

REVISIONS

Letter	ECO No.	Description	Checked	Approved	Date
A	36-494	INITIAL RELEASE	B.G.	<i>[Signature]</i>	2/9/96

NAME	DATE	MASSACHUSETTS INSTITUTE OF TECHNOLOGY CENTER FOR SPACE RESEARCH			
Drawn: BRIAN KLATT	2/2/96	CAPACITOR, POLYPROPYLENE FILM, FILM/FOIL			
Checked: <i>Gordon C. Long</i>	2/9/96				
Approved: <i>R. F. [Signature]</i>	2/9/96				
Released: <i>William Mays</i>	2/9/96				
		Size	Code Identification No.	Drawing No.	Rev.
		T	80230	36-02312	A
		Scale: NONE			Sheet: 1 of 5

1.0 SCOPE

1.1 Introduction This drawing describes device requirements for Polypropylene film, film/foil capacitors. These parts will be used in flight hardware for a space experiment on the AXAF CCD Imaging Spectrometer (ACIS) Instrument, in an Earth orbit 10,000 km by 140,000 km.

1.2 Absolute maximum ratings

TA = -55°C to +100°C

2.0 APPLICABLE DRAWINGS

2.1 Government Specifications and Standards Unless otherwise specified, the following specifications and standards, of the latest released issue, form a part of this drawing, to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-C-19978	Capacitors, Fixed, Plastic (or Paper-Plastic) Dielectric (Hermetically Sealed in Metal, Ceramic, or Glass Cases), Established and Non-established Reliability, General Specification for
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INDUSTRY

WIMA Catalog	Capacitors for electronic equipment (dated 1995)
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2.2 Order of precedence In the event of conflict between the text of this drawing and the references cited herein, the text of this drawing shall govern.

3.0 REQUIREMENTS

3.1 General Requirements

3.1.1 Item Requirements The capacitors described herein shall, in all respects, meet the requirements of this specification and the data sheet for WIMA FKP 2 parts described on page 36 of the WIMA catalog cited above. Page 36 of the WIMA catalog is included as figure 1.

3.1.2 Procuring Activity For the purposes of this specification and documents referenced herein, the procuring activity is the Massachusetts Institute of Technology (MIT), Center for Space Research (CSR).

3.1.3 Product Changes The supplier(s) shall notify MIT of proposed changes to capacitors described herein, including changes in design, materials, fabrication methods, or processes, and changes which may affect the quality or intended end use.

3.2 Part marking Capacitor marking shall include the manufacturers name, capacitance in pico-farads, working voltage, and tolerance.

- 3.2.1 Part Number The MIT part number is 36-02312.
- 3.3 Electrical performance characteristics Unless otherwise specified, the electrical performance characteristics are as specified in the WIMA data sheet, and apply over the full operating temperature range.
 - 3.3.1 Capacitance The capacitance shall be 220 pico-farads.
 - 3.3.2 Voltage The working voltage shall be 100 Volts DC, 63 Volts AC.
 - 3.3.3 Tolerance Capacitance tolerance shall be $\pm 1\%$.
 - 3.3.4 Temperature coefficient The temperature coefficient shall be -200×10^{-6} per degree C.
 - 3.3.5 Dielectric Absorption The dielectric absorption shall not exceed 0.05%.
 - 3.3.6 Dissipation Factor The dissipation factor shall be $\leq 3 \times 10^{-4}$ at 1 kHz.
- 3.4 Design and Construction Requirements
 - 3.4.1 Package The package shall be per page 36 of the WIMA catalog.
 - 3.4.2. Lead Finish The leads shall be solderable.

