BLUE bean | Data sheet

BLUE bean is a high performance and ultra low power surface mount USB radio combining single-stream 11ac Wave2 Wi-Fi and Bluetooth® 5.0 in a very small form factor

BLUE bean is IEEE 802.11b/g/n/a/ac Wave2 dual-band wireless LAN and Bluetooth 5.0 USB module optimised for small size and low power consumption.

It is based on Qualcomm QCA9377-7 chipset. Has an integrated dual-band (2.4 and 5 GHz) 1x1 802.11ac Wave2 WiFi (supporting MU-MIMO) and Bluetooth® 5.0 transceivers and combined in to very small form factor (17 x 12 mm with RF connector and 24 x 12mm with integrated antenna).

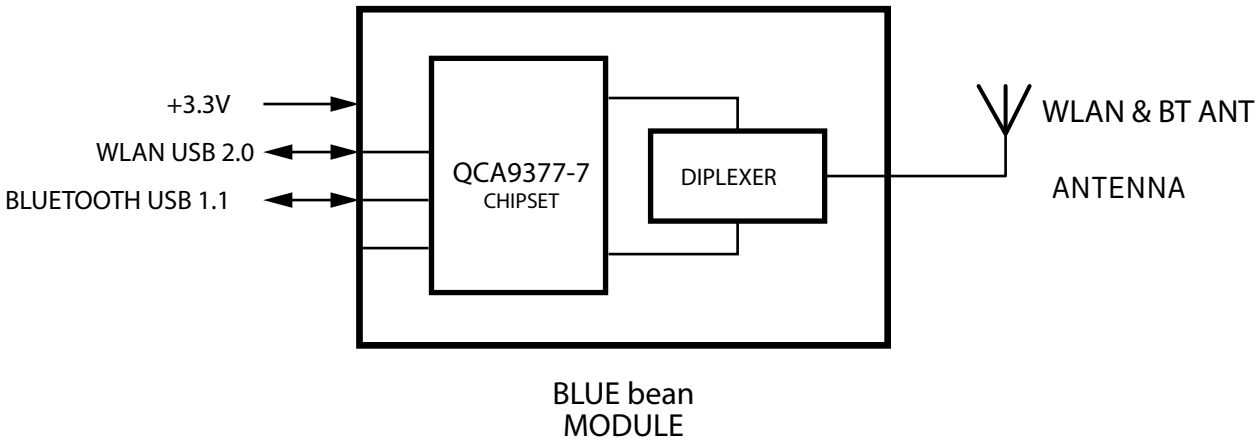
The radio module supports advanced power saving techniques. Bluetooth supports both Class1 and Class2 transmissions and advanced coexistence mechanisms allow it to work seamlessly with Wi-Fi ensuring good quality and high performance.

BLUE bean software drivers are available for Linux, Windows 10 and Android operating systems.

