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Iridium **9603**

SBD Transceiver Developer's Kit
REVISION 1.0

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1   What is the Iridium 9603 Developer's Kit

The Iridium 9603 is the latest Short Burst Data Transceiver from Iridium. It is much smaller than its predecessor, the Iridium 9602, and is intended to be mounted onto a PCB using the two mounting holes provided. More information on the Iridium 9603 is provided in the Iridium 9603 Developer's Guide.
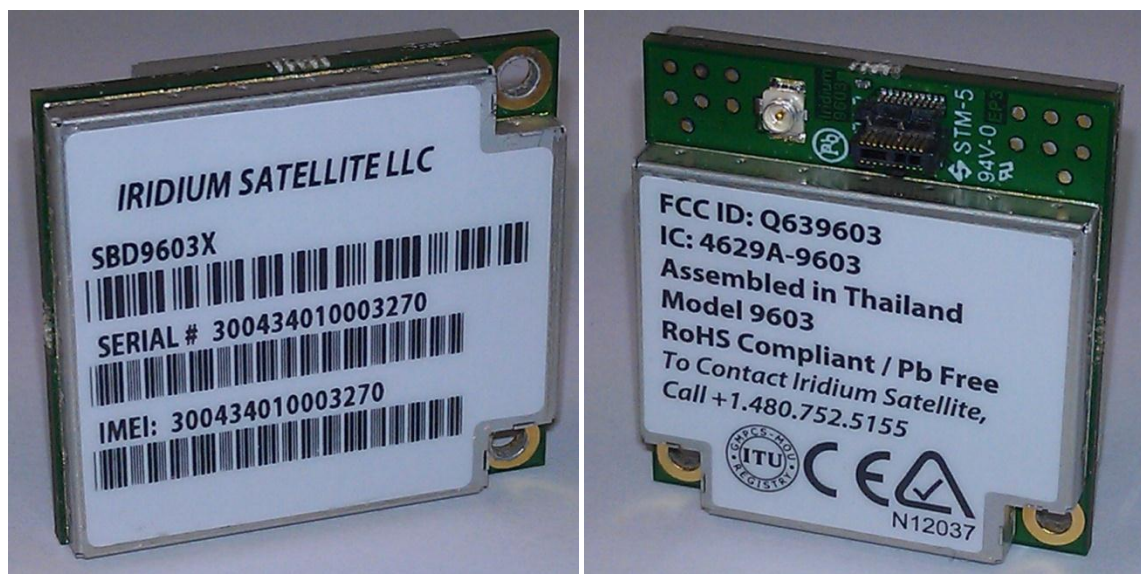
Figure 1. Iridium 9603 Transceiver

The Iridium 9603 Developer's Kit includes a 9603 mounted onto a Test Interface Card (TIC). This will allow for easy powering, control and interfacing to the 9603 and allow use of the 9603 with off the shelf hardware (e.g. with 5V DC power supply, Iridium-approved antenna, etc.)

1.1   Parts List

Each Developer's Kit consists of:

1. 1 x Iridium 9603 module (mounted on a 'Iridium 9602 TIC Board')
2. 1 x Iridium 9602 Test Interface Card (TIC)
3. CD with 9603 Developer's Guide, SBD Service Developer's Guide, reference design files in a variety of formats.
4. 1 x Pigtail cable, U.FL to SMA (SAMTEC MH113-MH1RP-01BJ1-0150)
5. Power Supply
6. Packaging

