

NDL5481P Series

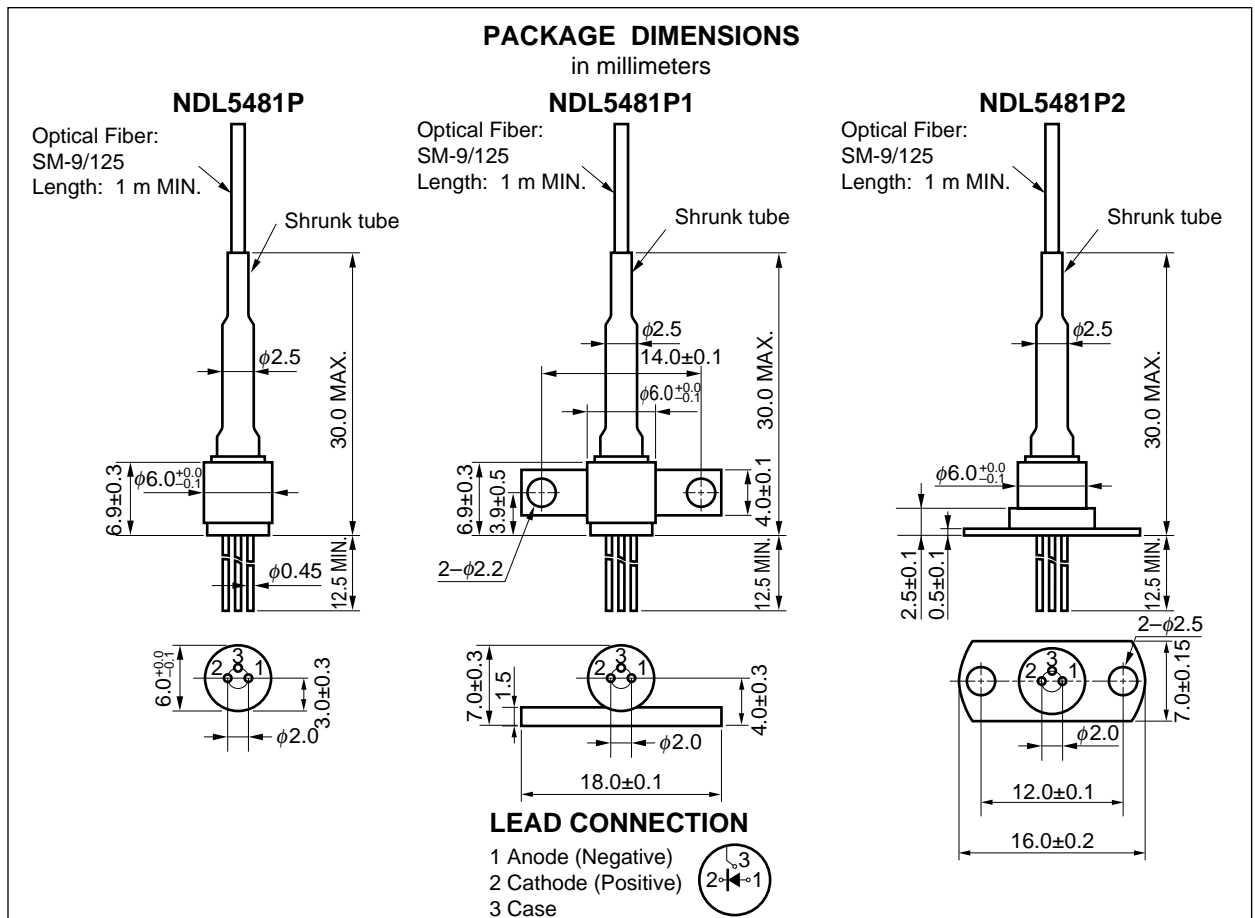
1 300 nm OPTICAL ANALOG CATV SYSTEM $\phi 80 \mu\text{m}$ InGaAs PIN PHOTO DIODE MODULE WITH SMF

DESCRIPTION

NDL5481P Series is InGaAs PIN photo diode modules with singlemode fiber. They are designed for analog transmission systems like CATV applications, and feature low intermodulation distortion and 40 dB minimum of optical return loss.

