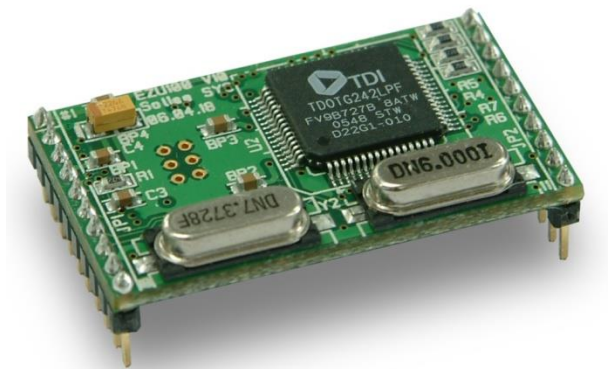


Serial to PPP Converter

EZU-100 User Manual

Version 2.1



Sollae Systems Co., Ltd.
<http://www.eztcp.com>

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1 Overview

1.1 Overview

With the development of Internet technologies, the demands for data communication over Internet are in increasing trends. Data communication over Internet uses the Internet communication protocols TCP/IP. In other words, devices are connected to Internet by implementing TCP/IP protocols. Users can implement TCP/IP by implementing TCP/IP protocol by themselves, porting open TCP/IP, or using an Operating System (OS). However, these methods have many restrictions in terms of time, cost and technology.

The ezTCP series of Serial ↔ TCP/IP protocol converters manufactured by Sollae Systems provide TCP/IP communication (Internet communication) “by simply connecting the serial ports”. ezTCP performs TCP/IP processing on the data received from the serial port and sends the result to the Internet network. In addition, it performs TCP/IP processing on the data received from the Internet network and sends the resulting raw data to the serial port.

EZU-100 provides TCP/IP communication through PPP of ezTCP product groups. By connecting one serial port of EZU-100 to user device and the other to USB interface of mobile phone, HSDPA, wireless modem, dial-up modem, or TRS terminal, EZU-100 provide TCP or UDP communication in the command format defined by Sollae System.

EZU-100 supports TCP client mode, TCP server mode, UDP data transmission, PING transmission, etc., depending on the commands.

1.2 Components

- EZU-100 body
- EZU-100 evaluation board (optional)
- 5V power adaptor (optional)
- RS232 serial cable (optional)

2 Specification

2.1 Brief Specification

Power	Input Voltage	3.3V
	Power Consumption	26mA in typical
Dimension	34mm x 20mm	
Weight	About 5g	
Interface	Serial-DTE(TE2)	2mm pitch 1x10 connector
	USB-Modem(MT2)	2mm pitch 1x10 connector
Serial port –DTE	UART (1200bps ~ 230400bps)	
USB – modem	2 USB port (support only 1 port in present)	
Temperature	Operating: 0 ~ 55°C, Storage: -40 ~ 85°C	
Protocol	TCP, UDP, IP, ICMP, PPP, TELNET, PAP, CHAP USB host, USB Communication Class	
Utilities	ezterm	Socket communication program for test
	uflash	Program for firmware downloading via serial port

☞ *Firmware and Utilities can be downloaded from our website. (<http://www.eztcp.com>)*

2.2 Interface

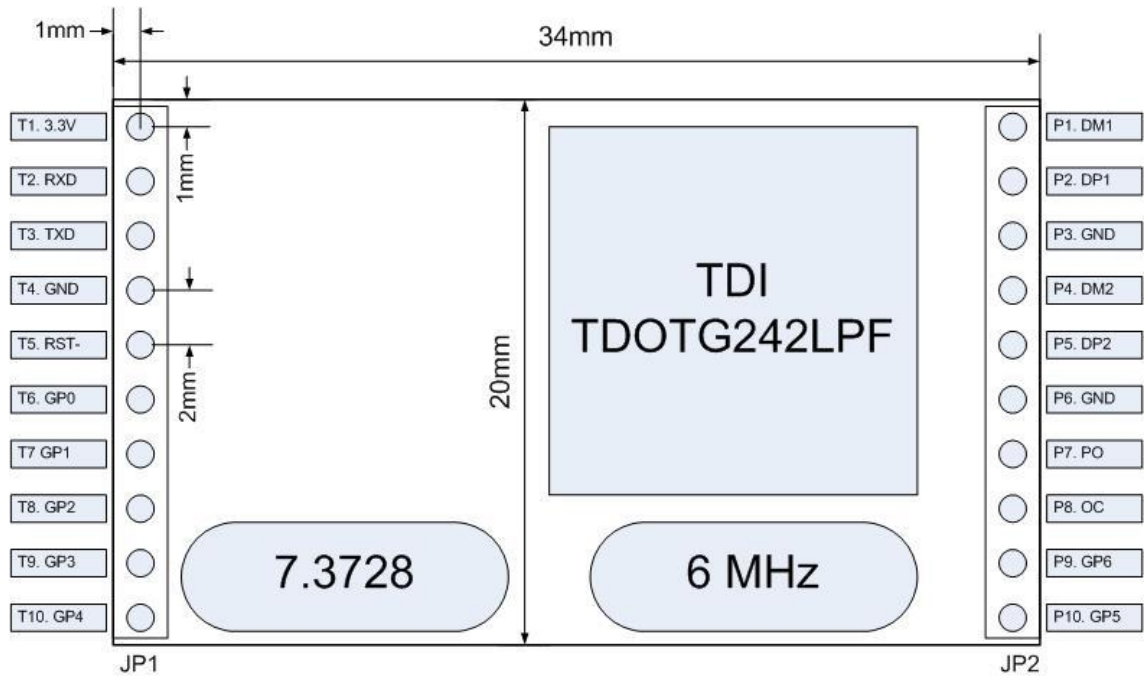


Fig 2-1 Dimension

● JP1

Table 2-1 Pins of JP1

#	Descriptions	I/O	Mandatory
T1	VCC(3.3V Input)		●
T2	Receive UART data from TE2	I	●
T3	Transmit UART data to TE2	O	●
T4	Ground		●
T5	Reset EZU-100 active Low	I	
T6	GP0 (Reserved)	I/O	
T7	GP1 – ISP	I	
T8	GP2 (Reserved)	I/O	
T9	GP3 – RTS	O	
T10	GP4 – CTS	I	

☞ Do not connect the GP0 and 1 (T6, T8) to your MCU because those pins are related to operation of ISP mode.

- JP2

Table 2-2 Pins of JP2

#	Descriptions	I/O	Mandatory
P1	Port 1 USB DATA -	I/O	●
P2	Port 1 USB DATA +	I/O	●
P3	Ground		●
P4	Port 2 USB DATA - (Unused)	I/O	
P5	Port 2 USB DATA + (Unused)	I/O	
P6	Ground		●
P7	PO (USB Power On/Off)	O	●
P8	OC (Over Current)	I	●
P9	GP6 (Reserved)	I/O	
P10	GP5 (Reserved)	I/O	

☞ Do not connect the GP5 and 6 (P9, P10) to your MCU because those pins are used by internal operation of the module.

2.2.1 Power

EZU-100 requires 3.3V power but 5V power is also required for USB device.

2.2.2 Reset

Reset is active LOW (Min. 1.5 μ s). The reset port is T5.

2.2.3 Serial Port Interface

EZU-100 provides a serial port for user device (TE2). If the amount of data to be transmitted is not large, it is enough to connect just RXD and TXD of UART in TE2.

