

CAPACITORS

Functional Polymer Capacitors (FPCAP)

RE Series

■ DESCRIPTIONS

Recent trends in development of digital, high-frequency electronic devices have led to increasing demand for capacitors with reduced ripple and noise characteristics, plus compact size, high capacitance, and low ESR. The FPCAP capacitor utilizes a revolutionary new proprietary cathode formation process for greatly reducing ESR and improving efficiency with a variety of power supplies, as well as ripple and noise reduction.

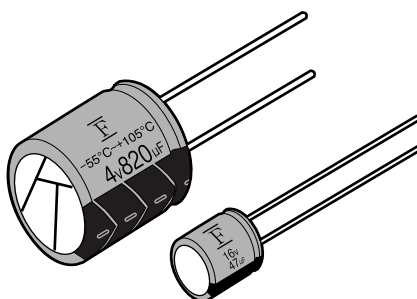
The FUJITSU RE series FPCAP uses a functional conductive polymer cathode layer material to greatly reduce ESR in comparison with previous processes using electrolytic fluids. The use of a solidified cathode layer eliminates the worry of leakage.

The RE series capacitor is ideal for use in applications demanding higher efficiency, low noise, reduced size, and high performance such as PC power supply smoothing and CPU backup.

■ FEATURES

- Low ESR
- High ripple effect
- High reliability, long life

■ PACKAGES



RE Series

■ PRODUCT LINEUP

(1) Standard type (Production symbol: 01)

Part number	Rated voltage (surge voltage) (V)	Static capaci- tance (μ F)	Loss angle tangent	Leak current (μ A)	ESR (100 kHz) (m Ω)	Maximum capacity ripple current (mA rms)	Case size ϕ D x L (mm)
FP-6R3RE470M-01R	6.3 (7.2)	47	0.07	5.92	60	1430	6.3 x 7.0
FP-6R3RE151M-01R		150	0.07	18.90	30	2780	8 x 11.5
FP-6R3RE221M-01R		220	0.07	27.72	30	3000	8 x 11.5
FP-6R3RE331M-01R		330	0.07	41.58	25	3500	10 x 12.5
FP-010RE330M-01R	10 (11.5)	33	0.07	6.60	70	1370	6.3 x 7.0
FP-010RE680M-01R		68	0.07	13.60	50	2000	6.3 x 10.0
FP-010RE101M-01R		100	0.07	20.00	30	2670	8 x 11.5
FP-010RE221M-01R		220	0.07	44.00	27	3370	10 x 12.5
FP-016RE220M-01R	16 (18.4)	22	0.06	7.04	70	1350	6.3 x 7.0
FP-016RE330M-01R		33	0.06	10.56	70	1370	6.3 x 7.0
FP-016RE470M-01R		47	0.06	15.04	60	1830	6.3 x 10.0
FP-016RE680M-01R		68	0.06	21.76	36	2700	8 x 11.5
FP-016RE101M-01R		100	0.06	32.00	30	2740	8 x 11.5
FP-016RE151M-01R		150	0.06	48.00	28	3260	10 x 12.5
FP-020RE150M-01R	20 (23)	15	0.06	6.00	90	1200	6.3 x 7.0
FP-020RE220M-01R		22	0.06	8.80	70	1300	6.3 x 7.0
FP-020RE330M-01R		33	0.06	13.20	70	1710	6.3 x 10.0
FP-020RE470M-01R		47	0.06	18.80	40	2450	8 x 11.5
FP-020RE680M-01R		68	0.06	27.20	36	2600	8 x 11.5
FP-020RE101M-01R		100	0.06	40.00	30	3210	10 x 12.5
FP-025RE100M-01R	25 (28.7)	10	0.06	5.00	90	1150	6.3 x 7.0
FP-025RE150M-01R		15	0.06	7.50	70	1650	6.3 x 10.0
FP-025RE220M-01R		22	0.06	11.00	40	2330	8 x 11.5
FP-025RE330M-01R		33	0.06	16.50	35	2900	10 x 12.5
FP-025RE470M-01R		47	0.06	23.50	35	2980	10 x 12.5

