TDK

February 2016

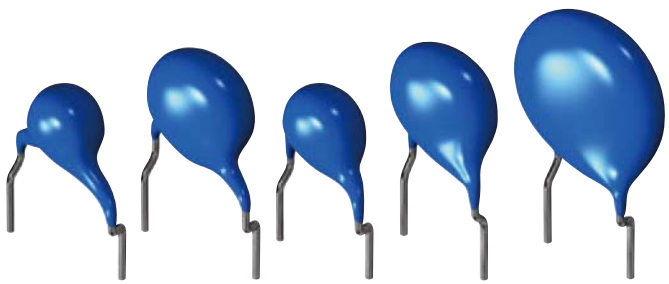
# Disc Type Capacitors with Lead

## High Voltage Ceramic Capacitors

## Automotive Grade, Safety Standard Approved

# CS series

**Type:** **CS [SL, B, Z5U characteristics, Eac: X1:440V, Y2:300V]**



# REMINDERS FOR USING THESE PRODUCTS

Before using these products, be sure to request the delivery specifications.

# SAFETY REMINDERS

Please pay sufficient attention to the warnings for safe designing when using these products.

## ⚠ REMINDERS

- Do not use or store in locations where there are conditions such as gas corrosion (salt, acid, alkali, etc.).
- Before soldering, be sure to preheat components.
  The preheating temperature should be set so that the temperature difference between the solder temperature and product temperature does not exceed 150°C.
- Soldering corrections after mounting should be within the range of the conditions determined in the specifications.
  If overheated, a short circuit, performance deterioration, or lifespan shortening may occur.
- Self heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set thermal design.
- Do not use for a purpose outside of the contents regulated in the delivery specifications.
- The products listed on this catalog are intended for use in automotive electronic equipment under a normal operation and use condition.
  The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property.
  If you intend to use the products in the applications listed below or if you have special requirements exceeding the range or conditions set forth in the each catalog, please contact us.

(1) Aerospace/Aviation equipment
(2) Transportation equipment (electric trains, ships, etc.)
(3) Medical equipment
(4) Power-generation control equipment
(5) Atomic energy-related equipment
(6) Seabed equipment
(7) Transportation control equipment
(8) Public information-processing equipment
(9) Military equipment
(10) Electric heating apparatus, burning equipment
(11) Disaster prevention/crime prevention equipment
(12) Safety equipment
(13) Other applications that are not considered general-purpose applications

- Please refer to the guideline of notabilia for fixed ceramic capacitors issued by JEITA(Japan Electronics and Information Technology Association, EIAJ RCR-2335).

When designing your equipment even for automotive-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.

# Disc Type Capacitors with Lead

**Product compatible with RoHS directive**
**Halogen-free**

## High Voltage Ceramic Capacitors, Automotive Grade, Safety Standard Approved

# Overview of CS Series

## FEATURES

- AEC-Q200 compliant.
- 1,000 cycles guaranteed under heat shock testing at –55°C to +125°C.
- It can be used as a Y capacitor for battery chargers used in automobiles (EV, PHEV).
- Compliant with IEC and the safety standards of various countries.
- Rated at a withstand voltage of AC.2600V.
- These products shall conform to RoHS Directive due to lead(Pb) free of lead wire and internal solder material.
- Compatible with halogen-free external resin coating.

## APPLICATION

For use in Y capacitor for battery chargers or air-conditioners used in automobiles.

## PART NUMBER CONSTRUCTION

| CS | 80 | ZU | 2GA | 222 | M | A | □ | K | A |
|---|---|---|---|---|---|---|---|---|---|
| Series name | Type* | Temperature characteristics | Rated voltage | Nominal capacitance | Capacitance tolerance | Grade classification | Lead type | Application classification | Internal code |

**Type***

| |
|---|
| 45 |
| 65 |
| 70 |
| 75 |
| 80 |
| 85 |
| 95 |
| 11 |

**Temperature characteristics**

| | |
|---|---|
| SL | +350 to –1000ppm/°C |
| B | ±10% |
| ZU (Z5U) | +22, -56% |

**Rated voltage**

| | |
|---|---|
| 2GA | X1:440V<br>Y2:300V |

**Nominal capacitance**

| | |
|---|---|
| 100 | 10pF |
| 221 | 220pF |
| 472 | 4,700pF |

**Capacitance tolerance**

| | |
|---|---|
| J | ±5% |
| K | ±10% |
| M | ±20% |

**Grade classification**

| | |
|---|---|
| A | For use in automobiles |

**Lead type**

| | |
|---|---|
| G | Long lead |
| N | Short lead |
| V | Taping |

**Application classification**

| | |
|---|---|
| K | Safety standard |

**Internal code**

| | |
|---|---|
| A | Halogen-free |

* Please refer to P-6~8 about the product dimensions.