4.0 **QUALITY ASSURANCE PROVISIONS**

- 4.1 Responsibility for Inspection Unless otherwise specified herein, the manufacturer is responsible for the performance of all examinations and tests as specified herein.
- 4.2 Screening All capacitors shall be subjected to and pass subgroup 1 of the group A inspections detailed in Table XIII of MIL-C-19978
- 4.3 Quality Conformance Inspection (QCI) In accordance with paragraph 4.6 of MIL-C-19978, quality conformance inspection shall consist of groups A and B, Tables XI and XV respectively of MIL-C-19978. Tests which are performed 100% in the course of screening, need not be repeated for quality conformance.
- 4.4 Qualification Qualification shall consist of successful completion of the QCI in paragraph 4.3 above plus life test.
 - 4.4.1 Life Test Life test shall be in accordance with paragraph 3.24 of MIL-C-19978. Capacitance shall not change more than 1%.
 - 4.4.2 Test Duration The life test duration shall be 1000 +72, -0 hours
 - 4.4.3 Sample Size The sample size shall be per MIL-C-19978, Table XVI, Group C Inspection, Subgroup 3, Life, for non-ER devices. This requires twelve (12) sample units.
- 4.5 Inspection and Test Records The supplier shall maintain inspection and test records for 36 months after hardware delivery to MIT or submit the inspection and test records to MIT. Test data for all electrical tests, screening, QCI inspections, and qualification shall be submitted to MIT with the delivery of flight parts.

4.6 Source Inspection

4.6.1 Government Source Inspection (GSI) The government has the right to inspect any or all of the work included in this order at the supplier's facility.

4.6.2 MIT Source Inspection MIT Performance Assurance imposes mandatory inspection at final inspection, and must be notified 2 months before parts are ready for MIT. (call area code 617, phone 253-7555).

5.0 **PACKAGING**

5.1 Packaging requirements Packaging shall be sufficient to protect the parts from damage during shipment.

6.0 **NOTES**

6.1 Approved Source of Supply

WIMA Division
Intertechnical Group Inc.
175 Clearbrook Road,
P.O. Box 535
Elmsford, New York 10523



Polypropylene film and foil capacitors for pulse applications in PCM 5 mm

- CECC approval Certificate No. 31 801-001. ■ PCM 5 mm available in rated voltages up to 630 VDC.
- Close tolerances up to 1%. ■ Low loss and low damping capacitors with high resonant frequency.
- Constantly negative TK_C . ■ For all pulse applications with high repetition frequency like switch mode power supplies, ballasts, etc. ■ Available taped and reeled.

Technical Data

Dielectric: Polypropylene film.
Capacitor electrodes: Metal foil.
Encapsulation: Flame-retardent plastic case, UL 94 V-O, with epoxy resin seal. Colour: Green. Marking: Black.
Temperature range: -55° C to +100° C.
Test specifications: In accordance with IEC 384-13 and CECC 31 800.
Test category: 55/085/56 in accordance with IEC.
Insulation resistance at +20° C:
 $> 5 \times 10^5$ megohms (mean value: 1×10^6 megohms)
 In accordance with IEC 384-13 and CECC 31 800.
Measuring voltage:
 $V_r = 63 \text{ V}; V_{\text{test}} = 50 \text{ V/1 min.}$
 $V_r \geq 100 \text{ V}; V_{\text{test}} = 100 \text{ V/1 min.}$
Capacitance tolerances: $\pm 10\%$, $\pm 5\%$, $\pm 2.5\%$, $\pm 1\%$.
Temperature coefficient: -200×10^{-6} per degree C (typical).
Maximum pulse rise time: 1000 V/microsecond for pulses equal to the rated voltage.
Dissipation factors at +20° C: $\tan \delta$

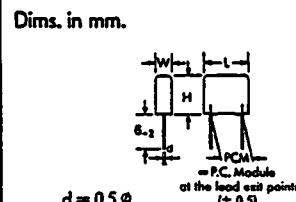
at f	$C \leq 1000 \text{ pF}$	$1000 \text{ pF} < C \leq 4700 \text{ pF}$	$4700 \text{ pF} < C \leq 0.033 \text{ } \mu\text{F}$
1 kHz	$\leq 3 \times 10^{-4}$	$\leq 4 \times 10^{-4}$	$\leq 4 \times 10^{-4}$
10 kHz	$\leq 3 \times 10^{-4}$	$\leq 4 \times 10^{-4}$	$\leq 4 \times 10^{-4}$
100 kHz	$\leq 4 \times 10^{-4}$	$\leq 5 \times 10^{-4}$	-
1 MHz	$\leq 10 \times 10^{-4}$	-	-

Test voltage: $2 V_r$, 2 sec.

