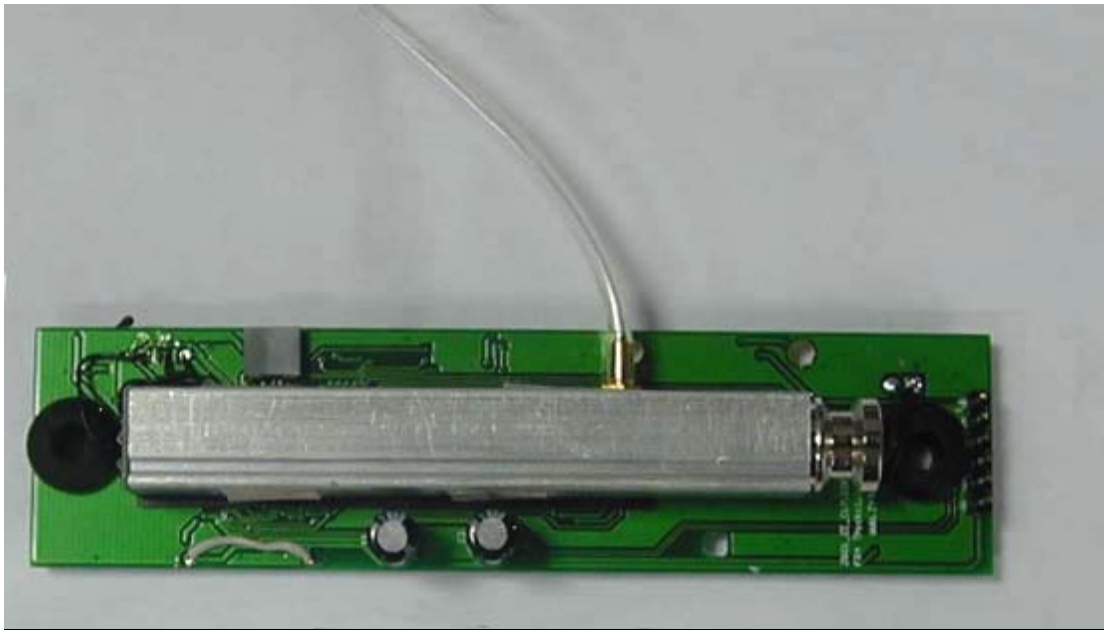


ZG01 CO2 Monitor Module

User Manual



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 EDITION NOV 20073

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1 General Description

This document describes the user guide of ZG0 Series (ZG01).

Edition 4/30/2008

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2 Features of Design

ZyAura, a world class leader and supplier of IR sensor technology and temperature measurement devices, is pleased to introduce a new CO2 monitor for use in scientific, commercial, and consumer applications. The ZG01 is a new and low-cost carbon dioxide monitor implementing IR-SoC technology, it can accurately detect carbon dioxide levels between 0 to 3000 ppm. This gas monitor is suitably fit for applications in Indoor Air Quality (IAQ), HVAC, safety, other industries.

