

### Surface Mount Type

Series: HA Type : V

- Features Endurance: 105°C 1000-2000h  
5.4 mm height (≤ φ6.3)  
Vibration-proof product is available upon request. (φ8≤)  
RoHS directive compliant (Parts No:EEE\*)



#### ■ Specifications

Category temp. range	-40 to +105°C									
Rated W.V. Range	6.3 to 100 V .DC									
Nominal Cap. Range	0.1 to 1500 μ F									
Capacitance Tolerance	±20, ±30 % (120Hz/+20°C)									
DC Leakage Current	I ≤ 0.01 CV or 3(μ A) after 2 minutes (Whichever is greater)									
tan δ	Please see the attached standard products list									
Characteristics at Low Temperature	W.V. (V)	6.3	10	16	25	35	50	63	100	(Impedance ratio at 120 Hz)
	-25 / +20 °C	4	3	2	2	2	2	3	3	
	-40 / +20 °C	8	6	4	4	3	3	4	4	
Endurance	After applying rated working voltage for 1000 hours for B~D8 sizes, 2000 hours for E~G sizes +105±2°C and then being stabilized at +20°C, capacitors shall meet the following limits.									
	Capacitance change	±30% of initial measured value E-G case sizes and B-D of 6.3V ±20% of initial measured value for other case sizes								
	tan δ	≤300% of initial measured value E-G case sizes and B-D of 6.3V ≤200% of initial measured value for other case sizes								
	DC leakage current	≤initial specified value								
Shelf Life	After storage for 1000 hours at +105±2°C with no voltage applied and then being stabilized at +20°C, capacitors shall meet the limits specified in Endurance (With voltage treatment)									
Resistance to Soldering Heat	After reflow soldering (Refer to page 86 for recommended temperature profile.) and then being stabilized at +20°C, capacitor shall meet the following limits.									
	Capacitance change	±10% of initial measured value								
	tan δ	≤ initial specified value								
	DC leakage current	≤ initial specified value								

#### ■ Marking

Example: 50V 1 μF (Polarized)

W.V. code

Negative polarity marking

Capacitance (μF)

Series identification

Lot number

W.V. code

V	6.3	10	16	25	35	50	63	100
Code	j	A	C	E	V	H	J	2A

#### ■ Dimensions in mm (not to scale)

0.3 max

φD±0.5

A±0.2 ( ) reference size

B±0.2

E, F, G = L ±0.3

D8

L +0.1 / -0.2

(mm)

Size code	D	L	A, B	H	I	W	P	K
B	4.0	5.4	4.3	5.5MAX	1.8	0.65±0.1	1.0	0.35 -0.20 to +0.15
C	5.0	5.4	5.3	6.5MAX	2.2	0.65±0.1	1.5	0.35 -0.20 to +0.15
D	6.3	5.4	6.6	7.8MAX	2.6	0.65±0.1	1.8	0.35 -0.20 to +0.15
D8	6.3	7.7	6.6	7.8MAX	2.6	0.65±0.1	1.8	0.35 -0.20 to +0.15
E	8.0	6.2	8.3	9.5MAX	3.4	0.65±0.1	2.2	0.35 -0.20 to +0.15
F	8.0	10.2	8.3	10.0MAX	3.4	0.90±0.2	3.1	0.70 ±0.2
G	10.0	10.2	10.3	12.0MAX	3.5	0.90±0.2	4.6	0.70 ±0.2

#### ■ Case size

Cap. (μF) \ W.V.(V)	6.3 (0J)	10 (1A)	16 (1C)	25 (1E)	35 (1V)	50 (1H)	63 (1J)	100 (2A)
0.1 to 2.2						B		
3.3						B		E
4.7				B	B	C		F(E)
10			B	C(B)	C(B)	D	E	F
22	B	(B)	C(B)	D(C)	D(C)	E	F(E)	G(F)
33	(B)	C(B)	(C)	D(C)	E(D)	(E)FD8	G	G
47	C(B)	(C)	D(C)	E(D)	F(E)	G(F),D8	G(F)	(G)
100	D(C)	E(D)	(D)	F, D8(E)	G(F), D8	G(F)	G(F)	
220	(D)	F, D8	G(F), D8	G(F)	G(F)	G		
330	F, D8		G(F)	G(F)	G			
470	(F)	G(F)	G(F)	G				
680			G					
1000	G(F)	G						
1500	G							

