

## 1. Features

### 1.2 Electrical features

- $V_{CES}=1200V$
- $I_{C\ nom}=400A / I_{CRM}=800A$
- Low switching losses
- Low inductance
- Fast switching and short tail current
- High power and thermal cycling capability

### 1.2 Mechanical features

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



Figure1 IGBT Module

## 2. Typical Applications

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

## 3. Description

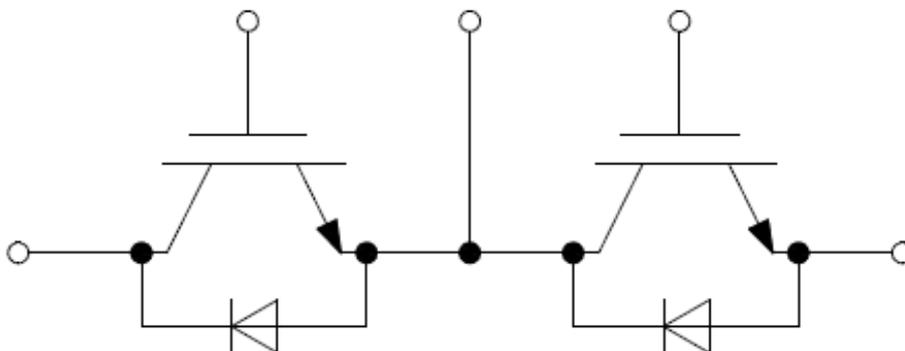


Figure 2 Half Bridge

## 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	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Continuous DC collector current 连续集电极电流	$T_C = 100^{\circ}\text{C}, T_{vj, \max} = 150^{\circ}\text{C}$	$I_{C \text{ nom}}$	400	A
Repetitive peak collector current 集电极峰值电流	$t_P = 1 \text{ ms}$	$I_{CRM}$	800	A
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	$I_C = 400 \text{ A}, V_{GE} = 15 \text{ V}$	$V_{CE, \text{sat}}$	1.7	$T_{vj} = 25^{\circ}\text{C}$ 1.95		V
				$T_{vj} = 125^{\circ}\text{C}$ 2.35		
				$T_{vj} = 150^{\circ}\text{C}$ 2.40		
Gate threshold voltage 栅极阈值电压	$I_C = 15.2 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	$V_{GE, \text{th}}$	5.2	5.8	6.6	V
Internal gate resistor 内部栅极电阻	$T_{vj} = 25^{\circ}\text{C}$	$R_{Gint}$		1.88		$\Omega$
Input capacitance 输入电容	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$	$C_{ies}$		38.4		nF
Reverse transfer capacitance 反向传输电容	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$	$C_{res}$		0.42		nF
Collector-emitter cut-off current 集电极-发射极截止电流	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$	$I_{CES}$			100	$\mu\text{A}$
Gate-emitter leakage current 栅极-发射极漏电流	$V_{CE} = 0 \text{ V}, V_{GE} = 20 \text{ V}, T_{vj} = 25^{\circ}\text{C}$	$I_{GES}$			10	$\mu\text{A}$
Turn-on delay time, inductive load 开通延迟时间	$I_C = 400 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = +15/-15 \text{ V}$ $R_{G, \text{on}} = 5 \Omega$	$T_{vj} = 150^{\circ}\text{C}$	$T_{d, \text{on}}$	0.18		$\mu\text{s}$
Rise time, inductive load 上升时间	$I_C = 400 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = +15/-15 \text{ V}$ $R_{G, \text{on}} = 5 \Omega$	$T_{vj} = 150^{\circ}\text{C}$	$T_r$	0.09		$\mu\text{s}$

(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	$I_C = 400A, V_{CE} = 600V$ $V_{GE} = +15/-15V$ $R_{G,on} = 5\Omega$	$T_{vj} = 150^\circ C$ $T_{d,off}$		0.38		us
Fall time, inductive load 下降时间	$I_C = 400A, V_{CE} = 600V$ $V_{GE} = +15/-15V$ $R_{G,on} = 5\Omega$	$T_{vj} = 150^\circ C$ $T_f$		0.25		us
Turn-on energy loss per pulse 开通损耗能量	$I_C = 400A, V_{CE} = 600V, L_s = 30nH$ $V_{GE} = +15/-15V, di/dt = 3700A/\mu s$ $R_{G,on} = 5\Omega$	$T_{vj} = 150^\circ C$ $E_{on}$		31.3		mJ
Turn-off energy loss per pulse 关断损耗能量	$I_C = 400A, V_{CE} = 600V, L_s = 30nH$ $V_{GE} = +15/-15V, dv/dt = 6700V/\mu s$ $R_{G,off} = 5\Omega$	$T_{vj} = 150^\circ C$ $E_{off}$		45.6		mJ
SC data 短路数据	$V_{GE} \leq 15V, V_{CC} = 600V, t_p \leq 8\mu s, T_{vj} = 150^\circ C,$ $C_{GE} = 0.0\mu F, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$I_{sc}$		1900		A

## 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	$T_{vj} = 25^\circ C$	$V_{RRM}$	1200	V
Continuous DC forward current 连续正向直流电流		$I_F$	400	A
Repetitive peak forward current 正向重复峰值电流	$t_p = 1ms$	$I_{FRM}$	800	A

