

FCL Components Wireless Unit
Wirepas Mesh 2.4 GHz USB Dongle
FWM8BLZ09T (Tag) Datasheet

Ver. 2
Feb 1, 2024

The above Product is designed, developed and manufactured as contemplated for general use, including without limitation, general office use, personal use, household use, and ordinary industrial use, but is not designed, developed and manufactured as contemplated (1)for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2)for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite), hereinafter referred to as "High Safety Required Use". You shall not use this Product without securing the sufficient safety or reliability required for the High Safety Required Use. If you wish to use this Product for High Safety Required Use, please consult with our sales representatives in charge before such use.

FCL Components Limited

All specifications are preliminary which may be changed without any prior notice

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1. Summary

This datasheet applies to the Wirepas Mesh 2.4 GHz based mesh unit FWM8BLZ09T.

2. Features

This product is a USB dongle shaped unit which incorporates Wirepas Mesh 2.4 GHz and is possible to communicate in 2.4 GHz ISM (Industrial Scientific Medical) band.

Wirepas Mesh is a wireless mesh network technology that enables wireless IoT networks at massive scale, and this product operates as a Tag in the positioning function of Wirepas Mesh.

The followings are the key features.

- Wirepas Mesh 2.4 GHz enabled
- Nordic Semiconductor nRF52833 based
- Built-in Tag in Positioning firmware provided by Wirepas
- RoHS Compliant
- Dimensions: 17.8 x 14.2 x 6.6 (Unit: mm)
- Operating temperature: -30 to 60 °C
- Operating humidity: +20 to +80 %RH
- The LED lights up when the power is turned on.
- Sending command strings, using the AppConfig function, or using the RemoteAPI function allow configuration changes to be made wirelessly (via the Wirepas Mesh network).

3. Applicable Standard

- FCC, ISED certification
FCC ID: SQK-8BLZ09
ISED ID: 337L-8BLZ09
- CE Marking
- UKCA Marking
- ARIB STD-T66
Radio Act (Japan) Certification No. 007- AK0198
- RoHS Compliant
- RCM Compliant

4. Block Diagram

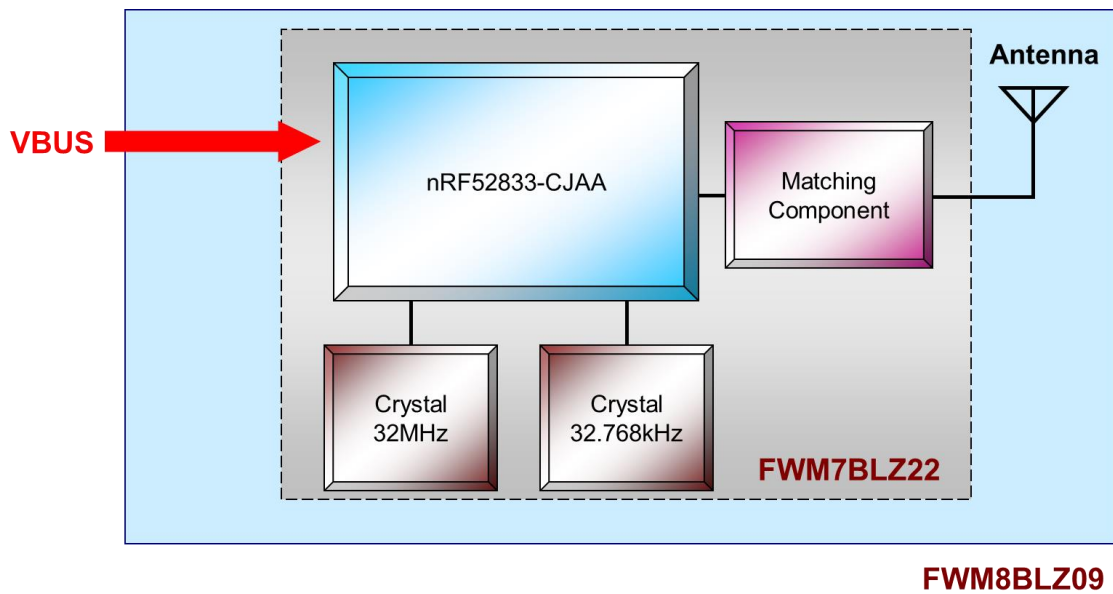


Figure 4-1: Block diagram

5. Electrical Characteristics

5-1. General Features

Wirepas Mesh 2.4 GHz enabled

Carrier Frequency 2400 MHz to 2483.5 MHz

Modulation: GFSK

Symbol Rate: 1 Mbps

Modulation Index: 0.5

Channel: 40 channels
(Channel No. $N = 2402 + (N-1) \times 2 \text{ MHz}$)

