

1. Product Features

1.1 Electrical features

- $V_{CES}=1700V$
- $I_{C\ nom}=200A / I_{CRM}=400A$
- Low switching losses
- Low inductance
- Fast switching and short tail current
- High power and thermal cycling capability



Figure1 IGBT Module

1.2 Mechanical features

- 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

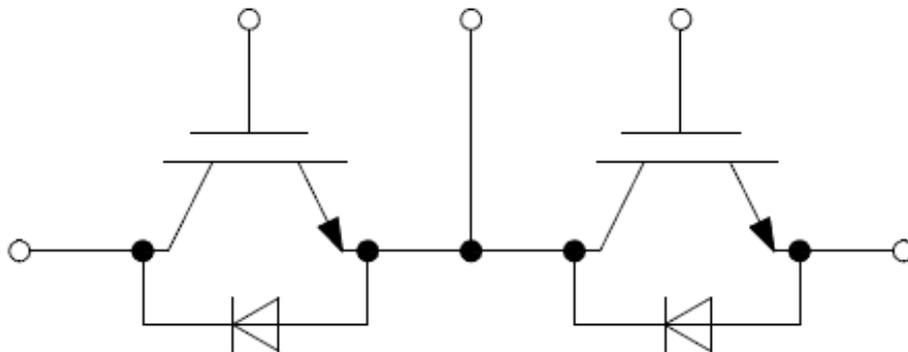


Figure 2 Half Bridge

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	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1700	V
Continuous DC collector current 连续集电极电流	$T_C = 100^{\circ}\text{C}, T_{vj, \max} = 150^{\circ}\text{C}$	$I_{C \text{ nom}}$	200	A
Repetitive peak collector current 集电极峰值电流	$t_P = 1 \text{ ms}$	I_{CRM}	300	A
Total power dissipation 总功率损耗	$T_C = 25^{\circ}\text{C}, T_{vj, \max} = 175^{\circ}\text{C}$	P_{tot}	1250	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	$I_C = 200 \text{ A}, V_{GE} = 15 \text{ V}$	$V_{CE, \text{sat}}$		$T_{vj} = 25^{\circ}\text{C}$	1.65	V
				$T_{vj} = 125^{\circ}\text{C}$	1.96	V
				$T_{vj} = 150^{\circ}\text{C}$	2.01	V
Gate threshold voltage 栅极阈值电压	$I_C = 1 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	$V_{GE, \text{th}}$	5.0	5.66	6.2	V
Gate charge 栅极电荷	$V_{GE} = -15 \text{ V} \dots +15 \text{ V}$	Q_G		2.3		μC
Internal gate resistor 内部栅极电阻	$T_{vj} = 25^{\circ}\text{C}$	$R_{G \text{ int}}$		3.6		Ω
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}		18		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}		0.58		nF
Collector-emitter cut-off current 集电极-发射极截止电流	$V_{CE} = 1700 \text{ V}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$	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}			300	nA
Turn-on delay time, inductive load 开通延迟时间	$I_C = 200 \text{ A}, V_{CE} = 900 \text{ V}$ $V_{GE} = +15/-15 \text{ V}$ $R_{G, \text{on}} = 2.2 \Omega$	$T_{d, \text{on}}$		$T_{vj} = 25^{\circ}\text{C}$	0.185	us
