

Panasonic

2014

CATALOG

Electrolytic Capacitors

(Conductive Polymer Hybrid Aluminum Electrolytic Capacitors)



Small can type Aluminum Electrolytic Capacitors

■ Surface Mount Type

High Temperature · Long Life

Conductive Polymer Hybrid

ZC

125 °C
4000 h

ZA

105 °C
10000 h

TQ

125 °C
2000 h

TP

125 °C
2000 h to 3000 h

TK

125 °C
3000 h

TG

125 °C
1000 h to 2000 h

HD

105 °C
5000 h

HC

105 °C
3000 h to 5000 h

EB

(Large can)
105 °C
3000 h to 5000 h

FT

105 °C
2000 h

FP

105 °C
2000 h

FK

105 °C
2000 h to 5000 h

FC

105 °C
1000 h

HB

105 °C
2000 h

HB

105 °C/2000 h
5.4 mm height

HA

105 °C
1000 h

S

85 °C
1000 h to 2000 h

Low Impedance

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)
- 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 qualified*
- RoHS directive compliant

■ Specifications

Category Temp. Range	-55 °C to +105 °C										
Rated W.V.Range	25 V.DC to 80 V.DC										
Nominal Cap.Range	10 µF to 330 µF										
Capacitance Tolerance	±20 % (120 Hz/+20 °C)										
DC Leakage Current	I ≤ 0.01 CV or 3 (µA) After 2 minutes (whichever is greater)										
tan δ	Please see the attached Standard Products list										
Endurance	The capacitor shall be subjected to application of the D.C. voltage with full rated ripple current at +105 °C for 10000 hours. After stabilizing at room temperature(+15 to 35 °C), the capacitor shall not exceed the specified limits. (The sum of DC voltage and ripple peak voltage shall not exceed the rated voltage.)										
	Capacitance change	±30 % of initial measured value									
	tan δ	≤ 200 % of initial specified value									
	E. S. R.	≤ 200 % of initial specified value									
	DC leakage current	≤ initial specified value									
Shelf Life	Size Code										
	ESR after Endurance (Ω/100 kHz) (-40 °C)	C	D	D8	F	G					
		2.0	1.4	0.8	0.4	0.3					
	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)										
	After applying rated working voltage for 2000 hours at +85 °C ± 2 °C / 85% to 90%RH and then being stabilized at +20 °C, Capacitors shall meet the following limits.										
Damp Heat (Load)	Capacitance change	±30 % of initial measured value									
	tan δ	≤ 200 % of initial specified value									
	E. S. R.	≤ 200 % of initial specified value									
	DC leakage current	≤ initial specified value									
	After reflow soldering and then being stabilized at +20 °C, capacitors shall meet the following limits.										
Resistance to Soldering Heat	Capacitance change	±10 % of initial measured value									
	tan δ	≤ initial specified value									
	DC leakage current	≤ initial specified value									

■ Marking

Example:25 V 33 µF Marking color : BLACK	
Negative polarity marking (-)	Capacitance (µF)
33	Series identification
E ZA	
Lot number	Rated Voltage Mark
Rated Voltage Mark	
E	25 V
V	35 V
H	50 V
J	63 V
K	80 V

■ Dimensions in mm (not to scale)

(Unit : mm)								
Size code	D	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} _{-0.10}
D	6.3	5.8±0.3	6.6	7.8 max.	2.6	0.65±0.1	1.8	0.35 ^{+0.20} _{-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

Pressure Relief (ø10 and larger)

() Reference size

* This product qualify for AEC-Q200, but it has some deviations.

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.

03 Dec. 2014

■ Standard Products

Endurance : 105 °C 10000 h

W.V. (V)	Cap. (±20 %) (μF)	Case size			Specification			Part No. (RoHS:compliant)	Reflow	Min. Packaging Q'ty (pcs)
		Dia. (mm)	Length (mm)	Size Code	Ripple Current (100 kHz) (+105 °C) (mA r.m.s.)	E.S.R. (100 kHz) (+20 °C) (mΩ)	tan δ (120 Hz) (+20 °C)			
25	33	5	5.8	C	900	80	0.14	EEHZA1E330R	(5)	1000
	56	6.3	5.8	D	1300	50	0.14	EEHZA1E560P	(5)	1000
	100	6.3	7.7	D8	2000	30	0.14	EEHZA1E101XP	(5)	900
	220	8	10.2	F	2300	27	0.14	EEHZA1E221P	(6)	500
	330	10	10.2	G	2500	20	0.14	EEHZA1E331P	(6)	500
35	22	5	5.8	C	900	100	0.12	EEHZA1V220R	(5)	1000
	27	6.3	5.8	D	1300	60	0.12	EEHZA1V270P	(5)	1000
	47	6.3	5.8	D	1300	60	0.12	EEHZA1V470P	(5)	1000
	68	6.3	7.7	D8	2000	35	0.12	EEHZA1V680XP	(5)	900
	150	8	10.2	F	2300	27	0.12	EEHZA1V151P	(6)	500
	270	10	10.2	G	2500	20	0.12	EEHZA1V271P	(6)	500
50	10	5	5.8	C	750	120	0.10	EEHZA1H100R	(5)	1000
	22	6.3	5.8	D	1100	80	0.10	EEHZA1H220P	(5)	1000
	33	6.3	7.7	D8	1600	40	0.10	EEHZA1H330XP	(5)	900
	68	8	10.2	F	1800	30	0.10	EEHZA1H680P	(6)	500
	100	10	10.2	G	2000	28	0.10	EEHZA1H101P	(6)	500
63	10	6.3	5.8	D	1000	120	0.08	EEHZA1J100P	(5)	1000
	22	6.3	7.7	D8	1500	80	0.08	EEHZA1J220XP	(5)	900
	33	8	10.2	F	1700	40	0.08	EEHZA1J330P	(6)	500
	56	10	10.2	G	1800	30	0.08	EEHZA1J560P	(6)	500
80	22	8	10.2	F	1550	45	0.08	EEHZA1K220P	(6)	500
	33	10	10.2	G	1700	36	0.08	EEHZA1K330P	(6)	500

· Please refer to the page of "Reflow Profile" and "The Taping Dimensions".

· When requesting vibration-proof product, please put the last "V" instead to "P".

■ Frequency correction factor for ripple current

Capacitance (μF)	Frequency (kHz)	0.1	0.12	0.2	0.3	0.5	1	2	3	5	10	15	20	30	40	50	100	300	500	1000
C < 47	Correction factor	0.10	0.10	0.10	0.15	0.20	0.30	0.40	0.45	0.50	0.60	0.65	0.70	0.75	0.80	0.85	1.00	1.00	1.05	1.05
47 ≤ C < 150		0.15	0.15	0.20	0.25	0.30	0.40	0.45	0.55	0.60	0.70	0.75	0.80	0.80	0.85	0.90	1.00	1.00	1.00	1.00
150 ≤ C		0.15	0.15	0.25	0.25	0.30	0.45	0.50	0.60	0.65	0.75	0.80	0.85	0.85	0.90	1.00	1.00	1.00	1.00	1.00

Surface Mount Type

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

High temperature Lead-Free reflow

**■ Features**

- Endurance: 4000 h at 125 °C
(The longest endurance in the industry by each case size)
- Low ESR and High ripple current (85% over, Lower ESR than Current V-TP)
- High-withstand voltage (25 V to 63 V), 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 qualified*
- RoHS directive compliant

■ Specifications

Category Temp. Range	-55 °C to +125 °C					
Rated W.V.Range	25 V.DC to 63 V.DC					
Nominal Cap.Range	10 µF to 330 µF					
Capacitance Tolerance	±20 % (120 Hz/+20 °C)					
DC Leakage Current	I ≤ 0.01 CV or 3 (µA) After 2 minutes (whichever is greater)					
tan δ	Please see the attached Standard Products list					
Endurance	The capacitor shall be subjected to application of the D.C. voltage with full rated ripple current at +125 °C for 4000 hours. After stabilizing at room temperature(+15 to 35 °C), the capacitor shall not exceed the specified limits. (The sum of DC voltage and ripple peak voltage shall not exceed the rated voltage.)					
	Capacitance change	±30 % of initial measured value				
	tan δ	≤ 200 % of initial specified value				
	E. S. R.	≤ 200 % of initial specified value				
	DC leakage current	≤ initial specified value				
Damp Heat (Load)	ESR after Endurance (Ω/100 kHz) (-40 °C)					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)					
Resistance to Soldering Heat	After applying rated working voltage for 2000 hours at +85 °C±2 °C / 85% to 90%RH and then being stabilized at +20 °C, Capacitors shall meet the following limits.					
	Capacitance change	±30 % of initial measured value				
	tan δ	≤ 200 % of initial specified value				
	E. S. R.	≤ 200 % of initial specified value				
	DC leakage current	≤ initial specified value				

■ Marking

Example:25 V 33 µF	Marking color : BLACK
Negative polarity marking (-)	
Capacitance (µF)	
Series identification	
Lot number	
Rated Voltage Mark	
E	25 V
V	35 V
H	50 V
J	63 V

■ Dimensions in mm (not to scale)

(Unit : mm)

Size code	D	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

Pressure Relief (Φ10 and larger)

() Reference size

* This product qualify for AEC-Q200, but it has some deviations.

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.

01 Mar. 2014

■ Standard Products

Endurance : 125 °C 4000 h

W.V. (V)	Cap. (±20 %) (μF)	Case size			Specification			Part No. (RoHS:compliant)	Reflow	Min. Packaging Q'ty (pcs)
		Dia. (mm)	Length (mm)	Size Code	Ripple Current (100 kHz) (+125 °C) (mA r.m.s.)	E.S.R. (100 kHz) (+20 °C) (mΩ)	tan δ (120 Hz) (+20 °C)			
25	33	5	5.8	C	550	80	0.14	EEHZC1E330R	(5)	1000
	56	6.3	5.8	D	900	50	0.14	EEHZC1E560P	(5)	1000
	100	6.3	7.7	D8	1400	30	0.14	EEHZC1E101XP	(5)	900
	220	8	10.2	F	1600	27	0.14	EEHZC1E221P	(6)	500
	330	10	10.2	G	2000	20	0.14	EEHZC1E331P	(6)	500
35	22	5	5.8	C	550	100	0.12	EEHZC1V220R	(5)	1000
	47	6.3	5.8	D	900	60	0.12	EEHZC1V470P	(5)	1000
	68	6.3	7.7	D8	1400	35	0.12	EEHZC1V680XP	(5)	900
	150	8	10.2	F	1600	27	0.12	EEHZC1V151P	(6)	500
	270	10	10.2	G	2000	20	0.12	EEHZC1V271P	(6)	500
50	10	5	5.8	C	500	120	0.10	EEHZC1H100R	(5)	1000
	22	6.3	5.8	D	750	80	0.10	EEHZC1H220P	(5)	1000
	33	6.3	7.7	D8	1100	40	0.10	EEHZC1H330XP	(5)	900
	68	8	10.2	F	1250	30	0.10	EEHZC1H680P	(6)	500
	100	10	10.2	G	1600	28	0.10	EEHZC1H101P	(6)	500
63	10	6.3	5.8	D	700	120	0.08	EEHZC1J100P	(5)	1000
	22	6.3	7.7	D8	900	80	0.08	EEHZC1J220XP	(5)	900
	33	8	10.2	F	1100	40	0.08	EEHZC1J330P	(6)	500
	56	10	10.2	G	1400	30	0.08	EEHZC1J560P	(6)	500

- Please refer to the page of "Reflow Profile" and "The Taping Dimensions".
- When requesting vibration-proof product, please put the last "V" instead to "P".

■ Frequency correction factor for ripple current

Capacitance (μF)	Frequency (kHz)	0.1	0.12	0.2	0.3	0.5	1	2	3	5	10	15	20	30	40	50	100	300	500	1000
C < 47	Correction factor	0.10	0.10	0.10	0.15	0.20	0.30	0.40	0.45	0.50	0.60	0.65	0.70	0.75	0.80	0.85	1.00	1.00	1.05	1.05
47 ≤ C < 150		0.15	0.15	0.20	0.25	0.30	0.40	0.45	0.55	0.60	0.70	0.75	0.80	0.80	0.85	0.90	1.00	1.00	1.00	1.00
150 ≤ C		0.15	0.15	0.25	0.25	0.30	0.45	0.50	0.60	0.65	0.75	0.80	0.85	0.85	0.85	0.90	1.00	1.00	1.00	1.00

Notices matter

■ Law and regulation which are applied

- This product complies with the RoHS Directive (Restriction of the use of certain Hazardous substances in electrical and electronic equipment (DIRECTIVE 2011/65/EU).
- No Ozone Depleting Chemicals(ODC's), controlled under the Montreal Protocol Agreement, are used in producing this product.
- We do not PBBs or PBDEs as brominated flame retardants.
- Export procedure which followed export related regulations, such as foreign exchange and a foreign trade method, on the occasion of export of this product Thank you for your consideration.

■ Usage limitation

- This capacitor is designed to be used for electronics circuits such as audio/visual equipment, home appliances, computers and other office equipment, optical equipment, measuring equipment.
High reliability and safety are required [be / a possibility that incorrect operation of this product may do harm to a human life or property] more. When use is considered by the use, the delivery specifications which suited the use separately need to be exchanged.

Items to be observed

- This specification guarantees the quality and performance of the product as individual components.
Before use, check and evaluate their compatibility with installed in your products.
- Do not use the products beyond the specifications described in this document.

■ When using this capacitor in a product where safety is critical

- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other signification damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/ gas equipment, rotating equipment, and disaster/crime prevention equipment.
 - The system is equipped with a protection circuit and protection device.
 - The system is equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault.

■ Conditions of use

- Before using the products, carefully check the effects on their quality and performance, and determined whether or not they can be used. These products are designed and manufactured for general-purpose and standard use in general electronic equipment. These products are not intended for use in the following special conditions.
 - (1) In liquid, such as Water, Oil, Chemicals, or Organic solvent.
 - (2) In direct sunlight, outdoors, or in dust.
 - (3) In vapor, such as dew condensation water or resistive element, or water leakage, salty air, or air with a high concentration corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO₂.
 - (4) In an environment where strong static electricity or electromagnetic waves exist.
 - (5) Mounting or placing heat-generating components or inflammables, such as vinyl-coated wires, near these products.
 - (6) Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin and other material.
 - (7) Using resolvent, water or water-soluble cleaner for flux cleaning agent after soldering.
(In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues)
 - (8) Using in the atmosphere which strays Acid or alkaline.
 - (9) Using in the atmosphere which there are excessive vibration and shock.
- Please arrange circuit design for preventing impulse or transitional voltage.
Do not apply voltage, which exceeds the full rated voltage when the capacitors receive impulse voltage, instantaneous high voltage, high pulse voltage etc.
- Electrolyte is used in the products. Therefore, misuse can result in rapid deterioration of characteristics and functions of each product. Electrolyte leakage damages printed circuit and affects performance, characteristics, and functions of customer system.

⚠ Application Guidelines

1. Circuit Design

1.1 Operating Temperature and Frequency

Electrical parameters for electrolytic capacitors are normally specified at 20 °C temperature and 120 Hz frequency. These parameters vary with changes in temperature and frequency. Circuit designers should take these changes into consideration.

(1) Effects of operating temperature on electrical parameters

- (a) At higher temperatures, leakage current and capacitance increase while equivalent series resistance (ESR) decreases.
- (b) At lower temperatures, leakage current and capacitance decrease while equivalent series resistance (ESR) increases.

(2) Effects of frequency on electrical parameters

- (a) At higher frequencies, capacitance and impedance decrease while $\tan\delta$ increases.
- (b) At lower frequencies, heat generated by ripple current will rise due to an increase in equivalent series resistance (ESR).

1.2 Operating Temperature and Life Expectancy

(1) Expected life is affected by operating temperature. Generally, each 10 °C reduction in temperature will double the expected life. Use capacitors at the lowest possible temperature below the upper category temperature.

(2) If operating temperatures exceed the upper category limit, rapid deterioration of electrical parameter will occur and irreversible damage will result.

Check for the maximum capacitor operating temperatures including ambient temperature, internal capacitor temperature rise due to ripple current, and the effects of radiated heat from power transistors, IC's or resistors. Avoid placing components, which could conduct heat to the capacitor from the back side of the circuit board.

(3) The formula for calculating expected life at lower operating temperatures is as follows :

$$L_2 = L_1 \times 2^{\frac{T_1 - T_2}{10}}$$

L_1 : Guaranteed life (h) at temperature, T_1 °C

L_2 : Expected life (h) at temperature, T_2 °C

T_1 : Upper category temperature (°C)

T_2 : Actual operating temperature, ambient temperature + temperature rise due to ripple current heating(°C)

(4) Please use according to the lifetime as noted in this specification. Using products beyond end of the lifetime may change characteristics rapidly, short-circuit, operate pressure relief vent, or leak electrolyte.

1.3 Common Application Conditions to Avoid

The following misapplication load conditions will cause rapid deterioration of a capacitor's electrical parameters.

In addition, rapid heating and gas generation within the capacitor can occur, causing the pressure relief vent to operate and resultant leakage of electrolyte. Under extreme conditions, explosion and fire ignition could result.

The leaked electrolyte is combustible and electrically conductive.

(1) Reverse Voltage

DC capacitors have polarity. Therefore, please do not apply the reverse voltage. Verify correct polarity before insertion.

(2) Charge / Discharge Applications

Standard capacitors are not suitable for use in repeating charge/discharge applications. For charge/ discharge applications, consult us with your actual application condition.

For rush current, please to nor exceed 100A.

(3) ON-OFF circuit

Do not use capacitors in circuit where ON-OFF switching is repeated more than 10000 times/per day.

In case of applying to the theses ON-OFF circuit, consult with us about circuit condition and so on.

(4) Over voltage

Do not apply voltages exceeding the maximum specified rated voltage. Voltages up to the surge voltage rating are acceptable for short periods of time.

Ensure that the sum of the DC voltage and the superimposed AC ripple voltage does not exceed the rated voltage

(5) Ripple Current

Do not apply ripple currents exceeding the maximum specified value. For high ripple current applications, use a capacitor designed for high ripple currents. In addition, consult us if the applied ripple current is to be higher than the maximum specified value. Ensure that rated ripple currents that superimposed on low DC bias voltages do not cause reverse voltage conditions. Even if it is within a rated ripple current, in case the practical use is over the pre described endurance life time, it causes the increase of deterioration of ESR characteristic and the internal generation heat by ripple current. Due to this, there is some possibility of vent open, bulging of sleeve and rubber, electrolyte leakage, and shot circuit, explosion and ignition in the worst case.

1.4 Using Two or More Capacitors in Parallel

The circuit resistance can closely approximate the series resistance of the capacitor, causing an imbalance of ripple current loads within the capacitors. Careful wiring methods can minimize the possible application of an excessive ripple current to a capacitor. Moreover, please do not use it in series.

1.5 Capacitor Mounting Considerations

(1) Double-Sided Circuit Boards

Avoid wiring pattern runs, which pass between the mounted capacitor and the circuit board.

(2) Clearance for Case Mounted Pressure Relief (\geq Dia. 10 mm)

Capacitors with case mounted pressure relief require sufficient clearance to allow for proper pressure relief operation. The minimum clearance are dependent on capacitor diameters as follows.

- \geq Dia. 10 mm : 2mm minimum

(3) Wiring Near the Pressure Relief (\geq Dia. 10 mm)

Avoid locating high voltage or high current wiring or circuit board paths above the pressure relief. Flammable, high temperature gas that exceeds 100°C may be released which could dissolve the wire insulation and ignite.

(4) Circuit Board Patterns Under the Capacitor

Avoid circuit board runs under the capacitor, as an electrical short can occur due to an electrolyte leakage.

1.6 Electrical Isolation of the Capacitor

Completely isolate the capacitor as follows.

- Between the cathode and the case and between the anode terminal and other circuit paths.

1.7 Capacitor Sleeve

The laminate coating is intended for marking and identification purposes and is not meant to electrically insulate the capacitor.

2. Capacitor Handling Techniques

2.1 Considerations Before Using

(1) Capacitors have a finite life. Do not reuse or recycle capacitors from used equipment.

(2) Transient recovery voltage may be generated in the capacitor due to dielectric absorption.

If required, this voltage can be discharged with a resistor with a value of about 1kΩ.

(3) Capacitors stored for a long period of time may exhibit an increase in leakage current.

This can be corrected by gradually applying rated voltage in series with a resistor of approximately 1kΩ.

(4) If capacitors are dropped, they can be damaged mechanically or electrically. Avoid using dropped capacitors.

(5) Dented or crushed capacitors should not be used.

The seal integrity can be damaged and loss of electrolyte/ shortened life can result.

2.2 Capacitor Insertion

(1) Verify the correct capacitance and rated voltage of the capacitor.

(2) Verify the correct polarity of the capacitor before insertion.

(3) Verify the correct hole spacing and land pattern size before insertion to avoid stress on the terminals.

(4) Excessive mounting pressure can cause high leakage current, short circuit, or disconnection.

2.3 Reflow Soldering

(1) Surface-mount type capacitor are exclusively for reflow soldering.

When reflow solder is used an ambient heat condition system such as the simultaneous use of infrared and hot-air is recommended.

(2) Observe proper soldering conditions (temperature, time, etc.). Do not exceed the specified limits.

* The Temperature on Capacitor top shall be measured by using thermal couple that is fixed firmly by epoxy glue.

(3) In case of use in 2times reflow, 2nd reflow must be done when the capacitor's temperature return back to normal level.

(4) In our recommended reflow condition , the case discoloration and the case swelling might be slightly generated. But please acknowledge that these two phenomena do not influence the reliability of the product.

(5) The crack on top marking might be occurred by reflow heat stress.

But please acknowledge that it does not influence the reliability of the product.

(6) VPS (Vapor Phase Soldering) reflow can cause significant characteristics change and/ or mounting failure due to deformation by acute temperature rise.

VPS is acceptable provided that the process does not exceed recommended reflow profile and temperature rise is less than 3degC/sec.

Please contact Panasonic for detailed conditions.

2.4 Manual Soldering

- (1) Observe temperature and time soldering specifications or do not exceed temperature of 350 °C for 3 seconds or less.
- (2) If a soldered capacitor must be removed and reinserted, avoid excessive stress on the capacitor leads.
- (3) Avoid physical contacts between the tip of the soldering iron and capacitors to prevent or capacitor failure.

2.5 Capacitor Handling after Soldering

- (1) Avoid moving the capacitor after soldering to prevent excessive stress on the lead wires where they enter the seal.
- (2) Do not use the capacitor as a handle when moving the circuit board assembly.
- (3) Avoid striking the capacitor after assembly to prevent failure due to excessive shock.

2.6 Circuit Board Cleaning

- (1) Circuit boards can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes and up to 60 °C maximum temperatures. The boards should be thoroughly rinsed and dried.
The use of ozone depleting cleaning agents is not recommended for the purpose of protecting our environment.
- (2) Avoid using the following solvent groups unless specifically allowed in the specification ;
 - (a) Halogenated cleaning solvents : except for solvent resistant capacitor types, halogenated solvents can permeate the seal and cause internal capacitor corrosion and failure.
For solvent resistant capacitors, carefully follow the temperature and time requirements based on the specification. 1-1-1 trichloroethane should never be used on any aluminum electrolytic capacitor.
 - (b) Alkaline solvents : could react and dissolve the aluminum case.
 - (c) Petroleum based solvents : deterioration of the rubber seal could result.
 - (d) Xylene : deterioration of the rubber seal could result.
 - (e) Acetone : removal of the ink markings on the vinyl sleeve could result.
- (3) A thorough drying after cleaning is required to remove residual cleaning solvents that may be trapped between the capacitor and the circuit board. Avoid drying temperatures, which exceed the Upper category temperature of the capacitor.
- (4) Monitor the contamination levels of the cleaning solvents during use in terms of electrical conductivity, pH, specific gravity, or water content.
Chlorine levels can rise with contamination and adversely affect the performance of the capacitor.
- (5) Depending on the cleaning method, the marking on a capacitor may be erased or blurred.
Please consult us if you are not certain about acceptable cleaning solvents or cleaning methods.

2.7 Mounting Adhesives and Coating Agents

When using mounting adhesives or coating agents to control humidity, avoid using materials containing halogenated solvents.

Also, avoid the use of chloroprene based polymers.

Harden on dry adhesive or coating agents well lest the solvent should be left.

After applying adhesives or coatings, dry thoroughly to prevent residual solvents from being trapped between the capacitor and the circuit board.

2.8 Fumigation

In exporting electronic appliances with aluminum electrolytic capacitors, in some cases fumigation treatment using such halogen compound as methyl bromide is conducted for wooden boxes.

If such boxes are not dried well, the halogen left in the box is dispersed while transported and enters in the capacitors inside.

This possibly causes electrical corrosion of the capacitors. Therefore, after performing fumigation and drying make sure that no halogen is left.

Don't perform fumigation treatment to the whole electronic appliances packed in a box.

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

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.

Storage period is one year. When storage period is over 12 months, a capacitor should be reconditioned by applying the rated voltage in series with a 1000 Ω current limiting resistor for a time period of 30 minutes.

For storage condition, keep room temperature (5°C to 35°C) and humidity (45% to 85%) where direct sunshine doesn't reach.

5.1 Environmental Conditions

- (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.

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.

*** Intellectual property right**

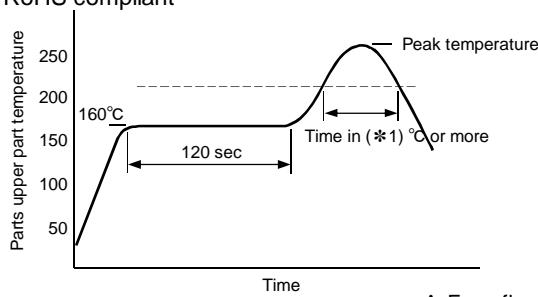
We, Panasonic Group are providing the product and service that customers can use without anxiety, and are working positively on the protection of our products under intellectual property rights.

Representative patents relating to Conductive Polymer Hybrid Aluminum Electrolytic Capacitors are as follows:

US Patent Nos. 7497879 and 7621970 JP Patent No. 5360250

■ Reflow guaranteed condition

- RoHS compliant



Reflow No.	Fig. (5)	Fig. (6)	
Category	$\phi 5, \phi 6.3$	$\phi 8, \phi 10$	
Peak temperature	260°C (255°C)	245°C	260°C
Time in peak temperature	$\geq 250^\circ\text{C}$ 5 s (10 s)	$\geq 240^\circ\text{C}$ 10 s	$\geq 250^\circ\text{C}$ 5 s
Time in (*1) °C or more	$\geq 230^\circ\text{C}$ 30 s $\geq 217^\circ\text{C}$ 40 s $\geq 200^\circ\text{C}$ 70 s	$\geq 230^\circ\text{C}$ 30 s $\geq 217^\circ\text{C}$ 40 s $\geq 200^\circ\text{C}$ 70 s	$\geq 230^\circ\text{C}$ 30 s $\geq 217^\circ\text{C}$ 40 s $\geq 200^\circ\text{C}$ 70 s
Time of reflow	2 times	2 times	1 time

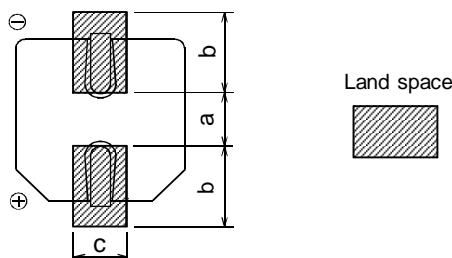
* For reflow, use a thermal condition system such as infrared radiation (IR) or hot blast.

* Panasonic have several series available for pure Tin terminal and ZVEI reflow based on J-STD-020D (JEDEC). (Please contact sales for details.)

■ 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.



[Table of Board Land Size vs. Capacitor Size] (Unit : mm)

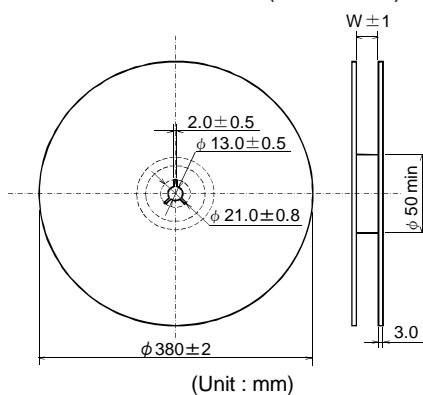
Size	a	b	c
C ($\phi 5$)	1.5	2.8	1.6
D ($\phi 6.3$)	1.8	3.2	1.6
D8 ($\phi 6.3 \times 7.7L$)	1.8	3.2	1.6
F ($\phi 8 \times 10.2L$)	3.1	4.0	2.0
G ($\phi 10 \times 10.2L$)	4.6	4.1	2.0

* 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.

■ Packaging Specifications

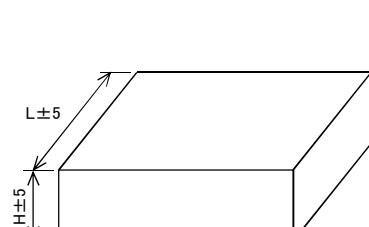
- Reel Dimensions in mm (not to scale)



(Unit : mm)

Size code	W
C	14
D, D8	18
F, G	26

- Dimensions of Outer Carton Box



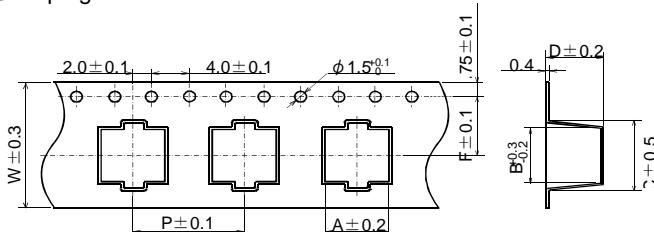
(Unit : mm)

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

- Min.Packing Quantity

Size code	Min.Packing Q'ty pcs.
C, D	1000
D8	900
F, G	500

- Taping Dimensions in mm



* Ask factory for technical specifications.

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

Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor

V type ZA series



EEHZA1E330R	25V33μF	φ 5x5.8	… ZA-2
EEHZA1E560P	25V56μF	φ 6.3x5.8	… ZA-3
EEHZA1E101XP	25V100μF	φ 6.3x7.7	… ZA-4
EEHZA1E221P	25V220μF	φ 8x10.2	… ZA-5
EEHZA1E331P	25V330μF	φ 10x10.2	… ZA-6
EEHZA1V220R	35V22μF	φ 5x5.8	… ZA-7
EEHZA1V270P	35V27μF	φ 6.3x5.8	… ZA-8
EEHZA1V470P	35V47μF	φ 6.3x5.8	… ZA-9
EEHZA1V680XP	35V68μF	φ 6.3x7.7	… ZA-10
EEHZA1V151P	35V150μF	φ 8x10.2	… ZA-11
EEHZA1V271P	35V270μF	φ 10x10.2	… ZA-12
EEHZA1H100R	50V10μF	φ 5x5.8	… ZA-13
EEHZA1H220P	50V22μF	φ 6.3x5.8	… ZA-14
EEHZA1H330XP	50V33μF	φ 6.3x7.7	… ZA-15
EEHZA1H680P	50V68μF	φ 8x10.2	… ZA-16
EEHZA1H101P	50V100μF	φ 10x10.2	… ZA-17
EEHZA1J100P	63V10μF	φ 6.3x5.8	… ZA-18
EEHZA1J220XP	63V22μF	φ 6.3x7.7	… ZA-19
EEHZA1J330P	63V33μF	φ 8x10.2	… ZA-20
EEHZA1J560P	63V56μF	φ 10x10.2	… ZA-21
EEHZA1K220P	80V22μF	φ 8x10.2	… ZA-22
EEHZA1K330P	80V33μF	φ 10x10.2	… ZA-23

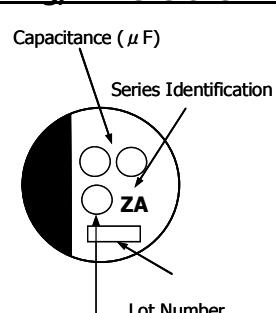
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1E330R

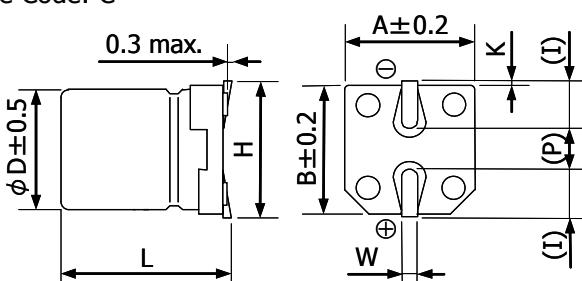
$\phi 5.0 \times 5.8$ mm / 25 V / 33 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	8.2 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μ F (at 120 Hz)		ESR	80 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	900 mAmax. max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

Marking, Dimensions in mm (not to scale)



Size Code: C



Rated Voltage Mark

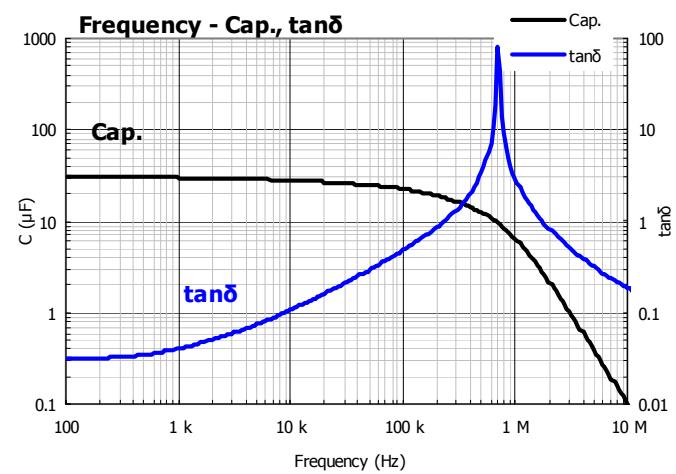
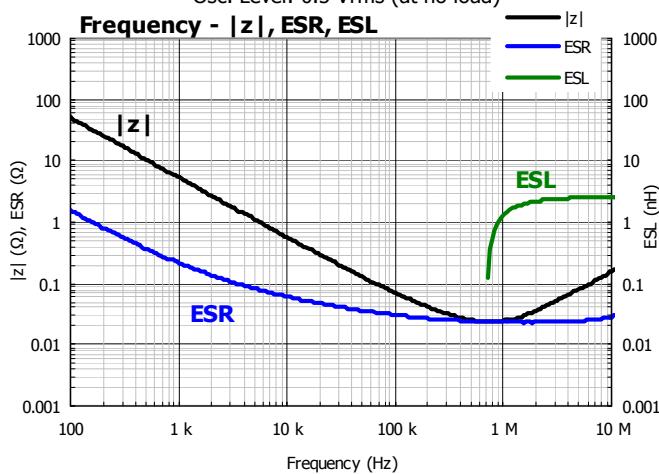
():

Reference Size

	(mm)
D	5.0
L	5.8±0.3
A, B	5.3
H	6.5 max.
I	2.2
W	0.65±0.10
P	1.5
K	0.35+0.15/-0.20

