3. Precautions for using capacitors

3.1 Environmental conditions

Capacitors should not be stored or used in the following environments.
(1) Exposure to temperatures above the upper category or below the lower category temperature of the capacitor.
(2) Direct contact with water, salt water, or oil.
(3) High humidity conditions where water could condense on the capacitor.
(4) Exposure to toxic gases such as hydrogen sulfide, sulfuric acid, nitric acid, chlorine, chlorine compound, bromine, bromine compound or ammonia.
(5) Exposure to ozone, radiation, or ultraviolet rays.
(6) Vibration and shock conditions exceeding specified requirements.

3.2 Electrical precautions

(1) Avoid touching the terminals of a capacitor as a possible electric shock could result. The exposed aluminum case is not insulated and could also cause electric shock if touched.
(2) Avoid short circuiting the area between the capacitor terminals with conductive materials including liquids such as acids or alkaline solutions.
(3) A low-molecular-weight-shiroxane which is included in a silicon material shall causes abnormal electrical characteristics.

4. Emergency procedures

(1) If the pressure relief of the capacitor operates, immediately turn off the equipment and disconnect from the power source.
This will minimize an additional damage caused by the vaporizing electrolyte.
(2) Avoid contact with the escaping electrolyte gas, which can exceed 100 °C temperatures.
If electrolyte or gas enters the eye, immediately flush the eye with large amounts of water.
If electrolyte or gas is ingested by mouth, gargle with water.
If electrolyte contacts the skin, wash with soap and water.

5. Long term storage

(1) Leakage current of a capacitor increases with long storage times. The aluminum oxide film deteriorates as a function of temperature and time.
If used without reconditioning, an abnormally high current will be required to restore the oxide film.
This surge current could cause the circuit or the capacitor to fail.
Expiration date is 42 months from outgoing inspection date.
For storage condition, keep room temperature (5 °C to 35 °C) and humidity (45 % to 85 %) where direct sunshine doesn't reach.
(2) Environmental conditions
Do not store under condition outside the area described in the specification, and also under conditions listed below.
(a) Exposure to temperatures above the upper category or below the lower category temperature of the capacitor.
(b) Direct contact with water, salt water, or oil.
(c) High humidity conditions where water could condense on the capacitor.
(d) Exposure to toxic gases such as hydrogen sulfide, sulfuric acid, nitric acid, chlorine, Chlorine compound, Bromine, Bromine compound or ammonia.
(e) Exposure to ozone, radiation, or ultraviolet rays.
(f) Vibration and shock conditions exceeding specified requirements.

6. Capacitor disposal

When disposing capacitors, use one of the following methods.
(1) Incinerate after crushing the capacitor or puncturing the can wall (to prevent explosion due to internal pressure rise).
(2) Dispose as solid waste.

NOTE : Local laws may have specific disposal requirements which must be followed.

The precautions in using aluminum electrolytic capacitors follow the "Safety application guide for the use in fixed aluminum electrolytic capacitors for electronic equipment", RCR-2367D issued by JEITA in October 2017.
Please refer to the above application guide for details.

* Intellectual property right

We, Panasonic Group are providing the product and service that customers can use without anxiety, and are working positively on the protection of our products under intellectual property rights.

Representative patents relating to Conductive Polymer Hybrid Aluminum Electrolytic Capacitors are as follows:
US Patent No.7497879, No.7621970
JP Patent No.5360250

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Line up

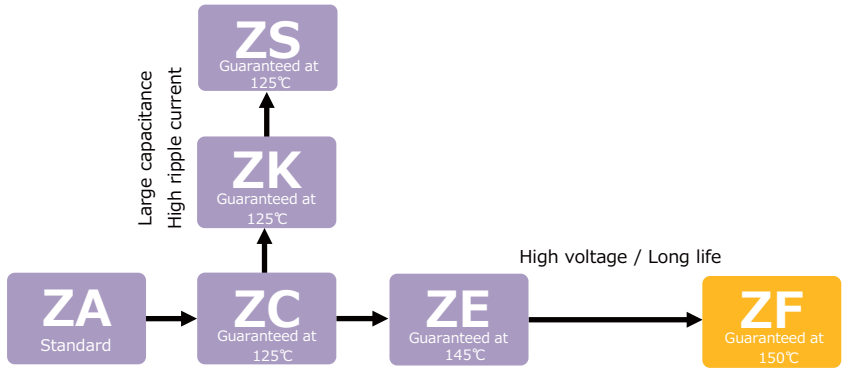
Surface mount type

Series	Part No.	Features	Small size	Large cap.	High ripple	High temp.	Long life	Category temperature range (℃)	Rated voltage range (V.DC)	ESR (mΩ)	Capacitance range (μF)	Size code	Size (mm) φD	Size (mm) L
ZA	EEHZA---	Low ESR High ripple current Long life 105 ℃ 10000 h	●					-55 to 105	25 to 50	80 to 120	10 to 33	C	5.0	5.8
									25 to 63	50 to 120	10 to 56	D	6.3	5.8
										30 to 80	22 to 100	D8	6.3	7.7
									25 to 80	27 to 45	22 to 220	F	8.0	10.2
										20 to 36	33 to 330	G	10.0	10.2
ZC	EEHZC---	Low ESR High ripple current Long life 125 ℃ 4000 h	●				●	-55 to 125	25 to 50	80 to 120	10 to 33	C	5.0	5.8
									25 to 63	50 to 120	10 to 56	D	6.3	5.8
										30 to 80	22 to 100	D8	6.3	7.7
									25 to 80	27 to 45	22 to 220	F	8.0	10.2
										20 to 36	33 to 330	G	10.0	10.2
ZK	EEHZK---	Large capacitance High ripple current Long life 125 ℃ 4000 h	●	●	●		●	-55 to 125	25 to 35	80 to 100	33 to 47	C	5.0	5.8
										50 to 60	56 to 68	D	6.3	5.8
										30 to 35	100 to 150	D8	6.3	7.7
										27	180 to 270	F	8.0	10.2
										20	330 to 470	G	10.0	10.2
ZE	EEHZE---	145 ℃ 2000 h 135 ℃ 4000 h				●	●	-55 to 145	25 to 63	27 to 40	33 to 220	F	8.0	10.2
										20 to 30	56 to 330	G	10.0	10.2
ZS	EEHZS---	125 ℃ 4000 h		●	●		●	-55 to 125	25 to 63	11 to 15	150 to 560	G16	10.0	16.5

Radial lead type

Series	Part No.	Features	Small size	Large cap.	High ripple	High temp.	Long life	Category temperature range (℃)	Rated voltage range (V.DC)	ESR (mΩ)	Capacitance range (μF)	Size code	Size (mm) φD	Size (mm) L
ZF	EEHAZF---	150 ℃ 1000 h				●	●	-55 to 150	25 to 63	27 to 40	33 to 150	F	8.0	9.5
										20 to 30	56 to 270	G	10.0	9.5

