



Introduction on Multilayer Chip Ceramic Inductor

**Material +
Create Better World**

Catalogs

- 1 Electronic Components and Materials Division**
- 2 Quality Assurance (QA)**
- 3 Technical Capability**
- 4 Future Planning**

1. Electronic Components & Materials Division

Basics




Electronic Components & Materials Division

Location: Chaozhou, Guangdong, Shenzhen, Sichuan
Nanchong, Deyang


Products: MLCC / **Inductors** /Resistors, etc.

Employees: more than 2,000



 **Deyang Sanhuan Technology Co.**
AUTO production base & Sales base




 **Nanchong Sanhuan Electronics Co.**
production base & sales base

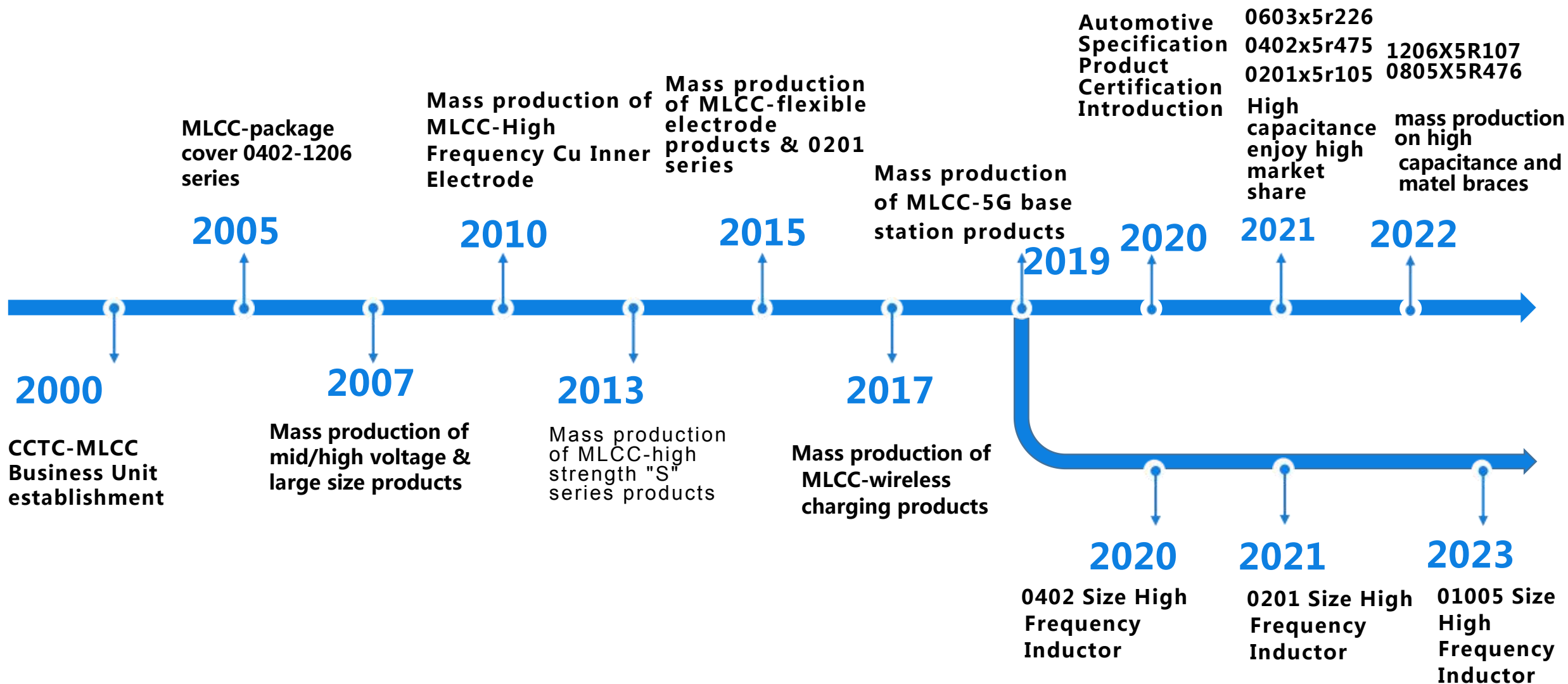


 **Shenzhen Sanhuan Electronics Co.**
production base & sales base



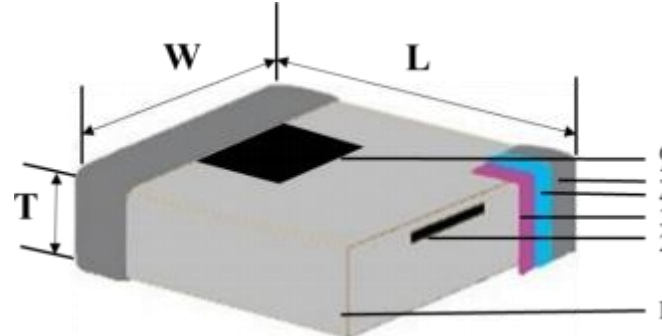
 **Chaozhou Sanhuan (Group) Co.**
Main production bases & sales base

Milestones



Products

Internal composition



NO.	NAME
1	Ceramic media
2	Inner electrode
3	Outer electrode
4	Nickel layer
5	Tinfoil
6	Marking

Electrical Property	Test Condition
L-value	Test equipment: Keysight E4991A (fixture Keysight 16197A) or other equipment of the same class Test frequency: 50\100\300\500 MHz Test Signal: -20dBm or 50mV
Q-value	
DC resistance	Test equipment: Aglient 4338B or other equipment of the same class
self-resonant frequency	Test equipment: Keysight E4991A\E5071C or other equipment of the same grade
rated current	Temperature Rise Test Method

