

Report No: CCISE190310104V01

# FCC REPORT

Applicant:	8devices
Address of Applicant:	Gedimino 47, Kaunas, LT-44242, Lithuania
Equipment Under Test (F	EUT)
Product Name:	Broadband Digital Transmission System
Model No.:	BLUE bean A, BLUE bean C, RED bean A, RED bean C
FCC ID:	Z9W-MB
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	28. Mar., 2019
Date of Test:	29. Mar., to 26 May, 2019
Date of report issued:	10 Jun., 2019
Test Result:	PASS *

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



## 2 Version

Version No.	ersion No. Date Description	
00	27 May, 2019	Original
01	10 Jun., 2019	Update page 32, 49~54

Tested by:

Mike.ou

Date:

10 Jun., 2019

Test Engineer

Reviewed by:

Wimer

Date:

10 Jun., 2019

**Project Engineer** 

## CCIS

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## 4 Test Summary

Test Items	Section in CFR 47	Result			
Antenna requirement	15.203 & 15.247 (b)	Pass			
AC Power Line Conducted Emission	15.207	Pass			
Conducted Peak Output Power	15.247 (b)(3)	Pass			
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	Pass			
Power Spectral Density	15.247 (e)	Pass			
Band Edge	15.247 (d)	Pass			
Spurious Emission	15.205 & 15.209	Pass			
Pass: The EUT complies with the essential N/A: Not Applicable.	Pass: The EUT complies with the essential requirements in the standard. N/A: Not Applicable.				



## 5 General Information

## 5.1 Client Information

Applicant:	8devices
Address:	Gedimino 47, Kaunas, LT-44242, Lithuania
Manufacturer/ Factory:	8devices
Address:	Gedimino 47, Kaunas, LT-44242, Lithuania

## 5.2 General Description of E.U.T.

Product Name:	Broadband Digital Transmission System		
Model No.:	BLUE bean A, BLUE bean C, RED bean A, RED bean C		
Operation Frequency:	2402-2480 MHz		
Channel numbers:	40		
Channel separation:	2 MHz		
Modulation technology:	GFSK		
Data speed :	1Mbps		
Antenna Type:	Ceramic Antenna External antenna		
Antenna gain:	Ceramic Antenna: 3.0 dBi External antenna A: 4.0 dBi External antenna B: 3.2 dBi		
Power supply:	DC 3.3V		
Remarks:	<ul> <li>The No.: BLUE bean A and BLUE bean C, RED bean A and RED bean C identical inside, the electrical circuit design, layout, components used and internal wiring up to RF output. with only difference as follow:</li> <li>BLUE bean C and RED bean C RF output is connected to connector Murata HSC, BLUE bean A and RED bean A RF output is connected to connector Murata HSC and connected to antenna, to accommodate antenna PCB length is increased, antenna, antennas passive components and RF probe switch added to PCB.</li> <li>Modules use different version of chip BLUE bean Qualcomm QCA9377-7 and RED bean Qualcomm QCA9377-3.</li> <li>QCA9377-7 and QCA9377-3 only differs what interface it uses to connect to WIFI and BT.</li> <li>BLUE bean QCA9377-7 uses USB2.0 for WIFI and USB1.1 for BT.</li> <li>RED bean QCA9377-3 uses SDIO3.0 for WIFI and UART/PCM for BT.</li> <li>Circuit design, layout components used and internal wiring for interface connection is different.</li> </ul>		
Test Sample Condition:	The test samples were provided in good working order with no visible defects.		



### Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Note:

In section 15.31(*m*), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test. Channel No. 0, 20 & 39 were selected as Lowest, Middle and Highest channel.

## 5.3 Test environment and test mode

Operating Environment:					
Temperature: 24.0 °C					
Humidity: 54 % RH					
Atmospheric Pressure:	1010 mbar				
Test mode:					
Transmitting mode	Keep the EUT in continuous transmitting with modulation				
Remarks: During the test, pre-scan BLUE bean A, BLUE bean C, RED bean A, RED bean C, found BLUE bean A, was worse case. The report only reflects the worst case.					
bean A, was worse case. The report only reflects the worst case. The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.					

## 5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
LENOVO	Laptop	SL510	2847A65	DoC
ULEFONE	Adapter	HJ-0503000K7-EU	N/A	N/A
baofeng	Test suite	Pi3B+SD	N/A	N/A

## 5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.54 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.84 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.36 dB (k=2)



## 5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### • FCC - Registration No.: 727551

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

#### IC - Registration No.: 10106A-1

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

#### • CNAS - Registration No.: CNAS L6048

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

#### • A2LA - Registration No.: 4346.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <u>https://portal.a2la.org/scopepdf/4346-01.pdf</u>

## 5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd. Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755-23118282, Fax: +86-755-23116366 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

## 5.8 Test Instruments list

Radiated Emission:						
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)	
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020	
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020	
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020	
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020	
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019	
EMI Test Software	AUDIX	E3	١	/ersion: 6.110919	b	
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020	
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020	
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020	
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019	
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020	
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020	
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020	
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020	
RF Switch Unit	MWRFTEST	MW200	N/A	N/A	N/A	
Test Software	MWRFTEST	MTS8200	Version: 2.0.0.0			

Conducted Emission:						
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)	
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-18-2019	03-17-2020	
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-18-2019	03-17-2020	
LISN	CHASE	MN2050D	1447	03-18-2019	03-17-2020	
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019	
Cable	HP	10503A	N/A	03-18-2019	03-17-2020	
EMI Test Software	AUDIX	E3	Version: 6.110919b			

Project No.: CCISE1903101



## 6 Test results and Measurement Data

## 6.1 Antenna requirement

Standard requirement:	FCC Part 15 C Section 15.203 /247(b)
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15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

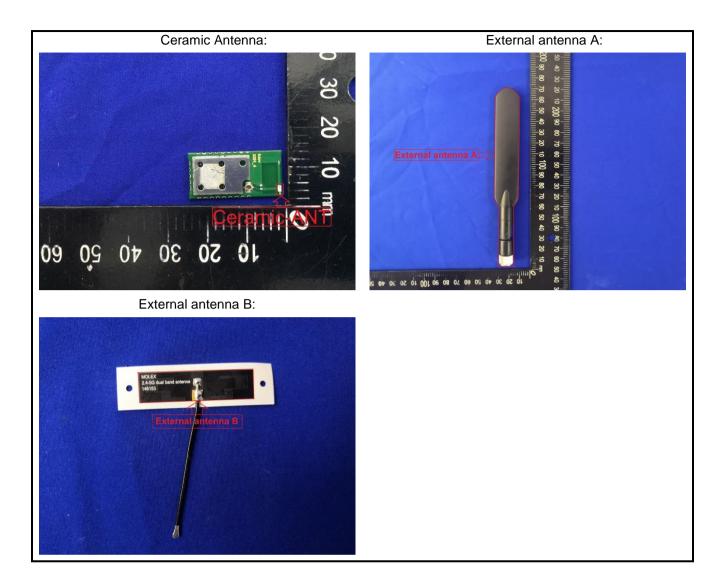
#### E.U.T Antenna:

The product is a professionally installed device which has two types of antennas for the application. The antennas information as below table:

Antenna Type	Antenna Gain (dBi)
Ceramic Antenna	3
External antenna A	4
External antenna B	3.2

According to above information, the antennas meet the requirements of this section







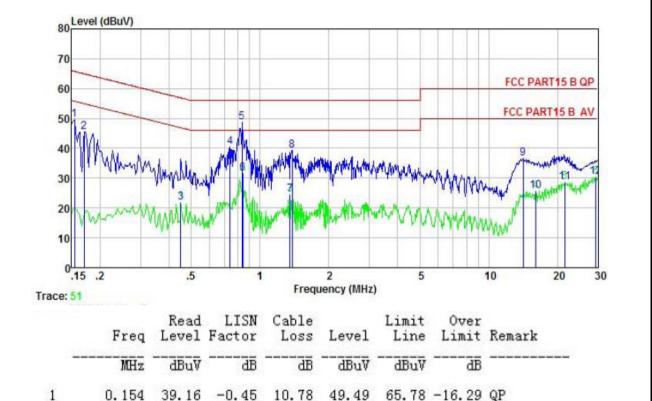
## 6.2 Conducted Emission

Test Requirement:	FCC Part 15 C Section 15	.207	
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150 kHz to 30 MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:		Limit	(dBuV)
	Frequency range (MHz)	Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
Test procedure	<ol> <li>line impedance stabili 50ohm/50uH coupling</li> <li>The peripheral device a LISN that provides a termination. (Please r photographs).</li> <li>Both sides of A.C. line interference. In order positions of equipment</li> </ol>	ators are connected to the inequency. ators are connected to the ization network (L.I.S.N.) g impedance for the mea es are also connected to a 50ohm/50uH coupling efer to the block diagram e are checked for maxim to find the maximum em at and all of the interface ANSI C63.4: 2014 on co	which provides a suring equipment. the main power through impedance with 50ohm n of the test setup and um conducted ission, the relative cables must be
Test setup:			AC power
Test Instruments:	Refer to section 5.8 for det	tails	
Test mode:	Refer to section 5.3 for det	tails	
Test results:	Passed		

