

Philips DreamStation Modem Accessory - Operational Description

1. OVERVIEW

The primary use of the wireless modem accessories is to transmit patient compliance information from the Philips DreamStation (Nirvana) CPAP device to the EncoreAnywhere database. The secondary function of the accessories is interfacing with a Pulse-Oximeter device for logging Oxygen levels of the user.

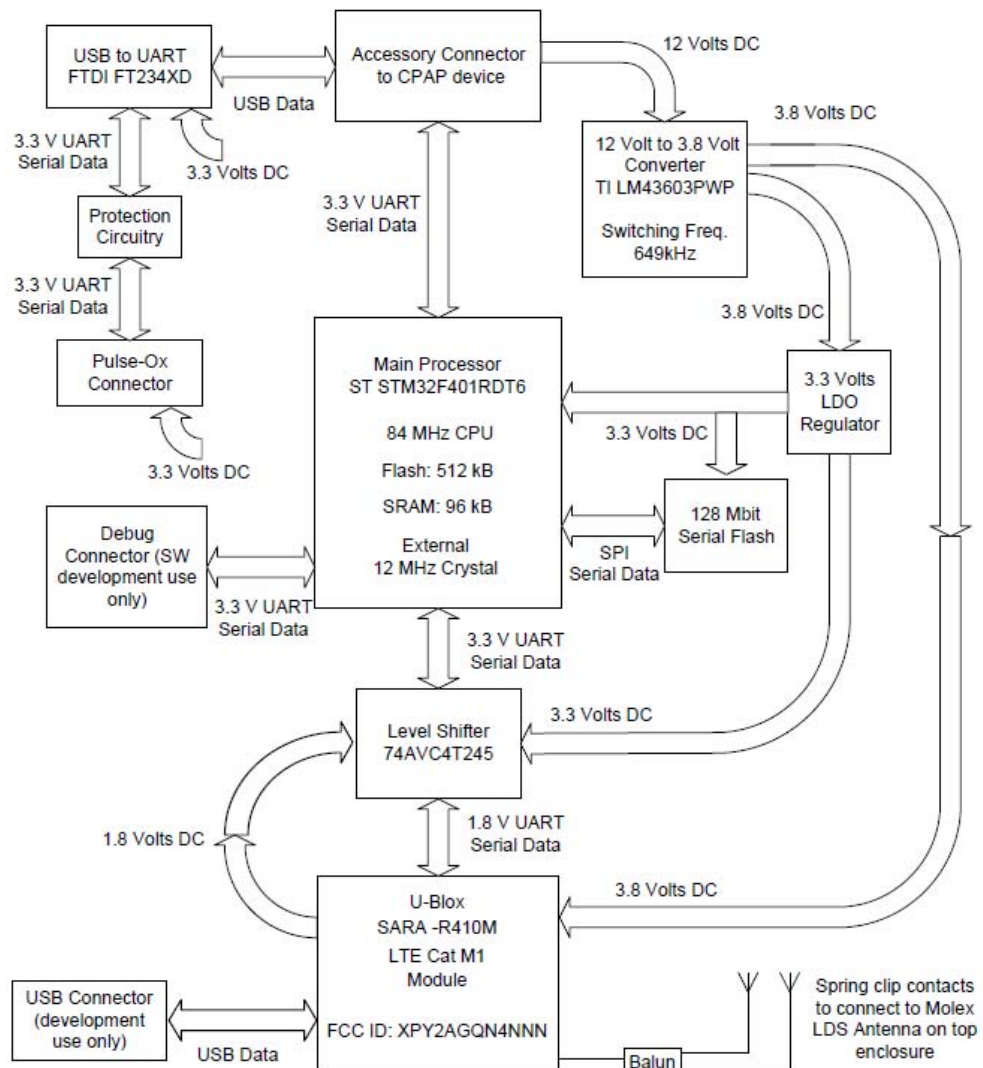
The Cellular Modem is designed for use with the Philips DreamStation therapy devices. Once installed, it collects therapy compliance data from the device and automatically connects to EncoreAnywhere to upload that data. Home care providers and medical professionals can then use this information as one of several elements to evaluate patient compliance and if necessary, change the therapy device's settings. Any new settings will be implemented during the modem's next connection. The Cellular Modem is able to receive oximetry data and transfer it to the therapy device.

The cellular modem used is a U-Blox SARA-R410M-02B FCC ID: XPY2AGQN4NNN. The processor is a STM32F401 operating at 84 MHz. The processor is powered by a LM43603 switcher. There is an 8 Mbit Flash memory IC U11. A block diagram follows.



2. BLOCK DIAGRAM

DreamStation Cell Modem Models 200603C and 200604C



3. EXTERNAL CONNECTORS

a. Accessory Connector – [To DreamStation Base](#)

The accessory interface PX1 is a custom gold-finger edge connector of the accessory PCB. The interface is intended to support all communications to the host device via RASP (Respirionics Advanced Serial Protocol). 12 volt power is provided from the host device on pins 9, 10, 11 and 12. The serial connection is a UART connection on pins 16 and 18. The connector also carries USB signals on pins 3 and 4 for the pulse oximeter.

b. Accessory Connector – Pulse Oximeter

The pulse-oximeter interfaces through connector J3. The interface provides 3.3 volts to the pulse-oximeter on pin 1. The serial connection is a UART interface on pins 2 and 3. The 200604C does not have the pulse oximeter circuit parts placed and the case does not have a hole for the related connector. The only difference between the 200603C and 200604C is the pulse ox circuit and having a hole in the case for the connector.

4. USER INTERFACE

The only user interface for the modem accessories is through the LCD and rotary encoder on the host device. SEE DREAMSTATION USER MANUAL FOR SPECIFICS.

5. Internal Radio and RF Section

Cellular radio functionality is provided on the Philips DreamStation Wireless Modem Accessory by a U-Blox SARA-R410M-02B module FCC ID: XPY2AGQN4NNN. The module is a LTE Cat. M1 radio. It interfaces to the host processor via a UART connection. The host processor controls the U-Blox module with AT commands.

a. Modulations/Maximum Data Rate

- 3GPP LTE Cat M1 using QPSK and 16-QAM modulations data rates:
 - FL max. 375kbps, RL max. 375kbps

b. Matching Network

The antenna impedance is matched by a stub on the printed circuit board. The pads for an impedance matching circuit is populated only by zero ohm resistors for connection to the modem.

c. Antenna

The antenna is a dipole. The dipole is followed by a balun transformer to convert from balanced antenna feed to an unbalanced line that connects to the cell modem. The antenna is deposited on the plastic enclosure top, and then painted to match the color of the plastic.



6. ACCESSORIES

Accessory units can be bundled with or sold separately from the Philips DreamStation Wireless Modem Accessory.

a. Pulse Oximeter

This is a device that measures the pulse rate and blood oxygen saturation of the patient. Data from the pulse-oximeter is compiled on the DreamStation device as part of the user compliance data.

7. Unauthorized User Protection

Embedded software on the host processor can only be changed via a JTAG connector that is located on the PCB and not available outside the case. The JTAG connector is not installed on production units. Users do not have access to this port nor access to the project code.

Updating of user software can only be done over a serial connection to the accessory connection port. The process can only be completed if the user is familiar with RASP, Respirationics Advanced Serial Protocol, which is a proprietary protocol only used for internal purposes.

8. Philips DreamStation Modem Market | Model Name | Model Number

- United States | DreamStation Cellular Modem, US | 200603C, and 200604C

