Surface Mount Type

Series: FK Type : V

■ Features

Endurance: 2000 to 5000h at105°C
Low impedance (40 to 60% less than FC series)
Miniaturized(30 to 50% less than FC series)
Vibration-proof product is available upon request.(φ8 ≦)
RoHS directive compliant(Parts No:EEV∗ φ12.5 ≦,EEE∗)

■ Specifications

Category temp. range	-55 to +105°C
Rated W.V. Range	6.3 to 100V .DC
Nominal Cap. Range	3.3 to 6800 μ F
Capacitance Tolerance	±20 % (120Hz/+20°C)
DC Leakage Current	I ≦ 0.01CV or 3(μA) After 2 minutes application of rated working voltage at +20°C. (Whichever is greater)
tan δ	Please see the attached standard products list

Characteristics at Low Temperature (Impedance ratio at 120 Hz)

W.V. (V)	6.3	10	16	25	35	50	63	80	100
Z(-25°C) / Z(+20°C)	2	2	2	2	2	2	2	2	2
Z(-40°C)/ Z(+20°C)	3	3	3	3	3	3	3	3	3
Z(-55°C)/ Z(+20°C)	4	4	4	3	3	3	3	3	3

Endurance

After applying rated working voltage at +105±2°C for 2000 hours (≧dia.12.5 and suffix "G" in dia.8 to 10 are 5000 hours)the capacitors shall meet the limits specified below. Post-test requirement at +20°C.

Capacitance change	±30% of initial measured value (Suffix "G" is 35%)
tan δ	≦200 % of initial specified value (Suffix "G" is 300%)
DC leakage current	≦initial specified value

Shelf Life

After storage for 1000 hours at +105±2 °C with no voltage applied and then being stabilized at +20°C, capacitors shall meet the limits specified in Endurance(With voltage treatment)

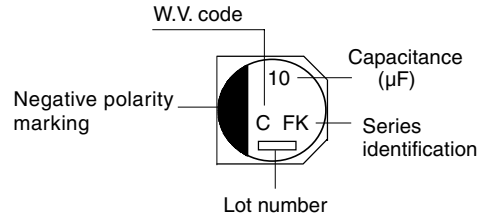
Resistance to Soldering Heat

After reflow soldering (Refer to page 86 for recommended temperature profile) and then being stabilized at +20°C, capacitor shall meet the following limits.

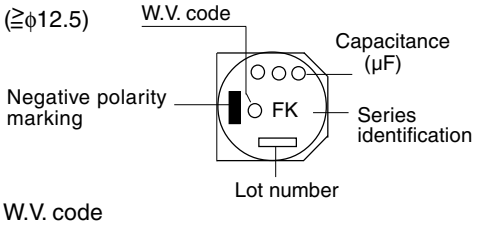
Capacitance change	±10% of initial measured value
tan δ	≦initial specified value
DC leakage current	≦initial specified value

■ Marking

Example.16V10μF
Marking color : BLACK



(≧φ12.5)



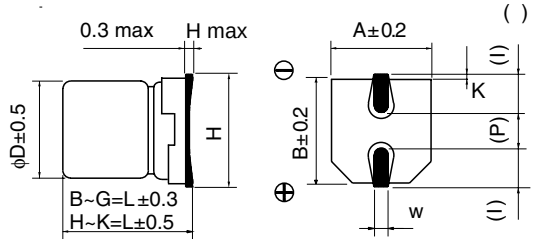
W.V. code

V	6.3	10	16	25	35
Code	j	A	C	E	V

V	50	63	80	100
Code	H	J	K	2A

■ Dimensions in mm (not to scale)

( ) reference size



Size code	D	L	A,B	H max.	I	W	P	K
B	4.0	5.8	4.3	5.5	1.8	0.65±0.1	1.0	0.35 -0.20 to +0.15
C	5.0	5.8	5.3	6.5	2.2	0.65±0.1	1.5	0.35 -0.20 to +0.15
D	6.3	5.8	6.6	7.8	2.6	0.65±0.1	1.8	0.35 -0.20 to +0.15
D8	6.3	7.7	6.6	7.8	2.6	0.65±0.1	1.8	0.35 -0.20 to +0.15
E	8.0	6.2	8.3	9.5	3.4	0.65±0.1	2.2	0.35 -0.20 to +0.15
F	8.0	10.2	8.3	10.0	3.4	0.90±0.2	3.1	0.70 ±0.20
G	10.0	10.2	10.3	12.0	3.5	0.90±0.2	4.6	0.70 ±0.20
H13	12.5	13.5	13.5	15.0	4.7	0.90±0.3	4.4	0.70 ±0.30
J16	16.0	16.5	17.0	19.0	5.5	1.20±0.3	6.7	0.70 ±0.30
K16	18.0	16.5	19.0	21.0	6.7	1.20±0.3	6.7	0.70 ±0.30

■ Case size VS Capacitance, Impedance and Ripple current

Impedance;(Ω/100kHz,+20°C),
Ripple current;(mA r.m.s./100kHz+105°C)

W.V. / Capacitance (μF)	6.3			10			16		
	Size	Impedance	Ripple current	Size	Impedance	Ripple current	Size	Impedance	Ripple current
10							B	1.35	90
22	B	1.35	90	B	1.35	90	C(B)	0.7(1.35)	160(90)
33				C(B)	0.7(1.35)	160(90)			
47	C(B)	0.7(1.35)	160(90)				D(C)	0.36(0.7)	240(160)
68							D	0.36	240
100	D(C)	0.36(0.7)	240(160)				D	0.36	240
150				D	0.36	240	D8	0.34	280
220	D	0.36	240	D8	0.34	280	D8	0.34	280
				E	0.26	300	E	0.26	300
330	D8	0.34	280	◎F	0.16	600	◎F	0.16	600
	E	0.26	300						
470	◎F	0.16	600	◎F	0.16	600	◎F	0.16	600
680				◎F	0.16	600	◎G	0.08	850
1000	◎F	0.16	600	◎G	0.08	850			
1500	◎G	0.08	850				H13	0.06	1100
2200				H13	0.06	1100			
3300	H13	0.06	1100				J16	0.035	1800
4700				J16	0.035	1800	K16	0.033	2060
6800	J16	0.035	1800	K16	0.033	2060			

W.V. / Capacitance (μF)	25			35			50		
	Size	Impedance	Ripple current	Size	Impedance	Ripple current	Size	Impedance	Ripple current
4.7				B	1.35	90	B	2.9	60
10	B	1.35	90	C(B)	0.7(1.35)	160(90)	D(C)	0.88(1.52)	165(85)
22	C	0.7	160	C	0.7	160	D	0.88	165
33	D(C)	0.36(0.7)	240(160)	D	0.36	240	D8	0.68	195
							E	0.68	195
47	D	0.36	240	D	0.36	240	E(D8)	0.68	195
68	D	0.36	240	D8	0.34	280			
100	D8	0.34	280	D8	0.34	280	◎F	0.34	350
	E	0.26	300	◎F	0.16	600			
150	◎F	0.16	600	◎F	0.16	600	◎G	0.18	670
220	◎F	0.16	600	◎F	0.16	600	◎G	0.18	670
330	◎F	0.16	600	◎G	0.08	850	H13	0.12	900
390							H13	0.12	900
470	◎G	0.08	850	H13	0.06	1100	J16	0.073	1610
680				H13	0.06	1100	J16	0.073	1610
1000	H13	0.06	1100	J16	0.035	1800	J16	0.073	1610
1500				J16	0.035	1800			
2200	J16	0.035	1800						
3300	K16	0.033	2060						

W.V. / Capacitance (μF)	63			80			100		
	Size	Impedance	Ripple current	Size	Impedance	Ripple current	Size	Impedance	Ripple current
3.3				C	5	25			
4.7	C	3	50	D	3	40			
10	D	1.5	80	D8	2.4	60			
				E	2.4	60			
22	D8	1.2	120	F	1.3	130	F	1.3	130
	E	1.2	120	F	1.3	130			
33	F	0.65	250	F	1.3	130	G	0.7	200
47	F	0.65	250	G	0.7	200	H13	0.32	500
68	F	0.65	250	H13	0.32	500	H13	0.32	500
100	G	0.35	400	H13	0.32	500	J16	0.17	793
150	H13	0.16	800	H13	0.32	500	J16	0.17	793
220	H13	0.16	800				K16	0.153	917
330				J16	0.17	793	K16	0.153	917
470	J16	0.082	1410	K16	0.153	917			
680	K16	0.080	1690						

( );Miniaturization type ◎Life time 5000h available upon request(suffix : G)

