

## Stacked Metallized PEN Film Chip Capacitor

Type: **ECWU(C)**

Stacked metallized PEN film as dielectric with simple mold-less construction

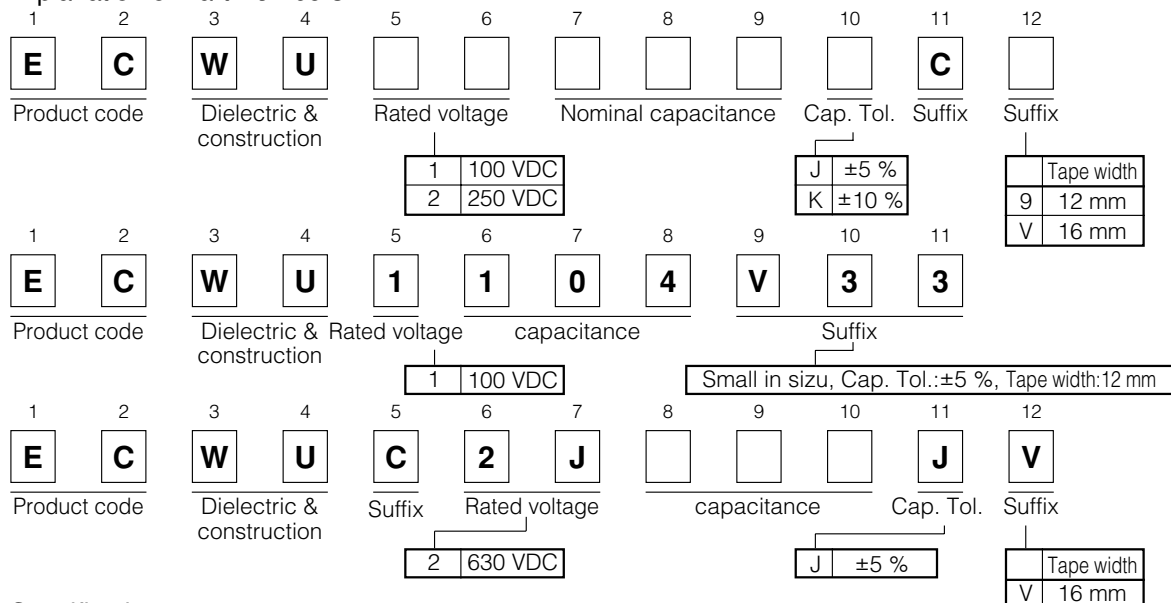
### ■Features

- Small in size
- For reflow soldering
- RoHS directive compliant

### ■Recommended Applications

- General purpose (Coupling, By-pass)

### ■Explanation of Part Numbers



### ■Specifications

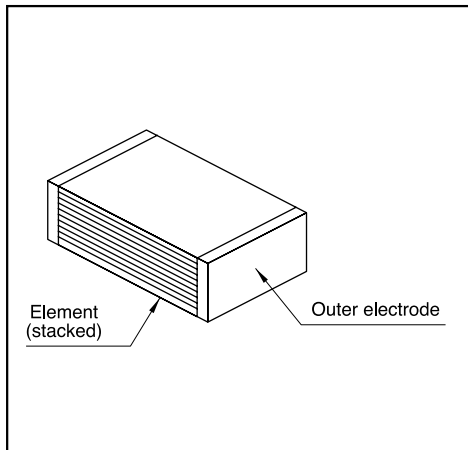
|                                                                     |                                                                                       |                                                                                                                                                 |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Category temp.range<br>(Including temperature-rise on unit surface) | -55 °C to +125 °C                                                                     |                                                                                                                                                 |
| Rated voltage                                                       | 100 VDC, 250 VDC, 630 VDC<br>(Derating of rated voltage by 1.25 %/°C more than 85 °C) |                                                                                                                                                 |
| Capacitance range                                                   | 100 VDC                                                                               | 0.012 μF to 1.0 μF (E12)                                                                                                                        |
|                                                                     | 250 VDC                                                                               | 0.0010 μF to 0.12 μF (E12)                                                                                                                      |
|                                                                     | 630 VDC                                                                               | 0.022 μF, 0.027 μF, 0.033 μF                                                                                                                    |
| Capacitance tolerance                                               | 100 VDC                                                                               | ±5 % (J), ±10 % (K) (C ≥ 0.18 μF : ±10 % (K) only)                                                                                              |
|                                                                     | 250 VDC                                                                               | ±5 % (J), ±10 % (K)                                                                                                                             |
|                                                                     | 630 VDC                                                                               | ±5 % (J)                                                                                                                                        |
| Withstand voltage                                                   | Between terminals: Rated volt. (VDC) × 150 % 60 s                                     |                                                                                                                                                 |
| Dissipation factor (tan δ)                                          | tan δ ≤ 1.0 % (20 °C, 1 kHz)                                                          |                                                                                                                                                 |
| Insulation resistance (IR)                                          | C ≤ 0.33 μF                                                                           | 100 VDC, 250 VDC, 630 VDC : IR ≥ 3000 MΩ · (20 °C, 100 VDC, 60 s)                                                                               |
|                                                                     | C > 0.33 μF                                                                           | 100 VDC : IR ≥ 1000 MΩ · μF (20 °C, 100 VDC, 60 s)                                                                                              |
| Soldering conditions                                                | 100 VDC<br>250 VDC                                                                    | Reflow soldering : 240 °C max. and 60 s max. at more than 220 °C (Temp. at cap. surface)<br>(Please consult us for Reflow 250 °C max. product.) |
|                                                                     | 630 VDC                                                                               | Reflow soldering : 250 °C max. and 60 s to 150s. at more than 217 °C<br>(Temp. at cap. surface)                                                 |

\* In case of applying voltage in alternating current (50 Hz or 60 Hz sine wave) to a capacitor with DC rated voltage, please refer to the page of "Permissible voltage (R.M.S) in alternating current corresponding to DC rated voltage".

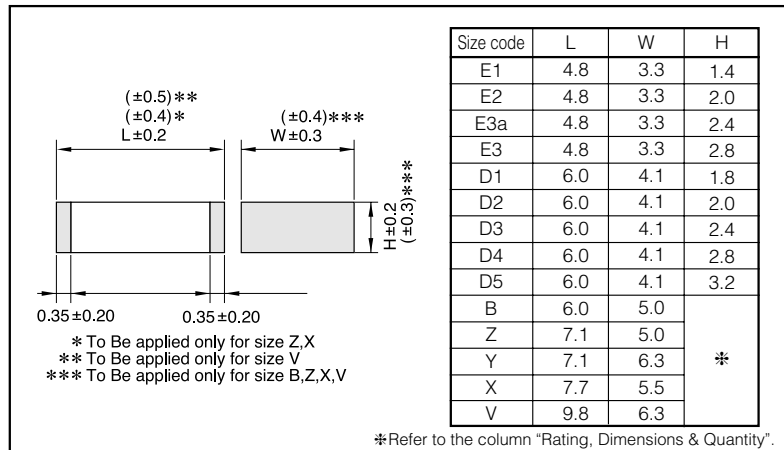
\* Please consult us for capacitance range between 0.15 μF and 1.0 μF. ( 250 VDC)

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.  
Whenever a doubt about safety arises from this product, please inform us immediately for technical consultation without fail.

## ■ Construction



## ■ Dimensions in mm (not to scale)



## ■ Taping Specification for Automatic Mounting

Refer to the page of taping specifications.

