

**VR** Miniature Sized series



Anti-Solvent Feature (Through 100V only)

- One rank smaller case sizes than VX series.
- Compliant to the RoHS directive (2002/95/EC).



## Specifications

| Item                          | Performance Characteristics  |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
|-------------------------------|--|--|--|-------------|---|---|---|------|---|--|------------|------------|--------------|------|------|-----------------|-----------------|------|------|------|------|------|------|---|---|---|---|---|----|-----------------|----|----|---|---|---|---|---|---|---|---|----|---|
| Category Temperature Range    | -40 to +85°C (6.3V to 400V), -25 to +85°C (450V)   |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Rated Voltage Range           | 6.3 to 450V  |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Rated Capacitance Range       | 0.1 to 33000μF   |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Capacitance Tolerance         | ±20% at 120Hz, 20°C  |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Leakage Current               | <table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3 to 100V</th> <th>160 to 450V</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td>After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater.</td> <td>After 1 minute's application of rated voltage, CV ≤ 1000 : I = 0.1CV+40μA or less</td> </tr> <tr> <td></td> <td>After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.</td> <td>After 1 minute's application of rated voltage, CV &gt; 1000 : I = 0.04CV+100 (μA) or less</td> </tr> </tbody> </table>                 | Rated voltage (V)  | 6.3 to 100V                                  | 160 to 450V | _____   | After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater. | After 1 minute's application of rated voltage, CV ≤ 1000 : I = 0.1CV+40μA or less |      | After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater. | After 1 minute's application of rated voltage, CV > 1000 : I = 0.04CV+100 (μA) or less |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
|                               | Rated voltage (V)  | 6.3 to 100V  | 160 to 450V                                  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| _____                         | After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater.  | After 1 minute's application of rated voltage, CV ≤ 1000 : I = 0.1CV+40μA or less      |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
|                               | After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater.  | After 1 minute's application of rated voltage, CV > 1000 : I = 0.04CV+100 (μA) or less |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Tangent of loss angle (tan δ) | For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120Hz at 20°C<br><table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160 to 315</th> <th>350 to 450</th> </tr> </thead> <tbody> <tr> <td>tan δ (MAX.)</td> <td>0.28</td> <td>0.24</td> <td>0.20</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.08</td> <td>0.20</td> <td>0.25</td> </tr> </tbody> </table>  | Rated voltage (V)  | 6.3  | 10          | 16  | 25  | 35  | 50   | 63  | 100  | 160 to 315 | 350 to 450 | tan δ (MAX.) | 0.28 | 0.24 | 0.20            | 0.16            | 0.14 | 0.12 | 0.10 | 0.08 | 0.20 | 0.25 |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Rated voltage (V)             | 6.3  | 10   | 16   | 25          | 35  | 50  | 63  | 100  | 160 to 315  | 350 to 450   |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| tan δ (MAX.)                  | 0.28   | 0.24   | 0.20   | 0.16        | 0.14  | 0.12  | 0.10  | 0.08 | 0.20  | 0.25   |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Stability at Low Temperature  | <table border="1"> <thead> <tr> <th colspan="2">Rated voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160 to 200</th> <th>250 to 350</th> <th>400</th> <th>450</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Impedance ratio</td> <td>Z-25°C / Z+20°C</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>3</td> <td>4</td> <td>6</td> <td>15</td> </tr> <tr> <td>ZT / Z20 (MAX.)</td> <td>12</td> <td>10</td> <td>8</td> <td>5</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>4</td> <td>8</td> <td>10</td> <td>—</td> </tr> </tbody> </table> | Rated voltage (V)  |  | 6.3         | 10  | 16  | 25  | 35   | 50  | 63   | 100        | 160 to 200 | 250 to 350   | 400  | 450  | Impedance ratio | Z-25°C / Z+20°C | 5    | 4    | 3    | 2    | 2    | 2    | 2 | 2 | 3 | 4 | 6 | 15 | ZT / Z20 (MAX.) | 12 | 10 | 8 | 5 | 4 | 3 | 3 | 3 | 4 | 8 | 10 | — |
| Rated voltage (V)             |  | 6.3  | 10   | 16          | 25  | 35  | 50  | 63   | 100   | 160 to 200   | 250 to 350 | 400        | 450          |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Impedance ratio               | Z-25°C / Z+20°C  | 5  | 4  | 3           | 2   | 2   | 2   | 2    | 2   | 3  | 4          | 6          | 15           |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
|                               | ZT / Z20 (MAX.)  | 12   | 10   | 8           | 5   | 4   | 3   | 3    | 3   | 4  | 8          | 10         | —            |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Endurance                     | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C. <table border="1"> <tbody> <tr> <td>Capacitance change</td> <td>Within ±20% of the initial capacitance value</td> </tr> <tr> <td>tan δ</td> <td>200% or less than the initial specified value</td> </tr> <tr> <td>Leakage current</td> <td>Less than or equal to the initial specified value</td> </tr> </tbody> </table>  | Capacitance change   | Within ±20% of the initial capacitance value | tan δ       | 200% or less than the initial specified value | Leakage current   | Less than or equal to the initial specified value                                 |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Capacitance change            | Within ±20% of the initial capacitance value   |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| tan δ                         | 200% or less than the initial specified value  |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Leakage current               | Less than or equal to the initial specified value  |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Shelf Life                    | After storing the capacitors under no load at 85°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above.   |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |
| Marking                       | Printed with white color letter on black sleeve.   |  |  |             |   |   |   |      |   |  |            |            |              |      |      |                 |                 |      |      |      |      |      |      |   |   |   |   |   |    |                 |    |    |   |   |   |   |   |   |   |   |    |   |

