PRODUCT SPECIFICATION

EL3394-P

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

Combo Module Datasheet

Version:v1.0

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2025/07/01	Initial release	Lxp	Zzq	Qjp

1. General Description

1.1 Introduction

EL3394-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	EL3394-P
Product Description	Support Wi-Fi/BLE functionalities
Dimension	L x W x H: 30mm x 17.7 x 3.16mm
Wi-Fi /BLE Interface	UART
Operating temperature	-20°C to +85°C
Storage temperature	-20°C to +85°C

2. Features

General Features

- 4MB 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. General Specification

3.1 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 : 17.5dBm ± 1.5 dB	EVM ≤ -14dB
	802.11g /54Mbps : 16.5dBm ± 1.5 dB	EVM ≤ -30dB
	802.11n /HT20MCS7 : 16dBm ± 1.5 dB	EVM ≤ -30dB
	802.11n /HT40MCS7 : 15dBm ± 1.5 dB	EVM ≤ -30dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
Test Items	**TYP Test Value**	**Standard Value**
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94 dBm	≤-83 dBm
	- 2Mbps PER @ -92 dBm	≤-80 dBm
	- 5.5Mbps PER @ -89 dBm	≤-79 dBm
	- 11Mbps PER @ -90 dBm	≤-76 dBm
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -89 dBm	≤-85 dBm
	- 9Mbps PER @ -88 dBm	≤-84 dBm
	- 12Mbps PER @ -87 dBm	≤-82 dBm
	- 18Mbps PER @ -86 dBm	≤-80 dBm
	- 24Mbps PER @ -84 dBm	≤-77 dBm
	- 36Mbps PER @ -80 dBm	≤-73 dBm
	- 48Mbps PER @ -77 dBm	≤-69 dBm
	- 54Mbps PER @ -76 dBm	≤-68 dBm
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-85 dBm
	- MCS=1 PER @ -86 dBm	≤-82 dBm
	- MCS=2 PER @ -84 dBm	≤-80 dBm
	- MCS=3 PER @ -82 dBm	≤-77 dBm
	- MCS=4 PER @ -79 dBm	≤-73 dBm
	- MCS=5 PER @ -76 dBm	≤-69 dBm
	- MCS=6 PER @ -74 dBm	≤-68 dBm
	- MCS=7 PER @ -73 dBm	≤-67 dBm
SISO Receive Sensitivity	- MCS=0 PER @ -89 dBm	≤-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		

