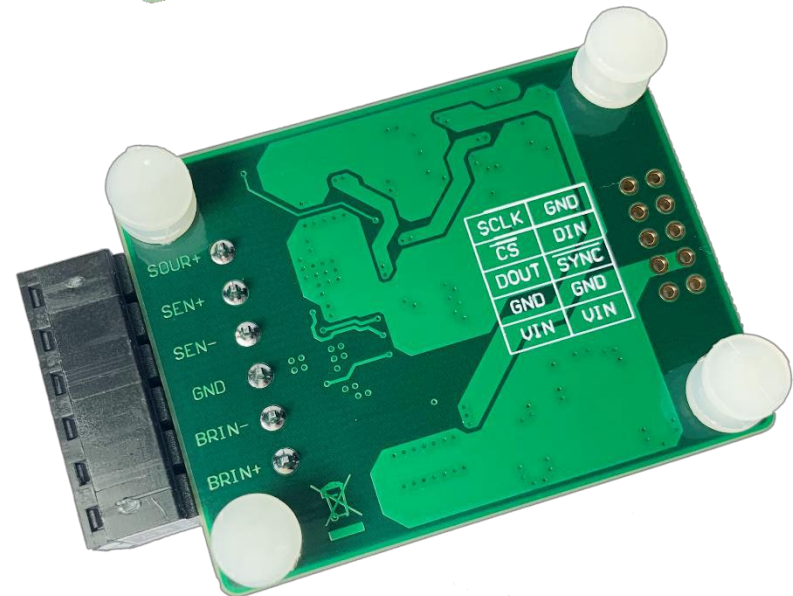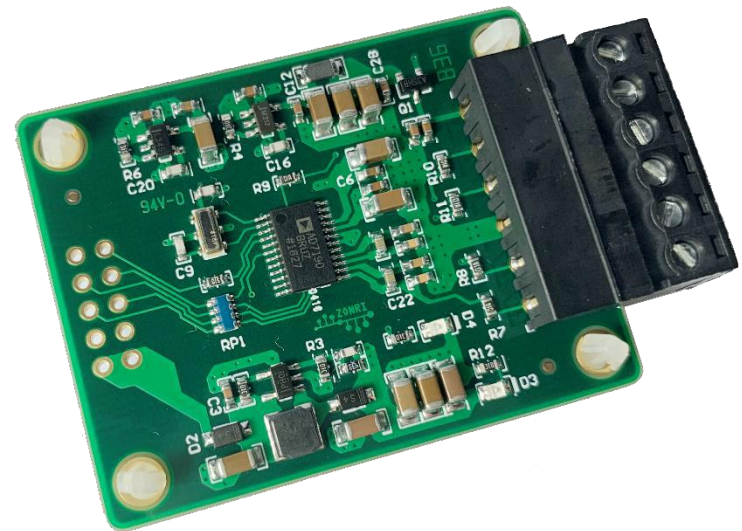# Ad7190 strain acquisition module manual

