1. Product Features

1.1 Electrical features

- V_{CES}=1200V
- $I_{C\ nom}$=200A / I_{CRM}=400A
- Low switching losses
- Low inductance
- Fast switching and short tail current
- 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

- High Frequency Switching Application
- Motor drives
- UPS system

3. Description

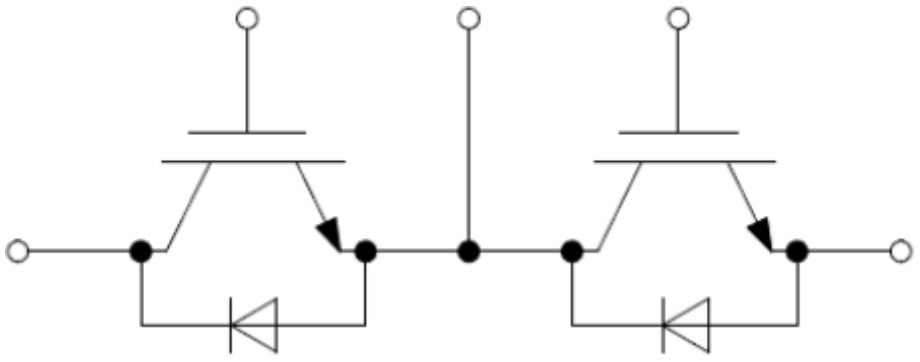


Figure 2 Half Bridge

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	$I_{C\,nom}$	200	A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	400	A
Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	1250	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 = 200A, V_{GE} = 15 V	T_{vj} = 25°C	$V_{CE,sat}$		1.63		V
		T_{vj} = 125°C			1.86		V
		T_{vj} = 150°C			1.92		V
Gate threshold voltage	I_C = 2mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	5.5	6.0	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		1.96		µC
Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1.50		Ω
Input capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		55.2		nF
Reverse transfer capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.44		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
	I_C = 200A, V_{CE} = 600V	T_{vj} = 25°C			0.13		us
Turn-on delay time, inductive load	V_{GE} = +15/-15V	T_{vj} = 125°C	$t_{d,on}$		0.14		us
	$R_{G,on}$ =4.1Ω	T_{vj} = 150°C			0.14		us
	I_C = 200A, V_{CE} = 600V	T_{vj} = 25°C			0.06		us
Rise time, inductive load	V_{GE} = +15/-15V	T_{vj} = 125°C	t_r		0.07		us
	$R_{G,on}$ =4.1Ω	T_{vj} = 150°C			0.07		us

(table continues...)

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
	I_C = 200A, V_{CE} = 600V	T_{vj} = 25°C			0.31		us
Turn-off delay time, inductive load	V_{GE} = +15/-15V	T_{vj} = 125°C	$t_{d,off}$		0.34		us
	$R_{G,off}$ = 4.1Ω	T_{vj} = 150°C			0.34		us
	I_C = 200A, V_{CE} = 600V	T_{vj} = 25°C			0.22		us
Fall time, inductive load	V_{GE} = +15/-15V	T_{vj} = 125°C	t_f		0.25		us
	$R_{G,off}$ = 4.1Ω	T_{vj} = 150°C			0.27		us
	I_C = 200A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C			14.10		mJ
Turn-on energy loss per pulse	V_{GE} = +15/-15V, di/dt =2200A/μs	T_{vj} = 125°C	E_{on}		20.90		mJ
	$R_{G,on}$ = 4.1Ω (T_{vj} = 150°C)	T_{vj} = 150°C			24.38		mJ
	I_C = 200A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C			13.52		mJ
Turn-off energy loss per pulse	V_{GE} = +15/-15V, dv/dt =7500V/μs	T_{vj} = 125°C	E_{off}		14.58		mJ
	$R_{G,off}$ = 4.1Ω (T_{vj} = 150°C)	T_{vj} = 150°C			15.90		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}		1160		A
Thermal resistance, junction to case	Per IGBT		$R_{th,JC}$			0.12	K/W

5. Diode

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	200	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	400	A

5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
		T_{vj} = 25°C			2.10	2.42	V
Forward voltage	I_F = 200A, V_{GE} = 0 V	T_{vj} = 125°C	V_F		2.08		V
		T_{vj} = 150°C			1.99		V

(table continues...)

