

### 1. Soldering of chip type

The chip type film capacitor is available in three types, ECWU(X), ECWU(C), ECHU(X), ECPU(A) exclusively for reflow soldering and ECHU(C) for both flow and reflow soldering. Although there are specific restrictive conditions for the chip type film capacitor, please check and consider the following items in order to guarantee soldering quality. Please consult us when using part adhesive for mounting because there is a possibility that type of adhesive affects the characteristic and the reliability of capacitor.

#### 1.1 Printed wiring board

##### 1.1.1 Selection of printed wiring board

The chip parts are directly mounted on the printed wiring board without using lead wires, and therefore thermal expansion of the printed wiring board may affect the characteristic of the film chip capacitor, and hence the following cautions should be observed.

##### 1.1.2 Parts layout on Printed wiring board

Film chip capacitors, unlike the leaded type film capacitors do not have coating.

Retaliated heat from a near by heated components may cause the temperature to exceed the usable temperature range.

Without coating, if there is an exposed live part in the vicinity, a short circuit may be formed through the capacitor. Consider the arrangement.

##### 1.1.3 Land dimension design

If the land area is wide, tombstone phenomenon (chip rising) is likely to occur in relation to the solder amount.

It is disadvantageous for keeping the mount clearance of the mounting machine, but it is advised to design in the recommended land dimension shown each specifications.

#### <Remarks for selecting the printed wiring board>

Item	Point of notice
Coefficient of thermal expansion of printed wiring board	<p>If there is a large difference in coefficient of thermal expansion between the capacitor and Printed wiring board, a mechanical stress is applied due to temperature changes after mounting, and the element main body may be changed, the soldered area may be cracked, and the performance may be lowered. Check sufficiently beforehand.</p> <p>* In particular, consult us if you are using ceramic Printed wiring boards.</p>

Item	Chip film capacitor			Resin Printed wiring board			Ceramic Printed wiring board
	ECHU (PPS film)	ECWU (PEN film)	ECPU (Plastic film)	Paper phenol	Paper epoxy	Glass epoxy	Alumina
Coefficient of thermal expansion(*10 <sup>-6</sup> /°C)	22	10	( 7 )	1~30	1~15	1~25	7~8

### 1.2 Flow soldering

#### 1.2.1 Flow soldering conditions

In flow soldering, the chip capacitor is soaked in molten solder, and only the ECHU(C) type using heat resistant PPS film can be used.

The ECWU and ECPU type cannot be used in flow soldering.

#### 1.2.2 Cautions for flow soldering

The film chip capacitor has no coating on the capacitor element, and the capacitor internal electrode may be deteriorated due to activating agents (halogen, etc.) in the flux, and the capacitance value may decrease or the characteristic may be deteriorated.

Use flux with halogen content of 0.1wt.% or less.

When washing right after soldering, make sure the capacitor surface temperature is lower than 60°C.

### 1.3 Reflow soldering

Reflow soldering is a method of soldering by printing a proper amount of cream solder on the mounting land of the surface mount Printed Wiring Board, putting a film chip capacitor thereon, heating, and fusing the cream solder to fix.

#### 1.3.1 Reflow soldering conditions

Perform reflow soldering within the following temperature profile.

When performing reflow soldering, an appropriate

#### 1.3.2 Cautions for reflow soldering

The film chip capacitor has no coating on the capacitor element, and the internal evaporated electrode may be deteriorated due to activating agent (halogen, etc.) in the cream solder, and the capacitance value may be decrease, dissipation factor (Dissipation factor) may increase, or the characteristic may be deteriorated.

Use cream solder with halogen content of 0.1wt.% or less.

### ECHU(C) Flow soldering conditions

(Dipping is within twice, the second dip should be carried after the capacitor itself has returned to normal temperature.)