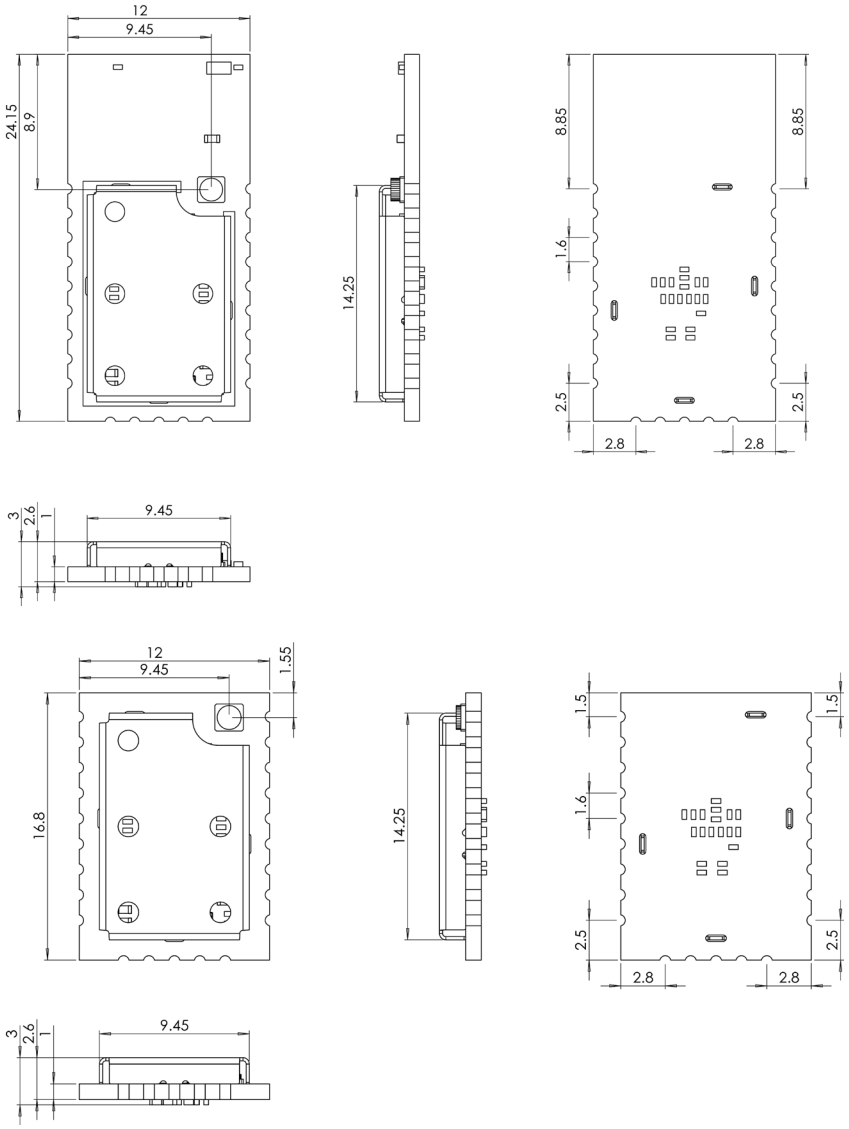
Quick specs

- 802.11a/b/g/n/ac, 2.4 and 5 GHz, 1x1 SISO, 433 Mbps data rate, up to 20 dBm output power
- 20/40/80 MHz channel size support
- STBC, MU-MIMO, transmit beam-forming
- Bluetooth v5.0, BLE, ANT+ and backwards compatibility with BT v1.x and BT v2.x + enhanced data rate
- Connectorized (Murata HSC type connector: MM4829-2702RB0) or an integrated dual-band antenna version
- Linux, Windows and Android drivers available
- Based on QCA9377-7 chipset
- Industrial temperature range -40 to +85 C°
- Very small form factor (17 by 12 mm without antenna or 24 by 12 mm with antenna)
- Surface mount, dual-side design
- Available interfaces - Bluetooth USB 1.1, WLAN USB 2.0

Block diagram



Module dimensions (with antenna/ without antenna)



Radio characteristics

2.4 GHz 802.11AC (20 MHz)	Data rate (Mbps)	7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	86.7
	Sensitivity (dBm)	-92	-89	-87	-83	-80	-76	-75	-73	-69
	Output power (dBm)	18	18	18	18	18	16	16	16	15

2.4 GHz 802.11AC (40 MHz)	Data rate (Mbps)	15	30	45	60	90	120	135	150	180	200
	Sensitivity (dBm)	-88	-86	-84	-81	-77	-73	-72	-70	-66	-64
	Output power (dBm)	17	17	17	17	17	15	15	15	13	13

5 GHz 802.11AC (20 MHz)	Data rate (Mbps)	7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	86.7
	Sensitivity (dBm)	-91	-87	-85	-82	-78	-74	-73	-71	-67
	Output power (dBm)	15	15	15	14	14	12	11	10	10

5 GHz 802.11AC (40 MHz)	Data rate (Mbps)	15	30	45	60	90	120	135	150	180	200
	Sensitivity (dBm)	-87	-85	-82	-79	-76	-72	-70	-68	-65	-63
	Output power (dBm)	14	14	14	13	13	12	11	9	9	8