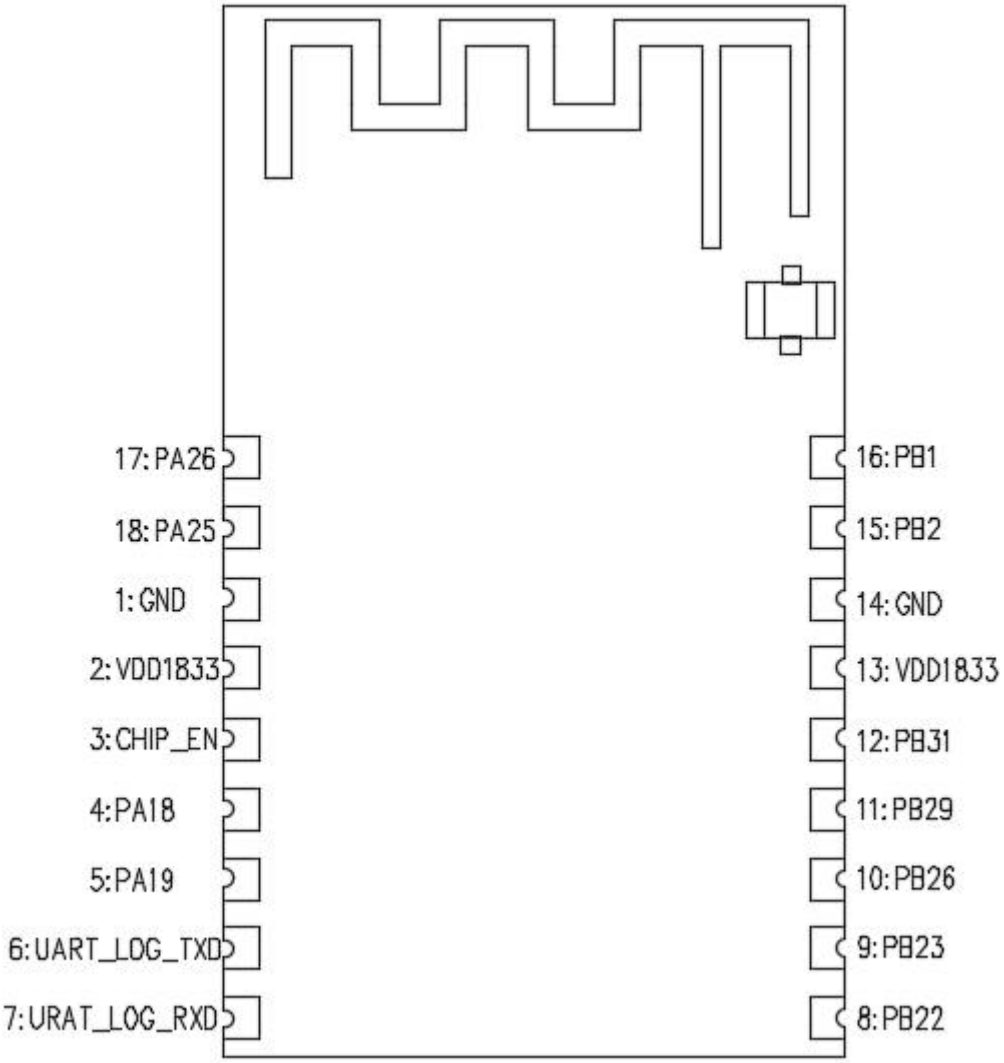
3.2 Bluetooth Specification

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 ±2 dB	
	CL1(dBm)
BLE Output Power	6
Sensitivity, tolerance : /	
Sensitivity @ BLE=30.8% for LE (1Mbps)	-98
Sensitivity @ BLE=30.8% for 2LE (2Mbps)	-96
Maximum Input Level	GFSK (1Mbps):-20dBm

4. Pin Definition

4.1 Pin Outline

< TOP VIEW >



4.2 Definition details

NO.	Name	Type	Description	Voltage
1	GND	P	Ground connections	
2	VDD33	I/O	3.3V	
3	CHIP_EN	I/O	HW reset, LV effective	
4	UART0_TX/PA18	I/O	HS_UART0_TX	
5	UART0_RX/PA19	I/O	HS_UART0_RX	

6	UART1_TX	I/O	UART_TX_LOG	
7	UART1_RX	I/O	UART_RX_LOG	
8	PB22	I/O	HS_PWM14	
9	PB23	I/O	HS_PWM15	
10	PB26	I/O	GPIO Pin	
11	PB29	I/O	GPIO Pin	
12	PB31	I/O	GPIO Pin	
13	VDD1833	I/O	3.3V	
14	GND	P	Ground connections	
15	PB2	I/O	LP_UART_RX	
16	PB1	I/O	LP_UART_TX	
17	PA25	I/O	HS_PWM5	
18	PA26	I/O	HS_PWM4	

P:POWER I:INPUT O:OUTPUT

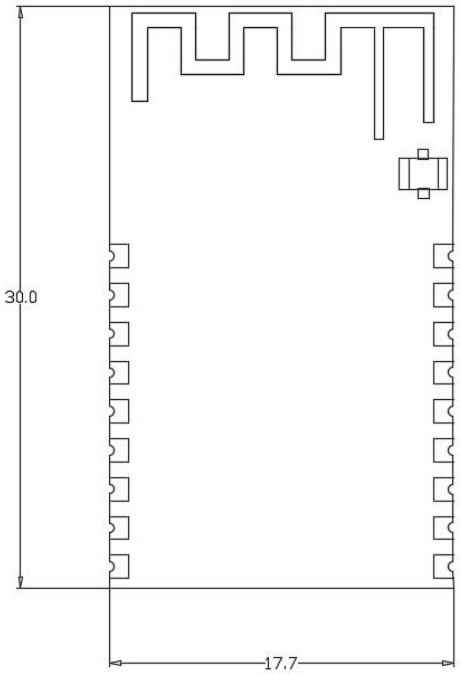
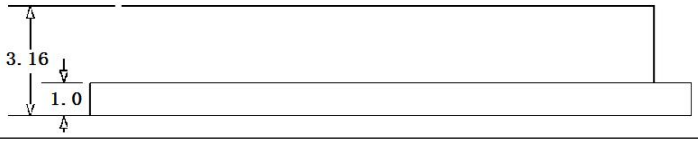
5. Electrical Specifications

