

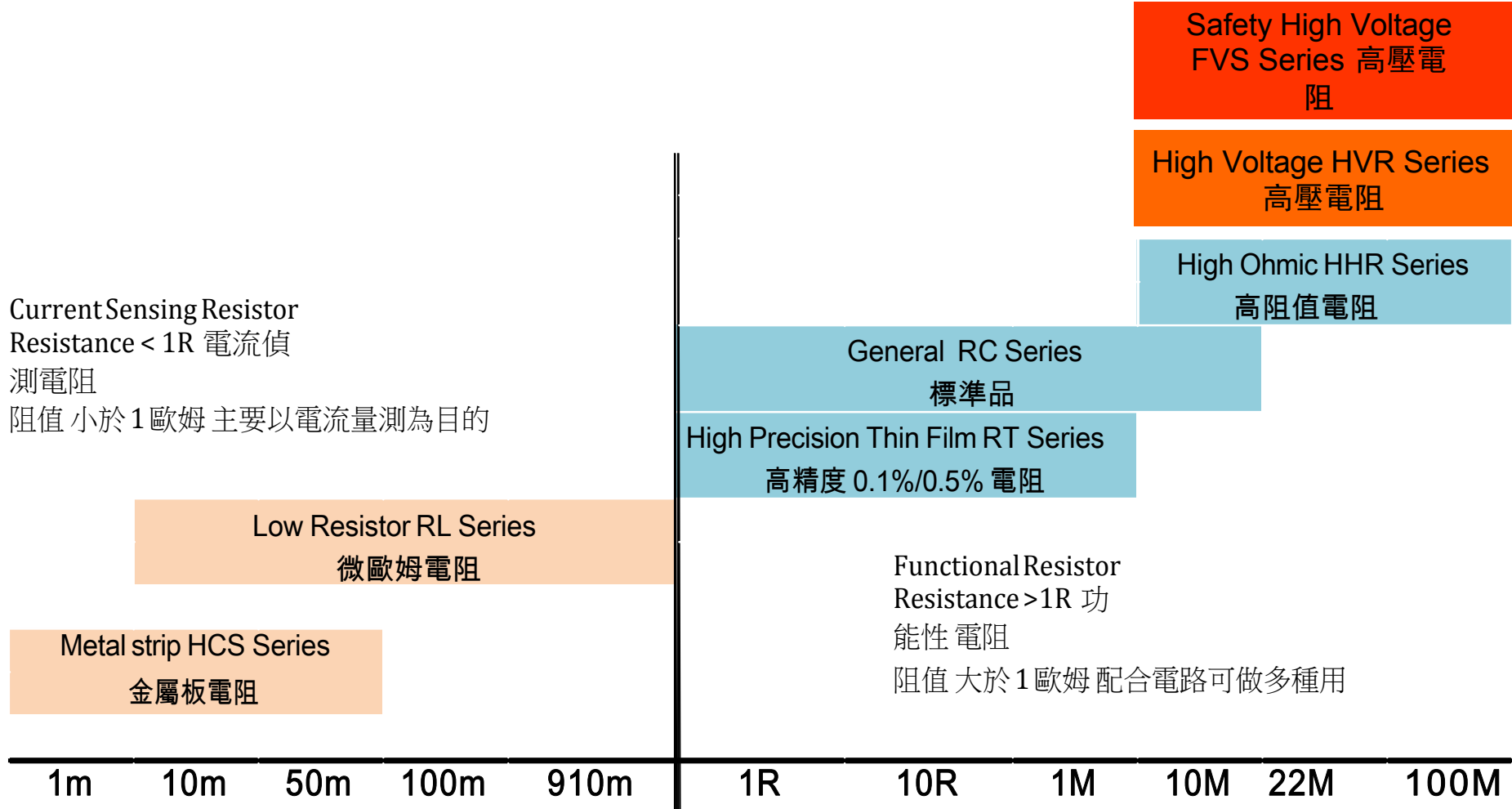


# ***Chip Resistor Product Introduction***

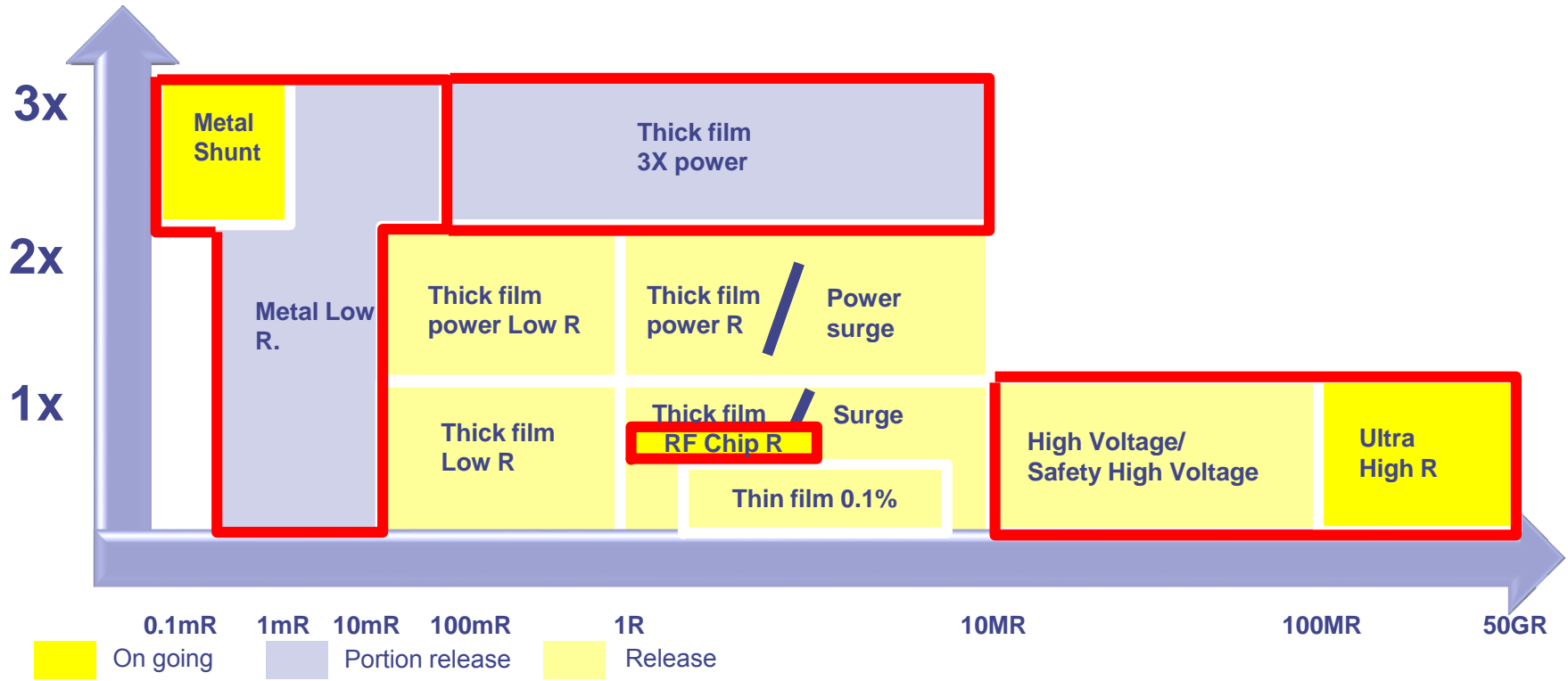
# Chip Resistor Products

系列 Series	Description	阻值 Resistance
RL	金屬厚模電阻 Metal Type Chip Resistors	R010-R910
HCS	金屬板電阻 Metal Strip Current Sensing Resistors	R001 to R150
HLR	高功率金屬板電阻 High Power Metal Strip Current Sensing	R005 to R100
HVR	高壓電阻 High Voltage Chip Resistors	100K-10M
RE	高精度厚膜電阻 High Precision Thick Film Chip Resistor	20R-510K
RT	高精度薄膜電阻 High Precision Thin Film Chip Resistor	10R-1M
HPF/HPL	高功率電阻 High Power Chip Resistors	R050-1M
HSR	抗突波電阻 Surge Resistors	1R0-1M
HMR	超高阻電阻 Mega High Resistance Resistors	101M -1G
HHR	高阻電阻 High Resistance Chip Resistors	10M-100M
FTF	可修整電阻 Trimmable Chip Resistors	10-1M