The voltage level is 3.3V. So, the serial port may be connected through the RS232 driver, depending on user applications.

EZU-100 supports RTS/CTS flow-control. RTS and CTS are interfaced by GP3 and GP4 respectively.

☞ The firmware of EZU-100 supports data speed from 1200 to 230400 bps. But this doesn't mean the data throughput. The average speed of the serial port is about 5K bps.

2.2.4 USB Port Interface

EZU-100 has 2 USB ports (USB1 and USB2). But user can use only the USB1 port now. This port is for a USB interfaced modem; for example cellular phone.

To connect an USB device, a simple power circuit is required. The following is a block diagram for that.

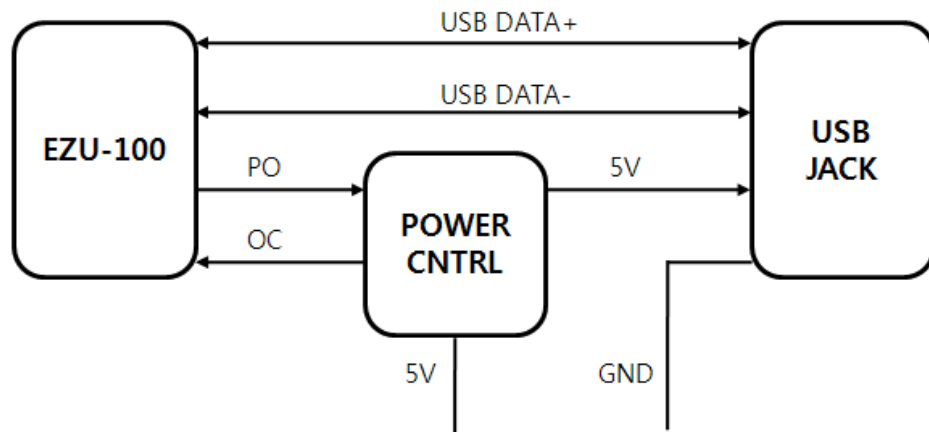


Fig 2-2 USB Interface

PO is a pin that controls the power controller whether the power controller supplies 5V power to USB device or not. If the PO is low, the power controller supplies power to USB device. And if the PO is high, the power controller doesn't supply power to the USB device.

Power on the USB device	PO: Low
Power off the USB device	PO: High

OC is a pin to indicate to EZU-100 when there is over-current situation in the power controller. When the over current happens, OC should be low. And when the current is OK, OC should be High.

When over current is occurred	OC: Low
During normal operation	OC: High

For the power controller, we recommend TPS2042BD of TI.

2.2.5 ISP

ISP decides that EZU-100 operates in Normal mode or ISP mode. If ISP is High EZU-100 operates as Normal mode that is the ordinary communication mode, and if ISP is Low EZU-100 operates as ISP mode that is firmware download mode.

We recommend you to make ISP interface as following section.

3 Using

3.1 Operation

3.1.1 Definition of expression

EZU-100 is equipped with a serial port and two USB port (only one USB port is applicable). The serial port is connected to the equipment for Internet communication and the USB port is connected to a mobile phone or modem. For the convenience of explanation, its components and ports are defined as follows:

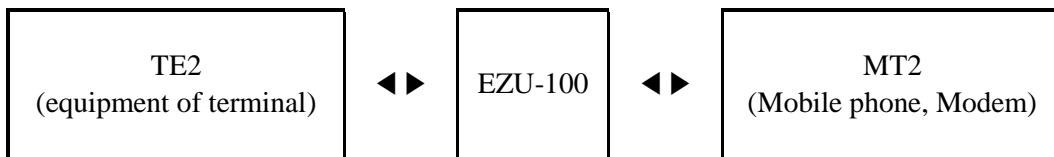


Figure 3-1 Definition of expression

3.1.2 Modem dialing

A mobile device that supports wireless Internet communication acts like a modem through the serial port. You can do dialing like a typical modem and can connect with the packet network using AT commands. An example to connect the packet network using a mobile terminal is shown below:



Figure 3-2 Example of dialing with CDMA modem

- ☞ *The process of dialing and modem setting may be different to ISP (Internet Service Provider) or manufacture of modem. Please ask to ISP or manufacture of modem for the correct process of dialing.*

3.1.3 Data communication

After call setup using the AT command above, TE2 transmits the UP command to EZU-100 to perform PPP connection. After PPP connection has been accomplished normally, the mobile terminal can send/receive UDP data to/from the host connected to the Internet network using the US and UL commands. It can also send/receive TCP data to/from the host computer connected to the Internet network using the TO command. After TCP data communication is completed, the remote computer can close the TCP connection or EZU-100 can close the TCP connection using <ESC>. After TCP connection is cleared, you have to close the PPP connection and release the call. The procedure for TCP connection and TCP close is summarized below:

1. Connecting USB modem
2. Making a call after modem setting (Dialing)
3. Connecting PPP (UP)
4. Connecting TCP (TO)
5. Sending/receiving data
6. Closing TCP (<ESC> x 3)
7. PPP down (DN)
8. Hang up

Figure 3-3 TCP data communication

☞ For more details, please refer to “[4 EZU-100 Command](#)” and “[5 Operation Examples](#)”.

3.1.4 Operation states

Operation states of EZU-100 can be divided with 4 steps. Each operation state handles differently a serial data. The following describes operation states of EZU-100.

- Before USB configuration
Before USB configuration, users can't send any data to MT2
- After USB configuration
EZU-100 directly connects the serial ports of TE2 and MT2 upon power up. It transmits all data received from the serial port of TE2 to that of MT2 and vice versa. It can be assumed that the serial ports of TE2 and MT2 are connected directly. However, if the Escape-Character (hereinafter referred to as <ESC>) is entered through the serial port of TE2, EZU-100 recognized the characters from <ESC> to <CR> (hexadecimal 0x0d) as a command. The default value of <ESC> is '!' (Hexadecimal 0x21), which can be changed to a character defined by user.
- After PPP connection
If the PPP connect command is received, TE2 handles only EZU-100 commands and ignores others. MT2 recognizes only the HDLC data format for PPP data processing. After PPP has been connected, UDP data can be transmitted or received and TCP connection is allowed.
- After TCP connected
While TCP is connected, all data received from TE2 is processed by TCP/IP/PPP and transmitted to MT2. In addition, the TCP/IP/PPP data received from MT2 is processed and the resulting raw data is transferred to TE2.

3.2 User Command

3.2.1 Definitions

The terms and definitions used in this document are listed below:

Table 3-1 Definitions of terms

Name	Hexadecimal	Description
<ESC>	-	Escape Character of EZU-100 Default value is '!' (0x21)
<CR>	0x0d	Carriage Return
<LF>	0x0a	Line Feed
<SP>	0x20	Space
<OP>	-	Optional data for commands

Other values not given in <> or () in the command format are ASCII values. For instance, BR is the two bytes of 0x42, 0x52.

3.2.2 Command format

The following describes command format of EZU-100.