Channel Spacing: 2 MHz

Output power: +8 dBm max

5-2. Absolute Maximum Ratings

Items	Symbol	Min	Max	Unit
Supply voltage (VDD)	VDD	-0.3	5.5	V
Supply voltage (GND)	GND		0	V
Storage Temperature	Tstg	-30	60	°C

5-3. Recommended Operating Conditions

Items	Symbol	Min	Typ	Max	Unit
Supply voltage	VDD	4.35	5.5	5.5	V
Operating temperature	Ta	-30	25	60	°C
Operating humidity	Hopr	20	-	+80	%RH

*Note: Condensation-free.

5-4. General radio characteristics

Items	Condition	Min	Typ	Max	Unit
Operating frequencies	3 MHz channel spacing	2400		2483.5	MHz
PLL programming resolution			2		kHz
PLL channel spacing			1		MHz
Frequency deviation			±250		kHz

5-5. Transmitter Specifications

Items	Condition	Min	Typ	Max	Unit
Maximum Output power		-20		+8	dBm
Step size of RF power control			4		dB
RF power control range			24		dB
RF power accuracy				±4	dB
1st Adjacent Channel Transmit Power 1 MHz				-25	dBc
2nd Adjacent Channel Transmit Power 2 MHz				-54	dBc

5-6. Receiver Sensitivity

Items	Condition	Min	Typ	Max	Unit
Maximum received signal strength	< 30.8 % PER		0		dBm
Receiver sensitivity	Dirty transmitter < 30.8 % PER		-96		dBm

5-7. Receiver Specification

Items	Condition	Min	Typ	Max	Unit
RX selectivity (C/I performance)	Co-channel interference		10		dB
	Adjacent (-1 MHz) interference		-5		dB
	Adjacent (+1 MHz) interference		-14		dB
	Adjacent (-2 MHz) interference		-19		dB
	Adjacent (+2 MHz) interference		-42		dB
	Adjacent (+3 MHz) interference		-37		dB
	Adjacent (+3 MHz) interference		-47		dB
	Adjacent (>= 6 MHz) interference		-52		dB
	Image frequency interference		-24		dB
	Adjacent (1 MHz) interference to in-band image frequency		-37		dB
RX intermodulation	IMD performance, 1 Mbps, 5th offset channel, packet length ≤ 37 bytes		-34		dBm

5-8. Current Consumption

Ta=25±2°C

Items	Symbol	Typ	Max	Unit
TX only run current P _{OUT} = +8 dBm	I _{TX,PLUS8dBm}	30.4		mA
TX only run current P _{OUT} = +4 dBm	I _{TX,PLUS4dBm}	20.7		mA
TX only run current P _{OUT} = 0 dBm	I _{TX,0dBm}	10.3		mA
TX only run current P _{OUT} = -4 dBm	I _{TX,MINUS4dBm}	8.0		mA
TX only run current P _{OUT} = -8 dBm	I _{TX,MINUS8dBm}	7.1		mA
TX only run current P _{OUT} = -12 dBm	I _{TX,MINUS12dBm}	6.4		mA
TX only run current P _{OUT} = -16 dBm	I _{TX,MINUS16dBm}	5.9		mA
TX only run current P _{OUT} = -20 dBm	I _{TX,MINUS20dBm}	5.5		mA
RX only run current	I _{RX}	8.9		mA
Deep Sleep current	I _{SLEEP}	30		uA