■ Standard Products

W.V. (V)	Cap. (±20%) (µF)	Case size Dia. (mm)	Length (mm)	Size Code	Specification Ripple current (100kHz) (+105°C) (mA)	Impedance (100kHz) (+20°C) (Ω)	tan δ (120Hz) (+20°C)	Part No. (RoHS: not compliant)	Reflow	Part No. (RoHS: compliant)	Reflow	Min. Packaging Q'ty Taping (pcs)
6.3	22	4	5.8	B	90	1.35	0.26	EEVFK0J220R	(1)	EEEFK0J220R	(4)	2000
	47	4	5.8	B	90	1.35	0.26	EEVFK0J470UR	(1)	EEEFK0J470UR	(4)	2000
		5	5.8	C	160	0.70	0.26	EEVFK0J470R	(1)	EEEFK0J470R	(4)	1000
	100	5	5.8	C	160	0.70	0.26	EEVFK0J101UR	(1)	EEEFK0J101UR	(4)	1000
		6.3	5.8	D	240	0.36	0.26	EEVFK0J101P	(1)	EEEFK0J101P	(4)	1000
	220	6.3	5.8	D	240	0.36	0.26	EEVFK0J221P	(1)	EEEFK0J221P	(4)	1000
	330	6.3	7.7	D8	280	0.34	0.26	EEVFK0J331XP	(1)	EEEFK0J331XP	(4)	900
		8	6.2	E	300	0.26	0.26	EEVFK0J331P	(2)	EEEFK0J331P	(5)	1000
	470	8	10.2	F	600	0.16	0.26	EEVFK0J471P	(2)	EEEFK0J471P	(5)	500
	1000	8	10.2	F	600	0.16	0.26	EEVFK0J102P	(2)	EEEFK0J102P	(5)	500
	1500	10	10.2	G	850	0.08	0.26	EEVFK0J152P	(2)	EEEFK0J152P	(5)	500
	3300	12.5	13.5	H13	1100	0.06	0.30			EEVFK0J332Q	(2)	200
	6800	16	16.5	J16	1800	0.035	0.36			EEVFK0J682M	(2)	125
10	22	4	5.8	B	90	1.35	0.19	EEVFK1A220R	(1)	EEEFK1A220R	(4)	2000
	33	4	5.8	B	90	1.35	0.19	EEVFK1A330UR	(1)	EEEFK1A330UR	(4)	2000
		5	5.8	C	160	0.70	0.19	EEVFK1A330R	(1)	EEEFK1A330R	(4)	1000
	150	6.3	5.8	D	240	0.36	0.19	EEVFK1A151P	(1)	EEEFK1A151P	(4)	1000
	220	6.3	7.7	D8	280	0.34	0.19	EEVFK1A221XP	(1)	EEEFK1A221XP	(4)	900
		8	6.2	E	300	0.26	0.19	EEVFK1A221P	(2)	EEEFK1A221P	(5)	1000
	330	8	10.2	F	600	0.16	0.19	EEVFK1A331P	(2)	EEEFK1A331P	(5)	500
	470	8	10.2	F	600	0.16	0.19	EEVFK1A471P	(2)	EEEFK1A471P	(5)	500
	680	8	10.2	F	600	0.16	0.19	EEVFK1A681P	(2)	EEEFK1A681P	(5)	500
	1000	10	10.2	G	850	0.08	0.19	EEVFK1A102P	(2)	EEEFK1A102P	(5)	500
	2200	12.5	13.5	H13	1100	0.06	0.21			EEVFK1A222Q	(2)	200
	4700	16	16.5	J16	1800	0.035	0.25			EEVFK1A472M	(2)	125
	6800	18	16.5	K16	2060	0.033	0.29			EEVFK1A682M	(2)	125
16	10	4	5.8	B	90	1.35	0.16	EEVFK1C100R	(1)	EEEFK1C100R	(4)	2000
	22	4	5.8	B	90	1.35	0.16	EEVFK1C220UR	(1)	EEEFK1C220UR	(4)	2000
		5	5.8	C	160	0.70	0.16	EEVFK1C220R	(1)	EEEFK1C220R	(4)	1000
	47	5	5.8	C	160	0.70	0.16	EEVFK1C470UR	(1)	EEEFK1C470UR	(4)	1000
		6.3	5.8	D	240	0.36	0.16	EEVFK1C470P	(1)	EEEFK1C470P	(4)	1000
	68	6.3	5.8	D	240	0.36	0.16	EEVFK1C680P	(1)	EEEFK1C680P	(4)	1000
	100	6.3	5.8	D	240	0.36	0.16	EEVFK1C101P	(1)	EEEFK1C101P	(4)	1000
	150	6.3	7.7	D8	280	0.34	0.16	EEVFK1C151XP	(1)	EEEFK1C151XP	(4)	900
	220	6.3	7.7	D8	280	0.34	0.16	EEVFK1C221XP	(1)	EEEFK1C221XP	(4)	900
		8	6.2	E	300	0.26	0.16	EEVFK1C221P	(2)	EEEFK1C221P	(5)	1000
	330	8	10.2	F	600	0.16	0.16	EEVFK1C331P	(2)	EEEFK1C331P	(5)	500
	470	8	10.2	F	600	0.16	0.16	EEVFK1C471P	(2)	EEEFK1C471P	(5)	500
	680	10	10.2	G	850	0.08	0.16	EEVFK1C681P	(2)	EEEFK1C681P	(5)	500
	1500	12.5	13.5	H13	1100	0.06	0.16			EEVFK1C152Q	(2)	200
	3300	16	16.5	J16	1800	0.035	0.20			EEVFK1C332M	(2)	125
	4700	18	16.5	K16	2060	0.033	0.22			EEVFK1C472M	(2)	125
25	10	4	5.8	B	90	1.35	0.14	EEVFK1E100R	(1)	EEEFK1E100R	(4)	2000
	22	5	5.8	C	160	0.7	0.14	EEVFK1E220R	(1)	EEEFK1E220R	(4)	1000

An explanation of the taping dimensions can be found on page 84.
Reflow profiles can be found on page 86.
Endurance: 105°C 2000h - 5000h