## ■ Rating, Dimensions &amp; Quantity/Reel

● Capacitance tolerance :  $\pm 5\%$  (J),  $\pm 10\%$  (K)

| Cap.<br>( $\mu$ F) | Rated volt. 100 VDC               |                 |     |     |           |      | Rated volt. 250 VDC |                 |     |     |           |      |   |
|--------------------|-----------------------------------|-----------------|-----|-----|-----------|------|---------------------|-----------------|-----|-----|-----------|------|---|
|                    | Part No                           | Dimensions (mm) |     |     | Size code | Q'ty | Part No             | Dimensions (mm) |     |     | Size code | Q'ty |   |
|                    |                                   | L               | W   | H   |           |      |                     | L               | W   | H   |           |      |   |
| 0.0010             | Please use 100 VDC rating ECWU(X) |                 |     |     |           |      | ECWU2102□C9         | 4.8             | 3.3 | 1.4 | E1        | 3000 |   |
| 0.0012             |                                   |                 |     |     |           |      | ECWU2122□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0015             |                                   |                 |     |     |           |      | ECWU2155□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0018             |                                   |                 |     |     |           |      | ECWU2182□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0022             |                                   |                 |     |     |           |      | ECWU2222□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0027             |                                   |                 |     |     |           |      | ECWU2272□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0033             |                                   |                 |     |     |           |      | ECWU2332□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0039             |                                   |                 |     |     |           |      | ECWU2392□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0047             |                                   |                 |     |     |           |      | ECWU2472□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0056             |                                   |                 |     |     |           |      | ECWU2562□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0068             |                                   |                 |     |     |           |      | ECWU2682□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.0082             |                                   |                 |     |     |           |      | ECWU2822□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.010              |                                   |                 |     |     |           |      | ECWU2103□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.012              | ECWU1123□C9                       | 4.8             | 3.3 | 1.4 | E1        | 3000 | ECWU2123□C9         | 4.8             | 3.3 | 1.4 | E1        | 2000 |   |
| 0.015              | ECWU1153□C9                       | 4.8             | 3.3 | 1.4 | E1        |      | ECWU2153□C9         | 4.8             | 3.3 | 1.4 | E1        |      |   |
| 0.018              | ECWU1183□C9                       | 4.8             | 3.3 | 1.4 | E1        |      | ECWU2183□C9         | 4.8             | 3.3 | 2.0 | E2        |      |   |
| 0.022              | ECWU1223□C9                       | 4.8             | 3.3 | 1.4 | E1        |      | ECWU2223□C9         | 4.8             | 3.3 | 2.0 | E2        |      |   |
| 0.027              | ECWU1273□C9                       | 4.8             | 3.3 | 1.4 | E1        |      | ECWU2273□C9         | 4.8             | 3.3 | 2.4 | E3a       |      |   |
| 0.033              | ECWU1333□C9                       | 4.8             | 3.3 | 1.4 | E1        |      | ECWU2333□C9         | 4.8             | 3.3 | 2.8 | E3        |      |   |
| 0.039              | ECWU1393□C9                       | 4.8             | 3.3 | 1.4 | E1        |      | ECWU2393□C9         | 6.0             | 4.1 | 2.0 | D2        | 3000 |   |
| 0.047              | ECWU1473□C9                       | 4.8             | 3.3 | 2.0 | E2        |      | ECWU2473□C9         | 6.0             | 4.1 | 2.4 | D3        |      |   |
| 0.056              | ECWU1563□C9                       | 4.8             | 3.3 | 2.0 | E2        |      | ECWU2563□C9         | 6.0             | 4.1 | 2.8 | D4        | 2000 |   |
| 0.068              | ECWU1683□C9                       | 4.8             | 3.3 | 2.4 | E3a       |      | ECWU2683□C9         | 6.0             | 4.1 | 3.2 | D5        |      |   |
| 0.082              | ECWU1823□C9                       | 4.8             | 3.3 | 2.8 | E3        | 2000 | ECWU2823□C9         | 6.0             | 5.0 | 3.2 | B         | 1500 |   |
| 0.10               | ECWU1104□C9                       | 6.0             | 4.1 | 1.8 | D1        |      | 3000                | ECWU2104□C9     | 6.0 | 5.0 | 3.8       |      | B |
|                    | ECWU1104V33                       | 4.8             | 3.3 | 2.8 | E3        | 2000 | ECWU2124□C9         | 6.0             | 5.0 | 4.5 | B         |      |   |
| 0.12               | ECWU1124□C9                       | 6.0             | 4.1 | 2.4 | D3        |      | ↑————Cap. tol. code |                 |     |     |           |      |   |
| 0.15               | ECWU1154□C9                       | 6.0             | 4.1 | 2.8 | D4        | 1500 |                     |                 |     |     |           |      |   |
| 0.18               | ECWU1184KC9                       | 7.1             | 5.0 | 2.0 | Z         |      |                     |                 |     |     |           |      |   |
| 0.22               | ECWU1224KC9                       | 7.1             | 5.0 | 2.4 | Z         |      |                     |                 |     |     |           |      |   |
| 0.27               | ECWU1274KC9                       | 7.1             | 5.0 | 2.9 | Z         |      |                     |                 |     |     |           |      |   |
| 0.33               | ECWU1334KC9                       | 7.1             | 5.0 | 3.5 | Z         | 1000 |                     |                 |     |     |           |      |   |
| 0.39               | ECWU1394KCV                       | 7.7             | 5.5 | 3.4 | X         |      |                     |                 |     |     |           |      |   |
| 0.47               | ECWU1474KCV                       | 7.7             | 5.5 | 4.0 | X         |      |                     |                 |     |     |           |      |   |
| 0.56               | ECWU1564KCV                       | 9.8             | 6.3 | 3.0 | V         |      |                     |                 |     |     |           |      |   |
| 0.68               | ECWU1684KCV                       | 9.8             | 6.3 | 3.6 | V         |      |                     |                 |     |     |           |      |   |
| 0.82               | ECWU1824KCV                       | 9.8             | 6.3 | 4.3 | V         |      |                     |                 |     |     |           |      |   |
| 1.0                | ECWU1105KCV                       | 9.8             | 6.3 | 5.1 | V         |      |                     |                 |     |     |           |      |   |

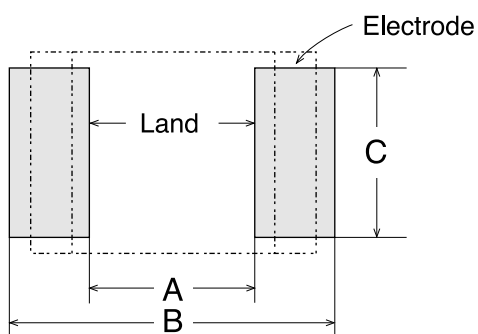
Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.  
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### ■ Rating, Dimensions & Quantity/Reel

● Capacitance tolerance :  $\pm 5\%$  (J)

| Cap. (μF) | Rated volt. 630 VDC |                 |     |     |           | Q'ty |
|-----------|---------------------|-----------------|-----|-----|-----------|------|
|           | Part No.            | Dimensions (mm) |     |     | Size Code |      |
|           |                     | L               | W   | H   |           |      |
| 0.022     | ECWUC2J223JV        | 7.1             | 6.3 | 3.6 | Y         | 1000 |
| 0.027     | ECWUC2J273JV        | 7.1             | 6.3 | 4.1 | Y         |      |
| 0.033     | ECWUC2J333JV        | 7.1             | 6.3 | 5.1 | Y         |      |

