ATA7602

10GB/s Offset Control TIA

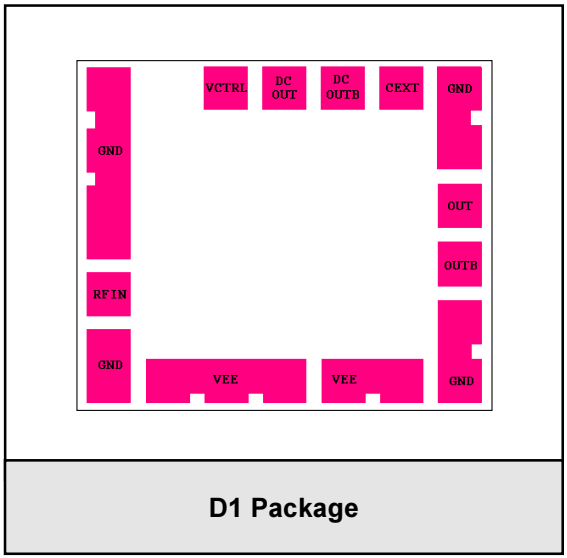
Advanced Product Information - Rev 0

FEATURES

- Differential Output Topology
- DC Output Offset Control (external loop)
- Low Group Delay
- DC Coupled Outputs
- -5.2V Power Supply
- InGaP HBT Technology

APPLICATIONS

- SONET OC-192/STM-64
- 10Gb/s DWDM
- 10Gb/s Datacom

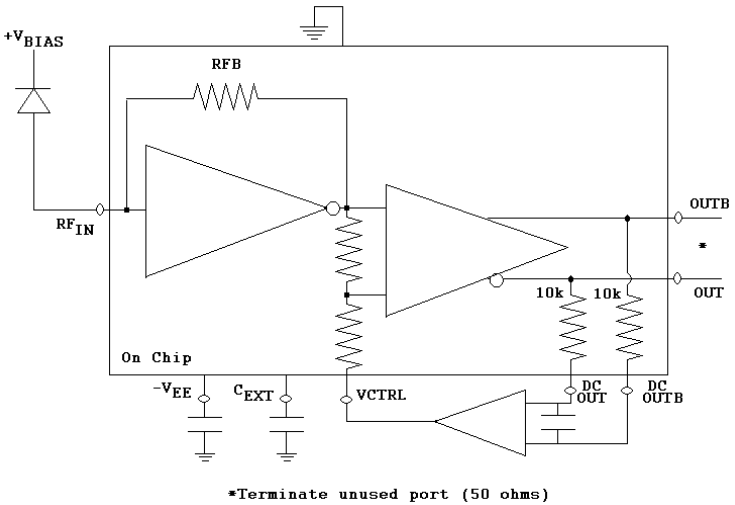


D1 Package

PRODUCT DESCRIPTION

The ANADIGICS ATA7602 is a -5.2V high speed transimpedance amplifier (TIA) for 10Gb/s applications available in bare die form and manufactured using an InGaP HBT process. The device is used in conjunction with a photodetector to convert an optical signal into a differential voltage that can be AC or DC coupled to a post amplifier. The DC offset between the two outputs can be adjusted in order to maintain low dury cycle distortion for large signal operation or to provide an adjustable decision threshold for the post amplifier.

Figure 1: Block Diagram



Absolute Maximum Ratings

PARAMETER	MIN	TYP	MAX	UNIT
DC Power supply (V_{EE})	-7.0		1.0	V
Storage Temperature	-65		125	°C
DC Input Current			3.0	mA

Operating Conditions

PARAMETER	MIN	TYP	MAX	UNIT
Operating Voltage Range	-5.50	-5.2	-4.90	V
Operating Temperature Range	-40		85	°C
Photodiode Capacitance (PIN + stray)			0.3	pF
Series Resistance (Bondwire + anode)			15	Ω
Bondwire Inductance			1.0	nH