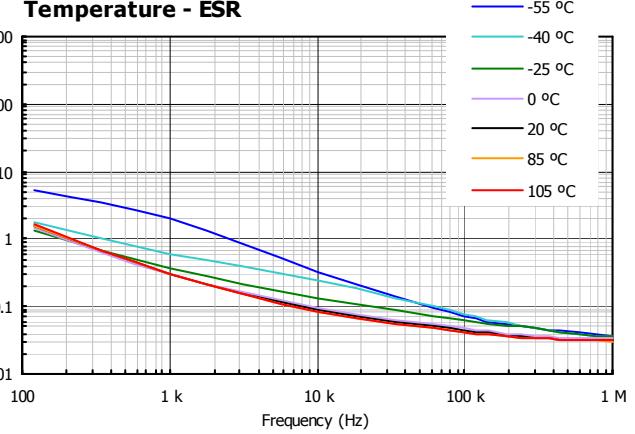
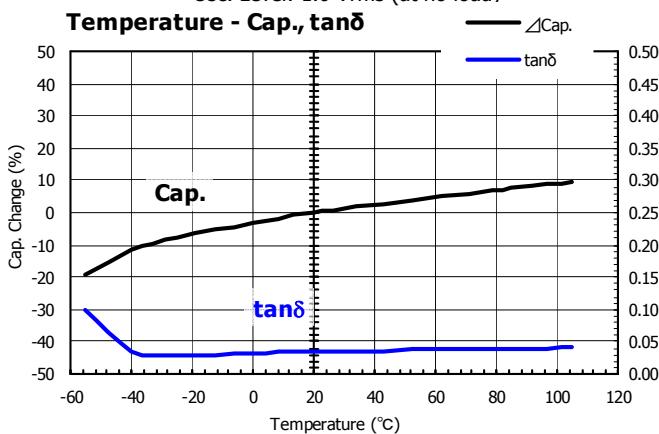
Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics

Osc. Level: 0.5 Vrms (at no load)



Temperature - Capacitance, $\tan\delta$, ESR Characteristics

Osc. Level: 1.0 Vrms (at no load)



Typical Curve

Technical Data

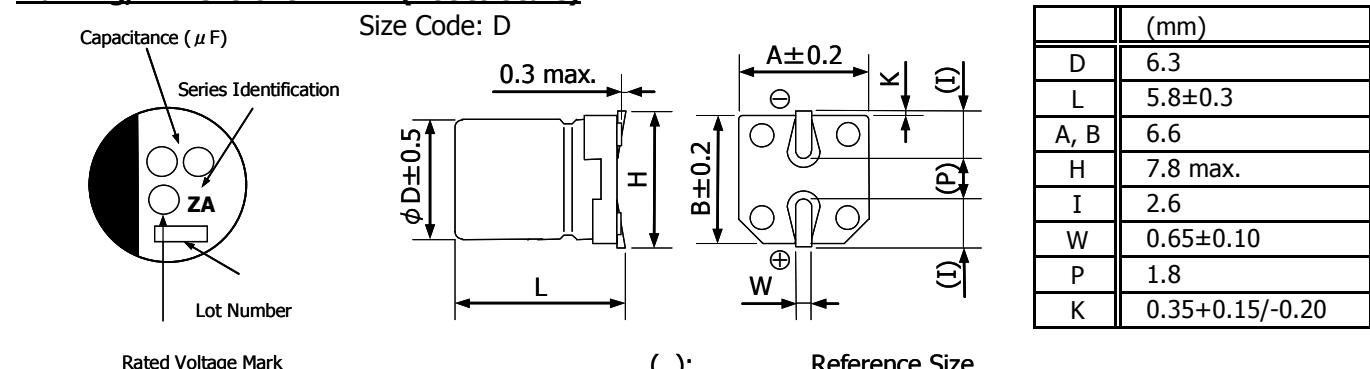
Conductive Polymer Hybrid Aluminum Electrolytic Capacitor ZA series

Part Number: EEHZA1E560P

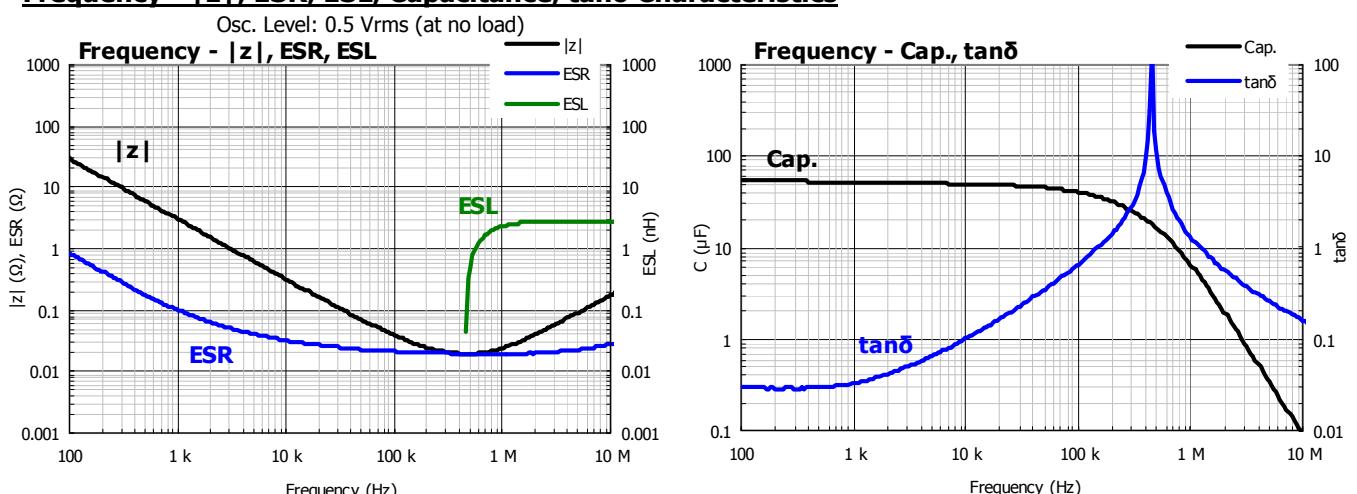
$\phi 6.3 \times 5.8 \text{ mm} / 25 \text{ V} / 56 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	14 µA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	56 µF (at 120 Hz)		ESR	50 mΩ max. (at 100 kHz)
Capacitance Tolerance	±20 %		Ripple Current	1300 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

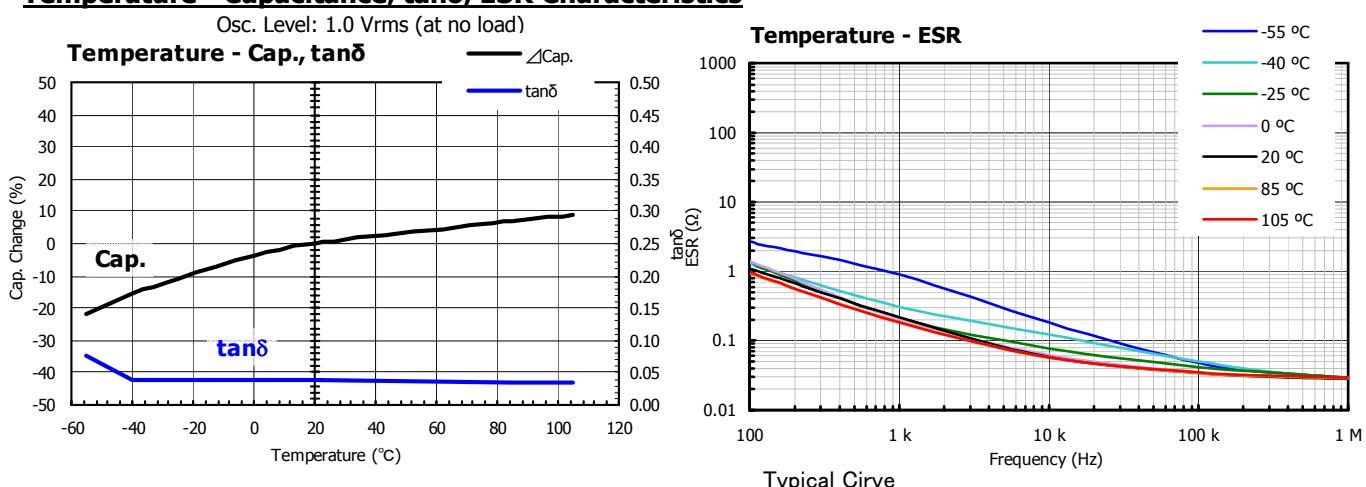
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



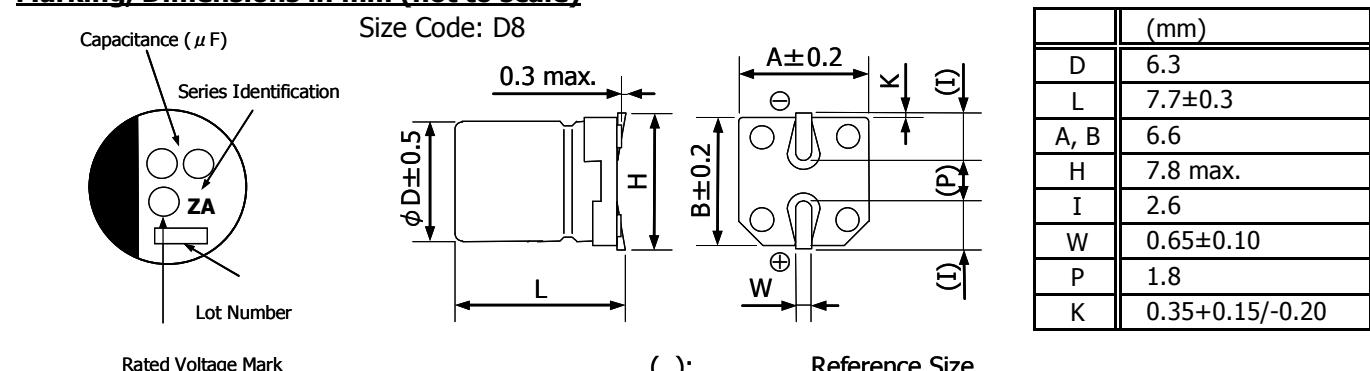
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1E101XP

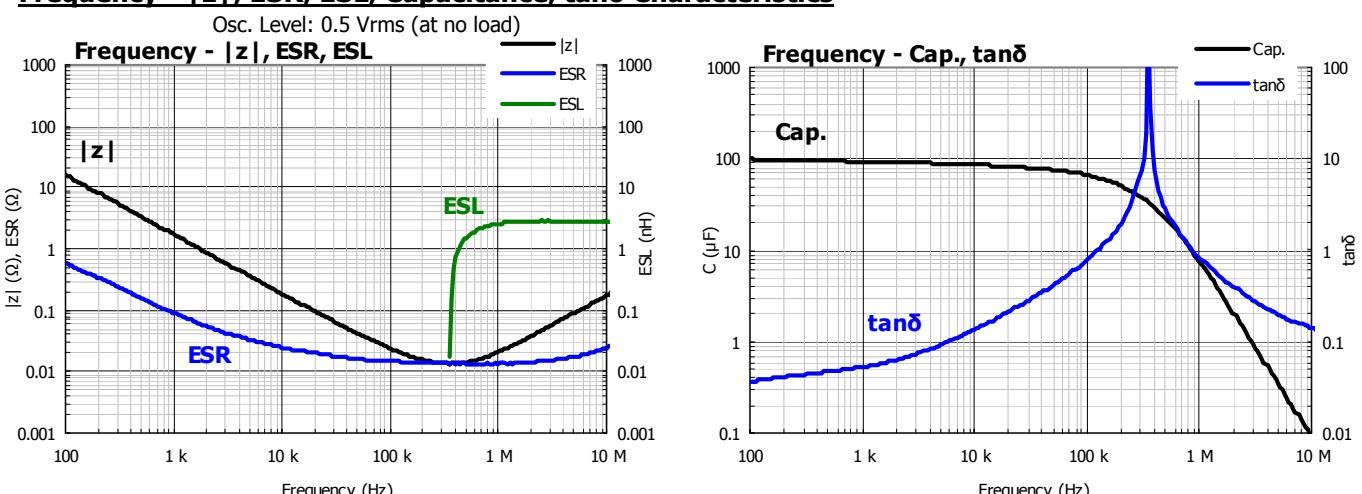
$\phi 6.3 \times 7.7 \text{ mm} / 25 \text{ V} / 100 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	25.0 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	100 μF (at 120 Hz)		ESR	30 m Ω max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	2000 mA rms max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

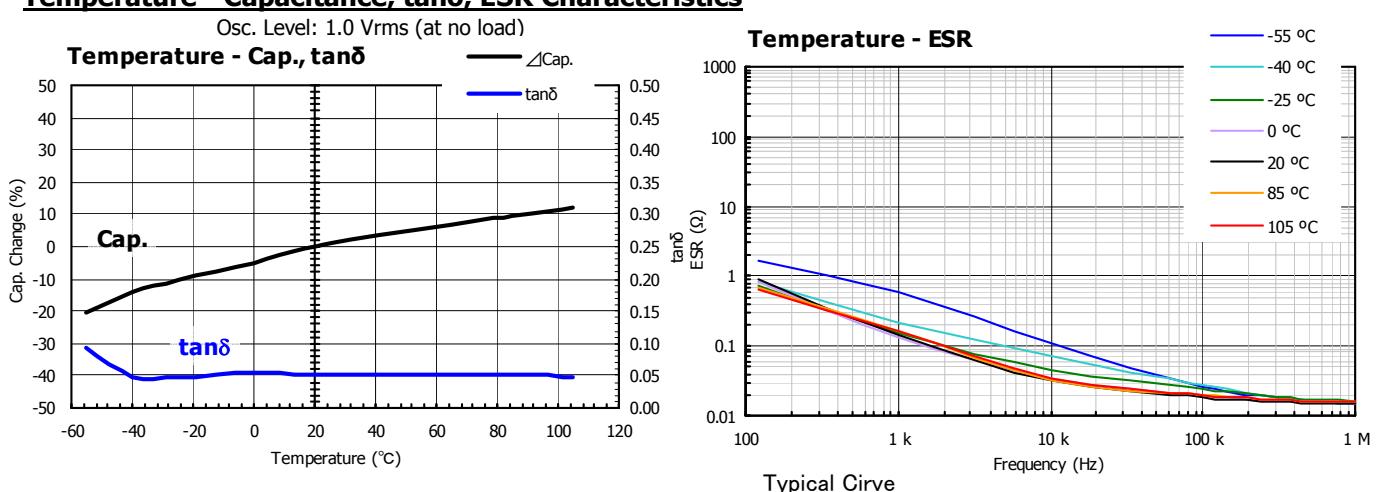
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



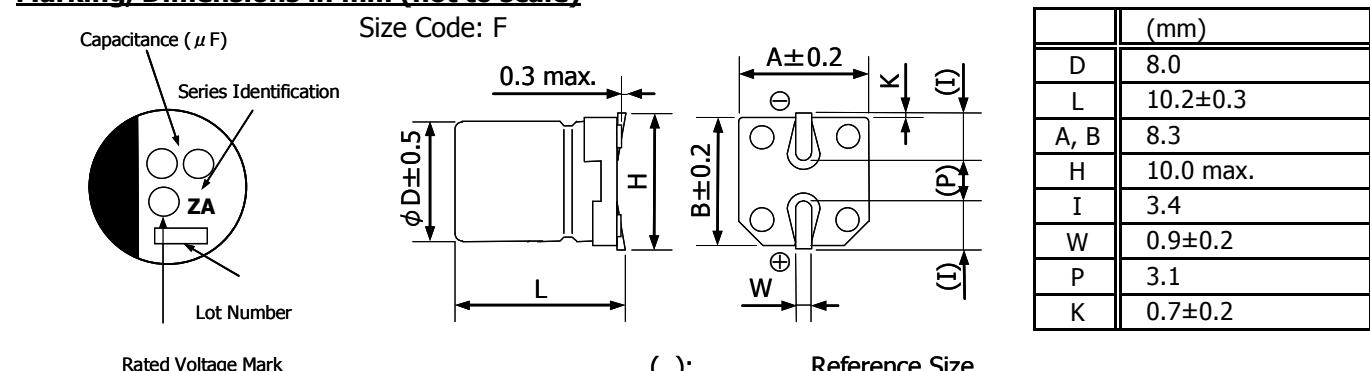
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1E221P

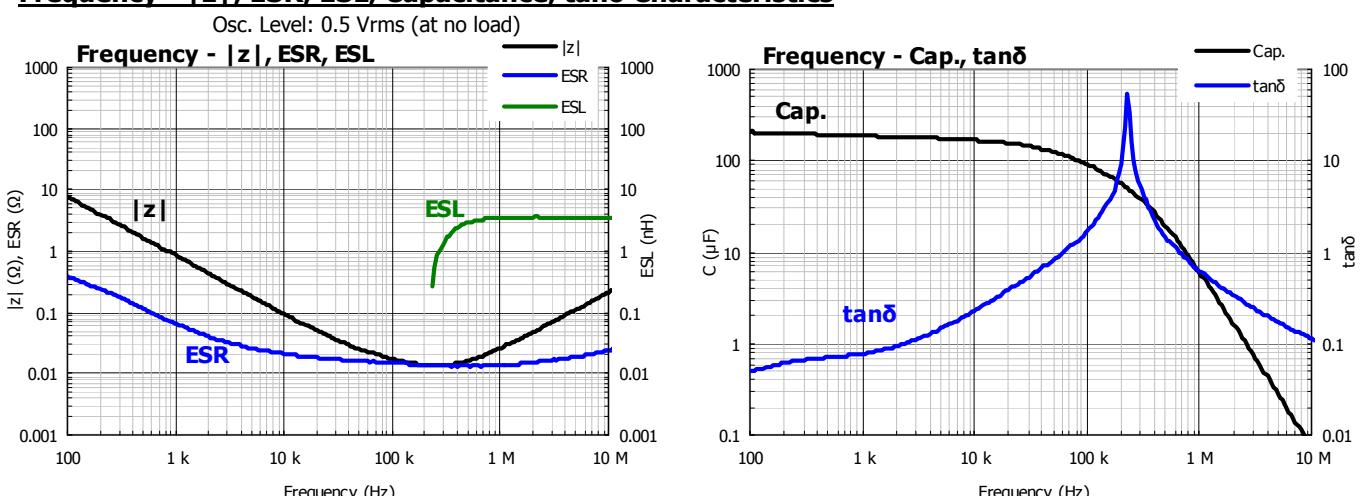
$\phi 8.0 \times 10.2$ mm / 25 V / 220 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	55.0 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	220 μ F (at 120 Hz)		ESR	27 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2300 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

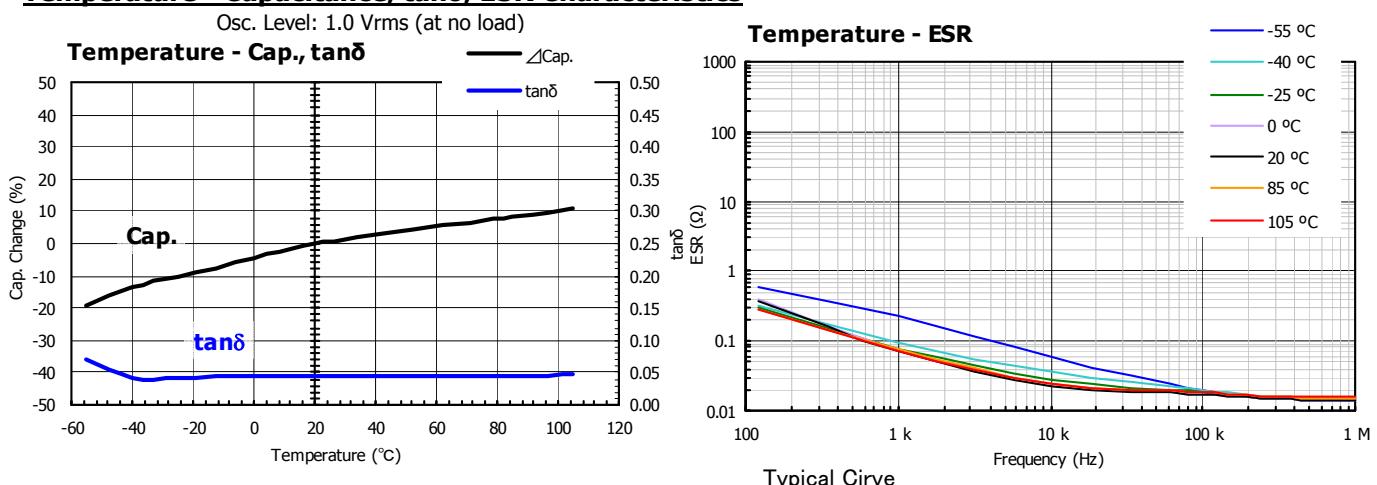
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



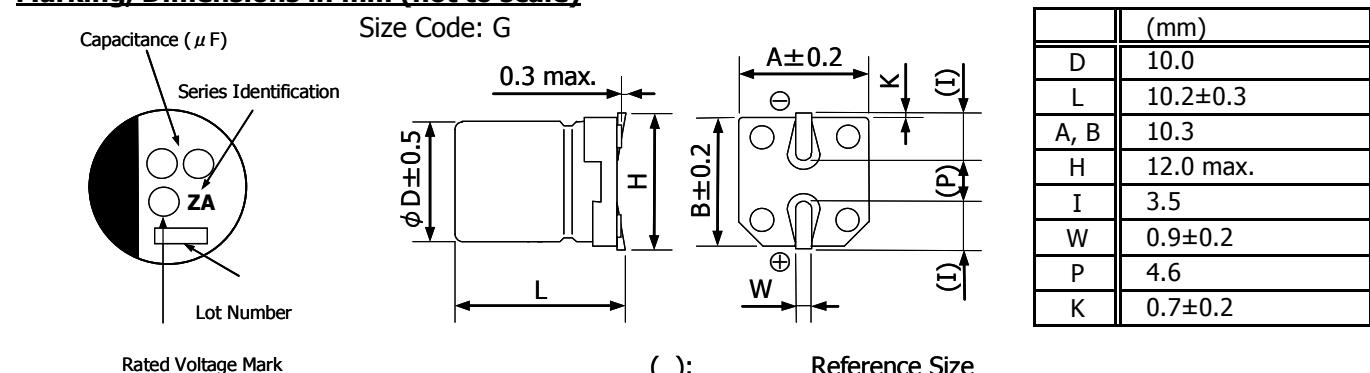
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1E331P

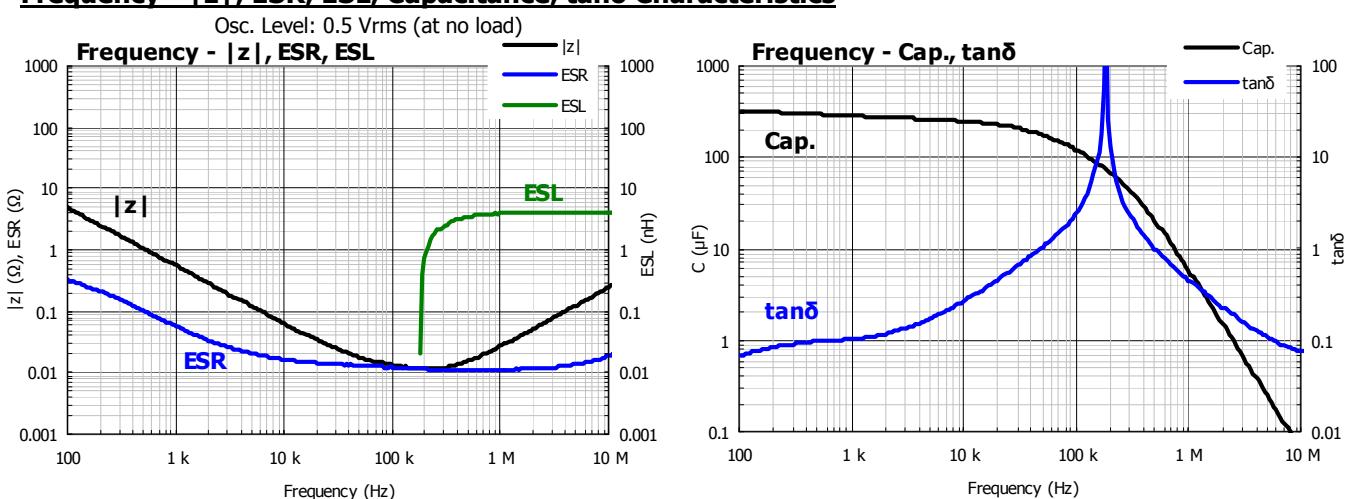
$\phi 10.0 \times 10.2$ mm / 25 V / 330 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	82.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	330 μ F (at 120 Hz)		ESR	20 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2500 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

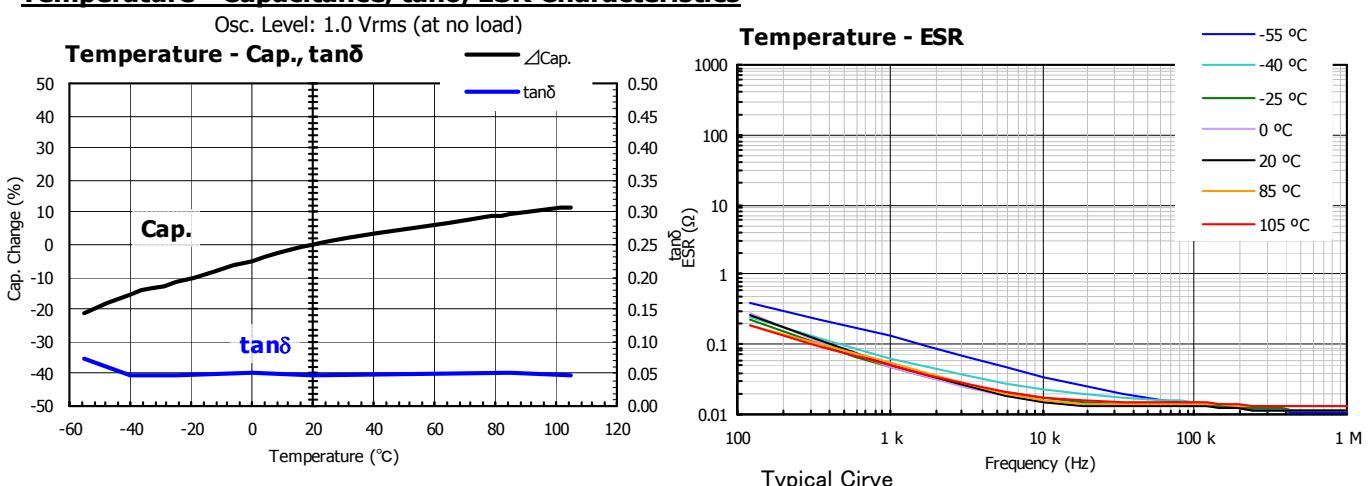
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



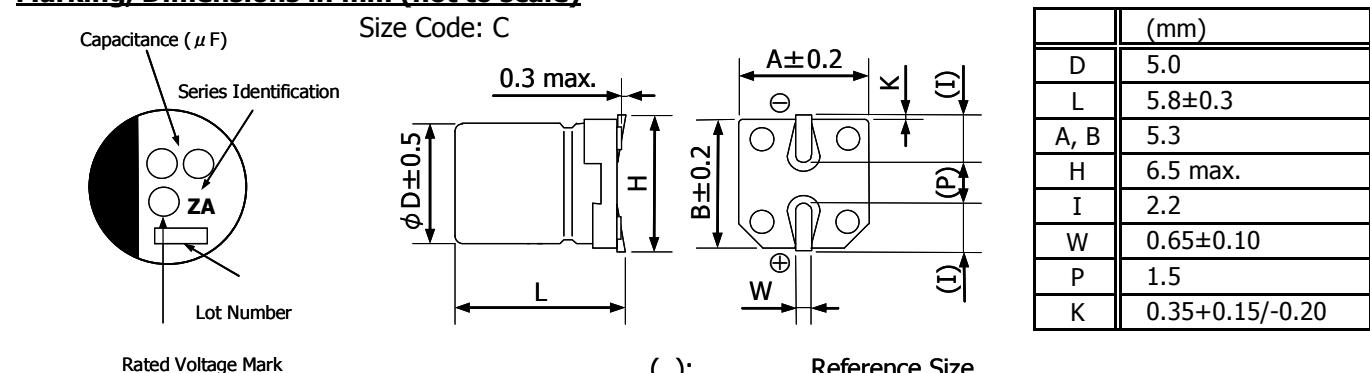
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1V220R

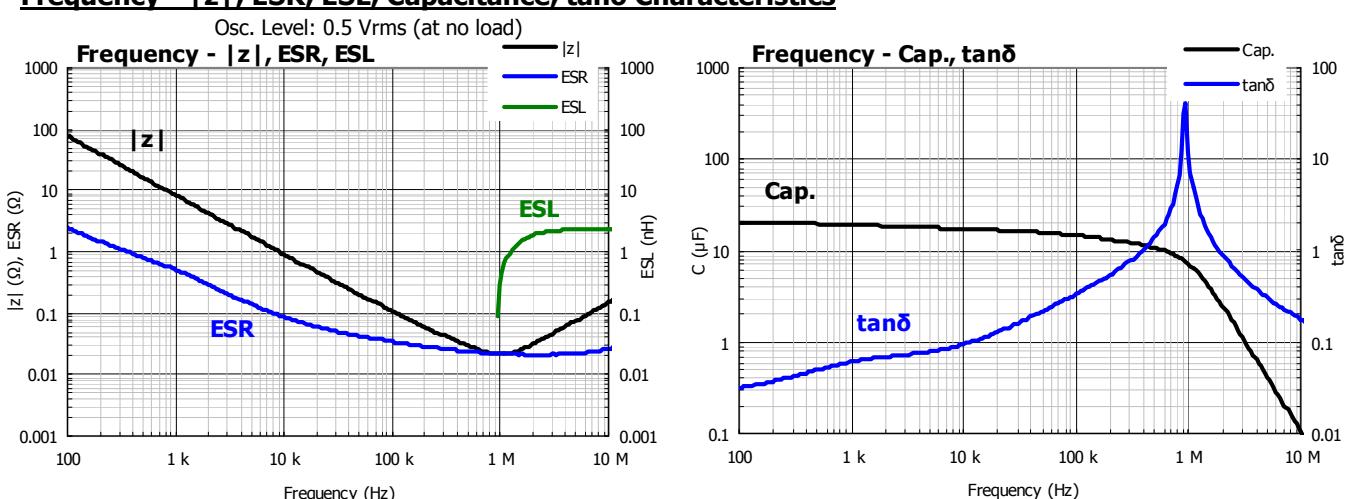
$\phi 5.0 \times 5.8$ mm / 35 V / 22 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	7.7 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 μ F (at 120 Hz)		ESR	100 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	900 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

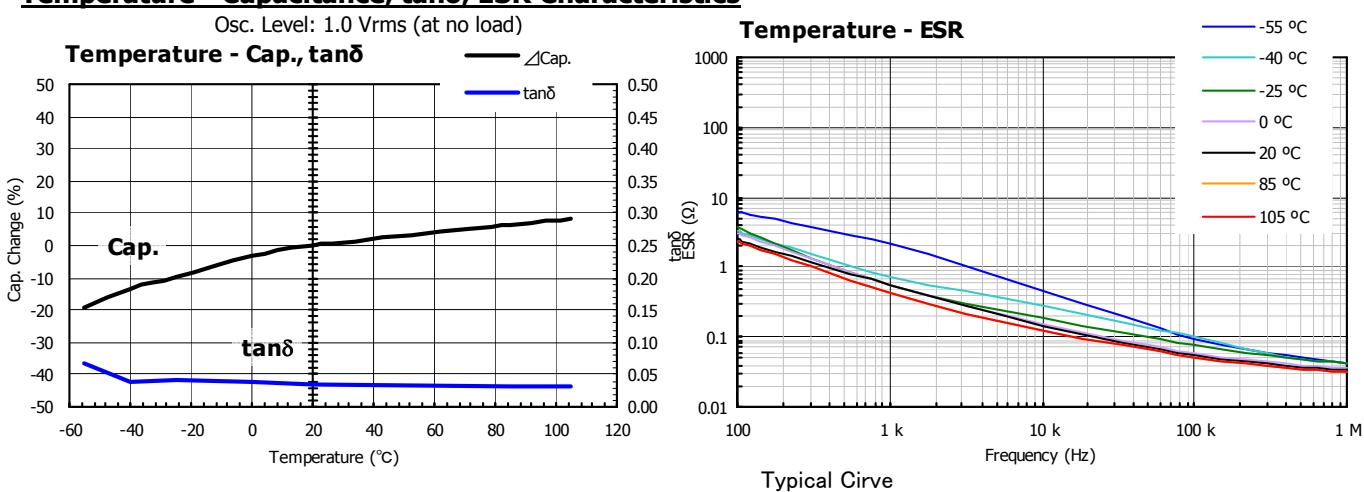
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



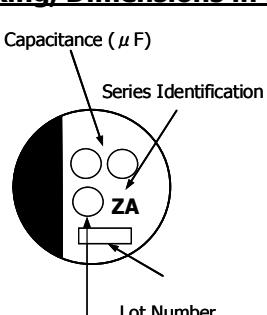
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1V270P

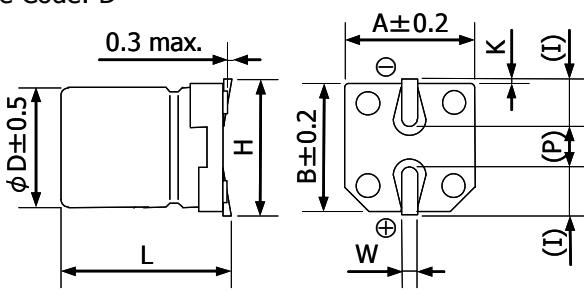
$\phi 6.3 \times 5.8 \text{ mm} / 35 \text{ V} / 27 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	9.4 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	27 μF (at 120 Hz)		ESR	60 $\text{m}\Omega$ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	1300 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

Marking, Dimensions in mm (not to scale)



Size Code: D



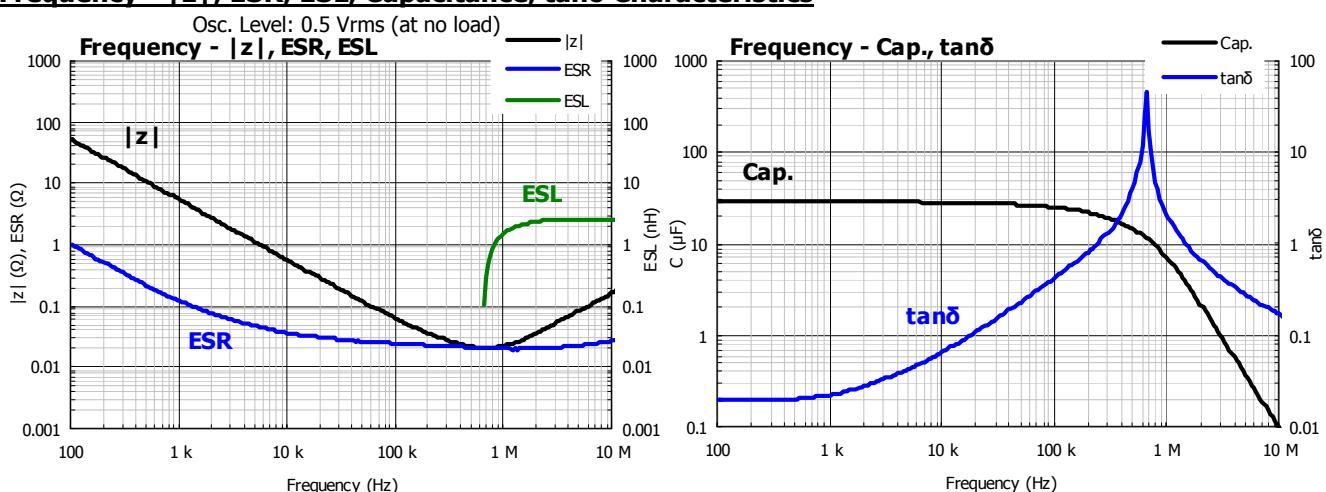
	(mm)
D	6.3
L	5.8 ± 0.3
A, B	6.6
H	7.8 max.
I	2.6
W	0.65 ± 0.10
P	1.8
K	0.35 + 0.15/-0.20