Diagram



Size・ESR Matrix list

V.DC	μF / Series	10	22	27	33	47	56	68	82	100	120	150	180	220	270	330	470	560
25	ZA				C (80)		D (50)			D8 (30)				F (27)		G (20)		
	ZC				C (80)		D (50)			D8 (30)				F (27)		G (20)		
	ZK					C (80)		D (50)				D8 (30)			F (27)		G (20)	
	ZE													F (27)		G (20)		
	ZF											F (27)			G (20)			
	ZS																	G16 (11)
35	ZA		C (100)	D (60)		D (60)		D8 (35)				F (27)			G (20)			
	ZC		C (100)			D (60)		D8 (35)				F (27)			G (20)			
	ZK				C (100)		D (60)			D8 (35)			F (27)			G (20)		
	ZE											F (27)			G (20)			
	ZF									F (30)		G (23)						
	ZS																G16 (11)	
50	ZA	C (120)	D (80)		D8 (40)			F (30)		G (28)								
	ZC	C (120)	D (80)		D8 (40)			F (30)		G (28)	G (28)							
	ZE							F (30)		G (28)								
	ZF						F (35)			G (28)								
	ZS													G16 (13)				
63	ZA	D (120)	D8 (80)		F (40)		G (30)											
	ZC	D (120)	D8 (80)		F (40)	F (40)	G (30)	G (30)	G (30)									
	ZE				F (40)		G (30)											
	ZF				F (40)		G (30)											
	ZS											G16 (15)						
80	ZA		F (45)		G (36)													
	ZC		F (45)		G (36)	G (36)												

Size code (ESR mΩ)

Size code

Unit : mm

C	φ5 x L5.8	F	φ8 x L10.2
D	φ6.3 x L5.8	G	φ10 x L10.2
D8	φ6.3 x L7.7	G16	φ10 x L16.5

F	φ8 x L9.5
G	φ10 x L9.5

V type　　A type

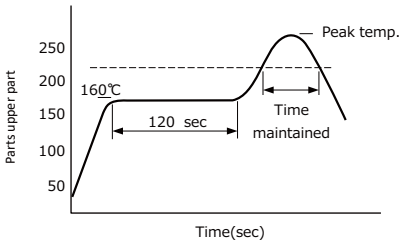
Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Mounting specification

Specifications for surface mount type

● Reflow guaranteed condition

< RoHS compliant >



Size code	C, D, D8	F, G, G16	
Peak temp.	260℃ (255℃)	245℃	260℃
Time in peak temperature	≧ 250℃ 5 s (10 s)	≧ 240℃ 10 s	≧ 250℃ 5 s
Time maintained	≧ 230℃ 30 s	≧ 230℃ 30 s	≧ 230℃ 30 s
	≧ 217℃ 40 s	≧ 217℃ 40 s	≧ 217℃ 40 s
	≧ 200℃ 70 s	≧ 200℃ 70 s	≧ 200℃ 70 s
Time of reflow	2 times	2 times	1 time

* For reflow, use a thermal condition system such as infrared and radiation (IR) or hot blas
* Panasonic have several series available for pure Tin terminal ZVEI reflow based on J-STD-020D (JEDEC). (Please contact sales for details.)

Specifications for radial lead type

● Flow soldering condition

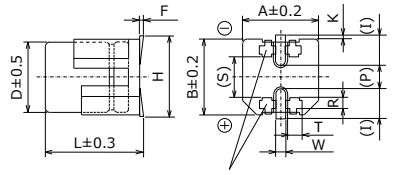
< RoHS compliant >

	Temperature	Time	Flow number
Soldering condition	260℃ + 5℃ or less	10 sec +1 sec or less	1 time

Vibration-proof products

The size and shape are different frome standard products.
Please inquire details of our company.

< Size code : D, D8 >



Supportive terminals

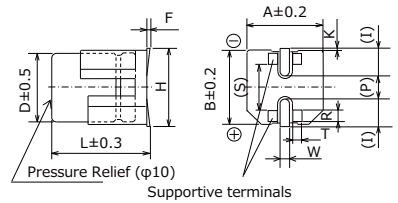
( ) Reference size

Unit : mm

Size code	φD	L	A、B	H max.	F	I	W
D	6.3	6.1	6.6	7.8	0 to +0.15	2.4	0.65±0.1
D8	6.3	8.0	6.6	7.8	0 to +0.15	2.4	0.65±0.1

Size code	P	K	R	S	T
D	2.2	0.35 +0.15 -0.20	0.85	3.7	1.05
D8	2.2	0.35 +0.15 -0.20	0.85	3.7	1.05

< Size code : F, G, G16 >



Supportive terminals

( )Reference size

Unit : mm

Size code	φD	L	A、B	H	F	I	W
F	8.0	10.5	8.3	10.0 max.	0 to +0.15	3.4	1.2±0.2
G	10.0	10.5	10.3	12.0 max.	0 to +0.15	3.5	1.2±0.2
G16	10.0	16.8	10.3	11.0±0.2	0 to +0.15	3.2	1.2±0.2

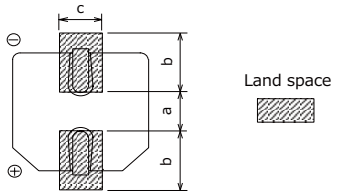
Size code	P	K	R	S	T
F	3.1	0.70±0.2	0.70±0.2	5.3±0.2	1.3±0.2
G	4.6	0.70±0.2	0.70±0.2	6.9±0.2	1.3±0.2
G16	4.6	---	0.70±0.2	6.9±0.2	1.3±0.2

Mounting specification

Land / Pad pattern

The circuit board land/pad pattern size for chip capacitors is specified in the following table.
The land pitch influences installation strength and consider it.

< Standard products >



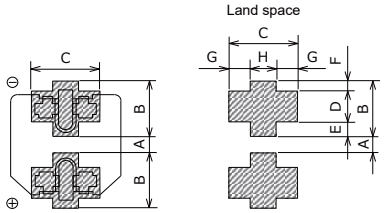
Unit : mm

Size code	a	b	c
C : φ5×L5.8	1.5	2.8	1.6
D : φ6.3×L5.8	1.8	3.2	1.6
D8 : φ6.3×L7.7	1.8	3.2	1.6
F : φ8×L10.2	3.1	4.0	2.0
G : φ10×L10.2	4.6	4.1	2.0
G16 : φ10×L16.5	4.6	4.1	2.0

When size “a” is wide, back fillet can be made, decreasing fitting strength.

∗Take mounting conditions, solderability and fitting strength into consideration when selecting parts for your company’s design.

< Vibration-proof products >

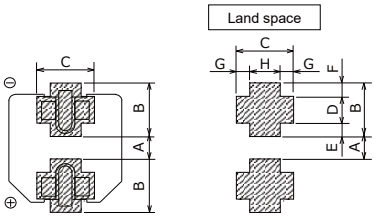


Unit : mm

Size code	A	B	C	D
D : φ6.3×L5.8	1.2	3.6	3.2	2.0
D8 : φ6.3×L7.7	1.2	3.6	3.2	2.0

Size code	E	F	G	H
D : φ6.3×L5.8	0.95	0.65	1.0	1.2
D8 : φ6.3×L7.7	0.95	0.65	1.0	1.2

When size “A” is wide, back fillet can be made, decreasing fitting strength.



Unit : mm

Size code	A	B	C	D
F : φ8×L10.2	2.7	4.0	4.7	1.3
G : φ10×L10.2	3.9	4.4	4.7	1.3
G16 : φ10×L16.5	3.9	4.4	4.7	1.3

Size code	E	F	G	H
F : φ8×L10.2	1.0	1.7	1.1	2.5
G : φ10×L10.2	1.2	1.9	1.1	2.5
G16 : φ10×L16.5	1.2	1.9	1.1	2.5

When size “A” is wide, back fillet can be made, decreasing fitting strength.

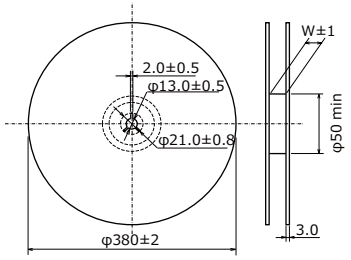
∗Take mounting conditions, solderability and fitting strength into consideration when selecting parts for your company’s design.

