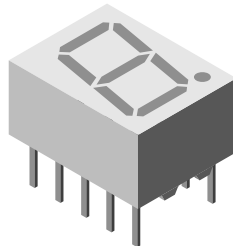




## Standard 7-Segment Display 10 mm



19236

### DESCRIPTION

The TDS.31.. series are 10 mm character seven segment LED displays in a very compact package.

The displays are designed for a viewing distance up to 6 m and available in four bright colors. The grey package surface and the evenly lighted untinted segments provide an optimum on-off contrast.

All displays are categorized in luminous intensity groups. That allows users to assemble displays with uniform appearance. Typical applications include instruments, panel meters, point-of-sale terminals and household equipment.

### FEATURES

- Evenly lighted segments
- Grey package surface
- Untinted segments
- Luminous intensity categorized
- Yellow and green categorized for color
- Wide viewing angle
- Suitable for DC and high peak current
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

### APPLICATIONS

- Panel meters
- Test- and measure-equipment
- Point-of-sale terminals
- Control units

### PRODUCT GROUP AND PACKAGE DATA

- Product group: Display
- Package: 10 mm
- Product series: Standard
- Angle of half intensity:  $\pm 50^\circ$

| PARTS TABLE |            |                                       |      |        |               |                 |      |      |               |                     |      |      |               |                |
|-------------|------------|---------------------------------------|------|--------|---------------|-----------------|------|------|---------------|---------------------|------|------|---------------|----------------|
| PART        | COLOR      | LUMINOUS INTENSITY ( $\mu\text{cd}$ ) |      |        | at $I_F$ (mA) | WAVELENGTH (nm) |      |      | at $I_F$ (mA) | FORWARD VOLTAGE (V) |      |      | at $I_F$ (mA) | CIRCUITRY      |
|             |            | MIN.                                  | TYP. | MAX.   |               | MIN.            | TYP. | MAX. |               | MIN.                | TYP. | MAX. |               |                |
| TDSO3150    | Orange red | 450                                   | 4500 | -      | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common anode   |
| TDSO3150-KL | Orange red | 1800                                  | -    | 5600   | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common anode   |
| TDSO3150-L  | Orange red | 2800                                  | -    | 5600   | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common anode   |
| TDSO3155    | Orange red | 1100                                  | -    | 9000   | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common anode   |
| TDSO3160    | Orange red | 450                                   | 4500 | -      | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common cathode |
| TDSO3160-KL | Orange red | 1800                                  | -    | 5600   | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common cathode |
| TDSO3160-L  | Orange red | 2800                                  | -    | 5600   | 10            | 612             | -    | 625  | 10            | -                   | 2    | 3    | 20            | Common cathode |
| TDSY3150    | Yellow     | 450                                   | 3000 | -      | 10            | 581             | -    | 594  | 10            | -                   | 2.4  | 3    | 20            | Common anode   |
| TDSY3150-K  | Yellow     | 1800                                  | -    | 3600   | 10            | 581             | -    | 594  | 10            | -                   | 2.4  | 3    | 20            | Common anode   |
| TDSY3160    | Yellow     | 450                                   | 3000 | -      | 10            | 581             | -    | 594  | 10            | -                   | 2.4  | 3    | 20            | Common cathode |
| TDSG3150    | Green      | 450                                   | 6800 | -      | 10            | 562             | -    | 575  | 10            | -                   | 2.4  | 3    | 20            | Common anode   |
| TDSG3150-M  | Green      | 4500                                  | -    | 9000   | 10            | 562             | -    | 575  | 10            | -                   | 2.4  | 3    | 20            | Common anode   |
| TDSG3150-MN | Green      | 4500                                  | -    | 14 000 | 10            | 562             | -    | 575  | 10            | -                   | 2.4  | 3    | 20            | Common anode   |
| TDSG3151    | Green      | 1800                                  | -    | 9000   | 10            | 562             | -    | 575  | 10            | -                   | 2.4  | 3    | 20            | Common anode   |
| TDSG3160    | Green      | 450                                   | 6800 | -      | 10            | 562             | -    | 575  | 10            | -                   | 2.4  | 3    | 20            | Common cathode |
| TDSG3160-M  | Green      | 4500                                  | -    | 9000   | 10            | 562             | -    | 575  | 10            | -                   | 2.4  | 3    | 20            | Common cathode |



| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)<br><b>TDSO315., TDSO316., TDSY315., TDSY316., TDSG315., TDSG316.</b> |   |            |            |                    |
|---|---|------------|------------|--------------------|
| PARAMETER   | TEST CONDITION                                    | SYMBOL     | VALUE      | UNIT               |
| Reverse voltage per segment or DP   |   | $V_R$      | 6          | V                  |
| DC forward current per segment or DP  |   | $I_F$      | 20         | mA                 |
| DC forward current per segment or DP  | $t_p \leq 10\text{ }\mu\text{s}$ (non repetitive) | $I_{FSM}$  | 0.15       | A                  |
| Power dissipation   | $T_{amb} \leq 45\text{ }^{\circ}\text{C}$         | $P_V$      | 480        | mW                 |
| Junction temperature  |   | $T_j$      | 100        | $^{\circ}\text{C}$ |
| Operating temperature range   |   | $T_{amb}$  | -40 to +85 | $^{\circ}\text{C}$ |
| Storage temperature range   |   | $T_{stg}$  | -40 to +85 | $^{\circ}\text{C}$ |
| Soldering temperature   | $t \leq 3\text{ s}$ , 2 mm below seating plane    | $T_{sd}$   | 260        | $^{\circ}\text{C}$ |
| Thermal resistance LED junction/ambient   |   | $R_{thJA}$ | 120        | K/W                |

| <b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)<br><b>TDSO3150, TDSO3150-KL, TDSO3150-L, TDSO3155, TDSO3160, TDSO3160-KL, TDSO3160-L, ORANGE RED</b> |                               |  |             |      |          |      |                |
|---|-------------------------------|--|-------------|------|----------|------|----------------|
| PARAMETER   | TEST CONDITION                | PART   | SYMBOL      | MIN. | TYP.     | MAX. | UNIT           |
| Luminous intensity per segment (digit average) <sup>(1)</sup>   | $I_F = 10\text{ mA}$          | TDSO3150   | $I_V$       | 450  | 4500     | -    | $\mu\text{cd}$ |
|   |                               | TDSO3150-KL  |             | 1800 | -        | 5600 |                |
|   |                               | TDSO3150-L   |             | 2800 | -        | 5600 |                |
|   |                               | TDSO3155   |             | 1100 | -        | 9000 |                |
|   |                               | TDSO3160   |             | 450  | 4500     | -    |                |
|   |                               | TDSO3160-KL  |             | 1800 | -        | 5600 |                |
|   |                               | TDSO3160-L   |             | 2800 | -        | 5600 |                |
| Dominant wavelength   | $I_F = 10\text{ mA}$          | TDSO3150,<br>TDSO3150-KL,<br>TDSO3150-L,             | $\lambda_d$ | 612  | -        | 625  | nm             |
| Peak wavelength   | $I_F = 10\text{ mA}$          | TDSO3150-KL,<br>TDSO3150-L,                          | $\lambda_p$ | -    | 630      | -    | nm             |
| Angle of half intensity   | $I_F = 10\text{ mA}$          | TDSO3155,<br>TDSO3160,<br>TDSO3160-KL,<br>TDSO3160-L | $j$         | -    | $\pm 50$ | -    | deg            |
| Forward voltage per segment or DP   | $I_F = 20\text{ mA}$          |  | $V_F$       | -    | 2        | 3    | V              |
| Reverse voltage per segment or DP   | $I_R = 10\text{ }\mu\text{A}$ |  | $V_R$       | 6    | 15       | -    | V              |

**Note**

<sup>(1)</sup>  $I_{Vmin.}$  and  $I_V$  groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is  $\geq 0.5$ , excluding decimal points and colon.

| <b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)<br><b>TDSY3150, TDSY3150-K, TDSY3160, YELLOW</b> |                               |                                      |             |      |          |      |                |
|---|-------------------------------|--------------------------------------|-------------|------|----------|------|----------------|
| PARAMETER   | TEST CONDITION                | PART                                 | SYMBOL      | MIN. | TYP.     | MAX. | UNIT           |
| Luminous intensity per segment (digit average) <sup>(1)</sup>   | $I_F = 10\text{ mA}$          | TDSY3150                             | $I_V$       | 450  | 3000     | -    | $\mu\text{cd}$ |
|   |                               | TDSY3150-K                           |             | 1800 | -        | 3600 |                |
|   |                               | TDSY3160                             |             | 450  | 3000     | -    |                |
| Dominant wavelength   | $I_F = 10\text{ mA}$          | TDSY3150,<br>TDSY3150-K,<br>TDSY3160 | $\lambda_d$ | 581  | -        | 594  | nm             |
| Peak wavelength   | $I_F = 10\text{ mA}$          |                                      | $\lambda_p$ | -    | 585      | -    | nm             |
| Angle of half intensity   | $I_F = 10\text{ mA}$          |                                      | $j$         | -    | $\pm 50$ | -    | deg            |
| Forward voltage per segment or DP   | $I_F = 20\text{ mA}$          |                                      | $V_F$       | -    | 2.4      | 3    | V              |
| Reverse voltage per segment or DP   | $I_R = 10\text{ }\mu\text{A}$ |                                      | $V_R$       | 6    | 15       | -    | V              |

