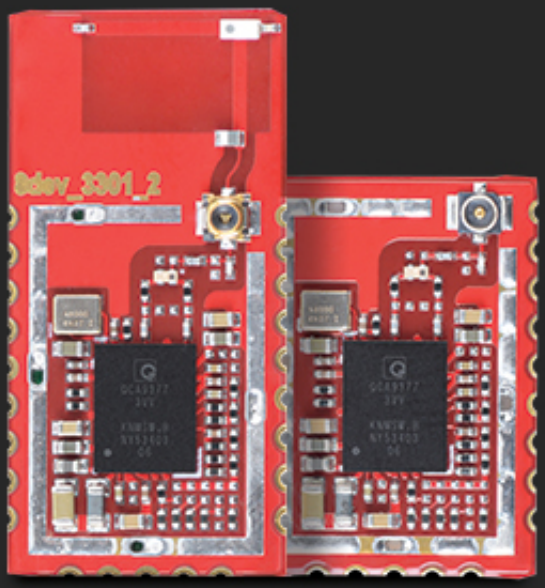


RED bean is IEEE 802.11b/g/n/a/ac Wave2 dual-band wireless LAN and Bluetooth 5.0 SDIO 3.0 module optimised for small size and low power consumption.

It is based on Qualcomm QCA9377-3 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.

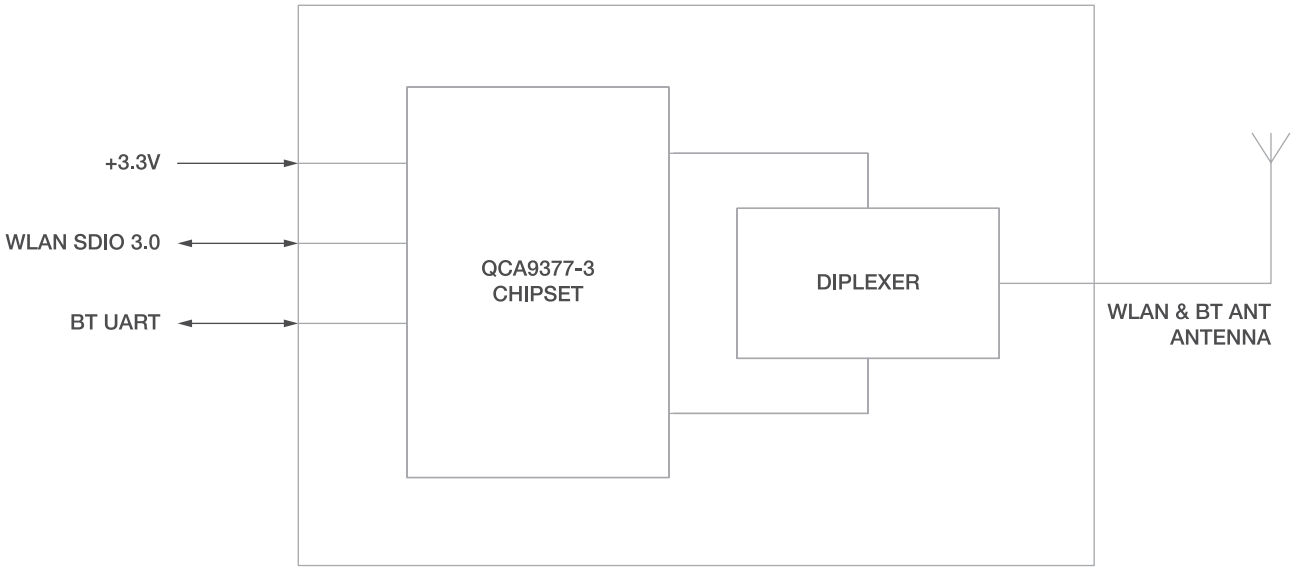
RED bean software drivers are available for Linux, Windows 10 and Android operating systems.

