# AMT8302

2.125 Gb/s Integrated 850nm MSM-TIA

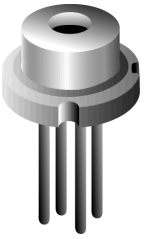
Preliminary Data Sheet - Rev 0

## FEATURES

- Differential Output TIA
- 3.3V Operation
- Automatic Gain Control
- Integrated 850nm MSM Detector & TIA
- TO-56 Ultra Flat-Window Hermetic Package
- High Reliability

## APPLICATIONS

- 2x Fibre Channel (2.125 Gb/s)



**T56F**
**TO-56 Ultra Flat Window Package**

**Product Description**

The ANADIGICS AMT8302 is a 3.3V 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 TO56 flat window packaged receiver pass stringent reliability requirements. These products are readily designed into receiversand transceivers for 2X Fibre Channel applications.

**Figure 1: AMT8302 Equivalent Circuit**

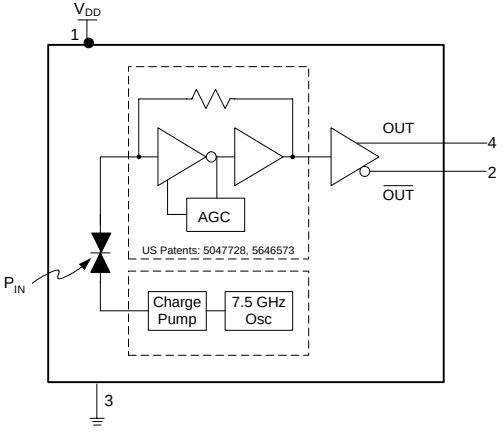


**Table 1: Absolute Maximum Ratings**

| | |
|---|---|
| $V_{DD}$ | 6.0V |
| $P_{IN}$ | +5dBm |
| $T_S$ | Storage Temp. - 65 °C to 125 °C |

**Table 2: Electrical Characteristics**

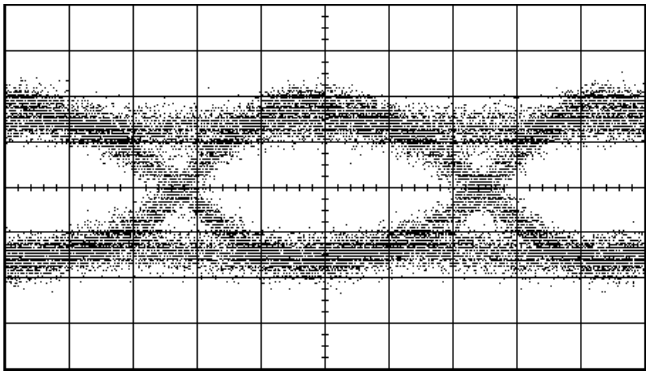
| PARAMETER | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|
| Wavelength (λ) | 770 | 850 | 860 | nm |
| Detector Diameter | - | 100 | - | µm |
| Small Signal Differential Responsivity (1) (@ 50 MHz) | 1000 | - | - | V/W |
| Bandwidth(1) | 1400 | 1900 | - | MHz |
| Low Frequency Cutoff | - | - | 300 | kHz |
| Output Resistance | - | 40 | - | Ω |
| Optical Overload (2) | 0 | - | - | dBm |
| Optical Sensitivity (2) | -19 | - | - | dBm |
| Differential Output Voltage (3) | - | 750 | - | mV |
| $T_{RISE}$ and $T_{FALL}$ (20-80%) (3) | - | 140 | - | ps |
| Duty Cycle Distortion (3) | - | 5 | - | % |
| Total Jitter (3), (4) | - | 50 | - | ps |
| Supply Current | - | 35 | 55 | mA |
| Operating Voltage Range | + 3.0 | +3.3 | +3.6 | Volts |
| Operating Case Temperature Range | 0 | - | 80 | °C |

*(1) Measured at –14 dBm optical input power with output connected into $R_L$ = 100Ω (differential)*
*(2) Measured at $10^{-10}$ BER with a $2^7$-1 PRBS at 2.125 Gb/s*
*(3) Measured with a $2^7$-1 PRBS at 2.125 Gb/s, an input optical power of -3dBm and $R_L$ = 100 Ω (differential)*
*(4) 6σ about the center eye crossing*

