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HCS Series 85 °C V-chip Aluminum Electrolytic Capacitor

Operating with general temperature range -40~+85°C
Load life of 2000 hours
RoHS & REACH compliant, Halogen-free

SPECIFICATIONS

Items	Characteristics
Operation Temperature Range	-40 ~ +85°C
Voltage Range	4 ~ 450V
Capacitance Range	0.1 ~ 10000μF
Capacitance Tolerance	±20% at 120Hz, 20°C
Leakage Current	Rated Voltage: 6.3 ~ 100V / 160 ~ 450V Case size: ∅4~∅10 / ∅12.5~∅18 / ∅6.3~∅18 Time: After 2 min. application of rated voltage at 20°C / After 1 min. application of rated voltage at 20°C / After 5 min. application of rated voltage at 20°C Leakage current: ≤0.01CV or 3μA, whichever is greater / ≤0.03CV or 4μA, whichever is greater / ≤0.04CV+100μA, whichever is greater C: Nominal capacitance (μF) , V: Rated voltage (V)
Dissipation Factor (tan δ)	Measurement frequency : 120Hz, Temperature: 20°C

Rated Voltage (V)		4	6.3	10	16	25	35	50	63	100	160~250	350~450
tan δ (max.)	∅4~∅10	0.42	0.28	0.24	0.20	0.14	0.12	0.12	0.10	0.10	0.20	0.25
	∅12.5~∅18	0.45	0.38	0.34	0.30	0.28	0.22	0.18	0.14	0.10	0.20	0.25

Stability at Low Temperature

Measurement frequency : 120Hz

Rated Voltage (V)			4	6.3	10	16	25	35	50~100	160~250	350~450
Impedance Ratio ZT/Z20 (max.)	∅4~∅10	Z(-25°C)/Z(20°C)	7	4	3	2	2	2	2	2	3
		Z(-40°C)/Z(20°C)	15	8	6	4	4	3	3	3	6
	∅12.5~∅18	Z(-25°C)/Z(20°C)	7	5	4	3	2	2	2	2	4
		Z(-40°C)/Z(20°C)	17	12	10	8	5	4	3	6	10

Load Life

After 2000 hours application of the rated voltage at 85°C, they meet the characteristics listed below.

Capacitance Change	Within ±20% of initial value (Within ±30% of initial value for 4V)
Dissipation Factor	200% or less of initial specified value
Leakage Current	initial specified value or less

Shelf Life

After leaving capacitors under no load at 85°C for 1000 hours, they meet the specified value for load life characteristics listed above.

Resistance to Soldering Heat

After reflow soldering and restored at room temperature, they meet the characteristics listed below.

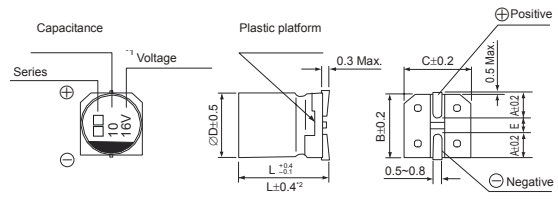
Capacitance Change	Within ±10% of initial value
Dissipation Factor	initial specified value or less
Leakage Current	initial specified value or less

Marking

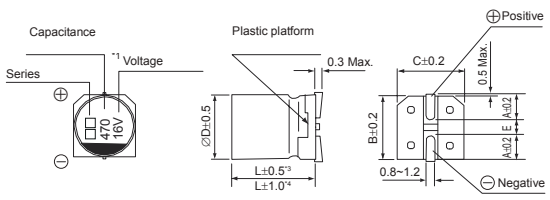
Black print on the case top.

DRAWING (Unit: mm)

(∅4~∅6.3×7.7)



(∅8×10.5~∅18)



*1. Voltage mark for 6.3V is [6V]
*2. Applicable to ∅6.3×7.7
*3. Applicable to ∅8×10.5~∅10
*4. Applicable to ∅12.5~∅18

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DIMENSIONS (Unit: mm)

ØD x L	4 x 5.4	5 x 5.4	6.3 x 5.4	6.3 x 7.7	8 x 10.5	10 x 10.5	10 x 13.5	12.5 x 13.5	12.5 x 16	16 x 16.5	18 x 16.5	18 x 18.5
A	2.0	2.2	2.6	2.6	3.0	3.3	3.3	4.9	4.9	5.8	6.2	6.2
B	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0	19.0	19.0
C	4.3	5.3	6.6	6.6	8.4	10.4	10.4	13.0	13.0	17.0	19.0	19.0
E ± 0.2	1.0	1.4	1.9	1.9	3.1	4.7	4.7	4.7	4.7	6.4	6.4	6.4
L	5.4	5.4	5.4	7.7	10.5	10.5	13.5	13.5	16.0	16.5	16.5	18.5

