

Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

REMINDERS

- Product information in this catalog is as of October 2010. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.
- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance. Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN' s official sales channel"). It is only applicable to the products purchased from any of TAIYO YUDEN' s official sales channel.
- Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. Taiyo Yuden Co., Ltd. grants no license for such rights.
- Caution for export**
Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

COIN TYPE PAS CAPACITOR



REFLOW

FEATURES

High capacity / High reliability

PAS can store a large number of ions into its amorphous structure (doping), therefore PAS capacitor has much larger capacity than conventional electric double layer capacitor. In addition, PAS is extremely stable material and PAS capacitor shows excellent performance of cycle life and durability to overcharge and overdischarge.

RoHS / WEEE compliance

PAS capacitors are RoHS and WEEE compliant products and have no recycling and collection duty that is required in lithium ion battery's case.

The world's smallest capacitor

"PAS311 series" is the world's smallest coin shaped capacitors, whose size is diameter 3.8mm × height 1.1mm.

This smallest product was carried out by developing electrode materials, sealing technology and introducing special processed heat resistance gasket.

APPLICATIONS

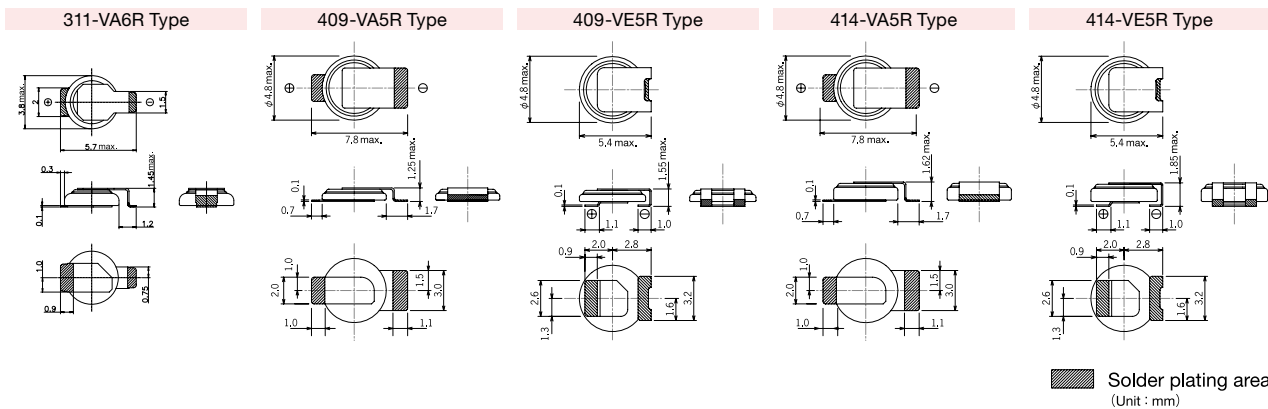
Memory and RTC back-up power source used for cellular phone, PDA, digital camera, portable radio and so on.

ORDERING CODE

P A S 3 1 1 H R - V A 6 R

1 Series name	2 Diameter ϕD (mm)	3 Height H (mm)	4 Maximum Usable Voltage (V) / Soldering	5 Common sign	6 Terminal Shape						
PAS Polyacene Capacitors	3 3.8 4 4.8	09 0.9 11 1.1 14 1.4	SR 2.5 (2.6*) HR 3.3	Lead Free Reflow Soldering Lead Free Reflow Soldering	- Fixation						
(*) : PAS311SR only											
				<table border="1"> <tr> <td>VA5R</td> <td>Individually specified</td> </tr> <tr> <td>VA6R</td> <td>Individually specified</td> </tr> <tr> <td>VE5R</td> <td>Individually specified</td> </tr> </table>		VA5R	Individually specified	VA6R	Individually specified	VE5R	Individually specified
VA5R	Individually specified										
VA6R	Individually specified										
VE5R	Individually specified										