Method	Recommendable condition	Note
Flow soldering	<p>The graph shows a temperature profile for flow soldering. The vertical axis is labeled 'Solder temp. (°C)' and ranges from 0 to 300 in increments of 50. The horizontal axis represents time. The profile starts at 0°C, rises to a plateau at 150°C labeled '(150°C max.) Pre-heating'. A horizontal arrow below this plateau indicates a duration of 'Less than 3 minutes'. The temperature then rises sharply to a second plateau at 250°C labeled '(250°C max.) Soldering'. A horizontal arrow below this plateau indicates a duration of 'Less than 5 seconds'. Finally, the temperature decreases linearly, with a horizontal arrow below the cooling curve indicating a duration of 'More than 2 minutes'.</p>	Flow soldering is applicable to only ECHU(C) type.

### Reflow soldering conditions

(Soldering is within twice, the second dip should be carried after the capacitor itself has returned to normal temperature.)

Method	Recommendable condition	Note
Reflow soldering		<p>External temperature of P. W. B. will be different according to P. W. B. materials and soldering method.</p> <p>For temperature measuring we recommend glass epoxy P. W. B. (115mm×50mm. 0.8t) as standard.</p>

When performing reflow soldering, an appropriate coating thickness of cream solder is 0.10 to 0.15 mm.

When washing right after soldering, make sure the capacitor surface temperature is lower than 60°C.

The maximum temperature reached on the element surface in reflow is as follows. If a higher temperature is applied, abnormality may occur on the appearance or electrical characteristics.

Type	Max. temperature on element surface
ECHU	260°C
ECWU	230°C or 240°C
ECPU	240°C

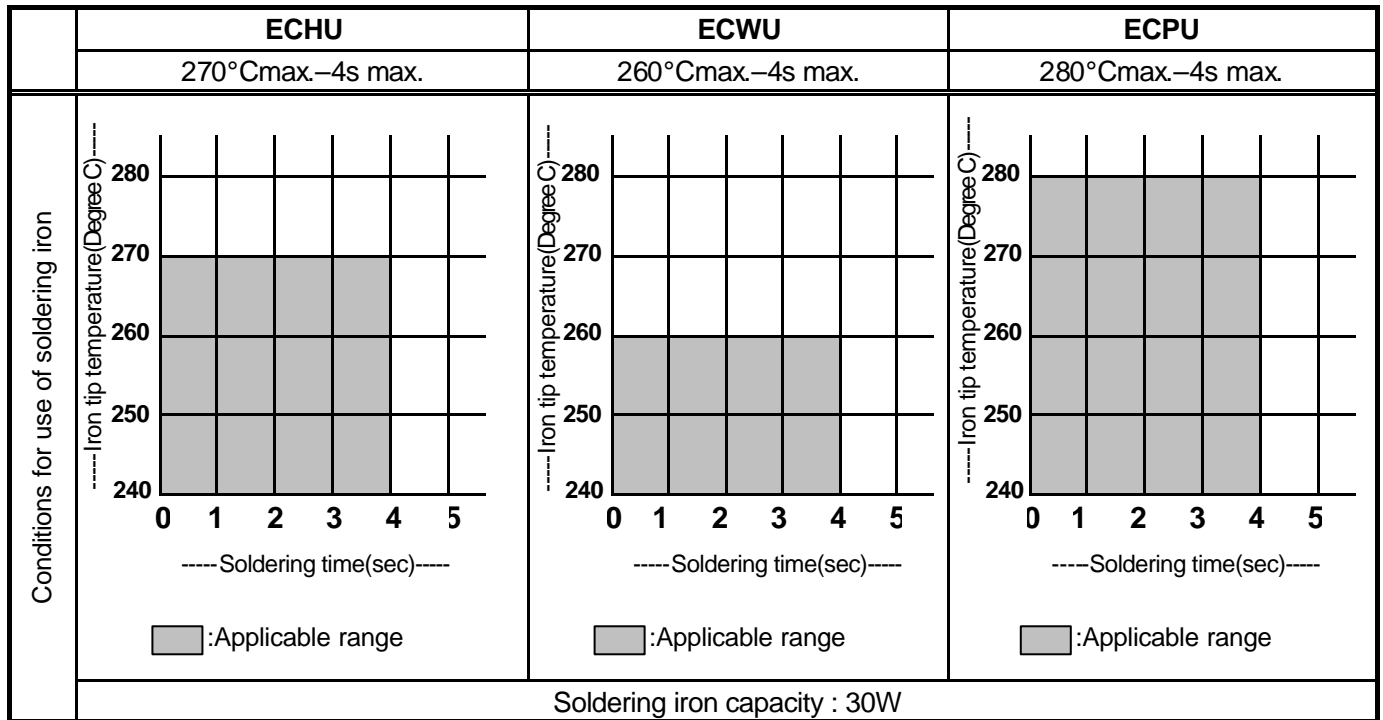
If exceeding the specified temperature, it must be noted that the reliability of the part cannot be guaranteed. The maximum temperature reached on the element surface of ECWU is fixed at the specification concretely.

