(1)
A Gigabit Fully Integrated Plastic Optical Fiber Receiver for a RCLED Source

M. Atef, R. Swoboda and H. Zimmermann

Abstract:

The presented work describes a plastic optical fiber receiver for gigabit transmission using a resonant cavity light emitting diode (RC-LED). The integrated optical receiver is realized in 0.6μm BiCMOS technology. The main novelty of the presented design is the integration of the equalizer with the optical receiver. A large area Si photodiode is integrated with the optical receiver. The design combines a TIA, equalizer and post amplifier stage followed by a 50 Ω output driver. To minimize power supply noise and substrate noise, a fully differential design is used. A dummy TIA provides a symmetrical input signal reference and a control loop is used to compensate the offset levels. The total transimpedance of the complete receiver chain is in the range of 85dBΩ. The value of the DC gain and the corner frequency of the equalizer can be adapted via an external control voltage to adapt the design to different SI-POF lengths and RC-LED limited bandwidths. The optical receiver operates at a 3.3 V single power supply and the total current consumption is 31mA. The presented optical receiver succeeded to equalize the low-bandwidth transmission system (RC-LED and 50m POF). A data rate of 1Gbit/s can be transmitted over 50m SI-POF with a sensitivity of -13dBm at BER of 10-9

Keywords:

Equalization , Integrated Optical Receiver , Plastic Optical Fiber

Published In:

15th IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems (DDECS2012), Talline, Estonia , , pp.74-78

(2)
2.5 Gbit/s Transimpedance Amplifier Using Noise Cancelling for Optical Receivers

M. Atef and H. Zimmermann

Abstract:

This work presents the design and performance of a 2.5Gbit/s transimpedance amplifier (TIA) for optical receivers implemented in a 40nm CMOS technology. The TIA is based on an inverting voltage amplifier with a shunt feedback resistor using noise cancelling technique to reduce the input noise. The TIA is followed by two stages of differential limiting amplifiers and the last stage is a 50□ differential output driver to provide an interface to the measurement setup. The TIA shows a post layout simulated optical sensitivity of □25dBm for a BER= 10□12 and an optical power dynamic range of 25dB. The complete chip achieves a transimpedance gain of 79.5dB□, 1.5GHz bandwidth and occupies a chip area of 0.16mm2. The power consumption of the TIA is only 4.5mW and the complete chip dissipates 15mW for a 1.1V single supply voltage.

Keywords:

Bandwidth , CMOS integrated circuits , Noise cancellation , Optical amplifiers , Optical receivers , Optical sensors

Published In:

IEEE International Symposium on Circuits and Systems (ISCAS2012),Seoul, Korea , , pp.1740 - 1743

(3)
10 Gbit/s 2mW Inductorless Transimpedance Amplifier

M. Atef and H. Zimmermann

Abstract:

This work presents the design and performance of a 10Gbit/s transimpedance amplifier (TIA) implemented in a 40nm CMOS technology. The introduced TIA uses an inverter with active common-drain feedback (ICDF-TIA). The TIA is followed by a two-stage differential amplifier and a 50Ω differential output driver to provide an interface to the measurement setup. The optical receiver shows an optical sensitivity of −19dBm for a BER= 10^{-12}. The transimpedance amplifier achieves a transimpedance gain of 47dBΩ, 8GHz bandwidth with 0.45pF total input capacitance for the photodiode, ESD protection and input PAD. The TIA occupies 0.0002mm2 whereas the complete optical receiver occupies a chip area of 0.16mm2. The power consumption of the TIA is only 2mW and the complete chip dissipates 16mW for a 1.1V single supply voltage. The complete optical receiver has a 58dBΩ transimpedance gain and 7GHz bandwidth.

