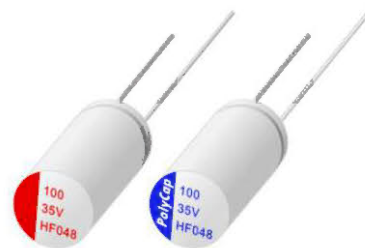


## HF series Hybrid (16V~100V)

- Conductive Polymer Hybrid Aluminum Electrolytic Capacitor
- Load life of 5000 hours at 105°C
- Compliant to the RoHS2.0 directive
- Suitable for Long running Electronic Device.

混合型铝电容器，具有 5000 小时超长寿命，以及超低 ESR 和超大纹波电流，产品满足 RoHS2.0 指令，适合用于长时间工作的电子设备。



### ✧ Specifications

| Items                                                    | Characteristics                                     |                                           |
|----------------------------------------------------------|-----------------------------------------------------|-------------------------------------------|
| Operating Temp. Range                                    | -55°C ~ +105°C                                      |                                           |
| Capacitance Range                                        | 4.7 ~ 5600μF                                        |                                           |
| Capacitance Tolerance                                    | M : ±20%                                            |                                           |
| Rated Voltage Range                                      | 16V ~ 100V DC                                       |                                           |
| Dissipation Factor                                       | Not to exceed the value specified                   |                                           |
| Leakage Current                                          | Not to exceed the value specified (after 2 minutes) |                                           |
| ESR (100K~300KHz)                                        | Not to exceed the value specified                   |                                           |
| Endurance<br>105°C , 5000h ,<br>at rated voltage         | Capacitance Change                                  | Within ±20% of the value before test      |
|                                                          | Dissipation Factor                                  | Not to exceed 150% of the value specified |
|                                                          | ESR                                                 | Not to exceed 150% of the value specified |
|                                                          | Leakage current                                     | Not to exceed the value specified         |
| Moisture Resistance<br>Stored at 85°C , RH85% ,<br>1000h | Capacitance Change                                  | Within ±20% of the value before test      |
|                                                          | Dissipation Factor                                  | Not to exceed 150% of the value specified |
|                                                          | ESR                                                 | Not to exceed 150% of the value specified |
|                                                          | Leakage Current                                     | Not to exceed the value specified         |

### ✧ Dimensions (Unit:mm)

**Φ6.3mm**

Plastic coating Aluminum. Case

Lead Wire (+)

ΦD

L+αMax

15Min

4Min

F

Φd

**Φ8mm~Φ12.5mm**

Plastic coating Aluminum. Case

Stand-off

Lead Wire (+)

ΦD

L+αMax

15Min

4Min

F

Φd

| ΦD+0.5max. | 6.3 |   |    |    | 8   |      |    |     |    | 10  |      |    |    |     | 12.5 |     |    |  |  |  |  |
|------------|-----|---|----|----|-----|------|----|-----|----|-----|------|----|----|-----|------|-----|----|--|--|--|--|
| L          | 5   | 8 | 11 | 14 | 8   | 11.5 | 13 | 16  | 20 | 10  | 12.5 | 13 | 16 | 20  | 17   | 21  | 26 |  |  |  |  |
| α          | 1.0 |   |    |    | 1.0 |      |    | 1.5 |    | 1.0 |      |    |    | 1.5 |      | 1.5 |    |  |  |  |  |
| F±0.5      | 2.5 |   |    |    | 3.5 |      |    |     |    | 5.0 |      |    |    |     | 5.0  |     |    |  |  |  |  |
| Φd±0.05    | 0.5 |   |    |    | 0.6 |      |    |     |    | 0.6 |      |    |    |     | 0.6  |     |    |  |  |  |  |