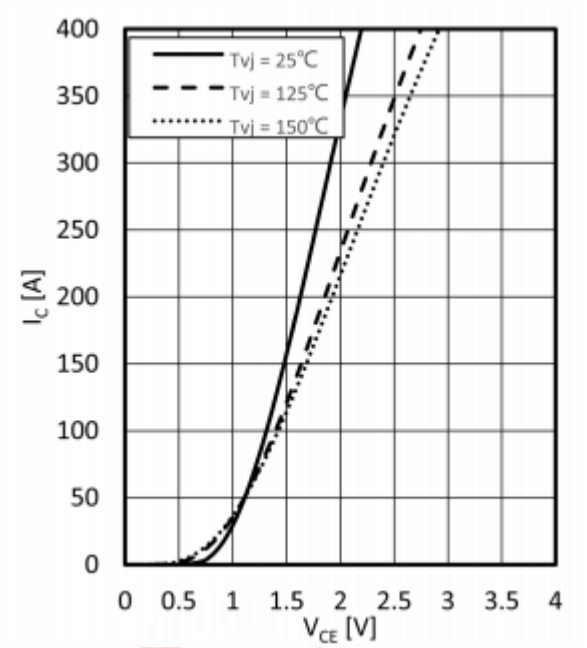
Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current	I_F = 200A, V_R = 600V V_{GE} = -15V , - di_F/dt = 1140 A/µs (T_{vj}=150°C)	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		159 171 179		A A A
Recovered charge	I_F = 200A, V_R = 600V V_{GE} = -15V , - di_F/dt = 1140 A/µs (T_{vj}=150°C)	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		13.9 18.8 25.2		µC µC µC
Reverse recovery energy	I_F = 200A, V_R = 600V V_{GE} = -15V , - di_F/dt = 1140 A/µs (T_{vj}=150°C)	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		3.50 4.40 6.00		mJ mJ mJ
Thermal resistance, junction to	Per diode		$R_{th,JC}$			0.20	K/W

6. Module

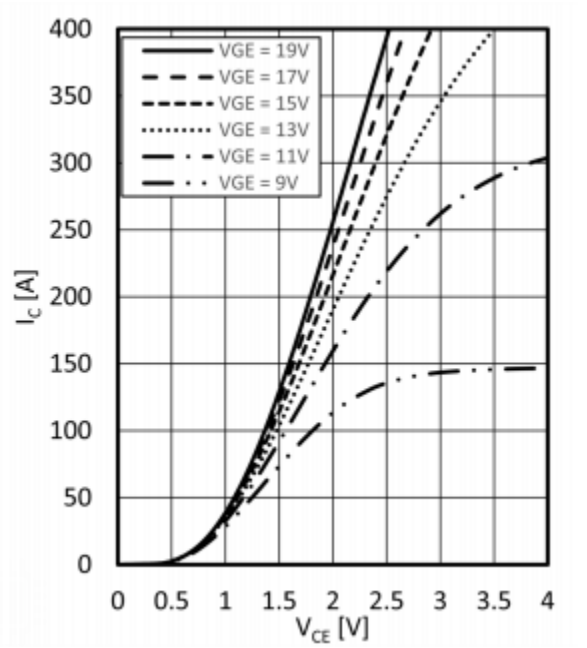
6.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage	RMS, f=50HZ,1min	V_{ISOL}			4000	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 M6	M	3		6	N.m
Terminal Connection Torque	Screw M6	M	2.5		5	N.m
Weight of Module		G		340		g

