Installation Guide

Savi Tag ST-696-001
ISO Container Door Tag
with GPS/GPRS and Sensors

Contents

About Savi Sensor Tag ST-696-001 ISO Container Door Tag

Savi® Tag ST-696-001 ISO Container Door Tag with GPS/GPRS and Sensors is a high performance active RFID tag that works with Savi software to track and
monitor the security status of containers as they move through the global
supply chain. This device is fully compatible with fixed and portable Savi readers and features up to 300 feet (91.44 meters) of omni-directional line-of-sight range. In addition, ST-696-001 Tag utilizes GPS receiver to report and recorded asset location using GSM/GPRS cellular network.

Rechargeable Lithium Ion battery life is typically 90 days between the charges. The ST-696-001 tag is available with 128K of programmable memory. It includes a door clamp and external antennas. Using the door clamp, you affix the tag to the left door of an ISO-compliant container.

Note: Savi Tag ST-696-001 ISO Container Door Tag only supports ISO 668: 1995(E) Series 1 freight containers.

Features

- 433 MHz, active RFID technology with up to 300-foot (91.44-meter) range for monitor, wake-up, RF write/read
- 123 KHz receiver for slot level, portal, or chokepoint tag wake-up and short range commissioning (12 feet [3.7 meters] or less)
- GSP Receiver for asset real time location
- GSM/GPRS modem for worldwide communication to cellular networks
- Small form factor, ideally suited for shipping containers
- Rugged, weatherproof design
- Powered by a rechargeable Lithium Ion battery
- Intrusion detection sensors monitor door and light status
- Expandable sensor port connects to third-party sensor equipment
- Temperature, humidity, and shock sensors monitor the internal environment of a container
- 128KB nonvolatile memory for logging GPS location coordinates and sensor data

Description

Figure 1-1   Savi Tag ST-696-001 ISO Container Door Tag

Intrusion Detection Sensors

The ST-696-001 tags include door and light sensors. The door sensor monitors the amount of pressure between the door and the device. If the door is open and the device has not been electronically unsealed, the device sends a message to the monitoring software indicating that the device has been tampered. It also writes the time and date of the tamper to an event log. The device also includes a light sensor that triggers an alarm if light is detected inside the container.

Environmental Sensors

The environmental sensors on the ST-696-001 tags monitor the temperature and humidity within the container. You can set the maximum and minimum values, and if the temperature or humidity rises above or falls below this range, the device writes the time and date of the breach to the event log. For example, if you are shipping a product that needs to be kept at temperatures between x and y degrees, you can set the ST-696-001 tag to record the date and time whenever the temperature breaches the maximum or minimum value.

Tamper-Protection Plate

The tamper-protection plate's right angle flaps are bent to extend and protect the gap behind the plate as well as the tag plate. This plate prevents anyone from inserting a foreign object in an attempt to hold the tag plate in the closed position.

RFID Communication Module

The communication module is positioned on the outside of the container and operates at 433 MHz. This enables the Savi Tag ST-696-001 to communicate back to the Savi network with excellent RF performance in both heavy metal and non line-of-sight environments.

GPS/GPRS Communication Modules

The GPS receiver communication module is positioned on the outside of the container and it periodically turns on to acquire the location information which gets logged and subsequently reported through GPRS module to the application. The GPRS modem is a quad band radio that support worldwide deployment on GSM/GPRS cellular networks.

For More Information

Guides to Read

For information about using:

- Signposts, see the *Savi Signpost SP-65X Series Installation Guide*

- Fixed readers, see the *Savi Fixed Reader SR-650-101 Installation Guide*

- Mobile readers, see the *Savi Mobile Reader SMR-650 for the Intermec 751G/A Mobile Computer and PC User Guide*

Contacting Savi Global Support Services

If you cannot find the information you need, contact Savi Global Support Services.

- Check www.savi.com/services/su.contact.shtml for contact information.
- Send email to help@savi.com.
- Call 1-888-994-SAVI (North America only) or 1-650-316-4760 between 9 a.m. and 5 p.m. Pacific time.

