



# **NR4211TH**

**Data Sheet** 

R08DS0022EJ0100 Rev.1.00 Sep 13, 2012

RECEIVER (Limiting TIA, with DCA function)

InAIAs APD RECEIVER WITH INTERNAL PRE-AMPLIFIER FOR 10 Gb/s APPLICATIONS

#### DESCRIPTION

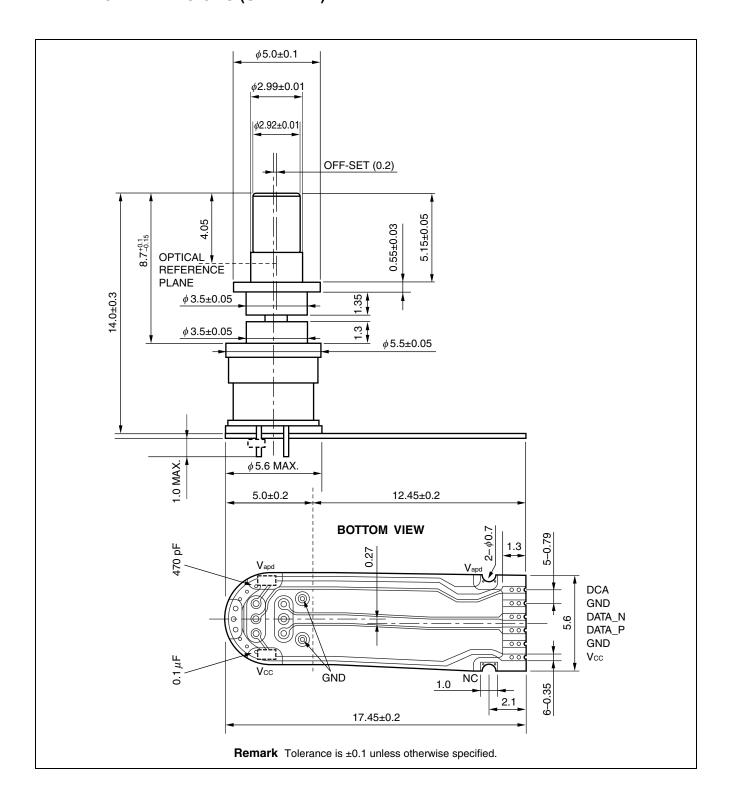
The NR4211TH product consists of InAIAs-APD (avalanche photo diode) ROSAs (Receiver Optical Sub-Assembly) with internal pre-amplifiers designed for 10 Gb/s long-reach optical transceivers such as the XENPAK/X2/XFP and Transponder. These modules are ideal as receivers for IEEE 10G BASE and SONET OC-192 systems and D-WDM systems.

#### **FEATURES**

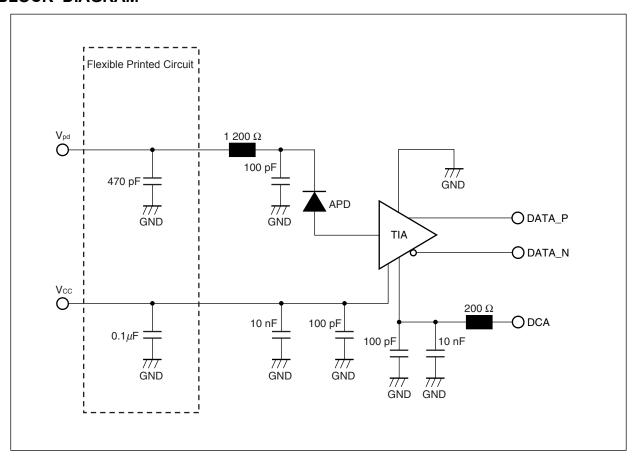
- XMD-MSA compliant ROSA
- 10 Gb/s high sensitivity InAlAs-APD
- +3.3 V transimpedance pre-amplifier
- Minimum receiver sensitivity  $P_r = -27.5 \text{ dBm}$ • Operating case temperature  $T_C = -5 \text{ to } +90^{\circ}\text{C}$
- Transimpedance  $Z_t = 6\,000\,\Omega$  (Single-ended)
- Cut-off frequency  $f_C = 7.5 \text{ GHz}$
- With DCA function (Cross point control)
- With flexible printed circuit



