Technical datasheet

1. Product Features

1.1 Electrical features

- V_{CES}=1200V
- $I_{C\ nom}$=600A / I_{CRM}=1200A
- 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

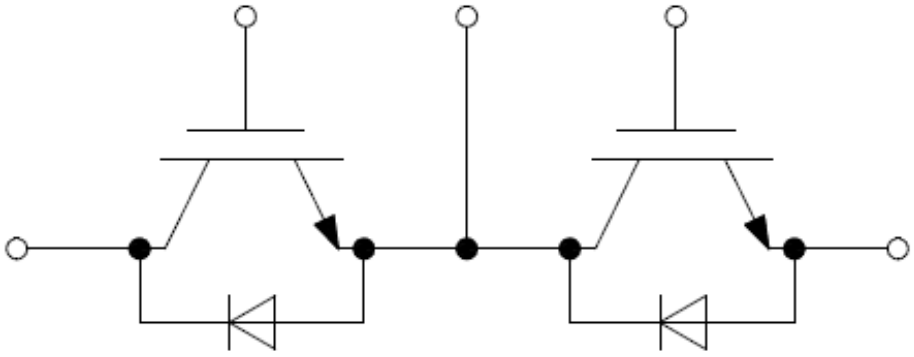


Figure 2 Half Bridge

4. IGBT, Inverter

4.1 Maximum Rated Values

Parameter	Note or test condition	Symbol	Values	Unit
Collector-emitter voltage 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	$I_{C\ nom}$	600	A
Repetitive peak collector current 集电极峰值电流	t_P = 1 ms	I_{CRM}	1200	A
Total power dissipation 总功率损耗	T_C = 25°C, $T_{vj, max}$ = 175	P_{tot}	1875	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 = 600 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 栅极阈值电压	I_C = 22.8mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	5.8	6.5	V
Gate charge 栅极电荷	V_{GE} = -15 V ... +15 V		Q_G		6.9		µC
Internal gate resistor 内部栅极电阻	T_{vj} = 25°C		R_{Gint}		0.53		Ω
Input capacitance 输入电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		86		nF
Reverse transfer capacitance 反向传输电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.6		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}			4	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}			400	nA
Turn-on delay time, inductive load 开通延迟时间	I_C = 600A, V_{CE} = 600V V_{GE} = +15/-15V $R_{G,on}$ = 1.6Ω	T_{vj} = 25°C T_{vj} = 125° T_{vj} = 150°C	$t_{d,on}$		0.19 0.19 0.20		us us us
Rise time, inductive load 上升时间	I_C = 600A, V_{CE} = 600V V_{GE} = +15/-15V $R_{G,on}$ = 1.6Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0.11 0.11 0.11		us us 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 = 600A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,off}$		0.60		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.60		us
	$R_{G,off}$ = 1.6Ω	T_{vj} = 150°C			0.62		us
Fall time, inductive load 下降时间	I_C = 600A, V_{CE} = 600V	T_{vj} = 25°C	t_f		0.15		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.31		us
	$R_{G,off}$ = 1.6Ω	T_{vj} = 150°C			0.33		us
Turn-on energy loss per pulse 开通能量	I_C = 600A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C	E_{on}		51.9		mJ
	V_{GE} = +15/-15V, di/dt =4300A/µs	T_{vj} = 125°C			52.6		mJ
	$R_{G,on}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			57.2		mJ
Turn-off energy loss per pulse 关断能量	I_C = 600A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C	E_{off}		69.3		mJ
	V_{GE} = +15/-15V, dv/dt =3500V/µs	T_{vj} = 125°C			81.7		mJ
	$R_{G,off}$ = 1.6Ω (T_{vj} = 150°C)	T_{vj} = 150°C			88.0		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}		3100		A
Thermal resistance, junction to case 结-外壳热阻	Per IGBT		$R_{th,JC}$			0.08	K/W