### ■ Recommended for Land Dimensions (mm)

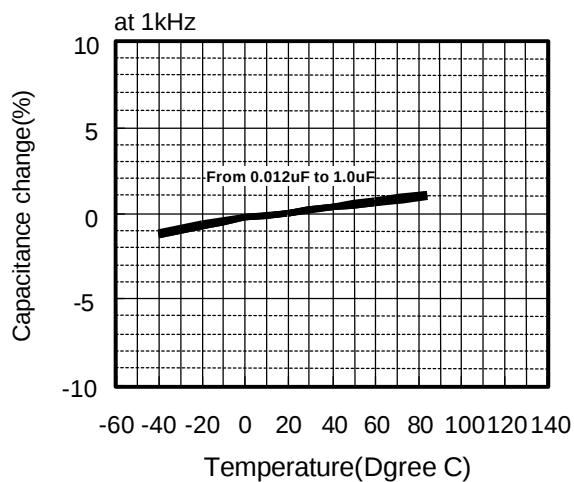


| Size code      | Land dimensions for reflow soldering |      |     |
|----------------|--------------------------------------|------|-----|
|                | A                                    | B    | C   |
| E1,E2,E3a,E3   | 2.6                                  | 6.6  | 3.0 |
| D1,D2,D3,D4,D5 | 3.8                                  | 7.8  | 3.8 |
| B              | 3.8                                  | 7.8  | 4.6 |
| Z              | 4.5                                  | 9.0  | 4.6 |
| Y              | 4.5                                  | 9.0  | 5.7 |
| X              | 5.1                                  | 9.7  | 5.0 |
| V              | 7.2                                  | 11.9 | 5.7 |

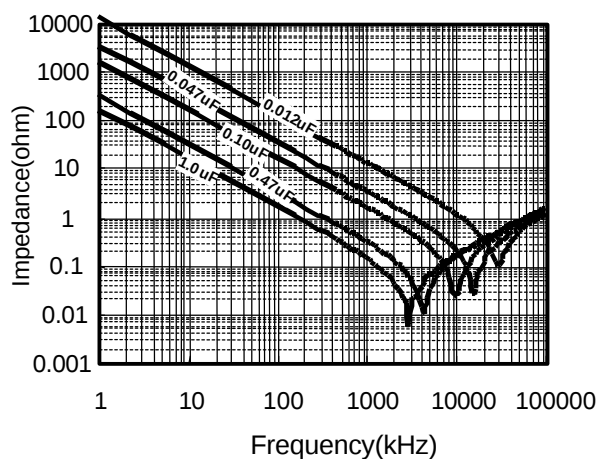
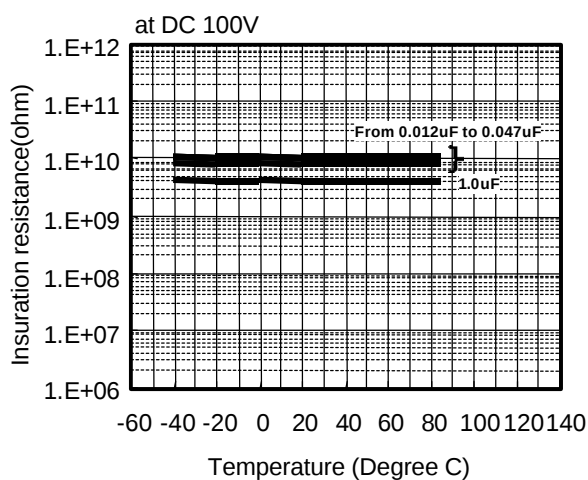
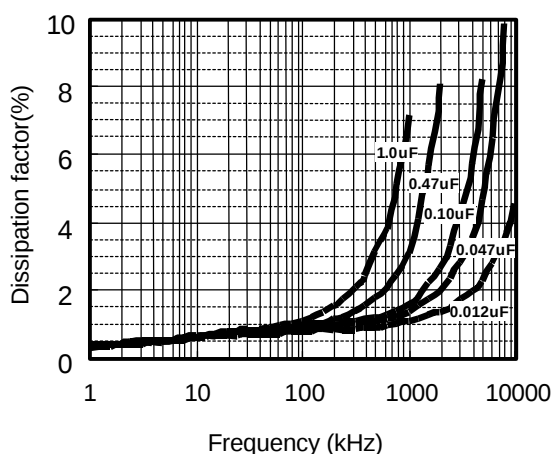
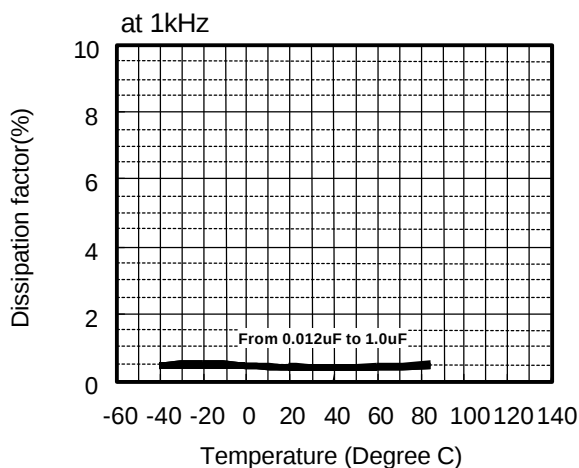
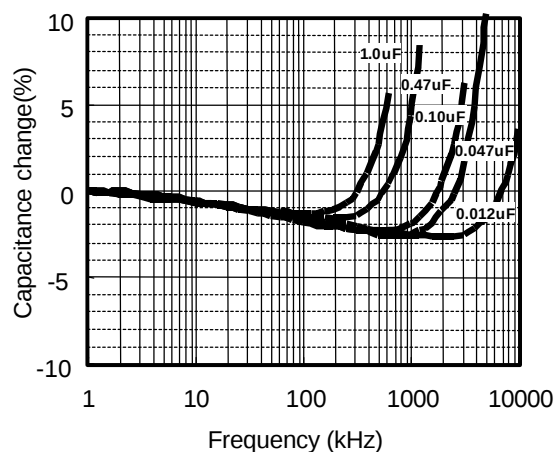
## ECWU (C) Type DC100V series (Stacked Metallized Film)

### Electrical Characteristics < Typical Data >

**Temperature Characteristics**



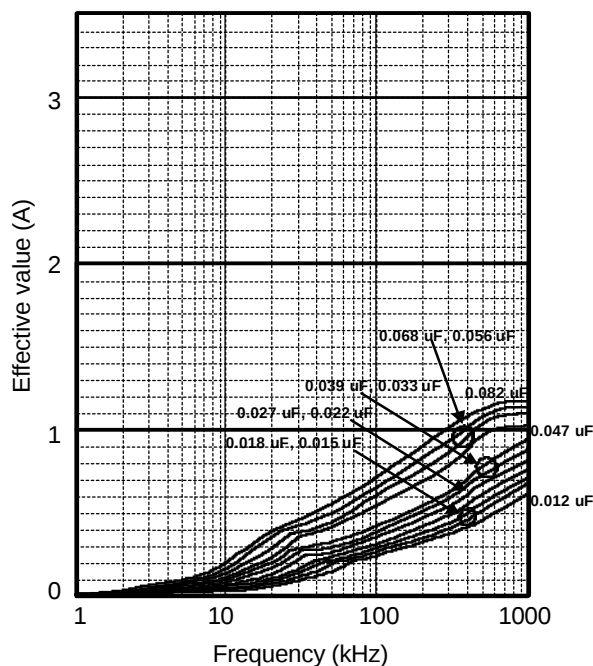
**Frequency Characteristics**



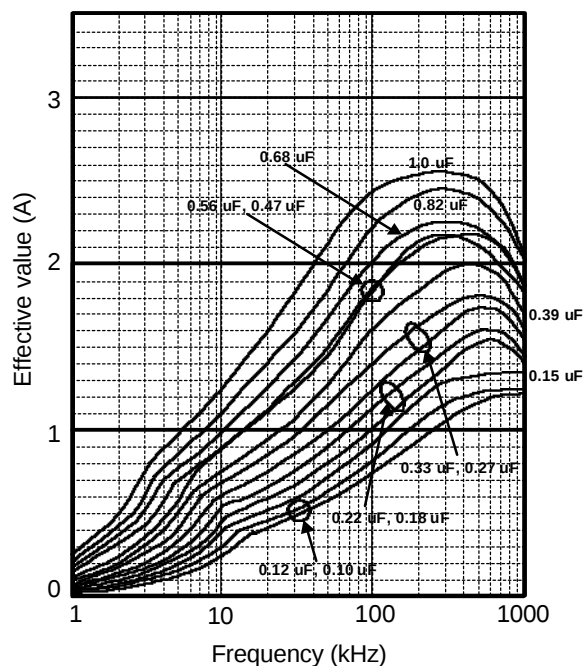
## ECWU (C) Type DC100V series (Stacked Metallized Film)

