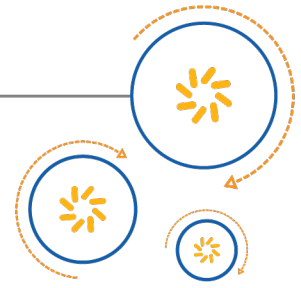




Qualcomm Technologies International, Ltd.



PSTool

User Guide

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Revision history

Revision	Date	Description
1	AUG 2006	Original publication of this document. Alternative document number CS-00101505-UG.
2	AUG 2009	Updated to include a description of the filter field.
3	OCT 2009	Updated to latest style guidelines. Document references updated.
4	AUG 2010	Update for Bluetooth SDKs 2010 and remove Qualcomm® BlueLab™ references.
5	MAR 2012	Updated to latest Style guidelines.
6	MAY 2012	Minor editorial correction
7	DEC 2013	Updated to latest style for ADK 3.0
8	MAY 2015	Updated with new GUI images and associated descriptions
9	SEP 2015	Updated description of Stores menu
10	SEP 2016	Updated to conform to QTI standards. No technical content was changed in this document revision.
AL	OCT 2017	Added to Management Content System. Updated the DRN to use the Agile number. No change to technical content.

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1 Introduction to PSTool

PSTool is an editing tool that allows you to read and modify the Persistent Store of Qualcomm® BlueCore™ ICs. The Persistent Store consists of key-value pairs that modify the operation of the firmware.

BlueCore is a very flexible device with many setup options. PS Keys must be set correctly for BlueCore to work in a particular design. Some of the keys must be calibrated for each individual chip.

Do not modify Persistent Store values unless you have a clear understanding of what they do and the effect that changing the value will have. Careless changes to the Persistent Store can prevent the firmware from executing correctly or can stop BlueCore from communicating with the PC. In some cases, it may not be possible to restore the BlueCore device to the state in which it was supplied.

See QTIL documentation on PS Key settings, supplied with individual Firmware releases, before editing values.

Perform a backup using **BlueFlash** or **E2Cmd** as appropriate before editing PS Keys.

2 Opening the PSTool application

To open the PSTool utility:

1. Browse to the location of the PSTool executable:
C:\<SDK-Name>_version\tools\bin\PSTool.exe
2. Select **PSTool** from the **Start** menu:
Start\Programs\<SDK-Name>\Tools\PSTool
3. The **Choose Transport** window opens:

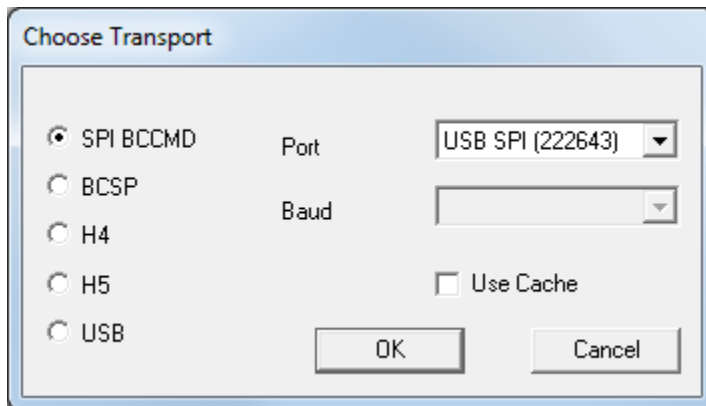


Figure 2-1 Choose Transport window

NOTE The transport options are described in [PSTool transport options](#).

4. Select the appropriate options for the required transport.
5. Click **OK**.
The PSTool main window appears.

2.1 PSTool transport options

PSTool initially opens a **Choose Transport** window that allows selection of the interface used to access the Persistent Store (PS).

The options available are:

- SPI BCCMD
- BCSP
- H4

- H5
- USB

These options are described in [Connecting PSTool using SPI BCCMD](#), and [Connecting PSTool using other transport interfaces](#).

2.1.1 Connecting PSTool using SPI BCCMD

SPI BCCMD uses the BlueCore Command (BCCMD) Protocol over the Serial Peripheral Interface layer. It is a relatively robust transport that also provides some error detection.

NOTE SPI BCCMD is the recommended transport protocol when editing the Persistent Store, since it does not depend on any particular Host Interface.

