

Prüfbericht-Nr.: <i>Test report No.:</i>	50067229 001	Auftrags-Nr.: <i>Order No.:</i>	164074141	Seite 1 von 26 <i>Page 1 of 26</i>	
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date.:</i>	18.09.2016		
Auftraggeber: <i>Client:</i>	THUMBS UP(UK) LTD Unit L, Braintree Industrial Estate, Braintree Road HA4 0EJ, Ruislip, LONDON, United Kingdom				
Prüfgegenstand: <i>Test item:</i>	Bluetooth Splash Speaker				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	SPLSPKBLKPRM, SPLSPKORNPRM, SPLSPKAQUPRM				
Auftrags-Inhalt: <i>Order content:</i>	FCC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15.247 CFR47 FCC Part 15.207 CFR47 FCC Part 15.209 CFR47 FCC Part 2.1093				
Wareneingangsdatum: <i>Date of receipt:</i>	08.10.2016			Please refer to photo documents	
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000461224-001 A000461224-002				
Prüfzeitraum: <i>Testing period:</i>	11.10.2016 - 01.12.2016				
Ort der Prüfung: <i>Place of testing:</i>	Emtek (Shenzhen) Co., Ltd.				
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by:	kontrolliert von / reviewed by:				
11.01.2017	Andy Yan / Project Manager	11.01.2017	Owen Tian / Technical Certifier		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other:					
FCC ID: 2AHHESPLSPKPRM All the Identification no. are identical in the hardware and electronic aspects with each other for marketing strategy only.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>		
* 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(pass) = entspricht o.g. Prüfgrundlage(n) F(fail) = entspricht nicht o.g. Prüfgrundlage(n) Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(pass) = passed a.m. test specifications(s) F(fail) = failed a.m. test specifications(s) N/A = nicht anwendbar N/T = nicht getestet N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

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Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Pass

5.1.4 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.5 20dB BANDWIDTH

RESULT: Pass

5.1.6 CARRIER FREQUENCY SEPARATION

RESULT: Pass

5.1.7 NUMBER OF HOPPING FREQUENCY

RESULT: Pass

5.1.8 TIME OF OCCUPANCY

RESULT: Pass

5.1.9 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

6.1.1 ELECTROMAGNETIC FIELDS

RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Bluetooth 4.1 (Single mode) of Conducted Testing

Appendix B: Test Results of Bluetooth 4.1 (Single mode) of Radiated Emission and AC Conducted Emission

2 Test Sites

2.1 Test Facilities

Emtek (Shenzhen) Co., Ltd.

Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen Guangdong, China

FCC Registration No.: 406365

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment
Emtek (Shenzhen) Co., Ltd.

Radio Spectrum Test				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Signal Analyzer	Agilent	N9010A	My53470879	28.05.2017
Spurious Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	Rohde & Schwarz	ESCI	101414	28.05.2017
Spectrum Analyzer	Rohde & Schwarz	FSV40	132.1-3008K39-100967-AP	28.05.2017
Bilog Antenna	Schwarzbeck	VULB9163	660	29.05.2017
Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	28.05.2017
Horn Antenna	Schwarzbeck	BBHA 9120	1178	29.05.2017
Horn Antenna	Schwarzbeck	BBHA 9170	RS1307229170547	29.05.2017
Pre-Amplifier	Lunar EM	LNA1G18-48	J1011131010001	28.05.2017
Pre-Amplifier	LUNAR-EM	LNA30M3G-25	J10100000071	28.05.2017
RF Coaxial Cable	H+B	NmNm-7-C15702	--	29.05.2017
RF Coaxial Cable	H+B	NmSm-05-C15052	--	29.05.2017
RF Coaxial Cable	H+B	NmSm-2-C15201	--	29.05.2017
RF Coaxial Cable	H+B	NmNm-7-C15702	--	29.05.2017
RF Coaxial Cable	H+B	SAC-40G-1	6200283933	29.05.2017
RF Coaxial Cable	H+B	SUCOFLEX104	--	29.05.2017
RF Coaxial Cable	H+B	BLU18A-NmSm-6500	--	29.05.2017
Conducted Emission on AC Mains				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Test Receiver	R&S	ESCI	26115-010-0027	28.05.2017
L.I.S.N.	R&S	ENV216	101161	28.05.2017
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	29.05.2017

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table

Item	Extended Uncertainty
Conducted Emission	± 2.96 dB
Radiated Emission (9kHz-30MHz)	U=3.78dB, k=2, σ=95%
Radiated Emission (30-1000MHz)	U=4.27dB, k=2, σ=95%
Radiated Emission (above 1000MHz)	U=4.96dB, k=2, σ=95%
Occupied Channel Bandwidth	±5.0 %
RF Output Power, Conducted	±1.5 dB
Power Spectral Density, Conducted	±3.0 dB
Unwanted Emission, Conducted	±3.0 dB
Duty Cycle	±5.0 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The Emtek (Shenzhen) Co., Ltd. Test facility located at Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen Guangdong, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Bluetooth Splash Speaker which supports Bluetooth 4.1 (Single mode). This report is for Bluetooth function.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Bluetooth Splash Speaker
Type Designation	SPLSPKBLKPRM, SPLSPKORNPRM, SPLSPKAQUPRM
FCC ID	2AHHESPLSPKPRM
Operating Frequency	2402 - 2480 MHz
Operating Voltage	DC 3.7V rechargeable battery
Testing Voltage	DC 3.7V rechargeable battery or charged by USB port
Type of Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Channel Number	BDR & EDR mode: 79 channels
Channel Separation	BDR & EDR mode: 1MHz
Wireless Technology	Bluetooth 4.1 (Single mode)
Antenna Type	Integral Antenna
Max. Antenna Gain	0.00 dBi

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Table 3: RF Channel and Frequency of Bluetooth

RF Channel	Frequency (MHz)						
00	2402.00	20	2422.00	40	2442.00	60	2462.00
01	2403.00	21	2423.00	41	2443.00	61	2463.00
02	2404.00	22	2424.00	42	2444.00	62	2464.00
03	2405.00	23	2425.00	43	2445.00	63	2465.00
04	2406.00	24	2426.00	44	2446.00	64	2466.00
05	2407.00	25	2427.00	45	2447.00	65	2467.00
06	2408.00	26	2428.00	46	2448.00	66	2468.00
07	2409.00	27	2429.00	47	2449.00	67	2469.00
08	2410.00	28	2430.00	48	2450.00	68	2470.00
09	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	78	2480.00
19	2421.00	39	2441.00	59	2461.00	--	--

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Table 4: Frequency Hopping Information

Technical Specification	Description
Hopping Range	Hereby we declare that the frequency range of this device is 2402-2480MHz. This is according the Bluetooth Core Specification V2.1 + EDR for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests.
Hopping Sequence	Example of a 79 hopping sequence in data mode: 33,04,21,44,23,42,53,46,55,48,40,59,72,29,76,31,08,73, 07,75,09,45,60,39,58,13,47,11,77,52,35,50,65,54,67,56, 69,62,71,64, 7,25,27,66,57,70,74,61,78,63,10,41,05,43, 15,44,64,68,02,70,06,01,51,03,55,05,03,66,53,49,36,47..
Receiver input bandwidth	The input bandwidth of the receiver is 1MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packer has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth transmitting mode (BDR & EDR mode)
 - a) Low Channel
 - b) Middle Channel
 - c) High Channel
- B. On, Transmitting on Hopping channel
- C. On, Bluetooth connecting mode

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- Schematics
- Technical Description
- FCC/IC Label and Location Info
- Photo Document
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
iPhone 5C	Apple	A1526	--	--
Adapter	ME	G051B-050200B-1	--	Input: 100-240V,50/60Hz 0.25A Output: 5V-2A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

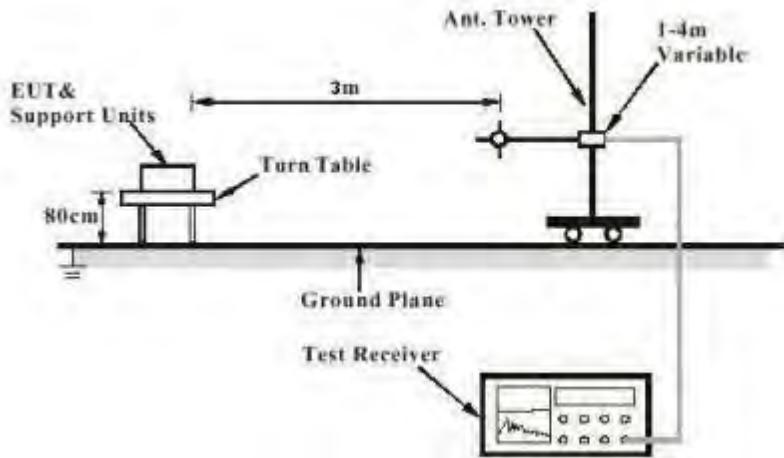
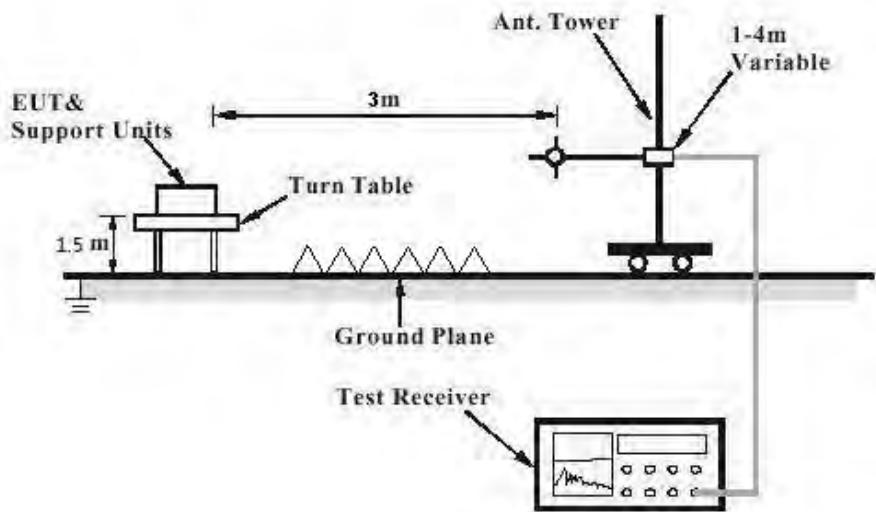
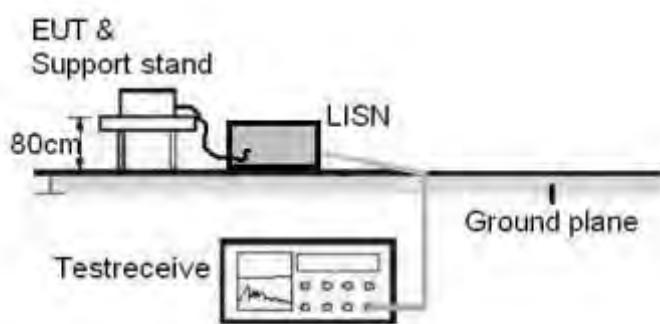
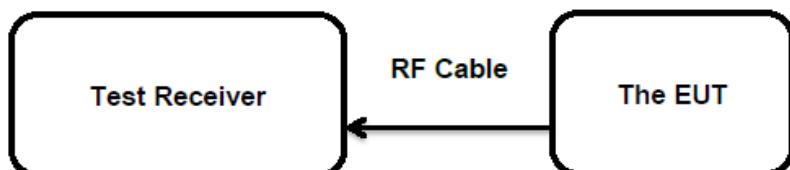


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



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Test Report No.Seite 13 von 26
Page 13 of 26**Diagram of Measurement Configuration for Mains Conduction Measurement****Diagram of Measurement Configuration for Conducted Transmitter Measurement**

5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: Pass

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has an integral antenna, the directional gain of antenna is 0dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

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5.1.2 Maximum Peak Conducted Output Power

RESULT:
Pass
Test Specification

Test standard	:	FCC Part 15.247(b)(1)&(3)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 0.125 Watts
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	11.10.2016
Input voltage	:	DC 3.7V fully charged lithium battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 6: Test Result of Maximum Peak Conducted Output Power

Test Mode	Channel Frequency (MHz)	Measured Peak Output Power		Limit (W)
		(dBm)	(W)	
BDR	2402	-3.389	0.458	< 0.125
	2441	-3.963	0.402	
	2480	-4.682	0.340	
EDR	2402	-3.456	0.451	< 0.125
	2441	-4.022	0.396	
	2480	-4.692	0.339	
Maximum Measured Value		-3.389	0.458	/

Note: The cable loss 1.0 dB is taken into account in results.

This testing was carried out on all operation modes, but only the worst case was presented in this report.

For the measurement records, refer to the appendix A.

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*Test Report No.*Seite 16 von 26
Page 16 of 26**5.1.3 Conducted Spurious Emissions Measured in 100 kHz Bandwidth****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	11.10.2016
Input voltage	:	DC 3.7V fully charged lithium battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to following test plot, and compliance is achieved as well.

For the measurement records, refer to the appendix A.

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Page 17 of 26**5.1.4 Radiated Spurious Emission****RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d) & FCC Part 15.205
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 25.11.2016 - 01.12.2016
Input voltage	: DC 3.7V fully charged lithium battery or Charged by USB Port of adapter with input: 120V/60Hz
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

Remark:

During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions. After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation shown in the test set-up photos.

Pre-test the EUT in continuous transmitting with different data packet. Compliance test in continuous transmitting mode with BDR as the worst case was found and reported.

Testing was carried out within frequency range 9kHz to the tenth harmonics.

For the measurement records, refer to the appendix B.

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5.1.5 20dB Bandwidth

RESULT:
Pass
Test Specification

Test standard	:	FCC Part 15.247(a)(1)
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	14.10.2016
Input voltage	:	DC 3.7V fully charged lithium battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 7: Test Result of 20dB Bandwidth

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
BDR	2402	1103	735	Within the Frequency band 2400~2483.5MHz
	2441	1103	735	
	2480	1100	733	
EDR	2402	1319	879	Within the Frequency band 2400~2483.5MHz
	2441	1304	869	
	2480	1303	869	
Maximum Measured Value		1319	879	

For the measurement records, refer to the appendix A.

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5.1.6 Carrier Frequency Separation

RESULT:
Pass
Test Specification

Test standard	:	FCC Part 15.247(a)(1)
Basic standard	:	ANSI C63.10: 2013
Limits	:	$\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth, whichever is greater
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	11.10.2016
Input voltage	:	DC 3.7V fully charged lithium battery
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 8: Test Result of Carrier Frequency Separation

Channel	Channel Frequency (MHz)	Measured Channel Separation (KHz)	Limit (kHz)	Result
Low Channel	2402	999	$\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth	Pass
Adjacency Channel	2403			
Middle Channel	2441	1074	$\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth	Pass
Adjacency Channel	2442			
High Channel	2480	993	$\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth	Pass
Adjacency Channel	2479			

Note:

The limit is maximum 2/3 of the 20 dB bandwidth: 879 KHz.

For the measurement records, refer to the appendix A.

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Page 20 of 26**5.1.7 Number of Hopping Frequency****RESULT:****Pass****Test Specification**

Test standard	:	FCC part 15.247(a)(1)(iii)
Basic standard	:	ANSI C63.10: 2013
Limits	:	≥ 15 non-overlapping channels
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	14.10.2016
Input voltage	:	DC 3.7V fully charged lithium battery
Operation mode	:	B
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 9: Test Result of Number of Hopping Frequency

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2402 to 2480 MHz	79	≥ 15	Pass

For the measurement records, refer to the appendix A.

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Page 21 of 26**5.1.8 Time of Occupancy****RESULT:****Pass****Test Specification**

Test standard	:	FCC part 15.247(a)(1)(iii)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 0.4s
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	11.10.2016
Input voltage	:	DC 3.7V fully charged lithium battery
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

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Table 10: Test Result of Time of Occupancy

Test Mode	Test Channel	Data Packet	Pulse width (ms)	Measured Dwell time(s)	Limit (s)
BDR mode	2402	DH1	0.356	0.114	< 0.4s
		DH3	1.659	0.265	
		DH5	2.890	0.308	
	2441	DH1	0.404	0.129	
		DH3	1.652	0.264	
		DH5	2.950	0.315	
	2480	DH1	0.408	0.131	
		DH3	1.652	0.264	
		DH5	2.930	0.313	
EDR mode	2402	3DH1	0.356	0.114	< 0.4s
		3DH3	1.645	0.263	
		3DH5	2.950	0.315	
	2441	3DH1	0.408	0.131	
		3DH3	1.659	0.265	
		3DH5	2.900	0.309	
	2480	3DH1	0.408	0.131	
		3DH3	1.645	0.263	
		3DH5	2.900	0.309	
Maximum Measured Value			2.950	0.315	

Note:

Dwell time = Pulse width x (Hopping rate / Number of channels) x Period

Period = 0.4 x 79 (channel) = 31.6 seconds

This testing was carried out on all operation modes, but only the worst case was presented in this report.