### Applicable Specifications

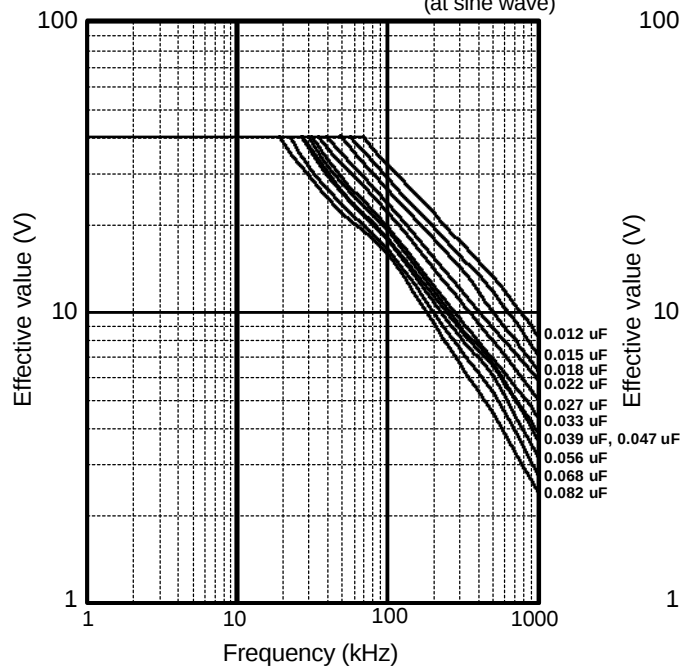
Permissible current



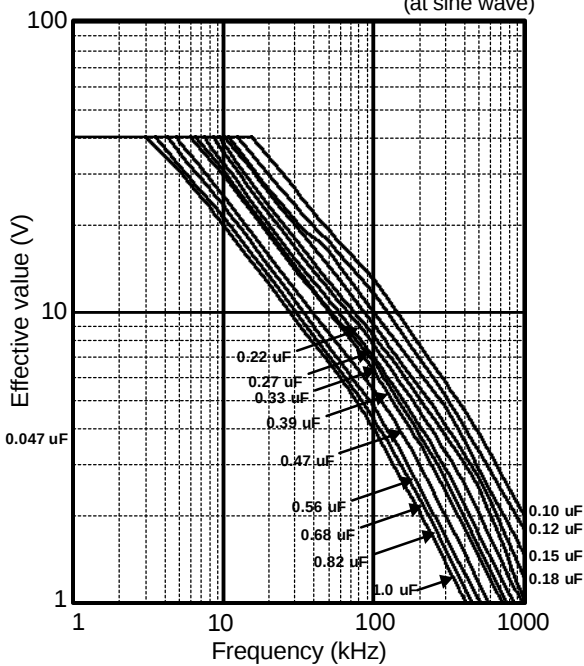
Permissible current



Permissible voltage  
(at sine wave)



Permissible voltage  
(at sine wave)



\* Please consult Panasonic if your condition exceeds the above spec.

\*Permissible voltage graph is the case of sine waveform. When you use this product, peak voltage must not exceed DC rated voltage.

\*The current value (Aop) is calculated using "nominal capacitance." In fact, it changes by the tolerance of a capacitance value, capacitance change, etc.

## ECWU (C) Type DC100V series (Stacked Metallized Film)

### Applicable Specifications

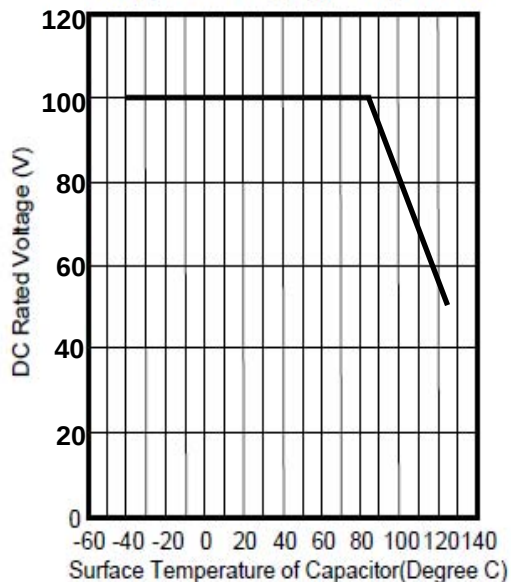
**Pulse Handling Capability (dv/dt)**  
(Max 10000cycles)

| Rating Voltage | Capacitance Value(uF) | Code | dv/dt(V/us) | Current(I <sub>CP</sub> ) (A) |
|----------------|-----------------------|------|-------------|-------------------------------|
| DC 100V        | 0.012                 | 123  | 320         | 3.8                           |
|                | 0.015                 | 123  |             | 4.8                           |
|                | 0.018                 | 183  |             | 5.8                           |
|                | 0.022                 | 223  |             | 7.0                           |
|                | 0.027                 | 273  |             | 8.6                           |
|                | 0.033                 | 333  |             | 10.6                          |
|                | 0.039                 | 393  |             | 12.5                          |
|                | 0.047                 | 473  |             | 15.0                          |
|                | 0.056                 | 563  |             | 17.9                          |
|                | 0.68                  | 683  |             | 21.8                          |
|                | 0.82                  | 823  |             | 26.2                          |

**Pulse Handling Capability (dv/dt)**  
(Max 10000cycles)

| Rating Voltage | Capacitance Value(uF) | Code | dv/dt(V/us) | Current(I <sub>CP</sub> ) (A) |
|----------------|-----------------------|------|-------------|-------------------------------|
| DC 100V        | 0.10                  | 104  | 210         | 21.0                          |
|                | 0.12                  | 124  |             | 25.2                          |
|                | 0.15                  | 154  |             | 31.5                          |
|                | 0.18                  | 184  | 120         | 21.6                          |
|                | 0.22                  | 224  |             | 26.4                          |
|                | 0.27                  | 274  |             | 32.4                          |
|                | 0.33                  | 334  |             | 39.6                          |
|                | 0.39                  | 394  | 100         | 39.0                          |
|                | 0.47                  | 474  |             | 47.0                          |
|                | 0.56                  | 564  |             | 39.2                          |
|                | 0.68                  | 684  | 70          | 47.6                          |
|                | 0.82                  | 824  |             | 57.4                          |
|                | 1.0                   | 105  |             | 70.0                          |

**Voltage Derating by Temperature**



\* Please consult Panasonic if your condition exceeds the above spec.

