TEST REPORT

Reference No......	:	WTN22D06110705W001 V2
FCC ID	:	2AQV6BDS531
Applicant.....	:	Suzhou Pairlink Network Technology Ltd.
Address.....	:	Room 117, No.55, Su hong xi Road, Suzhou Industrial Park, Suzhou City, Jiangsu Province, China
Manufacturer	:	Suzhou Pairlink Network Technology Ltd.
Address.....	:	Room 117, No.55, Su hong xi Road, Suzhou Industrial Park, Suzhou City, Jiangsu Province, China
Product.....	:	Buffalo-DS531 Bluetooth 5.1 BLE Module
Model(s).	:	Buffalo-DS531-B, Buffalo-DS531-C
Standards.....	:	FCC 47CFR Part 15.247
Date of Receipt sample	:	2022-06-06
Date of Test	:	2022-06-06 to 2022-06-16
Date of Issue.....	:	2022-07-07
Test Result.....	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTN22D06110705 W001	2022-06-06	2022-06-06 to 2022-06-16	2022-07-04	Original	-	Replaced
WTN22D06110705 W001 V1	2022-06-06	2022-06-06 to 2022-06-16	2022-07-05	Version 1	updated	Replaced
WTN22D06110705 W001 V2	2022-06-06	2022-06-06 to 2022-06-16	2022-07-07	Version 2	updated	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Buffalo-DS531 Bluetooth 5.1 BLE Module
Model(s):	Buffalo-DS531-B, Buffalo-DS531-C
Model Description:	Buffalo-DS531 is a series model based on Dialog DA14531 SOC. Buffalo-DS531-B with a PCB Antenna. Buffalo-DS531-C with a Dipole Antenna.
Bluetooth Version:	V5.1
Hardware Version:	V2
Software Version:	V1

4.2 Details of E.U.T.

Operation Frequency:	2402~2480MHz
Max. RF output power:	2.11dBm
Type of Modulation:	GFSK
Antenna installation:	For Buffalo-DS531-B: PCB Antenna For Buffalo-DS531-C: Dipole Antenna
Antenna Gain:	For Buffalo-DS531-B: -0.41dBi For Buffalo-DS531-C: 2.0dBi
Ratings:	DC 1.8V~3.6V

4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

4.4 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

4.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.6 Abnormalities from Standard Conditions

None.

4.7 Test Mode

Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	BT BLE	1 Mbps	0/19/39	TX
Power Spectral Density	BT BLE	1 Mbps	0/19/39	TX
6dB Bandwidth	BT BLE	1 Mbps	0/19/39	TX
Band Edge	BT BLE	1 Mbps	0/19/39	TX
Transmitter Spurious Emissions	BT BLE	1 Mbps	0/19/39	TX

Note: Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

5 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	N/A
Conducted Emissions	15.207(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

Remark: according to the description of model difference, the two models are just different antennas, so the rf test of the conducted method shows only one set of data.

6 Equipment Used during Test

6.1 Equipments List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date	Valid
Conducted Emissions 2#						
1	EMI Test Receiver	R&S	ESCI	101155	2021-07-26	1Year
2	LISN	SCHWARZBECK	NSLK 8128	8128-259	2021-07-26	1Year
3	Pulse Limiter	CYBERTEK	EM5010	261115-001-0024	2021-07-26	1Year
4	Cable	Laplace	RF300	-	2021-07-26	1Year
5	Test software	EZ-EMC	RA-03A1-1	-	N/A	N/A
3m Semi-anechoic Chamber for Radiation Emissions (SAEMC)						
1	Spectrum Analyzer	R&S	FSP30	100091	2022-04-28	1Year
2	Amplifier	Agilent	8447D	2944A10178	2021-07-26	1Year
3	Tri-log Broadband Antenna	SCHWARZBECK	VULB9163	336	2021-08-23	1Year
4	Coaxial Cable	Top	TYPE16(13M)	-	2022-04-28	1Year
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120D	667	2022-04-28	1Year
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-07-30	1Year
7	Broadband Preamplifier	COMPLIANCE	PAP-1G18	2004	2021-07-26	1Year
8	Coaxial Cable	Top	ZT26-NJ-NJ-8M/FA	-	2022-04-28	1Year
9	Microwave Amplifier	SCHWARZBECK	BBV 9721	100472	2021-07-26	1Year
10	Coaxial Cable	Top	ZT40-2.92J-2.92J-2.0M	17100919	2022-04-28	1Year
11	Test software	EZ-EMC	RA-03A1-1	-	N/A	N/A
3m Semi-anechoic Chamber for Radiation Emissions (TDK)						
1	Test Receiver	R&S	ESCI	101296	2022-04-28	1Year
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-10-30	1Year
3	Active Loop Antenna	Com-Power	AL-130R	10160007	2022-04-28	1Year
4	Amplifier	ANRITSU	MH648A	M43381	2022-04-28	1Year
5	Cable	HUBER+SUHNER	CBL2	525178	2022-04-28	1Year
6	Test software	EZ-EMC	RA-03A1-1	-	N/A	N/A
RF Conducting						
1	Spectrum Analyzer	R&S	FSP40	100501	2021-07-26	1Year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2021-07-26	1Year

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

6.3 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10^{-7}Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval：95%. Confidence factor:k=2	

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R. China.

7 Duty Cycle

Type of Modulation	On time ms	Period ms	Duty Cycle linear	Duty Cycle %	Duty Cycle Factor(dB)	Average Factor(dB)
GFSK	0.417	0.628	0.664	66.4	1.778	-3.557

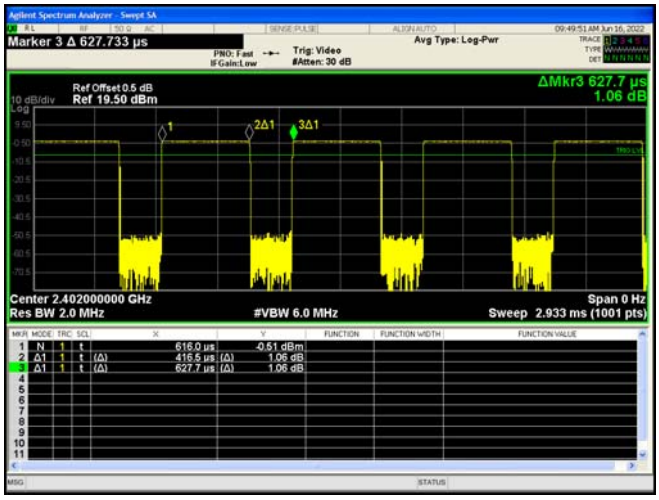
Remark:

Duty cycle=On Time/period;

Duty cycle factor=10*log(1/Duty cycle);

Average factor=20$\log_{10}$Duty cycle

GFSK



8 Radiated Emissions

Test Requirement: FCC 47CFR Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment**:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

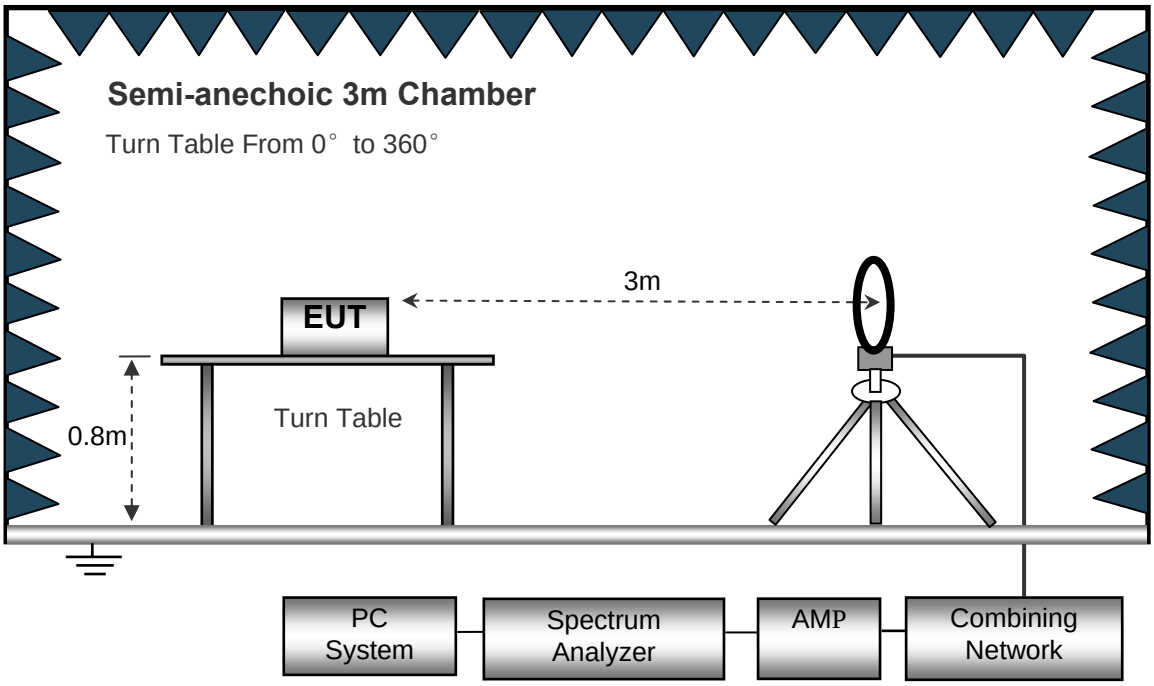
EUT Operation:

The test was performed in TX transmitting mode, the test data were shown in the report.