To make the connection using this protocol follow the instructions below.

Connecting using USB-SPI

To connect using SPI-USB, the PC must be connected via a QUIL USB-SPI converter to the SPI connection on the development board.

1. Select the **SPI BCCMD** radio button.
2. Select a USB-SPI device from the Port drop-down list.
3. Click **OK**.

Connecting using LPT-SPI

To connect using LPT-SPI, a SPI cable connection between the PC printer port and the SPI connection on the development board is required.

1. Select the **SPI BCCMD** radio button.
2. Select a printer port (LPT1 to LPT20) from the Port drop-down list.
3. Click **OK**.

NOTE LPT-SPI is not supported for Windows 7 or later Operating Systems.

2.1.2 Connecting PSTool using other transport interfaces

Before selecting other transport interfaces in the **Choose Transport** window, certain PS Keys must be set to the appropriate values using an SPI connection.

The alternative transport interfaces available and their configuration is briefly described in the rest of this section.

BCSP

To connect PSTool using the BCSP protocol:

1. Using an SPI connection set the following PS Keys:
 - a. PSKEY_HOST_INTERFACE: Select **UART link running BCSP** from drop-down list and click **Set**.
 - b. PSKEY_UART_CONFIG_BCSP: Check that this key is set to 0x0806.

NOTE These two PS Keys can be set using the canned operation **@bcsp**.

- c. **PSKEY_UART_BAUDRATE**: Select the preferred Baud rate (bits/s) from the drop-down list and click **Set** (this value is required later when connecting using the BSCP option). Unless your PC has a fast UART, speeds above 115 Kbps may not work.
2. Click **Reset**.

NOTE Ensure that there is cable connection from a COM port on the PC to the BlueCore development board.
3. Click **Reconnect**.
4. In the **Choose Transport** window:
 - a. Select the **BCSP** radio button.
 - b. Select a COM Port (COM 1 to COM 50) from the drop-down list.
 - c. Select the required Baud (bits/s) rate (this must match that set on the BlueCore IC in step 1.b).
 - d. Click **OK**.

BCSP uses BlueCore Serial Port protocol over the UART interface.

H4

To connect PSTool using H4 protocol:

1. Using an SPI connection set the following PS Keys:
 - a. **PSKEY_HOST_INTERFACE**: Select **UART link running H4** from drop-down list and click **Set**.
 - b. **PSKEY_UART_CONFIG_H4**: Check that this key is set to 0x08a8.

NOTE These two PS Keys can be set using the canned operation **@h4**.
 - c. **PSKEY_UART_BAUDRATE**: Select the preferred Baud (bits/s) rate from the drop-down list and click **Set** (this value is required later when connecting using the BSCP option). Unless your PC has a fast UART, speeds above 115K bps may prove unreliable.
2. Click **Reset**.
3. Ensure that there is cable connection from a COM port on the PC to the BlueCore development board.
4. Click **Reconnect**.
5. Re-open PSTool and in the **Choose Transport** window:
 - a. Select the **H4** radio button.
 - b. Select a COM Port (COM 1 to COM 50) from the drop-down list.
 - c. Select the required Baud rate (this must match that set on the BlueCore IC in step 1.c).
 - d. Click **OK**.

H4 is a Host Control Interface (HCI) five-wire UART transport protocol. It is the simplest of the Bluetooth standard host transports and has the advantage of simplicity and speed but this is generally outweighed by the disadvantage of poor error detection.

H5

To connect PSTool using H5 protocol:

1. Using an SPI connection set the following PS Keys:
 - a. PSKEY_HOST_INTERFACE: Select **UART link running H5** from drop-down list and click **Set**.
 - b. PSKEY_UART_CONFIG_H5: Check that this key is set to 0x1806.

NOTE These two PS Keys can be set using the canned operation **@h5**.
 - c. PSKEY_UART_BAUDRATE: Select the preferred Baud (bits/s) rate from the drop-down list and click **Set** (this value is required later when connecting using the **BSCP** option).
2. Click **Reset**.
3. Ensure that there is cable connection from a COM port on the PC to the BlueCore development board.
4. Click **Reconnect**.
5. Re-open PSTool and in the **Choose Transport** window:
 - a. Select the **H5** radio button.
 - b. Select a COM Port (COM 1 to COM 50) from the drop-down list.
 - c. Select the required Baud rate (this must match that set on the BlueCore IC in step 1.c).
 - d. Click **OK**.