## CCIS

#### Measurement Data:

Product name:	Broadband Digital Transmission System	Product model:	BLUE BEAN A
Test by:	Mike	Test mode:	BLE Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Huni: 55%



45.59

21.76

40.34

48.62

31.50

24.44

39.38

36.49

25.80

28.55

30.52

64.94 -19.35 QP

56.00 -15.66 QP

56.00 -16.62 QP

60.00 -23.51 QP

56.00

46.89 -25.13 Average

-7.38 QP

46.00 -14.50 Average

46.00 -21.56 Average

50.00 -24.20 Average

50.00 -21.45 Average

50.00 -19.48 Average

Notes:

234

5

67

8

9

10

11

12

0.170

0.449

0.739

0.835

0.839

1.352

1.381

14.138

16.055

21.486

29.371

35.25

11.40

29.93

38.18

21.06

13.92

28.86

26.25

15.64

18.64

20.76

-0.43

-0.38

-0.38

-0.38

-0.38

-0.39

-0.39

-0.67

-0.75

-1.00

-1.11

1. An initial pre-scan was performed on the line and neutral lines with peak detector.

2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

10.77

10.74

10.79

10.82

10.82

10.91

10.91

10.91

10.91

10.91

10.87

3. Final Level =Receiver Read level + LISN Factor + Cable Loss.



Fest frequency:     150 kHz ~ 30 MHz     Phase:     Neutral	Product name:		Broadband Digital Transmission System		Produc	ct model:	BLU	E BEAN A		
Test voltage:         AC 120 V/60 Hz         Environment:         Temp: 22.5°         Huni: 55% $u^{0}$ $u^{$	Test by:	Mike	Mike		Test m	Test mode: BLE T		Tx mode		
$\frac{1}{1}  0.166  38.77  -0.68  10.77  48.86  65.16  -16.30  QP \\ 2  0.222  34.55  -0.67  10.76  44.64  62.74  -18.10  QP \\ 3  0.675  15.40  -0.64  10.77  25.53  46.00  -20.47  Average \\ 4  0.724  27.41  -0.64  10.77  25.53  46.00  -13.87  Average \\ 6  0.835  34.13  -0.64  10.82  44.31  56.00  -11.69  QP \\ 7  1.381  15.03  -0.65  10.91  25.29  46.00  -20.71  Average \\ 8  2.474  15.15  -0.67  10.94  25.22  34.60  021.72  QP \\ 1  1.431  14.39  -0.81  10.91  24.49  50.00  -21.72  QP \\ 1  2.194  30  -0.81  10.91  24.49  50.00  -21.51  Average \\ 1  2.194  30  -0.81  10.91  24.49  50.00  -21.51  Average \\ 1  2.194  30  -0.81  10.91  24.49  50.00  -21.51  Average \\ 1  2.194  30  -0.81  10.91  24.49  50.00  -21.51  Average \\ 2  -2.22  -2.51  Average \\ 3  -2.51  Average \\ 4  -2.51  Average \\ 4  -2.42  -2.41  -0.64  10.82  24.49  50.00  -2.51  Average \\ 4  -2.42  -2.44  -2.42  -2.44  -$	Test frequency:	150	150 kHz ~ 30 MHz		Phase:		Neut	eutral		
$\frac{1}{10,166} = \frac{1}{38,77} = \frac{1}{0.68} = \frac{1}{10,77} = \frac{1}{2} $	Test voltage:	AC	120 V/60 I	Hz		Enviro	nment:	Tem	p: 22.5℃	Huni: 55%
$\frac{1}{10,166} = \frac{1}{38,77} = 0.68 + 10.77 + 10.78 + $										
$ \frac{1}{1} 0.166 38.77 - 0.68 10.77 48.86 65.16 - 16.30 QP \\ 2 0.222 34.55 - 0.67 10.76 44.64 62.74 - 18.10 QP \\ 3 0.675 15.40 - 0.64 10.77 25.53 46.00 - 20.47 Average \\ 0.724 27.41 - 0.68 10.77 25.53 46.00 - 11.87 QP \\ 3 0.675 15.40 - 0.64 10.78 37.55 56.00 - 11.845 QP \\ 5 0.817 21.95 - 0.64 10.82 32.13 46.00 - 13.87 Average \\ 6 0.835 34.13 - 0.64 10.82 34.31 56.00 - 11.87 QP \\ 7 1.381 15.03 - 0.64 10.82 44.31 56.00 - 20.71 Average \\ 8 2.474 15.15 - 0.67 10.94 25.42 46.00 - 20.58 Average \\ 9 13.841 28.18 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 10 14.213 14.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 22.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 36 0.00 - 21.87 QP \\ 11 36 0.00 - 21.78 QP \\ 11 36 0.00 - 21.78 QP \\ 11 31 4.09 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 31 4.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 21.946 30.64 - 1.42 10.91 40.13 60.00 - 19.87 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.72 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.78 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.78 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21.78 QP \\ 11 31 40.39 - 0.81 10.91 38.28 60.00 - 21$	80	evel (dBuv)								
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$\frac{1}{10000000000000000000000000000000000$									FCC PART15	BQP
$\frac{1}{10,166} + \frac{1}{10,166} + \frac{1}{10,176} + \frac{1}{10,166} + \frac{1}$	60	_								
$ \frac{40}{90} \underbrace{40}_{0} 4$	50	1 2	-						FCC PART15	BAV
$\frac{1}{1} \qquad \begin{array}{c} 0.166 \\ 0.817 \\ 0.222 \\ 0.222 \\ 0.675 \\ 1.5.40 \\ 0.675 \\ 1.5.40 \\ 0.675 \\ 1.5.40 \\ 0.675 \\ 1.5.40 \\ 0.664 \\ 1.5.40 \\ 0.664 \\ 1.5.70 \\ 0.675 \\ 1.5.40 \\ 0.664 \\ 1.5.70 \\ 0.664 \\ 1.5.70 \\ 0.675 \\ 1.5.40 \\ 0.664 \\ 1.5.70 \\ 0.675 \\ 1.5.40 \\ 0.664 \\ 1.5.70 \\ 0.664 \\ 1.5.70 \\ 0.675 \\ 1.5.40 \\ 0.664 \\ 1.5.70 \\ 0.664 \\ 1.5.70 \\ 0.675 \\ 1.5.40 \\ 0.664 \\ 1.5.70 \\ 0.664 \\ 1.5.70 \\ 0.675 \\ 1.5.40 \\ 0.641 \\ 1.5.75 \\ 0.671 \\ 1.5.53 \\ 0.600 \\ -11.69 \\ 0.60 \\ -11.69 \\ 0.675 \\ 0.817 \\ 21.95 \\ -0.661 \\ 10.82 \\ 22.13 \\ 46.00 \\ -11.69 \\ 0.675 \\ 1.5.40 \\ 0.64 \\ 10.82 \\ 22.13 \\ 46.00 \\ -11.69 \\ 0.675 \\ 1.5.40 \\ 0.61 \\ 0.817 \\ 21.95 \\ -0.661 \\ 10.82 \\ 22.13 \\ 46.00 \\ -11.69 \\ 0.69 \\ 0.817 \\ 1.381 \\ 15.03 \\ -0.65 \\ 10.91 \\ 25.29 \\ 46.00 \\ -20.71 \\ Average \\ 8 \\ 2.474 \\ 15.15 \\ -0.67 \\ 10.94 \\ 25.42 \\ 46.00 \\ -20.58 \\ Average \\ 9 \\ 1.841 \\ 28.18 \\ -0.81 \\ 10.91 \\ 38.28 \\ 60.00 \\ -21.72 \\ 0 \\ 1.51 \\ Average \\ 1.2.946 \\ 30.64 \\ -1.42 \\ 10.91 \\ 40.13 \\ 60.00 \\ -19.87 \\ 0 \end{array}$	n	ha i Î							0 1	1
$\frac{20}{10} \underbrace{10}_{0} \underbrace{15}_{2} \underbrace{2}_{5} \underbrace{1}_{5} \underbrace{1}_{2} \underbrace{2}_{1} \underbrace{2}_{1} \underbrace{5}_{1} \underbrace{10}_{2} \underbrace{20}_{30} \underbrace{30}_{15}_{15} \underbrace{10}_{2} \underbrace{20}_{30}_{2} \underbrace{10}_{1} \underbrace{20}_{1} \underbrace{30}_{1} \underbrace{10}_{1} \underbrace{20}_{1} \underbrace{30}_{1} \underbrace{10}_{1} \underbrace{20}_{1} \underbrace{30}_{1} \underbrace{10}_{1} \underbrace{20}_{1} \underbrace{30}_{1} \underbrace{10}_{1} \underbrace{10}_{1$	40	MAL		MA.	1.4				1 mar marth	1000
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		9	Read	LISN	Frequ Cable	iency (MHz)	Limit	Over		50
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		9	Read	LISN	Frequ Cable	iency (MHz)	Limit	Over		50
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Freq	Read Level	LISN Factor	Frequ Cable Loss	Level	Limit Line	Over Limit		
5       0.817       21.95       -0.64       10.82       32.13       46.00       -13.87       Average         6       0.835       34.13       -0.64       10.82       44.31       56.00       -11.69       QP         7       1.381       15.03       -0.65       10.91       25.29       46.00       -20.71       Average         8       2.474       15.15       -0.67       10.94       25.42       46.00       -20.58       Average         9       13.841       28.18       -0.81       10.91       38.28       60.00       -21.72       QP         10       14.213       14.39       -0.81       10.91       24.49       50.00       -25.51       Average         11       21.946       30.64       -1.42       10.91       40.13       60.00       -19.87       QP		9 Freq MHz	Read Level dBuV	LISN Factor 	Frequ Cable Loss dB	Level	Limit Line dBuV	Over Limit dB	Remark	
5       0.817       21.95       -0.64       10.82       32.13       46.00       -13.87       Average         6       0.835       34.13       -0.64       10.82       44.31       56.00       -11.69       QP         7       1.381       15.03       -0.65       10.91       25.29       46.00       -20.71       Average         8       2.474       15.15       -0.67       10.94       25.42       46.00       -20.58       Average         9       13.841       28.18       -0.81       10.91       38.28       60.00       -21.72       QP         10       14.213       14.39       -0.81       10.91       24.49       50.00       -25.51       Average         11       21.946       30.64       -1.42       10.91       40.13       60.00       -19.87       QP	Trace: 4	Freq MHz 0.166	Read Level dBuV 38.77	LISN Factor dB -0.68	Frequ Cable Loss dB 10.77	Level dBuV 48.86	Limit Line dBuV 65.16	Over Limit dB -16.30	Remark 	
