Type AHA, -55°C to 105°C

SMT Aluminum Electrolytic Capacitors - Long Life, 105°C

Long Life Filtering, Bypassing, Power Supply Decoupling

Type AHA Capacitors deliver twice the life of many SMT aluminum capacitor types, and they handle high levels of ripple current. The AHA can handle the ripple current of Type AVS at 20°C higher temperature. The vertical cylindrical cases facilitate automatic mounting and reflow soldering and Type AHA offers a significant cost savings over tantalum capacitors.

Highlights

- +105°C, Up to 2000 Hour Load Life
- Capacitance Range: 0.1 µF to 1500 µF
- Voltage Range: 6.3 Vdc to 100 Vdc

Specifications

Operating Temperature: -55°C to +105°C
Rated Voltage: 6.3, 10, 16, 25, 35, 50, 63 & 100 Vdc
Capacitance: 0.1 µF to 1500 µF
D.F. (@ 20°C): See Ratings Table
Capacitance Tolerance: ±20% @ 120Hz and +20°C
Leakage Current: 0.01 CV or 3 µA @ +20°C after two minutes (whichever is greater)
Ripple Current Multipliers: **Frequency**

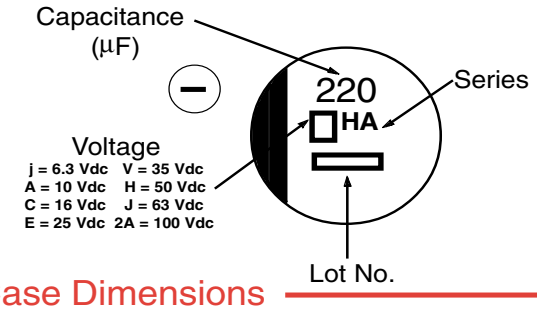
50/60 Hz	120 Hz	1 kHz	10 kHz & up
0.7	1	1.3	1.7

Load Life: 1000 h @ +105°C, 4.0 - 6.3 mm dia.
2000 h @ +105°C, 8.0 - 10.0 mm dia.
Δ Capacitance ± 20%
DF: ≤200% of limit
DCL: ≤100% of limit

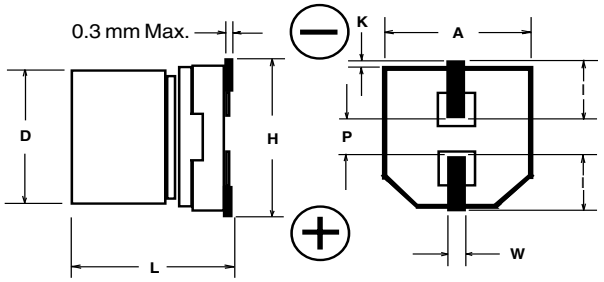
Shelf Life: 1000 h @ +105°C, 4.0 - 6.3 mm dia.
Δ Capacitance ± 20%
DF: ≤200% of limit
DCL: ≤100% of limit

Maximum Impedance Ratio								
W.V. (Vdc)	6.3	10	16	25	35	50	63	100
-25 °C / +20 °C	4	3	2	2	2	2	3	3
-40 °C / +20 °C	8	6	4	4	3	3	4	4

AHA Series Marking



Outline Drawing



Case Dimensions

(mm)

Case Code	D ± 0.5	L	A ± 0.2	H (max)	I (ref)	W	P (ref)	K
B	4.0	5.4 +.1,-.2	4.3	5.5	1.8	0.65 ± 0.1	1.0	0.35 + 0.15/-0.20
C	5.0	5.4 +.1,-.2	5.3	6.5	2.2	0.65 ± 0.1	1.5	0.35 + 0.15/-0.20
D	6.3	5.4 +.1,-.2	6.6	7.8	2.4	0.65 ± 0.1	1.8	0.35 + 0.15/-0.20
X	6.3	7.9 ±.3	6.6	7.8	2.6	0.65 ± 0.1	1.8	0.35 + 0.15/-0.20
E	8.0	6.2 ±.3	8.3	9.5	3.4	0.65 ± 0.1	2.2	0.35 + 0.15/-0.20
F	8.0	10.2 ±.3	8.3	10	3.4	0.90 ± 0.2	3.1	0.70 ± 0.20
G	10.0	10.2 ±.3	10.3	12	3.5	0.90 ± 0.2	4.6	0.70 ± 0.20