## ✧ Capacitance List

| W.V (S.V)<br>SIZE | 16 (18)       | 25 (29)       | 35 (40)       | 50 (58)     | 63 (72)     | 80 (92)     | 100 (115)   |
|-------------------|---------------|---------------|---------------|-------------|-------------|-------------|-------------|
| 6.3×5             |               |               | 33 ~ 68μF     | 15 ~ 27μF   | 10 ~ 18μF   |             |             |
| 6.3×8             |               |               | 56 ~ 120μF    | 27 ~ 47μF   | 18 ~ 27μF   |             |             |
| 6.3×11            |               |               | 82 ~ 180μF    | 39 ~ 68μF   | 27 ~ 39μF   |             |             |
| 6.3×14            |               |               | 150 ~ 270μF   | 68 ~ 100μF  | 47 ~ 56μF   |             |             |
| 8×8               |               |               | 82 ~ 220μF    | 39 ~ 68μF   | 27 ~ 47μF   | 15 ~ 27μF   | 10 ~ 18μF   |
| 8×11.5            |               |               | 100 ~ 270μF   | 56 ~ 82μF   | 39 ~ 68μF   | 22 ~ 39μF   | 15 ~ 27μF   |
| 8×13              |               |               | 150 ~ 330μF   | 68 ~ 120μF  | 56 ~ 82μF   | 33 ~ 56μF   | 22 ~ 39μF   |
| 8×16              | 680 ~ 1200μF  | 220 ~ 680μF   | 180 ~ 390μF   | 82 ~ 150μF  | 68 ~ 100μF  | 33 ~ 56μF   | 22 ~ 39μF   |
| 8×20              | 820 ~ 1500μF  | 330 ~ 820μF   | 220 ~ 560μF   | 100 ~ 220μF | 82 ~ 120μF  | 47 ~ 82μF   | 33 ~ 47μF   |
| 10×10             |               |               | 120 ~ 330μF   | 68 ~ 120μF  | 47 ~ 82μF   | 27 ~ 47μF   | 18 ~ 33μF   |
| 10×12.5           | 680 ~ 1200μF  | 220 ~ 680μF   | 180 ~ 470μF   | 82 ~ 180μF  | 68 ~ 120μF  | 33 ~ 68μF   | 22 ~ 47μF   |
| 10×13             | 820 ~ 1500μF  | 330 ~ 820μF   | 220 ~ 560μF   | 120 ~ 220μF | 82 ~ 150μF  | 47 ~ 82μF   | 33 ~ 56μF   |
| 10×16             | 1000 ~ 1800μF | 390 ~ 1000μF  | 330 ~ 680μF   | 120 ~ 270μF | 82 ~ 180μF  | 47 ~ 100μF  | 33 ~ 68μF   |
| 10×20             | 1200 ~ 2700μF | 470 ~ 1500μF  | 470 ~ 1000μF  | 150 ~ 390μF | 100 ~ 220μF | 68 ~ 150μF  | 47 ~ 100μF  |
| 12.5×17           | 1500 ~ 3300μF | 560 ~ 1800μF  | 560 ~ 1200μF  | 220 ~ 470μF | 150 ~ 270μF | 82 ~ 180μF  | 56 ~ 100μF  |
| 12.5×21           | 1800 ~ 4700μF | 820 ~ 2700μF  | 820 ~ 1500μF  | 270 ~ 560μF | 220 ~ 330μF | 120 ~ 220μF | 82 ~ 150μF  |
| 12.5×26           | 2700 ~ 5600μF | 1000 ~ 3300μF | 1000 ~ 1800μF | 330 ~ 820μF | 270 ~ 470μF | 150 ~ 270μF | 100 ~ 180μF |