## Radial Lead Type



|    | (mm) |     |     |     |     |      |     |     |      |      |      |
|----|------|-----|-----|-----|-----|------|-----|-----|------|------|------|
| φD | 4    | 5   | 6.3 | 8   | 10  | 12.5 | 16  | 18  | 20   | 22   | 25   |
| P  | 1.5  | 2.0 | 2.5 | 3.5 | 5.0 | 5.0  | 7.5 | 7.5 | 10.0 | 10.0 | 12.5 |
| φd | 0.45 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6  | 0.8 | 0.8 | 1.0  | 1.0  | 1.0  |
| β  | 0.5  | 0.5 | 0.5 | 0.5 | 0.5 | 0.5  | 0.5 | 0.5 | 0.5  | 1.0  | 1.0  |

|   |          |     |
|---|----------|-----|
| α | (L < 20) | 1.5 |
|   | (L ≥ 20) | 2.0 |

• Please refer to page 20 about the end seal configuration.

## Type numbering system (Example : 10V 330μF)



※ Configuration

| φ D        | Pb-free leadwire<br>Pb-free PET sleeve |
|------------|--|
| 4          | DD6                                    |
| 5          | DD                                     |
| 6.3        | ED                                     |
| 8 · 10     | PD                                     |
| 12.5 to 18 | HD                                     |
| 20 to 25   | RD                                     |

Please refer to page 20, 21, 22 about the formed or taped product spec.  
Please refer to page 4 for the minimum order quantity.

• Dimension table in next page.

