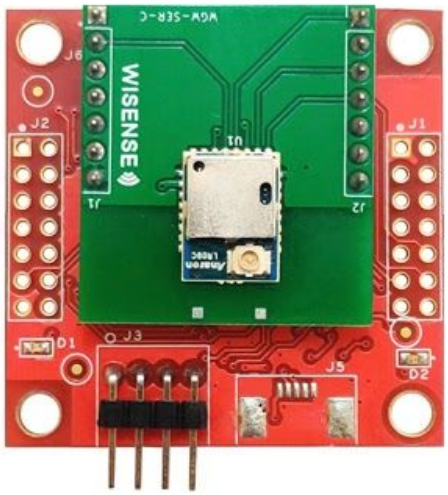
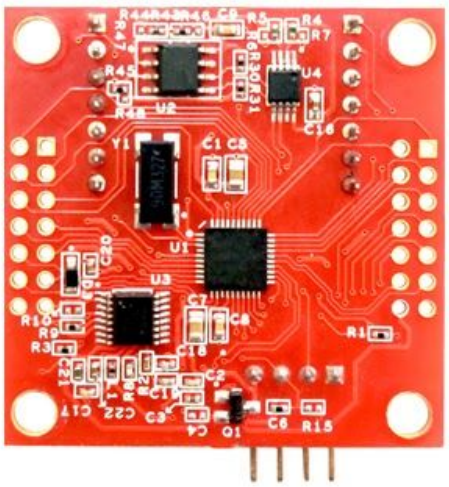
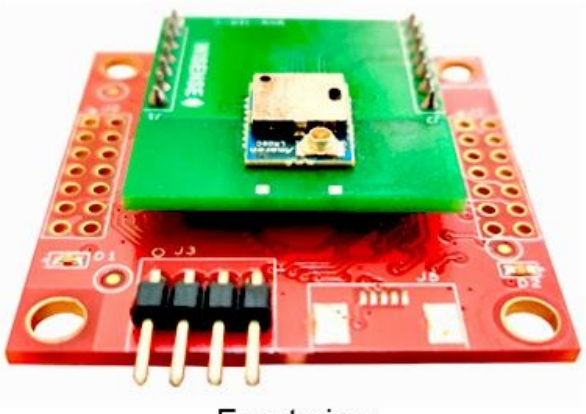
WiSense WSN1101ANL Datasheet



Top view



Back view



Front view

The WSN1101ANL is a low profile low power WiSense Sub 1-GHz wireless mesh node. It includes the CC1101 high-performance sub-GHz radio (from TI) and the MSP430G2955 microcontroller (from TI).

The module consists of two separate PCBs.