FEATURES

- Low intermodulation distortion $\text{IMD2} = -75 \text{ dBc MAX.}$ • Small capacitance $C_i = 0.7 \text{ pF}$
- $\text{IMD3} = -90 \text{ dBc MAX.}$ • Low operating voltage $V_R = 10 \text{ V}$
- Optical return loss 45 dB • Detecting area size $\phi 80 \mu\text{m}$
- High quantum efficiency $\eta = 81 \% @ \lambda = 1 \text{ 300 nm}$ • Coaxial module with singlemode fiber (SM-9/125)
- Small dark current $I_D = 0.1 \text{ nA}$ • NDL5481P1 and NDL5481P2 have a flange.



The information in this document is subject to change without notice.

★ ORDERING INFORMATION

| Part Number | Available Connector | |
|-------------|-----------------------|-------------------|
| NDL5481P | Without Connector | no flange |
| NDL5481PC | With FC-UPC Connector | |
| NDL5481PD | With SC-UPC Connector | |
| NDL5481P1 | Without Connector | flat mount flange |
| NDL5481P1C | With FC-UPC Connector | |
| NDL5481P1D | With SC-UPC Connector | |
| NDL5481P2 | Without Connector | vertical flange |
| NDL5481P2C | With FC-UPC Connector | |
| NDL5481P2D | With SC-UPC Connector | |

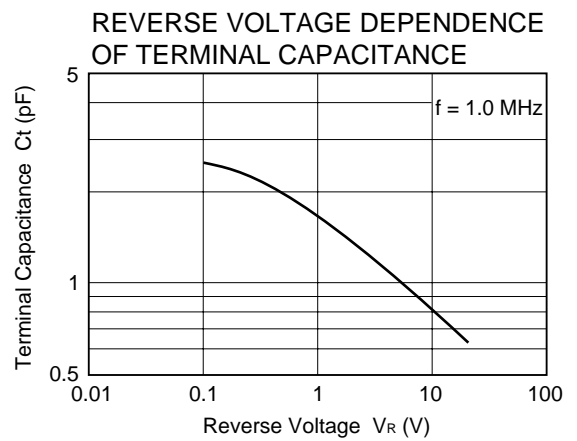
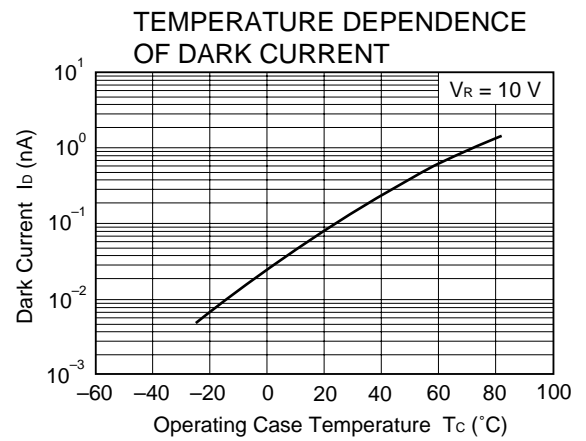
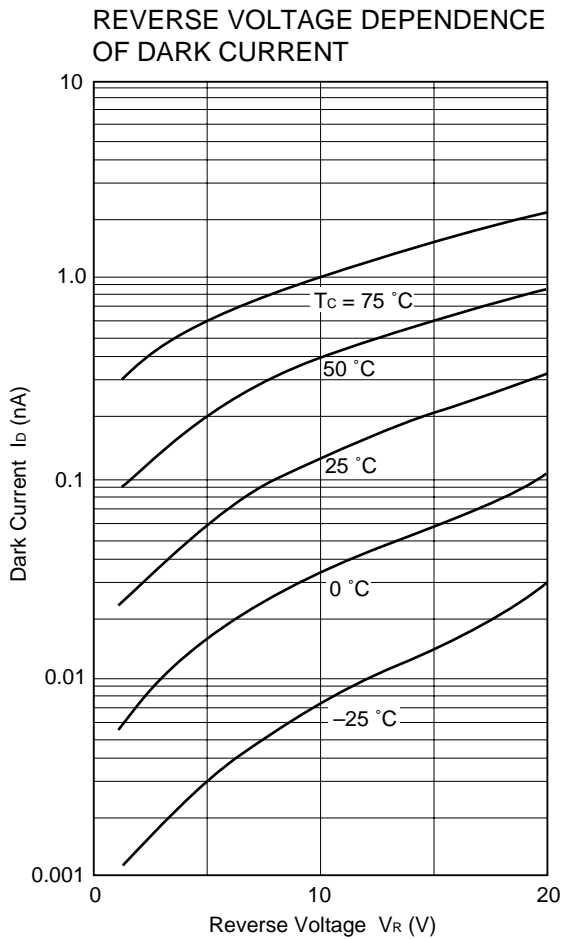
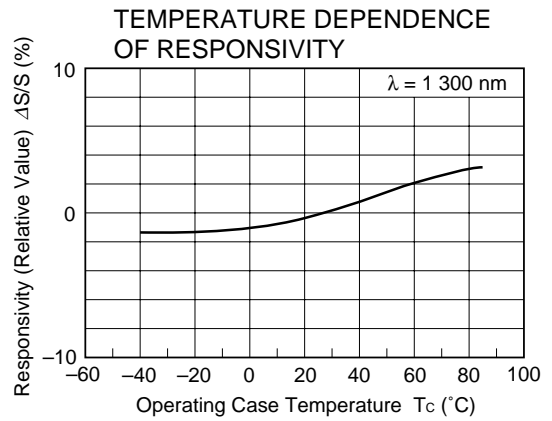
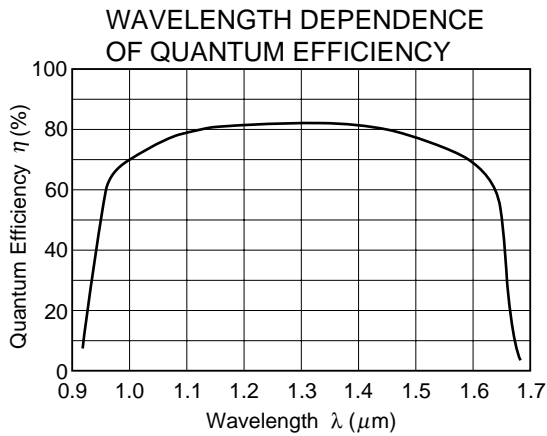
ABSOLUTE MAXIMUM RATINGS (T_c = 25 °C)

