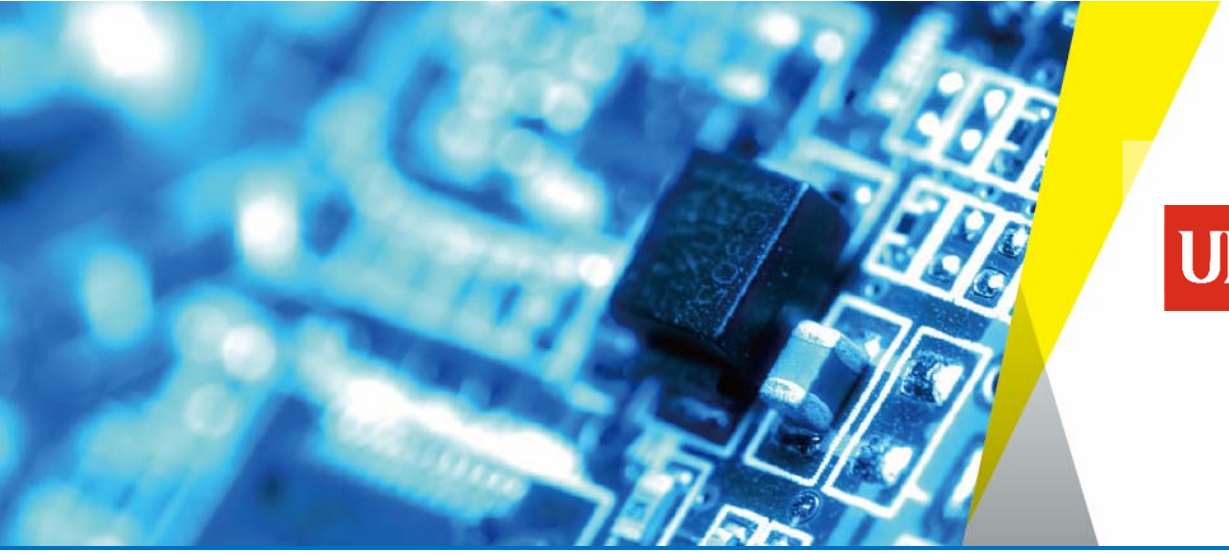

DATA SHEET

Product Name **Carbon Film Fixed Resistors**

Part Name **CFR/CPR Series**

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Uniroyal Electronics Industry Co., Ltd.
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Aeon Technology Corporation
Uniroyal Electronics Global Co.,Ltd Xiamen Branch
Kunshan Foss Electronic material Co., Ltd.

Brands ***RoyalOhm*** ***UniOhm***

1. Scope

1.1 This specification for approve relates to the Carbon Film Fixed Resistors manufactured by UNI-ROYAL.
1.2 High quality performance ； Great economy.
1.3 Flame Retardant available ； Automatically insertable .

2. Part No. System

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

2.1 1th ~4th digits
This is to indicate the Chip Resistor. Example: CFR0= Carbon Film Fixed Resistors ;CPR0= Carbon Film Power Resistors

2.2 5th~6th digits:

2.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers,
The following codes are used; and please refer to the following chart for detail:
W=Normal Size; 1"~"G"to denote"1"~"16"as Hexadecimal:

1/16W~1W: (＜1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/16
Normal Size	W2	W3	W4	W5	W6	W8	WA	WG
Small Size	S2	S3	S4	S5	S6	S8	SA	SG
Extra Small Size	U2	U3	U4	U5	U6	U8	UA	UG

1W~16W (≧1W)

Wattage	1	2	3	5	7	8	9	10	15
Normal Size	1W	2W	3W	5W	7W	8W	9W	AW	FW
Small Size	1S	2S	3S	5S	7S	8S	9S	AS	FS
Extra Small Size	1U	2U	3U	5U	7U	8U	9U	AU	FU

2.2.2 For power rating less or equal to 1 watt, the 5th digit will be the letters W to represent the size required & the 6th digit will be a number or a letter code. Example: WA=1/10W; W4=1/4W

2.2 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance. D=±0.5% F=±1% G=±2% J=±5% K= ±10%

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

2.4.1 For the standard resistance values of 5%&10% series, the 8th digit is "0",the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;
For the standard resistance values of ≤2% series in, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the zeros following.

