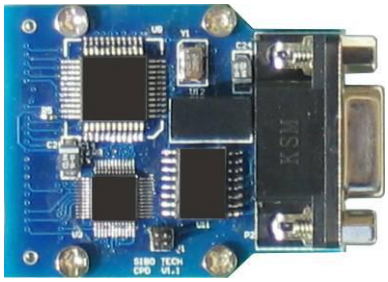
Compact Embedded PROFIBUS DP Module
GS20-DP-MS

User Manual

V 1.2

REV A



SST Automation

E-mail: SUPPORT@SSTCOMM.COM
WWW.SSTCOMM.COM

Catalog

1 About the Module

1.1 Product Function

Embedded PROFIBUS DP module GS20-DP-MS is one of the compact embedded module series with the same embedded interface (hardware). It can connect Modbus RTU equipments to PROFIBUS DP protocol through the UART interface. Users only need to develop hardware and software once; the device can have a variety of fieldbus interfaces.

1.2 Feature

- Compact module with PROFIBUS DP standard DB9 connector;
- Support PROFIBUS DPV1;
- Communicate with Modbus RTU products by UART interface;
- If the equipment runs Modbus RTU protocol, after development, the product will add a DP interface to connect to the PROFIBUS DP network;
- There are two ways to set the DP address: use automatic detection of address or use the DIP switch;

1.3 Technical Specification

[1] The PROFIBUS side of GS20-DP-MS is PROFIBUS DP V1 slave, in the serial port side is the MODBUS master station;

[2] PROFIBUS DP baud rate is self-adaptive, range: 9600~12Mbps;

[3] Input Bytes ≤244 Bytes;

Output Bytes ≤244 Bytes;

[4] 1KV isolated PROFIBUS interface;

[5] Power: 3.3VDC (3.0V-3.6V), Power consumption is about 700mW;

[6] Working temperature: -4°F to 140°F (-20℃ to 60℃), Relative humidity: 5% to 95% (Non-condensing);

[7] External dimension(L*W*H): 1.93 in*1.57 in*0.78 in (49mm*40mm*20mm);

[8] GS20-DP-MS embedded Modbus RTU interface is UART interface, baud rate can be configured by the configuration software.

1.4 Related Products

Related products include GT200-DP-RS.

More information about these products, please visit: http://www.sstcomm.com.

1.5 Terms

PROFIBUS DP: PROFIBUS DP protocol

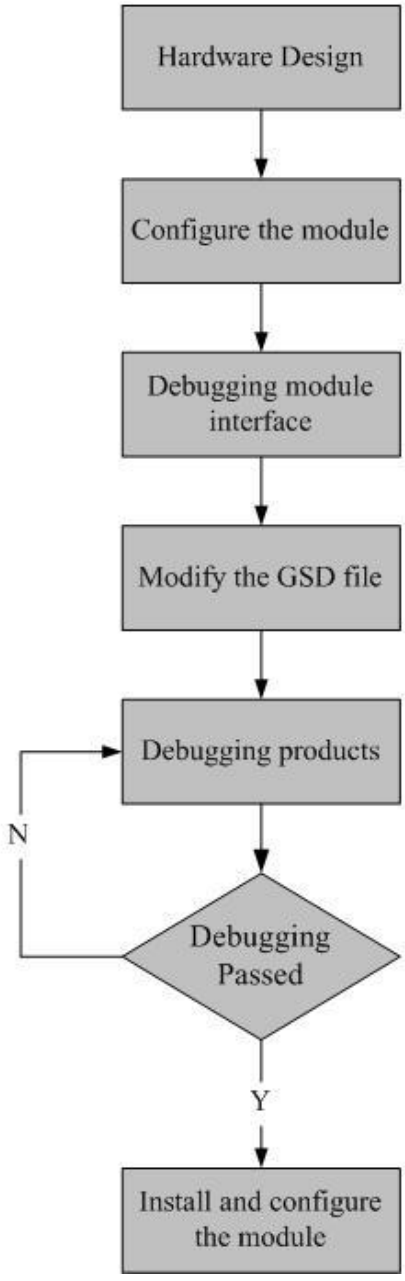
1.6 Versions

1. Modify the state of configuration pin, high level: run mode; Low level: the configuration mode;

2. Increase the function of automatic detection device address; take the configuration of the first Modbus command as a probe command;

3. Add the light state, if the DP address is out of the range (1-126), green light flashing and red light is on.

2 Product Development Process



According to the user manual "Chapter 3 : Hardware Description", Dimensions of the GS20-DP-MS, interface pin definitions, PROFIBUS connector definition. To complete the user hardware schematics, design PCB diagram according to the actual situation.

Configure GS20-DP-MS, please refer to "chapter 4: Software Description" of GS20-DP-MS user manual for details information. Notes: need a TTL to RS-232 hardware to connect to the computer

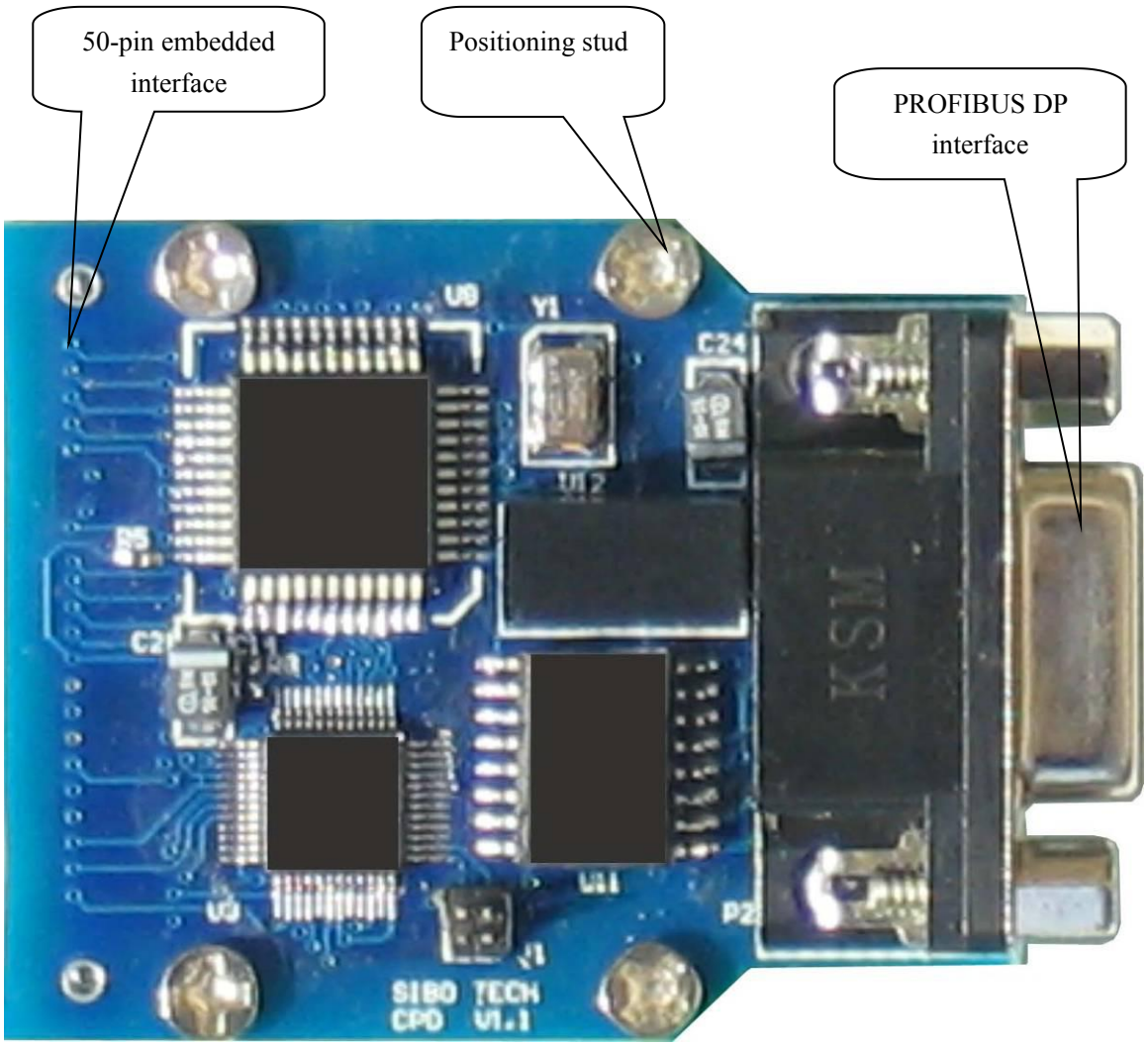
Test the serial data exchange between GS20-DP-MS and user templates

