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10.7 Gbps 3.3V LOW NOISE HIGH GAIN TIA WITH PERFORMANCE MONITORS

Preliminary Technical Data **ADN2820**

FEATURES

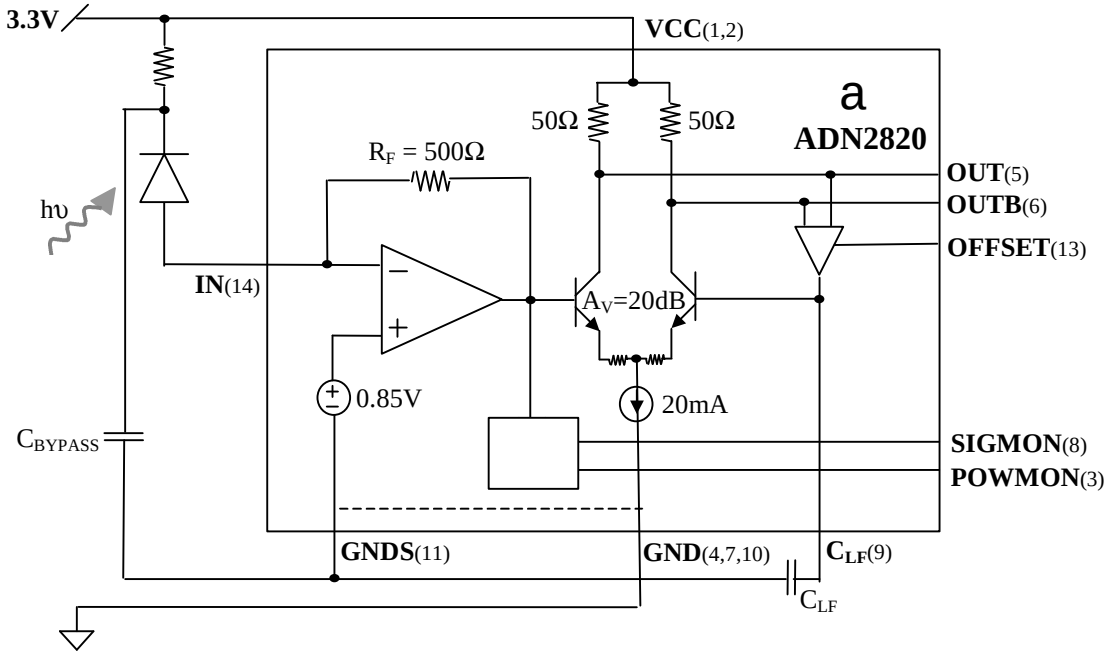
Technology: High Performance SiGe
Bandwidth: 9GHz
Input Noise Current Density: 11pA/ root Hz
Optical sensitivity: -19.3 dBm[1]
Differential Transimpedance: 5000 V/A
Power Dissipation: 250mW
Input Current Overload: 2.5mA pk-pk
Linear Input Range: 0.12mA pk-pk
Output Resistance: 50Ω / side
Output Offset Adjustment Range: ±100mV
On-Chip Performance Monitors
Average Input Power Monitor: 1V/mA
AC Input Signal Monitor: 5V/mA (pk-pk)
Die Size: 0.87mm x 1.06mm

APPLICATIONS

10.7 Gbps Optical Modules
SONET/SDH OC-192/STM-64 and 10 GbE
Receivers, Transceivers, Transponders

PRODUCT DESCRIPTION

The ADN2820 is a compact, high performance 3.3V power supply SiGe Trans-impedance Amplifier (TIA) optimized for 10Gbps Metro-Access and Ethernet systems. It is a single chip solution for detecting photodiode current with a differential output voltage. The ADN2820 features low input referred noise current and high output trans-impedance gain, capable of driving a typical CDR or transceiver directly. POWMON and SIGMON outputs are provided for input average power and input AC signal monitoring and alarm generation. Low nominal output offset enables DC output coupling to 3.3V circuits. The OFFSET control input enables output slice level adjustment for asymmetric input signals. The ADN2820 operates with a 3.3 Volt power supply and is available in die form.



ADN2820 Functional Block Diagram / Typical Operating Circuit (TOC)

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ADN2820

ELECTRICAL SPECIFICATIONS

Parameter	Conditions[2]	Min	Typ	Max	Units
DYNAMIC PERFORMANCE					
Bandwidth	-3dB	7.5	9		GHz
Total Input RMS Noise	DC to 9GHz		1.05		ì A
Small Signal Transimpedance	10MHz	4000	5000	6000	V/A
Group Delay Variation	100MHz to 3GHz 100MHz to 3 dB BW		± 10 ± 30		ps ps
Low Frequency Cut-Off	C_{LF}=0.1ì F		20	50	kHz
Output Return Loss	9GHz		-12	-10	dB
Linear Input Range	Pk-Pk, <1dB Gain Compression		0.12		mA
Input Overload Current	Pk-Pk, 10^{-12} BER		2.5		mA
Maximum Output Swing	Pk-Pk diff, $I_{IN,PK-PK}$ =2.0mA		1		V
SIGMON Sensitivity	$I_{IN,PK-PK}$ =0ì A to 200ì A		5		V/mA
SIGMON Offset	25C, 3.3V		0		mV
DC PERFORMANCE					
Power Dissipation			250		mW
Input Voltage			0.85		V
Output Common Mode Voltage	DC terminated to Vcc		Vcc-0.3		V
Output Impedance	single-ended		50		ohms
Output Offset	$I_{IN,AVE}$ < 0.1mA $I_{IN,AVE}$ < 1mA	-5 -20		5 20	mV mV
Offset Adjust Sensitivity	0.8V < Voffset < 2.8V		100		mV/V
Offset Adjust Range	0.8V < Voffset < 2.8V		±100		mV
POWMON Sensitivity	$I_{IN,AVE}$ =0mA to 1mA	0.95	1	1.25	V/mA
POWMON Offset			10		mV

