

# 9602-AB User Guide

Version C

March 24, 2023



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## REVISION HISTORY

Revision	Date	Description
1.0	8/06/2012	Initial Version
1.4	11/08/2013	Revised Version
1.5	05/29/2014	Revised Version
1.6	06/17/2021	Updated to new template
A	07/12/2022	Formal Release
B	01/23/2023	Updated mechanical drawing
C	03/22/2023	Updated links

## REFERENCE DOCUMENTS

The latest revisions of the NAL documents are available from the NAL Research website at

<https://www.nalresearch.com/>

Reference	Title	Revision/Date
[1]	SatTerm User Guide	Version 8.9.7, 03/28/2022

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## GLOSSARY

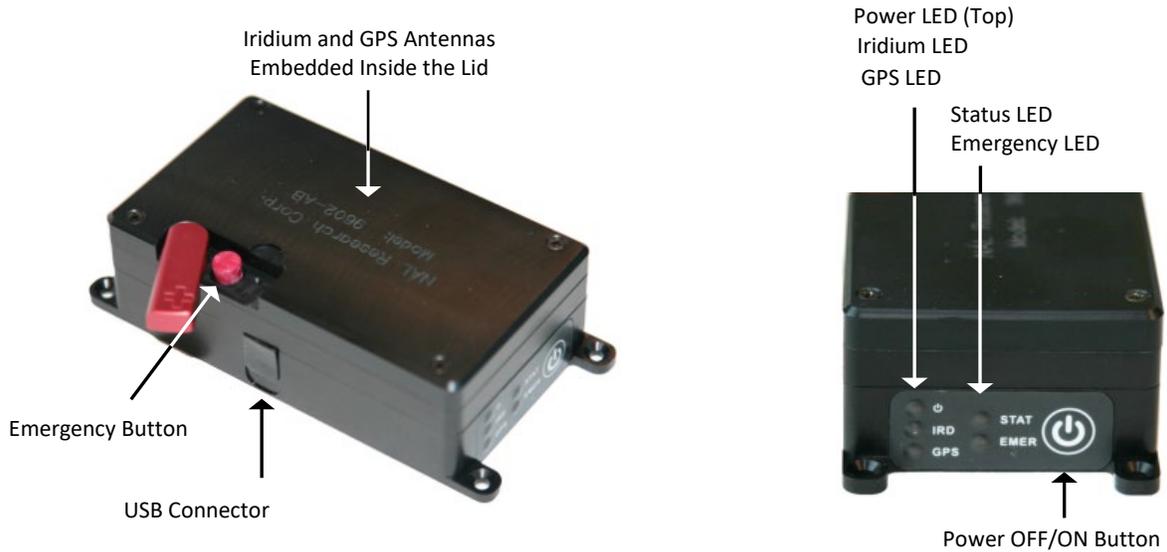
ABS .....	Acrylonitrile butadiene styrene
BIS .....	Bureau of Industry and Security
CE .....	Conformité Européenne
DTE .....	Data terminal equipment
EAR .....	Export Administration Regulations
ETSI.....	European Telecommunications Standards Institute
FCC .....	Federal Communications Commission
GPS .....	Global Positioning System
LCD .....	Liquid-crystal display
LED .....	Light-emitting diode
Li-ion.....	Lithium-ion
OFAC.....	Office of Foreign Asset Controls
SatTerm.....	Satellite terminal emulator software
SBD .....	Short-burst data
USB .....	Universal Serial Bus

# 1 PURPOSE

The 9602-AB Tracker is an ultra-low power consumption tracker designed for Short Burt Data (SBD) communication using the Iridium satellite network. It has internal Iridium and GPS antennas and internal Li-ion battery. When a Data Terminal Equipment (DTE) with SatTerm software installed is connected to the 9602-AB USB Mini interface, the DTE can be used to set up the operating parameters of the 9602-AB via a Universal Serial Bus (USB) port. A DTE can be a desktop computer, a laptop computer, or a microcontroller. Refer to the “SatTerm user guide” [1] on how to set the 9602-AB operating parameters.

## 2 DESIGN SPECIFICATIONS

Dimensions:	3.75" L x 2.16" W x 1.23" D (95 mm x 55 mm x 31 mm)
Weight:	8.0 oz. (227 g)
Enclosure:	Hard Anodized Enclosure, ABS Lid
Multi-Interface Connector:	USB-mini
OFF/ON Switch:	Push Button
Emergency Switch:	Guarded Button
Status LED Displays:	Power, GPS, Iridium, SBD status, and Emergency



**Figure 1: 9602-AB Operational Features**

### 3 CHARGING THE 9602-AB

The 9602-AB has an internal 1.95 Ah rechargeable Li-ion battery, and ships with the internal battery partially charged. Fully charge the 9602-AB before use. There are two (2) ways of charging the 9602-AB:

- Use the supplied AC wall adapter.
  - The charging time is approximately five (5) hours.
- Connect to a standard USB device: Make sure to use the USB cable provided with the 9602-AB.
  - The charging time depends on the type of USB port.
    - USB 1.0 should be able to charge the 9602-AB in about a day, assuming the port is capable of producing an output current of 100 mA.
    - USB 2.0 can charge in about four (4) hours, assuming the current output of 1.5 A.

