

Issue Number: R2009012

Date: Sep 17, 2020

Document Number: FPL8040-04

Revision: 04

Messrs: 山西长城计算机系统有限公司

**SPECIFICATIONS OF  
FUNCTIONAL POLYMER ALUMINUM SOLID  
ELECTROLYTIC CAPACITORS**

***FPCAP***



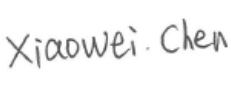
**L8 Series (RE Type)**

**- Blue Marking -**

**Lead-free & RoHS Compliance & Halogen Free**

<b>Receipt Confirmation</b>
Date: _____
Title / Section Name : _____ / _____
Signature: _____

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**NICHICON CORPORATION  
NICHICON ELECTRONICS (SUQIAN) CO., LTD.**

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### 1. Specifications of RE type

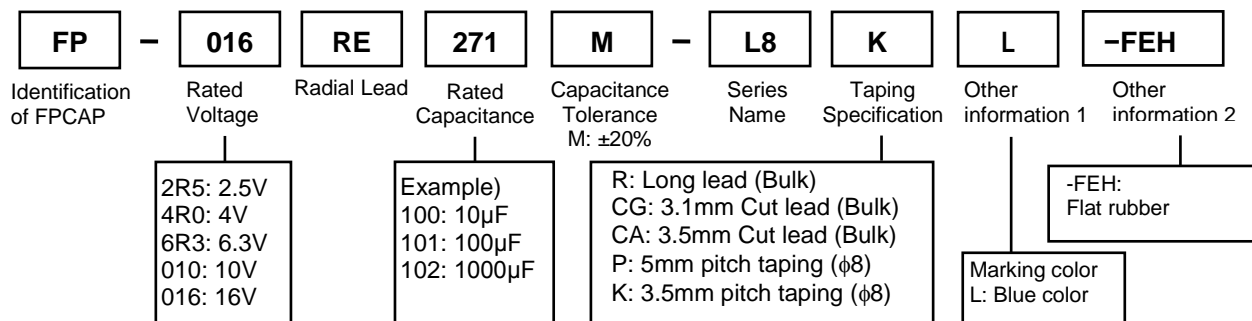
#### 1-1. Scope

This document describes the specifications of FPCAP RE type for Functional Polymer Capacitors. (The Capacitors to call)

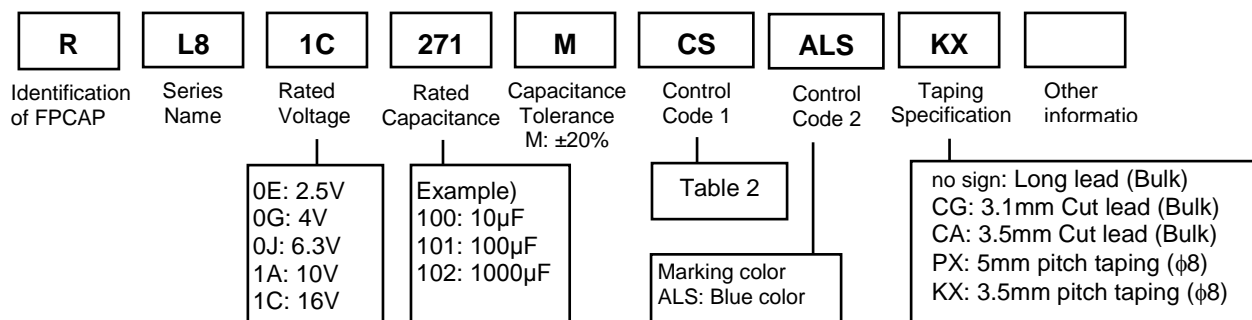
#### 1-2. Part number

Part number of it is expressed by the following formula

##### 1-2-1. FPCAP part number



##### 1-2-2. NICHICON part number



#### 1-3. List of products

Table 1: Standard Ratings (R.V.: Rated Voltage, S.V.: Surge Voltage)

[Unit: mm]

R.V. (S.V.) [V]	2.5 (2.8)	4.0 (4.6)	6.3 (7.2)	10 (11.5)	16 (18.4)
Cap. [μF]					
100					
180					
220					
270					φ8×8
330					
390					
470					
560					
680					
820					
1000					

