

### RH SERIES ▪ LONG LIFE 105°C TYPE

**KEY FEATURES**  HIGH VOLTAGE  LONG LIFE

- **ALUMINUM ELECTROLYTIC CAPACITOR** ▪ Screw terminal type
- Useful life: 105°C ▪ 8000 hours
- Wide capacitance range
- All-welded construction ensures highest reliability
- Bottom cooling possible due to the thermal construction



### SPECIFICATIONS

Items		Performance Characteristics	
Operating Temperature Range		-40 ~ +105°C	
Rated Voltage Range	$V_R$	160 ~ 450V DC	
Surge Voltage	$V_S$	$V_S = 1.10 \cdot V_R$	
Capacitance Range	$C_R$	220 ~ 47000µF	
Cap. Tolerance	$\Delta C$	±20% (120Hz ▪ 20°C)	
Leakage Current (20°C ▪ $V_R$ applied)	$I_{LEAK}$	$\leq 0.018 \cdot (C_R \cdot V_R)^{0.85} + 4$ (µA) or 5mA (whichever is smaller) ▪ After 5 minutes [ $I_{LEAK}$ (µA) ; $C_R$ (µF) ; $V_R$ (V) ]	
Dissipation Factor % (20°C ▪ 120Hz)	$\tan\delta$	$V_R$ (V DC)	160 ~ 450
		$\tan\delta$	15
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	160 ~ 450
		Z-25°C/Z+20°C	4
		Z-40°C/Z+20°C	10

Lifetime Test			
Useful Life 105°C ( $V_R$ & $I_R$ applied)	Test	<b>8000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 15\%$ of initial measured value	
	$\tan\delta$	$\leq 175\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
	Deviation Rate at Useful Life: 100 FIT = 0.01%/1000h with 60% confidence level ▪ parts show higher drift as test criteria		
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	<b>2000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 10\%$ of initial measured value	
	$\tan\delta$	$\leq 130\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 10\%$ of initial measured value	
	$\tan\delta$	$\leq 130\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4			
Vibration Resistance Test	Max. 10g force, $f_{RANGE}$ 10Hz ... 55Hz, amplitude 0.75mm; X/Y/Z-axis each 2h; capacitor rigidly clamped by body to surface ▪ IEC 60068-2-6		

★ Remark: For **Halogen Free** products see chapter **SLEEVE AND PRINTING** selection.

**STANDARD RATINGS**

□□□ see terminal code at dimensions table

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (mΩ)	Max. ESR +20°C - 120Hz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
160	1000	35	60	110	200	1900	RH102M160P60□□□
	1500	35	80	68	130	2500	RH152M160P800□□□
	2200	35	100	48	90	3300	RH222M160PA00□□□
	3300	35	120	32	60	4500	RH332M160PA20□□□
	3300	51	80	32	60	4500	RH332M160R800□□□
	4700	51	100	22	42	5500	RH472M160RA00□□□
	6800	51	140	15	29	7800	RH682M160RA40□□□
	6800	63.5	100	15	29	7500	RH682M160SA00□□□
	10000	63.5	120	10	20	8800	RH103M160SA20□□□
	15000	76.2	120	7	13	10800	RH153M160TA20□□□
	22000	76.2	140	5	9	13800	RH223M160TA40□□□
	22000	89	130	5	9	14500	RH223M160XA30□□□
	33000	89	140	3	6	15500	RH333M160XA40□□□
	47000	89	220	3	5	19200	RH473M160XB20□□□
200	680	35	50	150	290	1400	RH681M200P500□□□
	1000	35	60	110	200	2000	RH102M200P600□□□
	1500	35	80	68	130	2500	RH152M200P800□□□
	2200	35	120	48	90	3600	RH222M200PA20□□□
	2200	51	80	48	90	3600	RH222M200R800□□□
	3300	51	80	32	60	4600	RH332M200R800□□□
	3300	51	100	32	60	4800	RH332M200RA00□□□
	4700	51	140	22	42	6400	RH472M200RA40□□□
	4700	63.5	100	22	42	6200	RH472M200SA00□□□
	6800	63.5	120	15	29	7700	RH682M200SA20□□□
	10000	76.2	120	10	20	10000	RH103M200TA20□□□
	15000	76.2	140	7	13	11500	RH153M200TA40□□□
	15000	76.2	160	7	13	12200	RH153M200TA60□□□
	22000	76.2	160	5	9	15500	RH223M200TA60□□□
	22000	89	140	5	9	16500	RH223M200XA40□□□
250	470	35	60	220	420	1200	RH471M250P600□□□
	680	35	80	150	290	1700	RH681M250P800□□□
	1000	35	100	110	200	2500	RH102M250PA00□□□
	1500	51	80	68	130	2900	RH152M250R800□□□
	2200	51	100	48	90	4000	RH222M250RA00□□□
	3300	51	140	32	60	5300	RH332M250RA40□□□
	3300	63.5	100	32	60	5000	RH332M250SA00□□□
	4700	63.5	120	22	42	6600	RH472M250SA20□□□
	6800	76.2	120	15	29	8300	RH682M250TA20□□□
	10000	76.2	160	10	20	11000	RH103M250TA60□□□
	10000	89	140	10	20	11500	RH103M250XA40□□□
	15000	89	170	7	13	14500	RH153M250XA70□□□
	22000	89	220	5	9	17000	RH223M250XB20□□□