- A command of EZU-100 starts with <ESC> and finishes with <CR> and does not concern upper and lower cases.
- The default value of <ESC> is ! (0x21). Users can change this value using the "EC" command.
- Since all parameters by commands are stored in the volatile memory, their values are cleared to the default values after EZU-100 reset
- Command without option

<ESC>	Command (2 bytes)	<CR>
-------	-------------------	------

- Command with option

<ESC>	Command (2 bytes)	<SP>	<OP> (n bytes)	<CR>
-------	-------------------	------	----------------	------

If a command is defined without option, the current values will be displayed.

3.2.3 Response Code Format

As shown below, response messages of EZU-100 are displayed in two formats, depending on their options:

- Response code without option

<ESC>	Response Code (3 bytes)	<CR>	<LF>
-------	-------------------------	------	------

- Response code with option

<ESC>	Response Code (3 bytes)	<SP>	<OP> (n bytes)	<CR>	<LF>
-------	-------------------------	------	----------------	------	------

The response codes for commands are given as follows:

Table 3-2 response codes and option strings

Response Code	Option strings (with V1 command)	Description
001	–	EZU-100 booting
900	COMMAND STATE	EZU-100 is ready to receive commands
700	COMMAND OK	Command OK
710	PPP UP	PPP connected
720	TCP CONNECTED	TCP connected
730	UDP SENT	UDP data sent
740	ICMP RCVD	Response to the ICMP echo request has been received
800	UNKNOWN COMMAND	Invalid command
801	BAD STATE	EZU-100 is in the bad state
810	PPP DOWN	PPP connection fail or PPP closed
820	TCP CLOSED	TCP connection fail or TCP closed
830	UDP TIMEOUT	EZU-100 didn't received during the given timeout
840	ICMP TIMEOUT	Fail in receiving response to ICMP Echo Request
850	USB POWER OFF	Disconnect power to the USB device(MT2) (PO: High)
860	USB DISCONNECTED	1. the MT2 is removed from the USB port 2. EZU-100 doesn't support the MT2
870	EEPROM LOCKED	EEPROM is locked

4 EZU-100 Command

4.1 D0/D1: DTR High/Low

4.1.1 Description

These commands are used to convert the DTR signal output of MT2 to High (D0) or Low (D1). The DTR output holds Low after a call has been connected and a short pulse created by High(D0)→Low(D1) is required to release the call forcibly. Basically, a mobile terminal is automatically disconnected when PPP is closed. However, some modems which are not disconnected automatically should be released using the DTR signal.

- Use format

<ESC>	Command		<CR>
0x21	0x44	0x30	0x0d
'!'	'D'	'0'	-

<ESC>	Command		<CR>
0x21	0x44	0x31	0x0d
'!'	'D'	'1'	-

4.1.2 Example

	Data		Description
	!D0<CR>	▶	DTR signal High
◀	!700<CR><LF>		Command OK
	!D1<CR>	▶	DTR signal Low
◀	!700<CR><LF>		Command OK

☞ In above example, signal output is TTL level base which does not pass by RS232 drivers.

4.2 DN: PPP Down

4.2.1 Description

This command is used to close the PPP connection. After TCP has been disconnected, TE2 has to disconnect the PPP connection using the DN command.

- Use format

<ESC>	Command		<CR>
0x21	0x44	0x4e	0x0d
'!'	'D'	'N'	-

4.2.2 Example

	Data		Description
	!DN<CR>	▶	PPP down command
◀	!810<CR><LF>		PPP down

4.3 E0/E1: Local Echo Off/On

4.3.1 Description

These commands are used set echo OFF (E0) or ON (E1) for input character strings. It is recommended to set echo to ON with the E1 command where it is necessary to check command input for the operation of EZU-100 in the process of product development.

- Use format

<ESC>	Command		<CR>
0x21	0x45	0x30	0x0d
'!	'E'	'0'	-

<ESC>	Command		<CR>
0x21	0x45	0x31	0x0d
'!	'E'	'1'	-

4.3.2 Example

	Data		Description
	!E0<CR>	▶	Local Echo OFF
◀	!700<CR><LF>		Command OK
	!E1<CR>	▶	Local Echo ON
◀	!700<CR><LF>		Command OK

4.4 EC: Escape Character

4.4.1 Description

This command is used to change the <ESC> character. <OP> carries the two-digit hexadecimal value for an ASCII code of the desired <ESC> character. The ASCII value of the current ESC character is displayed when no parameter is entered. Since the value ranges can be from 00 through FF. The initial <ESC> value is ‘!’ (0x21).

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x45	0x43	0x20	Value (2 bytes)	0x0d
‘!’	‘E’	‘C’	‘ ‘		–

☞ If you omit <SP> and <OP>, current setting value is returned.

- A two-digit Hexadecimal value should be entered in the <OP> field.

4.4.2 Example

	Data		Description
	!EC 2B<CR>	▶	Change <ESC> to ‘+’ (0x2b)
◀	!700<CR><LF>		Command OK
	+EC<CR>	▶	Confirm <ESC>
◀	+2B<CR><LF>		Display <ESC>
◀	+700<CR><LF>		Command OK

4.5 ES: Erase Script

4.5.1 Description

EZU-100 stores user commands in the EEPROM of the product by script function. If there are valid scripts in EEPROM, EZU-100 always executes scripts whenever boot up.

ES command erases the script in the EEPROM. The last script will be erased with this command. Before using this command, user has to unlock the EEPROM with UE command.

- Use format

<ESC>	Command		<CR>
0x21	0x45	0x53	0x0d
'!'	'E'	'S'	-

☞ Before using this command, you should unlock EEPROM with “UE” command.

4.5.2 Example

	Data		Description
	!ES<CR>	▶	Erase the script command
◀	!870<CR><LF>		EEPROM Locked(Command fail)
	!UE 5A3CA5C3<CR>	▶	Unlock EEPROM command
◀	!700<CR><LF>		Command OK
	!ES<CR>	▶	Erase the script command
◀	!700<CR><LF>		Command OK

4.6 FC: Flow Control

4.6.1 Description

This command is used to set ON/OFF for hardware flow control of the serial port connected to TE2 and MT2.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x46	0x43	0x20	Value (1 byte)	0x0d
'!	'F'	'C'	' '		-

☞ If you omit <SP> and <OP>, current setting value is returned.

- A two-digit Hexadecimal value should be entered in the <OP> field. Using hardware flow control is given as follows, depending on setting values:

Setting value	Flow Control
00	No flow control
10	Use Flow Control on TE2

4.6.2 Example

	Data		Description
	!FC 11<CR>	▶	Use flow control both MT2 and TE2 side
◀	!700<CR><LF>		Command OK
	!FC<CR>	▶	Confirm flow control setting
◀	!11<CR><LF>		Display flow control setting
◀	!700<CR><LF>		Command OK

4.7 HE: Help

4.7.1 Description

This command lists commands of EZU-100.

- Use format

<ESC>	Command		<CR>
0x21	0x48	0x45	0x0d
'!	'H'	'E'	-

4.7.2 Example

	Data		Description
	!HE<CR>	▶	Request command lists of EZU-100
◀	!BR : UART0 Baud Rate(F4-19.2k, FE-115.2k, FF-230.4K)<CR><LF>		First command list
◀	!D0 : DTR High<CR><LF>		Second command list
(ellipsis)			
◀	!UE : Unlock EEPROM<CR><LF>		Last command list
◀	!700<CR><LF>		Command OK

4.8 ID/PW: PAP/CHAP User ID, Password

4.8.1 Description

These commands are used to set user ID and password required for PAP or CHAP authentication. Although authentication may be unnecessary for CDMA wireless network, it may be required for PPP server connection from wired telephone network through modem, depending on PPP server types or settings.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x49	0x44	0x20	Value (32 bytes)	0x0d
'!	'I'	'D'	' '		-

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x49	0x44	0x20	Value (16 bytes)	0x0d
'!	'P'	'W'	' '		-

☞ To remove the ID and PW, input '5a3ca5c3' to the <OP>

☞ If you omit <SP> and <OP>, current setting value is returned.

