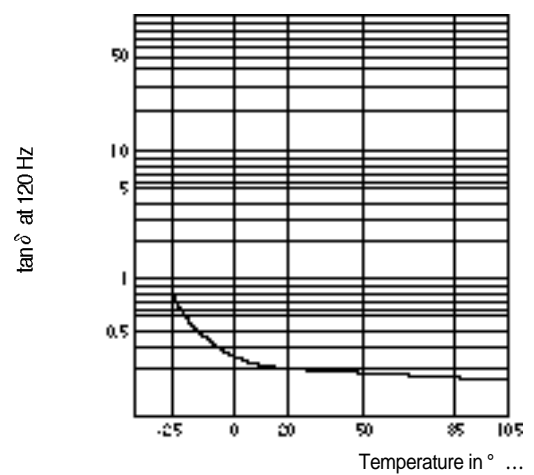
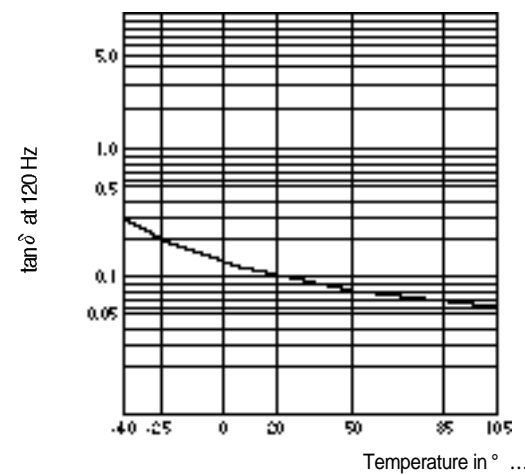
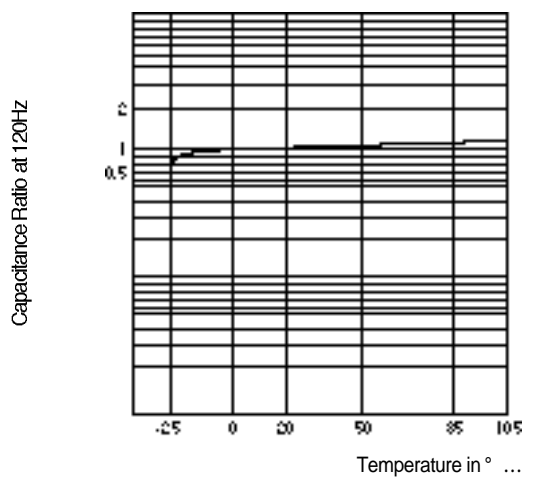
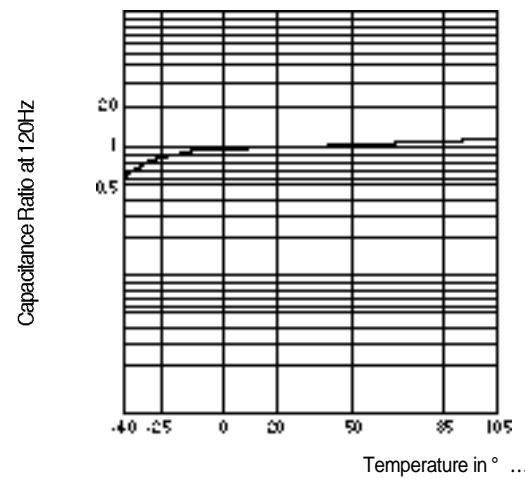
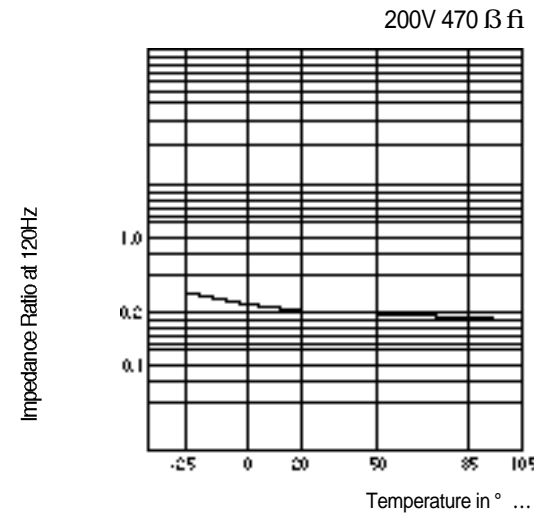
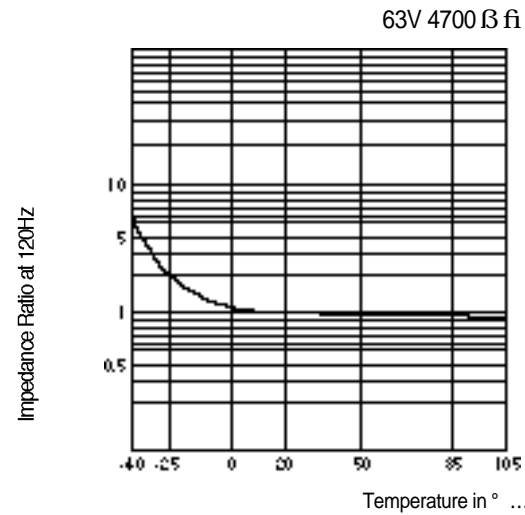