Quick specs

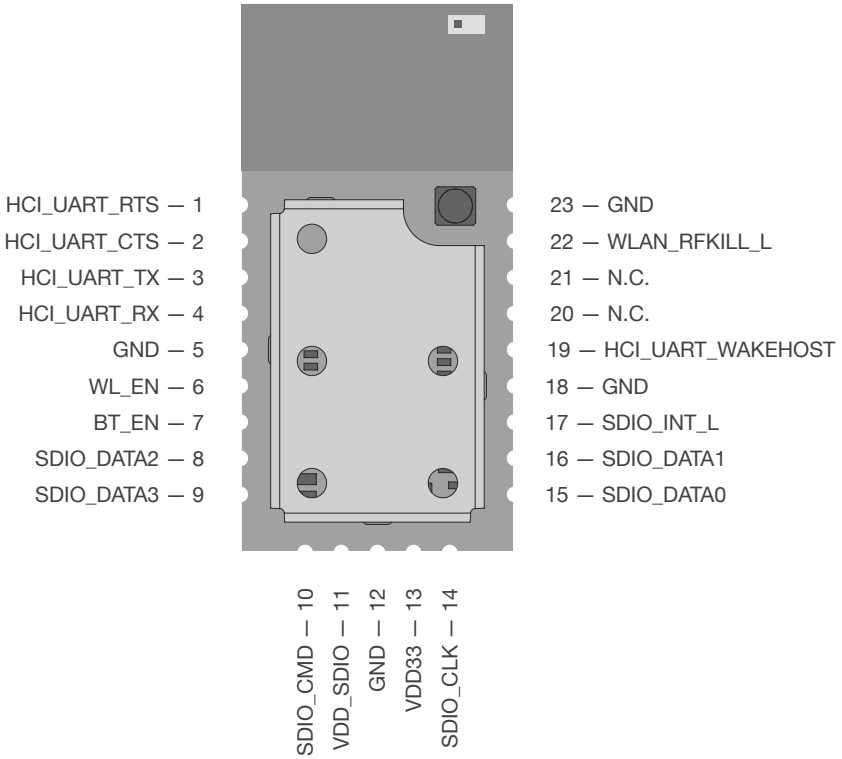
- 802.11a/b/g/n/ac, 2.4 and 5 GHz, 1x1 SISO, 433 Mbps data rate, up to 20 dBm output power
- 20/40/80 MHz channel size support
- MU-MIMO
- Bluetooth v5.0, BLE, ANT+ and backwards compatibility with BT v1.x and BT v2.x + enhanced data rate
- Connectorized (Murata HSC type connector: MM4829-2702RB0) or an integrated dual-band antenna version
- Linux, Windows and Android drivers available
- Based on QCA9377-3 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 UART, WLAN SDIO 3.0