## OPERATING TEMPERATURE RANGE

| Capacitance temperature characteristics | Temperature range* | |
|---|---|---|
| | Operating temperature (°C) | Storage temperature** (°C) |
| SL | –25 to +125 | –25 to +125 |
| B | –25 to +125 | –25 to +125 |
| Z5U | –25 to +125 | –25 to +125 |

* The maximum operating temperature of 125°C includes capacitor self-generated heat of up to 20°C.
** The storage temperature range applies to after MLCC is mounted on board.

- RoHS Directive Compliant Product: See the following for more details related to RoHS Directive compliant products. http://product.tdk.com/en/environment/rohs/
- Halogen-free: Indicates that Cl content is less than 900ppm, Br content is less than 900ppm, and that the total Cl and Br content is less than 1500ppm.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# Overview of CS Series

## PACKAGE QUANTITY

| Type | Package quantity | |
|---|---|---|
| | Taping (pieces / box) | Bulk (pieces / bag) |
| CS | 1000 | 1000 |

## CERTIFIED STATUS OF VARIOUS COUNTRIES

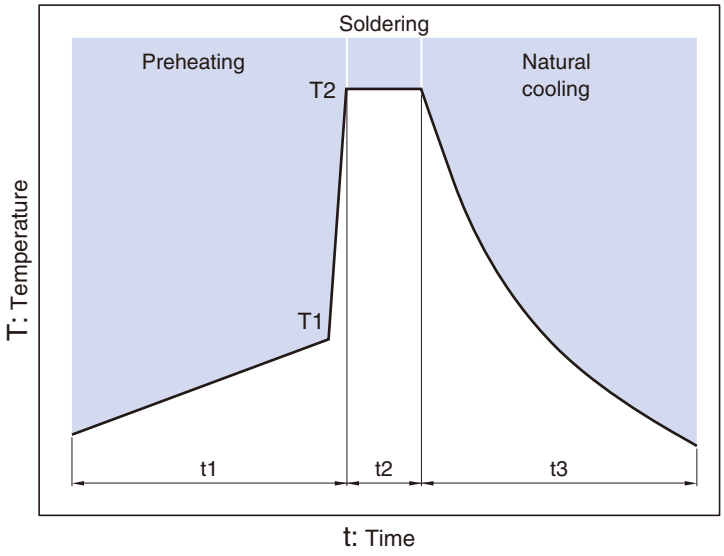
| Safety standard | Standard No. | Temperature characteristics | Insulation sub-class and rated voltage | Approval report No.* | |
|---|---|---|---|---|---|
| | | | | Taiwan | Xiamen |
| BSI | BS EN60384-14 | SL, B, Z5U | X1: AC.440V<br>Y2: AC.300V | | KM37103 |
| VDE | IEC 60384-14 | | | | 40017930 |
| SEV | IEC 60384-14 | | | | 15.0120 |
| SEMKO | EN 60384-14 | | | | 1406932 |
| NEMKO | EN 60384-14 | | | | P12215336 |
| DEMKO | EN 60384-14 | | | | D-01153 |
| FIMKO | EN 60384-14 | | | | FI 27399 |
| IMQ | EN 60384-14 | | | | V3692 |
| SAA | AS 3250 | | | | CS6268 |
| CSA | CSA-E60384-14 | | | | 1785515 |
| UL | UL60384-14 | | | | E37861 |
| CQC | GB/T14472-1998 | | | CQC12001082619 | CQC10001052862 |
| KTL | K60384-14 | | | Sub-Class:X1 | |
| | | | | SZ03001-12006 | SU03047-12006 |
| | | | | Sub-Class:Y2 | |
| | | | | SZ03001-12008 | SU03047-12008 |