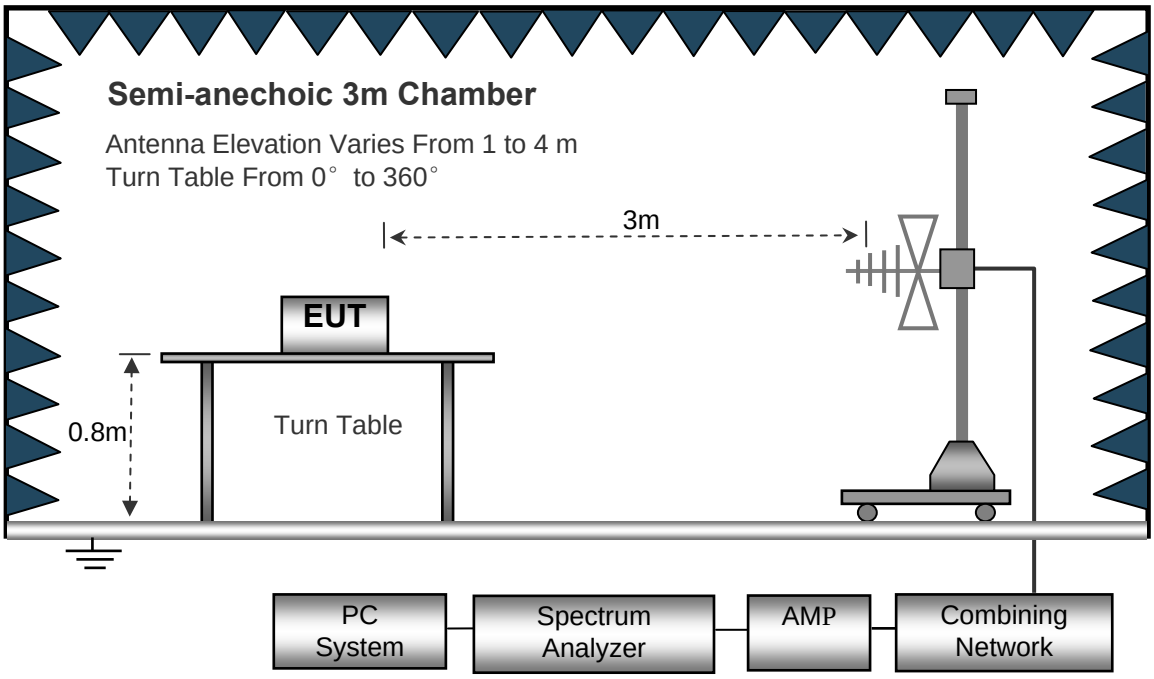
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

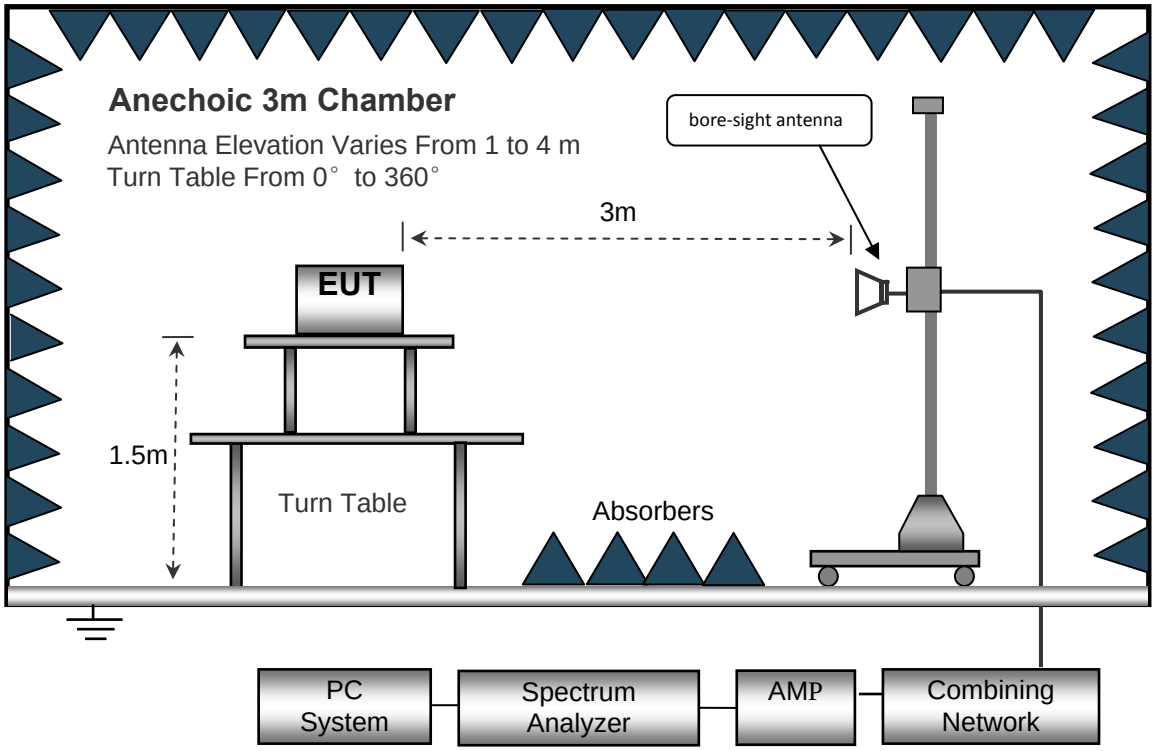
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



2.1 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.3 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

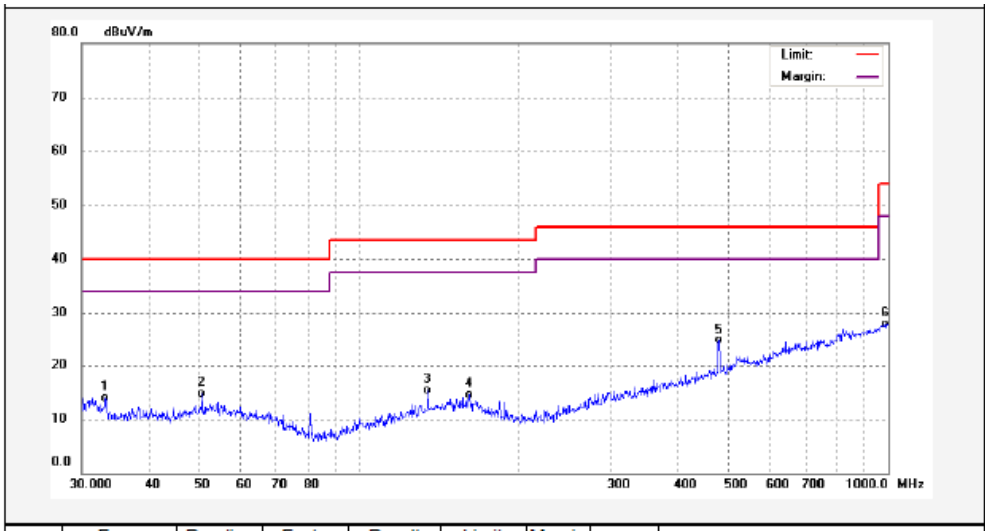
8.5 Summary of Test Results

Test Frequency: 9kHz ~ 30MHz
Note: The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 1GHz
Model: Buffalo-DS531-B

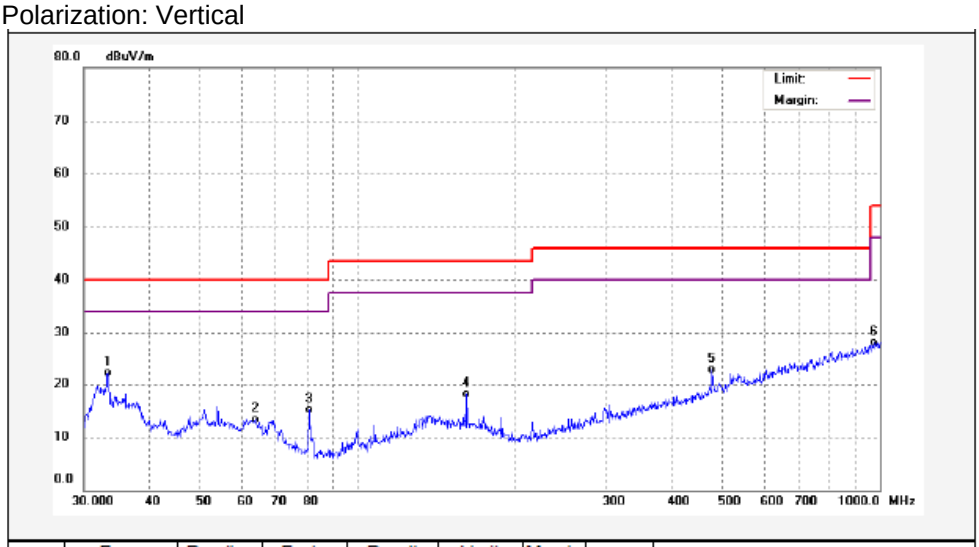
Mode: TX GFSK channel 0

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.2112	31.94	-17.99	13.95	40.00	-26.05	QP	
2	50.5860	31.46	-16.81	14.65	40.00	-25.35	QP	
3	135.0319	31.50	-16.16	15.34	43.50	-28.16	QP	
4	162.0414	29.95	-15.45	14.50	43.50	-29.00	QP	
5	478.8456	35.16	-10.51	24.65	46.00	-21.35	QP	
6	986.0715	29.25	-1.32	27.93	54.00	-26.07	QP	

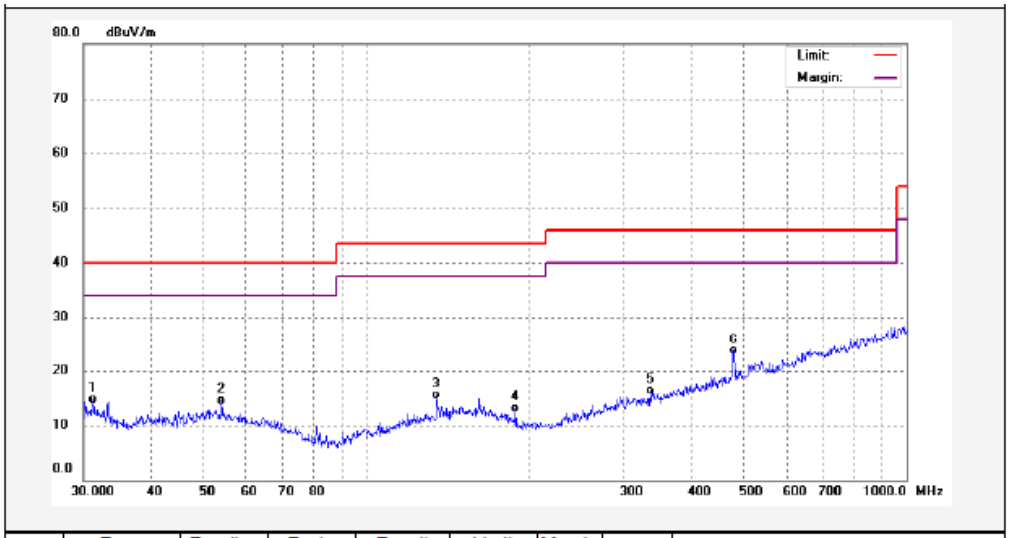
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.3279	40.07	-17.99	22.08	40.00	-17.92	QP	
2	63.7588	31.11	-17.75	13.36	40.00	-26.64	QP	
3	80.9274	36.50	-21.37	15.13	40.00	-24.87	QP	
4	162.0414	33.54	-15.45	18.09	43.50	-25.41	QP	
5	477.1694	33.17	-10.56	22.61	46.00	-23.39	QP	
6	975.7527	29.64	-1.48	28.16	54.00	-25.84	QP	

