User Manual

Model: ST6002

Ref T407

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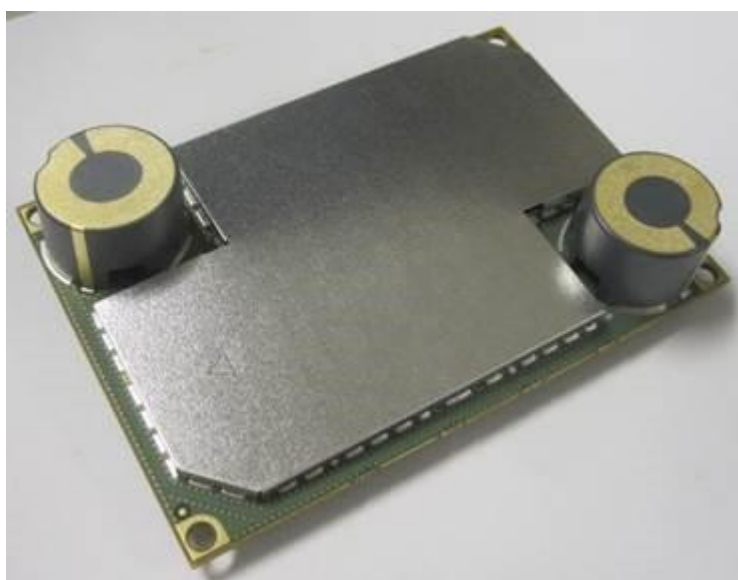
http://partner-support.orbcomm.com

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1 Product Overview

The ST6002 provides a high performance, low latency, two-way communication solution that uses the IsatData Pro network.

This OEM device consists of a Lua application controller, integral antennas, a satellite modem for communicating with the satellite, an integral GNSS subsystem, several input/output feeds capable of monitoring and controlling external sensors and devices and dedicated serial ports (two RS-232 ports). Solution Providers (SPs) must create a custom power supply for their particular application.

Figure 1: ST6002

The ST6002 is suitable for both industrial and fixed applications, and it can work as a standalone data-messaging device, with built-in I/O data collection and processing capabilities. Feature-rich software tools make programming easy and shorten the design and testing time.

1. 1 Key Features and Benefits

The ST6002 has the following key features and benefits:

- Designed to be incorporated into a custom solution
- Built-in GNSS receiver to calculate position, speed, and heading that uses the satellite antenna
- Broad operational temperature range
- IsatData Pro message payload and latency capabilities

2 Compliance

The ST6002 is in the process to obtain the following certifications:

CE Mark

- RED 2014/53/EU
- Declaration of Conformity

  Hereby, ORBCOMM declares that the radio equipment type ST6002 is in compliance with Directive 2014/53/EU.
  The DOC (Declaration of Conformity) is either included in the packaging or can be found at the following link:
  The full text of the EU declaration of conformity is available from http://www2.orbcomm.com/eudoc.

Inmarsat Type Approval

ISED Canada

- IC: 11881A-ST6002
- ISED Canada Compliance Statements

  This device contains licensed transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licensed RSS(s). Operation is subject to the following two conditions:
  (1)   This device may not cause interference.
  (2)   This device must accept any interference, including interference that may cause undesired operation of the device.
  L'émetteur/récepteur autorisée contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio autorisée. L'exploitation est autorisée aux deux conditions suivantes :
  (1)   L'appareil ne doit pas produire de brouillage;
  (2)   L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

  This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This module antenna should be installed and operated with minimum distance 20 cm (7.9 inches) between the radiator and any part of your body.
  Pour se conformer aux exigences de conformité ISED RSS-102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes.

FCC Part 25

- FCC ID: XGS-ST6002
- CFR Title 47: Telecommunication, Part 25 - Satellite Communications, Sub-part C - Technical Standards
- OET 65 - Radiation Safety

- FCC Compliance Statement

   This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
   This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
   (1)   this device may not cause harmful interference, and
   (2)   this device must accept any interference received, including interference that may cause undesired operation. Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
   Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

   This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, this equipment should be installed and operated with minimum distance 20 cm (7.9 inches) between the antenna and your body during normal operation. Users must follow the specific operating instructions for satisfying RF exposure compliance.