## 4 STATUS LEDs

The 9602-AB has five (5) status LEDs, as shown in **Figure 1**. These include power indicator, GPS availability, Iridium signal strength, SBD transmission status, and emergency mode alert. They provide a quick visual check to ensure proper operations with the following information:

- Power LED:
  - Solid: Battery level is at +80% or battery is fully charged with power cable plugged in.
  - Rapid blinking (on 0.5 second, off 0.125 second): Battery level is between 50% – 80% or battery level is between 50% – 90% with power cable plugged in.
  - Slower blinking (on 1 second, off 0.25 second): Battery level is between 20% – 50%.
  - Slow blinking (on 2 seconds, off 0.5 second): Battery level is between 0% – 20%.
  - Very slow blinking (on 0.1 seconds, off 5 seconds): Sleeping between reports.
  - Off: The device is off.
- GPS LED:
  - Solid: There is a valid 3D position fix.
  - Blinking: There is 2D position fix.
  - Off: Unable to obtain a position fix, only able to obtain time, or GPS receiver is off.
- Iridium LED:
  - Solid: The Iridium signal strength is between 3–5 bars.
  - Blinking: The Iridium signal strength is between 1–2 bars.
  - Off: The Iridium signal strength is at zero (0) bars or Iridium transceiver is off.
- Status LED:
  - Solid: The most recent SBD transmission succeeded.
  - Blinking: An SBD transmission was successful in the past, but the most recent transmission failed.
  - Off: No successful SBD transmission yet.
- Emergency LED:
  - Solid: Emergency is enabled.
  - Off: Emergency is disabled.

## 5 POWER CONSUMPTION

The 9602-AB has an internal 1.95 Ah Li-ion rechargeable battery. When both the Iridium and GPS antennas have a clear view of the sky, the battery is fully charged and the report rate is set to less than two hours, the 9602-AB is capable of sending more than 1,500 tracking reports with the report rate set to two (2) hours. Blocked or partially blocked antennas force the 9602-AB to retry multiple SBD transmissions for each report, and as a result can significantly reduce the overall number of reporting cycles.

The 9602-AB saves valid ephemeris data after each 3D fix. The ephemeris data reduces acquisition time in the next reporting cycle from cold-start to hot-start. If the ephemeris data is older than two hours (time between reports is set for more than two hours), the GPS receiver goes through cold-start each time it wakes up to send a report. As a result, the 9602-AB configured for report rate of more than two hours can only send approximately 750 tracking reports.

**IMPORTANT:** Data presented here are only estimates and are highly dependent on the operating environment. Data are based on measurements made with multiple 9602-ABs placed on the roof of NAL Research's facility with no blockage.

## 6 TECHNICAL SUPPORT

For technical support, please contact us at:

Phone: 703-392-1136,

Fax: 703-392-6795

Email: [support@nalresearch.com](mailto:support@nalresearch.com)

Technical documents are also available to download on NAL Research's website [www.nalresearch.com](http://www.nalresearch.com) in the **Support > Documentation & Downloads** section.

## 7 STANDARDS COMPLIANCE

The 9602-AB comprises an Iridium 9602 transceiver. The 9602 transceiver is designed to meet the regulatory requirements for approval for FCC, Canada, and CE, assuming an antenna with a gain of approximately 3 dBi and adequate shielding. The 9602-AB testing complies with the regulatory and technical certifications as shown in **Table 1**.

**Table 1: Regulatory and Technical Certifications**

Regulatory Approvals	Radio Tests	EMC Tests	Mechanical/ Electrical Tests
CE	ETSI EN 301 441 V1.1.1 (2000-05)	ETSI EN 301 489-1 V1.8.1 (2008-04) ETSI EN 301 489-20 V1.2.1 (2002-11)	EN60950-1:2006 Part 1
FCC	FCC CFR47 Parts 2, 15, and 25	EN61000-4-2: 1995/A2: 2001 Part 4.2 EN61000-4-3: 2002 Part 4.3 EN61000-4-4: 2004 EN61000-4-6: 1996/A1: 2001 Part 4.6 EN55022: 2006	
Industry Canada	Industry Canada RSS170 Issue 1, November 6, 1999		

## 8 EXPORT COMPLIANCE

The 9602-AB is controlled by the export laws and regulations of the United States of America (USA). It is the policy of NAL Research to fully comply with all U.S. export and economic sanction laws and regulations. The export of NAL Research products, services, hardware, software, and technology must be made only in accordance with the laws, regulations, and licensing requirements of the U.S. government. NAL Research customers must also comply with these laws and regulations. Failure to comply can result in the imposition of fines and penalties, the loss of export privileges, and termination of your contractual agreements with NAL Research.

The export and re-export of NAL Research products and services are subject to regulation by the Export Administration Regulations (15 CFR 730-744), as administered by the U.S. Department of Commerce, Bureau of Industry and Security (BIS).

See: <https://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear> for further information on BIS and the Export Administration Regulations (EAR). Additional export restrictions are administered by the U.S. Department of the Treasury's Office of Foreign Asset Controls (OFAC). See: <http://www.ustreas.gov/ofac> for further information on OFAC and its requirements.

# 9 MECHANICAL DRAWING

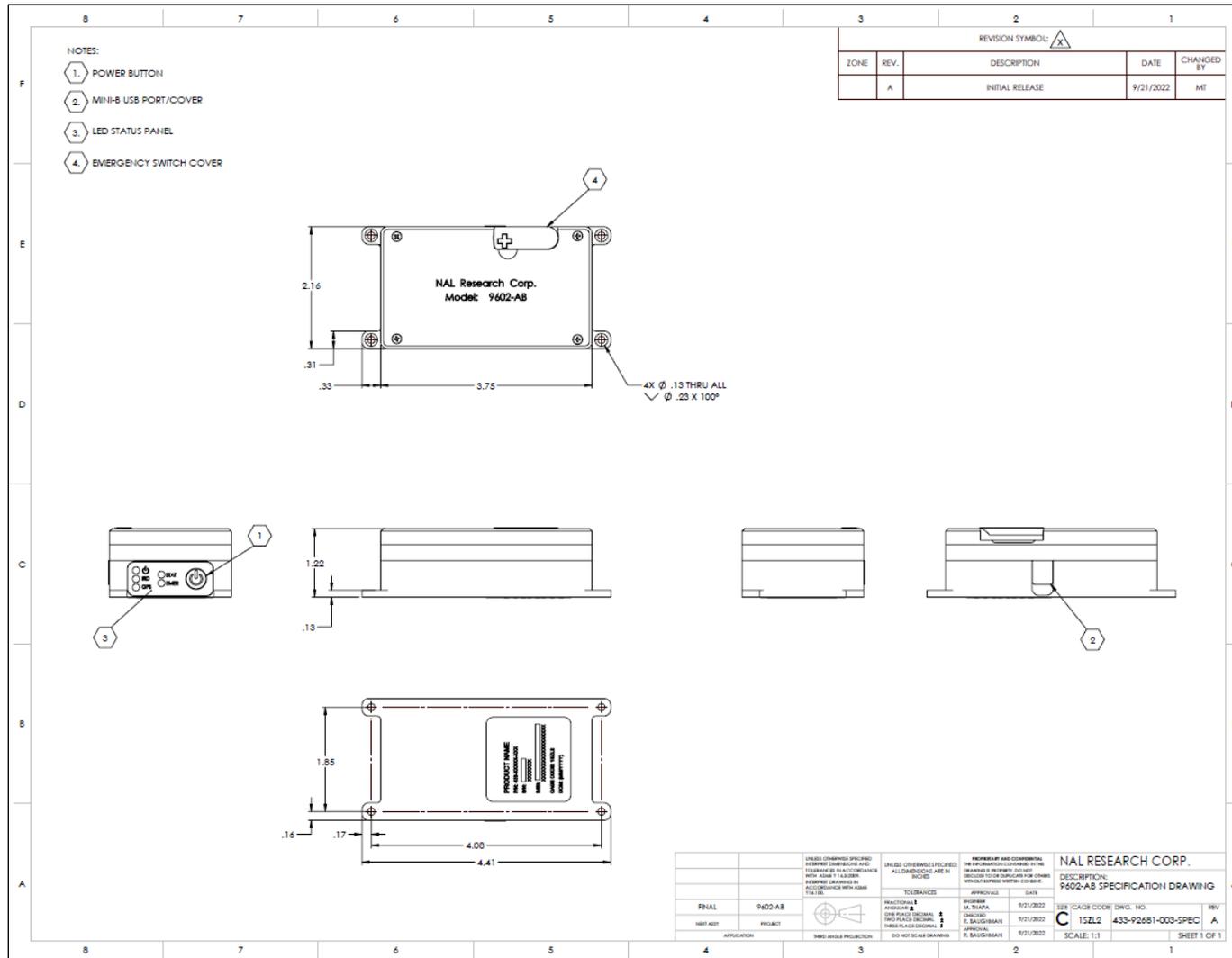


Figure 2: 9602-AB Mechanical Drawing