

# AMT8100

1.25 Gb/s Integrated 850 nm MSM-TIA

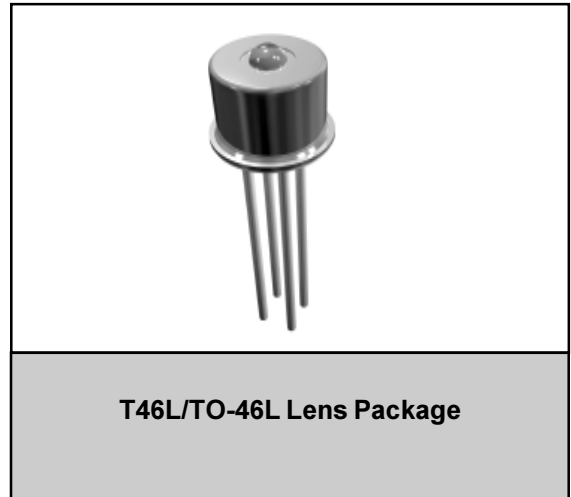
Data Sheet - Rev 2

## FEATURES

- 1.25 Gb/s Differential Output TIA
- 5.0V Operation
- Automatic Gain Control
- 850nm Photodetector with 100  $\mu\text{m}^2$  Active Area
- Integrated MSM Detector & TIA
- TO46 Lens Package

## APPLICATIONS

- Gigabit Ethernet (1.25 Gb/s)
- Fiber Channel (1.0625 Gb/s)



## PRODUCT DESCRIPTION

The ANADIGICS AMT8100 is a 5V monolithically integrated Metal-Semiconductor-Metal (MSM) photodetector and transimpedance amplifier (TIA) used to convert an 850nm input optical signal into a differential output voltage, and is manufactured in ANADIGICS' 6" GaAs wafer fabrication facility. The integrated MSM and TIA receiver maximizes the receiver performance by minimizing the photodetector input parasitics to the TIA and

internally biasing the photodetector to achieve high sensitivity, bandwidth and overload performance. As an integrated product the reliability is inherently better than a discrete solution, and both the MSM-TIA integrated circuit and TO46 lens packaged receiver pass stringent reliability requirements. These products are readily designed into receivers and transceivers for Gigabit Ethernet and Fibre Channel applications.

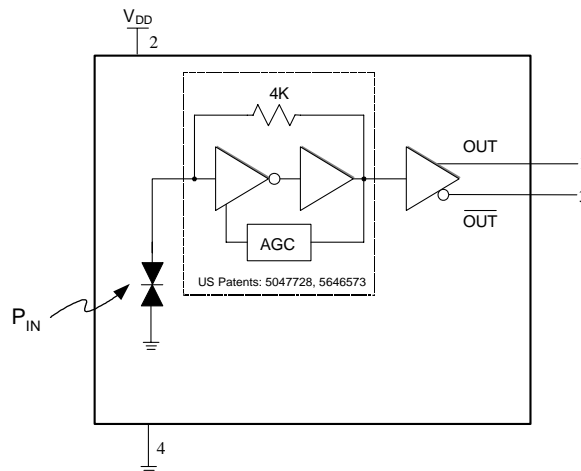


Figure 1: AMT8100T46L Equivalent Circuit

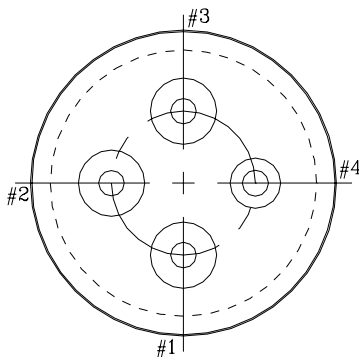


Figure 2: Pin Outline (Bottom View)

Table 1: Package Pin Description

PIN	DESCRIPTION	COMMENT
1	$V_{OUT}$ - TIA Output Voltage (Non-inverted)	Logical '1' with optical input
2	$V_{DD}$ - Positive Supply Voltage	+5 Volts
3	$\overline{V_{OUT}}$ - TIA Output Voltage (Inverted)	Logical '0' with optical input
4	Ground	Case is grounded

**ELECTRICAL CHARACTERISTICS**

Table 2: Absolute Maximum Ratings

$V_{DD}$	7.0 V
$P_{IN}$	+ 5 dBm
$T_S$	Storage Temp. - 65 °C to 125 °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 Characteristics

