Quick Start Guide

RX65N Group

Cloud Kit for RX65N Microcontroller Group
CK-RX65N
Quick Start Guide

Renesas RX Family
RX600 Series

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General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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Precautions

This Cloud Kit is only intended for use in a laboratory environment under ambient temperature and humidity conditions. A safe separation distance should be used between this and any sensitive equipment. Its use outside the laboratory, classroom, study area, or similar such area invalidates conformity with the protection requirements of the Electromagnetic Compatibility Directive and could lead to prosecution.

The product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures:

• Ensure attached cables do not lie across the equipment.

• Reorient the receiving antenna.

• Increase the distance between the equipment and the receiver.

• Connect the equipment into an outlet on a circuit different from that which the receiver is connected.

• Power down the equipment when not in use.

• Consult the dealer or an experienced radio/TV technician for help.

Note: It is recommended that wherever possible shielded interface cables are used.

The product is potentially susceptible to certain EMC phenomena. To mitigate against them it is recommended that the following measures be undertaken:

• The user is advised that mobile phones should not be used within 10 m of the product when in use.

• The user is advised to take ESD precautions when handling the equipment.

The Cloud Kit does not represent an ideal reference design for an end product and does not fulfill the regulatory standards for an end product.

Renesas RX Family

CK-RX65N

Contents

Figures

1. Introduction

This Quick Start Guide (QSG) provides:

- An overview of the Quick Start example project that the CK-RX65N board comes pre-programmed with.
- Instructions for running the Quick Start example project.
- Instructions for importing, modifying, and building the Quick Start example project using Flexible Integration Technology (FIT) and e^2 studio Integrated Development Environment (IDE).

1.1 Assumptions and Advisory Notes

1. Tool experience: It is assumed that the user has prior experience working with IDEs such as e2 studio and terminal emulation programs such as Tera Term.
2. Subject knowledge: It is assumed that the user has basic knowledge about microcontrollers, embedded systems, and FIT to modify the example project described in this document.
3. Prior to running the Quick Start example project or programming the CK-RX65N board, default jumper settings must be used. Refer to the CK-RX65N user's manual for the default jumper settings.
4. The screen shots provided throughout this document are for reference. The actual screen content may differ depending on the version of software and development tools used.

2. Kit Contents

The following components are included in the kit:

1. CK-RX65N v1 board
2. RYZ014A PMOD (CAT-M1 Cellular Kit)
3. SIM card (CAT-M1 Cellular Kit)
4. USB Micro B to USB A adapter cable
5. USB Micro B to USB A cable x2
6. Antenna (CAT-M1 Cellular Kit)

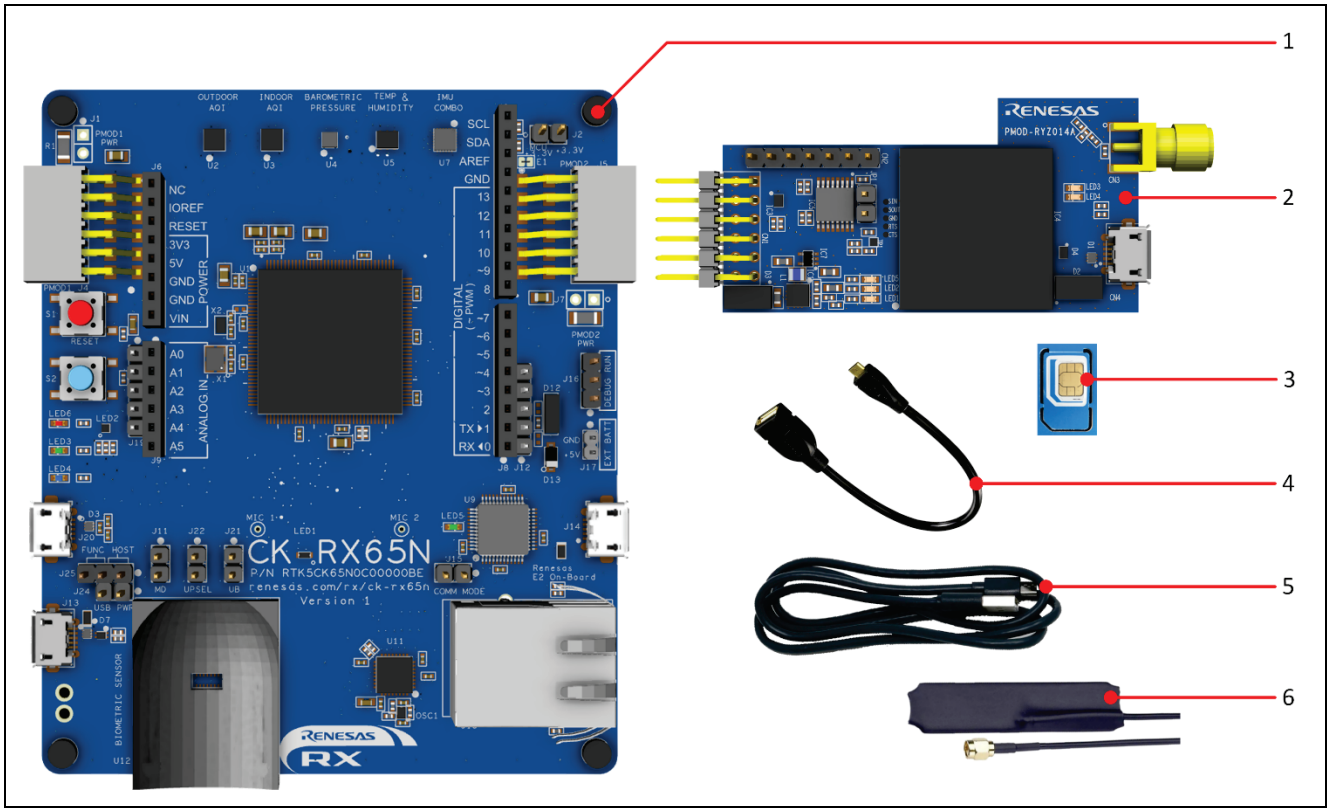

Figure 1. CK-RX65N Kit Contents

3. Overview of the Quick Start Example Project

The Quick Start example project allows the user to change the frequency of the on-board user LED3 (blue) using the user button (S2). The supported frequencies are 1 Hz, 5 Hz, and 10 Hz.

When the CK-RX65N board running the Quick Start example project is connected to a host PC via USB as a Full Speed CDC Device, the kit information, MCU die temperature, and user LED blinking frequency are displayed on a terminal console.