**STANDARD RATINGS**

□□□ see terminal code at dimensions table

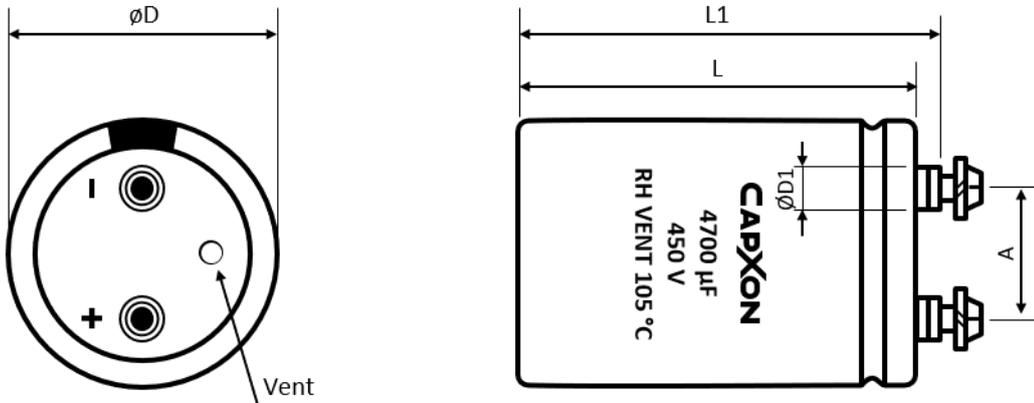
V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (mΩ)	Max. ESR +20°C - 120Hz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
350	330	35	60	320	600	1600	RH331M350P600□□□
	470	35	80	220	420	2300	RH471M350P800□□□
	680	35	100	150	290	3300	RH681M350PA00□□□
	1000	35	120	110	200	4400	RH102M350PA20□□□
	1000	51	80	110	200	4600	RH102M350R800□□□
	1500	51	80	68	130	5700	RH152M350R800□□□
	1500	51	100	68	130	6800	RH152M350RA00□□□
	2200	51	105	48	90	7700	RH222M350RA05□□□
	2200	51	120	48	90	8300	RH222M350RA20□□□
	2200	51	140	48	90	8800	RH222M350RA40□□□
	2700	63.5	80	39	74	8700	RH272M350S800□□□
	3300	63.5	100	32	60	10000	RH332M350SA00□□□
	3300	63.5	120	32	60	10800	RH332M350SA20□□□
	3900	63.5	120	27	51	11500	RH392M350SA20□□□
	4700	63.5	145	22	42	12600	RH472M350SA45□□□
	4700	76.2	105	22	42	12600	RH472M350TA05□□□
	4700	76.2	120	22	42	13000	RH472M350TA20□□□
	5600	76.2	130	19	36	14800	RH562M350TA30□□□
	6800	76.2	140	15	29	16500	RH682M350TA40□□□
	8200	76.2	160	13	24	20000	RH822M350TA60□□□
	8200	89	145	13	24	21500	RH822M350XA45□□□
	10000	76.2	160	10	20	21500	RH103M350TA60□□□
	10000	76.2	190	10	20	23000	RH103M350TA90□□□
	10000	89	140	10	20	23000	RH103M350XA40□□□
12000	76.2	220	9	17	27500	RH123M350TB20□□□	
12000	89	170	9	17	28500	RH123M350XA70□□□	
15000	89	190	7	13	30000	RH153M350XA90□□□	
18000	89	220	6	11	34000	RH183M350XB20□□□	
400	220	35	50	470	900	1400	RH221M400P500□□□
	330	35	60	320	600	1700	RH331M400P600□□□
	470	35	80	220	420	3300	RH471M400P800□□□
	680	35	120	150	290	3900	RH681M400PA20□□□
	680	51	80	150	290	4100	RH681M400R800□□□
	1000	51	80	110	200	4700	RH102M400R800□□□
	1500	51	105	68	130	6400	RH152M400RA05□□□
	1500	51	120	68	130	7000	RH152M400RA20□□□
	2200	51	130	48	90	9100	RH222M400RA30□□□
	2200	63.5	100	48	90	8300	RH222M400SA00□□□
	2700	63.5	100	39	74	10000	RH272M400SA00□□□
	3300	63.5	130	32	60	11500	RH332M400SA30□□□
	3300	76.2	105	32	60	11700	RH332M400TA05□□□
	3300	76.2	120	32	60	12200	RH332M400TA20□□□
	3900	76.2	120	27	51	13000	RH392M400TA20□□□
	4700	76.2	120	22	42	14500	RH472M400TA20□□□

