

THICK FILM CHIP RESISTORS HPF SERIES

HIGH POWER

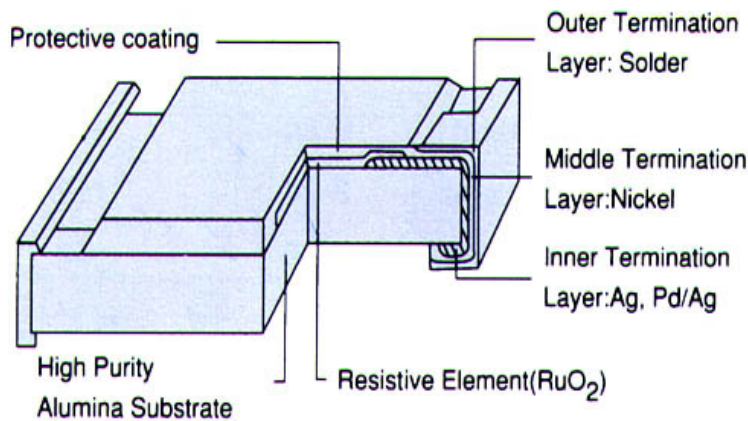
■ Features

- Suitable for lead free soldering.
- Compatible with flow and reflow soldering

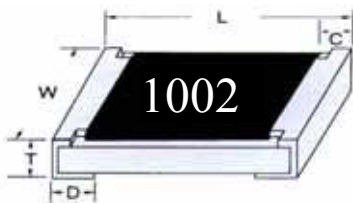
■ Applications

- Consumer Electronics
- SMPS, M/B
- Portable Device
- Measurement instrument
- Electronic equipment

■ Configuration

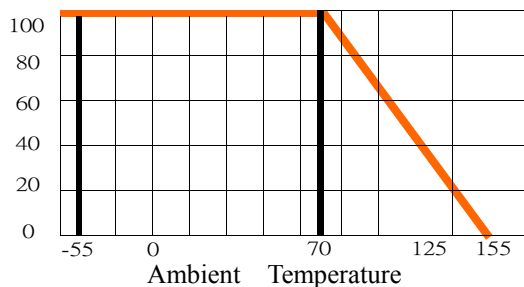


■ Dimensions



Size	L	W	C	D	T
0402	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.15
0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.15
1206	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.60±0.15
1210	3.10±0.10	2.60±0.10	0.50±0.20	0.50±0.20	0.55±0.10
2010	5.00±0.20	2.50±0.20	0.60±0.25	0.60±0.25	0.55±0.10
2512	6.40±0.20	3.20±0.20	0.60±0.25	0.60±0.25	0.60±0.10

■ Power Derating Curve



Maximum dissipation in percentage of rated power as a function of the ambient temperature.

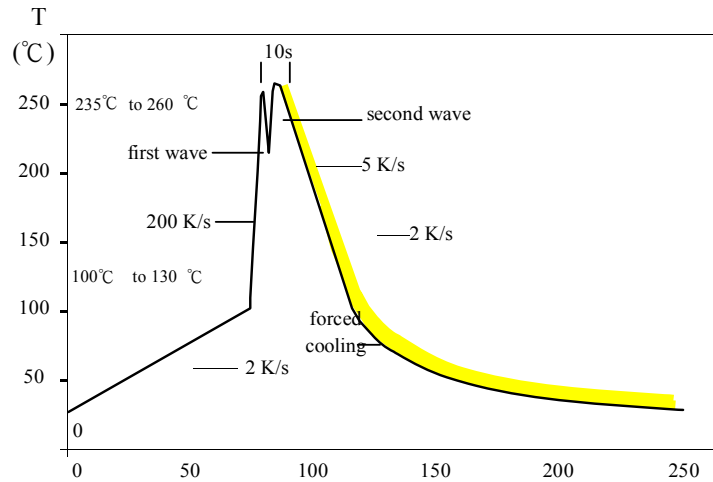
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Rating