For the measurement records, refer to the appendix A.

Prüfbericht - Nr.: 50067229 001
*Test Report No.*Seite 23 von 26
Page 23 of 26**5.1.9 Conducted Emission on AC Mains****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.207(a)
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	23.11.2016
Input voltage	:	AC 120V/60Hz
Operation mode	:	C
Earthing	:	Not connected
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:**Pass****Test Specification**

Test standard : CFR47 FCC Part 2.1093
Limit : FCC KDB Publication 447498 v06

Measurement Record:

The minimum distance for the EUT is less than 5mm.

The maximum specified e.i.r.p.: -3.0 dBm = 0.5 mW

Antenna Gain: 0dBi

According to KDB 447498 D01 v06 4.3.1 a)

Exempted Power for this Bluetooth device: 9.5mW, hence the EUT is compliance with the RF exposure.

7 Photographs of the Test Set-Up

Photograph 1: Set-up for Radiated Spurious Emission up to 1GHz

Please refer to the attached setup photos.

Photograph 2: Set-up for Radiated Spurious Emission above 1GHz

Please refer to the attached setup photos.

Photograph 3: Set-up for Conducted Emission on AC Mains

Please refer to the attached setup photos.

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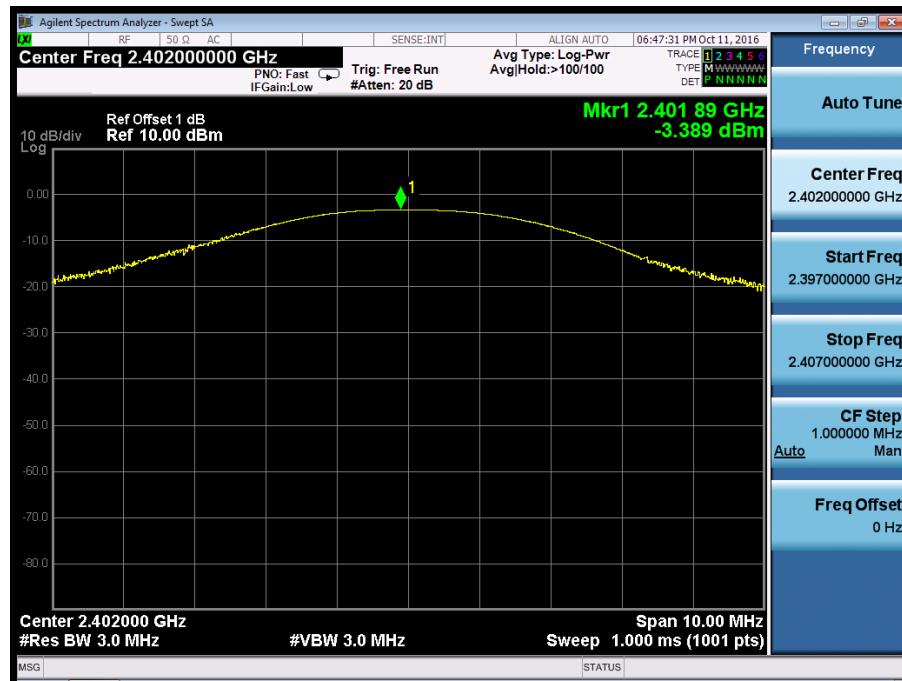
Appendix A

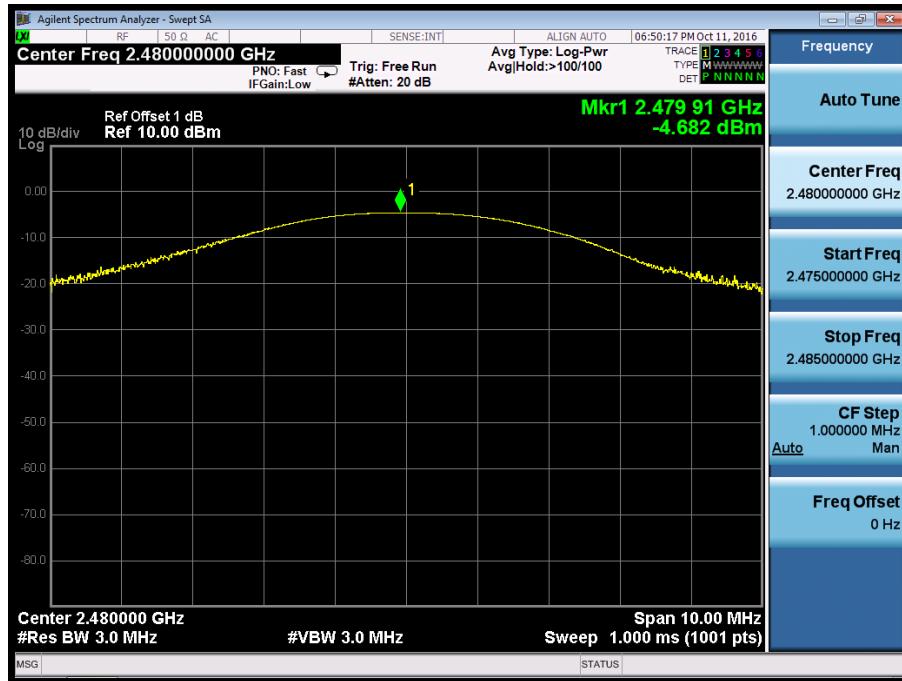
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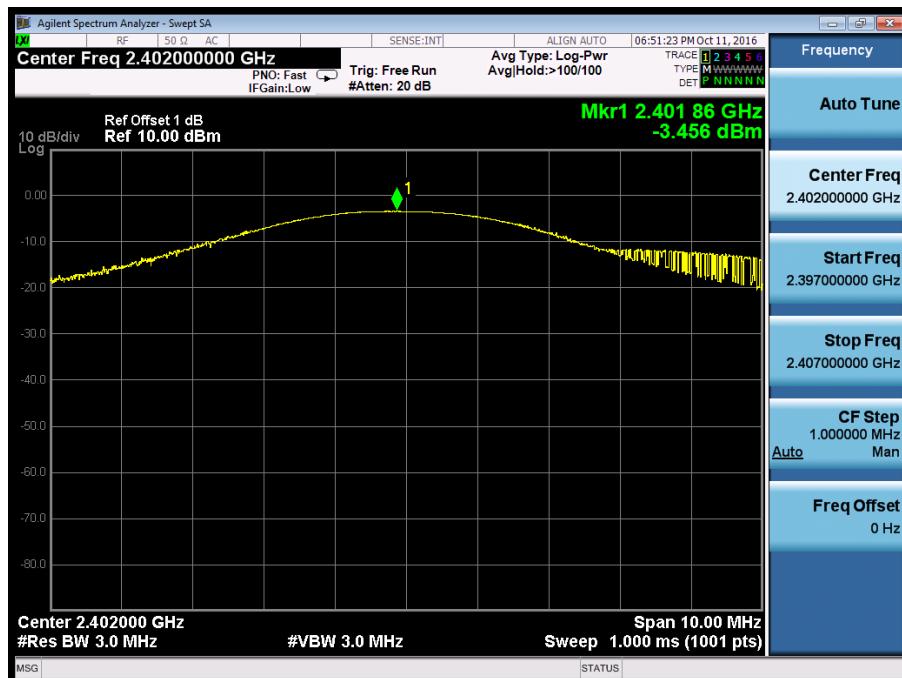
Appendix A.1: Test Plots of Maximum Peak Conducted Output Power

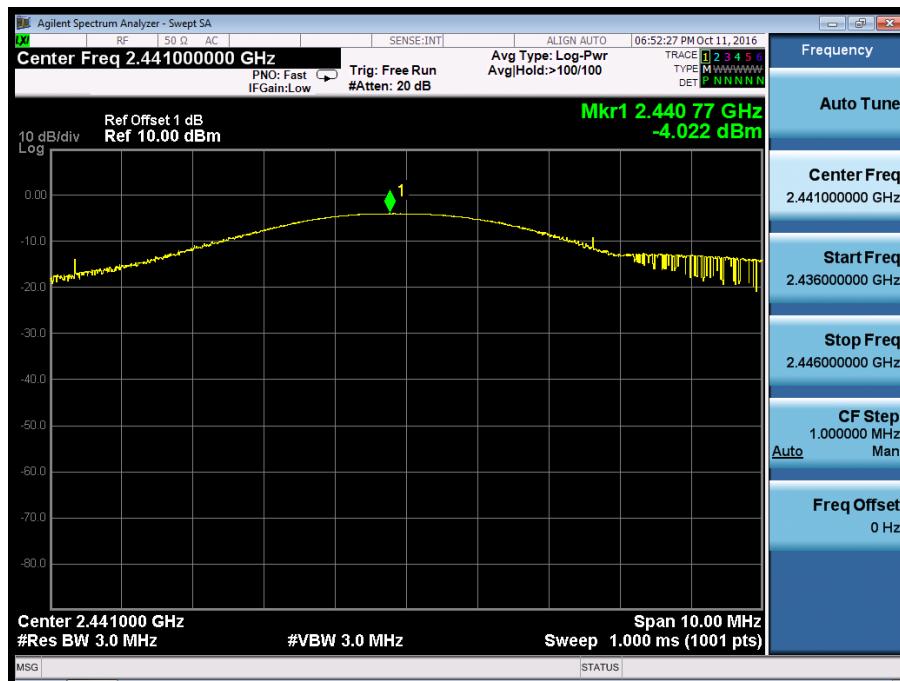
BDR Mode, DH1





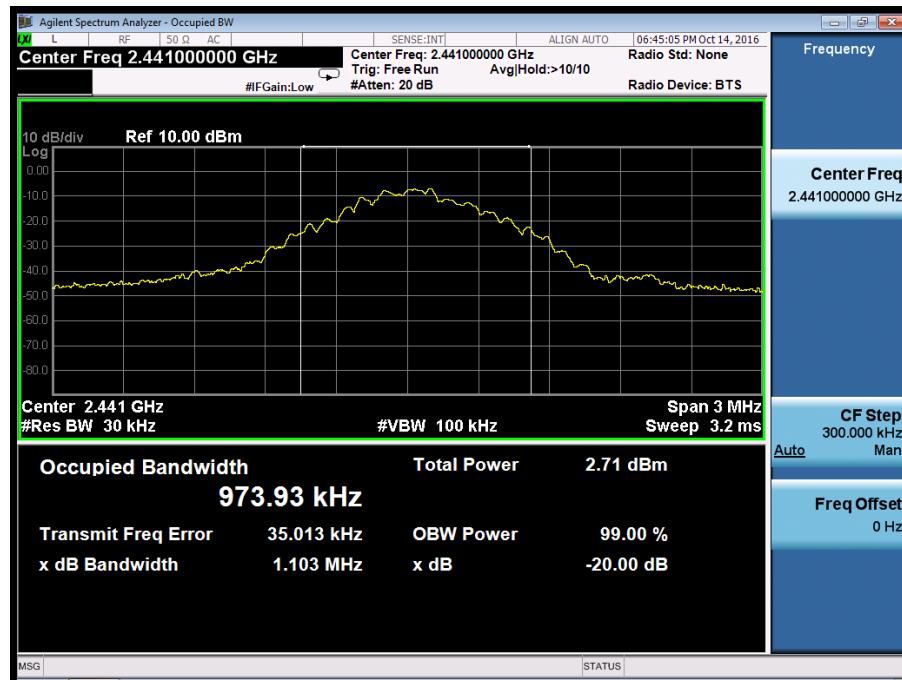
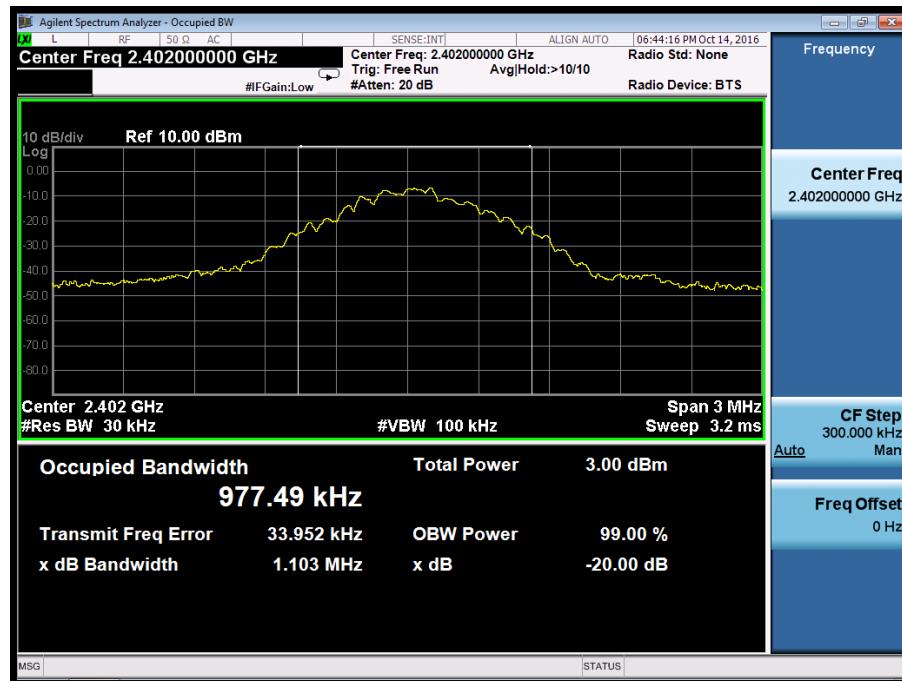
EDR Mode, 3DH1





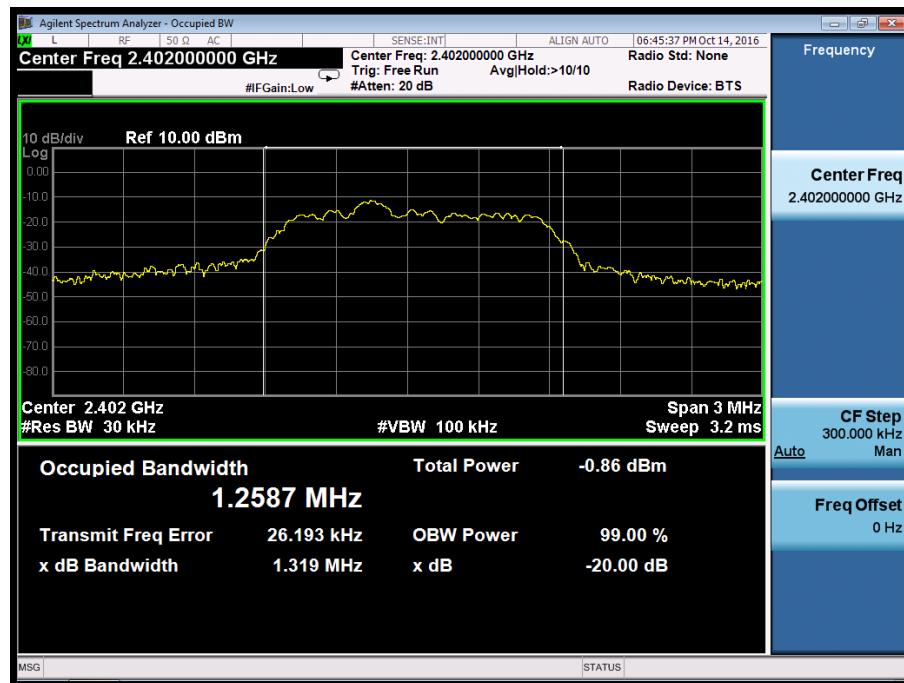
Appendix A.2: Test Plots of 20dB Bandwidth

