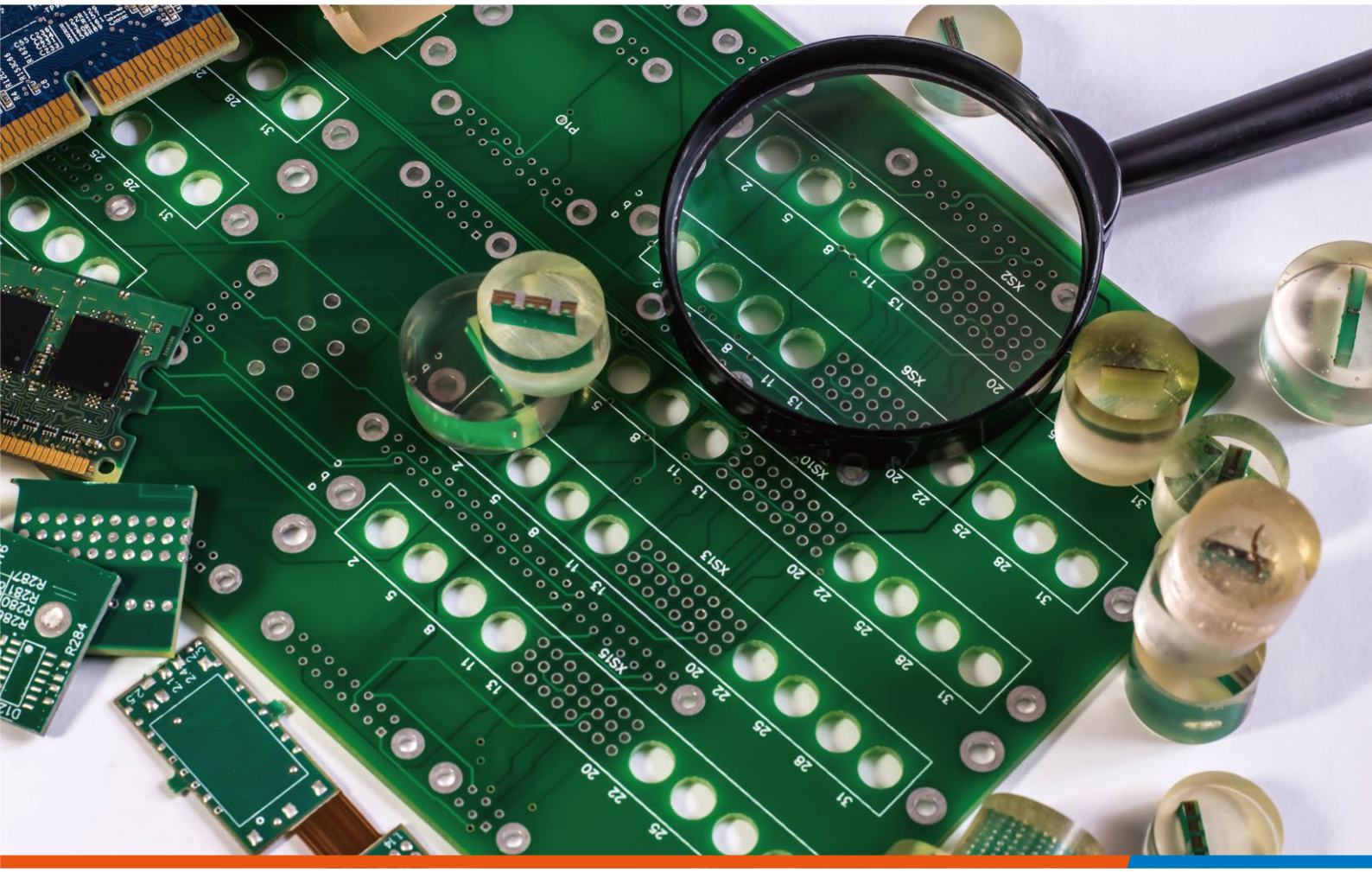
微谱
WEIPU



微谱PCB领域技术服务

WEIPU TECHNICAL SERVICES IN THE PCB INDUSTRY

服务，不止于检测！

SERVICE, MORE THAN TESTING!

ABOUT US

大型研究型检测机构

微谱，大型研究型检测机构，始于2008年，总部位于上海，是科技服务改变世界的践行者。

微谱聚焦先进制造、生物医药、美丽健康、生态环保、食品农产品五大领域，向社会提供分析测试、检测评价、研发服务、计量校准、认证审核、知识产权六大服务，全方位的技术解决方案助力客户取得更大成功。

微谱现已在全国30多个城市设立分子公司以及50多个专业实验室，拥有3000余名专业人员。微谱是中国合格评定国家认可委员会(CNAS)认可的、市场监督管理局资质认定(CMA)的、国家认证认可监督管理委员会批准的大型第三方检测认证机构，也是国家药品监督管理局批准的化妆品注册和备案检验检测机构，具有海关总署颁发的进出口商品检验鉴定机构资格，也拥有农产品CATL(农产品质量安全检测)资质，实验动物使用许可证，病原微生物BSL-2实验室，ISO9001质量管理体系认证等。同时微谱也是国家工业和信息化部认定的国家产业技术基础公共服务平台、国家服务型制造示范平台、国家中小企业公共服务示范平台、国家专精特新小巨人企业。基于十七年的专业技术积累和遍布全国的服务网络，微谱每年出具超过27万份技术报告，累计服务客户30万余家，其中包括世界五百强客户百余家。

微谱始终秉承“**服务，不止于检测！**”的理念，尽心尽力让科技进步更快，让产品质量更好，让人类生活更安全、更健康、更绿色！

WEIPU, a large-scale research-oriented testing institution, was founded in 2008 and is headquartered in Shanghai,He is a practitioner of technology services that change the world.

WEIPU focuses on five fields: advanced manufacturing, biomedicine, beauty and health, ecological environmental protection, and food and agricultural products. It provides six services to the society: analysis and testing, detection and evaluation, research and development services, metrology and calibration, certification and audit, and intellectual property. The all-round technical solutions help customers achieve greater success.

At present, WEIPU has established subsidiaries and more than 50 professional laboratories in more than 30 cities across the country, with more than 3,000 professionals. WEIPU is a comprehensive third-party inspection and testing institution accredited by the China National Accreditation Service for Conformity Assessment (CNAS) and qualified by the Market Supervision and Administration Bureau for certification (CMA)and approved by the Certification and Accreditation Administration of the People's Republic of China. It is also a cosmetics registration and filing inspection and testing institution approved by the National Medical Products Administration. It has the qualification of an import and export commodity inspection and appraisal institution issued by the General Administration of Customs, as well as the CATL (agricultural product quality and safety testing) qualification, laboratory animal use permit, pathogen BSL-2 laboratory, ISO9001 quality management system certification, etc. At the same time, WEIPU is also a national industrial technology basic public service platform, a national service-oriented manufacturing demonstration platform, a national demonstration platform for public services for small and medium-sized enterprises, and a national specialized, refined, peculiar, and new little giant enterprise recognized by the Ministry of Industry and Information Technology. Based on sixteen years of professional technical accumulation and a service network all over the country, WEIPU issues more than 270,000 technical reports every year and has served more than 250,000 customers in total, including more than one hundred Fortune 500 customers.

Weipu has always adhered to the principle of "service, more than testing!" We will do our best to make scientific and technological progress faster, make product quality better, and make human life safer, healthier and greener!

科技服务 改变世界

Technology Services Change the World

- 让科技进步更快
  Faster Development of Technology
- 让产品质量更好
  Better Quality of Products
- 让人类生活更安全 更健康 更绿色
  Safer ,Healthier and Greener Life of Human Beings

50+ 遍布全国实验室

50+ Laboratories across the country

27万+ 每年出具报告

270000+ Reports issued each year

10万+ 资质认可检测项目

100000+ Qualification accreditation testing projects

400万+ 数据库

4 million+ Databases

3000+人 专业技术服务团队

3000+ Professional service teams

30万+ 服务海内外客户

250000+ Customers at home and abroad

1000+ 硕博学历人员

1000+ Personnel with master's/doctor's degrees

105 授权发明专利

102 Licensed patents for invention

DEVELOPMENT HISTORY

发展历程

2024

战略**并购飞尔**，**深耕有色金属检测领域**；
新增基地**14个**，面积超**2万平米**，涉及领域含**食品、生物科技、医疗器械（EMC）、整车测试、环境**等。

Strategic acquisition of FAIR to deepen presence in the non-ferrous metal testing sector;
adding 14 new bases with an area exceeding 20,000 square meters, covering sectors including food, biotechnology, medical devices (EMC), whole vehicle testing, environmental, and more.

2023

微谱被认定为
第五批国家产业技术基础公共服务平台。

WEIPU has been identified as
The fifth batch of national industrial technology basic public service platforms.

2022

凝心聚力、破浪前行，
微谱销售额破10亿大关。

Gathered the minds and broke the waves;
WEIPU's sales have surpassed the 1 billion RMB mark.

2021

进入**动物实验研究领域**；
进入**新能源车热管理、半导体等相关领域**。

Entered the animal experimentation research field;
Entered the fields of thermal management of new energy vehicles, semiconductors, etc.

2020

进入**食品农产品**检测及审核领域；
进入**生物安全检测领域**。

Entered the food and agricultural products testing and audit field;
Entered the biosafety testing field.

2018

进入**药物研发、测试及临床研究领域**；
布局**生物分析研究服务**；
微谱**苏州环境检测基地**开业。

Entered the drug R&D, testing and clinical research field;
Planned for bioanalytical research services;
Opened WEIPU (Suzhou) Environment Detection Base.

2015

微谱总部新办公楼落成入住
微谱销售额突破1亿元。

Completed and put into operation the new office building of WEIPU Headquarters;
WEIPU's business scale exceeded 100 million yuan.

2014

进入**生物医药分析检测及研究领域**；
进入**化妆品和消毒产品检测领域**。

Entered the biomedicine field;
Entered the cosmetics and sterilization products testing field.

2012

成立**广州分公司**，
布局华南业务市场。

Founded WEIPU Guangzhou Company,
planning for market expansion in South China.

2008

上海微谱分析测试中心在同济大学科技园内成立，
主营**分析测试**，技术开发等业务；
并在**业内首次提出“微谱分析”的概念**。

Shanghai WEIPU Analysis and Testing Center was founded in the National Science and Technology Park of Tongji University. It is specialized in businesses including analysis, testing and technology development, and proposed the concept of "microspectral analysis" for the first time in the industry.