5       0.817       21.95       -0.64       10.82       32.13       46.00       -13.87       Average         6       0.835       34.13       -0.64       10.82       44.31       56.00       -11.69       QP         7       1.381       15.03       -0.65       10.91       25.29       46.00       -20.71       Average         8       2.474       15.15       -0.67       10.94       25.42       46.00       -20.58       Average         9       13.841       28.18       -0.81       10.91       38.28       60.00       -21.72       QP         10       14.213       14.39       -0.81       10.91       24.49       50.00       -25.51       Average         11       21.946       30.64       -1.42       10.91       40.13       60.00       -19.87       QP	Trace: 4	Freq MHz 0.166 0.222	Read Level dBuV 38.77 34.55	LISN Factor dB -0.68 -0.67	Frequ Cable Loss dB 10.77 10.76	Level dBuV 48.86 44.64	Limit Line dBuV 65.16 62.74	Over Limit  dB -16.30 -18.10	Remark  QP QP	
6 0.835 34.13 -0.64 10.82 44.31 56.00 -11.69 QP 7 1.381 15.03 -0.65 10.91 25.29 46.00 -20.71 Average 8 2.474 15.15 -0.67 10.94 25.42 46.00 -20.58 Average 9 13.841 28.18 -0.81 10.91 38.28 60.00 -21.72 QP 10 14.213 14.39 -0.81 10.91 24.49 50.00 -25.51 Average 11 21.946 30.64 -1.42 10.91 40.13 60.00 -19.87 QP	Trace: 4	Freq MHz 0.166 0.222 0.675	Read Level dBuV 38.77 34.55 15.40	LISN Factor dB -0.68 -0.67 -0.64	Frequ Cable Loss dB 10.77 10.76 10.77	Level dBuV 48.86 44.64 25.53	Limit Line dBuV 65.16 62.74 46.00	Over Limit dB -16.30 -18.10 -20.47	Remark  QP QP Average	
7       1.381       15.03       -0.65       10.91       25.29       46.00       -20.71       Average         8       2.474       15.15       -0.67       10.94       25.42       46.00       -20.58       Average         9       13.841       28.18       -0.81       10.91       38.28       60.00       -21.72       QP         10       14.213       14.39       -0.81       10.91       24.49       50.00       -25.51       Average         11       21.946       30.64       -1.42       10.91       40.13       60.00       -19.87       QP	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724	Read Level dBuV 38.77 34.55 15.40 27.41	LISN Factor dB -0.68 -0.67 -0.64 -0.64	Frequ Cable Loss dB 10.77 10.76 10.77 10.78	Level dBuV 48.86 44.64 25.53 37.55	Limit Line dBuV 65.16 62.74 46.00 56.00	Over Limit dB -16.30 -18.10 -20.47 -18.45	Remark  QP QP Average QP	
8 2.474 15.15 -0.67 10.94 25.42 46.00 -20.58 Average 9 13.841 28.18 -0.81 10.91 38.28 60.00 -21.72 QP 10 14.213 14.39 -0.81 10.91 24.49 50.00 -25.51 Average 11 21.946 30.64 -1.42 10.91 40.13 60.00 -19.87 QP	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817	Read Level dBuV 38.77 34.55 15.40 27.41 21.95	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64	Frequ Cable Loss dB 10.77 10.76 10.77 10.78 10.82	Level dBuV 48.86 44.64 25.53 37.55 32.13	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87	Remark QP QP Average QP Average	
10 14.213 14.39 -0.81 10.91 24.49 50.00 -25.51 Average 11 21.946 30.64 -1.42 10.91 40.13 60.00 -19.87 QP	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.64	Frequ Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.82	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69	Remark QP QP Average QP Average QP	
10 14.213 14.39 -0.81 10.91 24.49 50.00 -25.51 Average 11 21.946 30.64 -1.42 10.91 40.13 60.00 -19.87 QP	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.64 -0.65	Frequ Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.82 10.91	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71	Remark QP QP Average QP Average QP Average	
11 21.946 30.64 -1.42 10.91 40.13 60.00 -19.87 QP	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67	Frequ Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.82 10.91 10.94	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 46.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58	Remark QP QP Average QP Average QP Average Average	
	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474 13.841	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15 28.18	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67 -0.81	Frequence Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.82 10.91 10.94 10.91	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42 38.28	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 46.00 60.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58 -21.72	Remark QP QP Average QP Average QP Average Average QP	
12 24.010 23.19 -1.44 10.08 32.03 50.00 -11.31 Average	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474 13.841 14.213	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15 28.18 14.39	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67 -0.81 -0.81	Frequence Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.82 10.91 10.94 10.91 10.91	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42 38.28 24.49	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 46.00 50.00 50.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58 -21.72 -25.51	Remark QP QP Average QP Average QP Average Average QP Average QP	
	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474 13.841 14.213 21.946	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15 28.18 14.39 30.64	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67 -0.81 -0.81 -1.42	Freque Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.91 10.91 10.91 10.91 10.91	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42 38.28 24.49 40.13	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 46.00 50.00 50.00 60.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58 -21.72 -25.51 -19.87	Remark QP QP Average QP Average QP Average Average QP Average QP	
	Trace: 44	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474 13.841 14.213 21.946	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15 28.18 14.39 30.64	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67 -0.81 -0.81 -1.42	Freque Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.91 10.91 10.91 10.91 10.91	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42 38.28 24.49 40.13	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 46.00 50.00 50.00 60.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58 -21.72 -25.51 -19.87	Remark QP QP Average QP Average QP Average Average QP Average QP	
	Trace: 44	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474 13.841 14.213 21.946	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15 28.18 14.39 30.64	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67 -0.81 -0.81 -1.42	Freque Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.91 10.91 10.91 10.91 10.91	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42 38.28 24.49 40.13	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 46.00 50.00 50.00 60.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58 -21.72 -25.51 -19.87	Remark QP QP Average QP Average QP Average Average QP Average QP	
1. An initial pre-scan was performed on the line and neutral lines with peak detector.	Trace: 4	Freq MHz 0.166 0.222 0.675 0.724 0.817 0.835 1.381 2.474 13.841 14.213 21.946 24.015	Read Level dBuV 38.77 34.55 15.40 27.41 21.95 34.13 15.03 15.15 28.18 14.39 30.64 23.19	LISN Factor dB -0.68 -0.67 -0.64 -0.64 -0.64 -0.64 -0.65 -0.67 -0.81 -1.42 -1.42	Frequent Cable Loss dB 10.77 10.76 10.77 10.78 10.82 10.82 10.91 10.91 10.91 10.91 10.91 10.88	Level dBuV 48.86 44.64 25.53 37.55 32.13 44.31 25.29 25.42 38.28 24.49 40.13 32.63	Limit Line dBuV 65.16 62.74 46.00 56.00 46.00 56.00 46.00 50.00 50.00 50.00	Over Limit dB -16.30 -18.10 -20.47 -18.45 -13.87 -11.69 -20.71 -20.58 -21.72 -25.51 -19.87 -17.37	Remark QP QP Average QP Average QP Average Average QP Average QP	

