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## **Fiberoptic Devices**

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In today's global information network, vast amounts of information are exchanged around the world. Through the development of the Internet and high performance computers, there is an immense transformation going on in our social environment. The significance is growing around the globe of larger volume and higher speed telecommunications, capacity of information storage devices and pervasion of network infrastructure.

Along with this, optical fiber communications are moving forward from the level of gigabit to the level of several hundred gigabit transfer rates through dense wavelength division multiplexing (DWDM) technologies. Without such ultra high speed communications technologies, the future global information network, as represented by the Internet, would be unthinkable. The device that is supporting all of them. NEC Compound Semiconductor Devices has been developing and delivering leading edge optical devices to the world since the beginning of optical fiber communications technologies. Through sophisticated R&D activities as well as design, development and quality control, NEC Compound Semiconductor Devices has succeeded in bringing a multitude of products related to optical fiber communications to the marketplace. These products are sold widely in Japan and abroad. The optical semiconductor products introduced here serve as key devices in building the global information network.



## **Major Products**

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Lasers (Digital)		CAN/TOSA	Coaxial	Butterfly	
1310nm	FP	NX5302 Series NX7312UA/UB NX7313UA/UB NX7314UA/UB NX7315UA/UB	NX7301BA/CA NX7302BA/CA NX7303BA/CA NX7304BG	10 G Direct Modulated LD* <sup>1</sup>	
	DFB	NX6301 Series NX8310 Series* <sup>1</sup> NX8311 Series* <sup>1</sup> NX8312 Series* <sup>1</sup>	NX8300BE/CE NX8303BG/CG	10 G Direct Modulated LD* <sup>1</sup>	
1550nm	DFB	NX6504 Series	NX8503BG/CG NX8504BE/CE	NX8560LJ NX8562LB NX8563LB NX8564LE NX8565LE NX8566LE NX8570 Series NX8571 Series	

\*1 Under development

Remark Lasers for EDFA and OTDR are also available.

#### Detectors

	Coaxial	Coaxial with an Internal Pre-amp	17-pin mini-butterfly
PIN-PD	NR7500 Series NR7800 Series	-	NR3470MU
APD	NR8500 Series NR8501 Series	NR4500BP/CP	NR4270MU

## 10 Gb/s EA Modulator Integrated DFB-LD Module : NX8560LJ



#### Description

The NX8560LJ is an Electro-Absorption (EA) modulator integrated, 1550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode. It is capable of transmitting up to 40 km for 10 Gb/s applications by using standard fiber.

#### Features

- Integrated electroabsorption modulator
- Up to 40 km transmission capability with standard single mode fiber
- Low modulation voltage
- With GPO<sup>™</sup> connector
- 10 Gb/s application based on ITU-T recommendations
- Butterfly package with SC-UPC connector

## 1550 nm CW Source DFB-LD Module with Wavelength Monitor : NX8570 Series

## New Products

### Description

The NX8570 Series is a 1550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode module with wavelength monitor function.

This device is designed as CW light source and ideal for transmission systems in which external modulators are used.

#### Features

- Wavelength monitor function (Etalon Filter, Wavelength monitor PD)
- Output power  $P_f = 20 \text{ mW MIN}$ .
- Available for DWDM wavelengths based on ITU-T recommendations (50 GHz grid)
- 4 channel wavelength tunable capability for 50 GHz-spacing
- Internal thermo-electric cooler and isolator
- Hermetically sealed 14-pin butterfly package
- Polarization maintain fiber pigtail
- 10 mW product (NX8571 Series) also available

### 10 Gb/s APD Module with Internal Pre-amp : NR4270MU

**New Products** 

#### Description

The NR4270MU-CC is a 10 Gb/s superlattice avalanche photo diode (APD) receiver in a 17-pin mini-butterfly package with an internal preamplifier. This module is ideal as a receiver for ITU-T recommended Synchronous Digital Hierarchy (SDH) STM-64 and SONET OC-192 systems.

#### Features

- Superlattice avalanche photo diode
- Internal GaAs transimpedance preamplifier
- Receiver for 10 Gb/s transmission (STM-64, OC-192)
- Minimum receiver sensitivity  $P_r = -24$  dBm MAX.
- Transimpedance  $Z_t = 60 \text{ dB}\Omega \text{ MIN}$ .
- 17-pin mini-butterfly package with single mode fiber
- AC-coupled differential output
- With SC-UPC connector

An InGaAs PIN-PD with an internal pre-amp, NR3470MU, in the same package is also available.

