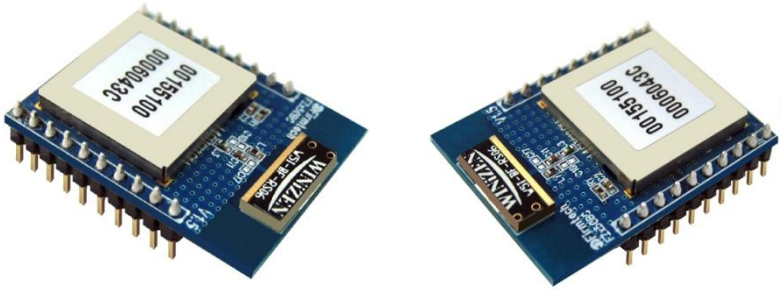
FZ760BS/FZ760BC

Quick Guide

TinyBee™

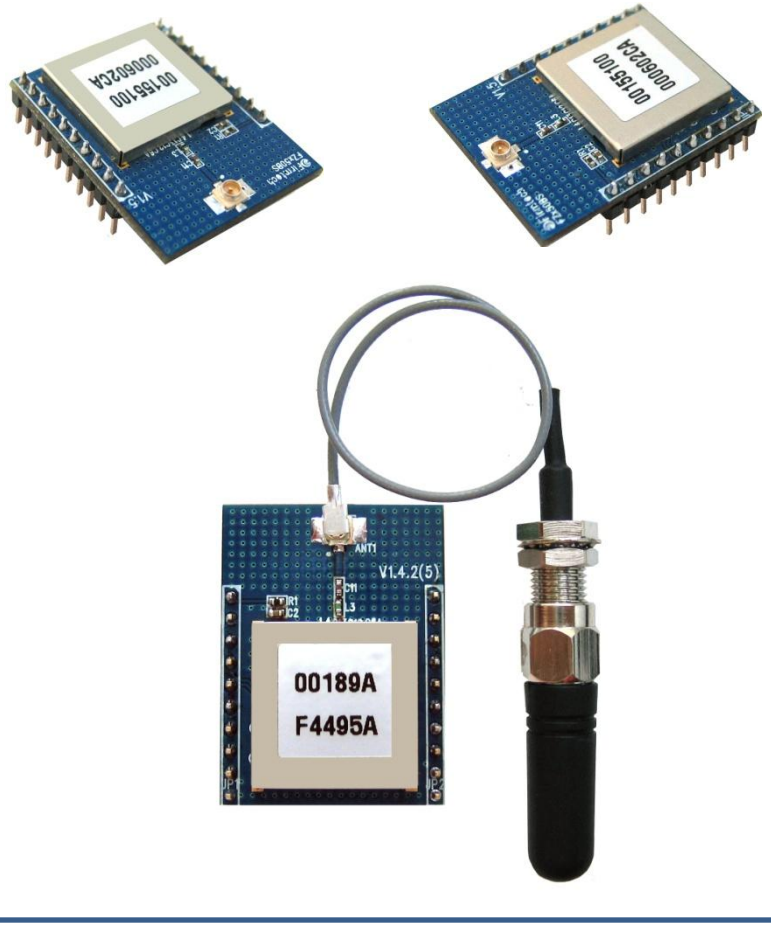
Features of FZ760BC / 760BS

TinyBee™



< FZ760BC >

TinyBee™



< FZ760BS >

* Before Getting Started…

< IEEE 802.15.4 >

- **This is a standard specification for near-distance wireless communication networks that enables configuring and maintaining of a cost-effective and effective near distance wireless network among home electronics devices, lighting, office equipment, etc. as a wireless private domain network.**

- **It uses the internationally permitted 2.4GHz ISM band (Industrial, Scientific, Medical).**

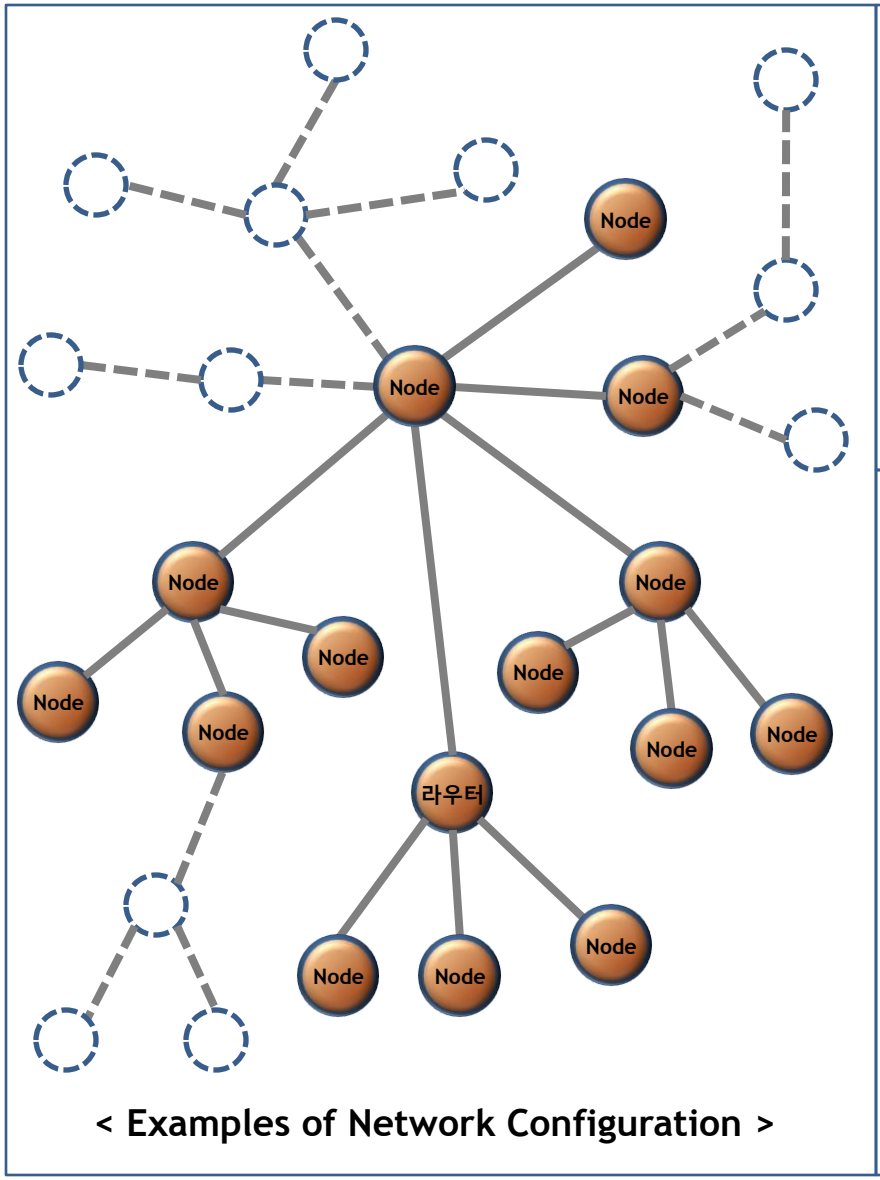
- **It uses 16 channels in the 2.4GHz bandwidth.**

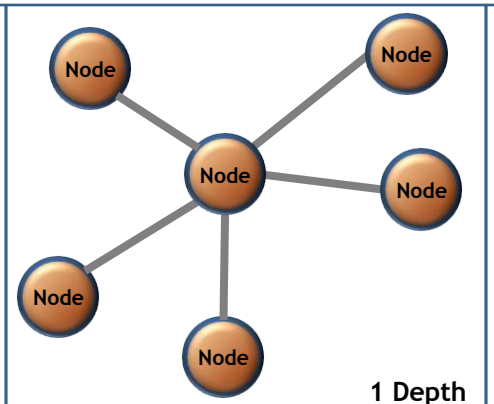
- **It uses a 250Kbps wireless transmission speed.**

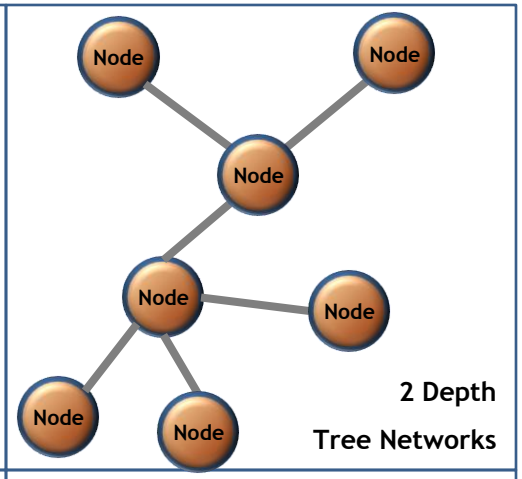
- **Based on the network address, it supports Star or Peer to Peer type networks.**

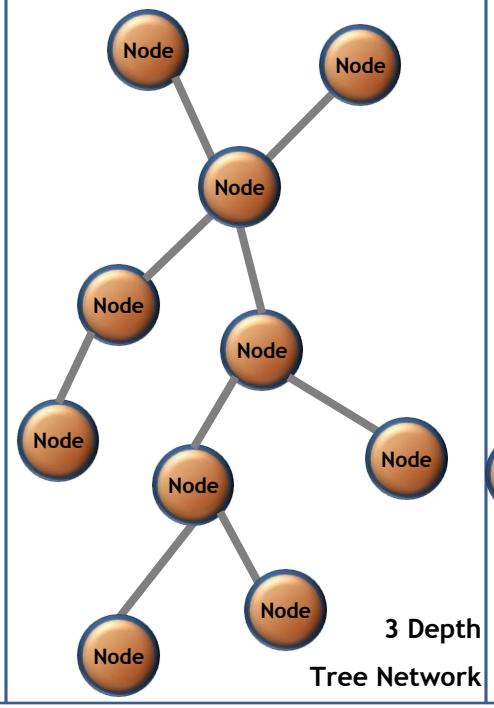
- **It allows a user to confirm data reception by using the ACK Option for data transmission.**

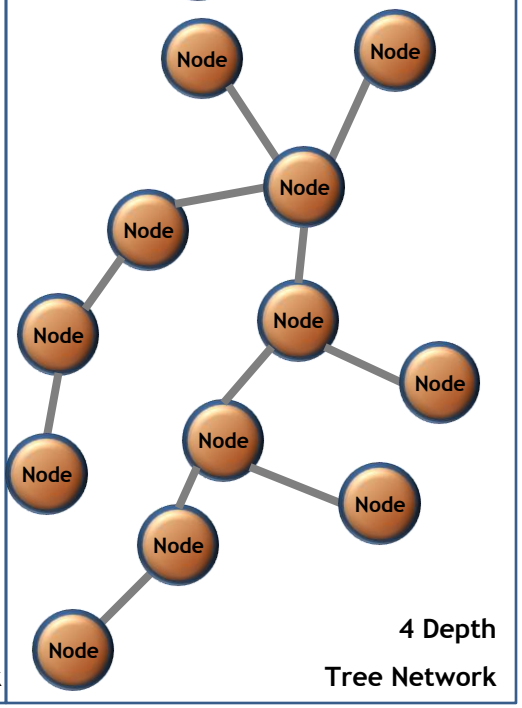
* Examples of IEEE 802.15.4 Network Configuration











* Features of FZ760BX

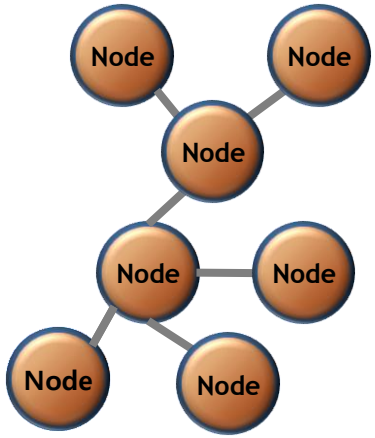
FZ760BX

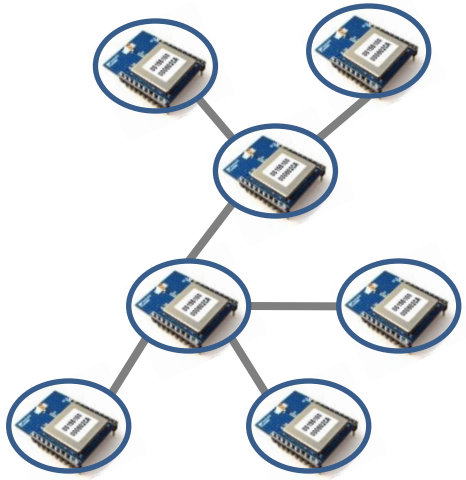
FZ760BC (Chip Antenna)

20pin Header Type

FZ760BS (Helical Antenna)

20pin Header Type

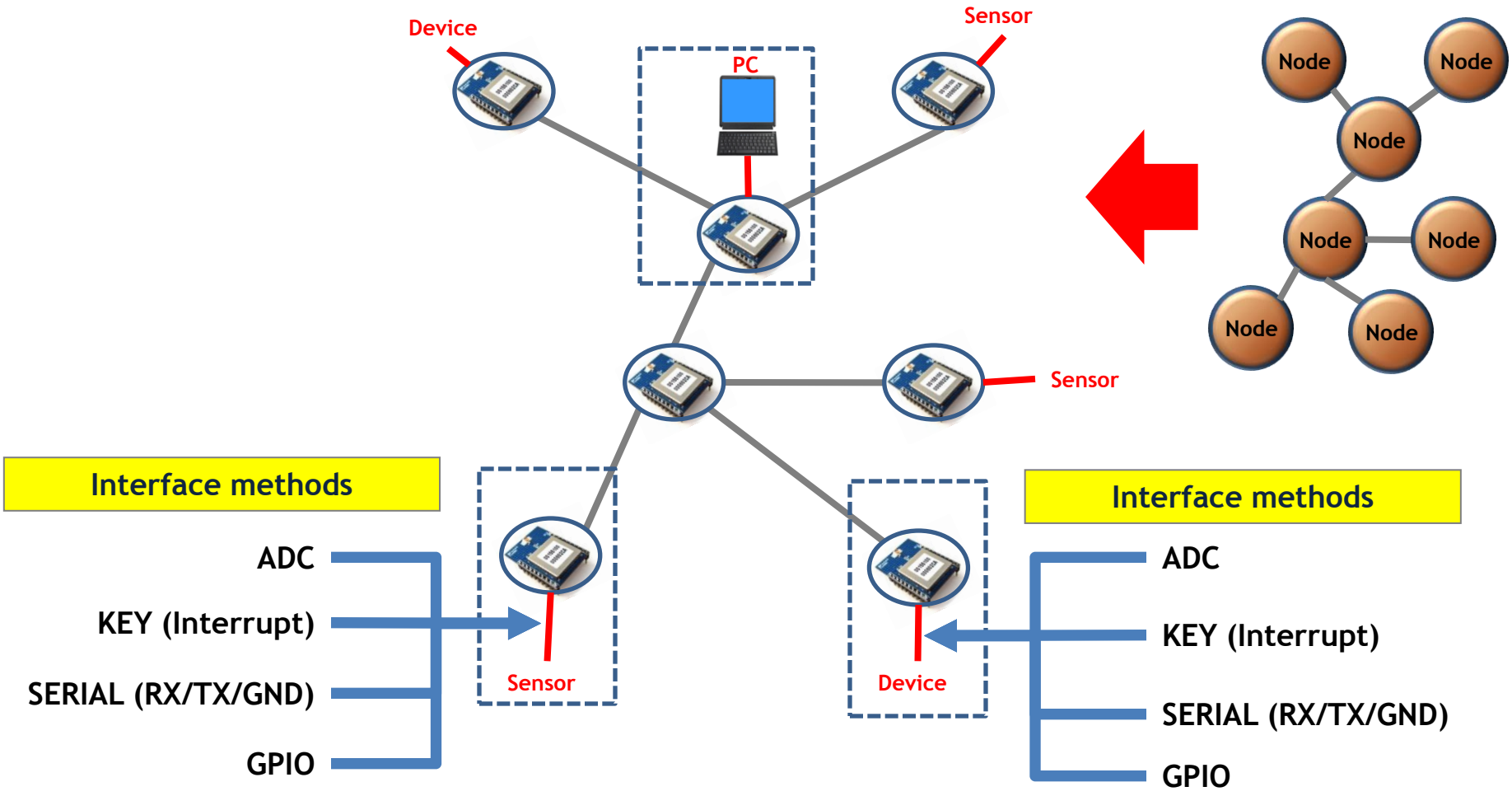




< FZ760BX is >

- Based on IEEE 802.15.
- Supports Star and Peer to Peer Networks.
- 20pin header-type.
- Supports UART, ADC, KEY and GPIO interfaces.
- Supports AT command based setup.
- Supports ACK function for data transmission.