H5 is an HCI 3-wire UART transport protocol, which provides error detection and correction.

USB

To connect PSTool using USB protocol:

1. Using an SPI connection set the following PS Keys:
 - a. PSKEY_HOST_INTERFACE select **USB link** from drop-down list and click **Set**.
 - b. PSKEY_USB_VM_CONTROL set this key to False.

NOTE These two PS Keys can be set using the canned operation **@usb**.
2. Click **Reset**.
3. Ensure that there is a USB cable connection between the PC and the BlueCore development board.
4. Click **Reconnect**.
5. Re-open PSTool and in the **Choose Transport** window:
 - a. Select the **USB** radio button.
 - b. Select the device from the drop-down list of USB devices.
 - c. Click **OK**.

PSTool connects to the module using USB.

NOTE When a USB cable is connected to a Casira unit, the RS232 port does not work.

3 PSTool main window

When the transport selection has been completed the PSTool main window appears, see [Figure 3-1](#).

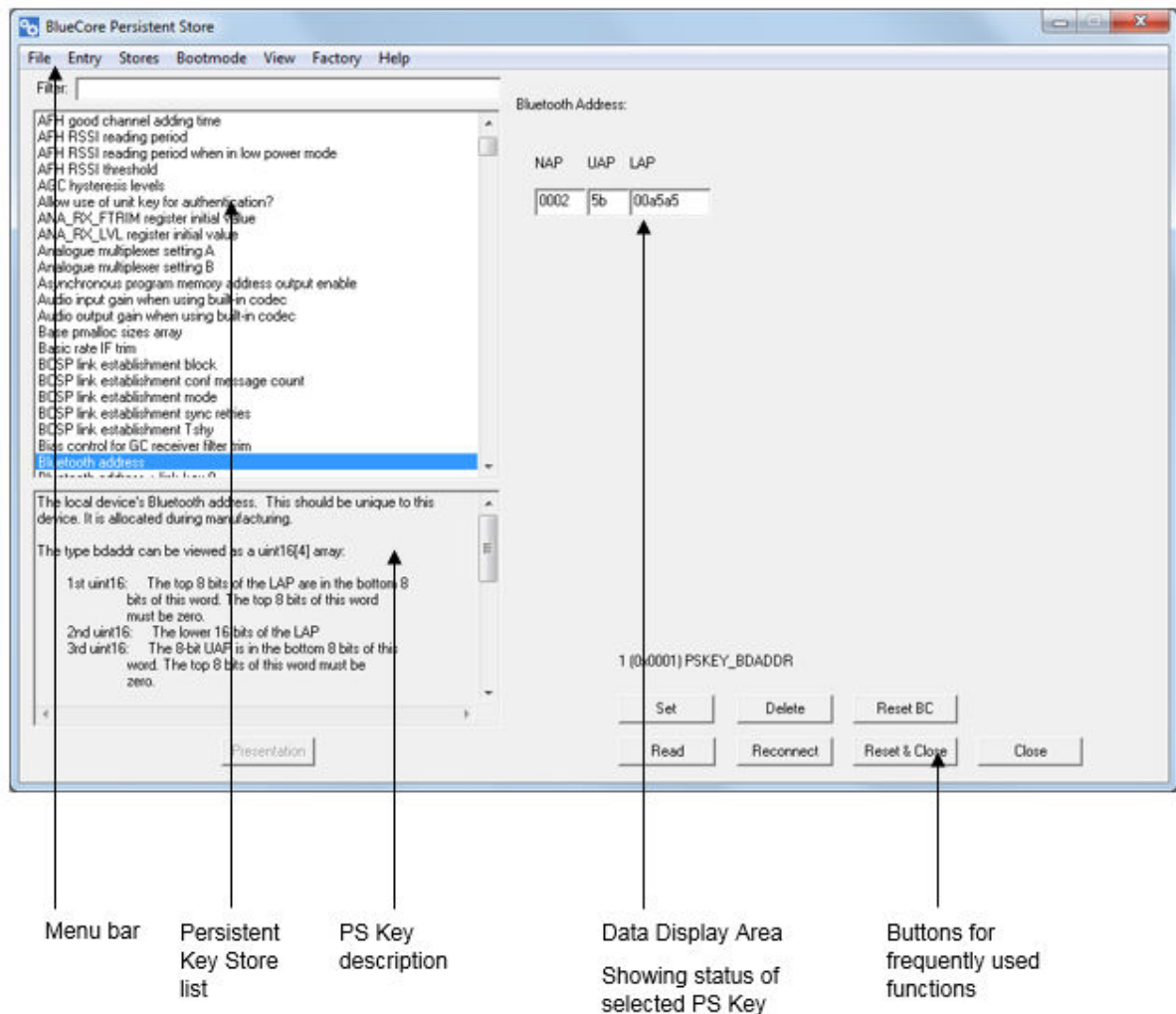


Figure 3-1 PSTool main window

The PSTool main window provides the main user interaction with the PS Key values.

The menus in the menu bar provide access to the full range of PSTool functionality, see [Chapter 4](#).

The Data Display Area displays the value of the currently selected PS Key in a user-friendly format. Here developers can read the existing value for a selected PS Key and amend it if necessary.

NOTE PS Key values displayed in this area are presented in a user-friendly format. Where appropriate drop-down lists of alternative settings for the PS Key are provided to simplify setting alternative values otherwise values can be changed using the keyboard.

To save changes made to the value of a PS Key click **Set** before selecting another PS Key.

The buttons displayed on the main PSTool window are provided for convenience. They perform the same function as frequently used functions that are otherwise accessed from menus in the menu bar.

4 PSTool functionality

4.1 PSTool File menu

The File menu consists of four menu items:

- **Merge**
- **Run Query**
- **Dump**
- **Exit**

Merge

This facility sets PS Keys to those contained in a previously saved `.psr` file (`.psr` files are created by the dump and query processes described in the following sections).

To use a `.psr` file to set the values of PS Keys:

1. Select **Merge** from the **File** menu.
An **Open Persistent Store File** window appears.
2. Browse to the location of the `.psr` you want to merge.
3. Select the required file and click **Open**.
The window closes and the PS Key values in the `.psr` file are downloaded to the BlueCore IC.

Run Query

