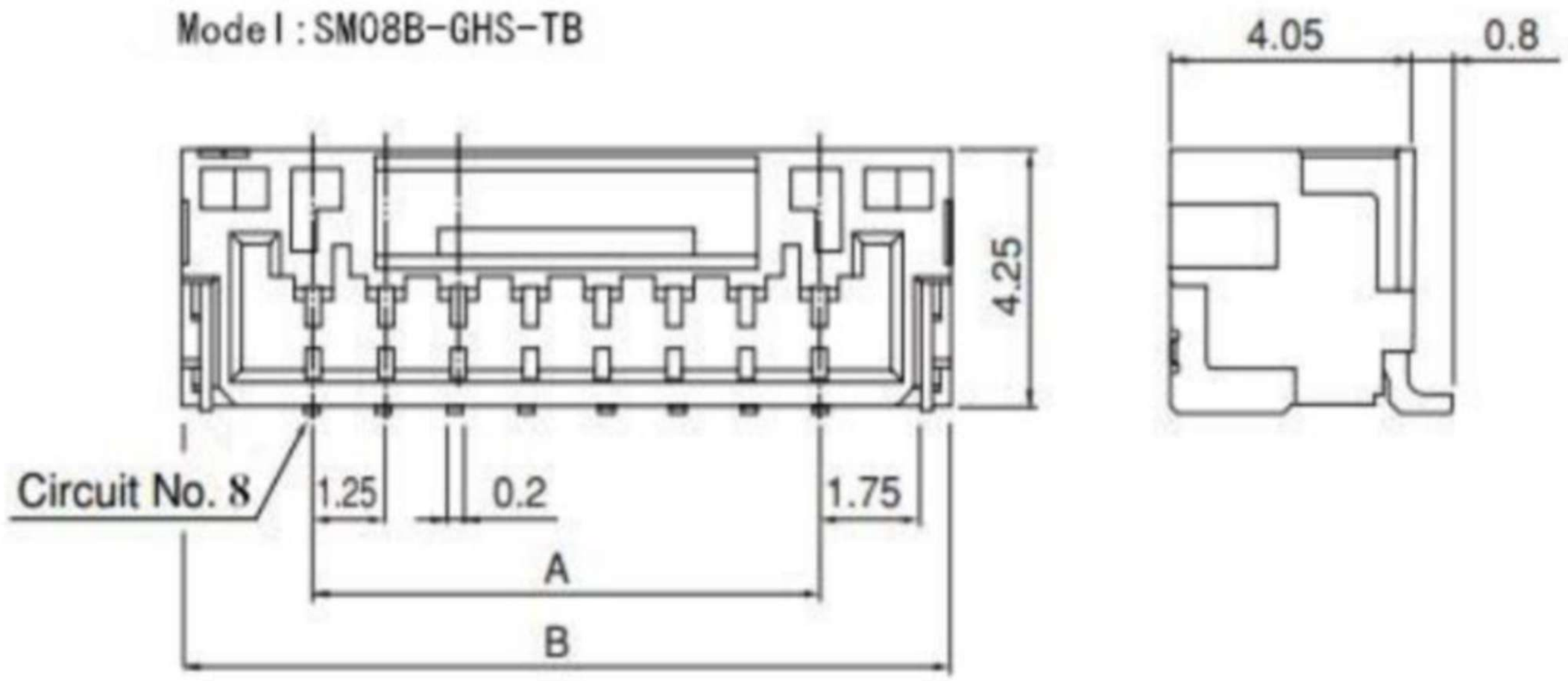
Prana Air

INDOOR SENSOR DATASHEET

Prana Air

Connector Information



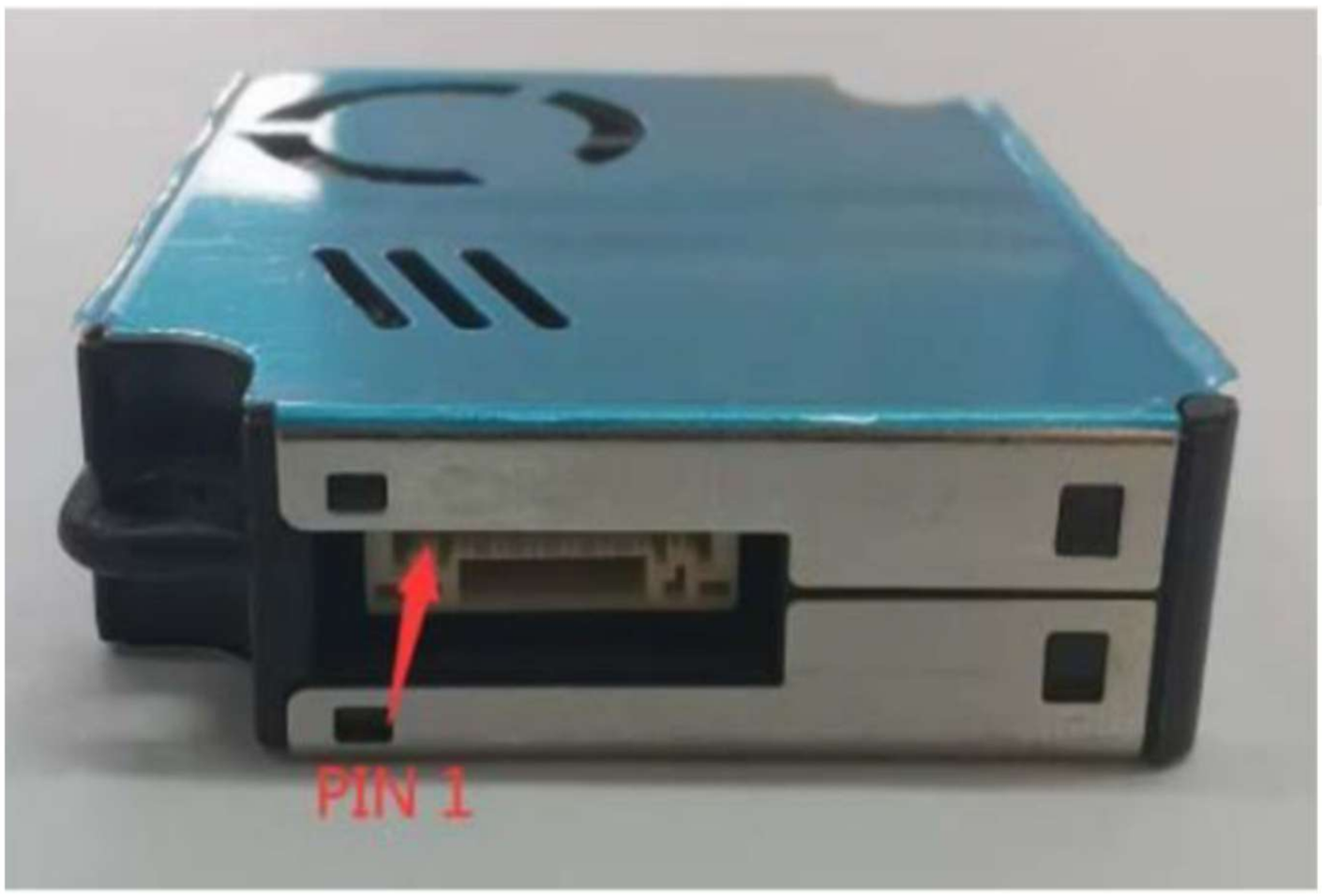


Chart 2 Connector pin definition diagram

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■Output pin definition

The sensor interface is the 8 needle of spacing 1.25mm. The definition of the pin is shown:

■Table1 Output pin definition

Pin number	Pin assignment	Describe
1	VCC	+5V Power input
2	GND	Power ground
3	SET	Set pin /TTL level @3.3V，high level or Suspension is Normal working state. Low level is off state
4	RXD/SDA	Serial receive（3.3V　level）
5	TXD/SCL	Serial send（3.3V　level）
6	RESET	Module reset signal /TTL level @3.3V，low reset
7		Retain
8		Retain

Attention to circuit design:

The input power of the sensor is 5V, and the data communication (RXD, TXD) and control pins (set, reset) are 3.3V. If the communication level of external main board MCU is 5V, level conversion chip or circuit shall be added to the communication line and control pin.

■Table2 Sensor technical index

Parameter name	Index
Rated voltage	5V
Rated current	70mA
Communication level	3.3 V
working temperature	-20～70℃
Storage temperature	-20～85℃
Operating humidity	0～90%RH
Particle size resolution	0.3μm
PM2.5 Effective range of mass concentration	0～999μg /m^3
PM10 Effective range of mass concentration	0～1500μg /m^3
Mass concentration data resolution	1μg /m^3
PM2.5 Mass concentration consistency	±10% or ±10μg，Take larger values
Mean time to failure	≧30000 hour

NOTES：The above indexes are tested at 25℃ and 50%RH.

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Communication Protocol

The sensor adopts UART, and the communication interface is configured as follows:

Baud rate	9600
Data bits	8 bits
Stop bit	1 bit
Parity bit	no

There are two communication modes: Q&A mode and continuous mode. The default mode is Q&A mode.

In Q&A mode, communication is carried out in frames. The command frame format is fixed, and each frame is composed of 9 bytes. When the external device sends the command frame to the sensor, the sensor will reply to the corresponding response frame of the external device.

In continuous mode, the sensor sends a frame of data at a fixed interval (1s by default), each frame of data is composed of 32 bytes.

