



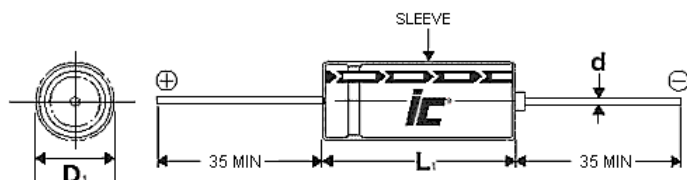
## FEATURES

Axial lead - High voltage

## APPLICATIONS

Filtering – Bypass – Coupling – Blocking

| Operating Temperature Range                              |                | -40°C to +85°C (10 to 350 WVDC)<br>-25°C to +85°C (450 WVDC)  |     |                |     |                                       |      |      |      |                        |     |     |                      |  |
|----------------------------------------------------------|----------------|---------------------------------------------------------------|-----|----------------|-----|---------------------------------------|------|------|------|------------------------|-----|-----|----------------------|--|
| Capacitance Tolerance                                    |                | +20% at 120 Hz, 20°C                                          |     |                |     |                                       |      |      |      |                        |     |     |                      |  |
| Surge voltage                                            | WVDC           | 10                                                            | 16  | 25             | 35  | 50                                    | 63   | 100  | 160  | 200                    | 250 | 350 | 450                  |  |
|                                                          | SVDC           | 13                                                            | 20  | 32             | 44  | 63                                    | 79   | 125  | 200  | 250                    | 300 | 400 | 500                  |  |
| Dissipation Factor                                       | WVDC           | 10                                                            | 16  | 25             | 35  | 50                                    | 63   | 100  | 160  | 200                    | 250 | 350 | 450                  |  |
|                                                          | Tan δ          | .24                                                           | .20 | .16            | .14 | .12                                   | .1   | .1   | .2   | .2                     | .2  | .25 | .25                  |  |
|                                                          |                | Add .02 for every 1000µF above 1000µF                         |     |                |     |                                       |      |      |      |                        |     |     |                      |  |
| Leakage current                                          |                | 10 to 100 WVDC                                                |     |                |     |                                       |      |      |      | 160 to 450 WVDC        |     |     |                      |  |
|                                                          |                | 1 Minute                                                      |     |                |     | 2 Minutes                             |      |      |      | 1 Minute               |     |     | 1 Minute             |  |
|                                                          |                | .03CV or 4µA,<br>Whichever is greater                         |     |                |     | .01CV or 3µA,<br>Whichever is greater |      |      |      | CV≤1000<br>.04CV+100µA |     |     | CV>1000<br>.1CV+40µA |  |
| Low temperature stability<br>Impedance ratio<br>(120 Hz) | WVDC           | 10                                                            | 16  | 25             | 35  | 50                                    | 63   | 100  | 160  | 200                    | 250 | 350 | 450                  |  |
|                                                          | -25°C to +20°C | 4                                                             | 3   | 2              | 2   | 2                                     | 2    | 2    | 4    | 4                      | 4   | 4   | 6                    |  |
|                                                          | -40°C to +20°C | 10                                                            | 8   | 5              | 4   | 3                                     | 3    | 3    | 15   | 15                     | 15  | 10  | -                    |  |
| Load Life                                                |                | 2000 hours at 85°C with rated WVDC and ripple current applied |     |                |     |                                       |      |      |      |                        |     |     |                      |  |
|                                                          |                | Capacitance change                                            |     |                |     | ≤20% of initial measured value        |      |      |      |                        |     |     |                      |  |
|                                                          |                | Dissipation factor                                            |     |                |     | ≤200% of maximum specified value      |      |      |      |                        |     |     |                      |  |
|                                                          |                | Leakage current                                               |     |                |     | ≤100% of maximum specified value      |      |      |      |                        |     |     |                      |  |
| Shelf Life                                               |                | 1000 hours at 85°C with no voltage applied                    |     |                |     |                                       |      |      |      |                        |     |     |                      |  |
|                                                          |                | Capacitance change                                            |     |                |     | ≤20% of initial measured value        |      |      |      |                        |     |     |                      |  |
|                                                          |                | Dissipation factor                                            |     |                |     | ≤200% of maximum specified value      |      |      |      |                        |     |     |                      |  |
|                                                          |                | Leakage current                                               |     |                |     | ≤100% of maximum specified value      |      |      |      |                        |     |     |                      |  |
| Ripple Current Multipliers                               |                | Capacitance                                                   |     | Frequency (Hz) |     |                                       |      |      |      | Temperature (°C)       |     |     |                      |  |
|                                                          |                | µF                                                            |     | 50             | 120 | 400                                   | 1k   | 10k  | 50k  | +85                    | +70 | +60 | +30                  |  |
|                                                          |                | C≤10                                                          |     | .8             | 1.0 | 1.3                                   | 1.45 | 1.65 | 1.7  | 1.0                    | 1.3 | 1.5 | 1.8                  |  |
|                                                          |                | 10<C≤100                                                      |     | .8             | 1.0 | 1.23                                  | 1.36 | 1.48 | 1.53 | 1.0                    | 1.3 | 1.5 | 1.8                  |  |
|                                                          |                | 100<C≤1000                                                    |     | .8             | 1.0 | 1.16                                  | 1.25 | 1.35 | 1.38 | 1.0                    | 1.3 | 1.5 | 1.8                  |  |
|                                                          |                | C>1000                                                        |     | .8             | 1.0 | 1.11                                  | 1.17 | 1.25 | 1.28 | 1.0                    | 1.3 | 1.5 | 1.8                  |  |