## Characteristics

### Temperature characteristics



## HRB Series

PC Board Plug-in Type

Aluminum Electrolytic Capacitors

### Features

- The guaranteed life is for 2,000 hours at 105° ... available range of rated voltage is 10 to 450 volts
- Smaller case sizes than SMU series.

### Specifications

- Operating temperature range : 400° WV : -40° ~ +105° , 450V° WV : -25° ~ +105° ...
- Rated working voltage : 10~450Vdc
- Rated capacitance : 56~47,000  $\mu$ F
- Capacitance tolerance : (at 120Hz, +20° ),  $\pm$  20%
- Tan  $\delta$  : (at 120Hz, 20° ) ..

W.V.	10	16	25	35	50	63	80	100
Tan $\delta$ max	0.5	0.40	0.3	0.25	0.2	0.2	0.15	0.15

W.V.	160	180	200	250	315	350	400	450
Tan $\delta$ max	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

### DC leakage current : max.

$$I = 0.03 CV \text{ } \mu\text{A} \text{ or } 3 \mu\text{A}$$

whichever is smaller.

where I=DC leakage current in  $\mu$ A

C=rated capacitance in  $\mu$ F

V=rated working voltage in V

DC leakage current shall be measured after 5 minutes

application of the DC rated working voltage through the 1000  $\Omega$  resistor at 20° ...

### Load life :

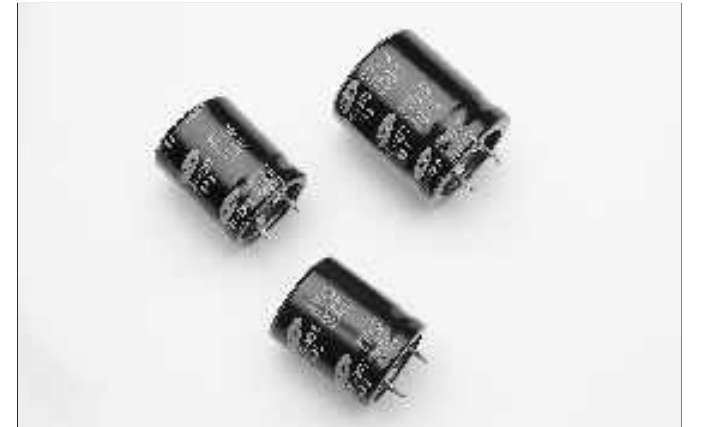
After 2000 hours application of DC rated working voltage at 105° ... the measurements shall meet following limits.

Measurements shall be performed after 2 hours exposure at room temperature.

Capacitance change	$\pm$ 20% of the initial measured value.
Tan $\delta$ %	$\pm$ 200% of the initial specified value.
DC leakage current	$\pm$ the initial specified value.

### Shelf life :

After storage for 1,000 hours at 105° , without voltage application, the measurements shall meet the following limits.