PROFESSIONAL COMPETENCE WITH EXTENSIVE RECOGNITION

专业能力 屡获认可

资质认可 | Qualification accreditation

- CMA检验检测机构资质认定证书
  CMA Certificate of Accreditation for Inspection and Testing Organizations
- CNAS实验室认可证书
  CNAS Certificate for Laboratories
- 国家药品监督管理局批准的化妆品注册和备案检验机构
  Makeup registration and filing inspection agency
- 海关总署颁发的进出口商品检验鉴定机构资格证书
  Qualification certificate of inspection and appraisal institution
- 农产品质量安全检测机构考核合格证书(CATL)
  Certificate of the China Agri-product Testing Laboratory (CATL)
- 实验动物使用许可证
  Permit for the Use of Experimental Animals
- 病原微生物实验室备案凭证(BSL-2)
  Recordation Document of Pathogenic Microorganism Laboratories (BSL-2)
- ISO9001质量管理体系认证证书
  Certificate of ISO9001 Quality Management System
- ……

国家级荣誉 | National honors

- 国家产业技术基础公共服务平台
  National Industrial Technology Base Public Service Platforms
- 国家服务型制造示范平台
  Model National Service Manufacturing Platforms
- 国家中小企业公共服务示范平台
  Public service demonstration platform
- 专精特新“小巨人”企业高质量发展中小企业公共服务示范平台
  Specialized, refined, and innovative "little giant" enterprises
- 国家知识产权优势企业
  National Intellectual Property Advantageous Enterprises
- 国家高新技术企业
  National High and New Technology Enterprises
- 院士专家工作站
  Academician (Expert) Workstation
- ……

省市级荣誉 | Provincial and municipal honors

- 上海市质量标杆
  Shanghai Quality Benchmarking Enterprises
- 上海市企业技术中心
  Shanghai Enterprise Technology Center
- 上海市明星科创企业
  Shanghai Star Sci-tech Innovation Enterprises
- 上海市服务型制造示范平台
  Model Shanghai Service Manufacturing Platforms
- 上海市高新技术成果转化项目(多项)
  Shanghai High and New Technology Conversion Projects (Multiple)
- 上海市科技小巨人工程十年“百佳企业”
  Shanghai Science and Technology Little Giant
- 江苏省中小企业公共服务示范平台
  Model Jiangsu Public service demonstration platform
- 苏州市工程技术研究中心
  Suzhou Engineering Technology Research Center
- 成都市中小企业成长工程企业
  Enterprises of Chengdu Small and Medium-sized Enterprises Growth Project
- ……

微谱PCB实验室 Weipu PCB Laboratory

深圳微谱标准技术服务有限公司，简称微谱PCB实验室，成立于2020年，是一家拥有CNAS与CMA认可资质的第三方实验室，公司拥有100多套检测测试设备和一支经验丰富的PCB行业专业团队。我们为客户提供显微结构分析、电性能分析、热性能分析、无损结构分析、物理性能检测、可靠性试验等专业技术服务，帮助客户解决在PCB研发创新、质量升级、工艺改善、产品认证及贸易等环节遇到的相关技术问题。

Shenzhen Weipu Standard Technical Service Co., Ltd., abbreviated as Weipu PCB Laboratory, was established in 2020. It is a third-party laboratory with CNAS and CMA accreditation qualifications. The company has over 100 sets of testing equipment and an experienced PCB industry professional team. We provide professional technical services such as microstructure analysis, electrical performance analysis, thermal performance analysis, non-destructive structural analysis, physical performance testing, reliability testing, etc. to help customers solve related technical problems encountered in PCB research and development innovation, quality upgrading, process improvement, product certification, and trade.

实验室服务项目及设备 Laboratory Service Projects And Equipment

- 材料成分分析 Component Analysis
- 显微表征及仪器测试 Instrument Testing
- 电子材料检测 Electronic Material Testing
- PCB/PCBA/FPC有害物质环保法规培训及检测 Hazardous Substance Detection
- 汽车及通讯领域PCB符合性评价 PCB Compliance Evaluation
- PCBA检测评价 PCBA Testing Evaluation
- FPC 组件/零件测试评价 FPC Component/part Testing Evaluation
- PCB/PCBA/FPC失效分析 Failure Analysis

聚焦离子束电镜(FIB)
Focused Ion Beam

透射电子显微镜
Field Emission Transmission Electron Microscope

场发射扫描电镜能谱仪/FESEM-EDS
Field Emision Scanning Electron Microscopy

X射线检测系统
X-ray Detection System

无铅热风回流炉
Hot-air Lead-free Reflow Oven

离子迁移在线测试系统CAF
Electrochemical Migration Evaluation System

绝缘电阻测试系统
Insulation Resistance Testing System

HAST高加速寿命试验箱
Highly Accelerated Life Test Chamber

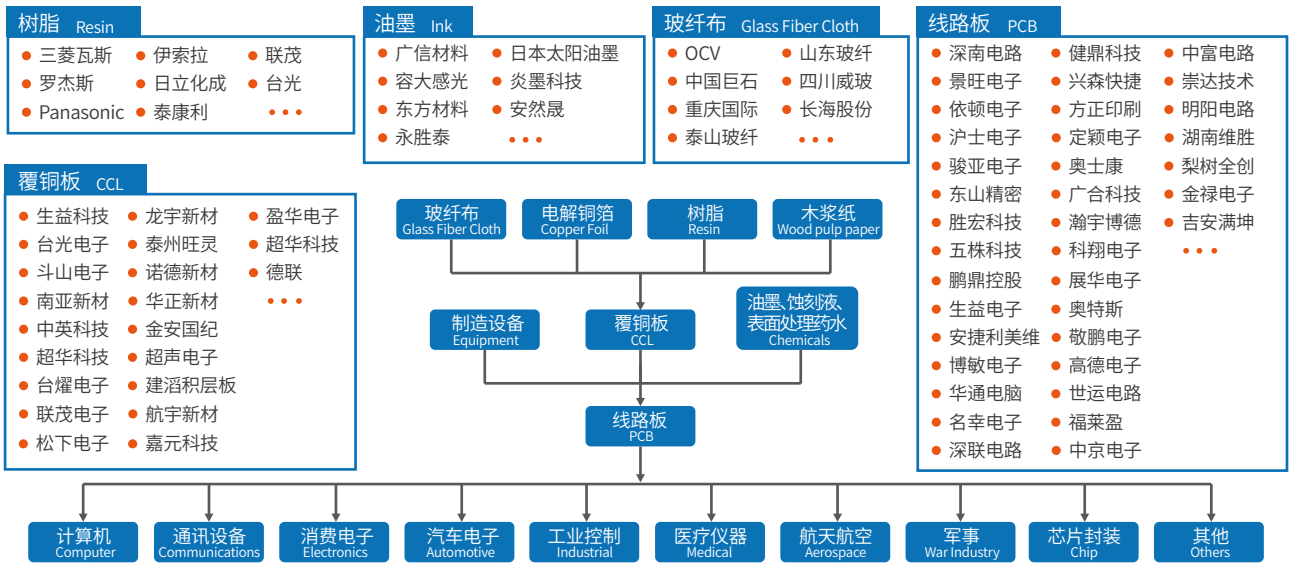
• 以上提及的资质、荣誉等相关数据来源：微谱科技集团旗下分子公司及其关联公司；以上提及的各项业务，由拥有相应业务资质的微谱科技集团旗下分子公司及起关联公司承接；其中专利代理业务由上海微略知识产权代理有限公司全权受理。
The above mentioned qualifications, honors and other related data sources: subsidiaries of Weipu Technology Group and its affiliates; Each of the businesses mentioned above shall be owned by the respective business Qualified subsidiaries and affiliates of Weipu Technology Group; Among them, the patent agency business is fully accepted by Shanghai Weiluo Intellectual Property Agency Co., Ltd.

微谱PCB服务领域 Weipu PCB Service Area

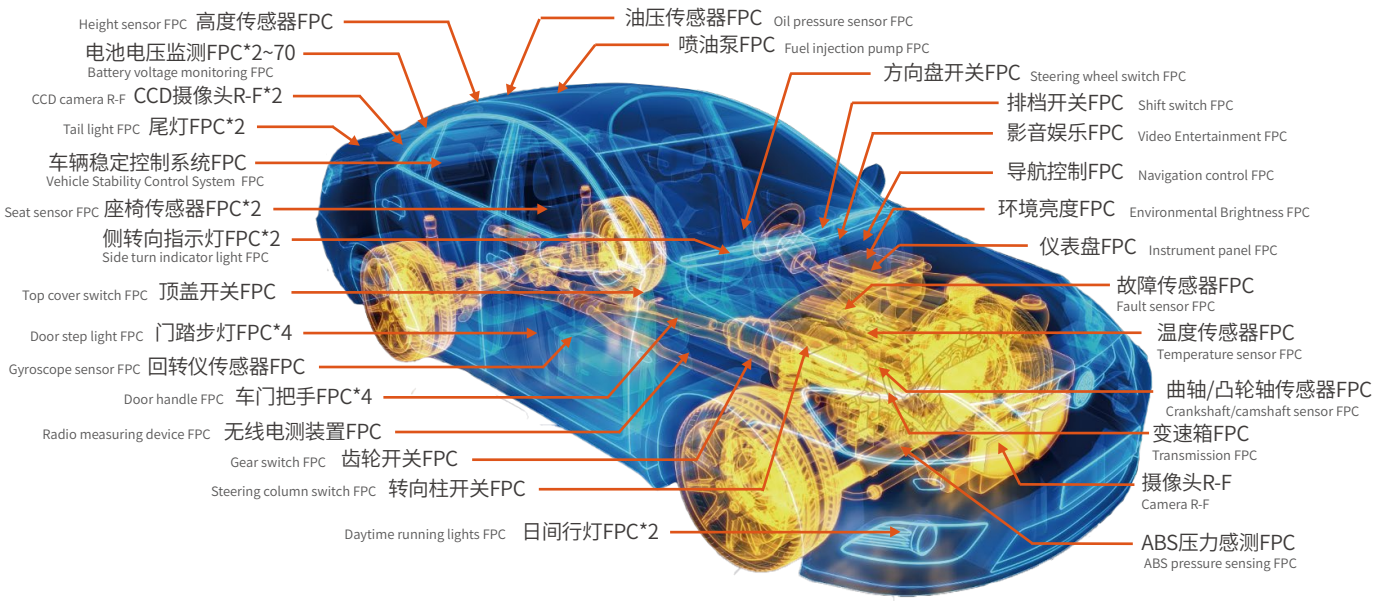
微谱凭借长期服务于先进材料、新能源汽车、手机终端、5G通讯、风电光伏、芯片半导体等领域所沉淀的行业技术解决方案，以及对分析测试、检测评价、可靠性试验、研发服务能力的专业深耕，为PCB产业链提供个性化综合性科技服务，助力客户获取更大成功。

With its long-term service in advanced materials, new energy vehicles, mobile terminals, 5G communication, wind power and photovoltaic, chip semiconductors and other fields, Weipu has accumulated industry technology solutions, as well as professional expertise in analysis and testing, testing and evaluation, reliability testing, and research and development services. It provides personalized and comprehensive technological services for the PCB industry chain, helping customers achieve greater success.