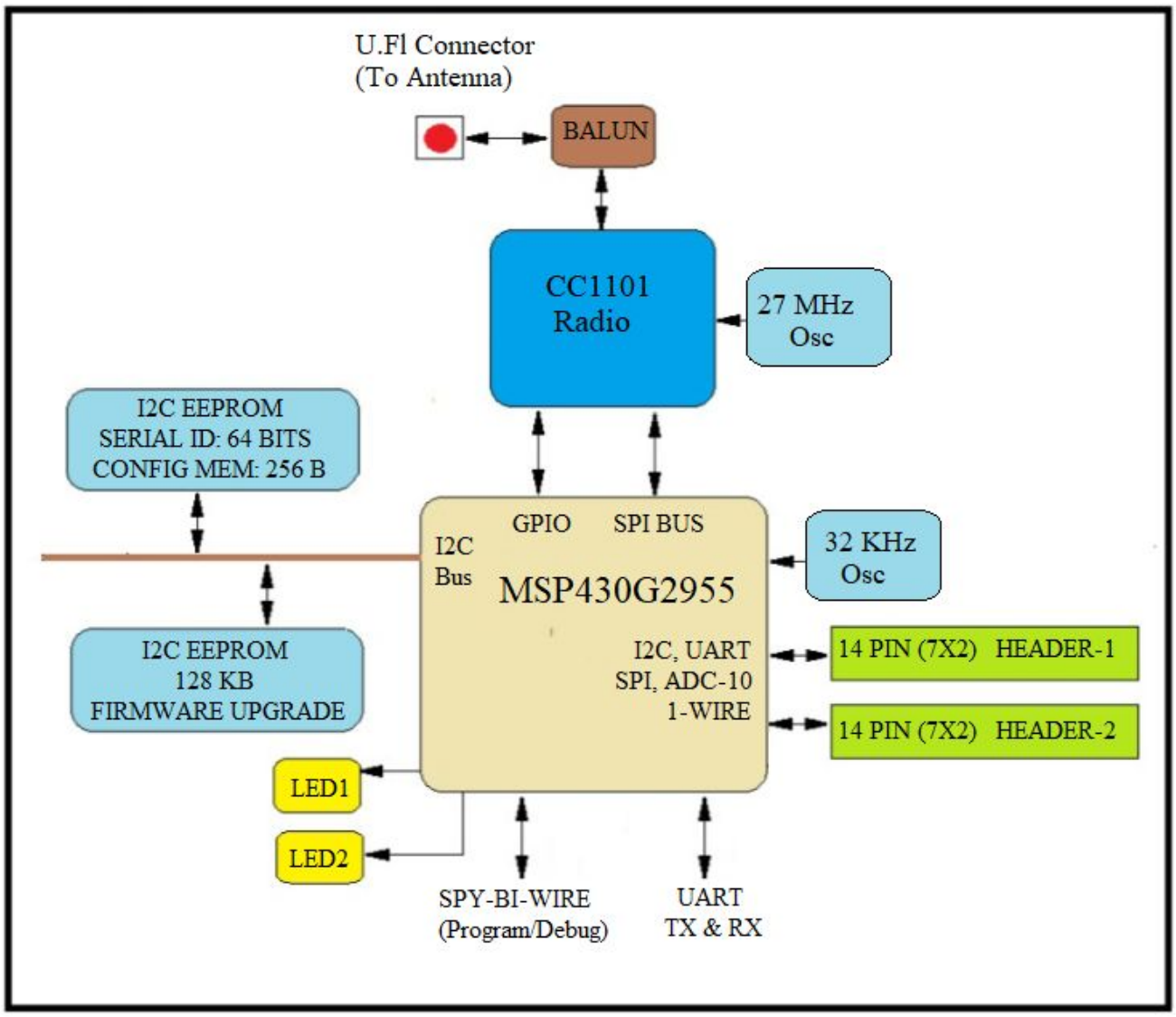
- The PCB on top hosts the CC1101 radio module.
- The PCB on the bottom hosts the microcontroller.

The WSN1101ANL comes pre-programmed out of the box to operate as a WiSense mesh network reduced function device (RFD). Once the node joins a WiSense mesh network, it will periodically report sensor data as programmed. This sensor node can support multiple sensors. By default, the node reports supply voltage in every message sent to the network gateway. This reporting interval is configurable in real time through the Network Coordinator. Wireless communication between gateway and sensor nodes is bi-directional. This allows node behavior to be reconfigured during installation and at any time after installation. Very low standby mode current consumption less than 1 uA allows for long battery life. WiSense gateway can support up to 64 simultaneous sensor nodes in a single network. Each node has a unique IEEE assigned 64-bit address.

