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# **DIRECT**

## **Electronics Tech.**

### **(FRN, FKN, FSQ) Fusible Resistors**

Web: [www.direct-token.com](http://www.direct-token.com)

Email: [rfq@direct-token.com](mailto:rfq@direct-token.com)

**Direct Electronics Industry Co., Ltd.**

**China:** 12F, Zhong Xing Industry Bld., Chuang Ye Road,  
Nan Shan District, Shen Zhen City,  
Guang Dong, China 518054  
Tel: +86 755 26055363; Fax: +86 755 26055365

**Taiwan:** No.137, Sec. 1, Zhongxing Rd., Wugu District,  
New Taipei City, Taiwan, R.O.C. 24872  
Tel: +886 2981 0109 Fax: +886 2988 7487

## ▶ Product Introduction

### ||| Fusible resistor features best of both worlds.

#### Features :

- Low Cost
- Low Noise
- Reduced numbers of parts used in circuits
- Products with Pb-free Terminations and RoHS compliant

#### Applications :

- Telecommunications
- Household appliances
- Inrush Pulse protection
- Lightning strike protection
- Input protection for small power supplies and battery chargers

Designers of small power supplies and battery chargers for consumer products can benefit from a fusible resistor with superior lightning strike and pulse abilities in a cost effective package.

Direct Electronics offers a combination resistor/fuses series of metal/carbon film fusible resistor (FRN), wire wound fuse resistor (FKN) and cement encased fusing resistors (FSQ). Direct offers fusible FRN series a low-cost alternative to traditional solutions for applications that require surge protection.



The robust ceramic encased cement resistor (FSQ) and wire wound resistor (FKN) are ideal for power supply applications across the telecoms, military and industrial markets which require a replacement for carbon composition resistors within the circuit design.

As part of the Direct input protection range, this resistor provides a key fusible solution and is completely customizable to suit the individual application design requirements. Key design engineers with a need for a robust resistor, will find the FRN, FKN and FSQ series are a multifaceted product, providing comparable pulse performance with added fusing capabilities.

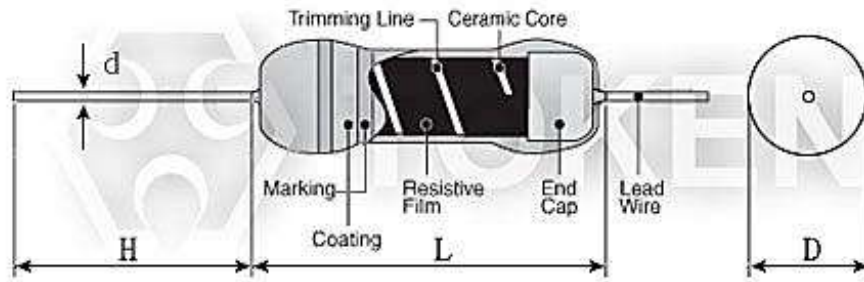
Our custom solutions are designed to address your need for technical and economic success in a timely manner. Contact us with your specific needs. Or link to Direct official website "[General Purpose Resistors](http://www.direct-token.com)" for more information.



► **Specifications (FRN)**

**Specifications & Dimensions (Unit: mm) Thin-Film Fusible Resistor (FRN)**

Type	Rated Wattage	Dimension (mm)				Resistance Range	Dielectric Withstanding Voltage
		L ± 1.5	D ± 1	H ± 3	d ± 0.05		
FRN	1/4W	6	2.3	26	0.40~0.50	0.22Ω~100KΩ	300V
	1/2W	6	2.3	26	0.50~0.55	0.22Ω~100KΩ	300V
	1W	9	3.0	26	0.50~0.55	0.22Ω~100KΩ	350V
	2W	11	4.0	26	0.75~0.80	0.3Ω~100KΩ	500V
	3W	15	5.0	35	0.75~0.80	0.3Ω~100KΩ	500V

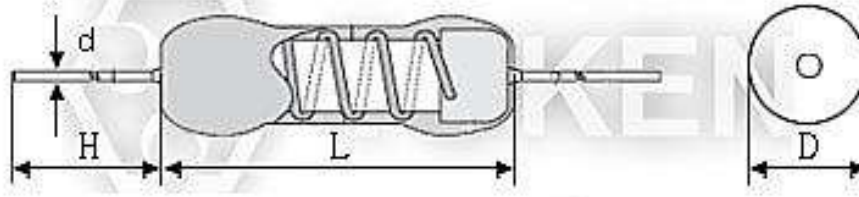


**Thin-Film Fusible Resistor (FRN) Dimensions (Unit: mm)**

► **Specifications (FKN)**

**Specifications & Dimensions (Unit: mm) Wire wound Fuse Resistor (FKN)**

Type	Rated Wattage	Dimension (mm)				Resistance Range	Dielectric Withstanding Voltage
		L ± 1.5	D ± 1	H ± 3	d ± 0.05		
FKN	1W	9	4.5	26	0.50~0.55	0.1Ω~22Ω	500V
	2W	11	5.0	26	0.75~0.80	0.1Ω~60Ω	500V
	3W	15	5.5	35	0.75~0.80	0.1Ω~100Ω	500V
	5W	17	6.5	35	0.75~0.80	0.2Ω~200Ω	500V
	6W	24	8.5	38	0.75~0.80	0.3Ω~250Ω	500V

