

Prüfbericht-Nr.: Test report no.:	60417370 001	Auftrags-Nr.: Order no.:	168280909	Seite 1 von 28 Page 1 of 28
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2020-09-01	
Auftraggeber: Client:	Edifier International Limited P.O. Box 6264 General Post Office Hong Kong			
Prüfgegenstand: Test item:	Smart Home Speaker			
Bezeichnung / Typ-Nr.: Identification / Type no.:	MS30A (Trademark: EDIFIER)			
Auftrags-Inhalt: Order content:	FCC and IC approval			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 2 February 2017 CFR47 FCC Part 15: Subpart C Section 15.207 RSS-Gen Issue 5 March 2019 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-102 Issue 5 March 2015 CFR47 FCC Part 2.1093			
Wareneingangsdatum: Date of sample receipt:	2020-09-04	Please refer to photo documents		
Prüfmuster-Nr.: Test sample no.:	A002902677-001 to 003			
Prüfzeitraum: Testing period:	2020-09-10 – 2020-09-29			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd. Testing Center			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	genehmigt von: authorized by:			
Datum: Date: 2021-01-21	 Signed by: Alex Lan		 Signed by: Winnie Hou	
Stellung / Position	Senior Project Engineer	Ausstellungsdatum: Issue date: 2021-01-21		
Stellung / Position		Department Manager		
Sonstiges / Other:				
FCC ID: Z9G-EDF85 IC: 10004A-EDF85 HVIN: MS30A				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged:		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) 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>				

v05

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 99% BANDWIDTH

RESULT: Pass

5.1.4 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH

RESULT: Pass

5.1.5 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.6 20dB BANDWIDTH

RESULT: Pass

5.1.7 CARRIER FREQUENCY SEPARATION

RESULT: Pass

5.1.8 NUMBER OF HOPPING FREQUENCY

RESULT: Pass

5.1.9 TIME OF OCCUPANCY

RESULT: Pass

5.1.10 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: Photographs of the Test Set-up

Appendix B: Test Results of Conducted Testing

Appendix C: Test Results of Radiated Testing & AC Mains Conducted Emission

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Registration No.: 694916

IC Registration No.: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Radiated Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR7	102022	2020-08-19
Bilog Antenna	TESEQ	CBL6112D	51321	2020-08-29
Conducted Emissions				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR3	102428	2020-08-19
Artificial Mains Network	R&S	ENV216	102333	2020-08-19
Radio Spectrum Testing				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Wireless Connectivity Tester	Rohde & Schwarz	CMW270	101375	2021-08-30
Signal Analyzer	Rohde & Schwarz	FSV 40	101441	2021-08-30
Vector Signal Generator	Rohde & Schwarz	SMBV100A	263301	2021-08-30
Signal Generator	Rohde & Schwarz	SMB100A	115186	2021-08-30
OSP	Rohde & Schwarz	OSP 150	101017	2020-12-20
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	Rohde & Schwarz	WMS32 (V10.40.10)	N/A	N/A
Power Meter	Rohde & Schwarz	NRP2	107105	2020-12-20
Wideband Power Sensor	Rohde & Schwarz	NRP-Z81	105350	2020-12-20
Unwanted Emission Testing				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Signal Generator	Rohde & Schwarz	SMB100A	180840	2021-08-30
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	165339	2021-08-30
Signal Analyzer	Rohde & Schwarz	FSV 40	101440	2021-08-30
System Controller Interface	Rohde & Schwarz	SCI-100	S10010036	N/A
Filterbank	Rohde & Schwarz	CDMA	100751	2021-08-30
Filterbank	Rohde & Schwarz	GSM	100811	2021-08-30
OSP	Rohde & Schwarz	OSP 120	102041	N/A
OSP	Rohde & Schwarz	OSP 150	101385	N/A
Pre-amplifier	Rohde & Schwarz	SCU08F1	08320030	2021-08-30
Amplifier	Rohde & Schwarz	SCU-18F	180079	2021-08-30
Amplifier	Rohde & Schwarz	SCU40A	100450	2021-09-03
Trilog Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VULB9162	192	2021-09-02

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Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218719	2021-09-02
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18312	2021-09-02
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19066	2021-09-02
Biconical Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VUBA 9117	357	2021-09-02
Double Ridged Broadband Horn Antenna (1 – 18 GHz)	Schwarzbeck	BBHA 9120 D	01760	2021-09-02
Broadband Horn Antenna (15 – 40 GHz)	Schwarzbeck	BBHA 9170	00862	2021-09-02
Test software	Rohde & Schwarz	EMC32 (V10.40.00)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NW9P2	N/A
Conducted Emissions				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR3	102428	2021-08-19
Artificial Mains Network	R&S	ENV216	102333	2021-08-19

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		± 2.74 dB
Radiated Emission (30-1000MHz)	Field strength (dB μ V/m)	4.27dB
Radiated Emission (above 1000MHz)	Field strength (dB μ V/m)	4.46dB
Radio Spectrum		± 1.5 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C 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 TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of 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 Smart Home Speaker which supports Bluetooth 5.0 (BDR&EDR) and 2.4GHz Wi-Fi technologies.

According to declaration of applicant, the Bluetooth and Wi-Fi can't transmitting simultaneously.

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

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Smart Home Speaker
Type Designation	MS30A
Trade Mark	EDIFIER
FCC ID	Z9G-EDF85
IC	10004A-EDF85
HVIN	MS30A
Operating Voltage	DC 5V, 2A via MicroUSB interface for charging DC 3.7V, 2500mAh
Testing Voltage	DC 3.7V

Technical Specification of Wi-Fi 802.11 b/g/n

Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)
Channel Separation	5 MHz
Antenna Type	Integral Antenna
Max. Antenna Gain	3.22 dBi

Technical Specification of Bluetooth

Technical Specification	Value
Operating Frequency	2402 - 2480 MHz
Type of Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Channel Number	BDR & EDR mode:79 channels
Channel Separation	BDR & EDR mode:1MHz
Wireless Technology	Bluetooth 5.0
Antenna Type	Integral Antenna
Max. Antenna Gain	2.59 dBi

Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n

RF Channel	802.11 b/g/n(HT20)	802.11 n(HT40)
	Frequency (MHz)	Frequency (MHz)
01	2412	/
02	2417	/
03	2422	2422
04	2427	2427
05	2432	2432
06	2437	2437
07	2442	2442
08	2447	2447
09	2452	2452
10	2457	/
11	2462	/

Table 4: RF Channel and Frequency of Bluetooth

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	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	--	--

Table 5: 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 V5.0 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
 - 1. 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
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

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

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 6: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Mobile Phone	HTC	D626w	N/A
Notebook	Lenovo	ThinkPad X260	N/A

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)

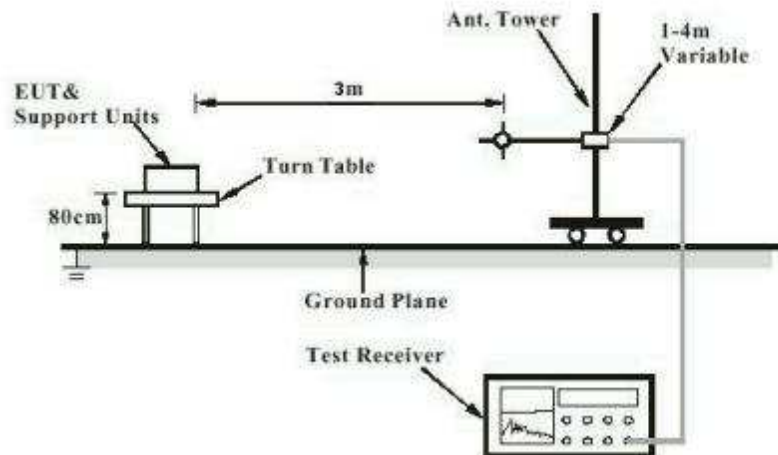


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

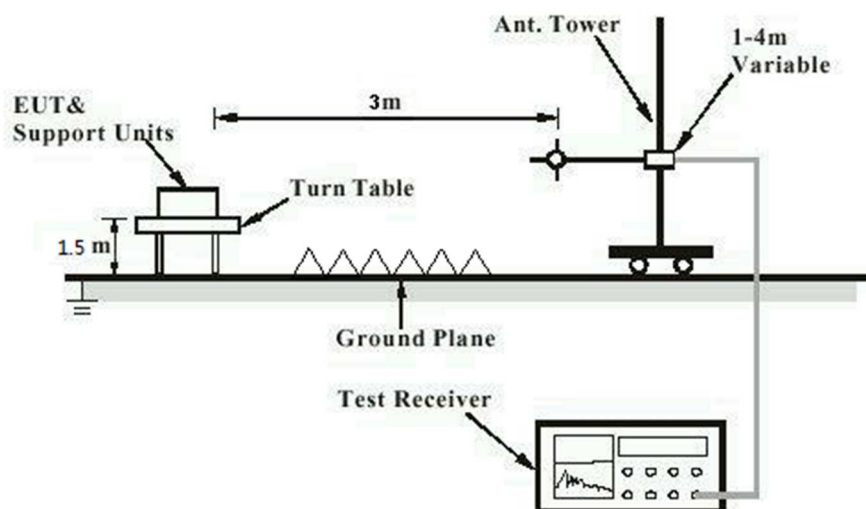


Diagram of Measurement Configuration for Mains Conduction Measurement

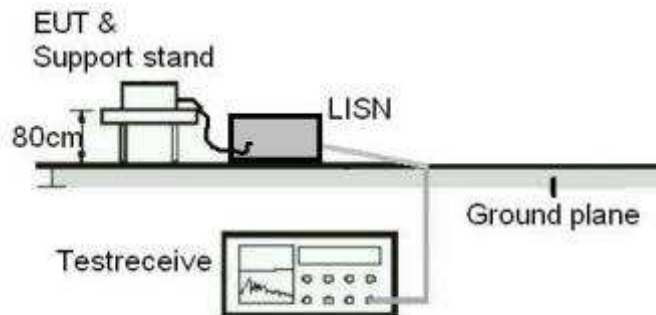
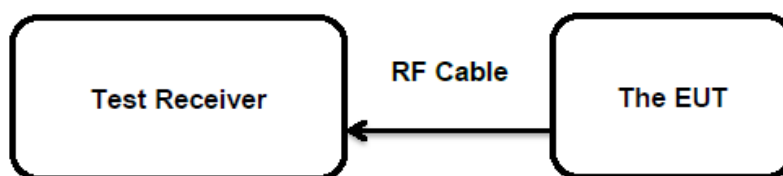


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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
RSS-Gen Clause 8.3

According to the manufacturer declared, the EUT has an integral antenna, the directional gain of antenna is 2.59 dBi, 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.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT:
Pass
Test Specification

Test standard	: FCC Part 15.247(b)(1) RSS-247 Clause 5.4(b)
Basic standard	: ANSI C63.10: 2013 FHSS<0.125W(Maximum peak conducted output
Limits	: power) < 4 W (e.i.r.p.)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 10.09.2020
Input voltage	: DC 3.7V
Operation mode	: A.1
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Table 7: Test Result of Maximum Peak Conducted Output Power

Test Mode	Channel Frequency (MHz)	Measured Peak Output Power		Measured Average Output Power		Limit (W)
		(dBm)	(W)	(dBm)	(W)	
BDR	2402	-1.80	0.00066	-3.15	0.00048	< 0.125
	2441	0.10	0.00102	-1.09	0.00078	
	2480	4.79	0.00301	3.40	0.00219	
EDR	2402	-4.0	0.00040	-7.01	0.00020	< 0.125
	2441	-2.05	0.00062	-5.02	0.00031	
	2480	2.62	0.00183	-0.25	0.00094	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 7.38 dBm less than 4W(36dBm).

5.1.3 99% Bandwidth

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

Test standard : RSS-Gen Clause 6.7
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 10.09.2020
Input voltage : DC 3.7V
Operation mode : A.1
Test channel : Low / Middle / High
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

Table 8: Test Result of 99% Bandwidth

Test Mode	Channel Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)
BDR	2402	860	/
	2441	865	
	2480	865	
EDR	2402	1175	/
	2441	1175	
	2480	1175	

For the measurement records, refer to the appendix B

5.1.4 Conducted Spurious Emissions Measured in 100 kHz Bandwidth**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d) RSS-247 Clause 5.5
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	: 10.09.2020
Input voltage	: DC 3.7V
Operation mode	: A.1
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 B.

5.1.5 Radiated Spurious Emission

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

Test standard	: FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 6 & Table 7
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 15.09.2020 - 21.09.2020
Input voltage	: DC 3.7V
Operation mode	: A.1, B
Test channel	: Low / Middle / High
Ambient temperature	: 23 °C
Relative humidity	: 56 %
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.

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

For the measurement records, refer to the appendix C.

5.1.6 20dB Bandwidth

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(a)(1)
RSS-247 Clause 5.1(a)

Basic standard : ANSI C63.10: 2013

Kind of test site : Shielded Room

Test Setup

Date of testing : 10.09.2020

Input voltage : DC 3.7V

Operation mode : A.1

Test channel : Low / Middle / High

Ambient temperature : 25 °C

Relative humidity : 56 %

Atmospheric pressure : 101 kPa

Table 9: Test Result of 20dB Bandwidth

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
BDR	2402	930	620.000	/
	2441	930	620.000	
	2480	930	620.000	
EDR	2402	1265	843.333	/
	2441	1270	846.667	
	2480	1265	843.333	

For the measurement records, refer to the appendix B.

5.1.7 Carrier Frequency Separation

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)
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	:	10.09.2020
Input voltage	:	DC 3.7V
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 10: Test Result of Carrier Frequency Separation

Test Mode	Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
BDR	Low Channel	2401.995050	1.009900	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
	Adjacency Channel	2403.004950			
	Middle Channel	2440.995050	1.009900		Pass
	Adjacency Channel	2442.004950			
	High Channel	2478.995050	1.009900		Pass
	Adjacency Channel	2480.004950			
EDR	Low Channel	2401.995050	1.009900	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
	Adjacency Channel	2403.004950			
	Middle Channel	2440.995050	0.980198		Pass
	Adjacency Channel	2441.975248			
	High Channel	2478.995050	1.009900		Pass
	Adjacency Channel	2480.004950			

Note:

The limit is maximum 2/3 of the 20 dB bandwidth: 846.667 KHz.

For the measurement records, refer to the appendix B.

5.1.8 Number of Hopping Frequency

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

Test standard : FCC part 15.247(a)(1)(iii)
RSS-247 Clause 5.1(d)
Basic standard : ANSI C63.10: 2013
Limits : ≥ 15 non-overlapping channels
Kind of test site : Shielded Room

Test Setup

Date of testing : 10.09.2020
Input voltage : DC 3.7V
Operation mode : B
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

Table 11: 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 B.

5.1.9 Time of Occupancy

RESULT:

Pass

Test Specification

Test standard	: FCC part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)
Basic standard	: ANSI C63.10: 2013
Limits	: < 0.4s
Kind of test site	: Shielded Room

Test Setup

Date of testing	:	26.02.2020
Input voltage	:	DC 3.7V
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 12: Test Result of Time of Occupancy

Test Mode	Channel	Data Packet	Pulse width (ms)	Measured Dwell time(s)	Limit (s)
BDR	2441	DH1	0.411	0.132	< 0.4s
		DH3	1.667	0.267	
		DH5	2.915	0.311	
EDR	2441	2DH1	0.421	0.135	< 0.4s
		2DH3	1.671	0.267	
		2DH5	2.922	0.312	

Note:

$$\text{Dwell time} = \text{Pulse width} \times (\text{Hopping rate} / \text{Number of channels}) \times \text{Period}$$

Period = 0.4×79 (channel) = 31.6 seconds

5.1.10 Conducted Emission on AC Mains**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.207(a) RSS-Gen Clause 8.8
Basic standard	: ANSI C63.10: 2013
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 30.09.2020
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 C.

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
RSS-102 Issue 5 March 2019
FCC KDB Publication 447498 v06

Limit : CFR47 FCC Part 1.1310

The measured maximum conducted power of the EUT is 4.79dBm $\approx$ 3.01 mW , which is far below the SAR exclusion threshold level 10mW (Appendix B, SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and <50 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile and Portable RF Exposure. Guidance v06.

The measured maximum specified e.i.r.p (average) of the EUT is 5.99dBm $\approx$ 3.97W, which is far below the SAR exclusion threshold level 4mW, hence the EUT is excluded from SAR evaluation according to RSS-102 Issue 5 section 2.5.1.

7 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

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Appendix B

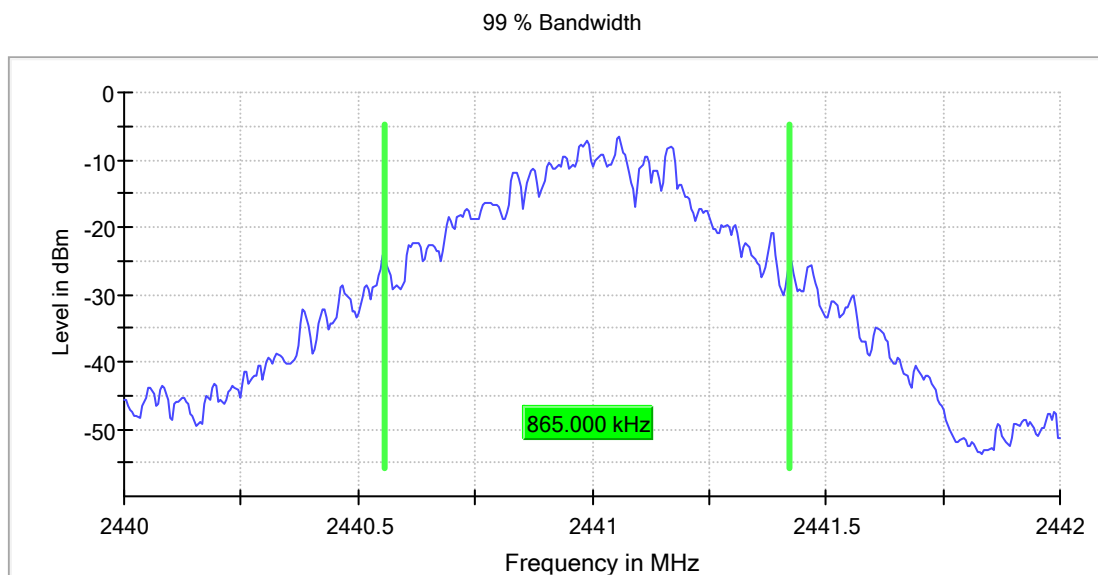
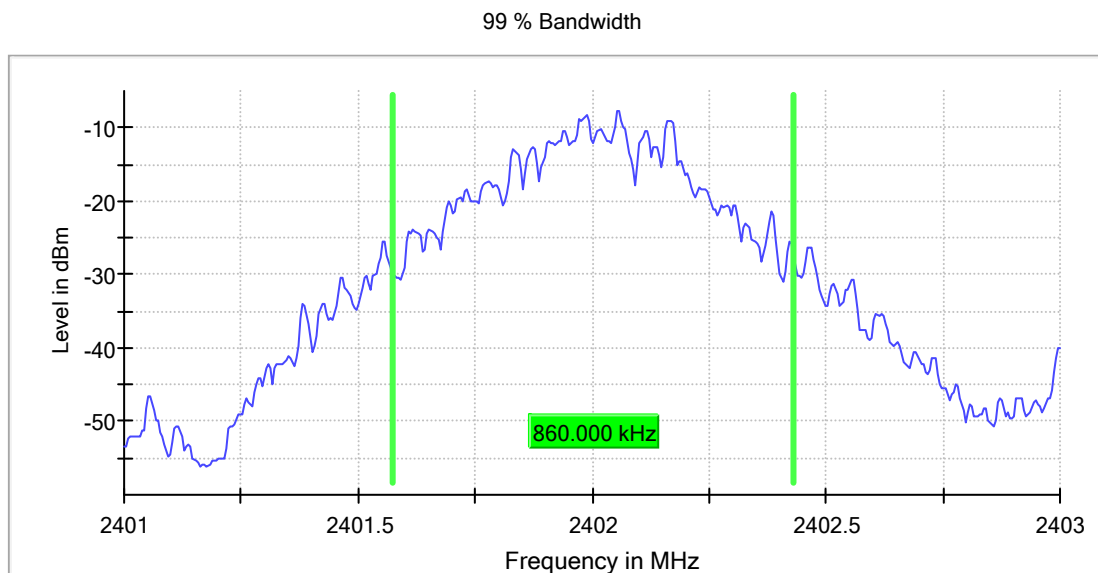
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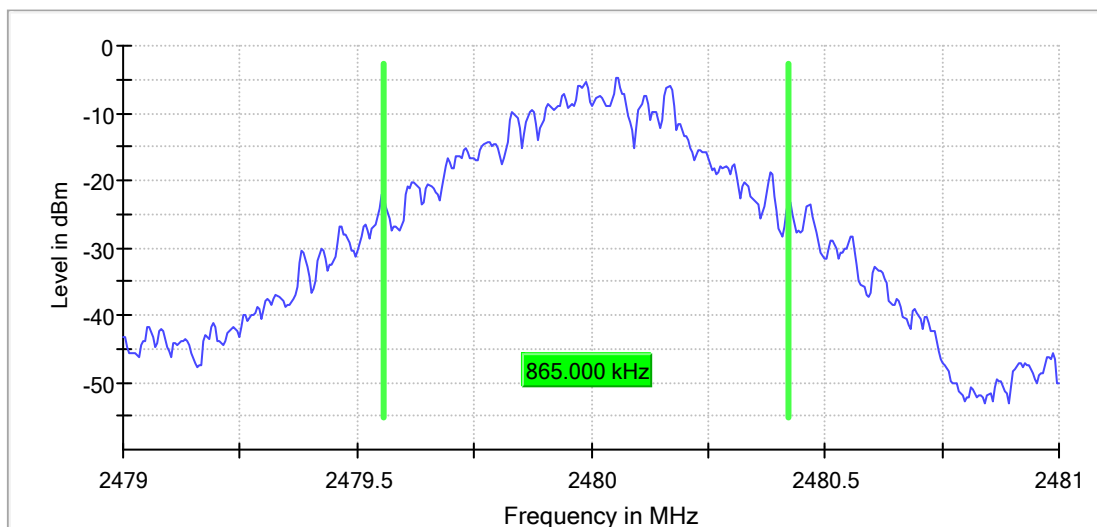
Appendix B.1: Test Plots of 99% Bandwidth

