AirPrime XS1110

Development Kit User Guide

SIERRA WIRELESS®

41113415
Rev 2.0

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Revision History

Revision number	Release date	Changes
1.0	September 05, 2019	Creation
1.1	September 10, 2019	Updated SYSTEM0 on page 8
1.2	March 05, 2020	Updated Development Kit photos to the latest version
1.3	March 11, 2020	Updated images
2.0	April 16, 2020	Minor text edits Changed Figure 4-5 Changed Map description on page 17

Contents

1: Introduction

The main purpose of the Development Kit is to simplify the evaluation process for GNSS modules and to help testers operate our products with convenience and ease.

Figure 1-1: Development Kit

This device can communicate with computer devices via USB cable, and it must be used in conjunction with the software, **GNSS Tool**, for users to record all module data such as satellites' status, time-to-first-fix (TTFF), date and time.

Note that:

- The GNSS signal may be cut off or become seriously weakened if you operate the Development Kit inside any infrastructure such as buildings, tunnels, or near any huge objects and/or obstruction. Signal being cut off does not mean the Development Kit has malfunctioned; it will operate properly again once it receives clear GNSS signals (works normally under the open sky).
- Select a suitable external passive antenna based on the satellite system that you use.

2: Hardware Overview

The following figure identifies the location of the Development Kit's connectors and other components.

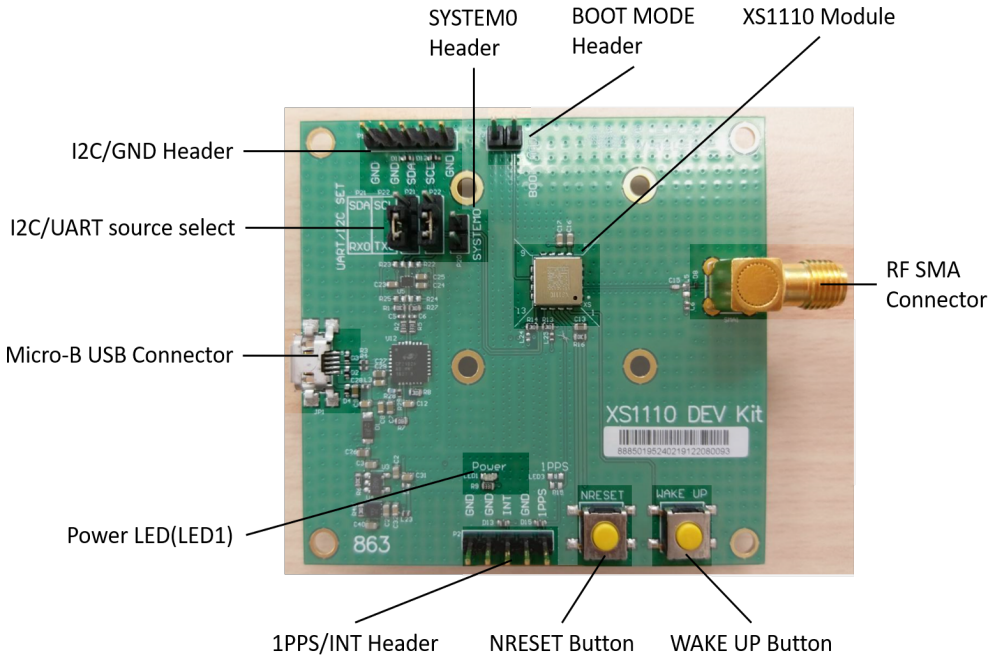


Figure 2-1: Development Kit Connectors and Components

Refer to the subsequent chapter, Interfaces on page 7, for detailed description.

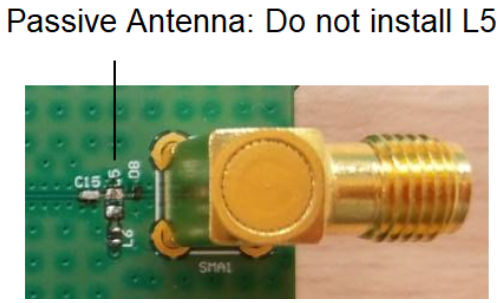


Figure 2-2: RF SMA Connector

3: Interfaces

This section describes the physical interfaces available on the Development Kit.

