



## AYX-HR Series

AYX-HR Flat Bottom

AYUX-HR Mounting Stud

Series	Voltage	Temperature	Case $\Phi$ x H [mm]	Applications
AY(U)X-HR	40-500V	-40°C,+85°C	51x105/90x222	High Ripple High reliability Long Life

*Table 1-General*

### Mechanical Outlines:

- **Case:** aluminium made
- **Terminals:** screw
- **Sealing:** hermetic by beading on an EPR gasket, housed on a resin cover
- **Pressure Release Vent:** made in silicone-rubber
- **Sleeve:** self-extinguishing thermoshrinkable sleeve
- **Size:** see enclosed drawings
- **Mounting Hardware:** see hardware section

Specifications	Temperature Range	Capacitance
CECC 30300 IEC 384-4 ("long life grade") MIL C62D DIN 41240/DIN45910	Operating: -25°C/+85°C <sup>1</sup> Climatic category : 25/85/56	Standard tolerance X=10%+30% Upon request M=±20%

*Table 2-General Specifications*

<sup>1</sup> Capacitors can be operated @-40°C, but impedance should be considered

## Leakage Current

After the rated voltage has been applied to the capacitor for 5 minutes the leakage current must be within limits given in Table 3-Leakage Current limits:

Maximum limit	@25°C	$I_f \leq 0,004 \times C \times V$
Operating limit	@25°C	$I_f \leq 0,001 \times C \times V$

*Table 3-Leakage Current limits*

Where:

- $I_f$ =leakage current [ $\mu$ A]
- C=capacitance [ $\mu$ F]
- V=rated voltage [V]

## Important

*When using high-capacitance and high-voltage electrolytic capacitors it is important to remember that the inner part (the rolled section) is not insulated from can: between the negative pole and the aluminium can there is a variable and not defined resistance essentially due to the electrolyte used in capacitor manufacture.*

## Surge Voltage

Surge Voltage is the maximum voltage which may be applied for short periods, limit for each working voltage is shown in Table 4-Surge Voltage values.

Working Voltage	63	75	100	160	200	250	350	400	420	450	500
Surge Voltage	73	86	115	185	230	290	385	440	460	495	525

*Table 4-Surge Voltage values*

## Ripple Current

The allowable values of ripple current in Ampères, are related to the temperature and frequency by

$$I_{\text{Ripple}} = K_t \cdot K_f \cdot I_{\text{Ripple@85}^\circ\text{C}}$$

*Equation 1*

Where:

- $I_{\text{Ripple@85}^\circ\text{C}}$  is the limit given by tables, @ 85°C/100HZ
- $K_t$  is the Temperature Correlation Factor, tabulated in Table 5-Kt Values
- $K_f$  is the Frequency Correlation Factor, tabulated in Table 6-Kf Values

*Note .Superimposed alternating voltage summed to DC voltage must not exceed rated voltage, rated ripple current must not be exceeded and no reverse polarity is allowed*

°C	40	55	65	75	80	85
Kt	1.65	1.50	1.40	1.20	1.1	1.0

*Table 5-Kt Values*

Vn/Hz	Kf			
	50<V=300		V>300	
	Diameter Code A,B		Diameter Code C,D,E	
50	0.79	0.76	0.78	0.72
100	1.00	1.00	1.00	1.00
120	1.04	1.04	1.02	1.03
200	1.12	1.17	1.06	1.14
300	1.16	1.28	1.08	1.24
400	1.20	1.35	1.09	1.29
500	1.22	1.39	1.09	1.32
>1000	1.25	1.45	1.09	1.37

