

Stacked Metallized PPS Film Chip Capacitor

Type: **ECHU(X)**

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

■Features

- Small in size (minimum size 1.6 mm × 0.8 mm)
- 85 °C, 85 %RH, W.V. × 1.0 for 500 hours
- For reflow soldering
- RoHS directive compliant

■Recommended Applications

- Time-constant
- Filtering
- Oscillation and resonance

■Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	C	H	U							X	

Product code

Dielectric & construction

Rated voltage

Capacitance

Cap. Tol.

Suffix

1C	16 VDC
1H	50 VDC

G	±2 %
J	±5 %

	Tape width
	Reel diameter
5	8 mm size ø180 mm
9	12 mm size ø330 mm

* Tape width 8 mm and diameter ø330 mm reel is prepared.

■Specifications

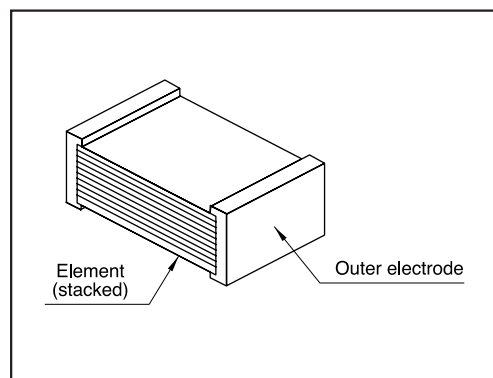
Category temp. range (Including temperature-rise on unit surface)	−55 °C to +125 °C
Rated voltage	16 VDC, 50 VDC (50 VDC: 0.12 µF or more: Derating or rated voltage by 1.25 % / °C at more than 105 °C)
Capacitance range	0.00010 µF to 0.22 µF (E12)
Capacitance tolerance	±2 % (G), ±5 % (J)
Withstand voltage	Between terminals : Rated volt. (VDC) × 150 % 60 s
Dissipation factor (tan δ)	$\tan \delta \leq 0.6 \%$ (20 °C, 1 kHz)
Insulation resistance (IR)	16 VDC : $IR \geq 3000 \text{ M}\Omega$ (20 °C, 10 VDC, 60 s) 50 VDC : $IR \geq 3000 \text{ M}\Omega$ (20 °C, 50 VDC, 60 s)
Soldering conditions	Reflow soldering : 260 °C max. and 95 sec max. at more than 220 °C (Temp. at cap. surface)

* Please consult us for flow soldering

* 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".

■Construction

■Dimensions in mm (not to scale)



Technical drawing of a rectangular component. The drawing shows two views: a front view and a side view. The front view is a rectangle with a width dimension $L \pm 0.2$ and a height dimension $H \pm 0.2$. The side view is a rectangle with a width dimension $W \pm 0.20$ and a height dimension $H \pm 0.2$. The drawing also includes three sets of tolerance specifications: $(\pm 0.3) ***$ for the length L , $(\pm 0.15) **$ for the width W , and $(\pm 0.15) **$ for the height H . The drawing is labeled with 'e' and 'g' at the bottom left and right, respectively, indicating specific dimensions or tolerances.

e ± 0.30
(± 0.25) *
(± 0.20) **

g

e ± 0.30
(± 0.25) *
(± 0.20) **

* To be applied only for size code J1 & J2

** To be applied only for size code K1

*** To be applied only for size code E1, E2, D1,
D3, D4

size code	L	W	H	e	g
K1	1.6	0.8	0.7	0.35	≥ 0.4
J1	2.0	1.25	0.9	0.45	≥ 0.6
J2	2.0	1.25	1.1	0.45	≥ 0.6
H1	3.2	1.6	0.9	0.65	≥ 1.0
H2	3.2	1.6	1.1	0.65	≥ 1.0
H3	3.2	1.6	1.5	0.65	≥ 1.0
G1	3.2	2.5	1.1	0.65	≥ 1.0
G2	3.2	2.5	1.5	0.65	≥ 1.0
G3	3.2	2.5	2.1	0.65	≥ 1.0
E1	4.8	3.3	1.5	0.80	≥ 2.0
E2	4.8	3.3	2.1	0.80	≥ 2.0
D1	6.0	4.1	1.9	0.80	≥ 2.0
D3	6.0	4.1	2.5	0.80	≥ 2.0
D4	6.0	4.1	2.8	0.80	≥ 2.0

■ Taping Specification for Automatic Mounting

Refer to the page of taping specifications

■ Rating, Dimensions & Quantity/Reel

● Capacitance tolerance : $\pm 2\%$ (G), $\pm 5\%$ (J)