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Type AHA, -55°C to 105°C

SMT Aluminum Electrolytic Capacitors - Long Life, 105°C

Ratings Table

Cap µF	Catalog Number	Max. DCL µA)	Max. Dissipation Factor @ 120 Hz	Max. ESR @ 120 Hz/20°C (Ohms)	Max. Ripple Current 120 Hz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
6.3 Vdc (8 Vdc Surge)								
22	AHA226M06B12T	3.0	0.30	22.6	29	B	4x5.4	2000
33	AHA336M06B12T	3.0	0.35	17.6	29	B	4x5.4	2000
47	AHA476M06B12T	3.0	0.35	12.3	36	B	4x5.4	2000
47	AHA476M06C12T	3.0	0.30	10.6	46	C	5x5.4	1000
100	AHA107M06C12T	6.3	0.35	5.8	47	C	5x5.4	1000
100	AHA107M06D16T	6.3	0.30	5.0	71	D	6.3x5.4	1000
220	AHA227M06D16T	13.9	0.35	2.6	74	D	6.3x5.4	1000
330	AHA337M06X16T	20.8	0.30	1.5	105	X	6.3x7.9	900
330	AHA337M06F24T	20.8	0.35	1.8	230	F	8x10.2	500
470	AHA477M06F24T	29.6	0.35	1.2	300	F	8x10.2	500
1000	AHA108M06F24T	63.0	0.35	0.6	300	F	8x10.2	500
1000	AHA108M06G24T	63.0	0.35	0.6	400	G	10x10.2	500
1500	AHA158M06G24T	94.5	0.35	0.4	480	G	10x10.2	500
10 Vdc (13 Vdc Surge)								
22	AHA226M10B12T	3.0	0.30	22.6	28	B	4x5.4	2000
33	AHA336M10B12T	3.3	0.30	15.1	29	B	4x5.4	2000
33	AHA336M10C12T	3.3	0.22	11.1	43	C	5x5.4	1000
47	AHA476M10C12T	4.7	0.30	10.6	43	C	5x5.4	1000
100	AHA107M10D16T	10.0	0.30	5.0	70	D	6.3x5.4	1000
100	AHA107M10E16T	10.0	0.26	4.3	110	E	8x6.2	1000
220	AHA227M10X16T	22.0	0.22	1.7	105	X	6.3x7.9	900
220	AHA227M10F24T	22.0	0.26	2.0	160	F	8x10.2	500
470	AHA477M10F24T	47.0	0.26	0.9	200	F	8x10.2	500
470	AHA477M10G24T	47.0	0.26	0.9	270	G	10x10.2	500
1000	AHA108M10G24T	100.0	0.26	0.4	580	G	10x10.2	500
16 Vdc (20 Vdc Surge)								
10	AHA106M16B12T	3.0	0.16	26.5	28	B	4x5.4	2000
22	AHA226M16B12T	3.5	0.26	19.6	28	B	4x5.4	2000
22	AHA226M16C12T	3.5	0.16	12.1	39	C	5x5.4	1000
33	AHA336M16C12T	5.3	0.26	13.1	35	C	5x5.4	1000
47	AHA476M16C12T	7.5	0.26	9.2	39	C	5x5.4	1000
47	AHA476M16D16T	7.5	0.16	5.6	70	D	6.3x5.4	1000
100	AHA107M16D16T	16.0	0.26	4.3	70	D	6.3x5.4	1000
220	AHA227M16X16T	35.2	0.16	1.2	105	X	6.3x7.9	900
220	AHA227M16F24T	35.2	0.20	1.5	150	F	8x10.2	500
220	AHA227M16G24T	35.2	0.20	1.5	210	G	10x10.2	500
330	AHA337M16F24T	52.8	0.20	1.0	170	F	8x10.2	500
330	AHA337M16G24T	52.8	0.20	1.0	230	G	10x10.2	500
470	AHA477M16F24T	75.2	0.20	0.7	190	F	8x10.2	500
470	AHA477M16G24T	75.2	0.20	0.7	340	G	10x10.2	500
25 Vdc (31 Vdc Surge)								
4.7	AHA475M25B12T	3.0	0.14	49.4	22	B	4x5.4	2000
10	AHA106M25B12T	3.0	0.20	33.2	22	B	4x5.4	2000
10	AHA106M25C12T	3.0	0.14	23.2	28	C	5x5.4	1000
22	AHA226M25C12T	5.5	0.20	15.1	35	C	5x5.4	1000
22	AHA226M25D16T	5.5	0.14	10.6	55	D	6.3x5.4	1000
33	AHA336M25C12T	8.3	0.20	10.0	42	C	5x5.4	1000
33	AHA336M25D16T	8.3	0.14	7.0	65	D	6.3x5.4	1000
47	AHA476M25D16T	11.8	0.20	7.1	70	D	6.3x5.4	1000
47	AHA476M25E16T	11.8	0.16	5.6	91	E	8x6.2	1000
100	AHA107M25E16T	25.0	0.16	2.7	91	E	8x6.2	1000
100	AHA107M25F24T	25.0	0.16	2.7	130	F	8x10.2	500
220	AHA227M25F24T	55.0	0.16	1.2	160	F	8x10.2	500
220	AHA227M25G24T	55.0	0.16	1.2	190	G	10x10.2	500
330	AHA337M25F24T	82.5	0.16	0.8	180	F	8x10.2	500
330	AHA337M25G24T	82.5	0.16	0.8	340	G	10x10.2	500
470	AHA477M25G24T	117.5	0.16	0.6	360	G	10x10.2	500

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Type AHA, -55°C to 105°C
SMT Aluminum Electrolytics Capacitors - Long Life, 105°C

