

Zhejiang Sine Power Technology. CO., Ltd.
浙江赛英电力科技有限公司





Outline

- **SINE Company Introduction**
- **SINE Busbar Applications**
- **Major Cooperative Customers**
- **Reference Projects**
- **Design Capabilities**
- **Testing Capabilities**
- **Production Capabilities**
- **Quality Management**
- **Appendix (Group Introduction)**

Company Introduction



Zhejiang Sine Power Technology Co., Ltd. is a core subsidiary of Sun.King Technology Group Limited (listed on the main board of Hong Kong in 2010, with stock code 0580.HK).























- Founded in 2011, with registered capital 30 million CNY;
- Located in Zhejiang Jiashan Economic Development Zone, the center of the Yangtze River Delta Economic Zone, covering an area of 8,000 square meters and having a total of 110 employees.
- Specializing in technology development and production services of laminated busbar products.

Applications



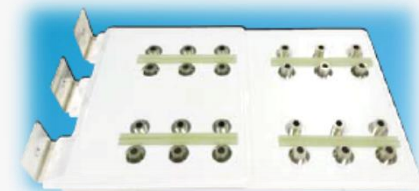
① Wind power	② EV	④ Communication
③ Rail transportation		
⑤ PV Power	⑥ Power Grid	⑦ Industrial Frequency Converter

Major Cooperative Customers

Segment	Rail transportation	Wind power	PV Power	Power Grid	EV	Communication	Industrial Frequency Converter
Customers	   <p>北京纵横机电科技有限公司 BEIJING ZONGHENG ELECTRO-MECHANICAL TECHNOLOGY CO.,LTD.</p> 	  <p>Smarter. Greener. Together.</p>  	  <p>特变电工西安电气科技有限公司</p>	 <p>许继集团有限公司 XJ GROUP CORPORATION</p> 	  <p>新能源汽车 引领者</p>  	  	  

References

◆ Rail Transportation Busbar Products



Category	Customer	Ref. Projects
High-speed train	CRRC YONGJI	Standardized EMU with a speed of 350 km/h
		250km standard EMU
		160km centralized power EMU
Electric Locomotive	CRRC YONGJI	9600KW electric locomotive
		7200KW electric locomotive
Diesel Locomotive	CRRC YONGJI	South Africa D45
Urban Rail	Nanjing Rail Transit	NanJing Metro Line 1 and 2, BeiJing Metro Line 13
	South Korea DAKYEONG	Seoul Metro Line 1 and 6, Busan Metro Line 2, Bundang Line
	CRRC SRI	Chongqing Metro Line 10
		Beijing Metro Yanfang Line
	CRRC DALIAN	Chengdu IT Avenue
		Dalian Jinpu Line

References

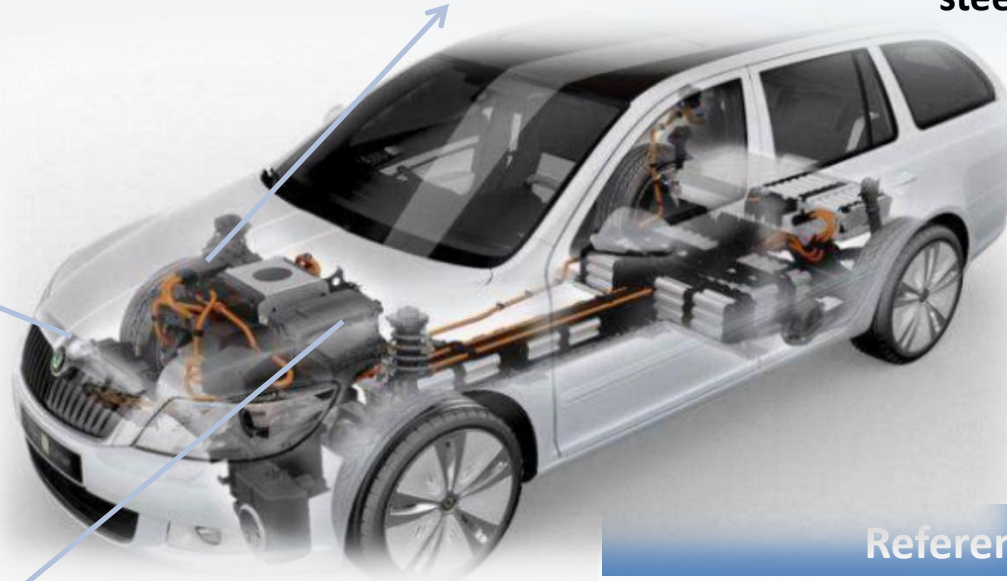
◆ New Energy Busbar Products



Steering controller bus:
 Provides steering assistance and smooth steering.



Motor bus: increase the torque, reduce the loss, and achieve a smooth output.