PCB产业链应用 Application Of PCB Industry Chain



FPC在新能源车中的应用 Application Of FPC In New Energy Vehicles



微谱PCB服务项目 Weipu PCB Service Items

材料成分分析及失效分析 Material Composition Analysis And Failure Analysis

九大品类服务项目 覆盖芯片半导体、光伏、锂电、汽车、通讯、电子电器、轨道交通、工控设备等先进制造领域

Nine categories of service projects Covering fields such as chip semiconductors, photovoltaics, lithium-ion batteries, automobiles, communications, electronics, rail transit, and industrial control equipment

高分子橡塑、胶粘剂、油墨、涂料成分分析 Polymer Compositional Analysis Of Rubbers, Plastics, Adhesives, Inks And Paints

玻纤布分析	Fiberglass Fabric
基板材料分析	Substrate Material
酚醛树脂分析	Phenolic Resin
环氧树脂分析	Epoxy Resin
聚酰亚胺分析	Polyimide
聚四氟乙烯PTFE分析	Polytetrafluoroethylene PTFE
半固化片PP分析	Prepreg
粘结材料分析	Adhesive Materials
导热硅脂分析	Thermal Conductive Silicone Grease
感光材料分析	Photosensitive Material
湿膜和干膜分析	Wet Film and Dry Film
防焊漆(油墨)分析	Solder Resistant Paint (Ink)
三防漆分析	Three Proof Paint/Conformal Coating
IC芯片底部填充胶分析	IC Chip Bottom Filling Adhesive
胶粘剂分析	Adhesive
红胶分析	Red Gum
底片分析	Negative Film Analysis
高分子中指定树脂定性定量分析	Qualitative and Quantitative Analysis of Specified Resin in Polymer
树脂结构解析	Structural Analysis of Resin
聚合物结构解析	Structure Analysis of Polymer

无机材料及电子化学品成分分析 Composition Analysis Of Inorganic Materials And Electronic Chemicals

铜箔分析	Copper Foil
陶瓷材料分析	Ceramic Material
显影液分析	Developing Solution
刻蚀液分析	Etching Solution
去膜液分析	Film Stripping Liquid
镀铜液分析	Copper Plating Solution
绿油分析	Green Oil
沉金液分析	Gold Precipitation Solution
锡膏分析	Solder Paste
助焊剂分析	Flux
洗板水分析	Circuit Board Cleaner
清洗剂分析	Cleaning Agent
红胶去除剂分析	Red Gum Remover
水样分析	Water Analysis
土壤/固废/底泥处理助剂分析	Soil/Solid Waste/Sediment Treatment Additives Qualitative and Quantitative Analysis of Specified
助剂中指定成分定性定量分析	Ingredient in Auxiliary Agents
助焊剂指定松香定性定量分析	Qualitative and Quantitative Analysis of Specified Rosin in Flux

工业诊断及个性化分析 Industrial Diagnosis And Customized Analysis

材料失效分析	Material Failure Analysis
材料一致性分析	Material Consistency Analysis
气味溯源分析	Odor Traceability Analysis
杂质副产物分析	Analysis of Impurities and Byproducts
助焊剂残留分析	Analysis of Flux Residue
固体/液体废弃物分析	Solid/Liquid Waste Analysis
燃烧/热裂解/挥发/反应后气体分析	Gas Analysis after Combustion/Pyrolysis/Volatilization/Reaction
填充/保护气分析	Analysis of Filling/Protective Gas
废气/环境气分析	Analysis of Exhaust Gas/Environmental Gas
异常气体综合分析	Comprehensive Analysis of Abnormal Gases

微谱PCB服务项目 Weipu PCB Service Items

显微表征及仪器测试 Instrument Testing

产品分类 Product category	测试类别 Testing Classification	仪器名称 Instrument Name	项目介绍 Item Introduction
显微表征及仪器测试 Instrument Testing	形貌表征 Morphology Characterization	扫描电子显微镜-能谱仪（SEM-EDS） Scanning electron microscope	观察样品表面微观结构、颗粒物尺寸、截面厚度等内容 Observing the surface microstructure, particle size, cross-sectional thickness, and other contents of the sample
		透射电子显微镜（TEM） Field Emission Transmission Electron Microscope	测试样品在纳米尺度下的组织结构、晶体结构和界面的微观结构等 Provide organizational structure, crystal structure, and microstructure of interfaces
		原子力显微镜（AFM） Atomic Force Microscope	AFM可获得样品的表面观察、表面粗糙测定、颗粒度解析、缺陷分析等信息 Surface observation, surface roughness measurement, particle size analysis, defect analysis
		3D X射线检测系统（CT） 3D X-RAY Detection System	CT可实现样品的内部及外部测量、断层扫描、尺寸比对、缺陷查找与分析等 Test sample tomography, size comparison, wall thickness analysis, defect detection and analysis, etc
		飞秒激光聚焦离子束（FIB） FOCUSED ION BEAM	FIB可实现快速、高质量、定点制样，对小于10 nm复杂结构的快速、准确、精确表面微加工和元素沉积 FIB can achieve fast, high-quality, and fixed-point sample preparation
		离子减薄仪（CP） Ion Millin (Cross-sction Polishing)	对样品进行表面抛光、断面切割、平面剖光 Surface polishing, cross-sectional cutting
	元素类 Chemical Element Testing	X射线光电子能谱（XPS）	测试材料表面元素成分分析、化学价态分析、元素相对含量 Testing element composition analysis and chemical valence state analysis
		能谱仪（EDS） Energy Dispersive Spectrometer	EDS可以多模式下（面扫、线扫、点扫）测量样品微区表面的元素种类与含量 Measure the element species and content
		俄歇电子能谱仪（AES） Auger electron spectrometer	实现大于20 nm直径的异物表面的化学信息分析 Foreign object surface analysis
		原子吸收光谱仪（AAS） Atomic Absorption Spectrometer	AAS可以测试材料中微量常见金属、重金属以及稀土金属元素含量 Test the content of trace common metals, heavy metals, and rare earth metal elements in materials
		辉光放电质谱仪（GD-MS） Glow Discharge Mass Spectrometer	测量固体样品从锂到铀之间所有元素成分 Measure the composition of all elements from lithium to uranium in solid samples
		飞行时间二次离子质谱仪 (TOF-SIMS) Time of Flight Secondary Ion Mass Spectrometry	主要用于薄膜的成份及杂质测定，掺杂剂与杂质的深度剖析，探测样品成分和纵向分布，可用于研究SEI膜成分 TOF-SIMS is mainly used for the composition and impurity determination of film, the depth analysis of dopants and impurities
		离子色谱仪 (IC) Ion Chromatograph	IC可测试材料中常见阴、阳离子的含量 Test the content of anions and cations
		电感耦合等离子体发射光谱仪/质谱仪 (ICP-OES/MS)	ICP-OES/MS 适用于磁性元素、金属元素和非金属元素分析（ppm/ppb） Metallic elements analysis
		能量型/波长型X射线荧光光谱仪 (EDXRF/WDXRF)	XRF主要应用于材料主成分及杂质元素分析，半定量测定固体、液体样品中的元素含量 Analysis of Principal Component and Impurity Elements in Materials

产品分类 Product category	测试类别 Testing Classification	仪器名称 Instrument Name	项目介绍 Item Introduction
显微表征及仪器测试 Instrument Testing	元素类 Chemical Element Testing	高频红外碳硫分析仪 High Frequency Infrared Ray Carbon Sulphur Analyzer	碳硫分析仪主要分析无机材料中碳含量和硫含量的分析 The sulfur analyzer mainly analyzes the carbon content and sulfur content in inorganic materials
		有机元素分析仪 Organic element analyzer	有机元素分析仪可用于测定有机样品中C、H、O、N、S的百分含量 Test the content of C, H, O, N, and S
	光谱 Spectrum Analysis	核磁共振波谱仪(NMR) Nuclear magnetic resonance spectrometer	NMR可得到1H、13C、19F、31P、29Si、DEPT、COSY、HSQC、HMBC、NOESY等一维及二维核磁谱图信息，帮助确定化合物的结构 NMR can obtain 1H, 13C, 19F, 31P, 29Si, DEPT, COSY, HSQC, HMBC, NOESY spectra
		傅立叶变换红外光谱仪（FTIR） Fourier transform infrared spectroscopy	FTIR提供红外谱图或匹配谱图，帮助确认样品中有机官能团信息 FTIR provides infrared spectra or matching spectra to help confirm organic functional group information in samples
		激光拉曼光谱仪（Raman） Laser Raman Spectrometer	拉曼光谱是对与入射光频率不同的散射光谱进行分析以得到分子振动、转动方面信息，并应用于分子结构研究的一种分析方法 An analytical method for obtaining information on molecular vibration and rotation, and applying it to molecular structure research
		X-射线衍射仪（XRD） X-ray diffractometer	XRD可测试无机材料、涂层的晶体结构、结晶度、石墨化度、取向度等 Test the crystal structure, crystallinity, graphitization degree
		紫外/可见/红外分光光度计 (UV/VIS/IR) Spectrometer	UV/VIS/IR主要用于溶液透射率、吸收度、反射性质的分析 Analysis of solution transmittance, absorbance
	色谱质谱类 Chromatography and mass spectrometry	气相色谱仪（GC） Gas Chromatography	实现混合组分中小分子有机物及易挥发组分的分离定性及定量分析，如锂电池胀气的气体分析 Separation, qualitative and quantitative analysis of organic matter and volatile components
		气相色谱质谱联用仪（GC-MS） Gas Chromatography-Mass Spectrometer	GC-MS对材料组分、添加剂组分进行定性定量分析 Qualitative and quantitative analysis of material and additive components can be carried out by GC-MS
		热裂解气相色谱质谱联用仪 (Py-GCMS)	Py-GC-MS主要用于典型高分子聚合物单体分析，辅助解析聚合物结构 Analysis of Polymer Monomers
		基质辅助激光解吸电离飞行时间质谱仪 (Maldi-TOF-MS)	Maldi-TOF-MS应用于微生物的分类和鉴定，聚合物的分析，包括单体构成、分子量等数据 Monomer composition and molecular weight analysis of polymers
		液相色谱质谱联用仪（LCMS） Liquid Chromatograph-MS-MS	LC-MS/MS适用于有机物纯度分析、有效物质含量测定、副产物分析、杂质确认、痕量物质分析 Organic purity analysis, determination of effective substance content, and analysis of by-products
		凝胶渗透色谱仪（GPC） Gel Permeation Chromatography	GPC可表征聚合物的分子量与分子量分布情况，对高聚物的合成和性质研究起到关键作用 Provide the molecular weight and molecular weight distribution
	热分析 Thermo analysis	差示扫描量热仪 (DSC) Differential Scanning Calorimeter	研究样品的玻璃化转变温度、结晶温度、熔点、结晶度、熔融过程等 Test the glass transition temperature and melting point of materials
		热重分析仪(TGA) Thermal Gravimetric Analyzer	TGA主要用于研究材料的热稳定性，可以测试热分解温度，灰分含量等 Test thermal decomposition temperature and ash content
		热重红外气相色谱质谱联用仪 (TGA-IR-GCMS)	TGA-IR-GCMS可检测材料各组分的热稳定性能、热分解过程并确定逸出和分解产物的类别及含量 Detect the category and content of decomposition products under heating of materials
		动态机械分析仪(DMA) Dynamic Mechanical Analyzer	DMA测量材料的模量、阻尼、蠕变、应力松弛、玻璃化转变、软化点、膨胀系数等参数 Test the coefficient of expansion of the material
		热机械分析仪(TMA) Thermo Mechanical analyzer	TMA主要用于无机材料、金属材料、复合材料及高分子材料的热膨胀系数、玻璃化转变温度、熔点、软化点、蠕变等的测试 Test the thermal expansion coefficient of the material

微谱PCB服务项目 Weipu PCB Service Items

PCB检测评价 PCB Testing And Evaluation

PCB（Printed Circuit Board），中文名称为印制电路板，又称印刷线路板，是各种元器件的载体与电路信号连接的枢纽，PCB已经成为电子信息产品中最为重要而关键的部分。随着新能源汽车、5G通讯、半导体设计和制造技术的日益发展，印制电路板也朝着超薄型、高密度、多层数、高性能等方向发展，PCB行业也面临着巨大的挑战，提高PCB质量，减少废品率，是各厂家一直不懈追求的目标。

PCB (Printed Circuit Board), also known as Printed Circuit Board in Chinese, is the carrier of various components and the hub for connecting circuit signals. PCB has become the most important and critical part of electronic information products. With the increasing development of new energy vehicles, 5G communication, semiconductor design and manufacturing technology, printed circuit boards are also moving towards ultra-thin, high-density, multi-layer, high-performance and other directions. The PCB industry is also facing huge challenges. Improving PCB quality and reducing scrap rates have always been the goals pursued by various manufacturers.