1-4. Dimensions

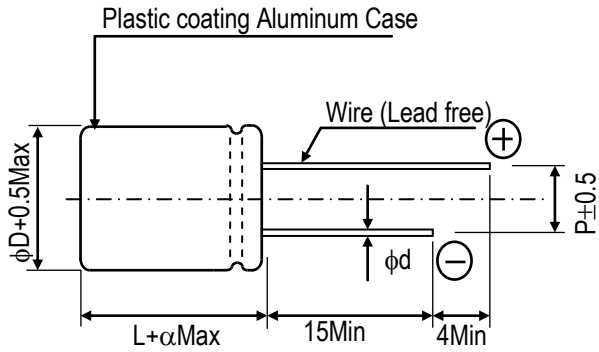
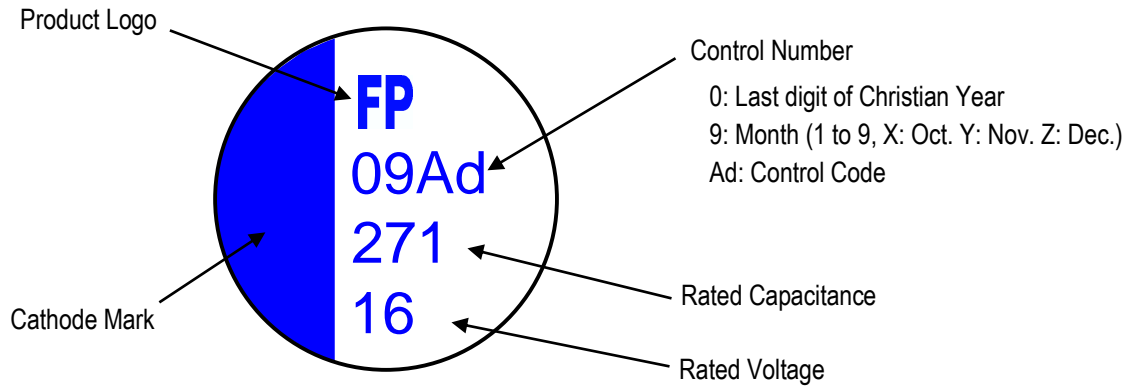


Table 2: Dimensions [Unit: mm]

$\phi D \times L$	$\phi d$	P	$\alpha$	Control Code 1 (P/N)
8×8 (Flat rubber)	0.6	3.5	1.0	CS

1-5. Outer appearance

1-5-1. Marking <Example>



1-5-2. Marking color

Marking color: Blue

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### 1-6. Part Number and Specification

Table 3: Part Number and Specification list

Rated Voltage [V]	Rated Capacitance* <sup>1</sup> [μF]	FPCAP Part Number (NICHICON Part Number)	Leakage Current* <sup>2</sup> [μA]	Tangent of loss angle* <sup>1</sup>	Equivalent Series Resistance* <sup>3</sup> [mΩ]	Rated Ripple Current* <sup>4</sup> [mA rms]	Case Size φD×L [mm]
<b>16</b>	<b>270</b>	<b>FP-016RE271M-L8□□L-FEH (RL81C271MCSALS□□)</b>	<b>864</b>	<b>0.12</b>	<b>13</b>	<b>4700</b>	<b>φ8×8</b>

\*1: 120Hz at 20°C (Ambient temperature of capacitor)

\*2: Apply the rated voltage for 2 minutes at 20°C (Ambient temperature of capacitor)

\*3: 100kHz at 20°C (Ambient temperature of capacitor)

\*4: 100kHz at 105°C (Ambient temperature of capacitor)



No.	Item	Characteristics		Test method	
9	Surge Test	Appearance	No remarkable abnormality	Test temperature: 25±10°C Applied voltage: Rated Voltage x 1.15 (see Table 1) Voltage application: 1000 cycles of charging for 30±5 s with a period of 6±0.5 min. Series Resistance: 1kΩ Discharge Resistance: 1kΩ	
		Leakage current	To satisfy No.6 with the rated voltage (after voltage treatment ) <sup>*5</sup>		
		Change in capacitance	Within ±20% of the value before test		
		Tangent of loss angle	To satisfy No.5		
10	Terminal strength	Tensile strength of termination	Such abnormalities as breakage, loosening shall not appear.	Lead dia	Tension
				φ0.6mm	10 N
		Bending strength	Such abnormalities as breakage, loosening shall not appear.	A specified weight is installed in the lead wire of the terminal. After it bends it from the weld of the terminal to right and left (90°), it returns it to former position.	
				Lead dia	Weigh
				φ0.6mm	5 N
11	Vibration	Appearance	No remarkable abnormality	Conditions of vibration: 3 directions of x, y and z, each 2 h, 6 h in total. Class A, peak-to-peak amplitude 1.5mm Sweeping time: Approximately 1 min for 10 to 55 to 10 Hz	
		Capacitance	During test: measurement data become stable The end test: ±5% of the value before test		
12	Solderability	A new uniform coating of solder shall cover a minimum of 95 % of the surface being immersed.		Kind of solder: H60A, H60S, H63A or Sn+3.0%Ag+0.5%Cu Flux: Ethanol solution of 25wt % colophony. Temperature of solder: 245±5°C Duration of immersion into solder: 3±0.5s Depth of immersion: A point 1.5 to 2.0mm from root of termination with a thermal screen used. Speed of immersion: 25±2.5mm/s	
13	Resistance to soldering heat	Appearance	No remarkable abnormality	Kind of solder: H60A, H60S, H63A or Sn+3.0%Ag+0.5%Cu Flux: Ethanol solution of 25wt% colophony. Temperature of solder: 260±5°C (400±10°C)** Duration of immersion into solder: 10±1s (3±1s)** Times of depth: Twice Depth of immersion: A point 1.5 to 2.0mm from root of termination with a thermal screen used. Speed of immersion: 25±2.5mm/s **: Within ( ), it is the condition of maximum heating. Its condition is possible to apply with a soldering iron.	
		Leakage current	To satisfy No.6 (after voltage treatment ) <sup>*5</sup>		
		Change in capacitance	Within ±3% of the value before test		
		Tangent of loss angle	To satisfy No.5		
		Depth of immersion: A point 1.5 to 2.0mm from root of termination with a thermal screen used. Speed of immersion: 25±2.5mm/s **: Within ( ), it is the condition of maximum heating. Its condition is possible to apply with a soldering iron.			

