

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

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).

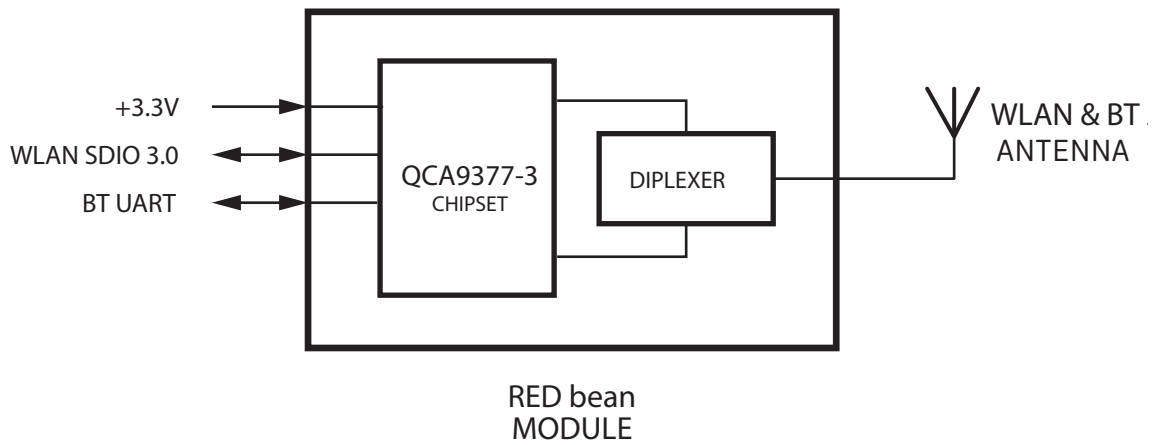
The radio module supports advanced power saving techniques. Bluetooth supports both Class1 and Class2 transmissions and advanced coexistence mechanisms allow it to work seamlessly with Wi-Fi ensuring good quality and high performance.

