

Approval Sheet

for

**Wire Wound Resistors
Fusible & Flame-Proof Type**

FKN series

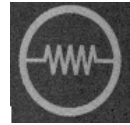
$\pm 1\%$ & $\pm 5\%$

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1. PRODUCT:

FUSIBLE & FLAME-PROOF WIRE WOUND RESISTORS

(Ultra Miniature Style)

The resistors are coated with flameproof silicone lacquer (UL94V-0), the 5th colour band is white to represent fusible wire-wound resistors.

2. PART NUMBER:

Part number of the fusible & flame-proof wire wound resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type, resistance value and suffix for alloy wire.

Example :

| | | | | | | | |
|-------------|--------------|----------------------|---------------|---------------------------------------|--------------|------------------|-----------------------|
| FKN | 2SS | J | T | - | 52- | 10R | CN |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Series Name | Power Rating | Resistance Tolerance | Packing Style | Temperature Coefficient of Resistance | Special Type | Resistance Value | Suffix for alloy wire |

(1) Style: FKN SERIES

(2) Power Rating : 1SS=1W 、 2SS=2W 、 3SS=3W 、 5SS=5W

(3) Tolerance: F=±1% J=±5%

(4) Packaging Type: R=Paper Taping Reel
T= Tape on Box Packing
B= Bulk Packing

(5) Temperature Coefficient : “-”=base on spec or ignored.

(6) Special Type : 52- = 52mm
73- = 73mm

(7) Resistance Value : ±1% for E24&E96 series and ±5% for E24 Series

Example : 1R 、 3R3 、 10R 、 100R

(8) Suffix for alloy wire: Optional code, represents specific alloy wire requirement.

Example : CN, CM, CY, CL, FE, FD and etc.

3. BAND-CODE:

| COLOR | 1ST BAND | 2ND BAND | MULTIPLIER | TOLERANCE |
|--------|----------|----------|------------|------------|
| BLACK | 0 | 0 | 1Ω | |
| BROWN | 1 | 1 | 10Ω | ± 1 % (F) |
| RED | 2 | 2 | 100Ω | |
| ORANGE | 3 | 3 | 1KΩ | |
| YELLOW | 4 | 4 | | |
| GREEN | 5 | 5 | | |
| BLUE | 6 | 6 | | |
| VIOLET | 7 | 7 | | |
| GREY | 8 | 8 | | |
| WHITE | 9 | 9 | | FKN series |
| GOLD | | | 0.1Ω | ± 5 % (J) |
| SILVER | | | 0.01Ω | |

4. ELECTRICAL CHARACTERISTICS

TABLE I Ultra Miniature Style

| STYLE | FKN1SS | FKN2SS | FKN3SS | FKN5SS |
|-----------------------------|---|-----------|------------|------------|
| Power Rating at 40 °C | | | 3W | 5 W |
| Power Rating at 70 °C | 1 W | 2 W | | |
| Maximum Working Voltage | $= \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ | | | |
| Voltage Proof on Insulation | 300V | | | |
| Resistance Range | 0.1Ω~47Ω | 0.47Ω~62Ω | 0.47Ω~150Ω | 0.47Ω~240Ω |
| Operating Temp. Range | - 40 °C to + 155 °C | | | |
| Temperature Coefficient | ± 300 ppm /°C | | | |

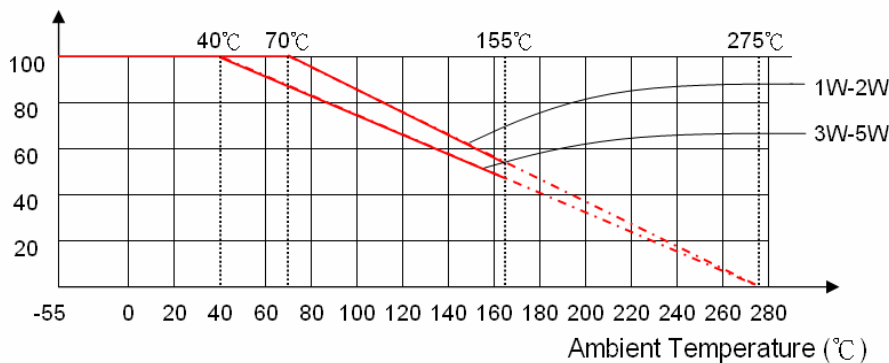
* Below or over this resistance range on request.