■ Standard Products

W.V.	Cap. (±20%) (μF)	Case size Dia. (mm)	Length (mm)	Size Code	Specification Ripple current (100kHz) (+105°C) (mA)	Impedance (100kHz) (+20°C) (Ω)	tan δ (120Hz) (+20°C)	Part No. (RoHS: not compliant)	Reflow	Part No. (RoHS: compliant)	Reflow	Min. Packaging Q'ty Taping (pcs)
25	33	5	5.8	C	160	0.7	0.14	EEVFK1E330UR	(1)	EEEFK1E330UR	(4)	1000
		6.3	5.8	D	240	0.36	0.14	EEVFK1E330P	(1)	EEEFK1E330P	(4)	1000
	47	6.3	5.8	D	240	0.36	0.14	EEVFK1E470P	(1)	EEEFK1E470P	(4)	1000
	68	6.3	5.8	D	240	0.36	0.14	EEVFK1E680P	(1)	EEEFK1E680P	(4)	1000
	100	6.3	7.7	D8	280	0.34	0.14	EEVFK1E101XP	(1)	EEEFK1E101XP	(4)	900
		8	6.2	E	300	0.26	0.14	EEVFK1E101P	(2)	EEEFK1E101P	(5)	1000
	150	8	10.2	F	600	0.16	0.14	EEVFK1E151P	(2)	EEEFK1E151P	(5)	500
	220	8	10.2	F	600	0.16	0.14	EEVFK1E221P	(2)	EEEFK1E221P	(5)	500
	330	8	10.2	F	600	0.16	0.14	EEVFK1E331P	(2)	EEEFK1E331P	(5)	500
	470	10	10.2	G	850	0.08	0.14	EEVFK1E471P	(2)	EEEFK1E471P	(5)	500
	1000	12.5	13.5	H13	1100	0.06	0.14		(2)	EEVFK1E102Q	(2)	200
	2200	16	16.5	J16	1800	0.035	0.16		(2)	EEVFK1E222M	(2)	125
	3300	18	16.5	K16	2060	0.033	0.18		(2)	EEVFK1E332M	(2)	125
35	4.7	4	5.8	B	90	1.35	0.12	EEVFK1V4R7R	(1)	EEEFK1V4R7R	(4)	2000
	10	4	5.8	B	90	1.35	0.12	EEVFK1V100UR	(1)	EEEFK1V100UR	(4)	2000
		5	5.8	C	160	0.70	0.12	EEVFK1V100R	(1)	EEEFK1V100R	(4)	1000
	22	5	5.8	C	160	0.70	0.12	EEVFK1V220R	(1)	EEEFK1V220R	(4)	1000
	33	6.3	5.8	D	240	0.36	0.12	EEVFK1V330P	(1)	EEEFK1V330P	(4)	1000
	47	6.3	5.8	D	240	0.36	0.12	EEVFK1V470P	(1)	EEEFK1V470P	(4)	1000
	68	6.3	7.7	D8	280	0.34	0.12	EEVFK1V680XP	(1)	EEEFK1V680XP	(4)	900
	100	6.3	7.7	D8	280	0.34	0.12	EEVFK1V101XP	(1)	EEEFK1V101XP	(4)	900
		8	10.2	F	600	0.16	0.12	EEVFK1V101P	(2)	EEEFK1V101P	(5)	500
	150	8	10.2	F	600	0.16	0.12	EEVFK1V151P	(2)	EEEFK1V151P	(5)	500
	220	8	10.2	F	600	0.16	0.12	EEVFK1V221P	(2)	EEEFK1V221P	(5)	500
	330	10	10.2	G	850	0.08	0.12	EEVFK1V331P	(2)	EEEFK1V331P	(5)	500
	470	12.5	13.5	H13	1100	0.06	0.12			EEVFK1V471Q	(2)	200
	680	12.5	13.5	H13	1100	0.06	0.12			EEVFK1V681Q	(2)	200
	1000	16	16.5	J16	1800	0.035	0.12			EEVFK1V102M	(2)	125
	1500	16	16.5	J16	1800	0.035	0.12			EEVFK1V152M	(2)	125
50	4.7	4	5.8	B	60	2.9	0.10	EEVFK1H4R7R	(1)	EEEFK1H4R7R	(4)	2000
	10	5	5.8	C	85	1.52	0.10	EEVFK1H100UR	(1)	EEEFK1H100UR	(4)	1000
		6.3	5.8	D	165	0.88	0.10	EEVFK1H100P	(1)	EEEFK1H100P	(4)	1000
	22	6.3	5.8	D	165	0.88	0.10	EEVFK1H220P	(1)	EEEFK1H220P	(4)	1000
	33	6.3	7.7	D8	195	0.68	0.10	EEVFK1H330XP	(1)	EEEFK1H330XP	(4)	900
		8	6.2	E	195	0.68	0.10	EEVFK1H330P	(2)	EEEFK1H330P	(5)	1000
	47	6.3	7.7	D8	195	0.68	0.10	EEVFK1H470XP	(1)	EEEFK1H470XP	(4)	900
		8	6.2	E	195	0.68	0.10	EEVFK1H470P	(2)	EEEFK1H470P	(5)	1000
	100	8	10.2	F	350	0.34	0.10	EEVFK1H101P	(2)	EEEFK1H101P	(5)	500
	150	10	10.2	G	670	0.18	0.10	EEVFK1H151P	(2)	EEEFK1H151P	(5)	500
	220	10	10.2	G	670	0.18	0.10	EEVFK1H221P	(2)	EEEFK1H221P	(5)	500
	330	12.5	13.5	H13	900	0.12	0.10			EEVFK1H331Q	(2)	200
	390	12.5	13.5	H13	900	0.12	0.10			EEVFK1H391Q	(2)	200
	470	16	16.5	J16	1610	0.073	0.10			EEVFK1H471M	(2)	125
	680	16	16.5	J16	1610	0.073	0.10			EEVFK1H681M	(2)	125
	1000	16	16.5	J16	1610	0.073	0.10			EEVFK1H102M	(2)	125

An explanation of the taping dimensions can be found on page 84.
Reflow profiles can be found on page 86.
Endurance: 105°C 2000h - 5000h

■ Standard Products

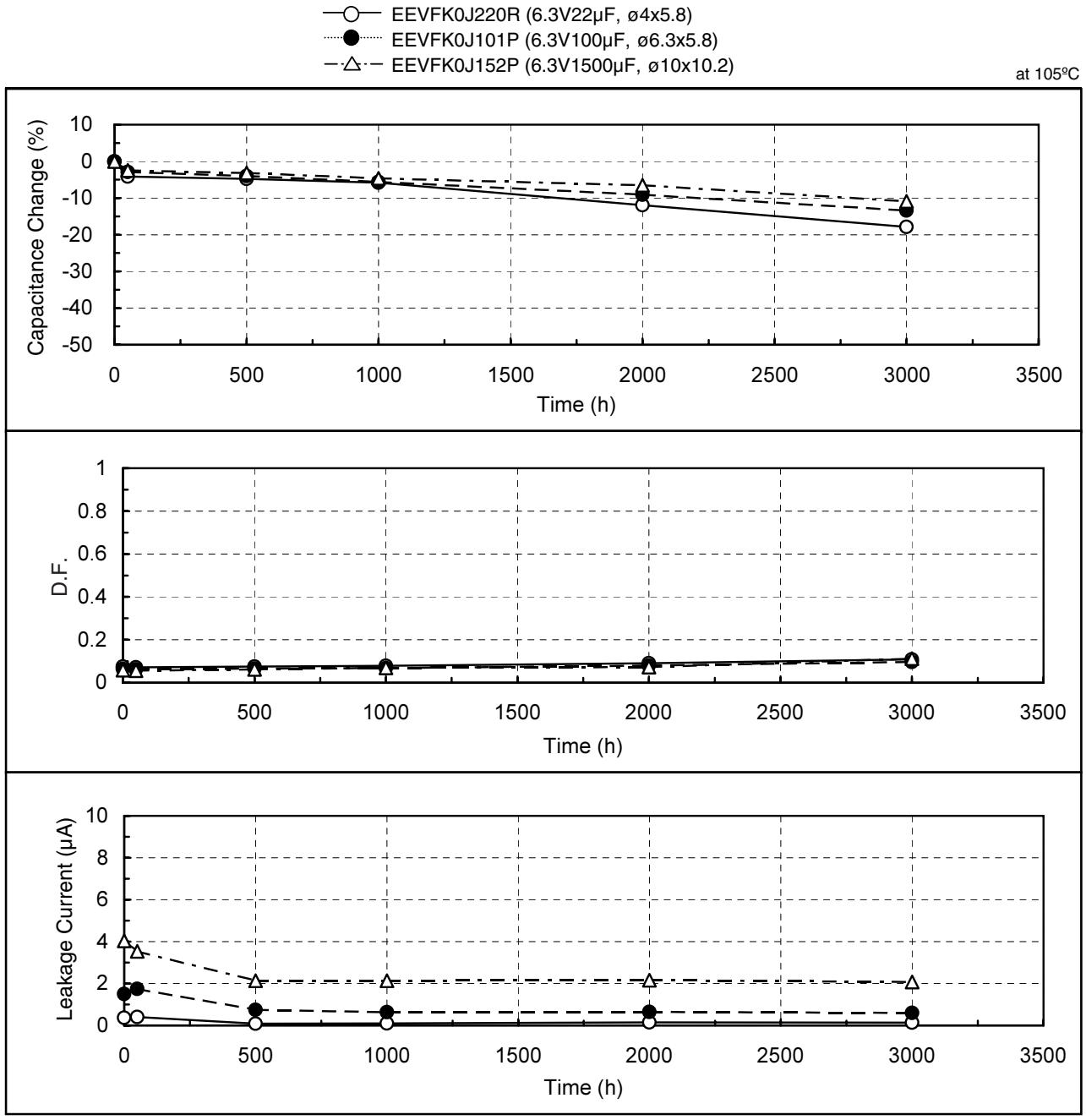
W.V. (V)	Cap. (±20%) (μF)	Case size Dia. (mm)	Length (mm)	Size Code	Specification Ripple current (100kHz) (+105°C) (mA)	Impedance (100kHz) (+20°C) (Ω)	tan δ (120Hz) (+20°C)	Part No. (RoHS: not compliant)	Reflow	Part No. (RoHS: compliant)	Reflow	Min. Packaging Q'ty Taping (pcs)
63	4.7	5	5.8	C	50	3.0	0.08	EEVFK1J4R7R	(1)	EEEFK1J4R7R	(4)	1000
	10	6.3	5.8	D	80	1.5	0.08	EEVFK1J100P	(1)	EEEFK1J100P	(4)	1000
	22	6.3	7.7	D8	120	1.2	0.08	EEVFK1J220XP	(1)	EEEFK1J220XP	(4)	900
		8	6.2	E	120	1.2	0.08	EEVFK1J220P	(2)	EEEFK1J220P	(5)	1000
	33	8	10.2	F	250	0.65	0.08	EEVFK1J330P	(2)	EEEFK1J330P	(5)	500
	47	8	10.2	F	250	0.65	0.08	EEVFK1J470P	(2)	EEEFK1J470P	(5)	500
	68	8	10.2	F	250	0.65	0.08	EEVFK1J680UP	(2)	EEEFK1J680UP	(5)	500
	100	10	10.2	G	400	0.35	0.08	EEVFK1J101P	(2)	EEEFK1J101P	(5)	500
	150	12.5	13.5	H13	800	0.16	0.08			EEVFK1J151Q	(2)	200
	220	12.5	13.5	H13	800	0.16	0.08			EEVFK1J221Q	(2)	200
	470	16	16.5	J16	1410	0.082	0.08			EEVFK1J471M	(2)	125
	680	18	16.5	K16	1690	0.08	0.08			EEVFK1J681M	(2)	125
80	3.3	5	5.8	C	25	5.0	0.08	EEVFK1K3R3R	(1)	EEEFK1K3R3R	(4)	1000
	4.7	6.3	5.8	D	40	3.0	0.08	EEVFK1K4R7P	(1)	EEEFK1K4R7P	(4)	1000
	10	6.3	7.7	D8	60	2.4	0.08	EEVFK1K100XP	(1)	EEEFK1K100XP	(4)	900
		8	6.2	E	60	2.4	0.08	EEVFK1K100P	(2)	EEEFK1K100P	(5)	1000
	22	8	10.2	F	130	1.3	0.08	EEVFK1K220P	(2)	EEEFK1K220P	(5)	500
	33	8	10.2	F	130	1.3	0.08	EEVFK1K330P	(2)	EEEFK1K330P	(5)	500
	47	10	10.2	G	200	0.7	0.08	EEVFK1K470P	(2)	EEEFK1K470P	(5)	500
	68	12.5	13.5	H13	500	0.32	0.08			EEVFK1K680Q	(2)	200
	100	12.5	13.5	H13	500	0.32	0.08			EEVFK1K101Q	(2)	200
	150	12.5	13.5	H13	500	0.32	0.08			EEVFK1K151Q	(2)	200
	330	16	16.5	J16	793	0.17	0.08			EEVFK1K331M	(2)	125
	470	18	16.5	K16	917	0.153	0.08			EEVFK1K471M	(2)	125
100	22	8.0	10.2	F	130	1.3	0.07	EEVFK2A220P	(2)	EEEFK2A220P	(5)	500
	33	10	10.2	G	200	0.7	0.07	EEVFK2A330P	(2)	EEEFK2A330P	(5)	500
	47	12.5	13.5	H13	500	0.32	0.07			EEVFK2A470Q	(2)	200
	68	12.5	13.5	H13	500	0.32	0.07			EEVFK2A680Q	(2)	200
	100	16	16.5	J16	793	0.17	0.07			EEVFK2A101M	(2)	125
	150	16	16.5	J16	793	0.17	0.07			EEVFK2A151M	(2)	125
	220	18	16.5	K16	917	0.153	0.07			EEVFK2A221M	(2)	125
	330	18	16.5	K16	917	0.153	0.07			EEVFK2A331M	(2)	125

