ATA121302

1.25Gb/s Transimpedance Amplifier

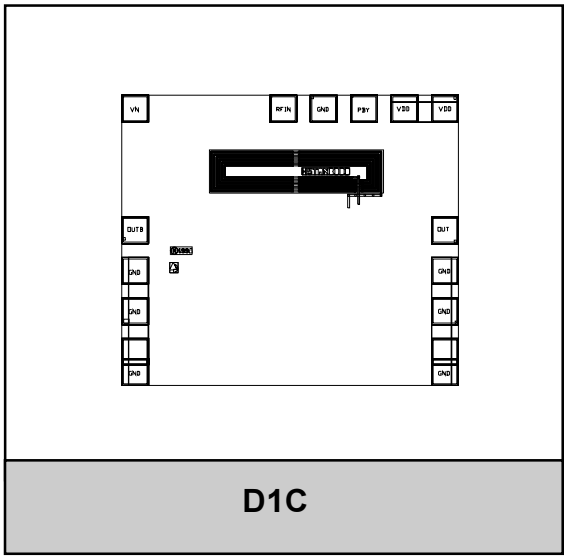
ADVANCED PRODUCT INFORMATION - Rev 0.1

FEATURES

- 1.25 Gb/s Differential Output TIA
- Automatic Gain Control
- Single +5V Supply
- 1100 MHz Bandwidth
- -28 dBm typical sensitivity
- On-Chip PIN Photodiode Bias Voltage

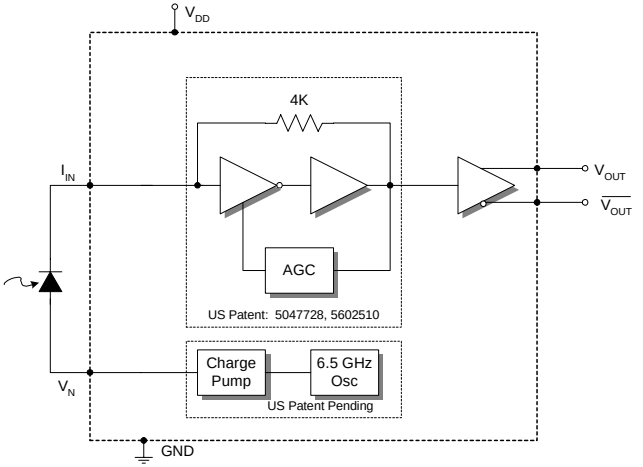
APPLICATIONS

- Gigabit Ethernet (1.250 Gb/s)
- Fibre Channel (1.0625 Gb/s)



PRODUCT DESCRIPTION

The ANADIGICS ATA121302 is a +5V low noise transimpedance amplifier designed to be used in Gigabit Ethernet and Fiber Channel fiber optic links. The device is used in conjunction with a photodetector (PIN diode or avalanche photodiode) to convert an optical signal into a differential output voltage. The ATA121302 offers a bandwidth of 1100MHz, a dynamic range in excess of 28dB and an on-chip bias voltage for PIN photodetectors. It is manufactured in a GaAs MESFET process and is available in bare die form.



The photodetector cathode must be connected to I_{IN} and the anode can be connected to V_N or ground for proper AGC operation.

Figure 1: ATA121302 Equivalent Circuit

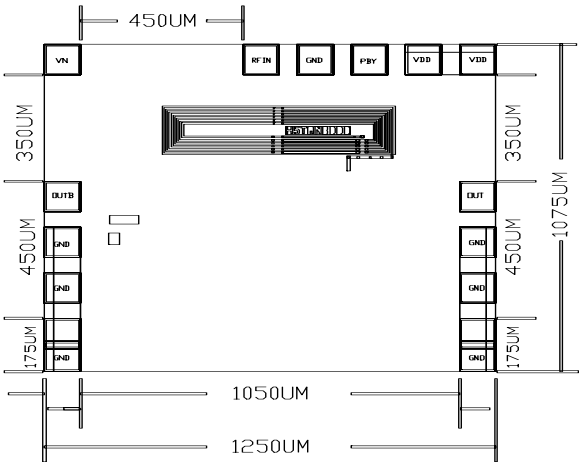


Figure 2: Bonding Pad Layout

Table 1: ATA121302 Pad Description

PAD	DESCRIPTION	COMMENT
VDD	Positive Supply Voltage	+ 5 Volts
I_{IN}	TIA Input	Connect to detector cathode for proper operation
V_N	Negative Voltage for Photodiode Biasing	Connect to detector anode for optimum performance
$\overline{V_{OUT}}$	TIA Output Voltage (Non-Inverted)	Logical '1' with optical input
V_{OUT}	TIA Output Voltage (Inverted)	Logical '0' with optical input

