



### FEATURES

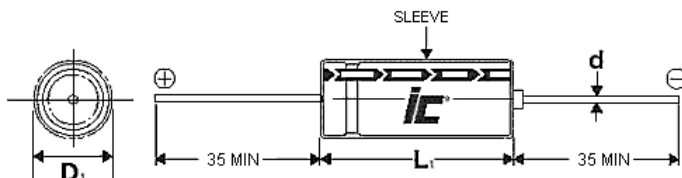
Extended Life - High Voltage

### APPLICATIONS

Filtering - Bypass - Coupling - Blocking

|   |                       |  |                                  |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|---|-----------------------|--|----------------------------------|-----|------|------|------|------|------------------------|-------------------------|------|------------------------|-----|-----|-----|--|
| <b>Operating Temperature Range</b>                        |                       | <b>-40°C to +105°C (6.3 to 100VDC)</b><br><b>-25°C to +105°C (160 to 450VDC)</b> |                                  |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
| <b>Capacitance Tolerance</b>                              |                       | <b>±20% at 120 Hz, 20°C</b>  |                                  |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
| <b>Surge voltage</b>                                      | <b>WVDC</b>           | 6.3  | 10                               | 16  | 25   | 35   | 50   | 63   | 100                    | 160                     | 200  | 250                    | 350 | 400 | 450 |  |
|   | <b>SVDC</b>           | 7.9  | 13                               | 20  | 32   | 44   | 63   | 79   | 125                    | 200                     | 250  | 300                    | 400 | 450 | 500 |  |
| <b>Dissipation Factor</b>                                 | <b>WVDC</b>           | 6.3  | 10                               | 16  | 25   | 35   | 50   | 63   | 100                    | 160                     | 200  | 250                    | 350 | 400 | 450 |  |
|   | <b>Tan δ</b>          | .28  | .24                              | .2  | .16  | .14  | .12  | .1   | .1                     | .2                      | .2   | .2                     | .2  | .25 | .25 |  |
|   |                       | Add .02 for every 1000uF above 1000uF  |                                  |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
| <b>Leakage current</b>                                    |                       | <b>6.3 to 100 WVDC</b>   |                                  |     |      |      |      |      | <b>160 to 450 WVDC</b> |                         |      |                        |     |     |     |  |
|   |                       | <b>1 Minutes</b>   |                                  |     |      |      |      |      | <b>1 Minute</b>        |                         |      | <b>1 Minute</b>        |     |     |     |  |
|   |                       | .03CV or 4uA,<br>Whichever is greater  |                                  |     |      |      |      |      | CV≤1000<br>.01CV+40uA  |                         |      | CV>1000<br>.04CV+100uA |     |     |     |  |
| <b>Low temperature stability Impedance ratio (120 Hz)</b> | <b>WVDC</b>           | 6.3  | 10                               | 16  | 25   | 35   | 50   | 63   | 100                    | 160                     | 200  | 250                    | 350 | 400 | 450 |  |
|   | <b>-25°C to +20°C</b> | 5  | 4                                | 3   | 2    | 2    | 2    | 2    | 2                      | 4                       | 4    | 4                      | 4   | 4   | 6   |  |
|   | <b>-40°C to +20°C</b> | 12   | 10                               | 8   | 6    | 5    | 4    | 4    | 4                      | 15                      | 15   | 15                     | 10  | 10  | -   |  |
| <b>Load Life</b>  |                       | <b>2000 hours at 105°C with rated WVDC and ripple current applied</b>            |                                  |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|   |                       | <b>Capacitance change</b>  | ≤20% of initial measured value   |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|   |                       | <b>Dissipation factor</b>  | ≤200% of maximum specified value |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|   |                       | <b>Leakage current</b>   | ≥100% of maximum specified value |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
| <b>Shelf Life</b>   |                       | <b>1000 hours at 105°C with no voltage applied</b>                               |                                  |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|   |                       | <b>Capacitance change</b>  | ≤20% initial measured value      |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|   |                       | <b>Dissipation factor</b>  | ≤200% of maximum specified value |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
|   |                       | <b>Leakage current</b>   | ≥100% of maximum specified value |     |      |      |      |      |                        |                         |      |                        |     |     |     |  |
| <b>Ripple Current Multipliers</b>                         |                       | <b>Capacitance</b>   | <b>Frequency (Hz)</b>            |     |      |      |      |      |                        | <b>Temperature (°C)</b> |      |                        |     |     |     |  |
|   |                       | <b>µF</b>  | 50                               | 120 | 400  | 1k   | 10k  | 50k  | +105                   | +85                     | +70  |                        |     |     |     |  |
|   |                       | <b>C&lt;47</b>   | .75                              | 1.0 | 1.35 | 1.57 | 2.0  | 2.0  | 1.0                    | 1.4                     | 1.62 |                        |     |     |     |  |
|   |                       | <b>47&lt;C≤470</b>   | .8                               | 1.0 | 1.23 | 1.34 | 1.5  | 1.5  | 1.0                    | 1.4                     | 1.62 |                        |     |     |     |  |
|   |                       | <b>C&gt;470</b>  | .85                              | 1.0 | 1.1  | 1.13 | 1.15 | 1.15 | 1.0                    | 1.4                     | 1.62 |                        |     |     |     |  |