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

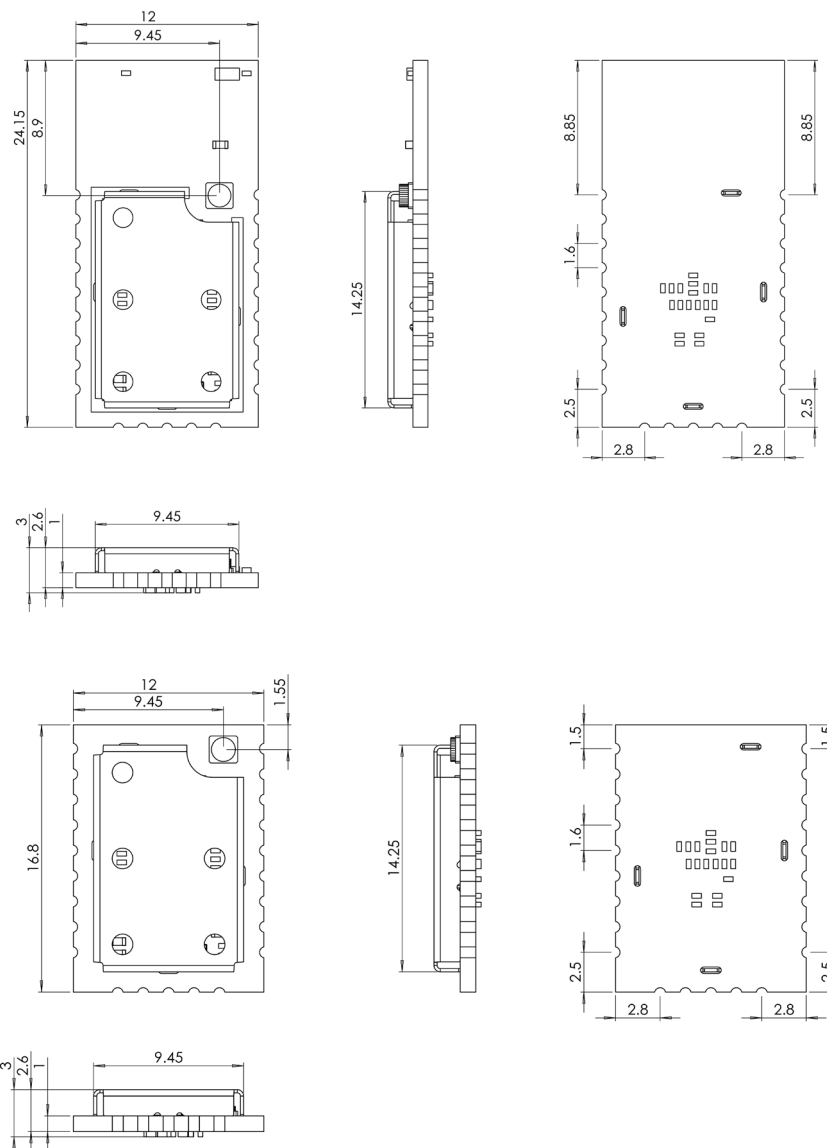
### Quick specs

- 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

## Block diagram



## Module dimensions (with antenna/ without antenna)



<b>2.4 GHz 802.11AC (20 MHz)</b>	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	
<b>2.4 GHz 802.11AC (40 MHz)</b>	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
<b>5 GHz 802.11AC (20 MHz)</b>	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	
<b>5 GHz 802.11AC (40 MHz)</b>	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
<b>5 GHz 802.11AC (80 MHz)</b>	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
<b>Bluetooth</b>	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

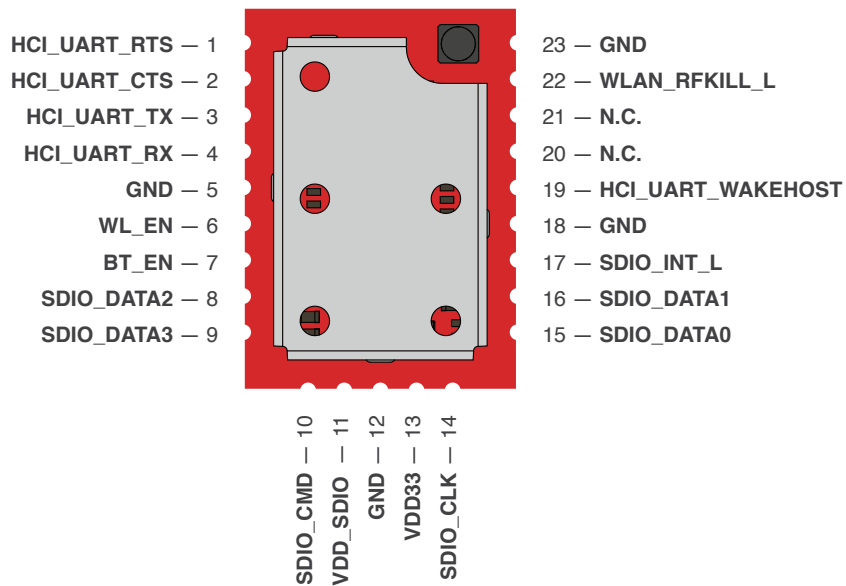
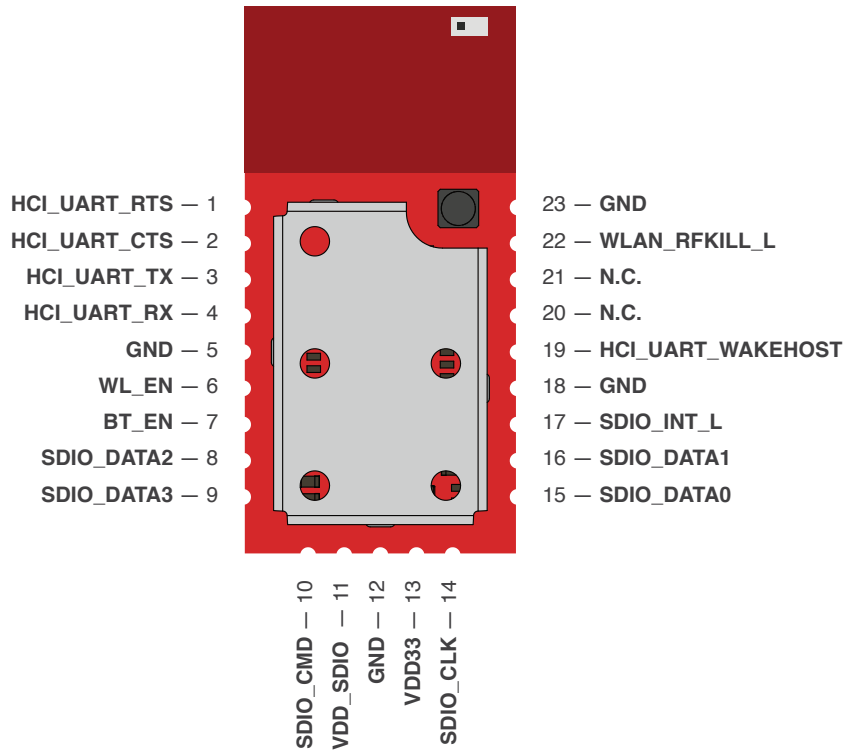
Wi-Fi mode	mA	Bluetooth mode	mA
Standby (deep sleep)	0.16	Continuous Rx burst	22
2G tx99 11b 1Mbps	356	Continuous Tx Class 2 (+4 dBm)	38
2G tx99 11n HT20 MCS7	326	Continuous Tx Class 2 (+12.5 dBm)	64
5G tx99 11n HT20 MCS0	487	1.28 sec page scan (non-interlaced)	0.31
5G tx99 11n HT20 MCS7	422	1.28 sec LE ADV	0.18
5G tx99 11ac VHT80 MCS9	421	1.28 sec sniff as master	0.17
		1.28 sec sniff as slave	0.22