Rated Voltage Mark

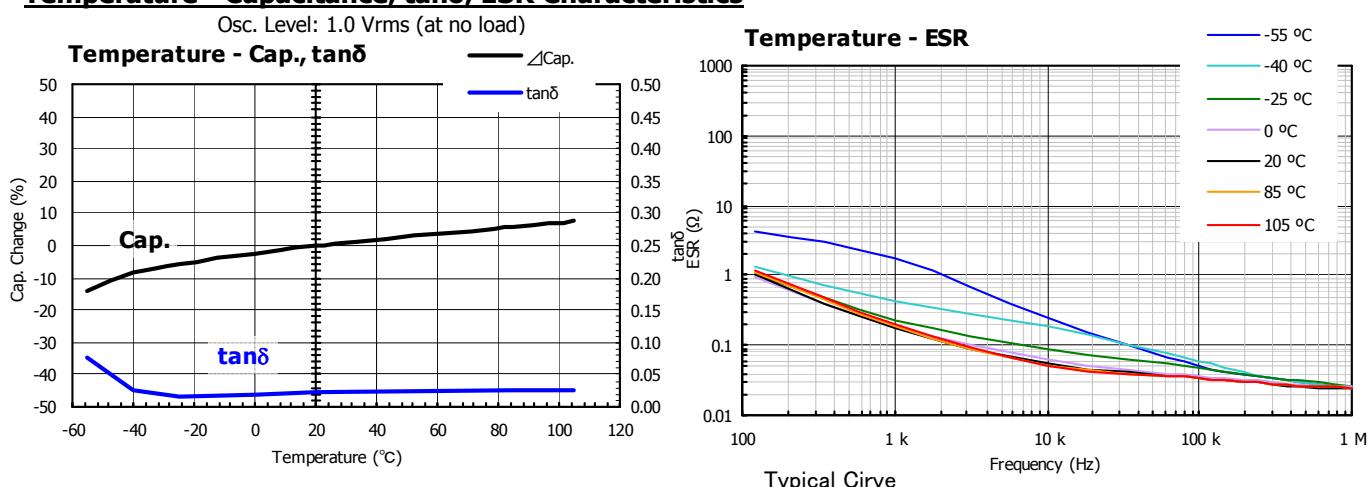
():

Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



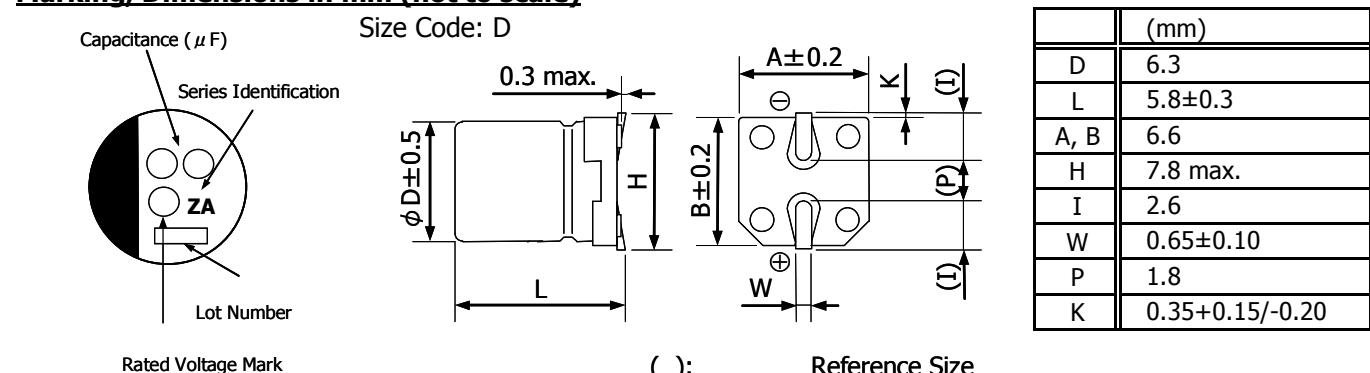
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1V470P

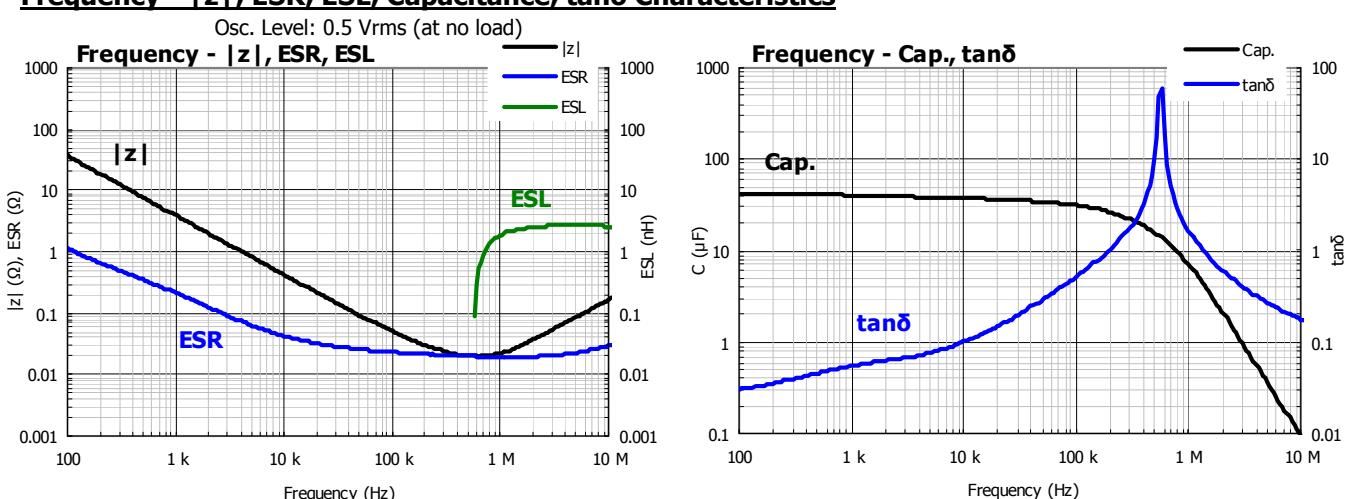
$\phi 6.3 \times 5.8 \text{ mm} / 35 \text{ V} / 47 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	16.4 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	47 μF (at 120 Hz)		ESR	60 $\text{m}\Omega$ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	1300 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

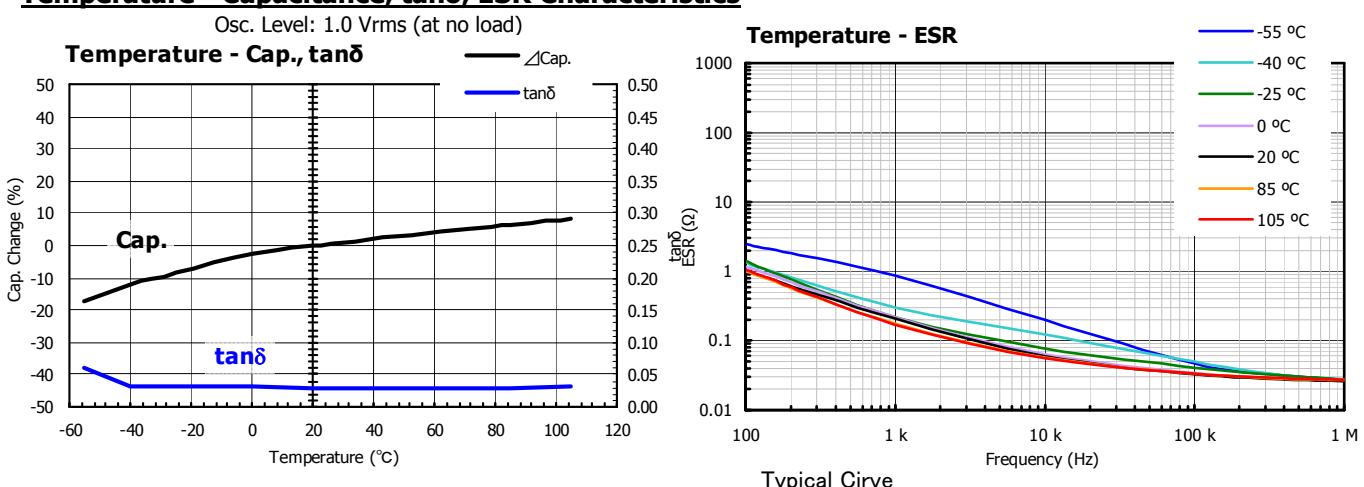
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



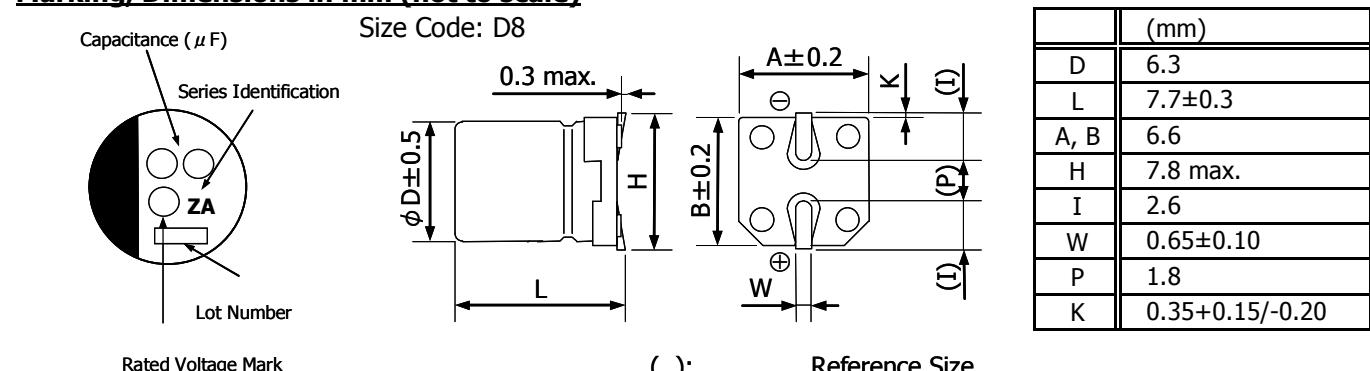
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1V680XP

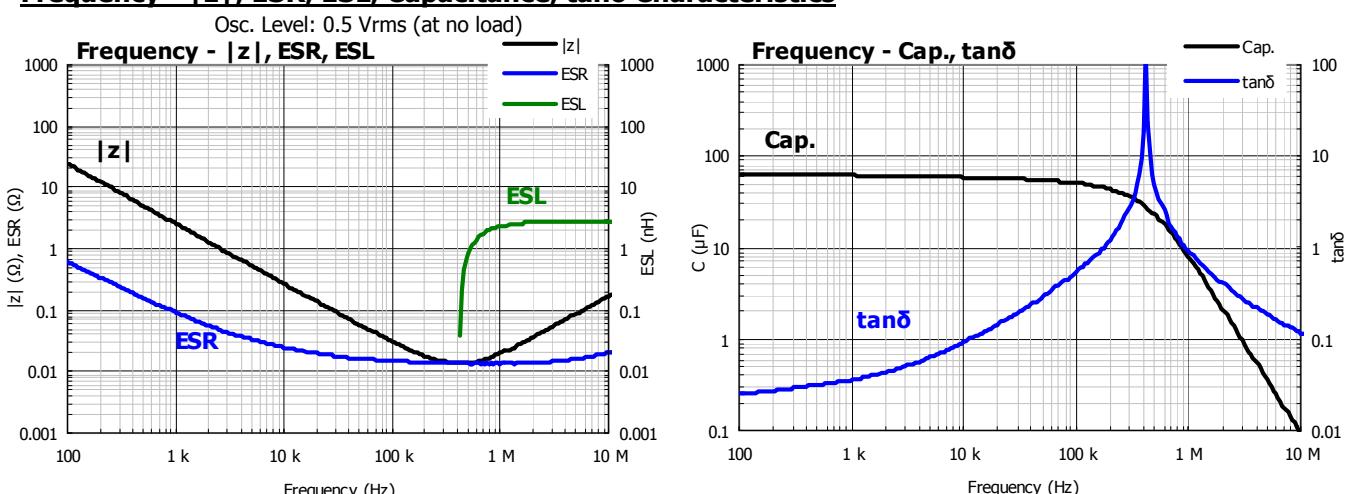
$\phi 6.3 \times 7.7 \text{ mm} / 35 \text{ V} / 68 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	23.8 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	68 μF (at 120 Hz)		ESR	35 m Ω max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	2000 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

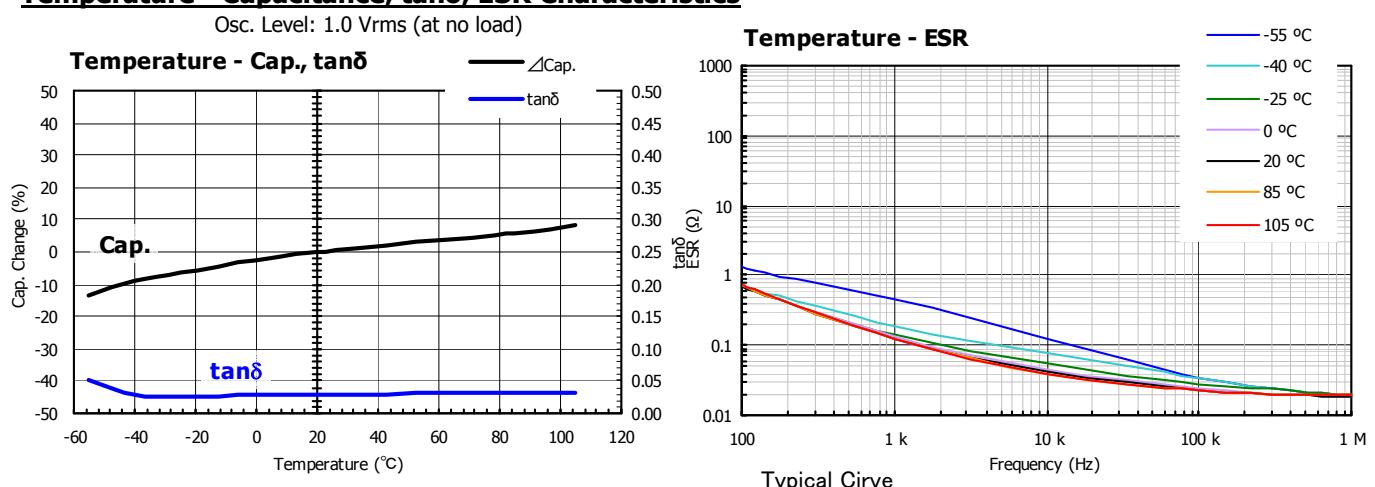
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



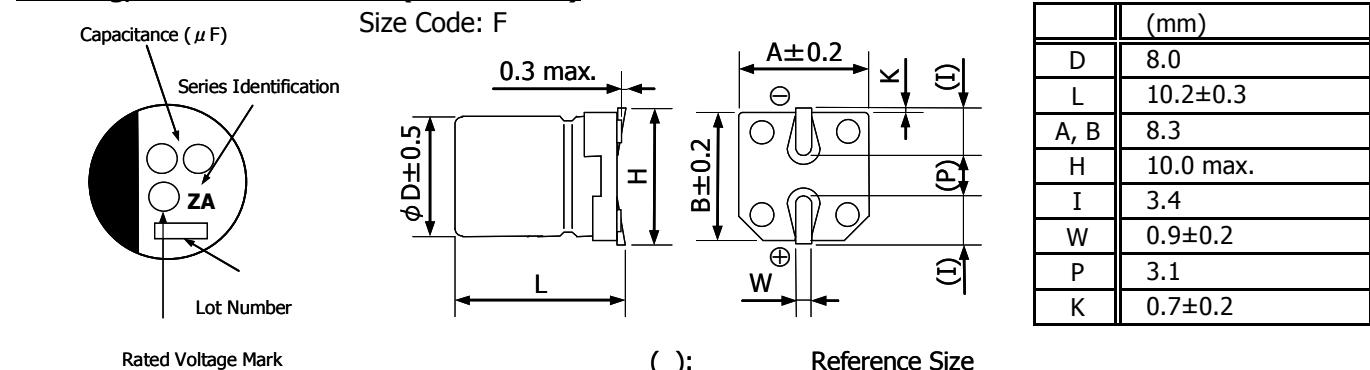
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1V151P

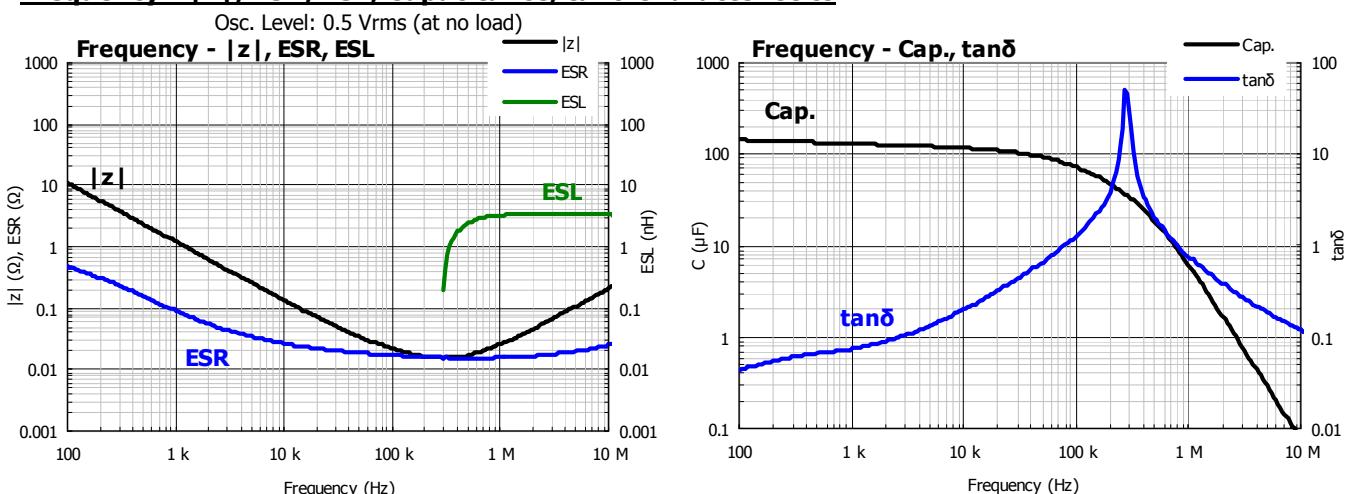
$\phi 8.0 \times 10.2$ mm / 35 V / 150 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	52.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	150 μ F (at 120 Hz)		ESR	27 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2300 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

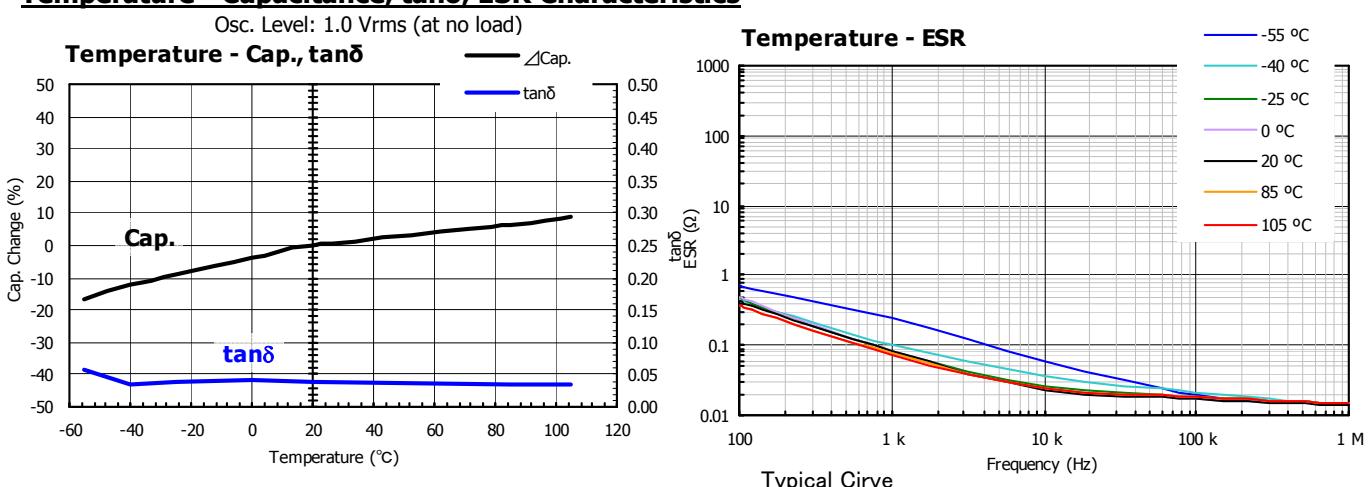
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



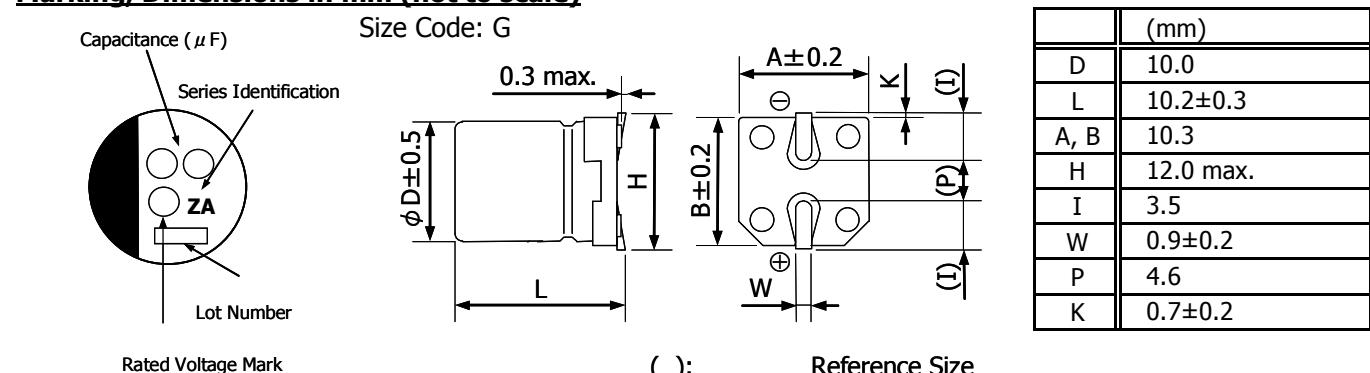
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1V271P

$\phi 10.0 \times 10.2$ mm / 35 V / 270 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	94.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	270 μ F (at 120 Hz)		ESR	20 mΩ max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2500 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

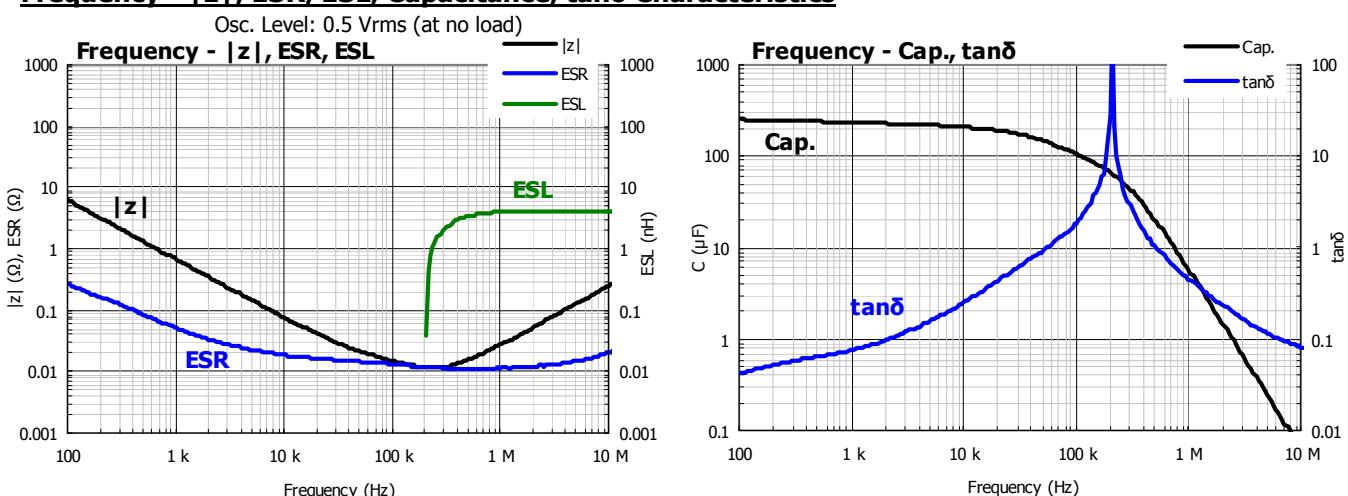
Marking, Dimensions in mm (not to scale)



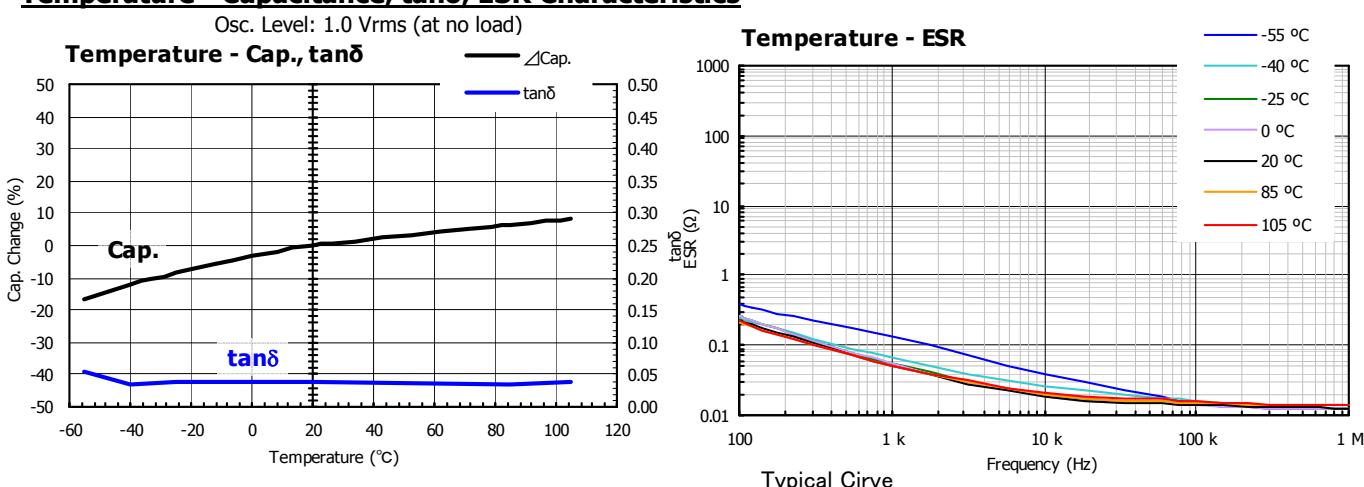
Rated Voltage Mark

(): Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



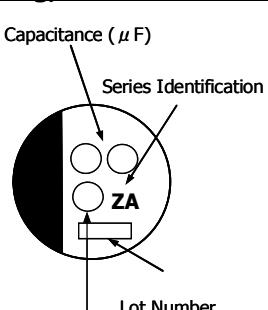
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1H100R

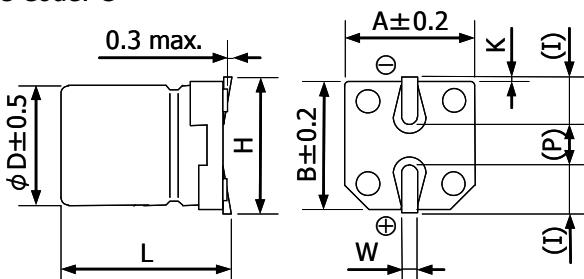
$\phi 5.0 \times 5.8$ mm / 50 V / 10 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.1 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	10 μ F (at 120 Hz)		ESR	120 mΩ max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	750 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

Marking, Dimensions in mm (not to scale)



Size Code: C



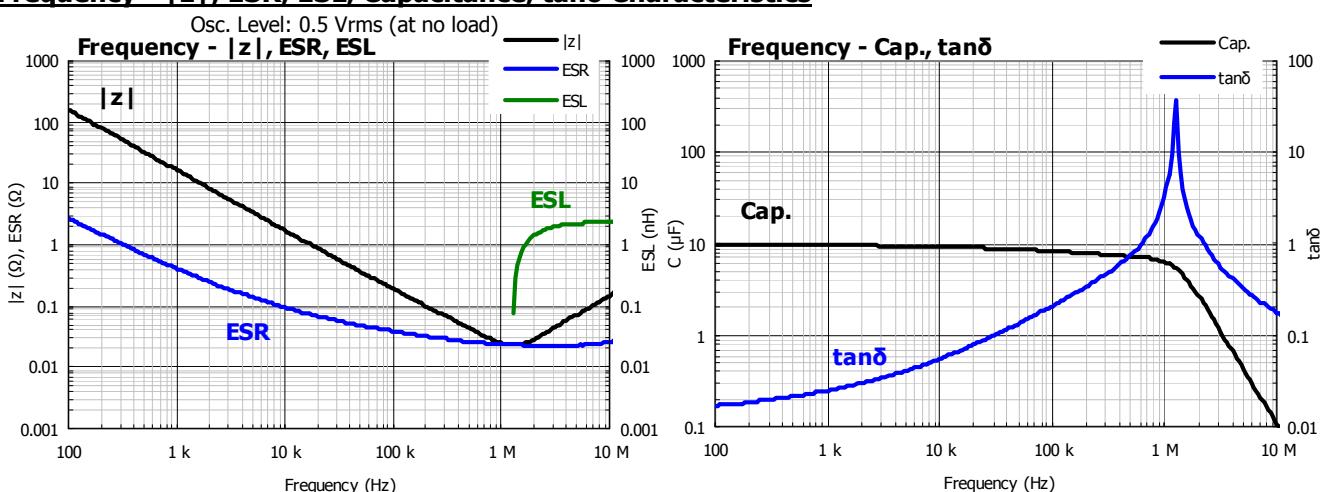
Rated Voltage Mark

():

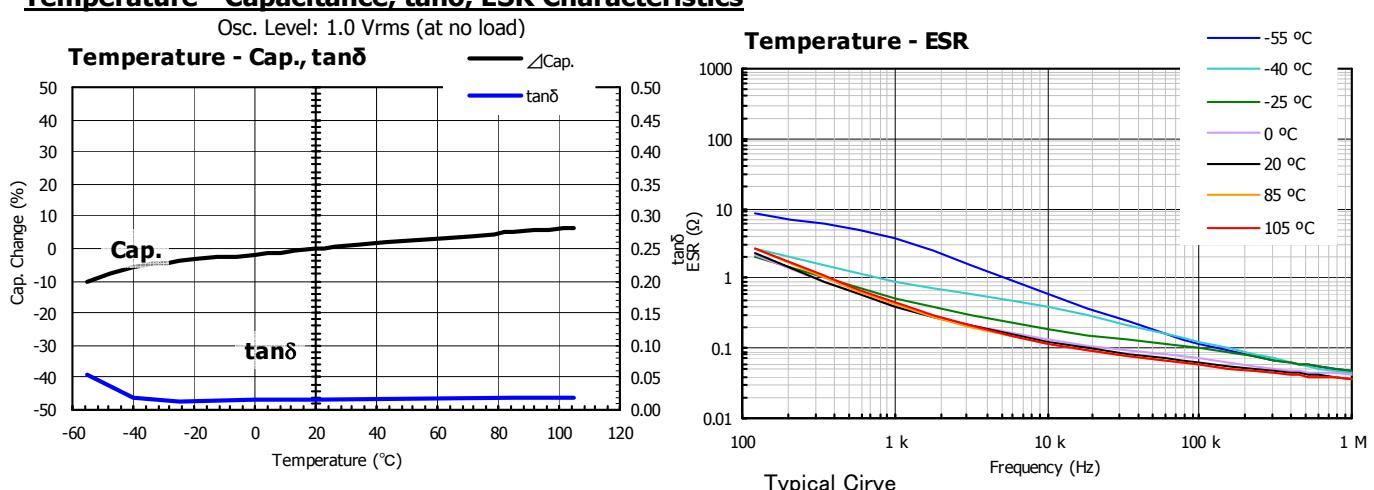
Reference Size

	(mm)
D	5.0
L	5.8±0.3
A, B	5.3
H	6.5 max.
I	2.2
W	0.65±0.10
P	1.5
K	0.35+0.15/-0.20

Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



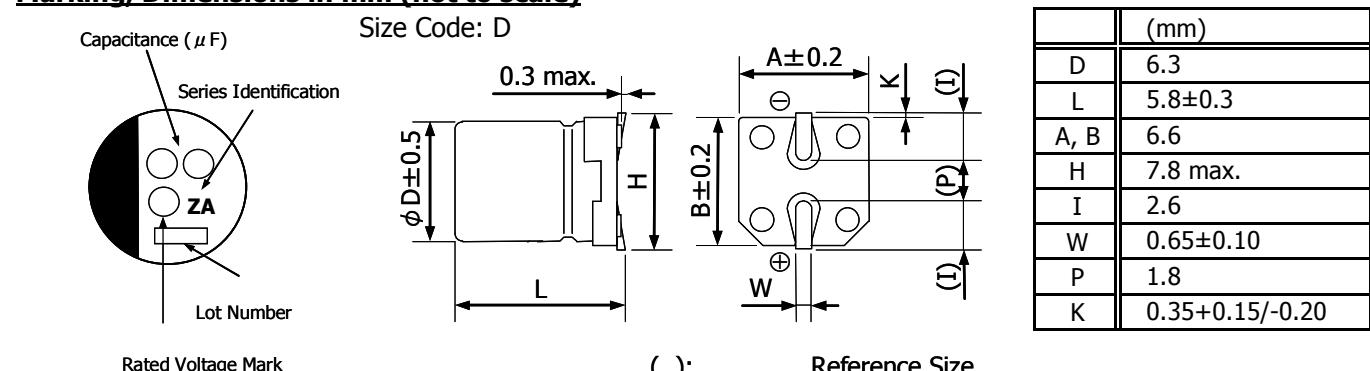
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1H220P

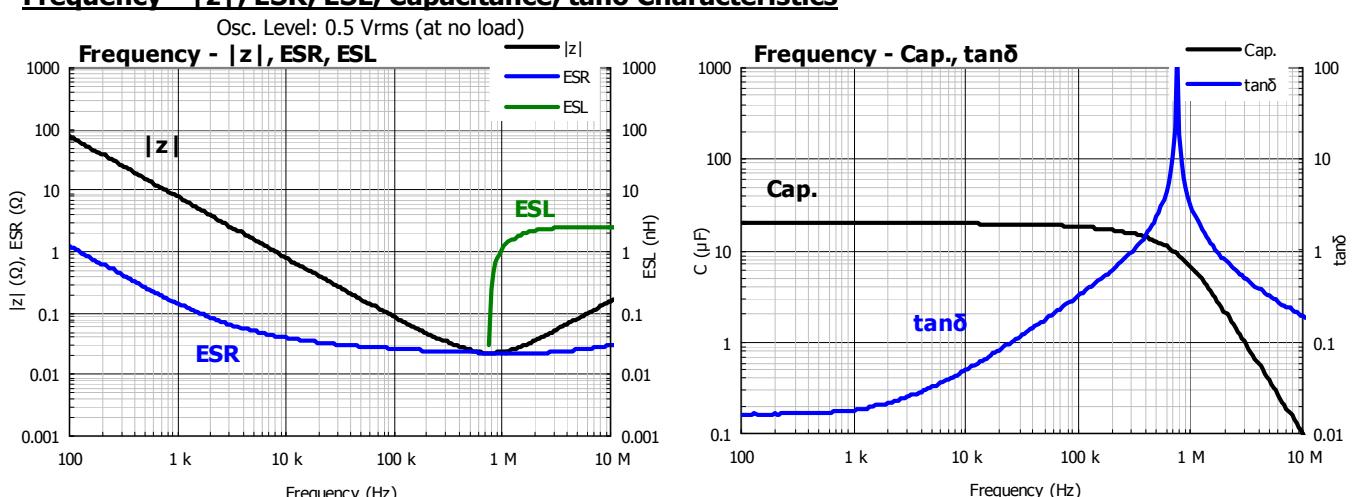
$\phi 6.3 \times 5.8 \text{ mm} / 50 \text{ V} / 22 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.10 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	11 µA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 µF (at 120 Hz)		ESR	80 mΩ max. (at 100 kHz)
Capacitance Tolerance	±20 %		Ripple Current	1100 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

