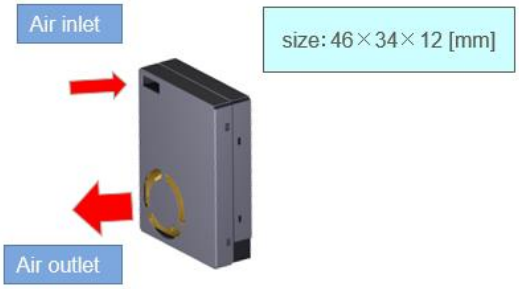
GP2Y1040AU0F

Particulate Matter Sensor w/ Fan

Description

GP2Y1040AU0F is a new laser particle counting sensor with built-in fan. The laser type is VCSEL (Vertical Cavity Surface Emitting Laser).

This air quality sensor outputs particle counts in the form of number concentrations for different particle sizes as well as the corresponding PM_1, $PM_{2.5}$, and PM_{10} mass concentration values in units of $\mu g/m^3$.



Features

- Real-time output of PM concentration values
- High accuracy of ±10% based on TSI reference
- Quiet and reliable built-in fan with auto-clean
- Both UART and I^2C interface are supported

Applications

- Air purifier / air cleaner
- Air conditioner
- Portable air quality monitor
- Smart home / IoT sensor devices
- HVAC / ventilation
- Environmental monitoring

Compliance

- Lead-free and RoHS directive compliant
- Compliant with RoHS 2011/65/EU
- Compliant with RoHS (EU)2015/863
- Compliant with REACH

References

- GP2Y1040AU0F Specification
- GP2Y1040AU0F Application Note
- Sharp Dust Sensors Product Lineup
- Sharp Electronic Components Catalog

Datasheet last updated: 2021-Oct-10

1 Application / Scope

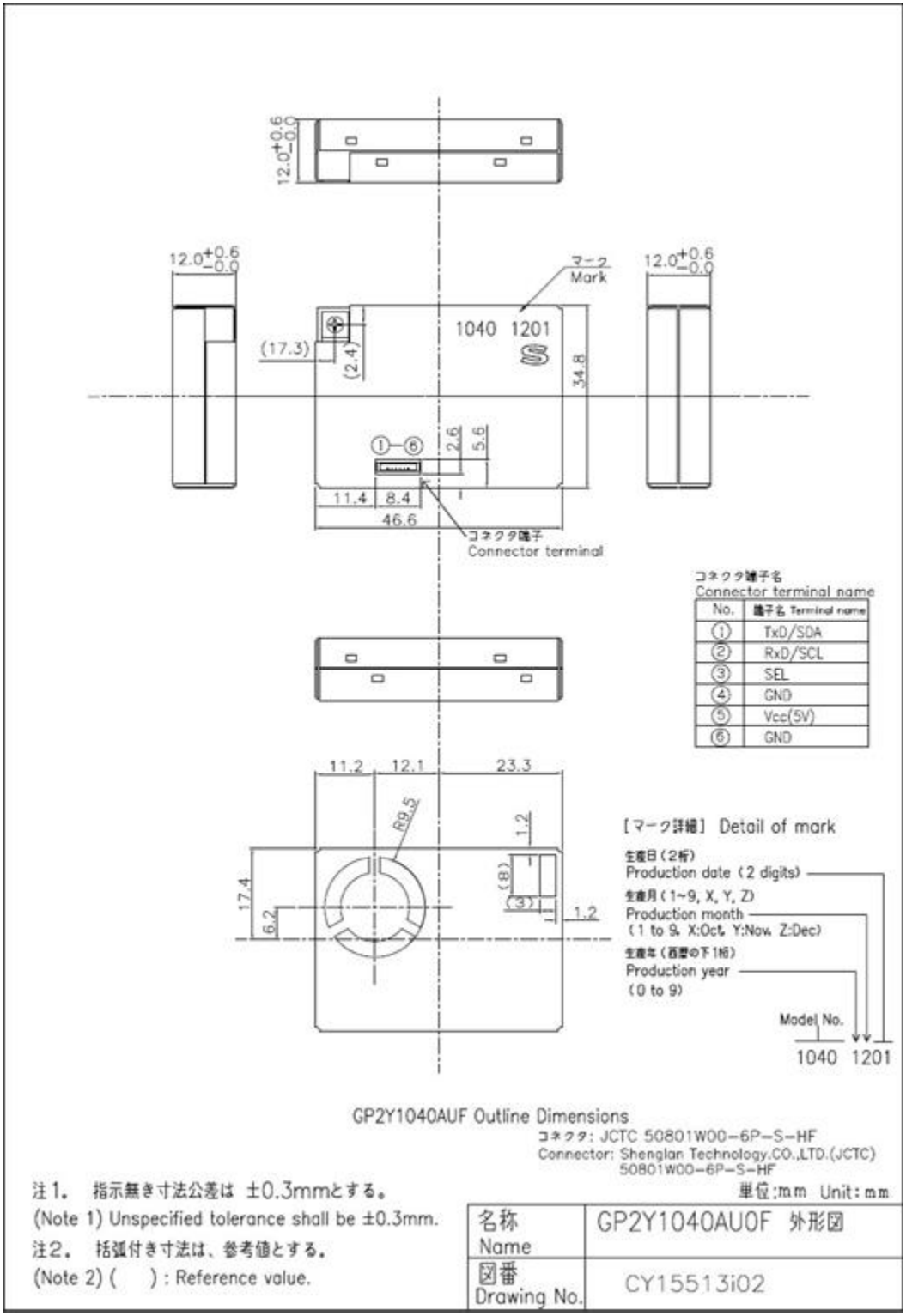
This datasheet applies to the outline and characteristics of Model No. **GP2Y1040AU0F** (Dust sensor) and is based on Sharp Specification No. **ED—20G001** (issued on January 7, 2021). If there is any discrepancy between this datasheet and the specification, the specification shall take precedence.

When using this Sharp product, please observe the absolute maximum ratings, other conditions and instructions for use described in the specification sheets, as well as the precautions mentioned below (see Section 8).