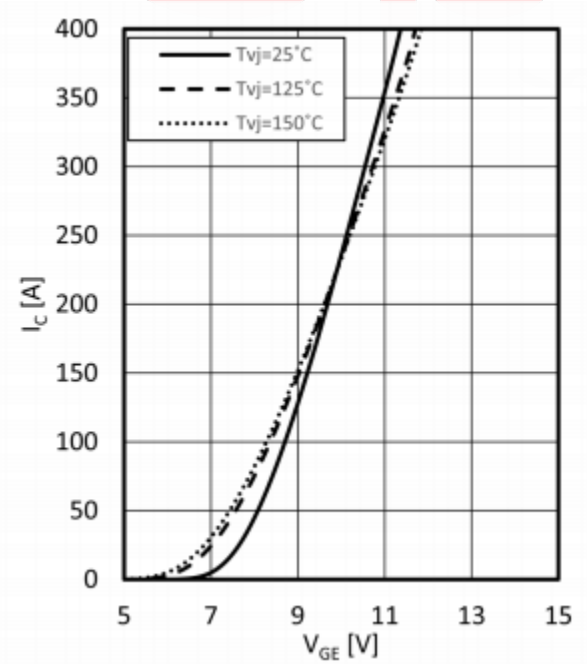
7. Characteristics diagrams



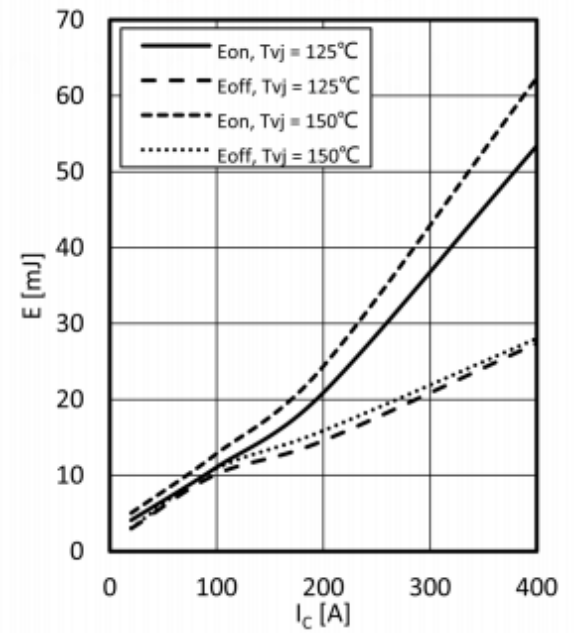
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
V_{GE} = 15V



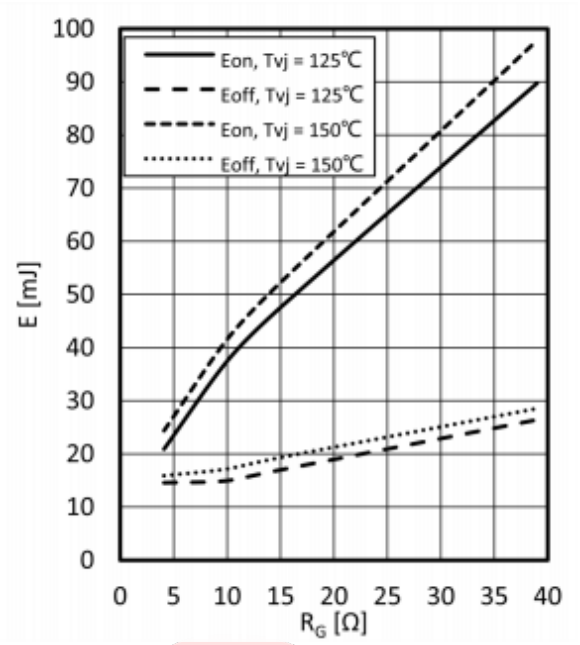
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



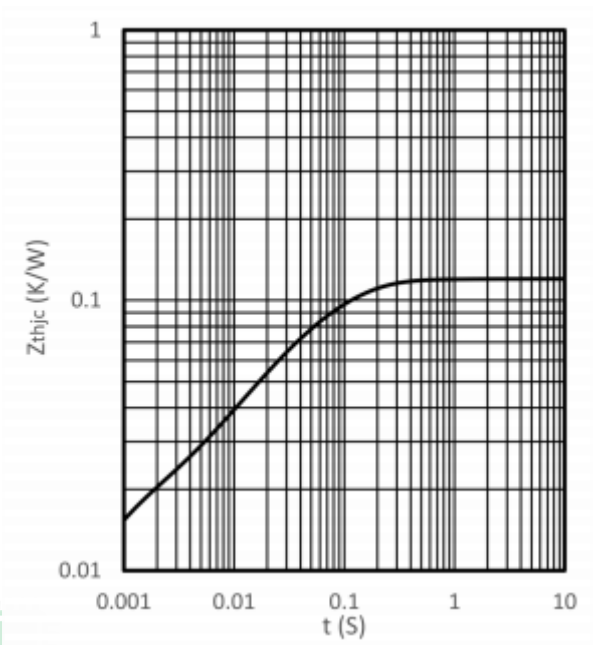
Transfer characteristic IGBT (typical)
$I_C = f(V_{GE})$
V_{CE} = 20V