5 GHz 802.11AC (80 MHz)	Data rate (Mbps)	32.5	65	97.5	130	195	260	292.5	325	390	433.3
	Sensitivity (dBm)	-84	-81	-78	-76	-72	-68	-67	-65	-61	-59
	Output power (dBm)	13	13	13	12	12	11	11	9	9	8

Bluetooth	Frequency range	2.402 - 2.480 GHz
	Supported modes	BT and BLE
	Max TX power	14 dBm (4 dBm BLE)
	RX sensitivity (BER >= 0.1%)	-95 dBm (-99 dBm BLE)

Power consumption

Wi-Fi mode	USB 2.0 mA
Standby (deep sleep)	0.24
2G tx99 11b 1Mbps	356
2G tx99 11n HT20 MCS7	326
5G tx99 11n HT20 MCS0	487
5G tx99 11n HT20 MCS7	423
5G tx99 11ac VHT80 MCS9	421

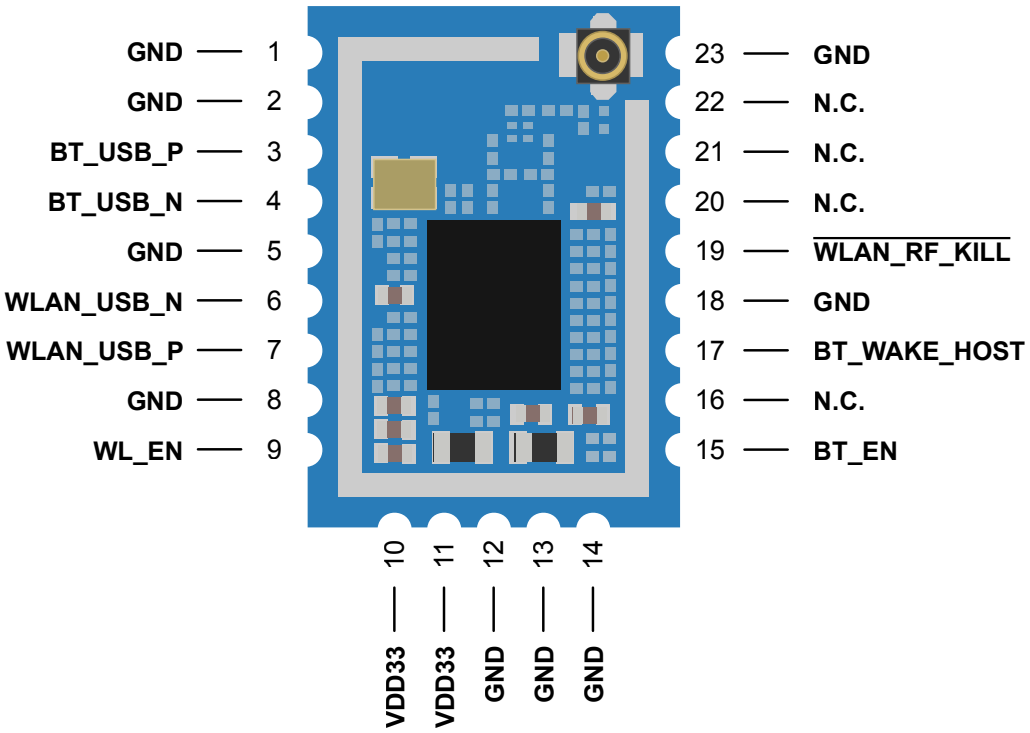
Bluetooth mode	USB 1.1 mA
Continuous Rx burst	22.5
Continuous Tx Class 2 (+4 dBm)	38.5
Continuous Tx Class 2 (+12.5 dBm)	64.5
1.28 sec page scan (non-interlaced)	0.36
1.28 sec LE ADV	0.23
1.28 sec sniff as master	0.22
1.28 sec sniff as slave	0.27

