

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.

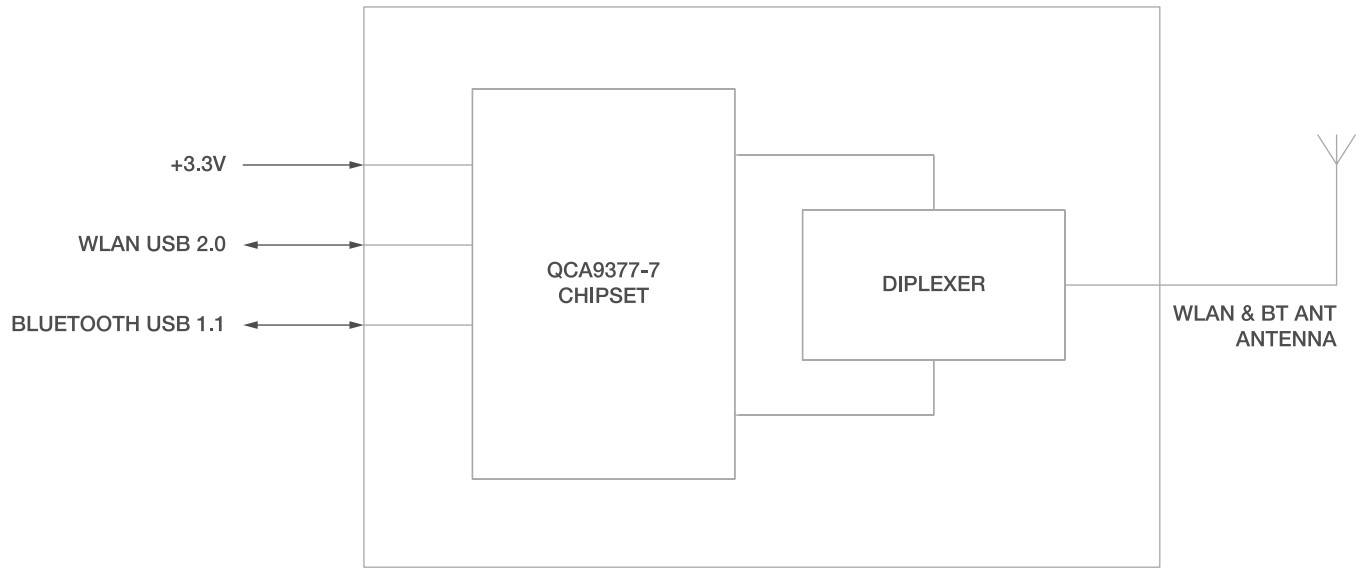
Quick specs

- 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
- MU-MIMO
- 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