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Packaging specifications

Specifications for surface mount type

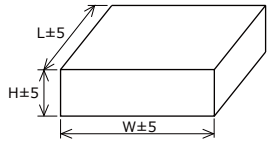
● Reel dimensions (not to scale)



Unit : mm

Size code	W
C	14.0
D, D8	18.0
F, G, G16	26.0

● Dimensions of outer carton box



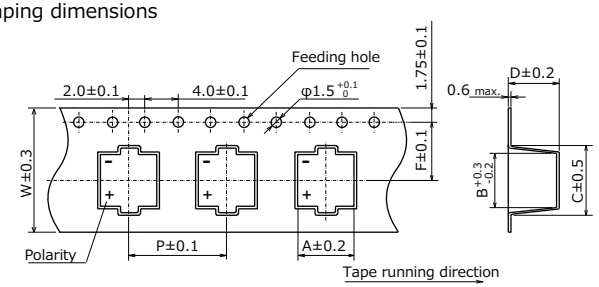
Unit : mm

Size code	H	W, L
C	220	395
D, D8	250	395
F, G, G16	220	395

● Min.packing quantity

Size code	Min.packing (pcs.)
C	1000
D, D8	1000
F, G	500
G16	250

● Taping dimensions



∗ Ask factory for technical specifications

Unit : mm

Size code	A	B	C	D	P	F	W
C	5.7	5.7	8.0	6.4	12.0	5.5	12.0
D	7.0	7.0	9.0	6.4	12.0	7.5	16.0
D8	7.0	7.0	9.0	8.4	12.0	7.5	16.0
F	8.7	8.7	12.5	11.0	16.0	11.5	24.0
G	10.7	10.7	14.5	11.0	16.0	11.5	24.0
G16	10.7	10.7	14.5	17.5	20.0	11.5	24.0

Specifications for radial lead type

● Packing quantity

Size code	Quantity (pcs. / Bag)	Quantity (pcs. / Box)
F (φ8×L9.5)	200	4000
G (φ10×L9.5)	200	2000

Explanation of part numbers

◇ Part number system

・Surface mount type

EEH	ZC	1E	101	X	P
Product classification 3 figures	Series 2 figures	Voltage code 2 figures	Capacitance code 3 figures	Size code 0 to 1 figure	Taping code 1 figure

Series	Code
ZA	ZA
ZC	ZC
ZE	ZE
ZK	ZK
ZS	ZS

Rated voltage	Code
25	1E
35	1V
50	1H
63	1J
80	1K

Capaci-tance	Code
10	100
22	220
27	270
33	330
47	470
56	560
68	680
100	101
120	121
150	151
180	181
220	221
270	271
330	331
470	471
560	561

φD x L	Code
6.3 x 7.7 (D8)	X

*Only D8 is marked with X

φD	Code
5	R
6.3 to 10	P
Vibration-proof	V

・Radial lead type

EEHA	ZF	1V	151
Product classification 4 figures	Series 2 figures	Voltage code 2 figures	Capacitance code 3 figures

Series	Code
ZF	ZF

Rated voltage	Code
25	1E
35	1V
50	1H
63	1J

Capaci-tance	Code
33	330
56	560
100	101
150	151
270	271

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Surface Mount Type

Series: **ZA** Type: **V**

High temperature lead-free reflow

Features

- Endurance : 10000 h at 105 °C
- Low ESR and high ripple current (70 % over, Lower ESR than current V-FP)
- High voltage (to 80 V.DC)
- Equivalent to conductive polymer type aluminum electrolytic capacitor (There are little characteristics change by temperature and frequency)
- Vibration-proof product is available upon request. New lineup of φ6.3 product. (φ6.3, φ8, φ10)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Size code	C	D	D8	F	G
Category temp. range	−55 ℃ to +105 ℃				
Rated voltage range	25 V.DC to 50 V.DC	25 V.DC to 63 V.DC		25 V.DC to 80 V.DC	
Nominal cap.range	10 μF to 33 μF	10 μF to 56 μF	22 μF to 100 μF	22 μF to 220 μF	33 μF to 330 μF
Capacitance tolerance	±20 % (120 Hz / +20 ℃)				
DC leakage current	I ≦ 0.01 CV or 3 (μA) After 2 minutes (whichever is greater)				
Dissipation factor (tan δ)	Please see the attached characteristics list				

Endurance: +105 °C ± 2 °C, 10000 h, apply the rated ripple current without exceeding the rated voltage

Capacitance change	Within ±30% of the initial value
Dissipation factor (tan δ)	≦ 200 % of the initial limit
ESR	≦ 200 % of the initial limit
DC leakage current	Within the initial limit

ESR after Endurance (Ω / 100 kHz)(-40 ℃)

Size code C	D	D8	F	G
2.0	1.4	0.8	0.4	0.3

Shelf life: After storage for 1000 hours at +105 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance. (With voltage treatment)

Damp heat (Load): +85 °C ± 2 °C, 85 % to 90 %, 2000 h, rated voltage applied

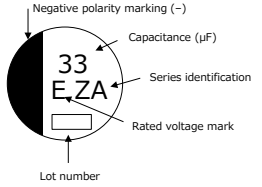
Capacitance change	Within ±30% of the initial value
Dissipation factor (tan δ)	≦ 200 % of the initial limit
ESR	≦ 200 % of the initial limit
DC leakage current	Within the initial limit

Resistance to soldering heat: After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.

Capacitance change	Within ±10% of the initial value
Dissipation factor (tan δ)	Within the initial limit
DC leakage current	Within the initial limit

Marking

Example : 25 V.DC 33 μF
Marking color : BLACK

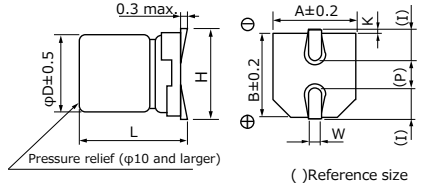


Rated voltage mark

Unit : V.DC

E	25
V	35
H	50
J	63
K	80

Dimensions (not to scale)



( )Reference size

Unit : mm

Size code	φD	L	A,B	H	I	W	P	K
C	5.0	5.8±0.3	5.3	6.5 max.	2.2	0.65±0.1	1.5	0.35 +0.15 -0.20
D	6.3	5.8±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 +0.15 -0.20
D8	6.3	7.7±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 +0.15 -0.20
F	8.0	10.2±0.3	8.3	10.0 max.	3.4	0.90±0.2	3.1	0.70±0.2
G	10.0	10.2±0.3	10.3	12.0 max.	3.5	0.90±0.2	4.6	0.70±0.2

