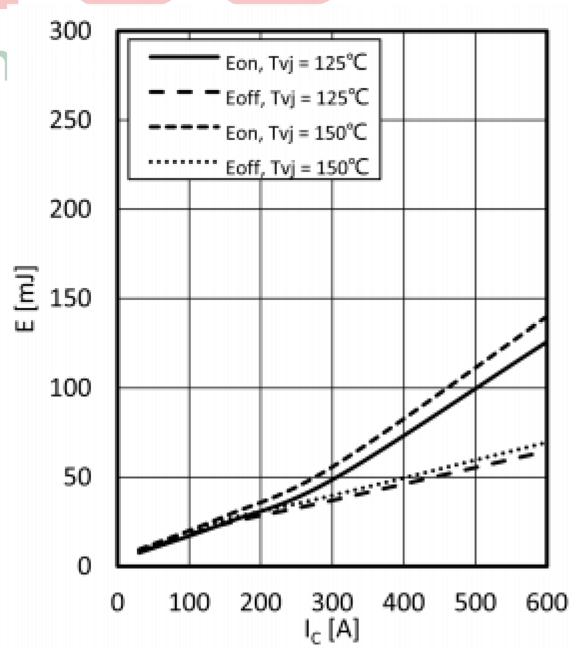
Output characteristic IGBT, Inverter (typical)
$I_C = f(V_{CE})$ $V_{GE} = 15V$



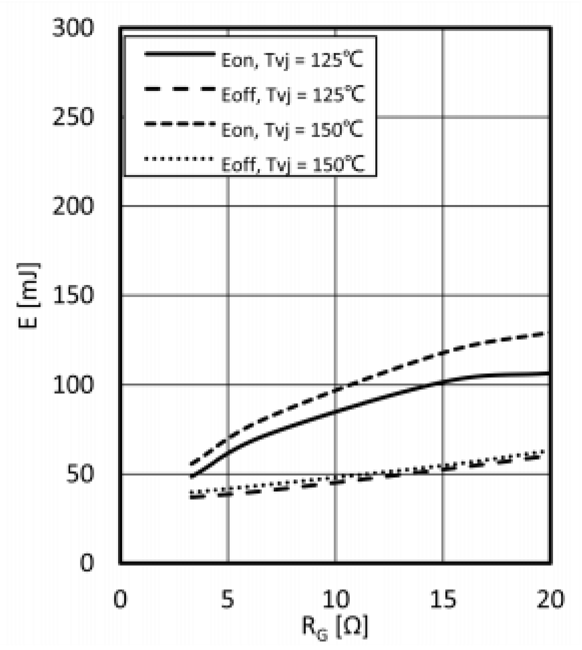
Output characteristic IGBT, Inverter (typical)
$I_C = f(V_{CE})$ $T_{vj} = 150°C$



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

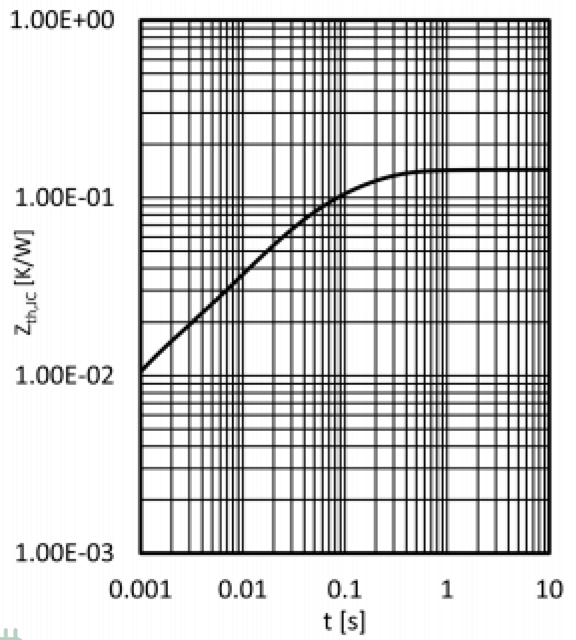


Switching losses IGBT, Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$ $V_{GE} = \pm15V$, $R_{Gon} = 3.3\ \Omega$ $R_{Goff} = 3.3\ \Omega$, $V_{CE} = 600V$



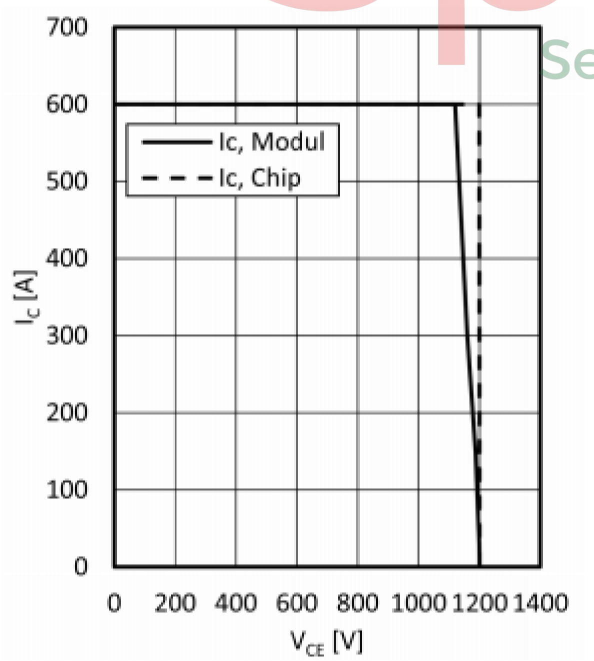
Switching losses IGBT, Inverter (typical)