**Table 3: Package PIN Description**

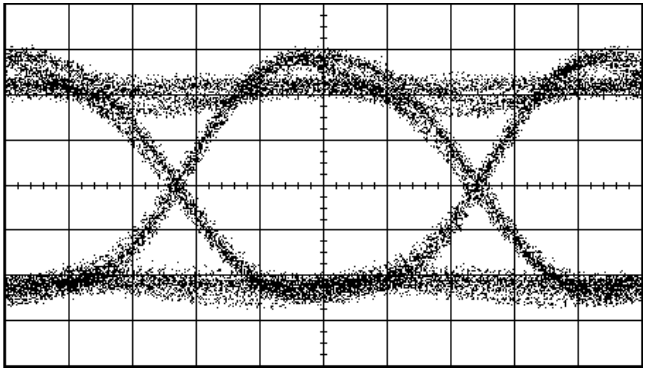
| Pin | Description | Comment |
|---|---|---|
| 1 | $V_{DD}$ - Positive Supply Voltage | +3.3 Volts |
| 2 | $\overline{V_{OUT}}$ - TIA Output Voltage (Inverted) | Logical '0' with optical input |
| 3 | Ground | Case is grounded |
| 4 | $V_{OUT}$ - TIA Output Voltage (Non-Inverted) | Logical '1' with optical input |

