

# CEL

## NEC's 1310 nm InGaAsP MQW FP LASER DIODE IN CAN PACKAGE FOR 155 Mb/s and 622 Mb/s APPLICATIONS

### NX5306 SERIES

#### FEATURES

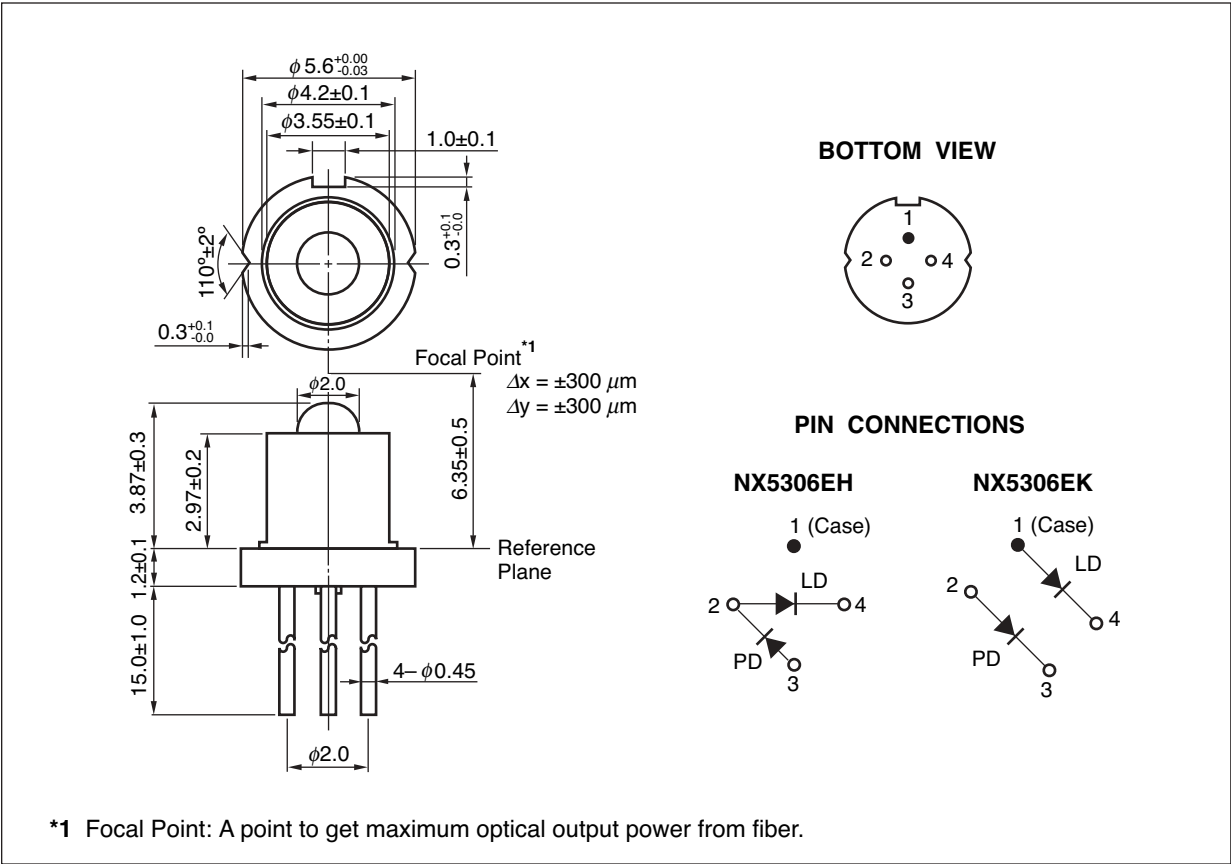
- **OPTICAL OUTPUT POWER:**  
 $P_o = 5.0 \text{ mW}$
- **LOW THRESHOLD CURRENT :**  
 $I_{TH} = 10 \text{ mA}$
- **HIGH SPEED:**  
 $t_r = 0.3 \text{ ns MAX}$   
 $t_f = 0.3 \text{ ns MAX}$
- **WIDE OPERATING TEMPERATURE RANGE:**  
 $T_c = -40 \text{ to } +85^\circ\text{C}$
- **InGaAs MONITOR PIN-PD**
- **CAN PACKAGE:**  
 $\varnothing 5.6 \text{ mm}$
- **BASED ON TELCORDIA RELIABILITY**



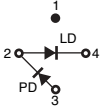
#### DESCRIPTION

NEC's NX5306 series is a 1310 nm Multiple Quantum Well (MQW) structured Fabry-Perot (FP) laser diode with InGaAs monitor PIN-PD. This device is ideal for Synchronous Digital Hierarchy (SDH) systems, long haul STM-1 (L-1.1), short haul STM-4 (S-4.1), and ITU-T recommendations.

