

# TLB600M07S1P

## ➤ 产品外观 / Appearance



$V_{CES} = 650 \text{ V}$

$I_{C \text{ nom}} = 600 \text{ A} / I_{CRM} = 1200 \text{ A}$

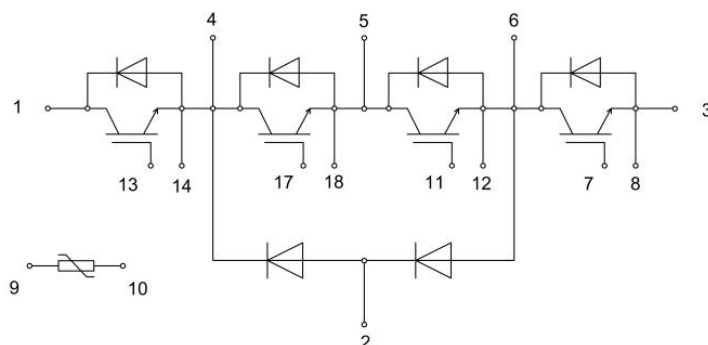
## ➤ 特性 / Features

- |                                   |          |
|-----------------------------------|----------|
| a. Ultrasonic Welding of Terminal | 功率端子超声焊接 |
| b. Copper Wire Bonding            | 铜线键合工艺   |
| c. Low Switching Loss             | 低开关损耗    |

## ➤ 用途 / Applications

- |                                 |       |
|---------------------------------|-------|
| a. Solar Energy                 | 太阳能   |
| b. Uninterruptible Power Supply | 不间断电源 |
| c. 3-Level Applications         | 三电平应用 |

## ➤ 电路拓扑 / Circuit Topology



# TLB600M07S1P



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## IGBT (T1, T2, T3, T4), 逆变器/ IGBT (T1, T2, T3, T4), Inverter

### 最大额定值/ Maximum Rated Values

集电极-发射极电压 Collector-Emitter voltage	$T_J = 25^\circ\text{C}$	$V_{CES}$	650	V
连续集电极直流电流 Continuous DC collector current	$T_C = 100^\circ\text{C}, T_J \text{ max} = 175^\circ\text{C}$	$I_{C \text{ nom}}$	600	A
集电极重复峰值电流 Repetitive peak collector current	$T_P = 1\text{ms}$	$I_{CRM}$	1200	A
栅极-发射极峰值电压 Gate-emitter peak voltage		$V_{GES}$	+/-20	V

### 电特性/ Electrical Characteristics ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
集电极-发射极饱和电压 Collector-Emitter Saturation Voltage	$V_{GE} = 15\text{ V}, I_C = 600\text{ A}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $V_{CE(sat)}$		1.51 1.69 1.75		V
栅极-发射极阈值电压 Gate-Emitter Threshold Voltage	$V_{GE} = V_{CE}, I_C = 6\text{ mA}$	$V_{GE(th)}$	5.0	5.7	6.0	V
总栅极电荷 Total Gate Charge	$V_{CC} = 300\text{ V}, V_{GE} = -15\text{ V} \cdots +15\text{ V}$	$Q_g$		3.64		$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_J = 25^\circ\text{C}$	$R_{Gint}$		0.67		$\Omega$
输入电容 Input Capacitance	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$C_{ies}$		42		pF
输出电容 Output Capacitance	$f = 1\text{ MHz}$	$C_{res}$		1.78		
集电极-发射极截止电流 Collector-Emitter Cut-off Current	$V_{GE} = 0\text{ V}, V_{CE} = 650\text{ V}$	$I_{CES}$			1.0	mA
栅极峰值电流 Gate Leakage Current	$V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$	$I_{GES}$			400	nA
开通延迟时间 Turn-on Delay Time	$V_{CE} = 300\text{ V}, I_C = 600\text{ A}, V_{GE} = \pm 15\text{ V}, R_G = 3.3\ \Omega, \text{ Inductive Load}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $t_{d(on)}$		103 104 112		ns
上升时间 Rise Time		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $t_r$		384 385 388		
关断延迟时间 Turn-off Delay Time		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $t_{d(off)}$		925 953 965		
下降时间 Fall Time		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $t_f$		200 203 214		
开通损耗能量 Turn-on Switching Loss per Pulse	Turn-off( $T_J = 150^\circ\text{C}$ ): $dv/dt = 2000\text{ V}/\mu\text{s}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $E_{on}$		14.0 15.6 16.7		mJ
关断损耗能量 Turn off Switching Loss per Pulse		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$ $E_{off}$		57.0 60.2 64.3		
短路数据/SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $t_p \leq 10\mu\text{s}, T_J = 150^\circ\text{C}$	$I_{sc}$		2400		A
芯片 - 外壳热阻 Thermal Resistance - chip-to-case	每个 IGBT / per IGBT	$R_{thJC}$			0.07	$^\circ\text{C}/\text{W}$
开关状态下温度 Temperature under switching		$T_{j \text{ op}}$	-40		150	$^\circ\text{C}$