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Maximum Ratings

V_{DD}	7.0V
I_{IN}	3.5mA
T_S	Storage Temp. -65 ^{0}C to 125 ^{0}C

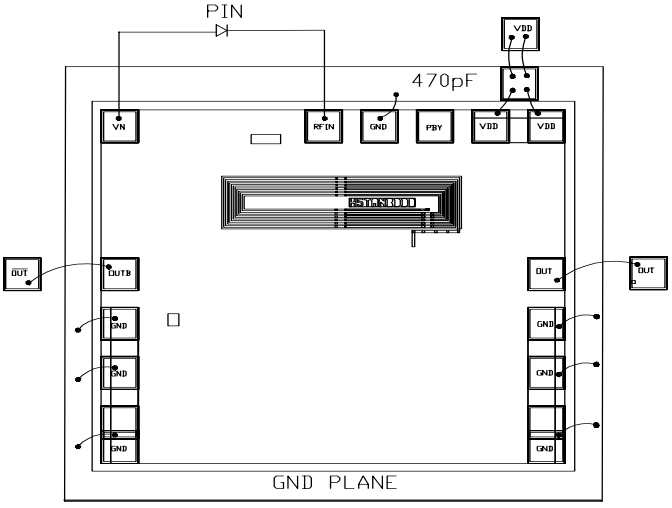
Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Table 3: Electrical Specifications (1) (T_A= 25 °C, V_{DD} =+5.0V ± 10%)

PARAMETER	MIN	TYP	MAX	UNIT
Small Signal Differential (RL = 100) Transresistance (2)	-	2.8	-	KΩ
Bandwidth	1000	1100	-	MHz
Low Frequency Cutoff	-	800	-	kHz
Input Resistance		100		Ω
Output Resistance	-	40	-	Ω
Input Offset Voltage	-	1.4	-	V
Output Offset Voltage	-	2.2	-	V
Photodiode Biasing Voltage (V_N)		-5	-	V
Optical Overload (1), (3)	-3		-	dBm
Optical Sensitivity (1), (3)	-	- 28		dBm
Input Noise Current	-		280	nArms
Differential Output Voltage (4), (5)	-	350	-	mV
T_{RISE} & T_{FALL} (20 - 80%) (5), (6)	-	280	-	ps
Duty Cycle Distortion (4), (7)	-	4	-	%
RMS Jitter (4), (7), (8)	-	20	-	ps
Total Jitter (pk-pk) (4), (7), (9)	-	100	-	ps
Supply Current	-	35	-	mA
Operating Voltage Range	+4.5	+5.0	+5.5	V
Operating Temperature Range	0	-	85	°C

Notes:

1. *Measured with a photodiode having a maximum capacitance of 0.6 pF and a minimum responsivity of 0.8 A/W.*
2. *f = 50 MHz*
3. *Measured at 10^{-10} BER with a 2^7-1 PRBS, 1.25 Gb/s.*
4. *Input optical power = -3 dBm, R_L = 100 W (differential)*
5. *Measured with a 625 MHz, 50% duty cycle square wave.*
6. *Measured differentially at -14dBm optical input power.*
7. *Measured with a 2^7-1 PRBS.*
8. *1s about the center eye crossing.*
9. *6s about the center eye crossing.*



Scribe streets are 37.5μm wide

Figure 3: ATA 121302 Typical Bonding Diagram

PERFORMANCE DATA

Figure 4: Frequency Response
(Typical Characteristics measured with a photodiode)

