This specification is intended to be utilized in conjunction with Series FR data sheet.

RESISTOR SPECIFICATION

RCD Series FR
Custom Fuse Resistors

RCD Components Inc. 520 E.Industrial Pk Dr, Manchester, NH, USA 03109
Tel:603-669-0054 Fax:603-669-5455

RCD FR SERIES FUSE RESISTORS

Table of Contents

Note: performance ratings apply to standard FR Series fuse resistors. Consult factory for performance ratings of parts that are custom-designed to meet specialty fusing or other requirements.

1.0 SERIES FR PRODUCT HISTORY

RCD's FR Series was developed in 1973 to combine the function of two components, resistor and fuse, into one small package. The FR Series has been constantly improved and expanded to achieve greater stability under various environmental conditions, a wider range of resistance values, and fusing options.

RCD offers the widest range of fusible resistors in the industry, including wirewound, film, and thermal fuses.

2.0 PRODUCT DESCRIPTION

- Designed for precision fusing requirements
- Wide range of custom options including non-standard values, min and max blow times, pulse capability, military screening, etc)

3.0 DESIGN FEATURES

- Compared to conventional resistors, the FR series fuses quickly and consistently without burning or explosion
- Design objectives are achieved by element material (wire or film), insulation material, and processing. Material thermal conductivity is altered to meet design spoecifics. Typical construction is ceramic encased wirewound element.
- Low noise and high mechanical strength resulting from welded construction
- Excellent temperature stability
- Flameproof per UL94V-0
- Small size

4.0 CONSTRUCTION AND MANUFACTURING PROCESS

The design and construction of the FR Series results in excellent reliability. Depending on the design objectives, product is made with wirewound or film element. Wirewound enables wider range of fusing options, i.e. slow/medium/fast blow. Film units offer lower cost and are generally utilized on less demanding circuits.

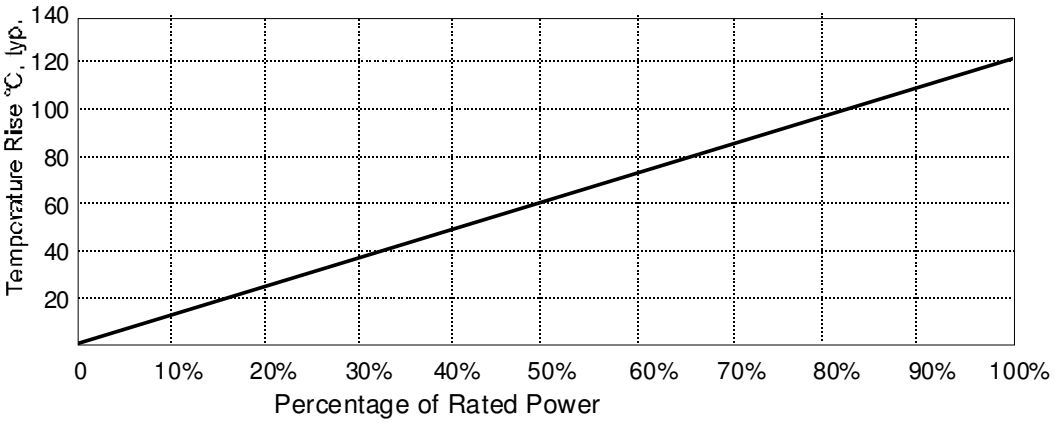
In the first phase of film production, the ceramic rods are deposited with metal alloy custom tailored to meet specific resistivity, power, stability, and fusing levels. Once the ceramic rods have undergone the degree of metalization required, metal caps are press fit onto each end. During the next stage the resistance film is trimmed to the required resistance value by cutting a helical groove around the body. Leads are welded to the end caps, and then processed through coating and marking operations. Wirewound product utilizes precision resistive wire welded to terminations and encased in ceramic package.

