

Radial Leaded Aluminum Hybrid Electrolytic Capacitors

RHA Series



FEATURES

- Low ESR
- Endurance: 105°C, 5000-10,000 hours
- RoHS Compliance and Halogen-free

APPLICATIONS

- High Reliability applications
- Base station equipment

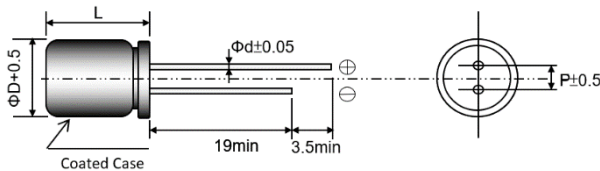


HOW TO ORDER

R	HA	1009	471	M	016	K	-
Product Type	Series Type	Case Size	Capacitance Code	Tolerance	Rated DC Voltage	Packaging	Lead Type
Aluminum		See table below	µF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	M = ±20%	016 = 16Vdc 025 = 25Vdc 035 = 35Vdc 040 = 40Vdc 050 = 50Vdc	063 = 63Vdc 080 = 80Vdc 100 = 100Vdc 125 = 125Vdc	K = Ammo Pack B = Bulk Pack
							" " empty = Standard long lead "C" = Lead cut only "D" = Lead cut and crimp "F" = Lead cut and form "H" = Lead cut, crimp and form "B" = Forming only "L" = Lead cut and bend (Left) "Z" = Lead cut and bend (Right)

CASE DIMENSIONS millimeters (inches)

Code	D±0.50 (0.020)	L±1.50 (0.060)	d±0.05 (0.002)	P±0.50 (0.020)	Typical Weight (g)
0607	6.30 (0.248)	7.20 (0.283)	0.50 (0.020)	2.50 (0.098)	0.45
0809	8.00 (0.315)	9.50 (0.374)	0.60 (0.024)	3.50 (0.138)	0.87
1009	10.00 (0.394)	9.50 (0.374)	0.60 (0.024)	5.00 (0.197)	1.34
1011	10.00 (0.394)	11.50 (0.453)	0.60 (0.024)	5.00 (0.197)	1.47



*If different rubber seal is needed, please contact your sales representative.

*For ammo packing lead shape please refer to "Lead forming taping specification for ammo pack".

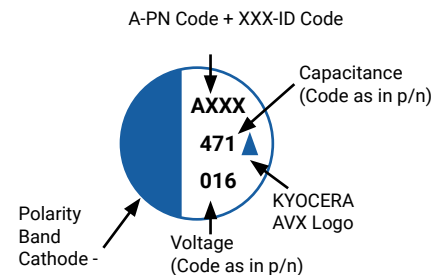
*If different lead shape is needed, please refer to "Termination type".

TECHNICAL SPECIFICATIONS

Category Temperature Range:	-55°C to +105°C	
Capacitance Range	At 25°C, 120Hz	10µF to 560µF
Capacitance Tolerance:	At 25°C, 120Hz	±20%
Surge Voltage:	at 15 - 35°C	Rated voltage x 1.15
Dissipation Factor (%)	Measurement Frequency: 120Hz at 25°C	Please see the ratings and part number reference table below
Leakage Current:	After 2 minutes at rated working voltage at 25°C*	I ≤ 0.01CV or 3µA, whichever is greater

* Note: In the case of an anomalous reading, re-measure the leakage current after following voltage treatment:
Voltage treatment: DC rated voltage to be applied to the capacitors for 120 minutes at 105°C.