Cap. (μ F)	Rated volt. 16 VDC						Rated volt. 50 VDC					
	Part No.	Dimensions (mm)			Size Code	Q'ty	Part No.	Dimensions (mm)			Size Code	Q'ty
		L	W	H				L	W	H		
0.00010	ECHU1C101□X5	1.6	0.8	0.7	K1	4000	ECHU1H101□X5	2.0	1.25	0.9	J1	3000
0.00012	ECHU1C121□X5	1.6	0.8	0.7	K1		ECHU1H121□X5	2.0	1.25	0.9	J1	
0.00015	ECHU1C151□X5	1.6	0.8	0.7	K1		ECHU1H151□X5	2.0	1.25	0.9	J1	
0.00018	ECHU1C181□X5	1.6	0.8	0.7	K1		ECHU1H181□X5	2.0	1.25	0.9	J1	
0.00022	ECHU1C221□X5	1.6	0.8	0.7	K1		ECHU1H221□X5	2.0	1.25	0.9	J1	
0.00027	ECHU1C271□X5	1.6	0.8	0.7	K1		ECHU1H271□X5	2.0	1.25	0.9	J1	
0.00033	ECHU1C331□X5	1.6	0.8	0.7	K1		ECHU1H331□X5	2.0	1.25	0.9	J1	
0.00039	ECHU1C391□X5	1.6	0.8	0.7	K1		ECHU1H391□X5	2.0	1.25	0.9	J1	
0.00047	ECHU1C471□X5	1.6	0.8	0.7	K1		ECHU1H471□X5	2.0	1.25	0.9	J1	
0.00056	ECHU1C561□X5	1.6	0.8	0.7	K1		ECHU1H561□X5	2.0	1.25	0.9	J1	
0.00068	ECHU1C681□X5	1.6	0.8	0.7	K1	3000	ECHU1H681□X5	2.0	1.25	0.9	J1	3000
0.00082	ECHU1C821□X5	1.6	0.8	0.7	K1		ECHU1H821□X5	2.0	1.25	0.9	J1	
0.0010	ECHU1C102□X5	1.6	0.8	0.7	K1		ECHU1H102□X5	2.0	1.25	0.9	J1	
0.0012	ECHU1C122□X5	1.6	0.8	0.7	K1		ECHU1H122□X5	2.0	1.25	0.9	J1	
0.0015	ECHU1C152□X5	1.6	0.8	0.7	K1		ECHU1H152□X5	2.0	1.25	0.9	J1	
0.0018	ECHU1C182□X5	1.6	0.8	0.7	K1		ECHU1H182□X5	2.0	1.25	0.9	J1	
0.0022	ECHU1C222□X5	1.6	0.8	0.7	K1		ECHU1H222□X5	2.0	1.25	0.9	J1	
0.0027	ECHU1C272□X5	1.6	0.8	0.7	K1		ECHU1H272□X5	2.0	1.25	0.9	J1	
0.0033	ECHU1C332□X5	2.0	1.25	0.9	J1		ECHU1H332□X5	3.2	1.6	0.9	H1	
0.0039	ECHU1C392□X5	2.0	1.25	0.9	J1		ECHU1H392□X5	3.2	1.6	0.9	H1	
0.0047	ECHU1C472□X5	2.0	1.25	0.9	J1	3000	ECHU1H472□X5	3.2	1.6	0.9	H1	2000
0.0056	ECHU1C562□X5	2.0	1.25	0.9	J1		ECHU1H562□X5	3.2	1.6	0.9	H1	
0.0068	ECHU1C682□X5	2.0	1.25	0.9	J1		ECHU1H682□X5	3.2	1.6	0.9	H1	
0.0082	ECHU1C822□X5	2.0	1.25	1.1	J2		ECHU1H822□X5	3.2	1.6	1.1	H2	
0.010	ECHU1C103□X5	2.0	1.25	1.1	J2		ECHU1H103□X5	3.2	1.6	1.1	H2	
0.012	ECHU1C123□X5	3.2	1.6	0.9	H1		ECHU1H123□X5	3.2	2.5	1.1	G1	
0.015	ECHU1C153□X5	3.2	1.6	0.9	H1		ECHU1H153□X5	3.2	2.5	1.1	G1	
0.018	ECHU1C183□X5	3.2	1.6	0.9	H1		ECHU1H183□X5	3.2	2.5	1.5	G2	
0.022	ECHU1C223□X5	3.2	1.6	0.9	H1		ECHU1H223□X5	3.2	2.5	1.5	G2	
0.027	ECHU1C273□X5	3.2	1.6	1.1	H2		ECHU1H273□X5	3.2	2.5	1.5	G2	
0.033	ECHU1C333□X5	3.2	1.6	1.1	H2	2000	ECHU1H333□X5	3.2	2.5	2.1	G3	3000
0.039	ECHU1C393□X5	3.2	1.6	1.5	H3		ECHU1H393□X5	3.2	2.5	2.1	G3	
0.047	ECHU1C473□X5	3.2	1.6	1.5	H3		ECHU1H473□X9	4.8	3.3	1.5	E1	
0.056	ECHU1C563□X5	3.2	2.5	1.5	G2		ECHU1H563□X9	4.8	3.3	1.5	E1	
0.068	ECHU1C683□X5	3.2	2.5	1.5	G2		ECHU1H683□X9	4.8	3.3	1.5	E1	
0.082	ECHU1C823□X5	3.2	2.5	2.1	G3		ECHU1H823□X9	4.8	3.3	2.1	E2	
0.10	ECHU1C104□X5	3.2	2.5	2.1	G3		ECHU1H104□X9	4.8	3.3	2.1	E2	
0.12							ECHU1H124□X9	6.0	4.1	1.9	D1	
0.15							ECHU1H154□X9	6.0	4.1	1.9	D1	
0.18							ECHU1H184□X9	6.0	4.1	2.5	D3	
0.22							ECHU1H224□X9	6.0	4.1	2.8	D4	