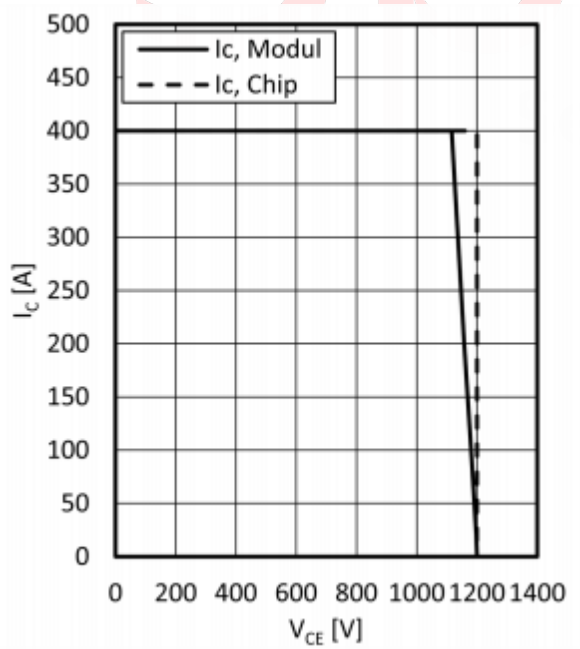
Switching losses IGBT (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
R_{Goff} = 4.1 Ω, R_{Gon} = 4.1 Ω, V_{CE} =600 V, V_{GE} = ± 15 V



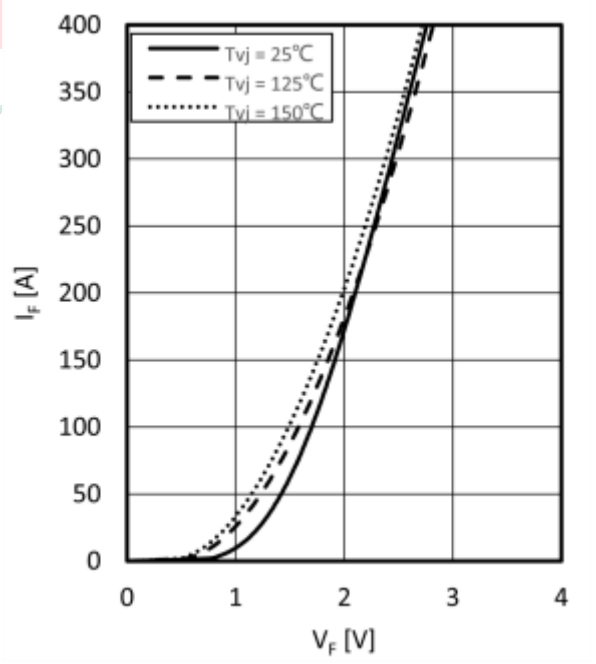
Switching losses IGBT (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$I_C = 200$ A, $V_{CE} = 600$ V, $V_{GE} = \pm 15$ V



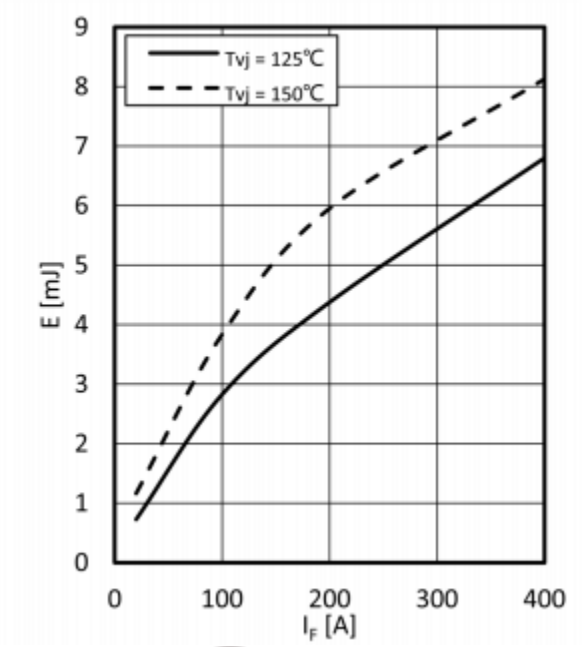
Transient thermal impedance IGBT
$Z_{thJC} = f(t)$



