

# HM301D

## ECG analog front-end



### Fully integrated, mixed-signal diagnostic quality ECG acquisition system

STMicroelectronics' HM301D is the world's most highly integrated front-end chip for ECG (Electrocardiogram) applications. This mixed-signal device provides all of the analog and digital signal-conditioning and filtering functions required to transform the small electrical signals picked up by the electrodes attached to the patient into fully conditioned digital data that can be stored or displayed in diagnostic-quality ECG equipment.

#### KEY FEATURES

- 3 channels with integrated analog high-pass filters
- Embedded pace detection
- 1 bio-impedance channel with 2- or 4-wire measurement
- Configurable digital band-pass filtering for all channels
- Multi-chip configuration
- Maximum data rate: 125 kSPS
- Less than 1 mA/channel power consumption at full bandwidth with drivers on
- SPI serial interface
- Available in LGA 6 x 6 mm, 40 leads

#### TARGETED APPLICATIONS

- Cardiographs
- Bed side monitors
- Automatic external defibrillators
- Holter monitors
- Wearable remote monitoring
- ECG (electrocardiogram)
- EEG (electroencephalogram)
- EMG (electromyography)



The HM301D is a highly integrated diagnostic-quality biopotential acquisition system with 3 differential and one impedance channel.

Multi master/slave configuration supports up to 16 channels of simultaneous sampling (12 biopotential acquisitions and 4 bio-impedance channels).

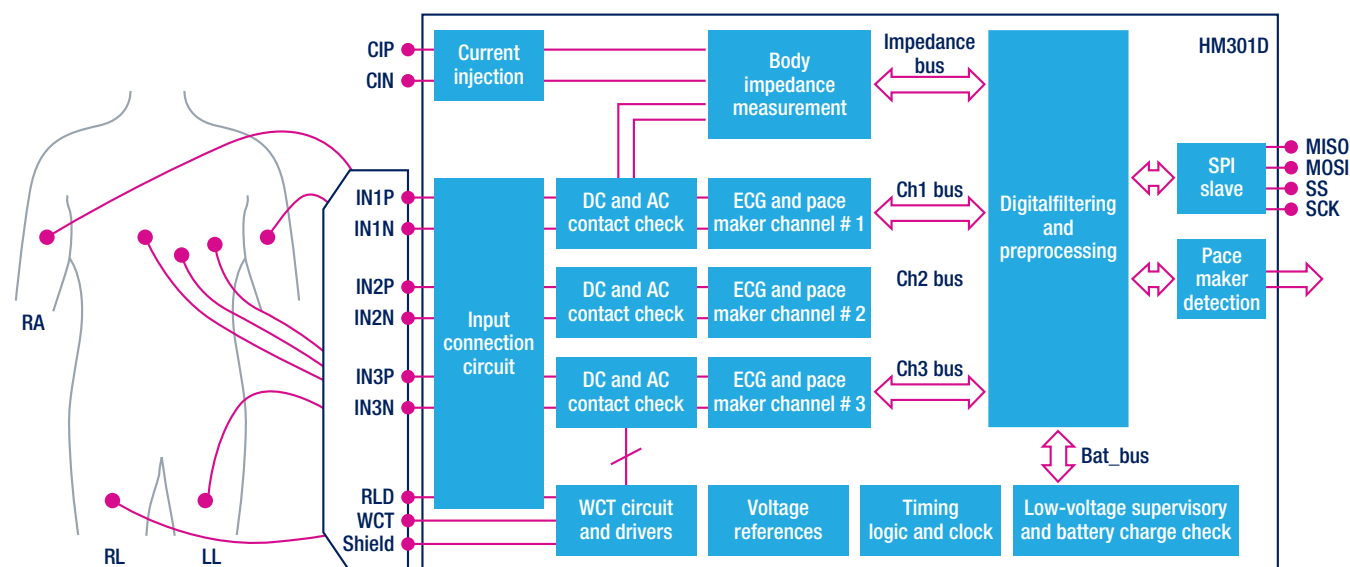
A fully integrated analog high-pass filter removes the DC component of the signal to enable the channels to work with the AC component only. Each channel provides high resolution and low noise conversion of biopotential signals up to 10 kHz. The input connection circuit matrix

guarantees maximum flexibility in terms of electrode cables and connectors. The HM301D includes a dedicated impedance measurement channel that can be used to measure both body impedance average value and variation due to respiration. This channel delivers both the real and the imaginary parts of the body and the breathing impedances.

The WCT circuit and driver block implements the driving functions (right leg driver and shield driver) and the Wilson common terminal commonly used in ECG systems. The electrode-to-skin contact is checked by injecting an AC or DC current. A digital

filtering and preprocessing (DFP) block implements configurable band-pass filters, IQ impedance demodulation and enables specific algorithm implementation for lead-off check and pacemaker detection. The SPI interface allows the exchange of data with both the microcontroller and other HM301D devices in case of chain connection. Full configurability and low power design techniques make it ideal for many applications, including battery-powered devices. High quality recordings are obtained with a small, power-saving system. It is available in a 6 x 6 mm 40-lead LGA.

## APPLICATION DIAGRAM



## PRODUCT DETAILS

Part number	Input channels typ	Impedance channel	Resolution(n) typ (b)	Gain typ (W/W)	Sample rate typ	Supply voltage min - max (V)	Current consumption typ (A)	Interface	Package
HM301D	3	Yes	16	8 - 64	125 kSPS	1.7 - 3.6	0.003	SPI	LGA 40L 6 x 6 x 0.9 mm

The STEVAL-IME002V1 and STEVAL-IME002V2 are respectively designed to demonstrate the use of HM301D in Electrocardiogram (ECG) and Automated External Defibrillator (AED) configurations.

- STEVAL-IME002V1 Multi-lead electrocardiogram (ECG) and body impedance demonstration board
- STEVAL-IME002V2 Single-lead electrocardiogram (ECG) and body impedance evaluation board

