

# CAPACITOR SOURCEBOOK

Full Range of  
Film Capacitors  
for Audio & Video:  
AudioCap™  
MultiCap™  
Exotica™

■ **Film & Foil**  
aluminum, tin, copper,  
polypropylene, polystyrene, Teflon

■ **Metalized Polypropylene**

.001 - 100 Microfarads

100 - 2400 Volts

reliable  
capacitors



## Reliable Capacitors

Incorporated in 1962, Rel Cap has become a leading and innovative producer of plastic film dielectric capacitors. Custom designed caps are now a part of the company's standard capabilities. Rel Cap has long produced capacitors for the telecommunication, computer, industrial, and consumer OEM markets and includes a division specializing in hermetically sealed capacitors for military, aerospace, instrumentation & high-voltage applications, and high temperature usage in oil drilling, power supply manufacture, and for nuclear environments.

Rel now introduces a division devoted to audio and video manufacturers, modifiers, and distributors. In these products, the company's abilities in the fields above are combined and concentrated into special lines that will meet the most exacting audio and video specifications.

### AudioCap™ Line

This line offers five series of high-quality, high-performance caps at competitive prices, designed to meet specific needs of speaker, electronics, and audio/video power supply designers. A full line of film capacitors.

- **AudioCap Metalized Polypropylene PPMF** This series offers high performance at a reasonable price, for all applications. It is available in values up to 100 microfarads, making it ideal for speaker crossovers.
- **AudioCap Metalized Polypropylene High Voltage PPMT** This series comes in voltages up to 2400 V at .47 mfd. Put two in series for .22 mfd/4800 V or parallel for 1 mfd/2400 V. Excellent for electrostatic speakers, power supplies, and some high-voltage tube applications.
- **AudioCap Alpha PPF** Polypropylene & aluminum film & foil capacitor. An excellent standard audio capacitor, preferred by lovers of clean, accurate sound reproduction. Very fast.
- **AudioCap Theta PPT** Polypropylene and tin film & foil capacitor. A little larger in size than the Alpha. The sound is rich and full.
- **AudioCap Polystyrene & Tin Foil RT** An industry standard in polystyrene performance. Preferred by many audiophiles for its clarity.

### MultiCap™ Line

The MultiCap was conceived for high-current, high-speed, pulsed-power applications. It is ideal for audio, video, and high-frequency designs because its **patented construction**, which winds capacitors coaxially one upon the other into a single unit, **significantly reducing typical capacitor losses**. Since each coaxial section is in parallel, the inductance of the overall capacitor never exceeds that of a piece of lead wire the same length as the capacitor's body. Measured equivalent series resistance (ESR) values are 5 to 10 times lower than conventional designs. MultiCap's patented internal bypass design also solves the problems of multiple resonances encountered when a circuit's high-frequency impedance is lowered by externally paralleling a large, conventionally wound capacitor with smaller ones, as in conventional bypassing. In addition, the MultiCap uses the finest film materials and proprietary slow-winding construction techniques to further reduce dissipation factor (DF) and dielectric absorption (DA). The MultiCap offers substantial advantages in bypassing and in high-current applications, where losses can be significant.

- **MultiCap RTX - Ultimate Film & Foil** Recommended for high-current applications and wherever the finest performance is required. This polystyrene cap exhibits the lowest DA and the highest stability in frequency and temperature characteristics. Its tin foil is compatible with the other materials used in the MultiCap, preventing oxidation and electrolysis and providing an extraordinarily stable long-term performance.

- **MultiCap PPFXS - Excellent Film & Foil** Recommended for high-current, high-temperature applications. Polypropylene & tin, with similar characteristics to RTX, but with extended temperature range.

- **MultiCap PPFX - Excellent Film & Foil** Recommended for high-current, high-temperature applications. Polypropylene & aluminum. Lowest ESR available. Lighter in weight, lower in cost than the RTX or PPFXS. Highly accurate, stable performance.

- **MultiCap PPMFX - Ultimate Metalized Polypropylene** Recommended for lower currents, and wherever small size & lower cost are required. Self-healing; extended temperature range. Combines the small size and lower price of the metalized capacitor with the proven high performance of the self-bypass design.

- **MultiCap-II PPMFX-2 - Excellent Metalized Polypropylene** Similar in performance to the PPMFX, but smaller and less expensive, offering significantly increased performance over conventional, non-bypassed metalized capacitors for about the same price. An excellent introduction to the benefits of high performance capacitors.

### Exotica™ Line

Film and foil capacitors of special design and construction, made with the finest materials available for audio capacitors, to bring out the highest performance possible in the most sensitive, highly resolving equipment.

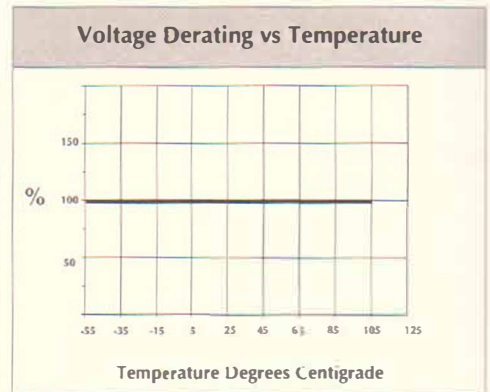
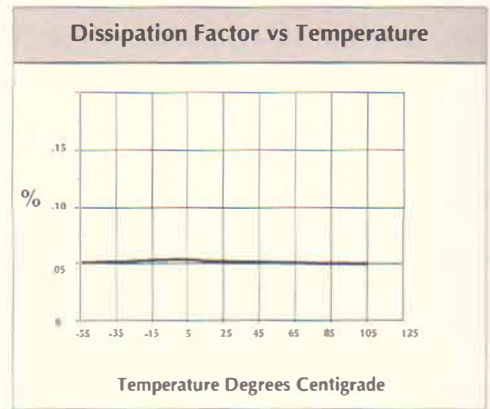
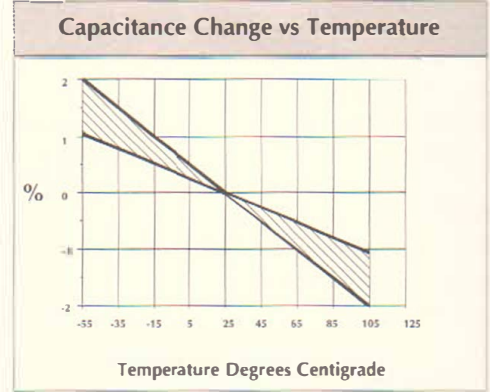
- **Exotica Teflon TFT** This series, with Teflon film, has electrical properties that allow it to withstand high temperatures. Listening tests reveal superb sonic qualities, making it the designer's choice whenever only the highest performance will do. The TFT is suitable for all audio applications, and will provide high performance and long-life.
- **Exotica Copper Foil Polypropylene Film PCU** This series, with copper foil, has low distortion and provides superbly clean, clear performance. It is especially suitable for ultra-high frequencies, bringing a remarkable clarity in this sonic range. Special manufacturing techniques are employed to insure that copper will remain reliable and provide high performance over time. The gold-plated OFHC lead wires provide long-term reliability, superior to silver wires owing to gold's non-oxidizing properties; the matching of copper foil with copper leads ensures long-term high performance.
- **Exotica Prime™** This capacitor is a proprietary design from Richard Marsh, built to the highest specs by Reliable Capacitors to satisfy the perfectionist. Unrivaled audio performance, superior in listening tests even to AudioCap Teflon or MultiCap. Ultra-low distortion, extreme clarity throughout the audible frequency range. Values: 0.10 mfd to 1.0 mfd, at 100, 200, 400 volts, in case form only. Applications: coupling, bypass, filters. **For information on this custom line of high-performance audio capacitors, please call Finch & Marsh at (916) 885-6809.**

# AudioCap™ High Performance Capacitors

## AudioCap Metalized Polypropylene Capacitor PPMF

The PPMF AudioCaps are metalized polypropylene, useful as upgrade from Mylar or inferior film caps, and available in values large enough to be ideal for speaker crossover networks. They are built of the best materials and exhibit excellent electrical and environmental characteristics. Their superior build quality and high capacitance values provide a high-quality stable, long-term performance not usually found in this price range. The gold-plated OFHC leads provide long-term high reliability and excellent solderability, superior to silver wire because of gold's non-oxidizing properties.