3. Final Level =Receiver Read level + LISN Factor + Cable Loss.



## 6.3 Conducted Output Power

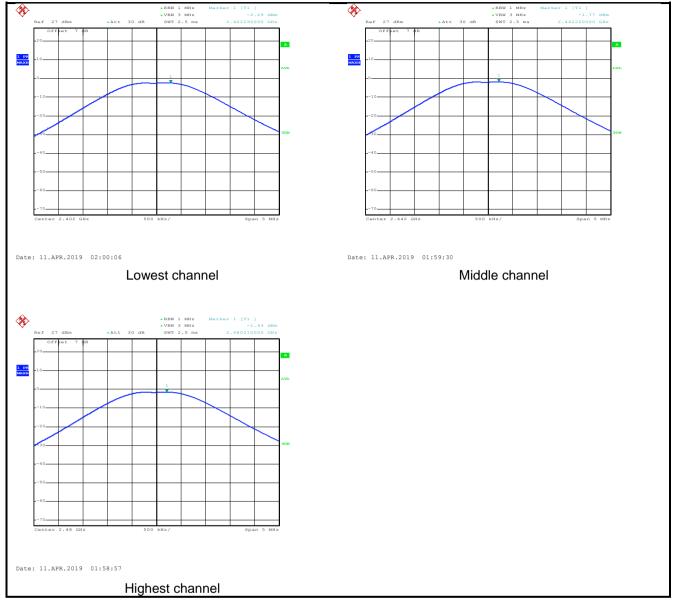
Test Requirement:	FCC Part 15 C Section 15.247 (b)(3)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Limit:	30dBm	
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

#### Measurement Data:

Test CH	Maximum Conducted Output Power (dBm)	Limit(dBm)	Result
Lowest	-2.29		
Middle	-1.77	30.00	Pass
Highest	-1.43		



#### Test plot as follows:





## 6.4 Occupy Bandwidth

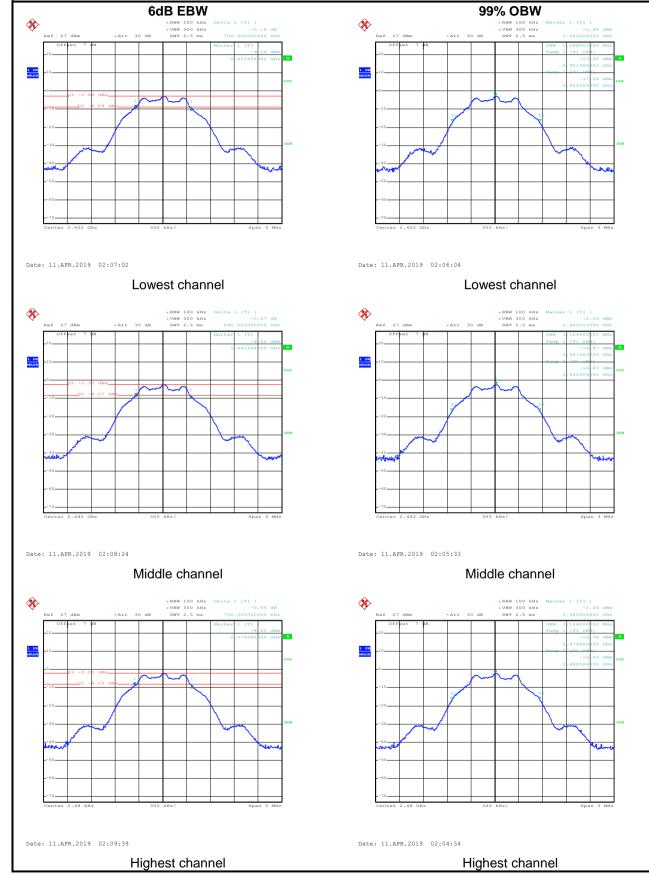
Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Limit:	>500kHz	
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

#### Measurement Data:

Test CH	6dB Emission Bandwidth (MHz)	Limit(kHz)	Result
Lowest	0.702		
Middle	0.690	>500	Pass
Highest	0.720		
Test CH	99% Occupy Bandwidth (MHz)	Limit(kHz)	Result
Lowest	1.098		
Middle	1.104	N/A	N/A
Highest	1.104		

## **CCIS**

#### Test plot as follows:





## 6.5 Power Spectral Density

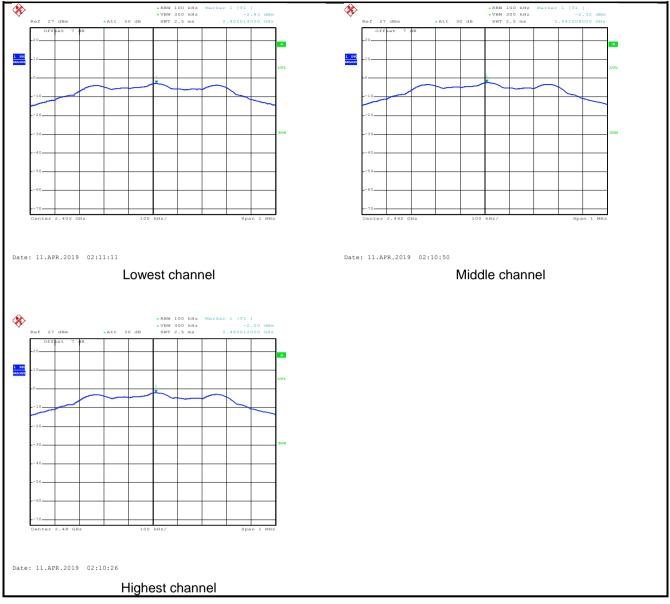
Test Requirement:	FCC Part 15 C Section 15.247 (e)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Limit:	8 dBm	
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

#### Measurement Data:

Test CH	Power Spectral Density (dBm)	Limit(dBm)	Result
Lowest	-2.83		
Middle	-2.32	8.00	Pass
Highest	-2.00		



#### Test plots as follow:





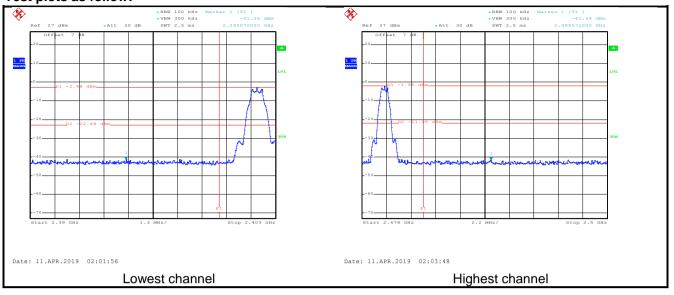
## 6.6 Band Edge

## 6.6.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB 558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed



#### Test plots as follow:





### 6.6.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C	C Section 15	5.20	5 and 15.209			
Test Method:	ANSI C63.10:	2013 and I	KDB	558074			
Test Frequency Range:	2.3GHz to 2.5	GHz					
Test Distance:	3m						
Receiver setup:	Frequency	Detector	r	RBW	V	/BW	Remark
	Above 1GHz	Peak		1MHz	3	MHz	Peak Value
		RMS		1MHz		MHz	Average Value
Limit:	Frequer	псу	Lim	nit (dBuV/m @3	sm)		Remark
	Above 10	GHz –		54.00 74.00			verage Value Peak Value
Test Procedure:	<ul> <li>the groun to determ</li> <li>2. The EUT antenna, tower.</li> <li>3. The anter the groun Both hori: make the</li> <li>4. For each case and meters ar to find the</li> <li>5. The test-n Specified</li> <li>6. If the emi the limit s of the EU have 10 c</li> </ul>	ad at a 3 me inne the posi- was set 3 m which was r anna height is ad to determ zontal and v measureme suspected e then the an ad the rota t e maximum receiver sys Bandwidth ssion level o specified, the T would be dB margin w	ter c ition nete mou s vai yertic ent. emiss tenr able reac stem with of th en te repo	camber. The tall of the highest rs away from the nted on the top ried from one not the maximum v cal polarizations assion, the EUT ha was turned from ding. was set to Peat a Maximum Hole e EUT in peak esting could be ported. Otherwis	ble w radia ne int o of a neter value s of tl was a o heigo om 0 ak De d Mode stopp e the one b	as rotate tion. erference variable to four to of the fi he anter arranged ghts fron degrees etect Fur de was 10 ped and e emission y one us	e-height antenna meters above eld strength. nna are set to d to its worst n 1 meter to 4 to 360 degrees nction and 0 dB lower than the peak values ons that did not sing peak, quasi-
Test setup:		Test Rece	Ground Ri	arm	Antenna T	ower	
Test Instruments:	Refer to section	on 5.8 for de	etails	3			
Test mode:	Refer to section	on 5.3 for de	etails	3			
Test results:	Passed						