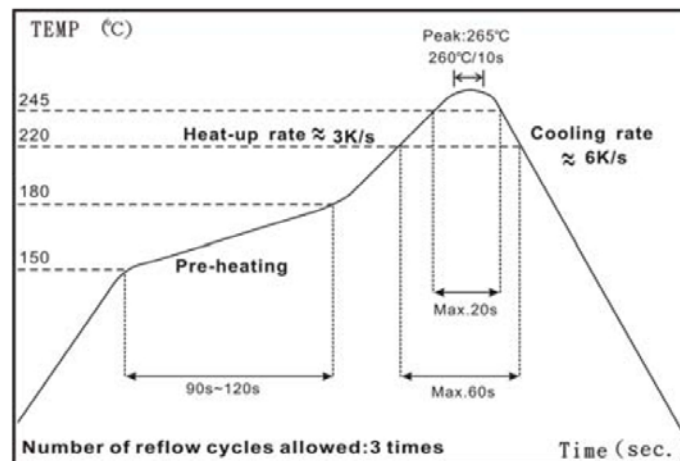
Type	Size	Power Rating at 70°C	Max. RC WV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance Range (Ω)		Standard Resistance Values
							Min.	Max.	
HPF0402	0402	1/8W	50V	100V	±1%(F)	±100	1Ω	1MΩ	E-96
HPF0603	0603	1/8W	50V	100V					
HPF0805	0805	1/4W	150V	300V					
HPF1206	1206	1/2W	200V	400V	±5%(J)	±200	1Ω	1MΩ	E-24
HPF1210	1210	1/2W	200V	400V					
HPF2010	2010	1W	200V	400V					
HPF2512	2512	2W	300V	600V					

Note : (1) RCWV = $(P \times R)^{1/2}$ or Max. RCWV listed above, whichever is lower
 (2) $R \leq 10\Omega$: TCR $\leq -200 \sim +400$ ppm/°C

Soldering Temperature Curve



Process limits (dotted line). **WAVE soldering.**

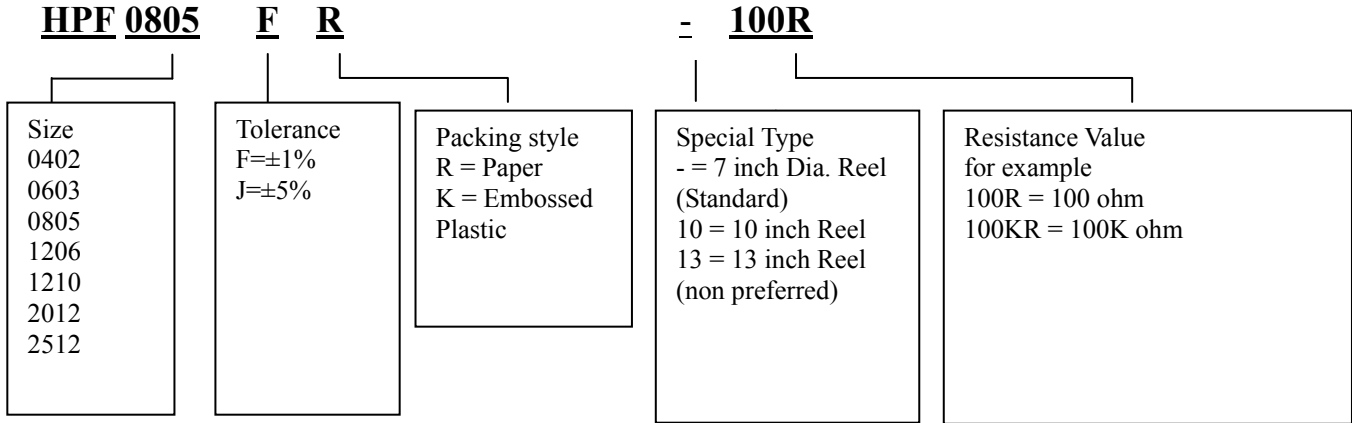


IR Reflow Soldering

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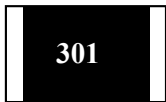
HPF SERIES

■ Part Numbering



GENERAL SPECIFICATION

■ Resistance Marking



3 digit marking for E-24 ±5% 0603 0805 1206 1210 2010 2512
example : **301** $30 \cdot 10^1 = 300 \Omega$