An explanation of the taping dimensions can be found on page 84.
Reflow profiles can be found on page 86.
Endurance: 105°C 2000h - 5000h

■ Frequency Correction Factor of Rated Ripple Current

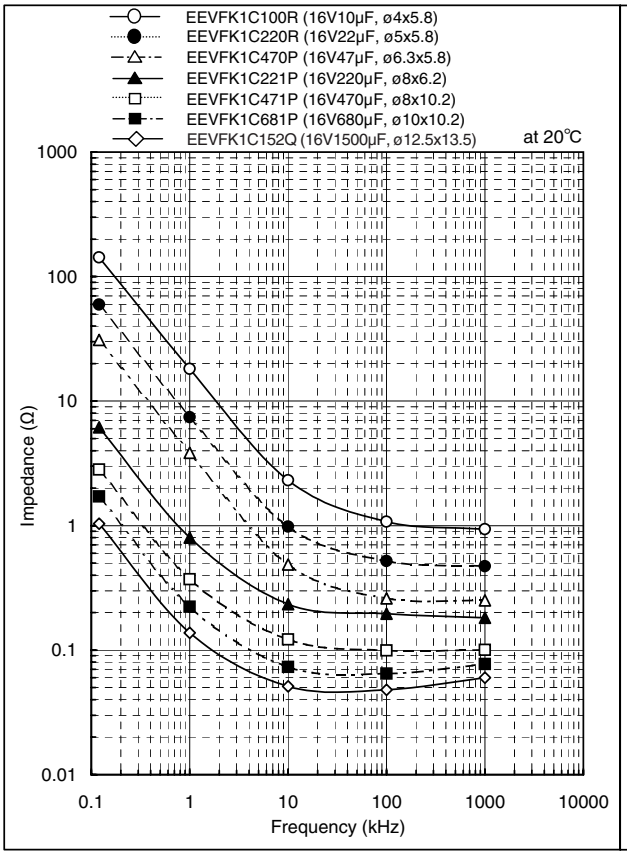
	Frequency (Hz)				
	50,60	120	1k	10k	100k~
coefficient	0.70	0.75	0.90	0.95	1.00

■ Endurance

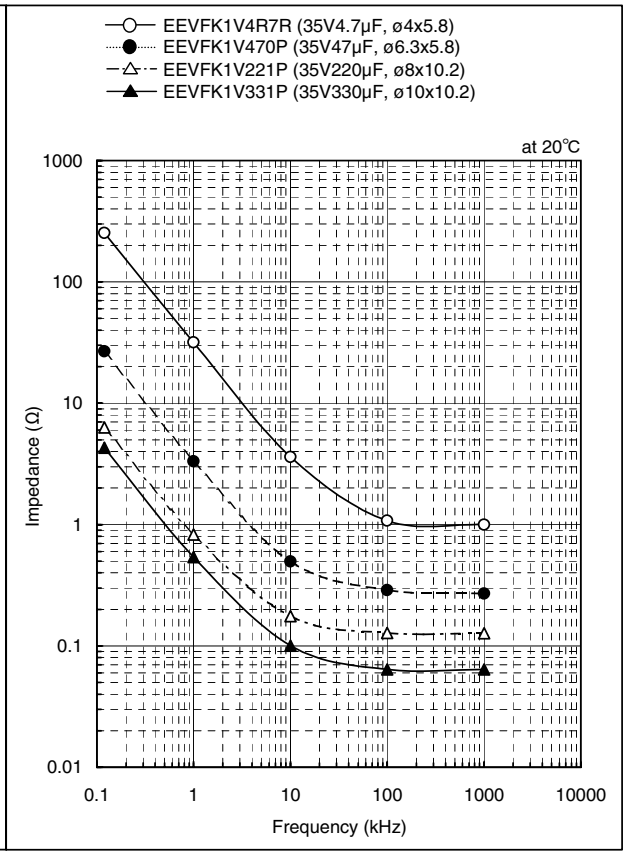


■ Frequency Characteristics (Impedance)

