



Film Chip Capacitors 2003

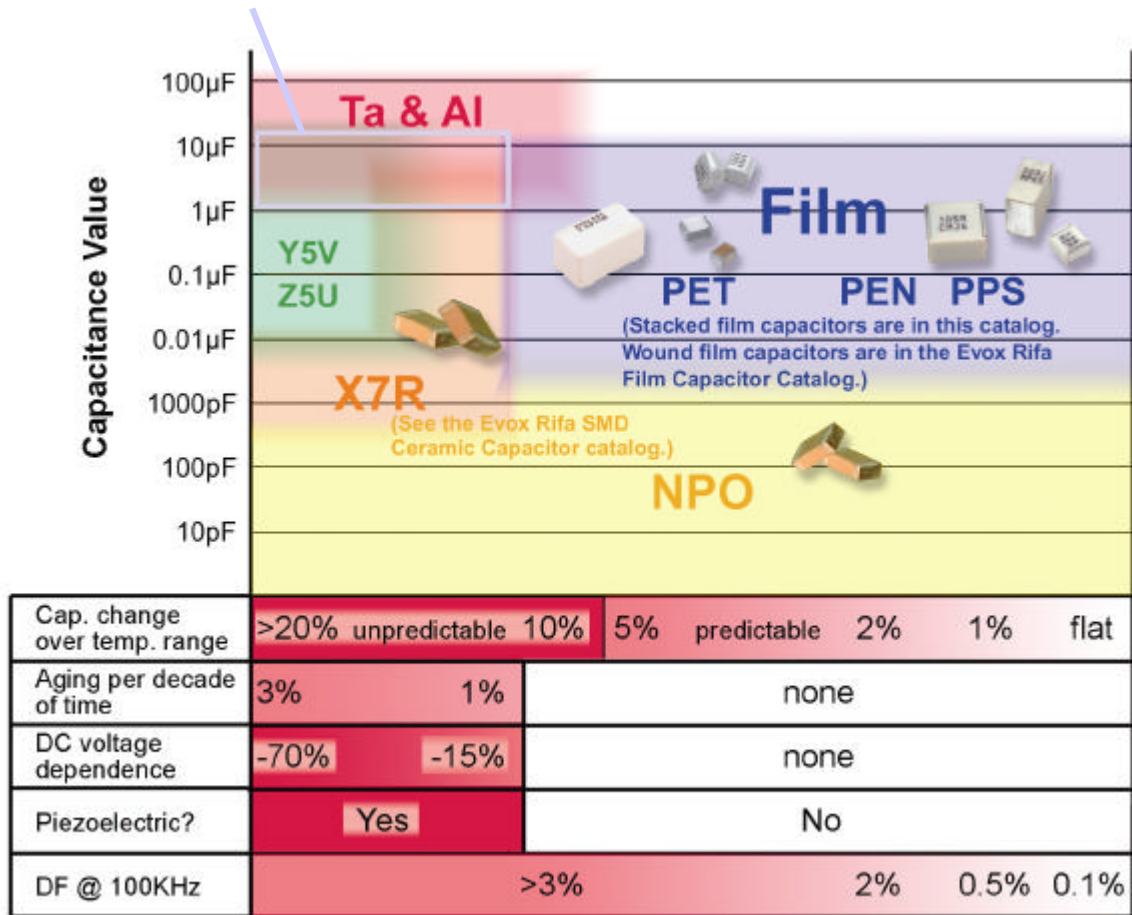
ERS – Film Chip capacitor

Selection Guidelines for Surface Mount Capacitors

Surface Mount Capacitor Application Chart

While variations do exist, the chart below provides a general guideline for selecting the correct surface mount capacitor. Begin at the left edge of the red stripes which denote the various electrical properties. Move to the right until all of the properties meet your design requirements. Then move upward to the capacitance value of interest.

Film capacitors are recommended for these applications if transients or surges may occur. "Self healing" metallized film capacitors are designed to recover from a transient over voltage.



Evox Rifa offers a broad line of SMD capacitors

Encapsulated and naked wound SMD film capacitors for applications requiring superior environmental resistance and solder withstand. Ask for our main "Film capacitor catalog".