**Figure 2: Eye Diagram with an Optical Input Power of -18dBm**



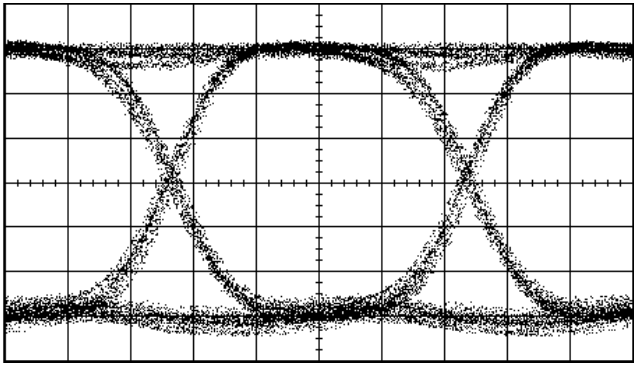
10mV/Div 100ps/Div

**Figure 3: Eye Diagram with an Optical Input Power of -8.0dBm**



60mV/Div. 100ps/Div

**Figure 4: Eye Diagram with an Optical Input Power of 0dBm**



150mV/Div. 100ps/Div

**Figure 5: Supply Current vs. Temperature**

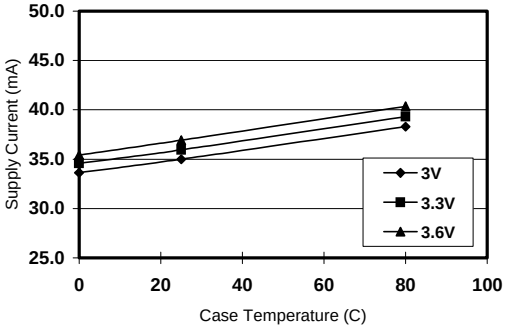



**Figure 6: Bandwidth vs. Temperature**

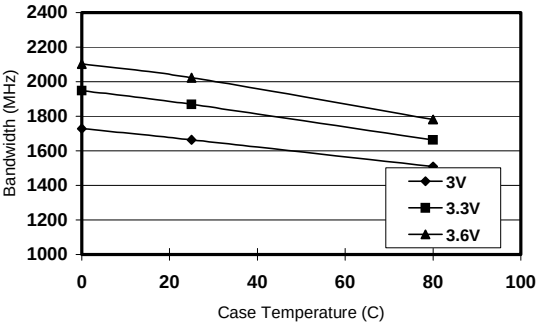



**Figure 7: Differential Responsivity vs. Temperature**

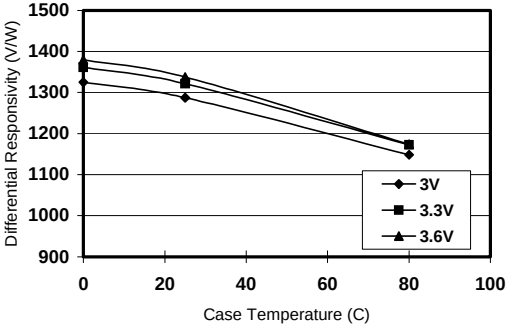



**Figure 8: Sensitivity vs. Temperature**

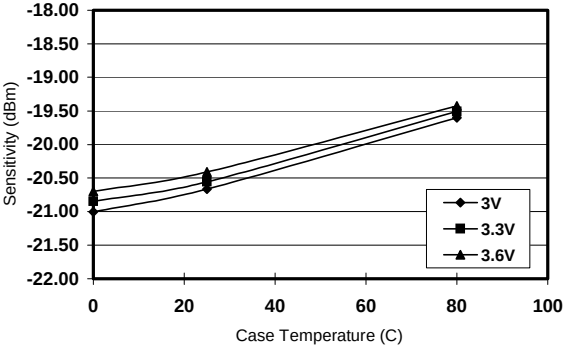


**Figure 9: Test Setup for Frequency Response**

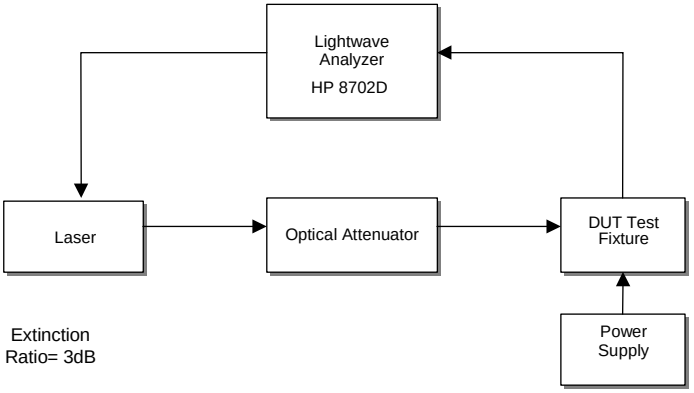



**Figure 10: Test Setup for Sensitivity**

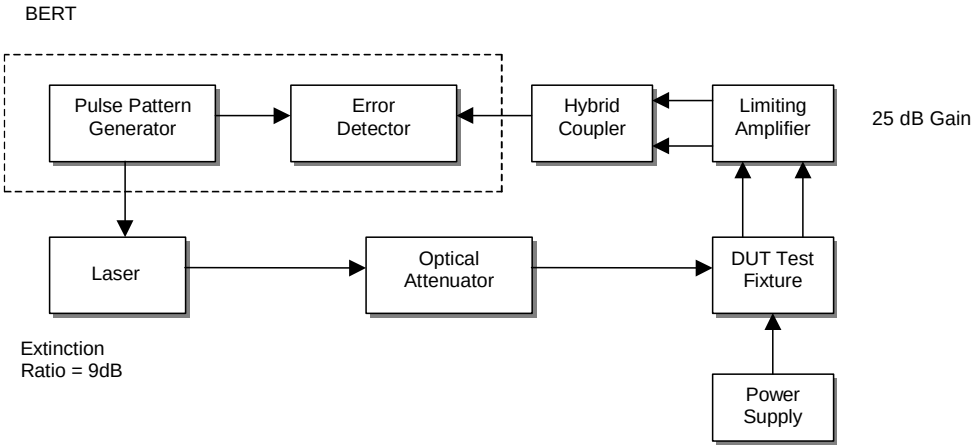



**Figure 11: Test Setup for Eye Measurements**

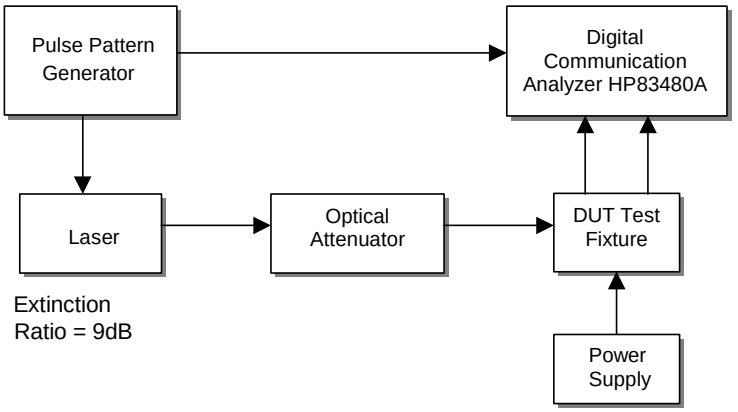


**Figure 12: DUT Test Fixture Schematic**

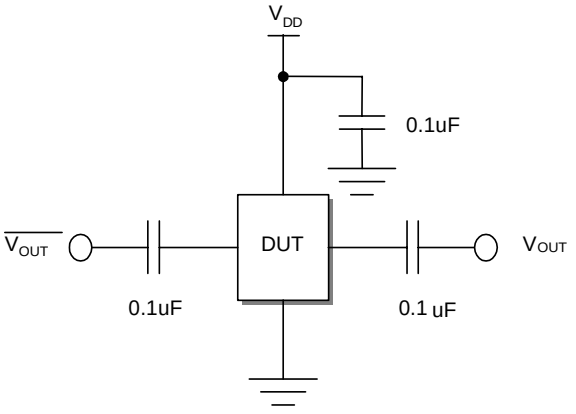
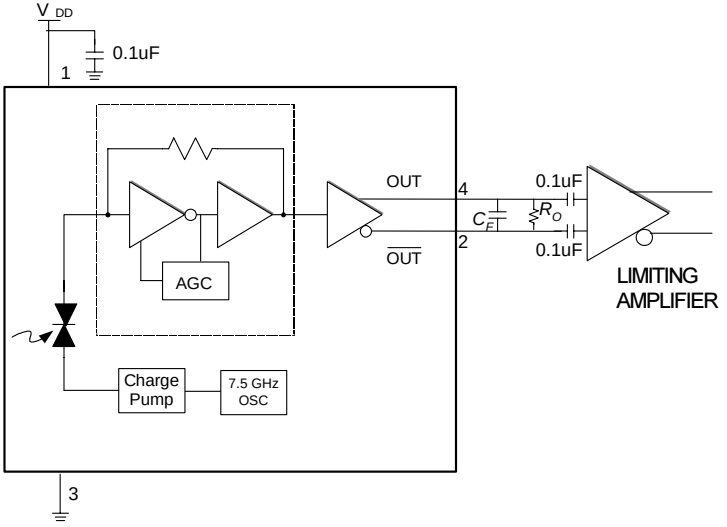



**Figure 13: Application Schematic**




$C_F$ is an optional single pole noise filter

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

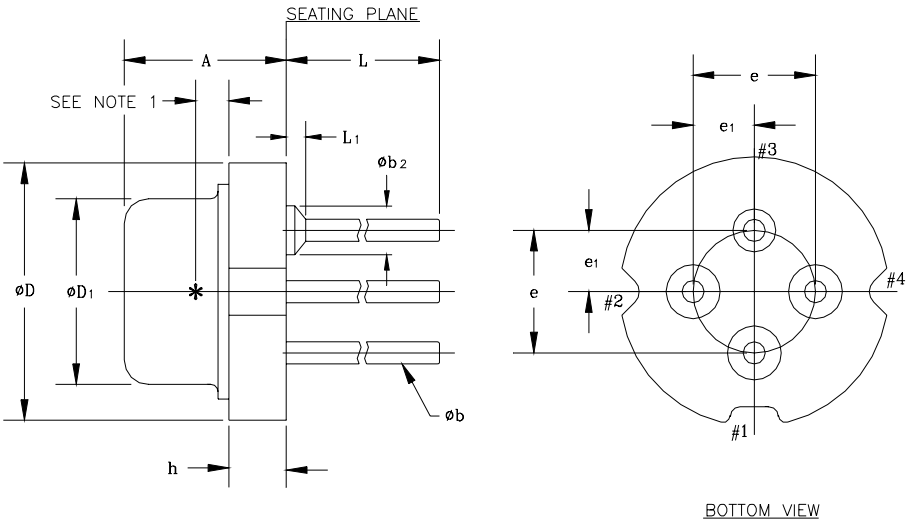