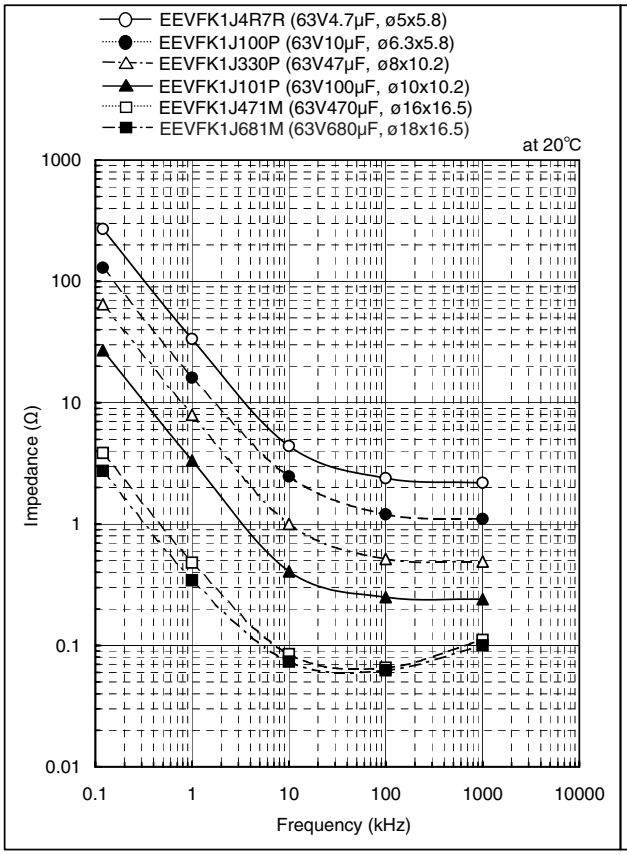
● 16WV



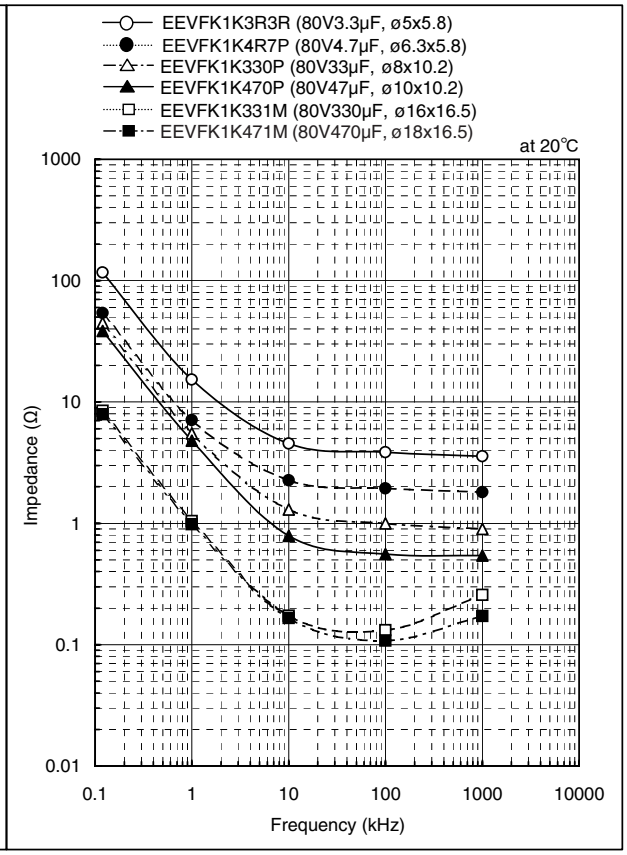
● 35WV



● 63WV

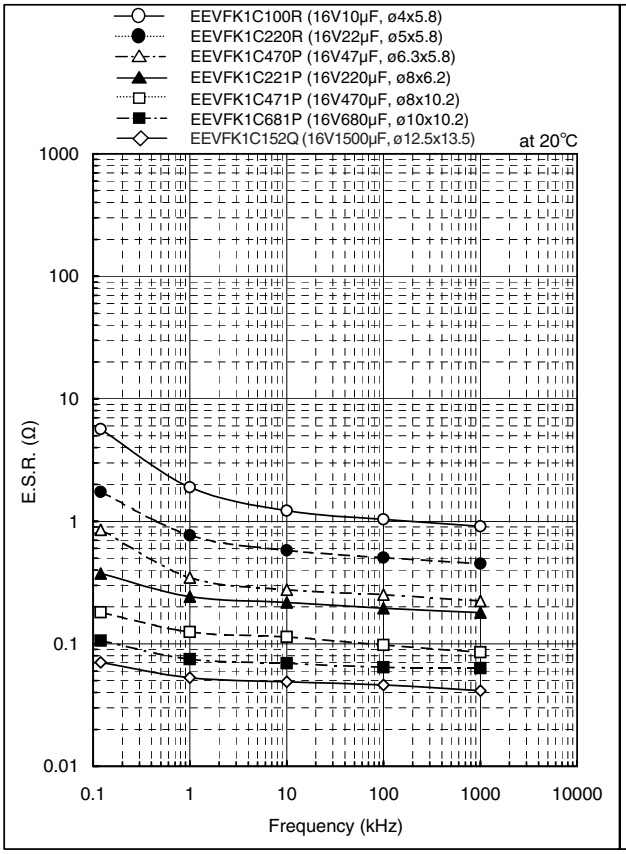


● 80WV

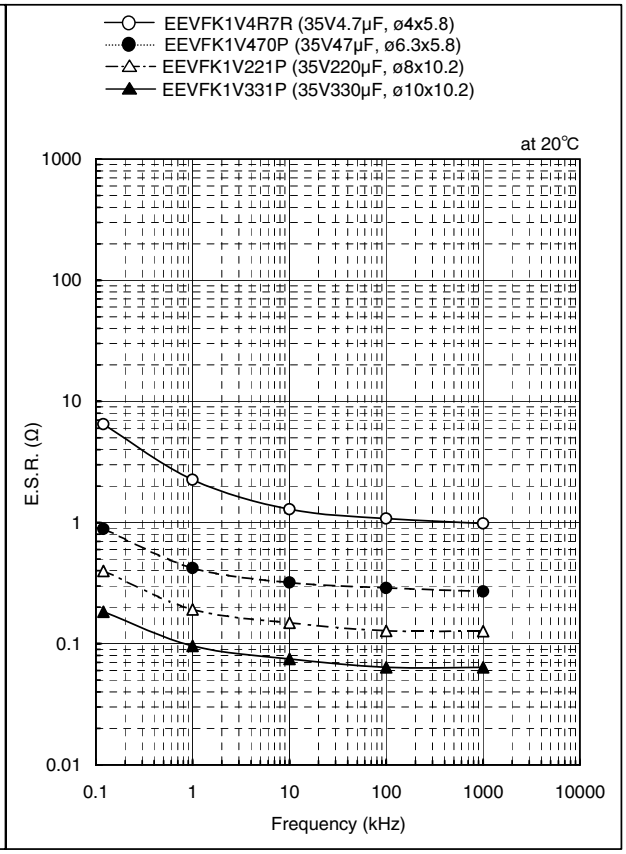


■ Frequency Characteristics (ESR)