5. Diode, Inverter

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	600	A
Repetitive peak forward current 正向重复峰值电流	t_P = 1 ms	I_{FRM}	1200	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°C	V_F		2.00	2.40	V
		T_{vj} = 125°C			1.65		V
		T_{vj} = 150°C			1.60		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 = 600A, V_R = 600V V_{GE} = -15V , - di_F/dt = 1750 A/μs (T_{vj}=150°C)	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		290 480 520		A A A
Recovered charge 恢复电荷	I_F = 600A, V_R = 600V V_{GE} = -15V , - di_F/dt = 1750 A/μs (T_{vj}=150°C)	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		38.4 96.5 118.0		μC μC μC
Reverse recovery energy 反向恢复损耗 （每脉冲）	I_F = 600A, V_R = 600V V_{GE} = -15V , - di_F/dt = 1750 A/μs (T_{vj}=150°C)	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		10.7 27.0 32.8		mJ mJ mJ
Thermal resistance, junction to case 结-外壳热阻	Per diode		$R_{th,JC}$			0.10	K/W

6. Module

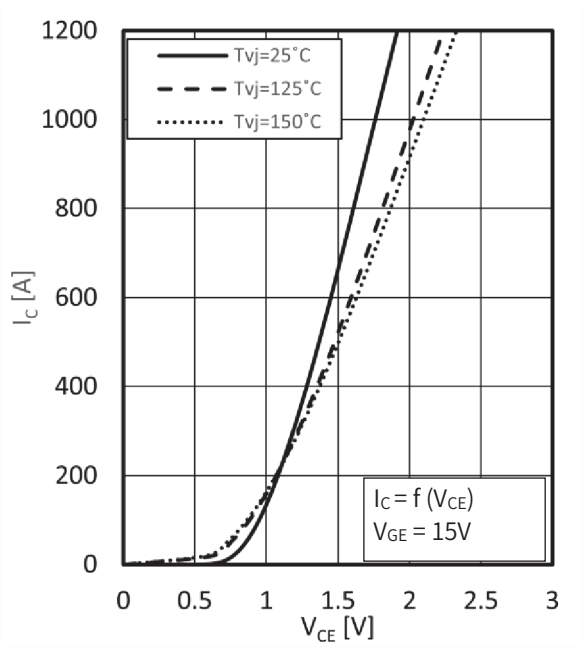
6.1 Characteristic value

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}		20		nH

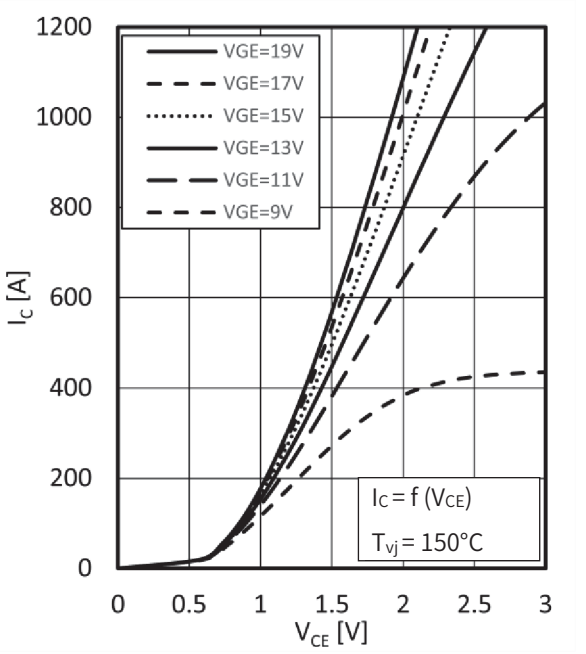
(table continues...) 待续

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
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 M6	M	3		6	N.m
Terminal Connection Torque 端子速接扭矩	Screw M6	M	2.5		5	N.m
Weight of Module 重量		G		340		g

