NR4211TH

RECEIVER (Limiting TIA, with DCA function)

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

R08DS0022EJ0100
Rev.1.00
Sep 13, 2012

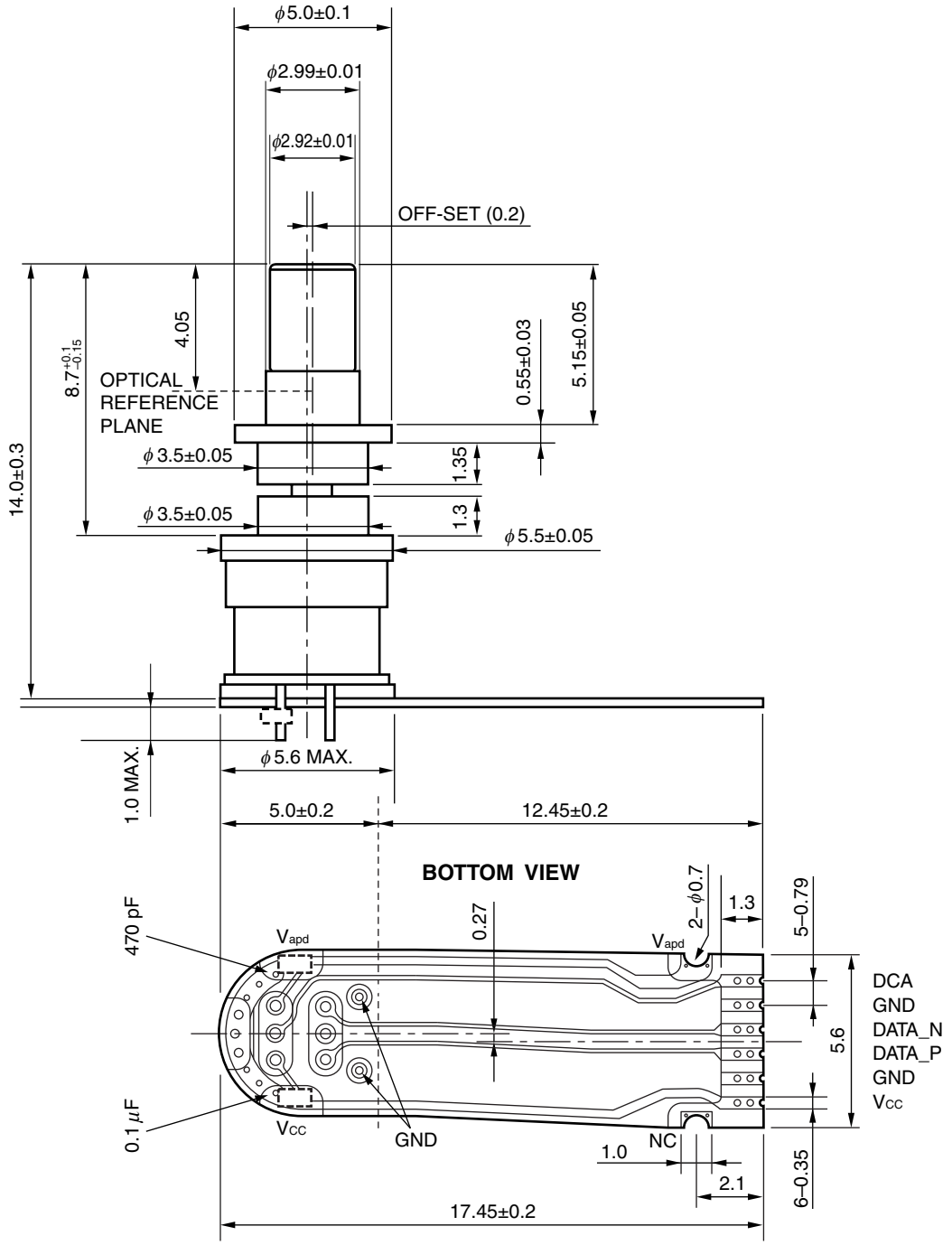
DESCRIPTION

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

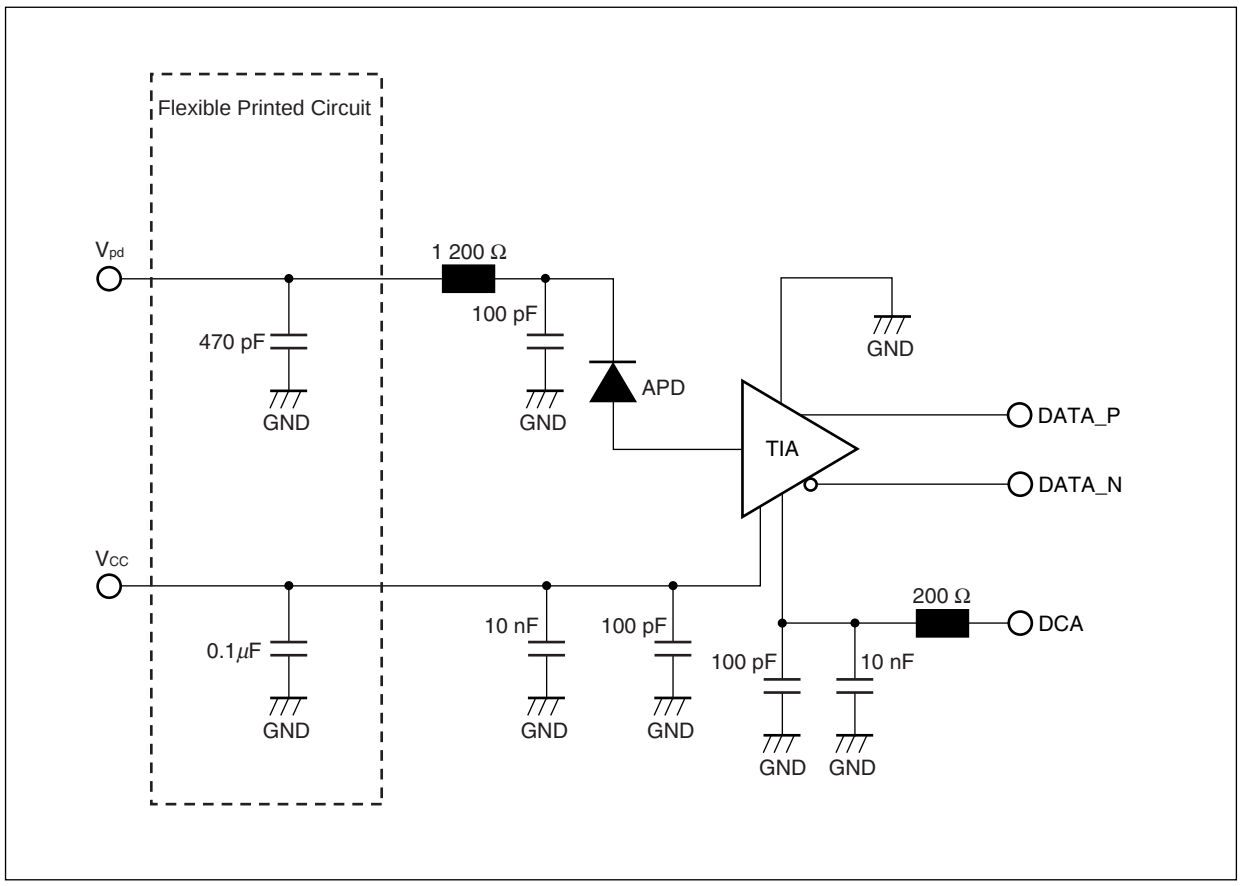
- XMD-MSA compliant ROSA
- 10 Gb/s high sensitivity InAlAs-APD
- +3.3 V transimpedance pre-amplifier
- Minimum receiver sensitivity P_r = –27.5 dBm
- Operating case temperature T_C = –5 to +90°C
- Transimpedance Z_t = 6 000 Ω (Single-ended)
- Cut-off frequency f_C = 7.5 GHz
- With DCA function (Cross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

PACKAGE DIMENSIONS (UNIT: mm)



Remark Tolerance is ±0.1 unless otherwise specified.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
APD Reverse Voltage	V_R	V_{BR}	V
APD Reverse Current	$I_{R\ (peak)}$	4	mA
Maximum Optical Input Power	$P_{in\ (peak)}$	3	dBm
Maximum Optical Input Power (with 7.5 kΩ serial resistance)		7	
IC Supply Voltage	V_{CC}	–0.5 to +3.7	V
DCA Voltage	V_{DCA}	0 to +4 and < V_{CC}+0.5	V
Operating Case Temperature	T_C	–5 to +90	°C
Storage Temperature	T_{stg}	–40 to +90	°C
Lead Soldering Temperature (Flexible Printed Circuit)	T_{sld}	260 (10 sec.)	°C

ELECTRO-OPTICAL CHARACTERISTICS
(T_C = –5 to +90°C, V_{CC} = +3.13 to +3.47 V, λ = 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_D = 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°C			0.7	μA
IC Supply Current	I_{CC}				50	mA