BDR Mode, DH1

RBW=10KHz, VBW=30KHz



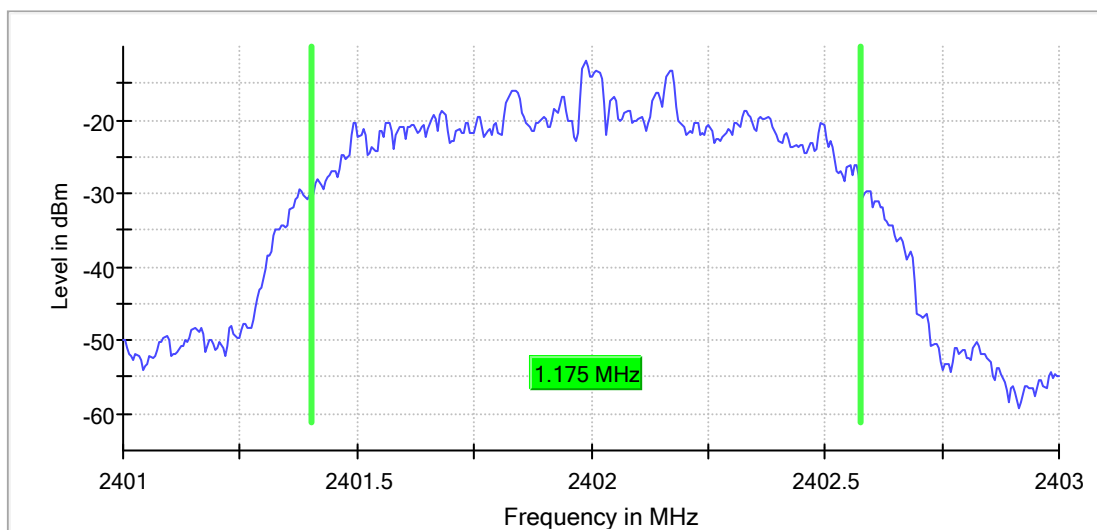
99 % Bandwidth



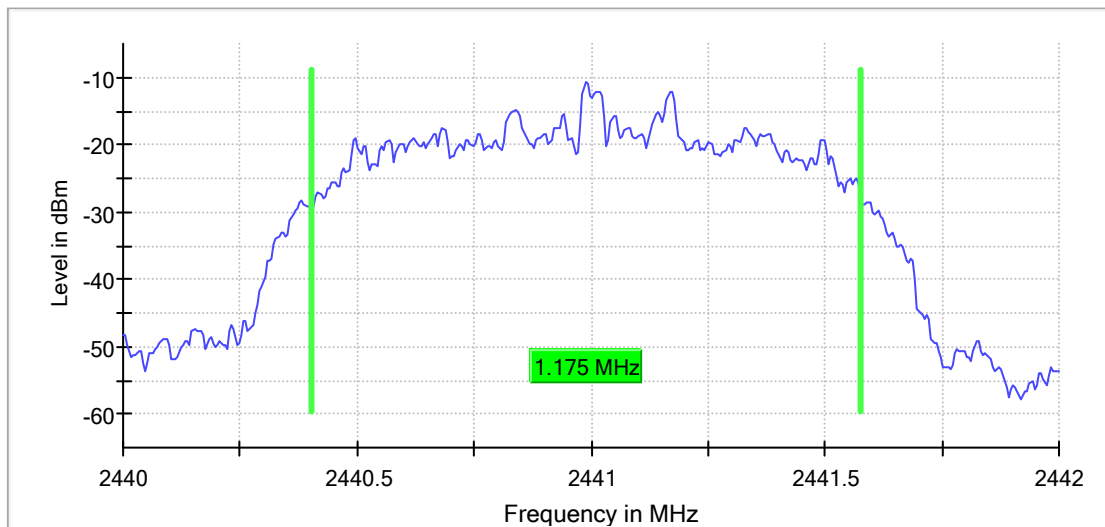
EDR Mode, 3DH1

RBW=30KHz VBW=100KHz

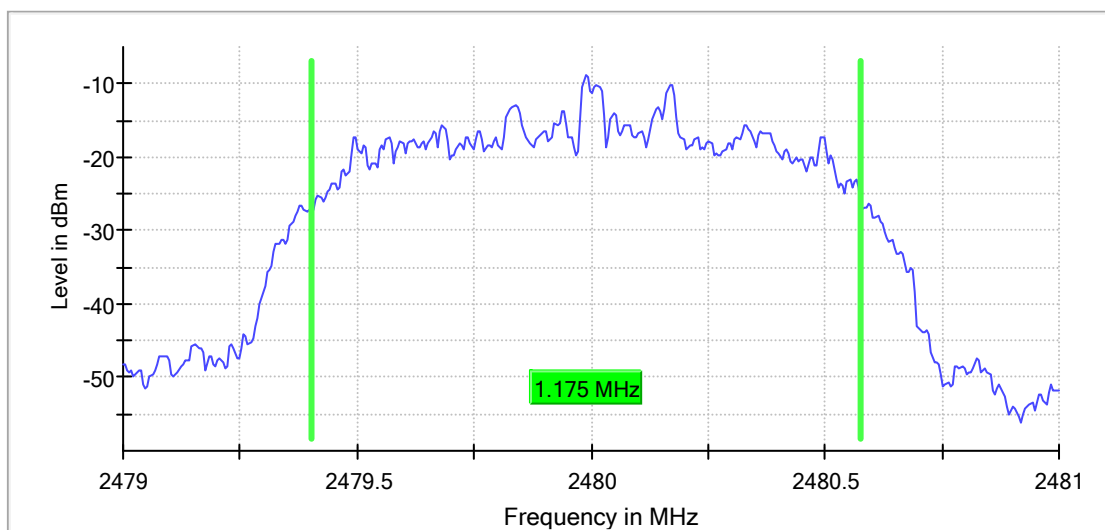
99 % Bandwidth



99 % Bandwidth



99 % Bandwidth

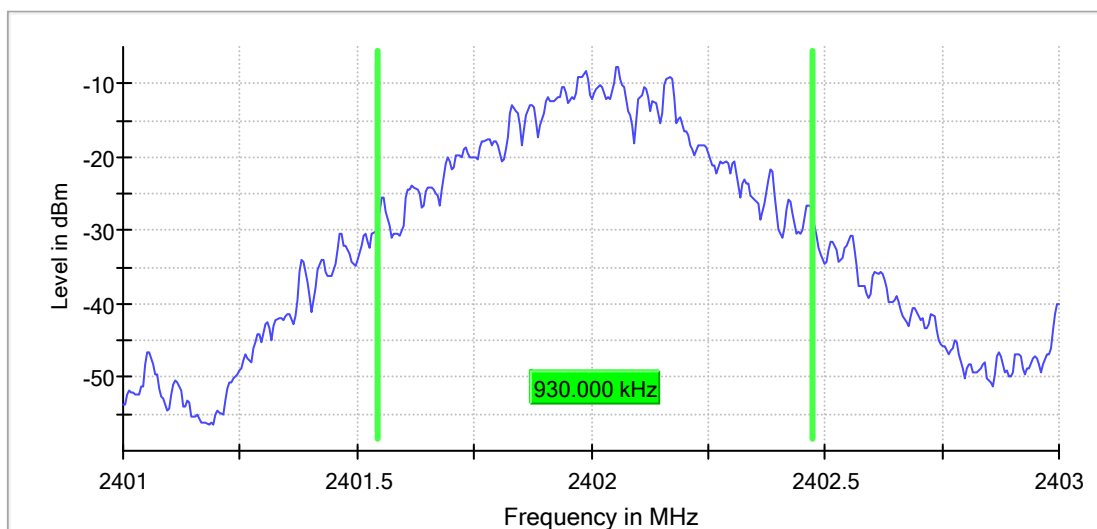


Appendix B.2: Test Plots of 20dB Bandwidth

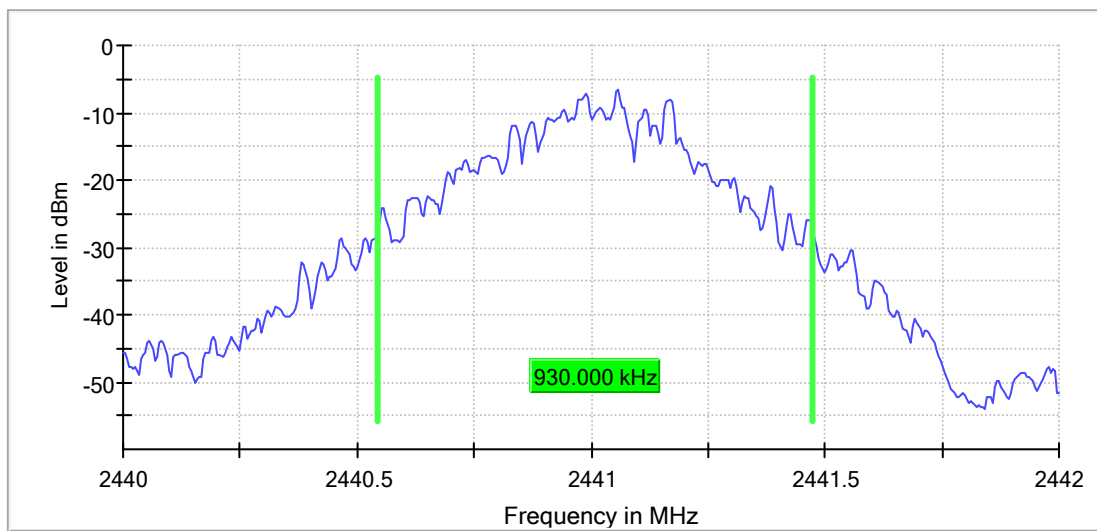
BDR Mode, DH1

RBW=10KHz VBW=30KHz

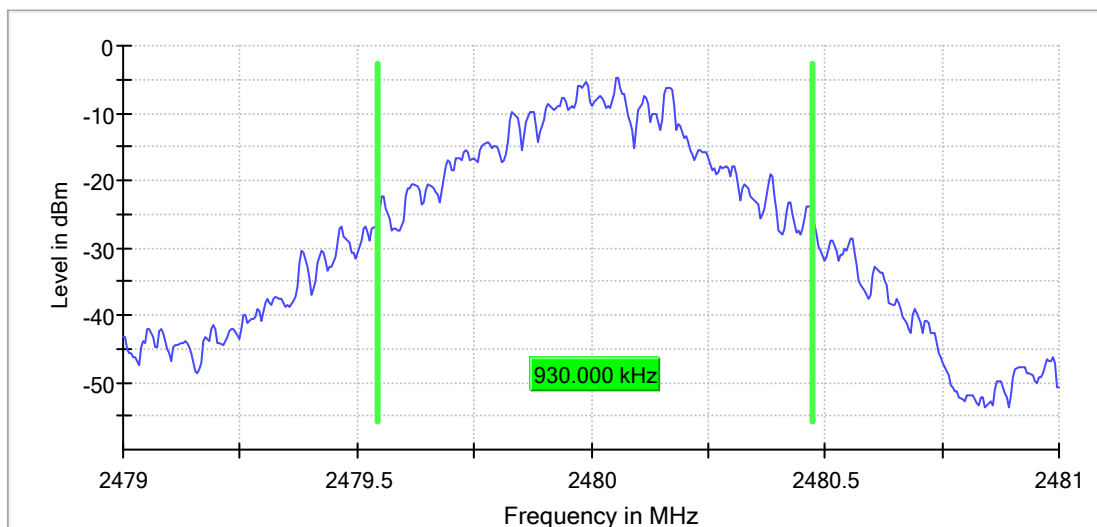
20 dB Bandwidth



20 dB Bandwidth



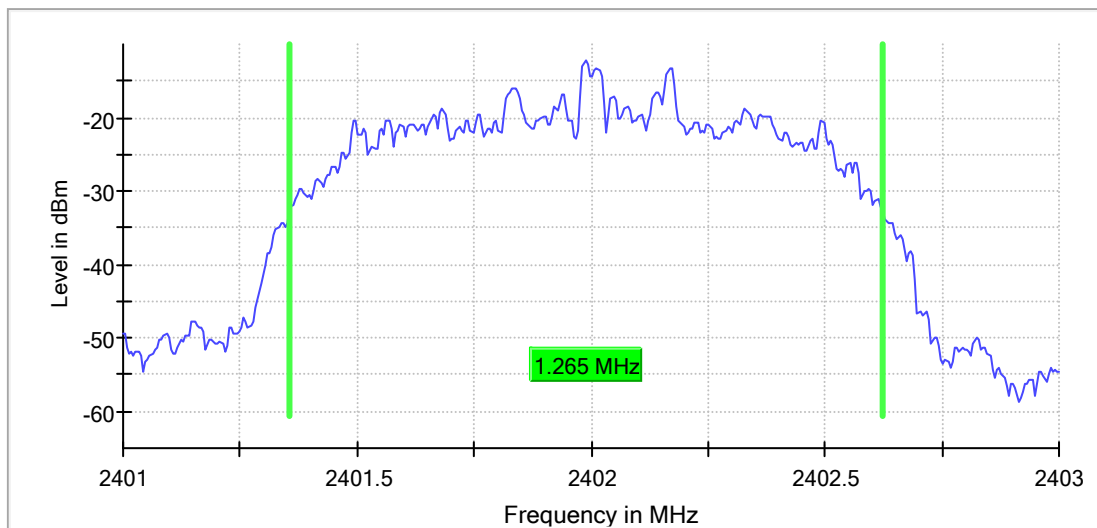
20 dB Bandwidth



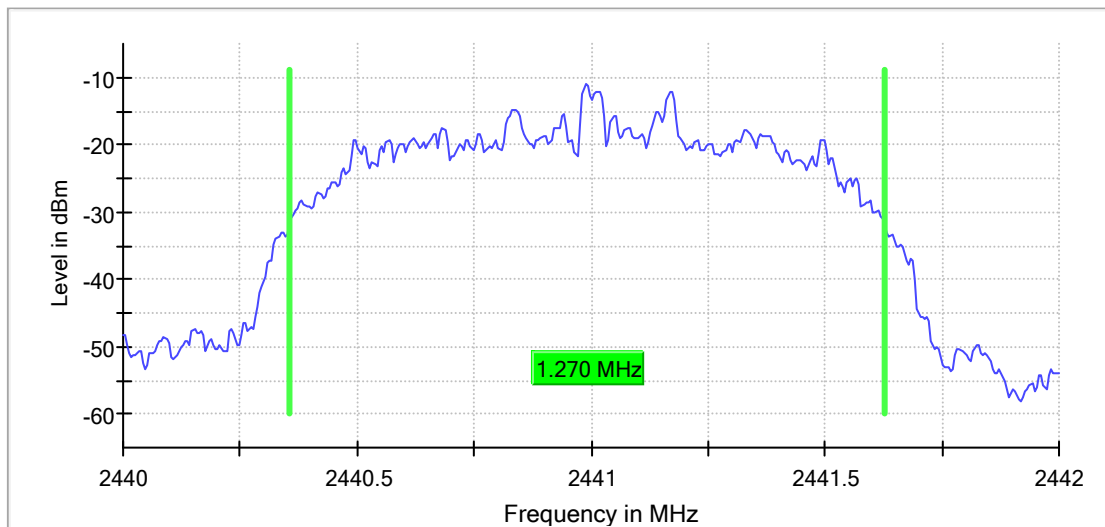
EDR Mode, 3DH1

RBW=30KHz VBW=100KHz

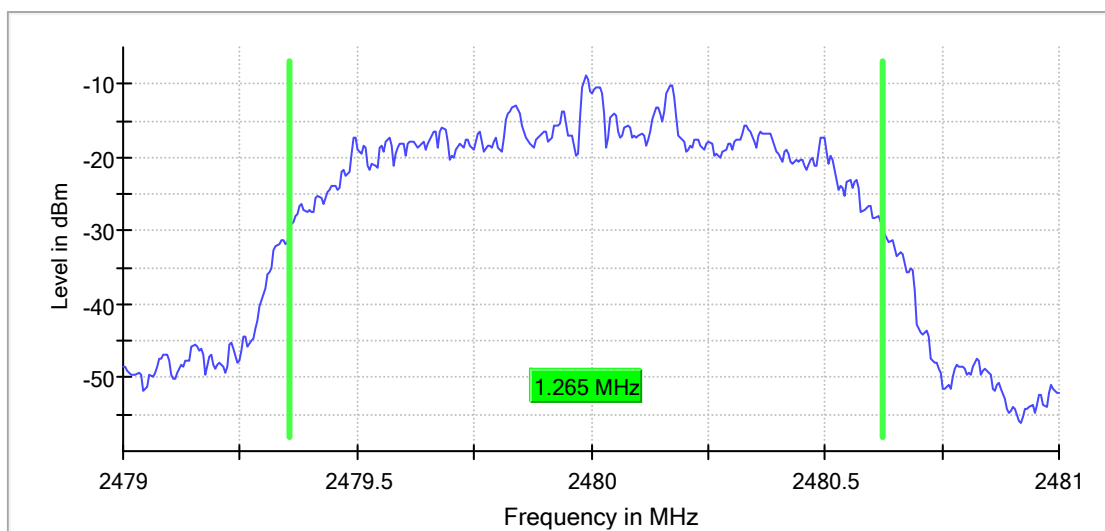
20 dB Bandwidth



20 dB Bandwidth

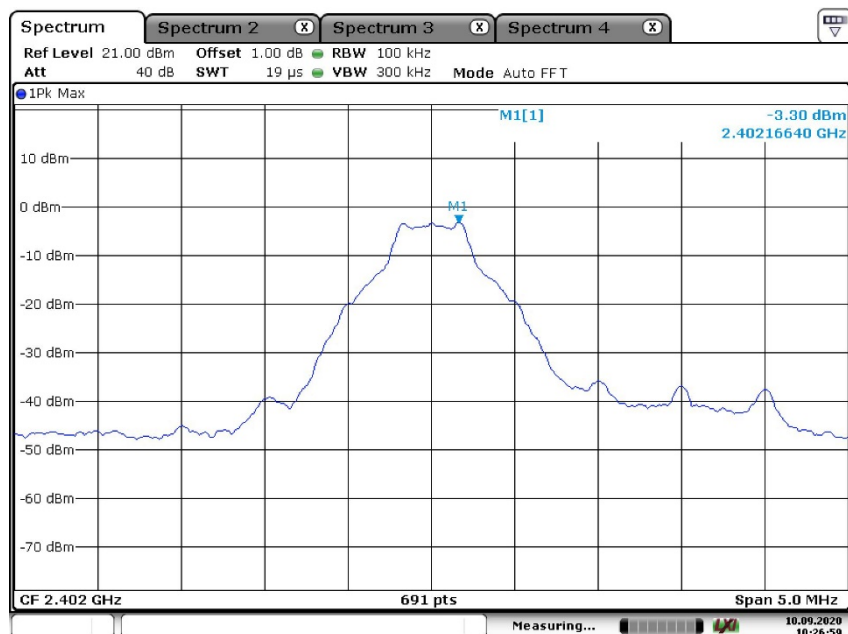


20 dB Bandwidth

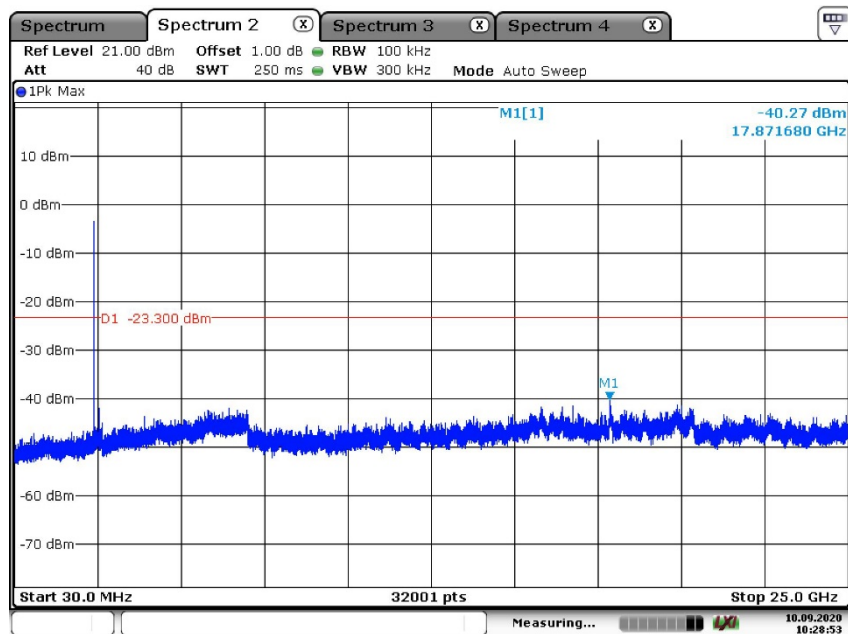


Appendix B.3: Test Plots of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

BDR Mode, Low Channel

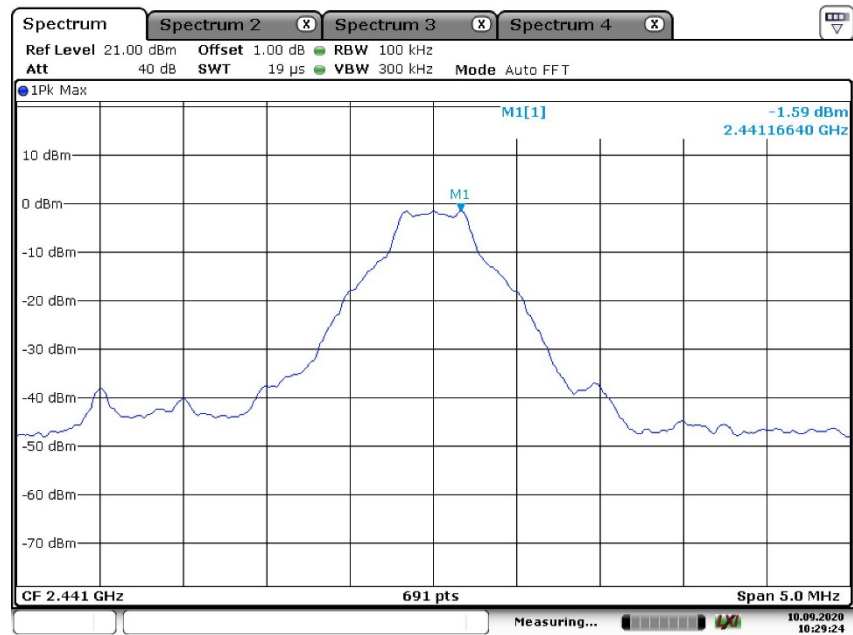


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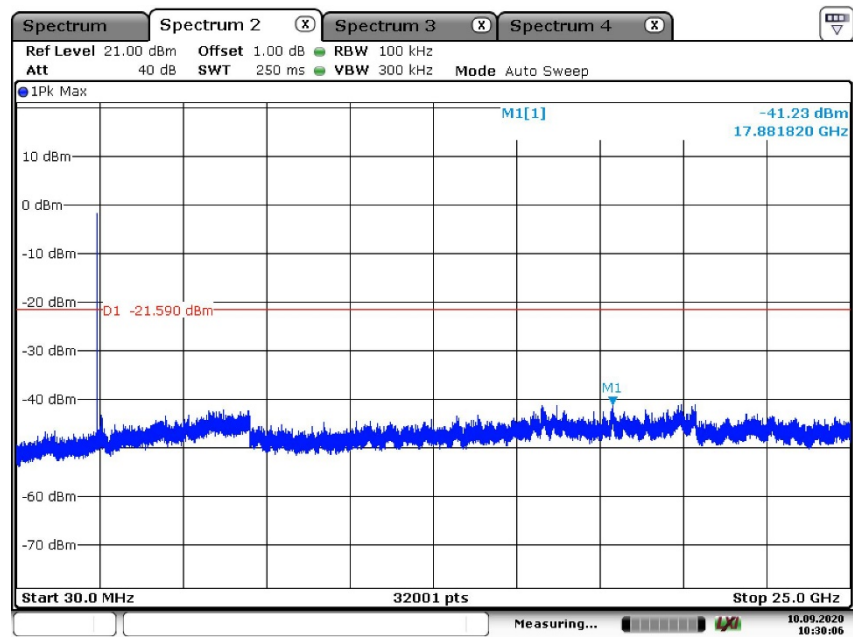