				$T_{vj} = 125^{\circ}\text{C}$	0.202	us
				$T_{vj} = 150^{\circ}\text{C}$	0.214	us
Rise time, inductive load 上升时间	$I_C = 200 \text{ A}, V_{CE} = 900 \text{ V}$ $V_{GE} = +15/-15 \text{ V}$ $R_{G, \text{on}} = 2.2 \Omega$	T_r		$T_{vj} = 25^{\circ}\text{C}$	0.036	us
				$T_{vj} = 125^{\circ}\text{C}$	0.046	us
				$T_{vj} = 150^{\circ}\text{C}$	0.050	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	$I_C = 200A, V_{CE} = 900V$ $V_{GE} = +15/-15V$ $R_{G,off} = 2.2\Omega$	$T_{vj} = 25^\circ C$	$T_{d,off}$		0.41		us
		$T_{vj} = 125^\circ C$			0.461		us
		$T_{vj} = 150^\circ C$			0.469		us
Fall time, inductive load 下降时间	$I_C = 200A, V_{CE} = 900V$ $V_{GE} = +15/-15V$ $R_{G,off} = 2.2\Omega$	$T_{vj} = 25^\circ C$	T_f		0.19		us
		$T_{vj} = 125^\circ C$			0.231		us
		$T_{vj} = 150^\circ C$			0.491		us
Turn-on energy loss per pulse 开通损耗能量	$I_C = 200A, V_{CE} = 900V, L_s = 60nH$ $V_{GE} = +15/-15V, di/dt = 3300A/\mu s$ $R_{G,on} = 2.2\Omega (T_{vj} = 150^\circ C)$	$T_{vj} = 25^\circ C$	E_{on}		19.90		mJ
		$T_{vj} = 125^\circ C$			34.83		mJ
		$T_{vj} = 150^\circ C$			40.36		mJ
Turn-off energy loss per pulse 关断损耗能量	$I_C = 200A, V_{CE} = 900V, L_s = 60nH$ $V_{GE} = +15/-15V, dv/dt = 4200V/\mu s$ $R_{G,off} = 2.2\Omega (T_{vj} = 150^\circ C)$	$T_{vj} = 25^\circ C$	E_{off}		35.53		mJ
		$T_{vj} = 125^\circ C$			49.25		mJ
		$T_{vj} = 150^\circ C$			53.49		mJ
SC data 短路数据	$V_{GE} \leq 15V, V_{CC} = 900V, t_p \leq 8\mu s, T_{vj} = 150^\circ C,$ $C_{GE} = 0.0\mu F, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$		I_{sc}		1032		A
Thermal resistance, junction to case 结-外壳热阻	Per IGBT		$R_{th,JC}$		0.120		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	$T_{vj} = 25^\circ C$	V_{RRM}	1700	V
Continuous DC forward current 连续正向直流电流		I_F	200	A
Repetitive peak forward current 正向重复峰值电流	$t_p = 1ms$	I_{FRM}	400	A