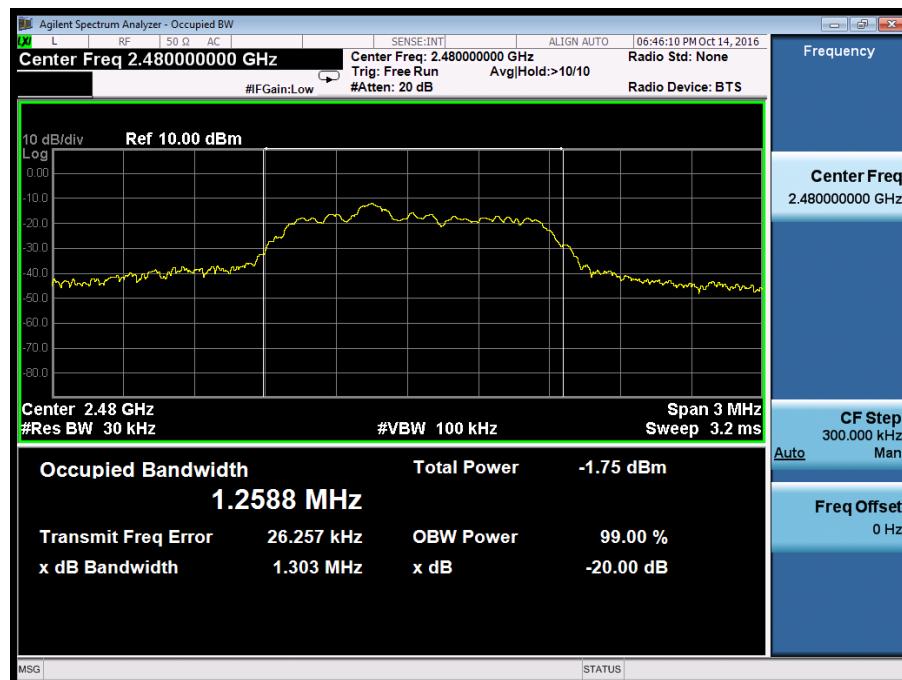
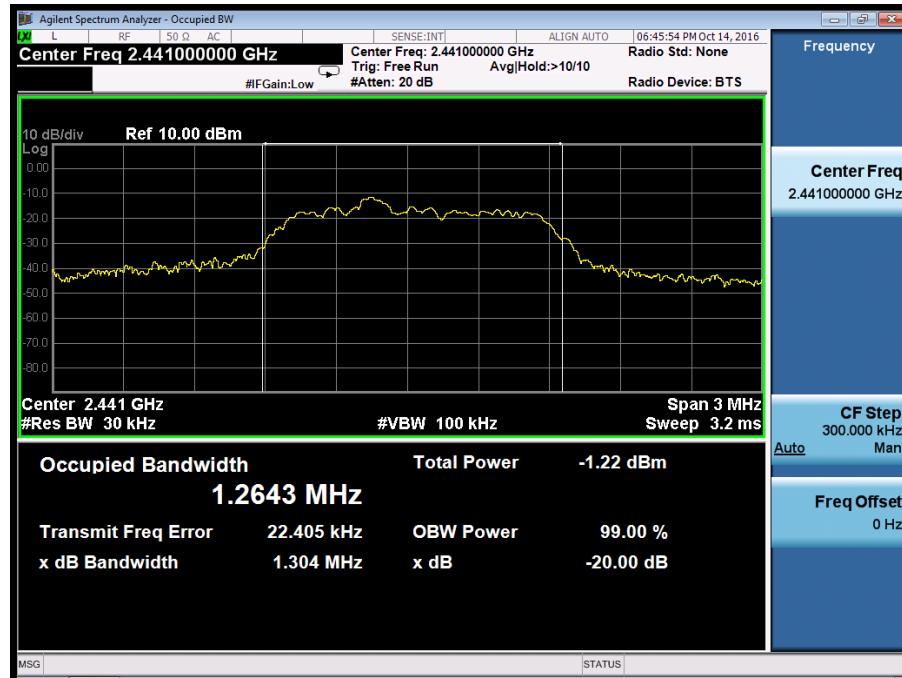
BDR Mode, DH1