Date: 10.SEP.2020 10:28:54

BDR Mode, Middle Channel

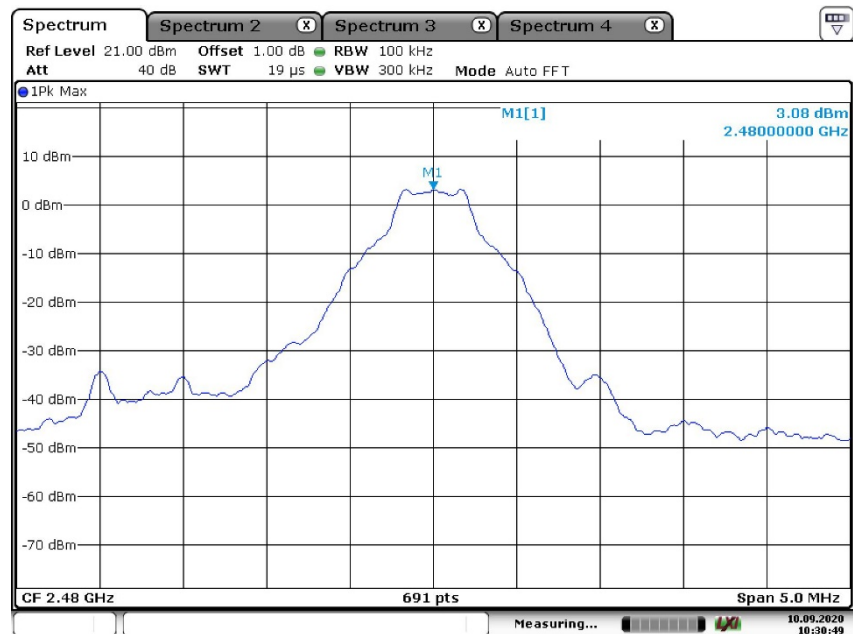


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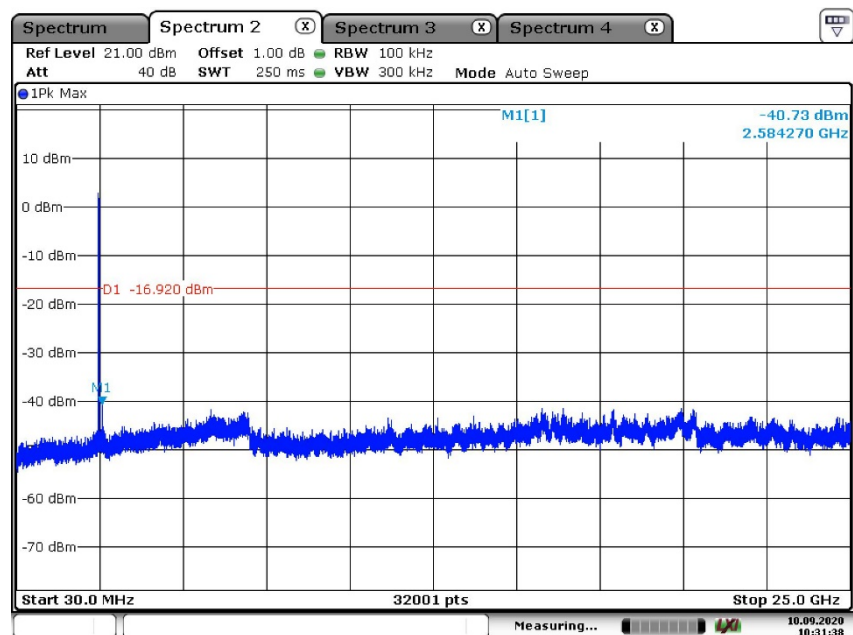


Date: 10.SEP.2020 10:30:07

BDR Mode, High Channel

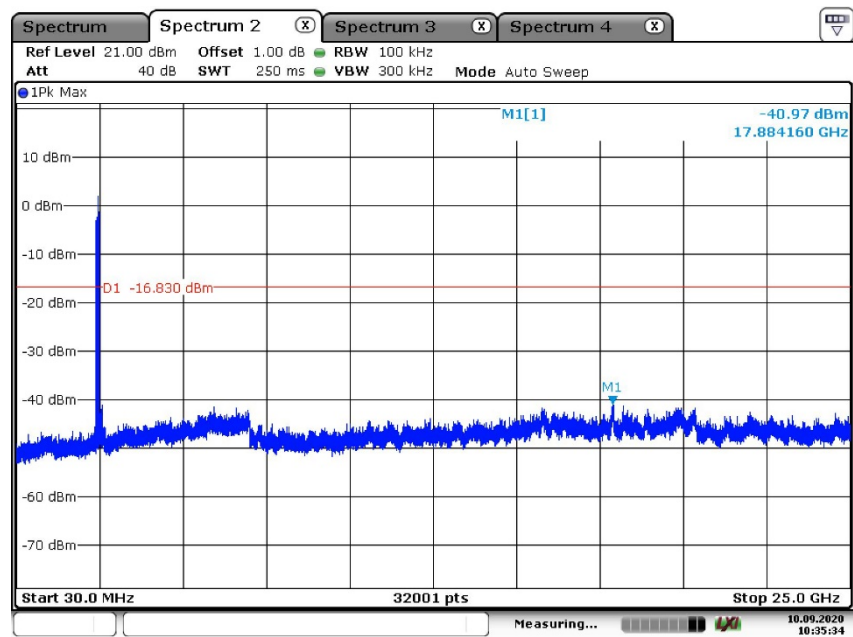
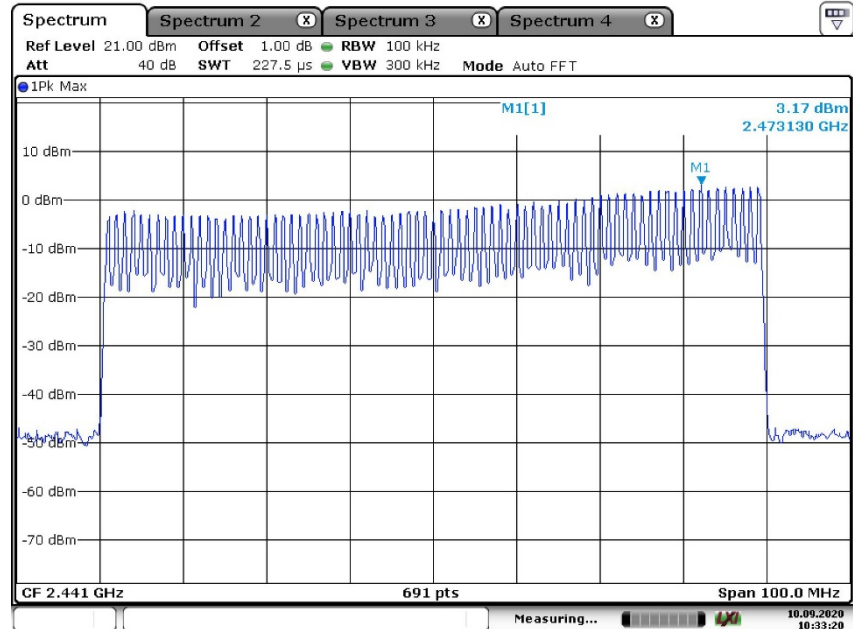


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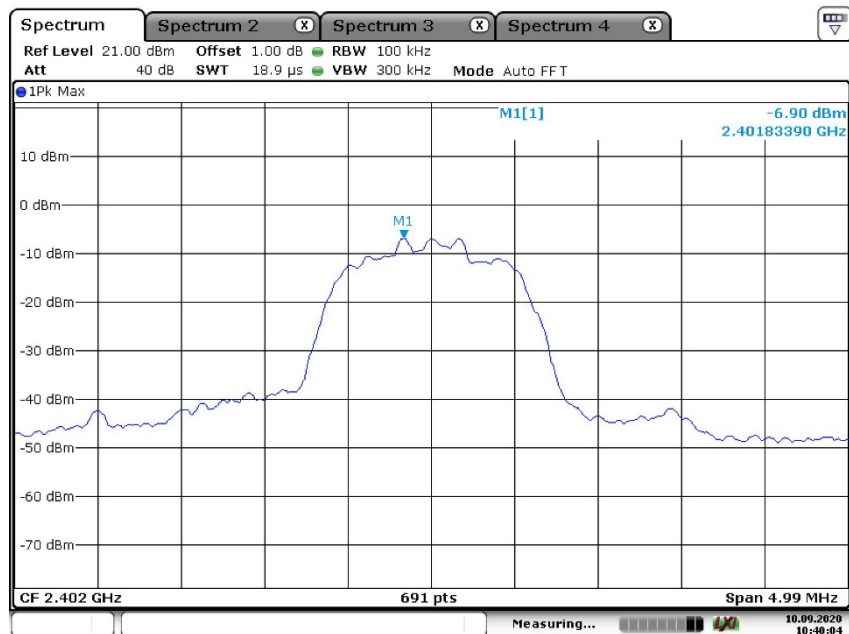


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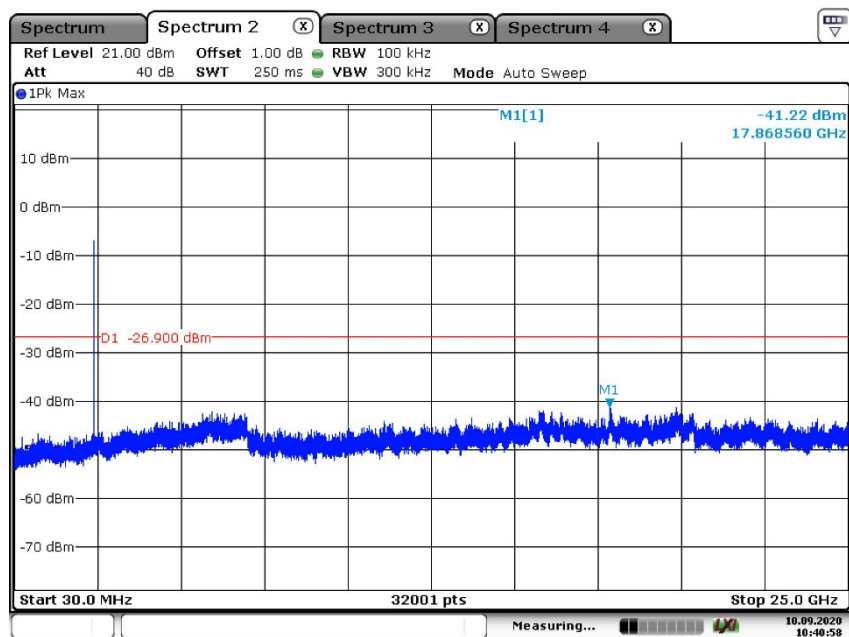
BDR, Hopping



EDR Mode, Low Channel

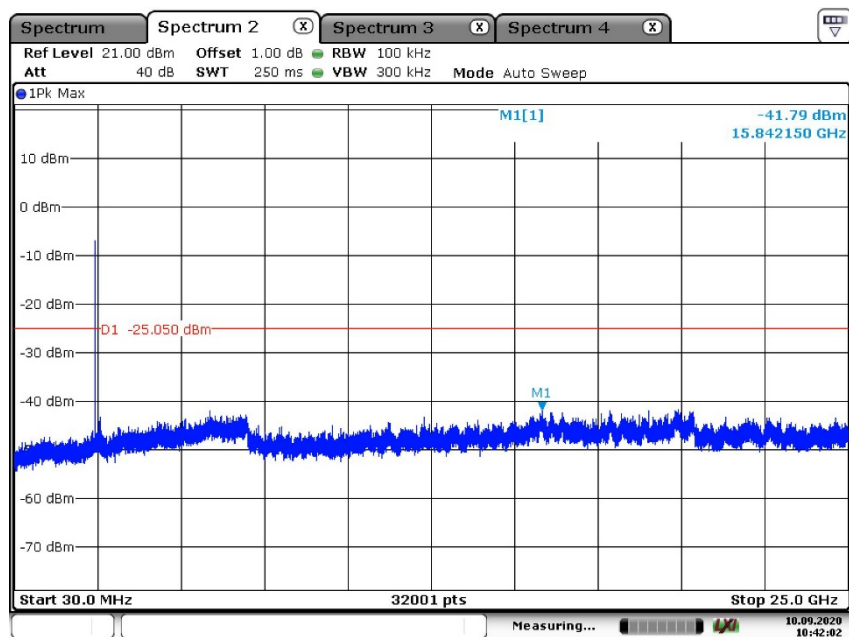
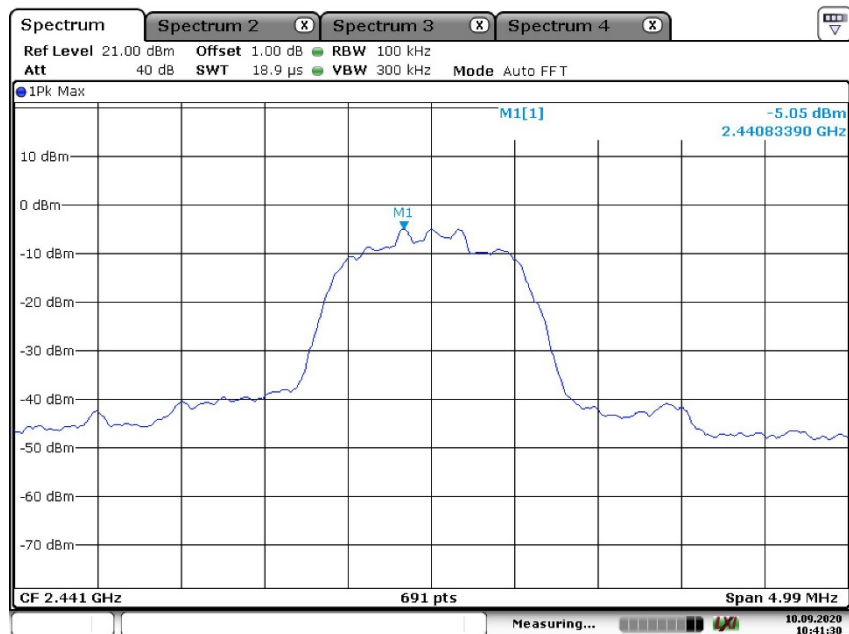


Date: 10.SEP.2020 10:40:05

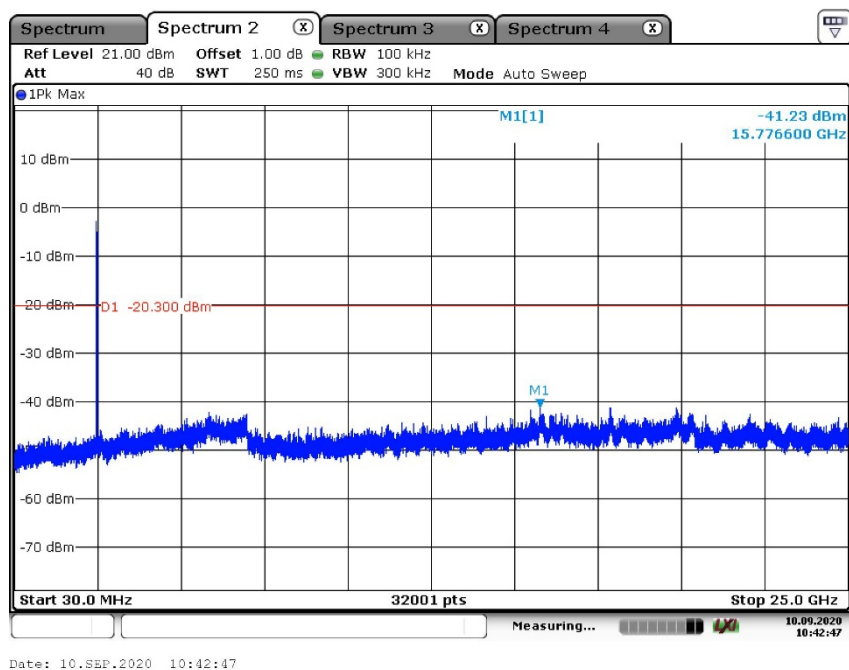
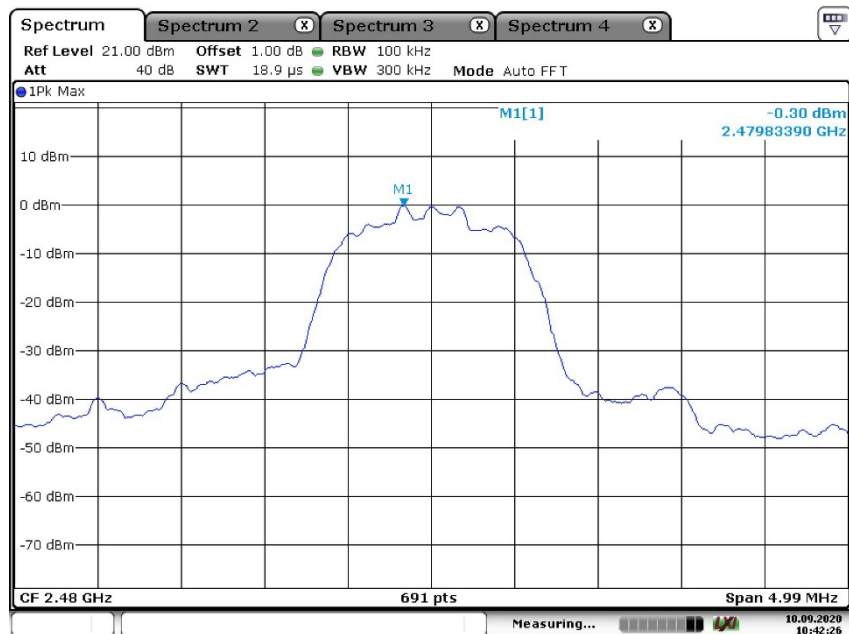


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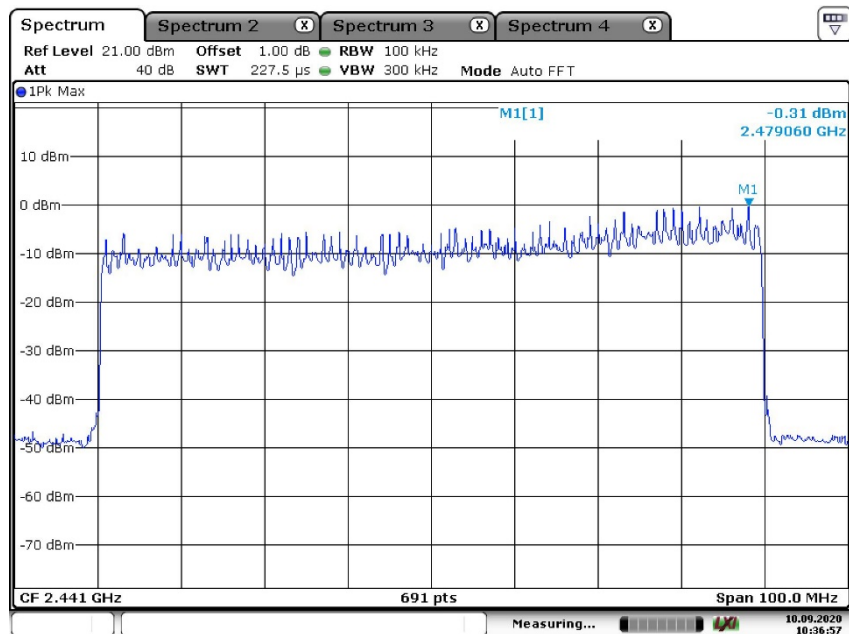
EDR Mode, Middle Channel