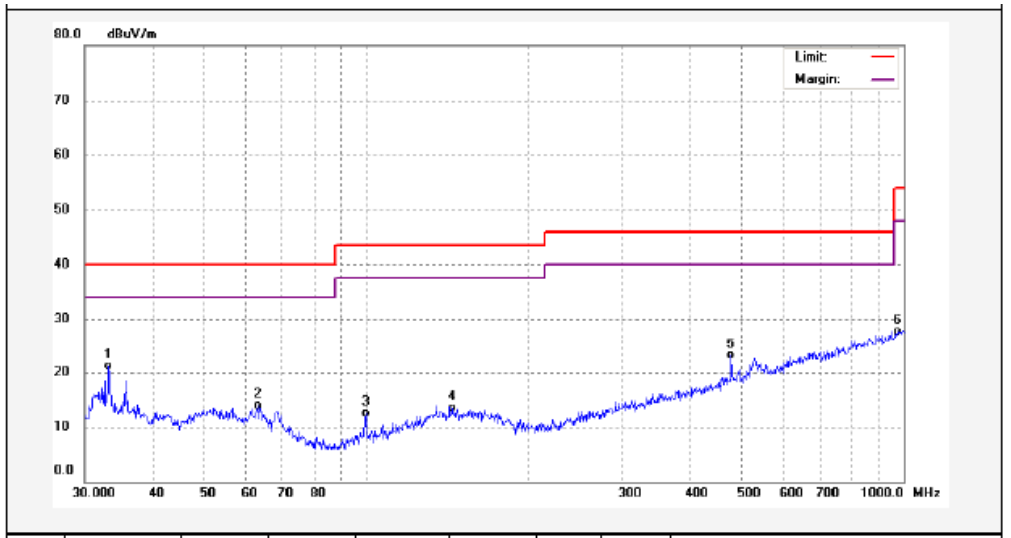
Mode: TX GFSK channel 19

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	31.1798	32.69	-18.08	14.61	40.00	-25.39	QP	
2	53.8818	31.43	-16.95	14.48	40.00	-25.52	QP	
3	135.0319	31.70	-16.16	15.54	43.50	-27.96	QP	
4	189.0743	30.81	-17.78	13.03	43.50	-30.47	QP	
5	334.8589	30.27	-14.02	16.25	46.00	-29.75	QP	
6	478.8456	34.13	-10.51	23.62	46.00	-22.38	QP	

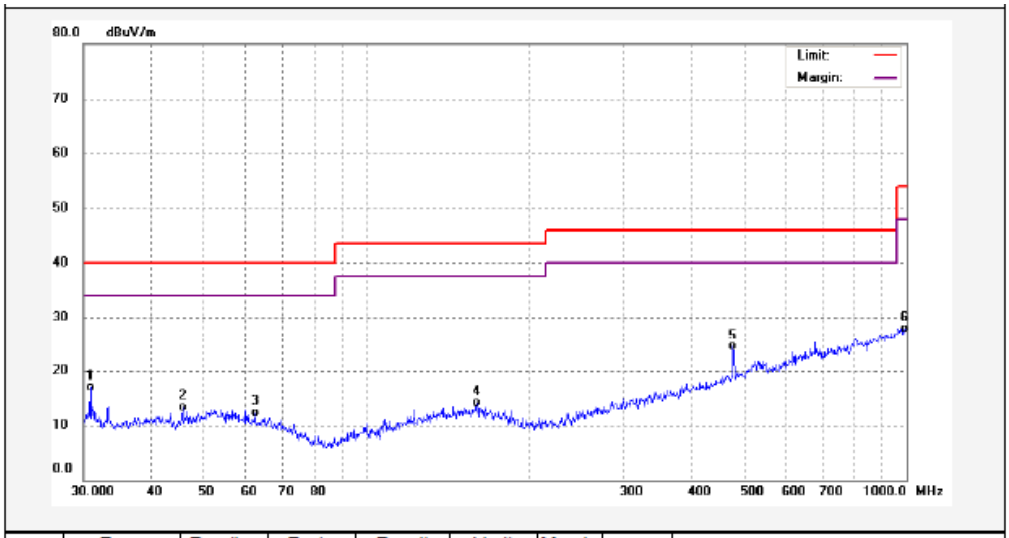
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.2112	39.05	-17.99	21.06	40.00	-18.94	QP	
2	62.8708	31.45	-17.62	13.83	40.00	-26.17	QP	
3	99.8777	31.95	-19.35	12.60	43.50	-30.90	QP	
4	144.8418	29.02	-15.57	13.45	43.50	-30.05	QP	
5	477.1694	33.63	-10.56	23.07	46.00	-22.93	QP	
6	972.3374	29.30	-1.57	27.73	54.00	-26.27	QP	

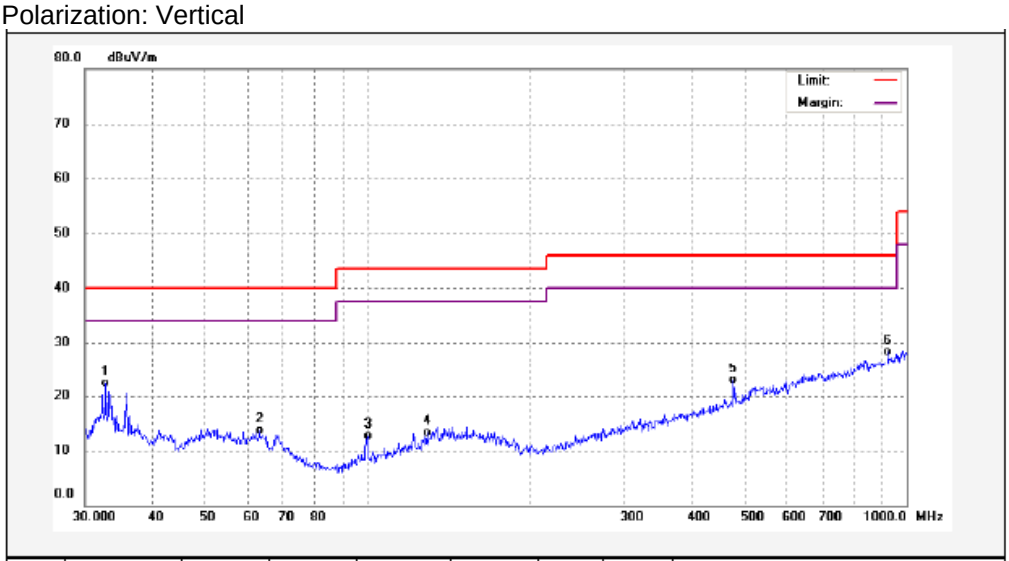
Mode: TX GFSK channel 39

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	30.8535	34.91	-18.10	16.81	40.00	-23.19	QP	
2	45.6948	30.55	-17.22	13.33	40.00	-26.67	QP	
3	62.2128	29.80	-17.54	12.26	40.00	-27.74	QP	
4	160.3456	29.53	-15.36	14.17	43.50	-29.33	QP	
5	477.1694	35.07	-10.56	24.51	46.00	-21.49	QP	
6	993.0114	29.18	-1.22	27.96	54.00	-26.04	QP	

Polarization: Vertical

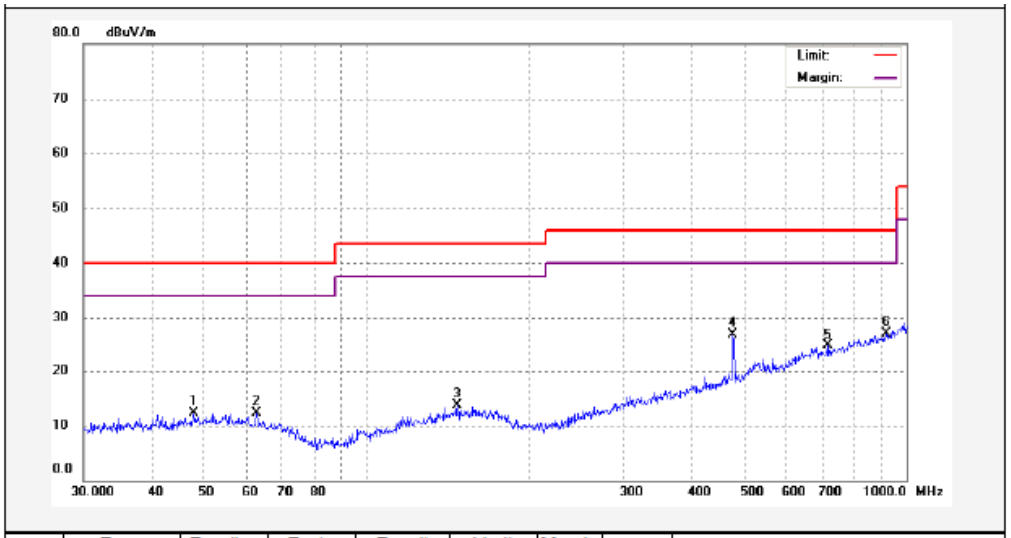


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	32.7486	40.38	-18.01	22.37	40.00	-17.63	QP	
2	63.0916	31.33	-17.65	13.68	40.00	-26.32	QP	
3	100.2286	31.94	-19.31	12.63	43.50	-30.87	QP	
4	129.0146	29.88	-16.55	13.33	43.50	-30.17	QP	
5	477.1694	33.51	-10.56	22.95	46.00	-23.05	QP	
6	922.5157	31.11	-2.84	28.27	46.00	-17.73	QP	

Model: Buffalo-DS531-C

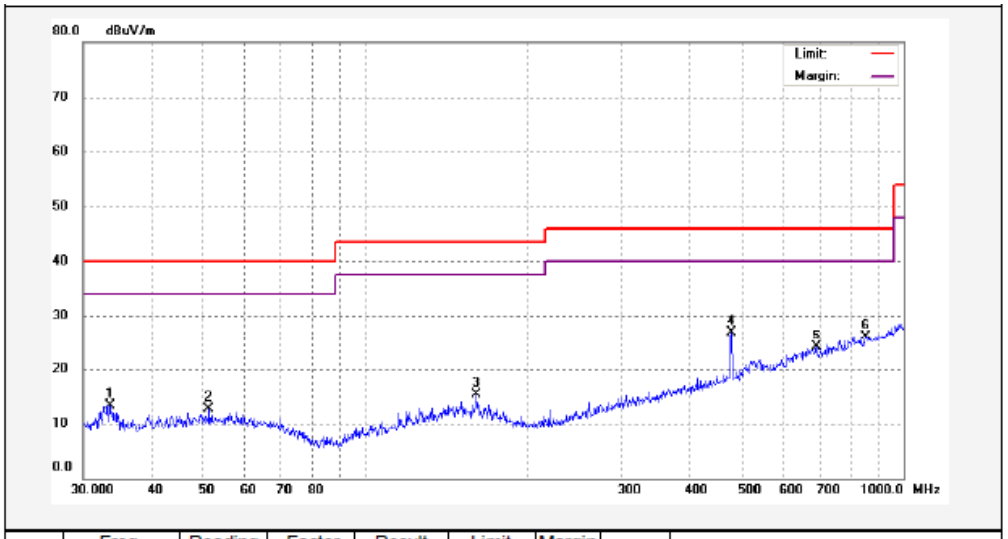
Mode: TX GFSK channel 0

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	47.9938	29.44	-17.04	12.40	40.00	-27.60	peak	
2	62.6505	29.86	-17.64	12.22	40.00	-27.78	peak	
3	147.4036	29.15	-15.44	13.71	43.50	-29.79	peak	
4	477.1693	37.55	-10.61	26.94	46.00	-19.06	peak	
5	716.6820	30.66	-6.03	24.63	46.00	-21.37	peak	
6	916.0684	30.02	-2.82	27.20	46.00	-18.80	peak	