3.1 Quick Start Example Project Flow

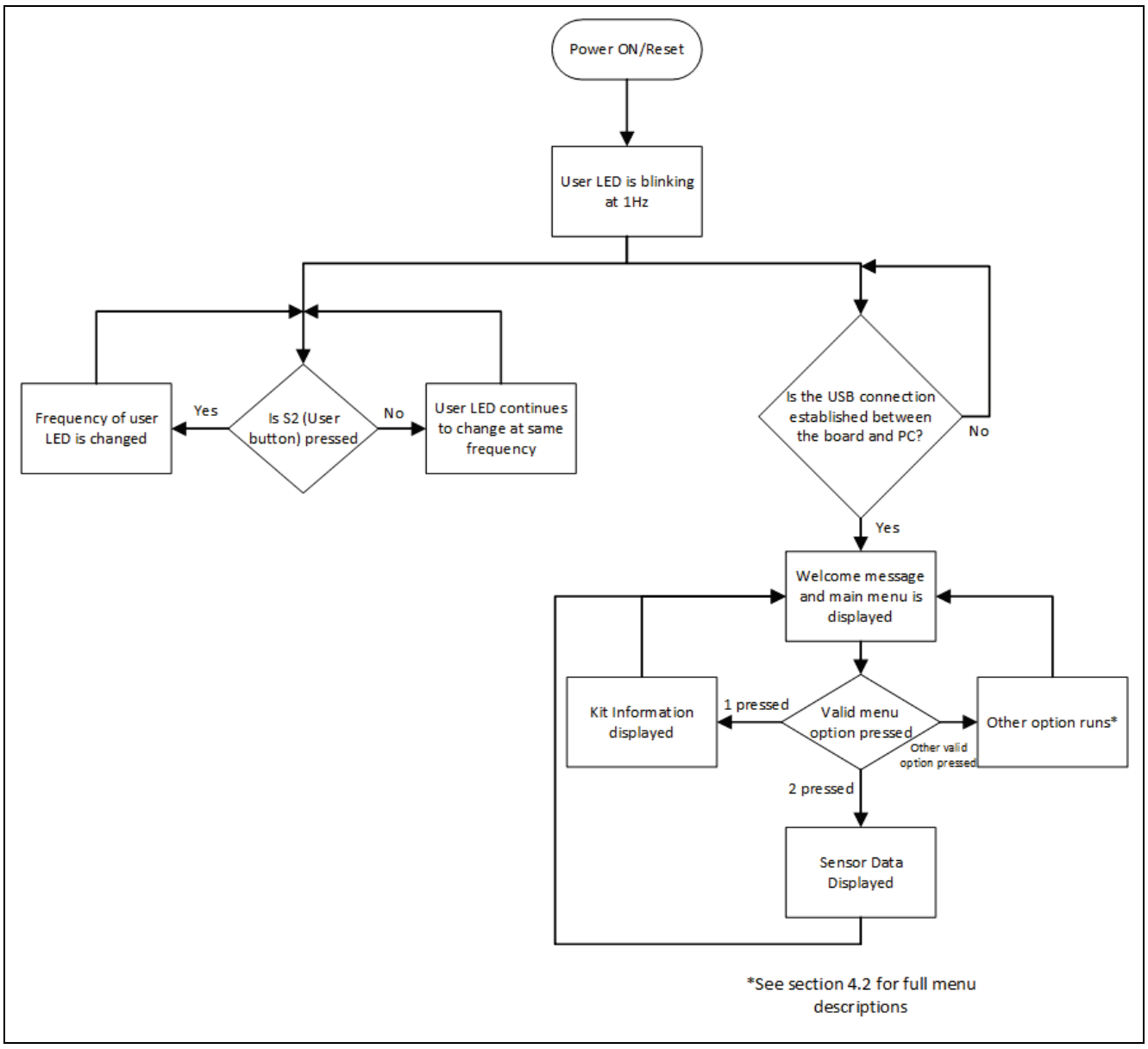

Figure 2. Quick Start Example Project Flow

4. Running the Quick Start Example Project

This section lists the requirements and instructions to power up the CK-RX65N board and run the Quick Start example project.

Hardware Requirements

- CK-RX65N board
- Micro USB device cable x2
- A PC with at least 2 USB ports
- A router with at least 1 available full duplex Ethernet port*
- Ethernet cable

* The PHY implemented on the Cloud Kit does not support half-duplex operation.

Software Requirements

- Windows® 10 operating system
- USB Serial Drivers (included in Windows 10)
- Tera Term (or similar) terminal console application

4.1 Connecting and Powering Up the CK-RX65N Board

1. Check that:
   A. J25 is set to link pins 2-3
   B. J24 link is closed
   C. J16 is set to link pins 2-3 (RUN)
2. Connect J14 and J20 on the CK-RX65N board to USB ports on the host PC using the 2 micro USB cables supplied.
3. Power LED (LED1) on the CK-RX65N board lights up white, indicating that the CK-RX65N board is powered on.

Note: If the CK-RX65N board is not powered through the Debug port (J14) the current available to the board may be limited to 100 mA.
When using the supplied RYZ014A Pmod module with other code (found here: RYZ014A - LTE Cat-M1 Cellular IoT Module | Renesas) be aware that this Pmod has a maximum operating current of 480 mA dependent upon the LTE band, Tx/Rx settings, and network coverage. Please ensure that the host board can supply sufficient power or provide supplemental USB power via CN4 on the Pmod to avoid RF instability.

