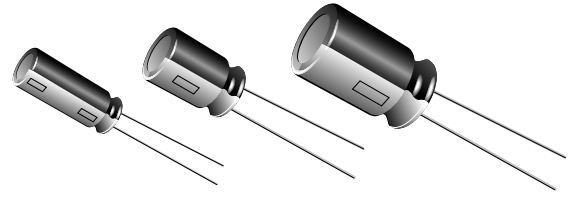


### Aluminum Electrolytic Capacitors (Radial Lead Type)

Series: HFQ

Type: A (Radial Leads)

Style: 04/JIS C 5141



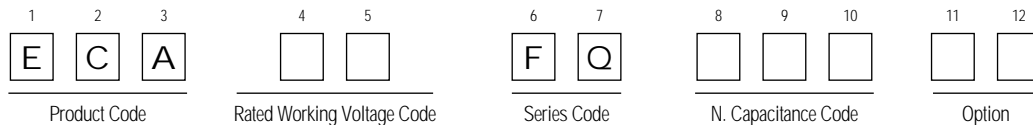
#### ■ Features

- Lifetime: 105°C 1000 h to 2000 h
- Low impedance (1/3 to 1/4 of Series HFE)

#### ■ Recommended Applications

- Power supplies, lighting, robots, industrial controls, telecommunications

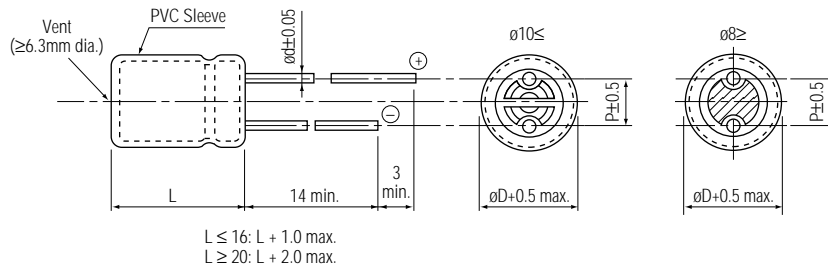
#### ■ Explanation of Part Numbers



#### ■ Specifications

Operating temperature range	-55 to +105°C							
Rated working voltage	6.3 to 63 V DC							
Nominal capacitance range	6.8 to 1500 μF							
Capacitance tolerance	±20% (120 Hz/+20°C)							
DC leakage current	$I \leq 0.01 CV$ or 3 (μA) after 2 minutes							
tan δ	(120 Hz/+20°C)							
	<b>Working voltage (V)</b>	<b>6.3</b>	<b>10</b>	<b>16</b>	<b>25</b>	<b>35</b>	<b>50</b>	<b>63</b>
	tan δ	0.22	0.19	0.16	0.14	0.12	0.10	0.08
Add 0.02 per 1,000 μF for products of 1,000 μF or more. (120 Hz/+20°C)								
Characteristics at low temperature	(Impedance ratio at 100 Hz) Impedance at -10°C, 100 kHz ≤ 200% of initial specified value at +20°C, 100 kHz							
Endurance	After following test life with DC voltage and +105±2°C ripple current value applied (the sum of DC and ripple peak voltage shall not exceed the rated working voltage), the capacitors shall meet the limits specified below. Duration: 1,000 hours (ø4 to 8); 2,000 hours (ø10 to 18) post-test requirements at +20°C							
	Capacitance change	±20% of initial measured value (4V: ±30%)						
	tan δ	≤ 200% of initial specified value						
	DC leakage current	≤ initial specified value						
Shelf life	After storage for 1,000 hours at +105°C with no voltage applied then being stabilized at +20°C, capacitor shall meet the limits specified in "Endurance."							