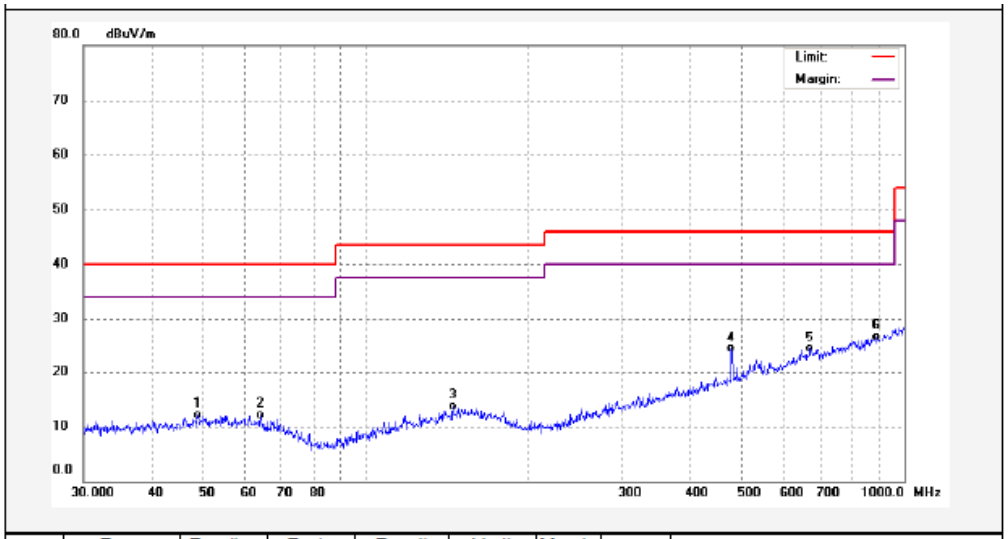
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.5623	31.31	-18.02	13.29	40.00	-26.71	peak	
2	51.3004	29.67	-16.90	12.77	40.00	-27.23	peak	
3	160.9088	30.68	-15.40	15.28	43.50	-28.22	peak	
4	478.8455	37.52	-10.56	26.96	46.00	-19.04	peak	
5	689.5643	30.30	-6.14	24.16	46.00	-21.84	peak	
6	851.0353	29.77	-3.67	26.10	46.00	-19.90	peak	

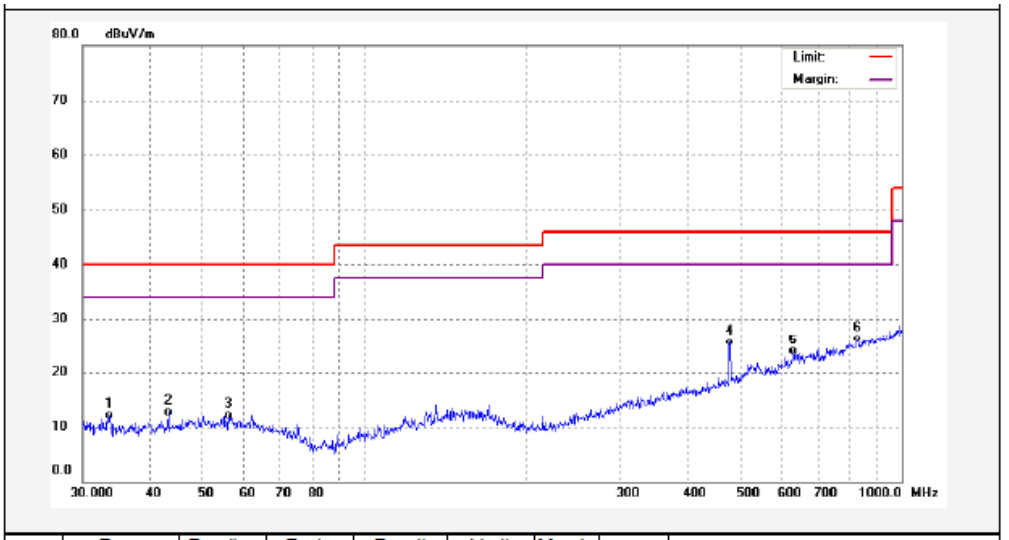
Mode: TX GFSK channel 19

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	48.8427	29.01	-16.96	12.05	40.00	-27.95	QP	
2	63.7588	29.97	-17.79	12.18	40.00	-27.82	QP	
3	145.3505	29.26	-15.55	13.71	43.50	-29.79	QP	
4	477.1693	34.85	-10.61	24.24	46.00	-21.76	QP	
5	668.1422	30.32	-6.09	24.23	46.00	-21.77	QP	
6	887.6096	29.99	-3.32	26.67	46.00	-19.33	QP	

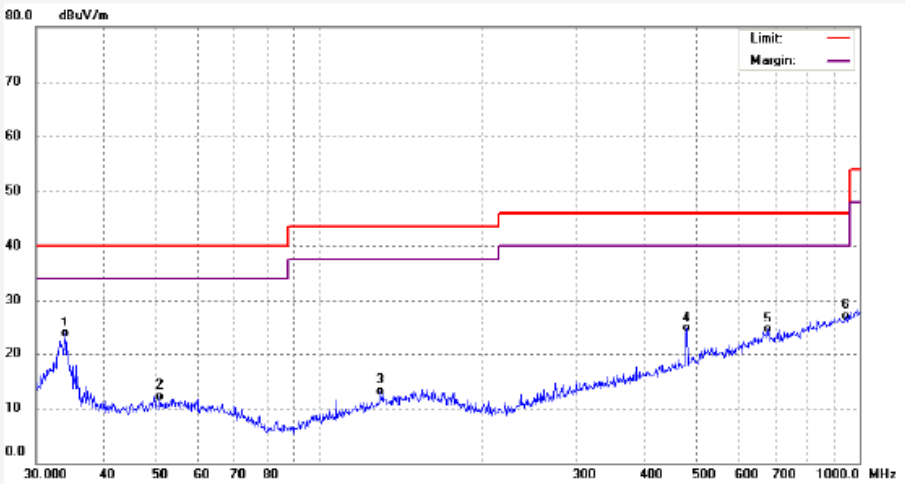
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.6802	30.16	-18.01	12.15	40.00	-27.85	QP	
2	43.2014	30.26	-17.49	12.77	40.00	-27.23	QP	
3	56.0007	29.13	-17.10	12.03	40.00	-27.97	QP	
4	478.8455	36.23	-10.56	25.67	46.00	-20.33	QP	
5	627.2735	31.02	-7.17	23.85	46.00	-22.15	QP	
6	827.4932	30.52	-4.20	26.32	46.00	-19.68	QP	

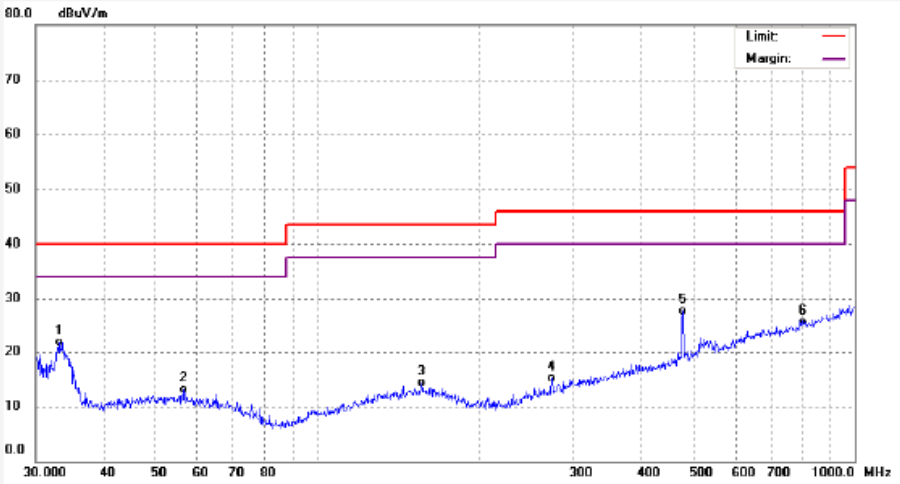
Mode: TX GFSK channel 39

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.9172	41.80	-18.00	23.80	40.00	-16.20	QP	
2	50.7635	29.00	-16.88	12.12	40.00	-27.88	QP	
3	129.9225	29.62	-16.50	13.12	43.50	-30.38	QP	
4	478.8455	35.19	-10.56	24.63	46.00	-21.37	QP	
5	677.5797	30.44	-5.89	24.55	46.00	-21.45	QP	
6	942.1304	29.37	-2.22	27.15	46.00	-18.85	QP	

Polarization: Vertical

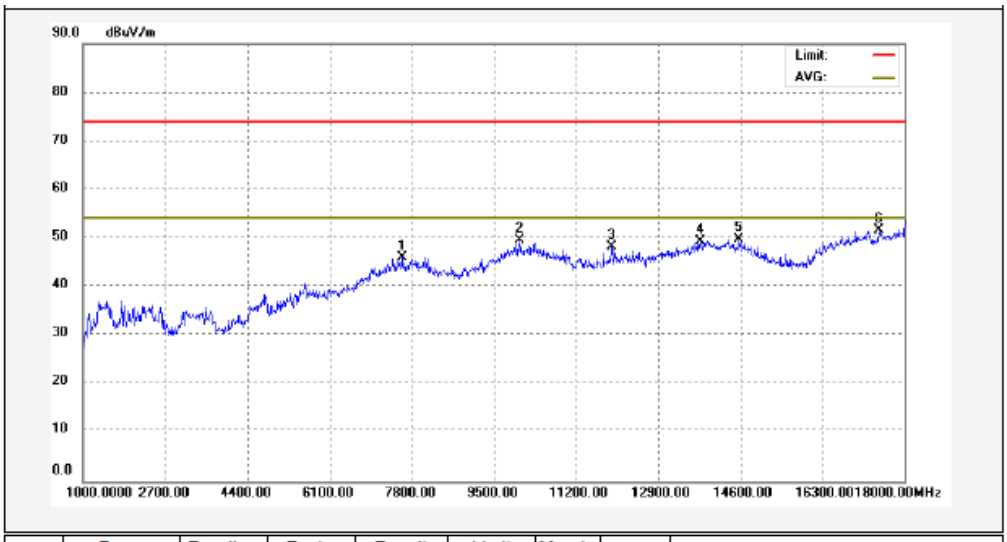


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	33.2111	39.82	-18.03	21.79	40.00	-18.21	QP	
2	56.5929	30.18	-17.13	13.05	40.00	-26.95	QP	
3	156.4576	29.54	-15.33	14.21	43.50	-29.29	QP	
4	273.2339	31.02	-15.83	15.19	46.00	-30.81	QP	
5	478.8455	38.19	-10.56	27.63	46.00	-18.37	QP	
6	798.9796	29.88	-4.18	25.70	46.00	-20.30	QP	