## ✧ Characteristics List

| W.V (V) | Capacitance (μF) | L.C. (μA,2min) | tgδ (120Hz,20℃) | ESR (mΩ,100kHz) | Rated Ripple Current(mA,r.m.s) | Size ΦD×L(mm) | Part Number         |
|---------|------------------|----------------|-----------------|-----------------|--------------------------------|---------------|---------------------|
| 16      | 1200             | 300            | 0.12            | 12              | 6000                           | 8×16          | PHF122M016F16□□□□□□ |
|         | 1500             | 300            | 0.12            | 10              | 6700                           | 8×20          | PHF152M016F20□□□□□□ |
|         | 1200             | 300            | 0.12            | 12              | 5000                           | 10×12.5       | PHF122M016G1B□□□□□□ |
|         | 1500             | 300            | 0.12            | 12              | 5100                           | 10×13         | PHF152M016G13□□□□□□ |
|         | 1800             | 300            | 0.12            | 10              | 7200                           | 10×16         | PHF182M016G16□□□□□□ |
|         | 2700             | 300            | 0.12            | 10              | 7500                           | 10×20         | PHF272M016G20□□□□□□ |
|         | 3300             | 300            | 0.15            | 10              | 7500                           | 12.5×17       | PHF332M016H17□□□□□□ |
|         | 4700             | 300            | 0.15            | 10              | 8500                           | 12.5×21       | PHF472M016H21□□□□□□ |
|         | 5600             | 300            | 0.15            | 10              | 9200                           | 12.5×26       | PHF562M016H26□□□□□□ |
|         | 680              | 300            | 0.12            | 15              | 5500                           | 8×16          | PHF681M025F16□□□□□□ |
| 25      | 820              | 300            | 0.12            | 12              | 6200                           | 8×20          | PHF821M025F20□□□□□□ |
|         | 680              | 300            | 0.12            | 15              | 4600                           | 10×12.5       | PHF681M025G1B□□□□□□ |
|         | 820              | 300            | 0.12            | 15              | 4800                           | 10×13         | PHF821M025G13□□□□□□ |
|         | 1000             | 300            | 0.12            | 12              | 6800                           | 10×16         | PHF102M025G16□□□□□□ |
|         | 1500             | 300            | 0.12            | 12              | 7000                           | 10×20         | PHF152M025G20□□□□□□ |
|         | 1800             | 300            | 0.12            | 12              | 7000                           | 12.5×17       | PHF182M025H17□□□□□□ |
|         | 2700             | 300            | 0.15            | 10              | 7800                           | 12.5×21       | PHF272M025H21□□□□□□ |
|         | 3300             | 300            | 0.15            | 10              | 8600                           | 12.5×26       | PHF332M025H26□□□□□□ |
|         | 56               | 100            | 0.12            | 40              | 1700                           | 6.3×5         | PHF560M035E05□□□□□□ |
|         | 100              | 175            | 0.12            | 35              | 2100                           | 6.3×8         | PHF101M035E08□□□□□□ |
| 35      | 150              | 262.5          | 0.12            | 28              | 2500                           | 6.3×11        | PHF151M035E11□□□□□□ |
|         | 220              | 300            | 0.12            | 20              | 2900                           | 6.3×14        | PHF221M035E14□□□□□□ |
|         | 220              | 300            | 0.12            | 25              | 2700                           | 8×8           | PHF221M035F08□□□□□□ |
|         | 270              | 300            | 0.12            | 22              | 2900                           | 8×11.5        | PHF271M035F1A□□□□□□ |
|         |                  |                |                 |                 |                                |               |                     |