RoHS

- Restriction of Hazardous Substances (RoHS)
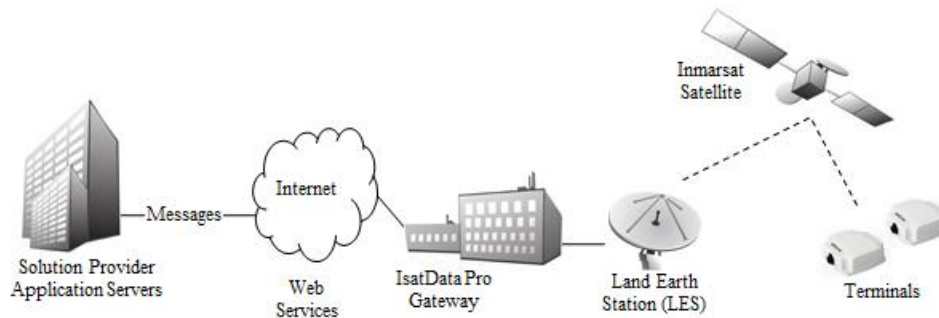
3 Satellite Messaging System Overview

IsatData Pro is a global, low data rate, two-way messaging service, optimized for machine-to-machine communications. It offers fully-acknowledged transactions of varying size, with near real-time delivery. The service is ideal for applications requiring relatively low amount of data such as form transfer, text messaging, periodic reports and being suitable for event-driven data. Typical applications include vessel and fleet management and security, remote monitoring, telematics and SCADA.
The network provides the following key features:

- Up to 6,400 bytes from-mobile messages
- Up to 10,000 bytes to-mobile messages
- Broadcast and multicast capabilities
- Store-and-forward message processing

IsatData Pro is an Inmarsat service delivered exclusively by ORBCOMM through the Inmarsat network. ORBCOMM provides the service, either directly or through Distribution Partners, to Solution Providers (SP) responsible for value-add application development and commercial fulfillment for end users of the technology.
The key system elements to deliver the services are shown in Figure 2:
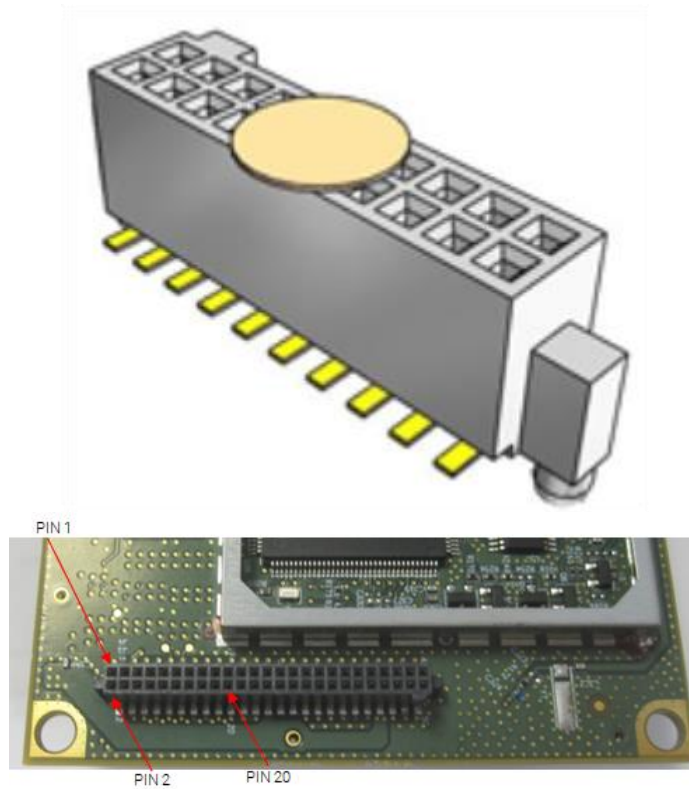
Figure 2: IsatData Pro Network

- Application servers exchange data with the gateway to access the IsatData Pro service and process the data to deliver it as meaningful business information to end users.
- Gateway provides a web-service interface to application servers via the Internet and manages administrative and billing aspects of the IsatData Pro service.
- Land Earth Stations provide connection to the satellites in each region.
- Inmarsat satellites provide global service coverage.
- Terminals installed on remote assets send and receive messages using the Inmarsat satellites and interface with devices or personal deployed in the field.
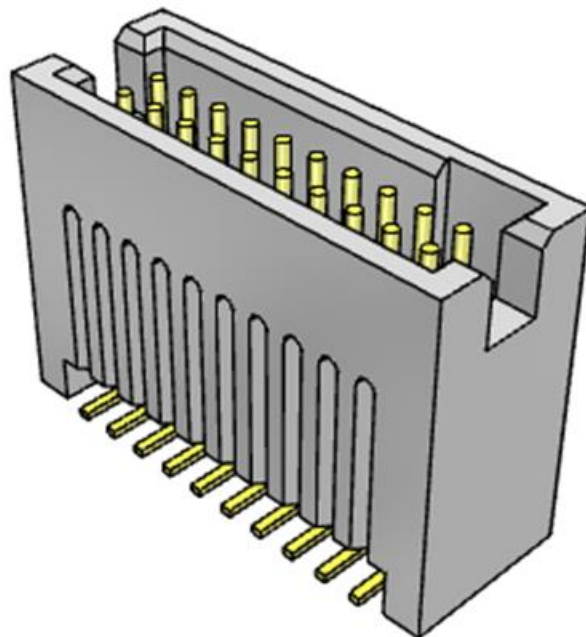
4 Summary of Specifications