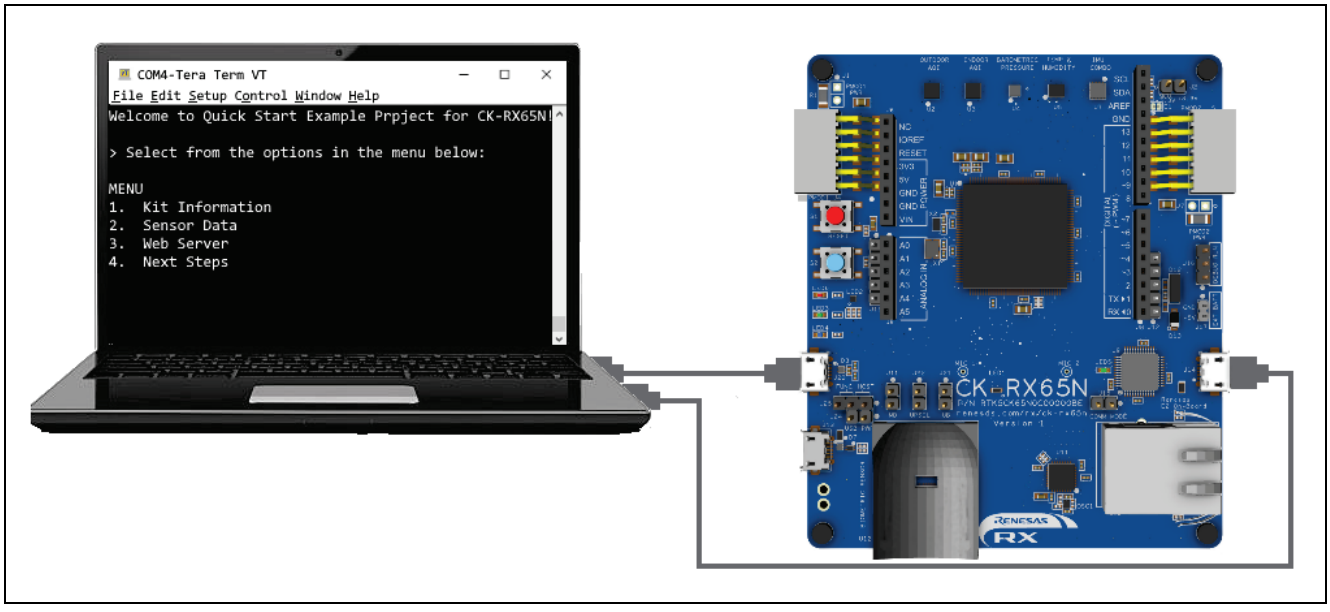

Figure 3. Connecting the CK-RX65N Board to the Host PC via USB Serial Port

4.2 Running the Quick Start Example Project

To run the Quick Start example project, use the following instructions:

1. On power up or RESET, the four user LEDs will take on the following states:
   — LED2 RGB – Off
   — LED3 Green – Steady, full intensity
   — LED4 Blue – Blinking at 1 Hz frequency
   — LED6 Red – Off

2. Press the user button (S2) on the CK-RX65N board to change the blinking frequency of the user LED4 (blue). With every press of the first user button (S2), the frequency will switch from 1 Hz to 5 Hz to 10 Hz and cycle back.
3. On the host PC, open Windows Device Manager. Expand **Ports (COM & LPT)**, locate **USB Serial Device (COMxx)** and note down the COM port number for reference in the next step.

