

# WARRIERTECH

## SBD Warrior Data Sheet

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## DOCUMENT HISTORY

Version	Description	Date
1.0	Initial Release.	14-Jan-2013
1.1	Updated for Rev 2.0 hardware.	25-Nov-2013
1.2	Updated sleep current values. Updated maximum operational ratings. Revised ADC channel identifiers.	24-Mar-2014
1.3	Formatting updates.	11-Aug-2014
1.4	Updated operational parameters for 9603N.	02-Nov-2015
1.5	Updated for Rev 4.0 hardware.	26-Sep-2016
A	GNSS receiver updates.	18-July-2023

# 1 OVERVIEW

The SBD Warrior is a GNSS-enabled satellite modem that allows reliable pole-to-pole communication. It is a controller for the 9603N from Iridium, the world's smallest commercially available satellite transceiver. The SBD Warrior features a high-performance 32-bit microcontroller with an industry-leading GNSS receiver, fast ADCs, General Purpose Input/Output, external power supply controls and UART communication interface, all accessible through a convenient DB15 female connector. The SBD Warrior can be used in harsh automotive environments thanks to the in-built transient voltage protection. Application programming support is provided for developers through an extended AT command set, allowing easy SBD Warrior integration into third-party products.

## 1.1 Features

- Controller for Iridium 9603N SBD transceiver
- Multi-constellation, Multi-frequency GNSS receiver
- Serial interface for 3rd party equipment or PC control
- Wide supply voltage range (7– 28 VDC)
- Fused 5V switched power output for external sensors
- Two 12 bit Analog to Digital Converter (ADC) inputs
- Four Digital I/Os
- Transient voltage protection
- Low standby power consumption
- PCB only and fully enclosed versions available
- Extremely small solution size (2L x 1.4W x 0.75H inch)
- Easy integration into OEM products with a convenient DB15 interface
- Application Programming support through extended AT commands



**Figure 1: SBD Warrior**

## 2 SPECIFICATIONS

Key specifications of the SBD Warrior are shown in Table 1.

**Table 1: SBD Warrior Specifications**

Parameter	Min	Typ	Max	Unit
Input Voltage ( $V_{in}$ )	7	-	28	V
Peak Current during SBD transmission (@ 12V)*		0.6		A
Sleep Current (@ 12V)		1		mA
Weight		90		g
Operating Temperature	-40	-	70	°C

\* Peak current specification is highly dependent on the antenna view of satellites and can vary.

### 2.1 Multi-Interface Connector Pin Description

The SBD Warrior features a DB15 female connector that enables all power, digital and analog signals to be on the same physical interface. The pinout of the connector is shown in Table 2.

**Table 2: SBD Warrior Pinout**

Pin	Name	Primary Function	Input/Output	Special Function Available
1	EXT_UART_TXD	UART Transmit	O	N
2	GND	Ground		N

3	GPIO_3	General Purpose Digital I/O 3	I/O	N
4	GND	Ground		N
5	VIN	Input Supply Positive		N
6	EXT_5V_SUPPLY	Switched 5V Supply	O	N
7	RSVD_1	Reserved		N
8	RSVD_2	Reserved		N
9	GPIO_2	General Purpose Digital I/O 2	I/O	Y
10	ADC_2	Analog to Digital 2	I	N
11	EXT_UART_RXD	UART Receive	I	N
12	GND	Ground		N
13	GPIO_4	General Purpose Digital I/O 4	I/O	N
14	GPIO_1	General Purpose Digital I/O 1	I/O	Y
15	ADC_3	Analog to Digital 3	I	N

\* The pin designation is looking into the DB15 towards the SBD Warrior as Data Communication Equipment.

\*\* Special function pins are used for SWD programming of the onboard microcontroller.



## 2.2 Power Supply

The operational power supply range of the SBD Warrior is 7 – 28 VDC. To ensure reliable operation, the power supply should be able to handle peak currents of up to 1.5A during Iridium transmission bursts.

## 2.3 Switched Supply (5V)

Pin 6 (EXT\_5V\_SUPPLY) of the DB15 connector could provide 5 VDC supply for applications such as powering an external sensor. This supply is current limited to 100 mA. This supply can be controlled through the serial interface using the extended AT commands.

## 2.4 Low Power Mode

When idle, the SBD Warrior controller enters a low-power mode. In this mode, current consumption is less than 1 mA.

## 2.5 GNSS Receiver

The SBD Warrior features an industry-leading GNSS receiver that combines GPS/QZSS and Galileo in the L1/E1 and L5/E5 bands, GLONASS in the L1, BeiDou in the B1 and B2 bands, IRNSS in the L5 band, to provide improved performances for position reporting solutions. The use of two frequencies (L1/E1 and L5/E5) improves the location accuracy and greatly reduces multipath effects in urban areas.

The GNSS sentences can be streamed over the UART interface. Active or passive antenna support is enabled and can be configured through the serial communication interface.

## 2.6 Iridium Transceiver (9603N)

Extended AT commands are provided for SBD data packet creation, transmission, and reception. Both binary and text modes and the option to buffer messages are supported. Parameters such as SBD session retries and timeout are accessible through the serial communication interface.