(2) High capacity type (Production symbol: S1)

Part number	Rated voltage (surge voltage) (V)	Static capaci- tance (μ F)	Loss angle tangent	Leak current (μ A)	ESR (100 kHz) (m Ω)	Maximum capacity ripple current (mA rms)	Case size ϕ D x L (mm)
FP-4R0RE561M-S1R	4.0 (4.6)	560	0.08	224.00	14	4080	8 x 11.5
FP-4R0RE821M-S1R		820	0.08	328.00	12	5040	10 x 12.5
FP-6R3RE391M-S1R	6.3 (7.2)	390	0.08	245.70	16	3810	8 x 11.5
FP-6R3RE681M-S1R		680	0.08	428.40	13	4840	10 x 12.5
FP-010RE471M-S1R	10 (11.5)	470	0.08	470.00	15	4510	10 x 12.5

■ PRINCIPAL CHARACTERISTICS

Parameter		Test method (JIS C 5101-4-1998)	Value		Unit
			Min.	Max.	
Category temperature range		—	−55	+105	°C
Maximum temperature at rated voltage		—	—	+105	°C
Rated voltage range		—	4.0	25	V•DC
Static capacitance range		—	10	820	μF
Static capacitance tolerance		Measurement frequency : 120 Hz ± 20% Measurement voltage : 0.5 Vrms or less, + 2.1 Vdc to 2.5 Vdc Measurement circuit : Equivalent series circuit Measurement temperature : 20 °C ± 2 °C	−20	+20	%
Loss angle tangent	FP-6R3REXXXM-01R	Measurement frequency : 120 Hz ± 20% Measurement voltage : 0.5 Vrms or less, + 2.1 Vdc to 2.5 Vdc Measurement circuit : Equivalent series circuit Measurement temperature : 20 °C ± 2 °C	—	0.07	—
	FP-010REXXXM-01R		—	0.07	
	FP-016REXXXM-01R		—	0.06	
	FP-020REXXXM-01R		—	0.06	
	FP-025REXXXM-01R		—	0.06	
	FP-4R0REXXXM-S1R		—	0.08	
	FP-6R3REXXXM-S1R		—	0.08	
	FP-010RE471M-S1R		—	0.08	
Leak current	FP-6R3RE470M-01R	Apply rated voltage through serial protective resistance of approx. 1000 Ω or less	—	5.92	μA
	FP-6R3RE151M-01R		—	18.90	
	FP-6R3RE221M-01R		—	27.72	
	FP-6R3RE331M-01R		—	41.58	
	FP-010RE330M-01R		—	6.60	
	FP-010RE680M-01R		—	13.60	
	FP-010RE101M-01R		—	20.00	
	FP-010RE221M-01R		—	44.00	
	FP-016RE220M-01R		—	7.04	
	FP-016RE330M-01R		—	10.56	
	FP-016RE470M-01R		—	15.04	
	FP-016RE680M-01R		—	21.76	
	FP-016RE101M-01R		—	32.00	
	FP-016RE151M-01R		—	48.00	
	FP-020RE150M-01R		—	6.00	
	FP-020RE220M-01R		—	8.80	
	FP-020RE330M-01R		—	13.20	
	FP-020RE470M-01R		—	18.80	
	FP-020RE680M-01R		—	27.20	
	FP-020RE101M-01R		—	40.00	
	FP-025RE100M-01R		—	5.00	
	FP-025RE150M-01R		—	7.50	
	FP-025RE220M-01R		—	11.00	
	FP-025RE330M-01R		—	16.50	
	FP-025RE470M-01R		—	23.50	
	FP-4R0RE561M-S1R		—	224.00	
	FP-4R0RE821M-S1R		—	328.00	
	FP-6R3RE391M-S1R		—	245.70	
	FP-6R3RE681M-S1R		—	428.40	
	FP-010RE471M-S1R		—	470.00	

(Continued)

