

FEATURES

- Single 3.3V or 5V power supply
- Up to 155Mbps operation
- Low noise PECL data outputs
- Chatter-free TTL Loss-of-Signal (LOS) output
- TTL /EN input
- Programmable LOS level set (LOS_{LVL})
- Available in a tiny 10-pin MSOP (3mm) package

DESCRIPTION

The SY88803V low power limiting post amplifier is designed for use in fiber-optic receivers. The device connects to typical transimpedance amplifiers (TIAs). The linear signal output from TIAs can contain significant amounts of noise and may vary in amplitude over time. The SY88803V quantizes these signals and outputs PECL level waveforms.

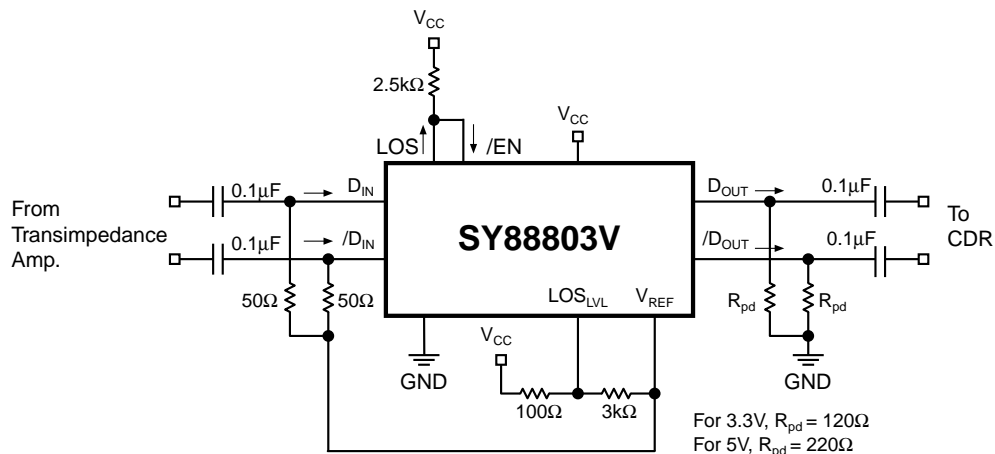
The SY88803V operates from a single +3.3V or +5V power supply, over temperatures ranging from -40°C to $+85^{\circ}\text{C}$. With its wide bandwidth and high gain, signals with data rates up to 155Mbps and as small as 5mVp-p can be amplified to drive devices with PECL inputs.

The SY88803V generates a TTL LOS output. A programmable loss-of-signal level set pin (LOS_{LVL}) sets the sensitivity of the input amplitude detection. LOS asserts high if the input amplitude falls below the threshold set by LOS_{LVL} and deasserts low otherwise. /EN deasserts the true output signal without removing the input signal. Typically 4.6dB loss-of-signal hysteresis is provided to prevent chattering.

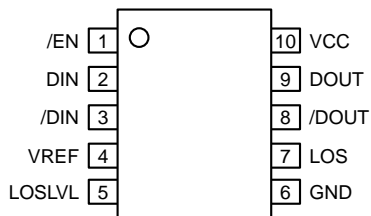
APPLICATIONS

- 155Mbps SONET/SDH
- Small form factor transceivers
- High-gain line driver and line receiver

TYPICAL APPLICATIONS CIRCUIT



PACKAGE/ORDERING INFORMATION



**10-Pin MSOP
(K10-1)**

Ordering Information⁽¹⁾

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|-----------------------------|--------------|-----------------|--|-------------|
| SY88803VKC | K10-1 | Commercial | SY88803V | Sn-Pb |
| SY88803VKCTR ⁽²⁾ | K10-1 | Commercial | SY88803V | Sn-Pb |
| SY88803VKG | K10-1 | Industrial | SY88803V with Pb-free bar-line indicator | NiPdAu |
| SY88803VKGTR ⁽²⁾ | K10-1 | Industrial | SY88803V with Pb-free bar-line indicator | NiPdAu |

Notes:

