

TO Messrs. AVNET ABACUS

ALUMINUM ELECTROLYTIC CAPACITORS REFERENCE SHEET

| | | |
|----------------------|------------------------|----------------|
| CUSTOMER PART No. | | |
| Rubycon PART No. | 35 TLV 470 M 12.5X13.5 | |
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RUBYCON CORPORATION
ENGINEERING DIVISION

1938-1, NISHIMINOWA, INA-SHI, NAGANO-KEN, JAPAN

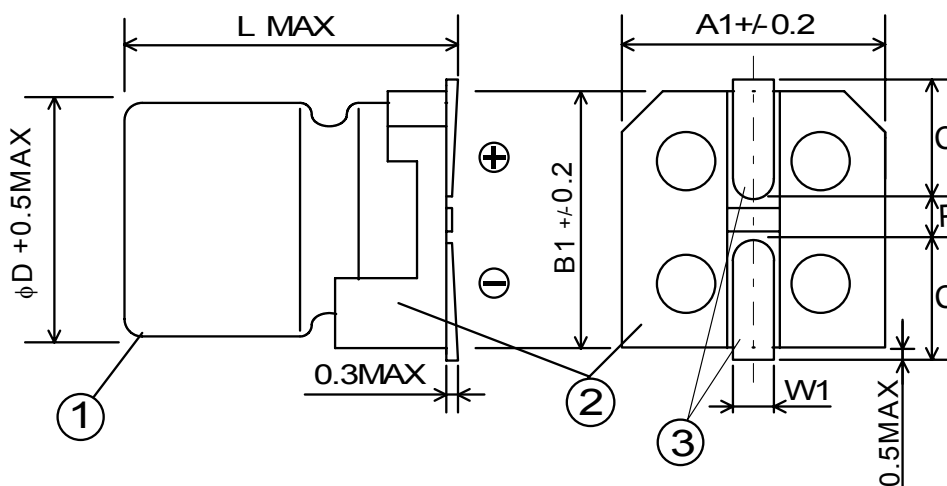
TEL No. 0265-72-7116

FAX No. 0265-73-3380

| | |
|----------|--------------|
| DESIGN | SEIJI IWAI |
| | |
| CHECK | TETSUYA MIZU |
| | |
| APPROVAL | KENROU FUJII |
| | |

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|----------------------------------|-----------------------------|----------------|---------------------------------|
| ALUMINUM ELECTROLYTIC CAPACITORS | Style | CE 32 | |
| | Operating Temperature Range | -55°C ~ +105°C | |
| | Reference Standard | JIS C 5102 | |
| 35 WV 470 MFD (TLV SERIES) | ① Case | Aluminum | Plastic Laminated Aluminum Case |
| | ② Terminal base board | | Heat resisting plastic |
| | ③ Lead Wire | CP Wire | Tin plated |

1. Dimensions unit : mm



2. Electrical Performance

Table-1

| NOMINAL CAPACITANCE (μF) | CAPACITANCE TOLERANCE (%) 20°C, 120Hz | RATED VOLTAGE (V.DC) | SURGE VOLTAGE (V.DC) | LEAKAGE CURRENT (μA MAX) 20°C | D.F. tan δ MAX 20°C 120Hz | MAX RIPPLE CURRENT (mA rms) 105°C 100kHz | IMPEDANCE (Ω MAX) 20°C 100kHz |
|--------------------------|--|----------------------|----------------------|----------------------------------|---------------------------------------|--|-------------------------------------|
| | | | | 2min | | | |
| 470 | -20~+20 | 35 | 44 | 164 | 0.12 | 1100 | 0.065 |

| IMPEDANCE RATIO 120Hz | | | DIMENSIONS (mm) | | | | | | |
|--------------------------|--------------|--------------|-----------------|------|----|----|-----|-----------|-----|
| Z-25°C/Z20°C | Z-40°C/Z20°C | Z-55°C/Z20°C | φD | L | A1 | B1 | C | W1 | P |
| 2 | 3 | 3 | 12.5 | 13.5 | 13 | 13 | 4.9 | 0.8 ~ 1.1 | 4.5 |

3. Marking : Unless otherwise specified, capacitor shall be clearly marked the following items on its body.

- | | |
|-------------------------|--------------------------------------|
| (1) Rated Voltage | 1V (Symbol of 35V) |
| (2) Series | TL |
| (3) Nominal Capacitance | 470 |
| (4) Lot Number | |
| (5) Polarity | (Negative Polarity Marking is Black) |

4. Vent

Safety vent shall be provided.