5.1 Power Supply DC Characteristics

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

6. Size reference

6.1 Module Picture

L x W : 30 x 17.7 (±0.25) mm	
H: 3.16±0.2mm	
Weight	2.35±0.1g

6.2 Marking Description

Note:

QR code content:

1. Fn-Link trademark
2. CE mark.
3. Model: EL3394-P (unchanged).
4. PN: S3 (unchanged).
5. SN: 780F77572A6D (consistent with customer-supplied MAC address in QR code).
6. FCC ID: 2AATL-EL3394-P
7. Version: NIUF-FL-ST01 (hardware version unchanged).

S3 TestVersion (changes according to firmware version).

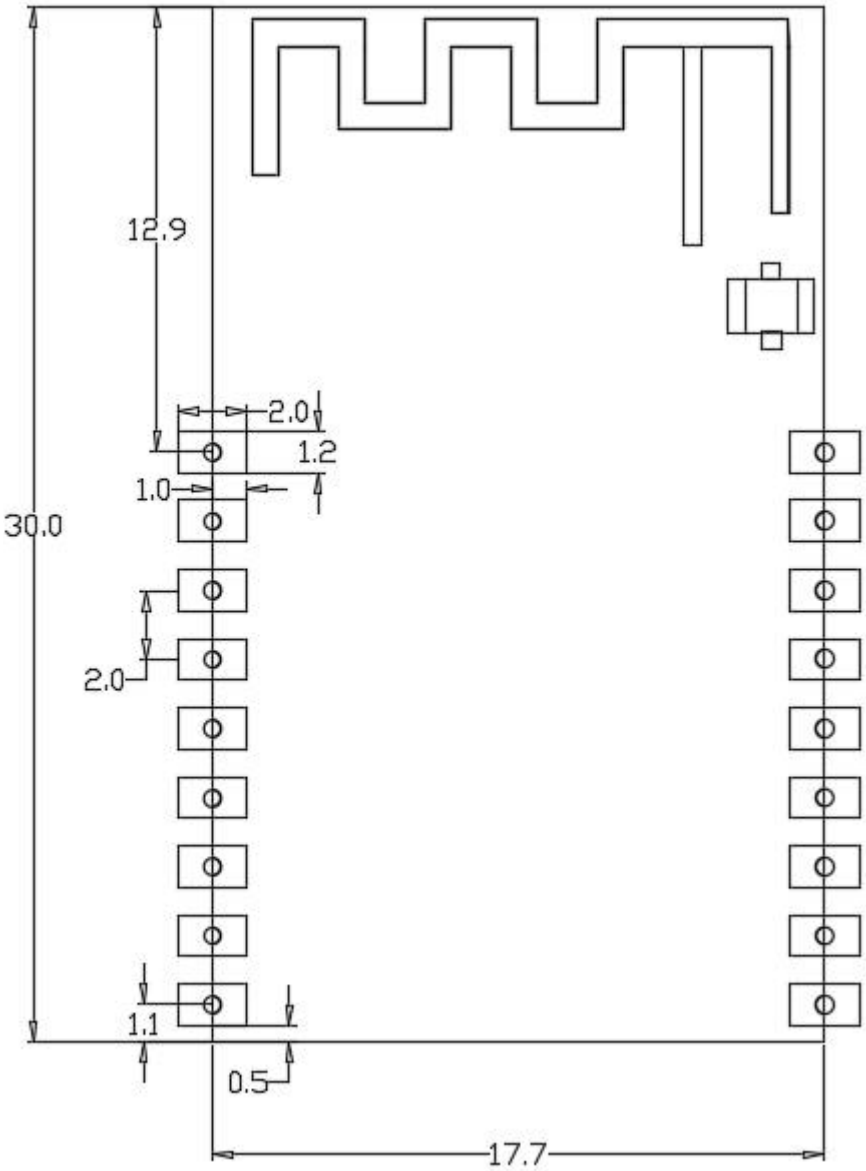
8. QR code encoding rule: "MAC address; Model; Bootloader version".