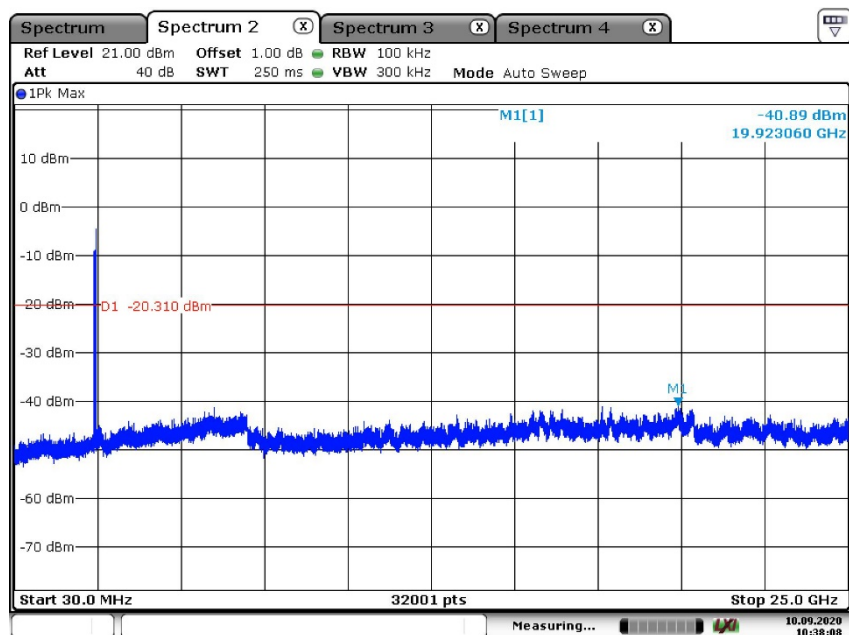
EDR Mode, High Channel



EDR, Hopping

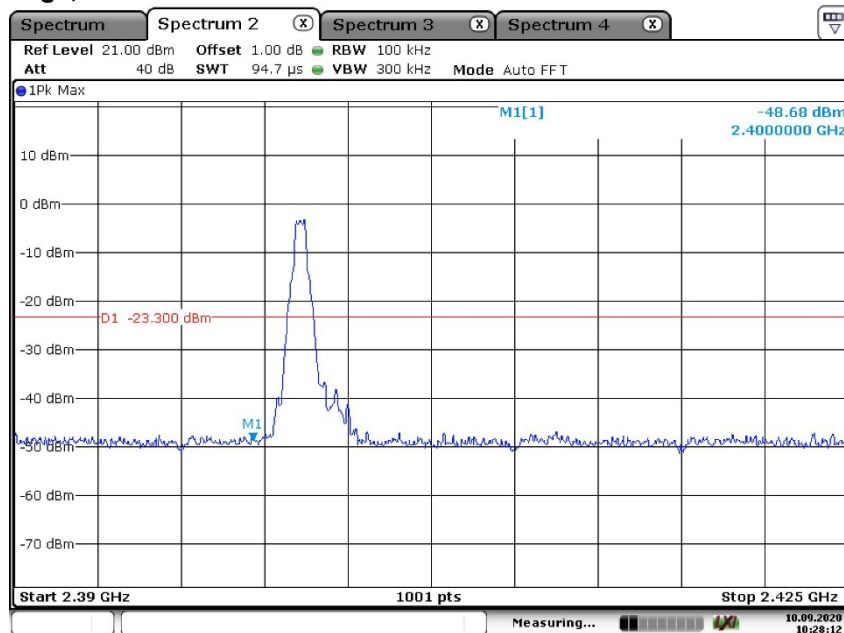


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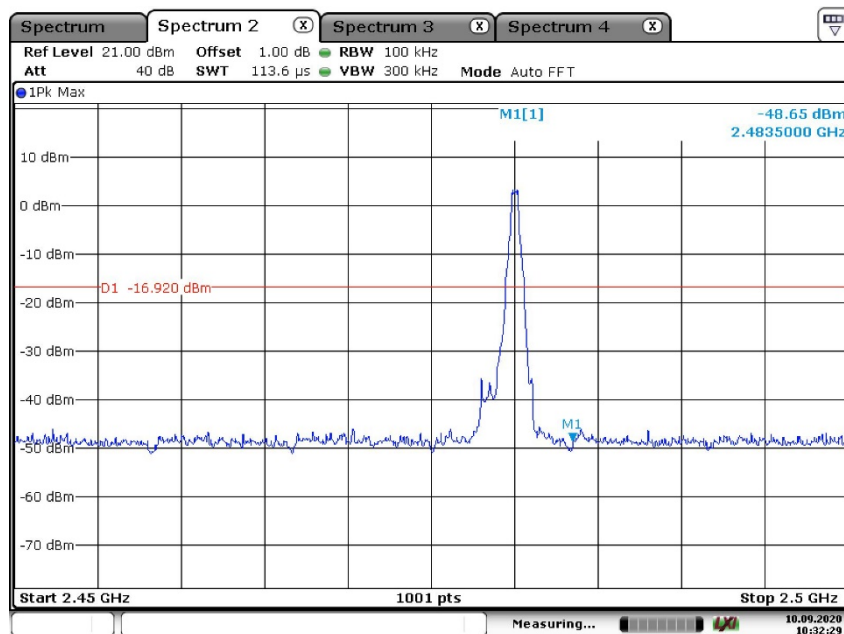
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BDR Mode, Band Edge, Low Channel