Controller bus: integrated design, effectively improve controller stability



Reference Project	
HEV	BYD - Qin / Song / Tang
EV	BYD - E6 / Yuan / Denza / K9 Electric Bus
High voltage electric control	Capacitor copper busbar for DCDC converter
	IGBT busbar for DCDC converter

References

◆ Wind Power Busbar Products



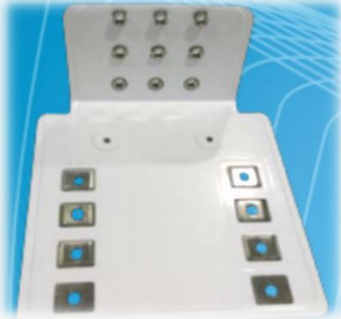
Reference Project

**Wind Power
Frequency
Converter**

2.0MW / 2.8MW on-shore wind power converter; 4.5MW / 6MW off-shore wind power converter

References

◆ PV Busbar Products



Reference Project

PV inverter

Inverter - 500KW / 1250KW / 3125KW

◆ VSC-HVDC Busbar Products



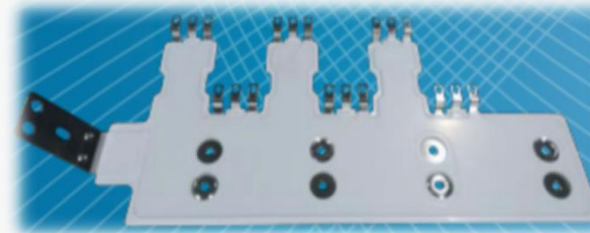
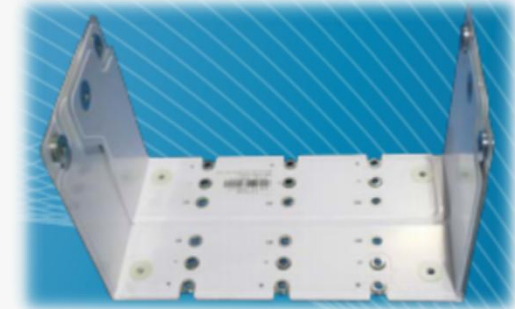
Reference Project

VSC-HVDC

- ± 200KV XiaMen Project
- ± 320KV Yu'E Project
- ± 500KV ZhangBei Project
- ± 200KV ZhouShan Project
- ± 800KV WuDongDe Project

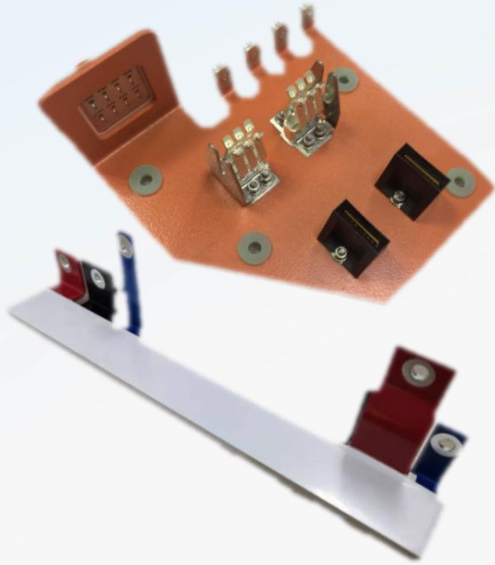
References

◆ Industrial Power Supply Busbar Products



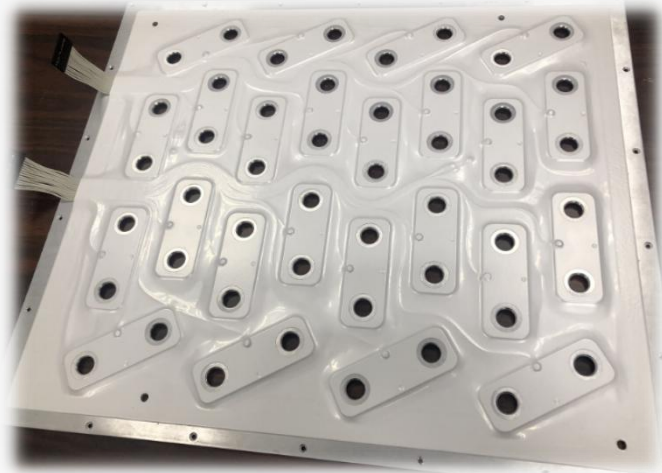
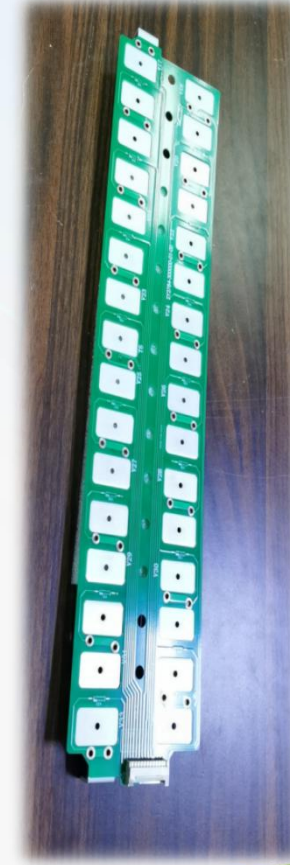
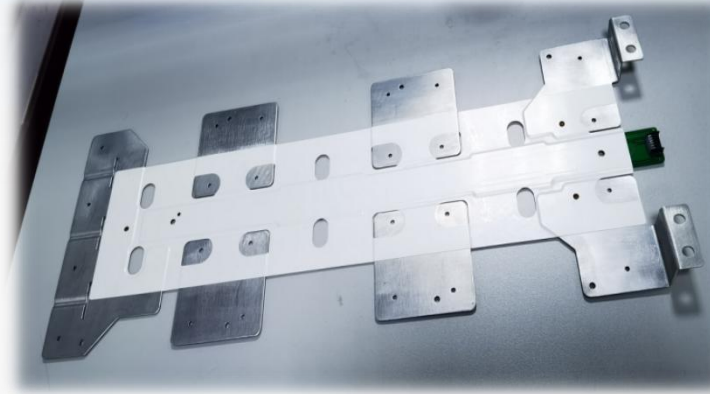
Category	Reference voltage level
Industrial frequency converter	3300V
	1140V
	690V