No.	Item	Characteristics		Test method										
14	Resistance to Solvent	No remarkable abnormality on appearance and marking is easily readable		Kind of solvent: Isopropyl alcohol Temperature: 20 to 25°C Visually examine the appearance after immersion into solvent for 30±5s.										
15	Damp heat (steady state)	Appearance	No remarkable abnormality	Temperature: 60±2°C Relative humidity: 90 to 95% Duration: 1000 +24/-0 h Before the final measurement, the protective resistor of about 1k ohm shall be connected in series. Direct current voltage, which is equal to the rated voltage, is applied for 1h. Next, the specimens shall be discharged through the resistor of about 1kΩ. Then, it shall be allowed to stand under the standard conditions (temperature: 15 to 35°C, relative humidity: 25 to 75%) for 2h.										
		Leakage current	To satisfy No.6 (after voltage treatment)*5											
		Change in capacitance	Within ±20% of the value before test											
		Tangent of loss angle	Not more than 150% the specified value in No.5											
16	Electrical endurance	Appearance	No remarkable abnormality	Temperature: 105±2°C Voltage application: Rated Voltage Duration: 2000+48/-0 h Connect protective resistor of approximately 1kΩ in series and apply the rated voltage. Before the final measurement, it shall be allowed to stand under the standard conditions for minimum 2h.										
		Leakage current	To satisfy No.6											
		Change in capacitance	Within ±20% of the value before test											
		Tangent of loss angle	Not more than 150% the specified value in No.5											
		Equivalent Series Resistance	Not more than 150% the specified value in No.7											
17	Rated ripple current	<p>Rated ripple current (Ambient temperature 105°C, 100kHz) to Table 3 When ripple current is 100kHz (mA rms) and operating temperature is within -55 to 105°C (Ambient temperature of capacitor), reduction of temperature should not carried out.</p> <p>Frequency correction factor for ripple current.</p> <table border="1"> <tr> <td>Frequency</td> <td>120Hz</td> <td>1kHz</td> <td>10kHz</td> <td>100kHz to 300kHz</td> </tr> <tr> <td>Coefficient</td> <td>0.10</td> <td>0.45</td> <td>0.50</td> <td>1.00</td> </tr> </table>			Frequency	120Hz	1kHz	10kHz	100kHz to 300kHz	Coefficient	0.10	0.45	0.50	1.00
Frequency	120Hz	1kHz	10kHz	100kHz to 300kHz										
Coefficient	0.10	0.45	0.50	1.00										
18	Reverse voltage	Appearance	No remarkable abnormality	Temperature: 105±2°C Applied voltage: Rated Voltage x -0.15  Apply the dc voltage specified in the detail specification in the inverse direction to the marked polarity for 125±4h. Then, apply the category voltage in the forward direction to the marked polarity for 125±4h.										
		Leakage current	To satisfy No.6											
		Change in capacitance	Within ±20% of the value Before test											
		Tangent of loss angle	Not more than 150% the specified value in No.5											



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No.	Item	Characteristics	Test method	
19	Failure rate level	0.1% / 1000hrs Max. (Confidence level: 60%)	Temperature: 105±2°C Voltage application: Rated Voltage  Connect protective resistor of approximately 1kΩ in series and apply the rated voltage. Before the final measurement, it shall be allowed to stand under the standard conditions for minimum 2h.	
		Appearance		No remarkable abnormality
		Leakage current		Not more than 30 times of the specified value in No.6
		Change in capacitance		Within ±30% of the value before test
		Tangent of loss angle		Not more than 300% the specified value in No.5

\*5: If there is doubt about the measured result, measurement should be made again after the voltage treatment.  
Voltage treatment: the rated voltage is applied for 120 minutes at the temperature of 105°C.

### 1-8. Structure

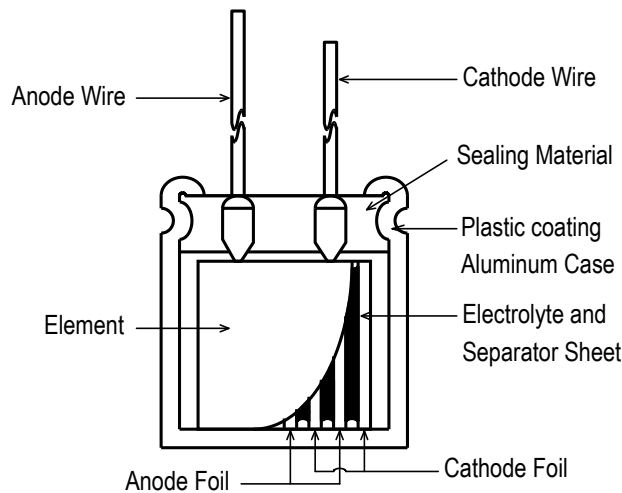


Table 5: Materials

Composition Part	Materials
Anode Foil	Aluminum
Cathode Foil	Aluminum
Separator Sheet	Electrolytic Capacitor Paper
Electrolyte	Functional Polymer
Wire	Tin Plating Lead
Plastic coating Aluminum Case	Aluminum + Plastic
Sealing Material	Rubber

### 1-9. Factory

Factory: NICHICON ELECTRONICS (SUQIAN) CO., LTD.