## **Photocouplers**

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The photocoupler is widely used for programmable controllers, power supplies, air conditioners, all types of home appliances, OA devices, PBX and FAX machines, telephones and other communications devices. Regardless of whether they are household devices or industrial devices, it is a device which is applicable for a broad range of applications. NEC Compound Semiconductor Devices photocouplers are assured of excellent quality through the use of



sophisticated automated production lines and a stable supply is possible. Other than the most basic DIP type, the SOP type, which makes it possible to reduce the product's size, and the newer SSOP type, which enables still higher density packaging, are also available. Surface mount products and taping products suited for automatic mounting are also available. NEC Compound Semiconductor Devices photocouplers received certification under overseas safety standards so they now can be used widely overseas. NEC Compound Semiconductor Devices is developing production facilities overseas and setting up a supply system for rapid response to overseas demands.

## **Major Products**

Tr. Output Type		4-pin DIP	SOP	Small SOP	Ultra-small Flat-lead
Standard	Single	PS2501-1/-2/-4 PS2513-1 PS2561-1/-2 PS2581L1/L2	PS2701-1 PS2761-1	PS2801-1/-4 PS2841-4A/-4B (Common lead) PS2861-1	PS2911-1
	Darlington	PS2502-1/-2/-4 PS2562-1/-2	PS2702-1	PS2802-1/-4	-
AC Input	Single	PS2505-1/-2/-4 PS2565-1/-2	PS2705-1 PS2707-1 PS2765-1	PS2805-1/-4 PS2845-4A (Common lead) PS2865-1	PS2915-1
	Darlington	PS2506-1/-2/-4 PS2566-1/-2	PS2706-1	PS2806-1/-4	-
Low Input Cur	rent, High CTR	-	PS2711-1 PS2715-1	PS2811-1 PS2815-1	PS2911-1 PS2913-1 PS2915-1
Low Inpu	t Current	PS2503-1/-2/-4	PS2703-1	-	-
High Collector to	Emitter Voltage	PS2532-1/-2/-4 PS2533-1/-2/-4	PS2732-1 PS2733-1	PS2832-1/-4 PS2833-1/-4	PS2932-1 PS2933-1
	DC Input	PS2521-1/-2/-4	-	-	-
	AC Input	PS2525-1/-2/-4	-	-	-
IC Outp	ut Type	-	8-pin DIP	SOP	-
High-Speed 200 kbps Analog Output		-	-	PS8703	-
High-Speed 1 Mbps	Analog Output	-	PS8601 PS8602	PS8701	-
	Digital Output	-	PS9613	PS9713	-
High-Speed 10 Mbps	Open Collector Output	-	PS9614	PS9714	-
	Totem Pole Output	-	PS9611	PS9715	-
Motor Control (Inverter)		-	PS9613	PS9713	-
Diode Output Type		-	-	-	Small SOP
High Linearity		-	-	-	PS8741

## **Ultra-small Flat-lead Photocouplers : PS29xx Series**

### New Products



#### Description

PS29xx series adopted Ultra-small flat-lead package which realizes a reduction in mounting area of about 30% compared with the PS28xx series. Insulation thickness 0.4 mm (formerly 0.3 mm) realized high reliability.

#### Features

- Ultra-small flat-lead package (L: 5.0, W: 2.5, H: 2.1 mm)
- Insulation thickness: 0.4 mm
- Line up
- PS2911/13: DC input/Single Tr.
- PS2915: AC input/Single Tr. PS2932, PS2933: DC input/Darlington Tr.

High Collector to Emitter Voltage PS2932: VCEO = 300 V

PS2933: VCEO = 350 V

#### Applications

• ÖBP Modem/PC card

 Hybrid IC Telephone, Exchange equipment, FAX

### Ultra-Small Common Lead : PS2841-4A, PS2841-4B and PS2845-4A



### High Speed / High CMR Photocouplers : PS9614, PS9714, PS9715

**New Products** 



#### Description

The PS9614, PS9714, PS9715 are optically coupled isolators containing a GaAIAs infrared LED on the input side and a photo diode and a signal processing circuit on the output side on a single chip.