Ratings Table

Cap µF	Catalog Number	Max. DCL (µA)	Max. Dissipation Factor @ 120 Hz	Max. ESR @ 120 Hz/20°C (Ohms)	Max. Ripple Current 120 Hz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
35 Vdc (44 Vdc Surge)								
4.7	AHA475M35B12T	3.0	0.12	42.3	22	B	4x5.4	2000
10	AHA106M35B12T	3.6	0.16	26.5	22	B	4x5.4	2000
10	AHA106M35C12T	3.6	0.12	19.9	30	C	5x5.4	1000
22	AHA226M35C12T	7.7	0.16	12.1	35	C	5x5.4	1000
22	AHA226M35D16T	7.7	0.12	9.0	60	D	6.3x5.4	1000
33	AHA336M35D16T	11.6	0.16	8.0	42	D	6.3x5.4	1000
33	AHA336M35E16T	11.6	0.14	7.0	84	E	8x6.2	1000
47	AHA476M35E16T	16.5	0.14	4.9	84	E	8x6.2	1000
47	AHA476M35F24T	16.5	0.14	4.9	98	F	8x10.2	500
100	AHA107M35X16T	35.0	0.12	2.0	84	X	6.3x7.9	900
100	AHA107M35F24T	35.0	0.14	2.3	120	F	8x10.2	500
100	AHA107M35G24T	35.0	0.14	2.3	160	G	10x10.2	500
220	AHA227M35F24T	77.0	0.14	1.1	170	F	8x10.2	500
220	AHA227M35G24T	77.0	0.14	1.1	210	G	10x10.2	500
330	AHA337M35G24T	115.5	0.14	0.7	250	G	10x10.2	500
50 Vdc (63 Vdc Surge)								
0.1	AHA104M50B12T	3.0	0.12	1990	1	B	4x5.4	2000
0.22	AHA224M50B12T	3.0	0.12	905	2	B	4x5.4	2000
0.33	AHA334M50B12T	3.0	0.12	603	3	B	4x5.4	2000
0.47	AHA474M50B12T	3.0	0.12	424	5	B	4x5.4	2000
1	AHA105M50B12T	3.0	0.12	199	10	B	4x5.4	2000
2.2	AHA225M50B12T	3.0	0.12	90.5	16	B	4x5.4	2000
3.3	AHA335M50B12T	3.0	0.12	60.3	16	B	4x5.4	2000
4.7	AHA475M50C12T	3.0	0.12	42.4	23	C	5x5.4	1000
10	AHA106M50D16T	5.0	0.12	19.9	35	D	6.3x5.4	1000
22	AHA226M50E16T	11.0	0.12	9.0	70	E	8x6.2	1000
33	AHA336M50X16T	16.5	0.12	6.0	60	X	6.3x7.9	900
33	AHA336M50E16T	16.5	0.12	6.0	70	E	8x6.2	1000
33	AHA336M50F24T	16.5	0.12	6.0	91	F	8x10.2	500
47	AHA476M50X16T	23.5	0.12	4.2	63	X	6.3x7.9	900
47	AHA476M50F24T	23.5	0.12	4.2	95	F	8x10.2	500
47	AHA476M50G24T	23.5	0.12	4.2	100	G	10x10.2	500
100	AHA107M50F24T	50.0	0.12	2.0	110	F	8x10.2	500
100	AHA107M50G24T	50.0	0.12	2.0	120	G	10x10.2	500
220	AHA227M50G24T	110.0	0.12	0.9	150	G	10x10.2	500
63 Vdc (75 Vdc Surge)								
10	AHA106M63E16T	6.3	0.18	29.9	25	E	8x6.2	1000
22	AHA226M63E16T	13.9	0.18	13.6	30	E	8x6.2	1000
22	AHA226M63F24T	13.9	0.18	13.6	30	F	8x10.2	500
33	AHA336M63G24T	20.8	0.18	9.0	45	G	10x10.2	500
47	AHA476M63F24T	29.6	0.18	6.3	50	F	8x10.2	500
47	AHA476M63G24T	29.6	0.18	6.3	50	G	10x10.2	500
100 Vdc (125 Vdc Surge)								
3.3	AHA335M2AE16T	3.3	0.18	90.5	30	E	8x6.2	1000
4.7	AHA475M2AE16T	4.7	0.18	63.5	30	E	8x6.2	1000
4.7	AHA475M2AF24T	4.7	0.18	63.5	50	F	8x10.2	500
10	AHA106M2AF24T	10.0	0.18	29.8	55	F	8x10.2	500
22	AHA226M2AF24T	22.0	0.18	13.6	55	F	8x10.2	500
22	AHA226M2AG24T	22.0	0.18	13.6	60	G	10x10.2	500
33	AHA336M2AG24T	33.0	0.18	9.0	65	G	10x10.2	500

Part Numbering System

AHA — **Type**

106 — **Capacitance**
- **104** = 0.1 µF
- **105** = 1.0 µF
- **106** = 10 µF
- **107** = 100 µF
- **108** = 1000 µF

M — **Capacitance Tolerance**
- **M** = ±20%

16 — **Voltage**
- **06** = 6.3 Vdc
- **10** = 10 Vdc
- **16** = 16 Vdc
- **25** = 25 Vdc
- **35** = 35 Vdc
- **50** = 50 Vdc
- **63** = 63 Vdc
- **2A** = 100 Vdc

B — **Case Code**

12T — **Packaging Information**
- **12** = Carrier Tape Width (mm)
- **T** = Tape & Reel
- **B** = Bulk

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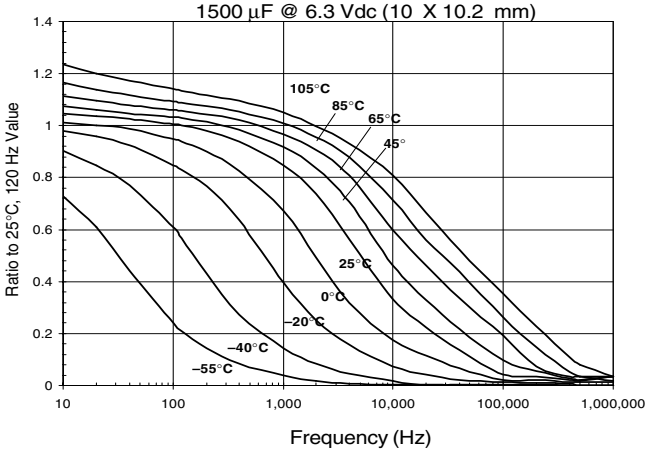
Type AHA, -55°C to 105°C

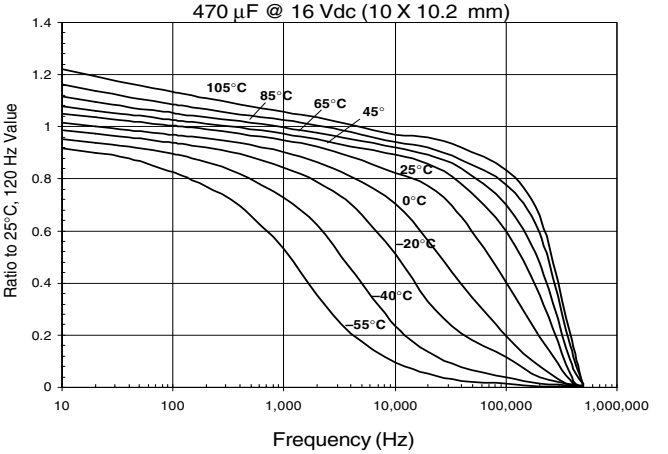
SMT Aluminum Electrolytic Capacitors - Long Life, 105°C

Typical Performance Curves

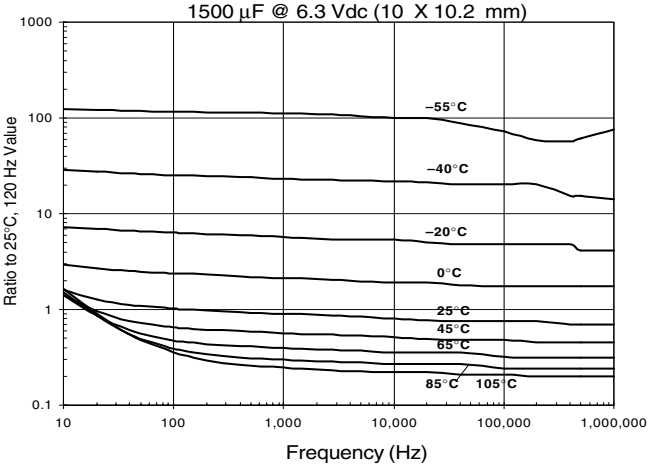
Capacitance vs. Temperature & Frequency
1500 µF @ 6.3 Vdc (10 X 10.2 mm)



