

8DEV_3100 Black Bean Datasheet

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1. Product Overview

BLACK bean is IEEE 802.11b/g/n/a/ac Wave2 dual-band wireless LAN and Bluetooth 5.0 PCIE M.2 module optimized for small size and low power consumption. It is based on Qualcomm QCA9377-5 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 (30 x 16.5mm). 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.

1.1. General description

- 802.11a/b/g/n/ac Wave2, 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)
- Linux, Windows and Android drivers available
- Based on QCA9377-5 chipset
- Industrial temperature range -40 to +85 C°
- Very small form factor (30 by 16.5 mm)
- Surface mount, dual-side design
- Available interfaces - Bluetooth USB1.1, WLAN PCIE

2. Block diagram

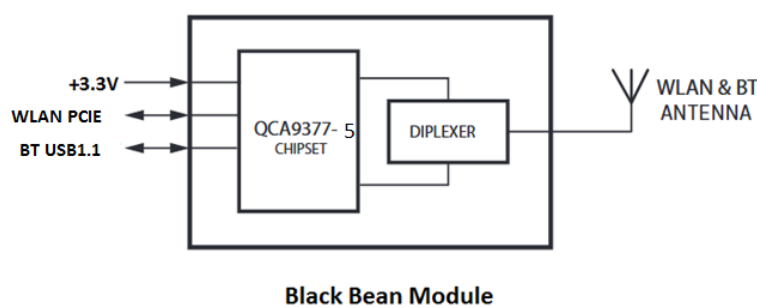


Figure 2-1. Black Bean Module Block Diagram

3. Module pinout and Pin description

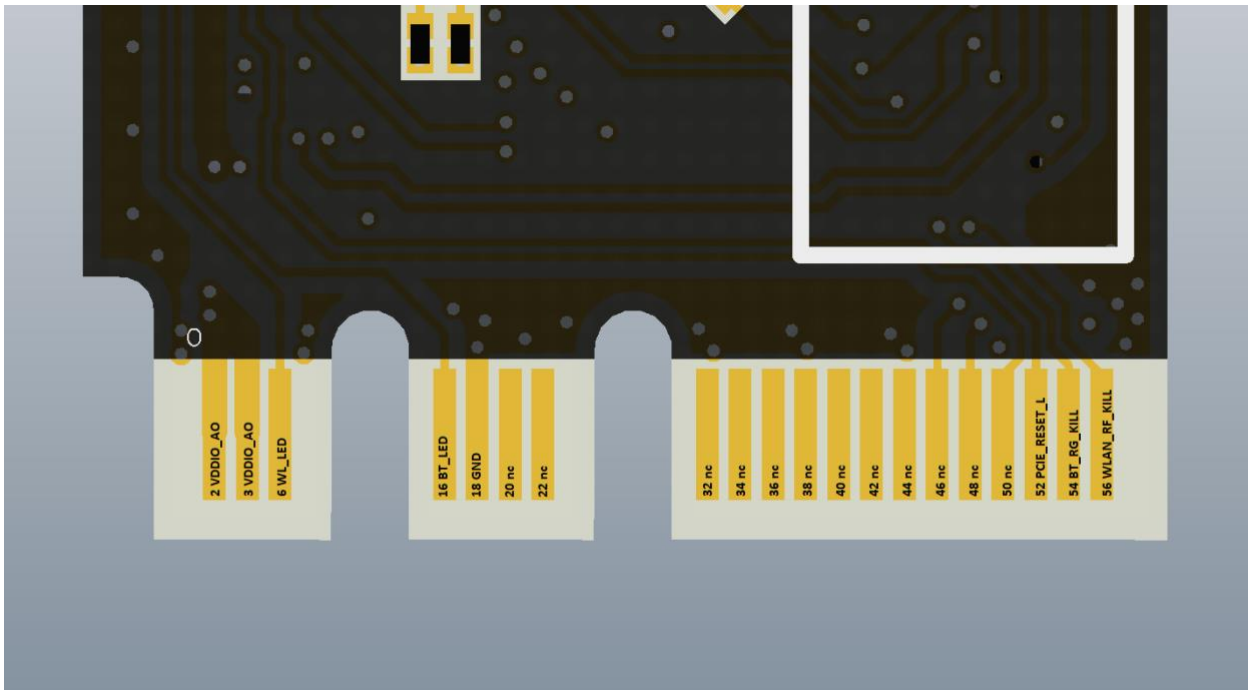


Table 3-1. Module pin out, bottom side

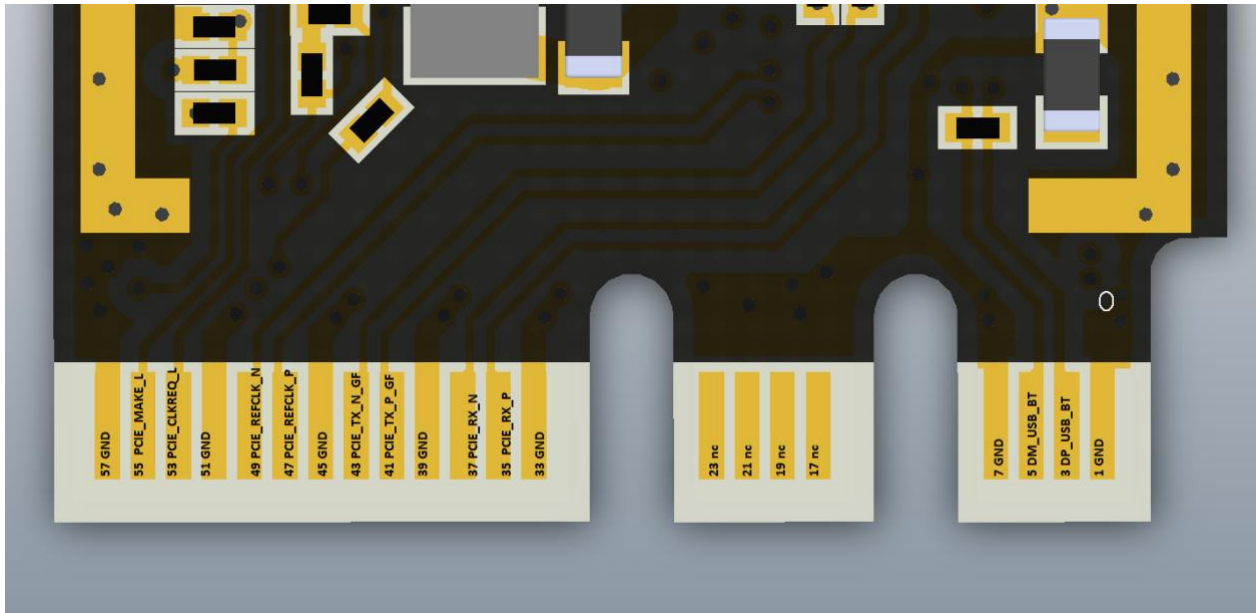


Table 3-2. Module pin out, top side

4. Electrical characteristics

4.1. Power consumption

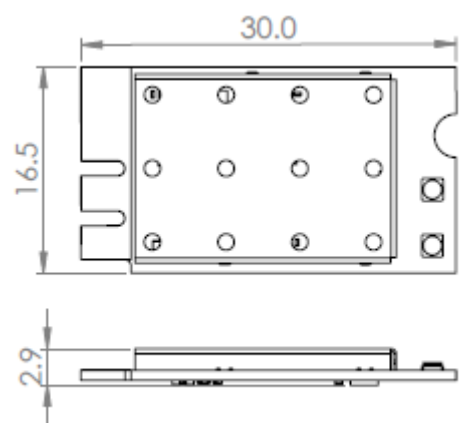
Wi-Fi mode	mA	Bluetooth mode	mA
Standby (deep sleep)	0.16	Continuous Rx burst	22
2G tx00 11b 1Mbps	356	Continuous Tx Class 2 (+4 dBm)	38
2G tx00 11n HT20 MCS7	326	Continuous Tx Class 2 (+12.5 dBm)	64
5G tx00 11n HT20 MCS0	487	1.28 sec page scan (non-interlaced)	0.31
5G tx00 11n HT20 MCS7	422	1.28 sec LE ADV	0.18
5G tx00 11ac VHT80 MCS0	421	1.28 sec sniff as master	0.17
		1.28 sec sniff as slave	0.22

Table 4-1. Power consumption

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

Table 4-2. Temperature limit ratings

5. Mechanical characteristics



6. 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)									

7. Document revision history

Revision	Revision Date	Description
0.1	2019.01.11	Draft version

Federal Communication Commission Interference Statement

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.

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

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

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Radiation Exposure Statement:

The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions:

- 1) For mobile applications, the antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) For portable applications, the antenna must be installed at a location where no other metal objects are present, such that its RF exposure characteristics remains unchanged. Also, the antenna must be installed such that 1.5 cm is maintained between the antenna and users.
- 3) The transmitter module may not be co-located with any other transmitter or antenna.

As long as **3** conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: **Z9W-BLB**”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

The product can be kept as far as possible from the user body or set the device to lower output power if such function is available. The final end product must be labeled in a visible area with the following: “Contains FCC ID: **Z9W-BLB**”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Industry Canada statement:

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:

The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

Déclaration d'exposition aux radiations:

Le produit est conforme aux limites d'exposition pour les appareils portables RF pour les Etats-Unis et le Canada établies pour un environnement non contrôlé.

Le produit est sûr pour un fonctionnement tel que décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conservé aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible.

Radiation Exposure Statement:

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with greater than 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 20 cm entre le radiateur et votre corps.

This device is intended only for OEM integrators under the following conditions: (For module device use)

- 1) The antenna must be installed and operated with greater than 20cm between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installée et exploitée avec plus de 20 cm entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

NOTE IMPORTANTE:

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC:

11468A-BLB”.

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l’antenne peut être installée et utilisée à plus de 20 cm entre l’antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: **11468A-BLB** ”.

End Product Labeling

The product can be kept as far as possible from the user body or set the device to lower output power if such function is available. The final end product must be labeled in a visible area with the following: “Contains IC: **11468A-BLB**”.

Plaque signalétique du produit final

L'appareil peut être conservé aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: **11468A-BLB** ”.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

Caution :

- (i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- (ii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
- (iii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate;
- (iv) where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Avertissement:

Le guide d'utilisation des dispositifs pour réseaux locaux doit inclure des instructions précises sur les restrictions susmentionnées, notamment :

- (i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
- (ii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis pour les dispositifs utilisant les bandes de 5 250 à 5 350 MHz et de 5 470 à 5 725 MHz doit être conforme à la limite de la p.i.r.e;
- (iii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5 725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée, selon le cas;
- (iv) lorsqu'il y a lieu, les types d'antennes (s'il y en a plusieurs), les numéros de modèle de l'antenne et les pires angles d'inclinaison nécessaires pour rester conforme à l'exigence de la p.i.r.e. applicable au masque d'élévation, énoncée à la section 6.2.2.3, doivent être clairement indiqués