■ Dimensions in mm (not to scale)



Body Dia. $\phi D$	4	5	6.3	8	10	12.5	16	18	
Lead Dia. $\phi d$						15-25	30-40		
Lead Space $\phi d$	0.45	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
Lead Space P	1.5	2	2.5	3.5	5	5	5	7.5	7.5

■ Frequency Correction Factor for Ripple Current

Working Voltage (V DC)	Cap. ( $\mu F$ )	Frequency (Hz)				
		60	120	1 k	10 k	100 k
6.3 to 63	6.8 to 330	0.55	0.65	0.85	0.90	1.0
	390 to 11000	0.70	0.75	0.90	0.95	1.0
	1200 to 2200	0.75	0.80	0.90	0.95	1.0
	2700 to 15000	0.80	0.85	0.95	1.00	1.0

### ■ Case Size/Impedance/Ripple Current

Case Size øD x L (mm)	Capacitance (μF)	6.3 (0J)			10 (1A)			Ripple Current (mA) rms (100 kHz/+105°C)
		Impedance (Ω) (100 kHz)		Ripple Current (mA) rms (100 kHz/+105°C)	Impedance (Ω) (100 kHz)		Ripple Current (mA) rms (100 kHz/+105°C)	
		-10°C	+20°C		-10°C	+20°C		
4 x11	68	2.000	1.000	120	47	2.000	1.000	120
5 x11	100	1.300	0.650	175	82	1.300	0.650	175
5 x15	150	0.920	0.460	235	100	0.920	0.460	235
6.3 x11.2	220	0.600	0.300	290	180	0.600	0.300	290
6.3 x11.5	330	0.400	0.200	400	220	0.400	0.200	400
8 x11.5	470	0.340	0.170	445	330	0.340	0.170	455
8 x15	680 L*	0.240	0.120	575	470 L*	0.240	0.120	575
8 x20	1,000	0.180	0.090	760	680	0.180	0.090	760
10 x12.5	680	0.240	0.120	625	470	0.240	0.120	625
10 x16	820	0.180	0.090	795	560	0.180	0.090	795
10 x20	1,200 L*	0.130	0.065	1015	1,000 L*	0.130	0.065	1,015
10 x25	1,500	0.110	0.055	1,190	1,200	0.110	0.055	1,190
10 x30	2,200 L*	0.090	0.045	1,440	1,500 L*	0.090	0.045	1,440
12.5 x15	1,200	0.130	0.065	1,010	1,000	0.130	0.065	1,010
12.5 x20	2,200	0.084	0.042	1,400	1,800	0.084	0.042	1,400
12.5 x25	2,700	0.068	0.034	1,690	2,200	0.068	0.034	1,690
12.5 x30	3,900	0.060	0.030	1,950	2,700	0.060	0.030	1,950
12.5 x35	4,700 L*	0.048	0.024	2,220	3,300 L*	0.048	0.024	2,220
12.5 x40	5,600 L*	0.042	0.021	2,390	3,900 L*	0.042	0.021	2,390
16 x15	2,700 S*	0.092	0.046	1,360	1,800 S*	0.092	0.046	1,390
16 x20	4,700	0.068	0.034	1,730	3,300	0.068	0.034	1,730
16 x25	5,600	0.056	0.028	2,070	3,900	0.056	0.028	2,070
16 x31.5	6,800	0.060	0.025	2,350	5,600	0.050	0.025	2,350
16 x35.5	8,200	0.044	0.022	2,550	6,800 L*	0.044	0.022	2,550
16 x40	12,000	0.036	0.018	2,900	8,200 L*	0.036	0.018	2,900
18 x15	3,300	0.076	0.038	1,620	2,200 S*	0.076	0.038	1,620
18 x20	5,600 S*	0.056	0.028	2,000	3,900 S*	0.056	0.028	2,000
18 x25	6,800 S*	0.050	0.025	2,200	5,600 S*	0.050	0.025	2,200
18 x31.5	10,000	0.046	0.023	2,800	6,800	0.046	0.023	2,800
18 x35.5	12,000 S*	0.042	0.021	2,900	8,200	0.042	0.021	2,900
18 x40	15,000	0.034	0.017	3,000	10,000	0.034	0.017	3,000

