



## GENERAL SPECIFICATIONS

### CONSTRUCTION

#### Electrodes:

High purity aluminum.

#### Separators:

Porous paper impregnated with a high stability electrolyte.

#### Terminations:

Welded for high mechanical and electrical strength.

#### Case:

Extruded aluminum can.

#### Windings:

Low inductance. Hermetically sealed within the case.

#### Seals:

Highest quality rubber, rubber/phenolic or high temperature elastomer end seals. Vented safety end seals are on selected sizes. Epoxy end seals are available on special order.

### INSULATING SLEEVE

#### Standard Sleeve:

Polyvinyl chloride (PVC).

#### Optional Material:

Polyester.

#### Insulation Resistance:

≥50 MEGAOHMS @100WVDC.

#### Dielectric Strength:

1.5kV for 30 seconds with no breakdown.

### MARKINGS

#### Locations:

On sleeve or aluminum can.

IC

Capacitance (µf)

Working voltage (WVDC)

Location of cathode lead wire (on polarized capacitors)

Date code

Maximum Operating Temperature Series Designation

### AMMO PACK/TAPE & REEL CONFIGURATIONS

Axial capacitors with diameters ≤12.5 mm are available on tape and reel for use in automatic insertion equipment. Radial capacitors with diameters ≤12.5 mm are available in Ammo Pack/Tape and Reel for use in automatic insertion equipment.

### SHOCK & VIBRATION

All IC capacitors meet requirements of MIL STD 202F method 201 Part A: 10 g or 0-50HZ for a maximum total of

6 hours with no serious external or internal damage. After test, electrical performance will be within standard +25°C specifications.

### SAFETY VENTING

Vented safety end seals are supplied on selected case sizes.

### SOLDERABILITY

All capacitors meet the solderability requirements of ANSI/J-STD 002. Flow soldering can be used when the above temperature-time considerations are observed. Follow limits outlined in EIA RS395 par. 2.1.4.

### LEAD PULL & BEND TEST

#### Lead pull

5 lbs. axially for 10 seconds

#### Test:

(MIL STD 202D method 211A part A)

#### Lead bend

1 lb. for one cycle

#### Test:

(MIL STD 202D method 211A part C)

### STANDARD TEST METHODS

E.I.A. RS395

E.I.A. RS296D

E.I.A. RS468A

MIL-202F

J.I.S.-C-5141

I.E.C. Standards

ANSI/J-STD-002

### CLEANING SOLUTION PRECAUTIONS:

**NOTE: Use of halogenated hydrocarbon or chlorine based cleaning solvents can contaminate aluminum electrolytic capacitors without epoxy end seals.**

These chemicals can penetrate into the capacitor windings thus causing intermittent operation and premature failure. The corrosive effects of halogens on aluminum are well known. Care must be taken to prevent incursion for reliable long life operation.

### SOLVENT TOLERANT END SEALS:

Solvent tolerant end seals\* are standard on most series of IC aluminum electrolytic capacitors, (indicated

within each product section). These end seals are useable with the following halogenated solvents with a maximum exposure period of five minutes.

#### Acceptable Solvents\*:

Freon® TE, TES, TS, TMS

#### Cleaning Systems:

Vapor, Immersion, Ultrasonic

Please contact IC concerning specific use of halogenated hydrocarbon or other type of cleaning solvent.

### SOLVENT TOLERANT END SEAL:

The following series are now available with the solvent tolerant end seal as a standard feature (≤250 WVDC rated or as specified). \*

BPS CKS LSR PLM RLS RSS TLS  
CKH LBA PBM PUM RZM TTA CKR  
LMU PGM RZS SAK RCZ TMA

### OPTIONAL EPOXY END SEALS:

Epoxy End Seals\* are available on most series of aluminum electrolytic capacitors as an available option (indicated at each product.) The Epoxy End Seal is recommended for use with all halogenated or chlorinated cleaning solvents. Epoxy end seals also provide mechanical rigidity for those applications where microphonics could be a concern. IC offers a proprietary epoxy end seal specifically developed for protection of aluminum electrolytic capacitors against solvent penetration during typical board cleaning procedures.

\* **NOTE:** The solvent tolerant end seals are useable under the above stated solvents. No guarantees or warranties are expressed or implied with the use of any solvents. Chlorinated solvents will swell PVC sleeving and may result in cracking or splitting after exposure to the solvent.