Example: 780F77572A6D; EL3394-P; VM25002IAR01IAR

(MAC address is customer-supplied, BLE MAC in WIFI+1, EL3394-P remains fixed, VM25002IAR01IAR Bootloader version changes according to firmware version. Please refer to the customer application firmware description in BOM for version consistency with QR code).

----Case sensitivity must match the example diagram, all symbols are English.

6.3 Layout Recommendation

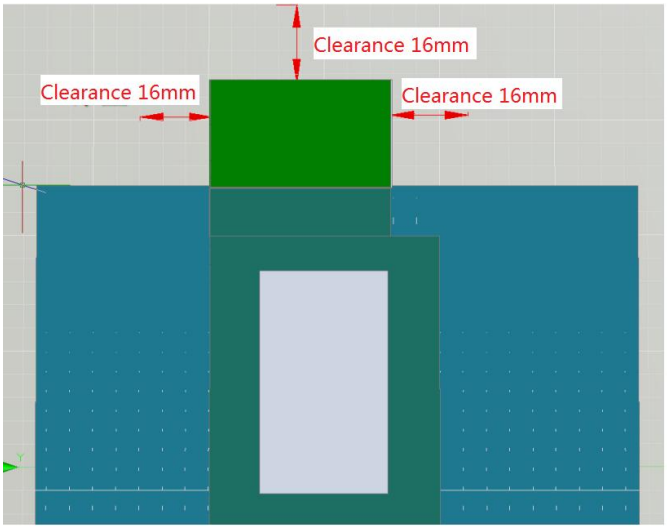


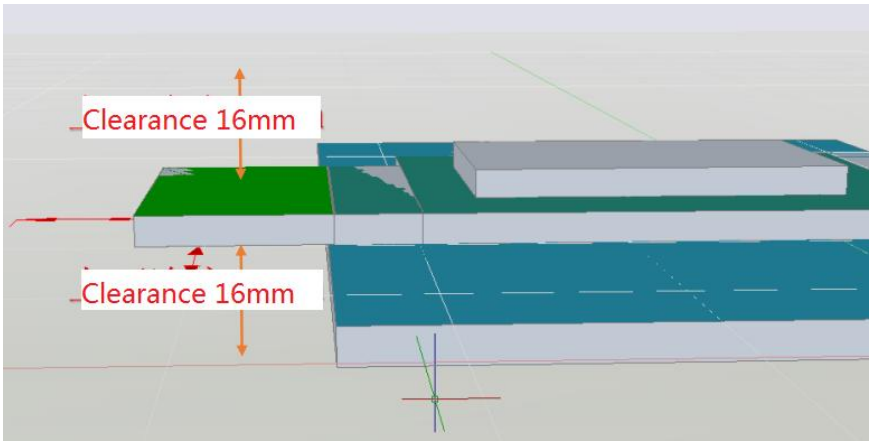
7. The Key Material List

Item	Part Name	Description	Manufacturer
1	Crystal	2016 40MHz ±10ppm,12pF	ECEC, TKD, Hosonic, JWT, TXC
2	Chipset	RTL8721CSM-VA1-CG QFN68	Realtek
3	PCB	EL3394-P dark green, FR4, 4 layers through-hole, halogen-free TG150, gold 2 μ,20 pieces, 17.7x30x1.0mm	XY-PCB, GDKX, Sunlord, SLPCB,TRULY
4	Flash	4MB, SOIC8 150MIL	BY,GD,HS,WH

8. 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.