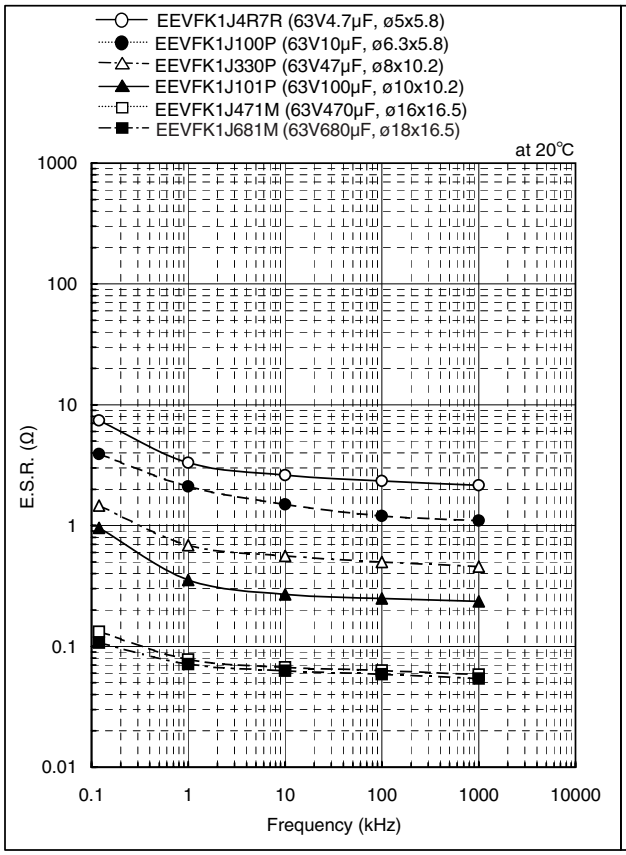
● 16WV



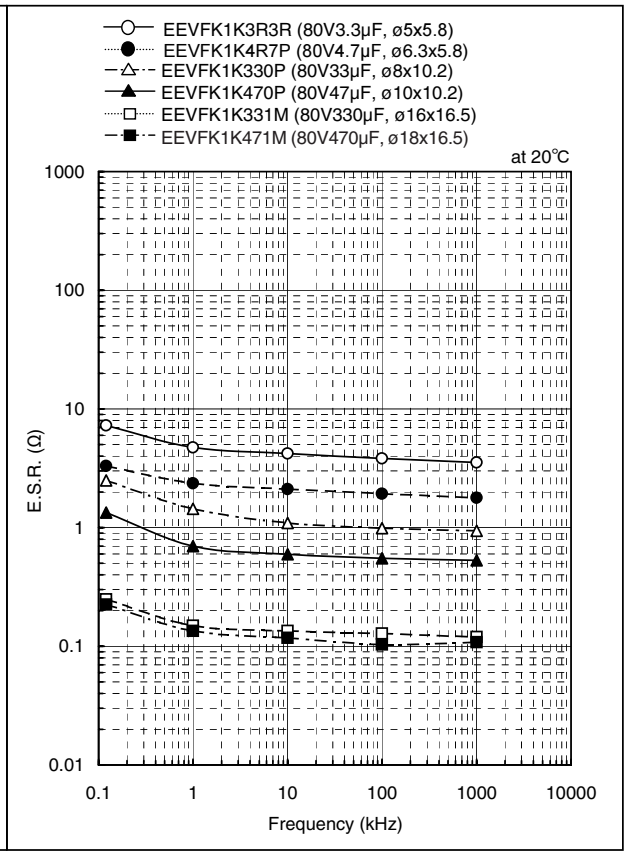
● 35WV



● 63WV

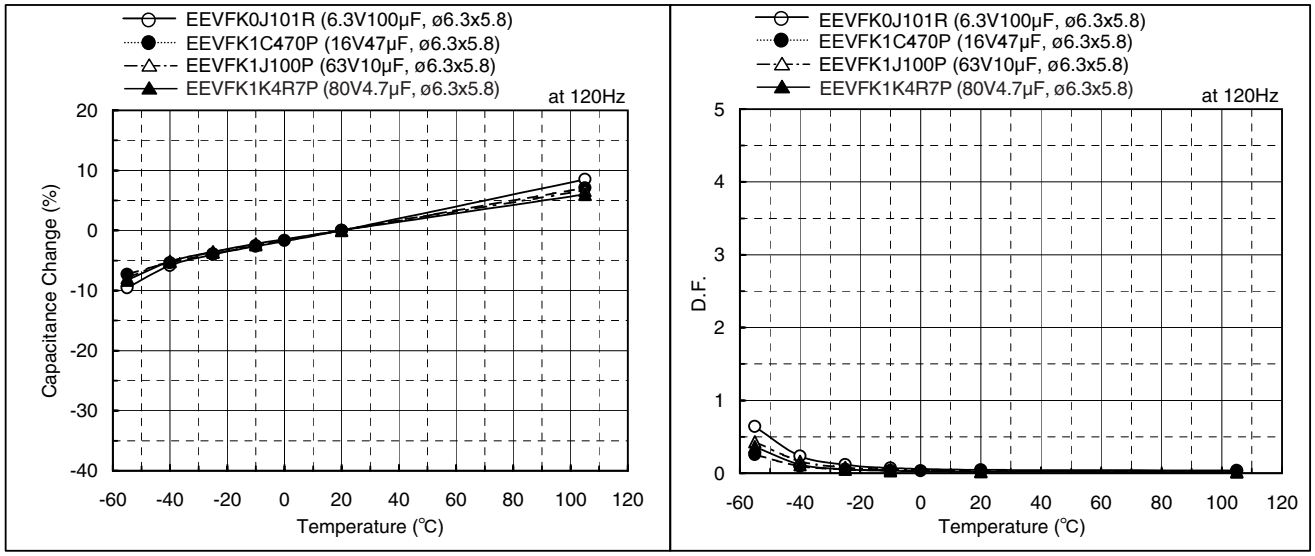


● 80WV

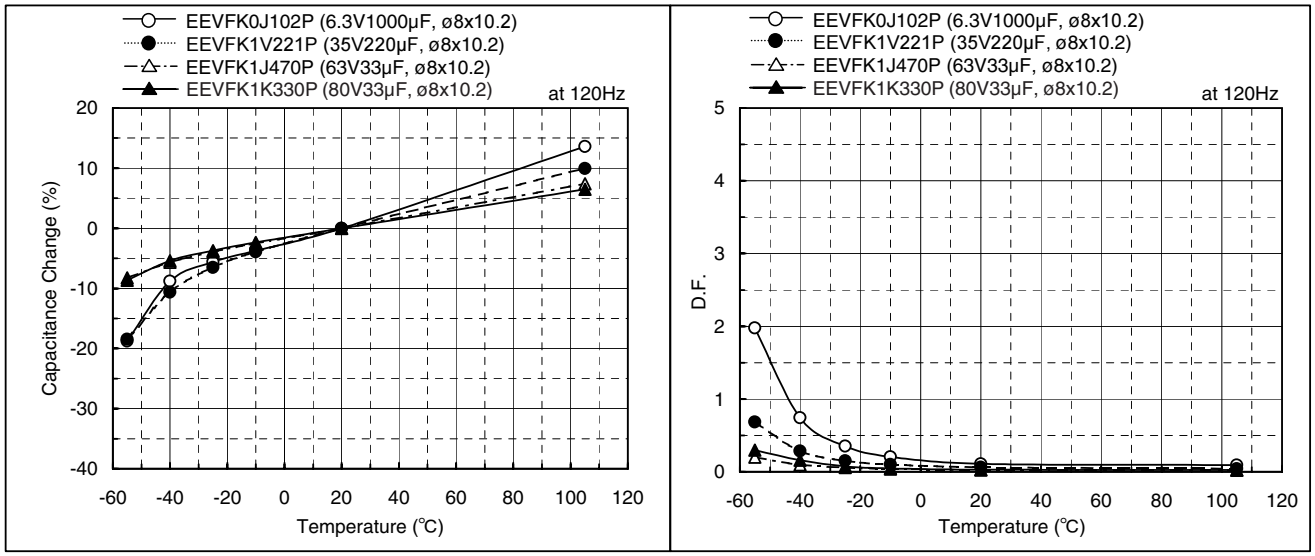


■ Temperature Characteristics

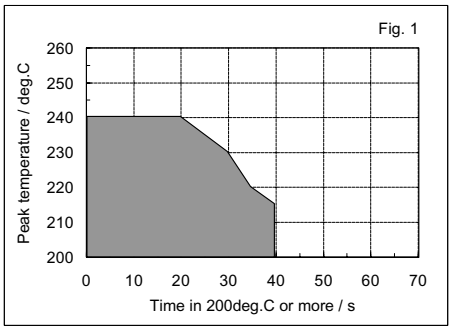
● ø6.3 x 5.8

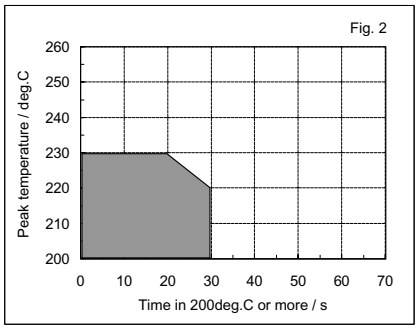


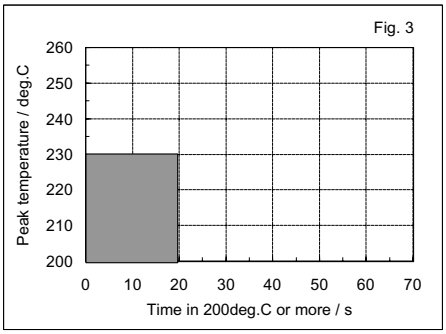
● ø8 x 10.2

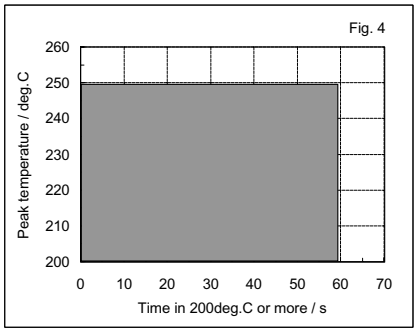


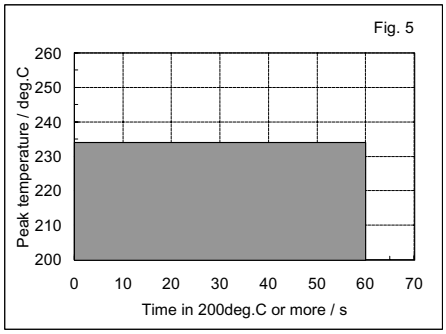
Pre-fix	Suffix	Case Diameter	RoHS Compliant	Terminal Finish	Reflow Condition		Reflow Chart
					Peak Temperature	Time above 200	
ECE-V	R	3mm to 5mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	6mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	8mm to 10mm	No	Sn-Pb	230 for 5 seconds	20 seconds	(2) Fig.2
EEV-	R	4mm to 5mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	6mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	8mm to 10mm	No	Sn-Pb	230 for 5 seconds	20 seconds	(2) Fig.2
	Q	12.5mm	Yes	Sn	230 for 5 seconds	20 seconds	(2) Fig.2 (Except for EB series)
							(3) Fig.3 (EB series only)
	M	16mm to 18mm	Yes	Sn	230 for 5 seconds	20 seconds	(2) Fig.2 (Except for EB series)
							(3) Fig.3 (EB series only)
EEE-	R	3mm to 5mm	Yes	Sn-Bi	250 for 5 seconds	60 seconds	(4) Fig.4
	P	6mm	Yes	Sn-Bi	250 for 5 seconds	60 seconds	(4) Fig.4
	P	8mm to 10mm	Yes	Sn-Bi	235 for 5 seconds	60 seconds	(5) Fig.5