4.8.2 Example

	Data		Description
	!ID eztcp<CR>	▶	Set PAP User ID to eztcp
◀	!700<CR><LF>		Command OK
	!PW sollae<CR>	▶	Set PAP User Password to Sollae
◀	!700<CR><LF>		Command OK
	!ID<CR>	▶	Confirm PAP User ID
◀	!eztcp<CR><LF>		Display PAP User ID
◀	!700<CR><LF>		Command OK
	!ID 5A3CA5C3<CR>	▶	Remove PAP User ID
	!ID<CR>	▶	Confirm PAP User ID
◀	!<CR><LF>		Display PAP User ID(Nothing)
◀	!700<CR><LF>		Command OK

4.9 LA: Local IP Address

4.9.1 Description

This command is used when a fixed IP address is assigned to PPP network. Each number of IP address should be separated with a dot like www.xxx.yyy.zzz. Only a decimal value is allowed for each number.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x4c	0x41	0x20	Value (n bytes)	0x0d
'!	'L'	'A'	' '		-

☞ If users omit <SP> and <OP>, current setting value is returned.

☞ Note that user should not set Local IP Address, because in general, IP addresses for PPP connection are allocated dynamically.

4.9.2 Example

Data	Description
~ (complete modem dialing after boot up) ~	
!LA<CR>	▶ Confirm Local IP Address of EZU-100
◀ !0.0.0.0<CR><LF>	Display Local IP Address of EZU-100 (IP is 0.0.0.0 because PPP connection closed)
◀ !700<CR><LF>	Command OK
!UP<CR>	▶ PPP connect command
◀ !710<CR><LF>	PPP connection Success
!LA<CR>	▶ Confirm Local IP Address of EZU-100
◀ !172.16.0.250<CR><LF>	Display Local IP Address of EZU-100 (Obtain from PPP server)
◀ !700<CR><LF>	Command OK

4.10 P0/P1: USB Power Off/On

4.10.1 Description

This command is for controlling signal to USB power controller via PO pin. When users input TE2, to let the USP power controller supply power to the modem, EZU-100 gives Low to its PO port. If you using TE2 command, PO port will be High and the USB device will be turned off.

- Use format

<ESC>	Command		<CR>
0x21	0x50	0x30	0x0d
'!	'P'	'0'	-

<ESC>	Command		<CR>
0x21	0x50	0x31	0x0d
'!	'P'	'1'	-

4.10.2 Example

	Data		Description
	!P0<CR>	▶	Not supply the power to the USB device
◀	!700<CR><LF>		Command OK
◀	!850 USB POWER OFF<CR><LF>		The USB device is turned off
◀	!860 USB DISCONNECTED<CR><LF>		The USB device is disconnected
	!P1<CR>	▶	Supply the power to the USB device
◀	!700<CR><LF>		Command OK
◀	!750 USB POWER ON		The USB device is turned on

4.11 PA: Peer Host Address

4.11.1 Description

This command is used to set an IP address of the server to be connected. Each number of IP address should be separated with a dot like www.xxx.yyy.zzz. Only a decimal value is allowed for each number.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x50	0x41	0x20	Value (n bytes)	0x0d
'!	'P'	'A'	' '		-

☞ If you omit <SP> and <OP>, current setting value is returned.

4.11.2 Example

	Data		Description
	!PA 172.16.0.154<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PA<CR>	▶	Confirm remote host IP address
◀	!172.16.0.154<CR><LF>		Display remote host IP address
◀	!700<CR><LF>		Command OK

4.12 PI: Product Information

4.12.1 Description

This command displays the firmware version and internal software module of EZU-100. If there are any problems, you have to check the version and internal software module of your product with the PI command because a different module type may be used depending on its version.

- User format

<ESC>	Command		<CR>
0x21	0x50	0x49	0x0d
'!	'P'	'I'	-

4.12.2 Example

	Data		Description
	!PI<CR>	▶	Confirm product information
◀	!ezTCP/USB/PPP v3.2A (BOOT10) Sollae Systems Co.,Ltd.<CR><LF>		Display firmware revision
◀	!USB2.0 PPP IP CHAP/MD5 VJCOMP ICMP UDP TCP TELNET DEBUG_PPP DEBUG_INET DEBUG_TELNET<CR><LF>		Display the information of software module
◀	!700<CR><LF>		Command OK

4.13 PP: Peer TCP/UDP Port

4.13.1 Description

This command is used to set a TCP/UDP port of the remote host.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x50	0x50	0x20	Port Number (n bytes)	0x0d
'!	'P'	'P'	' '		-

- ☞ If you omit <SP> and <OP>, current setting value is returned.
- ☞ Only a decimal number is allowed for the port number of <OP> field and configuration range is 0 ~ 65,535.

4.13.2 Example

	Data		Description
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	!PP<CR>	▶	Confirm remote host Port
◀	!1470<CR><LF>		Display remote host Port
◀	!700<CR><LF>		Command OK

4.14 SC: Send Comment to peer TCP host

4.14.1 Description

This command is for identification of multiple devices which are remotely located. When setting the comment, EZU-100 sends the comment to the remote host right after the TCP connection is established. The comment should be set before the connection and it will be useful to store it into the script. The maximum length of the comment is 8 bytes.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x53	0x43	0x20	comment (n bytes)	0x0d
'!	'S'	'C'	' '		-

- Data format of sending Comment ID

Comment ID								<CR>	<LF>
0x30	0x31	0x32	0x33	0x34	0x35	0x36	0x37	0x0d	0x0a
'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	-	-

☞ Users should remember that even though the length of Comment is over 8 bytes, the maximum valid data of <OP> is only 8.

☞ To remove the comment, input '5a3ca5c3' to <OP>

4.14.2 Example

	Data		Description
	!SE 5A3CA5C3<CR>	▶	Remove the Comment
◀	!700<CR><LF>		Command OK
	!SE 01234567<CR>	▶	Set 01234567 as the value of comment
◀	!700<CR><LF>		Command OK
	!TO<CR>	▶	Try to make TCP connection with the remote host
◀	!720<CR><LF>		TCP connected
EZU-100 sends Comment to the remote host ('01234567<CR><LF>' is transmitted)			

4.15 SD: Script Delay

4.15.1 Description

EZU-100 stores user commands in the EEPROM of the product by script function. If there are valid scripts in EEPROM, EZU-100 always executes scripts whenever boot up.

When there are several scripts in the EEPROM, SD command is used to set delay between each script. It is meaningless using SD command as a normal command; user should use this command as the script for controlling the interval of each script execution.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x53	0x44	0x20	delay (n bytes)	0x0d
'!'	'S'	'D'	' '		-

☞ Only a decimal number is allowed for the delay of <OP> field and unit is 10ms.