MARKING



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CAPACITANCE AND RATED VOLTAGE RANGE (FIGURES DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V _R)								
μF	Code	16V	25V	35V	40V	50V	63V	80V	100V	125V
10	100						0607		1009	1009
12	120							1009	1009	
15	150					0607		1009	1011	
18	180							1011		
22	220						0809			
27	270				0607					
33	330					0809	0809, 1009			
47	470			0607			1009			
56	560				0809	1009	1011			
68	680		0607							
82	820					1011				
100	101		0607	0809	1009					
120	121	0607			1011					
150	151		0809	1009						
220	221			1011						
270	271	0809	1009							
330	331		1011							
470	471	1009								
560	561	1011								

Released ratings

RATINGS & PART NUMBER REFERENCE

Part No.	Case Size	Capacitance (μF)	Rated Voltage (V)	DCL Max. (μA)	DF Max. (%)	ESR Max. @100kHz (mΩ)	100kHz RMS Current (mA)	MSL
16 Volt								
RHA0607121M016*	0607	120	16	19	16	40	1500	1
RHA0809271M016*	0809	270	16	43	16	26	2000	1
RHA1009471M016*	1009	470	16	75	16	21	2600	1
RHA1011561M016*	1011	560	16	90	16	15	3000	1
25 Volt								
RHA0607680M025*	0607	68	25	17	16	45	1400	1
RHA0607101M025*	0607	100	25	25	16	45	1400	1
RHA0809151M025*	0809	150	25	38	16	27	1900	1
RHA1009271M025*	1009	270	25	68	16	22	2500	1
RHA1011331M025*	1011	330	25	83	16	16	2900	1
35 Volt								
RHA0607470M035*	0607	47	35	16	16	60	1300	1
RHA0809101M035*	0809	100	35	35	16	30	1800	1
RHA1009151M035*	1009	150	35	53	16	23	2400	1
RHA1011221M035*	1011	220	35	77	16	17	2800	1
40 Volt								
RHA0607270M040*	0607	27	40	11	16	70	1200	1
RHA0809560M040*	0809	56	40	22	16	32	1700	1
RHA1009101M040*	1009	100	40	40	16	24	2400	1
RHA1011121M040*	1011	120	40	48	16	18	2700	1
50 Volt								
RHA0607150M050*	0607	15	50	8	16	80	1200	1
RHA0809330M050*	0809	33	50	17	16	35	1600	1
RHA1009560M050*	1009	56	50	28	16	25	2300	1
RHA1011820M050*	1011	82	50	41	16	19	2600	1

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RATINGS & PART NUMBER REFERENCE

Part No.	Case Size	Capacitance (μF)	Rated Voltage (V)	DCL Max. (μA)	DF Max. (%)	ESR Max. @100kHz (mΩ)	100kHz RMS Current (mA)	MSL
63 Volt								
RHA0607100M063*	0607	10	63	6	16	100	1000	1
RHA0809220M063*	0809	22	63	14	16	40	1500	1
RHA0809330M063*	0809	33	63	21	16	40	1500	1
RHA1009330M063*	1009	33	63	21	16	30	2100	1
RHA1009470M063*	1009	47	63	30	16	30	2100	1
RHA1011560M063*	1011	56	63	35	16	22	2400	1
80 Volt								
RHA1009120M080*	1009	12	80	10	16	70	1600	1
RHA1009150M080*	1009	15	80	12	16	70	1600	1
RHA1011180M080*	1011	18	80	14	16	50	1800	1
100 Volt								
RHA1009100M100*	1009	10	100	10	16	80	1400	1
RHA1009120M100*	1009	12	100	12	16	80	1400	1
RHA1011150M100*	1011	15	100	15	16	60	1600	1
125 Volt								
RHA1009100M125*	1009	10	125	13	16	90	1200	1

* Used to denote packing type: "K" for Ammo Pack or "B" for Bulk.

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5RMS with DC bias of 2.2 volts. DCL is measured at rated voltage after 2 minutes

FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

Capacitance Range	100 ≤ F(Hz) <1K	1K ≤ F(Hz) <10K	10K ≤ F(Hz) <100K	100K ≤ F
4.7 < C ≤ 33	0.05	0.32	0.67	1.00
33 < C	0.10	0.35	0.70	1.00

Internal heating produced by ripple current will reduce the lifetime of capacitors, at a rate of halving the lifetime with every 5°C rise.