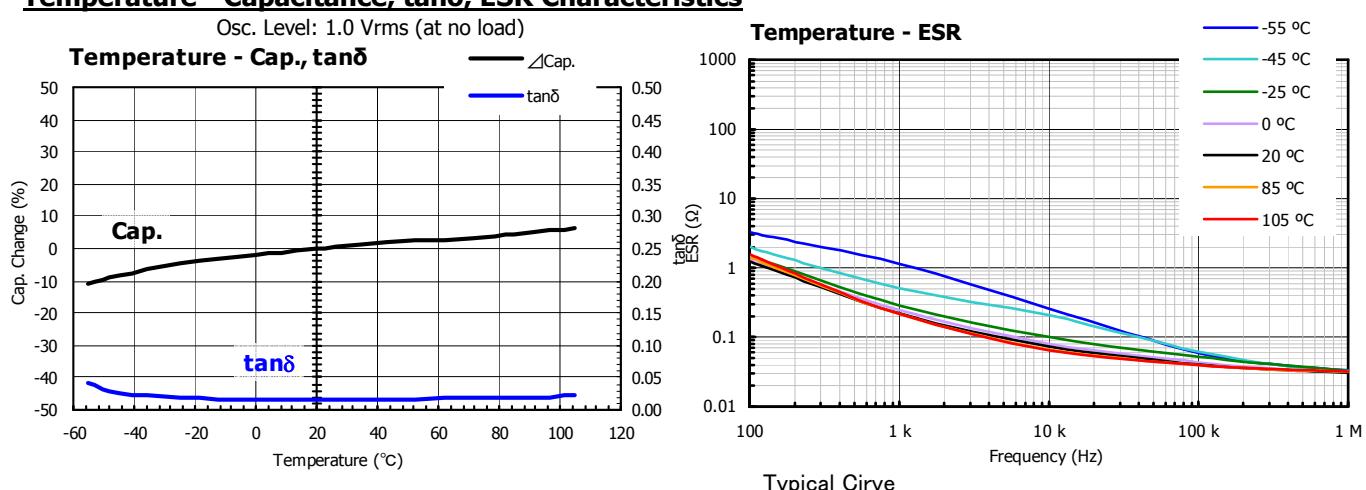
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



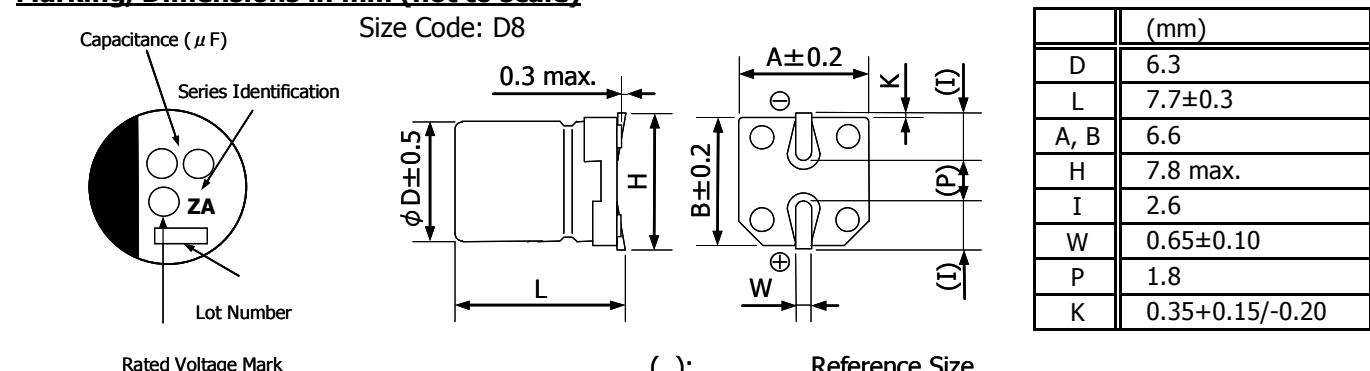
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1H330XP

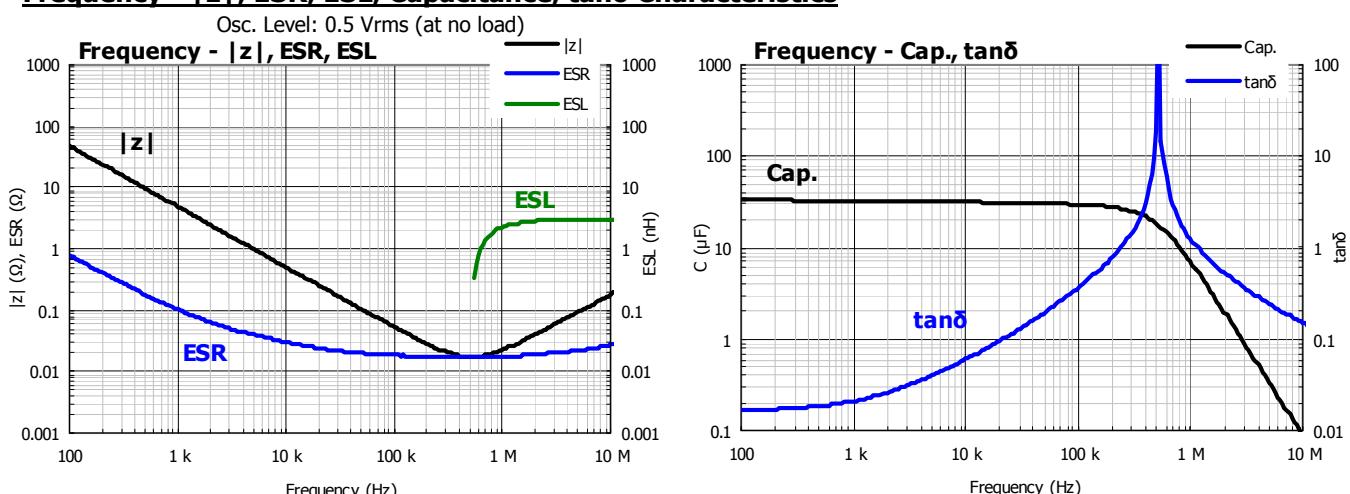
$\phi 6.3 \times 7.7 \text{ mm} / 50 \text{ V} / 33 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.10 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	16.5 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μF (at 120 Hz)		ESR	40 m Ω max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	1600 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

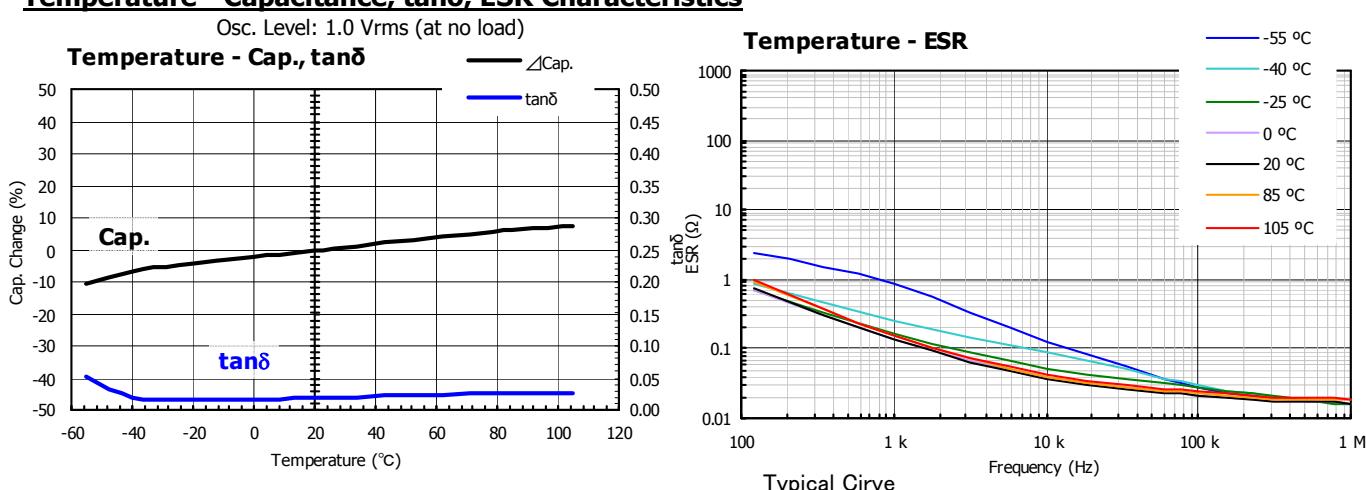
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



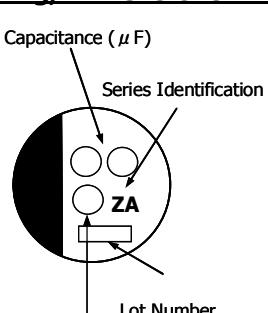
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1H680P

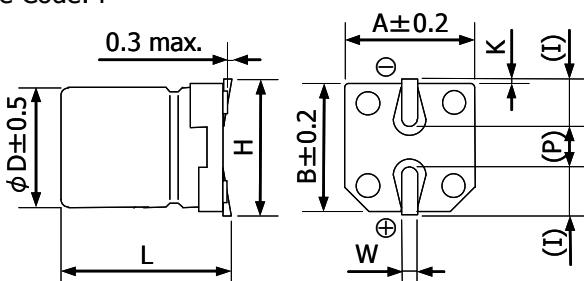
$\phi 8.0 \times 10.2$ mm / 50 V / 68 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.1 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	34 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	68 μ F (at 120 Hz)		ESR	30 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1800 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

Marking, Dimensions in mm (not to scale)



Size Code: F



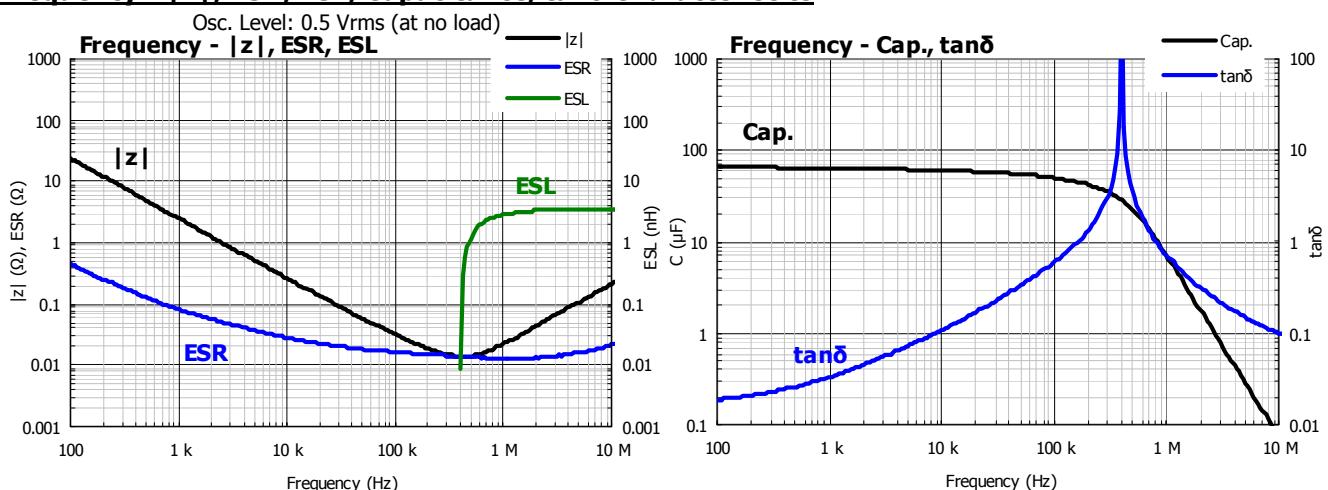
	(mm)
D	8.0
L	10.2±0.3
A, B	8.3
H	10.0 max.
I	3.4
W	0.9±0.2
P	3.1
K	0.7±0.2

Rated Voltage Mark

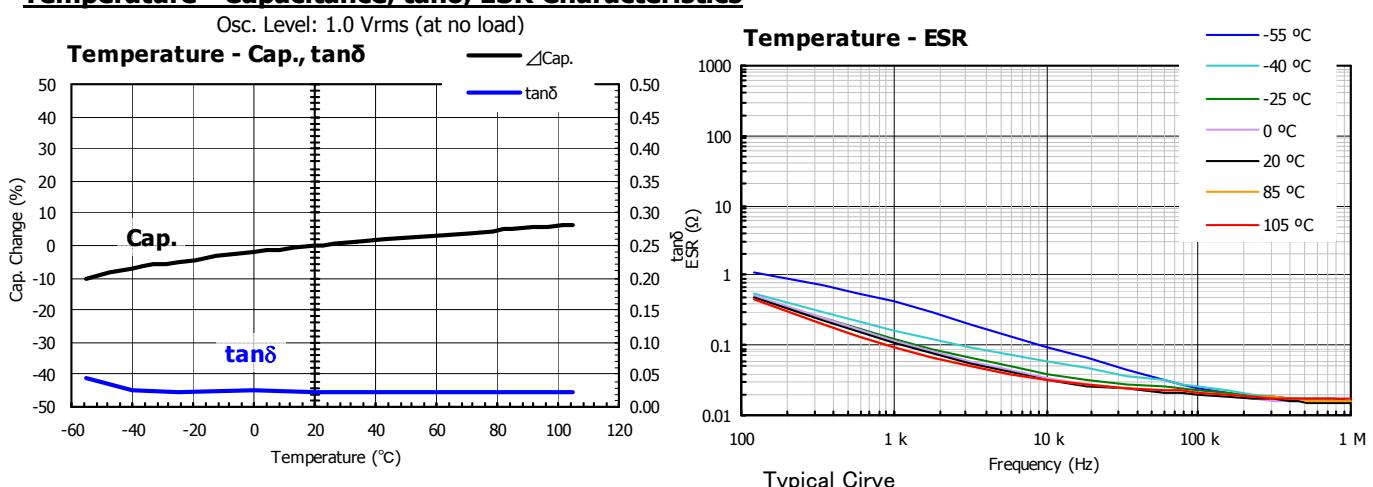
():

Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



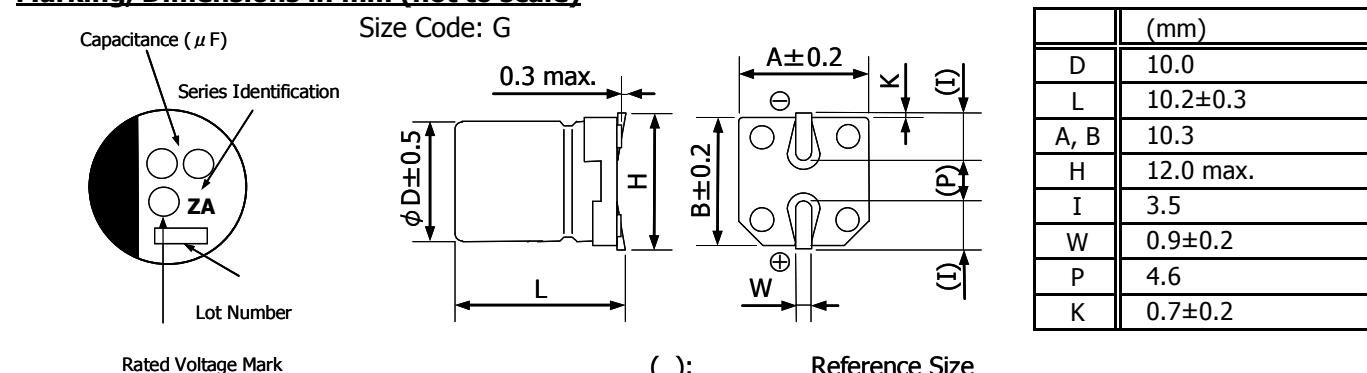
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1H101P

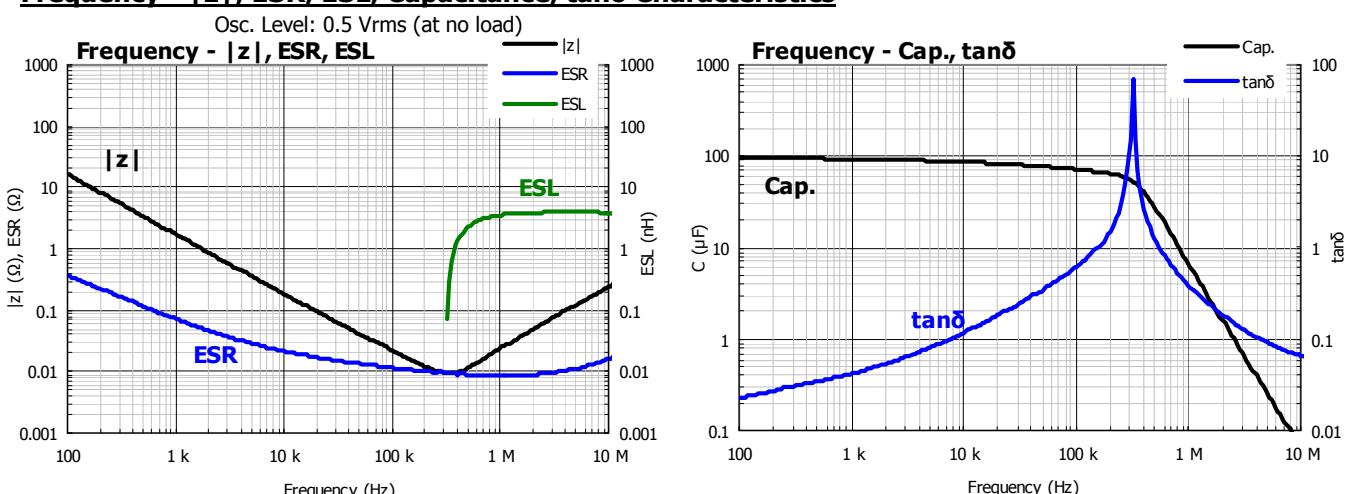
$\phi 10.0 \times 10.2$ mm / 50 V / 100 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.1 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	50 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	100 μ F (at 120 Hz)		ESR	28 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2000 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

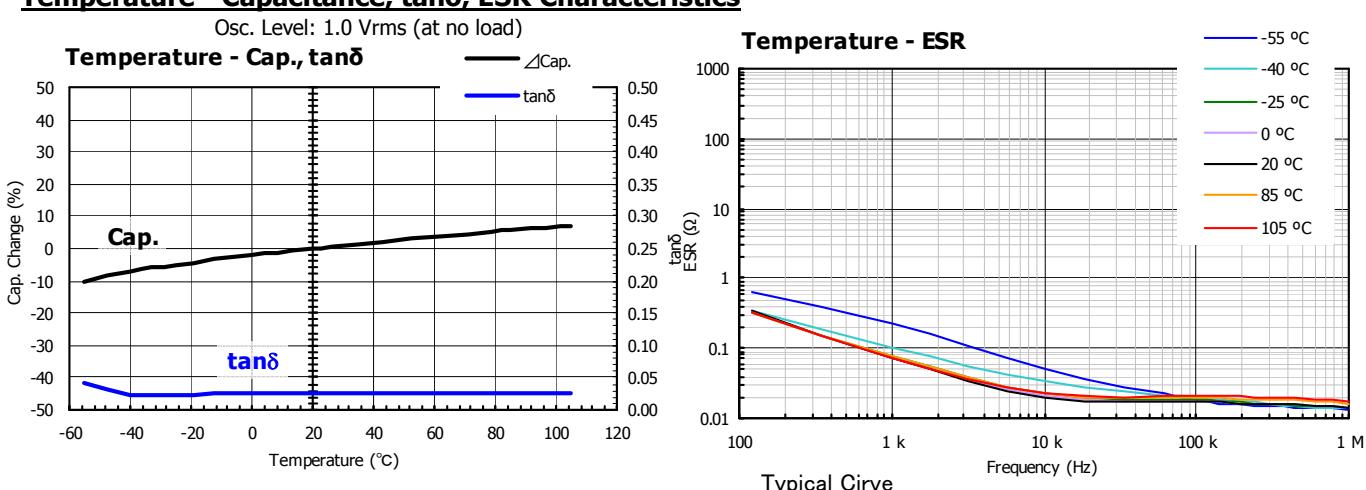
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



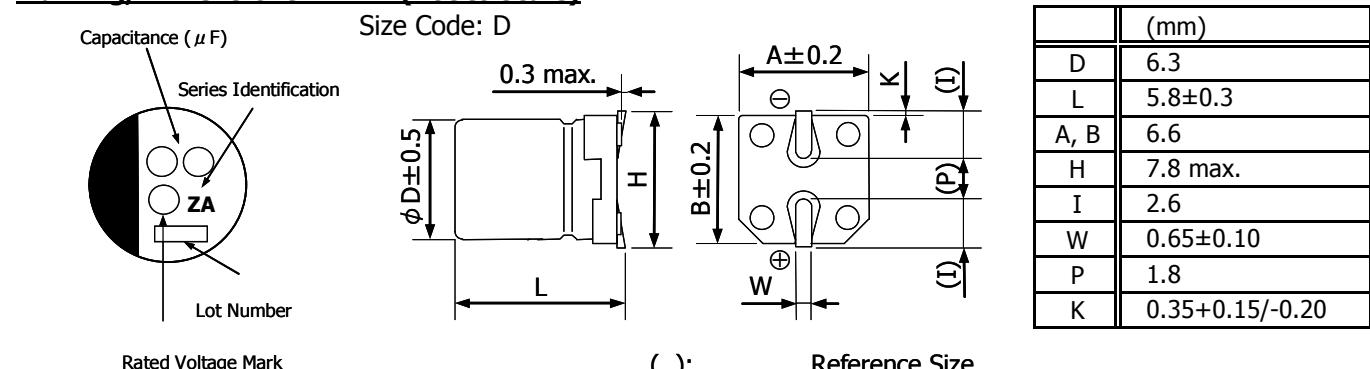
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1J100P

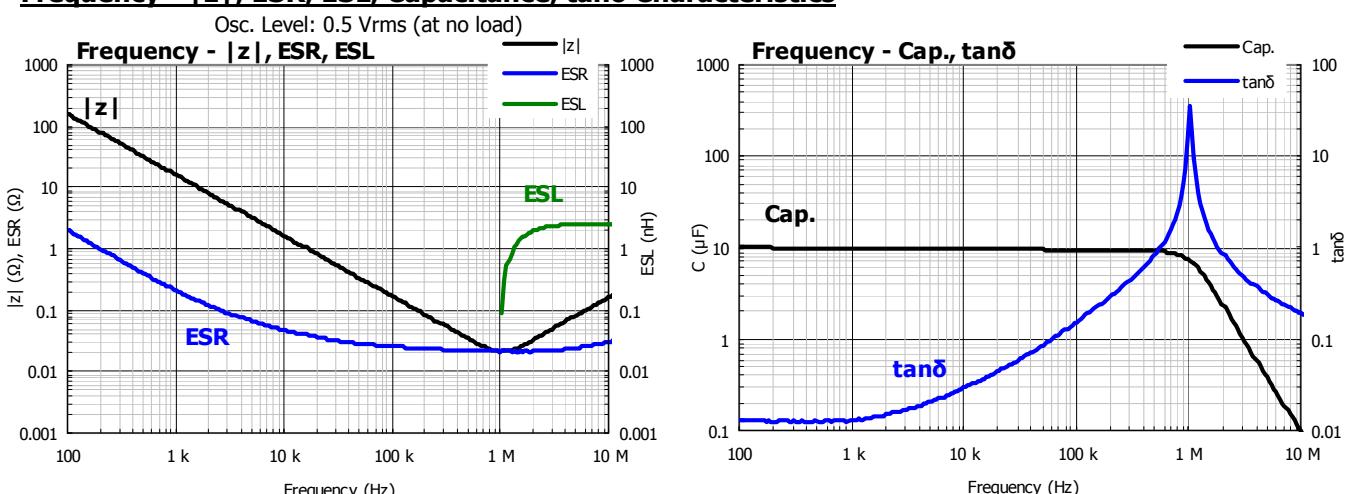
$\phi 6.3 \times 5.8 \text{ mm} / 63 \text{ V} / 10 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	6.3 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	10 μF (at 120 Hz)		ESR	120 $m\Omega$ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	1000 mA max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

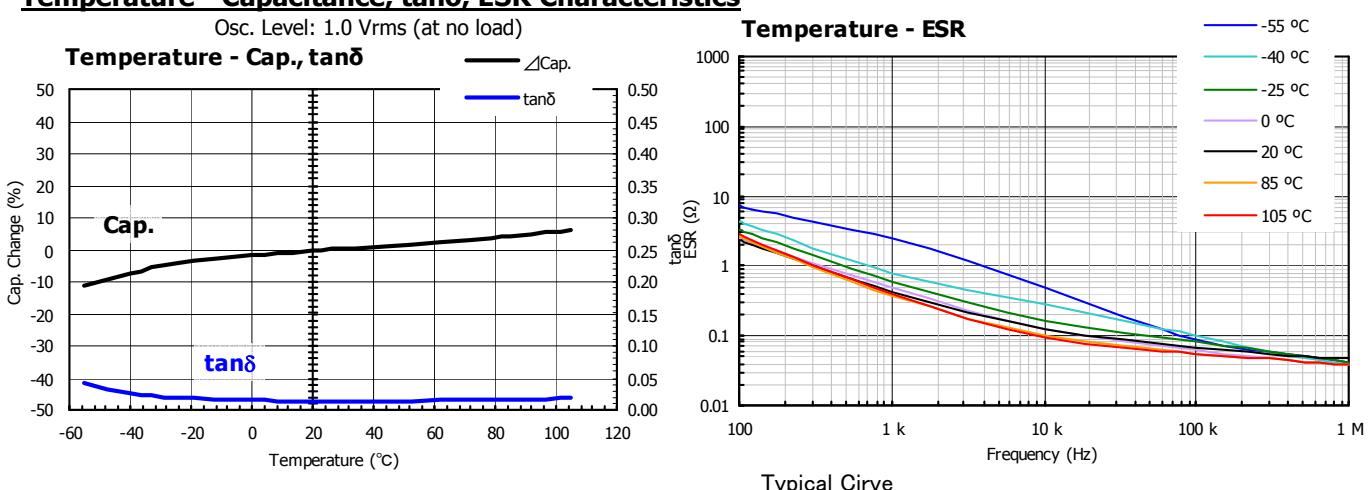
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



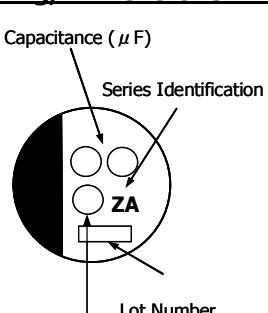
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1J220XP

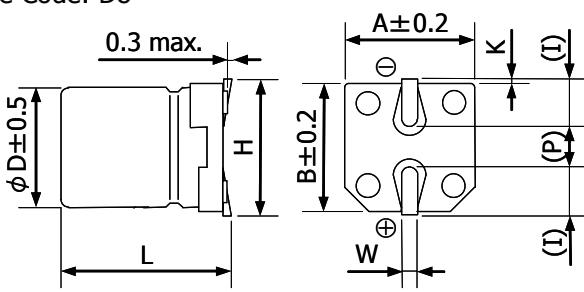
$\phi 6.3 \times 7.7 \text{ mm} / 63 \text{ V} / 22 \mu\text{F} / 105^\circ\text{C}, 10000 \text{ h}$

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	13.8 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 μF (at 120 Hz)		ESR	80 m Ω max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	1500 mA rms max. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

Marking, Dimensions in mm (not to scale)



Size Code: D8



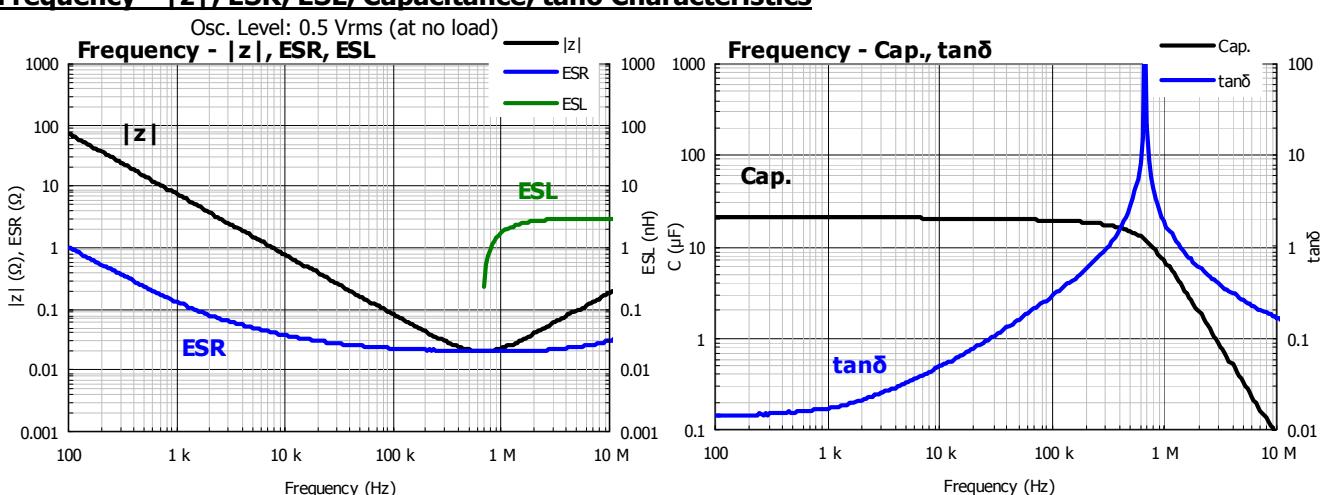
Rated Voltage Mark

():

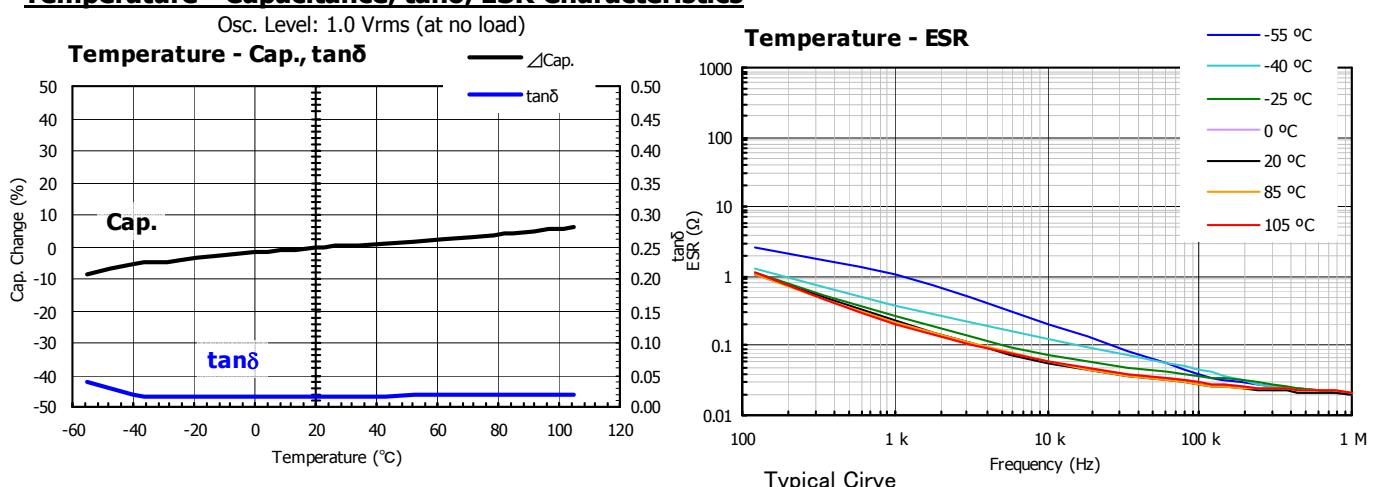
Reference Size

	(mm)
D	6.3
L	7.7 ± 0.3
A, B	6.6
H	7.8 max.
I	2.6
W	0.65 ± 0.10
P	1.8
K	0.35 + 0.15/-0.20

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



Technical Data

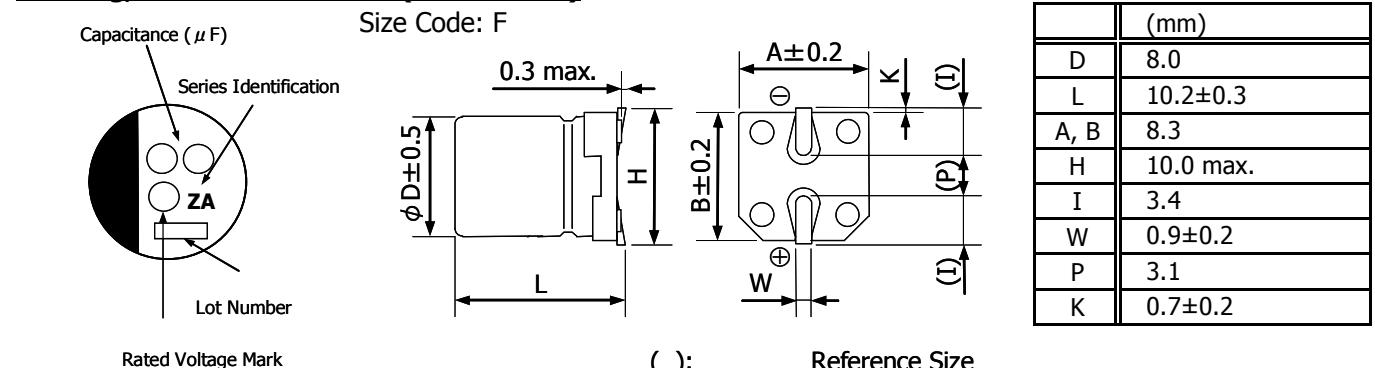
Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1J330P

$\phi 8.0 \times 10.2$ mm / 63 V / 33 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	20.7 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μ F (at 120 Hz)		ESR	40 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1700 mAmax. (at 100 kHz, 105 °C)

Endurance	105 °C, 10000 h
-----------	-----------------

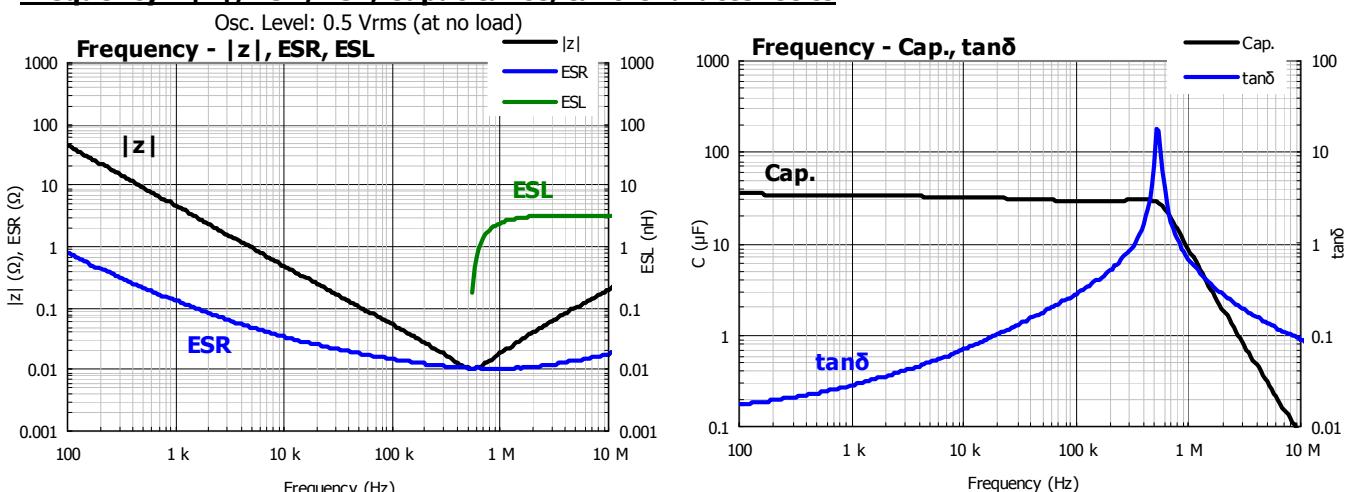
Marking, Dimensions in mm (not to scale)