5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage 正向电压	$I_F = 200A, V_{GE} = 0V$	$T_{vj} = 25^\circ C$	V_F		2.11		V
		$T_{vj} = 125^\circ C$			2.32		V
		$T_{vj} = 150^\circ C$			2.35		V

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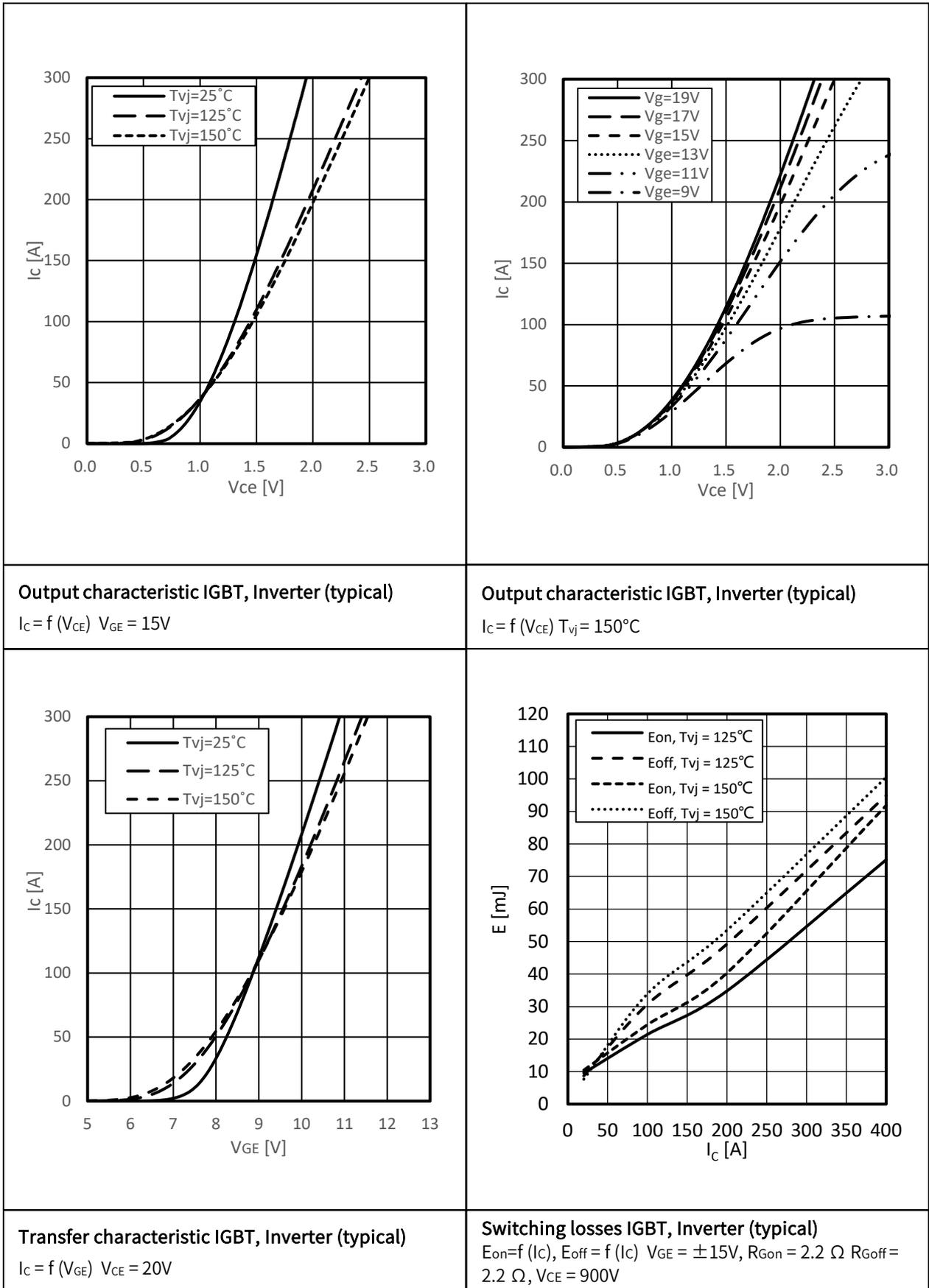
Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current 反向恢复峰值电流	I _F = 200A, V _R = 900V V _{GE} = -15V, - di _F /dt = 1400 A/μs (T _{vj} =150°C)	T _{vj} = 25°C	I _{RM}		388		A
		T _{vj} = 125°C			315		A
		T _{vj} = 150°C			305		A
Recovered charge 恢复电荷	I _F = 200A, V _R = 900V V _{GE} = -15V, - di _F /dt = 1400 A/μs (T _{vj} =150°C)	T _{vj} = 25°C	Q _r		46		μC
		T _{vj} = 125°C			59		μC
		T _{vj} = 150°C			67		μC
Reverse recovery energy 反向恢复损耗 (每脉冲)	I _F = 200A, V _R = 900V V _{GE} = -15V, - di _F /dt = 1400 A/μs (T _{vj} =150°C)	T _{vj} = 25°C	E _{rec}		20		mJ
		T _{vj} = 125°C			30		mJ
		T _{vj} = 150°C			35		mJ
Thermal resistance, junction to case 结-外壳热阻	Per diode		R _{th,Jc}		0.230		K/W

