

PRODUCT SPECIFICATION

EL5027-P

Wi-Fi Single-band 1x1 802.11b/g/n + BLE5.0

IoT Module Datasheet

Version:v1.0

Customer: _____

Customer P/N: _____

Signature: _____

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EL5027-P Module Datasheet

Ordering Information	Part NO.	Description
	FG6221NDICX-02	RTL8721CSM-VA1-CG/802.11b/g/n,BLE 5.0/30*17mm/UART



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1. General Description

1.1 Introduction

EL5027-P is a low-power single-band (2.4GHz) wireless local Area Network (WLAN) and Bluetooth Low Energy (BLE 5.0) communication module based on the RT8721CSM. Integrated with a high-performance MCU (Armv8-M, Cortex-M33 instruction set compatible)(or later KM4) and a low-power MCU (Armv8-M, Cortex-M23 instruction set compatible)(or later KM0), WLAN (802.11b /g/n) MAC, A WLAN baseband that supports 1T1R, RF, Bluetooth and peripherals, The UART communicates with the mcu through a strip.

1.2 Description

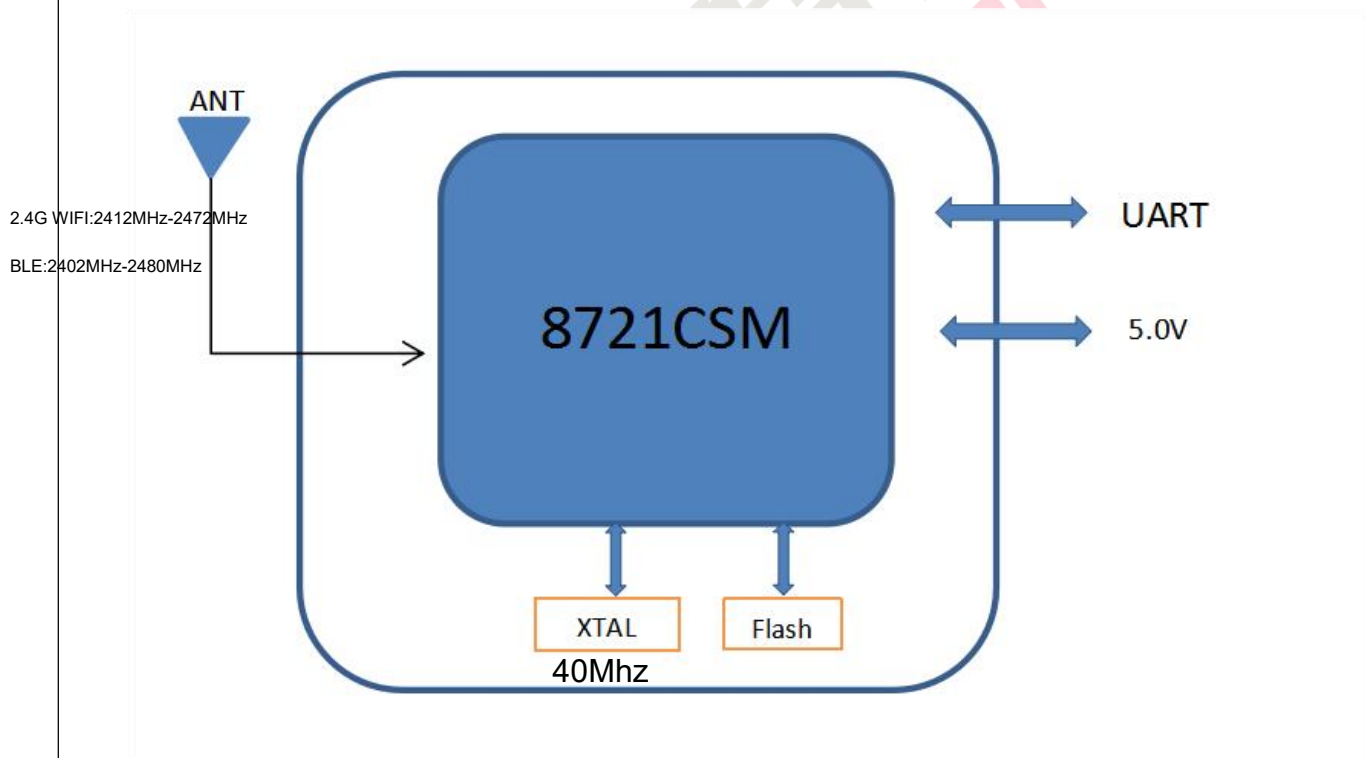
Model Name	EL5027-P
Product Description	Support Wi-Fi/BLE functionalities
Dimension	L x W x H: 30mm*17*6.9mm
Wi-Fi /BLE Interface	UART
Operating temperature	-20°C to +85°C
Storage temperature	-55°C to +125°C