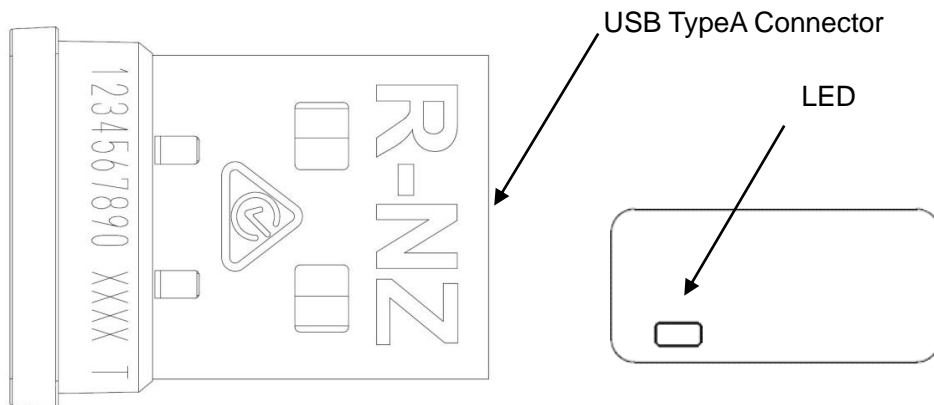
6. Interface Specification

6-1. Software Interface

Refer to the document of

“Wirepas_Mesh_USB_Dongle_Firmware_Specification_FWM8BLZ09P_T”.

6-2. Hardware Interface



7. Function

7-1. Hardware Function

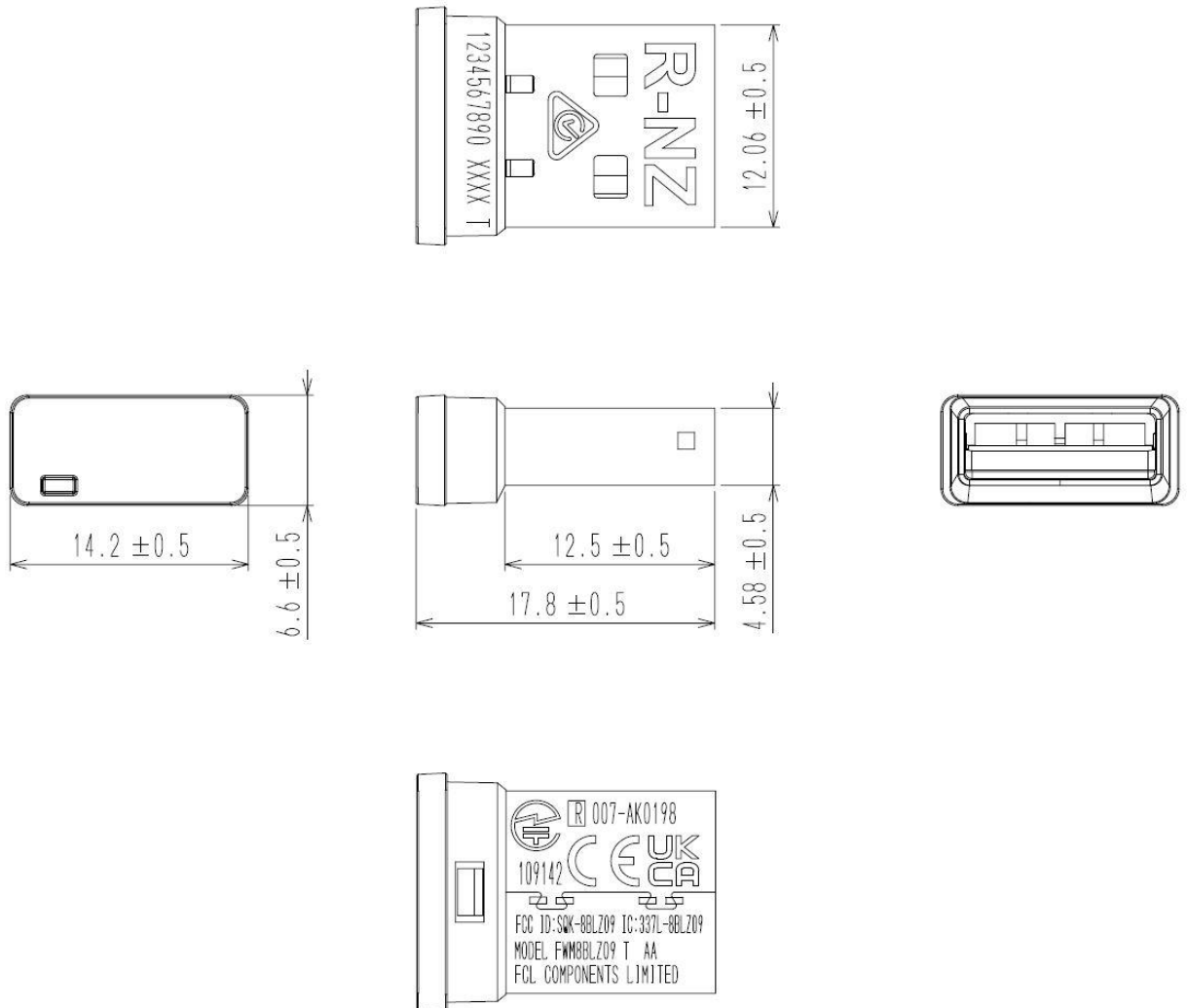
The various operation settings of this product can be changed.