Capacitance change	$\pm$ 20% of the initial measured value.
Tan $\delta$ %	$\pm$ 450% of the initial specified value.
DC leakage current	$\pm$ the initial specified value.

Measurements shall be performed after exposure for 24 hours at room temperature after application of DC rated voltage to the capacitors for 30 minutes.

### Low temperature impedance stability.

Impedance ratio against value at +20° at 120Hz

W.V.(V DC)	$\pm$ N-25° /+20° ...	$\pm$ N-40° /+20° ...
10~35	4	15
50~100	4	10
160~400	3	10
450	8	£ $\neq$

1. add 0.5 per 1,000  $\mu$ F for more than 1,000  $\mu$ F items

2. add 1.0 per 1,000  $\mu$ F for more than 1,000  $\mu$ F items

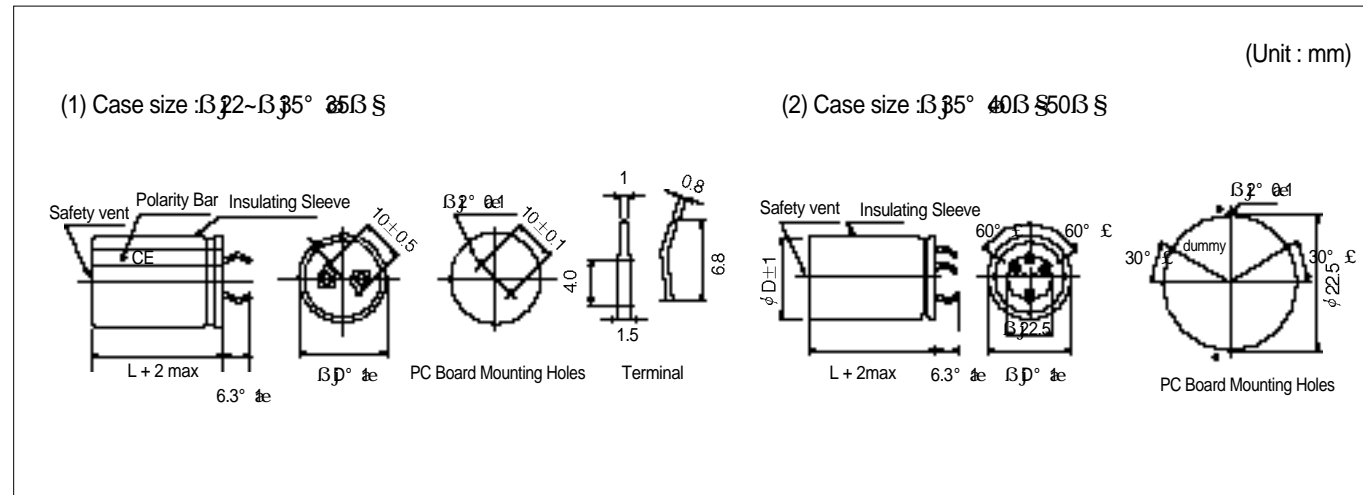
### Frequency compensation coefficient of permissible ripple current

WV	Frequency	50Hz	60Hz	120Hz	300Hz	1KHz	10KHz~
~100 V		0.92	0.95	1.00	1.06	1.11	1.20
160~250 V		0.85	0.9	1.00	1.18	1.32	1.50
315~450 V		0.82	0.87	1.00	1.16	1.3	1.40

### Temperature compensation coefficient of permissible ripple current

Surrounding Temperature (°) ..	+ 70	+ 85	+ 105
Compensation Coefficient	2.17	1.68	1.00