SMD multilayer ceramic capacitors in size down to 0201. Ask for our "Multilayer Ceramic Capacitor catalog".

ERS – Film Chip capacitor

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General Information

Construction:

Film Chip capacitor is using stacked construction with metallized polyethylene Naphthalate film (PEN) and metallized polyphenylene sulphide (PPS) dielectric. It is non-encapsulated.

Typical functions for Film Chip Capacitors:

- Filtering, bypass
- Coupling, decoupling
- Time constant
- Timing circuit
- Oscillator circuit in backlight inverter

Typical applications for Film Chip Capacitors:

- Telecommunication (PLL circuit, xDSL, broadband, cellular phone)
- Automotive (HID lamp, Audio, Navigation System)
- Consumer (backlight inverter, EL driver)
- SMPS, DC/DC converters
- Industrial devices

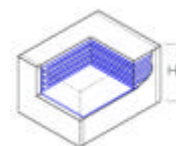
Key advantages of film capacitors

- No aging
- Low ESR
- Low Dissipation factor
- Low dielectric absorption
- Excellent temperature characteristics
- No voltage dependence
- Not susceptible to cracking

ERS – PPS Film Chip capacitor

HUX 16Vdc, 50Vdc

HUC 50Vdc



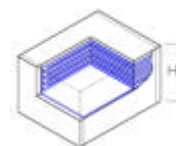
Type code ¹	ERS_HUX		ERS_HUC		ERS_HUC	
Dielectric	PPS		PPS		PPS	
Rated voltage	16VDC		50VDC		50VDC	
Category Temp	-55° C to +125° C		-55° C to +125° C		-55° C to +125° C	
Capacitance tolerance	±2%,±5%		±2%,±5%		±2%,±5%	
Withstand voltage	1.75xUr, 1 to 5s		1.75xUr, 1 to 5s		1.5x Ur, 60s	
Dissipation factor	≤ 0.6%, 20°C, 1kHz		≤ 0.6%, 20°C, 1kHz		≤ 0.6%, 20°C, 1kHz	
Insulation resistance	≥ 3000MW		≥ 3000MW		≥ 3000MW	
Soldering	Reflow		Reflow		Flow & Reflow	
Cap. Value μ F	Size code	H (mm)	Size code	H (mm)	Size code	H (mm)
0.0001	0603	0.7	0805	0.9		
0.00012	0603	0.7	0805	0.9		
0.00015	0603	0.7	0805	0.9		
0.00018	0603	0.7	0805	0.9		
0.00022	0603	0.7	0805	0.9		
0.00027	0603	0.7	0805	0.9		
0.00033	0603	0.7	0805	0.9		
0.00039	0603	0.7	0805	0.9		
0.00047	0603	0.7	0805	0.9		
0.00056	0603	0.7	0805	0.9		
0.00068	0603	0.7	0805	0.9		
0.00082	0603	0.7	0805	0.9		
0.001	0603	0.7	0805	0.9		
0.0012	0603	0.7	0805	0.9		
0.0015	0603	0.7	0805	0.9		
0.0018	0603	0.7	0805	0.9		
0.0022	0603	0.7	0805	0.9		
0.0027	0603	0.7	0805	0.9		
0.0033	0805	0.9	1206	0.9		
0.0039	0805	0.9	1206	0.9		
0.0047	0805	0.9	1206	0.9		
0.0056	0805	0.9	1206	0.9		
0.0068	0805	0.9	1206	0.9		
0.0082	0805	1.1	1206	1.1		
0.01	0805	1.1	1206	1.1		
0.012	1206	0.9	1210	1.1		
0.015	1206	0.9	1210	1.1		
0.018	1206	0.9	1210	1.5		
0.022	1206	0.9	1210	1.5		
0.027	1206	1.1	1210	1.5		
0.033	1206	1.1	1210	2.1		
0.039	1206	1.5	1210	2.1		
0.047	1206	1.5			1812	1.4
0.056	1210	1.5			1812	2.0
0.068	1210	1.5			1812	2.0
0.082	1210	2.1			1812	2.4
0.10	1210	2.1			1812	2.8
0.12					2216	1.8
0.15					2216	2.4
0.18					2216	2.8
0.22					2216	3.2