PARAMETER	MIN	TYP	MAX	UNIT
Wavelength ( $\lambda$ )	770	850	860	nm
Detector Active Area	-	100 x 100	-	$\mu\text{m}^2$
Small Signal Differential Responsivity <sup>(1)</sup> (@ 50 MHz)	1000	-	-	V/W
Bandwidth <sup>(1)</sup>	800	-	1500	MHz
Low Frequency Cutoff	-	300	1000	kHz
Output Resistance	25	40	60	Ohm
Optical Overload <sup>(2)</sup>	0	-	-	dBm
Optical Sensitivity <sup>(3)</sup>	-20	- 21		dBm
Differential Output Voltage <sup>(4), (5)</sup>	-	650	-	mV
TRISE & TFALL (20 - 80%) <sup>(4), (5)</sup>	-	260	-	ps
Duty Cycle Distortion <sup>(4), (6)</sup>	-	6	10	%
RMS Jitter <sup>(4), (6), (7)</sup>	-	20	-	ps
Total Jitter (pk-pk) <sup>(4), (6), (8)</sup>	-	100	-	ps
Supply Current	-	-	50	mA
Operating Voltage Range	4.5	5.0	5.5	V
Operating Ambient Temperature Range	0	-	70	°C

## NOTES:

- (1) Measured at  $-14$  dBm optical input power with output connected into  $R_L = 100\Omega$  (differential)
- (2) Measured at  $10^{-12}$  BER with a  $2^7-1$  PRBS at 1.25 GB/s
- (3) Measured at  $10^{-10}$  BER with a  $2^7-1$  PRBS at 1.25 Gb/s.
- (4) Input optical power =  $-3$  dBm,  $R_L = 100\Omega$  (differential).
- (5) Measured with a 625 MHz, 50% duty cycle square wave.
- (6) Measured with a 1.25 Gb/s,  $2^7-1$  PRBS.
- (7)  $1\sigma$  about the center eye crossing.
- (8)  $6\sigma$  about the center eye crossing.

