

ISM400-EK01 GPS Evaluation Board Functional Specification



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Overview

Inventek's ISM400-EKO1 Breakout board is intended to permit customers to evaluate the ISM400F1 module without having to do any circuit layout. The ISM400-EKO1 comprises of the following:

- A ISM400F1-N4, 20-channel global positioning system (GPS) receiver in a compact surface-mountable module. Based on the fast and deep search capabilities of SiRFstar III, it features high sensitivity, and low power.
- 20 pin cable/connector which can be used to graft the ISM400F1 module right into your circuit. To make the unit begin navigating, all that is required is to connect Tx, Rx, Vcc, Gnd and several connections per table 2 and the antenna.
- ISM400F1-Breakout_board
- Schematic for the board
- U.FL to SMA adapter
- 25mm waterproof antenna with 5 meter cable
- ISM400F1-spec
- Evaluation CD
 - SirF Demo Software
 - SiRF Binary manual
 - SiRF NMEA manual

The ISM400-EKO1 lets you integrate GPS functionality into your product quickly and easily. It's suitable for a quick evaluation of our ISM400 GPS modules. Using an external antenna, you can quickly and easily test the GPS module and become familiar with the interface.

The ISM400 world class performance suits it to navigating urban canyons, as well as wide-open spaces. TTFF (time-to-first-fix) under open sky is typically 35 s from a cold start, 1 s from a hot start. Reacquisition time is 1 s.

The ISM400-EKO1 provides both a simple UART (universal asynchronous receiver/transmitter) interface via the included cable or test points directly on the board. Hook this directly to your embedded microcontroller.

Mechanical

Table 1 summarizes the dimensions of the ISM400-EK01.

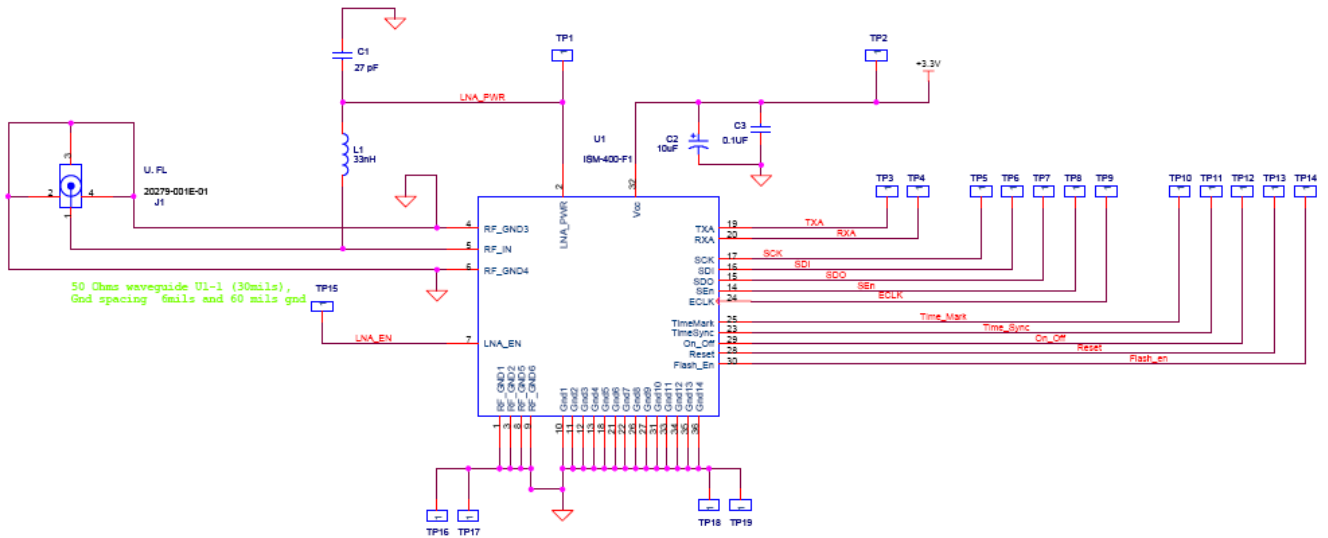
Parameter	Value
Length	42.0±0.1 mm
Width	33.0±0.1 mm
Height	8.6 mm

Table 1 Dimensions



Figure 1 LGA Dimensions (Inches)

Electrical



Connector Header & Pin out

Below summarizes the connector header pinout. For ease of use all critical pins also have test points (TP) located directly on the evaluation board that you can connect as well.