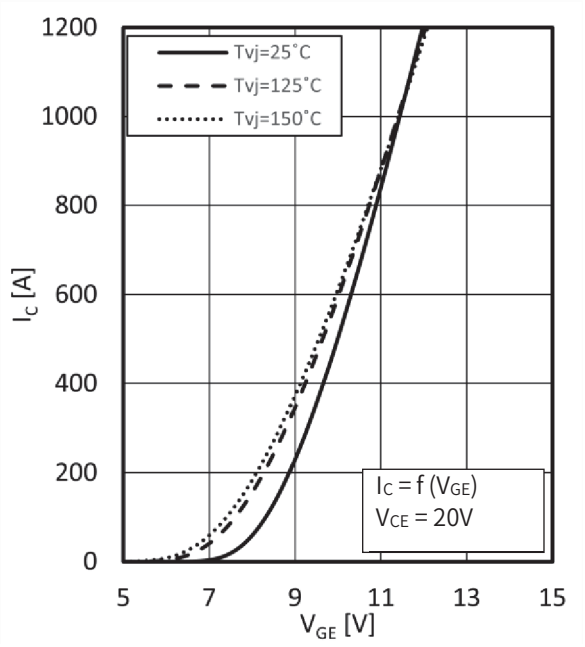
7. Characteristics diagrams



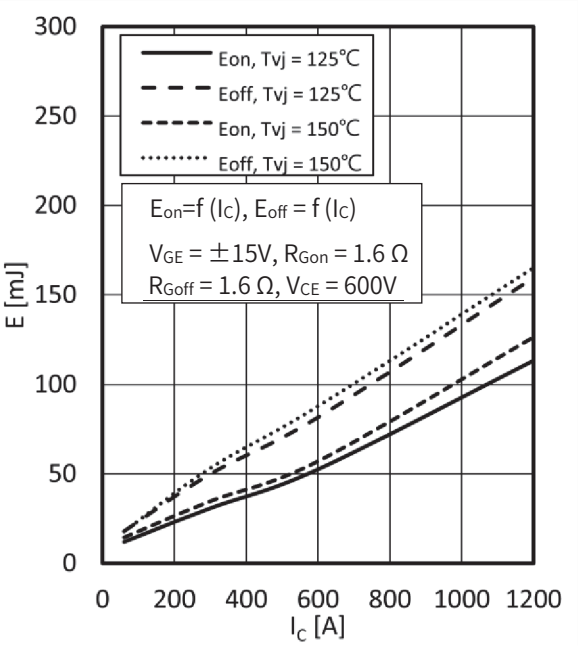
Output characteristic IGBT, Inverter (typical)



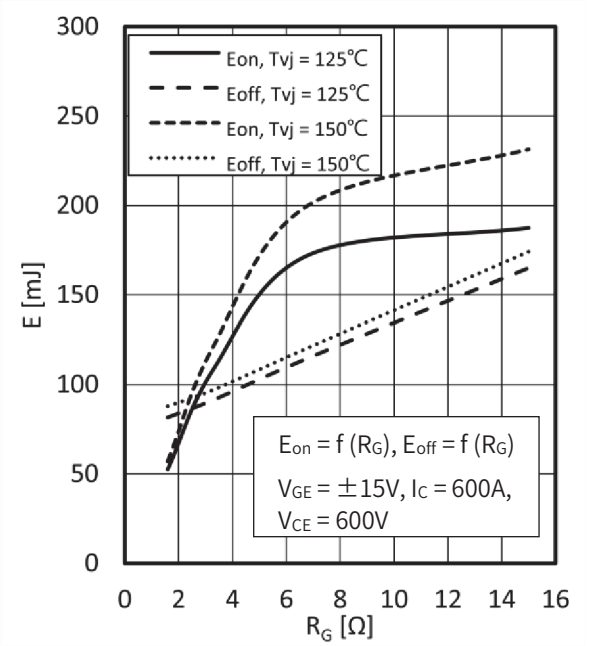
Output characteristic IGBT, Inverter (typical)