・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Characteristics list

Endurance : 105 ℃ 10000 h

Rated voltage (V.DC)	Capacitance (±20 %) (μF)	Case size (mm) φD	Case size (mm) L	Size code	Specification Ripple current *1 (mA r.m.s.)	Specification ESR*2 (mΩ)	Specification tan δ*3	Part number Standard Product	Part number Vibration-proof product	Min.packaging q'ty Taping (pcs)
25	33	5.0	5.8	C	900	80	0.14	EEHZA1E330R	–	1000
	56	6.3	5.8	D	1300	50	0.14	EEHZA1E560P	EEHZA1E560V	1000
	100	6.3	7.7	D8	2000	30	0.14	EEHZA1E101XP	EEHZA1E101XV	900
	220	8.0	10.2	F	2300	27	0.14	EEHZA1E221P	EEHZA1E221V	500
	330	10.0	10.2	G	2500	20	0.14	EEHZA1E331P	EEHZA1E331V	500
35	22	5.0	5.8	C	900	100	0.12	EEHZA1V220R	–	1000
	27	6.3	5.8	D	1300	60	0.12	**EEHZA1V270P**	**EEHZA1V270V**	**1000**
	47	6.3	5.8	D	1300	60	0.12	EEHZA1V470P	EEHZA1V470V	1000
	68	6.3	7.7	D8	2000	35	0.12	EEHZA1V680XP	EEHZA1V680XV	900
	150	8.0	10.2	F	2300	27	0.12	EEHZA1V151P	EEHZA1V151V	500
	270	10.0	10.2	G	2500	20	0.12	EEHZA1V271P	EEHZA1V271V	500
50	10	5.0	5.8	C	750	120	0.10	EEHZA1H100R	–	1000
	22	6.3	5.8	D	1100	80	0.10	EEHZA1H220P	EEHZA1H220V	1000
	33	6.3	7.7	D8	1600	40	0.10	EEHZA1H330XP	EEHZA1H330XV	900
	68	8.0	10.2	F	1800	30	0.10	EEHZA1H680P	EEHZA1H680V	500
	100	10.0	10.2	G	2000	28	0.10	EEHZA1H101P	EEHZA1H101V	500
63	10	6.3	5.8	D	1000	120	0.08	EEHZA1J100P	EEHZA1J100V	1000
	22	6.3	7.7	D8	1500	80	0.08	EEHZA1J220XP	EEHZA1J220XV	900
	33	8.0	10.2	F	1700	40	0.08	EEHZA1J330P	EEHZA1J330V	500
	56	10.0	10.2	G	1800	30	0.08	EEHZA1J560P	EEHZA1J560V	500
80	22	8.0	10.2	F	1550	45	0.08	EEHZA1K220P	EEHZA1K220V	500
	33	10.0	10.2	G	1700	36	0.08	EEHZA1K330P	EEHZA1K330V	500

*1: Ripple current (100 kHz / +105 ℃)
*2: ESR (100 kHz / +20 ℃)
*3: tan δ (120 Hz / +20 ℃)
・Please refer to the page of “Reflow profile” and “The taping dimensions”.
・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100Hz ≦ f< 200Hz	200Hz ≦ f< 300Hz	300Hz ≦ f< 500Hz	500Hz ≦ f< 1kHz
C < 47μF	Correction factor	0.10	0.10	0.15	0.20
47μF ≦ C < 150μF		0.15	0.20	0.25	0.30
150μF ≦ C		0.15	0.25	0.25	0.30

Rated capacitance (C)	Frequency (f)	1kHz ≦ f< 2kHz	2kHz ≦ f< 3kHz	3kHz ≦ f< 5kHz	5kHz ≦ f< 10kHz
C < 47μF	Correction factor	0.30	0.40	0.45	0.50
47μF ≦ C < 150μF		0.40	0.45	0.55	0.60
150μF ≦ C		0.45	0.50	0.60	0.65

Rated capacitance (C)	Frequency (f)	10kHz ≦ f< 15kHz	15kHz ≦ f< 20kHz	20kHz ≦ f< 30kHz	30kHz ≦ f< 40kHz
C < 47μF	Correction factor	0.60	0.65	0.70	0.75
47μF ≦ C < 150μF		0.70	0.75	0.80	0.80
150μF ≦ C		0.75	0.80	0.85	0.85

Rated capacitance (C)	Frequency (f)	40kHz ≦ f< 50kHz	50kHz ≦ f< 100kHz	100kHz ≦ f< 500kHz	500kHz ≦ f
C < 47μF	Correction factor	0.80	0.85	1.00	1.05
47μF ≦ C < 150μF		0.85	0.90	1.00	1.00
150μF ≦ C		0.85	0.90	1.00	1.00

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Surface Mount Type

Series: **ZC** Type: **V**

High temperature lead-free reflow

UP GRADE

Features

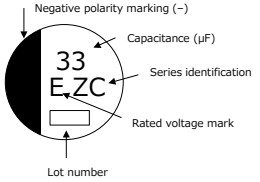
- Endurance: 4000 h at 125 °C (High temperature / Long life)
- Low ESR and high ripple current (85 % over, Lower ESR than current V-TP)
- High-withstand voltage (to 80 V.DC), Low LC (0.01 CV or 3 μA)
- Equivalent to conductive polymer type aluminum electrolytic capacitor (There are little characteristics change by temperature and frequency)
- Vibration-proof product is available upon request. New lineup of φ6.3 product. (φ6.3, φ8, φ10)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Size code	C	D	D8	F	G
Category temp. range	−55 ℃ to +125 ℃				
Rated voltage range	25 V.DC to 50 V.DC	25 V.DC to 63 V.DC		25 V.DC to 80 V.DC	
Nominal cap.range	10 μF to 33 μF	10 μF to 56 μF	22 μF to 100 μF	22 μF to 220 μF	33 μF to 330 μF
Capacitance tolerance	±20 % (120 Hz / +20 ℃)				
DC leakage current	I ≦ 0.01 CV or 3 (μA) After 2 minutes (whichever is greater)				
Dissipation factor (tan δ)	Please see the attached characteristics list				
Endurance 1	+125 °C ± 2 ℃, 4000 h, apply the rated ripple current without exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial value			
	Dissipation factor (tan δ)	≦ 200 % of the initial limit			
	ESR	≦ 200 % of the initial limit			
	DC leakage current	Within the initial limit			
Endurance 2	+125 °C ± 2 ℃, 3000 h, apply the rated ripple current without exceeding the rated voltage.				
	Capacitance change	Within ±30% of the initial value			
	Dissipation factor (tan δ)	≦ 200 % of the initial limit			
	ESR	≦ 300 % of the initial limit			
	DC leakage current	Within the initial limit			
Shelf life	After storage for 1000 hours at +125 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance. (With voltage treatment)				
Damp heat (Load)	+85 °C ± 2 ℃, 85 % to 90 %, 2000 h, rated voltage applied				
	Capacitance change	Within ±30% of the initial value			
	Dissipation factor (tan δ)	≦ 200 % of the initial limit			
	ESR	≦ 200 % of the initial limit			
	DC leakage current	Within the initial limit			
Resistance to soldering heat	After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.				
	Capacitance change	Within ±10% of the initial value			
	Dissipation factor (tan δ)	Within the initial limit			
	DC leakage current	Within the initial limit			

Marking

Example : 25 V.DC 33 μF
Marking color : BLACK

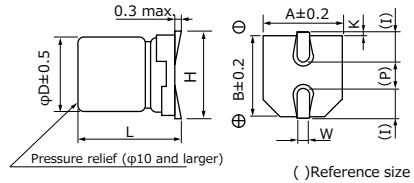


Rated voltage mark

Unit : V.DC

E	25	J	63
V	35	K	80
H	50		

Dimensions (not to scale)



( )Reference size

Unit : mm

Size code	φD	L	A,B	H	I	W	P	K
C	5.0	5.8±0.3	5.3	6.5 max.	2.2	0.65±0.1	1.5	0.35 +0.15 −0.20
D	6.3	5.8±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 +0.15 −0.20
D8	6.3	7.7±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 +0.15 −0.20
F	8.0	10.2±0.3	8.3	10.0 max.	3.4	0.90±0.2	3.1	0.70±0.2
G	10.0	10.2±0.3	10.3	12.0 max.	3.5	0.90±0.2	4.6	0.70±0.2