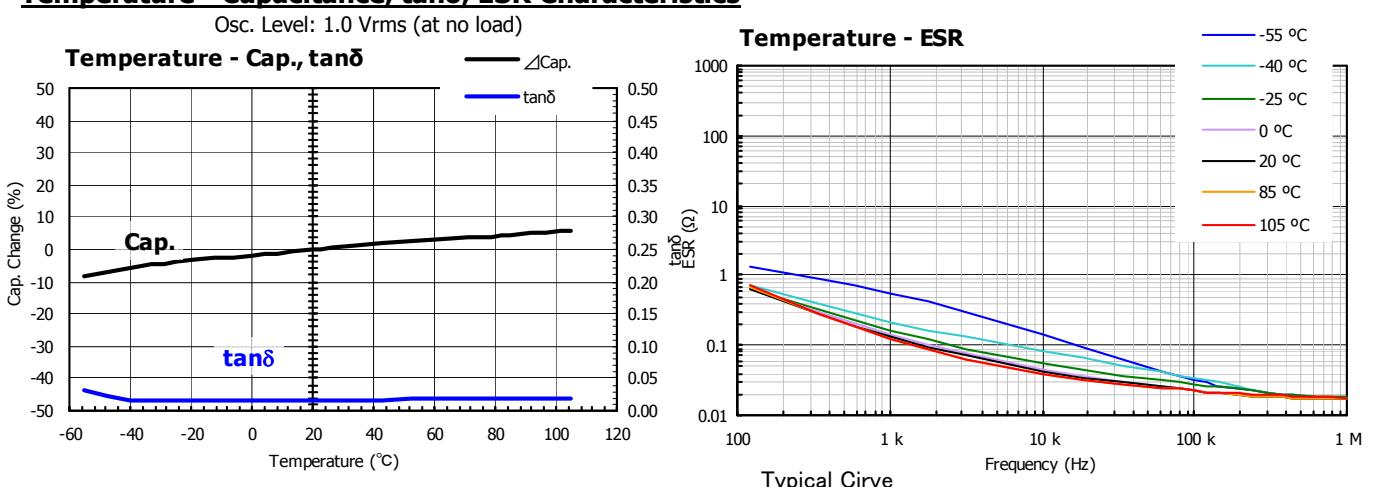
Rated Voltage Mark

(): Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



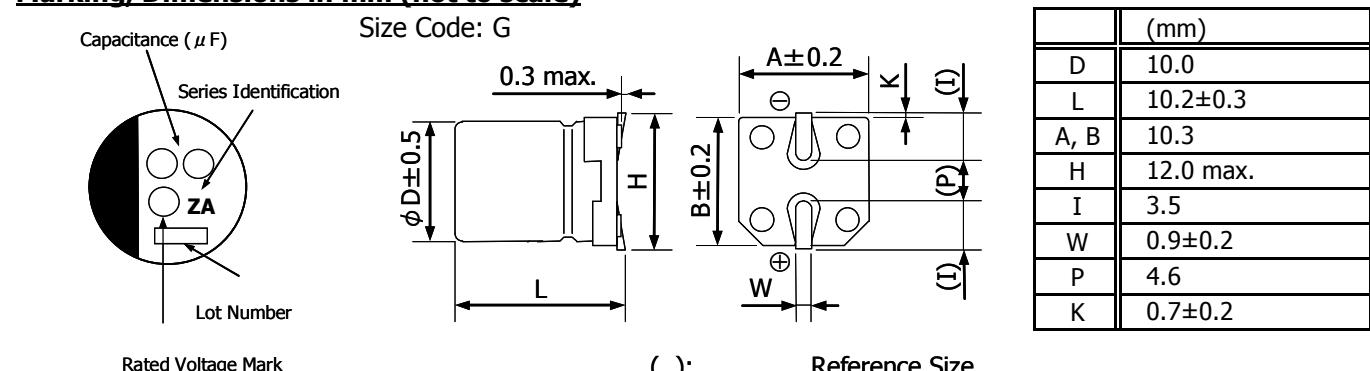
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1J560P

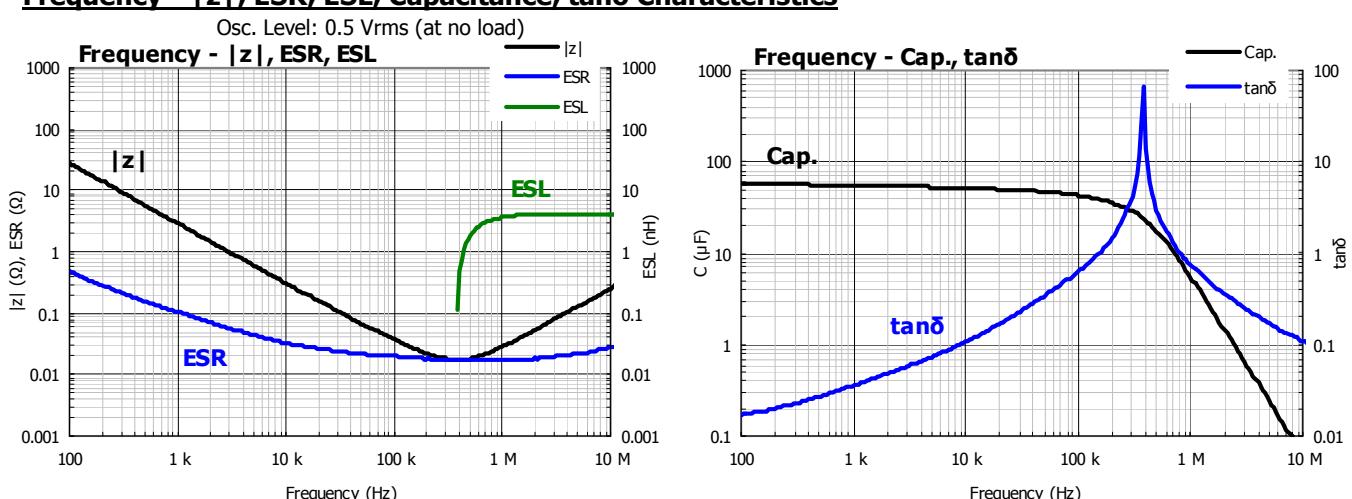
$\phi 10.0 \times 10.2$ mm / 63 V / 56 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	35.2 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	56 μ F (at 120 Hz)		ESR	30 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1800 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

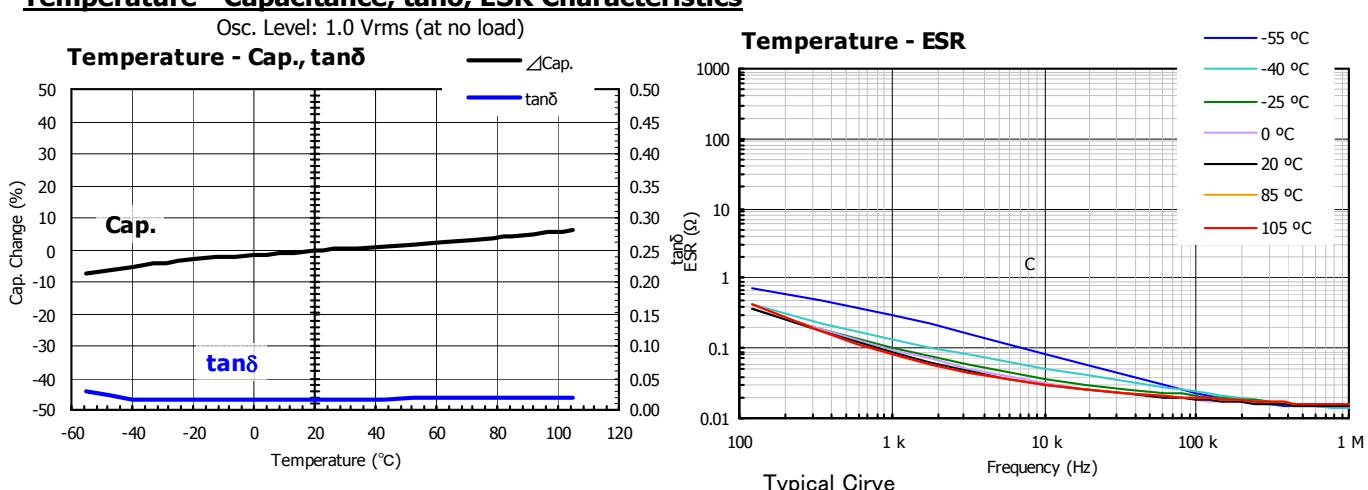
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



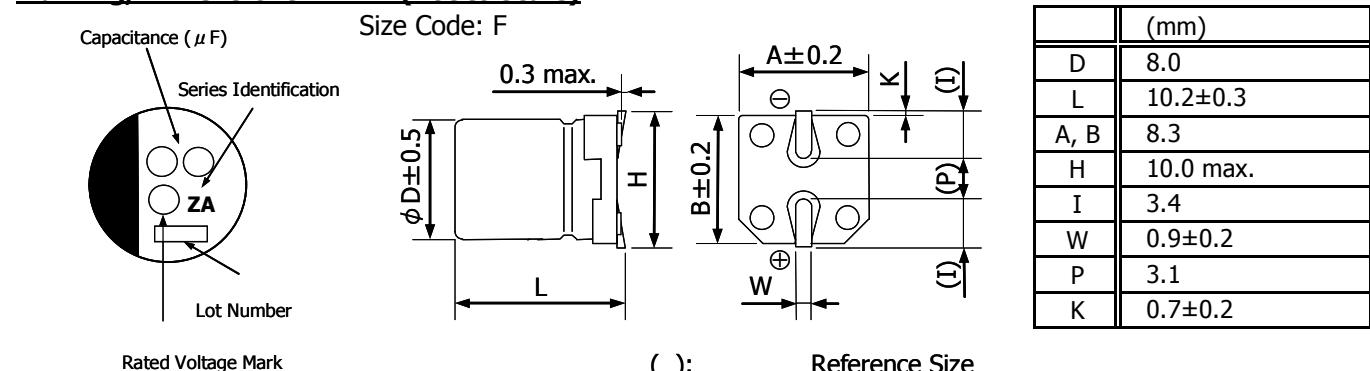
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1K220P

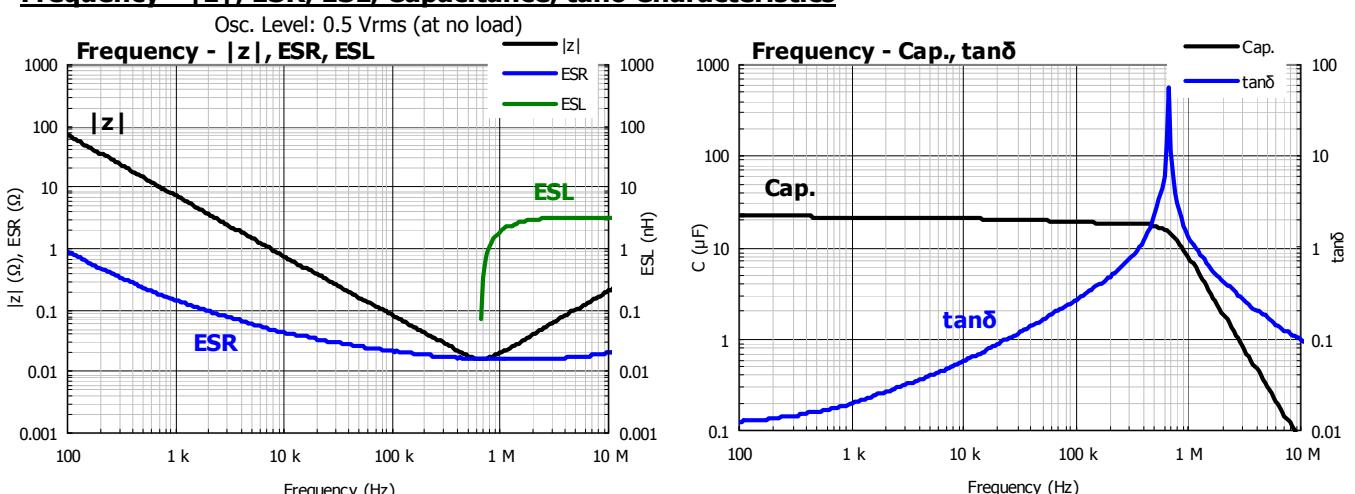
$\phi 8.0 \times 10.2$ mm / 80 V / 22 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 80 V		DC Leakage Current	17.6 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 μ F (at 120 Hz)		ESR	45 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1550 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

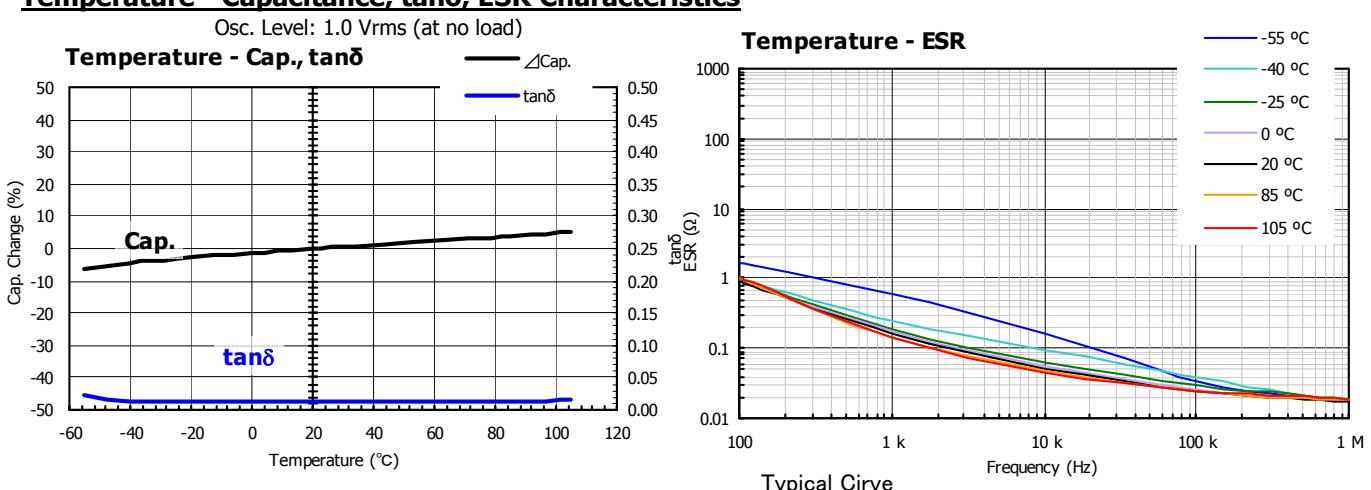
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



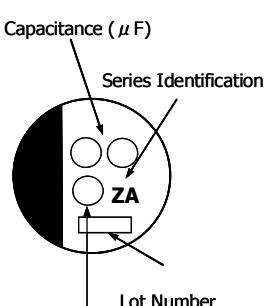
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZA series Part Number: EEHZA1K330P

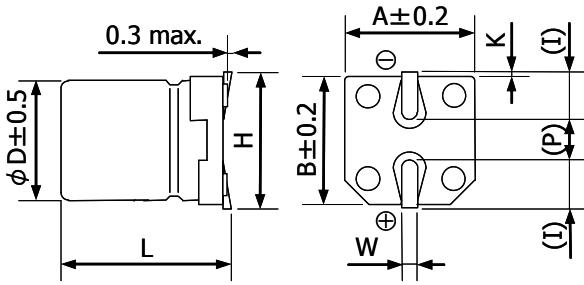
$\phi 10.0 \times 10.2$ mm / 80 V / 33 μ F / 105 °C, 10000 h

Category	Temperature Range	-55 to 105 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 80 V		DC Leakage Current	26.4 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μ F (at 120 Hz)		ESR	36 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1700 mAmax. (at 100 kHz, 105 °C)
			Endurance	105 °C, 10000 h

Marking, Dimensions in mm (not to scale)



Size Code: G



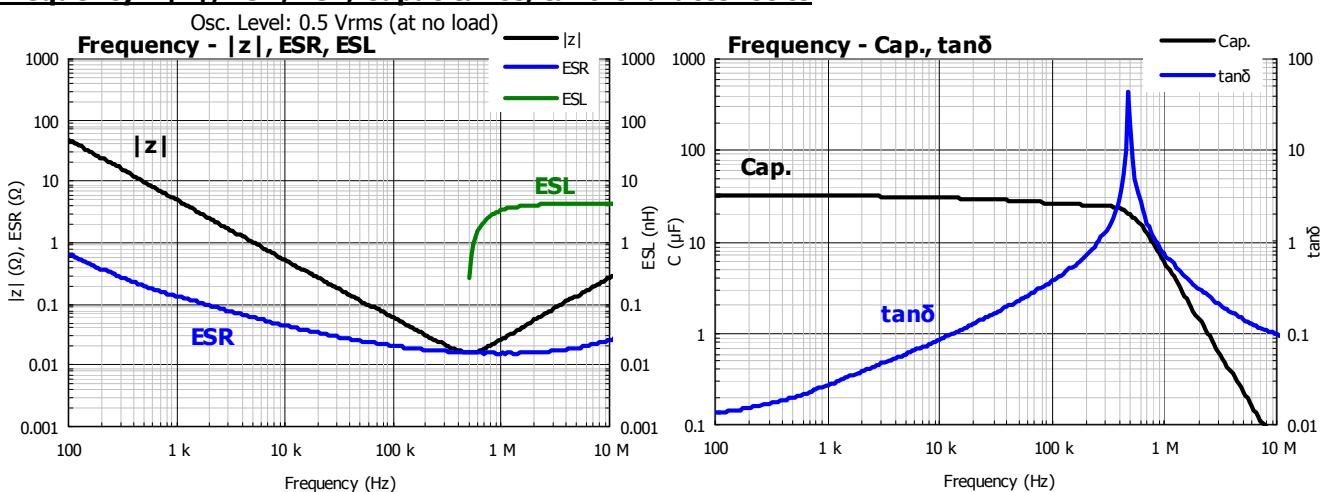
Rated Voltage Mark

():

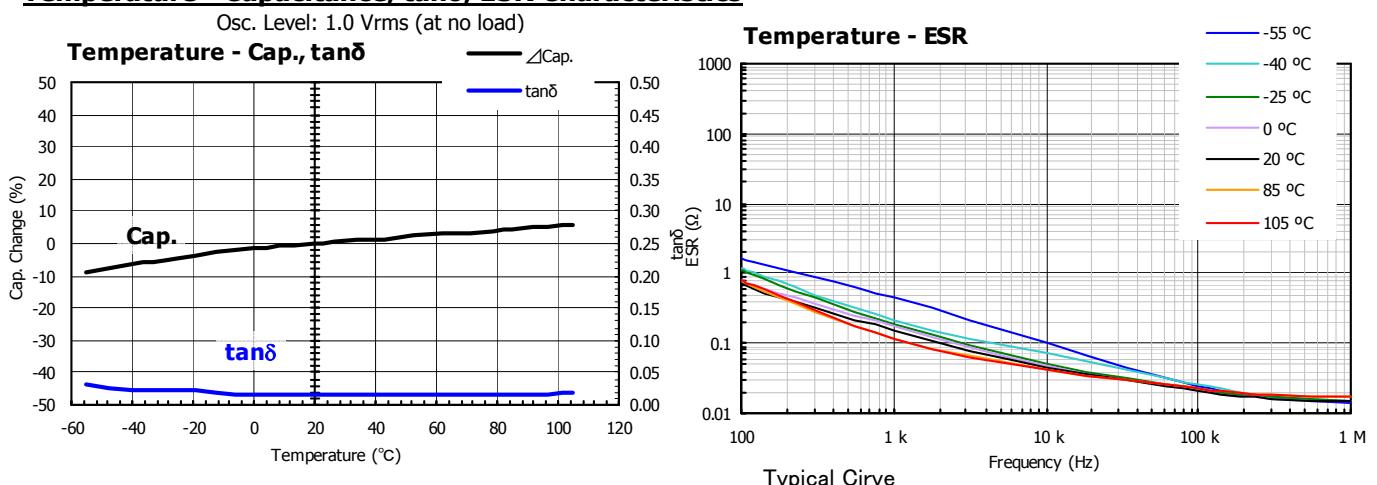
Reference Size

	(mm)
D	10.0
L	10.2±0.3
A, B	10.3
H	12.0 max.
I	3.5
W	0.9±0.2
P	4.6
K	0.7±0.2

Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor

V type ZC series



EEHZC1E330R	25V33 μ F	ϕ 5x5.8	... ZC-2
EEHZC1E560P	25V56 μ F	ϕ 6.3x5.8	... ZC-3
EEHZC1E101XP	25V100 μ F	ϕ 6.3x7.7	... ZC-4
EEHZC1E221P	25V220 μ F	ϕ 8x10.2	... ZC-5
EEHZC1E331P	25V330 μ F	ϕ 10x10.2	... ZC-6
EEHZC1V220R	35V22 μ F	ϕ 5x5.8	... ZC-7
EEHZC1V470P	35V47 μ F	ϕ 6.3x5.8	... ZC-8
EEHZC1V680XP	35V68 μ F	ϕ 6.3x7.7	... ZC-9
EEHZC1V151P	35V150 μ F	ϕ 8x10.2	... ZC-10
EEHZC1V271P	35V270 μ F	ϕ 10x10.2	... ZC-11
EEHZC1H100R	50V10 μ F	ϕ 5x5.8	... ZC-12
EEHZC1H220P	50V22 μ F	ϕ 6.3x5.8	... ZC-13
EEHZC1H330XP	50V33 μ F	ϕ 6.3x7.7	... ZC-14
EEHZC1H680P	50V68 μ F	ϕ 8x10.2	... ZC-15
EEHZC1H101P	50V100 μ F	ϕ 10x10.2	... ZC-16
EEHZC1J100P	63V10 μ F	ϕ 6.3x5.8	... ZC-17
EEHZC1J220XP	63V22 μ F	ϕ 6.3x7.7	... ZC-18
EEHZC1J330P	63V33 μ F	ϕ 8x10.2	... ZC-19
EEHZC1J560P	63V56 μ F	ϕ 10x10.2	... ZC-20

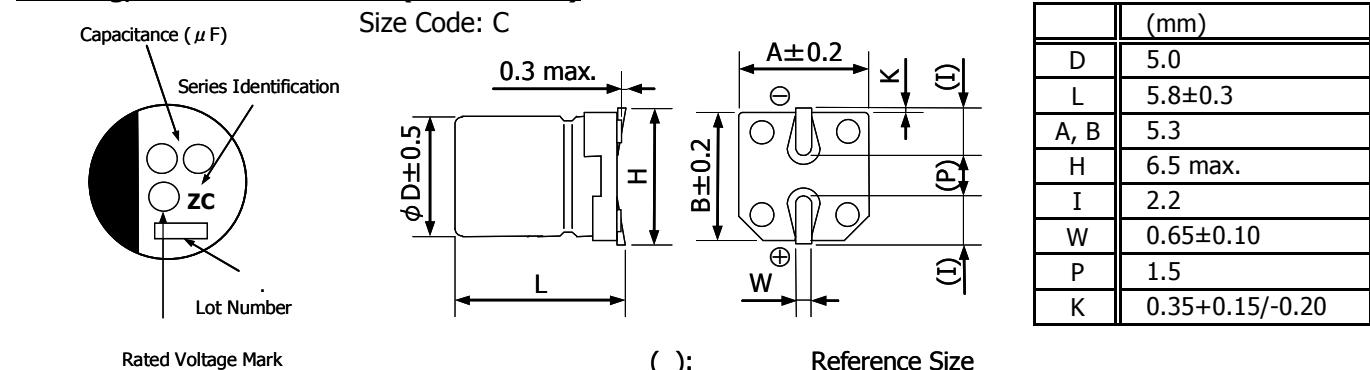
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1E330R

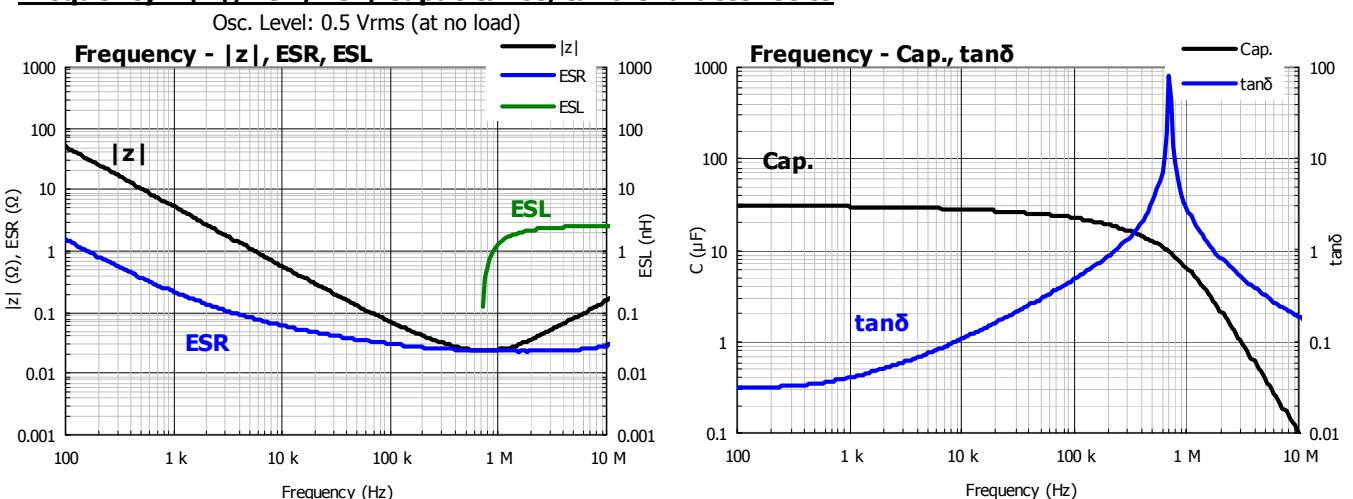
$\phi 5.0 \times 5.8 \text{ mm} / 25 \text{ V} / 33 \mu\text{F} / 125^\circ\text{C}, 4000 \text{ h}$

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	8.2 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μF (at 120 Hz)		ESR	80 m Ω max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	550 mAmax. max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

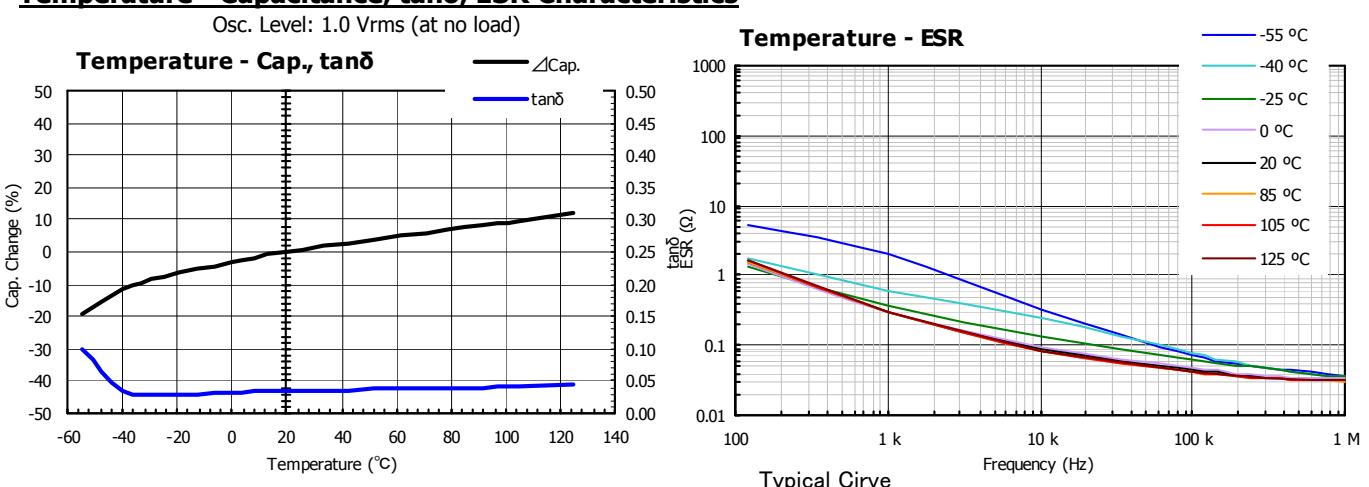
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



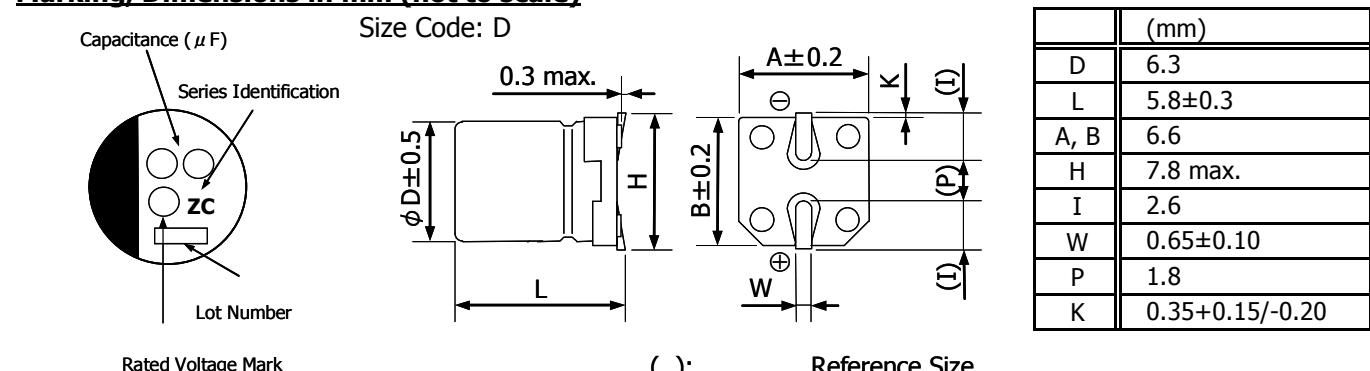
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1E560P

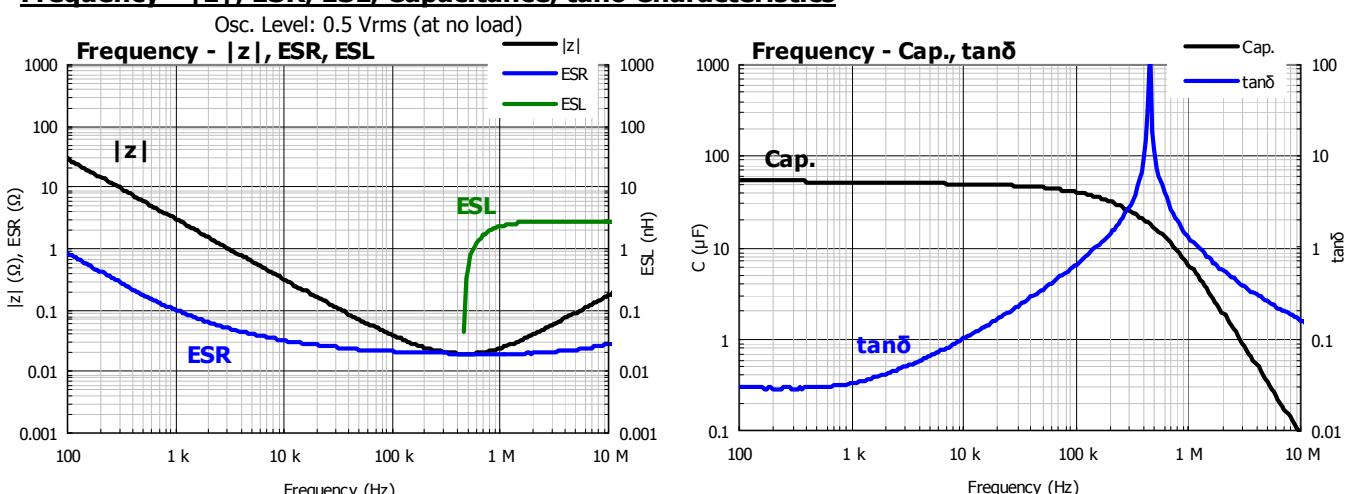
$\phi 6.3 \times 5.8$ mm / 25 V / 56 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	14 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	56 μ F (at 120 Hz)		ESR	50 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	900 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

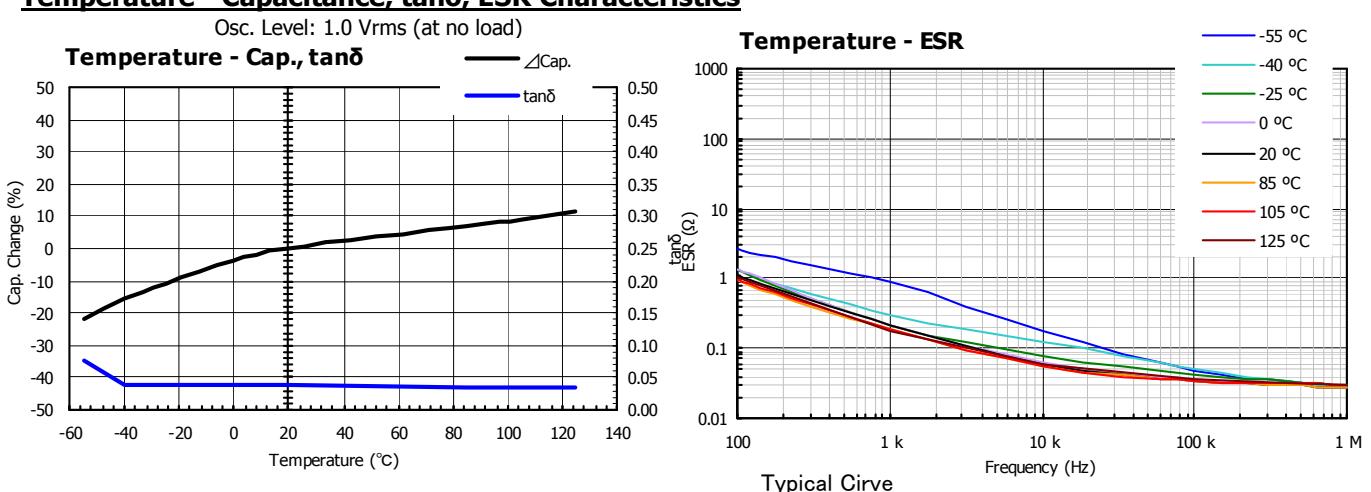
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



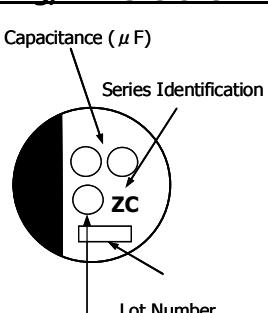
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1E101XP

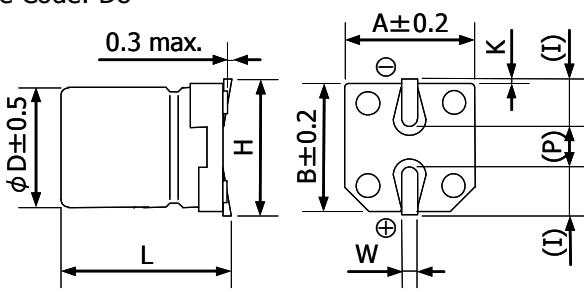
$\phi 6.3 \times 7.7$ mm / 25 V / 100 μF / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	25 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	100 μF (at 120 Hz)		ESR	30 mΩ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20\%$		Ripple Current	1400 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

Marking, Dimensions in mm (not to scale)