| D | 5   | 6.3 | 8   | 10  | 12.5 | 16  | 18  | 22  | 25  |
|---|-----|-----|-----|-----|------|-----|-----|-----|-----|
| d | 0.5 | 0.5 | 0.6 | 0.6 | 0.6  | 0.8 | 0.8 | 0.8 | 0.8 |
| B | 0.5 | 0.5 | 0.5 | 0.5 | 0.8  | 0.5 | 0.5 | 1.0 | 1.0 |

D≤10mm, L<sub>1</sub>=L+1.5mm Max. mmD>10mm, L<sub>1</sub>=L+2mm Max.D<sub>1</sub>=D+B Max.

# TTA

+85°C, Standard, general purpose 2000 hours

| Capacitance (μF) | WVDC | IC PART NUMBER | Maximum ESR (Ω) 120 Hz, +20°C | Maximum RMS Ripple Current (mA) 120 Hz, +85°C | Dims DxL (mm) |
|------------------|------|----------------|-------------------------------|-----------------------------------------------|---------------|
| 0.47             | 100  | 474TTA100M     | 352.737                       | 10                                            | 5x13          |
| 1                | 50   | 105TTA050M     | 165.786                       | 10                                            | 5x13          |
| 1                | 100  | 105TTA100M     | 331.573                       | 18                                            | 5x13          |
| 1                | 160  | 105TTA160M     | 331.573                       | 14                                            | 6.3x13        |
| 1                | 350  | 105TTA350M     | 331.573                       | 20                                            | 6.3x16        |
| 1                | 450  | 105TTA450M     | 414.466                       | 19                                            | 8x16          |
| 2.2              | 50   | 225TTA050M     | 90.4289                       | 23                                            | 5x13          |
| 2.2              | 100  | 225TTA100M     | 75.3575                       | 27                                            | 5x13          |
| 2.2              | 160  | 225TTA160M     | 150.715                       | 23                                            | 6.3x16        |
| 2.2              | 250  | 225TTA250M     | 150.715                       | 30                                            | 8x16          |
| 2.2              | 350  | 225TTA350M     | 150.715                       | 33                                            | 8x16          |
| 2.2              | 450  | 225TTA450M     | 188.394                       | 31                                            | 10x21         |
| 3.3              | 100  | 335TTA100M     | 50.2383                       | 34                                            | 5x13          |
| 3.3              | 160  | 335TTA160M     | 100.477                       | 33                                            | 8x16          |
| 3.3              | 250  | 335TTA250M     | 100.477                       | 40                                            | 8x16          |
| 3.3              | 450  | 335TTA450M     | 125.596                       | 38                                            | 8x20          |
| 4.7              | 50   | 475TTA050M     | 42.3284                       | 36                                            | 5x13          |
| 4.7              | 100  | 475TTA100M     | 50.3284                       | 40                                            | 5x13          |
| 4.7              | 160  | 475TTA160M     | 70.5474                       | 50                                            | 8x16          |
| 4.7              | 350  | 475TTA350M     | 70.5474                       | 55                                            | 8x20          |
| 4.7              | 450  | 475TTA450M     | 88.184                        | 50                                            | 10x26         |
| 10               | 35   | 106TTA035M     | 23.2101                       | 41                                            | 5x13          |
| 10               | 50   | 106TTA050M     | 19.8944                       | 50                                            | 5x13          |
| 10               | 63   | 106TTA063M     | 16.579                        | 55                                            | 5x13          |
| 10               | 100  | 106TTA100M     | 16.579                        | 65                                            | 6.3x13        |
| 10               | 160  | 106TTA160M     | 33.157                        | 80                                            | 8x20          |
| 10               | 250  | 106TTA250M     | 33.157                        | 90                                            | 10x21         |