The settings can be changed by using Wirepas Terminal or Wirepas Network Tool.

The settings can also be changed by using the AppConfig function or RemoteAPI.

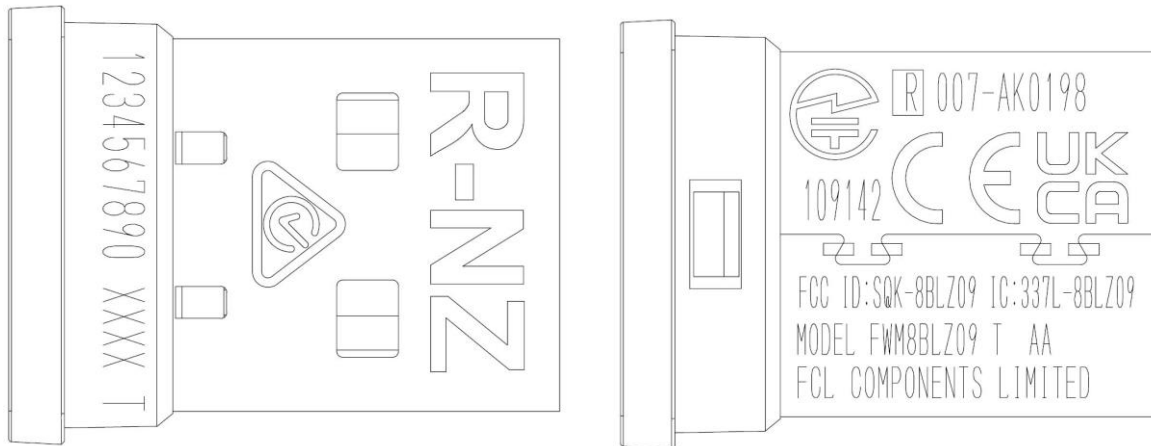
8. Mechanical Characteristics

8-1. Appearance and Dimensions



Unit: mm

8-2. Marking

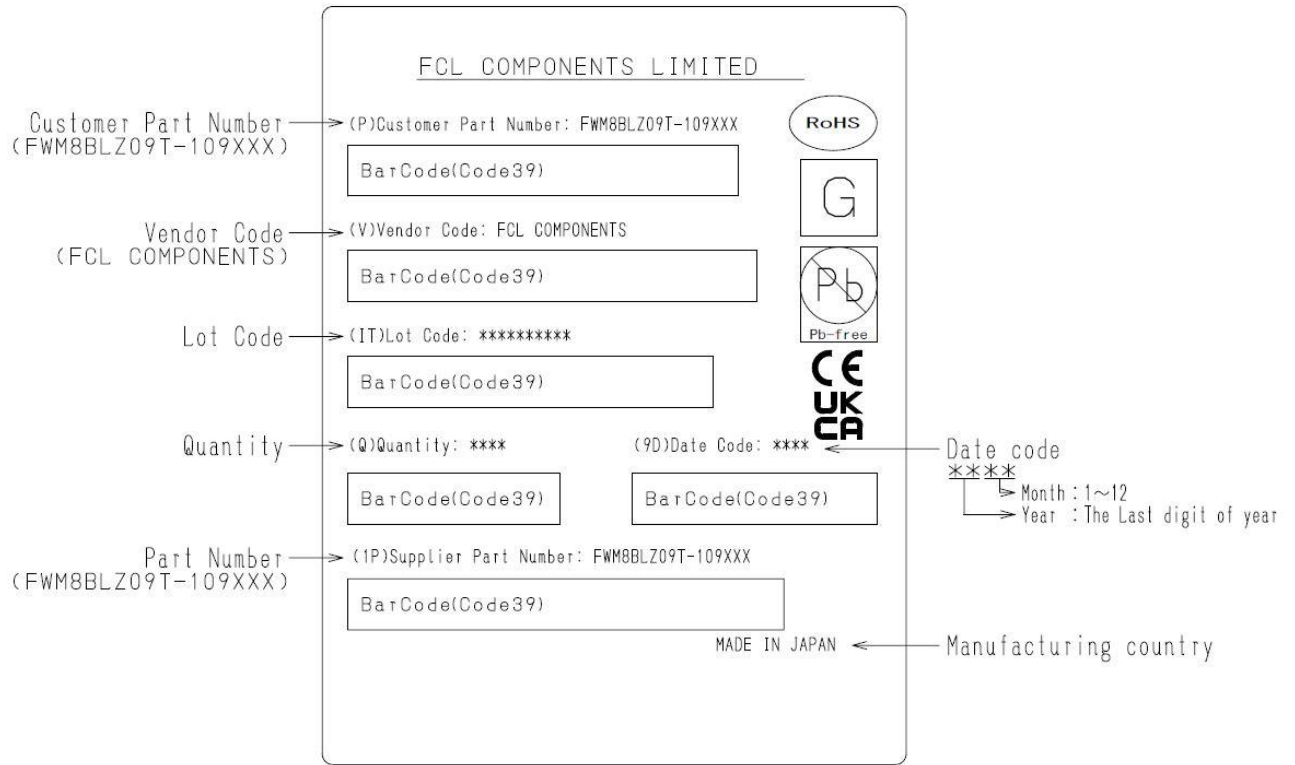


9. Storage Conditions

- Do not store this units in the environments exposed to shock or vibration. It may result in damage, malfunction, or deterioration of quality.
- Do not throw or drop cartons containing the units during transportation. It may result in damage, malfunction, or deterioration of quality.
- Keep the units in original packing condition until just before use.
- Store the units at recommended storage condition. When deviated from the condition, check the appearance and function of the units prior to use.

