

|   |   |                  |           |             |
|---|---|------------------|-----------|-------------|
|  <b>FUZETEC TECHNOLOGY CO., LTD.</b> | <b>NO.</b>                                      | <b>PQ28-122E</b> |           |             |
|   | <b>Product Specification and Approval Sheet</b> | <b>Version</b>   | <b>A0</b> | <b>Page</b> |

## Radial Leaded PTC Resettable Fuse : FRVL Series

### 1. Summary

- (a) **RoHS Compliant (Lead Free) product**
- (b) **Applications : Wide variety of electronic equipment**
- (c) **Product Features : Solid state, Radial leaded product ideal for up to 120V<sub>AC/DC</sub>**
- (d) **Operation Current : 0.10A~3.75A**
- (e) **Maximum Operating Voltage : 120V<sub>AC/DC</sub>**
- (f) **Maximum Interrupt Voltage : 135V<sub>AC/DC</sub>**
- (g) **Temperature Range : -40°C to 85°C**

### 2. Agency Recognition

UL : File No. E211981  
 C-UL: \*File No. E211981  
 TÜV : File No. R50122733

\*FRVL040-120F~FRVL070-120F and FRVL090-120F~FRVL130-120F C-UL In Process.

### 3. Electrical Characteristics (23°C)

| Part Number  | Hold Current       | Trip Current       | Max.Time to Trip       | Max. Current         | Max. Oper. Voltage                    | Max. Int. Voltage                       | Typ Power          | Resistance       |                   |
|--------------|--------------------|--------------------|------------------------|----------------------|---------------------------------------|---|--------------------|------------------|-------------------|
|              | I <sub>H</sub> , A | I <sub>T</sub> , A | at 5xI <sub>H</sub> ,S | I <sub>MAX</sub> , A | V <sub>MAX</sub> , V <sub>AC/DC</sub> | V <sub>I-MAX</sub> , V <sub>AC/DC</sub> | P <sub>d</sub> , W | R <sub>MIN</sub> | R <sub>1MAX</sub> |
|              |                    |                    |                        |                      |                                       |   |                    | Ohms             | Ohms              |
| FRVL010-120F | 0.10               | 0.20               | 10.0                   | 2.0                  | 120                                   | 135                                     | 0.84               | 3.00             | 7.50              |
| FRVL017-120F | 0.17               | 0.34               | 10.0                   | 2.0                  | 120                                   | 135                                     | 0.84               | 2.00             | 7.00              |
| FRVL020-120F | 0.20               | 0.40               | 9.0                    | 2.0                  | 120                                   | 135                                     | 1.08               | 1.83             | 4.40              |
| FRVL025-120F | 0.25               | 0.50               | 7.5                    | 3.0                  | 120                                   | 135                                     | 1.08               | 1.25             | 3.00              |
| FRVL030-120F | 0.30               | 0.60               | 8.5                    | 3.0                  | 120                                   | 135                                     | 1.44               | 0.88             | 2.10              |
| FRVL040-120F | 0.40               | 0.80               | 6.5                    | 3.0                  | 120                                   | 135                                     | 1.44               | 0.55             | 1.29              |
| FRVL050-120F | 0.50               | 1.00               | 6.0                    | 3.0                  | 120                                   | 135                                     | 1.56               | 0.50             | 1.17              |
| FRVL065-120F | 0.65               | 1.30               | 5.7                    | 5.0                  | 120                                   | 135                                     | 1.68               | 0.31             | 0.72              |
| FRVL070-120F | 0.75               | 1.50               | 6.3                    | 5.0                  | 120                                   | 135                                     | 1.80               | 0.25             | 0.60              |
| FRVL075-120F | 0.75               | 1.50               | 15.0                   | 7.5                  | 120                                   | 135                                     | 2.64               | 0.25             | 0.69              |
| FRVL090-120F | 0.90               | 1.80               | 7.2                    | 5.0                  | 120                                   | 135                                     | 1.80               | 0.20             | 0.47              |
| FRVL100-120F | 1.00               | 2.00               | 15.0                   | 10.0                 | 120                                   | 135                                     | 2.64               | 0.18             | 0.47              |
| FRVL110-120F | 1.10               | 2.20               | 8.2                    | 8.0                  | 120                                   | 135                                     | 2.28               | 0.15             | 0.38              |
| FRVL125-120F | 1.25               | 2.50               | 20.0                   | 12.5                 | 120                                   | 135                                     | 2.88               | 0.11             | 0.33              |
| FRVL130-120F | 1.35               | 2.70               | 9.6                    | 10.0                 | 120                                   | 135                                     | 2.64               | 0.12             | 0.30              |
| FRVL135-120F | 1.35               | 2.70               | 20.0                   | 13.5                 | 120                                   | 135                                     | 3.12               | 0.11             | 0.30              |
| FRVL160-120F | 1.60               | 3.20               | 11.4                   | 12.0                 | 120                                   | 135                                     | 3.12               | 0.09             | 0.22              |
| FRVL185-120F | 1.85               | 3.70               | 12.6                   | 12.0                 | 120                                   | 135                                     | 3.36               | 0.08             | 0.19              |
| FRVL200-120F | 2.00               | 4.20               | 36.0                   | 20.0                 | 120                                   | 135                                     | 4.32               | 0.08             | 0.21              |
| FRVL250-120F | 2.50               | 5.00               | 15.6                   | 15.0                 | 120                                   | 135                                     | 4.44               | 0.05             | 0.13              |
| FRVL300-120F | 3.00               | 6.00               | 19.8                   | 17.0                 | 120                                   | 135                                     | 4.56               | 0.04             | 0.10              |
| FRVL375-120F | 3.75               | 7.50               | 24.0                   | 20.0                 | 120                                   | 135                                     | 4.80               | 0.03             | 0.08              |