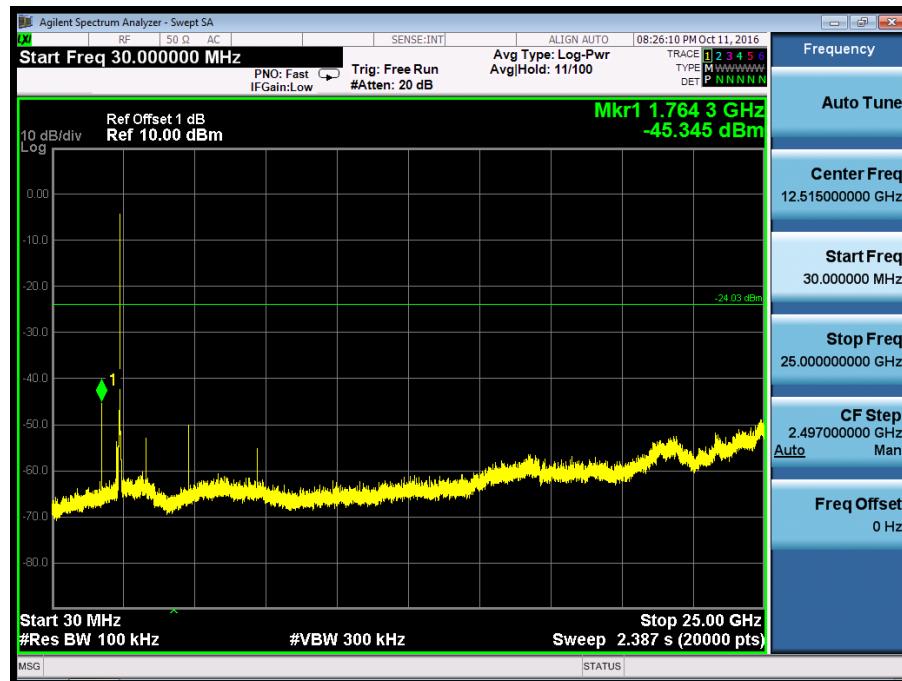
EDR Mode, 3DH1





Appendix A.3: Test Plots of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

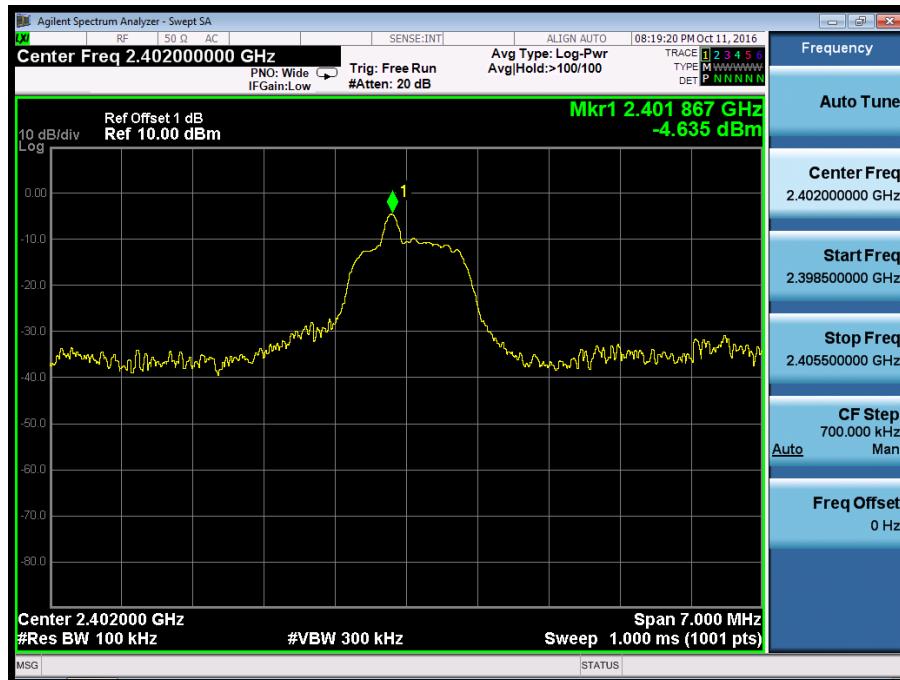
BDR Mode, DH1

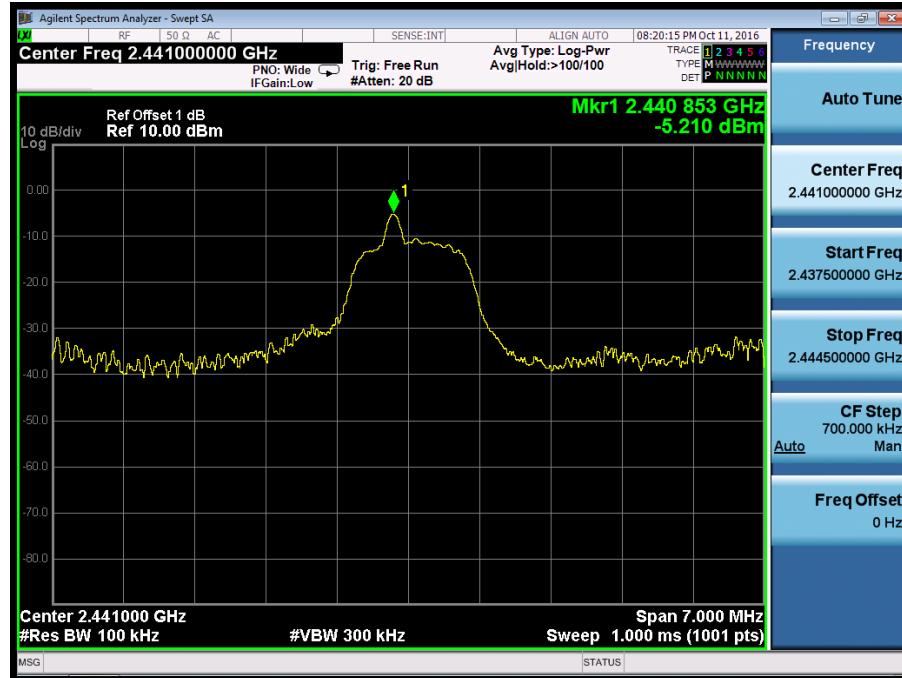






EDR Mode, 3DH1







BDR Mode, Band Edge

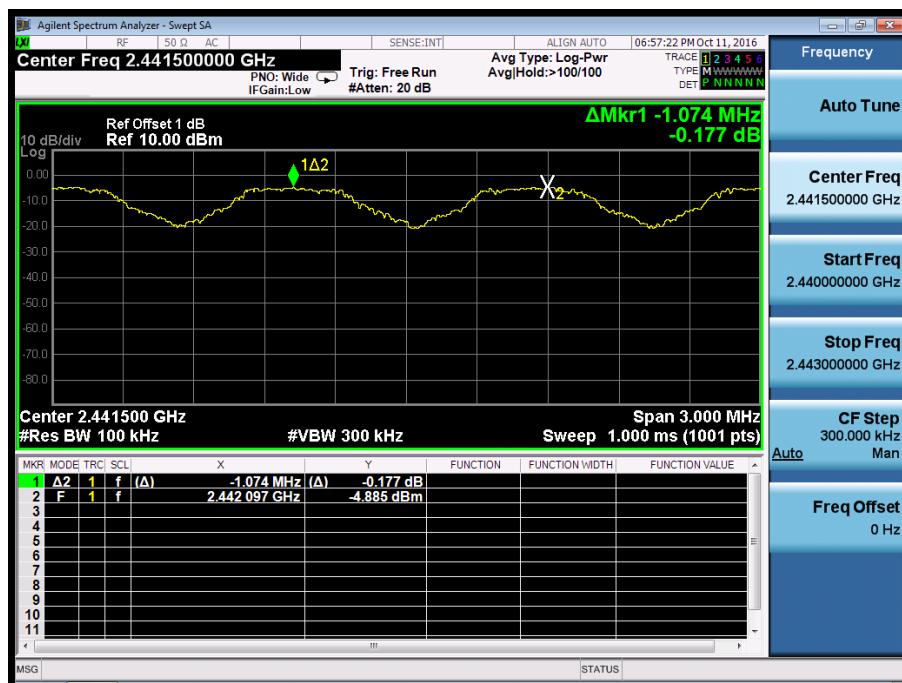


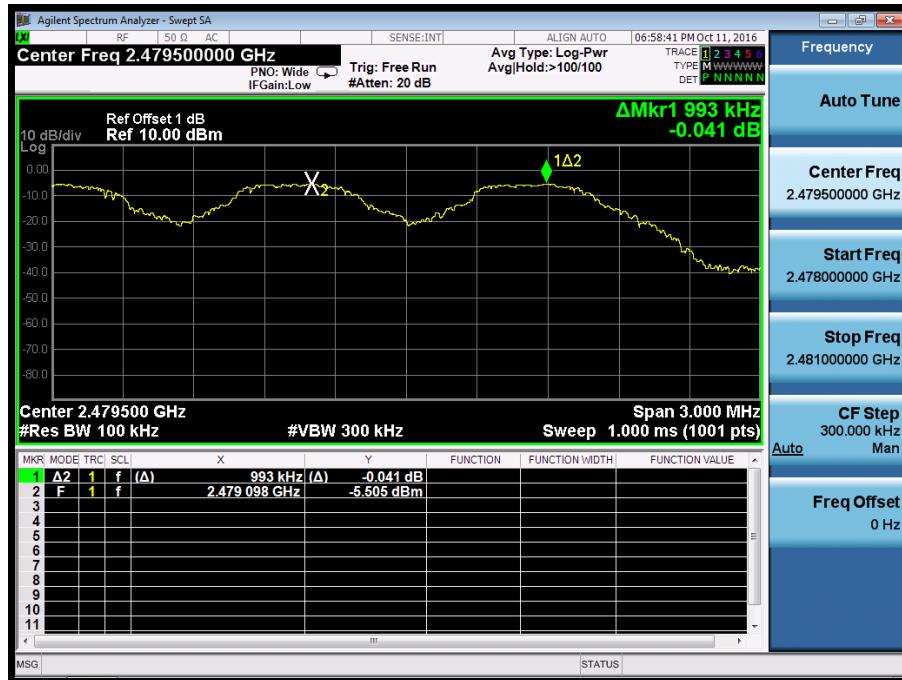
EDR Mode, Band Edge



Appendix A.4: Test Plots of Carrier Frequency Separation

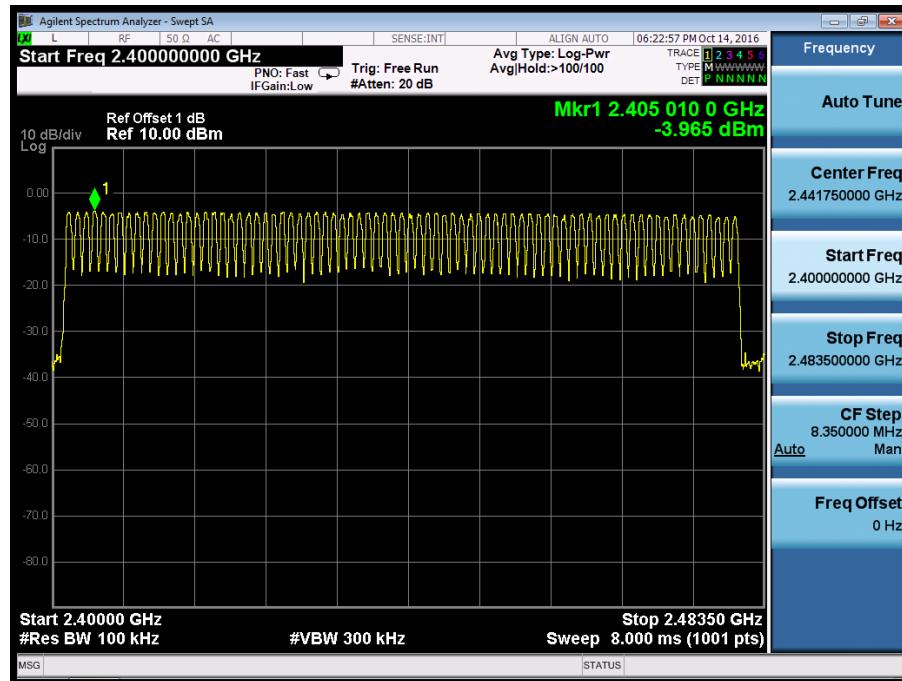
Hopping Mode





Appendix A.5: Test Plots of Number of Hopping Frequency

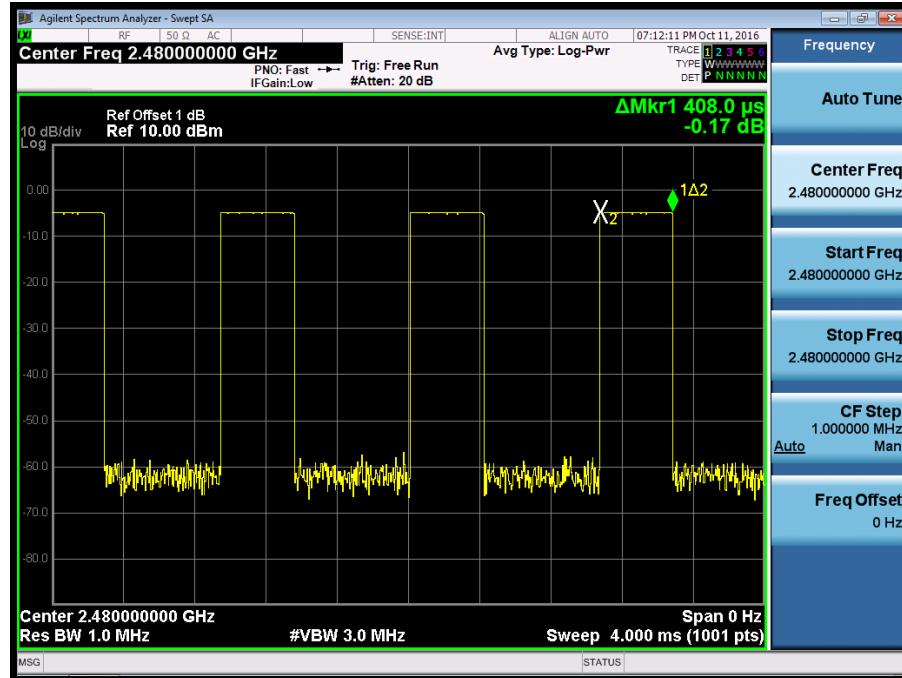
Hopping Mode



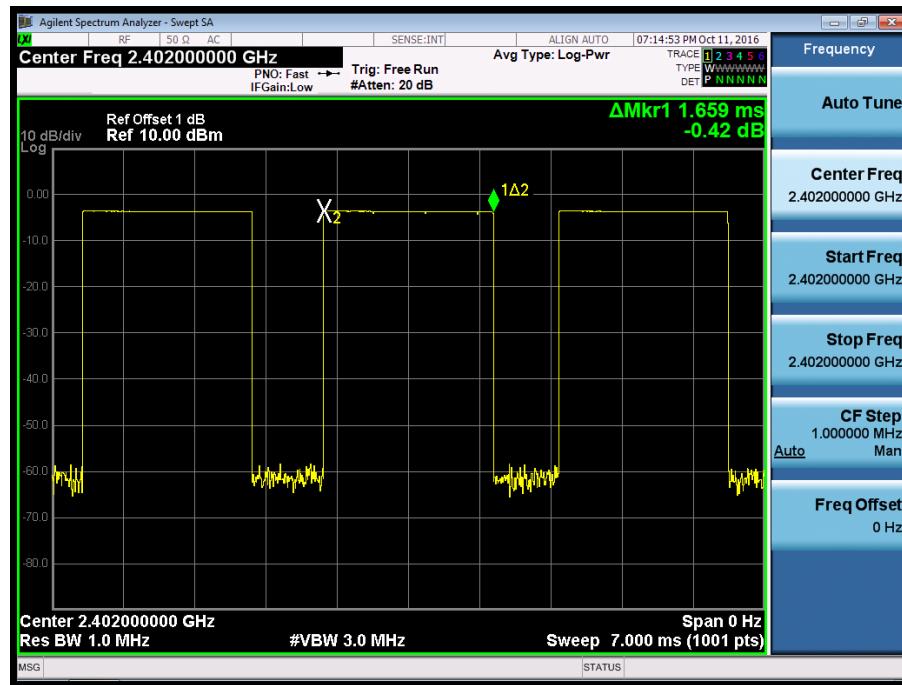
Appendix A.6: Test Plots of Time of Occupancy

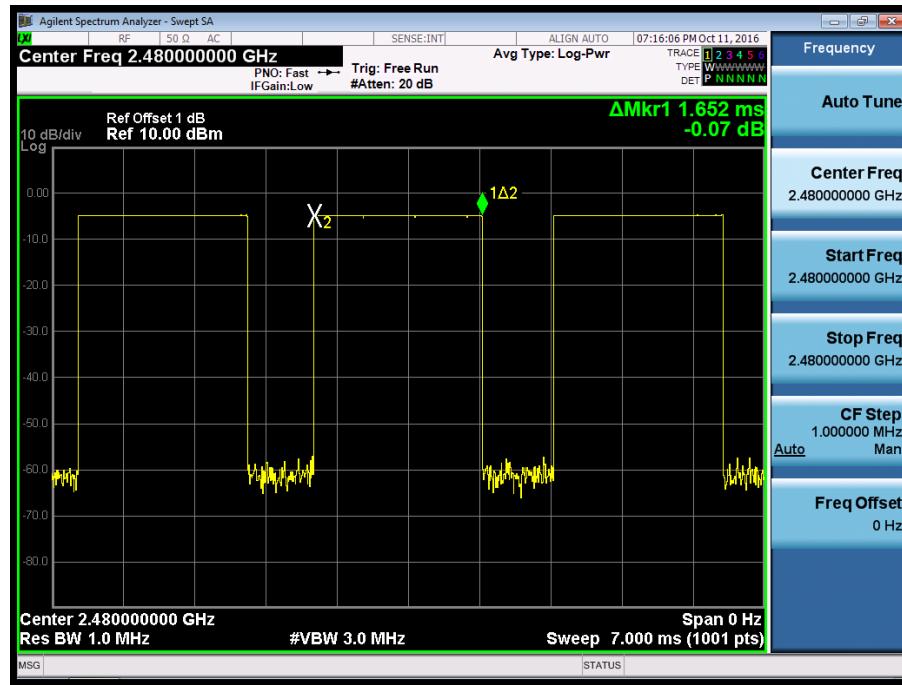
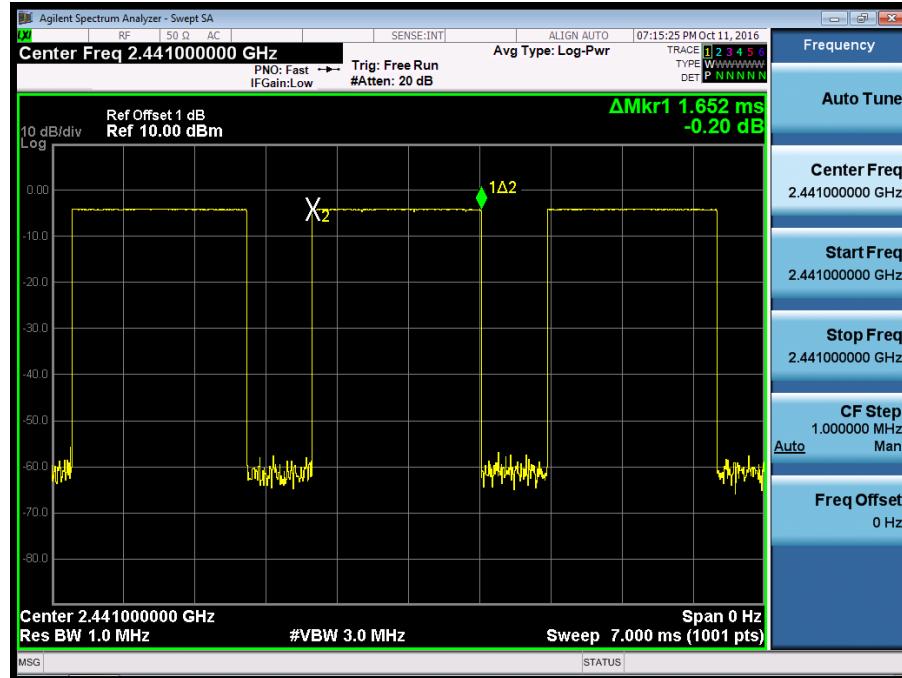
BDR Mode, DH1



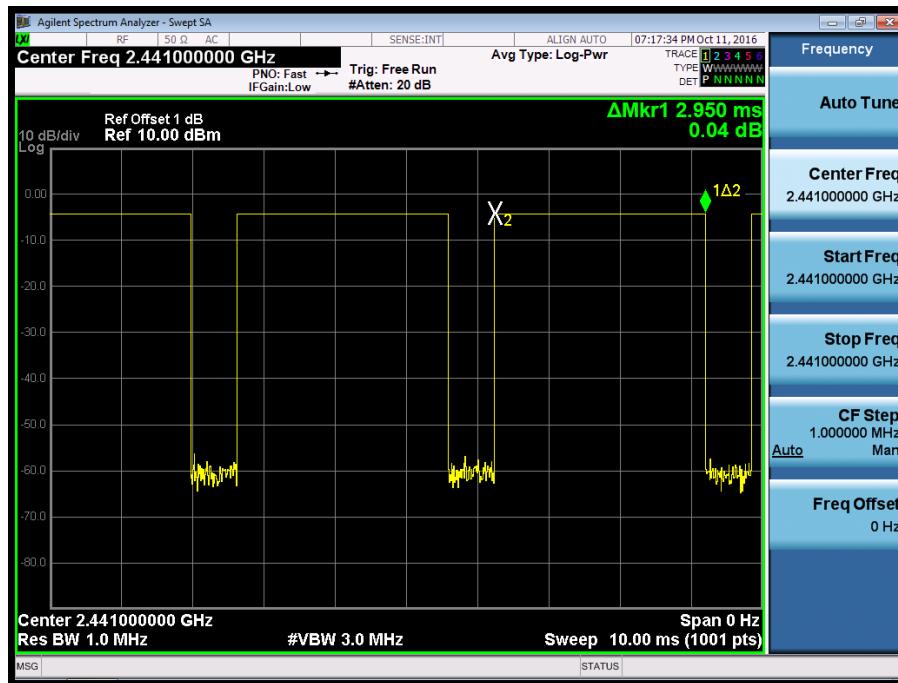
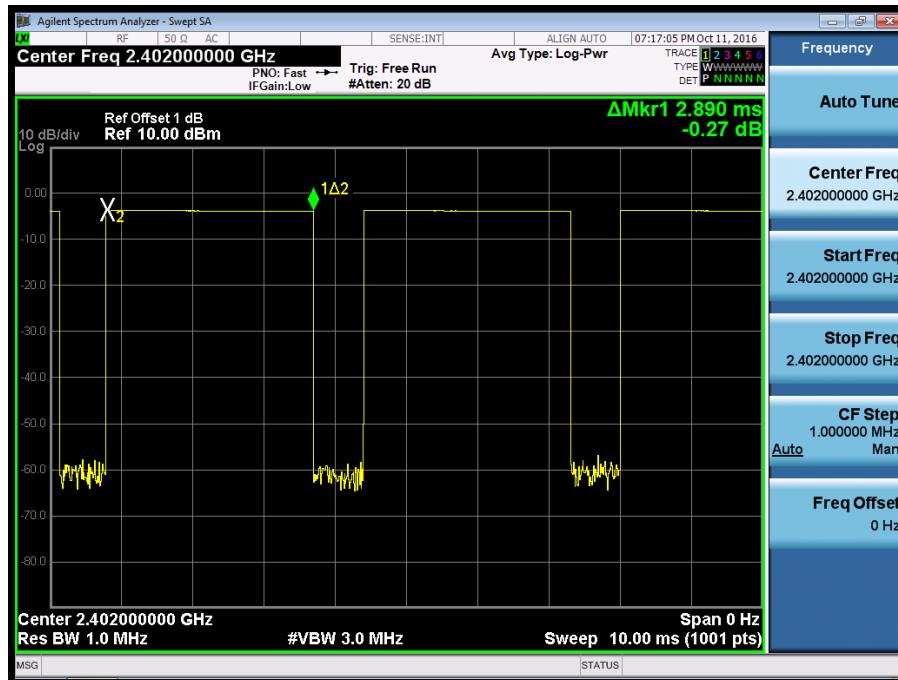


BDR Mode, DH3



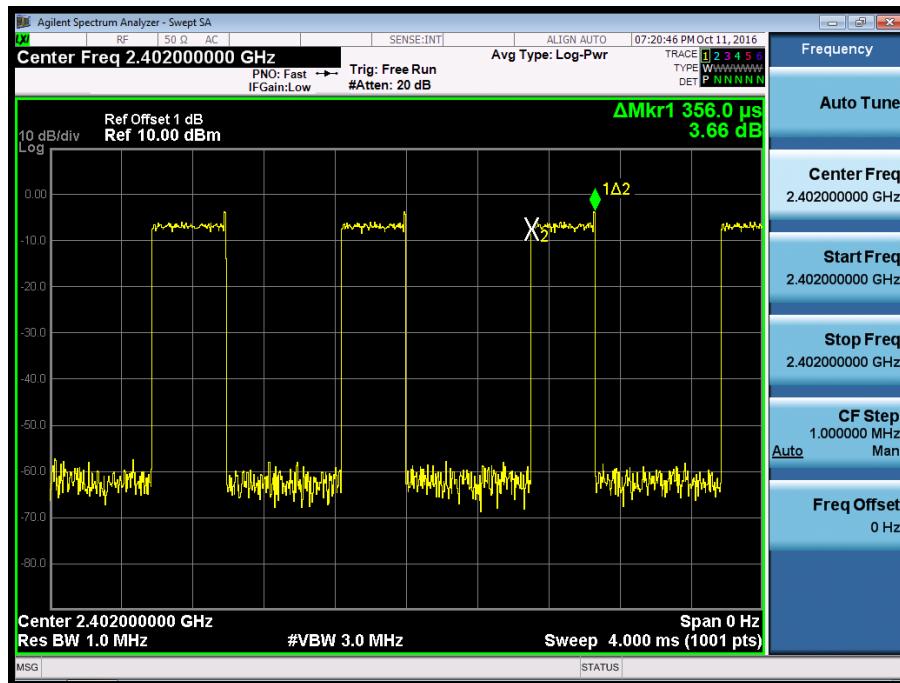


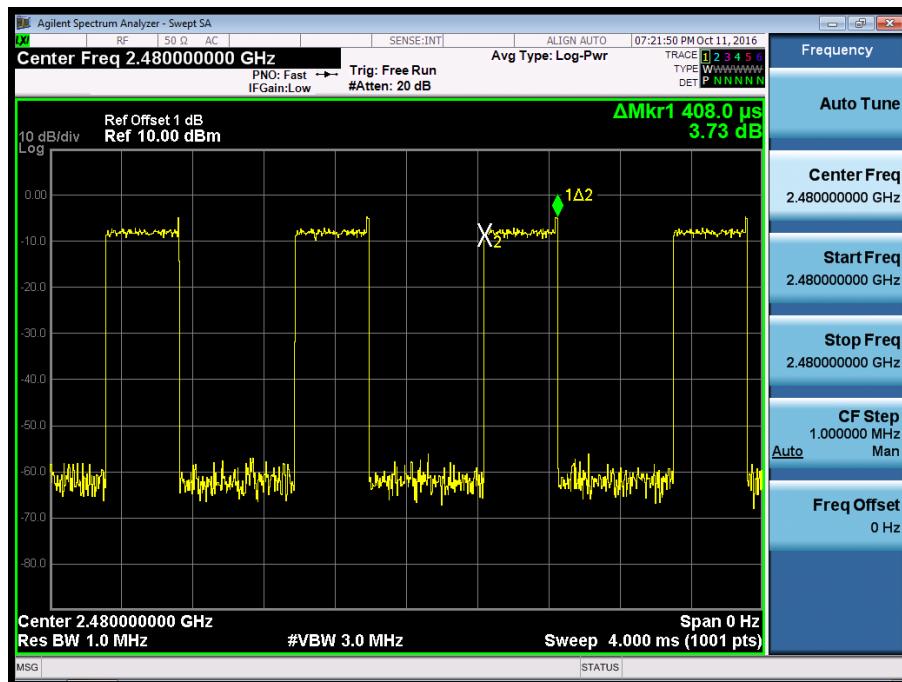
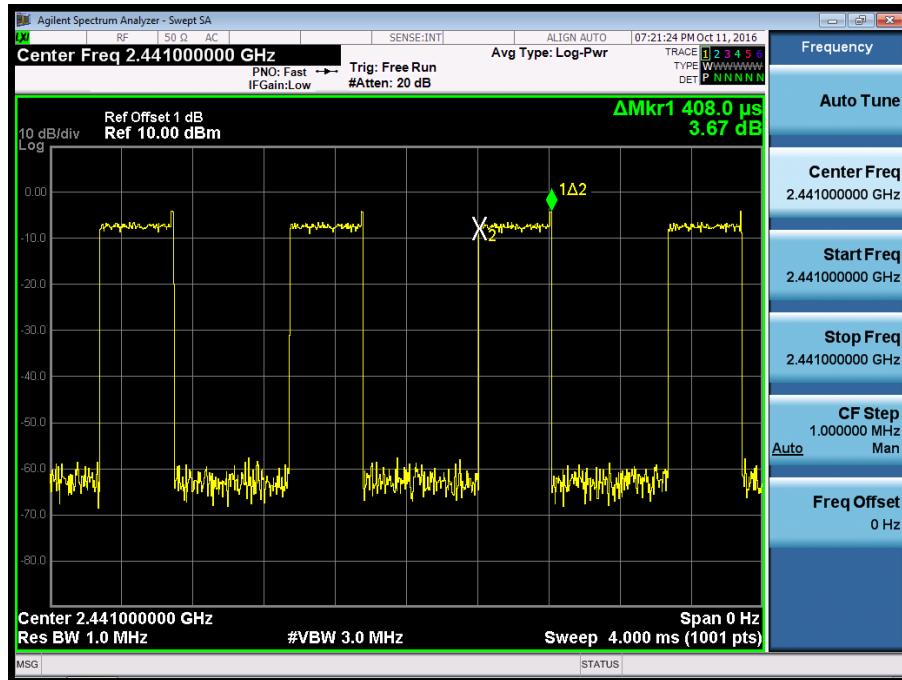
BDR Mode, DH5



