

## SINGLE-ENDED LEADS - General purpose 105°C / 2000 h

### Description

Long life for 2000 hours at 105°C, ideally suited for high quality and high reliability applications.

### Applications

Coupling, decoupling, by-pass, filtering.

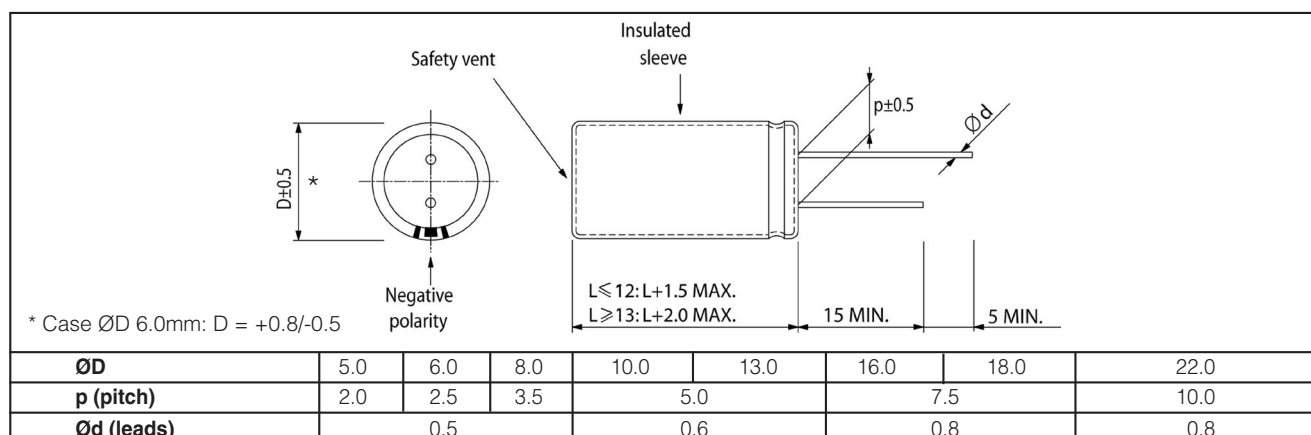
### Features

Case with  $\varnothing D \geq 6.0$  mm has the safety vent at the bottom.

### Marking

Series: (ESH), Operating temperature: (105°C)  
Rated capacitance ( $\mu F$ ), Rated voltage: (Vdc),  
Negative polarity: (white line), Date code.

Diagram of dimensions (Units=mm)



### Electrical characteristics

|                       |                                                                                                                                |                                  |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Rated voltage         | 6.3 to 100 Vdc                                                                                                                 | 160 to 450 Vdc                   |
| Operating temperature | -40 to +105°C                                                                                                                  | -25 to +105°C                    |
| Capacitance range     | 0.47 $\mu F$ to 15000 $\mu F$                                                                                                  | 0.47 $\mu F$ to 470 $\mu F$ .    |
| Capacitance tolerance | $\pm 20\%$ at 120Hz / 20°C                                                                                                     |                                  |
| Endurance test        | 2000 hours (see conditions in Test method and performance)                                                                     |                                  |
| Leakage current       | $I = 0.01 CV (\mu A)$                                                                                                          | $I = 0.03 CV (\mu A) + 10 \mu A$ |
|                       | C = rated capacitance ( $\mu F$ ); V = rated voltage (Vdc)<br>(after that DC rated voltage at 20°C has been applied for 2 min) |                                  |

### Compensation factor of ripple current (R.C.) vs. frequency

| Rated voltage  | Capacitance range     | 50 Hz | 120 Hz | 300 Hz | 1 kHz | 10 to 100 kHz |
|----------------|-----------------------|-------|--------|--------|-------|---------------|
| 6.3 to 100 Vdc | 0.47 to 68 $\mu F$    | 0.75  | 1.00   | 1.30   | 1.57  | 2.00          |
| 6.3 to 100 Vdc | 100 to 470 $\mu F$    | 0.75  | 1.00   | 1.23   | 1.34  | 1.50          |
| 6.3 to 100 Vdc | 680 to 15 000 $\mu F$ | 0.75  | 1.00   | 1.10   | 1.13  | 1.15          |
| 160 to 450 Vdc | 0.47 to 470 $\mu F$   | 0.80  | 1.00   | 1.25   | 1.40  | 1.60          |

