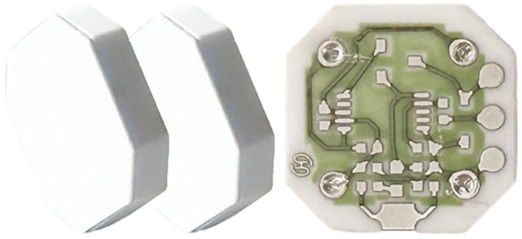
General Instruction and Datasheet

Measuring your business

ESS502I/V/IIC GID-5-EV03.3.6

ESS502I/V/IIC Flush Diaphragm Ceramic Pressure Sensor Module (Electronic on PCB | Electronic on Ceramic)

Electronic on PCB



Electronic on Ceramic

- **Range:** 0~5bar~70bar~200bar
- **Diaphragm Material:** Ceramic Al_2O_3 96%
- **Integrated accuracy:** 0.5%
- **Output:** 0.5-4.5Vdc | 4-20mA | I2C
- **Flush Diaphragm Ceramic**
- **Electronic on PCB | Ceramic**

Description

Based on ESS502 **flush diaphragm ceramic sensing cell,** ESS502 I/V/IIC pressure sensors module is integrated electronic on pcb or on ceramic, which amplify the output from mv to analogy signal such as 0.5-4.5Vdc or 4-20mA and I2C.

Because of the Al2O3 ceramic excellent chemical resistance (aggressive gases, most of solvents and acids, etc.), no additional protection is normally required.

Key Features & Benefits

- **Pressure range 0~5bar…0bar**
- **Excellent resistance to corrosion and abrasion**
- **Absolute measurement available**
- **Thermally compensated**
- **Extended customization**
- **Flush Diaphragm**

Application

- **Cooling equipment & A/C system**
- **Automotive and vehicle**
- **Industrial process control**
- **HVAC system**
- **Refrigeration equipment**
- **Air conditioning unit**

Technical Characteristics [for sensor module]

Parameter	Unit	Description			
Sensor type	-	Absolute (A), Gauge (R) or Sealed gauge (S)			
Technology	-	Piezoresistive			
Diaphragm material	-	Ceramic Al_2O_3 96% (standard), 99.6% or sapphire (Sapphire is underway)			
Weight	g	≤ 8 (ceramic cell only)； ≤ 30 (module)			
Response time	ms	≤ 1 (@90%/FS)			
Output signal		0-5V	I2C	0.5-4.5V	4-20mA
Supply voltage	VDC	2...36	2.7-5.5	3.0-5.5	11-36
Current cons.	mA	≤ 3 @ 10V	2.5(TYP)	2.5(TYP)	-
Impedance	Ω	11k ± 30%	>10k	>10k	≤50（U-11）

Offset		mv/v	- 0.2 ± 0.1 (Other nominal values available on request)										
Operating temperature		°C	①-40...+85℃ (-40 °F...+185 °F) ; ②-40...+135℃ (-40 °F...+275 °F) ;										
Storage temperature		°C	①-40...+125℃ (-40 °F...+257 °F) ; ②-40...+140℃ (-40 °F...+284 °F) ;										
Nominal pressure FSO	bar	0.5*	1*	2*	5	10	20	50	100	200	400*	600	800
	psi	7	14	29	73	145	290	725	1450	2900	5800	8700	11600
Overload pressure	bar	1	2	4	10	15	35	100	150	350	500	750	1000
	psi	14	29	58	145	217	507	1450	2175	5075	7250	10875	14500
Burst pressure	bar	2	3	6	15	25	65	120	200	500	650	950	1250
	psi	29	43	87	217	362	942	1740	2900	7250	9425	13775	18125
Vacuum capability	bar	-0.1	-0.5	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	psi	-1.4	-7	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14
Type	-	R	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	S	S	S	S	S
Total thickness	mm				6.30	6.30	6.35	6.55	6.78	6.95			
	in	0.242	0.2432	0.245	0.248	0.250	0.258	0.263	0.263	0.278	0.288	0.297	0.317
Sensitivity	mv/v	1.4-	2.0-3.6	2.3-3.5	2.3-4.0	3.1-5.5	2.4-4.0	4.0-6.0	3.0-4.8	2.5-3.9	3.1-4.8	3.1-4.8	2.0-3.5
Accuracy	%/fs	0.4/0.	0.3/0.9	0.3/0.6	0.2/0.4	0.2/0.5	0.2/0.5	0.2/0.5	0.2/0.5	0.4/0.9	0.5/1.0	0.5/1.0	0.5/1.0
Thermal offset shift(typ./max.)	%/fs/k	± 0.005 / ± 0.040				25 °C...85 °C				(77 °F...185 °F)			
Thermal span shift	%/fs/k	≤ ± 0.010 ≤ ± 0.012 ≤ ± 0.014				0 °C...70 °C -25 °C...0 °C / 70 °C...85 °C -40 °C...-25 °C / 85 °C...135 °C				(32 °F...158 °F) (-13 °F...32 °F / 158 °F...185 °F) (-40 °F...-13 °F / 185 °F...275 °F)			
Reliability tests	-	1000 hours @85 °C (185 °F) & 85 %RH 1000 hours burn-in @150 °C (302 °F)						500 thermal shocks -40°C...+150 °C (-40 °F... +302 °F) 10 million 0 bar to Pnom pressure cycles					

