



**成都亿佰特电子科技有限公司**  
**Chengdu Ebyte Electronic Technology Co.,Ltd.**

## E01-ML01SP2 Datasheet V1.0

### 1. Introduction

### E01-ML01SP2



E01-ML01SP2 is a SMD wireless transceiver module, operates at 2.4 GHz. It is the smallest RF module with Nrf24L01 and PA on the market. SPI interface and batch production, which make the module suitable for various applications.

E01-ML01SP2 is based on original imported nRF24L01P from Nordic in Norway. And equipped with 20dBm power amplifier chip imported from USA, which makes the transmitting power achieves 100mW (20dBm). The professional hardware design allows the module features small-size, which is convenient for all kinds of embedded development.

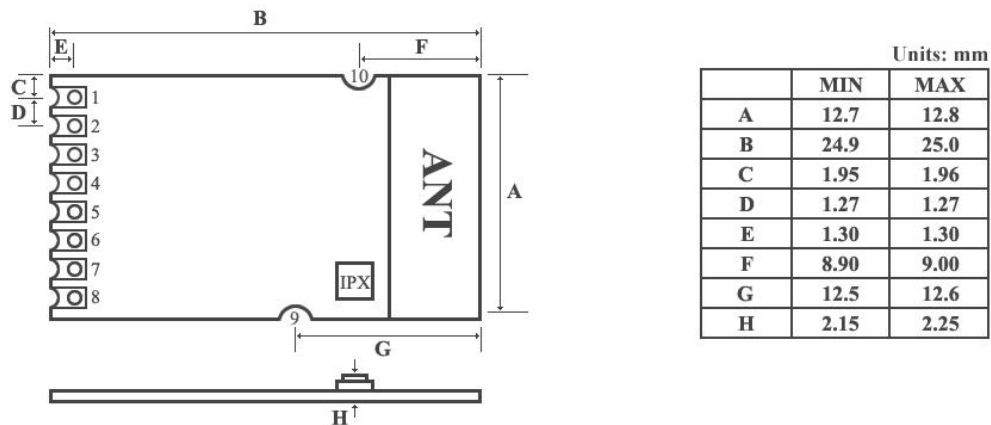
### 2. Electrical parameter

### E01-ML01SP2

| No. | Parameter item          | Parameter details  | Description   |
|-----|-------------------------|--------------------|---|
| 1   | RF IC                   | nRF24L01P          | Nordic  |
| 2   | Size                    | 12.8 * 25.0 mm     |   |
| 3   | Production process      | Machine            | Lead-free   |
| 4   | Connector               | 1 * 8 * 1.27mm     | SMD   |
| 6   | Supply voltage          | 2.0 ~ 3.6V DC      | Notes: the voltage higher than 3.6V is forbidden  |
| 3   | Frequency               | 2400 ~ 2525MHz     | Adjustable  |
| 7   | Communication level     | 0.7VCC ~ 3.6V      | VCC refers to the supply voltage  |
| 8   | Operation Range         | 1200m              | Test condition: Clear and open area, 20dBm , antenna gain: 5dBi , height: 2m , Air date rate: 250Kbps |
| 9   | Max Power               | Maximum 20dbm      | About 100mW   |
| 10  | Air data rate           | 3 level adjustable | 250kbps, 1Mbps, 2Mbps   |
| 11  | Sleep current           | 1.0uA              | nRF24L01P sets as power-down  |
| 12  | Transmitting current    | 120mA@20dBm        | The largest emission current  |
| 13  | Receiving current       | 21mA               | CE=1  |
| 14  | Communication interface | SPI                | Data rate: up to 10Mbps   |
| 15  | Transmitting length     | 3 level FIFO.      | 32 bytes (maximum) for one package  |
| 16  | Receiving length        | 3 level FIFO.      | 32 bytes (maximum) for one package  |
| 17  | RSSI support            | N/A                | Support simple data packet loss statistics  |
| 18  | Antenna type            | PCB/IPEX           | Default:PCB (50 ohm characteristic impedance)   |
| 19  | Sensitivity             | -106dBm            | 250kbps   |
| 20  | Operating temperature   | -40 ~ +85°C        | Industrial-grade  |
| 21  | Operating humidity      | 10% ~ 90%          | Relative humidity, without condensation   |
| 22  | Storage temperature     | -40 ~ +125°C       | Industrial-grade  |

### 3. Pin definition

E01-ML01SP2



| Pin No. | Pin item | Pin direction | Pin application               |
|---------|----------|---------------|-------------------------------|
| 1       | VCC      |               | Power supply 2.0V ~ 3.6V DC   |
| 2       | CE       | Input         | Chip Enable                   |
| 3       | CSN      | Input         | SPI Chip select               |
| 4       | SCK      | Input         | SPI clock                     |
| 5       | MOSI     | Input         | SPI master output slave input |
| 6       | MISO     | Output        | SPI master input slave output |
| 7       | IRQ      | Output        | Interrupt request.            |
| 8       | GND      |               | Ground                        |
| 9       | GND      |               | Ground                        |
| 10      | GND      |               | Ground                        |

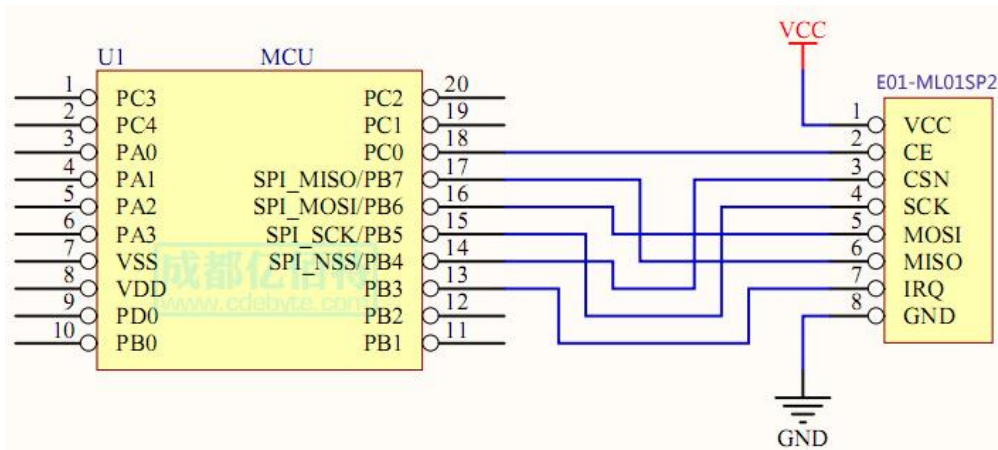
### 4. Note

E01-ML01SP2

| No. | Item               | Attention   |
|-----|--------------------|---|
| 1   | Static electricity | Please try not to touch the electronic components with bare hands.  |
| 2   | Welding            | When welding, soldering iron needs grounding. The producer needs to wear cable electrostatic bracelet which is grounding when mass production.  |
| 3   | Power supply       | Power quality has a great impact on the performance of the module, please make sure the power supply has small ripple and avoid the frequent and large jitter. $\pi$ filter is recommended (Ceramic capacitor // tantalum capacitor + inductance).  |
| 4   | Ground             | Single-point grounding is recommended. 0 ohm resistor or 10mH inductance are recommended.   |
| 5   | Antenna            | How to install antenna has a great impact on the performance of the module, please make sure the antenna is exposed and vertical upward. It will lead to the transmitting distance greatly weakened if the antenna installs in the interior of housing. When the module is installed in the interior of the housing, high-quality antenna extension line can be used to extend the antenna to the outside of the housing. |
| 6   | Interference       | If there are different modules work in other frequency band in the same product, the user need to plan rationally and take measures to shield, in case the harmonic interference and intermodulation interference exist.  |

## 5. USAGE

## E01-ML01SP2



| No. | Brief introduction of connection between module and MCU (STM8)   |
|-----|--|
| 1   | CE pin can be high level for long-term, but it needs to set as POWER DOWN mode when the module write registers, and it is recommended that CE is controlled by MCU pin.  |
| 2   | As interrupt pin for IRQ, it can be used to wake-up MCU and achieve fast response;<br>But the user can get the interrupt status through SPI (not recommended, it is not conducive to the overall power consumption, and with low efficiency) . |

## 6. Drive mode

## E01-ML01SP2

| No. | Description  |
|-----|--|
| 1   | This module is nRF24L01+PA+LNA, the drive mode is exactly equivalent to nRF24L01P, the user can operate according to the nRF24L01P manual (Please see nRF24L01P manual for more details).  |
| 2   | Make sure the CE pin connect to LNA enable pin , when CE equal to 1, LNA is turned on, when CE to 0, LNA is turned off. This operation is perfectly matched with the transceiver mode of nRF24L01; that is to say, users do not have to care about the LNA operation   |
| 3   | If the automatic response is needed, the CE pin must keep high level when transmitting, instead of keeping high level time just more than 10us like the datasheet mentioned.<br>The operation we recommended is: when CE equal to 1, the module begin sending, after sending all, then make the CE equal to 0, instead of making the CE equal to 0 after 10 us.<br>The reason is: the module turns into receiving mode immediately after sending L01P,<br>If CE equal to 0,it means LNA closed, will not be beneficial to the receiving senility |

## 7. Series of products

## E01-ML01SP2

| Model       | RF IC     | Package | Power | Range | Antenna Type |
|-------------|-----------|---------|-------|-------|--------------|
| E01-ML01S   | nRF24L01P | SMD     | 0dBm  | 100m  | PCB          |
| E01-ML01D   | nRF24L01P | Plug-in | 0dBm  | 100m  | PCB          |
| E01-ML01IPX | nRF24L01P | SMD     | 0dBm  | 100m  | IPEX         |
| E01-ML01DP3 | nRF24L01P | Plug-in | 20dBm | 1100m | SMA-K        |
| E01-ML01DP4 | nRF24L01P | Plug-in | 20dBm | 800m  | PCB          |
| E01-ML01DP5 | nRF24L01P | Plug-in | 20dBm | 2100m | SMA-K        |
| E01-ML01SP2 | nRF24L01P | SMD     | 20dBm | 1200m | PCB /IPEX    |
| E01-ML01SP4 | nRF24L01P | SMD     | 20dBm | 1800m | IPEX         |

**8. FAQ****E01-ML01SP2**

| ★ Operation Range is too short to reach the ideal distance |                       |   |
|--|-----------------------|---|
| 1  | Barrier               | 2.4G frequency features with poor penetration due to its physical properties, it has deep influence on the operation range when there are barriers. |
| 2  | Interference resource | Temperature, humidity, same frequency interference can increase the packet loss rate of the communication   |
| 3  | Metal                 | Metal objects around the antenna, antenna placed inside metal case, which cause the signal attenuation badly.                                       |
| 4  | CE Pin                | If the pin cannot keep high level when transmitting, it may lead to the lower receiving sensitivity when receiving signals.                         |
| 5  | Parameter values      | Wrong parameter setting. Setting the air data rate too high, which lead to the shorter distance.  |
| 6  | Low voltage           | When the voltage below 3.3V, the lower the voltage is, the lower the transmitting power can be.   |

**9. About us****E01-ML01SP2**

Chengdu Ebyte Electronic Technology Co., Ltd is a high-tech company, focus on wireless transmission. Our company owns a number of independent research & development products and obtain unanimously approved customers. With powerful R&D team, our company can provide customers with perfect After-sales service and technical assistance.



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