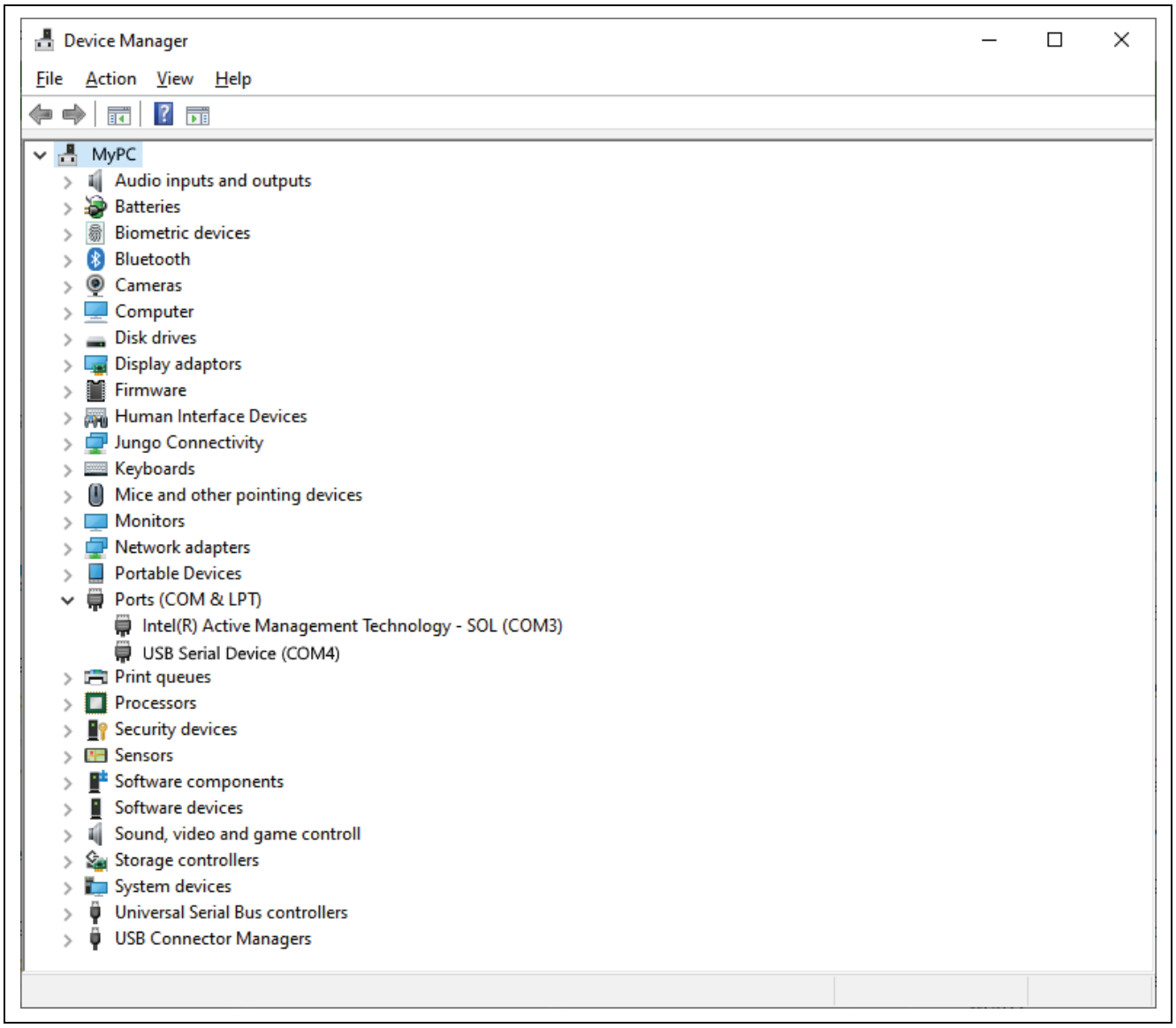

Figure 4. USB Serial Device in Windows Device Manager

4. Open Tera Term, select **Serial** and **COMxx: USB Serial Device (COMxx)** and click **OK**.

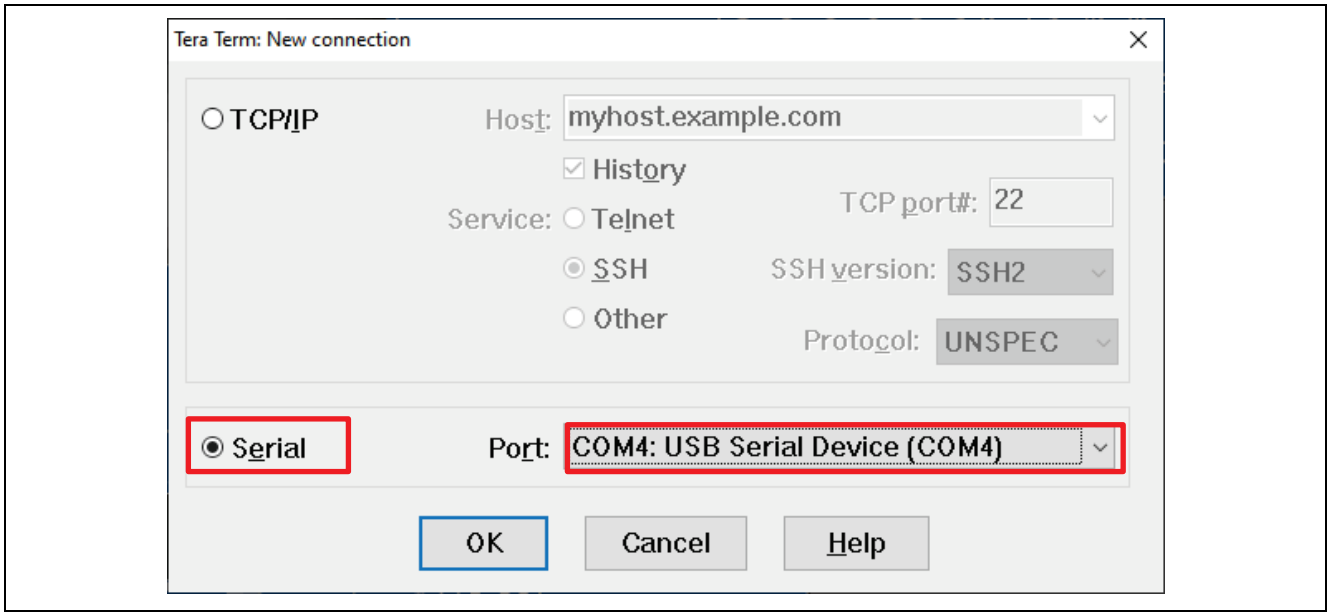

Figure 5. Selecting the Serial Port on Tera Term

5. Using the **Setup** menu pull-down, select **Serial port…** and ensure that the Baud rate is set to 115200, data is set to 8 bit, parity is set to none, and stop is set to 1 bit, as shown below.