Specific Application

Bluetooth WIFI Module



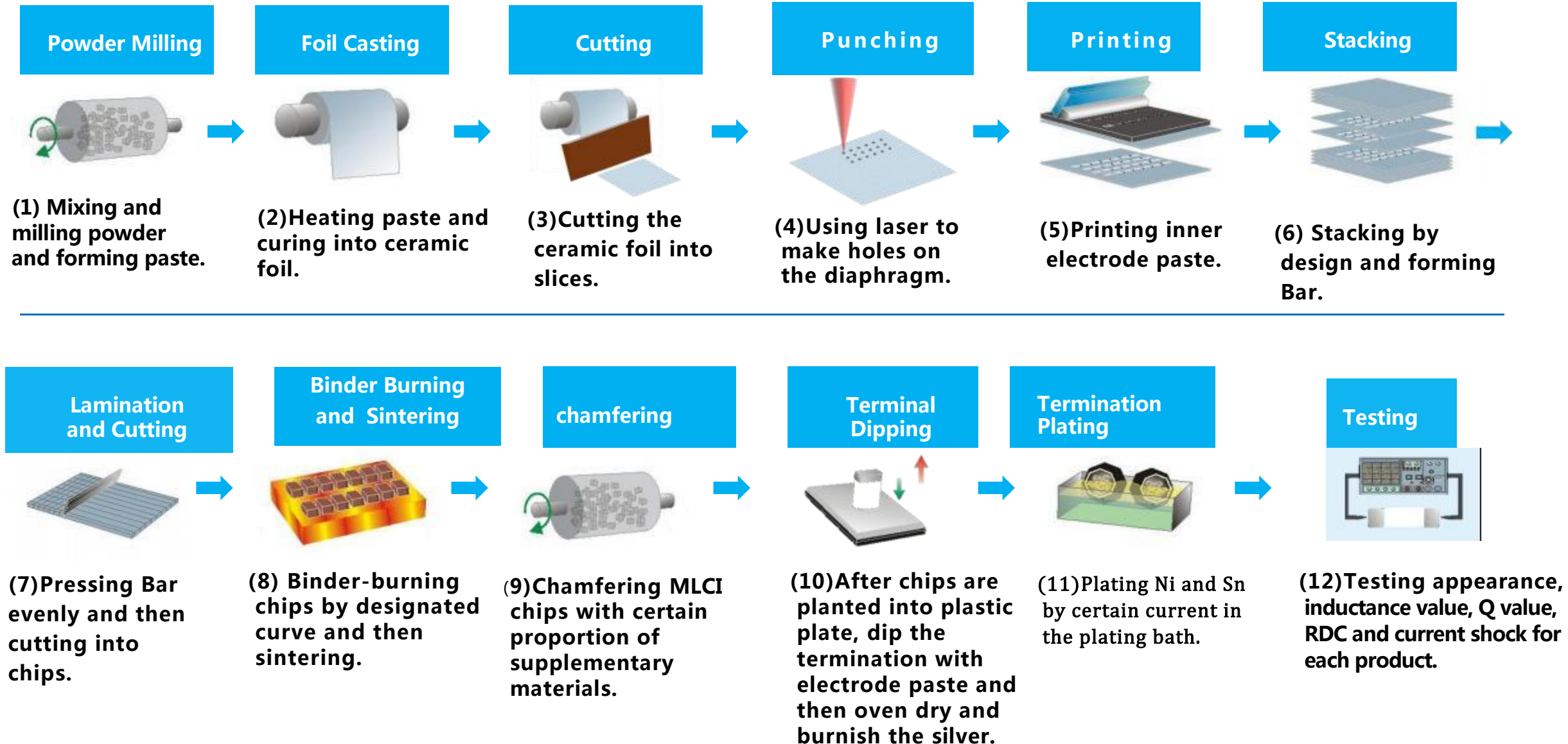
Wireless Communication Devices e.g., cell phones



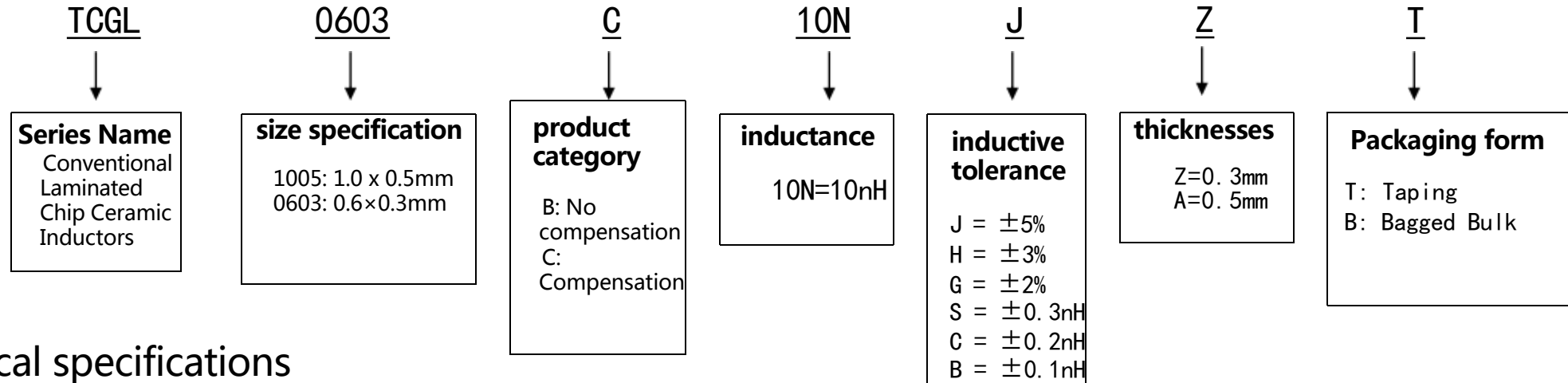
GPS System



Dry process route



Naming and Specifications



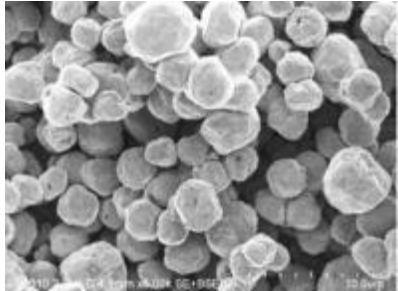
Typical specifications

range	L (nH)	Q(min)	RDC(max) (Ω)	SRF (min) (MHz)	rated current (mA)
TCGL1005B	0.6	4	0.10	10000	800
	1.0-33	8	0.10-0.90	1300-10000	200-400
	39-270	8	1.00-4.80	400-1200	100-200
TCGL0603C	0.6-27	13	0.06-2.10	2000-10000	140-850
	33-56	10	2.20-3.50	1400-1800	100-120
	68-120	9	3.50-5.0	800-1200	80-100

