

福建省乔光电子科技有限公司

Fujian Qiaoguang Electronic Technology co., ltd

FTR

Advanced Material Innovation Leader

开拓

创新

共赢

引领

<https://wfyearsemi.com/brand/ftr/>

前言

Fujian Qiaoguang Electronic Technology Co., Ltd. is a professional manufacturer of varistor and related passive components for 15 years. Located in Zhangping City, Longyan City, Fujian Province!

It has won the title of "National high-tech Enterprise", "Fujian Province Specialized and special new Technology Enterprise", "Fujian Province Science and Technology Small Giant Enterprise", "Fujian Province Science and Technology Small and medium-sized Enterprise" and so on.

The company focuses on the production of zinc oxide varistor (MOV) main products, the production scale of zinc oxide consumption of about 200 tons per month, ranking the world's top 3.

Company profile

Fujian Qiaoguang Electronic Technology Co., Ltd. also has passive protection components related to **TVS** transient suppression diode, **GDT** ceramic gas discharge tube, **SPG** glass gas discharge tube, **PPTC** self-recovery fuse, **TMOV** overheat protection varistor, **NTC** negative temperature coefficient thermistor and other related products. To provide customers with over voltage over current and other supporting passive components support and services.

CATALOG

01



Company profile

02



Development experience

03



Product introduction

04



Technological innovation

05



Customer group

06



Quality assurance

07



System VS safety

08

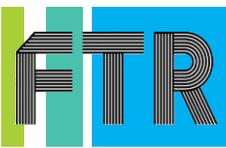


Honor VS qualification

About the Company

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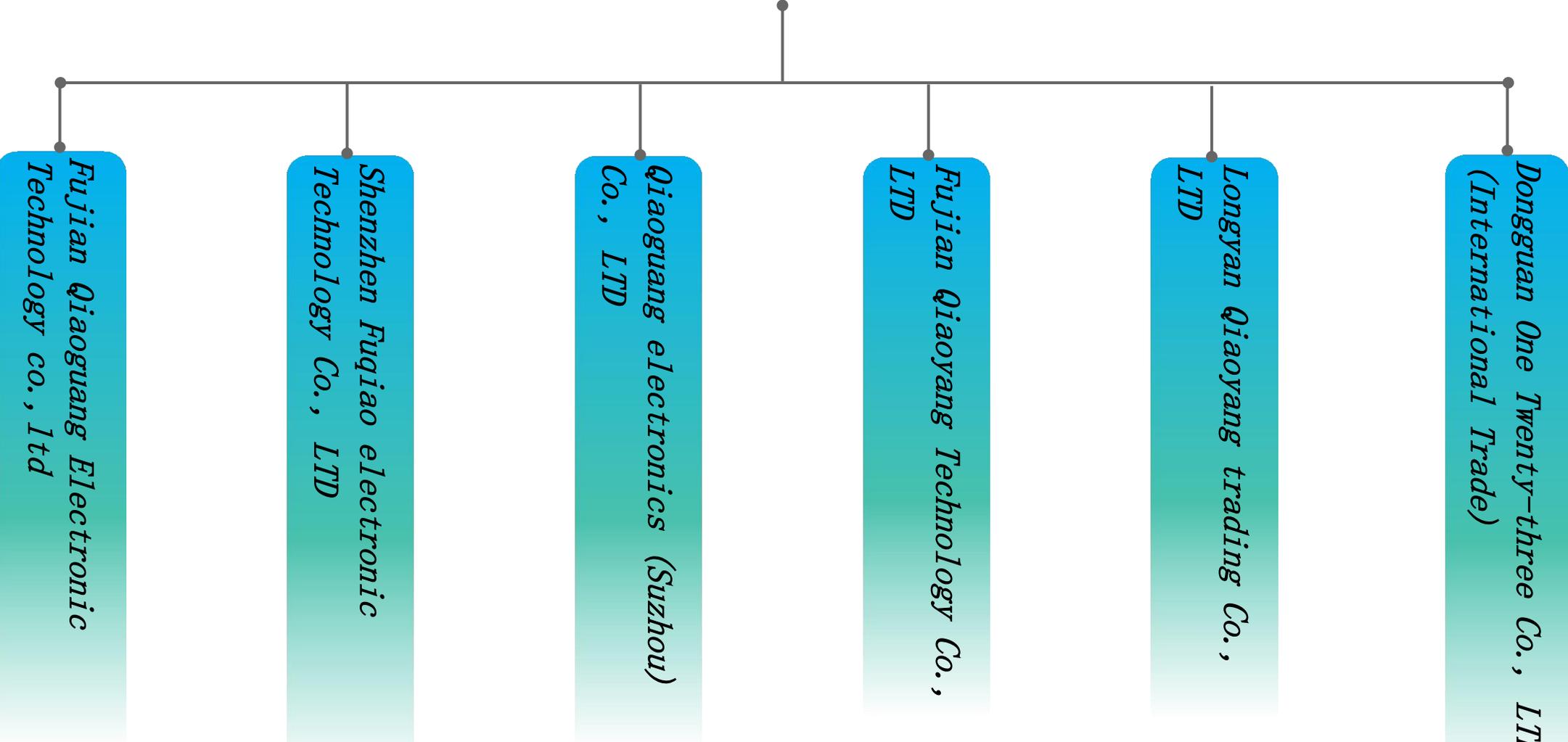
Construction and production scale