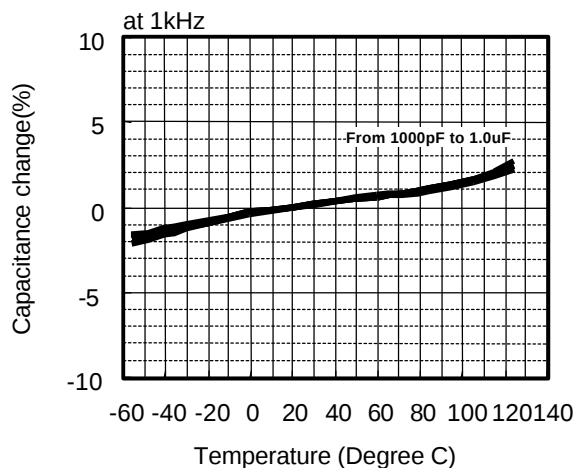
\*Permissible voltage graph is the case of sine waveform. When you use this product, peak voltage must not exceed DC rated voltage.

\*The current(I<sub>CP</sub>) value is calculated using nominal capacitance.

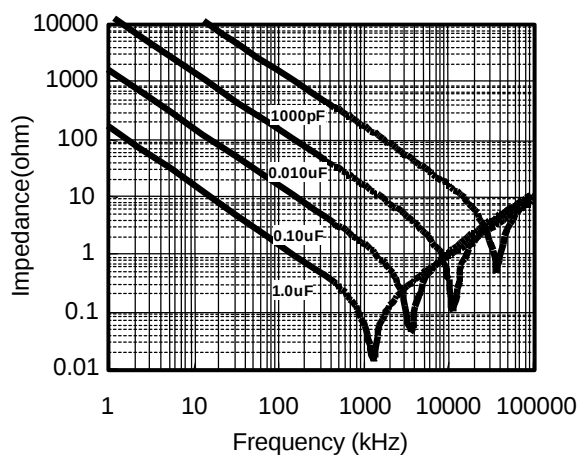
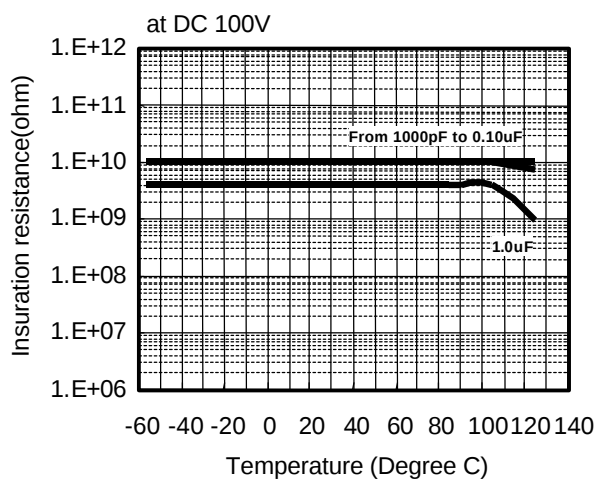
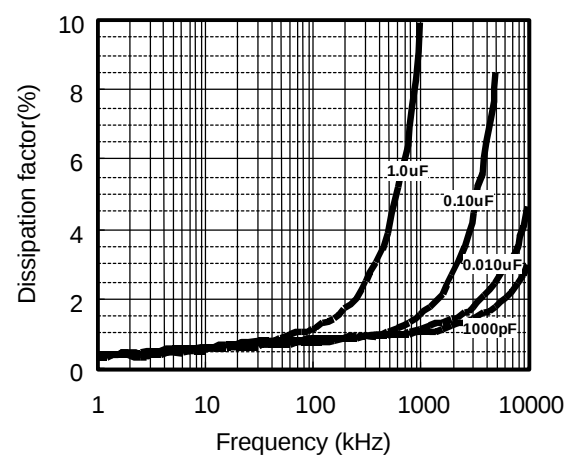
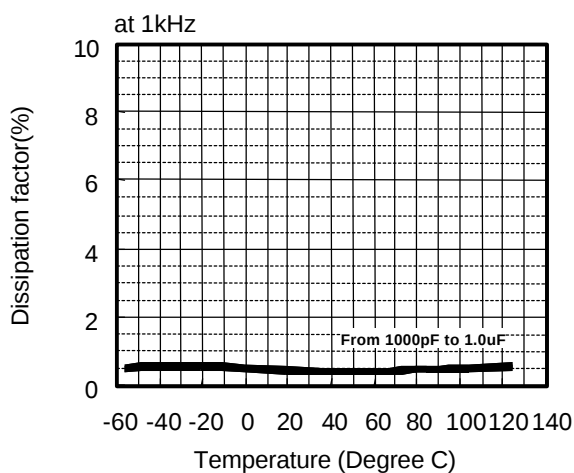
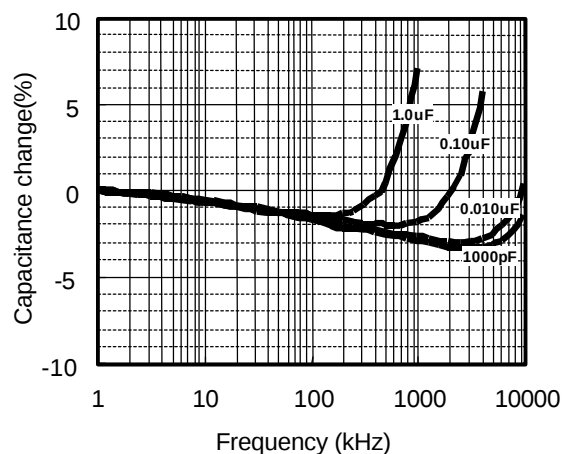
## ECWU (C) Type DC250V series (Stacked Metallized Film)