RE Series

Parameter		Test method (JIS C 5101-4-1998)	Value		Unit
			Min.	Max.	
Equivalent series resistance (ESR)	FP-6R3RE470M-01R	Measurement frequency : 100 kHz $\pm$ 10% Measurement voltage : 0.5 Vrms or less, +2.1 Vdc to 2.5 Vdc Measurement circuit : Equivalent series circuit Measurement temperature : 20 °C $\pm$ 2 °C	—	60	mΩ
	FP-6R3RE151M-01R		—	30	
	FP-6R3RE221M-01R		—	30	
	FP-6R3RE331M-01R		—	25	
	FP-010RE330M-01R		—	70	
	FP-010RE680M-01R		—	50	
	FP-010RE101M-01R		—	30	
	FP-010RE221M-01R		—	27	
	FP-016RE220M-01R		—	70	
	FP-016RE330M-01R		—	70	
	FP-016RE470M-01R		—	60	
	FP-016RE680M-01R		—	36	
	FP-016RE101M-01R		—	30	
	FP-016RE151M-01R		—	28	
	FP-020RE150M-01R		—	90	
	FP-020RE220M-01R		—	70	
	FP-020RE330M-01R		—	70	
	FP-020RE470M-01R		—	40	
	FP-020RE680M-01R		—	36	
	FP-020RE101M-01R		—	30	
	FP-025RE100M-01R		—	90	
	FP-025RE150M-01R		—	70	
	FP-025RE220M-01R		—	40	
	FP-025RE330M-01R		—	35	
	FP-025RE470M-01R		—	35	
	FP-4R0RE561M-S1R		—	14	
	FP-4R0RE821M-S1R		—	12	
	FP-6R3RE391M-S1R		—	16	
	FP-6R3RE681M-S1R		—	13	
	FP-010RE471M-S1R		—	15	

(Continued)

Parameter		Test method (JIS C 5101-4-1998)							Value		Unit
									Min.	Max.	
Maximum allowable ripple current	FP-6R3RE470M-01R	100 kHz							—	1430	mArms
	FP-6R3RE151M-01R								—	2780	
	FP-6R3RE221M-01R								—	3000	
	FP-6R3RE331M-01R								—	3500	
	FP-010RE330M-01R								—	1370	
	FP-010RE680M-01R								—	2000	
	FP-010RE101M-01R								—	2670	
	FP-010RE221M-01R								—	3370	
	FP-016RE220M-01R								—	1350	
	FP-016RE330M-01R								—	1370	
	FP-016RE470M-01R								—	1830	
	FP-016RE680M-01R								—	2700	
	FP-016RE101M-01R								—	2740	
	FP-016RE151M-01R								—	3260	
	FP-020RE150M-01R	Frequency compensation coefficient	Frequency (Hz)	120	1 k	10 k	100 k	300 k	—	1200	
	FP-020RE220M-01R		Coefficient	0.10	0.45	0.50	1.00	1.00	—	1300	
	FP-020RE330M-01R								—	1710	
	FP-020RE470M-01R								—	2450	
	FP-020RE680M-01R								—	2600	
	FP-020RE101M-01R								—	3210	
	FP-025RE100M-01R								—	1150	
	FP-025RE150M-01R								—	1650	
	FP-025RE220M-01R								—	2330	
	FP-025RE330M-01R								—	2900	
	FP-025RE470M-01R								—	2980	
	FP-4R0RE561M-S1R								—	4080	
	FP-4R0RE821M-S1R								—	5040	
	FP-6R3RE391M-S1R								—	3810	
	FP-6R3RE681M-S1R								—	4840	
	FP-010RE471M-S1R								—	4510	

(Continued)