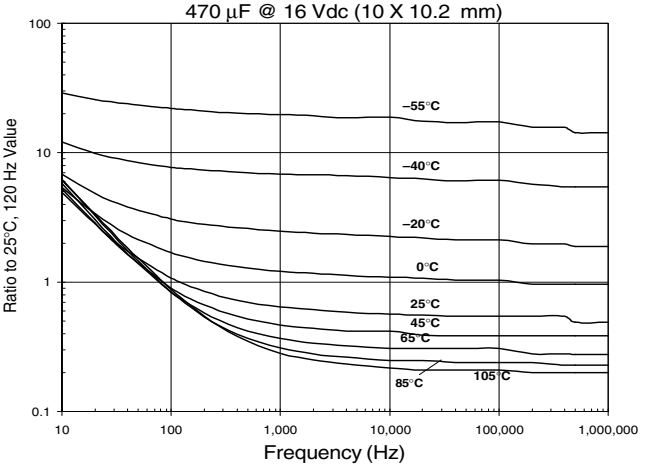
Capacitance vs. Temperature & Frequency
470 µF @ 16 Vdc (10 X 10.2 mm)



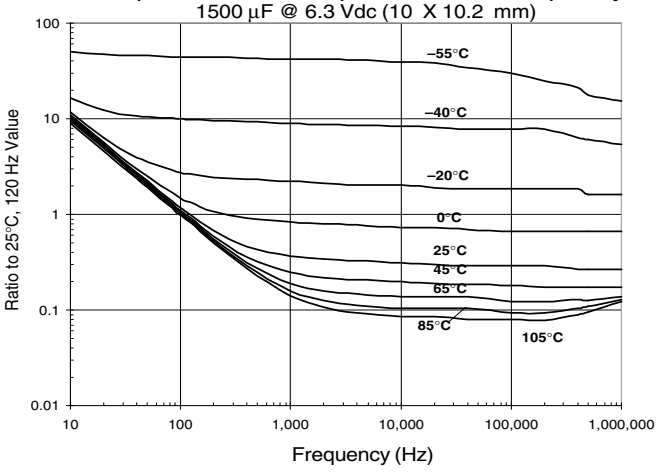
ESR vs. Temperature and Frequency
1500 µF @ 6.3 Vdc (10 X 10.2 mm)



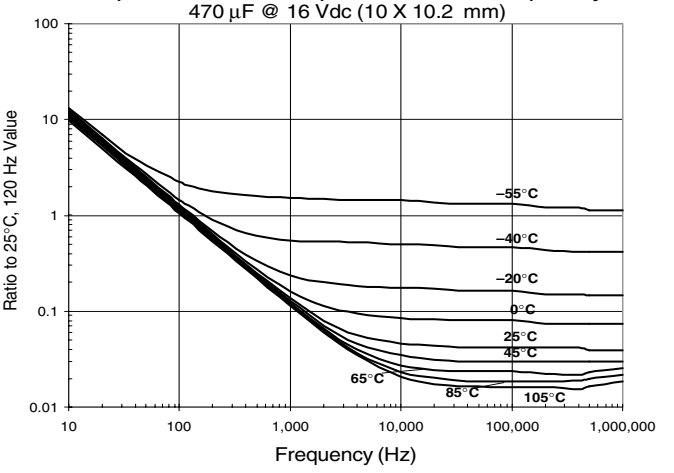
ESR vs. Temperature and Frequency
470 µF @ 16 Vdc (10 X 10.2 mm)



Impedance vs. Temperature and Frequency
1500 µF @ 6.3 Vdc (10 X 10.2 mm)



Impedance vs. Temperature and Frequency
470 µF @ 16 Vdc (10 X 10.2 mm)



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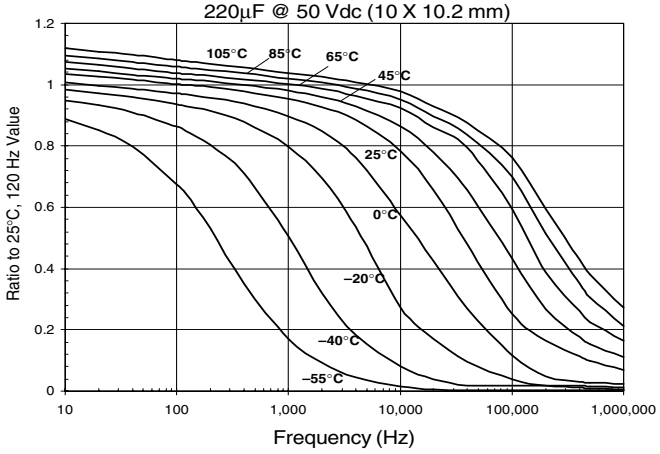
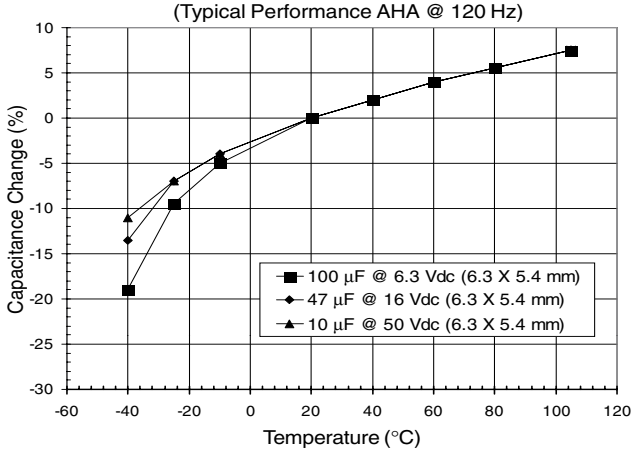
Typical Performance Curves