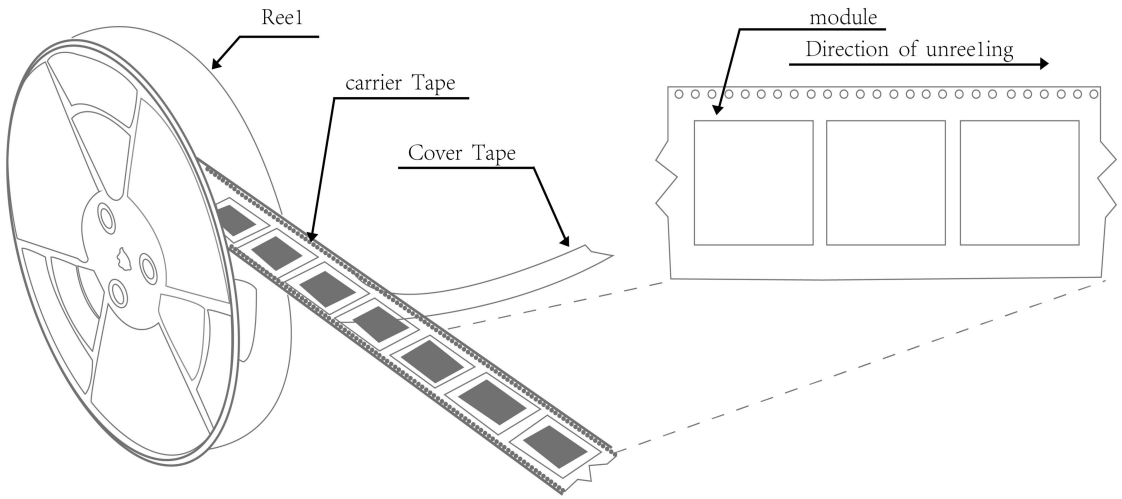
9. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

10. Package

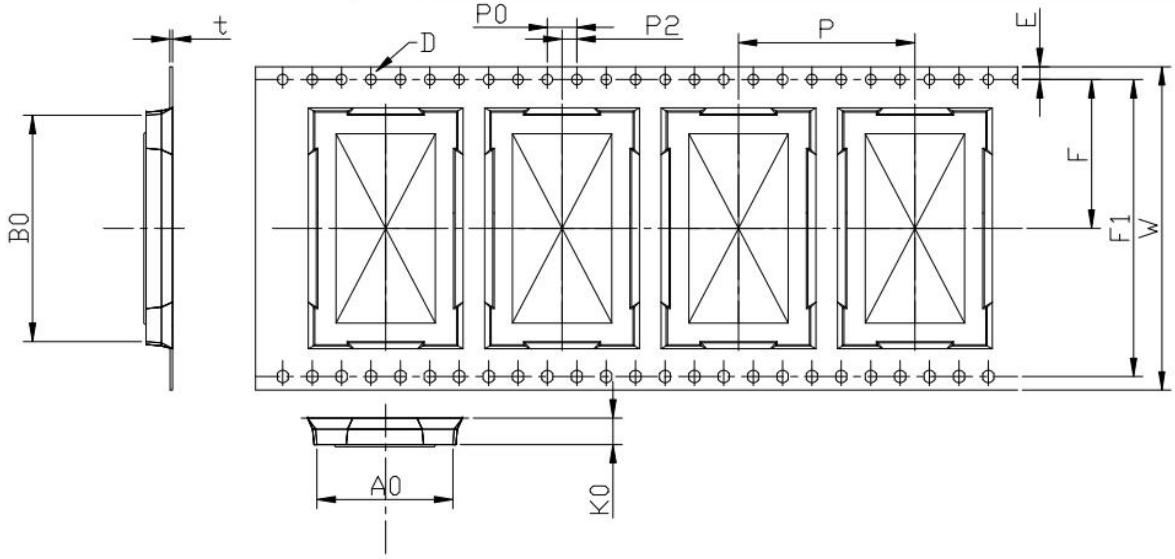
10.1 Reel

A roll of 700pcs



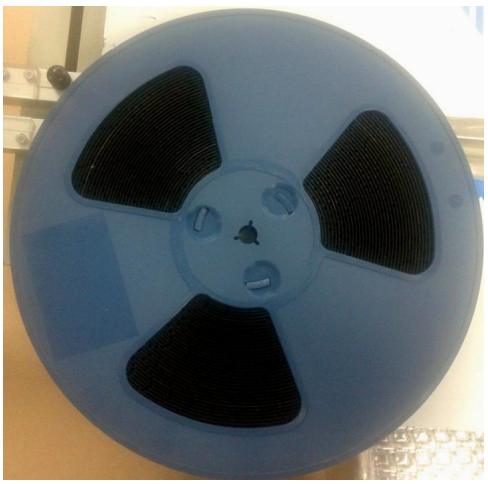
10.2 Carrier Tape Detail

ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	44	18.15	30.40	1.5	1.75	20.2	40.4	3.65	4.0	2.0	24.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	±0.1	±0.15	±0.10	±0.10	±0.1	±0.15	±0.1	±0.05