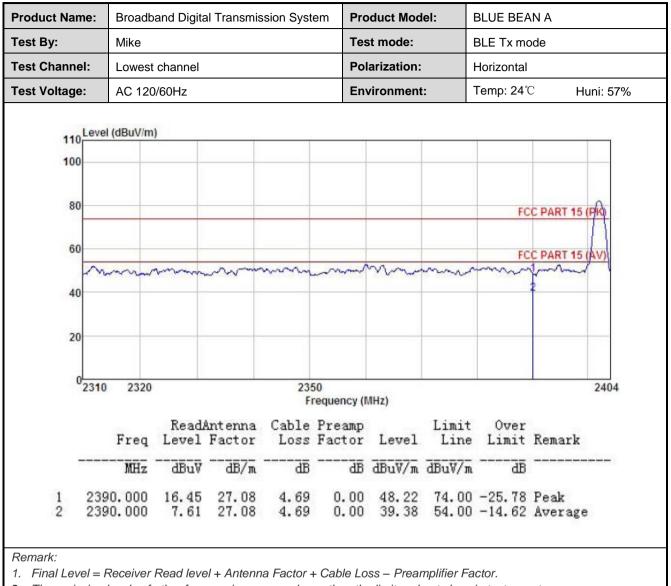


#### **External ANT A:**

duct Name:	Bro	badband D	igital Trans	mission S	System	Product N	lodel:	BLUE	BEAN A		
t By:	Mik	ke				Test mode	e:	BLE T	x mode		
t Channel:	Lov	west chan	nel			Polarizatio	on:	Vertica	al		
t Voltage:	AC	120/60Hz	2			Environm	ent:	Temp:	Temp: 24℃ Huni: 57%		
	Land (2D-1) line)										
110 Level (	dBuV/m)										
100											
C.6									Λ		
80											
								FCC	PART 15 (PK)		
60											
	n n	100000	man	nmm.	- mon	5.00 m	man	FCC	PART 15 (AV)		
40	· w	VI. 1				~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
20											
20											
0											
2310	2320			2350 Fre	) equency (MI	Hz)			2404		
		B 1						<u>^</u>			
	Freq		Antenna Factor	Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark		
	MHz				dB	dBuV/m					
			Service Service								
	).000 ).000	18.16 8.12	27.07 27.07	4.69		49.92		-24.08	Peak Average		
2 2390	. 000	0.12	21.01	4.09	0.00	19.00	04.00	-14.12	TAGE afe		

2. The emission levels of other frequencies are very lower than the limit and not show in test report.







roduct Name:	Broadband	Digital Transr	nission S	System	Product M	odel:	BLUE	BEAN A
est By:	Mike				Test mode	:	BLE T	x mode
est Channel:	Highest cha	nnel		1	Polarizatio	on:	Vertica	al
est Voltage:	AC 120/60H	Iz		1	Environme	ent:	Temp:	24℃ Huni: 57%
110 Level (d) 100 80 60 40	BuV/m)	2			~~~~	~		ART 15 (PK) ART 15 (AV)
0.0	-							
20								
0 2478			Fre	quency (MH	z)			2500
0 2478	Read Freq Level	lântenna 1 Factor	Cable	Preamp		Limit Line	Over Limit	2500 Remark
0 2478	Read Freq Level MHz dBuy	L Factor	Cable	Preamp Factor		Line		





Product Name:	Broadb					oduct Mo	del: B	BLUE BEAN A			
Test By:	Mike				Те	est mode:	В	LE Tx mod	de		
Fest Channel:	Highest	t channel			Р	olarization	н: Н	lorizontal			
Fest Voltage:	AC 120	)/60Hz			Er	Environment: Temp: 24°C Huni					
110 Leve 100 80	I (dBuV/m)								2 PART 15 (PK)		
40 20 0 2478			2	Err					2500		
40		Peeda	2		equency (M	Hz)	T :- : +				
40		ReadA	ntenna Factor	Cable		1041 1400	Limit Line	Over			
40				Cable	Preamp Factor	1041 1400	Line	Over	2500		

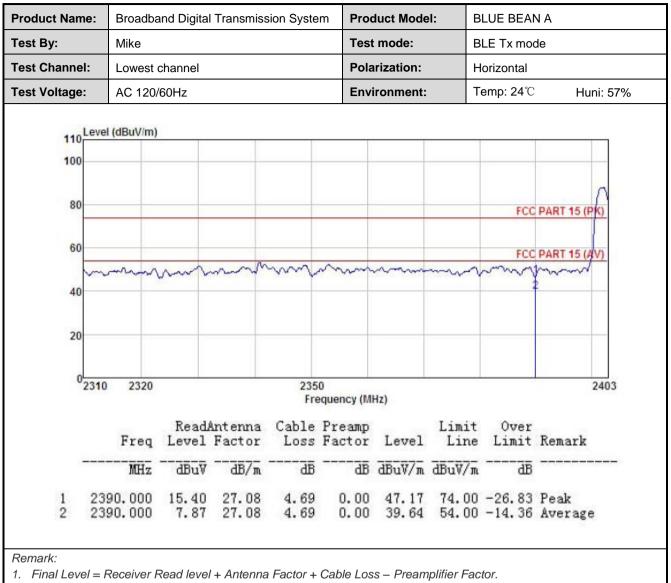


#### **External ANT B:**

Product Name:	Broa	dband Dig	gital Transr	nission S	ystem I	Product N	lodel:	BLUE	BEAN A		
Test By:	Mike					Test mod	e:	BLE 1	Tx mode		
Test Channel:	Lowe	est channe	əl		1	Polarizati	on:	Vertic	al		
Test Voltage:	AC 1	20/60Hz			1	Environm	ent:	Temp	Temp: 24℃ Hu		
	110 Level (dBuV/m)										
110 Level (c	(BuV/m)										
100											
80								FC	PART 15	PKA	
60								FC	PART 15	(AV)	
m	ma	m	mun	mon	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m		m	form	7	
40									2		
20											
02310	2320	1		2350		1000				2403	
				Free	quency (MH	łz)					
	Freq	Read/ Level	Intenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark		
	MHz	dBu∛	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
	390.000	18.65	27.07	4.69				-23.59			
	390.000	7.44	27.07	4.69	0.00	39.20	54.00	-14.80	Average	•	

2. The emission levels of other frequencies are very lower than the limit and not show in test report.







luct Name:	, , , , , , , , , , , , , , , , , , ,					Product I	Model:	BLUE	BLUE BEAN A BLE Tx mode			
By:	Mik	e				Test mod	e:	BLE	Tx mode			
Channel:	Hig	hest chan	nel			Polarizati	on:	Vertio	cal			
Voltage:	AC	120/60Hz	2			Environment: T			Temp: 24℃ Huni: 5			
Level (d	Dedland				·			·				
110 Level (d	Buv/m)											
100												
80	7	-						FC	C PART 15	5 (PK)		
60												
60	_	6	1	-	~			FC	C PART 15	5 (AV)		
		6		~	$\sim$			FC	C PART 15	5 (AV)		
60 40		6	2	~	~				C PART 15	5 (AV)		
40			2	~	~				C PART 15	5 <u>(AV)</u>		
			2		~~			FC FC	C PART 15	5 (AV)		
40			2		~				C PART 15			
40			2	Fr	requency (h	nHz)			C PART 15	2500		
40		Read	2 Antenna				Limit	Over	C PART 15			
40 20 0 2478	Freq	Readi	2 Antenna Factor	Cable				Over	Remark	2500		
40 20 0 2478	Freq	Read. Level dBuV	Factor	Cable	Preamp Factor		Line	Over Limit		2500		
40 20 0 2478	MHz	Level dBuV	Factor dB/m	Cable Loss dB	Preamp Factor dB	Level dBuV/m	Line dBuV/m	Over Limit dB	Remark	2500		
40 20 0 2478	MHz . 500	Level	Factor dB/m 27.36	Cable Loss	Preamp Factor dB 0.00	Level dBuV/m 52.71	Line <u>dBuV/m</u> 74.00	Over Limit	Remark 	2500		





Product Name:	Broadband Dig	gital Transmissior	System	Product M	odel:	BLUE BEA	AN A
Fest By:	Mike			Test mode	):	BLE Tx m	ode
Test Channel:	Highest chann	nel		Polarizatio	on:	Horizontal	
Fest Voltage:	ge: AC 120/60Hz			Environment: Temp: 24°C			C Huni:
110 Leve	l (dBuV/m)						
100							
80	$\langle \rangle$					FCC	C PART 15 (PK)
1	1					100	21 ANT 12 (FIV)
60		4				FCC	PART 15 (AV)
	~						
40							
20							
20							
20 0 2478							250
2	\$		Frequency (I	MHz)			250
2		Antenna Cab	le Preamp		Limit	Over	
2					Limit Line		
2	Read	Factor Lo	le Preamp ss Factor		Line	Limit	
0_2478	Read Freq Level MHz dBuV	Factor Lo dB/m	le Preamp ss Factor dBdB	Level dBuV/m	Line dBuV/m	Limit dB	Remark
0_2478  1 248	Read Freq Level	Factor Lo 	le Preamp ss Factor	Level dBuV/m 52.47	Line dBuV/m 74.00	Limit dB -21.53	Remark
0 2478  1 248	Read Freq Level MHz dBuV 3.500 20.31	Factor Lo 	le Preamp ss Factor dB dB dB	Level dBuV/m 52.47	Line dBuV/m 74.00	Limit dB -21.53	Remark  Peak