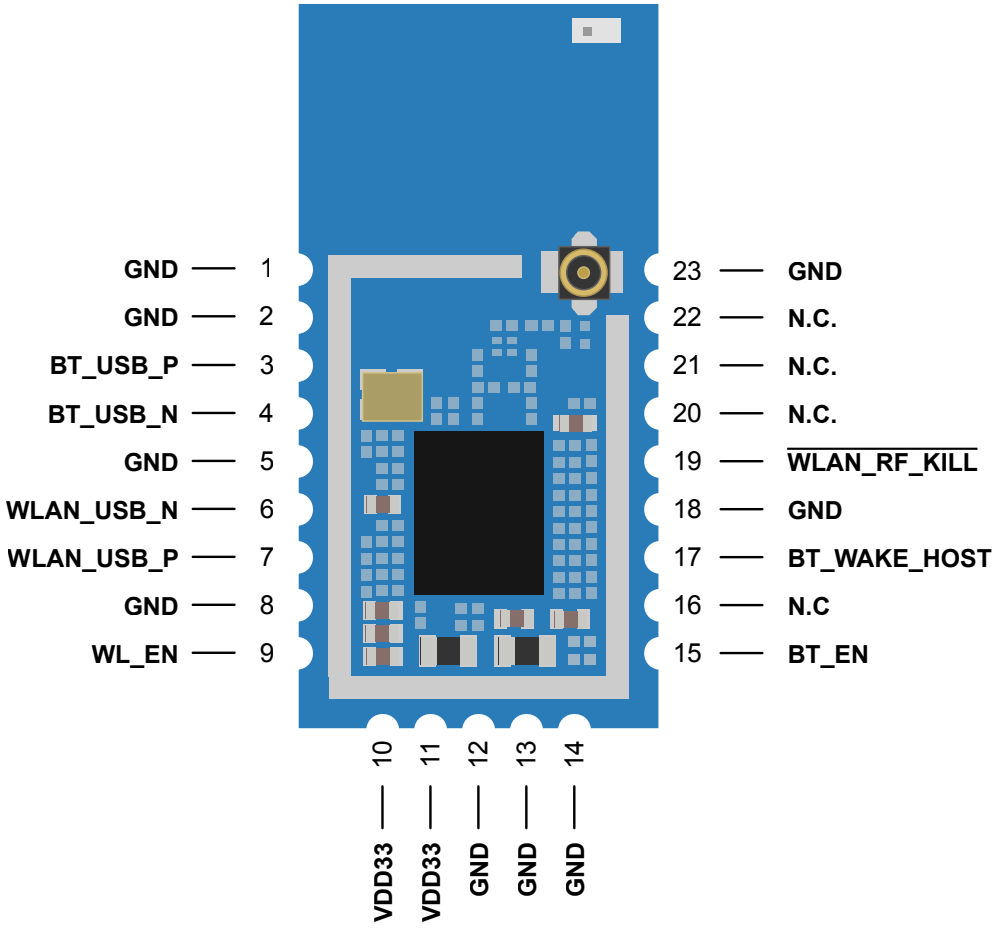
Operating conditions

The module can operate in a wide temperature range and different conditions depending on the enclosure. The following guidelines guarantee that it will work correctly.

Parameter	Units	Min	Max
Working temperature	°C	-40	85
Storage temperature	°C	-40	90
Humidity	%RH	10	90
Storage humidity	%RH	5	90

Pinout Information





Pin	Name	I/O	Description
1	GND	-	Ground connection
2	GND	-	Ground connection
3	BT_USB_P	IO	Bluetooth USB data +
4	BT_USB_N	IO	Bluetooth USB data -
5	GND	-	Ground connection
6	WLAN_USB_N	IO	WLAN USB data -
7	WLAN_USB_P	IO	WLAN USB data +
8	GND	-	Ground connection
9	WL_EN	PU	WLAN enable. Active high.
10	+3V3	PI	+3V3 digital power supply
11	+3V3	PI	+3V3 digital power supply
12	GND	-	Ground connection
13	GND	-	Ground connection
14	GND	-	Ground connection
15	BT_EN	PU	Bluetooth enable. Active high.
16	N.C.	-	Not connected
17	BT_WAKE_HOST	O	Signal indicating that Bluetooth interface requires requires attention. High - host must wake up and remain awake. Low - host device may sleep.
18	GND	-	Ground connection
19	WLAN_RF_KILL	PU	Turn off WLAN RF analog and front-end. Active low.
20	N.C	-	Not connected
21	N.C	-	Not connected
22	N.C	-	Not connected
23	GND	-	Ground connection