$f_c$ is the desired cutoff frequency

$R$ = 50 Ω

$R_O$ is required with high input resistance limiting amplifiers

$R_O$ = 100 Ω

## Figure14: T56F Package Outline Design




MM CONTROLLING DIMENSIONS

| SYMBOL | MILLIMETERS | | INCHES | | NOTE |
|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 3.10 | 3.50 | 0.122 | 0.138 | |
| øb | 0.41 | 0.48 | 0.016 | 0.019 | |
| øb2 | – | 0.89 | – | 0.035 | |
| øD | 5.57 | 5.60 | 0.219 | 0.221 | |
| øD1 | 3.80 | 3.90 | 0.150 | 0.154 | |
| e | 2.54 T.P. | | 0.100 T.P. | | |
| e1 | 1.27 T.P. | | 0.050 T.P. | | |
| h | 1.10 | 1.30 | 0.043 | 0.051 | |
| L | 6.00 | 7.00 | 0.236 | 0.276 | |
| L1 | – | 0.38 | – | 0.015 | |

NOTES:

1. INTERNAL OPTICAL HEIGHT = 0.70±0.04[0.028±0.0015]
2. BENT LEADS SHOULD NOT EXTEND OUTSIDE DIAMETER (øD) OF CAP OR TOUCH EACH OTHER.
3. ALL DIMENSIONS ARE REFERENCE ONLY, EXCEPT A, øD & h.
4. DETECTOR DIODE PLACEMENT ACCURACY: ⌖ 0.15MM[0.006] WITH RESPECT TO CENTER OF HEADER: REFERENCE ONLY.
5. CAN PLACEMENT ACCURACY: ⌖ 0.2MM[0.008] WITH RESPECT TO CENTER OF HEADER: REFERENCE ONLY.

## Ordering Information

| Part Number | Package Option | Package Description |
|---|---|---|
| AMT8302T56F | TO-56F | Ultra Flat Window Package |

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