RE Series

Parameter		Test method (JIS C 5101-4-1998)	Value		Unit
			Min.	Max.	
Solder thermal resistance	Static capacitance variability ($\Delta C/C$)		-3	+3	%
	Loss angle tangent	FP-6R3REXXXM-01R	—	0.07	—
		FP-010REXXXM-01R	—	0.07	
		FP-016REXXXM-01R	—	0.06	
		FP-020REXXXM-01R	—	0.06	
		FP-025REXXXM-01R	—	0.06	
		FP-4R0REXXXM-S1R	—	0.08	
		FP-6R3REXXXM-S1R	—	0.08	
		FP-010RE471M-S1R	—	0.08	
	Leak current	FP-6R3RE470M-01R	—	5.92	μA
		FP-6R3RE151M-01R	—	18.90	
		FP-6R3RE221M-01R	—	27.72	
		FP-6R3RE331M-01R	—	41.58	
		FP-010RE330M-01R	—	6.60	
		FP-010RE680M-01R	—	13.60	
		FP-010RE101M-01R	—	20.00	
		FP-010RE221M-01R	—	44.00	
		FP-016RE220M-01R	—	7.04	
		FP-016RE330M-01R	—	10.56	
		FP-016RE470M-01R	—	15.04	
		FP-016RE680M-01R	—	21.76	
		FP-016RE101M-01R	—	32.00	
		FP-016RE151M-01R	—	48.00	
		FP-020RE150M-01R	—	6.00	
		FP-020RE220M-01R	—	8.80	
		FP-020RE330M-01R	—	13.20	
		FP-020RE470M-01R	—	18.80	
		FP-020RE680M-01R	—	27.20	
		FP-020RE101M-01R	—	40.00	
		FP-025RE100M-01R	—	5.00	
		FP-025RE150M-01R	—	7.50	
		FP-025RE220M-01R	—	11.00	
		FP-025RE330M-01R	—	16.50	
		FP-025RE470M-01R	—	23.50	
		FP-4R0RE561M-S1R	—	224.00	
		FP-4R0RE821M-S1R	—	328.00	
		FP-6R3RE391M-S1R	—	245.70	
		FP-6R3RE681M-S1R	—	428.40	
		FP-010RE471M-S1R	—	470.00	

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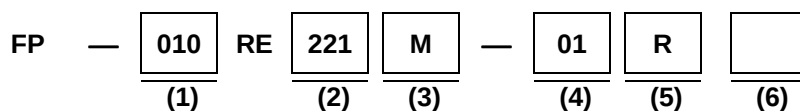
Parameter			Test method (JIS C 5101-4-1998)		Value		Unit
					Min.	Max.	
High temperature high humidity (Constant)	Static capacitance variability ($\Delta C/C$)				-10	+10	%
	Loss angle tangent	FP-6R3REXXXM-01R			—	0.105	—
		FP-010REXXXM-01R			—	0.105	
		FP-016REXXXM-01R			—	0.09	
		FP-020REXXXM-01R			—	0.09	
		FP-025REXXXM-01R			—	0.09	
		FP-4R0REXXXM-S1R			—	0.12	
		FP-6R3REXXXM-S1R			—	0.12	
		FP-010RE471M-S1R			—	0.12	
	Leak current	FP-6R3RE470M-01R			—	5.92	μA
		FP-6R3RE151M-01R			—	18.90	
		FP-6R3RE221M-01R			—	27.72	
		FP-6R3RE331M-01R			—	41.58	
		FP-010RE330M-01R			—	6.60	
		FP-010RE680M-01R			—	13.60	
		FP-010RE101M-01R			—	20.00	
		FP-010RE221M-01R			—	44.00	
		FP-016RE220M-01R	Measurement temperature : 60 °C $\pm$ 2 °C Test time : 1000 h $\pm$ 48 h Relative humidity : 90% to 95% Measurement conditions : After recovery to room temperature		—	7.04	
		FP-016RE330M-01R			—	10.56	
		FP-016RE470M-01R			—	15.04	
		FP-016RE680M-01R			—	21.76	
		FP-016RE101M-01R			—	32.00	
		FP-016RE151M-01R			—	48.00	
		FP-020RE150M-01R			—	6.00	
		FP-020RE220M-01R			—	8.80	
		FP-020RE330M-01R			—	13.20	
		FP-020RE470M-01R			—	18.80	
		FP-020RE680M-01R			—	27.20	
		FP-020RE101M-01R			—	40.00	
		FP-025RE100M-01R			—	5.00	
		FP-025RE150M-01R			—	7.50	
		FP-025RE220M-01R			—	11.00	
		FP-025RE330M-01R			—	16.50	
		FP-025RE470M-01R			—	23.50	
		FP-4R0RE561M-S1R			—	224.00	
		FP-4R0RE821M-S1R			—	328.00	
		FP-6R3RE391M-S1R			—	245.70	
		FP-6R3RE681M-S1R			—	428.40	
		FP-010RE471M-S1R			—	470.00	