NOTE : Specification subject to change without notice.

2019/9/18



IH=Hold current-maximum current at which the device will not trip at 23°C still air.  
 IT=Trip current-minimum current at which the device will always trip at 23°C still air.  
 V MAX=Maximum voltage device can withstand without damage at its rated current.  
 I MAX= Maximum fault current device can withstand without damage at rated voltage (V MAX).  
 Pd=Typical power dissipated from device when in tripped state in 23°C still air environment.  
 RMIN=Minimum device resistance at 23°C.  
 R1MAX=Maximum device resistance at 23°C, 1 hour after tripping .  
 Physical specifications:  
 Lead material: FRVL010-120F Tin plated copper clad steel, 24AWG.  
                   FRVL017-120F Tin plated copper, 24AWG.  
                   FRVL020-120F~FRVL070-120F and FRVL090-120F Tin plated copper, 22AWG.  
                   FRVL075-120F and FRVL100-120F~FRVL375-120F Tin plated copper, 20AWG.  
 Soldering characteristics:MIL-STD-202, Method 208E.  
 Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement.

**4. Production Dimensions (millimeter)**

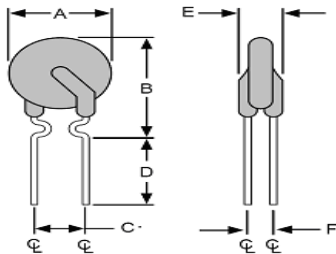


Fig.1

**FRVL010-120F~FRVL017-120F**  
 Lead S size :24AWG  
 Φ 0.51 mm Diameter

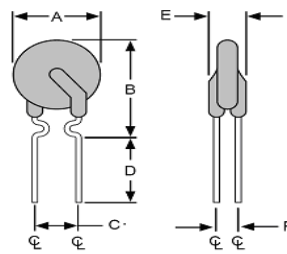


Fig.2

**FRVL020-120F~FRVL090-120F**  
 Lead Size :22AWG  
 Φ 0.65 mm Diameter

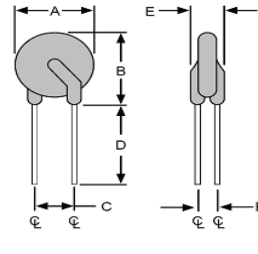


Fig.3

**FRVL110-120F~FRVL375-120F**  
 Lead Size :20AWG  
 Φ 0.81 mm Diameter

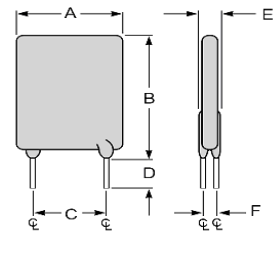


Fig.4

**FRVL075-120F ~FRVL200-120F**  
 Lead Size : 20AWG  
 Φ 0.81 mm Diameter

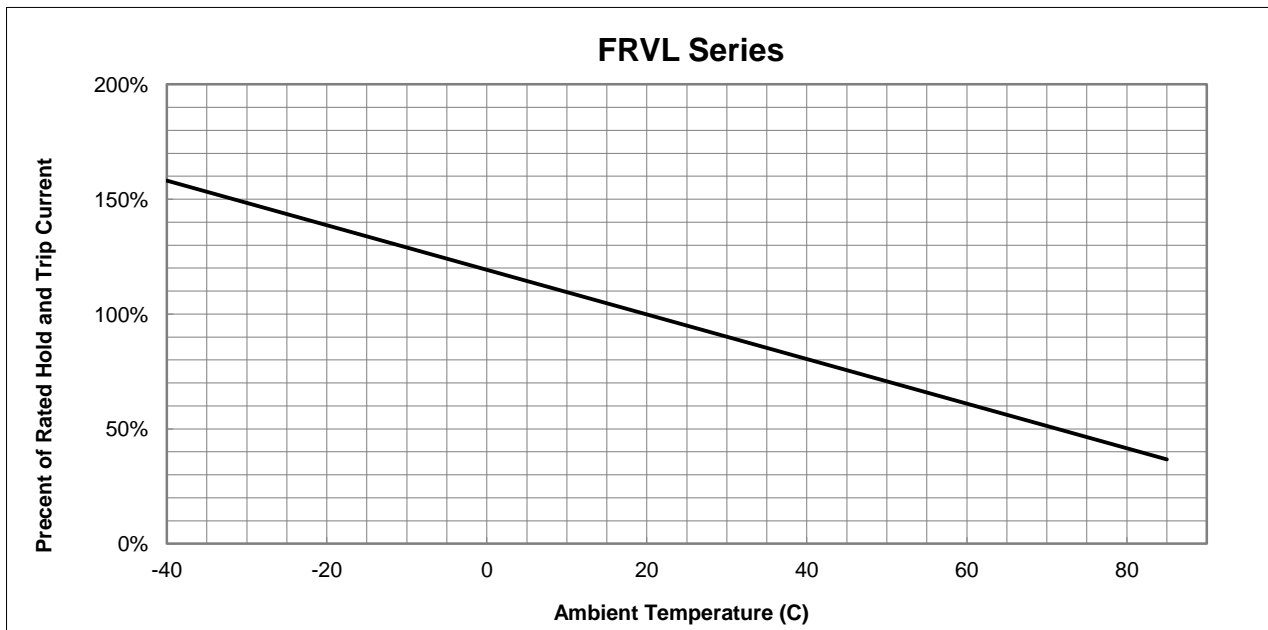
| Part Number  | Fig. | A       | B       | C       | D       | E       | F       |