### Special Order Options



|   |     |     |     |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| D | 5   | 6.3 | 8   | 10  | 13  | 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.

D > 10mm, L<sub>1</sub> = L + 2mm Max.

D<sub>1</sub> = D + B Max.

mm

# TMA

+105°C, Extended Life, 2000 hours

| WVDC | Capacitance (µF) | IC PART NUMBER | Maximum ESR (Ω) 120 Hz, +20°C | Maximum RMS Ripple Current (mA) 120 Hz, +105°C | Dims DxDL (mm) |
|------|------------------|----------------|-------------------------------|--|----------------|
| 6.3  | 100              | 107TMA6R3M     | 4.642                         | 89   | 6.3x13         |
| 6.3  | 3300             | 338TMA6R3M     | 0.171                         | 860  | 13x26          |
| 6.3  | 4700             | 478TMA6R3M     | 0.127                         | 1060   | 13x31          |
| 6.3  | 10000            | 109TMA6R3M     | 0.076                         | 1620   | 16x41          |
| 6.3  | 15000            | 159TMA6R3M     | 0.062                         | 1740   | 18x41          |
| 6.3  | 22000            | 229TMA6R3M     | 0.054                         | 2000   | 22x41          |
| 10   | 47               | 476TMA010M     | 8.466                         | 57   | 5x13           |
| 10   | 220              | 227TMA010M     | 1.809                         | 115  | 6.3x16         |
| 10   | 470              | 477TMA010M     | 0.847                         | 250  | 8x16           |
| 10   | 1000             | 108TMA010M     | 0.398                         | 460  | 10x21          |
| 10   | 2200             | 228TMA010M     | 0.211                         | 780  | 13x26          |
| 10   | 3300             | 338TMA010M     | 0.151                         | 980  | 13x31          |
| 10   | 4700             | 478TMA010M     | 0.113                         | 1220   | 16x31          |
| 10   | 6800             | 688TMA010M     | 0.0878                        | 1370   | 16x31          |
| 10   | 10000            | 109TMA010M     | 0.0696                        | 1690   | 18x41          |
| 10   | 15000            | 159TMA010M     | 0.0575                        | 1950   | 22x41          |
| 10   | 22000            | 229TMA010M     | 0.053                         | 2080   | 22x51          |
| 16   | 33               | 336TMA016M     | 10.048                        | 54   | 5x13           |
| 16   | 47               | 476TMA016M     | 7.055                         | 71   | 6.3x13         |
| 16   | 330              | 337TMA016M     | 1.005                         | 230  | 8x16           |
| 16   | 470              | 477TMA016M     | 0.706                         | 310  | 8x20           |
| 16   | 1000             | 108TMA016M     | 0.332                         | 550  | 10x26          |
| 16   | 2200             | 228TMA016M     | 0.181                         | 910  | 13x31          |
| 16   | 3300             | 338TMA016M     | 0.131                         | 1140   | 16x31          |
| 16   | 4700             | 478TMA016M     | 0.099                         | 1300   | 16x31          |
| 16   | 6800             | 688TMA016M     | 0.078                         | 1620   | 16x41          |