When you contact Savi Global Support Services by telephone or email, have the following information available:

- Contact information (company name, your name, email, and phone number)
- Problem description
- Product type
- Software version
- Serial number or license information

Installing Savi Tag ST-696-001 ISO Container Door Tag

Required Tools and Materials

Before you begin installation, make sure the following materials are available:

- Savi Tag ST-696-001 ISO Container Door Tag with GPS/GPRS
- SaviTag Write Cable STA-1030
- Wall Adapter (provided)

Tag commissioning with SaviTag Write Cable STA-1030

You can commission Savi Tag ST-696-001 ISO Container Door Tag using SaviTag Write Cable STA-1030. You can also commission a tag using Savi software that operates on a mobile device, such as the Intermec® 741G/A or 751G/A Mobile Computer with an attached Savi® Mobile Reader SMR-650. You can purchase the cable, software, and mobile device separately.

<u>WARNING!!!</u>

The antenna used for GSM transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter to ensure compliance with FCC (and other, national) rf exposure requirements.

Note: Savi Tag ST-696-001 ISO Container Door Tag is shipped from the factory with the battery at 50% charge. Before you attempt to commission the tag, make sure the battery is fully charged. | See "Charging the Tag Battery " on page 11.

1. Connect SaviTag Write Cable STA-1030 to an available serial port on the host computer.

2. Locate the tag commissioning port on the Savi ST-696-001 ISO Container Door Tag.

3. Unplug the rubber cap covering the port.

4. Insert SaviTag Write Cable STA-1030, with the LED up, into the Tag ST-696-001 commissioning port. Start the tag commissioning application. The LED is lit when the application writes data to the tag.

Charging the Tag Battery

Savi Tag ST-696-001 ISO Container Door Tag is equipped with non-volatile memory, which means stored data is not lost when the battery is fully depleted.

1. Using a coin or flat-head screwdriver, turn the charging plug cover counterclockwise.
   When removing the charging plug cover, hold on to it to avoid dropping it.

2. Plug wall adapter (provided) into the standard AC outlet.

3. Plug the wall adapters' plug into the power jack on the tag. Charging of fully depleted battery may take from 10-12 hours. In order to check whether the battery if fully charged remove that plug and wait for the tag to complete power up sequence. After several seconds the Tag will beep with 4 consecutive beeps. The fourth beep indicates battery charge state. If the fourth beep is short then the battery is full. If the fourth beep is long than the battery is low and if it is missing (only 3 beeps heard) the battery is still not fully charged. If the battery is not fully charged reconnect the wall adapter plug back into the units and wait until tag reports fully charged battery status.

4. After completing the battery charging using a coin or screwdriver.
   With the coin placed in the power plug cover groove, push the cover in. Turn the plug cover counterclockwise 1/4 to 1/2 of a turn to properly seat the cover. Turn the battery cover clockwise until it fits flush with the tag case. Be careful not to overtighten. Make sure the plug cover is completely closed and that it is not cross-threaded.

Tag Placement

Savi Technology recommends that you fit the Savi Tag ST-696-001 ISO Container Door Tag above the door bracket and on the lefthand door of the container. The recommended mounting location for the tag is shown in the following photos.

1. Open the right door of the container.

2. Align the device with the bracket on the right door, if possible.

3. Using both hands, secure the device on the *left* door until it is flush. This is a view from inside the container.

4. Move the door sensor to the left and ensure that the lever is fully extended before closing the container door. This is a side view of the device mounted on the *left* door. This is a view of the outside of the container

5. Close the right door. This is a view of the tag on the container with both doors closed.

6. Seal the tag using the software on your mobile device. The door sensor recognizes when the right door is closed and when the container is dark.