Case Size øD x L (mm)	Capacitance (μF)	16 (1C)			25 (1E)			Ripple Current (mA) rms (100 kHz/+105°C)
		Impedance (Ω) (100 kHz)		Ripple Current (mA) rms (100 kHz/+105°C)	Impedance (Ω) (100 kHz)		Ripple Current (mA) rms (100 kHz/+105°C)	
		-10°C	+20°C		-10°C	+20°C		
4 x11	39	2.000	1.000	120	27	2.000	1.000	120
5 x11	56	1.300	0.650	175	39	1.300	0.650	175
5 x15	82	0.920	0.460	235	56	0.920	0.460	235
6.3 x11.2	120	0.600	0.300	290	82	0.600	0.300	290
6.3 x15	180	0.400	0.200	400	120	0.400	0.200	400
8 x11.5	270	0.340	0.170	445	180	0.340	0.170	445
8 x15	330 L*	0.240	0.120	575	220 L*	0.240	0.120	575
8 x20	470	0.180	0.090	750	330	0.180	0.090	760
10 x12.5	330	0.240	0.120	625	220	0.240	0.120	625
10 x16	390	0.180	0.090	790	270	0.180	0.090	795
10 x20	680 L*	0.130	0.065	1015	470 L*	0.130	0.065	1015
10 x25	820	0.110	0.055	1,190	560	0.110	0.055	1,190
10 x30	1,200 L*	0.090	0.045	1,440	820 L*	0.090	0.045	1,440
12.5 x15	680	0.130	0.065	1,010	470	0.130	0.065	1,010
12.5 x20	1,200	0.084	0.042	1,400	820	0.084	0.042	1,400
12.5 x25	1,500	0.068	0.034	1,690	1,000	0.068	0.034	1,690
12.5 x30	2,200 L*	0.060	0.030	1,950	1,500 L*	0.060	0.030	1,950
12.5 x35	2,700 L*	0.048	0.024	2,220	1,800 L*	0.048	0.024	2,220
16 x15	1,500 S*	0.092	0.046	1,360	820 S*	0.092	0.046	1,360
16 x20	2,200	0.068	0.034	1,730	1,500	0.068	0.034	1,730
16 x25	2,700	0.056	0.028	2,070	1,800	0.056	0.028	2,070
16 x31.5	3,900	0.050	0.025	2,350	2,700	0.050	0.025	2,350
16 x35.5	4,700 L*	0.044	0.022	2,550	3,300 L*	0.044	0.022	2,550
16 x40	5,700	0.036	0.018	2,900	3,900 L*	0.036	0.018	2,900
18 x15	1,800	0.076	0.038	1,620	1,200	0.076	0.038	1,620
18 x20	3,300 S*	0.056	0.028	2,000	2,200 S*	0.056	0.028	2,000
18 x25	3,900 S*	0.050	0.025	2,200	2,700 S*	0.050	0.025	2,200
18 x31.5	4,700	0.046	0.023	2,800	3,300	0.046	0.023	2,800
18 x35.5	6,800	0.042	0.021	2,900	3,900	0.042	0.021	2,900
18 x40	8,200	0.034	0.017	3,000	4,700	0.034	0.017	3,000

( ) shows W. V. code

\* L or S in case size table are optional codes. Example: ECA □ □ FQ □ □ □ □

■ Case Size/Impedance/Ripple Current (cont'd)