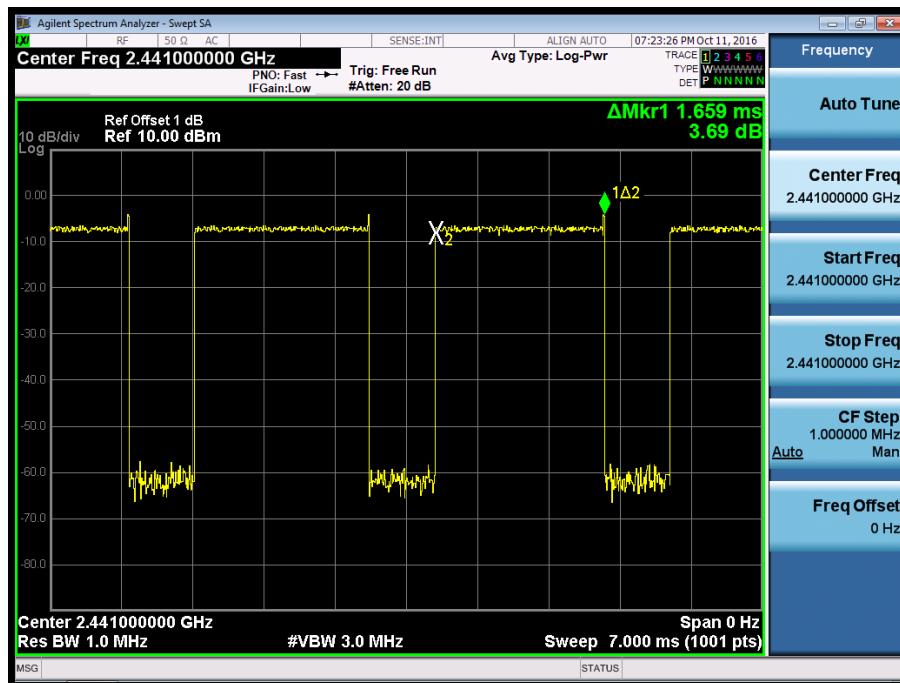
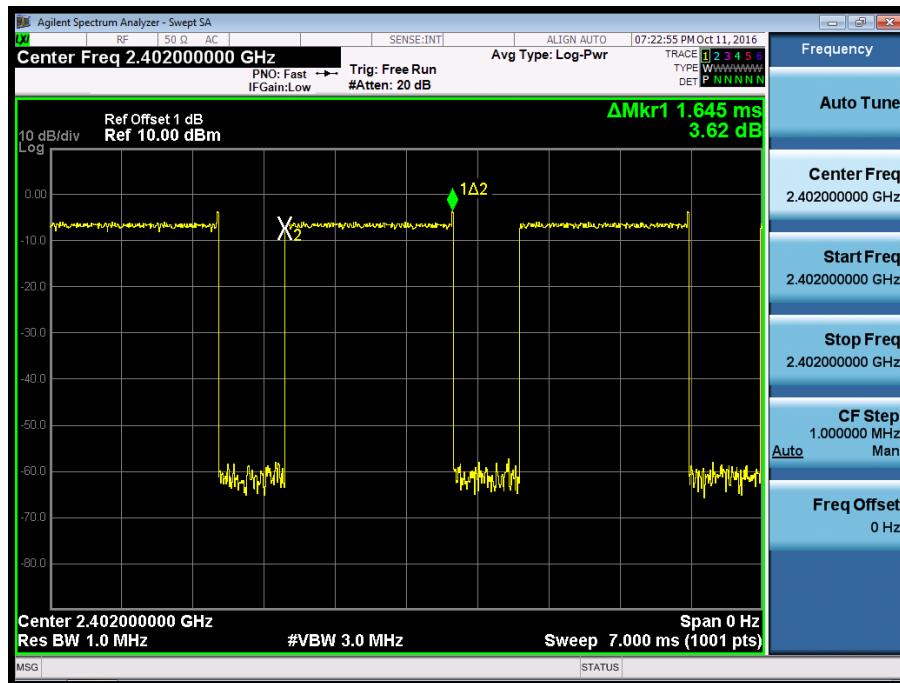


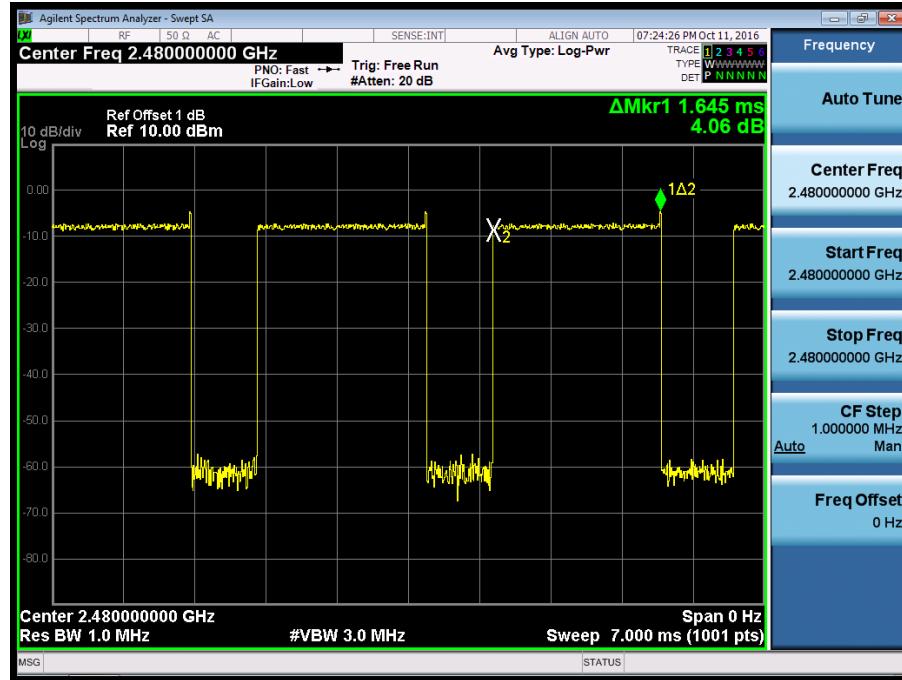
EDR Mode, 3DH1





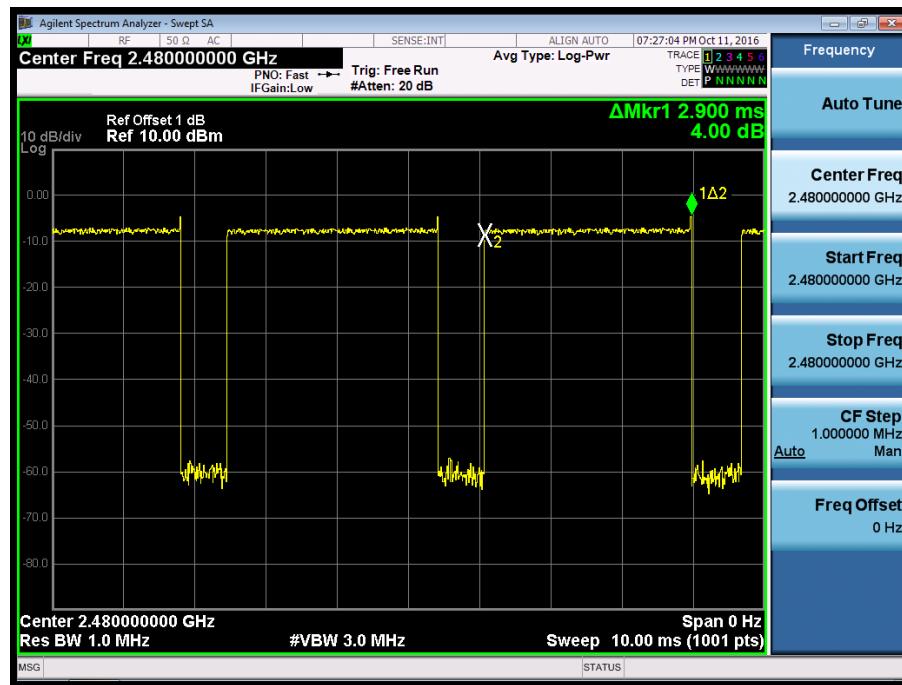
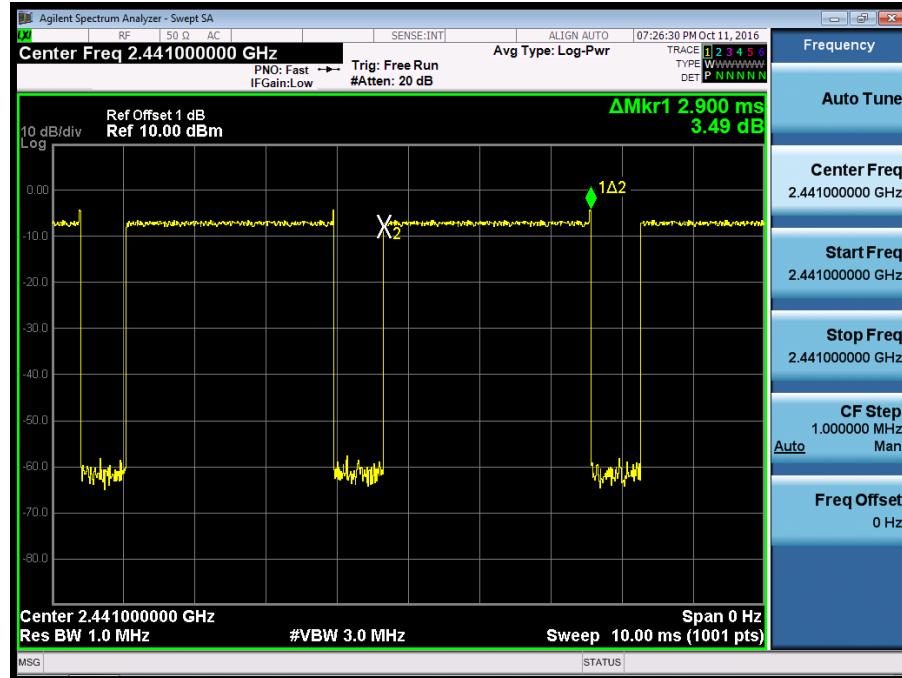
EDR Mode, 3DH3





EDR Mode, 3DH5





Appendix B

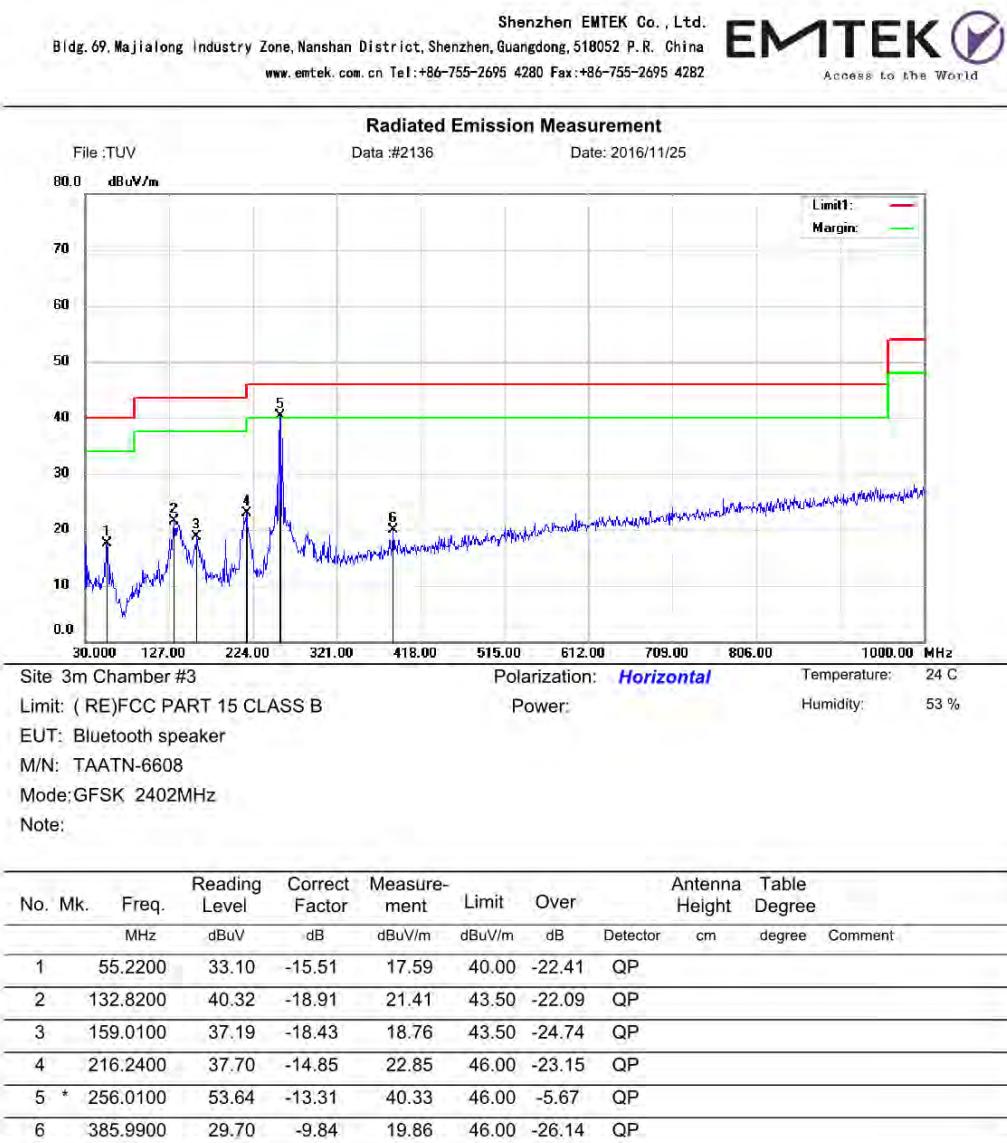
Test Results of Bluetooth 4.1 (Single mode) of Radiated Emission and AC Conducted Emission

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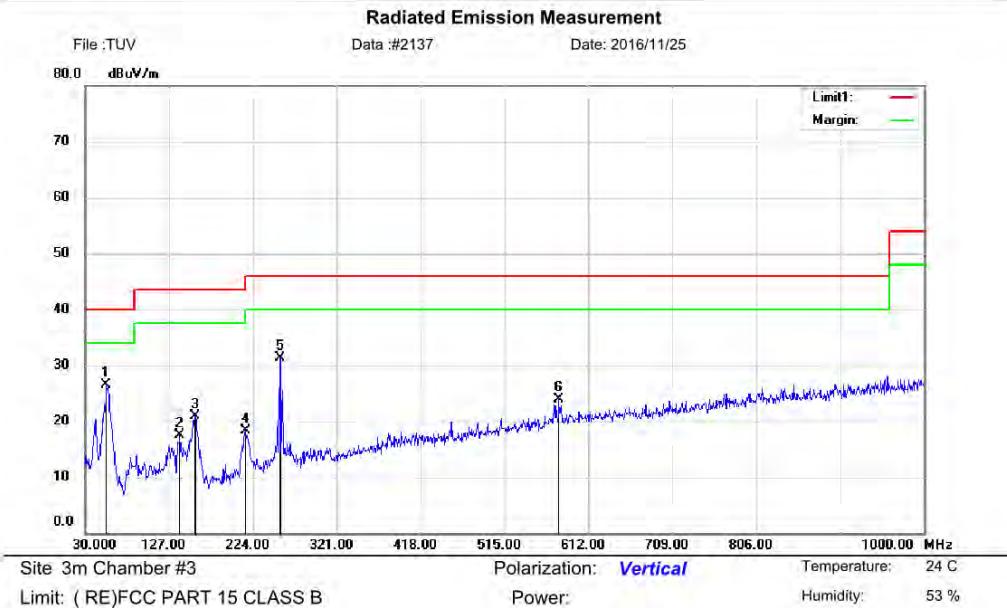
Note: The radiated spurious emission were measured from 9KHz to 26.5GHz, the measurements from 9KHz-30MHz and 18-26.5GHz were greater than 20dB below the limit, so the radiated Spurious Emissions (9kHz – 30MHz and 18-26.5GHz) tests were recorded but not showed in the appendix B.