| Parameter | Symbol | Ratings | Unit |
|----------------------------|------------------|------------|------|
| Reverse Voltage | V _R | 20 | V |
| Forward Current | I _F | 10 | mA |
| Optical Input Power | P _{in} | 8 | mW |
| Operating Case Temperature | T _c | -40 to +85 | °C |
| Storage Temperature | T _{stg} | -40 to +85 | °C |

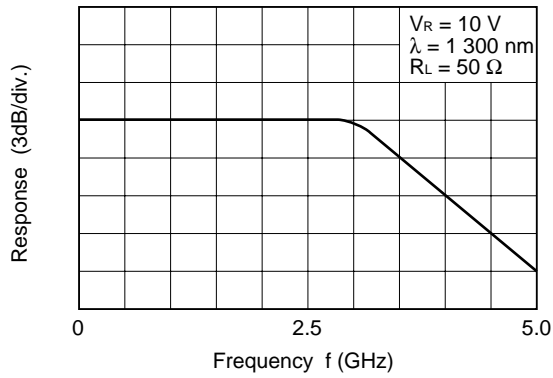
ELECTRO-OPTICAL CHARACTERISTICS (T_c = 25 °C)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|----------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Dark Current | I _D | V _R = 10 V | | 0.1 | 1.0 | nA |
| Terminal Capacitance | C _t | V _R = 10 V, f = 1.0 MHz | | 0.7 | 1.0 | pF |
| Quantum Efficiency | η | λ = 1 300 nm | 76 | 81 | | % |
| Responsivity | S | λ = 1 300 nm | 0.8 | 0.85 | | A/W |
| Cut-off Frequency | f _c | V _R = 10 V, λ = 1 300 nm, R _L = 50 Ω | 2.5 | | | GHz |
| Optical Return Loss | ORL | λ = 1 300 nm | 40 | 45 | | dB |
| Intermodulation Distortion | 2 order | λ = 1 300 nm, 2 Laser 2 Tone Test, V _R = 10 V, OMI = 50 %/LD, P _{in} = 0.5 mW, f ₁ = 187.25 MHz, f ₂ = 193.25 MHz | | | -75 | dBc |
| | 3 order | | | | -90 | dBc |