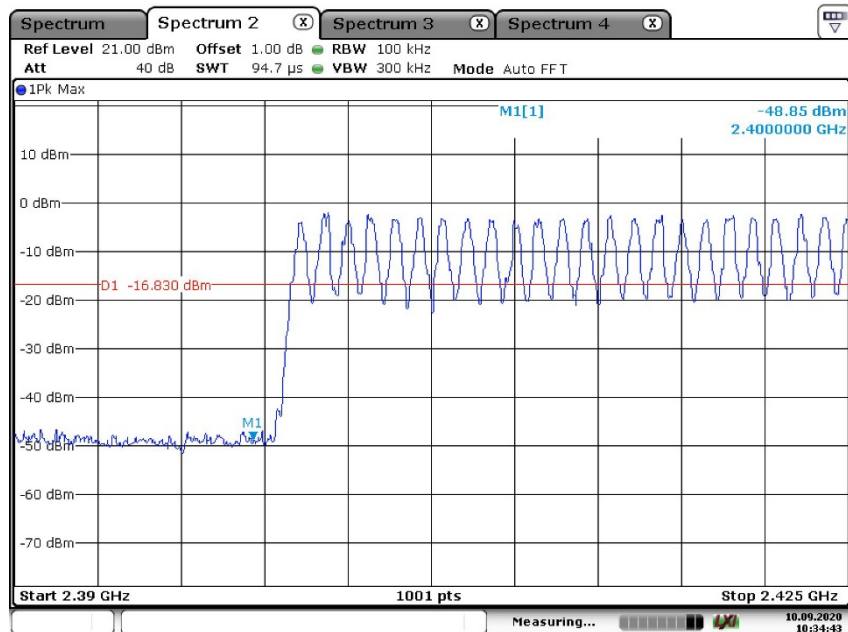
Date: 10.SEP.2020 10:28:12

BDR Mode, Band Edge, High Channel

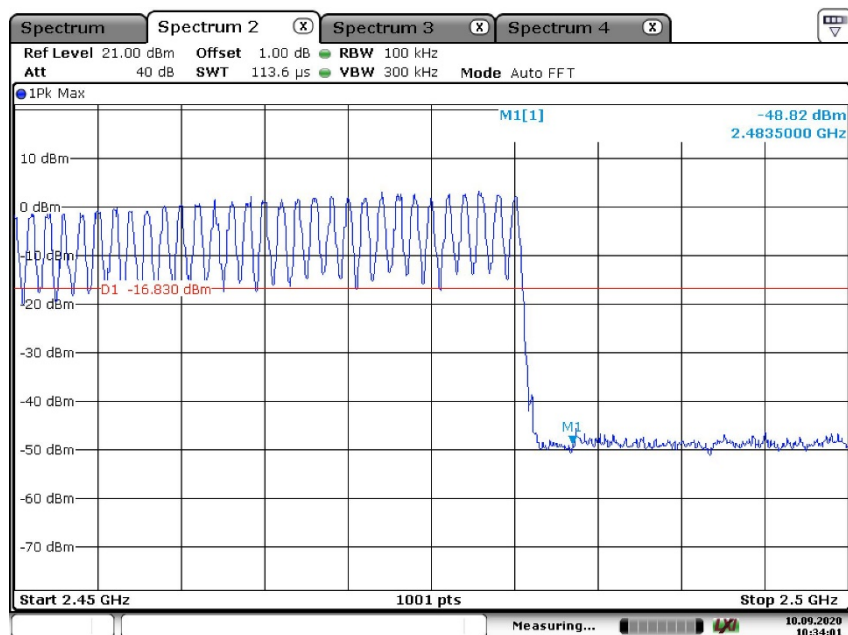


Date: 10.SEP.2020 10:32:29

BDR Mode, Hopping Band Edge

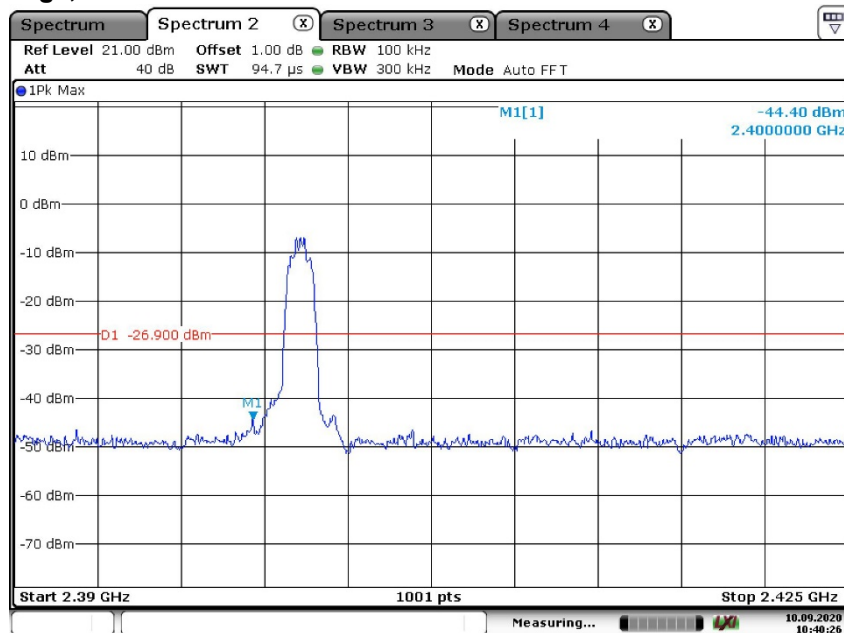


Date: 10.SEP.2020 10:34:44



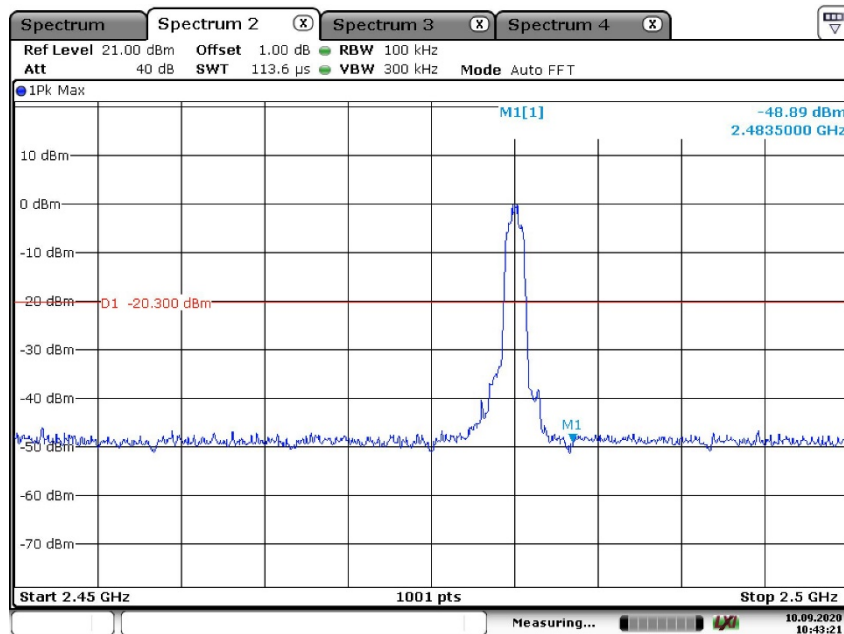
Date: 10.SEP.2020 10:34:02

EDR Mode, Band Edge, Low Channel



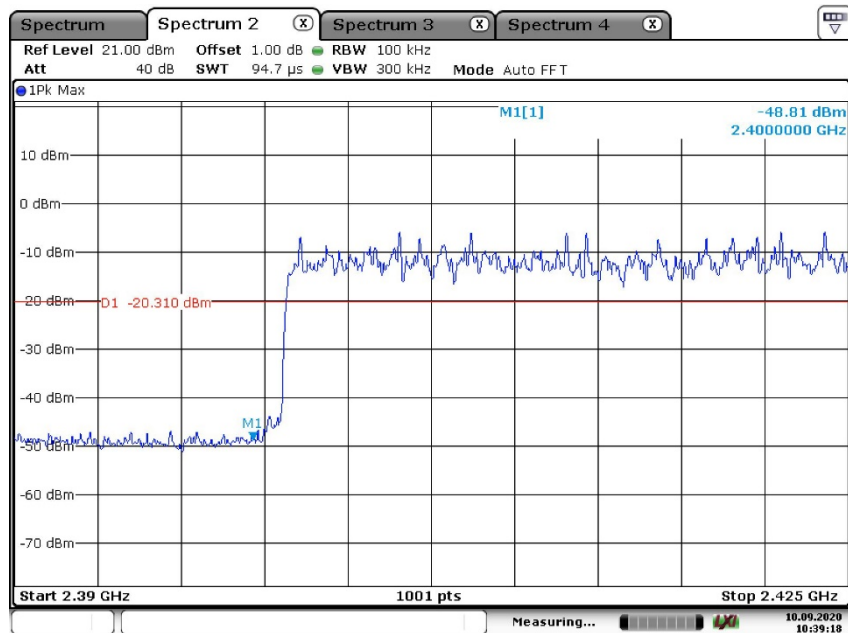
Date: 10.SEP.2020 10:40:27

EDR Mode, Band Edge, High Channel

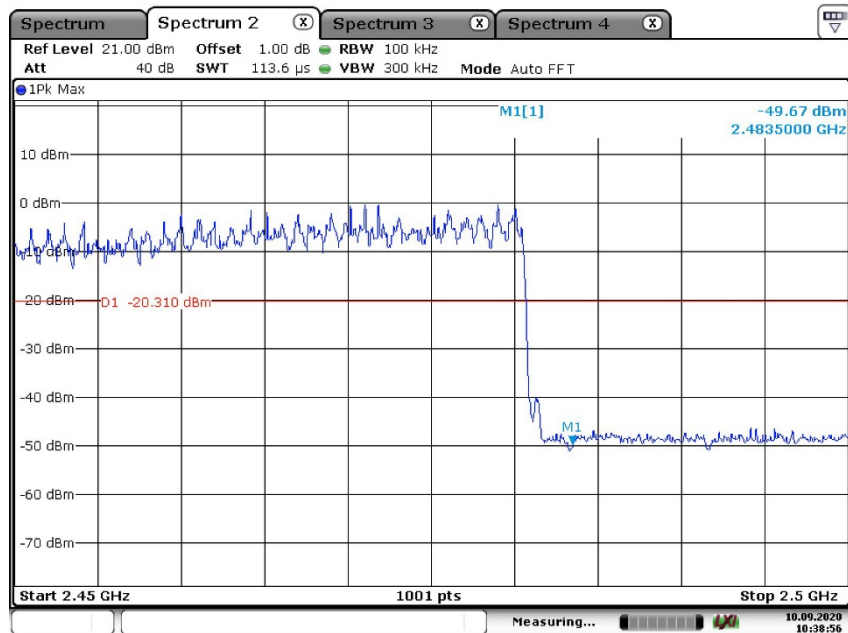


Date: 10.SEP.2020 10:43:22

EDR Mode, Hopping Band Edge



Date: 10.SEP.2020 10:39:19

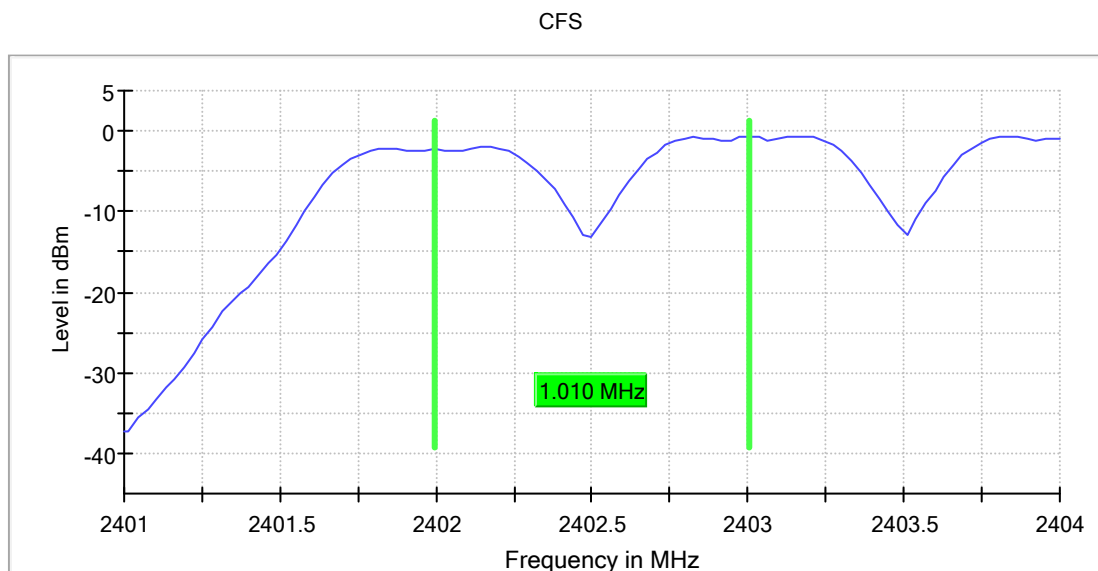


Date: 10.SEP.2020 10:38:56

Appendix B.4: Test Plots of Carrier Frequency Separation

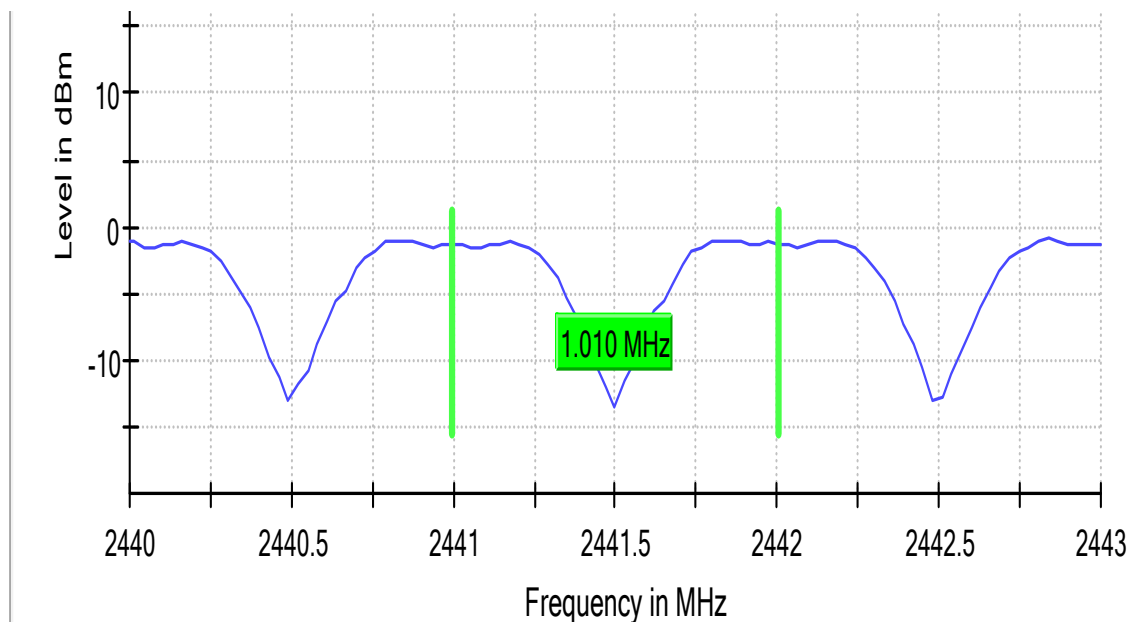
BDR, Low Channel

RBW=300KHz, VBW=300KHz

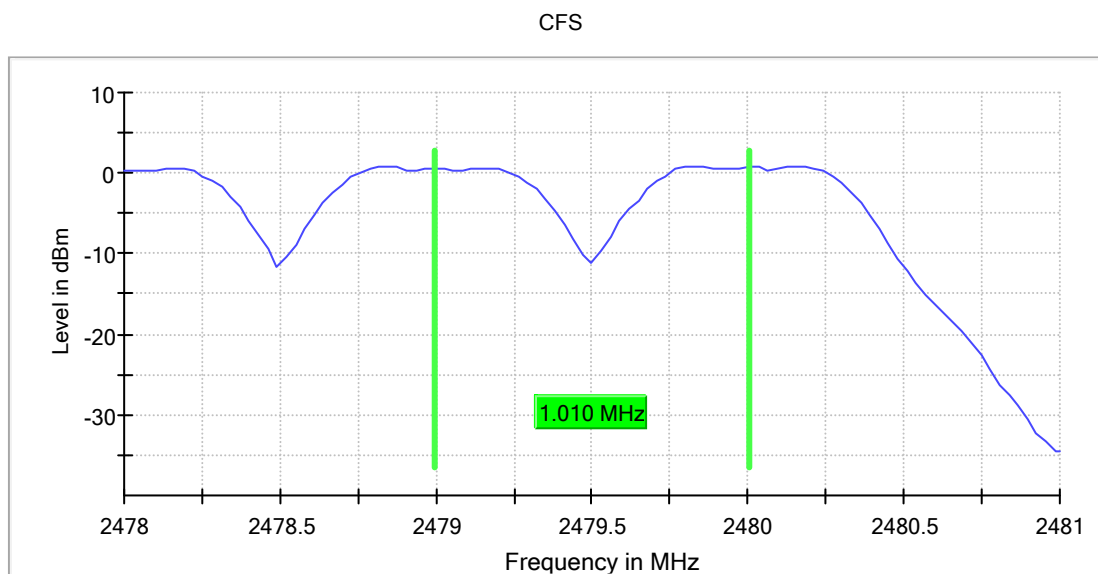


BDR, Middle Channel

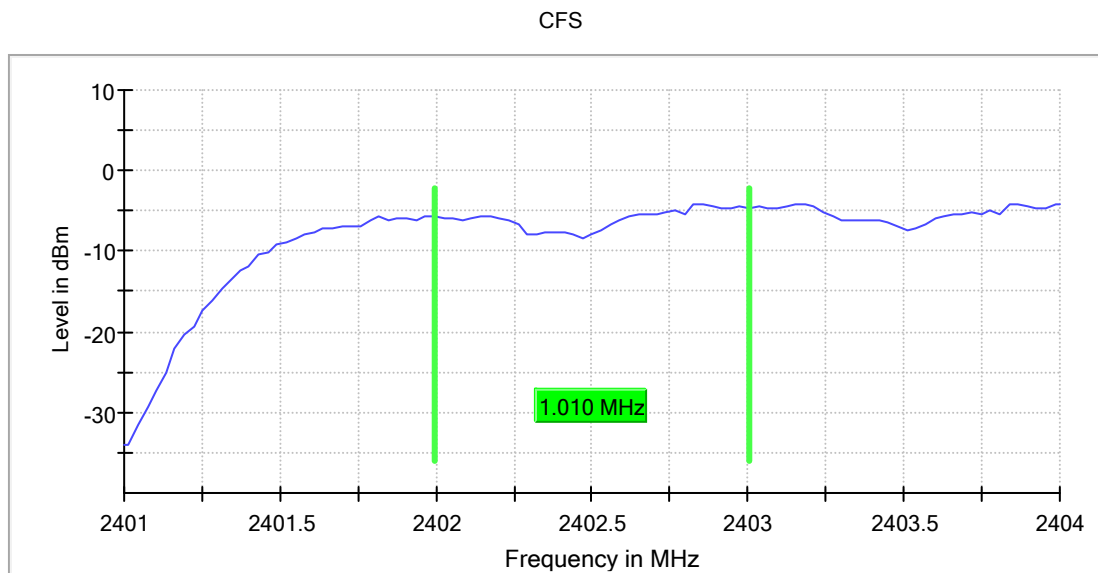
RBW=300KHz, VBW=300KHz



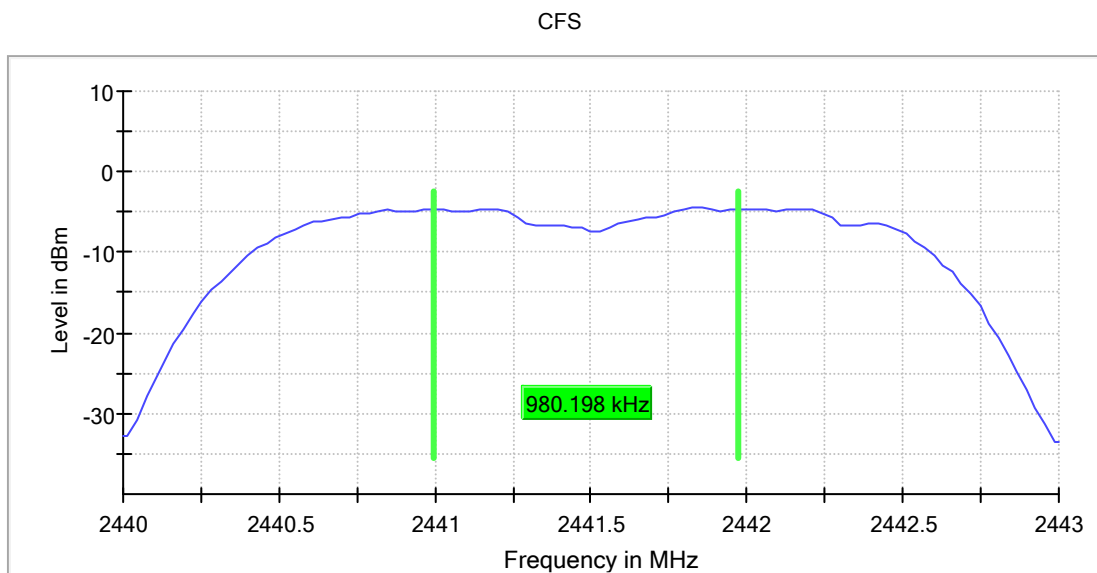
BDR, High Channel
RBW=300KHz, VBW=300KHz



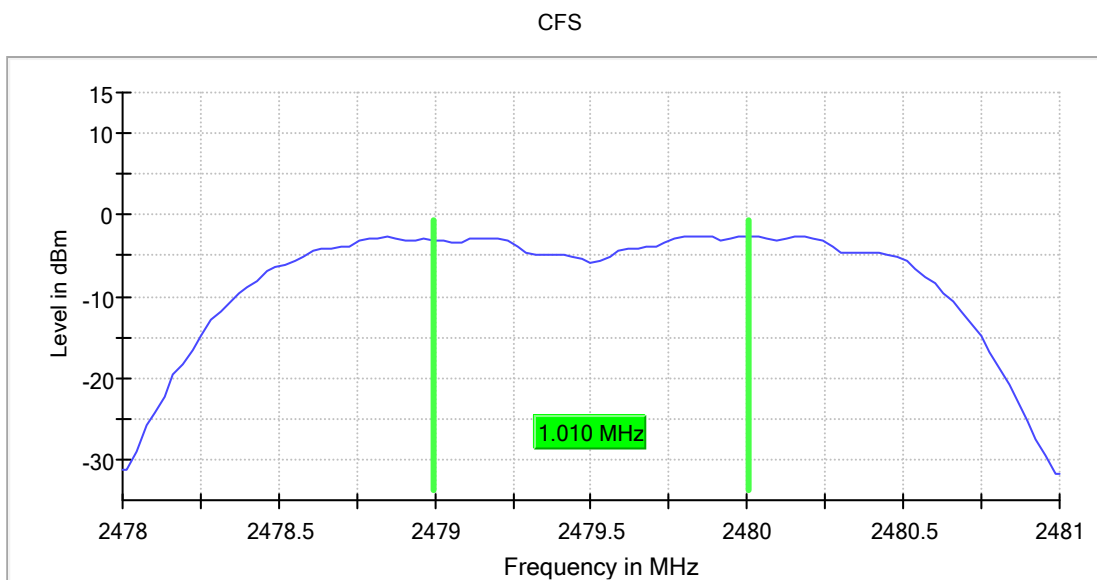
EDR, Low Channel
RBW=300KHz, VBW=300KHz



EDR, Middle Channel
RBW=300KHz, VBW=300KHz



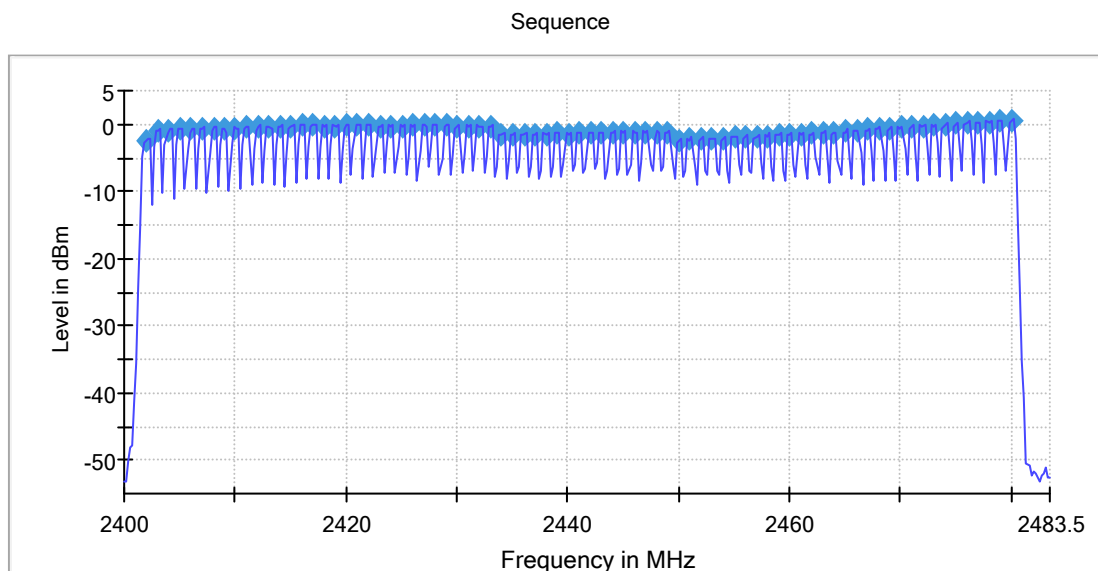
EDR, High Channel
RBW=300KHz, VBW=300KHz



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

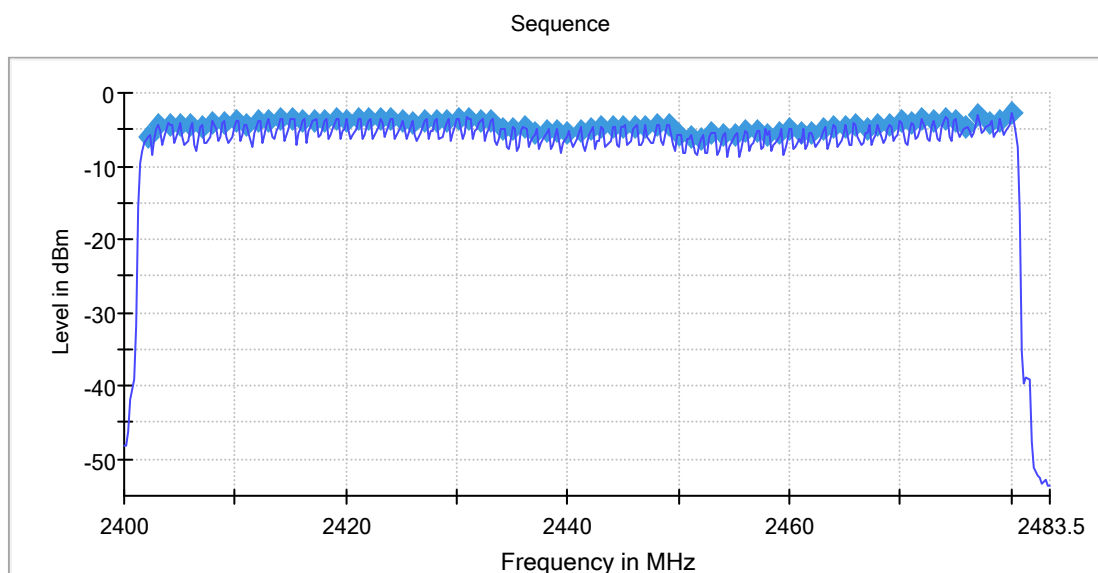
BDR, Hopping

RBW=200KHzM, VBW=200KHz



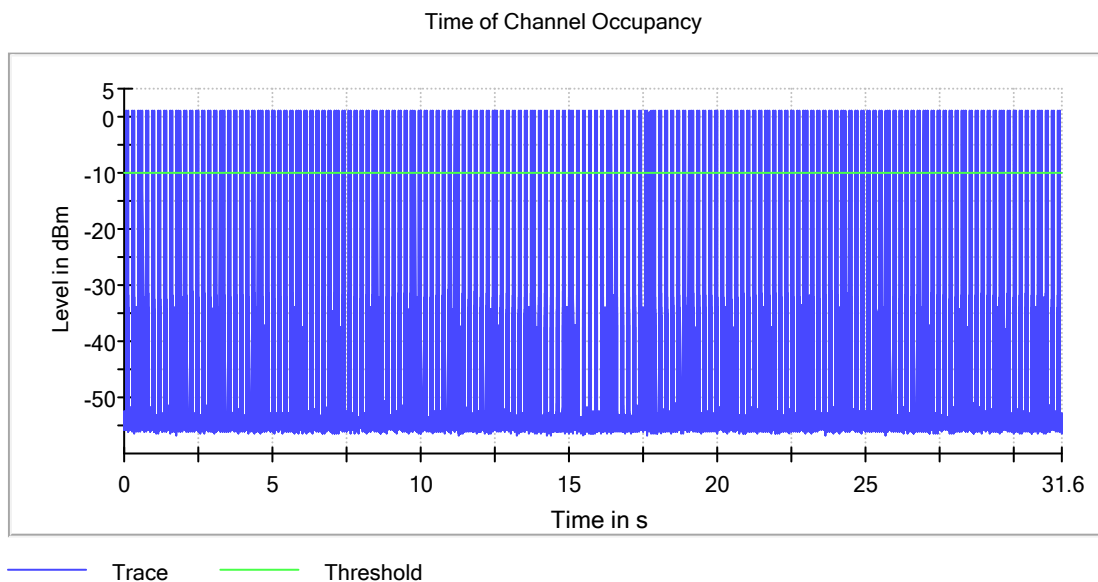
EDR, Hopping

RBW=200KHzM, VBW=200KHz

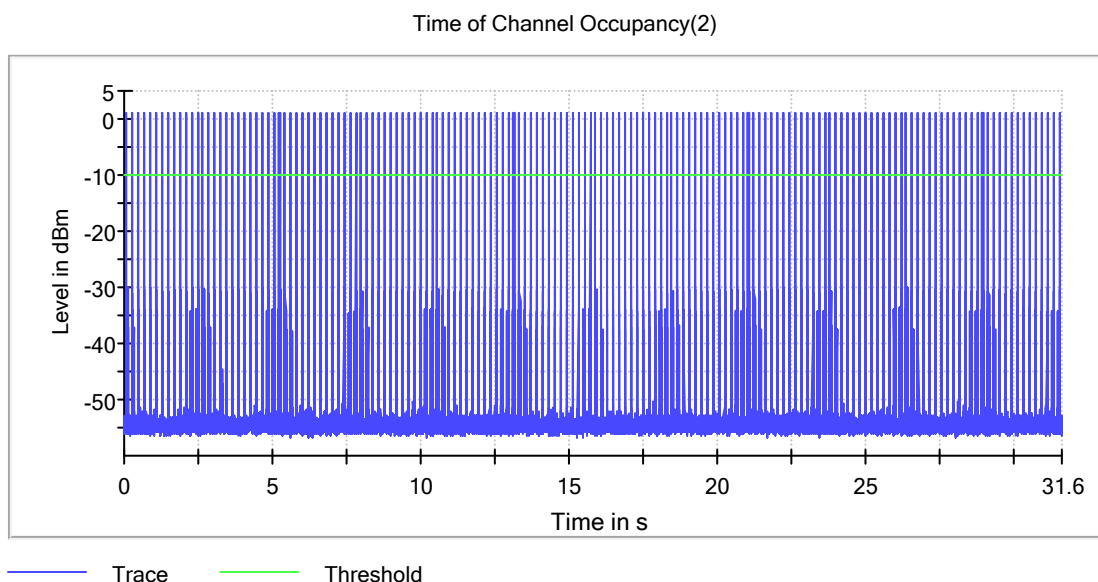


Appendix B.6: Test Plots of Time of Occupancy

BDR Mode, DH1, Middle Channel
RBW=500KHzM, VBW=1MHz

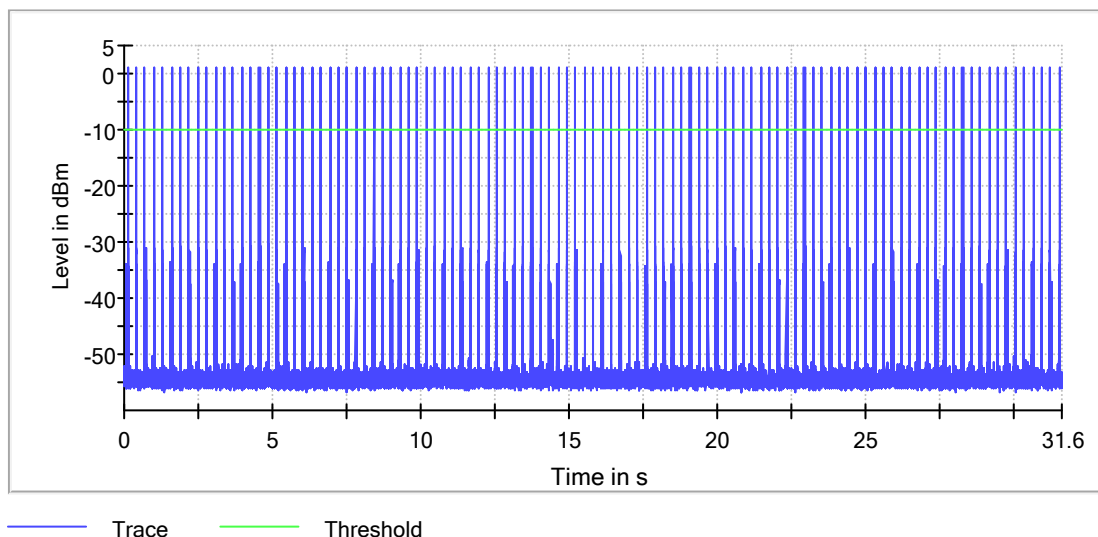


BDR Mode, DH3, Middle Channel
RBW=500KHzM, VBW=1MHz



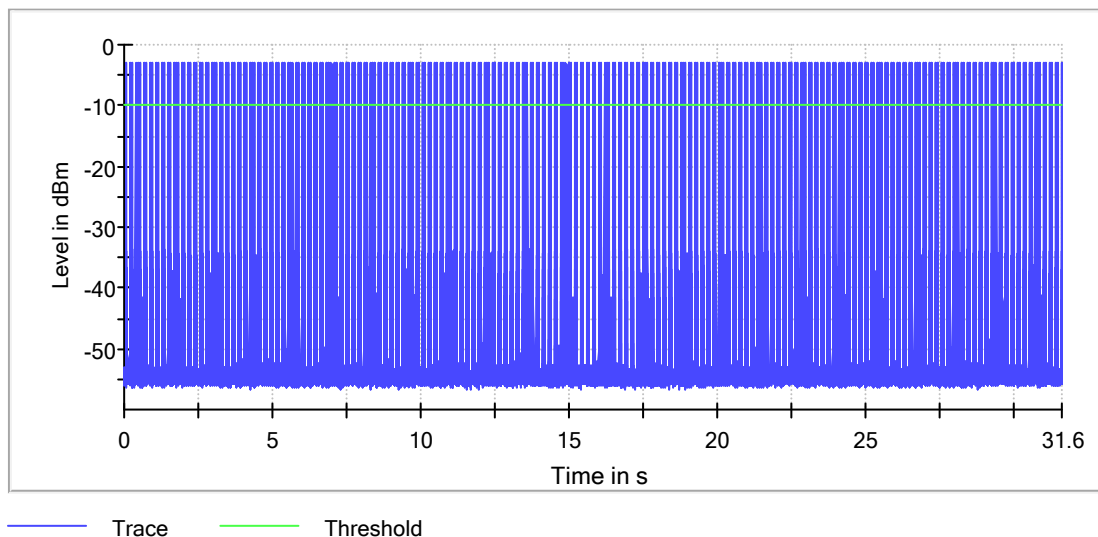
BDR Mode, DH5, Middle Channel
RBW=500KHzM, VBW=1MHz

Time of Channel Occupancy(3)



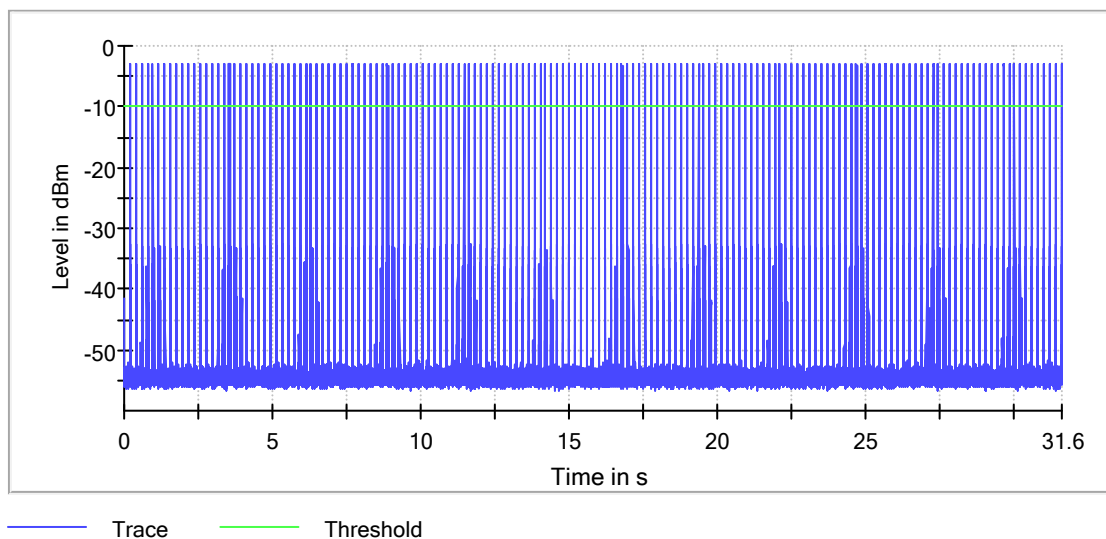
EDR Mode, 3DH1, Middle Channel
RBW=500KHzM, VBW=1MHz