FWF	符合 AEC Q200 車用電阻 Automotive Chip Resistors	1R0-10M
FVS	安規認證晶電阻 Safety Certificate High Voltage Chip Resistors	100K-10M
RC	厚膜電阻 Thick Film Chip Resistors	1R0-10M

# General Information – Chip Resistor



# Chip R Product Series Map

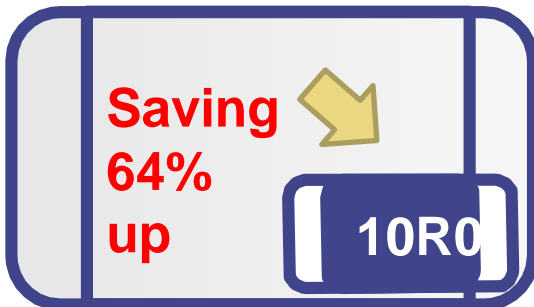


- Automotive Chip Resistors & Array
- Anti-Sulfuration Chip Resistor
- Non-Magnetic Chip Resistors

# New Product Information

## ▶ Ultra High Power — Triple Power-chip Resistor

Type	Resistance	2512	1206	0805	0603
Normal (RC)	R100-10M	1	1/4	1/8	1/10
High Power (HPF)	R100-1M	2	1/2	1/4	1/8
Ultra Power (TPH)	R100-1M	3	3/4	1/2	1/4



1206 Normal Type Down Size to 0603  
Power Chip saving **75%** layout

2010 Normal Type Down Size to  