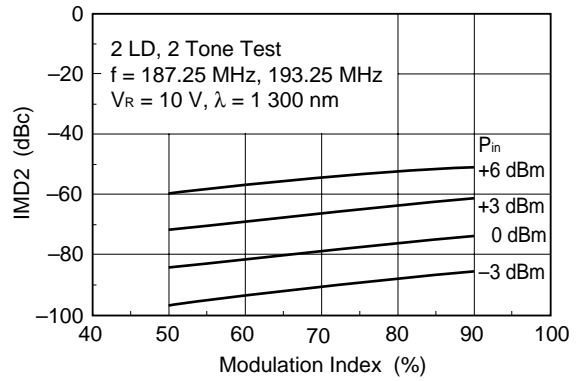
TYPICAL CHARACTERISTICS



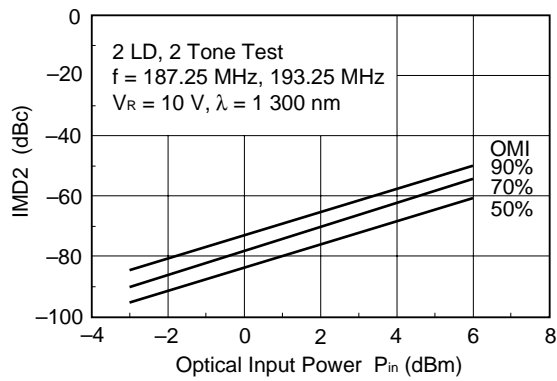
FREQUENCY RESPONSE



MODULATION INDEX vs. IMD2



OPTICAL INPUT POWER vs. IMD2

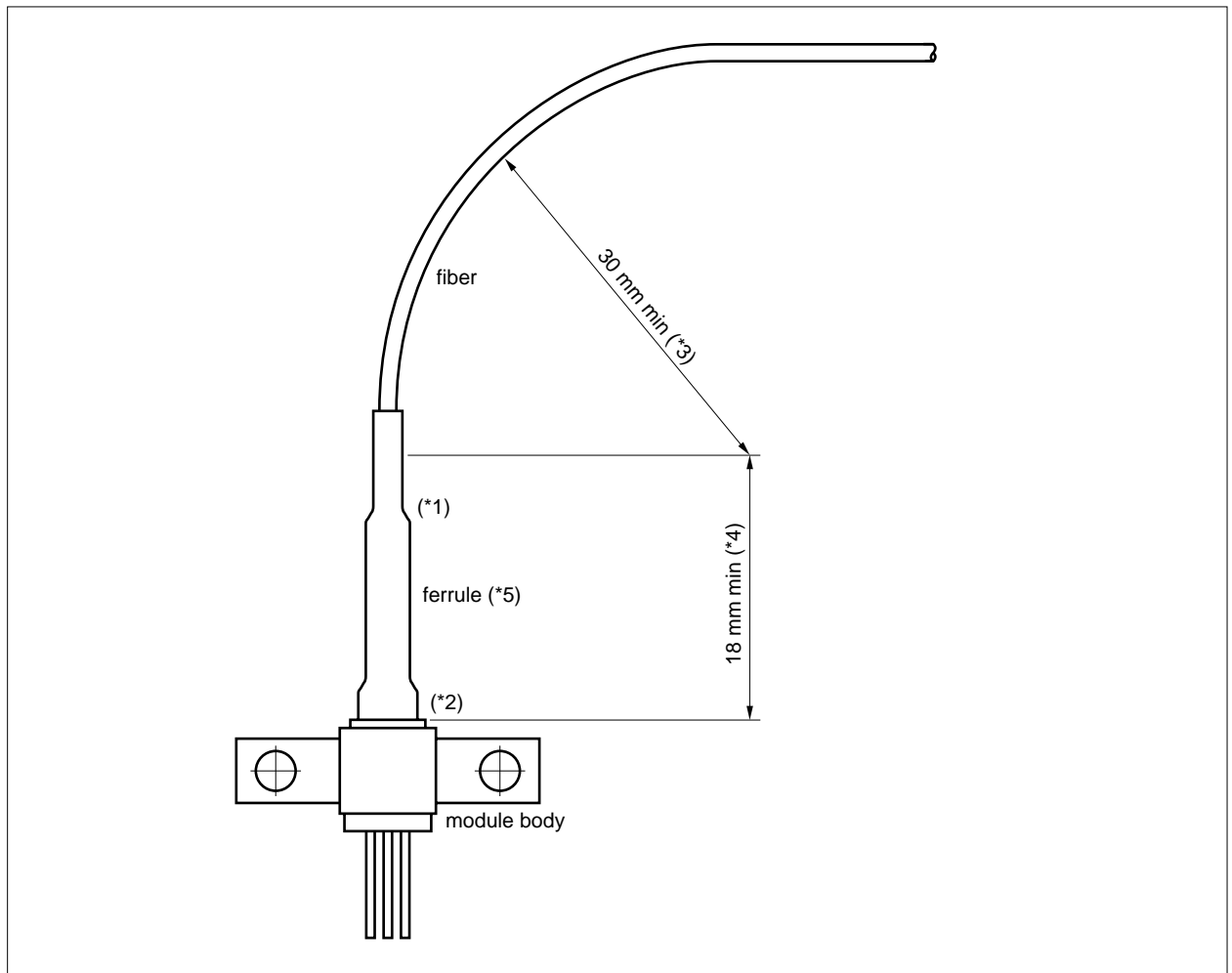


HANDLING PRECAUTION for PD/APD MODULE



The NEC PD/APD module has heat shrink tubing to protect the ferrule edge (*1) and the junction between the ferrule and the module body (*2). In order to avoid breaking the fiber and/or optical coupling degradation, NEC recommends the following handling precautions.

1. Do not make the fiber bend radius less than 30 mm (*3).
2. Do not bend the fiber within the 18 mm section from the module body (*4).
3. Do not stress the ferrule with a lateral force exceeding 500 g (*5).



★ InGaAs APD/PD FAMILY

| Features Packages | APD | | | | PIN-PD | | Remarks |
|-----------------------------------|--------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------|------------------------------------------------------|
| | φ30 μm (for 2.5 Gb/s) | φ50 μm (for 2.5 Gb/s) | φ50 μm | φ80 μm | φ50 μm (for 2.5 Gb/s) | φ80 μm | |
| TO-18 type Can | NDL5530 | ———— | NDL5500 | NDL5510 | ———— | ———— | 3 pins |
| TO-18 type Can with Micro Lens | ———— | ———— | ———— | ———— | NDL5490L ^{*3,4} | NDL5405L | 3 pins |
| Small Can φ5.6 μm | NDL5531 | ———— | ———— | ———— | NDL5490 ^{*3,4} | ———— | |
| Chip on Carrier | NDL5530C | NDL5520C | NDL5500C | NDL5510C | ———— | ———— | |
| Receptacle Module | ———— | ———— | ———— | ———— | ———— | NDL5471RC NDL5471RD | 3 pins RC: FC receptacle RD: SC receptacle |