Dimensions



Dimension & Maximum permissible ripple current

W. V(Vdc) Cap(B f)	10WV(1A)				16WV(1C)				25WV(1E)				35WV(1V)			
	B 22	B 25.4	B 30	B 35	B 22	B 25.4	B 30	B 35	B 22	B 25.4	B 30	B 35	B 22	B 25.4	B 30	B 35
3300													22° 25 (1.525)			
3900													22° 30 (1.78)			
4700									22° 25 (1.783)				22° 35 (2.05)	25.4° 25 (1.94)		
5600									22° 30 (2.014)				22° 35 (2.25)	25.4° 30 (2.27)	30° 25 (2.32)	
6800					22° 25 (1.96)				22° 35 (2.118)				22° 45 (2.59)	25.4° 35 (2.61)	30° 30 (2.69)	
8200					22° 30 (2.24)				22° 40 (2.45)	25.4° 30 (2.33)			22° 50 (2.96)	25.4° 40 (2.91)	30° 30 (2.89)	
10000	22° 25 (2.15)				22° 30 (2.45)	25.4° 25 (2.52)			22° 40 (2.723)	25.4° 35 (2.81)				25.4° 45 (3.34)	30° 35 (3.31)	
12000	22° 30 (2.48)				22° 35 (2.74)	25.4° 30 (2.88)	30° 25 (2.94)		22° 45 (2.99)	25.4° 40 (3.09)	30° 30 (3.06)	35° 25 (3.09)		25.4° 50 (3.78)	30° 40 (3.71)	35° 30 (3.64)
15000	22° 35 (2.76)	25.4° 25 (2.67)			22° 40 (3.01)	25.4° 35 (3.22)	30° 30 (3.35)			25.4° 45 (3.55)	30° 35 (3.45)	35° 30 (3.55)			30° 45 (4.15)	35° 35 (4.11)
18000	22° 35 (2.93)	25.4° 30 (3.03)			22° 45 (3.4)	25.4° 40 (3.49)	30° 30 (3.48)			25.4° 50 (3.93)	30° 40 (3.91)	35° 35 (4.03)				35° 40 (4.54)
22000	22° 40 (3.26)	25.4° 35 (3.38)	30° 25 (3.27)			25.4° 45 (4.01)	30° 35 (3.97)				30° 45 (4.35)	35° 35 (4.15)				35° 50 (5.03)
27000	22° 50 (3.86)	25.4° 40 (3.85)	30° 30 (3.68)			25.4° 50 (4.39)	30° 40 (4.39)	35° 30 (4.29)								
33000		25.4° 45 (4.23)	30° 35 (4.18)													35° 50 (5.38)
39000		25.4° 50 (4.45)	30° 40 (4.41)	35° 30 (4.34)												
47000			30° 45 (4.87)	35° 35 (4.83)									35° 45 (5.5)	® Case size B 35° 40mm ® Ripple current (Arms) at 105° ,.120Hz		

Dimension & Maximum permissible ripple current

W. V(Vdc) Cap(B f)	50WV(1M)				63WV(1J)				80WV(1K)				100WV(2A)					
	B 22	B 25.4	B 30	B 35	B 22	B 25.4	B 30	B 35	B 22	B 25.4	B 30	B 35	B 22	B 25.4	B 30	B 35		
820									22° 25 (1.35)				22° 35 (1.443)	25.4° 25 (1.49)				
1000									22° 30 (1.54)	25.4° 25 (1.61)			22° 40 (1.69)	25.4° 30 (1.75)				
1200								22° 25 (1.229)					22° 45 (1.82)	25.4° 35 (1.85)	30° 30 (1.81)			
1500								22° 30 (1.48)	25.4° 25 (1.54)				22° 50 (2.15)	25.4° 40 (2.26)	30° 30 (2.21)			
1800	22° 25 (1.528)							22° 30 (1.63)	25.4° 25 (1.67)				22° 40 (2.11)	25.4° 35 (2.21)	30° 25 (2.17)	25.4° 45 (2.59)	30° 35 (2.61)	
2200	22° 30 (1.73)							22° 35 (1.778)	25.4° 30 (1.85)				22° 45 (2.51)	25.4° 35 (2.49)	30° 30 (2.52)		30° 40 (2.83)	35° 30 (2.72)
2700	22° 30 (1.95)	25.4° 25 (1.97)						22° 40 (2.11)	25.4° 35 (2.24)	30° 25 (2.11)				25.4° 45 (2.89)	30° 35 (2.83)		30° 45 (3.14)	35° 40 (3.11)
3300	22° 35 (2.21)	25.4° 30 (2.15)						22° 50 (2.49)	25.4° 40 (2.48)	30° 30 (2.41)				25.4° 50 (3.31)	30° 40 (3.3)	35° 30 (3.21)		35° 45 (3.52)
3900	22° 40 (2.41)	25.4° 35 (2.5)	30° 25 (2.34)						25.4° 45 (2.83)	30° 35 (2.8)					30° 45 (3.72)	35° 35 (3.67)		35° 45 (4.05)
4700	22° 45 (2.755)	25.4° 40 (2.86)	30° 30 (2.81)						25.4° 50 (3.2)	30° 40 (3.2)	35° 30 (3.12)				30° 50 (4.1)	35° 40 (4.08)		
5600	22° 50 (3.011)	25.4° 40 (2.95)	30° 35 (3.1)								30° 45 (3.49)	35° 35 (3.43)						35° 45 (4.45)
6800		25.4° 50 (3.56)	30° 40 (3.56)	35° 30 (3.46)							30° 50 (3.94)	35° 40 (3.9)						35° 50 (4.62)
8200			30° 45 (3.95)	35° 35 (3.86)								35° 45 (4.22)						
10000			30° 50 (4.43)	35° 40 (4.41)								35° 50 (4.76)						
12000				35° 45 (4.79)	® Case size B 35° 40mm ® Ripple current (Arms) at 105° ,.120Hz													

