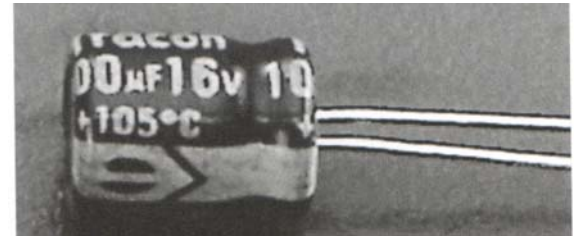


## FHR series

Aluminum Electrolytic Capacitors  
105°C/1000hrs Radial type



### ◆ Features

- » Standard series for general purposes.
- » Used in communication equipments, switching power supply
- » Safety vent construction design

### ◆ Part Number

FHR	104	M	500	R	B	0511
Series	Capacitance	Tolerance	Voltage	Lead form	package	Size
FHR	0.1µF=104	20%=M	10V=100	Radial=R	Bulk=B	5x11=0511
	4.7µF=475		50V=500	Axial=A	Taping=T	6x11=0611
	47µF=476		100V=101			8x11=0811
						10x12=1012

## ◆ Specification

Test Item	Performance Characteristics																																										
Operating Temperature Range	-40 to +105°C	-25 to +105°C																																									
Rated voltage Range	6.3 to 100 VDC	160 to 450 VDC																																									
Capacitance Range	0.1 to 15000uF	0.47 to 470uF																																									
Capacitance Tolerance	±20%(120Hz, +20°C)																																										
Leakage Current (+20°C, max.)	$I \leq 0.01$ CV or 3(uA) After 1minute whichever is greater measured with rated working voltage applied.	$I \leq 0.03$ CV or 3(uA) After 1minute with rated working voltage applied..																																									
Dissipation Factor ( tanδ )	<table border="1"> <tr> <td>Working Voltage (VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>D.F.(%)max</td> <td>23</td> <td>20</td> <td>16</td> <td>14</td> <td>12</td> <td>10</td> <td>10</td> <td>10</td> </tr> </table> <table border="1"> <tr> <td>Working Voltage (VDC)</td> <td>160</td> <td>200</td> <td>250</td> <td>350</td> <td>400</td> <td>450</td> </tr> <tr> <td>D.F.(%)max</td> <td>15</td> <td>15</td> <td>16</td> <td>20</td> <td>20</td> <td>20</td> </tr> </table> <p>For Capacitance &gt; 1000uF , add 2% per another 1000uF (+20°C, at 120Hz)</p>		Working Voltage (VDC)	6.3	10	16	25	35	50	63	100	D.F.(%)max	23	20	16	14	12	10	10	10	Working Voltage (VDC)	160	200	250	350	400	450	D.F.(%)max	15	15	16	20	20	20									
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Low Temperature Characteristics (120Hz)	<table border="1"> <tr> <td>Working Voltage (VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>Z-25°C/Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C/Z+20°C</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> <table border="1"> <tr> <td>Working Voltage (VDC)</td> <td>160</td> <td>200</td> <td>250</td> <td>350</td> <td>400</td> <td>450</td> </tr> <tr> <td>Z-25°C/Z+20°C</td> <td>3</td> <td>3</td> <td>3</td> <td>5</td> <td>6</td> <td>15</td> </tr> </table> <p>For Capacitance Value 1000uF , add 0.5 per another 1000uF for -25°C/+20°C add 1 per another 1000uF for -40°C/+20°C</p>		Working Voltage (VDC)	6.3	10	16	25	35	50	63	100	Z-25°C/Z+20°C	4	3	2	2	2	2	2	2	Z-40°C/Z+20°C	8	6	4	3	3	3	3	3	Working Voltage (VDC)	160	200	250	350	400	450	Z-25°C/Z+20°C	3	3	3	5	6	15
Working Voltage (VDC)	6.3	10	16	25	35	50	63	100																																			
Z-25°C/Z+20°C	4	3	2	2	2	2	2	2																																			
Z-40°C/Z+20°C	8	6	4	3	3	3	3	3																																			
Working Voltage (VDC)	160	200	250	350	400	450																																					
Z-25°C/Z+20°C	3	3	3	5	6	15																																					
Load Life	<p>Test conditions            Duration time : 1000Hrs            Ambient temperature:+105°C            Applied voltage: Rated DC working voltage            After test requirements:at+20°C            After test requirements: ≤±20% of the initial measured value            Dissipation Factor: ≤200% of the initial specified value            Leakage current: ≤The initial specified value</p>																																										
Shelf Life	<p>Test conditions            Duration time :500Hrs            Ambient temperature:+105°C            Applied voltage: None            After test requirements at +20°C : Some limits as Load life.            Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes.</p>																																										