### 1.4 When using soldering iron

With a soldering iron, high temperature is directly applied to the film chip capacitor. Abide by the following soldering iron conditions, and strictly control the iron tip temperature.

#### 1.4.1 Soldering conditions when using soldering iron

Observe the following cautions, and use within the soldering conditions below.



### 1.4.2 Cautions for use of soldering iron

Be careful that the soldering iron 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, short circuit 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 product (part) once removed by the soldering iron.

Avoid mass mounting of chip film capacitors by soldering iron. (Temperature control is difficult, and the characteristics may be deteriorated.)

Please do not re-solder with heat directly from bottom side of P. W. B. because capacitor will likely be damaged.

### 2. Washing

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.

### <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
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.

Applicability of detergents in film chip capacitors is listed for reference.

### <List of applicability of detergents>

Washing condition			Applicability
Solvent	Alcohol	<b>Ethanol</b> Ultrasonic washing or immersion washing for 5 min	Washing enabled
		<b>Isopropyl alcohol (IPA)</b> Ultrasonic washing or immersion washing for 5 min	Washing enabled
	Silicon	<b>FRW-17</b> : Ultrasonic washing for 5 min, 60°C. <b>FRW-1N</b> : Ultrasonic washing for 5 min, 60°C <b>FRW-100</b> : Steam drying for 1 min, 100°C	Washing enabled
		Halogen	<b>Asahi Clean AK-225AES</b> Ultrasonic washing or immersion washing for 5 min
	<b>HCFC141b-MS</b> Ultrasonic washing or immersion washing for 5 min		Washing enabled
	Petroleum hydrocarbon	<b>P3 Cold Cleaner 225S</b> Ultrasonic washing for 5 min, 60°C IPA ultrasonic rinsing for 5 min at ordinary temperature hot air drying for 5 min, 40°C	Washing enabled
		<b>Toluene</b> Ultrasonic washing or immersion washing for 5 min	Washing disabled
Terpene	<b>Terpene Cleaner EC-7</b> Spray washing for 5 min at ordinary temperature purified water spraying for 5 min, 50°C hot air drying for 5 min, 80°C	Washing disabled	
Water	<b>Purified water</b>	1.Ultrasonic washing for 5 min 60°C 2.Wind-free drying for 5 min, 85°C	Washing enabled conditionally
	Surface active agent	<b>Clean Through 750H</b>	Washing disabled
		<b>Clean Through 750L</b>	Washing disabled
		<b>Clean Through 710M</b>	Washing disabled
		<b>Clean Through LC-841</b>	Washing disabled
		<b>Pine-Alfa ST-100s</b>	Washing disabled
		<b>Aqua-Cleaner 210SET</b>	Washing disabled

### <Wash-free flux>

Low residue flux	<b>ULF-500VS</b>	Washing enabled
Inactivated flux	<b>AM-173</b>	Washing enabled

Washing disabled detergent should be avoided because the appearance may be impaired, the characteristic may be deteriorated, and the reliability cannot be guaranteed.