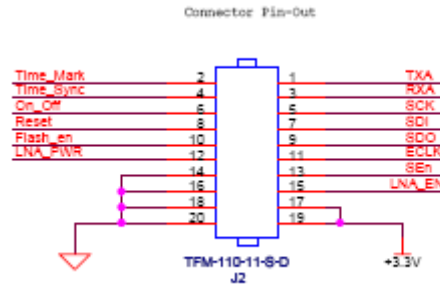


Table 2 describes the ISM400-EK01 connector pin assignments.

Pin	Name	I/O	V dc	Description
1	TXA	O	1.8	UART transmit.
2	TIMEMARK	O	1.8	1 PPS (or 5 PPS with custom order 5 Hz build)
3	RXA	I	1.8	UART receive, internal pull-up.
4	TIMERSYNC	I	1.8	External AGPS time synchronization.
5	SCK	I	1.8	No connect
6	ON_OFF	I	1.2	Power On and Request Power Off. (See figure 1)
7	SD	I	1.8	No connect
8	RESET	I	1.2	System reset (active low) Do not force High. (CAUTION: 1.2 V maximum!) .
9	SDO	O	1.8	No connect
10	FLASH_EN	I	1.2	Flash chip enable (active high).
11	ECLK	I	1.8	External time reference.
12	LNA_PWR	I	2.85	LNA power, (20 mA max)
13	SEn	I	1.8	SPI Enable requires pull-up if using UART.
14	RF_GND	O		Antenna ground.
16	GND	O		Module ground.
18	RF_GND	O		Antenna ground.
20	RF_GND	O		Antenna ground.
17,19	VCC	I	3.25	Power.(3.25-5.5V)

Table 2 ISM400-EK01 Pin Assignments

Power

Table 3 summarizes the ISM400-EKO1's power requirements.

Parameter	Value
VCC	3.25–5.5 V dc
Continuous tracking	50 mW
Energy/fix	40 mW-s
Standby current	5 μ A

Table 3 Power Requirements

The ISM400-EKO1 receives power on pin 17 . Figure 4 depicts typical power circuitry.

You can reduce power consumption by turning on the GPS engine only when needed to acquire a fix. Use pin 30 (ON_OFF) to toggle power to the GPS engine. The pulse must be at least 63 μ s wide.

ON_OFF: On_OFF input is a 1.2V-1.5V level direct hardware connection to the Finite state machine/ The RTC clock must be on and stable for this control to be functional. The minimum on pulse duration is two RTC ticks, about 63 μ s. Minimum interpulse is one second. Minimum off duration is two RC ticks, about 63 μ s. A critical item is to avoid contact bounce is mechanical switches are being used.

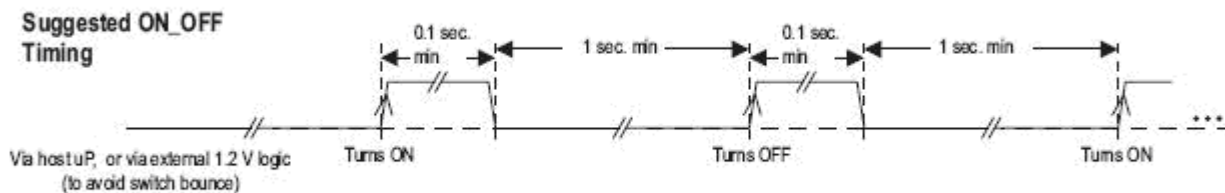


Figure 4 On_Off Timing Diagram

Use pin 14 (TIMEMARK) to determine when the GPS engine has a navigation solution. Pin 14 goes high following an over-solved navigation solution (involving five satellites or more). Pin 14 stays high until the GPS engine is reset or turned off, even if the engine can't compute solutions on subsequent cycles. Pin 14 stays low after the GPS engine is turned back on, until the next over-solved navigation solution.

Antenna

The ISM400-EKO1 is designed for use with an active antenna.

Input/Output

The ISM400-EKO1 enables I/O by way of a UART (universal asynchronous receiver/transmitter). The UART supports the NMEA-0183 protocol at either 4800 Baud or SSB (SiRF Standard Binary) protocol at 57600 Baud.

When the UART is enabled, I/O occurs on (TXA) and (RXA).