### Electrical Characteristics < Typical Data >

Temperature Characteristics

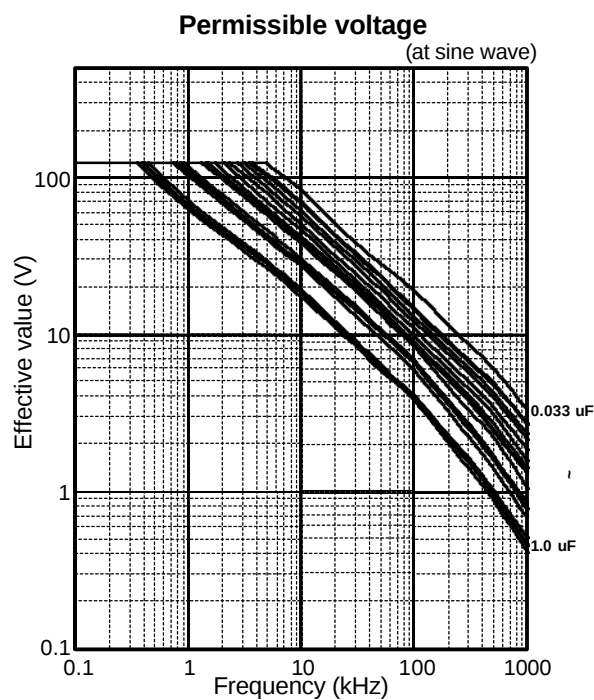
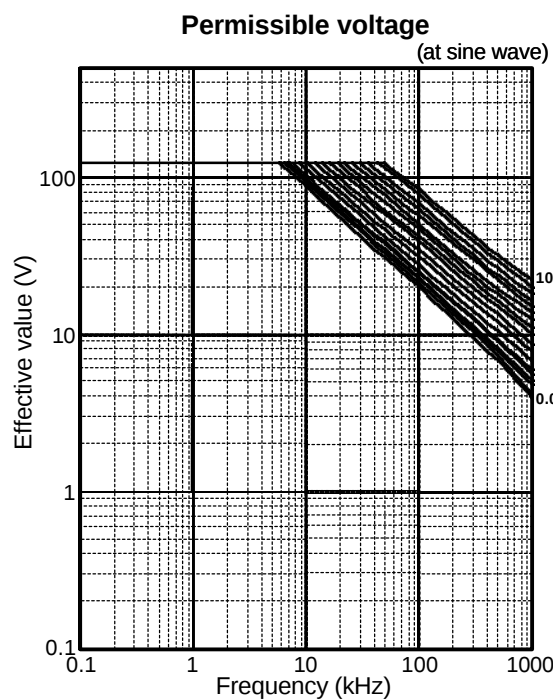
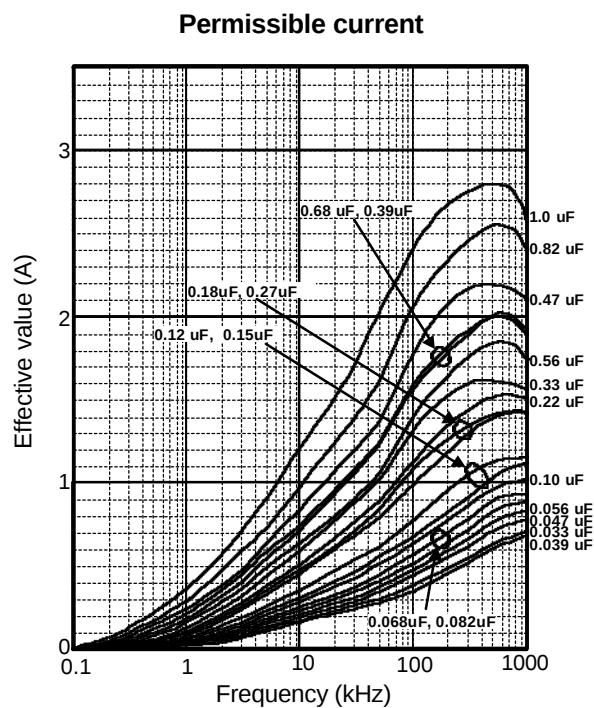
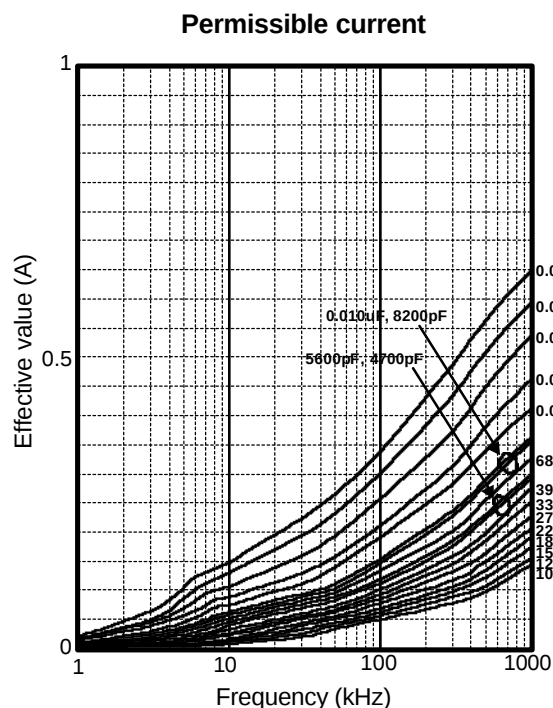


Frequency Characteristics



## ECWU (C) Type DC250V series (Stacked Metallized Film)

### Applicable Specifications



\* Please consult Panasonic if your condition exceeds the above spec.

\*Permissible voltage graph is the case of sine waveform. When you use this product, peak voltage must not exceed DC rated voltage.

\*The current<sub>(0-P)</sub> value is calculated using nominal capacitance.



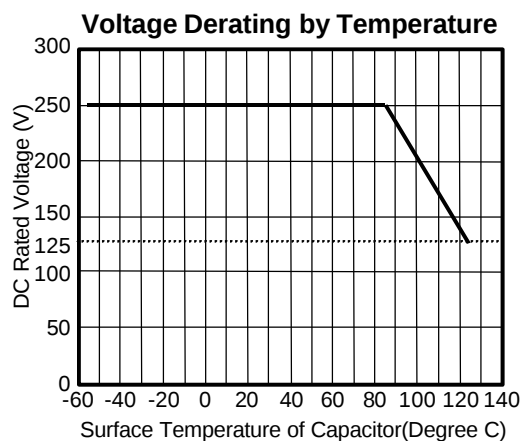
## ECWU (C) Type DC250V series (Stacked Metallized Film)

### Applicable Specifications

#### Pulse Handling Capability (dv/dt) (Max 10000cycles)

| Rating Voltage | Capacitance Value(uF) | Code | dv/dt(V/us) | Current(I <sub>0-P</sub> ) (A) |
|----------------|-----------------------|------|-------------|--------------------------------|
| DC 250V        | 0.0010                | 102  | 615         | 0.62                           |
|                | 0.0012                | 122  |             | 0.74                           |
|                | 0.0015                | 152  |             | 0.92                           |
|                | 0.0018                | 182  |             | 1.11                           |
|                | 0.0022                | 222  |             | 1.35                           |
|                | 0.0027                | 272  |             | 1.66                           |
|                | 0.0033                | 332  |             | 2.03                           |
|                | 0.0039                | 392  |             | 2.40                           |
|                | 0.0047                | 472  | 360         | 1.69                           |
|                | 0.0056                | 562  |             | 2.02                           |
|                | 0.0068                | 682  |             | 2.45                           |
|                | 0.0082                | 822  |             | 2.95                           |
|                | 0.010                 | 103  |             | 3.60                           |
|                | 0.012                 | 123  |             | 4.32                           |
|                | 0.015                 | 153  |             | 5.40                           |
|                | 0.018                 | 183  |             | 6.48                           |
|                | 0.022                 | 223  |             | 7.92                           |
|                | 0.027                 | 273  |             | 9.72                           |
|                | 0.033                 | 333  |             | 11.88                          |

| Rating Voltage | Capacitance Value(uF) | Code | dv/dt(V/us) | Current(I <sub>0-P</sub> ) (A) |
|----------------|-----------------------|------|-------------|--------------------------------|
| DC 250V        | 0.039                 | 393  | 240         | 9.36                           |
|                | 0.047                 | 473  |             | 11.28                          |
|                | 0.056                 | 563  |             | 13.44                          |
|                | 0.068                 | 683  |             | 16.32                          |
|                | 0.082                 | 823  |             | 19.68                          |
|                | 0.10                  | 104  |             | 24.00                          |
|                | 0.12                  | 124  |             | 28.80                          |
|                | 0.15                  | 154  | 190         | 28.50                          |
|                | 0.18                  | 184  |             | 34.20                          |
|                | 0.22                  | 224  |             | 41.80                          |
|                | 0.27                  | 274  | 115         | 31.05                          |
|                | 0.33                  | 334  |             | 37.95                          |
|                | 0.39                  | 394  |             | 44.85                          |
|                | 0.47                  | 474  |             | 54.05                          |
|                | 0.56                  | 564  | 65          | 36.40                          |
|                | 0.68                  | 684  |             | 44.20                          |
|                | 0.82                  | 824  |             | 53.30                          |
|                | 1.0                   | 105  |             | 65.00                          |



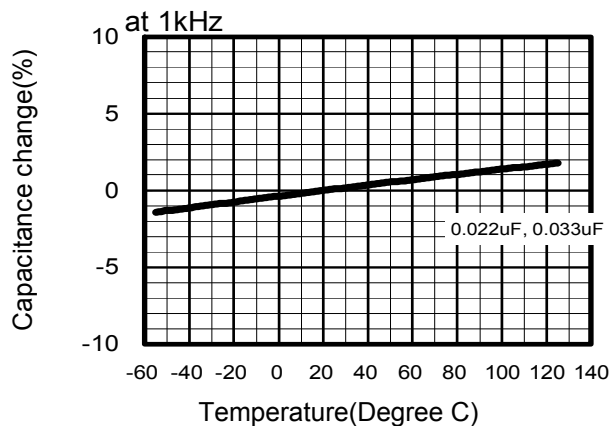
\* Please consult Panasonic if your condition exceeds the above spec.