Module

The Development Kit includes an XS1110 module.

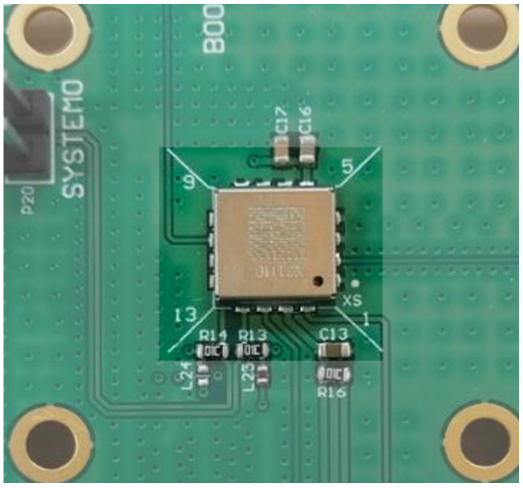


Figure 3-1: XS1110 on the Development Kit

Table 3-1: Module Details

Component	PCB Label	Description
Module	XS	XS1110 module

Note that the XS1110 requires an external RF antenna to be connected to the RF SMA connector of the Development Kit.

Antenna Connection

The RF SMA connector is used to connect an external antenna for the XS1110 module.

Figure 3-2: RF SMA Connector

Table 3-2: Antenna Connector Details

Component	PCB Label	Description
RF SMA Connector	SMA1	External antenna connector for the XS1110 module

SYSTEM0

The SYSTEM0 header is used to set whether transmissions are done via UART or I2C.

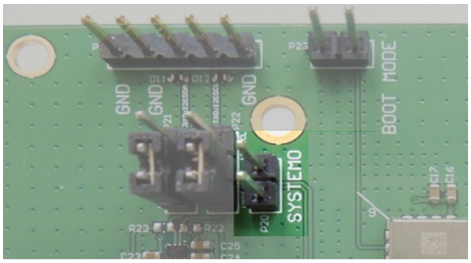


Figure 3-3: SYSTEM0 Header

Table 3-3: SYSTEM0 Details

Component	PCB Label	Description
2-pin header	P20	• Transmission selection (UART or I2C) • SYSTEM0 : 0=I2C ; 1=UART

To set transmission selection to UART, disconnect jumper on SYSTEM0 for SYSTEM0 pins to pull high (default).

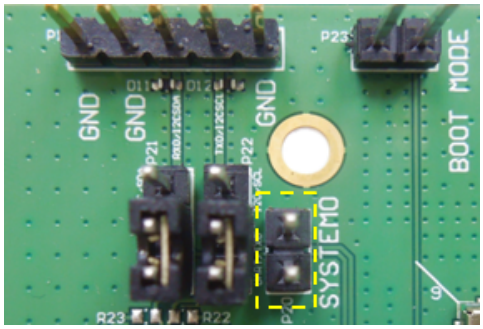


Figure 3-4: No Jumper on SYSTEM0 for UART Transmission

To set transmission selection to I2C, short SYSTEM0 with a jumper. SYSTEM0 pins will then enter pull low status. The Development Kit must then be re-powered (by unplugging then replugging the power supply), after which the NRESET button must be pressed to reboot the module to change transmission selection from UART to I2C.

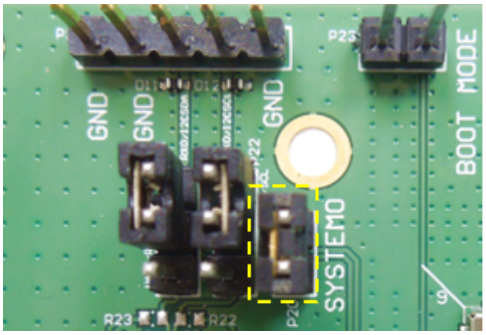


Figure 3-5: Jumper Across SYSTEM0 for I2C Transmission

I2C

Connectivity to peripheral devices are available through the I2C interface.