¹ See page 8 for ordering information. Part number example 0805,10nF, 5%, 16V = ERS0805HUX103J165

ERS – PEN Film Chip capacitor

WUC 16Vdc, 50Vdc

For smaller Capacitance values use PPS film



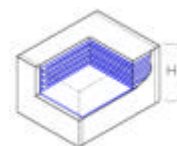
Type code ²	ERS_WUC		ERS_WUC		
Dielectric	PEN		PEN		
Rated voltage	16VDC		50VDC		
Category Temp	-55° C to +105° C		-55° C to +105° C		
Capacitance tolerance	±5%		±5%		
Withstand voltage	1.75xUr, 1 to 5s		1.75xUr, 1 to 5s		
Dissipation factor	≤ 1%, 20°C, 1kHz		≤ 1%, 20°C, 1kHz		
Insulation resistance	C ≤ 0.33mF ≥ 3000MW C > 0.33mF ≥ 1000 W·F		C ≤ 0.33mF ≥ 3000MW		
Soldering	Reflow		Reflow		
Cap. Value mF	Size code	H (mm)	Size code	H (mm)	
0.056			1812	2.0	
0.068			1812	2.0	
0.082			1812	2.4	
0.10			1812	2.8	
0.12	1812	1.4	2216	1.8	
0.15	1812	2.0	2216	2.0	
0.18	1812	2.0	2216	2.4	
0.22	1812	2.4	2216	2.8	
0.27	2216	1.8			
0.33	2216	2.0			
0.39	2216	2.4			
0.47	2216	2.8			

² See page 8 for ordering information. Part number example: 1812 size, 100nF, 5%, 50V = ERS1812WUC104J509

ERS – PEN Film Chip capacitor

WUX 100Vdc

WUC 100Vdc, 250Vdc



Type code ³	ERS_WUX		ERS_WUC		ERS_WUC	
Dielectric	PEN		PEN		PEN	
Rated voltage	100 VDC		100 VDC		250 VDC	
Category Temp	-55° C to +105° C		-40° C to +85° C		-55° C to +125° C	
Capacitor tolerance	±5%		±5%, ±10%		±5%, ±10%	
Withstand voltage	1.75xUr, 1 to 5s		1.5xUr, 60s		1.5xUr, 60s	
Dissipation factor	≤ 1%, 20°C, 1kHz		≤ 1%, 20°C, 1kHz		≤ 1%, 20°C, 1kHz	
Insulation resistance	C ≤ 0.33mF ≥ 3000MW		C ≤ 0.33mF ≥ 3000MW C > 0.33mF ≥ 1000 W·F		C ≤ 0.33mF ≥ 3000MW C > 0.33mF ≥ 1000 W·F	
Soldering	Reflow		Reflow		Reflow	
Cap. Value mF	Size code	H (mm)	Size code	H (mm)	Size code	H (mm)
0.001	1206	1.1			1812	1.4
0.0012	1206	1.1			1812	1.4
0.0015	1206	1.1			1812	1.4
0.0018	1206	1.1			1812	1.4
0.0022	1206	1.1			1812	1.4
0.0027	1206	1.1			1812	1.4
0.0033	1206	1.5			1812	1.4
0.0039	1206	1.5			1812	1.4
0.0047	1206	1.5			1812	1.4
0.0056	1210	1.5			1812	1.4
0.0068	1210	1.5			1812	1.4
0.0082	1210	2.1			1812	1.4
0.01	1210	2.1			1812	1.4
0.012			1812	1.4	1812	1.4
0.015			1812	1.4	1812	1.4
0.018			1812	1.4	1812	2.0
0.022			1812	1.4	1812	2.0
0.027			1812	1.4	1812	2.4
0.033			1812	1.4	1812	2.8
0.039			1812	1.4	2216	2.0
0.047			1812	2.0	2216	2.4
0.056			1812	2.0	2216	2.8
0.068			1812	2.4	2216	3.2
0.082			1812	2.8	2220	3.2
0.10			2216	1.8	2220	3.8
0.12			2216	2.4	2220	4.5
0.15			2216	2.8	2825	3.5
0.18			2820	2.0	2825	4.1
0.22			2820	2.4	2825	5.1
0.27			2820	2.9	3925	3.9
0.33			2820	3.5	3925	4.8
0.39			3022	3.4	3931	4.4
0.47			3022	4.0	3931	5.3
0.56			3925	3.0	6031	3.7
0.68			3925	3.6	6031	4.4
0.82			3925	4.3	6039	4.2
1.00			3925	5.1	6039	5.1

Available in ±10% tolerance only

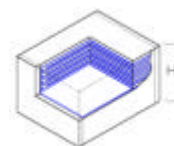
³ See page 8 for ordering information. Part number example: 1812 size, 10nF, 5%, 250V = ERS1812WUC103J2509

ERS – PEN Film Chip capacitor

WUC-V 250Vdc, 400Vdc

For xDSL/ DC blocking application

Where a higher withstand voltage is required.



Type code ⁴	ERS_WUC-V ⁵		ERS_WUC-V ⁵			
Dielectric	PEN		PEN			
Rated voltage	250VDC		400 VDC			
Category Temp	-55 to +85° C		-55 to +85° C			
Capacitor tolerance	±5%		±5%			
Withstand voltage	400Vdc, 60s		600Vdc, 60s			
Dissipation factor	≤ 1%, 20°C, 1kHz		≤ 1%, 20°C, 1kHz			
Insulation resistance	C ≤ 0.33mF ≥ 3000MW		C ≤ 0.33mF ≥ 3000MW			
Soldering	Reflow		Reflow			
Cap. Value mF	Size code	H (mm)	Size code	H (mm)		
0.001	1812	1.4	1812	1.4		
0.0012	1812	1.4	1812	1.4		
0.0015	1812	1.4	1812	1.4		
0.0018	1812	1.4	1812	1.4		
0.0022	1812	1.4	1812	1.4		
0.0027	1812	1.4	1812	1.4		
0.0033	1812	1.4	1812	1.4		
0.0039	1812	1.4	1812	1.4		
0.0047	1812	1.4	1812	1.4		
0.0056	1812	1.4	1812	2.0		
0.0068	1812	1.4	1812	2.0		
0.0082	1812	1.4	1812	2.4		
0.01	1812	1.4	1812	2.8		
0.012	1812	1.4	2216	2.0		
0.015	1812	1.4	2216	2.4		
0.018	1812	2.0	2216	2.8		
0.022	1812	2.0	2216	3.2		
0.027	1812	2.4	2220	3.0		
0.033	1812	2.8	2220	3.6		
0.039	2216	2.0	2820	3.2		
0.047	2216	2.4	2820	3.8		
0.056	2216	2.8	2825	3.6		
0.068	2216	3.2	2825	4.4		
0.082	2220	3.2	3925	3.4		
0.10	2220	3.8	3925	4.0		
0.12	2220	4.5	3931	3.8		
0.15			3931	4.6		

⁴ See page 8 for ordering information. Part number example 1812 size, 10nF, 5%, 250V = ERS1812WUC103J2509V

⁵ When ordering use ERSxxxxWUCxxxJxV, ending with the suffix "V"

ERS – Film Chip capacitor

Ordering Information

Part Numbering System for Chip Film Capacitors

ERS	0805	HUX	103	J	16	5	V
↓	↓	↓	↓	↓	↓	↓	↓
Type	Size code	Dielectric	Capacitance value	Tolerance	Voltage	Taping	Suffix
	0603 0805 etc.	HUC = PPS HUX = PPS WUC = PEN WUX = PEN	Expressed in Pico farads. Three digits code where the first two digits are significant figures. The third digit indicates the number of zeros for capacitance greater than or equal to 10pF (e.g. 101 = 100pF)	±2% = G ±5% = J ±10% = K Note 1	16 50 100 250 400	5 = 8mm 9 = 12mm V = 16mm Z = 24mm Note 2	Special code Note 3
			9 = third digit for 1.0 - 9.9pF (e.g. 479 = 4.7pF)				

Note 1: Available tolerances vary by series. See the individual tables for each series.

Note 2: Taping codes denote the width of the tape, a function of the capacitor size. Obtain the correct taping code from the table of tape and reel dimensions, page 10.

Note 3: Use suffix "V" to distinguish type WUC-V from type WUC. Other suffixes may be applied to denote customized capacitors.

Warranty, Product Liability

Evox Rifa warrants that the goods manufactured by Evox Rifa are free from defects in design, material and workmanship.

Evox Rifa's liability under this warranty shall be limited to replacement or repair free of charge, at one of Evox Rifa's factories selected by Evox Rifa, provided that notification of such failure or defect is given to EvoxRifa immediately upon the same becoming apparent and that on Evox Rifa's request and instruction the goods are promptly returned to Evox Rifa carriage paid by buyer.

In case the goods thus returned as defective, prove to be without fault or defect, Evox Rifa is entitled to charge buyer 10% of the value of the returned goods.

If the goods supplied or part thereof are not manufactured by or branded Evox Rifa, Evox Rifa will only extend to the buyer the benefit of the warranty granted by the manufacturer of the goods. Evox Rifa's liability is further limited to a period of 12 months from the date of shipment to buyer.

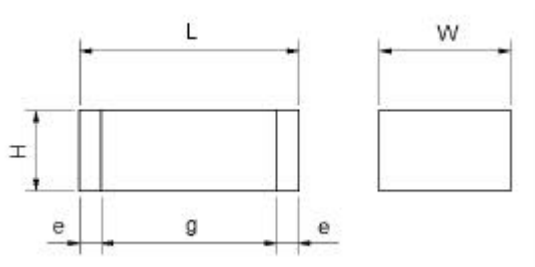
Evox Rifa shall not be liable for any defect that is due to accident, fair wear and tear, negligent use, tampering, improper handling, improper use, improper operation or improper storage or any other default on the part of any person other than Evox Rifa.

Evox Rifa shall have no other liabilities in case of defective goods than those stated above shall under no circumstances be liable for any consequential loss or damage arising from the use of goods sold by Evox Rifa. Liability under paragraph 823 BGB is expressly excluded.

The above limitations of Evox Rifa's liability for defective goods shall apply also with regard to product liability, and Evox Rifa shall have no responsibility for injury to persons or for damage to goods or property of any kind.

ERS – Film Chip capacitor

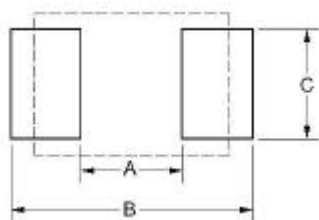
Mechanical dimensions and Packing Quantity



Size code	L	Tol.	W	Tol.	H	Tol.	e	Tol.	g	Reel Ø	Packing Qty
0603	1.60	±0.2	0.80	±0.15	0.7	±0.15	0.35	±0.2	≥ 0.4	180	4000
0805	2.00	±0.2	1.25	±0.2	0.90	±0.2	0.45	±0.25	≥ 0.6	180	3000
0805	2.00	±0.2	1.25	±0.2	1.10	±0.2	0.45	±0.25	≥ 0.6	180	3000
1206	3.20	±0.2	1.60	±0.2	0.90	±0.2	0.65	±0.30	≥ 1.0	180	3000
1206	3.20	±0.2	1.60	±0.2	1.10	±0.2	0.65	±0.30	≥ 1.0	180	3000
1206	3.20	±0.2	1.60	±0.2	1.50	±0.2	0.65	±0.30	≥ 1.0	180	2000
1210	3.20	±0.2	2.50	±0.2	1.10	±0.2	0.65	±0.30	≥ 1.0	180	2000
1210	3.20	±0.2	2.50	±0.2	1.50	±0.2	0.65	±0.30	≥ 1.0	180	2000
1210	3.20	±0.2	2.50	±0.2	2.10	±0.2	0.65	±0.30	≥ 1.0	180	2000
1812	4.80	±0.2	3.30	±0.3	1.40	±0.2	0.35	±0.2	–	330	3000
1812	4.80	±0.2	3.30	±0.3	2.00	±0.2	0.35	±0.2	–	330	3000
1812	4.80	±0.2	3.30	±0.3	2.40	±0.2	0.35	±0.2	–	330	2000
1812	4.80	±0.2	3.30	±0.3	2.80	±0.2	0.35	±0.2	–	330	2000
2216	6.00	±0.2	4.10	±0.3	1.80	±0.2	0.35	±0.2	–	330	3000
2216	6.00	±0.2	4.10	±0.3	2.00	±0.2	0.35	±0.2	–	330	3000
2216	6.00	±0.2	4.10	±0.3	2.40	±0.2	0.35	±0.2	–	330	2000
2216	6.00	±0.2	4.10	±0.3	2.80	±0.2	0.35	±0.2	–	330	2000
2216	6.00	±0.2	4.10	±0.3	3.20	±0.2	0.35	±0.2	–	330	2000
2220	6.00	±0.3	5.00	±0.4	□	±0.3	0.35	±0.2	–	330	1500
2820	7.10	±0.4	5.00	±0.4	□	±0.3	0.35	±0.2	–	330	1500
2825	7.10	±0.4	6.30	±0.4	□	±0.3	0.35	±0.2	–	330	1000
3022	7.70	±0.4	5.50	±0.4	□	±0.3	0.35	±0.2	–	330	1000
3925	9.80	±0.5	6.30	±0.4	□	±0.3	0.35	±0.2	–	330	1000
3931	9.80	±0.5	8.00	±0.4	□	±0.3	0.35	±0.2	–	330	1000
6031	15.20	±0.5	8.00	±0.4	□	±0.3	0.35	±0.2	–	330	750
6039	15.20	±0.5	10.00	±0.4	□	±0.3	0.35	±0.2	–	330	750

All dimensions are in millimeters

Soldering Land Dimensions

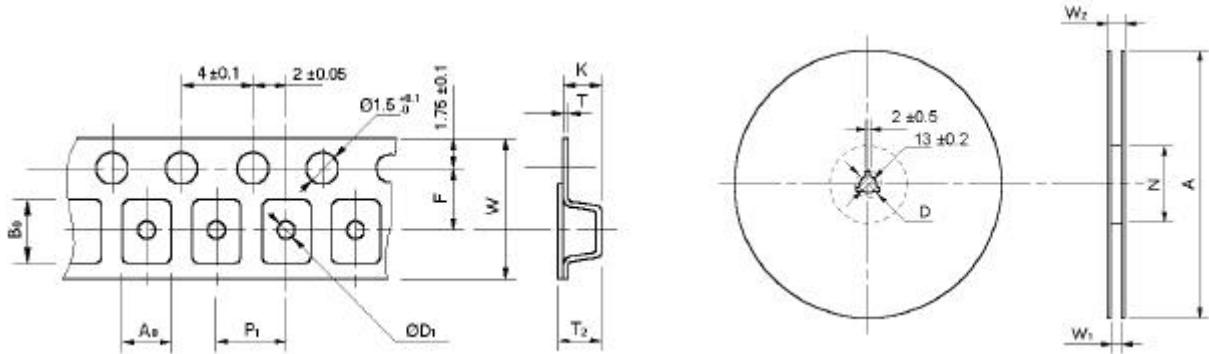


Size code	Recommended Land dimensions (mm)		
	A	B	C
0603	0.60	2.00	0.70
0805	0.80	2.40	1.10
1206	1.80	3.60	1.40
1210	1.80	3.60	2.30
1812	2.60	6.60	3.00
2216	3.80	7.80	3.80
2220	3.80	7.80	4.60
2820	4.50	9.00	4.60
2825	4.50	9.00	5.70
3022	5.10	9.70	5.00
3925	7.20	11.90	5.70
3931	7.20	11.90	7.20
6031	12.60	17.30	7.20
6039	12.60	17.30	9.00

All dimensions are in millimeters

ERS – Film Chip capacitor

Tape and reel dimensions



Note: the taping codes shown below are used when ordering. See page 8.