Time of Channel Occupancy



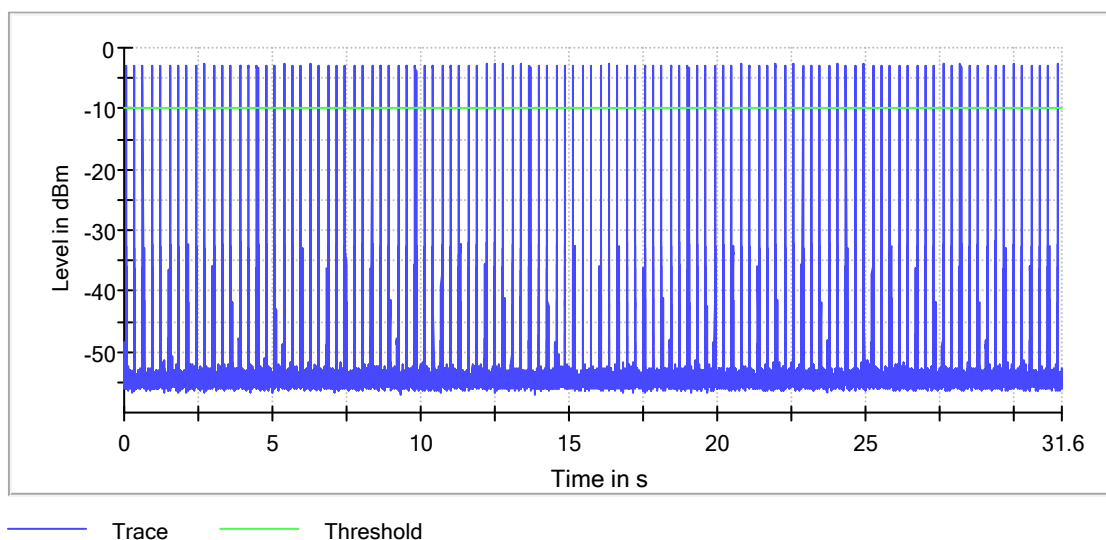
EDR Mode, 3DH3, Middle Channel
RBW=500KHzM, VBW=1MHz

Time of Channel Occupancy(2)



EDR Mode, 3DH5, Middle Channel
RBW=500KHzM, VBW=1MHz

Time of Channel Occupancy(3)



Appendix C

Test Results of Radiated Emission & AC Mains Conducted Emission

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APPENDIX C.1: TEST PLOTS OF RADIATED SPURIOUS EMISSION	2
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<i>EDR mode, Low Channel</i>	22
<i>EDR mode, High Channel</i>	24
APPENDIX C.3: TEST PLOTS OF AC MAINS CONDUCTED EMISSION	26

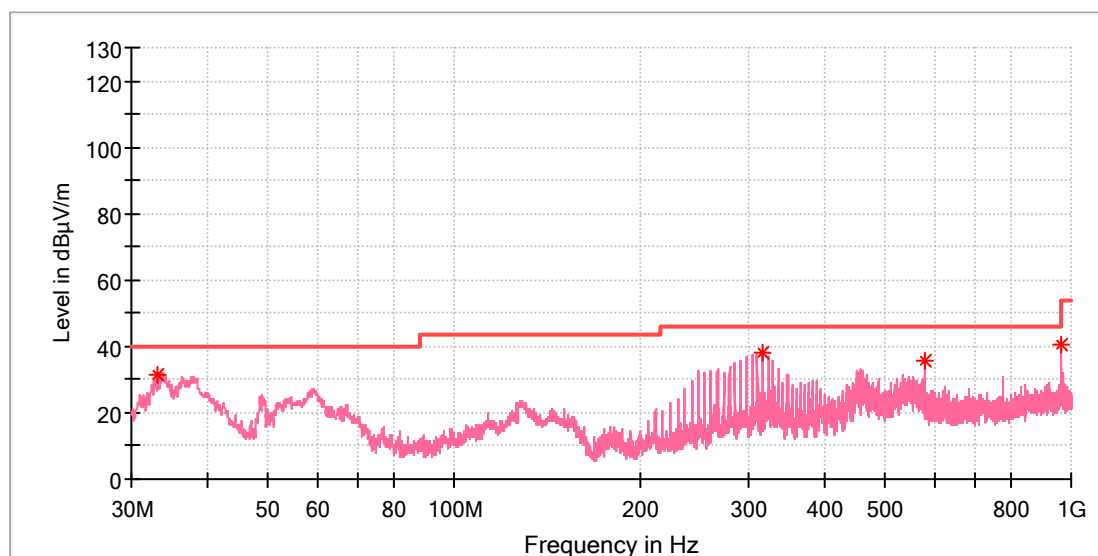
Note: The radiated spurious emission were measured from 9KHz to 26.5GHz, the measurement results below 30MHz and above 18GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported.

Appendix C.1: Test Plots of Radiated Spurious Emission

BDR mode, 30MHz - 1GHz

EUT Information

EUT Name:	Smart Home Speaker
Model:	MS30A
Test Mode:	TX_BT_DH5_Low CH
Test Voltage::	Battery
Remark:	Temp 23 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

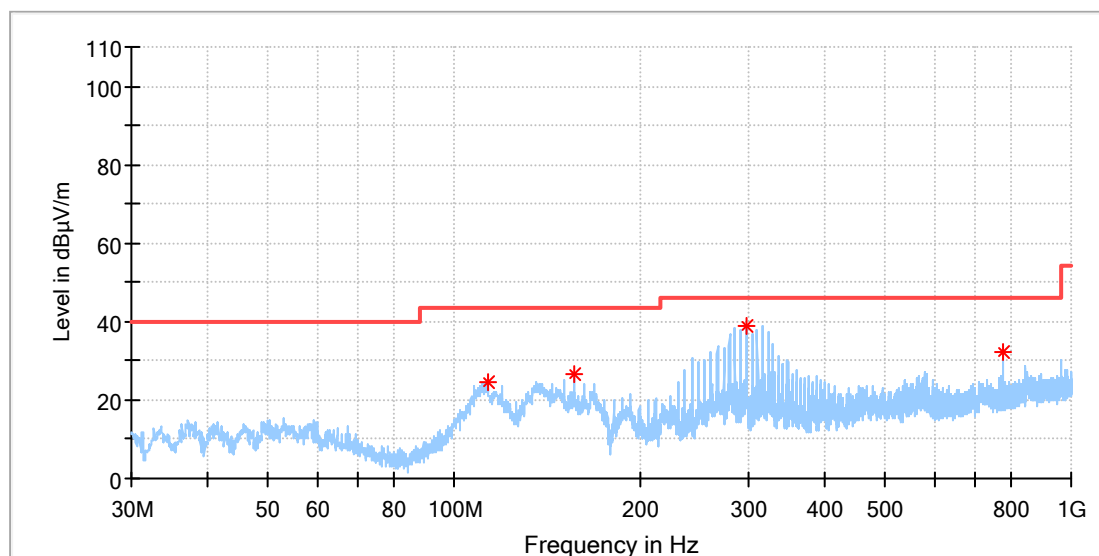


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.152500	31.68	---	40.00	8.32	100.0	V	302.0	-22.8
316.392500	37.97	---	46.00	8.03	100.0	V	343.0	-16.2
579.990000	35.47	---	46.00	10.53	100.0	V	302.0	-10.6
966.680500	40.77	---	54.00	13.23	100.0	V	272.0	-4.6

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_Low CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

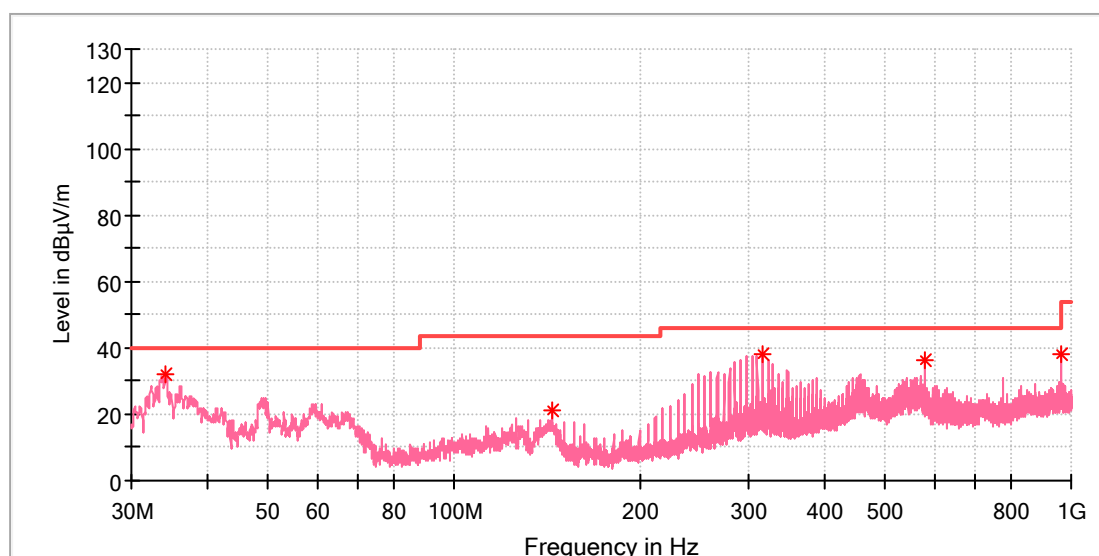


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
113.614000	24.72	---	43.50	18.78	100.0	H	296.0	-19.9
156.633500	26.38	---	43.50	17.12	100.0	H	254.0	-22.2
297.962500	39.04	---	46.00	6.96	100.0	H	151.0	-16.7
773.311000	32.15	---	46.00	13.85	100.0	H	46.0	-7.2

EUT Information

EUT Name: Smart Home Speaker
 Model: MS30A
 Test Mode: TX_BT_DH5_High CH
 Test Voltage:: Battery
 Remark: Temp 23 Humi:55%
 Test Standard: FCC 15.247
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

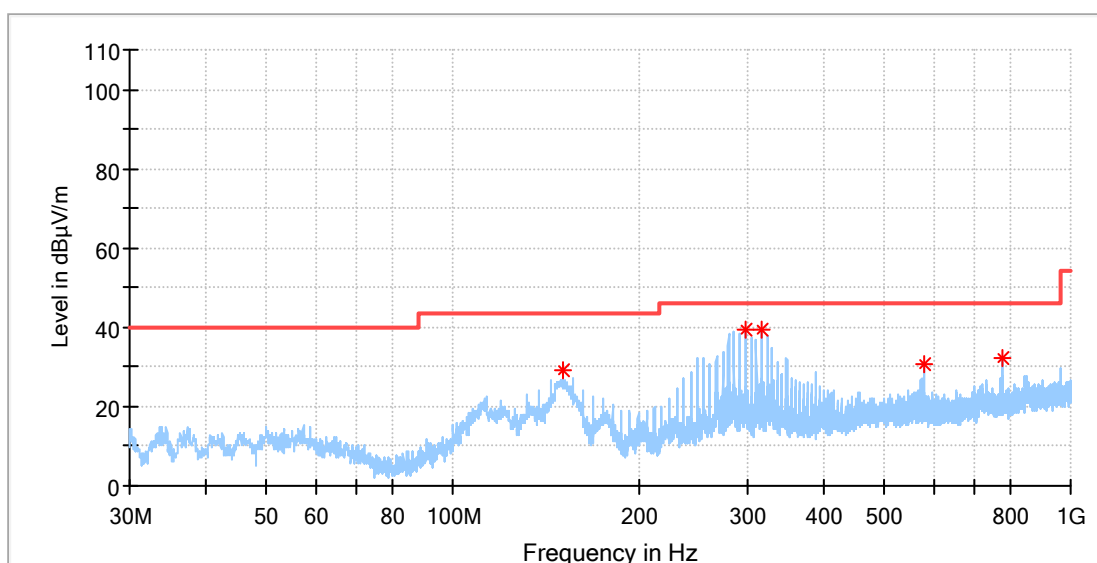


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.171000	32.01	---	40.00	7.99	100.0	V	53.0	-22.5
144.363000	20.95	---	43.50	22.55	100.0	V	74.0	-22.6
316.392500	37.84	---	46.00	8.16	100.0	V	348.0	-16.2
579.990000	36.17	---	46.00	9.83	100.0	V	286.0	-10.6
966.680500	38.16	---	54.00	15.84	100.0	V	358.0	-4.6

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_High CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



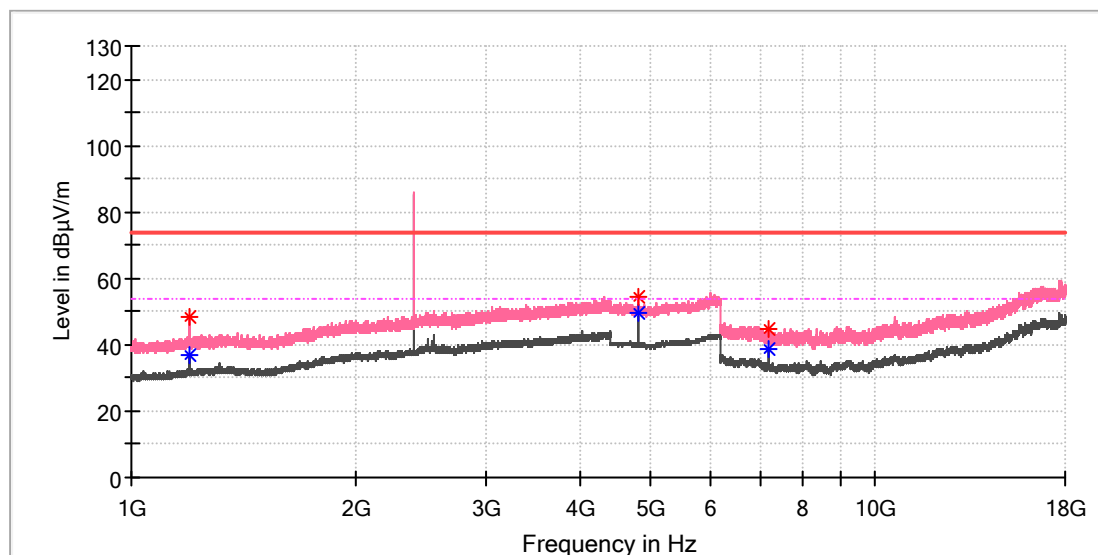
Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
150.474000	29.05	---	43.50	14.45	100.0	H	158.0	-22.5
297.962500	39.59	---	46.00	6.41	100.0	H	168.0	-16.7
316.392500	39.20	---	46.00	6.80	100.0	H	301.0	-16.2
579.990000	30.78	---	46.00	15.22	100.0	H	216.0	-10.6
773.359500	32.22	---	46.00	13.78	100.0	H	33.0	-7.2

BDR mode, 1GHz - 18GHz

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_Low CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

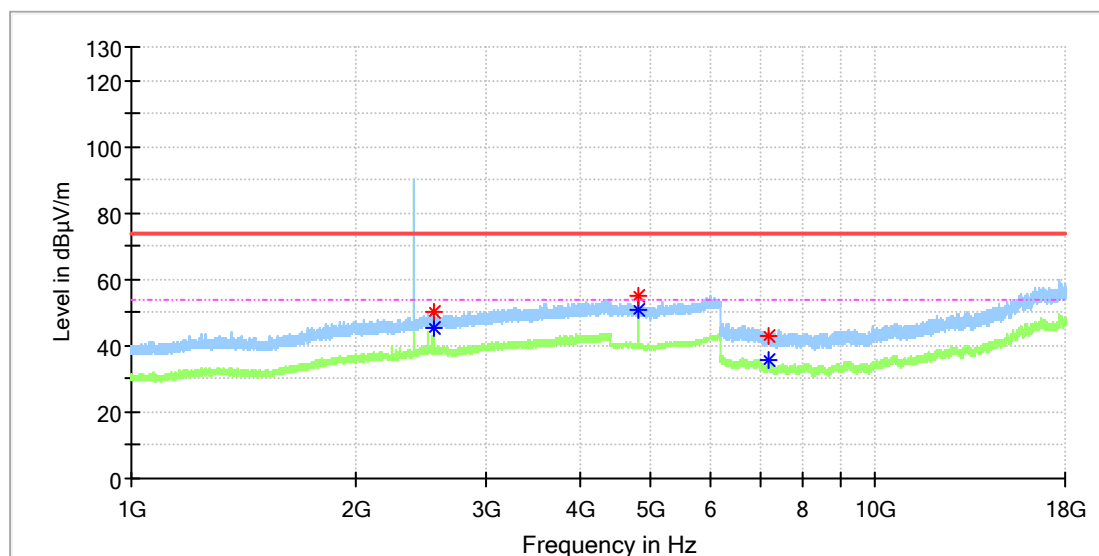


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1197.837500	48.61	---	74.00	25.39	100.0	V	320.0	1.1
1197.837500	---	36.70	54.00	17.30	100.0	V	320.0	1.1
4804.000000	---	49.76	54.00	4.24	100.0	V	204.0	13.6
4804.500000	54.58	---	74.00	19.42	100.0	V	204.0	13.6
7180.383333	45.01	---	74.00	28.99	100.0	V	0.0	8.8
7205.950000	---	38.93	54.00	15.07	100.0	V	214.0	8.8

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_Low CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



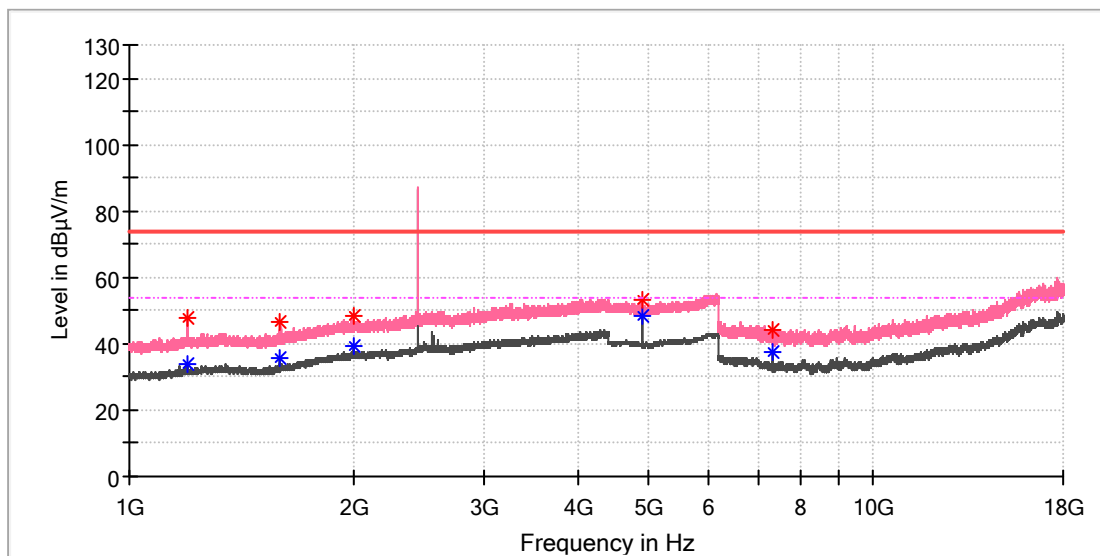
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2558.050000	---	45.38	54.00	8.62	100.0	H	307.0	7.6
2558.262500	50.08	---	74.00	23.92	100.0	H	307.0	7.6
4803.500000	55.04	---	74.00	18.96	100.0	H	204.0	13.6
4804.000000	---	50.70	54.00	3.30	100.0	H	196.0	13.6
7205.458333	43.03	---	74.00	30.97	100.0	H	341.0	8.8
7205.458333	---	35.97	54.00	18.03	100.0	H	341.0	8.8

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Products

EUT Information

EUT Name: Smart Home Speaker
 Model: MS30A
 Test Mode: TX_BT_DH5_Mid CH
 Test Voltage:: Battery
 Remark: Temp 23 Humi:55%
 Test Standard: FCC 15.247
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

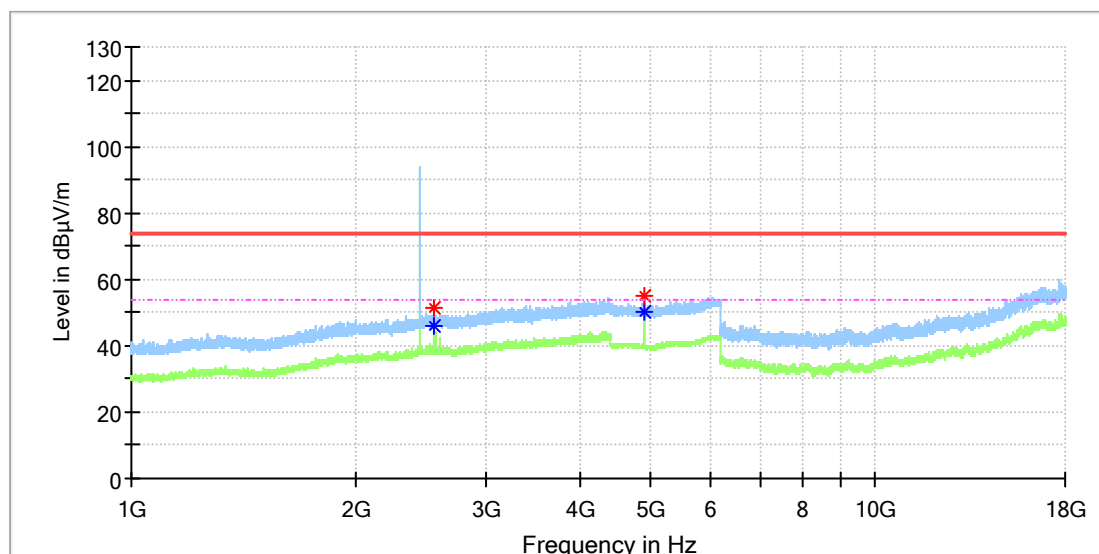


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1198.050000	48.06	---	74.00	25.94	100.0	V	322.0	1.1
1198.050000	---	33.73	54.00	20.27	100.0	V	322.0	1.1
1594.362500	---	35.85	54.00	18.15	100.0	V	334.0	2.0
1597.125000	46.37	---	74.00	27.63	100.0	V	257.0	2.1
1997.050000	48.56	---	74.00	25.44	100.0	V	292.0	6.0
1997.475000	---	39.58	54.00	14.42	100.0	V	292.0	6.0
4881.500000	53.50	---	74.00	20.50	100.0	V	203.0	13.4
4882.000000	---	48.14	54.00	5.86	100.0	V	203.0	13.4
7322.475000	---	37.70	54.00	16.30	100.0	V	214.0	8.2
7322.966667	44.30	---	74.00	29.70	100.0	V	214.0	8.2

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_Mid CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