Location: Suqian, China

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## 2. Specification of packing

### 2-1. Bulk packing

#### 2-1-1. Bag and box packing

(1) Materials of bag and inner box: Polyethylene for bag, Corrugated cardboard box.

(2) Materials of outer box: Waterproof corrugated cardboard box.

(3) Shock absorbing material: Corrugated cardboard.

(4) Packing quantity

Table 6: Packing quantity

Case Size [mm]	Long lead		Cut lead	
	Inner bag [pcs]	Packing Unit [pcs/Carton Box]	Inner bag [pcs]	Packing Unit [pcs/Carton Box]
$\phi 8 \times 8$	200	3,200	200	4,000

(5) Marking on a bag: FPCAP symbol mark, Quantity, Lead-free mark, RoHS compliance mark, others

(6) Marking on boxes

- a) Customer's part number
- b) Manufacturing part number
- c) Lot number
- d) Quantity

#### 2-1-2. Bag packing of different lot

Usually one bag contains one lot, but when two lots are contained in one bag.

## 2-2. Taping and packing

## 2-2-1. Taping methods

- (1) Lead space and polarity direct of each capacitor shall be formed regularly. Lead wires between two capacitors shall be set at a regular interval and vertically to the base tape and fixed adhesive tape.

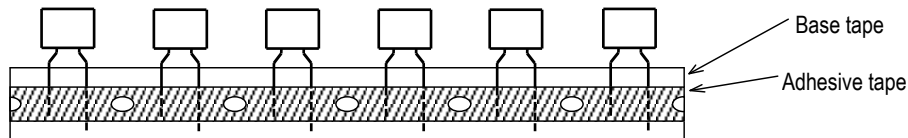


Figure-1

- (2) Missing of continuous three capacitors after taping shall be allowed. Intermittent missing shall be also allowed. But total quantity of a package shall the numbers shown quantity (pcs / ammo pack) in TABLE-7.

- (3) When feeding, polarity (+) shall come first and the polarity position of all capacitors shall be the same.

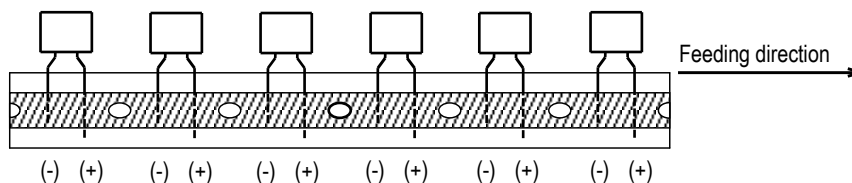


Figure-2

- (4) Each crease line be located on the rights side of the sprocket hole as shown in figure-3. The crease line shall be made every 25 capacitors.

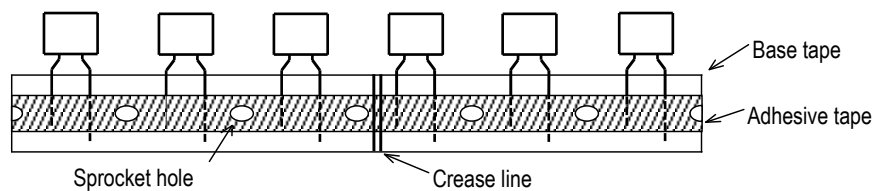


Figure-3

- (5) There shall be absence of more than five capacitors at the beginning of and end of taping.

- (6) Joints of base tape in the midst of taping process shall be fixed by adhesive tape.

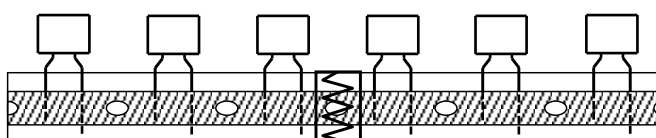
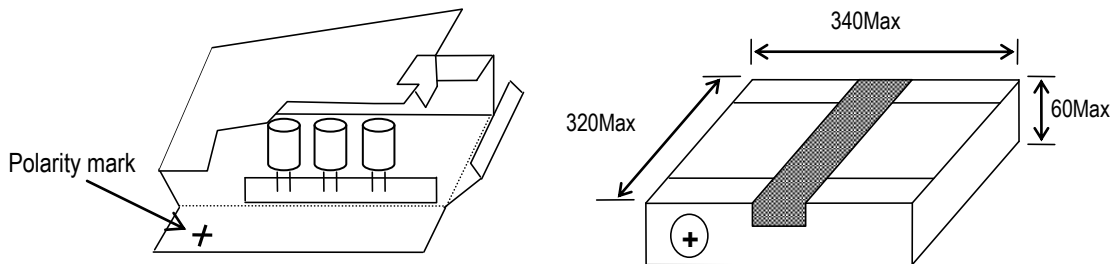


Figure-4

## 2-2-2. Packing for taped part

- (1) Materials of ammo pack and outer box: Corrugated cardboard box, Waterproof corrugated cardboard box.
- (2) Shock absorbing material: Corrugated cardboard.
- (3) Ammo pack and dimensions (unit: mm)



The lid of feeding side of the taping box shall be torn off at the perforation line.