*Table 6-Kf Values*

## Dimensions

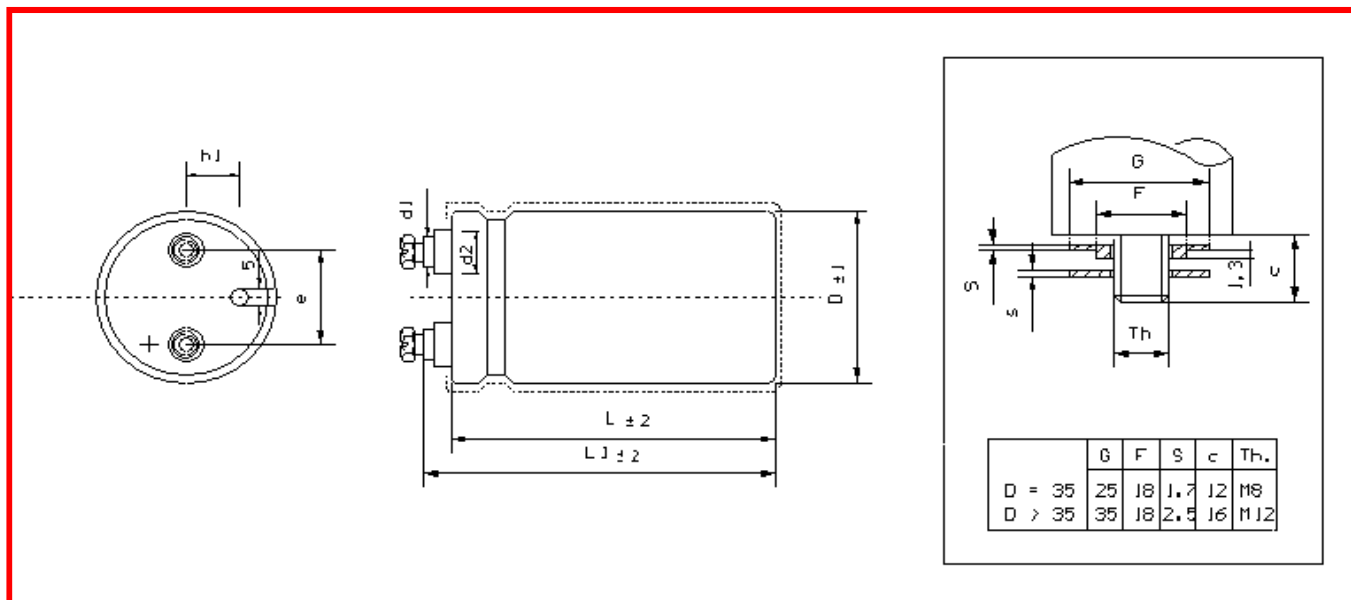


Table 7-General View

Case Code	$\Phi \times L$	l1	d1	d2	h1	e	Case Code	$\Phi \times L$	l1	d1	d2	h1	e
All dimensions in [mm] general tolerance $\pm 0,5$ mm													
BC	51x105	109	13	18	13	22.2	DJ	76x220	222	13	18	19	31.8
CC	63x107	111	13	18	16	28.6	EC	90x107	112	17	23	19	31.8
DC	76x107	111	13	18	19	31.8	EF	90x147	153	17	23	19	31.8
DF	76x147	151	13	18	19	31.8	EJ	90x220	227	17	23	19	31.8
DK	76x167	173	13	18	19	31.8							

Table 8-Dimensions

Insert screw thread (diam 51,63 and 76mm)= M5	Insert screw thread (diam 90mm)= M6
Insert screw torque max. (M5) = 2,0Nm	Insert screw torque max. (M6) = 2,5Nm
Insert screw length =10mm	Screw torque for hex nuts M12 =10Nm