Cap. tol. code

■ Recommended for Land Dimensions (mm)

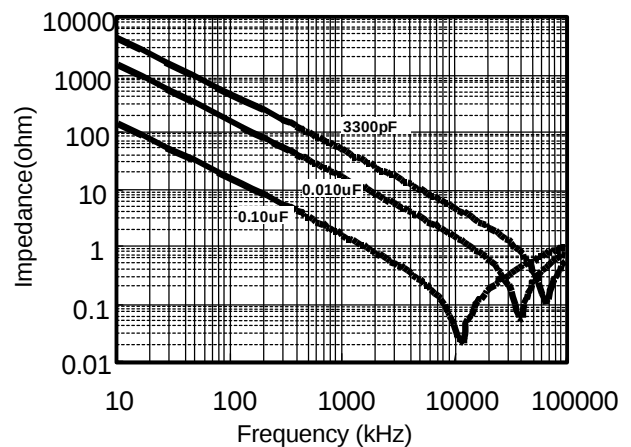
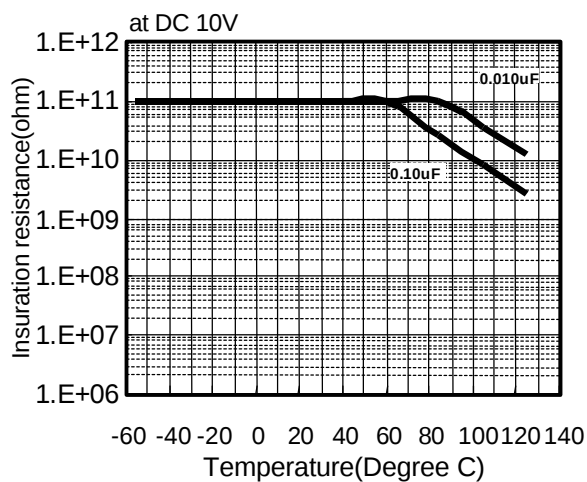
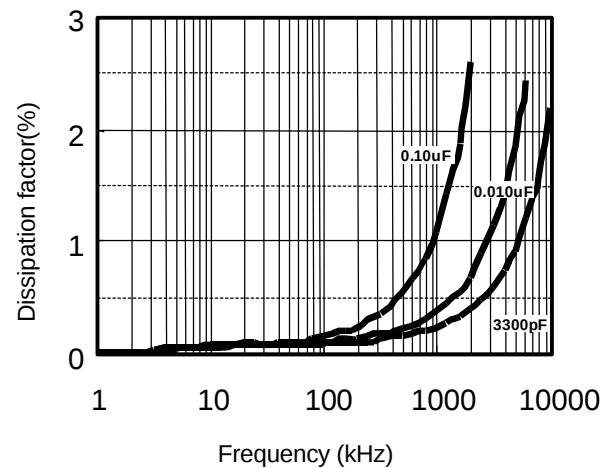
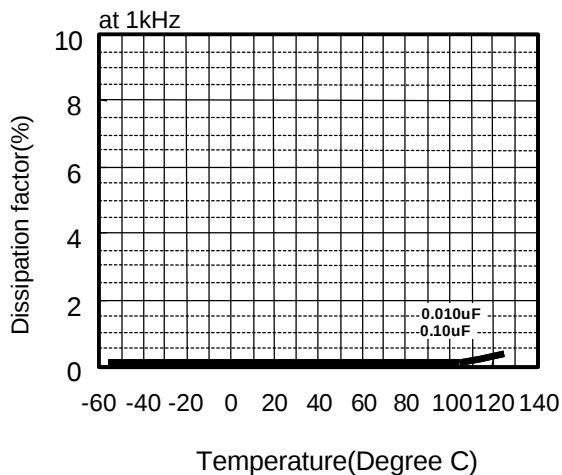
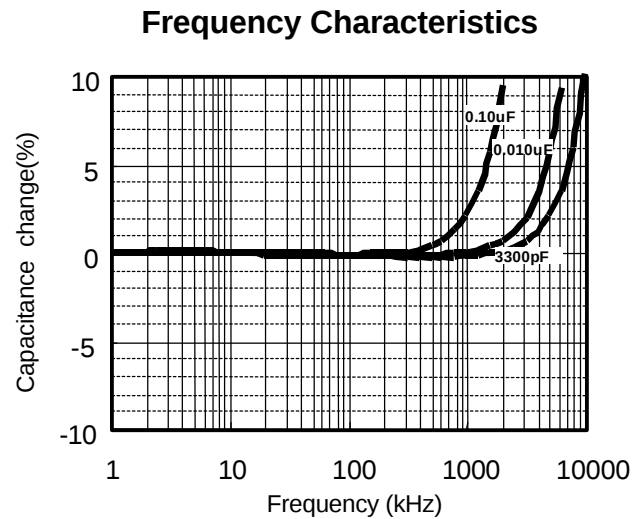
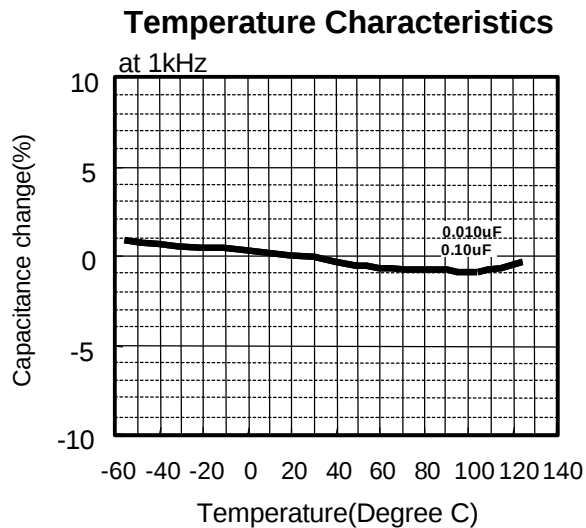
				Land dimensions		
				Reflow soldering		
				A	B	C
K1				0.6	2.0	0.7
J1,J2				0.8	2.4	1.1
H1,H2,H3				1.8	3.6	1.4
G1,G2,G3				1.8	3.6	2.3
E1,E2				3.0	5.6	3.0
D1,D3,D4				4.0	7.0	3.8