Dimension & Maximum permissible ripple current

W. V(Vdc) Cap(βfi)	160WV(2C)				180WV(2Y)				200WV(2D)				250WV(2E)			
	β22	β25.4	β30	β35	β22	β25.4	β30	β35	β22	β25.4	β30	β35	β22	β25.4	β30	β35
150													22° 25 (0.69)			
180													22° 25 (0.75)			
220													22° 30 (0.89)	25.4° 25 (0.91)		
270	22° 25 (0.926)				22° 25 (0.926)				22° 30 (0.926)				22° 35 (1.05)	25.4° 30 (1.12)	30° 25 (1.14)	
330	22° 30 (1.024)				22° 30 (1.094)				22° 35 (1.09)	25.4° 25 (1.15)			22° 40 (1.243)	25.4° 30 (1.2)	30° 25 (1.23)	
390	22° 30 (1.23)				22° 35 (1.23)	25.4° 25 (1.25)			22° 40 (1.261)	25.4° 30 (1.3)			22° 45 (1.46)	25.4° 40 (1.51)	30° 30 (1.47)	
470	22° 35 (1.4)	25.4° 25 (1.41)			22° 40 (1.38)	25.4° 30 (1.39)			22° 45 (1.42)	25.4° 35 (1.39)	30° 25 (1.43)		25.4° 40 (1.58)	30° 30 (1.54)	35° 25 (1.57)	
560	22° 40 (1.56)	25.4° 30 (1.57)			22° 45 (1.54)	25.4° 35 (1.57)	30° 25 (1.55)		22° 50 (1.56)	25.4° 35 (1.55)	30° 30 (1.58)		25.4° 45 (1.88)	30° 35 (1.79)	35° 30 (1.79)	
680	22° 45 (1.76)	25.4° 35 (1.74)	30° 30 (1.71)		22° 50 (1.75)	25.4° 40 (1.78)	30° 30 (1.76)			25.4° 45 (1.85)	30° 35 (1.78)	35° 25 (1.81)		30° 40 (2.14)	35° 35 (2.12)	
820	22° 50 (1.97)	25.4° 40 (2.03)	30° 30 (1.99)	35° 25 (1.95)		25.4° 45 (2.05)	30° 35 (2.07)	35° 30 (1.97)		25.4° 50 (2.18)	30° 40 (2.07)	35° 30 (2.15)		30° 45 (2.45)	35° 40 (2.4)	
1000		25.4° 45 (2.28)	30° 35 (2.26)	35° 30 (1.95)		25.4° 50 (2.28)	30° 40 (2.32)	35° 30 (2.34)			30° 45 (2.43)	35° 35 (2.42)			35° 40 (2.75)	
1200		25.4° 50 (2.52)	30° 40 (2.5)	35° 30 (2.48)			30° 45 (2.61)	35° 35 (2.61)			30° 50 (2.71)	35° 40 (2.61)			35° 45 (2.92)	
1500			30° 45 (2.85)	35° 40 (2.67)				35° 45 (2.88)				35° 45 (3.01)				
1800			30° 50 (3.21)	35° 45 (3.21)				35° 50 (3.34)								
2200				35° 50 (3.75)					® Base size βD° Lmm ® Ripple current (Arms) at 105° ,.120Hz							