7. After successfully sealing the tag, insert the container's bolt into the hasp.

Savi Tag ST-696-001 ISO Container Door Tag Specifications

Specification	Description
Physical characteristics	**Tag** Height: 10 inches Width: 6 inches Depth: 5 inches
Total weight of tag	2 lb 12 ounces (1.3 Kg)
Environment	**Temperature:** -20ºC to +60ºC) operating; -40ºC to +85ºC storage **Humidity:** 100% non-condensing **Altitude:** Maximum altitude = 40,000 feet (12,192m); MIL-STD-810E Method 500.3, Procedure I
RFID receiver/transmitter	**Ultra High Frequency transceiver:** **Frequency:** 433.92 MHz **Modulation:** FSK, deviation +/- 50 KHz **Data rate:** 27.8 Kbps **Data coding:** Manchester **Communication range (unobstructed):** Typical range is up to 300 feet (91.44 meters) line-of-sight when mounted on a container and communicating with a Savi Fixed Reader SR-650-101 or SaviReader 410R. Typical range is 200 feet (61 meters) line-of-sight when mounted on a container and communicating with a Savi MobileReader SMR-650P-110 and SMR-650P-111 or Savi Mobile Reader SMR-650-212 **Maximum transmit power:** -7.4 dBm (0.18mW) typical; -2.4 dBm (0.6 mW) with ground reflection (uncommon) **Air protocol:** Savi EchoPoint Air Protocol 2.2 (32-bit tag identification supported)
GSM/GPRS radio module	**GSM quad band radio:** **Frequency:** 850MHz and 1900MHz **Modulation and Data coding:** as per GSM standard
GPS radio module	**GPS receiver:** **Frequency:** 1575MHz **Modulation and Data coding:** as per GPS communication specification

Specification	Description
LF receiver (downlink)	**Low Frequency receiver (downlink)** **Frequency:** 123 KHz
	Modulation: ASK On-Off Keying
	Data rate: Average 1.6 Kbps, 50% duty cycle **Data coding:** Pulse Width Modulation
	Communication range: Up to 4 feet (1.22 meters) from Savi MobileReader SMR-650P-110 and SMR-650P-111 or Savi Mobile Reader SMR-650-212
	Up to 12 feet (3.66 meters) from Savi Signpost (models SP-600-xxx and SP-65x-xxx)
	Air protocol: Savi EchoPoint Air Protocol 1.1
Network	**Wireless:** RF read/write capable with Savi software that operates on a mobile device
	Wired: Serial read/write capable via Savi Tag Write Cable STA-1030
Memory	On board non-volatile 128K memory and 32K sensor memory

Specification	Description
Hardware compatibility	✦ Savi Mobile Reader SMR650P (model SMR-650P-xxx) ✦ Savi Mobile Reader SMR-650 (models SMR-650-xxx) ✦ Savi Fixed Reader SR-650 ✦ Savi Signpost SP 65x series
Antenna	Internal loop antenna
Shock and vibration	**Shock:** MIL-STD-810E Mechanical Shock, Transit Drop Methods 516.4 **Vibration:** MIL-STD-810E Method 514.4, Category 10 **Loose cargo test:** MIL-STD-810F Method 514.5
Protection type	Sealed to IP 54 ISO 1496 weatherproofing requirements
Power	**Battery type:** Li-Ion rechargeable 13.8Ah @ 3.7V, user non replaceable **Battery life:** min 90 days between charges (500 charge cycles) **Power management:** UHF sleep mode prevents unwanted collections, enabled/disabled by LF link **Diagnostics:** Reports low tag battery status, diagnostic data
Regulatory approvals	**Radiated emission (intentional):** U.S. emission standards as contained in FCC Part 15 and European Community emission standards as contained in EN 300 220 (433 MHz) **Electromagnetic immunity:** ESD compliance Exposed to 8 kV air discharge or 4 kV contact discharge in accordance with EN 301 489-1 **Radiated emission (unintentional):** U.S. emissions standards as contained in FCC Part 15 and European Community emission standards as contained in EN 301 489-1 **Safety approval:** U.S UL 1950; European EN 60950 **Markings:** Savi logo, product model and serial number, EMC compliance (FCC/EN)

Specification	Description
Sensors	**Door sensor:** Senses the right side of the container door in the closed or open position
	Light sensor: Senses light coming through the door
	Temperature sensor: Integrated temperature takes readings every five minutes (default; use Savi software to adjust settings). Mounted in its own compartment to isolate it from other circuit boards
	Humidity sensor: Integrated humidity sensor takes readings every five minutes (default; use Savi software to adjust settings). Mounted in the same compartment as the temperature sensor
	Shock sensor: Senses shock in the container above a set threshold
Mounting	Contains a door clamp that clips onto the left-side door of a container
Software	EchoPoint FTMobile, EchoPoint EK-650, and Savi SmartChain Transportation Security System (TSS), Savi SmartChain Site Manager 5.6, Savi SmartChain Client Tools 4.x, TAV Tools 3.6, Savi Retriever 2.1
Accessories	Wall Adapter