2   How to use the 9603 Developer's Kit
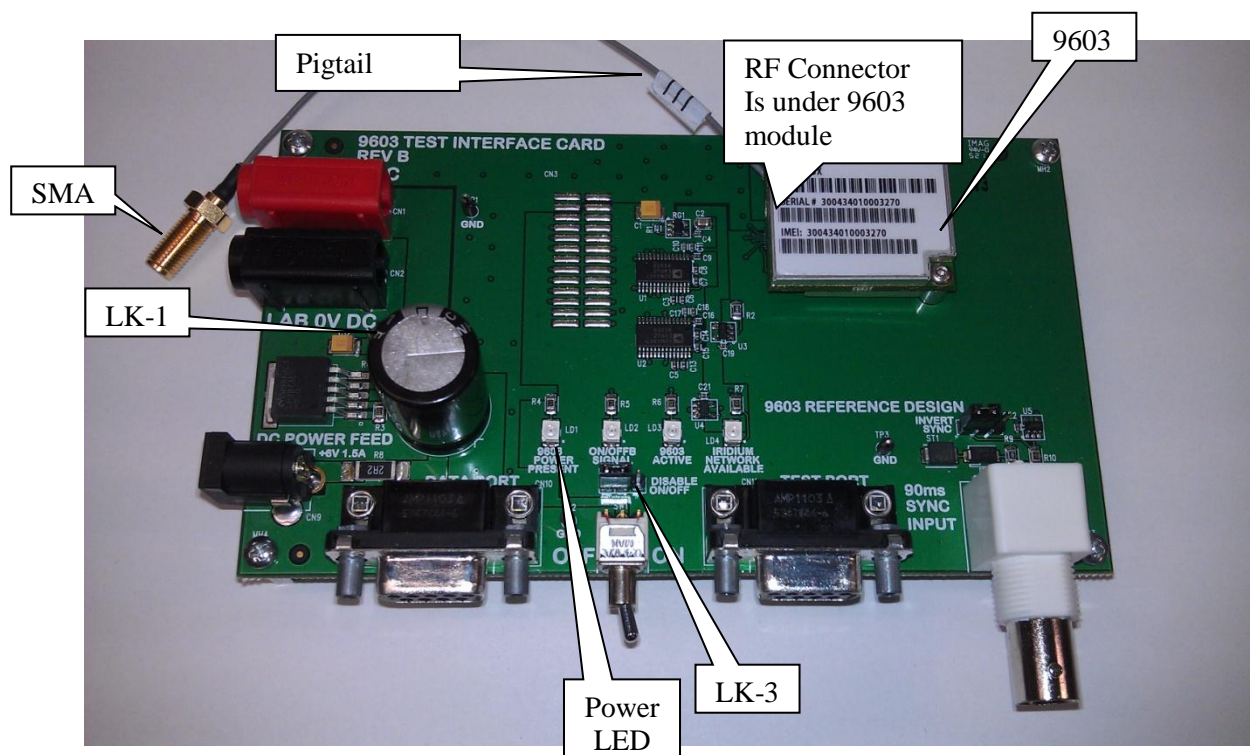
Figure 2. Iridium 9603 Developer's Kit.

2.1   Power Supply

There are two methods DC power can be supplied to developer kit.

1.   Either +5VDC from a laboratory bench power supply connected to the red & black jacks or

2.   Use of a DC power block (6VDC 1.5A) to connected to the DC Power Feed jack (not provided).

Link LK1 should be set as follows:

   o   Connecting Pin 1 to Pin 2 supports a laboratory power supply *(This is the default setting)*

   o   Connecting Pin 2 to Pin 3 supports the DC Feed from an external power block

The "9602 Power Present" indicator should light when board power is on.

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2.2   ON / OFF

After the DC power is connected, the Iridium 9603 module can be turned on and off using the ON/OFF switch.

Link LK3 should be set as follows:

- o Connecting Pin 1 to Pin 2 supports ON/OFF via the switch *(This is the default)*
- o Connecting Pin 2 to Pin 3 turns off the module
- o Disconnect the link and use a digital signal attached to Pin 2 to support automatic ON/OFF signalling from another source

The "ON/OFF Signal" and "9602 Active" indicators should both light when the switch is set to the ON position (push to the right).

2.3   90ms SYNC INPUT

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

2.4   DATA PORT

The RS-232 serial port is the main serial data port for the Iridium 9602 TIC Board supporting the AT command interface to the module.. The TIC board provided RS-232 level conversion while the Iridium 9603 transceiver interface is 3.3 volt CMOS. Product Developers should use a standard straight through cable with 9 pin D-type connections to interface the Application Board to a PC.