PU - Input signals with weak internal pull-up, to prevent signals from floating when left open

PI - Power input

IO - digital bi-directional signal

O - digital output

Power supply

It is recommended to use pin 10 and pin 11 to give power supply to the module.

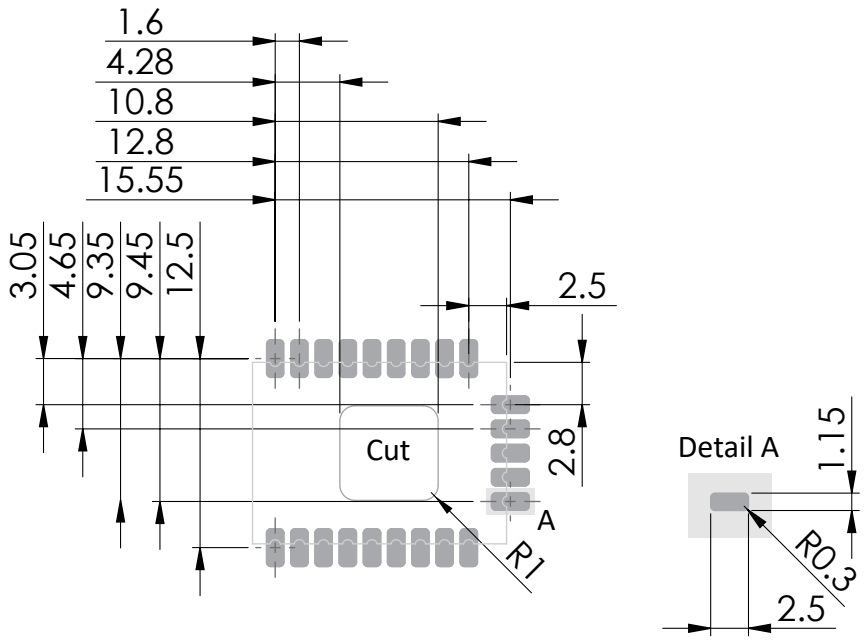
Power ratings

Parameter	Units	Min	Nominal	Max
Supply Voltage (+3V3)	V	3.135	3.3	3.465

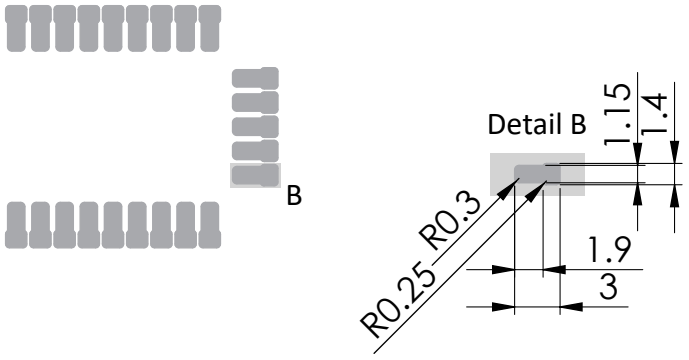
Software

Drivers for BLUE bean USB module (based on QCA9377-7) are available for Windows 7, Windows 10, Linux and Android operating systems.