When long life performance is required in actual use the rms ripple current should be minimized.

QUALIFICATION TABLE

Test	RHA Series (Temperature Range -55°C to +105°C)		
	Condition	Characteristics	
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 5000 to 10,000 hours at 105°C. Φ6.3=5000hrs, D≥Φ8=10,000hrs.	Visual examination	no visible damage
		ΔC/C	≤ ±30% of the initial limit
		DF:	≤ 200% of the initial specified limit
		ESR:	≤ 200% of the initial specified limit
		DCL:	≤ Initial specified limit
Damp Heat (Steady State)	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjecting them to store at 60°C, 90 to 95% RH for 1000 hours, without DC applied	Visual examination	no visible damage
		ΔC/C	≤ ±30% of the initial limit
		DF:	≤ 200% of the initial specified limit
		ESR:	≤ 200% of the initial specified limit
		DCL:	≤ Initial specified limit
Surge Voltage	The capacitors shall be subjected to 1000 cycles each consisting of charge with the surge voltages specified at 15-35°C for 30 seconds through a protective resistor (R = 1 kΩ) and discharge for 5 minutes 30 seconds.	Visual examination	no visible damage
		ΔC/C	≤ ±30% of the initial limit
		DF:	≤ 200% of the initial specified limit
		ESR:	≤ 200% of the initial specified limit
		DCL:	≤ Initial specified limit

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STORAGE

- It is recommended to keep capacitors between the ambient temperatures of 5°C to 35°C (if between 35°C to 85°C, it should be less than three months) and the relative humidity of 75% or below.
- Confirm that the environment does not have any of the following conditions:
 - Damp conditions such as water, saltwater spray, oil spray or fumes. High humidity or humidity condensation situations.
 - In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
 - Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
 - Being exposed to acidic or alkaline solutions.
 - Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.
- Shelf life

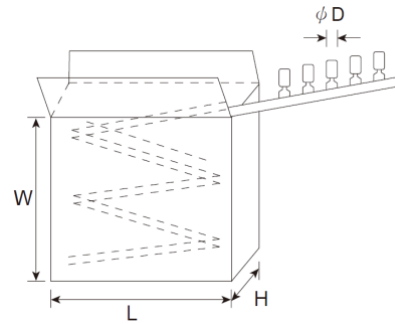
Years		
0-1	1-2	>2
Ok	Ok	Performance check

- Years from manufacturing date code.
- KYOCERA AVX does not guarantee or assume responsibility for product behavior after 3 years of storage.
- Ageing procedure should be performed as follows:
 - Connect the capacitor in series to a 1kΩ resistor, and apply half rated voltage for 2 hours.
 - After half rated voltage for 2 hours applied, increase and apply rated voltage for another 2 hours.

PACKAGE TAPE DIMENSIONS units (mm)

AMMO PACKING

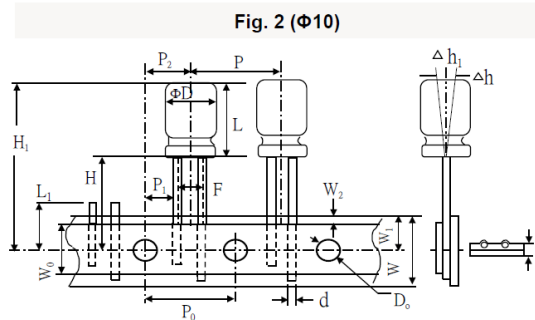
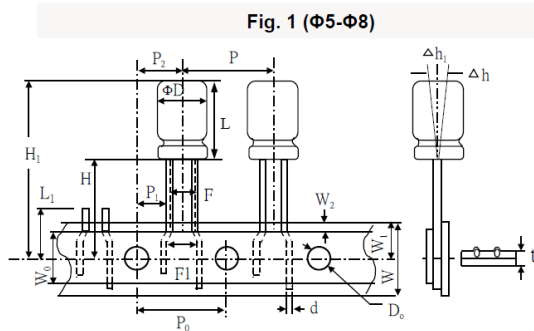
Ammo Pack						
Size Code	W±5	L±5	H±5	Qty. (pcs)	G.W. kg/box	Box /Carton
0607	235	327	54	1,500	1.12	10
0809	265	327	51	1,000	1.48	10
1009-1011	235	330	57	600	1.29	10