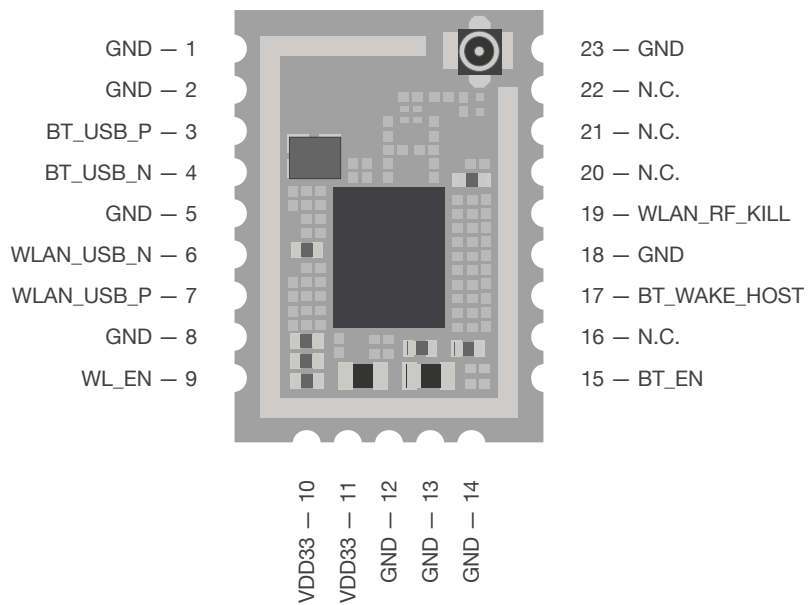
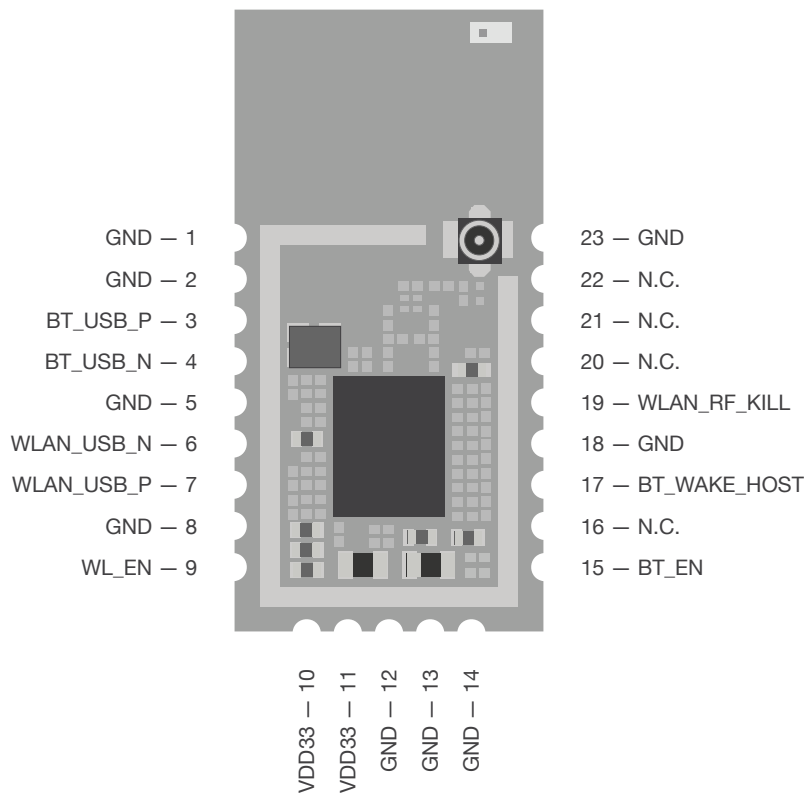
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1. Block diagram



2. Pinout Information (with antenna/ without antenna)



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	VDD33	PI	+3V3 digital power supply
11	VDD33	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_L	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

3. Electrical characteristics

3.1 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	422
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

3.2. POWER RATINGS

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

3.3. 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

3.4. SOFTWARE

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

3.5. POWER SUPPLY

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

4. 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)