◆ Communication Server Busbar Products



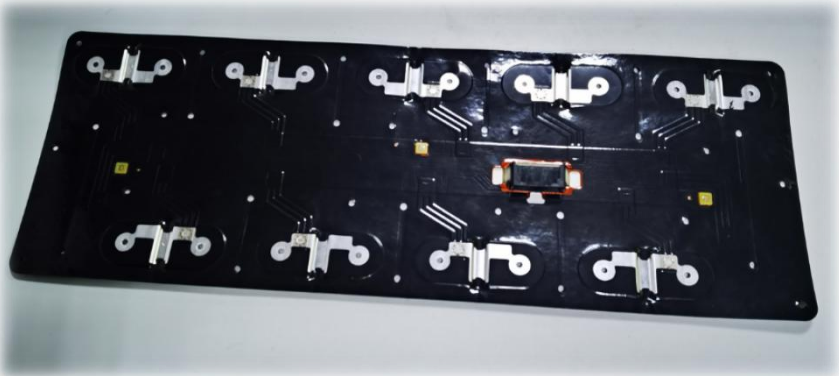
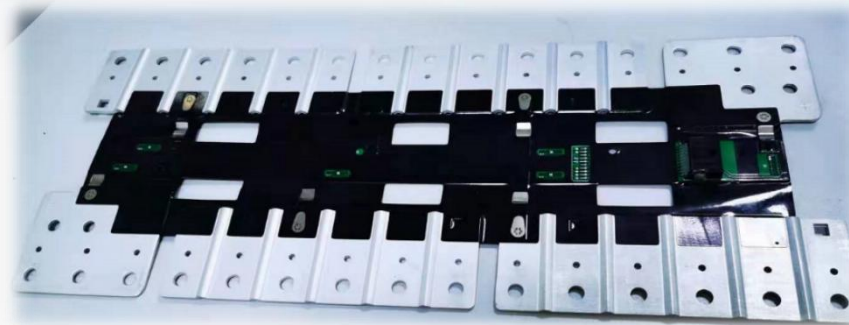
Category	References
Communication server	IT server
	Server backplate
	5G server power supply
	Server battery pack

◆ Energy Storage Busbar Products



Application	Product
Household energy storage	Battery pack integrated cover busbar 电池组集成盖板母排
Wind power energy storage	
Super charge energy storage	Capacitor group integrated busbar 电容组集成母排