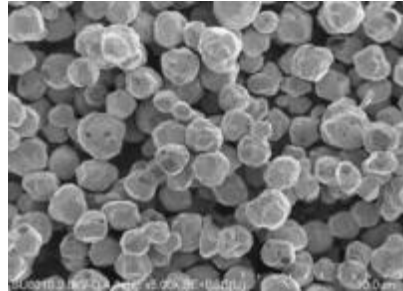
Technology Capability

Self-manufactured raw materials

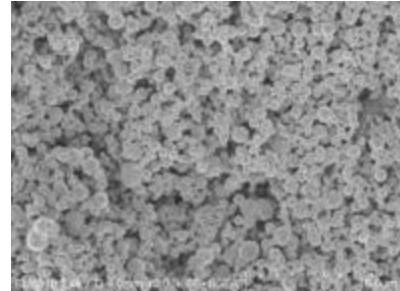
Self-made
rough powder



Self-made
Medium Powder



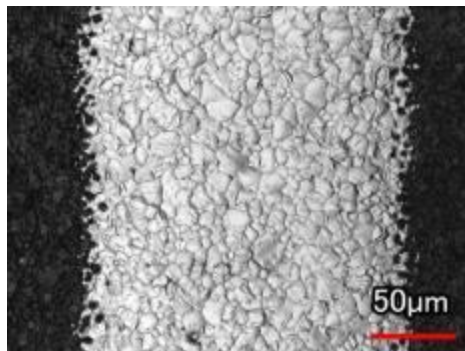
Self-made
fine powder



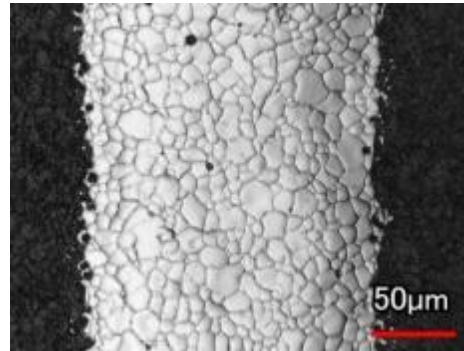
- It can realize the independent research and development of materials, such as medium powder, inner pulp, outer pulp and so on.

Self-made silver powder, different particle diameter grades to realize the shrinkage of controllable.

Other paste

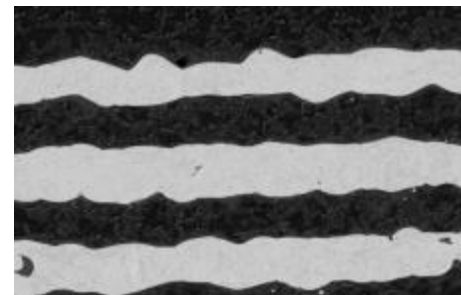


self-made paste



Advantage: the grains of the self-made paste after sintering are larger, more uniform and less rough.

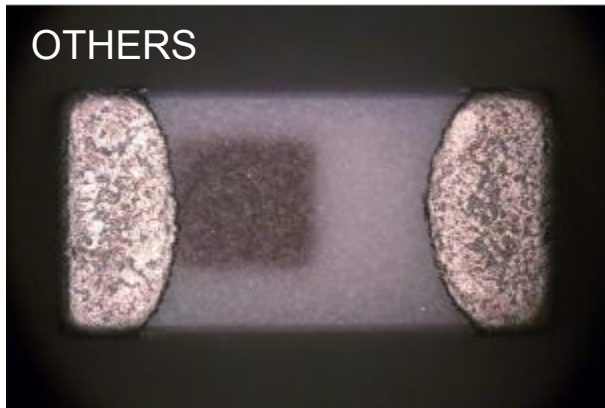
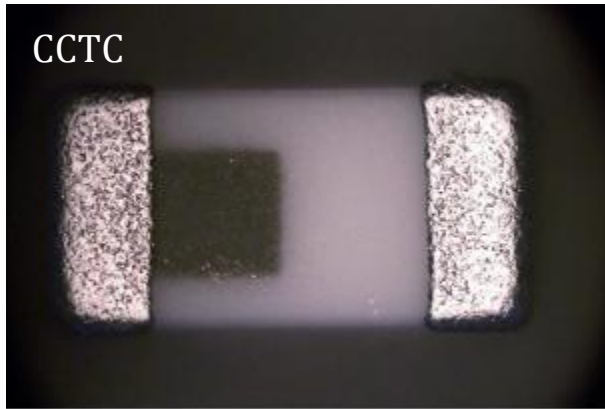
Products with other Paste products with CCTC self-made Paste



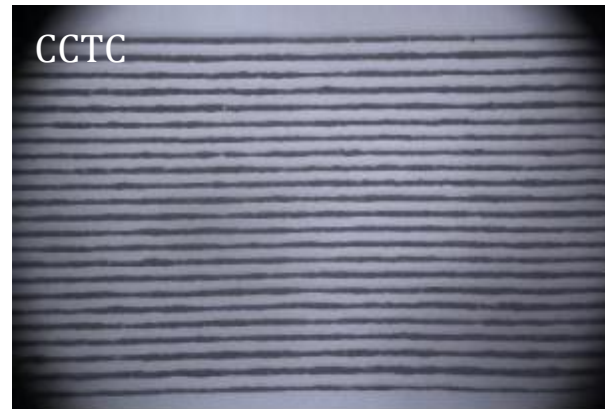
Advantage: products made with CCTC self-made Paste have better straightness, consistency and fewer loss

