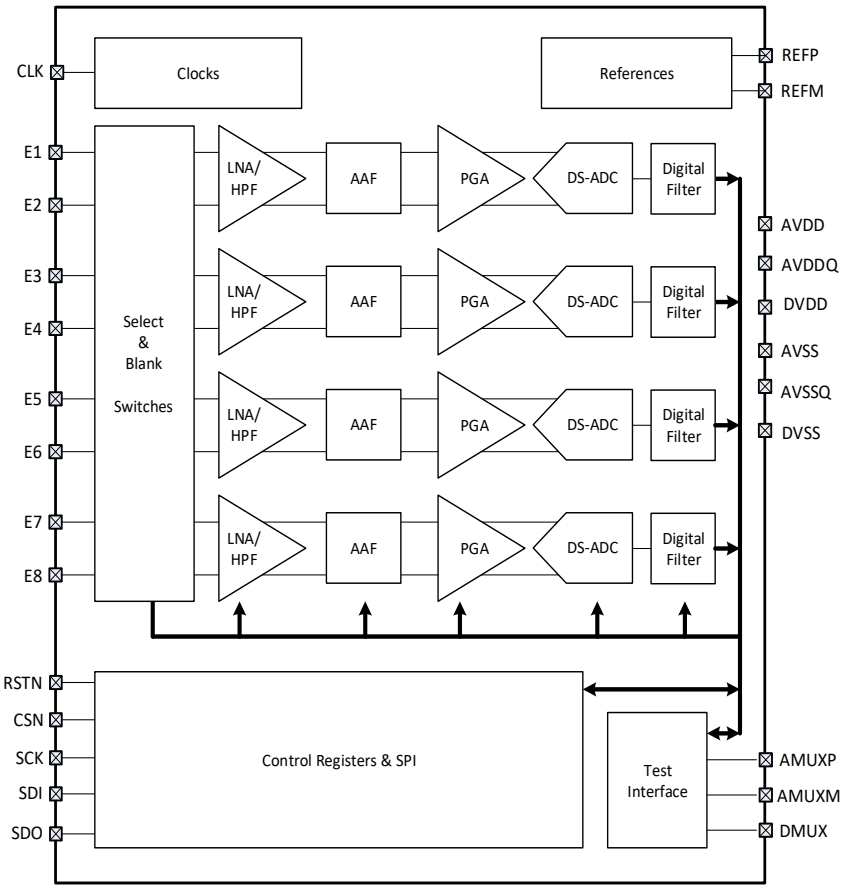
CSI080

4 Channel Neural Sensing IC
Datasheet 1.4B

FEATURES

- 4 Independent Differential Sense Channels
- Patented Closed-Loop Chopper Amplifier
- Low Input Referred Noise (350nV$_{RMS}$)
- Low-Power & Low-Noise Modes
- Programmable High-Pass Filter (1, 3, 10Hz)
- Ultra-Low High-Pass Filter Option (0.15Hz)
- High Input Impedance Option (200MW)
- Programmable Gains (100, 200, 400, 800)
- Input Select & Blank Switches
- Programmable Fast-Recovery Control
- 16-Bit Sigma Delta ADCs with SPI Readout
- Integrated Digital Filters
- 5mm x 5mm Plastic QFN Package
- WLCSP Package - available soon

CIRCUIT DIAGRAM



APPLICATIONS

- Simultaneous Neural Recording
- Closed-Loop Neuromodulation
- Biopotential Recording Simultaneous

GENERAL DESCRIPTION

The CSI080 is a 4 channel Neural Sensing IC intended for neural recording and other biopotential applications. Each of 4 independent signal paths is a low noise sensor that amplifies, filters, and converts biopotential signals to digital data. The circuit utilizes a low noise, closed-loop chopper front end amplifier to eliminate 1/f noise, thus providing enhanced signal-to-noise ratio. A dedicated 16-bit delta-sigma ADC for each channel supports true simultaneous, high-resolution recording. An input selection multiplexer provides flexibility for electrode pairing, a blanking feature provides isolation from stimulation artifacts, and a fast recovery feature enables virtually continuous sensing in the presence of stimulation. Filter corners and gains are programmable to optimize the circuit for a range of input signals. The channels can also be configured for either the lowest noise or the lowest power operation. The part is available in a 5mm x 5mm plastic QFN package, and wafer-level chip-scale packaging (WLCSP) will be available upon request.

PIN DEFINITIONS *[Preliminary]*

PIN	NAME	DESCRIPTION	.	PIN	NAME	DESCRIPTION
1	E1	Electrode 1		17	CLK	Main clock input
2	E2	Electrode 2		18	RSTN	Reset (low active)
3	E3	Electrode 3		19	AVSS	Analog ground
4	E4	Electrode 4		20	SDO	SPI data out
5	E5	Electrode 5		21	SDI	SPI data in
6	E6	Electrode 6		22	SCK	SPI clock
7	E7	Electrode 7		23	CSN	SPI chip select (low active)
8	E8	Electrode 8		24	DMUX	Digital test mux output
9	AVSSQ	Quiet Ground		25	DVSS	Digital ground
10	AVDDQ	Quiet 1.8V Supply		26	DVDD	Digital 1.8V supply
11	AVSS	Analog ground		27	AVSS	Analog ground
12	REFP	Reference Voltage 1		28	AMUXP	Analog test mux output 1
13	REFM	Reference Voltage 2		29	AMUXM	Analog test mux output 2
14	NC	No Connect		30	AVSS	Analog ground
15	AVDD	Analog 1.8V supply		31	AVDD	Analog 1.8V supply
16	AVSS	Analog ground		32	AVSS	Analog ground

SPECIFICATIONS

DESCRIPTION	MIN	TYP	MAX	UNITS
Analog Input Referred Noise		350		nV_{RMS}
High-Pass Filter Corner		1, 3, 10		Hz
High-Pass Filter Corner (Ultra-Low Option)		0.15		Hz
Analog Input Impedance		3		MΩ
Analog Input Impedance (High Z Option)		200		MΩ
Analog Input Dynamic Range	-8		8	mV
Analog Signal Gain (LNA)		100		V/V
Analog Signal Gain (PGA)		1, 2, 4, 8		V/V
Analog Signal Bandwidth		400		Hz
ADC Sample Rate		2600		s/s
ADC Resolution		16		Bits
ADC Integral Non-Linearity		5		Bits
ADC Differential Non-Linearity	-0.5		0.5	Bits
Supply Current - *Per Channel*		100		uA
DVDD / AVDD / AVDDQ Supplies	1.7	1.8	1.9	V

T_A= 0°C to 50°C, typical values at T_A= 37°C