## (4) Packing quantity

Table 7: Packing quantity

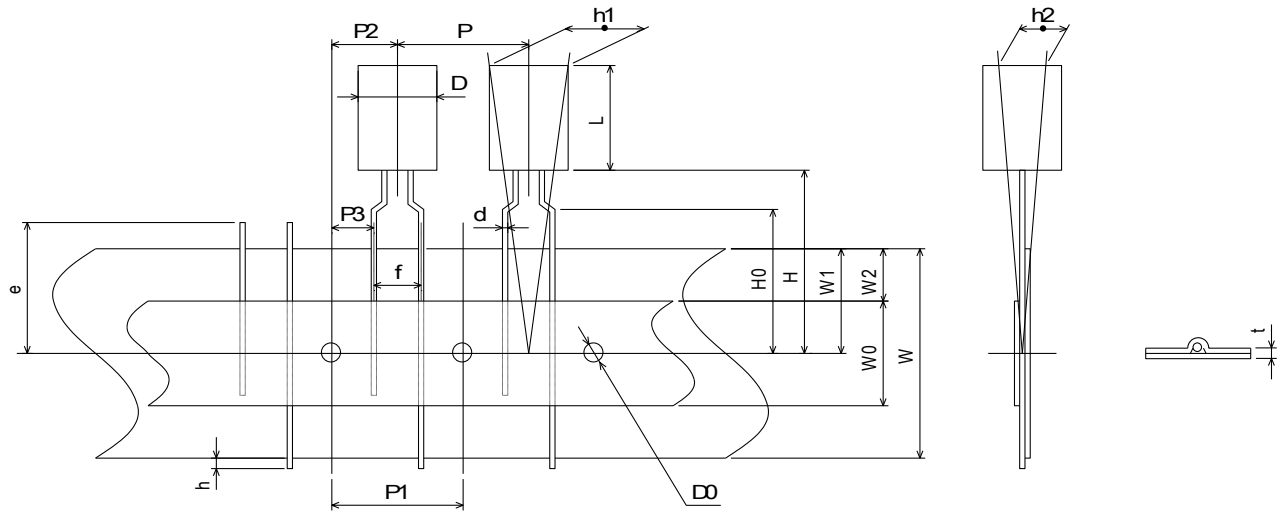
Case Size [mm]	Packing Unit [pcs/Ammo Pack]
$\phi 8$	1,000

## (4) Marking on boxes

- a) Customer's part number
- b) Manufacturing part number
- c) Lot number
- d) Quantity

2-2-3. Detailed taping specification

(1) **f=5.0[mm]** Taping specifications to  $\phi 8 \times 8$  for formed lead

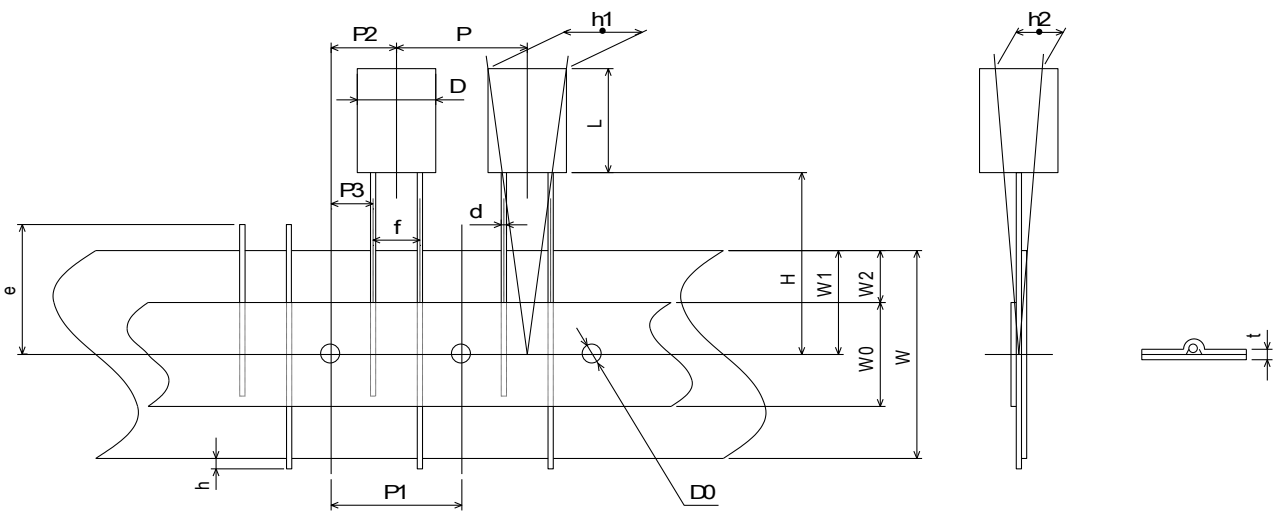


FPCAP Parts Number : FP -   RE   M - L8 P L - FEH  
 Rated Voltage      Rated Capacitance      Terminal Code      Other information

NICHICON Parts Number: R L8     M CS ALS PX  
 Rated Voltage      Rated Capacitance      Terminal Code

