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INSTALLATION AND OPERATION

USER MANUAL

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UFirebirdII-UC6580

Evaluation Kit

Revision History

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R1.0	First release	Apr.,2023

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Foreword

This document describes the use of the UC6580 evaluation kit (EVK) for the function and performance test of the chip.

Target Readers

This document applies to technicians who are familiar with GNSS receivers.

Content

1 Overview

UC6580 evaluation kit (EVK) has two parts: bottom board and GNSS adapter. The bottom board connects to the GNSS adapter via the connector. The EVK is mainly used in the function and performance test of the chip UC6580 for the convenience of the users.
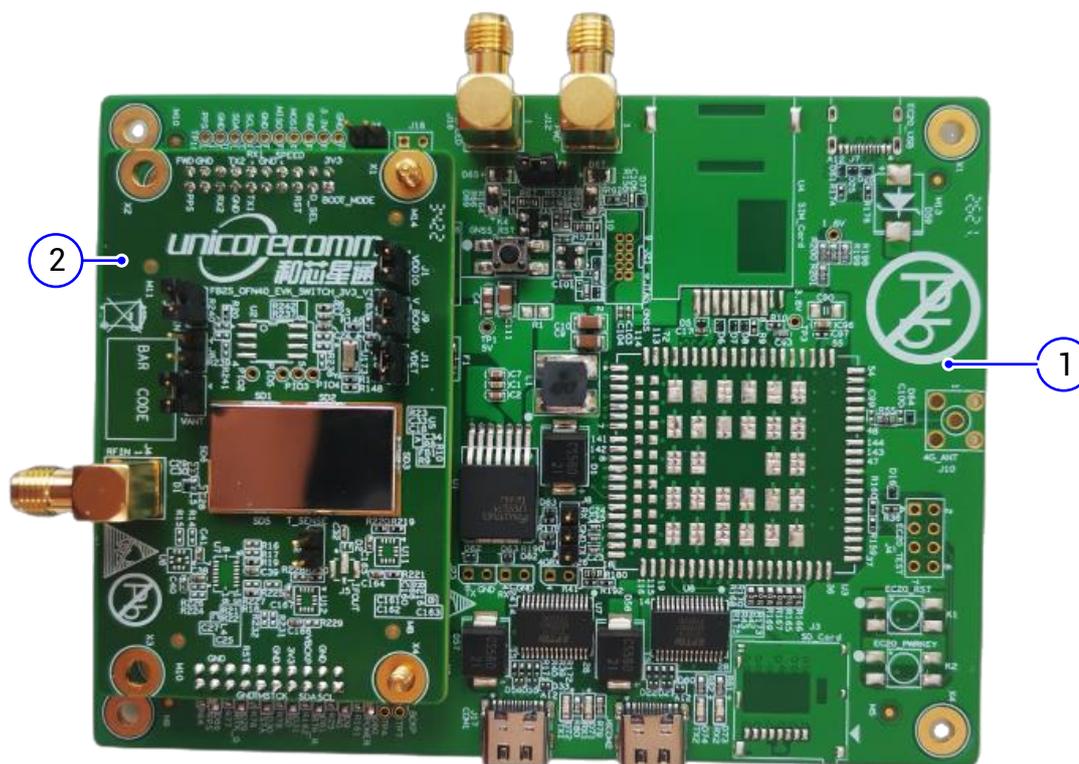
Figure 1-1   UC6580 EVK