Overview:
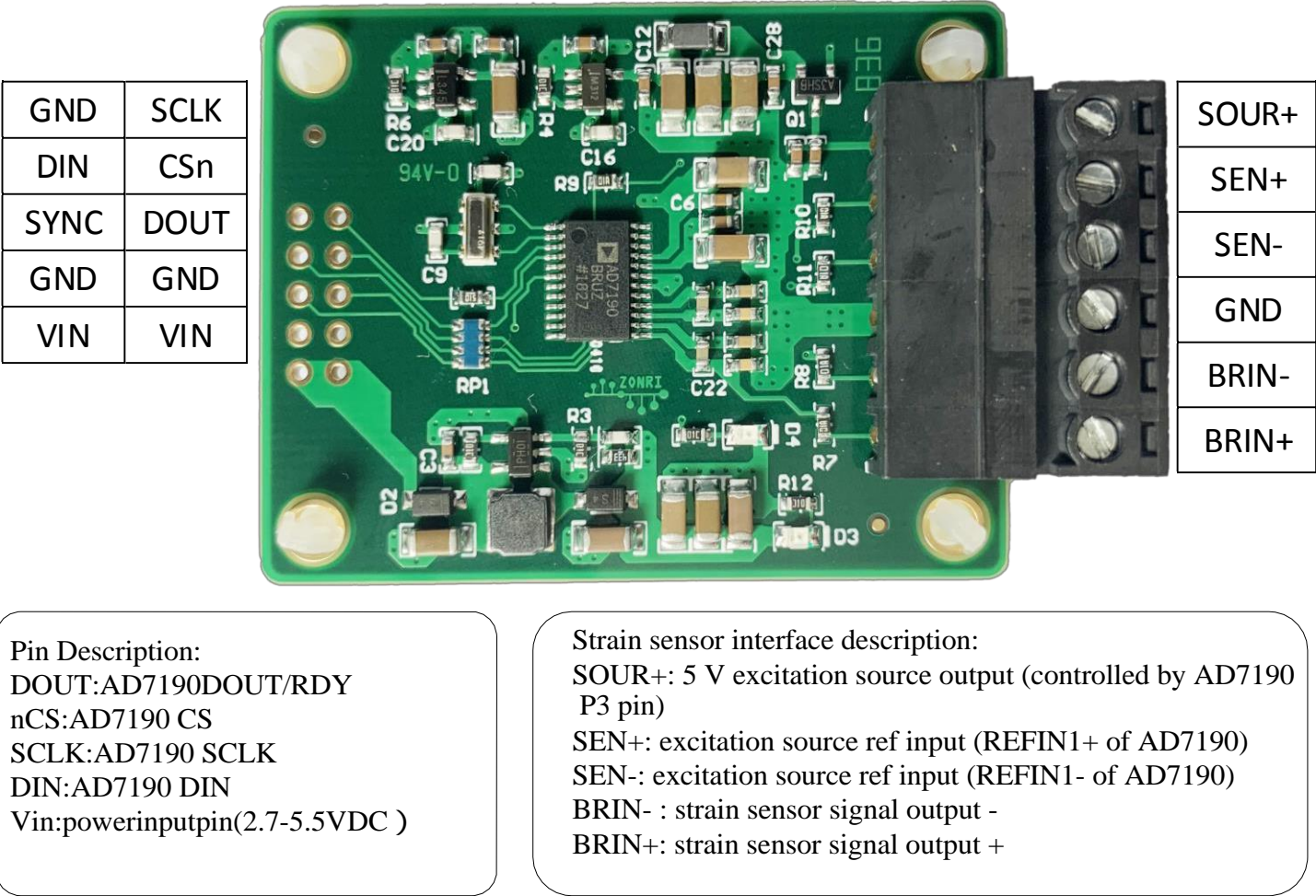
▶ Single power supply, power supply voltage (2.7v – 5.5v dc).

▶ Good data is still available when the filter is not used.

▶ Supports data update rate of 4.67-4.8Ksps. At 19.2sps/Gain=128, the typical input flicker free digit is 20Bit.

▶ When PGA=128, the input range is +-39mV.

▶Support 2mV/V or 3mV/V sensors or mount strain gages.

▶ Four layers of fr4 Pcb, in line with rohs instructions.