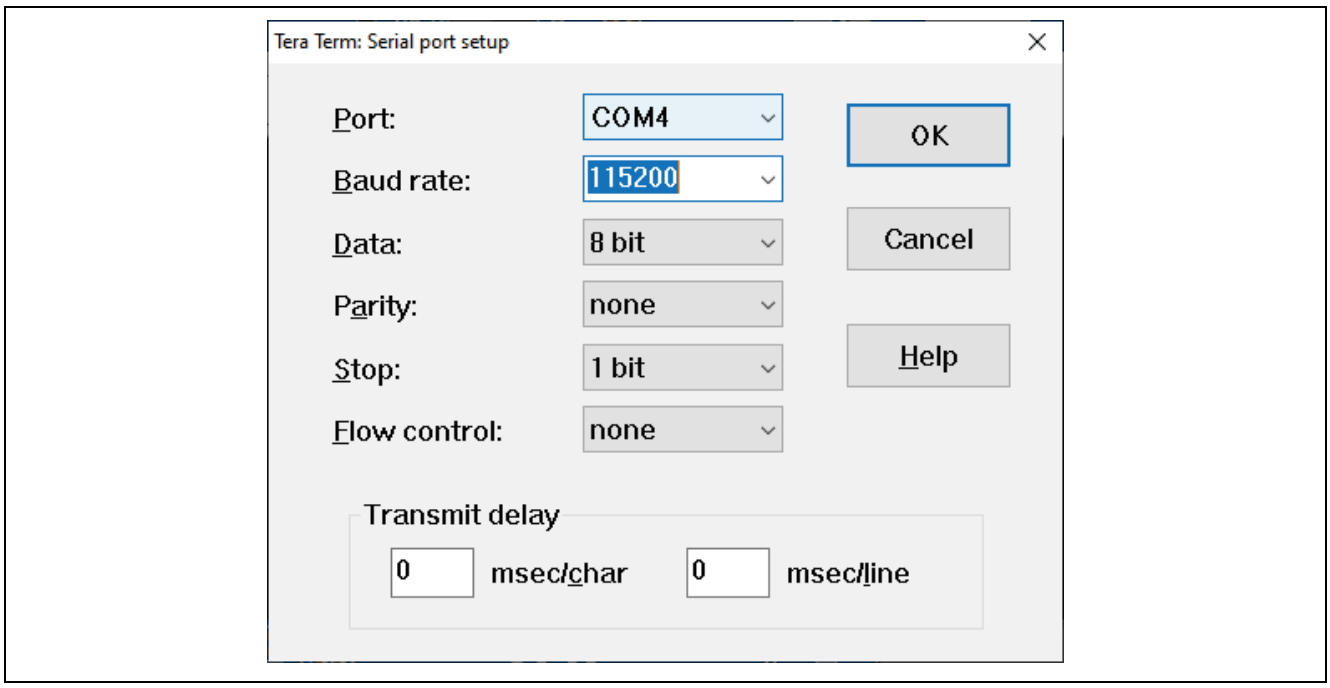

Figure 6. Select Communication Settings

6. Complete the connection. The ‘welcome and main menu’ screen will be displayed.

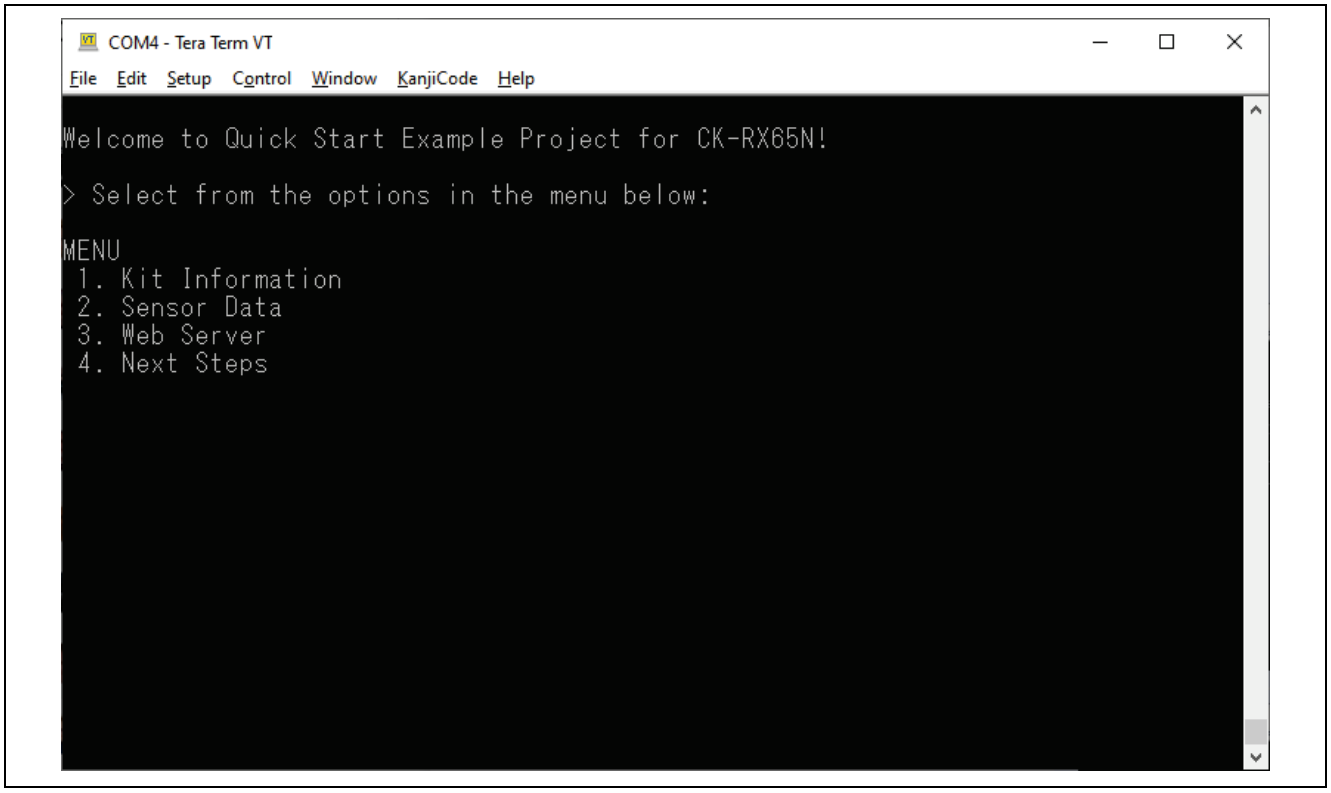

Figure 7. Welcome and Main Menu

7. Press **1** to display the **Kit Information** including the kit name, part number, MCU ID, MCU die temperature, and the user LED’s current blinking frequency.

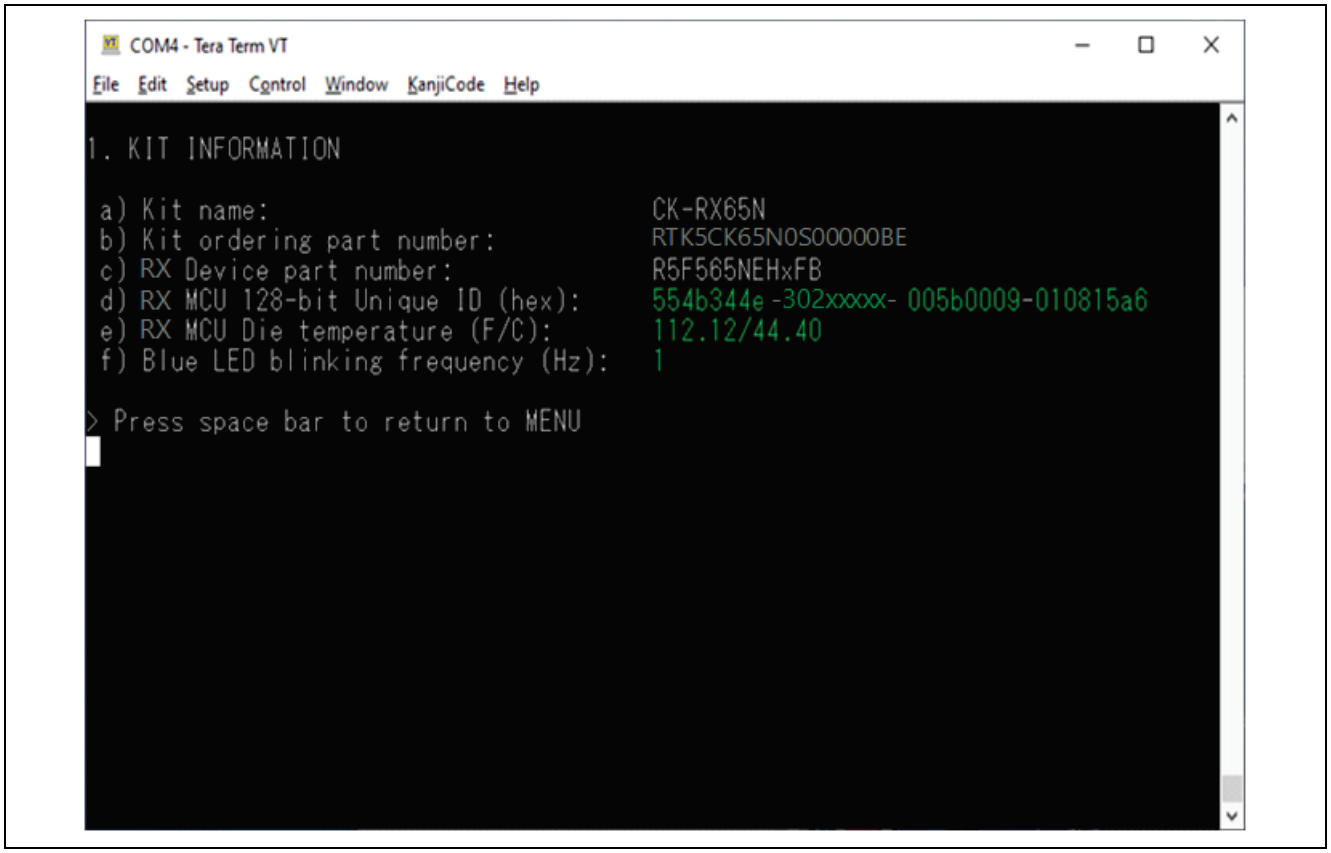

Figure 8. Kit Information

8. Press **space** to return to the 'welcome and main menu' screen.
9. Press **2** to display the **Sensor Data**. It will display a list of all of the on board sensors along with their readings. Some of these sensors may take some time to provide data, the data will be output as soon as it is available.