The default port settings are 8 bits, 1 stop bit, no parity, no handshake at a baud rate of 19200

Quick check:

> Turn on the 9603 module.

> 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 9603 module.

The AT control interface for the data port has not changed from the 9602. Please see section 4 for the full list of supported AT commands

2.5   TEST PORT

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

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3   Example Scenarios

3.1   Setting the Default Configuration

The Field Application (FA)sets the Transceiver's default configuration to no handshaking, no flow control, radio enabled, SBD automatic notifications enabled.

To Transceiver (from FA)	To FA (from Transceiver)	Description
AT&K0		Disable RTS/CTS flow control
	OK	
AT*R1		Enable the radio
	OK	
AT+SBDMTA=1		Enable SBD ring indications
	OK	
AT&W0		Store the configuration as profile 0
	OK	
AT&Y0		Select profile 0 as the power-up default
	OK	

3.2   Power-on to Sending a Message

The FA will power up the Transceiver, wait for the Transceiver to acquire the network, and send a 70-byte message.

To Transceiver (from FA)	To FA (from Transceiver)	Description
		Apply power to the Iridium 9603
		Wait for DSR to become asserted
AT+CIER=1,0,1,0		Enable service indication reporting (note that this can be stored in the default configuration)
	OK	
	+CIEV: 1,1	Wait for the Iridium 9603 to acquire the network
AT+SBDWB=70		Transfer message to Iridium 9603
	READY	
<binary transfer>		
	0	
AT+SBDIX		Perform SBD session
	+SBDIX: 0,23,0,-1,0,0	
AT+SBDD0		Clear the MO message buffer
	OK	

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3.3   Automatic Notification Registration

The FA verifies its registration state, performs a registration in order to be able to receive automatic notifications, and enables automatic notification indications.

To Transceiver (from FA)	To FA (from Transceiver)	Description
AT+SBDREG?		Query the Transceiver registration status
	+SBDREG:0	Transceiver is detached, i.e. un-registered
AT+SBDREG		Tell the Transceiver to register for automatic notifications
	+SBDREG:2,0	Transceiver is now registered
AT+SBDREG?		Query the Transceiver registration status
	+SBDREG:2	Transceiver is registered
AT+SBDMTA=1		Enable SBD ring indications from Transceiver to FA
	OK	

3.4   Automatic Notification Message Reception

The FA verifies its registration state. Upon receiving a automatic notification the FA initiates an SBD session to receive an MT message.

To Transceiver (from FA)	To FA (from Transceiver)	Description
AT+SBDREG?		Query the Transceiver registration status
	+SBDREG:2	Transceiver is registered
	…	Vendor application sends an MT message to the GSS
	+SBDRING	Transceiver indicates an incoming message. The RI line also toggles.
AT+SBDIXA		FA initiates an SBD session in answer to the automatic notification
	+SBDIXA:0,23,1,237,90,2	Transceiver informs FA that a 90-byte message was successfully received with MTMSN 237, and that two further MT messages are queued at the GSS
AT+SBDRB		FA retrieves the received message from the Transceiver
	<binary transfer>	

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3.5 Automatic Notification Automatic Registration

The FA verifies its registration state and enables automatic registration using the "Ask" mode.

To Transceiver (from FA)	To FA (from Transceiver)	Description
AT+SBDREG?		Query the Transceiver registration status
	+SBDREG:2	Transceiver is registered
AT+SBDAREG=2		FA sets the automatic registration to "Ask" mode
	OK	
	…	Transceiver is moved
	+AREG:0,0	Transceiver notifies FA that it needs to register
AT+SBDREG		FA instructs the Transceiver to register
	+SBDREG:2,0	Registration is successful

3.6 Sending a Message with Minimal Radio Activity

Assuming that service indication events have been turned on with AT+CIER=1,0,1, and the radio has been disabled with AT*R0.