DC Characteristics

PARAMETER	MIN	TYP	MAX	UNIT
Supply Current (DC Coupled)		115	155	mA
Input DC Voltage		-3.9		V
Output DC Voltage		-0.4		V

AC Electrical Characteristics (V_{EE}=-5.2V+/-0.3V, $C_{DIODE}+C_{STRAY}$=0.3pF, L_{BOND}=0.7nH)

PARAMETER	MIN	TYP	MAX	UNIT
Small Signal Differential Transimpedance (R_L = 100Ω)	2000	2200		Ω
Maximum Output Voltage Swing (R_L = 50Ω)	600	700	800	mVpp
Input Current @ 80% Output Saturation	550			μApp
Bandwidth (-3dB; I_{input} <= 1.65mApk-pk)	8.5	9.5		GHz
Low Frequency Cutoff (1)(4)		30		kHz
Group Delay Deviation (30kHz to 8.0GHz) (1)	-15		+15	ps
Group Delay Deviation (30kHz to Fc) (1)	-25		+25	ps
Optical Sensitivity (with a PIN Photodiode) (2)(3)(4)(5)		-19		dBm
Optical Overload (with a PIN Photodiode) (2)(3)(4)	0			dBm
Output Return Loss (10MHz to Fc)		-15	-12	dB
Output Return Loss (F_C to 20GHz)			-5	dB

(1) Optical input power = -19 to 0dBm, F_c = 9.5GHz
(2) Responsivity of the photodiode = 0.95A/W typical, laser extinction ratio=10dB
(3) BER: 10^{-10}; 9.95328Gbps NRZ pattern; PRBS 2^{31}-1, λ=1.55μm
(4) External 1nF Capacitor Required (C_{ext}: see figure 3)
(5) Measurements made in reference fixture with open cavity fiber alignment. Improvements in coupling will result in better performance.

Pad Description

PAD	Description	Comment
V_{EE1}, V_{EE}	Negative Supply Voltage	-5.2V
RF_{IN}	TIA Input	Connect to detector anode
DC OUT	Non-inverted DC Output Voltage	Feeds into External Op-amp for Offset control
DC OUTB	Inverted DC Output Voltage	Feeds into External Op-amp for Offset control
V_{CTRL}	Offset Control	Use to set relative DC offset between the output ports
C_{EXT}	Pad for bonding external capacitor to ground in order to set low freq. Cutoff)	Choose Capacitor using the attached chart
OUT	TIA Output Voltage (Non-inverted)	Logical '1' with optical input
OUTB	TIA Output Voltage (Inverted)	Logical '0' with optical input