Size code	Cap height	Taping code	Ao±0.1	Bo±0.1	W±0.3	F±0.05	P1±0.1	ØD1 +0.2/-0	T±0.05	T2±0.2	K±0.1
0603	0.7 ± 0.15	5	1.00	1.85	8.00	3.50	-	-	0.20	1.10	1.00
0805	0.90 ± 0.2	5	1.55	2.30	8.00	3.50	4.00	1.00	0.25	1.30	1.20
0805	1.10 ± 0.2	5	1.55	2.30	8.00	3.50	4.00	1.00	0.25	1.50	1.40
1206	0.90 ± 0.2	5	1.90	3.50	8.00	3.50	4.00	1.00	0.25	1.50	1.40
1206	1.10 ± 0.2	5	1.90	3.50	8.00	3.50	4.00	1.00	0.25	1.50	1.40
1206	1.50 ± 0.2	5	1.90	3.50	8.00	3.50	4.00	1.00	0.25	1.90	1.80
1210	1.10 ± 0.2	5	2.80	3.50	8.00	3.50	4.00	1.00	0.25	1.90	1.80
1210	1.50 ± 0.2	5	2.80	3.50	8.00	3.50	4.00	1.00	0.25	1.90	1.80
1210	2.10 ± 0.2	5	2.80	3.50	8.00	3.50	4.00	1.00	0.25	2.50	2.40
1812	1.40 ± 0.2	9	3.80	5.10	12.00	5.50	8.00	1.50	0.30	2.00	1.90
1812	2.00 ± 0.2	9	3.80	5.10	12.00	5.50	8.00	1.50	0.30	2.60	2.50
1812	2.40 ± 0.2	9	3.80	5.10	12.00	5.50	8.00	1.50	0.30	3.40	3.30
1812	2.80 ± 0.2	9	3.80	5.10	12.00	5.50	8.00	1.50	0.30	3.40	3.30
2216	1.80 ± 0.2	9	4.60	6.30	12.00	5.50	8.00	-	0.30	2.70	2.60
2216	2.00 ± 0.2	9	4.60	6.30	12.00	5.50	8.00	-	0.30	2.70	2.60
2216	2.40 ± 0.2	9	4.60	6.30	12.00	5.50	8.00	-	0.30	3.50	3.40
2216	2.80 ± 0.2	9	4.60	6.30	12.00	5.50	8.00	-	0.30	3.50	3.40
2216	3.20 ± 0.2	9	4.60	6.30	12.00	5.50	8.00	-	0.30	4.60	4.50
2220	□	9	5.50	6.30	12.00	5.50	8.00	-	0.30	5.10	5.00
2820	□	9	5.50	7.50	12.00	5.50	8.00	-	0.30	4.70	4.60

Size code	Cap height	Taping code	Ao±0.1	Bo±0.1	W +0.3/-0.1	F±0.1	P1±0.1	ØD1 +0.25/-0	T ±0.013	T2±0.2	K±0.1
2825	□	V	6.91	8.43	16.00	7.50	12.00	1.50	0.343	5.685	5.64
3022	□	V	6.91	8.43	16.00	7.50	12.00	1.50	0.343	5.685	5.64
3925	□	V	8.94	10.54	16.00	7.50	12.00	1.50	0.343	5.795	5.75
3931	□	V	8.94	10.54	16.00	7.50	12.00	1.50	0.343	5.795	5.75
6031	□	Z	10.80	16.00	24.00	11.50	16.00	1.50	0.355	5.815	5.77
6039	□	Z	10.80	16.00	24.00	11.50	16.00	1.50	0.355	5.815	5.77