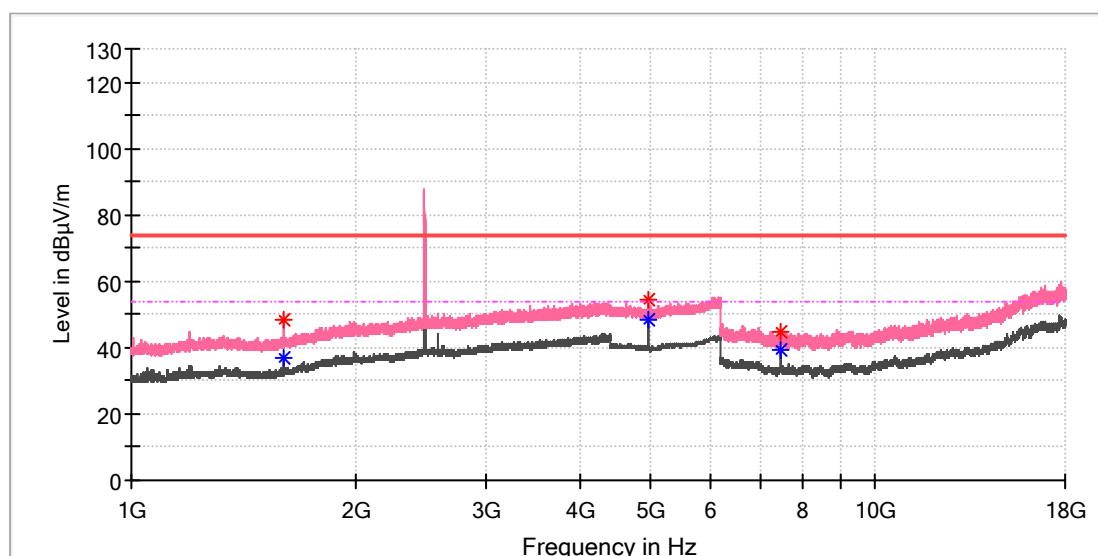


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2544.875000	---	45.92	54.00	8.08	100.0	H	190.0	7.6
2545.087500	51.48	---	74.00	22.52	100.0	H	190.0	7.6
4881.500000	54.83	---	74.00	19.17	100.0	H	140.0	13.4
4882.000000	---	49.90	54.00	4.10	100.0	H	205.0	13.4

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_High CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

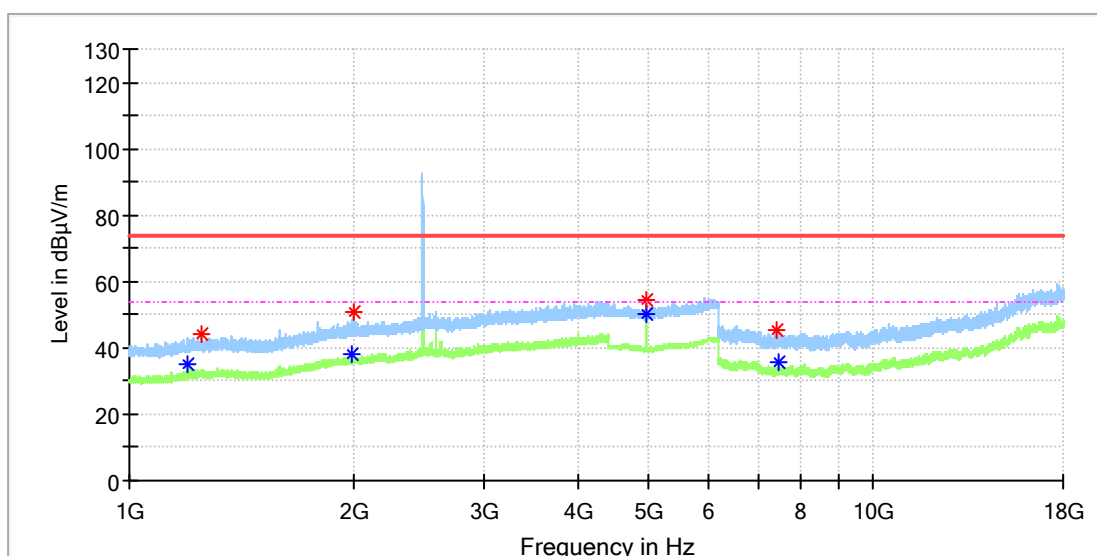


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1599.675000	48.20	---	74.00	25.80	100.0	V	143.0	2.1
1599.675000	---	36.95	54.00	17.05	100.0	V	143.0	2.1
4960.000000	54.14	---	74.00	19.86	100.0	V	270.0	13.2
4960.000000	---	48.56	54.00	5.44	100.0	V	270.0	13.2
7439.491667	44.46	---	74.00	29.54	100.0	V	165.0	8.4
7439.491667	---	39.48	54.00	14.52	100.0	V	165.0	8.4

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_High CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



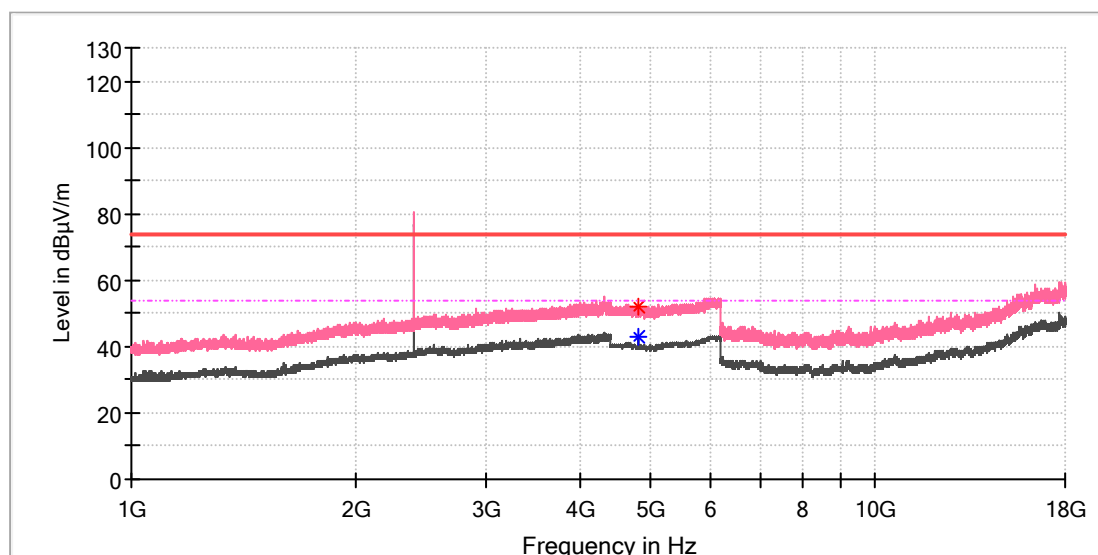
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1200.600000	---	35.10	54.00	18.90	100.0	H	107.0	1.1
1250.112500	44.38	---	74.00	29.62	100.0	H	166.0	1.9
1992.587500	---	38.19	54.00	15.81	100.0	H	285.0	6.0
1997.475000	50.95	---	74.00	23.05	100.0	H	190.0	6.0
4960.000000	54.40	---	74.00	19.60	100.0	H	188.0	13.2
4960.000000	---	50.43	54.00	3.57	100.0	H	188.0	13.2
7432.116667	45.29	---	74.00	28.71	100.0	H	73.0	8.4
7439.983333	---	35.94	54.00	18.06	100.0	H	0.0	8.4

EDR mode, 1GHz - 18GHz

EUT Information

EUT Name:	Smart Home Speaker
Model:	MS30A
Test Mode:	TX_BT_3DH5_Low channel
Test Voltage::	Battery
Remark:	Temp 23 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

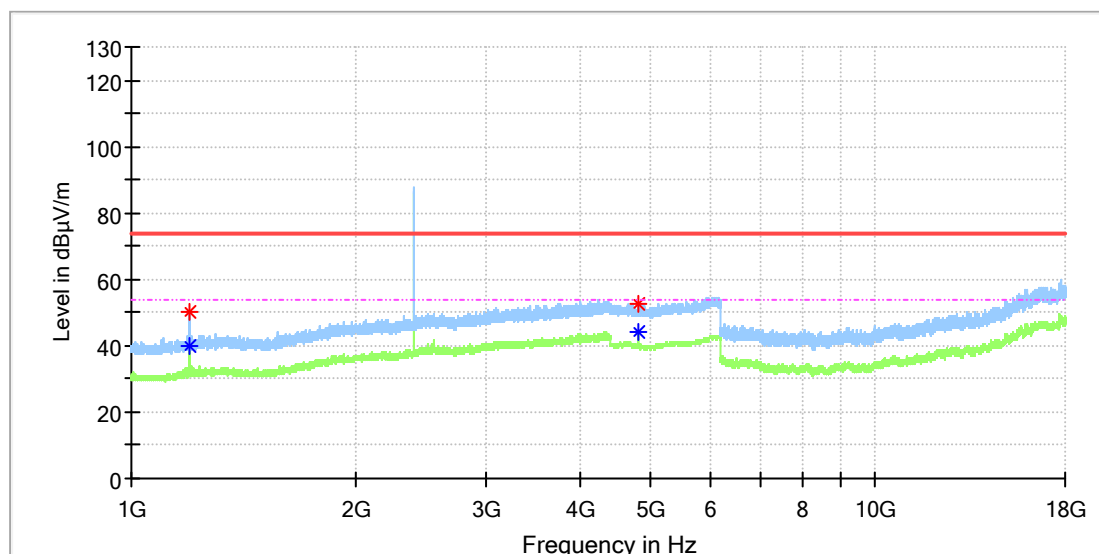


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	51.74	---	74.00	22.26	100.0	V	106.0	13.6
4803.500000	---	43.05	54.00	10.95	100.0	V	106.0	13.6

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_3DH5_Low channel
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin

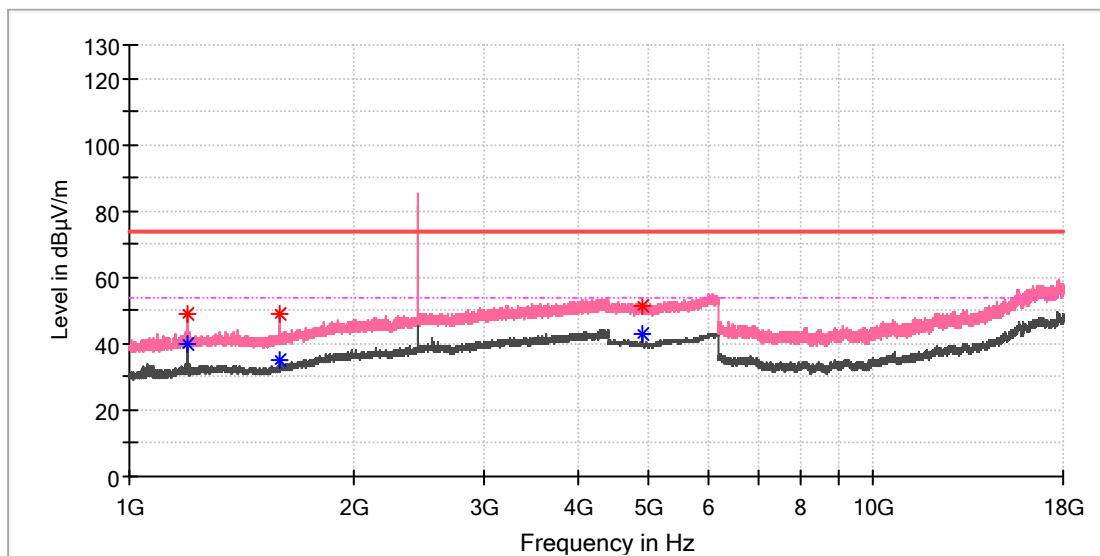


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1194.437500	50.39	---	74.00	23.61	100.0	H	186.0	1.1
1194.437500	---	40.08	54.00	13.92	100.0	H	186.0	1.1
4803.500000	52.38	---	74.00	21.62	100.0	H	182.0	13.6
4804.000000	---	43.92	54.00	10.08	100.0	H	190.0	13.6

EUT Information

EUT Name: Smart Home Speaker
 Model: MS30A
 Test Mode: TX_BT_3DH5_Mid CH
 Test Voltage:: Battery
 Remark: Temp 23 Humi:55%
 Test Standard: FCC 15.247
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

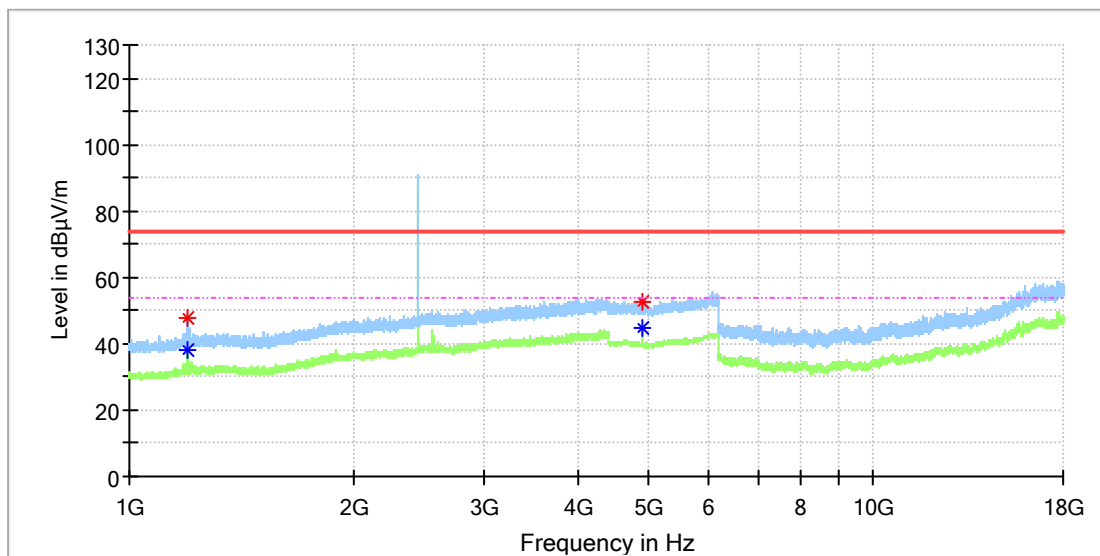


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1194.862500	49.21	---	74.00	24.79	100.0	V	63.0	1.1
1194.862500	---	39.82	54.00	14.18	100.0	V	63.0	1.1
1595.425000	49.07	---	74.00	24.93	100.0	V	277.0	2.0
1595.637500	---	34.86	54.00	19.14	100.0	V	277.0	2.0
4882.000000	---	42.98	54.00	11.02	100.0	V	285.0	13.4
4883.500000	51.36	---	74.00	22.64	100.0	V	285.0	13.4

EUT Information

EUT Name: Smart Home Speaker
 Model: MS30A
 Test Mode: TX_BT_3DH5_Mid CH
 Test Voltage:: Battery
 Remark: Temp 23 Humi:55%
 Test Standard: FCC 15.247
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

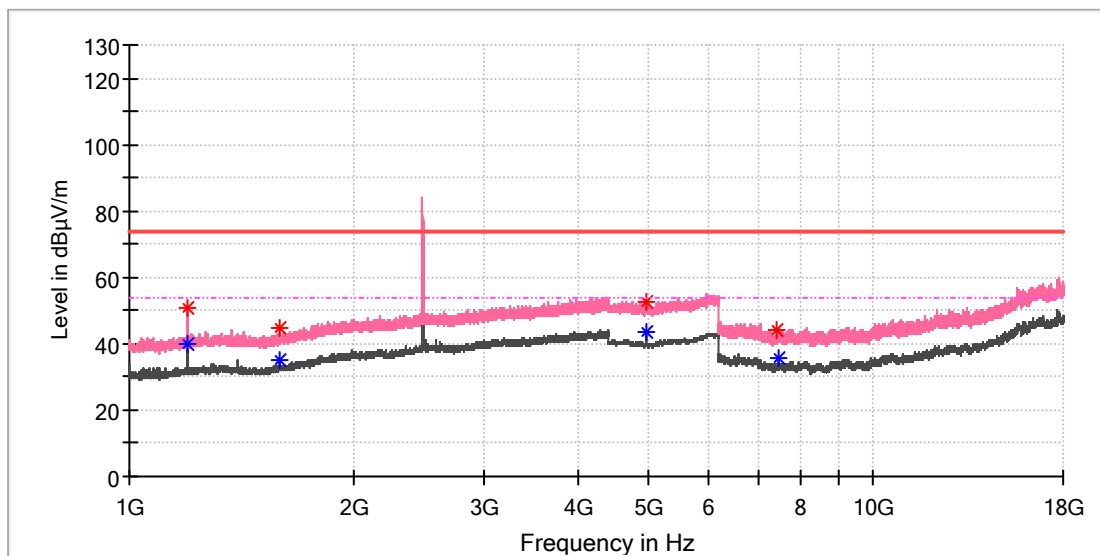


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1197.625000	47.99	---	74.00	26.01	100.0	H	237.0	1.1
1197.625000	---	38.01	54.00	15.99	100.0	H	237.0	1.1
4881.500000	---	44.68	54.00	9.32	100.0	H	229.0	13.4
4882.500000	52.89	---	74.00	21.11	100.0	H	222.0	13.4

EUT Information

EUT Name: Smart Home Speaker
 Model: MS30A
 Test Mode: TX_BT_3DH5_High CH
 Test Voltage:: Battery
 Remark: Temp 23 Humi:55%
 Test Standard: FCC 15.247
 Tested By: Kei Zhang
 Reviewed By: Terry Yin

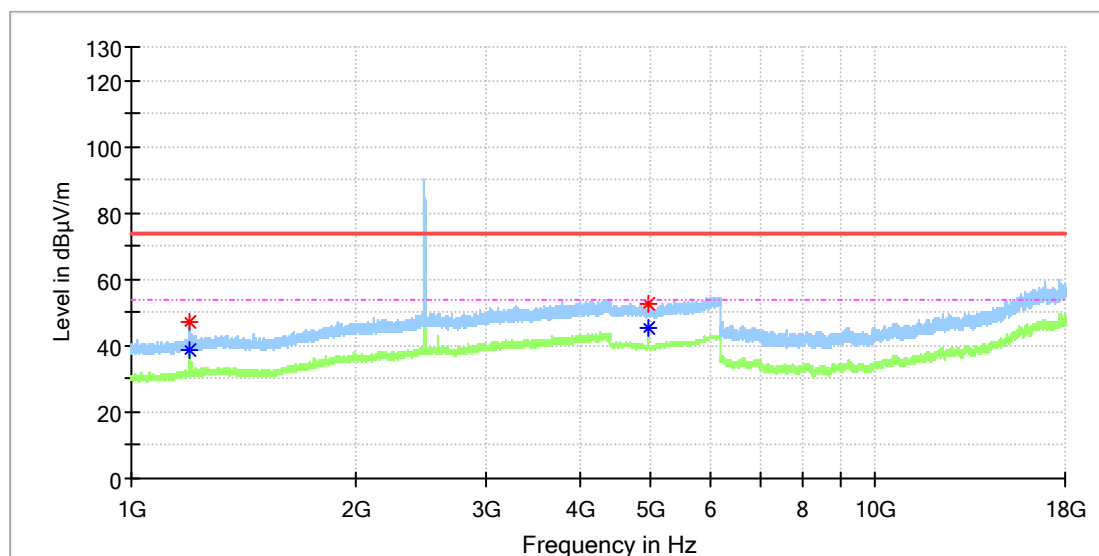


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1197.200000	---	39.76	54.00	14.24	100.0	V	91.0	1.1
1199.537500	50.83	---	74.00	23.17	100.0	V	100.0	1.1
1596.487500	---	35.32	54.00	18.68	100.0	V	14.0	2.1
1596.487500	44.65	---	74.00	29.35	100.0	V	14.0	2.1
4960.000000	52.87	---	74.00	21.13	100.0	V	267.0	13.2
4960.000000	---	43.46	54.00	10.54	100.0	V	267.0	13.2
7435.066667	44.31	---	74.00	29.69	100.0	V	186.0	8.4
7439.983333	---	35.46	54.00	18.54	100.0	V	227.0	8.4

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_3DH5_High CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



Critical_Freqs

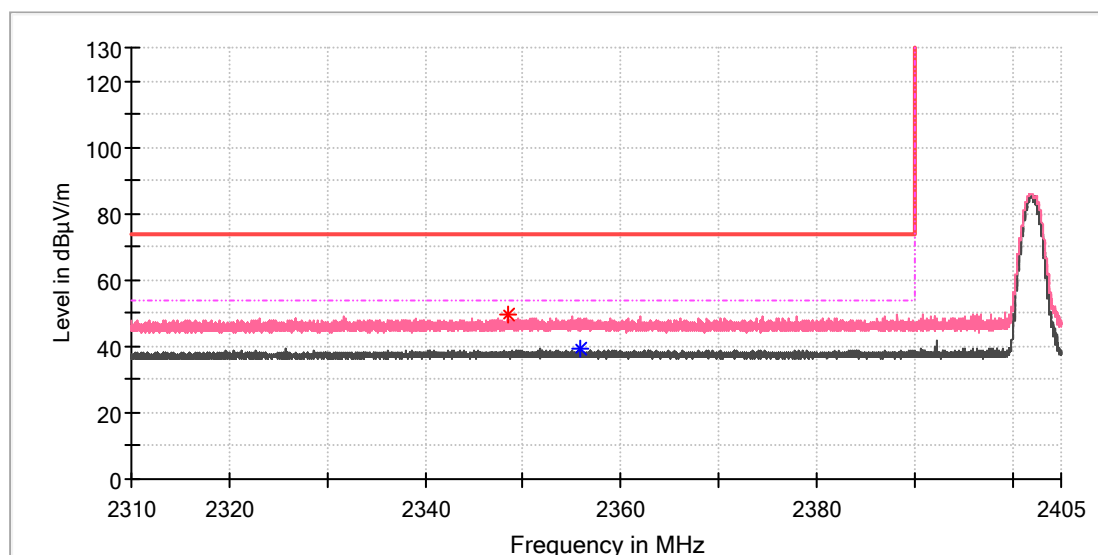
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.962500	47.31	---	74.00	26.69	100.0	H	71.0	1.1
1199.962500	---	38.48	54.00	15.52	100.0	H	71.0	1.1
4959.500000	52.80	---	74.00	21.20	100.0	H	221.0	13.2
4959.500000	---	45.27	54.00	8.73	100.0	H	221.0	13.2