* Example of A Sensor and Device Network Configuration Using FZ760BX



* Functions of Interface Board 1

It converts EIA Level to TTL Level or in reverse order

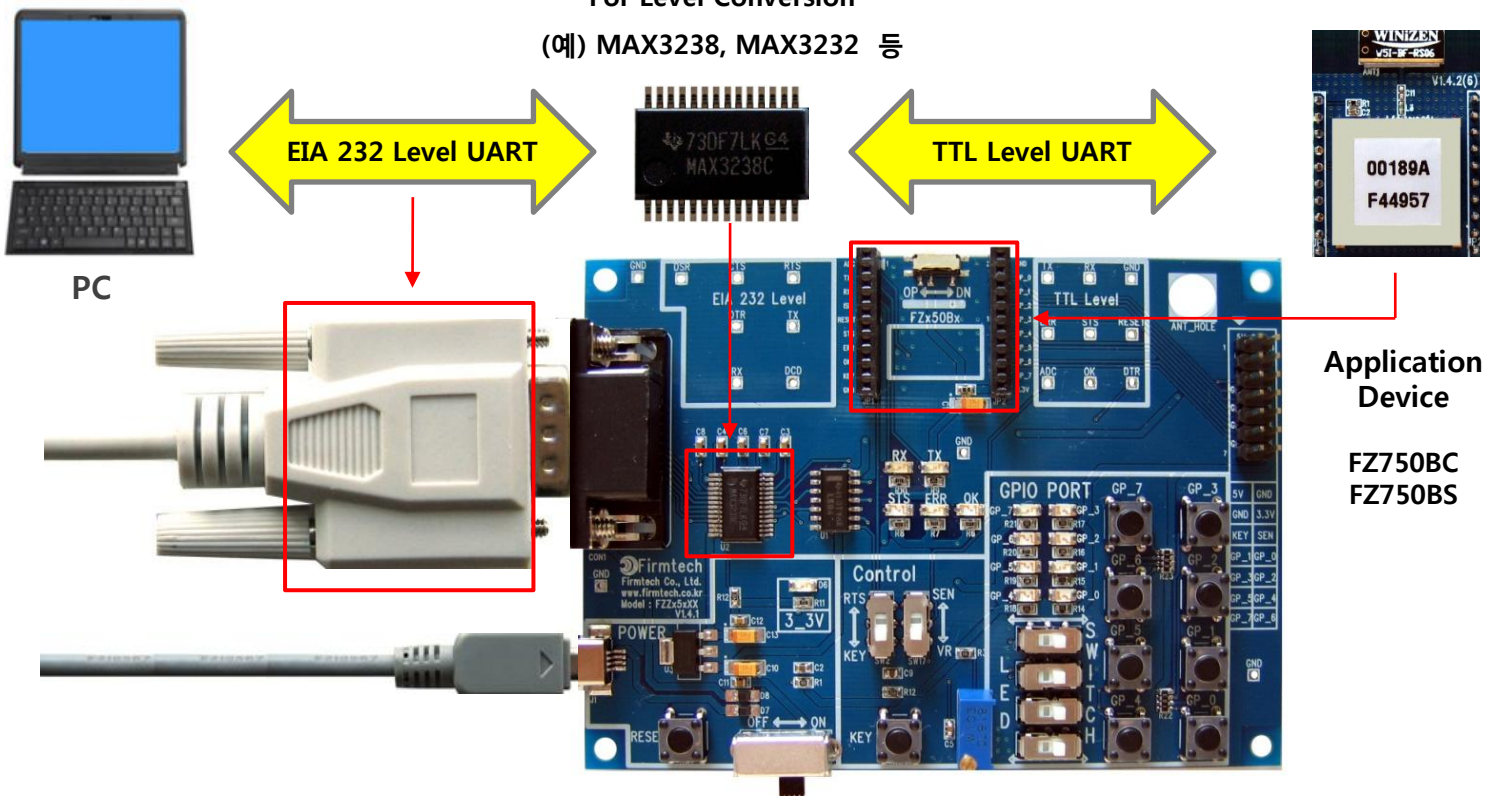
Note : UART : **U**niversal **A**synchronous **R**eceiver **T**ransmitter

EIA-232 Level⇔ TTL Level

Dedicated Driver IC

For Level Conversion

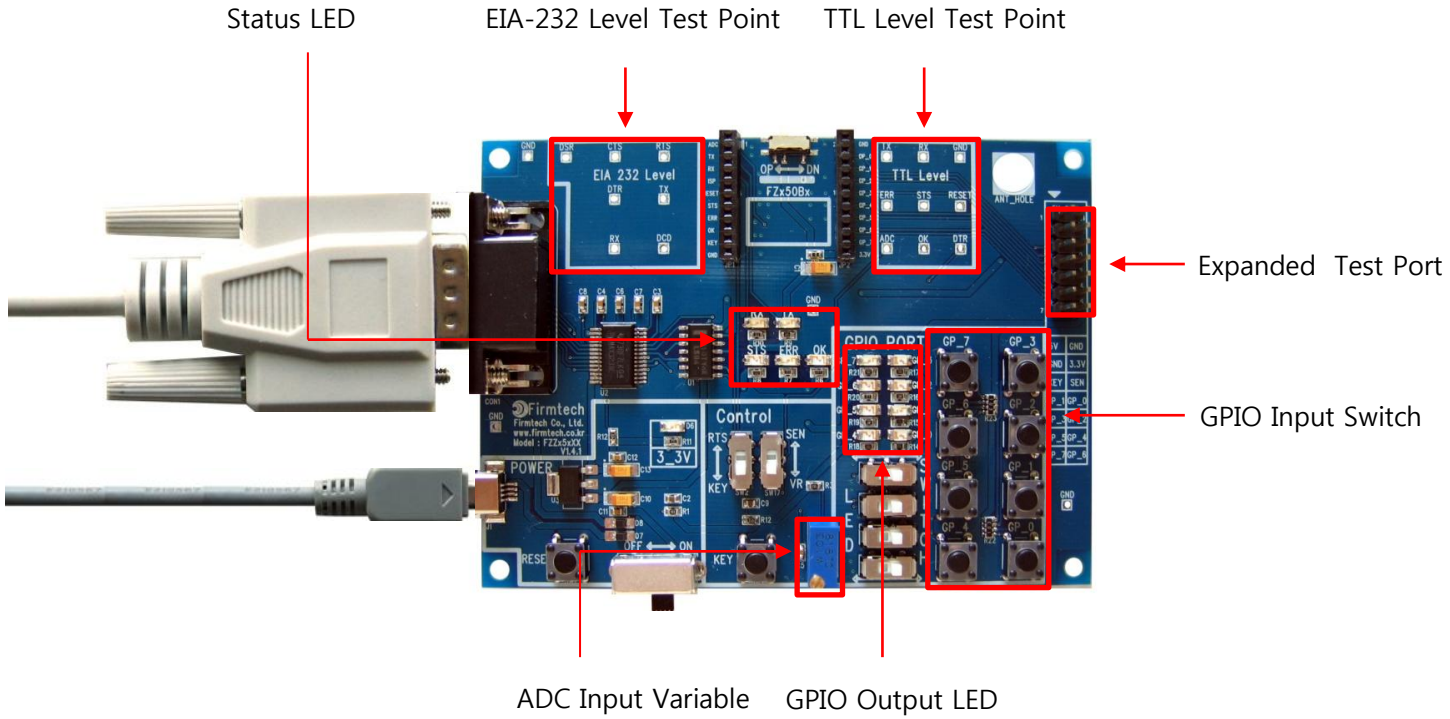
(예) MAX3238, MAX3232 등



Interface Board (FZZx5xXX)

* Functions of Interface Board 2

Setup of FZ760BX Environment and Monitoring & Basic Function Test of FZ760BX



Test Point	Allows users to directly check the control signal line with an oscilloscope, etc.
GPIO Input Switch	Switch for digital port input
GPIO Output LED	LED for digital port output
ADC Input Variable	Variable resistor for ADC data input
Status LED	LED that displays overall status
Expanded Port	Plays a role of expanding the main signal line to user board

< “The FZ760BX Quick Guide”…>

(1) Consists of eight chapters in total.

(2) Even though it is divided into eight chapters, in some chapters it uses the setup values that were used in previous chapters.

(3) In other words, the progressive method of this “FZ760BX Quick Guide” guides the user in order from the start.

(4) Thus, if you read this guide for the first time, you need to proceed chapter by chapter in order to correctly understand its meaning.

(5) It is better for a user to understand the overall functions of the FZ760BX first and migrate to subsequent chapters to refer to the functions necessary for each chapter.

< Table of Contents >

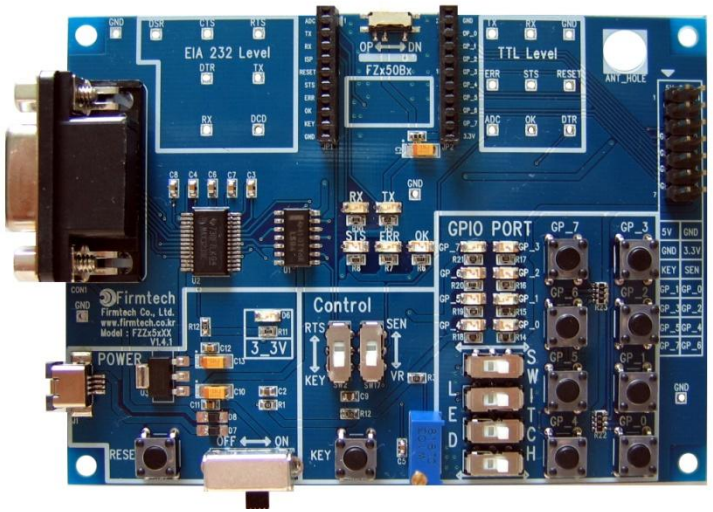
[0] Product Content

&

Installation

1. FZ760BX Network Content

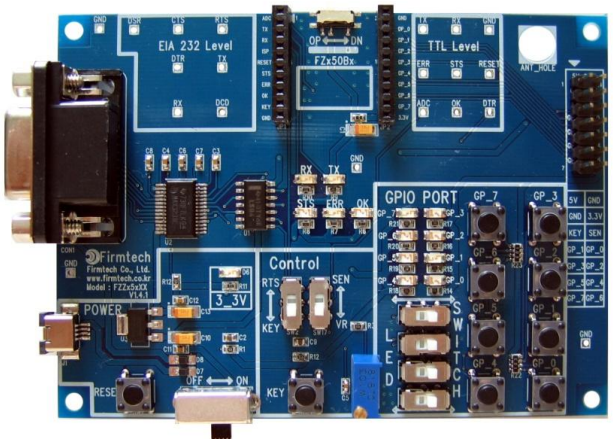
(1) Product Content in One Set of FZ760BX - FZ760BC-Type (1 Set)

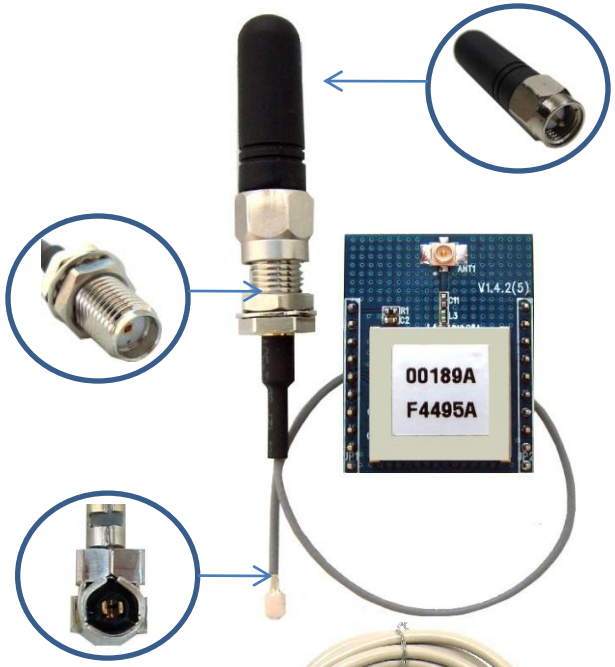


< Product Content in One Set >

- FZ760BC
- Interface Board
- USB Power Cable
- Serial Cable

(2) Product Content In One Set of FZ760BX - FZ760BS-Type (1 Set)

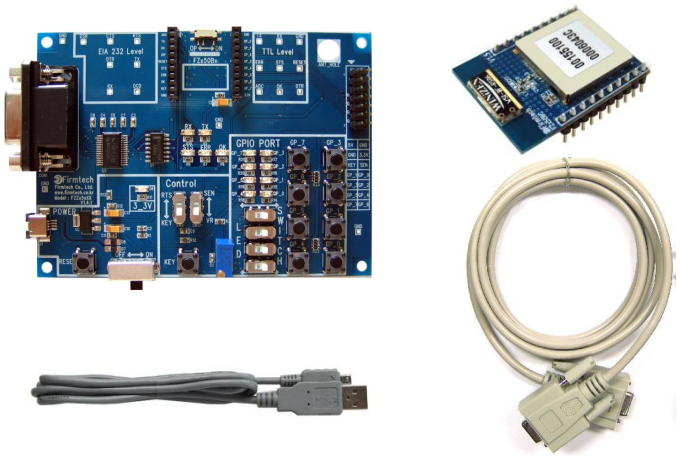




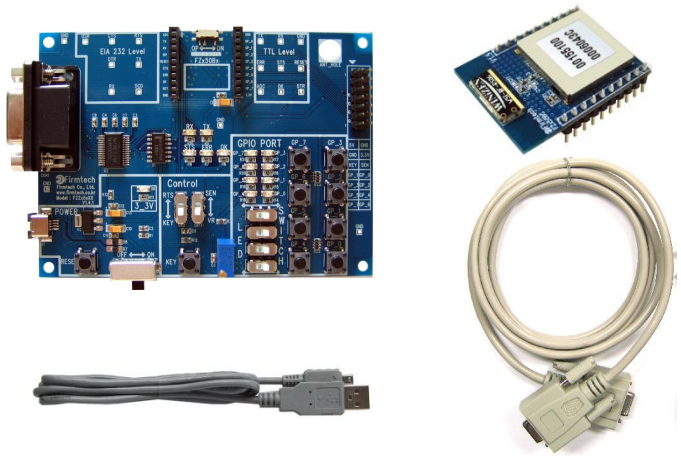
< Product Content in One Set >

- FZ760BS
- Interface Board
- CMP Cable
- Helical Antenna (1 dBi Gain)
- USB Power Cable
- Serial Cable

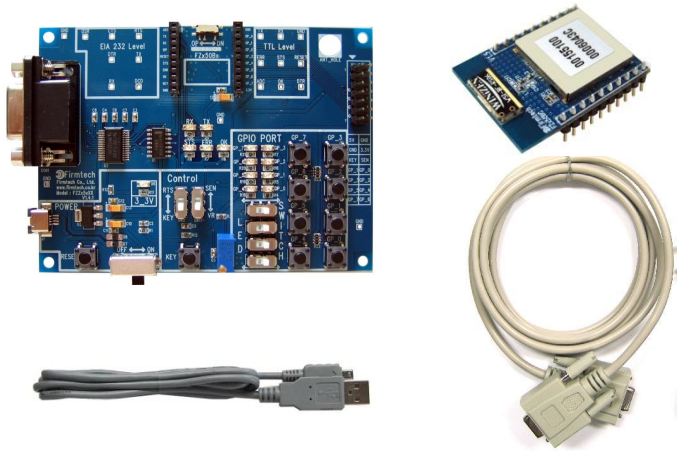
(3) Network Configuration Using 3 Sets



1 Set for Node 1 Setup



1 Set for Node 2 Setup

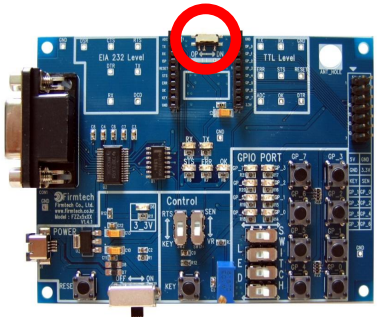


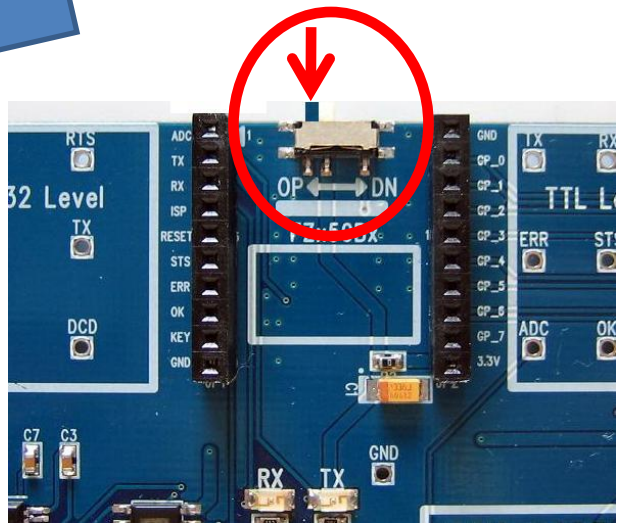
1 Set for Node 2 Setup

- “FZ760BX Quick Guide” uses three devices for explanation purpose.

2. Checking Items Before Installing the FZ760BX Product Content

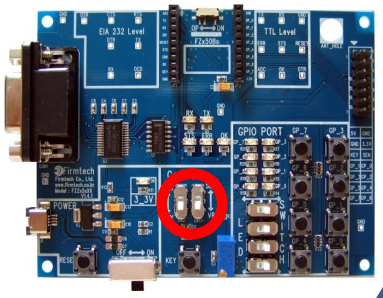
(1) Checking of ISP Selection Switch





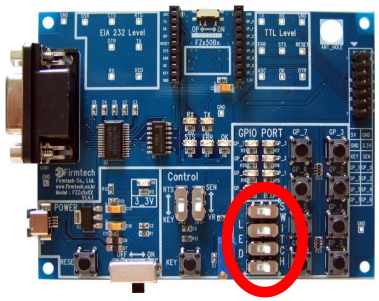
- Position the OP / DN selection switch to OP.
- Do the switch selection as above for all three Interface Boards.

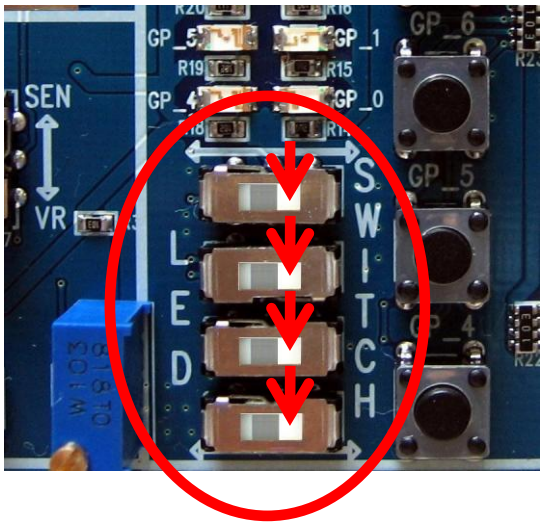
(2) Checking of Control Selection Switch



- Position the RTS / KEY selection switch to KEY.
- Position the SEN / VR selection switch to VR.
- Do the switch selection as above for all three Interface Boards.

