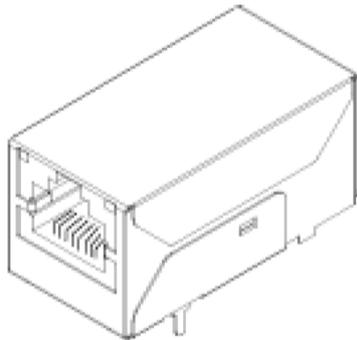


Embedded EtherNet/IP Module EIP-341

User Manual

REV 1.0



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1 About the embedded module

1.1 Function

EIP-341 is an embedded EtherNet/IP module. User devices can communicate with it through UART, and then achieve the connection between user devices with EtherNet.

1.2 Features

- ◆ Upgrade UART interface to EtherNet/IP interface expediently;
- ◆ EtherNet is 10/100M adaptive;
- ◆ EtherNet/IP support multiple link;
- ◆ Web Server for configuration;
- ◆ Can finish the module initialization through serial port.

1.3 Specifications

[1] Support ODVA standard EtherNet/IP protocol;

[2] EIP-341 has an Ethernet interface and UART interface (included in 20-pin socket connectors), can achieve data transformation between EtherNet/IP and serial port;

[3] EtherNet is 10/100M adaptive;

[4] The input and output buffer can be set by users:

The input buffer is the most 256 bytes;

The output buffer is the most 256 bytes;

[5] EtherNet/IP server, support multiple EtherNet/IP clients (different IP addresses or different ports) communication at the same time;

[6] Serial port is UART, half duplex, baudrate: 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400bps, 8 data bits, None Parity, one stop bit;

[7] Serial port use user-defined protocol;

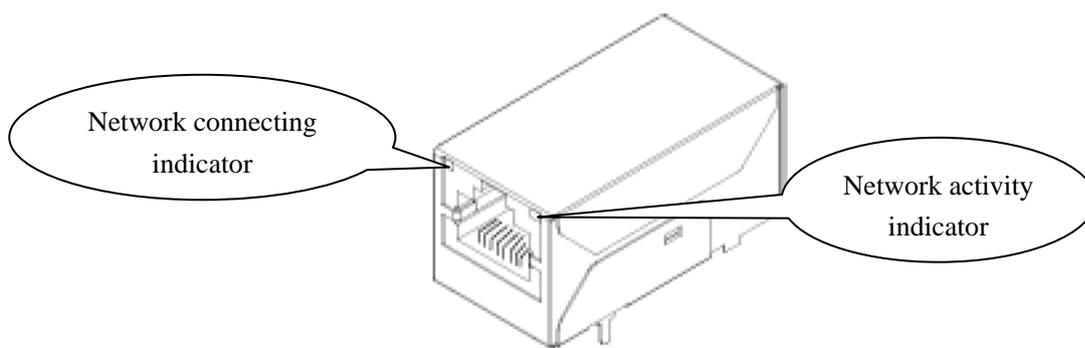
[8] Power: +3.3VDC (3.14 ~ 3.45V), 270mA;

[9] Environmental temperature: -40 ~ 85°C, humidity: 5% ~ 90%;

[10] Dimension: 37mm (Length)*20mm (Width)*22mm (Height)。

2 Hardware

2.1 External appearance

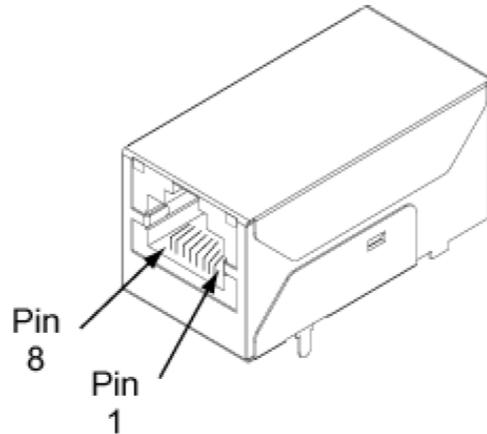


2.2 Indicators

Indicator	Status	Description
Yellow	Off	No network connection
	Always on	Have network connection
Green	Off	No network data transmitting or receiving
	Blinking	Have network data transmitting or receiving

2.3 Interface

2.3.1 Ethernet interface



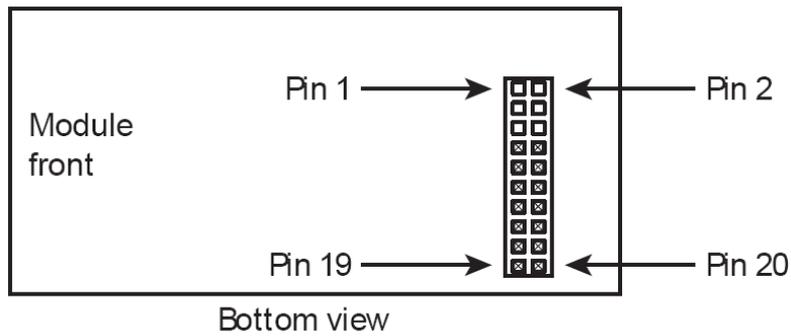
Ethernet interface use 8-line RJ-45 interface, and the pin definition show as follow:

Pins	Signals	Descriptions
Pin 1	TXD+	Transmit Data+
Pin 2	TXD-	Transmit Data-
Pin 3	RXD+	Receive Data+
Pin 4	EPWR+	Power from Switch+
Pin 5	EPWR+	Power from Switch+
Pin 6	RXD-	Receive Data-
Pin 7	EPWR-	Power from Switch-
Pin 8	EPWR-	Power from Switch-

2.3.2 Power and device interface

EIP-341 has 20-pin socket connector (needle-type). It includes power interface, UART interface and GPIO.

Pin position and definition show as follow:



Pins	Signals	Description
1	VETH+	Power Pass-Thru+
2	VETH-	Power Pass-Thru-
3 ~ 6	NC	No Pin
7	RXD	UART Receive (Input), connect with TXD of user board processor
8	TXD	UART Transmit (Output), connect with RXD of user board processor
9	GPIO	Reserve
10	/RUN	RUN (Output), and need a 10K pull-up resistor on user board. Logic 1: The module is starting; Logic 0: The module finished starting and is in run status (include waiting for initializing, starting TCP protocol stack and being in data exchange and so on). If the pin is pulled down to low electrical level through 1K pull-down resistance before starting the module, the module will start with default IP configuration (192.168.0.11) after being started.
11	BAUD2	Set UART baudrate (Input), see next table.
12	BAUD1	
13	BAUD0	
14	/RESET	Reset signal (Input), low-level effectively.
15	+3.3V	Wire DC power +3.3V
16	GND	Wire power ground
17 ~ 19	NC	Reserve
20	/DATAEXCH	Data exchange (Output), and need a 10K pull-up resistor on user board. Logic 1: The module is in non-data exchange (be in starting, be in waiting for initializing, be in

		starting TCP protocol stack and so on); Logic 0: The module is in data-exchange.
--	--	--

2.4 UART baudrate

UART baudrate setting show as follow:

Index	BAUD2	BAUD1	BAUD0	Baudrate (bps)
0	0	0	0	2400
1	0	0	1	4800
2	0	1	0	9600
3	0	1	1	19200
4	1	0	0	38400
5	1	0	1	57600
6	1	1	0	115200
7	1	1	1	230400

