

**CV** series Chip Type, High Voltage / Long Life



Upgrade

- High voltage (to 125V), Low ESR, High ripple current.
- Load life of 3000 hours at 105°C.
- SMD type : Lead free reflow soldering condition at 260°C peak correspondence.
- Compliant to the RoHS directive (2002/95/EC).

CX ← High Temperature CV



## Specifications

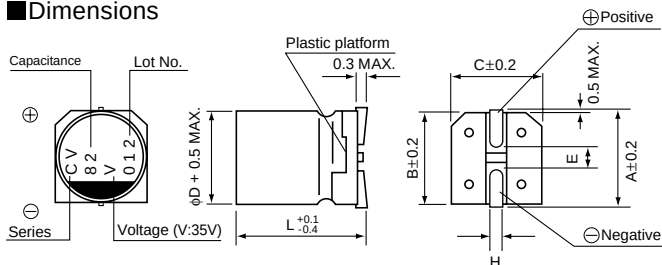
| Item                                              | Performance Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                                     |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------|
| Category Temperature Range                        | -55 to +105°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |                                                     |
| Rated Voltage Range                               | 16 to 125V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                                                     |
| Rated Capacitance Range                           | 5.6 to 680μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                                                     |
| Capacitance Tolerance                             | ±20% at 120Hz, 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                       |                                                     |
| Tangent of loss angle (tan δ)                     | Less than or equal to the specified value at 120Hz, 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                                                     |
| ESR (※ 1)                                         | Less than or equal to the specified value at 100kHz, 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |                                                     |
| Leakage Current (※ 2)                             | Less than or equal to the specified value . After 2 minutes' application of rated voltage at 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                       |                                                     |
| Temperature Characteristics (Max.Impedance Ratio) | Z+105°C / Z+20°C ≦ 1.25 (100kHz)<br>Z-55°C / Z+20°C ≦ 1.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                                                     |
| Endurance                                         | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 3000 hours at 105°C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Capacitance change    | Within ± 20% of the initial capacitance value (※ 3) |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | tan δ                 | 150% or less than the initial specified value       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ESR (※ 1)             | 150% or less than the initial specified value       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Leakage current (※ 2) | Less than or equal to the initial specified value   |
| Damp Heat (Steady State)                          | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 60°C, 90% RH.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Capacitance change    | Within ± 20% of the initial capacitance value (※ 3) |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | tan δ                 | 150% or less than the initial specified value       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ESR (※ 1)             | 150% or less than the initial specified value       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Leakage current (※ 2) | Less than or equal to the initial specified value   |
| Resistance to Soldering Heat                      | After soldering the capacitor under the soldering conditions prescribed here, the capacitor shall meet the specifications listed at right, provided that it's temperature profile is measured at the capacitor top and the terminal.<br>Pre-heating shall be done at 150 to 200°C and for 60 to 180 sec.<br>The duration for over +230°C temperature at capacitor surface shall not exceed 60 seconds.<br>In the case of peak temp, less than 250°C, reflow soldering shall be two times maximum.<br>In the case of peak temp, less than 260°C, reflow soldering shall be once.<br>Measurement for solder temperature profile shall be made at the capacitor top and the terminal. | Capacitance change    | Within ± 10% of the initial capacitance value (※ 3) |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | tan δ                 | 130% or less than the initial specified value       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ESR (※ 1)             | 130% or less than the initial specified value       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Leakage current (※ 2) | Less than or equal to the initial specified value   |
| Marking                                           | Navy blue print on the case top                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       |                                                     |

※ 1 ESR should be measured at both of the terminal ends closest where the terminals protrude through the plastic platform.

※ 2 Conditioning : If any doubt arises, measure the leakage current after the voltage treatment of applying DC rated voltage continuously to the capacitor for 120 minutes at 105°C.

※ 3 Initial value : The value before test of examination of resistance to soldering.

## Dimensions



## Type numbering system (Example : 35V 82μF)



|      | (mm)       |            |            |            |            |            |            |
|------|------------|------------|------------|------------|------------|------------|------------|
| Size | φ6.3×6L    | φ8×7L      | φ8×10L     | φ8×12L     | φ10×8L     | φ10×10L    | φ10×12.7L  |
| φD   | 6.3        | 8.0        | 8.0        | 8.0        | 10.0       | 10.0       | 10.0       |
| L    | 5.9        | 6.9        | 9.9        | 11.9       | 7.9        | 9.9        | 12.6       |
| A    | 7.3        | 9.0        | 9.0        | 9.0        | 11.0       | 11.0       | 11.0       |
| B    | 6.6        | 8.3        | 8.3        | 8.3        | 10.3       | 10.3       | 10.3       |
| C    | 6.6        | 8.3        | 8.3        | 8.3        | 10.3       | 10.3       | 10.3       |
| E    | 2.1        | 3.2        | 3.2        | 3.2        | 4.6        | 4.6        | 4.6        |
| H    | 0.5 to 0.8 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1 |

## Voltage

| V    | 16 | 20 | 25 | 35 | 50 | 63 | 80 | 100 | 125 |
|------|----|----|----|----|----|----|----|-----|-----|
| Code | C  | D  | E  | V  | H  | J  | K  | 2A  | 2B  |