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RE Series

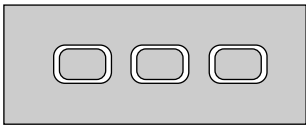
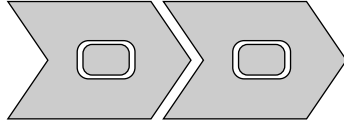
Parameter			Test method (JIS C 5101-4-1998)		Value		Unit
					Min.	Max.	
Durability	Static capacitance variability ($\Delta C/C$)				-20	+20	%
	Loss angle tangent	FP-6R3REXXXM-01R			—	0.105	—
		FP-010REXXXM-01R			—	0.105	
		FP-016REXXXM-01R			—	0.09	
		FP-020REXXXM-01R			—	0.09	
		FP-025REXXXM-01R			—	0.09	
		FP-4R0REXXXM-S1R			—	0.12	
		FP-6R3REXXXM-S1R			—	0.12	
		FP-010RE471M-S1R			—	0.12	
	Leak current	FP-6R3RE470M-01R			—	5.92	μA
		FP-6R3RE151M-01R			—	18.90	
		FP-6R3RE221M-01R			—	27.72	
		FP-6R3RE331M-01R			—	41.58	
		FP-010RE330M-01R			—	6.60	
		FP-010RE680M-01R			—	13.60	
		FP-010RE101M-01R			—	20.00	
		FP-010RE221M-01R			—	44.00	
		FP-016RE220M-01R			—	7.04	
		FP-016RE330M-01R			—	10.56	
		FP-016RE470M-01R			—	15.04	
		FP-016RE680M-01R			—	21.76	
		FP-016RE101M-01R			—	32.00	
		FP-016RE151M-01R			—	48.00	
		FP-020RE150M-01R			—	6.00	
		FP-020RE220M-01R			—	8.80	
		FP-020RE330M-01R			—	13.20	
		FP-020RE470M-01R			—	18.80	
		FP-020RE680M-01R			—	27.20	
		FP-020RE101M-01R			—	40.00	
		FP-025RE100M-01R			—	5.00	
		FP-025RE150M-01R			—	7.50	
		FP-025RE220M-01R			—	11.00	
		FP-025RE330M-01R			—	16.50	
		FP-025RE470M-01R			—	23.50	
		FP-4R0RE561M-S1R			—	224.00	
		FP-4R0RE821M-S1R			—	328.00	
		FP-6R3RE391M-S1R			—	245.70	
		FP-6R3RE681M-S1R			—	428.40	
		FP-010RE471M-S1R			—	470.00	

■ PART NUMBER DESIGNATION



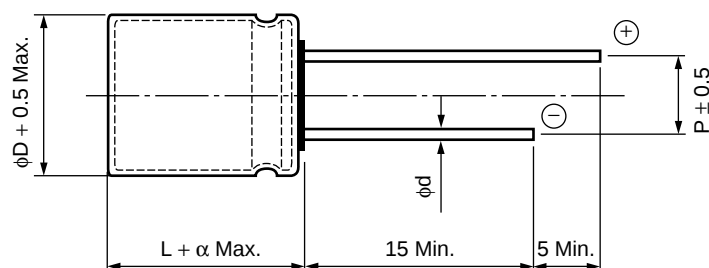
- (1) Rated voltage: 3 digit rated voltage code : (Example) 6.3 V→6R3
10 V→010
- (2) Static capacitance: 3 digit static capacitance in μF : (Example) 10 μF →100
100 μF →101
- (3) Static capacitance tolerance : M: $\pm 20\%$
- (4) Production symbol : 01 : Standard type
S1 : High capacitance type
- (5) Taping symbol: R: Long lead
J: 2.5mm pitch taping
P: 5mm pitch taping
- (6) Control number