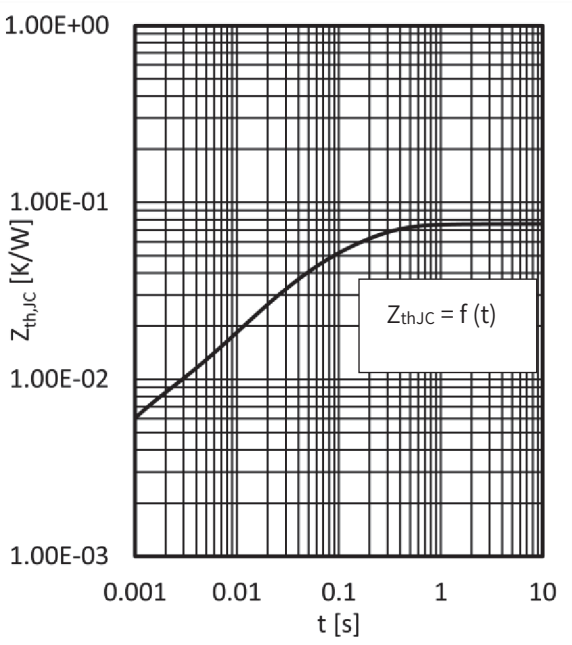
Transfer characteristic IGBT, Inverter(typical)



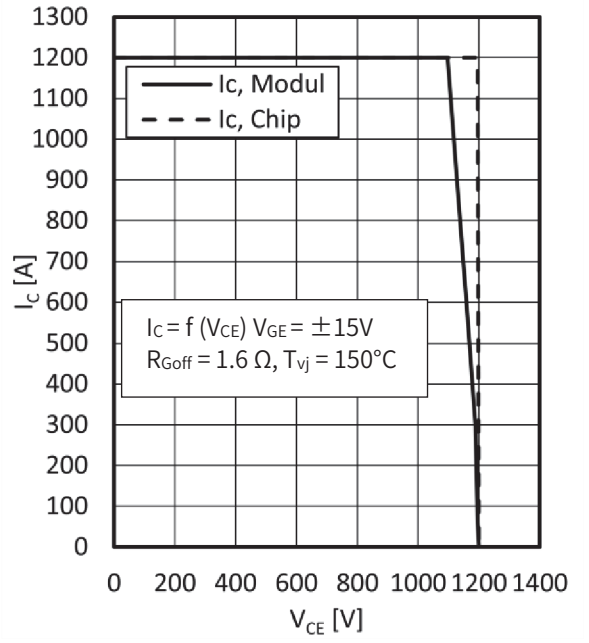
Switching losses IGBT, Inverter (typical)



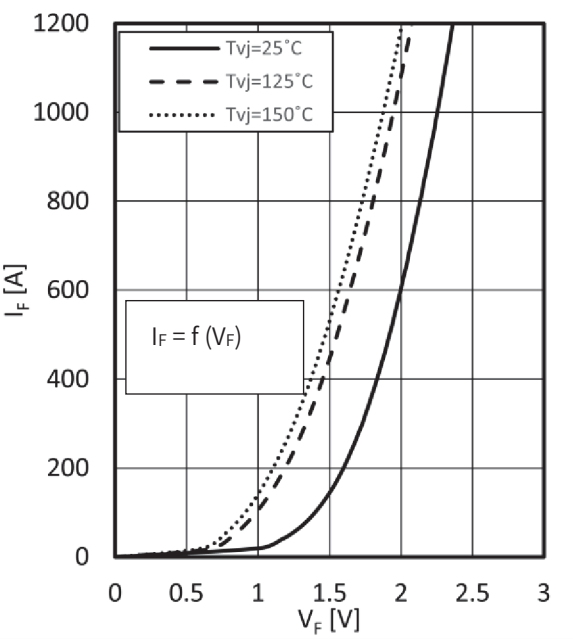
Switching losses IGBT, Inverter (typical)