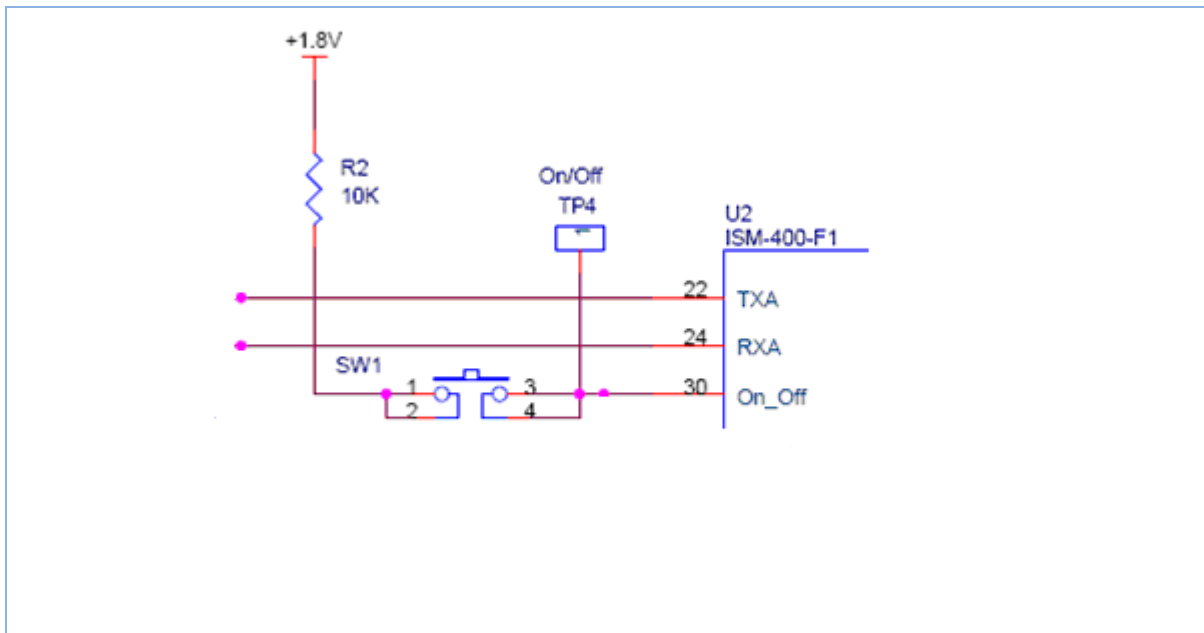


Figure 6 Typical UART Circuitry

Performance

The ISM400-EKO1 has a tracking sensitivity of -159 dBm and an acquisition sensitivity of -142 dBm. It is capable of receiving SBAS (satellite-based augmentation system) differential corrections (both WAAS (Wide-Area Augmentation System) and EGNOS (European Geostationary Navigation Overlay Service)).

Item	Value
Hot start–Autonomous	< 1 s
Warm start–Autonomous	< 35 s
Cold start–Autonomous	< 35 s
MS (mobile station) based–GSM coarse time	<0.6 s
MS assisted–GSM coarse time	<5.3 s
Horizontal (autonomous) ¹	< 2.5 m
Horizontal (with SBAS) ²	< 2.0 m
Speed ²	< 0.01 m/s
Heading ³	< 0.01°

Table 4 Performance Parameters

¹ 50% 24 hr static, -130 dBm

² 50% @ 30 m/s

Firmware

The ISM400-EKO1 runs GSWLT3, the SiRF standard software for SiRFstarIII–LT™ receivers. Table 9 describes the firmware options available for the ISM400-EKO1. Standard evaluation kits ships with NMEA -0182 (N4) versions

Part No.	Description										
ISM400-EKO1-N4	NMEA-0183 @ 4800 Baud, SBAS enabled										
ISM400-EKO1-S5	SiRF Binary, @ 57,600 , SBAS enabled										
ISM400-EKO1-C5-Vxxx	The C5 series comprises custom firmware off-the-shelf. These are firmware release available <table border="1"> <thead> <tr> <th>Item</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>Single UART with NMEA-0183 running at 57600 Bd on port A with only GGA messages</td> <td>V0001</td> </tr> <tr> <td>Single UART with SiRF binary running at 115200 Bd on port A with position, velocity and time updated 5 Hz</td> <td>V0005</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Item	X	Single UART with NMEA-0183 running at 57600 Bd on port A with only GGA messages	V0001	Single UART with SiRF binary running at 115200 Bd on port A with position, velocity and time updated 5 Hz	V0005				
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Table 5 Part Nos. by Firmware Release Ordering Information

Ordering Part Number

The ISM400-EKO1 ordering information. Please specify the corresponding part number when ordering. Please see detailed specification of the ISM400 for more information

Part No.	Package
ISM400-EKO1	Board