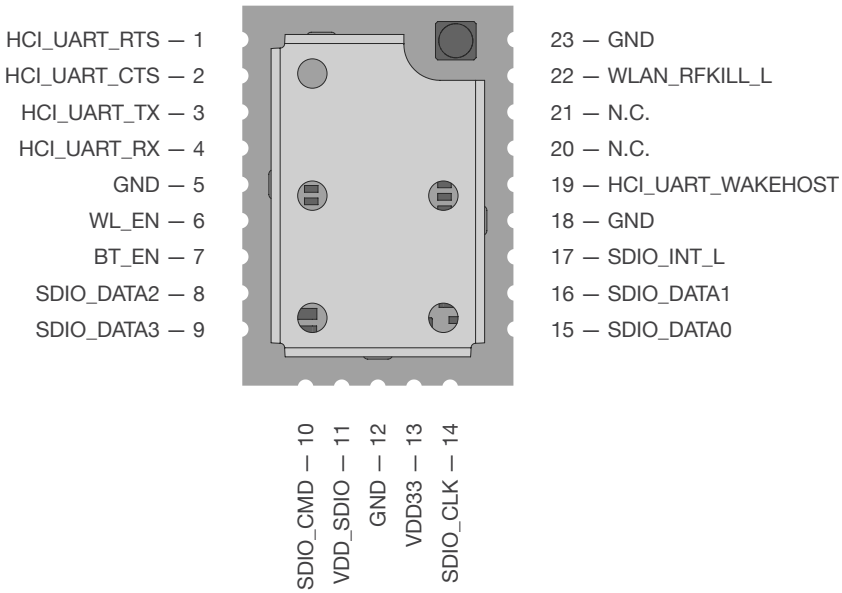
Table of Contents

1. Block diagram



2. Pinout Information (with antenna/ without antenna)





Pin	Pin name	I/O	Description
1	HCI_UART_RTS	DO	UART RTS signal
2	HCI_UART_CTS	DI	UART CTS signal
3	HCI_UART_TX	DO	UART TX signal
4	HCI_UART_RX	DI	UART RX signal
5	GND	-	Ground connection
6	WL_EN	PU	WLAN enable. Active high
7	BT_EN	PU	Bluetooth enable. Active high
8	SDIO_DATA2	B	SDIO data bus D2
9	SDIO_DATA3	B	SDIO data bus D3
10	SDIO_CMD	DI	SDIO CMD line signal
11	VDD_SDIO	PI	Voltage supply input 1.8V or 3.3V
12	GND	-	Ground connection
13	VDD33	PI	+3V3 digital power supply
14	SDIO_CLK	OD	SDIO clock signal
15	SDIO_DATA0	B	SDIO data bus D0
16	SDIO_DATA1	B	SDIO data bus D1
17	SDIO_INT_L	DO	SDIO interupt signal
18	GND	-	Ground connection
19	HCI_UART_WAKEHOST	OD	Bluetooth wakeup host. Active high
20	N.C.	-	Not connected
21	N.C.	-	Not connected
22	WLAN_RFKILL_L	PU	Turn off WLAN RF analog at front-end. Active low
23	GND	-	Ground connection

3. Electrical characteristics

3.1 POWER CONSUMPTION

Wi-Fi mode	mA
Standby (deep sleep)	0.16
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	mA
Continuous Rx burst	22
Continuous Tx Class 2 (+4 dBm)	38
Continuous Tx Class 2 (+12.5 dBm)	64
1.28 sec page scan (non-interlaced)	0.31
1.28 sec LE ADV	0.18
1.28 sec sniff as master	0.17
1.28 sec sniff as slave	0.22

3.2. POWER RATINGS

Parameter	Units	Min	Nominal	Max
Supply voltage (VDD33)	V	3.135	3.3	3.465
Supply voltage (VDD_SDIO)	V	-	1.8 or 3.3	-

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 RED bean SDIO module (based on QCA9377-3) are available for Windows 7, Windows 10, Linux and Android operating systems.

3.5. POWER SUPPLY

Use pins 11, 13 for module powering. For SDIO3.0 mode use 1.8V, in SDIO2.0 mode module can be powered 1.8V or 3.3V

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)