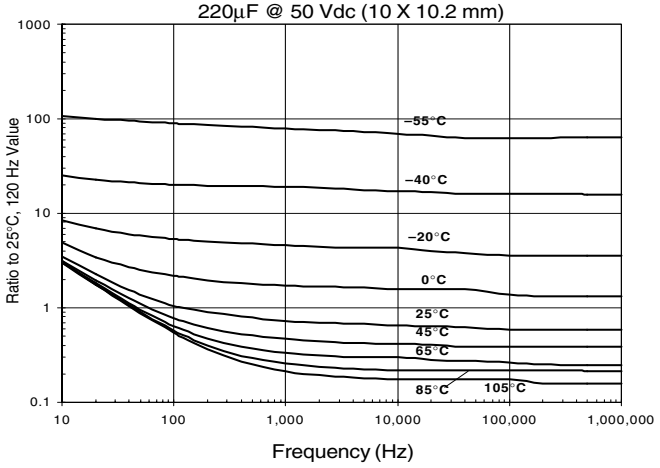
Capacitance vs. Temperature & Frequency
220µF @ 50 Vdc (10 X 10.2 mm)



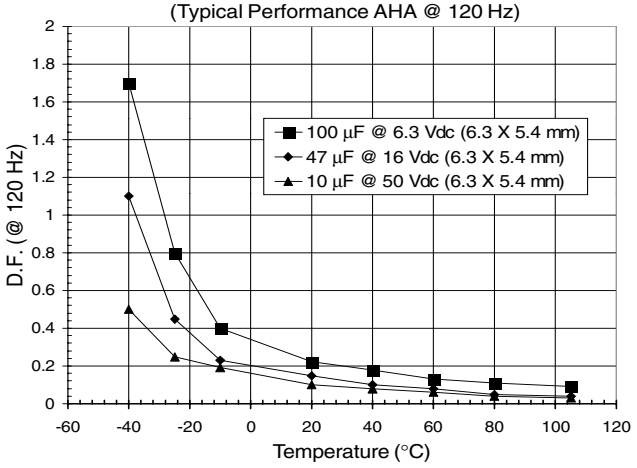
Capacitance Change with Temperature
(Typical Performance AHA @ 120 Hz)



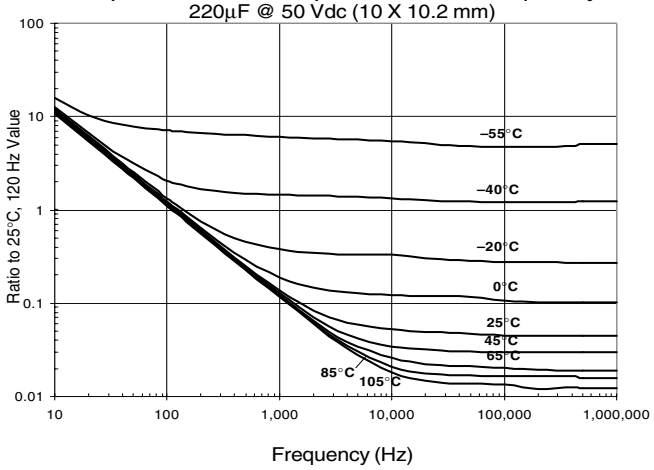
ESR vs. Temperature and Frequency
220µF @ 50 Vdc (10 X 10.2 mm)



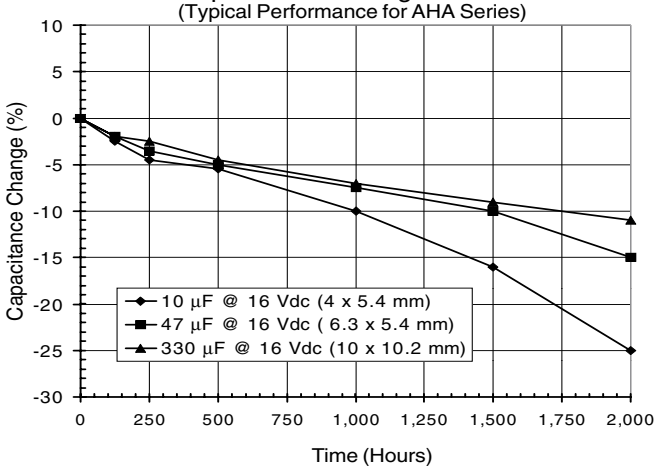
Dissipation Factor vs. Temperature
(Typical Performance AHA @ 120 Hz)



Impedance vs. Temperature and Frequency
220µF @ 50 Vdc (10 X 10.2 mm)



Capacitance Change vs Time
(Typical Performance for AHA Series)