3 Specification

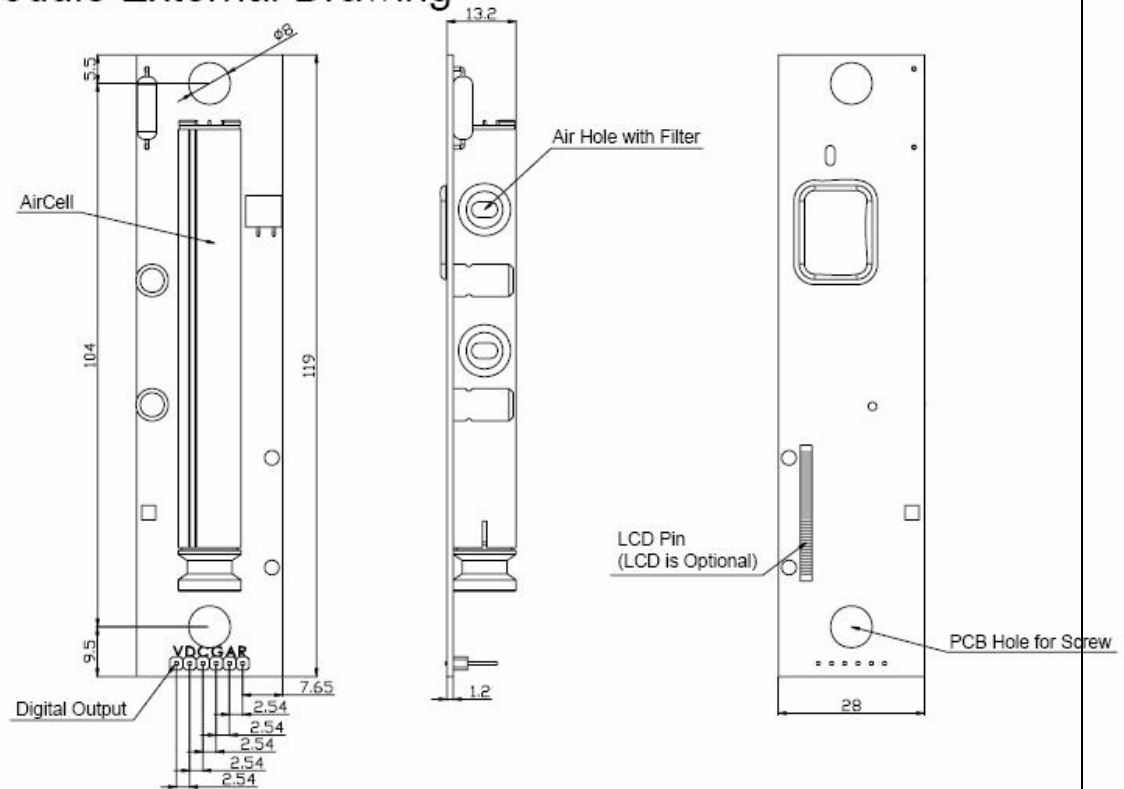
Measurement Method	NDIR
Sample Method	Diffusion or flow through (0.05~0.2l/min)
Measurement Range	0~3000ppm/0.3%
Operating TempRange	32 to 122° F (0-50°C) 0-95% RH,non-condensing
Storage Range	-20~60C,95%RH
■Accuracy	
CO2 Accuracy	+/-50ppm or 5% of reading
Ambient Temperature Accuracy	+/-1.0oC
Pressure Dependence	0.13% of reading per mm Hg
Repeatability	20ppm
Resolution	1ppm
■Outputs	
Output Interface	6pin Vertical Connector,Space=2.54mm
Digital Output	CO2 & Tamb in ZyAura Protocol
OC (Open Collector)Output	Fixed setpoint, factory set at 1000 ppm, 50 ppm hysteresis
■Power Supply	
AC/DC Supply	6.0VDC
■Warm Up & Response	
Response Time #R1 (63% RiseTime)	<1min
Warm Up Time(CO2)	<60 sec
Update Period	7 sec
Warm Up Time(Ambient Temp)	20~30min
Dimension	118x28x20mm (4.65x1.10x0.79 inch)
Weight	49g (1.73 oz)
Sensor Life	>2Years

Pin Assignment of ZG01

Warning: The Dimension in this drawing is for reference only.
For actual dimension, please download from

-
- | | |
|------------------------------|--------------------------------|
| V: Vdd | G: GND |
| D: Data (Serial Data) | C: Clock (Serial Clock) |
| OC: Open Collector | R: Reset |

ZG01 Module External Drawing



Note: ZG01 has the same pin assignment.

Fig 5. the Module External Drawing

4 Serial Output

4.1 Typical Diagram

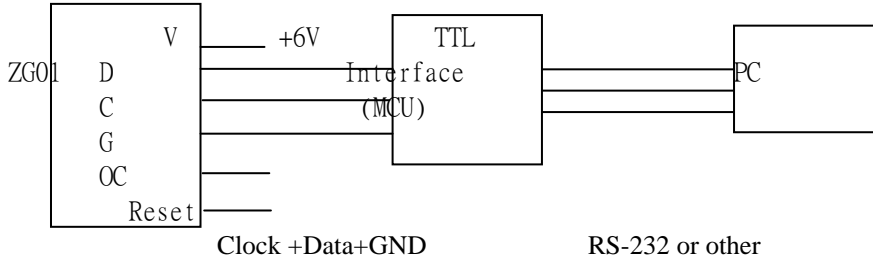


Fig 6. Typical Diagram

ZG01 to TTL Interface (MCU)

V:Vcc

D:Data

C:Clock (2KHz)