符合性测试 Compliance Testing

测试项目 Test items	测试内容 Test content
外观及缺陷检查 Visual examination	白斑、微裂纹、分层/起泡、外来夹杂物、露织物、断裂的纤维、晕圈、划痕、压痕/加工痕迹、表面空洞、颜色变化、粉红圈、孔内电镀层和涂覆层空洞、焊盘起翘、晕圈、标记等 Measling, Crazing, Blistering, Delamination, Haloing, Foreign Inclusions, Weave Exposure, Scratches/Dents/Tool Marks, Surface Micro-voids, Color Variations, Pink Ring, Plating and Coating Voids in the Hole, Lifted Lands, Wicking, Marking etc. IPC-6012 IPC-A-600
尺寸测量 Dimensional measurement	孔径、导线宽度、导线厚度、导线间距、焊盘尺寸、焊盘偏位、阻焊层厚度、铜箔厚度涂镀层厚度等 Hole size, Conductor width, Conductor thickness, Conductor spacing, Lands size, Lands defelction, Solder resist thickness Copper foil thickness, Plating/coating thickness, etc. IPC-6012 IPC-A-600
结构完整性 Structural integrity	层压板空洞/裂纹、分层或起泡、凹蚀、去钻污、负凹蚀、树脂凹缩、孔壁拉脱、镀层突沿、内层铜箔最小厚度、最小表面导体厚度、阻焊膜厚度、镀层空洞、镀层结瘤、镀层折叠/夹杂物、芯吸、内层夹杂、内层分离、镀层分离、铜箔裂纹、镀层裂纹、钉头 Laminate Voids/Cracks (Outside Thermal Zone)、Delamination/Blister、Etchback、Negative Etchback、Smear Removal、Dielectric Material, Clearance, Metal Plane for Supported Holes、Layer-to-Layer Spacing、Resin Recession、Hole Wall Dielectric/Plated Barrel Separation、Surface Conductor Thickness (Foil Plus Plating)、Foil Thickness – Internal Layers、Annular Ring – Internal Layers、Lifted Lands – (Cross-Sections)、Foil Crack、Plating Crack 、Plating Nodules、Copper Plating Thickness、Plating Voids、Solder Mask Thickness、Wicking、Nailheading、Roughness and Nodules IPC-6012 IPC-A-600

清洁度（离子及颗粒物残留） Cleanliness (Residual Ions And Particles)

测试项目 Test items		参考标准 Reference standards	
板面离子清洁度	Detection and Measurement of Ionizable Surface Contaminants by Resistivity of Solvent Extract (ROSE)	IPC-TM-650 2.3.25	GB/T 4677
清洁度（离子色谱法）	Cleanliness (Ion Chromatography Method)	IPC-TM-650 2.3.28.2	
颗粒物清洁度-萃取衰减曲线	Particle cleanliness-attenuated curve	VDA 19.1	ISO 16232
颗粒物清洁度测试	Particle cleanliness	VDA 19.1	ISO 16232

环境模拟测试 Environmental Testing

测试项目 Test items		参考标准 Reference standards	
高/低温存储	High/Low temperature storage test	GB/T 2423.2	GB/T 2423.1
恒定湿热试验	Constant temperature and humidity test	GB/T 2423.3	
温湿度循环	Cyclic damp heat test	GB/T2423.4	
冷热冲击(RTC)	Thermal shock test	IPC-TM-650 2.6.7.2	GB/T 2423.22
温度快速变化(RTC)	Speedy temperature change test	IPC-TM-650 2.6.7.2	GB/T 2423.22
高加速应力试验(HAST)	Highly accelerated stress test (HAST)	JESD22-A110	GB/T 2423.40
表面绝缘电阻（SIR）	Surface insulation resistance	IPC-TM-650 2.6.3.7 J-STD-004	GB/T 9491 JIS Z 3197
导电阳极丝测试（CAF）	Conductive anodic filament resistance test (CAF)	IPC-TM-650 2.6.25	
电化学迁移（ECM）	Electrochemical migration resistance test	IPC-TM-650 2.6.14.1	
互连强度测试(IST)	Interconnect stress testing(IST)	IPC-TM-650 2.6.26	
回流焊测试	Reflow test	IPC-TM-650 2.6.27	
可焊性测试	Weldability test	IPC/EIA J-STD-003	GB/T 4677
热应力测试	Thermal stress test	IPC-TM-650 2.6.8	
热油测试	Hot oil test	IPC-TM-650 2.4.6	
吸湿性	Water absorption, metal clad plastic laminates	IPC-TM-650 2.6.2.1	
孔铜结晶	Pore copper crystallization	IPC-TM-650 2.1.1	
正弦振动测试	Sine vibration test	GB/T2423.10	IEC 60068-2-6
随机振动测试	Random vibration test	GB/T2423.56	IEC 60068-2-64
定频振动测试	Resonance frequency vibration test	GB/T2423.10	IEC 60068-2-6
共振振动测试	Resonance vibration test	GB/T2423.10	IEC 60068-2-6
跌落测试	Drop test	GB/T2423.8	IEC 60068-2-31
盐雾腐蚀	Salt spray corrosion test	GB/T 2423.17	
气体腐蚀	Gas corrosion test	GB/ 2423.51	GB/T 2423.33

热学性能 Thermal Properties

测试项目 Test items		参考标准 Reference standards	
导热系数/热阻	thermal conductivity/thermal impedance	ASTM D 5470	
热膨胀系数	Coefficient of thermal expansion	IPC-TM-650 2.4.24	
Z轴CTE，α1 /α2 -CTE ppm/°C、PTE(%)	Coefficient of thermal expansion test (CTE)	IPC-TM-650 2.4.24（TMA法）	
玻璃化转变温度/固化因子，Tg	Glass transition temperature/ cure factor test , Tg factor test , Tg	IPC-TM-650 2.4.24（TMA法） IPC-TM-650 2.4.25（DSC法）	
分层时间 (TMA)：T260,T288,T300min	Time to Delamination test(T260, T288,T300)	IPC-TM-650 2.4.24.1	
热分解温度测试(Td)	Thermal decomposition temperature test (Td)	IPC-TM-650 2.4.24.6（TGA）	
阻燃性能	Flame retardant performance	GB/T 2408 IPC-TM-650 2.3.9	UL94 PC-TM-650 2.3.10

微谱PCB服务项目 Weipu PCB Service Items

PCB检测评价 PCB Testing And Evaluation

电性能 Electrical Performance

测试项目 Test items		参考标准 Reference standards	
耐电压测试	Hi pot test	IPC-TM-650 2.5.7 TM-650 Method 2.5.7.2	IPC-TM-650 2.5.7.1
击穿电压	Breakdown voltage	IPC TM-650 Method 2.5.6.3	
绝缘电阻	Insulation resistance	GB/T 4677 IPC-TM-650 2.6.3.4	IPC-TM-650 2.6.3
绝缘电阻及耐湿性(MIR)	Moisture and insulation resistance, printed boards	IPC-TM-650 2.6.3 IPC-TM-650 2.6.3.1	IPC-TM-650 2.6.3.4
互连电阻	Interconnection resistance, multilayer printed wiring	GB/T 4677 6.1.2	IPC-TM-650 2.5.12
金属化孔电阻变化	Change in resistance of plated-through holes	GB/T 4677	
微电阻测试	Micro resistance test	/	
介电常数/介电损耗	Permittivity and loss tangent, parallel plate	GB/T 4722	IPC-TM-650 2.5.5.9
表面电阻/体积电阻Rv，Rs	Volume and surface resistivity of dielectric materials	IPC-TM-650 2.5.17.1	GB/T 4722
漏电起痕(CTI)	Comparative tracking index	GB/T4207	IEC60112
耐电痕化指数（PTI）	Moisture and insulation resistance, printed boards	GB/T4207	
耐电弧性	Arc resistance	IPC-TM-650 2.5.1	
电气强度	Electrical strength	/	

机械性能 Mechanical Performance

测试项目 Test items		参考标准 Reference standards	
弓曲和扭曲（翘曲度）	Bow and twist (percentage)	IPC-TM-650 2.4.22 GB/T 4722	GB/T 4677
弯曲强度	Flexural strength test	IPC-TM-650 2.4.4	GB/T 4722
铜箔剥离强度	Peel strength	IPC-TM-650 2.4.8	GB/T 4722
拉脱强度	Tensile strength	IPC-TM-650 2.4.18.1 GB/T 4677	IPC-TM-6502.4.21 GB/T 472
镀层附着力	Plating and coating adhesion	IPC-TM-650 2.4.1 IPC-TM-650 2.4.28.1	IPC-TM-650 2.4.1.1 GB/T 4677
镀层厚度	Plating and coating thickness	IPC-TM-650 2.1.1	
铜箔延展率测试	Copper foil elongation test	IPC-TM-650 2.4.18	

PCBA检测评价 PCBA Testing And Evaluation

PCBA是指将电子元器件(如电阻、电容、电感、IC等)通过焊接或插接的方式固定在PCB(Printed Circuit Board,印刷电路板)上的产品。PCB是PCBA的基础,它是一种用于电子元器件之间电气连接的绝缘基板,通过预先设计好的线路图形和孔位,使元器件之间的连接变得简单、方便。

PCBA refers to a product that fixes electronic components (such as resistors, capacitors, inductors, ICs, etc.) onto a printed circuit board (PCB) through soldering or insertion. PCB is the foundation of PCBA, which is an insulating substrate used for electrical connections between electronic components. Through pre designed circuit graphics and hole positions, the connection between components becomes simple and convenient.

测试项目 Test items		参考标准 Reference standards	
X-ray/CT检查 /扫描声学显微镜	X-ray/CT/ C-SAM Inspection	IPC-A-610	
金相切片	Cross section analysis	IPC-TM-650 2.1.1	IPC 7095
IMC测量	IMC measurement	IPC-TM-650 2.1.1	JY/T0584
镍腐蚀分析	Nickel corrosion analysis	IPC-4552	
染色试验(BGA)	Dye and pry (BGA)	IPC-TM-650 2.4.53	IPC-TM-650.2.1.2
锡须观察	Tin whiskers analysis	JEDEC JESD22-A121 IPC-TM-650 GB/T 16594	JESD201 JY/T0584
红外热像分析	Infrared thermal image analysis	/	
显微红外分析	Microscopic infrared analysis	GB/T 6040	GB/T 7764
扫描电镜及能谱分析	SEM/EDS	JY/T0584 GB/T 17359	GB/T 16594
动态翘曲度	Dynamic warpage	JEITAET-7506	
应力应变测试	Strain measurement	IPC/JEDEC-9704	
焊点剪切强度/抗拉强度（推拉力）	shear strength	JIS Z 3198-7	JIS Z 3198-6
温度循环	Temperature cyclic test	GB/T2423.4	
温度冲击	Thermal shock test	IPC-TM-650 2.6.7.2	GB/T 2423.22
温度变化	Speedy temperature change test	IPC-TM-650 2.6.7.2	GB/T 2423.22
高/低温存储试验	High/low temperature test	GB/T 2423.2	GB/T 2423.1
湿热试验	Constant temperature and humidity test	GB/T 2423.3	
高加速寿命试验(HALT)	Highly accelerated life test (HALT)	/	
高加速应力筛选(HASS)	High accelerated stress screening (HASS)	/	
振动试验	random vibration test& sine vibration test	GB/T 2423.10	GB/T 2423.56
跌落试验	Drop test	GB/T 2423.8	

微谱PCB服务项目 Weipu PCB Service Items

FPC组件/零件测试评价 FPC Component/Part Testing And Evaluation

柔性电路板(Flexible Printed Circuit ，FPC)，又称软性电路板、挠性电路板，其以质量轻、厚度薄、可自由弯曲折叠等优良特性而备受青睐。随着新能源车、可穿戴设备、柔性显示和智能设备的爆发式增长，对柔性电路板的需求大幅增加，电路板设计越来越趋于高精度、高密度化，FPC的质量也面临巨大挑战。

Flexible Printed Circuit (FPC), also known as Flexible Circuit Board or Flexible Circuit Board, is highly favored for its excellent characteristics such as light weight, thin thickness, and free bending and folding. With the explosive growth of new energy vehicles, wearable devices, flexible displays, and intelligent devices, the demand for flexible circuit boards has significantly increased. Circuit board design is becoming increasingly high-precision and high-density, and the quality of FPCs is also facing huge challenges.