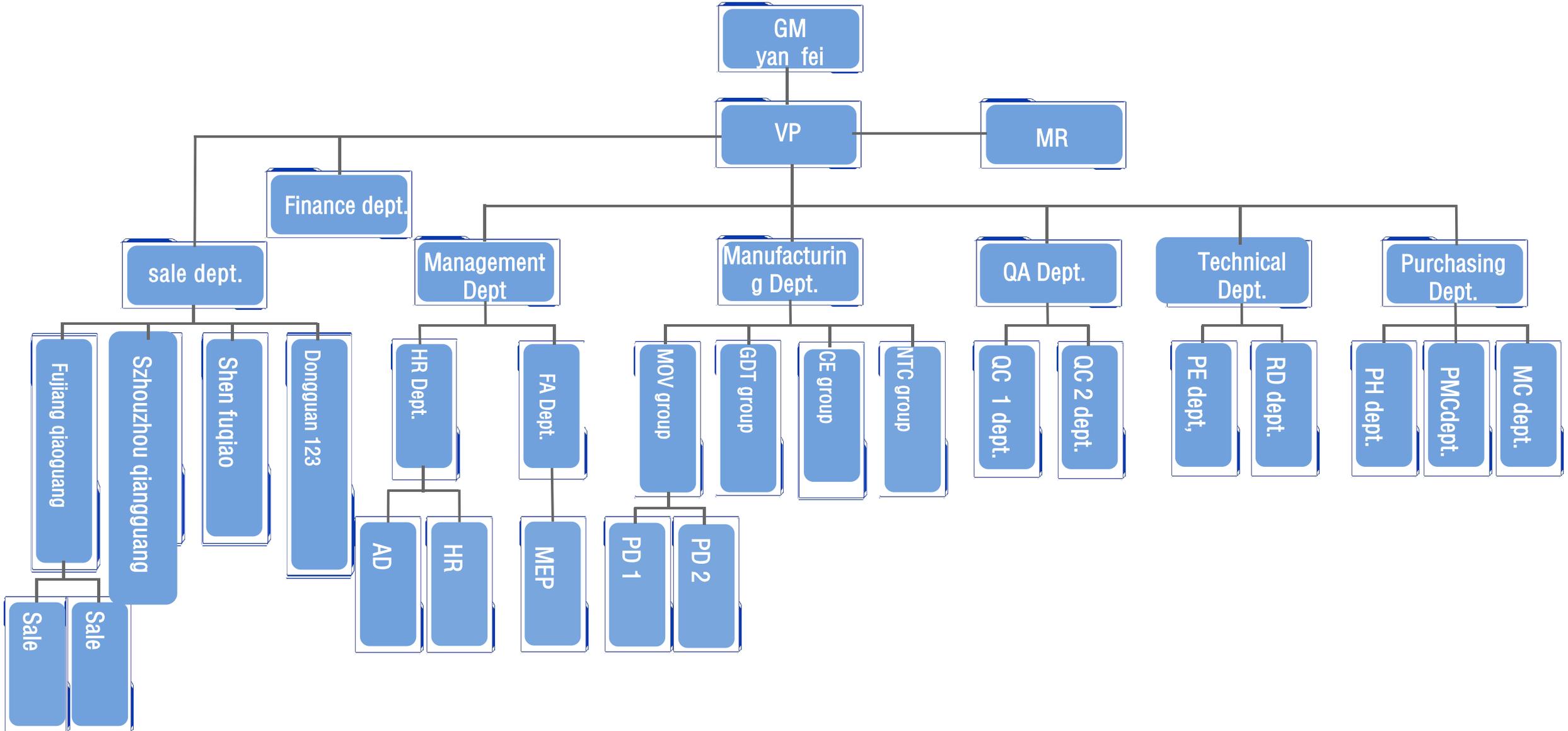
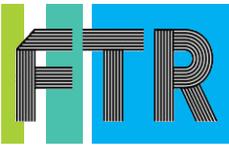
- ◆ The first phase covers an area of 17,425m² construction area of 25,000m²
- ◆ The second phase of the construction of the reserved land area of 29,718 m²,
Number of people 200.
- ◆ Varistor production line 16 automatic lines, 3 fully automatic production lines,
monthly capacity: 95kkpcs/M
- ◆ GDT ceramic gas discharge tube production line 2, monthly capacity:1.5kkpcs/M
- ◆ TMOV overheat protection varistor production line 1, monthly capacity:3kkpcs/M
- ◆ NTC thermistor production line 2, monthly capacity:15kkpcs/M
- ◆ 5 production lines of conductive thermal adhesive (film), monthly
capacity:100Tons/M
- ◆ Other product lines:.....

Organizational structure

FTR *Fujian Qiaoguang Electronic Technology co., ltd*



Department organization chart



Development history

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公司发展历程



2009

乔光电子
深圳工厂成立

2009

2013

2013
乔光电子东莞工厂成立

2017

2017
国家高新技术企业认证通过

2019

- FTR注册商标转福建乔光
- 东莞/深圳/上海销售公司成立
- 获得CQC/UL/CUL/VDE铜电极压敏安规认证

2017

2013

2014

2014

2014
东莞工厂通过
ISO9001体系认证

2018

2018

2018
福建工厂
筹建项目部成立

2020

2020

- 获得GDT产品UL安规认证
- 2月乔光福建总公司建成投产

2022

- 国家级高新技术企业
- 通过福建省绿色工厂
- 福建省“专精特新”中小企业
- 通过年度诚信经营先进单位
- 年度龙岩市守合同重信用企业

2019

2021

2021

- 深圳福乔销售公司成立
- GDT陶瓷气体放电管产品事业部成立
- 福建省乔扬科技有限公司成立(主营导电胶/导热胶)
- 福建省乔扬电子有限公司成立(MOV自动化生产线/NTC生产线)
- 中国第十届创新创业大赛入围福建省半决赛,获优秀企业称号
- 国家级科技型中小企业
- 福建省科技小巨人企业
- 通过GJB9001C-2017武器装备质量管理体系认证
- 通过ISO50001:2018能源管理体系认证
- 通过ISO14001:2015环境管理体系认证
- 通过ISO45001:2018职业健康管理体系认证
- 获得UL/CUL/CQC/TUV NTCR热敏电阻安规认证

2023

- 通过IATF16949汽车行业质量管理体系认证

2023

2022

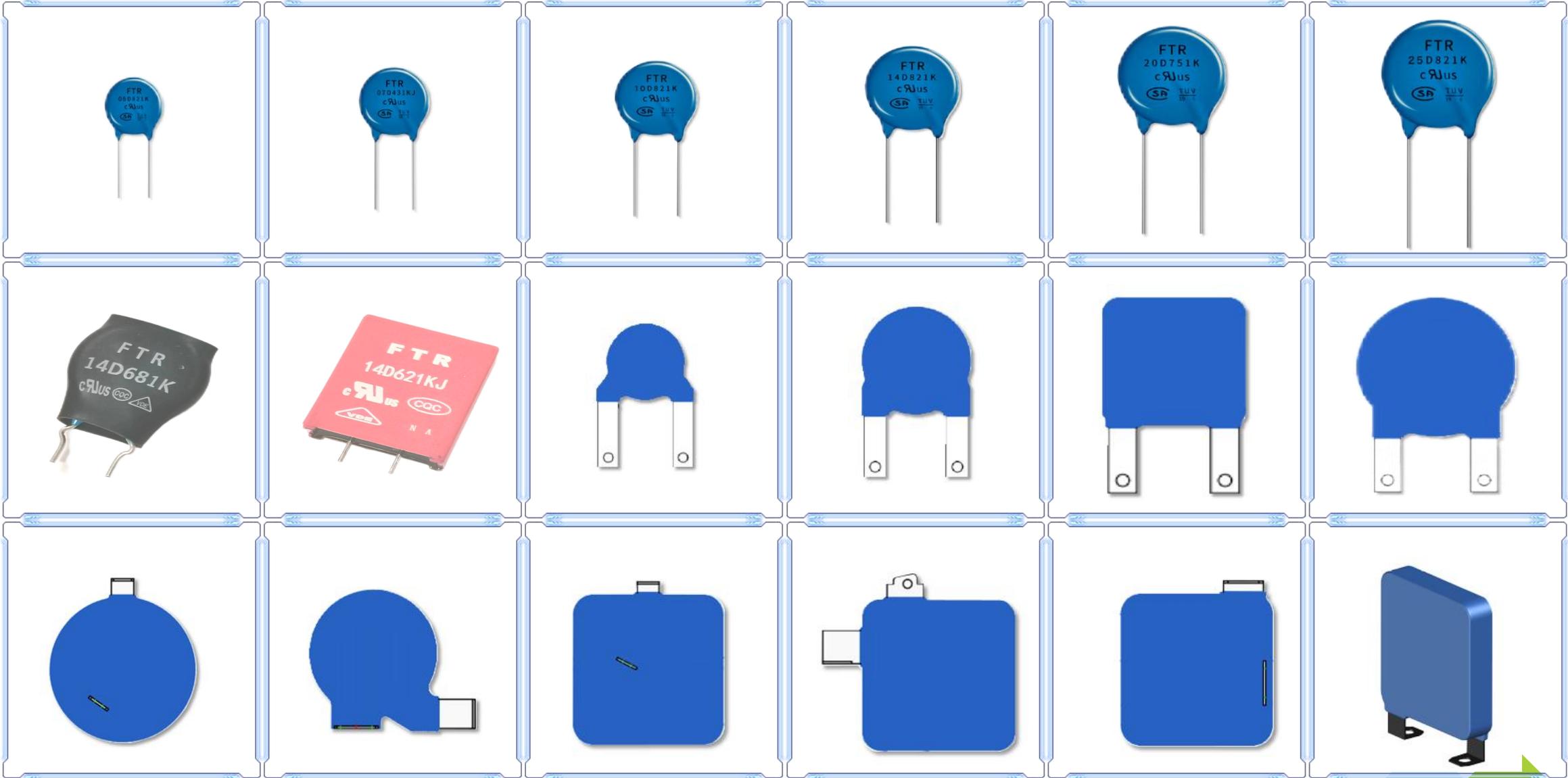
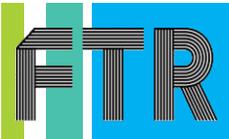
2021