PERFORMANCE DATA

Figure 3: Eye Diagram with an Optical Input Power of 17dBm

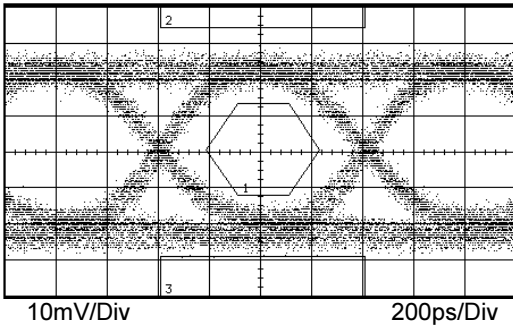


Figure 4: Eye Diagram with an Optical Input Power of -1.0dB

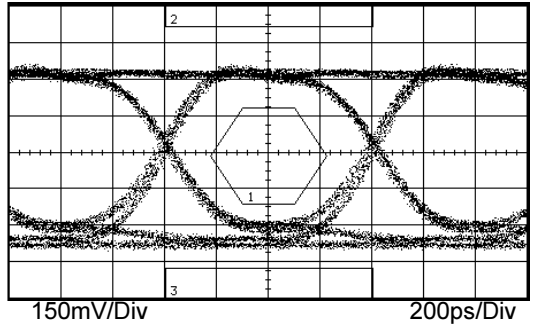


Figure 5: Supply Current vs. Temperature

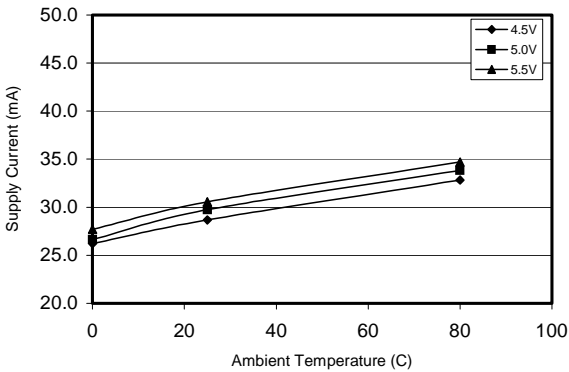


Figure 6: Bandwidth vs. Temperature

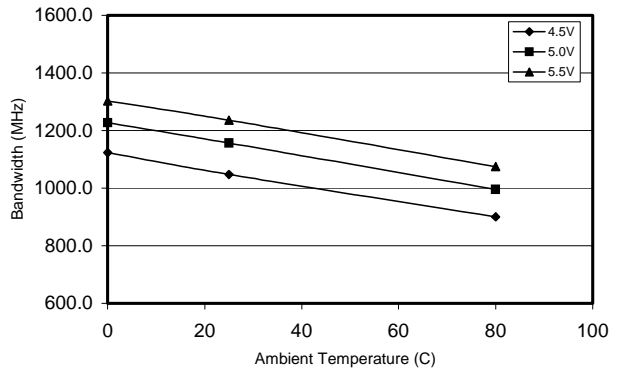


Figure 7: Differential Responsivity vs. Temperature

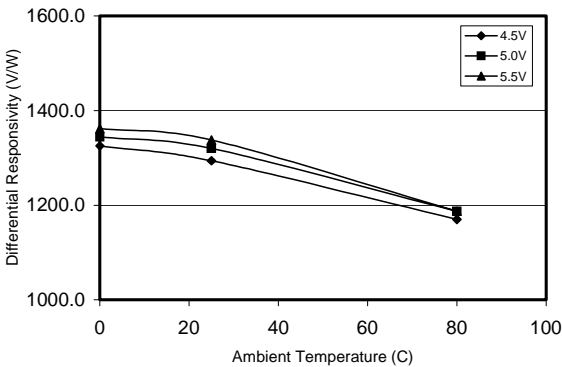
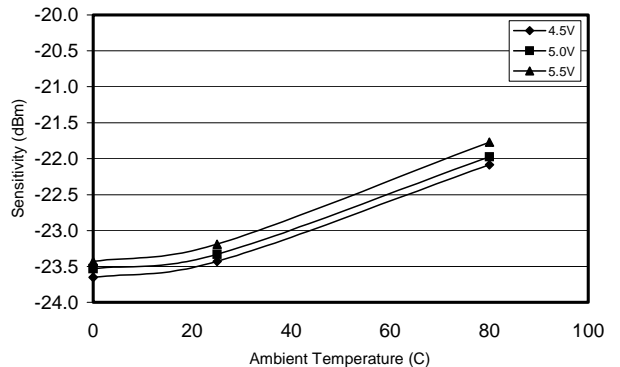