Case Size øD x L (mm)	Capacitance (μF)	35 (1V)			50 (1H)			Ripple Current (mA) rms (100 kHz/+105°C)
		Impedance (Ω) (100 kHz)		Ripple Current (mA) rms (100 kHz/+105°C)	Impedance (Ω) (100 kHz)		Ripple Current (mA) rms (100 kHz/+105°C)	
		-10°C	+20°C		-10°C	+20°C		
4 x11	18	2.00	1.00	120	10	5.000	2.500	90
5 x11	27	1,300	0.065	175	18	2.600	1.300	155
5 x15	39	0.920	0.460	235	27	1.800	0.900	215
6.3 x11.2	56	0.600	0.300	290	33	1.200	0.600	260
6.3 x15	82	0.400	0.200	400	56	0.800	0.400	360
8 x11.5	120	0.340	0.170	455	68	0.600	0.300	410
8 x15	150 L*	0.240	0.120	575	100	0.460	0.230	500
8 x20	220	0.180	0.090	750	150	0.320	0.160	670
10 x12.5	150	0.240	0.120	625	82	0.460	0.230	510
10 x16	180	0.180	0.090	795	120	0.320	0.160	640
10 x20	330 L*	0.130	0.065	1,015	220 L*	0.220	0.110	890
10 x25	390	0.110	0.055	1,190	270	0.180	0.090	1,040
10 x30	560 L*	0.090	0.045	1,440	390 L*	0.150	0.075	1,300
12.5 x15	330	0.130	0.065	1,010	220	0.260	0.130	920
12.5 x20	560	0.084	0.042	1,400	330	0.160	0.080	1,200
12.5 x25	680	0.068	0.034	1,690	470	0.140	0.070	1,440
12.5 x30	1,000 L*	0.060	0.030	1,950	560	0.120	0.060	1,680
12.5 x35	1,200 L*	0.048	0.024	2,220	680 L*	0.100	0.050	1,850
12.5 x40	1,500 L*	0.042	0.021	2,390	820 L*	0.086	0.043	2,010
16 x15	560 S*	0.092	0.046	1,360	390	0.168	0.084	1,270
16 x20	1,000	0.068	0.034	1,730	680	0.106	0.053	1,470
16 x25	1,200	0.056	0.028	2,070	820	0.088	0.044	1,810
16 x31.5	1,800	0.050	0.025	2,350	1,000	0.066	0.033	2,120
16 x35.5	2,200 L*	0.044	0.022	2,550	1,200 L*	0.056	0.028	2,260
16 x40	2,700 L*	0.036	0.018	2,900	1,500 L*	0.052	0.026	2,410
18 x15	820	0.076	0.038	1,620	470 S*	0.140	0.070	1,470
18 x20	1,500	0.056	0.028	2,000	680 S*	0.100	0.050	1,810
18 x25	1,800 S*	0.050	0.025	2,200	1,000 S*	0.082	0.041	2,000
18 x31.5	2,200	0.046	0.023	2,800	1,200	0.062	0.031	2,220
18 x35.5	2,700	0.042	0.021	2,900	1,500	0.054	0.027	2,460
18 x40	3,300	0.034	0.017	3,000	1,800	0.050	0.025	2,560

63 (1J)

4 x11	6.8	7.000	3.500	80
5 x11	12	4.000	2.000	145
5 x15	18	2.600	1.300	200
6.3 x11.2	22	2.000	1.000	240
6.3 x15	39	1.400	0.700	330
8 x11.5	56	0.760	0.380	370
8 x15	82	0.600	0.300	450
8 x20	100 L*	0.380	0.190	600
10 x12.5	68	0.600	0.300	470
10 x16	100	0.380	0.190	580
10 x20	150 L*	0.280	0.140	820
10 x25	180	0.240	0.120	950
10 x30	270 L*	0.190	0.095	1,110
12.5 x15	150	0.320	0.160	890
12.5 x20	220	0.190	0.095	1,140
12.5 x25	330	0.180	0.090	1,420
12.5 x30	390	0.160	0.080	1,620
12.5 x35	470 L*	0.130	0.065	1,780
12.5 x40	560 L*	0.120	0.060	1,950
16 x15	270	0.200	0.100	1,220
16 x20	470	0.140	0.070	1,450
16 x25	560	0.120	0.060	1,750
16 x31.5	680	0.100	0.050	2,050
16 x35.5	820	0.084	0.042	2,220
16 x40	1,000 L*	0.068	0.034	2,370
18 x15	330 S*	0.170	0.085	1,410
18 x20	560 S*	0.130	0.065	1,750
18 x25	680 S*	0.114	0.057	1,940
18 x31.5	1,000	0.096	0.048	2,110
18 x35.5	1,200	0.082	0.041	2,300
18 x40	1,500	0.066	0.033	2,510

( ) shows W. V. code

\* L or S in case size table are optional codes. Example: ECA □ □ FQ □ □ □ □