DCA input Voltage	V_{DCA}		2.5		3.5	V
DCA current	I_{DCA}		–30		30	μA
Transimpedance	Z_t	Single-ended	3 000	6 000	10 000	Ω
Maximum Output Voltage Swing	V_{clip}	Single-ended			350	mV_{PP}
Cut-off Frequency	f_C	M = 9, P_{in} = –27 dBm	6	7.5		GHz
RF Output Return Loss	S_{22}	1G–6G, M = 9, Single-ended			–5	dB
Minimum Receiver Sensitivity	P_r	9.95 Gb/s, BER = 10^{-12}, M_{opt}, PRBS = 2^{31}–1, ER = 13 dB, NRZ		–27.5	–26.0	dBm
Overload	P_O	9.95 Gb/s, BER = 10^{-12}, M_{opt}, 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

Caution 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. 1. 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

Rev.	Date	Description	
		Page	Summary
1.00	Sep 13, 2012	–	First edition issued

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
3. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.
   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.
   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc.
   Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.
6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.
(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

RENESAS

SALES OFFICES

Renesas Electronics Corporation

http://www.renesas.com

Refer to "http://www.renesas.com/" for the latest and detailed information.

California Eastern Laboratories, Inc.
4590 Patrick Henry Drive, Santa Clara, California 95054, U.S.A.
Tel: +1-408-919-2500, Fax: +1-408-988-0279

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

[Colophon 2.2]