・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

Characteristics list

Endurance 1 : 125 ℃ 4000 h
Endurance 2 : 125 ℃ 3000 h

Rated voltage (V.DC)	Capacitance (±20 %) (μF)	Case size (mm) φD	Case size (mm) L	Size code	Specification: Ripple current *1 (mA r.m.s.) Endurance 1	Specification: Ripple current *1 (mA r.m.s.) Endurance 2	Specification: ESR*2 (mΩ)	Specification: tan δ *3	Part number: Standard Product	Part number: Vibration-proof product	Min.packaging q'ty: Taping (pcs)
25	33	5.0	5.8	C	550	–	80	0.14	EEHZC1E330R	–	1000
	56	6.3	5.8	D	900	–	50	0.14	EEHZC1E560P		1000
	100	6.3	7.7	D8	1400	–	30	0.14	EEHZC1E101XP	EEHZC1E101XV	900
	220	8.0	10.2	F	1600	1900	27	0.14	EEHZC1E221P	EEHZC1E221V	500
	330	10.0	10.2	G	2000	2900	20	0.14	EEHZC1E331P	EHZC1E331V	500
35	22	5.0	5.8	C	550	–	100	0.12	EEHZC1V220R	–	1000
	47	6.3	5.8	D	900	–	60	0.12	EEHZC1V470P	EEHZC1V470V	1000
	68	6.3	7.7	D8	1400	–	35	0.12	EEHZC1V680XP	EEHZC1V680XV	900
	150	8.0	10.2	F	1600	1900	27	0.12	EEHZC1V151P	EEHZC1V151V	500
	270	10.0	10.2	G	2000	2800	20	0.12	EEHZC1V271P	EEHZC1V271V	500
50	10	5.0	5.8	C	500	–	120	0.10	EEHZC1H100R	–	1000
	22	6.3	5.8	D	750	–	80	0.10	EEHZC1H220P	EEHZC1H220V	1000
	33	6.3	7.7	D8	1100	–	40	0.10	EEHZC1H330XP	EEHZC1H330XV	900
	68	8.0	10.2	F	1250	–	30	0.10	EEHZC1H680P	EEHZC1H680V	500
	100	10.0	10.2	G	1600	–	28	0.10	EEHZC1H101P	EEHZC1H101V	500
	120	10.0	10.2	G	1600	–	28	0.10	EEHZC1H121P	EEHZC1H121V	500
63	10	6.3	5.8	D	700	–	120	0.08	EEHZC1J100P	EEHZC1J100V	1000
	22	6.3	7.7	D8	900	–	80	0.08	EEHZC1J220XP	EEHZC1J220XV	900
	33	8.0	10.2	F	1100	–	40	0.08	EEHZC1J330P	EEHZC1J330V	500
	NEW 47	8.0	10.2	F	1100	–	40	0.08	EEHZC1J470P	EEHZC1J470V	500
	56	10.0	10.2	G	1400	–	30	0.08	EEHZC1J560P	EEHZC1J560V	500
	68	10.0	10.2	G	1400	–	30	0.08	EEHZC1J680P	EEHZC1J680V	500
	82	10.0	10.2	G	1400	–	30	0.08	EEHZC1J820P	EEHZC1J820V	500
80	22	8.0	10.2	F	1050	–	45	0.08	EEHZC1K220P	EEHZC1K220V	500
	33	10.0	10.2	G	1360	–	36	0.08	EEHZC1K330P	EEHZC1K330V	500
	47	10.0	10.2	G	1360	–	36	0.08	EEHZC1K470P	EEHZC1K470V	500

*1: Ripple current (100 kHz / +125 ℃)
*2: ESR (100 kHz / +20 ℃)
*3: tan δ (120 Hz / +20 ℃)
・Please refer to the page of "Reflow profile" and "The taping dimensions".
・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100Hz ≦ f< 200Hz	200Hz ≦ f< 300Hz	300Hz ≦ f< 500Hz	500Hz ≦ f< 1kHz
C < 47μF	Correction factor	0.10	0.10	0.15	0.20
47μF ≦ C < 150μF		0.15	0.20	0.25	0.30
150μF ≦ C		0.15	0.25	0.25	0.30

Rated capacitance (C)	Frequency (f)	1kHz ≦ f< 2kHz	2kHz ≦ f< 3kHz	3kHz ≦ f< 5kHz	5kHz ≦ f< 10kHz
C < 47μF	Correction factor	0.30	0.40	0.45	0.50
47μF ≦ C < 150μF		0.40	0.45	0.55	0.60
150μF ≦ C		0.45	0.50	0.60	0.65

Rated capacitance (C)	Frequency (f)	10kHz ≦ f< 15kHz	15kHz ≦ f< 20kHz	20kHz ≦ f< 30kHz	30kHz ≦ f< 40kHz
C < 47μF	Correction factor	0.60	0.65	0.70	0.75
47μF ≦ C < 150μF		0.70	0.75	0.80	0.80
150μF ≦ C		0.75	0.80	0.85	0.85

Rated capacitance (C)	Frequency (f)	40kHz ≦ f< 50kHz	50kHz ≦ f< 100kHz	100kHz ≦ f< 500kHz	500kHz ≦ f
C < 47μF	Correction factor	0.80	0.85	1.00	1.05
47μF ≦ C < 150μF		0.85	0.90	1.00	1.00
150μF ≦ C		0.85	0.90	1.00	1.00

After endurance ESR (100 kHz, −40 °C)

Size	φ5 x L5.8	φ6.3 x L5.8	φ6.3 x L7.7	φ8 x L10.2	φ10 x L10.2
ESR (Ω)	2	1.4	0.8	0.4	0.3

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Surface Mount Type

Series: **ZK** Type: **V**

High temperature lead-free reflow

Features

- High capacitance and High ripple current compared with ZC series
- Endurance : 4000 h at 125 °C (High temperature / Long life)
- Low ESR (85 % over, Lower ESR than Current V-TP), Low LC (0.01 CV or 3 μA)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor
  (There are little characteristics change by temperature and frequency)
- Vibration-proof product is available upon request. New lineup of φ6.3 product. (φ6.3、φ8、φ10)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Size code	C	D	D8	F	G
Category temp. range	−55 ℃ to +125 ℃				
Rated voltage range	25 V.DC to 35 V.DC				
Nominal cap.range	33 μF to 47 μF	56 μF to 68 μF	100 μF to 150 μF	180 μF to 270 μF	330 μF to 470 μF
Capacitance tolerance	±20 % (120 Hz / +20 ℃)				
DC leakage current	I ≦ 0.01 CV or 3 (μA) After 2 minutes (whichever is greater)				
Dissipation factor (tan δ)	Please see the attached characteristics list				

Endurance: +125 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage.

Capacitance change	Within ±30% of the initial value
Dissipation factor (tan δ)	≦ 200 % of the initial limit
ESR	≦ 200 % of the initial limit
DC leakage current	Within the initial limit

ESR after Endurance (Ω / 100 kHz)(-40 ℃)

Size code C	D	D8	F	G
2.0	1.4	0.8	0.4	0.3

Shelf life: After storage for 1000 hours at +125 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in Endurance. (With voltage treatment)

Damp heat (Load): +85 °C ± 2 °C, 85 % to 90 %, 2000 h, rated voltage applied

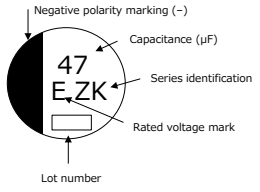
Capacitance change	Within ±30% of the initial value
Dissipation factor (tan δ)	≦ 200 % of the initial limit
ESR	≦ 200 % of the initial limit
DC leakage current	Within the initial limit

Resistance to soldering heat: After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.