G:GND

OC:Open Collector

Reset: Restart the device

Note: Data Pin is High when there is no data out, Time Out > 2ms

4.2 Timing of SPI

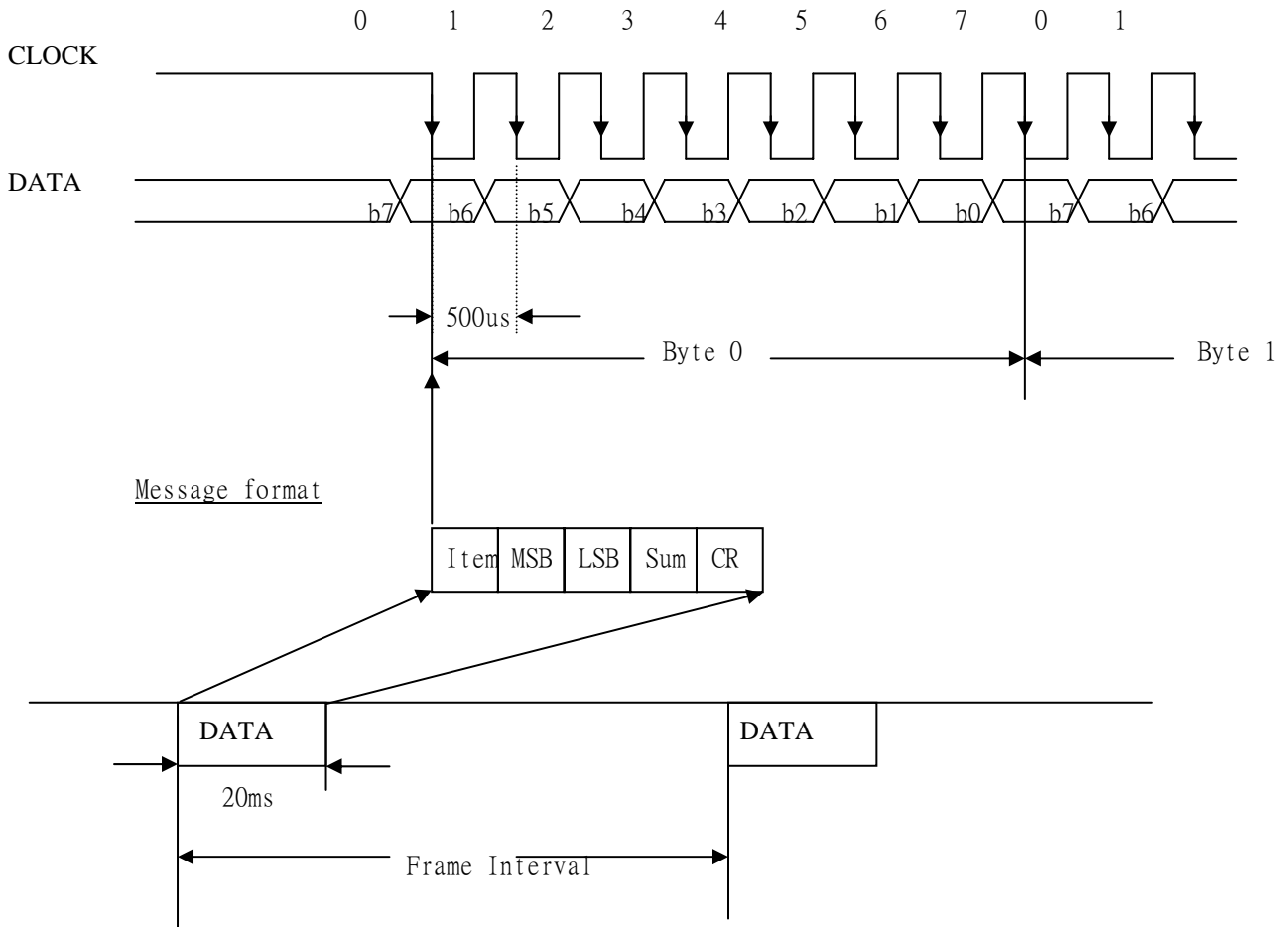


Fig 7. Timing of SPI

4.2.1 Format of Message