Size Code: D8



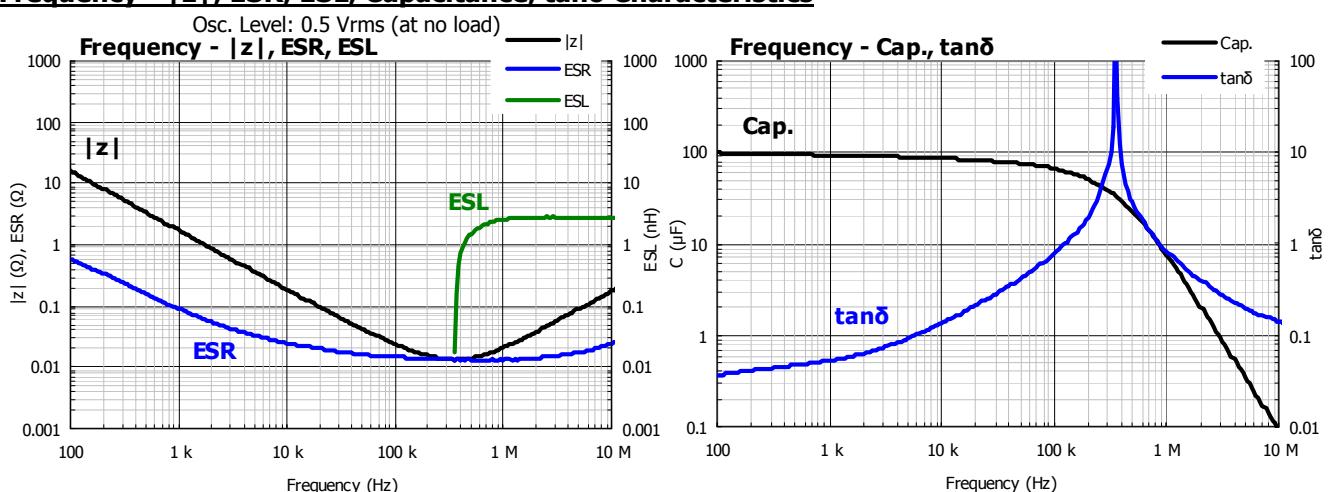
	(mm)
D	6.3
L	5.8 ± 0.3
A, B	6.6
H	7.8 max.
I	2.6
W	0.65 ± 0.10
P	1.8
K	0.35 + 0.15/-0.20

Rated Voltage Mark

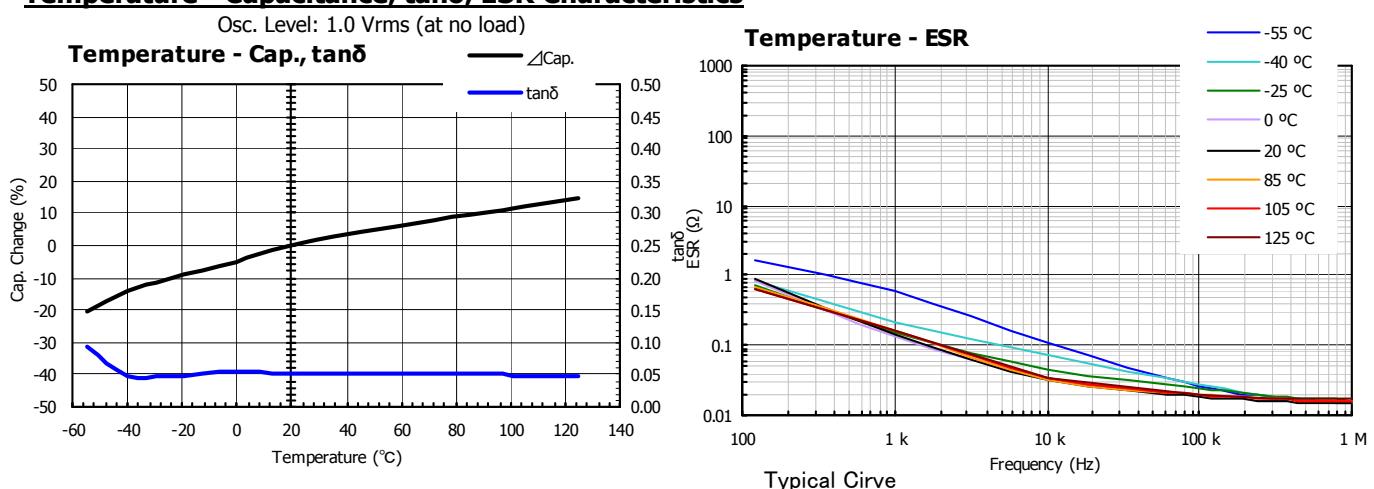
():

Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



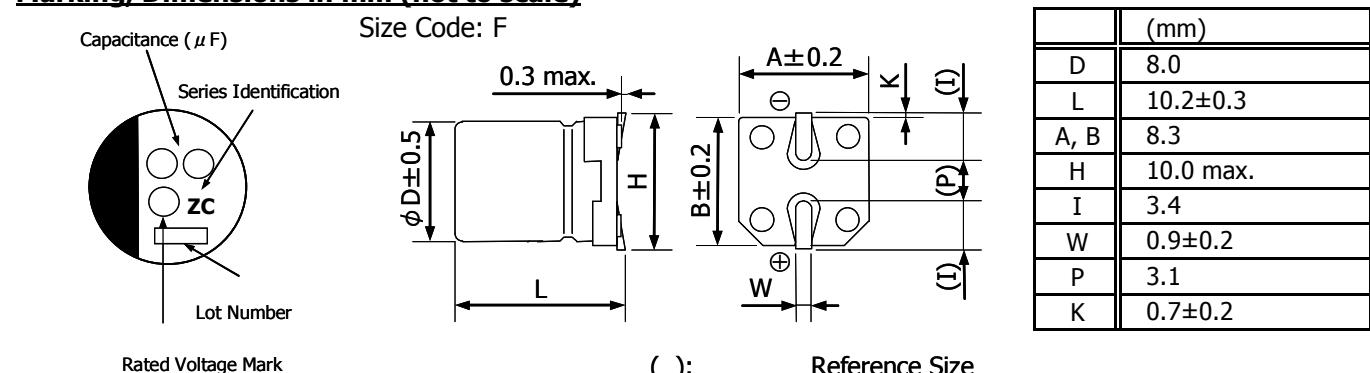
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1E221P

$\phi 8.0 \times 10.2$ mm / 25 V / 220 μ F / 125 °C, 4000 h

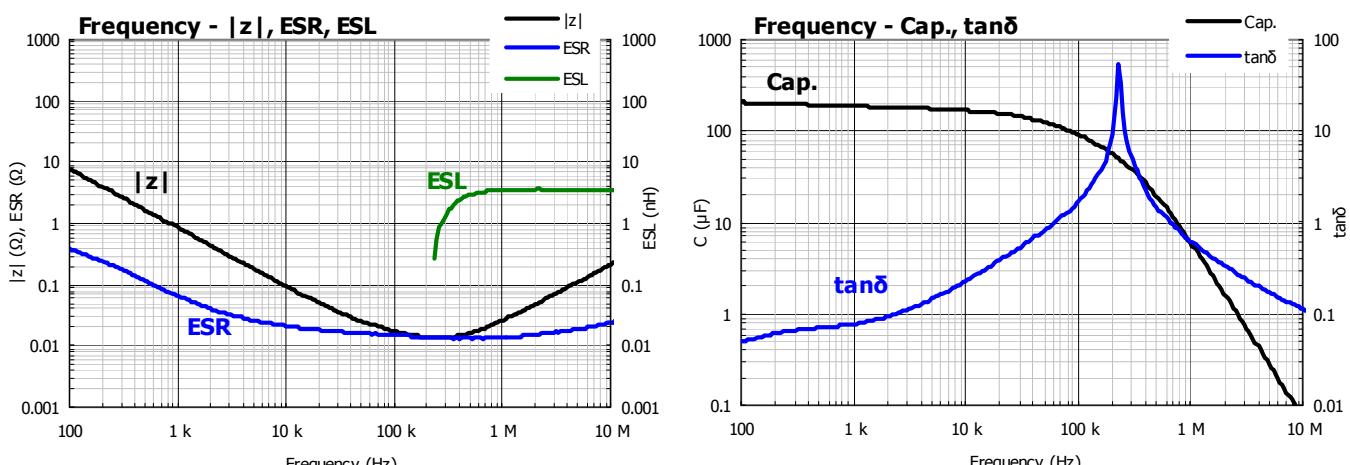
Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	55 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	220 μ F (at 120 Hz)		ESR	27 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1600 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

Marking, Dimensions in mm (not to scale)



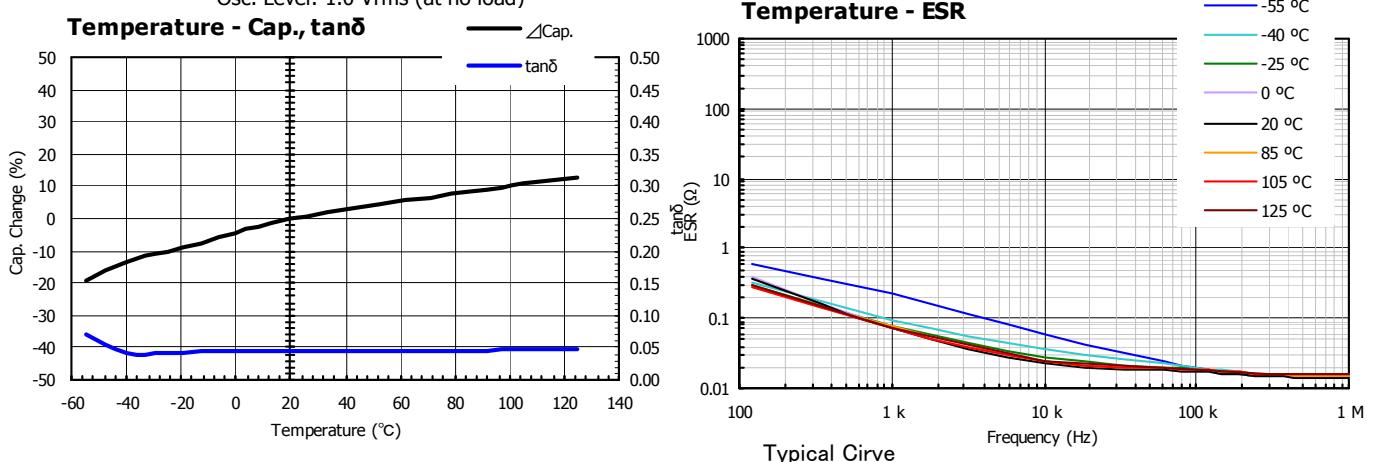
Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics

Osc. Level: 0.5 Vrms (at no load)



Temperature - Capacitance, $\tan\delta$, ESR Characteristics

Osc. Level: 1.0 Vrms (at no load)



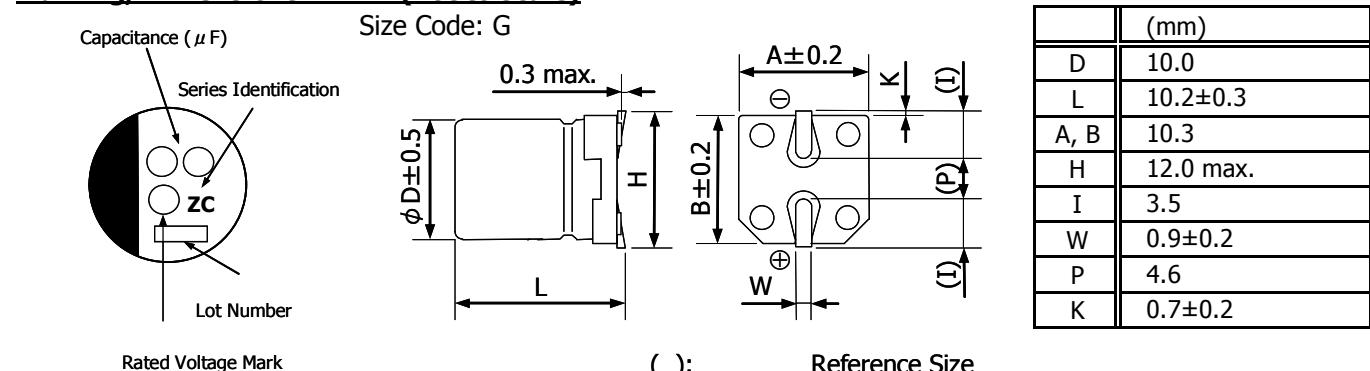
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1E331P

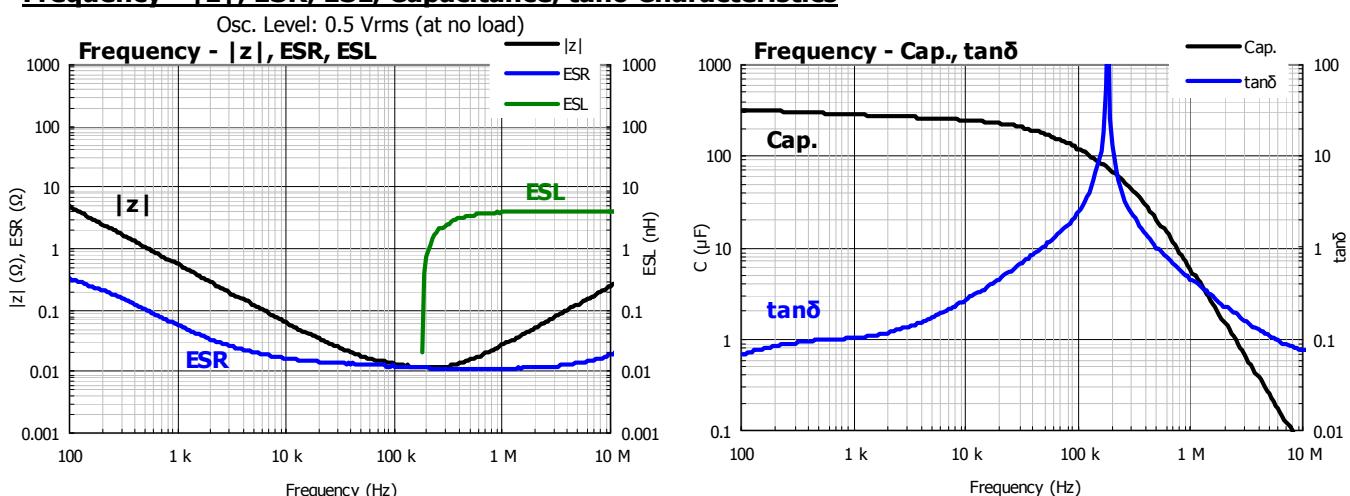
$\phi 10.0 \times 10.2$ mm / 25 V / 330 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.14 max. (at 120 Hz)
Rated W.V. Range	DC 25 V		DC Leakage Current	82.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	330 μ F (at 120 Hz)		ESR	20 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2000 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

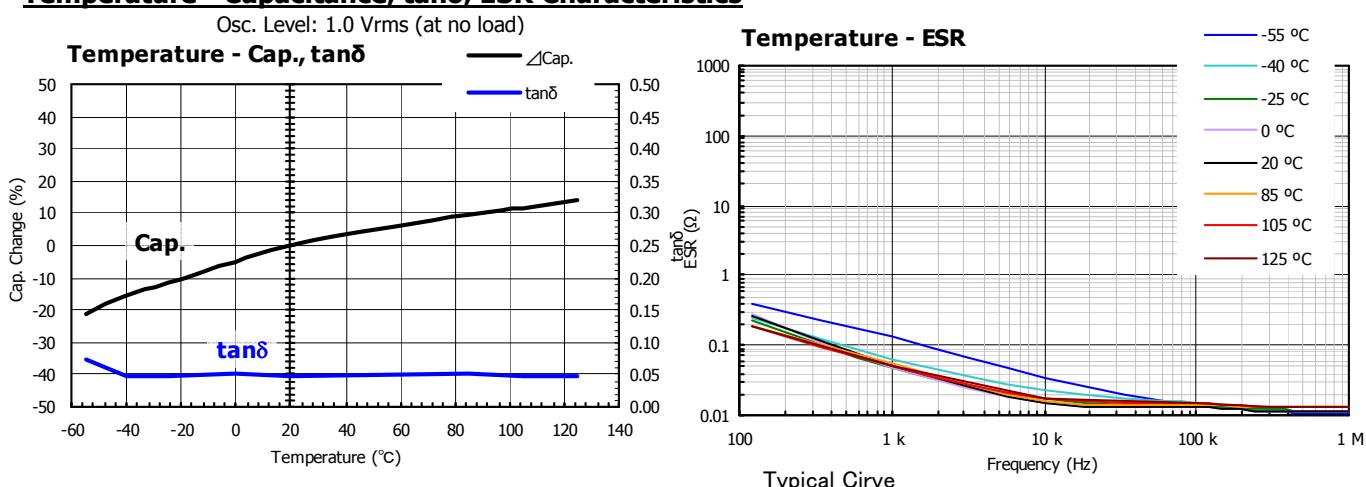
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



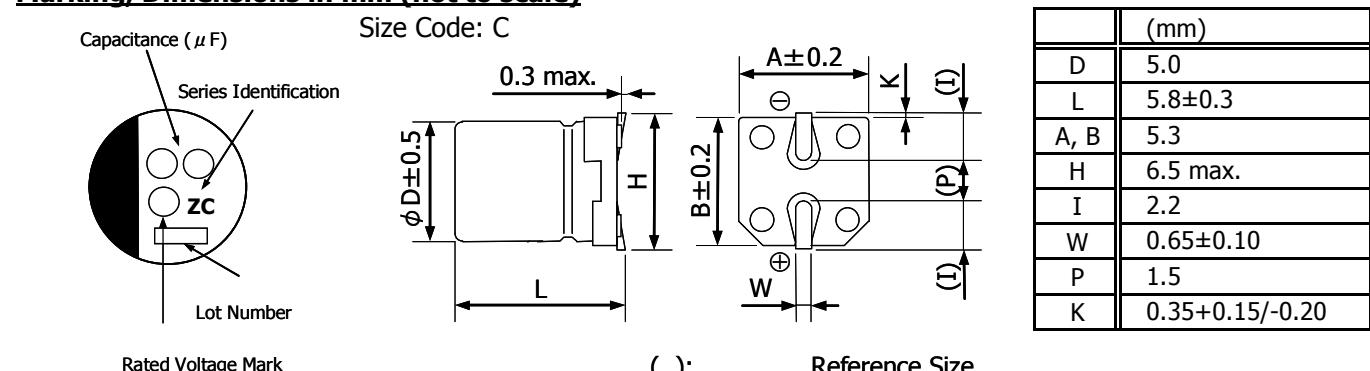
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1V220R

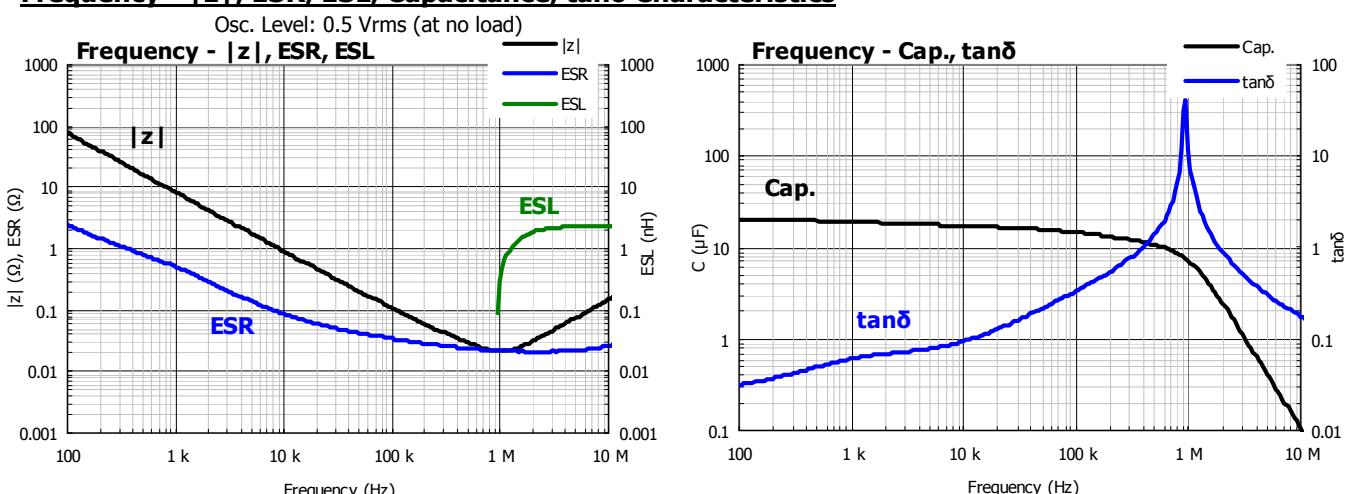
$\phi 5.0 \times 5.8 \text{ mm} / 35 \text{ V} / 22 \mu\text{F} / 125^\circ\text{C}, 4000 \text{ h}$

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	7.7 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 μF (at 120 Hz)		ESR	100 $\text{m}\Omega$ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	550 mArms max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

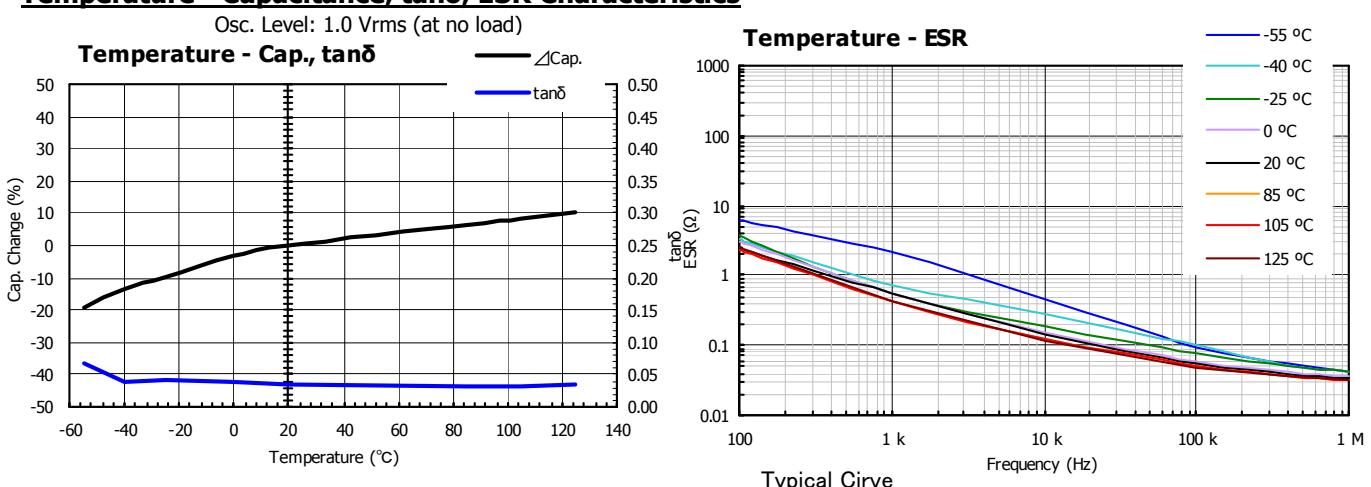
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



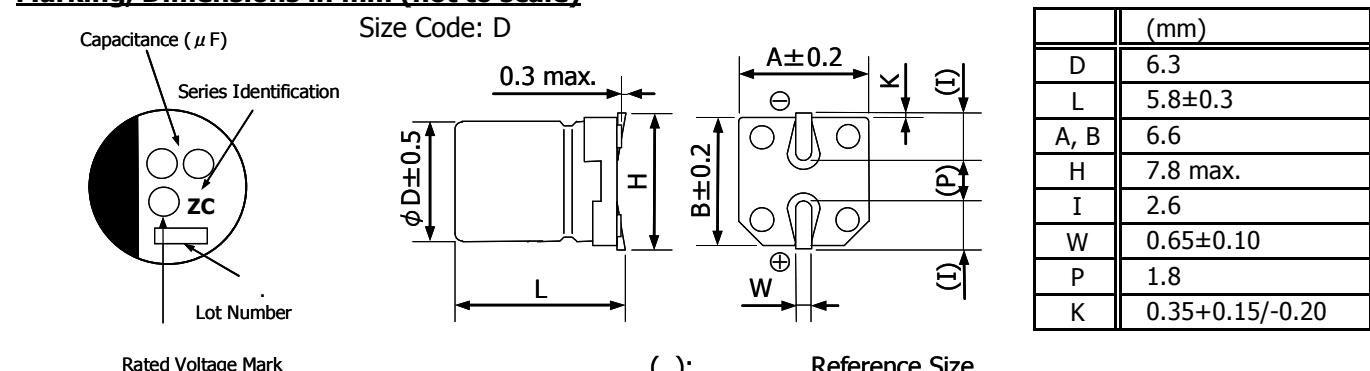
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1V470P

$\phi 6.3 \times 5.8$ mm / 35 V / 47 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	16.4 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	47 μ F (at 120 Hz)		ESR	60 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	900 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

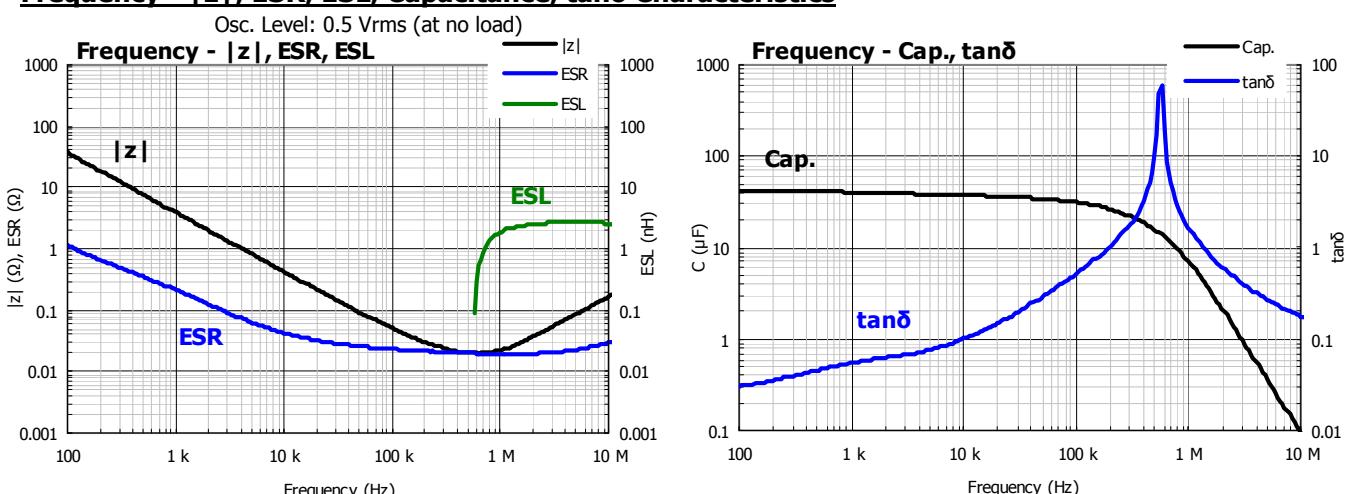
Marking, Dimensions in mm (not to scale)



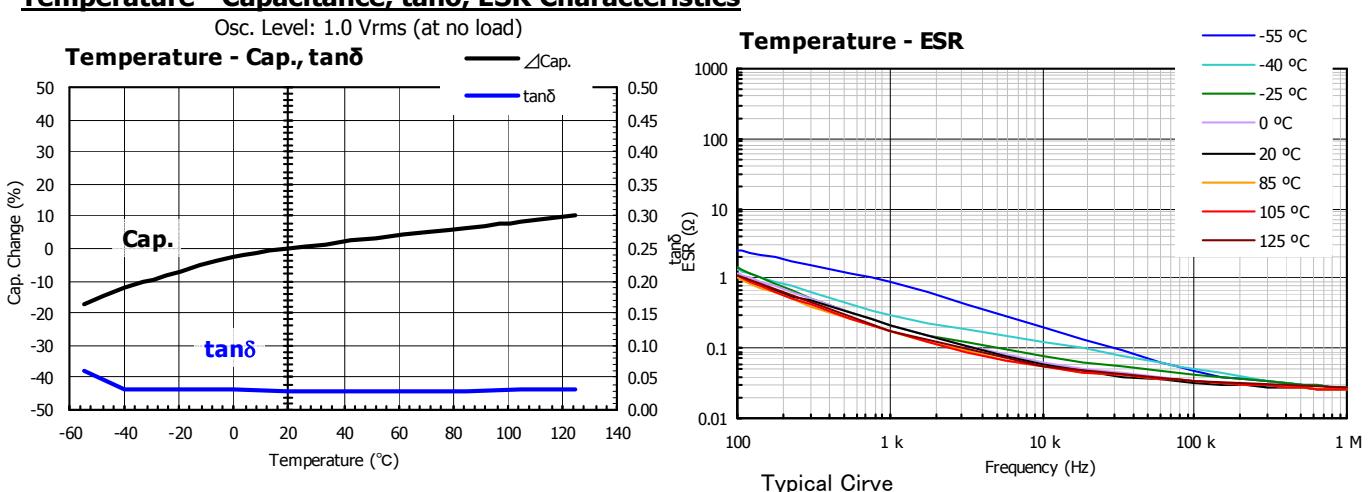
Rated Voltage Mark

(): Reference Size

Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



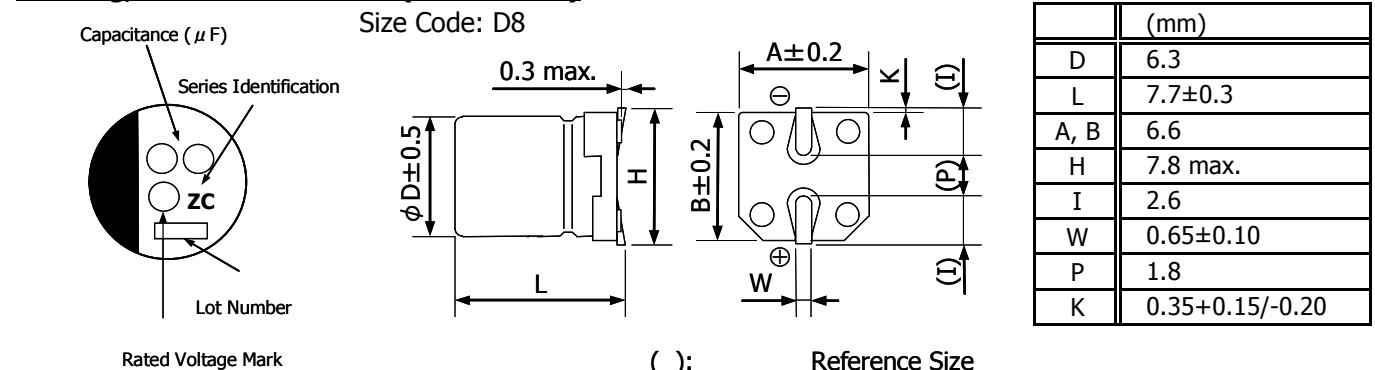
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1V680XP

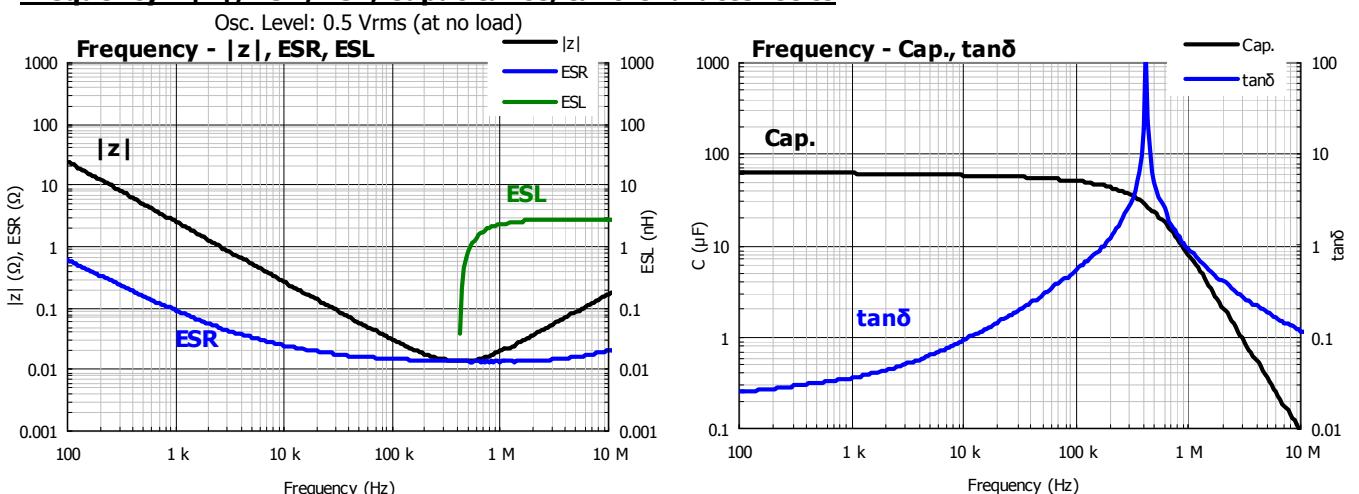
$\phi 6.3 \times 7.7$ mm / 35 V / 68 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	23.8 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	68 μ F (at 120 Hz)		ESR	35 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1400 mA max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

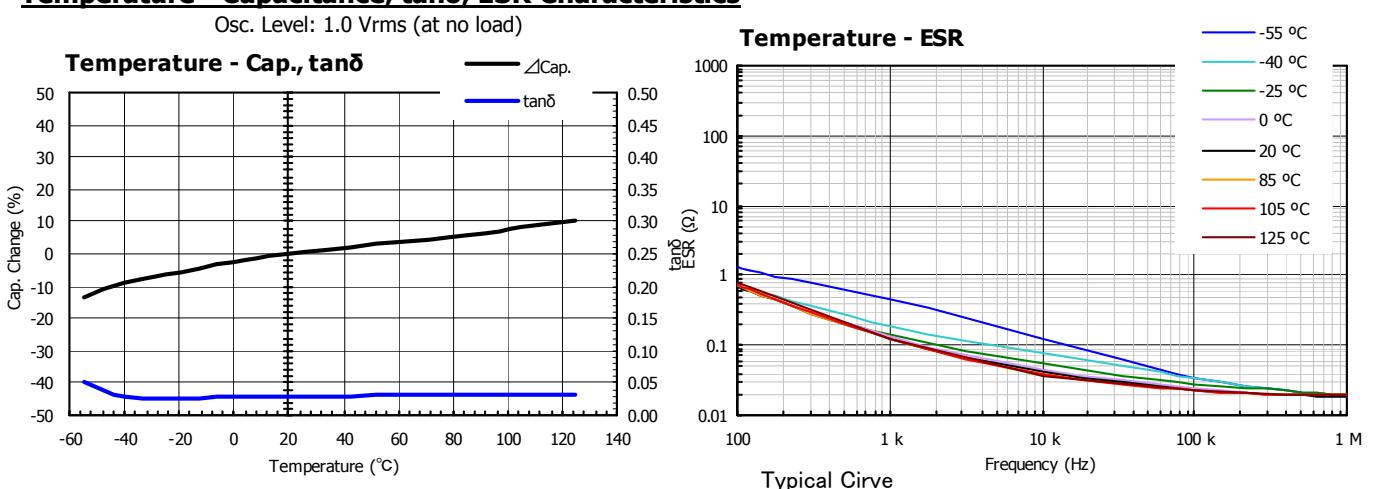
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



