

## RF Exposure Evaluation Report

**Product** : BeaglePlay  
**Trade mark** : Beagleboard.org  
**Model/Type reference** : BeaglePlay  
**Serial Number** : N/A  
**Report Number** : EED32P80002503  
**FCC ID** : Z4T-BBP23010V1  
**Date of Issue** : Feb. 21, 2023  
: 47 CFR Part 1.1307  
**Test Standards** : 47 CFR Part 2.1091  
: KDB447498D01 General  
: RF Exposure Guidance v06  
**Test result** : PASS

Prepared for:

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Prepared by:

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Date:

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## 2 Version

Version No.	Date	Description
00	Feb. 21, 2023	Original

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## 4 General Information

### 4.1 Client Information

Applicant:	Seed Technology Co., Ltd
Address of Applicant:	9F, Building G3, TCL International E city, Zhongshanyuan Road, Nanshan, Shenzhen, China.
Manufacturer:	Seed Technology Co., Ltd
Address of Manufacturer:	9F, Building G3, TCL International E city, Zhongshanyuan Road, Nanshan, Shenzhen, China.
Factory:	Shenzhen Xinxian Technology Co., Limited
Address of Factory:	F5, Building B17, Hengfeng Industrial City, No. 739 Zhoushi Rd, Baoan District, Shenzhen, Guangdong, P.R.C.

### 4.2 General Description of EUT

Product Name:	BeaglePlay
Model No.:	BeaglePlay
Trade mark:	Beagleboard.org

### 4.3 Product Specification subjective to this standard

Frequency Range:	Bluetooth: 2402MHz to 2480MHz LoRa DTS: 902MHz~928MHz WLAN: 11a/b/g/n HT20/HT40
Modulation Type:	Bluetooth: GFSK LoRa DTS: Chirp Spread Spectrum IEEE for 802.11b:DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g:OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40): OFDM (64QAM, 16QAM,QPSK,BPSK) IEEE 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Test Power Grade:	Default
Antenna Type	PCB Antenna
Antenna Gain	Bluetooth: 1.54dBi LoRa DTS: 1.81dBi WIFI 1: 2.4GWIFI:1.54 dBi 5GWIFI:3.40 dBi WIFI 2: 2.4GWIFI:1.54 dBi 5GWIFI:3.40 dBi
Power Supply:	DC 5V
Max Conducted Peak Output Power:	BLE: 2.97dBm, LoRa: 20.62dBm The Max Conducted Peak Output Power data refer to the report EED32P80002501, EED32P80002502.
Sample Received Date:	Jan. 03, 2023
Sample tested Date:	Jan. 03, 2023 to Feb. 16, 2023
Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.	

## 4.4 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

## 4.5 Deviation from Standards

None.

## 4.6 Abnormalities from Standard Conditions

None.

## 4.7 Other Information Requested by the Customer

None.

## 5 RF Exposure Evaluation

### 5.1 RF Exposure Compliance Requirement

Given  $E = \frac{\sqrt{30 \times P \times G}}{d}$  &  $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm<sup>2</sup>

## 5.2 Maximum Permissible Exposure

Substituting the MPE safe distance using  $d = 20$  cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where  $P$  = Power in mW

$G$  = Numeric antenna gain

$S$  = Power density in mW / cm<sup>2</sup>

**TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(i) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
<b>(ii) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

### 1) For BLE

#### Measurement Data:

BLE 1M:

GFSK mode(Worst)				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	2.97	2±1	3	1.995
Middle(2440MHz)	2.87	2±1	3	1.995
Highest(2480MHz)	2.91	2±1	3	1.995

## 2) For LoRa

LoRa:

LoRa mode(Worst)				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(906MHz)	20.54	20±1	21	125.893
Middle(914MHz)	20.54	20±1	21	125.893
Highest(924MHz)	20.51	20±1	21	125.893

## BLE:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
0	2402	1.995	1.426	20	0.00057	1

Note: 1.Refer to report No. EED32P80002501.

## LoRa DTS:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
1	906	125.893	1.517	20	0.0380	0.6

Note: 2.Refer to report No. EED32P80002502.

## 2.4GHz WLAN:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
1	2412	56.234	1.426	20	0.0160	1

Note: 3.Refer to report No. FA741330,FCC ID:Z64-WL18DBMOD.

the module(FCC ID:Z64-WL18DBMOD) antenna gain changed from 3.2dBi to 1.54dBi and does not support bluetooth function.

## 5GHz WLAN:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm <sup>2</sup> )
36	5180	89.125	2.188	20	0.039	1

Note: 4.Refer to report No. FA741330,FCC ID:Z64-WL18DBMOD.

the module(FCC ID:Z64-WL18DBMOD) antenna gain changed from 4.5dBi to 3.40dBi and does not support bluetooth function.



### 5.2.1 EUT RF Exposure Evaluation simultaneous transmission operations

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits :

Simultaneous transmission mode		The sum of the ratios	Result
BLE + 2.4G Wi-Fi	Support	$0.00057/1 + 0.0160/1$	$=0.01657 < 1$
BLE + 5G Wi-Fi	Support	$0.00057/1 + 0.039/1$	$=0.03957 < 1$
LoRa + 2.4G Wi-Fi	Support	$0.038/0.6 + 0.0160/1$	$=0.0793 < 1$
LoRa + 5G Wi-Fi	Support	$0.038/0.6 + 0.039/1$	$=0.1023 < 1$
2.4G Wi-Fi + 5G Wi-Fi	Not support	\	\
BLE + LoRa	Not support	\	\

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\*\*\* End of Report \*\*\*