2.5 Reset signal

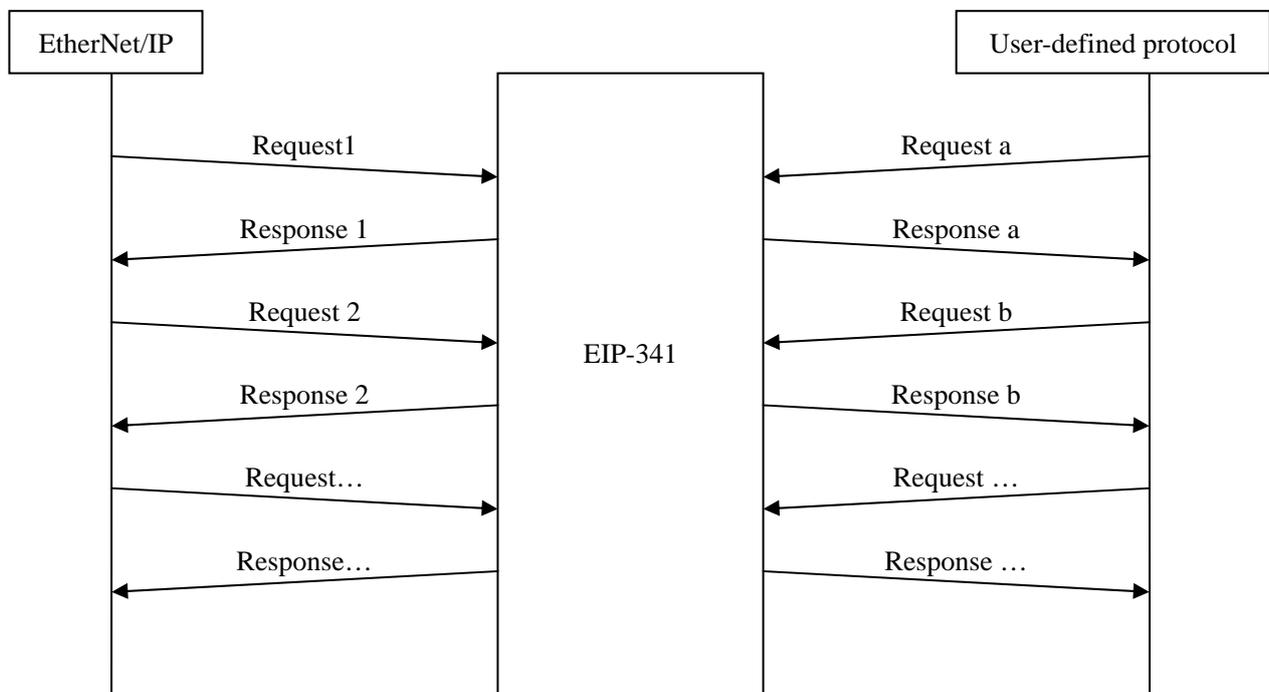
The RESET (Pin 14) of the embedded module support hardware reset signal input. When the RESET pin is polled down to GND or low to 2.88V lasting 1 microsecond, module will be forced to reset, and the delay time of resetting is 250 milliseconds (typical value).

3 Communication protocol

3.1 Description

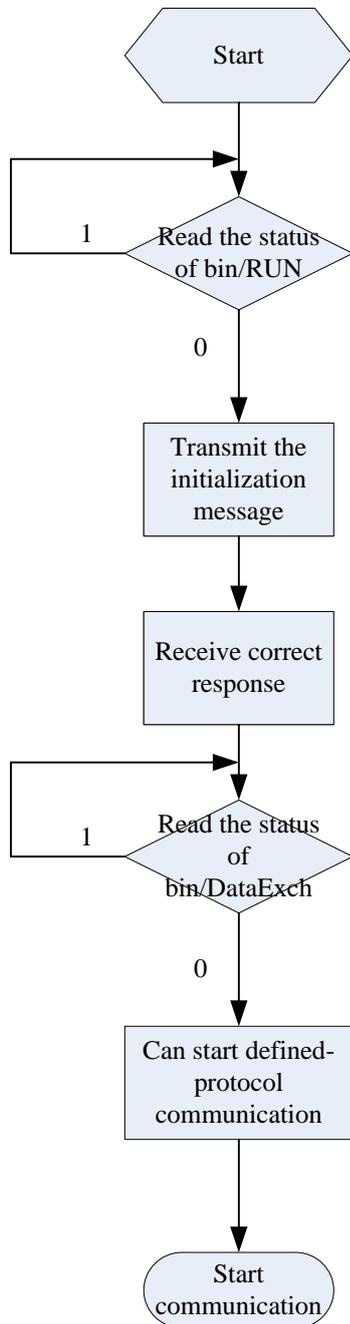
EIP-341 is EtherNet/IP server, and the serial protocol is user-defined protocol. EtherNet/IP communication and serial communication of EIP-341 are independent, and finish data exchanging through the input and output data buffer inside EIP-341. User board can finish input and output data exchanging according to the simple serial communication protocol of EIP-341.

The message transmission procedure of the mode show as follow:

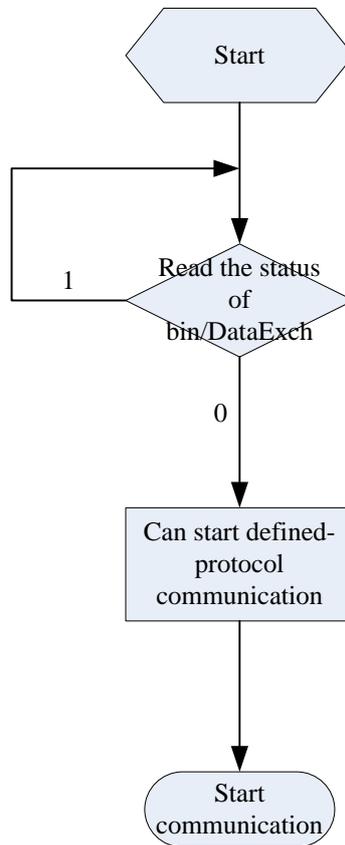


3.2 The communication flowchart between user program and EIP-341

The communication flow chart of using UART setting mode:



The communication flow chart of using web server mode:



3.3 Initialization communication

Communication mode: User board is communication initiator, and EIP-341 response.

Baudrate: EIP-341 obtains the baudrate which will be used by UART through reading bins BAUD0, BAUD1 and BAUD2 when it is started.

1. Initialize request message (user board->module)

Byte	EtherNet/IP turn user-defined protocol
0	Data length 17, high-byte priority
1	
2	Reserve, always 0
3	IP configuration mode, 0: Static configuration; 1: DHCP; 2: BOOTP
4	IP address, high-byte priority
5	
6	
7	
8	Subnet Mask, high-byte priority
9	
10	
11	
12	Default gateway address, high-byte priority
13	
14	
15	
16	Reserve, always 0
17	Reserve, always 0
18	Reserve, always 0
19	Check sum, byte 0+byte 1+...+byte 18

2. Initialize response message (module->user board)

byte	Correct response	Incorrect response
0	Data length, 2	Data length, 2
1	0: Correct	Error code (not 0)
2	0	Extra code
3	Check sum, byte 0+byte 1+byte 2	Check sum, byte 0+byte 1+byte 2

3. Error code

Index	Error	Explanation
0	1	Check sum is error.
1	2	Data length is error.
2	3	IP configuration mode that don't exist.

4. Extra code is always 0xFF.

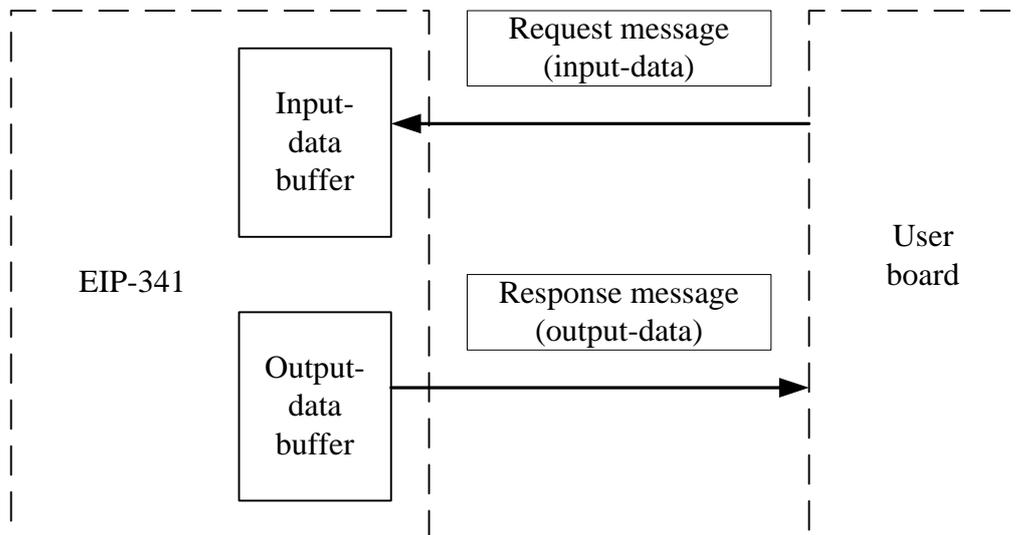
3.4 User-defined protocol communication

Communication mode: User board is communication initiator, and EIP-341 response.