* Certificate numbers shall be changed owing to the revisions of the related standards.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# Overview of CS Series

## RECOMMENDED FLOW PROFILE




| Preheating | | Peak | | Natural cooling |
|---|---|---|---|---|
| Temp. | Time | Temp. | Time | Time |
| T1 | t1 | T2 | t2 | t3 |
| 110°C min. | 30 to 60s. | 260°C | Within 10s. | Over 60s. |

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# CS45 Type

## CAPACITANCE AND DIMENSIONS

□Temperature Characteristics: SL (+350 to –1000ppm/°C)

□Rated Voltage Edc: X1:440V, Y2:300V

| Capacitance (pF) | Capacitance tolerance | Dimensions (mm) | | | | | Part No.* |
|---|---|---|---|---|---|---|---|
| | | D max. | T max. | F (Applied to bulk) | F (Applied to taping) | d | |
| 10 | ±5% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS45SL2GA100JA□KA** |
| 15 | ±5% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS45SL2GA150JA□KA |
| 22 | ±5% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS45SL2GA220JA□KA |
| 33 | ±5% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS45SL2GA330JA□KA |
| 47 | ±5% | 8.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS45SL2GA470JA□KA |
| 68 | ±5% | 9.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS45SL2GA680JA□KA |

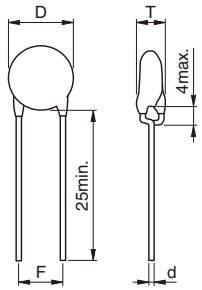
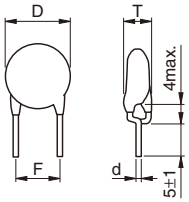
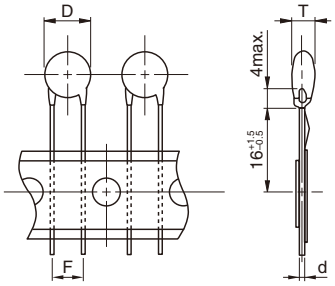
* The part numbers are TDK's standard specification products.

** The " □ " of the Part Number contains the lead type, G, N or V. Please refer to the details of each shape is shown below.

• Please refer to P-9 about the taping dimemsions.

## LIST OF STANDARD LEAD SHAPES

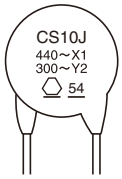
Dimemsions in mm

| | Symbol G Bulk/Long lead | Symbol N Bulk/Short lead | Symbol V Taping |
|---|---|---|---|
| Vertical kink |  |  |  |

• TDK's standard product is vertical kink.

• TDK's recommendation is short lead type with the symbol N for bulk products.

## MARKINGS

| Item | Markings | Specifications | Marking examples |
|---|---|---|---|
| 1. Series | CS | CS series |  |
| 2. Nominal capacitance | 10 | 10pF | |
| 3. Capacitance tolerance | J | ±5% | |
| 4. Rated voltage Eac | 440～X1<br>300～Y2 | X1: AC.440V<br>Y2: AC.300V | |
| 5. TDK's logogram | ⬡ | Production base code | |
| 6. Date code | 54 | 2015.4* | |
| 7. Applications | — | For use in automobiles | |
| | (Underscore below date of production) | | (Marking position is reference.) |

* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

* The expression has become simplified due to a revision in the standards.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# CS65,70,75,85 Type

## CAPACITANCE AND DIMENSIONS

□Temperature Characteristics: B (±10%)

□Rated Voltage Edc: X1:440V, Y2:300V

| Capacitance (pF) | Capacitance tolerance | Dimensions (mm) | | | | | Part No.* |
|---|---|---|---|---|---|---|---|
| | | D max. | T max. | F (Applied to bulk) | F (Applied to taping) | d | |
| 100 | ±10% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS65-B2GA101KA□KA** |
| 150 | ±10% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS65-B2GA151KA□KA |
| 220 | ±10% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS65-B2GA221KA□KA |
| 330 | ±10% | 7.5 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS70-B2GA331KA□KA |
| 470 | ±10% | 9.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS75-B2GA471KA□KA |
| 680 | ±10% | 9.5 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS85-B2GA681KA□KA |