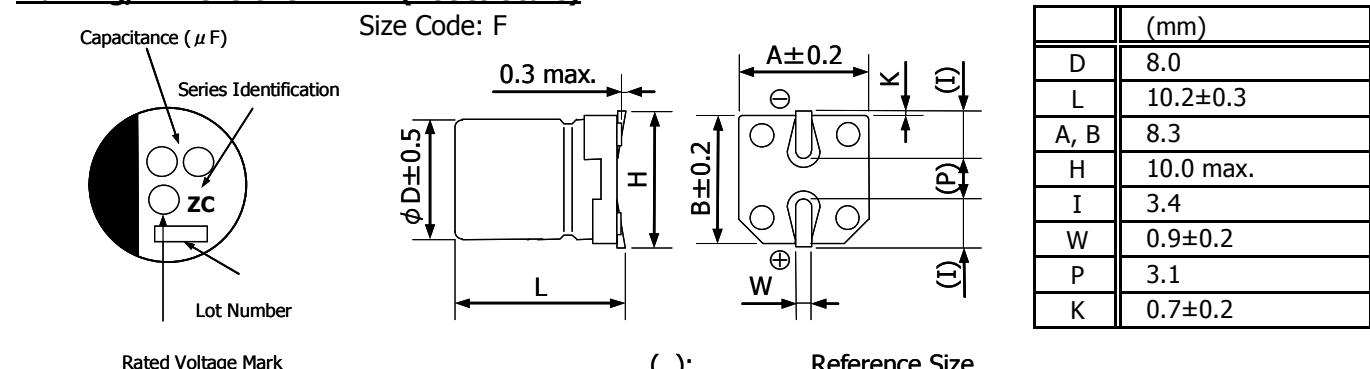
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1V151P

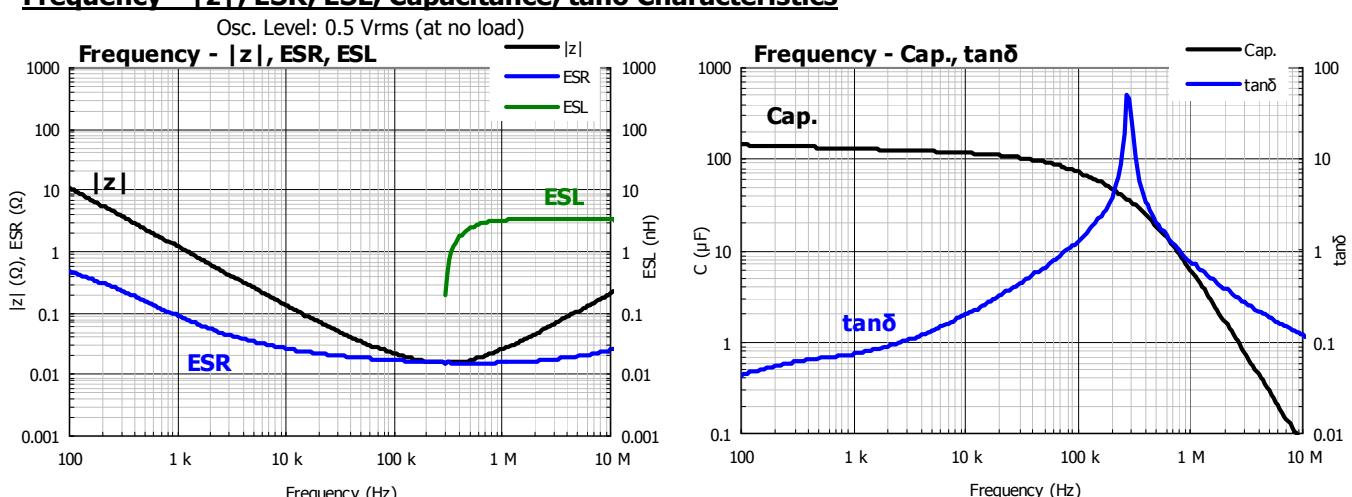
$\phi 8.0 \times 10.2$ mm / 35 V / 150 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	52.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	150 μ F (at 120 Hz)		ESR	27 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1600 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

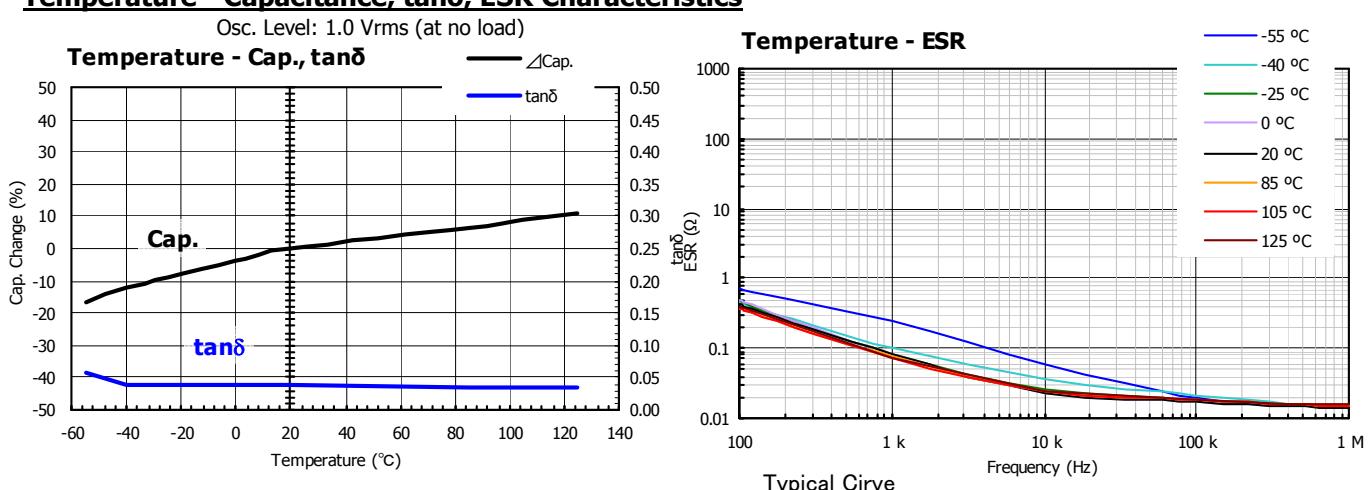
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



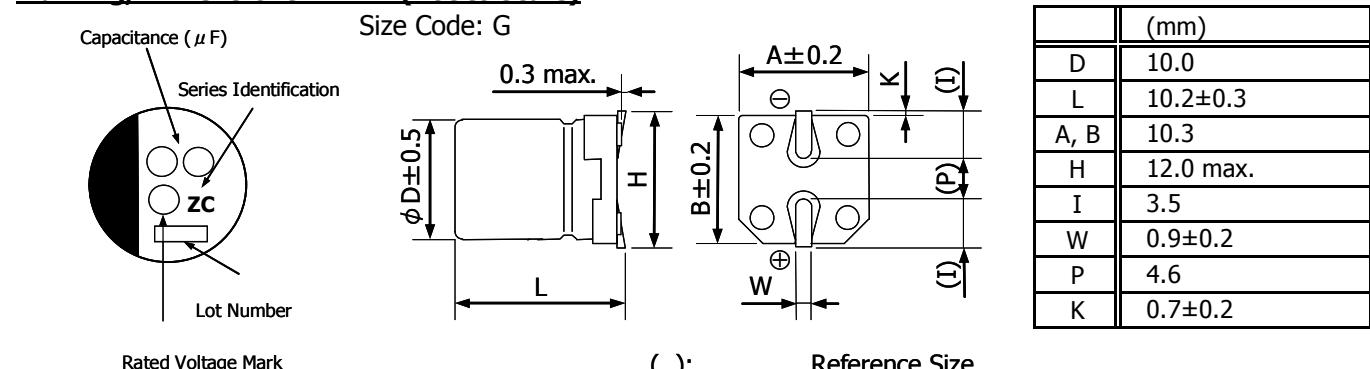
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1V271P

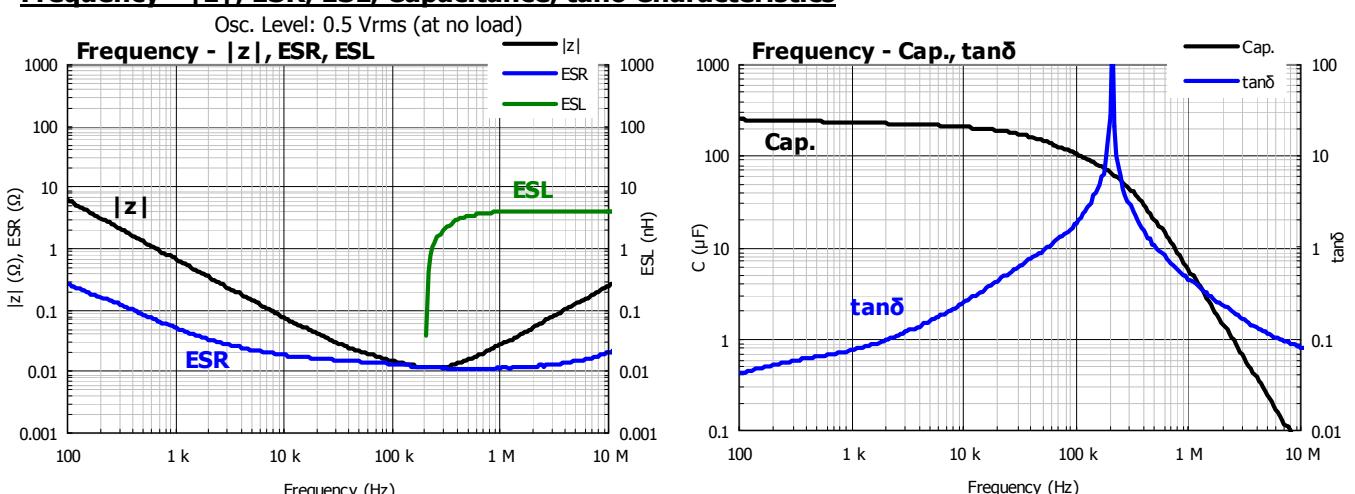
$\phi 10.0 \times 10.2$ mm / 35 V / 270 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.12 max. (at 120 Hz)
Rated W.V. Range	DC 35 V		DC Leakage Current	94.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	270 μ F (at 120 Hz)		ESR	20 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	2000 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

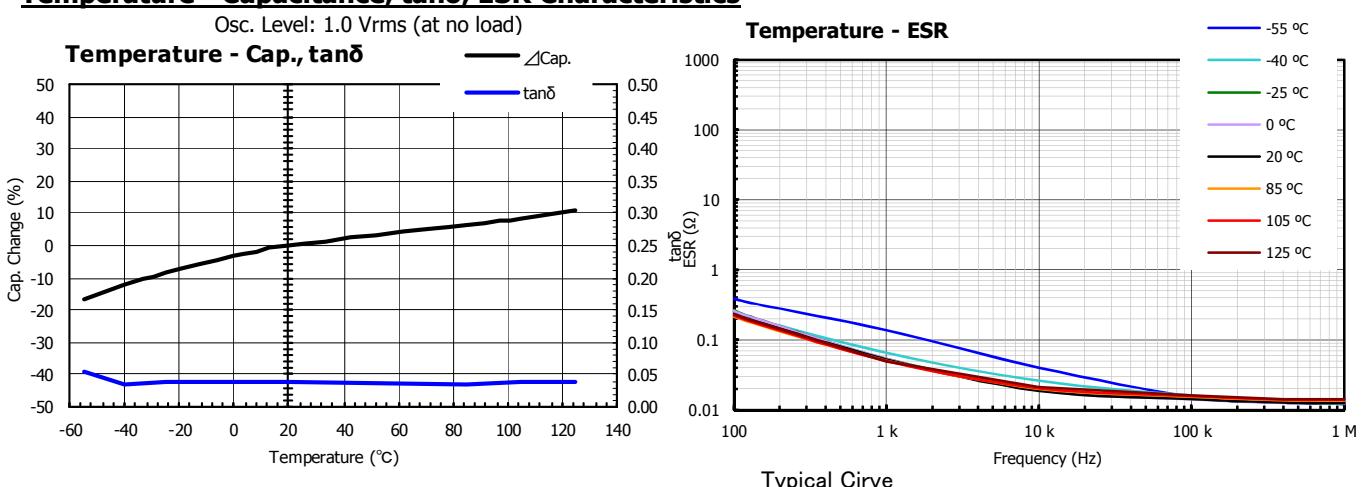
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



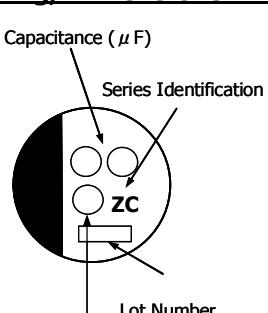
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1H100R

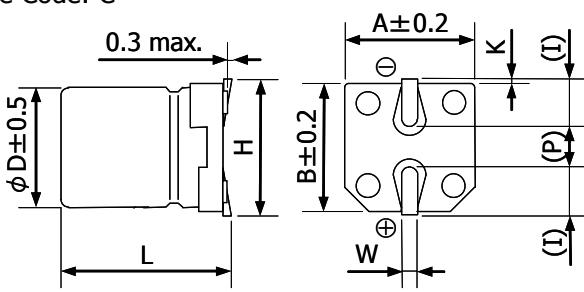
$\phi 5.0 \times 5.8 \text{ mm} / 50 \text{ V} / 10 \mu\text{F} / 125^\circ\text{C}, 4000 \text{ h}$

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.1 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	5 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	10 μF (at 120 Hz)		ESR	120 $\text{m}\Omega$ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	500 mArms max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

Marking, Dimensions in mm (not to scale)



Size Code: C



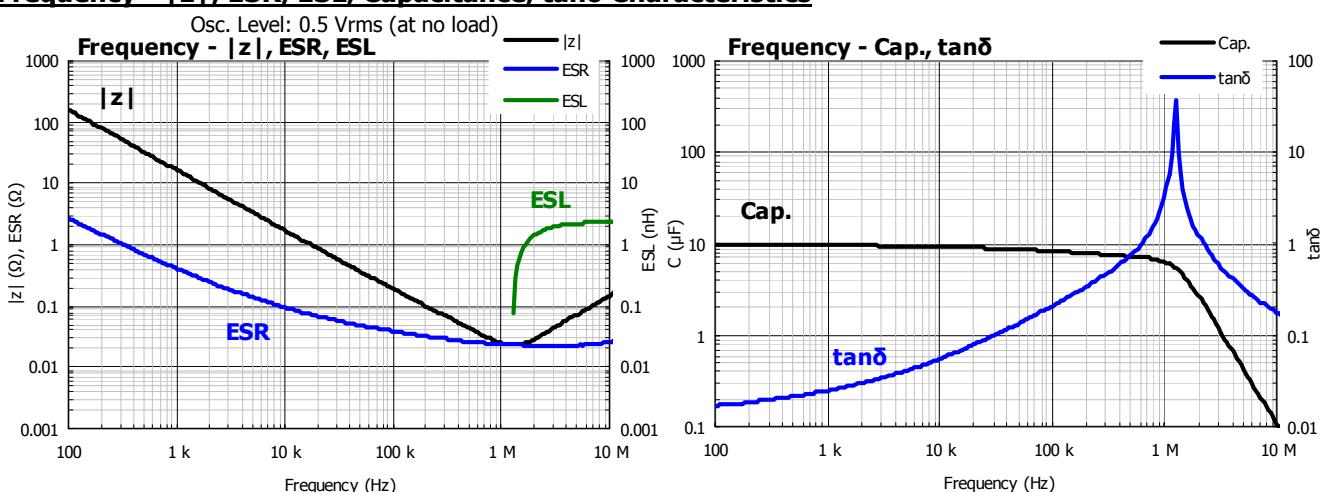
	(mm)
D	5.0
L	5.8±0.3
A, B	5.3
H	6.5 max.
I	2.2
W	0.65±0.10
P	1.5
K	0.35+0.15/-0.20

Rated Voltage Mark

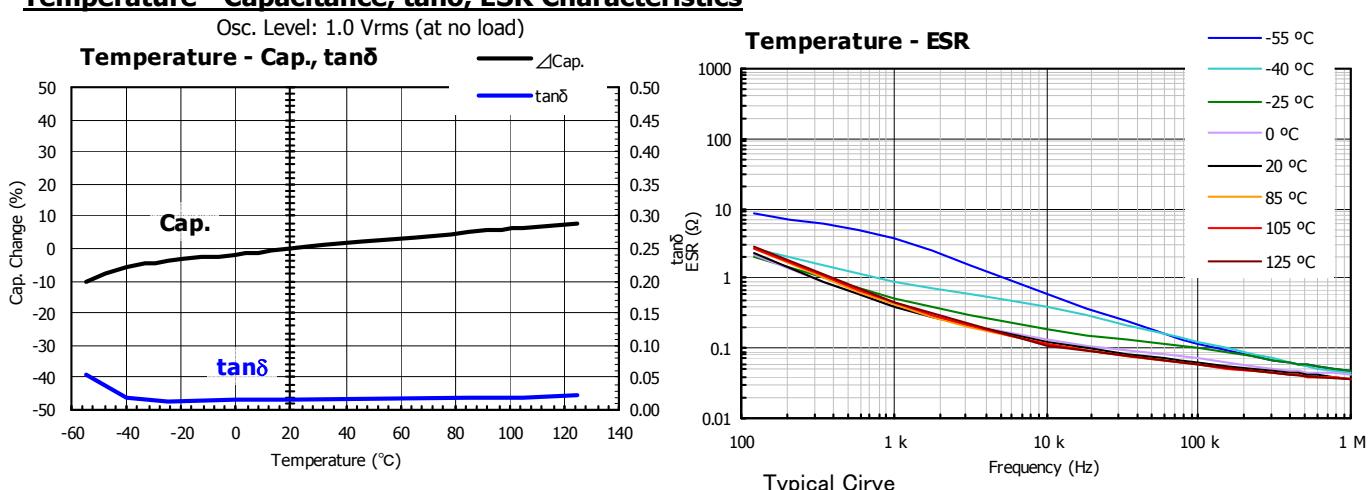
():

Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



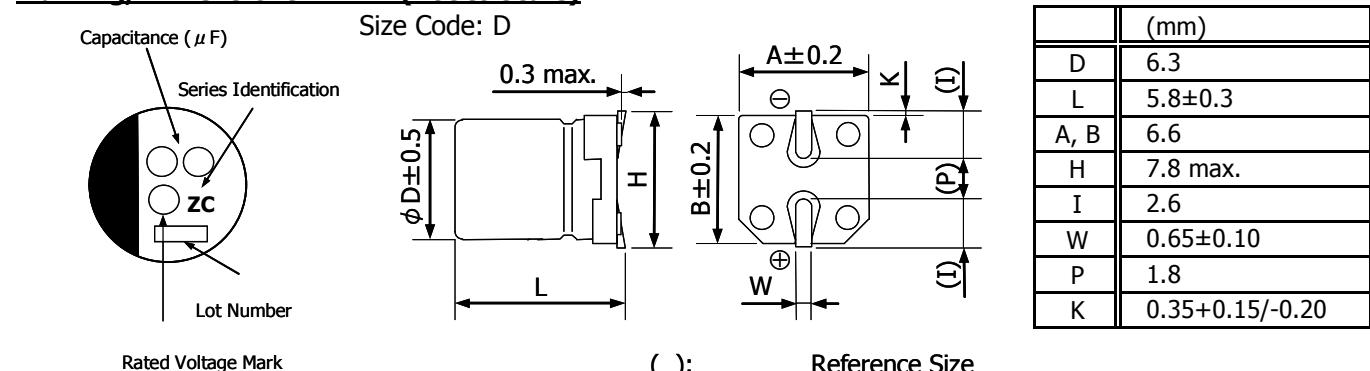
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1H220P

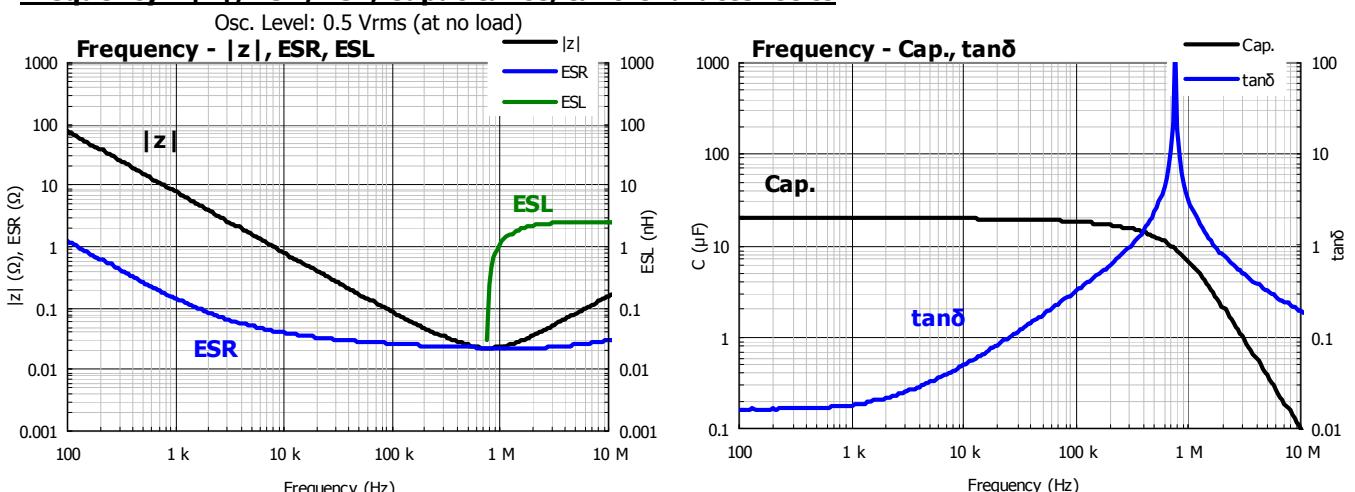
$\phi 6.3 \times 5.8$ mm / 50 V / 22 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.10 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	11 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 μ F (at 120 Hz)		ESR	80 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	750 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

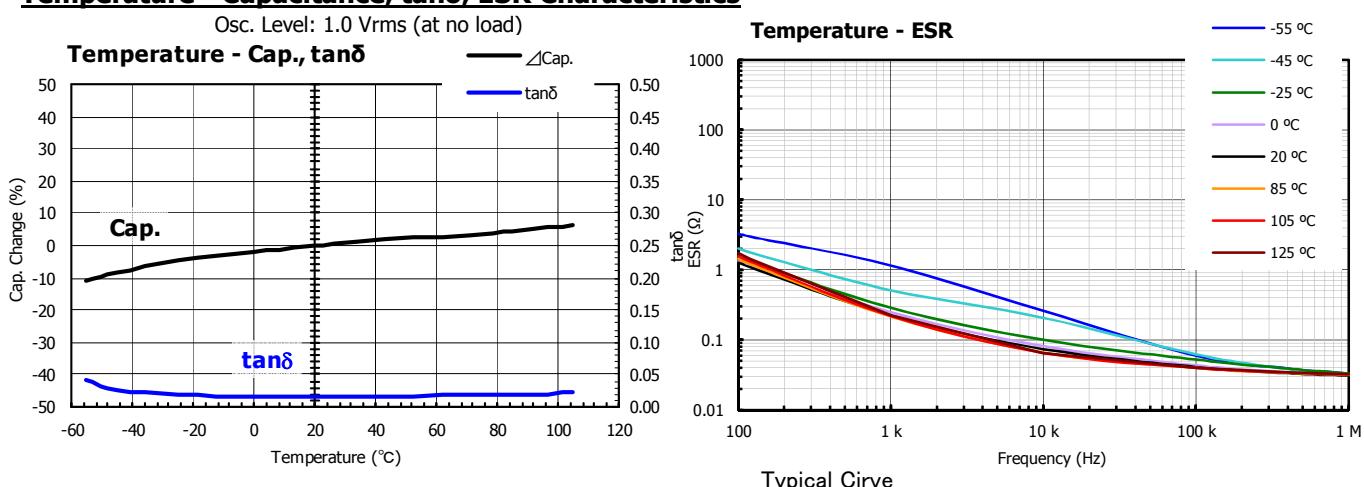
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



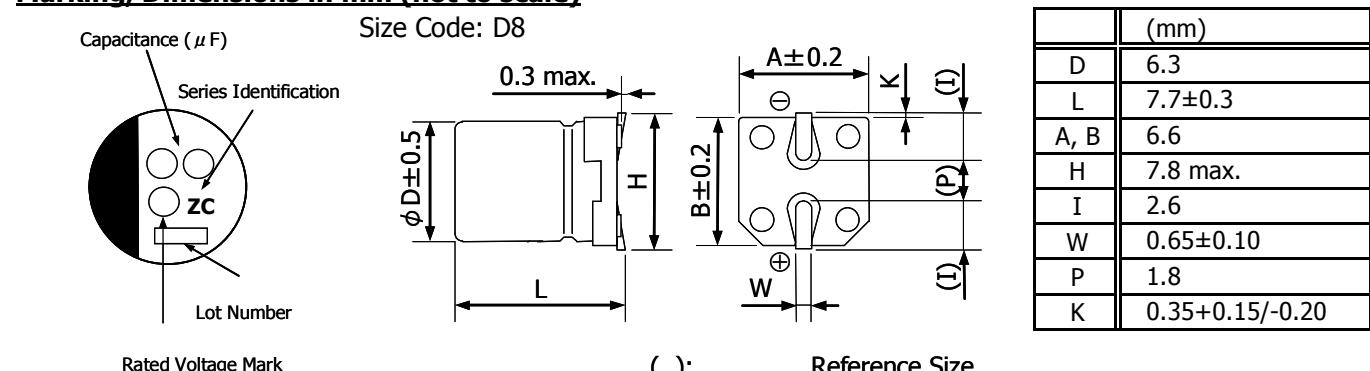
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1H330XP

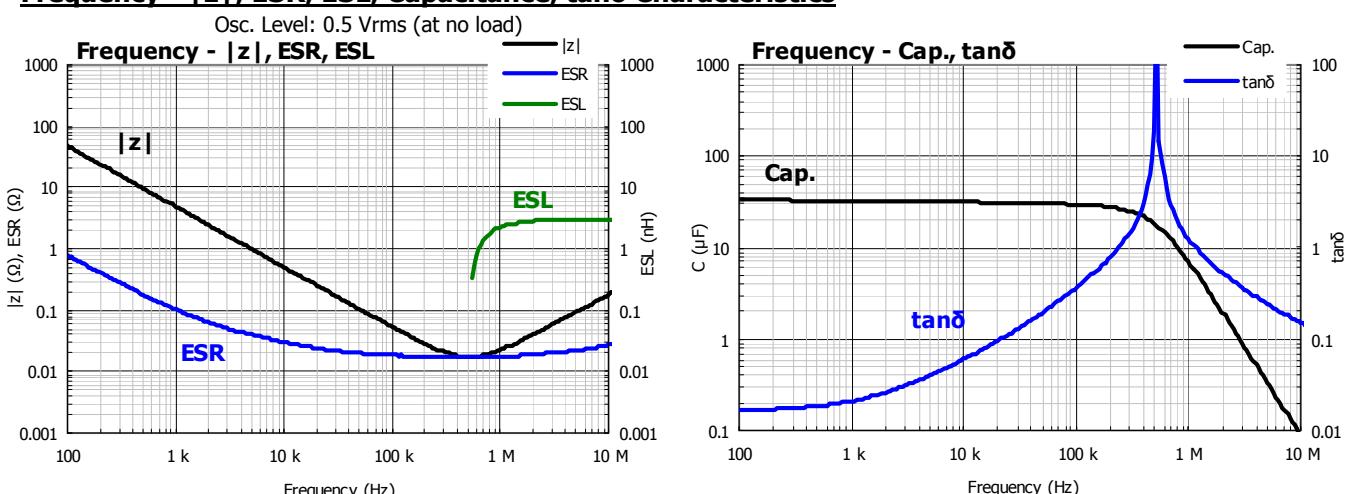
$\phi 6.3 \times 7.7$ mm / 50 V / 33 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.10 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	16.5 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μ F (at 120 Hz)		ESR	40 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1100 mA max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

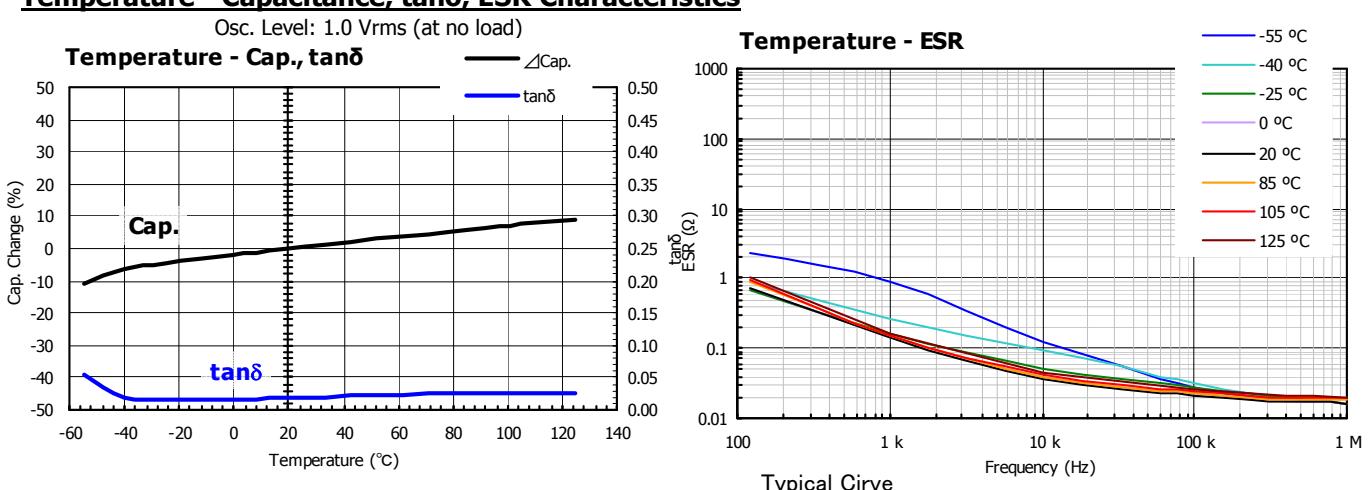
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



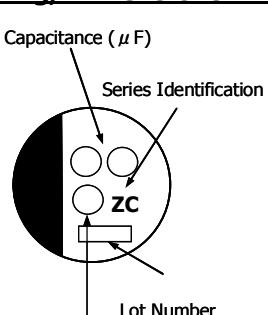
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1H680P

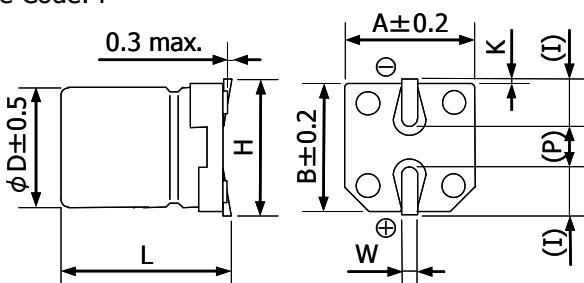
$\phi 8.0 \times 10.2$ mm / 50 V / 68 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.1 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	34 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	68 μ F (at 120 Hz)		ESR	30 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1250 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

Marking, Dimensions in mm (not to scale)



Size Code: F

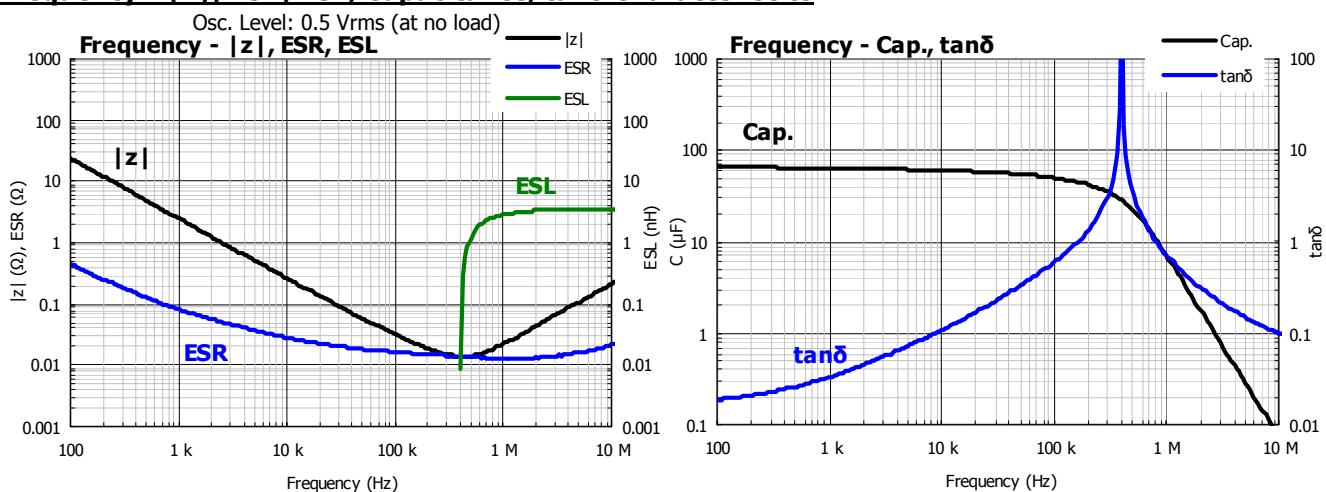


	(mm)
D	8.0
L	10.2±0.3
A, B	8.3
H	10.0 max.
I	3.4
W	0.9±0.2
P	3.1
K	0.7±0.2

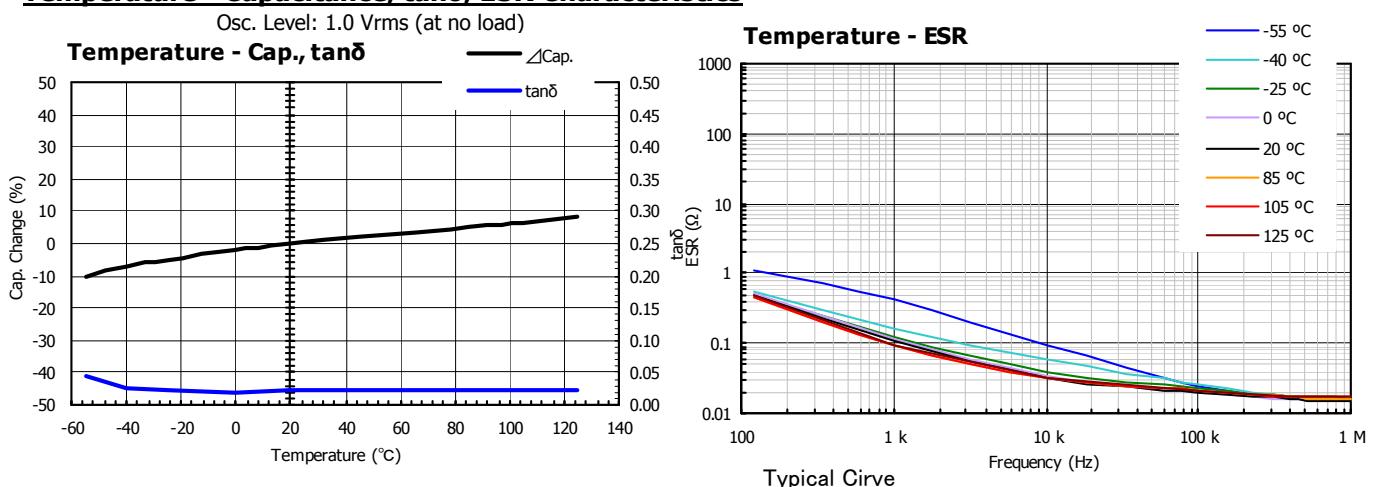
Rated Voltage Mark

(): Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



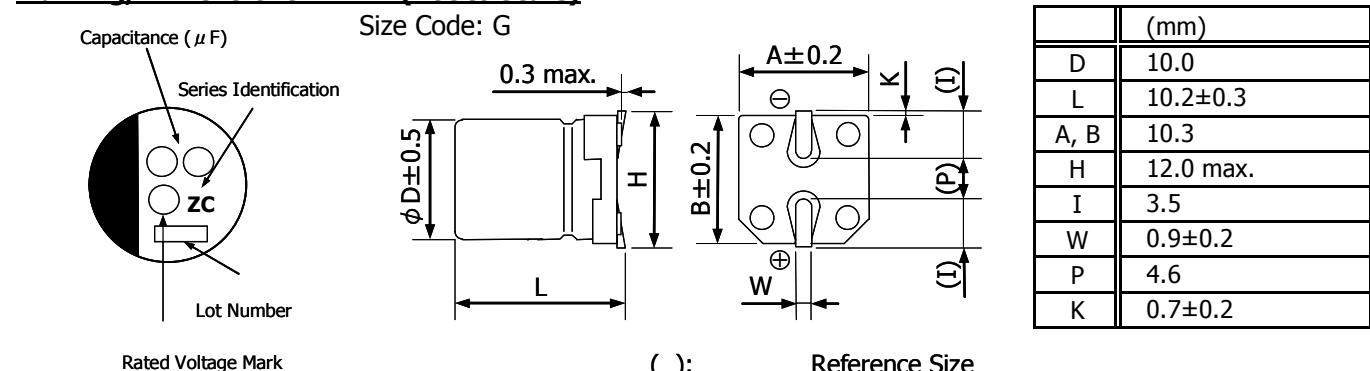
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1H101P