Request frame and response frame are fixed length messages. The corresponding response timeout are 2s, 1s, 500ms and 300ms when the baudrate are 2400bps, 4800bps, 9600bps and other baudrates separately.

If the module returns abnormal response in communication process, there are corresponding misinformation showing in the list: showing “Response timeout” if receiving no response; showing “Response error” if response being error (incorrect response and abnormal response).

The request messages contain input-data in the protocol, and the response message contain output-data. The communication process show as follow:



1. Request message of user-defined protocol (user board -> module)

Byte	Description
0	Input-data length, which is input-data buffer bytes number setting in initial message, high-byte priority
1	
2	Input data, high-byte priority
...	
n	
n+1	Check sum, byte 0+byte 1+...+byte n

2. Response message of user-defined protocol (module -> user board)

Byte	Correct response	Byte	Abnormal response
0	Output-data length, which is output-data buffer bytes	0	0x80

1	number setting in initial message, high-byte priority	1	Data length, 2
2	Output data, high-byte priority	2	Error code
...		3	Extra code
n		4	Check sum, byte 0+byte 1+byte 2+byte3
n+1	Check sum, byte 0+byte 1+...+byte n		

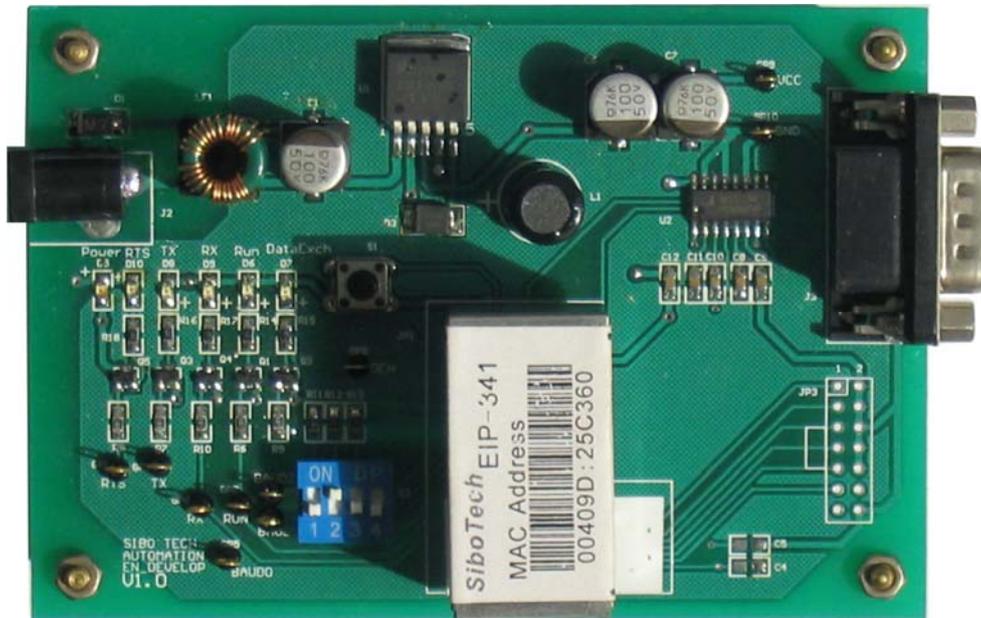
3. Error code

Index	Error code	Description
0	1	Check sum error
1	2	Data length error

4. Extra code is always 0xFF.

4 Development board

4.1 Appearance



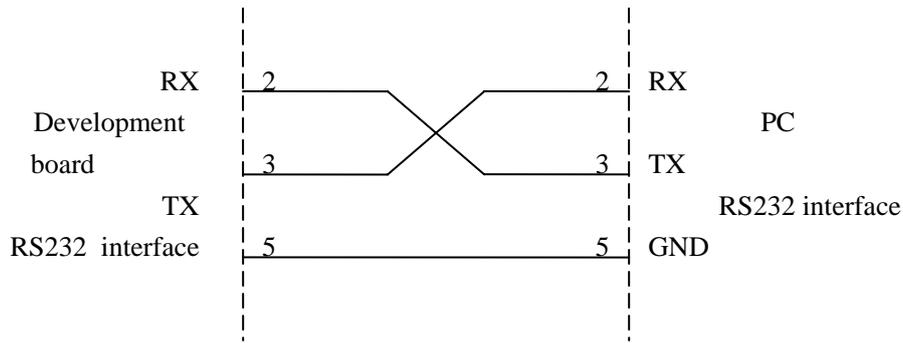
4.2 Function

4.2.1 RS232 interface

RS232 interface is DB9 pin-connector, the description show as follow:

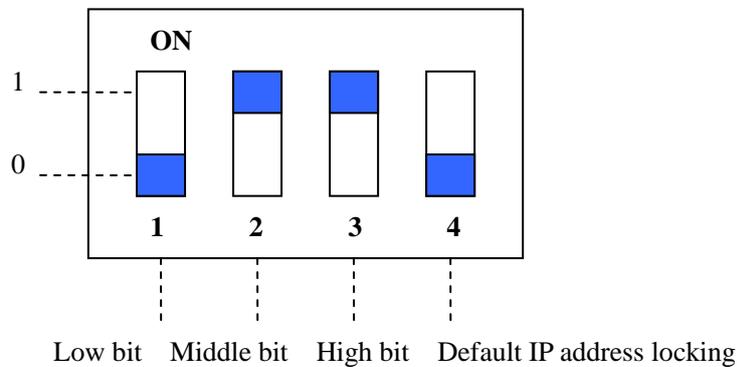
Pin	Signal	Description
2	RX	Connect with pin TX of RS232 of PC
3	TX	Connect with pin RX of RS232 of PC
5	GND	Connect with pin GND of RS232 of PC

DB9 hole-connector crossover cable must be used when connect the board with RS232 interface of PC:



4.2.2 Baudrate setting switch

The 4-bit DIP switch on the development board is used setting serial baudrate and default IP address locking:



Corresponding relation of baudrate show as follow:

Index	High bit	Middle bit	Low bit	Corresponding baudrate (bps)
0	0	0	0	2400
1	0	0	1	4800
2	0	1	0	9600
3	0	1	1	19200
4	1	0	0	38400
5	1	0	1	57600
6	1	1	0	115200
7	1	1	1	230400

The baudrate showing in the picture is 115200bps.

The fourth bit of DIP is “Default IP address locking” bit, when the bit is “ON”, the module start with default

IP configuration:

IP address: 192.168.0.11

Subnet mask: 255.255.255.0

Default gateway: 192.168.0.1

4.2.3 Reset

The press-button on the development board is reset button, which is used hand-resetting EIP-341.

4.2.4 LED

There are six indicators on the development board, and the description show as follow:

Index	Name	Description
0	Power	Power indicator, Always light: Power on; Close: Power off
1	RTS	The version doesn't support the function.
2	TX	EIP-341serial port transmit indicator, Blinking: Serial port is transmitting data; Close: Serial port isn't transmitting data.
3	RX	EIP-341serial port receive indicator, Blinking: Serial port is receiving data; Close: Serial port isn't receiving data.
4	Run	EIP-341status indicator, Always light: In run status; Close: In starting status.
5	DataExch	EIP-341data-exchange indicator, Always light: In data-exchange status; Close: Not in data-exchange status.