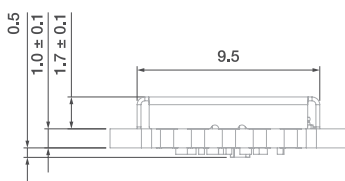
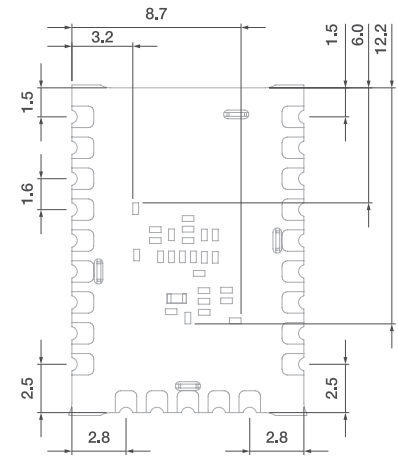
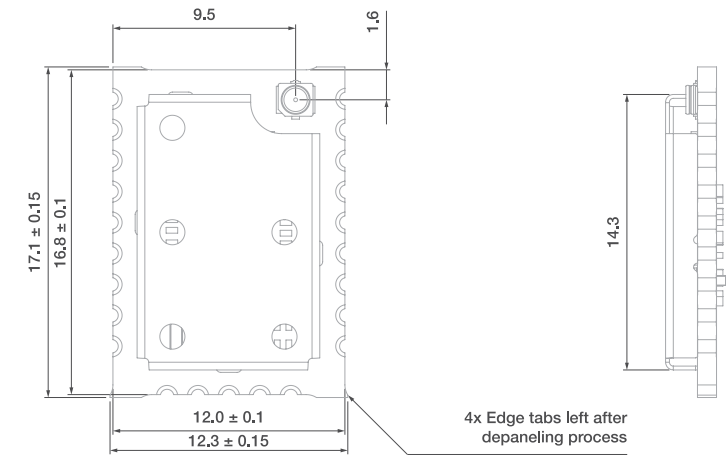
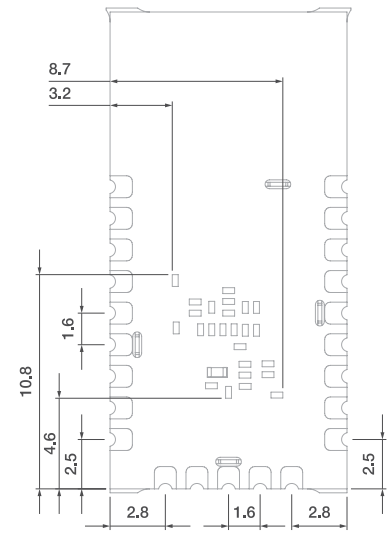
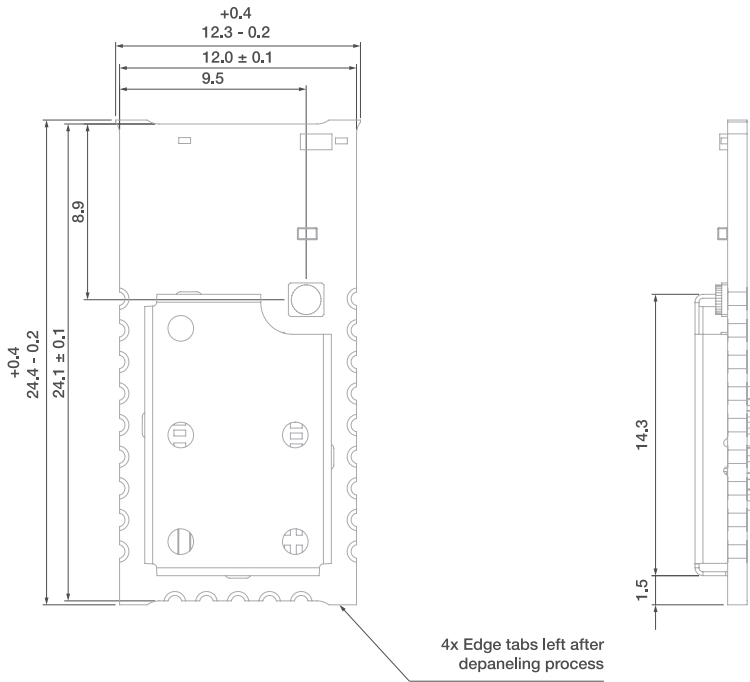
Data rate (Mbps)	32.5	65	97.5	130	195	260	292.5	325	390	433.3
Sensitivity (dBm)	-84	-81	-78	-76	-72	-68	-67	-65	-61	-59
Output power (dBm)	13	13	13	12	12	11	11	9	9	8