0805 Power Chip saving **80%** layout

2010 Normal Type Down Size to  
1206 Power Chip saving **64%** layout

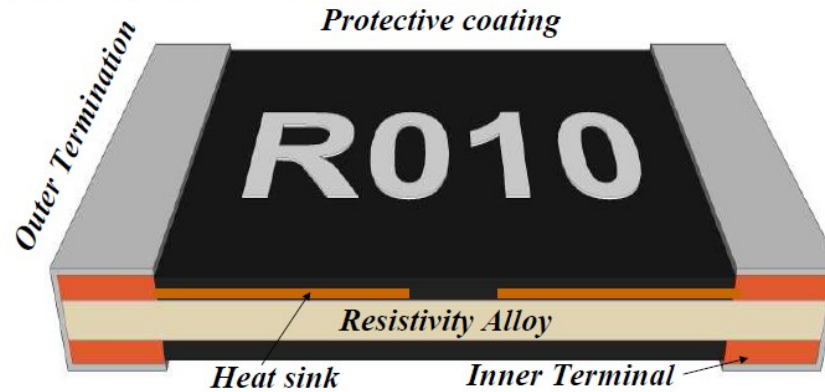
# New Product Information

## ▶ 3Watt Metal Strip 2512 High current sensing Resistors

具有散熱片 3Watt 電流偵測電阻

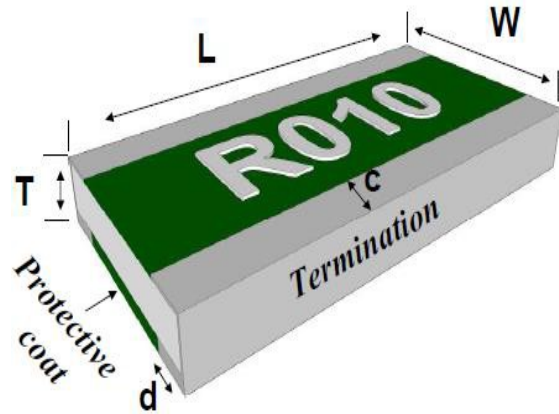
Type	Product	Features	Application	Resistance Range
HLR series	Metal Strip Current Sensing Resistors	<ul style="list-style-type: none"> <li>·High power rating and low TCR</li> <li>·Low resistance and high precision (1%)</li> <li>·Inductance less than 1.0nH</li> <li>·RoHS compliant &amp; Halogen Free</li> </ul>	Switching model power supply, Battery pack, Charger Notebook, Tablet PC	5/6/8/10/18/ 20/25/30/33/ 35/40/50mR Release

