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# 9602-AB User Guide

Version B

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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 |

# Reference Documents

The latest revisions of the NAL documents are available from the NAL Research website at https://www.nalresearch.com/support/documentation-downloads/.

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

# Table of Contents

# TABLE OF FIGURES



# 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

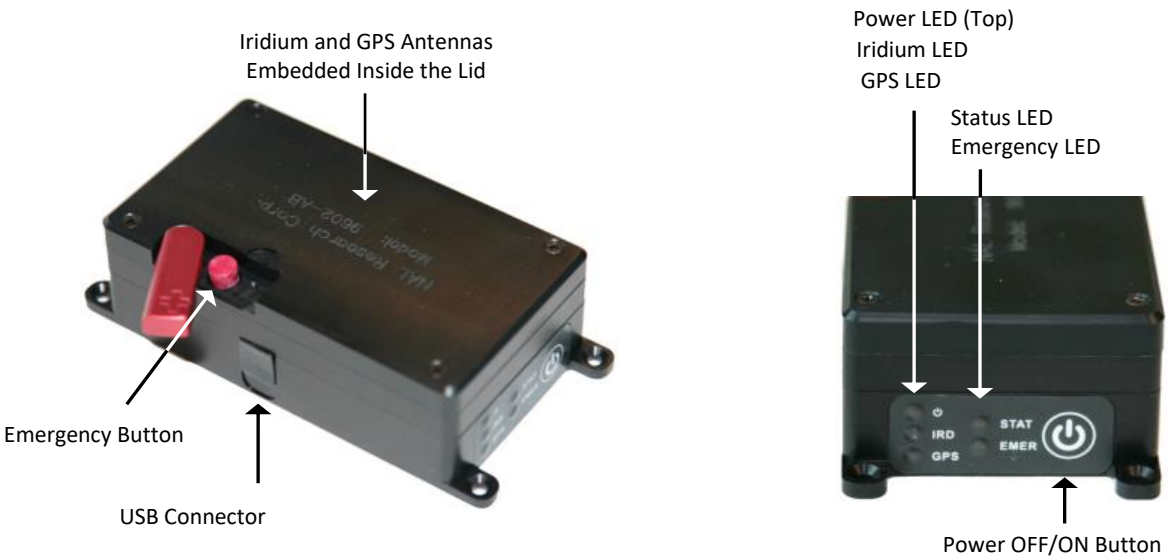


*Figure 1: 9602-AB Operational Features*

# 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 zer0 (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

Technical documents are also available to download on NAL Research's website 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)<br>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<br>EN61000-4-3: 2002 Part 4.3<br>EN61000-4-4: 2004<br>EN61000-4-6: 1996/A1: 2001 Part 4.6<br>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

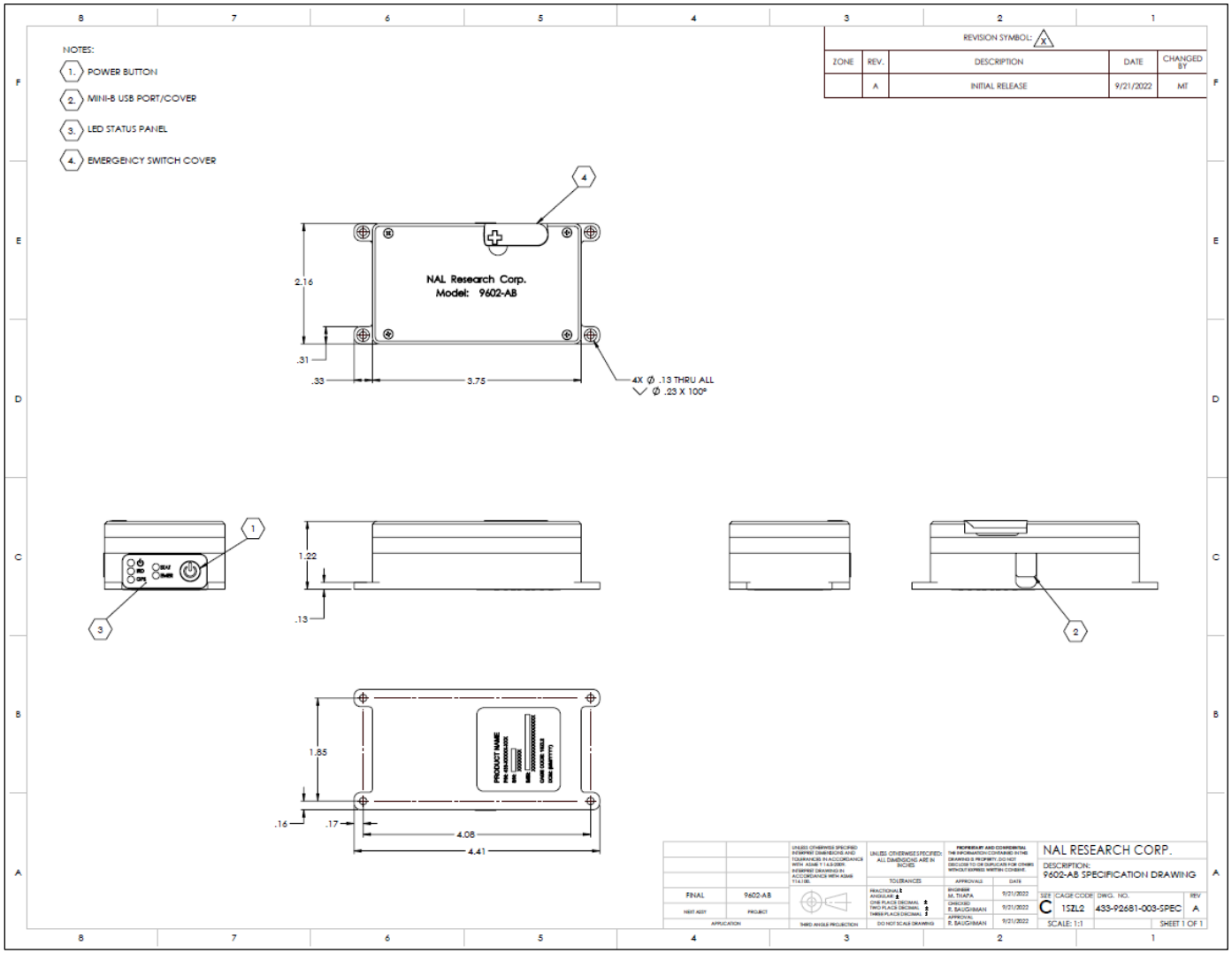


*Figure 2: 9602-AB Mechanical Drawing*