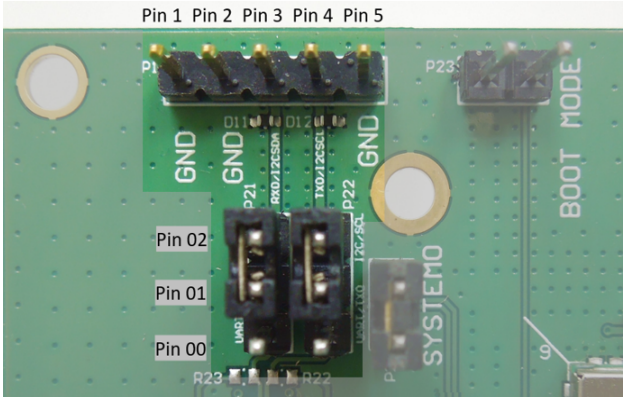


Figure 3-6: I2C Header

Table 3-4: I2C Header Details

Component	PCB Label	Description
5-pin header	P1	I2C signals; refer to Table 3-5 for details

Table 3-5: I2C Header Pins

Pin Number	Pin Name	Description
1	GND	Ground
2	GND	Ground
3	RX0 / I2CSDA	I2C serial data (in slave mode)
4	TX0 / I2CSCL	I2C serial clock (in slave mode)
5	GND	Ground

Pins 01 to 02 have to be configured by connecting them with jumpers.

See Figure 3-4 and Figure 3-5 on page 9 for jumper configuration consistent with SYSTEM0 settings.

Mismatching jumper connections will result in pin error after reboot; in this case, I2C features will not be enabled.

BOOT Mode

The BOOT Mode header is used to place the module in Flash download mode to perform firmware updates.

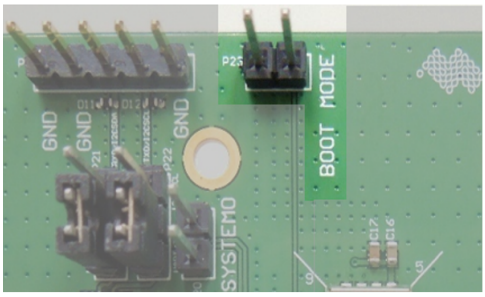


Figure 3-7: BOOT Mode Header

Table 3-6: BOOT Mode Details

Component	PCB Label	Description
2-pin header	P23	Add a jumper to make the module ready for firmware upgrade

1PPS / INT

Connectivity to peripheral devices is supported via the 1PPS and INT (for I2C) header.

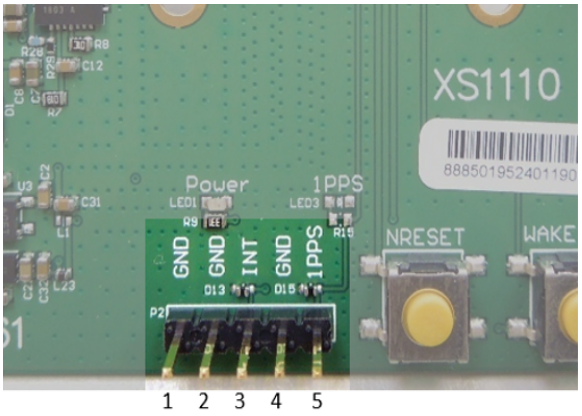


Figure 3-8: 1PPS / INT Header

Table 3-7: 1PPS / INT Details

Component	PCB Label	Description
5-pin header	P2	1PPS / INT header

Table 3-8: 1PPS / INT Header Pins

Pin Number	Pin Name	Description
1	GND	Ground
2	GND	Ground
3	INT	Interrupt pin for I2C application
4	GND	Ground
5	1PPS	1PPS time mark output

WAKE UP

The WAKE UP pushbutton wakes the module up.