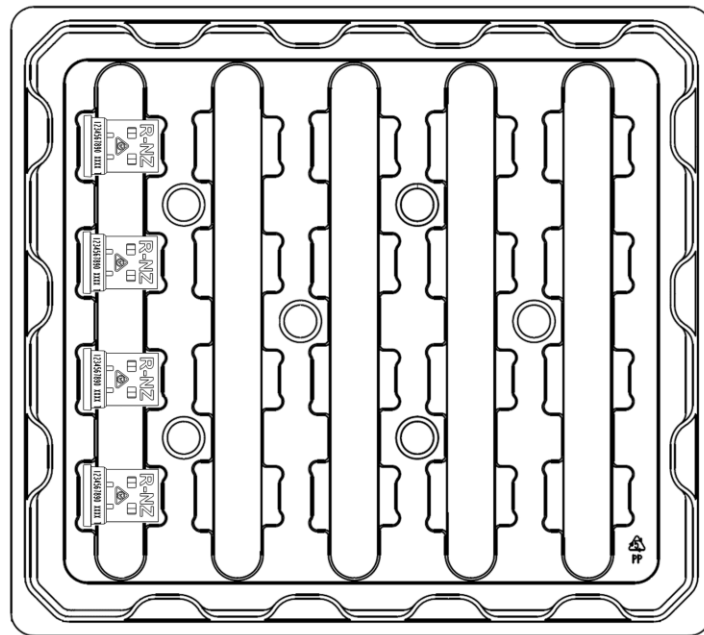
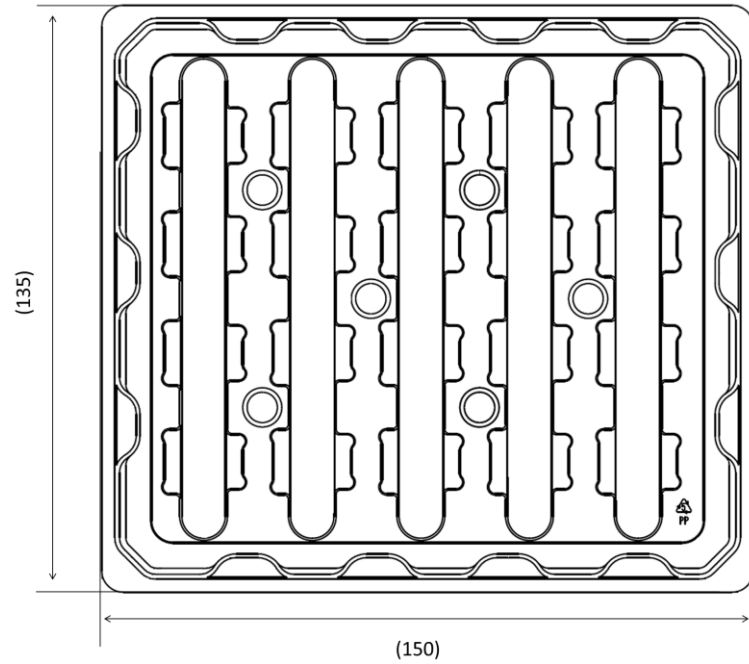
10. Packing Specification in shipment