※ It is not warrantable that you can mount the capacitor without trouble under all the mounting condition when "Recommender for Land dimensions" is adopted.



ECHU (X) Type DC16V series (Stacked Metallized Film)

Electrical Characteristics < Typical Data >

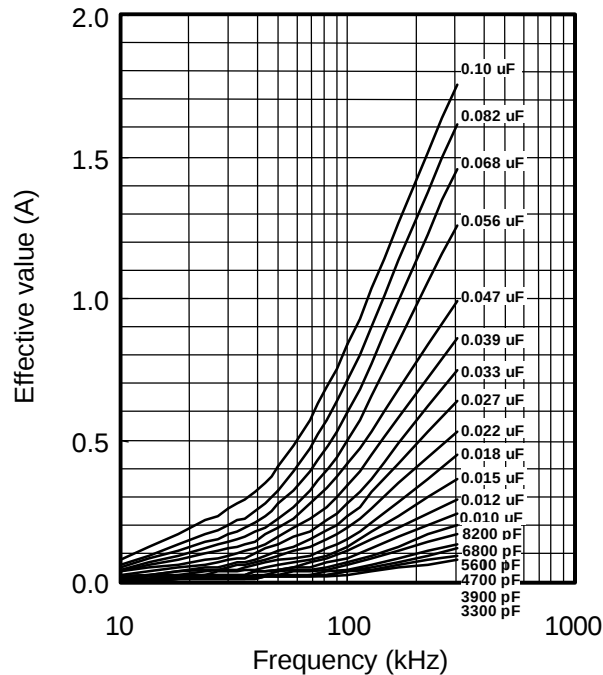




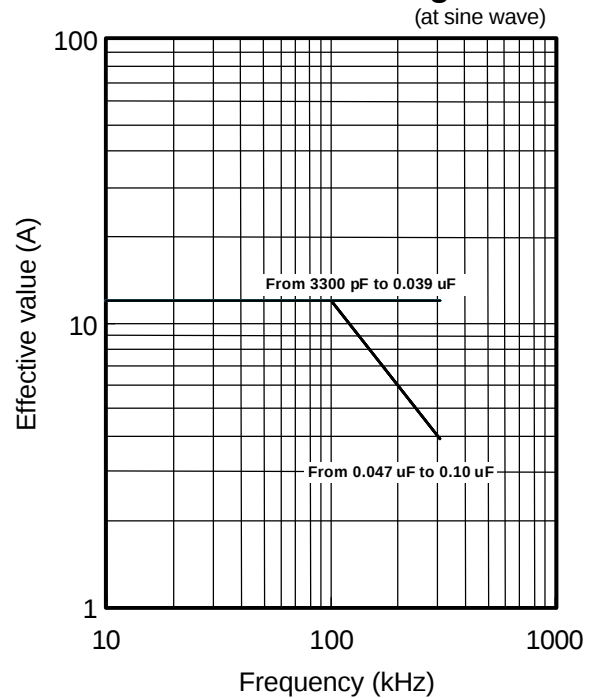
ECHU (X) Type DC16V series (Stacked Metallized Film)