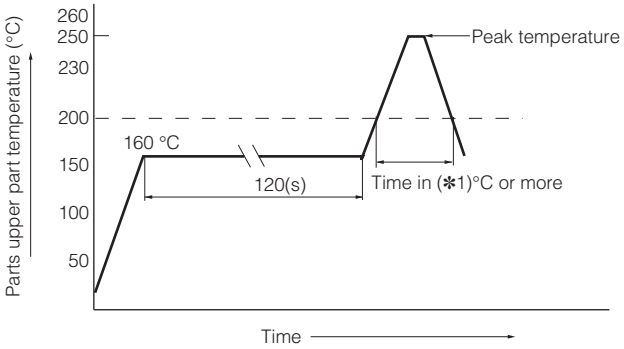






■ Reflow guaranteed condition

● RoHS compliant



■ Lead-Free reflow

Reflow No.	Fig. (1)	Fig. (2)	Fig. (3)	Fig. (4)
Category	ϕ3 to ϕ6.3	ϕ8 to ϕ10	ϕ12.5 to ϕ18	EB series (ϕ10 to ϕ18)
Peak temperature	250 °C	235 °C	230 °C (220 °C)	230 °C
Time in peak temperature	5 s	5 s	5 s (5 s)	5 s
Time in (✻1) °C or more	≧200 °C 60 s	≧200 °C 60 s	≧200 °C 20 s (30 s)	≧200 °C 20 s
Time of reflow	1 time	1 time	1 time	1 time

■ High temperature Lead-Free reflow

Reflow No.	Fig. (5)	Fig. (6)		Fig. (7)		Fig. (8)	
Category	ϕ4 to ϕ6.3	ϕ8 to ϕ10		ϕ8 to ϕ10		ϕ6.3 to ϕ10 (TK・TP series)	
Peak temperature	260 °C (255 °C)	245 °C	260 °C	250 °C	260 °C	255 °C	260 °C
Time in peak temperature	≧250 °C 5 s (10 s)	≧240 °C 10 s	≧250 °C 5 s	≧240 °C 10 s	≧250 °C 5 s	≧250 °C 30 s	≧250 °C 20 s
Time in (✻1) °C or more	≧230 °C 30 s	≧230 °C 30 s	≧230 °C 30 s	≧230 °C 30 s	≧230 °C 30 s	≧230 °C 40 s	≧230 °C 30 s
	≧217 °C 40 s	≧217 °C 40 s	≧217 °C 40 s	≧217 °C 40 s	≧217 °C 40 s	≧217 °C 65 s	≧217 °C 65 s
	≧200 °C 70 s	≧200 °C 70 s	≧200 °C 70 s	≧200 °C 70 s	≧200 °C 70 s	≧200 °C 90 s	≧200 °C 70 s
Time of reflow	2 times	2 times	1 time	2 times	1 time	2 times	2 times

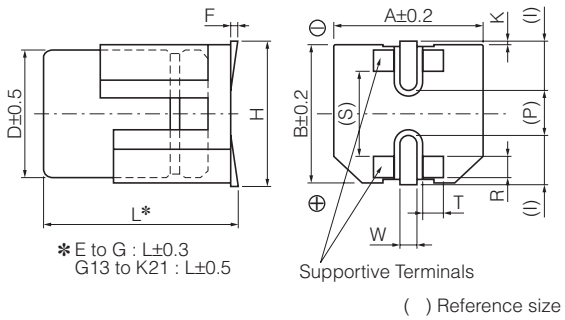
Reflow No.	Fig. (9)	Fig. (10)	Fig. (11)
Category	ϕ12.5 to ϕ18 (FK, TK, HD series) 6.3 V to 35 V	ϕ12.5 to ϕ18 (FK series) 50 V to 63 V (TK series) 50 V	ϕ12.5 to ϕ18 (FK series) 80 V to 100 V (TK series) 63 V to 100 V
Peak temperature	245 °C	245 °C	245 °C
Time in peak temperature	≧240 °C 30 s	≧240 °C 5 s	≧240 °C 5 s
Time in (✻1) °C or more	≧217 °C 90 s	≧217 °C 30 s	≧217 °C 30 s
Time of reflow	2 times	2 times	1 time

✻ For reflow, use a thermal condition system such as infrared radiation (IR) or hot blast.
✻ Vapor heat transfer systems (VPS) are not recommended.
✻ Panasonic have several series available for pure Tin terminal and ZVEI reflow based on J-STD-020D (JEDEC). (Please contact sales for details.)

■ Dimensions (Vibration-proof products)

✻ The size and shape are different from standard products. Please inquire details of our company.

(mm)



✻ E to G : L±0.3
G13 to K21 : L±0.5

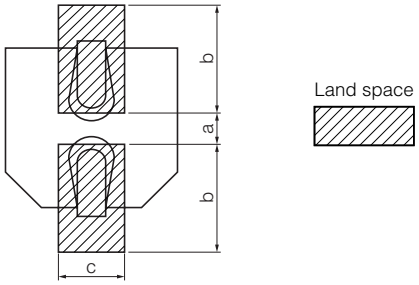
( ) Reference size

Size Code	φD	L	A, B	H max.	F	I	W	P	K	R	S	T
E	8.0	6.5	8.3	9.5	−0.1~+0.15	3.4	0.7±0.1	2.2	$0.35^{+0.15}_{-0.20}$	0.70±0.2	5.3±0.2	1.7±0.2
F	8.0	10.5	8.3	10.0	−0.1~+0.15	3.4	1.2±0.2	3.1	0.70±0.2	0.70±0.2	5.3±0.2	1.3±0.2
G	10.0	10.5	10.3	12.0	−0.1~+0.15	3.5	1.2±0.2	4.6	0.70±0.2	0.70±0.2	6.9±0.2	1.3±0.2
G13	10.0	13.8	10.3	12.0	−0.1~+0.15	3.5	1.2±0.2	4.6	0.70±0.2	0.70±0.2	6.9±0.2	1.3±0.2
H13	12.5	13.8	13.5	15.0	−0.1~+0.15	4.7	1.2±0.2	4.4	0.70±0.3	2.2±0.2	7.1±0.2	2.4±0.2
H16	12.5	16.8	13.5	15.0	−0.1~+0.15	4.7	1.2±0.2	4.4	0.70±0.3	2.2±0.2	7.1±0.2	2.4±0.2
J16	16.0	16.8	17.0	19.0	−0.1~+0.15	5.5	1.4±0.2	6.7	0.70±0.3	3.0±0.2	9.0±0.2	1.9±0.2
J21	16.0	21.8	17.0	19.0	−0.1~+0.15	5.5	1.4±0.2	6.7	0.70±0.3	3.0±0.2	9.0±0.2	1.9±0.2
K16	18.0	16.8	19.0	21.0	−0.1~+0.15	6.7	1.4±0.2	6.7	0.70±0.3	3.0±0.2	11.0±0.2	1.9±0.2
K21	18.0	21.8	19.0	21.0	−0.1~+0.15	6.7	1.4±0.2	6.7	0.70±0.3	3.0±0.2	11.0±0.2	1.9±0.2

■ Land/Pad Pattern

The circuit board land/pad pattern size for chip capacitors is specified in the following table.
The land pitch influences installation strength and consider it.

● Standard products

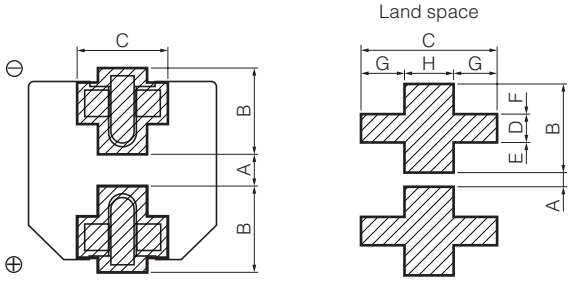


[Table of Board Land Size vs. Capacitor Size] (mm)

Size/Dimension	a	b	c
A (φ3)	0.6	2.2	1.5
B (φ4)	1.0	2.5	1.6
C (φ5)	1.5	2.8	1.6
D (φ6.3)	1.8	3.2	1.6
E (φ8 × 6.2L)	2.2	4.0	1.6
F (φ8 × 10.2L)	3.1	4.0	2.0
G (φ10 × 10.2L)	4.6	4.1	2.0
H (φ12.5)	4.0	5.7	2.0
J (φ16)	6.0	6.5	2.5
K (φ18)	6.0	7.5	2.5

✻ When size “a” is wide, back fillet can be made, decreasing fitting strenght.