■ Metal 3W Product Construction



# New Product Information

## ► Long side terminal design 3720 High current sensing Resistors 長端極高功率電流偵測電阻



- Long side terminal design.
- Low resistance and high precision (1%).
- Excellent reliability and suitable cost.
- Suitable for lead free soldering.
- RoHS compliant & Halogen Free.

Current Sensing		Power Rating at 70°C	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance (mΩ)
Type	Size (Metric)				
LR08	1508 (3720)	1W	±1 ±2 ±5	±200	5
				±100	10

# New Product Information

## ► Safety Certificate High Voltage Resistors

### UL 安規認證電阻

Type	Certificate Number	Product	Size	Safety Standard
FVS series	E358325	Safety Certified High Voltage Chip Resistors	0603/0805/1206 2010/2512	UL/CSA/IEC/EN 60950-1...2.5KV impulse UL/CSA/IEC/EN 60065...10KV impulse

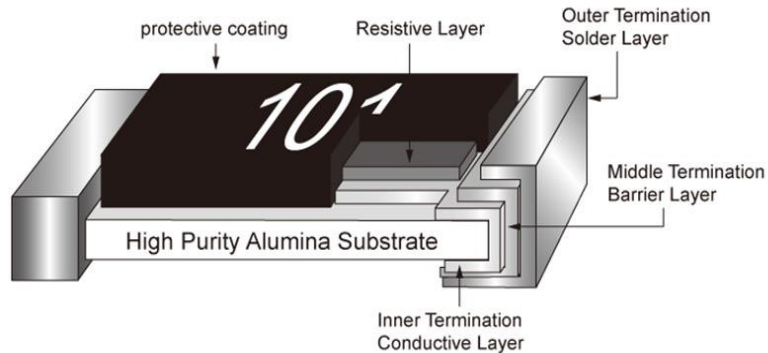




# New Product Information

## ► NON-MAGNETIC Chip Resistors

無磁性電阻



Construction of Chip-Resistor

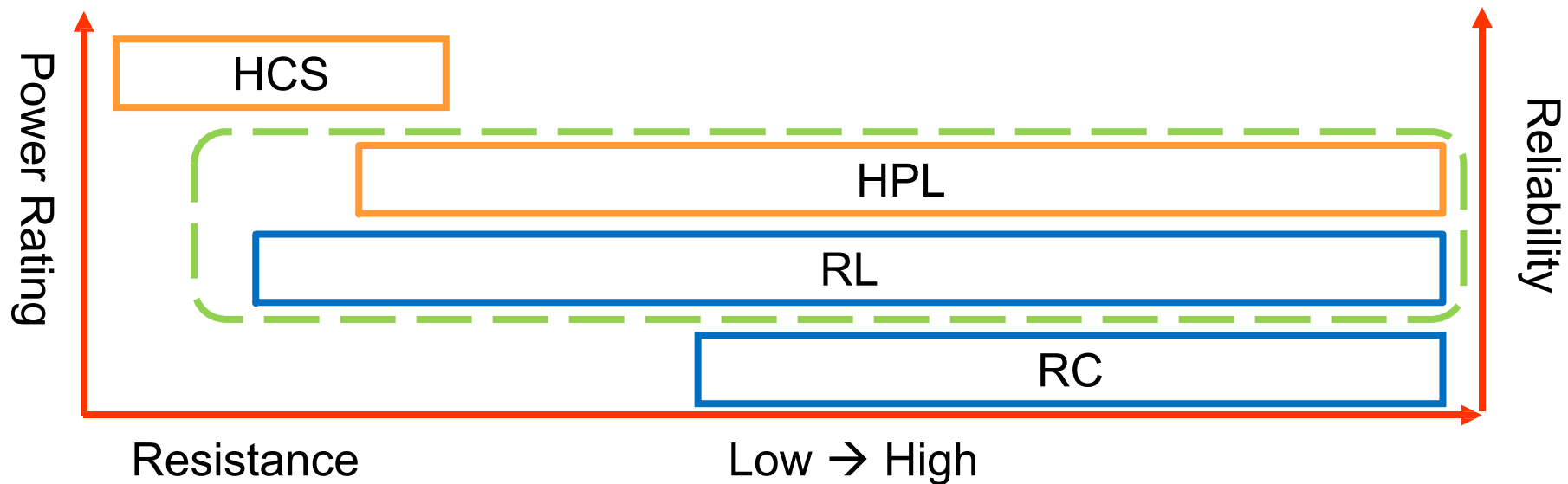
- Medical equipment
- MRI industry
- Automotive industry
- Measurement instrument