Table 9-Connections

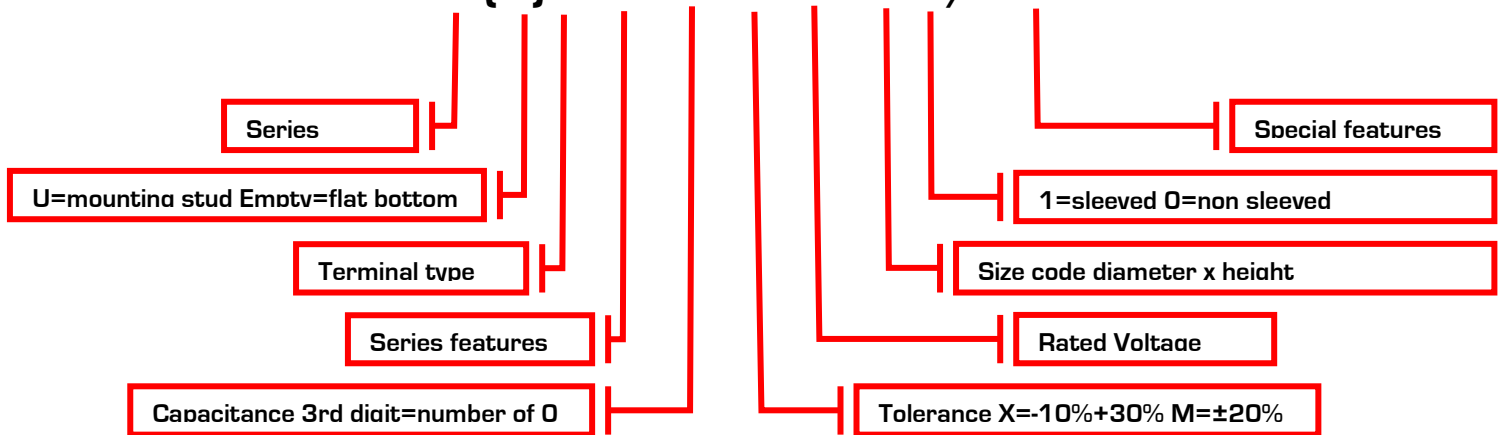
Diam <sup>2</sup> Height <sup>3</sup>	B   pcs/box	C   pcs/box	D   pcs/box	E   pcs/box
A	/	/		
B	30	/		
C	30	20	12	6
F	/	20	12	6
K	/	/	12	6
G	/	/	6	6
J	/	/	8	6
L	/	/	8	8
thread	M5	M5	M5/M6	M5/M6