\*Permissible voltage graph is the case of sine waveform. When you use this product, peak voltage must not exceed DC rated voltage.

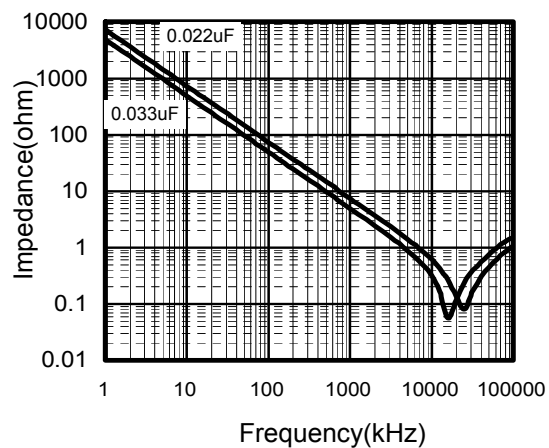
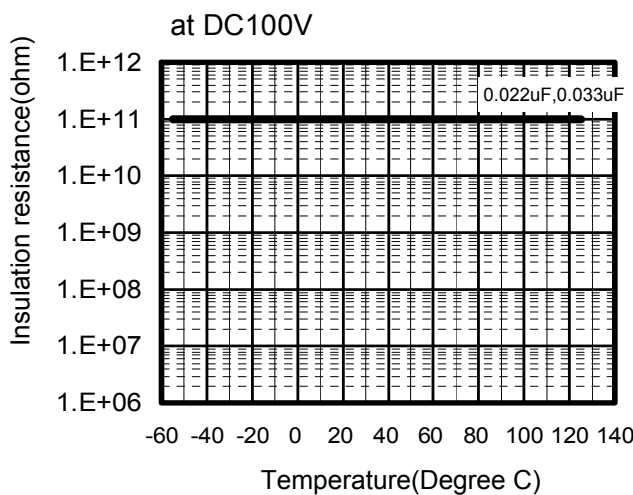
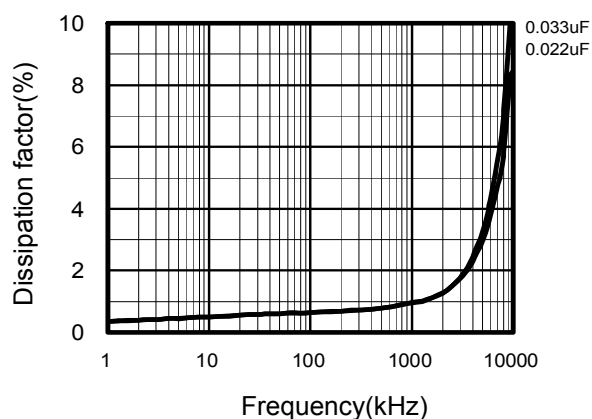
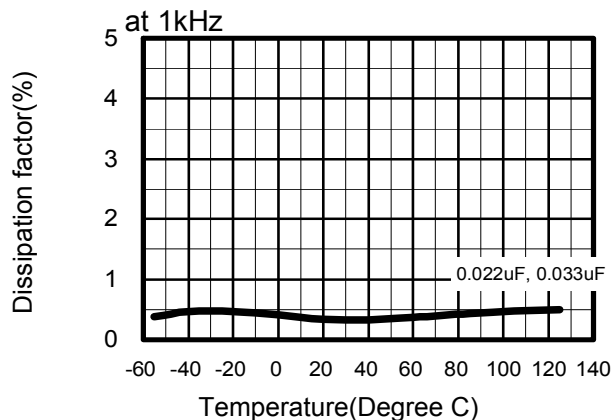
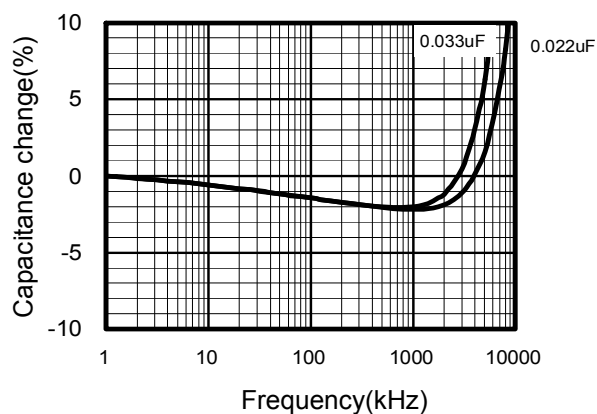
\*The current(I<sub>0-P</sub>) value is calculated using nominal capacitance.

**Electrical Characteristics <Typical Data >**

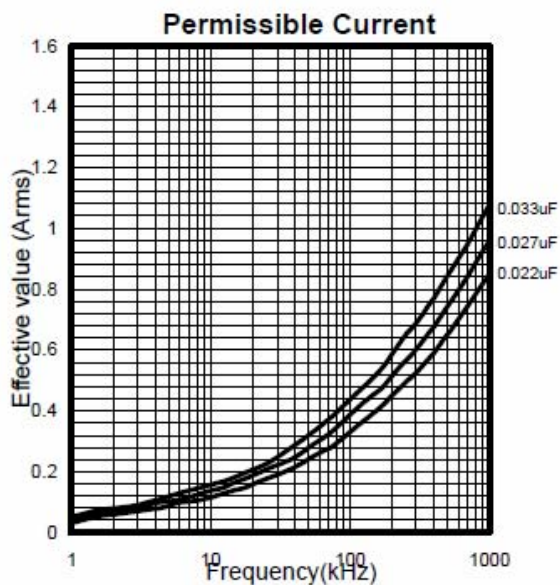
**Temperature Characteristics**



**Frequency Characteristics**



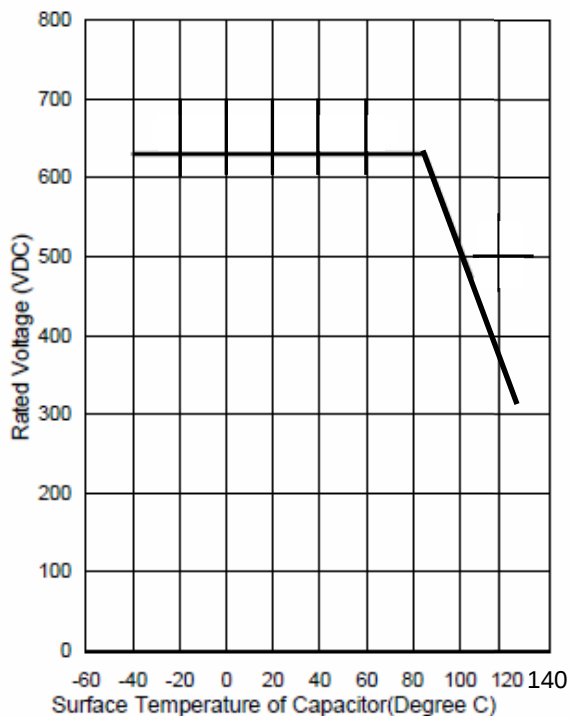
## Applicable Specifications



## Pulse Handling Capability (dv/dt) (Max 10000cycles)

| Rating Voltage | Capacitance Value (μF) | Code | dV/dt (V/μs) | Current(A <sub>0-P</sub> ) |
|----------------|------------------------|------|--------------|----------------------------|
| DC 630V        | 0.022                  | 223  | 250          | 5.5                        |
|                | 0.027                  | 273  | 250          | 6.7                        |
|                | 0.033                  | 333  | 250          | 8.2                        |

## Voltage Derating by Temperature



\*Please consult Panasonic if your condition exceeds the above

\*Permissible voltage graph is the case of sine waveform. When you use this product, peak voltage must not exceed DC rated voltage.