### ■ Standard Products

W.V.	Cap. (±20%)	Case size			Specification		Part No. (RoHS: not compliant)	Part No. (RoHS: compliant)	Min. Packagng Q'ty	Endurance		
		Dia.	Length	Size Code	Ripple current (120Hz) (+105°C) (mA)	tan δ (120Hz) (+20°C)					Reflow	Reflow
(V)	(μF)	(mm)	(mm)									
6.3	22	4	5.4	B	29	0.30	EEVHA0J220R	(1)	EEEHA0J220R	(4)	2000	1000
	33	4	5.4	B	29	0.35	EEVHA0J330WR	(1)	EEEHA0J330WR	(4)	2000	1000*
	47	4	5.4	B	36	0.35	EEVHA0J470WR	(1)	EEEHA0J470WR	(4)	2000	1000*
				C	46	0.30	EEVHA0J470R	(1)	EEEHA0J470R	(4)	1000	1000
	100	5	5.4	C	47	0.35	EEVHA0J101WR	(1)	EEEHA0J101WR	(4)	1000	1000*
				D	71	0.30	EEVHA0J101P	(1)	EEEHA0J101P	(4)	1000	1000
	220	6.3	5.4	D	74	0.35	EEVHA0J221WP	(1)	EEEHA0J221WP	(4)	1000	1000*
	330	6.3	7.7	D8	105	0.30	EEVHA0J331XP	(1)	EEEHA0J331XP	(4)	900	1000
				F	230	0.35	EEVHA0J331P	(2)	EEEHA0J331P	(5)	500	2000*
	470	8	10.2	F	300	0.35	EEVHA0J471UP	(2)	EEEHA0J471UP	(5)	500	2000*
	1000	8	10.2	F	300	0.35	EEVHA0J102UP	(2)	EEEHA0J102UP	(5)	500	2000*
G				400	0.35	EEVHA0J102P	(2)	EEEHA0J102P	(5)	500	2000*	
1500	10	10.2	G	480	0.35	EEVHA0J152P	(2)	EEEHA0J152P	(5)	500	2000*	
10	22	4	5.4	B	28	0.30	EEVHA1A220WR	(1)	EEEHA1A220WR	(4)	2000	1000
	33	4	5.4	B	29	0.30	EEVHA1A330WR	(1)	EEEHA1A330WR	(4)	2000	1000
				C	43	0.22	EEVHA1A330R	(1)	EEEHA1A330R	(4)	1000	1000
	47	5	5.4	C	43	0.30	EEVHA1A470WR	(1)	EEEHA1A470WR	(4)	1000	1000
	100	6.3	5.4	D	71	0.30	EEVHA1A101WP	(1)	EEEHA1A101WP	(4)	1000	1000
				E	110	0.26	EEVHA1A101P	(2)	EEEHA1A101P	(5)	1000	2000*
	220	6.3	7.7	D8	105	0.22	EEVHA1A221XP	(1)	EEEHA1A221XP	(4)	900	1000
				F	160	0.26	EEVHA1A221P	(2)	EEEHA1A221P	(5)	500	2000*
	470	8	10.2	F	200	0.26	EEVHA1A471UP	(2)	EEEHA1A471UP	(5)	500	2000*
				G	270	0.26	EEVHA1A471P	(2)	EEEHA1A471P	(5)	500	2000*
	1000	10	10.2	G	400	0.26	EEVHA1A102P	(2)	EEEHA1A102P	(5)	500	2000*
16	10	4	5.4	B	28	0.16	EEVHA1C100R	(1)	EEEHA1C100R	(4)	2000	1000
	22	4	5.4	B	28	0.26	EEVHA1C220WR	(1)	EEEHA1C220WR	(4)	2000	1000
				C	39	0.16	EEVHA1C220R	(1)	EEEHA1C220R	(4)	1000	1000
	33	5	5.4	C	35	0.26	EEVHA1C330WR	(1)	EEEHA1C330WR	(4)	1000	1000
	47	5	5.4	C	39	0.26	EEVHA1C470WR	(1)	EEEHA1C470WR	(4)	1000	1000
				D	70	0.16	EEVHA1C470P	(1)	EEEHA1C470P	(4)	1000	1000
	100	6.3	5.4	D	70	0.26	EEVHA1C101WP	(1)	EEEHA1C101WP	(4)	1000	1000
	220	6.3	7.7	D8	105	0.16	EEVHA1C221XP	(1)	EEEHA1C221XP	(4)	900	1000
				F	150	0.20	EEVHA1C221UP	(2)	EEEHA1C221UP	(5)	500	2000
		8	10.2	G	210	0.20	EEVHA1C221P	(2)	EEEHA1C221P	(5)	500	2000
				F	170	0.20	EEVHA1C331UP	(2)	EEEHA1C331UP	(5)	500	2000
330	10	10.2	G	230	0.20	EEVHA1C331P	(2)	EEEHA1C331P	(5)	500	2000	
			F	340	0.20	EEVHA1C471UP	(2)	EEEHA1C471UP	(5)	500	2000	
470	8	10.2	F	340	0.20	EEVHA1C471P	(2)	EEEHA1C471P	(5)	500	2000	
			G	340	0.20	EEVHA1C471P	(2)	EEEHA1C471P	(5)	500	2000	
680	10	10.2	G	380	0.20	EEVHA1C681P	(2)	EEEHA1C681P	(5)	500	2000	
25	4.7	4	5.4	B	22	0.14	EEVHA1E4R7R	(1)	EEEHA1E4R7R	(4)	2000	1000
	10	4	5.4	B	22	0.20	EEVHA1E100WR	(1)	EEEHA1E100WR	(4)	2000	1000
				C	28	0.14	EEVHA1E100R	(1)	EEEHA1E100R	(4)	1000	1000
	22	5	5.4	C	35	0.20	EEVHA1E220WR	(1)	EEEHA1E220WR	(4)	1000	1000

An explanation of the taping dimensions can be found on page 84.