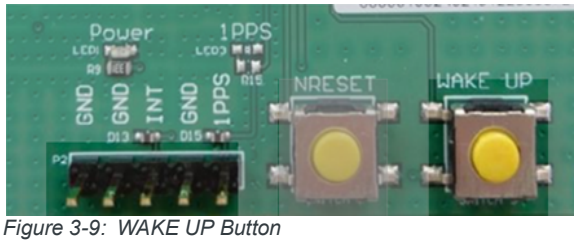


Figure 3-9: WAKE UP Button

Table 3-9: WAKE UP Button Details

Component	PCB Label	Description
Button	SWITCH 3	Pushing the WAKE UP button wakes the module up from sleep mode.

NRESET

The NRESET pushbutton reboots the module.

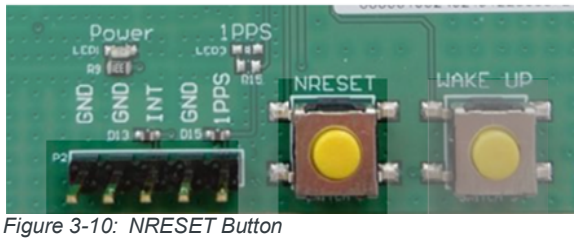


Figure 3-10: NRESET Button

Table 3-10: NRESET Button Details

Component	PCB Label	Description
Button	SWITCH 2	Pushing the NRESET button reboots the module.

Micro-B USB

The Micro-B USB connector provides for power and serial access from a host device, and interfaces to an on-board CP2102N IC which provides access to the module's UART interface.

When the Development Kit is powered ON:

- LED1 (Power) is lit,
- the host device can connect to the XS1110's console, and

- the module's UART access becomes accessible (default setting of 115200kbps baud rate and update rate of 1Hz).

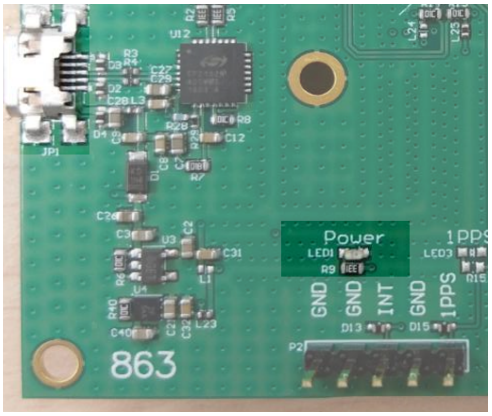


Figure 3-11: Micro-B USB Connector and Power LED

Table 3-11: Micro-B USB Connector Details

Component	PCB Label	Description
Micro-B USB connector	JP1	Connects the Development Kit to a host device and provides access to the module's UART interface

4: Software Usage

System Requirements

- Operating System: Microsoft Windows 7, 8, and 10
- USB Driver: CP210x VCPInstaller.zip
  - For Windows 7, Windows 8 or Windows 8.1, please use CP210xVCP driver v6.7 or the latest version (v6.7.5).
  - For Windows 10, please use CP210xVCP driver v6.7.5; v10.1.1
- GUI Tool: GNSS Tool
- Microsoft .NET Framework 4.5
- Microsoft Visual C++ 2015 Redistributable Package (x86)

USB Driver and GNSS Tool

Before setting up the connection between the module's UART port and the PC, you will need the Development Kit USB Driver (CP210x VCP) and GNSS Tool.exe to operate the Development Kit.

Please download and install the USB Driver (CP210x VCP) from https://source.sierrawireless.com/resources/airprime/software/cp210x-windows-drivers.

Please download the GNSS tool from https://source.sierrawireless.com/resources/airprime/software/gnss_tool/.