Item	Symbol	Dimensions	Tolerance
Lead wire interval	f	5.0	+0.8, -0.2
Components diameter	D	$\phi 8$	+0.5 Max
Components length	L	8.0	+1.0 Max
Lead wire diameter	d	$\phi 0.6$	$\pm 0.05$
Pitch between components	P	12.7	$\pm 1.0$
Feed holes position gap	P1	12.7	$\pm 0.3$
Feed holes position gap	P2	6.35	$\pm 1.0$
Feed holes position gap	P3	3.85	$\pm 0.7$
Base tape	W	18.0	+1.0, -0.5
Adhesive tape	W0	8.5	Min
Feed holes position gap	W1	9.0	$\pm 0.5$
Adhesive tape gap	W2	3.0	Max
Lead wire clinch height	H0	16.0	$\pm 0.5$
Components height	H	20.0	$\pm 0.75$
Cut position of interior components	h	0	-
Components alignment	$\Delta h1$	2	Max
Components alignment	$\Delta h2$	2	Max
Feed hole diameter	D0	4.0	$\pm 0.2$
Tape thickness	t	0.6	$\pm 0.2$
Hold-Down tape gap	e	11.0	Max

(2) f=3.5[mm] Taping specifications to  $\phi 8 \times 8$  for straight lead



FPCAP Parts Number : FP -   RE   M - L8 K L - FEH  
 Rated Voltage      Rated Capacitance      Terminal Code      Other information

NICHICON Parts Number: R L8   M CS ALS KX  
 Rated Voltage      Rated Capacitance      Terminal Code

Item	Symbol	Dimensions	Tolerance
Lead wire interval	f	3.5	+0.8, -0.2
Components diameter	D	$\phi 8$	+0.5 Max
Components length	L	8.0	+1.0 Max
Lead wire diameter	d	$\phi 0.6$	$\pm 0.05$
Pitch between components	P	12.7	$\pm 1.0$
Feed holes position gap	P1	12.7	$\pm 0.3$
Feed holes position gap	P2	6.35	$\pm 0.5$
Feed holes position gap	P3	4.6	$\pm 0.5$
Base tape	W	18.0	+1.0, -0.5
Adhesive tape	W0	8.5	Min
Feed holes position gap	W1	9.0	$\pm 0.5$
Adhesive tape gap	W2	3.0	Max
Lead wire clinch height	H0	-	-
Components height	H	20.0	$\pm 0.5$
Cut position of interior components	h	0	-
Components alignment	$\Delta h1$	2	Max
Components alignment	$\Delta h2$	2	Max
Feed hole diameter	D0	4.0	$\pm 0.2$
Tape thickness	t	0.6	$\pm 0.2$
Hold-Down tape gap	e	11.0	Max

## 3. Lead cutting specification

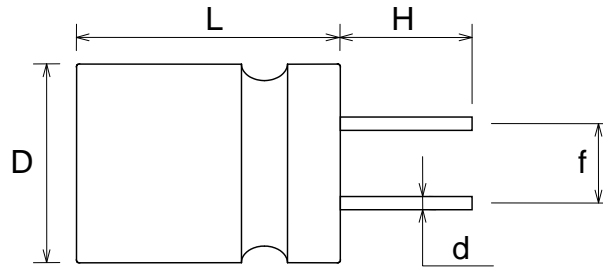


Table 8: Dimensions

[Unit: mm]

Item	Symbol	Dimensions		Tolerance
Terminal Code	-	<b>CG</b>	<b>CA</b>	-
Components diameter	D	φ8.0	φ8.0	+0.5Max
Components length	L	8.0	8.0	+1.0Max
Lead wire diameter	d	φ0.6	φ0.6	±0.05
Lead wire Length	H	<b>3.1</b>	<b>3.5</b>	±0.3
Lead wire interval	f	3.5	3.5	±0.5

3-1. **H=3.1[mm]** Lead cutting

FPCAP Parts Number : FP – □□□ RE □□□ M – L8 **CG** L – **FEH**  
 Rated Voltage      Rated Capacitance      Terminal Code      Other information

NICHICON Parts Number: R L8 □□ □□□ M CS ALS **CG**  
 Rated Voltage      Rated Capacitance      Terminal Code

3-2. **H=3.5[mm]** Lead cutting

FPCAP Parts Number : FP – □□□ RE □□□ M – L8 **CA** L – **FEH**  
 Rated Voltage      Rated Capacitance      Terminal Code      Other information

NICHICON Parts Number: R L8 □□ □□□ M CS ALS **CA**  
 Rated Voltage      Rated Capacitance      Terminal Code

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#### 4. Directions for use

##### 4-1. Crucial and Basic Precautions

###### 4-1-1. Polarity

FPCAP is a functional polymer capacitor with polarity, then do not reverse the polarity when using.  
If it is used with the polarities reversed, swelled case, increased leakage current or a decreased life span may result.

###### 4-1-2. Loading Voltages

Applying surge voltage is guaranteed, but over voltage exceeding the surge voltage may not be applied even for an instant as it may cause a short circuit or swelled case. Therefore, use the RE type within rated voltage when continuous load is applied.

###### 4-1-3. Sudden charge and discharge

Sudden charge and discharge restricted (for maintenance of high-proof reliability).  
A protection circuit is recommended for when a sudden charge or discharge causes excessive rush current because this is a main cause of short circuits and large leakage current.  
Use protection circuit to ensure reliability is recommended when the rush current value exceeds 10A.  
Be sure to insert a protection resistor of about 1kΩ for charge and discharge when measuring the leakage current.

###### 4-1-4. Soldering

The soldering conditions are to be within the range prescribed in this specification. If the specifications are not followed, there is the possibility of the appearance becoming defective and of increase of leak current and capacity reduction when soldering is conducted under conditions that are harsher than those stipulated.