### Compensation factor of ripple current (R.C.) vs. temperature

| Temperature        | 65°C | 85°C | 105°C |
|--------------------|------|------|-------|
| Multiplier factors | 1.70 | 1.40 | 1.00  |

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### Test method and performance

| Conditions                                                        | Load life test                                                                                                                                                                              | Shelf life test                                                                                                |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Temperature:<br>Test duration:<br>Ripple current:<br><br>Voltage: | 105°C<br>2000 hours<br>max ripple current at 120Hz 105°C<br>specified in the table.<br>the sum of D.C. voltage and the peak A.C. voltage<br>must not exceed the rated voltage of capacitor. | 105°C<br>1000 hours<br>no ripple current applied.<br><br>no voltage applied.                                   |
| <b>Performance</b>                                                | The following specifications will be satisfied when the capacitors are restored at 20°C                                                                                                     |                                                                                                                |
| Capacitance change:<br>Dissipation factor:<br>Leakage current:    | within 20% of initial value.<br>not exceed 200% of the initial requirement.<br>not exceed initial requirement.                                                                              | within 20% of initial value.<br>not exceed 200% of the initial requirement.<br>not exceed initial requirement. |

### Technical data and ordering codes

| 6.3 Vdc Rated voltage - 8 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 100                                         | 5 x 11                      | 26                                | 100                                             | 4                              | ESH107M6R3AC3AA |
| 150                                         | 5 x 11                      | 26                                | 120                                             | 12                             | ESH157M6R3AC3AA |
| 220                                         | 6 x 11                      | 26                                | 165                                             | 17                             | ESH227M6R3AE3AA |
| 330                                         | 6 x 11                      | 26                                | 200                                             | 24                             | ESH337M6R3AE3AA |
| 330                                         | 8 x 11                      | 26                                | 200                                             | 24                             | ESH337M6R3AG3AA |
| 470                                         | 8 x 11                      | 26                                | 280                                             | 33                             | ESH477M6R3AG3AA |
| 680                                         | 10 x 12                     | 26                                | 320                                             | 46                             | ESH687M6R3AH1AA |
| 1000                                        | 10 x 12                     | 26                                | 470                                             | 66                             | ESH108M6R3AH1AA |
| 1500                                        | 10 x 15                     | 26                                | 600                                             | 97                             | ESH158M6R3AH2AA |
| 2200                                        | 13 x 20                     | 26                                | 930                                             | 142                            | ESH228M6R3AL3AA |
| 3300                                        | 13 x 20                     | 26                                | 1100                                            | 211                            | ESH338M6R3AL3AA |
| 4700                                        | 16 x 25                     | 26                                | 1320                                            | 299                            | ESH478M6R3AM7AA |
| 6800                                        | 16 x 25                     | 26                                | 1490                                            | 431                            | ESH688M6R3AM7AA |
| 10000                                       | 16 x 32                     | 26                                | 1830                                            | 633                            | ESH109M6R3AM2AA |
| 15000                                       | 16 x 36                     | 26                                | 2280                                            | 948                            | ESH159M6R3AM3AA |

| 10 Vdc Rated voltage - 13 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 47                                          | 5 x 11                      | 22                                | 75                                              | 8                              | ESH476M010AC3AA |
| 68                                          | 5 x 11                      | 22                                | 80                                              | 10                             | ESH686M010AC3AA |
| 100                                         | 5 x 11                      | 22                                | 110                                             | 13                             | ESH107M010AC3AA |
| 150                                         | 6 x 11                      | 22                                | 130                                             | 18                             | ESH157M010AE3AA |
| 220                                         | 6 x 11                      | 22                                | 180                                             | 25                             | ESH227M010AE3AA |
| 330                                         | 8 x 11                      | 22                                | 255                                             | 36                             | ESH337M010AG3AA |
| 470                                         | 8 x 11                      | 22                                | 305                                             | 50                             | ESH477M010AG3AA |
| 680                                         | 10 x 12                     | 22                                | 420                                             | 71                             | ESH687M010AH1AA |
| 1000                                        | 10 x 15                     | 22                                | 570                                             | 103                            | ESH108M010AH2AA |
| 1500                                        | 10 x 19                     | 22                                | 750                                             | 153                            | ESH158M010AH4AA |
| 2200                                        | 13 x 20                     | 22                                | 1010                                            | 223                            | ESH228M010AL3AA |
| 3300                                        | 13 x 25                     | 22                                | 1220                                            | 333                            | ESH338M010AL4AA |
| 4700                                        | 16 x 25                     | 22                                | 1410                                            | 473                            | ESH478M010AM7AA |
| 6800                                        | 16 x 32                     | 22                                | 1610                                            | 683                            | ESH688M010AM2AA |
| 10000                                       | 18 x 36                     | 22                                | 1980                                            | 1003                           | ESH109M010AN2AA |