Sharp assumes no responsibility for any damages resulting from use of the product which does not comply with absolute maximum ratings, other conditions and instructions for use included in the specification sheets, and the precautions mentioned below (see Section 8).

2 Outline Dimensions

Refer to the following drawing No.CY15513i02.



GP2Y1040AUF Outline Dimensions

コネクタ: JCTC 50801W00-6P-S-HF
Connector: Shenglan Technology.CO.,LTD.(JCTC)
50801W00-6P-S-HF

単位:mm Unit: mm

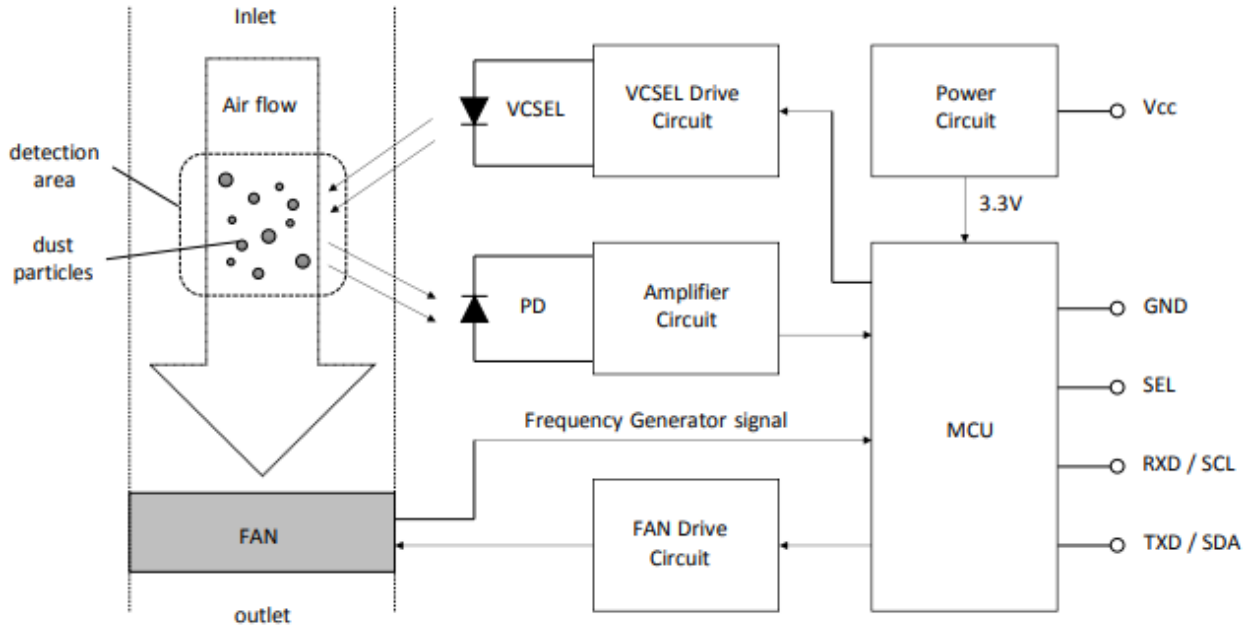
注1. 指示無き寸法公差は ±0.3mmとする。
(Note 1) Unspecified tolerance shall be ±0.3mm.
注2. 括弧付き寸法は、参考値とする。
(Note 2) ( ) : Reference value.

名称 Name	GP2Y1040AU0F 外形図
図番 Drawing No.	CY15513i02

Datasheet last updated: 2021-Oct-10

3 Ratings and Characteristics

3-1 Constitution Diagram (Internal Schematic)



3-2 PIN Description

No.	PIN Name	Description	Remarks
1	TXD	UART : Transmitting Pin	3.3V Logic
	SDA	I2C : Serial data	
2	RXD	UART : Receiving Pin	3.3V Logic
	SCL	I2C : Serial clock	
3	SEL	Interface select	UART: Floating or 3.3V, I2C: Low level (=GND)
4	GND	Ground	—
5	Vcc	Supply Voltage	5V±10%
6	GND	Ground	—

3-3 Sensor Characteristics

Parameter	Conditions	Value	Unit
Particle size range	–	0.3 – 10.0	μm
Mass concentration consistency (for PMX_1 output) (*1) (*3)	0 - 100 μg/m^3	±30	μg/m^3
	100 - 500 μg/m^3	±30	%
Mass concentration consistency (for PMX_2 output) (*2) (*3)	0 - 100 μg/m^3	±10	μg/m^3
	100 - 500 μg/m^3	±10	%
Mass concentration range	–	0 – 1,000	μg/m^3
Mass concentration resolution	–	1	μg/m^3
Mass concentration size range	PM1	0.3 – 1.0	μm
	PM2.5	0.3 - 2.5	μm
	PM10	0.3 – 10.0	μm
Number Concentration range	–	0 – 3,000	1/cm^3
Number concentration size range	NC_0.3	0.3 – 10.0	μm
	NC_0.5	0.5 – 10.0	μm
	NC_1	1.0 – 10.0	μm
	NC_2.5	2.5 – 10.0	μm
	NC_4	4.0 – 10.0	μm
Sampling interval	–	1	s
Response time	–	≦ 8	s
Life time (Reference) （*4）	Ta=25℃, 15 – 65% RH	50,000	hours

Acoustical noise	0.3m	≦ 28	dB(A)

(*1) PMX_1 represents the mass concentration of particle size 0.3μm-Xμm. (Please refer to the section "Measurement data format" in 3-7-3 and 3-8-3.) To measure the mass concentration [μg/m^3], standard particles (KCl particles) are used. As a reference measuring instrument, TSI's DustTrak™ Ⅱ model8530 is used. (Adjustment coefficient :Photometric = 1 *default setting)

(*2) PMX_2 represents the mass concentration of particle size 0.3μm-Xμm. (Please refer to the section "Measurement data format" in 3-7-3 and 3-8-3.) To measure the mass concentration [μg/m^3], cigarette smoke (Mebius or Hong Ta Shan) are used. As a reference measuring instrument, TSI's DustTrak™ Ⅱ model8530 is used. (Adjustment coefficient :Photometric = 0.38)

(*3) The setting value of "Fan speed control" is 100% (default setting). For the setting method of "Fan speed control", please refer to "UART command" of 3-7-4 and "I2C command" of 3-8-5.