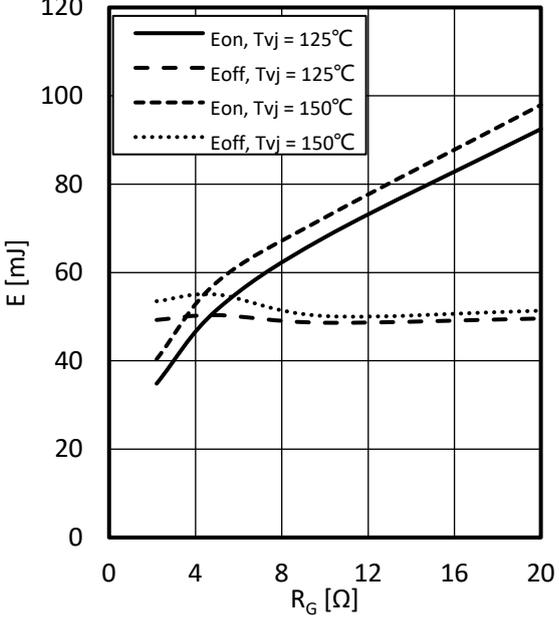
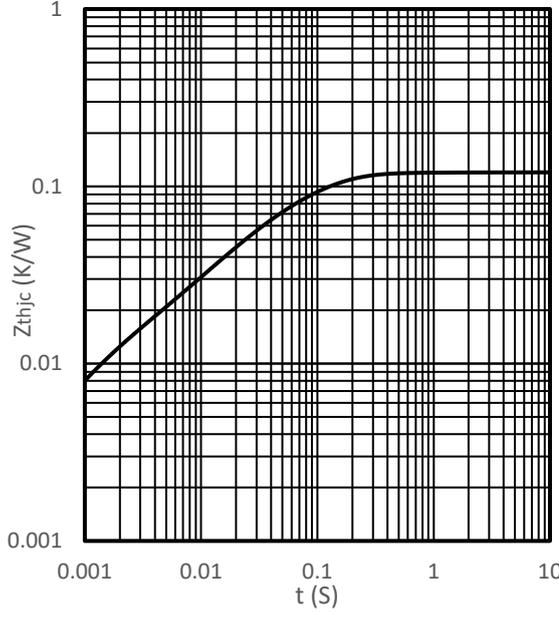
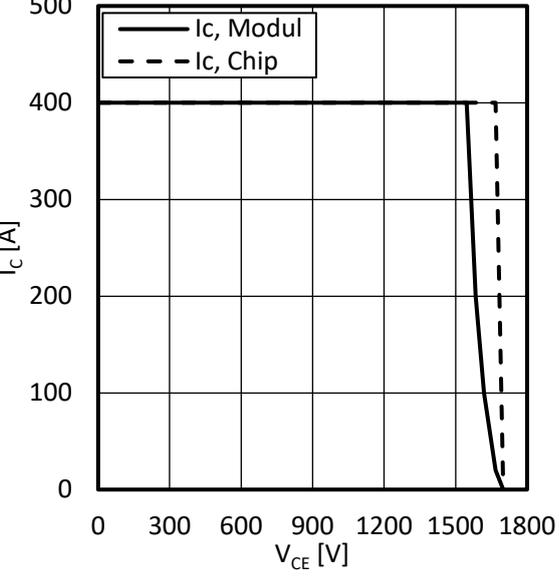
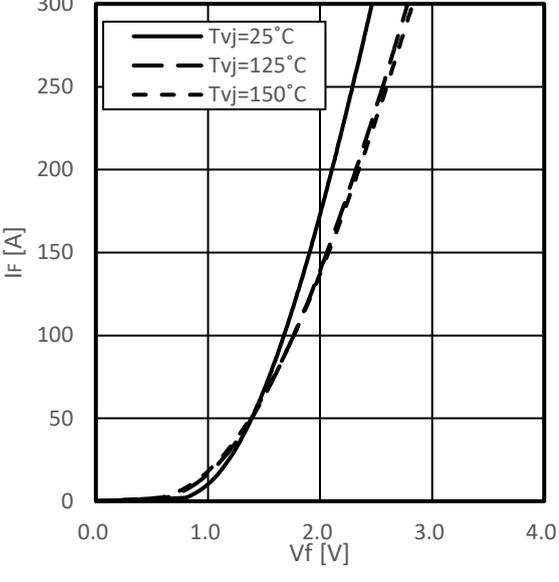
6. Module

