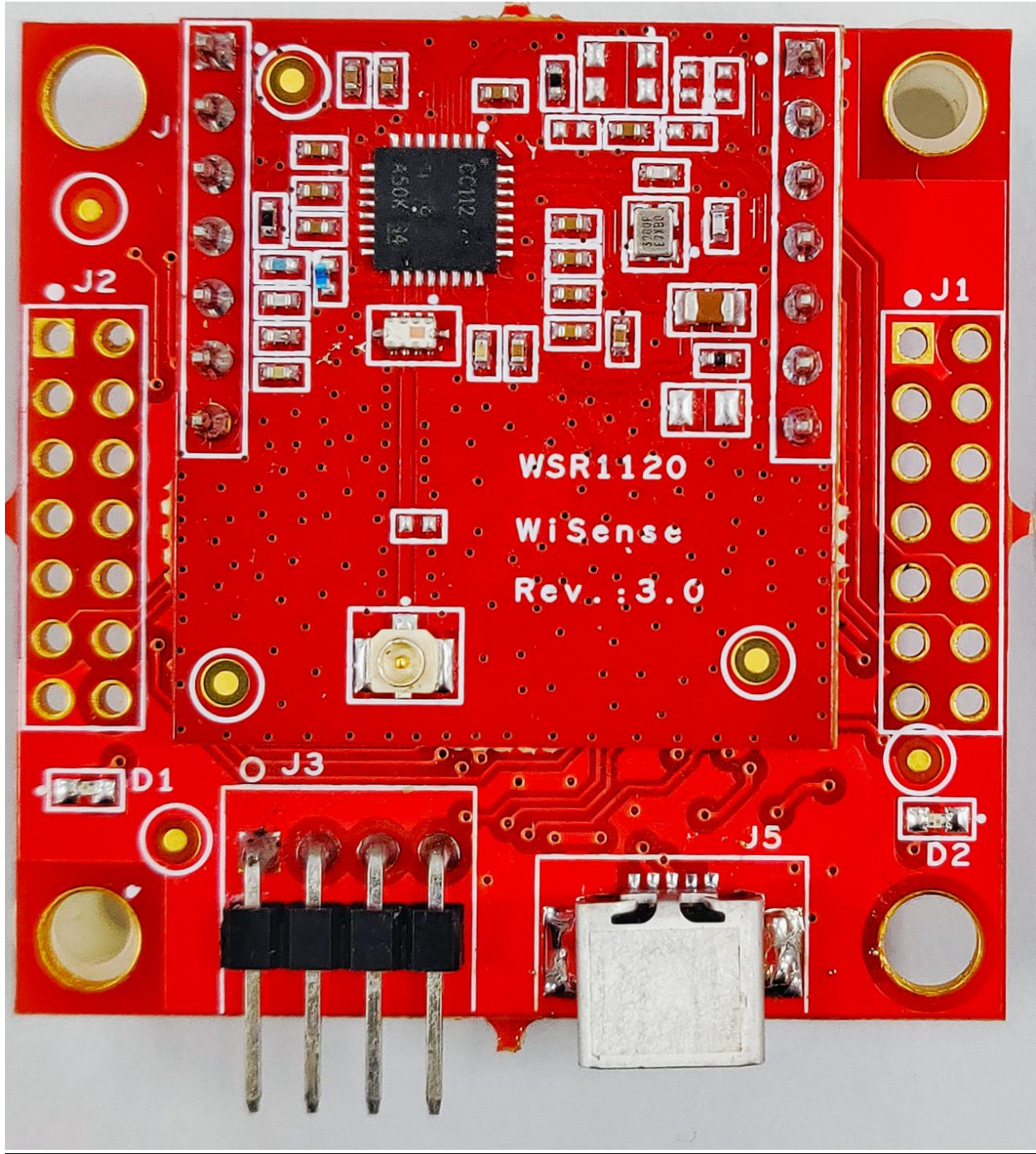
