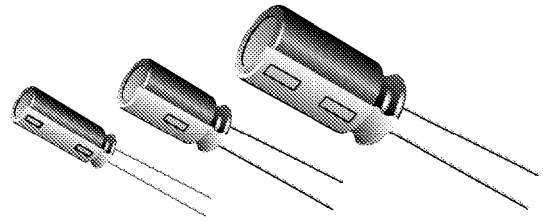


### Aluminum Electrolytic Capacitors (Radial Lead Type)

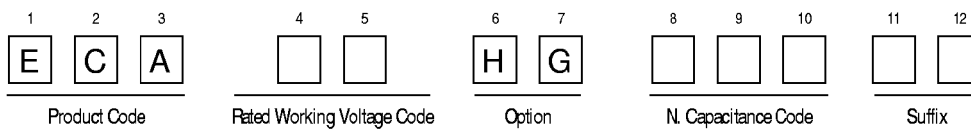
Series: NHG



#### ■ Features

- Compact size (same case size as series M)
- Life: 1,000 – 2,000 hours at +105°C

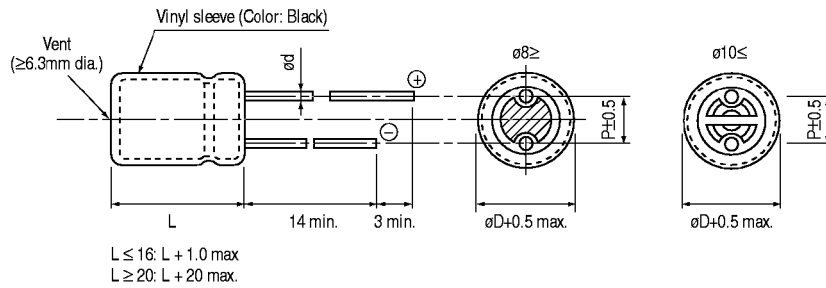
#### ■ Explanation of Part Numbers



#### ■ Specifications

Operating temperature range	–55 to +105°C	–25 to +105°C													
Rated working voltage	6.3 to 100 V DC	160 to 450 V DC													
Nominal capacitance range	0.1 to 22,000 μF	1.0 to 330 μF													
Capacitance tolerance	±20% (120 Hz/+20°C)														
DC leakage current	$I \leq 0.01 CV (\mu A)$ or $3 (\mu A)$ (Whichever is greater after 2 minutes application of rated working voltage at +20°C)	$I \leq 0.06 CV + 10 (\mu A)$ after 2 minutes application of rated working voltage at +20°C													
tan δ	(120 Hz/+20°C)														
	<b>W.V. (V)</b>	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
	tan δ	0.28	0.24	0.20	0.16	0.14	0.12	0.10	0.08	0.15	0.15	0.15	0.20	0.24	0.24
	For capacitance value > 1,000 μF, add 0.02 per every 1,000 μF.														
Ripple current	Refer to standard products table (120 Hz, +105°C) Correction factor for frequency														
	<b>W.V. (V DC)</b>	<b>Cap (μF)</b>	<b>Frequency</b>												
			60	120	1k	10 k	100 k								
	6.3–100	~ 33	0.75	1	1.55	1.80	2.00								
		47 ~ 470	0.80	1	1.35	1.50	1.50								
		1000 ~	0.85	1	1.10	1.15	1.15								
	160–450	1.0 ~ 330	0.80	1	1.35	1.50	1.50								
Endurance	<b>Test conditions</b>														
	Duration	2,000 hours (1,000 hours for ≤ ø8mm products)													
	Ambient temperature	+105°C													
	Applied voltage	DC voltage with maximum permissible ripple current specified at +105°C (sum of the DC voltage and super-imposed peak AC voltage for maximum permissible ripple current should be equal to rated DC working voltage)													
	<b>Post-test requirements at +20°C</b>														
	Leakage current	≤ initial specified value													
	Capacitance change	± 20% of initial measured value													
tan δ	≤ 200% of initial specified value														
Shelf life	<b>Test conditions (Post-test requirements at +20°C. Same limits as "Endurance".)</b>														
	Duration	1,000 hours													
	Ambient temperature	+105°C													
	Applied voltage	(none)													