EXTERNAL DIMENSIONS



EXTERNAL DIMENSIONS, WEIGHT



Type	ϕD	H	Weight
311	3.8 (0.150)	1.1 (0.043)	0.03
409	4.8 (0.189)	0.9 (0.035)	0.05
414	4.8 (0.189)	1.4 (0.055)	0.06

Unit : mm (inch), g

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PART NUMBERS

Part Number	Terminal Shape	LeadFree Reflowable	RoHS	Maximum Usable Voltage (V)	Nominal Capacity (μ Ah)	Nominal Capacitance (F)	Typical Internal Resistance (Ω)
PAS311HR	VA6R	○	○	3.3	10^{-11}	0.03	120
PAS409HR	VA5R	○	○	3.3	12^{-11}	0.03	100
	VE5R	○	○				
PAS414HR	VA5R	○	○	3.3	20^{-11}	0.06	80
	VE5R	○	○				
PAS311SR	VA6R	○	○	2.6	10^{-12}	0.03	50
PAS414SR	VA5R	○	○	2.5	18^{-12}	0.07	50
	VE5R	○	○				

(*1) : Capacity is measured from maximum usable voltage to 2.0V.
 (*2) : Capacity is measured from maximum usable voltage to 1.5V.

HR Type

FEATURES

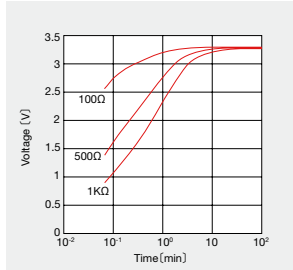
- Reflowable with lead-free condition
(Refer to Reliability Data for recommendable reflow pattern)
- Voltage can be set up freely below 3.3V
- PAS311HR is the world's smallest size

SPECIFICATIONS

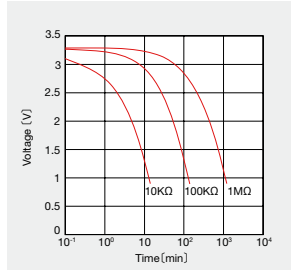
Part Number	311HR	409HR	414HR
1. Operating Temp. Range	-20~+60°C		
2. Max. Usable Voltage	3.3V		
3. Initial Capacitance (F)	Over 0.02	Over 0.022	Over 0.03
4. Initial Capacity (μ Ah)	Over 6	Over 7	Over 10
5. Initial Internal Resistance (Ω)	Below 600	Below 300	Below 260
6. Max. Discharge Current (μ A)	10	20	20
7. Temperature Characteristics	Highest temperature (60°C) Capacity : Over 90% of initial spec. Lowest temperature (-20°C) Capacity : Over 50% of initial spec.		

ELECTRICAL CHARACTERISTICS

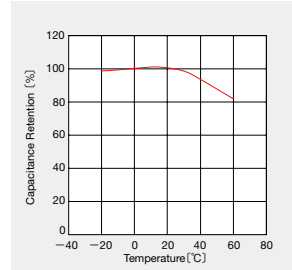
PAS414HR ● Charging characteristics (Constant R)



● Discharging characteristics (Constant R)



● Temperature characteristics



SR Type

FEATURES

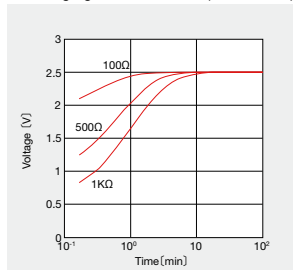
- Reflowable with lead-free condition
(Refer to Reliability Data for recommendable reflow pattern)
- Voltage can be set up freely below 2.5V (2.6V for PAS311SR)
- PAS311SR is the world's smallest size

SPECIFICATIONS

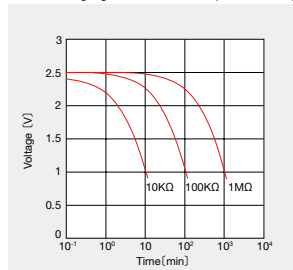
Part Number	311SR	414SR
1. Operating Temp. Range	-25~+70°C	
2. Max. Usable Voltage	2.6V	2.5V
3. Initial Capacitance (F)	Over 0.025	Over 0.05
4. Initial Capacity (μ Ah)	Over 8	Over 13
5. Initial Internal Resistance (Ω)	Below 120	Below 120
6. Max. Discharge Current (μ A)	10	20
7. Temperature Characteristics	Highest temperature (70°C) Capacitance : Over 90% of initial spec. Lowest temperature (-25°C) Capacitance : Over 50% of initial spec.	