Reflow profiles can be found on page 86.

\* Endurance capacitance change ±30%, tanδ 300% of initial measured value.

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### Standard Products

W.V. (V)	Cap. (±20%) (μF)	Case size			Specification		Part No. (RoHS: not compliant)	Reflow	Part No. (RoHS: compliant)	Reflow	Min. Packagng Q'ty Taping (pcs)	Endurance (hours)
		Dia. (mm)	Length (mm)	Size Code	Ripple current (120Hz) (+105°C) (mA)	tan δ (120Hz) (+20°C)						
25	22	6.3	5.4	D	55	0.14	EEVHA1E220P	(1)	EEEHA1E220P	(4)	1000	1000
	33	5	5.4	C	45	0.20	EEVHA1E330WR	(1)	EEEHA1E330WR	(4)	1000	1000
		6.3	5.4	D	65	0.14	EEVHA1E330P	(1)	EEEHA1E330P	(4)	1000	1000
	47	6.3	5.4	D	70	0.20	EEVHA1E470WP	(1)	EEEHA1E470WP	(4)	1000	1000
		8	6.2	E	91	0.16	EEVHA1E470P	(2)	EEEHA1E470P	(5)	1000	2000*
	100	6.3	7.7	D8	91	0.14	EEVHA1E101XP	(1)	EEEHA1E101XP	(4)	900	1000
		8	6.2	E	91	0.16	EEVHA1E101UP	(2)	EEEHA1E101UP	(5)	1000	2000*
		8	10.2	F	130	0.16	EEVHA1E101P	(2)	EEEHA1E101P	(5)	500	2000*
	220	8	10.2	F	160	0.16	EEVHA1E221UP	(2)	EEEHA1E221UP	(5)	500	2000*
		10	10.2	G	190	0.16	EEVHA1E221P	(2)	EEEHA1E221P	(5)	500	2000*
330	8	10.2	F	180	0.16	EEVHA1E331UP	(2)	EEEHA1E331UP	(5)	500	2000*	
	10	10.2	G	340	0.16	EEVHA1E331P	(2)	EEEHA1E331P	(5)	500	2000*	
470	10	10.2	G	360	0.16	EEVHA1E471P	(2)	EEEHA1E471P	(5)	500	2000*	
35	4.7	4	5.4	B	22	0.12	EEVHA1V4R7R	(1)	EEEHA1V4R7R	(4)	2000	1000
	10	4	5.4	B	22	0.16	EEVHA1V100WR	(1)	EEEHA1V100WR	(4)	2000	1000
		5	5.4	C	30	0.12	EEVHA1V100R	(1)	EEEHA1V100R	(4)	1000	1000
	22	5	5.4	C	35	0.16	EEVHA1V220WR	(1)	EEEHA1V220WR	(4)	1000	1000
		6.3	5.4	D	60	0.12	EEVHA1V220P	(1)	EEEHA1V220P	(4)	1000	1000
	33	6.3	5.4	D	42	0.16	EEVHA1V330WP	(1)	EEEHA1V330WP	(4)	1000	1000
		8	6.2	E	84	0.14	EEVHA1V330P	(2)	EEEHA1V330P	(5)	1000	2000*
	47	8	6.2	E	84	0.14	EEVHA1V470UP	(2)	EEEHA1V470UP	(5)	1000	2000*
		8	10.2	F	98	0.14	EEVHA1V470P	(2)	EEEHA1V470P	(5)	500	2000*
	100	6.3	7.7	D8	84	0.12	EEVHA1V101XP	(1)	EEEHA1V101XP	(4)	900	1000
		8	10.2	F	120	0.14	EEVHA1V101UP	(2)	EEEHA1V101UP	(5)	500	2000*
		10	10.2	G	160	0.14	EEVHA1V101P	(2)	EEEHA1V101P	(5)	500	2000*
	220	8	10.2	F	170	0.14	EEVHA1V221UP	(2)	EEEHA1V221UP	(5)	500	2000*
10		10.2	G	210	0.14	EEVHA1V221P	(2)	EEEHA1V221P	(5)	500	2000*	
330	10	10.2	G	250	0.14	EEVHA1V331P	(2)	EEEHA1V331P	(5)	500	2000*	
50	0.1	4	5.4	B	1	0.12	EEVHA1HR10R	(1)	EEEHA1HR10R	(4)	2000	1000
	0.22	4	5.4	B	2	0.12	EEVHA1HR22R	(1)	EEEHA1HR22R	(4)	2000	1000
	0.33	4	5.4	B	3	0.12	EEVHA1HR33R	(1)	EEEHA1HR33R	(4)	2000	1000
	0.47	4	5.4	B	5	0.12	EEVHA1HR47R	(1)	EEEHA1HR47R	(4)	2000	1000
	1	4	5.4	B	10	0.12	EEVHA1H1R0R	(1)	EEEHA1H1R0R	(4)	2000	1000
	2.2	4	5.4	B	16	0.12	EEVHA1H2R2R	(1)	EEEHA1H2R2R	(4)	2000	1000
	3.3	4	5.4	B	16	0.12	EEVHA1H3R3R	(1)	EEEHA1H3R3R	(4)	2000	1000
	4.7	5	5.4	C	23	0.12	EEVHA1H4R7R	(1)	EEEHA1H4R7R	(4)	1000	1000
	10	6.3	5.4	D	35	0.12	EEVHA1H100P	(1)	EEEHA1H100P	(4)	1000	1000
	22	8	6.2	E	70	0.12	EEVHA1H220P	(2)	EEEHA1H220P	(5)	1000	2000*
	33	6.3	7.7	D8	70	0.12	EEVHA1H330XP	(1)	EEEHA1H330XP	(4)	900	1000
		8	6.2	E	70	0.12	EEVHA1H330UP	(2)	EEEHA1H330UP	(5)	1000	2000*
		8	10.2	F	91	0.12	EEVHA1H330P	(2)	EEEHA1H330P	(5)	500	2000*
	47	6.3	7.7	D8	63	0.12	EEVHA1H470XP	(1)	EEEHA1H470XP	(4)	900	1000
8		10.2	F	95	0.12	EEVHA1H470UP	(2)	EEEHA1H470UP	(5)	500	2000*	
10		10.2	G	100	0.12	EEVHA1H470P	(2)	EEEHA1H470P	(5)	500	2000*	