5. FUSING CHARACTERISTICS

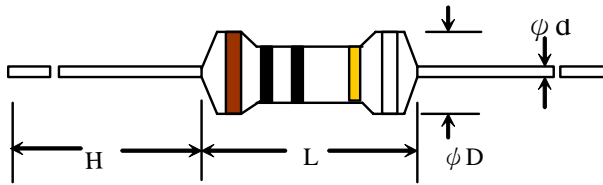
R≤2.0 Ω Fusing time within 60 seconds at 36 times of rated power;
 R>2.0 Ω Fusing time within 60 seconds at 25 times of rated power;
 Fusing residual resistive value at least 100 times rated resistance.

6. DERATING CURVE

Rated Load (%)



7. DIMENSIONS



Unit: mm

| STYLE | DIMENSION | | | |
|-----------------|-----------|----------|--------|-----------|
| Ultra Miniature | L | ϕD | H | ϕd |
| FKN1SS | 6.3±0.5 | 2.5±0.3 | 28±2.0 | 0.55±0.05 |
| FKN2SS | 9.0±0.5 | 3.5±0.3 | 26±2.0 | 0.55±0.05 |
| FKN3SS | 11.5±1.0 | 4.6±0.5 | 35±2.0 | 0.8±0.05 |
| FKN5SS | 15.5±1.0 | 5.2±0.5 | 33±2.0 | 0.8±0.05 |

8. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 10 times of the rated power applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes

$$\text{Short Time Overload Voltage} = \sqrt{10 * \text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within $\pm 2.0 \% + 0.05 \Omega$

(2) Voltage Proof

The resistor shall be clamped in the trough of a 90° metal V Block. Apply the insulation voltage specified in the "Table I & II" between the terminals connected together with the block for about 60 seconds.

The resistor shall be able to withstand without breakdown or flashover.

(3) Temperature Coefficient Test

Test of resistors above room temperature $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.

The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R₀ = Resistance value at the room temperature

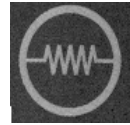
t = The testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply "measuring voltage" between protective coating and termination for 1 min., then measure. The measuring voltage shall be either 100V±15V d.c. for resistors with an insulation voltage lower than 500V or 500V±50V d.c. for resistors with an insulation voltage equal to or greater than 500V.

The test resistance should be high than 100M ohm.



(5) Solderability

Immerse the specimen into the solder pot at 235 ± 5 °C for 3 ± 0.5 seconds.
At least 95% solder coverage on the termination.

(6) Solvent Resistance of Marking

The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 5 ± 0.5 minutes.
The specimen is no deterioration of coatings and color code.

(7) Robustness of Terminations

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reached the requirement.
The load shall be held for 10 seconds. The load of weight shall be ≥ 2.5 kg (24.5N).

(8) Damp Heat Steady State

Place the specimen in a test chamber at 40 ± 2 °C and 90 ~ 95 % relative humidity. Apply the 0.1 times rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 56 days.
The change of the resistance value shall be within $\pm 5\% + 0.05 \Omega$

(9) Endurance at 70 °C

Placed in the constant temperature chamber of 70 ± 3 °C the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value °

The change of the resistance value shall be within $\pm 5\% + 0.05 \Omega$.

There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(10) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour °

Temperature Cycling Conditions:

| Step | Temperature(°C) | Time (minute) |
|------|-----------------|---------------|
| 1 | -40 ± 3 | 30 |
| 2 | 25 ± 3 | 10 ~ 15 |
| 3 | 155 ± 3 | 30 |
| 4 | 25 ± 3 | 10 ~ 15 |

The change of the resistance value shall be within $\pm 1.0\% + 0.05 \Omega$

After the test the resistor shall be free from the electrical or mechanical damage.

(11) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at 260 ± 3 °C for 10 ± 1.0 seconds up to 2.5 ~ 3.5 mm.

The change of the resistance value shall be within $\pm 1.0\% + 0.05 \Omega$

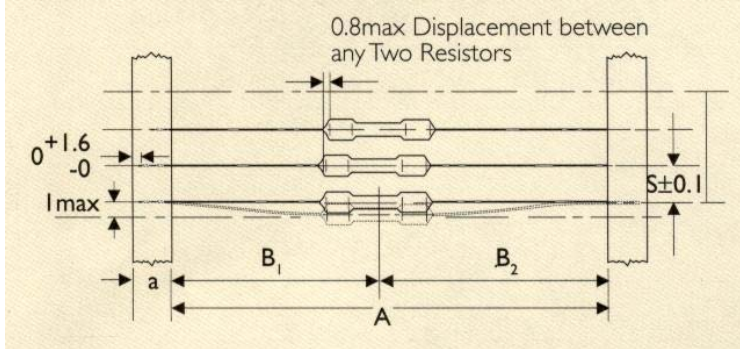
(12) Overload Flame Retardant

At 4 times of the rated voltage (If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) applied for 1 minute

Overload Test Voltage = $4 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$
 The resistor shall be able to no evidence of flaming or arcing.