This option allows you to run a simple query to read the value of specific sets of PS Keys. To do this the user must prepare a `.psq` file to list the PS Keys to be read.

`.psq` files

`.psq` files can be written using a plain text editor such as notepad. The syntax for `.psq` files is in the form:

```
?1234= // read and dump the value of PS key "1234".
```

```
?1234~ 5678 9adc // read and dump value of PS key "1234" if it differs from the data specified.
```

Using the Run Query facility

1. Select **Run Query** from the **File** menu.
A **Run PS Query File** window appears.
2. Browse to the location of the prepared `.psq` file.

3. Select the required `.psq` file and click **Open**.
A **Save Persistent Store File As** window appears.
4. Enter a name for the query results file and click **Save**.
The file is saved as a `.psr` file in the selected location and the window closes.
5. The file can then be opened from its saved location. The file contains the values dumped as a result of the query.

Dump

This facility allows a copy of the PS Keys as set on the BlueCore module to be saved as a `.psr` file, this can be used to reset these values using the **Merge** facility described in Section [Merge](#).

To save a dump of a modules PS Key values:

1. Select **Dump** from the **File** menu.
A **Save Persistent Store File As** window:
2. Browse to the location in which you wish to save the `.psr` file.
3. Enter a name for the file.
4. Click **Save**.
The file is saved to the selected location.

Exit

This option closes the PSTool application.

4.2 PSTool Entry menu

The **Entry** menu provides a range of options and facilities:

- **Read Entry:** reads the value of the PS Key selected in the Persistent Key Store list and displays the value in the Data Display area. This menu item performs the same function as the **Read** button.

NOTE A read is automatically performed when a key is selected from the Persistent Store list.

- **Set Entry:** This option writes the value displayed in the Data Display Area to the selected PS Key. This menu item performs the same function as the **Set** button.
- **Delete Entry:** This option removes the selected PS Key. If necessary, the stack creates the key using a default value the next time the stack reboots. Otherwise the key displays **Not Present** when selected in the list. This menu item performs the same function as the **Delete** button.
- **Edit Raw:** This allows the user to edit the raw words of the selected PS Key value rather than the user-friendly presentation in the Data Display Area of the main PSTool window.
- **Canned Operations:** This option allows the user to select from a list of predefined operations. These write individual keys or combination of keys to the required values for the selected option.