(*4) The value of "life time" is a reference value. Please consent in advance that this value is not a guaranteed value.

3-4 Absolute Maximum Ratings

(Ta=25℃)

Parameter	Symbol	Rating	Unit	Remark
Supply voltage	Vcc	-0.3 ～ +6	V	—
Interface Select SEL	V_SEL	-0.3 ～ +3.6	V	—
I/O pins (RXD/SCL, TXD/SDA)	V_IO	-0.3 ～ +3.6	V	—
Max. current on any I/O pin	I_IO	±25	mA	—
Operating temperature	Topr	-10 ～ +60	℃	—
Storage temperature	Tstg	-40 ～ +75	℃	—

3-5 Electrical Characteristics

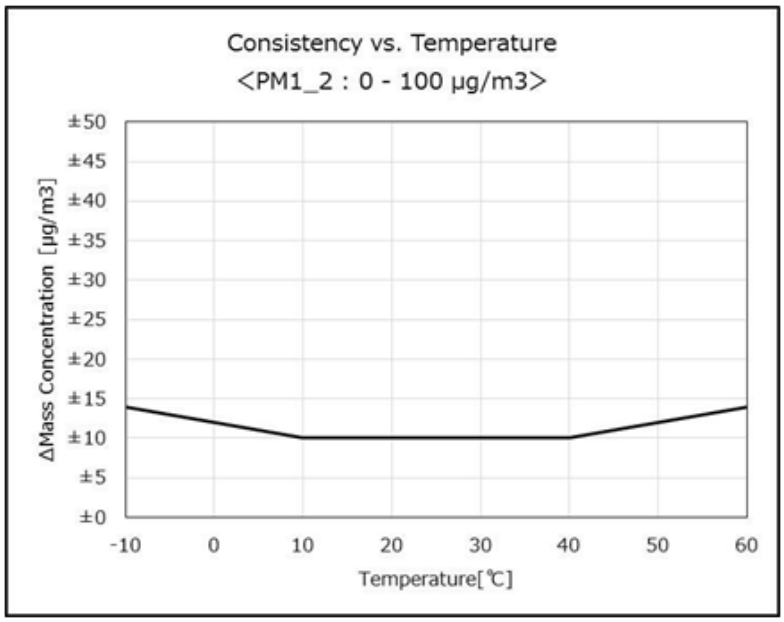
(Ta=25℃, Vcc=5V)

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Supply voltage	Vcc	-	4.5	5.0	5.5	V
Active Current	Icc	Measurement mode	-	50	65	mA
Sleep Current	I_sleep	Sleep mode	-	35	50	μA
Input high level voltage	V_IH	-	2.31	-	-	V
Input low level voltage	V_IL	-	-	-	0.99	V
Output high level voltage	V_OH	I_{OH} = 4mA	2.70	-	-	V
Output low level voltage	V_OL	I_{OL} = 3mA	-	-	0.40	V