2. Quality Assurance (QA)

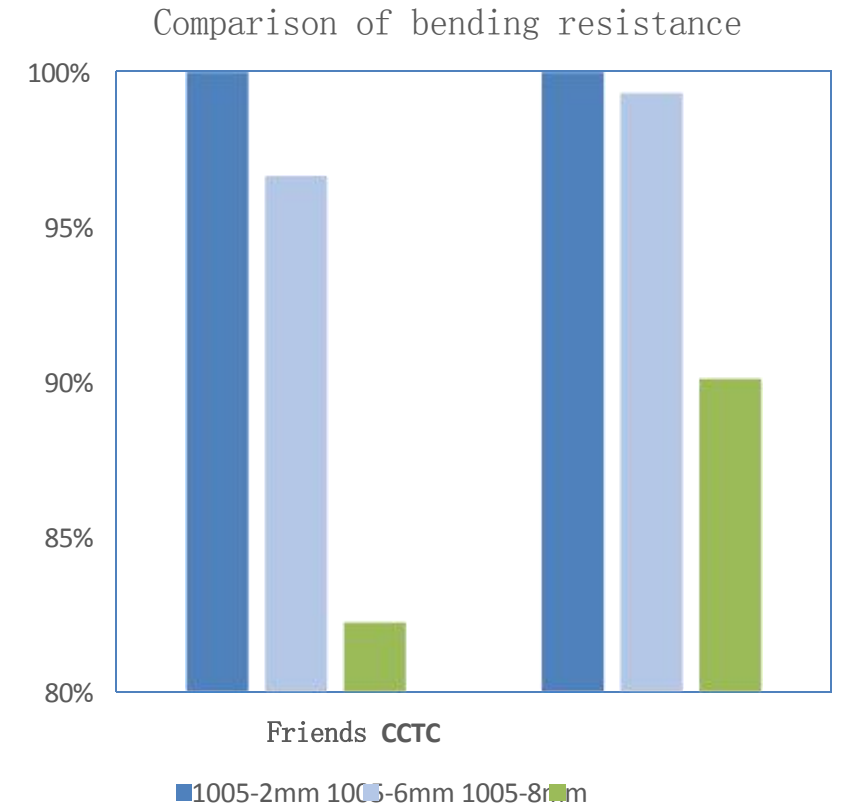
Product Advantages



**Smooth appearance
without protrusions**

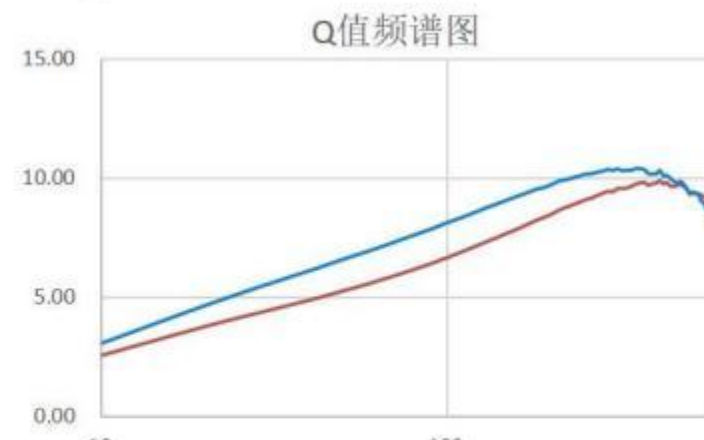
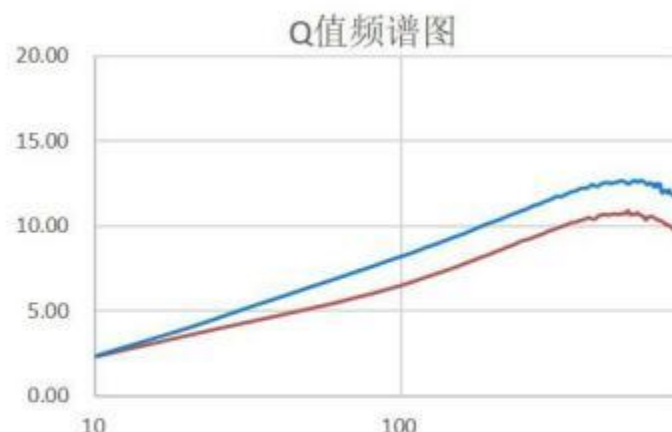
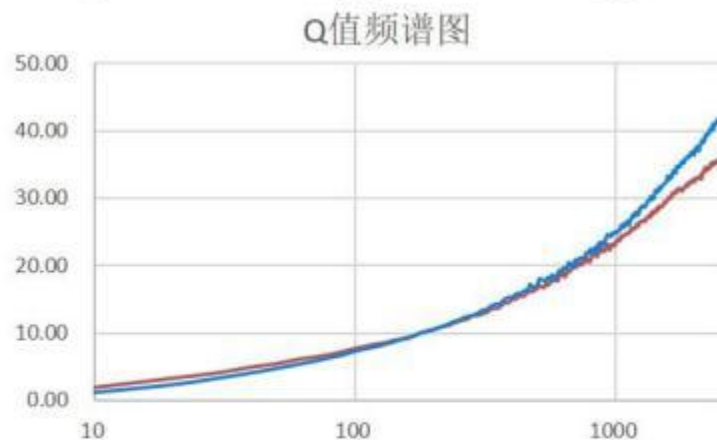
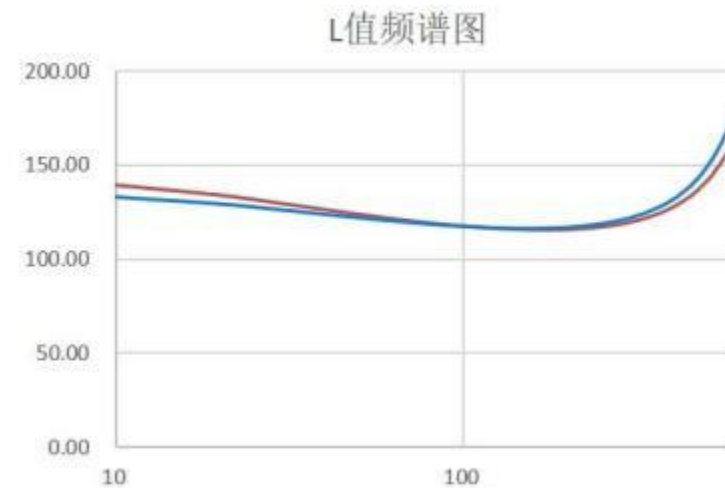
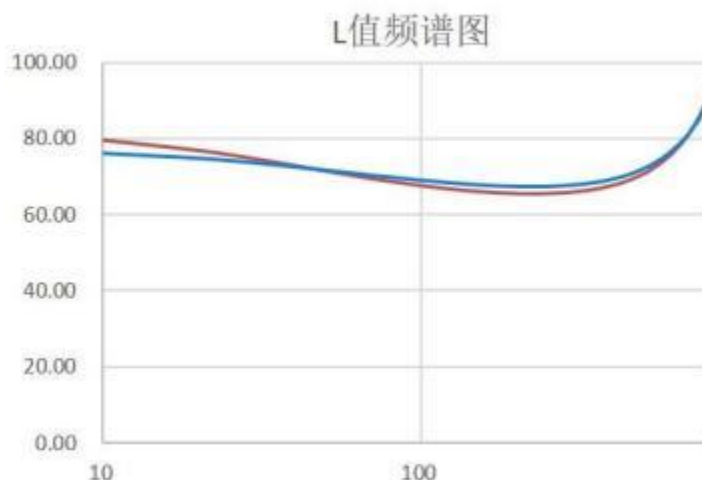
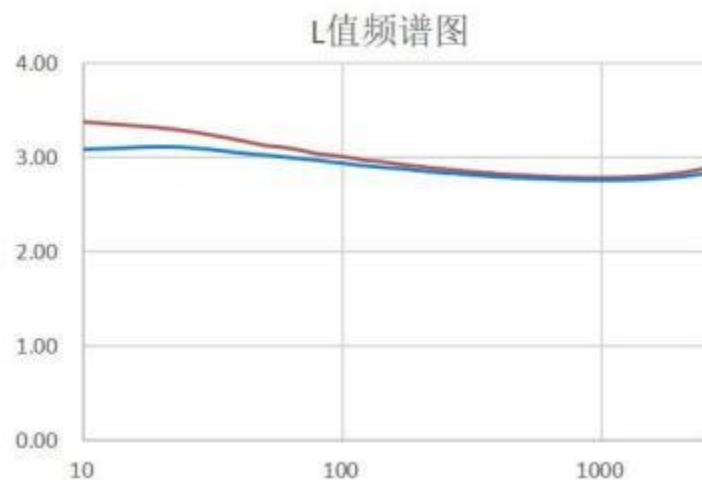