For example selecting **@bcsp** writes values to two keys PSKEY_HOST_INTERFACE (to UART link running BCSP) and PSKEY_UART_CONFIG_BCSP (the UART configuration key for BCSP) and sets them to the required values to allow BCSP transport communication with the host.

4.3 PSTool Stores menu

This menu allows the user to select which of the various layers available to the Persistent Store that PSTool interacts with.

The options are:

- **All (TIFR) / All (TIFAR)**
- **Not RAM (IFR) / Not RAM (IFAR)**
- **RAM Only (T)**
- **Implementation Only (I)**
- **Factory Only (F)**
- **FileSystem Only (A)**
- **ROM Only (R)**

NOTE (1) During development the layer storing the PS Key value can be largely ignored. The distribution between stores only becomes significant during production (some PS Keys are set during module production, some later, it is at this point that the layer used to store the PS Key value becomes more significant).

(2) The FileSystem (A) layer is only available on devices with supporting firmware. For a device whose firmware does not support the FileSystem layer, options 1 and 2 above are displayed as All (TIFR) and Not RAM (IFR) respectively, and option 6 is grayed-out. For a device whose firmware supports the FileSystem layer, options 1 and 2 are displayed as All (TIFAR) and Not RAM (IFAR) respectively, and option 6 is available for selection.

(3) The FileSystem layer behaves like a read-only layer for the purposes of PSTool.

Figure 4-1 shows a representation of the Persistent Store Architecture of the various stores.

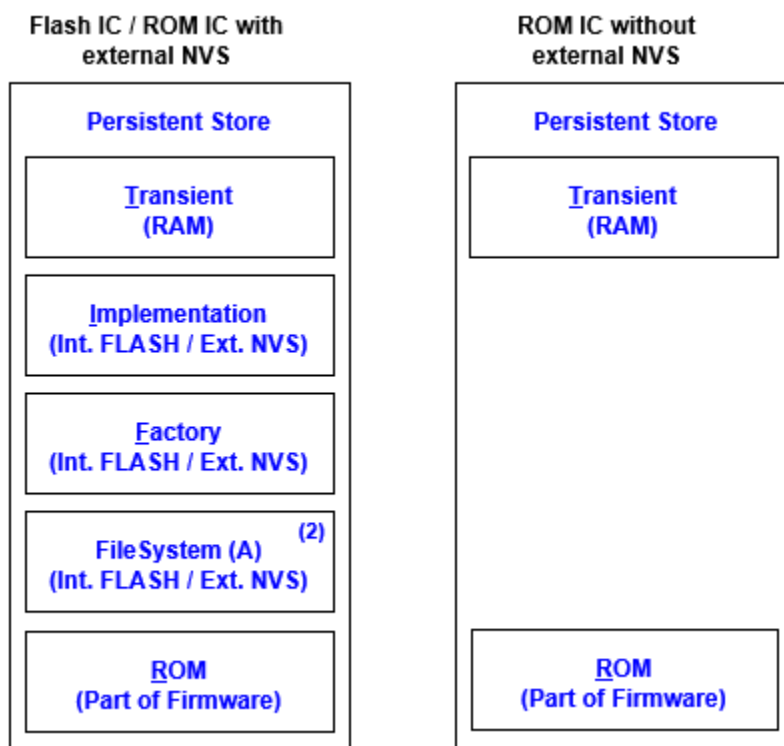


Figure 4-1 Persistent Store architecture

Default values of PS Keys defined by the firmware are stored in ROM.

Keys that are set during product manufacture are generally set in the Factory and Implementation area, while keys that are set during runtime as a result of user interaction with the product are generally stored in Transient.

At runtime the value stored at the highest level is used.

NOTE If an attempt is made to write the same value for a PS Key in the layer immediately above the layer in which the value is currently stored, the write command is aborted.

If Flash is not identified on the IC and there is no E2 supported in the firmware, writes are made in the Transient layer by default.

