

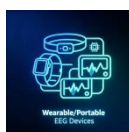
Highlights

- ✓ Single/Dual-channel low-noise analog front-end
- ✓ Ultra-low-power (supply current $\sim 140 \mu\text{A}$)
- ✓ Low input-referred noise ($\sim 1 \mu\text{Vrms}$)
- ✓ Programmable gain (360 to 2720)
- ✓ Supports dry-electrode input
- ✓ Built-in high precision 1.8 V LDO

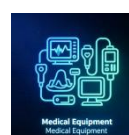
➤ Overview

FS109X Single/dual-channel, low-noise, wearable EEG-dedicated analog front-end (AFE). Pure analog output with no built-in ADC; external ADC/MCU sampling required. Key features: as low as $1 \mu\text{Vrms}$ noise + ultra-low power consumption of $140/210 \mu\text{A}$ + enhanced input impedance for dry electrode support + $3 \times 3 \text{ mm}$ QFN-20 package

➤ Target Applications



- Brain-Computer Interface (BCI) devices (EEG helmets/headsets, etc.)
- Attention/Meditation training
- Entertainment/Gaming peripherals



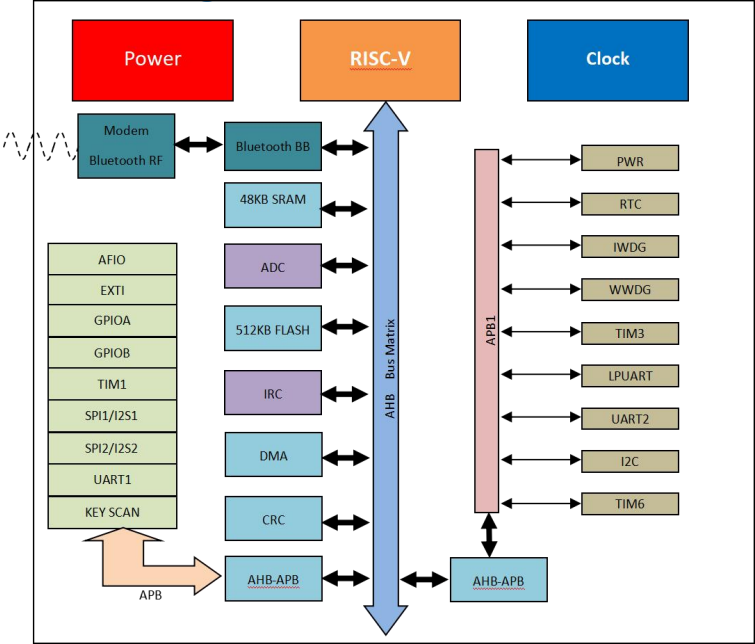
- Multi-channel EEG equipment for EEG study/brain sciences
- Weak signal detection, such as fetal ECG, EMG, etc

➤ Features

- Single/Dual-channel low-noise analog front-end
- Shut down mode: $< 0.1 \mu\text{A}$
- Common-mode rejection ratio: $\sim 100 \text{ dB}$ (DC-100 Hz)
- Digital IO level: 1.8 V to 3.6 V
- Built-in filter bandwidth: 0.05 to 200 Hz
- Built-in SPI-compatible serial interface
- Supports DC-coupled input
- $\pm 4 \text{ kV}$ HBM ESD rating
- Supply current: $\sim 140 \mu\text{A}$ (1-channel); $\sim 210 \mu\text{A}$ (2-channel)
- Low input-referred noise: $\sim 1 \mu\text{Vrms}$
- Single supply operation: 2 V to 3.6 V
- Programmable gain: 360 to 2720
- Built-in reference drive amplifier
- Supports baseline fast restoring
- Supports dry-electrode input
- $3 \text{ mm} \times 3 \text{ mm}$ QFN-20 package

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7 Block Diagram



7 Specification

Items	Parameters
Supply Voltage	2 V ~ 3.6 V
Gain	360 to 2720 (programmable)
Bandwidth	0.05 Hz to 200 Hz
Supply Current	~140 μ A (1-channel); ~210 μ A (2-channel)
Operating Temperature	0 $^{\circ}$ C ~ 70 $^{\circ}$ C (performance); -40 $^{\circ}$ C ~ +85 $^{\circ}$ C (operational)
Input-Referred Noise	~1 μ Vrms
CMRR	~100 dB (DC-100 Hz)
PSRR	85 dB (min.), 105 dB (typ.)
Shutdown Current	<0.1 μ A
Startup Time	60 μ S (min.) ~ 100 μ S (max.)
Digital IO Level	1.8 V ~ 3.6 V
ESD Rating	$\pm$ 4 kV HBM
Package Size	QFN-20 (3 mm $\times$ 3 mm)



For more info, please contact
fea@fossilicon.com

About FS108X

The FS109X (FS1091 single-channel / FS1092 dual-channel) is a single/dual-channel bioelectrical signal conditioning IC for EEG and similar weak biopotential signals, integrating PGA, filters, SPI, bias drive (reference) circuitry, high-precision references and LDO. By means of input impedance boosting it supports dry electrodes, with adjustable gain of 360-2720, and features high-pass, low-pass and fast-restore functions. The QFN package measures 3 $\times$ 3 mm, designed for wearable EEG/BCI applications with low noise, low power consumption and compact size.