TLV SERIES

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5. Load life Test

Capacitor under test shall be applied the rated voltage continuously through 1000 ohm series protective resistor (with maximum ripple current) at $105 \pm 2^\circ\text{C}$ for 5000^{+72}_0 hours. After the test and returned in standard condition for 2 hours or more, and the capacitor shall meet following requirements.

Capacitance Change : within $\pm 30\%$ of the initially measured value.
 Dissipation Factor : less than 200% of the specified value.
 Leakage Current : less than the specified value.
 Appearance : notable changes shall not be found.

6. Shelf life Test

Capacitor under test shall be stored at $105 \pm 2^\circ\text{C}$ without loading. After 1000^{+48}_0 hours, capacitor shall be subjected to voltage treatment specified in JIS C 5141 paragraph 5.2, then capacitor shall meet following requirement.

Capacitance Change : within $\pm 30\%$ of the initially measured value.
 Dissipation Factor : less than 200% of the specified value.
 Leakage Current : less than the specified value.
 Appearance : notable changes shall not be found.

7. Reflow soldering condition.

7-1 Capacitors shall be proof the following reflow soldering condition.

- (1) Temperature at surface of capacitor shall not exceed $T^\circ\text{C}$.
(Temperature measurement point is top of case.)
- (2) Period that temperature at surface of capacitor becomes more than 200°C and 230°C shall not exceed t and t_1 seconds, respectively.
- (3) Holding time in the peak temperature shall be as short as possible.
- (4) Preheat shall be made at 100°C to 180°C and for maximum 150 seconds.
- (5) Reflow soldering process shall be 1 cycle.

| Size | $T^\circ\text{C}$ | $T_1^\circ\text{C}$ | t (sec.) | t_1 (sec.) |
|-------------------------|-------------------|---------------------|------------|--------------|
| $\phi 12.5 \times 13.5$ | 240 | 230 | 60 | 30 |

7-2 Notes.

- (1) Reflow soldering condition (reflow time, temperature) depends on following points.
 - Kind of reflow oven. • Kind of PW-board.
 - Mounting condition (part size, PW-board size etc.) of parts on the PW-board.
 Please confirm your reflow profile.
- (2) The thermocouple (Type CA $\phi 0.1\text{mm}$ dia) shall be fixed to the surface of capacitor by adhesives.

8. Correction factor for ripple current

The maximum permissible ripple current is the maximum A.C. current at 120Hz and can be applied at maximum operating temperature. The combined value of D.C. voltage and the peak A.C. voltage shall not exceed the rated voltage and shall not be reverse voltage.

< Frequency Coefficient >

| Freq. (Hz) | 120 | 1k | 10k | 100k \leq |
|------------|------|------|------|-------------|
| Multiplier | 0.60 | 0.85 | 0.95 | 1.00 |

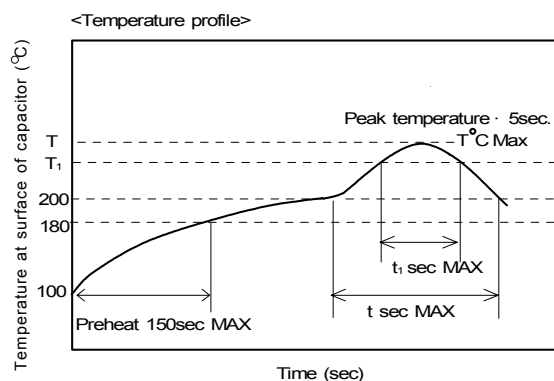
< Temperature Coefficient >

| Ambient Temperature($^\circ\text{C}$) | 105 | 85 | 65 \geq |
|---|-----|-----|-----------|
| Coefficient | 1.0 | 1.7 | 2.1 |

◇ Temperature coefficient shows a limit of ripple current exceeding the rated ripple current that can be passed through a capacitor at each temperature when the life expectancy of a capacitor becomes to be nearly equal with the lifetime at the rated maximum operating temperature.