Tests performed at 25°C in Eastsensor housings, unless otherwise specified. Different housings may affect performances.

1. Psi values for reference only.

2. The sensitivity of each production batch is constant, within the indicated range and with minimal dispersion.

3. Accuracy = $\sqrt{NonLinearity^2 + Hysteresis^2 + NonRepeatability^2}$, terminal based.

4. All technical characteristics will remain within indicated ranges performing the above-mentioned reliability tests.

5. Please consult manufacturer when pressure range with ""*

Drawing

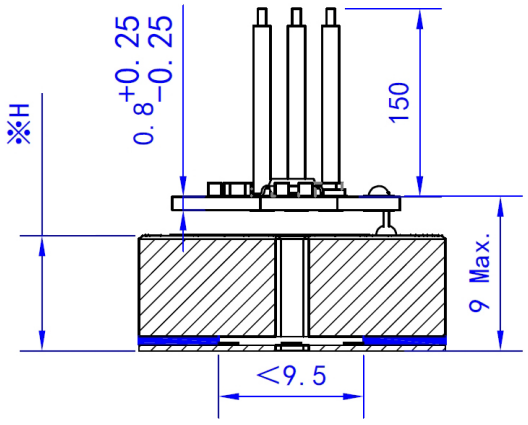
【FLUSH DIAPHRAGM】ESS502-I/V/IIC
Ceramic Piezo-resistive Pressure Sensor Module | Electronic on PCB

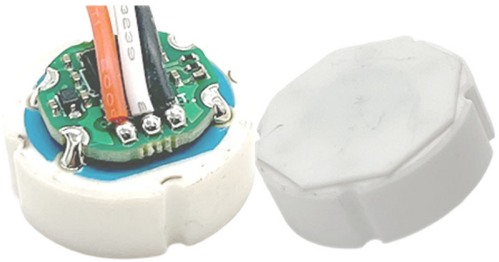
Output: 4-20mA Power Supply: 11-36V
Output: 0.5-4.5V Power Supply: 5V
Output: I2C Power Supply: 2.7-5.5V

Available Rane: 0-5 bar | 0-10 bar | 0-16 bar | 0-20 bar | 0-25 bar | 0-35 bar | 0-50 bar | 0-70 bar | 0-100 bar | 0-200 bar