## ■Dimensions

| Cap.(μF) | V<br>Code | 6.3       |      | 10        |      | 16        |      | 25        |      | 35        |      | 50        |      | 63        |      | 100                       |                 |
|----------|-----------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|---------------------------|-----------------|
|          |           | 0J        |      | 1A        |      | 1C        |      | 1E        |      | 1V        |      | 1H        |      | 1J        |      | 2A                        |                 |
| 0.1      | 0R1       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 1.3  |           |      | 5 × 11                    | 2.1             |
| 0.22     | R22       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 2.9  |           |      | 5 × 11                    | 4.7             |
| 0.33     | R33       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 4.3  |           |      | 5 × 11                    | 7               |
| 0.47     | R47       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 6.2  |           |      | 5 × 11                    | 10              |
| 1        | 010       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 17   |           |      | 5 × 11                    | 21              |
| 2.2      | 2R2       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 28   |           |      | 5 × 11                    | 30              |
| 3.3      | 3R3       |           |      |           |      |           |      |           |      |           |      | • 5 × 11  | 35   |           |      | 5 × 11                    | 40              |
| 4.7      | 4R7       |           |      |           |      |           |      | • 5 × 11  | 35   | • 5 × 11  | 40   | • 5 × 11  | 40   |           |      | 5 × 11                    | 45              |
| 10       | 100       |           |      |           |      | • 5 × 11  | 50   | • 5 × 11  | 55   | • 5 × 11  | 60   | • 5 × 11  | 60   | 5 × 11    | 65   | 6.3 × 11                  | 75              |
| 22       | 220       | • 5 × 11  | 65   | • 5 × 11  | 65   | • 5 × 11  | 75   | • 5 × 11  | 80   | • 5 × 11  | 90   | 5 × 11    | 95   | 5 × 11    | 100  | 6.3 × 11                  | 130             |
| 33       | 330       | • 5 × 11  | 80   | • 5 × 11  | 85   | • 5 × 11  | 90   | • 5 × 11  | 95   | 5 × 11    | 105  | 5 × 11    | 125  | 6.3 × 11  | 140  | 8 × 11.5                  | 180             |
| 47       | 470       | • 5 × 11  | 95   | • 5 × 11  | 100  | • 5 × 11  | 110  | • 5 × 11  | 115  | 5 × 11    | 130  | 6.3 × 11  | 155  | 6.3 × 11  | 170  | 10 × 12.5                 | 230             |
| 100      | 101       | • 5 × 11  | 135  | • 5 × 11  | 145  | 5 × 11    | 160  | 6.3 × 11  | 190  | 6.3 × 11  | 210  | 8 × 11.5  | 260  | 10 × 12.5 | 300  | 10 × 20                   | 370             |
| 220      | 221       | 5 × 11    | 200  | 6.3 × 11  | 240  | 6.3 × 11  | 260  | 8 × 11.5  | 330  | 10 × 12.5 | 385  | 10 × 12.5 | 430  | 10 × 16   | 490  | 12.5 × 25                 | 620             |
| 330      | 331       | 6.3 × 11  | 270  | 6.3 × 11  | 290  | 8 × 11.5  | 370  | 10 × 12.5 | 440  | 10 × 12.5 | 490  | 10 × 16   | 590  | 10 × 20   | 710  | 12.5 × 25                 | 760             |
| 470      | 471       | 6.3 × 11  | 320  | 6.3 × 11  | 350  | 8 × 11.5  | 440  | 10 × 12.5 | 550  | 10 × 16   | 650  | 12.5 × 20 | 760  | 12.5 × 20 | 900  | 16 × 25                   | 1000            |
| 1000     | 102       | 8 × 11.5  | 540  | 10 × 12.5 | 650  | 10 × 16   | 790  | 10 × 20   | 960  | 12.5 × 20 | 1150 | 12.5 × 25 | 1350 | 16 × 25   | 1300 | 18 × 40                   | 1380            |
| 2200     | 222       | 10 × 20   | 1000 | 10 × 20   | 1100 | 12.5 × 20 | 1300 | 12.5 × 25 | 1550 | 16 × 25   | 1800 | 16 × 35.5 | 2100 | 18 × 35.5 | 2300 | 22 × 50                   | 2400            |
| 3300     | 332       | 10 × 20   | 1190 | 12.5 × 20 | 1450 | 12.5 × 25 | 1700 | 16 × 25   | 1980 | 16 × 35.5 | 2280 | 18 × 35.5 | 2500 | 20 × 40   | 2700 | 25 × 50                   | 2900            |
| 4700     | 472       | 12.5 × 20 | 1550 | 12.5 × 25 | 1800 | 16 × 25   | 2100 | 16 × 31.5 | 2450 | 18 × 35.5 | 2700 | 20 × 40   | 2900 | 22 × 50   | 3400 |                           |                 |
| 6800     | 682       | 12.5 × 25 | 1920 | 16 × 25   | 2250 | 16 × 35.5 | 2650 | 18 × 35.5 | 2900 | 20 × 40   | 3000 | 22 × 50   | 3500 | 25 × 50   | 3900 |                           |                 |
| 10000    | 103       | 16 × 25   | 2350 | 16 × 35.5 | 2700 | 18 × 35.5 | 2950 | 20 × 40   | 3000 | 22 × 50   | 3700 | 25 × 50   | 4000 |           |      |                           |                 |
| 15000    | 153       | 16 × 35.5 | 2850 | 18 × 35.5 | 3100 | 20 × 40   | 3400 | 22 × 50   | 3800 | 25 × 50   | 4300 |           |      |           |      |                           |                 |
| 22000    | 223       | 18 × 40   | 3350 | 20 × 40   | 3700 | 22 × 50   | 4200 | 25 × 50   | 4500 |           |      |           |      |           |      |                           |                 |
| 33000    | 333       | 22 × 50   | 3900 | 22 × 50   | 4500 | 25 × 50   | 4800 |           |      |           |      |           |      |           |      | Case size<br>φ D × L (mm) | Rated<br>ripple |