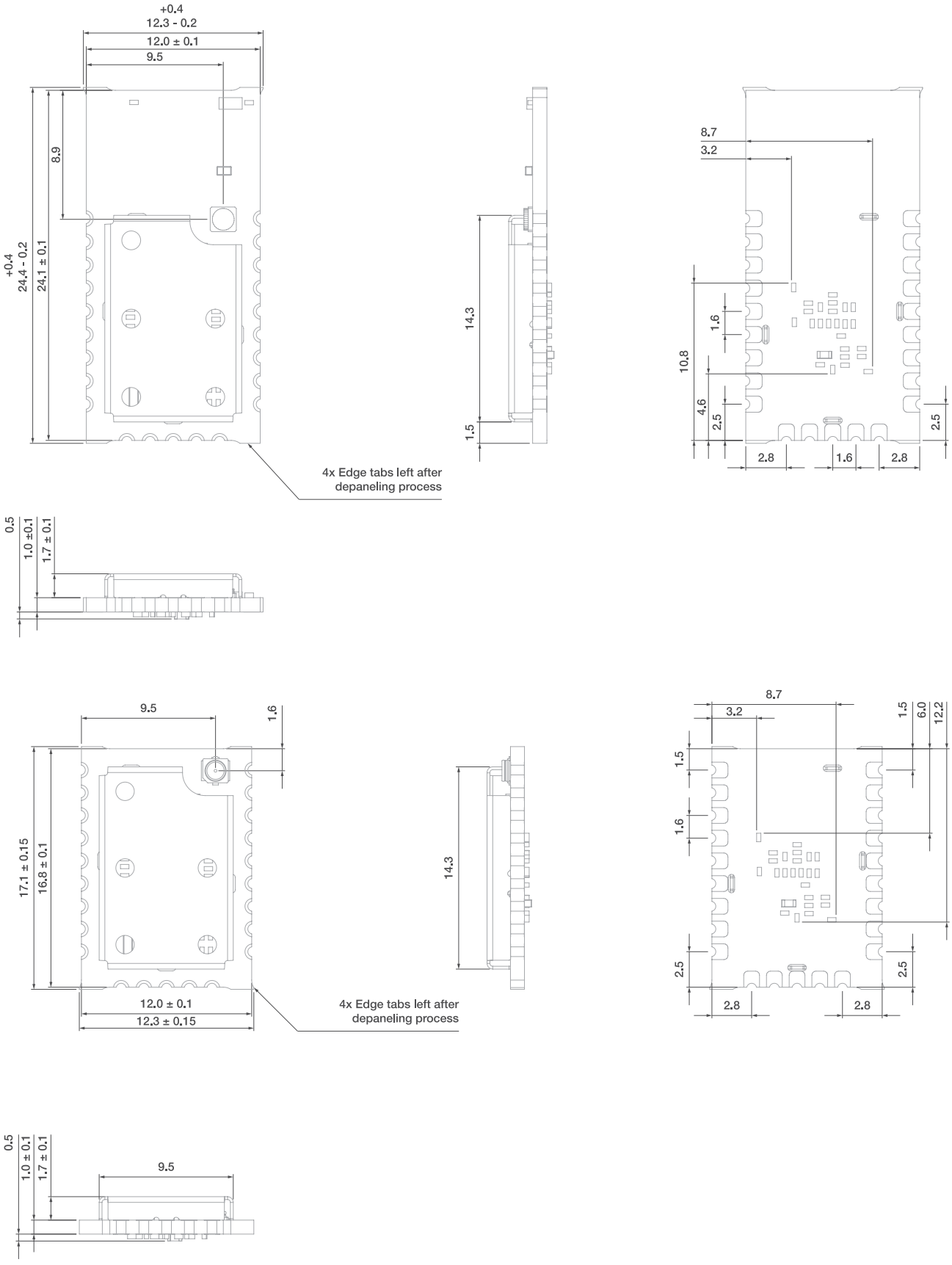
Data rate (Mbps)	32.5	65	97.5	130	195	260	292.5	325	390	433.3
Sensitivity (dBm)	-84	-81	-78	-76	-72	-68	-67	-65	-61	-59
Output power (dBm)	13	13	13	12	12	11	11	9	9	8