#### Features

- High common mode transient immunity
- $(CMH, CML = \pm 20 \text{ kV}/\mu \text{s TYP.})$
- High-speed response (PS9614, PS9714: tPHL = 50 ns, tPLH = 60 ns TYP.) (PS9715: tPHL = 35 ns, tPLH = 40 ns TYP.)
- Small and thin package (PS9614 (8-pin DIP)) (PS9714, PS9715 (5-pin SOP)) Minimized pulse width distortion
- (PS9614, PS9714: | tPHL tPLH | = 30 ns TYP.)  $(PS9715: | t_{PHL} - t_{PLH} | = 7 \text{ ns TYP.})$

#### Applications

- FA and control equipment Inverter control equipment
- Color PDP • L'AN
  - Measurement and control equipment

## **OCMOS FETs (Solid State Relays)**

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The Optical-coupled MOS FET (OCMOS FET) is a new semiconductor relay which uses a light emitting diode (LED) for the input and a MOS FET for the output. It furnishes a number of outstanding properties which are unattainable with a mechanical relay, such as high speed, high sensitivity, high reliability and long life. When the MOS FET is used in the output, it realizes excellent cutoff characteristics (high isolation voltage, extremely small leak current in the OFF state), its ON resistance is also small and since its linearity is good, it is possible to control minute analog signals. Because this is a entire solid state device through semiconductors,



there is no mechanical moving part as with a mechanical relay. Plus, it is small, lightweight, vibration resistant, and has outstanding impact resistance. The MOS FET is not influenced by mechanical wear, this makes it possible to carry out repeated on/off operations semipermanently. Also, assembly and sorting of NEC Compound Semiconductor Devices's OCMOS FET utilizes sophisticated production line technologies developed for photocoupler large volume production, so excellent quality is assured and stable supply is possible.

## Major Products

	6-pin DIP (1-ch)	8-pin DIP (2-ch)	4-pin SOP (1-ch)	8-pin SOP (2-ch)
Standard	PS7113-1A PS7122-1A PS7122A-1A PS7122A-1B PS7141-1A PS7141-1B PS7142-1A PS7142-1B PS7160-1A	PS7113-2A PS7122-2A PS7122A-2A PS7122A-2B PS7122A-1C PS7141-1C PS7141-2A PS7141-2B PS7142-2A PS7142-2B PS7142-1C PS7160-2A	PS7212-1A PS7241-1A PS7241-1B	PS7211-2A PS7221-2A PS7221A-2A PS7241-2A PS7241-2B PS7241-1C
Current Limit	PS7341C-1A	PS7141C-2A	-	-
Low C × R	-	-	PS7200B-1A PS7200E-1A PS7200H-1A PS7200K-1A	-
Low On-State Resistance	PS710A-1A PS710B-1A PS710E-1A	-	PS7206-1A PS7205B-1A PS7214-1A	-
Low Offset Voltage	-	-	PS7200A-1A PS7200R-1A	-
High Isolation Voltage	PS7341-1A PS7341-1B PS7342-1A PS7360-1A	-	-	-

## Low C × R OCMOS FETs : PS7200 Series



#### Description

The low on-state resistance PS7200H-1A, PS7200K-1A and low capacitance PS7200R-1A are OCMOS FET products that realize a combined CR of about 10 pF  $\Omega$  which is a considerable reduction compared with other 30 pF·Ω NEC Compound Semiconductor Devices products.

These OCMOS FETs are ideal for measuring equipment that requires high frequency signal control, and are particularly suitable for Memory or LSI measurement line and feedback resistor switching. Features

- $\bigcirc$  PS7200H-1A Low on-state resistance (R<sub>on</sub> = 2.2  $\Omega$  TYP.)
  - Low  $C \times R$  ( $C \times R = 9.2 \text{ pF} \cdot \Omega \text{ TYP}$ )

- $\bigcirc$  PS7200K-1A Low on-state resistance (R<sub>on</sub> = 1.1  $\Omega$  TYP.) • Low  $C \times R$  ( $C \times R = 10.5 \text{ pF} \cdot \Omega \text{ TYP.}$ )
- ○PS7200R-1A Low output capacitance (Cout = 1.1 pF TYP.)
  - Low  $C \times R$  ( $C \times R = 11 \text{ pF} \cdot \Omega \text{ TYP}$ .)
- $\bigcirc$ Low off-state leakage current (I<sub>Loff</sub> = 30 pA TYP.)