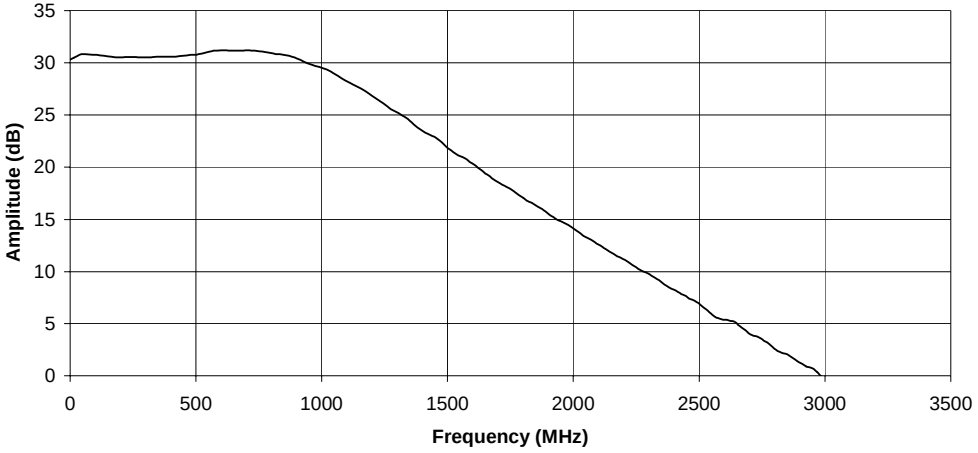


Figure 5: Eye Diagram with an Optical Input Power of –3dB

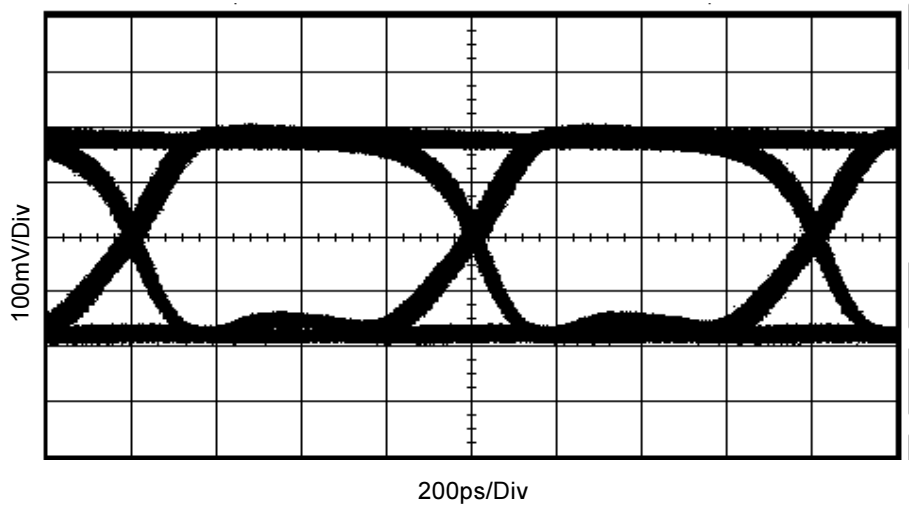


Figure 6: Eye Diagram with an Optical Input Power of –17 dBm

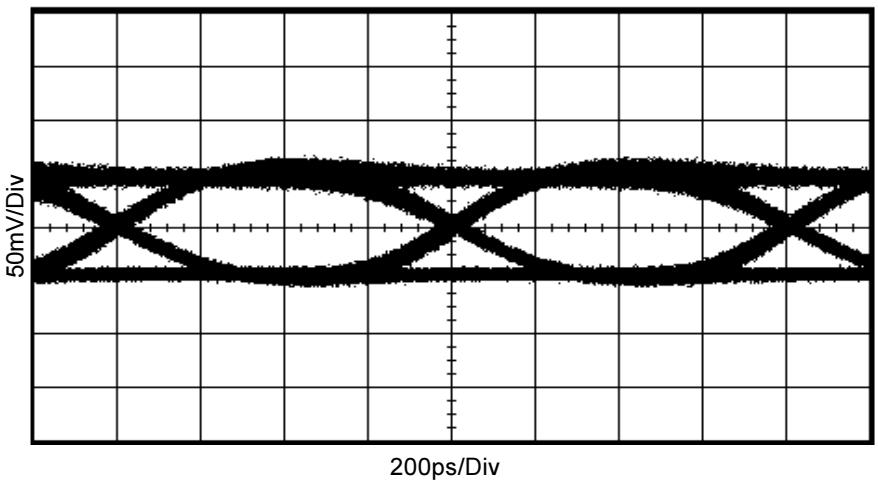


Figure 7: Supply Current vs. Case Temperature

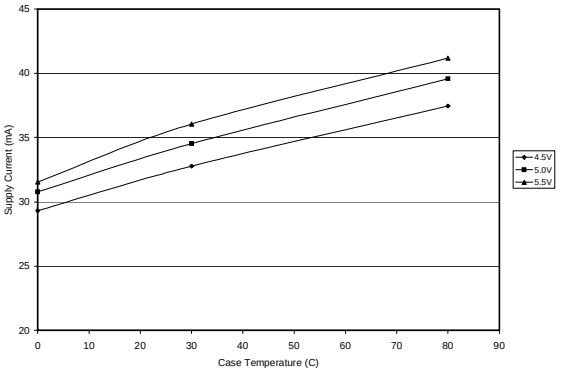


Figure 8: Bandwidth vs. Case Temperature

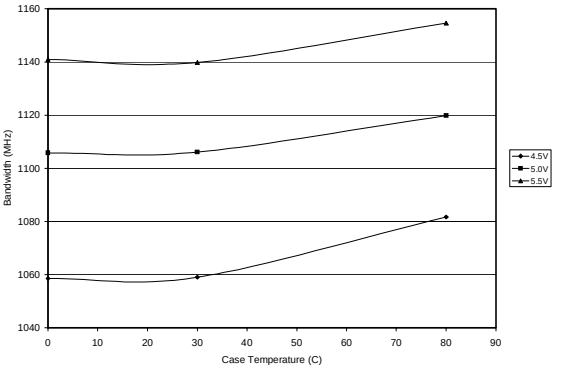


Figure 9: Differential Responsivity vs. Temperature

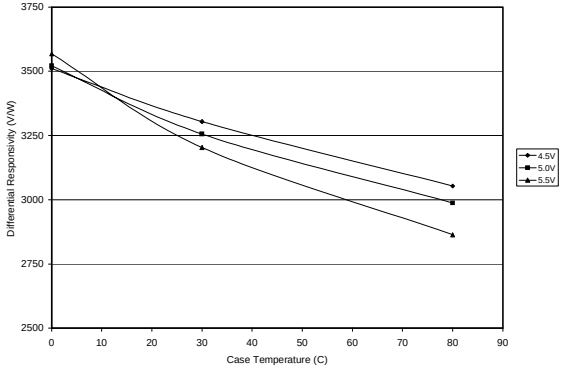