2021

Product Introduction

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Major Product: **MOV** Metal Oxide Varistor Series (Top 3 in China)



GDT

Gas Discharge Tube



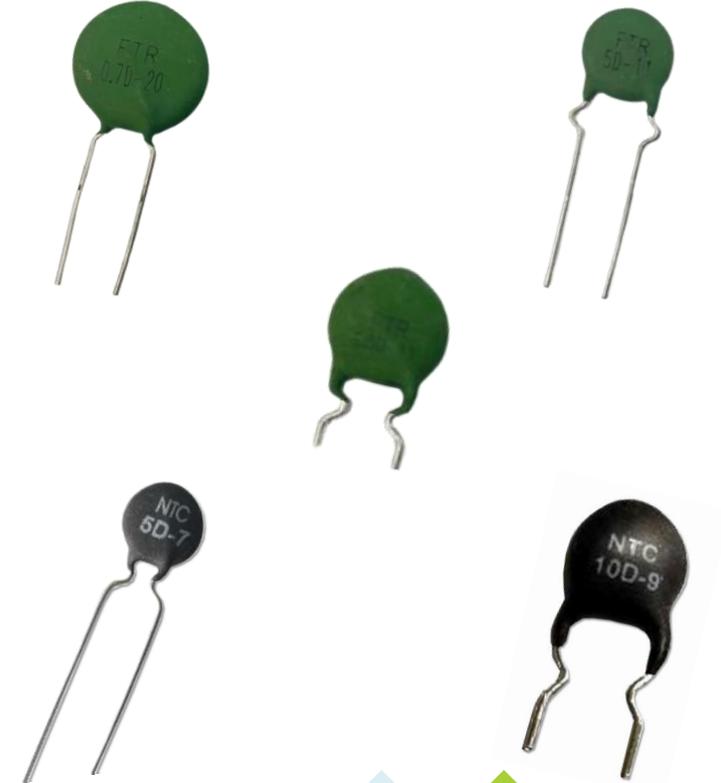
TMOV

Thermal Protected Varistors

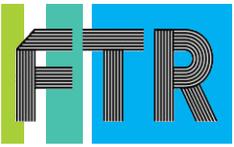


NTC

Negative Temperature Coefficient Resistance

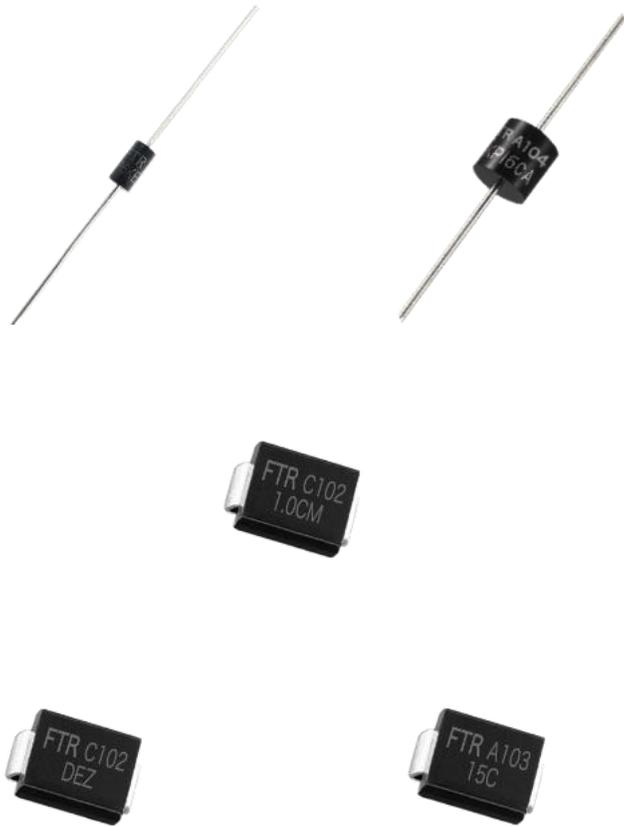


Major Product:

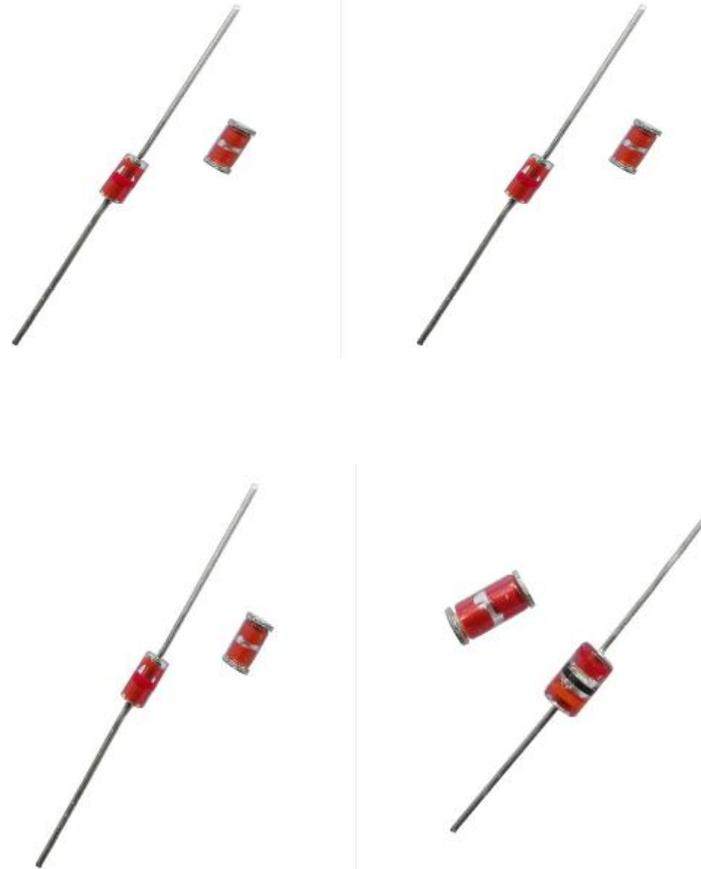


TVS

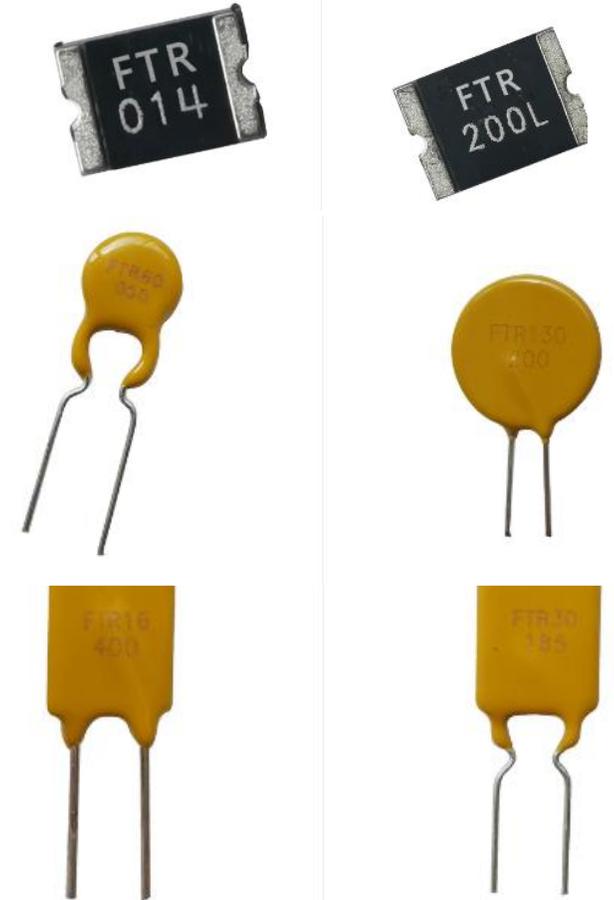
Transient Voltage Suppressors



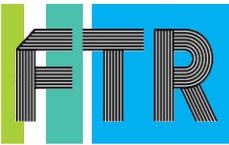
SPG Spark Gap



PPTC Polymeric Positive Temperature Coefficient



MOV Varistor product use introduction



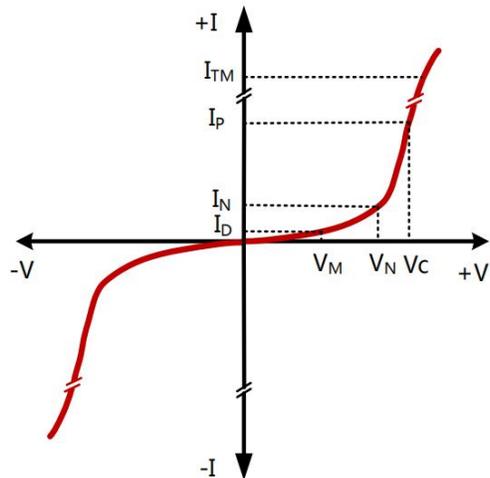
Product name

Product function

Product use

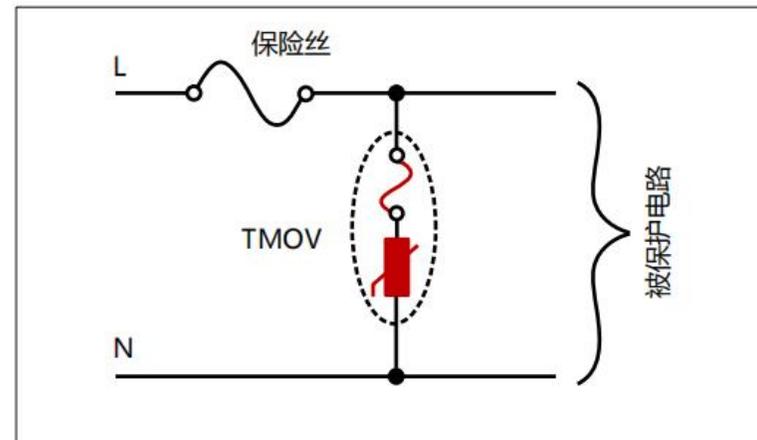
Metal oxide varistor MOV

Changes as the voltage applied to the product changes, A ceramic electronic component belonging to a semiconductor

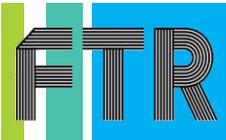


Absorb unstable current and voltage waves, Protect electronic devices from instant lightning, The unstable voltage and current waves in the electronic circuit are not destroyed

Military, civil, household appliances, wind power, solar power, large power stations and other fields, there must be a varistor



Varistor product selection introduction



V_{1mA}

压敏电压选择时要考虑电源电压波动、压敏电阻电压精度、压敏电阻的老化系数等因素，如下为压敏电阻经验选型公式：

$$V_{1mA} \geq \frac{(1+a)}{(1-b)(1-c)} \cdot V_P$$

a: 电源波形系数 (0.1~0.5)

b: 压敏电压公差 (0.1~0.2)

c: 压敏电阻老化系数，一般取0.1

V_P : 电源输入电压峰值

如对 $110V_{AC}$ 输入保护，MOV 电压按照上述公式计算如下，压敏电压应选取范围为 $211V \sim 249V$ 。

如对 $220V_{AC}$ 输入保护，MOV 电压按照上述公式计算如下，压敏电压应选取范围为 $423V \sim 499V$

压敏电阻电压选的越低，MOV 越容易误动作，使用寿命也越低。

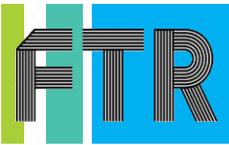
$$V_{1mA} \geq \frac{[1 + (0.1 \sim 0.3)]}{(1 - 0.1)(1 - 0.1)} * 110 * 1.414 = (211 \sim 249)V$$

一般 $V_{1mA} = 1.5V_p = 2.2V_{AC}$ (V_p 是电路额定电流的峰值， V_{AC} 是额定交流电压的有效值。)

如家用额定电压是 $220V_{AC}$ 则； $V_{1mA} = 1.5V_p = 1.5 \times \sqrt{2} \times 220 = 467V$ ；因此 V_{1mA} 值可选；

$V_{1mA} = 2.2V_{AC} = 2.2 \times 220 = 484V$ ；可在 $470 \sim 484V$ 之间选择，即 $471K$ 的规格！

MOV Varistor applications



The main products are used in household appliances, lighting, power drive, high voltage power station, new energy charging pile, photovoltaic, wind power and so on



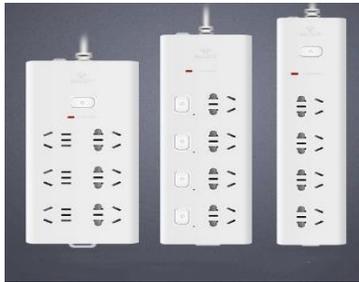
Household appliance



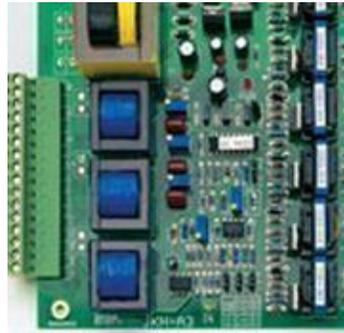
Communication equipment
intelligent lighting