table of Contents:
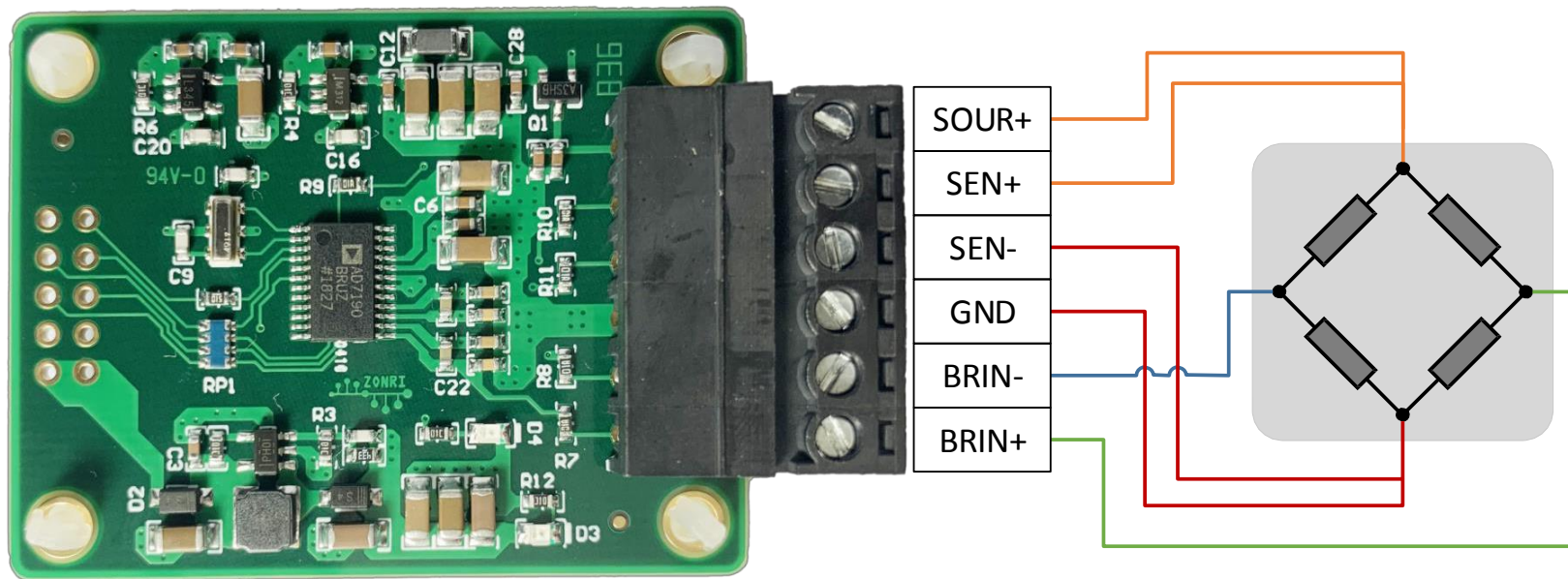
1, ad7190 strain collection module interface diagram

GND	SCLK
DIN	CSn
SYNC	DOUT
GND	GND
VIN	VIN

SOUR+
SEN+
SEN-
GND
BRIN-
BRIN+

Pin Description:
DOUT:AD7190DOUT/RDY
nCS:AD7190 CS
SCLK:AD7190 SCLK
DIN:AD7190 DIN
Vin:powerinputpin(2.7-5.5VDC

Strain sensor interface description:
SOUR+: 5 V excitation source output (controlled by AD7190 P3 pin)
SEN+: excitation source ref input (REFIN1+ of AD7190)
SEN-: excitation source ref input (REFIN1- of AD7190)
BRIN- : strain sensor signal output -
BRIN+: strain sensor signal output +

|	
SOUR+	
SEN+	
SEN-	
GND	
BRIN-	
BRIN+	

NOTE:

When the sensor leads are long, it is recommended to use a six-wire connection. Connect SOUR+ and SEN+ to the positive end of the strain bridge excitation source, and connect GND and SEN- to the negative side of the strain bridge excitation source. The AD7190 strain scheme is based on the strain bridge excitation voltage.

The strain signal is amplified by the AD7190's internal 128-fold (configurable) gain and sent to the ADC, eliminating the need for a voltage reference and avoiding the errors caused by this part of the circuit.