Excellent microstructure



Excellent mechanical properties

Electrical Performance Comparison



— 友商 — CCTC

— 友商 — CCTC

— 友商 — CCTC

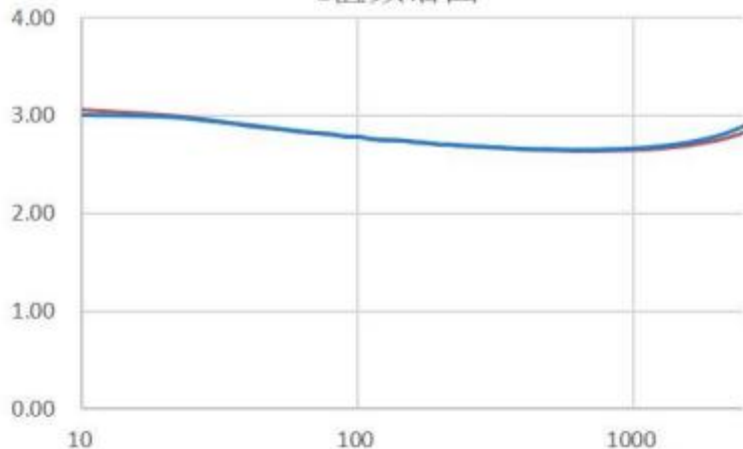
0603-2.7nH 0603-68nH

0603-120nH

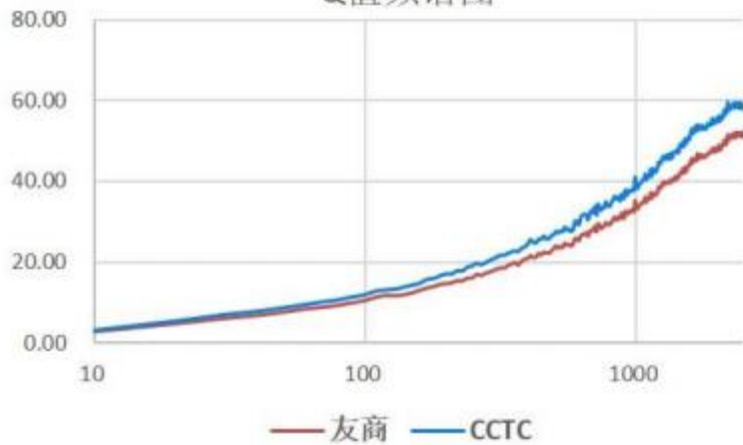
Excellent high frequency Q value. Low loss and high efficiency.