| 16 Vdc Rated voltage - 20 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 33                                          | 5 x 11                      | 18                                | 70                                              | 8                              | ESH336M016AC3AA |
| 47                                          | 5 x 11                      | 18                                | 85                                              | 10                             | ESH476M016AC3AA |
| 68                                          | 5 x 11                      | 18                                | 100                                             | 14                             | ESH686M016AC3AA |
| 100                                         | 6 x 11                      | 18                                | 135                                             | 19                             | ESH107M016AE3AA |
| 150                                         | 8 x 11                      | 18                                | 180                                             | 27                             | ESH157M016AG3AA |
| 220                                         | 8 x 11                      | 18                                | 235                                             | 38                             | ESH227M016AG3AA |
| 330                                         | 10 x 12                     | 18                                | 285                                             | 56                             | ESH337M016AH1AA |
| 470                                         | 10 x 12                     | 18                                | 395                                             | 78                             | ESH477M016AH1AA |
| 680                                         | 10 x 15                     | 18                                | 530                                             | 112                            | ESH687M016AH2AA |
| 1000                                        | 10 x 19                     | 18                                | 700                                             | 163                            | ESH108M016AH4AA |
| 1500                                        | 13 x 20                     | 18                                | 860                                             | 243                            | ESH158M016AL3AA |
| 2200                                        | 13 x 25                     | 18                                | 1150                                            | 355                            | ESH228M016AL4AA |
| 3300                                        | 16 x 25                     | 18                                | 1350                                            | 531                            | ESH338M016AM7AA |
| 4700                                        | 16 x 32                     | 18                                | 1560                                            | 755                            | ESH478M016AM2AA |
| 6800                                        | 18 x 36                     | 18                                | 1790                                            | 1091                           | ESH688M016AN2AA |

| 25 Vdc Rated voltage - 32 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 22                                          | 5 x 11                      | 16                                | 60                                              | 8                              | ESH226M025AC3AA |
| 33                                          | 5 x 11                      | 16                                | 75                                              | 11                             | ESH336M025AC3AA |
| 47                                          | 5 x 11                      | 16                                | 90                                              | 15                             | ESH476M025AC3AA |
| 68                                          | 6 x 11                      | 16                                | 125                                             | 20                             | ESH686M025AE3AA |
| 100                                         | 6 x 11                      | 16                                | 145                                             | 28                             | ESH107M025AE3AA |
| 150                                         | 8 x 11                      | 16                                | 200                                             | 40                             | ESH157M025AG3AA |
| 220                                         | 8 x 11                      | 16                                | 250                                             | 58                             | ESH227M025AG3AA |
| 220                                         | 10 x 12                     | 16                                | 250                                             | 58                             | ESH227M025AH1AA |
| 330                                         | 10 x 12                     | 16                                | 355                                             | 85                             | ESH337M025AH1AA |
| 470                                         | 10 x 12                     | 16                                | 405                                             | 120                            | ESH477M025AH1AA |
| 470                                         | 10 x 15                     | 16                                | 470                                             | 120                            | ESH477M025AH2AA |
| 680                                         | 10 x 19                     | 16                                | 650                                             | 173                            | ESH687M025AH4AA |
| 1000                                        | 13 x 20                     | 16                                | 855                                             | 253                            | ESH108M025AL3AA |
| 1500                                        | 13 x 25                     | 16                                | 1020                                            | 378                            | ESH158M025AL4AA |
| 2200                                        | 16 x 25                     | 16                                | 1230                                            | 553                            | ESH228M025AM7AA |
| 3300                                        | 16 x 32                     | 16                                | 1450                                            | 828                            | ESH338M025AM2AA |
| 4700                                        | 18 x 36                     | 16                                | 1690                                            | 1178                           | ESH478M025AN2AA |

For capacitor whose capacitance exceeds 1000 μF the value of D.F. (%) is increased by 2% for every addition of 1000 μF