General Data

Capacitance	63 VDC/40 VAC*				100 VDC/63 VAC*				250 VDC/160 VAC*				400 VDC/220 VAC*				630 VDC/250 VAC*							
	W	H	L	PCM	W	H	L	PCM	W	H	L	PCM	W	H	L	PCM	W	H	L	PCM				
100 pF					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
150 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
220 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
330 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
470 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
680 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
1000 pF					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
1500 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
2200 .					4.5	6	7.2	5	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*	4.5	6	7.2	5*
3300 .	4.5	6	7.2	5	5.5	7	7.2	5	5.5	7	7.2	5*	5.5	7	7.2	5*	5.5	7	7.2	5*	5.5	7	7.2	5*
4700 .	4.5	6	7.2	5	5.5	7	7.2	5	6.5	8	7.2	5*	6.5	8	7.2	5*	6.5	8	7.2	5*	6.5	8	7.2	5*
6800 .	4.5	6	7.2	5	5.5	7	7.2	5	6.5	8	7.2	5*	7.2	8.5	7.2	5*	7.2	8.5	7.2	5*	7.2	8.5	7.2	5*
0.01 μF	5.5	7	7.2	5	6.5	8	7.2	5	7.2	8.5	7.2	5*	8.5	10	7.2	5*	8.5	10	7.2	5*	8.5	10	7.2	5*
0.015 .	6.5	8	7.2	5	7.2	8.5	7.2	5	8.5	10	7.2	5*												
0.022 .	7.2	8.5	7.2	5	8.5	10	7.2	5																
0.033 .	8.5	10	7.2	5																				

* AC voltage: $f \leq 1000 \text{ Hz}; 1.4 \times V_{\text{rms}} + \text{VDC} \leq \text{VDC (rated)}$
 ** PCM = Printed circuit module \Rightarrow lead spacing
 Also available in E12-values.
 * Produced in accordance with CECC



Taped version see page 70.
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Vibration: 6 hours at 10...2000 Hz and 0.75 mm displacement amplitude or 10 g in accordance with IEC 68-2-6.
Low air density: 1 kPa = 10 mbar in accordance with IEC 68-2-13.
Bump test: 4000 bumps at 390 m/sec² in accordance with IEC 68-2-29.
Dielectric absorption: 0.05%.
Voltage derating: A voltage derating factor of 1.35% per K must be applied from +85° C for DC voltages and from +75° C for AC voltages.
 Graphs see page 6.

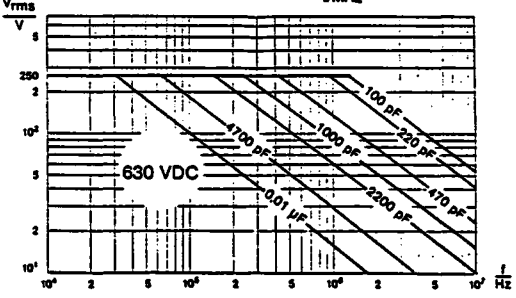
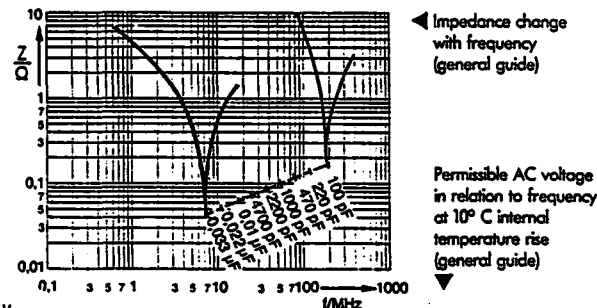


FIGURE 1