New energy vehicle
charging pile



Charging switch



All kinds of AC and
DC power drivers



High voltage
power station State
Grid

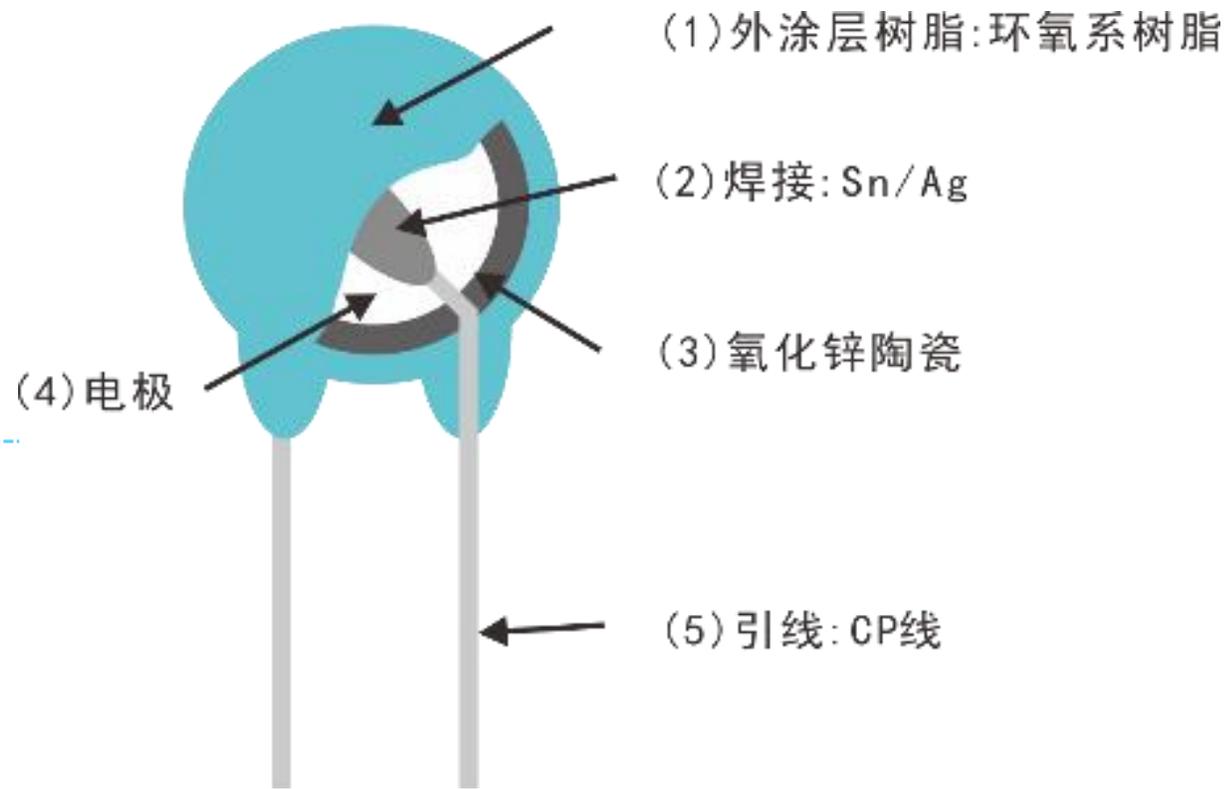
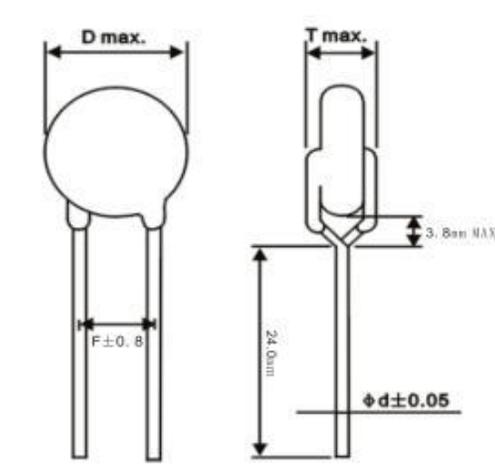
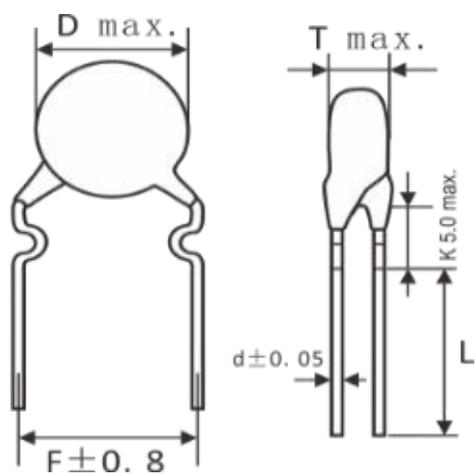
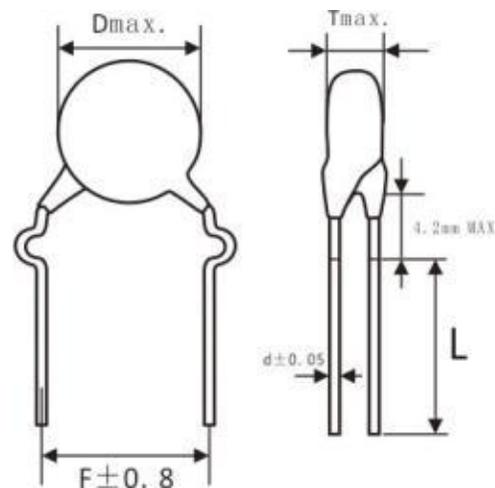
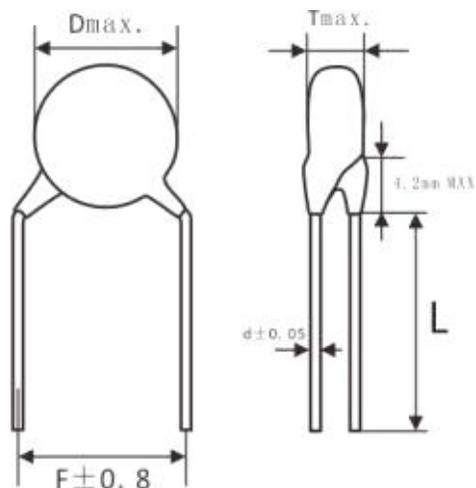


Electricity,
photovoltaic power
generation, etc

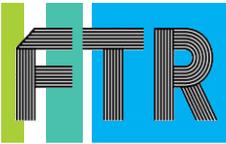


Technological innovation

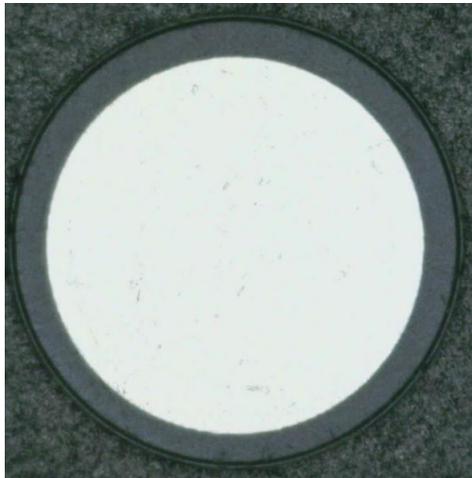
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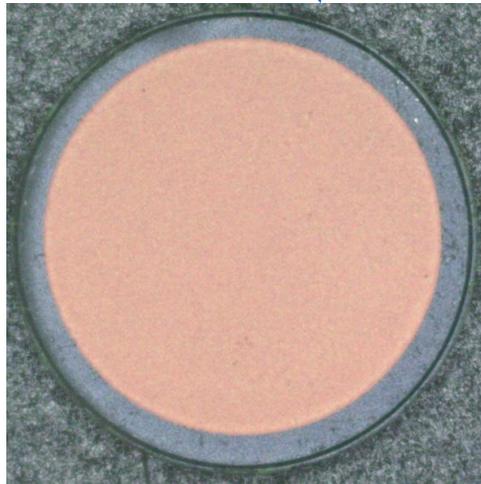
FTR MOVVaristor technology innovation



MOV Body



Conventional silver electrode



New copper electrode

As a ceramic electrode material, copper electrode has been a relatively mature application in the capacitor industry. Due to the competitive cost pressure, more capacitor manufacturers have already transformed to low-cost base metal copper electrode materials instead of precious metal silver electrode materials.

But in the varistor industry, due to the limitations of technical barriers, the key point is the ceramic body formula and copper burning process control technology, at present, only a few of the manufacturers of precious metal silver electrode conversion base metal copper electrode success, and with the printing process, Japan TDK (Epcos) belongs to the conversion of copper to replace silver earlier and more successful manufacturers, other household copper to replace silver, more with vacuum sputtering and spray copper replaced, Qiaoguang electronic technology is the earliest successful domestic enterprises silver to copper electrode professional factory, the use of independent research and development formula with copper electrode successfully.

