Iridium 9523 Developer's Kit Guide

Iridium Communications, Inc.

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Revision History

Revision	Date	Comment
1.1	Nov 4, 2011	First published revision

1   Description of Iridium 9523 Developer's Kit

The Iridium 9523 is Iridium's voice and data transceiver module. It is intended to be mounted onto a field application (FA) board using four corner screw holes, four corner alignment screws, and central alignment pin. More information on the 9523 is provided in the 9523 Developer's Guide.

The Iridium 9523 Developer's Kit includes a 9523 already mounted onto a 9523 Test Interface Board (TIB), which serves as an example application board and allows use of the 9523 with off-the-shelf hardware (e.g. with the 5V DC power supply provided in the kit, an Iridium-approved antenna, and an Iridium Intelligent Handset).
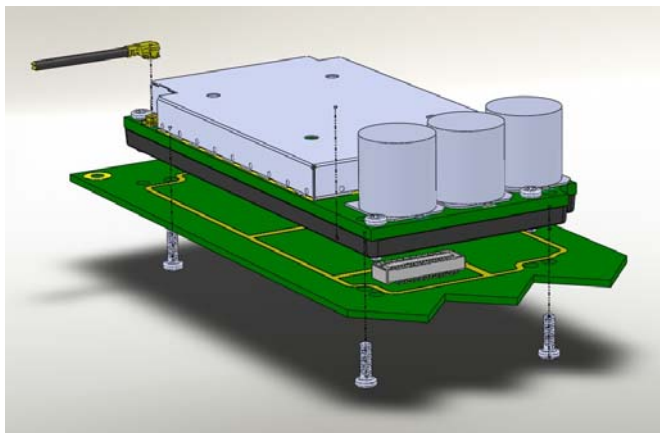
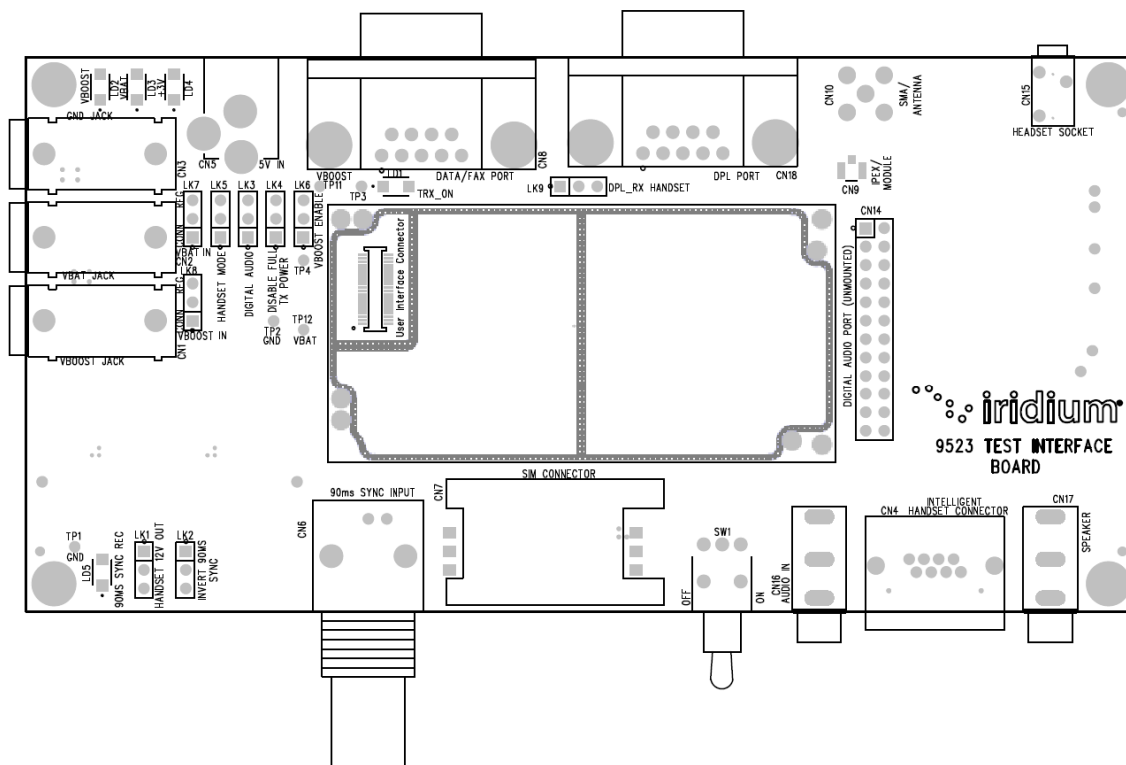**Figure 1: 9523 Top View**   **Figure 2: 9523 Bottom View**   **Figure 3: 9523 Left Side View**