| 10               | 350  | 106TTA350M     | 33.157                        | 100                                           | 13x26         |
| 10               | 450  | 106TTA450M     | 41.4466                       | 90                                            | 12.5x25       |
| 15               | 50   | 156TTA050M     | 13.2629                       | 70                                            | 5x13          |
| 22               | 35   | 226TTA035M     | 10.55                         | 70                                            | 5x13          |
| 22               | 50   | 226TTA050M     | 9.0429                        | 85                                            | 6.3x13        |
| 22               | 100  | 226TTA100M     | 7.536                         | 120                                           | 8x16          |
| 22               | 160  | 226TTA160M     | 15.072                        | 130                                           | 10x26         |
| 22               | 250  | 226TTA250M     | 15.072                        | 160                                           | 13x26         |
| 22               | 350  | 226TTA350M     | 15.072                        | 150                                           | 13x31         |
| 22               | 450  | 226TTA450M     | 18.8394                       | 160                                           | 16x31         |
| 22               | 500  | 226TTA500AQW   | 18.8394                       | 115                                           | 16x32         |
| 33               | 25   | 336TTA025M     | 8.0381                        | 80                                            | 5x13          |
| 33               | 50   | 336TTA050M     | 6.0286                        | 115                                           | 6.3x16        |
| 33               | 100  | 336TTA100M     | 5.0238                        | 145                                           | 8x16          |
| 33               | 160  | 336TTA160M     | 10.048                        | 170                                           | 13x26         |
| 33               | 250  | 336TTA250M     | 10.048                        | 190                                           | 13x31         |
| 33               | 350  | 336TTA350M     | 10.048                        | 210                                           | 16x31.5       |
| 33               | 450  | 336TTA450M     | 12.5596                       | 230                                           | 16x41         |
| 47               | 16   | 476TTA016M     | 7.0547                        | 90                                            | 5x13          |
| 47               | 25   | 476TTA025M     | 5.6438                        | 105                                           | 6.3x13        |
| 47               | 50   | 476TTA050M     | 4.2328                        | 140                                           | 6.3x16        |
| 47               | 63   | 476TTA063M     | 3.527                         | 165                                           | 8x16          |
| 47               | 100  | 476TTA100M     | 3.527                         | 190                                           | 8x20          |
| 47               | 160  | 476TTA160M     | 7.055                         | 225                                           | 13x31         |
| 47               | 250  | 476TTA250M     | 7.055                         | 255                                           | 16x31         |
| 47               | 350  | 476TTA350M     | 7.055                         | 290                                           | 16x41         |
| 47               | 450  | 476TTA450MRZ   | 8.8184                        | 300                                           | 18x41         |
| 47               | 500  | 476TTA500ARZ   | 8.8184                        | 290                                           | 18x40         |
| 68               | 16   | 686TTA016M     | 4.8761                        | 150                                           | 6.3x16        |
| 68               | 35   | 686TTA035M     | 3.4132                        | 200                                           | 8x16          |
| 68               | 63   | 686TTA063M     | 2.438                         | 250                                           | 8x20          |