PACKAGE DIMENSIONS (Units in mm)



**ORDERING INFORMATION**

| PART NUMBER | PACKAGE                      | PIN CONNECTIONS                                                                   |
|-------------|------------------------------|-----------------------------------------------------------------------------------|
| NX5306EH    | 4-pin CAN with ball lens cap |  |
| NX5306EK    |                              |  |

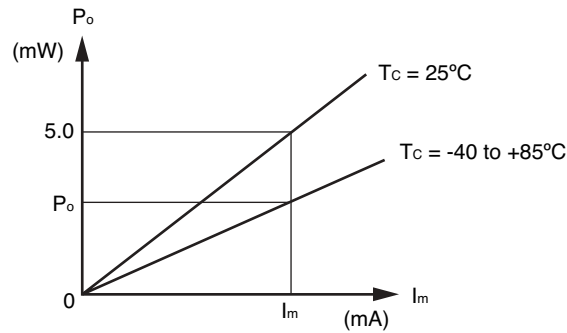
- Remarks**
1. The color of ball lens cap might be observed differently from our can package products.
  2. The hermetic test will be performed as AQL 1.0%.

ABSOLUTE MAXIMUM RATINGS

| PARAMETER                         | SYMBOL           | RATINGS      | UNIT |
|-----------------------------------|------------------|--------------|------|
| Optical Output Power              | P <sub>o</sub>   | 20           | mW   |
| Forward Current of LD             | I <sub>F</sub>   | 150          | mA   |
| Reverse Voltage of LD             | V <sub>R</sub>   | 2.0          | V    |
| Forward Current of PD             | I <sub>F</sub>   | 10           | mA   |
| Reverse Voltage of PD             | V <sub>R</sub>   | 20           | V    |
| Operating Case Temperature        | T <sub>C</sub>   | −40 to +85   | °C   |
| Storage Temperature               | T <sub>stg</sub> | −40 to +85   | °C   |
| Assembly Temperature              | T <sub>asb</sub> | 150 (15 Hr)  | °C   |
| Lead Soldering Temperature        | T <sub>sld</sub> | 350 (3 sec.) | °C   |
| Relative Humidity (noncondensing) | RH               | 85           | %    |