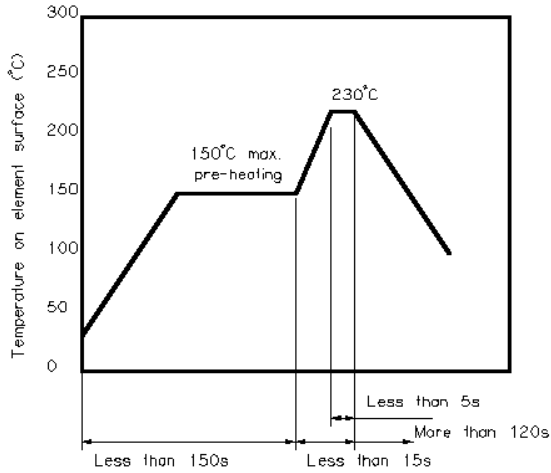
A	Tape width (mm)	Taping code	D	N	W1	W2
180 +0/-1.5	8	5	21 ±0.8	60 +1/-0	9.0 +1/-0	13.0 ±1.0
330 ±0.2	12	9	21 ±0.8	80 ±1	13.4 ±1.0	17.4 ±1.0
330 ±0.2	16	V	21 ±0.8	80 ±1	17.4 ±1.0	21.4 ±1.0
330 ±0.2	24	Z	21 ±0.8	80 ±1	25.4 ±1.0	29.4 ±1.0

All dimensions are in millimeters

ERS – Film Chip capacitor

Recommended Soldering Profile

Reflow soldering profile

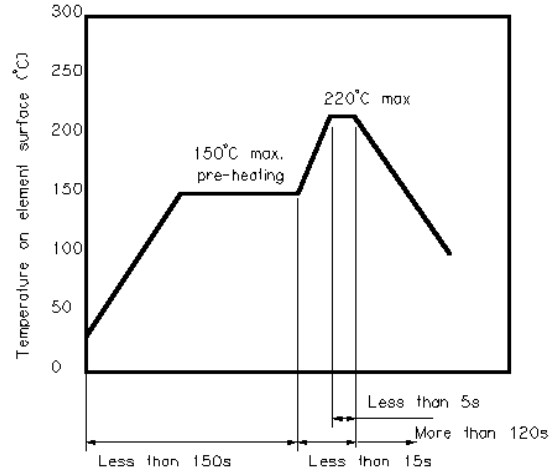


ERS_HUC 50Vdc
ERS_HUX 16Vdc, 50Vdc

Reflow: 260°C max. and 30 seconds max. at more than 230°C

ERS_WUC 16Vdc, 50Vdc
ERS_WUX 100Vdc

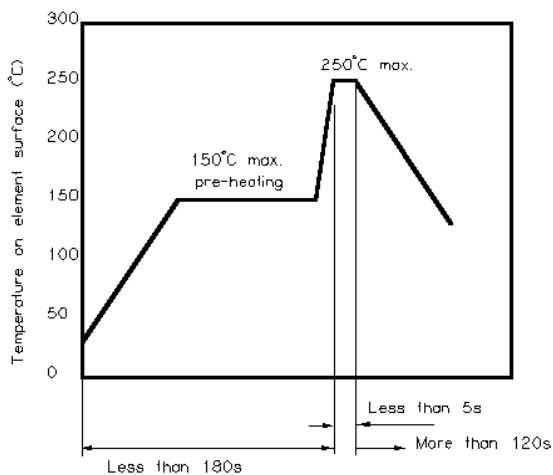
Reflow: 240°C max. and 30 seconds max. at more than 210°C.



ERS_WUC 100Vdc, 250Vdc
ERS_WUC-V 250Vdc, 400Vdc

Reflow: 230°C max. and 30 seconds max. at more than 210°C

Flow soldering profile



ERS-HUC 50V only

Flow: 260°C max. 5 seconds

Precautions

The dielectric of film chip capacitors is not flame retardant. In the worst case burning may happen when used beyond specified conditions. If necessary, it is recommended that film chip capacitors be enclosed in flame retardant material. Please ensure that the film chip capacitors are used completely within the product specifications. If in doubt please consult Evox Rifa.

Please contact Evox Rifa when film chip capacitors are used in life support systems, aviation control systems, and engine or drive control systems of vehicles, as well as other systems that have the possibility of endangering life.

It is recommended to have a circuit design that prevents overloading to the film chip capacitors when other components in the circuit are faulty.

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