BLUETOOTH

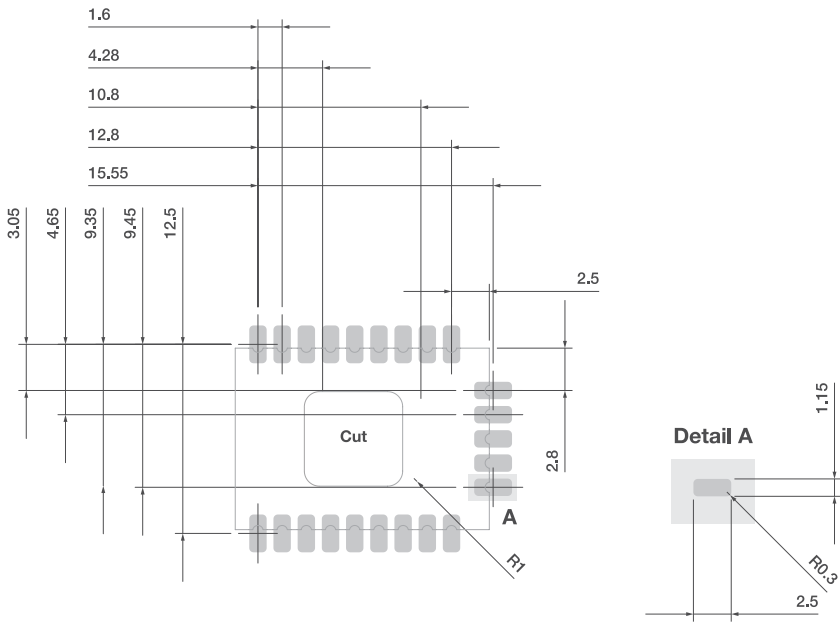
Frequency range	2.402 - 2.480 GHz
Supported modes	BT and BLE
Max TX power	8 dBm (4 dBm BLE)
RX sensitivity (BER >= 0.1%)	-95 dBm (-99 dBm BLE)

5. Mechanical characteristics

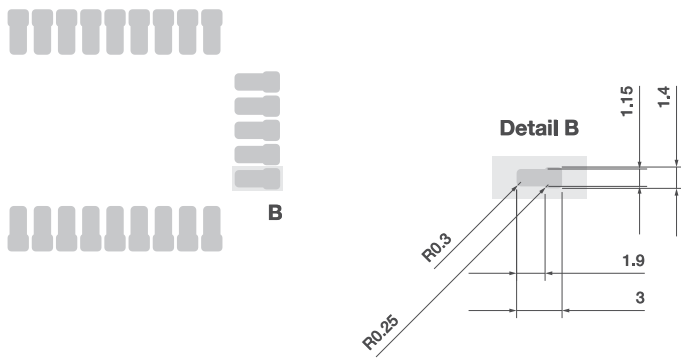
5.1. MODULE DIMENSIONS (WITH ANTENNA/ WITHOUT ANTENNA)