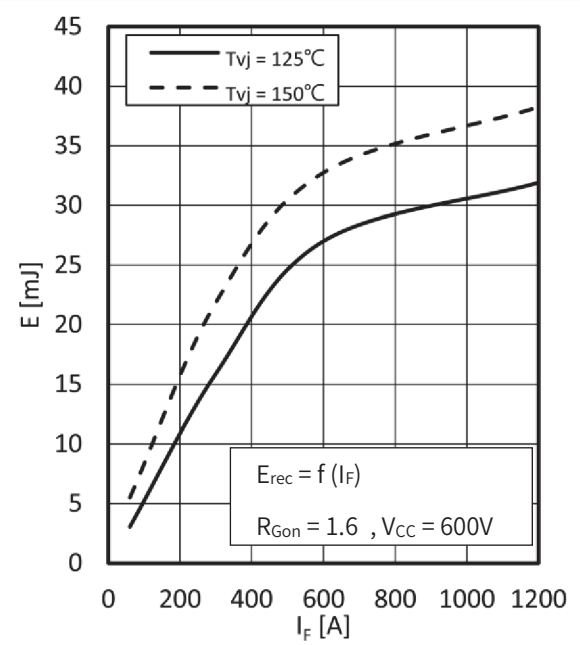
Transient thermal impedance IGBT, Inverter



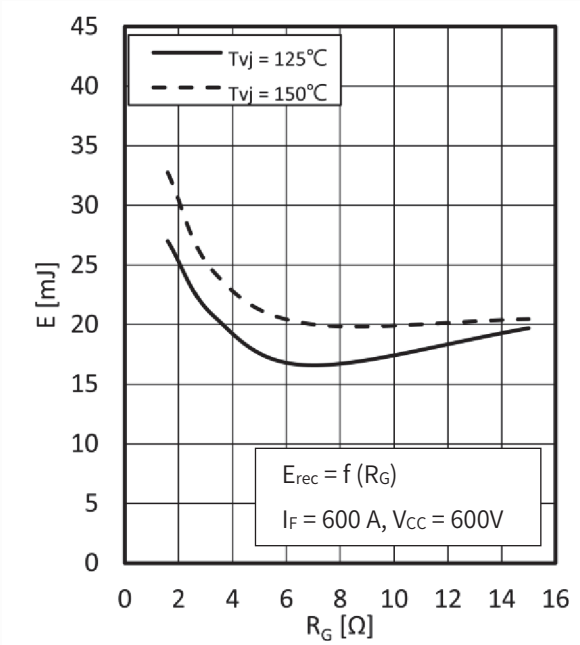
Reverse bias safe operating area IGBT,Inverter (RBSOA)



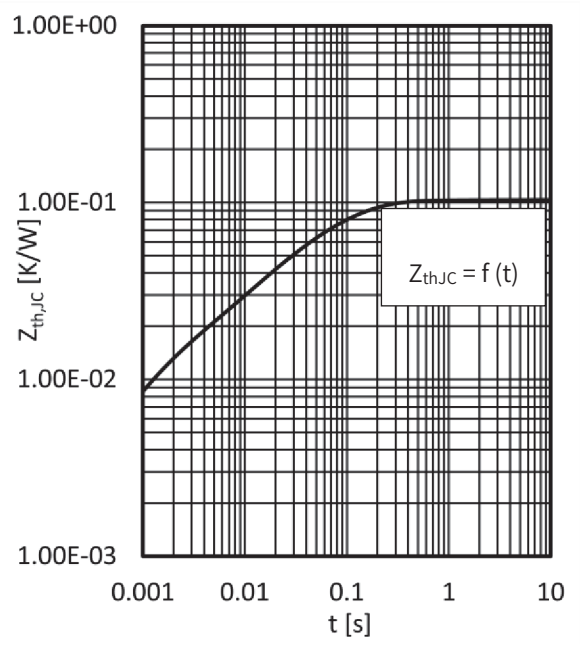
Forward characteristic of Diode, Inverter(typical)



Switching losses Diode, Inverter (typical)



Switching losses Diode, Inverter (typical)