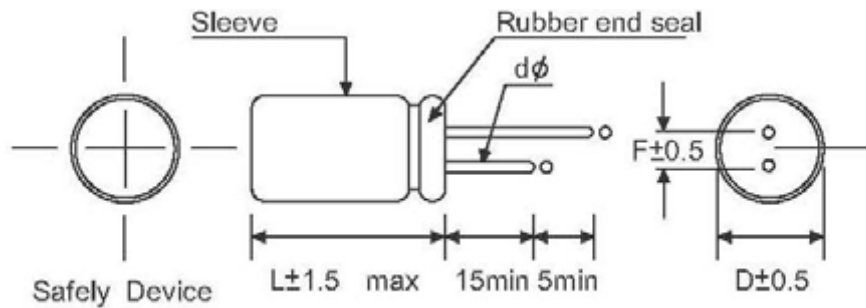
## Multiplier for Ripple Current VS, Frequency

CAP (uF) \ HZ		50(60)	120	400	1K	10K	50-100K
Multiplier	CAP ≤ 10	0.8	1.0	1.30	1.45	1.65	1.70
	10 < CAP ≤ 100	0.8	1.0	1.23	1.36	1.48	1.53
	100 < CAP ≤ 1000	0.8	1.0	1.16	1.25	1.35	1.38
	1000 < CAP	0.8	1.0	1.11	1.18	1.25	1.28

## Multiplier for Ripple Current VS, Temperature

Temperature (°C)	45	60	70	85	105
Multiplier	2.10	1.90	1.65	1.40	1.00

## Diagram of Dimensions: (Unit: mm)



D Ø	5	6.3	8	10	13	16	18	22	25
F	2.0	2.5	3.5	5.0	5.0	7.5	7.5	10	12
d Ø	0.5			0.6		0.8		1.0	

## ◆ Standard Products Table

		Ø D x L (mm)									
uF	WV	6.3		10		16		25		35	
		Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
1		-	-	-	-	5x11	9	5x11	9	5x11	11
4.7		-	-	-	-	-	-	5x11	27	5x11	29
6.8		-	-	-	-	-	-	5x11	35	5x11	38
10		-	-	-	-	5x11	38	5x11	40	5x11	42
22		-	-	5x11	50	5x11	56	5x11	60	5x11	62
33		5x11	56	5x11	60	5x11	65	5x11	70	5x11	78
47		5x11	68	5x11	72	5x11	100	5x11	105	5x11	110
68		5x11	77	5x11	82	5x11	105	6.3x11	120	6.3x11	140
100		5x11	98	5x11	110	5x11	115	5x11	135	6.3x11	165
						6.3x11	135	6.3x11	150	8x11	180
						8x11	165	8x11	175	8x14	190
220		5x11 6.3x11	160 180	5x11 6.3x11	170 180	6.3x11	220	6x11	230	8x11	300
						8x11	230	8x11	240	8x14	325
						10x12	285	10x12	285	8x16	330
									8x20	350	
									10x12	330	
330		6.3x11	200	6.3x11 8x11	260 280	8x11	300	8x11	350	10x12	410
								8x14	352	10x15	420
								10x12	355		
470		6.3x11 8x11	280 310	6.3x11 8x11	300 315	8x11	380	8x14	415	8x20	500
						8x14	390	10x12	445	10x12	460
						10x12	400	10x15	450	10x15	470
								10x17	480	10x17	480
560		8x11	320	8x11	330	10x12	410	10x15	460	10x17	540
								13x14	500		
680		8x11	360	8x11	400	8x14	470	10x12	450	10x20	650
				8x14	410	10x12	480	10x15	520	13x21	750
820		8x11	390	10x12	480	10x15	550	10x17	600		
				10x12	480	10x15	550	10x15	640	10x20	760
1000		8x11 10x12	420 460	8x11	490	8x16	570	10x15	740	10x20	810
				8x14	500	8x20	595	10x17	800	10x25	870
				8x16	530	10x12	580	10x17	800	13x14	850
				10x12	530	10x13	590	10x20	850	13x16	860
				10x15	580	10x15	600	13x16	850	13x21	880
						10x17	630	13x21	900	13x26	910
						10x20	640			16x16	910
						10x17	770	10x20	820	13x21	910
2200		10x17 10x20	780 800	10x17 10x20	870 900	10x20	980	10x25	1180	13x26	1260
						13x16	980	13x21	1210	16x21	1290
						13x21	1020	13x26	1250	16x26	1300
						13x26	1060	16x16	1270	16x31	1400
								16x26	1290	18x16	1280
2700		10x20	850	13x21	920	13x21	1100	16x26	1330	16x31	1500
3300		10x20 13x21	970 1010	10x25 13x21	1110 1160	13x21	1220	16x26	1480	16x31	1620
						13x26	1240	16x31	1540	16x36	1680
						16x16	1220	18x17	1450	18x36	1720
4700		10x25 13x21	1160 1200	13x21 13x26	1360 1380	13x26	1450	16x31	1800	18x36	1900
						16x26	1620				
5600		13x26	1320	16x26	1510	16x31 18x19	1720 1660	16x36	1890	18x36	2000
6800		16x26	1470	16x26 16x31	1680 1800	16x31	1880	18x36	2040	18x41	2090
8200		16x26	1520	16x31	1840	16x36	1950	18x36	2090	22x42	2180
10000		16x26	1690	16x36	1900	18x36	2060	18x41	2160	18x40	2200
		16x31	1740	18x36	1980	18x41	2080	22x42	2200	25x44	2300
15000		16x36	2080	18x36	2230	22x40	2300	22x42	2500	-	-
		18x36	2190								