[1] 10^{-12} BER, 8dB extinction ratio, 0.85 A/W PIN, responsivity, 1.1 µA RMS input referred TIA noise, SNR = 14.1 for a BER of $1x10^{-12}$

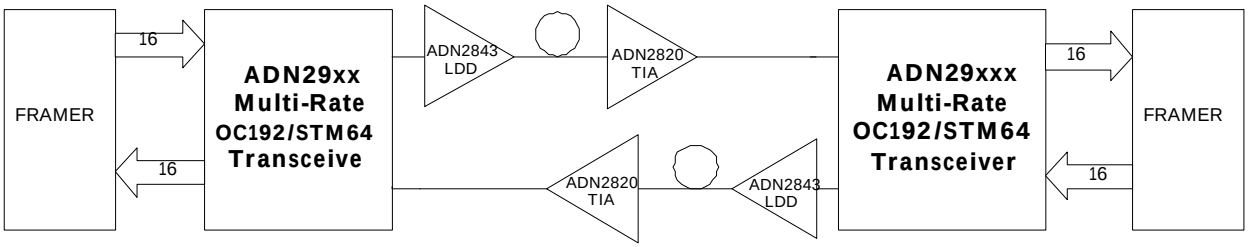
[2] Photodiode capacitance = 0.22pF ± 0.04pF, Photodiode resistance = 20Ω Input wire bond inductance = 0.85nH ± 0.15nH, Output bond wire inductance = 0.85nH ± 0.15nH
Load impedance = 50Ω (each output, DC or AC coupled)
Min/Max Vcc = +3.3V ± 0.3V, $T_{ambient}$ = -15 °C to +85°C; Typ Vcc=3.3V, $T_{ambient}$ = +25C

ABSOLUTE MAXIMUM RATINGS[3]

Supply Voltage (Vcc to Gnd) ..... TBD
Internal Power Dissipation
Output Short Circuit Duration ..... Indefinite
Maximum Input Current ..... 10 mA
Storage Temperature Range ..... -65°C to +125°C
Operating Ambient Temperature Range ..... -15°C to +85°C
Maximum Junction Temperature ..... +165°C

[3] Stresses above those listed under 'Absolute Maximum Rating' may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

SIGNAL CHAIN CONTEXT:



PAD DESCRIPTIONS:

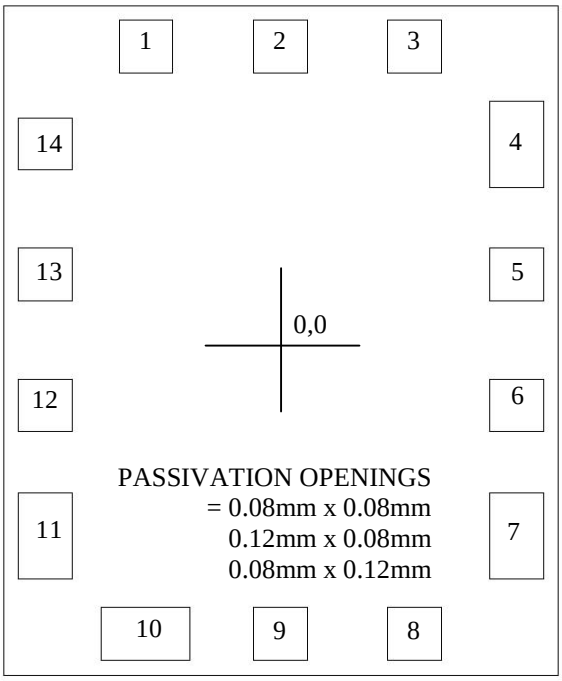
#	PAD	FUNCTION
1-2	VCC	Positive Supply. Bypass with a 100pF or greater capacitor to GND.
3	SIGMON	Input AC Signal Monitor. Analog signal proportional to AC optical input power.
4	GND	Ground
5	OUT	Positive Output. Drives 50ohm termination (AC or DC termination).
6	OUTB	Negative Output. Drives 50ohm termination (AC or DC termination).
7	GND	Ground
8	POWMON	Input Average Power Monitor. Analog signal proportional to average (AC+DC) optical input power.
9	C_{LF}	Low Frequency Cutoff set point. Connect with a 0.1ì F capacitor to GNDS for 20kHz.
10	GND	Ground.
11	GNDS	Ground Sense.
12	TEST	Test Pad. Leave floating.
13	IN	Current Input. Bond directly to reverse biased PIN or APD anode.
14	OFFSET	Offset Adjust Input.

ADN2820

DIE SIZE:

0.870mm x 1.060mm (edge-edge including 3mil scribe)

PAD LAYOUT:



PAD COORDINATES:

#	PAD	X	Y
1	VCC	-0.20mm	0.45mm
2	VCC	0.00mm	0.45mm
3	SIGMON	0.20mm	0.45mm
4	GND	0.35mm	0.30mm
5	OUT	0.35mm	0.10mm
6	OUTB	0.35mm	-0.10mm
7	GND	0.35mm	-0.30mm
8	POWMON	0.20mm	-0.45mm
9	CLF	0.00mm	-0.45mm
10	GND	-0.20mm	-0.45mm
11	GNDS	-0.35mm	-0.30mm
12	TEST	-0.35mm	-0.10mm
13	IN	-0.35mm	0.10mm
14	OFFSET	-0.35mm	0.30mm