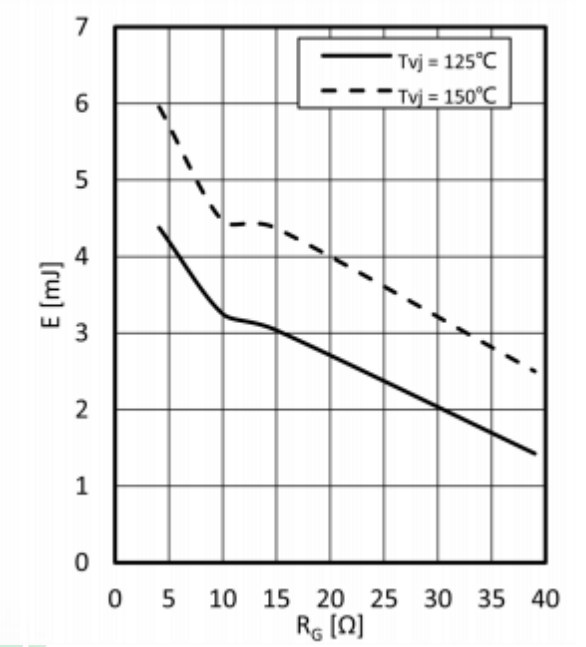
Reverse bias safe operating area IGBT(RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 4.1\ \Omega$, $T_{vj} = 150°C$



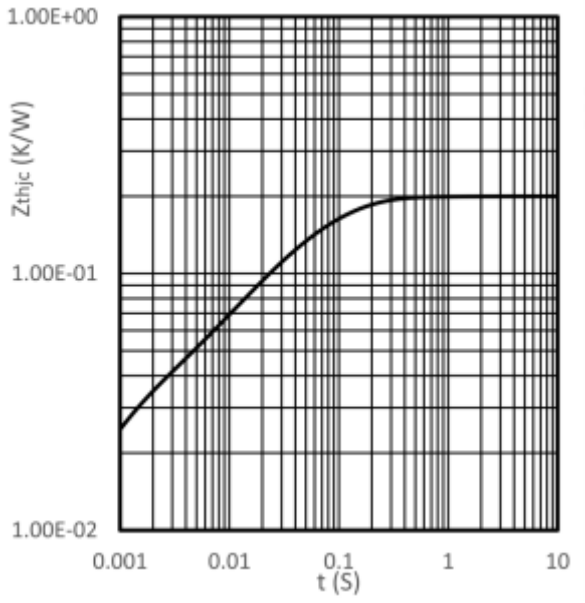
Forward characteristic of Diode (typical)
$I_F = f(V_F)$



Switching losses Diode (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 4.1\ \Omega$, $V_{CE} = 600\ V$



Switching losses Diode (typical)
$E_{rec} = f(R_G)$
$I_F = 200\ A$, $V_{CE} = 600\ V$