<b>Capacitance Values:</b>	.68 to 100.0 mfd
<b>Tolerances:</b>	+/- 10%. Also: 5%, 2%, 1%
<b>Working Voltages:</b>	100, 200, 400; 50 - 100 mfd at 100 volts only
<b>Test Volts:</b>	2.0 x rated voltage for one minute.
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @ 1kHz @ 25° C < 0.05% > 10.0 mfd @ 120 Hz @ 25° C < 0.03% .1 - 1.0 mfd @ 1kHz @ 25° C < 0.02% .001 - .1 mfd @ 1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	-55° C to 105° C
<b>Temperature Coefficient:</b>	See Capacitance Change vs. Temperature Chart
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Gold-plated OFHC



DIMENSIONS (IN.) • AUDIOCAP PPMF • AXIAL LEADS, OVAL CASE

Capacitance n mfd	100 VDC h x w x l	200 VDC h x w x l	400 VDC h x w x l
.68	.28 x .41 x .69	.30 x .45 x 1.2	.63 x .76 x 1.4
.82	.32 x .44 x .69	.32 x .48 x 1.2	.57 x .77 x 1.4
1.0	.35 x .48 x .69	.37 x .53 x 1.2	.64 x .84 x 1.4
1.5	.34 x .46 x .94	.45 x .59 x 1.2	.72 x .92 x 1.7
2.0	.39 x .53 x .94	.55 x .65 x 1.2	.85 x 1.0 x 1.7
3.0	.51 x .63 x .94	.68 x .82 x 1.2	.97 x 1.2 x 1.9
5.0	.60 x .80 x 1.2	.71 x .85 x 1.7	
8.0	.60 x .80 x 1.4	.88 x 1.0 x 1.7	
10.0	.68 x .88 x 1.4	.99 x 1.2 x 1.7	
15.0	.91 x 1.2 x 1.4	1.2 x 1.4 x 2.0	
20.0	.88 x 1.1 x 1.8	1.3 x 1.5 x 2.0	
30.0	1.1 x 1.3 x 2.1	1.4 x 1.6 x 2.8	
40.0	1.3 x 1.5 x 2.0		
50.0	1.3 x 1.6 x 2.3		
60.0	1.4 x 1.6 x 2.8		
70.0	1.4 x 1.6 x 3.3		
80.0	1.4 x 1.6 x 3.3		
100.0	1.5 x 1.8 x 3.3		

Sizes accurate to +/- .06. Lead diameters: .025" for caps up to 1/2" diameter; .032" for caps up to 3/4" diameter; .04" for caps 1" and over. Capacitors are not covered by our warranty if used at over the rated voltage and temperatures. Please allow 48 hours break-in before judging sonic performance.



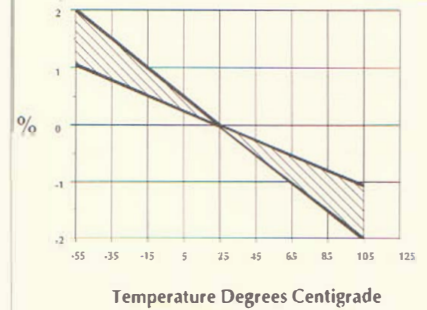


### AudioCap Metalized High Voltage Capacitor PPMT

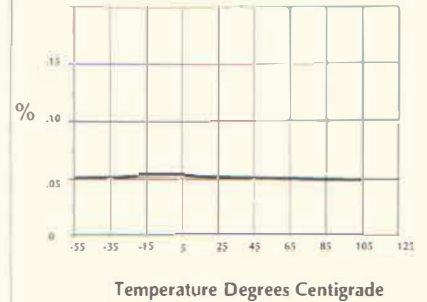
The PPMT AudioCap capacitors are metalized polypropylene, available in voltages high enough to be ideal for all high-voltage applications, such as power supplies for tube electronics, high-voltage bypassing, high-voltage coupling and electrostatic loudspeaker crossovers. They exhibit excellent electrical and environmental characteristics, and will provide high quality performance and long life at a reasonable price. The gold-plated OFHC leads provide long-term high reliability, superior to silver wires, owing to gold's non-oxidizing properties.

<b>Capacitance Values:</b>	0.10 to 2.0 mfd
<b>Tolerances:</b>	+/- 10%. Also: 5%, 2%, 1%
<b>Working Voltages:</b>	1000, 1500 V: 2400V; call for information on lower voltages
<b>Test Volts:</b>	2.0 x rated voltage for one minute.
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @ 1kHz @ 25° C < 0.05% > 10.0 mfd @ 120 Hz @ 25° C < 0.03% .1 - 1.0 mfd @ 1kHz @ 25° C < 0.02% .001 - .1 mfd @ 1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	- 55° C to 105° C
<b>Temperature Coefficient:</b>	See Capacitance Change vs. Temperature Chart
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Gold-plated OFHC

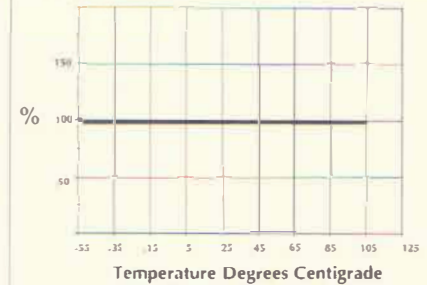
Capacitance Change vs Temperature



Dissipation Factor vs Temperature



Voltage Derating vs Temperature



DIMENSIONS (IN.) • AUDIOCAP PPMT • AXIAL LEADS, ROUND CASE

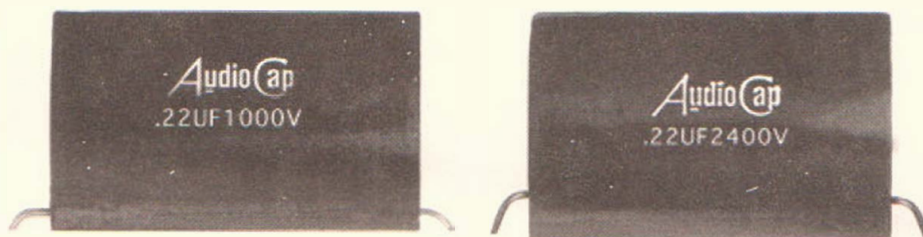
Capacitance in mfd	1000 VDC dia x l	1500 VDC dia x l	2400 VDC dia x l
.10	.450 x 1.25	.500 x 1.75	.720 x 1.75
.22	.650 x 1.25	.720 x 1.75	1.06 x 1.75
.33	.800 x 1.25	.850 x 1.75	1.30 x 1.75
.47	.760 x 1.75	1.01 x 1.75	1.50 x 1.75
.68	.790 x 1.75	1.25 x 1.75	
.82	1.00 x 1.75	1.32 x 1.75	
1.0	1.10 x 1.75	1.45 x 1.75	
1.5	1.34 x 1.75		
2.0	1.50 x 1.75		

Sizes are accurate to +/- .06. Lead Diameters: .025" for caps up to 1/2" diameter; .032" for caps up to 3/4" diameter; .04" for caps 1" and over diameter.

Higher voltages can be obtained by placing these capacitors in series. Higher capacitance can be obtained by placing these capacitors in parallel.

Capacitors are not covered by our warranty if they are used at over the rated voltage and temperatures. Please allow 48 hours break in before judging sonic performance.

### AudioCap Metalized Polypropylene High Voltage Capacitors PPMT



Reliable Capacitors

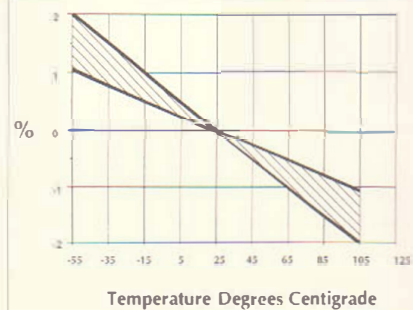
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## AudioCap Polypropylene & Aluminum Film & Foil PPF Alpha

The PPF Alpha AudioCap is an excellent film & foil capacitor for all audio circuits and power supplies, a fine upgrade from metalized film. It provides low distortion and long-term reliability and exhibits excellent electrical and environmental characteristics. Its sonics are clear and clean, the choice wherever accuracy is important. Its superior build quality provides the designer with high-quality, stability, and long-life in a film & foil cap seldom available in this price range. The gold-plated OFHC leads provide long-term high reliability and excellent solderability, superior to silver wire owing to gold's non-oxidizing properties.