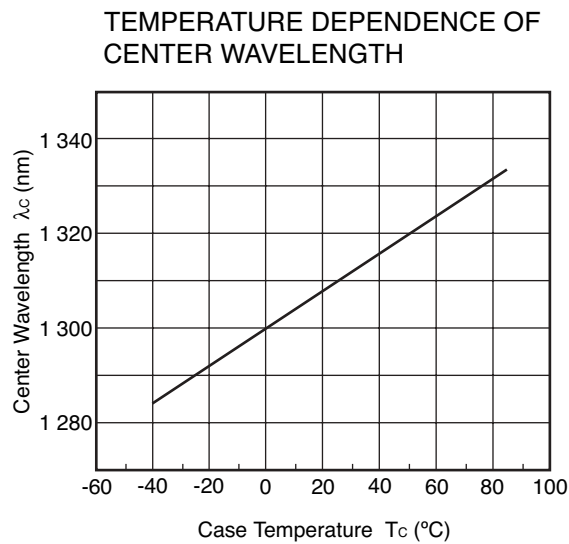
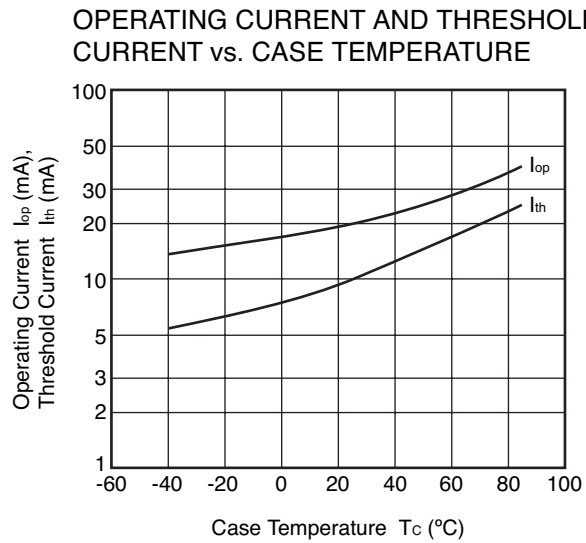
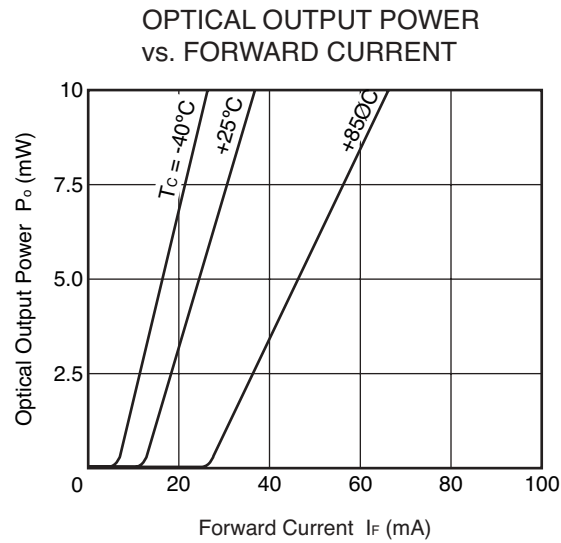
**ELECTRO-OPTICAL CHARACTERISTICS** ( $T_C = -25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                                         | SYMBOL                   | CONDITIONS                                                                                                          | MIN.  | TYP. | MAX.  | UNIT                    |
|---------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------|-------|------|-------|-------------------------|
| Operating Voltage                                 | $V_{op}$                 | $P_o = 5.0 \text{ mW}$ , $T_C = -40 \text{ to } +85^\circ\text{C}$                                                  |       | 1.1  | 1.5   | V                       |
| Threshold Current                                 | $I_{th}$                 |                                                                                                                     |       | 10   | 15    | mA                      |
|                                                   |                          | $T_C = 85^\circ\text{C}$                                                                                            |       | 25   | 30    |                         |
| Threshold Output Power                            | $P_{th}$                 | $T_C = -40 \text{ to } +85^\circ\text{C}$ , $I_F = I_{th}$                                                          |       | 100  | 200   | $\mu\text{W}$           |
| Differential Efficiency                           | $\eta_d$                 |                                                                                                                     | 0.32  | 0.4  |       | W/A                     |
| Temperature Dependence of Differential Efficiency | $\Delta\eta_d$           | $\Delta\eta_d = 10 \log \frac{\eta_d (@85^\circ\text{C})}{\eta_d (@25^\circ\text{C})}$                              | -3.0  | -1.2 |       | dB                      |
| Center Wavelength                                 | $\lambda_c$              | $P_o = 5.0 \text{ mW}$ , RMS (-20 dB)<br>$T_C = -40 \text{ to } +85^\circ\text{C}$                                  | 1 263 |      | 1 360 | nm                      |
| Temperature Dependence of Center Wavelength       | $\Delta\lambda/\Delta T$ | $T_C = -40 \text{ to } +85^\circ\text{C}$                                                                           |       | 0.4  | 0.5   | nm/<br>$^\circ\text{C}$ |
| Spectral Width                                    | $\sigma$                 | $P_o = 5.0 \text{ mW}$ , RMS (-20 dB)<br>$T_C = -40 \text{ to } +85^\circ\text{C}$                                  |       | 1.0  | 2.5   | nm                      |
| Rise Time                                         | $t_r$                    | 10-90%                                                                                                              |       | 0.15 | 0.3   | ns                      |
| Fall Time                                         | $t_f$                    | 90-10%                                                                                                              |       | 0.15 | 0.3   | ns                      |
| Monitor Current                                   | $I_m$                    | $V_R = 5 \text{ V}$ , $P_o = 5.0 \text{ mW}$                                                                        | 150   | 300  | 600   | $\mu\text{A}$           |
| Monitor Dark Current                              | $I_D$                    | $V_R = 5 \text{ V}$                                                                                                 |       | 0.1  | 10    | nA                      |
|                                                   |                          | $V_R = 5 \text{ V}$ , $T_C = -40 \text{ to } +85^\circ\text{C}$                                                     |       |      | 500   |                         |
| Monitor PD Terminal Capacitance                   | $C_t$                    | $V_R = 5 \text{ V}$ , $f = 1 \text{ MHz}$                                                                           |       | 6    | 20    | pF                      |
| Tracking Error <sup>*1</sup>                      | $\gamma$                 | $I_m = \text{const.} (@ P_o = 5.0 \text{ mW}, T_C = 25^\circ\text{C})$<br>$T_C = -40 \text{ to } +85^\circ\text{C}$ | -1.0  |      | 1.0   | dB                      |