According to our provided sample GSD file, modify it into user defined GSD file

Set up a debugging system, include communication among DP master, GS20-DP-MS and user module. User can refer to "Chapter 5: Working Principle of Modbus Master" for details information

3 Hardware Description

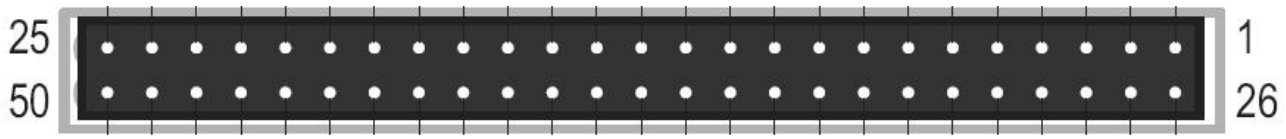
3.1 Products Appearance

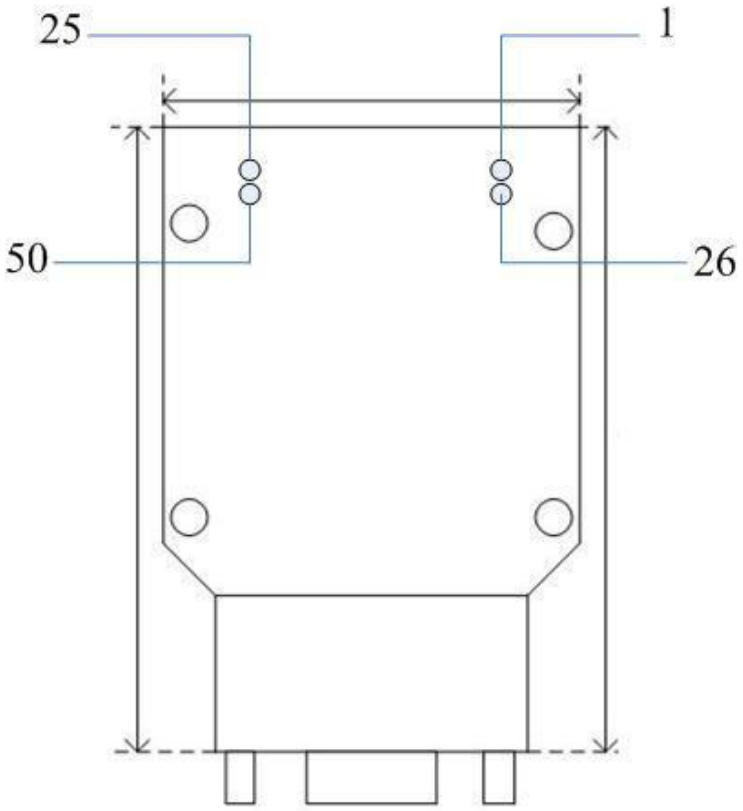


Note: This picture is only for reference and the product appearance should prevail in kind.

3.2 Embedded Interface

Embedded interface uses 50-pin connector socket.





Note: rear view

Signals are defined as follows:

Pin	Signal	Type	Function
1	VSS	PWR	GND
2	Reserved		Reserved
3	TX	O	UART interface, transmit
4	LED1B	O	network status LED output, high level active
5	DP6	O	DP address , bit 6
6	DP2	I	DP address , bit 2

7	DP5	O/I	DP address , bit 5
8	RESET-	I	Reset signal, low level active
9	Reserved		Reserved
10	Reserved		Reserved
11	DP0	I	DP address , bit 0
12	VSS	PWR	GND
13	VDD	PWR	Power: +3.3V DC
14	Reserved		Reserved
15	Reserved		Reserved
16	Reserved		Reserved
17	Reserved		Reserved
18	Reserved		Reserved
19	Reserved		Reserved
20	Reserved		Reserved
21	Reserved		Reserved
22	Reserved		Reserved
23	Reserved		Reserved
24	Reserved		Reserved
25	Reserved		Reserved
26	Reserved		Reserved
27	Reserved		Reserved
28	RX	I	UART interface , Receive
29	LED1A	O	network status LED output, high level active
30	Reserved		Reserved
31	DP4	I	DP address , bit 4
32	DP3	O	DP address , bit 3

33	Reserved		Reserved
34	Reserved		Reserved
35	DP1	I	DP address , bit 1
36	OM	I	Operating Mode 1: Run mode; 0: configuration mode
37	VSS	PWR	GND
38	VDD	PWR	Power: +3.3V DC
39	Reserved		Reserved
40	Reserved		Reserved
41	Reserved		Reserved
42	Reserved		Reserved
43	Reserved		Reserved
44	Reserved		Reserved
45	Reserved		Reserved
46	Reserved		Reserved
47	Reserved		Reserved
48	Reserved		Reserved
49	Reserved		Reserved
50	Reserved		Reserved

I: Input; O: Output; BI: Bidirectional, Tri-state; PWR: Power input.

Notes:

1. The TX and RX pin of GS20-DP-MS must be cross-connected to the user's MCU chip, that is to say: The TX of GS20-DP-MS should be connected to the RX of MCU; The RX of GS20-DP-MS should be connected to the TX of MCU. If the user's MCU is 5V power supply, while GS20-DP-MS is 3.3V, it is suggested to add a level conversion circuit.

2. During initialization, set the RESET pin of GS20-DP-MS to low, it is recommended low-level time should not be less than 100ms, after resetting, wait another 100ms for GS20-DP-MS successfully reset.

3. All marked "reserved" pin, let it hung up

3.3 Signals Description

3.3.1 Operating Mode

OM——Operating Mode, pin 36

The operating mode of GS20-DP-MS depends on pin 36. As provided below, high level means 1, low level means 0, and there are two kinds of operating mode. When the module is in configuration mode, you can use the configuration software SST-CPD-CFG to configure it through UART port. Because there is a TTL level interface on GS20-DP-MS. SST-CPD-CFG communicates with the computer through RS232 serial, user can design the TTL/RS232 circuit. The detailed way of using the software is described in the chapter 4 in the instructions of GS20-DP-MS

Module scans the state of these signals to determine the module's operating mode when starting or restarting. That is to say, when changing the state, you should restart the module to let it take effect (power off and power on).

Operating Modes	OM	Descriptions
0	0	Configuration Mode
1	1	Run Mode

3.3.2 DP Address Settings

There are two kinds of ways to set DP address:

1. Using DIP switch set DP address
2. Automatic detection of address

3.3.2.1 Set DP address with DIP Switch

DP address depends on 7 pins: DP0 to DP6. High level means 1, low level means 0, DP0 means DP address bit 0 and so on. Module scans the state of these 7 pins to determine the module's DP address when starting or restarting, so if you changed the state of these 7 pins, you must restart the module (power off and power on).

If you want to set the DP address as 2, the DP0 to DP6 respectively should be set to: 0100000, see the table below:

Pin	state
DP6	0
DP5	0
DP4	0
DP3	0
DP2	0
DP1	1
DP0	0

3.3.2.2 Automatic Detection of Address

Use automatic detection of address, these 7 pins of DP0 to DP6 can be hung up.

When GS20-DP-MS enters into run mode, use the configured first Modbus commands as detecting command, the range of address is 1 ~ 126, the detection of address is used for Modbus communication and DP slave station.

3.4 Network Status Output

Noted that these output signals cannot be directly drive LED lights, it must be driven by transistors and other components.

These output signals, high level turns on LED lights, and low level turns off LED lights.

Network status outputs are defined as follows:

Name	Color	State	Description
LED1A	Green	ON	Data exchange
		Blinking	Running state (no data exchange)
LED1B	Red	ON	Configuration state
LED1A green blinking and LED1B red on			DP address out of range (Address range 1 ~ 126)

3.5 UART Interface

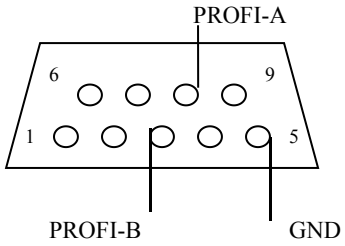
UART interface uses the following settings:

8 data bits, no parity, 1 stop bit

Range of baud rate: 300 bps to 115200 bps

Baud rate is configured by the configuration software, please refer to chapter 4.

3.6 PROFIBUS DP Interface



DB9 PIN	Function
3	PROFI_B，data+
5	GND
8	PROFI_A，data-

4 Software Description

4.1 Notes before Configuration

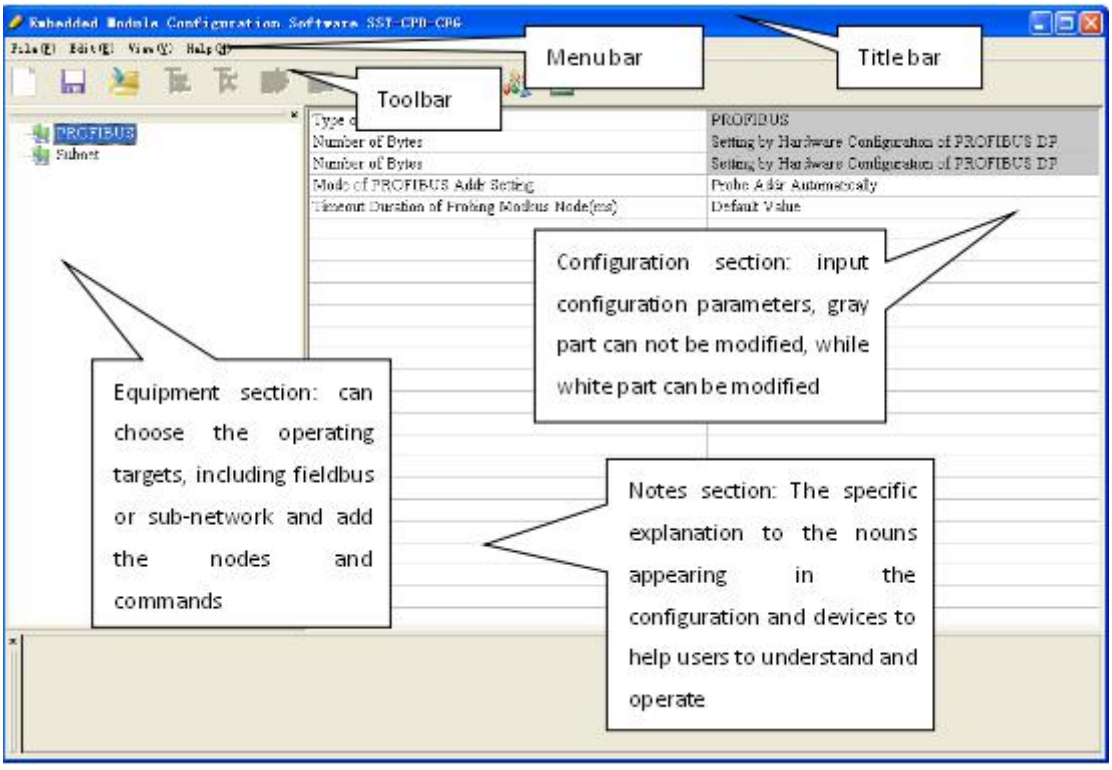
SST-CPD-CFG is a software based on Windows platform, used to configure the field bus gateway device SST-CPD-CFG, it can set the related parameters of the Modbus field bus and command.

Notes: To configure GS20-DP-MS, user may design a TTL/RS-232 circuit to connect to the serial port of PC.

4.2 User Interface

The interface of SST-CPD-CFG including: the title bar, menu bar, toolbar, status bar, the equipment section, the configuration section and the notes section.

Note: in the software, all of the gray part is cannot be changed.



Toolbar is shown as below:

Functions from left to right are: new, save, open, add node, delete node, add command, delete

command, upload configuration, download configuration, Auto mapping, conflict detect and Export Excel.

: Create a new configuration project

: Save the current configuration

: Open a configuration project

: Add a Modbus slave node

: Delete a Modbus slave node

: Add a Modbus command

: Delete a Modbus command

: Read the configuration from the module and show it in the software

: Download the configuration from the software to the module

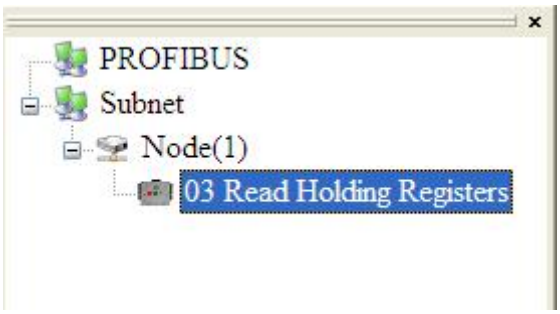
: Automatically computing mapping address

: Detect whether there is conflict in memory data buffer of the gateway

: Output the current configuration to local hard disk and save it as .xls file

4.3 The Operation of Equipment View

4.3.1 Equipment View



4.3.2 Operation Mode

The equipment view supports three types of operation: Edit Menu, Edit Toolbar and Right click edit Menu.

4.3.3 Operation Types

1) Add Node: Right click on subnet or existing nodes, and then perform the operation of adding a new node. Then there is a new node named "new node" under subnet. **Note: GS20-DP-MS only supports configuring a Modbus node**.

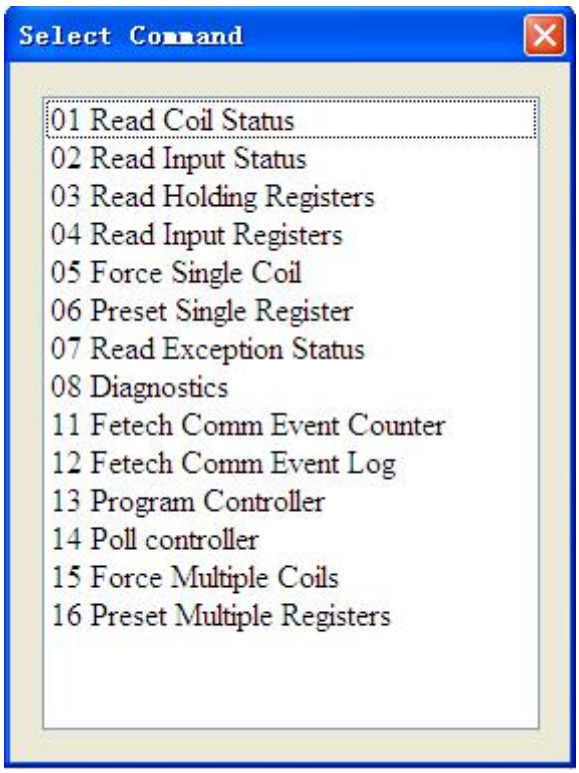
2) Delete Node: Right click on the node to be deleted, and then perform the operation of deleting the node. The node and its all commands will be deleted.

3) Add Command: Right click on the node, and then perform the operation of adding command to add a

command for the node. The dialog box will be shown as follow:

Currently, it supports the commands: 01, 02, 03, 04, 05, 06, 15 and 16.

Select the command: Double click the command

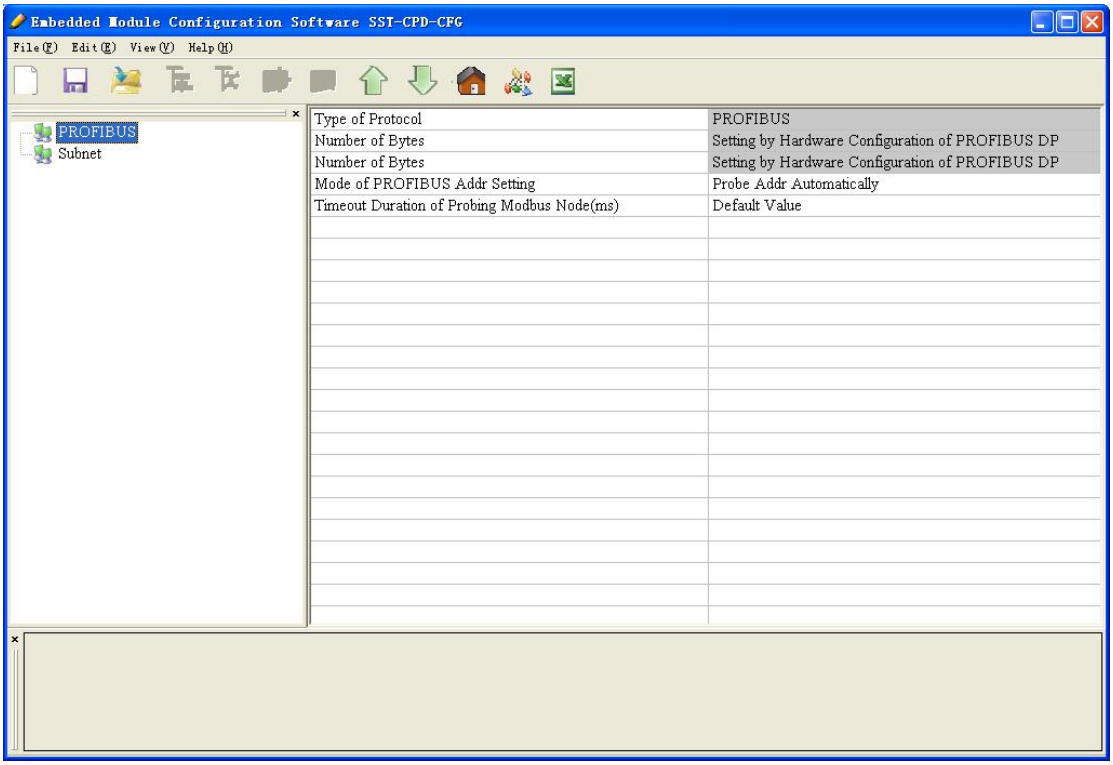


4) Delete Command: Right-click on the command and then perform the operation of deleting the command.

4.4 The Operation of Configuration Interface

4.4.1 Interface of Fieldbus Configuration

In the equipment view, click PROFIBUS, and then the configuration interface is shown as follows:



Fieldbus configuration interface of GS20-DP-MS

4.4.2 Interface of Subnet Configuration

In the equipment interface, click Subnet, and then the configuration interface is shown as follows:

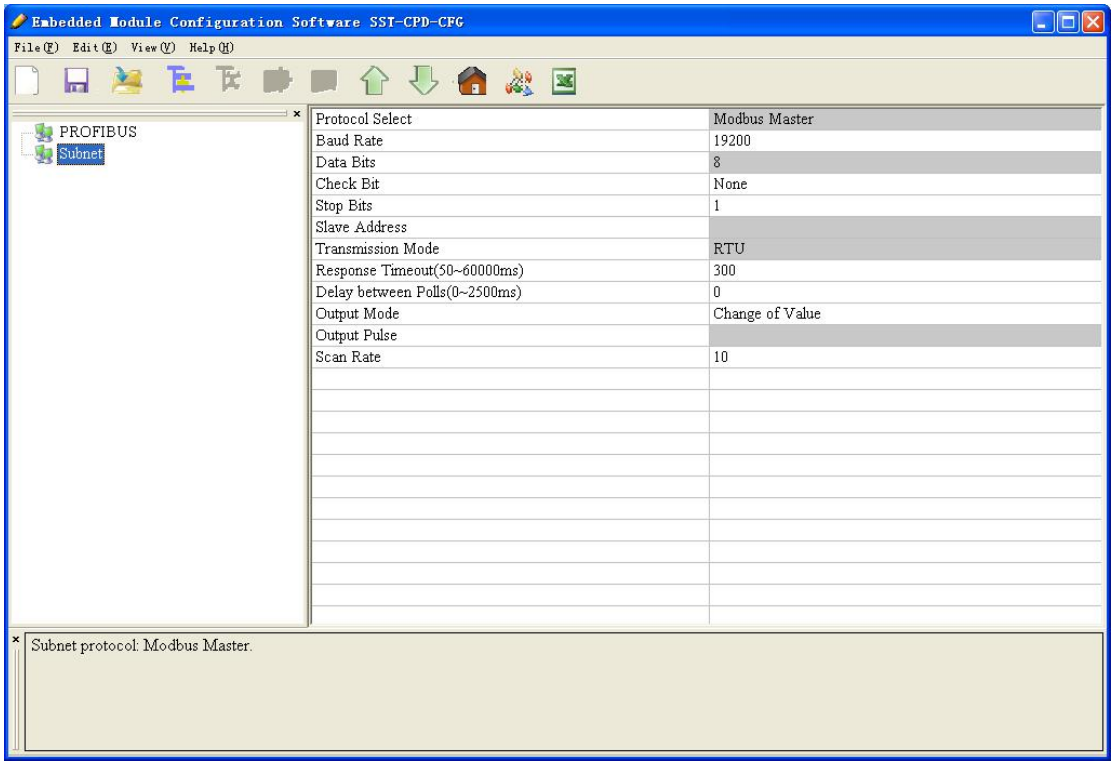
The protocol type is Modbus master.

Modbus Master

Configurable parameters are as follows:

Baud Rate, Data Bits, Check Bit, Stop Bits, Transmission Mode, Response Timeout, Delay between Polls, Output Mode, Output Pluses, Scan Rate

Interface of configuration view is shown as follow:



Baud Rate: There are 300, 600, 1200, 2400, 9600, 19200, 38400, 57600 and 115200bps to be selected.

Data Bits: 8 bits

Check Bit: There are none, odd, even, mark and space to be selected.

Stop Bits: Number of stop bits: 1, 2.

Transmission Mode: Modbus RTU

Response Timeout: After the gateway sends request, it waits the Modbus slave's response for max time which is in ms. (Range: 50~6000ms)

Delay between Polls: Delay between polls means delay between a response has been received and sending next request. The range of the parameter value is 0 to 2500ms.

Output Mode: There are three type of output:

Cycle: the write command will be sent periodically;

Forbidden: The gateway will not send write command;

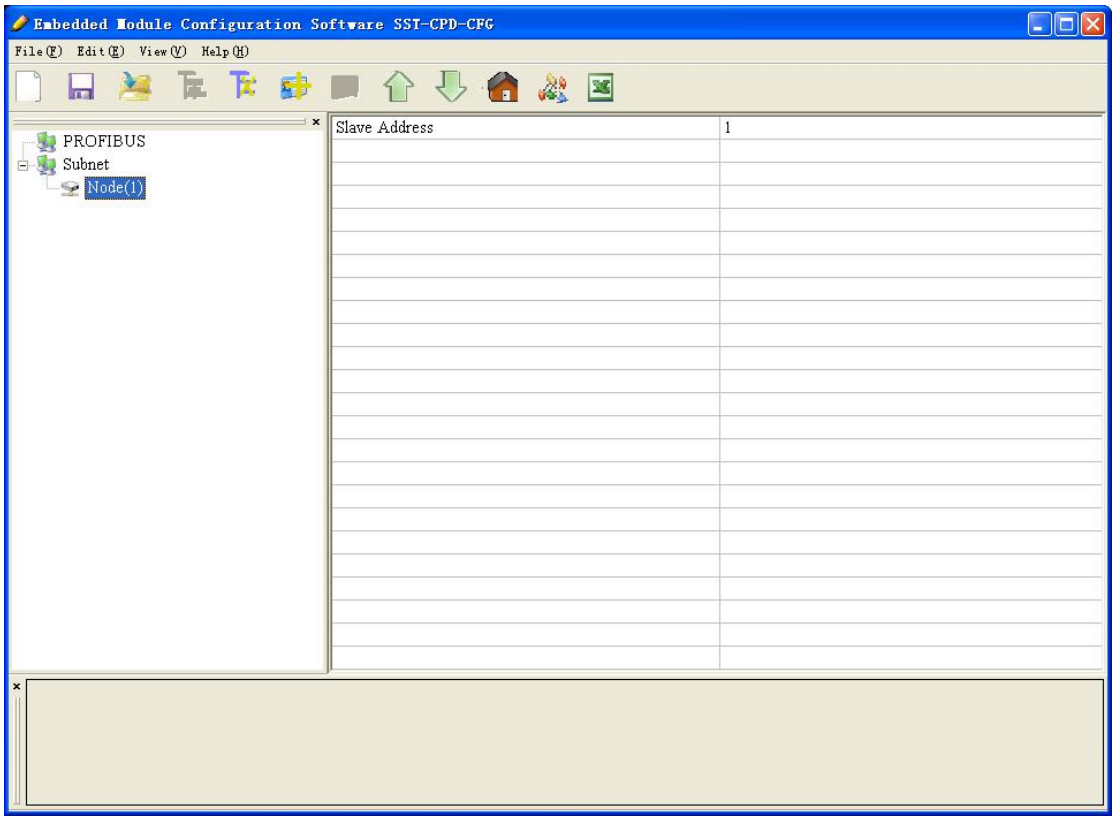
Change of Value: when the output data change, the write command will be sent;

Scan Rate: Scan Rate is ratio of fast scan to slow scan. Every Modbus command can be set to fast scan or slow scan. If this parameter value is set to 10 then every fast scan command will be sent 10 times and those slow

commands will be sent once. (Range: 0~255)

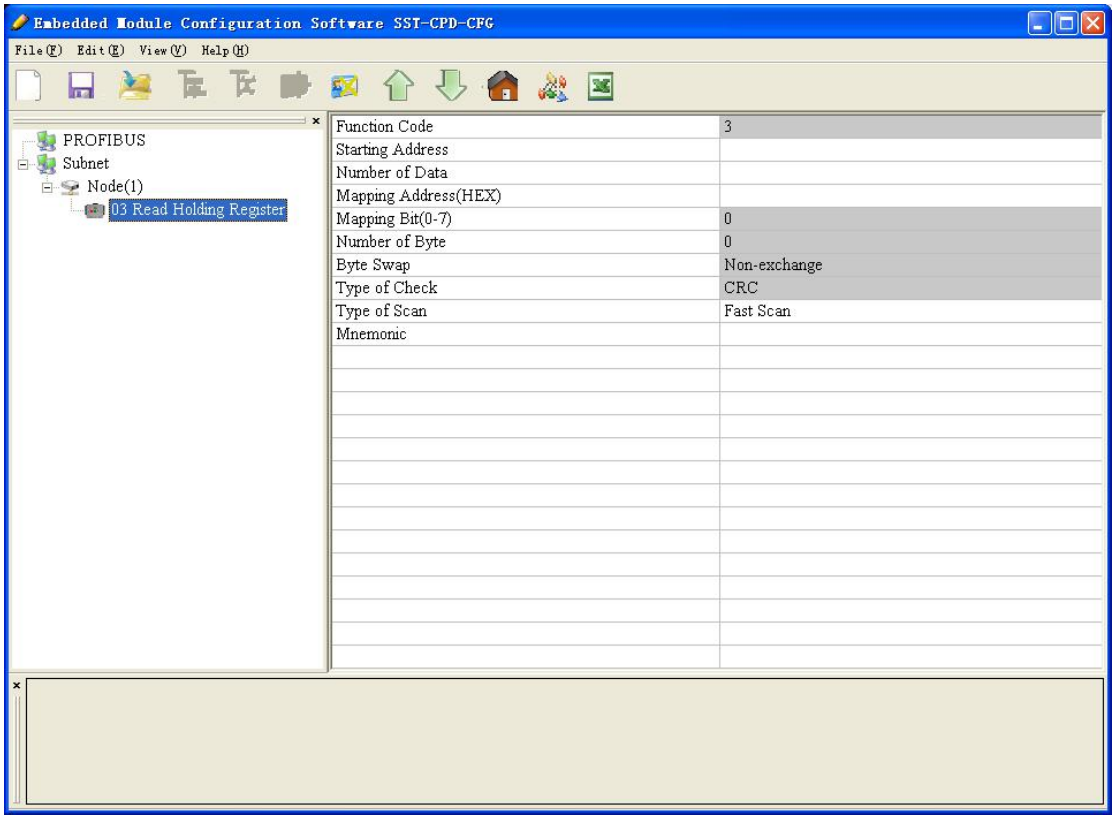
4.4.3 Interface of Node Configuration

When the protocol type of subnet is "Modbus master", in the interface of device view, left click a node, and then configuration interface is shown as follow:



4.4.4 Interface of Command Configuration

When the protocol type of subnet is "Modbus master", in the interface of device view, left click a command, and then configuration interface is shown as follow:



Starting Address: Modbus salve Register or coils starting address. The range of the parameter value is 0 to 65535.

Number of Data: Now GS20-DP-MS only support RTU mode, the range is 1 to 122 (Modbus function code 3, 4, 16), 1 to 400 (Modbus function code 1, 2, 15)

Mapping Address (Hex): The starting address of data in memory buffer of the module.

The address range of data mapping in the module memory:

Read command: 0x0000 ~ 0x00F3

Write command: 0x4000 ~ 0x40F3

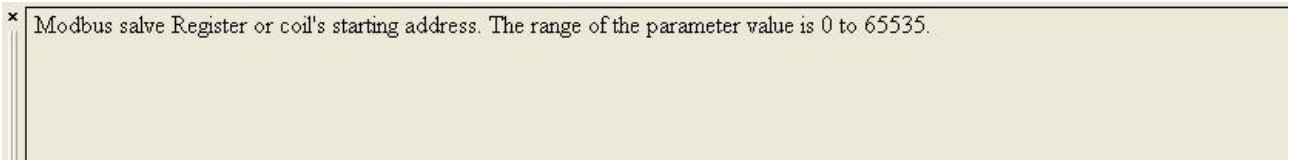
Mapping Bit (0 ~ 7): When reading or writing a coil or an input status its value will be mapping into one bit of input or output buffer. (Range: 0~7)

Byte Swap: There are three kinds of type: Non-exchange, Double-byte-exchange, and Four-byte-exchange.

Type of Scan: Every Modbus command can be set to fast scan or slow scan. The gateway will send Modbus command according to the "Scan Rate". Scan Rate is ratio of fast scan to slow scan.

4.4.5 Notes Interface

Notes interface displays the explanation of configuration. The notes that show how to configure "Starting Address" is shown as follow:



4.5 Upload and Download Configuration

4.5.1 Serial Configuration

The software automatically scan the available serial port of system, and the available serial can be shown in serial list. After modifying all items, pressing “OK” to save your settings.

4.5.2 Upload Configuration

Choose upload configuration, upload the configuration from gateway to the software, the display interface is shown as follow:

Note: Before uploading the configuration, please check whether the “serial port configuration” is the available port.

If upload successfully, the display interface is as follows:

4.5.3 Download Configuration

Before downloading the configuration, please check whether the "serial port configuration" is the available port:

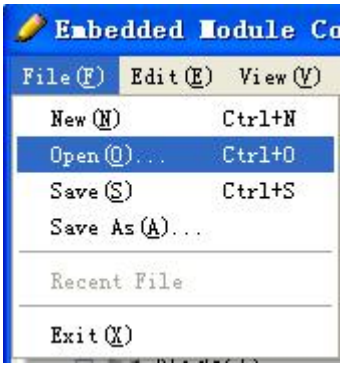
If download successfully, the display interface is as follows:

Remark: Before downloading the configuration, make sure that all configurations have been completed.

4.6 Load and Save Configuration

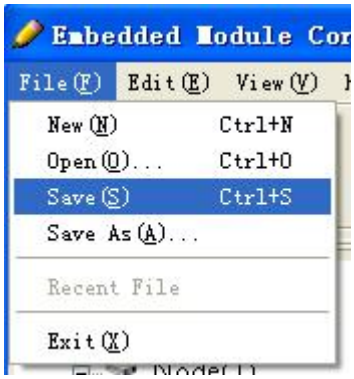
4.6.1 Load Configuration

Choosing "Open" can save the configuration project as .xml document.



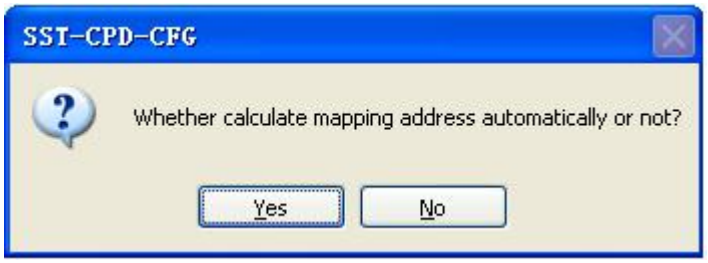
4.6.2 Save Configuration

Choosing "Save" can save the configuration project as .xml document.



4.7 Auto Mapping

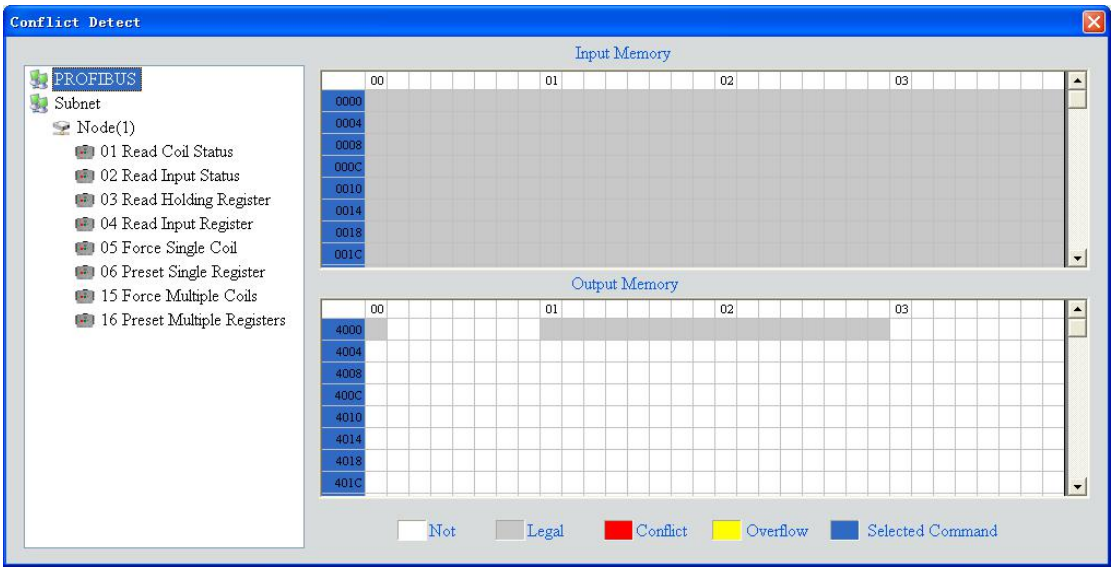
The function helps user configuration "The starting address of mapping memory". Click the icon  :



Click "Yes" and SST-CPD-CFG will calculate the parameter automatically.

4.8 Conflict Detect

The function helps user check memory. Click the icon  :



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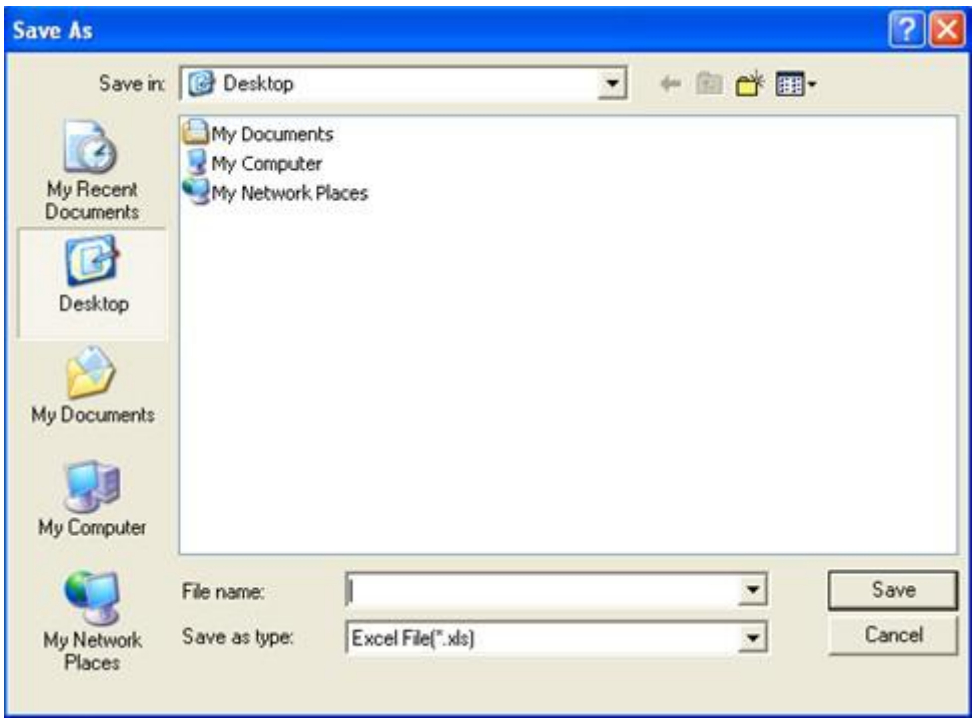
4.9 Output Excel Document

Choose the icon  , save the configuration as excel document and choose the right path



Double click the .xls document and open it: "Order List", "PROFIBUS" and "Subnet".

Command List: as follow:

A	B	C	D	E	F	G	H	I	J
Number	Function Code	Starting Address	Number of Data	Mapping Address(Hex)	Mapping Bit(0-7)	Number of Bytes	Byte Swap	Type of check	Type of Scan
1	3	32	23	0012H	0	0	Non-exchange	CRC	Fast Scan
2	16	23	34	4000H	0	0	Non-exchange	CRC	Fast Scan

PROFIBUS: Protocol type and relevant parameters, as follow:

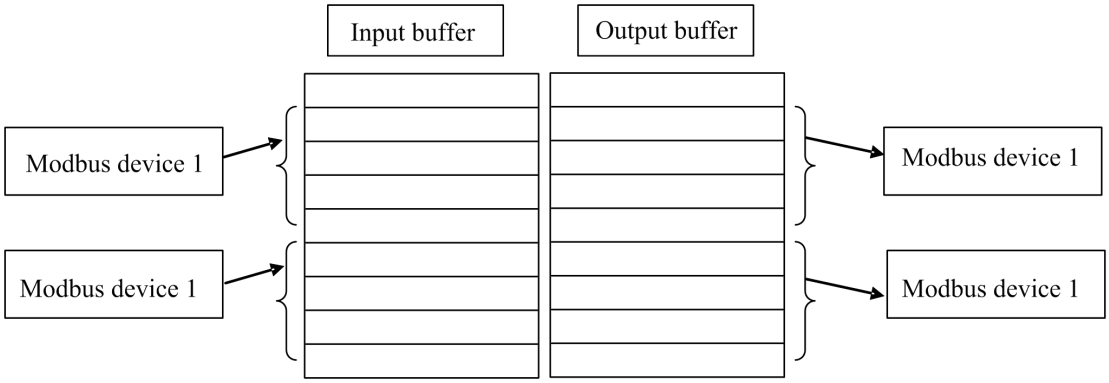
A	B
Type of Protocol	Number of Bytes
PROFIBUS	Setting through Hardware Configuration of PROFIBUS DP

Subnet: Modbus subnet parameters, as follow:

A	B	C	D	E	F	G
Protocol Select	Baud Rate	Data Bits	Check Bit	Stop Bits	Slave Adddress	Transmission Mode
Modbus Master	19200	8	None	1		RTU

5 Working Principle of Modbus Master

The data conversion of GS20-DP-MS between the Modbus and PROFIBUS is realized through the "mapping" relationships. The GS20-DP-MS has two data buffers, one is the PROFIBUS network input buffer, and the other is the PROFIBUS network output buffer. Modbus read command writes the read data into the input buffer, for PROFIBUS network reading. The Modbus preset register commands take data from the network output buffer and output to the corresponding Modbus devices by writing command.



Users can configure 48 commands; Each Modbus command can read a set of consecutive Modbus registers.

6 GSD File

This product provides sample GSD file, user-friendly development and use.

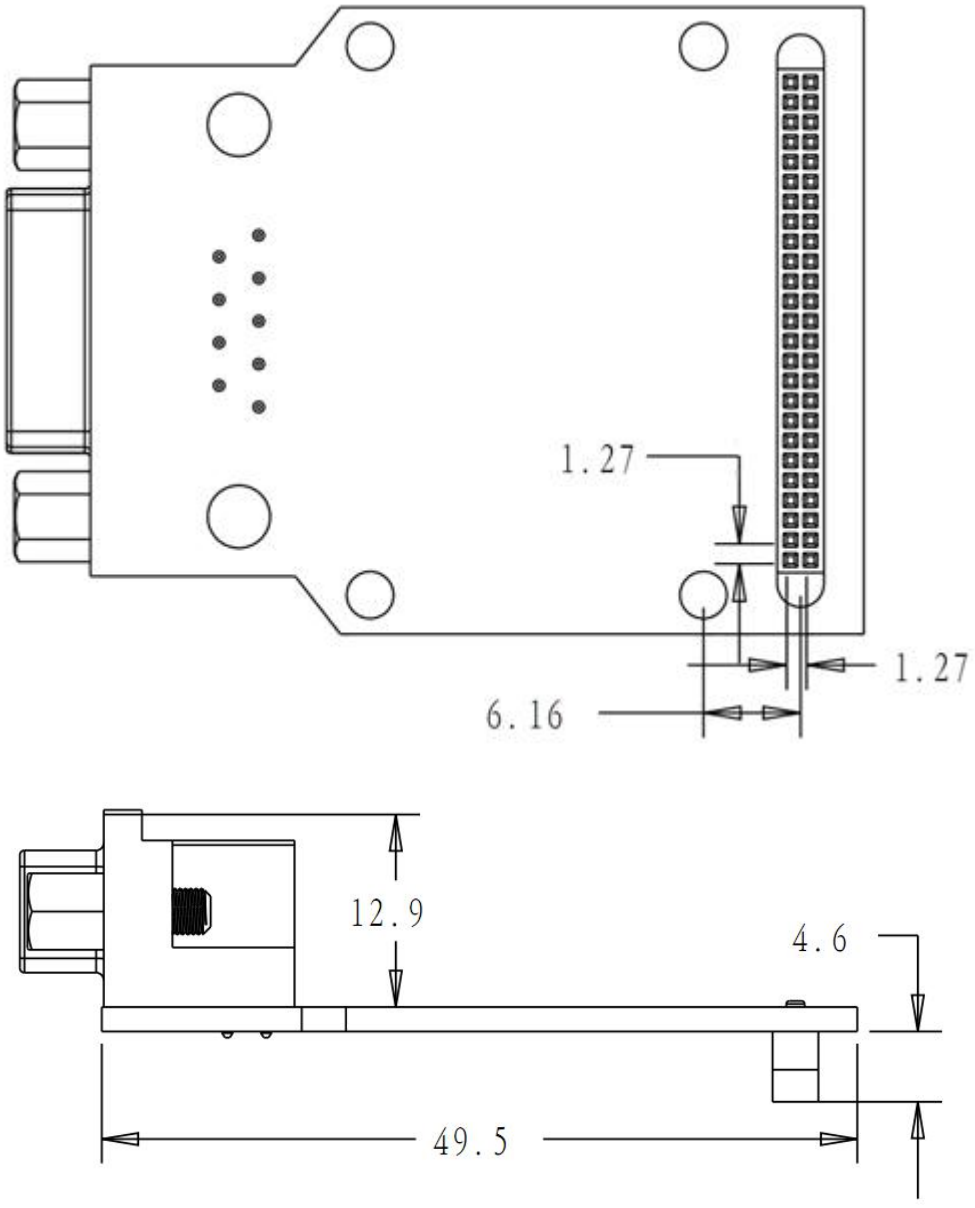
GSD files can be opened and edited by Notepad.