(1)   Bottom Board   (2)   GNSS Adapter

2 EVK Introduction

2.1 Block Diagram
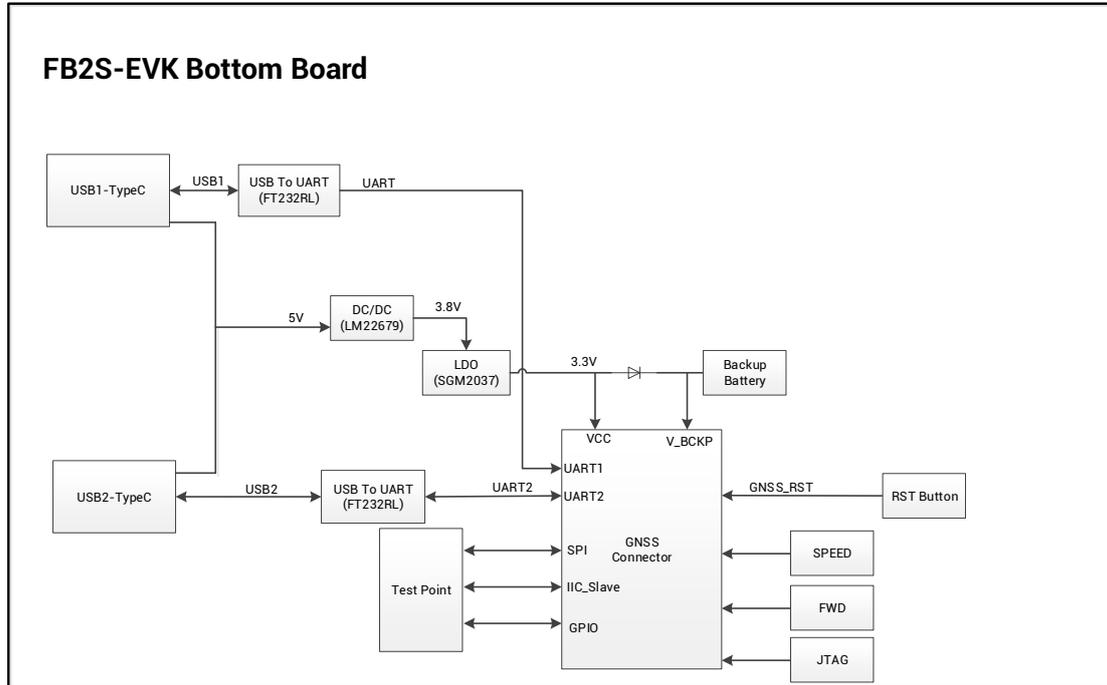
Figure 2-1   Block Diagram of Bottom Board
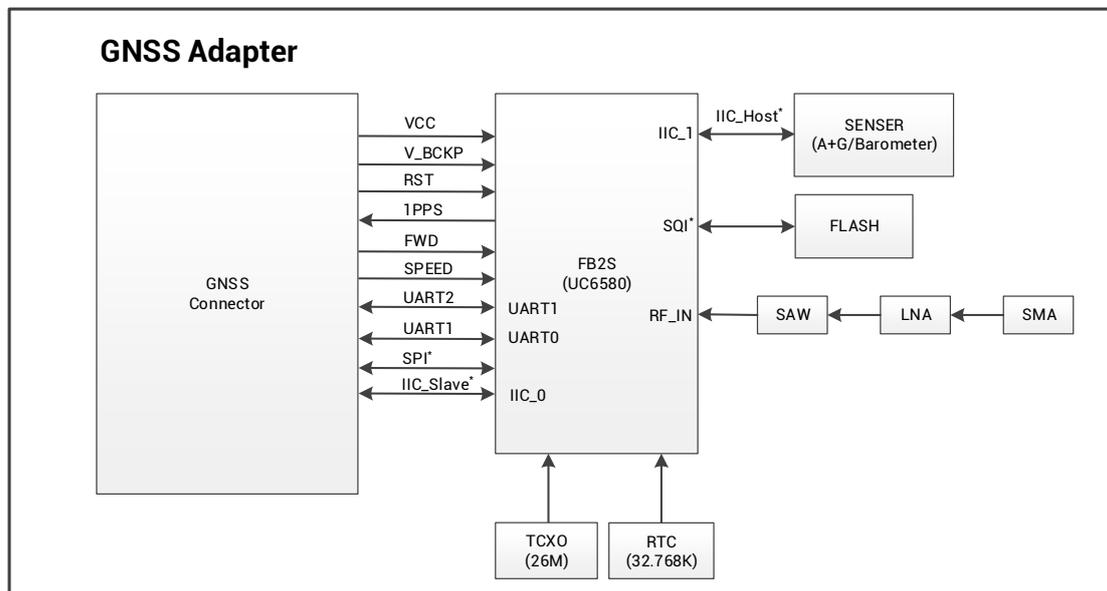
Figure 2-2   Block Diagram of GNSS Adapter

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*: Supported later.