Keywords:

Bandwidth;CMOS integrated circuits;Impedance;Inverters;Noise;Optical receivers;Power demand

Published In:

IEEE International Symposium on Circuits and Systems (ISCAS2012), Seoul, South Korea , , pp. 1728 -1731

(4)
Optical Communication over POF Integrated Optical Receiver Technology

Mohamed Atef and Horst Zimmermann

Abstract:

This book presents high-performance data transmission over plastic optical fibers (POF) using integrated optical receivers having good properties with multilevel modulation, i.e. a higher sensitivity and higher data rate transmission over a longer plastic optical fiber length. Integrated optical receivers and transmitters with high linearity are introduced for multilevel communication. For binary high-data rate transmission over plastic optical fibers, an innovative receiver containing an equalizer is described leading also to a high performance of a plastic optical fiber link. The cheap standard PMMA SI-POF (step-index plastic optical fiber) has the lowest bandwidth and the highest attenuation among multimode fibers. This small bandwidth limits the maximum data rate which can be transmitted through plastic optical fibers. To overcome the problem of the plastic optical fibers high transmission loss, very sensitive receivers must be used to increase the transmitted length over POF. The plastic optical fiber limited bandwidth problem can be decreased by using multilevel signaling like multilevel pulse amplitude modulation or by using an equalizer for binary data transmission.

Keywords:

Equalization Techniques - High-speed Transmission through Plastic Optical Fibers - Multi-level Data Transmission - Multilevel Modulation Formats - Multilevel Signaling - Optical Communication - Optical Receiver - Optical Transmitter - Plastic Optical Fiber - Transimpedance Amplifier Theory

Published In:

Springer-Verlag, Berlin, Heidelberg , ISBN 978-3-642-30387-6 , pp. 130

(5)
8 Gbits/s inductorless transimpedance amplifier in 90 nm CMOS technology

Mohamed Atef, Francisco Aznar, Stefan Schidl, Andreas Polzer, Wolfgang Gaberl, Horst Zimmermann

Abstract:

This work presents the design and the measured performance of a 8 Gb/s transimpedance amplifier (TIA) fabricated in a 90 nm CMOS technology. The introduced TIA uses an inverter input stage followed by two common-source stages with a 1.5 k□ feedback resistor. The TIA is followed by a single-ended to differential converter stage, a differential amplifier and a 50 □ differential output driver to provide an interface to the measurement setup. The optical receiver shows a measured optical sensitivity of □18.3 dBm for a bit error rate = 10□9. A gain control circuitry is integrated with the TIA to increase its input photo-current dynamic range (DR) to 32 dB. The TIA has an input photo-current range from 12 to 500 □A without overloading. The stability is guaranteed over the whole DR. The optical receiver achieves a transimpedance gain of 72 dB□ and 6 GHz bandwidth with 0.3 pF total input capacitance for the photodiode and input PAD. The TIA occupies 0.0036 mm2 whereas the complete optical receiver occupies a chip area of 0.46 mm2. The power consumption of the TIA is only 12 mW from a 1.2 V single supply voltage. The complete chip dissipates 60 mW where a 1.6 V supply is used for the output stages.

Keywords:

Optical receiver Transimpedance amplifier OEICs

Published In:

Analog Integrated Circuits and Signal Processing , Vol. 79-No.1 , PP.27-36

(6)

Implementation of Optical Distance Measurement Using Correlation-Based and Time Stretching Technique on Digital Signal Controller

Mohamed Atef, Ehab A. Hamed, Abdu-Allah Mahfouz

Abstract:

Through this paper we aim to measure a distance using an optical signal. The distance measurement is based on the time of the flight (TOF) method via correlation technique. A method of stretching the time scale is used to decrease the operating frequency. A proof of concept using Matlab results in a distance resolution less than 17mm. The algorithm is implemented on a standalone cheap digital signal controller and the measured results show high accuracy comparable to the simulated one. The optical transmitters and optical receivers are implemented using off shelf components.

Keywords:

Distance measurement, TOF, DSC Based System, Phase Correlation.