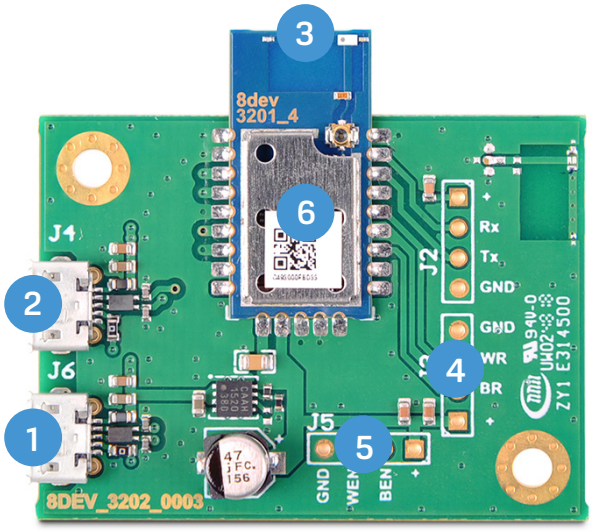
PCB footprint (same for BLUE bean C and BLUE bean A modules)



Soldering paste footprint (same for BLUE bean C and BLUE bean A modules)



Development kit



1 - USB Wi-Fi

2 - USB Bluetooth

3 - Dual-band ceramic antenna

4 - Turn off WLAN and Bluetooth

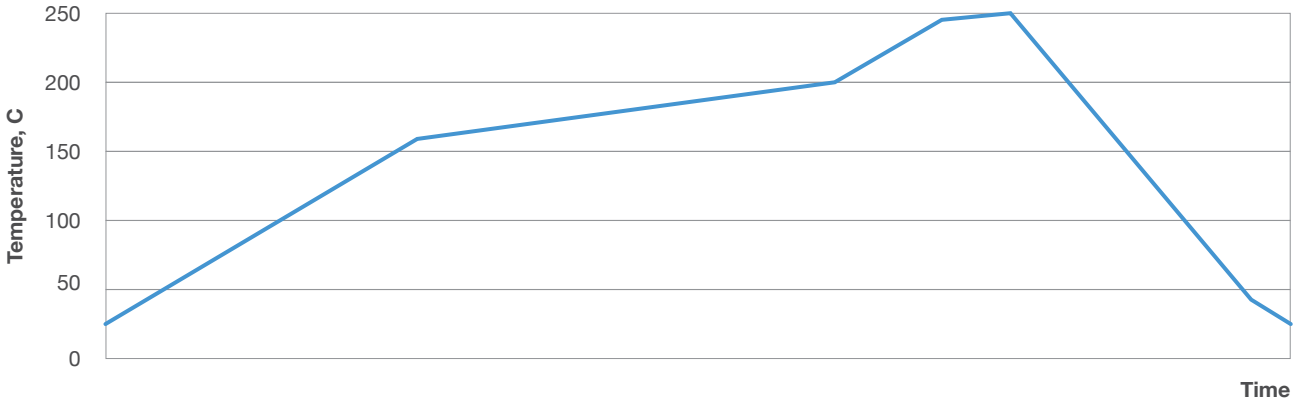
5 - Turn on WLAN and Bluetooth

6 - BLUE bean module

Reflow profile recommendation

Ramp up rate	3°C/second max
Maximum time maintained above 217°C	120 seconds
Peak temperature	250°C
Maximum time within 5°C of peak temperature	20 seconds
Ramp down rate	6°C/second max