**Note**

<sup>(1)</sup>  $I_{Vmin.}$  and  $I_V$  groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is  $\geq 0.5$ , excluding decimal points and colon.



| OPTICAL AND ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |                        |  |                |      |      |        |      |
|---|------------------------|--|----------------|------|------|--------|------|
| TDSG315., TDSG316., GREEN   |                        |  |                |      |      |        |      |
| PARAMETER   | TEST CONDITION         | PART   | SYMBOL         | MIN. | TYP. | MAX.   | UNIT |
| Luminous intensity per segment (digit average) <sup>(1)</sup>                                 | I <sub>F</sub> = 10 mA | TDSG3150   | I <sub>V</sub> | 450  | 6800 | -      | μcd  |
|   |                        | TDSG3150-M   |                | 4500 | -    | 9000   |      |
|   |                        | TDSG3150-MN  |                | 4500 | -    | 14 000 |      |
|   |                        | TDSG3151   |                | 1800 | -    | 9000   |      |
|   |                        | TDSG3160   |                | 450  | 6800 | -      |      |
|   |                        | TDSG3160-M   |                | 4500 | -    | 9000   |      |
| Dominant wavelength   | I <sub>F</sub> = 10 mA | TDSG3150,<br>TDSG3150-M,<br>TDSG3150-MN,<br>TDSG3151,<br>TDSG3160,<br>TDSG3160-M | λ <sub>d</sub> | 562  | -    | 575    | nm   |
| Peak wavelength   | I <sub>F</sub> = 10 mA |  | λ <sub>p</sub> | -    | 565  | -      | nm   |
| Angle of half intensity   | I <sub>F</sub> = 10 mA |  | j              | -    | ± 50 | -      | deg  |
| Forward voltage per segment or DP   | I <sub>F</sub> = 20 mA |  | V <sub>F</sub> | -    | 2.4  | 3      | V    |
| Reverse voltage per segment or DP   | I <sub>R</sub> = 10 μA |  | V <sub>R</sub> | 6    | 15   | -      | V    |

**Note**

<sup>(1)</sup> I<sub>Vmin.</sub> and I<sub>V</sub> groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is ≥ 0.5, excluding decimal points and colon.

| LUMINOUS INTENSITY CLASSIFICATION |                       |        |
|-----------------------------------|-----------------------|--------|
| GROUP                             | LIGHT INTENSITY (μcd) |        |
|                                   | MIN.                  | MAX.   |
| STANDARD                          |                       |        |
| E                                 | 180                   | 360    |
| F                                 | 280                   | 560    |
| G                                 | 450                   | 900    |
| H                                 | 700                   | 1400   |
| I                                 | 1100                  | 2200   |
| K                                 | 1800                  | 3600   |
| L                                 | 2800                  | 5600   |
| M                                 | 4500                  | 9000   |
| N                                 | 7000                  | 14 000 |

**Note**

- The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one tube (there will be no mixing of two groups in one tube). In order to ensure availability, single brightness groups will not be orderable.

| COLOR CLASSIFICATION |            |      |        |      |       |      |
|----------------------|------------|------|--------|------|-------|------|
| GROUP                | ORANGE RED |      | YELLOW |      | GREEN |      |
|                      | MIN.       | MAX. | MIN.   | MAX. | MIN.  | MAX. |
| 1                    | 612        | 617  | 581    | 584  |       |      |
| 2                    | 616        | 621  | 583    | 586  |       |      |
| 3                    | 620        | 625  | 585    | 588  | 562   | 565  |
| 4                    |            |      | 587    | 590  | 564   | 567  |
| 5                    |            |      | 589    | 592  | 566   | 569  |
| 6                    |            |      | 591    | 594  | 568   | 571  |
| 7                    |            |      |        |      | 570   | 573  |
| 8                    |            |      |        |      | 572   | 575  |

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm.



TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)



Fig. 1 - Forward Current vs. Ambient Temperature



Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature



Fig. 2 - Relative Luminous Intensity vs. Angular Displacement



Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle



Fig. 3 - Forward Current vs. Forward Voltage



Fig. 6 - Relative Luminous Intensity vs. Forward Current

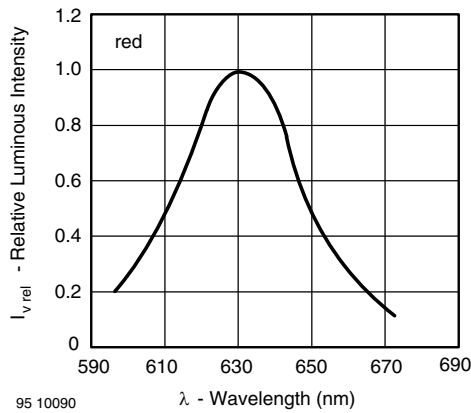


Fig. 7 - Relative Intensity vs. Wavelength

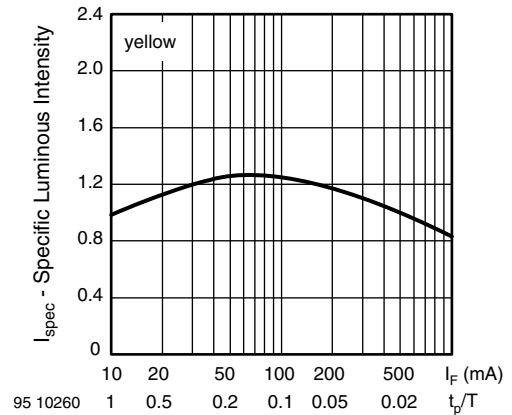


Fig. 10 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

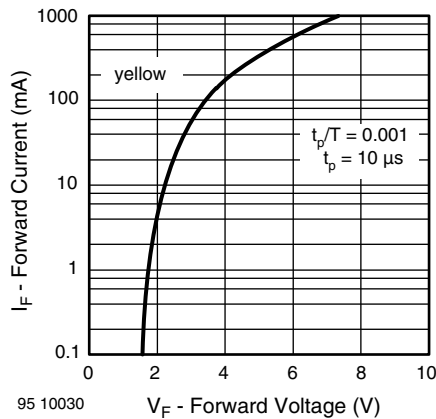


Fig. 8 - Forward Current vs. Forward Voltage

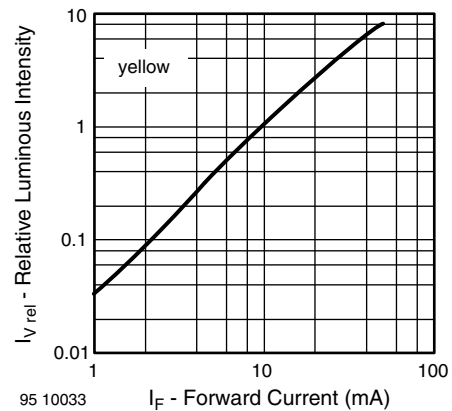


Fig. 11 - Relative Luminous Intensity vs. Forward Current

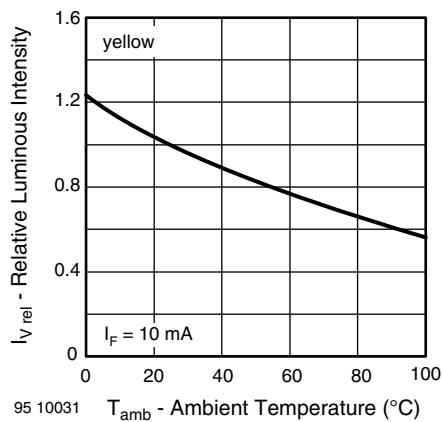


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

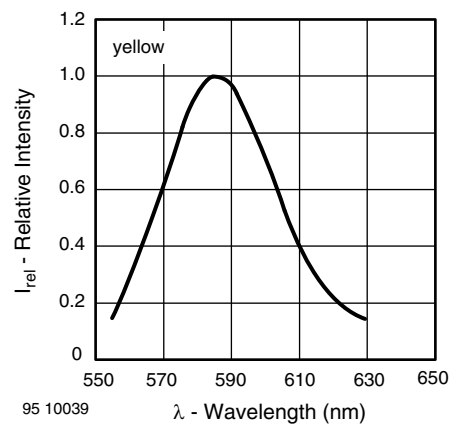


Fig. 12 - Relative Intensity vs. Wavelength



