



# SMART Dust Sensor SM-PWM-01S



Telaire SM-PWM-01S SMART Dust Sensor detects dust particle concentration in air by using an optical sensing method where an infrared light emitting diode (IR LED) and a photosensor are optically arranged in the device. The photosensor detects the reflected IR LED light by dust particles in air.

The SMART Dust Sensor can detect small particles, such as smoke, pollens, and common dust. It can also distinguish between small and large particles by the amplitude of the signal output.

## Applications

- Detection of dust in the air for indoor air quality monitoring
- Air cleaners, air purifiers, air conditioners and indoor air quality monitors
- Outdoor dust monitoring with special mechanical design for customer
- Smoke-type fire alarm application by different sensor adjustments (customer option)

## Features

- Compact size, lightweight (approx W46x H34x D17.6 mm, ~10g)
- Pulse Width Modulation (PWM) Output - low pulse output
- Distinguishes small particles of cigarette smoke from large particles of house dust
- Low pulse width is proportional to particle size and concentration
- Airflow is formed through central hole of the dust sensor
- Lead-free and ROHS directive compliant
- Minimum detected size is 1 $\mu$ m nominal diameter (House dust size: avg 20 $\mu$ m, yellow dust size: avg 20 $\mu$ m, cigarette dust size: avg 1 $\mu$ m)

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# Specifications

## Electrical Characteristics

### Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Power Supply Voltage	V <sub>cc</sub>	-0.3 to 7.0	V
Operating Temperature	T <sub>opr</sub>	-10 to 60	°C
Storage Temperature	T <sub>stg</sub>	-30 to 80	°C

### Operating Power Supply Voltage and Signal Output (T<sub>a</sub> = 25°C)

Parameter	Symbol	Rating	Unit
Power Supply Voltage	V <sub>cc</sub>	DC 5 ± 5%, Ripple <100mV	V
Current Consumption	I <sub>cc</sub>	< 60 ± 10%	mA
Signal Output	PWM/ UART	Negative Logic Pulse Output/UART Output	
Start Time *		90	Sec

\*1. To stabilize heater resistor and air flow in dust sensor.

### Recommended Operating Temperature/ Humidity

Parameter	Rating	Unit
Operating Temp/ Humidity	-10°C ~ 45°C, < 85%RH <sup>*1</sup>	°C, %RH

\*1. Dust sensor can detect micro-size water droplets, like fog and mist, as particles.

*Do not use the dust sensor in high humidity environments, as the humid air is under submicron size, and the dust sensor cannot differentiate this.*

## Internal Schematic

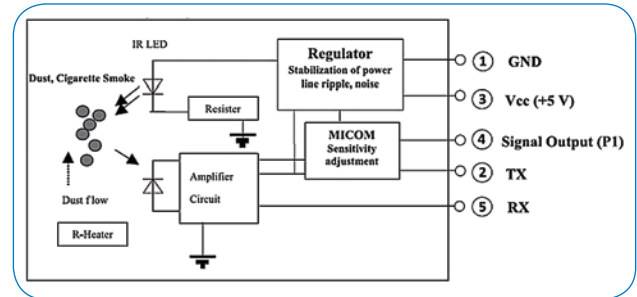


Figure 1

P1: small particle (1 ~ 2µm),  
P2: large particle (3 ~ 10µm)

- SM-PWM-01S dust sensor cannot calculate the number of the particles or conduct quantitative measurement; this dimension is for reference only.



## Connector

### Standard Connector (SM-PWM-01S)

Connector Part No.	Symbol	Description	Maker
Connector	A1252	1.25mm pitch	CJT
Housing	A1252H		
Terminal	A1252T		

- Standard A1252

### Pin Set State

Number	Symbol	Pin Description
1	GND	Ground, Connected with system ground
2	TX	UART-TX
3	Vcc	Input Power Supply Voltage
4	PWM	Low pulse signal output (PWM) of small particle, active low signal
5	RX	UART-RX

- Please refer to drawings for pin sequence.

## PWM Output Definition

PWM Output is active at low pulse with a cycle of 1000 ms. The low pulse is calculated from the beginning of each cycle. The minimum output is 1ms, meaning LPO = 0.1%. For example: The active cycle is 100ms, meaning LPO = 10%.

The active cycle is 300 ms, meaning LPO = 30%.  
LPO has a correspondence relation with the dust concentration.

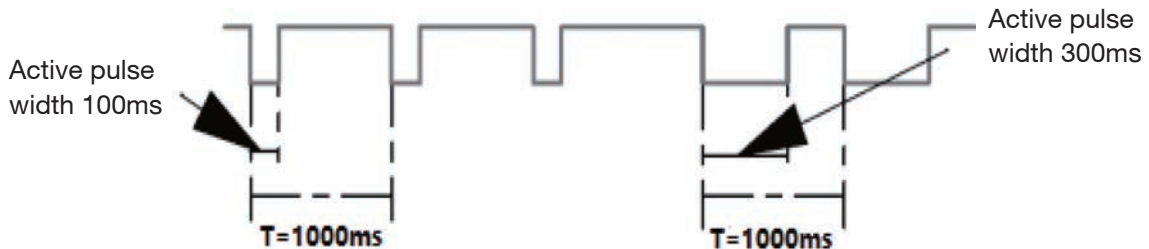


Figure 2 - PWM output definition

## UART reads the data command. Baud rates: 9600 bit/s

### Message:

0x1C 0x11 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xMSB  
0xLSB Function Read LPO\_OUT by USART

### Description:

0x1C – Slave address  
0x11 – Function code  
0xMSB 0xLSB – Modbus CRC

### Response:

0x1C 0x11 0xHdata 0xLdata 0x00 0x00 0x00 0x00  
0xMSB 0xLSB Function Read LPO\_OUT by USART

### Description:

0x1C – Slave address  
0x11 – Function code  
0xHdata – High end byte of LPO  
0xLdata – Low end byte of LPO  
0xMSB 0xLSB – Modbus CRC

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