## SINGLE-ENDED LEADS - General purpose 105°C / 2000 h

| 35 Vdc Rated voltage - 44 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 10                                          | 5 x 11                      | 14                                | 44                                              | 6                              | ESH106M035AC3AA |
| 15                                          | 5 x 11                      | 14                                | 50                                              | 8                              | ESH156M035AC3AA |
| 22                                          | 5 x 11                      | 14                                | 65                                              | 11                             | ESH226M035AC3AA |
| 33                                          | 5 x 11                      | 14                                | 85                                              | 14                             | ESH336M035AC3AA |
| 47                                          | 6 x 11                      | 14                                | 115                                             | 19                             | ESH476M035AE3AA |
| 68                                          | 8 x 11                      | 14                                | 130                                             | 27                             | ESH686M035AG3AA |
| 100                                         | 8 x 11                      | 14                                | 190                                             | 38                             | ESH107M035AG3AA |
| 150                                         | 10 x 12                     | 14                                | 240                                             | 55                             | ESH157M035AH1AA |
| 220                                         | 10 x 12                     | 14                                | 315                                             | 80                             | ESH227M035AH1AA |
| 330                                         | 10 x 15                     | 14                                | 440                                             | 118                            | ESH337M035AH2AA |
| 470                                         | 10 x 19                     | 14                                | 580                                             | 167                            | ESH477M035AH4AA |
| 470                                         | 13 x 20                     | 14                                | 580                                             | 167                            | ESH477M035AL3AA |
| 680                                         | 13 x 20                     | 14                                | 730                                             | 241                            | ESH687M035AL3AA |
| 1000                                        | 13 x 25                     | 14                                | 995                                             | 353                            | ESH108M035AL4AA |
| 1500                                        | 16 x 25                     | 14                                | 1110                                            | 528                            | ESH158M035AM7AA |
| 2200                                        | 16 x 32                     | 14                                | 1450                                            | 773                            | ESH228M035AM2AA |
| 3300                                        | 18 x 36                     | 14                                | 1660                                            | 1158                           | ESH338M035AN2AA |

| 50 Vdc Rated voltage - 63 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                        | 5 x 11                      | 12                                | 7                                               | 3                              | ESH474M050AC3AA |
| 1.0                                         | 5 x 11                      | 12                                | 12                                              | 3                              | ESH105M050AC3AA |
| 2.2                                         | 5 x 11                      | 12                                | 18                                              | 4                              | ESH225M050AC3AA |
| 3.3                                         | 5 x 11                      | 12                                | 25                                              | 5                              | ESH335M050AC3AA |
| 4.7                                         | 5 x 11                      | 12                                | 30                                              | 5                              | ESH475M050AC3AA |
| 6.8                                         | 5 x 11                      | 12                                | 30                                              | 6                              | ESH685M050AC3AA |
| 10                                          | 5 x 11                      | 12                                | 50                                              | 8                              | ESH106M050AC3AA |
| 15                                          | 5 x 11                      | 12                                | 50                                              | 10                             | ESH156M050AC3AA |
| 22                                          | 5 x 11                      | 12                                | 75                                              | 14                             | ESH226M050AC3AA |
| 33                                          | 6 x 11                      | 12                                | 105                                             | 19                             | ESH336M050AC3AA |
| 47                                          | 8 x 11                      | 12                                | 125                                             | 26                             | ESH476M050AG3AA |
| 68                                          | 8 x 11                      | 12                                | 159                                             | 37                             | ESH686M050AG3AA |
| 100                                         | 10 x 12                     | 12                                | 210                                             | 53                             | ESH107M050AH1AA |
| 150                                         | 10 x 12                     | 12                                | 289                                             | 78                             | ESH157M050AH1AA |
| 220                                         | 10 x 15                     | 12                                | 400                                             | 113                            | ESH227M050AH2AA |
| 330                                         | 10 x 19                     | 12                                | 535                                             | 168                            | ESH337M050AH4AA |
| 470                                         | 13 x 20                     | 12                                | 730                                             | 238                            | ESH477M050AL3AA |
| 680                                         | 13 x 25                     | 12                                | 860                                             | 343                            | ESH687M050AL4AA |
| 1000                                        | 16 x 25                     | 12                                | 1110                                            | 503                            | ESH108M050AM7AA |
| 1500                                        | 16 x 32                     | 12                                | 1350                                            | 753                            | ESH158M050AM2AA |
| 2200                                        | 18 x 36                     | 12                                | 1530                                            | 1103                           | ESH228M050AN2AA |