| W.V.<br>(V) | Capacitance<br>( $\mu$ F) | L.C.<br>( $\mu$ A,2min) | tg $\delta$<br>(120Hz,20 °C) | ESR<br>(m $\Omega$ ,100kHz) | Rated Ripple<br>Current(mA,r.m.s) | Size<br>$\Phi$ D $\times$ L(mm) | Part Number         |
|-------------|---------------------------|-------------------------|------------------------------|-----------------------------|-----------------------------------|---------------------------------|---------------------|
| 35          | 330                       | 300                     | 0.12                         | 20                          | 3200                              | 8 $\times$ 13                   | PHF331M035F13□□□□□□ |
|             | 390                       | 300                     | 0.12                         | 20                          | 3400                              | 8 $\times$ 16                   | PHF391M035F16□□□□□□ |
|             | 560                       | 300                     | 0.12                         | 18                          | 3700                              | 8 $\times$ 20                   | PHF561M035F20□□□□□□ |
|             | 330                       | 300                     | 0.12                         | 25                          | 2900                              | 10 $\times$ 10                  | PHF331M035G10□□□□□□ |
|             | 470                       | 300                     | 0.12                         | 22                          | 3100                              | 10 $\times$ 12.5                | PHF471M035G1B□□□□□□ |
|             | 560                       | 300                     | 0.12                         | 20                          | 3300                              | 10 $\times$ 13                  | PHF561M035G13□□□□□□ |
|             | 680                       | 300                     | 0.12                         | 20                          | 3700                              | 10 $\times$ 16                  | PHF681M035G16□□□□□□ |
|             | 1000                      | 300                     | 0.12                         | 18                          | 4100                              | 10 $\times$ 20                  | PHF102M035G20□□□□□□ |
|             | 1200                      | 300                     | 0.12                         | 15                          | 4100                              | 12.5 $\times$ 17                | PHF122M035H17□□□□□□ |
|             | 1500                      | 300                     | 0.12                         | 12                          | 5200                              | 12.5 $\times$ 21                | PHF152M035H21□□□□□□ |
|             | 1800                      | 300                     | 0.12                         | 12                          | 6100                              | 12.5 $\times$ 26                | PHF182M035H26□□□□□□ |
| 50          | 22                        | 100                     | 0.12                         | 45                          | 1700                              | 6.3 $\times$ 5                  | PHF220M050E05□□□□□□ |
|             | 33                        | 100                     | 0.12                         | 35                          | 2000                              | 6.3 $\times$ 8                  | PHF330M050E08□□□□□□ |
|             | 56                        | 140                     | 0.12                         | 25                          | 2300                              | 6.3 $\times$ 11                 | PHF560M050E11□□□□□□ |
|             | 100                       | 250                     | 0.12                         | 20                          | 3700                              | 6.3 $\times$ 14                 | PHF101M050E14□□□□□□ |
|             | 56                        | 140                     | 0.12                         | 25                          | 2500                              | 8 $\times$ 8                    | PHF560M050F08□□□□□□ |
|             | 82                        | 205                     | 0.12                         | 22                          | 2700                              | 8 $\times$ 11.5                 | PHF820M050F1A□□□□□□ |
|             | 100                       | 250                     | 0.12                         | 20                          | 3000                              | 8 $\times$ 13                   | PHF101M050F13□□□□□□ |
|             | 150                       | 300                     | 0.12                         | 20                          | 3200                              | 8 $\times$ 16                   | PHF151M050F16□□□□□□ |
|             | 220                       | 300                     | 0.12                         | 18                          | 3500                              | 8 $\times$ 20                   | PHF221M050F20□□□□□□ |
|             | 100                       | 250                     | 0.12                         | 25                          | 2700                              | 10 $\times$ 10                  | PHF101M050G10□□□□□□ |
|             | 150                       | 300                     | 0.12                         | 22                          | 2900                              | 10 $\times$ 12.5                | PHF151M050G1B□□□□□□ |
|             | 220                       | 300                     | 0.12                         | 20                          | 3100                              | 10 $\times$ 13                  | PHF221M050G13□□□□□□ |
|             | 270                       | 300                     | 0.12                         | 20                          | 3500                              | 10 $\times$ 16                  | PHF271M050G16□□□□□□ |
|             | 330                       | 300                     | 0.12                         | 18                          | 3900                              | 10 $\times$ 20                  | PHF331M050G20□□□□□□ |