### 3. Temperature measuring in soldering of film Capacitor

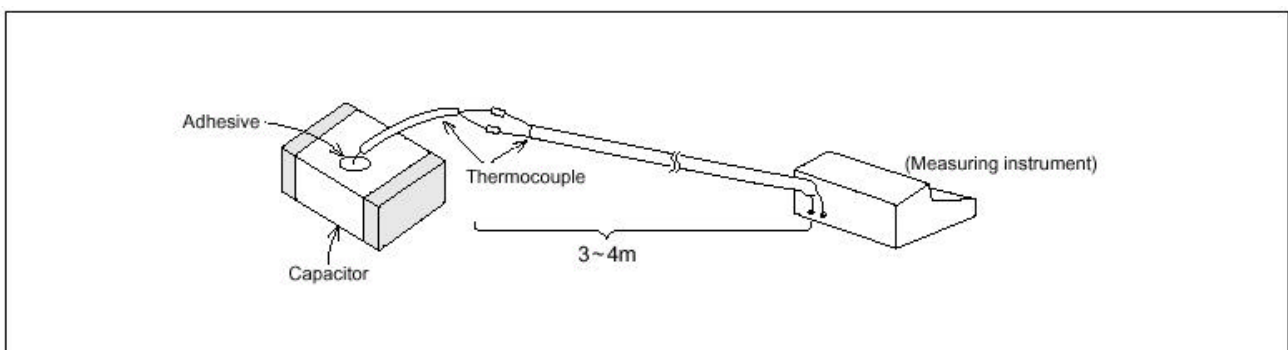
When using film capacitor of low heat resisting temperature in mounting or chip type, measure the element temperature profile in mounting in the following manner, and make sure the soldering is done below the heat resisting temperature.

#### <Preparation of measuring sample>

Fix thermocouple ( $\phi 0.1T$  wire) to the top of the capacitor with adhesive.

#### <Measurement of temperature profile>

As shown below, connect a thermocouple (3 to 4m) of same type as the thermocouple to the capacitor, to the thermocouple of the capacitor as shown below. Mount the sample on the mounting printer wiring board, and pass into the soldering and mounting process, and measure the temperature profile.

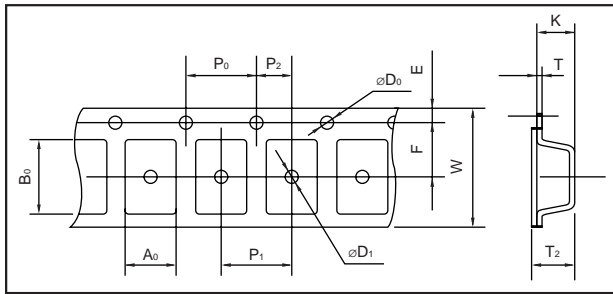


### 4. Additional Points

Product specifications, materials and other points mentioned in the catalog may be changed without notification.

■ Chip type embossed taping

● Embossed taping



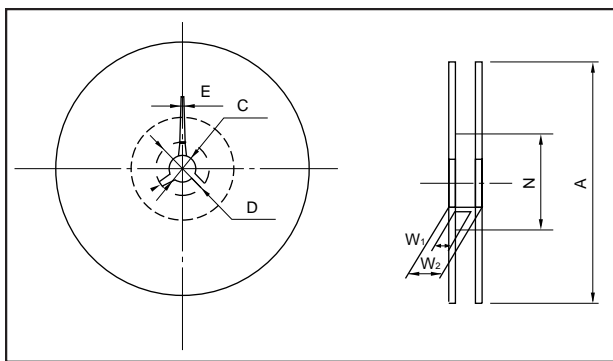
● Standard packaging quantities

Size code	Reel	Quantities
J1, J2, H1, H2	φ180	3000pcs/reel
H3, G1, G2, G3	φ180	2000pcs/reel
E1, E2, D1, D2	φ330	3000pcs/reel
E3a, E3, D3, D4, D5	φ330	2000pcs/reel
B, Z	φ330	1500pcs/reel
X, Y, V, U	φ330	1000pcs/reel
S, T	φ330	750pcs/reel