2. Features

General Features

- 4M bytes PSRAM
- 4MB flash
- 802.11 b/g/n 1x1, 2.4GHz
- Internal PTA interface for arbitrating data transmission between Wi-Fi and internal Bluetooth or external 2.4G devices
- Supports 20MHz/40MHz up to MCS7
- BLE 5.0
- Internal co-existence mechanism between Wi-Fi and BT to share the same antenna

3. Block Diagram



4. General Specification

4.1 WI-FI Specification

Feature	Description	
WLAN Standard	IEEE 802.11 b/g/n Wi-Fi compliant	
Frequency Range	2.400GHz~2.4835GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz: Ch1 ~ Ch14	
Test Items	Typical Value	EVM
Output Power	802.11b /11Mbps : 17dBm $\pm$ 2 dB	EVM $\leq$ -10dB
	802.11g /54Mbps : 16dBm $\pm$ 2 dB	EVM $\leq$ -25dB
	802.11n /HT20MCS7 : 15dBm $\pm$ 2 dB	EVM $\leq$ -28dB
	802.11n /HT40MCS7 : 15dBm $\pm$ 2 dB	EVM $\leq$ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	$\pm$ 20ppm	
Test Items	TYP Test Value	Standard Value
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94 dBm	$\leq$ -83 dBm
	- 2Mbps PER @ -92 dBm	$\leq$ -80 dBm
	- 5.5Mbps PER @ -89 dBm	$\leq$ -79 dBm
	- 11Mbps PER @ -87 dBm	$\leq$ -76 dBm
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -89 dBm	$\leq$ -85 dBm
	- 9Mbps PER @ -88 dBm	$\leq$ -84 dBm
	- 12Mbps PER @ -87 dBm	$\leq$ -82 dBm
	- 18Mbps PER @ -86 dBm	$\leq$ -80 dBm
	- 24Mbps PER @ -84 dBm	$\leq$ -77 dBm
	- 36Mbps PER @ -80 dBm	$\leq$ -73 dBm
	- 48Mbps PER @ -77 dBm	$\leq$ -69 dBm
	- 54Mbps PER @ -75 dBm	$\leq$ -68 dBm
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	$\leq$ -85 dBm
	- MCS=1 PER @ -86 dBm	$\leq$ -82 dBm
	- MCS=2 PER @ -84 dBm	$\leq$ -80 dBm
	- MCS=3 PER @ -82 dBm	$\leq$ -77 dBm
	- MCS=4 PER @ -79 dBm	$\leq$ -73 dBm
	- MCS=5 PER @ -76 dBm	$\leq$ -69 dBm
	- MCS=6 PER @ -74 dBm	$\leq$ -68 dBm
	- MCS=7 PER @ -72 dBm	$\leq$ -67 dBm
SISO Receive Sensitivity	- MCS=0 PER @ -89 dBm	$\leq$ -82 dBm

(11n,40MHz) @10% PER	- MCS=1	PER @ -86 dBm	≤-79 dBm
	- MCS=2	PER @ -83 dBm	≤-77 dBm
	- MCS=3	PER @ -80 dBm	≤-74 dBm
	- MCS=4	PER @ -77 dBm	≤-70 dBm
	- MCS=5	PER @ -74 dBm	≤-66 dBm
	- MCS=6	PER @ -72 dBm	≤-65 dBm
	- MCS=7	PER @ -70 dBm	≤-64 dBm
Maximum Input Level	802.11b : -10 dBm		
	802.11g/n : -20 dBm		