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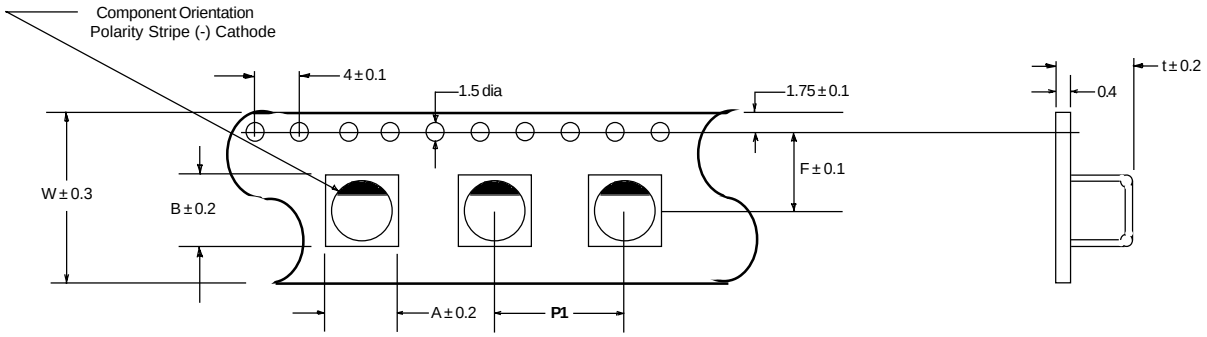
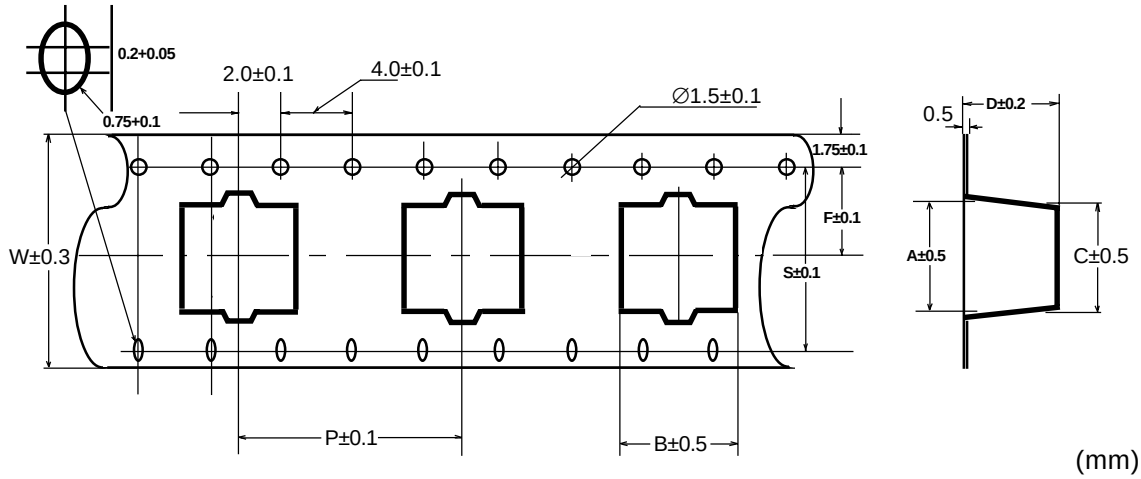
AVS, AHA, AFC, AFK, AHD, AEB Tape and Reel Specifications

Tape Specifications



(mm)

Case Code	W	A	B	P1	F	t
A	12.0	3.4	3.5	8.0	5.5	5.8
B	12.0	4.7	4.6	8.0	5.5	5.8
C	12.0	6.0	6.0	12.0	5.5	5.8
D	16.0	7.0	7.0	12.0	7.5	5.8
X	16.0	7.0	7.0	12.0	7.5	8.4
E	16.0	8.7	8.7	12.0	7.5	6.8
F	24.0	8.7	8.7	16.0	11.5	11.0
G	24.0	10.7	10.7	16.0	11.5	11.0



(mm)

Case Code	W	A	B	C	D	F	P	S
J	32.0	10.7	10.7	14.5	14.5	14.2	20.0	28.4
K	32.0	10.7	10.7	14.5	18.5	14.2	20.0	28.4
H	32.0	14.0	14.0	18.0	14.5	14.2	24.0	28.4
L	32.0	14.0	14.0	18.0	17.5	14.2	24.0	28.4
P	44.0	17.5	17.5	23.0	17.5	20.2	28.0	40.4
R	44.0	19.5	19.5	26.0	17.5	20.2	32.0	40.4
S	44.0	19.5	19.5	26.0	22.5	20.2	32.0	40.4
U	44	17.5	17.5	23	22.5	20.2	28	40.4

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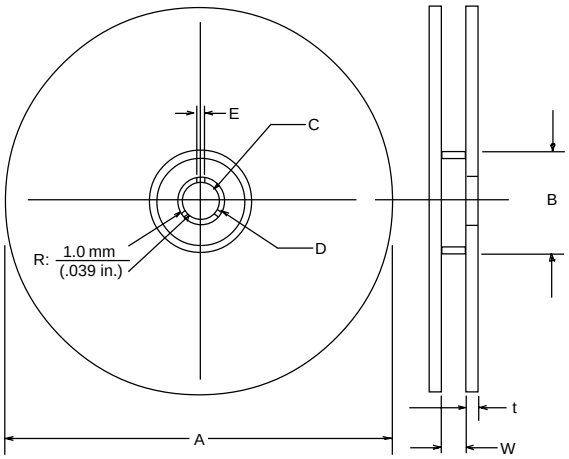
AVS, AHA, AFC, AFK, AHD, AEB Tape and Reel Specifications

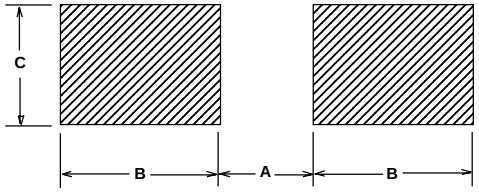
Reel Specifications



(mm)

Case Code	A	B	C	D	E	W	t
A, B size	380±2	50 min	13.0±0.5	21.0±0.8	2.0±0.5	14±1	3.0
C, D, E, X size	380±2	50 min	13.0±0.5	21.0±0.8	2.0±0.5	18±1	3.0
F, G size	380±2	50 min	13.0±0.5	21.0±0.8	2.0±0.5	26±1	3.0
J, K, H, L size	330±2	50 min	13.0±0.5	21.0±0.8	2.0±0.5	34±1	3.0
P, R, S, U size	330±2	50 min	13.0±0.5	21.0±0.8	2.0±0.5	46±1	3.0

Land Pattern:



(mm)

Case Code	A	B	C
A	0.6	2.2	1.5
B	1.0	2.5	1.6
C	1.5	2.8	1.6
D	2.2	3.0	1.6
E	2.2	4.5	1.6
F	3.2	4.0	2.0
G	4.6	4.3	2.0
J, K	4	4.5	2.0
H	4.0	5.7	2.0
L	4.0	5.7	2.0
P	6.0	6.5	2.5
R, U	6.0	6.5	2.5
S	6.0	7.5	2.5