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

BDR mode, Low Channel

EUT Information

EUT Name:	Smart Home Speaker
Model:	MS30A
Test Mode:	TX_BT_DH5_Low CH
Test Voltage::	Battery
Remark:	Temp 23 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

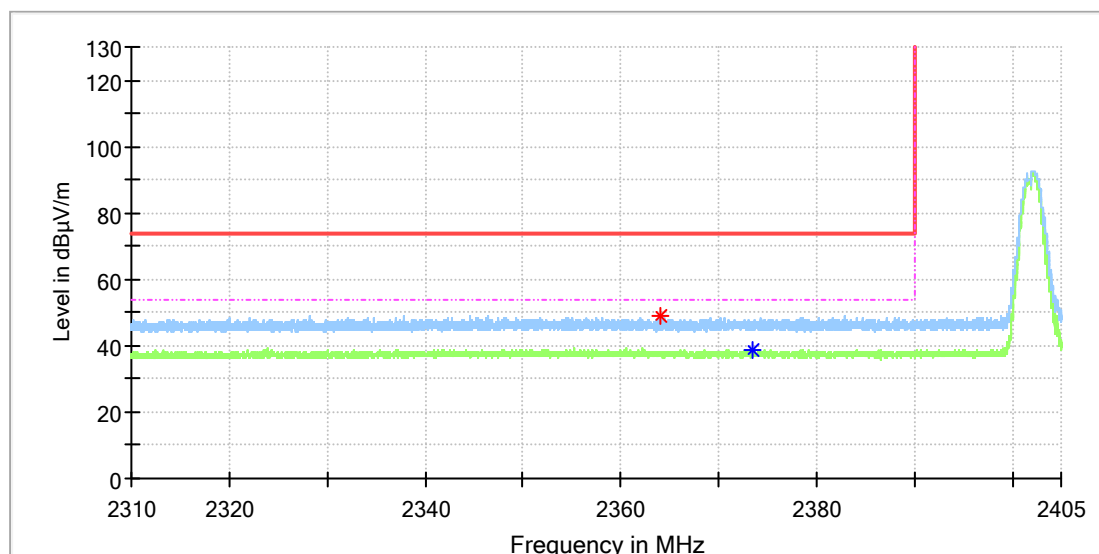


Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2348.561250	49.74	---	74.00	24.26	100.0	V	358.0	6.9
2355.825938	---	39.03	54.00	14.97	100.0	V	280.0	6.9

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_Low CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



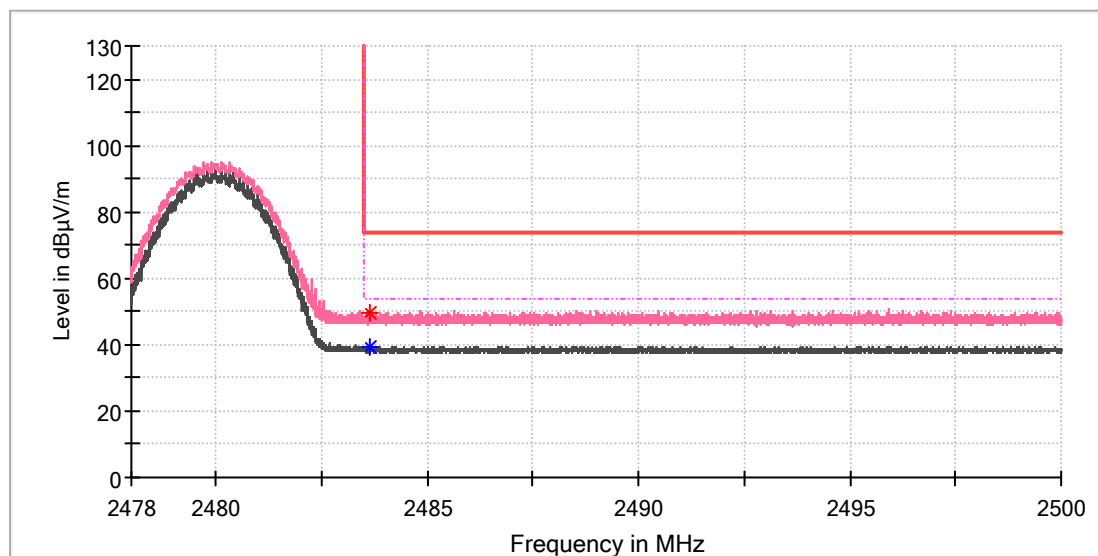
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2364.147188	49.01	---	74.00	24.99	100.0	H	296.0	6.9
2373.413438	---	38.75	54.00	15.25	100.0	H	11.0	6.9

BDR mode, High Channel

EUT Information

EUT Name:	Smart Home Speaker
Model:	MS30A
Test Mode:	TX_BT_DH5_High CH
Test Voltage::	Battery
Remark:	Temp 23 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

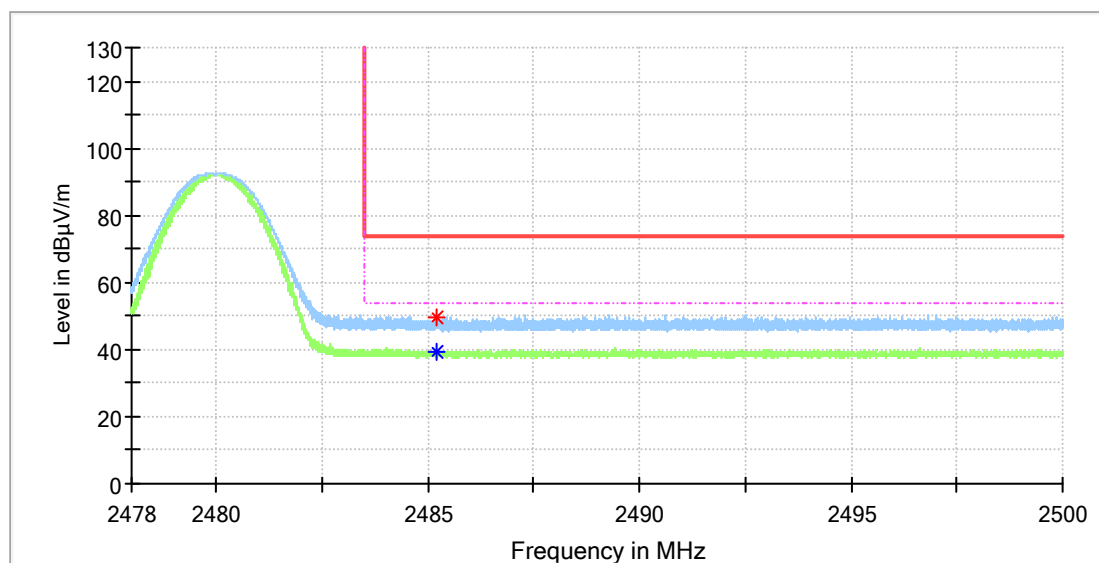


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.634750	49.84	---	74.00	24.16	100.0	V	132.0	7.4
2483.644375	---	39.18	54.00	14.82	100.0	V	261.0	7.4

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_DH5_High CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



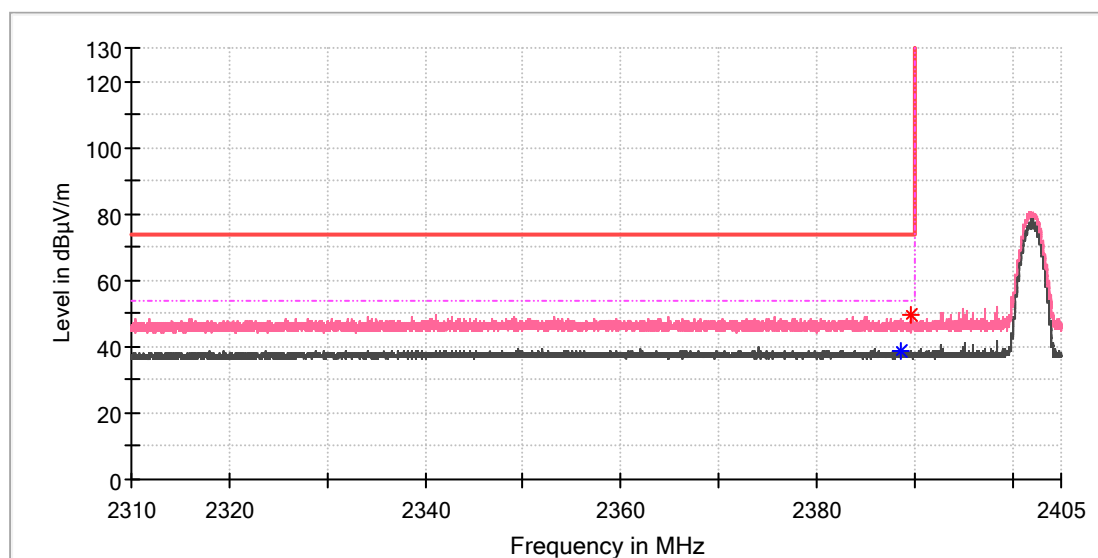
Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2485.220125	---	39.58	54.00	14.42	100.0	H	324.0	7.4
2485.229750	49.65	---	74.00	24.35	100.0	H	156.0	7.4

EDR mode, Low Channel

EUT Information

EUT Name:	Smart Home Speaker
Model:	MS30A
Test Mode:	TX_BT_3DH5_Low channel
Test Voltage::	Battery
Remark:	Temp 23 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

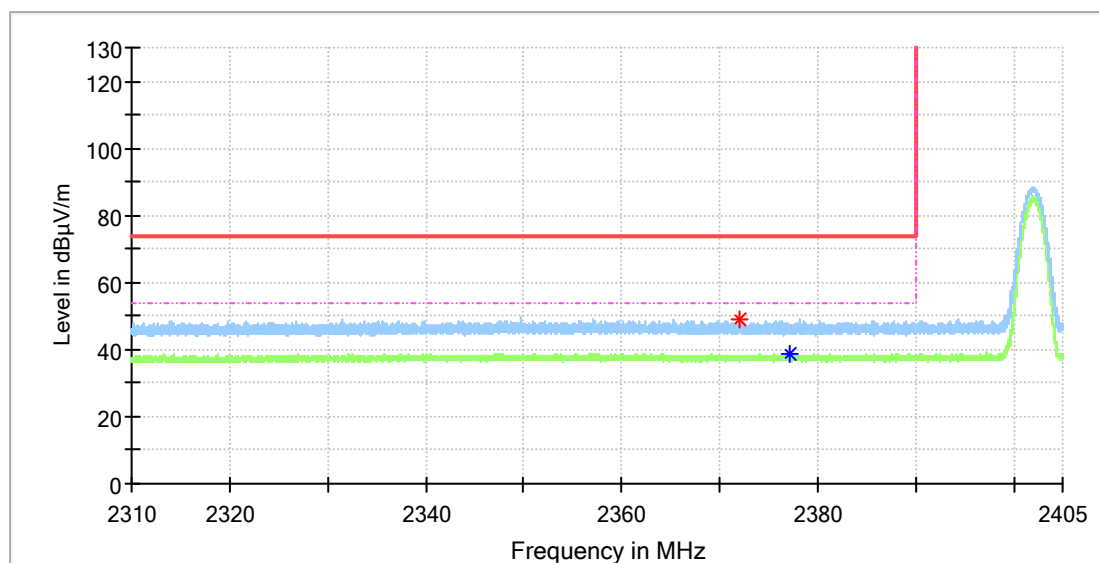


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2388.713438	---	38.87	54.00	15.13	100.0	V	282.0	7.0
2389.604063	49.70	---	74.00	24.30	100.0	V	291.0	7.0

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_3DH5_Low channel
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



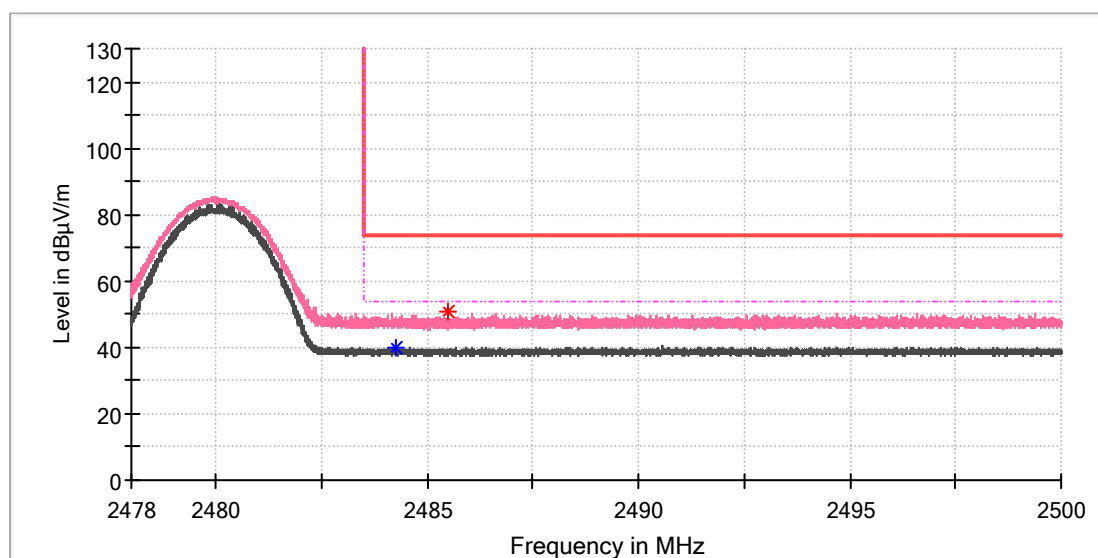
Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2372.106250	48.87	---	74.00	25.13	100.0	H	140.0	6.9
2377.165000	---	38.68	54.00	15.32	100.0	H	103.0	6.9

EDR mode, High Channel

EUT Information

EUT Name:	Smart Home Speaker
Model:	MS30A
Test Mode:	TX_BT_3DH5_High CH
Test Voltage::	Battery
Remark:	Temp 23 Humi:55%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

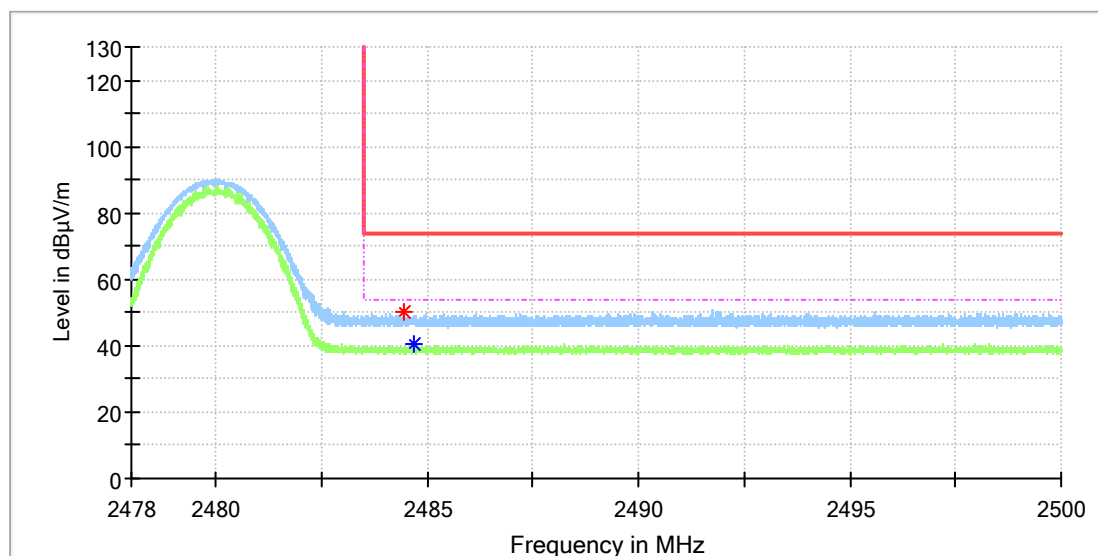


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.270000	---	39.72	54.00	14.28	100.0	V	83.0	7.4
2485.478625	50.81	---	74.00	23.19	100.0	V	0.0	7.4

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: TX_BT_3DH5_High CH
Test Voltage:: Battery
Remark: Temp 23 Humi:55%
Test Standard: FCC 15.247
Tested By: Kei Zhang
Reviewed By: Terry Yin



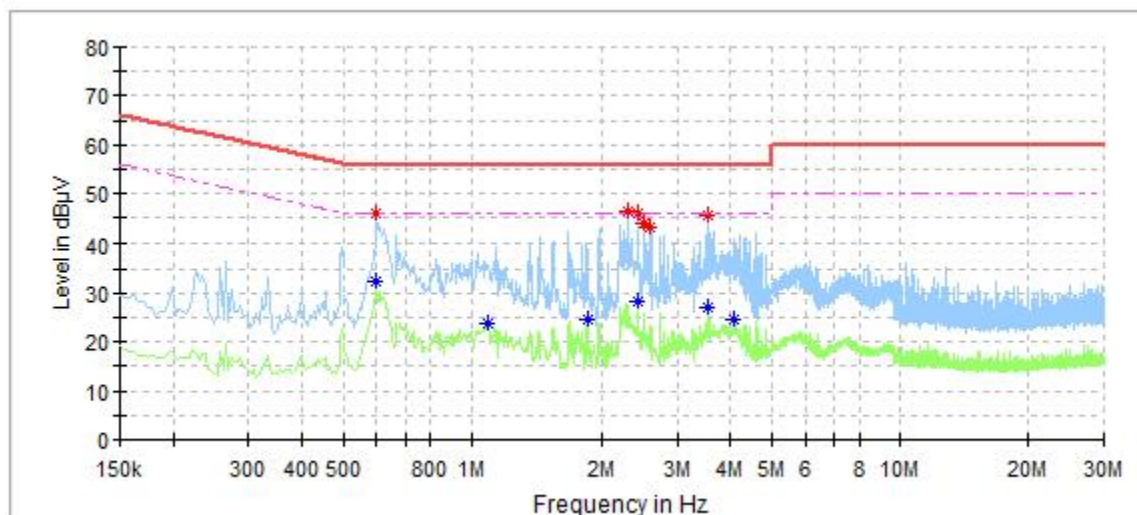
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.466625	50.29	---	74.00	23.71	100.0	H	137.0	7.4
2484.689375	---	40.28	54.00	13.72	100.0	H	146.0	7.4

Appendix C.3: Test Plots of AC Mains Conducted Emission

EUT Information

EUT Name: Smart Home Speaker
Model: MS30A
Test Mode: BT playing
Test Voltage: AC 120V/60Hz
Test By: Tom Guo
Review By: Gary Chen
Remark:



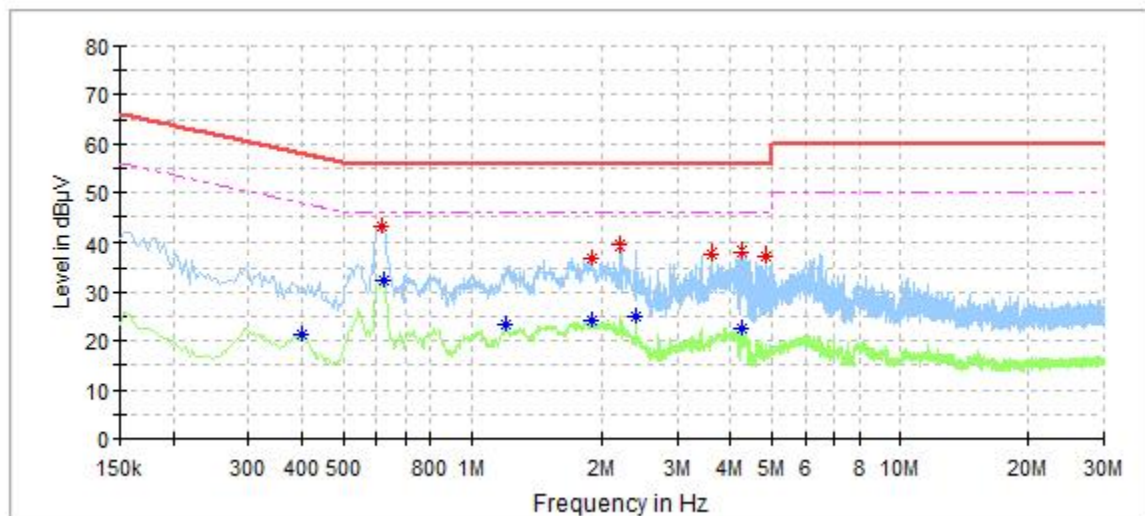
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.600000	46.15	---	56.00	9.85	L1	9.7
0.600000	---	32.45	46.00	13.55	L1	9.7
1.096000	---	23.65	46.00	22.35	L1	9.7
1.844000	---	24.44	46.00	21.56	L1	9.7
2.292000	46.32	---	56.00	9.68	L1	9.7
2.432000	45.96	---	56.00	10.04	L1	9.8
2.432000	---	28.33	46.00	17.67	L1	9.8
2.500000	43.95	---	56.00	12.05	L1	9.8
2.592000	43.17	---	56.00	12.83	L1	9.8
3.528000	45.58	---	56.00	10.42	L1	9.8
3.560000	---	27.25	46.00	18.75	L1	9.8
4.096000	---	24.43	46.00	21.57	L1	9.8

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EUT Information

EUT Name: Smart Home Speaker
 Model: MS30A
 Test Mode: BT playing
 Test Voltage: AC 120V/60Hz
 Test By: Tom Guo
 Review By: Gary Chen
 Remark:



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.402000	---	21.14	47.81	26.67	N	9.7
0.616000	43.02	---	56.00	12.98	N	9.7
0.624000	---	32.45	46.00	13.55	N	9.7
1.200000	---	23.37	46.00	22.63	N	9.7
1.888000	37.01	---	56.00	18.99	N	9.7
1.892000	---	24.39	46.00	21.61	N	9.7
2.204000	39.44	---	56.00	16.56	N	9.7
2.400000	---	25.22	46.00	20.78	N	9.8
3.604000	37.56	---	56.00	18.44	N	9.8
4.236000	---	22.69	46.00	23.31	N	9.8
4.244000	38.26	---	56.00	17.74	N	9.8
4.832000	37.28	---	56.00	18.72	N	9.9