Standards Compliance

Region	**Operating Frequency Range**	**Certification**
USA/Canada	902-928 MHz	FCC
EU	868-870 MHz	ETSI
India	865-867 MHz	WPC (Self Certified)

HARDWARE ARCHITECTURE



Microcontroller PCB

- MSP430G2955 Ultra-low-power 16 bit microcontroller from TI
    - 56 KB flash, 4KB SRAM
    - Standby current (in LPM3) as low as 1 microamp.
    - Operating voltage: 1.8 V – 3.6 V
    - Multiple On-chip 10 bit ADC channels
    - On-chip power supply voltage measurement
    - On-chip temperature sensor
- 2 pin Spy-Bi-Wire protocol for development (Programming and debugging).
- SPI/GPIO interface to the radio module
- UART/I2C/SPI/1-wire/GPIO/ADC interface to sensors
- Onboard serial (I2C) EEPROM (AT24MAC602) with hardwired and globally unique 48-bit and 64-bit addresses.
- Onboard 128 Kilo-Bytes EEPROM (M24M01) for over the air firmware upgrade. EEPROM can store two full images.
- Onboard high accuracy 32 kHz crystal
- 1 three-pin right-angled header (UART) – Tx, Rx, and Gnd
- 1 four-pin right-angled header (Spy-Bi-Wire) – Vcc, Gnd, Test, Reset
- 2 LEDs
- 2 2x7 headers which expose most of the MSP430G2955 pins.
- Dimensions: 42 mm x 42 mm
- Microcontroller Datasheet: http://www.ti.com/lit/gpn/msp430g2955
- Microcontroller User guide: http://www.ti.com/lit/pdf/slau144

Radio PCB

- CC1101 Transceiver (TI)
  - Low-cost sub-1 GHz transceiver designed for very low-power wireless applications.
  - Receiver Sensitivity
    - -118 dBm at 1.2 kBaud, 868 MHz, 1% PER
    - -120 dBm at 1.2 kBaud, 915 MHz, 1% PER
  - Operating voltage: 1.8 V – 3.6 V
  - Modulation: 2-FSK, 4-FSK, GFSK, and MSK supported as well as OOK and flexible ASK shaping.
  - Programmable output power up to +12 dBm for all supported frequencies
  - Programmable data rate from 0.6 to 600 kbps.
  - http://www.ti.com/lit/ds/symlink/cc1101.pdf
- Onboard high accuracy 27 MHz crystal
- Antenna options (mutually exclusive)
  - U.FL antenna connector. Can use U.FL to SMA cable assembly to connect to the antenna outside the weatherproof enclosure.
  - PCB antenna.
- Interface
  - Two 1x7 2.54 mm pitch headers for mating with the microcontroller board.
- Dimensions
  - 37.61 mm x 37.61 mm

Power Supply

- The WSN1101ANL supply voltage range: 1.8 V to 3.6 V
- Note: Exceeding 3.6 V can damage the WSN1101ANL !!!
- The WSN1101ANL can be powered by a 3 V lithium coin cell or a pair of 1.5 V AA/AAA batteries in series. Note that the WSN1101ANL does not have a battery/coin cell holder. This needs to be purchased separately.
- Optional Solar + Li-Ion battery power supply unit (PSU).