【0.5-4.5V】Side View | Schematics ~

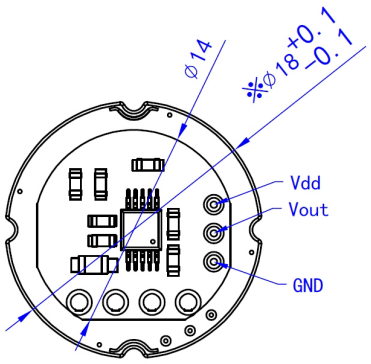
Range: 0bar~200bar,

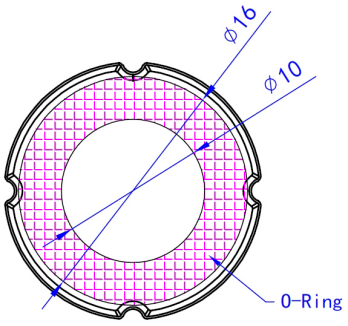


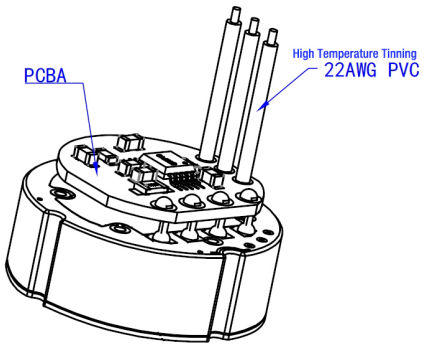


1	2	3
Power supply	Output	Power supply
"+"	Voltage	"-"

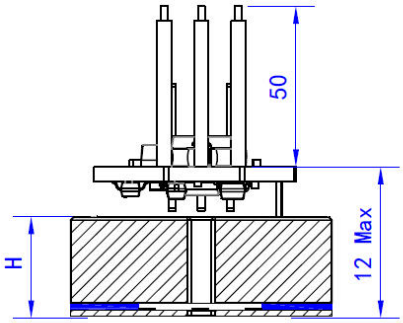
【0.5-4.5V】Top View | Schematics





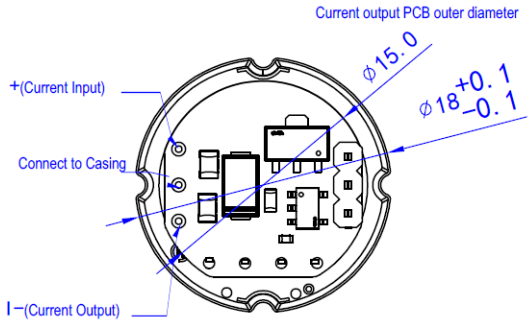


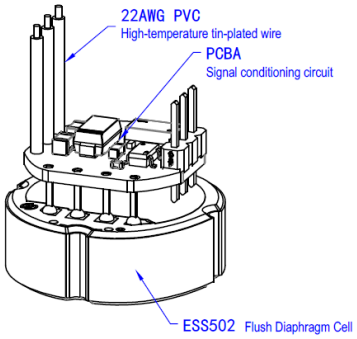
【4-20mA】Side View | Schematics ~



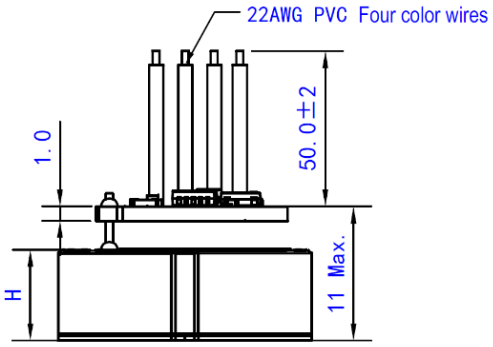
1	2	3
Power supply	Output	Power supply
“+”	Voltage	“-”