Figure 4: Mounting 9523 to Application Board

Figure 5: 9523 Test Interface Board Top View

1.1 Parts List

Each Developer's Kit consists of:

1. 1 x Iridium 9523

2. 1 x Iridium 9523 Test Interface Board (TIB)

3. 1 x AC/DC 6V Power Supply

4. 4 x Screws (M1.6X0.35X5MM Torx Plus Recessed Flat Top Pan Head)

5. 1 x CD containing Iridium 9523 Developer's Kit Guide (this document), Iridium 9523 Developer's Guide, warranty, evaluation form, and application board reference design files

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2   Use of the 9523 Developer's Kit

2.1   Configuration Jumpers

There are several jumpers on the TIB, labelled LK1-LK9, that allow configuration of the TIB and 9523. Each jumper is composed of a three-pin header, with the two outer pins holding the jumper's two input values and the central pin holding the jumper's output value. A user connects the central pin to one of the outer pins with a conductive cap in order to select one of the inputs onto the output. Most of the jumpers on the TIB select digital ON or OFF onto their output; two of the jumpers (LK7 and LK8) select one of two input power sources onto their output. Use of each jumper is described in the following sections.

Where jumper positions are provided, this references the position of the jumper cap with respect to the orientation of the TIB presented in the figure above: looking down on the board, with the Iridium logo right-side up. When the jumper is described as in the "up" position, this means that the jumper cap connects the central pin with the top pin; when the jumper is described as in the "down" position, this means that the jumper cap connects the central pin with the bottom pin; and so on for "left" and "right".

Please note that LK6/VBOOST ENABLE does not serve as a jumper but rather as an output of the board.

2.2   Power Input

There are two input power supply options to the TIB:

1. Plugging in the included AC/DC 5V "wall-wart" power supply and connecting it to the jack on the TIB labelled 5V IN. Power circuitry on the TIB converts this 5V input to the VBAT, VBOOST, and LVTTL levels needed to power the 9523 and TIB. This is the simplest and the recommended method of powering the TIB and 9523.

2. Providing power through the three separate jacks on the TIB labelled GND JACK, VBAT JACK, and VBOOST JACK. This is a more direct way of powering the 9523. It allows use of a lab power supply for testing performance and power consumption over various voltage levels within the specified ranges (relative to GND):

Supply	Minimum	Nominal	Maximum
VBAT	3.2 V	3.7V	6.0 V
VBOOST	10.5 V	28.V	30.0 V

The input power supply method is selected using the LK7/VBAT IN and LK8/VBOOST IN jumpers. When using the first option (5V input), both jumpers should be in the up position; when using the second option (VBAT and VBOOST inputs), both jumpers should be in the down position. Users should disconnect all power inputs to the TIB before switching the jumper positions and should ensure that the two jumpers are in the same position before connecting power input again. VBOOST, VBAT, and +3V LEDs light up to indicate that the TIB is powered.

When using the second option, the LK6/VBOOST ENABLE pins may be probed for the 9523's PA_BOOST_EN output.

2.3 On/Off Toggle Switch

After the DC power is connected, the 9523 can be turned on and off using the ON/OFF toggle switch, labelled SW1. This selects digital ON or OFF onto the TRX_ON 9523 input. The LED labelled TRX_ON lights up when ON is selected.

2.4 90ms Sync Pulse Input

This port is used for special test modes. It is not intended for general use by developers.

2.5 Data/Fax RS-232 Port

This RS-232/DE-9 serial port provides access to the 9523's data/fax interface, which is the medium for AT commands and responses to and from the module. Product developers may connect a PC's serial port to the TIB data/fax port through a standard RS-232/DE-9 cable; they may then send commands and see responses using HyperTerminal or similar software on their PC. In order to use the 9523's data/fax interface, the HANDSET MODE jumper should be in the down position.