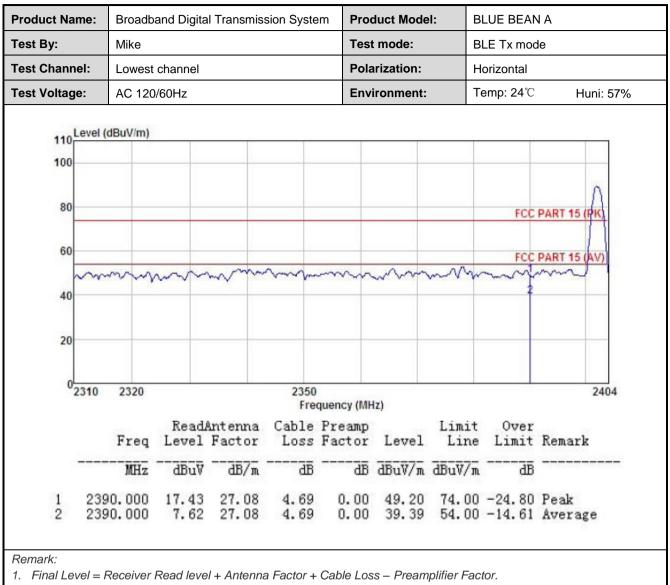


#### **Ceramic ANT**

duct Name:	Broadband I	Digital Trans	mission S	system I	Product M	lodel:	BLUE	BEAN A	
t By:	Mike			-	Test mode	e:	BLE T	x mode	
t Channel:	Lowest char	nel		1	Polarizatio	on:	Vertica	al	
t Voltage:	AC 120/60H	z		1	Environm	ent:	Temp:	Temp: 24°C Huni: 57%	
110 Level (dB	uV/m)							2 m 140	
4-07-00									
100									
00								Δ	
80							FCC	PART 15 (PK)	
60									
60		mon	2		11-1-1-1		FCCI	PART 15 (AV)	
				~~~~~	~	and in	1		
40									
20									
20									
0									
2310	2320		2350 Fre	quency (MH	17)			2404	
F	Read req Level	lAntenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark	
	MHz dBui	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 2390.	000 18.60	27.07	4.69	0.00	50.36	74.00	-23.64	Peak	
2 2390.			4.69					Average	









roduct Name:	Broadba	and Di	gital Trans	mission S	System	Product	Model:	BLU	BLUE BEAN A			
est By:	Mike					Test mod	de:	BLE	Tx mode			
est Channel:	Highest	t chanr	nel			Polarizat	ion:	Vert	Vertical			
est Voltage:	AC 120	/60Hz				Environn	nent:	Tem	າp: 24℃	Huni: 57%		
110 100	dBuV/m)											
80								FC	CC PART 15	(PK)		
60	1		1		~~			FC	CC PART 15	(AV)		
7		~~~	,	~~	~					57.95 V		
40			2									
40			2									
			2	Fr	requency (f	лнz)				2500		
20			2 ntenna Factor	Cable			Limit Line	Over Limit	Remark	2500		
20	Freq L			Cable	Preamp Factor		Line			2500		





roduct Name:						roduct Mo	odel: E	BLUE BEAN A				
est By:	Mike				Т	est mode:	E	3LE Tx mo	de			
est Channel:	Highest	channel			Р	olarizatio	n: ⊦	Iorizontal				
est Voltage:	AC 120/	60Hz			E	nvironme	nt: 7	ີemp: 24℃	D Huni: 5			
110 Leve 100 80 60	l (dBuV/m)								C PART 15 (PK) C PART 15 (AV)			
40			2									
				Fr	equency (M	IHZ)			2500			
20		ReadAr Level H		Cable	Preamp		Limit Line	Over Limit				
20				Cable	Preamp Factor		Line	Limit	2500			



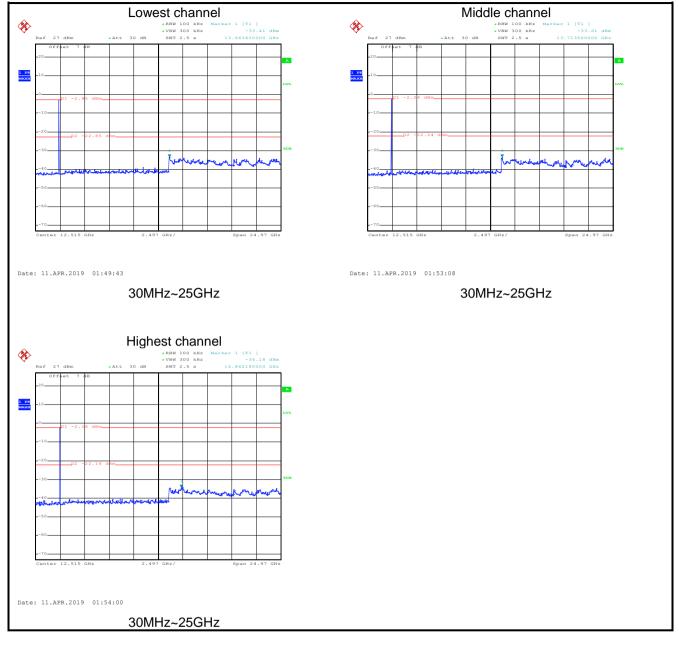
## 6.7 Spurious Emission

## 6.7.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB 558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed



#### Test plot as follows:





### 6.7.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C	Section 15	5.205	5 and 15.209			
Test Method:	ANSI C63.10:20	)13					
Test Frequency Range:	9kHz to 25GHz						
Test Distance:	3m						
		Detecto	or .	RBW	VB	۱۸/	Remark
Receiver setup:	Frequency 30MHz-1GHz	Quasi-pe		120KHz	300		Quasi-peak Value
	5010112-10112	Peak		1MHz	3M		Peak Value
	Above 1GHz	RMS		1MHz	3M		Average Value
Limit:	Frequency		Lin	nit (dBuV/m @			Remark
	30MHz-88M	Hz		40.0		G	Quasi-peak Value
	88MHz-216M	1Hz		43.5		G	Quasi-peak Value
	216MHz-960			46.0		G	Quasi-peak Value
	960MHz-1G	Hz		54.0			Quasi-peak Value
	Above 1GH	17		54.0			Average Value
Test Procedure:				74.0	(		Peak Value table 0.8m(below
	<ol> <li>highest rad</li> <li>The EUT antenna, w tower.</li> <li>The antenn the ground Both horizo make the n</li> <li>For each s case and t meters and to find the n</li> <li>The test-re Specified E</li> <li>If the emiss the limit sp of the EUT have 10 dE</li> </ol>	iation. was set 3 hich was na height to detern ontal and neasurem suspected hen the a the rota maximum eceiver sy Bandwidth sion level ecified, the would be margin w	3 m mou is va wrine vert ent. I em table reac yster with of th en te e rep vould	eters away inted on the transform of the maximum ical polarization, the Enna was turned ding. m was turned ding. m Maximum Hose EUT in persona could to ported. Other of the ported of the ported of the ported of the re-tested of the re-tested of the ported of the por	from the cop of a ne met um valu- cions of EUT was do to he from 0 to Pea old Mo ak more poe stop wise the d one b	ne inte varial er to f ue of f the a as arra eights degre k Def de. de was ped ar ie emis y one	the position of the erference-receiving ble-height antenna four meters above the field strength. antenna are set to anged to its worst from 1 meter to 4 ses to 360 degrees tect Function and a 10 dB lower than nd the peak values ssions that did not using peak, quasi- reported in a data
Test setup:	Below 1GHz	3m <				Antenna Search Antenn Test eiver –	

Project No.: CCISE1903101



	Hom Antenna Tower Hom Antenna Tower Ground Reference Plane Test Receiver Controller
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	<ol> <li>Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.</li> <li>9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report.</li> </ol>