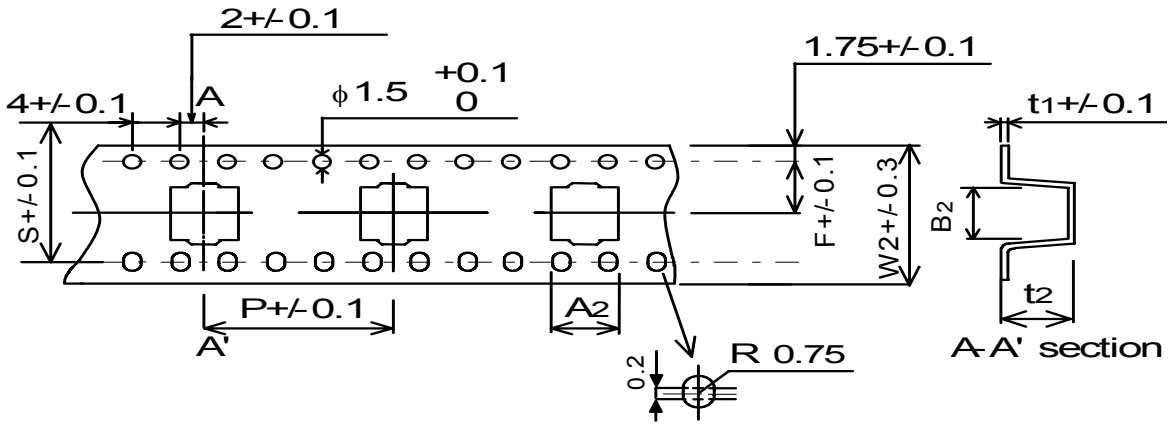
◇ Ripple voltage with wide amplitude

Use of aluminum electrolytic capacitor under ripple voltage with wide amplitude is equivalent to quick charge-discharge operation. When ripple voltage with the amplitude over 70Vp-p is expected for the products with rated voltage over 100V, please contact us.



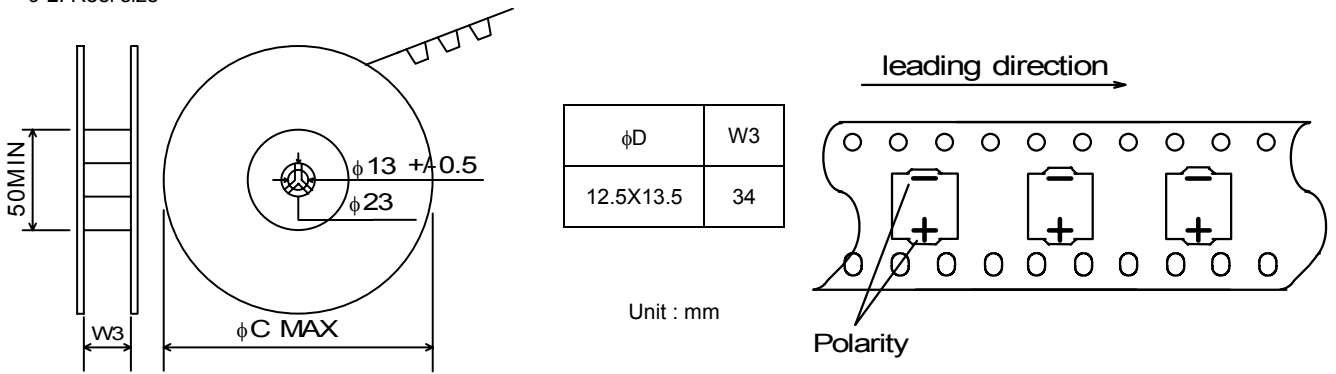
9.Packing

9-1. Carrier Tape



| (mm) | | | | | | | | |
|-----------|------|------|------|------|------|------|-----|------|
| φD | W2 | A2 | B2 | P | t2 | F | t1 | S |
| 12.5X13.5 | 32.0 | 14.0 | 14.0 | 24.0 | 14.0 | 14.2 | 0.5 | 28.4 |