BLUETOOTH

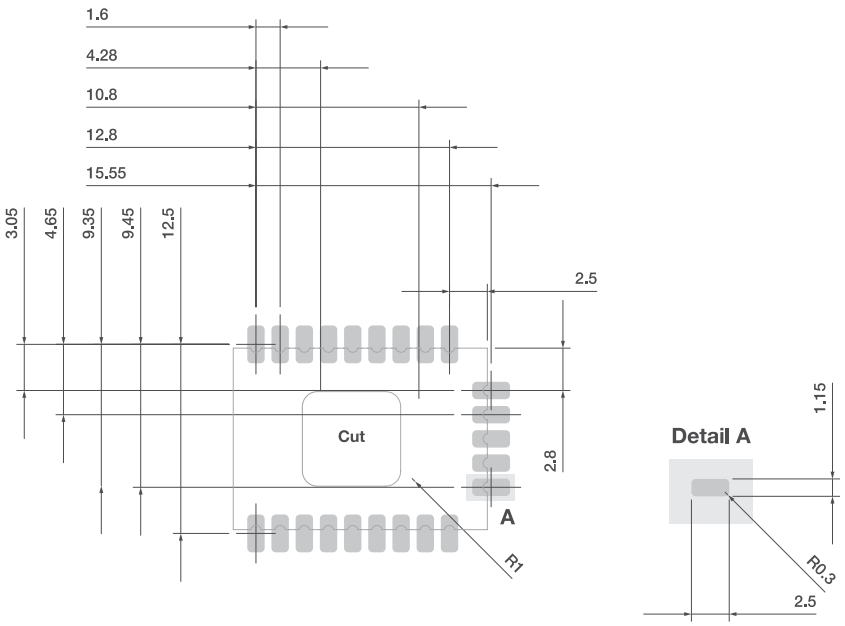
Frequency range	2.402 - 2.480 GHz
Supported modes	BT and BLE
Max TX power	8 dBm (4 dBm BLE)
RX sensitivity (BER >= 0.1%)	-95 dBm (-99 dBm BLE)

5. Mechanical characteristics

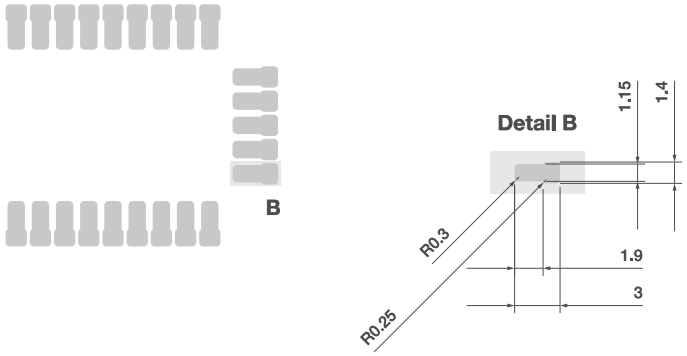
5.1. MODULE DIMENSIONS (WITH ANTENNA/ WITHOUT ANTENNA)



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)