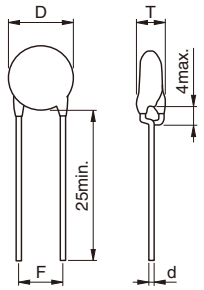
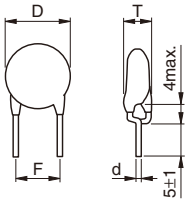
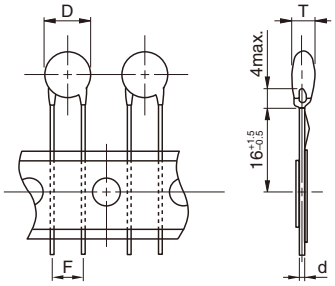
* The part numbers are TDK's standard specification products.

** The " □ " of the Part Number contains the lead type, G, N or V. Please refer to the details of each shape is shown below.

• Please refer to P-9 about the taping dimemsions.

## LIST OF STANDARD LEAD SHAPES

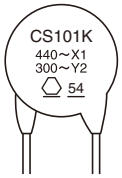
Dimemsions in mm

| | Symbol G<br>Bulk/Long lead | Symbol N<br>Bulk/Short lead | Symbol V<br>Taping |
|---|---|---|---|
| Vertical kink |  |  |  |

• TDK's standard product is vertical kink.

• TDK's recommendation is short lead type with the symbol N for bulk products.

## MARKINGS

| Item | Markings | Specifications | Marking examples |
|---|---|---|---|
| 1. Series | CS | CS series |  |
| 2. Nominal capacitance | 101 | 100pF | |
| 3. Capacitance tolerance | K | ±10% | |
| 4. Rated voltage Eac | 440～X1<br>300～Y2 | X1: AC.440V<br>Y2: AC.300V | |
| 5. TDK's logogram | ⬡ | Production base code | |
| 6. Date code | 54 | 2015.4* | |
| 7. Applications | — | For use in automobiles | |
| | (Underscore below date of production) | | (Marking position is reference.) |

* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

* The expression has become simplified due to a revision in the standards.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# CS65,75,80,95,11 Type

## CAPACITANCE AND DIMENSIONS

□Temperature Characteristics: Z5U (+22, -56%)

□Rated Voltage Edc: X1:440V, Y2:300V

| Capacitance (pF) | Capacitance tolerance | Dimensions (mm) | | | | | Part No.* |
|---|---|---|---|---|---|---|---|
| | | D max. | T max. | F (Applied to bulk) | F (Applied to taping) | d | |
| 1,000 | ±20% | 7.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS65ZU2GA102MA□KA** |
| 1,500 | ±20% | 8.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS75ZU2GA152MA□KA |
| 2,200 | ±20% | 9.5 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS80ZU2GA222MA□KA |
| 3,300 | ±20% | 12.0 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS95ZU2GA332MA□KA |
| 4,700 | ±20% | 13.5 | 7.0 | 7.5±1.5 | 7.5±0.8 | 0.6±0.05 | CS11ZU2GA472MA□KA |

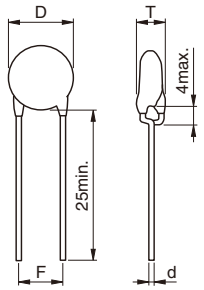
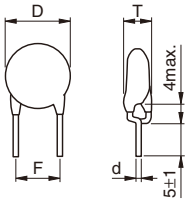
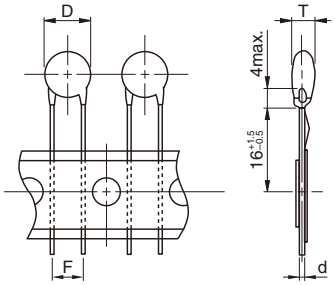
* The part numbers are TDK's standard specification products.

** The " □ " of the Part Number contains the lead type, G, N or V. Please refer to the details of each shape is shown below.

• Please refer to P-9 about the taping dimemsions.

## LIST OF STANDARD LEAD SHAPES

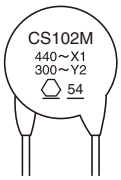
Dimemsions in mm

| | Symbol G Bulk/Long lead | Symbol N Bulk/Short lead | Symbol V Taping |
|---|---|---|---|
| Vertical kink |   |   |   |

• TDK's standard product is vertical kink.