1. Contact factory for die availability. Die is guaranteed at T_A = 25°C, DC electricals only.
2. Tape and Reel.

PIN DESCRIPTION

| Pin Number | Pin Name | Type | Pin Function |
|------------|----------|--------------------------------|---|
| 1 | /EN | TTL Input: Default is high. | Enable: Deasserts true data output when high. |
| 2 | DIN | Data Input | True data input. |
| 3 | /DIN | Data Input | Complementary data input. |
| 4 | VREF | | Reference voltage. |
| 5 | LOSLVL | Input | Loss-of-Signal Level Set: A voltage between V _{CC} and V _{REF} on this pin sets the threshold for the data input amplitude at which LOS will be asserted. |
| 6 | GND | Ground | Device ground. |
| 7 | LOS | Open-collector TTL Output | Loss-of-Signal: Asserts high when the data input amplitude falls below the threshold set by LOS _{LVL} . Requires external pullup resistor of 2.5kΩ. |
| 8 | /DOUT | PECL Output | Complementary data output. |
| 9 | DOUT | PECL Output | True data output. |
| 10 | VCC | Power Supply | Positive power supply. |

Absolute Maximum Ratings⁽¹⁾

| | |
|--|------------------------------|
| Supply Voltage (V_{CC}) | 0V to +7.0V |
| Input Voltage (D_{IN} , $/D_{IN}$) | 0 to V_{CC} |
| Output Current (I_{OUT}) | |
| Continuous | 50mA |
| Surge | 100mA |
| $/EN$ Voltage | 0 to V_{CC} |
| V_{REF} Current | -800 μ A to +500 μ A |
| LOS_{LVL} Voltage | 0 to V_{CC} |
| Lead Temperature (soldering, 20 sec.) | +260°C |
| Storage Temperature (T_S) | -55°C to +125°C |

Operating Ratings⁽²⁾

| | |
|---|-------------------------------------|
| Supply Voltage (V_{CC}) | +3.0V to +3.6V or +4.5V to +5.5V |
| Ambient Temperature (T_A), Note 3 | -40°C to +85°C |
| Junction Temperature (T_J), Note 3 | -40°C to +120°C |
| Package Thermal Resistance | |
| MSOP | |
| (θ_{JA}) Still-Air | 113°C/W |
| (ψ_{JB}) Still-Air | 74°C/W |

DC ELECTRICAL CHARACTERISTICS⁽⁴⁾

$V_{CC} = 3.0V$ to $3.6V$ or $4.5V$ to $5.5V$; $R_{LOAD} = 50\Omega$ to $V_{CC}-2V$; $T_A = -40^\circ C$ to $+85^\circ C$; typical values at $V_{CC} = 3.3V$, $T_A = 25^\circ C$

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|--------------|----------------------------|--|----------------|----------------|----------------|--------------------|
| I_{CC} | Power Supply Current | no output load | | 25 | 42 | mA |
| LOS_{LVL} | LOS_{LVL} Voltage | | V_{REF} | | V_{CC} | V |
| V_{IH} | $/EN$ Input HIGH Voltage | | 2.0 | | | V |
| V_{IL} | $/EN$ Input LOW Voltage | | | | 0.8 | V |
| I_{IH} | $/EN$ Input HIGH Current | $V_{IN} = 2.7V$ $V_{IN} = V_{CC}$ | | | 20 100 | μ A μ A |
| I_{IL} | $/EN$ Input LOW Current | $V_{IN} = 0.5V$ | -0.3 | | | mA |
| V_{OL} | LOS Output LOW Level | $I_{OL} = +2mA$ | | | 0.5 | V |
| I_{OH} | LOS Output Leakage | $V_{OH} = 5.5V$ | | | 250 | μ A |
| V_{OH} | PECL Output HIGH Voltage | 50 Ω to $V_{CC}-2V$ output load | $V_{CC}-1.085$ | $V_{CC}-0.955$ | $V_{CC}-0.880$ | V |
| V_{OL} | PECL Output LOW Voltage | 50 Ω to $V_{CC}-2V$ output load | $V_{CC}-1.830$ | $V_{CC}-1.705$ | $V_{CC}-1.555$ | V |
| V_{OFFSET} | Differential Output Offset | | | | ± 100 | mV |
| V_{IHCMR} | Common Mode Range | Note 5 | GND+1.7 | | V_{CC} | V |
| V_{REF} | Reference Voltage | Note 6 | $V_{CC}-1.38$ | $V_{CC}-1.32$ | $V_{CC}-1.26$ | V |

Notes:

1. Permanent device damage may occur if absolute maximum ratings are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.
3. Commercial devices are guaranteed from 0°C to +85°C ambient temperature.
4. Specification for packaged product only.
5. The V_{IHCMR} range is referenced to the most positive side of the differential input signal.
6. The current provided into or from V_{REF} must be limited to 800 μ A source and 500 μ A sink.