Test Frequency: 1GHz~18GHz
Model: Buffalo-DS531-B

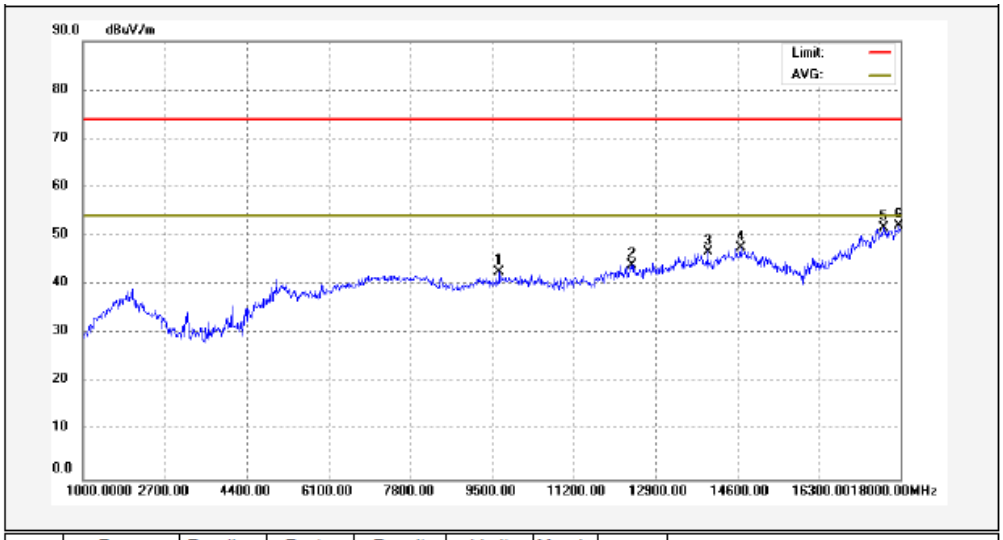
Mode: TX GFSK channel 0

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7613.000	43.24	2.76	46.00	74.00	-28.00	peak	
2	10027.000	44.42	5.11	49.53	74.00	-24.47	peak	
3	11931.000	41.82	6.35	48.17	74.00	-25.83	peak	
4	13767.000	39.11	10.32	49.43	74.00	-24.57	peak	
5	14566.000	40.10	9.72	49.82	74.00	-24.18	peak	
6	17473.000	34.34	17.35	51.69	74.00	-22.31	peak	

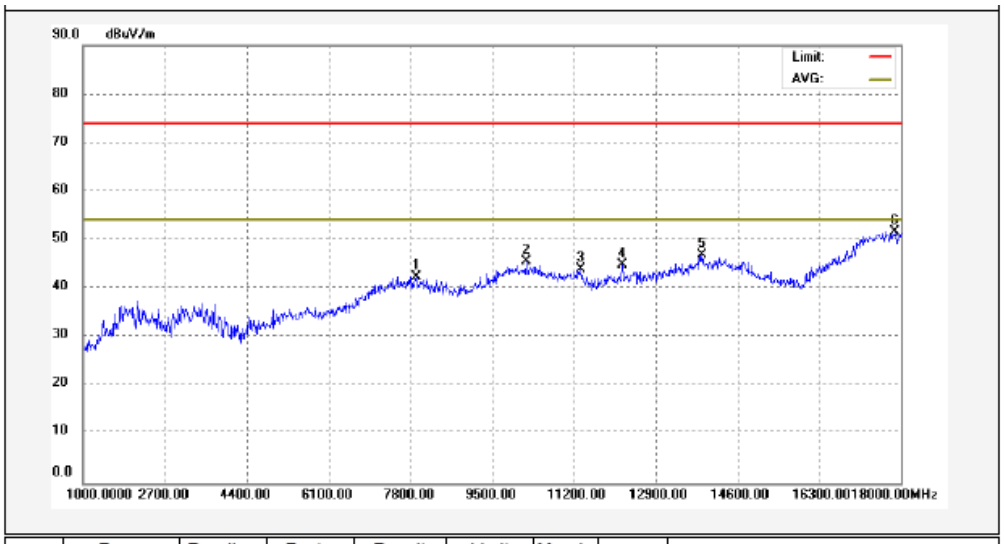
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	9653.000	38.97	3.61	42.58	74.00	-31.42	peak	
2	12407.000	37.06	6.93	43.99	74.00	-30.01	peak	
3	13988.000	37.23	9.57	46.80	74.00	-27.20	peak	
4	14668.000	37.29	10.26	47.55	74.00	-26.45	peak	
5	17643.000	36.10	15.54	51.64	74.00	-22.36	peak	
6	17966.000	35.45	16.64	52.09	74.00	-21.91	peak	

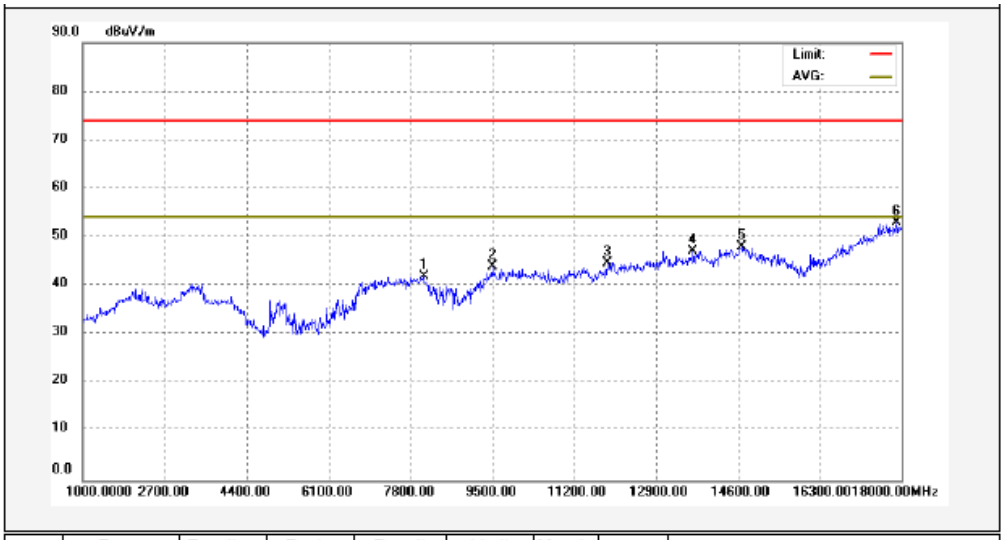
Mode: TX GFSK channel 19

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7919.000	39.59	2.85	42.44	74.00	-31.56	peak	
2	10214.000	40.31	5.31	45.62	74.00	-28.38	peak	
3	11353.000	37.60	6.49	44.09	74.00	-29.91	peak	
4	12203.000	38.42	6.53	44.95	74.00	-29.05	peak	
5	13869.000	36.29	10.57	46.86	74.00	-27.14	peak	
6	17881.000	33.29	18.40	51.69	74.00	-22.31	peak	

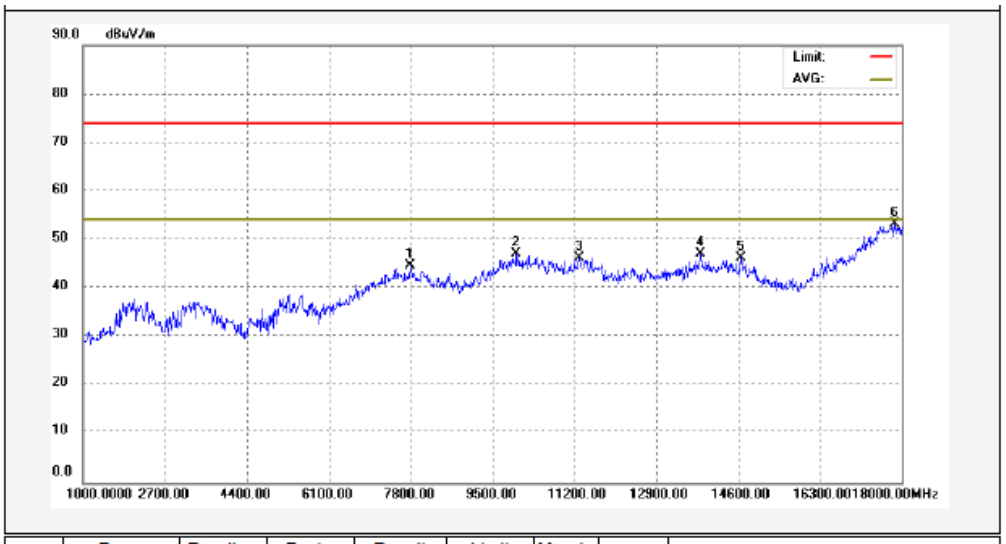
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	8072.000	39.85	2.17	42.02	74.00	-31.98	peak	
2	9500.000	40.54	3.49	44.03	74.00	-29.97	peak	
3	11880.000	38.44	6.23	44.67	74.00	-29.33	peak	
4	13665.000	37.69	9.51	47.20	74.00	-26.80	peak	
5	14668.000	37.89	10.26	48.15	74.00	-25.85	peak	
6	17898.000	36.47	16.41	52.88	74.00	-21.12	peak	

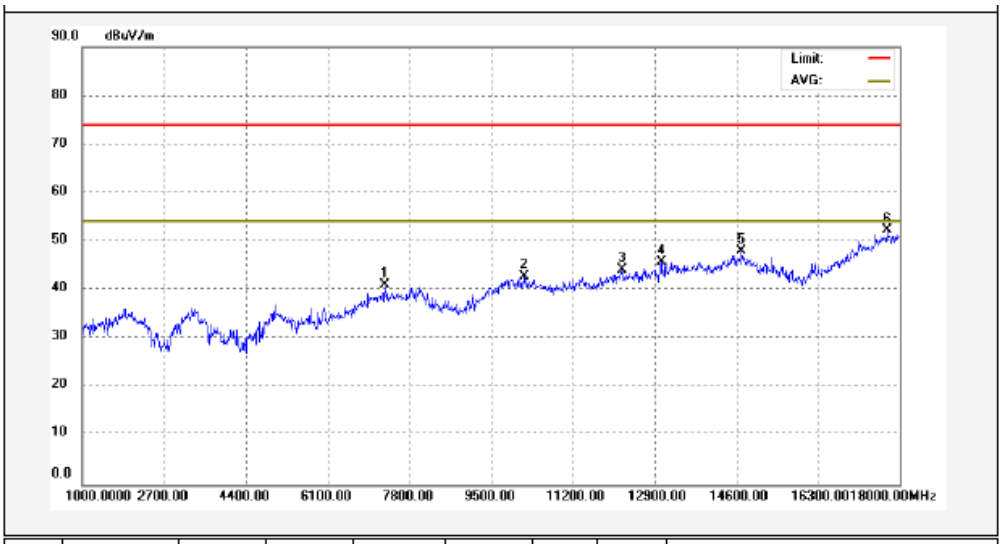
Mode: TX GFSK channel 39

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7783.000	41.77	2.81	44.58	74.00	-29.42	peak	
2	9993.000	41.99	5.06	47.05	74.00	-26.95	peak	
3	11302.000	39.88	6.43	46.31	74.00	-27.69	peak	
4	13818.000	36.63	10.45	47.08	74.00	-26.92	peak	
5	14651.000	36.79	9.45	46.24	74.00	-27.76	peak	
6	17847.000	34.90	18.32	53.22	74.00	-20.78	peak	