Capacitance change	Within ±10% of the initial value
Dissipation factor (tan δ)	Within the initial limit
DC leakage current	Within the initial limit

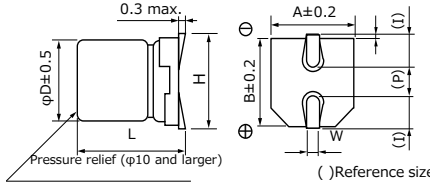
Marking

Example : 25 V.DC 47 μF
Marking color : BLACK



Rated vol. mark	Unit : V.DC
E	25
V	35

Dimensions (not to scale)



( )Reference size

Unit : mm

Size code	φD	L	A、B	H	I	W	P	K
C	5.0	5.8±0.3	5.3	6.5 max.	2.2	0.65±0.1	1.5	0.35 +0.15 −0.20
D	6.3	5.8±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 +0.15 −0.20
D8	6.3	7.7±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 +0.15 −0.20
F	8.0	10.2±0.3	8.3	10.0 max.	3.4	0.90±0.2	3.1	0.70±0.2
G	10.0	10.2±0.3	10.3	12.0 max.	3.5	0.90±0.2	4.6	0.70±0.2

・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

Characteristics list

Endurance : 125 ℃ 4000 h

Rated vol. (V.DC)	Cap. (±20 %) (μF)	Case size (mm) φD	Case size (mm) L	Size code	Specification Ripple current *1 (mA r.m.s.)	Specification ESR*2 (mΩ)	Specification tan δ*3	Part number Standard Product	Part number Vibration-proof product	Min.packaging q'ty Taping (pcs)
25	47	5.0	5.8	C	660	80	0.14	EEHZK1E470R	–	1000
	68	6.3	5.8	D	1080	50	0.14	EEHZK1E680P	EEHZK1E680V	1000
	150	6.3	7.7	D8	1680	30	0.14	EEHZK1E151XP	EEHZK1E151XV	900
	270	8.0	10.2	F	1920	27	0.14	EEHZK1E271P	EEHZK1E271V	500
	470	10.0	10.2	G	2800	20	0.14	EEHZK1E471P	EEHZK1E471V	500
35	33	5.0	5.8	C	660	100	0.12	EEHZK1V330R	–	1000
	56	6.3	5.8	D	1080	60	0.12	EEHZK1V560P	EEHZK1V560V	1000
	100	6.3	7.7	D8	1680	35	0.12	EEHZK1V101XP	EEHZK1V101XV	900
	180	8.0	10.2	F	1920	27	0.12	EEHZK1V181P	EEHZK1V181V	500
	330	10.0	10.2	G	2800	20	0.12	EEHZK1V331P	EEHZK1V331V	500

*1: Ripple current (100 kHz / +125 ℃)
*2: ESR (100 kHz / +20 ℃)
*3: tan δ (120 Hz / +20 ℃)
・Please refer to the page of “Reflow profile” and “The taping dimensions”.
・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100Hz ≦ f< 200Hz	200Hz ≦ f< 300Hz	300Hz ≦ f< 500Hz	500Hz ≦ f< 1kHz
C ≦ 47 μF	Correction factor	0.15	0.20	0.25	0.35
47 μF < 100 μF		0.15	0.25	0.30	0.40
100 μF ≦ C		0.15	0.25	0.30	0.40

Rated capacitance (C)	Frequency (f)	1kHz ≦ f< 2kHz	2kHz ≦ f< 3kHz	3kHz ≦ f< 5kHz	5kHz ≦ f< 10kHz
C ≦ 47 μF	Correction factor	0.45	0.55	0.60	0.65
47 μF < 100 μF		0.50	0.60	0.65	0.70
100 μF ≦ C		0.50	0.60	0.65	0.70

Rated capacitance (C)	Frequency (f)	10kHz ≦ f< 15kHz	15kHz ≦ f< 20kHz	20kHz ≦ f< 30kHz	30kHz ≦ f< 40kHz
C ≦ 47 μF	Correction factor	0.70	0.75	0.75	0.75
47 μF < 100 μF		0.75	0.75	0.80	0.80
100 μF ≦ C		0.75	0.80	0.85	0.85

Rated capacitance (C)	Frequency (f)	40kHz ≦ f< 50kHz	50kHz ≦ f< 100kHz	100kHz ≦ f< 500kHz	500kHz ≦ f
C ≦ 47 μF	Correction factor	0.80	0.85	1.00	1.05
47 μF < 100 μF		0.85	0.90	1.00	1.00
100 μF ≦ C		0.85	0.90	1.00	1.00

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Surface Mount Type

Series: **ZE** Type: **V**

High temperature lead-free reflow

Features

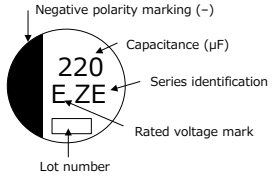
- Endurance: 2000 h at 145 °C (High temperature / Long life)
- Low ESR and high ripple current (85 % over, Lower ESR than current V-TP)
- High-withstand voltage (to 63 V.DC), Low LC (0.01 CV or 3 μA)
- Equivalent to conductive polymer type aluminum electrolytic capacitor
  (There are little characteristics change by temperature and frequency)
- Vibration-proof product is available upon request. (φ8 mm and larger)
- AEC-Q200 compliant
- RoHS directive compliant

Specifications

Size code	F	G
Category temp. range	−55 ℃ to +145 ℃	
Rated voltage range	25 V.DC to 63 V.DC	
Nominal cap.range	33 μF to 220 μF	56 μF to 330 μF
Capacitance tolerance	±20 % (120 Hz / +20 ℃)	
DC leakage current	I ≦ 0.01 CV or 3 (μA) After 2 minutes (whichever is greater)	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Endurance 1	+145 °C ± 2 °C, 2000 h, apply the rated ripple current without exceeding the rated voltage	
	Capacitance change	Within ±30% of the initial value
	Dissipation factor (tan δ)	≦ 200 % of the initial limit
	E.S.R.	≦ 200 % of the initial limit
	DC leakage current	Within the initial limit
Endurance 2	+135 °C ± 2 °C, 4000 h, apply the rated ripple current without exceeding the rated voltage	
	Capacitance change	Within ±30% of the initial value
	Dissipation factor (tan δ)	≦ 200 % of the initial limit
	E.S.R.	≦ 200 % of the initial limit
	DC leakage current	Within the initial limit
Shelf life	After storage for 1000 hours at +145 °C±2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance 1. (With voltage treatment)	
Damp heat (Load)	85 °C ± 2 °C, 85 % to 90 %, 2000 h, rated voltage applied	
	Capacitance change	Within ±30% of the initial value
	Dissipation factor (tan δ)	≦ 200 % of the initial limit
	E.S.R.	≦ 200 % of the initial limit
	DC leakage current	Within the initial limit
Resistance to soldering heat	After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.	
	Capacitance change	Within ±10% of the initial value
	Dissipation factor (tan δ)	Within the initial limit
	DC leakage current	Within the initial limit

Marking

Example : 25 V.DC 220 μF
Marking color : BLACK

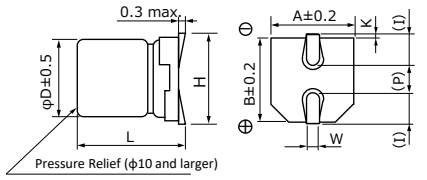


Rated voltage mark	
E	25
V	35

Unit : V.DC

H	50
J	63

Dimensions (not to scale)