Dimension & Maximum permissible ripple current

W. V(Vdc) Cap(βfi)	315WV(2F)				350WV(2V)				400WV(2G)				450WV(2W)			
	β22	β25.4	β30	β35	β22	β25.4	β30	β35	β22	β25.4	β30	β35	β22	β25.4	β30	β35
56													22° 25 (0.396)			
68									22° 25 (0.465)				22° 30 (0.437)	25.4° 25 (0.44)		
82	22° 25 (0.51)				22° 25 (0.51)				22° 30 (0.578)	25.4° 25 (0.61)			22° 35 (0.52)	25.4° 30 (0.55)		
100	22° 30 (0.602)				22° 30 (0.602)	25.4° 25 (0.62)			22° 35 (0.65)	25.4° 30 (0.67)			22° 40 (0.59)	25.4° 30 (0.56)	30° 25 (0.59)	
120	22° 30 (0.66)	25.4° 25 (0.66)			22° 35 (0.7)	25.4° 30 (0.72)			22° 40 (0.74)	25.4° 30 (0.72)	30° 25 (0.76)		22° 45 (0.67)	25.4° 35 (0.65)	30° 30 (0.68)	
150	22° 35 (0.78)	25.4° 30 (0.79)	30° 25 (0.82)		22° 40 (0.83)	25.4° 30 (0.79)	30° 25 (0.82)		22° 45 (0.88)	25.4° 35 (0.84)	30° 30 (0.87)		22° 50 (0.79)	25.4° 40 (0.75)	30° 30 (0.72)	35° 25 (0.74)
180	22° 40 (0.88)	25.4° 30 (0.85)	30° 25 (0.88)		22° 45 (0.93)	25.4° 35 (0.91)	30° 30 (0.93)		22° 50 (0.95)	25.4° 40 (0.93)	30° 30 (0.93)	35° 25 (0.94)		25.4° 45 (0.83)	30° 35 (0.83)	35° 30 (0.84)
220	22° 45 (1.01)	25.4° 35 (1.01)	30° 30 (1.03)		22° 50 (1.06)	25.4° 40 (1.06)	30° 30 (1.03)	35° 25 (1.05)		25.4° 45 (1.09)	30° 35 (1.06)	35° 30 (1.08)		25.4° 50 (0.98)	30° 40 (0.95)	35° 30 (0.98)
270	22° 50 (1.16)	25.4° 40 (1.15)	30° 35 (1.18)	35° 25 (1.15)		25.4° 45 (1.22)	30° 35 (1.18)	35° 30 (1.22)		25.4° 50 (1.25)	30° 40 (1.21)	35° 35 (1.26)			30° 45 (1.09)	35° 35 (1.03)
330		25.4° 50 (1.36)	30° 35 (1.32)	35° 30 (1.33)			30° 40 (1.41)	35° 35 (1.42)			30° 45 (1.45)	35° 40 (1.46)				35° 45 (1.31)
390			30° 40 (1.48)	35° 35 (1.52)			30° 45 (1.57)	35° 35 (1.52)			30° 50 (1.62)	35° 45 (1.61)				35° 45 (1.46)
470			30° 50 (1.72)	35° 40 (1.7)				35° 40 (1.7)				35° 45 (1.75)				35° 45 (1.58)
560				35° 45 (1.86)				35° 45 (1.86)				35° 50 (1.92)				
680				35° 50 (2.13)	® Base size βD° Lmm ® Ripple current (Arms) at 105° ,.120Hz											