## 2.7 General Purpose Digital I/O

There are four dedicated GPIO pins available on the DB15 connector. Each I/O can be configured separately as a digital input or output. When used as outputs, they can be configured in either open-drain or push-pull modes. Optional internal pull-up and pull-down configurations are available when they are used as inputs. Each I/O pin can source or sink up to a maximum of 8mA. The I/O pins can be configured through the serial interface, and extended AT commands are provided to read and write the I/O lines. Two of the GPIO pins can be used for Single Wire Debug (SWD) programming of the onboard microcontroller.

## 2.8 Analog Functions

The microcontroller on the SBD Warrior features a 12-bit, 1 Msps, multi-channel Analog-to-Digital converter (ADC). Analog voltages can be read on pin 10 (ADC\_2) and pin 15 (ADC\_3). The reference voltage of the ADC is set to 3.3V. Resistive voltage dividers are provided at the ADC front end, allowing users to scale the input voltage to suit their needs. In addition, provisions are made to measure the main supply voltage to the SBD Warrior board. ADC measurements can be read using the extended AT commands.

## 2.9 Serial Communication Interface

The SBD Warrior has a 3-wire UART interface, which enables communication with external devices such as third-party sensors. The UART operates at 3.3V logic level. The communication settings are 115200 bps, 8-bit data size with no parity. The serial interface can also be used for custom application development using the extended AT commands.

## 2.10 RF connectors

The onboard RF connector for GNSS is an SMA female type, supporting active and passive antennas. A separate onboard antenna port for SBD is not provided since the 9603N has a U.FL connector built into it. The user can select any termination for the antenna if a U.FL termination adapter is available. Only passive antenna support is available for SBD.

## 2.11 Memory

The SBD Warrior board features onboard flash memory of up to 256 Mbit, stores configuration parameters, and buffers incoming and outgoing SBD messages. The user can also store non-SBD

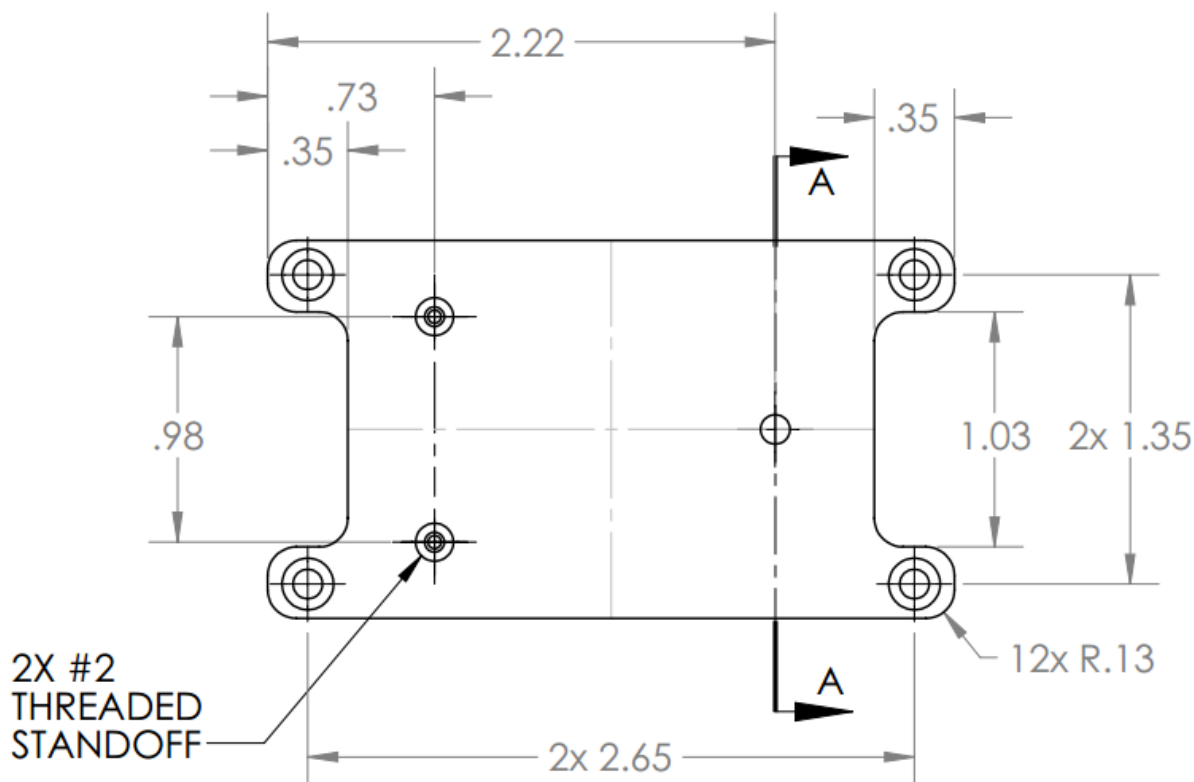
data on this flash memory space. Access to this memory is through the serial communication interface by means of the extended AT commands.

## 2.12 LED

A single LED is provided, which can be controlled using the extended AT commands.

## 2.13 Mechanical Footprint

An optional enclosure is provided for the SBD Warrior. The mechanical footprint of the SBD Warrior enclosure is shown below. #4 Mounting screws can secure the device using the mounting feet.



\* Dimensions are in inches.

**Figure 2: SBD Warrior Mechanical Footprint**