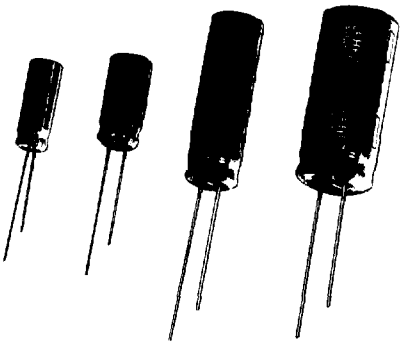
HFZ Series

FEATURES



- Long Life : 5000 hours at +105°C
  (Expected Life : 13 years at +60°C)
- Low Impedance at High Frequency & Low Temperature
- Wide Range of Operating Temperature from −55°C to +105
- Anti-solvent : Freon-TE, TES, TP35 or equivalents

SPECIFICATIONS

<table>
<tr><th>Item</th><th>Performance Characteristics</th></tr>
<tr><td>Operating Temperature Range</td><td>−55°C to +105°C</td></tr>
<tr><td>Rated Working Voltage Range</td><td>6.3V to 63V DC</td></tr>
<tr><td>Nominal Capacitance Range</td><td>22 to 5 600μF (120Hz, +20°C)</td></tr>
<tr><td>Capacitance Tolerance</td><td>±20% (120Hz, +20°C)</td></tr>
<tr><td>Leakage Current</td><td>I ≤ 0.01CV or 3 [μA] whichever is greater measured after a 2 minute application of rated working voltage at +20°C. (C = nominal capacitance in micro-farads, V = rated working voltage in volts)</td></tr>
<tr><td>Tangent of Loss Angle</td><td>
<table>
<tr><td>Rated working voltage [V]</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>40</td><td>50</td><td>63</td></tr>
<tr><td>tan δ (120Hz, +20°C) : ≤</td><td>0.17</td><td>0.15</td><td>0.10</td><td>0.08</td><td>0.07</td><td>0.07</td><td>0.06</td><td>0.05</td></tr>
</table>
For capacitance > 1 000μF, add 0.02 per another 1 000μF</td></tr>
<tr><td>Impedance at High Frequency</td><td>Refer to tabulated maximum impedance values in the standard products table.</td></tr>
<tr><td>Impedance at Low Temperature</td><td>Z (100KHz, −10°C) ≤ 2 times of the specified value (100KHz, +20°C)</td></tr>
<tr><td>Ripple Current</td><td>Refer to standard products table.</td></tr>
<tr><td>Ripple Current Correction Factor for Frequency</td><td>
<table>
<tr><td colspan="2">Frequency [Hz]</td><td>60</td><td>120</td><td>1K</td><td>10K</td><td>100K</td></tr>
<tr><td rowspan="4">Correction Factor (Multiplier)</td><td>22-330μF</td><td>0.55</td><td>0.65</td><td>0.85</td><td>0.90</td><td>1.0</td></tr>
<tr><td>390-1 000μF</td><td>0.70</td><td>0.75</td><td>0.90</td><td>0.95</td><td>1.0</td></tr>
<tr><td>1 200-2 200μF</td><td>0.75</td><td>0.80</td><td>0.90</td><td>0.95</td><td>1.0</td></tr>
<tr><td>2 700-5 600μF</td><td>0.80</td><td>0.85</td><td>0.95</td><td>1.0</td><td>1.0</td></tr>
</table></td></tr>
<tr><td>Surge Voltage</td><td>
<table>
<tr><td>Rated working voltage [V]</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>40</td><td>50</td><td>63</td></tr>
<tr><td>Surge Voltage [V]</td><td>8</td><td>13</td><td>20</td><td>32</td><td>44</td><td>50</td><td>63</td><td>79</td></tr>
</table></td></tr>
<tr><td>High Temperature Loading</td><td>Test conditions
<table>
<tr><td>Duration</td><td>5 000 hours</td></tr>
<tr><td>Ambient temperature</td><td>+105°C</td></tr>
<tr><td>Applied voltage</td><td>DC voltage with rated ripple current (the sum of the DC voltage and super-imposed peak AC voltage for rated ripple current should be equal to rated DC working voltage)</td></tr>
</table></td></tr>
</table>

