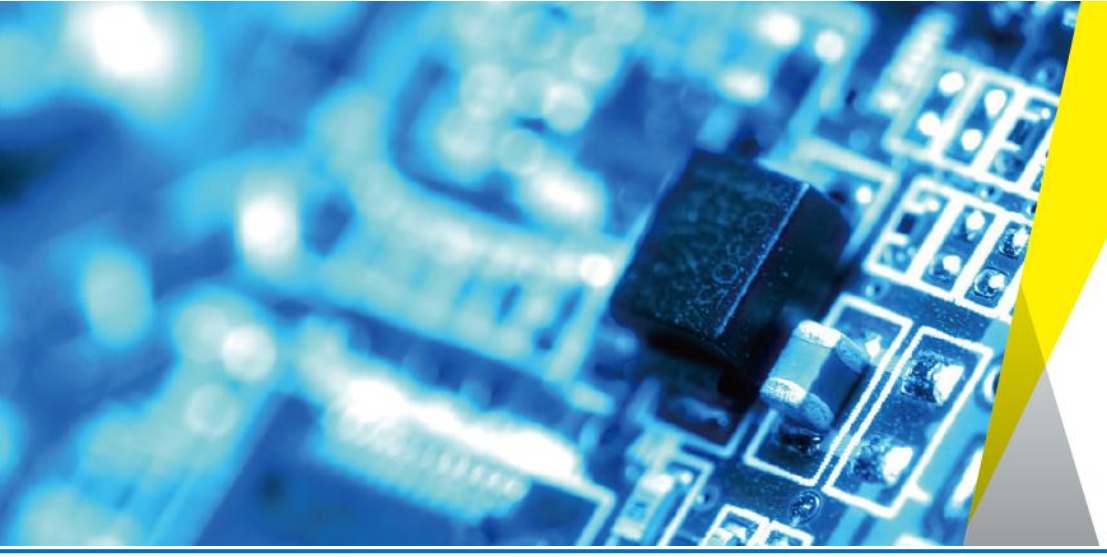

DATA SHEET

Product Name	**Cement Thermal Fusible Resistors**
Part Name	**FTR Series**
File No.	**DIP-SP-053**

Uniroyal Electronics Global Co., Ltd.

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Manufacture Plant	Uniroyal Electronics Industry Co., Ltd.
	Aeon Technology Corporation
	Royal Electronic Factory (Thailand) Co., Ltd.
	Royal Technology (Thailand) Co., Ltd.

1. Scope

1.1 This datasheet is the characteristics of Cement Thermal Fusible Resistors manufactured by UNI-ROYAL.

1.2 Self-extinguishing

1.3 Excellent flame & moisture resistance

1.4 Extremely small & sturdy mechanically safe

1.5 Non-inductive type available

1.6 Circuit protection applied to industrial and motor control

2. Part No. System

The standard Part No. includes 14 digits with the following explanation:

2.1 Cement Thermal Fusible Resistors the 1st to 3rd digits are to indicate the product type.
Example: PF3=FTR3

2.2 The 4th digit is to Fusing Temp
Example: A=98˚C B=104˚C

2.3 The 5th~6th digit is to Wattage
Example: 14=1.4W 15=1.5W

2.4 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.
J=±5% K= ±10%

2.5 The 8th to 11th digits is to denote the Resistance Value.

2.5.1 For Cement Fixed Resistors the 8th digits will be coded with "W" to denote Wire-wound type respectively of the Cement Fixed Resistor product .The 9th to 11th please refer to point a) of item 4.
Example: W10J=1Ω W120=12Ω

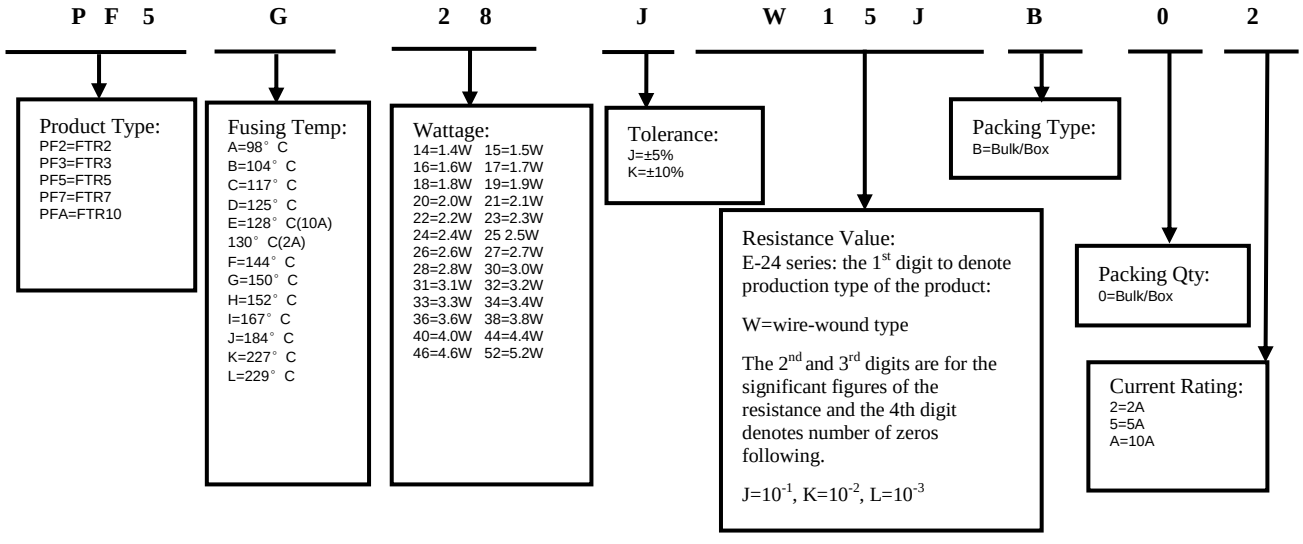
2.6 The 12th digit is to denote the Packaging Type with the following codes:
B=Bulk /Box