Fig. 13 - Forward Current vs. Forward Voltage



Fig. 16 - Relative Luminous Intensity vs. Forward Current



Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature



Fig. 17 - Relative Intensity vs. Wavelength



Fig. 15 - Specific Luminous Intensity vs. Forward Current

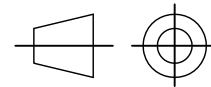
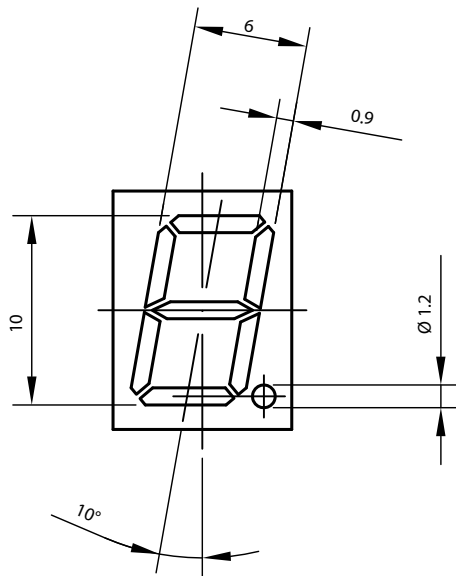
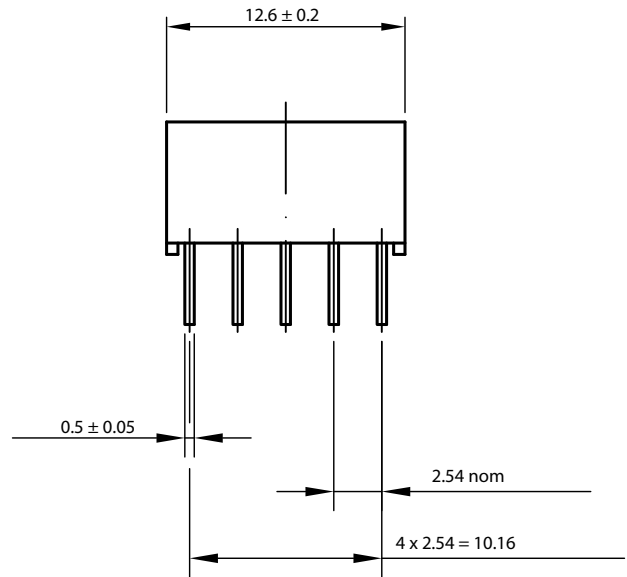
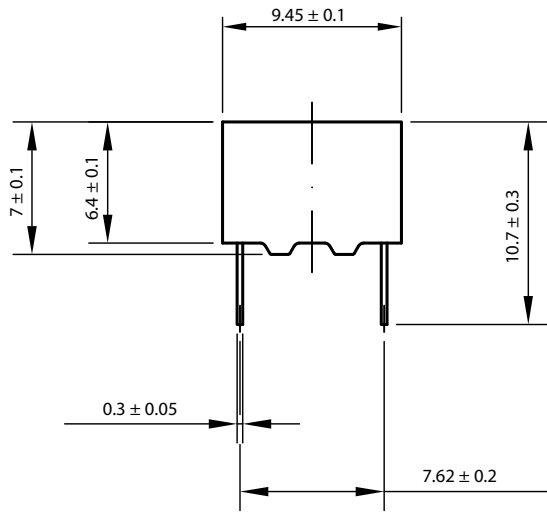


Fig. 18 - TDS.31..

96 11678



**PACKAGE DIMENSIONS FOR TDS.31..** in millimeters

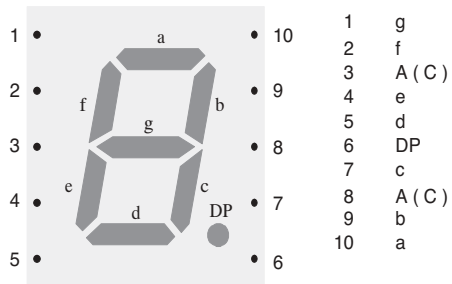


technical drawings  
according to DIN  
specifications

Drawing-No.: 6.544-5093.01-4  
Issue: 2; 23.03.2012



## Pin Connections 10 mm



9611678



### Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design  
and may do so without further notice.**

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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:

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