

信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

No.566-1, Gaoshi Rd., Lujhu, Yangmei Dist., Taoyuan City 32668, Taiwan, R.O.C.

Tel. : +886-3-4753355

Fax : +886-3-4854959

www.pdc.com.tw

SPECIFICATION FOR APPROVAL

DATE :

CUSTOMER :

PART NAME :

High Ohmic Lead Free& Halogen Free Chip-R Resistors

CUSTOMER'S DWG. NO. :

CUSTOMER'S PART NO. :

PDC PART NO. :

FHF SERIES APPROVED

DESCRIPTION. :

RESULT	ACTION	CUSTOMER'S SIGNATURE	NOTE
	"V"		
FULL APPROVED			
CONDITIONAL APPROVED			
REJECTED			

OUR ACTION	SIGNATURE
PREPARED By	Jenny Tseng
CHECKED By	Tony Chow
APPROVED By	Byron Tsai

CUSTOMER SIGNATURE FOR
ACCEPTANCE

Contents.

Descriptions	Pages
01. Features	2
02. Applications	2
03. Dimension and construction	2
04. Power Derating Curve	2
05. Rating	3
06. Part Number	3
07. Marking / Soldering	3-4
08. Reliability Performance	5
09. Packing Information	6
10. Storage / Handling	7
※ Appendix	8

FHF Series High Ohmic Thick-film Lead Free Chip Resistors

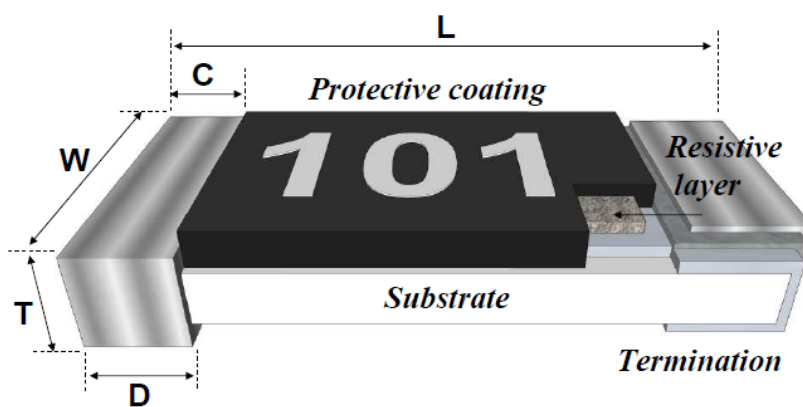
1. Features

- Small size and light weight.
- Suitable for lead free soldering.
- Compatible with wave and reflow soldering.
- RoHS compliant & Halogen free.

2. Applications

- Medical equipment.
- Printer, Converter.
- Power supply.
- Telecom application.

3. Dimension and Construction

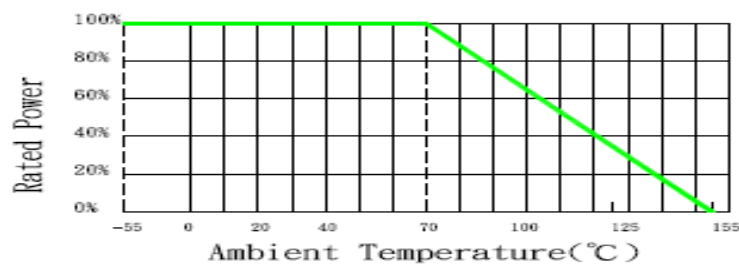


Type	L	W	C	D	T
FHF02	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
FHF03	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
FHF05	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
FHF06	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10

Unit : mm

4. Power Derating Curve

Operating Temperature Range: -55 to +155 deg.C



FHF Series High Ohmic Thick-film Lead Free Chip Resistors

5. Rating

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Tolerance (%)	Resistance (Ω)	Temperature Coefficient (ppm/°C)	Standard Resistance Values
FHF02	0402	1/16W	50V	100V	±1 ±5	10 ~ 30 M	±300	E-24
FHF03	0603	1/10W	50V	100V	±1	11 ~ 22 M	±200	E-24
					±5	11 ~ 100 M		
FHF05	0805	1/8W	150V	300V	±1	11 ~ 22 M	±200	E-24
					±5	11 ~ 100 M		
FHF06	1206	1/4W	200V	400V	±1	11 ~ 22 M	±200	E-24
					±5	11 ~ 100 M		

Note : RCWV = $(P \times R)^{1/2}$ or Max. RCWV listed above, whichever is lower.