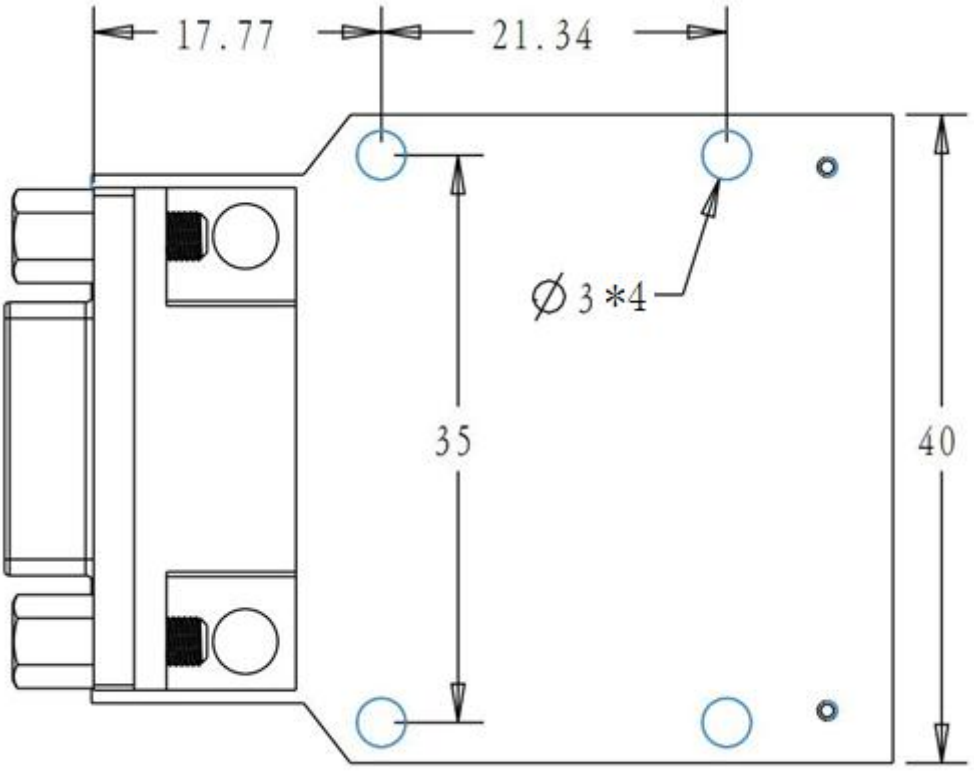
7 Installations

7.1 Mechanical Dimensions

Size (L*H*D):1.93 in*1.57 in*0.78 in (49mm*40mm*20mm).

The size in the below pictures is in cm.

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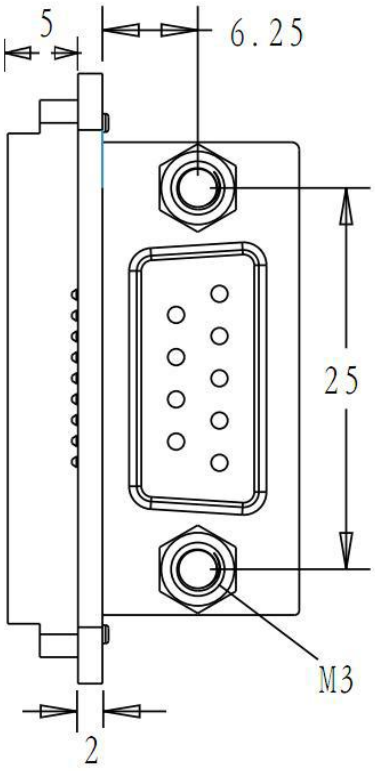
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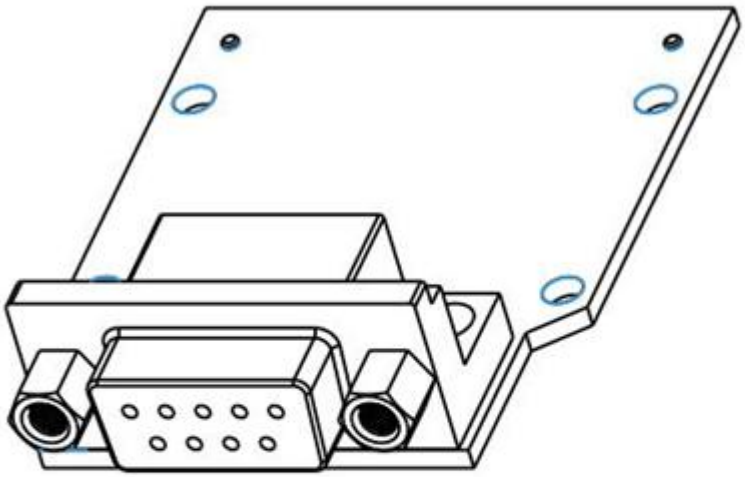
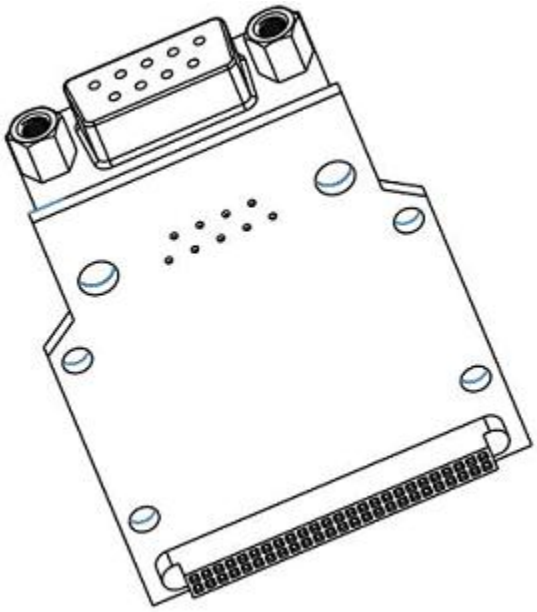
M3
2



Proportion 2.000



For reference, see package module by SSTCOMM.

7.2 Installation Method

Using four positioning stud installation.

8 Copyright Information

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