<b>Capacitance Values:</b>	0.22 to 12.0 mfd ; call for information on larger values
<b>Tolerances:</b>	+/- 10%. Also: 5%, 2%, 1%
<b>Working Voltages:</b>	200, 400, 600 V
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd; not to exceed 500,000 megohms
<b>Operating Temperature Range:</b>	- 55° C to 105° C
<b>Temperature Coefficient:</b>	See Capacitance Change vs. Temperature Chart
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Gold-plated OFHC

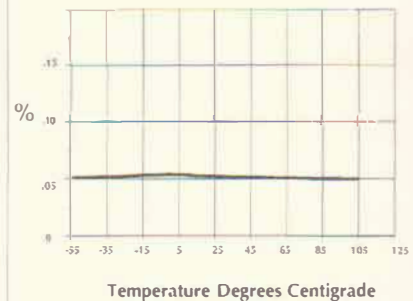
### Capacitance Change vs Temperature



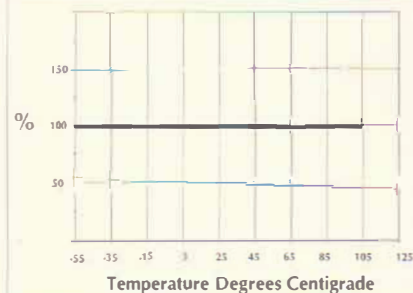
### DIMENSIONS (IN.) • AUDIOCAP PPF ALPHA • AXIAL LEADS, OVAL CASE

Capacitance in mfd	200 VDC h x w x l	400 VDC h x w x l	600 VDC h x w x l
.22	.28 x .47 x 1.1	.38 x .57 x 1.1	.48 x .67 x 1.2
.33	.38 x .57 x 1.2	.48 x .67 x 1.3	.57 x .76 x 1.3
.47	.38 x .66 x 1.2	.48 x .76 x 1.3	.67 x .76 x 1.3
.68	.48 x .67 x 1.3	.57 x .76 x 1.4	.67 x .95 x 1.8
1.0	.57 x .76 x 1.3	.67 x .95 x 1.3	.76 x 1.1 x 1.8
2.0	.76 x 1.2 x 1.3	.86 x 1.1 x 2.0	
3.0	.76 x 1.2 x 1.8	.90 x 1.1 x 2.1	
4.0	.95 x 1.3 x 1.8		
5.0	1.1 x 1.4 x 1.8		
6.0	1.1 x 1.4 x 1.8		
7.0	1.1 x 1.3 x 2.3		
8.0	1.1 x 1.4 x 2.3		
9.0	1.2 x 1.6 x 2.3		
10.0	1.3 x 1.6 x 2.3		
12.0	1.4 x 1.6 x 2.3		

### Dissipation Factor vs Temperature



### Voltage Derating vs Temperature



### AudioCap PPF "Alpha"



Sizes are accurate to  $\pm .06$ . Lead Diameters: .025" for caps up to 1/2" diameter; .032" for caps up to 3/4" diameter; .04" for caps 1" diameter and over.

Capacitors are not covered by our warranty if they are used at over the rated voltage and temperatures.

Please allow 48 hours break-in before judging sonic performance.

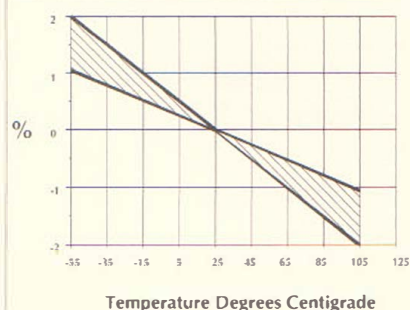


## AudioCap Polypropylene & Tin Film & Foil PPT Theta

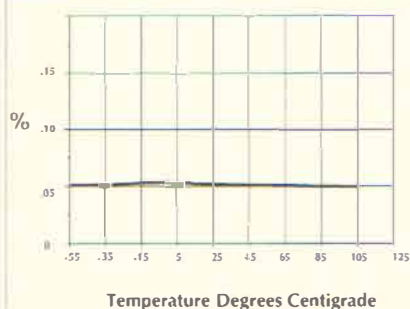
The PPT Theta AudioCap is an excellent film & foil capacitor for all audio circuits and power supplies. It provides low distortion performance and long-term reliability. It exhibits excellent electrical and environmental characteristics at a reasonable price. Its sonic signature is rich and full and its superior build quality ensures a high-quality stable, long-term performance not usually available in this price range. The gold-plated OFHC lead wires provide long-term high reliability and excellent solderability, superior to silver wire owing to gold's non-oxidizing properties.

<b>Capacitance Values:</b>	.01 to 12.0 mfd; call for information on larger values
<b>Tolerances:</b>	+/- 10%. Also: 5%, 2%, 1%
<b>Working Voltages:</b>	200, 400, 600
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.05% @ 1kHz @ 25°C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd; not to exceed 500,000 megohms
<b>Operating Temperature Range:</b>	- 55°C to 105°C without derating
<b>Temperature Coefficient:</b>	See Capacitance Change vs. Temperature Chart
<b>Life Tests:</b>	Rated voltage @ 85°C for 1000 hours; 140% rating at 85°C for 250 hours
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Gold-plated OFHC

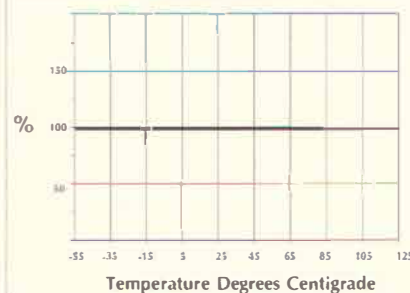
### Capacitance Change vs Temperature



### Dissipation Factor vs Temperature



### Voltage Derating vs Temperature



### DIMENSIONS (IN.) • AUDIOCAP PPT THETA • AXIAL LEADS, OVAL CASE

Capacitance in mfd	200 VDC w x h x l	400 VDC w x h x l	600 VDC w x h x l
.01	.11 x .24 x .53	.11 x .24 x .53	.15 x .27 x .75
.022	.15 x .29 x .53	.15 x .30 x .53	.22 x .37 x .75
.033	.20 x .32 x .53	.19 x .33 x .45	.27 x .40 x .75
.047	.21 x .33 x .53	.25 x .37 x .75	.26 x .39 x 1.0
.068	.22 x .35 x .53	.30 x .42 x .75	.33 x .46 x 1.0
.10	.28 x .40 x .75	.30 x .45 x 1.0	.40 x .59 x 1.1
.15	.27 x .39 x 1.0	.40 x .59 x 1.1	.40 x .59 x 1.2
.22	.28 x .48 x 1.0	.40 x .59 x 1.1	.45 x .68 x 1.2
.33	.30 x .50 x 1.3	.45 x .68 x 1.3	.59 x .78 x 1.3
.47	.37 x .59 x 1.3	.45 x .78 x 1.3	.68 x .88 x 1.3
.68	.50 x .72 x 1.3	.59 x .87 x 1.4	.68 x .88 x 1.8
1.0	.59 x .88 x 1.3	.68 x 1.0 x 1.8	.78 x 1.2 x 1.8
1.5	.68 x 1.2 x 1.3		
2.0	.88 x 1.2 x 1.3		
3.0	.86 x 1.2 x 1.8		
4.0	1.2 x 1.3 x 1.8		
5.0	1.3 x 1.4 x 1.8		
6.0	1.3 x 1.5 x 1.8		
8.0	1.4 x 1.7 x 2.3		
10.0	1.5 x 1.7 x 2.3		
12.0	1.6 x 1.7 x 2.3		

Sizes are accurate to +/- .06.

**Lead Diameters:** .025" for caps up to 1/2" diameter; .032" for caps up to 3/4" diameter; .04" for caps 1" and over diameter.

Capacitors are not covered by our warranty if they are used at over the rated voltage and temperatures.

Please allow 48 hours break-in before judging sonic performance.

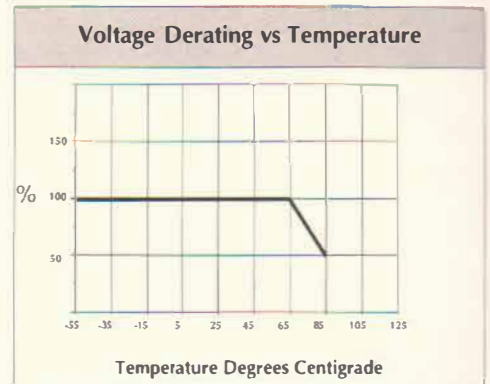
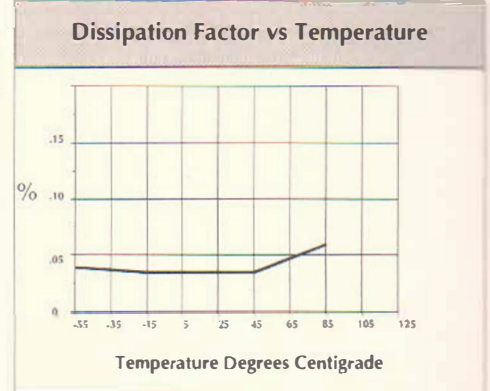
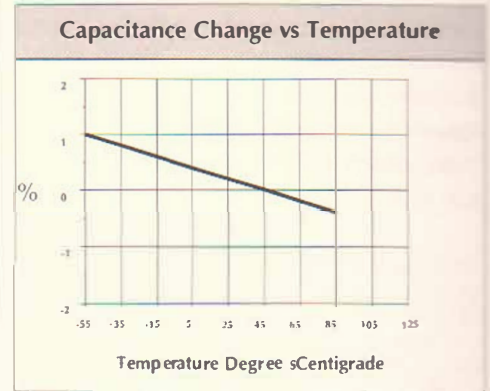
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### AudioCap Polystyrene & Tin Foil RT

The RT series AudioCap offers very high insulation resistance, with the lowest dielectric absorption and dissipation factor available, and low temperature coefficient. It has excellent stability and retrace, making this an ideal capacitor for all applications in audio except those with extremely high operating temperatures. In performance, it is second only to the MultiCap polystyrene (RTX) and the AudioCap Teflon (TFT), and makes a particularly good bypass cap, providing added performance in the upper frequencies. It is suitable for ultra-high frequencies, and will provide high performance and long-life; the gold-plated OFHC leads provide long-term reliability, superior to silver wires owing to gold's non-oxidizing properties.