RCWV : Working Voltage (V) , P : Rated Power (W) , R : Resistance Value (Ω)

6. Part Number

Type	Size	Tolerance	Packing	Watt	Resistance Code
FHF	02 :0402 03 :0603 05 :0805 06 :1206	F : ±1% J : ±5%	Paper Tape : 0402 V : 10 Kpcs 0603.0805.1206 I : 5Kpcs	As Rating Info.	XXX 5% : ex. 306_ 1% : ex. 1005

Example :

FHF02JV-306

→ 0402 size, tolerance ±5%, paper tape, 1/16W, 30MΩ.

FHF06FT-2005

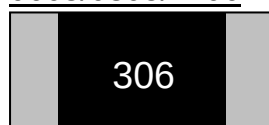
→ 1206 size, tolerance ±1%, paper tape, 1/4W, 20MΩ.

7. Marking/Surge/Soldering

Resistance value identify :

E24 ±5% : 3 Digits marking to identify the resistance value

0603/0805/1206

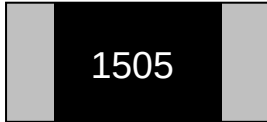


$$306 \rightarrow 30 \times 10^6 = 30 \text{ M}\Omega$$



E24 $\pm 1\%$: 4 Digits marking to identify the resistance value

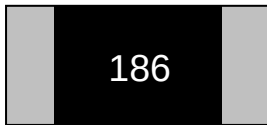
0805/1206



$$1505 \rightarrow 150 \times 10^5 = 15 \text{ M}\Omega$$

E24 $\pm 1\%$ (exclude E96) : 3 Digits marking to identify the resistance value

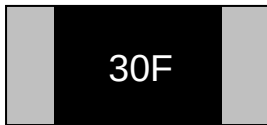
0603



$$186 \rightarrow 18 \times 10^6 = 18 \text{ M}\Omega$$

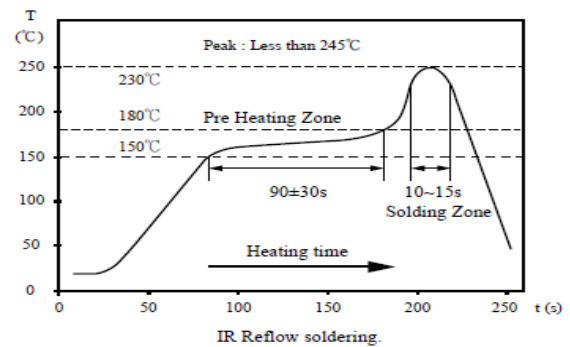
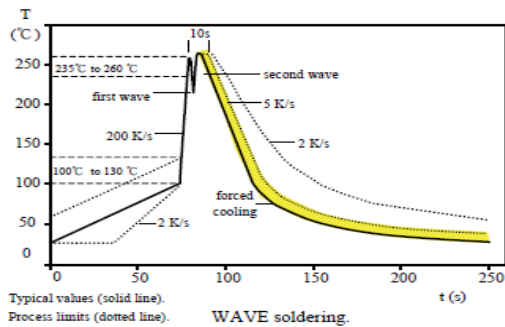
E96 $\pm 1\%$: 3 Digits marking to identify the resistance value

0603



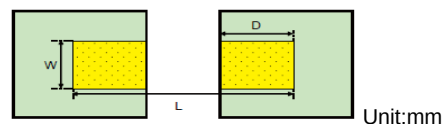
$$30F \rightarrow \text{Refer 0603 marking table} = 20 \text{ M}\Omega$$

Soldering Reference :



Recommend Solder Pad Dimensions :

Type	W	D	L
FHF02	0.60	0.50	1.50
FHF03	0.90	1.00	3.00
FHF05	1.30	1.15	3.50
FHF06	1.80	1.30	4.70



FHF Series High Ohmic Thick-film Lead Free Chip Resistors

8. Reliability Performance

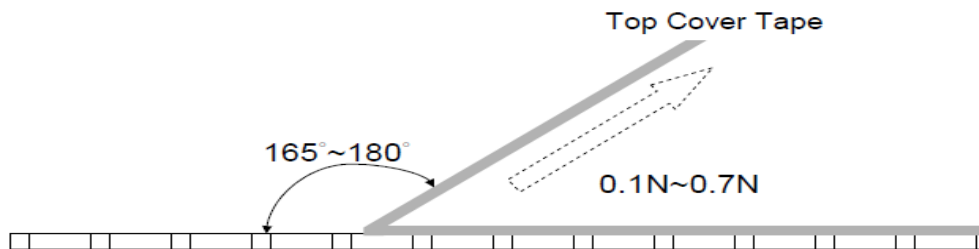
Test Item	Specification	Test Method
DC Resistance	F:±1% J:±5%	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
Resistance to Solder Heat	F, J: $\Delta R \leq \pm(2\% + 0.1\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.18 Solder dipping @ 260°C±5°C for 10sec.±1sec.
Solder Ability	Over 95% of termination must be covered with solder.	IEC 60115-1, Clause 4.17 After immersing flux, dip in the 245±2°C molten solder bath for 3±0.5 sec.
Board Flex	F, J: $\Delta R \leq \pm(2\% + 0.1\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.33 Resistance change after bended on the 90mm PCB. Bending 3mm
Short Time Overload	F, J: $\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.13 2.5 × Rated voltage for 5 seconds
Temperature Cycle	F, J: $\Delta R \leq \pm(5\% + 0.1\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.19 Repeat 5 cycles as follow. -55°C(30min)→25°C(2~3min)→155°C(30min)→25°C(2~3min)
Load Life Humidity	F, J: $\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.24 40±2°C with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.
Temperature Coefficient of Resistance (TCR)	Within the spec.	IEC 60115-1, Clause 4.8 Test temperature : T1:25°C / T2:-55°C or +155°C $TCR(ppm/^{\circ}C) = (R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$
Load Life	F, J: $\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.25 Rated voltage for 1.5 hours for followed by a pause 0.5 hour at 70±2°C.Cycle repeated 1000 hours.
Insulation Resistance	Between termination and coating must over 1000MΩ	IEC 60115-1, Clause 4.6 Test voltage : 100±15V

9. PACKAGING

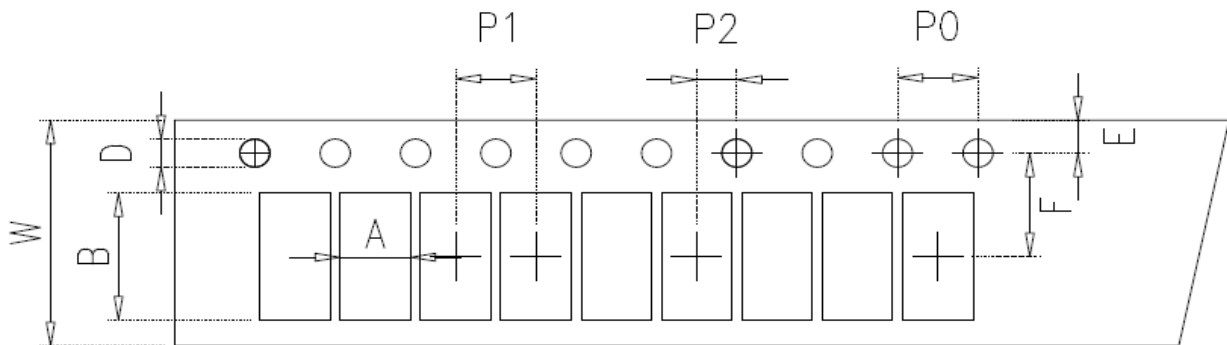
9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

The peel force of top cover tape shall between 0.1 to 0.7N

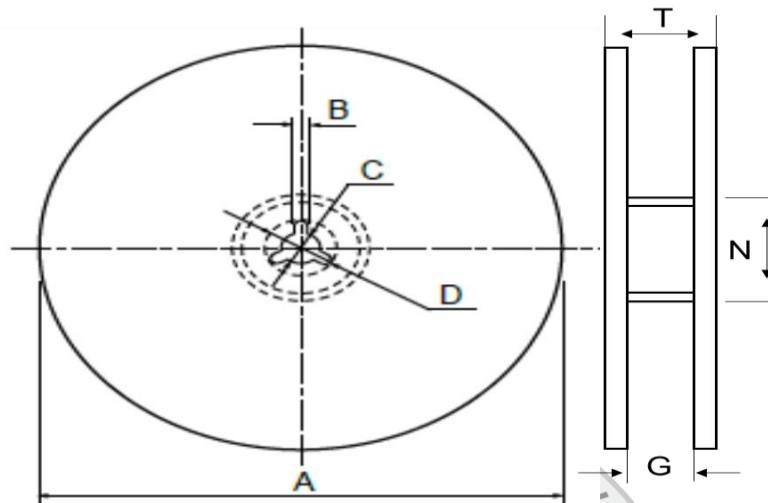


9.2 Tape Packaging Dimensions



Size	A	B	W	F	E	P1	P2	P0	D
0402	0.70±0.10	1.20±0.10	8.00±0.30	3.50±0.05	1.75±0.10	2.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
0603	1.10±0.20	1.90±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
0805	1.65±0.20	2.40±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1206	2.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0

9.3 Reel Dimensions



unit:mm								
Size	Packaging Q'ty	A	N	C	D	B	G	T
0402	10kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
0603 0805 1206	5kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	10kpcs/Reel	254.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	20kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.

10. Storage & Handling

... Products are recommended to be used up within one year as ensured shelf life.

Check solder ability in case shelf life extension is needed.

... To store products with following condition:

Temperature: 5 to 40°C ; Humidity: 20 to 70% relative humidity.

FHF Series High Ohmic Thick-film Lead Free Chip Resistors

Appendix

0603 1% Marking Table (Table 1)

Code	E48	E96	Code	E48	E96	Code	E48	E96	Code	E48	E96
01	100	100	25	178	178	49	316	316	73	562	562
02		102	26		182	50		324	74		576
03	105	105	27	187	187	51	332	332	75	590	590
04		107	28		191	52		340	76		604
05	110	110	29	196	196	53	348	348	77	619	619
06		113	30		200	54		357	78		634
07	115	115	31	205	205	55	365	365	79	649	649
08		118	32		210	56		374	80		665
09	121	121	33	215	215	57	383	383	81	681	681
10		124	34		221	58		392	82		698
11	127	127	35	226	226	59	402	402	83	715	715
12		130	36		232	60		412	84		732
13	133	133	37	237	237	61	422	422	85	750	750
14		137	38		243	62		432	86		768
15	140	140	39	249	249	63	442	442	87	787	787
16		143	40		255	64		453	88		806
17	147	147	41	261	261	65	464	464	89	825	825
18		150	42		267	66		475	90		845
19	154	154	43	274	274	67	487	487	91	866	866
20		158	44		280	68		499	92		887
21	162	162	45	287	287	69	511	511	93	909	909
22		165	46		294	70		523	94		931
23	169	169	47	301	301	71	536	536	95	953	953
24		174	48		309	72		549	96		976

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

※ All product specification and data are subject to change without notice.