| 63 Vdc Rated voltage - 79 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|---------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)        | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                        | 5 x 11                      | 10                                | 8                                               | 3                              | ESH474M063AC3AA |
| 1.0                                         | 5 x 11                      | 10                                | 12                                              | 4                              | ESH105M063AC3AA |
| 2.2                                         | 5 x 11                      | 10                                | 20                                              | 4                              | ESH225M063AC3AA |
| 3.3                                         | 5 x 11                      | 10                                | 27                                              | 5                              | ESH335M063AC3AA |
| 4.7                                         | 5 x 11                      | 10                                | 34                                              | 6                              | ESH475M063AC3AA |
| 6.8                                         | 5 x 11                      | 10                                | 37                                              | 7                              | ESH685M063AC3AA |
| 10                                          | 5 x 11                      | 10                                | 55                                              | 9                              | ESH106M063AC3AA |
| 15                                          | 5 x 11                      | 10                                | 65                                              | 12                             | ESH156M063AC3AA |
| 22                                          | 6 x 11                      | 10                                | 90                                              | 17                             | ESH226M063AE3AA |
| 33                                          | 8 x 11                      | 10                                | 110                                             | 24                             | ESH336M063AG3AA |
| 47                                          | 8 x 11                      | 10                                | 155                                             | 33                             | ESH476M063AG3AA |
| 68                                          | 10 x 12                     | 10                                | 198                                             | 46                             | ESH686M063AH1AA |
| 100                                         | 10 x 12                     | 10                                | 260                                             | 66                             | ESH107M063AH1AA |
| 150                                         | 10 x 15                     | 10                                | 330                                             | 97                             | ESH157M063AH2AA |
| 220                                         | 10 x 19                     | 10                                | 465                                             | 142                            | ESH227M063AH4AA |
| 330                                         | 13 x 20                     | 10                                | 650                                             | 211                            | ESH337M063AL3AA |
| 470                                         | 13 x 25                     | 10                                | 800                                             | 299                            | ESH477M063AL4AA |
| 680                                         | 16 x 25                     | 10                                | 1000                                            | 431                            | ESH687M063AM7AA |
| 1000                                        | 16 x 32                     | 10                                | 1200                                            | 633                            | ESH108M063AM2AA |
| 1500                                        | 16 x 36                     | 10                                | 1450                                            | 948                            | ESH158M063AM3AA |

| 100 Vdc Rated voltage - 125 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 5 x 11                      | 10                                | 10                                              | 3                              | ESH474M100AC3AA |
| 1.0                                           | 5 x 11                      | 10                                | 15                                              | 4                              | ESH105M100AC3AA |
| 2.2                                           | 5 x 11                      | 10                                | 22                                              | 5                              | ESH225M100AC3AA |
| 3.3                                           | 5 x 11                      | 10                                | 29                                              | 6                              | ESH335M100AC3AA |
| 4.7                                           | 5 x 11                      | 10                                | 37                                              | 8                              | ESH475M100AC3AA |
| 6.8                                           | 5 x 11                      | 10                                | 46                                              | 10                             | ESH685M100AC3AA |
| 10                                            | 6 x 11                      | 10                                | 65                                              | 13                             | ESH106M100AE3AA |
| 15                                            | 8 x 11                      | 10                                | 82                                              | 18                             | ESH156M100AG3AA |
| 22                                            | 8 x 11                      | 10                                | 115                                             | 25                             | ESH226M100AG3AA |
| 33                                            | 10 x 12                     | 10                                | 160                                             | 36                             | ESH336M100AH1AA |
| 47                                            | 10 x 15                     | 10                                | 210                                             | 50                             | ESH476M100AH2AA |
| 68                                            | 10 x 19                     | 10                                | 241                                             | 71                             | ESH686M100AH4AA |
| 100                                           | 13 x 20                     | 10                                | 385                                             | 103                            | ESH107M100AL3AA |
| 150                                           | 13 x 25                     | 10                                | 414                                             | 153                            | ESH157M100AL4AA |
| 220                                           | 16 x 25                     | 10                                | 590                                             | 223                            | ESH227M100AM7AA |
| 330                                           | 16 x 25                     | 10                                | 720                                             | 333                            | ESH337M100AM7AA |
| 470                                           | 16 x 32                     | 10                                | 875                                             | 473                            | ESH477M100AM2AA |
| 680                                           | 16 x 36                     | 10                                | 1200                                            | 683                            | ESH687M100AM3AA |