Applicable Specifications

Permissible Current



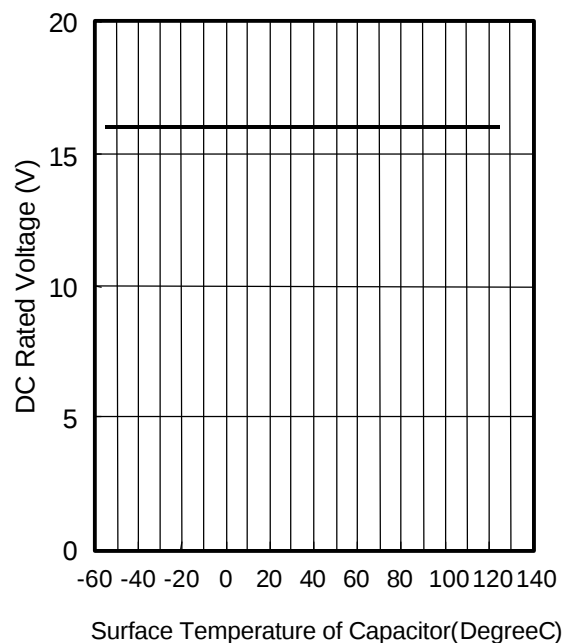
Permissible Voltage



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

Rating Voltage	Capacitance Value(uF)	Code	dv/dt(V/us)	Current(I _{p-p}) (A)
DC 16V	0.0033	332	86	0.28
	0.0039	392	80	0.31
	0.0047	472	74	0.35
	0.0056	562	68	0.38
	0.0068	682	62	0.42
	0.0082	822	58	0.48
	0.010	103	52	0.52
	0.012	123	48	0.58
	0.015	153	43	0.65
	0.018	183	40	0.72
	0.022	223	37	0.81
	0.027	273	33	0.89
	0.033	333	31	1.02
	0.039	393	28	1.09
	0.047	473	26	1.22
	0.056	563	24	1.34
	0.068	683	22	1.50
	0.082	823	20	1.64
	0.10	104	19	1.90

Voltage Derating by Temperature



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

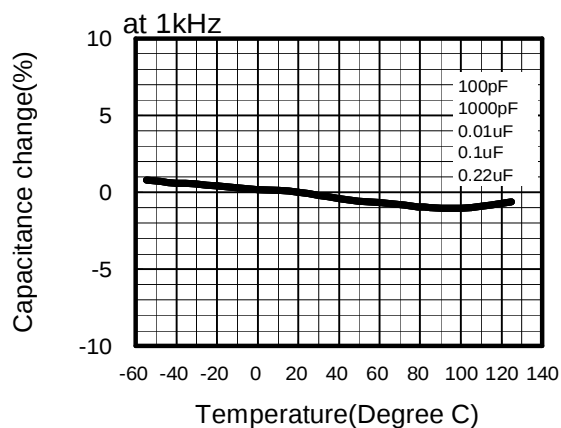
*Permissible voltage graph is the case of sine waveform. When you use this product, peak voltage must not exceed DC rated voltage.

*The current(I_{p-p}) value is calculated using nominal capacitance.