| 16   | 10000            | 109TMA016M     | 0.063                         | 1900   | 22x41          |
| 16   | 15000            | 159TMA016M     | 0.053                         | 2050   | 22x51          |
| 25   | 22               | 226TMA025M     | 12.057                        | 48   | 5x13           |
| 25   | 33               | 336TMA025M     | 8.038                         | 64   | 6.3x13         |
| 25   | 100              | 107TMA025M     | 2.653                         | 120  | 6.3x16         |
| 25   | 220              | 227TMA025M     | 1.206                         | 200  | 8x16           |
| 25   | 330              | 337TMA025M     | 0.804                         | 270  | 8x20           |
| 25   | 470              | 477TMA025M     | 0.564                         | 370  | 10x21          |
| 25   | 1000             | 108TMA025M     | 0.265                         | 640  | 13x26          |
| 25   | 2200             | 228TMA025M     | 0.151                         | 1040   | 16x31          |
| 25   | 3300             | 338TMA025M     | 0.111                         | 1200   | 16x31          |
| 25   | 4700             | 478TMA025M     | 0.085                         | 1540   | 18x41          |
| 25   | 6800             | 688TMA025M     | 0.0683                        | 1810   | 22x41          |
| 25   | 10000            | 109TMA025M     | 0.0729                        | 1980   | 22x51          |
| 35   | 10               | 106TMA035M     | 23.21                         | 33   | 5x13           |
| 35   | 22               | 226TMA035M     | 10.55                         | 57   | 6.3x13         |
| 35   | 220              | 227TMA035M     | 1.055                         | 240  | 8x20           |
| 35   | 330              | 337TMA035M     | 0.703                         | 330  | 10x21          |
| 35   | 470              | 477TMA035M     | 0.494                         | 430  | 10x26          |
| 35   | 1000             | 108TMA035M     | 0.232                         | 750  | 13x31          |
| 35   | 2200             | 228TMA035M     | 0.136                         | 1120   | 16x31          |
| 35   | 3300             | 338TMA035M     | 0.101                         | 1430   | 16x41          |
| 35   | 4700             | 478TMA035M     | 0.078                         | 1740   | 22x41          |
| 35   | 6800             | 688TMA035M     | 0.0634                        | 1910   | 22x51          |
| 50   | 1                | 105TMA050M     | 198.944                       | 10   | 5x13           |
| 50   | 2.2              | 225TMA050M     | 90.428                        | 18   | 5x13           |
| 50   | 3.3              | 335TMA050M     | 60.286                        | 22   | 5x13           |
| 50   | 10               | 106TMA050M     | 19.894                        | 41   | 5x13           |
| 50   | 47               | 476TMA050M     | 4.233                         | 100  | 6.3x16         |
| 50   | 100              | 107TMA050M     | 1.989                         | 155  | 8x16           |
| 50   | 220              | 227TMA050M     | 0.904                         | 290  | 10x21          |
| 50   | 330              | 337TMA050M     | 0.603                         | 400  | 10x26          |