Silver electrode

1, screen printing machine
2, air burning silver stove

The process is relatively simple and the technical content is not high

Easy to restore, low equipment cost, low electrode resistivity

High cost, multiple impact life is short, silver electrode is easy to form electrode edge tip discharge effect, the product is easy to fail

Electrode plating equipment

Technical threshold

advantage

shortcoming

Copper electrode

1, screen printing machine
2, nitrogen protection copper furnace

Advanced process technology, the same industry control is not much, because the electrode needs to cooperate with the ceramic formula, the formula is key

Low cost, copper electrode edge without tip discharge effect, product quality multiple impact long life

Difficult to reduce, the need for nitrogen protection of copper burning, equipment costs a high input



Vacuum sputtering

advantage

Low production material cost, Fine electrode particle

shortcomin

Expensive equipment and high maintenance costs,
Thin electrode layer, high quality risk,
production efficiency is not high
The surface is in physical contact,
which has reliability risks

Copper spraying

Low production material cost
Low equipment cost

The electrode layer is rough, the thickness is uneven, and the quality risk is great
The production efficiency is not high, the product yield is poor
The surface is in physical contact,
which has reliability risks

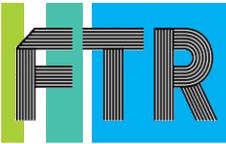
printing

High production efficiency,
good quality consistency,
High product life, surface contact

High cost of production materials
High requirements for formulation and production process control



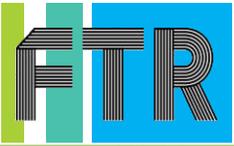
FTR Varistor technology innovation(Silver VS Copper electrode)



Spec.		FTR14D561K Parallel comparison							
Batch		KG00634							
Type		Silver electrode				Copper electrode			
		Offset(%)		cycles	Remark	Offset(%)		cycles	Remark
		Positive	Negative			Positive	Negative		
6KV/3KA 40次	avg	3.51	1.43	40 OK	6KV3KAadd to 350VAC/30S standard <±10%	7.04	2.81	40 OK	6KV3KAadd to 350VAC/30S standard <±10%
	max	4.32	2.06	40 OK		7.16	3.00	40 OK	
	min	3.00	1.12	40 OK		6.79	2.62	40 OK	
6KV/3KA 80次	avg	-5.61	-6.12	80 OK		5.24	3.54	80 OK	
	max	-8.12	-8.56	80 OK		6.01	4.65	80 OK	
	min	-4.56	-5.12	80 OK		4.24	3.24	80 OK	
6KV/3KA 120次	avg	-18.19	-19.13	120 NG		1.13	2.01	120 OK	
	max	-21.34	-23.14	120 NG		3.12	2.34	120 OK	
	min	-16.75	-17.82	120 NG		2.13	1.34	120 OK	
6KV/3KA 160次	avg					-7.13	-8.02	160 OK	
	max					-8.98	-9.01	160 OK	
	min					-6.89	-7.65	160 OK	
6KV/3KA 200次	avg				-10.10	-8.02	200 NG		
	max				-12.12	-9.01	200 NG		
	min				-9.39	-8.55	200 NG		

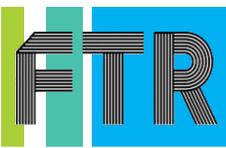
Remark:Under the same test conditions, under multiple current shocks, the copper electrode can effectively avoid the tip discharge effect under current shocks and avoid the continuous current impact deterioration of zinc oxide ceramic body, showing an absolute advantage over the silver electrode due to the edge tip discharge impact on the edge of the porcelain body caused by porcelain body deterioration, so that the resistance to multiple current impact is better and the service life is enhanced!

FTR Varistor technology innovation(FTR vs Opponent)



规格	14D681K		20D681K			20D821K		
品牌厂家	乔光FTR (14D)	厂家1 (14D)	乔光FTR (16D)	厂家1 (16D)	厂家2 (18D)	乔光FTR (16D)	厂家1(18D)	厂家2 (18D)
电极材质	铜电极	银电极	铜电极	银电极	银电极	铜电极	银电极	银电极
规格型号	FTR 14D681KZW	TIEDA 14KAC420	FTR 20D681KZW	TIEDA 20KAC420S	MYG3 20K420	FTR 20D821KZW	TIEDA 20KAC510	MYG3 20K510
多次雷击测试条件	3KA+220VAC Sample Qty: 3pcs		5KA+220VAC Sample Qty:3pcs			5KA+220VAC Sample Qty:3pcs		
40cycles	OK	OK	OK	OK	OK	OK	OK	OK
80cycles	OK	OK	OK	OK	OK	OK	OK	OK
Remark		变化率 -9.2% max即将失效		变化率 -6.5% max	变化率 -6.3% max		变化率 -3.2%max	变化率 -8.1%max
120cycles	OK		OK	NG	NG	OK	OK	NG
Remark	变化率- 6.7%max		变化率- 7.2%max	变化率超标	1pcs81次脱皮 2pcs变化率超标	变化率-3.5% max	变化率- 9.03%max即将 失效	变化率超标
160cycles	NG		NG			OK		
Remark	1/3失效 变化率-11.0% max		1/3失效 变化率-11.7% max			变化率-8.5% max		
180cycles						NG		
Remark						变化率超标		
单次通流 I _{max}	6KA OK		10KA OK			10KA OK		

FTR Varistor technology innovation(FTR vs Opponent)



1, 14D681:

1.1:FTR Surge I_{max}:6KA OK

FTR Surge In 3KA+load , 120cycles OK, ≥ 160 cycles failed!

Opponent 1 Surge In 3KA+load, 80cycles OK, ≥ 80 次failed!

2, 20D681K:

2.1:FTR Surge I_{max}:10KA OK

FTR Surge In 5KA+load, 120cycles OK, 160cycles failed! Opponent

1 Surge In 5KA+load, 80cycles OK, 120cycles failed!

Opponent 2 Surge In 5KA+load, 80cycles OK, 120cycles failed!

3, 20D821K:

3.1:FTR Surge I_{max}:10K AOK

FTR Surge In 5KA+load, 160cycles OK, 180cycles failed! !

Opponent 1 Surge In 5KA+load, 120cycles OK, ≥ 120 cycles failed!

Opponent 2 Surge In 5KA+load, 80cycles OK, ≥ 120 cycles failed!

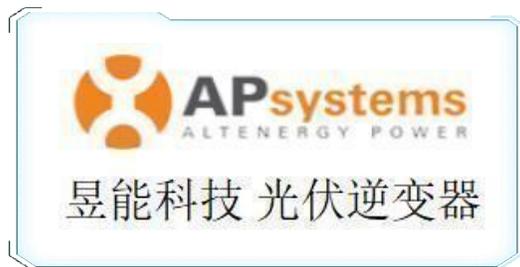
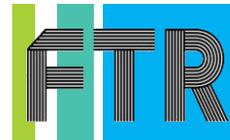
From Surge capacity comparison:
Qiaoguang FTR reliable performance through the current impact capacity than the other two manufacturers have absolute performance advantages