Table 10-Quantity per box

Standard Mounting Stud Hardware: Insulating Plastic Washer And Metallic Nut

### Ordering code

**AY(U)X-HR472X350DF1/XXXX**



<sup>2</sup> All dimensions in [mm] general tolerance ±0,5mm

<sup>3</sup> All dimensions in [mm] general tolerance ±0,5mm



## Expected Lifetime Vs Temperature and Ripple Current

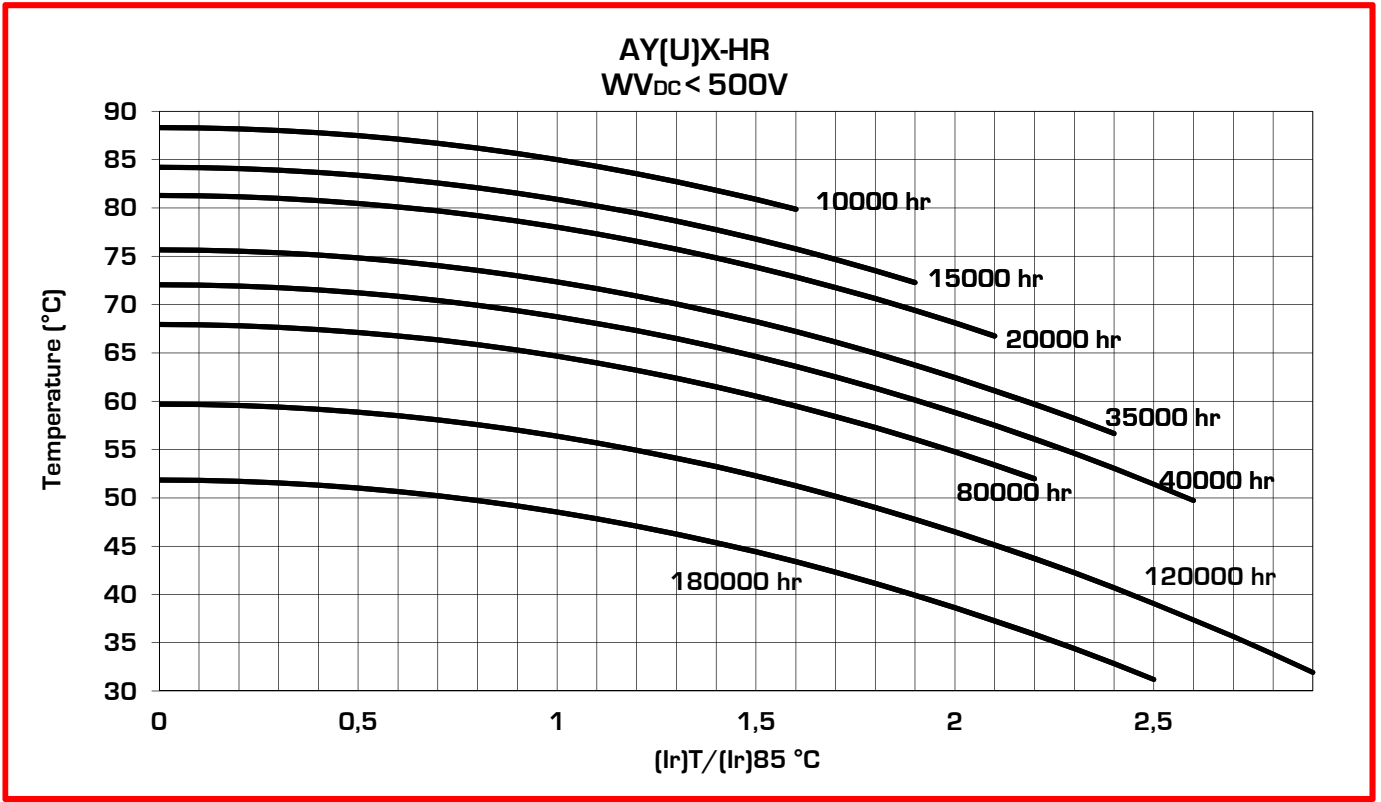


Table 11

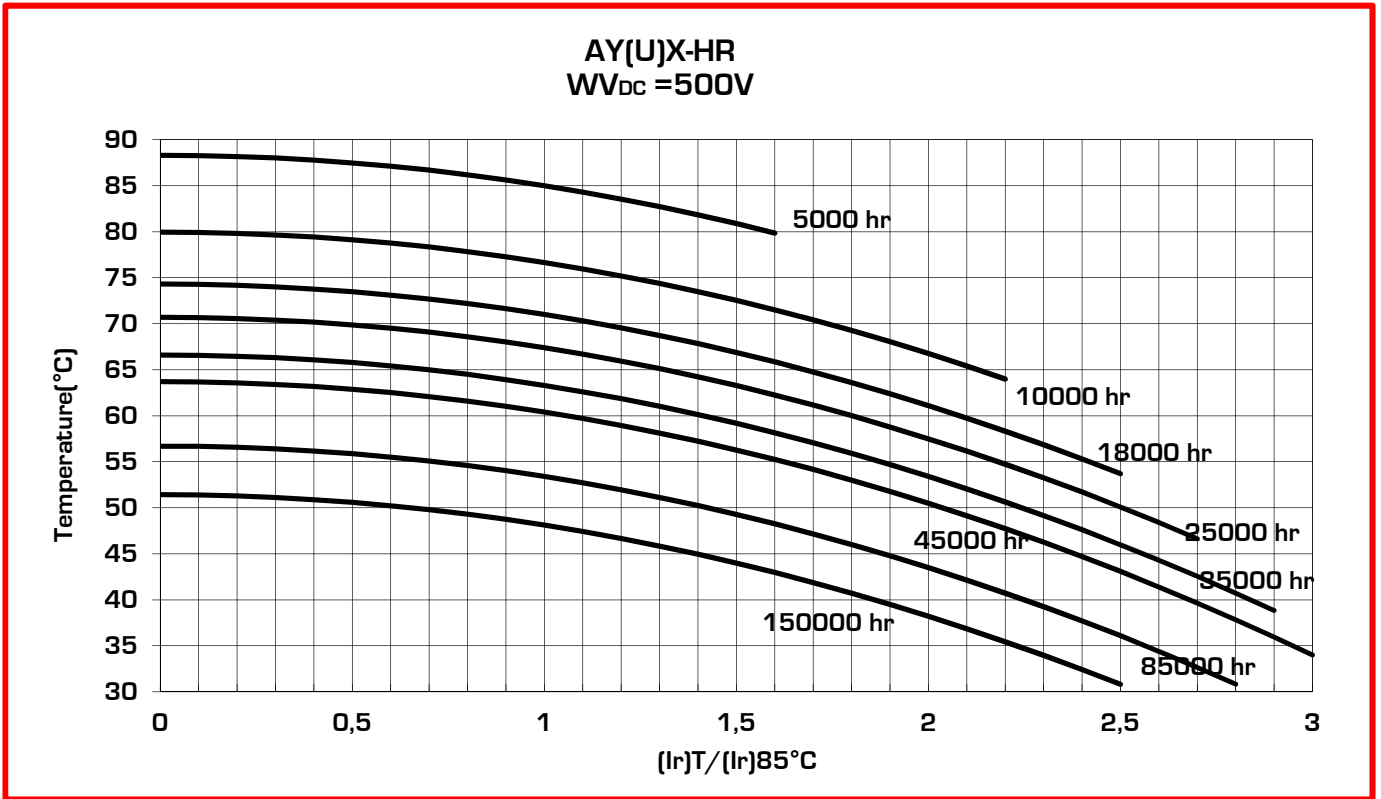


Table 12

## Expected Lifetime End of Life Criteria

During useful life typical electrical parameters of electrolytic capacitor are subject to change. End of Life criteria, when rated temperature, voltage and ripple are applied, are:

- $\frac{\Delta C}{C_{t0}} \leq 30\%$  *Equation 2*

- $ESR \leq 3 \cdot ESR_{t0}$  *Equation 3*

- $I_f \leq I_{ft0}$  *Equation 4*

where  $t_0$  is the initial value