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

8. Circuit Diagram

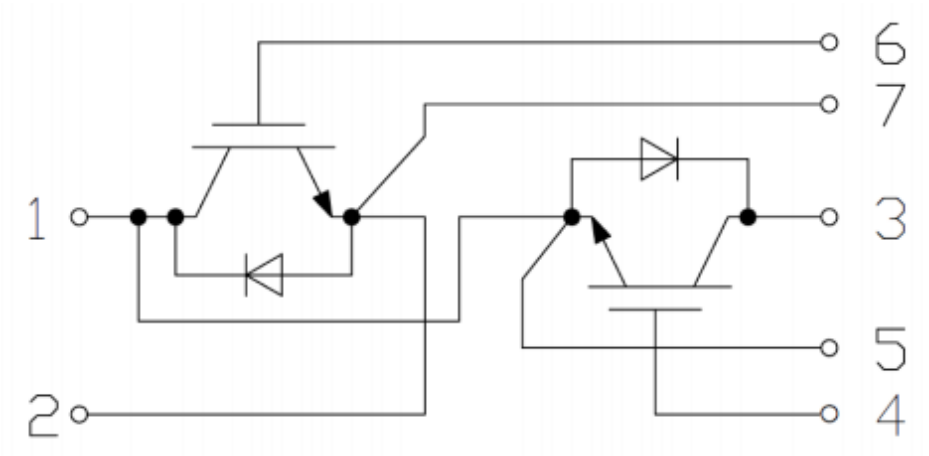


Figure 3

9. Package Outlines

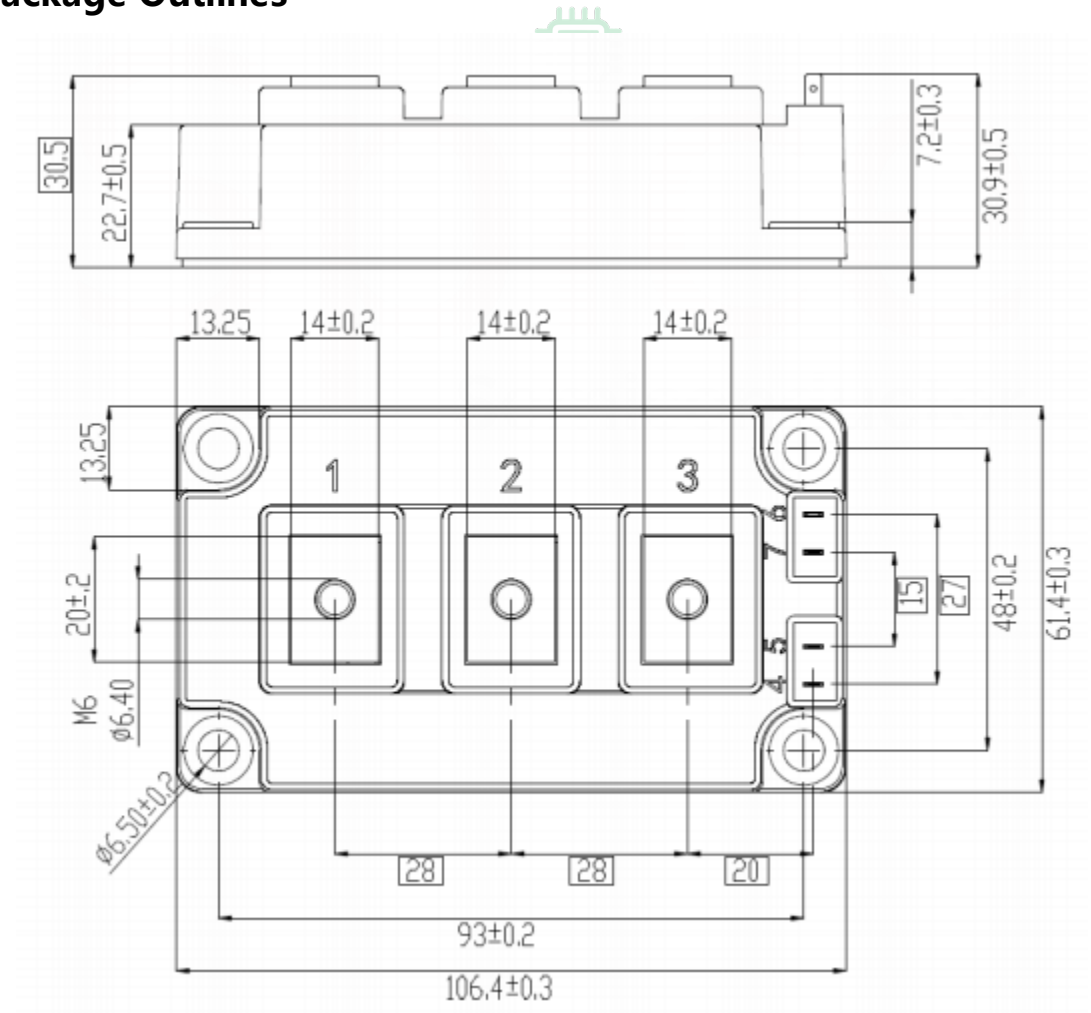


Figure 4