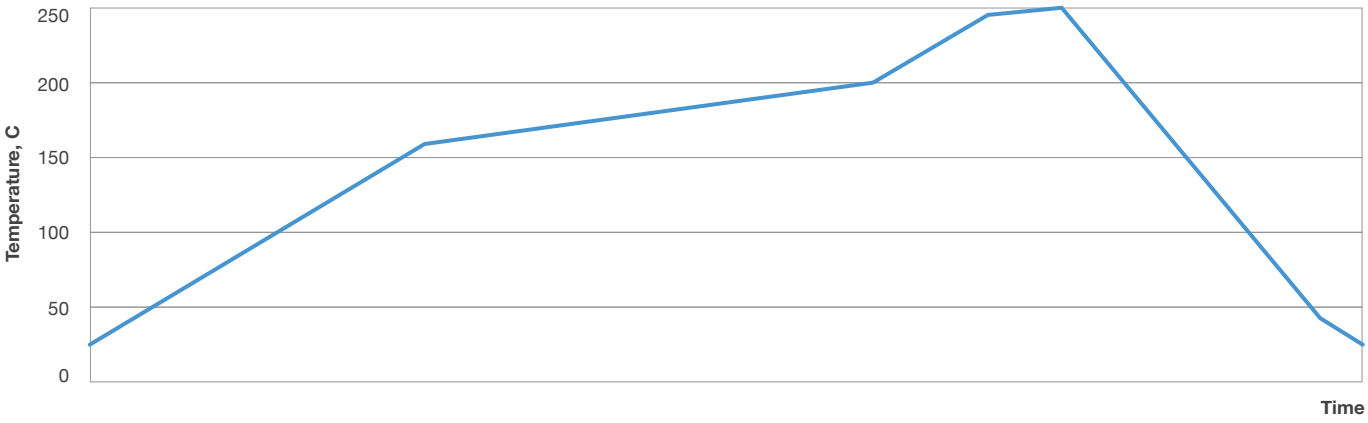


6. Reflow profile recommendations

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

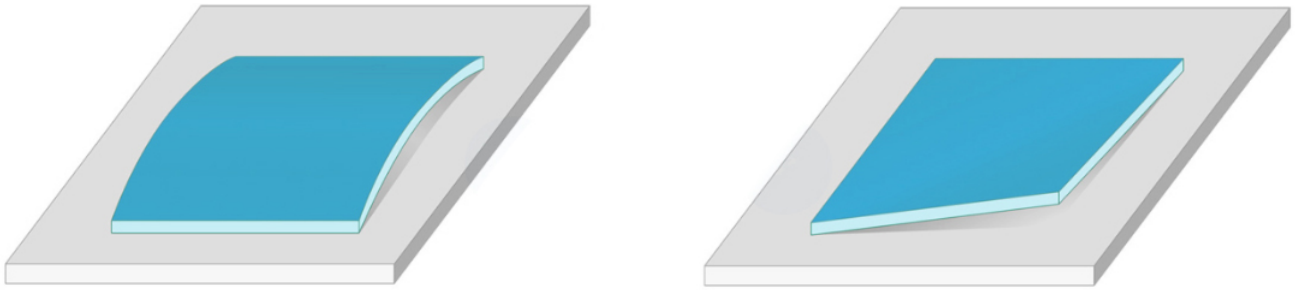


7. Laminate Conditions

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, RED 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.