## 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 (with antenna/ without antenna)



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 interrupt 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

**DO** - Digital output signal

**DI** - Digital input CMOS

**B** - Bidirectional digital with CMOS input

**PI** - Power input

**OD** - A digital output signal with open drain

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

## 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.

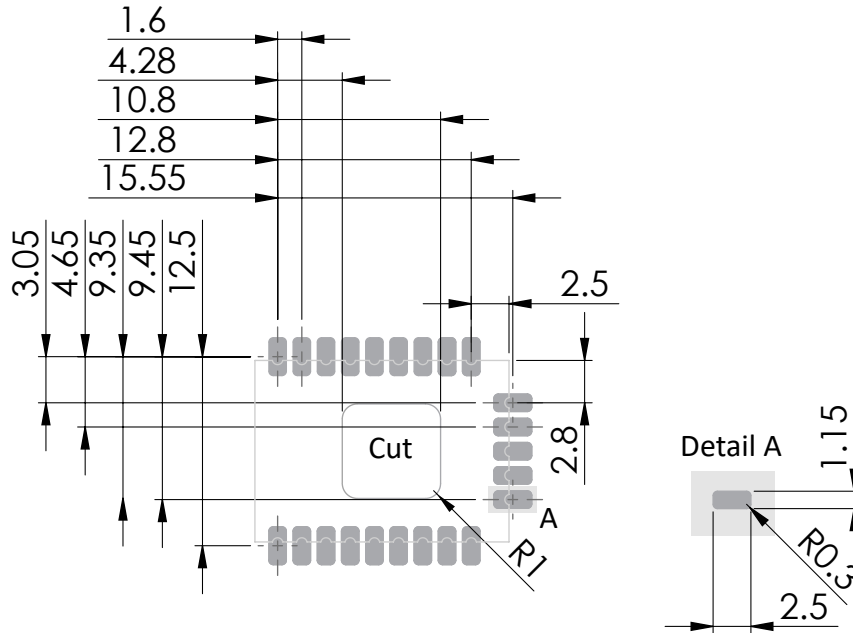
## Power ratings

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	-

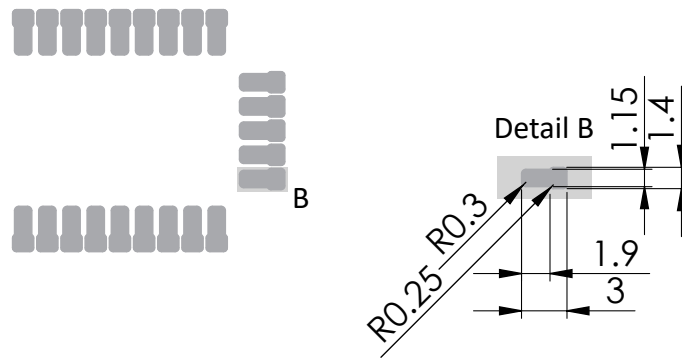
## Software

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

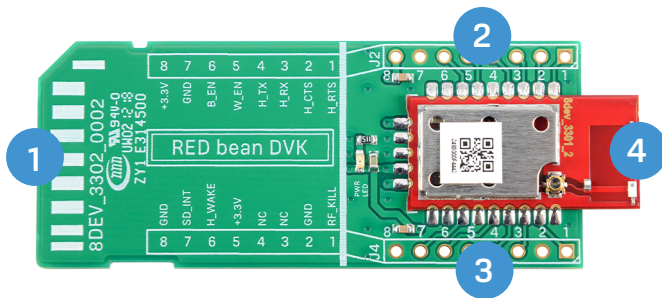
PCB footprint (same for RED bean C and RED bean A modules)