2.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:0=10^0 1=10^1 2=10^2 3=10^3 4=10^4 5=10^5 6=10^6 J=10^{-1} K=10^{-2} L=10^{-3} M=10^{-4}

2.4.3 The 12th, 13th & 14th digits.
The 12th digit is to denote the Packaging Type with the following codes:
C=Bulk in (Chip Product) T=Tape/Reel

2.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Reel packaging types. The following letter code is to be used for some packing quantities:
4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs

2.4.5 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

0=NIL	P=Panasert type	1=Avisert type 1	2=Avisert type 2
3=Avisert type 3	8=PT-58mm	9=PT-64mm	7=Lead wire(H)38mm
A=PT-83mm	C=PT-73mm	D=PT-71mm	

3. Ordering Procedure

(Example: CFR 2W ±5% 100Ω T/B-500)

C F R 0 2 W J 0 1 0 1 A A 0

Product Type:
CFR=Carbon Film Fixed Resistors
CPR= Carbon Film Power Resistors

Wattage:
Normal size:
W8=1/8W
W4=1/4W
W2=1/2W
1W=1W
2W=2W
Small size:
S4=1/4WS
1S=1WS
2S=2WS
3S=3WS

Special Features:
0= Standard product
F= Flame Retardant

Tolerance:
G=±2%
J=±5%
K=±10%

Resistance Value:
±5%、10% series:
The 1st digit will be "0"; the 2nd & 3rd digits are for the significant figures of the resistance and the 4th digit denotes number of zeros following
Example:20KΩ:0203
±2%series:
The 1st to 3rd digits are for the significant figures of the resistance and 4th digit denotes number of zeros following.
Example:20KΩ:2002
J=10^{-1}; K=10^{-2}; L=10^{-3}

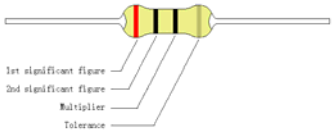
Packing Type:
A=Tape/Box;
T=Tape/Reel;
B=Bulk/Box

Packing quantity:
1=1,000pcs
2=2,000pcs
3=3,000pcs
4=4,000pcs
5=5,000pcs
A=500pcs
B=2,500pcs
0=Bulk/Box

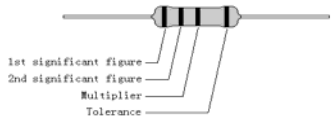
Additional Information:
0=NIL
P=Panasert type
1=Avisert type 1
2=Avisert type 2
3=Avisert type 3
8=PT-58mm
9=PT-64mm
7=Lead wire(H)38mm
A=PT-83mm
C=PT-73mm
D=PT-71mm

4. Marking

Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802



4.1 Label:
Label shall be marked with following items:
(1) Type and style
(2) Nominal resistance
(3) Resistance tolerance
(4) Quantity
(5) Lot number
(6) PPM

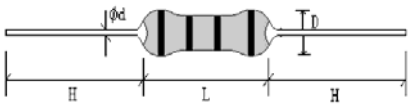


Example:

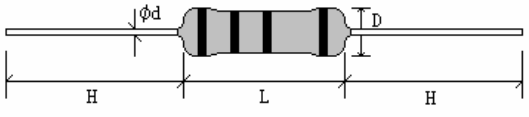
CARBON FILM FIXED RESISTORS	
WATT: 2W	VAL: 100Ω
Q'TY: 500	TOL: 5%
LOT: 4021548	PPM:

5. Dimension

For 1/8W、1/4WS :



Other:



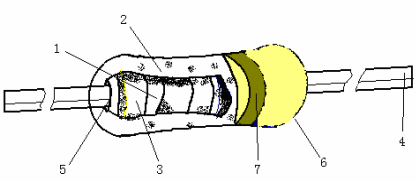
5.1 Ordinary Products:

Type	Dimension(mm)					Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Tolerance
	D	L	d ±0.05	H ±3	PT					
CR1/8W	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V	1Ω~1MΩ	
CR 1/4WS	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V	1Ω~1MΩ	
CR 1/4W	2.2±0.3	6.5±1.0	0.54	28	52	250V	500V	500V	1Ω~10MΩ	
CR 1/2W	3.0±0.6	9.5±1.0	0.54	28	52	350V	700V	700V	1Ω~10MΩ	±2%
CR 1WS	4.5±0.6	11.5±1.0	0.70	25	52	500V	1000V	1000V	1Ω~10MΩ	±5%
CR 1W	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V	1Ω~10MΩ	±10%
CR 2WS	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V	1Ω~10MΩ	
CR 2W	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V	1Ω~10MΩ	
CR 3WS	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V	1Ω~10MΩ	