### ■ Dimensions in mm (not to scale)



Body Dia. øD	5	6.3	8	10	12.5	16	18
Lead Dia. ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8
Lead Space P	2.0	2.5	3.5	5.0	5.0	7.5	7.5

### ■ Case Size

Cap. (μF)	Working Voltage							
	6.3 (0J)	10 (1A)	16 (1C)	25 (1E)	35 (1V)	50 (1H)	63 (1J)	100 (2A)
0.1 (0R1)						5 x11		
0.22 (R22)						5 x11		
0.33 (R33)						5 x11		
0.47 (R47)						5 x11		5 x11
1 (010)						5 x11		5 x11
2.2 (2R2)						5 x11		5 x11
3.3 (3R3)						5 x11		5 x11
4.7 (4R7)						5 x11		5 x11
10 (100)						5 x11	5 x11	6.3 x11.2
22 (220)						5 x11	5 x11	6.3 x11.2
33 (330)						5 x11	6.3 x11.2	8 x11.5
47 (470)				5 x11	5 x11	6.3x 11.2	6.3 x11.2	10 x12.5
100 (101)			5 x11	6.3 x11.2	6.3 x11.2	8 x11.5	10 x12.5	10 x20
220 (221)	5 x11		6.3 x11.2	8 x11.5	8 x11.5	10 x12.5	10 x16	12.5 x25
330 (331)		6.3 x11.2	8 x11.5	8 x11.5	10 x12.5	10 x16	10 x20	16 x25
470 (471)	6.3 x11.2	8 x11.5	8 x11.5	10 x12.5	10 x16	10 x20	12.5 x20	16 x25
1000 (102)	8 x11.5	10 x12.5	10 x16	10 x20	12.5 x20	12.5 x25	16 x25	18 x35.5
2200 (222)	10 x10	10 x20	12.5 x20	12.5 x25	16 x25	16 x31.5	18 x35.5	
3300 (332)	10 x20	12.5 x20	12.5 x25	16 x25	16 x31.5	18 x35.5		
4700 (472)	12.5 x20	12.5 x25	16 x25	16 x31.5	18 x35.5			
6800 (682)	12.5 x25	16 x25	16 x31.5	18 x35.5				
10000 (103)	16 x25	16 x31.5	18 x35.5					
15000 (153)	16 x31.5	18 x35.5						
22000 (223)	18 x35.5							
Cap. (μF)	160 (2C)	200 (2D)	250 (2E)	350 (2V)	400 (2G)	450 (2W)		
1 (010)	6.3 x11.2	6.3 x11.2	6.3 x11.2	6.3 x11.2	6.3 x11.2	8 x11.5		
2.2 (2R2)	6.3 x11.2	6.3 x11.2	6.3 x11.2	8 x11.5	8 x11.5	10 x12.5		
3.3 (3R3)	6.3 x11.2	6.3 x11.2	8 x11.5	10 x12.5	10 x12.5	10 x16		
4.7 (4R7)	6.3 x11.2	8 x11.5	8 x11.5	10 x16	10 x16	10 x20		
10 (100)	10 x12.5	10 x16	10 x16	10 x20	10 x20	12.5 x20		
22 (220)	10 x20	10 x20	12.5 x20	12.5 x20	12.5 x25	16 x25		
33 (330)	10 x20	12.5 x20	12.5 x20	16 x25	16 x25	16 x31.5		
47 (470)	12.5 x20	12.5 x20	12.5 x25	16 x25	16 x31.5			
100 (101)	16 x25	16 x25	16 x31.5	18 x31.5				
220 (221)	16 x31.5	18 x31.5						
330 (331)	18 x31.5							

( ) shows W.V. and capacitance code.

