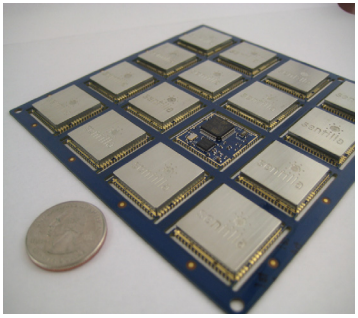
SENARM01
Sentilla OEM Module
User's Guide



April 2, 2009

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Chapter 1
Introduction

The SENARM01 serves as a building block for other products. This document provides you with a description of its operation, basic specifications, safety instructions, and regulatory information.

Theory of Operation

SENARM01 is a data acquisition, processing, and communication chip. It is designed to acquire data from a variety of sensors, process that data, and participate in a multihop wireless network. The device uses IEEE 802.15.4 standard for wireless communication.

Physical Characteristics

The module is packaged in an LCC68 form factor. The package pins bring out analog input signals, digital input and output, and RF interface. The package is physically shielded. The device buffers all input signals; it sources (or sinks) a maximum of 25mA across all output pins.

Communication Characteristics

In normal operation, the OEM Module complies with this protocol to implement various layers of the protocol stack:

- Physical — 802.15.4 PHY - 250 kbps signal in 128 byte packets are encoded using DSSS. The sequence of chips is modulated using O-QPSK and transmitted in a 2.4 GHz band.

Components

The device contains two major components:

1. STM32F103 microcontroller from ST Micro
2. CC2520 transceiver from Texas Instruments

Figure 1: SENARM01

Features

- STM program memory: 512K x 8
- Ram: 64K x 8
- I/O: 51
- Package: LCC68
- Maximum clock speed: 72 MHz

- Dedicated buses: 12
- Battery backup enable
- JTAG/RADIO Pins

Chapter 2
Usage

Physical Layout

Figure 2 shows a high-level layout of the SENARM01 including the STM Chip and the CC2520 Transceiver, with overall measurements.

Figure 2: SENARM01 Layout

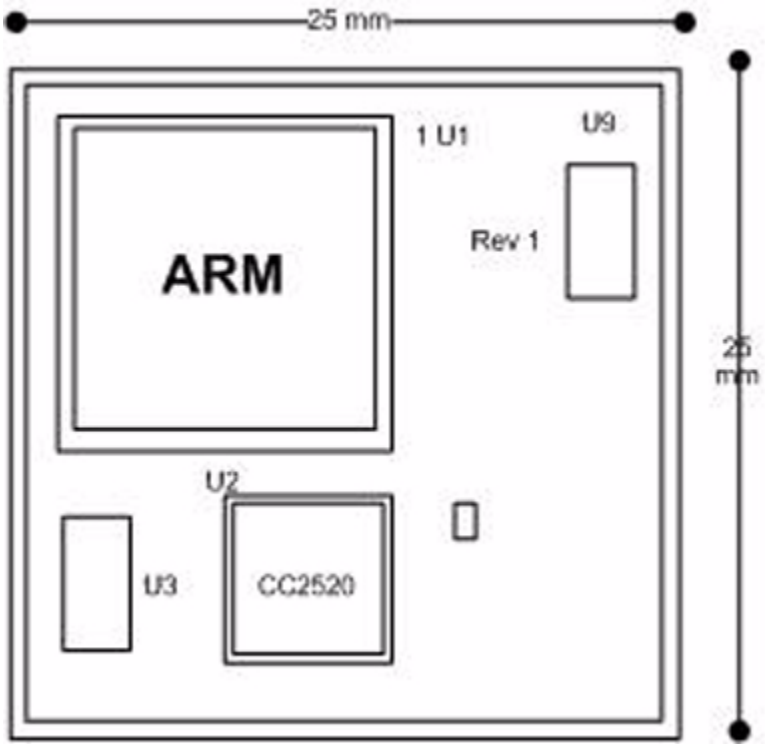

Table 3: SENARM01 Overall Dimensions

SENARM01 Specification	Unit	Minimum	Nominal	Maximum
Width	inches	0.95	095	0.95
	mm	25.0	25.0	25.0
Length	inches	.95	.95	.95
	mm	25.0	25.	25.
Height	inches	0.067	0.71	0.079
	mm	1.7	1.8	2.0

OEM Soldered Connections

SENARM01s can be soldered using standard reflow ovens (including lead-free soldering) at a maximum temperature of 250 degrees C for 30 seconds. Only use "No-Clean" solder paste. Do not clean or wash the printed circuit board (PCB) after soldering. When you use "No-Clean" solder paste, cleaning is not necessary. For the best connection to the PCB, the solder connection should fill the edge-plated via hole almost to the top.

Chapter 3
Specifications

Table 1: SENARM01 Specifications

Item	Specification
Model name and number	Sentilla OEM Module, SENARM01
Dimensions (W x H x D) inches	.9” x .9“
Unit Weight	Under 1 oz.
Standards	IEEE 802.15.4
Radio / Antennas	TI DN0007 or HyperLink HG2402RD-RSF
Power	Maximum 3.3 Volts

Chapter 4
Safety and Regulatory Notices

FCC Compliance Statement

SENARM01 has been designed, constructed, and tested for compliance with FCC Rules that regulate intentional and unintentional radiators.

CAUTION: The user is not permitted to make any modifications to this equipment without express approval from Sentilla Inc. Doing so will void the user's authority to operate this equipment.

This equipment has been tested and found to comply 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 devices must accept any interference received, including interference that may cause undesired operation.

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 in accordance with the instructions, 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.

However, there is no guarantee that interference will not occur in a particular installation.

FCC RF Radiation Exposure Statement

To comply with the FCC and ANSI C95.1 RF exposure limits, the antenna(s) for this device must:

- The antenna must operate with a separation distance of at least 20 cm from all persons using this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or radio transmitter.
- Installers and end users must follow the installation instructions provided by the manufacturer.
- End users must be provided with specific operations for satisfying RF exposure compliance.

Antenna List

This device has been designed to operate with the antennas listed below, and having a maximum gain of 3.3 dB. Antennas not included in this list or having a gain greater than 3.3 dB are strictly prohibited for use with this device. The required antenna impedance is 50 Ohm

1. Texas Instruments DN0007, maximum gain of 3.3 dB
2. HyperLink Technologies HG2402RD-RSF, maximum gain of 2.2 dB

OEM Requirements

The Original Equipment Manufacturer must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the final product that displays the contents shown in the figure below.

OEMs must test final product with unintentional radiators (FCC section 15.107 and 15.109) before declaring compliance of their final product to Part 15 of the FCC Rules.

Figure 1: U. S. Regulatory Label Text

Contains FCCID: TOQ SENARM01
The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference, and

This device must accept any interference received, including interference that may cause undesired operation.

Figure 2: Canadian Regulatory Label Text

Contains IC Number: 6142A-SENARM01
This Class A digital apparatus complies with Canadian ICES-003

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.