外观尺寸及结合力 Appearance Size And Adhesion

测试项目 Test items		参考标准 Reference standards
外观检测	Visual examination	IPC-A-610 IPC6013
尺寸检测	Dimension measurement	/
双面胶老化测试	Double sided adhesive tape aging test	/
PI膜和铜基材结合力测试	Adhesion between PI film and copper substrate	IPC-TM-650中2.4.9
FR4和FPC基材结合力测试	Adhesion between FR4 and FPC substrate	IPC-TM-650
双面胶和FPC基材结合力测试	Adhesion between double sided adhesive tape and FPC substrate	IPC-TM-650
背胶和FPC基材结合力测试	Adhesion between adhesive and FPC substrate	IPC-TM-650
AD胶和FPC基材结合力测试	Adhesion between AD and FPC substrate	IPC-TM-650
阻燃测试	Flame retardant performance	GBT2408 UL94

环境模拟实验 Environmental Simulation Experiment

测试项目 Test items		参考标准 Reference standards
高温暴露测试	High temperature storage test	USCAR2-6 5.6.3
恒定湿热测试	Constant temperature and humidity test	AEC-Q200
温湿循环测试	Cyclic damp heat test	USCAR2-6 中5.6.2
耐温度、湿度循环变化性能	Resistance to temperature and humidity cyclic changes	GB/T 31467.3
低温冲击测试	Low temperature impact test	ISO6722
振动测试	Vibration test	GBT 31467.3
盐雾测试	Salt spray corrosion test	/
耐高温高湿+浸水试验	Constant temperature and humidity test+immersion test	/
耐温度变化性能+浸水试验	Speedy temperature change+immersion test	/
振动测试+浸水试验	Vibration test+immersion test	/

机械性能 Mechanical Properties

测试项目 Test items		参考标准 Reference standards
推力测试	Push and pull test	/
焊接拉力、剥离力测试（铜铝焊接件）	Welding tension、Peel strength	/
焊接拉力、剥离力测试（镍片与铝焊接）	Welding tension、Peel strength	/
焊点抗拉强度测试	Welding point tensile strength test	/
剥离力测试	Peel strength	/
刮磨测试	Scratching test	ISO6722 9.3
弯曲测试	Flexural strength test	/
镍片拉伸强度	Nickel plate tensile strength	ASTM F2516
镍片硬度测试	Nickel plate hardness test	GB/T 4340.1
镍片表面粗糙度测试	Surface roughness testing of nickel sheets	GB/T 25978
镍片表面清洁度测试	Nickel surface cleanliness test	/
镍片导热系数测试	Thermal conductivity testing of nickel sheets	GB/T 3651
NTC密封测试	NTC sealing test	USCAR2-6
低温卷绕测试	Low temperature winding test	ISO6722

电性能 Electrical Performance

测试项目 Test items		参考标准 Reference standards
通断检测	On/off test	/
导通性	Continuity	/
绝缘测试	Insulation resistance	USCAR2-6 USCAR37
耐压测试	Hi pot test	USCAR2-6 USCAR37
最大载流能力测试	Max current carrying capacity	US-CAR2-6中5.3.3
保险载流测试	Fuses current carrying capacity	/
电流循环测试	Current cycling test	US-CAR2-6中5.3.4
回路电阻测试	RL ohms	/
焊接内阻（镍片与铝焊接）	Welding resistance (nickel sheet and aluminum welding)	/
焊接内阻（铜铝焊接件）	Welding resistance (copper aluminum welded joints)	/

微谱PCB服务项目 Weipu PCB Service Items

电子材料检测评价 Evaluation Of Electronic Material Testing

电子材料是指在电子技术和微电子技术中使用的材料，起的辅助焊接或者器件功能的实现等作用。在板级工艺中常见的电子材料（辅料）包括助焊剂、焊锡膏、焊锡丝、清洗剂、导热材料等。随着PCB、PCBA、整机产品等结构的复杂性和多样性发展，电子材料的应用场景也越来越复杂，会导致日益增加的失效问题发生，所以需要加强电子材料的质量和特性检测。

Electronic materials refer to materials used in electronic and microelectronic technologies, which play an auxiliary role in welding or achieving device functions. Common electronic materials (auxiliary materials) in board level processes include flux, solder paste, solder wire, cleaning agent, thermal conductive materials, etc. With the development of the complexity and diversity of structures such as PCB, PCBA, and whole machine products, the application scenarios of electronic materials are becoming increasingly complex, which will lead to an increasing number of failure problems. Therefore, it is necessary to strengthen the quality and characteristic testing of electronic materials.

三防漆 Conformal Coating

测试项目 Test items		参考标准 Reference standards
外观	Visual	GB/T 1981.2
外观	Visual	IPC-CC-830
酸值	Acid value	GB/T 1981.2
水基或乳胶漆的PH值	The pH value of water-based or latex paint	GB/T 1981.2
漆和铜的反应	The reaction between paint and copper	GB/T 1981.2
耐液体（包括水）性	Resistance to liquids (including water)	GB/T1981.2
耐液体（包括水）性	Resistance to liquids (including water)	ISO 2812-1
粘度	Viscosity	ISO 2555
不挥发物含量	Solid content	ISO 3251
体积电阻率	Volume resistivity	GB/T 31838.2
体积电阻率	Volume resistivity	GB/T 1981.2
电气强度	Electrical strength	GB /T1408.1
电气强度	Electrical strength	GB/T 1981.2
表面电阻率	Surface resistivity	GB/T 31838.3
附着力测试	Coating adhesion test	GB/T 9286
硬度	Hardness	GB/T 6739
吸水率	Water absorption rate	HG/T3856
易燃性	Flammability	UL94
温度与湿度老化（水解稳定性）	Temperature and humidity aging (hydrolysis stability)	IPC-TM-650 2.6.11.1
潮湿环境下的绝缘电阻	Insulation Resistance	IPC-TM-650 2.6.3.4
热冲击	thermal shock	IPC-TM-650 2.6.7.1
介质耐电压	Dielectric withstand voltage	IPC-TM-650 2.5.7.1
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.3
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.7
表面绝缘电阻	Insulation resistance surface insulation resistance	JIS Z 3197
电迁移	Electrochemical migration resistance test	IPC-TM-650 2.6.14.1
电迁移	Electrochemical migration resistance test	JIS Z 3197
电迁移	Electrochemical migration resistance test	JIS Z 3284

焊锡膏 Solder Paste

测试项目 Test items		参考标准 Reference standards
合金成分(锡)	Alloy composition (tin)	GB/T10574.1
合金化学成分	Alloy composition	GB/T10574.13
合金化学成分	Alloy composition	JISZ3910
水萃取液电阻率	Specific resistivity (electric resistivity) of aqueous solution	JIS Z 3197
水萃取液电阻率	Specific resistivity (electric resistivity) of aqueous solution	GB/T 9491
酸值	Acid value	IPC-TM-650 2.3.13
酸值	Acid value	JIS Z 3197
铜镜腐蚀	Copper mirror corrosion	IPC-TM-650 2.3.32
铜镜腐蚀	Copper mirror corrosion	JIS Z 3197
铜镜腐蚀	Copper mirror corrosion	GB/T 9491
卤化物含量	Halogen content test	IPC-TM-650 2.3.35
卤化物含量	Halogen content test	IPC-TM-650 2.3.28.1
卤化物含量	Halogen content test	JIS Z 3197
卤化物含量	Halogen content test	GB/T 9491
铜板腐蚀	Corrosion test	IPC-TM-650 2.6.15
铜板腐蚀	Corrosion test	JIS Z 3197
铜板腐蚀	Corrosion test	JIS Z 3284
铜板腐蚀	Corrosion test	GB/T 9491
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.3
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.7
表面绝缘电阻	Insulation resistance surface insulation resistance	JIS Z 3197
绝缘电阻	Insulation resistance	JIS Z 3284
绝缘电阻	Insulation resistance	GB/T 9491
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	IPC-TM-650 2.4.47
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	JIS Z 3197
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	GB/T 9491
扩展率（助焊性）	Spread test	IPC-TM-650 2.4.46
扩展率（助焊性）	Spread test	JIS Z 3197
扩展率（助焊性）	Spread test	GB/T 9491
电迁移	Electrochemical migration resistance test	IPC-TM-650 2.6.14.1
电迁移	Electrochemical migration resistance test	JIS Z 3197
电迁移	Electrochemical migration resistance test	JIS Z 3284
液体焊剂或性（润湿天平法）	Wetting balance test	IPC-TM-650 2.4.14.2
液体焊剂或性（润湿天平法）	Wetting balance test	JIS Z 3197
液体焊剂或性（润湿天平法）	Wetting balance test	GB/T 9491
金属含量	Metal content	IPC-TM-650 2.2.20
粘度	Viscosity	IPC-TM-650 2.4.34.2
粘度	Viscosity	IPC-TM-650 2.4.34.3
坍塌试验	Collapse test	IPC-TM-650 2.4.35
坍塌试验	Collapse test	JIS Z 3284
合金粉粒度大小与分布	Particle size and distribution of alloy powder	IPC-TM-650 2.2.14.3
合金粉粒度大小与分布	Particle size and distribution of alloy powder	IPC-TM-650 2.2.14.1
合金粉粒度大小与分布	Particle size and distribution of alloy powder	JIS Z 3284
润湿性试验	Wettability test	IPC-TM-650 2.4.45
润湿性试验	Wettability test	JIS Z 3284