2.7 The 13th digit is to denote the Packing Qty
0=Bulk/Box

2.8 The 14th digit is to denote the Current Rating:
Example:2=2A ; 5=5A; A=10A

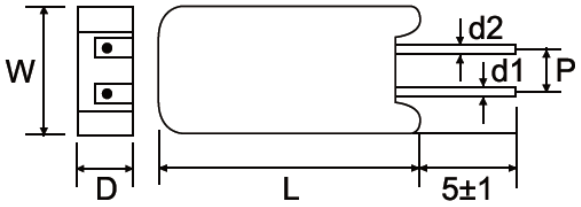
3. Ordering Procedure

(Example: FTR-5G 2.8W ±5% 1.5Ω 2A B/B)



4. Ratings & Dimension

4.1 Dimension



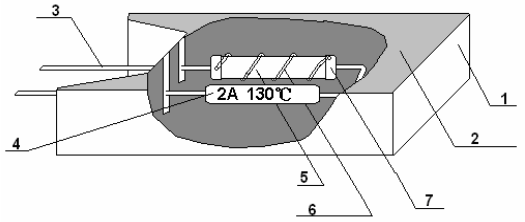
Part No.	Type	W ±2	D ±2	L ±2	P ±1	d1 ±0.05	d2 ±0.05
PF2	FTR2	12	7	21	5	0.6	0.75
PF3	FTR3	12	8	26	5	0.6	0.75
PF5	FTR5	13	9	26	5	0.6	0.75
PF7	FTR7	13	9	38.5	5	0.6	0.75
PFA	FTR10	16	13	35	7.5	0.6	0.75

4.2 Fusing Temperature Code

Current Rating	Voltage Rating	Fusing Temperature Code				Resistance Range
		C	D	E	G	
		117℃	125℃	130℃	150℃	
2A	250V	1.6W	1.9W	2.0W	2.0W	0.22Ω~270Ω
		1.7W	2.0W	2.1W	2.3W	0.27Ω~680Ω
		1.9W	2.3W	2.4W	2.8W	0.27Ω~680Ω
		2.2W	2.7W	2.8W	3.2W	0.68Ω~1.2KΩ
		2.6W	3.2W	3.3W	3.8W	1Ω~1.8KΩ

Current Rating	Voltage Rating	Fusing Temperature Code										Resistance Range
		A	B	C	E	F	H	I	J	K	L	
		98℃	104℃	117℃	128℃	144℃	152℃	167℃	184℃	227℃	229℃	
10A	250V	1.4W	1.6W	1.8W	2.0W	2.0W	2.0W	2.0W	2.0W	2.0W	2.0W	0.22Ω~270Ω
		1.5W	1.7W	1.9W	2.1W	2.2W	2.5W	2.8W	3.0W	3.0W	3.0W	0.27Ω~680Ω
		1.7W	1.9W	2.2W	2.4W	2.6W	3.1W	3.3W	3.8W	3.8W	3.8W	0.27Ω~680Ω
		2.0W	2.2W	2.5W	2.8W	3.0W	3.4W	3.8W	4.4W	4.4W	4.4W	0.68Ω~1.2KΩ
		2.4W	2.6W	3.0W	3.3W	3.6W	4.0W	4.6W	5.2W	5.2W	5.2W	1Ω~1.8KΩ

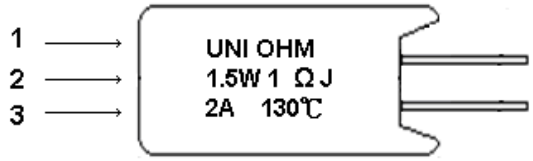
5. Construction



NO.	Name	Material generic name
1	Ceramic case	Steatite
2	Filling materials	Cement
3	Lead	Copper wire
4	Thermal fuse	/
5	Ceramic rod	Al_2O_3
6	Alloy	NiCr & CuNi
7	Cap	Iron