Electrical Performance Comparison

L值频谱图



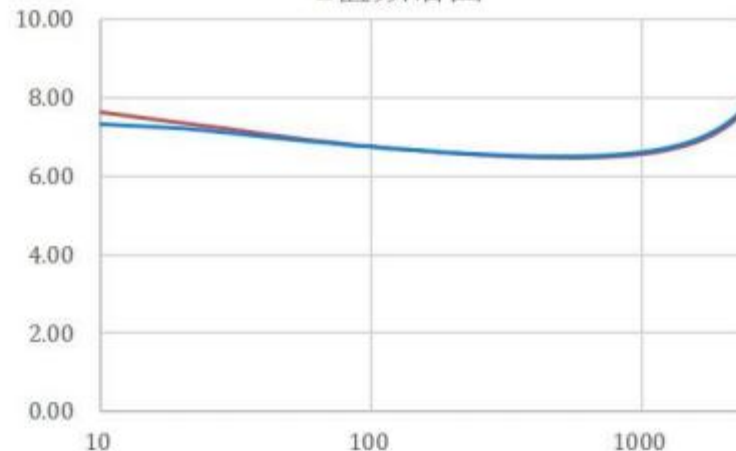
Q值频谱图



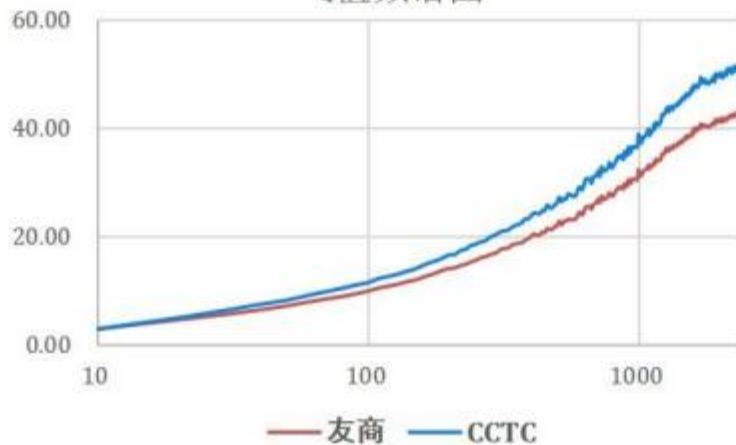
1005-2.7nH

0603-68nH

L值频谱图

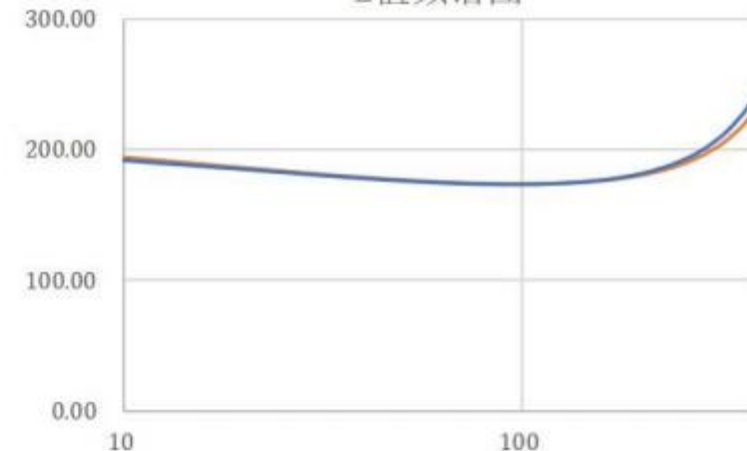


Q值频谱图

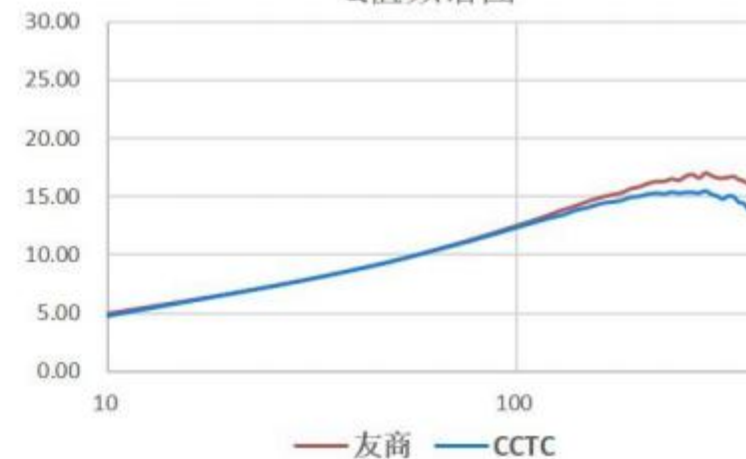


1005-6.8nH

L值频谱图



Q值频谱图

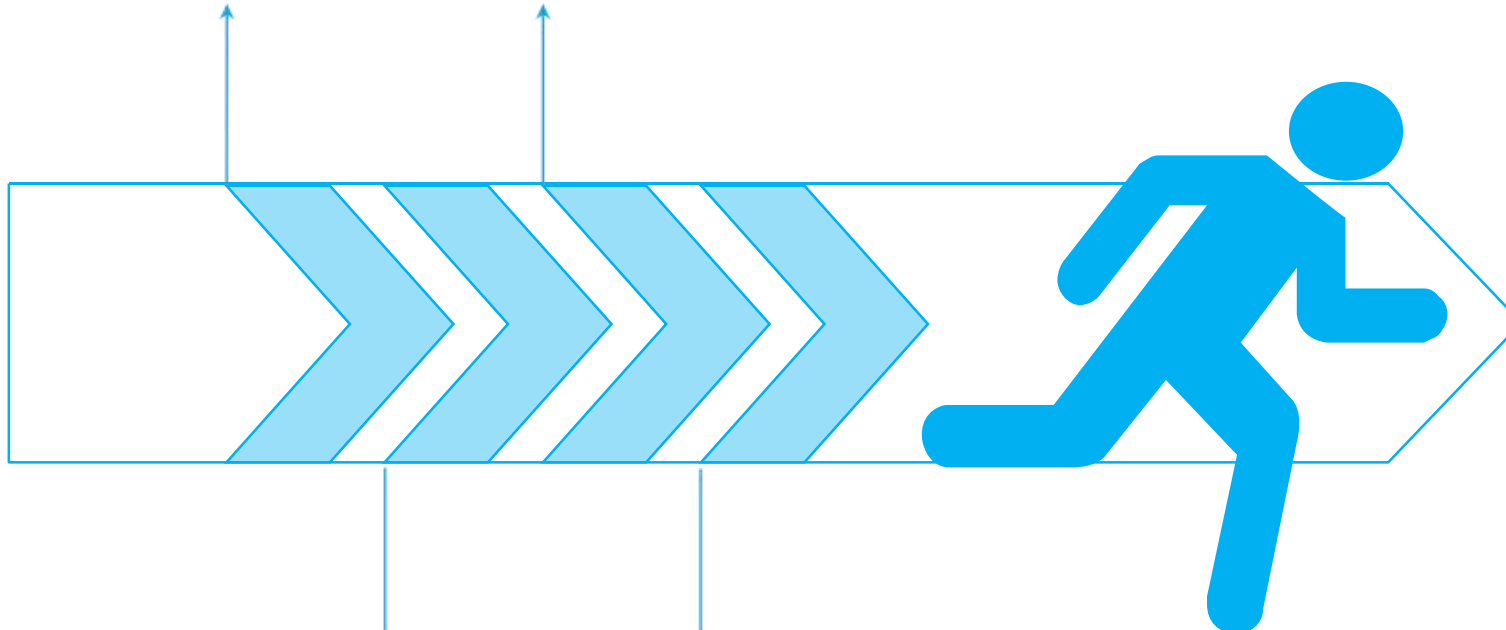


1005-180nH

Excellent high frequency Q value. Low loss and high efficiency.