## Voltage Endurance Test Requirements

Voltage Endurance Test are one of the basys for Expected Lifetime Curves.

For AY(U)X series, End of Life criteria, when rated temperature, and voltage are applied for 2'000hrs, are:

- $\frac{\Delta C}{C_{t0}} \leq 10\%$  *Equation 5*

- $ESR \leq 1,3 \cdot ESR_{t0}$  *Equation 6*

- $I_f \leq I_{ft0}$  *Equation 7*

where  $t_0$  is the initial value

## VN=63V

Capacitance	Case	Diam	Height	Tanδ	ESRmax   typ		Zmax	Iripple @100Hz		Part Number
					[μF]@100Hz	[mm]		[mm]	[%]@100Hz	
22000	BB	51	83	0,26	19	15	14	17,1	12,2	AY(U)X-HR223X063BB1
	BC	51	105	0,24	17	14	13	19,7	14,1	AY(U)X-HR223X063BC1
33000	BC	51	105	0,28	14	11	10	22,3	15,9	AY(U)X-HR333X063BC1
	CC	63	107	0,27	13	10	10	25,8	18,4	AY(U)X-HR333X063CC1
47000	CC	63	107	0,30	10	8	8	29,2	20,9	AY(U)X-HR473X063CC1
68000	DC	76	105	0,36	8	7	6	35,4	25,3	AY(U)X-HR683X063DC1
100000	DF	76	147	0,40	6	5	5	47,1	33,7	AY(U)X-HR103X063DF1