● Vibration-proof products



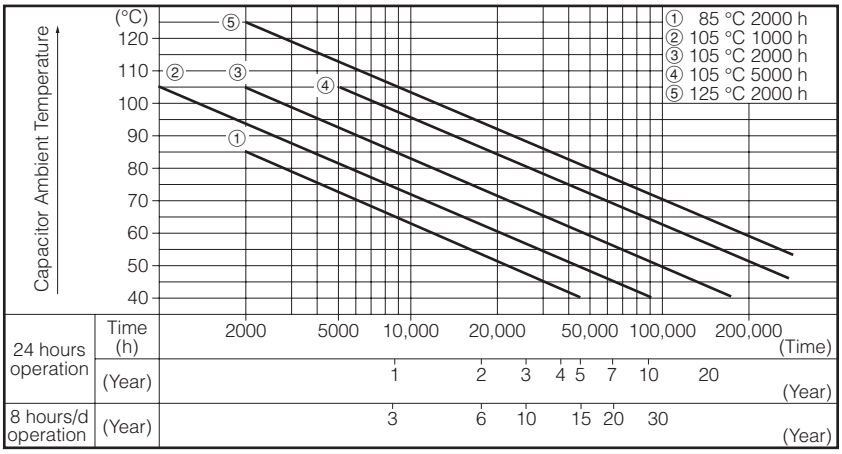
[Table of Board Land Size vs. Capacitor Size] (mm)

Size/Dimension	A	B	C	D	E	F	G	H
E (φ8 × 6.5L)	1.8	4.2	5.0	1.3	1.5	1.4	1.5	2.0
F (φ8 × 10.5L)	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
G (φ10)	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
H (φ12.5)	3.9	6.0	6.9	2.8	1.3	1.9	2.2	2.5
J (φ16)	5.8	6.8	6.2	3.6	1.3	1.9	1.7	2.8
K (φ18)	5.8	7.3	6.2	3.6	1.8	1.9	1.7	2.8

✻ When size “A” is wide, back fillet can be made, decreasing fitting strenght.

✻ Take mounting conditions, solderability and fitting strenght into consideration when selecting parts for your company’s design.

■ Expected Life Estimate Quick Reference Guide

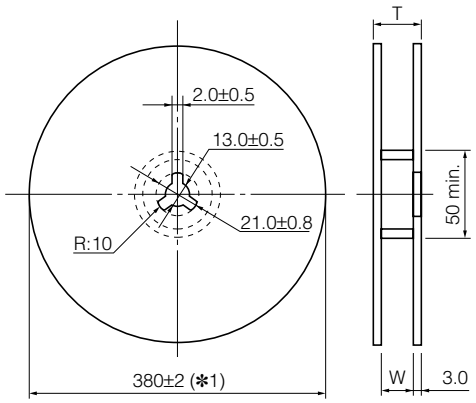


02 Dec. 2010

Surface Mount Type

■ Packaging Specifications.

● Reel Dimensions in mm (not to scale)



(mm)

Size	W
A,B,C	14±1
D, E,D8	18±1
F, G	26±1

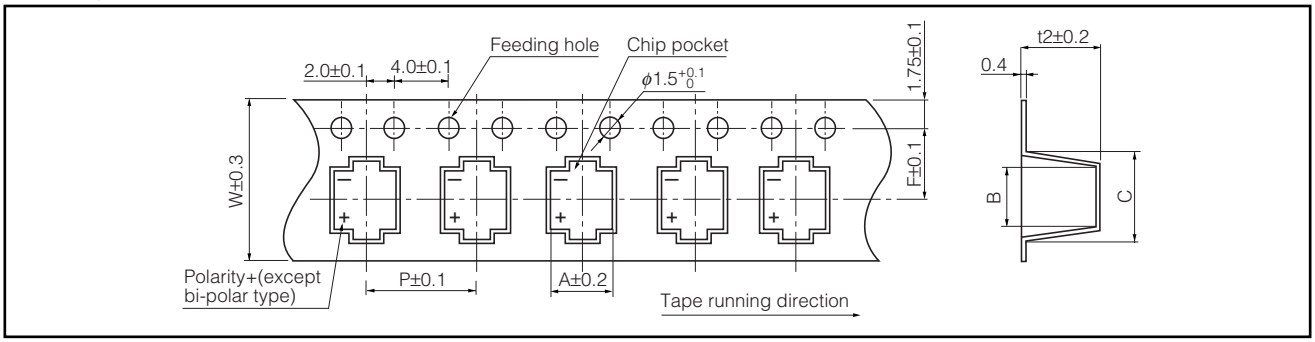
Size	W
G13 to G21	34±1
H13 to H21	
J16 to J21	46±1
K16 to K21	

(✻1) 330 mm (13 inch) reel is available on request. (code : A)

Size code	Height	Min.Packing Quantity pcs.	
		380 mm reel	330 mm reel
A, B	L=5.4 mm	2000	1500
	L=5.8 mm	2000	1200
C, D	L=5.4 mm	1000	1000
	L=5.8 mm	1000	800
E	–	1000	800
D8	–	900	500
F, G	–	500	300

Size code	Min.Packing Quantity pcs.
	330 mm reel
G13	250
G17, H13	200
G21, H16	150
H21, J16, K16	125
J21, K21	75

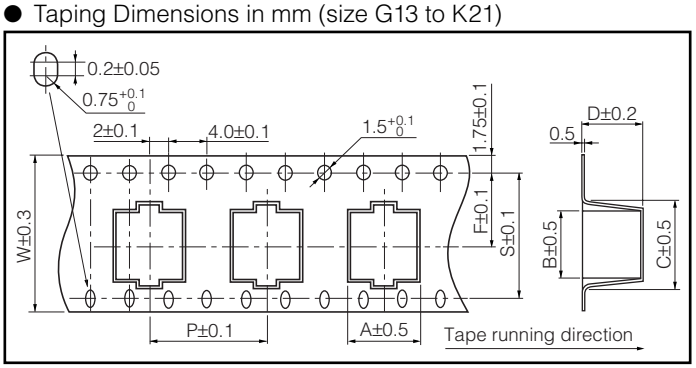
● Taping Dimensions in mm (size A to G)



Ask factory for technical specifications.

Size code	W	A	B	C	P	F	t2	
							Height	
							L=5.4 mm	L=5.8 mm
A	12.0	3.4	3.5±0.2	6.0±0.3	8.0	5.5	5.8	–
B	12.0	4.7	4.6±0.2	6.5±0.3	8.0	5.5	5.8	6.2
C	12.0	5.7	5.7±0.3	8.0±0.5	12.0	5.5	5.8	6.4
D	16.0	7.0	7.0±0.3	9.0±0.5	12.0	7.5	5.8	6.4
D8	16.0	7.0	7.0±0.3	9.0±0.5	12.0	7.5	8.4	
E	16.0	8.7	8.7±0.3	11.4±0.5	12.0	7.5	6.8	
F	24.0	8.7	8.7±0.3	12.5±0.5	16.0	11.5	11.0	
G	24.0	10.7	10.7±0.3	14.5±0.5	16.0	11.5	11.0	

● Taping Dimensions in mm (size G13 to K21)



Ask factory for technical specifications.

Size	Taping Size							
	A	B	C	D	F	P	S	W
G13	10.7	10.7	14.5	14.5	14.2	20.0	28.4	32.0
G17	10.7	10.7	14.5	17.5	14.2	20.0	28.4	32.0
H13	14.0	14.0	18.0	14.5	14.2	24.0	28.4	32.0
H16	14.0	14.0	18.0	17.5	14.2	24.0	28.4	32.0
J16	17.5	17.5	23.0	17.5	20.2	28.0	40.4	44.0
J21	17.5	17.5	23.0	22.5	20.2	28.0	40.4	44.0
K16	19.5	19.5	26.0	17.5	20.2	32.0	40.4	44.0
K21	19.5	19.5	26.0	22.5	20.2	32.0	40.4	44.0

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