Rapid response to customer complaints

Free assistance in analysis



Professional MLCI training

Local-based assistance for improvement

Customer Complaint Response

Response time to customer: 1 working day

Initial response time: 3 working days

Final response time: 5 working days

Assistance in analysis

With a wealth of expertise and advanced equipment, we can assist our customers in analyzing their products.

Professional training

For new customers, training on MLCI products is available.

Custom development

On-site technical support is available upon request.

3. Technical Capability

R&D capability

- CCTC-Research Institute has **more than 1,700 R&D team members**, including doctors, masters and senior engineers, **and more than 1,100 design team members**, which has a complete set of scientific research modes, such as technology research and development, technology service, technology management, and results transformation.
- At the same time, **seven academicians of the two academies** and **a number of experts in related disciplines** to form a scientific and technological expert committee, hundreds of well-known experts from the United States, Japan, Europe and South Korea to serve as a technical adviser, in order to better lead a new trend.
- With a **postdoctoral workstation**, it strongly supports the national policy of talent cultivation and gives postdoctoral talents to continue their research.



Chaozhou Sanhuan Research Institute



Nanchong Sanhuan Research Institute



Shenzhen Sanhuan Research Institute



Deyang Sanhuan Research Institute



Chengdu Sanhuan Research Institute



Suzhou Sanhuan Research Institute

Pilot Scheme Center

Test&Analysis Department

Inorganic Materials Department

Paste R&D

Mechanical& Automation R&D

Chemical R&D

Expert Team

Coating R&D

External Collaborative Department

New R&D Base

Analysis capability



ICP-OES
Compositional
Characterization



FE-SEM
Morphology +
Elemental
Characterization



FIB
Nanothin
Sectioning



XRD
Physical Phase
Characterization



EPMA
Microprobe

- CCTC-Research Institute has formed a professional R&D base with perfect R&D management mechanism, complete facilities and reasonable talent structure team.
- The test and analysis office of the research institute is equipped with advanced test and analysis instruments and experimental equipments such as TEM, FIB, EPMA, FE-SEM, XRD, ICP-OES, electronic universal material testing machine etc., which basically meet the needs for all the material performance analysis in the R&D and production of new products.

Product Analysis Capability - TEM Analysis

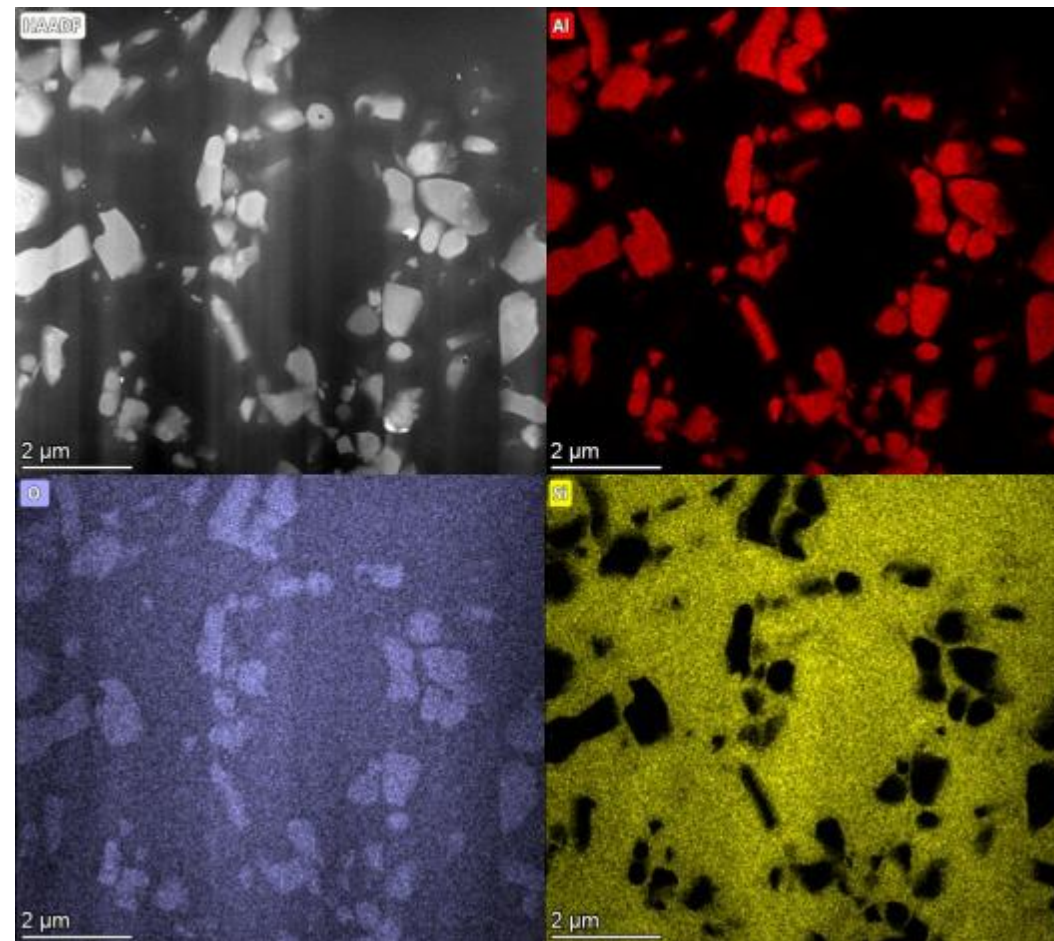
TEM

Analysis Ability

- Microzone (nanoscale) analysis.
- Detecting fine structure smaller than 0.2nm that can not be seen under an optical microscope.
- Equipped with wave spectrometer (wavelength dispersive X-ray spectrometer)