2, ad7190 strain acquisition module block diagram
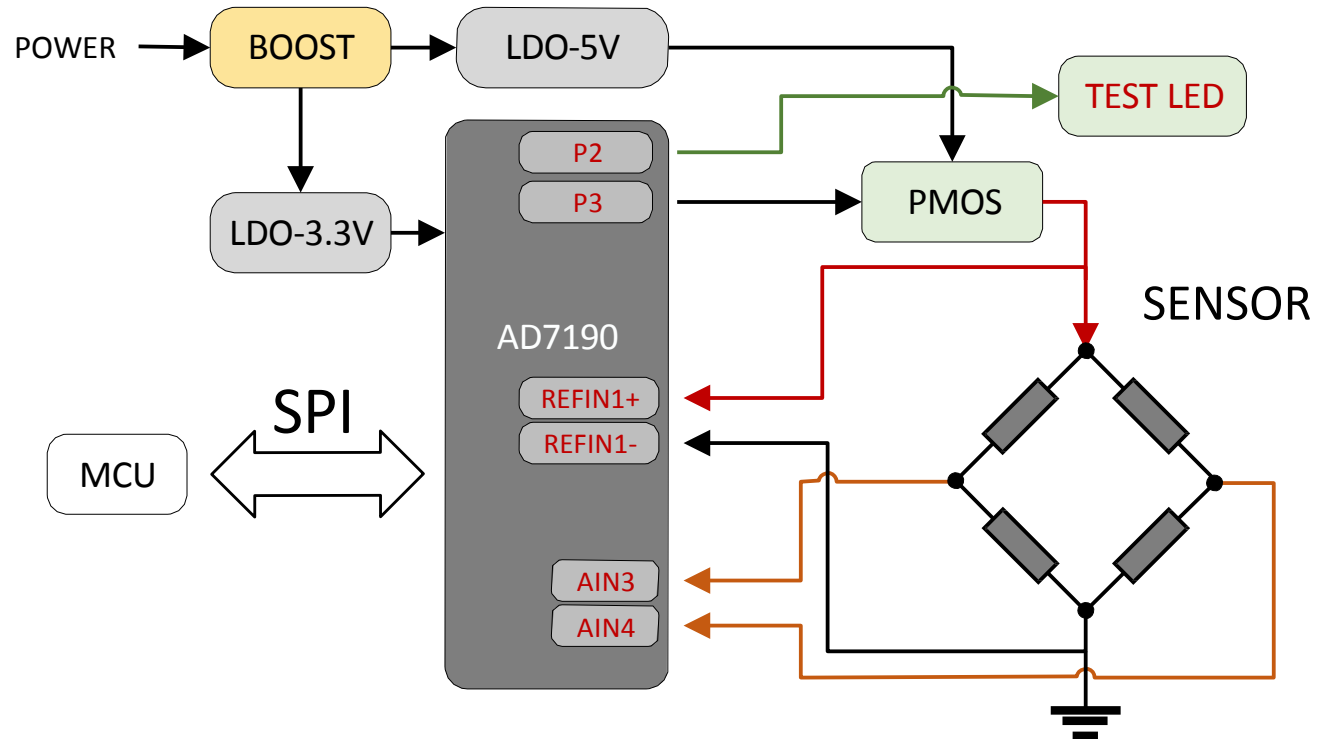
* An external LED is connected to the P2 interface on the acquisition module board. This LED can be used to verify the communication interface during program debugging