2.2 Power Supply

The EVK can be powered by a 5 V supply via the USB2.0 interface J17 or J6. You can directly connect it to the PC to communicate as well as supplying power.

2.3 Configuration

The bottom board provides many interfaces, such as two USB interfaces, a FWD signal SMA interface and a SPEED signal SMA interface. And on the GNSS adapter, there is the GNSS RF interface J4, the power interfaces VDDIO/DCDC_IN/V_BACK, and the antenna feed interface VANT etc.

3 Interface
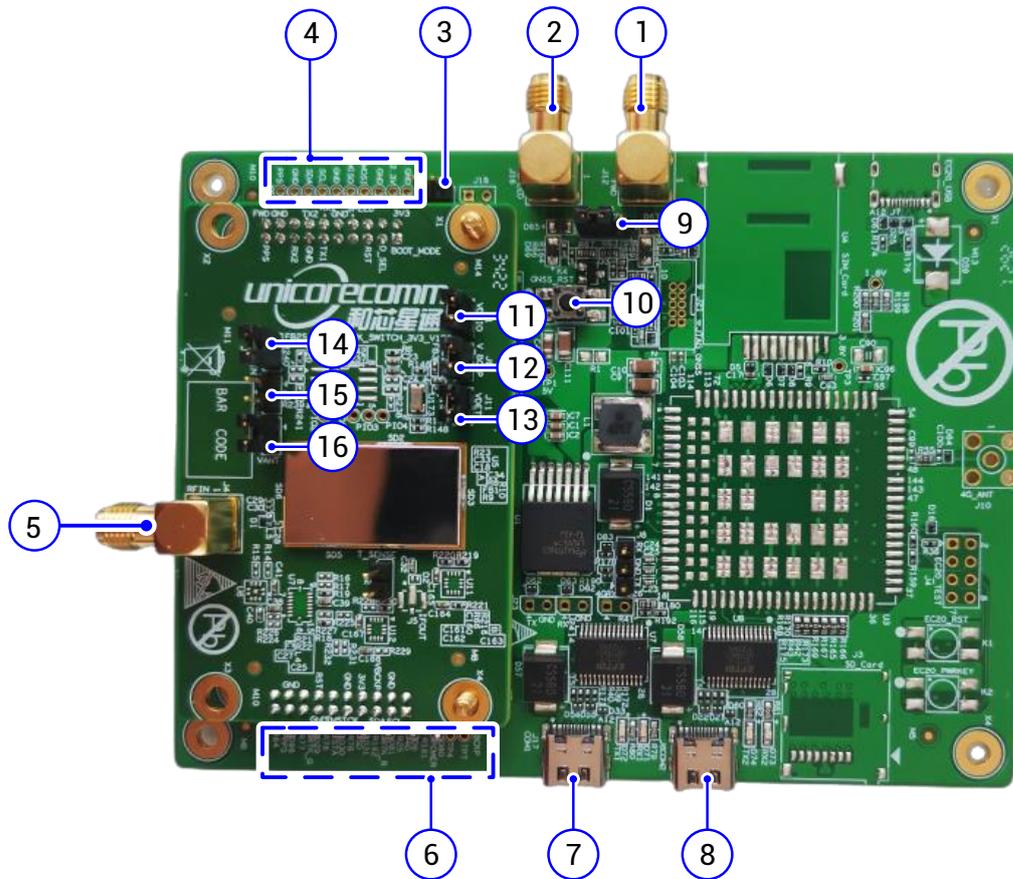
Figure 3-1   EVK

(1)	FWD Signal SMA Interface (J12)	(2)	SPEED Signal SMA Interface (J16)
(3)	SPI/I^{2}C Mode Selection (J25)	(4)	SPI/I^{2}C/PPS Test Point
(5)	GNSS Antenna SMA Interface (J4)	(6)	Status Indicator
(7)	USB1 Interface (COM1,J17)	(8)	USB2 Interface (COM2,J6)
(9)	SPEED Signal Phase Selection (J20)	(10)	GNSS Reset Button (K4)
(11)	VDDIO Jumper (J1)	(12)	Backup Battery V_BACK Jumper (J9)
(13)	VDET Jumper (J11)	(14)	DCDC_IN Jumper (J10)
(15)	VQPS Jumper (J8)	(16)	Antenna Feed Jumper (J3)