ELECTRICAL CHARACTERISTICS

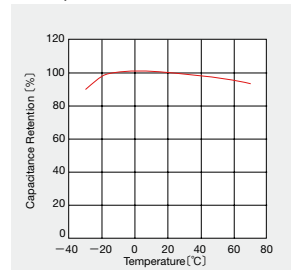
PAS414SR ● Charging characteristics (Constant R)



● Discharging characteristics (Constant R)

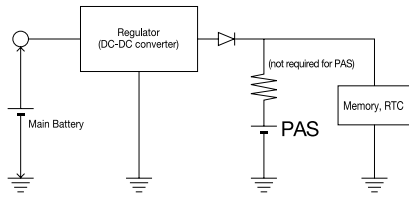


● Temperature characteristics

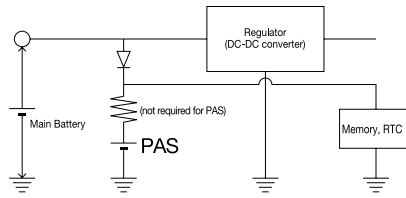


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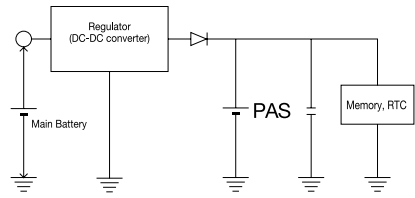
○ Application 1 : Cellular Phone



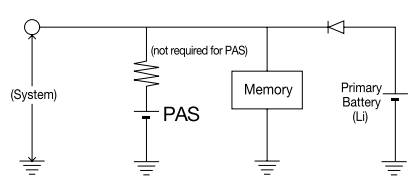
○ Application 2 : Cellular Phone



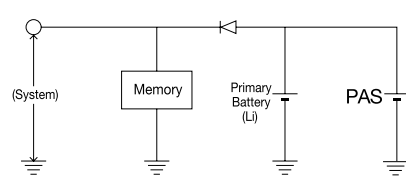
○ Application 3 : Cellular Phone



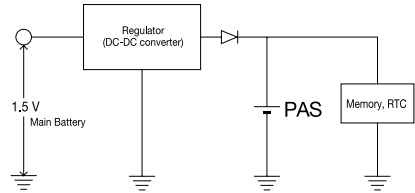
○ Application 4 : Memory card



○ Application 5 : IC Memory card



○ Application 6 : Pager



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PACKAGING

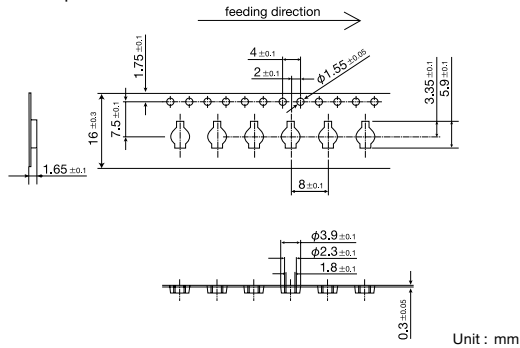
① Summary of Packaging Specifications

Item	Terminal Shape	Quantity per Reel	Products Direction (*)	Tape Width	Pitch	Reel Diameter	Emboss Shape
PAS311□□	VA5R	4000	—	16.0±0.3	8.0±0.1	330	A
PAS409□□	VA5R	4000	—	16.0±0.3	8.0±0.1	330	B
	VE5R	4000	—	16.0±0.3	8.0±0.1	330	B
PAS414□□	VA5R	4000	—	16.0±0.3	8.0±0.1	330	C
	VE5R	4000	—	16.0±0.3	8.0±0.1	330	C