or for additional status indication (bit number D4 led).
* The excitation source is controlled by a pmos as a switch, pmos is controlled by the ad7190 p3 interface, and when p3 is set low, pmos is turned on. In the power-on default or ad7190 reset state, the excitation source is off.
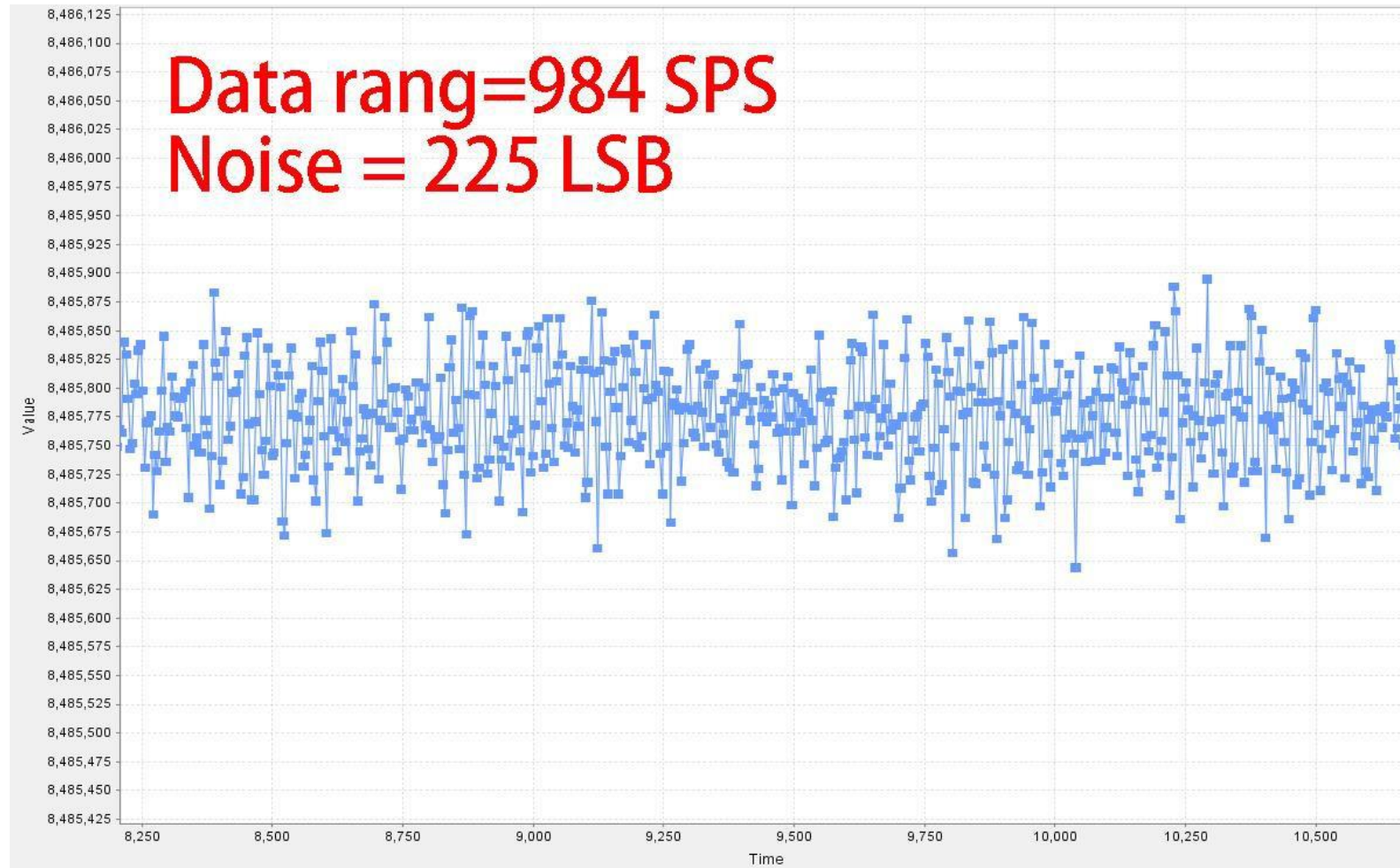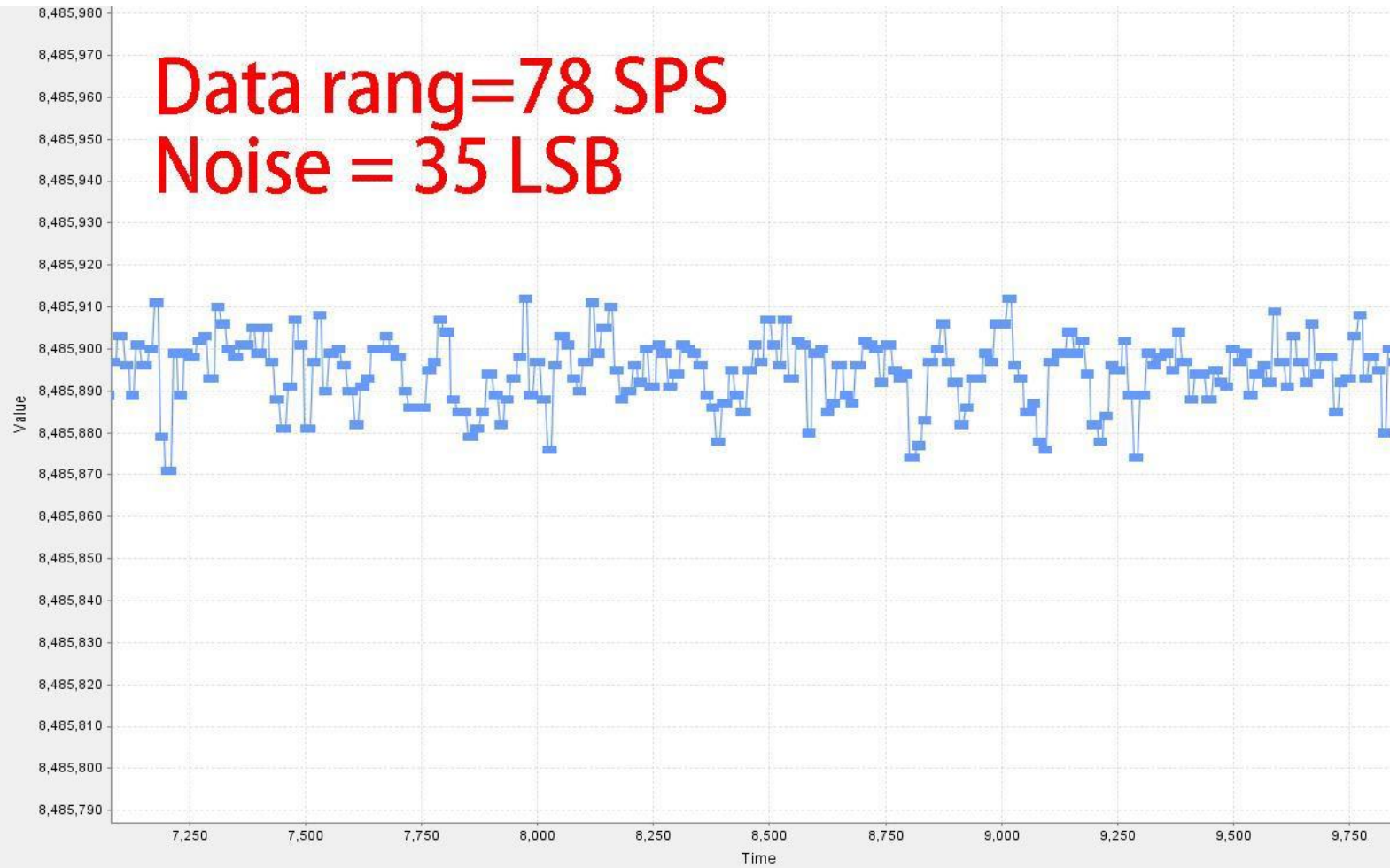
3, ad7190 strain collection module size chart
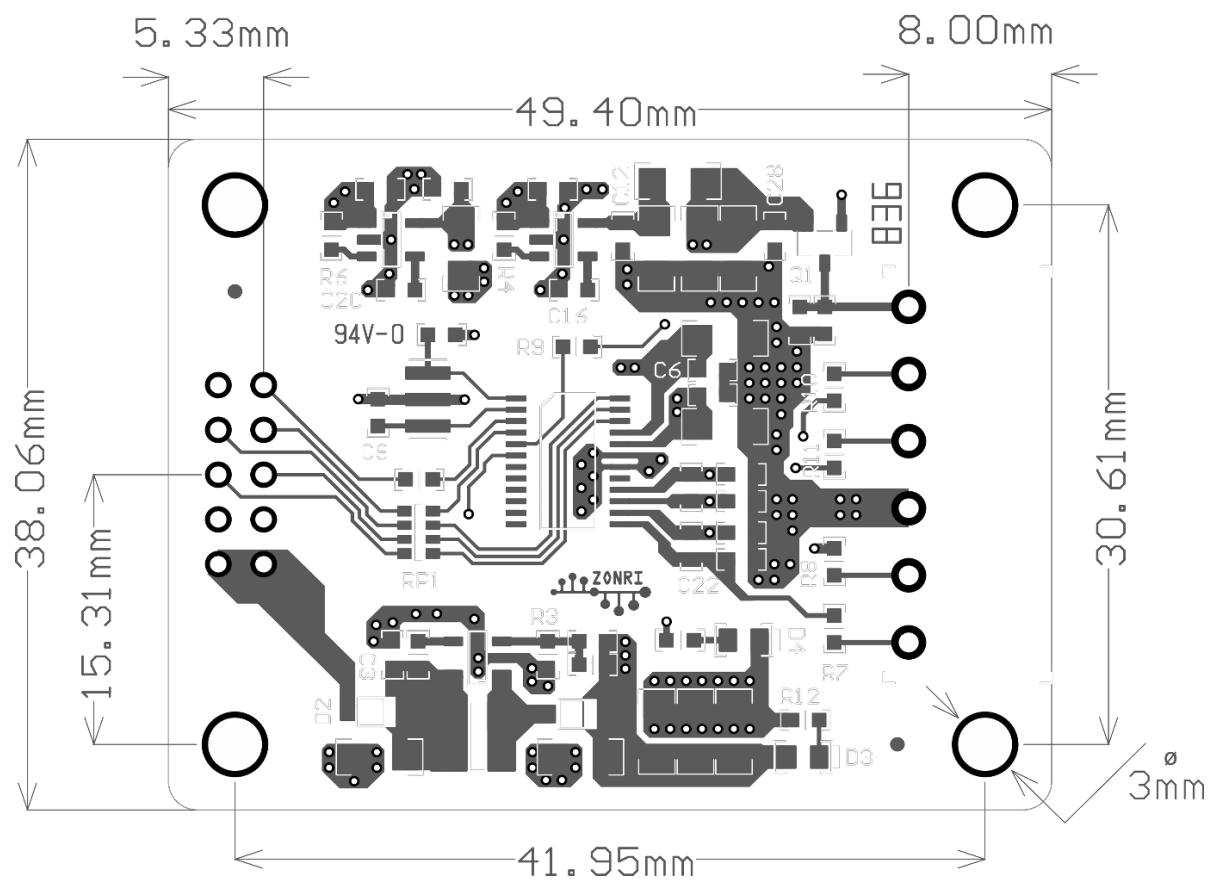
4,AD7190 test data
The following data test conditions are:

VIN=5V;strain bridge arm resistance is 330R;Gain=128.

Data rang=78 SPS
Noise = 35 LSB

Data rang=19.2 SPS
Noise = 15 LSB
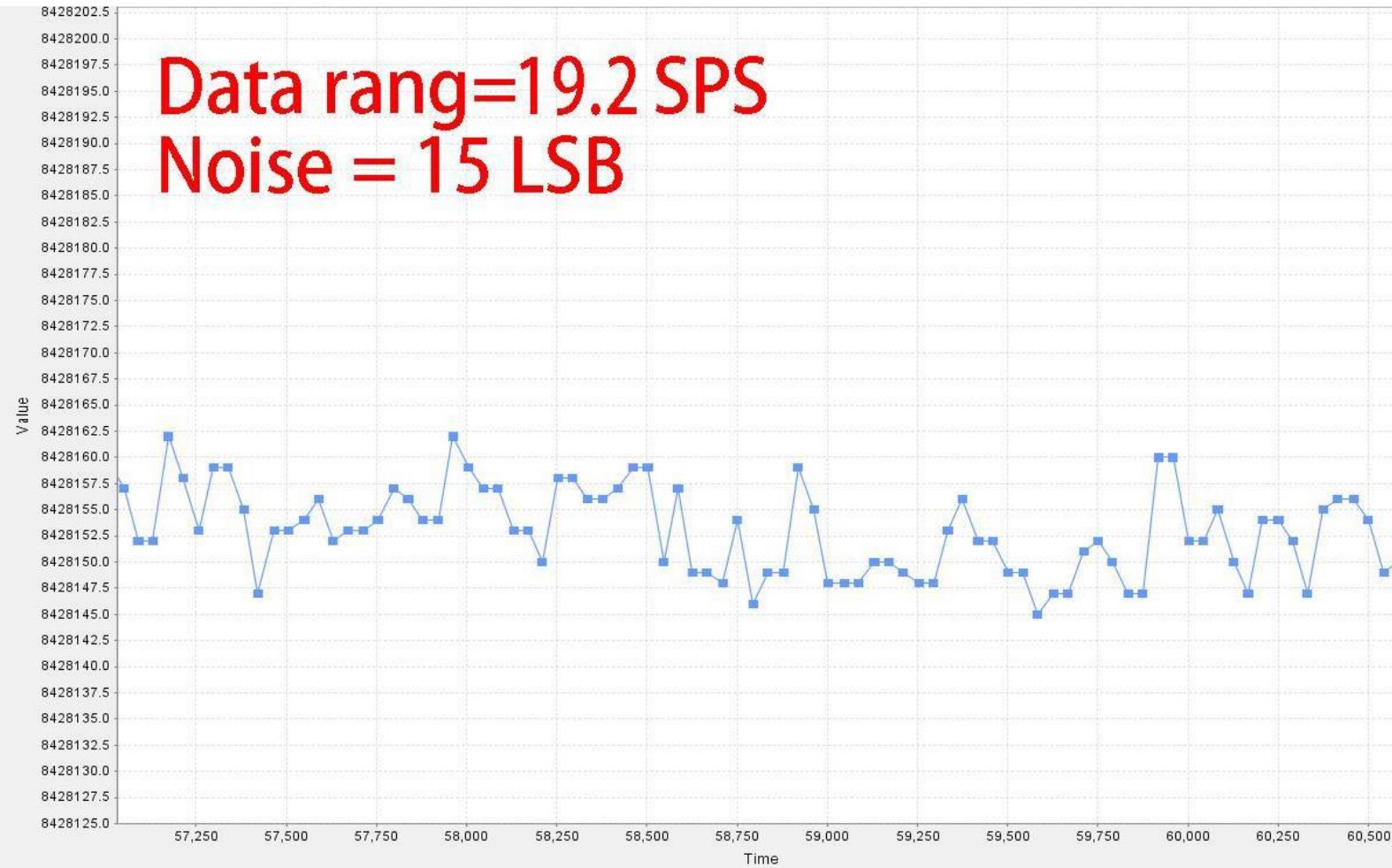
5, ad7190 program instructions