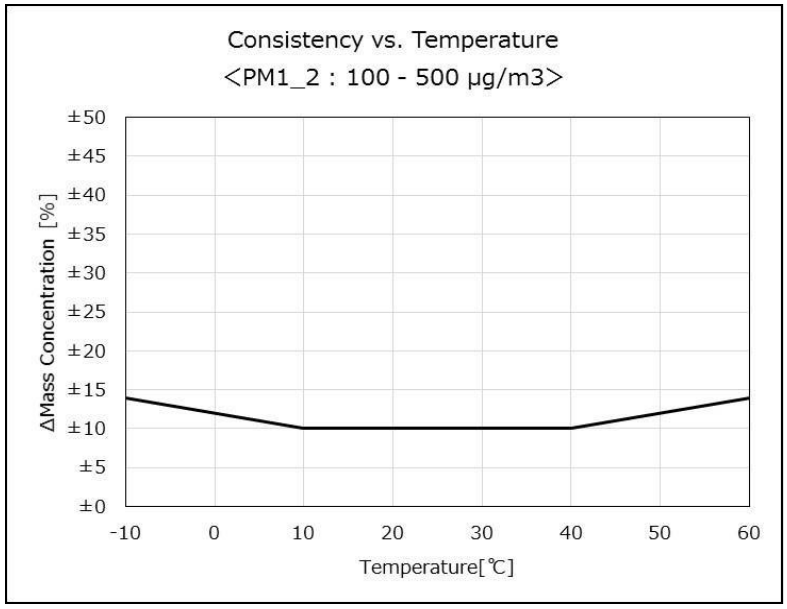
3-6 Temperature Characteristics

Mass Concentration consistency for PM1_2 vs. Temperature *Reference

(1) PM1_2 : 0–100 μg/m^3

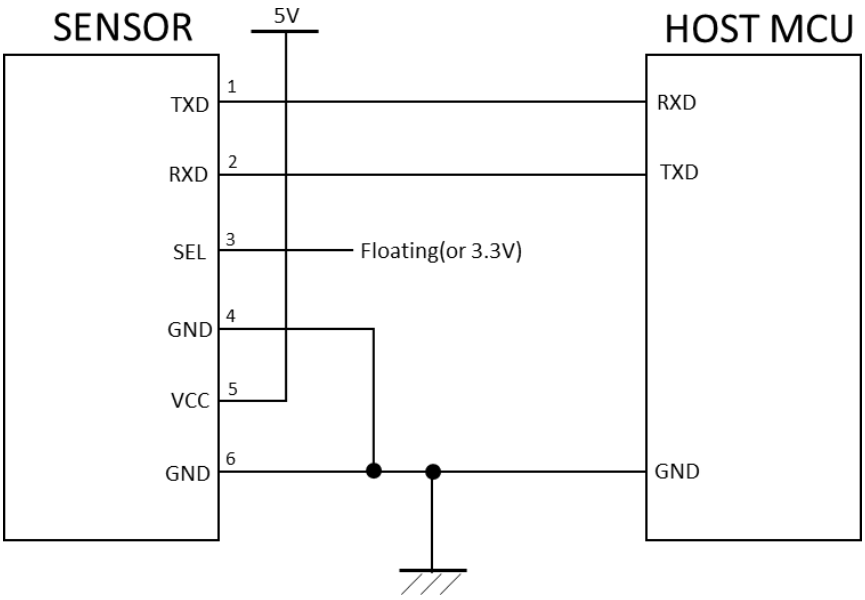


(2) PM1_2 : 100–500 μg/m^3



3-7 UART Interface

3-7-1 Typical application circuit for UART interface



To select the UART interface, please set the SEL terminal (pin3) to floating (or 3.3V).

If the RXD terminal of the sensor is not used, leave the RXD terminal (pin 2) floating.

3-7-2 UART transmission characteristics

The data frame consists of start bit, data and stop bit. It sends the data asynchronously within each data frame.

Data frame setting:

Parameter	Value
Data bit size	8bit
Parity	none
Stop bit size	1bit
Baud Rate	9600 bps

3-7-3 Measurement Data Format of UART

The measurement data format of UART is shown in the table below. Each UART output data is in 2 byte big endian format.

Byte	Symbol	Size [byte]	Format	Description
0-1	Start Frame	2	0xFF, 0xFA	Start of output data
2-3	NC_0.3	2	Unsigned int (16bit) big-endian	**NC_X [0.1/cm^3]** Number concentration of particle size Xμm-10μm
4-5	NC_0.5	2		
6-7	NC_1	2		
8-9	NC_2.5	2		
10-11	NC_4	2		
12-13	Status (*5)	2	-	Information about the internal state of the dust sensor module
14-15	PM1_1	2	Unsigned int (16bit) big-endian	**PMX_1 [μg/m^3]** Mass concentration of particle size 0.3μm-Xμm (standard particle)
16-17	PM2.5_1	2		
18-19	PM10_1	2		
20-21	PM1_2	2	Unsigned int (16bit) big-endian	**PMX_2 [μg/m^3]** Mass concentration of particle size 0.3μm-Xμm (cigarette smoke)
22-23	PM2.5_2	2		
24-25	PM10_2	2		
26	Reserved	1	-	reserved for future expansion
27	CheckSum	1	unsigned int (8bit)	Check sum (8bit)

(*5) About "Status":

	15	14	13	12	11	10	9	8
Byte 12	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

	7	6	5	4	3	2	1	0
Byte 13	Reserved	Reserved	Reserved	Reserved	Reserved	Fan Speed	Dust Accumulation	High Concentration

Bit 0 : High Concentration

0: Concentration is within the measurable range

1: Concentration is extremely high (not measurable).

Bit 1 : Dust Accumulation

0: Normal (measurable)

1: Dust accumulates inside the sensor (not measurable).

Bit 2 : Fan Speed

0: Fan speed is normal.

1: Fan speed is out of the set range.

3-7-4 UART Commands

By sending the protocol data in the table below from the HOST to the sensor, it is possible to change the operation mode, read the measurement data at any timing, execute each command, and change the setting of each parameter.

START byte1	START byte2	Command	Data1	Data2	Check Sum1	Check Sum2
0x42	0x4D	CMD	DATAH	DATAL	CSH	CSL

Checksum = 0x42 + 0x4D + CMD + DATAH + DATAL

Command definition:

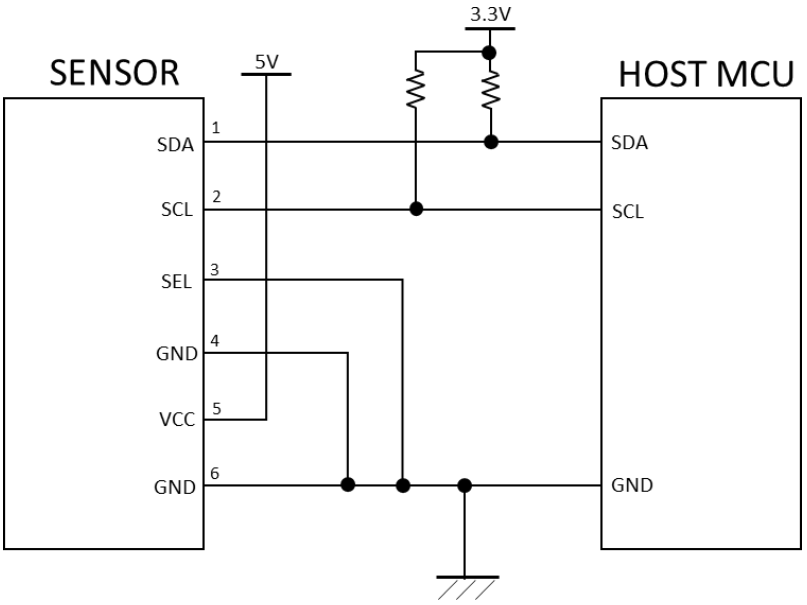
CMD	DATAH	DATAL	SYMBOL	Function
0xE2	X	X	READ	Read in passive mode
0xE1	X	0x00	MODE	Passive mode
		0x01		Active mode (default)
0xE4	X	0x00	SLEEP	Sleep
		0x01		wake up
0x01	X	X	CLEAN	Start Cleaning
0x02	0x81	X	RESET	Software reset
0x03	0x00	DATA	MAVE	Set the number of moving averages 1-60 [times] <default = 10>
0x04	0x00	DATA	TINT	Set interval time 0-59 [s] <default = 0>
0x05	0x00	DATA	TPREFAN	Set the pre-rotation time of the fan 0-59 [s] <default = 3>
0x06	DATA	DATA	TINTC	Set interval time for auto cleaning 0-60480 [10s] <default = 60480>

0x07	0x00	DATA	TCLEAN	Set cleaning time 0-255 [s] <default = 10>
0x08	0x00	DATA	SPEEDFAN	Fan Speed Control 60-100 [%] <default = 100>

"X" means "Don't care"

3-8 I²C Interface

3-8-1 Typical application circuit for I²C interface



To select the I2C interface, please set the SEL terminal (pin3) to GND (0V).