 $\bigcirc$ Small and thin package (4 × 4.4 × 2.1 mm)

## Low On-State Resistance Series for FA and Measurement Equipment



#### Description

The PS710A-1A, PS7206-1A, PS7214-1A are OCMOS FET products that realize a low on-state resistance. They are ideal for current switching in a variety of industrial and measurement equipment due to their high-current resistance feature.

#### Features

- OPS710A-1A (6-pin DIP) OPS710B-1A (6-pin DIP) OPS710E-1A (6-pin DIP)
- OPS7206-1A (4-pin SOP)

○PS7214-1A (4-pin SOP)

- Continuous load current (I<sub>L</sub> = 1.8 A MAX.)
- Low on-state resistance ( $R_{on} = 0.2 \Omega MAX$ .) Continuous load current (I<sub>L</sub> = 2.5 A MAX.)
- Low on-state resistance ( $R_{on} = 0.1 \Omega MAX$ .)
- Continuous load current (I<sub>L</sub> = 2.0 A MAX.)
- Low on-state resistance ( $R_{on} = 0.15 \Omega MAX.$ )
- OPS7205B-1A (4-pin SOP) Continuous load current (IL = 500 mA MAX.)
  - Low on-state resistance ( $R_{on} = 1.2 \Omega MAX.$ )
  - Continuous load current (IL = 600 mA MAX.)
  - Low on-state resistance ( $R_{on} = 0.8 \Omega MAX.$ )
  - Continuous load current (IL = 400 mA MAX.)
  - Low on-state resistance ( $R_{on} = 1.2 \Omega MAX$ .)

## 400 V Series for Communication Line Relays



#### Description

The 400 V series includes the general-purpose PS7141 series, which is an OCMOS FET with normally open, normally close and transfer output states, the compact, thin SOP type PS7241 series, and the PS7341 series featuring high isolation break down voltage. With such a lineup, the 400 V series can be used in a wide range of applications, from communication line relays to FA and measurement equipment. Features

OHigh break down voltage  $V_L = 400 V MAX.$ Olsolation voltage PS7141 Series (DIP): 1500 Vr.m.s. PS7241 Series (SOP): 1500 Vr.m.s. PS7341 Series (DIP): 3750 Vr.m.s. OHigh sensitivity (Low LED operating current  $I_F = 2 \text{ mA MAX}$ Obesigned for AC/DC switching line changer

## **Optical Storage Devices**

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As multimedia spreads, information is rapidly growing more voluminous and diversified, creating a growing need for higher-density and higher-speed information transmission and processing.

Visible laser diodes are being used to achieve higher-density characteristics for optical storage application unit, especially DVD player and DVD-ROM devices.

To meet these market needs, NEC Compound Semiconductor Devices has created the NV6A01 for DVD-related devices. This product for good performance has a wavelength of 650 nm and optical power output of 5 mW.

NEC Compound Semiconductor Devices has also developed and commercialized a PDIC photodetector for CD/DVD; a key device for both light-emitting devices and pickups. PDIC photodetectors have outstanding high speed and high sensitivity and when used for DVD, they are ideal for the design of pickups in combination with NEC Compound Semiconductor Devices's laser diodes.

NEC Compound Semiconductor Devices endeavors to predict market needs and develop and commercialize products on a timely basis to meet the optical storage market demands.





## **Major Products**

#### **Visible Lasers**

L	Part Number	Use	Wavelength (nm)	Optical Output Power (mW)	Remarks
	NV6A01AT	for DVD-player, DVD-ROM	650	5	Under Development

#### **Photo Diode IC**

Derf Num	Don't Number		Frequency	Output Voltage TYP.		Dementer
Part Num	ber	Use	Main (MHz) TYP.	<b>V</b> о <b>ғ (mV)</b>	<b>V</b> от <b>(mV)</b>	Remarks
PH525	3	for CD-player, VCD	8	360	730	@ Vcc = 5 V