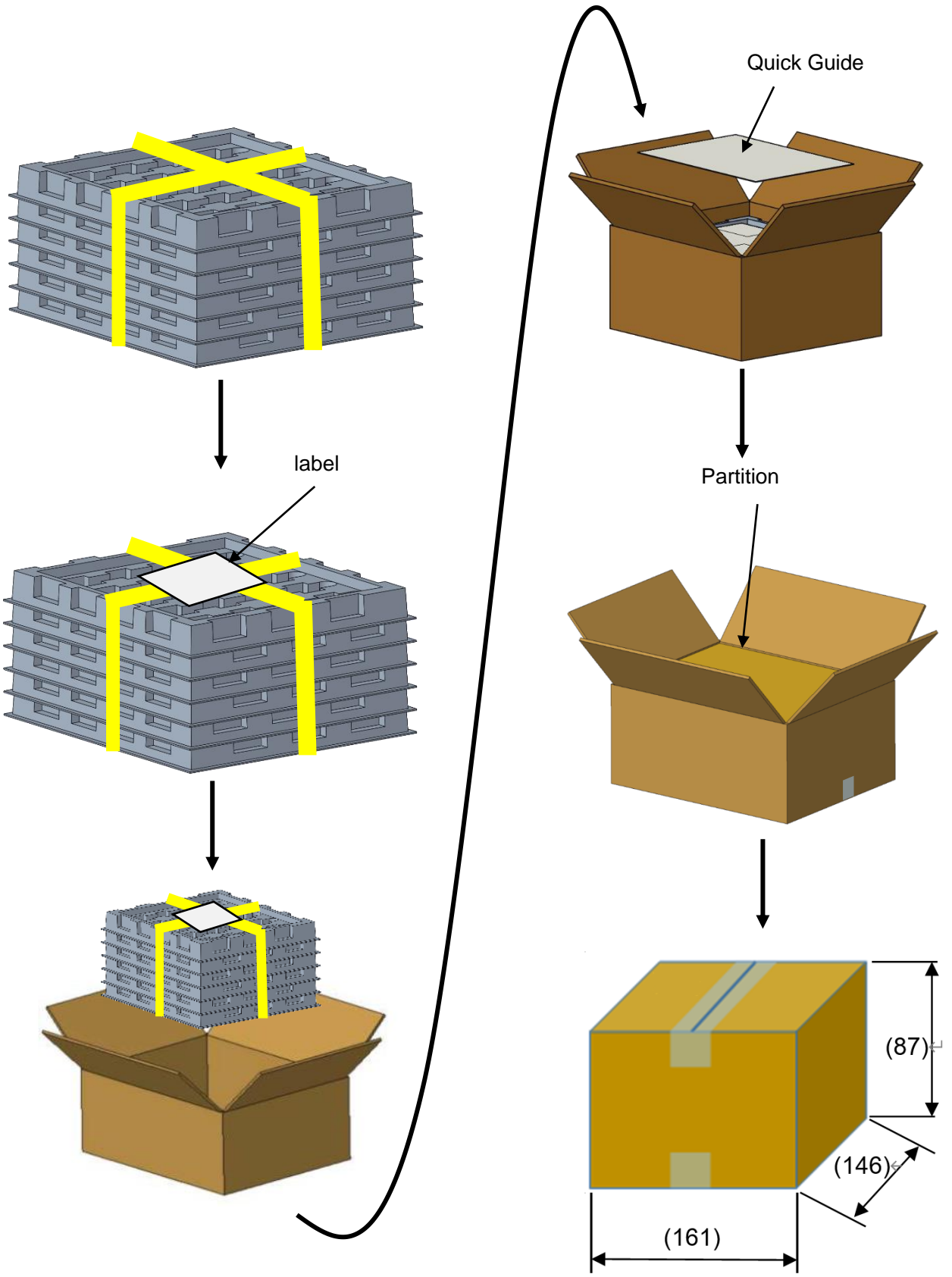
10-1. Label



10-2. Packing

Products are packed in a maximum of 4 trays (100 pieces) with 25 pieces stored in each tray.





Unit: mm

11. Warranty Period

The warranty period of this product is 18 months after the shipment from us.

12. Caution about Firmware installed

1. FCL Components Limited ("FCL") will update the firmware without prior notification.
2. FCL does not provide the updated firmware to the FCL products already delivered from FCL's factories in case the updated firmware is developed by FCL. If you hope continuously to use the previous version of firmware, please contact your nearest Sales of FCL products.

13. Compliance Statement

Note to users in the United States of America

Caution:

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

Declaration of Conformity

This device complies with part 15 of 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 to users in the United States of America and Canada

Note to users

It is strictly forbidden to use antenna except designated.

This equipment must not be co-located or operated in conjunction with any other antenna or transmitter.

This equipment complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate(SAR).

Note to users in the United States of America and Canada

Il est strictement interdit d'utiliser une antenne autre que celle désignée.
Cet équipement ne doit pas être co-localisé ou utilisé en conjonction avec toute autre antenne ou émetteur.

Cet équipement est conforme aux limites d'exposition aux rayonnements de la FCC/IC établies pour un environnement non contrôlé et répond aux directives d'exposition aux radiofréquences (RF) de la FCC et au RSS-102 des règles d'exposition aux radiofréquences (RF) de l'IC. Cet équipement présente de très faibles niveaux d'énergie RF qui sont considérés comme conformes sans test de débit d'absorption spécifique (DAS).

Note to users in Canada

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISED. Cet équipement émet une énergie RF très faible qui est considérée conforme sans évaluation de l'exposition maximale autorisée.

Note to users in Canada

This device complies with ISED licence-exempt RSSs.

Operation is subject to the following two conditions:

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

Remarque concernant les utilisateurs au Canada

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

European Community Compliance Statement

Note:

Hereby, FCL Components Limited, declares that this FWM8BLZ09 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

<https://www.fcl-components.com/products/wireless-modules/information/red.html>



United Kingdom Compliance Statement

Note:

Hereby, FCL Components Limited, declares that this FWM8BLZ09 is in compliance with the relevant statutory requirements.

The full text of the declaration of conformity is available at the following internet address:

<https://www.fcl-components.com/products/wireless-modules/information/red.html>



14. Version History

Version	Contents change	Date
0.01	Created first edition.	Aug. 17, 2021
1.00	Section 2: Errata Correction Section 3: Added Certification number Section 5: Added value and errata correction Section 6: Added Hardware Interface Section 8: Figure Correction Section 10: Added Packing Specification in shipment	May 9, 2022
1.01	Section 10: Errata Correction Section 13: Compliance Statement is added	May 31, 2022
2	Change of Company name	Feb 1, 2024