SCL and SDA terminals should be connected to external pull-up resistors (e.g. 10kΩ)

3-8-2 I²C transmission characteristics

I²C communication specifications are shown in the table below.

Slave address	0x69
Clock frequency	100kHz
General Call Address	Unsupported

3-8-3 Measurement data format of I²C

The measurement data format of I2C is shown in the table below. Each I2C output data is in IEEE754 float (32bit), big-endian format.

Byte	Symbol	Size [Byte]	Format	Description
0,1	NC_0.3	2	Upper two bytes	**NC_0.3 [1/cm^3]** Number concentration of particle size 0.3µm-10µm <IEEE754 float(32bit), big-endian>
2		1	CRC-8 for bytes 0,1	
3,4		2	Lower two bytes	
5		1	CRC-8 for bytes 3,4	
6,7	NC_0.5	2	Upper two bytes	**NC_0.5 [1/cm^3]** Number concentration of particle size 0.5µm-10µm <IEEE754 float(32bit), big-endian>
8		1	CRC-8 for bytes 6,7	
9,10		2	Lower two bytes	
11		1	CRC-8 for bytes 9,10	
12,13	NC_1	2	Upper two bytes	**NC_1 [1/cm^3]** Number concentration of particle size 1µm-10µm <IEEE754 float(32bit), big-endian>
14		1	CRC-8 for bytes 12,13	
15,16		2	Lower two bytes	
17		1	CRC-8 for bytes 15,16	
18,19	NC_2.5	2	Upper two bytes	**NC_2.5 [1/cm^3]** Number concentration of particle size 2.5µm-10µm <IEEE754 float(32bit), big-endian>
20		1	CRC-8 for bytes 18,19	
21,22		2	Lower two bytes	
23		1	CRC-8 for bytes 21,22	
24,25	NC_4	2	Upper two bytes	**NC_4 [1/cm^3]** Number concentration of particle size 4µm-10µm <IEEE754 float(32bit), big-endian>
26		1	CRC-8 for bytes 24,25	
27,28		2	Lower two bytes	
29		1	CRC-8 for bytes 27,28	
30,31	Status (*6)	2	Upper two bytes	Information about the internal state of the dust sensor module
32		1	CRC-8 for bytes 18,19	
33,34		2	Lower two bytes	
35		1	CRC-8 for bytes 21,22	

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Byte	Symbol	Size [Byte]	Format	Description
36,37	PM1_1	2	Upper two bytes	**PM1_1 [µg/m^3]** Mass concentration of particle size 0.3µm-1µm **(standard particle)** <IEEE754 float(32bit), big-endian>
38		1	CRC-8 for bytes 36,37	
39,40		2	Lower two bytes	
41		1	CRC-8 for bytes 39,40	
42,43	PM2.5_1	2	Upper two bytes	**PM2.5_1 [µg/m3]** Mass concentration of particle size 0.3µm-2.5µm **(standard particle)** <IEEE754 float(32bit), big-endian>
44		1	CRC-8 for bytes 42,43	
45,46		2	Lower two bytes	
47		1	CRC-8 for bytes 45,46	
48,49	PM10_1	2	Upper two bytes	**PM10_1 [µg/m3]** Mass concentration of particle size 0.3µm-10µm **(standard particle)** <IEEE754 float(32bit), big-endian>
50		1	CRC-8 for bytes 48,49	
51,52		2	Lower two bytes	
53		1	CRC-8 for bytes 51,52	
54,55	PM1_2	2	Upper two bytes	**PM1_2 [µg/m^3]** Mass concentration of particle size 0.3µm-1µm **(cigarette smoke)** <IEEE754 float(32bit), big-endian>
56		1	CRC-8 for bytes 54,55	
57,58		2	Lower two bytes	
59		1	CRC-8 for bytes 57,58	
60,61	PM2.5_2	2	Upper two bytes	**PM2.5_2 [µg/m^3]** Mass concentration of particle size 0.3µm-2.5µm **(cigarette smoke)** <IEEE754 float(32bit), big-endian>
62		1	CRC-8 for bytes 60,61	
63,64		2	Lower two bytes	
65		1	CRC-8 for bytes 63,64	
66,67	PM10_2	2	Upper two bytes	**PM10_2 [µg/m^3]** Mass concentration of particle size 0.3µm-10µm **(cigarette smoke)** <IEEE754 float(32bit), big-endian>
68		1	CRC-8 for bytes 66,67	
69,70		2	Lower two bytes	
71		1	CRC-8 for bytes 69,70	

(*6) About "Status":

	31	30	29	28	27	26	25	24
Byte 30	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
	23	22	21	20	19	18	17	16
Byte 31	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
	15	14	13	12	11	10	9	8
Byte 33	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
	7	6	5	4	3	2	1	0
Byte 34	Reserved	Reserved	Reserved	Reserved	Reserved	Fan Speed	Dust Accumulation	High Concentration

Bit 0 : High Concentration

0: Concentration is within the measurable range

1: Concentration is extremely high (not measurable).

Bit 1 : Dust Accumulation

0: Normal (measurable)

1: Dust accumulates inside the sensor (not measurable).

Bit 2 : Fan Speed

0: Fan speed is normal.

1: Fan speed is out of the set range.

3-8-4 Checksum

CRC-8 is used as check sum in I^2C output. Each output data is divided into upper 2 bytes and lower 2 bytes as shown in figure below, and CRC-8 is added to each 2 bytes.

0	1	2	3	4	5
upper 2 bytes		CRC-8	lower 2 bytes		CRC-8

The specifications of CRC-8 used in this sensor is shown in table below.