###### 4-1-5. PC board installations

The design must give consideration to the standard of lead position displacement given in this specification.  
The RE type may not be able to be inserted in the PC board if there is insufficient space.  
If Lead wires are applied large stress like as tensile stress, inner contacts are given damages, then opened safety vent, occurred short circuit or increased leakage current may result, when applying power.

###### 4-1-6. Directions for use circuits

Since problems can be expected due to the leakage current fluctuations that occur during soldering and other processes, the RE type cannot be used to the following circuits.

- (1) High impedance voltage retention circuits
- (2) Coupling circuits
- (3) Time constant circuits
- (4) Circuits greatly affected by leakage current
- (5) The circuits in which two or more of RE type is connected in series so as to raise the endurance voltage of them.

###### 4-1-7. Using in industrial equipment

To insure reliability when the RE type is used in industrial equipment, design must allow for its capacitors, impedance, and other characteristics.



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#### 4-1-8. Using in equipment regarding human life

The above products are designed, developed and manufactured as contemplated for general use, including without limitation, ordinary industrial use, general office use, personal use, and household use. But are not designed, developed and manufactured as contemplated (1) for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite).

You shall not use the above products for the above-mentioned uses.

If your equipment is likely to be used for the above-mentioned uses, please consult with our sales representative before use.

We shall not be liable against you and/or any third party for any claims or damages arising in connection with the above-mentioned uses of the above products.

#### 4-2. Generally Precautions

##### 4-2-1. Circuit designing cautions

###### (1) Check the specified performance

After checking the operation and installation environments, design the circuit so that it falls within the specified performance range stipulated in this specification.

###### (2) Operating temperature and ripple current

- a) Set the operating temperature (ambient of FPCAP) so that it falls within the range stipulated in this specification.
- b) Do not supply current that exceeds the rated ripple current in this specification.

###### (3) Leakage current

Even when the soldering condition fall within the range of this specification, leakage current increases a little on occasion. It also increases a little during high temperature no-load, moisture-proof no-load, and temperature cycling tests with no voltage applied.

###### (4) Applied voltages for designing

- a) Make sure the sum of the peak DC voltage and ripple voltage peak values does not exceed the rated voltage.
- b) Please do not apply the reverse voltage to FPCAP.
- c) When the DC voltage is low, please check whether the peak value of ripple voltage does not become a reverse voltage.

###### (5) Reduction of failure stress (For keeping high reliability of equipment)

The main failure mode of RE type is open mode primarily caused by capacitance drop, besides random short circuit mode failures primarily occurs as minor one. The time it takes to reach the failure mode can be extended by using the RE type with reduced ambient temperature, ripple current and applied voltage.

###### (6) Insulation

- a) Insulation of the plastic coating case is not guarantee.
- b) Be sure to completely separate the case, negative electrode terminal, positive electrode terminal from adjacent and components and PC board foil.

###### (7) Design for installing environment

- a) The pitch and diameter of PCB holes to which RE type is mounted should be designed in conforming to the dimensional tolerance stipulated in this specification.
- b) Give the space more than 2 mm from the top of capacitor.

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(8) PC board

- a) Avoid locating heat-generating components around the RE type and on the underside of the PC board (underneath the RE type).
- b) Insulation in the plastic coating case is not guaranteed, give a space between case and PCB circuit foil.

(9) Parallel connections

When it is used in parallel connection with another capacitor, carefully select the type of capacitor.

(10) Operating environments

Do not use the RE type in the following environments.

- a) Places where water or salt water can directly fall on it, and places where condensation may form.
- b) Places filled with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
- c) Places susceptible to ozone, ultraviolet rays and radiation.

(11) Other

Electrical characteristics are affected by temperature and frequency fluctuations. Design circuits after checking the amount of fluctuation.

4-2-2. Mounting precautions

(1) Things to know before mounting

- a) Do not reuse RE type that have been assembled in a set and energized. Excluding RE type that have been removed for measuring electrical characteristics during a periodic inspection, they cannot be reused.
- b) Leakage current may have increased that have been stored for a long period of time. In this case, use after treatment of rated voltage.
- c) There are non-halogen types of flux that do not contain ionic halides, but contain many non-ionic halides. When these non-ionic halides infiltrate the capacitor, they also cause a harmful reaction. Use soldering flux that does not contain non-ionic halides, also ionic halides.

(2) Mounting-1

- a) Mount after checking the capacitance and the rated voltage.
- b) Mount after checking the polarity.
- c) Do not drop the RE type on the floor. Do not use RE type that have been dropped.
- d) Do not deform and then mount an RE type.

(3) Mounting-2

- a) Mount after checking that the lead pitch and the PC board holes pitch match.
- b) When an automatic inserted is used to clinch the lead wires, make sure it is not set too strong.
- c) Be careful of the shock force that can be produced by absorbers, product checkers, and centering at an automatic inserters and installers.
- b) Do not apply excessive external force to the lead wires, the RE type itself, and electrode terminals.