【4-20mA】Top View | Schematics

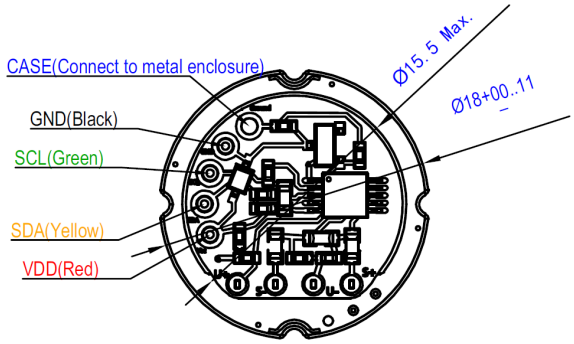


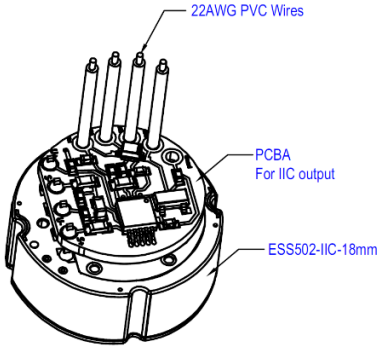


【IIC Output】Side View | Schematics



【IIC Output】Top View | Schematics





【FLUSH DIAPHRAGM】ESS502-I/V/IIC

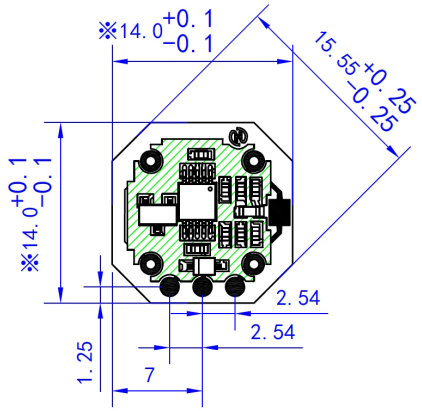
Ceramic Piezo-resistive Pressure Sensor Module | Electronic on Ceramic

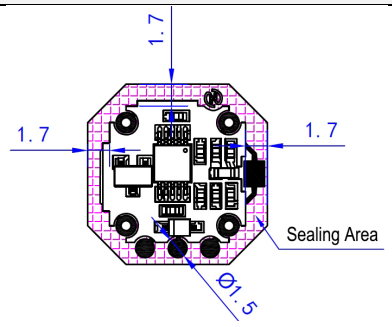
Available Rane: 0-5 bar | 0-10 bar | 0-16 bar | 0-20 bar | 0-25 bar | 0-35 bar | 0-50 bar | 0-70 bar | 0-100 bar

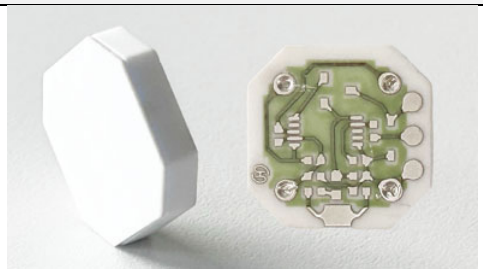
Output: 4-20mA Power Supply: 11-36V
Output: 0.5-4.5V Power Supply: 5V
Output: I2C Power Supply: 2.7-5.5V
Output: SENT/SPI (Customized)