(3) Checking of GPIO Selection Switch

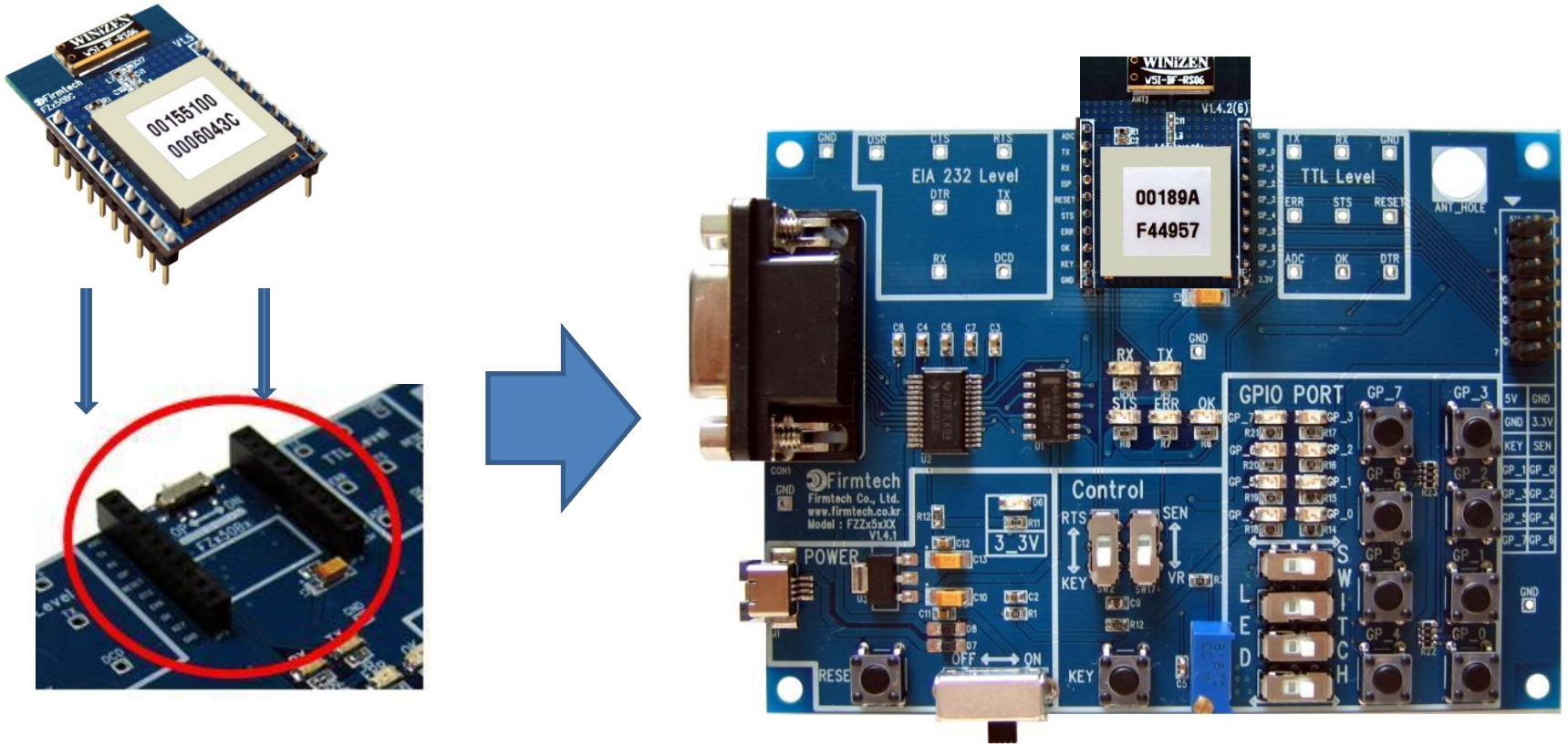




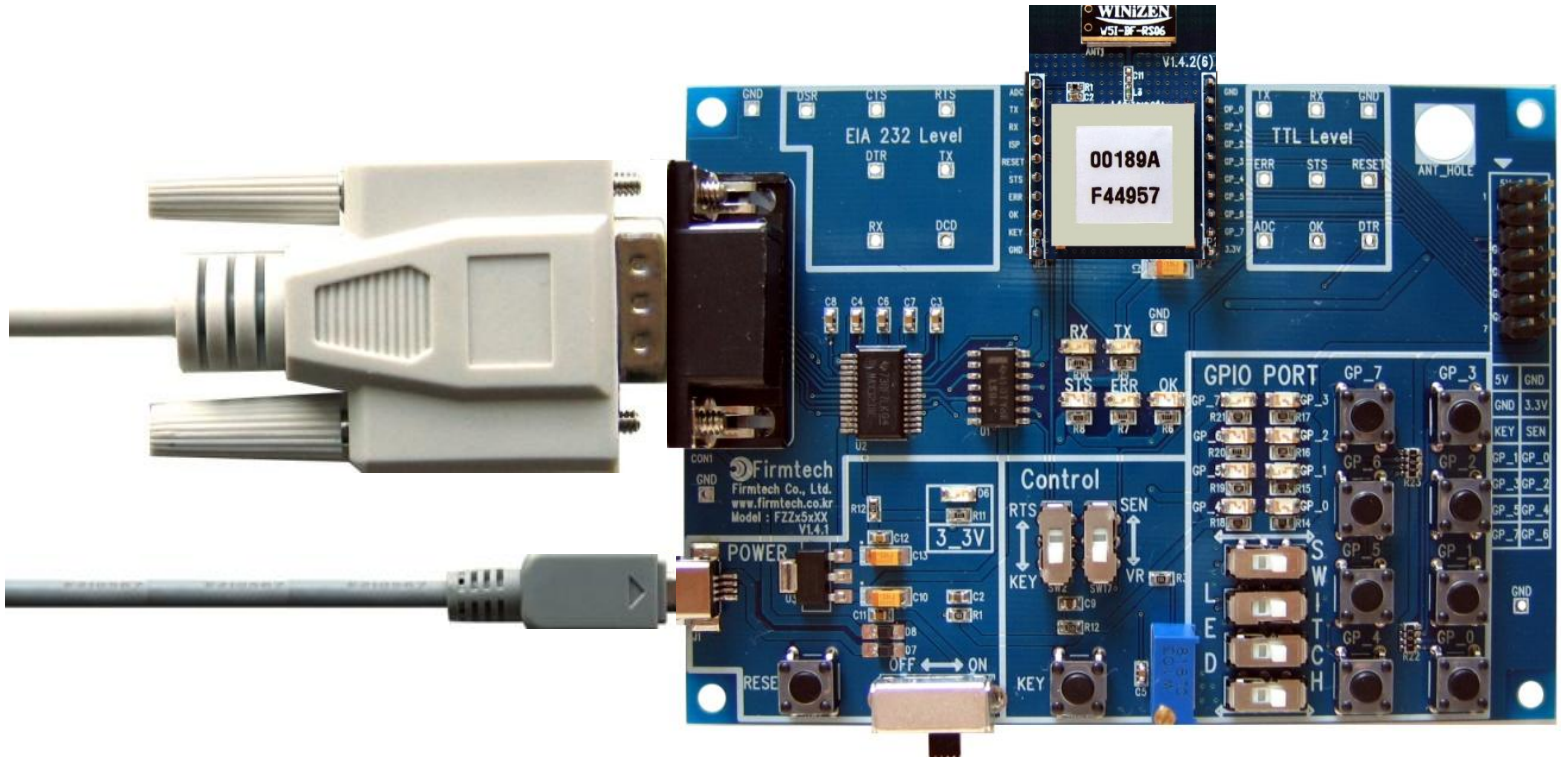
- Make sure to position the two upper LED / Switch selection switches to LED.
- Make sure to position the two lower LED / Switch selection switches to SWITCH.
- Do the switch selection as above for all three Interface Boards.

3. Installing the Product Content

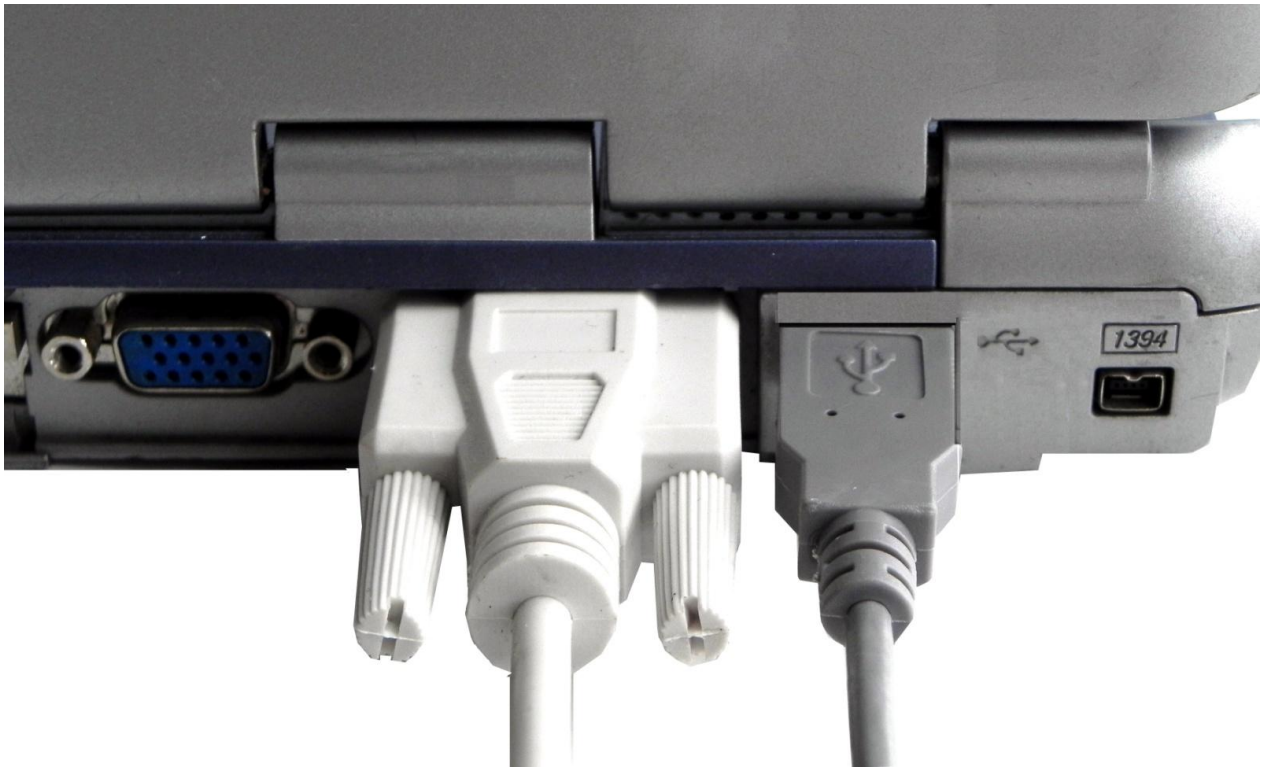
(1) FZ760BX + Interface Board



(2) Interface Board + USB Power Cable & Serial Cable

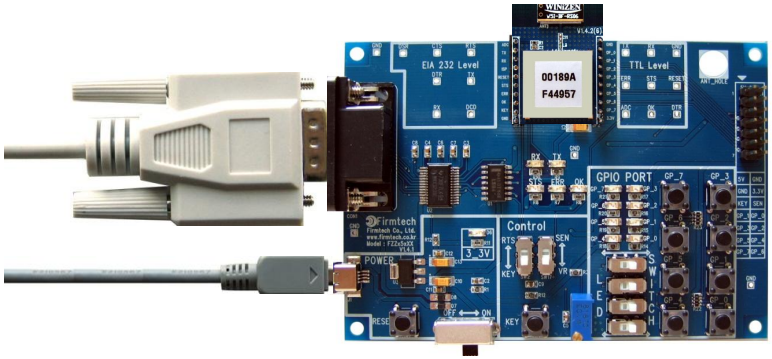


(3) PC + USB Power Cable & Serial Cable



(4) Image Showing Complete Installation of All Content

- Connect three FZ760BX to a PC.
- In this “FZ760BX Quick Guide,” three FZ760BX are connected to one PC for convenient explanation.

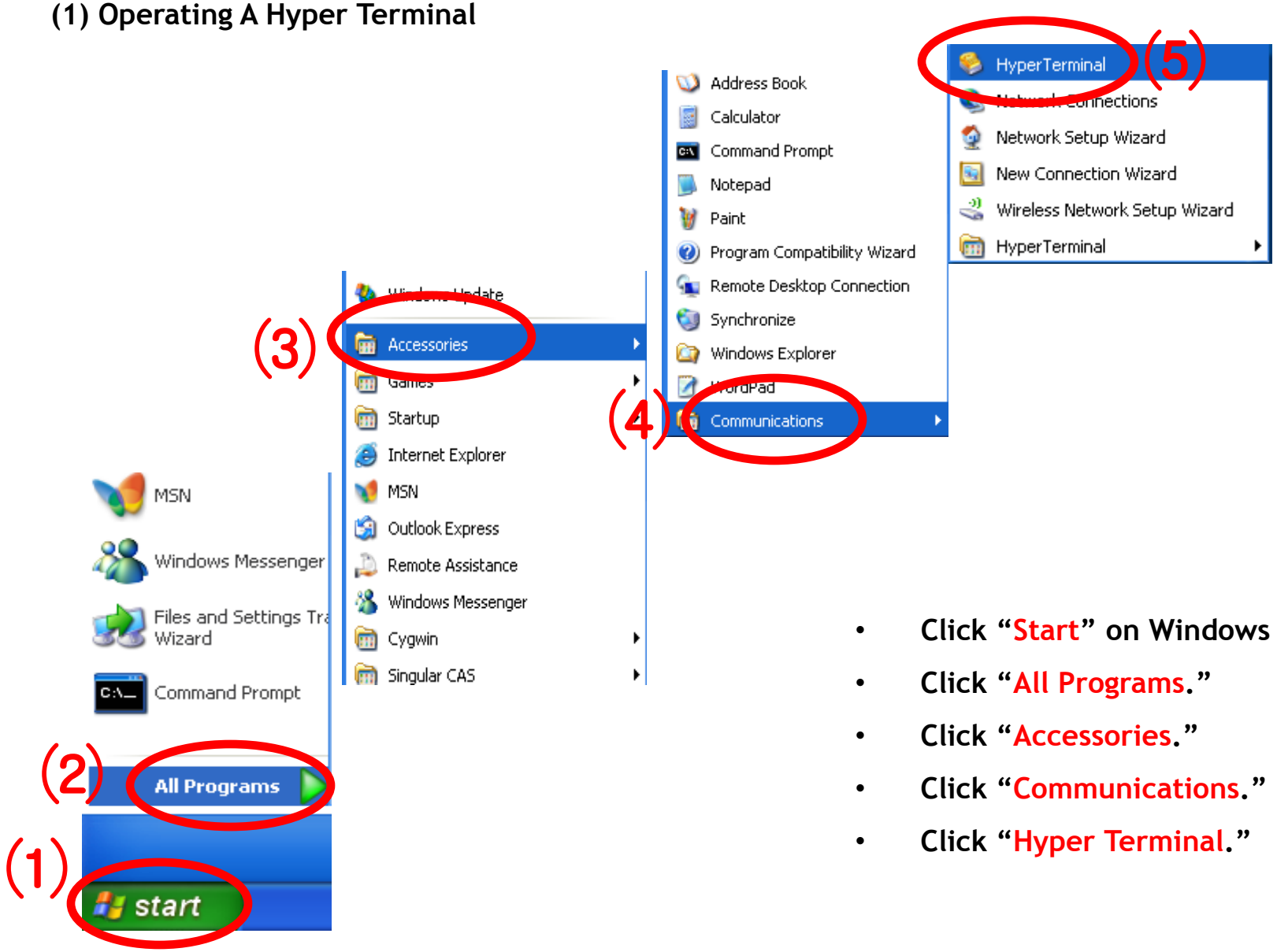


[1] Setup of Hyper Terminal

Checking received data using hyper terminals.

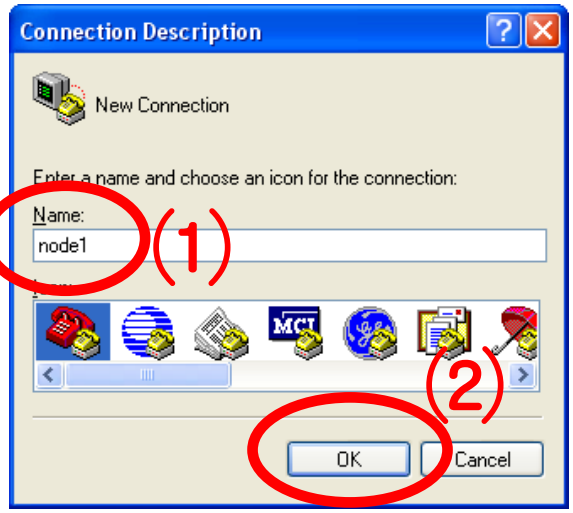
1. Running and Setup of Serial Communication Program (Hyper Terminal)

(1) Operating A Hyper Terminal



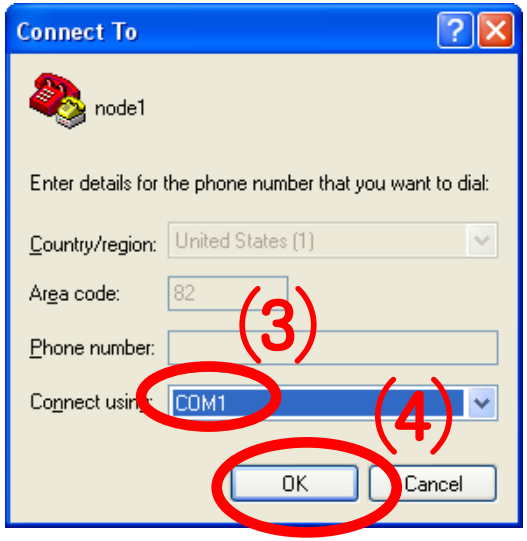
- Click "Start" on Windows Start menu.
- Click "All Programs."
- Click "Accessories."
- Click "Communications."
- Click "Hyper Terminal."

(2) Setup of Hyper Terminal – Name Setting



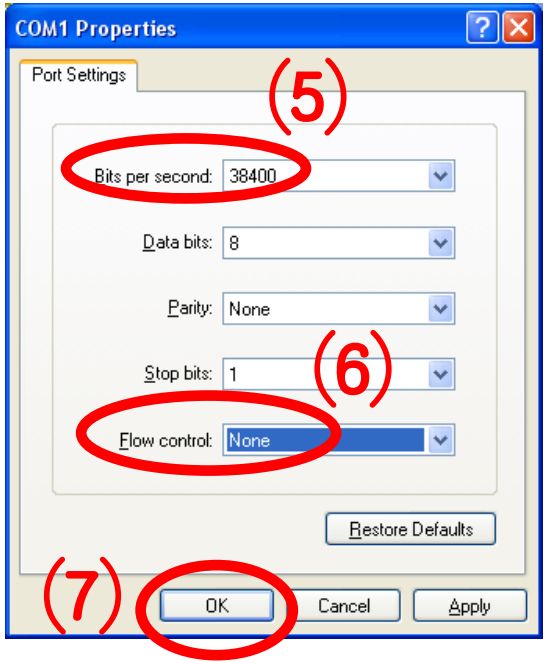
- Set up the hyper terminal connected to FZ760BX to be set up to Node 1.
- Enter “Node1” as a name.
- Click “OK” and proceed to the next step.