## ■ Standard Ratings

| Rated Voltage<br>(V)(code) | Surge Voltage<br>(V) | Rated Capacitance<br>(μF) | Case Size<br>φD × L (mm) | tan δ | Leakage Current<br>(μA) | ESR (mΩ)<br>(at 100kHz 20°C) | Rated Ripple<br>(mA <sub>rms</sub> ) | Part Number    |
|----------------------------|----------------------|---------------------------|--------------------------|-------|-------------------------|------------------------------|--------------------------------------|----------------|
| 16<br>(1C)                 | 18.4                 | 56                        | 6.3×6                    | 0.12  | 179                     | 50                           | 1000                                 | PCV1C560MCL1GS |
|                            |                      | 82                        | △ 6.3×6                  | 0.12  | 262                     | 47                           | 1300                                 | PCV1C820MCL2GS |
|                            |                      | 100                       | 8×7                      | 0.12  | 320                     | 36                           | 1500                                 | PCV1C101MCL1GS |
|                            |                      | 150                       | △ 8×7                    | 0.12  | 480                     | 34                           | 1700                                 | PCV1C151MCL2GS |
|                            |                      | 220                       | ▲ 8×10                   | 0.12  | 704                     | 27                           | 2000                                 | PCV1C221MCL6GS |
|                            |                      | 220                       | 10×8                     | 0.12  | 704                     | 31                           | 2000                                 | PCV1C221MCL1GS |
|                            |                      | 270                       | □ 8×10                   | 0.12  | 864                     | 21                           | 3800                                 | PCV1C271MCL7GS |
|                            |                      | 270                       | 8×12                     | 0.12  | 864                     | 26                           | 2300                                 | PCV1C271MCL1GS |
|                            |                      | 270                       | △ 10×8                   | 0.12  | 864                     | 24                           | 3200                                 | PCV1C271MCL2GS |
|                            |                      | 330                       | 10×10                    | 0.12  | 1056                    | 26                           | 2400                                 | PCV1C331MCL1GS |
|                            |                      | 390                       | △ 8×12                   | 0.12  | 1248                    | 20                           | 4100                                 | PCV1C391MCL2GS |
|                            |                      | 470                       | △ 10×10                  | 0.12  | 1504                    | 21                           | 3900                                 | PCV1C471MCL2GS |
| 20<br>(1D)                 | 23.0                 | 470                       | 10×12.7                  | 0.12  | 1504                    | 25                           | 2800                                 | PCV1C471MCL1GS |
|                            |                      | 680                       | △ 10×12.7                | 0.12  | 2176                    | 19                           | 4400                                 | PCV1C681MCL2GS |
|                            |                      | 47                        | 6.3×6                    | 0.12  | 188                     | 55                           | 1000                                 | PCV1D470MCL1GS |
|                            |                      | 56                        | △ 6.3×6                  | 0.12  | 224                     | 48                           | 1300                                 | PCV1D560MCL2GS |
|                            |                      | 68                        | 8×7                      | 0.12  | 272                     | 45                           | 1300                                 | PCV1D680MCL1GS |
|                            |                      | 100                       | △ 8×7                    | 0.12  | 400                     | 42                           | 1400                                 | PCV1D101MCL2GS |
|                            |                      | 150                       | ▲ 8×10                   | 0.12  | 600                     | 28                           | 2000                                 | PCV1D151MCL6GS |
|                            |                      | 150                       | 10×8                     | 0.12  | 600                     | 33                           | 1900                                 | PCV1D151MCL1GS |
|                            |                      | 180                       | △ 10×8                   | 0.12  | 720                     | 25                           | 3100                                 | PCV1D181MCL2GS |
|                            |                      | 220                       | □ 8×10                   | 0.12  | 880                     | 22                           | 3700                                 | PCV1D221MCL7GS |
|                            |                      | 220                       | 8×12                     | 0.12  | 880                     | 27                           | 2300                                 | PCV1D221MCL1GS |
|                            |                      | 270                       | △ 8×12                   | 0.12  | 1080                    | 21                           | 4000                                 | PCV1D271MCL2GS |
| 25<br>(1E)                 | 28.7                 | 270                       | 10×10                    | 0.12  | 1080                    | 27                           | 2300                                 | PCV1D271MCL1GS |
|                            |                      | 330                       | △ 10×10                  | 0.12  | 1320                    | 22                           | 3800                                 | PCV1D331MCL2GS |
|                            |                      | 330                       | 10×12.7                  | 0.12  | 1320                    | 26                           | 2700                                 | PCV1D331MCL1GS |