<b>Capacitance Values:</b>	.01 to 3.0 mfd
<b>Tolerances:</b>	+/- 10%. Special tolerances on request
<b>Working Voltages:</b>	100, 200, 400, 600 (small values)
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.02% @ 1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	- 55 to 85° C
<b>Temperature Coefficient:</b>	See Capacitance Change vs. Temperature Chart
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Gold-plated OFHC



DIMENSIONS (INCHES) • AUDIOCAP RT • AXIAL LEADS, ROUND CASE

Capacitance in mfd	100 VDC dia x l	200 VDC dia x l	400 VDC dia x l	600 VDC dia x l
.01	.20 x .75	.21 x .75	.28 x .75	.32 x 1.00
.022	.23 x .75	.30 x .75	.31 x 1.0	.47 x 1.00
.033	.28 x .75	.29 x 1.0	.38 x 1.0	.48 x 1.25
.047	.33 x .75	.34 x 1.0	.45 x 1.0	.57 x 1.25
.068	.31 x 1.0	.40 x 1.0	.45 x 1.25	.59 x 1.50
.10	.37 x 1.0	.42 x 1.25	.50 x 1.50	.64 x 1.75
.15	.44 x 1.0	.50 x 1.25	.60 x 1.50	.79 x 1.75
.22	.46 x 1.25	.53 x 1.50	.65 x 1.75	.94 x 1.75
.33	.49 x 1.50	.65 x 1.50	.79 x 1.75	1.05x 2.00
.47	.59 x 1.50	.70 x 1.75	.94 x 1.75	1.08 x 2.00
.68	.63 x 1.75	.84 x 1.75	1.03 x 2.00	

Lead Diameters: .025" for caps up to 1/2" diameter; .032" for caps up to 3/4" diameter; .04" for caps 1" and over diameter. Note: Sizes are accurate to +/- .06.

Capacitors are not covered by our warranty if they are used at over the rated voltage and temperatures. Please allow 48 hours or more of break-in before judging sonic performance.

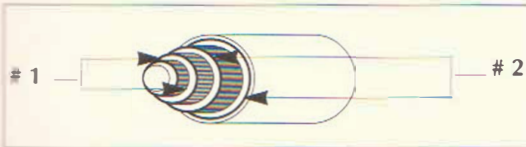


## MultiCap™ Ultra-High Performance Series

### MultiCap-II Metalized Polypropylene Two-Section Capacitor 2-PPMFX

The 2-PPMFX MultiCap reduces typical capacitor loss factors with a patented design that winds capacitors coaxially one upon the other, into a single, self-bypassed unit. The inductance of the overall capacitor is reduced by the number of sections used - here two. Inductance characteristics never exceed those of a piece of lead wire the same length as the capacitor's body; measured ESR values are several times lower than conventional designs (see Figure 1). This overall reduction of parasitics makes this series ideal in lower current applications, and wherever low ESR & DF, high resonant frequency, high performance, small size, and lower cost are important. An excellent way to test the advantages of self-bypassing wherever standard metalized capacitors are used.

<b>Capacitance Values:</b>	.01 to 10.0 mfd - see below for specific values available
<b>Tolerances:</b>	+/- 10%
<b>Working Voltages:</b>	200, 400, 600
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @ 1kHz @ 25°C < 0.03% .1 - 1.0 mfd @ 1kHz @ 25°C < 0.02% .01 - .1 mfd @ 1kHz @ 25°C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	- 55°C to 105°C
<b>Temperature Coefficient:</b>	-150 PPM/°C
<b>Life Tests:</b>	Rated voltage @ 85°C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Tin-plated copper



A cross-sectional drawing (leads removed) showing the coaxial construction of the MultiCap-II, showing both sections 1 & 2.

#### DIMENSIONS (INCHES) • MULTICAP-II 2-PPMFX • AXIAL LEADS, OVAL CASE

Capacitance in mfd	200 VDC w x h x l	400 VDC w x h x l	600 VDC w x h x l
.01			.15 x .25 x .50
.10		.25 x .40 x .80	
.22		.35 x .50 x .80	
.33		.35 x .50 x 1.0	
.47		.50 x .60 x 1.0	
.68		.55 x .80 x 1.25	
1.0		.60 x .80 x 1.30	
2.0	.55 x .70 x 1.3	.60 x .80 x 1.25	
3.0	.60 x .80 x 1.3	.85 x 1.0 x 1.8	
4.0	.60 x .80 x 1.5	.90 x 1.0 x 1.8	
5.0	.65 x .85 x 1.75	.90 x 1.2 x 1.8	
10.0	.90 x 1.2 x 2.0		

Sizes accurate to +/- .06. Lead diameters: .025" for caps up to 1/2" diameter; .032" for caps up to 3/4" diameter; .04" for caps 1"; .051" for caps over 1" diameter. Capacitors are not covered by our warranty if used at over the rated voltage and temperatures. Please allow 48 hrs break-in before judging sonic performance.

Figure 1 - MultiCap Specification ESR vs Frequency vs Capacitance

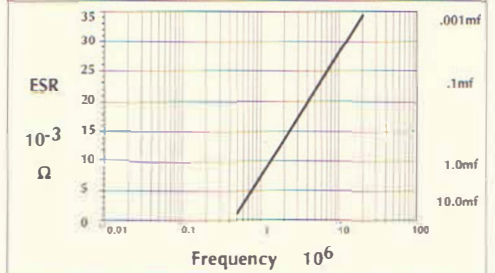


Figure 2 - Capacitance Change vs Temperature

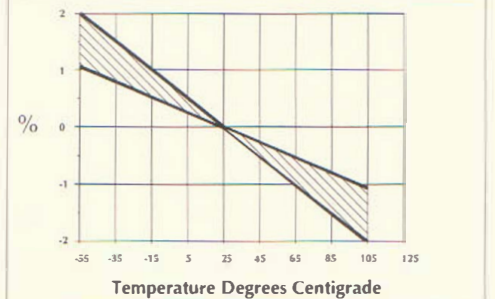


Figure 3 - Dissipation Factor vs Temperature

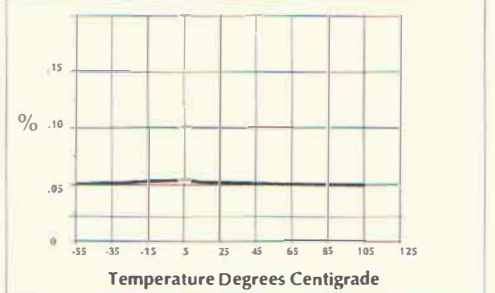
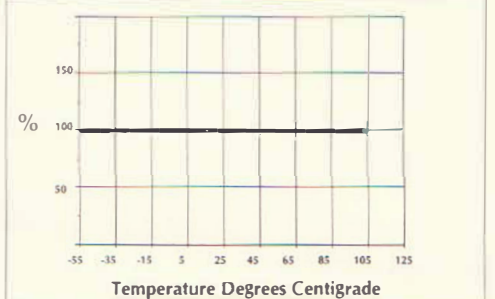


Figure 4 - Voltage Derating vs Temperature

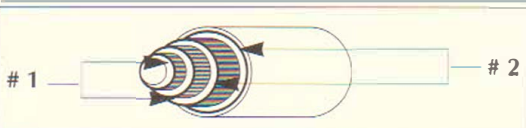




### MultiCap Metalized Polypropylene Multiple-Section Capacitor PPMFX

The PPMFX series of the MultiCap reduces typical capacitor loss factors with a patented design that winds capacitors coaxially one upon the other, into a single, self-bypassed unit. Since each section is in parallel, the inductance of the overall capacitor is reduced by the number of sections used - typically 10. Inductance characteristics never exceed those of a piece of lead wire the same length as the capacitor's body; measured ESR values are 5 - 10 times lower than conventional designs (see Figure 1). The PPMFX MultiCap is recommended for lower current applications. With its overall reduction of parasitics, this series is ideal for use wherever low ESR, low DF, high resonant frequency, high performance, and small size are important, and wherever metalized capacitors are in use.