Figure 8: Sensitivity vs. Temperature



MEASUREMENT METHODS

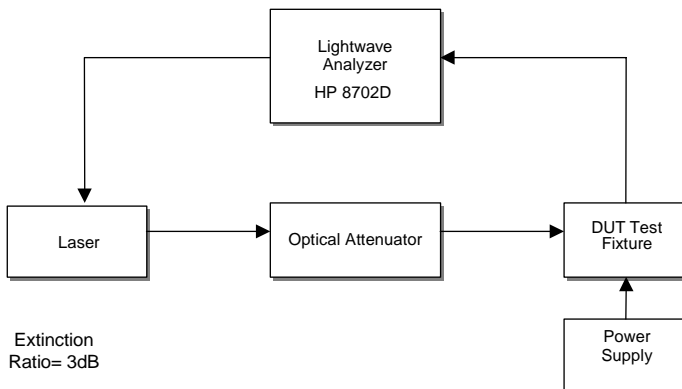


Figure 9: Test Setup for Frequency Response

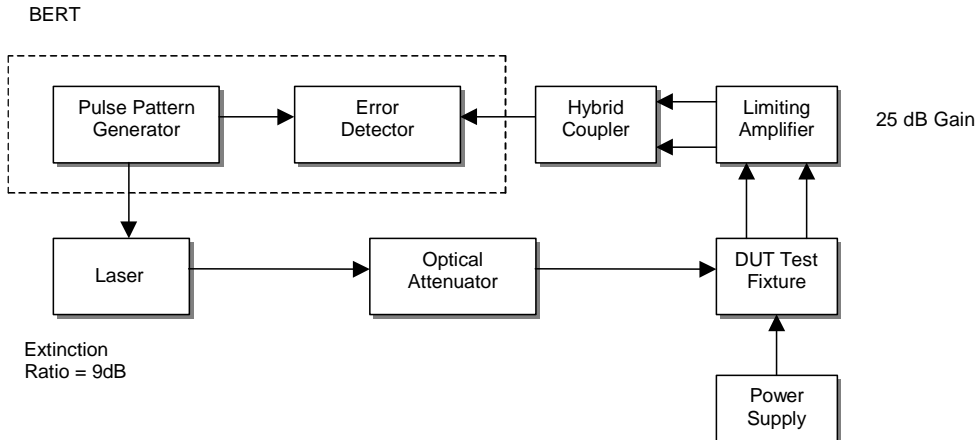


Figure 10: Test Setup for Sensitivity

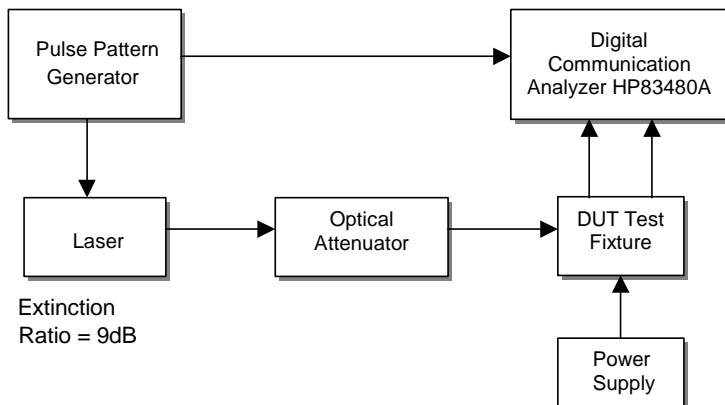


Figure 11: Test Setup for Eye Measurements

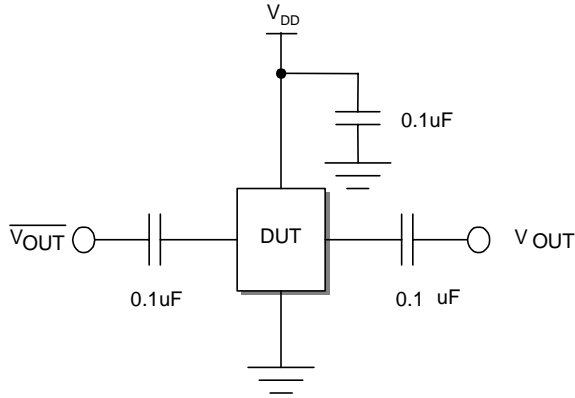


Figure 12: DUT Test Fixture Schematic

APPLICATION INFORMATION

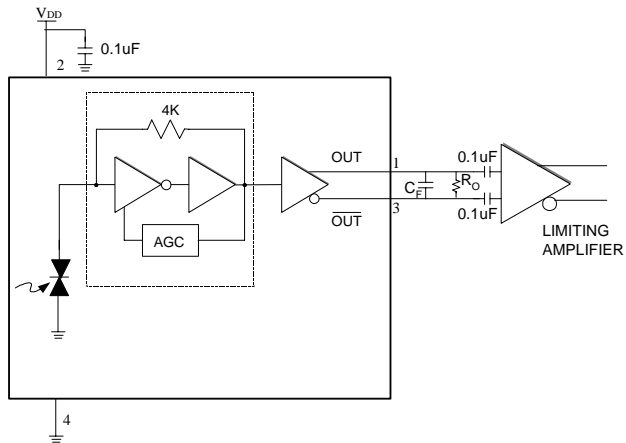


Figure 13: Application Schematic

$C_F$  is an optional single pole noise filter

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

$f_c$  is the desired cutoff frequency

$$R = 50 \Omega$$

$R_O$  is required with high input resistance limiting amplifiers

$$R_O = 100 \Omega$$

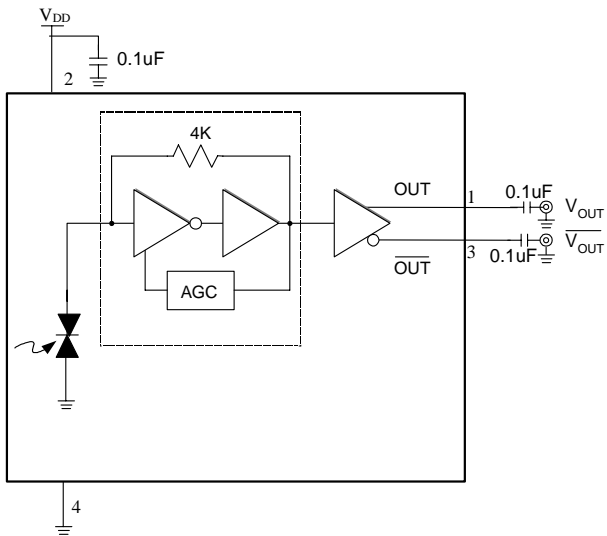


Figure 14: Evaluation Board Schematic

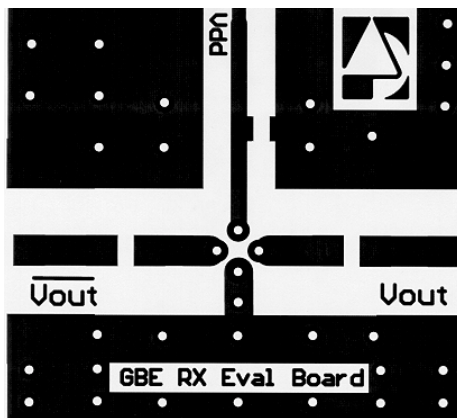
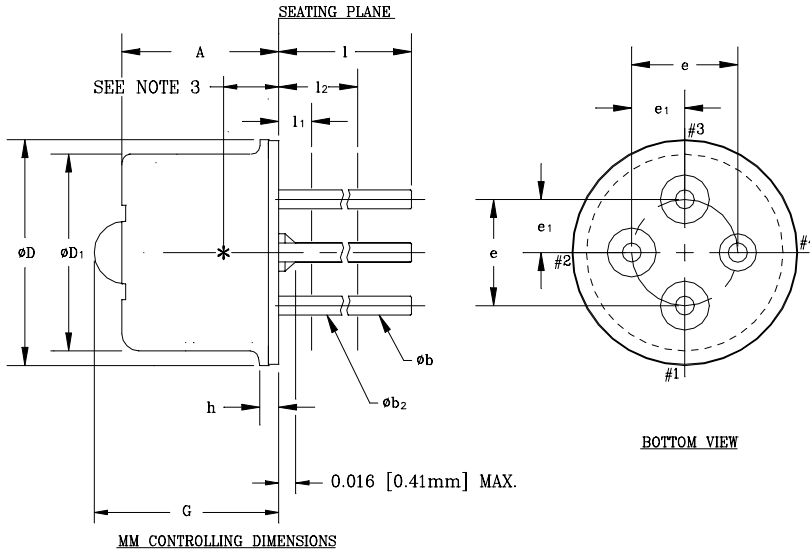


Figure 15: Evaluation Board Layout

PACKAGE OUTLINE



MM CONTROLLING DIMENSIONS

SYMBOL	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	--	0.160	--	4.00	
øb	0.016	0.020	0.41	0.51	1
øb2	0.012	0.019	0.30	0.48	1
øD	0.212	0.218	5.38	5.54	
øD1	0.181	0.187	4.60	4.75	
e	0.100	T.P.	2.54	T.P.	2
e1	0.050	T.P.	1.27	T.P.	2