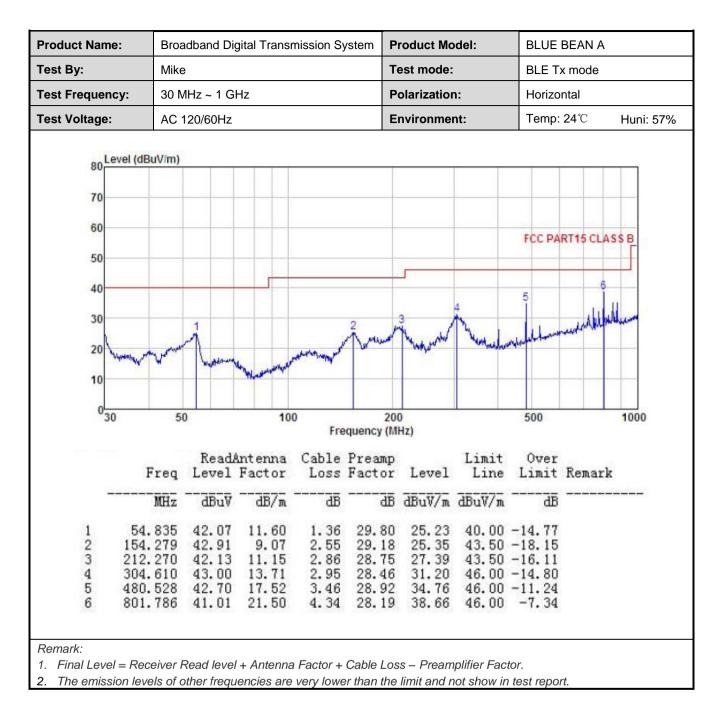
### Measurement Data (worst case):

Below 1GHz:

Product Name	e: Broa	adband Di	gital Transı	mission S	ystem P	Product Model:			BLUE BEAN A				
Test By:	Mike	9	Test mode: BLE Tx mode				x mode						
Test Frequend	cy: 30 N	/IHz ~ 1 G	Hz		Р	olarizatio	Vertical			Vertical			
Test Voltage:	AC	120/60Hz			E	nvironme	nt:	Temp: 24°C Huni: 57					
80 <mark>1</mark>	evel (dBuV/m	)											
70													
70													
60								FCC PA	RT15 CLA	SSB			
50										F			
10													
40	~~	~							6				
30	~ +	1			Å	3	4	5	herenally	antimited			
20		~	month	and search a		They and	and the states	persons the happing					
			w		×.	WIT							
10													
0	30	50	1(	00	20	00		500		1000			
				Fr	equency (N	1Hz)							
		Read	Intenna	Cable	Preamp		Limit	Over					
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	k			
-	MHz	dBu∛	dB/m	dB	dB	dBuV/m	dBuV/m	dB					
									NY232210				
1	46.340	54.04	12.24	1.28	29.85	37.71	40.00	-2.29	QP				
1	158.668	47.02	9.24	2.57	29.14	29.69	43.50	-13.81	QP				
1 2 3 4	158.668 210.786	47.02 40.79	9.24 11.08	2.57 2.86	29.14 28.76	29.69 25.97	43.50 43.50	-13.81 -17.53	QP QP				
1 2 3 4 5 6	158.668	47.02	9.24	2.57	29.14 28.76	29.69	43.50 43.50 46.00 46.00	-13.81	QP QP QP QP				





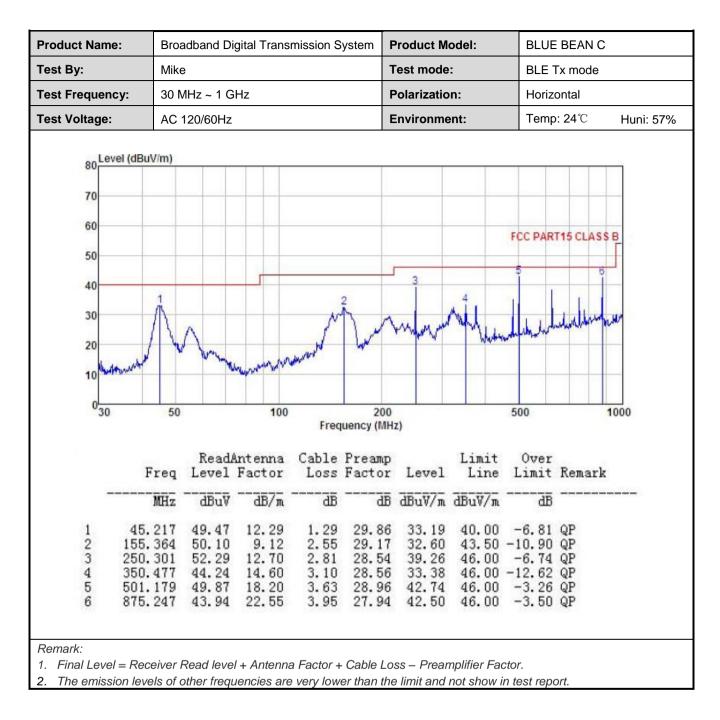




Product Name	ame: Broadband Digital Transmission System				System F	Product Model:			BLUE BEAN C				
Test By:	Mike				٦	Test mode: BLE Tx mode							
Test Frequenc	<b>:y:</b> 30 M	IHz ~ 1 G	Hz		F	Polarization:     Vertical       Environment:     Temp: 24°C			ion: Vertical		Vertical		
Test Voltage:	AC 1	20/60Hz			E				Huni: 57%				
80 70 60 50 40 30 10 0 30	evel (dBuV/m)	0	10		3 1 20 equency (M		M	FCC PA	RT15 CLAS				
		<b>D</b> 14	50 <b>2</b> 100-2006	<b>6 1 1</b>			<b>*</b> · · ·	~					
	Freq	Level	ntenna Factor	Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark				
5 <del>4</del>	MHz	dBuV	dB/m	dB	āĒ	dBuV/m	dBuV/m	ā					
1 2 3 4 5 6	45.855 106.385 154.279 250.301 501.179 875.247	53.54 49.94 56.94 50.32 47.60 42.60	12.27 11.98 9.07 12.70 18.20 22.55	1.29 2.01 2.55 2.81 3.63 3.95	29.85 29.48 29.18 28.54 28.96 27.94	37.25 34.45 39.38 37.29 40.47 41.16	40.00 43.50 43.50 46.00 46.00 46.00	-2.75 -9.05 -4.12 -8.71 -5.53 -4.84	QP QP QP QP				





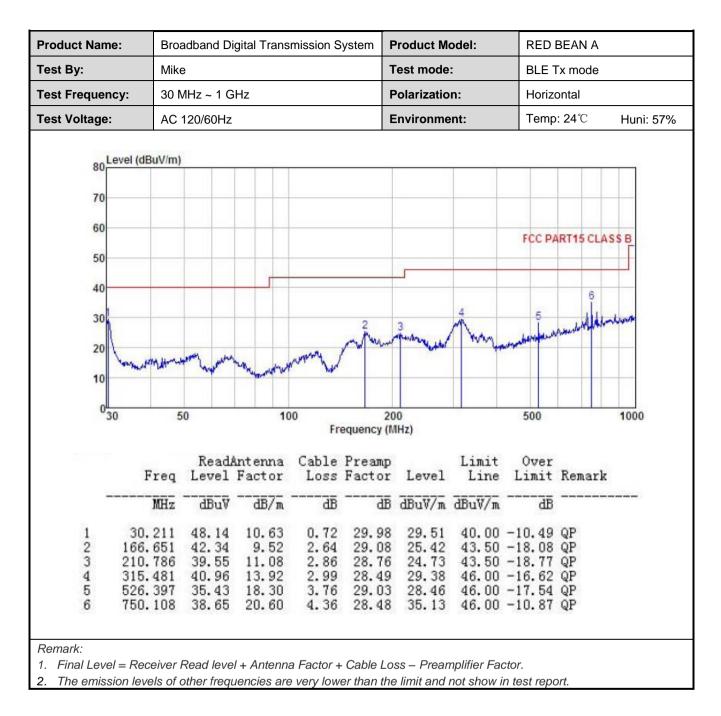




Product Name:	Broadband D	igital Transr	ystem P	roduct Mo	RED BEAN A					
Test By:	Mike			Т	est mode:		BLE T	BLE Tx mode		
Test Frequency:	30 MHz ~ 1 0	GHz		Р	olarization	Vertica	Vertical			
Test Voltage:	AC 120/60Hz			E	nvironme	ent: Temp: 24℃ Hur			Huni: 57%	
80 Level (	dBuV/m)									
70							_			
60							FCC PAR	T15 CLA	SSB	
50										
40										
30	mon o						5	6	a the	
	1 m	m.	3 hran	m.	putrus.	manning the	medanaly	show and the second		
20		W shares	m h		- Martine	1				
10										
030	50	10		20			500		1000	
				equency (M						
I		Antenna Factor			Level	Limit Line	Over Limit	Remar	k	
	MHz dBuV	dB/m	dB	₫₿	dBuV/m	dBuV/m	dB			
	016 48.67 803 46.24	12.26 9.42	1.28 1.41	29.85 29.75	32.36 27.32	40.00	-7.64 -12.68	QP		
3 120. 4 165.	699 40.30 487 42.62		2.18	29.39 29.09	23.94 25.64	43.50 43.50	-19.56			
5 526.			3.76	29.03		46.00		QP		
0 100.	100 30.30	20.00	4.00	20.40	51.04	40.00	-14.10	QT.		
Remark:										
1. Final Level = Red	eiver Read leve	el + Antenna	Factor +	Cable Los	s – Pream	plifier Fact	tor.			