|--------------|------|---------|---------|---------|---------|---------|---------|
|              |      | Maximum | Maximum | Typical | Minimum | Maximum | Typical |
| FRVL010-120F | 1    | 7.9     | 13.0    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL017-120F | 1    | 7.9     | 13.0    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL020-120F | 2    | 7.9     | 13.0    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL025-120F | 2    | 7.9     | 13.0    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL030-120F | 2    | 7.9     | 13.0    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL040-120F | 2    | 8.2     | 14.2    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL050-120F | 2    | 9.2     | 14.9    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL065-120F | 2    | 9.7     | 14.9    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL070-120F | 2    | 10.6    | 15.5    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL075-120F | 4    | 10.9    | 17.0    | 5.1     | 7.6     | 4.1     | 2.2     |
| FRVL090-120F | 2    | 11.9    | 15.9    | 5.1     | 7.6     | 3.8     | 2.2     |
| FRVL100-120F | 4    | 11.5    | 20.1    | 5.1     | 7.6     | 4.1     | 2.2     |
| FRVL110-120F | 3    | 13.3    | 18.3    | 5.1     | 7.6     | 4.1     | 2.2     |
| FRVL125-120F | 4    | 14.0    | 21.7    | 5.1     | 7.6     | 4.1     | 2.2     |
| FRVL130-120F | 3    | 15.5    | 20.6    | 5.1     | 7.6     | 4.1     | 2.2     |
| FRVL135-120F | 4    | 16.3    | 21.7    | 5.1     | 7.6     | 4.1     | 2.2     |
| FRVL160-120F | 3    | 17.5    | 22.5    | 5.1     | 7.6     | 4.1     | 2.2     |

NOTE : Specification subject to change without notice.