### ■ Standard Products

W.V. (V DC)	Cap. ( $\mu$ F)	Part No.	Cap. Tol. [%] (120 Hz/+20°C)	D.C.L. (+20°C/2 min.) ( $\mu$ A) max.	tan $\delta$ (120 Hz/+20°C) max.	Ripple Current (120 Hz/+105°C) [mA] rms max.	Dimensions (mm)	
							$\phi$ D	L
6.3	220	ECAQJHG221	$\pm 20$	13.8	0.28	140	5	11
	470	ECAQJHG471		29.6	0.28	230	6.3	11.2
	1000	ECAQJHG102		63.0	0.28	380	8	11.5
	2200	ECAQJHG222		138.6	0.30	710	10	16
	3300	ECAQJHG332		207.9	0.32	840	10	20
	4700	ECAQJHG472		296.1	0.34	1090	12.5	20
	6800	ECAQJHG682		428.4	0.38	1350	12.5	25
	10000	ECAQJHG103		630.0	0.46	1650	16	25
	15000	ECAQJHG152		945.0	0.56	2010	16	31.5
	22000	ECAQJHG223		1386.0	0.70	2350	18	35.5
10	330	ECA1AHG331	$\pm 20$	33.0	0.24	200	6.3	11.2
	470	ECA1AHG471		47.0	0.24	250	8	11.5
	1000	ECA1AHG102		100.0	0.24	460	10	12.5
	2200	ECA1AHG222		220.0	0.26	760	10	20
	3300	ECA1AHG332		330.0	0.28	1000	12.5	20
	4700	ECA1AHG472		470.0	0.30	1260	12.5	25
	6800	ECA1AHG682		680.0	0.34	1570	16	25
	10000	ECA1AHG103		1000.0	0.42	1890	16	31.5
	15000	ECA1AHG153		1500.0	0.52	2180	18	35.5
16	100	ECA1CHG101	$\pm 20$	16.0	0.20	110	5	11
	220	ECA1CHG221		35.2	0.20	180	6.3	11.2
	330	ECA1CHG331		52.8	0.20	260	8	11.5
	470	ECA1CHG471		75.2	0.20	310	8	11.5
	1000	ECA1CHG102		160.0	0.20	560	10	16
	2200	ECA1CHG222		352.0	0.22	920	12.5	20
	3300	ECA1CHG332		528.0	0.24	1170	12.5	25
	4700	ECA1CHG472		752.0	0.26	1480	16	25
	6800	ECA1CHG682		1088.0	0.30	1780	16	31.5
	10000	ECA1CHG103		1600.0	0.38	2060	18	35.5
25	47	ECA1EHG470	$\pm 20$	11.7	0.16	91	5	11
	100	ECA1EHG101		25.0	0.16	130	6.3	11.2
	220	ECA1EHG221		55.0	0.16	2300	8	11.5
	330	ECA1EHG331		82.5	0.16	310	8	11.5
	470	ECA1EHG471		117.5	0.16	380	10	12.5
	1000	ECA1EHG102		250.0	0.16	680	10	20
	2200	ECA1EHG222		550.0	0.18	1090	12.5	25
	3300	ECA1EHG332		825.0	0.20	1400	16	25
	4700	ECA1EHG472		1175.0	0.22	1750	16	31.5
	6800	ECA1EHG682		1700.0	0.26	2040	18	35.5
35	47	ECA1VHG470	$\pm 20$	16.4	0.14	90	5	11
	100	ECA1VHG101		35.0	0.14	150	6.3	11.2
	220	ECA1VHG221		77.0	0.14	270	8	11.5
	330	ECA1VHG331		115.5	0.14	350	10	12.5
	470	ECA1VHG471		164.5	0.14	460	10	16
	100	ECA1VHG102		350.0	0.14	810	12.5	20
	2200	ECA1VHG222		770.0	0.16	1260	16	25
	3300	ECA1VHG332		1155.0	0.18	1610	16	31.5
	4700	ECA1VHG472		1645.0	0.20	1910	18	35.5

■ Standard Products (cont'd)