**STANDARD RATINGS**

□□□ see terminal code at dimensions table

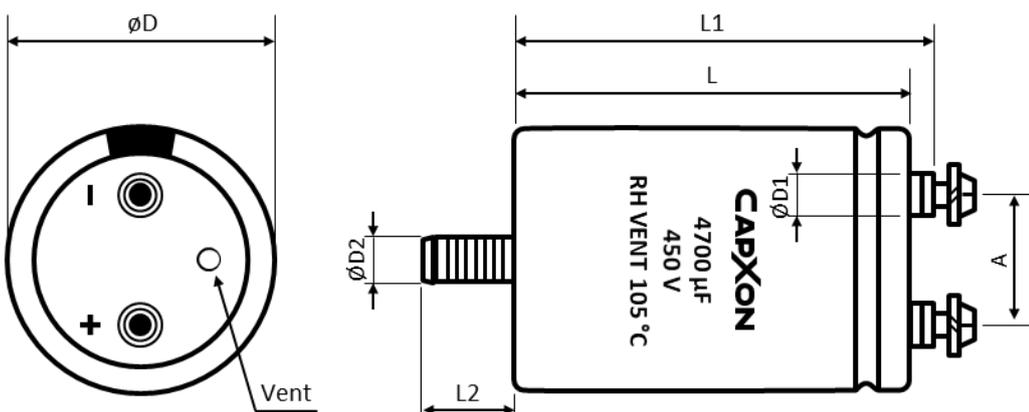
V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (mΩ)	Max. ESR +20°C - 120Hz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
400	4700	76.2	130	22	42	15000	RH472M400TA30□□□
	5600	76.2	145	19	36	17000	RH562M400TA45□□□
	6800	76.2	160	15	29	19300	RH682M400TA60□□□
	6800	89	145	15	29	20000	RH682M400XA45□□□
	8200	89	160	13	24	22000	RH822M400XA60□□□
	10000	89	160	10	20	24000	RH103M400XA60□□□
	12000	89	180	9	17	28000	RH123M400XA80□□□
	15000	89	200	7	13	31000	RH153M400XB00□□□
450	220	35	50	470	900	1400	RH221M450P500□□□
	330	35	60	320	600	1700	RH331M450P600□□□
	470	35	80	220	420	3500	RH471M450P800□□□
	680	35	120	150	290	4200	RH681M450PA20□□□
	680	51	80	150	290	5500	RH681M450R800□□□
	1000	51	80	110	200	5800	RH102M450R800□□□
	1000	51	105	110	200	6500	RH102M450RA05□□□
	1500	51	120	68	130	7100	RH152M450RA20□□□
	2200	63.5	100	48	90	8400	RH222M450SA00□□□
	2200	63.5	120	48	90	9200	RH222M450SA20□□□
	2700	63.5	130	39	74	11300	RH272M450SA30□□□
	3300	63.5	145	32	60	13200	RH332M450SA45□□□
	3300	76.2	120	32	60	12700	RH332M450TA20□□□
	3900	76.2	145	27	51	15000	RH392M450TA45□□□
	4700	76.2	120	22	42	15000	RH472M450TA20□□□
	4700	76.2	160	22	42	17000	RH472M450TA60□□□
	5600	76.2	130	19	36	16000	RH562M450TA30□□□
	5600	76.2	160	19	36	17800	RH562M450TA60□□□
	5600	89	145	19	36	20000	RH562M450XA45□□□
	6800	76.2	160	15	29	20000	RH682M450TA60□□□
	6800	76.2	220	15	29	22000	RH682M450TB20□□□
	6800	89	170	15	29	23000	RH682M450XA70□□□
	8200	89	180	13	24	24000	RH822M450XA80□□□
	10000	89	200	10	20	27000	RH103M450XB00□□□
12000	89	236	9	17	29000	RH123M450XB36□□□	