5 Web server

EIP-341 default IP configuration is:

IP address: 192.168.0.11

Subnet mask: 255.255.255.0

Default gateway: 192.168.0.1

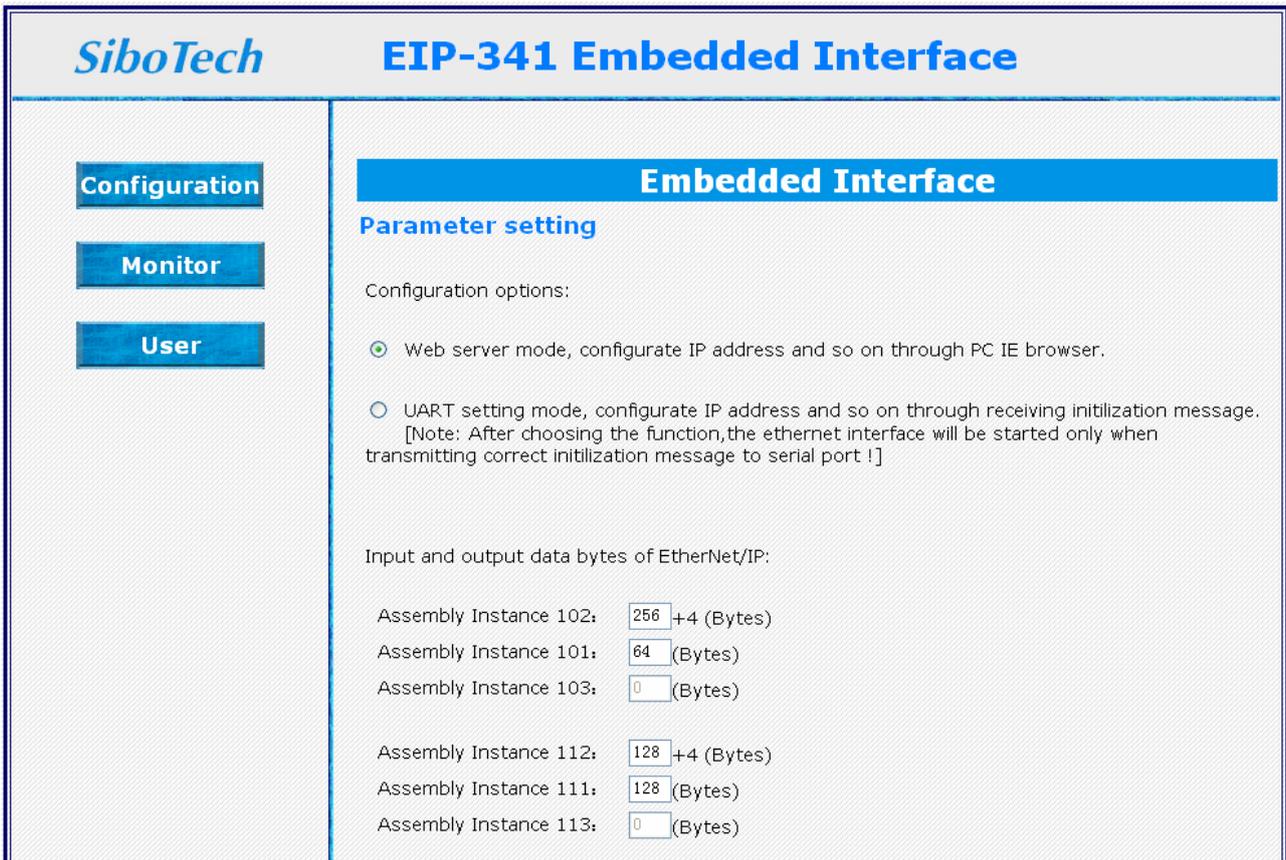
5.1 Embedded parts

Input IP address/eif-en.htm in IE address bar, then you can see login interface:



User name: admin; Password: The default is empty.

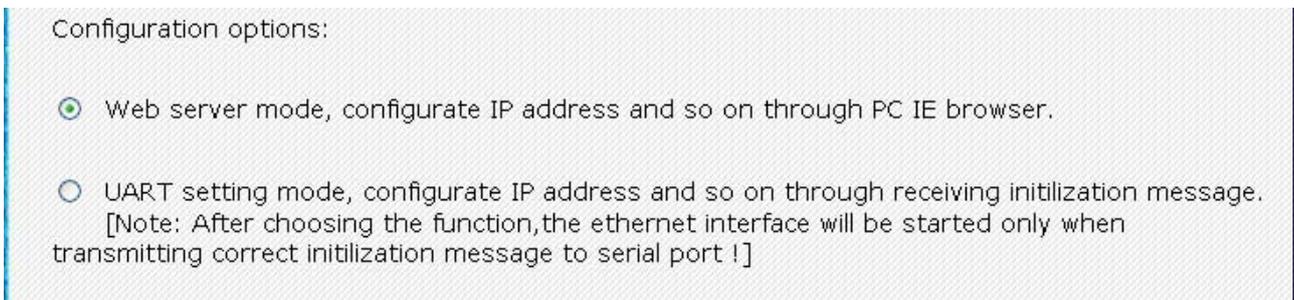
Input user name “admin”, then you can see:



The left side is provided to end-user, which will be explained next section.

Parameter setting: Configuration options, Input and output data bytes of EtherNet/IP

Configuration options:



If choose “Web server mode”, then you can configurate IP address and so on through PC IE browser.

If choose “UART setting mode”, then you can configurate IP address and so on through receiving initialization message.

Note: After choosing the “UART setting mode”, the EtherNet interface will be started only when transmitting correct initialization message to serial port!

Input and output data bytes of EtherNet/IP: EtherNet/IP provide three groups instance

Input and output data bytes of EtherNet/IP:

Assembly Instance 102: +4 (Bytes)
Assembly Instance 101: (Bytes)
Assembly Instance 103: (Bytes)

Assembly Instance 112: +4 (Bytes)
Assembly Instance 111: (Bytes)
Assembly Instance 113: (Bytes)

Assembly Instance 122: +4 (Bytes)
Assembly Instance 121: (Bytes)
Assembly Instance 123: (Bytes)

Input Instance: 102 (<=256Bytes), 112 (<=256Bytes), 122 (<=256Bytes);

Output Instance: 101 (<=256Bytes), 111 (<=256Bytes), 121 (<=256Bytes);

Configuration Instance: 103、113、123 can not be changed.

The relation between three groups instance and serial data of EIP-341:

The input-data bytes of serial port (User board ->EIP-341) is the maximum of three groups instance (102, 112, 122);

The output-data bytes of serial port (EIP-341->User board) is the maximum of three groups instance (101, 111, 121).

Instance data employ the mode of forward alignment, for example:

Three groups instance are [10, 10], [11, 11], [12, 12], then the bytes of serial port is [12, 12].

The first ten bytes of serial port match the first group instance;

The first eleven bytes of serial port match the second group instance;

The first twelve bytes of serial port match the third group instance.

5.2 End-user parts

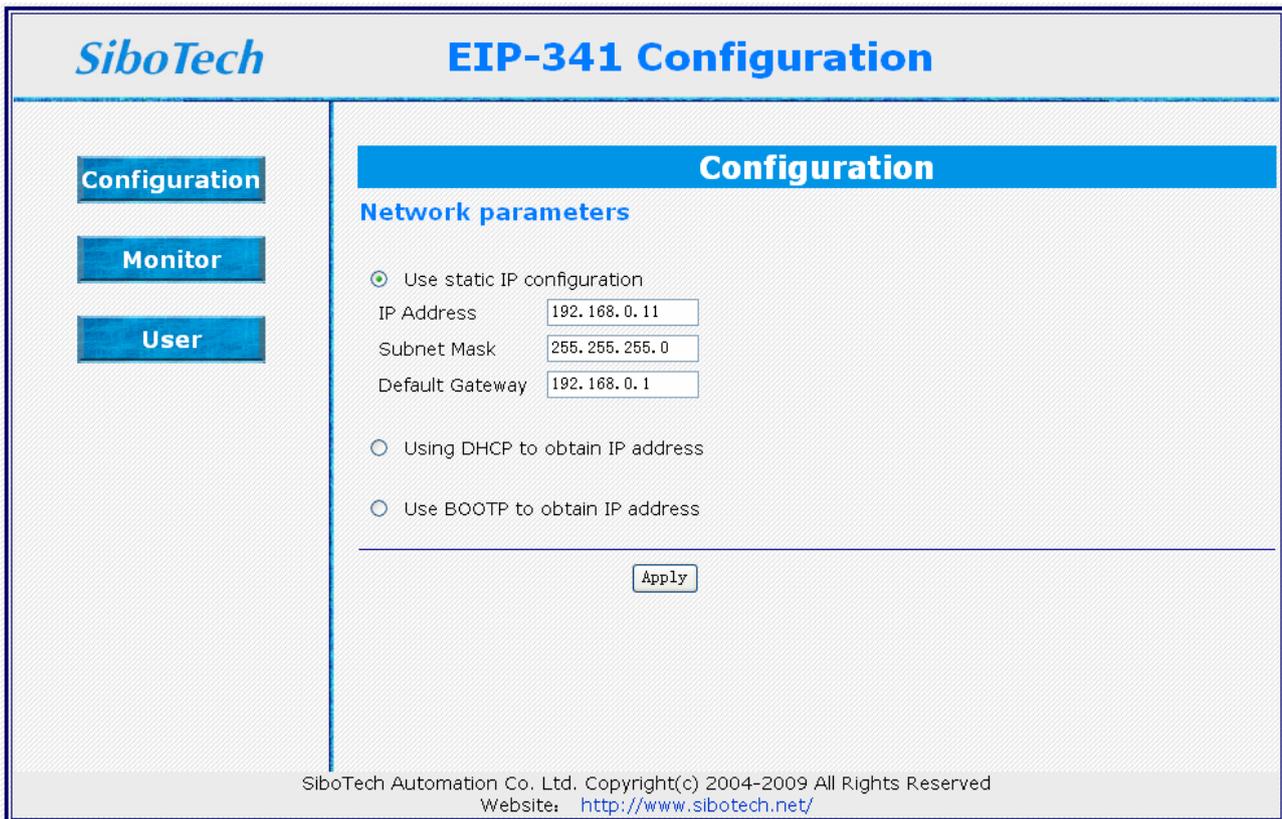
Input IP address in address bar of IE browser, then you can see the login interface.



Input user name “admin”, then you can see: (User name: admin; Password: The default is empty)

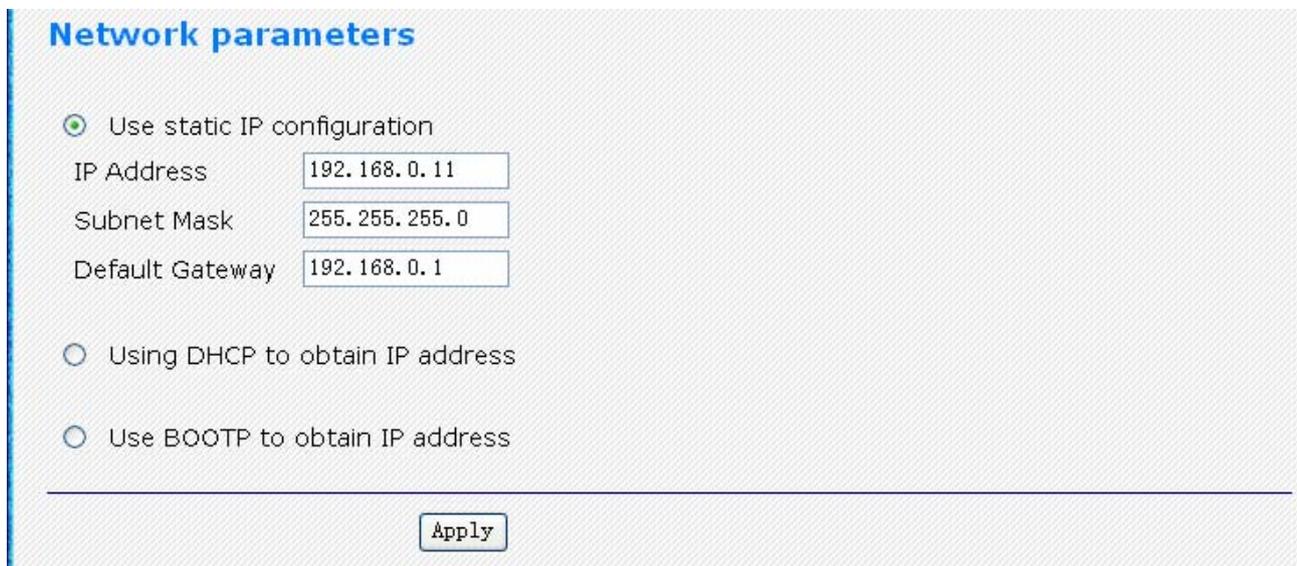


You can enter different configuration interface through choosing “Chinese” or “English”. After choosing “English”, you can see the configuration interface showing as follow:



The configuration interface includes three parts which can be configurate: “Configuration”, “Monitor”, and “User”.

- Choosing “Configuration”, then you can see:



You can configurate Network parameters in the interface. You can choose three kinds of mode to set IP: “Use static IP configuration”, “Using DHCP to obtain IP address”, and “Use BOOTP to obtain IP address”

- Choosing “Monitor”, then you can see:

Ethernet

Speed:

Duplex:

EtherNet/IP Connection

Connection instructions:

Data

Input data (HEX) :

00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

The “Monitor” interface include three parts: “Ethernet”, “EtherNet/IP Connection”, and “Data”. In the “Ethernet” part, you can monitor the speed and duplex of Ethernet through clicking “Refresh”; In the “EtherNet/IP Connection” part, you can monitor the connection status through clicking “Refresh”; In the “Data” part, you can monitor input and output data (HEX) of Ethernet through clicking “Refresh”.

- Choosing “User”, then you can see:

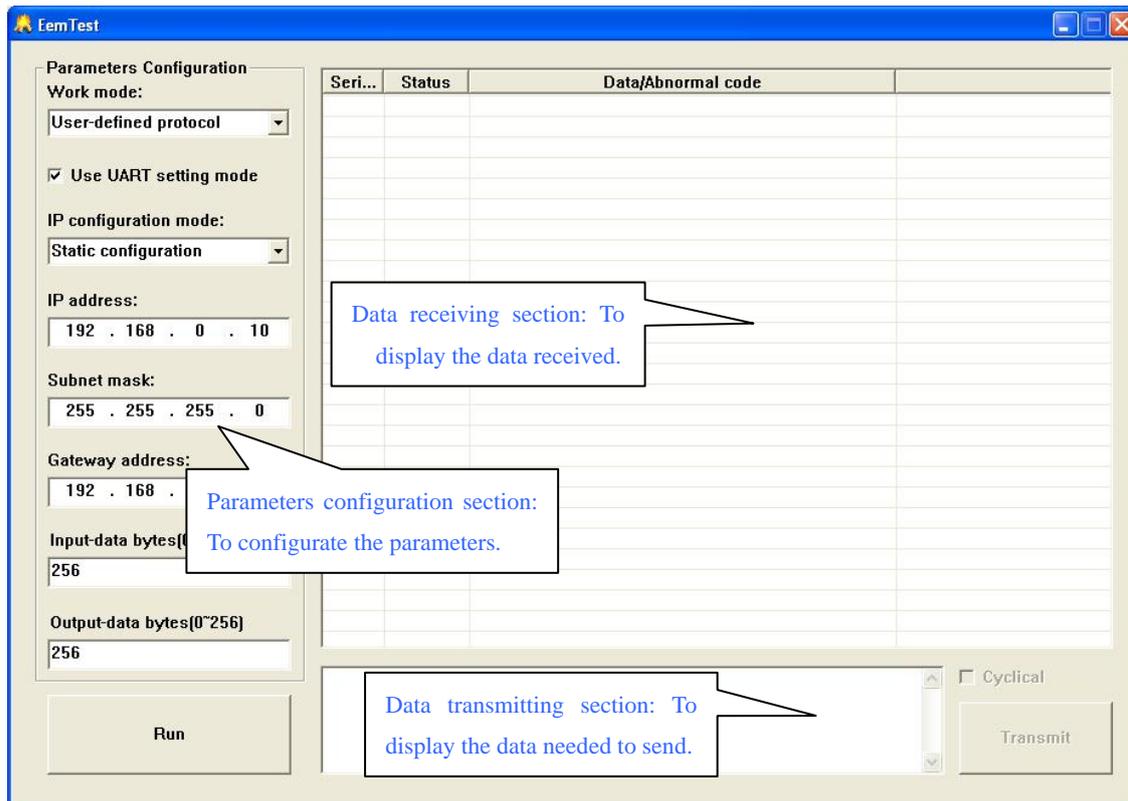
admin

User has permission of reading and modifying the configuration.

New Password

Confirm Password

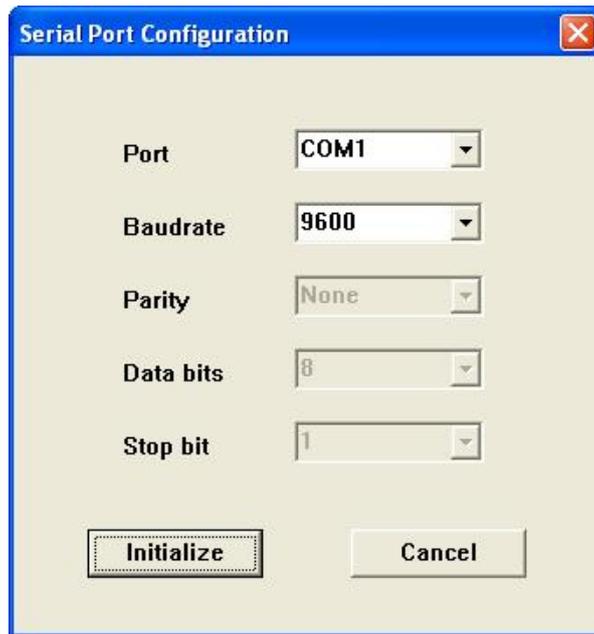
The “User” interface provides the function of change the password of admin.



- Work mode: The function of the first part of the parameters configuration is setting work mode. EIP-341 current version only support the work mode of user-defined protocol.
- Use UART setting mode: when you choose it, “IP configuration mode”, “IP address”, “Subnet mask”, “Gateway address” can be changed. When you choose “UART setting mode” in embedded configuration interface, you must choose the mode here.
IP configuration mode: Static configuration mode, DHCP, and BOOTP can be selected.
When you don’t choose it, “IP configuration mode”, “IP address”, “Subnet mask”, “Gateway address” can not be changed, and you can configure IP address and so on through PC IE browser.
- Input-data bytes, Output-data bytes: The value must be the same with the input and output bytes of EtherNet/IP setting in embedded configuration interface.

6.3 Establish connection and disconnect

The data in the parameters configuration section is default after you open the software, you can input the value you need and click the “Run” button. You need configurate serial port:

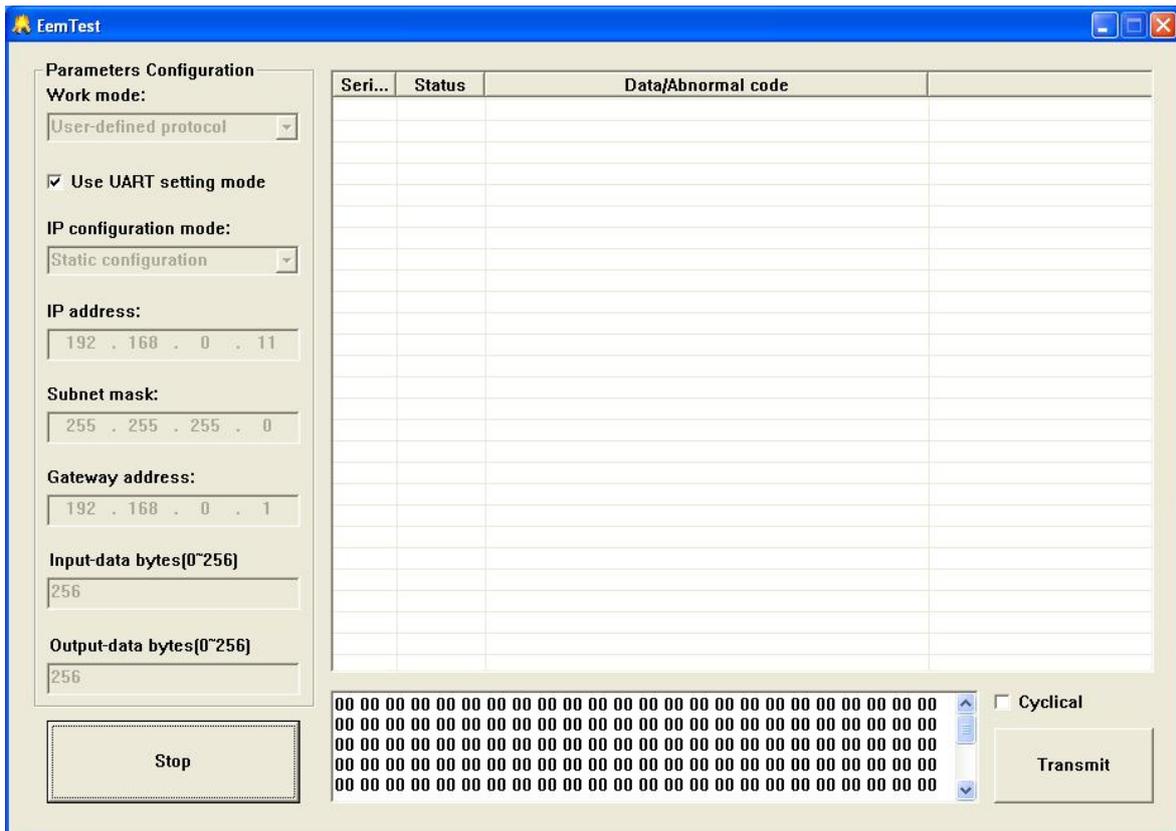


“Port” is the serial port being used; “Baudrate” is current serial port baudrate being set through DIP switches. After finish configuring parameters, click “Initialize” button to establish the connection and initialize hardware configuration.

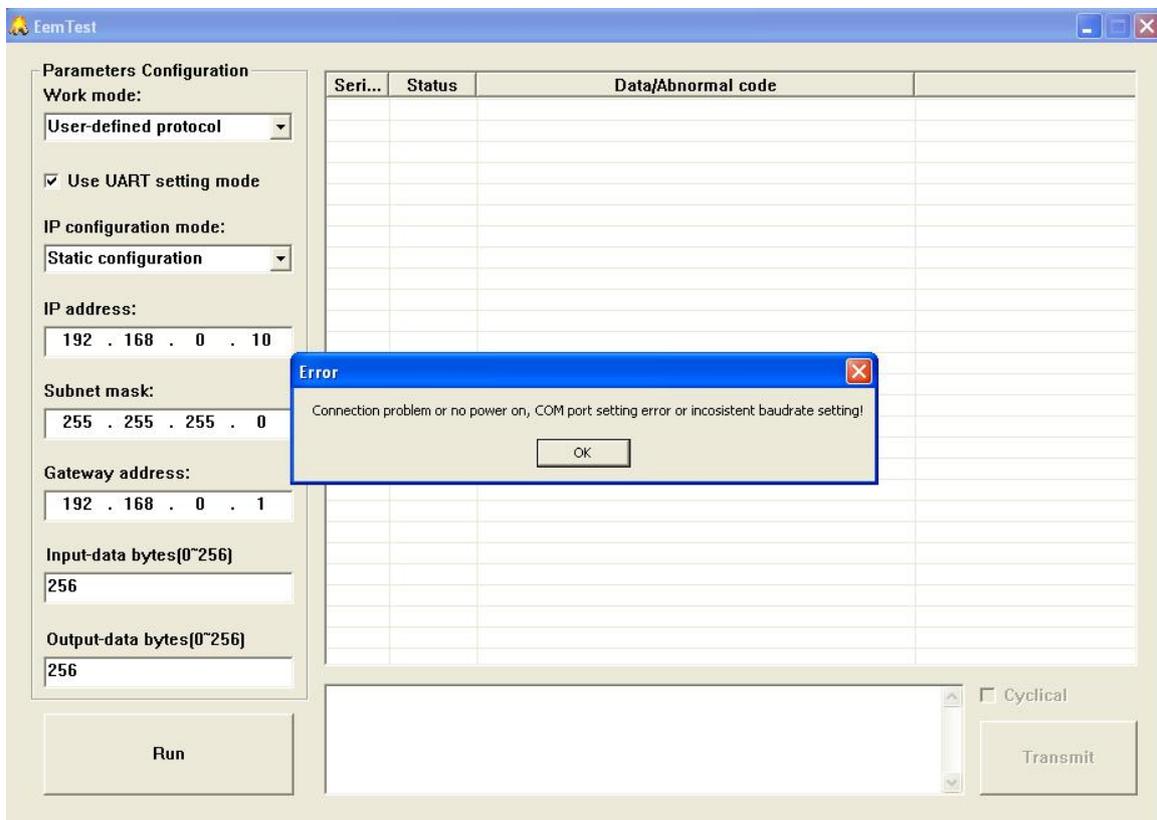
When choosing “Use UART setting mode”, click “Initialize” button to send initial message and enter run status.

When not choosing “Use UART setting mode”, click “Initialize” button and enter run status directly.

After establishing the connection, all the options in parameters configuration section will be gray, “Run” button will change to “Stop” and “Transmit” button will change to be usable.



If be fail in establishing the connection, there will pop-up failure dialog, and the options in parameters configuration section will not be gray.



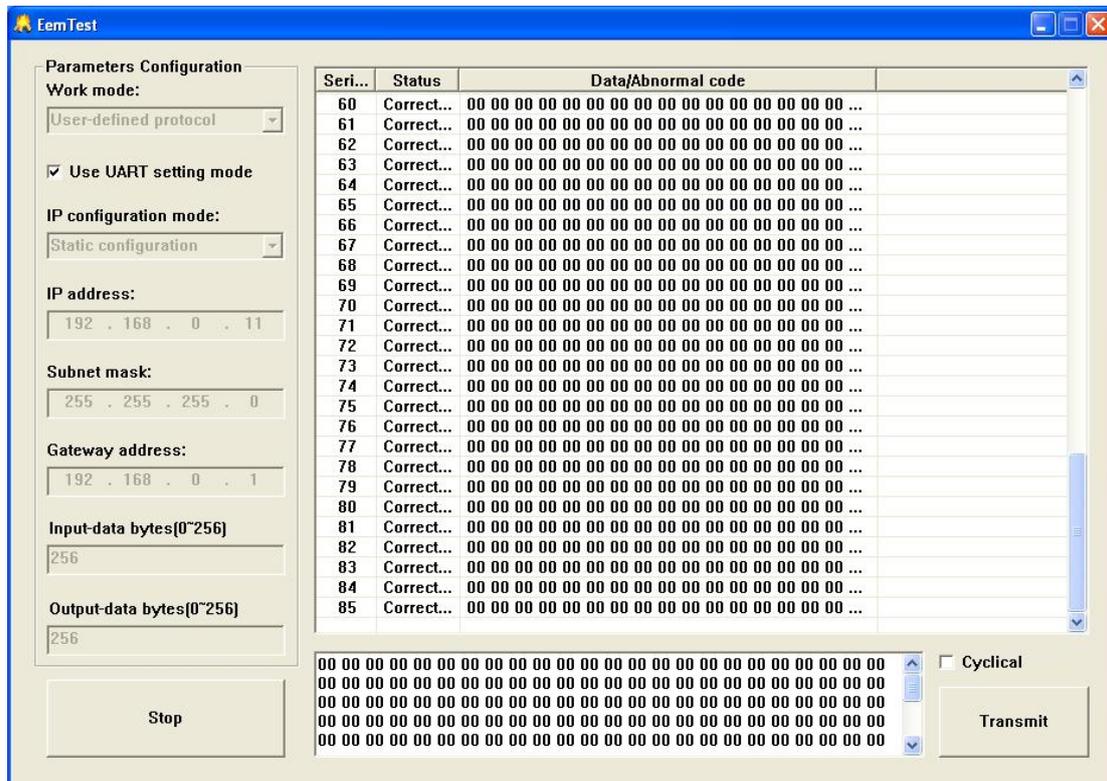
When users want to disconnect after establishing connection, they can click “Stop” button. The gray options will be usable again after disconnecting, “Stop” button will change to “Run”, and “Transmit” button will change to be unusable.

6.4 Receive and transmit data

In user-defined protocol mode, the testing-software is communication initiator, and the module response.

Data transmitting: After establishing the connection, user can transmit data in data transmitting section through clicking “Transmit” button. The format of data must be correct. There is a space every two bytes (HEX), and the data length must be the same with “Input-data bytes”.

Data receiving: After establishing the connection, user transmit data successfully then can receive data transmitting form the module, and display the data in data receiving section.



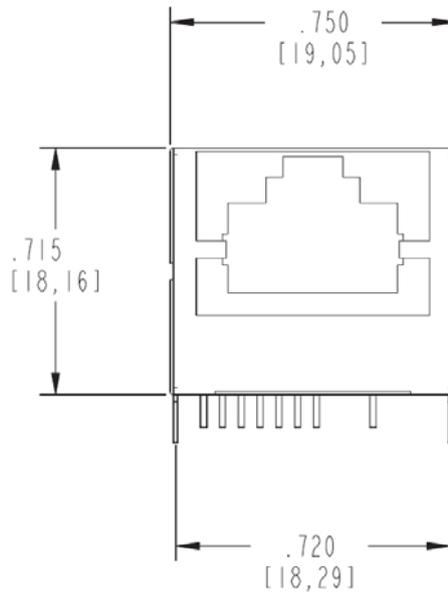
Cyclical: When user want to transmit data cyclically, you need choose “Cyclical”, and click “Transmit” button; When user want to stop transmitting data cyclically, you need only not choose “Cyclical”.

Note: The format of transmitting data must be correct, or you can not transmit them.

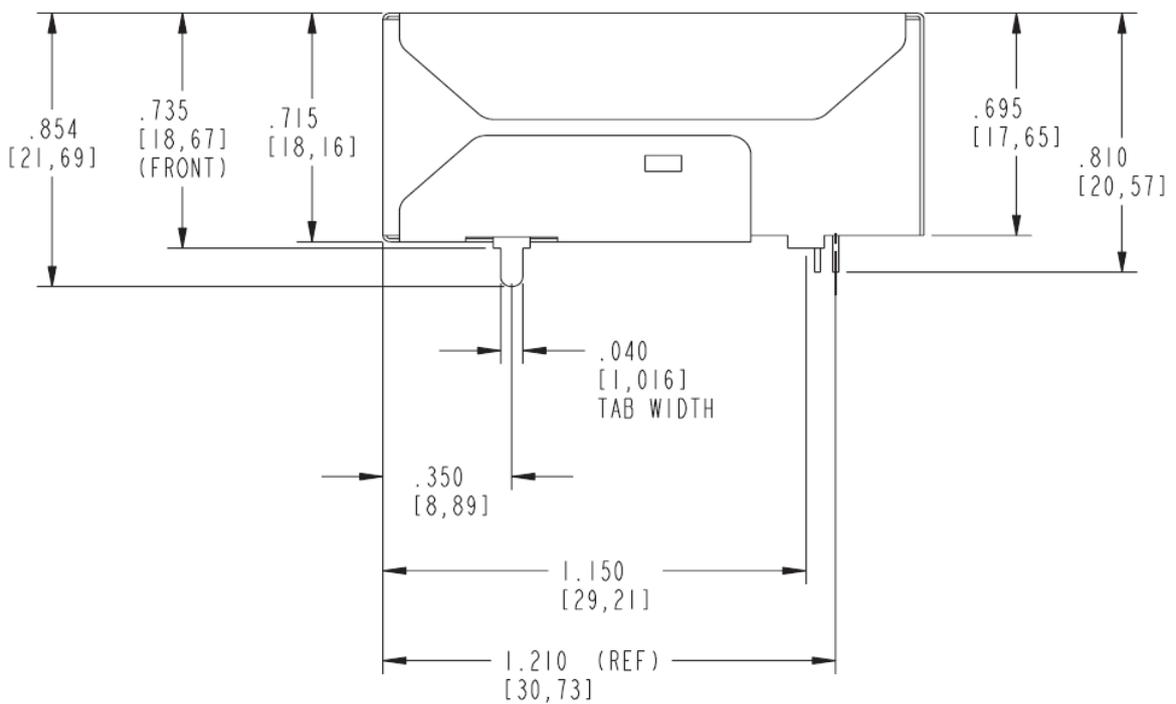
7 Dimension

Unit: in [mm]

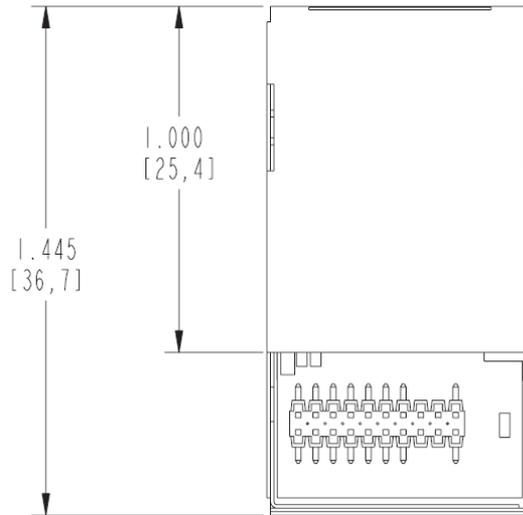
Front:



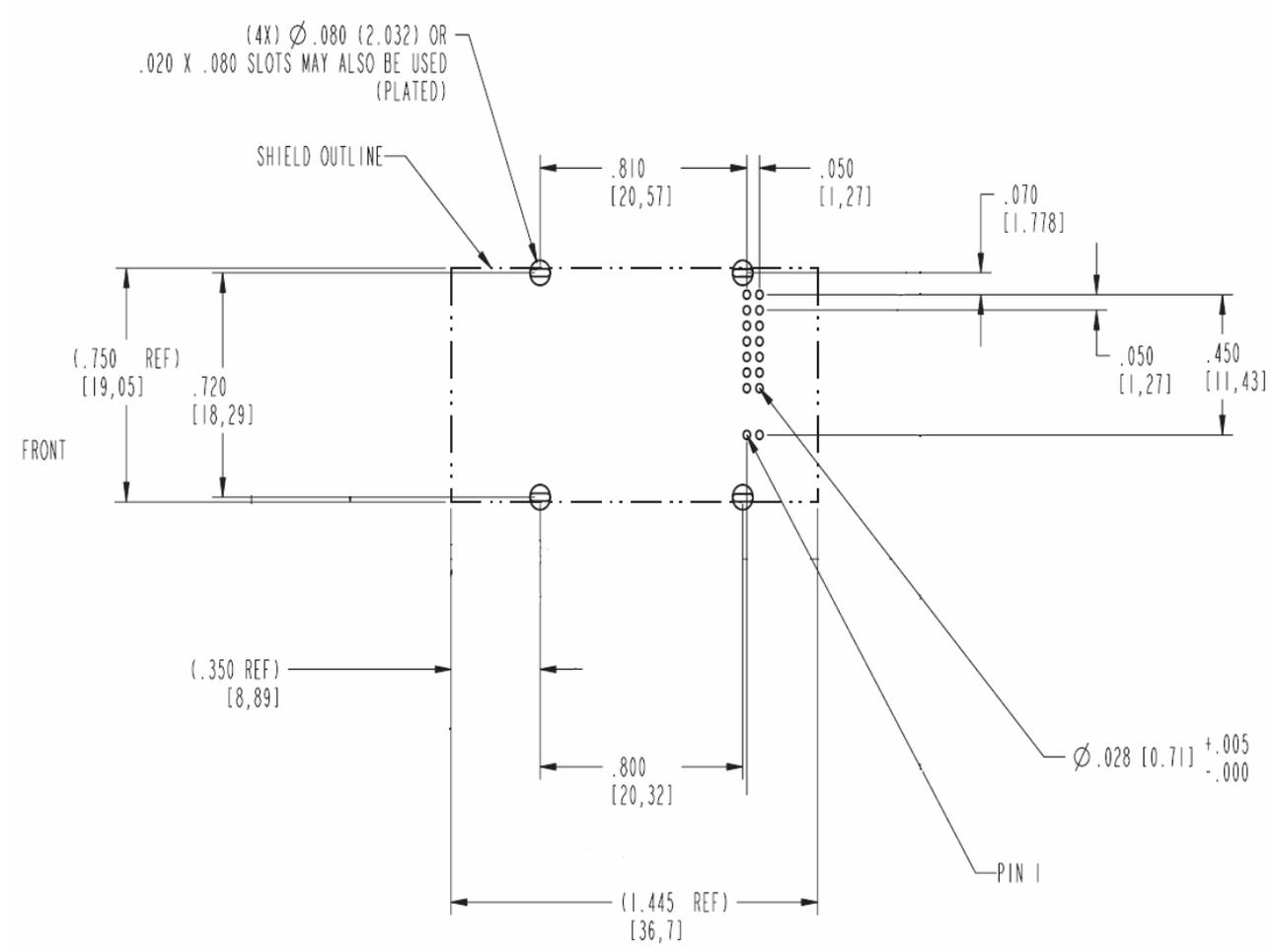
Side:



Undersurface:



PCB dimension:



8 Operation Maintenance and Cautions

- ✧ Prevent great pressure or will damage the panel;
- ✧ Prevent collision or may damage the inside elements;
- ✧ Power must be controlled in the range of that the manual have told you to prevent the module burned;
- ✧ Prevent water or will affect the normal work;
- ✧ Please check on the wiring before powering on.

Note: Because of much heat productivity of the module in running status, user must give EIP-341 enough space in designing the user board to emit heat!

9 Copyright information

The data and examples in the manual can not be copied without authorization. Sibotech maybe upgrades the product without notifying users.

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The product has many applications. The users must make sure that all operations and results are in accordance with the safety of relevant field, and the safety includes laws, rules, codes and standards.

10 Relational Products

Sibotech other relational products include:

ENB-302, PM-120, MD-21

More information about above products, please visit web: www.sibotech.net, or dial the technical support line: +86-021-5102 8348

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