## PACKAGE DIMENSIONS (UNIT: mm)



## **BLOCK DIAGRAM**





# ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^{\circ}C$ , unless otherwise specified)

| Parameter   | Symbol                 | Ratings                            | Unit |
|---|------------------------|------------------------------------|------|
| APD Reverse Voltage                                   | $V_R$                  | $V_{BR}$                           | V    |
| APD Reverse Current                                   | I <sub>R (peak)</sub>  | 4                                  | mA   |
| Maximum Optical Input Power                           | P <sub>in (peak)</sub> | 3                                  | dBm  |
| Maximum Optical Input Power                           |                        | 7                                  |      |
| (with 7.5 k $\Omega$ serial resistance)               |                        |                                    |      |
| IC Supply Voltage                                     | V <sub>CC</sub>        | -0.5 to +3.7                       | V    |
| DCA Voltage   | $V_{DCA}$              | 0 to +4 and < V <sub>CC</sub> +0.5 | V    |
| Operating Case Temperature                            | T <sub>C</sub>         | −5 to +90                          | °C   |
| Storage Temperature                                   | T <sub>stg</sub>       | -40 to +90                         | °C   |
| Lead Soldering Temperature (Flexible Printed Circuit) | T <sub>sld</sub>       | 260 (10 sec.)                      | °C   |

# ELECTRO-OPTICAL CHARACTERISTICS ( $T_C = -5$ to $+90^{\circ}$ C, $V_{CC} = +3.13$ to +3.47 V, $\lambda = 1$ 550 nm, unless otherwise specified)

| Parameter  | Symbol            | Conditions  | MIN.  | TYP.  | MAX.   | Unit    |
|--|-------------------|---|-------|-------|--------|---------|
| APD Sensitivity                                  | S                 | λ = 1 310 nm, M = 1   | 0.75  | 0.9   |        | A/W     |
|  |                   | λ = 1 550 nm, M = 1   | 0.75  | 0.9   |        |         |
| APD Breakdown Voltage                            | $V_{BR}$          | I <sub>D</sub> = 10 μA  |       |       | 36     | V       |
| Temperature Coefficient of APD Breakdown Voltage | δ*1               |   | 0     | 0.02  | 0.05   | V/°C    |
| APD Dark Current                                 | $I_D$             | $V_R = V_{BR} \times 0.9, T_C = 25^{\circ}C$  |       |       | 0.7    | μΑ      |
| IC Supply Current                                | I <sub>CC</sub>   |   |       |       | 50     | mA      |
| DCA input Voltage                                | $V_{DCA}$         |   | 2.5   |       | 3.5    | V       |
| DCA current                                      | I <sub>DCA</sub>  |   | -30   |       | 30     | μΑ      |
| Transimpedance                                   | Z <sub>t</sub>    | Single-ended  | 3 000 | 6 000 | 10 000 | Ω       |
| Maximum Output Voltage<br>Swing                  | V <sub>clip</sub> | Single-ended  |       |       | 350    | $mV_PP$ |
| Cut-off Frequency                                | f <sub>C</sub>    | $M = 9$ , $P_{in} = -27$ dBm  | 6     | 7.5   |        | GHz     |
| RF Output Return Loss                            | S <sub>22</sub>   | 1G-6G, M = 9, Single-ended  |       |       | -5     | dB      |
| Minimum Receiver Sensitivity                     | P <sub>r</sub>    | 9.95 Gb/s,<br>BER = $10^{-12}$ , $M_{opt}$ ,<br>PRBS = $2^{31}$ –1, ER = 13 dB, NRZ |       | -27.5 | -26.0  | dBm     |
| Overload   | Po                | 9.95 Gb/s,<br>BER = $10^{-12}$ , $M_{opt}$ ,<br>PRBS = $2^{31}$ –1, ER = 13 dB, NRZ | -6.5  |       |        | dBm     |
| Optical Return Loss                              | ORL               | λ = 1 310 nm  |       |       | -27    | dB      |
|  |                   | λ = 1 550 nm  |       |       | -27    |         |

Note: \*1.  $\delta = \frac{\Delta V_{BR}}{\Delta T_{C}}$ 

### SAFETY INFORMATION ON THIS PRODUCT

| C   |      |     |
|-----|------|-----|
| Cal | utio | 911 |

GaAs Products

This product uses gallium arsenide (GaAs).

GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.

- Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.
  - Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.
- 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.
- Do not burn, destroy, cut, crush, or chemically dissolve the product.
- Do not lick the product or in any way allow it to enter the mouth.

**Revision History** 

## NR4211TH Data Sheet

|      |              | Description |                      |
|------|--------------|-------------|----------------------|
| Rev. | Date         | Page        | Summary              |
| 1.00 | Sep 13, 2012 | _           | First edition issued |