Appendix B.1: Test Plots of Radiated Spurious Emission

BDR mode, 30MHz - 1GHz



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No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	54.2500	42.06	-15.47	26.59	40.00	-13.41	QP		
2		139.6100	36.64	-19.08	17.56	43.50	-25.94	QP		
3		157.0700	39.58	-18.58	21.00	43.50	-22.50	QP		
4		215.2700	33.26	-14.92	18.34	43.50	-25.16	QP		
5		256.0100	44.62	-13.31	31.31	46.00	-14.69	QP		
6		578.0500	29.57	-5.58	23.99	46.00	-22.01	QP		

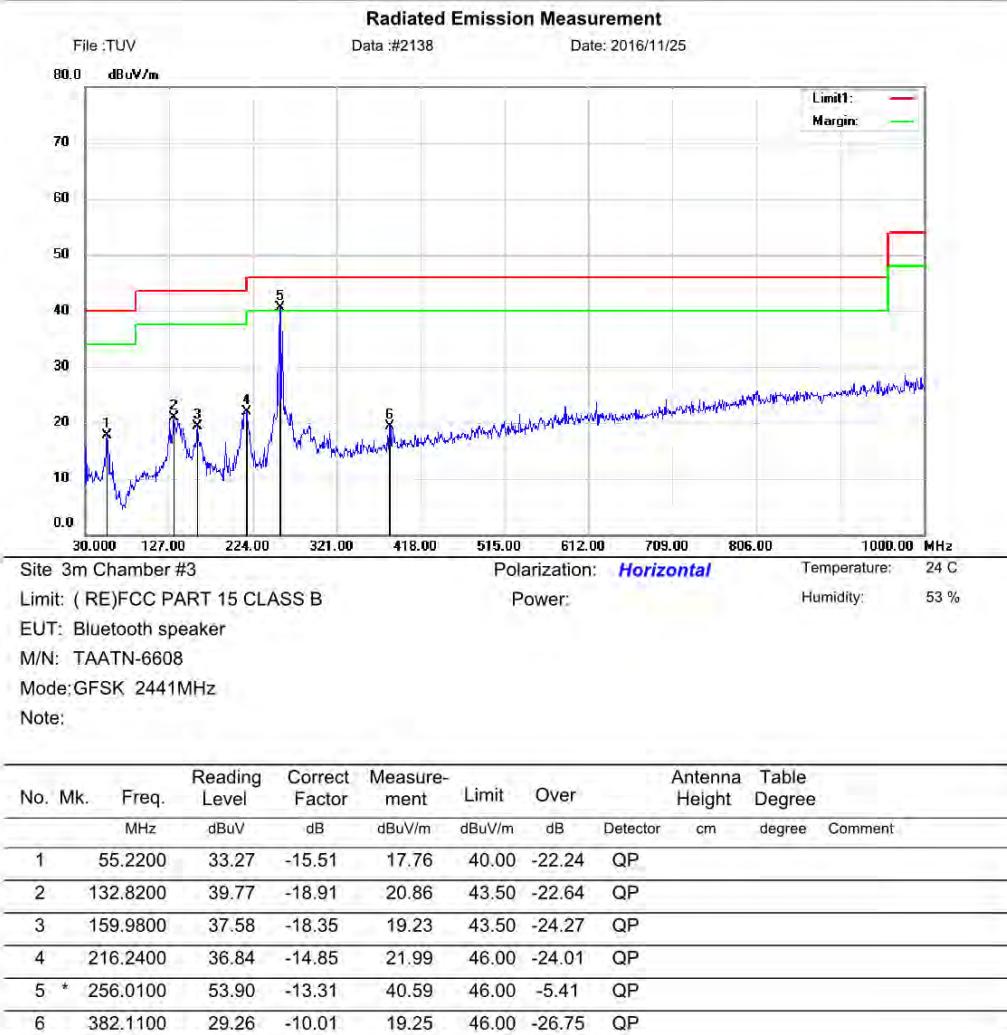
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Operator: LQZ

File :TUV Data #:2137

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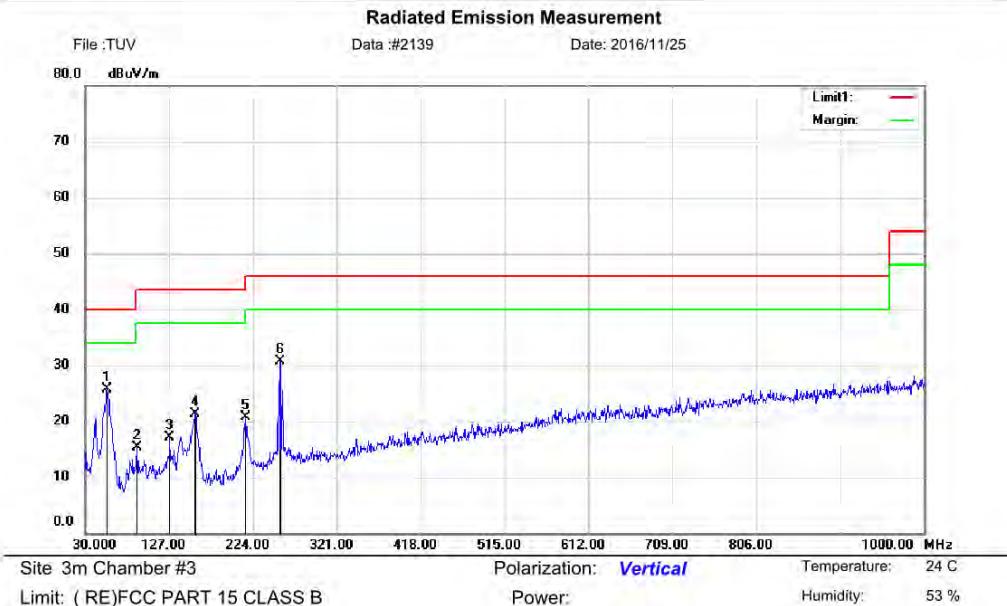
*:Maximum data x:Over limit !:over margin

Operator: LQZ

File :TUV|Data #:2138

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No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment						
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	55.2200	41.30	-15.51	25.79	40.00	-14.21	QP			
2		90.1400	31.75	-16.41	15.34	43.50	-28.16	QP			
3		127.9700	35.70	-18.55	17.15	43.50	-26.35	QP			
4		157.0700	39.86	-18.58	21.28	43.50	-22.22	QP			
5		215.2700	35.70	-14.92	20.78	43.50	-22.72	QP			
6		256.0100	44.08	-13.31	30.77	46.00	-15.23	QP			

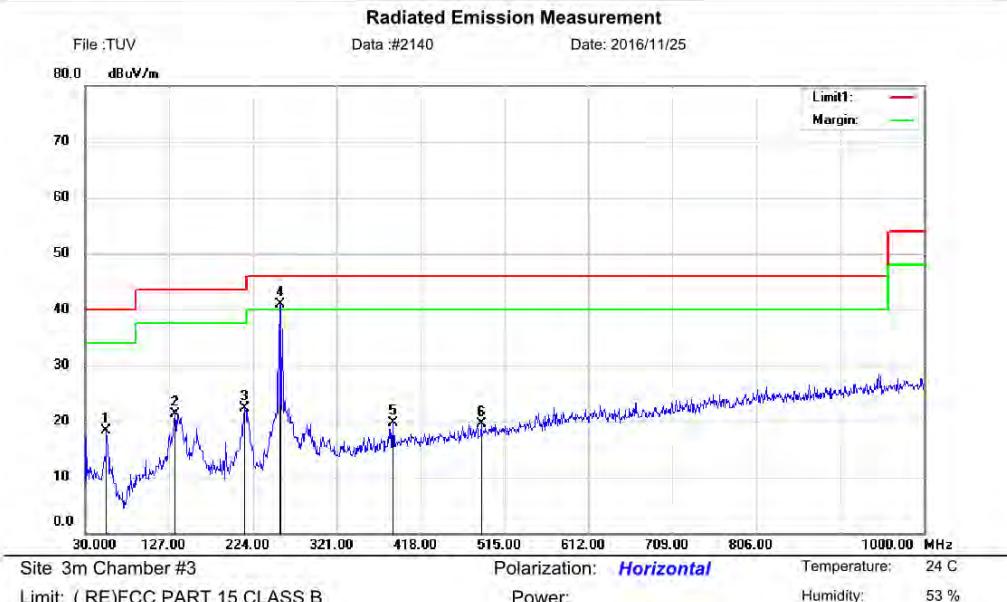
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Operator: LQZ

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No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment						
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	54.2500	33.85	-15.47	18.38	40.00	-21.62	QP				
2	133.7900	40.21	-18.94	21.27	43.50	-22.23	QP				
3	214.3000	37.23	-15.01	22.22	43.50	-21.28	QP				
4 *	256.0100	54.15	-13.31	40.84	46.00	-5.16	QP				
5	385.9900	29.50	-9.84	19.66	46.00	-26.34	QP				
6	487.8400	27.16	-7.66	19.50	46.00	-26.50	QP				

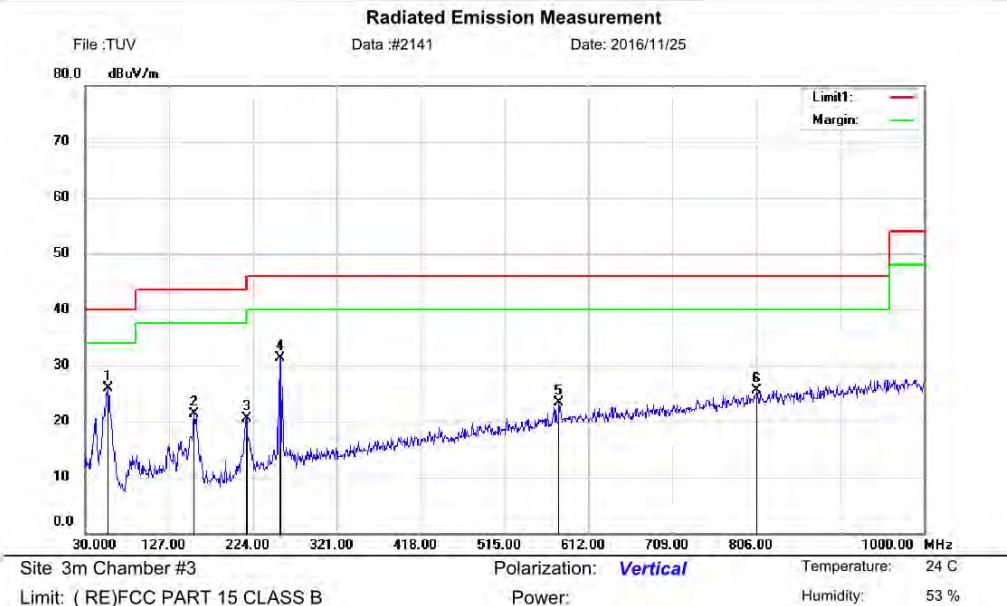
*:Maximum data x:Over limit !:over margin

Operator: LQZ

File :TUV Data #:2140

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No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	56.1900	41.38	-15.55	25.83	40.00	-14.17	QP		
2		156.1000	40.04	-18.65	21.39	43.50	-22.11	QP		
3		216.2400	35.43	-14.85	20.58	46.00	-25.42	QP		
4		256.0100	44.54	-13.31	31.23	46.00	-14.77	QP		
5		578.0500	28.83	-5.58	23.25	46.00	-22.75	QP		
6		806.9700	27.46	-1.95	25.51	46.00	-20.49	QP		

*:Maximum data x:Over limit !:over margin

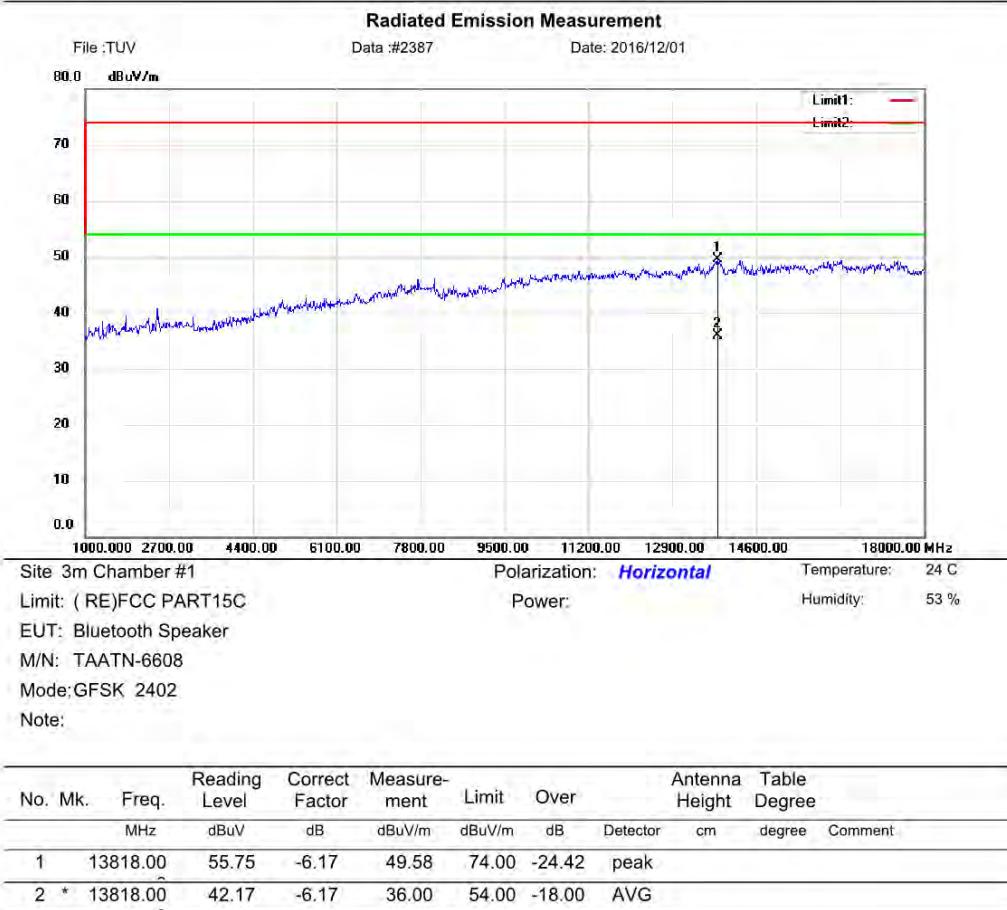
Operator: LQZ

File :TUV Data #:2141

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BDR mode, 1GHz - 18GHz

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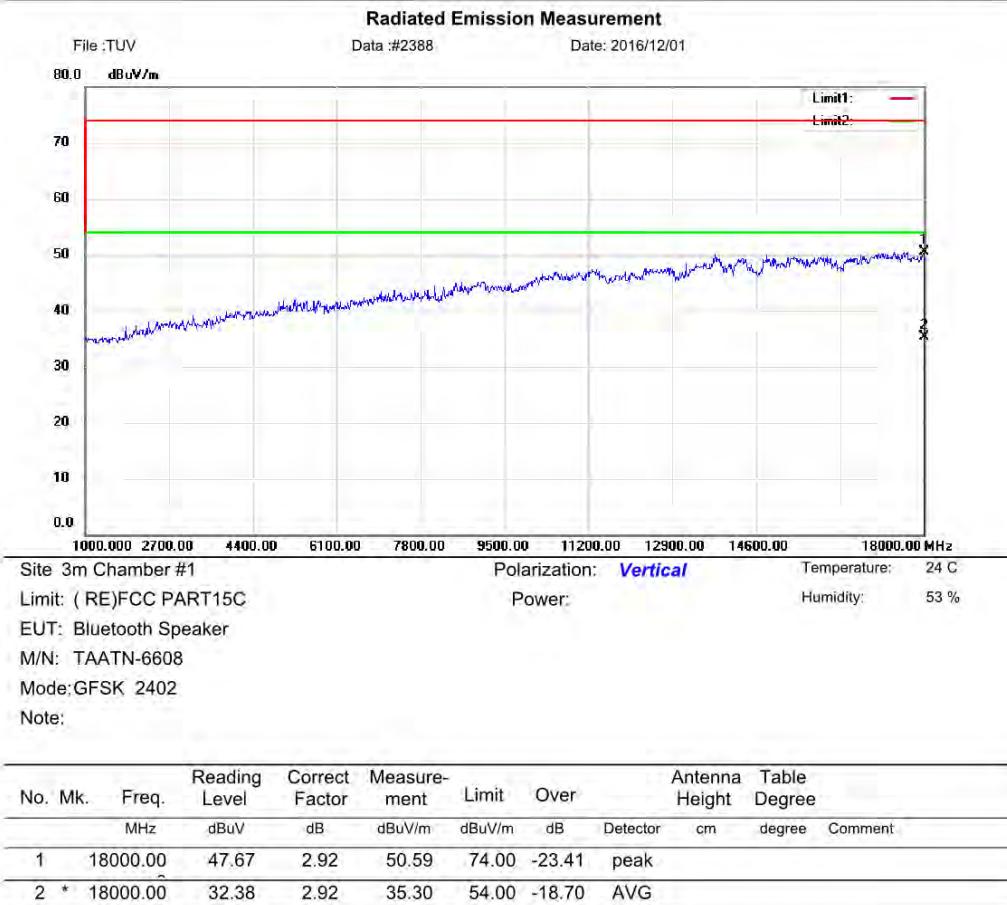
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Operator: KK