| WVDC | Capacitance (µF) | IC PART NUMBER | Maximum ESR (Ω) 120 Hz, +20°C | Maximum RMS Ripple Current (mA) 120 Hz, +105°C | Dims DxDL (mm) |
|------|------------------|----------------|-------------------------------|--|----------------|
| 50   | 470              | 477TMA050M     | 0.423                         | 530  | 13x26          |
| 50   | 1000             | 108TMA050M     | 0.199                         | 890  | 16x31          |
| 50   | 2200             | 228TMA050M     | 0.121                         | 1360   | 18x41          |
| 50   | 3300             | 338TMA050M     | 0.0904                        | 1660   | 22x41          |
| 50   | 4700             | 478TMA050M     | 0.071                         | 1860   | 22x51          |
| 63   | 4.7              | 475TMA063M     | 35.274                        | 32   | 5x13           |
| 63   | 10               | 106TMA063M     | 16.579                        | 44   | 6.3x13         |
| 63   | 22               | 226TMA063M     | 7.536                         | 73   | 6.3x16         |
| 63   | 33               | 336TMA063M     | 5.024                         | 89   | 6.3x16         |
| 63   | 47               | 476TMA063M     | 3.527                         | 115  | 8x16           |
| 63   | 100              | 107TMA063M     | 1.658                         | 185  | 8x20           |
| 63   | 220              | 227TMA063M     | 0.754                         | 340  | 10x26          |
| 63   | 330              | 337TMA063M     | 0.504                         | 460  | 13x26          |
| 63   | 470              | 477TMA063M     | 0.353                         | 590  | 13x31          |
| 63   | 1000             | 108TMA063M     | 0.166                         | 940  | 16x31          |
| 63   | 2200             | 228TMA063M     | 0.106                         | 1740   | 22x41          |
| 63   | 3300             | 338TMA063M     | 0.0804                        | 1740   | 22x51          |
| 100  | 0.47             | 474TMA100M     | 317.463                       | 10   | 5x13           |
| 100  | 1                | 105TMA100M     | 149.208                       | 14   | 5x13           |
| 100  | 2.2              | 225TMA100M     | 67.822                        | 19   | 5x13           |
| 100  | 3.3              | 335TMA100M     | 45.215                        | 27   | 6.3x13         |
| 100  | 4.7              | 475TMA100M     | 31.746                        | 32   | 6.3x13         |
| 100  | 10               | 106TMA100M     | 14.921                        | 52   | 6.3x16         |
| 100  | 22               | 226TMA100M     | 6.782                         | 85   | 8x16           |
| 100  | 33               | 336TMA100M     | 4.522                         | 115  | 8x20           |
| 100  | 47               | 476TMA100M     | 3.175                         | 135  | 8x20           |
| 100  | 100              | 107TMA100M     | 1.492                         | 240  | 10x26          |
| 100  | 220              | 227TMA100M     | 0.678                         | 430  | 13x31          |
| 100  | 330              | 337TMA100M     | 0.452                         | 570  | 16x31          |
| 100  | 470              | 477TMA100M     | 0.318                         | 770  | 16x41          |
| 100  | 1000             | 108TMA100M     | 0.149                         | 1210   | 22x41          |
| 160  | 10               | 106TMA160M     | 33.157                        | 43   | 8x20           |
| 160  | 22               | 226TMA160M     | 15.071                        | 85   | 10x26          |
| 160  | 33               | 336TMA160M     | 10.048                        | 120  | 13x26          |
| 160  | 47               | 476TMA160M     | 7.055                         | 155  | 13x31          |
| 160  | 100              | 107TMA160M     | 3.316                         | 300  | 16x41          |
| 160  | 220              | 227TMA160M     | 1.507                         | 510  | 22x41          |
| 200  | 1                | 105TMA200M     | 331.573                       | 9  | 6.3x13         |
| 200  | 2.2              | 225TMA200M     | 150.715                       | 17   | 6.3x16         |
| 200  | 4.7              | 475TMA200M     | 70.547                        | 28   | 8x16           |
| 200  | 10               | 106TMA200M     | 33.157                        | 50   | 10x21          |
| 200  | 33               | 336TMA200M     | 10.048                        | 135  | 13x26          |
| 200  | 47               | 476TMA200M     | 7.055                         | 155  | 13x31          |
| 200  | 100              | 107TMA200M     | 3.316                         | 300  | 16x41          |
| 200  | 220              | 227TMA200M     | 1.507                         | 510  | 22x41          |
| 250  | 3.3              | 335TMA250M     | 100.477                       | 24   | 8x16           |
| 250  | 4.7              | 475TMA250M     | 70.547                        | 32   | 8x20           |
| 250  | 10               | 106TMA250M     | 33.157                        | 50   | 10x21          |
| 250  | 22               | 226TMA250M     | 15.071                        | 100  | 13x26          |
| 250  | 33               | 336TMA250M     | 10.048                        | 135  | 13x26          |
| 250  | 47               | 476TMA250M     | 7.055                         | 175  | 16x31          |
| 250  | 100              | 107TMA250M     | 3.316                         | 300  | 16x41          |
| 250  | 220              | 227TMA250M     | 1.507                         | 550  | 22x51          |
| 350  | 1                | 105TMA350M     | 331.573                       | 10   | 6.3x16         |
| 350  | 2.2              | 225TMA350M     | 150.715                       | 17   | 8x16           |
| 350  | 3.3              | 335TMA350M     | 100.477                       | 24   | 8x20           |
| 350  | 4.7              | 475TMA350M     | 70.547                        | 33   | 10x20          |
| 350  | 10               | 106TMA350M     | 33.157                        | 60   | 13x26          |

