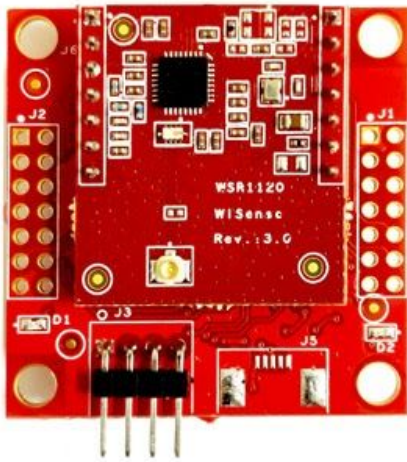
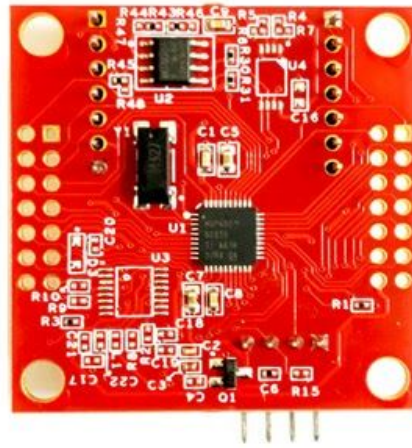


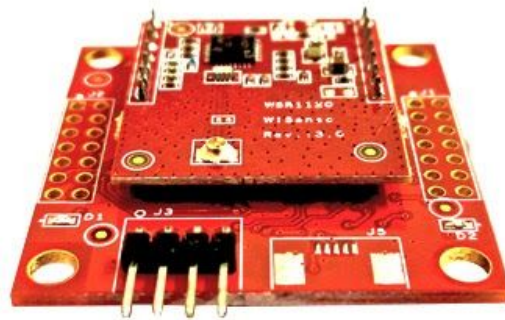
WiSense WSN1120L Datasheet



Top View



Back View



Front View

The WSN1120L is a low profile low power WiSense Sub 1-GHz wireless mesh node. It includes the CC1120 high-performance sub-GHz radio (from TI) and the MSP430G2955 microcontroller (from TI).

The module consists of two separate PCBs.

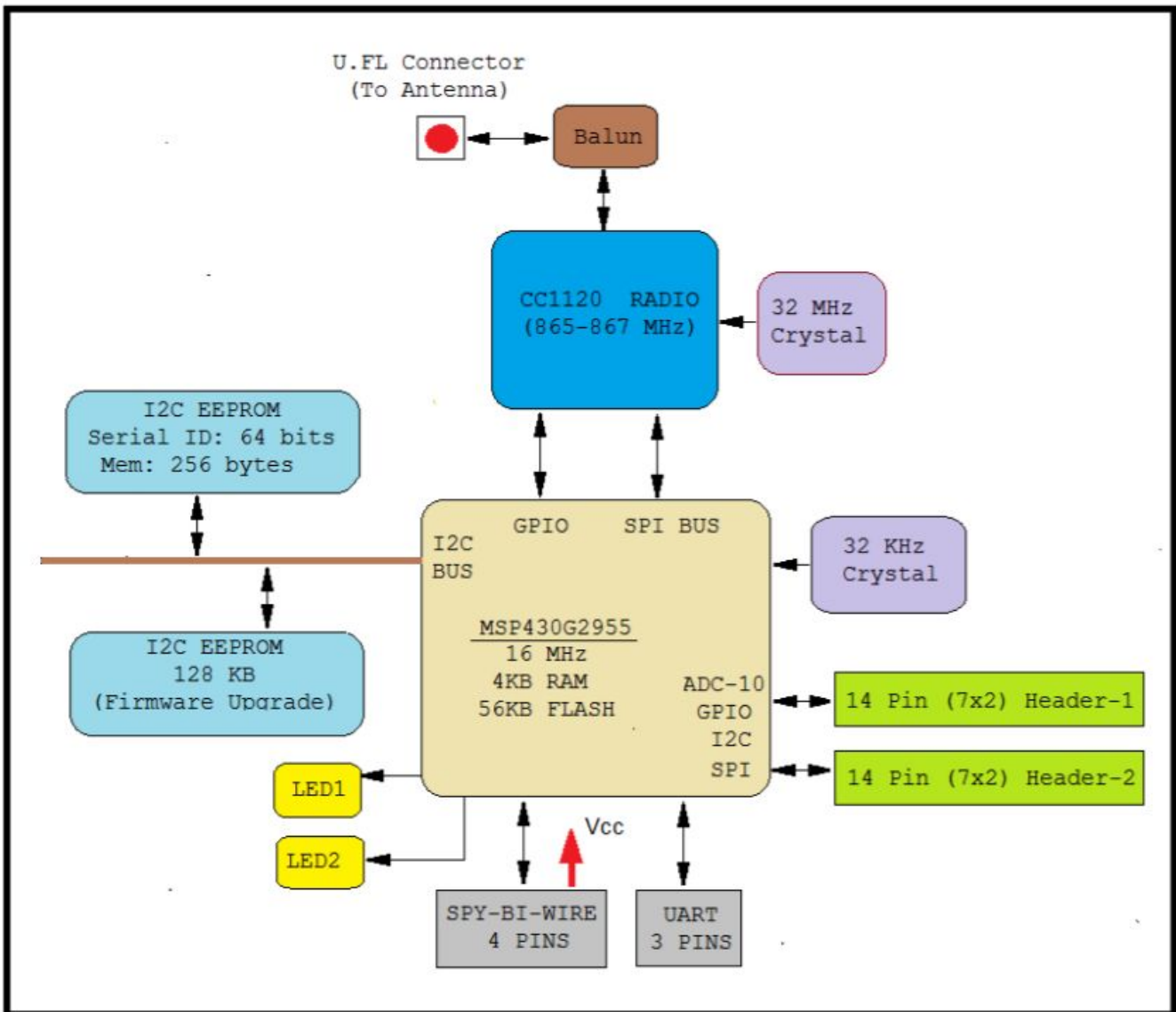
- The PCB on the top hosts the CC1120 radio.
- The PCB on the bottom hosts the microcontroller.

Standards Compliance

Region	Operating Frequency Range	Certification
India	865-867 MHz	WPC (Self Certified)

The WSN1120L comes pre-programmed out of the box to operate as a WiSense mesh network reduced function device (RFD) in the 865-867 MHz license-free band (in India). Once the node joins a WiSense mesh network, it will periodically report the supply voltage. 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.

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

Radio PCB

- CC1120 Transceiver (TI)
 - Low-cost sub-1 GHz transceiver designed for narrowband and very low-power wireless applications. The narrowband operation provides the link budget required to operate long-range links (1 KM and above).
 - Programmed by WiSense stack to operate in the 865-867 MHz license-free band in India
 - Operating voltage: 2.0 V – 3.6 V
 - Sensitivity: -123 dBm @ 1.2 kBaud (865-867 MHz)
 - Modulation: 2-FSK, 4-FSK, GFSK, and MSK supported as well as OOK and flexible ASK shaping. Default programmed modulation is 2-GFSK.
 - Programmable output power up to +13 dBm for all supported frequencies
 - Programmable data rate from 0 to 200 kbps. Lower the data rate, the higher the range. The default baud rate is 38.4 kbps.
- Onboard high accuracy 32 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

Range

- Line of Sight: More than 1000 meters @ 1.2 kbps
- Non Line of Sight: More than 500 meters @ 1.2 kbps

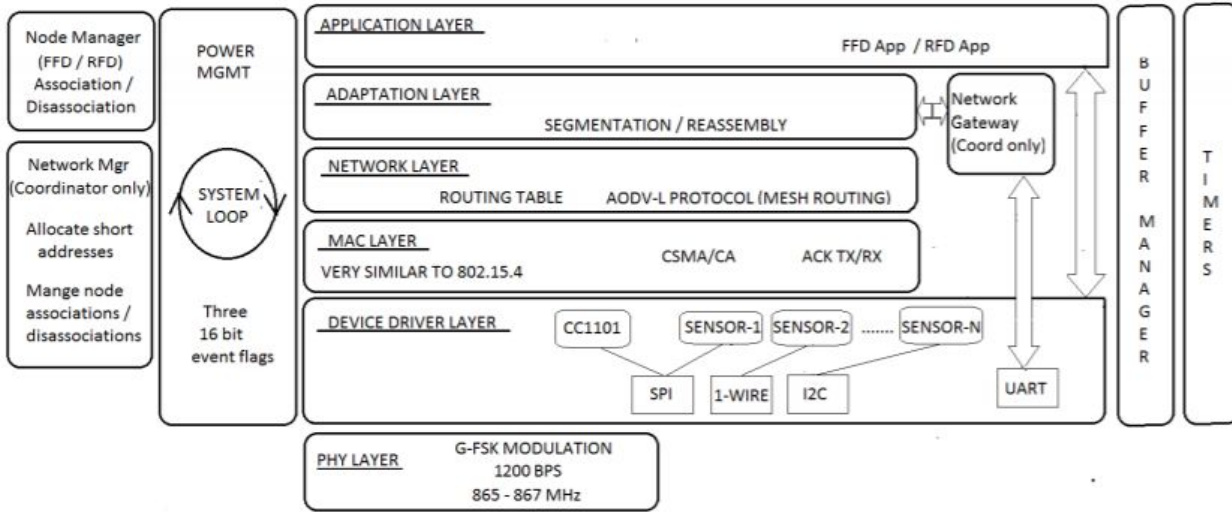
Power supply consideration

- The WSN1120L supply voltage range: 1.8 V to 3.6 V
- Note: Exceeding 3.6 V can damage the WSN1120L !!!
- The WSN1120L 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 WSN1120L does not have a battery/coin cell holder. This needs to be purchased separately.
- Optional Solar + Li-Ion battery power supply unit (PSU).

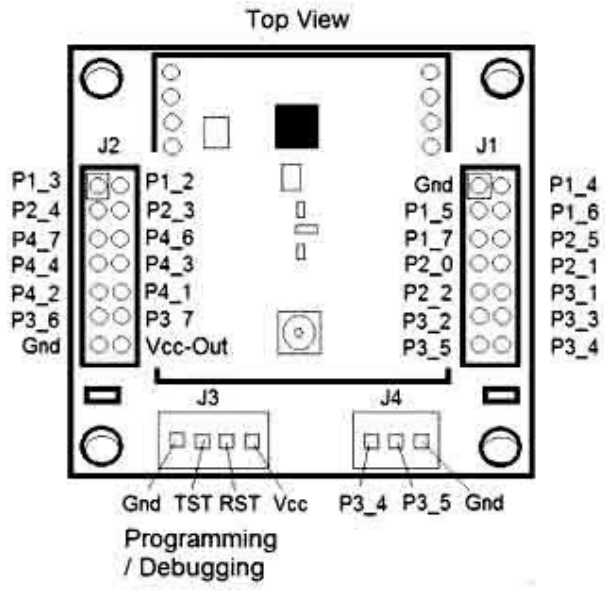
Message reporting options:

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

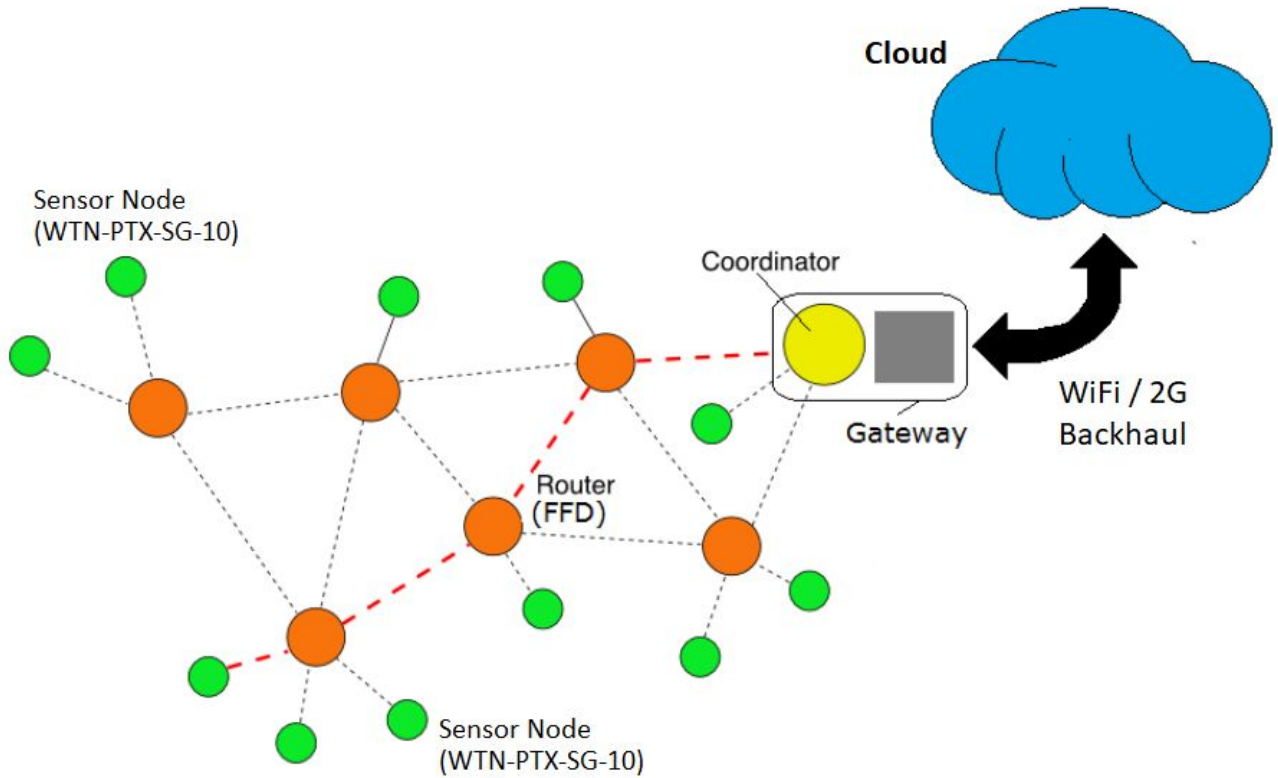
P3_1: Used by Radio (Do not use)
 P3_2: Used by Radio (Do not use)
 P3_3: Used by Radio (Do not use)
 P4_1: Used by Radio (Do not use)

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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