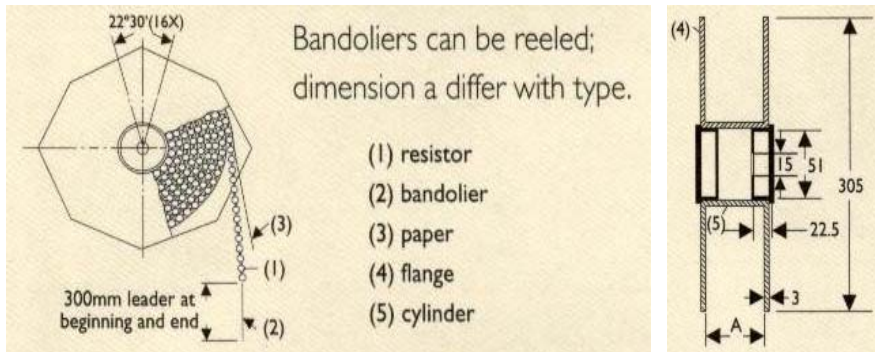
9. PACKING METHODS

Bandolier for Axial leads



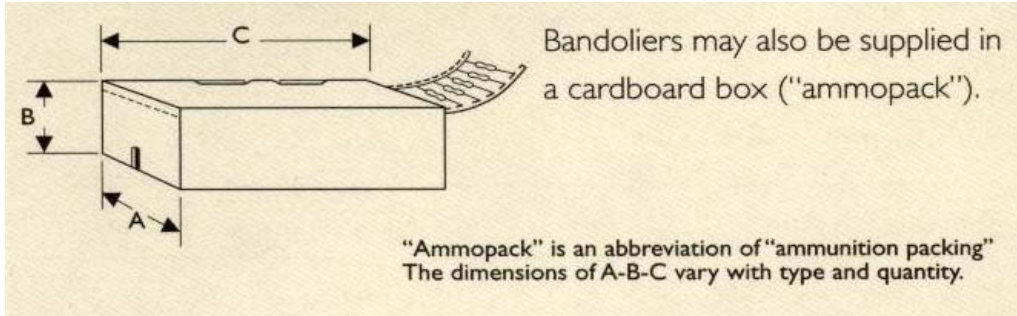
| STYLE | DIMENSIONS | | | Unit: : mm | |
|-----------------|------------|--------------------------|------------|------------|---|
| Ultra Miniature | a | A | B1-B2 | S(spacing) | T (max. deviation of spacing) |
| FKN1SS | 6 ± 0.5 | 52.4 ± 1.0 26.0 ± 1.0 | 1.2 1.0 | 5 | |
| FKN2SS | 6 ± 0.5 | 52.4 ± 1.0 | 1.2 | 5 | |
| FKN3SS | 6 ± 0.5 | 73.0 ± 1.5 52.4 ± 1.5 | 1.5 1.2 | 5 | 1 mm per 10 spacing 0.5 mm per 5 spacing |
| FKN5SS | 6 ± 0.5 | 73.0 ± 1.5 52.4 ± 1.5 | 1.5 1.2 | 5 | |

10. TAPE ON REEL PACKING



| STYLE | TAPE ON REEL | |
|--------|-------------------|--------------|
| | ACROSS FLANGE (A) | Qty per reel |
| FKN1SS | 72 | 5,000 |
| FKN2SS | 72 | 2,500 |
| FKN3SS | 95 | 2,000 |
| FKN5SS | 95 | 1,000 |

11. TAPE ON BOX PACKING



| STYLE | Standard Lead Length | | | Short Lead Length | | | Qty per box |
|-----------------|----------------------|---------|---------|-------------------|---------|---------|-------------|
| | W (A) | H (B) | L (C) | W (A) | H (B) | L (C) | |
| Ultra Miniature | | | | | | | |
| FKN1SS | 81 | 104 | 260 | 48 | 102 | 255 | 5,000 |
| FKN2SS | 73 | 45 | 258 | | | | 1,000 |
| FKN3SS | 103 | 78 | 260 | 81 | 91 | 260 | 1,000 |
| FKN5SS | 103 | 94 | 260 | 81 | 91 | 260 | 1,000 |

12. Plant Address

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