3.1　USB Interface

The EVK supports two Type-C USB2.0 interfaces J17 and J6. See Figure 3-1 (7) and (8). USB1 and USB2 respectively correspond to UART1 and UATR2 of the GNSS adapter. Both of the two UARTs can be used to communicate with the host, but only UART1 can be used for firmware upgrade.

3.2　Antenna Interface

The bottom board has two SMA interfaces: J16 (SPEED signal) and J12 (FWD signal). The voltage of the two signals should be no more than 15 V and no less than 5 V. The SPEED signal supports phase switch, which is controlled by the jumper J20; the signal is positive when pin 1 and 2 are connected and negative when pin 2 and 3 are connected. The pin 1 and 2 are connected by default.

The antenna interface on the GNSS adapter is used to connect the GNSS antenna. When you use an external active antenna, you need to install the jumper cap to the J11 (VDET jumper) and J3 (VANT jumper). The antenna voltage is (VDDIO-0.1V).

3.3　Button

On the bottom board, there is a chip reset button K4.

3.4　Communication Mode Selection

J25 on the bottom board supports the communication mode selection. Installing the jumper cap (ON) is the SPI[1] mode while removing (OFF) is the UART and I^{2}C_slave[1] mode. By default, it is OFF.

When the SPI mode is selected, SPI_SCK is the SCL testing point and SPI_CS is the SDA testing point.

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[1] Supported later.

3.5　Status Indicator

Indicator Symbol	Name	Description
D71	UART1-RX	Light on when receiving data; otherwise off
D72	UART1-TX	Light on when sending data; otherwise off
D73	UART2-RX	Light on when receiving data; otherwise off
D74	UART2-TX	Light on when sending data; otherwise off
D80	Power indicator	Light on when there is power supply; otherwise off
D66	PPS status indicator	Light on with low level voltage; off with high level voltage

3.6　GNSS Power Supply Interface

GNSS adapter has three power supply interfaces.

Symbol	Description	Pin 1	Pin 2
J1	VDDIO interface	3.3 V power supply from the bottom board	VDDIO power supply interface
J9	Backup battery interface		V_BACK power supply interface
J10	DCDC_IN interface		DCDC_IN power supply interface

Each interface has two pins. Pin 1 is connected to the 3.3 V power on the bottom board, and pin 2 is connected to different power domains. By default, the jumper caps are installed and the adapter is supplied by the power on the board. If you use an external voltage to power the interfaces, connect the power to pin 2.

4 Positioning and Power Consumption Test

4.1 Positioning Test

1. Connect the GNSS antenna to the interface J4 on the adapter and fix the antenna in a non-occluded area.

2. Connect the EVK to the PC through the USB interface. Then the power indicator is on.

3. Start the UPrecise on the PC, select the correct port and baud rate 115200 to make sure the receiver is connected.
   Then the positioning related information appears on the screen, and in the situation of open sky, the CN0 is normally above 40. Refer to *UPrecise User Manual* for more details.

Figure 4-1   Connecting EVK to PC

4.2　Power Consumption Test

4.2.1 Power Consumption in Running Mode

To power the GNSS adapter, you can use an external voltage or the power from the bottom board. See 4.2.1.1 and 4.2.1.2 for the procedures to test the power consumption in the running mode with different power source.

4.2.1.1　Powered by Bottom Board

When the adapter is powered by the bottom board. Follow the procedures below to test the power consumption in the running mode.