(4) Soldering with a soldering iron

- a) Set the soldering conditions (temperature, time) so that they fall within the range stipulated in the delivery specification.
- b) When the lead wire terminal must be processed because the terminal spacing and the PC board holes spacing do not match, process it before soldering so that no stress is applied to the RE type itself.
- c) Do not subject the RE type itself to excessive stress when soldering with a soldering iron.
- d) When a soldering iron is used to repair a RE type that has already been soldered once and needs to be removed, remove it after the solder has been completely melted so that no stress is applied to the RE type terminal.
- e) Do not let the tip of the soldering iron touch the RE type itself.
- f) The LC value after soldering may increase a little (from a few  $\mu\text{A}$  to several hundred  $\mu\text{A}$ ) depending on the soldering conditions (preheating and solder temperature and time, PC boards material and thickness, etc.) The leakage current can be reduced through self-repair by applying voltage.

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(5) Flow soldering

- a) Do not solder the RE type by submerging it in melted solder. Use the PC board to protect the RE type and only solder the opposite side that the RE type is mounted on.
- b) Set the soldering conditions (soldering temperature, terminal submersion time) so that they fall within the range stipulated in the delivery specification. The LC value after soldering may increase a little (from a few  $\mu A$  to several hundred  $\mu A$ ) depending on the soldering conditions (preheating and solder temperature and time, PC boards material and thickness, etc.).The leakage current can be reduced through self-repair by applying voltage.
- c) Take care that flux does not adhere to anyplace other than the terminal.
- d) When soldering, take care that other components do not fall over and touch the RE type.
- e) Flow soldering under extremely abnormal conditions may reduce the electrostatic capacity of products before or after soldering.

(6) Reflow soldering

Does not use reflow soldering for RE type.

(7) Handling after soldering

- a) Do not tilt, bend or twist the RE type after it has been soldered on the PC board.
- b) Do not subject to excessive stress after it has been soldered to the PC board.

(8) Washing the PC board

Check the following items before washing the PC board with these detergents; high quality alcohol-based cleaning fluid such as Pine- $\alpha$ ST-100S, clean thru 750H, 750L, 750K,or Techno Care FRW14 through 17;or detergents including substitute Freon such as AK-225AES and IPA.

- a) Use immersion or ultrasonic waves to clean for a total of less than five minutes.
- b) The temperature of the cleaning fluid should be less than 60°C.
- c) Watch the contamination of the detergent (conductivity, pH, specific gravity, water content, etc.).
- d) After cleaning do not store in a location subject to gases from the cleaning fluid or in an airtight container. Dry the PC board and RE type within hot air (less than the maximum operating temperature). Note that when it is heated (heat run, dry, etc.).
- e) Please contact our company for details about detergents and cleaning methods, and about detergents other than those listed above.

(9) Fixatives and coatings

- a) Select appropriate material for the RE type marking material and sealant. In particular, make sure the fixative, coating and thinner do not contain acetone or toluene.
- b) Before applying the fixative or coating, completely remove any flux residue and foreign matter from the area where the PC board and RE type are to be joined together.
- c) Allow any detergent to dry before applying the fixative or coating.
- d) Please contact our company for fixative and coating heat curing conditions.

4-2-3. Precautions with completed board

- (1) Do not directly touch the RE type terminals.
- (2) Do not use electric conductors to cause short circuits between the RE type terminals. Do not subject RE type to conductive solutions.
- (3) Check the installation environment of the board the RE type is installed in.
- (4) Age the board at conditions that fall below the capacitors ratings.
- (5) It is recommended that the board be used at room temperature and in ordinary humidity.

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#### 4-2-4. In the event that something unfortunate should occur

- (1) In the event that a short circuit causes the current to become relatively small (less than approximately 3A for  $\phi 10$ ), the RE type itself will generate a little heat, but the appearance will not be affected even when electricity is supplied continuously. However, if the short circuits current value exceeds the above mentioned values, the temperature inside the RE type will increase. When the temperature exceeds approximately 200°C the internal pressure is raised, and odorous gas is released. In this case, keep your face and hands away from the area.
- (2) If a short circuit occurs and odorous gas is released, either turn off the sets main power or unplug the power cord from the outlet.
- (3) If a short circuit should happen to occur, it may take anywhere from a few seconds to a few minutes until an odorous gas develops, depending on the conditions. Set it up so that a power protection circuit works during this time.
- (4) If the gas gets in your eyes, rinse them immediately. Gargle if it has been inhaled.
- (5) When the electrolyte gets on your skin, wash it off with soap.
- (6) The electrolyte, separator, rubber and tube used in the RE type are all combustible. When the current value is extraordinarily large after a short circuit, assuming the worst possibility, the shorted-out section in the lead wire or inside the capacitor has created a spark, and it may have caught fire to the rubber and or tube. Give consideration to the capacitors mounting method, mounting position, pattern design and such.

#### 4-2-5. Storage conditions

- (1) Do not store at high temperatures and high humidity. Store it in a location that is not subject to direct sunlight and that has low temperatures and humidity (generally, temperatures between 5 and 35°C and a relative humidity of 75% or less.
- (2) Store in an airtight plastic bag to keep the leads in good condition.
- (3) To keep the leads in good condition, store lead-type RE type for no more than one year
- (4) Do not store in places where water, salt water or oil can directly fall on it, or places where condensation may form.
- (5) Do not store in places filled with noxious gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
- (6) Do not store in places susceptible to ozone, ultraviolet rays and radiation.

#### 4-2-6. Disposals

Treat it as industrial waste when disposing of it.

For details, refer to the Operating Precaution Guidelines for the JEITA RCR-2367D

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