- Non-Magnetic chip resistors pass 3000 gauss magnetic detection
- Non-Magnetic chip resistors by copper plating on middle termination

Size	Power Rating	Tolerance(%)	TCR;ppm/°C	Resistance Range
0603	1/10W	±1%/±5%	±100/±200	1Ω-10MΩ
0805	1/8W	±1%/±5%	±100/±200	1Ω-10MΩ
1206	1/4W	±1%/±5%	±100/±200	1Ω-10MΩ

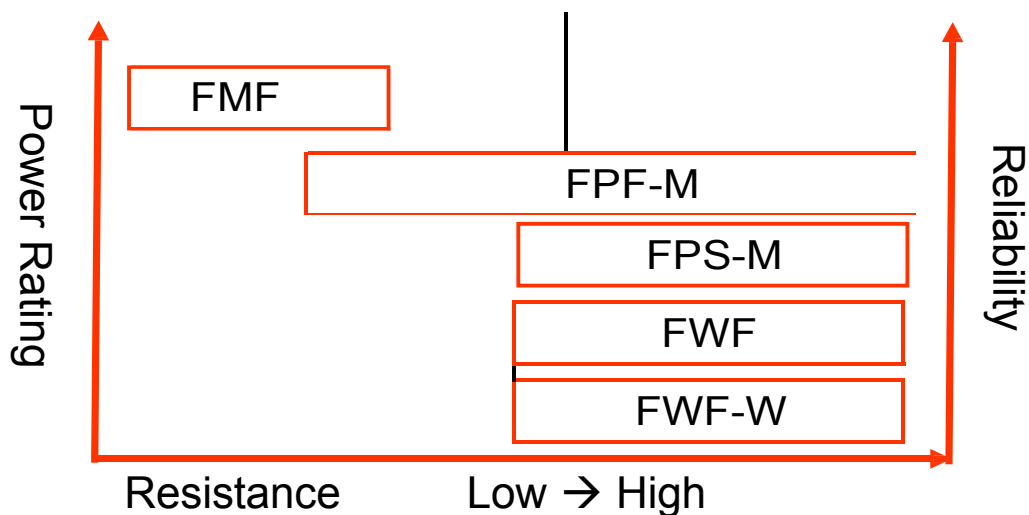
# Current Sensing Resistor Selection

Series	Product Type	Chip Size	Resistance Range (<math><1\Omega</math>)	Power Rating	Power Type	AEC Q200
HCS	Metal Strip	5931/2512/1206/0805	1m $\Omega$ ~100m $\Omega$	5W/1W/0.5W/0.25W	5W/2W(3W)/1W/0.5W	V
HPL	High Power	2512-0603	50m $\Omega$ ~ 910m $\Omega$		2W - 1/5W	V
RL	Metal Paste	2512-0603	10m $\Omega$ ~910m $\Omega$	1W- 1/10W	2W - 1/5W	
LR08	Long-Side Type	1508 (3720)	5m $\Omega$ / 10m $\Omega$		1W	
RC	Normal	2512-0603	510m $\Omega$ ~ 910m $\Omega$	1W- 1/16W		