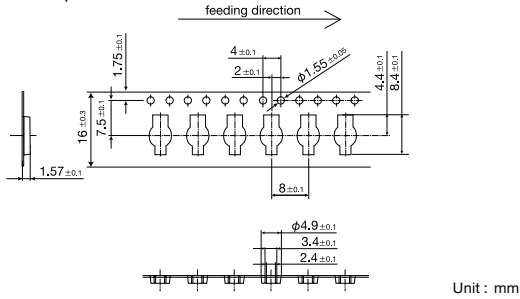
(*) Indicate the polarity of terminal which is close to sprocket hole. Unit : mm

② Taping Dimensions

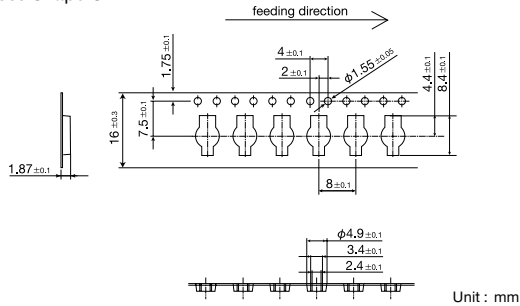
● Emboss Shape A



● Emboss Shape B



● Emboss Shape C

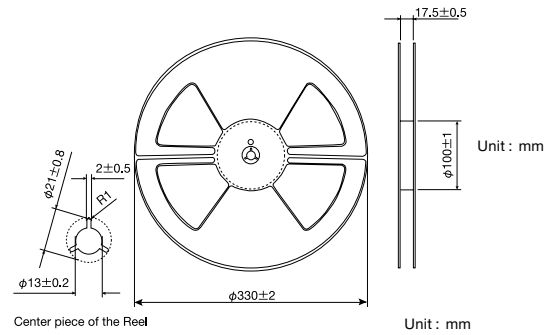


③ Leader Section/Trailer Section

Leader section :
Over 400mm
(Containing at least 44 vacant pockets of carrier tape sealed with top cover tape)

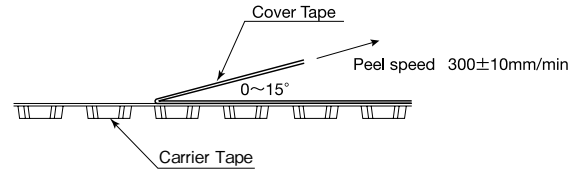
Trailer section :
Over 40mm
(Over 5 vacant pockets of carrier tape sealed with top cover tape)

④ Reel Size



⑤ Peel Strength

0.1-0.7N under the condition of the figure below.



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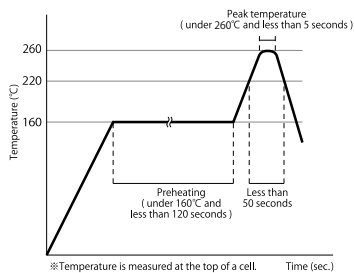
RELIABILITY DATA

Items	Specifications		Test Conditions, Remark
	HR type	SR type	
1. Operating Temperature range	-20~+60°C	-25~+70°C	
2. Max. Usable Voltage	3.3V	2.5V (2.6V*)	
3. Resistance to Reflow Soldering Heat	Capacity/Capacitance : Within initial spec. Appearance : No noticeable abnormality		Conduct reflow soldering twice according to the reflow soldering test condition mentioned below. (Conduct the reflow in the condition of the voltage of 0.3V or lower.)
4. Floating Charge Characteristics	Capacity/Capacitance : Over 70% of initial spec. Appearance : No noticeable abnormality		Apply a max.usage voltage to the capacitor for 500 hours at max. operating temp. and measure the floating charge characteristics after returning to normal temperature and humidity.
5. Charge/Discharge Cycle Characteristics	Capacity/Capacitance : Over 50% of initial spec. Appearance : No noticeable abnormality		Measure the charge/discharge cycle characteristics after the 10000 cycles of charge/discharge at 25±5 °C with the charge/discharge cycle test condition for each part.
6. Thermal Durability	Capacity/Capacitance : Over 80% of initial spec. Appearance : No noticeable abnormality		Leave the capacitor in an atmosphere of 85°C±2°C and -30±2°C consecutively for 96 hours each, and return to normal temperature and humidity.
7. Humidity Durability	Capacity/Capacitance : Over 80% of initial spec. Appearance : No noticeable abnormality		Temperature : 40±2°C, Humidity : 90~95%RH Leave the capacitor for under the condition for 96hours then return to normal temperature and humidity.
8. Vibration Durability	No exterior abnormality observed : initial spec. values retained		Apply a sine wave vibration of 1.5mm amplitude at frequency 10~55Hz, for 2hours per each direction (X,Y and Z) , for 6 hours in total.