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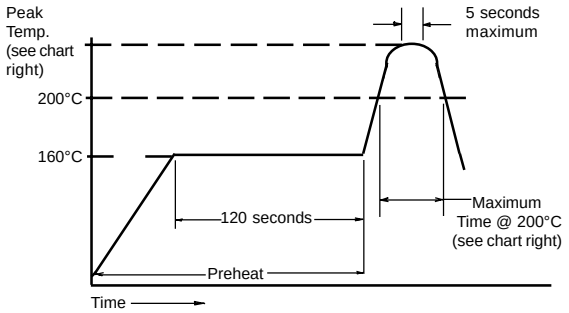
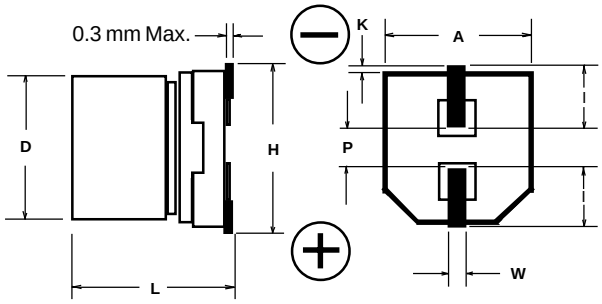
AVS, AHA, AFC, AFK, AHD, AEB Reflow Solder & Case Dimensions

Reflow Soldering Temperature Profile:



Case Code	Peak Temp (°C)	Max. Time @ 200°C (Sec.)
A, B, C, D, X	240	40
E, F, G, H J, K, L, P R, S, U	230	30

Outline Drawing



Case Dimensions

(mm)

Case Code	D ± 0.5	L	A ± 0.2	H (max)	I (ref)	W	P (ref)	K
A	3.0	5.4 +.1,-.2	3.3	4.5	1.5	0.55 ± 0.1	0.6	0.35 + 0.15/-0.20
B	4.0	5.4 +.1,-.2	4.3	5.5	1.8	0.65 ± 0.1	1.0	0.35 + 0.15/-0.20
C	5.0	5.4 +.1,-.2	5.3	6.5	2.2	0.65 ± 0.1	1.5	0.35 + 0.15/-0.20
D	6.3	5.4 +.1,-.2	6.6	7.8	2.4	0.65 ± 0.1	1.8	0.35 + 0.15/-0.20
X	6.3	7.9 ±.3	6.6	7.8	2.6	0.65 ± 0.1	1.8	0.35 + 0.15/-0.20
E	8.0	6.2 ±.3	8.3	9.5	3.4	0.65 ± 0.1	2.2	0.35 + 0.15/-0.20
F	8.0	10.2 ±.3	8.3	10	3.4	0.90 ± 0.2	3.2	0.70 ± 0.20
G	10.0	10.2 ±.3	10.3	12	3.5	0.90 ± 0.2	4.6	0.70 ± 0.20
H	12.5	13.5 ± .5	13.5	15	4.7	0.9 ±0.3	4.4	0.70 ± 0.30
J	10	13.5	10.3	12	3.5	0.9 ±0.2	4.6	0.70 ± 0.20
K	10	17.5	10.3	12	3.5	0.9 ±0.2	4.6	0.70 ± 0.20
L	12.5	16.5 ± .5	13.5	15.0	4.7	0.9±0.3	4.4	0.70 ± 0.30
P	16.0	16.5 ± .5	17.0	19.0	5.5	1.2±0.3	6.7	0.70 ± 0.30
R	18.0	16.5 ± .5	19.0	21.0	6.5	1.2±0.3	6.7	0.70 ± 0.30
S	18.0	21.5 ± .5	19.0	21.0	6.5	1.2±0.3	6.7	0.70 ± 0.30
U	16.0	21.5	17.0	19.0	6.7	1.2±0.3	6.7	0.70 ± 0.30

*5.8 +0.1,-0.2 for AFK and AHD Series

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V-Chip Cleaning and Coating Guide

Cleaning

Below is a table discribing the usable solvents for cleaning a PC board containing V-Chips.

Table 1

Solvent type	Name	Manufacturer	Recommended use level	Symtoms of Damage
Water Base				
Water	Distilled Water		1	None
Alkaline	Aqua Cleaner 210SEP	Sanei	2	None, though marking ink may fade
Surface active agent	Pine Alpha ST-100S	Aralaw a Kasei Kogyo	2	
	Clean-thru 750H	Kao Corporation	2	
	Clean-thru 750L		2	
	Clean-thru 710M		2	
	Sun-elec B-12	Sanyo Kasei	2	
	DK be-clean CW-5790	Dai-Ichi Kogyo Seiyaku	2	
Solvent Base				
Petroleum based	Cold-cleaner P3-375	Henkel Hakusui	3	swellling on sealing rubber rinse and dry well after cleaning
	Techno-cleaner 219	Seiwa Sangyo	3	
hydrocarbon	Axarel 32	Mitsui DFC	3	
Alcohol base	Isopropyl Alcohol		1	None
Silicon base	Techno-care FRW-17	Toshiba Corporation	3	None if used in combination
	Techno-care FRW-17		3	
	(Techno-care FRV-100)		3	
Halogenated hydrocarbon	Asashi-clean AK-225AES	Ashahi Glass	3	Contains CFC's subject to environmental regulations
	HCFC141B-MS	Dalkin Kogyo	3	
Telpen base	Telpen-cleaner EC-7R	Nippon Alpha Metals	3	swelled seal

Use level Number	Recommendation
1	Cleaning is possible
2	Cleaning is possible (markings may fade)
3	Cleaning is possible (Use caution. 1 and 2 are better choices)

V-Chips may be immersed for 5 minutes, safely, in Level 1&2 solvents. Use Level 3 solvents with caution.

Do not use chlorine-based halogenated cleaning solvents, adhesives or coating agents.

When halogenated chlorine-based solvents are used in the cleaning process, free clorine is liberated from the solvent. This chlorine causes corrosion and deterioration of the aluminum inside the capacitor

Dangers of "Free-Chlorine":

After the solvent dries, the chlorine remains on the capacitor seal, the chlorine slowly permeates into the capacitor element causing corrosion and damage that happens slowly. It may take some time before a failure is apparent. A representation of the chemical reaction is on the following page.

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V-Chip Cleaning and Coating Guide

Free-chlorine Diagram:

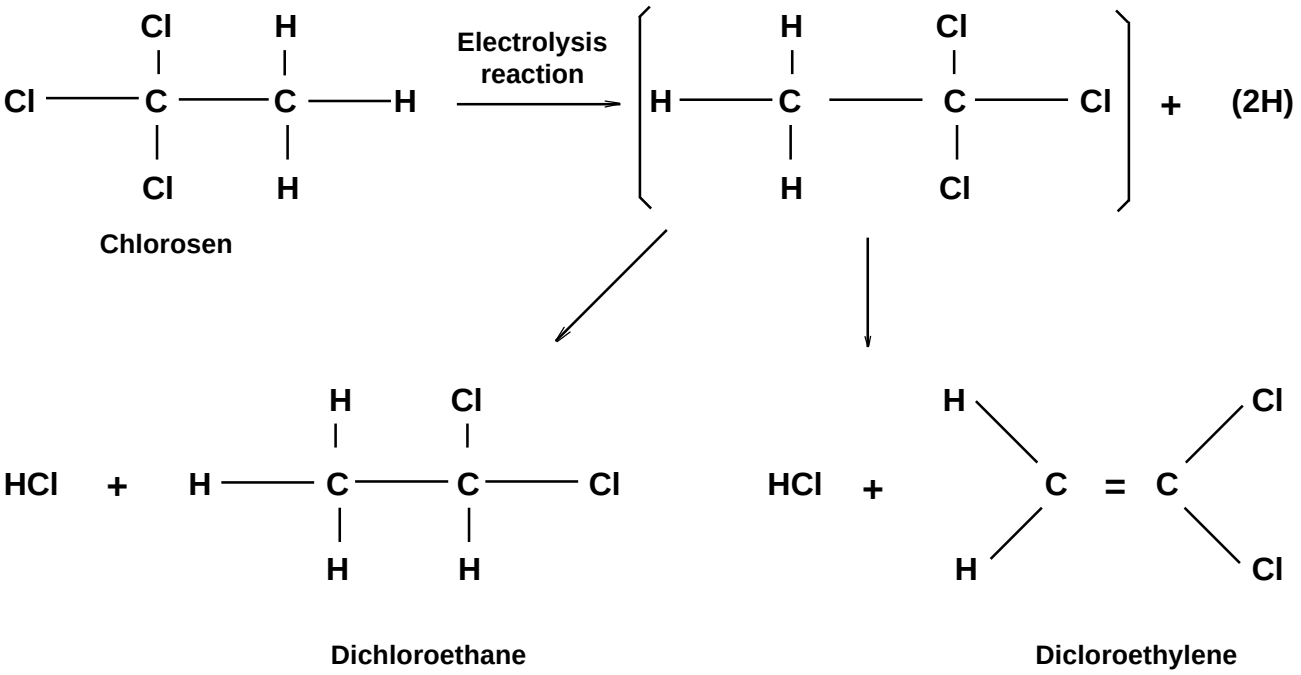

Fig. 1 Decomposed reaction of cleaning solvents (Free-chlorine)

Reaction of Free-chlorine and Aluminum

Combined free chlorine and hydrogen become hydrochloric acid, but it has high dissociation and most of it becomes chlorine ions. These chlorine ions react with the aluminum. The order of the reactions is represented below.

1.) Hydration of oxide film

$$AlO_3 + 3H_2O \longrightarrow 2Al(OH)_3$$

2.) Reaction of hydrated oxide film and chlorine (Dissolution of film)

$$Al(OH)_3 + 3HCl \longrightarrow AlCl_3 + 3H_2O$$

3.) Reaction of aluminum and hydrochloric acid (Dissolution of aluminum)

$$Al + 3HCl \longrightarrow AlCl_3 + 3/2H_2$$

4.) Precipitation of aluminum hydroxide

$$AlCl_3 + 3H_2O \longrightarrow Al(OH)_3 + 3HCl$$

The entire reaction can be summerized as the following:

$$Al + Al_2O_3 + 3HCl_3 + 3H_2O \longrightarrow 2Al(OH)_3 + AlCl_3 + AlCl_3 + H3/2\uparrow$$

Therefore the compounds produced by the reactions are aluminum hydroxide and hydrochloric acid from reaction #4; the hydrochloric acid is not consumed and acts as a catalyst.

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V-Chip Cleaning and Coating Guide

Solvents that should not be used

Table 2

Composition	Boiling Point (°C)	Common Name
1.1.1-Trichloroethane	74.1	Chlorosen
Trichloroethylene	87.2	Trichlene
Tetrachloroethylene	121.1	Perchloroethylene

Additional Cleaning Notes:

1.) Solvents containing CFC's destroy the ozone layer and should be avoided to protect the global environment.

2.) To avoid solvent residue between the capacitor's seal and the PC board, make sure the assembly is dried thoroughly immediately after cleaning.

Coating

Below is a list of coatings that are safe for use with V-Chips

Table 3

Manufacturer	Material	Coating Material Name
Hitachi Chemical	Acrylic	Taffi-1141, Taffi-1147
	Urethane	Taffi-1154
Boxy Brown	Acrylic	Humi Seal 1B66
	Urethane	Humi Seal 1A27
Dow Corning	Silicon	Perugan Z, Perugan C
Nihon Zeon	Urethane	Quinate System 160B

Influence of Coating Materials

Coating materials are typically used for insulation, waterproofing, dustproofing and rustproofing. When coating materials are selected there are factors to prevent internal corrosion (chlorine reaction with aluminum) while the capacitor is functioning. The following steps will help prevent this damage to the capacitor.

A.) Corrosion Reaction

Avoid halogen solvents which permeate the capacitor's seal, releasing chlorine which reacts with the aluminum inside the capacitor.

B.) Selecting a Coating Material

It is necessary to select a coating material that contains no chlorine.

The coating consists of the main ingredient which could be urethane resin, acrylic resin or other polymer, a solvent and other additives such as flameproofing agents.

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The coating's solvent dries and diffuses into the rubber seal of the capacitor, therefore halogenated hydrocarbon solvents containing chloride should not be used.

Similar to the solvent, additives can permeate into the capacitor through the rubber seal. Ingredients in many additives might not be listed, therefore use caution when choosing an additive.

C.) Other Concerns

Solvents and additives are subject to change without notice. Make sure ingredients are identified.

Avoid coating a substrate after cleaning it with a halogenated hydrocarbon. The coating will prevent the remaining solvent from diffusing which may cause corrosion.

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