10.3 Packaging Detail

the take-up package



Using self-adhesive tape

Size of black tape: 24mm*32.6m the cover tape :21.3mm*32.6m

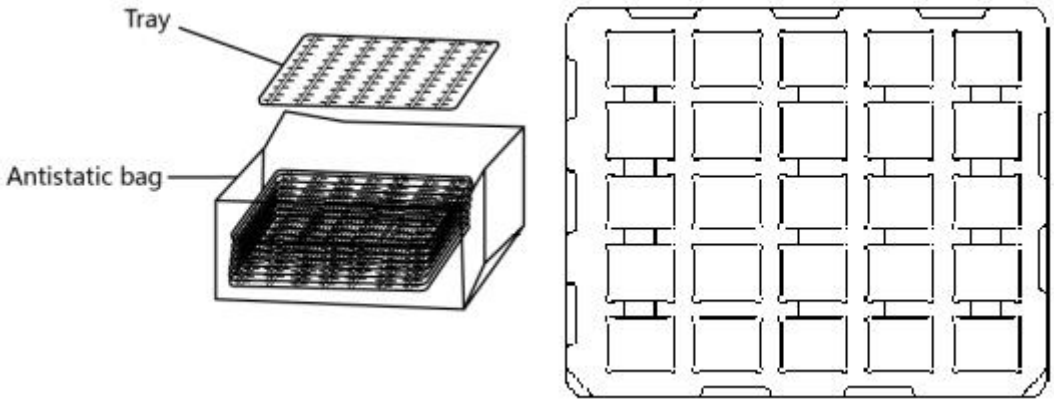
Color of plastic disc: blue

NY bag size:460mm*385mm size ： 350*350*35mm

The packing case size:350*210*370mm

10.4 Tray

Use pallet packaging for less than 300 pieces



11. 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:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

d) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected

e) Baking is required if conditions b) or c) are not respected

f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more

CE Caution:

Use the Product in the environment with the temperature Between -20℃ and 80℃; Otherwise, it may damage your product. Products can only be used below 2000m altitude

For the following equipment:

Product Name: Combo Module

Brand Name: /

Model No.: EL3394-P

FN-LINK TECHNOLOGY LIMITED

E-mail: jim@fn-link.com

hereby declares that this [Name: Combo Module, Model: EL3394-P] is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

CE

The full text of the EU declaration of conformity is available at the internet address: www.xxx.com

This product is intended for sale and application in a business environment.

RED Article 10 2

-This product can be used across EU member states

RED Article 10 10

-The product is class 1 product, No restrictions

The RF distance between body and product is 20cm

Frequency Range:

Technical Characteristics	
Bluetooth	
Bluetooth Version:	Bluetooth V5.0(LE Mode)
Frequency Range:	2402MHz-2480MHz
Max.RF Output Power:	1Mbps: 7.98dBm (EIRP) 2Mbps: 7.89dBm (EIRP)
Wi-Fi(2.4GHz)	
Support Standards:	802.11b, 802.11g, 802.11n-HT20/40
Frequency Range:	2412-2472MHz for 802.11b/g/n(HT20) 2422-2462MHz for 802.11n(HT40)
Max.RF Output Power:	18.01dBm (EIRP)

2.2 List of applicable FCC rules

FCC Part 15.247

2.6 RF exposure considerations

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

2.8 Label and compliance information

FCC ID label on the final system must be labeled with “Contains FCC ID: 2AATL-EL3394-P” or “Contains transmitter module FCC ID: 2AATL-EL3394-P”.

2.9 Information on test modes and additional testing requirements

Contact FN-LINK TECHNOLOGY LIMITED will provide stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

2.10 Additional testing, Part 15 Subpart B disclaimer

To ensure compliance with all non-transmitter functions the host manufacturer is
responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier’s Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, FN-LINK TECHNOLOGY LIMITED shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

FCC Warning

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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the

equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

NOTE 1: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: This module certified that complies with RF exposure requirement under mobile or fixed condition, this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.

Note 4: For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.