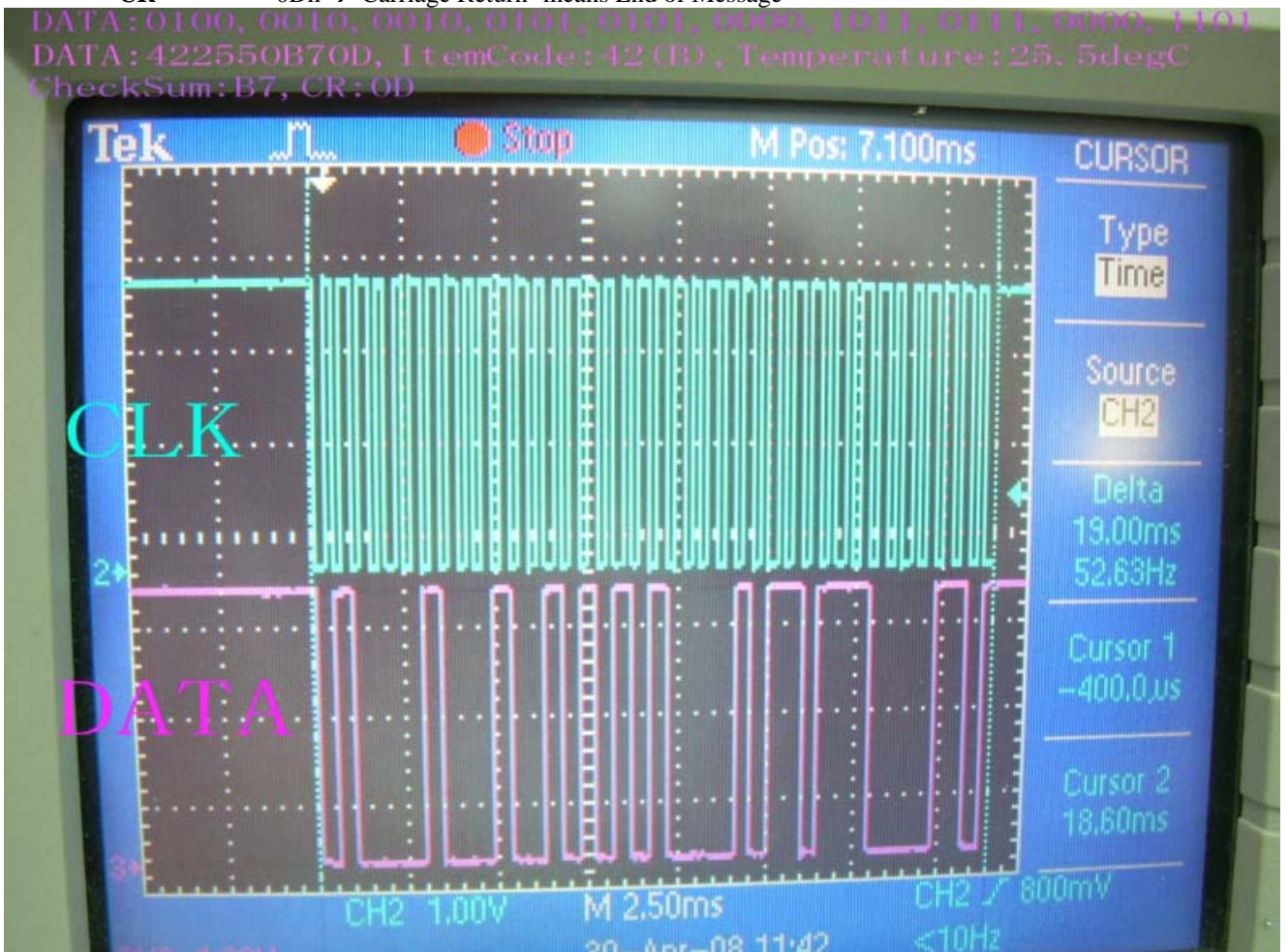
Item	MSB	LSB	Sum	CR
------	-----	-----	-----	----

Item "L"(4Ch): Tobj (Temperature of Obj)
 "F"(66h): Tamb (Ambient Temperature)
MSB 8 bit Data Msb
LSB 8 bit Data Lsb
Sum Item+MSB+LSB=SUM
CR 0Dh, End of the message

4.2.2 Example

42	25	50	B7	0D
----	----	----	----	----

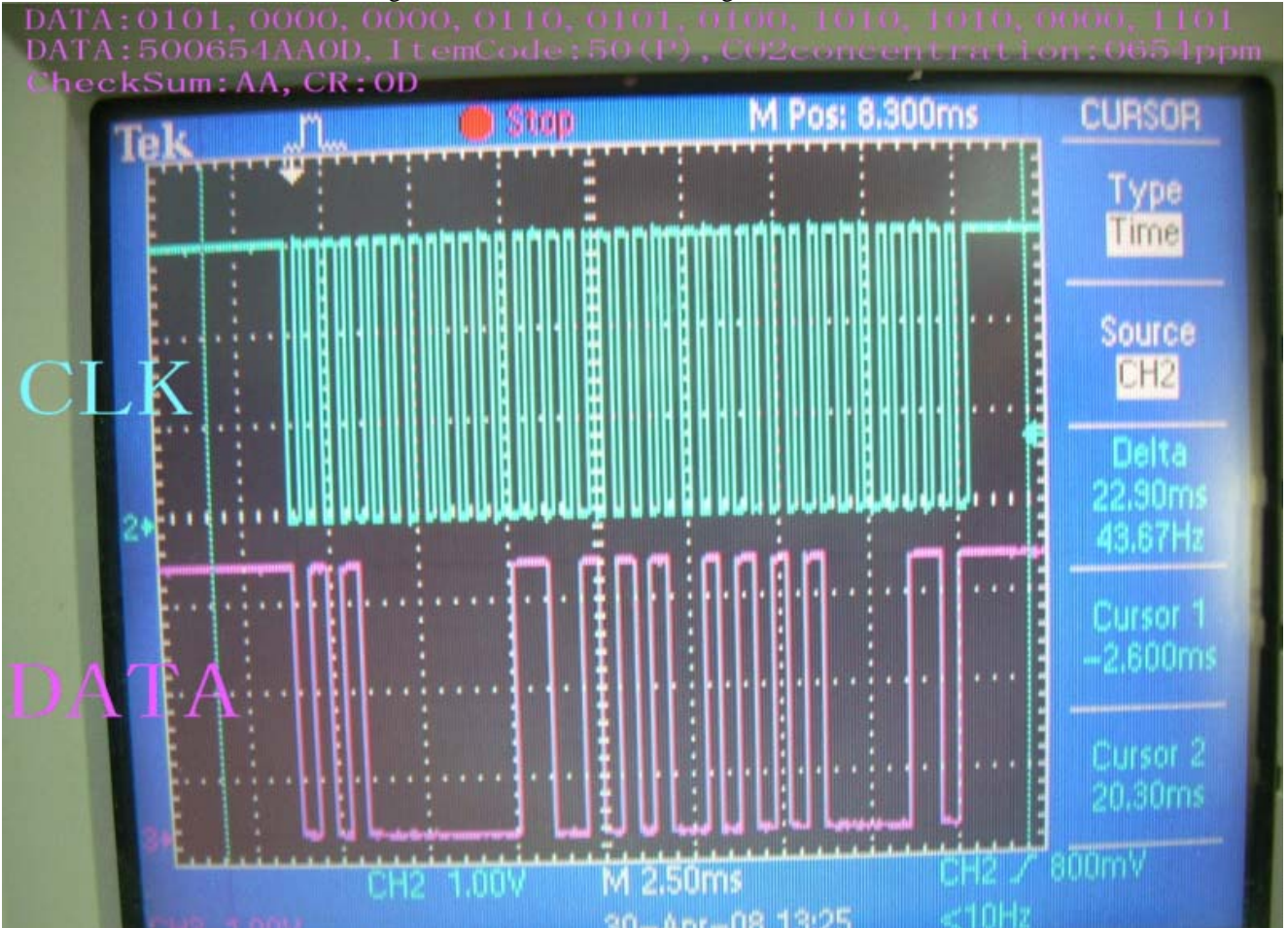
Item 42h → "L" the item code of Ambient temperature
Data MSB 25h
 LSB 50h
 Real Ambient Temperature Value :25.50degC
Sum CheckSum 42h+25h+50h=B7H (Only Low Byte)
CR 0Dh → 'Carriage Return' means End of Message



ZG01 CO2 Monitor Module

50	06	54	AA	0D
----	----	----	----	----

Item 50h → "L" the item code of CO2 concentration
Data MSB 06h
LSB 54h
Real CO2 concentration 654ppm
Sum CheckSum 50h+06h+54h=AAH (Only Low Byte)
CR 0Dh → 'Carriage Return' means End of Message



4.2.3 How to modify the Alarm Point? (How to write Alarm Level into EEPROM)

Warning: misuse may result in EEPROM failure, this may destroy the calibration data. The device may become useless!

- 1) The communication format is the same as reading data from the module:
ItemCode~HighByte~LowByte~Checksum(ItemCode+HighByte+LowByte)~CR,
total 40 clocks(& data).
Note: the sign “~” is not real data but only means “following by”
- 2) For writing Emissivity to ZG01, the command is:
“M”(4Dh)~HighByte~ LowByte~Checksum(ItemCode+HighByte+LowByte) (Only Low Byte)~CR(0Dh)
Emissivity value = HighByte(hex)/100(dec),
For example: ItemCode:4D,HighByte:06H,LowByte:00,Checksum:53H,CR:0D.
Send DATA:4D0600530D to ZG01 ,Will modify Alti to 600m.
Checksum value for this example: 4D(hex)+06(hex)+00(hex)=53(hex)
- 3) **The trick for write data to ZG01 is as below**
 - a. Action pin need to be floating while writing data to ZG01.
 - b. As you know, ZG01 will do routine data out by 40 clocks & datas with communication format.
After the 40th clock, ZG01 will pull the CLK & DATA pin to weak high for waiting if there is External CPU want write data to ZG01.
Please let External CPU start send 1st clock within the timing T1 after the 40th clock.
: 5ms < T1 < 10ms
 - c. The frequency of CLK should be 2KHz.
 - d. ZG01 will latch the data at negative edge of CLK, so data should be ready before the negative edge of 1st writing clock.
- 4) For example,
Emissivity =M0600 ==> 4DH ~ 06H ~ 00H ~ 53H ~ CR
- 5) Finally, how do we know write emissivity success.
About 5 ms after you send CLK & DATA to ZG01 completely.
ZG01 should have 3 kinds of response.
 - a. ZG01 will send out the same data which External CPU had written to ZG01.
(We call this ECHO). That means write emissivity success.
 - b. ZG01 will send out “S” ~ FF(hex) ~ FF(hex) ~ CheckSum(“S” + FF + FF) ~ CR.
That means ZG01 find data checksum error = a wrong data receiving.
ZG01 will forget the data, and you need to re-write again.
 - c. ZG01 have no response as above
That means ZG01 don't get full 40 clocks.
Please check the clock & data which control by External CPU.
Especially, please make sure the T1 timing is right.

5 Interface Demo Board: ZGhub

General Description:

ZGhub is an Interface box with LCD, for ZG0mseries.

This Box can work as an interface between the CO2 monitor module and PC. see Fig.A

“ZGhub” has a 2-column character type LCD Display, it can also work without the PC.

The Hub will show CO2 & Tamb (data from the ZG0m) continuously.

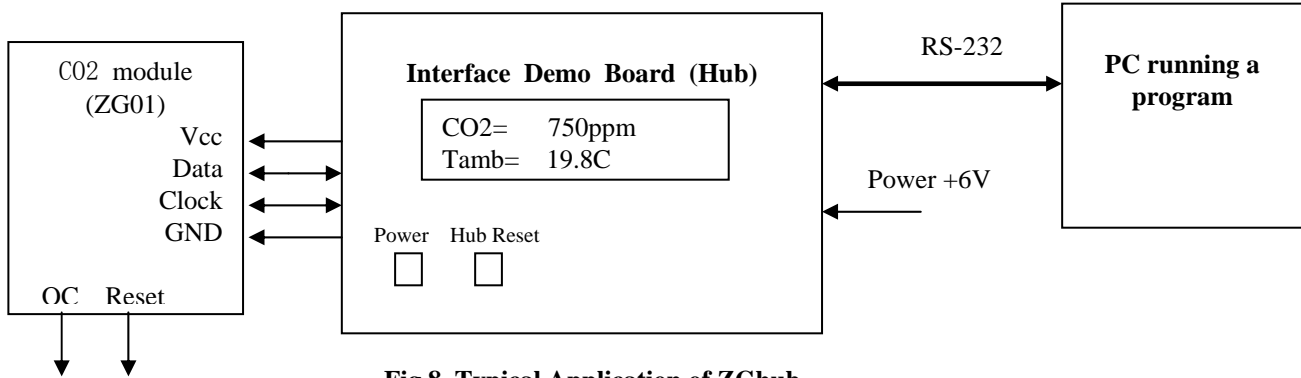


Fig 8. Typical Application of ZGhub

Model No:ZGhub



Fig 9.ZGhub

6 ZGview: Interface Program for PC

Program: ZGview

A Free version for demonstration can be downloading at <http://www.umarket.com.tw>