◆ Power Battery Busbar Products

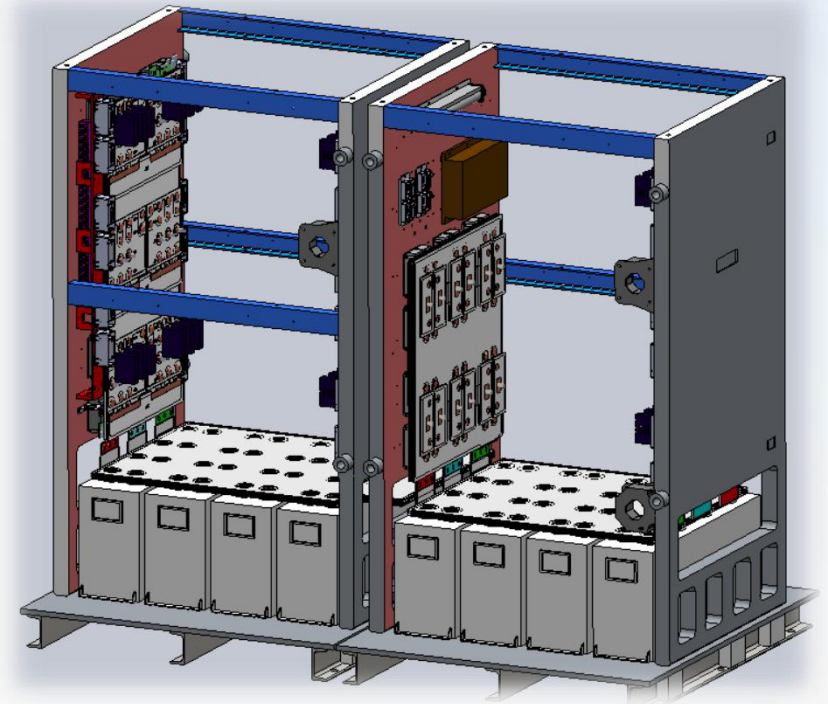


Application	Product
Motor power battery	Battery pack integrated cover busbar 电池组集成盖板母排
	Battery pack side plate 电池组侧板

Design Capabilities

SINE has a professional team for power electronics, materials, mechanical mold design. Following services are provided:

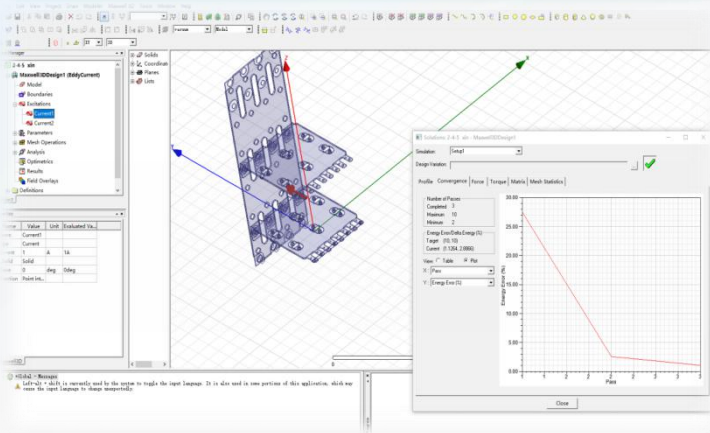
- Customizing and engineering busbars
- Electrical and structure design service
- Simulation service for developing project
- Product reliability test



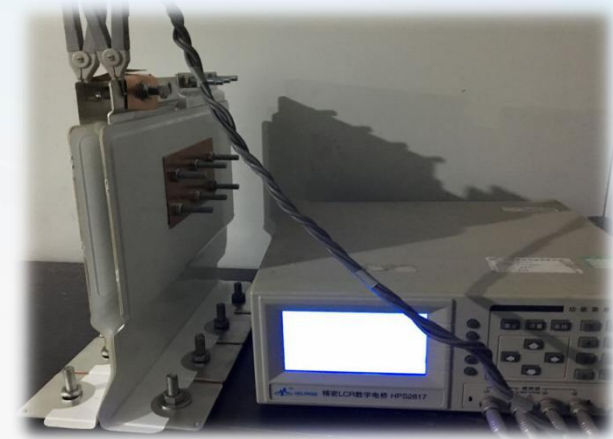
Design Capabilities

◆ Electrical Parameters - Simulation and Test

Inductance simulation

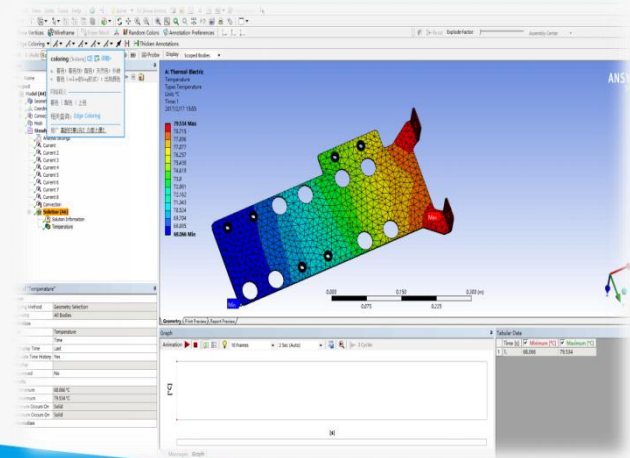


Inductance measurement:
LCR digital bridge



Temperature rise simulation

Temperature rise test: low voltage high current equipment, thermal imager



Design Capabilities

◆ Electrical parameters - creepage distances and clearances

Standard: GB/T 21413.1/IEC60077-1

Creepage mainly considers CTI index of insulative materials.