## VN=100V

Capacitance	Case	Diam	Height	Tanδ	ESRmax   typ		Zmax	Iripple @100Hz		Part Number
					[μF]@100Hz	[mm]		[mm]	[%]@100Hz	
10000	BB	51	83	0,12	19	15	14	16,9	12,1	AY(U)X-HR103X100BB1
	BC	51	105	0,1	16	13	12	20,6	14,7	AY(U)X-HR103X100BC1
15000	BC	51	105	0,11	12	9	9	24,0	17,1	AY(U)X-HR153X100BC1
22000	CC	63	107	0,15	11	9	8	28,3	20,2	AY(U)X-HR223X100CC1
	DC	76	107	0,14	10	8	8	32,5	23,2	AY(U)X-HR223X100DC1
33000	DC	76	107	0,18	9	7	7	35,2	25,1	AY(U)X-HR333X100DC1
	DF	76	147	0,16	8	6	6	42,8	30,6	AY(U)X-HR333X100DF1
47000	DF	76	147	0,18	6	5	5	48,1	34,4	AY(U)X-HR473X100DF1

Notes:

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**VN=160V**

Capacitance [μF]@100Hz	Case	Diam [mm]	Height [mm]	Tanδ [%]@100Hz	ESRmax   typ		Zmax [mΩ]@10KHz	Iripple @100Hz		Part Number (U) for mounting stud
					[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	
4700	BC	51	105	0,1	34	27	25	14,1	10,1	AY(U)X-HR472X160BC1
	CC	63	107	0,09	30	24	23	16,9	12,0	AY(U)X-HR472X160CC1
6800	DC	76	107	0,1	23	19	18	21,4	15,3	AY(U)X-HR682X160DC1
10000	DC	76	107	0,11	18	14	13	24,8	17,7	AY(U)X-HR103X160DC1
15000	DF	76	147	0,12	13	10	10	33,3	23,8	AY(U)X-HR153X160DF1
22000	DF	76	147	0,15	11	9	8	36,1	25,8	AY(U)X-HR223X160DF1
	EF	90	220	0,14	10	8	8	49,1	35,1	AY(U)X-HR223X160EF1

**VN=200V**

Capacitance [μF]@100Hz	Case	Diam [mm]	Height [mm]	Tanδ [%]@100Hz	ESRmax   typ		Zmax [mΩ]@10KHz	Iripple @100Hz		Part Number (U) for mounting stud
					[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	
3300	BC	51	105	0,10	48	39	36	11,8	8,4	AY(U)X-HR332X200BC1
4700	CC	63	107	0,10	34	27	25	16,0	11,4	AY(U)X-HR472X200CC1
	DC	76	107	0,09	30	24	23	18,8	13,4	AY(U)X-HR472X200DC1
6800	DC	76	107	0,10	23	19	18	21,4	15,3	AY(U)X-HR682X200DC1
10000	DF	76	147	0,11	18	14	13	28,4	20,3	AY(U)X-HR103X200DF1
15000	DF	76	147	0,12	13	10	10	33,3	23,8	AY(U)X-HR153X200DF1
22000	DF	76	147	0,12	9	7	7	40,3	28,8	AY(U)X-HR223X200DF1
	DK	76	167	0,12	9	7	7	42,7	30,5	AY(U)X-HR223X200DK1
33000	DK	76	167	0,12	6	5	4	52,3	37,4	AY(U)X-HR333M200DK1