### DIMENSIONS • Ring clamp mounting • All dimensions in mm



Terminal	Dimensions (mm) with insulating sleeve					Min. Full Thread (mm)	Max. Torque (Nm)	Terminal code
	$D \pm 2$	$L \pm 3$	$L1 \pm 3$	D1 max.	$A \pm 0.5$			
M5	35	50 ~ 120	56.5 ~ 126.5	8.3	12.7	8	2	A50
M5	51	50 ~ 140	56.5 ~ 146.5	10.3	22	8	2	A50
M5	63.5	80 ~ 140	86.5 ~ 146.5	10.3	28.6	8	2	A50
M5	63.5	80 ~ 140	86.5 ~ 146.5	13	28.6	8	2	A53
M5	76.2	100 ~ 240	106.5 ~ 246.5	10.3	31.8	12	2.5	A50
M5	76.2	100 ~ 240	106.5 ~ 246.5	17.5	31.8	12	2.5	A57
M6	76.2	100 ~ 240	106.5 ~ 246.5	17.5	31.8	12	2.5	A67
M6	89	100 ~ 240	106.5 ~ 246.5	17.5	31.8	12	2.5	A67

### DIMENSIONS • Threaded stud mounting • All dimensions in mm



**DIMENSIONS • Threaded stud mounting • All dimensions in mm**

Terminal	Dimensions (mm) with insulating sleeve							Min. Full Thread (mm)	Max. Torque (Nm)	Terminal code
	D ± 2	L ± 3	L1 ± 3	L2 ± 1	D1 max.	D2	A ± 0.5			
M5	35	50 ~ 120	56.5 ~ 126.5	12	8.3	M8	12.7	8	2	E50
M5	51	50 ~ 140	56.5 ~ 146.5	16	10.3	M12	22	8	2	E50
M5	63.5	80 ~ 140	86.5 ~ 146.5	16	10.3	M12	28.6	8	2	E50
M5	63.5	80 ~ 140	86.5 ~ 146.5	16	13	M12	28.6	8	2	E53
M5	76.2	100 ~ 240	106.5 ~ 246.5	16	10.3	M12	31.8	12	2.5	E50
M5	76.2	100 ~ 240	106.5 ~ 246.5	16	17.5	M12	31.8	12	2.5	E57
M6	76.2	100 ~ 240	106.5 ~ 246.5	16	17.5	M12	31.8	12	2.5	E67
M6	89	100 ~ 240	106.5 ~ 246.5	16	17.5	M12	31.8	12	2.5	E67