微谱PCB服务项目 Weipu PCB Service Items

电子材料检测评价 Evaluation Of Electronic Material Testing

焊锡丝 Solder Wire

测试项目 Test items		参考标准 Reference standards
水萃取液电阻率	Specific resistivity (electric resistivity) of aqueous solution	JIS Z 3197
水萃取液电阻率	Specific resistivity (electric resistivity) of aqueous solution	GB/T 9491
酸值	Acid value	IPC-TM-650 2.3.13
酸值	Acid value	JIS Z 3197
铜镜腐蚀性	Copper mirror corrosion	IPC-TM-650 2.3.32
铜镜腐蚀性	Copper mirror corrosion	JIS Z 3197
铜镜腐蚀性	Copper mirror corrosion	GB/T 9491
卤化物含量	Copper mirror corrosion	IPC-TM-650 2.3.35
卤化物含量	Copper mirror corrosion	IPC-TM-650 2.3.28.1
卤化物含量	Copper mirror corrosion	JIS Z 3197
卤化物含量	Copper mirror corrosion	GB/T 9491
铜板腐蚀	Corrosion test	IPC-TM-650 2.6.15
铜板腐蚀	Corrosion test	JIS Z 3197
铜板腐蚀	Corrosion test	GB/T 9491
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.3
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.7
表面绝缘电阻	Insulation resistance surface insulation resistance	JIS Z 3197
绝缘电阻	Insulation resistance	GB/T 9491
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	IPC-TM-650 2.4.47
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	JIS Z 3197
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	GB/T 9491
扩展率（助焊性）	Spread test	IPC-TM-650 2.4.46
扩展率（助焊性）	Spread test	JIS Z 3197
扩展率（助焊性）	Spread test	GB/T 9491
电迁移	Electrochemical migration resistance test	IPC-TM-650 2.6.14.1
电迁移	Electrochemical migration resistance test	JIS Z 3197
液体焊剂或性（润湿天平法）	Wetting balance test	IPC-TM-650 2.4.14.2
液体焊剂或性（润湿天平法）	Wetting balance test	JIS Z 3197
液体焊剂或性（润湿天平法）	Wetting balance test	GB/T 9491
外观	Visual	JIS Z 3283
焊剂含量	Flux content	IPC-TM-650 2.3.34.1
焊剂含量	Flux content	GB/T 3131
焊剂含量	Flux content	JIS Z 3283
焊剂含量	Flux content	IPC J-STD-006

助焊剂 Flux

测试项目 Test items		参考标准 Reference standards
外观	Visual	GB/T 9491
外观	Visual	IPC J-STD-004
比重（密度）	Density	JIS Z 3197
比重（密度）	Density	GB/T 9491
比重（密度）	Density	IPC J-STD-004
粘度	Viscosity	JIS Z 3197
物理稳定性	Physical stability	GB/T 9491
不挥发物含量	Solid content	IPC-TM-650 2.3.34
不挥发物含量	Solid content	IS Z 3197
不挥发物含量	Solid content	GB/T 9491
闪点	Flash point	JIS Z 3197
水萃取液电阻率	Specific resistivity (electric resistivity) of aqueous solution	JIS Z 3197
水萃取液电阻率	Specific resistivity (electric resistivity) of aqueous solution	GB/T 9491
酸值	Acid value	IPC-TM-650 2.3.13
酸值	Acid value	JIS Z 3197
铜镜腐蚀性	Copper mirror corrosion	IPC-TM-650 2.3.32
铜镜腐蚀性	Copper mirror corrosion	JIS Z 3197
铜镜腐蚀性	Copper mirror corrosion	GB/T 9491
卤化物含量	Halogen content test	IPC-TM-650 2.3.35
卤化物含量	Halogen content test	IPC-TM-650 2.3.28.1
卤化物含量	Halogen content test	JIS Z 3197
卤化物含量	Halogen content test	GB/T 9491
铜板腐蚀	Corrosion test	IPC-TM-650 2.6.15
铜板腐蚀	Corrosion test	JIS Z 3197
铜板腐蚀	Corrosion test	JIS Z 3284
铜板腐蚀	Corrosion test	GB/T 9491
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.3 （SIR）
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.7
表面绝缘电阻	Insulation resistance surface insulation resistance	JIS Z 3197
绝缘电阻	Insulation resistance	JIS Z 3284
绝缘电阻	Insulation resistance	GB/T 9491
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	IPC-TM-650 2.4.47
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	JIS Z 3197
残留物干燥度	Dryness test (evaluation of tackiness of flux residue)	GB/T 9491
扩展率（助焊性）	Spread test	IPC-TM-650 2.4.46
扩展率（助焊性）	Spread test	JIS Z 3197
扩展率（助焊性）	Spread test	GB/T 9491
电迁移	Electrochemical migration resistance test	IPC-TM-650 2.6.14.1
电迁移	Electrochemical migration resistance test	JIS Z 3197
电迁移	Electrochemical migration resistance test	JIS Z 3284
液体焊剂或性（润湿天平法）	Wetting balance test	IPC-TM-650 2.4.14.2
液体焊剂或性（润湿天平法）	Wetting balance test	JIS Z 3197
液体焊剂或性（润湿天平法）	Wetting balance test	GB/T 9491

微谱PCB服务项目 Weipu PCB Service Items

电子材料检测评价 Evaluation Of Electronic Material Testing

清洗剂 Cleaning Agent

测试项目 Test items		参考标准 Reference standards
比重（密度）	Density	ASTM D1298
残留量(wt%)	Residual amount	GB/T 9740
电导率	Conductivity	GB/T 12582
铜板腐蚀	Corrosion test	IPC-TM-650 2.6.15
铜板腐蚀	Corrosion test	JIS Z 3197
铜板腐蚀	Corrosion test	JIS Z 3284
铜板腐蚀	Corrosion test	GB/T 9491
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.3
表面绝缘电阻	Insulation resistance surface insulation resistance	IPC-TM-650 2.6.3.7
表面绝缘电阻	Insulation resistance surface insulation resistance	JIS Z 3197
电迁移	Electrochemical migration resistance test	IPC-TM-650 2.6.14.1
电迁移	Electrochemical migration resistance test	JIS Z 3197
电迁移	Electrochemical migration resistance test	JIS Z 3284

元器件 Component

测试项目 Test items		参考标准 Reference standards	
外观检查	Appearance inspection	GJB 548	
检查	X-ray inspection	GJB 548	
金相切片	Cross section analysis	GJB 548	
开封	Decap	GJB 548	
扫描电镜及能谱分析	SEM/EDS	GJB 548 GB/T 16594	JY/T0584 GB/T 17359
扫描声学显微镜（C-SAM）		/	
动态翘曲度	Dynamic warpage	JEITAET-7506	
锡须观察	Tin whiskers analysis	ISO 2555	
焊点温度循环	Solder joint temperature cycle	IPC-9701	
湿热敏感等级（MSL）	Humidity and heat sensitivity level	IPC/JEDEC J-STD-020	
高加速应力试验（HAST）	High acceleration stress test	GB/T 2423.40	
高加速应力试验（HAST）	High acceleration stress test	JESD22-A110	

PCB/PCBA/FPC失效分析 Failure Analysis

PCB/PCBA失效分析是通过成分分析、材料特性表征、理化性能测试、显微缺陷精定位、破坏性物理分析、板级应力应变分析等手段，为PCBA/PCB/FPC/FPCA领域提供研发、生产、市场失效问题综合解决方案。

PCB/PCBA failure analysis is a comprehensive solution for the research and development, production, and market failure problems in the field of PCBA/PCB/FPC/FPCA, provided through methods such as component analysis, material characterization, physicochemical performance testing, microscopic defect precise positioning, destructive physical analysis, and plate level stress-strain analysis.

PCB常见的失效模式

Common Failure Modes Of PCB

- PCB导线开路 — PCB wire open circuit
- PCB爆板分层 — PCB Delamination
- PCB孔铜断裂 — PCB hole copper fracture
- 电迁移与枝晶生长 — Electromigration and dendritic growth
- 化学镍金黑焊盘 — Chemical nickel gold black solder pads

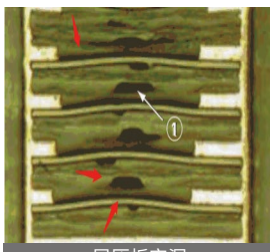
PCBA常见的失效模式

Common Failure Modes Of PCBA

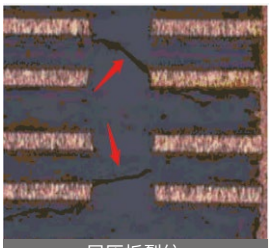
- 电迁移与枝晶生长 — Electromigration and dendritic growth
- PCBA组件腐蚀 — Corrosion of PCBA components
- 漏电 — Leakage
- 化学镍金黑焊盘 — Chemical nickel gold black solder pads
- 焊盘可焊性差 — Poor solderability of solder pads
- 焊点枕头效应 — Welding point pillow effect

PCB切片缺陷示例

Example Of PCB Defects



层压板空洞
Laminate Voids


层压板裂纹
Laminate Crack

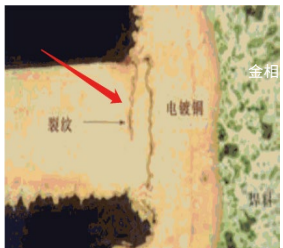

分层/起泡
Delamination/Blister


树脂凹缩
Resin Recession


孔壁拉脱
Hole Wall Pullaway


去污钻
Smear Removal


内层夹杂
Innerlayer Inclusions



铜箔裂纹
Foil Crack

微谱PCB服务项目 Weipu PCB Service Items

PCB/PCBA/FPC失效分析 Failure Analysis

失效分析案例 Failure Analysis Cases

失效分析-腐蚀 Failure Analysis-Corrosion

组分编号	组分名称	质量含量/%	俗称/ CAS No.	作用
1	柠檬酸	~10.0-10.5	77-92-9	有机酸
2	异丙醇	~10.0-10.5	67-63-0	有机溶剂
3	（此处隐藏）	（此处隐藏）	（此处隐藏）	缓蚀剂
4	甲醇	~0.04-0.05	67-56-1	有机溶剂
5	（此处隐藏）	（此处隐藏）	（此处隐藏）	表面活性剂
6	（此处隐藏）	（此处隐藏）	（此处隐藏）	表面活性剂
7	（此处隐藏）	（此处隐藏）	（此处隐藏）	助剂
8	盐酸（37%）	~4.5-5.0	7647-01-0	无机酸
9	碘醇*	~0.3-0.4	62-56-6	缓蚀剂
10	水	~69.0-70.0	/	/
以下空白				

■ 项目背景 Project Background

委托方用洗银水处理PCB板，于高湿环境下通电运行，部分铜孔有腐蚀迹象，三极管有被腐蚀风险，焊点呈灰色。

The client processed the PCB with silver dip cleaner before power-on operation under high-humidity environment. After the operation, some of the copper holes were found corroded, triodes are at risk of corrosions with their solder spots turned grey.

■ 项目需求 Project Requirement

定性评价腐蚀程度、腐蚀与洗银水的成分关联，以期改善

Evaluation of the corrosion situation and examine the connection between corrosion and the silver dip cleaner for possible improvement.

■ 核心方案 Core Experimental Plan

洗银水全成分分析+铜孔表面物质高级表征+微浅截面元素分析与腐蚀深度评估

Composition analysis of the silver dip cleaner, advanced surface substance characterizations, shallow micro cross-sectional element analysis and corrosion depth evaluation.