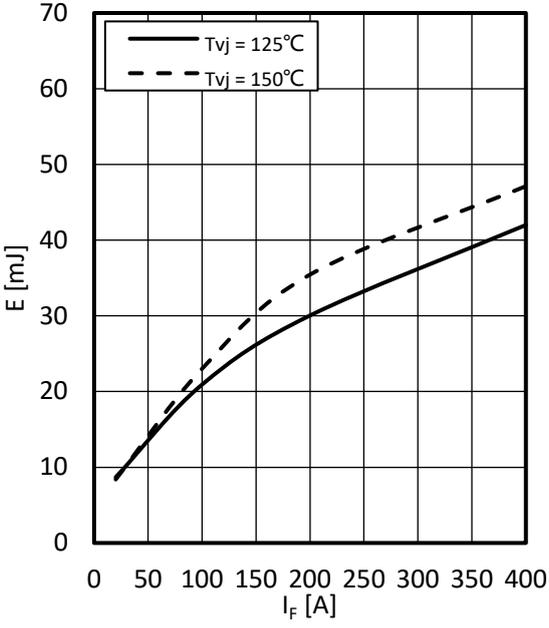
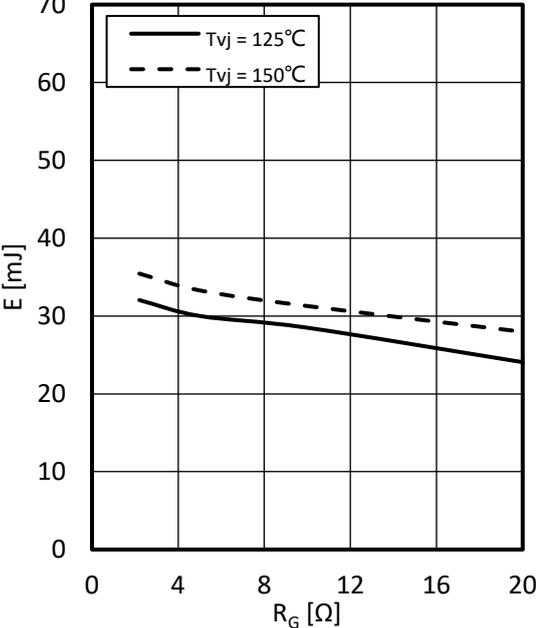
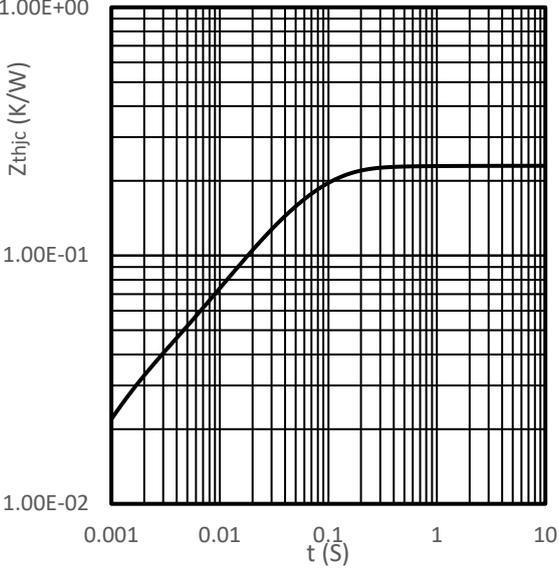
6.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage 隔离电压	RMS, f=50HZ,1min	V _{ISOL}			4000	V
Stray inductance module 杂散电感		L _{SCE}		20		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	2.5		6	N.m
Weight of Module 重量		G		340		g

7. Characteristics diagrams



	
<p>Switching losses IGBT, Inverter (typical) $E_{on} = f(R_G), E_{off} = f(R_G) V_{GE} = \pm 15V, I_C = 200A, V_{CE} = 900V$</p>	<p>Transient thermal impedance IGBT, Inverter $Z_{thJC} = f(t)$</p>
	
<p>Reverse bias safe operating area IGBT, Inverter (RBSOA) $I_C = f(V_{CE}) V_{GE} = \pm 15V R_{Goff} = 15\Omega, T_{vj} = 150^\circ C$</p>	<p>Forward characteristic of Diode, Inverter (typical)</p>

	
<p>Switching losses Diode, Inverter (typical) $E_{rec} = f(I_F) R_{Gon} = 2.2 \Omega, V_{CC} = 900V$</p>	<p>Switching losses Diode, Inverter (typical) $E_{rec} = f(R_G) I_F = 200 A, V_{CC} = 900V$</p>
	