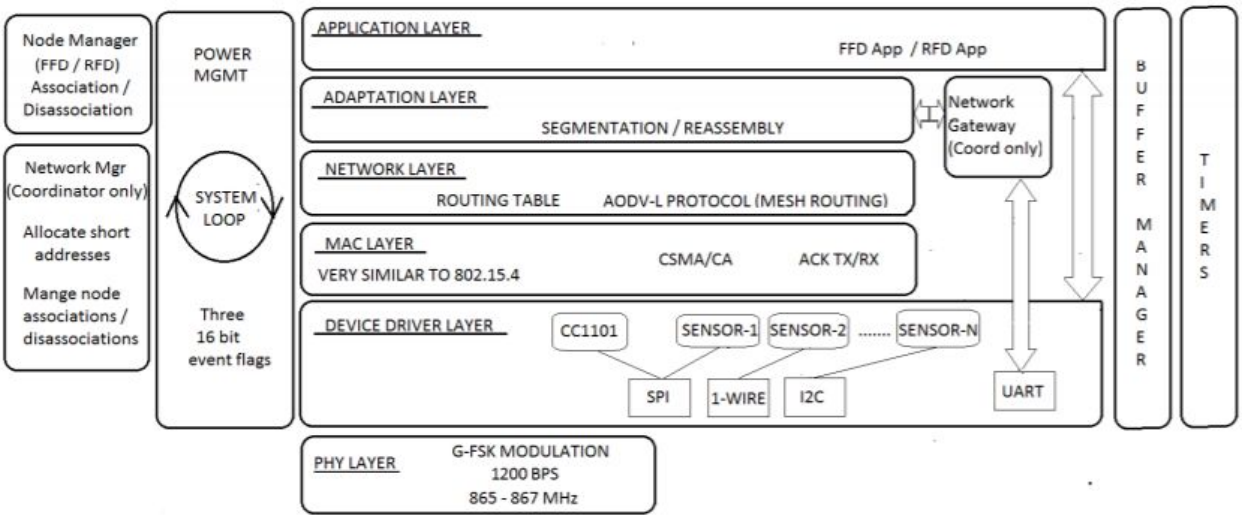
Sensor Data Reporting Options

1. Reports sensor data periodically with a configurable interval - Minimum (1 sec) / Maximum (1 day).

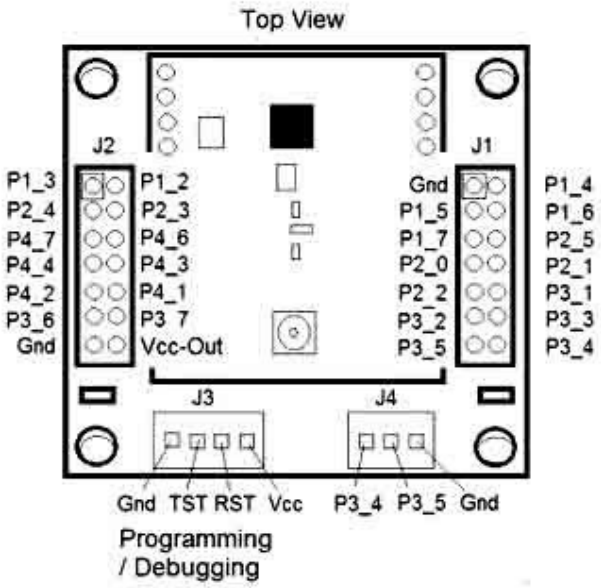
2. Reports sensor data only when it changes by a configurable percentage value with respect to the prior value reported. Also, reports measured temperature if no report sent for a configurable period of time.

3. Reports sensor data only when it crosses a configurable high or low threshold value. High and low hysteresis values are also configurable. Also, reports measured temperature if no report sent for a configurable period of time.

WiSense Network Stack Layers



PINOUT



P3_4 : UART TXD

P3_5 : UART_RXD

P3_6 : I2C SDA

P3_7 : I2C SCL

P3_1: Used by Radio (Do not use)

P3_2: Used by Radio (Do not use)

P3_3: Used by Radio (Do not use)

P4_1: Used by Radio (Do not use)

P2_0 : 10 bit ADC Chann 0 / Other Functionality - See datasheet

P2_1 : 10 bit ADC Chann 1 / Other Functionality - See datasheet

P2_2 : 10 bit ADC Chann 2 / Other Functionality - See datasheet

P2_3 : 10 bit ADC Chann 3 / Other Functionality - See datasheet

P2_4 : 10 bit ADC Chann 4 / Other Functionality - See datasheet

P2_5 : 10 bit ADC Chann 5 / Other Functionality - See datasheet

P1_4 : GPIO / Other Functionality - See datasheet

P1_5 : GPIO / Other Functionality - See datasheet

P1_6 : GPIO / Other Functionality - See datasheet

P1_7 : GPIO / Other Functionality - See datasheet

P3_1 : GPIO / Other Functionality - See datasheet

P3_2 : GPIO / Other Functionality - See datasheet

P3_3 : GPIO / Other Functionality - See datasheet

P4_2 : GPIO / Other Functionality - See datasheet

P4_3 : GPIO / Other Functionality - See datasheet

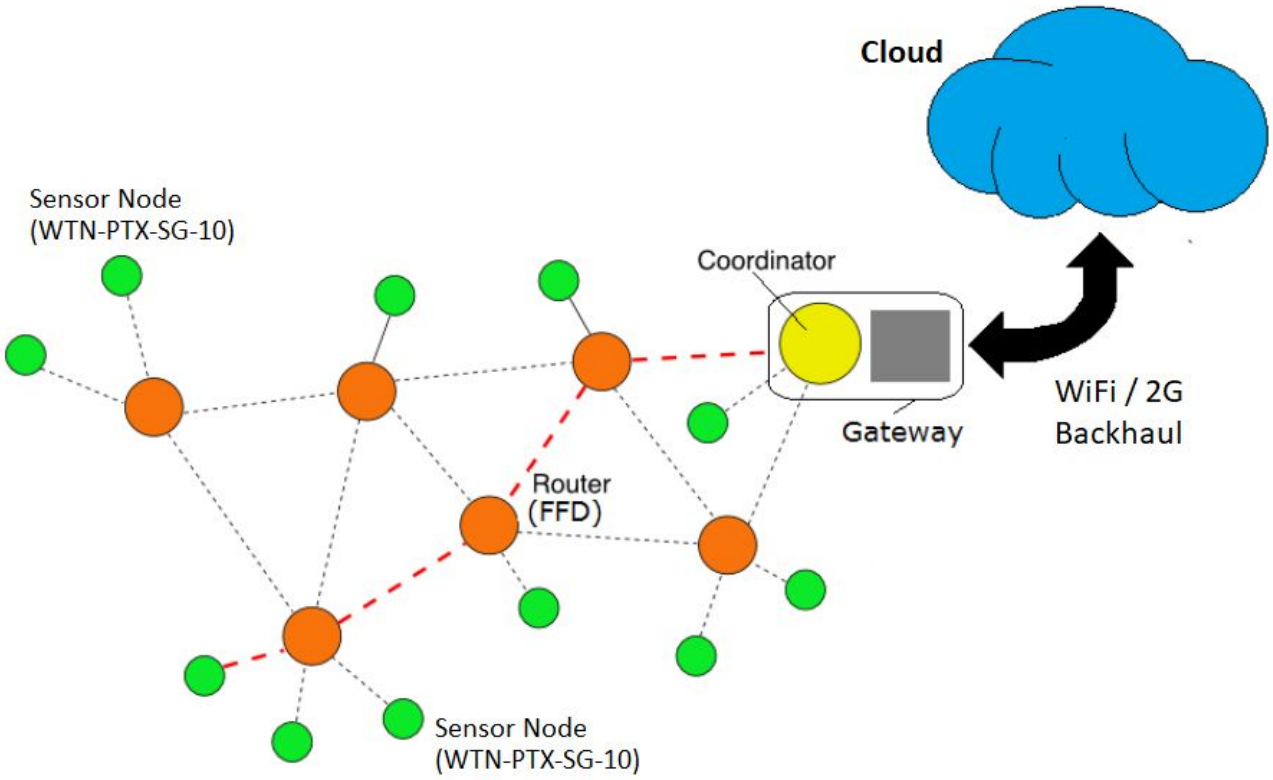
P4_4 : GPIO / Other Functionality - See datasheet

P4_6 : GPIO / Other Functionality - See datasheet

P4_7 : GPIO / Other Functionality - See datasheet

Micro Datasheet : http://www.ti.com/lit/ds/symlink/msp430g2955.pdf

WiSense Wireless Mesh / Star Network Architecture



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