■ 关键证据 Crucial Evident

洗银水全成分分析：洗银水中含有柠檬酸（不挥发性中强酸）、盐酸，具较大腐蚀风险；

Composition analysis of the silver dip cleaner: the silver dip cleaner contains citric acid (a involatile medium acid), hydrochloric acid, which post a non-negligible risk of corrosion;

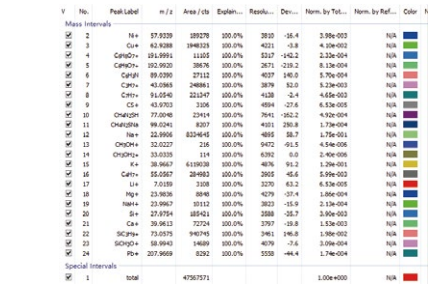
表面物质高级表征：腐蚀铜孔浅表面可检出氯离子以及其他来自洗银水的多种物质信息；

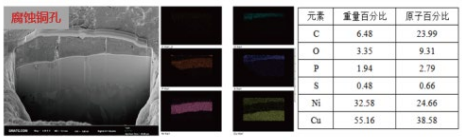
Advanced surface substance characterizations: chlorine and multiple other substances from the silver dip cleaner are detected on the surface of corroded copper hole;

FIB-SEM-EDS：铜孔截面未见氯元素富集，腐蚀仅发生在表面镍层。三极管焊锡表层及内部均有氯元素渗入，腐蚀较严重。

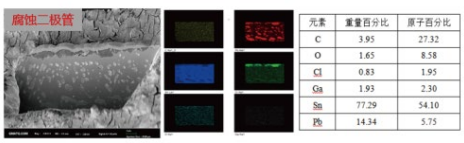
FIB-SEM-EDS: chlorine is not detected on the cross-section of the copper hole. The corrosion is within the nickel layer on the surface. On the other hand, the soldering tin of the triodes has chlorine on the surface and the inside, which means severe corrosion.

No.	元素	PCB-2# 含量/Atomic % 2#-0nm	2#-600nm	2#-1000nm	元素	PCB-3# 含量/Atomic % 3#-0nm	3#-600nm	3#-1000nm
1	C	69.61	30.85	19.46	C	48.39	7.23	7.95
2	O	17.17	14.49	15.03	O	25.29	19.77	16.62
3	Cu	3.86	27.57	19.24	Cu	10.51	26.8	26.69
4	Ni	3.13	11.6	30.56	Ni	3.22	34.84	37.81
5	N	2.11	2.78	2.3	N	3	1.34	1.67
6	Na	1.18	1.73	1.47	Na	0.38	/	/
7	S	0.86	1.08	0.98	S	1.27	/	1.67
8	Cl	0.64	3.08	2.49	Cl	4.76	3.67	2.92
9	Sn	0.32	0.21	0.16	Sn	0.08	0.19	0.18
10	Au	/	6.52	6.62	Au	1.69	2.49	1.43
11	Pb	/	0.09	0.06	Pb	0.11	0.11	0.11
12	P	/	/	1.64	P	1.31	3.55	2.94
13	Si	1.11	/	/				





元素	重量百分比	原子百分比
C	6.48	23.99
O	3.35	9.31
P	1.94	2.79
S	0.48	0.66
Ni	32.58	24.66
Cu	55.16	38.58



元素	重量百分比	原子百分比
C	3.95	27.32
O	1.65	8.58
Cl	0.83	1.95
Ga	1.93	2.30
Sn	77.29	54.10
Pb	14.34	5.75

■ 关键结论 Crucial Conclusion

本案为洗银水引起的化学腐蚀，铜孔位置腐蚀深度浅（未见致命损害），三极管腐蚀严重（建议更换新器件）。

The corrosion in this case is caused by the silver dipped cleaner. The copper hole is only corroded on the surface layer (non-critical damage), while the triodes are severely corroded (it is recommended to replace the components).

■ 项目价值 Project Value

委托方后续调整清洗方案，腐蚀比例降至0.02%以下。

The client has readjusted the cleaning process, and the proportion of corrosion failure has dropped below 0.02%.

失效分析-变色/异色 Failure Analysis-Discoloration

项目背景 Project Background

微型PCB板利用导电银胶粘接金层与贴片电阻，正常仓储发现银胶表面发黄。

Chip resistor is adhered to the gold soldering pad of micro-PCBA using conductive silver paste. Yellow discoloration is found after normal condition storage in the warehouse.

项目需求 Project Requirement

分析原因、评估风险、以期改善。

Cause analyses and risk evaluation for possible improvement.

核心方案 Core Experimental Plan

原样表面形貌与物质高级表征+环境小分子物质提取与识别+银胶原料全成分分析+风险物料指定成分分析。

Surface morphology of the original sample and advanced composition characterizations, environmental substance extractions and identifications, compositional analysis of the conductive silver paste raw material, specified composition analyses of possibly risky materials.

关键证据 Crucial Evident

SEM-EDS：NG品银胶比OK品银胶多出微量S元素；

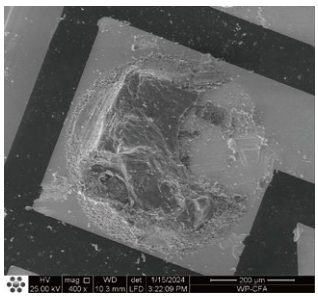
SEM-EDS: The NG silver paste (discolored) contains trace amount of S element compared to the OK silver paste (with original silver color)

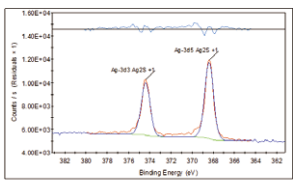
表面物质高级表征：NG品银胶表面含有硫酸盐、亚硫酸盐和金属硫化物，银主要以硫化银形式存在，而OK品银胶表面不含硫，且银主要以单质形式存在；

Advanced surface composition characterizations: sulfates, sulfites and metallic sulfides are detected in the NG silver paste, and the Ag element exists as Silver sulfide; while the OK silver paste does not contain sulfur element and its Ag element exists only as silver metal;

银胶全成分分析：NG品同批次银胶中检出含S固化剂。

Compositional analysis of the conductive silver paste raw material: Sulfur-containing curing agent was detected in the silver paste from the same batch of the NG discolored silver paste on the micro-PCBA.





Name	Peak BE eV	FWHM eV	Area (P) CPS.eV	Atomic %
Ag-3d5 Ag_2S +1	368.38	0.97	6823.56	100.00
Ag-3d3 Ag_2S +1	374.37	0.97	4724.00	

编号	组分名称	单位	含量	指标/CAS No.	作用
1	双酚F环氧树脂	Wt. %	3-4	BPF	树脂
2	1,4-丁二醇二缩水甘油醚		15-16	2425-79-8	活性稀释剂
3	（此处隐藏）		1-2	（此处隐藏）	（此处隐藏）
4	银粉		79-80	/	导电填料
5	（此处隐藏）		（此处隐藏）	（此处隐藏）	（此处隐藏）
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关键结论 Crucial Conclusion

银胶变色的原因为银粉与含硫物质发生反应，生成了硫化银Ag_2S。需要高度重视银胶中的含硫固化剂的质控、及微型PCB制程的硫元素管控。

The discoloration of silver paste is a result of the silver metal powder reaction with Sulfur-containing substances, which produced Ag2S. The Sulfur-containing curing agents, as well as the Sulfur-element in the manufacturing processes are of great importance in quality control and management.

项目价值 Project Value

委托方后续更新来料检验标准，并强化了过程管理，发黄比例显著降低。

The client has updated their acceptability criteria for incoming raw materials and enhanced the process management, resulting in significantly reduced proportion of silver paste discoloration.

微谱PCB服务项目 Weipu PCB Service Items

有害物质环保法规培训及检测 Training And Testing On Environmental Regulations For Harmful Substances

有害物质环保法规培训 Training On Environmental Protection Regulations For Hazardous Substances

电子产业面临日趋严格的化学有害物质管控要求，终端企业面对法规不断更新，供应链管理难度加大，只有将内部管控节点、供应链审核、产品风险识别、材料风险点结合，才能从容应对化学有害物质管控的要求。

The electronic industry is facing increasingly strict requirements for the control of hazardous chemicals, and terminal enterprises are facing continuous updates in regulations, making supply chain management more difficult. Only by combining internal control nodes, supply chain audits, product risk identification, and material risk points can they calmly respond to the requirements for the control of hazardous chemicals.

课程章节 Course chapters	具体内容 Concrete content
环保指令介绍 Introduction to Environmental Protection Directives	RoHS、REACH、POPs、PAHs、CA65等法规
风险识别 Risk Identification	供应链分级、产品风险识别、工艺风险识别、材料风险识别、管控化学物质风险识别 Supply chain grading, product risk identification, process risk identification, material risk identification, and control of chemical substance risk identification
供应链管理 Supply Chain Management	内部质量管理、环保供应链管理 Internal quality management, environmental supply chain management

有害物质环保法规检测 Hazardous Substance Environmental Regulations Testing

服务项目 Service	测试内容 Testing items	检测标准 Test methods	判定标准 Requirements
欧盟EU RoHS 2.0	Pb、Cd、Hg、Cr6+、PBBs、PBDEs、DIBP、DBP、BBP、DEHP	IEC 62321	RoHS指令 Directive 2011/65/EU
ElV	Pb、Cd、Hg、Cr6+、PBBs、PBDEs	QC/T 943-2013 or IEC62321	Q/CAM-266-2017 or GB/T30512-201
欧盟EU Reach SVHC	最新候选清单SVHC Candidate List-updated	Inhouse method	（EC）No 1907/2006
欧盟Reach 附录XVII Annex XVII of EU REACH	PBB、PCP、NPEOs、NP、BPA、D4、D5, 等etc	Inhouse method	（EC）No 1907/2006附录17
POPs	SCCP、PFOS、PFOA、HBCDD、四溴二苯醚Tetra-BDE、五溴二苯醚Penta-BDE、六溴二苯醚Hexa-BDE、七溴二苯醚， Hepta-BDE、十溴二苯醚Deca-BDE等etc	EPA 3550C&EPA 8270D ISO/TS 18219: 2015 Inhouse method	/

有害物质环保法规检测 Hazardous Substance Environmental Regulations Testing

服务项目 Service	测试内容 Testing items	检测标准 Test methods	判定标准 Requirements
PFAs	PFAs 220项	CEN/TS 15968:2010	/
PAHs	PAHs 16项 （多环芳烃16项） PAHs 16（16 Polycyclic aromatic hydrocarbons）	GB/T 29784.2-2013	/
TSCA	PCTP、DecaBDE、2,4,6-TTBP、HCBD、PIP3:1	Inhouse method	/
加州65 California Pro. 65	邻苯Phthalates 7P（DBP、BBP、DEHP、DNOP、DINP、DIDP、DNHP)、铅(Pb)、镉（Cd）、BPA等etc	美国加州65法案 California Pro. 65	/
包装物测试 Package	重金属、溶剂残留、VOC、苯、甲苯、二甲苯、乙苯、卤代烃、AOX、气味 Heavy Metals, Solvent Residues, VOC, Benzene, Toluene, Xylene, Ethylbenzene, Halogenated Hydrocarbons, AOX, Odor	GB/T 39084-2020	GB/T 39084-2020
卤素+硫 Halogen+Sulphur	F、Cl、Br、I、S	BE EN 14582:2007附录A	/
胶粘剂有害物质限量 VOC of Adhesive	可挥发性有机物（VOC）	GB33372-2020	GB33372-2020
涂料有害物质限量 Restricted Substances of painting and coating	VOC、苯、甲苯、二甲苯、卤代烃、多环芳烃总和、甲醇、乙二醇及醚酯、重金属、石棉含量等 VOC, Benzene, Toluene, Xylene, Halogenated Hydrocarbons, PAHs, Methyl Alcohol, Ethylene Glycol and ether esters, Heavy Metals and Abestos	GB 18581-2020 GB 18582-2020 GB 24409-2020 GB 30981-2020 GB 38469-2019	GB 18581-2020 GB 18582-2020 GB 24409-2020 GB 30981-2020 GB 38469-2019
油墨有害物质限量 VOC of Ink	VOC、17种禁用溶剂、卤代烃 VOC, 17 banned Solvents and Halogenated Hydrocarbons	GB 38507-2020	GB 38507-2020
清洗剂有害物质限量 Restricted Substances of Detergent	VOC、甲醛、二氯甲烷/三氯甲烷/三氯乙烯/四氯乙烯总和、苯/甲苯/乙苯/二甲苯总和 VOC, Formaldehyde, total Dichloromethane/Trichloroethylene/Tetrachloroethylene,total Benzene /Toluene/Ethylbenzene /Xylene	GB 38508-2020	GB 38508-2020
MSDS	化学品安全技术说明书（中国版、美国版、欧盟版） Safety Data Sheet of Chemical Materials(China, US, EU)	/	/
生物相容性 Biocompatibility	体外细胞毒性、皮肤刺激、皮肤致敏 Vitro Cytotoxicity, Skin Irritation, and Sensitization	ISO 10993	ISO 10993