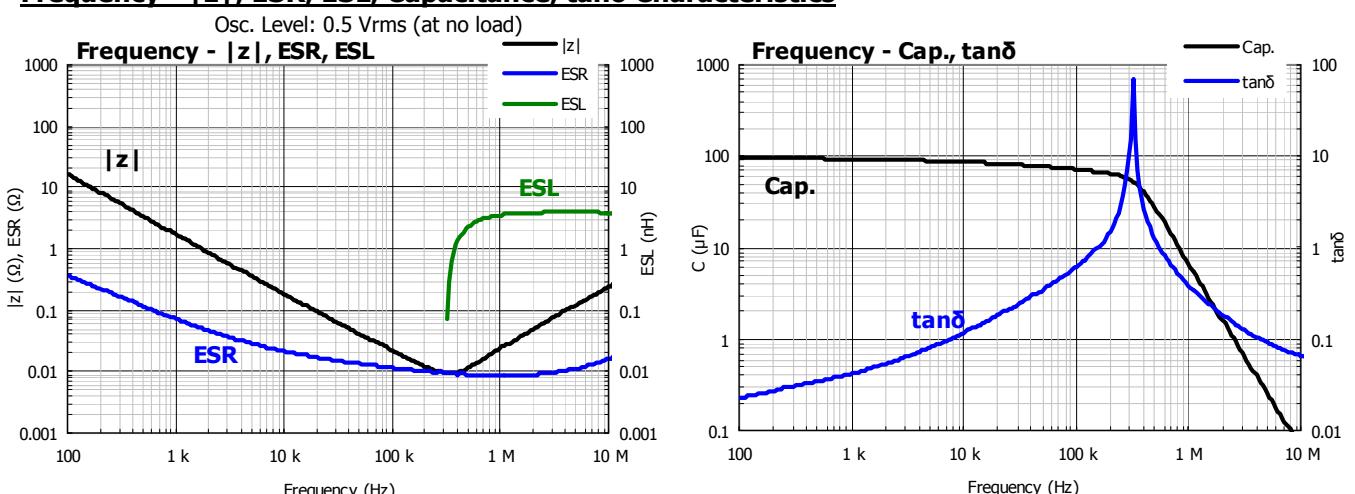
$\phi 10.0 \times 10.2 \text{ mm} / 50 \text{ V} / 100 \mu\text{F} / 125^\circ\text{C}, 4000 \text{ h}$

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.1 max. (at 120 Hz)
Rated W.V. Range	DC 50 V		DC Leakage Current	50 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	100 μF (at 120 Hz)		ESR	28 m Ω max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	1600 mA max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

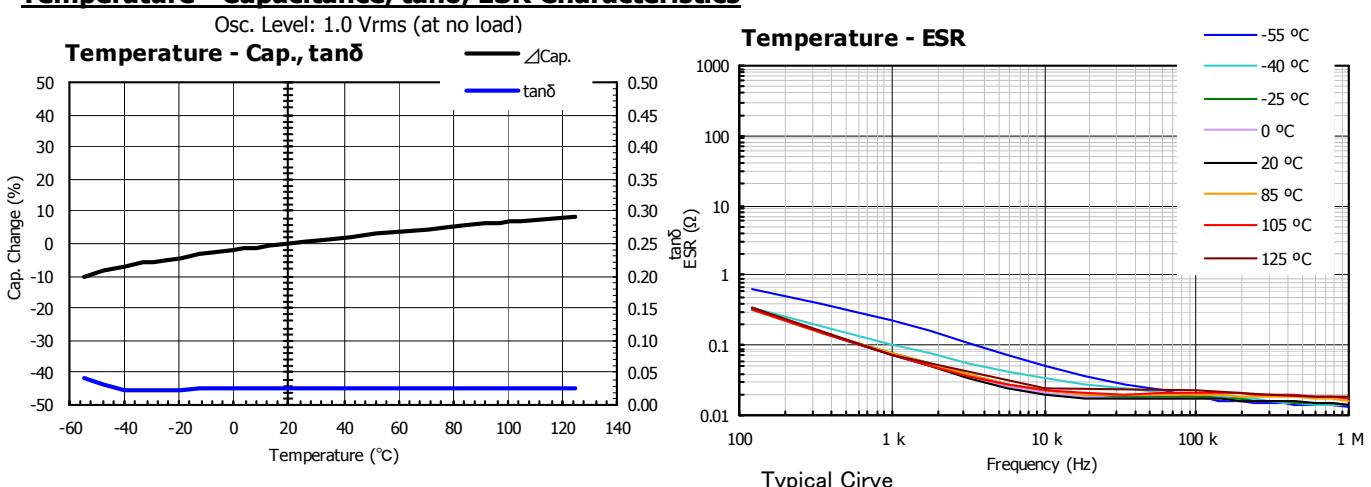
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



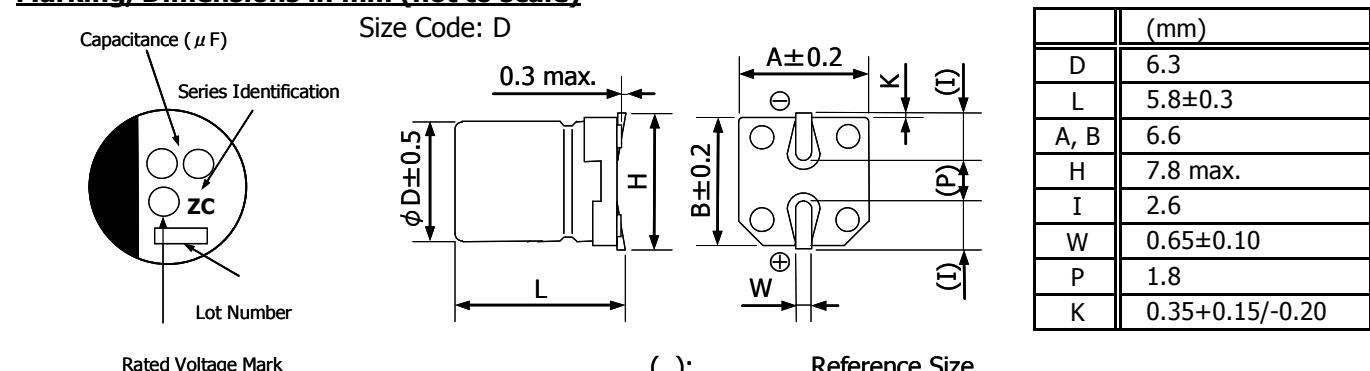
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1J100P

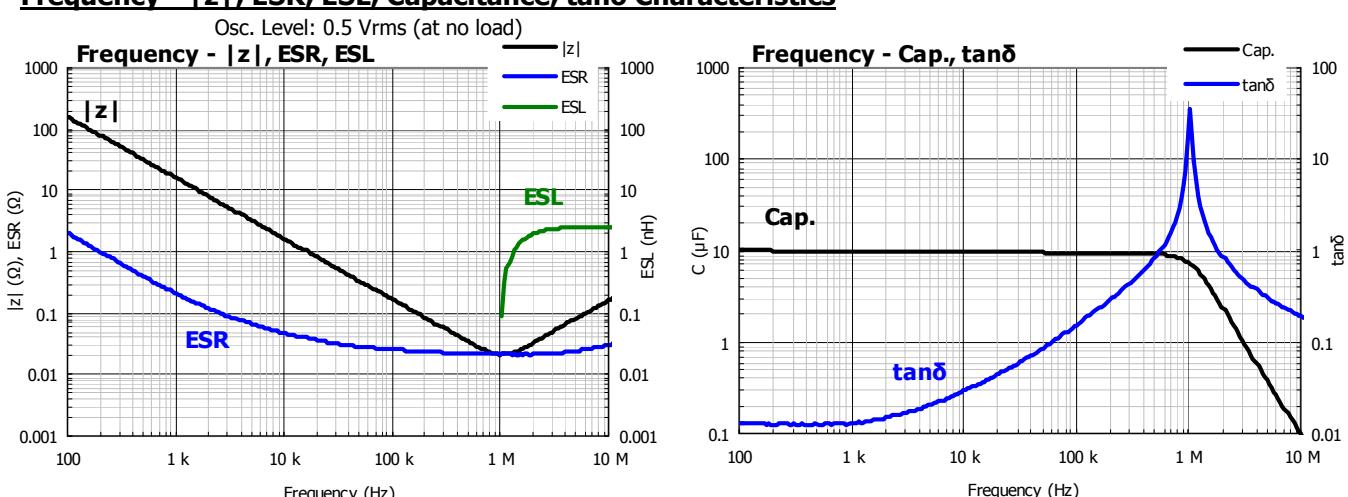
$\phi 6.3 \times 5.8 \text{ mm} / 63 \text{ V} / 10 \mu\text{F} / 125^\circ\text{C}, 4000 \text{ h}$

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	6.3 μA (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	10 μF (at 120 Hz)		ESR	120 $\text{m}\Omega$ max. (at 100 kHz)
Capacitance Tolerance	$\pm 20 \%$		Ripple Current	700 mArms max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

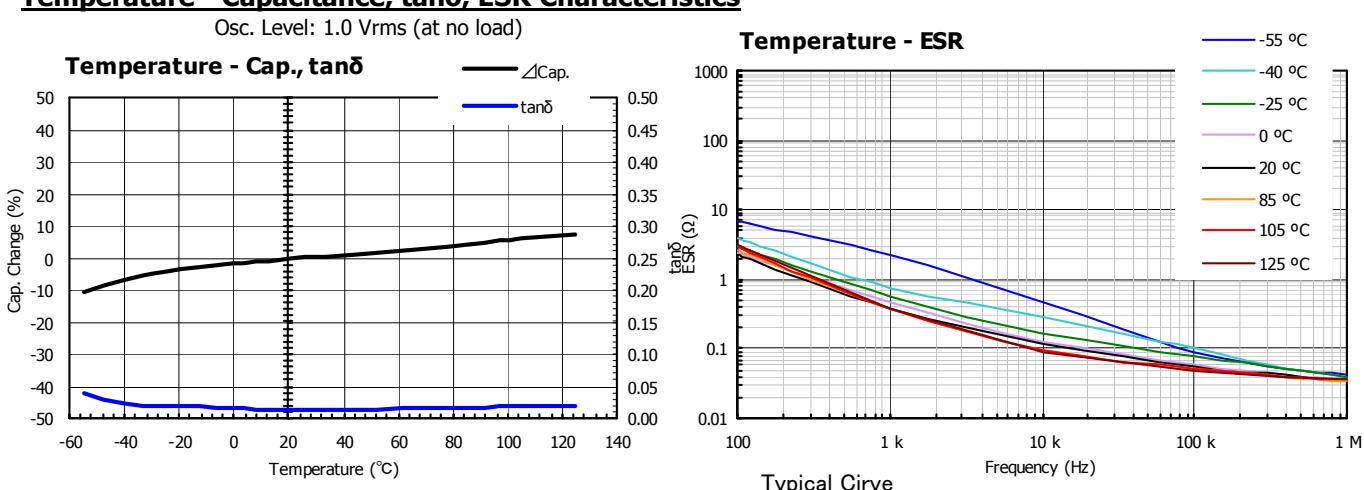
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



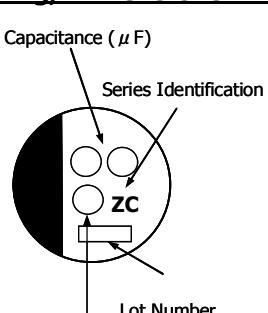
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1J220XP

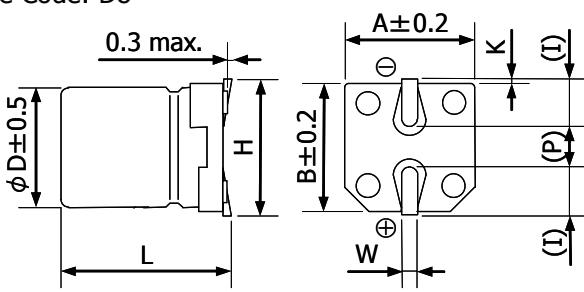
$\phi 6.3 \times 7.7$ mm / 63 V / 22 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	13.8 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	22 μ F (at 120 Hz)		ESR	80 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	900 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

Marking, Dimensions in mm (not to scale)



Size Code: D8

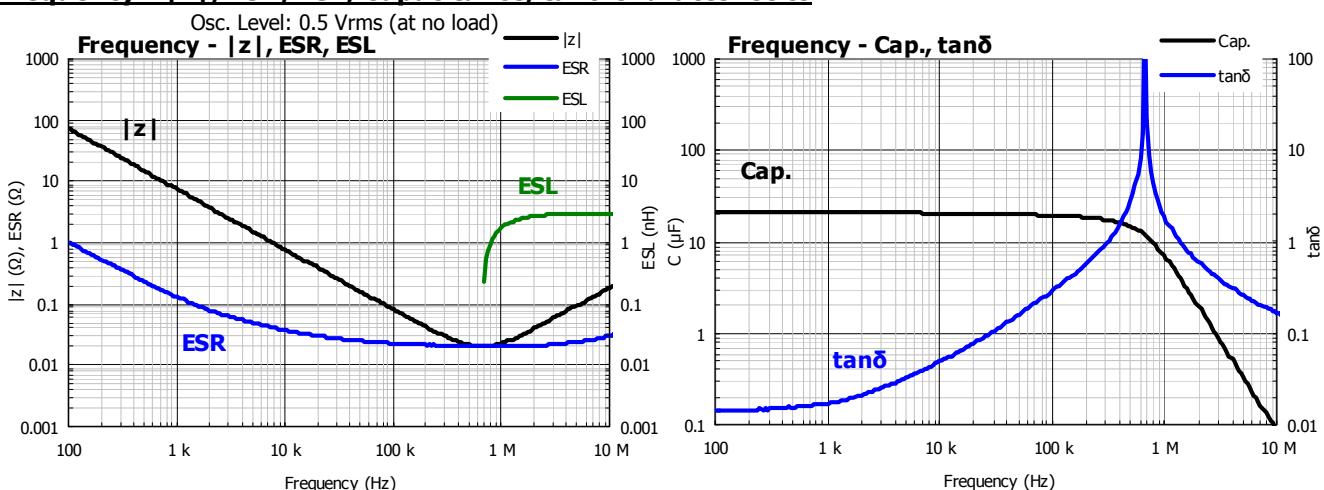


	(mm)
D	6.3
L	7.7 ± 0.3
A, B	6.6
H	7.8 max.
I	2.6
W	0.65 ± 0.10
P	1.8
K	0.35 + 0.15/-0.20

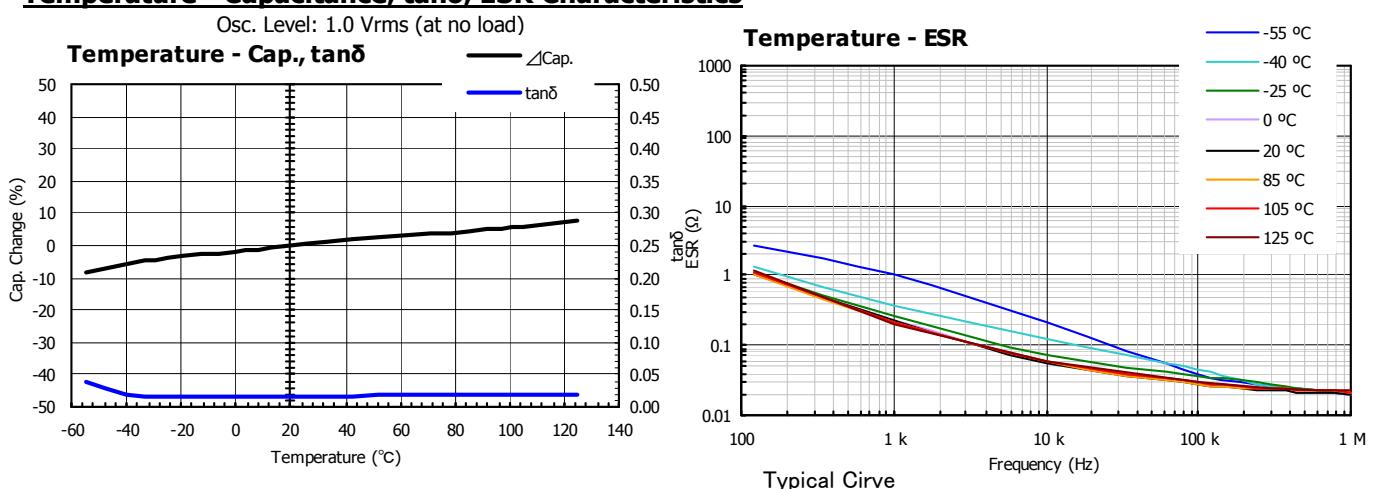
Rated Voltage Mark

(): Reference Size

Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



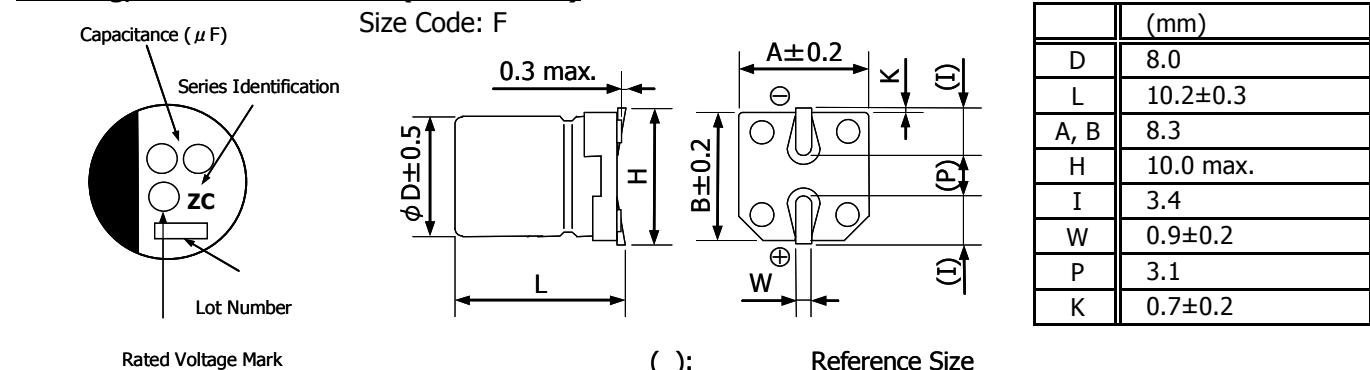
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1J330P

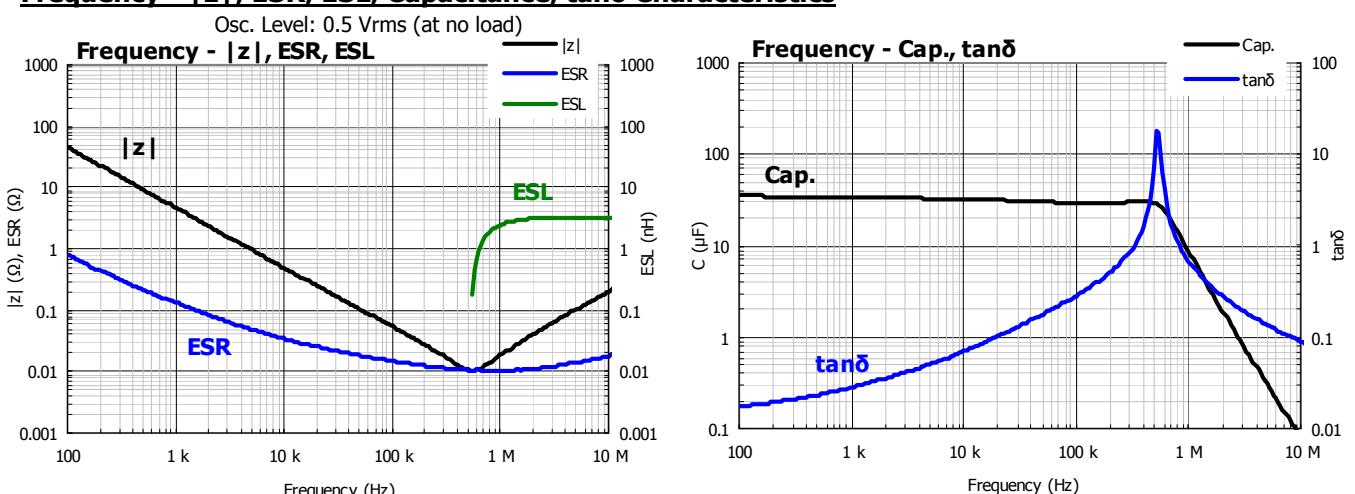
$\phi 8.0 \times 10.2$ mm / 63 V / 33 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	20.7 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	33 μ F (at 120 Hz)		ESR	40 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1100 mAmax. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

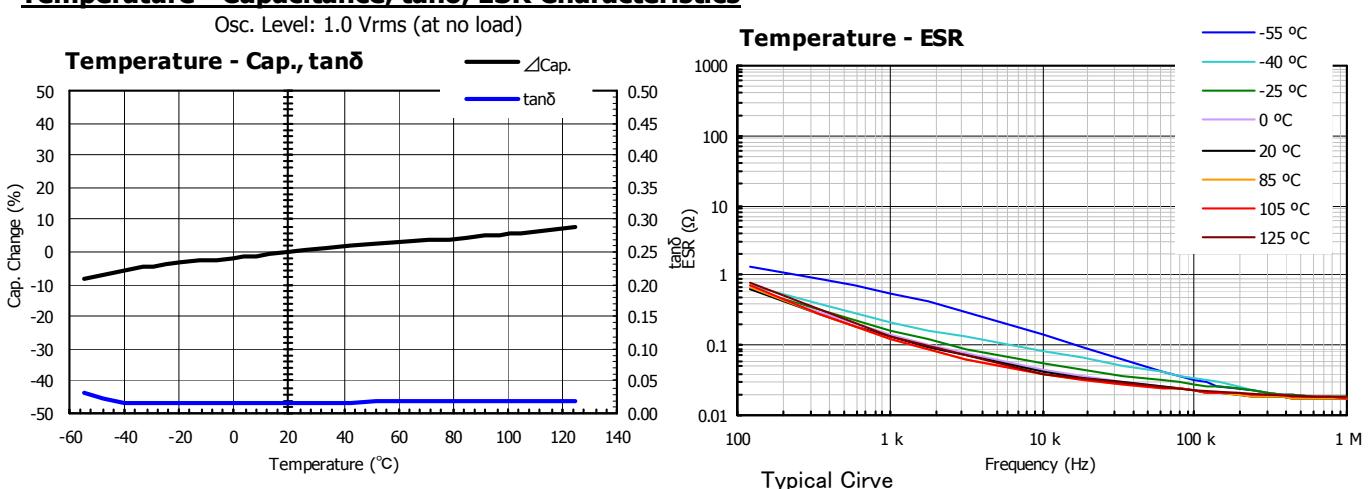
Marking, Dimensions in mm (not to scale)



Frequency - $|z|$, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



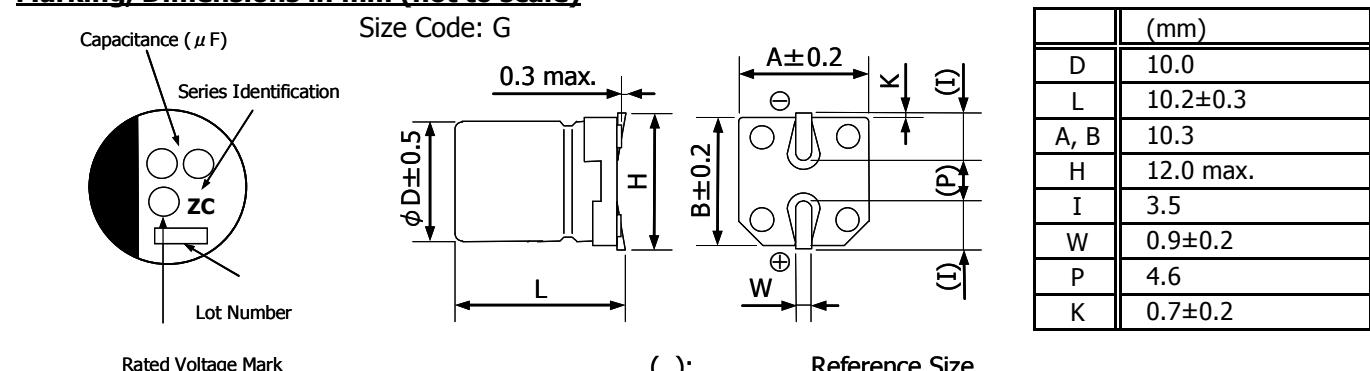
Technical Data

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor V type ZC series Part Number: EEHZC1J560P

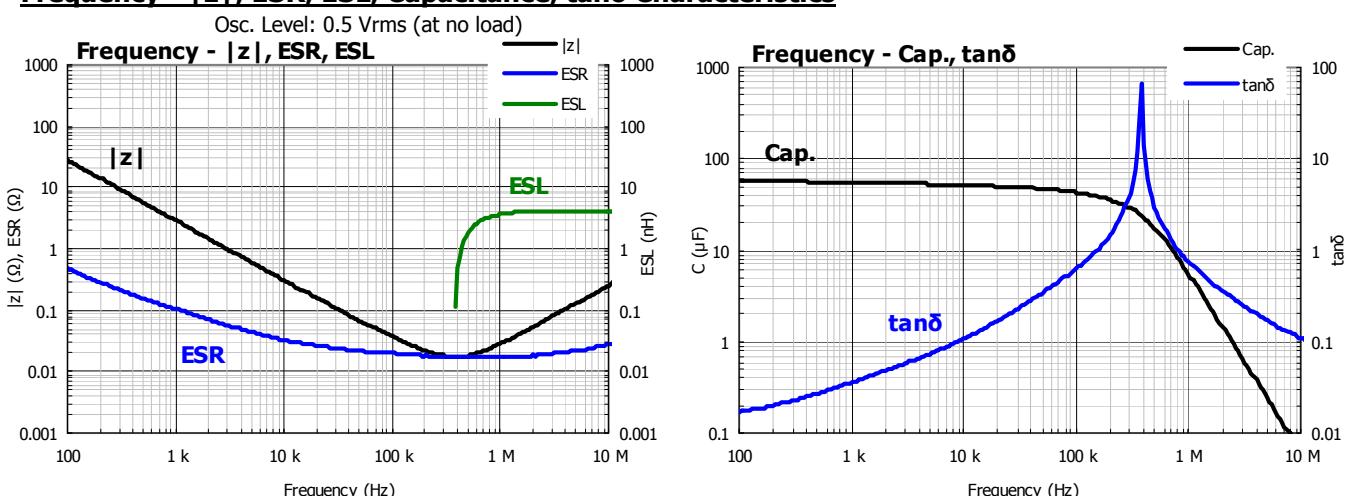
$\phi 10.0 \times 10.2$ mm / 63 V / 56 μ F / 125 °C, 4000 h

Category	Temperature Range	-55 to 125 °C	$\tan\delta$	0.08 max. (at 120 Hz)
Rated W.V. Range	DC 63 V		DC Leakage Current	35.2 μ A (0.01CV) max. (at W.V., After 2 min)
Nominal Capacitance Range	56 μ F (at 120 Hz)		ESR	30 m Ω max. (at 100 kHz)
Capacitance Tolerance	± 20 %		Ripple Current	1400 mA max. (at 100 kHz, 125 °C)
			Endurance	125 °C, 4000 h

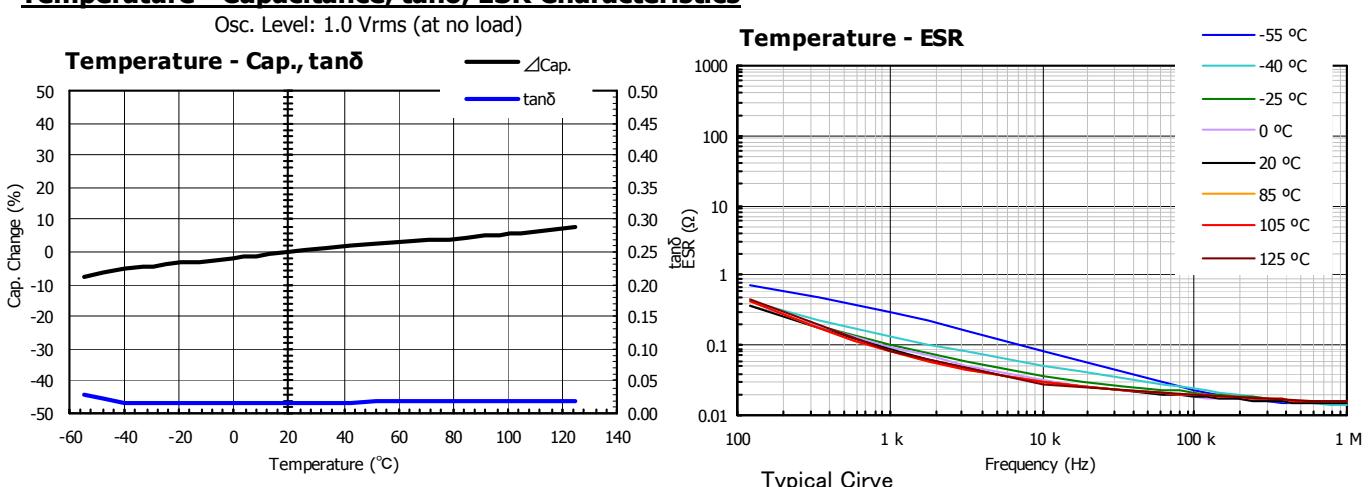
Marking, Dimensions in mm (not to scale)



Frequency - |z|, ESR, ESL, Capacitance, $\tan\delta$ Characteristics



Temperature - Capacitance, $\tan\delta$, ESR Characteristics



M E M O

M E M O

For more Information please contact the respective sales office of factory

Factory

Capacitor Business Division

Automotive & Industrial Systems Company, Panasonic Corporation

25, Nishinaka, Kowata, Uji, Kyoto, 611-8585 JAPAN TEL 81-774-32-1111

SALES OFFICES

Automotive & Industrial Systems Company

Panasonic Corporation (JAPAN)

Industrial Marketing & Sales Division
1006 Kadoma Kadoma-shi, Osaka 571-8506, JAPAN

North & Latin Americas

PIDSNA

Panasonic Industrial Devices Sales Company of America,
A Division of Panasonic Corporation of North America
Industrial Components Division
Two Riverfront Plaza, 7th Floor Newark, NJ 07102-2550, U.S.A.
Tel: 973-655-2112

Panasonic Canada Inc.
5770 Ambler Drive Mississauga, Ontario L4W 2T3 CANADA
Tel: 1-905-238-2311

Panasonic do Brasil Limitada
Av. do Caffe, 277-Bloco A-8 andar, CEP04311-900,
Sao Paulo, SP, BRASIL
Tel: 55-11-3889-4145

SANYO Electronic Device (U.S.A.) Corporation
A Division of SANYO North America Corporation
San Diego Headquarter
2055 Sanyo Ave., San Diego ,CA 92154, U.S.A.
Tel: 1-619-671-4356

Cupertino office
10900 North Tantau Ave., Ste #120 Cupertino, CA 95014, U.S.A.
Tel: 1-408-861-3959

Dallas sales office
2600 Network Blvd, 6th Floor, Frisco, TX 75034, U.S.A.
Tel: 1-469-362-5465

Europe

PIDSEU

Panasonic Industrial Devices Sales Europe GmbH
Winsbergstr 15, D-22525 Hamburg, GERMANY
Tel: 49-40-85386-370

PIDSEU-UK
Panasonic Industrial Devices Sales Europe GmbH UK Branch
Willoughby Road, Bracknell, Berkshire RG12 8FP, U.K.
Tel: 44-1344-862-444

PIDSEU-Paris

Panasonic Industrial Devices Sales Europe GmbH Paris Office
8/10 Rue des petits Ruisseaux, 91370 Verrières-Le-Buisson,
FRANCE
Tel: 33-(0)-1-60-13-57-00

PIDSEU-Milan

Panasonic Industrial Devices Sales Europe GmbH Milan Office
C/O Panasonic Italia S.p.A. Viale Dell'Innovazione 3-20125
Milano, ITALY
Tel: 39-02-6788-321

PIDSEU-Barcelona

Panasonic Industrial Devices Sales Europe GmbH Barcelona Office
Parque Empresarial @ Sant Cugat, Via Augusta 15_25 Edificio
B2 Planta 4 Oficina 17, 08174 Sant Cugat del Vales, Barcelona,
SPAIN
Tel: 34-93-504-3010

PIDSEU-Helsinki

Panasonic Industrial Devices Sales Europe GmbH Helsinki Sales Office
Urho Kekkosen Katu 7B, 00100 Helsinki, Finland
Tel: 358-9-6898-4150

East Asia and China

PIDSCN

Panasonic Industrial Devices Sales (China) Co.,Ltd
Floor 7, China Insurance Building, 166 East Road Lujiazui,
PuDong New District, Shanghai 200120, CHINA
Tel: 86-21-3855-2000

PSIDSHK

Panasonic Shun Hing Industrial Devices Sales (Hong Kong) Co.,Ltd,
Top Floor South Wing Chinachem Golden Plaza 77 Mody
Road Tsim Sha Tsui East Kowloon, HONG KONG
Tel: 852-2529-7322

PSIDSSZN

Panasonic SH Industrial Devices Sales (Shenzhen) Co.,Ltd.
8/F, Tower Three, Kerry Plaza, 1-1zhongxin 4th Road,
Futian District, Shenzhen 518048, CHINA
Tel: 86-755-8255-8888

SANYO Electric (Hong Kong) Ltd.

SANYO Electronic Components Company

Hong Kong Headquarter
Level 27, Tower 1, Kowloon Commerce Centre, 51 Kwai
Cheung Road, Kwai Chung, N.T., Hong Kong
Tel: 852-2484-5000

CAUTION AND WARNING

1. The electronic components contained in this catalog are designed and produced for use in home electric appliances, office equipment, information equipment, communications equipment, and other general purpose electronic devices.
Before use of any of these components for equipment that requires a high degree of safety, such as medical instruments, aerospace equipment, disaster-prevention equipment, security equipment, vehicles (automobile, train, vessel), please be sure to contact our sales representative.
2. When applying one of these components for equipment requiring a high degree of safety, no matter what sort of application it might be, be sure to install a protective circuit or redundancy arrangement to enhance the safety of your equipment. In addition, please carry out the safety test on your own responsibility.
3. When using our products, no matter what sort of equipment they might be used for, be sure to make a written agreement on the specifications with us in advance.
4. Technical information contained in this catalog is intended to convey examples of typical performances and/or applications and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of our company or any third parties nor grant any license under such rights.
5. In order to export products in this catalog, the exporter may be subject to the export license requirement under the Foreign Exchange and Foreign Trade Law of Japan.
6. No ozone-depleting substances (ODSs) under the Montreal Protocol are used in the manufacturing processes of Automotive & Industrial Systems Company, Panasonic Corporation.

● Please contact

● Factory

Capacitor Business Division
Automotive & Industrial Systems Company
Panasonic Corporation
25 Nishinaka, Kowata, UjiCity, Kyoto
611-8585,JAPAN
Tel : 81-774-32-1111
The information in this catalog is valid as of Jun. 2014.