5.0 QUALITY CONTROL

As part of RCD's ABZED program (ABsolute ZEro Defects), all key stages of production are monitored by Statistical Process Control (SPC), first-piece inspection, and/or a variety of in-process inspection steps to ensure optimum uniformity. Final outgoing inspection ensures 100% compliance. A wide range of military screening tests are available as an option fo high reliabilirt applications.

6.0 TEMPERATURE RISE

The temperature rise of low power resistors, particularly smaller models, depends largely on heat conduction through the leads or end terminations, which can vary significantly depending on PCB material and layout (i.e. pad size, trace area, copper thickness, air flow, etc.). It is recommended to evaluate product in actual use conditions to ensure that the proper component and PCB layout is utilized. Refer to chart below…



7.0 ELECTRICAL, ENVIRONMENTAL, AND MECHANICAL PERFORMANCE

7.1 Terminal Strength

The terminal welds shall not break when tested per MIL-STD-202 Method 211, pull test. Direct load (as specified for equivalent body sizes in MIL-R-10509) shall be 2 pounds on 1/2W through 1W sizes, and 5 pounds on 2W and larger sizes. Note: use strain relief and exercise care to avoid bending the leads right at the body, otherwise ceramic case or potting may crack.

7.2 Solderability

When resistors are tested per ANSI-J-STD-002 Cat.1, the dipped surface of the lead shall be at least 95% covered with new solder coating.

7.3 Solvent Resistance

When resistors are tested as specified in MIL-STD-202 Method 215, there shall be no mechanical damage and the markings shall remain legible.

7.4 Resistance Measurement

When measured at 25°C ±2C, the reading must be within the specified tolerance of the nominal value.

7.5 Temperature Coefficient

When measured at 25°C and +100°C the TCR shall not exceed 100ppm/°C 0.1 ohm to 9.9 ohm, 50ppm on values equal to or greater than 10 ohm.

7.6 Short Time Overload & Pulse Capability

Since FR series are designed to open under overload, they should not be utilized in circuits which are expected to survive pulses in excess of rated power without first consulting factory. Specialty pulse tolerant models are available .

7.7 High Temperature Exposure

When subjected to 125°C for 100 hours, the resistance value shall not shift more than 2% and marking shall remain legible.

7.8 Voltage Rating

FR Series resistors have a DC or AC_{RMS} voltage rating equivalent to $(PxR)^{1/2}$, not to exceed 40V for FR1/2, 55V FR1, 80V FR2, 140V FR3, 400V FR5.

7.9 Moisture Resistance

When tested per MIL-R-26 Par. 4.6.11, and MIL-STD-202 method 106, the resistance shift shall not exceed 5% + .05 ohm.

7.10 Load Life

When subjected to full rated power at 25°C (cycled 1½ hours on, ½ hour off) for 1000 hours, the resistance value shall not shift more than 5% (+.05Ω).

7.11 Vibration

When subjected to Vibration per MIL-STD-202 Method 201 (6 hours), the resistance value shall not shift more than 1% and no mechanical damage.

7.12 Dielectric Withstanding Voltage

When tested per MIL-STD-202 M.311 using V-block mounting, there shall be no evidence of flashover, mechanical damage, arcing, or insulation breakdown. Dielectric rating is 750VAC.

7.13 Insulation Resistance

Insulation resistance shall be 10,000 MegΩ Minimum, when tested per MIL-R-11 Par.3.11.

7.14 Noise

Typical noise level is –30dB or better

7.15 Operating Temperature Range

-55°C to +275°C

7.16 Power/ Voltage/Current Derating

Derate 0.4%/°C when ambient temperature exceeds 25°C (to zero at 275°C).

7.17 Flame Retardancy

Series FR is flameproof in accordance with UL-94-V0.

7.18 Shelf Life

Typical shelf life stability is better than 0.1% ΔR/year

7.19 Inductance

The inductance of RCD's FR Series is primarily value and size dependent, with lower values and smaller sizes have lower inductance levels. Typical inductance is 0.5uH on values up to 10 ohm FR3 and smaller (2uH FR5). Non-inductive design is available. External factors such as length of leads, layout of the circuit, stray capacitance, etc., may have an impact.