To Transceiver (from FA)	To FA (from Transceiver)	Description
AT+SBDWB=70		Transfer message to Iridium 9603
	READY	
<binary transfer>		
	0	
AT*R1		Activate the radio and wait for the Transceiver to acquire the network
	OK	
	+CIEV:1,1	Transceiver has acquired the network
AT+SBDI		Perform SBD session
	+SBDI: 0,23,0,-1,0,0	
AT*R0		Deactivate the radio
	OK	
AT+SBDD0		Clear the MO message buffer
	OK	

3.7 Powering Down

The FA flushes any pending EEPROM writes before powering down the Transceiver.

To Transceiver (from FA)	To FA (from Transceiver)	Description
AT*F		FA tells Transceiver to flush pending writes to EEPROM and waits for completion
	OK	
<binary transfer>		FA may now safely disconnect the Transceiver power supply.

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4 Supported AT Commands

Command	Description	Note
AT	Attention code	
A/	Repeat last command	
En	Echo	
In	Identification	
Qn	Quiet mode	
Vn	Verbose mode	
Zn	Soft reset	
&Dn	DTR option	
&Fn	Restore factory settings	
&Kn	Flow control	
&V	View active and stored configuration	
&Wn	Store active configuration	
&Yn	Designate default reset profile	
%R	Display registers	
*F	Flush to EEPROM	
*Rn	Radio activity	
+CCLK	Real-time clock	Reads Iridium Network time if available
+CGMI	Manufacturer identification	
+CGMM	Model identification	
+CGMR	Revision	
+CGSN	Serial number	
+CIER	Indicator event reporting	
+CRIS	Ring Indicator Status	
+CSQ	Signal quality	
+CULK	Unlock	
+GMI	Manufacturer identification	
+GMM	Model identification	
+GMR	Revision	
+GSN	Serial number	
+IPR	Fixed DTE rate	
+SBDAREG	Short burst data: Automatic registration	
+SBDC	Short burst data: Clear SBD MOMSN	
+SBDD	Short burst data: Clear SBD message buffers	
+SBDDET	Short burst data: Detach	
+SBDDSC	Short burst data: Delivery short code	
+SBDI	Short burst data: Initiate an SBD session	
+SBDIX	Short burst data: Initiate an SBD session extended	
+SBDIXA	Short burst data: Initiate an SBD session extended	
+SBDMTA	Short burst data: Mobile-terminated alert	Manual
+SBDRB	Short burst data: Read binary data from ISU	
+SBDREG	Short burst data: Automatic registration	
+SBDRT	Short burst data: Read a text message from the ISU	
+SBDS	Short burst data: Status	
+SBDSX	Short Burst data Status Extended	
+SBDTC	Short burst data: Transfer MO buffer to MT buffer	
+SBDWB	Short burst data: Write binary data to the ISU	Manual
+SBDWT	Short burst data: Write a text message to the ISU	
-MSSTM	Request system time	
+SBDLOE	SBD Lockout Expiry	

Table 1: Supported AT commands

5   More about the Iridium 9603

5.1   Size and mounting holes

The 9603 Transceiver Module is 31.5mm x 29.6mm x 8.1mm and is intended to be mounted onto a PCB of the host system. For this purpose, two mounting holes are provided, intended for 2-56 screws of a suitable length for the mounting application.