• TDK's recommendation is short lead type with the symbol N for bulk products.

## MARKINGS

| Item | Markings | Specifications | Marking examples |
|---|---|---|---|
| 1. Series | CS | CS series |   |
| 2. Nominal capacitance | 102 | 1000pF | |
| 3. Capacitance tolerance | M | ±20% | |
| 4. Rated voltage Eac | 440～X1<br>300～Y2 | X1: AC.440V<br>Y2: AC.300V | |
| 5. TDK's logogram | ⬡ | Production base code | |
| 6. Date code | 54 | 2015.4* | |
| 7. Applications | — | For use in automobiles | |
| | (Underscore below date of production) | | (Marking position is reference.) |

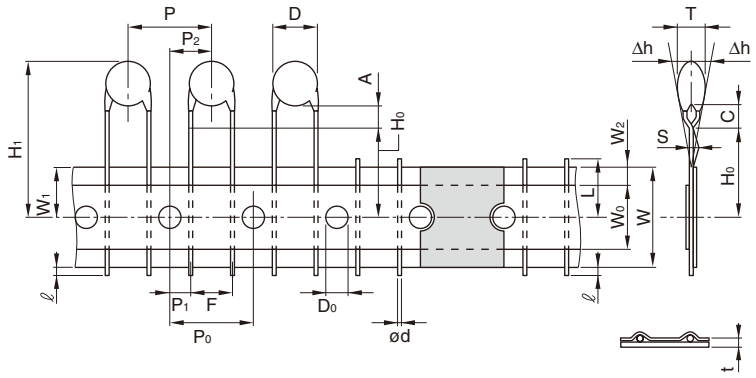
* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

* The expression has become simplified due to a revision in the standards.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

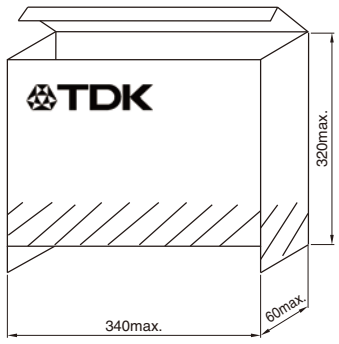
# CS Series

## TAPING DIMEMSIONS




| Item | Symbol | Dimensions(mm) | Remarks |
|---|---|---|---|
| Body diameter | D | Depends on the specification of each product. | |
| Body thickness | T | Depends on the specification of each product. | |
| Lead-wire diameter | ød | 0.6±0.05 | |
| Pitch of component | P | 15.0±1.0 | Including the slant of body |
| Feed hole pitch | $P_0$ | 15.0±0.3 | Excepting the tape splicing part |
| Feed hole center to lead | $P_1$ | 3.75±0.7 | |
| Feed hole center to component center | $P_2$ | 7.5±1.3 | |
| Lead-to lead distance | F | 7.5±0.8 | Measuring point is bottom kink |
| Component alignment | Δh | 0±2.0 | Including the slanting body due to bending lead-wire |
| Tape width | W | 18.0+1.0, –0.5 | |
| Adhesive tape width | $W_0$ | 10.0min. | |
| Hole position | $W_1$ | 9.0±0.5 | |
| Adhesive tape position | $W_2$ | 4.0max. | Adhesive tape do not stick out the tape |
| Bottom of kink from tape center | $H_0$ | 16.0+1.5, –0.5 | |
| Height of body from tape center | $H_1$ | 46.0max. | |
| Lead-wire protrusion | ℓ | 1.0max. | |
| Feed hole diameter | $D_0$ | 4.0±0.2 | |
| Total tape thickness | t | 0.6±0.3 | Including adhesive tape |
| Length of snipped lead | L | 11.0max. | |
| Coating on lead | C | 4.0max. | |
| Height of kink | A | 4.0max. | Measuring point is bottom kink |
| Spring action | S | 2.0max. | |

## AMMO PACK INNER BOX SIZE




Dimensions in mm

• For more information about products with other capacitance or other data, please contact us.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.
Please note that the contents may change without any prior notice due to reasons such as upgrading.

# OCEAN CHIPS
## Океан Электроники
## Поставка электронных компонентов

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**».

AVIC 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).

FORSTAR®

Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А