W.V. (V DC)	Cap. ( $\mu$ F)	Part No.	Cap. Tol. [%] (120 Hz/+20°C)	D.C.L. (+20°C/2 min.) ( $\mu$ A) max.	tan $\delta$ (120 Hz/+20°C) max.	Ripple Current (120 Hz/+105°C) [mA] rms max.	Dimensions (mm)	
							$\phi$ D	L
50	0.1	ECA1HHG0R1	$\pm 20$	3.0	0.12	1.1	5	11
	0.22	ECA1HHGR22		3.0	0.12	2.3	5	11
	0.33	ECA1HHGR33		3.0	0.12	3.5	5	11
	0.47	ECA1HHG47		3.0	0.12	5	5	11
	1	ECA1HHG010		3.0	0.12	10	5	11
	2.2	ECA1HHG2R2		3.0	0.12	18	5	11
	3.3	ECA1HHG3R3		3.0	0.12	22	5	11
	4.7	ECA1HHG4R7		3.0	0.12	26	5	11
	22	ECA1HHG220		11.0	0.12	65	5	11
	33	ECA1HHG330		16.5	0.12	90	5	11
	47	ECA1HHG470		23.5	0.12	110	6.3	11.2
	100	ECA1HHG101		50.0	0.12	180	8	11.5
	220	ECA1HHG220		110.0	0.12	330	10	12.5
	330	ECA1HHG331		165.0	0.12	410	10	16
	470	ECA1HHG471		235.0	0.12	530	10	20
	1000	ECA1HHG102		500.0	0.12	950	12.5	25
2200	ECA1HHG222	1100.0	0.14	1470	16	31.5		
3300	ECA1HHG332	1650.0	0.16	1700	18	35.5		
63	10	ECA1JHG100	$\pm 20$	6.3	0.10	46	5	11
	22	ECA1JHG220		13.8	0.10	71	5	11
	33	ECA1JHG330		20.7	0.10	100	6.3	11.2
	47	ECA1JHG470		29.6	0.10	120	6.3	11.2
	100	ECA1JHG101		63.0	0.10	215	10	12.5
	220	ECA1JHG221		138.6	0.10	335	10	16
	330	ECA1JHG331		207.9	0.10	510	10	20
	470	ECA1JHG471		296.1	0.10	640	12.5	20
	1000	ECA1JHG102		630.0	0.10	930	16	25
	2200	ECA1JHG222		1386.0	0.12	1610	18	35.5
100	0.47	ECA2AHGR47	$\pm 20$	3.0	0.08	9	5	11
	1	ECA2AHG010		3.0	0.08	14	5	11
	2.2	ECA2AHG2R2		3.0	0.08	21	5	11
	3.3	ECA2AHG3R3		3.3	0.08	31	5	11
	4.7	ECA2AHG4R7		4.7	0.08	38	5	11
	10	ECA2AHG100		10.0	0.08	54	6.3	11.2
	22	ECA2AHG220		22.0	0.08	93	6.3	11.2
	33	ECA2AHG330		33.0	0.08	130	8	11.5
	47	ECA2AHG470		47.0	0.08	165	10	12.5
	100	ECA2AHG101		100.0	0.08	265	10	20
	220	ECA2AHG221		220.0	0.08	440	12.5	25
	330	ECA2AHG331		330.0	0.08	540	16	25
	470	ECA2AHG471		470.0	0.08	715	16	25
	1000	ECA2AHG102		1000.0	0.08	985	18	35.5
160	1	ECA2CHG010	$\pm 20$	19.6	0.15	17	6.3	11.2
	2.2	ECA2CHG2R2		31.1	0.15	25	6.3	11.2
	3.3	ECA2CHG3R3		41.6	0.15	36	6.3	11.2
	4.7	ECA2CHG4R7		55.1	0.15	43	6.3	11.2
	10	ECA2CHG100		106.0	0.15	70	10	12.5
	22	ECA2CHG220		221.0	0.15	130	10	20
	33	ECA2CHG330		326.0	0.15	180	10	20
	47	ECA2CHG470		461.0	0.15	220	12.5	20
	100	ECA2CHG101		970.0	0.15	335	16	25
	220	ECA2CHG221		2122.0	0.15	540	16	31.5
	330	ECA2CHG331		3178.0	0.15	705	18	31.5