h	0.014	0.022	0.36	0.56	
l	0.500	0.540	12.70	13.70	1
l1	--	0.050	--	1.27	1
l2	0.250	--	6.35	--	1
G	--	0.190	--	4.66	7

NOTES:

- (FOUR LEADS) øb2 APPLIES BETWEEN l1 AND l2. øb APPLIES BETWEEN l2 AND 0.5 [12.70mm] FROM SEATING PLANE. DIAMETER IS UNCONTROLLED IN l1 AND BEYOND 0.5 [12.70mm] TO END OF PIN.
- MAXIMUM DIAMETER LEADS AT A GAGING PLANE 0.054 [1.37mm] +0.001 [0.025mm] -0.000 [0.000mm] BELOW SEATING PLANE TO BE WITHIN 0.007 [0.178mm] OF THEIR TRUE POSITION RELATIVE TO MAXIMUM-WIDTH TAB AND TO THE MAXIMUM 0.212 [5.40mm] DIAMETER MEASURED WITH A SUITABLE GAGE WHEN GAGE IS NOT USED. MEASUREMENT WILL BE MADE AT 0.250 [6.35mm] FROM SEATING PLANE.
- INTERNAL OPTICAL HEIGHT = 0.052±0.003 [1.32±0.08] DIE PLACEMENT ACCURACY FOR REF. ONLY.
- BENT LEADS SHOULD NOT EXTEND OUTSIDE DIAMETER (øD) OF CAP OR TOUCH EACH OTHER.
- ALL DIMENSIONS ARE REFERENCE ONLY-EXCEPT A, D & h.
- DETECTOR DIODE PLACEMENT ACCURACY:  $\phi \pm 0.15\text{MM} [0.006]$  ALL DIRECTIONS
- LENS HEIGHT = 0.65±0.1 [0.026±0.004]

0-022

Figure 16: T46L Package Outline Diagram



NOTES

**AMT8100**

**NOTES**

NOTES

## ORDERING INFORMATION

Part Number	Package Option	Package Description
AMT8100T46L	TO-46L	Lens Package



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