|                            |                      | 470                       | △ 10×12.7                | 0.12  | 1880                    | 20                           | 4300                                 | PCV1D471MCL2GS |
|                            |                      | 33                        | 6.3×6                    | 0.12  | 165                     | 60                           | 1000                                 | PCV1E330MCL1GS |
|                            |                      | 47                        | △ 6.3×6                  | 0.12  | 235                     | 49                           | 1300                                 | PCV1E470MCL2GS |
|                            |                      | 56                        | 8×7                      | 0.12  | 280                     | 50                           | 1300                                 | PCV1E560MCL1GS |
|                            |                      | 82                        | △ 8×7                    | 0.12  | 410                     | 47                           | 1400                                 | PCV1E820MCL2GS |
|                            |                      | 120                       | ▲ 8×10                   | 0.12  | 600                     | 29                           | 1900                                 | PCV1E121MCL6GS |
|                            |                      | 120                       | 10×8                     | 0.12  | 600                     | 35                           | 1800                                 | PCV1E121MCL1GS |
|                            |                      | 150                       | □ 8×10                   | 0.12  | 750                     | 23                           | 3600                                 | PCV1E151MCL7GS |
|                            |                      | 150                       | 8×12                     | 0.12  | 750                     | 28                           | 2200                                 | PCV1E151MCL1GS |
| 35<br>(1V)                 | 40.2                 | 150                       | △ 10×8                   | 0.12  | 750                     | 26                           | 3000                                 | PCV1E151MCL2GS |
|                            |                      | 180                       | 10×10                    | 0.12  | 900                     | 28                           | 2300                                 | PCV1E181MCL1GS |
|                            |                      | 220                       | △ 8×12                   | 0.12  | 1100                    | 22                           | 3800                                 | PCV1E221MCL2GS |
|                            |                      | 270                       | △ 10×10                  | 0.12  | 1350                    | 23                           | 3700                                 | PCV1E271MCL2GS |
|                            |                      | 270                       | 10×12.7                  | 0.12  | 1350                    | 27                           | 2700                                 | PCV1E271MCL1GS |
|                            |                      | 390                       | △ 10×12.7                | 0.12  | 1950                    | 21                           | 4200                                 | PCV1E391MCL2GS |
|                            |                      | 18                        | 6.3×6                    | 0.12  | 126                     | 64                           | 900                                  | PCV1V180MCL1GS |
|                            |                      | 22                        | △ 6.3×6                  | 0.12  | 154                     | 50                           | 1300                                 | PCV1V220MCL2GS |
|                            |                      | 27                        | 8×7                      | 0.12  | 189                     | 55                           | 1200                                 | PCV1V270MCL1GS |
|                            |                      | 39                        | △ 8×7                    | 0.12  | 273                     | 52                           | 1400                                 | PCV1V390MCL2GS |
|                            |                      | 56                        | 8×10                     | 0.12  | 392                     | 31                           | 1900                                 | PCV1V560MCL1GS |
|                            |                      | 68                        | 10×8                     | 0.12  | 476                     | 37                           | 1800                                 | PCV1V680MCL1GS |
| 35<br>(1V)                 | 40.2                 | 82                        | □ 8×10                   | 0.12  | 574                     | 24                           | 3600                                 | PCV1V820MCL7GS |
|                            |                      | 82                        | 8×12                     | 0.12  | 574                     | 29                           | 2200                                 | PCV1V820MCL1GS |
|                            |                      | 82                        | △ 10×8                   | 0.12  | 574                     | 27                           | 3000                                 | PCV1V820MCL2GS |
|                            |                      | 100                       | 10×10                    | 0.12  | 700                     | 29                           | 2200                                 | PCV1V101MCL1GS |
|                            |                      | 120                       | □ 8×12                   | 0.12  | 840                     | 23                           | 3800                                 | PCV1V121MCL7GS |
|                            |                      | 120                       | △ 10×10                  | 0.12  | 840                     | 24                           | 3700                                 | PCV1V121MCL2GS |
|                            |                      | 150                       | 10×12.7                  | 0.12  | 1050                    | 28                           | 2600                                 | PCV1V151MCL1GS |
|                            |                      | 180                       | △ 10×12.7                | 0.12  | 1260                    | 22                           | 4100                                 | PCV1V181MCL2GS |