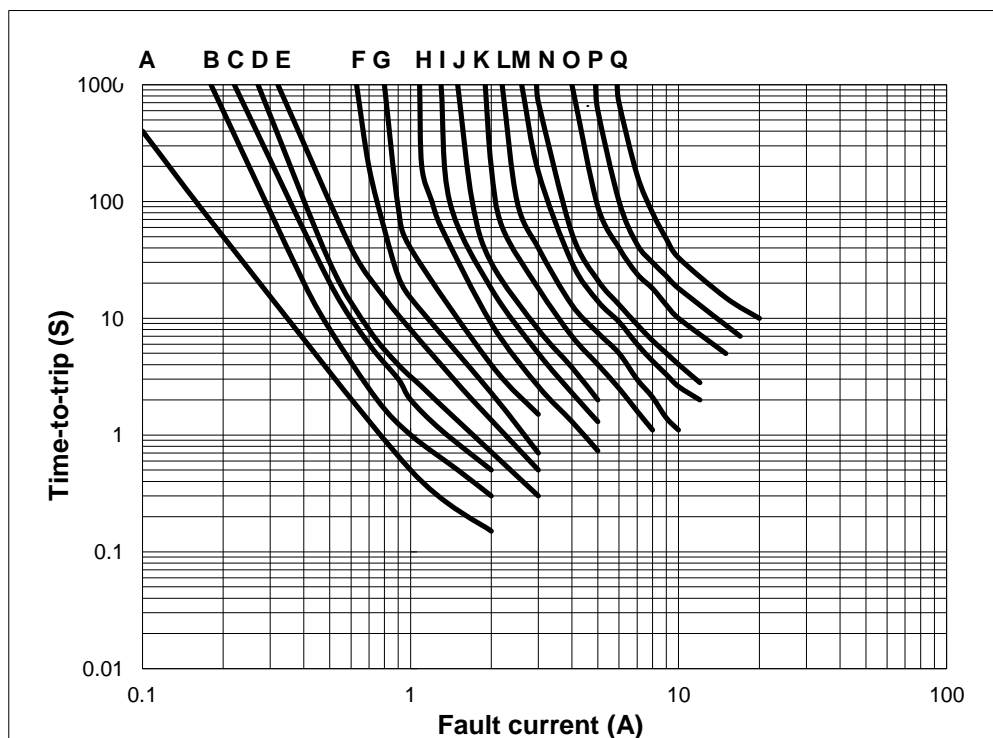
|              |   |      |      |      |     |     |     |
|--------------|---|------|------|------|-----|-----|-----|
| FRVL185-120F | 3 | 19.9 | 24.9 | 5.1  | 7.6 | 4.1 | 2.2 |
| FRVL200-120F | 4 | 23.5 | 27.9 | 10.2 | 7.6 | 4.1 | 2.2 |
| FRVL250-120F | 3 | 22.5 | 27.5 | 10.2 | 7.6 | 4.1 | 2.2 |
| FRVL300-120F | 3 | 25.5 | 30.0 | 10.2 | 7.6 | 4.1 | 2.2 |
| FRVL375-120F | 3 | 29.5 | 34.0 | 10.2 | 7.6 | 4.1 | 2.2 |