An explanation of the taping dimensions can be found on page 84.

Reflow profiles can be found on page 86.

\* Endurance capacitance change ±30%, tanδ 300% of initial measured value.

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### ■ Standard Products

W.V. (V)	Cap. (±20%) (μF)	Case size			Specification		Part No. (RoHS: not compliant)	Reflow	Part No. (RoHS: compliant)	Reflow	Min. Packaging Qty Taping (pcs)	Endurance (hours)
		Dia. (mm)	Length (mm)	Size Code	Ripple current (120Hz) (+105°C) (mA)	tan δ (120Hz) (+20°C)						
50	100	8	10.2	F	110	0.12	EEVHA1H101UP	(2)	EEEHA1H101UP	(5)	500	2000*
		10	10.2	G	120	0.12	EEVHA1H101P	(2)	EEEHA1H101P	(5)	500	2000*
	220	10	10.2	G	150	0.12	EEVHA1H221P	(2)	EEEHA1H221P	(5)	500	2000*
63	10	8	6.2	E	25	0.18	EEVHA1J100P	(2)	EEEHA1J100P	(5)	1000	2000*
	22	8	6.2	E	25	0.18	EEVHA1J220UP	(2)	EEEHA1J220UP	(5)	500	2000*
		8	10.2	F	30	0.18	EEVHA1J220P	(2)	EEEHA1J220P	(5)	500	2000*
	33	10	10.2	G	45	0.18	EEVHA1J330P	(2)	EEEHA1J330P	(5)	500	2000*
	47	8	10.2	F	45	0.18	EEVHA1J470UP	(2)	EEEHA1J470UP	(5)	500	2000*
		10	10.2	G	50	0.18	EEVHA1J470P	(2)	EEEHA1J470P	(5)	500	2000*
100	3.3	8	6.2	E	30	0.18	EEVHA2A3R3P	(2)	EEEHA2A3R3P	(5)	1000	2000*
	4.7	8	6.2	E	30	0.18	EEVHA2A4R7UP	(2)	EEEHA2A4R7UP	(5)	1000	2000*
		8	10.2	F	50	0.18	EEVHA2A4R7P	(2)	EEEHA2A4R7P	(5)	500	2000*
	10	8	10.2	F	55	0.18	EEVHA2A100P	(2)	EEEHA2A100P	(5)	500	2000*
	22	8	10.2	F	55	0.18	EEVHA2A220UP	(2)	EEEHA2A220UP	(5)	500	2000*
		10	10.2	G	60	0.18	EEVHA2A220P	(2)	EEEHA2A220P	(5)	500	2000*
	33	10	10.2	G	65	0.18	EEVHA2A330P	(2)	EEEHA2A330P	(5)	500	2000*
47	10	10.2	G	65	0.18	EEVHA2A470UP	(2)	EEEHA2A470UP	(5)	500	2000*	

An explanation of the taping dimensions can be found on page 84.