| Coaxial Module with MMF | ———— | NDL5521P NDL5521P1 NDL5521P2 | NDL5551P NDL5551P1 NDL5551P2 NDL5553P ^{*1} NDL5553P1 ^{*1} NDL5553P2 ^{*1} | NDL5561P ^{*2} NDL5561P1 ^{*2} NDL5561P2 ^{*2} | ———— | NDL5461P NDL5461P1 NDL5461P2 | P1, P2: With flange |
| Coaxial Module with SMF | ———— | ———— | NDL5553PS ^{*1} NDL5553P1S ^{*1} NDL5553P2S ^{*1} | ———— | ———— | NDL5481P ^{*5} NDL5481P1 ^{*5} NDL5481P2 ^{*5} | |
| 14-pin DIP Module with TEC | ———— | ———— | NDL5506P NDL5506PS | ———— | ———— | ———— | ΔT = 45 K (@ I _c = 1.1 A) PS: With SMF |
| 6-pin BFY Module with MMF | ———— | NDL5522P | ———— | ———— | NDL5422P | ———— | With Pre-AMP |

*1 For OTDR

*2 With GI-62.5/125

*3 Under development

*4 Internal pre-amplifier for 1Gb/s

*5 For analog application (optical CATV)

Remark Modules are available with FC-PC connector or optional SC-PC connector.

REFERENCE

| Document Name | Document No. |
|-------------------------------------------------------------|--------------|
| NEC semiconductor device reliability/quality control system | IEI-1205 |
| Quality grade on NEC semiconductor devices | IEI-1209 |
| Semiconductor device mounting technology manual | C10535E |
| Semiconductor device package manual | IEI-1213 |
| Guide to quality assurance for semiconductor devices | MEI-1202 |
| Semiconductor selection guide | X10679E |

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstance break the hermetic seal.

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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices in "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.