The default port settings are 8 bits, 1 stop bit, no parity, hardware flow control, and auto-baud at start-up.

Quick check:

> Provide power to the TIB and switch on the 9523
>
> Type "AT+CGMR" into a serial data terminal connected to the DATA Port.
>
> You should receive back some HW and SW revision information from the 9523 module.

Please see the end of the 9523 Developer's Guide for a full definition of the 9523's AT command interface and example use cases of that interface, such as sending an SBD message and making a voice call.

2.6 DPL RS-232 Port

This RS-232/DE-9 port is used for special test modes not intended for general use by developers and for the intelligent peripheral (IP) interface. In order to use this port instead of the Intelligent Handset port to access the Iridium 9523's DPL interface, the DPL_RX HANDSET jumper must be placed in the right (i.e. not left) position.

2.7 Antenna/RF Connection

A 50 ohm SMA connector (labelled "SMA/Antenna") and a smaller surface-mount coaxial connector (labelled "IPEX/Module") are mounted near each other on the TIB and electrically connected by a 50-ohm trace on the TIB PCB. The surface-mount coaxial connector is identical to

the antenna connector on the Iridium 9523, and is connected to the 9523's connector by a short 50-ohm coaxial cable. An external antenna may be connected to the 9523 antenna connector through the TIB's SMA connector.

2.8   Intelligent Handset Port

The TIB includes an RJ45 connector labelled "INTELLIGENT HANDSET", to which an Iridium Intelligent Handset (also known as the DPL Handset or DPL Peripheral Handset) may be directly connected. In order to use the Intelligent Handset port, the HANDSET 12V OUT jumper must be in the up position so that the TIB provides power to the handset connector and the DPL_RX HANDSET jumper must be in the left position in order to connect the handset connector to the 9523's DPL interface. In order to route audio input/output through the handset instead of the headset jack, the 9523 must be configured to use the appropriate PCM digital audio path through issuing the AT+CAR=2 command. The HANDSET MODE jumper may be in either position; if it is in the up position (setting 9523 input LBD_HSTB to OFF) then the 9523 will not accept AT commands on the data/fax interface and should consume less power.

If using the Iridium Intelligent Handset, please see the handset's manual for instructions.

2.9   Separate Microphone and Speaker Ports

A separate microphone and speaker may be attached to the TIB's connectors labelled "AUDIO IN" and "SPEAKER". These are tied to the same signals as the microphone and speaker wires on the Intelligent Handset connector. As when using the Intelligent Handset, the 9523 must be configured to use the appropriate PCM digital audio path through issuing the AT+CAR=2 command. Voice calls may be initiated and controlled through the data/fax port. The HANDSET MODE jumper must be in the down position (setting 9523 input LBT_HSTB to ON) in order to use the data/fax interface.

2.10 Headset Port

An Iridium Hands-Free Headset may be attached to the TIB's HEADSET SOCKET connector. The 9523 must be configured to use the appropriate PCM digital audio path through issuing the AT+CAR=1 command. Voice calls may be initiated and controlled through the data/fax port. The HANDSET MODE jumper must be in the down position (setting 9523 input LBT_HSTB to ON) in order to use the data/fax interface.

2.11 SIM Connector

This holds a SIM card. Due to circuitry on the TIB, the SIM card may be either 1.8V or 3V.

2.12 Digital Audio Port

This port provides access both to the 9523's two PCB digital audio interfaces and to the programming interface for the two codec chips on the TIB that provide the analog audio interface for the Headset port and the Intelligent Handset port. This port allows users to test their own codec circuitry and to configure the codecs on the TIB. As it is not expected that most users will want to

use this port, the connector is not mounted on the TIB as provided in the Developer's Kit and the 9523 + TIB regulatory certification does not include use of this port. Those interested in using the port may acquire and mount the connector themselves – the part is listed in the reference design files.

In order to use the digital audio port instead of the headset and handset ports, the DIGITAL AUDIO jumper must be placed in the up position. This causes the PCM digital audio inputs to the 9523 to be selected from the TIB's digital audio port instead of from the on-board codecs.

2.13 Disable Full Tx Power Jumper

This jumper sets the 9523 input FULL_POWER_EN to ON when in the down position and to OFF when in the up position.