6. Marking

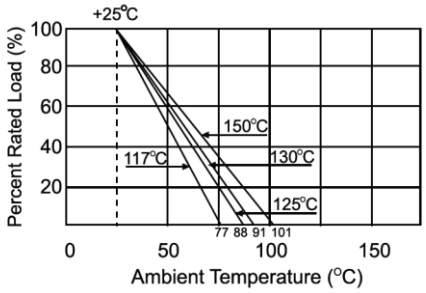
Example:



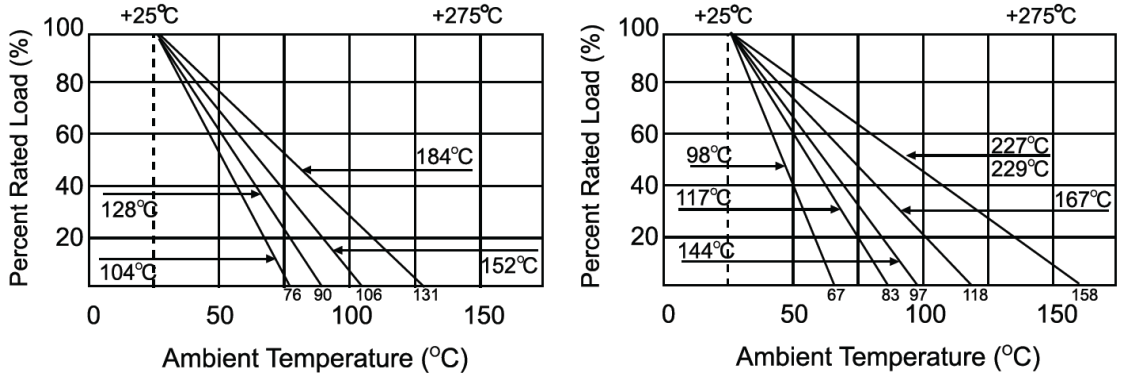
Code description and regulation:
1. Mark: UNI OHM
2.Power rating 1.5W, resistance 10Ω,resistance tolerance J=±5%
3.Thermal fuse: current rating 2A, rated functioning temperature 130℃
Note：The marking code shall be prevailed in kind!

7 Derating Curve

Derating Curve(current rating 2A)



Derating Curve(current rating 10A)



6.1Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

Where: RCWV = rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

P = power rating (WATT.)

R= nominal resistance (OHM)

8. Performance Specification

Characteristic	Limits	Test method (GB/T 5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	≧20Ω: ±350PPM/℃ Max <20Ω: ±400PPM/℃ Max	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance Value at room temperature （t_1）; R_2: Resistance at test temperature （t_2） t_1: +25 ℃ or specified room temperature t_2: Test temperature（-55℃or 125℃）
Short-time overload	Resistance change rate must be in ±(5%+0.05Ω) , and no mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times rcwv for 5 seconds.
Solderability	95% Coverage Min.	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder:245℃±3℃ Dwell time in solder: 2~3seconds.
Insulation Resistance	10,000 Megaohm Min	4.6 Apply 100V DC between protective coating and termination for 1 Min then measure
Resistance to soldering heat	Resistance change rate must be in ± (1%+0.05Ω) , and no mechanical damage.	4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260℃±5℃ solder for 10±1 seconds.
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down.	4.7 Resistors shall be clamped in the trough of a 90°metallic V-block and shall be tested at AC potential respectively specified in the above list for 60-70 seconds.for cement fixed resistors the testing voltage is 1000V.
Terminal strength	No evidence of mechanical damage	4.16 Direct load: Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90°at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations.
Humidity (Steady State)	For Wire-wound: ΔR/R: ±(5%+0.1Ω) Max. With no evidence of mechanical damage.	7.9 Resistance change after 1,000 hours without load in a humidity test chamber controlled at 40℃±2℃ and 90 to 95% relative humidity.
Load life	For Wire-wound: ΔR/R: ±(5%+0.1Ω) Max. With no evidence of mechanical damage.	4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours “ON”, 0.5 hour “OFF” at 70℃ ±2℃ ambient.
Fusing test	5min (max)	Set oil bath temperature is the resistor’s rated functioning temperature; place the resistor into oil bath, record the time which is from resistor into oil bath to resistor open.

9. Note

9.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35℃ under humidity between 25 to 75%RH. Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.

9.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.

9.3. Storage conditions as below are inappropriate:

a. Stored in high electrostatic environment

b. Stored in direct sunshine, rain, snow or condensation.

c. Exposed to sea wind or corrosive gases, such as Cl_2, H_2S, NH_3, SO_2, NO_2, Br etc.

10. Record

`Version	Description	Page	Date	Amended by	Checked by
1	First version	1~5	Apr.15, 2019	Haiyan Chen	Yuhua Xu
2	Modify the temperature coefficient test conditions	4	Nov.08, 2022	Haiyan Chen	Yuhua Xu
3	Updated version	1~6	Aug.01, 2023	Haiyan Chen	Yuhua Xu