\*1 Tracking Error:  $\gamma$ 

$$\gamma = \left| 10 \log \frac{P_o}{5.0} \right| [\text{dB}]$$

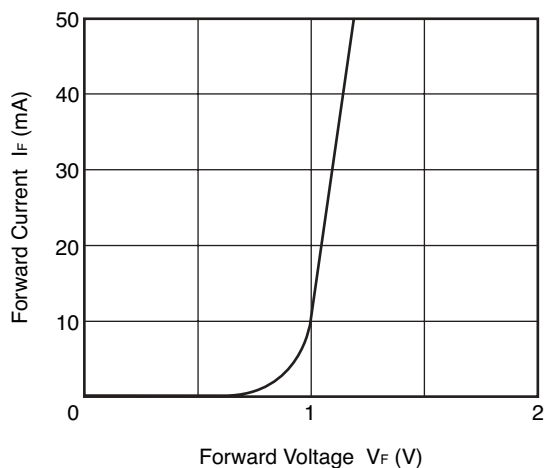
TYPICAL CHARACTERISTICS (T<sub>C</sub> = -40 to +85°C, unless otherwise specified)



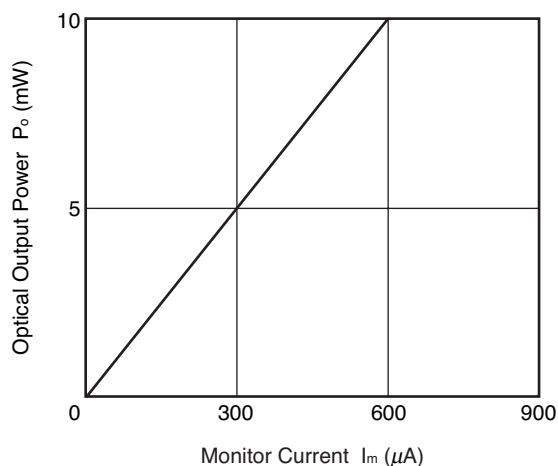
**Remark** The graphs indicate nominal characteristics.

# TYPICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

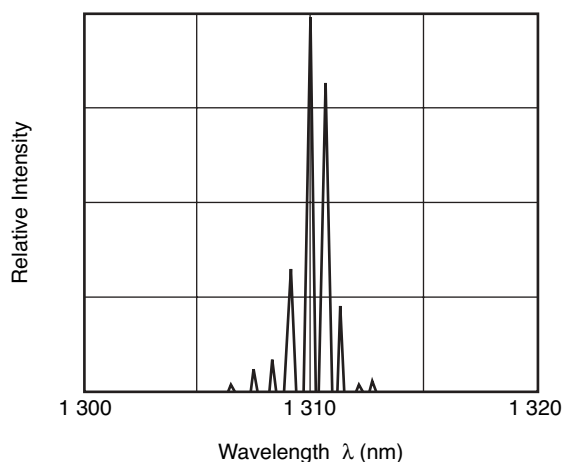
FORWARD CURRENT vs.  
FORWARD VOLTAGE



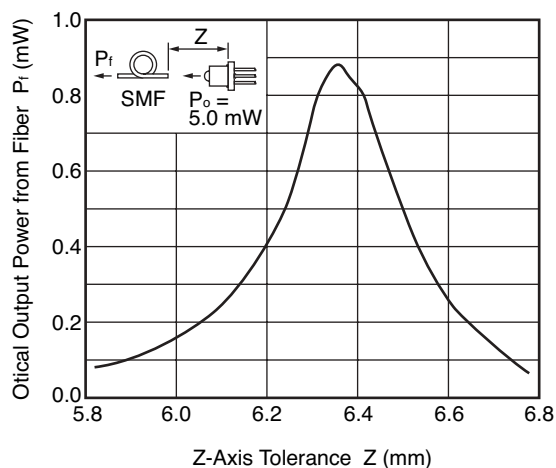
OPTICAL OUTPUT POWER  
vs. MONITOR CURRENT



SPECTRUM



TOLERANCE OF FIBER  
COUPLING DISTANCE (Z)



**Remark** The graphs indicate nominal characteristics.

## Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • [www.cel.com](http://www.cel.com)

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