表 6b 额定绝缘电压 1 000 V 以上的爬电距离

材料分组 ^a	相应污染等级的爬电距离/(mm/kV)			
	PD1	PD2	PD3	PD4 ^b
I	3.2	5.0	12.5	20.0
II	3.2	7.1	14.0	25.0

^a 不推荐使用材料分组 III。
^b 实际经验表明,某些直流电网要求更高值至 45 mm/kV。

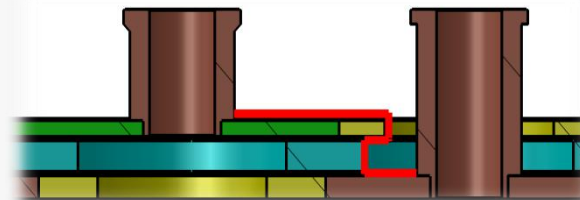
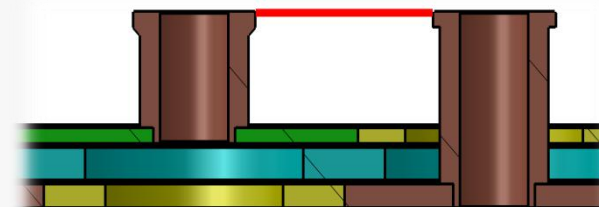


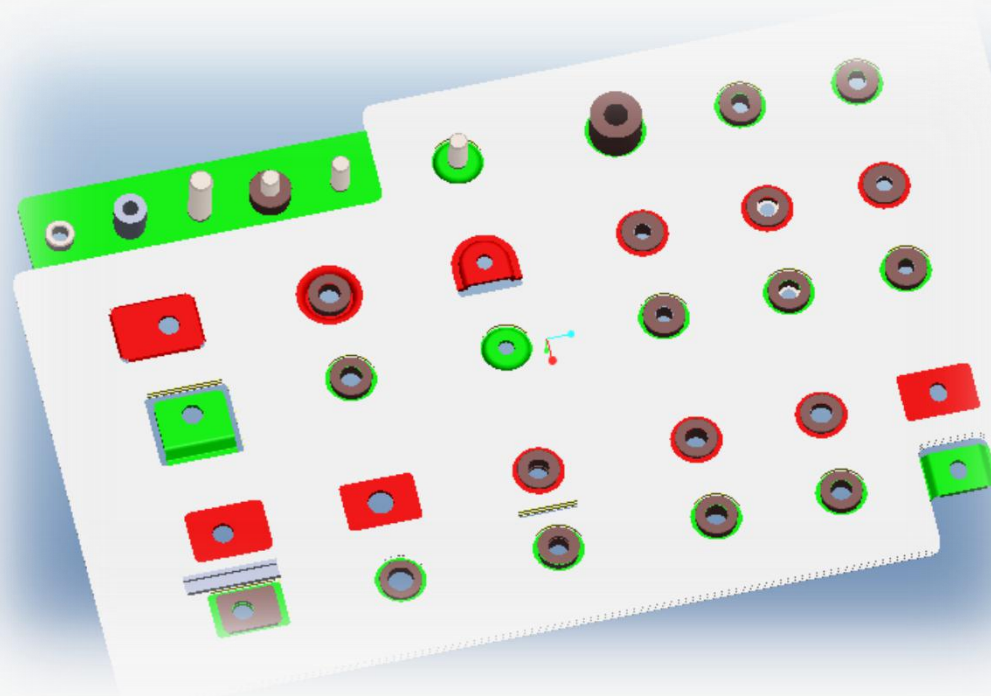
表 5 最小电气间隙

额定冲击电压 U_{imp} /kV	最小电气间隙/mm			
	PD1	PD2	PD3	PD4
0.33	0.01	0.2	0.8	5.5
0.5	0.04			
0.8	0.1			
1.5	0.5			
2.5	1.5			
3	2			
3.5	2.5		6.2	
4	3		7	
4.5	3.5		8	
5	4		8.5	
6	5.5		10	



◆ Mechanical Connection Design

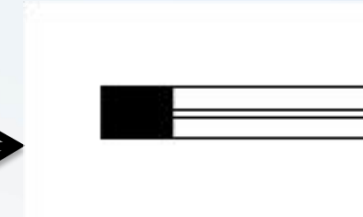
There are several connection styles in SINE which can meet a variety of installation requirements with short delivery time and low cost.