Name	CRC-8
Protected data	Read data
Width	8bit
Polynominal	0x31
Initialization	0xFF
Reflect output	None
Final XOR	None
Example	CRC(0xBEEF)=0x92 CRC(0x0000)=0x81

Receiving data can be used to use the data when the received data and the Check Sum are matched.

3-8-5 I^2C Commands

An overview of the available I^2C commands is shown in table below.

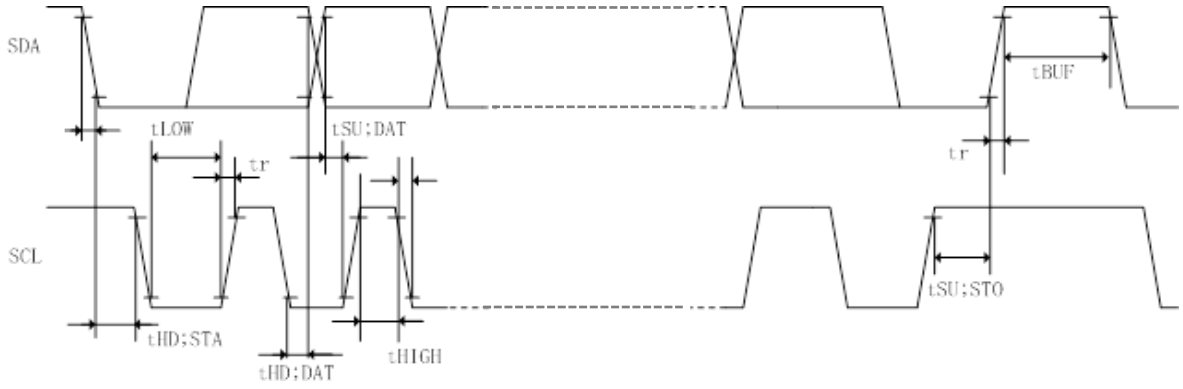
Address	R/W	Symbol	Function
0x00	R	READ	Read Measured value
0x50	R/W	SLEEP	[7] 1:Wake-up, 0:Sleep [0] 1:New data arrived, 0:New data not arrived
0x51	W	CLEAN	[0] 1:Start Cleaning
0x52	W	RESET	0x81:RESET (Same as power-on reset)
0x53	R/W	MAVE	[7:0] number of moving average : 1-60 (times) <default=10>
0x58	R/W	TINT	[7:0] interval time : 0-59 (s) <default=0>
0x59	R/W	TPREFAN	[7:0] pre-rotation time of the fan : 0-59 (s) <default=3>
0x5A	R/W	TINTC_H	[7:0] cleaning interval time_H : 0-60480 (10s) <default=60480>
0x5B	R/W	TINTC_L	[7:0] cleaning interval time_L : 0-60480 (10s) <default=60480>
0x5C	R/W	TCLEAN	[7:0] cleaning time : 0-60 (s) <default=10>
0x63	R/W	SPEEDFAN	[7:0] Fan speed control : 60-100 (%) <default=100>

3-8-6 I^2C AC Characteristics

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
SCL clock frequency	fSCL	(*7)	80	-	120	kHz
Hold time START condition	tHD:STA	(*7)(*8)	0.6	-	-	us
Low period of the SCL clock	tLOW	(*7)	1.3	-	-	us
High period of the SCL clock	tHIGH	(*7)	0.6	-	-	us
Data setup time	tSU:DAT	(*7)	100	-	-	ns
Data hold time	tHD:DAT	(*7)(*9)	0	-	0.9	us
Setup time for STOP condition	tSU:STO	(*7)	0.6	-	-	us
Bus free time between START and STOP condition	tBUF	(*7)	1.3	-	-	us
Startup time for I^2C	tST	(*10)	-	-	1	s
Wait time for clock stretch	tCSW	(*11)	-	-	10	us
Period of the data access	tRD	(*12)	1	-	-	s

(*7) The maximum value of Cb (capacitive load for each bus line) and maximum value of Rb (Pull-up resistor for each bus line) is following. (Cb=200pF, Rb=6kΩ)

I^2C-bus timing chart:

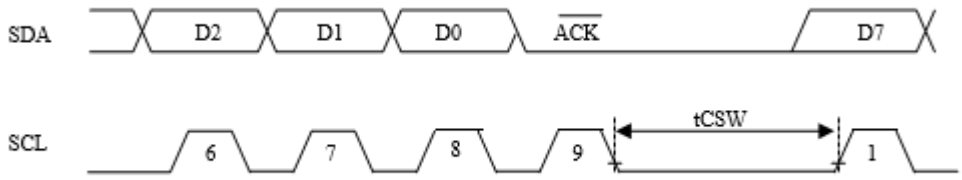


(*8) After this period, the first clock pulse is generated.

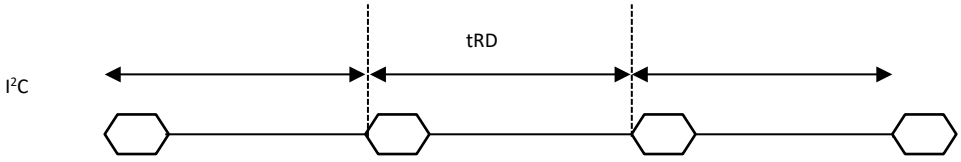
(*9) tHD;DAT is the data hold time that is measured from the falling edge of SCL, applies to data in transmission and the acknowledge.

(*10) Time before I^2C access becoming effective after Vcc is applied

(*11) I^2C-master device needs to wait for tCSW, if it doesn't have the clock-stretch function.



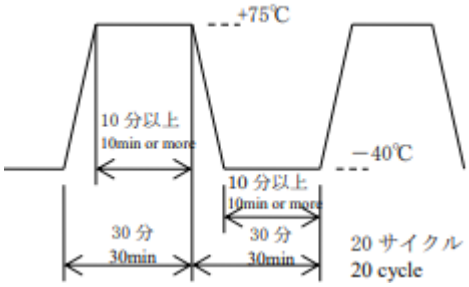
(*12) I^2C-master access interval for this products needs to be longer than tRD.