5.2. PCB FOOTPRINT (SAME FOR RED BEAN C AND RED BEAN A MODULES)



5.3. SOLDERING PASTE FOOTPRINT (SAME FOR RED BEAN C AND RED BEAN A MODULES)

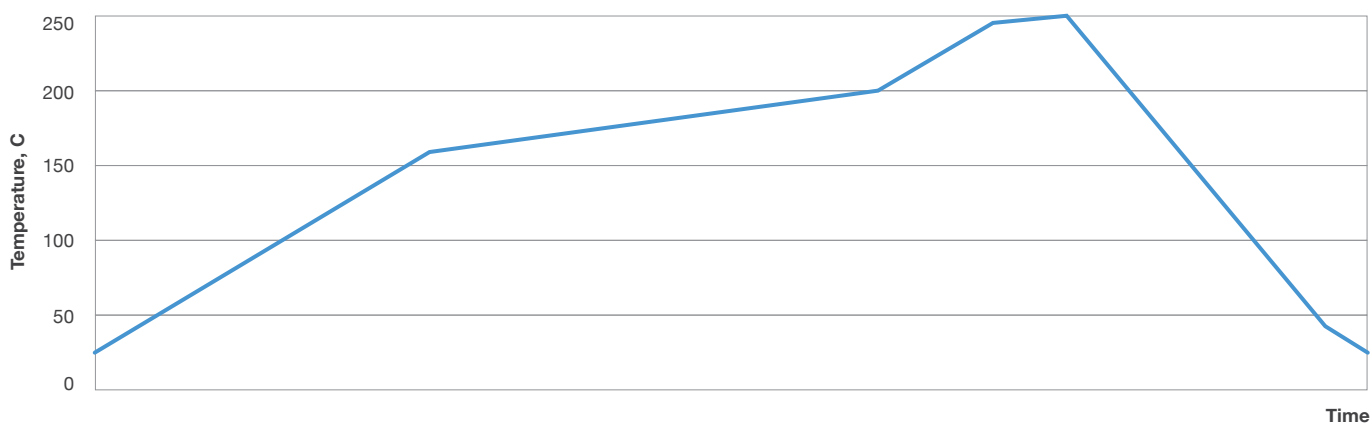


6. Reflow profile recommendations

6.1. REFLOW PROFILE PARAMETERS

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

6.2. REFLOW PROFILE



7. Laminate Conditions

7.1. BOW AND TWIST

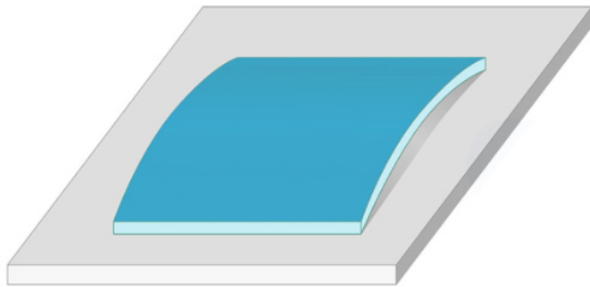
8devices modules are manufactured according to the standard IPC-A-610 Norm Class 2.

Standard states: "Bow/twist after solder should not exceed 1.5% for through-hole and 0.75% for surface mount printed board applications".

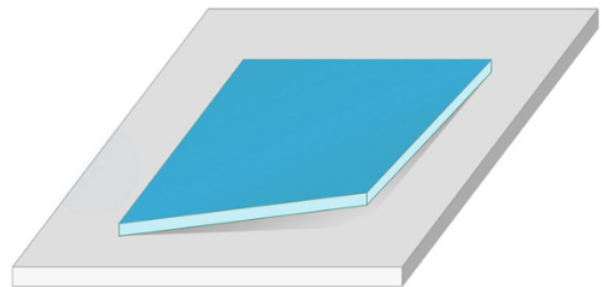
According to this statement, BLUE bean module can be bowed and twisted up to 0.183mm.

To avoid negative effects of bow and twist we recommend to increase the paste thickness for the module pads to achieve better co-planarity.

FIGURE 7-1. EXAMPLE OF BOW AND TWIST



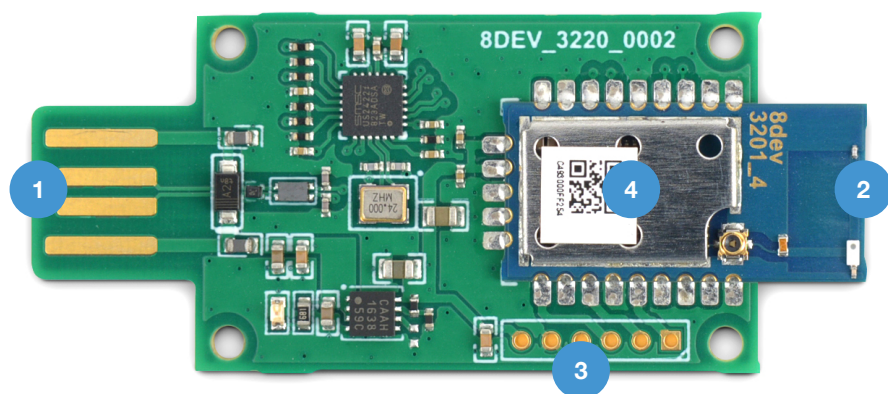
Bow



Twist

8. Development kit

8.1. DEVELOPMENT KIT INTERFACES



- 1 - USB Wi-Fi and Bluetooth
- 2 - Dual-band ceramic antenna
- 3 - Turn on/off WLAN and Bluetooth
- 4 - BLUE bean A module

9. Packaging and ordering info

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.

