MPM10 PM Sensor I2C Communication Description

(1) MPM10 Sensor Enables IIC Communication Interface:

Refer to "MPM10 PM Sensor Manual", when the MPM10 sensor is powered on, connect the pin whose function is marked as "PWM" to GND, and the sensor will enable the IIC digital output interface after power on. The host can read the internal register data of the PM sensor module through the IIC interface to obtain the PM concentration and other values.

On the IIC interface circuit, a pull-up resistor must be connected to the POWER supply VCC (3.3V) on both the SDA and SCL communication lines. The recommended resistance value is 4.7Kohm.

(2) General Format of IIC Communication Interface:

The host generates 8 clock pulses to send 8-bit data. At the 8th falling edge of the SCL bus, the device changes the SDA output as an input, and reads the reply value at the 9th clock pulse. After the 9th clock pulse, if the next reception is not ready, the data receiver pulls the SCL bus low to suspend the transmission of the next byte. When the receiver releases the SCL bus, data transmission continues.

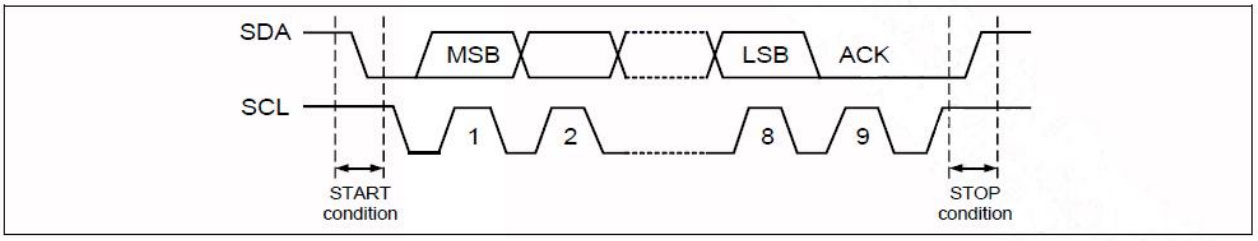

Figure 1. IIC Bus Data Protocol

The IIC bus protocol defines two states to start and end transmission, start (S) and stop (P) signals. Start signal: When SCL is high, there is a level change from high to low on the SDA bus. Stop signal: When SCL is high, there is a level change from low to high on SDA. The start or stop signal is usually generated by the host. After the start signal is generated, the IIC bus is regarded as busy, and after the stop signal, the IIC bus is regarded as idle.

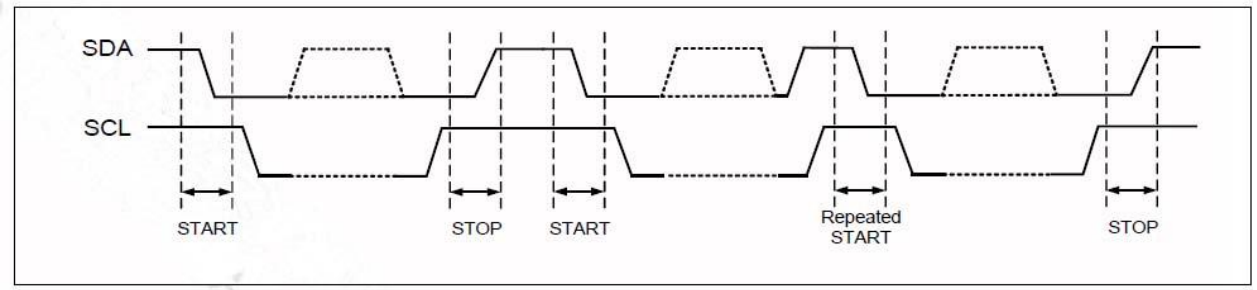

Figure 2. Initial START, Repeated START, and STOP

For details, please refer to the relevant manuals of IIC communication.