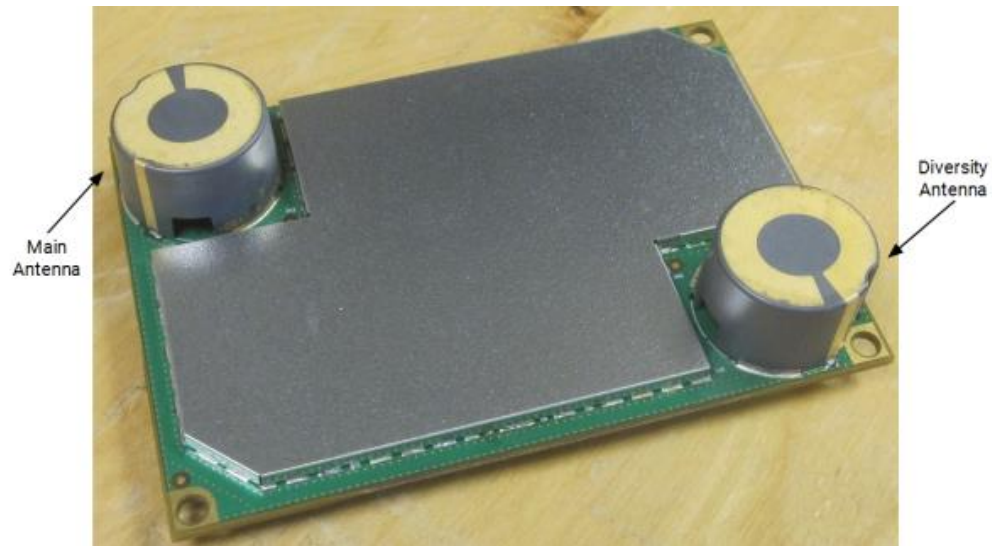| Item	Feature
Model/Part number	**ST6002**
Modulation	OQPSK
Operation Frequency (MHz)	Rx: 1525.0–1559.0 MHz, Ext band: 1518–1525 MHz
	Tx: 1626.5–1660.5 MHz, Ext band: 1668.0–1675.0 MHz
Maximum receiver input	10 dBm
Maximum transmitter output (EIRP)	7 dBW
Antenna elevation angle (fig. 5)	0 to 90°
Maximum transmit antenna gain	3.7 dBi (1626.5–1660.5 MHz), 3.9 dBi (1668–1675 MHz)
Polarization	RHCP
Electrical input voltage	V_{AUX}: 3.5 VDC (Min)
	V_{IN}: 5.8 VDC ±3%
Power consumption @ 5.9V & 25°C	IDP receive: 125 mA
	GPS/Glonass/Beidou/Galileo Receive: 40 mA
	Transmit: 1.2 A
Interfaces (fig. 3,4)	4x Analog/Digital input/ digital output
	2x Serial ports (TTL level)
Environmental	Operating Temperature: -40°C to +85°C
	Vibration: SAE J1455 (Sec 4.9.4.2 fig 6-8); MIL-STD-810G (Sec 14.6) Shock: MIL-STD-810G (Sec 516.6) Altitude: SAEJ1455(Sec 4.9.3) UV Exposure: 1334 hr exposure per ASTM G154
Accelerometer	3-axis accelerometer
Dimensions (fig 7.8)	7.0 x 10.0 x 2.0 cm
Weight	60 g