Published In:

The 32st National Radio Science Conference (NRSC2015) , 32nd , pp. 347-354

(7)
Optoelectronic Circuits in Nanometer CMOS Technology

Mohamed Atef and Horst Zimmermann

Abstract:

This book describes the newest implementations of integrated photodiodes fabricated in nanometer standard CMOS technologies. It also includes the required fundamentals, the state-of-the-art, and the design of high-performance laser drivers, transimpedance amplifiers, equalizers, and limiting amplifiers fabricated in nanometer CMOS technologies. This book shows the newest results for the performance of integrated optical receivers, laser drivers, modulator drivers and optical sensors in nanometer standard CMOS technologies. Nanometer CMOS technologies rapidly advanced, enabling the implementation of integrated optical receivers for high data rates of several Giga-bits per second and of high-pixel count optical imagers and sensors. In particular, low cost silicon CMOS optoelectronic integrated circuits became very attractive because they can be extensively applied to short-distance optical communications, such as local area network, chip-to-chip and board-to-board interconnects as well as to imaging and medical sensors.

Keywords:

NULL

Published In:

Springer International Publishing Switzerland , ISSN 1437-0387 , pp. 240

(8)

A Fully Integrated High-Sensitivity Wide Dynamic Range PPG Sensor With an Integrated Photodiode and an Automatic Dimming Control LED Driver

Mohamed Atef, Min Wang, Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE Sensors Journal , Vol. 18 - No. 2 , pp. 652 � 659

(9)

A Low-Power High-Sensitivity Analog Front-End for PPG Sensor

Binghui Lin, Mohamed Atef, and Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

The 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC17), Jeju Island, South Korea , NULL , 861 864

(10)
60-nW Level-Crossing ADC with Adaptive Sampling for Biomedical Applications

Yuting Hou, Jiali Qu, Zhenzhen Tian, Mohamed Atef, Khalil Yousef, Yong Lian, Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

2018 ISSCC Student Research Preview (SRP) , NULL , NULL

(11)

-Low-Noise High Input Impedance 8-Channels Chopper Stabilized EEG Acquisition System

Zhengnan Yan, Mohamed Atef , and Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

the 30th international IEEE System on Chip Conference (SOCC 2017), Munich, Germany , NULL , 51 55

(12)

Low-Noise 8-Channels Chopper-Stabilized EEG Acquisition System, 8th International IEEE EMBS Conference On Neural Engineering

Z. Yan, M. Atef, G. Wang, D. Cui, M. Sawan

Abstract:

NULL

Keywords:

NULL

Published In:

8th International IEEE EMBS Conference On Neural Engineering, Shanghai, China , NULL , NULL

(13)

Wide Dynamic Range Integrated Optical Receiver for Near Infrared Spectroscopy

A. Atef, M. Atef, M. Abbas, E. M. Khaled, D. Cui, M. Sawan, G. Wang

Abstract:

NULL

Keywords:

NULL

Published In:

8th International IEEE EMBS Conference On Neural Engineering, Shanghai, China , NULL , NULL

(14)

An Ultralow-power High-gain Biopotential Amplifier for Electromyogram Signal Recording

Ehab A. Hamed, Mohamed Atef, Mohamed Abbas

Abstract:

NULL

Keywords:

NULL

Published In:

Japan-Africa Conference on Electronics, Communications and Computers (JAC-ECC) , NULL , 33-66

(15)

A 44 Gbit/s Wide-dynamic Range and High-linearity Transimpedance Amplifier in 130 nm BiCMOS Technology

X. Luo, Y. Chen, M. Atef, G. Wang

Abstract:

NULL

Keywords:

NULL

Published In:

IEICE Transaction on Fundamentals of Electronics , Communications and Computer Sciences, , E101A(2) , 438-440

(16)

1.44 mW and 60 dB Dynamic Range Optical Receiver for Near Infrared Spectroscopy

Ahmed Atef , Mohamed Atef , Mohamed Abbas, and Elsayed Esam M. Khaled

Abstract:

NULL

Keywords:

NULL

Published In:

The 28nd International Conference on Microelectronic (ICM2016), Cairo, Egypt , NULL , 21-24

(17)

-Hall Sensor System Design and Modeling for Current Measurement in Power Meters

35. Baizhong Zhou, Xunhua Guo, Mohamed Atef and Guoxing Wang.

Abstract:

NULL

Keywords:

NULL

Published In:

The 28nd International Conference on Microelectronic (ICM2016), Cairo, Egypt , NULL , 49-52

(18)

Live Demonstration: A Support Vector Machine Based Hardware Platform for Blood Pressure Prediction

Bo liang, Kefeng Duan, Qingsong Xie, Mohamed Atef, Zhiliang Qian, Guoxing Wang and Yong Lian

Abstract:

NULL

Keywords:

NULL

Published In:

2016 IEEE Biomedical Circuits and Systems Conference (BioCAS) , NULL , 130-131

(19)
PTT Based Continuous Time Non-invasive Blood Pressure System

Mohamed Atef, Li Xiyan, Guoxing Wang, Yong Lian

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE International Midwest Symposium on Circuits and Systems (MWSCAS) , NULL , pp.333-336

(20)

10 Gb/s 1.95 mW Active Cascode Transimpedance Amplifier for High Speed Optical Receivers

Diaa Abd-elrahman; Mohamed Atef, Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE International Midwest Symposium on Circuits and Systems (MWSCAS) , NULL , 775-778

(21)

A Feature Exploration Methodology for Learning Based Cuffless Blood Pressure Measurement using Photoplethysmography

Kefeng Duan, Zhiliang Qian, Mohamed Atef, Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE 38th Annual International Conference of the Engineering, in Medicine and Biology Society (EMBC) , NULL , 6385-6388

(22)

High-Sensitivity Regulated Inverter Cascode Transimpedance Amplifier for Near Infrared Spectroscopy

Ahmed Atef , Mohamed Atef, Mohamed Abbas , Elsayed Esam

Abstract:

NULL

Keywords:

NULL

Published In:

Fourth International Japan-Egypt Conference on Electronics, Communications and Computers (JEC-ECC) , NULL , 103- 106

(23)

Low-Power Transimpedance Amplifier for Near Infrared Spectroscopy

Mohamed Atef, Ahmed Atef, Mohamed Abbas

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE International Symposium on Circuits and Systems (ISCAS) , NULL , 2423-2426

(24)

Low Power Transimpedance Amplifier Using Current Reuse with Dual Feedback

Diaa Abd-Elrahman, Mohamed Atef, Mohamed Abbas, Mohamed Abdelgawad

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE Intl. Conference on Electronics, Circuits, & Systems (ICECS 2015), Cairo , NULL , 244-247

(25)

Transferring Electromyogram Signal between Limbs

Ehab A. Hamed, Mohamed Atef, Mohamed Abbas, R. R. Gharieb

Abstract:

This paper introduces a sensing and stimulation system to transfer the electromyogram (EMG) signal from one limb to another, aiming to enable self-electro-physical therapy. The presented technique depends on sensing EMG signal from one limb muscle and, simultaneously, stimulating the corresponding muscle in the other limb by this signal. The technique has been implemented on a standalone cheap microcontroller. The sensing and stimulating circuits have been implemented using off-shelf components. The delivery of the stimulating signal has been done noninvasively through surface electrodes.

Keywords:

Electromyogram, EMG, Electrical Stimulation, Rehabilitation, Peripheral nerve injury, Electro-physical therapy

Published In:

Fourth International Japan-Egypt Conference on Electronics, Communications and Computers (JEC-ECC) , NULL , 141-144

(26)
An Ultralow-Power High-Gain Biopotential Amplifier for Electromyogram Signal Recording.

Ehab A. Hamed, Mohamed Atef and Mohamed Abbas

Abstract:

This paper introduces a design for an ultralowpower electromyogram (EMG) signal amplifier with low noise operation. The design consists of two stages, the first stage is highly efficient but supply-sensitive single ended amplifier and the second stage is differential, to improve the supply rejection ratio and common mode rejection ratio. Each stage is configured with cascode MOSFET transistors to increase the gain value. The proposed design is simulated by 130 nm CMOS, and its results are reported. The design achieves 60.62 dB mid-band gain with bandwidth of 1.72kHz. Using a supply voltage of 1.1 V, the amplifier consumes 1.03 A of current. Input referred noise is 3.006 Vrms. The common mode and power supply rejection ratios are above 49.05 dB and 55.72 dB respectively.