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## 二极管 (D1, D2, D3, D4), 逆变器/ Diode (D1, D2, D3, D4), Inverter

### 最大额定值/Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_j = 25^\circ\text{C}$	$V_{RRM}$	650	V
连续正向直流电流 Continuous DC forward current		$I_F$	600	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	1200	A

### 电特性/ Electrical Characteristics ( $T_j = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
二极管正向电压 Diode Forward Voltage	$I_F = 600\text{ A}, V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $V_F$		1.63 1.50 1.46		V
反向恢复电荷 Reverse Recovery Charge	$V_R = 300\text{ V},$ $I_F = 600\text{ A},$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $I_{RM}$		94 159 193		A
反向恢复峰值电流 Peak Reverse Recovery Current	$V_{GE} = -15\text{ V},$ $R_G = 3.3\ \Omega,$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $Q_r$		9.86 26.2 35.1		$\mu\text{C}$
反向恢复能量 Reverse Recovery Energy	$-di_F/dt = 1800\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $E_{rec}$		2.49 6.11 8.36		mJ
芯片 - 外壳热阻 Thermal Resistance - chip-to-case	每个二极管 / per diode	$R_{thJC}$			0.13	$^\circ\text{C}/\text{W}$
在开关状态下温度 Temperature under switching		$T_{j\text{op}}$	-40		150	$^\circ\text{C}$

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## 二极管 (D5, D6), 钳位/ Diode (D5, D6), Clamp

### 最大额定值/Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_j = 25^\circ\text{C}$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	600	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	1200	A

### 电特性/ Electrical Characteristics ( $T_j = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
二极管正向电压 Diode Forward Voltage	$I_F = 600\text{ A}, V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $V_F$		1.76 1.87 1.88	2.33	V
反向恢复电荷 Reverse Recovery Charge	$V_R = 600\text{ V},$ $I_F = 600\text{ A},$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $I_{RM}$		293 357 359		A
反向恢复峰值电流 Peak Reverse Recovery Current	$V_{GE} = -15\text{ V},$ $R_G = 3.3\ \Omega,$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $Q_r$		42.1 77.5 85.7		$\mu\text{C}$
反向恢复能量 Reverse Recovery Energy	$-di_F/dt = 1600\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ $E_{rec}$		17.7 31.9 34.6		mJ
芯片 - 外壳热阻 Thermal Resistance - chip-to-case	每个二极管 / per diode	$R_{thJC}$			0.20	$^\circ\text{C}/\text{W}$
在开关状态下温度 Temperature under switching		$T_{j\text{op}}$	-40		150	$^\circ\text{C}$

## 负温度系数热敏电阻/ NTC-Thermistor

### 特征值 / Characteristic Values

Parameter		Symbol	Min	Typ	Max	Unit
额定阻值 Rated resistance	$T_C = 25^\circ\text{C}$	$R_{25}$		5.00		$\text{k}\ \Omega$
阻值误差 Deviation of $R_{100}$	$T_C = 100^\circ\text{C}, R_{100} = 465\ \Omega$	$\Delta R/R$	-5		5	%
功率损耗 Power dissipation	$T_C = 25^\circ\text{C}$	$P_{25}$			10.0	mW
B 值/ B - value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$	$B_{25/50}$		3375		K
B 值/ B - value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298.15\text{K}))]$	$B_{25/80}$		3425		K
B 值/ B - value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15\text{K}))]$	$B_{25/100}$		3443		K