<b>Capacitance Values:</b>	.001 to 30.0 mfd. Special values on request
<b>Tolerances:</b>	+/- 10%. Special tolerances on request
<b>Working Voltages:</b>	200, 400, 600. 100 & 800 on request
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @ 1kHz @ 25° C < 0.05% > 10.0 mfd @ 120 Hz @ 25° C < 0.03% .1 - 1.0 mfd @ 1kHz @ 25° C < 0.02% .001 - .1 mfd @ 1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	- 55° C to 105° C
<b>Temperature Coefficient:</b>	-150 PPM/° C
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Tin-plated copper. Others available on request



A cross-sectional drawing (leads removed) showing the coaxial construction of a MultiCap. For simplicity's sake, only two of the 10 sections are included.

Figure 1 - MultiCap Specification ESR vs Frequency vs Capacitance

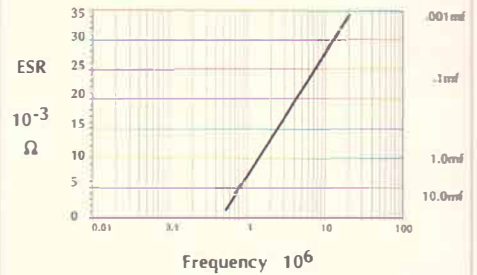


Figure 2 Capacitance Change vs Temperature

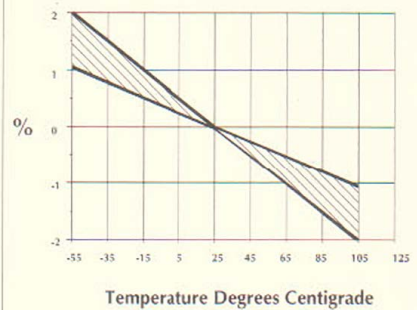


Figure 3 Dissipation Factor vs Temperature

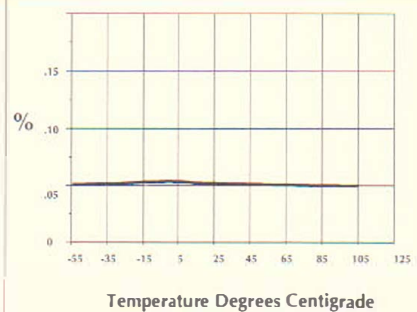
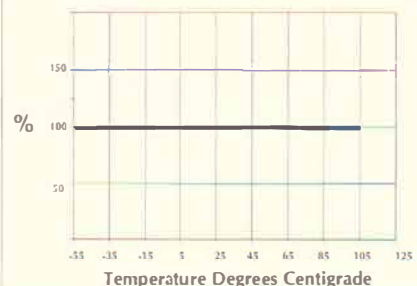


Figure 4 Voltage Derating vs Temperature



DIMENSIONS (INCHES) • MULTICAP PPMFX • AXIAL LEADS, OVAL CASE

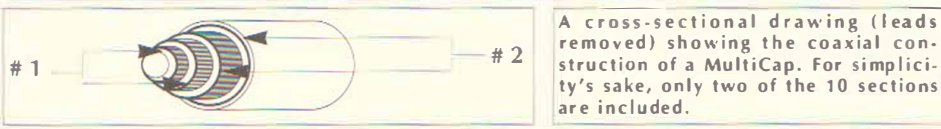
Capacitance in mfd	200 VDC w x h x l	400 VDC w x h x l	600 VDC w x h x l
.01			.20 x .30 x .60
.022			.20 x .40 x .60
.047			.30 x .40 x .60
.10	.30 x .50 x .60	.30 x .50 x .80	.30 x .60 x .80
.22	.30 x .50 x .80	.40 x .60 x .80	.50 x .60 x 1.0
.33	.30 x .50 x .80	.40 x .60 x 1.0	.50 x .70 x 1.0
.47	.30 x .50 x 1.1	.50 x .70 x 1.1	.60 x .80 x 1.3
.68	.40 x .60 x 1.1	.50 x .80 x 1.3	.70 x .90 x 1.3
1.0	.50 x .70 x 1.1	.70 x .80 x 1.3	.70 x 1.0 x 1.3
2.0	.60 x .80 x 1.3	1.0 x 1.1 x 1.3	
3.0	.70 x .90 x 1.3	.90 x 1.1 x 1.8	
4.0	.70 x .90 x 1.5	1.1 x 1.2 x 1.8	
5.0	.70 x .90 x 1.8	1.2 x 1.4 x 1.8	
8.0	.90 x 1.1 x 1.8		
10.0	1.0 x 1.2 x 2.1		
15.0	1.1 x 1.3 x 2.0		
20.0	1.3 x 1.5 x 2.1		
30.0	1.3 x 1.5 x 2.8		

Lead Diameters: .025", caps to 1/2" diameter; .032" to 3/4" ; .04" to 1" ; .051" over 1"

### MultiCap Polypropylene & Aluminum Foil Multiple-Section Capacitor PPFX

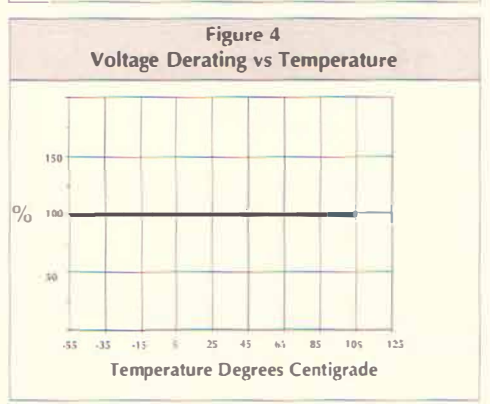
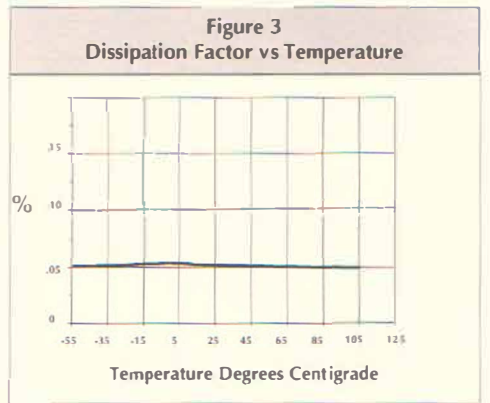
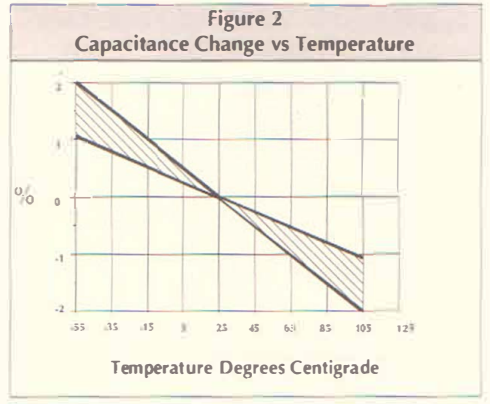
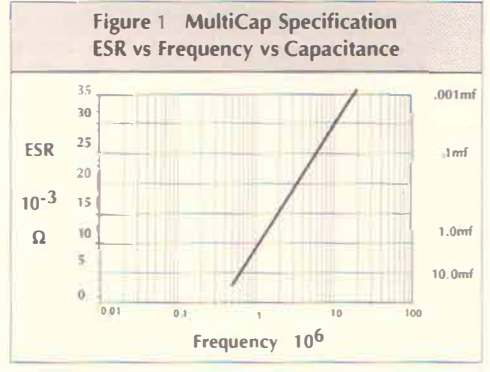
PPFX film and foil MultiCaps reduce typical capacitor loss factors with a patented design that winds capacitors coaxially one upon the other, into a single, self-bypassed unit. Since each section is in parallel, the inductance of the overall capacitor is reduced by the number of sections used - typically 10. Inductance characteristics never exceed those of a piece of lead wire the same length as the capacitor's body. Measured ESR values are 5 to 10 times lower than conventional designs (see Figure 1). Dielectric absorption is very low, making the PPFX desirable in high-speed circuits. In its overall reduction of parasitics, this series resembles the PPFXS in measured performance, and tolerates higher temperatures (105 C) than the RTX. Ideal for use in all high-current applications and wherever low ESR, ESL, & DF are important and wherever a fine film & foil capacitor is required.

<b>Capacitance Values:</b>	.01 to 16.0 mfd. Special values on request
<b>Tolerances:</b>	+/- 10%. Special tolerances on request
<b>Working Voltages:</b>	100, 200, 400, 600; 800 on request (to 1 mfd)
<b>Test Volts:</b>	2.0 x rated voltage for one minute.
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @ 1kHz @ 25° C < 0.05% > 10.0 mfd @ 120 Hz @ 25° C < 0.03% .1 - 1.0 mfd @ 1kHz @ 25° C < 0.02% .001 - .1 mfd @ 1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	-55° C to 105° C
<b>Temperature Coefficient:</b>	-150 PPM/° C
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Tin-plated copper. Others available on request



DIMENSIONS (INCHES) • MULTICAP PPFX • AXIAL LEADS, OVAL CASE				
Capacitance in mfd	100 VDC w x h x l	200 VDC w x h x l	400 VDC w x h x l	600 VDC w x h x l
.10			.30 x .50 x 1.0	.40 x .60 x 1.1
.15			.40 x .60 x 1.1	.40 x .60 x 1.2
.22			.40 x .60 x 1.1	.50 x .70 x 1.2
.33			.50 x .70 x 1.3	.60 x .80 x 1.3
.47			.50 x .80 x 1.3	.70 x .90 x 1.3
.68			.60 x .90 x 1.4	.70 x .90 x 1.8
1.0	.50 x .70 x 1.3	.60 x .90 x 1.3	.70 x 1.0 x 1.3	.80 x 1.1 x 1.8
1.5	.60 x .70 x 1.3	.70 x 1.0 x 1.3		
2.0	.70 x 1.0 x 1.3	.90 x 1.1 x 1.3		
3.0	.90 x 1.1 x 1.3	.90 x 1.1 x 1.8		
4.0	.90 x 1.2 x 1.3	1.0 x 1.3 x 1.8		
5.0	.90 x 1.1 x 1.8	1.2 x 1.5 x 1.8		
6.0	.90 x 1.2 x 1.8	1.2 x 1.5 x 1.8		
7.0	1.1 x 1.2 x 1.8	1.1 x 1.4 x 2.3		
8.0	1.1 x 1.4 x 1.8	1.2 x 1.5 x 2.3		
9.0	1.2 x 1.4 x 1.8	1.2 x 1.7 x 2.3		
10.0	1.4 x 1.7 x 1.8	1.4 x 1.7 x 2.3		
12.0	1.4 x 1.7 x 2.0	1.5 x 1.7 x 2.3		

Lead Diameters: .025", caps to 1/2" diameter; .032" to 3/4"; .04" to 1"; .051" over 1"

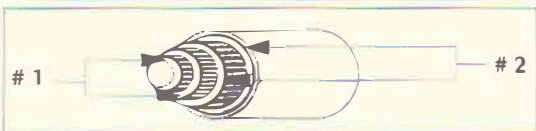




### MultiCap Polypropylene & Tin Foil Multiple-Section Capacitor PPFXS

PPFXS MultiCaps reduce typical capacitor loss factors with a patented design that winds capacitors coaxially one upon the other, into a single, self-bypassed unit. Since each section is in parallel, the inductance of the overall capacitor is reduced by the number of sections used - typically 10. Inductance characteristics never exceed those of a piece of lead wire the same length as the capacitor's body. Measured ESR values are 5 to 10 times lower than conventional designs (see Figure 1). Dielectric absorption is very low, making the PPFXS desirable in high-speed circuits. In its overall reduction of parasitics, this series comes closest to the RTX in measured performance, yet can tolerate higher temperatures (105 C). It is ideal for use in all applications where low ESR & DF and high current are important, and wherever the finest film & foil capacitors are required.

<b>Capacitance Values:</b>	.01 to 16.0 mfd. Special values on request
<b>Tolerances:</b>	+/- 10%. Special tolerances on request
<b>Working Voltages:</b>	100, 200, 400, 600; 800 on request (to 1 mfd)
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.05% 1.0 - 10.0 mfd @ 1kHz @ 25° C < 0.05% > 10.0 mfd @ 120 Hz @ 25° C < 0.03% .1 - 1.0 mfd @ 1kHz @ 25° C < 0.02% .001 - .1 mfd @ 1kHz @ 25° C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	- 55° C to 105° C
<b>Temperature Coefficient:</b>	-150 PPM/° C
<b>Life Tests:</b>	Rated voltage @ 85° C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Tin-plated copper. ●Others available on request



A cross-sectional drawing (leads removed) showing the coaxial construction of a MultiCap. For simplicity's sake, only two of the 10 sections are included.

#### DIMENSIONS (INCHES) • MULTICAP PPFXS • AXIAL LEADS, OVAL CASE

Capacitance in mfd	100 VDC w x h x l	200 VDC w x h x l	400 VDC w x h x l	600 VDC w x h x l
.10			.32 x .52 x 1.0	.42 x .62 x 1.1
.15			.42 x .62 x 1.1	.42 x .62 x 1.2
.22			.42 x .62 x 1.1	.52 x .72 x 1.2
.33			.52 x .72 x 1.3	.62 x .82 x 1.3
.47			.52 x .82 x 1.3	.72 x .92 x 1.3
.68			.62 x .92 x 1.4	.72 x .92 x 1.8
1.0	.52 x .72 x 1.3	.62 x .92 x 1.3	.72 x 1.2 x 1.3	.82 x 1.2 x 1.8
1.5	.62 x .72 x 1.3	.72 x 1.2 x 1.3		
2.0	.72 x 1.2 x 1.3	.92 x 1.2 x 1.3		
3.0	.92 x 1.2 x 1.3	.90 x 1.2 x 1.8		
4.0	.92 x 1.2 x 1.3	1.2 x 1.4 x 1.8		
5.0	.92 x 1.2 x 1.8	1.4 x 1.5 x 1.8		
6.0	.92 x 1.4 x 1.8	1.4 x 1.5 x 1.8		
7.0	1.3 x 1.5 x 1.8	1.3 x 1.5 x 2.3		
8.0	1.3 x 1.5 x 1.8	1.5 x 1.8 x 2.3		
9.0	1.4 x 1.6 x 1.8	1.6 x 1.8 x 2.3		
10.0	1.5 x 1.6 x 1.8	1.6 x 1.8 x 2.3		
12.0	1.6 x 1.8 x 2.0	1.7 x 1.8 x 2.3		

Lead Diameters: .025", caps to 1/2" diameter; .032" to 3/4" ; .04" to 1" ; .051" over 1"

Figure 1 MultiCap Specification ESR vs Frequency vs Capacitance

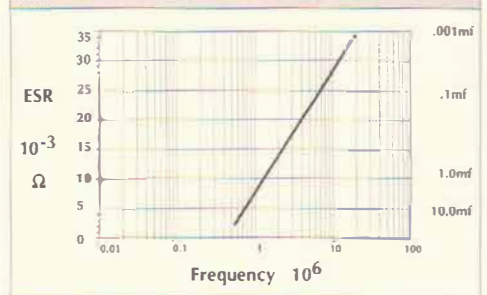


Figure 2 Capacitance Change vs Temperature

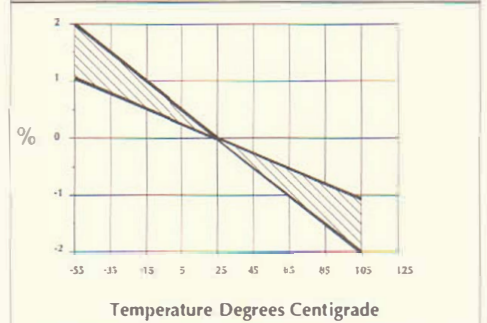


Figure 3 Dissipation Factor vs Temperature

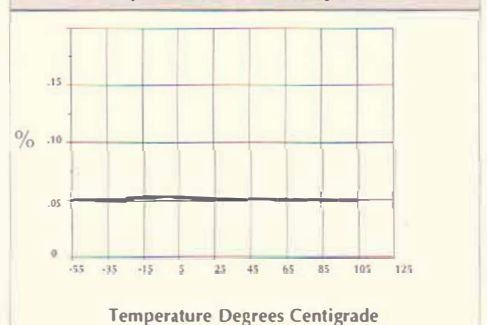
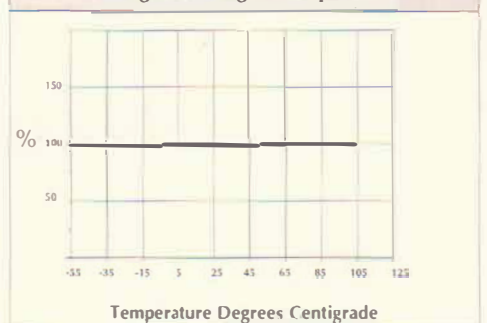


Figure 4 Voltage Derating vs Temperature



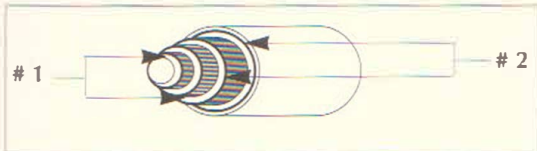
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### MultiCap Polystyrene & Tin Foil Multiple-Section Capacitor RTX

RTX MultiCaps reduce typical capacitor loss factors with a patented design that winds capacitors coaxially one upon the other, into a single, self-bypassed unit. Since each section is in parallel, the inductance of the overall capacitor is reduced by the number of sections used - typically 10. Inductance, resonance, dissipation factor (DF) and equivalent series resistance (ESR) are reduced significantly (see Figure 1); dielectric absorption (DA) is extremely low. The RTX series is ideal for use in high-current, high-frequency, low-heat applications and wherever very low DA, ESR, and DF are important. Or simply wherever the finest film and foil capacitors are required.

<b>Capacitance Values:</b>	.01 to 3.0 mfd
<b>Tolerances:</b>	+/- 10%. Special tolerances on request
<b>Working Voltages:</b>	100, 200, 400, 600 (small values)
<b>Test Volts:</b>	2.0 x rated voltage for one minute
<b>Dissipation Factor:</b>	< 0.02% @ 1kHz @ 25°C
<b>Insulation Resistance:</b>	>300,000 megohm/mfd
<b>Operating Temperature Range:</b>	- 55 to 85°C
<b>Temperature Coefficient:</b>	See Figure 4
<b>Life Tests:</b>	rated voltage @ 85°C for 1000 hrs
<b>Vibration:</b>	Will meet Mil-C-19978B
<b>Lead Material:</b>	Tin-plated copper. Others available on request



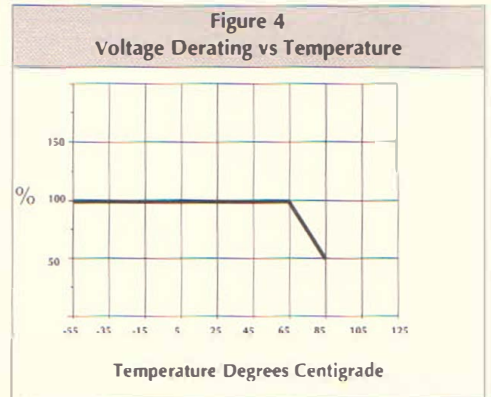
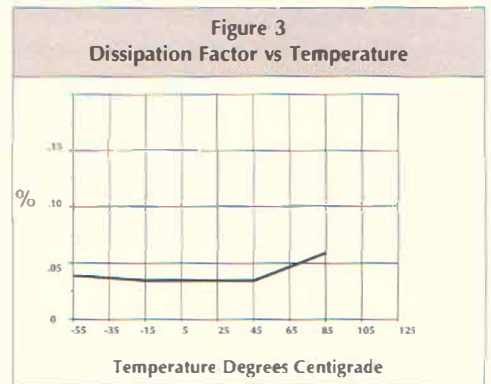
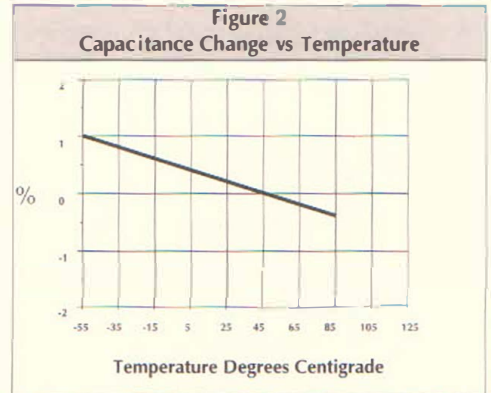
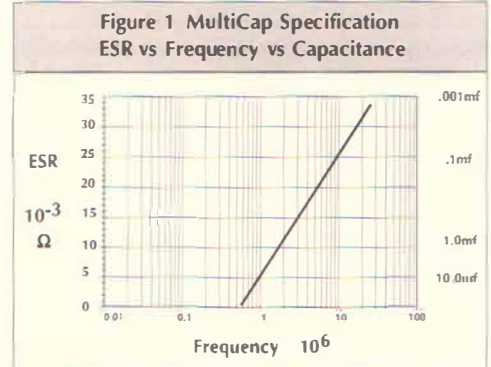
A cross-sectional drawing (leads removed) showing the coaxial construction of a MultiCap. For simplicity's sake, only two of the 10 sections are included.

DIMENSIONS (INCHES) • MULTICAP RTX • AXIAL LEADS, ROUND CASE

Capacitance in mfd	100 VDC dia x l	200 VDC dia x l	400 VDC dia x l	600 VDC dia x l
.01			.40 x .75	.40 x 1.10
.022			.50 x .80	.50 x 1.10
.033			.60 x 1.0	.70 x 1.10
.047	.42 x .75	.44 x 1.0	.56 x 1.0	.70 x 1.30
.068	.40 x 1.10	.50 x 1.0	.60 x 1.25	.70 x 1.30
.10	.35 x 1.10	.50 x 1.30	.60 x 1.50	.80 x 1.50
.15	.50 x 1.10	.60 x 1.30	.70 x 1.50	.95 x 1.80
.22	.60 x 1.25	.66 x 1.50	.70 x 1.80	1.10 x 1.80
.33	.62 x 1.50	.85 x 1.50	.85 x 1.80	1.10 x 1.80
.47	.75 x 1.50	.90 x 1.75	1.20 x 1.80	1.20 x 2.40
.68	.80 x 1.75	1.10 x 1.75	1.30 x 1.80	1.30 x 2.40
1.0	.80 x 1.80	1.20 x 1.80	1.20 x 2.40	
1.5	.95 x 1.75	1.40 x 1.80		
2.0	1.40 x 1.75	1.40 x 2.30		
3.0	1.35 x 2.25	1.50 x 2.30		

Lead Diameters: .025" for caps 1/4 - 1/2" diameter; .032" for caps 1/2 - 3/4" diameter; .04" for caps 3/4 - 1" diameter; .051" for caps over 1" diameter.

Capacitors are not covered by our warranty if used at over the rated voltage or temperatures. Please allow 48 hours break-in before judging sonic performance.





## EXOTICA™ Specialty Audio Series

### Exotica Teflon & Tin Foil TFT

Series Exotica TFT

This series, with Teflon film, withstands high temperatures. Listening tests have revealed superb sonic performance, first among conventional design capacitors, making it the choice for applications where only the highest performance will do. The TFT is suitable for all audio applications, and will provide high performance and long-life. The gold-plated OFHC lead wires provide long term reliability, superior to silver wires owing to gold's non-oxidizing properties.

DIMENSIONS (INCHES) • EXOTICA TFT • AXIAL LEADS, ROUND CASE				
Capacitance in mfd	100 VDC dia x l	200 VDC dia x l	400 VDC dia x l	600 VDC dia x l
.01		.210 x .530	.203 x .750	.270 x .750
.022		.230 x .750	.280 x .750	.310 x 1.00
.033		.275 x .750	.273 x 1.00	.373 x 1.00
.047		.320 x 750	.320 x 1.00	.440 x 1.00
.068		.305 x 1.00	.378x 1.00	.450 x 1.25
.10	.245 x .750	.365 x 1.00	.453 x 1.00	.540 x 1.25
.15	.286 x .750	.440 x 1.00	.471 x 1.25	.660 x 1.25
.22	.340 x .750	.452 x 1.25	.565 x 1.25	.710 x 1.50
.33	.330 x 1.00	.550 x 1.25	.620 x 1.50	
.47	.390 x 1.00	.586 x 1.50		
.68	.475 x 1.00	.698 x 1.50		
1.0	.480 x 1.25	.820 x 1.50		

Specifications - TFT	
Capacitance Values:	.01 to 1.0 mfd
Tolerances:	+/- 10% ; others available
Working Voltages:	100, 200, 400, 600
Test Volts:	2.0 x rated voltage, 1 min.
Dissipation Factor:	< 0.0005
Insulation Resistance:	300,000 megohm/mfd; not to exceed 500,000 megohms
Operating Temp:	-55C to 105°C without derating
Temp. Coefficient:	Flat from room temperature to 200 °C
Life Tests:	Rated voltage @ 85°C for 1000 hrs
Vibration:	Will meet Mil-C-19978B
Lead Material:	Gold-plated OFHC

### Exotica Copper Foil Polypropylene Film PCU

Series Exotica PCU

The Exotica PCU capacitor, with copper foil, has low distortion and provides superbly clean, clear performance. The PCU is especially suitable for ultra-high frequencies, bringing a remarkable clarity in this sonic range. Special manufacturing techniques are required to ensure that copper will remain reliable and provide high performance over time. The gold-plated OFHC lead wires provide long-term reliability, superior to silver wires owing to gold's non-oxidizing properties; the matching of copper foil with copper leads reduces deterioration of performance.

DIMENSIONS (INCHES) • EXOTICA PCU • AXIAL LEADS, ROUND CASE				
Capacitance in mfd	200 VDC dia x l	400 VDC dia x l	600 VDC dia x l	800 VDC dia x l
.1				
.22				
.33	Please call for specs.			
.47				
.68				
1.0				
2.0				

Specifications -PCU	
Capacitance Values:	.22 to 2.0 mfd
Tolerances:	+/- 10% ; others available
Working Voltages:	200, 400, 600, 800
Test Volts:	2.0 x rated voltage, 1 min.
Dissipation Factor:	< 0.0005
Insulation Resistance:	300,000 megohm/mfd
Operating Temperature:	- 55C to 105°C
Life Tests:	Rated voltage @ 85°C
Vibration:	Will meet Mil-C-19978B
Lead Material:	Gold-plated OFHC

### Exotica Prime™ - State of the Art Performance

Series Exotica Prime

The Exotica Prime™ capacitor is a proprietary design from Richard Marsh, handbuilt to the highest specs, to satisfy the perfectionist. It offers unrivaled audio performance. It offers ultra-low distortion and extreme clarity throughout the full audible frequency range. In listening tests, it has proven superior even to MultiCap polystyrene and AudioCap Terlon in sensitive equipment. Capacitance of .10 mfd to 1.0 mfd, at 100, 200, 400 volts, in case form. This is offered now as a custom product only. Applications: coupling, bypass, filters. **Call for information on specs, availability & ordering.**

## Why High Performance Capacitors?

Designers often overlook passive components in perfecting or improving the performance of their products. The right passive components, those that work best with the overall design and concept and with each other, can take a product from average performance levels to state of the art. As the leader in research into capacitor effects in audio circuits, Reliable offers not only the best parts at various price and performance levels, but a series of technical papers to help bring engineers up to speed on the latest in capacitor data and technology. We also offer application assistance on the best type of film capacitor to use and on the uses of the broad range of film caps offered in this catalog.

Reliability and long life are hallmarks of the Rel lines. Rel products are also used in consumer, communications, military, and geologic fields, which require very long life and stable performance. The experience acquired through constant research into materials and methods of construction has led to the innovative proprietary and patented designs exclusive to Reliable Capacitors. Our white papers are available on the Internet ([www.capacitors.com](http://www.capacitors.com)) and by mail, on request. Here is a brief synopsis of the major papers:

### • Considerations for a High Performance Capacitor (1990)

Thesis: All capacitors have unwanted inductance, resistance, dielectric losses and dielectric absorption. Proper construction and materials reduce these parasitics. The unique internal bypass design of the MultiCap further improves performance.

This paper defines several capacitor-based parasitics and explores their relationships and effects upon a circuit and upon a capacitor's performance. In an earlier paper ("Capacitors," *Audio*, Feb & Mar 1980), R. Marsh & W. Jung describe which dielectrics bring the best results in audio circuits (polystyrene, Teflon, and polypropylene) and why they do. "Considerations" discusses the roles that the metal of the leads, methods of lead attachment, plate material, and general construction play in losses, and how capacitor self-resonances and damping are related to performance.

Choosing the proper capacitor for each circuit can minimize losses and improve sonic performance and reliability of the component. Metalized film caps are small in size and self-healing, useful for applications calling for small signal levels. Film & foil caps have thicker plates, leading to lower losses and hence longer life and reliability. Film & foils are most useful in applications calling for large signals and high currents. In high-performance designs, the use of the best dielectrics or the best combination of dielectric and foil material can be important to the overall performance of the product.

The final section of the paper discusses ways in which the MultiCap reduces all parasitics and improves performance.

### • Phase Response vs ESR (1990)

This paper further examines equivalent series resistance, phase changes, and damping and describes their audible effects (image blurring and poor ambience retrieval are significant), and ways in which proper construction and materials reduce these effects. Attention is given the MultiCap's excellent performance in this area.

## Guidelines For High Performance & Long Life

- **Do not apply a voltage exceeding the capacitor's voltage rating.** To do so can shorten the life of the capacitor, change parameters or even destroy it. When using the cap with AC voltage superimposed on DC, be sure that the peak value of AC when added to DC does not exceed the cap's rating. There is no surge or overvoltage tolerance assumed or warranted.
- **Do not apply excessive force to the lead wires.** Our capacitors will withstand a three-pound maximum steady pull applied axially or radially for one minute, or one pound for one cycle. Applying excessive force to the leads will break them, sometimes internally, affecting the performance.
- **Do not overheat the capacitor.** The layout, size, shape, selection of components, and mechanical and enclosure design, together with the complex thermal interaction of the various parts of the circuit and nearby equipment, are intimately linked to thermal performance and long-term reliability. Measure the heat at the capacitor surface in the working environment; be particularly careful with polystyrene. See the temperature specifications for each series.
- **Use proper soldering techniques.** If the soldering iron is placed too close to the capacitor's body or the soldering temperature is too high, you may damage the electrical insulation or alter the cap's characteristics. Typical soldering-tip temperatures are from 280 to 390 C (540 -735 F). Solder assembly or part within one second (+/- 1/4 sec). In dip or wave soldering, leads should be dipped in solder of 260 F or under for three seconds or less.
- **Use the proper solvent.** Halogenated hydrocarbon cleaning solvents can contaminate capacitors. Chlorinated solvents can damage the insulation or the seals. We do not guarantee any solvent, but the following are normally considered safe: methyl alcohol; xylene; ethyl alcohol; alconox (water soluble); propyl alcohol; butyl alcohol.
- **Do not short the leads to discharge a capacitor without current limiting.** Without current limiting, discharging a capacitor into itself will result in very high currents. Capacitors appear, when discharged, as a dead short-circuit and have too little ESR to limit charging inrush current. We consider overvoltage surges and overcurrent surges (i.e., shorting of charged caps) as abuses of the capacitor.
- **Keep lead lengths as short as possible for good high-frequency performance.**
- **Please remember always to allow our capacitors to "break in" for a minimum of 48 hours before judging sonic performance.** This is particularly important for the MultiCap and the Exotica Prime. But all tightly and evenly wound capacitors can sound harsh and constricted when first installed into the circuit. With time, the capacitor "eases" a bit, or "forms," and once this has occurred, the sound will smooth out and extend to the frequency extremes. The capacitor will then hold this performance over its long life.
- **For further information, please call (801) 377-2397.**



# Ordering & Service

**Ordering** - Please call or email for price information, discount level, availability, and minimum order requirements. A Purchase Order with part numbers, quantities, shipping schedule, PO number, and complete billing & shipping addresses is required to place an order. First time customers will need to prepay their initial order. Please contact us for credit terms and applications.

**Prices** - Prices of all products described in this catalog appear in a separate price list. Call or email for quotations or price lists. All prices FOB Provo, UT.

**Payment** - We accept credit cards, ACH, wire transfer and check. All checks and wire transfers must be payable to Reliable Capacitors and include an invoice or PO number.

**Special Orders** - Reliable Capacitors can build custom values and materials. Custom orders require a 50% non-refundable deposit and may not be returned or canceled.

**Delivery Dates** - For all items that must be manufactured, there is an 8 - 10 week lead time. Stock items are shipped within two to five days of receipt of order.

**Terms & Conditions of Sale** - Contracted and Scheduled Purchase Orders are priced according to overall quantity and may not be canceled nor can the products be returned without written authorization from Reliable.

**Authorized Returns** - We accept no merchandise for return without an RA number from Reliable Capacitors. You must supply original invoice number and date. A credit will be issued for the value of goods returned due to customer error if the goods are in their original salable condition, less a 10% re-stocking fee. Defective or incorrectly shipped merchandise will be fully credited or replaced, subject to inspection.

**Warranty** - Reliable Capacitors warrants that its products are free from defects in materials and workmanship, and that these products, when properly installed and used, will perform within the applicable published specifications. Use of these products not in accordance with their design or with the instructions from Reliable Capacitors shall void this warranty. This warranty is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability for any particular purpose.

Reliable Capacitors reserves the right to make changes from the specifications herein in the construction and design without notice. The information and specifications included here are believed to be accurate. However, Reliable Capacitors assumes no responsibility for correctness, specific application, or uses.

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