Polarization: Vertical

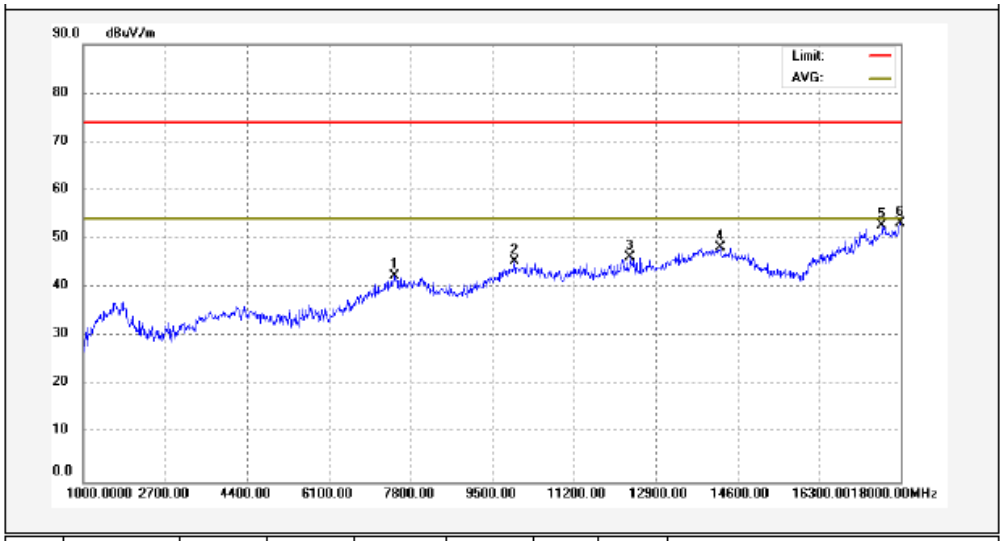


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7290.000	38.73	2.22	40.95	74.00	-33.05	peak	
2	10180.000	38.67	4.15	42.82	74.00	-31.18	peak	
3	12220.000	37.66	6.64	44.30	74.00	-29.70	peak	
4	13036.000	37.11	8.62	45.73	74.00	-28.27	peak	
5	14702.000	37.93	10.22	48.15	74.00	-25.85	peak	
6	17745.000	36.46	15.89	52.35	74.00	-21.65	peak	

Model: Buffalo-DS531-C

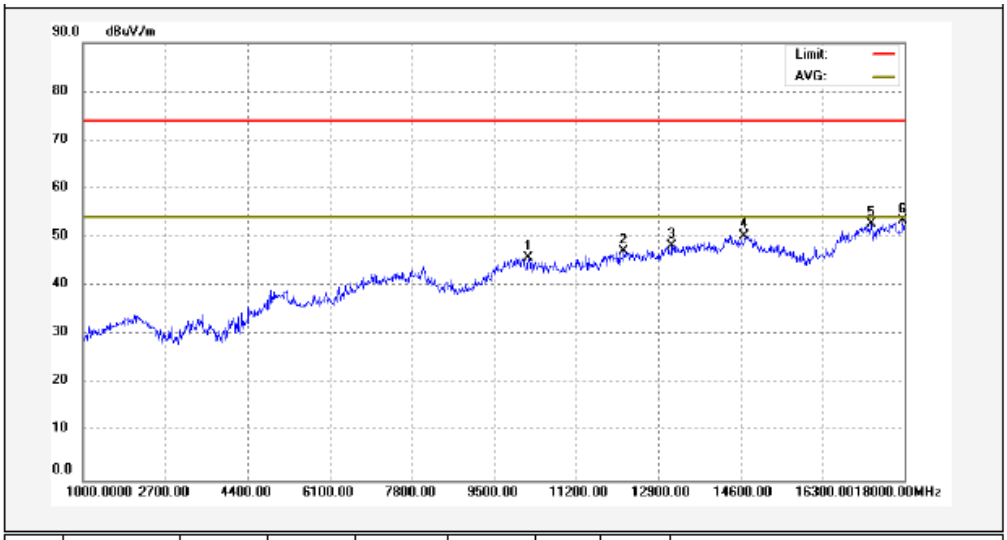
Mode: TX GFSK channel 0

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7460.000	39.66	2.69	42.35	74.00	-31.65	peak	
2	9959.000	40.40	5.02	45.42	74.00	-28.58	peak	
3	12373.000	39.61	6.73	46.34	74.00	-27.66	peak	
4	14243.000	37.74	10.42	48.16	74.00	-25.84	peak	
5	17609.000	34.98	17.80	52.78	74.00	-21.22	peak	
6	17983.000	34.57	18.62	53.19	74.00	-20.81	peak	

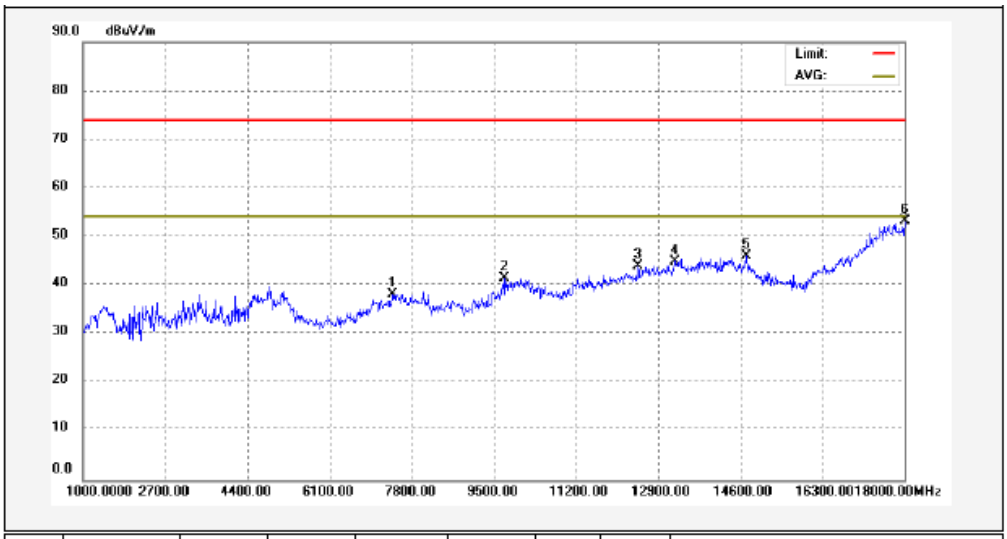
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	10214.000	41.67	4.20	45.87	74.00	-28.13	peak	
2	12186.000	40.60	6.58	47.18	74.00	-26.82	peak	
3	13189.000	39.36	8.91	48.27	74.00	-25.73	peak	
4	14685.000	40.16	10.24	50.40	74.00	-23.60	peak	
5	17303.000	38.41	14.30	52.71	74.00	-21.29	peak	
6	17966.000	36.82	16.64	53.46	74.00	-20.54	peak	

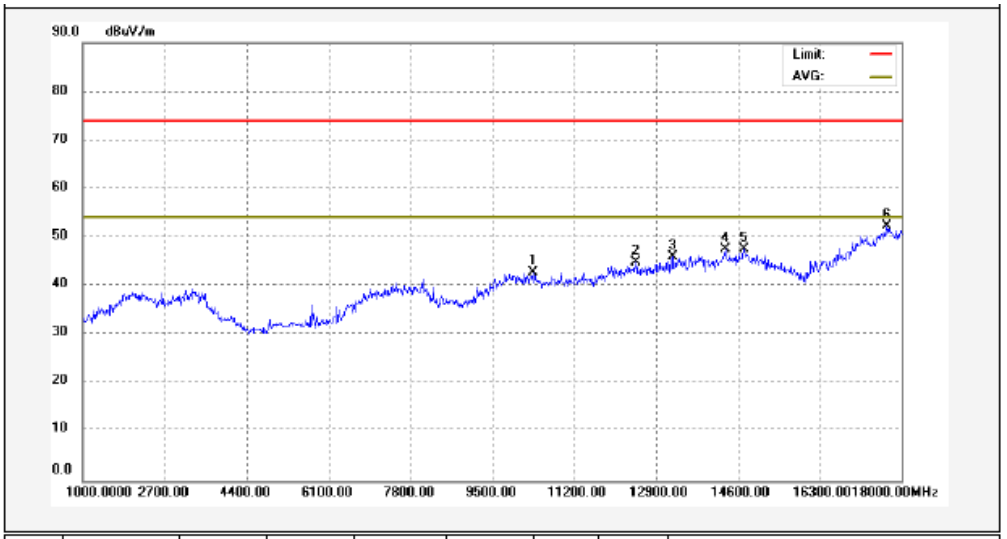
Mode: TX GFSK channel 19

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7409.000	35.51	2.66	38.17	74.00	-35.83	peak	
2	9704.000	36.81	4.61	41.42	74.00	-32.58	peak	
3	12475.000	37.10	6.85	43.95	74.00	-30.05	peak	
4	13240.000	36.06	8.94	45.00	74.00	-29.00	peak	
5	14719.000	36.79	9.22	46.01	74.00	-27.99	peak	
6	18000.000	34.59	18.66	53.25	74.00	-20.75	peak	

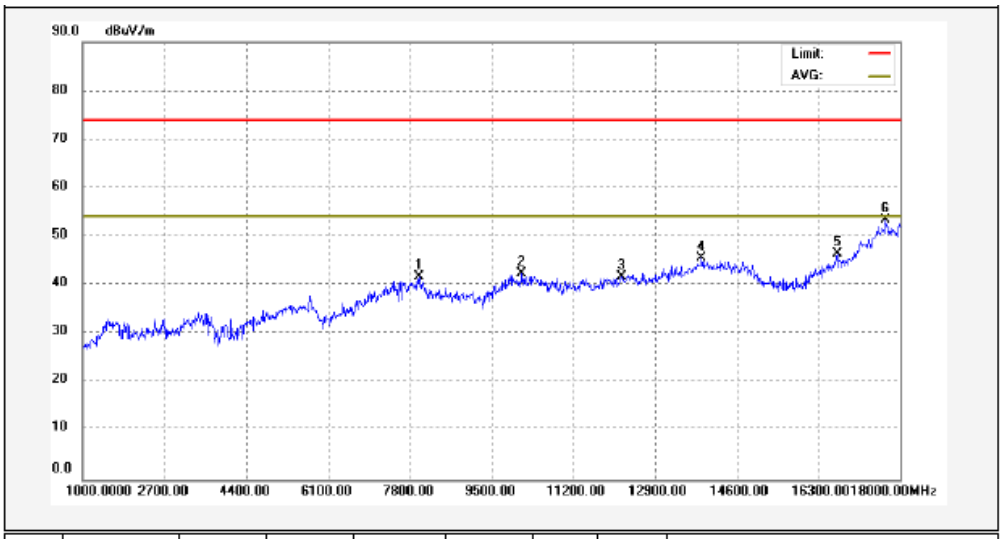
Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	10350.000	38.41	4.40	42.81	74.00	-31.19	peak	
2	12475.000	37.89	7.04	44.93	74.00	-29.07	peak	
3	13240.000	36.99	9.00	45.99	74.00	-28.01	peak	
4	14328.000	37.35	10.14	47.49	74.00	-26.51	peak	
5	14719.000	37.44	10.20	47.64	74.00	-26.36	peak	
6	17694.000	36.53	15.72	52.25	74.00	-21.75	peak	