( )Reference size

Unit : mm

Size code	φD	L	A, B	H	I	W	P	K
F	8.0	10.2±0.3	8.3	10.0 max.	3.4	0.90±0.2	3.1	0.70±0.2
G	10.0	10.2±0.3	10.3	12.0 max.	3.5	0.90±0.2	4.6	0.70±0.2

・The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

Characteristics list

Endurance 1 : 145 ℃ 2000 h
Endurance 2 : 135 ℃ 4000 h

Rated voltage (V.DC)	Capacitance (±20 %) (μF)	Case size (mm) φD	Case size (mm) L	Size code	Specification Ripple current *1 (mA r.m.s.) Endurance 1 (+145℃)	Specification Ripple current *1 (mA r.m.s.) Endurance 2 (+135℃)	ESR*2 (mΩ)	tan δ *3	Part number Standard product	Part number Vibration-proof product	Min. packaging q'ty Taping (pcs)
25	220	8.0	10.2	F	700	1600	27	0.14	EEHZE1E221P	EEHZE1E221V	500
	330	10.0	10.2	G	900	2000	20	0.14	EEHZE1E331P	EEHZE1E331V	500
35	150	8.0	10.2	F	700	1600	27	0.12	EEHZE1V151P	EEHZE1V151V	500
	270	10.0	10.2	G	900	2000	20	0.12	EEHZE1V271P	EEHZE1V271V	500
50	68	8.0	10.2	F	600	1250	30	0.10	EEHZE1H680P	EEHZE1H680V	500
	100	10.0	10.2	G	800	1600	28	0.10	EEHZE1H101P	EEHZE1H101V	500
63	33	8.0	10.2	F	600	1100	40	0.08	EEHZE1J330P	EEHZE1J330V	500
	56	10.0	10.2	G	800	1400	30	0.08	EEHZE1J560P	EEHZE1J560V	500

*1: Ripple current (100 kHz / +145 ℃ or+135℃)
*2: ESR (100 kHz / +20 ℃)
*3: tan δ (120 Hz / +20 ℃)
· Please refer to the page of "Reflow profile" and "The taping dimensions".
·The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100Hz ≦ f< 200Hz	200Hz ≦ f< 300Hz	300Hz ≦ f< 500Hz	500Hz ≦ f< 1kHz
C < 47μF	Correction factor	0.10	0.10	0.15	0.20
47μF ≦ C < 150μF		0.15	0.20	0.25	0.30
150μF ≦ C		0.15	0.25	0.25	0.30

Rated capacitance (C)	Frequency (f)	1kHz ≦ f< 2kHz	2kHz ≦ f< 3kHz	3kHz ≦ f< 5kHz	5kHz ≦ f< 10kHz
C < 47μF	Correction factor	0.30	0.40	0.45	0.50
47μF ≦ C < 150μF		0.40	0.45	0.55	0.60
150μF ≦ C		0.45	0.50	0.60	0.65

Rated capacitance (C)	Frequency (f)	10kHz ≦ f< 15kHz	15kHz ≦ f< 20kHz	20kHz ≦ f< 30kHz	30kHz ≦ f< 40kHz
C < 47μF	Correction factor	0.60	0.65	0.70	0.75
47μF ≦ C < 150μF		0.70	0.75	0.80	0.80
150μF ≦ C		0.75	0.80	0.85	0.85

Rated capacitance (C)	Frequency (f)	40kHz ≦ f< 50kHz	50kHz ≦ f< 100kHz	100kHz ≦ f< 500kHz	500kHz ≦ f
C < 47μF	Correction factor	0.80	0.85	1.00	1.05
47μF ≦ C < 150μF		0.85	0.90	1.00	1.00
150μF ≦ C		0.85	0.90	1.00	1.00

After endurance ESR (100 kHz、-40℃)

Size	φ8 x L10.2	φ10 x L10.2
ESR (Ω)	0.4	0.3

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Surface Mount Type

Series: **ZS** Type: **V** **NEW**

High temperature lead-free reflow

Features

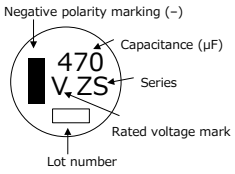
- High ripple current and Large capacitance compared with ZC series
- Endurance: 4000 h at 125 ℃
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor (There are little characteristics change by temperature and frequency)
- Vibration-proof product is available upon request.
- AEC-Q200 compliant
- RoHS compliant

Specifications

Size code	G16	
Category temp. range	−55 ℃ to +125 ℃	
Rated voltage range	25 V.DC to 63 V.DC	
Nominal cap.range	150 μF to 560 μF	
Capacitance tolerance	±20 % (120 Hz / +20 ℃)	
DC leakage current	I ≦ 0.01 CV or 3 (μA) After 2 minutes (whichever is greater)	
Dissipation factor (tan δ)	Please see the attached characteristics list	
Endurance	+125 ℃±2 ℃, 4000 h, apply the rated ripple current without exceeding the rated voltage.	
	Capacitance change	Within ±30% of the initial value
	Dissipation factor (tan δ)	≦ 200 % of the initial limit
	E.S.R.	≦ 200 % of the initial limit
	DC leakage current	Within the initial limit
	ESR after endurance (Ω / 100 kHz)(-40 ℃)	Size code: G16 → 0.3
Shelf life	After storage for 1000 hours at +125 ℃±2 ℃ with no voltage applied and then being stabilized at +20℃, capacitors shall meet the limits specified in endurance. (With voltage treatment)	
Damp heat (Load)	+85 ℃±2 ℃, 85 % to 90 %, 2000 h, rated voltage applied.	
	Capacitance change	Within ±30% of the initial value
	Dissipation factor (tan δ)	≦ 200 % of the initial limit
	E.S.R.	≦ 200 % of the initial limit
	DC leakage current	Within the initial limit
Resistance to soldering heat	After reflow soldering and then being stabilized at +20℃, capacitors shall meet the following limits.	
	Capacitance change	Within ±10% of the initial value
	Dissipation factor (tan δ)	Within the initial limit
	DC leakage current	Within the initial limit

Marking

Example : 35 V.DC 470 μF
Marking color : BLACK

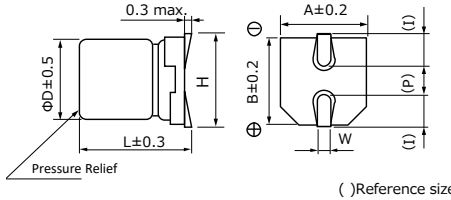


Rated voltage mark

Unit : V.DC

E	25	H	50
V	35	J	63

Dimensions (not to scale)



( )Reference size

Unit : mm

Size code	D	L	A,B	H	I	W	P
G16	10.0	16.5	10.3	11.0±0.2	3.2	1.2±0.2	4.6

·The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

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Should a safety concern arise regarding this product, please be sure to contact us immediately.

Characteristics list

Endurance : 125 ℃ 4000 h

Rated voltage (V.DC)	Capacitance (±20 %) (μF)	Case size (mm) φD	Case size (mm) L	Size code	Specification Ripple current *1 (mA r.m.s.)	Specification ESR*2 (mΩ)	Specification tan δ*3	Part number Standard product	Part number Vibration-proof product	Min. packaging q'ty Taping (pcs)
25	560	10.0	16.5	G16	4000	11	0.14	EEHZS1E561P	EEHZS1E561V	250
35	470	10.0	16.5	G16	4000	11	0.12	EEHZS1V471P	EEHZS1V471V	250
50	220	10.0	16.5	G16	3700	13	0.10	EEHZS1H221P	EEHZS1H221V	250
63	150	10.0	16.5	G16	3500	15	0.08	EEHZS1J151P	EEHZS1J151V	250

*1: Ripple current (100 kHz / +125 ℃)
*2: ESR (100 kHz / +20 ℃)
*3: tan δ (120 Hz / +20 ℃)
· Please refer to the page of “Reflow profile” and “The taping dimensions”.
·The dimensions of the vibration-proof products, please refer to the page of the mounting specification.