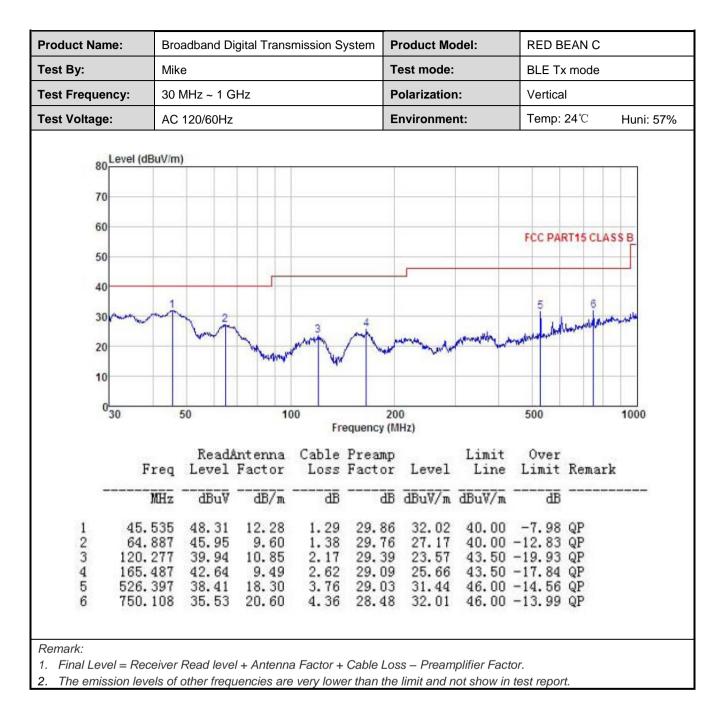




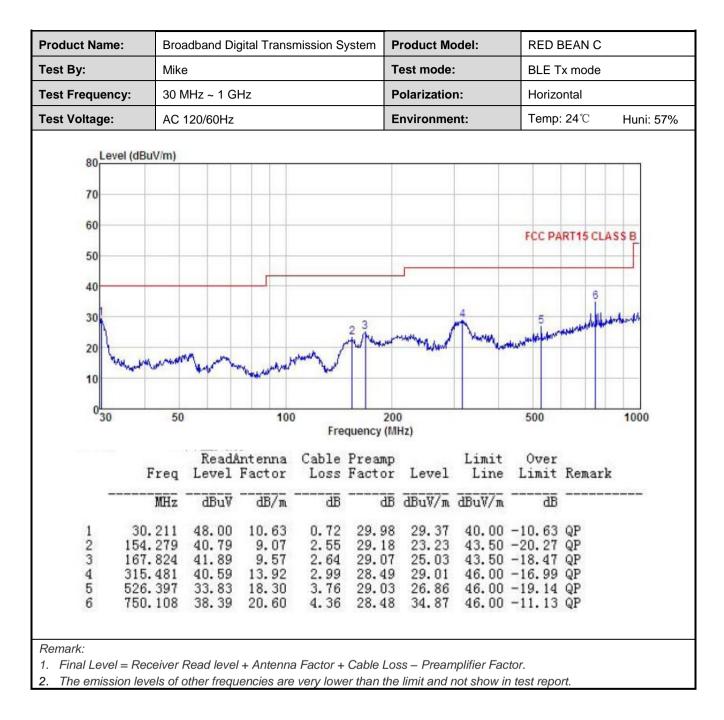














#### Above 1GHz:

# **External ANT A:**

			Test ch	annel: Low	est channel					
				tector: Peak						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4804.00	47.06	30.85	6.80	41.81	42.90	74.00	-31.10	Vertical		
4804.00	46.84	30.85	6.80	41.81	42.68	74.00	-31.32	Horizontal		
			Dete	ector: Avera	ge Value					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4804.00	36.58	30.85	6.80	41.81	32.42	54.00	-21.58	Vertical		
4804.00	36.14	30.85	6.80	41.81	31.98	54.00	-22.02	Horizontal		
Frequency (MHz)	Read Level	Antenna Factor	De Cable Loss	nannel: Mido tector: Peak Preamp Factor		Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
. ,	(dBuV)	(dB/m)	(dB)	(dB)	· · ·	· · ·	. ,			
4884.00	46.87	31.20	6.86	41.84	43.09	74.00	-30.91	Vertical		
4884.00	46.21	31.20	6.86	41.84	42.43	74.00	-31.57	Horizontal		
Detector: Average Value										
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4884.00	36.43	31.20	6.86	41.84	32.65	54.00	-21.35	Vertical		
4884.00	36.38	31.20	6.86	41.84	32.60	54.00	-21.40	Horizontal		
				annel: High						
	Read	Antenna	Cable	Preamp						
Frequency (MHz)	Level (dBuV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4960.00	46.74	31.63	6.91	41.87	43.41	74.00	-30.59	Vertical		
4960.00	46.89	31.63	6.91	41.87	43.56	74.00	-30.44	Horizontal		
			Dete	ector: Avera	ge Value					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4960.00	36.98	31.63	6.91	41.87	33.65	54.00	-20.35	Vertical		
4960.00	36.76	31.63	6.91	41.87	33.43	54.00	-20.57	Horizontal		
		r Read level + f other freque				plifier Factor. not show in tes	t report.			

# **External ANT B:**

			Test ch	nannel: Lowe	est channel			
		T	De	tector: Peak	< Value		Τ	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	47.63	30.85	6.80	41.81	43.47	74.00	-30.53	Vertical
4804.00	46.92	30.85	6.80	41.81	42.76	74.00	-31.24	Horizontal
			Dete	ector: Avera	ge Value			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	37.06	30.85	6.80	41.81	32.90	54.00	-21.10	Vertical
4804.00	36.84	30.85	6.80	41.81	32.68	54.00	-21.32	Horizontal
				nannel: Mido				
		,		tector: Peak	k Value		1	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	46.98	31.20	6.86	41.84	43.20	74.00	-30.80	Vertical
4884.00	46.76	31.20	6.86	41.84	42.98	74.00	-31.02	Horizontal
			Dete	ector: Avera	ge Value			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	36.47	31.20	6.86	41.84	32.69	54.00	-21.31	Vertical
4884.00	36.62	31.20	6.86	41.84	32.84	54.00	-21.16	Horizontal
				annel: High				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	46.77	31.63	6.91	41.87	43.44	74.00	-30.56	Vertical
4960.00	46.92	31.63	6.91	41.87	43.59	74.00	-30.41	Horizontal
		,		ector: Avera	ge Value			
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	37.83	31.63	6.91	41.87	34.50	54.00	-19.50	Vertical
4960.00	37.02	31.63	6.91	41.87	33.69	54.00	-20.31	Horizontal
		r Read level + f other freque				plifier Factor. not show in tes	t report.	



# Ceramic ANT:

			Test								
Test channel: Lowest channel											
				tector: Peal	< Value						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4804.00	46.47	30.85	6.80	41.81	42.31	74.00	-31.69	Vertical			
4804.00	46.23	30.85	6.80	41.81	42.07	74.00	-31.93	Horizontal			
100 1100	10.20	00.00		ector: Avera		1 1100	01100	Tionzonitai			
	Read	Antenna	Cable	Preamp							
Frequency (MHz)	Level (dBuV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4804.00	36.24	30.85	6.80	41.81	32.08	54.00	-21.92	Vertical			
4804.00	36.32	30.85	6.80	41.81	32.16	54.00	-21.84	Horizontal			
Test channel: Middle channel Detector: Peak Value											
	Read	Antonno	Cable	[							
Frequency (MHz)	Level (dBuV)	Antenna Factor (dB/m)	Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4884.00	46.64	31.20	6.86	41.84	42.86	74.00	-31.14	Vertical			
4884.00	46.19	31.20	6.86	41.84	42.41	74.00	-31.59	Horizontal			
			Dete	ector: Avera	ge Value						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4884.00	36.37	31.20	6.86	41.84	32.59	54.00	-21.41	Vertical			
4884.00	36.31	31.20	6.86	41.84	32.53	54.00	-21.47	Horizontal			
			Test ch	annel: High	est channel						
			De	tector: Peal	<ul> <li>Value</li> </ul>						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4960.00	46.69	31.63	6.91	41.87	43.36	74.00	-30.64	Vertical			
4960.00	46.34	31.63	6.91	41.87	43.01	74.00	-30.99	Horizontal			
			Dete	ector: Avera	ge Value		ı				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4960.00	36.27	31.63	6.91	41.87	32.94	54.00	-21.06	Vertical			
4960.00	36.57	31.63	6.91	41.87	33.24	54.00	-20.76	Horizontal			
Remark:		Read level +			l		1				

The emission levels of other frequencies are very lower than the limit and not show in test report.