4 Reliability

The reliability of products shall be satisfied with items listed below.

Confidence level：90% L T P D ： 20 or 30

No.	Test Items	Test Conditions	Failure Judgment Criteria	Samples (n) Defective(C)
1	Temperature cycling		L × 0.8 > K K > U × 1.2 U ： Upper specification limit L ： Lower specification limit (*13) (*14) (*15)	n=11, c=0
2	High temp. and high humidity storage	+60℃, 95%RH 500h		n=11, c=0
3	High temp. storage	+75℃, 500h		n=11, c=0
4	Room temp. operation	+25℃, Vcc=5V, 500h		n=11, c=0
5	Low temp. storage	-10℃, 500h		n=11, c=0
6	Mechanical shock	1000m/s^2, 6.0ms, 3times / ±X, ±Y, ±Z direction		n= 8, c=0
7	Variable frequency Vibration	5~55~5Hz / 1min. 2h / X, Y, Z direction, overall amplitude:1.5mm		n= 8, c=0
8	Static voltage	± 4kV : Contact ± 8kV : Air (According to IEC 61000-4-2.)		n= 8, c=0

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(*13) Test conditions are according to 3-4 Electro-optical characteristics.

(*14) After test, measurement shall be done after leaving under the normal temperature and the normal humidity for 2h. And there should be no dew.

(*15) Measurement is taken a sample of from a specific lot and it's put into effect. We inspect and don't guarantee it to any devices (product).

5 Outgoing Inspection

(1) Inspection lot

Inspection shall be carried out per each shipping lot.

(2) Inspection method

A single sampling plan, normal inspection level II based on ISO 2859 shall be adopted.

Defect	Inspection item	AQL (%)
Major defect	Sensor characteristics defect Electrical characteristics defect (In para. 3-3 or 3-5)	0.4
Minor defect	Defect on appearance and dimension Split, chip, scratch, stain	1.0

Split, chip, scratch, stain

One which affects the characteristics of para. 3-3 or 3-5 shall be defect.

Rust shall not be defect.

6 Supplements

6-1 Presence of ozone-depleting substance

This product shall not contain the following materials.

Also, the following materials shall not be used in the production process for this product.

Materials for ODS : CFC_S, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

6-2 Brominated flame retardants

Specified brominated flame retardants (PBB and PBDE) are not used in this device at all.

6-3 Product mass

Product mass : Approx. 22.15g (Ref.)