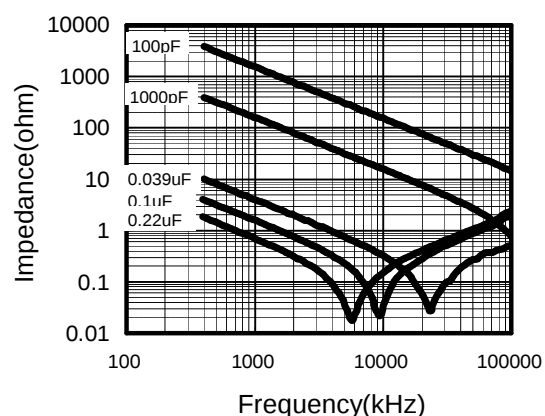
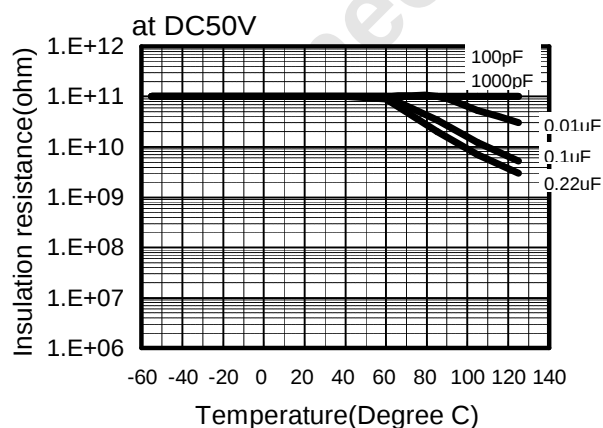
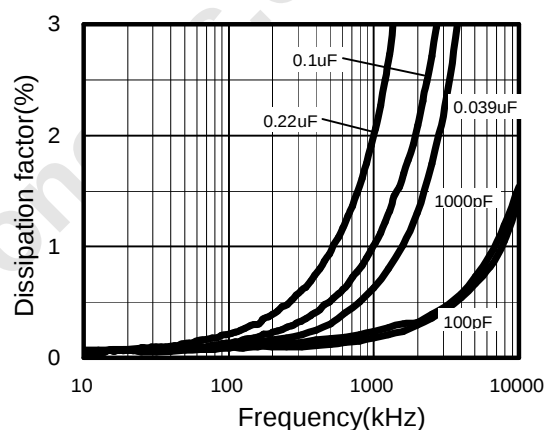
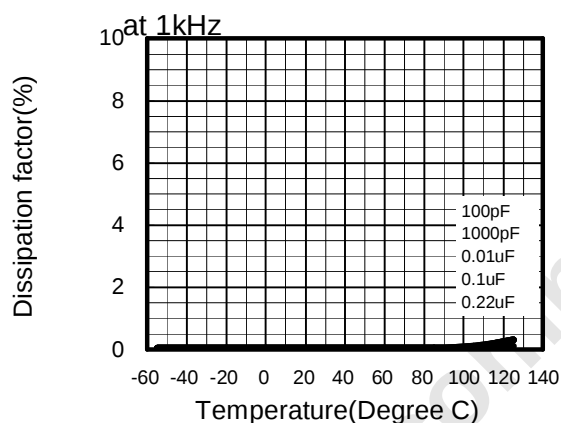
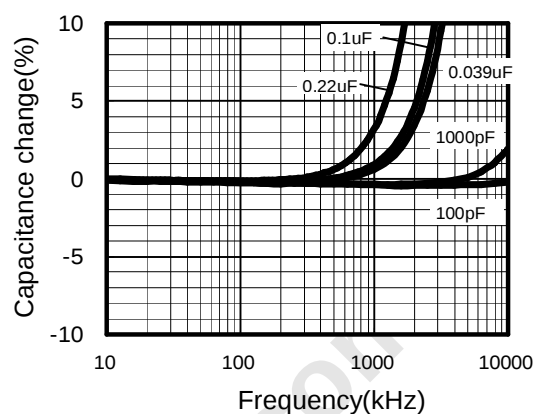
ECHU (X) Type DC50V series (Stacked Metallized Film)