- Running under Window operating system
- Must be used accompanied with ZGhub
- This program will show the curve of :
CO2 (ppm); Tamb (degC) continuously
- Modification of the setting ,such as Alarm Level

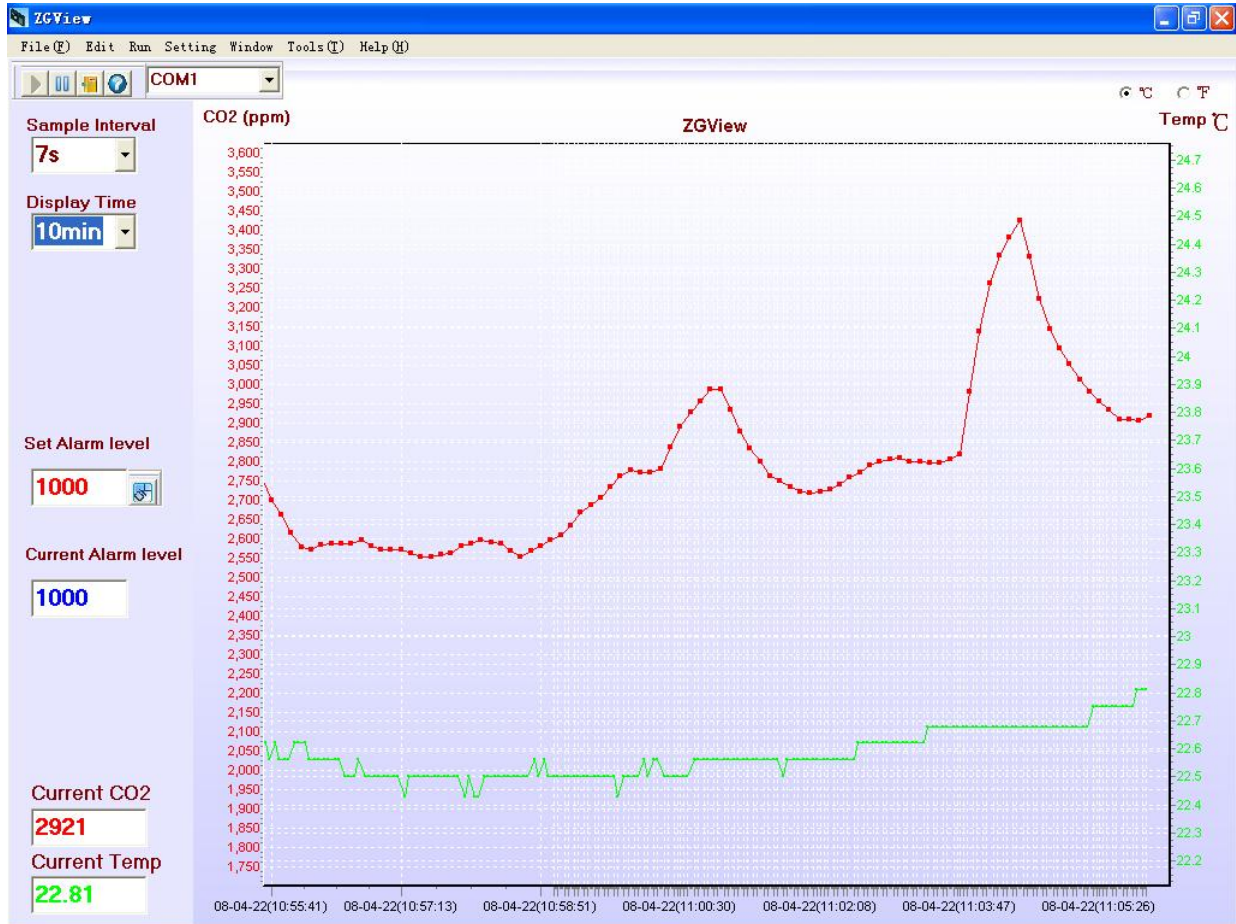


Fig.6 ZGview Window