Reflow profile



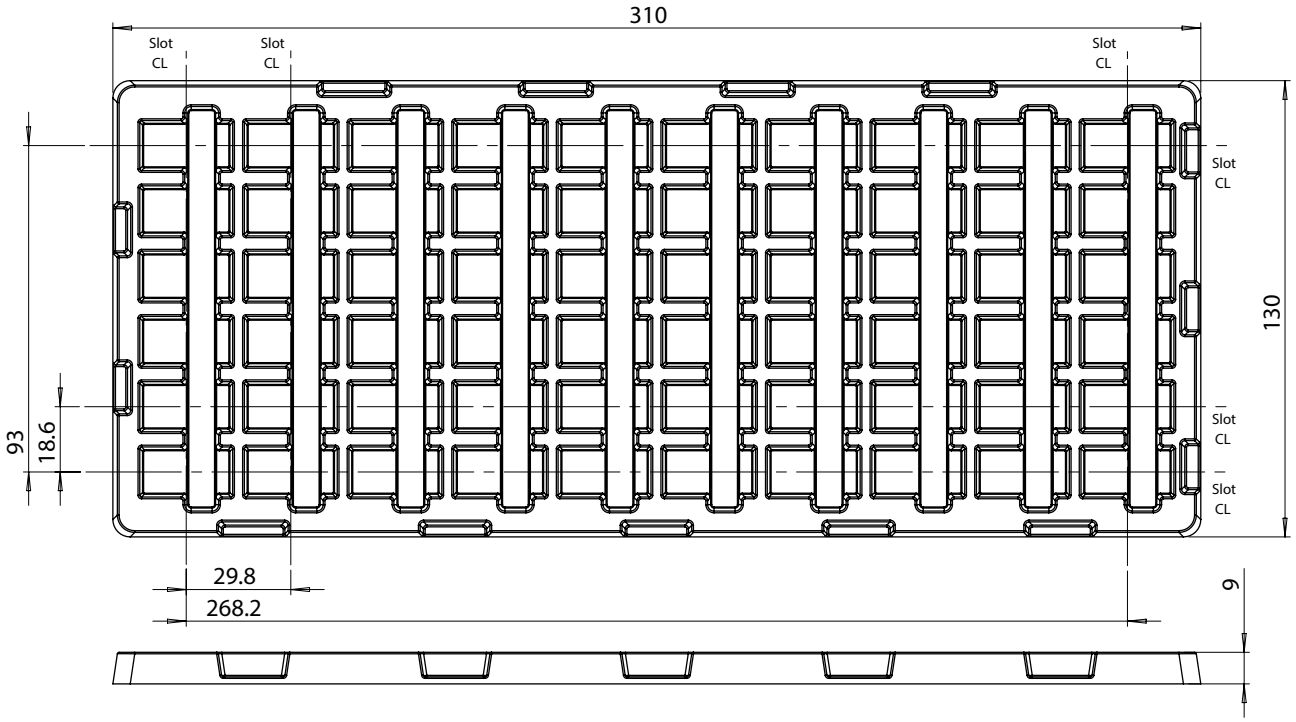
Ordering part number

BLUE-BEAN-C	BLUE bean with connector for external antenna
BLUE-BEAN-A	BLUE bean with an integrated dual-band ceramic omni-directional antenna
BLUE-BEAN-DVK	BLUE bean development kit. Comes with an integrated antenna module