Transient thermal impedance DiodeInverter

8. Circuit Diagram

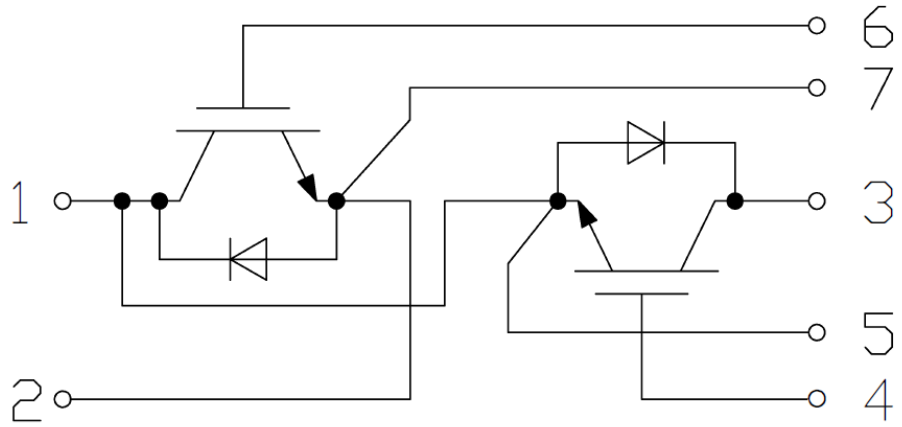


Figure 3

9. Package Outlines

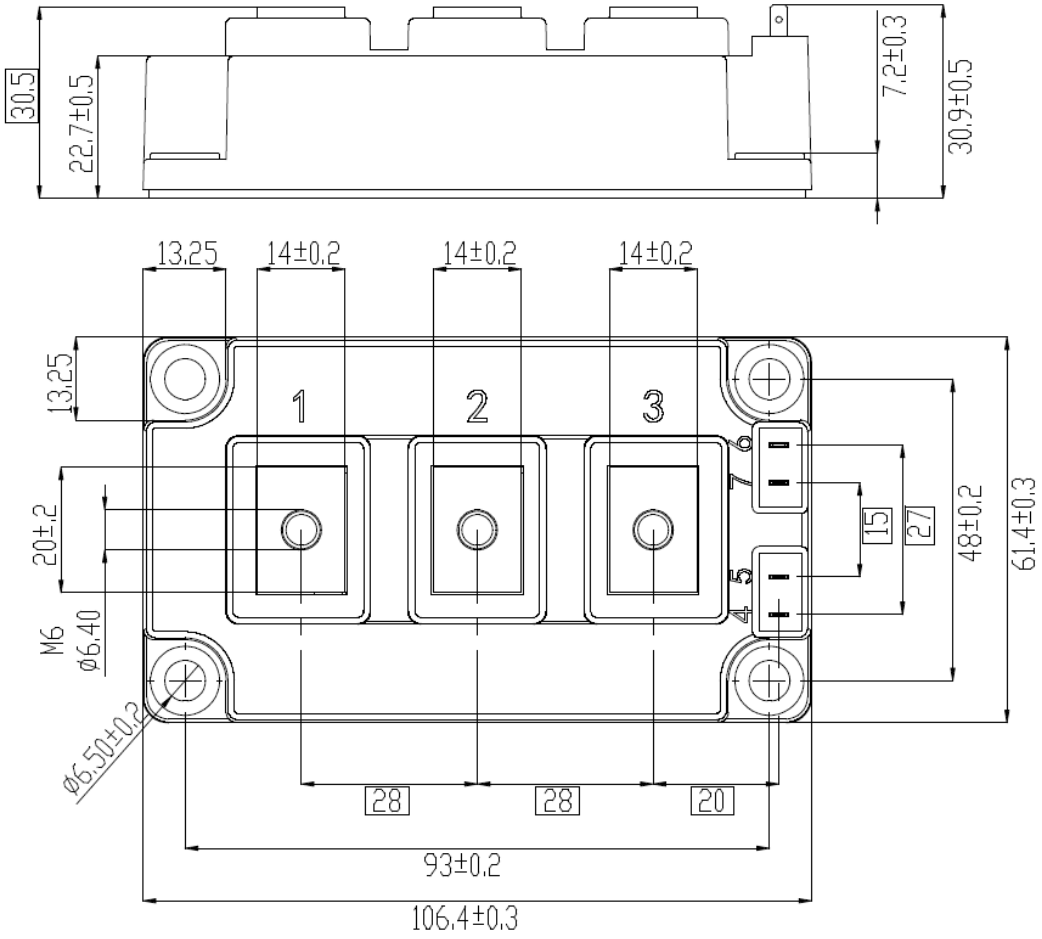


Figure 4