## ■ Standard Ratings

| Rated Voltage<br>(V)(code) | Surge Voltage<br>(V) | Rated Capacitance<br>(μF) | Case Size<br>φD × L (mm) | tan δ | Leakage Current<br>(μA) | ESR (mΩ)<br>(at 100kHz 20°C) | Rated Ripple<br>(mArms) | Part Number    |
|----------------------------|----------------------|---------------------------|--------------------------|-------|-------------------------|------------------------------|-------------------------|----------------|
| 50<br>(1H)                 | 57.5                 | 8.2                       | 6.3×6                    | 0.12  | 82                      | 81                           | 800                     | PCV1H8R2MCL1GS |
|                            |                      | 12                        | △ 6.3×6                  | 0.12  | 120                     | 55                           | 1200                    | PCV1H120MCL2GS |
|                            |                      | 15                        | 8×7                      | 0.12  | 150                     | 63                           | 1100                    | PCV1H150MCL1GS |
|                            |                      | 22                        | △ 8×7                    | 0.12  | 220                     | 60                           | 1300                    | PCV1H220MCL2GS |
|                            |                      | 33                        | ▲ 8×10                   | 0.12  | 330                     | 36                           | 1700                    | PCV1H330MCL6GS |
|                            |                      | 33                        | 10×8                     | 0.12  | 330                     | 49                           | 1500                    | PCV1H330MCL1GS |
|                            |                      | 39                        | 8×12                     | 0.12  | 390                     | 34                           | 2000                    | PCV1H390MCL1GS |
|                            |                      | 47                        | □ 8×10                   | 0.12  | 470                     | 29                           | 3300                    | PCV1H470MCL7GS |
|                            |                      | 47                        | △ 10×8                   | 0.12  | 470                     | 37                           | 2600                    | PCV1H470MCL2GS |
|                            |                      | 47                        | 10×10                    | 0.12  | 470                     | 30                           | 2200                    | PCV1H470MCL1GS |
|                            |                      | 56                        | △ 8×12                   | 0.12  | 560                     | 28                           | 3400                    | PCV1H560MCL2GS |
|                            |                      | 68                        | △ 10×10                  | 0.12  | 680                     | 29                           | 3400                    | PCV1H680MCL2GS |
|                            |                      | 68                        | 10×12.7                  | 0.12  | 680                     | 29                           | 2600                    | PCV1H680MCL1GS |
|                            |                      | 100                       | △ 10×12.7                | 0.12  | 1000                    | 27                           | 3600                    | PCV1H101MCL2GS |
| 63<br>(1J)                 | 72.4                 | 5.6                       | 6.3×6                    | 0.12  | 71                      | 105                          | 700                     | PCV1J5R6MCL1GS |
|                            |                      | 8.2                       | △ 6.3×6                  | 0.12  | 103                     | 56                           | 1200                    | PCV1J8R2MCL2GS |
|                            |                      | 10                        | 8×7                      | 0.12  | 126                     | 75                           | 1000                    | PCV1J100MCL1GS |
|                            |                      | 12                        | △ 8×7                    | 0.12  | 151                     | 70                           | 1100                    | PCV1J120MCL2GS |
|                            |                      | 22                        | ▲ 8×10                   | 0.12  | 277                     | 37                           | 1700                    | PCV1J220MCL6GS |
|                            |                      | 22                        | 10×8                     | 0.12  | 277                     | 56                           | 1400                    | PCV1J220MCL1GS |
|                            |                      | 27                        | □ 8×10                   | 0.12  | 340                     | 30                           | 3200                    | PCV1J270MCL7GS |
|                            |                      | 27                        | 8×12                     | 0.12  | 340                     | 35                           | 2000                    | PCV1J270MCL1GS |
|                            |                      | 27                        | △ 10×8                   | 0.12  | 340                     | 38                           | 2500                    | PCV1J270MCL2GS |
|                            |                      | 33                        | 10×10                    | 0.12  | 416                     | 31                           | 2200                    | PCV1J330MCL1GS |
|                            |                      | 39                        | △ 8×12                   | 0.12  | 491                     | 29                           | 3400                    | PCV1J390MCL2GS |
|                            |                      | 47                        | △ 10×10                  | 0.12  | 592                     | 30                           | 3300                    | PCV1J470MCL2GS |
|                            |                      | 47                        | 10×12.7                  | 0.12  | 592                     | 30                           | 2500                    | PCV1J470MCL1GS |
|                            |                      | 56                        | △ 10×12.7                | 0.12  | 706                     | 28                           | 3400                    | PCV1J560MCL2GS |
| 80<br>(1K)                 | 92.0                 | 10                        | 8×10                     | 0.12  | 160                     | 43                           | 1600                    | PCV1K100MCL1GS |
|                            |                      | 12                        | 8×12                     | 0.12  | 192                     | 41                           | 1800                    | PCV1K120MCL1GS |
|                            |                      | 15                        | 10×10                    | 0.12  | 240                     | 39                           | 1900                    | PCV1K150MCL1GS |
|                            |                      | 22                        | 10×12.7                  | 0.12  | 352                     | 38                           | 2200                    | PCV1K220MCL1GS |
| 100<br>(2A)                | 115                  | 6.8                       | 8×10                     | 0.12  | 136                     | 48                           | 1500                    | PCV2A6R8MCL1GS |
|                            |                      | 10                        | 8×12                     | 0.12  | 200                     | 45                           | 1700                    | PCV2A100MCL1GS |
|                            |                      | 12                        | 10×10                    | 0.12  | 240                     | 42                           | 1900                    | PCV2A120MCL1GS |
|                            |                      | 18                        | 10×12.7                  | 0.12  | 360                     | 41                           | 2100                    | PCV2A180MCL1GS |
| 125<br>(2B)                | 143                  | 6.8                       | 8×10                     | 0.12  | 170                     | 93                           | 1100                    | PCV2B6R8MCL1GS |
|                            |                      | 8.2                       | 8×12                     | 0.12  | 205                     | 84                           | 1300                    | PCV2B8R2MCL1GS |
|                            |                      | 12                        | 10×10                    | 0.12  | 300                     | 69                           | 1400                    | PCV2B120MCL1GS |
|                            |                      | 15                        | 10×12.7                  | 0.12  | 375                     | 48                           | 2000                    | PCV2B150MCL1GS |

Rated ripple current (mArms) at 105°C 100kHz

No marked, [1] will be put at 12th digit of type numbering system.

△ : In this case, [2] will be put at 12th digit of type numbering system.

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

□ : In this case, [7] will be put at 12th digit of type numbering system.

- Taping specifications are given in page 23.
- Recommended land size, soldering by reflow are given in page 18, 19.
- Please refer to page 3 for the minimum order quantity.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А