### 5. Thermal Derating Curve



### 6. Typical Time-To-Trip at 23°C

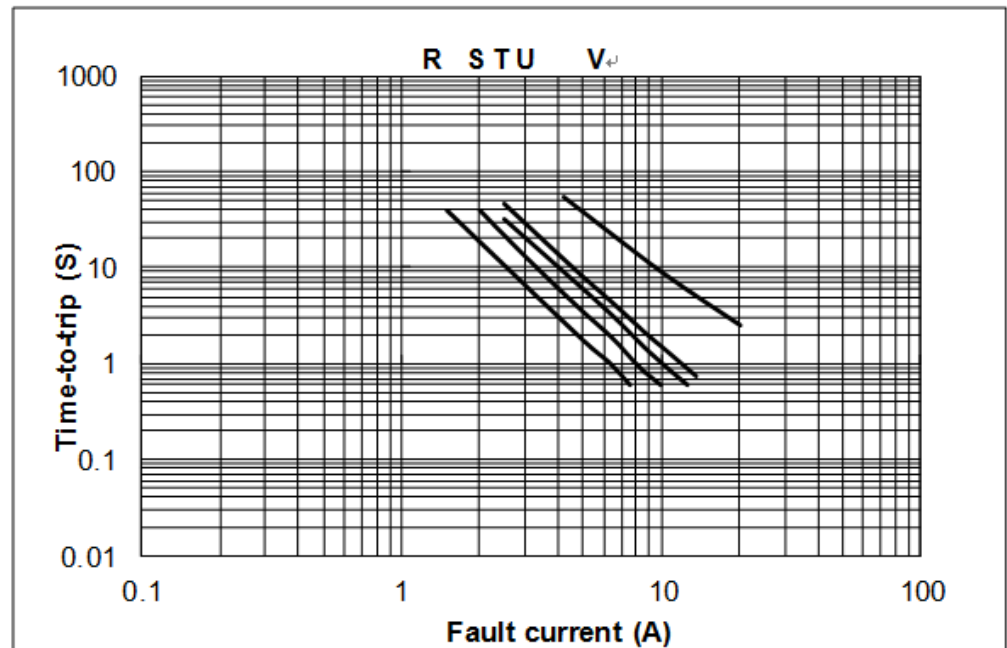
- A=FRVL010-120F
- B=FRVL017-120F
- C=FRVL020-120F
- D=FRVL025-120F
- E=FRVL030-120F
- F=FRVL040-120F
- G=FRVL050-120F
- H=FRVL065-120F
- I=FRVL070-120F
- J=FRVL090-120F
- K=FRVL110-120F
- L=FRVL130-120F
- M=FRVL160-120F
- N=FRVL185-120F
- O=FRVL250-120F
- P=FRVL300-120F
- Q=FRVL375-120F



NOTE : Specification subject to change without notice.



- R=FRVL075-120F
- S=FRVL100-120F
- T=FRVL125-120F
- U=FRVL135-120F
- V=FRVL200-120F

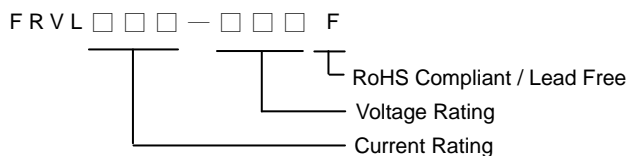


### 7. Material Specification

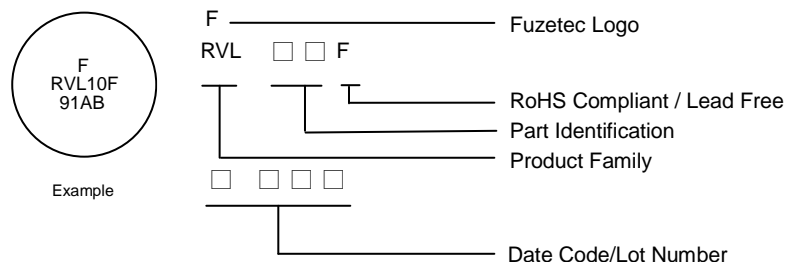
- Lead material : FRVL010-120F Tin plated copper clad steel, 24 AWG.
- FRVL017-120F Tin plated copper, 24 AWG.
- FRVL020-120F~FRVL070-120F and FRVL090-120F Tin plated copper, 22AWG.
- FRVL075-120F and FRVL100-120F~FRVL375-120F Tin plated copper, 20AWG.
- Soldering characteristics:MIL-STD-202, Method 208E.
- Insulating coating:Flame retardant epoxy, meets UL-94V-0 requirement

### 8. Part Numbering and Marking System

#### Part Numbering System



#### Part Marking System



Note: Font on Marking may look slightly different due to fine turnings of each Marking printer.

#### Warning:

- Each product should be carefully evaluated and tested for their suitability of application.
- Operation beyond the specified maximum rating or improper use may result in damage and possible electrical arcing and/or flame.
- PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
- Avoid contact of PPTC device with chemical solvent, including some inert material such as silicone based oil, lubricant and etc. Prolonged contact will damage the device performance.
- Additional protection mechanism are strongly recommended to be used in conjunction with the PPTC device for protection against abnormal or failure conditions.
- Avoid use of PPTC device in a constrained space such as potting material, housing and containers where have limited space to accommodate device thermal expansion and/or contraction.



NOTE : Specification subject to change without notice.

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