|             | 470                       | 300                     | 0.12                         | 18                          | 3900                              | 12.5 $\times$ 17                | PHF471M050H17□□□□□□ |
|             | 560                       | 300                     | 0.15                         | 15                          | 4200                              | 12.5 $\times$ 21                | PHF561M050H21□□□□□□ |
|             | 820                       | 300                     | 0.15                         | 15                          | 4700                              | 12.5 $\times$ 26                | PHF821M050H26□□□□□□ |
| 63          | 10                        | 300                     | 0.12                         | 50                          | 1400                              | 6.3 $\times$ 5                  | PHF100M063E05□□□□□□ |
|             | 22                        | 300                     | 0.12                         | 40                          | 1700                              | 6.3 $\times$ 8                  | PHF220M063E08□□□□□□ |
|             | 33                        | 300                     | 0.12                         | 50                          | 1400                              | 6.3 $\times$ 11                 | PHF330M063E11□□□□□□ |
|             | 47                        | 300                     | 0.12                         | 40                          | 1700                              | 6.3 $\times$ 14                 | PHF470M063E14□□□□□□ |
|             | 47                        | 300                     | 0.12                         | 30                          | 1900                              | 8 $\times$ 8                    | PHF470M063F08□□□□□□ |
|             | 56                        | 300                     | 0.12                         | 25                          | 2500                              | 8 $\times$ 11.5                 | PHF560M063F1A□□□□□□ |
|             | 82                        | 300                     | 0.12                         | 22                          | 2700                              | 8 $\times$ 13                   | PHF820M063F13□□□□□□ |
|             | 100                       | 300                     | 0.12                         | 18                          | 2900                              | 8 $\times$ 16                   | PHF101M063F16□□□□□□ |
|             | 120                       | 300                     | 0.12                         | 15                          | 3300                              | 8 $\times$ 20                   | PHF121M063F20□□□□□□ |
|             | 56                        | 300                     | 0.12                         | 25                          | 2200                              | 10 $\times$ 10                  | PHF560M063G10□□□□□□ |
|             | 100                       | 300                     | 0.12                         | 20                          | 2600                              | 10 $\times$ 12.5                | PHF101M063G1B□□□□□□ |
|             | 120                       | 300                     | 0.12                         | 20                          | 2800                              | 10 $\times$ 13                  | PHF121M063G13□□□□□□ |
|             | 150                       | 300                     | 0.12                         | 18                          | 3100                              | 10 $\times$ 16                  | PHF151M063G16□□□□□□ |
|             | 220                       | 300                     | 0.12                         | 15                          | 3600                              | 10 $\times$ 20                  | PHF221M063G20□□□□□□ |
|             | 270                       | 300                     | 0.12                         | 18                          | 3900                              | 12.5 $\times$ 17                | PHF271M063H17□□□□□□ |
|             | 330                       | 300                     | 0.15                         | 15                          | 4200                              | 12.5 $\times$ 21                | PHF331M063H21□□□□□□ |
|             | 470                       | 300                     | 0.15                         | 15                          | 4700                              | 12.5 $\times$ 26                | PHF471M063H26□□□□□□ |
| 80          | 22                        | 100                     | 0.10                         | 28                          | 2300                              | 8 $\times$ 8                    | PRM220M080F08□□□□□□ |
|             | 33                        | 132                     | 0.10                         | 25                          | 2500                              | 8 $\times$ 11.5                 | PRM330M080F1A□□□□□□ |
|             | 47                        | 188                     | 0.10                         | 22                          | 2800                              | 8 $\times$ 13                   | PRM470M080F13□□□□□□ |
|             | 56                        | 224                     | 0.10                         | 22                          | 3000                              | 8 $\times$ 16                   | PRM560M080F16□□□□□□ |
|             | 82                        | 300                     | 0.10                         | 20                          | 3300                              | 8 $\times$ 20                   | PRM820M080F20□□□□□□ |
|             | 56                        | 224                     | 0.10                         | 28                          | 2500                              | 10 $\times$ 10                  | PRM560M080G10□□□□□□ |