| Cap.(μF) | V<br>Code | 160       |      | 200       |      | 250       |      | 315       |      | 350       |      | 400       |     | 450       |                           |                 |
|----------|-----------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|-----|-----------|---------------------------|-----------------|
|          |           | 2C        |      | 2D        |      | 2E        |      | 2F        |      | 2V        |      | 2G        |     | 2W        |                           |                 |
| 0.47     | R47       | 6.3 × 11  | 15   | 6.3 × 11  | 15   | 6.3 × 11  | 15   |           |      |           |      |           |     |           |                           |                 |
| 1        | 010       | 6.3 × 11  | 22   | 6.3 × 11  | 22   | 6.3 × 11  | 22   | 6.3 × 11  | 22   | 6.3 × 11  | 22   | 8 × 11.5  | 25  | 8 × 11.5  | 23                        |                 |
| 2.2      | 2R2       | 6.3 × 11  | 33   | 6.3 × 11  | 33   | 6.3 × 11  | 33   | 8 × 11.5  | 33   | 8 × 11.5  | 38   | 10 × 12.5 | 45  | 10 × 12.5 | 35                        |                 |
| 3.3      | 3R3       | 6.3 × 11  | 40   | 6.3 × 11  | 40   | 8 × 11.5  | 46   | 10 × 12.5 | 55   | 10 × 12.5 | 55   | 10 × 12.5 | 55  | 10 × 16   | 45                        |                 |
| 4.7      | 4R7       | 6.3 × 11  | 50   | 8 × 11.5  | 55   | 8 × 11.5  | 55   | 10 × 12.5 | 65   | 10 × 12.5 | 65   | 10 × 16   | 70  | 10 × 20   | 55                        |                 |
| 10       | 100       | 8 × 11.5  | 80   | 10 × 12.5 | 95   | 10 × 16   | 105  | 10 × 20   | 115  | 10 × 20   | 115  | 12.5 × 20 | 130 | 12.5 × 20 | 90                        |                 |
| 22       | 220       | 10 × 16   | 155  | 10 × 20   | 170  | 12.5 × 20 | 190  | 12.5 × 20 | 190  | 12.5 × 25 | 200  | 16 × 25   | 240 | 16 × 25   | 165                       |                 |
| 33       | 330       | 10 × 20   | 205  | 12.5 × 20 | 230  | 12.5 × 20 | 230  | 16 × 25   | 275  | 16 × 25   | 275  | 16 × 31.5 | 300 | 16 × 35.5 | 230                       |                 |
| 47       | 470       | 12.5 × 20 | 270  | 12.5 × 20 | 270  | 12.5 × 25 | 300  | 16 × 25   | 340  | 16 × 35.5 | 380  | 16 × 35.5 | 370 | 18 × 40   | 300                       |                 |
| 100      | 101       | 12.5 × 25 | 430  | 16 × 31.5 | 530  | 16 × 31.5 | 520  | 18 × 35.5 | 560  | 18 × 40   | 590  | 20 × 40   | 550 | 22 × 40   | 350                       |                 |
| 220      | 221       | 16 × 35.5 | 800  | 18 × 35.5 | 810  | 20 × 40   | 740  | 22 × 50   | 850  | 22 × 50   | 850  | 25 × 50   | 750 |           |                           |                 |
| 330      | 331       | 18 × 40   | 940  | 20 × 40   | 1130 | 22 × 50   | 1170 | 25 × 50   | 1250 | 25 × 50   | 1250 |           |     |           |                           |                 |
| 470      | 471       | 22 × 40   | 1410 | 22 × 50   | 1490 | 25 × 50   | 1600 |           |      |           |      |           |     |           |                           |                 |
| 1000     | 102       | 25 × 50   | 1900 |           |      |           |      |           |      |           |      |           |     |           | Case size<br>φ D × L (mm) | Rated<br>ripple |

Size 4×11 is available for capacitors marked \*•

In this case, [6] will be put at 12th digit of type numbering system \*▲

Rated ripple current (mA rms) at 85°C 120Hz

## ●Frequency coefficient of rated ripple current

| V          | Cap.(μF)      | Frequency |       |       |       |               |
|------------|---------------|-----------|-------|-------|-------|---------------|
|            |               | 50Hz      | 120Hz | 300Hz | 1 kHz | 10kHz or more |
| 6.3 to 100 | 0.1 to 47     | 0.75      | 1.00  | 1.35  | 1.57  | 2.00          |
|            | 100 to 470    | 0.80      | 1.00  | 1.23  | 1.34  | 1.50          |
|            | 1000 to 33000 | 0.85      | 1.00  | 1.10  | 1.13  | 1.15          |
| 160 to 450 | 0.47 to 220   | 0.80      | 1.00  | 1.25  | 1.40  | 1.60          |
|            | 330 to 1000   | 0.90      | 1.00  | 1.10  | 1.13  | 1.15          |

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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