# Meet AEC-Q200 Automotive Chip Resistors

Type		Chip Size	Resistance Range	Typical TCR	Max Power
FPF-M	High Power	0603 - 2512	50mR-1MR	100ppm	2Watt
FPS-M	High Power Surge	0603 - 2512	1R-1MR	100ppm	2Watt
FMF-M	Metal strip	0805 - 5931	1mR-50mR	100ppm	5Watt
FWF	General	0402 - 2512	1R-1MR	200ppm	1Watt
FWF-W	Anti-Sulfurated	0402 - 2512	1R-1MR	200ppm	1Watt



# Automotive & Anti-Sulfuration Chip Resistor

Anti-Sulfuration Resistors Best Solution for Series & Base Station With AEC Q-200 compliant & High Stability

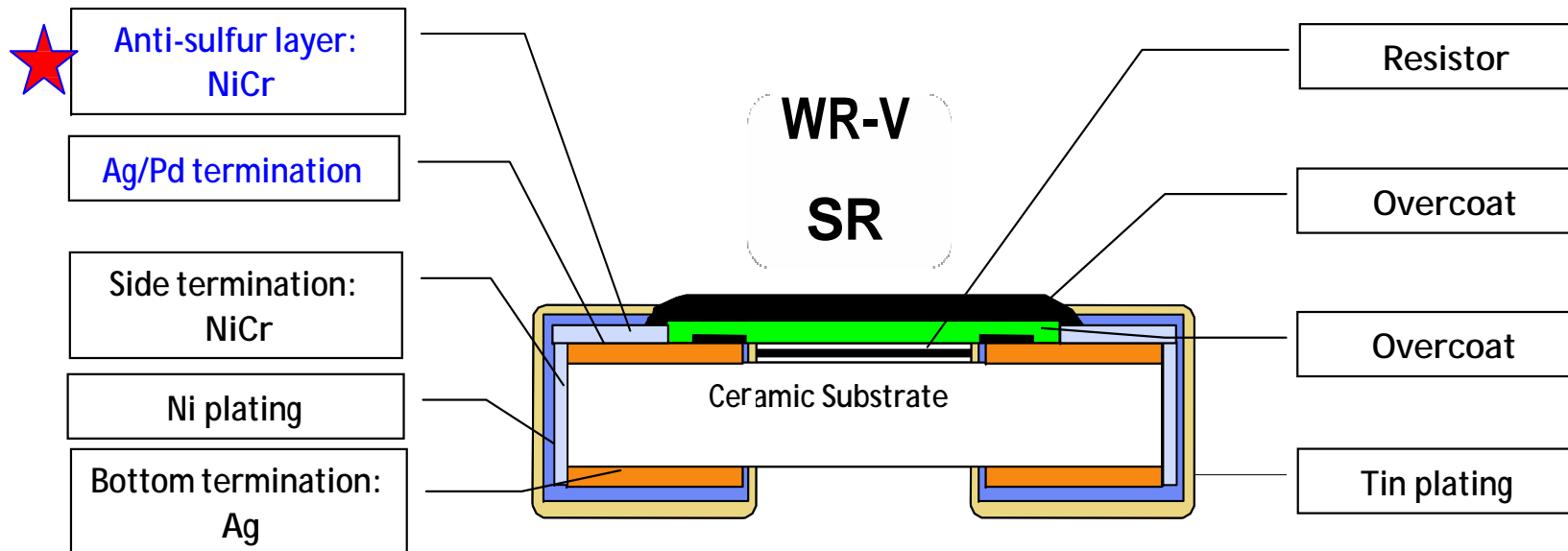
## Feature

- High Anti-sulfuration level H<sub>2</sub>S 1000ppm
- AEC -200 Compliant with Stability 1%
- Wide Product Range 0201-2512
- Multiple Series to support market need
- Thick film Technology

## Anti sulfur Resistor

- General type Anit-sulfur Resistor
- High Power Resistor
- Current Sensing Resistors
- High Power Current Sensing Resistor