(3) MPM10 Sensor IIC Communication Timing:

When reading the MPM10 register data through the IIC interface, the communication timing waveform is shown as

follows:

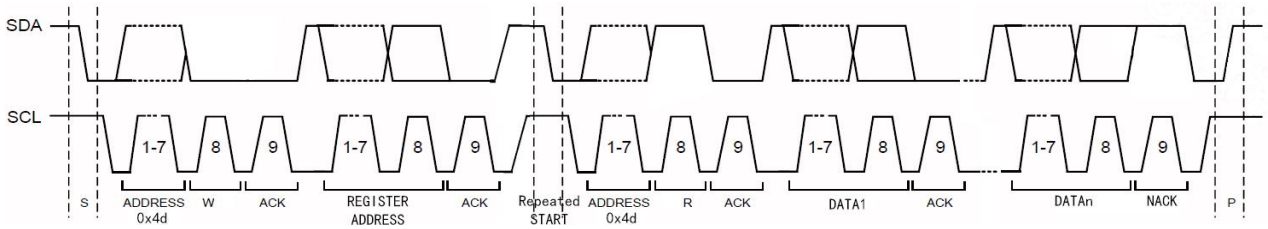

Figure 3. Communication Waveform When Reading MPM10 Register

Communication timing description:

As shown above, the host sends the IIC start signal → sends the sensor device address 0x4d (7 bits) + W (write bit) → sends the sensor data register address (send the address from which you want to start reading, see Table 1) → sends repeated IIC start signal (note that there is no stop signal here) → sends sensor device address 0x4d (7 bits) + R (read bit) → the host receives n bytes of data output by the sensor (when the host receives data, it needs to send an ACK signal to the sensor; If the host does not send an ACK signal bit, the sensor stops data transmission) → the host sends an IIC stop signal.

The MPM10 sensor device address is 0x4d, the maximum data transmission rate is 100Kbps, MSB-first, the start address of the data register is 0x20, and it supports continuous readout of data from address increments.

Table 1, IIC Register Address and Data Format

Register Address	Data	Description
0x20	Data 1 high byte	PM1.0 concentration value (standard particulate matter), unit: μg/m3 *
0x21	Data 1 low byte	
0x22	Data 2 high byte	PM2.5 concentration value (standard particulate matter), unit: μg/m3 *
0x23	Data 2 low byte	
0x24	Data 3 high byte	PM10 concentration value (standard particulate matter), unit: μg/m3 *
0x25	Data 3 low byte	
0x26	Data 4 high byte	PM1.0 concentration value (under atmospheric environment), unit: μg/m3 *
0x27	Data 4 low byte	
0x28	Data 5 high byte	PM2.5 concentration value (under atmospheric environment), unit: μg/m3 *
0x29	Data 5 low byte	
0x2A	Data 6 high byte	PM10 concentration value (under atmospheric environment), unit: μg/m3 *
0x2B	Data 6 low byte	
0x2C	Data 7 high byte	The number of particles with a diameter above 0.3um in 0.1 liter of air
0x2D	Data 7 low byte	
0x2E	Data 8 high byte	The number of particles with a diameter above 0.5um in 0.1 liter of air
0x2F	Data 8 low byte	
0x30	Data 9 high byte	The number of particles with a diameter above 1.0um in 0.1 liter of air
0x31	Data 9 low byte	
0x32	Data 10 high byte	The number of particles with a diameter above 2.5um in 0.1 liter of air
0x33	Data 10 low byte	
0x34	Data 11 high byte	The number of particles with a diameter above 5.0um in 0.1 liter of air
0x35	Data 11 low byte	
0x36	Data 12 high byte	The number of particles with a diameter of more than 10um in 0.1 liter of air
0x37	Data 12 low byte	

*Note: The standard particle mass concentration value in Table 1 refers to the mass concentration value obtained by

density conversion using industrial metal particles as equivalent particles, which is suitable for environments such as industrial production workshops. The mass concentration of particulate matter in the atmospheric environment is calculated by using the main pollutants in the air as equivalent particles for density conversion, which is suitable for ordinary indoor and outdoor atmospheric environments.