Electrical Characteristics <Typical Data >

Temperature Characteristics



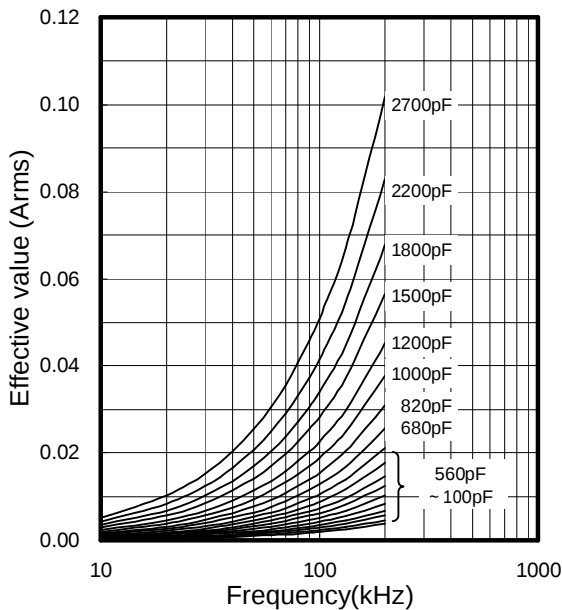
Frequency Characteristics



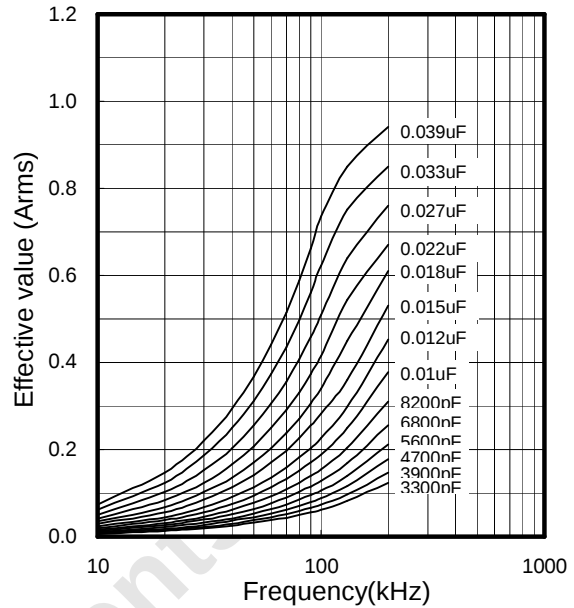
ECHU (X) Type DC50V series (Stacked Metallized Film)

Applicable Specifications

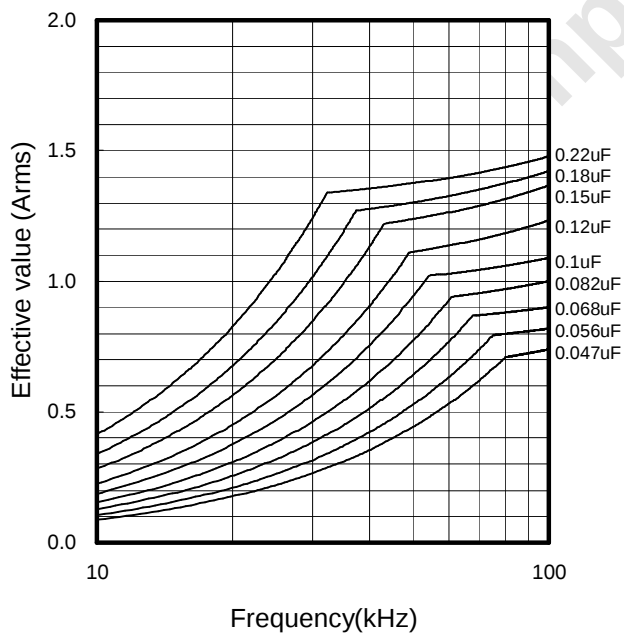
Permissible Current



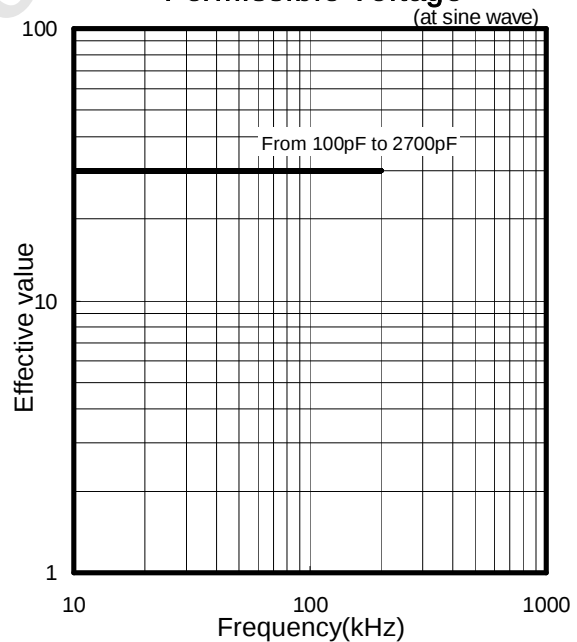
Permissible Current



Permissible Current



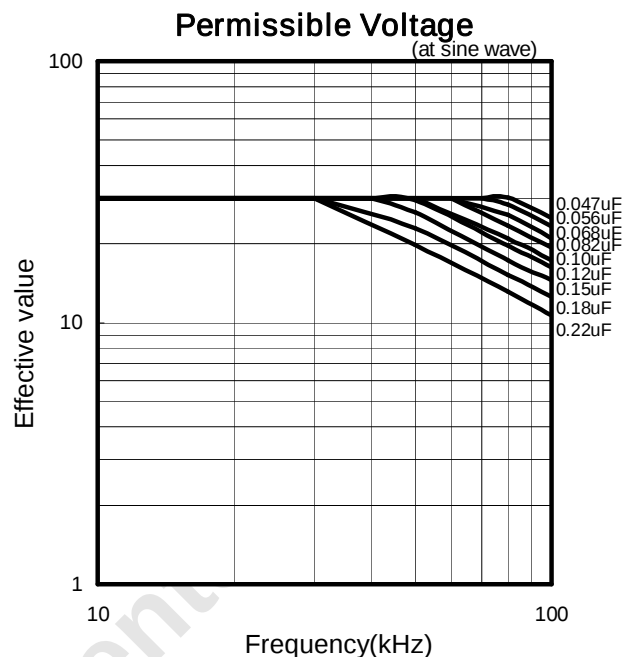
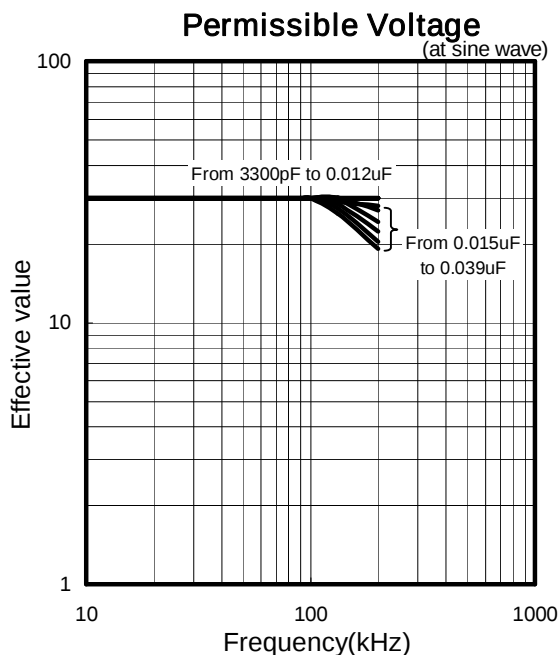
Permissible Voltage