Figure 2: Die Size and layout

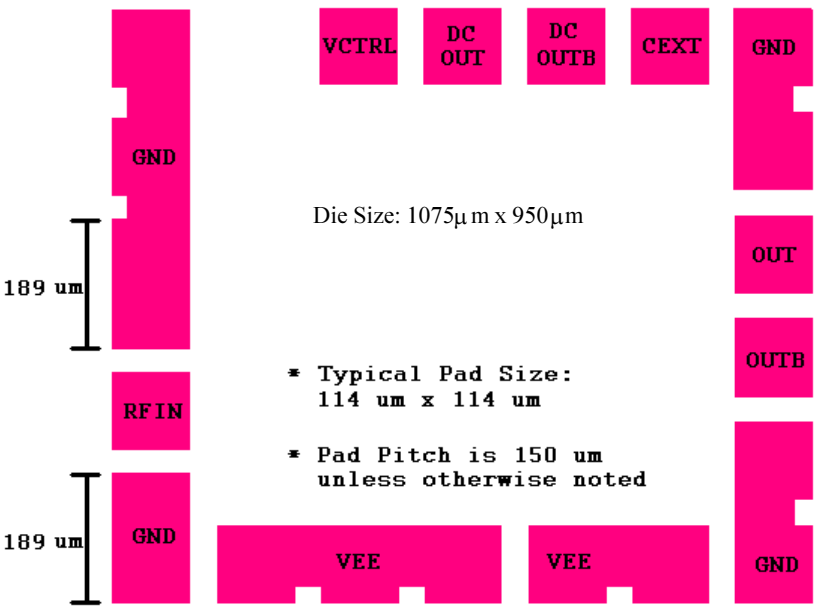


Figure 3: Calculated External Capacitor Size vs. Low Frequency Cutoff

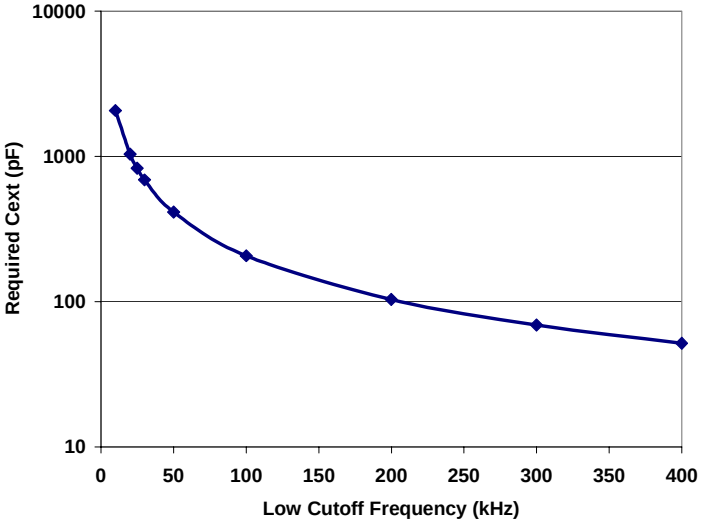


Figure 4: Simulated Bandwidth

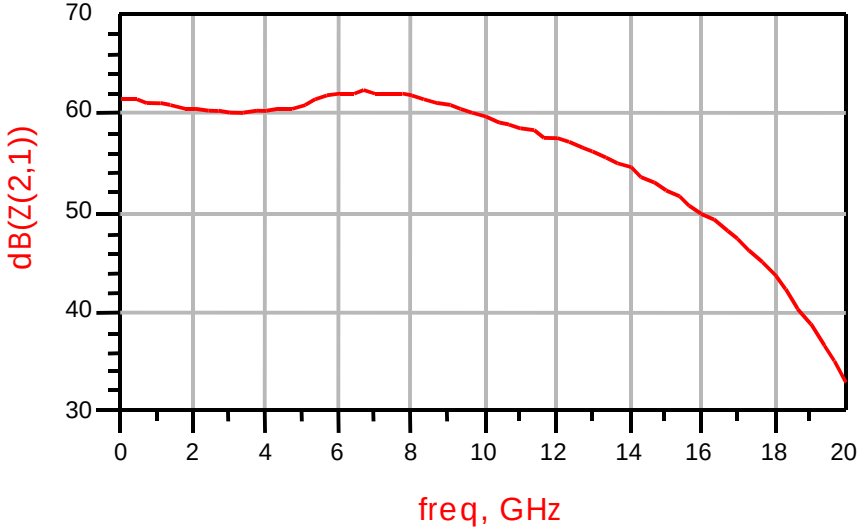


Figure 5: Simulated Group Delay

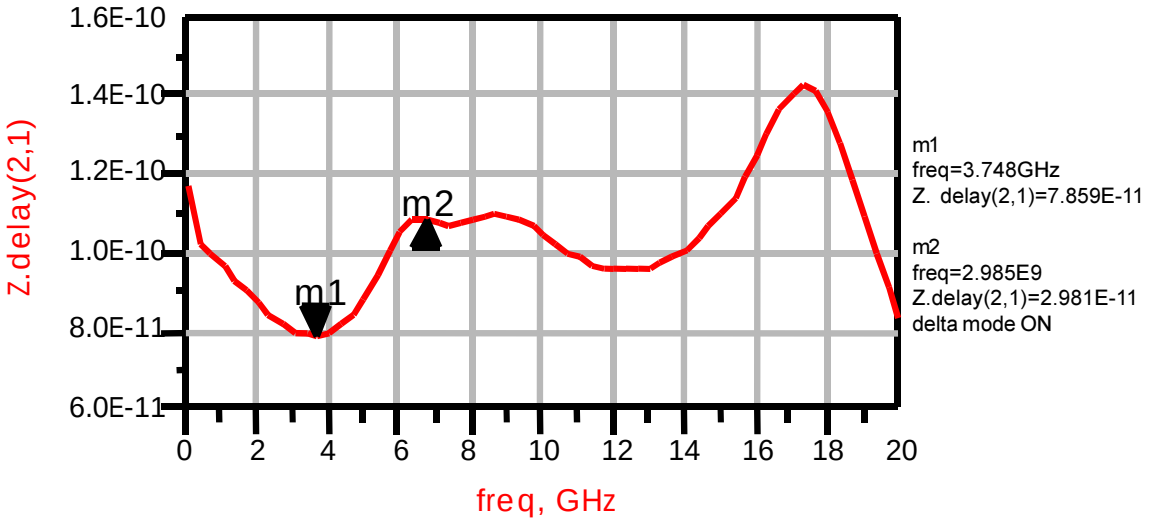