Important: *Please check whether you have the correct USB driver before you proceed to the next step. The Development Kit will not function without the correct driver.*

Installing the USB Driver

1. Double click **CP210x_VCP_Win.exe** to begin driver installation:

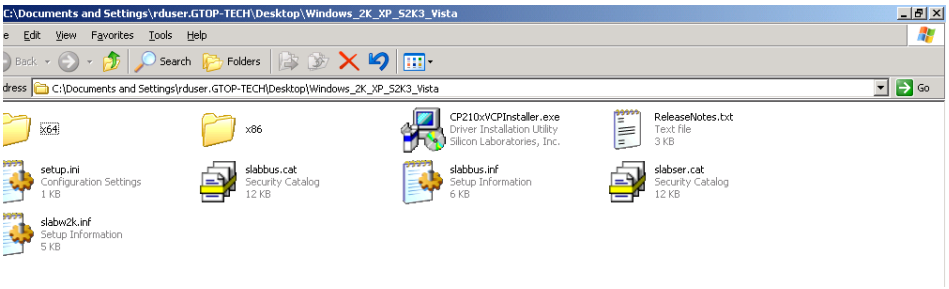


Figure 4-1: Driver Installation Folder

2. Click **Install**:

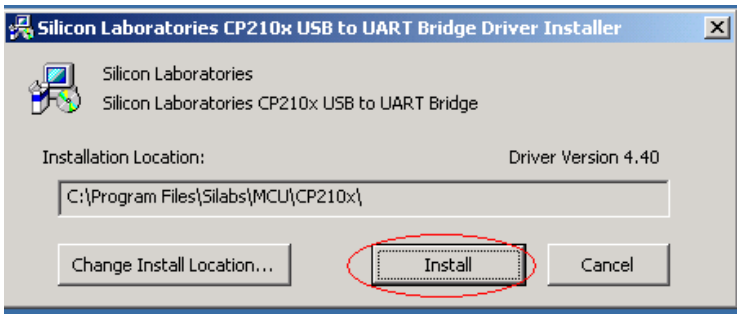


Figure 4-2: Starting the Installation Process

3. After the installation is complete, you may need to restart your computer. Please follow the instructions on screen to restart your computer.
4. After the computer has restarted, right click on **My Computer** and select **Manage**:

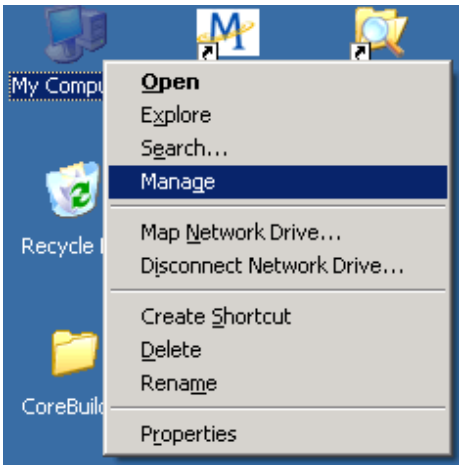


Figure 4-3: Selecting Manage

5. Left click **Device Manager** and select **Ports (COM &LPT)**. Check to see if a device named **Silicon Labs CP210x USB to UART Bridge (COM#)** is present. If so, the Development Kit is set up and ready for use.