Datasheet last updated: 2021-Oct-10

6-4 Packaging specification

Packing View

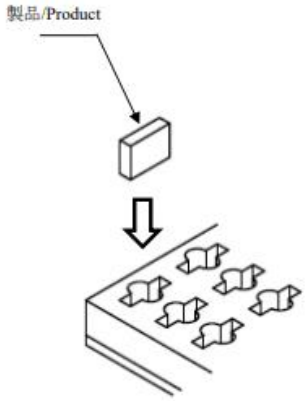


図 1
Fig.1

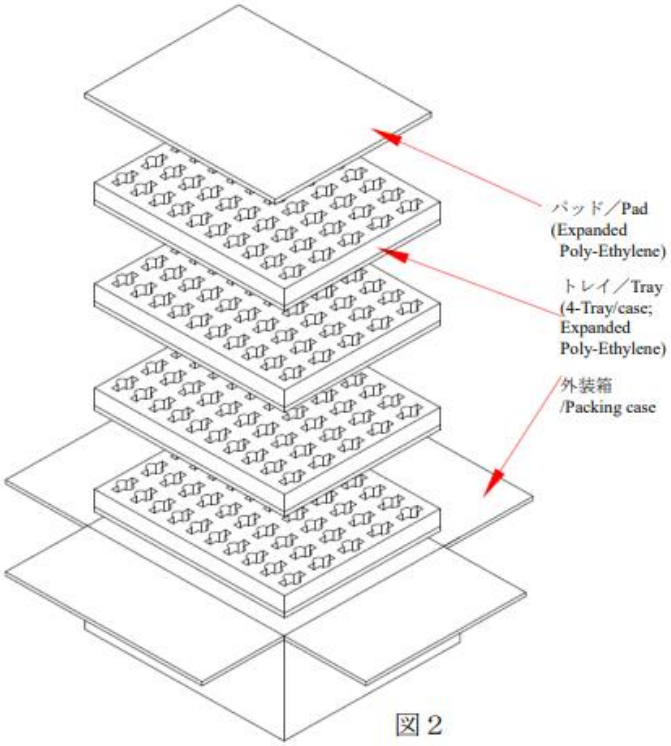


図 2
Fig.2

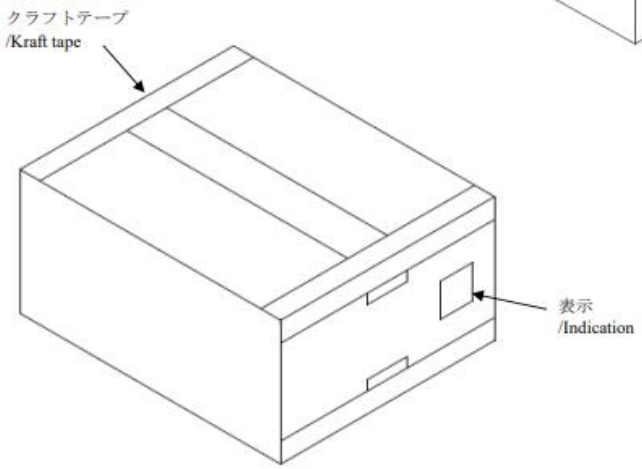


図 3　Fig.3

Packing method

1 Store 50 products in tray. (The storage method is shown in the figure.) (Fig.1)

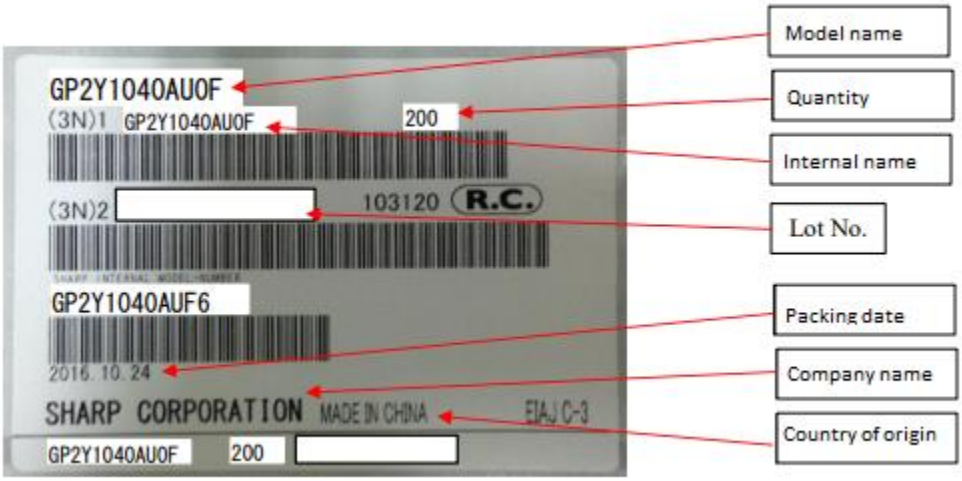
While stacking the product, stack it in 4 rows.

2 Pad (EPE) are put only on the top.
Put them (4 trays) in the packing box. (Fig.2)

3 Seal the packing box with kraft tape.
Put a label with Model No., Quantity, Lot No. on it. (Fig.3)

4 Indication items

The contents of the carton indication conforms to EIAJ C-3 and the following items are indicated.
Model No., Internal production control name, Quantity, Packing date, Corporate
name, Country
of origin
(200pcs/a
packing box)
(Formal packed mass : Approximately 5.7kg)



6-5 Country of origin

Country of origin：China

Production site：Zhuhai Ensei Electronics Co., Ltd.

Address：Xipu Village, Bingfangshan, No.8, jingan Town, Doumen District Zhuhai, Guangdong, China

6-6 Compliance with each regulation

6-6-1 RoHS

This product complies with EU RoHS Directive (2011/65/EU) and Commission Delegated Directive (EU)2015/863.

6-6-2 Management Methods for Control of Pollution

Content of six substances specified in Management Methods for Control of Pollution Caused by Electronic Information Products Regulation:

Marking Styles for the Names and Contents of the Hazardous Substances

Category	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr^{6+})	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Dust sensor	×	○	○	○	○	○

This table is prepared in accordance with the provisions of SJ/T 11364.

○：Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

×：Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572

Lead in glass of electronic components (designated by "×" in the above table) are exempt from the RoHS directive (2011/65/EU) , because there is no effective way to eliminate or substitute them by present scientific technology.

7 Notes

7-1 Connection of case and GND

As the case material, conductive resin is used for the inner case and sheet metal is used for the shield lid, and it is connected to GND in the sensor.

7-2 Cleaning

Please don't do cleaning, because there is a case that this device is not satisfied with its characteristics by cleaning.

7-3 Dust Adhesion

If dust adheres to the optical system part consisting of VCSEL, light receiving element, lens, etc., or inside the sensor, the detection sensitivity may fluctuate. The sensor has the "Cleaning" function of rotating the built-in fan at high speed to blow out the dust accumulated inside the fan, but this function cannot completely remove all the dust accumulated inside the sensor.

Regarding dust adhesion, please consider the structure and mechanism of the equipment as well.

7-4 Disassembly

Please do not disassemble the device such as removing a tapping screw and so on. Even if the device is reassembled, it may not satisfy the specification.

7-5 Use of this product

This product is manufactured for the purpose of using air conditioners with an air purifying function and air purifiers. Please contact us, when using for purposes other than above. In addition, please do not use this product for fire alarm.

7-6 Noise influence

If the sensor is located close to noise source (ex. Electric dust collector, etc.). The sensor output may be affected by leaded noise.

On top of that noise from power supply line also may affect the sensor output. When designing the system, please consider the effect from noise.

7-7 Vibration influence

The sensor output may be affected when outer-light enters the inside of the sensor through the air inlet or outlet of the sensor. When installing the sensor inside the application, please consider not to be affected by outer-light.

7-8 Incident light influence

The sensor output may be affected when outer-light enters the inside of the sensor through the air inlet or outlet of the sensor. When installing the sensor inside the application, please consider not to be affected by outer-light.

7-9 Dewing

When inside of the sensor is moisturized, this product does not keep its proper function. Please design the application so that moisturization of the sensor does not happen.

7-10 Status

The measurement data format of this sensor contains "Status" data that displays the internal status of the sensor. When using this "Status" data, please make sure that there are no problems in actual use before using it.

7-11 Fan speed control

When the fan speed is set lower than the default setting (100%) by the "Fan speed control" command, the sensor measurement value may become unstable depending on the usage environment. When setting the fan speed to less than 100%, please make sure that there are no problems in actual use in the application before using it.

8 Precautions

1. In making catalogue or instruction manual based on the specification sheets, please verify the validity of the catalogue or instruction manuals after assembling Sharp products in customer's products at the responsibility of customer.
2. This Sharp product is designed for use in the following application areas :
   - Computers
   - OA equipment
   - Telecommunication equipment (Terminal)
   - Measuring equipment
   - Tooling machines
   - Audio visual equipment
   - Home appliances

   If the use of the Sharp product in the above application areas is for equipment listed in paragraphs (3) or (4), please be sure to observe the precautions given in those respective paragraphs.
3. Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when Sharp product is used for equipment in responsibility of customer which demands high reliability and safety in function and precision, such as :
   - Transportation control and safety equipment (aircraft, train, automobile etc.)
   - Traffic signals
   - Gas leakage sensor breakers
   - Rescue and security equipment
   - Other safety equipment
4. Sharp product is designed for consumer goods and controlled as consumer goods in production and quality.

   Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as :
   - Space equipment