Figure 3: ST 60xx Connector and PIN location

Figure 4: Mating Connector

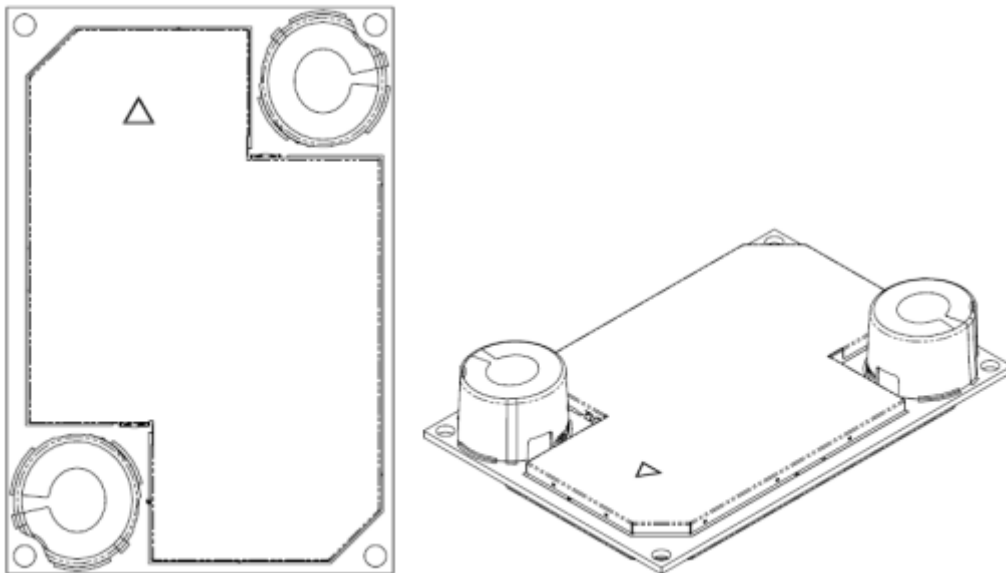**Figure 5: Onboard Antennas**

Figure 6: Top View
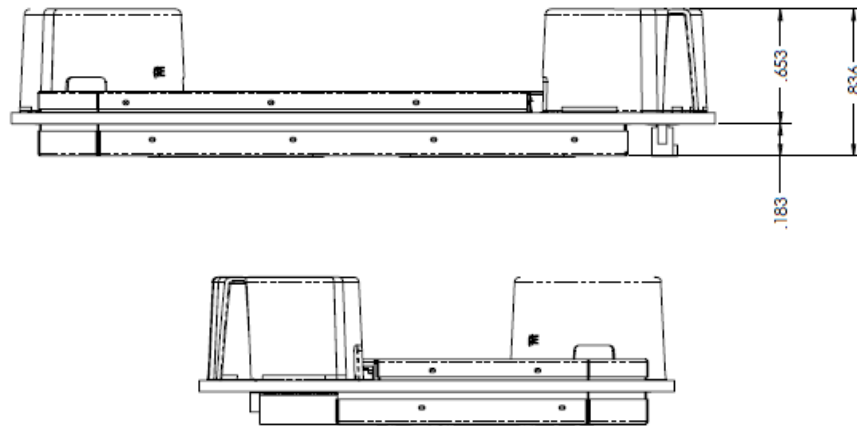
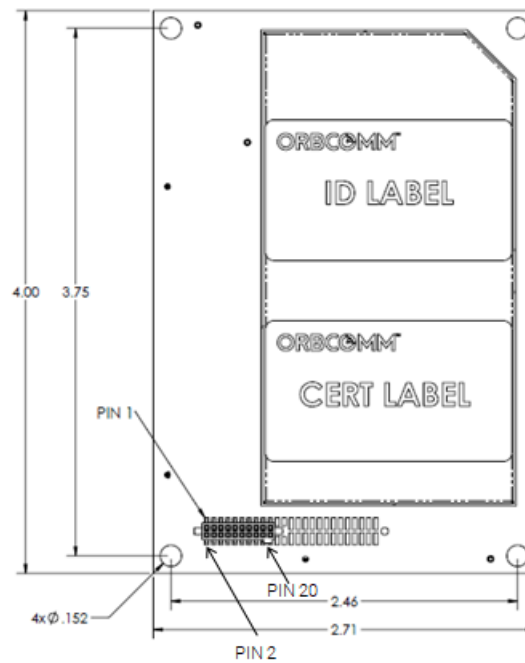**Figure 7: Side View Dimensions (in.)**

Figure 8: Bottom View Dimensions (in.)

5 Integration Guidelines

This section contains a number of guidelines to assist the Solution Provider (SP) in building their ST6002 enclosure. It must be recognized that this section provides guidelines only and each SP must use their own discretion to finalize the integration approach that works for them.

5.1 Enclosure Design

The ST6002 is not designed for outdoor environments. Consequently, the ST6002 requires a robust environmentally sealed enclosure that can house the ST6002.

The following guidelines are recommended for the enclosure design.

- An IP67 rating or better for outdoor use.
- Use enclosure materials that are transparent to L-Band (1–2 GHz) radio signals.
- Two recommended enclosure materials are:
    - Xenoy® Resin 5220U. This plastic material offers good chemical and UV resistance and great impact resistance even at low temperatures.
    - Lexan EXL 9330.

5.2. Ground plane requirements and antenna integration

There are some requirements for the integration of the ST6002 terminal into a customer design including ground plane requirements and minimum air gap between the antennas and the enclosure. Please contact your Account Manager for more details around this topic.

5.3 Labeling

The mobile ID on the ST6002 is the network identification number. It is recommended that the SP place a copy of the mobile ID on the exterior of the enclosure housing the device. With the mobile ID on the enclosure, installers can readily identify the network identification number.