(3) Setup of Hyper Terminal – Port Setting



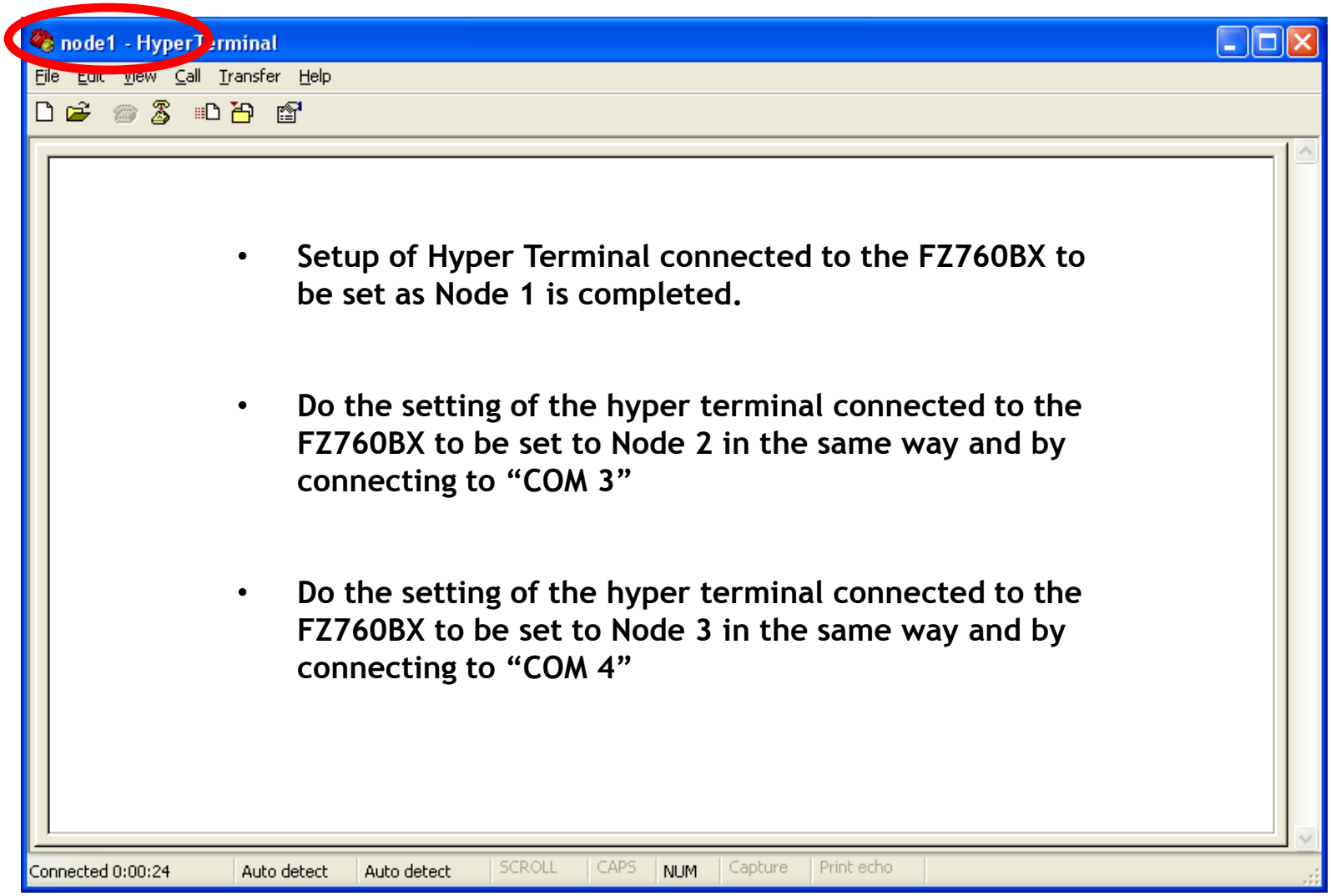
- Select a port to be connected to FZ760BX set up to Node 1. (Assumed here as ‘COM1’)
- Click “OK” and proceed to the next step.

(4) Setup of Hyper Terminal – Communication Speed, etc.



- Select “38400” for “Bits per Second”.
- Select “None” for “Flow Control”
- No change for other items.
- Click “OK.”

(5) Setup of Hyper Terminal - Finish

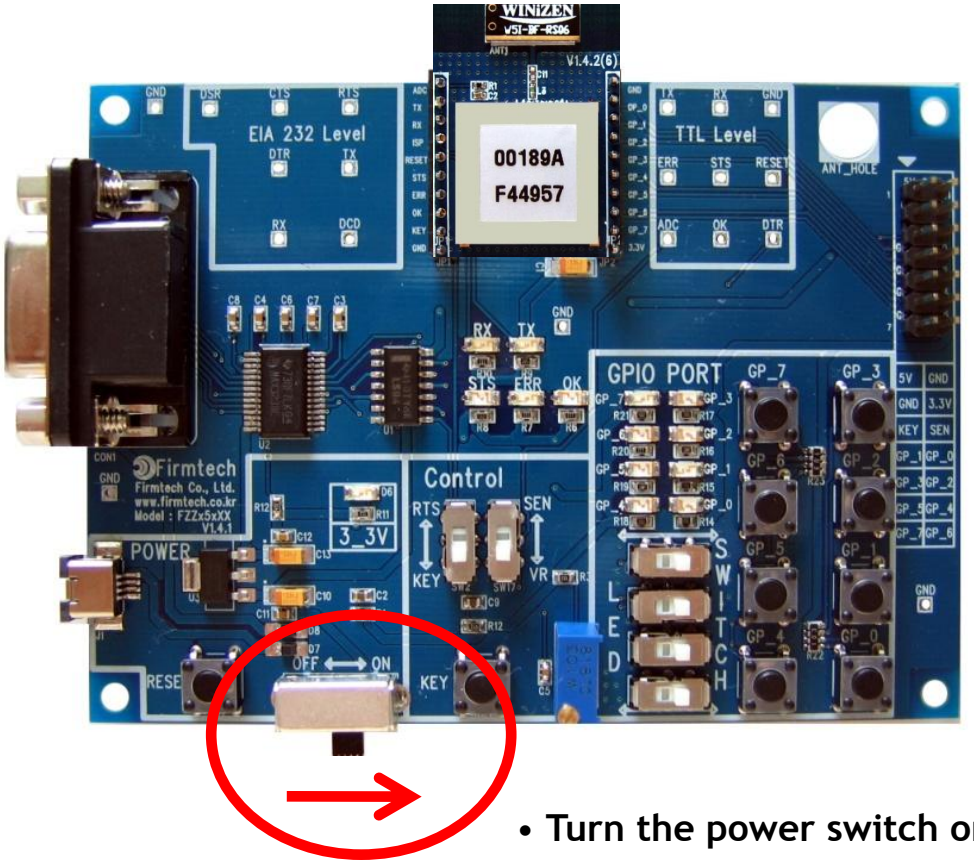


- Setup of Hyper Terminal connected to the FZ760BX to be set as Node 1 is completed.
- Do the setting of the hyper terminal connected to the FZ760BX to be set to Node 2 in the same way and by connecting to “COM 3”
- Do the setting of the hyper terminal connected to the FZ760BX to be set to Node 3 in the same way and by connecting to “COM 4”

[2] Operating the FZ760BX

1. Operating the FZ760BX

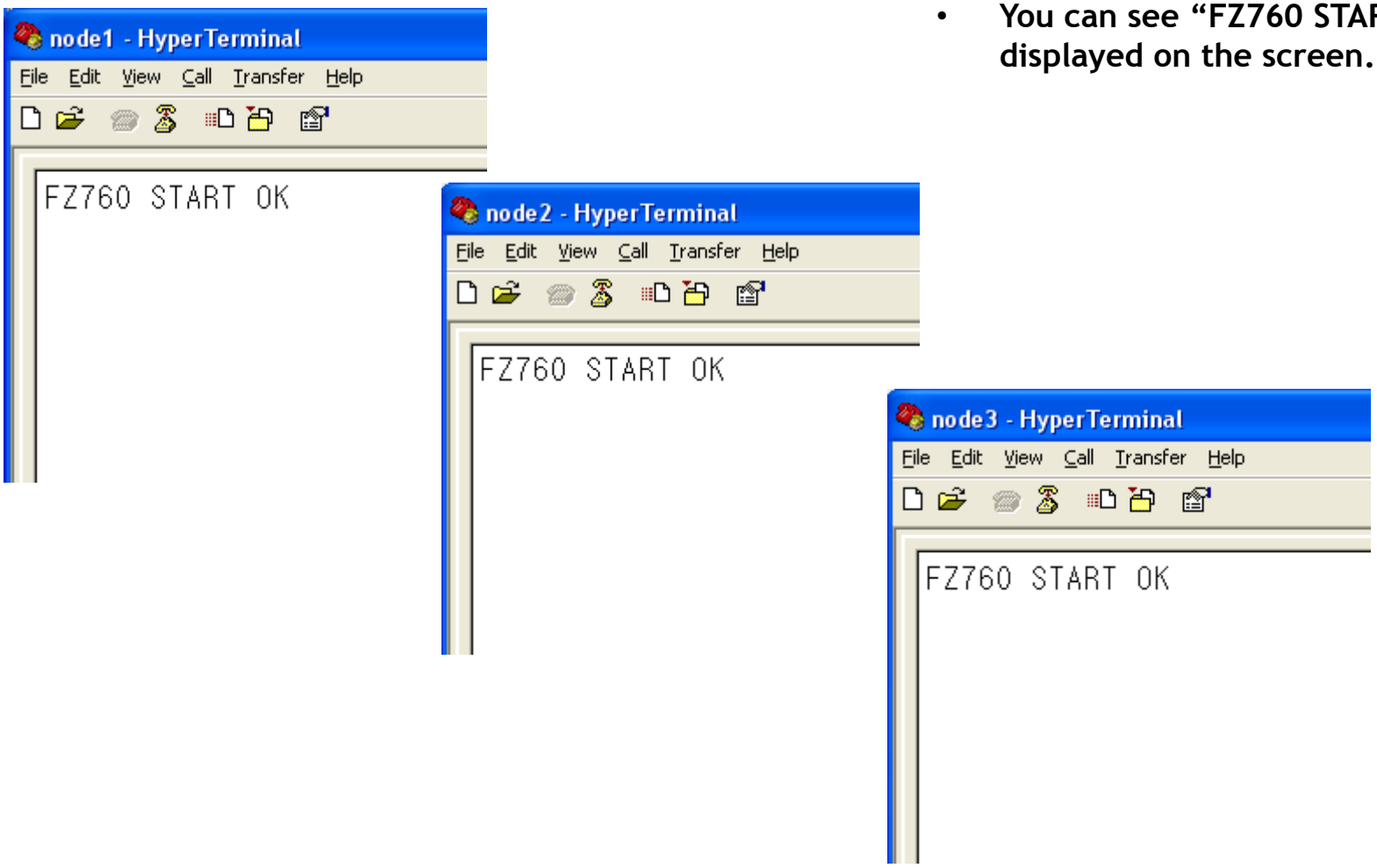
(1) Powering On the FZ760BX



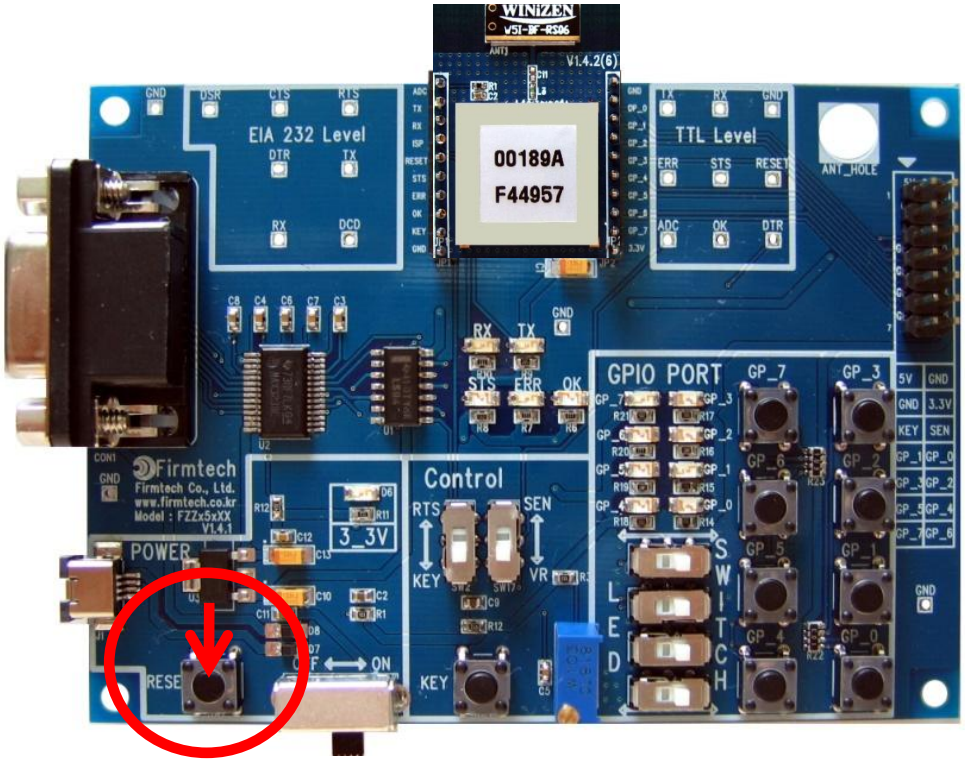
- Turn the power switch on.

(2) Hyper Terminal Output Screen

- Turn on the power switches of all three Interface Boards.
- You can see “FZ760 START OK” displayed on the screen.

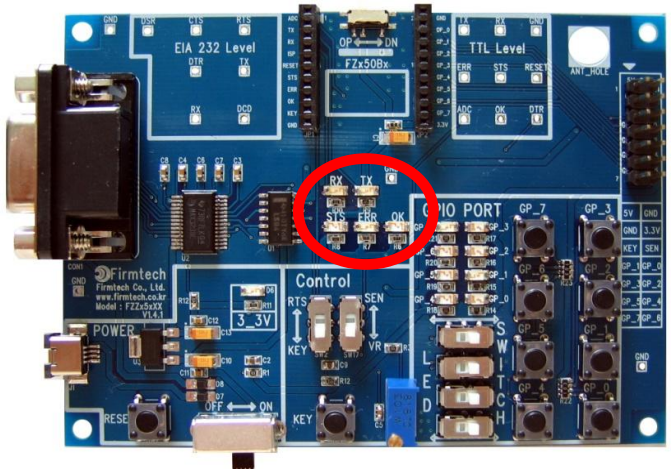


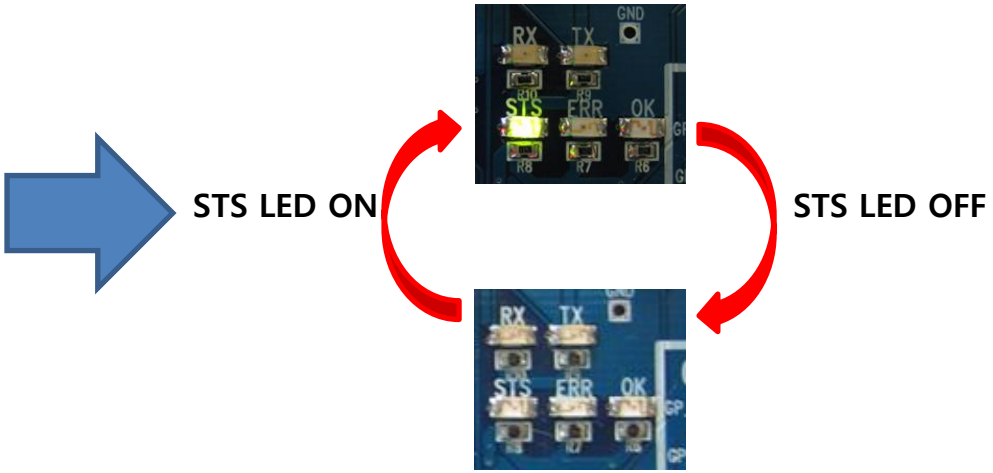
* Restarting the FZ760BX



- If the FZ760BX does not operate normally or no output letter is displayed on the screen, restart the FZ760BX.
- Restart the FZ760BX by pressing the reset switch on the Interface Board.
- Check the communication speed and other connection parameters as well.

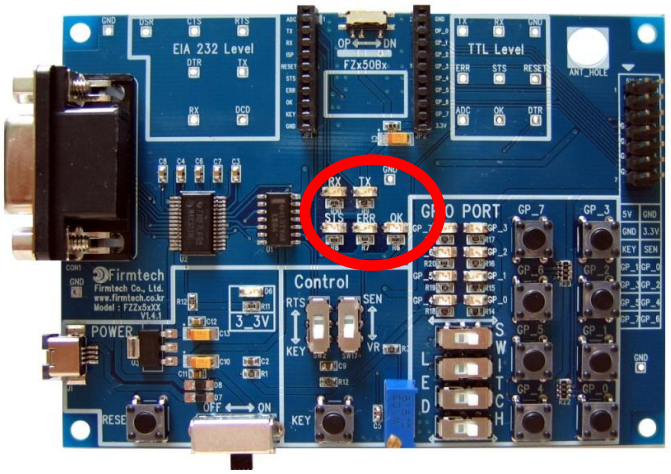
*** Normal Operating Status of STS LED**

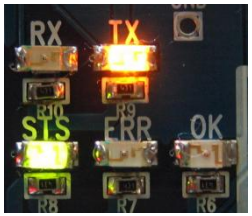




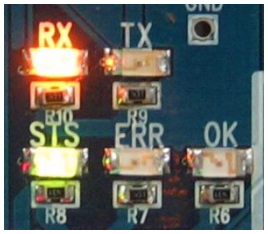
- If operated normally, the STS LED blinks twice in every one second.
- The ERR/OK LEDs on the FZ760BX remain to be OFF.

*** Status of TX/RX LED**



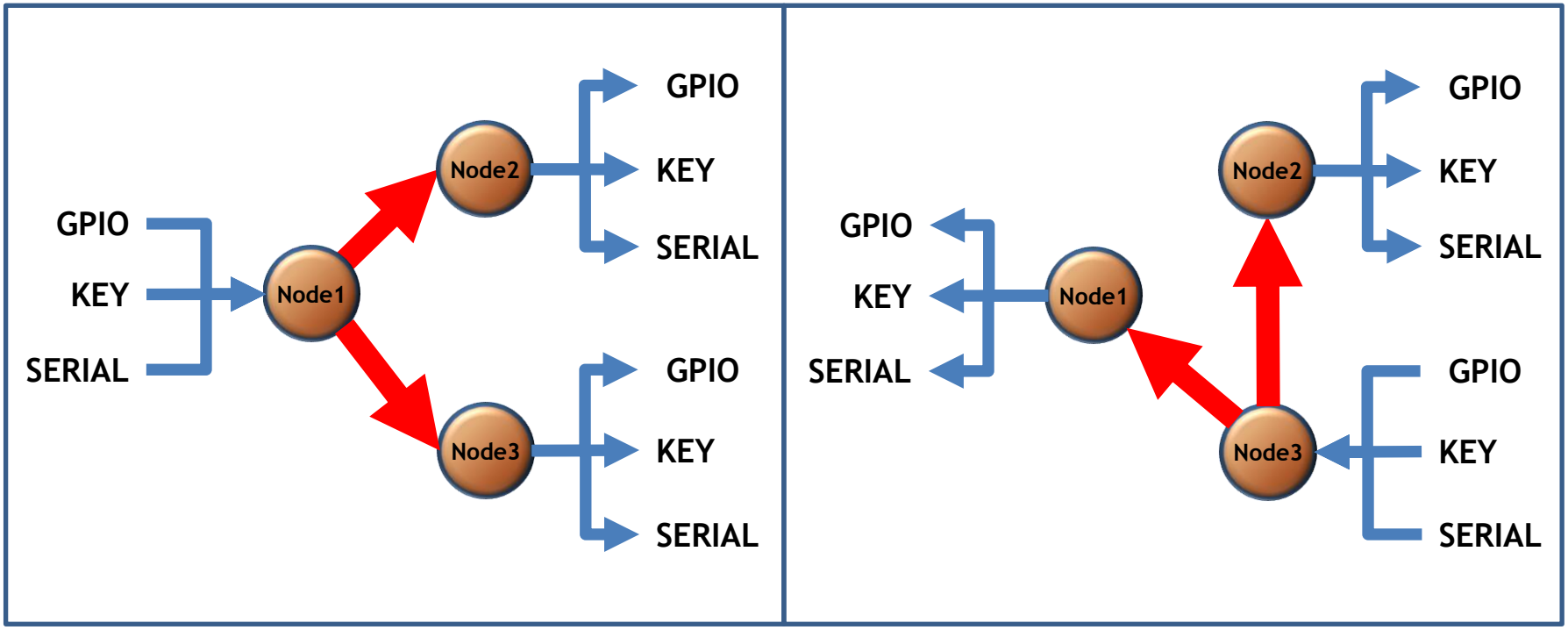


- If the FZ760BX is in Operation Mode, the TX LED blinks when a serial data output is made from the FZ760BX.