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Code / µF		4		6.3		10		16		25	
		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
4.7	475									4 × 5.4	19
10	106							4 × 5.4	25	5 × 5.4 (4 × 5.4)	28 (20)
15	156							4 × 5.4	28	5 × 5.4	34
22	226			4 × 5.4	31	5 × 5.4 (4 × 5.4)	35 (28)	5 × 5.4 (4 × 5.4)	39 (28)	6.3 × 5.4 (5 × 5.4)	52 (35)
33	336	4 × 5.4	26	5 × 5.4 (4 × 5.4)	39 (31)	5 × 5.4 (4 × 5.4)	43 (32)	6.3 × 5.4 (5 × 5.4)	57 (40)	6.3 × 5.4 (5 × 5.4)	63 (42)
47	476	4 × 5.4	34	5 × 5.4 (4 × 5.4)	47 (36)	5 × 5.4	43	6.3 × 5.4 (5 × 5.4)	68 (44)	6.3 × 5.4	68
56	566	4 × 5.4	39	5 × 5.4	46	6.3 × 5.4	57	6.3 × 5.4	74	6.3 × 5.4	82
68	686	5 × 5.4	45	6.3 × 5.4 (5 × 5.4)	62 (52)	6.3 × 5.4	72	6.3 × 5.4	80	6.3 × 5.4	94
100	107	5 × 5.4	61	6.3 × 5.4 (5 × 5.4)	71 (55)	6.3 × 5.4 (5 × 5.4)	76 (70)	6.3 × 5.4	86	6.3 × 7.7	130
150	157	6.3 × 5.4	74	6.3 × 5.4	78	6.3 × 5.4	88	6.3 × 7.7	135	8 × 10.5 (6.3 × 7.7)	200 (130)
220	227	6.3 × 5.4	82	6.3 × 5.4	95	6.3 × 7.7	150	8 × 10.5 (6.3 × 7.7)	215 (150)	8 × 10.5	250
330	337	6.3 × 7.7	150	6.3 × 7.7	150	8 × 10.5	280	8 × 10.5	280	10 × 10.5 (8 × 10.5)	340 (310)
470	477	6.3 × 7.7	150	8 × 10.5 (6.3 × 7.7)	300 (150)	10 × 10.5 (8 × 10.5)	320 (300)	10 × 10.5 (8 × 10.5)	420 (330)	10 × 10.5	400
680	687	8 × 10.5	300	8 × 10.5	300	10 × 10.5	380	10 × 10.5	450	10 × 13.5	550
1000	108	8 × 10.5	330	10 × 10.5 (8 × 10.5)	430 (330)	10 × 10.5	450	12.5 × 13.5 (10 × 13.5) (10 × 10.5)	710 (550) (490)	12.5 × 13.5	820
1500	158	10 × 10.5	450	10 × 13.5 (10 × 10.5)	650 (450)	10 × 13.5	650	12.5 × 13.5	750	12.5 × 16	1000
2200	228	10 × 13.5 (10 × 10.5)	620 (480)	12.5 × 13.5 (10 × 13.5)	890 (720)	12.5 × 13.5	960	16 × 16.5 (12.5 × 16)	1150 (1000)	16 × 16.5	1250
3300	338	10 × 13.5	700	12.5 × 16 (12.5 × 13.5)	1000 (900)	16 × 16.5 (12.5 × 16)	1300 (1050)	16 × 16.5	1350	18 × 16.5	1450
4700	478	12.5 × 13.5	850	16 × 16.5	1400	16 × 16.5	1450	18 × 16.5	1600	18 × 18.5	1750
6800	688	16 × 16.5 (12.5 × 16)	1350 (900)	18 × 16.5	1700	18 × 16.5	1700	18 × 18.5	2000		
10000	109			18 × 18.5	2000	18 × 18.5	2000				

WV / Code / µF		35		50		63		100	
		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
0.1	104			4 × 5.4	1.0	4 × 5.4	1.0		
0.22	224			4 × 5.4	2.3	4 × 5.4	2.3		
0.33	334			4 × 5.4	3.5	4 × 5.4	3.5		
0.47	474			4 × 5.4	5.0	4 × 5.4	5.0		
1	105			4 × 5.4	10	4 × 5.4	10	4 × 5.4	10
1.5	155			4 × 5.4	12	4 × 5.4	12	6.3 × 5.4	15
2.2	225			4 × 5.4	15	4 × 5.4	15	6.3 × 5.4	20
3.3	335	4 × 5.4	18	4 × 5.4	18	5 × 5.4	20	6.3 × 7.7 (6.3 × 5.4)	45 (28)
4.7	475	4 × 5.4	20	5 × 5.4 (4 × 5.4)	23 (19)	5 × 5.4	23	6.3 × 7.7 (6.3 × 5.4)	50 (30)
10	106	5 × 5.4 (4 × 5.4)	30 (20)	6.3 × 5.4 (5 × 5.4)	34 (27)	6.3 × 7.7 (6.3 × 5.4)	55 (34)	8 × 10.5 (6.3 × 7.7)	110 (50)
22	226	6.3 × 5.4 (5 × 5.4)	54 (42)	6.3 × 5.4	60	8 × 10.5 (6.3 × 7.7)	140 (70)	10 × 10.5 (8 × 10.5)	180 (120)
33	336	6.3 × 5.4	60	6.3 × 7.7	85	8 × 10.5 (6.3 × 7.7)	160 (85)	10 × 10.5	190
47	476	6.3 × 5.4 (6.3 × 7.7)	70 (165)	10 × 10.5 (8 × 10.5) (6.3 × 7.7)	130 (110) (90)	10 × 10.5 (8 × 10.5)	230 (170)		