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## VN=250V

Capacitance [μF]@100Hz	Case	Diam [mm]	Height [mm]	Tanδ [%]@100Hz	ESRmax   typ		Zmax [mΩ]@10KHz	Iripple @100Hz		Part Number (U) for mounting stud
					[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	
2200	BB	51	83	0,09	65	52	49	9,2	6,5	AY(U)X-HR222X250BB1
	BC	51	105	0,08	58	46	43	10,8	7,7	AY(U)X-HR222X250BC1
3300	BC	51	105	0,10	48	39	36	11,8	8,4	AY(U)X-HR332X250BC1
	CC	63	107	0,09	43	35	33	14,1	10,1	AY(U)X-HR332X250CC1
4700	DC	76	107	0,10	34	27	25	17,8	12,7	AY(U)X-HR472X250DC1
6800	DC	76	107	0,10	23	19	18	21,4	15,3	AY(U)X-HR682X250DC1
10000	DF	76	147	0,10	16	13	12	29,8	21,3	AY(U)X-HR103X250DF1
	EC	90	107	0,10	16	13	12	28,6	20,5	AY(U)X-HR103X250EC1
15000	EF	90	147	0,09	10	8	7	42,3	30,2	AY(U)X-HR153X250EF1
	EJ	90	222	0,09	10	8	7	50,8	36,3	AY(U)X-HR153X250EJ1

## VN=350V

Capacitance [μF]@100Hz	Case	Diam [mm]	Height [mm]	Tanδ [%]@100Hz	ESRmax   typ		Zmax [mΩ]@10KHz	Iripple @100Hz		Part Number (U) for mounting stud
					[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	
2200	BC	51	105	0,09	65	52	49	10,2	7,3	AY(U)X-HR222X350BC1
3300	CC	63	107	0,09	43	35	33	14,1	10,1	AY(U)X-HR332X350CC1
	DC	76	107	0,08	39	31	29	16,7	11,9	AY(U)X-HR332X350DC1
4700	DC	76	107	0,09	30	24	23	18,8	13,4	AY(U)X-HR472X350DC1
	DF	76	147	0,08	27	22	20	22,8	16,3	AY(U)X-HR472X350DF1
6800	DF	76	147	0,08	19	15	14	27,5	19,6	AY(U)X-HR682X350DF1
	EC	90	107	0,11	26	21	19	22,5	16,1	AY(U)X-HR682X350EC1
10000	DF	76	147	0,11	18	14	13	28,4	20,3	AY(U)X-HR103X350DF1
	DJ	76	222	0,10	16	13	12	35,9	25,6	AY(U)X-HR103X350DJ1
15000	DJ	76	222	0,10	11	8	8	44,0	31,4	AY(U)X-HR153X350DJ1
	EF	90	147	0,12	13	10	10	36,6	26,2	AY(U)X-HR153X350EF1
	EJ	90	222	0,12	13	10	10	44,0	31,4	AY(U)X-HR153X350EJ1
22000	EJ	90	222	0,12	9	7	7	53,3	38,1	AY(U)X-HR223M350EJ1

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**VN=400V**

Capacitance [μF]@100Hz	Case	Diam [mm]	Height [mm]	Tanδ [%]@100Hz	ESRmax   typ		Zmax [mΩ]@10KHz	Iripple @100Hz		Part Number (U) for mounting stud
					[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	
1500	BB	51	83	0,10	106	85	80	7,2	5,1	AY(U)X-HR152X400BB1
	BC	51	105	0,10	106	85	80	8,0	5,7	AY(U)X-HR152X400BC1
2200	CC	63	107	0,09	65	52	49	11,5	8,2	AY(U)X-HR222X400CC1
	DC	76	107	0,08	58	46	43	13,6	9,7	AY(U)X-HR222X400DC1
3300	CC	63	107	0,09	43	35	33	14,1	10,1	AY(U)X-HR332X400CC1
	DC	76	107	0,09	43	35	33	15,7	11,2	AY(U)X-HR332X400DC1
	DF	76	147	0,09	43	35	33	18,0	12,9	AY(U)X-HR332X400DF1
4700	DC	76	107	0,10	34	27	25	17,8	12,7	AY(U)X-HR472X400DC1
	DF	76	147	0,09	30	24	23	21,5	15,4	AY(U)X-HR472X400DF1
6800	DF	76	147	0,08	19	15	14	27,5	19,6	AY(U)X-HR682X400DF1
10000	DJ	76	222	0,11	18	14	13	34,2	24,5	AY(U)X-HR103X400DJ1
	EF	90	147	0,11	18	14	13	31,2	22,3	AY(U)X-HR103X400EF1
15000	EJ	90	222	0,08	8	7	6	53,9	38,5	AY(U)X-HR153X400EJ1
18000	EJ	90	222	0,08	7	6	5	59,0	42,2	AY(U)X-HR183M400EJ1