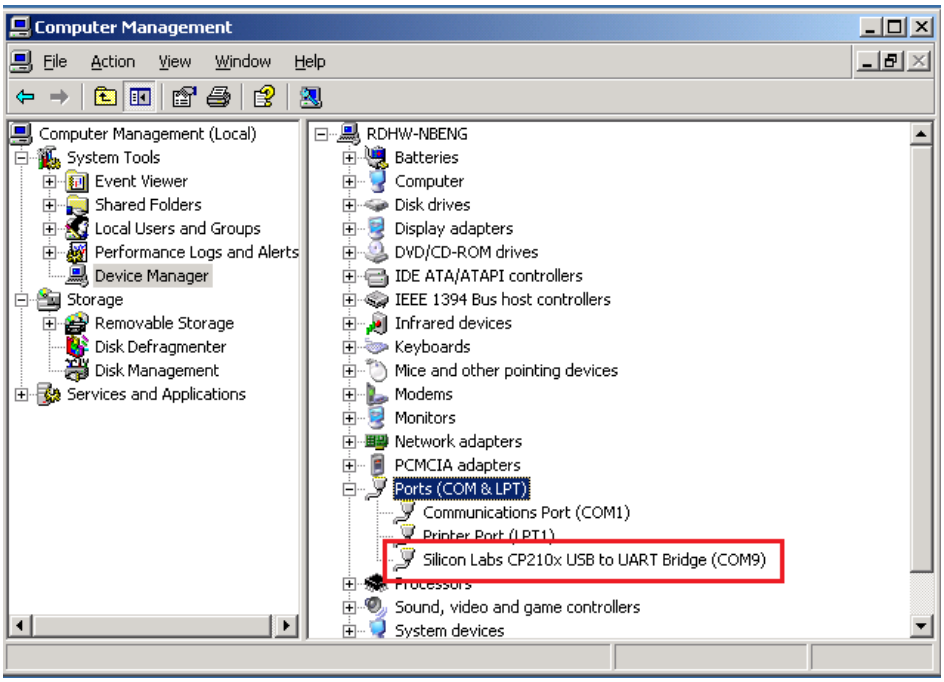


Figure 4-4: Accessing the Port Properties

"COM9" represents the virtual COM port number generated for the USB connection to the Development Kit. This generated COM port value must match the COM port value in the program setting for the application to establish proper communication with the Development Kit.

Using GNSS Tool

Microsoft Framework 4.5 or higher is required before you launch the GNSS Tool software on your PC.

Double click **GNSSTool.exe** to start the application, the main screen of the program is shown below:

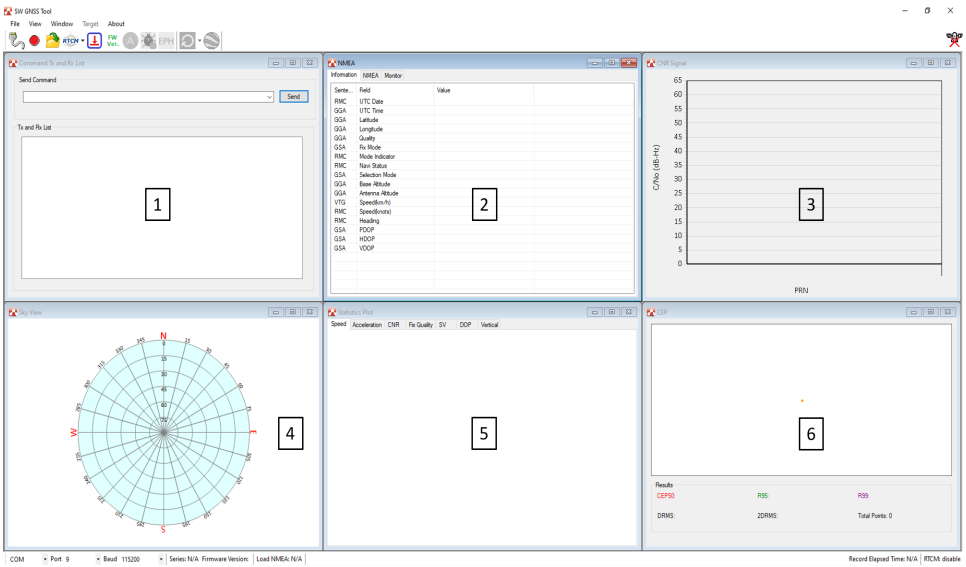


Figure 4-5: Main Program Screen

1. **Command Tx and Rx List:** clicking on this menu item will display the Command window.
2. **NMEA List:** clicking on this menu item will display a window with NMEA information.
3. **CNR Signal:** clicking on this menu item will display the CNR signal window.
4. **Sky View:** clicking on this menu item will display a window with a sky view of satellites.
5. **Statistics Plot:** clicking on this menu item will display the statistics plot window.
6. **CEP:** clicking on this menu item will display the CEP (Circular Error Probable) window, which can calculate the CEP in real-time or from a historical position.

After the Development Kit is connected with the PC, please choose the correct **<COM Port>** and **<Baud Rate>**.

Figure 4-6: COM Port Dialog

If you want more information about the GNSS Tool software, refer to AirPrime GNSS Tool User Guide.