4 digit marking for E-96 ±1% 0805 1206 1210 2010 2512
example : **1542** $154 \cdot 10^2 = 15K4 \Omega$



3 digit marking for E-24 ±1% 0603
example : **222** $22 \cdot 10^2 = 2K2 \Omega$



3 digit marking for E-96 ±1% 0603
example : **01C** $10K \Omega$



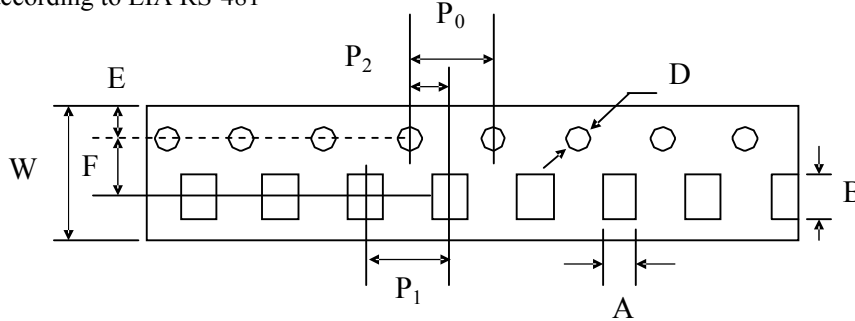
No marking for 0402 size

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■ Tape And Reel Package

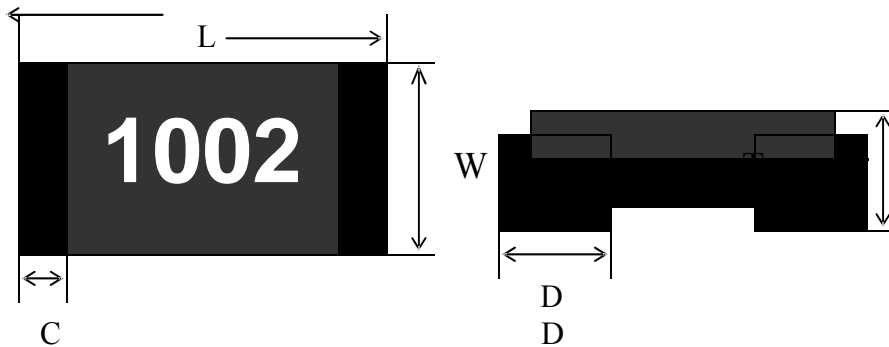
• Taping specs are according to EIA RS-481



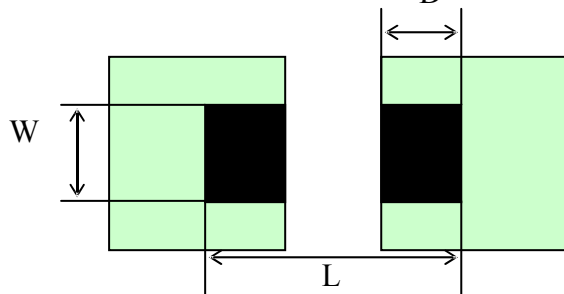
Accumulated dimensional tolerance $40 \pm 0.2 \text{ mm}$

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	$1.50 + 0.10 / -0$
1210	3.00 ± 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	$1.50 + 0.10 / -0$
2010	2.80 ± 0.20	5.50 ± 0.20	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
2512	3.50 ± 0.20	6.70 ± 0.20	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$

(unit: mm)