■ Standard Products (cont'd)

W.V. (V DC)	Cap. ( $\mu$ F)	Part No.	Cap. Tol. [%] (120 Hz/+20°C)	D.C.L. (+20°C/2 min.) ( $\mu$ A) max.	tan $\delta$ (120 Hz/+20°C) max.	Ripple Current (120 Hz/+105°C) [mA] rms max.	Dimensions (mm)	
							$\phi$ D	L
200	1	ECA2DHG010	$\pm 20$	22.0	0.15	17	6.3	11.2
	2.2	ECA2DHG2R2		36.4	0.15	25	6.3	11.2
	3.3	ECA2DHG3R3		49.6	0.15	36	6.3	11.2
	4.7	ECA2DHG4R7		66.4	0.15	50	8	11.5
	10	ECA2DHG100		130.0	0.15	08	10	16
	22	ECA2DHG220		274.0	0.15	140	10	20
	33	ECA2DHG330		406.0	0.15	190	12.5	20
	47	ECA2DHG470		574.0	0.15	220	12.5	20
	100	ECA2DHG101		1210.0	0.15	335	16	25
	220	ECA2DHG221		2650.0	0.15	575	18	31.5
250	1	ECA2EHG010	$\pm 20$	25.0	0.15	17	6.3	11.2
	2.2	ECA2EHG2R2		43.0	0.15	29	6.3	11.2
	3.3	ECA2EHG3R3		59.5	0.15	42	8	11.5
	4.7	ECA2EHG4R7		80.5	0.15	50	8	11.5
	10	ECA2EHG100		160.0	0.15	88	10	16
	22	ECA2EHG220		340.0	0.15	155	12.5	20
	33	ECA2EHG330		505.0	0.15	190	12.5	20
	47	ECA2EHG470		715.0	0.15	230	12.5	25
	100	ECA2EHG101		1510.0	0.15	365	16	31.5
350	1	ECA2VHG010	$\pm 20$	31.0	0.20	18	6.3	11.2
	2.2	ECA2VHG2R2		56.2	0.20	31	8	11.5
	3.3	ECA2VHG3R3		79.3	0.20	38	10	12.5
	4.7	ECA2VHG4R7		108.0	0.20	50	10	16
	10	ECA2VHG100		220.0	0.20	82	10	20
	22	ECA2VHG220		472.0	0.20	130	12.5	20
	33	ECA2VHG330		703.0	0.20	195	16	25
	47	ECA2VHG470		979.0	0.20	230	16	25
	100	ECA2VHG101		2110.0	0.20	375	18	31.5
400	1	ECA2GHG010	$\pm 20$	34.0	0.24	18	6.3	11.2
	2.2	ECA2GHG2R2		62.8	0.24	30	8	11.5
	3.3	ECA2GHG3R3		89.2	0.24	40	10	12.5
	4.7	ECA2GHG4R7		122.0	0.24	50	10	16
	10	ECA2GHG100		250.0	0.24	80	10	20
	22	ECA2GHG220		538.0	0.24	145	12.5	25
	33	ECA2GHG330		802.0	0.24	195	16	25
	47	ECA2GHG470		1138.0	0.24	250	16	31.5
450	1	ECA2WHG010	$\pm 20$	37.0	0.20	18	8	11.5
	2.2	ECA2WHG2R2		69.4	0.20	29	10	12.5
	3.3	ECA2WHG3R3		99.1	0.20	41	10	16
	4.7	ECA2WHG4R7		136.0	0.20	49	10	20
	10	ECA2WHG100		280.0	0.20	75	12.5	20
	22	ECA2WHG220		604.0	0.20	115	16	25
	33	ECA2WHG330		901.0	0.20	155	16	31.5