### 5.2 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Forward voltage 正向电压	$I_F = 400A, V_{GE} = 0V$	$T_{vj} = 25^\circ C$		1.70		V
		$T_{vj} = 125^\circ C$		1.70		V
		$T_{vj} = 150^\circ C$		1.70		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	$I_F = 400A, V_R = 600V$ $V_{GE} = -15V, -di_F/dt = 770 A/\mu s$	$T_{vj} = 150^\circ C$ $I_{RM}$		260		A
Recovered charge 恢复电荷	$I_F = 400A, V_R = 600V$ $V_{GE} = -15V, -di_F/dt = 770 A/\mu s$	$T_{vj} = 150^\circ C$ $Q_r$		60.9		$\mu C$
Reverse recovery energy 反向恢复损耗 (每脉冲)	$I_F = 400A, V_R = 600V$ $V_{GE} = -15V, -di_F/dt = 770 A/\mu s$	$T_{vj} = 150^\circ C$ $E_{rec}$		21.6		mJ

## 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		$L_{SCE}$		30		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	$^\circ C$
Storage Temperature Range 存储温度范围		$T_{stg}$	-40		125	$^\circ C$
Mounting Torque 安装扭矩	Screw M5	M	3		6	N.m
Weight of Module 重量		G		350		g

### 7. Circuit Diagram

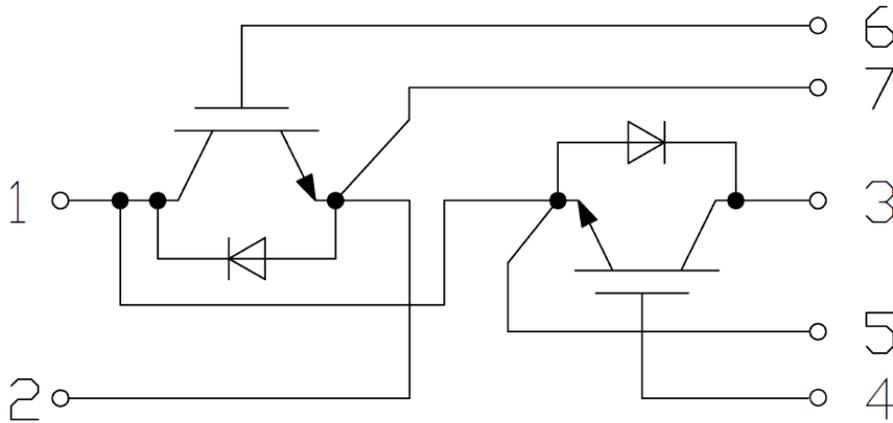


Figure 3

### 8. Package Outlines

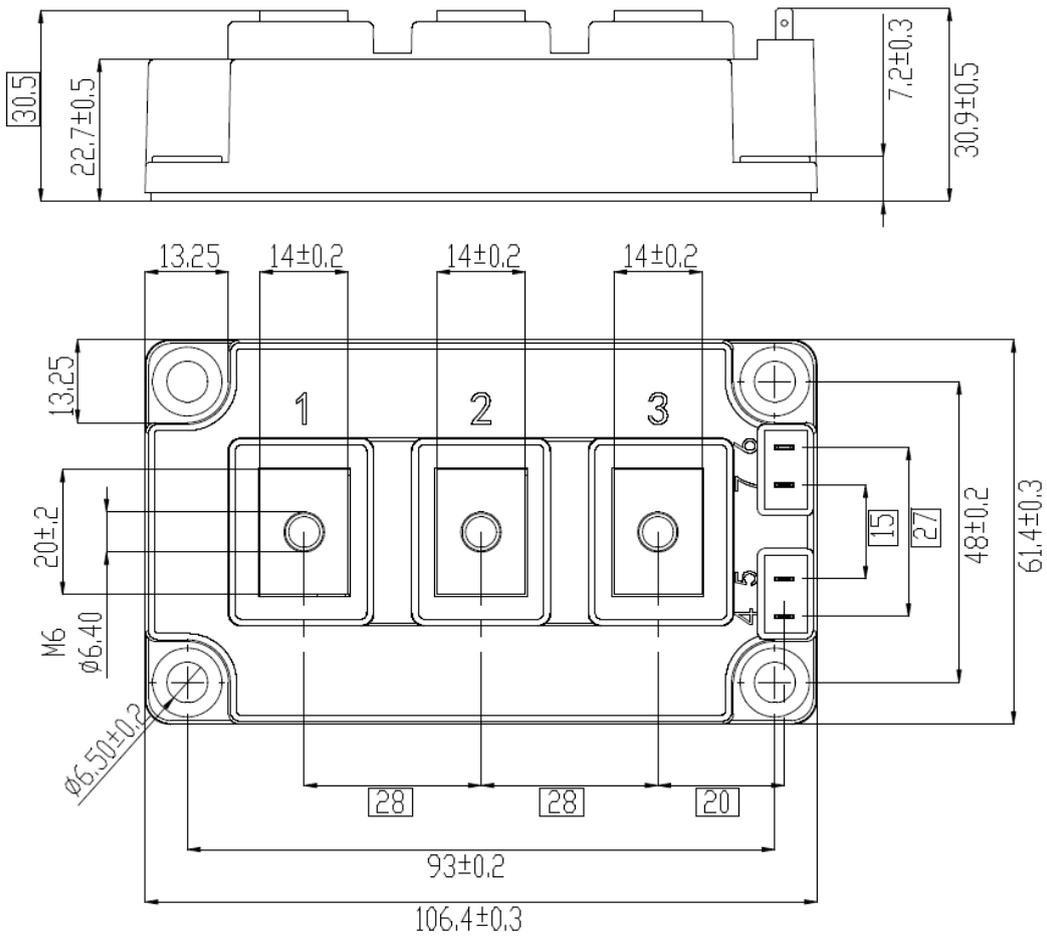


Figure 4