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



Development kit

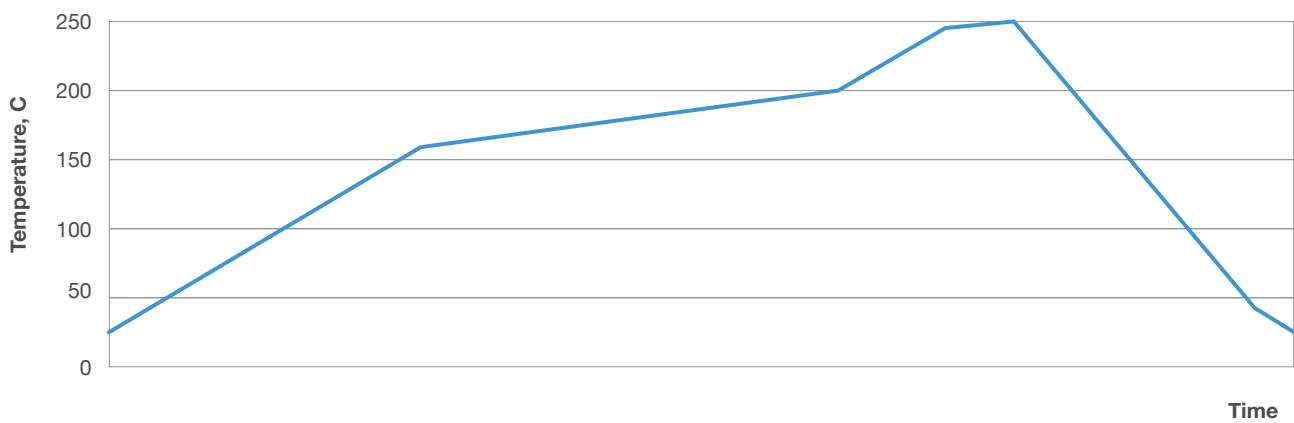


- 1 - SDIO interface (micro SD)
- 2, 3 - Module breakout for accessing HCI UART and other functionality
- 4 - RED bean module

## 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



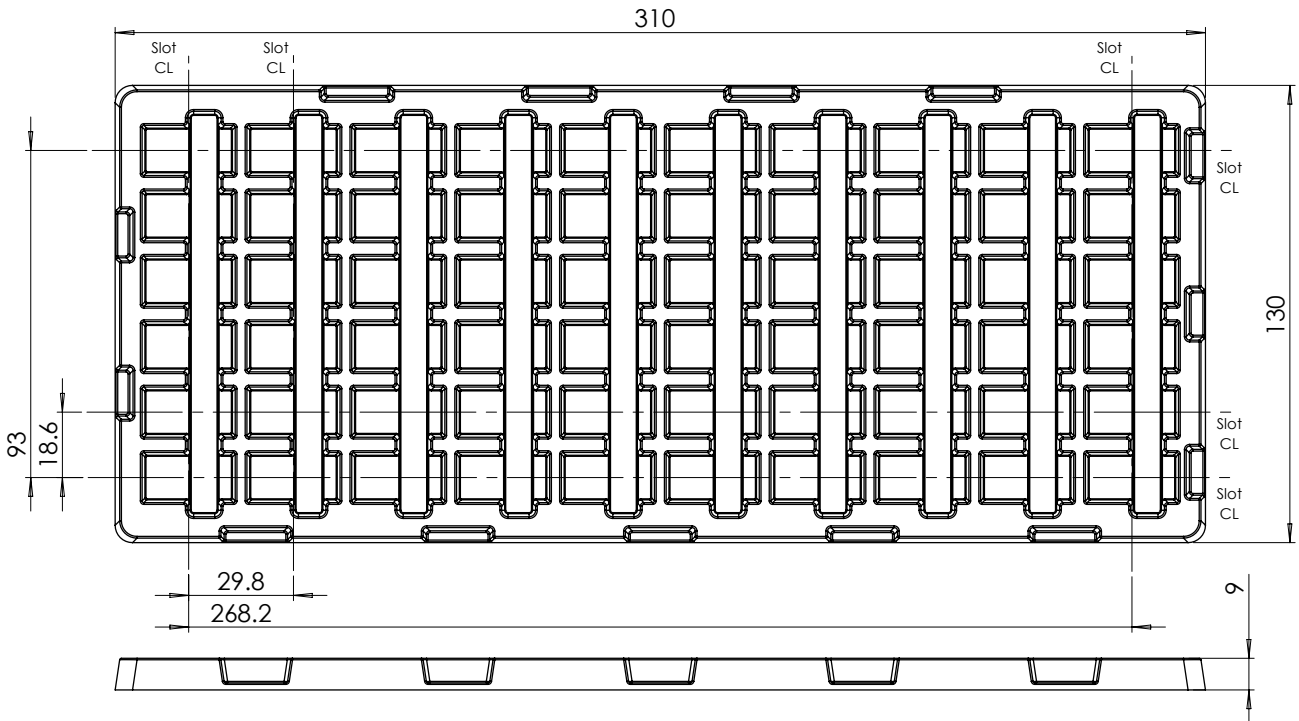
## Ordering part number

<b>RED-BEAN-C</b>	RED bean with connector for external antenna
<b>RED-BEAN-A</b>	RED bean with an integrated dual-band ceramic omni-directional antenna
<b>RED-BEAN-DVK</b>	RED bean development kit. Comes with an integrated antenna module

## Packaging

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.

### RED-BEAN-A tray



### RED-BEAN-C tray