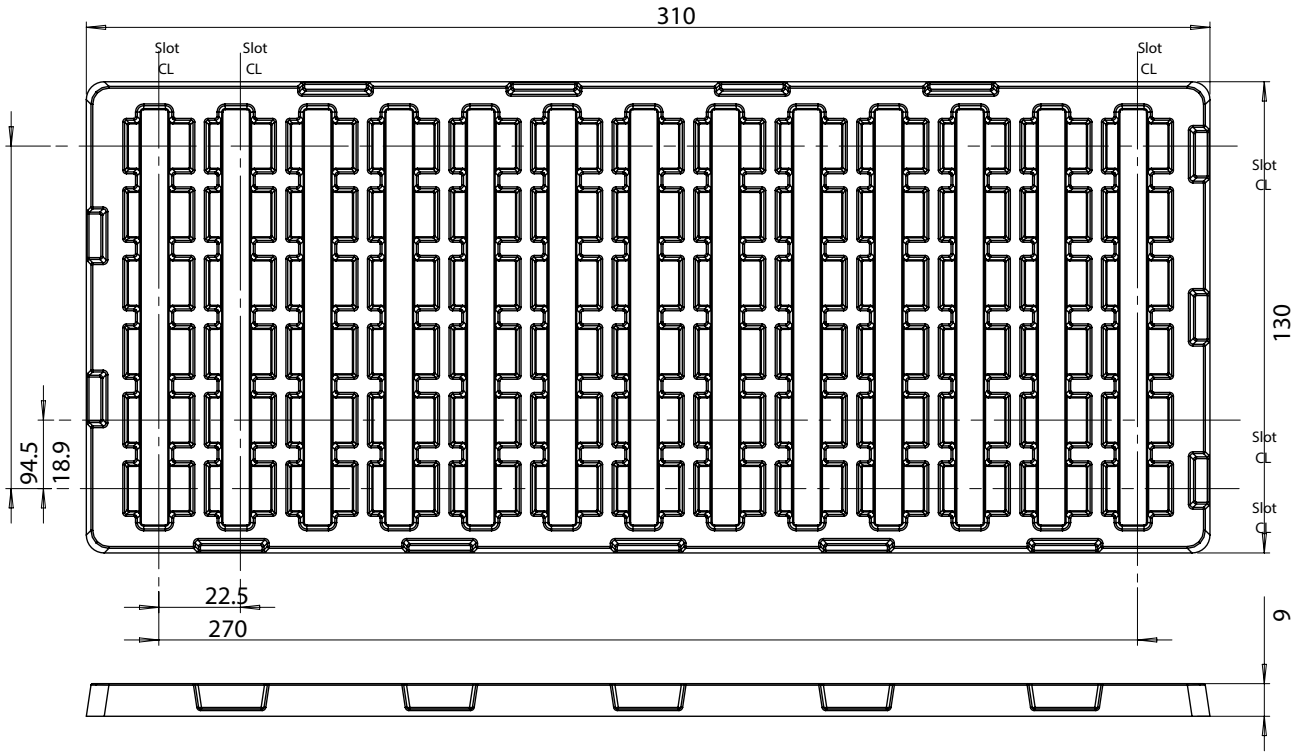
Packaging

BLUE bean modules are packed into vacuum sealed trays. A tray of BLUE-BEAN-A fits 60 modules and a tray of BLUE-BEAN-C fits 78 modules. Every 5 trays are vacuum sealed packaging 300 of BLUE-BEAN-A modules or 390 of BLUE-BEAN-C modules.

BLUE-BEAN-A tray



BLUE-BEAN-C tray

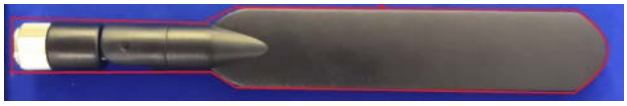


Antenna info

1. Type:External antenna

   Gain:2.4G :4.0 dBi 5G: 4.5 dBi

   Manufacturer:RF Solutions Ltd



2. Type:External antenna

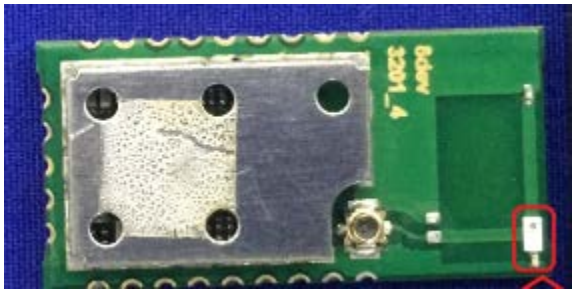
   Gain:2.4G :3.2 dBi 5G: 4.25 dBi

   Manufacturer:molex

3. Type: Ceramic Antenna

   Gain:2.4G :3.0 dBi 5G: 3.0 dBi

   Manufacturer:TDK



FCC Statements:

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.

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

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.

FCC Radiation Exposure Statement:

The antenna must be installed such that 20 cm is maintained between the antenna and users. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Important Notice to OEM integrators:

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: Z9W-MB Or Contains FCC ID: Z9W-MB”

When the module is installed inside another device, the user manual of the host 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.
(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.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

OEM integrator /End product manufaturer must perform the test of
radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.249 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.249 and 15.209 & 15.207 ,15B Class B requirement， then the end product can be sold legally.

IC STATEMENT

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences

et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :

(1) Cet appareil ne doit pas causer d'interférences.

(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement

indésirable de l'appareil.

IC Radiation Exposure Statement

This modular complies with IC 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.

If the IC 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 IC: 11468A-MB”

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

1. This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic

Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

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(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement

indésirable de l'appareil.

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.