1.　Remove the VDDIO and DCDC_IN jumper caps before power on.
2.　Use two test wires, one end of which inserted to the VDDIO jumper, and the other end connected to the multimeter (see Figure 4-2).
3.　Do step 2 again with another two wires and a multimeter but insert the wires to DCDC_IN jumper.
4.　Turn the multimeters to current mode.
5.　Connect the EVK to the PC through the USB interface. Then the EVK is powered.
6.　Connect the signal source to the antenna SMA interface J4. Set the signal strength to -130 dBm.
7.　Start the UPrecise and make sure that the positioning is successful.
8.　Read the current values of $VDDIO_{current}$ and $DCDC\_IN_{current}$.
9.　Compute the power consumption, which is equal to
　　$3.3\ V \times (VDDIO_{current} + DCDC\_IN_{current})$.

Figure 4-2　Testing Power Consumption

☞ If you just have one multimeter, you can measure the current VDDIO$_{current}$ and DCDC_IN$_{current}$ respectively. Make sure that when you measure either one of the current values, the other jumper cap is installed.

4.2.1.2　Powered by External Voltage

When you use the external voltage to power the adapter, the power consumption is tested as follows.

1. Remove the jumper caps of DCDC_IN (J10) and VDDIO (J1).

2. Connect the positive end (red) of the external power device to the pin 2 of DCDC_IN (J10) and VDDIO (J1). Here, you can use a one to two cable.

3. Connect the negative end (black) to the GND.

4. Connect the EVK to the PC through the USB interface. Then the EVK is powered.

5. Connect the signal source to the antenna SMA interface J4. Set the signal strength to -130 dBm.

6. Start the UPrecise and make sure that the positioning is successful.

7. Read the current values of DCDC_IN$_{current.}$ and VDDIO$_{current}$.
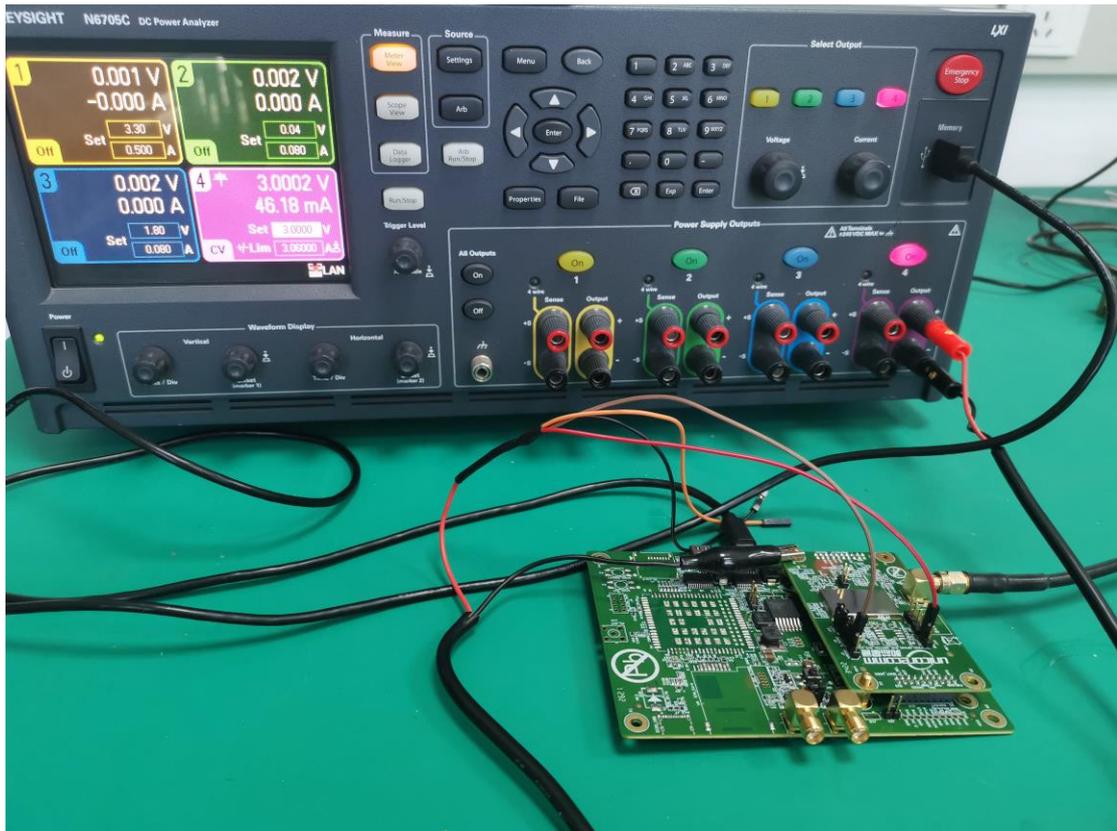
Figure 4-3 Testing DCDC_IN$_{current}$