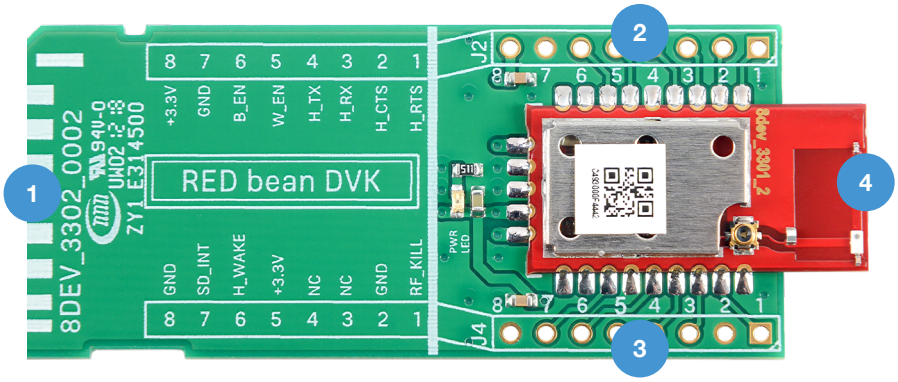
FIGURE 8-1. EXAMPLE OF BOW AND TWIST



Bow **Twist**

8. Development kit

8.1. DEVELOPMENT KIT INTERFACES



1 - SDIO interface

2, 3 - Module breakout for accessing HCI UART and other functionality

4 - RED bean module

9. Packaging and ordering info

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

FIGURE 9-1. RED-BEAN-A TRAY

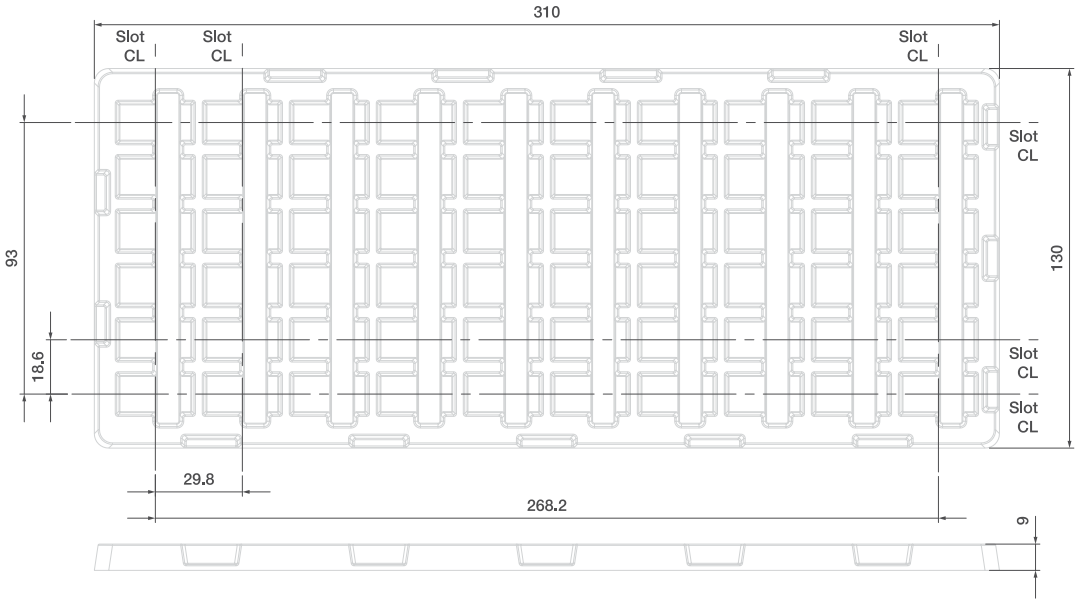
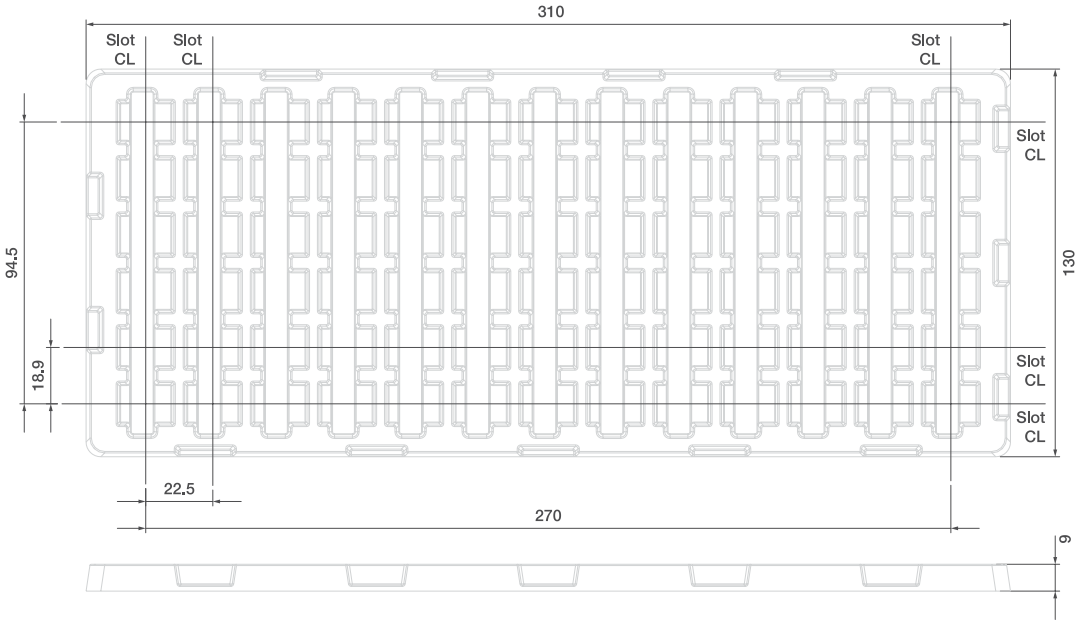