Keywords:

Electromyogram, EMG, power supply rejection ratio (PSRR), Common mode rejection ratio (CMRR), ultralow power, current-reuse complimentary input (CRCI).

Published In:

Electronics, Communications and Computers (JAC-ECC), 2017 Japan-Africa Conference , NULL , NULL

(27)

A Low Power Programmable Gain Integrated Front-End for Electromyogram Signal Sensing

Ehab A. Hamed, Mohamed Atef and Mohamed Abbas.

Abstract:

NULL

Keywords:

NULL

Published In:

25th International Conference Mixed Design of Integrated Circuits and Systems , NULL , 103-108

(28)

A 61-nW Level-Crossing ADC with Adaptive Sampling for Biomedical Applications

Yuting Hou , Jiali Qu , ZhenZhen Tian , Mohamed Atef , Khalil Yousef , Guoxing Wang Lian Young

Abstract:

NULL

Keywords:

NULL

Published In:

TCAS II , NULL , NULL

(29)

A 1-to-1kHz, 4.2-to-544-nW, Multi-level Comparator Based Level-Crossing ADC for IoT Applications

4. Yuting Hou, Khalil Yousef, Mohamed Atef, Guoxing Wang, Yong Lian

Abstract:

NULL

Keywords:

NULL

Published In:

TCAS II , vol.65, no.10 , pp. 1390 - 1394

(30)

Towards a Continuous Noninvasive Cuffless Blood Pressure Monitoring System Using PPG: Systems and Circuits Review

Guoxing Wang, Mohamed Atef, and Yong Lian

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE Circuits and Systems Magazine (CASM) , vol.18, no.3. , pp.6-26

(31)

14.85 µW Analog Front-End for Photoplethysmography Acquisition with 142-dB Gain and 64.2-pArms Noise

Binghui Lin, Mohamed Atef, Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

Sensors , vol.19, no.512 , pp.1-13

(32)

Fully integrated wide dynamic range optical receiver for Near Infrared Spectroscopy

Ahmed Atef, Mohamed Atef, Mohamed Abbas, Elsayed Esam M. Khaled, Guoxing Wang,

Abstract:

NULL

Keywords:

NULL

Published In:

Microelectronics Journal , pp. 92-97 , pp. 92-97

(33)

A 61-nW Level-Crossing ADC With Adaptive Sampling for Biomedical Applications

Yuting Hou, Jiali Qu, Zhenzhen Tian, Mohamed Atef, Khalil Yousef, Yong Lian, Guoxing Wang

Abstract:

NULL

Keywords:

NULL

Published In:

ISSCC Student Research Preview (SRP), , NULL , NULL

(34)

A 44 Gbit/s Wide-dynamic Range and High-linearity Transimpedance Amplifier in 130 nm BiCMOS Technology

X. Luo, Y. Chen, M. Atef, G. Wang

Abstract:

NULL

Keywords:

NULL

Published In:

IEICE Transaction on Fundamentals of Electronics , Communications and Computer Sciences, E101A(2) , NULL , pp. 438-440

(35)
Low-Noise 8-Channels Chopper-Stabilized EEG Acquisition System

Z. Yan, M. Atef, G. Wang, D. Cui, M. Sawan,

Abstract:

NULL

Keywords:

NULL

Published In:

8th International IEEE EMBS Conference On Neural Engineering, Shanghai, China , NULL , NULL

(36)

Current-reuse transimpedance amplifier with active inductor

Abd-Elrahman, Diaa; Atef, Mohamed; Abbas, Mohamed; Abdelgawad, Mohamed

Abstract:

NULL

Keywords:

NULL

Published In:

ISSCS 2015 - International Symposium on Signals, Circuits and Systems , NULL , NULL