E_{on} = f (R_G), E_{off} = f (R_G) V_{GE} = ±15V, I_C = 300A, V_{CE} = 600V



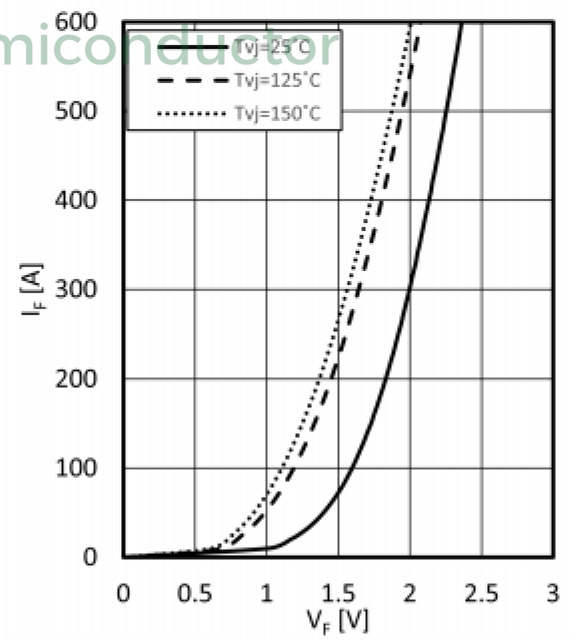
Transient thermal impedance IGBT, Inverter

Z_{thJC} = f (t)



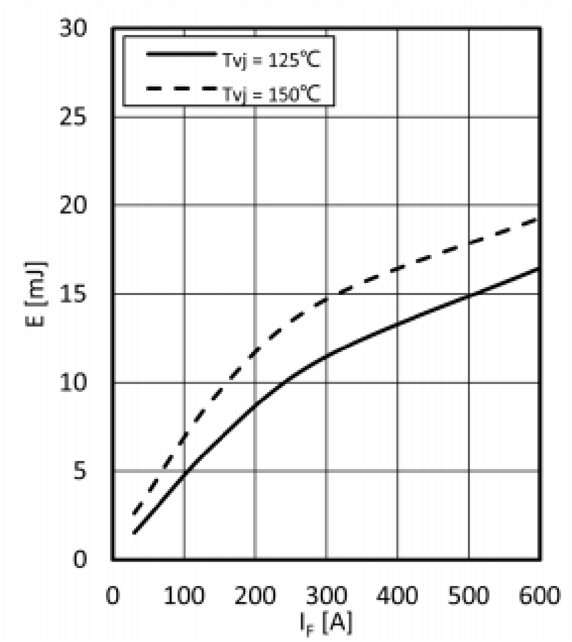
Reverse bias safe operating area IGBT, Inverter (RBSOA)

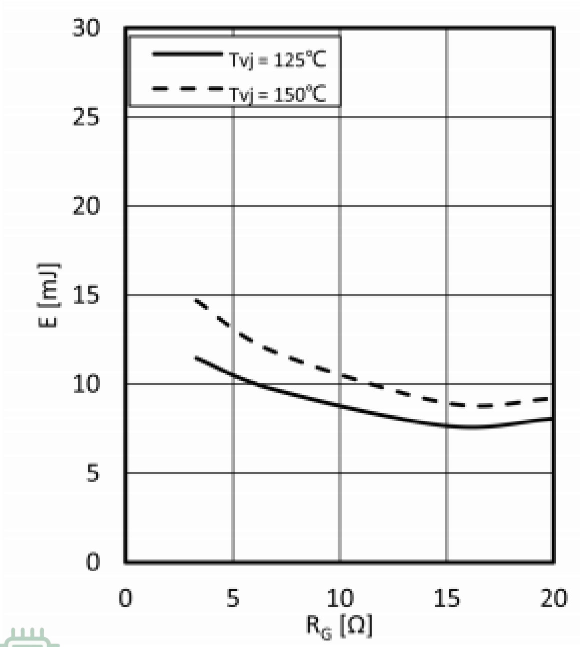
I_C = f (V_{CE}) V_{GE} = ±15V R_{Goff} = 3.3 Ω, T_{vj} = 150°C



Forward characteristic of Diode, Inverter (typical)

I_F = f (V_F)