Table3. The Commend Frame Format

Header	Command	Content	Checksum	Tail
Byte 1(0xAA)	Byte 2	Byte 3～Byte 6	Byte7～Byte8	Byte 9(0xBB)

Table4. Q&A Mode Specific Protocol

Function Description			Command Frame	ACK frame
Operand	R/W	Command	Content	Content
TURN ON	N/A	0x01	0x00000000	0x00004F4B
Read the mass concentrations of PM2.5 and PM10	R	0x02	0x00000000	Byte 3 (PM10 high byte) Byte 4 (PM10 low byte) Byte 5 (PM2.5 high byte) Byte 6 (PM2.5 low byte)
TURN OFF	N/A	0x03	0x00000000	0x00004F4B
Read Number of particles 2.5um~10um、0.3um~2.5um	Read	0x04	0x00000000	Byte 3 (high number of 2.5μm to 10um particles)、 Byte 4 (low number of 2.5μm to 10um particles)、 Byte 5 (high number of 0.3μm to 2.5um particles)、 Byte 6 (low number of 0.3μm to

				2.5um particles)
Read 32 byte measured data	Read	0x05	0x00000000	Specific Answer frame format See Table 5
Start sending 32 byte measurement data continuously	Write	0x06	0x00000000	The specific response frame format is shown in table five.
Stop sending 32 byte measurement data continuously.	Write	0x07	0x00000000	0x00004F4B
Send 32 bytes of measurement data continuously	write	0x08	0x00000000	0x00000001
Release continuous sending of measurement data	write	0x09	0x00000000	0x00000000
Read current operating mode	read	0x0A	0x00000000	0x00000000 is Q&A mode; 0x00000001 is 32 bytes continuous transmission mode;

Table 5 32 bytes measurement data frame format

Byte 1	Start character 1	0x42
Byte 2	Start character 2	0x4D
Byte 3	Frame length high byte	0x00
Byte 4	Frame length low byte	0x1C
Byte 5	Data 1 high 8 bit	Data 1 expression PM1.0 concentration
Byte 6	Data 1 low 8 bit	
Byte 7	Data 2 high 8 bit	Data 2 expression PM2.5 concentration
Byte 8	Data 2 low 8 bit	
Byte 9	Data 3 high 8 bit	Data 3 expression PM10 concentration
Byte 10	Data 3 low 8 bit	
Byte 11	Data 4 high 8 bit	Retain
Byte 12	Data 4 low 8 bit	Retain
Byte 13	Data 5 high 8 bit	Retain
Byte 14	Data 5 low 8 bit	Retain
Byte 15	Data 6 high 8 bit	Retain
Byte 16	Data 6 low 8 bit	Retain
Byte 17	Data 7 high 8 bit	Data 7 expression the number of particles above 0.3 um equivalent diameter in 0.1 L of air
Byte 18	Data 7 low 8 bit	
Byte 19	Data 8 high 8 bit	Data 8 expression the number of particles above 0.5 um equivalent diameter in 0.1 L of air
Byte 20	Data 8 low 8 bit	
Byte 21	Data 9 high 8 bit	Data 9 expression the number of particles above 1.0 um equivalent diameter in 0.1 L of air
Byte 22	Data 9 low 8 bit	

Byte 23	Data 10 high 8 bit	Data 10 expression the number of particles above 2.5 um equivalent diameter in 0.1 L of air
Byte 24	Data 10 low 8 bit	
Byte 25	Data 11 high 8 bit	Data 11 expression the number of particles above 5.0 um equivalent diameter in 0.1 L of air
Byte 26	Data 11 low 8 bit	
Byte 27	Data 12 high 8 bit	Data 12 expression the number of particles above 10 um equivalent diameter in 0.1 L of air
Byte 28	Data 12 low 8 bit	
Byte 29	Data 13 high 8 bit	Retain
Byte 30	Data 13 low 8 bit	Retain
Byte 31	Data sum check high 8 bit	Check code = Start character 1+ Start character 2+……+Data 13 low 8 bit
Byte32	Data sum check low 8 bit	

Attention:

1. PM2.5 concentration is strictly calibrated; PM 1 and PM10 concentration output is empirical reference data. If accurate calibration is required, please consult the sales staff.

2. The number of PM0.3, PM0.5, PM1, PM2.5, PM5 and PM10 particles output empirical reference data.

Q&A Mode Communication example:

Open the fan of the sensor, and read PM2.5 and PM10 detection data

1. The external device sends to the sensor a command frame AS:

Head	Command	Content	Checksum	Tail
0xAA	0x02	0x00000000	0x0167	0xBB

The sensor replies to the external device the response frame AS:

Head	Command	Content	Checksum	Tail
0xAA	0x02	0x01310123	0x01BD	0XBB

Calculate PM2.5 mass concentration: (Byte 5)*256 + (Byte 6) = 0x01*256+0x23 = 291μg/m^3

Calculate PM10 mass concentration: (Byte 3)*256 + (Byte 4) = 0x01*256+0x31 = 305μg/m^3

Calculate checksum bytes:

(Byte 1)+ (Byte 2)+ (Byte 3)+ (Byte 4)+ (Byte 5)+ (Byte 6)+ (Byte 9) = (Byte 7)*256+(Byte 8)

AS: 0xAA+0x02+0x01+0x31+0x01+0x23+0xBB = 0x01*256+0xBD.