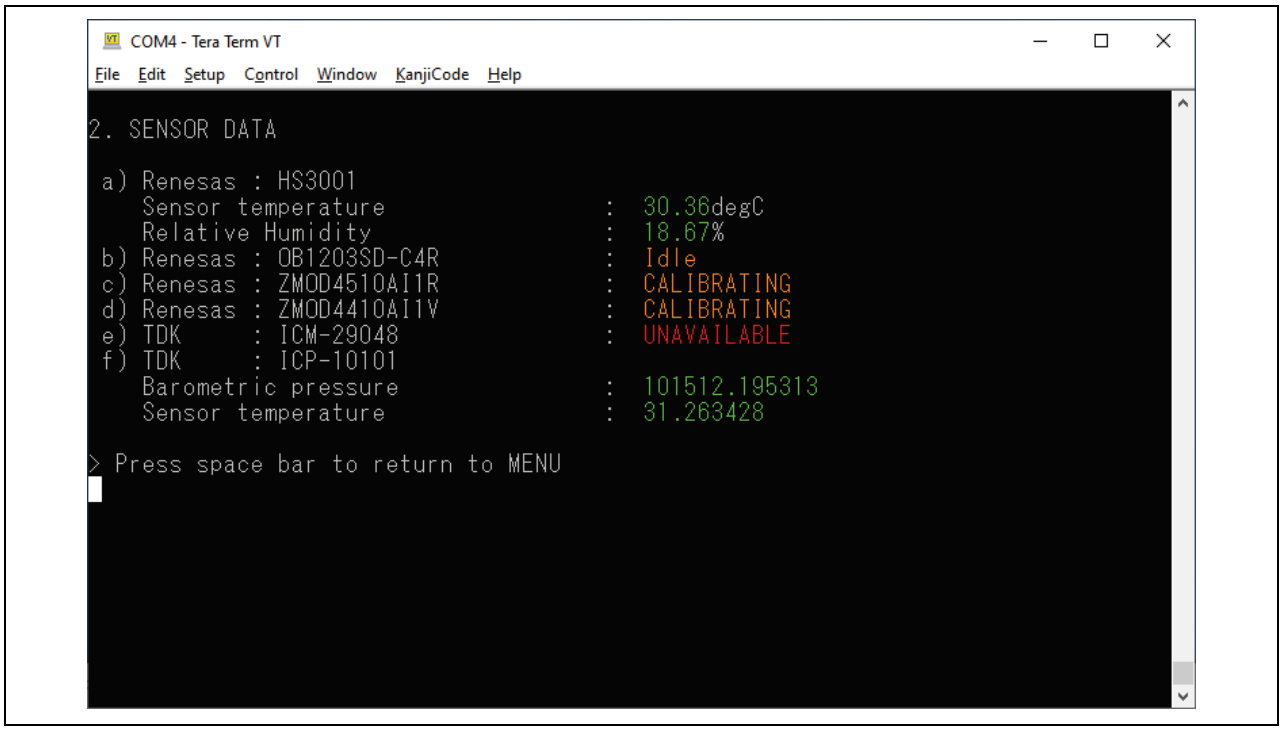

Figure 9. Loading Sensor List

The following figure shows the output when all data is available.

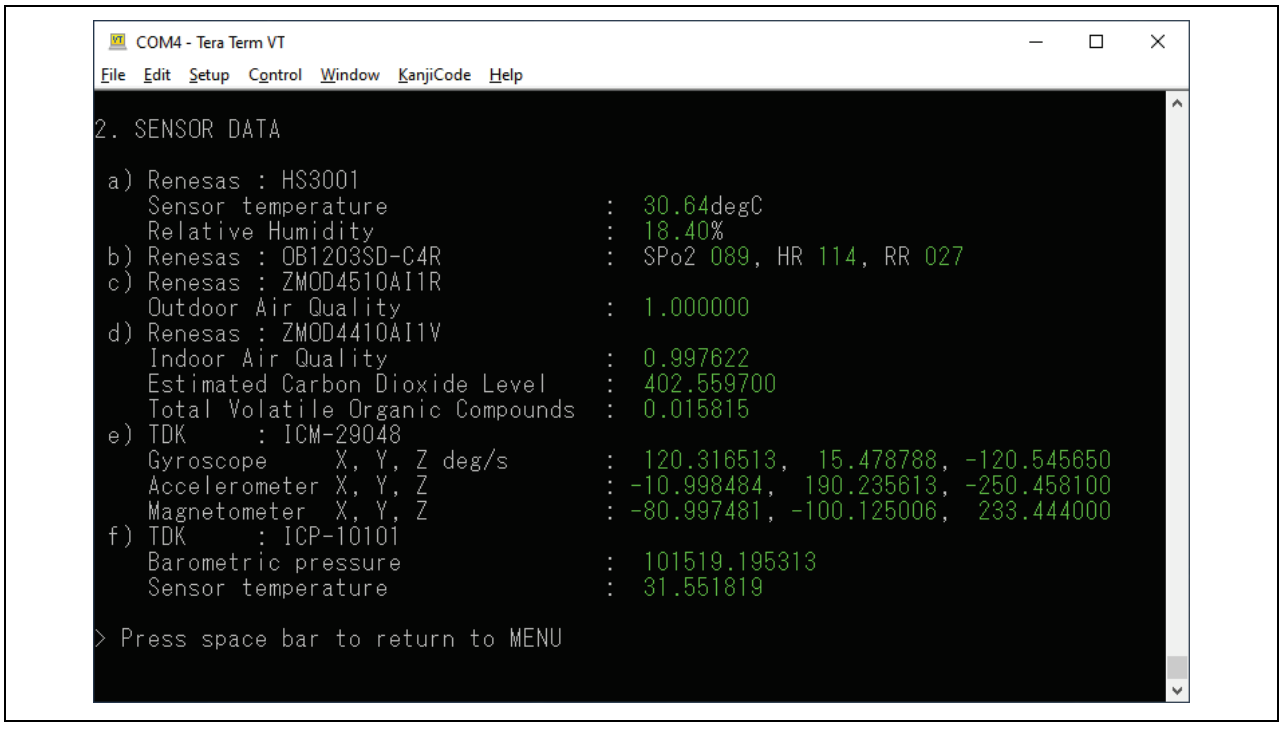

Figure 10. Sensor List with All Data

10. Press **space** to return to the ‘welcome and main menu’ screen.
11. Press **3** to display the **Web Server**. This application hosts a web server on the CK-RX65N kit showing communication with the host PC as a remote client.