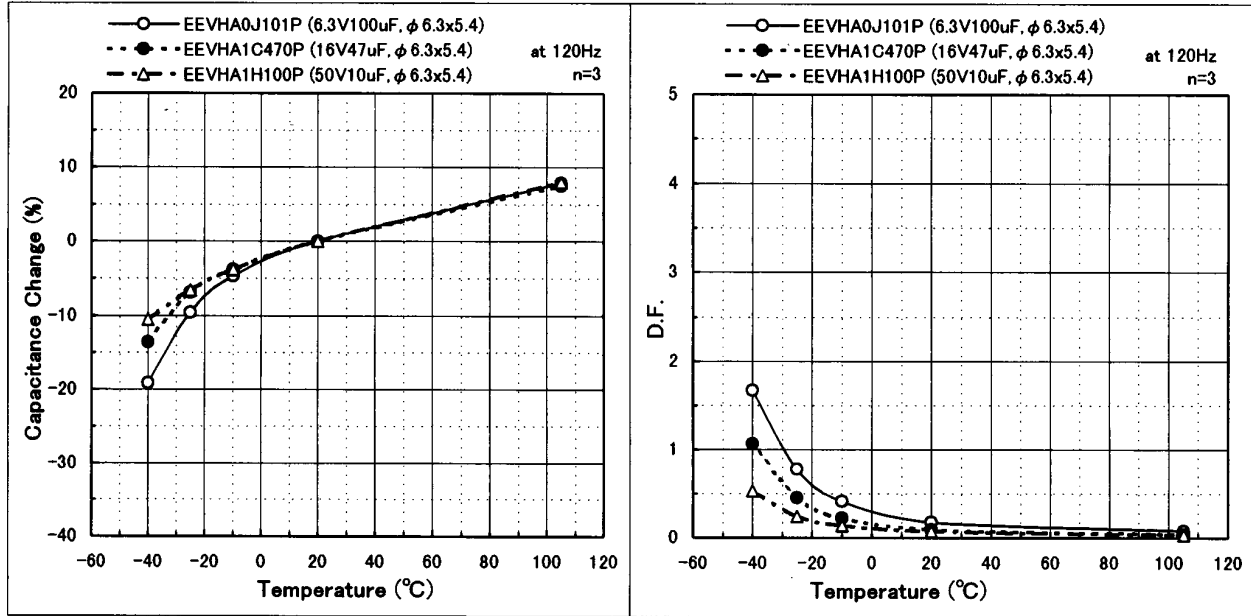
Reflow profiles can be found on page 86.

\* Endurance capacitance change ±30%, tanδ 300% of initial measured value.

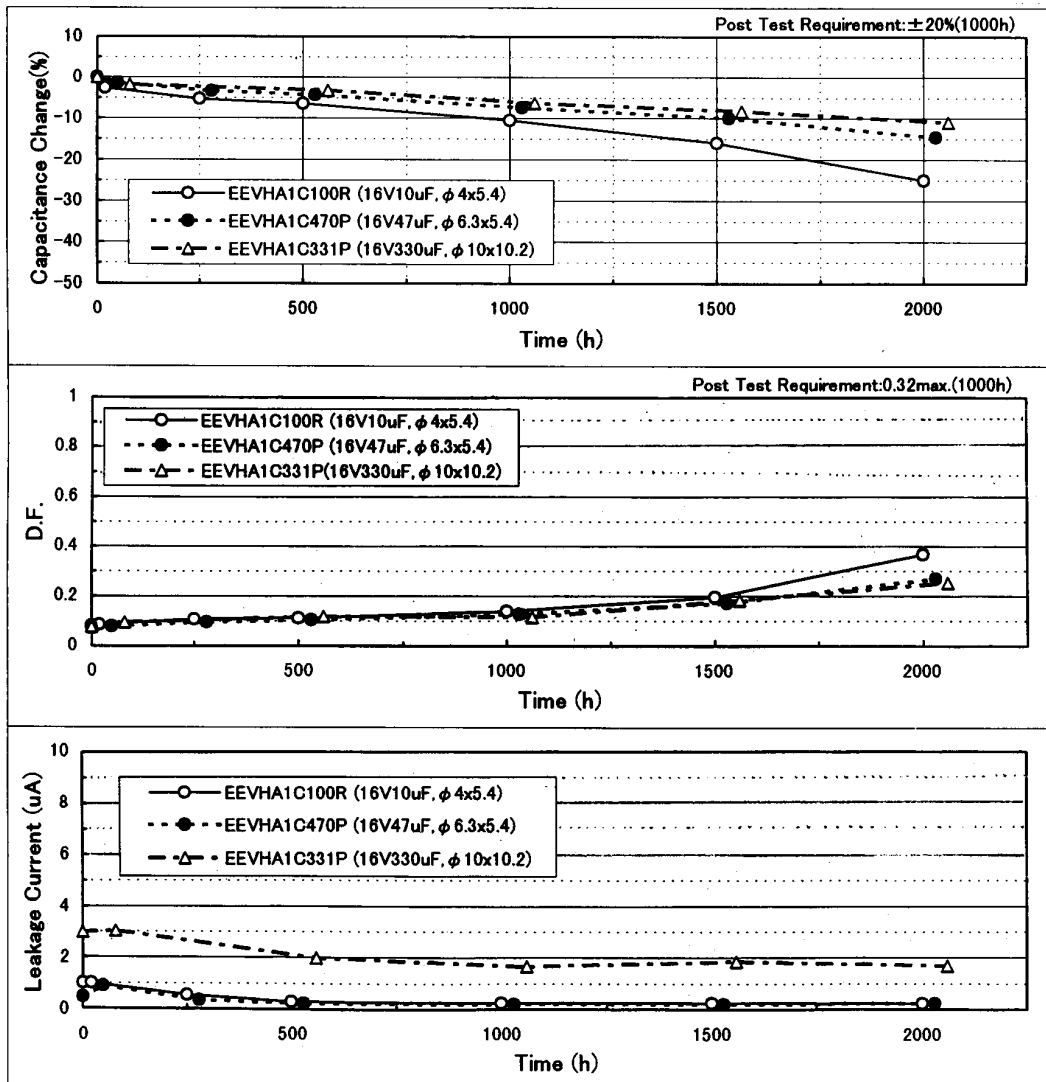
### ■ Frequency Correction Factor of Rated Ripple Current