Figure 6: Simulated Bandwidth and Group Delay vs. Input Inductance

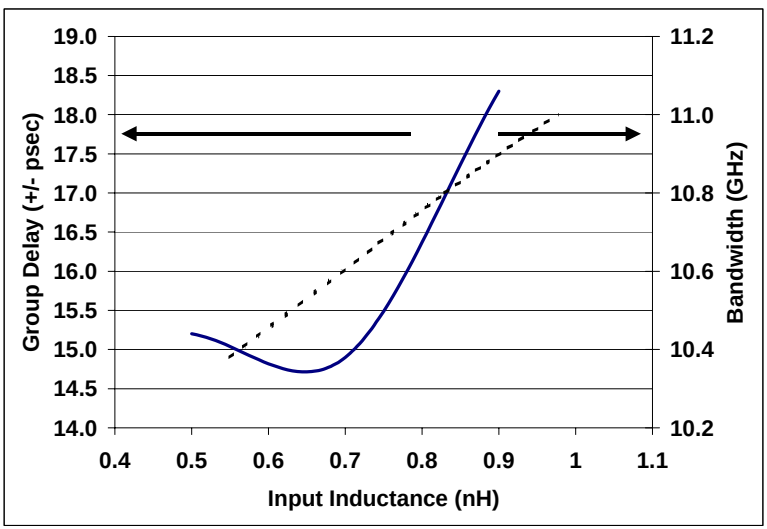
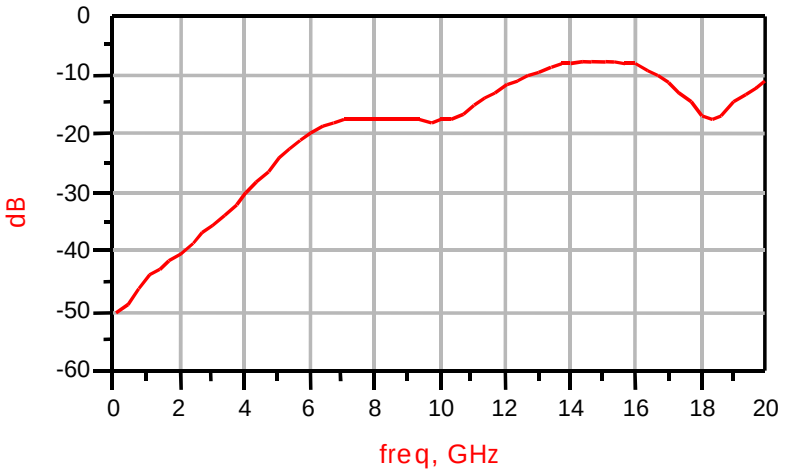


Figure 7: Simulated Output Return Loss



Ordering Information

Part Number	Package Option	Package Description
ATA7602D1	D1	Die

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