For capacitor whose capacitance exceeds 1000 μF the value of D.F. (%) is increased by 2% for every addition of 1000 μF

## SINGLE-ENDED LEADS - General purpose 105°C / 2000 h

| 160 Vdc Rated voltage - 200 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 5 x 11                      | 15                                | 12                                              | 12                             | ESH474M160AC3AA |
| 1.0                                           | 5 x 11                      | 15                                | 17                                              | 15                             | ESH105M160AC3AA |
| 2.2                                           | 6 x 11                      | 15                                | 25                                              | 20                             | ESH225M160AE3AA |
| 3.3                                           | 8 x 11                      | 15                                | 36                                              | 26                             | ESH335M160AG3AA |
| 4.7                                           | 8 x 11                      | 15                                | 43                                              | 32                             | ESH475M160AG3AA |
| 6.8                                           | 10 x 12                     | 15                                | 54                                              | 43                             | ESH685M160AH1AA |
| 10                                            | 10 x 12                     | 15                                | 70                                              | 58                             | ESH106M160AH1AA |
| 15                                            | 10 x 15                     | 15                                | 90                                              | 82                             | ESH156M160AH2AA |
| 22                                            | 10 x 19                     | 15                                | 130                                             | 116                            | ESH226M160AH4AA |
| 33                                            | 13 x 20                     | 15                                | 180                                             | 168                            | ESH336M160AL3AA |
| 47                                            | 13 x 25                     | 15                                | 250                                             | 236                            | ESH476M160AL4AA |
| 68                                            | 13 x 25                     | 15                                | 270                                             | 336                            | ESH686M160AL4AA |
| 100                                           | 16 x 25                     | 15                                | 390                                             | 490                            | ESH107M160AM7AA |
| 150                                           | 16 x 32                     | 15                                | 435                                             | 730                            | ESH157M160AM2AA |
| 220                                           | 16 x 36                     | 15                                | 700                                             | 1066                           | ESH227M160AM3AA |
| 330                                           | 18 x 40                     | 15                                | 850                                             | 1594                           | ESH337M160AN3AA |
| 470                                           | 22 x 40                     | 15                                | 980                                             | 2266                           | ESH477M160AQ4AA |

| 200 Vdc Rated voltage - 250 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 5 x 11                      | 15                                | 12                                              | 13                             | ESH474M200AC3AA |
| 1.0                                           | 6 x 11                      | 15                                | 17                                              | 16                             | ESH105M200AE3AA |
| 2.2                                           | 6 x 11                      | 15                                | 25                                              | 23                             | ESH225M200AE3AA |
| 3.3                                           | 8 x 11                      | 15                                | 36                                              | 30                             | ESH335M200AG3AA |
| 4.7                                           | 10 x 12                     | 15                                | 50                                              | 38                             | ESH475M200AH1AA |
| 6.8                                           | 10 x 12                     | 15                                | 60                                              | 51                             | ESH685M200AH1AA |
| 10                                            | 10 x 15                     | 15                                | 80                                              | 70                             | ESH106M200AH2AA |
| 15                                            | 10 x 19                     | 15                                | 110                                             | 100                            | ESH156M200AH4AA |
| 22                                            | 10 x 19                     | 15                                | 140                                             | 142                            | ESH226M200AH4AA |
| 33                                            | 13 x 20                     | 15                                | 190                                             | 208                            | ESH336M200AL3AA |
| 33                                            | 13 x 25                     | 15                                | 190                                             | 208                            | ESH336M200AL4AA |
| 47                                            | 13 x 20                     | 15                                | 260                                             | 292                            | ESH476M200AL3AA |
| 47                                            | 13 x 25                     | 15                                | 260                                             | 292                            | ESH476M200AL4AA |
| 68                                            | 16 x 25                     | 15                                | 280                                             | 418                            | ESH686M200AH7AA |
| 100                                           | 16 x 32                     | 15                                | 400                                             | 610                            | ESH107M200AM2AA |
| 150                                           | 16 x 36                     | 15                                | 450                                             | 910                            | ESH157M200AM3AA |
| 220                                           | 18 x 36                     | 15                                | 750                                             | 1330                           | ESH227M200AN2AA |
| 220                                           | 18 x 40                     | 15                                | 750                                             | 1330                           | ESH227M200AN3AA |
| 330                                           | 18 x 40                     | 15                                | 920                                             | 1990                           | ESH337M200AN3AA |
| 330                                           | 22 x 40                     | 15                                | 920                                             | 1990                           | ESH337M200AQ4AA |