•Case size ∅D×L(mm), ripple current (mA rms) at 85°C, 120Hz

DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

WV / Code / μF		35		50		63		100		160	
		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
22	226									10 × 13.5	100
33	336									12.5 × 13.5	290
47	476									12.5 × 13.5 (16 × 16.5)	300 (370)
56	566	6.3 × 7.7	80	6.3 × 7.7	110	10 × 10.5	250			12.5 × 16	390
68	686	6.3 × 7.7	110	8 × 10.5	170	10 × 10.5	260			16 × 16.5	500
100	107	8 × 10.5 (6.3 × 7.7)	175 (120)	10 × 10.5 (8 × 10.5)	240 (200)	12.5 × 13.5 (10 × 13.5) (10 × 10.5)	380 (290) (280)	12.5 × 13.5	440	16 × 16.5 (18 × 16.5)	650 (690)
150	157	8 × 10.5	220	10 × 10.5	240	10 × 13.5	310	12.5 × 13.5	540		
220	227	10 × 10.5 (8 × 10.5)	310 (270)	10 × 13.5 (10 × 10.5)	400 (320)	12.5 × 13.5	580	16 × 16.5	700		
330	337	10 × 10.5	350	12.5 × 13.5 (10 × 13.5)	600 (420)	16 × 16.5 (12.5 × 16)	820 (720)	18 × 16.5	780		
470	477	12.5 × 13.5 (10 × 13.5) (10 × 10.5)	600 (530) (400)	16 × 16.5 (12.5 × 16)	850 (740)	16 × 16.5	950				
680	687	12.5 × 13.5	750	16 × 16.5	950	18 × 16.5	1100				
1000	108	16 × 16.5 (12.5 × 16)	1100 (800)	18 × 16.5	1350						
2200	228	18 × 16.5	1450								
3300	338	18 × 18.5	1750								

WV / Code / μF		200		250		350		400		450	
		Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current	Size	Ripple current
3.3	335							10 × 13.5	80	10 × 13.5	80
4.7	475					10 × 13.5	115	10 × 13.5 (12.5 × 13.5)	100 (120)	10 × 13.5 (12.5 × 13.5)	100 (120)
10	106	10 × 13.5	135	10 × 13.5	135	12.5 × 13.5	120	12.5 × 13.5	120	12.5 × 13.5 (12.5 × 16)	120 (130)
22	226	12.5 × 13.5	240	12.5 × 13.5	150	16 × 16.5	140	16 × 16.5	140	16 × 16.5	140
33	336	12.5 × 13.5	300	12.5 × 16 (16 × 16.5)	240 (300)	16 × 16.5	140	16 × 16.5	140	18 × 16.5	180
47	476	16 × 16.5	420	16 × 16.5	340	18 × 16.5	280	18 × 16.5	280		
100	107	16 × 16.5	420	18 × 16.5	440	18 × 18.5	350	18 × 18.5	350		

•Case size ∅D×L(mm), ripple current (mA rms) at 85°C, 120Hz

FREQUENCY COEFFICIENT OF ALLOWABLE RIPPLE CURRENT

Frequency			50Hz	120Hz	300Hz	1KHz	10KHz~
Coefficient	Ø4 ~ Ø10	0.1 ~ 68μF	0.70	1.00	1.17	1.36	1.50
		100 ~ 3300μF	0.85	1.00	1.08	1.20	1.30
	Ø12.5 ~ Ø18	~ 68μF	0.75	1.00	1.35	1.57	2.00
		100 ~ 680μF	0.80	1.00	1.23	1.34	1.50
		1000 ~ 6800μF	0.85	1.00	1.10	1.13	1.15

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5~10°C rise. When long life performance is required in actual use, the rms ripple current has to be reduced.

◆ How to order

HCS	106	M	0035	0405	R	-
↓	↓	↓	↓	↓	↓	↓
Type	Capacitance code	Tolerance	Rated Voltage	Size Code	Package	Additional characters may be added for special requirements
HCS	pF Code: 1st two digits represent significant figures 3rd digit represents mulitplier (number of zeros to follow) 106 = 10uF 107 = 100uF	M: +/-20%	Code 0035: 35VDC For DC Voltage 0006: 6.3VDC 0035: 35VDC 0450: 450VDC	Code 0405: Size 4x5.4mm Size for V-chip E-cap 0405: Size 4x5.4mm 1010: Size 10x10.5mm 1818: Size 18x18.5mm	R: Tape & Reel	