LEAD FORMING TAPING SPECIFICATIONS FOR AMMO PACK

Case Diameter	6.3mm	8mm	10mm
Figure #	Fig. 1	Fig. 1	Fig. 2

(Unit:mm)



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Items	Symbol	Case Size				Tolerance	Remark
		0607	0809	1009	1011		
Lead Wire Diameter	d	0.50	0.50/0.60	0.60		±0.05	
Body Height	L	8.00	11.00	11.00	13.00	max	
Intervals of Bodies	P	12.70				±1.00	
Intervals of Punched Holes	P ₀	12.70				±0.20	
Distance between Holes and Lead Wire	P ₁	3.85					Fig.1
		5.10				±0.70	Fig.2
Distance between Holes and Body Center	P ₂	6.35				±1.00	
Distance between Lead and Lead	F	5.00				+0.80 -0.20	Fig.1
		2.50	3.50	5.00			Fig.2
		2.50					
		3.50					
Distance between Lead and Lead	F ₁	5.00					Fig.2
Base Tape Width	W	18.00				±0.50	
Adhesive Tape Width	W ₀	10.00	12.00			min	
		10.00					
		12.00					
Deviation between Holes and Base Tape	W ₁	9.00				±0.50	
Deviation between Adhesive and Base Tape	W ₂	1.50				max	
Deviation between Body Bottom and Tape Center	H	17.50	18.50			±0.75	Fig.1, Fig.2
		17.50					
		18.50					
Lead Wire Clinched Height	H ₀	15.00	16.00			±0.50	
		15.00					
		16.00					
Distance between Body Top and Tape Center	H ₁	28.00	31.00	31.00	33.00	max	
Punched Hole Diameter	D ₀	4.00				±0.30	
Length of not Good Lead Slit	L ₁	11.00				max	
Base and Adhesive Tape Thickness	t	0.70				±0.20	
Deviation of Body Alignment	Δh	0				±2.00	
Deviation of Body Alignment	Δh ₁	0				±2.00	

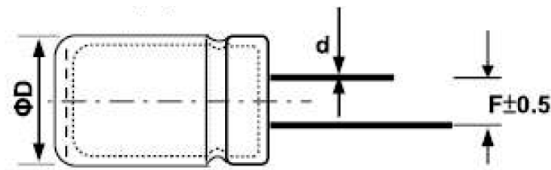
*All dimensions in mm

BULK PACKING

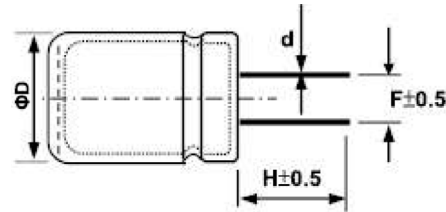
Package Box				
Size Code	Bags Inner box	Layer Quantity	Quantity (pcs/bag)	Total quantity (pcs/carton)
0607	9	2	1000	18,000
0809	10	2	500	10,000
1009-1011	11	2	200	4400

TERMINATION TYPE

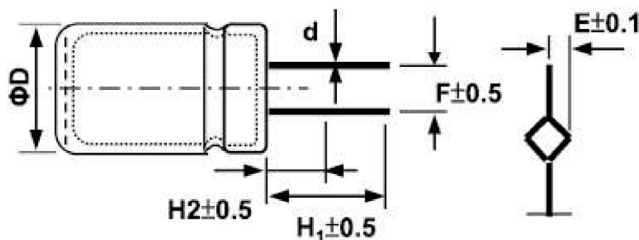
Letter " ": Empty = Standard Long lead.