In the Iridium 9603 Developer's Kit, 2-56 x 1/2" buttonhead socket capscrews (McMaster 92949A081) are used to attach the 9603 Transceiver Module. A .050" hex wrench is required to remove the 9603 Transceiver module. These screws attach through a 7/32" long hollow spacer (McMaster 92510A007) and into P-KF2-256-ET PEM nuts that are pressed into the 9603 TIC (Test Interface Card) boards.
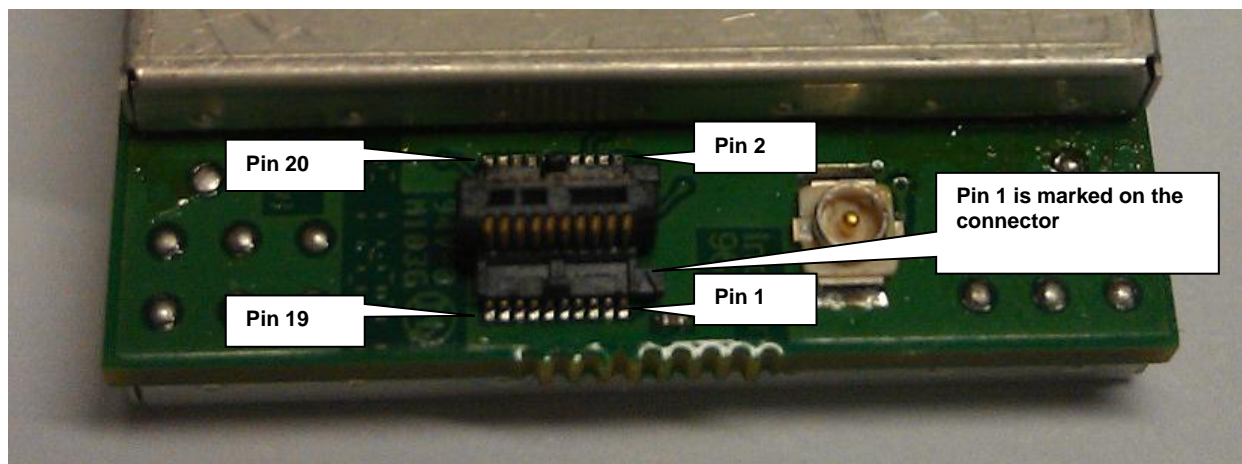
5.2   User Connector Pin out

The user connector on the 9603 is a SAMTEC ST4-10-2.50-L-D-P-TR (mating part SAMTEC SS4-10-3.00-L-D-K-TR). The pin out of the connector is provided below. The ST4 and SS4 connectors are rated for 100 cycles.

Pin No.	Signal Name	Signal direction (WRT 9603)	Signal function	Signal level
1	EXT_PWR	Input	Supply	+5 V +/- 0.5 V
2	EXT_PWR	Input	Supply	+5 V +/- 0.5 V
3	EXT_GND	Input	Supply return	0 V
4	EXT_GND	Input	Supply return	0 V
5	ON/OFF	Input	On/Off control input	Analogue On: >=2.0V Off: <=0.5V
6	DF_S_TX	Input	Data port, serial data input	3.3V Digital
7	DF_S_RX	Output	Data port, serial data output	3.3V Digital
8	SIG_GND	Input	Signal ground	0V
9	DF_ DCD	Output	Data port, Data Carrier Detect	3.3V Digital
10	DF_ DSR	Output	Data port, Data Set Ready	3.3V Digital
11	DF_ CTS	Output	Data port, Clear-to-Send	3.3V Digital
12	DF_RI	Output	Data port, Ring Indicator	3.3V Digital
13	DF_ RTS	Input	Data port, Request-to-Send	3.3V Digital
14	DF_ DTR	Input	Data port, Data Terminal Ready	3.3V Digital
15	SIG_GND	Input	Signal ground	0V
16	Reserved			
17	Reserved			
18	SIG_GND	Input	Signal ground	0V
19	NETWORK AVAILABLE	Output	Signals when the 9603 can see an available satellite network	3.3V Digital Available = high Not available= low
20	SUPPLY_OUT	Output	Supply power indicator output	+3.3 V 15mA maximum

Table 7: User Connector Pin Allocation

Figure 3 provides a reference for the pin designation. The pins are marked in the figure. Note that Pin 1 is marked on the connector.

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Figure 3. Image of the 9603 Transceiver interface.

Although the user connector is physically different, the control interface that it supports is very similar to that of the Iridium 9602. See Section 4 for a full list of AT commands supported.

5.3   Antenna Connector

The main RF connector for the Iridium 9603 is a Hirose U.FL-R-SMT-1 (mating cable SAMTEC MH113-MH1RP-01BJ1-0150 Pigtail). This provides the RF connection between the Iridium 9603 module and the motherboard.

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