ROM ICs that use an external NVS device to store PS Keys require the NVS device to be initialized before PSTool can read from or write to it. The amount of space appropriate for the store depends on the BlueCore ROM variant. See *Selection of I²C EEPROMS for use with BlueCore* and *Selection of SPI/SQIF Memory for Use with BlueCore*.

4.4 PSTool View menu

The **View** menu provides options that control the way PS Keys are displayed in the Persistent Key Store list.

The list can be displayed using either their Friendly names or by Programmer IDs and can be ordered alphabetically (Sort by name) or by number (Sort by ordinal).

4.5 PSTool Factory menu

The **Factory** menu contains:

- **Factory Set:** This applies to the PS Key currently selected in the Persistent Key Store list, see Chapter . When a PS Key has a value currently set in the Implementation level selecting **Factory Set** sets this value at the Factory level.
- **Factory Restore:** If the selected PS Key is set in the Factory level this option removes any values set at the higher levels.
- **Factory Restore All:** Selecting this option removes any values set in the higher levels for the full range of PS Keys for which values have been set in the Factory level.

4.6 PSTool Help menu

The **Help** menu contains:

- **Firmware version:** Reports the version of firmware currently running on the BlueCore IC.
- **Describe key:** See [PSTool Entry menu](#).
- **About:** Opens a separate window displaying version information for PSTool.

4.7 PSTool Filter field

Typing characters in this field filters out any PS Keys that do not contain the character or sequence of characters. This can be used to help locate specific PS Keys quickly.

4.8 PSTool button functions

The PSTool main window contains the following buttons:

- **Set:** Click to save the value displayed/entered in the Data Display Area to the selected PS Key.
- **Read:** Click to get the Persistent Store value for the selected key that is displayed in the Data Display Area.
- **Describe:** See Section [PSTool Entry menu](#).
- **Delete:** Click to remove the selected PS Key from the Persistent Store.

NOTE If necessary, the stack creates the PS Key using a default value the next time the stack reboots. Otherwise, the key continues to be reported in the Data Display Area as **Not present**.

- **Reconnect:** Click to bring up the **Choose Transport** window allowing the user to reconnect after a device reset or if the transport was disrupted for some reason.
- **Reset BC:** Click to reset the BlueCore device.

The device must be Reset and the stack rebooted before changes made to PS Keys using PSTool take effect.

- **Close:** Click to close the PSTool application.

Changes to PS Keys are not written unless the **Set** button is clicked before closing.

5 Troubleshooting PSTool problems

The most common fault experienced when using PSTool is a communication failure with the BlueCore IC.

NOTE A failure to communicate with the chip is indicated when PSTool reports "ENTRY NOT PRESENT – Click to add for a PS Key that is known to store a valid entry, for example, e.g. Bluetooth Address."

If this occurs there are a few possible causes, which can be readily diagnosed and corrected if necessary:

1. Reset the chip and reconnect PSTool.
2. Check that **All (TIFR)** is selected in the **Stores** menu.
3. Check that the SPI cable is correctly connected and the device is powered.

If PSTool still fails to communicate with the chip, two other possible causes are commonly found to be the source of the problem:

Cause: There is no firmware running on the device or the firmware is not suitable for the BlueCore variant being used.

Solution: Download compatible firmware using BlueFlash.

Document references

Document	Reference
<i>Selection of I²C EEPROMS for use with BlueCore</i>	80-CT624-1/CS-00101518-AN
<i>Selection of SPI/SQIF Memory for Use with BlueCore</i>	CS-00238182-AN

Terms and definitions

Term	Definition
BCCMD	BlueCore Command
BCSP	BlueCore Serial Protocol
BlueCore	Group term for the range of QTIL Bluetooth wireless technology ICs
Bluetooth SIG	Bluetooth Special Interest Group
Bluetooth	Set of technologies providing audio and data transfer over short-range radio connections
COM	Communication
H4	Bluetooth defined UART transport
H5	Three-wire UART transport
HCI	Host Communication Protocol
IC	Integrated Circuit
LPT	Line Printer Terminal
NVS	Non-Volatile Storage – For example, Flash or EEPROM
PC	Personal Computer
PS	Persistent Store
PS Key	A key-value pair within the Persistent Store
QTIL	Qualcomm Technologies International, Ltd.
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus