

## EN 62311 Report

**Report No.:** SE171207E10I

**Test Model:** BLACK bean

**Received Date:** Oct. 16, 2014

**Test Date:** Oct. 16 to Nov. 11, 2014

**Issued Date:** Apr. 15, 2019

**Applicant:** UAB 8devices

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### Release Control Record

Issue No.	Description	Date Issued
SE171207E10I	Original release.	Apr. 15, 2019

## 1 Certificate of Conformity

**Product:** BLACK-Bean  
**Brand:** 8devices  
**Test Model:** BLACK bean  
**Sample Status:** R&D SAMPLE  
**Applicant:** UAB 8devices  
**Test Date:** Oct. 16 to Nov. 11, 2014  
**Standards:** EN 62311:2008

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Phoenix Huang , **Date:** Apr. 15, 2019  
Phoenix Huang / Specialist

**Approved by :** May Chen , **Date:** Apr. 15, 2019  
May Chen / Manager

## 2 General Information

### 2.1 General Description of EUT

Product	BLACK-Bean
Brand	8devices
Test Model	BLACK bean
Status of EUT	R&D SAMPLE
Nominal Voltage	3.3Vdc from host equipment
Temperature Operating Range	-20°C ~ 50°C
Modulation Type	<b>WLAN:</b> CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz <b>BT-EDR:</b> GFSK, $\pi/4$ -DQPSK, 8DPSK <b>BT-LE:</b> GFSK
Modulation Technology	<b>WLAN:</b> DSSS, OFDM <b>BT-EDR:</b> FHSS <b>BT-LE:</b> DTS
Transfer Rate	<b>WLAN:</b> 802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n : up to 150Mbps 802.11ac: up to 433.3Mbps <b>BT-EDR:</b> up to 3Mbps <b>BT-LE:</b> up to 1Mbps
Operating Frequency	<b>WLAN:</b> <b>2.4GHz:</b> 2412 ~ 2472MHz <b>5GHz:</b> 5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5700MHz <b>BT-EDR &amp; BT-LE:</b> 2402 ~ 2480MHz
Number of Channel	<b>WLAN (2.4GHz):</b> 802.11b/g, 802.11n (HT20), VHT20: 13 802.11n (HT40), VHT40: 9 <b>WLAN (5GHz):</b> 802.11a, 802.11n (HT20) , 802.11ac (VHT20): 19 802.11n (HT40) , 802.11ac (VHT40): 9 802.11ac (VHT80): 4 <b>BT-EDR:</b> 79 <b>BT-LE:</b> 40
EIRP Power (Measured Max. Average)	<b>WLAN (2.4GHz):</b> 19.85dBm <b>WLAN (5GHz):</b> 22.21dBm <b>BT-EDR:</b> 8.34dBm <b>BT-LE:</b> 8.25dBm

Antenna Type	See item 2.2
Antenna Connector	See item 2.2
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. There are Bluetooth technology and WLAN technology used for the EUT.
2. The EUT support multiple function, therefore the WLAN OFDM will be cover BT OFDM (low power) scenario.
3. The modular of Bluetooth technology has two variant designs as following table:

Variant No.	Remark
SKU #1	TX/RX on transmitter circuit of J1
SKU #2	TX/RX on transmitter circuit of J2

Note: From the above variant designs, the spurious emissions worst case was found in **SKU #1**. Therefore only the test data of the mode was recorded in this report.

4. The EUT incorporates a 1T1R function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX
802.11n (HT40)	MCS 0~7	1TX	1RX
VHT20	MCS 0~8, Nss=1	1TX	1RX
VHT40	MCS 0~9, Nss=1	1TX	1RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX
802.11n (HT40)	MCS 0~7	1TX	1RX
802.11ac (VHT20)	MCS 0~8, Nss=1	1TX	1RX
802.11ac (VHT40)	MCS 0~9, Nss=1	1TX	1RX
802.11ac (VHT80)	MCS 0~9, Nss=1	1TX	1RX

5. WLAN/BT coexistence mode:

- ◆ 1x1 WLAN + BT:
  - 5GHz 802.11a/an (or 11ac) transmit concurrent with BT.
  - 2.4GHz: timely shared coexistence.

6. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

## 2.2 Description of Antenna

The antenna gain was declared by client; please refer to the following table:

Ant. No.	Transmitter Circuit	Brand	Model	Ant. Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5G Cable Loss (dBi)	Connector Type	Cable Length (mm)
1	Main	WNC	81-EBJ15.005	PIFA	3.00	Band 1&2: 2.56	1.15	Band 1&2: 1.70	IPEX	300
						Band 3: 4.76		Band 3: 1.74		
						Band 4: 4.76		Band 4: 1.79		
	Aux	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08	1.15	Band 1&2: 1.70	IPEX	300
						Band 3: 3.31		Band 3: 1.74		
						Band 4: 2.42		Band 4: 1.79		
2	Main	WNC	81.ED415.001	PIFA	0.22	Band 1&2: 5.56	0.96	Band 1&2: 1.29	IPEX	300
						Band 3: 5.03		Band 3: 1.36		
						Band 4: 3.14		Band 4: 1.38		
	Aux	WNC	81.ED415.001	PIFA	1.48	Band 1&2: 5.17	0.96	Band 1&2: 1.29	IPEX	300
						Band 3: 5.34		Band 3: 1.36		
						Band 4: 2.93		Band 4: 1.38		

Note: 1. Above antenna gains of antenna are Total (H+V).

### 3 RF Exposure Measurement

#### 3.1 Introduction

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current.

#### 3.2 Limit

According to EN 62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.

Frequency Range	E-Field Strength (V/m)	H-Field Strength (A/m)	B-Field (μT)	Equivalent Plane Wave Power Density $S_{eq}$ (W/m <sup>2</sup> )
0-1 Hz	—	$3,2 \times 10^4$	$4 \times 10^4$	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6.25	—
3-150 kHz	87	5	6.25	—
0,15-1 MHz	87	$0.73/f$	$0.92/f$	—
1-10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	—
10-400 MHz	28	0.073	0.092	2
400-2 000 MHz	$1.375 f^{1/2}$	$0.0037 f^{1/2}$	$0.0046 f^{1/2}$	$f/200$
2 ~ 300 GHz	61	0.16	0.20	10

#### 3.3 Normative Reference Classification of the Assessment Methods

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

##### Far Field Calculation Formula

$$E = \eta_0 H = \frac{\sqrt{30PG(\theta, \phi)}}{r}$$

G = antenna gain relative to an isotropic antenna  
 $\theta, \phi$  = elevation and azimuth angles to point of investigation  
r = distance from observation point to the antenna  
 $\eta_0$  = Characteristic impedance of free space



### 3.4 Test Results

Calculation for maximum EIRP

**For WLAN:**

**2.4GHz**

Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
19.85	96.605	8.512	61	Pass

**5GHz**

Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
22.21	166.341	11.169	61	Pass

**For BT-EDR:**

Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
8.34	6.823	2.262	61	Pass

**For BT-LE mode:**

Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
8.25	6.683	2.239	61	Pass

#### Conclusion:

Both of the WLAN (5GHz) and Bluetooth can transmit simultaneously, the formula of calculated the exposure is:

$$(CEF1 / LEF1)^2 + (CEF2 / LEF2)^2 + \dots \text{etc.} < 1$$

CEF = Calculation E-Field Strength

LEF = Limit of E-Field Strength

Therefore, the calculation of this situation is  $(11.169 / 61)^2 + (2.262 / 61)^2 = 0.03$ , which is less than the "1" limit.

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