* 2W loading with total solder-pad and trace size of 300 mm^2

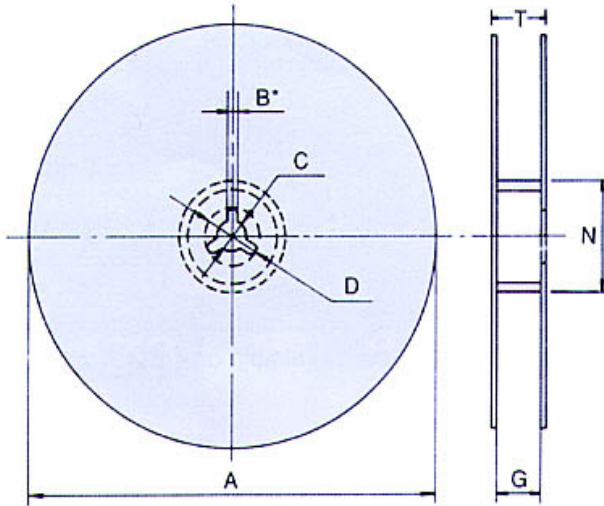


Type	W	D	L
HPF2512	3.7mm	2.45mm	7.6mm

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■ Reel Package



Size	Packaging Q'ty	A	N	C	D	B	G	T
0402 0603 0805 1206 1210	5Kpcs / Reel	178.0±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	10.0±1.5	14.9 max.
	10Kpcs / Reel	254.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	10.0±1.5	14.9 max.
	20Kpcs / Reel	330.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	10.0±1.5	14.9 max.
2010 2512	4Kpcs / Reel	178.0±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	13.8±1.5	16.7 max.
	8Kpcs / Reel	254.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	13.8±1.5	16.7 max.
	16Kpcs / Reel	330.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	13.8±1.5	20.0 max.

(unit: mm)

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GENERAL SPECIFICATION

■ HPF > 1Ω Specification And Test Methods

ITEM	SPECIFICATION	TEST METHOD
DC Resistance	J : $\pm 5\%$, F : $\pm 1\%$	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance value.
Short time Overload	J: $\Delta R \leq \pm (2\% + 0.5m\Omega)$ F: $\Delta R \leq \pm (1\% + 0.5m\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.13 2.5×Rated voltage or Max. Overload Voltage for 5 sec. measure resistance after 30 minutes
Solderability	Over 95% of termination must be covered with solder	IEC 60115-1 / JIS C 5201-1 , Clause 4.17 After immersing flux, dip in the $235\pm 2^\circ\text{C}$ molten solder bath for 2 ± 0.5 sec.
Resistance to Solder Heat	J: $\Delta R \leq \pm (1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm (0.5\% + 0.5m\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.18 With $260\pm 5^\circ\text{C}$ for 10 ± 1 sec.
Temperature Coefficient (TCR)	As Spec.	IEC 60115-1 / JIS C 5201-1 , Clause 4.8 $-55^\circ\text{C} \sim +125^\circ\text{C}$, 25°C is the reference temperature
Load Life Humidity	J: $\Delta R \leq \pm (3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm (1\% + 0.5m\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.24 Maintain the temperature of the resistor at $40\pm 2^\circ\text{C}$ and 90 ~ 95% R.H. with the rated voltage applied. Cycle ON for 1.5 hours and OFF for 0.5 hour for $1000+48/-0$ hours. After 1~4 hour, measure
Load Life	J: $\Delta R \leq \pm (3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm (1\% + 0.5m\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.25 Permanent resistance change after $1000+48/-0$ hours (1.5 hours ON , 0.5 hour OFF) at RCWV or Max. Keep the resistor at $70\pm 2^\circ\text{C}$ ambient
Temperature Cycle	J: $\Delta R \leq \pm (1\% + 1m\Omega)$ F: $\Delta R \leq \pm (0.5\% + 1m\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.19 Repeat 5 cycles as follows -55°C (30 min.) + 25°C (2~3 min.) $+125^\circ\text{C}$ (30 min.) + 25°C (2~3 min.) for 0201 55°C (30 min.) + 25°C (2~3 min.) $+155^\circ\text{C}$ (30 min.) + 25°C (2~3 min.) for others
Insulation Resistance	Between termination and coating must be over $1000M\Omega$	IEC 60115-1 / JIS C 5201-1 , Clause 4.6 Test voltage: $100\pm 15\text{V}$
Bending Strength	J: $\Delta R \leq \pm (1\% + 1m\Omega)$ F: $\Delta R \leq \pm (0.5\% + 1m\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.33 Resistance change after bended on the 90mm PCB Bend: 3mm for 0603、0805 2mm for 1206、1210、2010、2512