A) The reference program is based on the IO analog SPI and requires three outputs IO and one input IO. The IO macro definition is located at
   the beginning of the reference program.

B) void LED_TEST(void); is the LED test function connected to the AD7190 P2 port. When this function is run, the LED flashes at 0.5S intervals.

C) void read_reg(void); The function reads the mode register and the configuration register value. This function can be called after reset during debugging.
   The read result is consistent with the reset value marked by the datasheet.

D) In order to adapt to different MCUs, try to avoid operating too many MCU related peripherals. The code uses Delay(100); the run-time delay is about 25us.

E) Read AD7190 Device ID The result is 0xX4 and X is undefined.

5,ad7190strainacquisitionmoduleschematic

VCC
D1 SS14 L1 10uH VIN
C33 10uF C31 10uF C32 10uF C1 10uF C2 18pF R2 39K R1 10K C3 100nF C4 10uF
U1
SW VIN
GND
FB EN
TPS61040
GND GND GND GND R3 10K GND GND GND
GND

VCC U2 L2 10uH AVDD
R4 10K
VIN VOUT
GND
EN BYP
SPX3819M5-5.0
C15 100nF C16 18pF C11 10uF C12 100nF C13 10uF
GND GND GND GND GND

VCC U4 DVDD
R6 10K
VIN VOUT
GND
EN BYP
SPX3819M5-3.3
C19 100nF C20 18pF C17 10uF C18 100nF
GND GND GND GND

DVDD AVDD
C5 10uF C6 100nF C7 10uF C8 100nF
GND GND GND GND

GND GND
C9 18pF C10 18pF
X1
CSTCR4M91G53-R0
GND
R5 51R P3
SCLK
D4 R13 10K
0805_RED
GND
P2

U3
MCLK1 DIN
MCLK2 DOUT/RDY
SCLK SYNC
CS DVDD
P3 AVDD
P2 DGND
P1/REFIN2+ AGND
REFIN2- BPDSW
NC REFIN1-
AINCOM REFIN1+
AIN1 REFIN1+
AIN2 AIN3
AD7190

DVDD
AVDD
RP1
4 5 CS
3 6 DIN
2 7 DOUT/RDY
1 8 SYNC
51R

BPDSW
REFIN1-
REFIN1+
AIN4
AIN3

GND

C21 10nF AIN3 R7 100R OUT+
C22 1uF
C23 10nF R8 100R OUT- AIN4
GND
GND

C24 10nF REFIN1+ R10 100R SENSE+
C25 1uF
C26 10nF R11 100R SENSE- REFIN1-
GND
GND

J2
SOURCE 1
SENSE+ 2
SENSE- 3
4
OUT- 5
OUT+ 6
GND
15EDG-3.81-6P

VCC
D3 0805_RED
R12 10 K
GND

D2 SS14
VIN J1
1
GND 2
3
4
DOUT/RDY 5
SYNC 6
CS 7
DIN 8
SCLK 9
10
GND
2.54_10PINZ

P3 R9 1K
AVDD
C27 10uF C28 100nF
Q1
SI2303
2 3
SOURCE
C29 100nF C30 100nF
GND GND GND GND

M1 M2
MARK MARK