(*) : 2.6V for PAS311SR

● Reflow Soldering Test Condition

Reflow profile with lead free condition (HR/SR)



Cautions : Do not charge prior to reflow,
Set reflow condition within the range provided in "Specifications", which will be published separately.
Consult with us about the details.

● Charge/Discharge Cycle Test Condition

Part Number	311HR	409HR	414HR	311SR	414SR
Charging/Discharging Resistance (Ω)	3000	3000	3000	150	150
Charging Voltage (V)	3.3	3.3	3.3	2.5	2.5
Charging Time (min.)	12	12	24	5	9
Discharging Time (min.)	3	3	6	1	1

PRECAUTIONS

- Use under the maximum usable voltage.
If over maximum usable voltage is applied, it might cause abnormal current flow which shortens lifetime and sometimes damages PAS capacitor.
- Use under surrounding temperature kept as normal as possible.
Lifetime of PAS capacitor is greatly affected by surrounding temperature. Each 10°C drop in temperature extends its expected lifetime approximately twice as much. Therefore, avoid high temperature and use PAS capacitor under lower temperature than the maximum operating temperature range.
- Mind voltage drop when back-up.
When the discharge starts, voltage drop occurs by actuating current and internal resistance in the cell.
Consult us beforehand in case if discharging current of 311 type is over 10μA and over 20μA for 409/414 type.
- Consult us when using PAS capacitors in a series connection.
In case of using PAS capacitors in a series connection, the voltage may be different in these capacitors, the difference of the voltages could shorten the lifetime of the capacitors or break them down.
- Pay sufficient attention to use PAS in circuit with high ripple current.
Since PAS capacitor has higher internal resistance than electric capacitor, ripple current may heat up capacitor body, which might cause the increase of internal resistance and deterioration of capacity.
- Do not expose PAS capacitor into high humidity, alkaline or acid air.
In case PAS capacitor is used in high humidity, alkaline or acid air, lead terminal and container may be damaged.
Also, it may cause deteriorating of its performance.
- Do not touch with printed pattern.
If product touches printed pattern, short-circuit occurs.
Additionally, if there is a printed pattern under the product, it may occur short-circuit caused by a breakage of resist.
- Mind the polarity of PAS capacitor when soldering on board.
Identify the indication of polarity or terminal shapes when installing. Be sure that PAS is installed as the indication of polarity or terminal shapes.
It may turn out to be a breakage of product.
- Caution on soldering
 - Follow the scope of conditions regulated in specifications.
 - Do not charge prior to reflowing.
 - Consult us for details about reflow condition.
- Consult us about cleaning condition when cleaning circuit-board after soldering.
Cleaning may affect PAS capacitor. Consult us about cleaning conditions beforehand.
- Avoid excessive vibration.
Excessive vibration may be a cause of breaking soldering part and damaging terminal.
- Storage
Keep following cautions for storage :
 - Use our tray or reel. If you have to move the products from the tray or reel, be sure not to bend terminals of them.
 - Store under normal atmosphere. Sudden change of temperature or high humid condition deteriorates the performance.
 - Avoid dust and direct sunlight.
- Other cautions
 - Do not heat or throw into fire.
 - Do not short-circuit.
 - Do not solder directly to cell body.
 - Do not dismantle.
 - Do not deform.
 - Mind the edge of terminals.

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