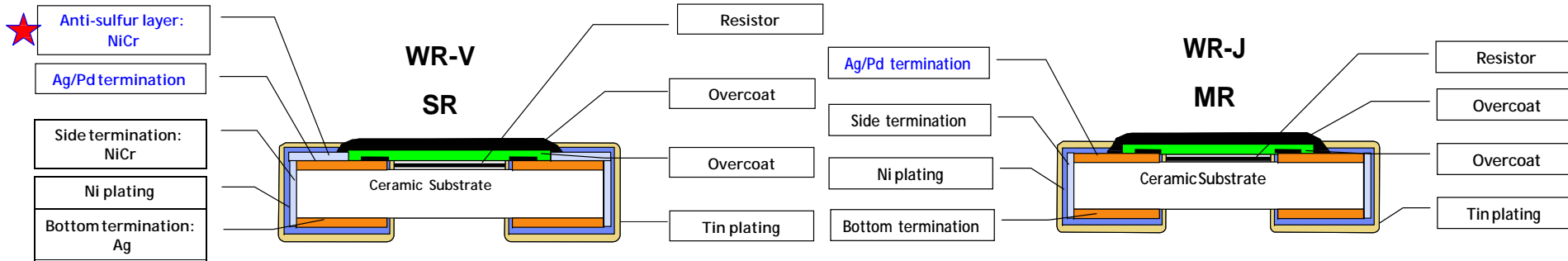
**FWF-W 系列使用特殊結構設計來防止硫化銀的硫滲透、排除失效。**

**FWF-W series uses a special structure designed to prevent the penetration of  $Ag_2S$  and prevent failure occurred.**

## 設計對照：

FWF-W	FWF
<ul style="list-style-type: none"> <li>- 高功率結構 (Hi-power structure)</li> <li>- 精密切割 (Hi-precision cutting)</li> <li>- 正常可靠度，穩定性 1% (Normal Reliability, stability 1%)</li> <li>- 附加抗硫化層結構 (Add Anti- Sulfur layer)</li> <li>- 100% CCD 檢測 (100% CCD Detection)</li> <li>- 高鈹導體材料 (Ag conductive material)</li> </ul>	<ul style="list-style-type: none"> <li>- 一般功率結構 (Normal Power structure)</li> <li>- 一般切割 (Normal cutting)</li> <li>- 正常可靠度，穩定性 2% (Normal Reliability, stability 1%)</li> <li>- 附加抗硫化層結構 (Add Anti- Sulfur layer)</li> <li>- 100% CCD 檢測 (100% CCD Detection)</li> <li>- 一般導體材料 (Normal conductive material)</li> </ul>