■ MARKING AND POLARITY INDICATION

Case diameter	$\phi 6.3$	$\phi 8, 10$
Negative terminal	Manufacturer mark $\overline{\text{F}}$ Voltage, capacitance 16V 47 μF  Cathode indicator	Manufacturer mark $\overline{\text{F}}$ Temperature range -55 °C ~ +105 °C Voltage, capacitance 10V150 μF  Cathode indicator
Positive terminal	Capacitance tolerance 1 0 5 °C Last digit of 0 0 21 Month of manufacture Control no. Ex: Jan-Sep.: 1-9, Oct.: O, Nov: N, Dec: D	Capacitance tolerance M Last digit of year 0 7 2 6 7 Month of manufacture Control no. Ex: Jan-Sep.: 1-9, Oct.: O, Nov: N, Dec: D

RE Series

■ PACKAGE DIMENSION



$\phi D \times L$	ϕd	P	α
6.3×7.0	0.45	2.5	1.0
6.3×10	0.6	2.5	1.0
8×11.5	0.6	3.5	1.5
10×12.5	0.6	5.0	1.5

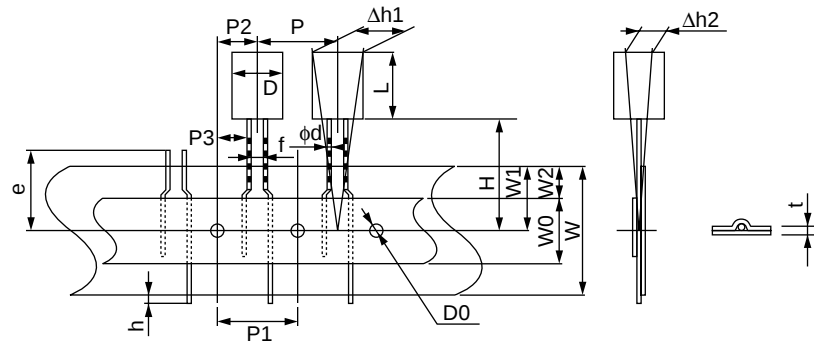
■ CLEANSING

The following are recommended for cleansing of boards after soldering.

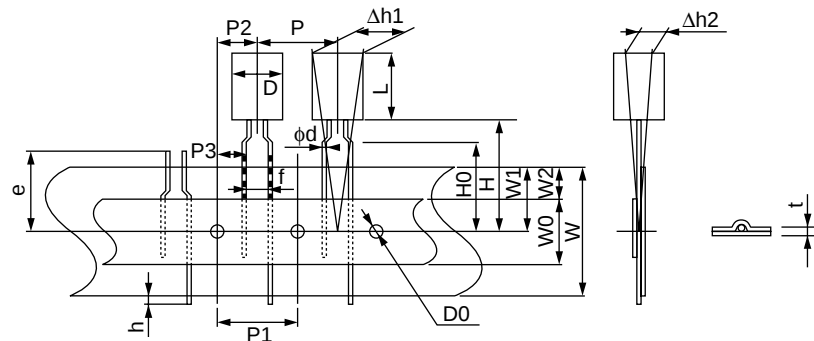
- High quality alcohol-based cleansers such as Pine Alpha, Clean Thru, or Techno Care
- Freon replacements such as AK225, or IPA
- User should verify effectiveness according to soldering conditions.
- Cleaning by immersion or ultrasound methods should not be done for more than five minutes.
- The temperature of the solution used for immersion should be 60 °C or lower.
- The solution used for immersion should be controlled to be kept clean.
- After cleansing, boards should not be stored in the atmosphere in which they were cleaned, and should not be sealed. Drying temperature should not exceed the maximum operating temperature of the board. Note that if boards are dried immediately after cleansing, sleeves may undergo secondary shrinkage.
- Users should consult with FUJITSU MEDIA DEVICE representatives regarding cleansing solutions and methods.

