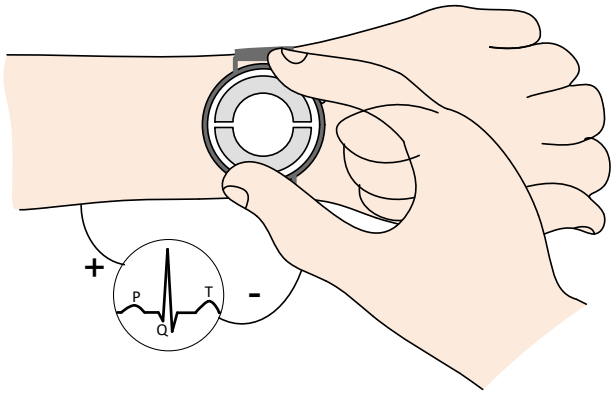
Product Overview

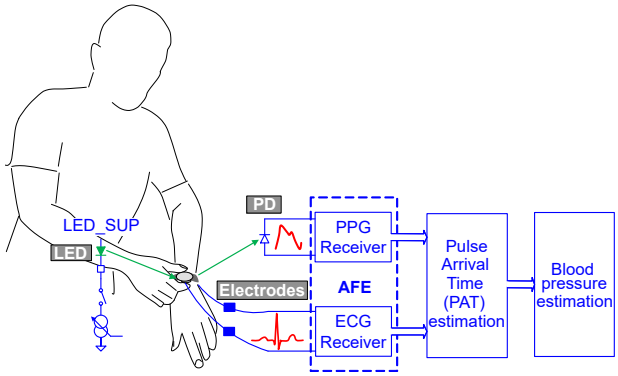
Electrocardiogram (ECG) and Cuffless Blood Pressure Monitoring With Integrated AFE

An Electrocardiogram (ECG) records the activity in the heart through the acquisition of electrical signals. The key challenges of realizing an ECG application on a wearable device with small form-factor electrodes include (i) high contact impedance from small, dry electrodes and (ii) need for a quick signal acquisition. The TI signal chain for wearable ECG has several attributes to mitigate these challenges including (i) high-input impedance, (ii) right-leg drive (RLD) which enables high common-mode rejection ratio (CMRR), and (iii) DC cancellation with fast recovery.

Cuffless blood pressure (BP) monitoring on a wearable device is based on the concept of Pulse Wave Velocity (PWV) which refers to the velocity of the pulse wave across the arteries due to cardiac activity, and can be estimated by measuring the relative delay between the ECG and photoplethysmogram (PPG) waveforms. TI analog front ends (AFE) have the capability to do synchronized acquisition of ECG and PPG waveforms, enabling cuffless BP estimation.



ECG Monitoring



Cuffless Blood Pressure Monitoring

Recommended Parts

Part Number	Description
AFE4950	Ultra-small integrated analog front end (AFE) for wearable optical heart-rate monitoring and SpO_2
AFE4960P	Two-channel ECG and PPG analog front end with integrated respiration and pace detection
AFE4500	Integrated analog front end (AFE) for bioimpedance analysis and electrical and optical biosensing

TI Resources

- *Understanding electrocardiogram (ECG) basics and lead derivation* Video
- *Electrode configurations and interface circuitry for electrocardiogram (ECG) in wearable devices* Video
- *Electrocardiogram (ECG) lead detection in wearable devices* Video
- *ECG Signal Acquisition on Wearables* Application Brief
- *Cuffless Blood Pressure Monitoring on Wearables* Application Brief
- *AFE4950 IEC test report* Application Note (under NDA)

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