Analyze the image schematic



Product analysis capabilities

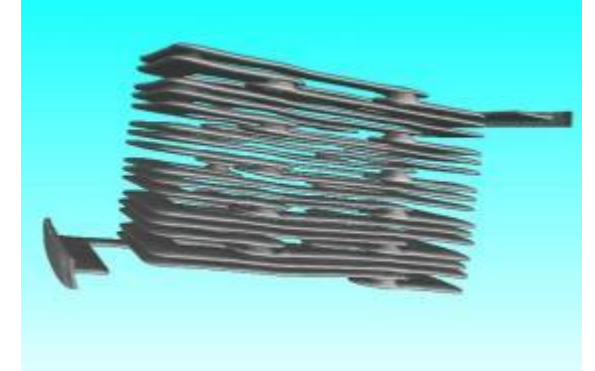
-- 3D-Xray Analysis



2D Analysis



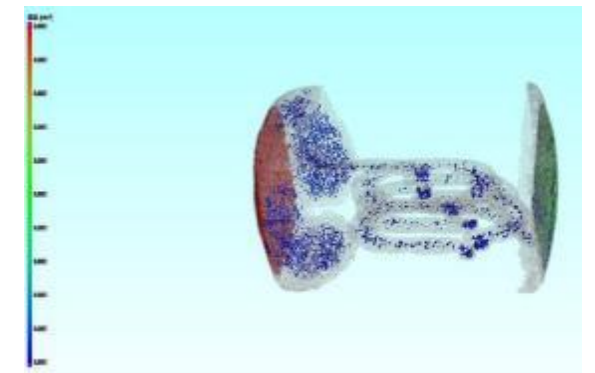
3D Reconstruction



Defect Finding



Pore Calculation



4.Future Planning

Future Planning - Specification Coverage & Capacity Enhancement

High-frequency inductors

Mass production of multi-specification magnetic beads

Mass production of thin-film type

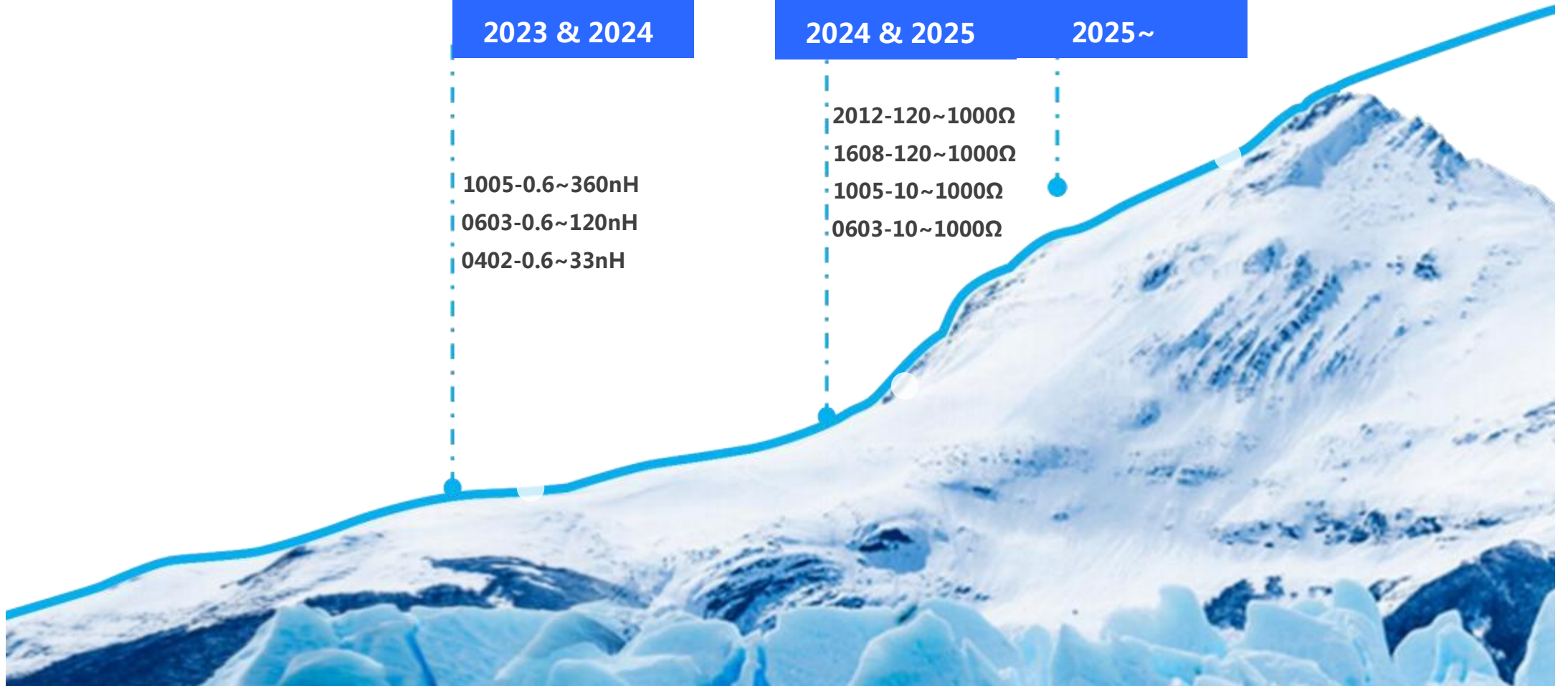
2023 & 2024

2024 & 2025

2025~

1005-0.6~360nH
0603-0.6~120nH
0402-0.6~33nH

2012-120~1000Ω
1608-120~1000Ω
1005-10~1000Ω
0603-10~1000Ω



THANK YOU!



三环集团

— SINCE 1970 —