**STANDARD TEST METHODS****STANDARD TEST PROCEDURES**

Capacitance, Dissipation factor (DF), ESR, and impedance (Z) shall be measured using the bridge method at a standard testing frequency of 120Hz, ( $\pm 5$ Hz) 2.2 Volts DC maximum bias and  $\leq 1.0$  VRMS @ 25°C, other frequencies may be specified for special applications.

**LEAKAGE CURRENT TEST PROCEDURE**

Capacitors are to be preconditioned at +25°C at rated voltage for 30 minutes at no less than 18 hours nor more than 24 hours prior to testing. Leakage current shall be measured at the time specified for each capacitor series after the application of maximum rated voltage at +25°C. Resistance of 1K $\Omega$  shall be placed in series with the capacitors under test. The leakage current shall be calculated as a function of the voltage measured across the resistor.

**REVERSE VOLTAGE**

Reverse voltage shall not exceed 1.5 volts for any polarized aluminum electrolytic capacitor.

**NON-POLAR CAPACITORS**

Limited reverse or AC voltage can be tolerated by non-polar capacitors under certain conditions. IC type BPA, BPS and PBM non-polar capacitors are designed for use in those circuits where polarity reversal can occur. Under no circumstances may the peak voltage exceed the rated voltage of the capacitor.

**CAUTION:** The AC ripple current ratings are not to be exceeded.

**SURGE VOLTAGE TEST PROCEDURE**

Capacitors shall be preconditioned at rated WVDC at +25°C for a 30 minute period at least 18 but no more than 24 hours prior to testing. Capacitors will withstand 1,000 cycles of surge voltage application at the specified temperature. Each power on cycle shall be of 30 seconds duration. The maximum surge shall be applied through at 1,000 ohm resistor, immediately followed by a 5 minute discharge through a 1,000 ohm resistor.

Upon completion of the test cycles, capacitors shall be allowed to cool for 30 minutes after which post-test measurements shall be made.

 **RIPPLE CURRENT TEST PROCEDURE**

Capacitors shall be preconditioned at rated voltage at +25°C for 30 minutes prior to beginning the test. Parameters under evaluation shall be measured at +25°C in accordance with standard test procedures. Capacitors shall then be placed in the test fixture with specified ripple current and rated temperature applied. Upon completion of the test, capacitors shall be allowed to cool to room temperature +25°C for 24 hours. Post test readings shall then be measured.

**CAUTION:** The surface temperature of the capacitor shall not rise more than 10°C above the ambient temperature and shall never exceed the maximum rated temperature.

**ENVIRONMENTAL PERFORMANCE****OPERATING TEMPERATURE**

IC aluminum electrolytic capacitors are designed for operational use over the temperature range as specified for each individual series.

**STORAGE TEMPERATURE**

IC aluminum electrolytic capacitors can be transported and stored at temperatures ranging from -55°C to +85°C for brief periods without permanent damage. Capacitors stored for any extended period of time beyond 24 months (except PLM, RLS and TLS 12 months) should be checked in accordance with standard test procedures prior to use.

**IMPEDANCE RATIO MEASUREMENTS**

Capacitors shall have initial measurements made at +25°C (+0, -5°C) for reference purposes. Capacitors shall reach thermal equilibrium at -25°C, -40°C or -55°C as specified for each particular series. Capacitance Dissipation Factor and/or ESR and

Impedance shall be measured at 120Hz, 2.2 VDC maximum bias and  $\leq 1.0$ VRMS using the bridge method. Measurements may be made at frequencies other than 120Hz for special application requirements.

**LOAD LIFE TEST PROCEDURE**

Capacitors shall be preconditioned at rated voltage for 30 min. prior to beginning the test. Test parameters shall be measured at +25°C in accordance with standard test procedures. The capacitors shall be placed in the oven with rated voltage applied. The oven shall provide dry circulating air at the specified temperature. Upon completion of the test period, capacitors shall be allowed to cool to room temperature (+25°C) for 24 hours. Post test readings shall then be measured. The time period, temperature and test voltage shall be established in accordance with the device under test.

**SHELF LIFE TEST PROCEDURE**

Capacitors shall be preconditioned at rated voltage for 30 min. prior to beginning the test. Parameters shall be measured at +25°C with standard test procedures. The capacitors shall be placed in the oven with no voltage applied. The oven shall provide dry circulating air at the specified temperature. Upon completion of the test, capacitors shall be allowed to cool to room temperature +25°C for 24 hours. Post test readings shall then be measured. The time period and temperature shall be established in accordance with the device under test.