■ TAPING

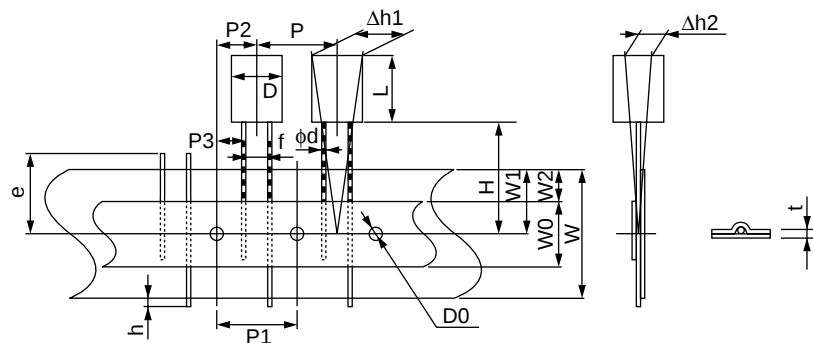
(1) 2.5-mm pitch taping ($\phi 6.3$)



(2) 5.0-mm pitch taping ($\phi 6.3$, $\phi 8$)



(3) 5.0-mm pitch taping ($\phi 10$)



• Taping Quantity

Case diameter	Quantity (per case)
$\phi 6.3$	2, 000
$\phi 8$	1, 000
$\phi 10$	500

RE Series

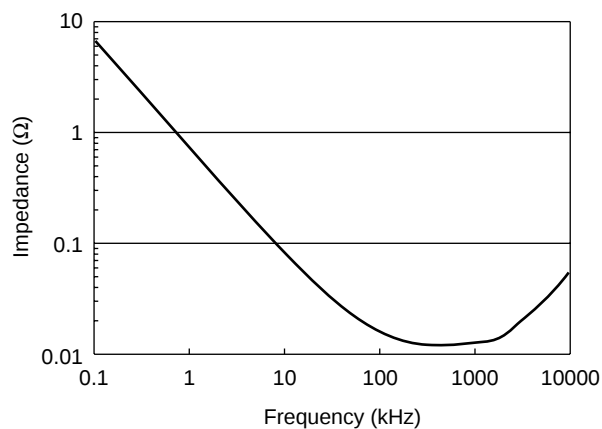
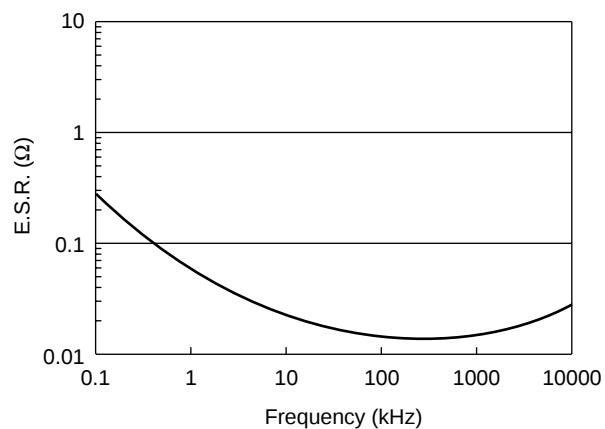
(Unit : mm)

Parameter	Symbol	Dimension			Tolerance
Case outside diameter	ϕD	6.3	8	10	+0.5 Max.
Lead diameter	ϕd	0.45	0.6	0.6	± 0.05
Lead pitch	f	2.5	5.0	5.0	+0.8 -0.2
Pitch between capacitors	P	12.7	12.7	12.7	± 1.0
Feed hole pitch	P1	12.7	12.7	12.7	± 0.3
Feed hole position offset	P2	6.35	6.4	6.4	± 0.5
Lead clinch height	H0	—	16.0	16.0	± 0.5
Product underside position	H	18.5	17.5	20.5	± 0.75
Backing width	W	18.0	18.0	18.0	+1.0 -0.5
Feed hole position offset	W1	9.0	9.0	9.0	± 0.5
Feed hole diameter	D0	4.0	4.0	4.0	± 0.2
Product slope	Δh	2.0	2.0	2.0	Max.
Tape thickness	t	0.7	0.7	0.7	± 0.2