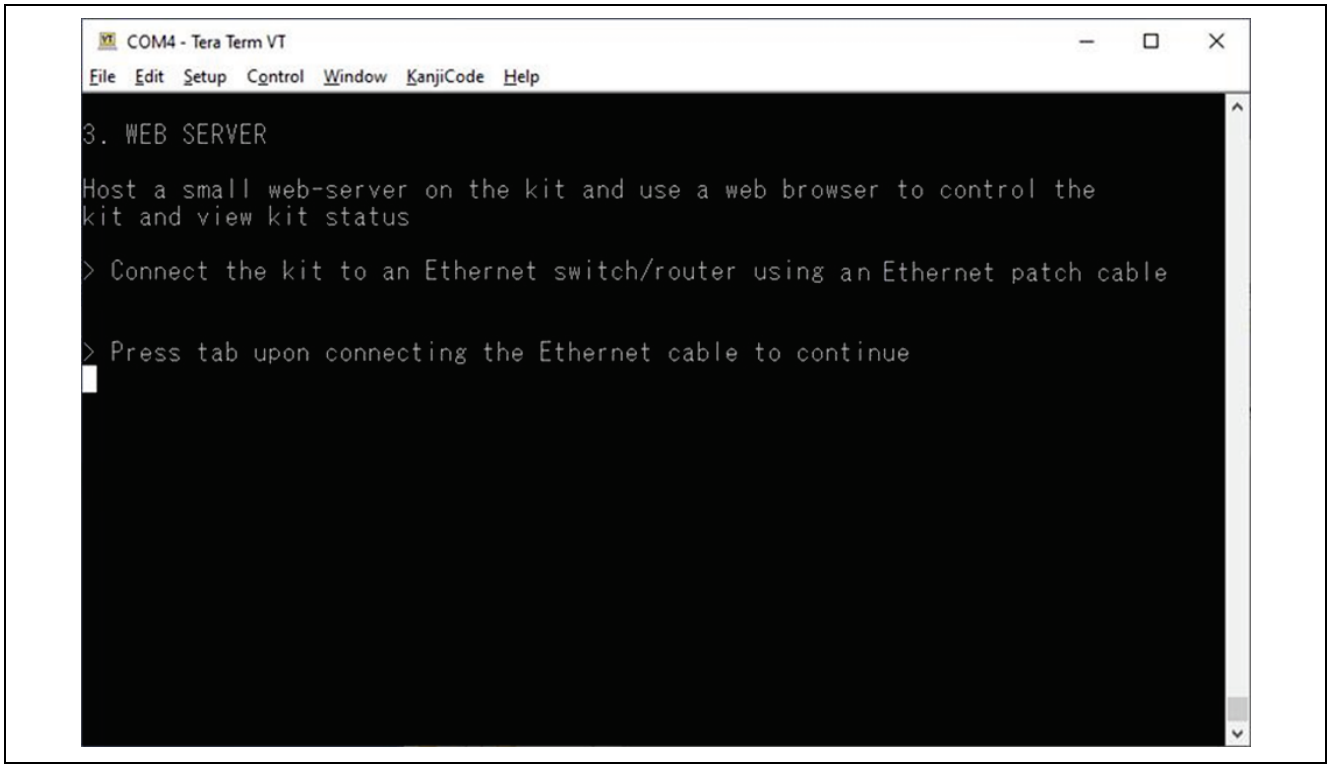

Figure 11. **Web Server**

12. Connect the Ethernet cable and press **tab**.
    The CK-RX65N as supplied, is configured to use DHCP for IP address resolution. Upon successful connection, the following is displayed.

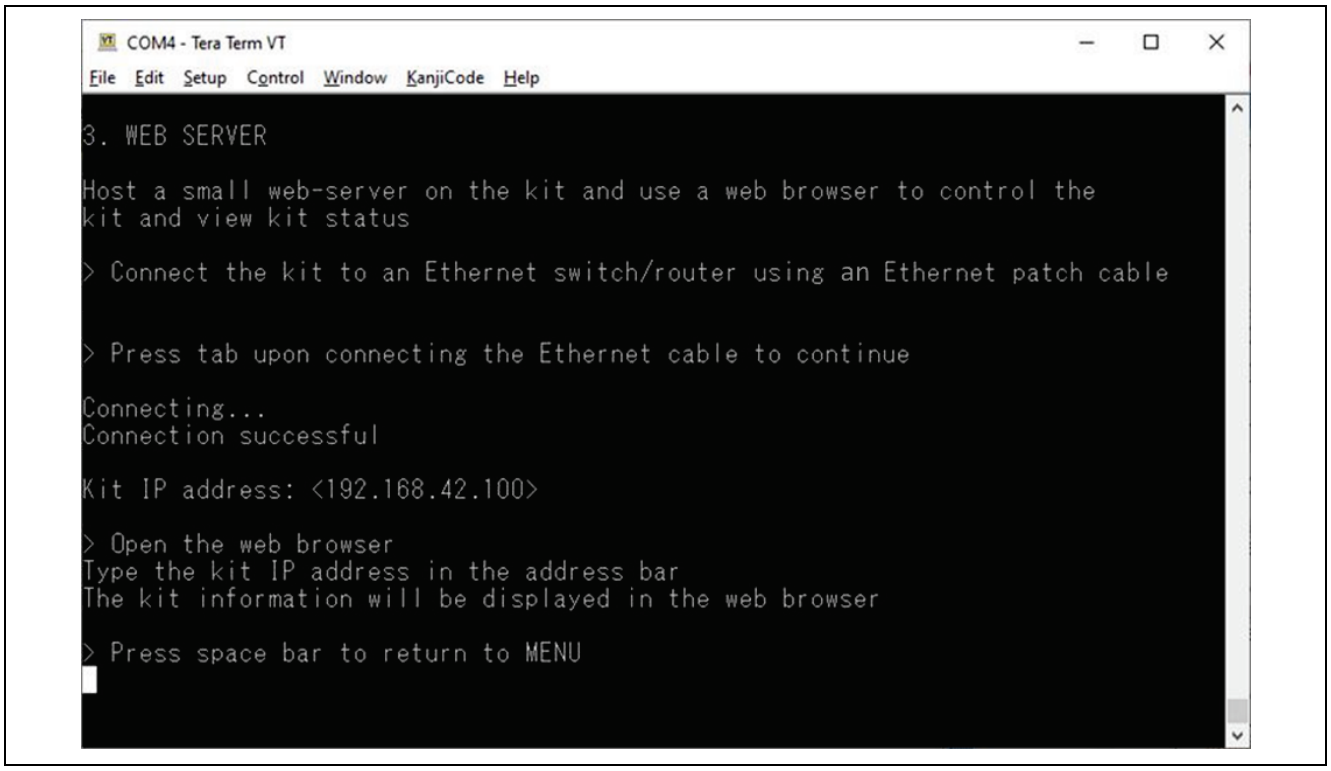

Figure 12. Using DHCP

If the DHCP fails to resolve a route or the DHCP server has been disabled, the application uses the static IP defined in the project. The following should be displayed.