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## 模块 / Module

### 绝缘配置 / Insulation Coordination

Parameter	Test Conditions	Symbol	Typ.	Unit
隔离试验电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min	$V_{ISOL}$	4.0	kV
模块基板材料 Material of module baseplate			Cu	
内部隔离 Internal Isolation	基本绝缘 (class 1, IEC61140) Basic insulation (class 1, IEC61140)		$Al_2O_3$	
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal	dCreep	29.0 23.0	mm
间距 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal	dClear	23.0 11.0	mm
相对漏电起痕指数 Comparative tracking index		CTI	> 400	

### 特征值 / Characteristic Values

Parameter		Symbol	Min	Typ	Max	Unit
杂散电感, 模块 Stray inductance module		$L_{sCE}$		20		nH
模块引线电阻 Module lead resistance	$T_c = 25^\circ C$ , 每个开关 / per switch	$R_{CC', +EE'}$		0.69		m $\Omega$
储存温度 Storage temperature		$T_{stg}$	-40		125	$^\circ C$
模块安装的安装扭矩 Mounting torque for module	螺丝 M5 / Screw M5	M	3.0		6.0	Nm
端子联接扭矩 Terminal connection torque	螺丝 M6 / Screw M6	M	2.5		5.0	Nm
重量 Weight		G		315		g

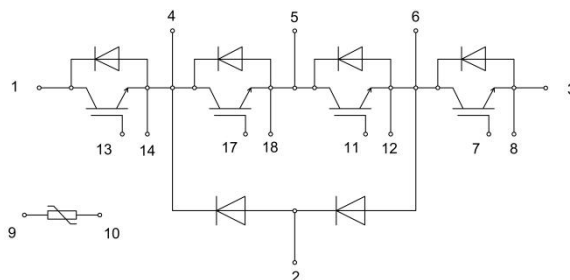
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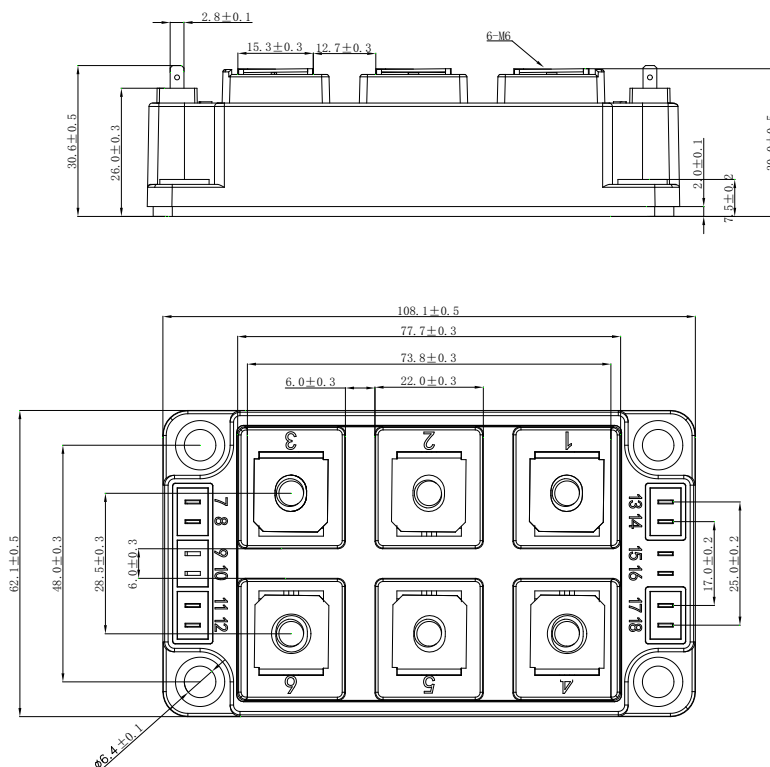
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## 封装/Package

### 电路拓扑/Circuit Topology



### 封装尺寸 / Package outlines



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公司地址：合肥市高新区创新大道与明珠大道交叉口 106 号 5 号楼 2 层 C 区、D 区。

Address: Area C and D, 2nd floor, Building 5, No. 106, Intersection of Innovation Avenue and Mingzhu Avenue, High-tech Zone, Hefei City.

Website: [合肥中恒微半导体有限公司\(zhmsemi.cn\)](http://zhmsemi.cn)