| Capacitance (μF) | WVDC | IC PART NUMBER | Maximum ESR (Ω) 120 Hz, +20°C | Maximum RMS Ripple Current (mA) 120 Hz, +85°C | Dims DxL (mm) |
|------------------|------|----------------|-------------------------------|-----------------------------------------------|---------------|
| 100              | 10   | 107TTA010M     | 3.9789                        | 130                                           | 6.3x13        |
| 100              | 25   | 107TTA025M     | 2.6526                        | 170                                           | 6.3x13        |
| 100              | 35   | 107TTA035M     | 2.231                         | 200                                           | 8x16          |
| 100              | 50   | 107TTA050M     | 1.9894                        | 220                                           | 8x16          |
| 100              | 63   | 107TTA063M     | 1.658                         | 260                                           | 8x20          |
| 100              | 100  | 107TTA100M     | 1.658                         | 310                                           | 10x26         |
| 100              | 160  | 107TTA160M     | 3.316                         | 400                                           | 16x31         |
| 100              | 250  | 107TTA250M     | 3.316                         | 450                                           | 16x41         |
| 100              | 350  | 107TTA350M     | 3.316                         | 460                                           | 18x41         |
| 100              | 450  | 107TTA450M     | 4.145                         | 370                                           | 22x51         |
| 150              | 25   | 157TTA025M     | 1.7684                        | 260                                           | 8x16          |
| 150              | 35   | 157TTA035M     | 1.5473                        | 270                                           | 8x20          |
| 150              | 50   | 157TTA050M     | 1.3263                        | 285                                           | 10x16         |
| 150              | 63   | 157TTA063M     | 1.052                         | 310                                           | 10x21         |
| 150              | 100  | 157TTA100M     | 1.1052                        | 515                                           | 13x26         |
| 220              | 16   | 227TTA016M     | 1.5071                        | 260                                           | 8x16          |
| 220              | 25   | 227TTA025M     | 1.2057                        | 280                                           | 8x16          |
| 220              | 35   | 227TTA035M     | 1.055                         | 340                                           | 8x20          |
| 220              | 50   | 227TTA050M     | 0.9043                        | 440                                           | 10x21         |
| 220              | 63   | 227TTA063M     | 0.754                         | 490                                           | 10x25         |
| 220              | 100  | 227TTA100M     | 0.754                         | 560                                           | 13x26         |
| 220              | 160  | 227TTA160M     | 1.507                         | 660                                           | 22x41         |
| 220              | 250  | 227TTA250M     | 1.507                         | 764                                           | 22x41         |
| 330              | 16   | 337TTA016M     | 1.0048                        | 320                                           | 8x16          |
| 330              | 25   | 337TTA025M     | 0.8038                        | 385                                           | 8x20          |
| 330              | 50   | 337TTA050M     | 0.6029                        | 565                                           | 10x26         |
| 330              | 63   | 337TTA063M     | 0.502                         | 650                                           | 13x26         |
| 330              | 100  | 337TTA100M     | 0.5024                        | 730                                           | 13x31         |
| 470              | 10   | 477TTA010M     | 0.8466                        | 350                                           | 8x16          |
| 470              | 16   | 477TTA016M     | 0.7055                        | 450                                           | 8x20          |
| 470              | 25   | 477TTA025M     | 0.5644                        | 560                                           | 10x21         |
| 470              | 35   | 477TTA035M     | 0.4938                        | 640                                           | 10x26         |
| 470              | 50   | 477TTA050M     | 0.4233                        | 740                                           | 13x26         |
| 470              | 63   | 477TTA063M     | 0.353                         | 845                                           | 13x31         |
| 470              | 100  | 477TTA100M     | 0.353                         | 960                                           | 16x31         |
| 1000             | 10   | 108TTA010M     | 0.3979                        | 570                                           | 10x21         |
| 1000             | 16   | 108TTA016M     | 0.3316                        | 700                                           | 10x26         |
| 1000             | 25   | 108TTA025M     | 0.2653                        | 830                                           | 13x26         |
| 1000             | 35   | 108TTA035M     | 0.2321                        | 980                                           | 13x26         |
| 1000             | 50   | 108TTA050M     | 0.1989                        | 1130                                          | 16x30         |
| 1000             | 63   | 108TTA063M     | 0.1658                        | 1330                                          | 16x31         |
| 1000             | 80   | 108TTA080M     | 0.1658                        | 1500                                          | 16x41         |
| 1000             | 100  | 108TTA100M     | 0.1658                        | 1640                                          | 18x41         |
| 1500             | 25   | 158TTA025M     | 0.1989                        | 1150                                          | 13x26         |
| 1500             | 35   | 158TTA035M     | 0.1768                        | 1280                                          | 16x31         |
| 1500             | 50   | 158TTA050M     | 0.1547                        | 1480                                          | 16x41         |
| 2200             | 10   | 228TTA010M     | 0.211                         | 1100                                          | 13x26         |
| 2200             | 16   | 228TTA016M     | 0.1809                        | 1190                                          | 13x31         |
| 2200             | 25   | 228TTA025M     | 0.1507                        | 1480                                          | 16x31         |
| 2200             | 35   | 228TTA035M     | 0.1356                        | 1580                                          | 16x31         |
| 2200             | 50   | 228TTA050M     | 0.1206                        | 1930                                          | 16x41         |
| 2200             | 63   | 228TTA063M     | 0.1055                        | 2158                                          | 18x40         |
| 2200             | 80   | 228TTA080M     | 0.106                         | 2260                                          | 22x51         |
| 2200             | 100  | 228TTA100M     | 0.1055                        | 2560                                          | 25x51         |
| 3300             | 10   | 338TTA010M     | 0.131                         | 1435                                          | 13x31         |
| 3300             | 16   | 338TTA016M     | 0.1306                        | 1610                                          | 16x31         |
| 3300             | 25   | 338TTA025M     | 0.1105                        | 1700                                          | 16x31         |
| 3300             | 35   | 338TTA035M     | 0.0904                        | 1810                                          | 16x41         |