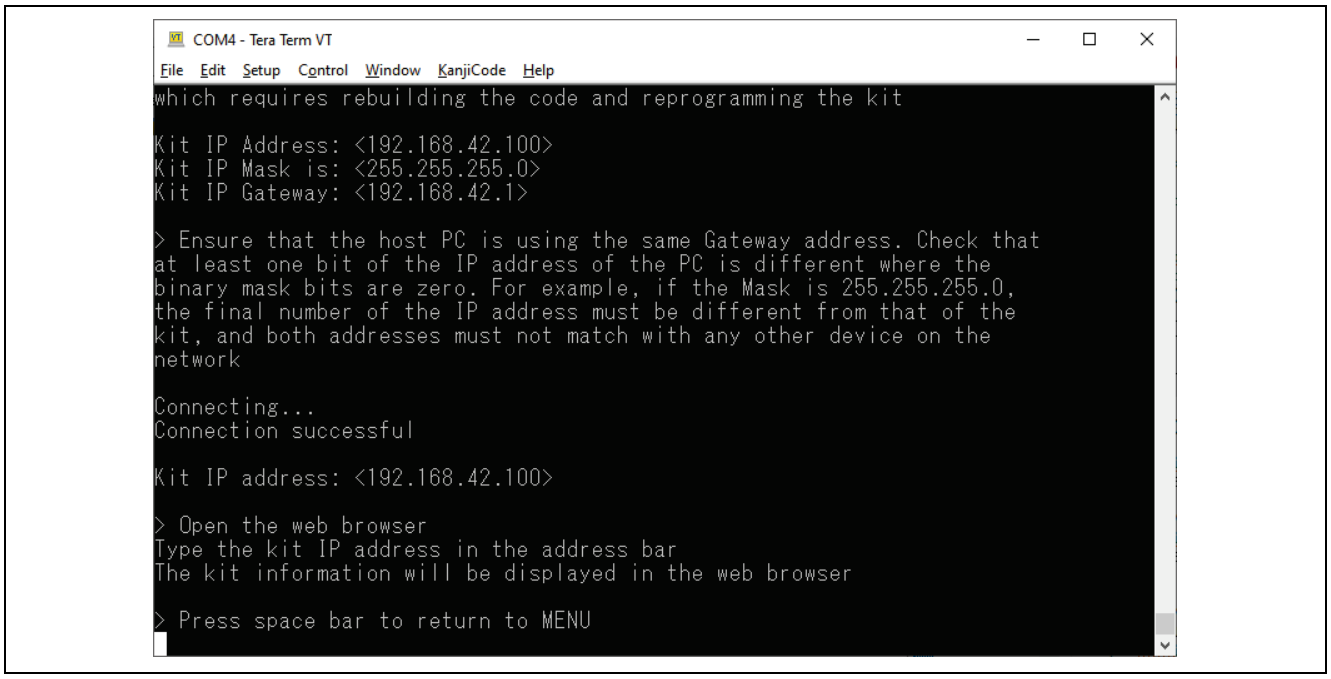

Figure 13. Using Static IP

13. Once a successful network connection is established, open the web browser on the host PC. Type the IP address of the CK-RX65N kit as shown in the Tera Term window in the address bar of the web browser. The following should be displayed in the web browser.

Figure 14. Browser View

14. In Tera Term, press **space** to return to the 'welcome and main menu' screen.
15. Press **4** to display **Next Steps**.

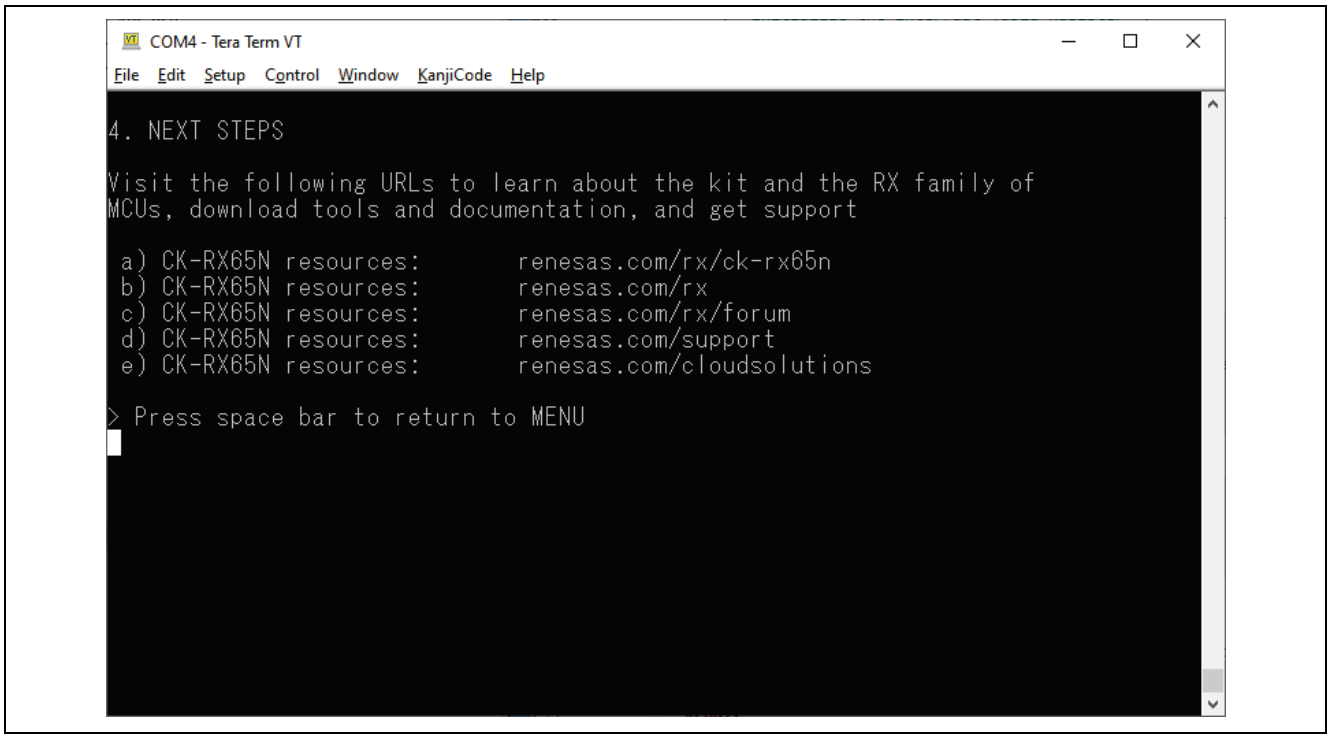

Figure 15. Next Steps

Press **space** to return to the 'welcome and main menu' screen.

5. Next Steps

To learn more about the CK-RX65N kit, refer to the CK-RX65N user's manual and design package available in the Documents and Download tabs respectively of the CK-RX65N webpage at renesas.com/rx/ck-rx65n

6. Website and Support

Visit the following URLs to learn about the kit and the RX family of microcontrollers, download tools and documentation, and get support.

CK-RX65N Resources	renesas.com/rx/ck-rx65n
Cloud Application Notes	renesas.com/cloudsolutions
RX Cloud Solution Portal	renesas.com/rx/cloudsolutions
RX Product Support Forum	renesas.com/rx/forum
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Revision History

Rev.	Date	Description	
		Page	Summary
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1.01	Sep.12.23		Removed section 5 ‘Customizing the Quick Start Example Project’

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