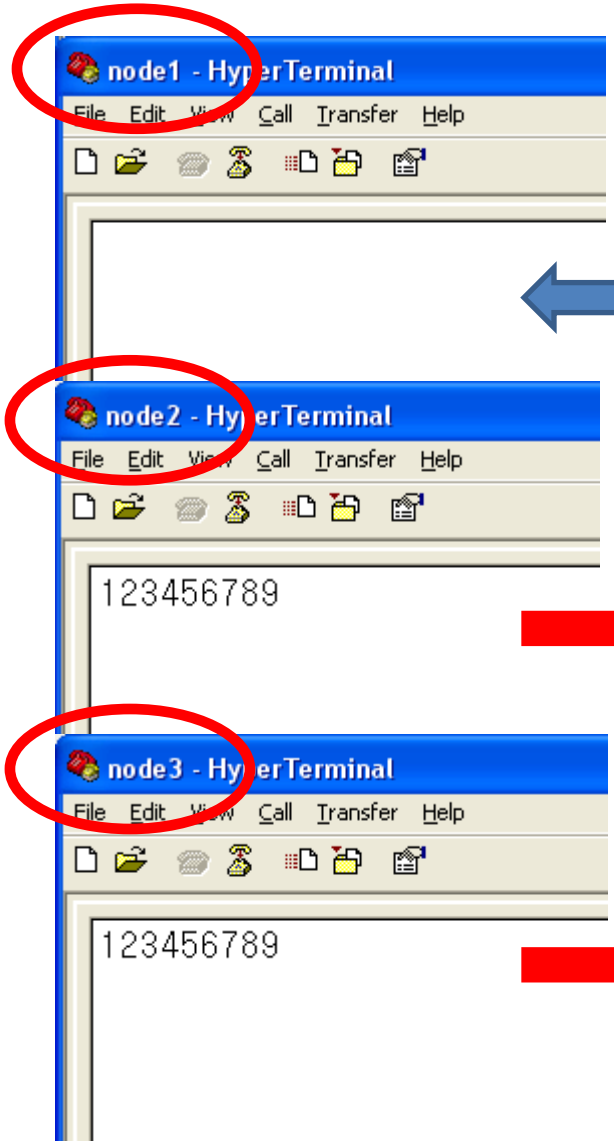
- If the FZ760BX is in Operation Mode, the RX LED blinks when a serial data input is made from the FZ760BX.

[3] Transmitting Serial, KEY and GPIO Data



1. Serial Data Communication

(1) Serial Data Transmission from Node 1 => Received by Node 2 and Node 3



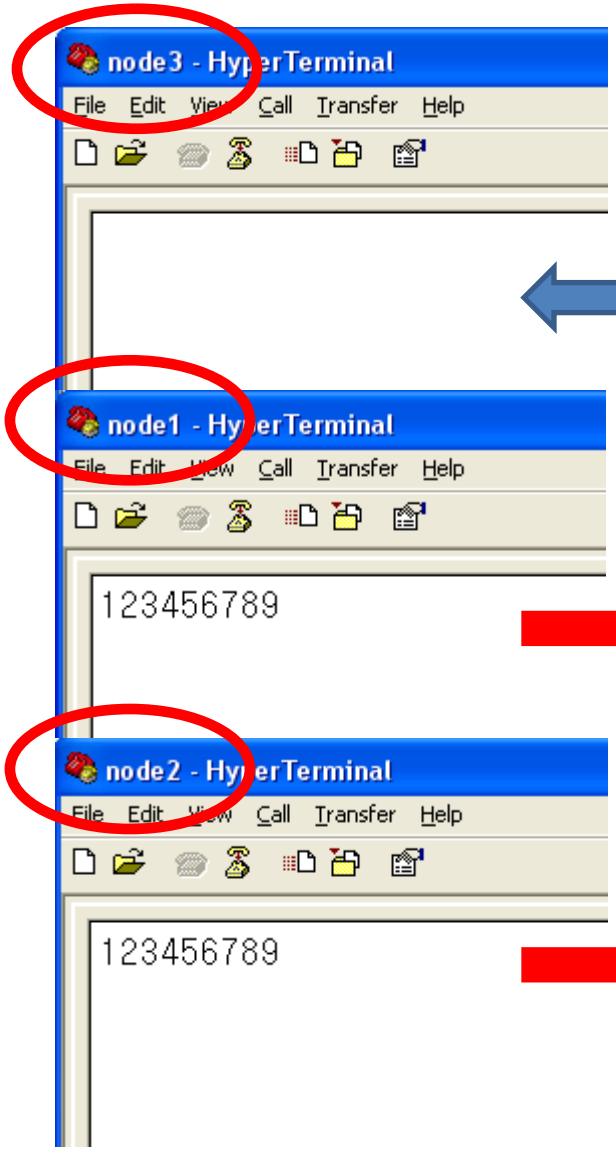
Enter as follows on the hyper terminal connected to the FZ760BX set up to Node 1.

- Enter “123456789” on the hyper terminal.
- The input data is not displayed on the hyper terminal.

- The following output is displayed on the hyper terminal connected to FZ760BX set up to Node 2.
- “123456789” is displayed on the screen of the hyper terminal.

- The following output is displayed on the hyper terminal connected to FZ760BX set up to Node 3.
- “123456789” is displayed on the screen of the hyper terminal.

(2) Serial Data Transmission from Node 3 => Received by Node 1 and Node 2



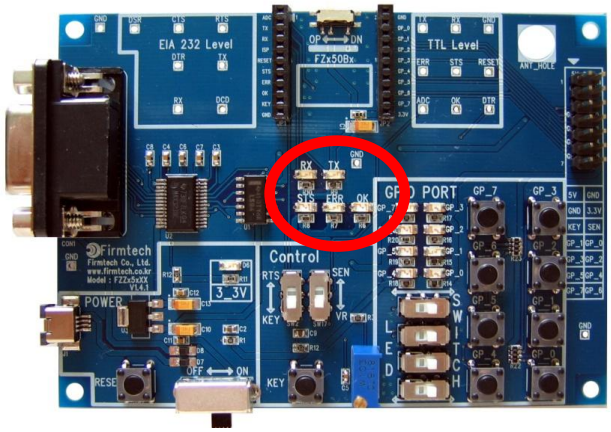
Enter as follows on the hyper terminal connected to the FZ760BX set up to Node 3.

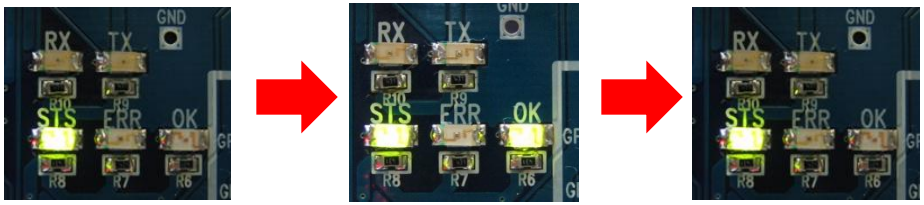
- Enter “123456789” on the hyper terminal.
- The input data is not displayed on the hyper terminal.

- The following output is displayed on the hyper terminal connected to the FZ760BX set up to Node 1.
- “123456789” is displayed on the screen of the hyper terminal.

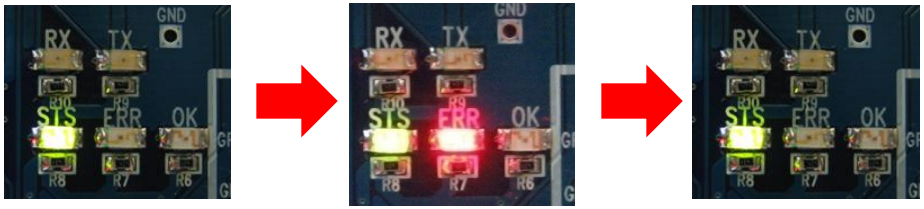
- The following output is displayed on the hyper terminal connected to the FZ760BX set up to Node 2.
- “123456789” is displayed on the screen of the hyper terminal.

*** OK/ERR LED Status Related to the ACK Function After Data Transmission**





< ACK received after data transmission >

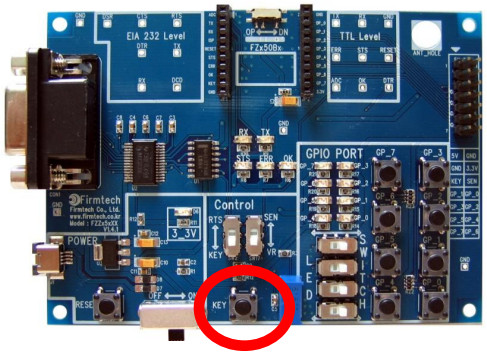


< ACK not received after data transmission >

- OK LED on the FZ760BX blinks once if data reception is made right after data transmission.
- ERR LED on the FZ760BX blinks once if data reception is not made right after data transmission.

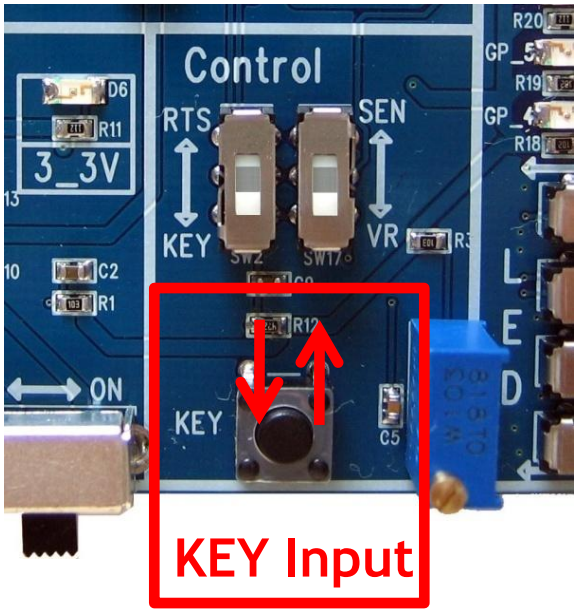
2. KEY Data Transmission

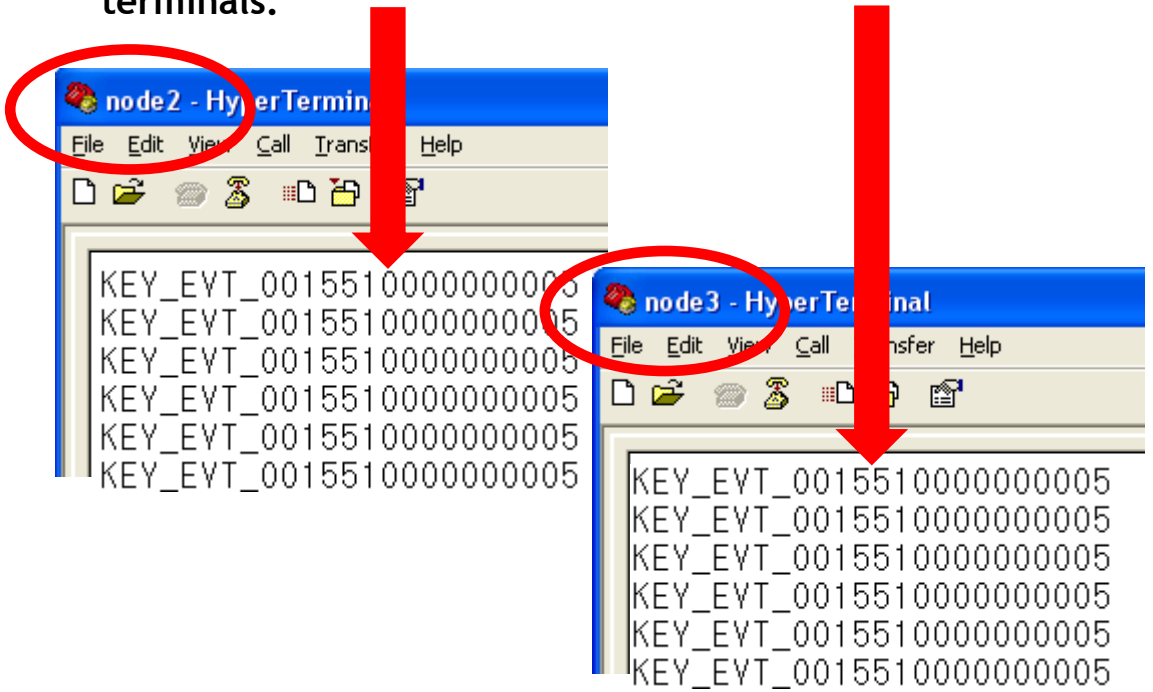
(1) KEY Data Transmission from Node 1 => Received by Node 2 and Node 3



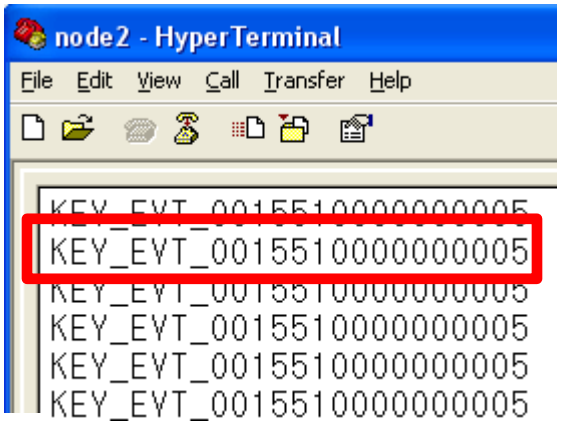
- Press KEY connected to the FZ760BX set up to Node1.

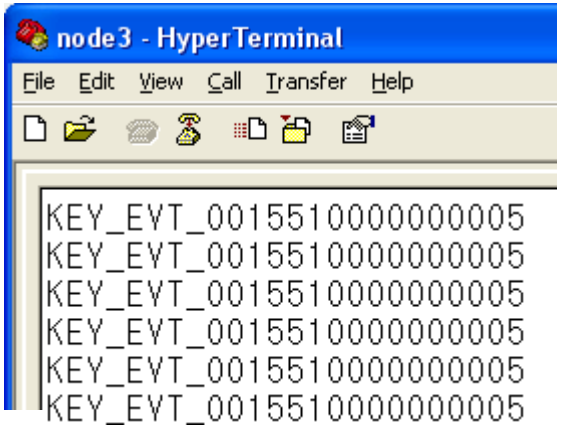
- The following is displayed on the hyper terminals connected to the FZ760BX set up to Node 2 and Node 3.
- “KEY_EVT_00155100000000005” is displayed on the hyper terminals.





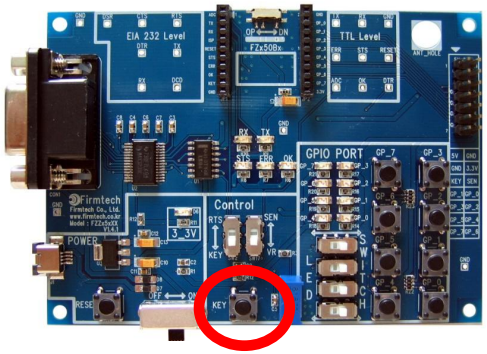
(2) Receiving Data Type on Node 2 and Node 3



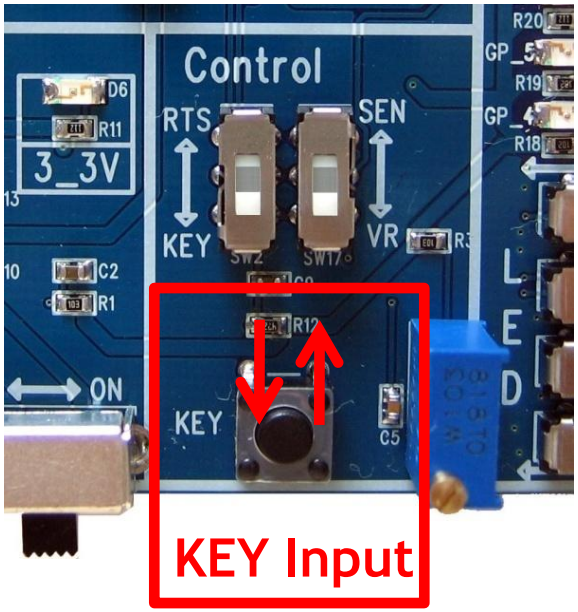


- **"KEY_EVT" means the received data is KEY data.**
- **"0015510000000005" shows the transmitting device.**
- **In other words, this means that the FZ760BX set up to Node 2 and Node 3 received the "KEY" data from a device with IEEE ADDRESS of "0015510000000005."**

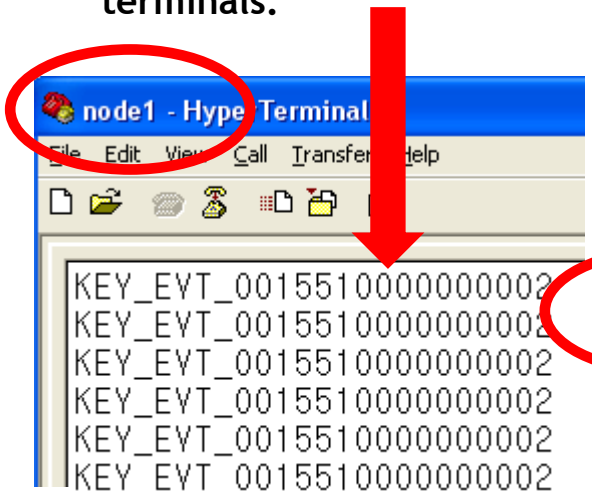
(3) KEY Data Transmission from Node 3 => Received by Node 1 and Node 2

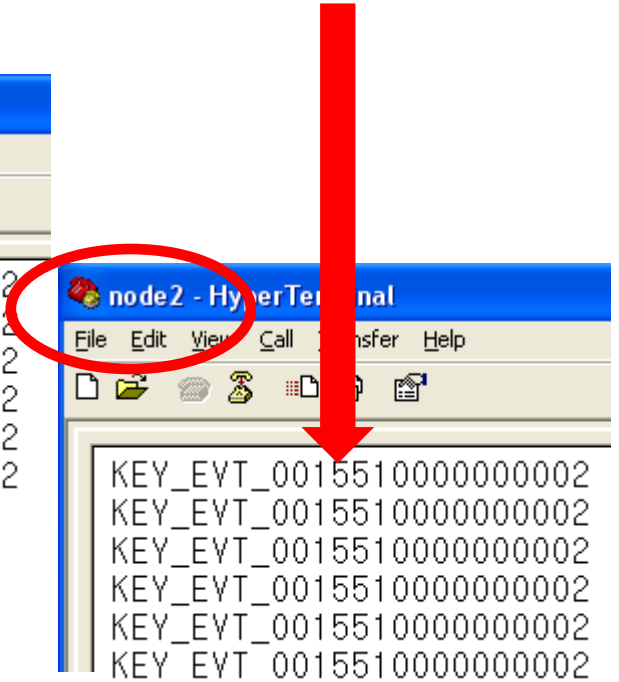


- Press KEY connected to the FZ760BX set up to Node3.