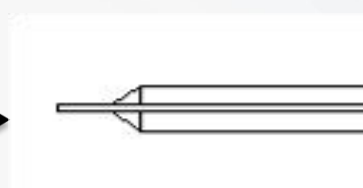
Design Capabilities

◆ Different Edge Sealing Process

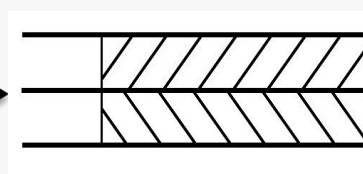
Potting



Insulating block filling



Edge sealing with insulating film

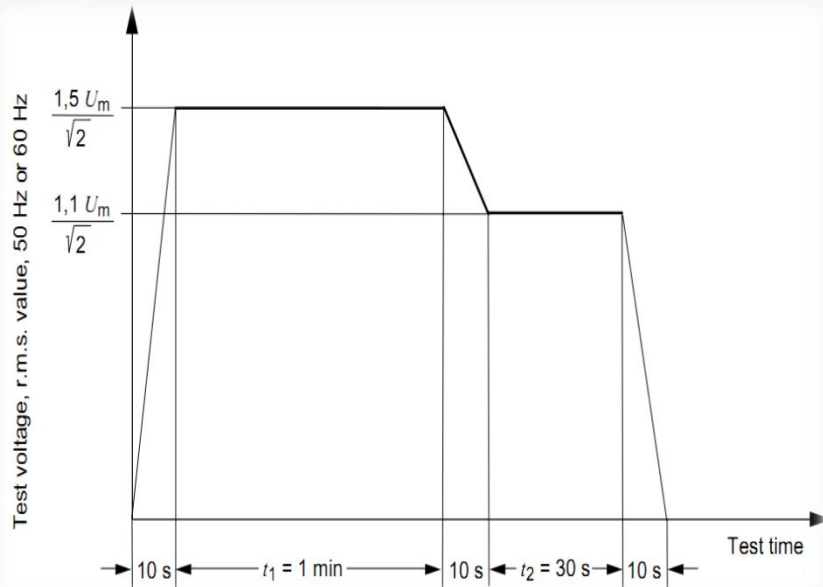


Insulating film open



◆ Regular test - partial discharge test

- Test standard: GB/T 25122.1
- Test method: U_m is the repeated peak overvoltage. Raise the voltage to $1.5U_m/\sqrt{2}$ within 10 seconds and hold it for 1 minute, and then drop to $1.1U_m/\sqrt{2}$ within 10 seconds. After waiting for 25 seconds, observe the average value of partial discharge in the following 5 seconds. Requirement $\leq 10pc$



Patial discharge voltage range: 0-20kV/ac

◆ Regular test - dielectric strength test

- Test standard: GB/T 21413.1/IEC60077-1
- Test method: 1 min dielectric strength applied for each polar plate of busbars

Tester range: 0-20KV/ac

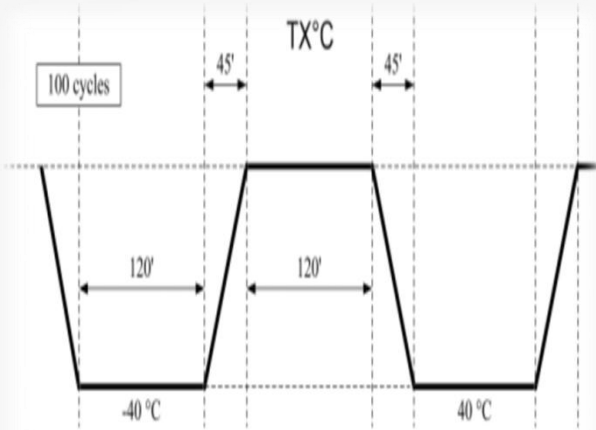
表 8 对单台设备进行的介电试验

项 目	对应于额定绝缘电压 U_i 的额定工频耐受电压 U_{50}/V					
	≤ 36	$>36\sim 60$	$>60\sim 300$	$>300\sim 660$	$>660\sim 1\ 200$	$>1\ 200\sim 10\ 000$
对单个电器,介电试验应加在额定电压的电路与其他电路及与地之间	750	1 000	1 500	2 500	$2U_i+1\ 500$	$2U_i+2\ 000$



◆ Internal reliability test - temperature resistance test

- GB/T 2423.4/ IEC 6008-2-30
- GB/T 2423.22/ IEC 6008-2-14
- GB/T 2423.1-2008
- GB/T 2423.2-2008



Temperature cycling test diagram



Temperature and humidity chamber

◆ Internal reliability test - corrosion resistance test

- GB/T 2423.17/IEC60068-2-11
- GB/T 10125



Spray tester



Layer thickness meter

◆ Reliability test (third party) - impact vibration test

○ Standard: IEC61373

类别	方位	均方根值 5小时试验周期 m/s ²	频率范围 (见图)
1 A级 车身装	垂直	4.25	图 2
	横向	2.09	
	纵向	2.83	
1 B级 车身装	垂直	5.72	图 3
	横向	2.55	
	纵向	3.96	
2 转向架装	垂直	30.6	图 4
	横向	26.6	
	纵向	14.2	
3 轴装	垂直	144	图 5
	横向	129	
	纵向	64.3	