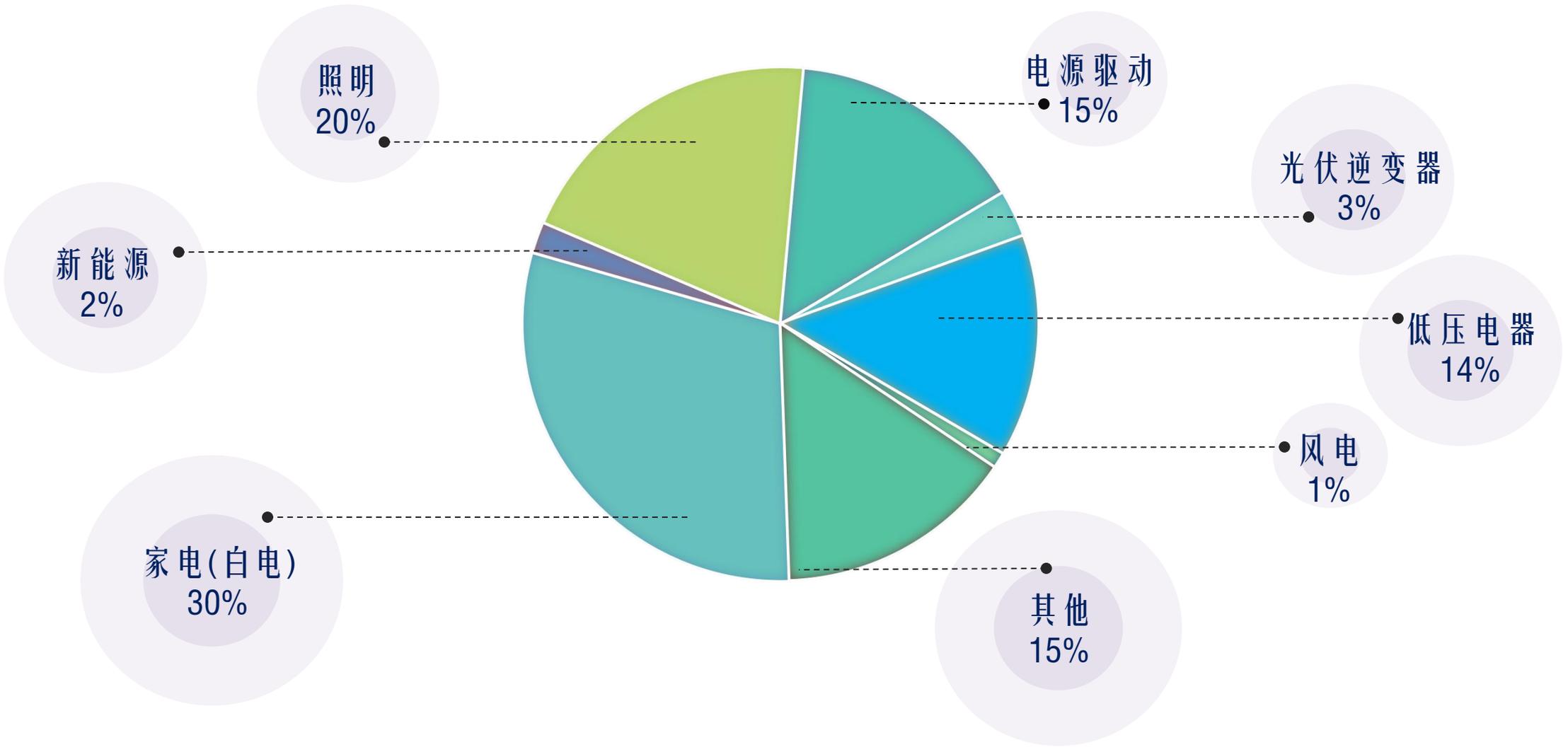
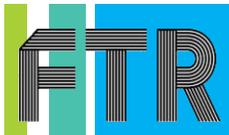
Customer group

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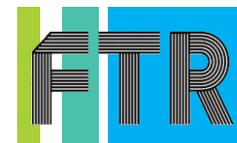
FTR Qiao Guang some cooperative customers



MOVVaristor product market share



FTR Varistor customer base distribution

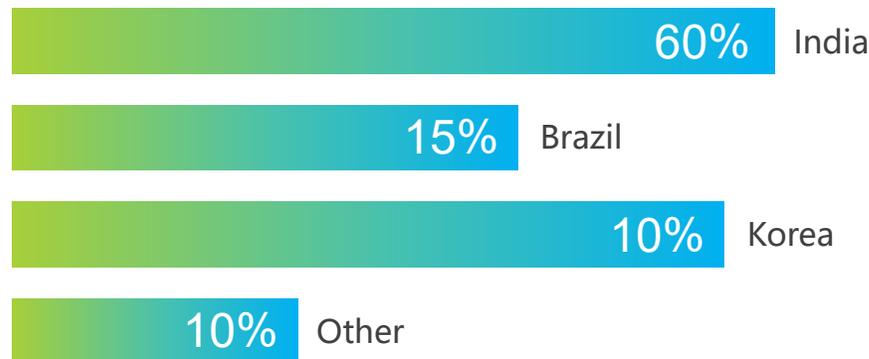
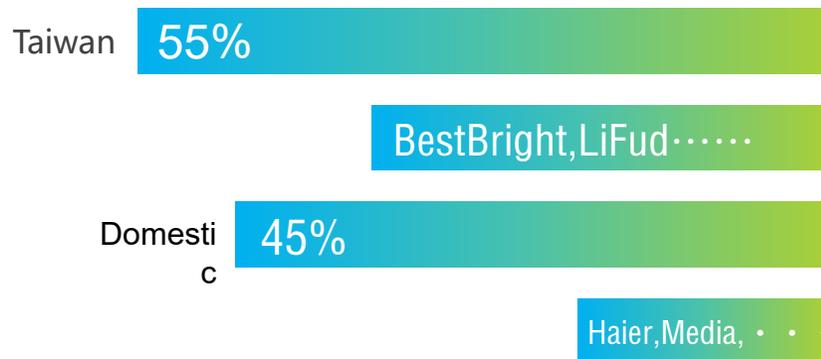


Domestic sales 80%

Export sales 20%

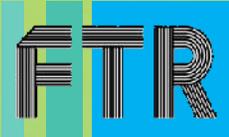
BestBright, Haier, Media, Tospo,
LiFud, TCL, Opple, AUX

Sumsang, LG, Dixon . Signify,
Embrestec, Ropla

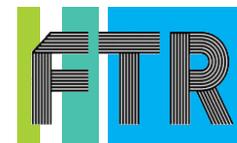


Qiaoguang electronic Technology Co., Ltd. varistor product production and sales at home and abroad, the industry production capacity ranks the top three, products exported to the Indian market, South Korea Samsung, Brazil, Italy, the main domestic representative customers are: Haier, Midea, TCL, Zhongli lightning protection, Opu lighting, Debang lighting, Chint electrical appliances, Yu Neng technology, Laiford, Bull, Hangzhou Panasonic and so on!