## 結構對照：



★ FWF-W 系列使用特殊結構設計來防止硫化銀的滲透、防止產品失效。

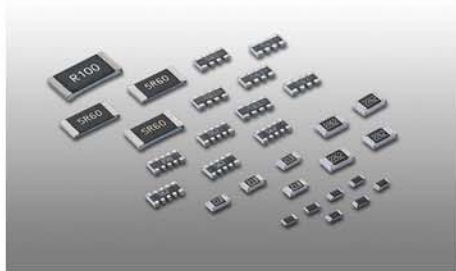
# Thin Film High Precision Resistors

## Best solution for High End Server with low TCR/ high stability/ low noise



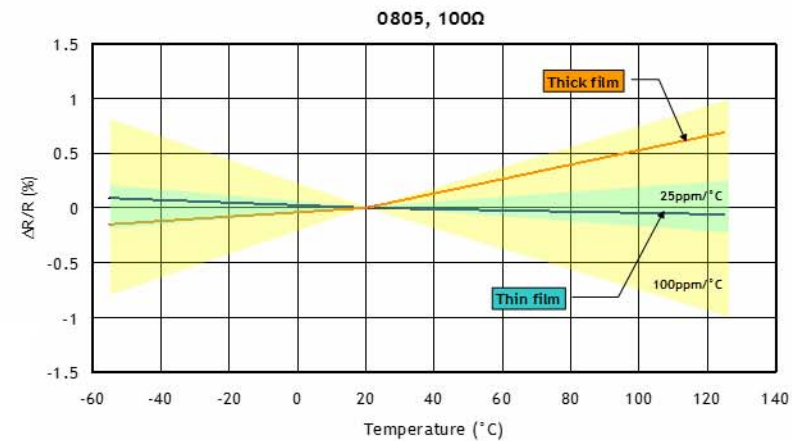
Hi-End Server

- Low TCR 25ppm, 10ppm, 5ppm
- High Stability 0.5%, 0.1%, 0.01%
- Low Noise
- RoHS Exemption free: Pb free
- Wide Product Range 0201 ~ 2512
- Anti-Sulfuration
- Thin Film Technology



Base Station

Automotive



# Thin Film Resistor – Type/Technology/Reliability/Anti-Sulfur

Type	Key Material & Technology	Reliability & Stability	Anti-Sulfur
RT	Conductor: Ag/Pd Resistor: Ni/Cr Hi-Voltage ensure	TCR: 25ppm/50ppm Stability: 0.5%	ASTM B-809 compliant
RT	Conductor: Ag/Pd Resistor: Ni/Cr Hi-Voltage ensure	TCR: 5ppm Stability: 0.25%	ASTM B-809 compliant
RT-W	Conductor: Ag/Pd Resistor: Ni/Cr Hi-Voltage ensure	TCR: 25ppm/50ppm Stability: 0.5%	105°C, 3%S compliant
<b>FAF-M</b>	<b>Conductor: Au</b> <b>Resistor: TaN</b> <b>High grade substrate</b> <b>Hi-Voltage ensure</b>	<b>TCR: 25ppm</b> <b>Stability: 0.1%</b> <b>AEC Q200 compliant</b>	<b>H2S 1000ppm compliant</b>

Size	1206	0805	0603	0402	
Rated Power	0.4W	0.2W	0.15W	0.0625W	
TCR(ppm/oC)	≤±25	≤±25	≤±25	≤±25	
Resistance Ω	Max	10	10	40	40
Rated Power	min	1M	350K	130K	35K



# Thin Film High Precision Resistors

## Power Type Thin Film Resistors

Size		2512		2010		1206		1210		0805				0603			
Rated Power		1W		3/4W		1/4W		2/5W		1/8W				1/10W			
TCR(ppm/oC)		≤±25	≤±50	≤±25	≤±50	≤±25	≤±50	≤±25	≤±50	≤±10	≤±15	≤±25	≤±50	≤±10	≤±25	≤±50	≤±25
Resistance Ω	Max	10	10	10	10	4.7	4.7	10	10	25	100	4.7	4.7	25	4.7	4.7	100
	min	1.5M	1.5M	1.5M	1.5M	1M	1M	1M	1M	200K	200K	1M	1M	100K	680K	680K	100K

## Normal Power Thin Film Resistors

Size		2512		2010		1210	1206				0805		0603		0402				0201		
Rated Power		3/4W		1/2W		1/4W	1/8W				1/10W		1/16W		1/16W				1/20W		
TCR(ppm/oC)		≤±25	≤±50	≤±25	≤±50	≤±25	≤±10	≤±15	≤±25	≤±50	≤±50	≤±25	≤±50	≤±25	≤±50	≤±10	≤±15	≤±25	≤±50	≤±25	≤±50
Resistance Ω	Max	10	10	10	10	10	25	100	4.7	4.7	10	4.7	4.7	4.7	4.7	25	100	10	10	47	47
	min	1.5M	1.5M	1.5M	1.5M	1M	300K	200K	1M	1M	1M	1M	1M	680K	680K	20K	20K	150K	150K	5K	10K

## Anti-Sulfur Thin Film Resistors

Size		1206	0805	0603	0402
Rated Power		0.4W	0.2W	0.15W	0.0625W
TCR(ppm/oC)		≤±25	≤±25	≤±25	≤±25
Resistance Ω	Max	10	10	40	40
Rated Power	min	1M	350K	130K	35K

**Thank You**