# TTA

+85°C, Standard, general  
purpose 2000 hours

| Capacitance<br>(μF) | WVDC | IC PART NUMBER    | Maximum<br>ESR (Ω)<br>120 Hz,<br>+20°C | Maximum<br>RMS Ripple<br>Current<br>(mA)<br>120 Hz,<br>+85°C | Dims DxL<br>(mm) |
|---------------------|------|-------------------|----------------------------------------|--------------------------------------------------------------|------------------|
| 3300                | 50   | <b>338TTA050M</b> | 0.0804                                 | 2350                                                         | 22x41            |
| 3300                | 63   | <b>338TTA063M</b> | 0.0804                                 | 2370                                                         | 22x51            |
| 4700                | 10   | <b>478TTA010M</b> | 0.1129                                 | 1730                                                         | 16x31            |
| 4700                | 16   | <b>478TTA016M</b> | 0.0988                                 | 1840                                                         | 16x31.5          |
| 4700                | 25   | <b>478TTA025M</b> | 0.0847                                 | 2190                                                         | 16x41            |
| 4700                | 35   | <b>478TTA035M</b> | 0.0705                                 | 2470                                                         | 22x41            |
| 4700                | 50   | <b>478TTA050M</b> | 0.705                                  | 2510                                                         | 22x51            |
| 4700                | 63   | <b>478TTA063M</b> | 0.0635                                 | 3080                                                         | 25x60            |
| 6800                | 16   | <b>688TTA016M</b> | 0.078                                  | 2310                                                         | 16x41            |

| Capacitance<br>(μF) | WVDC | IC PART NUMBER    | Maximum<br>ESR (Ω)<br>120 Hz,<br>+20°C | Maximum<br>RMS Ripple<br>Current<br>(mA)<br>120 Hz,<br>+85°C | Dims DxL<br>(mm) |
|---------------------|------|-------------------|----------------------------------------|--------------------------------------------------------------|------------------|
| 6800                | 25   | <b>688TTA025M</b> | 0.0683                                 | 2480                                                         | 18x41            |
| 6800                | 35   | <b>688TTA035M</b> | 0.0634                                 | 2760                                                         | 22x51            |
| 10000               | 10   | <b>109TTA010M</b> | 0.063                                  | 2350                                                         | 18x41            |
| 10000               | 16   | <b>109TTA016M</b> | 0.063                                  | 2520                                                         | 18x41            |
| 10000               | 25   | <b>109TTA025M</b> | 0.063                                  | 3240                                                         | 22x51            |
| 10000               | 35   | <b>109TTA035M</b> | 0.0531                                 | 3500                                                         | 25x51            |
| 15000               | 16   | <b>159TTA016M</b> | 0.0531                                 | 3310                                                         | 22x51            |
| 15000               | 25   | <b>159TTA025M</b> | 0.0486                                 | 3700                                                         | 25x51            |
| 22000               | 16   | <b>229TTA016M</b> | 0.0467                                 | 3600                                                         | 22x51            |