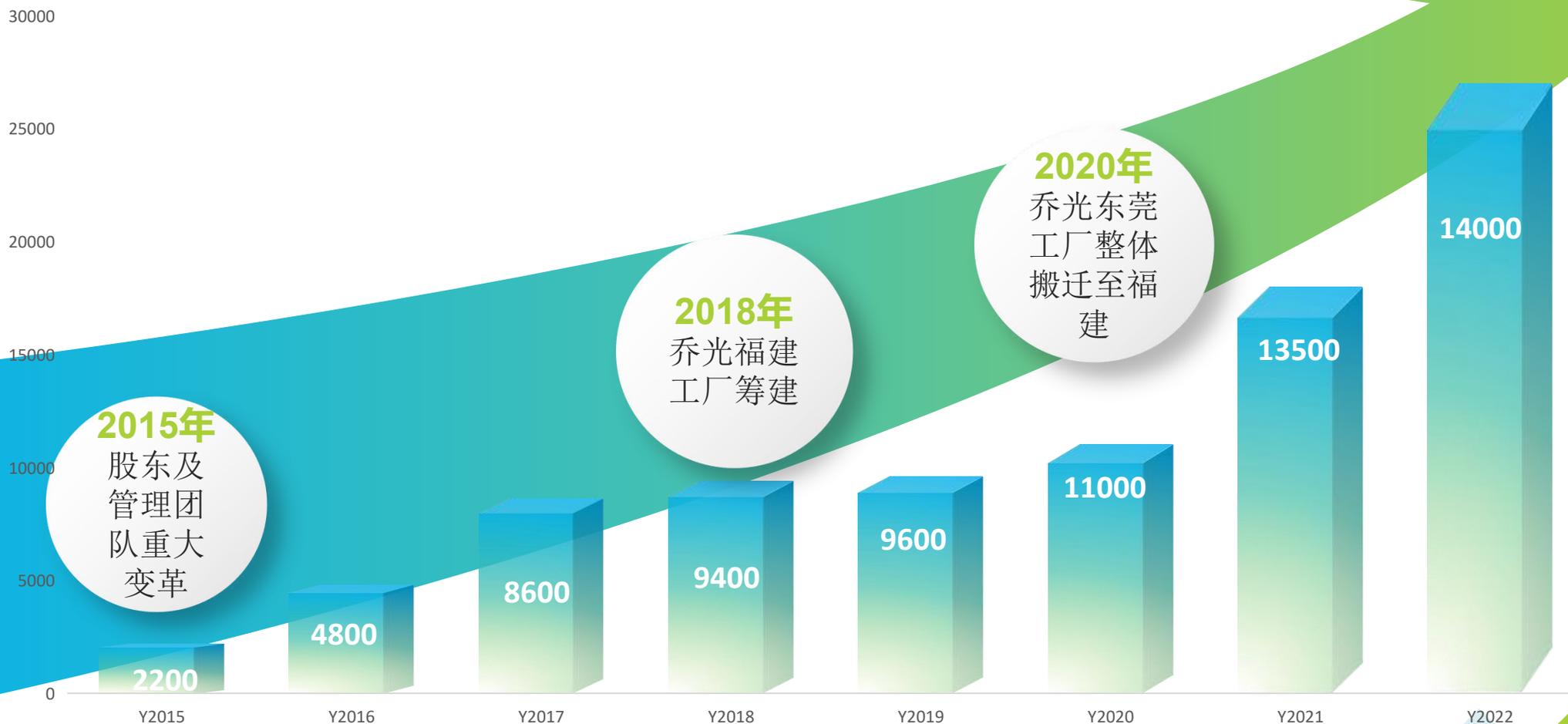
Sales and service network:



Qiao optoelectronic technology sales trend year by year



Sales amount/万元RMB



2015年
股东及
管理团队重大
变革

2018年
乔光福建
工厂筹建

2020年
乔光东莞
工厂整体
搬迁至福
建

■ 销售金额/万元RMB

Quality escort

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SPD热稳定测试仪



1.2/5us&20us组合波测试机
max:12KV/6KA



双85试验机





Rohs测试系统



125℃ 高温直流/交流老化测试机

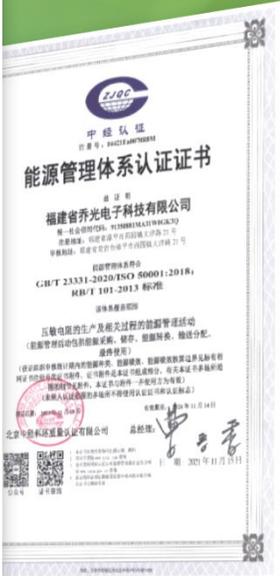
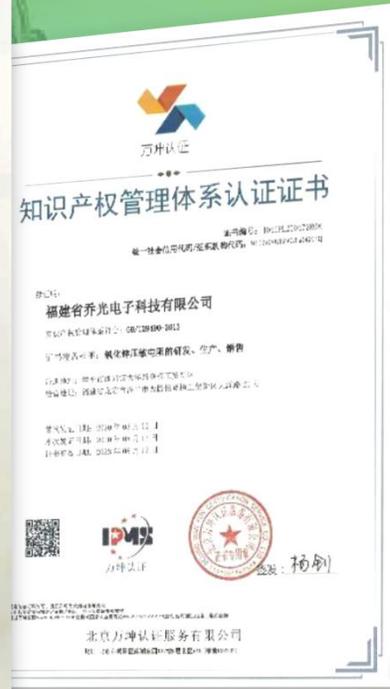
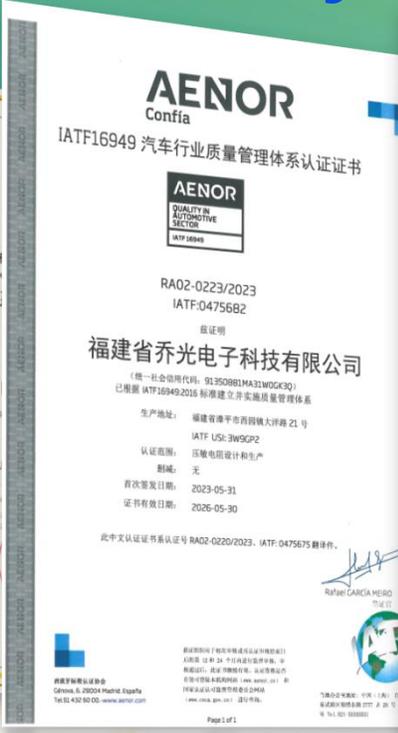
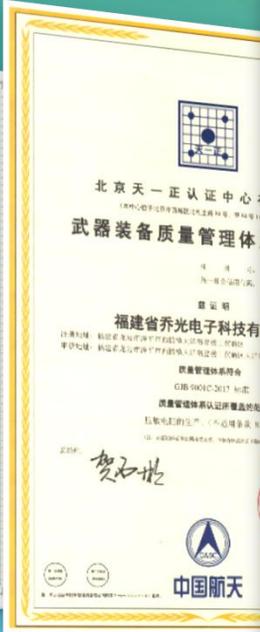
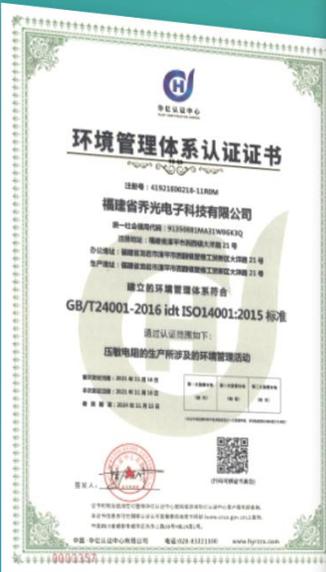


System and safety regulations

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System Certification

FTR



- ISO9001:2015 Quality management system
- ISO14001:2015 Environmental management system
- ISO45001:2018 Occupational health management system
- ISO50001:2018 Energy management system
- GJB9001C:2017 National military standard weapons quality management system
- IATF16949 Automotive industry quality management system

Safety certification



MOV Safety:

- CQC
- VDE
- UL, Canada CUL
- State Grid

NTC Safety:

- CQC
- TUV
- UL, Canada CUL

GDT Safety:

- UL

Honors and Qualifications

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- 福建省级绿色工厂
- 国家级高新技术企业
- 国家级科技型中小企业
- 福建省“专精特新”中小企业
- 年度漳平市民营经济企业纳税大户
- 中国科学家论坛 科技创新优秀发明成果
- 第十届中国创新创业大赛福建赛区《优秀企业》奖
- 龙岩市军民融合发展促进会第二届《副会长单位》
- 福建省科技小巨人企业
- 中国创新创业大赛《优秀企业》
- 龙岩市守合同重信用企业
- 年度诚信经营先进单位



Thank you for listening