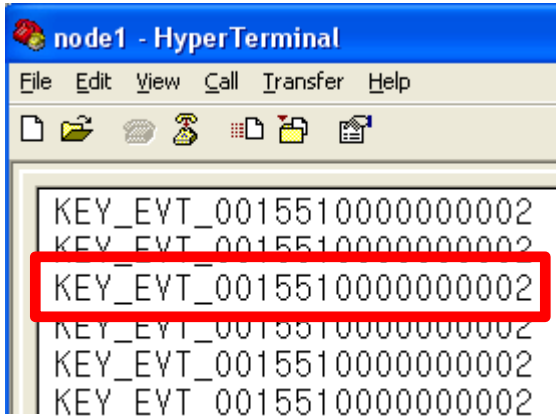


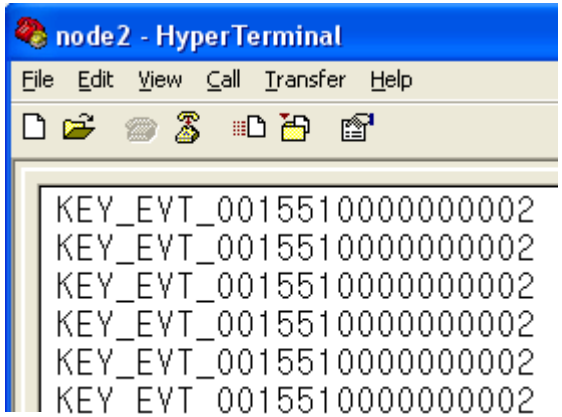
- The following is displayed on the hyper terminals connected to the FZ760BX set up to Node 1 and Node 2.
- "KEY_EVT_00155100000000002" is displayed on the hyper terminals.





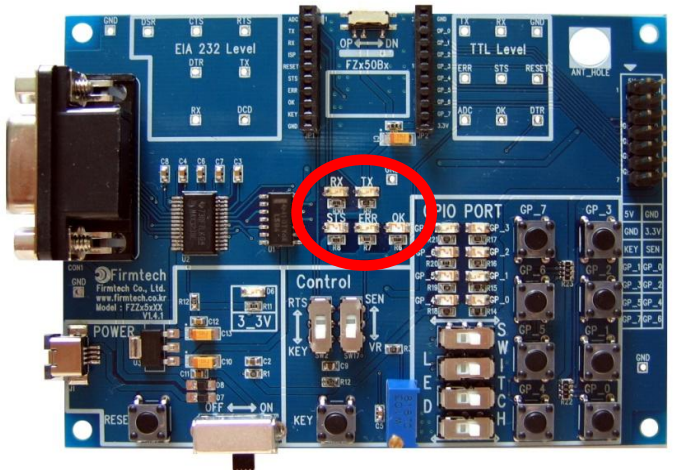
(4) Receiving Data Type on Node 1 and Node 2

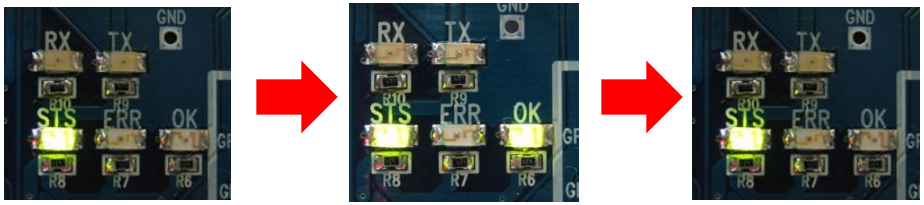




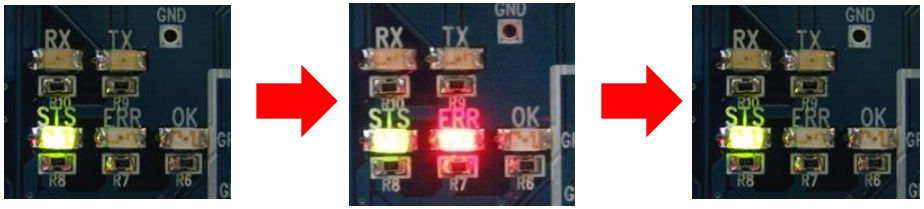
- **"KEY_EVT" means the received data is KEY data.**
- **"0015510000000002" shows the transmitting device.**
- **In other words, this means that the FZ760BX set up to Node 1 and Node 2 received the "KEY" data from a device with IEEE ADDRESS of "0015510000000002."**

* OK/ERR LED Status Related to the ACK Function After Data Transmission





< ACK received after data transmission >

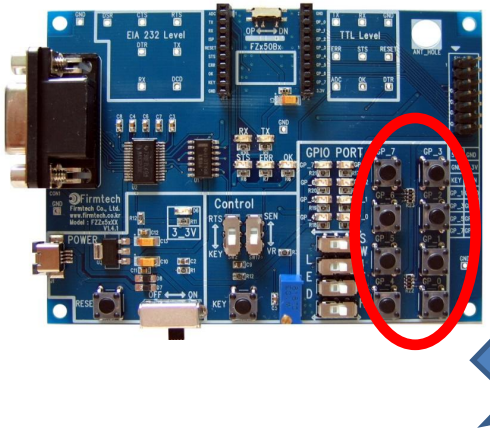


< ACK not received after data transmission >

- OK LED on the FZ760BX blinks once if data reception is made right after data transmission.
- ERR LED on the FZ760BX blinks once if data reception is not made right after data transmission.

3. GPIO Data Transmission

(1) GPIO Data Transmission from Node 1 => Received by Node 2 and Node 3



- Press the GPIO connected to the FZ760BX set up to Node 1.

Input of GPIO data is made as follows.

Press GP_0: 1111 1110 (= FE)

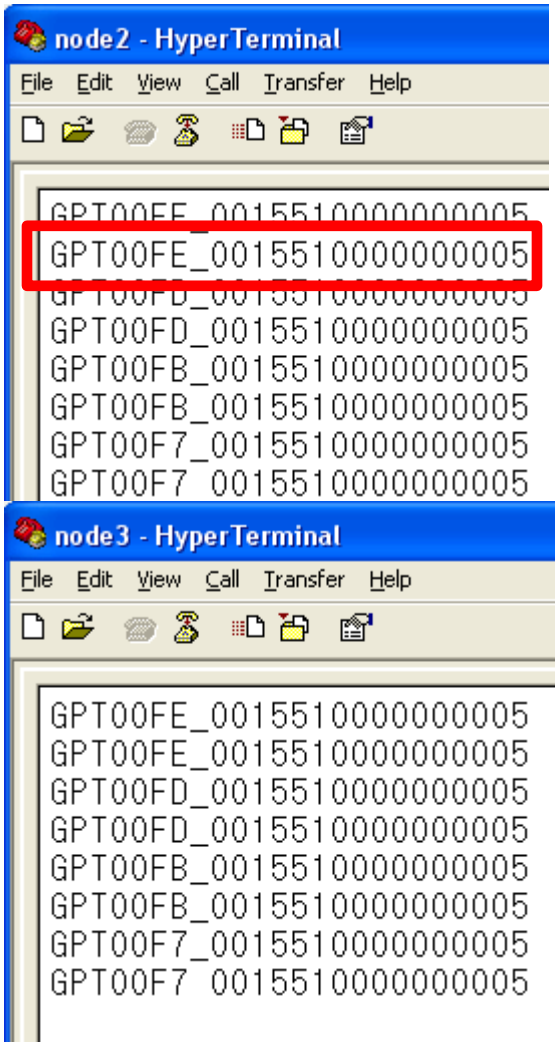
Press GP_1: 1111 1101 (= FD)

Press GP_2: 1111 1011 (= FB)

Press GP_3: 1111 0111 (= F7)

GPIO switches usable for input are GP_0 / GP_1 / GP_2 / GP_3.

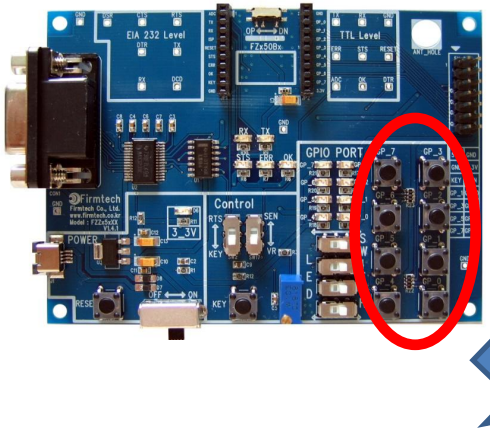
(2) Receiving Data Type on Node 2 and Node 3



- "GPT" means the received data is GPIO data.
- "00FE", "00FD", "00FB", "00F7" are the GPIO data values.
- "0015510000000005" shows the transmitting device.

- In other words, this means that the FZ760BX set up to Node 2 and Node 3 received the "GPIO" data from a device with IEEE ADDRESS of "0015510000000005."

(3) GPIO Data Transmission from Node 3 => Received by Node 1 and Node 2



- Press the GPIO connected to the FZ760BX set up to Node 3.

Input of GPIO data is made as follows.

Press GP_0: 1111 1110 (= FE)

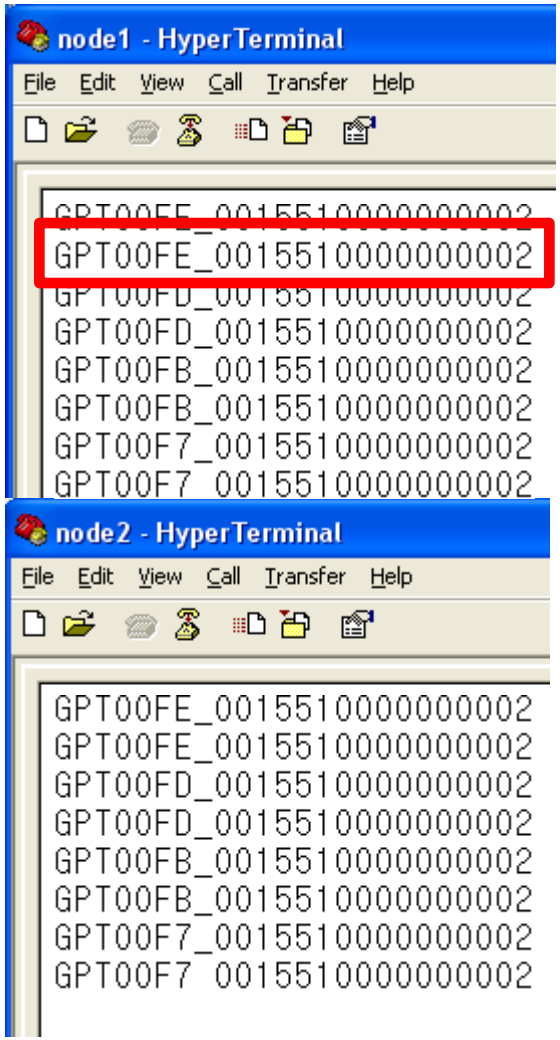
Press GP_1: 1111 1101 (= FD)

Press GP_2: 1111 1011 (= FB)

Press GP_3: 1111 0111 (= F7)

GPIO switches usable for input are GP_0 / GP_1 / GP_2 / GP_3.

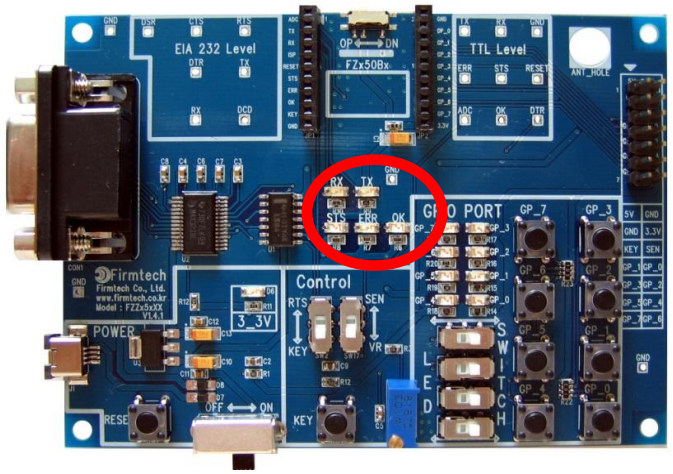
(4) Receiving Data Type on Node 1 and Node 2

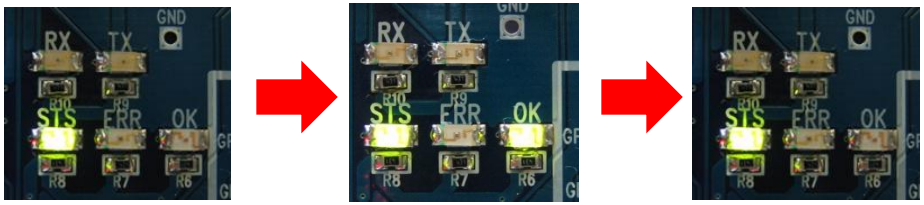


- **"GPT" means the received data is GPIO data.**
- **"00FE", "00FD", "00FB", "00F7" are the GPIO data values.**
- **"0015510000000002" shows the transmitting device.**

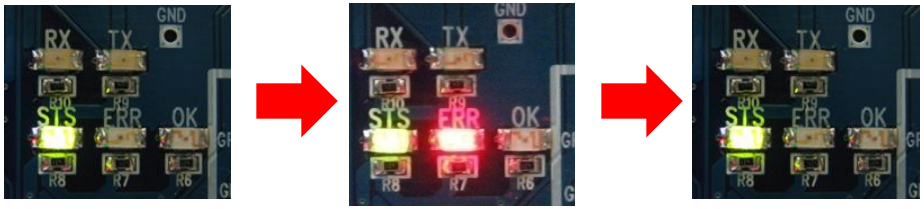
- **In other words, this means that the FZ760BX set up to Node 1 and Node 2 received the "GPIO" data from a device with IEEE ADDRESS of "0015510000000002."**

* OK/ERR LED Status Related to the ACK Function After Data Transmission





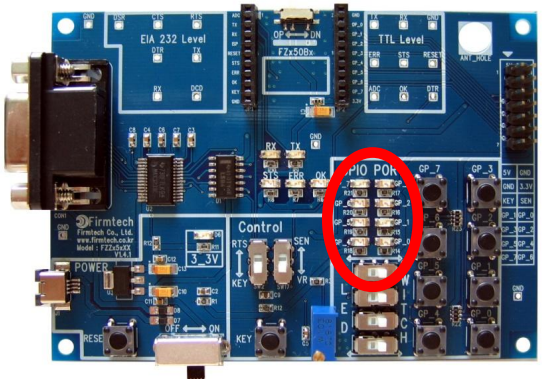
< ACK received after data transmission >



< ACK not received after data transmission >

- OK LED on the FZ760BX blinks once if data reception is made right after data transmission.
- ERR LED on the FZ760BX blinks once if data reception is not made right after data transmission.

* GPIO LE ıtus after GPIO Data Reception `



GP_4 is ON when the received data value is GPT00FE.

GP_5 is ON when the received data value is GPT00FD.

GP_6 is ON when the received data value is GPT00FB.

GP_7 is ON when the received data value is GPT00F7.

The FZ760BX operates the GPIO LEDs according to the received GPIO data values.

GP_4, GP_5, GP_6, GP_7 are used for data output.

When there is no more incoming GPIO data, the GPIO LEDs will be OFF after a short while.

[4] Setup of the FZ760BX for ADC Data Transmission

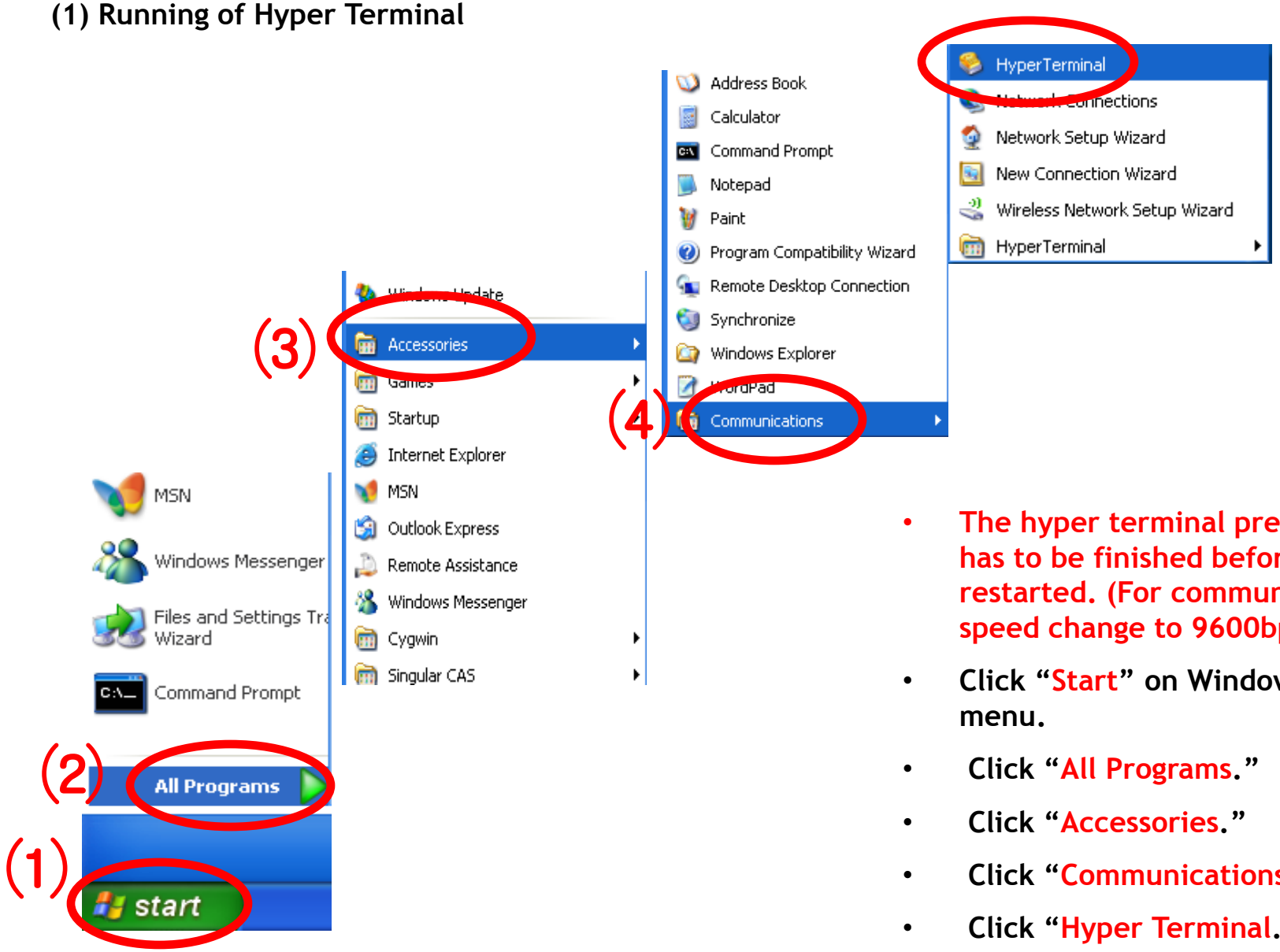
Changing/checking the internal setting values of the FZ760BX using a hyper terminal.
(Communication speed is fixed at 9600bps.)