Vibration

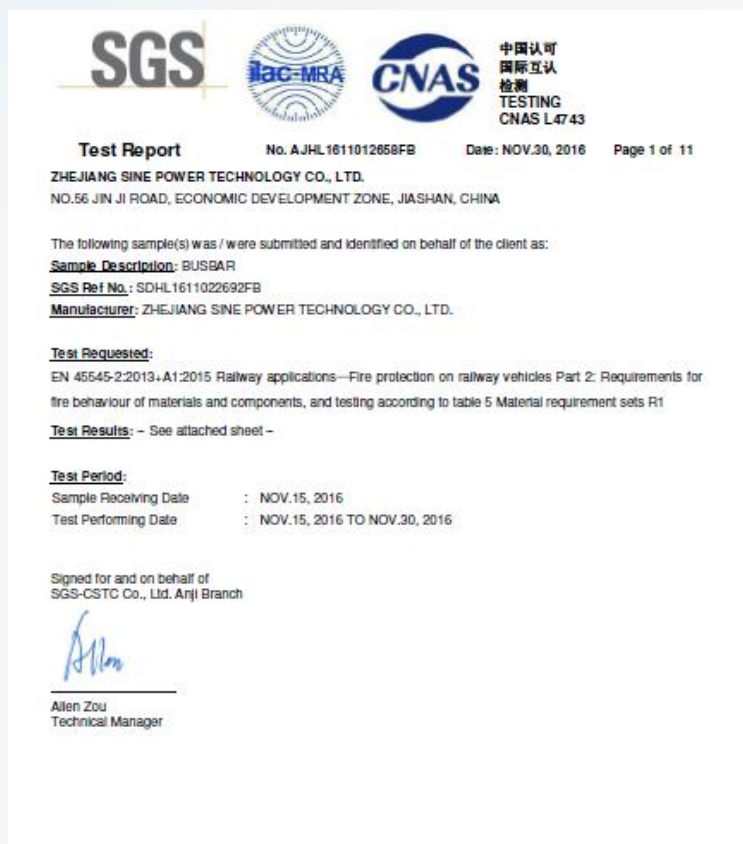
表 3-试验严酷等级、脉冲波形和方向

类别	取向	峰值加速度 A m/s ²	正规取向 D ms
1 A级和B级 车身装	垂直	30	30
	横向	30	30
	纵向	50	30
2 转向架装	全部	300	18
3 轴装	全部	1000	6

Impact

◆ Reliability test (third party) - flammability and smoke

- EN45545-2: 2013
- UL-94 V0



EN 45545-2:2013+A1:2015 铁路应用- 铁路车辆防火保护-第2部分: 材料和部件的燃烧性能要求, 测试方法根据表 5, 材料综合要求 R1 进行。

- 1) T02 ISO 5658-2:2006+A1:2011 建筑材料侧向火传播
- 2) T03.01 ISO 5660-1:2015 对火反应 — 热释放, 产烟量和质量损失速率-第1部分: 热释放速率(锥形量热仪法), 辐射热流 50 kW/m²
- 3) T10.01-02 EN ISO 5659-2:2012 塑料- 烟生成-第2部分: 单室法测定烟密度试验方法, 辐射热流 50 kW/m² + 无焰燃烧, 测试时间: 10min
- 4) T11.01 EN 45545-2:2013+A1:2015 附录 C 采用 FTIR 技术对 EN ISO 5659-2 烟箱法产烟进行烟气分析, 辐射热流 50 kW/m² + 无焰燃烧, 测试时间: 10min