| W.V.<br>(V) | Capacitance<br>( $\mu\text{F}$ ) | L.C.<br>( $\mu\text{A}$ , 2min) | $\text{tg}\delta$<br>(120Hz, 20 $^{\circ}\text{C}$ ) | ESR<br>(m $\Omega$ , 100kHz) | Rated Ripple<br>Current(mA, r.m.s) | Size<br>$\Phi\text{D}\times\text{L}(\text{mm})$ | Part Number         |
|-------------|----------------------------------|---------------------------------|------------------------------------------------------|------------------------------|------------------------------------|-------------------------------------------------|---------------------|
| 80          | 68                               | 272                             | 0.10                                                 | 25                           | 2700                               | 10 $\times$ 12.5                                | PRM680M080G1B□□□□□□ |
|             | 82                               | 300                             | 0.10                                                 | 22                           | 2900                               | 10 $\times$ 13                                  | PRM820M080G13□□□□□□ |
|             | 100                              | 300                             | 0.10                                                 | 22                           | 3300                               | 10 $\times$ 16                                  | PRM101M080G16□□□□□□ |
|             | 150                              | 300                             | 0.10                                                 | 18                           | 3700                               | 10 $\times$ 20                                  | PRM151M080G20□□□□□□ |
|             | 180                              | 300                             | 0.10                                                 | 18                           | 3700                               | 12.5 $\times$ 17                                | PRM181M080H17□□□□□□ |
|             | 220                              | 300                             | 0.10                                                 | 15                           | 3900                               | 12.5 $\times$ 21                                | PRM221M080H21□□□□□□ |
|             | 270                              | 300                             | 0.10                                                 | 15                           | 4200                               | 12.5 $\times$ 26                                | PRM271M080H26□□□□□□ |
| 100         | 15                               | 100                             | 0.10                                                 | 30                           | 2100                               | 8 $\times$ 8                                    | PRM150M100F08□□□□□□ |
|             | 22                               | 110                             | 0.10                                                 | 25                           | 2300                               | 8 $\times$ 11.5                                 | PRM220M100F1A□□□□□□ |
|             | 33                               | 165                             | 0.10                                                 | 22                           | 2600                               | 8 $\times$ 13                                   | PRM330M100F13□□□□□□ |
|             | 39                               | 195                             | 0.10                                                 | 22                           | 2800                               | 8 $\times$ 16                                   | PRM390M100F16□□□□□□ |
|             | 47                               | 235                             | 0.10                                                 | 20                           | 3100                               | 8 $\times$ 20                                   | PRM470M100F20□□□□□□ |
|             | 22                               | 110                             | 0.10                                                 | 28                           | 2700                               | 10 $\times$ 10                                  | PRM220M100G10□□□□□□ |
|             | 47                               | 235                             | 0.10                                                 | 25                           | 2500                               | 10 $\times$ 12.5                                | PRM470M100G1B□□□□□□ |
|             | 56                               | 280                             | 0.10                                                 | 22                           | 2700                               | 10 $\times$ 13                                  | PRM560M100G13□□□□□□ |
|             | 68                               | 300                             | 0.10                                                 | 22                           | 3100                               | 10 $\times$ 16                                  | PRM680M100G16□□□□□□ |
|             | 100                              | 300                             | 0.10                                                 | 18                           | 3500                               | 10 $\times$ 20                                  | PRM101M100G20□□□□□□ |
|             | 100                              | 300                             | 0.12                                                 | 20                           | 3500                               | 12.5 $\times$ 17                                | PRM101M100H17□□□□□□ |
|             | 150                              | 300                             | 0.12                                                 | 18                           | 3700                               | 12.5 $\times$ 21                                | PRM151M100H21□□□□□□ |
|             | 180                              | 300                             | 0.12                                                 | 18                           | 4000                               | 12.5 $\times$ 26                                | PRM181M100H26□□□□□□ |

\* For the last 6 digits of the part number, please refer to the part number system on page 125.

### ✧ Frequency Coefficient for Ripple Current

| Frequency                                                        | 120Hz $\leq$ freq.<1KHz | 1KHz $\leq$ freq.<10KHz | 10KHz $\leq$ freq.<50KHz | 50KHz $\leq$ freq.<100KHz | 100KHz $\leq$ freq.<300KHz |
|------------------------------------------------------------------|-------------------------|-------------------------|--------------------------|---------------------------|----------------------------|
| Coefficient<br>(C $\leq$ 1000 $\mu\text{F}$ )                    | 0.05                    | 0.3                     | 0.7                      | 0.85                      | 1                          |
| Coefficient<br>(3000 $\mu\text{F}$ $\geq$ C>1000 $\mu\text{F}$ ) | 0.1                     | 0.33                    | 0.85                     | 1                         | 1                          |
| Coefficient<br>(C>3000 $\mu\text{F}$ )                           | 0.12                    | 0.35                    | 1                        | 1                         | 1                          |