5.2 High Power Products:

Type	Dimension(mm)					Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Tolerance
	D	L	d ±0.05	H ±3	PT					
CPR1/2W	2.2±0.5	6.5±1.0	0.54	28	52	300V	500V	700V	3Ω~10MΩ	±2%
CPR 1W	3.5±0.5	9.5±1.0	0.54	28	52	500V	700V	1000V	3Ω~10MΩ	±5%
CPR 2W	4.5±0.5	11.0±1.0	0.70	25	52	500V	1000V	1000V	3Ω~10MΩ	±10%

6. Structure

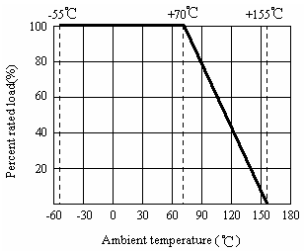


No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistor	Carbon Film
3	End Cap	Cold steel plated with copper/tin
4	Lead Wire	Tin solder coated copper wire
5	Joint	By welding
6	Coating	(1). Celluloid paint (2).Insulated Resin Color: Beige(Standard) Light Brown(CFR1WS,CFR2WS,CFR3WS) Gray Green(CPR1/2W,CPR1W,CPR2W)
7	Color Code	Epoxy resin

7. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55℃ to 70℃. For temperature in excess of 70℃, the load shall be derated as shown in figure 1

Figure 1



Voltage 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 commercial-line frequency and waveform (Volt.)

P = power rating (WATT.) R = nominal resistance (OHM)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less

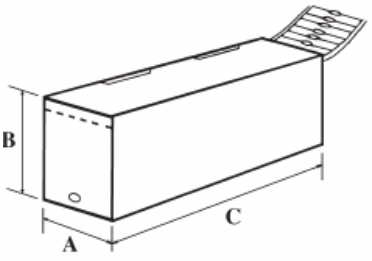
8. Performance Specification

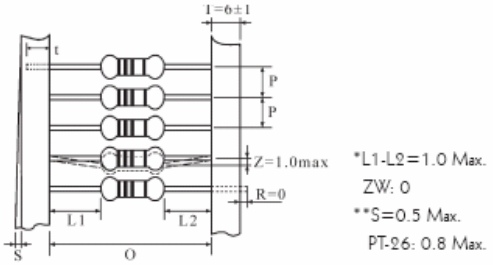
Characteristic	Limits	Test Method (GB/T5729&JIS-C-5201&IEC60115)
Temperature Coefficient	≤10Ω：±300 PPM/℃ 11Ω~99KΩ：±450 PPM/℃ 100KΩ~1MΩ：0~-700 PPM/℃ 1.1MΩ~10MΩ：0~-1500 PPM/℃	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) $\frac{R_3-R_1}{R_1(t_3-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance Value at room temperature （t_1）; R_2: Resistance Value at upper limit temperature ± 2℃（t_2） R_3 : Resistance Value at lower limit temperature ± 3℃（t_3） Test pattern： Room temperature：（t_1） Upper limit temperature：（t_2） Lower limit temperature ：（t_3）
Short-time overload	CFR：ΔR/R≤±(1%+0.05Ω) CPR：ΔR/R≤±(0.75%+0.05Ω)	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds.
Insulation resistance	Insulation resistance is: 10,000 MΩ Min.	4.6 The measuring voltage shall be either (100±15) V DC for resistors with an isolation voltage <500V or (500±50)V DC. for resistors with an isolation voltage≧500V
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.
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.
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 solder2~3 seconds.

Resistance to solvent	No deterioration of protective coatings & markings	4.29 Specimens shall be immersed in a bath of alcohol completely for 3 min. With ultrasonic
Rapid change of temperature	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; High Power Products： ΔR/R±(3%+0.05Ω)	4.19 30 min at lower limit temperature and 30 min at upper limit temperature，5 cycles.
Load life in humidity	Normal type: ΔR/R ±3% for <100KΩ ±5% for ≥ 100KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; High Power Products： ΔR/R±(3%+0.05Ω)	7.9 Resistance change after 1,000 hours (1.5 hours “ON”,0.5 hour “OFF”) at RCWV in a humidity test chamber controlled at 40℃±2℃ and 90 to 95% relative humidity.
Load life	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; High Power Products： ΔR/R±(3%+0.05Ω)	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.
Low Temperature Storage	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; High Power Products： ΔR/R±(3%+0.05Ω)	4.23.4 Lower limit temperature，for 2H.
High Temperature Exposure	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; High Power Products： ΔR/R±(3%+0.05Ω)	4.23.2 Upper limit temperature ，for 16H.