**SLEEVE AND PRINTING SELECTION TABLE**

Diameter ØD (mm)	Sleeve Material	Sleeve Printing	CapXon Standard	Halogen Free	Product Code Suffix	Product Code Example
35	PET	Ink	Yes	Yes	-	RH102M350PA20E50
> 35	PVC	Thermo	Yes	No	-	RH682M400TA60E50
> 35	PET	Thermo	No	No	(*) Note	RH682M400TA60E50*
> 35	PET	Ink	No	Yes	(**) Note	RH682M400TA60E50**

Note: (\*) and (\*\*) consult CapXon for further details.

**ACCESSORIES**

- The capacitors are supplied with suitable screws, serrated washers and plain washers. Accessories are not fastened to the capacitor.
- Suitable ring clamps and further assembly material see packaging information “Accessories”.

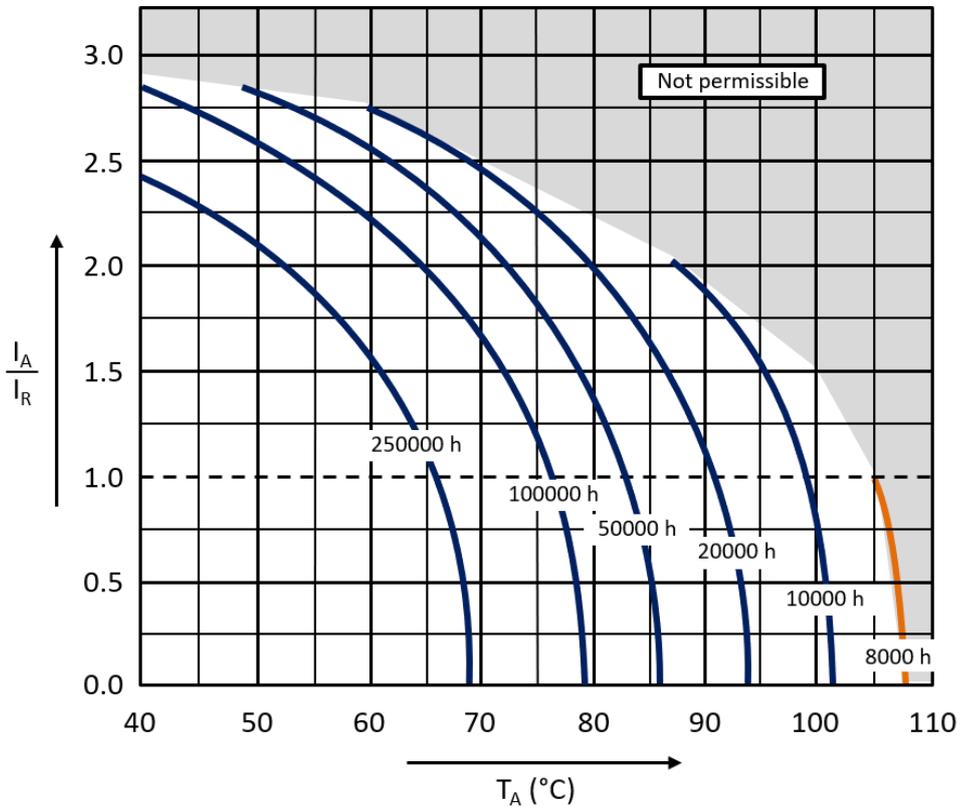
**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

Frequency (Hz)	50/60	100/120	300	1k	≥ 3k
$K_f$	0.8	1	1.2	1.3	1.4

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

<a href="#">General Precautions &amp; Guidelines</a>	<a href="#">Packaging Information</a>	<a href="#">3D Models</a>	<a href="#">Reliability Tests</a>

**USEFUL LIFE**


With:  $I_A$ : Actual application current  
 $I_R$ : Maximum permissible rated ripple current (A RMS)  
 $T_A$ : Ambient temperature of the capacitor

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.