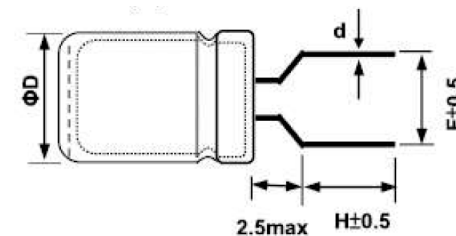
Letter "C": Lead cut only.



Letter "D": Lead cut and crimp.



Letter "F": Lead cut and form.



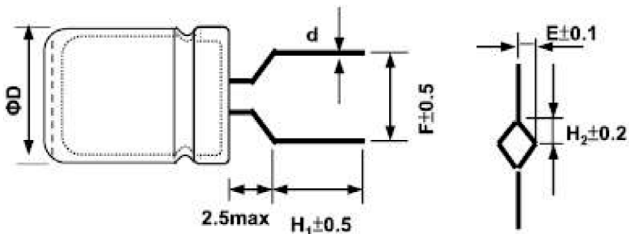
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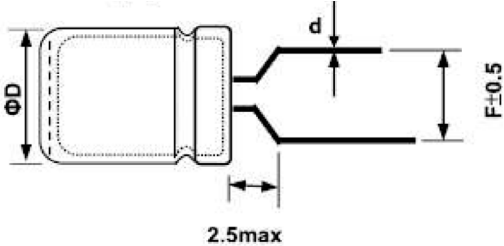


TERMINATION TYPE

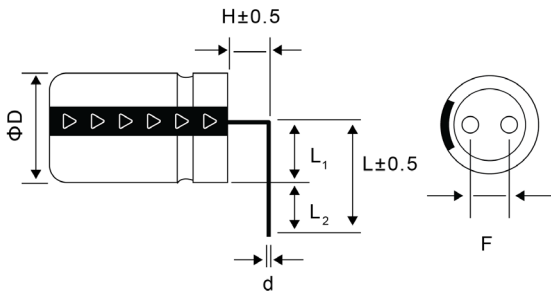
Letter "H": Lead cut, crimp, and form.



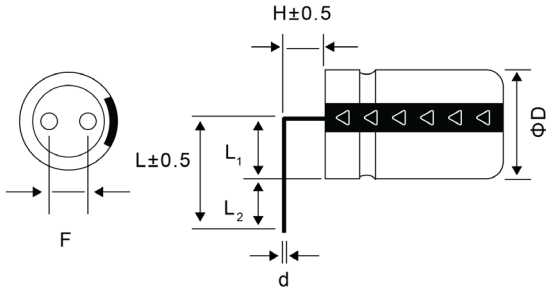
Letter "B": Forming only.



Letter "L": Lead cut and bend (Left).



Letter "Z": Lead cut and bend (Right).



Letter	Termination Type	Dø	6.3ø	8ø	10ø
	Standard long lead	F	2.50	3.50	5.00
		d	0.50	0.50	0.60
C	Lead cut only	F	2.50	3.50	5.00
		H	5.00	5.00	5.00
		d	0.50	0.50	0.60
D	Lead cut and crimp	E	1.12	1.32	1.32
		F			5.00
		H ₁			5.00
		H ₂			1.80
		d			0.60
F	Lead cut and form	F	5.00	5.00	
		H	5.00	5.00	
		d	0.50	0.50	
H	Lead, cut, crimp, and form	E	1.12	1.32	1.32
		F	5.00	5.00	
		H ₁	5.00	5.00	
		H ₂	1.80	1.80	
		d	0.50	0.50	
B	Forming only	F	5.00	5.00	
		d	0.50	0.50	
L/Z	Lead cut and bend	F	2.50	3.50	5.00
		H	2.00	2.50	2.50
		L ₁	3.40	4.50	5.30
		L ₂	3.50	3.50	3.50
		d	0.50	0.50	0.60

*All dimensions in mm.