微谱PCB服务项目 Weipu PCB Service Items

材料检测 Material Testing

行业/领域 Industry	子领域 Subdomain	检测项目 Testing items				
塑料 Plastic	物理性能 Physical properties	• 球压痕硬度 Ball indentation hardness	• 邵A硬度 Shore A hardness	• 邵D硬度 Shore D hardness	• 密度 Density	
	化学性能 Chemical properties	• 灰分 ASH	• 主材质定性 Main material qualitative			
	机械性能 Mechanical behavior	• 拉伸试验 Tensile test	• 弯曲试验 Bending test	• 冲击试验 Impact test	• 压缩试验 Compression test	
	热性能 Thermal properties	• 玻璃化转变温度 Glass transition temperature	• 熔融温度 Melting temperature	• 焓值 Enthalpy	• 氧化诱导期 Oxidative induction	• 热失重 Thermal weight loss
	电性能 Electrical properties	• 体积电阻 Volume resistance	• 体积电阻率 Volume resistivity	• 表面电阻 Surface resistance	• 表面电阻率 Surface resistivity	
	可靠性测试 Reliability test	• 光照老化 Light aging	• 氙灯老化 Xenon lamp aging	• 紫外老化 UV aging	• 太阳辐照 Solar irradiation	
		• 气候老化 Climate aging	• 温湿度老化 Temperature and humidity aging	• 冷凝水老化 Aging of condensate water	• 热氧空气老化 Thermal Oxygen Air Aging	
		• 耐液体介质 Resistant to liquid media	• 耐水性 Water resistance	• 耐油性 Oil resistance	• 耐酸碱 Acid and alkali resistant	• 耐油品 Oil resistant
			• 耐清洁剂 Resistant to detergents			
		• 盐雾试验 Salt spray test	• 交变盐雾 Alternating salt spray	• 中性盐雾 Neutral salt spray		
橡胶 Rubber	物理性能 Sample preparation	• 密度 Density	• 国际橡胶硬度 International rubber hardness	• 耐摩擦试验(植绒摩擦) Friction resistance test		
	机械性能 Mechanical behavior	• 拉伸试验 Tensile test	• 压缩试验 Compression test	• 撕裂试验 Tear test	• 压缩永久变形 Compression set	
	化学性能 Chemical properties	• 灰分 ASH	• 主材质定性 Main material qualitative			
	电性能 Electrical properties	• 体积电阻 Volume resistance	• 体积电阻率 Volume resistivity	• 表面电阻 Surface resistance	• 表面电阻率 Surface resistivity	
	可靠性测试 Reliability test	• 光照老化 Light aging	• 氙灯老化 Xenon lamp aging	• 紫外老化 UV aging	• 太阳辐照 Solar irradiation	• 臭氧老化 Ozone aging
		• 气候老化 Climate aging	• 温湿度老化 Temperature and humidity aging	• 冷凝水老化 Aging of condensate water	• 热氧空气老化 Thermal Oxygen Air Aging	
		• 耐液体介质 Resistant to liquid media	• 耐水性 Water resistance	• 耐油性 Oil resistance	• 耐酸碱 Acid and alkali resistant	• 耐油品 Oil resistant
			• 耐清洁剂 Resistant to detergents			
油漆和涂镀层 Paint and plating	物理性能 Sample preparation	• 色差 Color difference	• 光泽度 Gloss	• 厚度 Thickness		
	附着力 Adhesion	• 碎石冲击 Gravel impact	• 十字划格 Crosshatch	• 蒸汽喷射（高压冲水） Steam jet		
	可靠性测试 Reliability test	• 环境试验 Environmental testing	• 盐雾试验 Salt spray test	• 耐温性 Temperature resistance	• 二氧化硫气体腐蚀 Sulfur dioxide gas corrosion	
		• 光照老化 Light aging	• 氙灯老化 Xenon lamp aging	• 紫外老化 UV aging	• 太阳辐照 Solar irradiation	

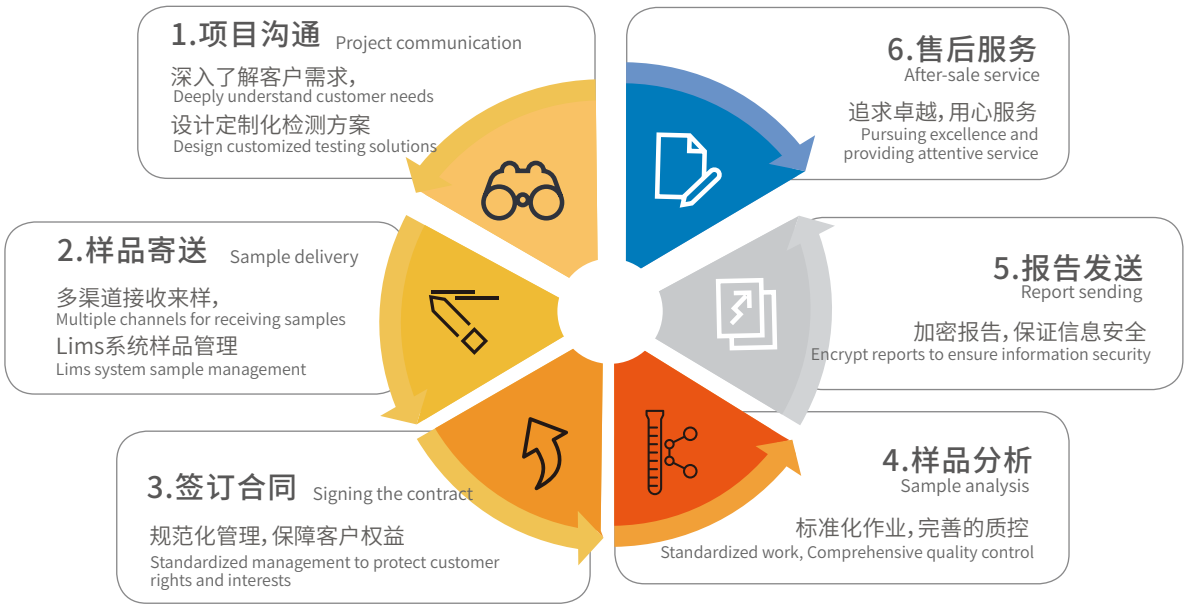
行业/领域 Industry	子领域 Subdomain	检测项目 Testing items
复合材料 Composite materials	物理性能 Physical properties	• 球压痕硬度 Ball indentation hardness • 邵D硬度 Shore D hardness • 密度 Density
	化学性能 Chemical properties	• 纤维含量 Fiber content • 树脂含量 Resin content
	机械性能 Mechanical behavior	• 拉伸试验（全温） Tensile test • 弯曲试验 Bending test • 剪切性能（全温） Shear performance • 压缩试验（全温） Compression test
	热性能 Thermal properties	• 玻璃化转变温度 Glass transition temperature • 熔融温度 Melting temperature • 焓值 Enthalpy • 氧化诱导期 Oxidative induction • 热失重 Thermal weight loss
	电性能 Electrical properties	• 体积电阻 Volume resistance • 体积电阻率 Volume resistivity • 表面电阻 Surface resistance • 表面电阻率 Surface resistivity
	可靠性测试 Reliability test	• 光照老化 Light aging — • 氙灯老化 Xenon lamp aging • 紫外老化 UV aging • 太阳辐照 Solar irradiation
		• 气候老化 Climate aging — • 温湿度老化 Temperature and humidity aging • 冷凝水老化 Aging of condensate water • 热氧空气老化 Thermal Oxygen Air Aging
		• 耐液体介质 Resistant to liquid media — • 耐水性 Water resistance • 耐油性 Oil resistance • 耐酸碱 Acid and alkali resistant • 耐油品 Oil resistant • 耐清洁剂 Resistant to detergents
		• 盐雾试验 Salt spray test — • 交变盐雾 Alternating salt spray • 中性盐雾 Neutral salt spray
金属材料 Metallic material	金相分析 Metallographic analysis	• 晶粒度 Grain size • 显微组织 Microstructure • 非金属夹杂物 Non-metallic inclusions • 球墨铸铁、灰铸铁 Ductile iron, gray cast iron • 镀层厚度 Coating thickness • 低倍 Low magnification tissue • 脱碳层、硬化层 Decarburized layer, hardened layer
	物理性能 Physical properties	• 密度 Density
	机械性能 Mechanical behavior	• 拉伸试验 Tensile test • 弯曲试验 Bending test • 冲击试验 Impact test • 压缩试验 Compression test • 硬度试验（布氏、维氏、里氏） Hardness (Brinell hardness、Vickers hardness、Leeb hardness)
	化学成分 Chemical composition	• 直读光谱法 (OES) • ICP-OES法 • 牌号检定 Brand identification • 电解法（专用于铜合金） Electrolysis method (specifically used for copper alloys)
	腐蚀试验 Corrosion test	• 中性盐雾 Neutral salt spray • 晶间腐蚀 Intergranular corrosion • 点腐蚀 Pitting corrosion
	失效分析 Failure analysis	
	断口分析 Fracture analysis	
	异物分析 Foreign body analysis	

服务体系
打造优质合作体验

Service System

Creating A High-quality Collaborative Experience

一站式服务流程 ONE STOP SERVICE



服务优势 Service Advantages

准 Accurate

1/ 精准的前处理方法；
Accurate preprocessing methods

2/ 齐备的分析仪器设备；
Complete analytical instruments and equipment

3/ 百万级谱图数据库；
Millions of spectrogram databases

4/ 完善的质量控制。
Comprehensive quality control

快 Fast

1/ 样品前处理的标准化和自动化；
Standardization and automation of sample pretreatment

2/ 自有先进仪器设备，提升实验效率；
Self-owned advanced instruments and equipment to improve experimental efficiency

3/ LIMS流程管控，缩短出报告周期；
LIMS process control to shorten reporting period

4/ 快速响应，及时解决售后问题。
Quick response and timely solve the after-sales service problem

专 Professional

1/ 专业的技术团队；
Professional technical team

2/ 多年的仪器分析方法积累；
Many years of experience in instrument analysis methods

3/ 先进的管理和分析软件；
Advanced management and analysis software

4/ 完善的实验室建设。
Comprehensive laboratory construction

暖 Heartwarming

1/ 售前免费评估；
Free pre-sales evaluation

2/ 售中专人跟进；
Dedicated person to follow up sale in the whole process

3/ 售后快速响应；
Quick response after Sales

4/ 专线投诉渠道。
A dedicated line for complaint channels

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成都 重庆 宁夏 合肥 亳州 武汉 西安 太原 郑州 贵州 长沙 江西 福建 太仓 内蒙古 广西 云南

400-700-8005 www.weipugroup.com