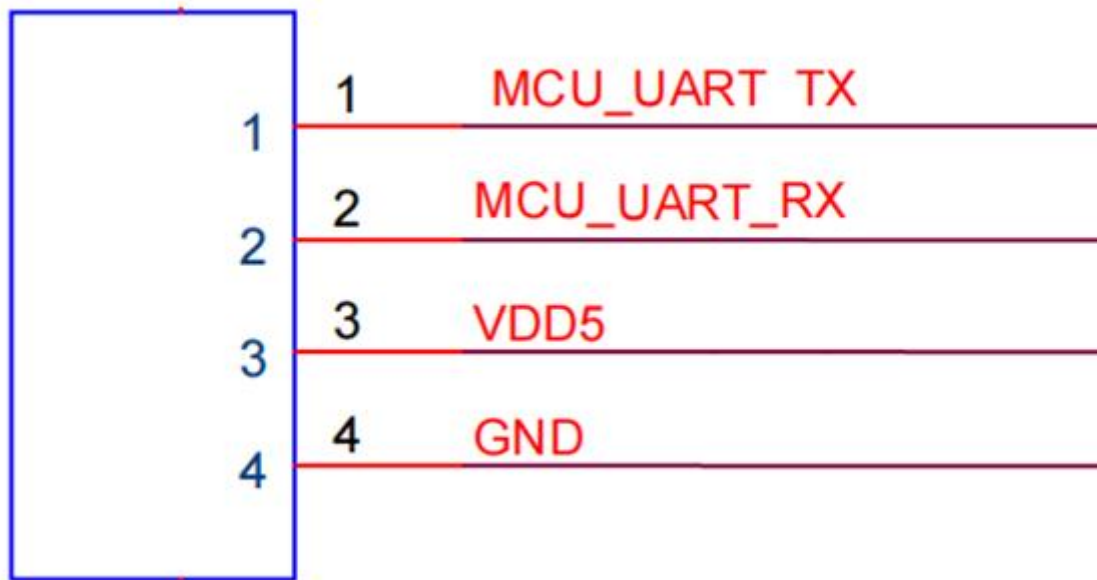
4.2 Bluetooth Specification

Feature	Description
General Specification	
Bluetooth Standard	BLE
Host Interface	UART
Frequency Band	2.400GHz~2.4835GHz (2.4 GHz ISM Band)
Number of Channels	40 channels for BLE
Modulation	GFSK
RF Specification	
Output Power , tolerance ±3 dB	
	CL1(dBm)
BLE Output Power	5
Sensitivity, tolerance : /	
Sensitivity @ BLE=30.8% for LE (1Mbps)	-90
Sensitivity @ BLE=30.8% for 2LE (2Mbps)	-88
Maximum Input Level	GFSK (1Mbps):-20dBm

5. Pin Definition

5.1 Pin Outline

< TOP VIEW >



Definition details

NO.	Name	Type	Description	Voltage
1	TX	I/O	GPIO Pin/UART TX	
2	RX	I/O	GPIO Pin/UART RX	
3	VDD5	P	5.0Vdc Power input	5.0V
4	GND	P	Ground connections	

P:POWER I:INPUT O:OUTPUT

6. Electrical Specifications

6.1 Power Supply DC Characteristics

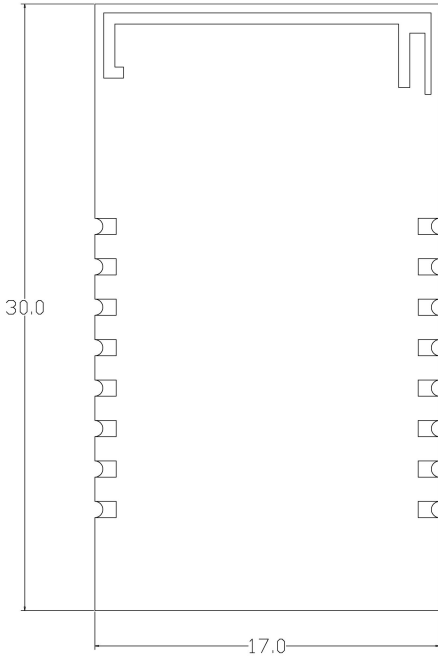
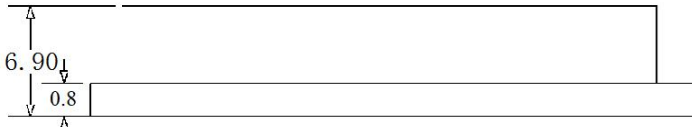
	Min.	Typ.	Max.	Unit
Operating Temperature	-20	25	85	deg.C
VDD33	3.0	3.3	3.6	V

6.2 Power Consumption

Test mode	Current Value @5.0Vdc	
TX	11M@18dBm	
	54M@17dBm	
	MCS7 HT40@16dbm	
	MCS7 HT40@16dbm	
RX		