4.15.2 Example

	Data		Description
	!UE 5A3CA5C3<CR>	▶	EEPROM Unlock command
◀	!700<CR><LF>		Command OK → EEPROM Unlocked
	!WS !PA 172.16.0.154<CR>	▶	Store script that set the remote host IP
◀	!700<CR><LF>		Command OK → script is saved
	!WS !SD 100<CR>	▶	Store script that set delay as 1 sec (100 x 10ms)
◀	!700<CR><LF>		Command OK → script is stored
	!WS !PP 1470<CR>	▶	Store script that set the remote host port
◀	!700<CR><LF>		Command OK → script is saved

In the above example, 3 scripts will be stored on EZU-100. If you set the SD command to one second, the !PP command will be implemented after one second. If you don't use this option, default value of implementation is 10ms.

4.16 SE: Send ICMP Echo Message (Ping)

4.16.1 Description

This command is used to check if the remote host works normally by receiving a message in response to the transmitted ICMP echo request (ping) message.

This command is available after PPP connection.

- Use format

<ESC>	Command		<CR>
0x21	0x53	0x45	0x0d
'!'	'S'	'E'	-

- ☞ *User should set the IP address of remote host by using "PA" command before using SE command.*

The response code is displayed as follows:

- When the response is arrived from remote host

<ESC>	Response code			<CR>	<LF>
0x21	0x37	0x34	0x30	0x0d	0x0a
'!'	'7'	'4'	'0'	-	-

- When there is no response

<ESC>	Response code			<CR>	<LF>
0x21	0x38	0x34	0x30	0x0d	0x0a
'!'	'8'	'4'	'0'	-	-

4.16.2 Example

	Data		Description
	~ (complete modem dialing after boot up) ~		
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection Success
	!PA 172.16.0.154<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!SE<CR>	▶	Send ICMP Echo request
◀	!740<CR><LF>		ICMP Echo response is arrived

☞ *Under some of PPP network services, this command is not available because the providers have chance to do not allow users to send the ICMP echo Messages.*

4.17 ST: EZU-100 Status

4.17.1 Description

This command shows the PPP and TCP connection status of EZU-100.
The output messages and their meanings are given below

Response code	Option strings (with V1 command)	Description
920	DEAD	PPP connection is closed
921	ESTABLISH	LCP is being connected
922	TERMINATE	LCP connection is being closed
923	PAP	PAP authentication is in progress
924	NETWORK	IP address is being allocated
925	INET	Connected to the PPP server
930	CLOSED	TCP closed
931	LISTEN	Waiting for TCP connection
932	SYN_SENT	TCP connection signal transmitted
933	SYN_RCVD	TCP connection signal received
934	ESTABLISHED	TCP connected
935	FIN_WAIT1	The TCP closed signal has been transmitted
936	FIN_WAIT2	ACK to the TCP closed signal has been received
937	CLOSE_WAIT	The TCP closed signal has been received
938	CLOSING	The TCP closed signal has been transmitted/received concurrently
939	LAST_ACK	Waiting for acknowledgement to the TCP close signal
940	TIME_WAIT	Waiting for confirming TCP closed

- Use format

<ESC>	Command		<CR>
0x21	0x53	0x54	0x0d
'!	'S'	'T'	-

4.17.2 Example

	Data		description
	!ST<CR>	▶	Request the status of EZU-100
◀	!920<CR><LF>		PPP connection is closed
◀	!930<CR><LF>		TCP closed
◀	!700<CR><LF>		Command OK

4.18 T0/T1: Trace Off/On

4.18.1 Description

These commands are used to set tracing PPP connection to OFF(T0) or ON(T1). The progress in PPP and TCP connection is displayed provided that Trace is set to ON. At this time, the output messages are the same as those displayed by the ST command.

- Use format

<ESC>	Command		<CR>
0x21	0x54	0x30	0x0d
'!	'T'	'0'	-

<ESC>	Command		<CR>
0x21	0x54	0x31	0x0d
'!	'T'	'1'	-

4.18.2 Example

	Data		description
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection Success
	!T1<CR>	▶	PPP connection trace ON
◀	!700<CR><LF>		Command OK
	!DN<CR>	▶	PPP down command
◀	!922<CR><LF>		LCP connection is being closed
◀	!920<CR><LF>		PPP connection is closed
◀	!810<CR><LF>		PPP down

After use "T1" command, there are additional response codes different to "[4.2.2 Example](#)".

4.19 TA: TCP Accept

4.19.1 Description

This command is used to accept TCP connection from the remote host. The equipment connected to the PPP network typically acts as a client. The TA command of EZU-100 is used to run such equipment as a TCP server.

- Use format

<ESC>	Command		<CR>
0x21	0x54	0x41	0x0d
'!	'T'	'A'	-

When EZU-100 listen to TCP connection by using “TA” command following after PPP connection, if an external host attempts connection to the port which is set using the TL command, EZU-100 accepts the TCP connections and displays the following message:

- Response code after EZU-100 accepts the TCP connection

<ESC>	Response Code			<CR>	<LF>
0x21	0x37	0x32	0x30	0x0d	0x0a
'!	'7'	'2'	'0'	-	-

If the TO command is executed before TCP connection after running the TA command, the TA command is ignored and EZU-100 is connected to the external host as a client.

☞ Please refer to [“4.21 TL: TCP Local Port”](#) for TL command.

☞ Please refer to [“4.22 TO: TCP Open”](#) for TO command.

4.19.2 Example

	Data		description
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection Success
	!TL 1470<CR>	▶	Set TCP Local Port as 1470
◀	!700<CR><LF>		Command OK
	!TA<CR>	▶	TCP listen at port 1470
◀	!720<CR><LF>		TCP connected

After TCP connection, EZU-100 commands are not available because all data transmitted from TE2 is transferred to the host over TCP.

4.20 TB: Baud Rate of TE2

4.20.1 Description

This command is used to change the baud rate of TE2 serial port.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x54	0x42	0x20	Baud Rate (n bytes)	0x0d
'!	'T'	'B'	' '		-

- ☞ If you omit <SP> and <OP>, current setting value is returned.
- ☞ Only a decimal number is allowed for the Baud Rate of <OP> field and configuration range is 1,200 ~ 230,400.

4.20.2 Example

	Data		Description
	!TB<CR>	▶	Confirm the Baud rate of TE2 serial port
◀	!115200<CR><LF>		Display the Baud rate of TE2 serial port
◀	!700<CR><LF>		Command OK
	!TB 19200<CR>	▶	Set the Baud rate of TE2 serial port as 19,200bps
Invalid data is received to TE2 serial port because of changing of Baud Rate			

- ☞ After using TB command, user should set suitable baud rate of user's serial device or terminal.
- ☞ TB command CANNOT be used in the script.

4.21 TD: Data Bits of TE2

4.21.1 Description

This command is used to change the number of data bit of TE2 serial port.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x54	0x44	0x20	Number of Data Bit (n bytes)	0x0d
'!	'T'	'D'	' '		-

- ☞ If you omit <SP> and <OP>, current setting value is returned.
- ☞ Only a decimal number is allowed for the <OP> field and configuration value can be 7 or 8.

4.21.2 Example

	Data		Description
	!TD<CR>	▶	Confirm the value of Data bit of TE2 serial port
◀	!8<CR><LF>		Display the value of TE2 serial port
◀	!700<CR><LF>		Command OK
	!TD 7<CR>	▶	Set the value to 7 bits
Invalid data is received to TE2 serial port because of changing of Data bit			

- ☞ After using the TD command, users should set suitable data bit of their serial device or terminal.
- ☞ TD command CANNOT be used in the script.

4.22 TL: TCP Local Port

4.22.1 Description

This command is used to set a port number for EZU-100 to act as a TCP server. This command is used along with the TA command.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x54	0x4c	0x20	Port number (n bytes)	0x0d
'!	'T'	'L'	' '		-

☞ If you omit <SP> and <OP>, current setting value is returned.

☞ Only a decimal number is allowed for the port number of <OP> field and configuration range is 0 ~ 65,535.

4.22.2 Example

	Data		Description
	!TL 1470<CR>	▶	Set TCP Local port as 1470
◀	!700<CR><LF>		Command OK
	!TL<CR>	▶	Confirm TCP Local port
◀	!1470<CR><LF>		Display TCP Local port
◀	!700<CR><LF>		Command OK

4.23 TO: TCP Open

4.23.1 Description

This command is used to attempt connection with the TCP port of the remote host defined by PA command and PP command.

- Use format

<ESC>	Command		<CR>
0x21	0x54	0x4f	0x0d
'!	'T'	'O'	-

The response code is displayed as follows:

- Success of TCP connection

<ESC>	Response Code			<CR>	<LF>
0x21	0x37	0x32	0x30	0x0d	0x0a
'!	'7'	'2'	'0'	-	-

- Failure of TCP connection

<ESC>	Response Code			<CR>	<LF>
0x21	0x38	0x32	0x30	0x0d	0x0a
'!	'8'	'2'	'0'	-	-

4.23.2 Example

	Data		Description
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection Success
	!PA 172.16.0.154<CR>	▶	Set the remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set the remote host port as 1470
◀	!700<CR><LF>		Command OK
	!TO<CR>	▶	Try to connect to the remote host
◀	!720<CR><LF>		TCP connected

After TCP connection, EZU-100 commands are not available because all data transmitted from TE2 is transferred to the host over TCP.

4.24 TP: Parity of TE2

4.24.1 Description

This command is used to set parity of TE2 serial port.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x54	0x50	0x20	Parity (n bytes)	0x0d
'!	'T'	'P'	' '		-

- Available values

Value	Description
0	No parity
1	EVEN parity
2	ODD parity

☞ If you omit <SP> and <OP>, current setting value is returned.

☞ Only a decimal number is allowed for the <OP> field and configuration value can be 7 or 8.

4.24.2 Example

	Data		Description
	!TP<CR>	▶	Confirm the value of Parity of TE2 serial port
◀	!0<CR><LF>		Display the value of TE2 serial port
◀	!700<CR><LF>		Command OK
	!TP 1<CR>	▶	Set the value to EVEN parity
Invalid data is received to TE2 serial port because of changing of parity type.			

☞ After using the TP command, users should set suitable parity of their serial device or terminal.

☞ TP command CANNOT be used in the script.

4.25 TS: Stop Bits of TE2

4.25.1 Description

This command is used to change the number of Stop bit of TE2 serial port.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x54	0x53	0x20	Number of Stop bit (n bytes)	0x0d
'!	'T'	'S'	' '		-

- ☞ If you omit <SP> and <OP>, current setting value is returned.
- ☞ Only a decimal number is allowed for the <OP> field and configuration value can be 1 or 2.

4.25.2 Example

	Data		Description
	!TS<CR>	▶	Confirm the value of Stop bit of TE2 serial port
◀	!1<CR><LF>		Display the value of TE2 serial port
◀	!700<CR><LF>		Command OK
	!TS 2<CR>	▶	Set the value to 2 bits
Invalid data is received to TE2 serial port because of changing of Stop bit.			

- ☞ After using the TS command, users should set suitable stop bit of their serial device or terminal.
- ☞ TS command CANNOT be used in the script.

4.26 UE: Unlock EEPROM

4.26.1 Description

EZU-100 stores user commands in the EEPROM of the product by script function. If there are valid scripts in EEPROM, EZU-100 always executes scripts whenever boot up.

To erase or add the script in the EEPROM, user has to unlock the EEPROM at the first time. Once unlock the EEPROM, user can erase or add the script in the EEPROM.

- Use format

<ESC>	Command		<SP>	<OP>								<CR>
0x21	0x55	0x45	0x20	0x35	0x41	0x33	0x43	0x41	0x35	0x43	0x33	0x0d
'!'	'U'	'E'	' '	'5'	'A'	'3'	'C'	'A'	'5'	'C'	'3'	-

☞ '5A3CA5C3', <OP> of this command is fixed value.

4.26.2 Example

	Data		Description
	!UE 5A3CA5C3<CR>	▶	EEPROM Unlock command
◀	!700<CR><LF>		Command OK → EEPROM Unlocked

4.27 UL: UDP Local Port

4.27.1 Description

This command is used to set a port to receive UDP data. When data is received through the UDP local port, EZU-100 converts the UDP data to raw data and transfers it to TE2.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x55	0x4c	0x20	Port number (n bytes)	0x0d
'!	'U'	'L'	' '		-

☞ If you omit <SP> and <OP>, current setting value is returned.

☞ Only a decimal number is allowed for the port number of <OP> field and configuration range is 0 ~ 65,535.

4.27.2 Example

	Data		Description
	!UL 1470<CR>	▶	Set UDP Local port as 1470
◀	!700<CR><LF>		Command OK
	!UL<CR>	▶	Confirm UDP Local port
◀	!1470<CR><LF>		Display UDP Local port
◀	!700<CR><LF>		Command OK

4.28 UP: PPP UP

4.28.1 Description

This command is used to initiate PPP connection. This command is available after the CONNECT message has been displayed after modem dialing process is completed.

- Use format

<ESC>	Command		<CR>
0x21	0x55	0x50	0x0d
'!	'U'	'P'	-

The response code is displayed as follows:

- Success of PPP connection

<ESC>	Response Code			<CR>	<LF>
0x21	0x37	0x31	0x30	0x0d	0x0a
'!	'7'	'1'	'0'	-	-

- Failure of PPP connection

<ESC>	Response Code			<CR>	<LF>
0x21	0x38	0x31	0x30	0x0d	0x0a
'!	'8'	'1'	'0'	-	-

After PPP has been connected (PPP UP), UDP data can be transmitted or received using US and UL commands. In addition, it is possible to connect TCP using the TO or TA command and to perform ping test using the SE command.

4.28.2 Example

	Data		Description
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection Success

	Data		Description
	!UP<CR>	▶	PPP connect command
◀	!810<CR><LF>		PPP connection Fail

4.29 US: UDP Send

4.29.1 Description

This command is used to send UDP data to the IP address set by PA and the port set by PP. Unlike TCP, UDP transmits data by the block. Therefore, the number of bytes to be transmitted or its duration should be set to define a block. UDP data is transmitted, when one of two conditions, Size and Timeout is satisfied.

- Use format

<ESC>	Command		<SP>	<OP>	<SP>	<OP>	<CR>
0x21	0x55	0x53	0x20	Size (n bytes)	0x20	Timeout (n bytes)	0x0d
'!	'U'	'S'	' '		' '		-

<OP> Size: Number of bytes to be transmitted by one block

<OP> Timeout: Time interval to separate data blocks to be transmitted (Unit: 10 ms)

- ☞ Only a decimal number is allowed for Size of <OP> field and configuration range is 0 ~ 256.
- ☞ Only a decimal number is allowed for Timeout of <OP> field and configuration range is 0 ~ 65,535. It may be omitted (shaded field in the above figure).

The response code is displayed as follows:

- UDP data is sent

<ESC>	Response Code			<CR>	<LF>
0x21	0x37	0x33	0x30	0x0d	0x0a
'!	'7'	'3'	'0'	-	-

- Fail to send UDP data

<ESC>	Response Code			<CR>	<LF>
0x21	0x38	0x33	0x30	0x0d	0x0a
'!	'8'	'3'	'0'	-	-

4.29.2 Example

	Data		Description
	!US 5<CR>	▶	Command to send 5-byte UDP data (block interval is not configured)
	Hello	▶	Send 5-byte data
◀	!730<CR><LF>		UDP data is sent

	Data		Description
	!US 3 100<CR>	▶	Command to send 3-byte UDP data (block interval is configured as 1 sec)
		▶	No data is sent during 1 sec
◀	!730<CR><LF>		UDP data transmission is failed

4.30 V0/V1: Verbose Response Off/On

4.30.1 Description

These commands are used to display the response code followed by string so that those developers who use EZU-100 first can easily understand meanings of output messages.

- Use format

<ESC>	Command		<CR>
0x21	0x56	0x30	0x0d
'!	'V'	'0'	-

<ESC>	Command		<CR>
0x21	0x56	0x31	0x0d
'!	'V'	'1'	-

The response code is displayed as follows:

- When Verbose is set to OFF(V0)

<ESC>	Response Code	<CR>	<LF>
0x21	Value (3 bytes)	0x0d	0x0a
'!		-	-

- When Verbose is set to ON(V1)

<ESC>	Response Code	<SP>	Option strings	<CR>	<LF>
0x21	Value (3 bytes)	0x20	Value (n bytes)	0x0d	0x0a
'!		' '		-	-

Please refer to “Table 3-2” in “[3.2.3 Response Code Format](#)” for detail information of option strings

4.30.2 Example

	Data		Description
	!V0<CR>	▶	Verbose OFF command
◀	!700<CR><LF>		Command OK
	!V1<CR>	▶	Verbose ON command
◀	!700 COMMAND OK<CR><LF>		Command OK

4.31 VS: View Script

4.31.1 Description

EZU-100 stores user commands in the EEPROM of the product by script function. If there are valid scripts in EEPROM, EZU-100 always executes scripts whenever boot up.

VS command is used to confirm scripts stored in the EEPROM of EZU-100.

- Use format

<ESC>	Command		<CR>
0x21	0x56	0x53	0x0d
'!'	'V'	'S'	-

4.31.2 Example

	Data		Description
	!VS<CR>	▶	Confirm scripts command
◀	!PA 172.16.0.154<CR><LF>		Display first script
◀	!PP 1470<CR><LF>		Display second script
◀	!700<CR><LF>		Command OK

4.32 WS: Write Script

4.32.1 Description

EZU-100 stores user commands in the EEPROM of the product by script function. If there are valid scripts in EEPROM, EZU-100 always executes scripts whenever boot up.

This command adds a script to the last line of EZU-100's script. The saved script is executed as soon as the EZU-100 boots up (except there are SD commands in the scripts). Therefore, to execute the new script, user has to reboot the EZU-100.

- Use format

<ESC>	Command		<SP>	<OP>	<CR>
0x21	0x57	0x53	0x20	Script (n bytes)	0x0d
'!	'W'	'S'	' '		–

☞ Script of <OP> inputs in the format identical with EZU-100 command format.

☞ Before using this command, user have to do 'UE' command (refer to "[4.23 UE: Unlock EEPROM](#)") to unlock the EEPROM.

4.32.2 Example

	Data		Description
	!UE 5A3CA5C3<CR>	▶	EEPROM Unlock command
◀	!700<CR><LF>		Command OK → EEPROM Unlocked
	!WS !PA 172.16.0.154<CR>	▶	Store script of PA command
◀	!700<CR><LF>		Command OK
	!WS !PP 1470<CR>	▶	Store script of PP command
◀	!700<CR><LF>		Command OK

5 Operation Examples

5.1 Changing setting values

5.1.1 Normal mode

	Data		Description
◀	!001<CR><LF>		EZU-100 reset
◀	!900<CR><LF>		EZU-100 is ready to receive user commands
	!BR FE<CR>	▶	Set MT2 serial port to 115,200bps
◀	!700<CR><LF>		Command OK
	!BR<CR>	▶	Confirm the baud rate of MT2 serial port
◀	!FE<CR><LF>		Display the setting value
◀	!700<CR><LF>		Command OK
	!EC 23<CR>	▶	Change <ESC> to '#' (0x23)
◀	#700<CR><LF>		Command OK
	#ID eztcp<CR>	▶	Set PAP User ID to ezTCP
◀	#700<CR><LF>		Command OK
	#ID<CR>	▶	Confirm PAP User ID
◀	#eztcp<CR><LF>		Display PAP User ID
◀	#700<CR><LF>		Command OK
	#PW sollae<CR>	▶	Set PAP User Password to Sollae
◀	#700<CR><LF>		Command OK

5.2 Script Management

	Data		Description
	!UE 5A3CA5C3<CR>	▶	Unlock EEPROM
◀	!700<CR><LF>		Command OK
	!WS !PA 10.1.0.1<CR>	▶	Adding script of PA command
◀	!700<CR><LF>		Command OK
	!WS !PP 1470<CR>	▶	Adding script of PP command
◀	!700<CR><LF>		Command OK
	!VS<CR>	▶	Viewing the saved script
◀	!PA 10.1.0.1<CR><LF>		The first saved script
◀	!PP 1470<CR><LF>		The second saved script
◀	!700<CR><LF>		Command OK
	!ES<CR>	▶	Erase the last script
◀	!700<CR><LF>		Command OK
	!VS<CR>	▶	View saved script
◀	!PA 10.1.0.1<CR><LF>		The first saved script
◀	!700<CR><LF>		Command OK

5.3 PPP Connection

5.3.1 Example of PPP Connection fail in CDMA

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed (Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!810<CR><LF>		PPP connection fail
	<CR><LF>NO CARRIER<CR><LF>	▶	Call release(Response from MT2)

5.3.2 Example of PPP connection success in CDMA

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed (Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success

5.3.3 PPP Down

Since PPP is rarely closed by the PPP server, it can be assumed that PPP is closed by EZU-100 or by call release due to communication fail.

After TCP has been closed, TE2 should close PPP using the DN command. Typically, the time required for PPP down is about several tens of milliseconds. However, where call is cleared due to communication fail, more than 4 seconds may be required for PPP down and EZU-100 should wait for the “810” message displayed. Since the process for PPP down is simple compared with closing TCP, it is enough to check the down message of EZU-100. Since call may be released while transmitting/receiving TCP data, it is necessary to monitor the PPP down message transmitted from EZU-100.

After normal PPP down, TE2 has to ensure that the call has been released by checking “NO CARRIER” or response to the “AT” command. There are some mobile terminals that would not be disconnected automatically, although most mobile terminals are automatically disconnected after PPP down. For such mobile terminals, call should be released by creating a pulse of moderate duration for the DTR pin, using the D0→D1 command. Where the DTR pin is not connected, call may be released using the “+++” escape sequence. However, it is desirable to connect DTR line to mobile terminal because there are some mobile phone types that do not support this scheme.

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed (Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success
(TCP or UDP data communication)			
	!DN<CR>	▶	PPP down command
◀	!810<CR><LF>		PPP down
	<CR><LF>NO CARRIER<CR><LF>	▶	Call release(Response from MT2)

5.4 TCP Communication

5.4.1 Example of TCP Connection fail

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed(Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success
	!TO<CR>	▶	TCP connect command (TO: TCP Open)
◀	!820<CR><LF>		TCP connection fail

5.4.2 Example of TCP Connection success

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed(Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success
	!TO<CR>	▶	TCP connect command (TO: TCP Open)
◀	!720<CR><LF>		TCP connection success

5.4.3 TCP Disconnection

- TCP closed by the remote host

When the remote host tries to disconnect the connection, TCP connection is closed. At this time, the following message is displayed.

<ESC>	Response Code			<CR>	<LF>
0x21	0x38	0x32	0x30	0x0d	0x0a
'!	'8'	'2'	'0'	-	-

- TCP closed by EZU-100

In order to close TCP connection by EZU-100, <ESC> must be sent 3 times according to the below sequence.

Communication Data1	Guard Time	Send <ESC>	Guard Time	Communication Data2
	Over 500ms	Interval between <ESC>: 0~500ms	Over 500ms	

A guard time longer than 500ms is required before and after sending three <ESC>s. That is, it is prohibited to send other data for 500ms before/after sending the <ESC>s. EZU-100 cannot recognize commands starting with <ESC> while TCP is connected but can recognize three <ESC> characters with a guard time of 500ms.

☞ *The <ESC> will be transmitted to the connected host.*

5.4.4 Example of TCP closed by the remote host

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed (Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success
	!TO<CR>	▶	TCP connect command (TO: TCP Open)
◀	!720<CR><LF>		TCP connection success
~ TCP data communication(TCP Connected) ~			
The remote host tries to disconnect the connection			
◀	!820<CR><LF>		TCP connection closed
	!DN<CR>	▶	PPP down command
◀	!810<CR><LF>		PPP down
	<CR><LF>NO CARRIER<CR><LF>	▶	Call release(Response from MT2)

5.4.5 Example of TCP closed by EZU-100

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed (Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success
	!TO<CR>	▶	TCP connect command (TO: TCP Open)
◀	!720<CR><LF>		TCP connection success
~ TCP data communication(TCP Connected) ~			
Wait over 500ms			
	!!!	▶	Send <ESC> character three times
Wait over 500ms			
◀	!900<CR><LF>		Transition to command mode
◀	!820<CR><LF>		TCP connection closed
	!DN<CR>	▶	PPP down command
◀	!810<CR><LF>		PPP down
	<CR><LF>NO CARRIER<CR><LF>	▶	Call release(Response from MT2)

5.5 UDP Communication

5.5.1 Example of UDP Data Send/Receive

	Data		Description
	!PA 211.22.78.210<CR>	▶	Set remote host IP address
◀	!700<CR><LF>		Command OK
	!PP 1470<CR>	▶	Set remote host Port
◀	!700<CR><LF>		Command OK
	!UL 2000<CR>	▶	Set UDP Local Port
◀	!700<CR><LF>		Command OK
	AT<CR>	▶	Check operation of modem(sent to MT2)
◀	<CR><LF>OK<CR><LF>		Command OK(Response from MT2)
	ATDT<CR>	▶	Dialing modem(sent to MT2)
◀	<CR><LF>CONNECT<CR><LF>		Dialing is completed (Response from MT2)
	!UP<CR>	▶	PPP connect command
◀	!710<CR><LF>		PPP connection success
	!US 5 100<CR>	▶	Command to send 5-byte UDP data (block interval is configured as 1 sec)
	<5 bytes data>	▶	Send 5-byte data within 1 sec
◀	!730<CR><LF>		UDP data is sent
◀	<3 bytes data>		UDP data received through port 2,000
	!DN<CR>	▶	PPP down command
◀	!810<CR><LF>		PPP down
	<CR><LF>NO CARRIER<CR><LF>	▶	Call release(Response from MT2)

6 Technical Support / Warranty / Precautions

6.1 Technical Support

If there are any questions regarding the product, please use FAQ or Q/A board in Solla Systems' homepage. Also, feel free to contact us by email.

- Customer support homepage address
<http://www.eztcp.com/en/support/qna.php>
- E-mail address
support@eztcp.com

6.2 Warranty

6.2.1 Refund

If user demands refund within 2 weeks of purchase, the product will be refunded.

6.2.2 Free A/S

If product malfunctions within 1 year of purchase, repair and product exchange will be done without charge.

6.2.3 Charged A/S

Products after 1 year of purchase or product malfunctions due to user's miss care will be repaired and exchanged with charge.

6.3 Precautions

- If the product is modified, it is no longer guaranteed.
- Specifications of the product may be changed without prior notice for performance improvement.
- If the product is used for functions that are not covered by the product specification, the product is no longer guaranteed as well.
- All kind of Reverse Engineering is prohibited.
- It prohibits the use of firmware and provided applications for other purpose.
- Do not use the product in extreme temperature or vibration conditions.
- Do not use the product in highly humid and oily environment.
- Do not use the product in combustible or corrosive gas environment.
- The product functions are not guaranteed in environments with too much noise.
- Do not use this product for special cases requiring high quality and reliability such as space, airplane, medicine, nuclear power, transportation and other safety devices.
- If accidents or loss may occur using this product, Sollae Systems will not be liable for any compensation.

7 Ordering Information

EZU-100-BO	EZU-100-E
EZU-100-SE	EZU-100-E Evaluation board 5V Power adapter (CE) CD
EZU-100-SU	EZU-100-E Evaluation board 5V Power adapter (UE) CD

8 Revision History

Date	Version	Description	Author
2006.07.13	1.0	○ The first release	
2006.11.01	1.1	○ Modified the Introduction (HSDPA) ○ Corrected the example of the US command	
2007.04.09	1.2	○ Add UE, WS, VS command ○ (above firmware version 3.1B)	
2009.04.02	1.3	○ Modify 6.1 Costumer Service ○ Add 4.3.2 LED status in each mode ○ Correct some expressions	
2009.09.15	1.4	○ Modified style of document ○ Modified descriptions of all commands ○ Removed contents of EVB and downloading F/W ○ Modified figure 2-2	
2009.10.15	1.5	○ Descriptions of 4.14 SC command have been added ○ A description in 4.16 SE command has been added ○ The order of 4.12 and 4.13 has been changed. ○ A description about removing ID/PW has been added	
2009.10.19	1.6	○ A description about average speed of RS232 has been added	
2009.12.02	1.7	○ Form of Revision History has been modified. ○ Operation/Storage Temperature have been added. ○ Examples of TCP communication have been modified.	Roy LEE
2010.02.26	1.8	○ TD, TP and TS commands have been added.	Roy LEE
2010.04.06	1.9	○ Contents menu has been modified.	Roy LEE
2010.05.11	2.0	○ Descriptions about GP0, 2, 5 and 6 have been added. ○ Description about reset operation has been corrected.	Roy LEE
2013.12.18	2.1	○ Correct some errors and expressions	Roy LEE