



# BITxxYYL

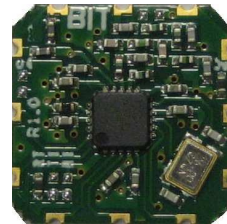
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## Value Line RF Transmitter, Receiver and Transceiver Modules

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### Applications

- ✓ Alarm and security systems, Home and building automation
- ✓ Wireless sensor networks and Active RFID
- ✓ Telemetry Station
- ✓ Private mobile radio



### Product Description

The **BITxxYYL** is a very low cost transceiver module designed for very low power wireless applications.

This module is intended for ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency band at 433 and 868/915 MHz, but can easily be programmed for operation at other frequencies:

**BIT04YYL** 387–464 MHz

**BIT08YYL** 779 – 928 MHz

The module supports various modulation formats (2-FSK, 4-FSK, GFSK, MSK, ASK) and has a configurable data rate up to 600 kbps. The communication range can be increased by enabling a Forward Error Correction option, which is integrated in the module.

**BITxxYYL** provides extensive hardware support for packet handling, data

buffering, burst transmissions, clear channel assessment, link quality indication and wake-on-radio.

The main operating parameters and the 128-byte transmit/receive FIFOs of **BITxxYYL** can be controlled via an SPI interface. In a typical system, the **BITxxYYL** will be used together with a microcontroller.

**BITxxYYL** has a very small package only 14,4 x 14,4 mm ready for SMT assembly.

**BITxxTXL** is a Transmitter based on the [CC115L](#) **BITxxRXL** is a receiver based on the [CC113L](#) **BITxxRTL** is a transceiver based on the [CC110L](#) Product from Texas Instruments.



# BITxxYYL

## Key Features

- Small size (14,4 x 14,4 mm package, 12 pins).
- Frequency bands:
  - BIT04YYL** 387–464 MHz
  - BIT08YYL** 779 – 928 MHz
- High sensitivity: -116 dbm @ 0.6 kbps with coding gain
- Programmable output power up to + 12 dBm.
- 200 nA sleep mode current consumption
- Excellent receiver selectivity and blocking performance.
- Programmable baseband modem.
- Ideal for multi-channel operation.
- Configurable packet handling hardware.
- Suitable for frequency hopping systems due to a fast settling frequency synthesizer.
- Optional Forward Error Correction with interleaving.
- 64-byte RX and TX data FIFOs
- Efficient SPI interface: All registers can be programmed with one “burst” transfer.
- Digital RSSI output.
- Programmable data rate up to 600 kbps
- **BITxxYYL** are suited for system compliant with EN 300 220 V2.3.1 (Europe) and FCC CFR Part 15 (US)
- Integrated analog temperature sensor.
- Lead-free “green package.”
- OOK/ASK, 2-FSK, 4-FSK GFSK e MSK supported.
- Flexible support for packet oriented systems: On chip support for sync word detection, flexible packet length and automatic CRC handling.
- Programmable channel filter bandwidth.
- Automatic Frequency Compensation can be used to align the frequency synthesizer to the received centre frequency.
- Many powerful digital features allow a high-performance RF system to be made using an inexpensive microcontroller.
- Optional automatic whitening and dewatering of data.
- Support for asynchronous transparent receive/transmit mode for backwards compatibility with existing radio communication protocols
- Programmable Carrier Sense indicator
- Programmable Preamble Quality Indicator for detecting preambles and improved protection against sync word detection in random noise.
- Support for automatic Clear Channel Assessment (CCA) before transmitting (for listen-before-talk systems).
- Support for per-package Link Quality Indication



## 1. Absolute Maximum Ratings

Under no circumstances must the absolute maximum ratings given in Table 1 be violated. Stress exceeding one or more of the limiting values may cause permanent damage to the device.

| Parameter                  | Min  | Max                 | Units | Condition  |
|----------------------------|------|---------------------|-------|--|
| Supply voltage             | -0.3 | 3.9                 | V     | All supply pins must have the same voltage                     |
| Voltage on any digital pin | -0.3 | VDD+0.3,<br>max 3.9 | V     |  |
| Input RF level             |      | +10                 | dBm   |  |
| Storage temperature range  | -40  | 85                  | °C    |  |
| ESD                        |      | 750                 | V     | According to JEDEC STD 22, method A114, Human Body Model (HBM) |
| ESD                        |      | 400                 | V     | According to JEDEC STD 22, C101C, Charged Device Model (CDM)   |

**Table 1: Absolute Maximum Ratings**

## 2. Operating Conditions

The operating conditions for BITxxRT are listed Table 2 in below.

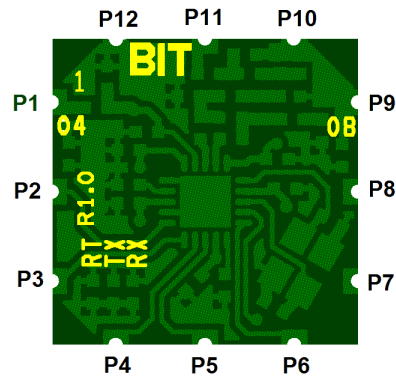
| Parameter                | Min | Max | Units | Condition                                  |
|--------------------------|-----|-----|-------|--|
| Operating temperature    | -30 | 85  | °C    |  |
| Operating supply voltage | 1.8 | 3.6 | V     | All supply pins must have the same voltage |

**Table 2: Operating Conditions**



# BITxxYYL

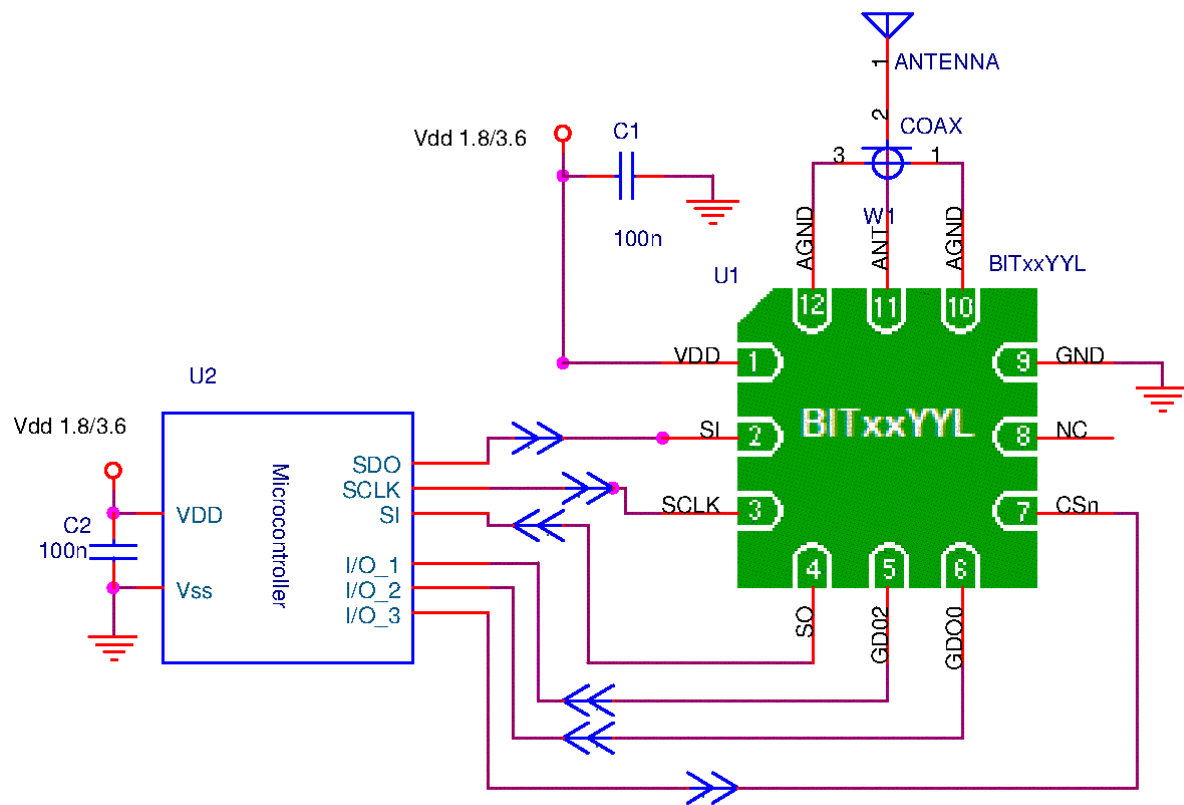
## 3. Pin-Out



| Pin #      | Pin Name   | Pin Type       | Descrizione  |
|------------|------------|----------------|--|
| <b>P1</b>  | VDD        | Power          | 1.8V – 3.6V analog power supply connection   |
| <b>P2</b>  | SI         | Digital Input  | Serial configuration interface, data input   |
| <b>P3</b>  | SCLK       | Digital Input  | Serial configuration interface, clock input  |
| <b>P4</b>  | SO<br>GDO1 | Digital Output | Serial configuration interface, data output<br>Optional general output pin when CSn in High  |
| <b>P5</b>  | GDO2       | Digital Output | Digital Output pin for general use: <ul style="list-style-type: none"> <li>• Test signal</li> <li>• FIFO status signals</li> <li>• Clear Channel Indicator</li> <li>• Clock output, down-divided from XOSC</li> <li>• Serial output RX data</li> </ul>   |
| <b>P6</b>  | GDO0       | Digital I/O    | Digital Output pin for general use: <ul style="list-style-type: none"> <li>• Test signal</li> <li>• FIFO status signals</li> <li>• Clear Channel Indicator</li> <li>• Clock output, down-divided from XOSC</li> <li>• Serial output RX data</li> <li>• Serial input TX data</li> </ul> Also used as analog test I/O for prototype/production testing |
| <b>P7</b>  | CSn        | Digital Input  | Serial configuration interface, chip select  |
| <b>P8</b>  | NC         | NC             | not connect  |
| <b>P9</b>  | GND        | Ground         | Ground Connection  |
| <b>P10</b> | AGND       | Ground         | Ground Connection for Antenna  |
| <b>P11</b> | RF         | RF I/O         | RF input/output to Antenna   |
| <b>P12</b> | AGND       | Antenna Ground | Ground connection for Antenna  |

**Table3: Pin-Out**

## 4. Typical application





## 5. Development Tools

### 5.1. Technical Documents:

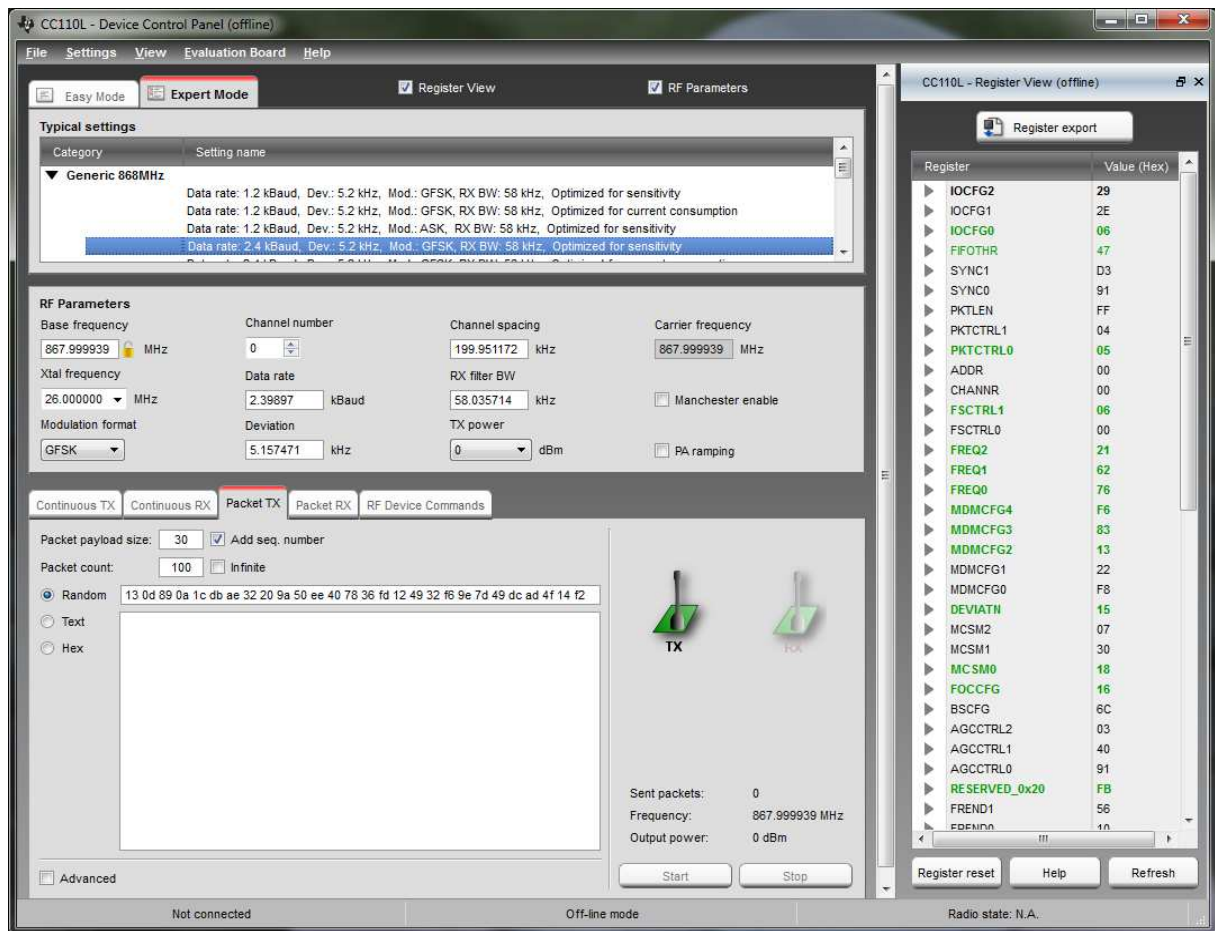
**BITxxRTL:** Data sheet CC110L available for download from <http://www.ti.com/product/cc110L>

**BITxxRXL:** Data sheet CC113L available for download from <http://www.ti.com/product/cc113L>

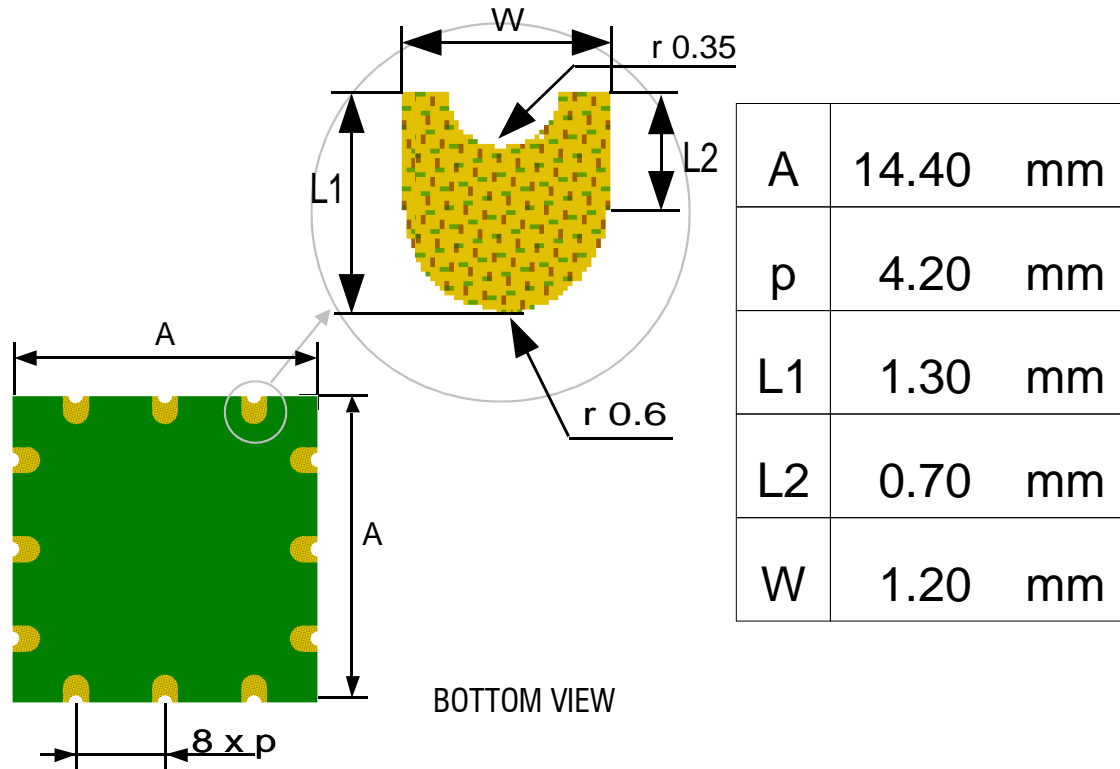
**BITxxTXL:** Data sheet CC115L available for download from <http://www.ti.com/product/cc115L>

### 5.2. Configuration Software

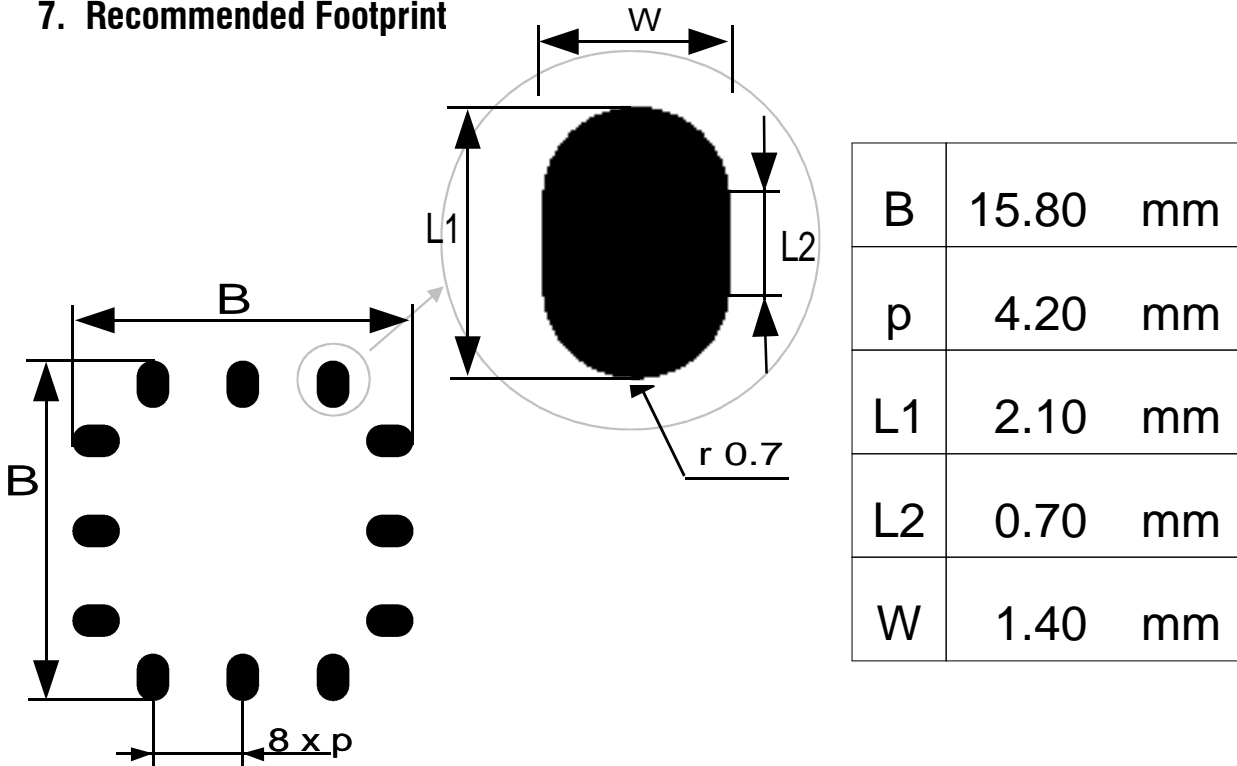
BITxxYYL can be configured using the SmartRF® Studio software, available for download from <http://www.ti.com/tool/smartrfm-studio>. The SmartRF® Studio software is highly recommended for obtaining optimum register settings, and for evaluating performance and functionality. A screenshot of the SmartRF® Studio user interface for CC110L is shown in Figure



## 6. Package Description



## 7. Recommended Footprint



The area underneath the module should be covered with solder resist in order to prevent short circuiting the test pads on the back side of the module. A solid ground plane is preferred.



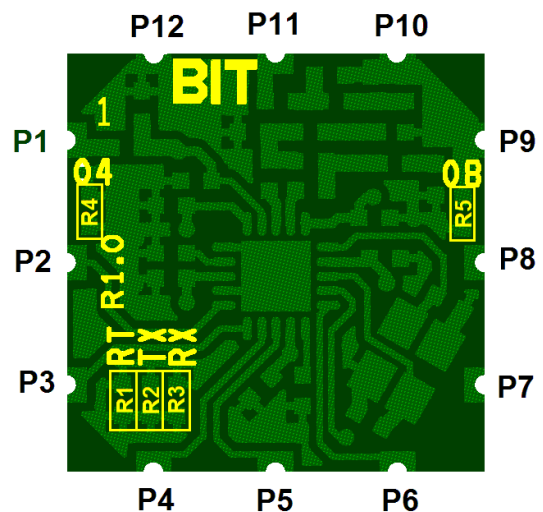
# BITxxYYL

## 8. Packaging information

| Orderable device               | Status | Package Type | Pins | Package Qty | Eco Plan                | MSL Peak Temp       |
|--------------------------------|--------|--------------|------|-------------|-------------------------|---------------------|
| BIT04TXL<br>Transmitter 433MHz | ACTIVE | MLF          | 12   | 84          | Green (RoHS & no Sb/Br) | Level-2-260C-1 YEAR |
| BIT04RXL<br>Receiver 433MHz    | ACTIVE | MLF          | 12   | 84          | Green (RoHS & no Sb/Br) | Level-2-260C-1 YEAR |
| BIT04RTL<br>Transceiver 433MHz | ACTIVE | MLF          | 12   | 84          | Green (RoHS & no Sb/Br) | Level-2-260C-1 YEAR |
| BIT08TXL<br>Transmitter 868MHz | ACTIVE | MLF          | 12   | 84          | Green (RoHS & no Sb/Br) | Level-2-260C-1 YEAR |
| BIT08RXL<br>Receiver 868MHz    | ACTIVE | MLF          | 12   | 84          | Green (RoHS & no Sb/Br) | Level-2-260C-1 YEAR |
| BIT08RTL<br>Transceiver 868MHz | ACTIVE | MLF          | 12   | 84          | Green (RoHS & no Sb/Br) | Level-2-260C-1 YEAR |

## 9. Top Side Mark Information

| Orderable device               | Mounted Resistor |
|--------------------------------|------------------|
| BIT04TXL<br>Transmitter 433MHz | R2 & R4          |
| BIT04RXL<br>Receiver 433MHz    | R3 & R4          |
| BIT04RTL<br>Transceiver 433MHz | R1 & R4          |
| BIT08TXL<br>Transmitter 868MHz | R2 & R5          |
| BIT08RXL<br>Receiver 868MHz    | R3 & R5          |
| BIT08RTL<br>Transceiver 868MHz | R1 & R5          |







## 10. General Information

### 10.1. Disclaimer

B.I.T. srl believes the information contained herein is correct and accurate at the time of this printing. However, B.I.T. srl reserves the right to make changes to this product without notice. B.I.T. srl does not assume any responsibility for the use of the described product; neither does it convey any license under its patent rights, or the rights of others. The latest updates are available at the BIT website or by contacting BIT directly.

As far as possible, major changes of product specifications and functionality, will be stated in product specific Errata Notes published at the BIT website. Customers are encouraged to sign up to the Developers Newsletter for the most recent updates on products and support tools.

Compliance with regulations is dependent on complete system performance. It is the customer's responsibility to ensure that the system complies with regulations.

### 10.2. Life Support Policy

This BIT product is not designed for use in life support appliances, devices, or other systems where malfunction can reasonably be expected to result in significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness. B.I.T. srl customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify B.I.T. srl for any damages resulting from any improper use or sale.



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