SPECIFICATIONS (continued)

<table>
<tr><th>Item</th><th>Performance Characteristics</th></tr>
<tr><td>High Temperature Loading (continued)</td><td>Post test requirements at +20°C
<table>
<tr><td>Leakage current</td><td>≤ Initial specified Value</td></tr>
<tr><td>Capacitance change</td><td>≤ ±20% of initial measured value</td></tr>
<tr><td>tan δ</td><td>≤ 200% of initial specified value</td></tr>
<tr><td>Impedance</td><td>≤ 200% of initial specified value</td></tr>
</table></td></tr>
<tr><td>Shelf Life</td><td>Post test requirements at +20°C
<table>
<tr><td>Duration</td><td>1 000 hours</td></tr>
<tr><td>Ambient temperature</td><td>+105°C</td></tr>
<tr><td>Applied voltage</td><td>(none)</td></tr>
</table>
Post test conditioning by application of voltage at +20°C
<table>
<tr><td>Applied voltage</td><td>Rated working voltage</td></tr>
<tr><td>Duration</td><td>30min</td></tr>
<tr><td>Discharge</td><td>Through a resistor after application of voltage</td></tr>
<tr><td>Stabilization time</td><td>24h to 48h after discharge</td></tr>
</table>
Post test requirements at +20°C (after post test conditioning)
<table>
<tr><td>Leakage current</td><td>≤ Initial specified Value</td></tr>
<tr><td>Capacitance change</td><td>≤ ±15% of initial measured value</td></tr>
<tr><td>tan δ</td><td>≤ 150% of initial specified value</td></tr>
<tr><td>Impedance</td><td>≤ 200% of initial specified value</td></tr>
</table></td></tr>
<tr><td>Cleaning</td><td>Capacitors shall be capable of withstanding exposure to following cleaning solvents.
<table>
<tr><th>Conditions / Solvents</th><th>Solvent structure</th><th>Exposure time</th><th>Temperature</th><th>Ultrasonic wave</th></tr>
<tr><td>Freon-TE, TES, TP35 or equivalents</td><td>Liquid or vapor</td><td>≤ 5 min (total)</td><td>≤ Boiling point at 1 atm</td><td>Acceptable</td></tr>
</table></td></tr>
<tr><td>Other Items</td><td>Unless otherwise specified herein, conform to Panasonic Specifications and/or JIS-C-5141 where it is applicable.</td></tr>
</table>

PART NUMBER SYSTEM

E C A □ □ F Z □ □ □ □ □

Working Voltage Code			
Code	W.V.	Code	W.V.
0J	6.3V	1V	35V
1A	10V	1G	40V
1C	16V	1H	50V
1E	25V	1J	63V

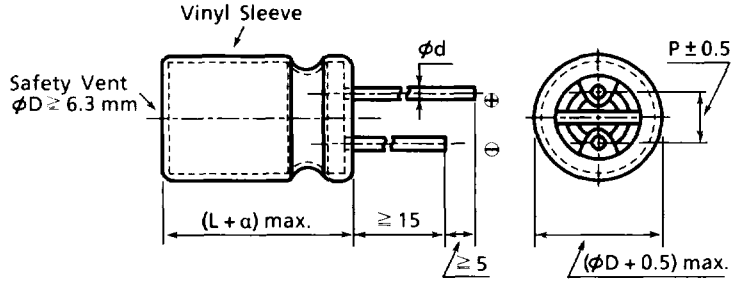
Capacitance Code in μF	
First two digits	Significant figures
Third digit	Number of zeros to follow

Case Size Variation Code if any
Refer to Part Number in tabulated standard products table.