| 250 Vdc Rated voltage - 300 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 5 x 11                      | 15                                | 12                                              | 13                             | ESH474M250AC3AA |
| 1.0                                           | 6 x 11                      | 15                                | 17                                              | 17                             | ESH105M250AE3AA |
| 2.2                                           | 8 x 11                      | 15                                | 29                                              | 26                             | ESH225M250AG3AA |
| 3.3                                           | 10 x 12                     | 15                                | 42                                              | 35                             | ESH335M250AH1AA |
| 4.7                                           | 10 x 12                     | 15                                | 52                                              | 45                             | ESH475M250AH1AA |
| 6.8                                           | 10 x 12                     | 15                                | 62                                              | 61                             | ESH685M250AH1AA |
| 10                                            | 10 x 15                     | 15                                | 75                                              | 85                             | ESH106M250AH2AA |
| 10                                            | 10 x 19                     | 15                                | 88                                              | 85                             | ESH106M250AH4AA |
| 15                                            | 13 x 20                     | 15                                | 120                                             | 122                            | ESH156M250AL3AA |
| 22                                            | 13 x 20                     | 15                                | 155                                             | 175                            | ESH226M250AL3AA |
| 22                                            | 13 x 25                     | 15                                | 155                                             | 175                            | ESH226M250AL4AA |
| 33                                            | 13 x 25                     | 15                                | 200                                             | 257                            | ESH336M250AL4AA |
| 47                                            | 16 x 25                     | 15                                | 270                                             | 362                            | ESH476M250AM7AA |
| 68                                            | 16 x 32                     | 15                                | 300                                             | 520                            | ESH686M250AM2AA |
| 100                                           | 18 x 36                     | 15                                | 440                                             | 760                            | ESH107M250AN2AA |
| 150                                           | 18 x 40                     | 15                                | 600                                             | 1135                           | ESH157M250AN3AA |
| 220                                           | 22 x 40                     | 15                                | 800                                             | 1660                           | ESH227M250AQ4AA |

| 350 Vdc Rated voltage - 400 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 6 x 11                      | 20                                | 14                                              | 15                             | ESH474M350AE3AA |
| 1.0                                           | 8 x 11                      | 20                                | 20                                              | 20                             | ESH105M350AG3AA |
| 2.2                                           | 10 x 12                     | 20                                | 35                                              | 33                             | ESH225M350AH1AA |
| 3.3                                           | 10 x 15                     | 20                                | 47                                              | 45                             | ESH335M350AH2AA |
| 4.7                                           | 10 x 15                     | 20                                | 55                                              | 59                             | ESH475M350AH2AA |
| 6.8                                           | 10 x 19                     | 20                                | 65                                              | 81                             | ESH685M350AH4AA |
| 10                                            | 13 x 20                     | 20                                | 95                                              | 115                            | ESH106M350AL3AA |
| 15                                            | 13 x 20                     | 20                                | 140                                             | 167                            | ESH156M350AL3AA |
| 22                                            | 16 x 25                     | 20                                | 165                                             | 241                            | ESH226M350AM7AA |
| 33                                            | 16 x 32                     | 20                                | 195                                             | 356                            | ESH336M350AM2AA |
| 47                                            | 16 x 36                     | 20                                | 210                                             | 503                            | ESH476M350AM3AA |
| 47                                            | 18 x 36                     | 20                                | 240                                             | 503                            | ESH476M350AN2AA |
| 68                                            | 18 x 36                     | 20                                | 320                                             | 724                            | ESH686M350AN2AA |
| 100                                           | 18 x 40                     | 20                                | 300                                             | 1060                           | ESH107M350AN3AA |
| 100                                           | 22 x 40                     | 20                                | 360                                             | 1060                           | ESH107M350AQ4AA |
| 150                                           | 22 x 40                     | 20                                | 480                                             | 1585                           | ESH157M350AQ4AA |