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# TMA

+105°C, Extended Life, 2000 hours

| WVDC | Capacitance (µF) | IC PART NUMBER | Maximum ESR (Ω) 120 Hz, +20°C | Maximum RMS Ripple Current (mA) 120 Hz, +105°C | Dims DxL (mm) |
|------|------------------|----------------|-------------------------------|--|---------------|
| 350  | 22               | 226TMA350M     | 15.071                        | 110  | 16x31         |
| 350  | 33               | 336TMA350M     | 10.048                        | 150  | 16x31         |
| 350  | 47               | 476TMA350M     | 7.055                         | 185  | 16x41         |
| 350  | 100              | 107TMA350M     | 3.316                         | 310  | 22x41         |
| 400  | 1                | 105TMA400M     | 414.466                       | 12   | 8x16          |
| 400  | 2.2              | 225TMA400M     | 188.394                       | 19   | 8x20          |
| 400  | 3.3              | 335TMA400M     | 125.596                       | 27   | 10x21         |
| 400  | 4.7              | 475TMA400M     | 88.184                        | 33   | 10x20         |
| 400  | 10               | 106TMA400M     | 41.447                        | 60   | 13x26         |
| 400  | 22               | 226TMA400M     | 18.839                        | 110  | 16x31         |
| 400  | 33               | 336TMA400M     | 12.56                         | 155  | 16x41         |

| WVDC | Capacitance (µF) | IC PART NUMBER | Maximum ESR (Ω) 120 Hz, +20°C | Maximum RMS Ripple Current (mA) 120 Hz, +105°C | Dims DxL (mm) |
|------|------------------|----------------|-------------------------------|--|---------------|
| 400  | 47               | 476TMA400M     | 8.818                         | 200  | 18x41         |
| 400  | 100              | 107TMA400M     | 4.145                         | 330  | 22x51         |
| 450  | 1                | 105TMA450M     | 414.466                       | 12   | 8x20          |
| 450  | 2.2              | 225TMA450M     | 199.394                       | 22   | 10x20         |
| 450  | 3.3              | 335TMA450M     | 125.596                       | 27   | 10x21         |
| 450  | 4.7              | 475TMA450M     | 88.184                        | 36   | 10x25         |
| 450  | 10               | 106TMA450M     | 41.447                        | 67   | 13x30         |
| 450  | 22               | 226TMA450M     | 18.839                        | 130  | 16x40         |
| 450  | 33               | 336TMA450M     | 12.56                         | 160  | 18x40         |
| 450  | 47               | 476TMA450M     | 8.818                         | 220  | 22x40         |

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