9-2. Reel size

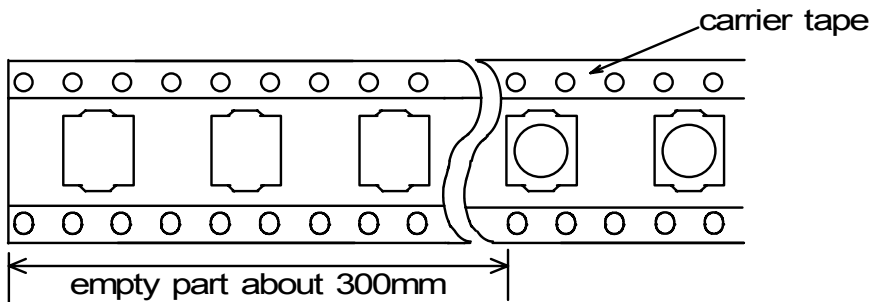


9-3. Quantity.

| φD | φC MAX | One reel |
|-----------|--------|----------|
| 12.5X13.5 | 332 | 200 pcs |

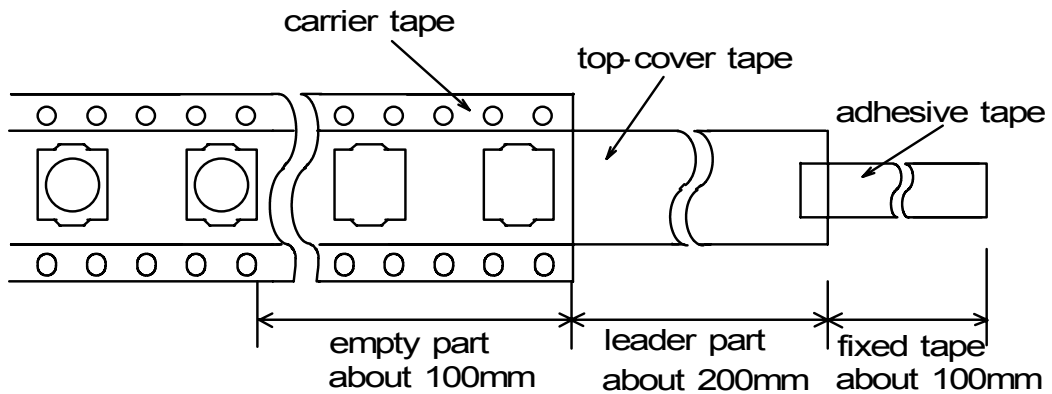
9-4. Packing form of the carrier tape.

(a) Carrier tape after the last component.

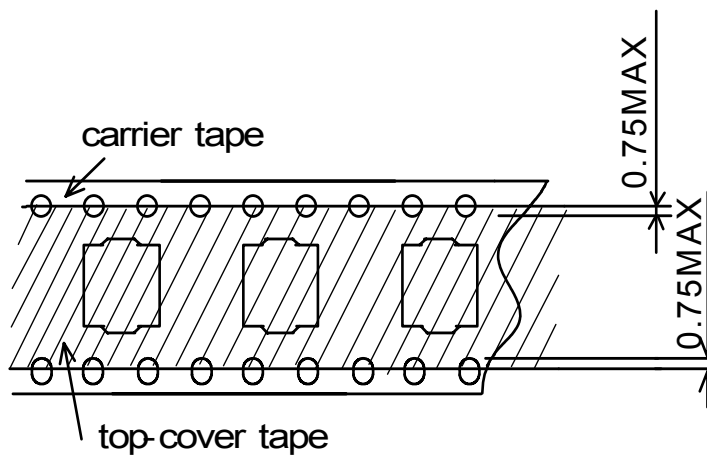


Carrier tape shall be inserted into reel without cover tape directly.

(b) Leader tape before the first component.

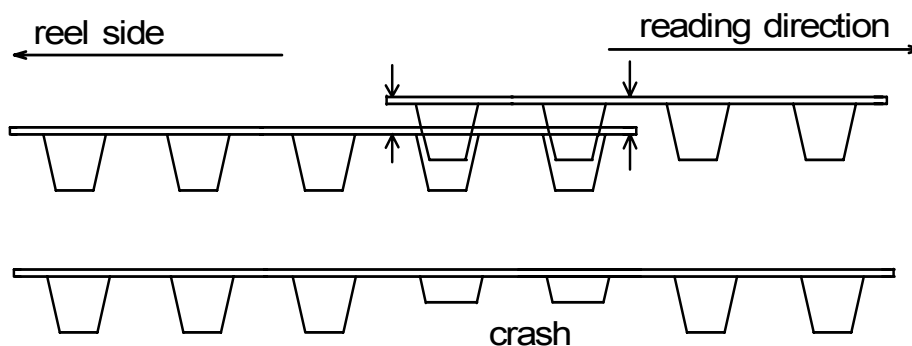


9-5. Deviation between carrier tape and top-cover tape.
 Top-cover tape whose cover the feeding hole shall not exceed 0.75mm.