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100Hz ≦ f< 200Hz	200Hz ≦ f< 300Hz	300Hz ≦ f< 500Hz	500Hz ≦ f< 1kHz
100μF ≦ C < 150μF	Correction	0.15	0.20	0.25	0.30
150μF ≦ C	factor	0.15	0.25	0.25	0.30

Rated capacitance (C)	Frequency (f)	1kHz ≦ f< 2kHz	2kHz ≦ f< 3kHz	3kHz ≦ f< 5kHz	5kHz ≦ f< 10kHz
100μF ≦ C < 150μF	Correction	0.40	0.45	0.55	0.60
150μF ≦ C	factor	0.45	0.50	0.60	0.65

Rated capacitance (C)	Frequency (f)	10kHz ≦ f< 15kHz	15kHz ≦ f< 20kHz	20kHz ≦ f< 30kHz	30kHz ≦ f< 40kHz
100μF ≦ C < 150μF	Correction	0.70	0.75	0.80	0.80
150μF ≦ C	factor	0.75	0.80	0.85	0.85

Rated capacitance (C)	Frequency (f)	40kHz ≦ f< 50kHz	50kHz ≦ f< 100kHz	100kHz ≦ f< 500kHz	500kHz ≦ f
100μF ≦ C < 150μF	Correction	0.85	0.90	1.00	1.00
150μF ≦ C	factor	0.85	0.90	1.00	1.00

Panasonic Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Radial Lead type

Series: **ZF** Type: **A**

NEW

Features

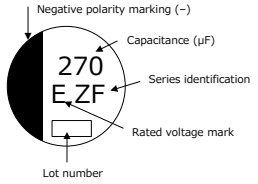
- Endurance : 1000 h at 150 °C (High temperature)
- High temperature compared with ZC series
- High-withstand voltage (to 63 V.DC), Low LC (0.01 CV or 3 μA)
- Equivalent to conductive polymer type Aluminum Electrolytic Capacitor
  (There are little characteristics change by temperature and frequency)
- AEC-Q200 compliant
- RoHS compliant

Specifications

Size code	F		G
Category temp. range	−55 ℃ to +150 ℃		
Rated voltage range	25 V.DC to 63 V.DC		
Nominal cap.range	33 μF to 150 μF		56 μF to 270 μF
Capacitance tolerance	±20 % (120 Hz / +20℃)		
DC leakage current	I ≦ 0.01 CV or 3 (μA) After 2 minutes (whichever is greater)		
Dissipation factor (tan δ)	Please see the attached characteristics list		
Endurance	+150 °C ± 2 °C, 1000 h, apply the rated ripple current without exceeding the rated voltage.		
	Capacitance change	Within ±30% of the initial value	
	Dissipation factor (tan δ)	≦ 200 % of the initial limit	
	ESR	≦ 200 % of the initial limit	
	DC leakage current	Within the initial limit	
	ESR after endurance (Ω / 100 kHz)(-40 ℃)	Size code F: 0.4	Size code G: 0.3
Shelf life	After storage for 1000 hours at +150 °C ± 2 °C with no voltage applied and then being stabilized at +20 °C, capacitors shall meet the limits specified in endurance. (With voltage treatment)		
Damp heat (Load)	+85 °C ± 2 °C, 85 % to 90 %, 2000 h, rated voltage applied		
	Capacitance change	Within ±30% of the initial value	
	Dissipation factor (tan δ)	≦ 200 % of the initial limit	
	ESR	≦ 200 % of the initial limit	
	DC leakage current	Within the initial limit	

Marking

Example : 25 V.DC 270 μF
Marking color : BLACK

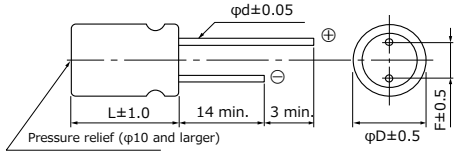


Rated voltage mark

E	25	H	50
V	35	J	63

Unit : V.DC

Dimensions (not to scale)



Unit : mm

Size code	φD	L	φd	F
F	8.0	9.5	0.6	3.5
G	10.0	9.5	0.6	5.0

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

Characteristics list

Endurance : 150 ℃ 1000 h

Rated voltage (V.DC)	Capaci-tance (±20 %) (μF)	Case size (mm) φD	Case size (mm) L	Size code	Specification Ripple current *1 (mA r.m.s.)	Specification ESR*2 (mΩ)	Specification tan δ*3	Part number	Min.packaging q'ty Long lead (pcs)
25	150	8.0	9.5	F	800	27	0.14	EEHAZF1E151	200
	270	10.0	9.5	G	1000	20	0.14	EEHAZF1E271	200
35	100	8.0	9.5	F	770	30	0.12	EEHAZF1V101	200
	150	10.0	9.5	G	950	23	0.12	EEHAZF1V151	200
50	56	8.0	9.5	F	700	35	0.10	EEHAZF1H560	200
	100	10.0	9.5	G	900	28	0.10	EEHAZF1H101	200
63	33	8.0	9.5	F	650	40	0.08	EEHAZF1J330	200
	56	10.0	9.5	G	840	30	0.08	EEHAZF1J560	200

*1: Ripple current (100 kHz / +150 ℃)
*2: ESR (100 kHz / +20 ℃)
*3: tan δ (120 Hz / +20 ℃)

Frequency correction factor for ripple current

Rated capacitance (C)	Frequency (f)	100Hz ≦ f < 200Hz	200Hz ≦ f < 300Hz	300Hz ≦ f < 500Hz	500Hz ≦ f < 1kHz
C < 47μF	Correction factor	0.10	0.10	0.15	0.20
47μF ≦ C < 150μF		0.15	0.20	0.25	0.30
150μF ≦ C		0.15	0.25	0.25	0.30

Rated capacitance (C)	Frequency (f)	1kHz ≦ f < 2kHz	2kHz ≦ f < 3kHz	3kHz ≦ f < 5kHz	5kHz ≦ f < 10kHz
C < 47μF	Correction factor	0.30	0.40	0.45	0.50
47μF ≦ C < 150μF		0.40	0.45	0.55	0.60
150μF ≦ C		0.45	0.50	0.60	0.65

Rated capacitance (C)	Frequency (f)	10kHz ≦ f < 15kHz	15kHz ≦ f < 20kHz	20kHz ≦ f < 30kHz	30kHz ≦ f < 40kHz
C < 47μF	Correction factor	0.60	0.65	0.70	0.75
47μF ≦ C < 150μF		0.70	0.75	0.80	0.80
150μF ≦ C		0.75	0.80	0.85	0.85

Rated capacitance (C)	Frequency (f)	40kHz ≦ f < 50kHz	50kHz ≦ f < 100kHz	100kHz ≦ f < 500kHz	500kHz ≦ f
C < 47μF	Correction factor	0.80	0.85	1.00	1.05
47μF ≦ C < 150μF		0.85	0.90	1.00	1.00
150μF ≦ C		0.85	0.90	1.00	1.00