7. Size reference

7.1 Module Picture

L x W : 30 x 17 (±0.1) mm	
H: 6.90±0.2mm	
Weight	1.90±0.1

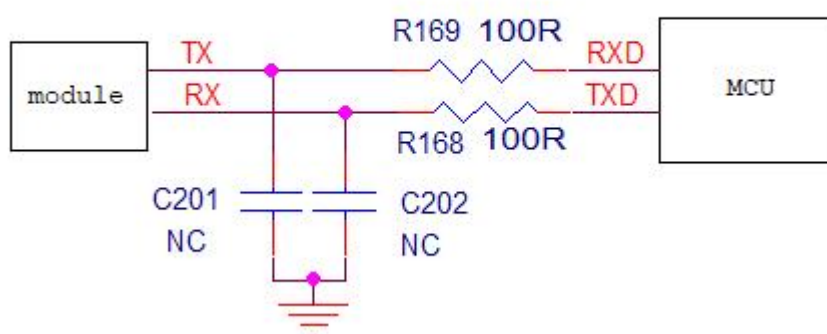
8. The Key Material List

Item	Part Name	Description	Manufacturer
1	Crystal	2016 40MHz ±10ppm,12pF	ECEC, TKD, Hosonic, JWT, TXC
2	Chipset	RTL8721CSM QFN68	Realtek
3	PCB	6221ND-IC 深绿色,FR4,4 层通孔,无卤 TG150	XY-PCB, GDKX, Sunlord, SLPCB,TRULY

4	Flash	4MB, SOIC8 150MIL	BY,GD,HS,WH
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9. Reference Design

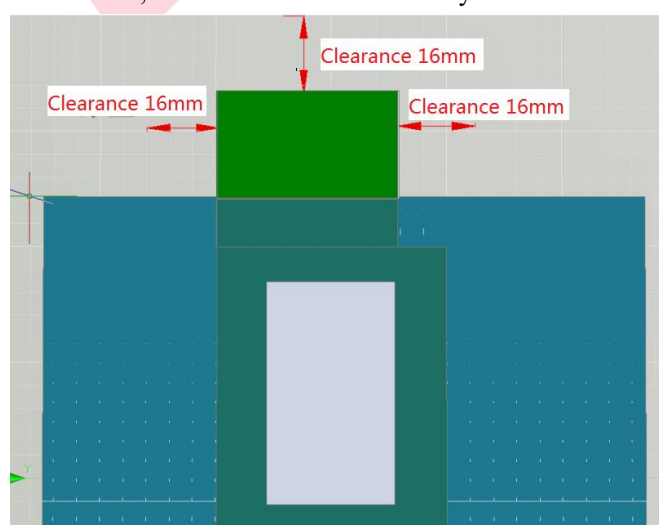
9.1 Schematic reference design

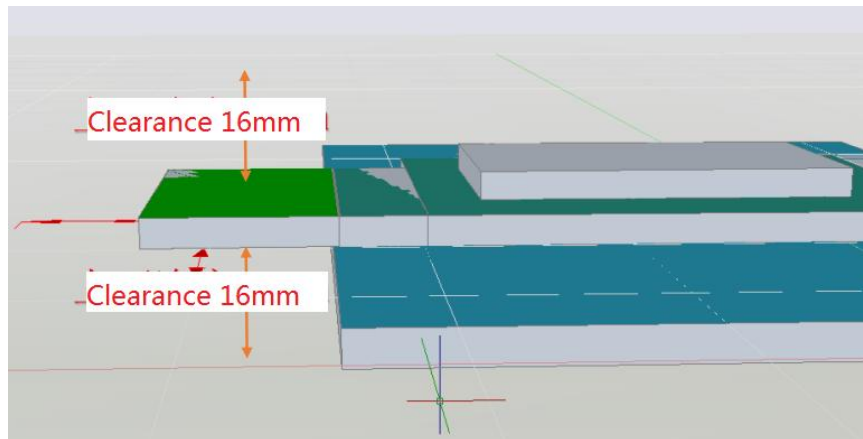


Note: Module requires independent power supply , supply capacity $\geq 1000\text{mA}$ and ripple less than 100mV; Do not share power with amplifier, infrared device, camera, etc.

9.2 Antenna clearance area requirements

When using PCB antenna on Wi-Fi module, make sure the distance between PCB on motherboard and other metal devices is at least 16mm. The shaded areas in the figure below need to be marked away from metal devices, sensors, interference sources, and other materials that may interfere with the signal.





The length of the antenna is 16.15 mm, the width is 0.55 mm, and the thickness is 0.0356 mm.

10. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

11. Package

TBD

12. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

- Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
- Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5
- The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition
- “IPC/JEDEC J-STD-033A paragraph 5.2” is respected
- Baking is required if conditions b) or c) are not respected
- Baking is required if the humidity indicator inside the bag indicates 10% RH or more

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. **This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.**

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

"Contains Transmitter Module FCC ID: **2AATL-EL5027-P**

When the module is installed inside another device, the user manual of this device must contain below warning statements:

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end user manual shall include all required regulatory information/warning as shown in this manual, include:

This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.