AC ELECTRICAL CHARACTERISTICS⁽⁷⁾

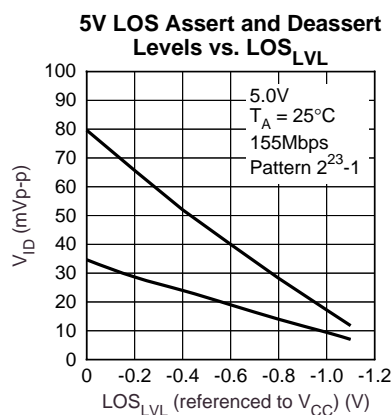
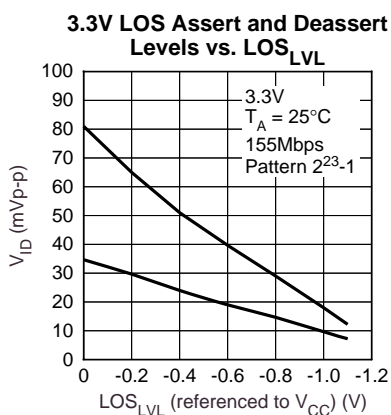
$V_{CC} = 3.0V$ to $3.6V$ or $4.5V$ to $5.5V$; $R_{LOAD} = 50\Omega$ to $V_{CC}-2V$; $T_A = -40^\circ C$ to $+85^\circ C$; typical values at $V_{CC} = 3.3V$, $T_A = 25^\circ C$

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|---------------|---|--|-----|-------------|------|--------------------------------------|
| HYS | LOS Hysteresis | electrical signal | 2 | 4.6 | 8 | dB |
| t_{OFF} | LOS Release Time | | | 0.1 | 0.5 | μs |
| t_{ON} | LOS Assert Time | | | 0.2 | 0.5 | μs |
| t_r, t_f | Differential Output Rise/Fall Time (20% to 80%) | | | | 1000 | ps |
| V_{ID} | Differential Input Voltage Swing | | 5 | | 1800 | mV _{PP} |
| V_{OD} | Differential Output Voltage Swing | $V_{ID} \geq 18mVp-p$ $V_{ID} = 5mVp-p$ | | 1500 400 | | mV _{PP} mV _{PP} |
| V_{SR} | LOS Sensitivity Range | | 5 | | 50 | mV _{PP} |
| $A_{V(Diff)}$ | Differential Voltage Gain | | | 38 | | dB |
| B_{-3dB} | 3dB Bandwidth | | 200 | | | MHz |
| S_{21} | Single-Ended Small-Signal Gain | | 26 | 32 | | dB |

Note:

7. Specification for packaged product only.

TYPICAL OPERATING CHARACTERISTICS



DETAILED DESCRIPTION

The SY88803V low-power limiting post-amplifier operates from a single +3.3V or +5V power supply, over temperatures from -40°C to $+85^{\circ}\text{C}$. Signals with data rates up to 155Mbps and as small as 5mV_{PP} can be amplified. Figure 1 shows the allowed input voltage swing. The SY88803V generates an LOS output. LOS_{LVL} sets the sensitivity of the input amplitude detection.

Input Amplifier/Buffer

Figure 2 shows a simplified schematic of the SY88803V's input stage. The high-sensitivity of the input amplifier allows signals as small as 5mV_{PP} to be detected and amplified. The input amplifier allows input signals as large as $1800\text{mV}_{\text{PP}}$. Input signals are linearly amplified with a typically 38dB differential voltage gain. Since it is a limiting amplifier, the SY88803V outputs typically $1500\text{mV}_{\text{PP}}$ voltage-limited waveforms for input signals that are greater than 18mV_{PP} . Applications requiring the SY88803V to operate with high-gain should have the upstream TIA placed as close as possible to the SY88803V's input pins to ensure the best performance of the device.

Output Buffer

The SY88803V's PECL output buffer is designed to drive 50Ω lines. The output buffer requires appropriate termination for proper operation. An external 50Ω resistor to $V_{\text{CC}}-2\text{V}$ for each output pin provides this. Figure 3 shows a simplified schematic of the output stage and includes an appropriate termination method.

Loss-of-Signal

The SY88803V generates a chatter-free TTL LOS. A recommended $2.5\text{k}\Omega$ pullup resistor to V_{CC} is required for proper operation, as shown in Figure 4. LOS is used to determine that the input amplitude is too small to be considered a valid input. LOS asserts high if the input amplitude falls below the threshold set by LOS_{LVL} and deasserts low otherwise. LOS can be fed back to the enable (/EN) input to maintain output stability under a loss of signal condition. /EN deasserts the true output signal without removing the input signals. Typically 4.6dB LOS hysteresis is provided to prevent chattering.