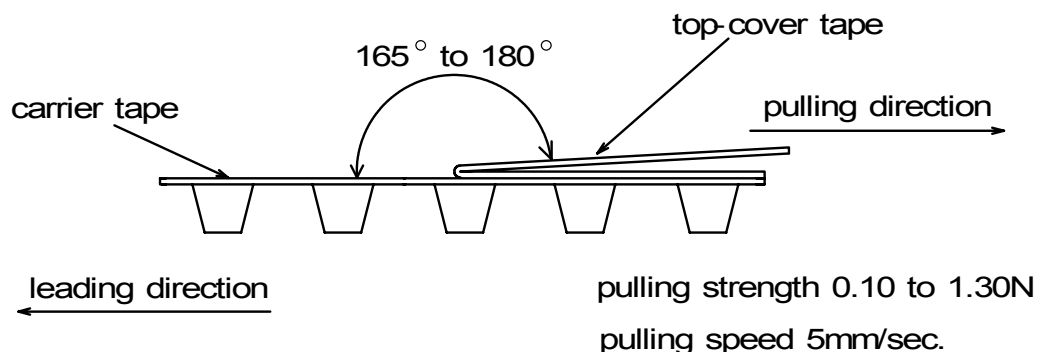
9-6. Connection of the carrier tape.

(a) Two pieces of embossed part of the each carrier tape shall be piled up without packing the capacitor in it and crashed by jigs.
 About connected part, carrier tape of the reel side shall be below one of leader side.



(b) Number of connection per reel shall be within three places.

9-7. Adhesion test.



9-8. Carrier tape shall be reeled whose embossed part is inside. (Top-cover tape shall be outside.)

10. Notes on use of aluminum electrolytic capacitors

(1) Charge and discharge

Do not use for the circuit that repeats quick charge or discharge

(2) External stress

Do not apply excessive force of pushing, pulling bending, and/or twisting to the main body, lead wire and terminals.

(3) Heat resistance at soldering process

In the soldering process of PC board with Capacitors mounted, secondary shrinkage or crack of sleeve may be observed when soldering temperature is too high and /or soldering time is too long.

If lead wire of other components or pattern of double sided PC board touches the capacitor, the similar failure may be also originated at pre-heating, heating at hardening process of adhesive and soldering process.

(4) Adhesives and coating materials

Do not use the adhesives and coating materials that contain halogenated organic solvents or chloroprene as polymer.

(5) Storage

Keep at a normal temperature and humidity. During a long storage time, leakage current will be increased. To prevent heat rise or any trouble that high leakage current possibly causes, voltage treatment is recommended for the capacitors that have been stored for a long time.

<Storage Condition>

*Aluminum electrolytic capacitors should not be stored in high temperatures or where there is a high level of humidity. The suitable storage condition is 5°C - 35°C and less than 75% in relative humidity.

*Aluminum electrolytic capacitors should not be stored in damp conditions such as water, saltwater spray or oil spray.

*Do not store aluminum electrolytic capacitors in an environment full of hazardous gas (hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas, ammonia or bromine gas).

*Aluminum electrolytic capacitors should not be stored under exposure to ozone, ultraviolet rays or radiation.

(6) Fumigation and halogenated flame retardant

It may cause corrosion of internal electrodes, aluminum cases and terminal surface when the following conditions exist.

*Fumigation of wooden pallets before shipment to disinfect vermin.

*Existence of components or parts that contain halogenated flame retardant agent (bromine etc.) together with capacitors.

*When halogenated detergents or antiseptics for preventing infection of epidemic diseases contact directly to capacitors.

(7) PC board cleaning after soldering

Please consult us when cleaning is subjected.

◆ Guide to application except the above are described in our catalog and EIAJ RCR-2367C.

EIAJ RCR-2367C: "Safety Application Guide for fixed aluminum electrolytic capacitors for use in electronic equipment."

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