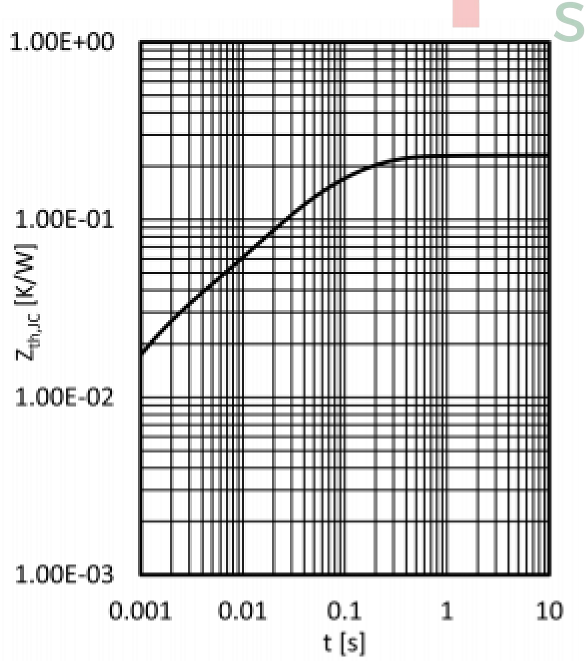


Switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$ $R_{Gon} = 3.3\ \Omega$, $V_{CC} = 600V$

Switching losses Diode, Inverter (typical)

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



ransient thermal impedance Diode Inverter

$Z_{thJC} = f(t)$

8. Circuit Diagram

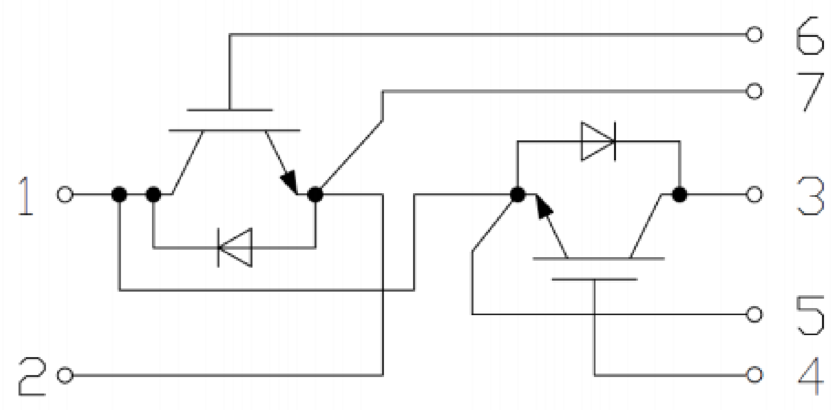


Figure 3

9. Package Outlines

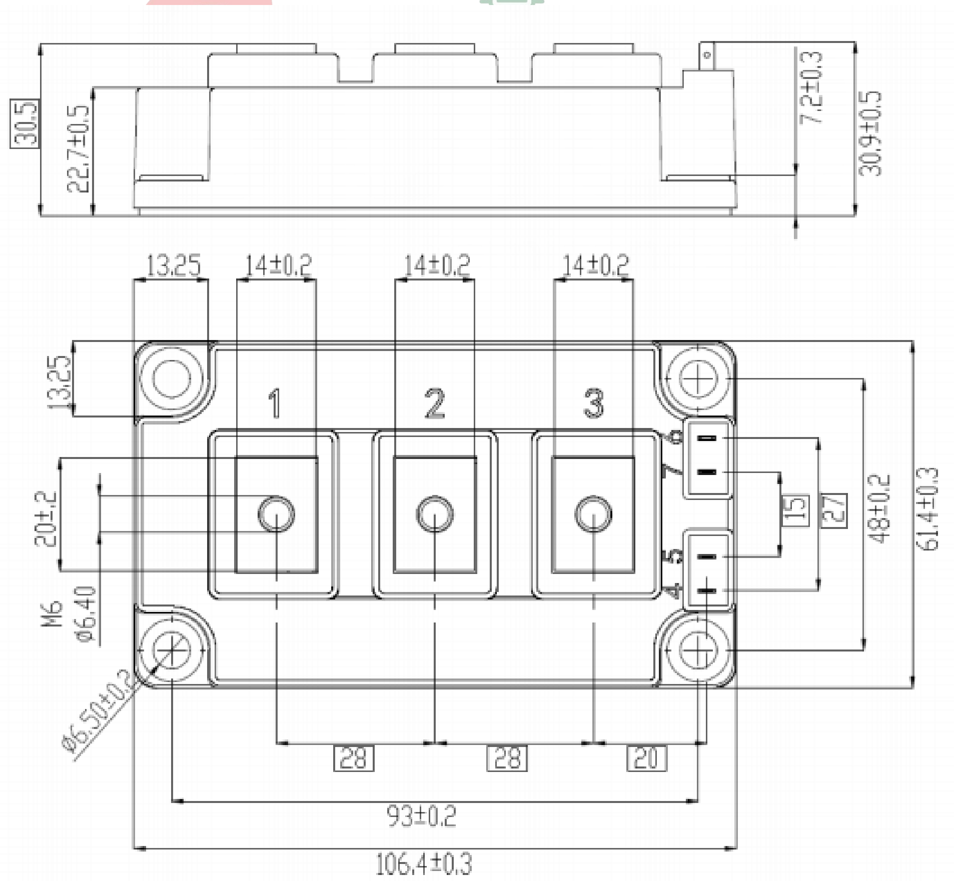


Figure 4