Loss-of-Signal Level Set

A programmable loss-of-signal level set pin (LOS_{LVL}) sets the threshold of the input amplitude detection. Setting a voltage on LOS_{LVL} between V_{CC} and V_{REF} sets this threshold. If desired, a resistor divider between V_{CC} and V_{REF} , as shown in Figure 5, also creates this threshold. The smaller the voltage difference from LOS_{LVL} to V_{CC} , the smaller the LOS sensitivity. Hence, larger input amplitude is required to deassert LOS. "Typical Operating Characteristics" shows the relationship between the input amplitude detection sensitivity and the LOS_{LVL} voltage.

Hysteresis

The SY88803V provides typically 4.6dB LOS electrical hysteresis. By definition, a power ratio measured in dB is $10\log(\text{power ratio})$. Power is calculated as V_{IN}^2/R for an electrical signal. Hence the same ratio can be stated as $20\log(\text{voltage ratio})$. While in linear mode, the electrical voltage input changes linearly with the optical power and hence the ratios change linearly. Therefore, the optical hysteresis in dB is half the electrical hysteresis in dB given in the datasheet. The SY88803V provides typically 2.3dB LOS optical hysteresis. As the SY88803V is an electrical device, this datasheet refers to hysteresis in electrical terms. With 6dB LOS hysteresis, a voltage factor of two is required to assert or deassert LOS.