Top View (without supporter) | Schematics

Range: 0bar~70bar,

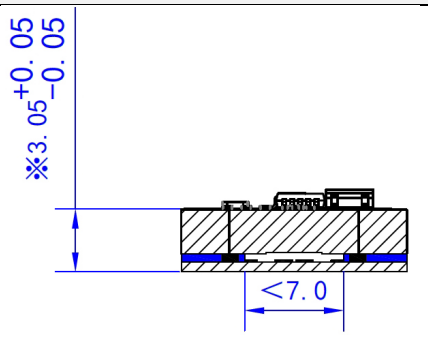


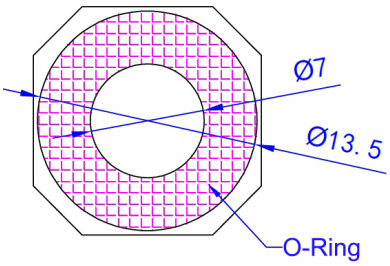


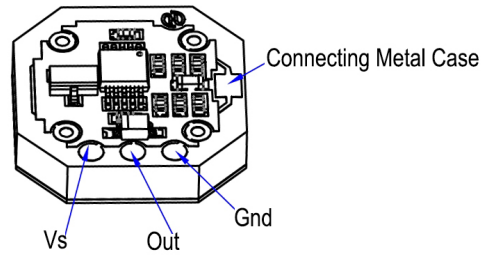


Output Signal	0.5-4.5V
Vs	Voltage Suply
Out	Voltage Output
GND	Ground

Side View (without supporter) | Schematics







*1. **Storage Conditions:** Store at 10~35°C with ≤70% RH. Avoid places that are too hot, exposed to direct sunlight, dusty, or have corrosive gases. The metal pins can easily oxidize in the air, so it's recommended to use the product within 10 days after unpacking. Under proper storage conditions, the soldering validity is 12 months. If stored for more than 12 months, the ceramic core needs to be rechecked for solderability and can only be used if it passes inspection.*
*2. **Product Installation Pressure:** During crimping installation, the crimping pressure should not exceed 20KN, and the direct pressure on the core should not exceed 5KN. Excessive force may damage the core structure or cause abnormal output signals. The ceramic core should not come into direct contact with hard objects like a metal casing to avoid significant internal stress and unstable output.*
*3. **Sealing Recommendations:** When using sealing rings, ensure that the sealing ring is centered with the elastic diaphragm and without uneven force. The inner diameter of the sealing ring should be >10.0mm and the outer diameter <16.0mm after compression deformation.*

Ordering Procedure

ESS5	Ceramic Piezoresistive Pressure Sensor

Code	Model
01	Pressure Sensor Cell, Monolithic 18*6.35mm
01 Thin	Pressure Sensor Cell, Monolithic 18*3.35mm
01-I	Pressure Sensor Module, Monolithic (with pcb) 4-20mA; Electronics on PCB
01-V	Pressure Sensor Module, Monolithic (with pcb) 0.5-4.5V; Electronics on PCB
01-IIC	Pressure Sensor Module, Monolithic (with pcb) I2C Output; Electronics on PCB
02 (18)	Pressure Sensor Cell, Flush diaphragm 18*6.35mm
02 (18)Thin	Pressure Sensor Cell, Flush diaphragm 18*3.35mm
02 (12)	Pressure Sensor Cell, Flush diaphragm 12*12*3mm
02 (14)	Pressure Sensor Cell, Flush diaphragm 14*14*3mm
02 (21)	Pressure Sensor Cell, Flush diaphragm 21*4.35mm
02-I	Pressure Sensor Module, Flush diaphragm (with pcb) 4-20mA; Electronics on PCB
02-IOC	Pressure Sensor Module, Flush diaphragm (with pcb) 4-20mA; Electronics on Ceramic
02-V	Pressure Sensor Module, Flush diaphragm (with pcb) 0.5-4.5V; Electronics on PCB
02-VOC	Pressure Sensor Module, Flush diaphragm (with pcb) 0.5-4.5V; Electronics on Ceramic
02-IIC	Pressure Sensor Module, Flush diaphragm (with pcb) I2C Output; Electronics on PCB
02-IICOC	Pressure Sensor Module, Flush diaphragm (with pcb) I2C Output; Electronics on Ceramic
03	Pressure Sensor Cell (with temperature sensor mounted), Monolithic 18*6.35mm
03 Thin	Pressure Sensor Cell (with temperature sensor mounted), Monolithic 18*3.35mm

Code	Span	Code	Span
R01	0...0.5 bar [0...7psi]	R07	0...50 bar [0...720psi]
R02	0...1 bar [0...14psi]	R08	0...100 bar [0...1450psi]
R03	0...2 bar [0...29psi]	R09	0...200 bar [0...2900psi]
R04	0...5 bar [0...72psi]	R10	0...400 bar [0...5800psi]
R05	0...10 bar [0...145psi]	R11	0...600 bar [0...8700psi]
R06	0...20 bar [0...290psi]	R12	0...800 bar [0...11600psi]

Code	Pressure Type
R	Gauge
A	Absolute
S	Sealed Gauge

Code	
M	Monolithic
F	Flush Diaphragm

Code	Sensitivity adjustment
0	Without
9	On request

Code	Output
0	0.5-4.5Vdc
9	4-20mA
10	IIC

Code	Termination type
02	Pre-tinned pads
03	Silicone single wires 80 mm-100 mm
07	Customization Type

Code	Accuracy
1	0.5%
2	1.0%
9	Others on request

ESS5	02-I	R06	R	F	0	9	03	1

Note: ❶*Extremely attention must be paid to sensor installation process to avoid any miss conduction that affect the sensor performance,* ❷*please protect the diaphragm and the compensated board carefully to prevent any damage.*❸ *Please contact us if your requested working temperature lower than -20℃*