Ripple Current(mA,rms)at1105°C 120Hz

Ø D x L (mm)

WV uF	50		63		100		160		200	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.1	5x11	1.3	5x11	1.3	5x11	1.3	-	-	-	-
0.22	5x11	2.9	5x11	2.9	5x11	2.9	-	-	-	-
0.33	5x11	4.2	5x11	4.2	5x11	4.2	-	-	-	-
0.47	5x11	8	5x11	8	5x11	8	5x11	12	5x11	12
1	5x11	14	5x11	14	5x11	15	5x11	17	6.3x11	17
2.2	5x11	20	5x11	21	5x11 6x11	22 24	6.3x11	26	6.3x11	33
3.3	5x11	26	5x11	28	5x11	30	6.3x11	32	6.3x11	43
4.7	5x11	32	5x11	34	5x11	36	6.3x11 8x11	36 42	8x11	51
6.8	5x11	40	5x11	42	6.3x11	47	8x11	56	10x12	63
10	5x11 6x11	50 55	5x11	51	6.3x11	60	8x11 10x12	75 78	10x12 10x15	83 90
22	5x11	75	5x11 6.3x11	75 85	6.3x11 8x11	98 105	10x15	105	10x20	135
33	5x11 6.3x11	90 95	6.3x11 8x11	105 115	8x11 10x12	145 155	10x20	170	13x21	180
47	6.3x11	120	6.3x11 8x11	145 155	10x12 10x15	170 180	13x21	210	13x21 13x26	220 230
68	8x11	155	8x11	185	10x15 10x17	240 250	13x26	280	16x26	300
100	8x11	200	8x11 10x12	220 240	10x16 10x20	250 270	13x26 16x26	320 330	16x26	360
220	8x16 10x12 10x15 10x17	355 350 360 365	10x17 10x20	400 430	13x26 16x26	530 560	16x36	580	18x36	590
330	10x15 10x17 10x20	435 450 470	10x20 13x21	500 570	16x26	680	18x31	710	18x31 18x36	590 740
470	10x20 13x21	590 610	13x21 13x26 16x26	640 700 720	16x26 16x31	840 860	18x36 18x41	870 880	22x42	890
560	13x21	660	13x26	770	16x36	880	-	-	-	-
680	13x21 13x26	730 770	16x26	880	16x36	920	-	-	-	-
820	13x26	850	16x26	920	18x31	970	-	-	-	-
1000	13x26 16x21 16x26	900 950 1010	16x26 16x36	1150 1220	18x41	1250	-	-	-	-
1500	16x31	1300	18x31	1350	22x42	1500	-	-	-	-
2200	16x26 16x31 18x36	1400 1450 1550	18x36 22x42	1590 2100	25x44	1880	-	-	-	-
2700	18x36	1610	22x42	1720	-	-	-	-	-	-
3300	18x36	1780	22x42	1900	-	-	-	-	-	-
4700	22x42	2050	25x44	2200	-	-	-	-	-	-
5600	25x42	2160	-	-	-	-	-	-	-	-
6800	25x44	2280	-	-	-	-	-	-	-	-
1000	25x42 25x50	2800 3100	-	-	-	-	-	-	-	-

Ripple Current(mA,rms)at105°C120Hz

Ø D x L (mm)

WV uF	250		350		400		450	
	Size	Ripple	Size	Ripple	Size	Ripple	Size	Ripple
0.47	5x11	12	6.3x11	15	6.3x11	15	6.3x11	15
1	6.3x11	17	6.3x11	20	6x11 8x11	20 22	8x11	22
2.2	6x11 8x11	35 36	10x12	39	8x11 10x12	35 39	10x12 10x17	39 50
3.3	8x11	43	10x12	53	10x12 10x15	53 55	10x15 10x20	53 55
4.7	8x11 10x12	48 51	10x12 10x15	63 66	8x11 8x14 10x12 10x15 10x17 10x20	60 63 63 69 70 72	10x20	64
6.8	10x12	70	10x15	79	10x15	85	10x20	75
10	10x15	90	10x20	110	10x12 10x15 10x17 10x20 13x21	98 100 110 112 115	13x21 13x26 16x16	92 98 98
22	10x12 10x20	115 160	13x26	180	13x21 16x26	170 190	16x26 16x31	175 180
33	13x21 13x26	175 180	16x26	190	13x26 16x16 16x21 16x26	200 200 210 220	16x36	210
47	13x26 16x26	240 260	16x31	250	16x26 16x31 16x36 18x21	280 300 350 270	16x26 16x36	250 280
68	16x26	320	16x31	330	16x31 16x36 18x26	340 355 350	18x31 18x36	320 330
100	16x31	400	18x36	420	18x31 18x36	435 450	18x36 22x30	430 500

Ripple Current(mA,rms)at105°C 120Hz