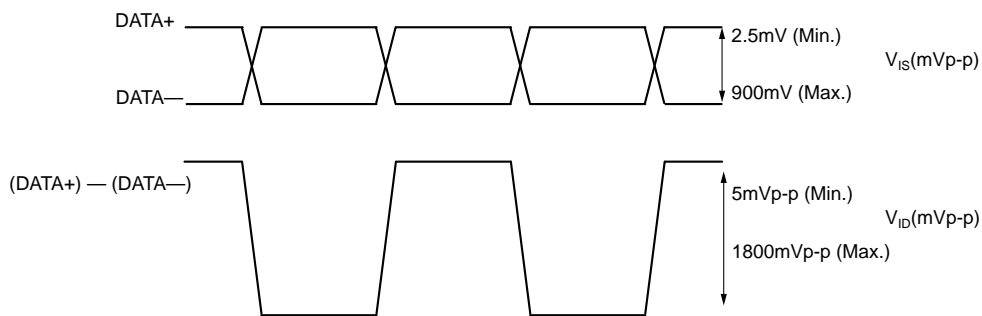


Figure 1. V_{IS} and V_{ID} Definitions

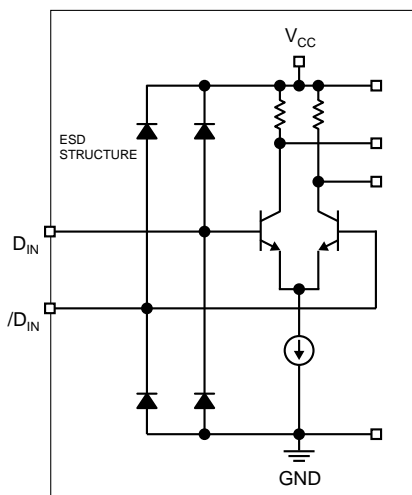


Figure 2. Input Structure

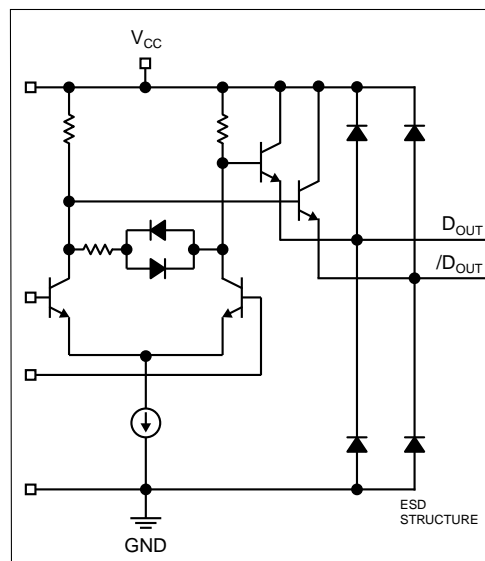


Figure 3. Output Structure

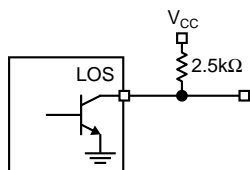


Figure 4. LOS Output Structure

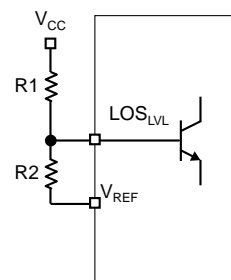
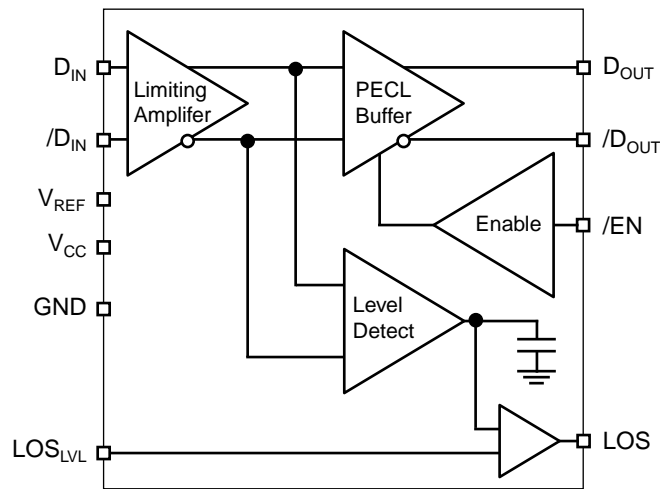


Figure 5. LOS_{LVL} Setting Circuit

Notes. $LOS_{LVL} = V_{CC} - 1.32V + \frac{R2}{R1+R2} \times 1.32V$
 $R1+R2 \geq 2.6k\Omega$

FUNCTIONAL BLOCK DIAGRAM



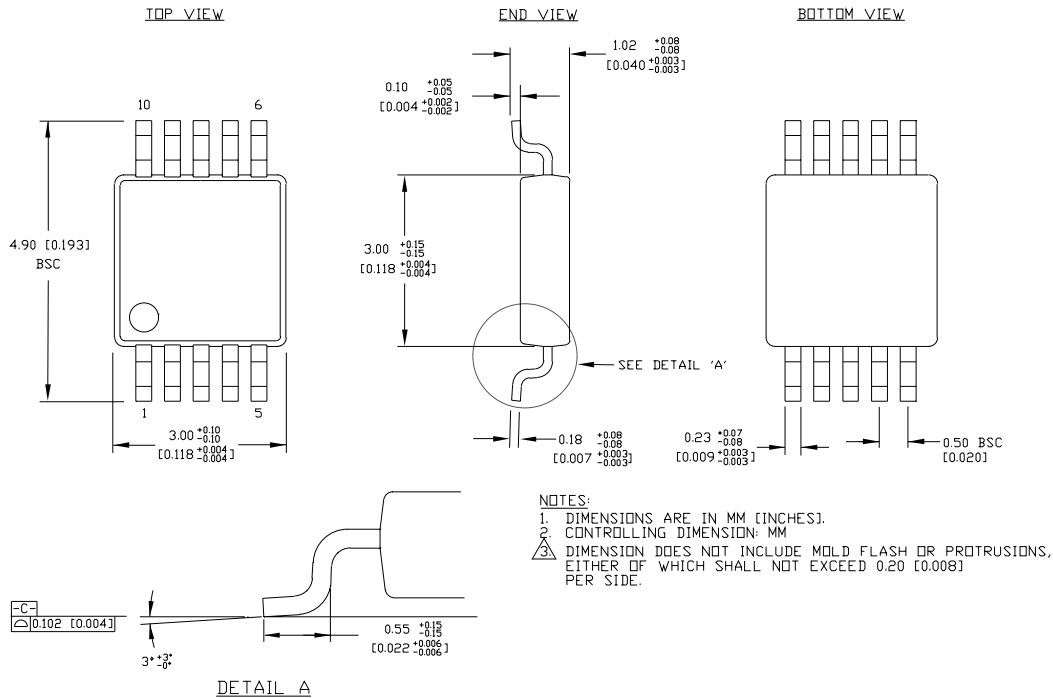
DESIGN PROCEDURE

Layout and PCB Design

Since the SY88803V is a high-frequency component, performance can be largely determined by the board layout and design. A common problem with high-gain amplifiers is the feedback from the large swing outputs to the input via the power supply.

The SY88803V's ground pin should be connected to the circuit board ground. Use multiple PCB vias close to the part to connect to ground. Avoid long, inductive runs which can degrade performance.

10-PIN MSOP (K10-1)



Rev. 00

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA

TEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

The information furnished by Micrel in this datasheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 2006 Micrel, Incorporated.

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

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

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