

5-Channel ECG AFE with Respiration, Pacemaker Detection and Lead-Off/Quality Detection

FEATURES

- ▶ 5 ECG acquisition channels and 1 driven reference
 - ▶ Flexible front-end arrangement allows right arm electrode or WCT referenced
 - ▶ Dedicated per channel Σ - Δ ADC
 - ▶ 50 mV typical calibration signal for gain correction
- ▶ Digital 50 Hz or 60 Hz mains power line filtering
- ▶ Flexible pacemaker detection capability
 - ▶ Digital detection algorithm on selectable 3 of 5 ECG channels
 - ▶ Programmable threshold levels
 - ▶ Dedicated high sample rate SAR ADCs
- ▶ Lead-off or lead fail detection
 - ▶ DC lead-off detection on ECG and RLD_OUT
 - ▶ Programmable polarity, current, and threshold levels
 - ▶ AC lead quality measurement
 - ▶ Programmable polarity, current
- ▶ Reference electrode drive
 - ▶ Flexible redirection to other electrodes if RLD lead failure
- ▶ Respiration measurement using impedance pneumography
- ▶ Shield drive amplifier
- ▶ Parallel ICs for larger lead count configurations
- ▶ SPI communication and 8 user programmable GPIOs
- ▶ Power
 - ▶ Low power architecture
 - ▶ Single channel ECG power: 3.04 mW
 - ▶ 3 channel ECG power: 4.95 mW
 - ▶ 5 channel ECG power: 7.64 mW
 - ▶ Designed for use with ADP5320 PMU
 - ▶ Operates from 2 or 3 voltage rails: 5 V, 1.8 V, or 1.2 V
- ▶ Packages and temperature range
 - ▶ Operating temperature range: -10°C to $+85^{\circ}\text{C}$
 - ▶ Package: 65-ball, 5.6 mm \times 6.2 mm WLCSP
- ▶ Supports medical standards: IEC 60601-2-25 Ed. 2.0 2011, IEC 60601-2-27 Ed. 3.0 2011, and IEC 60601-2-47 Ed. 2.0 2012

APPLICATIONS

- ▶ Portable and line powered ECG monitor and diagnostic measurement
- ▶ Battery powered ECG equipment

For up to date information on the production release timelines, contact your local [Analog Devices, Inc., sales representatives](#) or send an email to ADAS1021@analog.com.

SIMPLIFIED FUNCTIONAL BLOCK DIAGRAM

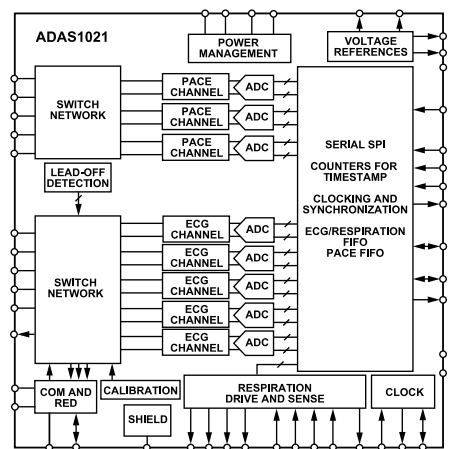


Figure 1.

GENERAL DESCRIPTION

The ADAS1021 is a highly integrated, analog front end (AFE) designed for measurement of patient biopotential information. The primary measurement performed is electrocardiogram (ECG) activity, where the ADAS1021 employs dedicated Σ - Δ analog-to-digital converters (ADCs) per channel to acquire and digitize on a lead basis. The signal acquisition is architected to support low noise, diagnostic level measurement in the presence of a variety of interferers.

The ADAS1021 also includes three dedicated successive approximation register (SAR) ADCs to digitize the high frequency pacemaker content that is analyzed by the on-chip pacemaker detection algorithm.

A dedicated and flexible impedance measurement block captures impedance variation during patient respiration and is available on multiple leads.

The ADAS1021 has a number of complementary features supporting ECG measurement: driven reference for common-mode rejection and lead-off detection that identifies if an electrode connection is degrading or has fallen off. The product also includes a shield drive amplifier to bias the shield of the cable.

NOTES