Size code	Dimensions(mm)												
	A <sub>0</sub> ±0.1	B <sub>0</sub> ±0.1	W±0.3	F±0.05	E±0.1	P <sub>1</sub> ±0.1	P <sub>2</sub> ±0.05	P <sub>0</sub> ±0.1	φD <sub>0</sub> <sup>+0.1</sup> <sub>-0</sub>	φD <sub>1</sub> <sup>+0.2</sup> <sub>-0</sub>	T±0.05	T <sub>2</sub> ±0.2	K±0.1
J1	1.55	2.3	8.0	3.50	1.75	4.0	2.00	4.0	1.5	1.0	0.25	1.3	1.2
J2	1.55	2.3										1.5	1.4
H1, H2	1.9	3.5										1.5	1.4
H3	1.9	3.5										1.9	1.8
G1, G2	2.8	3.5										1.9	1.8
G3	2.8	3.5	2.5	2.4									
E1	3.8	5.1	12.0	5.50	1.75	8.0	2.00	4.0	1.5	1.5	0.30	2.0	1.9
E2	3.8	5.1										2.6	2.5
E3a, E3	3.8	5.1										3.4	3.5
D1, D2	4.6	6.3										2.7	2.6
D3, D4	4.6	6.3										3.5	3.4
D5	4.6	6.3	4.6	4.5									
B, Z	5.5	7.5	4.7	4.6									

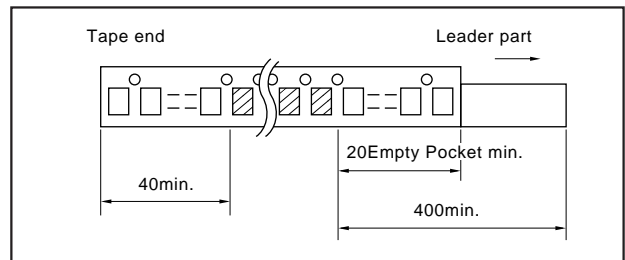
Size code	Dimensions(mm)												
	A <sub>0</sub> ±0.1	B <sub>0</sub> ±0.1	W <sup>+0.3</sup> <sub>-0.1</sub>	F±0.1	E±0.1	P <sub>1</sub> ±0.1	P <sub>2</sub> ±0.1	P <sub>0</sub> ±0.1	φD <sub>0</sub> <sup>+0.1</sup> <sub>-0</sub>	φD <sub>1</sub> <sup>+0.25</sup> <sub>-0</sub>	T±0.013	T <sub>2</sub> ±0.2	K±0.10
X, Y	6.91	8.43	16.0	7.5	1.75	12.0	2.0	4.0	1.50	1.50	0.343	5.685	5.64
U, V	8.94	10.54										5.795	5.75
S, T	10.80	16.00	24.0	11.5	16.0	0.355	5.815	5.77					

● Reel dimensions



● Leader part and tape end

(Unit : mm)



Code	Dimensions(mm)				
	Reel size φ180		Reel size φ330		
	Tape width 8		Tape width 12	Tape width 16	Tape width 24
A	180 <sup>0</sup> <sub>-1.5</sub>		330±2		
C	13.0±0.2		13.0±0.2		
D	21±0.6		21±0.8		
E	2±0.5		2±0.5		
N	60 <sup>+3</sup> <sub>0</sub>		80±1		
W1	9.0 <sup>+1.0</sup> <sub>0</sub>		13.4±1.0	17.4±1.0	25.4±1.0
W2	13.0±1.0		17.4±1.0	21.4±1.0	29.4±1.0