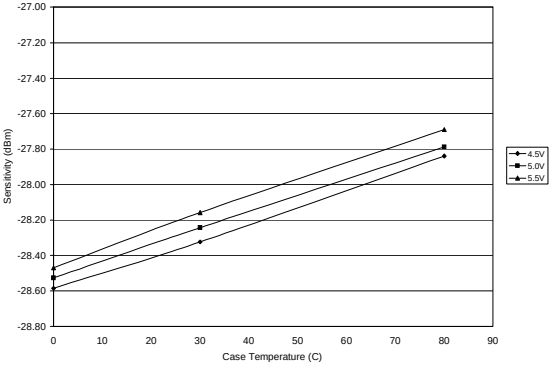


Figure 10: Sensitivity vs. Case Temperature



APPLICATION INFORMATION

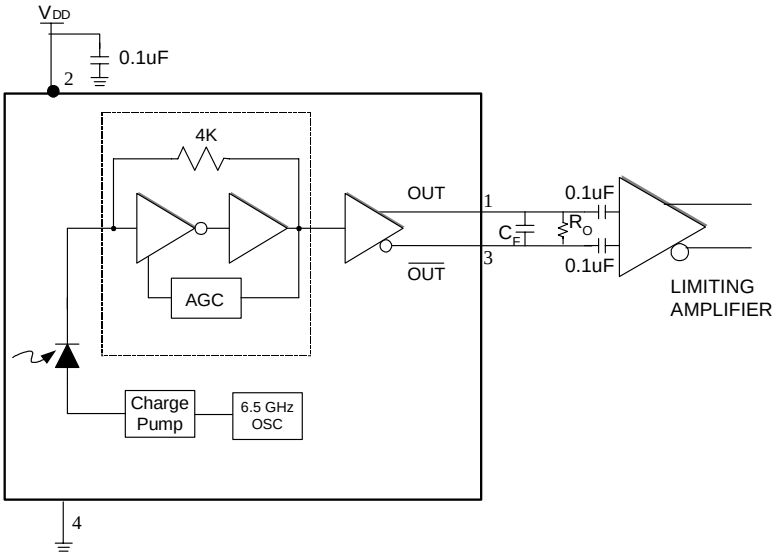


Figure 11: Application Schematic

C_F is an optional single pole noise filter

$$C_F = \frac{1}{2\pi f_c R}$$

f_c is the desired cutoff frequency

R = 50 Ω

R_O is required with high input resistance limiting amplifiers

R_O = 100 Ω

ORDERING INFORMATION

PART NUMBER	PACKAGE OPTION	PACKAGE DESCRIPTION
ATA121302D1C	D1	Die

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