Suffix for Configuration		
Suffix	Configuration	Packaging
(none)	Long lead	Bulk
*B	Taping	Fan fold box

※ Not standard

DIMENSIONS [mm]



α	L
1.0 mm	< 16 mm
2.0 mm	≧ 20mm

φD	8	10	12.5		16	18
L	–	–	≦25	>25	–	–
φd	0.6	0.6	0.6	0.8	0.8	0.8
A	3.5	5	5	5	7.5	7.5

STANDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz (+20°C) [μF]	Part Number	Dimensions φD×L [mm]	Maximum Permissible Ripple Current (100kHz) (+105°C) [mA rms]	Maximum Impedance		
					(100kHz) (+20°C) [Ω]	(300kHz) (+20°C) [Ω]	(500kHz) (+20°C) [Ω]
6.3	330	ECA0JFZ331	8×15	575	0.120	0.132	0.144
	390	ECA0JFZ391	10×16	795	0.090	0.099	0.108
	470	ECA0JFZ471	8×20	760	0.090	0.099	0109
	560	ECA0JFZ561	10×20	1 015	0.065	0.072	0.078
	820	ECA0JFZ821	10×25	1 190	0.055	0.066	0.071
	1 000	ECA0JFZ102	12.5×20	1 400	0.042	0.055	0.063
	1 200	ECA0JFZ122L ECA0JFZ122	10×30 12.5×25	1 440 1 690	0.045 0.034	0.054 0.044	0.058 0.051
	1 500	ECA0JFZ152	12.5×30	1 950	0.030	0.039	0.045
	1 800	ECA0JFZ182	16×20	1 690	0.034	0.051	0.061
	2 200	ECA0JFZ222L ECA0JFZ222 ECA0JFZ222S	12.5×35 16×25 18×20	2 220 2 010 2 010	0.024 0.028 0.028	0.031 0.042 0.045	0.036 0.050 0.062
	2 700	ECA0JFZ272L ECA0JFZ272	12.5×40 18×25	2 390 2 200	0.021 0.025	0.027 0.040	0.032 0.055
	3 300	ECA0JFZ332	16×31.5	2 350	0.025	0.038	0.045
	3 900	ECA0JFZ392L ECA0JFZ392	16×35.5 18×31.5	2 550 2 800	0.022 0.023	0.033 0.037	0.040 0.051
	4 700	ECA0JFZ472L ECA0JFZ472	16×40 18×35.5	2 900 2 900	0.018 0.021	0.027 0.034	0.032 0.046
	5 600	ECA0JFZ562	18×40	3 000	0.017	0.027	0.037
10	220	ECA1AFZ221	8×15	575	0.120	0.132	0.144
	330	ECA1AFZ331	10×16	795	0.090	0.099	0.108
	390	ECA1AFZ391	8×20	760	0.090	0.099	0.108
	470	ECA1AFZ471	10×20	1 015	0.065	0.072	0.078
	680	ECA1AFZ681	10×25	1 190	0.055	0.066	0.071
	820	ECA1AFZ821	12.5×20	1 400	0.042	0.055	0.063
	1 000	ECA1AFZ102L ECA1AFZ102	10×30 12.5×25	1 440 1 690	0.045 0.034	0.054 0.044	0.058 0.051
	1 200	ECA1AFZ122L ECA1AFZ122	12.5×30 16×20	1 950 1 690	0.030 0.034	0.039 0.051	0.045 0.061
	1 800	ECA1AFZ182L ECA1AFZ182 ECA1AFZ182S	12.5×35 16×25 18×20	2 220 2 010 2 010	0.024 0.028 0.028	0.031 0.042 0.045	0.036 0.050 0.062
	2 200	ECA1AFZ222L ECA1AFZ222 ECA1AFZ222S	12.5×40 16×31.5 18×25	2 390 2 350 2 200	0.021 0.025 0.025	0.027 0.038 0.040	0.032 0.045 0.055
	2 700	ECA1AFZ272	16×35.5	2 550	0.022	0.033	0.040
	3 300	ECA1AFZ332L ECA1AFZ332	16×40 18×31.5	2 900 2 800	0.018 0.023	0.027 0.037	0.032 0.051
	3 900	ECA1AFZ392	18×35.5	2 900	0.021	0.034	0.046
	4 700	ECA1AFZ472	18×40	3 000	0.017	0.027	0.037

STASNDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz (+20°C) [μF]	Part Number	Dimensions φD×L [mm]	Maximum Permissible Ripple Current (100kHz) (+105°C) [mA rms]	Maximum Impedance		
					(100kHz) (+20°C) [Ω]	(300kHz) (+20°C) [Ω]	(500kHz) (+20°C) [Ω]
16	150	ECA1CFZ151	8×15	575	0.120	0.132	0.144
	220	ECA1CFZ221L ECA1CFZ221	8×20 10×16	760 795	0.090 0.090	0.099 0.099	0.108 0.108
	330	ECA1CFZ331	10×20	1 015	0.065	0.072	0.078
	390	ECA1CFZ391	10×25	1 190	0.055	0.066	0.071
	470	ECA1CFZ471	12.5×20	1 400	0.042	0.055	0.063
	560	ECA1CFZ561	10×30	1 440	0.045	0.054	0.058
	680	ECA1CFZ681	12.5×25	1 690	0.034	0.044	0.051
	820	ECA1CFZ821L ECA1CFZ821	12.5×30 16×20	1 950 1 690	0.030 0.034	0.039 0.051	0.045 0.061
	1 000	ECA1CFZ102L ECA1CFZ102	12.5×35 16×25	2 220 2 010	0.024 0.028	0.031 0.042	0.036 0.050
	1 200	ECA1CFZ122L ECA1CFZ122	12.5×40 18×20	2 390 2 010	0.021 0.028	0.027 0.045	0.032 0.062
	1 500	ECA1CFZ152 ECA1CFZ152S	16×31.5 18×25	2 350 2 200	0.025 0.025	0.038 0.040	0.045 0.055
	1 800	ECA1CFZ182L ECA1CFZ182	16×35.5 18×31.5	2 550 2 800	0.022 0.023	0.033 0.037	0.040 0.051
	2 200	ECA1CFZ222L ECA1CFZ222	16×40 18×35.5	2 900 2 900	0.018 0.021	0.027 0.034	0.032 0.046
	2 700	ECA1CFZ272	18×40	3 000	0.017	0.027	0.037
25	82	ECA1EFZ820	8×15	575	0.120	0.132	0.144
	120	ECA1EFZ121L ECA1EFZ121	8×20 10×16	760 795	0.090 0.090	0.099 0.099	0.108 0.108
	180	ECA1EFZ181	10×20	1 015	0.065	0.072	0.078
	220	ECA1EFZ221	10×25	1 190	0.055	0.066	0.071
	270	ECA1EFZ271	12.5×20	1 400	0.042	0.055	0.063
	330	ECA1EFZ331L ECA1EFZ331	10×30 12.5×25	1 440 1 690	0.045 0.034	0.054 0.044	0.058 0.051
	470	ECA1EFZ471L ECA1EFZ471	12.5×30 16×20	1 950 1 690	0.030 0.034	0.039 0.051	0.045 0.061
	560	ECA1EFZ561L ECA1EFZ561 ECA1EFZ561S	12.5×35 16×25 18×20	2 220 2 010 2 010	0.024 0.028 0.028	0.031 0.042 0.045	0.036 0.050 0.062
	680	ECA1EFZ681L ECA1EFZ681	12.5×40 18×25	2 390 2 200	0.021 0.025	0.027 0.040	0.032 0.055
	820	ECA1EFZ821	16×31.5	2 350	0.025	0.038	0.045
	1 000	ECA1EFZ102L ECA1EFZ102	16×35.5 18×31.5	2 550 2 800	0.022 0.023	0.033 0.037	0.040 0.051
	1 200	ECA1EFZ122L ECA1EFZ122	16×40 18×35.5	2 900 2 900	0.018 0.021	0.027 0.034	0.032 0.046
	1 500	ECA1EFZ152	18×40	3 000	0.017	0.027	0.037

STANDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz (+20°C) [μF]	Part Number	Dimensions φD×L [mm]	Maximum Permissible Ripple Current (100kHz) (+105°C) [mA rms]	Maximum Impedance (100kHz) (+20°C) [Ω]	Maximum Impedance (300kHz) (+20°C) [Ω]	Maximum Impedance (500kHz) (+20°C) [Ω]
35	56	ECA1VFZ560	8×15	575	0.120	0.132	0.144
	82	ECA1VFZ820L ECA1VFZ820	8×20 10×16	760 795	0.090 0.090	0.099 0.099	0.108 0.108
	120	ECA1VFZ121	10×20	1 015	0.065	0.072	0.078
	150	ECA1VFZ151	10×25	1 190	0.055	0.066	0.071
	180	ECA1VFZ181	12.5×20	1 400	0.042	0.055	0.063
	220	ECA1VFZ221L ECA1VFZ221	10×30 12.5×25	1 440 1 690	0.045 0.034	0.054 0.044	0.058 0.051
	330	ECA1VFZ331L ECA1VFZ331	12.5×30 16×20	1 950 1 690	0.030 0.034	0.039 0.051	0.045 0.061
	390	ECA1VFZ391L ECA1VFZ391	12.5×35 16×25	2 220 2 010	0.024 0.028	0.031 0.042	0.036 0.050
	470	ECA1VFZ471L ECA1VFZ471	12.5×40 18×20	2 390 2 010	0.021 0.028	0.027 0.045	0.032 0.062
	560	ECA1VFZ561 ECA1VFZ561S	16×31.5 18×25	2 350 2 200	0.025 0.025	0.038 0.040	0.045 0.055
	680	ECA1VFZ681	16×35.5	2 550	0.022	0.033	0.040
	820	ECA1VFZ821L ECA1VFZ821	16×40 18×31.5	2 900 2 800	0.018 0.023	0.027 0.037	0.032 0.051
	1 000	ECA1VFZ102	18×35.5	2 900	0.021	0.034	0.046
	1 200	ECA1VFZ122	18×40	3 000	0.017	0.027	0.037
* (40)	47	ECA1GFZ470	8×15	575	0.120	0.132	0.144
	68	ECA1GFZ680L ECA1GFZ680	8×20 10×16	760 795	0.090 0.090	0.099 0.099	0.108 0.108
	100	ECA1GFZ101	10×20	1 015	0.065	0.072	0.078
	120	ECA1GFZ121	10×25	1 190	0.055	0.066	0.071
	150	ECA1GFZ151	12.5×20	1 400	0.042	0.055	0.063
	180	ECA1GFZ181L ECA1GFZ181	10×30 12.5×25	1 440 1 690	0.045 0.034	0.054 0.044	0.058 0.051
	270	ECA1GFZ271L ECA1GFZ271	12.5×30 16×20	1 950 1 690	0.030 0.034	0.039 0.051	0.045 0.061
	330	ECA1GFZ331L ECA1GFZ331 ECA1GFZ331S	12.5×35 16×25 18×20	2 220 2 010 2 010	0.024 0.028 0.028	0.031 0.042 0.045	0.036 0.050 0.062
	390	ECA1GFZ391L ECA1GFZ391	12.5×40 18×25	2 390 2 200	0.021 0.025	0.027 0.040	0.032 0.055
	470	ECA1GFZ471	16×31.5	2 350	0.025	0.038	0.045
	560	ECA1GFZ561L ECA1GFZ561	16×35.5 18×31.5	2 550 2 800	0.022 0.023	0.033 0.037	0.040 0.051
	680	ECA1GFZ681L ECA1GFZ681	16×40 18×35.5	2 900 2 900	0.018 0.021	0.027 0.034	0.032 0.046
	820	ECA1GFZ821	18×40	3 000	0.017	0.027	0.037

※ 40v is not standard.