	Frequency (Hz)			
	50,60	120	1k	10k~
coefficient	0.70	1.0	1.3	1.7

### Temperature Characteristics

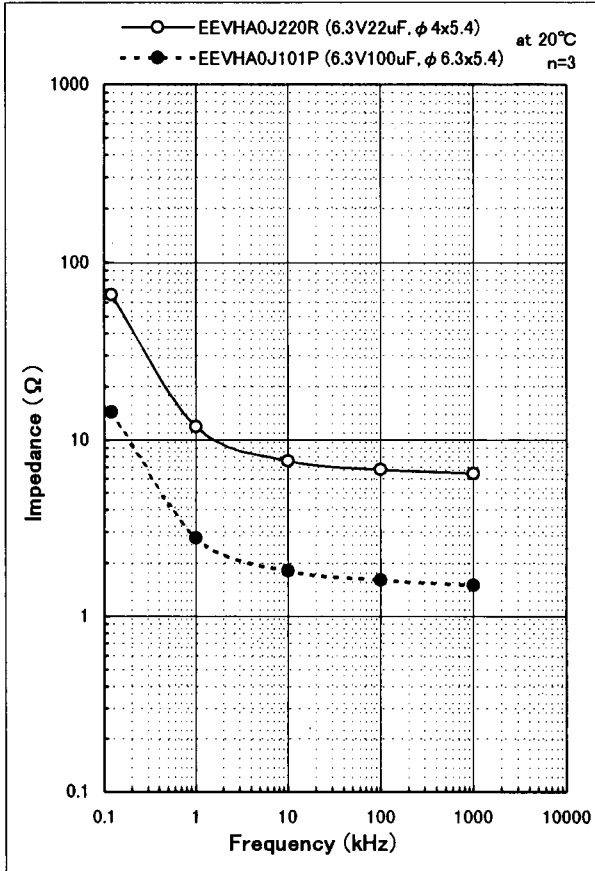


### Endurance

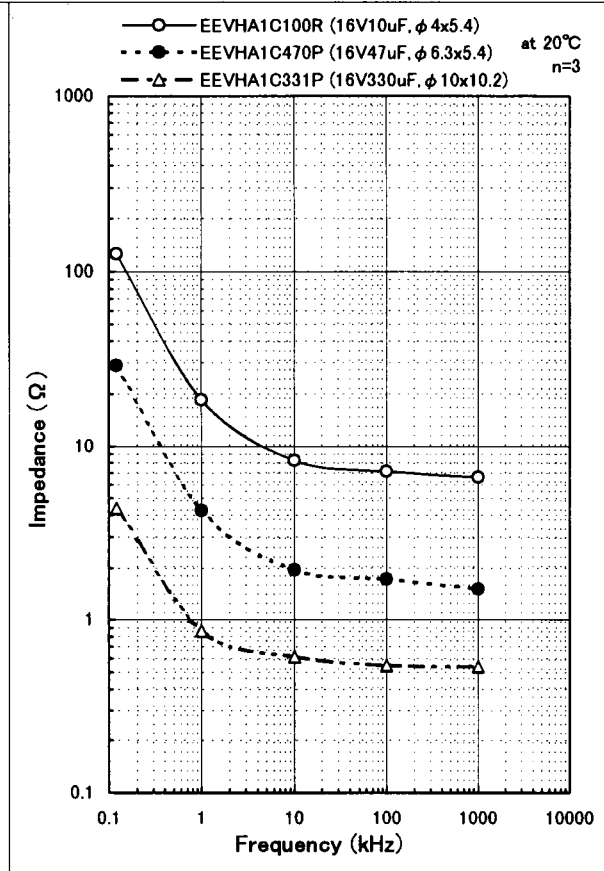