**VN=450V**

Capacitance [μF]@100Hz	Case	Diam [mm]	Height [mm]	Tanδ [%]@100Hz	ESRmax   typ		Zmax [mΩ]@10KHz	Iripple @100Hz		Part Number (U) for mounting stud
					[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	
1000	BB	51	83	0,12	191	153	143	5,4	3,8	AY(U)X-HR102X450BB1
1500	BB	51	83	0,11	117	93	88	6,8	4,9	AY(U)X-HR152X450BB1
	BC	51	105	0,10	106	85	80	8,0	5,7	AY(U)X-HR152X450BC1
2200	CC	63	107	0,12	87	69	65	10,0	7,1	AY(U)X-HR222X450CC1
	DC	76	107	0,11	80	64	60	11,6	8,3	AY(U)X-HR222X450DC1
3300	DC	76	107	0,12	58	46	43	13,6	9,7	AY(U)X-HR332X450DC1
	DF	76	147	0,1	48	39	36	17,1	12,2	AY(U)X-HR332X450DF1
4700	DF	76	147	0,12	41	33	30	18,6	13,3	AY(U)X-HR472X450DF1
	EC	90	107	0,11	37	30	28	18,7	13,4	AY(U)X-HR472X450EC1
6800	DF	76	147	0,13	30	24	23	21,6	15,4	AY(U)X-HR682X450DF1
	DJ	76	222	0,12	28	22	21	27,0	19,3	AY(U)X-HR682X450DJ1
10000	DJ	76	222	0,12	19	15	14	32,8	23,4	AY(U)X-HR103X450DJ1
	EJ	90	222	0,12	19	15	14	35,9	25,7	AY(U)X-HR103X450EJ1
15000	EJ	90	222	0,13	14	11	10	42,3	30,2	AY(U)X-HR153M450EJ1

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VN=500V

Capacitance	Case	Diam	Height	Tanδ	ESRmax   typ		Zmax	Iripple @100Hz		Part Number
[μF]@100Hz		[mm]	[mm]	[%]@100Hz	[mΩ]@100Hz	[mΩ]@10KHz		[A]@55°C	[A]@85°C	(U) for mounting stud
1000	BC	51	106	0,13	207	166	155	5,7	4,1	AY(U)X-HR102X500BC1
1500	DC	76	107	0,13	138	110	104	8,8	6,3	AY(U)X-HR152X500DC1
2200	DC	76	107	0,13	94	75	71	10,7	7,6	AY(U)X-HR222X500DC1
	DF	76	147	0,13	94	75	71	12,3	8,8	AY(U)X-HR222X500DF1
3300	DF	76	147	0,12	58	46	43	15,6	11,2	AY(U)X-HR332X500DF1
3900	DF	76	147	0,12	49	39	37	17,0	12,1	AY(U)X-HR392X500DF1
4700	DF	76	147	0,12	41	33	30	18,6	13,3	AY(U)X-HR472X500DF1
6800	DJ	76	220	0,12	28	22	21	26,9	19,2	AY(U)X-HR682X500DJ1
10000	EJ	90	220	0,12	19	15	14	35,8	25,6	AY(U)X-HR103X500EJ1

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