<p>Transient thermal impedance Diode Inverter $Z_{thjC} = f(t)$</p>	

8. Circuit Diagram

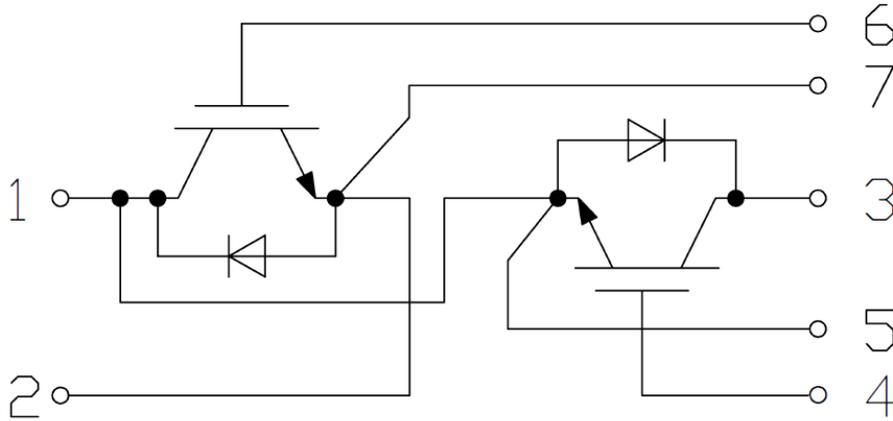


Figure 3

9. Package Outlines

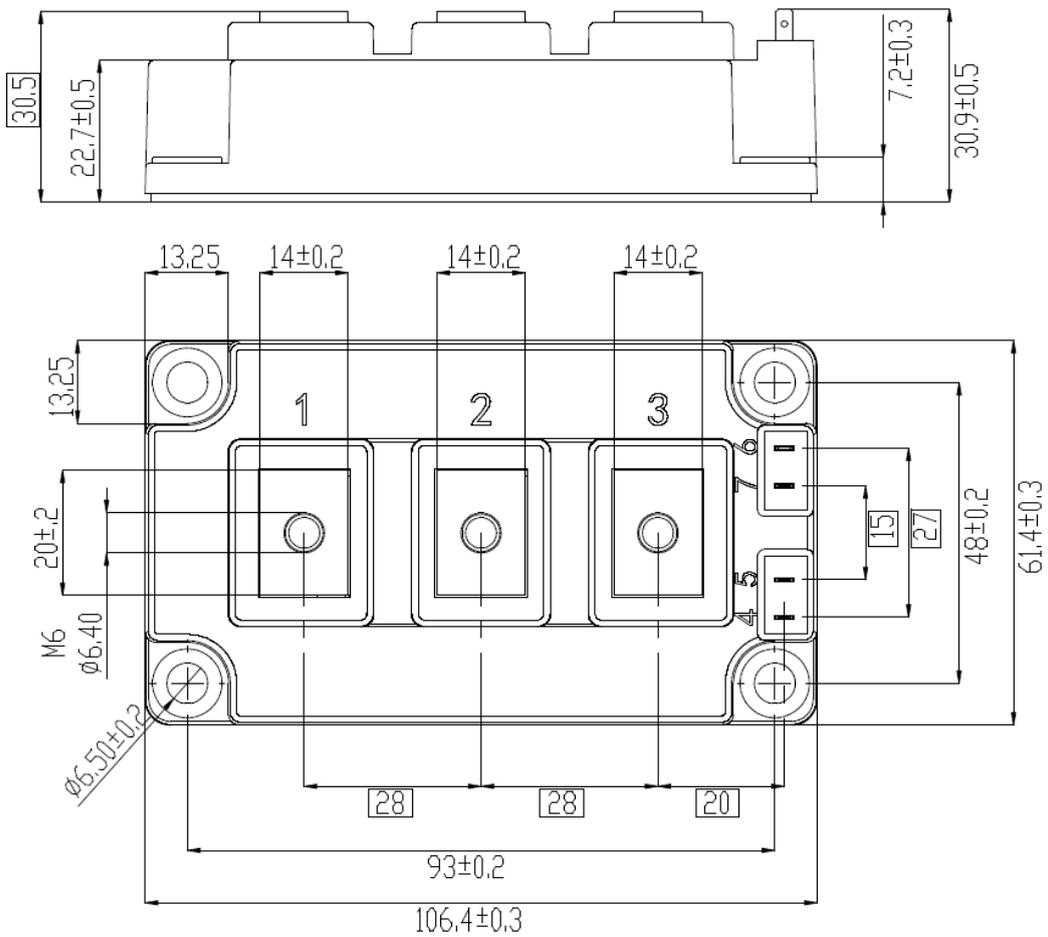


Figure 4