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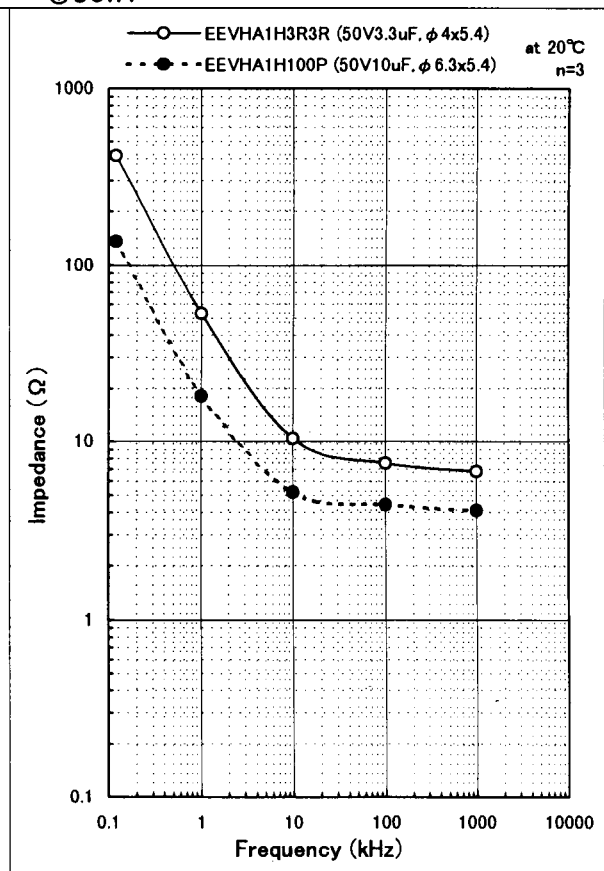
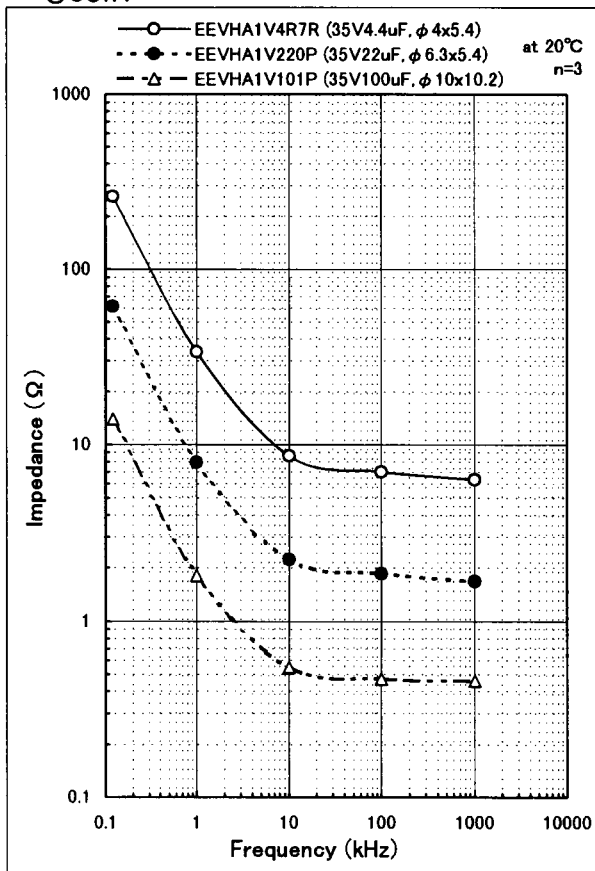
### Frequency Characteristics