1. AT Command Mode and Operation Mode

- The FZ760BX offers Operation Mode for data transmission and AT Command Mode for device settings.
- When power is supplied to the FZ760BX with no manipulation, the device is operated in Operation Mode that allows data communication.
- To set up internal values of the device, it has to be operated in the AT Command Mode.
- When the FZ760BX is operated in the AT Command Mode, data input to the device is recognized as AT Commands for operation.
- In the AT Command Mode, the UART communication speed is fixed at 9600bps.
- To enter the AT Command Mode, the user has to make a specific manipulation of the device before the power is turned on to the FZ760BX.

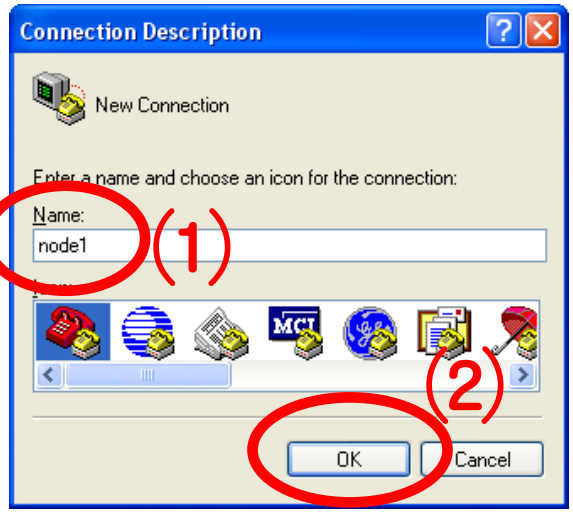
2. Running and Setup of Serial Communication Program (Hyper Terminal)

(1) Running of Hyper Terminal



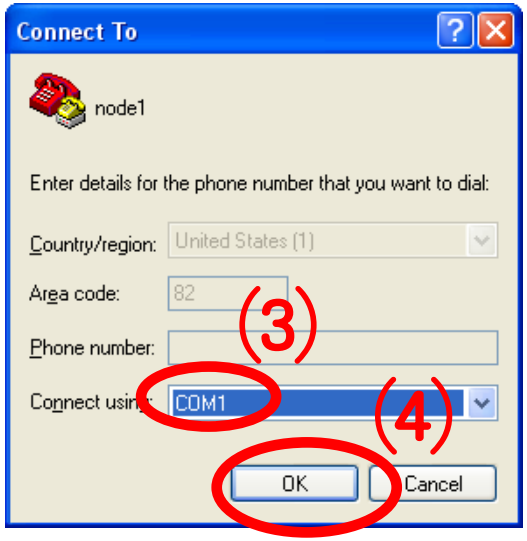
- The hyper terminal previously run has to be finished before it is restarted. (For communication speed change to 9600bps)
- Click “Start” on Windows Start menu.
- Click “All Programs.”
- Click “Accessories.”
- Click “Communications.”
- Click “Hyper Terminal.”

(2) Setup of Hyper Terminal – Name Setting



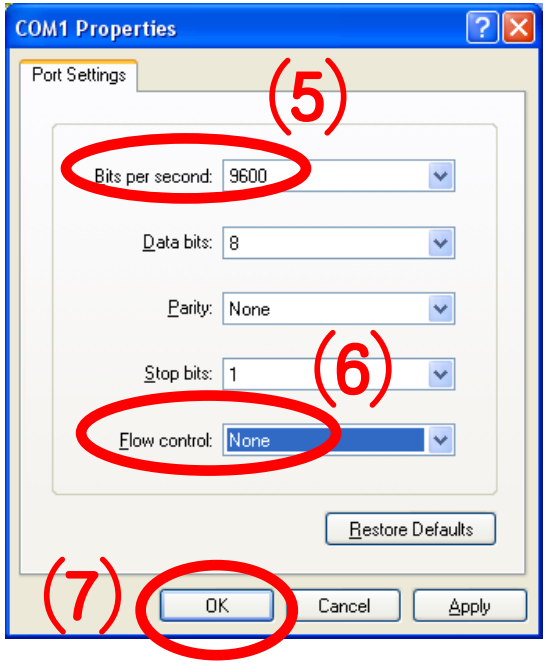
- Set up the hyper terminal connected to the FZ760BX to be set up to Node 1.
- Enter “Node1” as a name.
- Click “OK” and proceed to the next step.

(3) Setup of Hyper Terminal – Port Setting



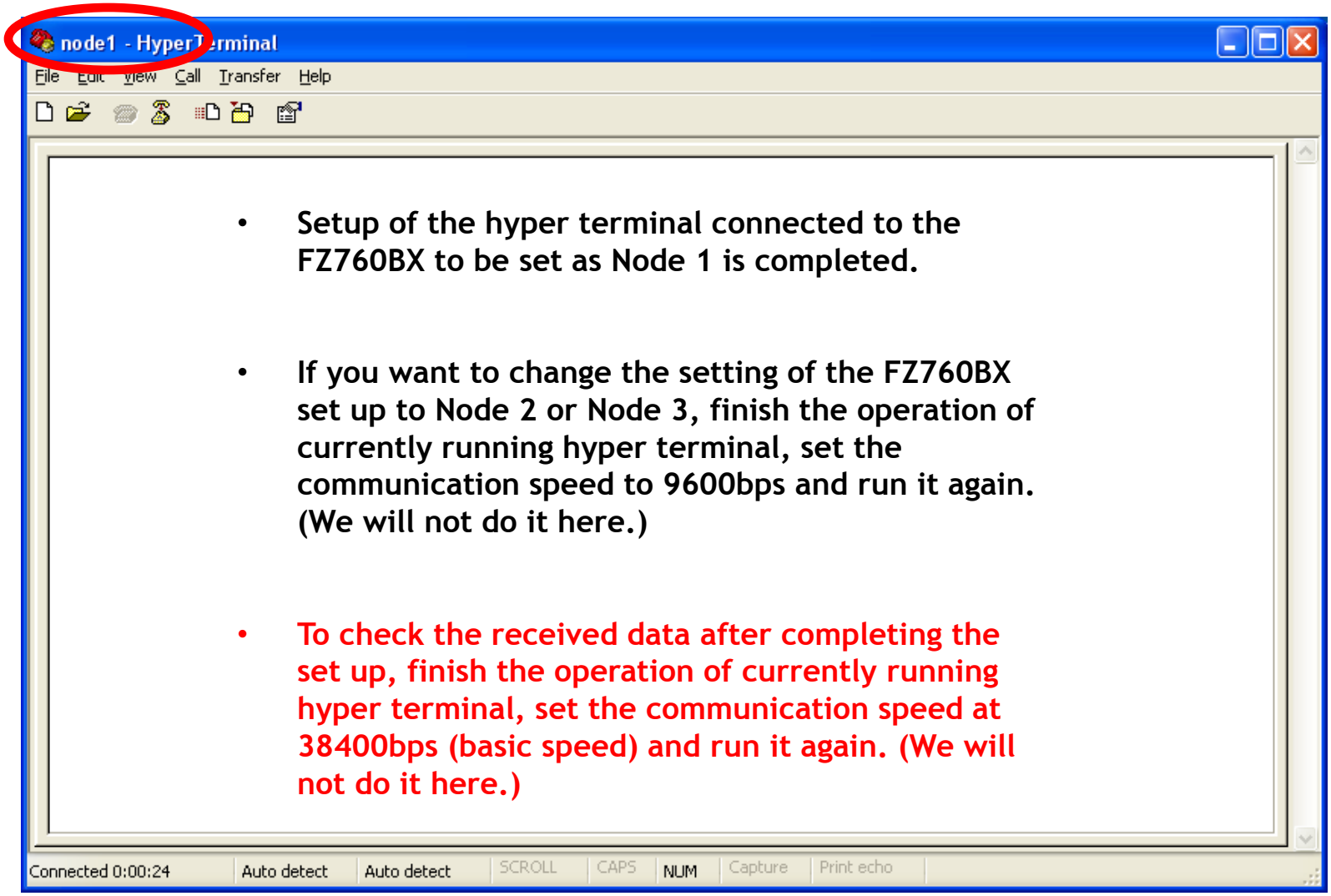
- Select a port to be connected to the FZ760BX set up to Node 1.
- Click “OK” and proceed to the next step.

(4) Setup of Hyper Terminal – Communication Speed, etc.



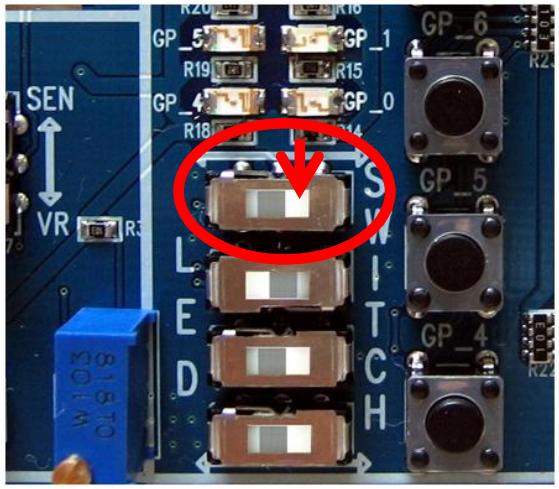
- Select “9600” for “Bits per Second”.
- Select “None” for “Flow Control”.
- No change for other items.
- Click “OK”.

(5) Setup of Hyper Terminal - Finish



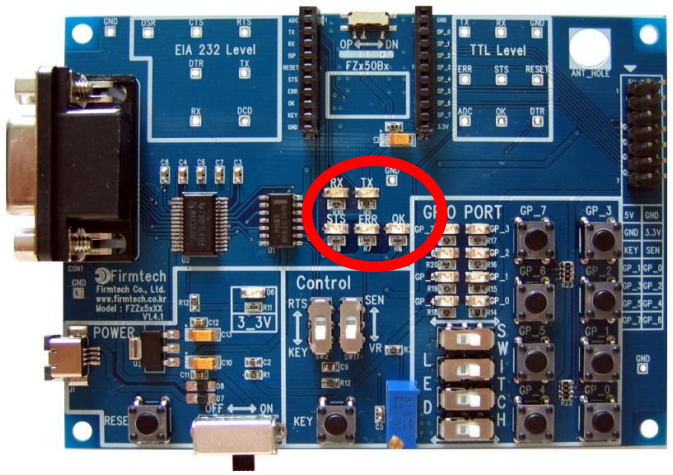
3. How To Enter the AT Command Mode?

(1) Checking Items of the Interface Board



- GPIO 0/1/2/3 Ports on the FZ760BX are preset as data input ports. (Operation Mode)
- GPIO 4/5/6/7 Ports on the FZ760BX are preset as data output ports. (Operation Mode)
- To enter the AT Commands, use the GPIO 7 Port that is preset as a data output port.
- Change the position of the selection switches of GPIO 6/7 on the Interface Board to “Switch” when power is off.
- While pressing the GPIO 7 Switch on the Interface Board, turn on the power of the Interface Board.
- When “OK” is displayed on the hyper terminal with a UART communication speed of 9600bps, it means it has entered the AT Command Mode.

* STS/ERR/OK LED Status in the AT Command Mode



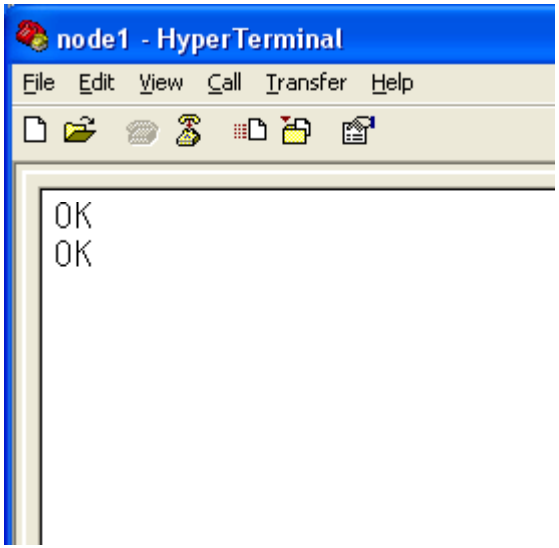
STS LED is OFF and ERR/OK LEDs are ON in the AT Command Mode.

STS LED blinks and ERR/OK LEDs are OFF in the Operation Mode.

- **STS LED is OFF when the FZ760BX is operated in the AT Command Mode.**
- **ERR/OK LEDs are ON when the FZ760BX is operated in the AT Command Mode.**

4. Setup for ADC Data Trasmission

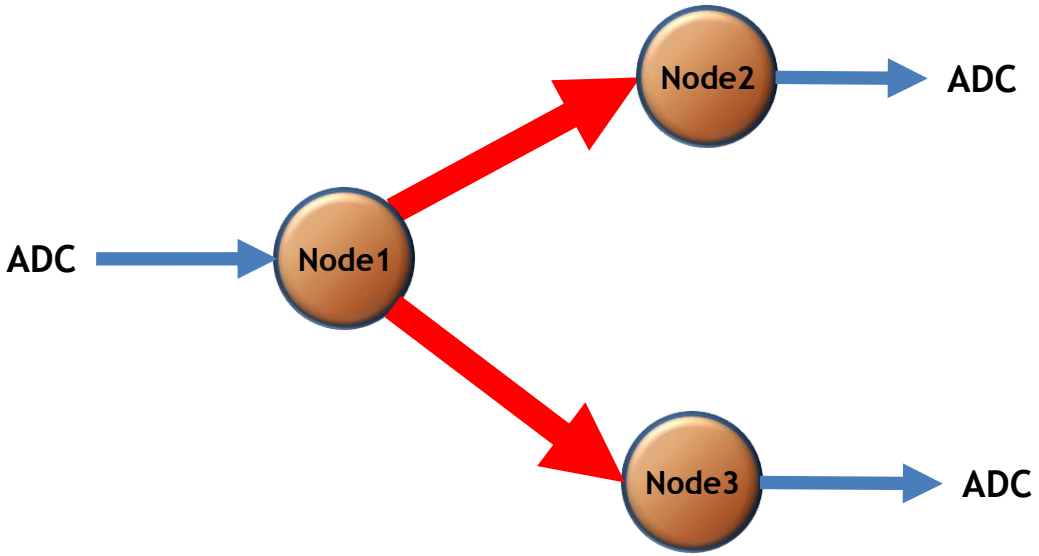
(1) Setup Process Using the AT Command



Enter the following on the hyper terminal connected to the FZ760BX set up to Node 1.

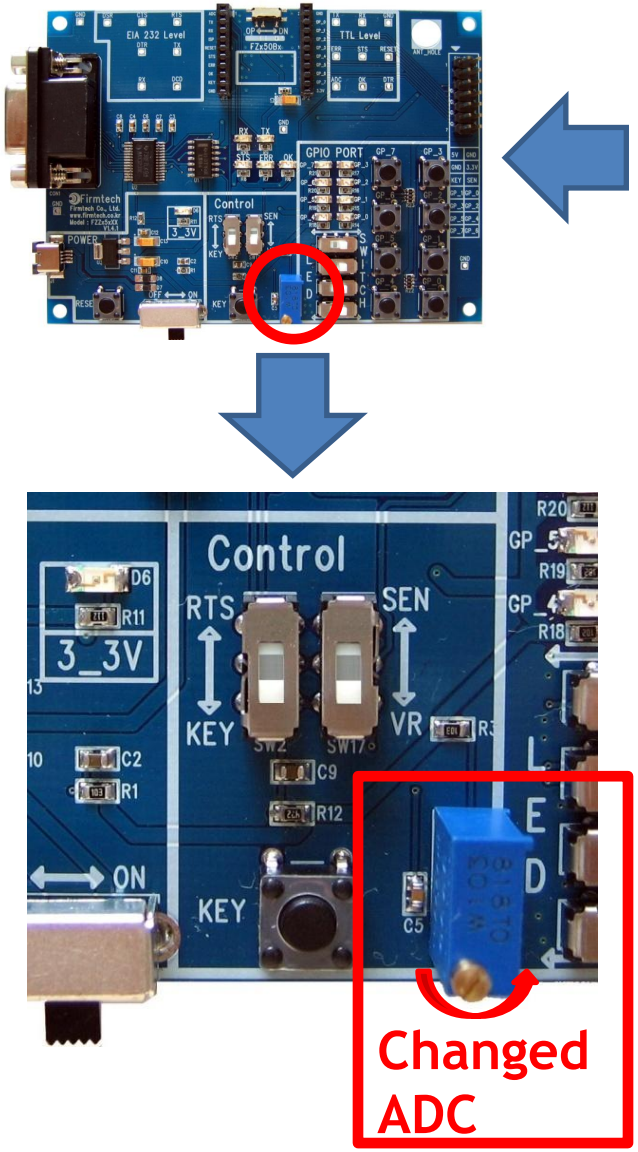
- After entering “AT+SETADC1” on the hyper terminal, press enter.
- “OK” output is made from the FZ760BX.
- After entering “AT+SETTMR10” on the hyper terminal, press enter.
- “OK” output is made from the FZ760BX.
- Turn OFF the power of the FZ760BX.
- It is preset to be able to send ADC data once in every ten seconds.