STANDARD PRODUCTS TABLE

Rated DC Working Voltage [V]	Nominal Capacitance (120Hz (+20°C) [μF]	Part Number	Dimensions φD×L [mm]	Maximum Permissible Ripple Current (100kHz) (+105°C) [mA rms]	Maximum Impedance (100kHz) (+20°C) [Ω]	Maximum Impedance (300kHz) (+20°C) [Ω]	Maximum Impedance (500kHz) (+20°C) [Ω]
50	33	ECA1HFZ330	8×15	500	0.230	0.253	0.276
	39	ECA1HFZ390	10×16	640	0.160	0.176	0.192
	47	ECA1HFZ470	8×20	670	0.160	0.176	0.192
	68	ECA1HFZ680	10×20	890	0.110	0.121	0.132
	82	ECA1HFZ820	10×25	1 040	0.090	0.099	0.108
	100	ECA1HFZ101	12.5×20	1 200	0.080	0.104	0.120
	120	ECA1HFZ121L ECA1HFZ121	10×30 12.5×25	1 300 1 440	0.075 0.070	0.083 0.091	0.090 0.105
	180	ECA1HFZ181L ECA1HFZ181	12.5×30 16×20	1 680 1 470	0.060 0.053	0.078 0.080	0.090 0.095
	220	ECA1HFZ221L ECA1HFZ221 ECA1HFZ221S	12.5×35 16×25 18×20	1 850 1 810 1 810	0.050 0.044 0.050	0.065 0.066 0.080	0.075 0.079 0.110
	270	ECA1HFZ271L ECA1HFZ271	12.5×40 18×25	2 010 2 000	0.043 0.041	0.056 0.066	0.065 0.090
	330	ECA1HFZ331	16×31.5	2 120	0.033	0.050	0.059
	390	ECA1HFZ391L ECA1HFZ391	16×35.5 18×31.5	2 260 2 220	0.028 0.031	0.042 0.050	0.050 0.068
	470	ECA1HFZ471L ECA1HFZ471	16×40 18×35.5	2 410 2 460	0.026 0.027	0.039 0.043	0.047 0.059
	560	ECA1HFZ561	18×40	2 560	0.025	0.040	0.055
63	22	ECA1JFZ220	8×15	450	0.300	0.330	0.360
	33	ECA1JFZ330L ECA1JFZ330	8×20 10×16	600 580	0.190 0.190	0.209 0.209	0.228 0.228
	47	ECA1JFZ470	10×20	820	0.140	0.154	0.168
	56	ECA1JFZ560	10×25	950	0.120	0.132	0.144
	82	ECA1JFZ820L ECA1JFZ820	10×30 12.5×20	1110 1140	0.095 0.095	0.105 0.123	0.114 0.143
	100	ECA1JFZ101	12.5×25	1420	0.090	0.117	0.135
	120	ECA1JFZ121	12.5×30	1620	0.080	0.104	0.120
	150	ECA1JFZ151L ECA1JFZ151	12.5×35 16×20	1780 1450	0.065 0.070	0.085 0.105	0.093 0.126
	180	ECA1JFZ181L ECA1JFZ181 ECA1JFZ181S	12.5×40 16×25 18×20	1950 1750 1750	0.060 0.060 0.065	0.078 0.090 0.104	0.090 0.108 0.143
	220	ECA1JFZ221L ECA1JFZ221	16×31.5 18×25	2050 1940	0.050 0.057	0.075 0.091	0.090 0.125
	270	ECA1JFZ271	16×35.5	2220	0.042	0.063	0.076
	330	ECA1JFZ331L ECA1JFZ331	16×40 18×31.5	2370 2110	0.034 0.048	0.051 0.077	0.061 0.106
	390	ECA1JFZ391	18×35.5	2300	0.041	0.066	0.090
	470	ECA1JFZ471	18×40	2510	0.033	0.053	0.073

ELECTRICAL CHARACTERISTICS

■Typical Impedance vs Frequency