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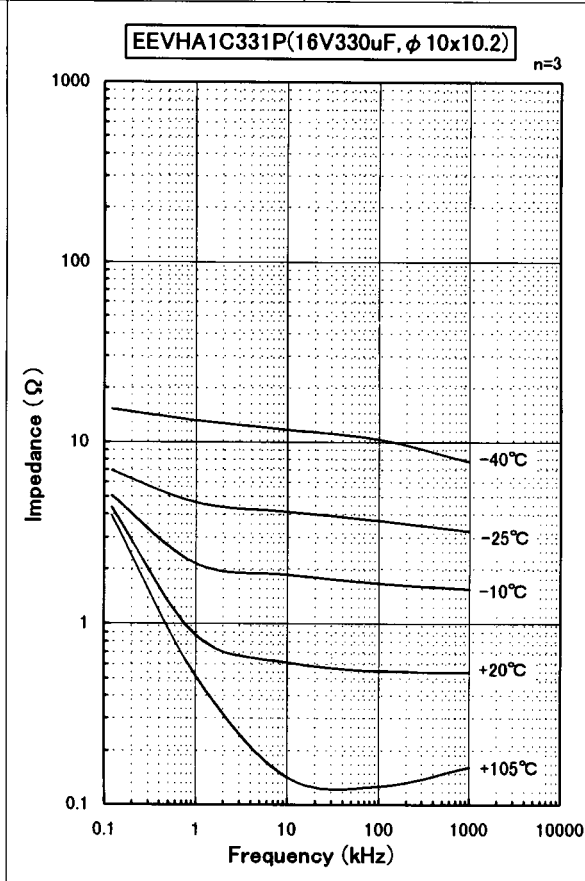
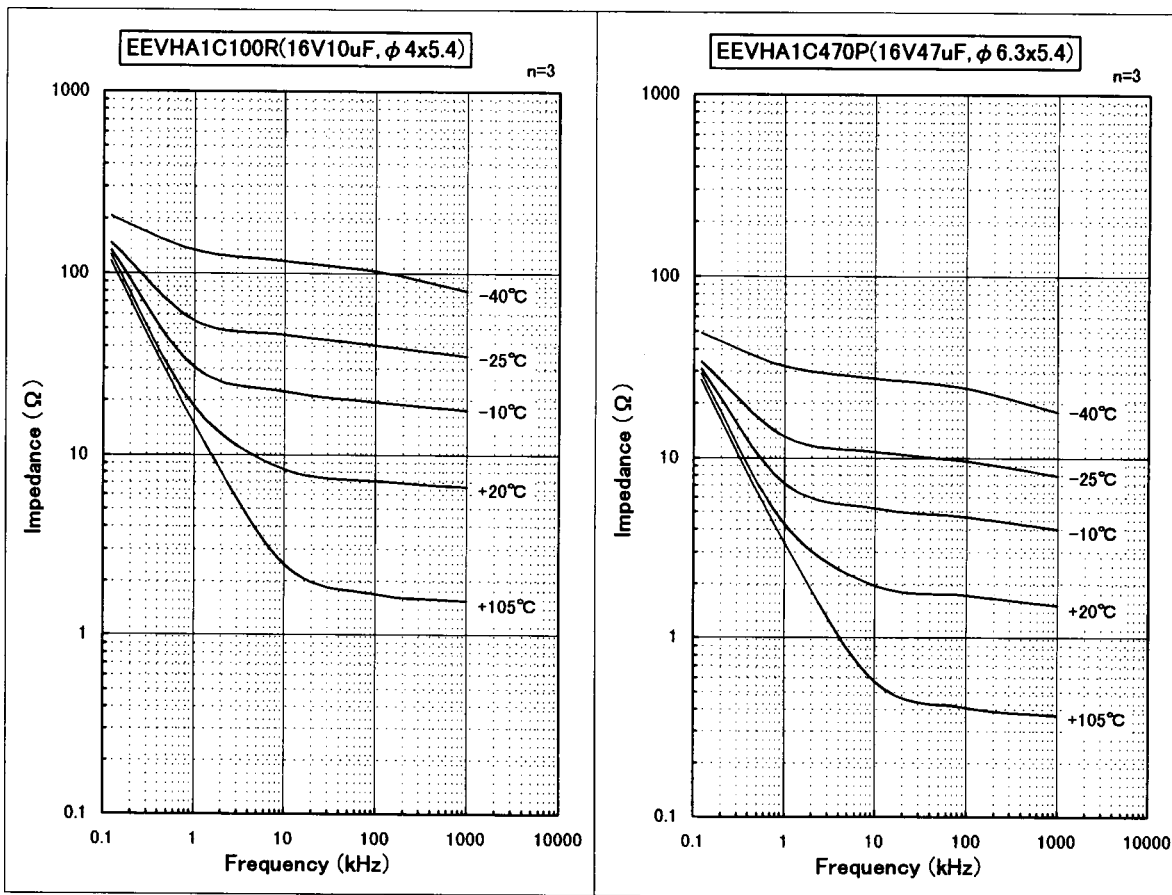


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### Temperature Characteristics



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Pre-fix	Suffix	Case Diameter	RoHS Compliant	Terminal Finish	Reflow Condition		Reflow Chart
					Peak Temperature	Time above 200	
ECE-V	R	3mm to 5mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	6mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	8mm to 10mm	No	Sn-Pb	230 for 5 seconds	20 seconds	(2) Fig.2
EEV-	R	4mm to 5mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	6mm	No	Sn-Pb	240 for 5 seconds	20 seconds	(1) Fig.1
	P	8mm to 10mm	No	Sn-Pb	230 for 5 seconds	20 seconds	(2) Fig.2
	Q	12.5mm	Yes	Sn	230 for 5 seconds	20 seconds	(2) Fig.2 (Except for EB series) (3) Fig.3 (EB series only)
	M	16mm to 18mm	Yes	Sn	230 for 5 seconds	20 seconds	(2) Fig.2 (Except for EB series) (3) Fig.3 (EB series only)
EEE-	R	3mm to 5mm	Yes	Sn-Bi	250 for 5 seconds	60 seconds	(4) Fig.4
	P	6mm	Yes	Sn-Bi	250 for 5 seconds	60 seconds	(4) Fig.4
	P	8mm to 10mm	Yes	Sn-Bi	235 for 5 seconds	60 seconds	(5) Fig.5