\*The current(I<sub>0-P</sub>) value is calculated using nominal capacitance.

### 2.4.2 Cautions for use of soldering iron

- Be careful that the soldering irons do not directly touch the main body of the chip film capacitor. In particular, don't touch the side (cut section). If touched by the heated soldering iron, lowering of insulation resistance, shortcircuit or other characteristic deterioration may occur.
- Preheat the printed wiring board land sufficiently with the soldering iron, and then solder. Solder without directly touching the iron tip to the electrode of the capacitor.
- Don't reuse the products once removed by the soldering irons.
- Should not mount the chip film capacitors in the mass production by soldering iron. (The temperature control is difficult, and the characteristics may be deteriorated.)
- Should not resolder with heat directly from bottom side of P. W. Board. because capacitor will likely be damaged.

### 3. Washing the mounted boards

#### <Usable detergent and washing method>

(Usable detergent)

| Classification          | Detergent name          | Maker                                |
|-------------------------|-------------------------|--------------------------------------|
| Alcohol derivative      | IPA (isopropyl alcohol) | (Reagent for general industrial use) |
| Halogenated hydrocarbon | AK-225AES               | Asahi Glass Co.                      |

(Washing method)

| Item \ Condition   | Temperature | Time             |
|--------------------|-------------|------------------|
| Immersion washing  | 50 °C       | Within 5 minutes |
| Steam washing      | 50 °C       | Within 5 minutes |
| Ultrasonic washing | 50 °C       | Within 5 minutes |

#### <CFC substitute detergent>

As a result of regulation of CFC and chlorine derivative detergents, many substitute detergents come to be used, but the performance of the chip type capacitor may be reduced depending on the type of detergent or washing condition. Check sufficiently beforehand. Consult us in advance if planning to use CFC substitute detergent.

#### <Drying after washing>

Dry after washing so that the detergent is not left over. If drying is insufficient, the detergent is left over on the element surface, and the insulation resistance is measured to be lowered. Dry enough so as not to leave detergent.

### 3.1. Washing of chip type

- Since the chip type capacitor does not have a coating, components of flux or detergent left over on the element at the time of washing may be activated and invade into the inside of the capacitor, and adverse effects may be caused. Observe the following cautions.
- In the case of washing, use flux and cream solder with halogen content of 0.1wt.% or less when mounting.
- In the case of ultrasonic washing, note that peeling of protective film, electrode separation due to resonance, or characteristic deterioration may occur depending on the detergent used or ultrasonic output. Check carefully beforehand.
- When using a CFC substitute detergent, with the washing method of spraying detergent (rinsing water) to the substrate at high pressure, the protective film on the element surface may be peeled off due to the water pressure. Check carefully beforehand.

### 3.2. Washing of leaded type

The film capacitor varies significantly in the effect of washing depending on the structure and material, and generally it is less affected by CFC or alcohol derivative washing solvent, and is likely to be affected by highly polar solvent.

The lead type film capacitor is coated with an epoxy resin excellent in chemical resistance, and is hardly affected by detergent, but it is recommended to be washed for short duration.

Applicability of detergents in film capacitors is listed for reference.

### < List of applicability of detergents >

| Washing condition   |                       |                                                                                                                                                                                        | Chip type | Lead type | Box type |
|---------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|----------|
|                     |                       |                                                                                                                                                                                        |           |           | ECQUL    |
| Solvent             | Alcohol               | Ethanol<br>Ultrasonic washing or immersion washing for 5 min                                                                                                                           | ○         | ○         | ○        |
|                     |                       | Isopropyl alcohol (IPA)<br>Ultrasonic washing or immersion washing for 5 min                                                                                                           | ○         | ○         | ○        |
|                     | Silicon               | FRW-17    Ultrasonic washing for 5 min, 60<br>FRW-1N    Ultrasonic washing for 5 min, 60<br>FRW-100   Steam drying for 1 min, 100                                                      | ○         | ○         | ○        |
|                     | Halogen               | Asahi Clean AK-225AES<br>Ultrasonic washing or immersion washing for 5 min                                                                                                             | ○         | ○         | ○        |
|                     |                       | HCFC141b-MS<br>Ultrasonic washing or immersion washing for 5 min                                                                                                                       | ○         | ○         | ○        |
|                     | Petroleum hydrocarbon | P3 Cold Cleaner 225S<br>Ultrasonic washing for 5 min 60                    IPA ultrasonic rinsing for 5 min<br>at ordinary temperature                    hot air drying for 5 min, 40 | ○         | ○         | ○        |
|                     |                       | Toluene<br>Ultrasonic washing or immersion washing for 5 min                                                                                                                           | ×         | ○         | ○        |
|                     | Terpene               | Terpene Cleaner EC-7<br>Spray washing for 5 min at ordinary temperature                    purified water<br>spraying for 5 min, 50                    hot air drying for 5 min, 80    | ×         | ○         | ○        |
| Water               | Purified water        | Ultrasonic washing for 5 min 60<br>wind-free drying    for 5 min, 85                                                                                                                   | ×         | ○         | ○        |
|                     | Surface active agent  | Clean Through 750H<br>Ultrasonic washing for 5 min, 60                    purified water ultrasonic<br>washing for 5 min, 60                    hot air drying for 5 min, 85           | ×         | ○         | ○        |
|                     |                       | Clean Through 750L<br>Ultrasonic washing for 5 min, 60                    purified water ultrasonic<br>washing for 5 min, 60                    hot air drying for 5 min, 85           | ×         | ○         | —        |
|                     |                       | Clean Through 710M<br>Ultrasonic washing for 5 min, 60                    purified water ultrasonic<br>washing for 5 min, 60                    hot air drying for 5 min, 85           | ×         | ○         | —        |
|                     |                       | Clean Through LC-841<br>Ultrasonic washing for 5 min, 60                    purified water ultrasonic<br>washing for 5 min, 60                    hot air drying for 5 min, 85         | ×         | ○         | ○        |
|                     |                       | Ultrasonic washing for 5 min, 60                    purified water ultrasonic<br>washing for 5 min, 60                    hot air drying for 5 min, 85                                 | ×         | ○         | ○        |
|                     |                       | Shower washing for 1 min, 60                    purified water<br>ultrasonic washing for 5 min, 60                    hot air drying for 5 min, 85                                     | ×         | ○         | ○        |
| ○ : Washing enabled |                       |                                                                                                                                                                                        |           |           |          |

### < Wash-free flux >

|           |                  |           |   |   |   |
|-----------|------------------|-----------|---|---|---|
| Wash-free | Low residue flux | ULF-500VS | ○ | ○ | ○ |
|           | Inactivated flux | AM-173    | ○ | ○ | ○ |

Washing disabled (x mark) detergent should be avoided because the appearance may be impaired, the characteristic may be deteriorated, and the reliability cannot be guaranteed

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