| 400 Vdc Rated voltage - 450 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 6 x 11                      | 20                                | 14                                              | 16                             | ESH474M400AE3AA |
| 1.0                                           | 8 x 11                      | 20                                | 20                                              | 22                             | ESH105M400AG3AA |
| 2.2                                           | 10 x 12                     | 20                                | 35                                              | 36                             | ESH225M400AH1AA |
| 3.3                                           | 10 x 12                     | 20                                | 42                                              | 50                             | ESH335M400AH1AA |
| 3.3                                           | 10 x 15                     | 20                                | 49                                              | 50                             | ESH335M400AH2AA |
| 4.7                                           | 10 x 15                     | 20                                | 57                                              | 66                             | ESH475M400AH2AA |
| 6.8                                           | 10 x 19                     | 20                                | 67                                              | 92                             | ESH685M400AH4AA |
| 10                                            | 10 x 19                     | 20                                | 75                                              | 130                            | ESH106M400AH4AA |
| 10                                            | 13 x 20                     | 20                                | 97                                              | 130                            | ESH106M400AL3AA |
| 15                                            | 13 x 25                     | 20                                | 145                                             | 190                            | ESH156M400AL4AA |
| 22                                            | 13 x 25                     | 20                                | 140                                             | 274                            | ESH226M400AL4AA |
| 22                                            | 16 x 25                     | 20                                | 170                                             | 274                            | ESH226M400AM7AA |
| 33                                            | 16 x 25                     | 20                                | 190                                             | 406                            | ESH336M400AM7AA |
| 33                                            | 16 x 32                     | 20                                | 230                                             | 406                            | ESH336M400AM2AA |
| 47                                            | 16 x 32                     | 20                                | 250                                             | 574                            | ESH476M400AM2AA |
| 47                                            | 18 x 36                     | 20                                | 300                                             | 574                            | ESH476M400AN2AA |
| 68                                            | 18 x 36                     | 20                                | 325                                             | 826                            | ESH686M400AN2AA |
| 100                                           | 18 x 36                     | 20                                | 290                                             | 1210                           | ESH107M400AN2AA |
| 100                                           | 22 x 40                     | 20                                | 365                                             | 1210                           | ESH107M400AQ4AA |
| 150                                           | 22 x 40                     | 20                                | 465                                             | 1810                           | ESH157M400AQ4AA |

| 450 Vdc Rated voltage - 500 Vdc Surge voltage |                             |                                   |                                                 |                                |                 |
|-----------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------------------|--------------------------------|-----------------|
| Rated cap.<br>120 Hz<br>20°C<br>(μF)          | Case<br>size<br>DxL<br>(mm) | D.F.<br>120 Hz<br>25°C<br>(tgδ %) | R.C.<br>120 Hz<br>105°C<br>(mA <sub>rms</sub> ) | L.C.<br>20°C<br>2 min.<br>(μA) | P/N             |
| 0.47                                          | 6 x 11                      | 20                                | 16                                              | 16                             | ESH474M450AE3AA |
| 1.0                                           | 8 x 11                      | 20                                | 22                                              | 23                             | ESH105M450AG3AA |
| 2.2                                           | 10 x 12                     | 20                                | 37                                              | 40                             | ESH225M450AH1AA |
| 3.3                                           | 10 x 15                     | 20                                | 51                                              | 54                             | ESH335M450AH2AA |
| 4.7                                           | 10 x 15                     | 20                                | 59                                              | 73                             | ESH475M450AH2AA |
| 6.8                                           | 13 x 20                     | 20                                | 69                                              | 102                            | ESH685M450AL3AA |
| 10                                            | 13 x 25                     | 20                                | 99                                              | 145                            | ESH106M450AL4AA |
| 15                                            | 16 x 25                     | 20                                | 150                                             | 212                            | ESH156M450AM7AA |
| 22                                            | 16 x 25                     | 20                                | 145                                             | 307                            | ESH226M450AM7AA |
| 22                                            | 16 x 32                     | 20                                | 175                                             | 307                            | ESH226M450AM2AA |
| 33                                            | 18 x 36                     | 20                                | 250                                             | 455                            | ESH336M450AN2AA |
| 47                                            | 18 x 40                     | 20                                | 350                                             | 644                            | ESH476M450AN3AA |
| 68                                            | 22 x 40                     | 20                                | 380                                             | 928                            | ESH686M450AQ4AA |