9. Standard Packing

9.1 Tapes in Box Packing:

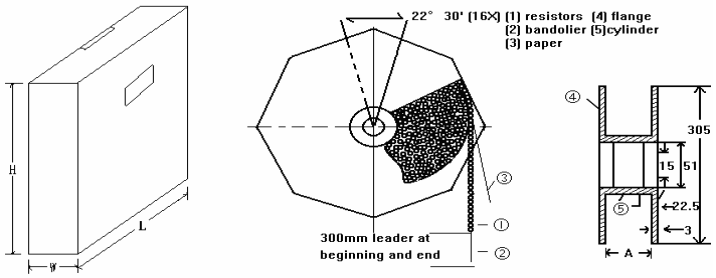




Dimension of T/B (mm)

TYPE	O	P	W (A)±5	H (B)±5	L (C)±5	Quantity Per Box
CR 1/8W	52±1	5±0.3	75	70	255	5,000pcs
CR 1/4WS	52±1	5±0.3	75	70	255	5,000pcs
CR 1/4W	52±1	5±0.3	75	98	255	5,000pcs
CR 1/2W	52±1	5±0.3	75	45	255	1,000pcs
CR 1WS	52±1	5±0.3	86	82	255	1,000pcs
CR 1W	64±5	10±0.5	94	88	255	1,000pcs
CR 2WS	64±5	10±0.5	94	88	255	1,000pcs
CR 2W	64±5	10±0.5	90	88	255	500pcs
CR 3WS	64±5	10±0.5	90	88	255	500pcs
CPR1/2W	52±1	5±0.3	75	116	255	5,000pcs
CPR1W	52±1	5±0.3	75	45	255	1,000pcs
CPR2W	52±1	5±0.3	86	82	255	1,000pcs

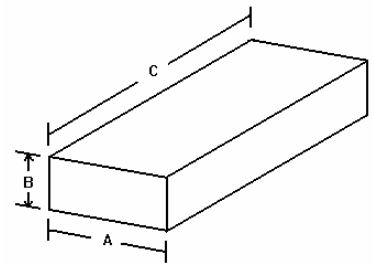
9.2 Tapes in Reel Packing



Dimension of Reel (mm)

Type	O	A	W±5	H±5	L±5	Quantity Per Reel
CR 1/8W	52±1	73±2	85	295	293	5,000pcs
CR 1/4WS	52±1	73±2	85	295	293	5,000pcs
CR 1/4W	52±1	73±2	85	295	293	5,000pcs
CR 1/2W	52±1	73±2	85	295	293	2,500pcs
CR 1WS	52±1	73±2	85	295	293	2,500pcs
CR 1W	64±5	80±5	95	295	293	1,000pcs
CR 2WS	64±5	80±5	95	295	293	1,000pcs
CR 2W	64±5	80±5	95	295	293	1,000pcs
CR 3WS	64±5	80±5	95	295	293	1,000pcs
CPR 1/2W	52±1	73±2	85	295	293	5,000pcs
CPR 1W	52±1	73±2	85	295	293	2,500pcs
CPR 2W	52±1	73±2	85	295	293	2,500pcs

9.3 Bulk in Box Packing



Dimension of Box (mm)

Type	A±5	B±5	C±5	Quantity Per Reel
CR 1/8W	140	80	240	1,000/20,000pcs
CR 1/4WS	140	80	240	1,000/20,000pcs
CR 1/4W	140	80	240	500/10,000pcs
CR 1/2W	140	80	240	250/5,000pcs
CR 1WS	140	80	240	100/2,500pcs
CR 1W	140	80	240	100/1,500pcs
CR 2WS	140	80	240	100/1,500pcs
CR 2W	140	80	240	100/1,000pcs
CR 3WS	140	80	240	100/1,000pcs
CPR 1/2W	140	80	240	500/10,000pcs
CPR 1W	140	80	240	250/5,000pcs
CPR 2W	140	80	240	100/2,500pcs

10. Precaution for storage/Transportation

10.1. UNI-ROYAL recommend the storage condition temperature: 15℃~35℃, humidity :25%~75%.
(Put condition for individual product).Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old.
(Put condition for each product) may be degraded.

10.2. Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.
Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

10.3. Product performance and soldered connections may deteriorate if the products are stored in the following places:
a. Storage in high Electrostatic.
b. Storage in direct sunshine、rain and snow or condensation.
c. Where the products are exposed to sea winds or corrosive gases, including Cl_2, H_2S_3 NH_3, SO_2, NO_2.

11. Record

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~7	Mar.20, 2018	Chen Haiyan	Chen Nana