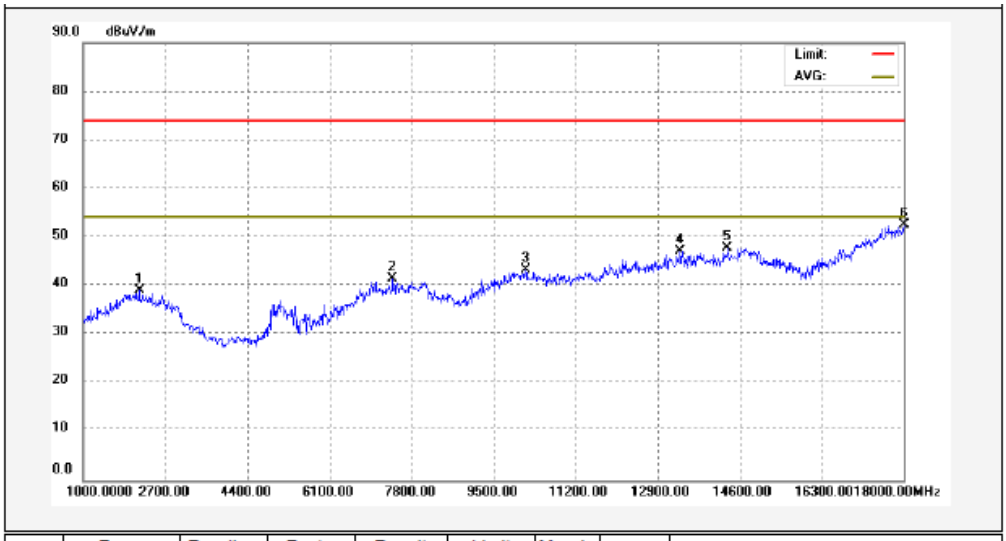
Mode: TX GFSK channel 39

Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	7987.000	38.87	2.85	41.72	74.00	-32.28	peak	
2	10129.000	37.15	5.22	42.37	74.00	-31.63	peak	
3	12203.000	35.12	6.53	41.65	74.00	-32.35	peak	
4	13869.000	34.88	10.57	45.45	74.00	-28.55	peak	
5	16691.000	34.17	12.28	46.45	74.00	-27.55	peak	
6	17694.000	35.35	17.98	53.33	74.00	-20.67	peak	

Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2156.000	50.08	-10.94	39.14	74.00	-34.86	peak	
2	7409.000	39.39	2.06	41.45	74.00	-32.55	peak	
3	10163.000	39.19	4.13	43.32	74.00	-30.68	peak	
4	13359.000	37.94	9.21	47.15	74.00	-26.85	peak	
5	14345.000	37.75	10.17	47.92	74.00	-26.08	peak	
6	18000.000	35.84	16.76	52.60	74.00	-21.40	peak	

Test Frequency: 18GHz~25GHz

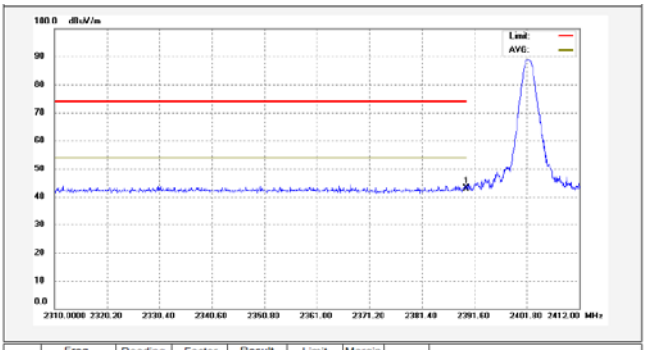
The measurements were more than 20 dB below the limit and not reported.

Within restricted frequency band

Model: Buffalo-DS531-B

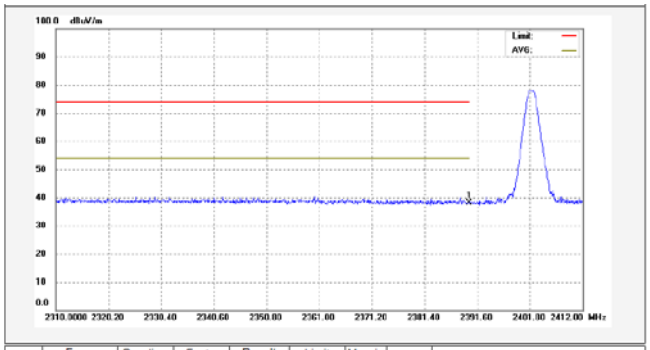
Polarization: Horizontal

2310 to 2390MHz



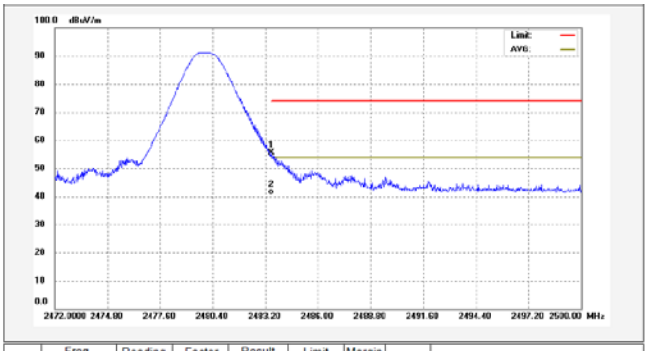
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2390.000	50.98	-8.05	42.93	74.00	-31.07	peak	

Polarization: Vertical

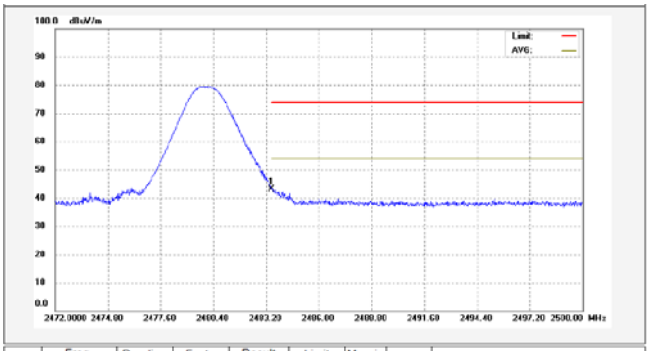


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2390.000	49.94	-11.80	38.14	74.00	-35.86	peak	

2483.5MHz to 2500MHz



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	63.62	-7.93	55.69	74.00	-18.31	peak	
2	2483.500	49.46	-7.93	41.53	54.00	-12.47	AVG	

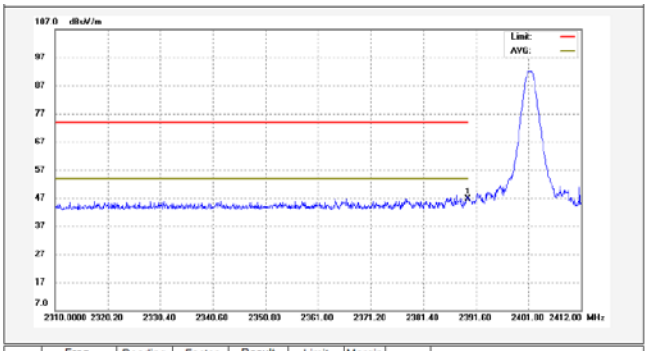


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	55.30	-12.15	43.15	74.00	-30.85	peak	

Model: Buffalo-DS531-C

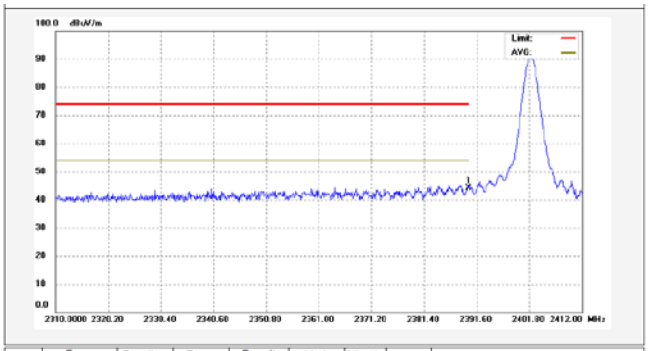
Polarization: Horizontal

2310 to 2390MHz



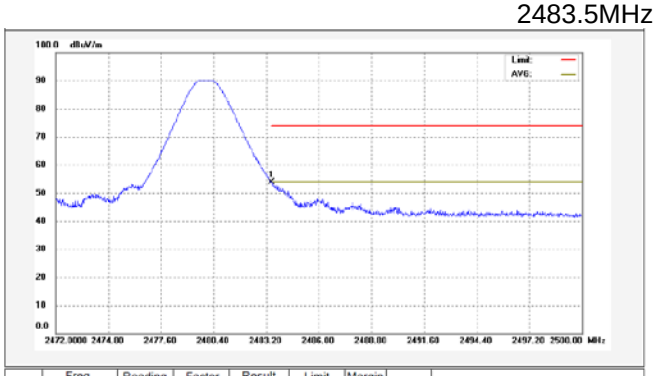
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2390.000	54.69	-8.05	46.64	74.00	-27.36	peak	

Polarization: Vertical

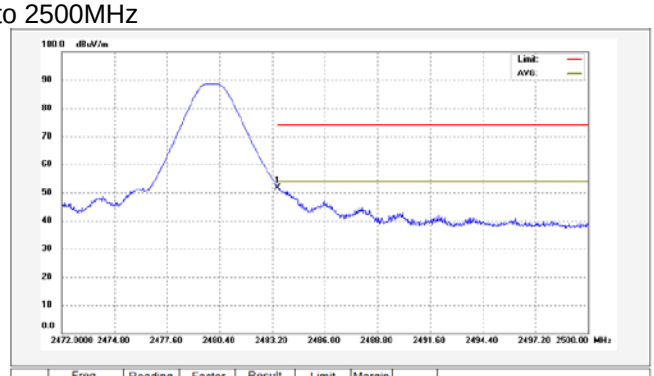


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2390.000	55.81	-11.80	44.01	74.00	-29.99	peak	

2483.5MHz to 2500MHz



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	61.72	-7.93	53.79	74.00	-20.21	peak	



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	63.76	-12.15	51.61	74.00	-22.39	peak	

9 Band Edge Measurement

Test Requirement:	FCC 47CFR Part 15 Section 15.247
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	Regulation 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