8. Compute the power consumption, which is equal to

External Voltage × (VDDIO$_{current}$ + DCDC_IN$_{current}$).

Similarly, if you do not have the one to two cable, you can measure the current VDDIO$_{current}$ and DCDC_IN$_{current}$ respectively.

4.2.2 Power Consumption in V_BACK Mode

To test the power consumption of V_BACK, do the following steps:

1. Remove the jumper caps of VDDIO and DCDC_IN.
2. Use two test wires, one end of which inserted to the VDDIO jumper, and the other end connected to the multimeter.
3. Do the steps 4 to 7 in section 4.2.1.1 again.
4. Read the current values of V_BACK$_{current}$.
5. Compute the power consumption, which is equal to 3.3V × V_BACK$_{current}$.

5 Firmware Upgrade

1. Connect the EVK to PC through USB1 following the procedures described in section 4.1.
2. Start the UPrecise.
3. Click **Receiver Upgrade** to do the upgrade. Refer to *UPrecise User Manual* for more details.

6 Remark

After connecting the PC, if a confliction between the serial port and the mouse happens, you can remove the serial enumerator in the advanced settings of the serial port property.
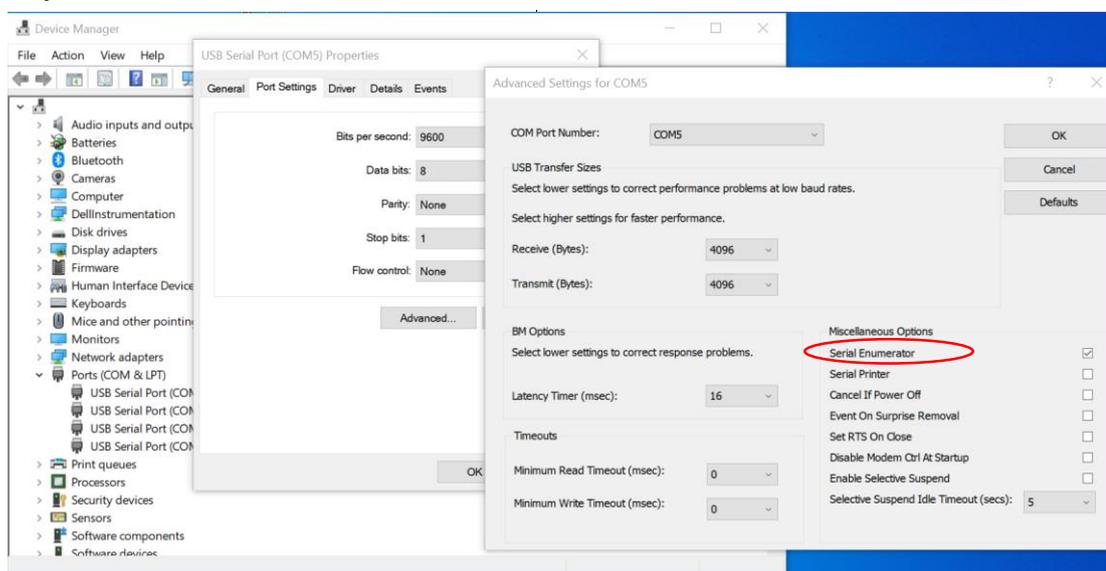
Figure 6-1 Removing Serial Enumerator

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