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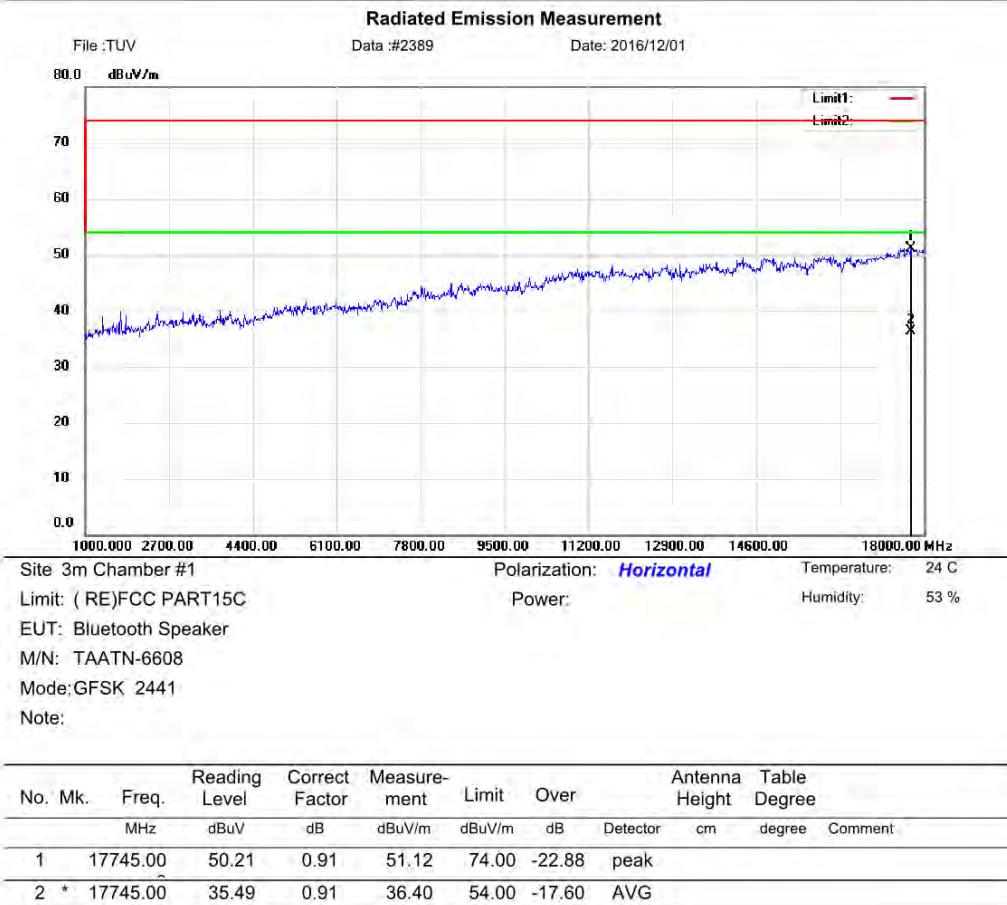
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Operator: KK

File :TUV\Data #2389

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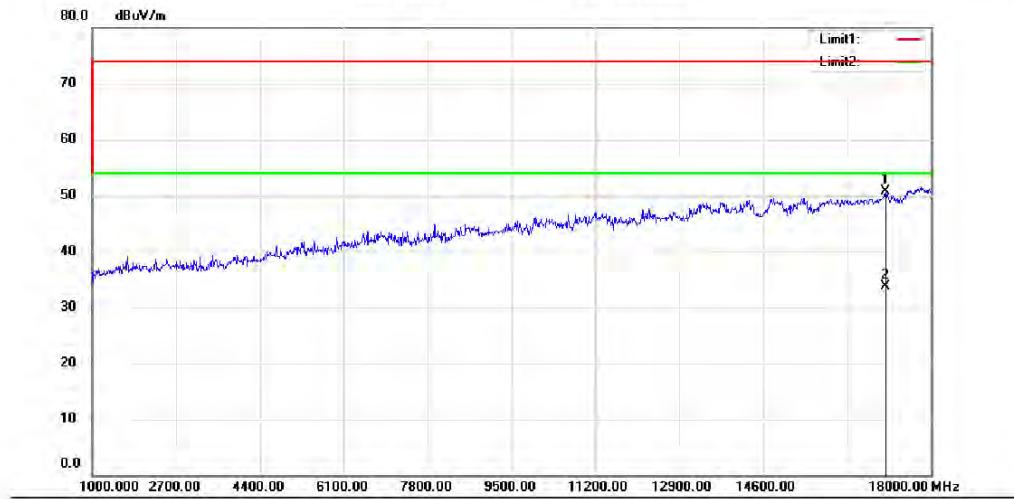


Radiated Emission Measurement

File :TUV

Data #:2390

Date: 2016/12/01



Site 3m Chamber #1

Polarization: **Vertical**

Temperature: 24 C

Limit: (RE)FCC PART15C

Power:

Humidity: 53 %

EUT: Bluetooth Speaker

M/N: TAATN-6608

Mode:GFSK 2441

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment			Height	Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		17082.00	55.11	-4.31	50.80	74.00	-23.20	peak			
2	*	17082.00	38.11	-4.31	33.80	54.00	-20.20	AVG			

*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV Data #:2390

Page: 1

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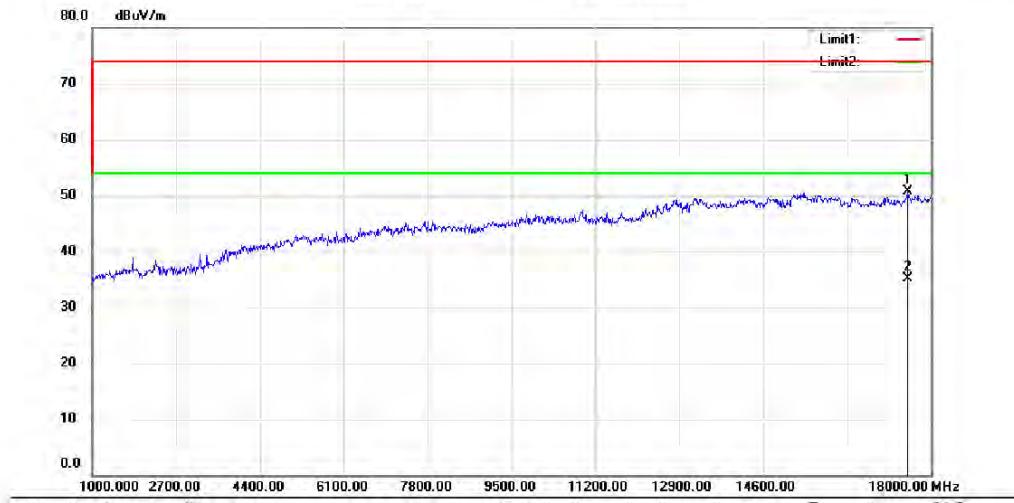


Radiated Emission Measurement

File :TUV

Data #:2391

Date: 2016/12/01



Site 3m Chamber #1

Polarization: **Horizontal**

Temperature: 24 C

Limit: (RE)FCC PART15C

Power:

Humidity: 53 %

EUT: Bluetooth Speaker

M/N: TAATN-6608

Mode:GFSK 2480

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment			Height	Degree		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		17524.00	51.55	-0.83	50.72	74.00	-23.28	peak			
2	*	17524.00	35.93	-0.83	35.10	54.00	-18.90	AVG			

*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV Data #:2391

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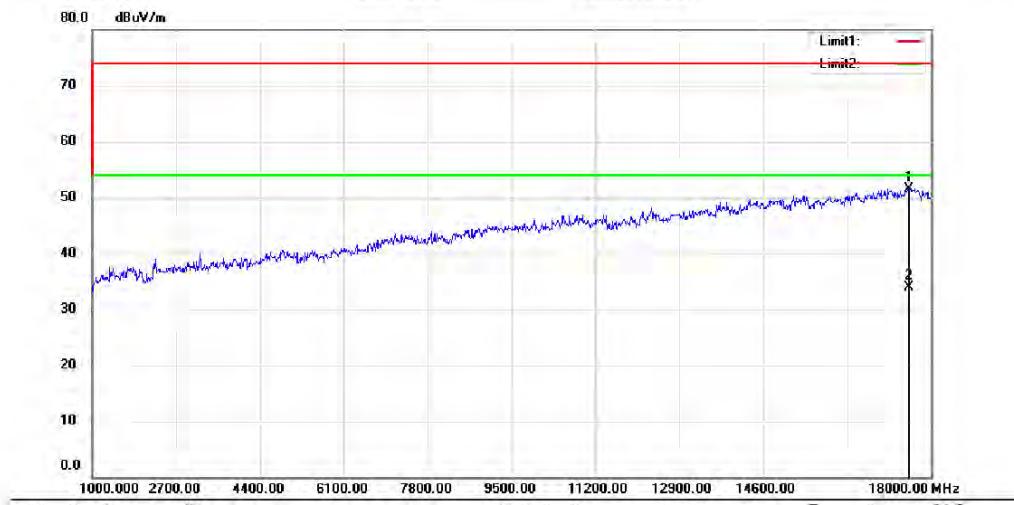


Radiated Emission Measurement

File :TUV

Data #:2392

Date: 2016/12/01



Site 3m Chamber #1

Polarization: **Vertical**

Temperature: 24 C

Limit: (RE)FCC PART15C

Power:

Humidity: 53 %

EUT: Bluetooth Speaker

M/N: TAATN-6608

Mode:GFSK 2480

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment					Height	Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		17558.00	52.14	-0.56	51.58	74.00	-22.42	peak			
2	*	17558.00	34.46	-0.56	33.90	54.00	-20.10	AVG			

*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV Data #:2392

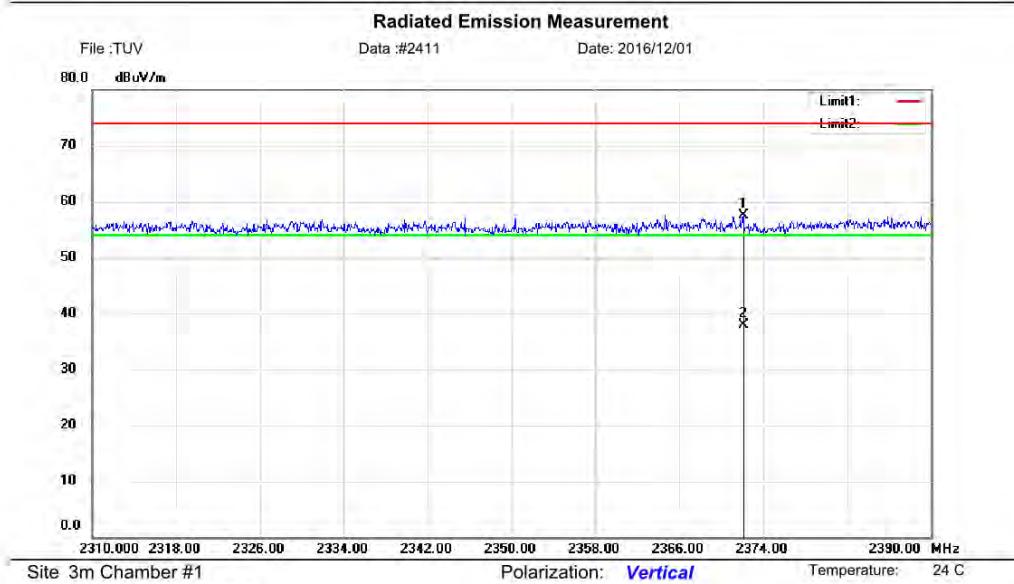
Page: 1

Appendix B.2: Test Plots of Band Edge (Radiated)

BDR mode, Low Channel

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Access to the World



No.	Mk.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dB	Detector	cm	degree
1	2372.080	27.28	30.20	57.48	74.00	-16.52	peak		
2 *	2372.080	7.70	30.20	37.90	54.00	-16.10	AVG		

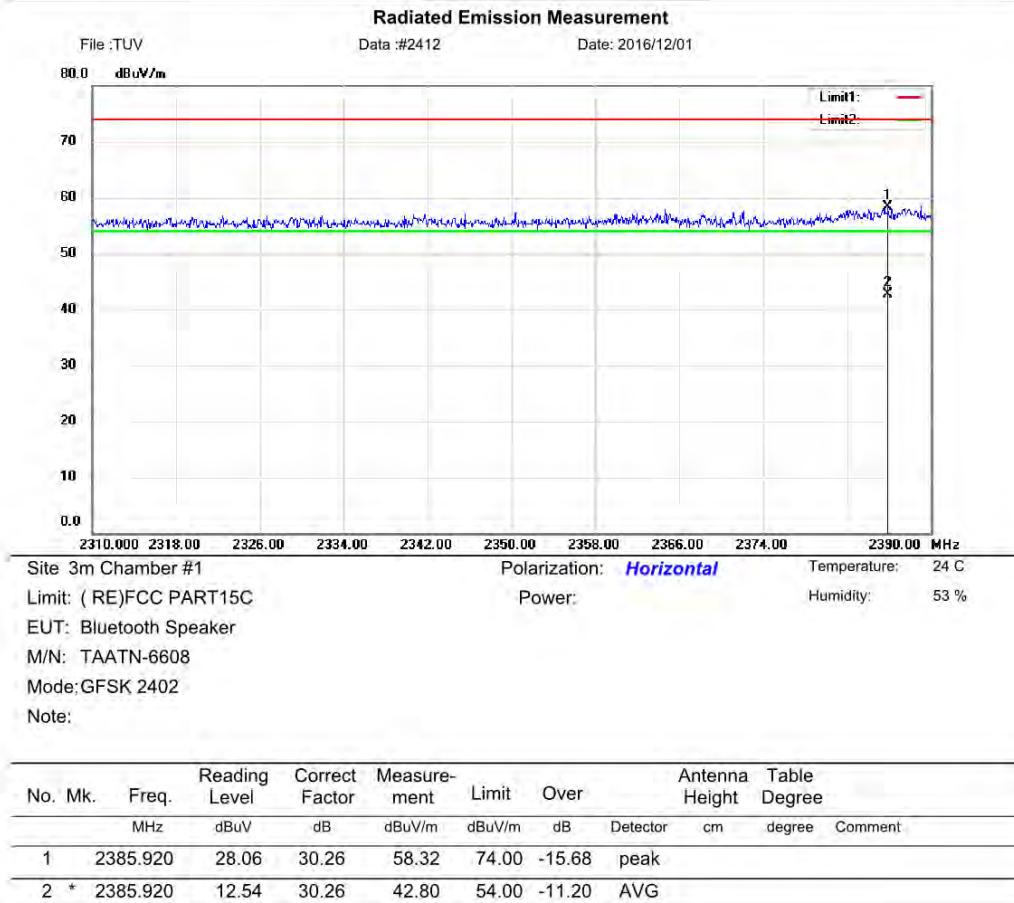
*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV Data #:2411

Page: 1

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*:Maximum data x:Over limit !:over margin