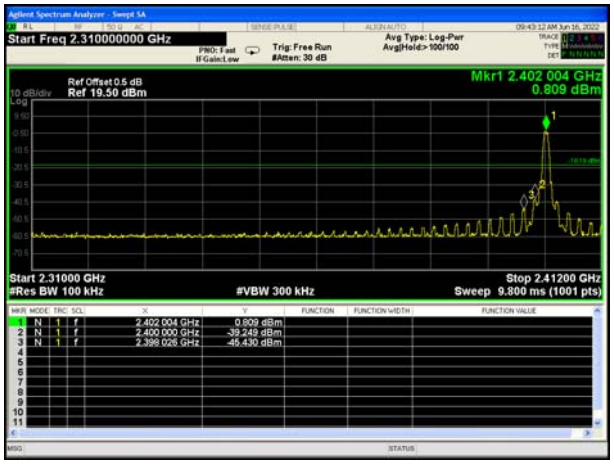
9.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

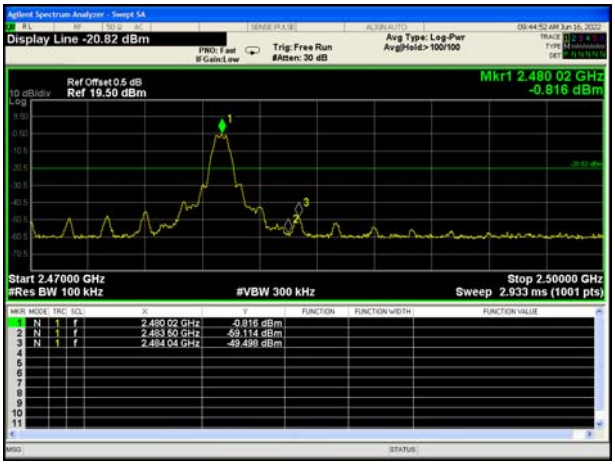
9.2 Test Result

Test result plots shown as follows:

BLE: Band edge-left side



BLE: Band edge-right side



10 6 dB Bandwidth Measurement

Test Requirement:	FCC 47CFR Part 15 Section 15.247
Test Method:	ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	§15.247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Mode:	Transmitting

10.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

99% Bandwidth Set the spectrum analyzer: 1~5% of the OBW, VBW = 3 times the RBW

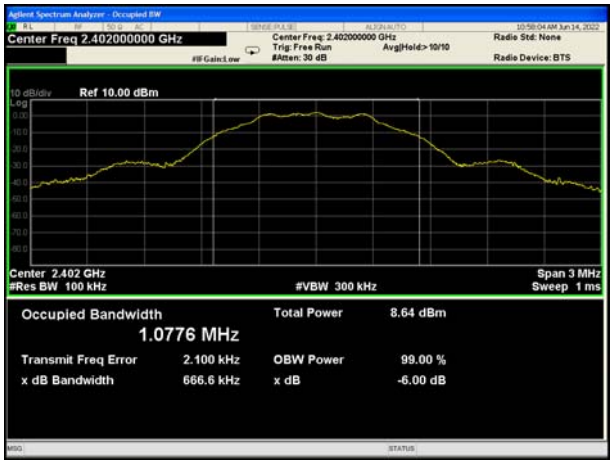
10.2 Test Result:

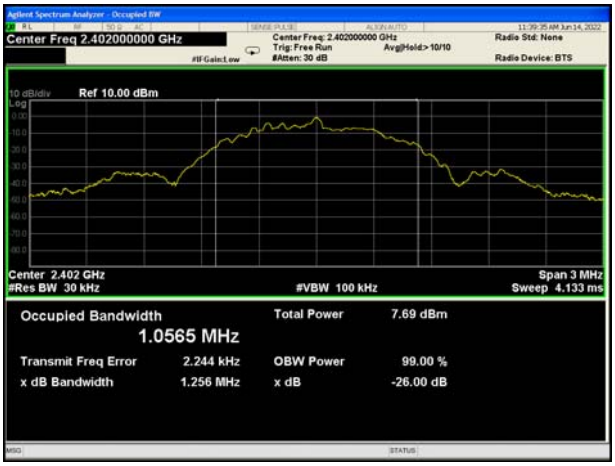
Operation mode	Test Channel	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BLE	Channel 0	0.667	1.057
	Channel 19	0.663	1.043
	Channel 39	0.687	1.055

Test result plot:

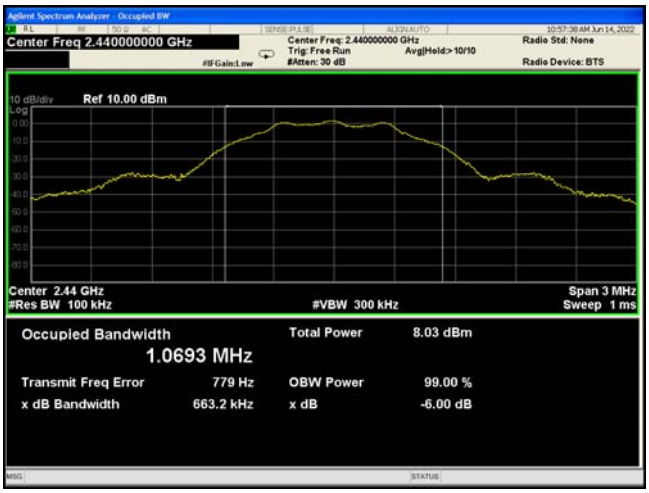
6 dB Bandwidth 99% Bandwidth

Mode: TX GFSK channel 0

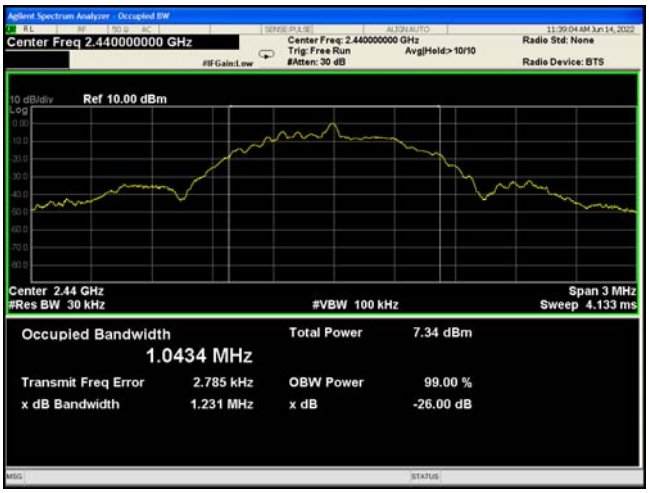




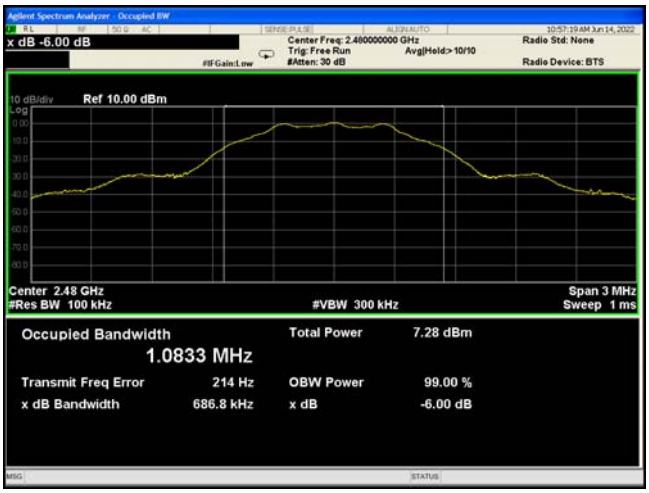
6 dB Bandwidth

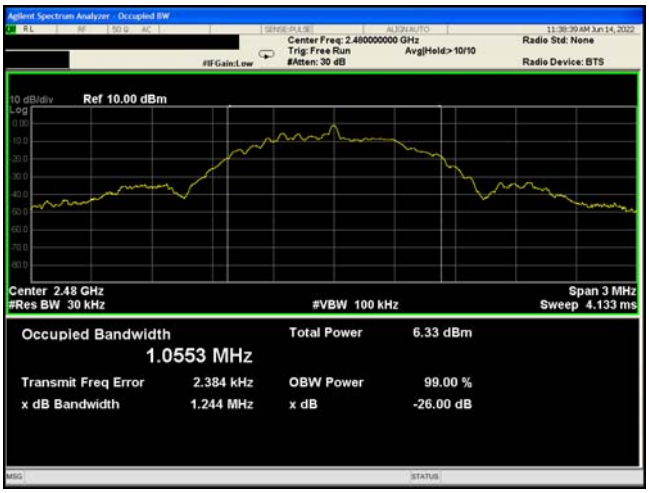


99% Bandwidth



Mode: TX GFSK channel 19





Mode: TX GFSK channel 39

11 Maximum Peak Output Power

Test Requirement:	FCC 47CFR Part 15 Section 15.247
Test Method:	ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	§15.247(b) The maximum peak conducted output power of the intentional radiator shall not exceed 1W.
Test Mode:	Transmitting

11.1 Test Procedure:

According to KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Section 8.3.1.1 RBW ≥ DTS bandwidth

Subclause 11.9.1.1 of ANSI C63.10 is applicable.

Section 8.3.1.2 Integrated band power method

For measuring the output power of a device transmitting a wide-band noise-like signal where the peak power amplitude is a statistical parameter, the preferred methodology is to use an integrated average power measurement, as described in 8.3.2. The peak integrated band power method of 11.9.1 in ANSI C63.10 is not applicable.

Subclause 11.9.2 of ANSI C63.10 is applicable.

11.2 Test Result:

Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
BLE	Low-2402	2.111	1W/30dBm
	Middle-2440	1.589	1W/30dBm
	High-2480	0.716	1W/30dBm

Test Plot

Mode: TX GFSK channel 0

Mode: TX GFSK channel 19

Mode: TX GFSK channel 39

12 Power Spectral density

Test Requirement:	FCC 47CFR Part 15 Section 15.247
Test Method:	ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	§15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
Test Mode:	Transmitting

12.1 Test Procedure:

According to KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 8.4

Subclause 11.10 of ANSI C63.10 is applicable.

Choose the test procedure according to the product type

Peak PSD

Subclause 11.10.2 of ANSI C63.10 is applicable.

AVG PSD

Subclause 11.10.3/4/5/6/7/8 of ANSI C63.10 is applicable.

12.2 Test Result:

Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
BLE	Low-2402	-13.541	8dBm per 3kHz
	Middle-2440	-13.474	8dBm per 3kHz
	High-2480	-14.046	8dBm per 3kHz

Test Plot

Mode: TX GFSK channel 0

Mode: TX GFSK channel 19

Mode: TX GFSK channel 39

13 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, 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. This product has two specified antennas fulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

14 RF Exposure

Remark: Please refer to MPE test report: WTN22D06110705W002.

15 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-Buffalo-DS531-B & Buffalo-DS531-C-Photos.

======End of Report======