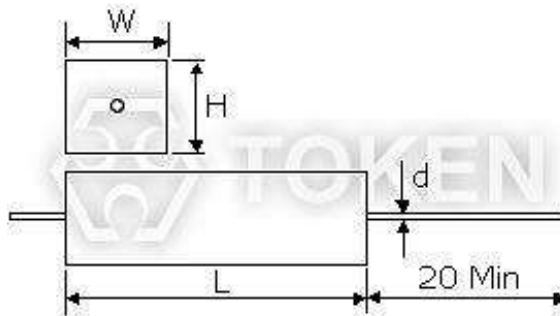


Wirewound Fuse Resistor (FKN) Dimensions (Unit: mm)

► **Specifications (FSQ)**

**Specifications & Dimensions (Unit: mm) Cement Fusing Resistor (FSQ)**

Type	Rated Wattage	Dimension (mm)					Resistance Range	Dielectric Withstanding Voltage
		L ± 1.5	H ± 0.5	W ± 0.5	H ± 3	d ± 0.05		
FSQ	2W	18	7	7	35	0.50~0.55	0.1Ω~22Ω	1000V
	3W	22	8	8	35	0.75~0.80	0.1Ω~120Ω	1000V
	5W	22	9	10	35	0.75~0.80	0.2Ω~120Ω	1000V
	7W	35	9	10	35	0.75~0.80	0.3Ω~250Ω	1000V
	10W	48	9	10	35	0.75~0.80	0.3Ω~500Ω	1000V



Ceramic Encased Cement Fusing Resistor (FSQ) Dimensions (Unit: mm)

**Characteristics****Electrical Characteristics (FRN, FKN, FSQ)**

Test Items	Condition	Spec.
Operating Temp.	-30°C~155°C	
Resistance Temp. Coeff.	-30°C~150°C	± 200PPM / °C
Short Time Overload	2 times of rated voltage for 5 sec.	± 2 %
Temp. Cycle	-30°C~85°C for 5 cycles	± 1 %
Load Life	25°C on-off cycle 1,000 hrs.	± 5 %
Moisture-Proof Load Life	40°C 95°C RH on-off cycle 1,000 hrs.	± 5 %
Solder Pot	270°C for 3 sec.	± 1 %
Incombustibility	16 times of rated wattage for 5 min.	not flamed

**Fusing Characteristics (FRN, FKN, FSQ)**

POWER WATTAGE	FUSING TIME
16 × Rated Wattage	Within 2 min
24 × Rated Wattage	Within 1 min
32 × Rated Wattage	Within 30 sec.



## ▶ Application Notes

### Application Notes of Fusible Resistors (FRN, FKN, FSQ)

For fusible resistors, unlike fuses, fusing performance is given in terms of power rather than current.

The power can be calculated:

$$\text{Power} = \text{Amperes}^2 \times \text{Ohms}$$

#### Fusing Device Application Notes

- When using, it shall be made sure that the overload conditions at unusual moments lie within the fusing territory.
- Consult with Direct in advance when overloaded higher than the rated voltage under an ordinary situation since such an overload may store up damages on resistors.
- Use at the maximum open-circuit voltage or lower as an arc phenomenon may arise when high voltage is applied again after fusing by an over current.
- Consult with us for the maximum open- circuit voltage because it varies with applications.

## ▶ Order Codes

### Order Codes (FRN, FKN, FSQ)

FRN	1/2W	0.47R		J	TB
Part Number	Rated Power (W)	Resistance Value (Ω)		Resistance Tolerance (%)	
FRN		R47	0.47Ω	J	±5%
FKN		47R	47Ω		P Bulk
FSQ		470R	470Ω		TB Taping Box
		4K7	4.7KΩ		
		47K	47KΩ		



## ► General Information

### General Purpose Resistors with Customized Service

Direct Electronics is expanding business to include a broad range of General Purpose Resistor products designed for high volume applications. This expanded range of commercial resistor presents a more comprehensive product offering for Customer Experience Management (CEM) and other high volume customers that require quality products at competitive pricing.

Backed by the same customer service, technical support and quality assurance that Direct has always provided, these new commercial products enable you the opportunity to source a wider range of resistors from a trusted supplier.

### General Use

When an ambient temperature exceeds a rated ambient temperature, resistor shall be applied on the derating curve by derating the load power. General purpose resistor under overloads is not combustion resistant and is likely to emit, flame, gas, smoke, red heat, etc. Flame retardant resistor generally emits smoke and red heat in a certain power and over but do not emit fire or flame.

When resistors are shielded or coated with resin etc., stress from the storage heat and the resins are applied. So, performance and reliability should be checked well before use.

When a voltage higher than rated is applied in a short time (single pulse, repeated pulses, surge, etc.), it does not necessarily ensure safety that an effective wattage is not higher than a rated wattage. Then consult with us with your specified pulse wave shape. Resistors shall be used in a condition causing no dew condensation.

Keep temperature from rising by choosing resistor with a higher rated capacity; do not use a component having the exact load value required. For considerations of safety in extended period applications, the rating should be more than four times higher than the actual wattage involved, but never use resistors at less than 25% of its rated power.

In applications where resistors are subject to intermittent current surges and spikes, be sure in advance that the components selected are capable of withstanding brief durations of increased load.

Do not exceed the recommended rated load. Resistor must use within the rated voltage range to prevent the shortening of service life and/or failure of the wound resistance elements.

Minimum load: Resistor must be utilized at 1/10 or more of the rated voltage to prevent poor conductance due to oxidation build-up. For basic particulars for cautions, refer to EIAJ Technical Report RCR-2121 "Guidance for care note on fixed-resistors".