[5] Transmitting ADC Data

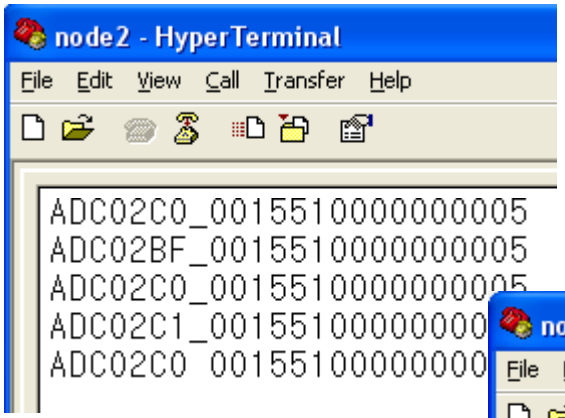


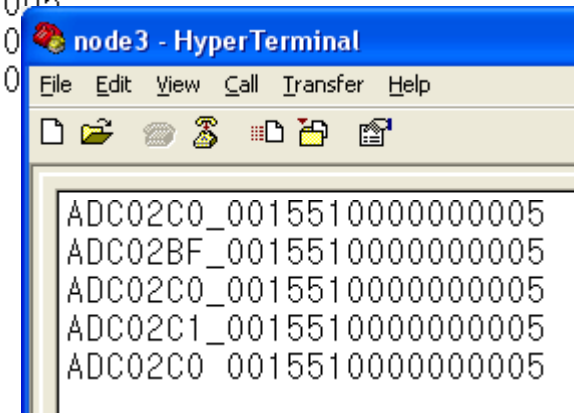
1. ADC Data Transmission

(1) ADC Data Transmission from Node 1 => Received by Node 2 and Node 3

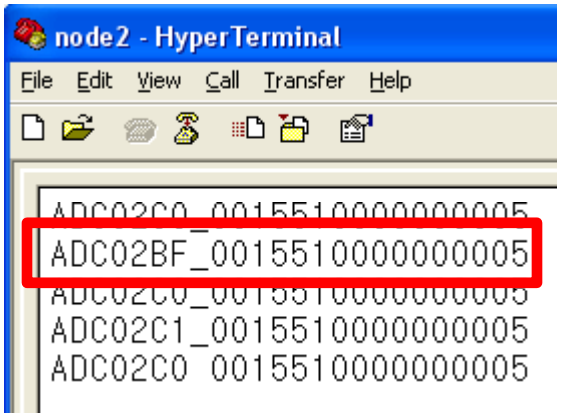


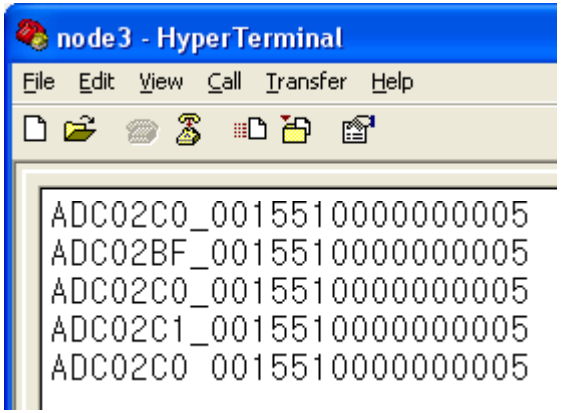
- Turn ON the power of the FZ760BX set as Node 1.
- When you change the resistance in the variable resister that is connected to the FZ760BX set up to Node 1, the ADC Value is changed and displayed on the hyper terminals connected to the FZ760BX set up to Node 2 and Node 3.
- The ADC data is displayed once in every ten seconds.





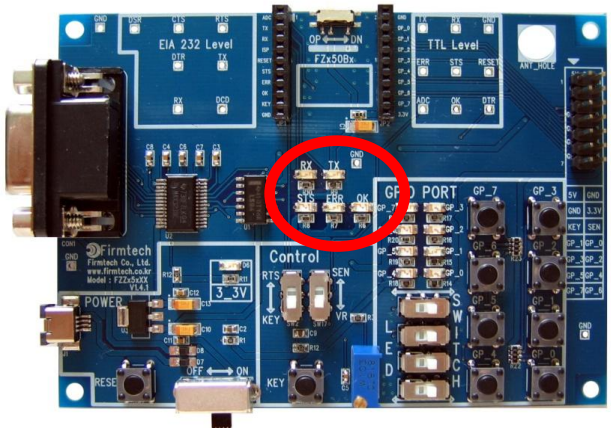
(2) Receiving Data Type on Node 2 and Node 3

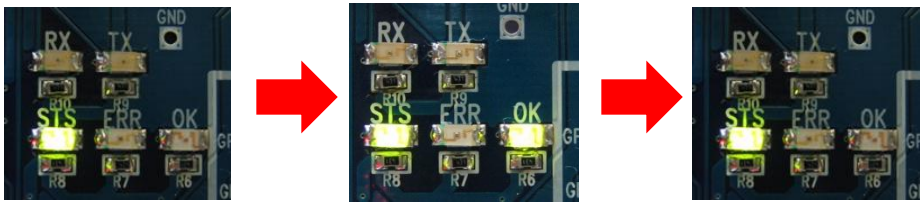




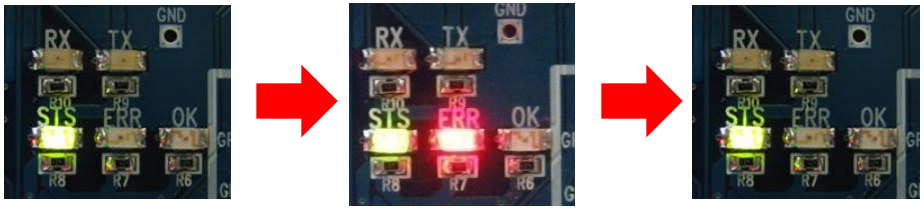
- "ADC" means the received data is ADC data.
- "02C0", "02BF"shows the ADC data values.
- "0015510000000005" shows the transmitting device.
- In other words, this means that the FZ760BX set up to Node 2 and Node 3 received the "ADC" data from a device with IEEE ADDRESS of "0015510000000005."
- The display range of the ADC data is 0000(min.) ~ 03FF(max.).

* OK/ERR LED Status Related to the ACK Function After Data Transmission





< ACK received after data transmission >



< ACK not received after data transmission >

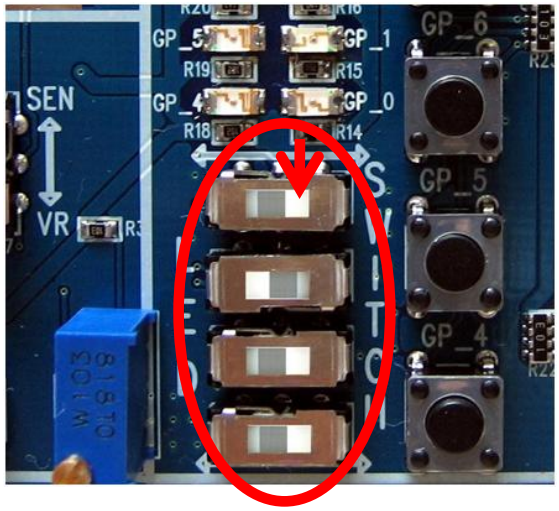
- OK LED on the FZ760BX blinks once if data reception is made right after data transmission.
- ERR LED on the FZ760BX blinks once if data reception is not made right after data transmission.

[6] Setup of The FZ760BX for COUNT Data Transmission

Changing/checking the internal setting values of the FZ760BX using a hyper terminal.
(Communication speed is fixed at 9600bps.)

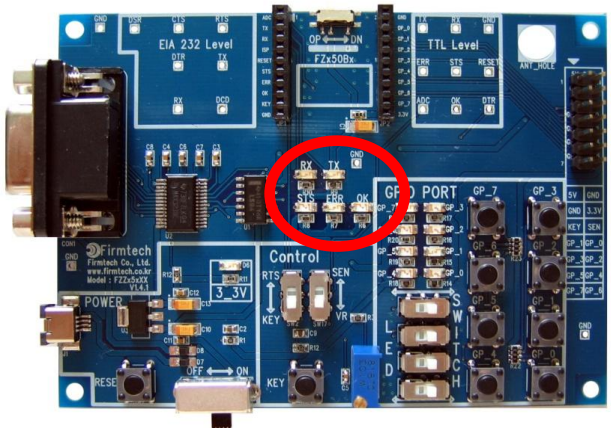
1. Entering the AT Command Mode

(1) Checking Items of the Interface Board



- Turn on the power of the FZ760BX set as Node 1.
- Change the position of the selection switches of GPIO 6/7 on the Interface Board to “Switch” when power is off. (If it is changed previously, skip this step.)
- While pressing the GPIO 7 Switch on the Interface Board, turn on the power of the Interface Board.
- When “OK” is displayed on the hyper terminal with a UART communication speed of 9600bps, it means it has entered the AT Command Mode. (If the communication speed has been changed to 9600bps, use the hyper terminal as it is.)

* STS/ERR/OK LED Status in the AT Command Mode



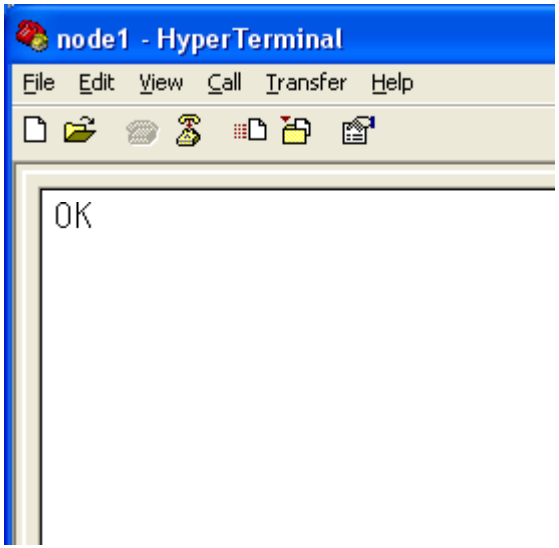
STS LED is OFF and ERR/OK LEDs are ON in the AT Command Mode.

STS LED blinks and ERR/OK LEDs are OFF in the Operation Mode.

- STS LED is OFF when FZ760BX is operated in the AT Command Mode.
- ERR/OK LEDs are ON when FZ760BX is operated in the AT Command Mode.

2. Setup for COUNT Data Communication

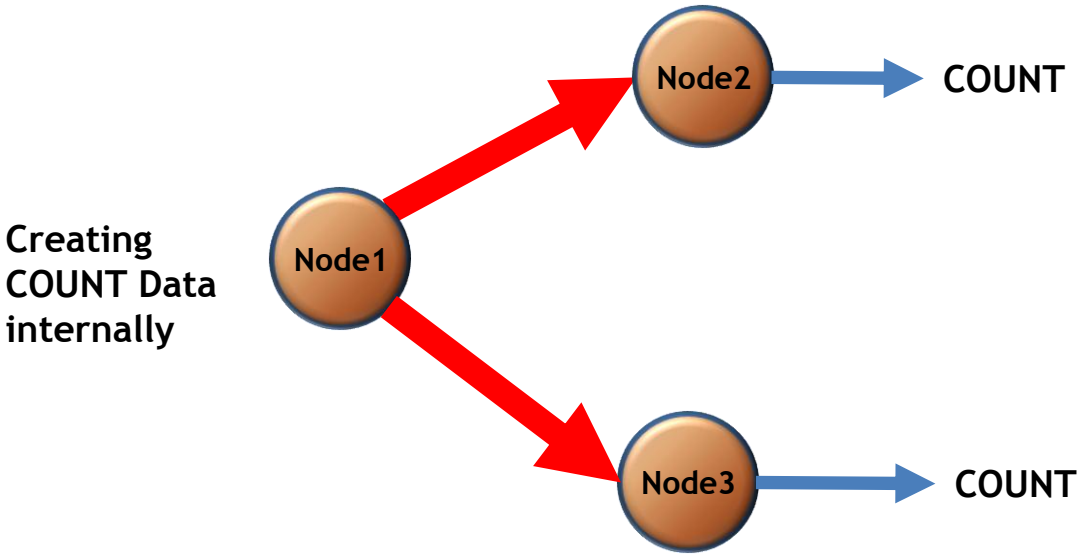
(1) Setup Process Using the AT Command



Enter the following on the hyper terminal connected to FZ760BX set up to Node 1.

- After entering “AT+SETCOUNT1” on the hyper terminal, press enter.
- “OK” is shown on the FZ760BX.
- Turn OFF the power of the FZ760BX.
- COUNT data can be transmitted when ADC data can be transmitted.
- The FZ760BX set up to Node 1 is set up to be able to transmit the ADC data in the previous test.
- If it is not in the state of transmitting ADC data, do the setup again by using the commands used for the “Setup for ADC Data Transmission.

[7] Transmitting COUNT Data

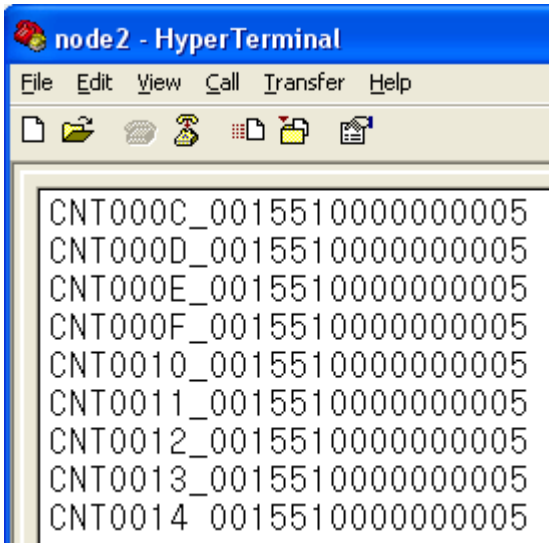


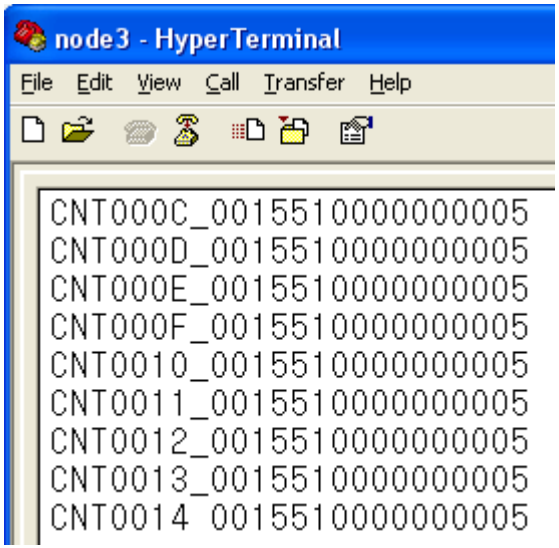
1. Transmitting COUNT Data

(1) COUNT Data Transmission from Node 1 => Received by Node 2 and Node 3

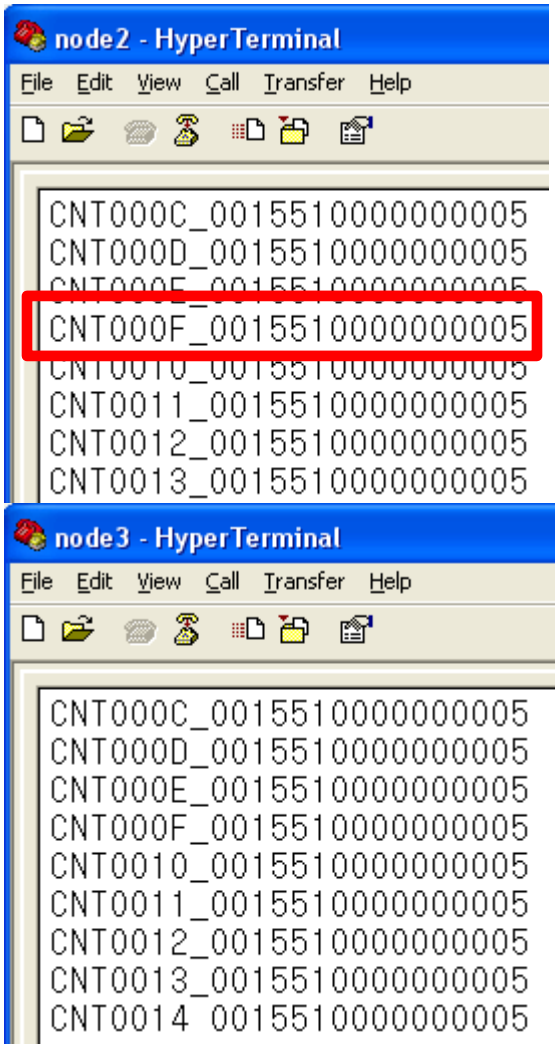
- Turn ON the power of the FZ760BX set as Node 1.

- The FZ760BX set up to Node 1 creates the COUNT data internally and automatically transmits it.
- The COUNT data values are displayed on the hyper terminals connected to the FZ760BX set up to Node 2 and Node 3.
- COUNT data is displayed once in every ten seconds.





(2) Receiving Data Type on Node 2 and Node 3

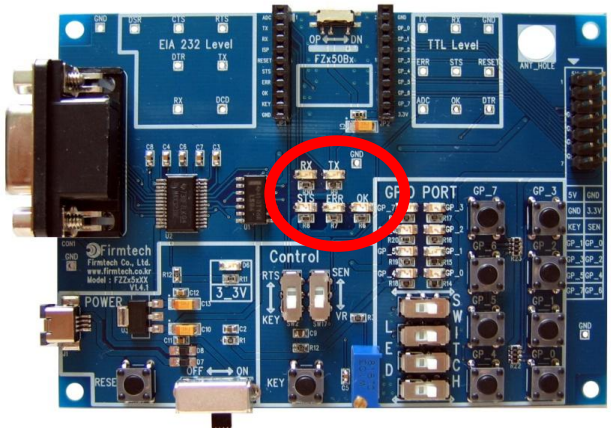


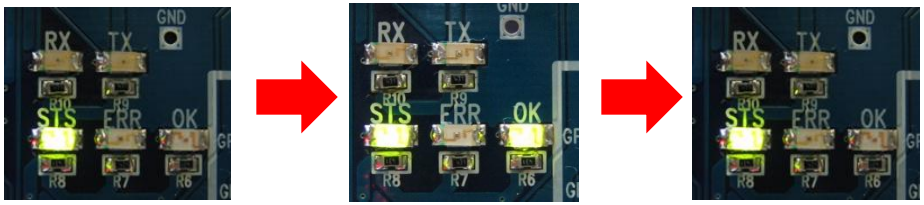
- "CNT" means the received data is COUNT data.
- "000F", "0010" shows the COUNT data values.
- "0015510000000005" shows the transmitting device.

- In other words, this means that the FZ760BX set up to Node 2 and Node 3 received "COUNT" data from a device with IEEE ADDRESS of "0015510000000005."

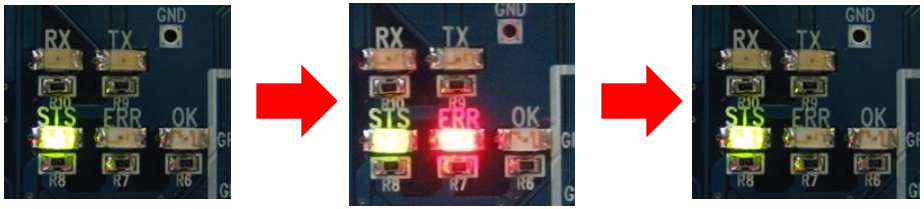
- The display range of the COUNT data is 0000(min.) ~ 03FF(max.).

*** OK/ERR LED Status Related to the ACK Function After Data Transmission**





< ACK received after data transmission >



< ACK not received after data transmission >

- OK LED on the FZ760BX blinks once if data reception is made right after data transmission.
- ERR LED on the FZ760BX blinks once if data reception is not made right after data transmission.

For even more details, please refer to FZ760BX User manual.