FIGURE 9-2. RED-BEAN-C TRAY

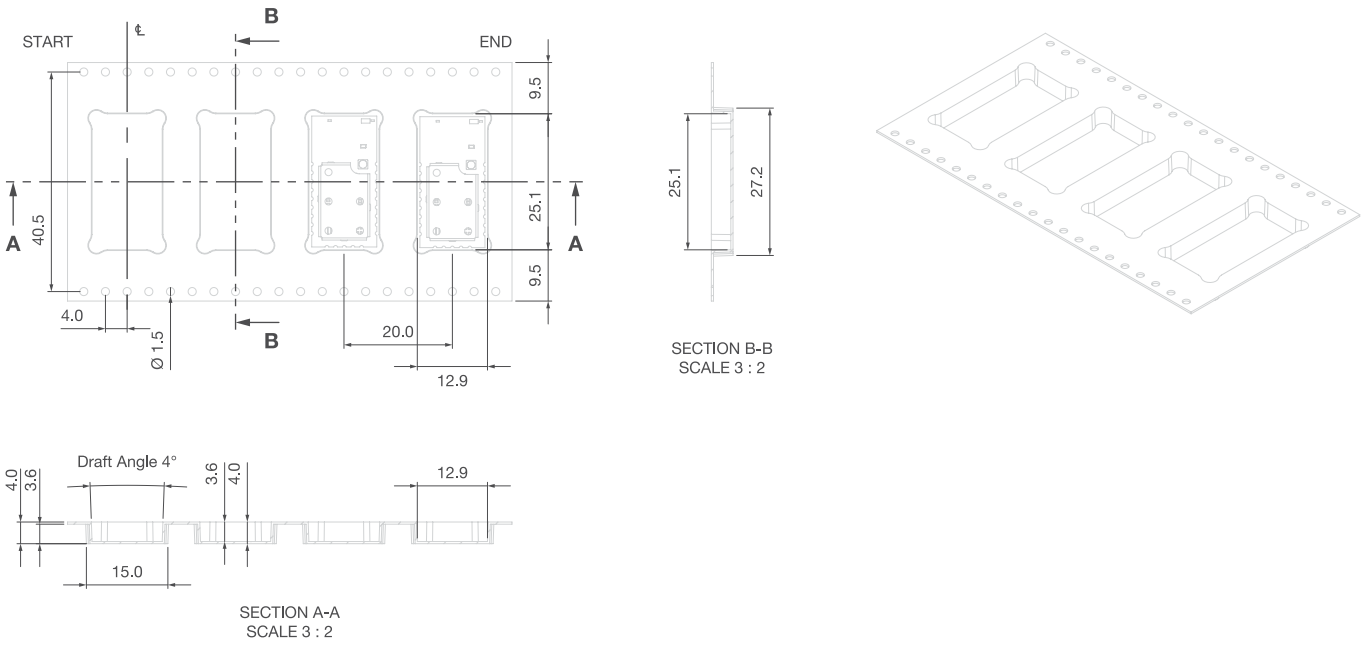


9.1. TAPE&REEL PACKAGING

When modules are packed into Tape&Reel, each reel contains 1000 modules.
There are 5 reels in one standard packing box.
First 5 slots of every tape are empty, beginning of the tape in the drawing is on the left side.

Note: Tape&Reel packaging for Antenna version.

FIGURE 9.1-1 TAPE&REEL PACKAGING



9.2. ORDERING PART NUMBERS

Order Number	Description
RED-BEAN-C-R2	RED bean with connector for external antenna
RED-BEAN-A-R2	RED bean with an integrated dual-band ceramic omni-directional antenna
RED-BEAN-DVK-R2	RED bean development kit. Comes with an integrated antenna module

10. Document Revision History

Revision	Revision Date	Description
v1.0	2022-08-19	Initial release on new format
v1.1	2022-12-21	Product drawings updated
v1.2	2023-01-09	Laminate conditions chapter added
v1.3	2023-05-29	Tape&Reel packaging information added