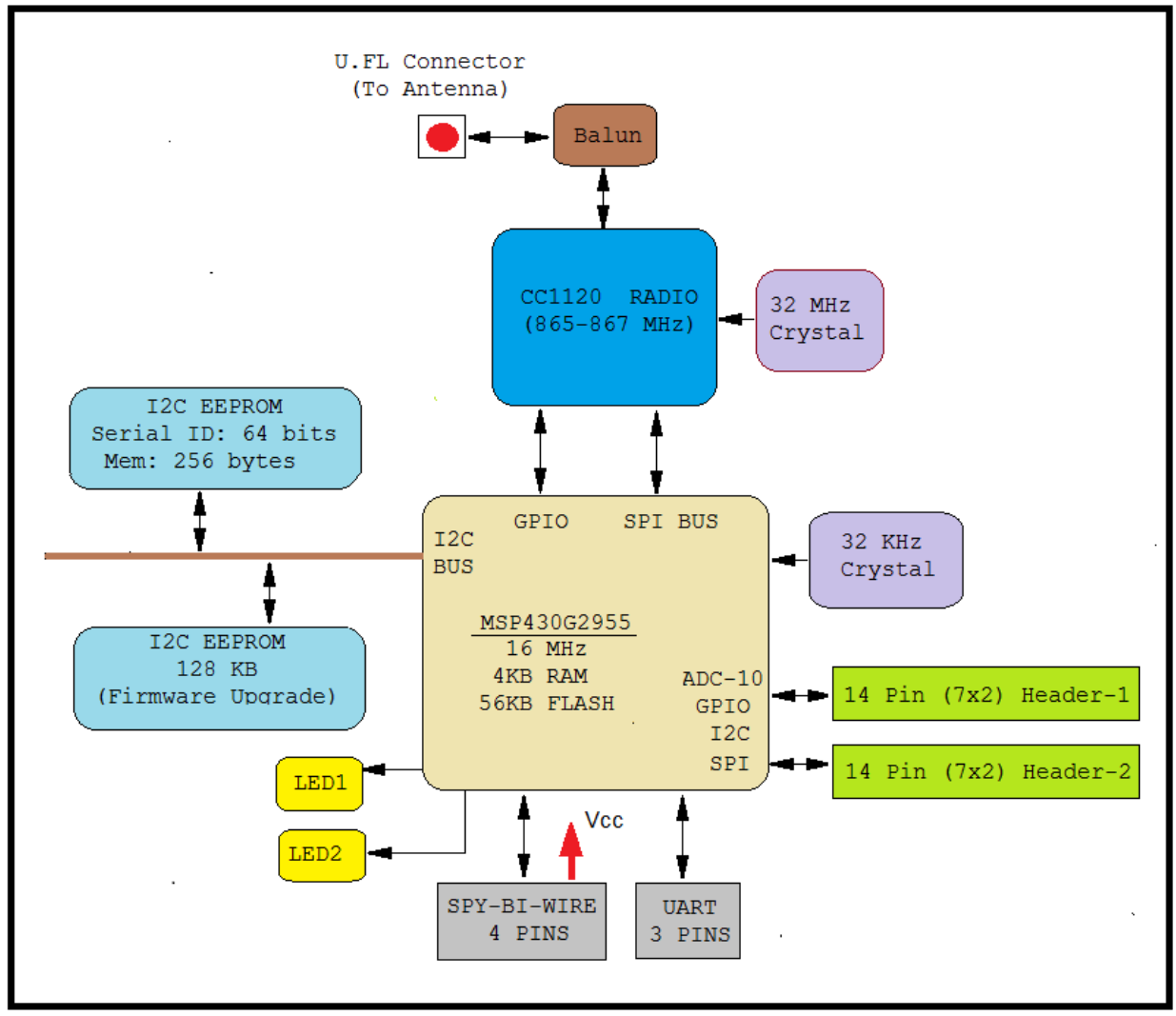


# WiSense WSN1120L Datasheet



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 WiSense wireless mesh network operates in the 865-867 MHz license free band in India.

The module consists of two PCBs. One PCB hosts the microcontroller while the other hosts the CC1120 radio.



### WSN1120L HW Architecture

### **Microcontroller PCB:**

- MSP430G2955
  - Ultra low power microcontroller from TI
  - 56 KB flash, 4KB SRAM
  - Standby current (in LPM3) as low as 1 micro amp.
  - Operating voltage: 1.8 V – 3.6 V
  - Multiple On-chip 10 bit ADC channels
  - Peripheral support (in hw):
    - SPI/I2C/UART
    - I2C and 1-wire (software)
    - UART/SPI (hardware)
  - 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 interface to sensors
- On board serial (I2C) EEPROM (AT24MAC602) with hardwired and globally unique 48 bit and 64 bit addresses.
- On board 128 Kilo-Bytes EEPROM (M24M01) for over the air firmware upgrade. EEPROM can store two full images.
- On board 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
  - Low-cost sub-1 GHz transceiver designed for narrow band and very low-power wireless applications. Narrow band 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. 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 programmed data rate, higher the range. Programmed baud rate is 20 kbps.
  
- Two antenna options (mutually exclusive)
  - U.FL antenna connector. Can use U.FL to SMA cable assembly to connect to antenna outside weatherproof enclosure.
  - PCB antenna.
- On board high accuracy 32 MHz crystal
- Uses 2 1x7 2.54 mm pitch headers for mating with 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

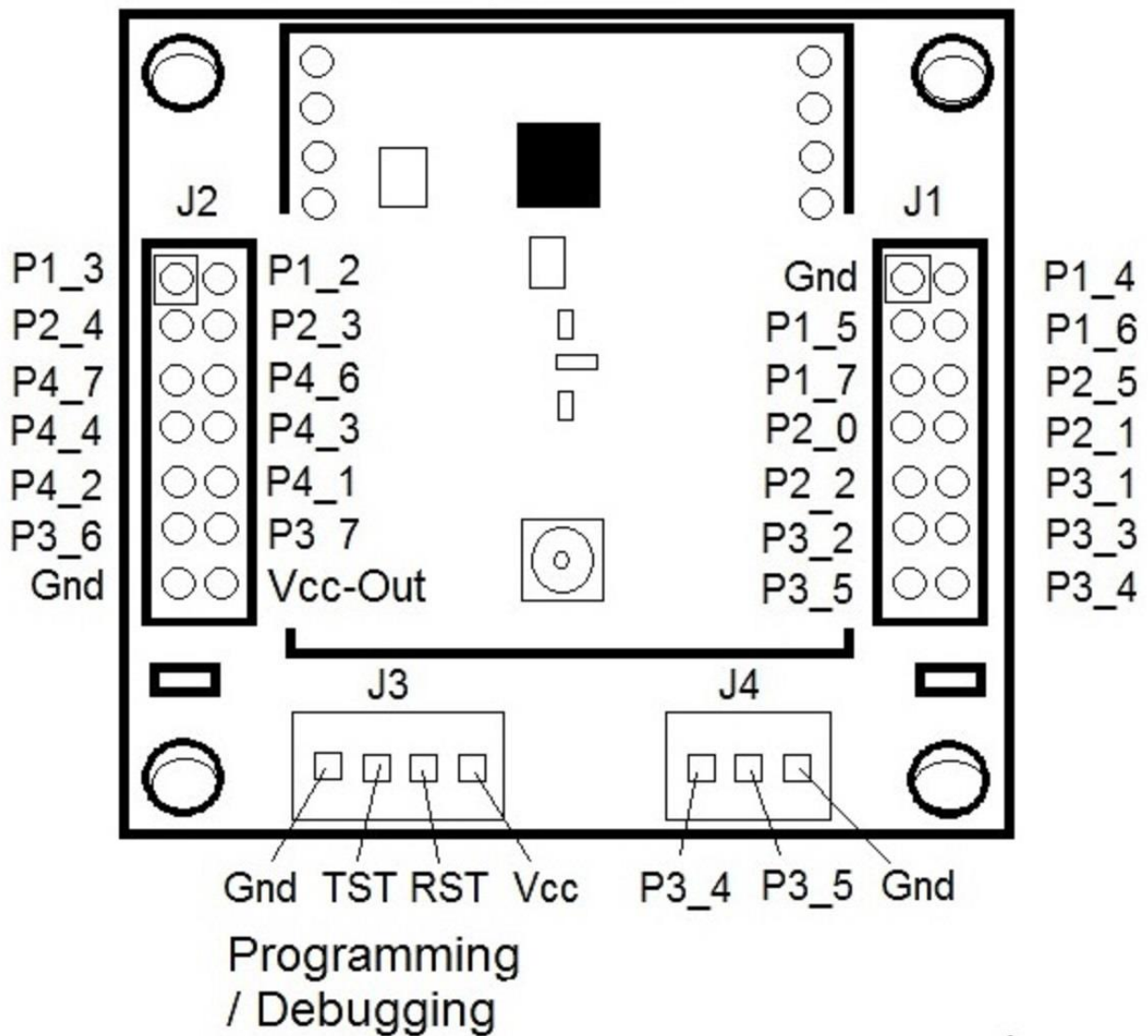
### **Power supply consideration**

- 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 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).

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 (every 3 seconds) report the supply voltage.

## WSN1120L Pin Out

### Top View



## Pin Functionality

### UART

- P3\_4 : UART TX
- P3\_5 : UART RX

### I2C (Implemented in software)

- P3\_6 : I2C SDA
- P3\_7 : I2C SCL

### SPI Bus Pins (Be careful since the RADIO also sits on this bus)

- P3\_1 : SIMO
- P3\_2 : SOMI
- P3\_3 : SCLK

### 10 bit ADC channels (Other functionality too - see MSP430G2955 datasheet)

- P2\_0
- P2\_1
- P2\_2
- P2\_3
- P2\_4
- P2\_5

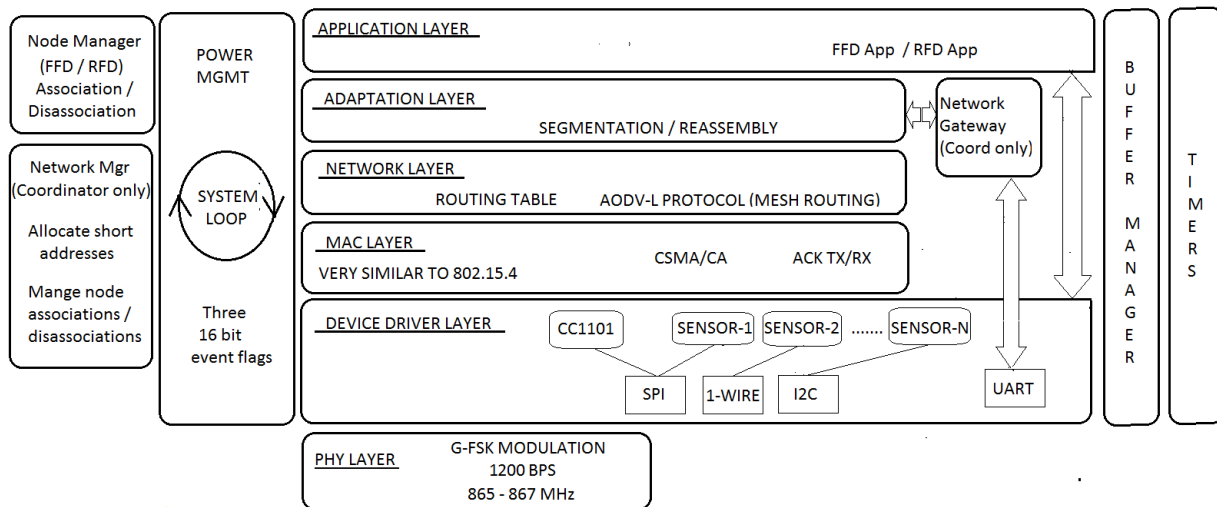
### GPIO (Other functionality too - see MSP430G2955 datasheet)

- P1\_4
- P1\_5
- P1\_6
- P1\_7
- P3\_1
- P3\_2
- P3\_3
- P4\_2
- P4\_3
- P4\_4
- P4\_6
- P4\_7

Do not use these pins

- P4\_1 : Used by the RADIO (SPI chip select signal)

### WiSense Network Stack Layers



### WiSense Network Stack