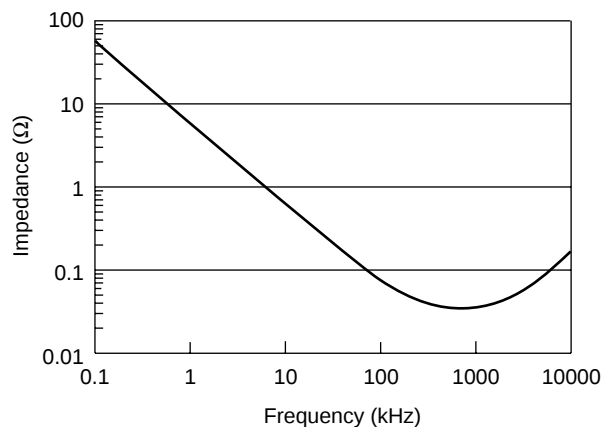
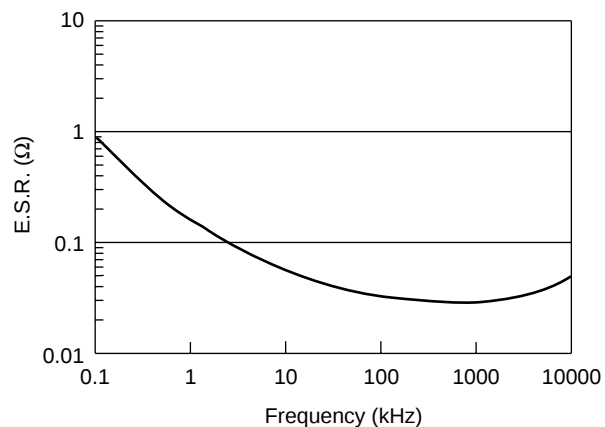
■ APPENDIX (Typ. values)

(1) Frequency characteristics

Model : FP-010RE221M-01R (10 V 220 μ F ϕ 10 $\times$ 12.5)

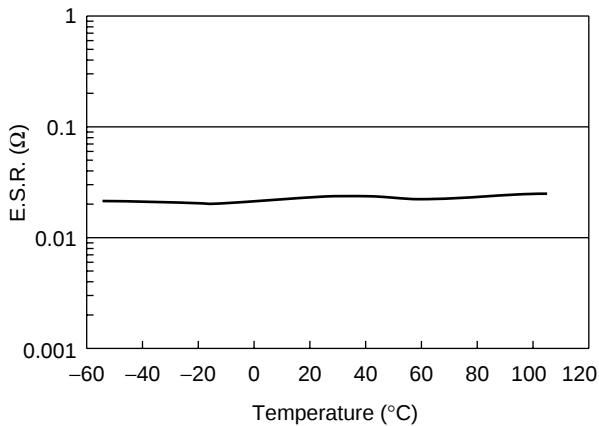
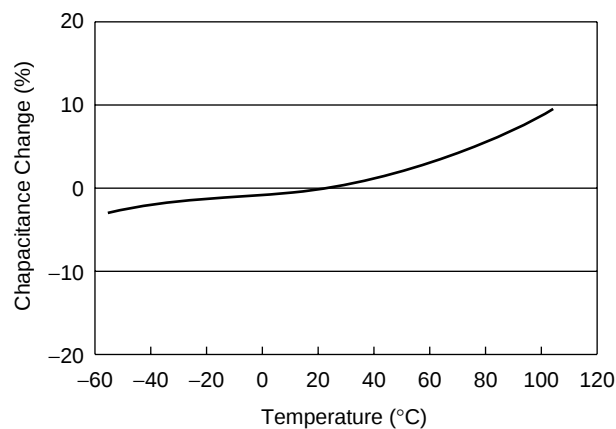


Model : FP-016RE330M-01R (16 V 33 μ F ϕ 6.3 $\times$ 7)



(2) Temperature Characteristics

Model : FP-010RE221M-01R (10 V 220 μ F ϕ 10 $\times$ 12.5)



RE Series

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