FIGURE 9-1. BLUE-BEAN-A TRAY

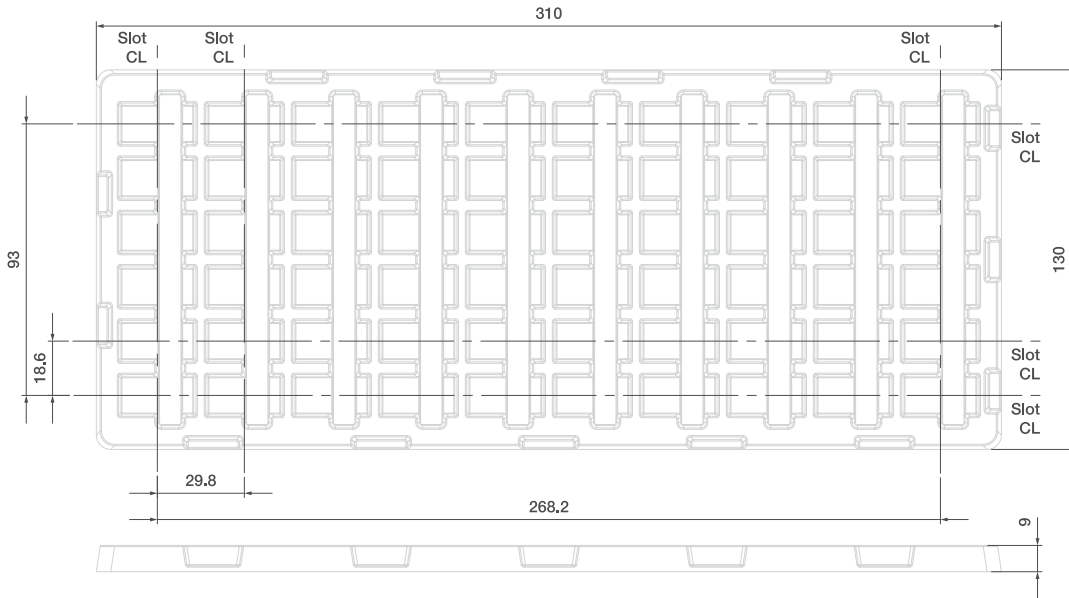
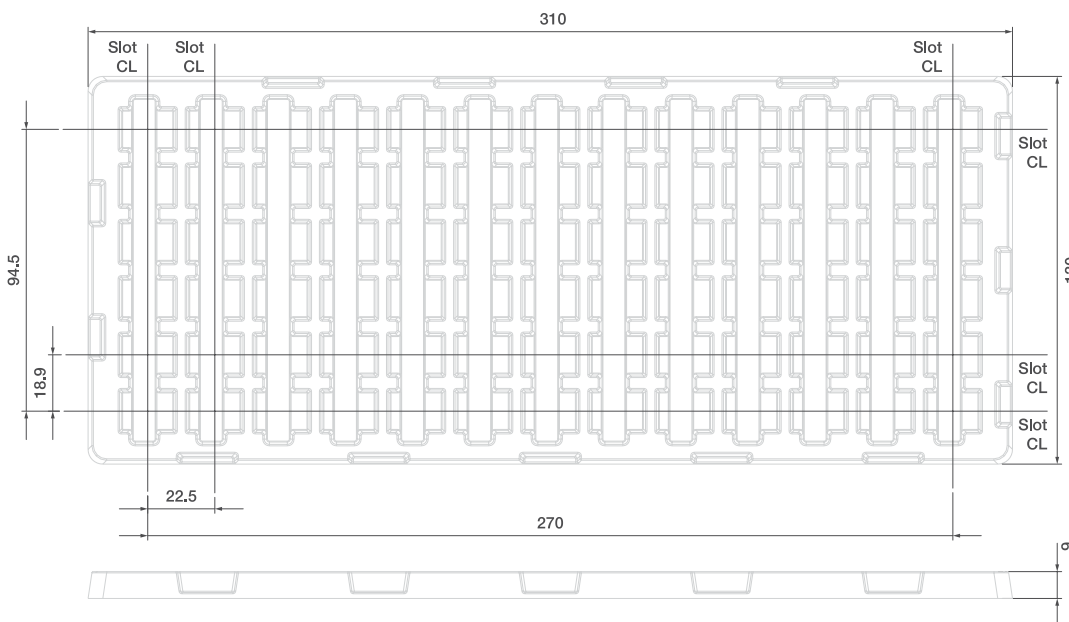


FIGURE 9-2. BLUE-BEAN-C TRAY



9.1. ORDERING PART NUMBERS

Order Number	Description
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

10. Document Revision History

Revision	Revision Date	Description
v1.0	2022-08-22	Initial release on new format
v1.1	2022-12-21	Product drawings updated
v1.2	2023-01-10	Laminate conditions chapter added