Raw Material



T2 Copper plate



GPO-3 plate



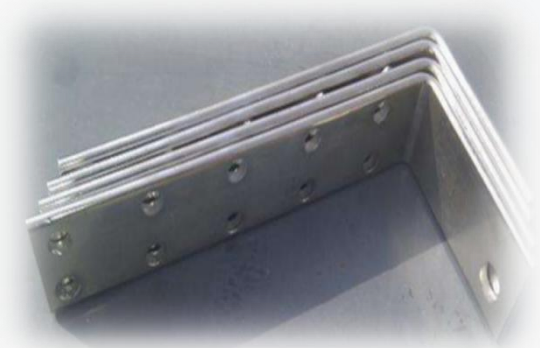
**PET 105°C/125 °C
PEN 150°C**



FR-4 plate



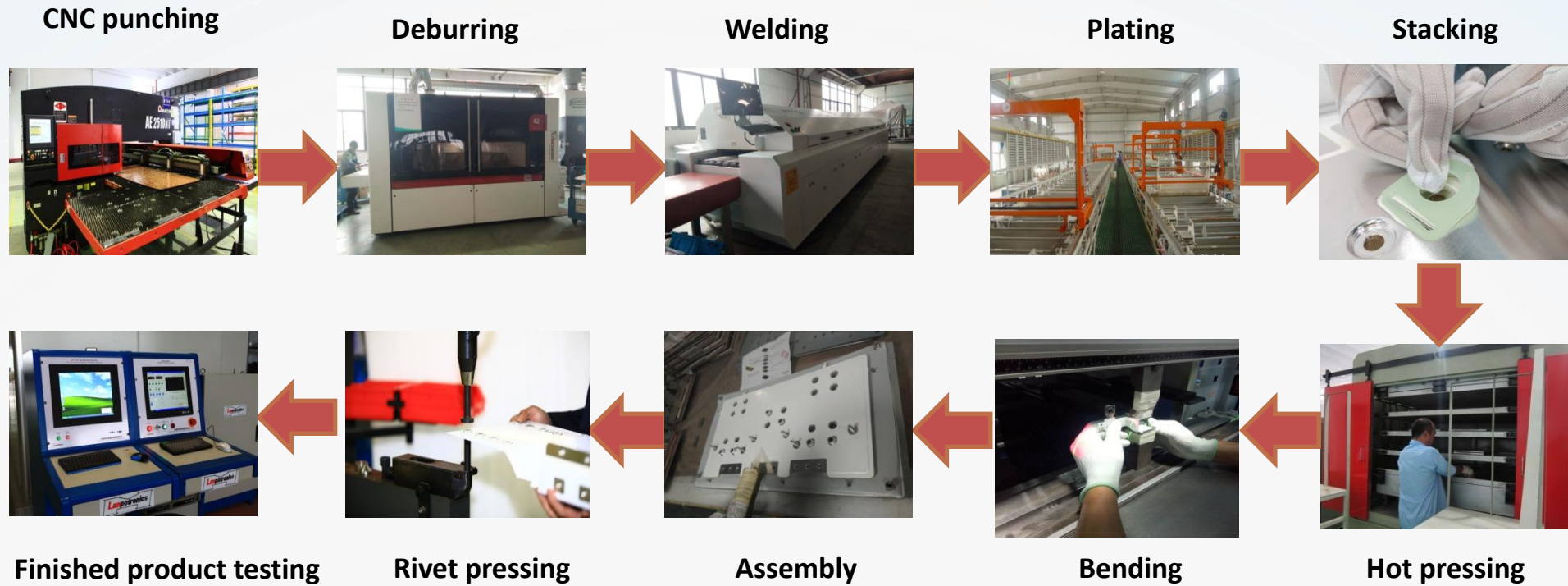
Riveted piece



**Surface treatment:
tin, nickel, silver**

Production Capabilities

◆ Common production process



Production Capabilities

◆ Production equipment



SINE has dozens of processing equipment such as CNC punching, CNC lathe, riveting machine, CNC bending and milling machine, which can meet various specifications for the manufacture of laminated busbar products.

Production Capabilities



A wide range of welding capabilities: polymer diffusion welding, brazing, and soft soldering, which is suitable for different customer needs, taking into account trial production, small batch and mass production.

Production Capabilities



One of the guarantees of excellent insulation performance of **SINE** laminated busbars - advanced deburring process equipment.

Production Capabilities

◆ Production equipment



Press	Plate Dim. L×W (mm)	Ton
1\2	750*600	200T
3	1500*800	300T
4\5	1000*1600	350T
6	1500*800	350T
7	1150*750	300T
8	700*500	50T
9	2000*600	240T

SINE boasts the most large-scale hot pressing equipment for laminated busbar in China, with 11 sets of various types of hot presses, a total of 48 hot pressing openings, and an annual production capacity of more than 300,000 pieces laminated busbars.

Quality Management

- In 2014, it passed the ISO9001: 2008 quality management system certification, and completed the ISO9001: 2016 version change in 2021;
- In 2015, it passed the ISO14001: 2004 environmental management system certification, and completed the ISO14001: 2015 version change in 2021;
- In 2015, it passed the ISO/TS16949: 2009 quality management system certification, and completed the IATF16949: 2016 version change in 2018



Appendix 1

◆ Distribution of Group Subsidiaries



① Beijing

Headquarter

② Jiashan, Zhejiang

Jiashan SunKing Power Equipment Technology Co.,Ltd.

Sun.King Pacific Semiconductor Technology (Zhejiang) Co., Ltd.

Zhejiang Jiashan Keneng Power Equipment Co., Ltd

Zhejiang Sine Power Technology Co., Ltd

③ Wuxi, Jiangsu

Wuxi Sun.King Power Capacitor Co., Ltd

Wuxi Astrol Power Electronics Limited

④ Wuhan, Hubei

Wuhan Langde Electrics Co., Ltd

Appendix 2

◆ Group Products

Sun.King focuses on the research and development of high-end power electronic components and power electronic systems, and establishes the long-term core competitiveness through continuous development of various new technologies and new products.

Power Electronic Components



Sunking IGBT



DC-link support capacitor



Laminated busbar



Power capacitor



Digital gate units



ABB full control devices



ABB half control devices



Power equipment online monitoring system



Anode saturation reactor



Power quality control device



Solid DC breaker



Solid AC switch



Impedance measurement device



Pulse power

Power Electronic Systems



SUN.KING TECHNOLOGY GROUP LIMITED

賽晶科技集團有限公司

Zhejiang Sine Power Technology Co., Ltd



www.sunking-tech.com

T: (86) 010-56301128

E: liuyang@sunking-tech.com

E: annn@sunking-tech.com