5: Troubleshooting

Setup Troubleshooting

Table 5-1: Troubleshooting Causes and Solutions

Problem	Possible Cause	Solution
Cannot find GNSS device	USB was not set up properly	Check to see if the Development Kit was set up properly, and make sure that the device is receiving enough power through the USB cable (red LED should light up continuously).
No NMEA data or GNSS signals	1. USB was not set up properly. 2. COM port or baud rate value is incorrect.	1. Check to see if the USB connector to the PC or Development Kit is connected properly. 2. Double check to see if the proper COM port and baud rate value are selected.
Poor GNSS Signal Reception	1. If it is used inside a vehicle, the anti-sunscreen film on the windshield may interfere and weaken the GNSS signal. 2. The vehicle might be under some area with a dense overhead canopy such as a forest, buildings, tunnels, etc.	For both problems, the user may connect an external active antenna to the Development Kit, and then place the antenna on top of the car's roof to improve signal reception.

Note: If these troubleshooting steps do not solve the problem, please contact us or send the module back to us for inspection.

Causes of Poor GNSS Signals

It is possible to have weak GNSS signal in the following situations:

Table 5-2: Examples Where Poor GNSS Signals May Occur

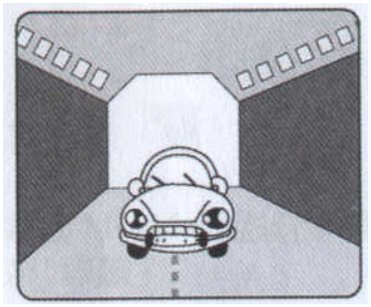
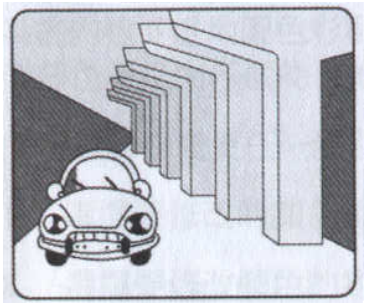
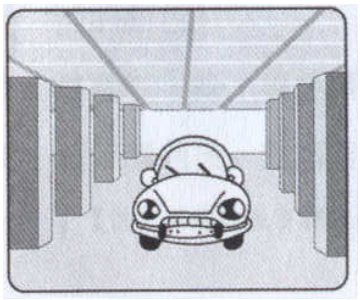
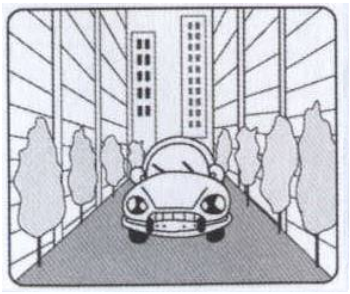
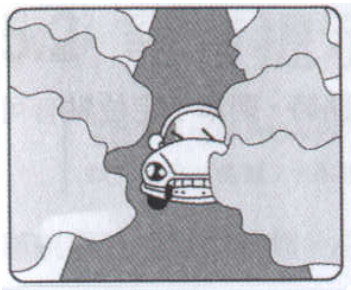
	Inside a tunnel, where the GNSS signal is blocked.
	Underneath infrastructure (e.g. a bridge), where the GNSS signal is blocked.
	Inside a building, where the GNSS signal is blocked.

Table 5-2: Examples Where Poor GNSS Signals May Occur (Continued)

	Next to tall buildings, where the GNSS signal is weakened.
	Underneath forests or any other kinds of canopy where the GNSS signal is weakened.

- If the Development Kit is used inside a car which has anti-sunlight films on the windshield and windows, the GNSS signal will be weakened severely, and may result in no GNSS reception.
- GPS satellites are the property of the United States Army. Sometimes they will tune-down accuracy for unknown reasons. In such cases, the GPS position may not be accurate.

6: References

Refer to the following documents for more information. Visit http://source.sierrawireless.com for the complete range of available documentation.

1. AirPrime XS1110 Product Technical Specification
   Reference number: 41113354
2. AirPrime GNSS Tool User Guide
   Reference number: 41111068