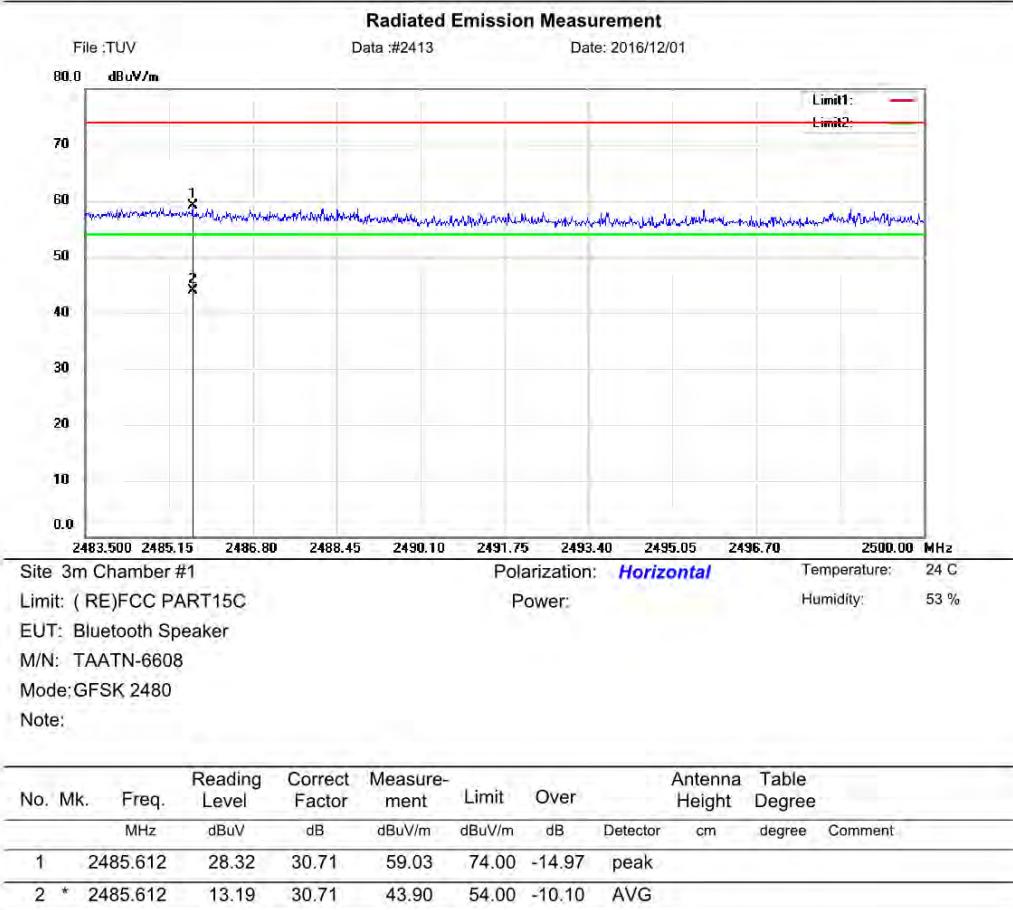
Operator: KK

File :TUV Data #:2412

Page: 1

BDR mode, High Channel

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*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV\Data #:2413

Page: 1

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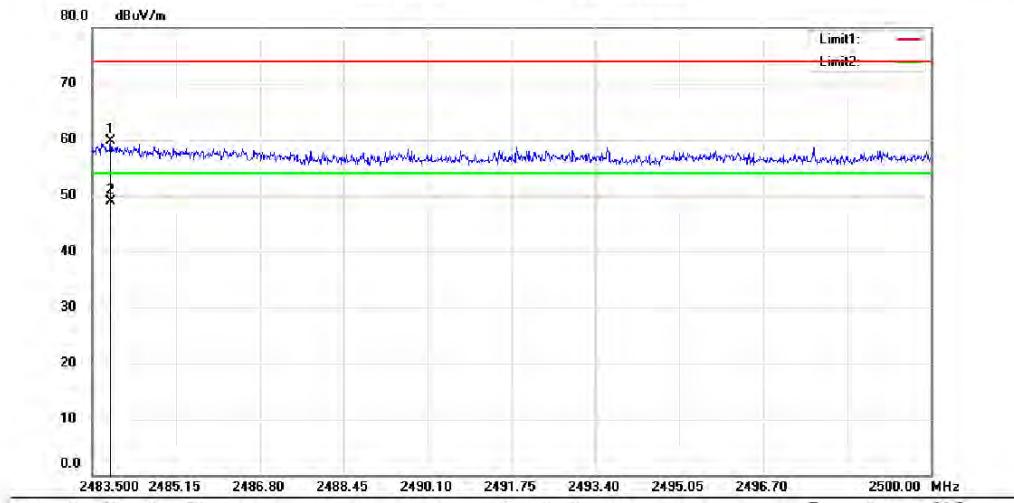


Radiated Emission Measurement

File :TUV

Data #:2414

Date: 2016/12/01



Site 3m Chamber #1

Polarization: **Vertical**

Temperature: 24 C

Limit: (RE)FCC PART15C

Power:

Humidity: 53 %

EUT: Bluetooth Speaker

M/N: TAATN-6608

Mode:GFSK 2480

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table		
			Level	Factor	ment						
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		2483.863	29.07	30.71	59.78	74.00	-14.22	peak			
2	*	2483.863	18.19	30.71	48.90	54.00	-5.10	AVG			

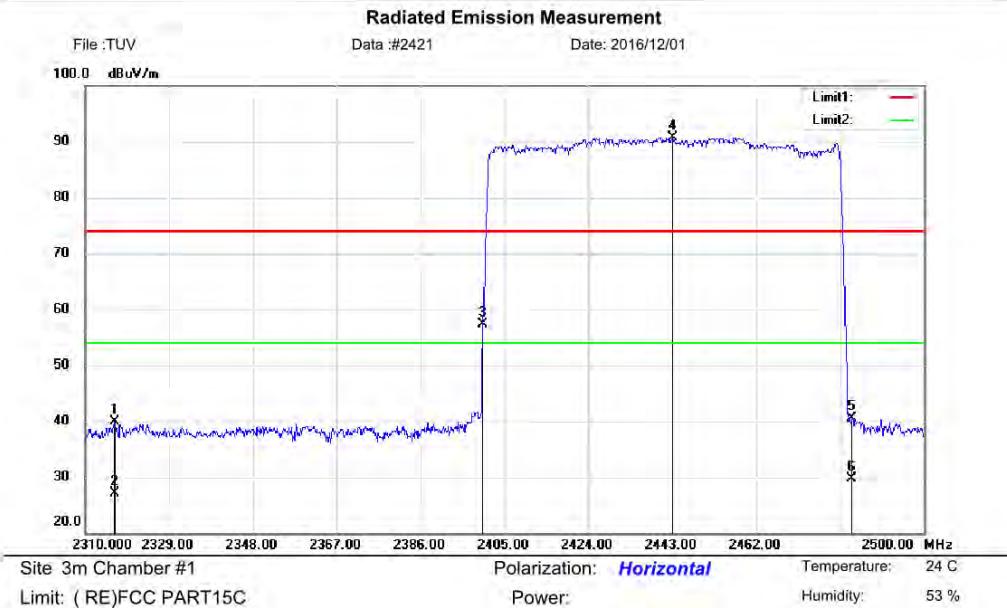
*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV Data #:2414

Page: 1

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No.	Mk.	Freq. MHz	Reading Level dB μ V	Correct Factor dB	Measure- ment dB μ V/m	Limit dB μ V/m	Over dB	Antenna Detector	Height cm	Table Degree	Comment
1	2316.650	64.12	-24.13	39.99	74.00	-34.01	peak				
2	2316.650	51.23	-24.13	27.10	54.00	-26.90	AVG				
3	2400.000	81.01	-23.66	57.35	74.00	-16.65	peak				
4	*	2443.000	114.13	-23.41	90.72	74.00	16.72	peak			
5	2483.500	63.64	-23.19	40.45	74.00	-33.55	peak				
6	2483.500	52.79	-23.19	29.60	54.00	-24.40	AVG				

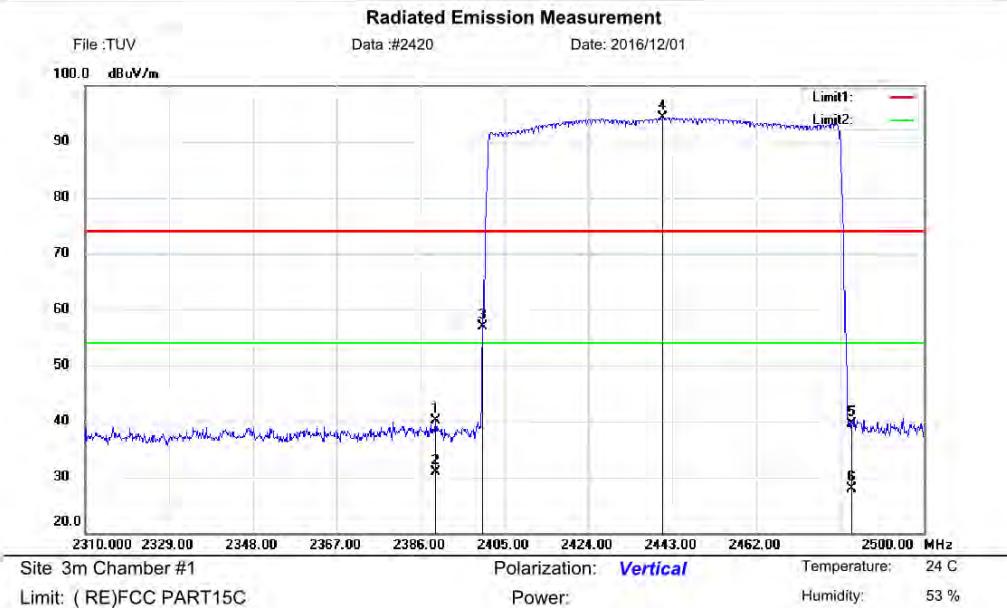
*:Maximum data x:Over limit !:over margin

Operator: KK

File :TUV Data #:2421

Page: 1

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No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	Comment
		MHz	dB μ V	dB	dB μ V/m	dB μ V/m	dB	Detector	cm	degree
1	2389.420	63.76	-23.73	40.03	74.00	-33.97	peak			
2	2389.420	54.63	-23.73	30.90	54.00	-23.10	AVG			
3	2400.000	80.59	-23.66	56.93	74.00	-17.07	peak			
4	*	2440.910	117.70	-23.43	94.27	74.00	20.27	peak		
5	2483.500	62.79	-23.19	39.60	74.00	-34.40	peak			
6	2483.500	51.09	-23.19	27.90	54.00	-26.10	AVG			

*:Maximum data x:Over limit !:over margin

Operator: KK

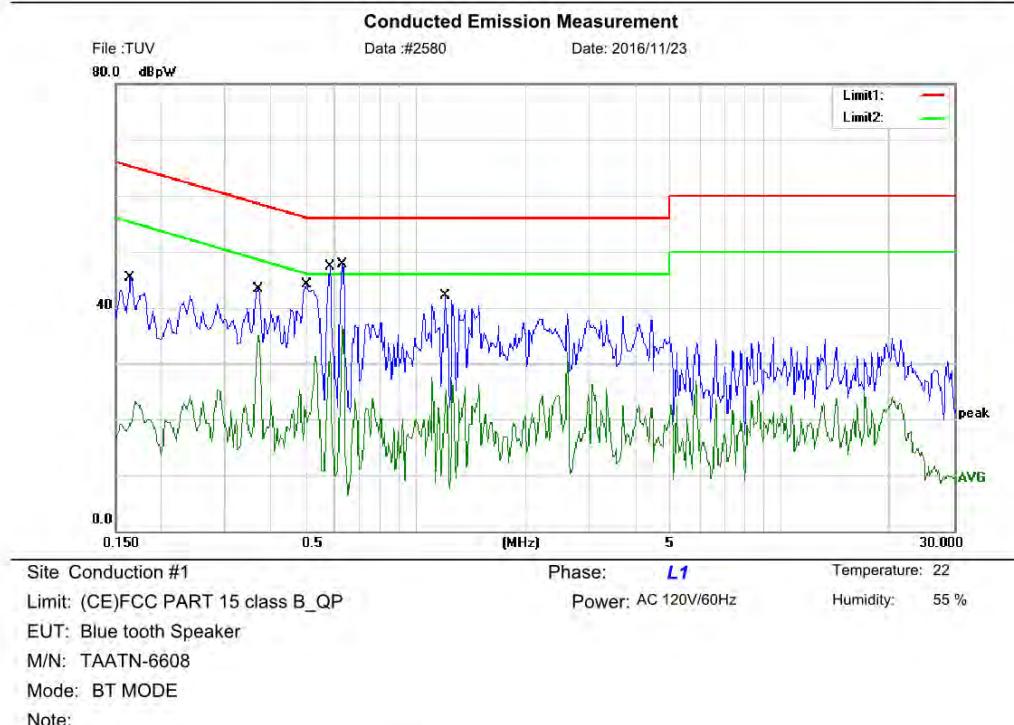
File :TUV Data #:2420

Page: 1

Appendix B.3: Test Plots of Conducted Emission

C Mode

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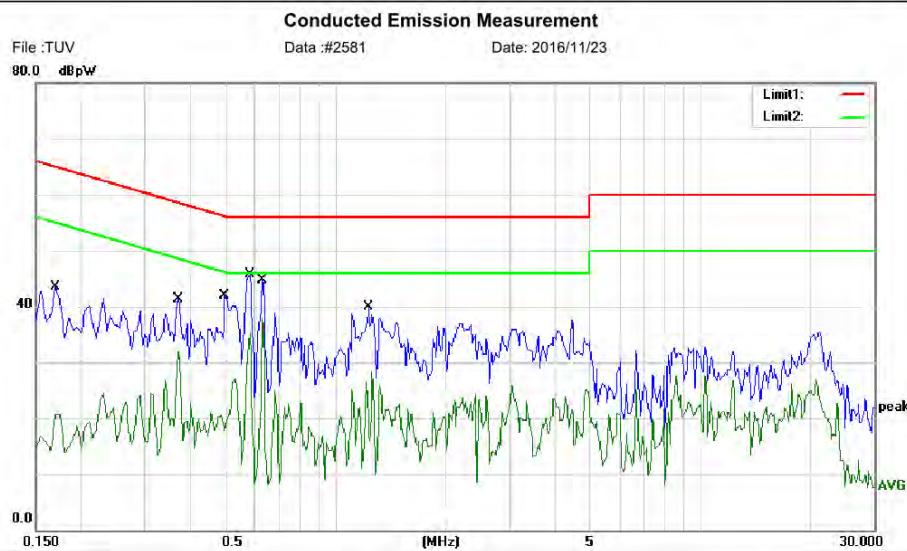
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Detector	Comment
		MHz	dBpW	dB	dBpW	dBpW	dB		
1		0.1650	45.22	0.00	45.22	65.21	-19.99	Q_P	
2		0.1650	23.01	0.00	23.01	55.21	-32.20	AVG	
3		0.3700	43.32	0.00	43.32	58.50	-15.18	Q_P	
4		0.3700	34.85	0.00	34.85	48.50	-13.65	AVG	
5		0.5000	44.10	0.00	44.10	56.00	-11.90	Q_P	
6		0.5000	31.36	0.00	31.36	46.00	-14.64	AVG	
7		0.5800	47.21	0.00	47.21	56.00	-8.79	Q_P	
8		0.5800	31.96	0.00	31.96	46.00	-14.04	AVG	
9	*	0.6300	47.80	0.00	47.80	56.00	-8.20	Q_P	
10		0.6300	36.76	0.00	36.76	46.00	-9.24	AVG	
11		1.2000	42.05	0.00	42.05	56.00	-13.95	Q_P	
12		1.2000	27.19	0.00	27.19	46.00	-18.81	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Stan

File :TUV\Data .#2580

Page: 1

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Site Conduction #1 Phase: N Temperature: 22
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 55 %
EUT: Blue tooth Speaker
M/N: TAATN-6608
Mode: BT MODE
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBpW	dB	dBpW	dB			
1		0.1700	43.48	0.00	43.48	64.96	-21.48	QP	
2		0.1700	20.79	0.00	20.79	54.96	-34.17	AVG	
3		0.3700	41.25	0.00	41.25	58.50	-17.25	QP	
4		0.3700	31.94	0.00	31.94	48.50	-16.56	AVG	
5		0.4950	41.84	0.00	41.84	56.08	-14.24	QP	
6		0.4950	27.10	0.00	27.10	46.08	-18.98	AVG	
7		0.5800	45.64	0.00	45.64	56.00	-10.36	QP	
8		0.5800	35.38	0.00	35.38	46.00	-10.62	AVG	
9		0.6300	44.66	0.00	44.66	56.00	-11.34	QP	
10	*	0.6300	37.88	0.00	37.88	46.00	-8.12	AVG	
11		1.2300	39.97	0.00	39.97	56.00	-16.03	QP	
12		1.2300	28.30	0.00	28.30	46.00	-17.70	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Stan
File :TUV\Data :#2581 Page: 1