*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(0-P) value is calculated using nominal capacitance.

ECHU (X) Type DC50V series (Stacked Metallized Film)**Applicable Specifications****Pulse Handling Capability (dv/dt)**

(Max 10000cycles)

Rating Voltage	Capacitance Value(uF)	code	dV/dt (V/us)	Current (Ao-p)
DC 50V	0.00010	101	1100	0.11
	0.00012	121	1050	0.13
	0.00015	151	940	0.14
	0.00018	181	890	0.16
	0.00022	221	800	0.18
	0.00027	271	730	0.20
	0.00033	331	690	0.23
	0.00039	391	610	0.24
	0.00047	471	580	0.27
	0.00056	561	520	0.29
	0.00068	681	480	0.33
	0.00082	821	440	0.36
	0.0010	102	400	0.40
	0.0012	122	370	0.44
	0.0015	152	340	0.51
	0.0018	182	310	0.56
	0.0022	222	270	0.59
	0.0027	272	260	0.70

Pulse Handling Capability (dv/dt)

(Max 10000cycles)

Rating Voltage	Capacitance Value(uF)	code	dV/dt (V/us)	Current (Ao-p)
DC 50V	0.0033	332	240	0.79
	0.0039	392	220	0.86
	0.0047	472	200	0.94
	0.0056	562	190	1.06
	0.0068	682	170	1.16
	0.0082	822	160	1.31
	0.010	103	145	1.45
	0.012	123	135	1.62
	0.015	153	120	1.80
	0.018	183	110	1.98
	0.022	223	100	2.20
	0.027	273	94	2.54
	0.033	333	86	2.84
	0.039	393	78	3.04

*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(0-P) value is calculated using nominal capacitance.

ECHU (X) Type DC50V series (Stacked Metallized Film)

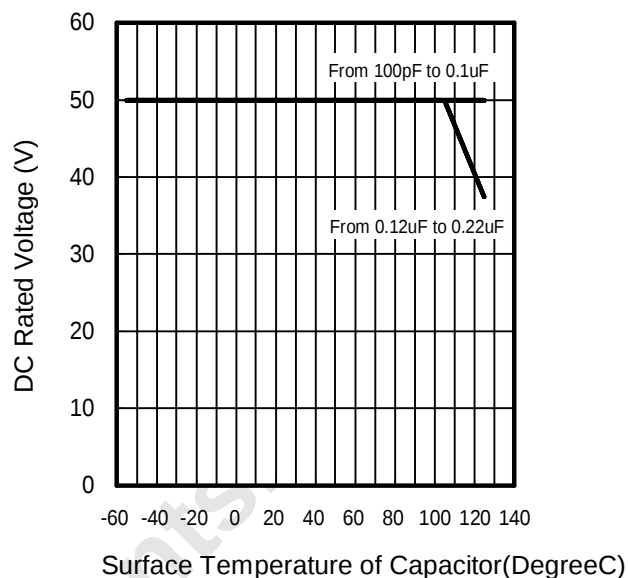
Applicable Specifications

Pulse Handling Capability (dv/dt)

(Max 10000cycles)

Rating Voltage	Capacitance Value(uF)	code	dV/dt (V/us)	Current (A0-p)
DC 50V	0.047	473	72	3.38
	0.056	563	68	3.81
	0.068	683	62	4.22
	0.082	823	56	4.59
	0.10	104	52	5.20
	0.12	124	48	5.76
	0.15	154	44	6.60
	0.18	184	40	7.20
	0.22	224	36	7.92

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