



Prüfbericht-Nr.: <i>Test report No.:</i>	60383805 001	Auftrags-Nr.: <i>Order No.:</i>	168155467	Seite 1 von 16 Page 1 of 16	
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date.:</i>	10.03.2020		
Auftraggeber: <i>Client:</i>	CabinAir Tech (Shenzhen) Co., Ltd. Unit 1A, Building B5, Merchants Guangming Science Park, #3009 Guanguang Road, Guangming, Shenzhen, 518107 Guangdong, P.R. China				
Prüfgegenstand: <i>Test item:</i>	Nordzone™ System – Active Air Quality System				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	9001 011 01, 9001 011 02, 9001 011 03, 9001 011 04, 9001 011 05, 9001 011 06, 9001 011 07, 9001 011 08, 9001 011 09, 9001 011 10, 9001 011 11, 9001 011 12, 9001 011 13, 9001 011 14, 9001 011 15, 9001 011 16, 9001 011 17 (Trademark: Nordzone™ System)				
Auftrags-Inhalt: <i>Order content:</i>	FCC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247				
Wareneingangsdatum: <i>Date of receipt:</i>	10.03.2020	Please refer to photo documents			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A002832622-001				
Prüfzeitraum: <i>Testing period:</i>	01.06.2020 - 12.06.2020				
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (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:				
					
20.07.2020	Ryan Yang / Assistant Project Manager	20.07.2020	Winnie Hou / 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:					
This report is for FCC Part 15C(Conducted) of BLE requirements only.					
Refer to STS report STS2005286W01 for details of FCC Part 15C(Radiated) of BLE requirements.					
FCC ID: 2AXCNZAQS1STD					
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>		
* 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>					
V04					

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 6dB BANDWIDTH

RESULT: Pass

5.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Pass

Contents

1	GENERAL REMARKS.....	4
1.1	COMPLEMENTARY MATERIALS	4
2	TEST SITES	5
2.1	TEST FACILITIES.....	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
2.3	TRACEABILITY	5
2.4	CALIBRATION.....	5
2.5	MEASUREMENT UNCERTAINTY	6
2.6	LOCATION OF ORIGINAL DATA	6
2.7	STATUS OF FACILITY USED FOR TESTING	6
3	GENERAL PRODUCT INFORMATION.....	7
3.1	PRODUCT FUNCTION AND INTENDED USE.....	7
3.2	RATINGS AND SYSTEM DETAILS	7
3.3	INDEPENDENT OPERATION MODES.....	8
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	8
3.5	SUBMITTED DOCUMENTS	8
4	TEST SET-UP AND OPERATION MODES.....	9
4.1	PRINCIPLE OF CONFIGURATION SELECTION.....	9
4.2	TEST OPERATION AND TEST SOFTWARE.....	9
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	9
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	9
4.5	TEST SETUP DIAGRAM	10
5	TEST RESULTS.....	11
5.1	TRANSMITTER REQUIREMENT & TEST SUITES.....	11
5.1.1	<i>Antenna Requirement.....</i>	<i>11</i>
5.1.2	<i>Maximum Peak Conducted Output Power.....</i>	<i>12</i>
5.1.3	<i>Conducted Power Spectral Density.....</i>	<i>13</i>
5.1.4	<i>6dB Bandwidth.....</i>	<i>14</i>
5.1.5	<i>Conducted Spurious Emissions Measured in 100 kHz Bandwidth</i>	<i>15</i>
6	LIST OF TABLES	16

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 Conducted Testing

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Accreditation Designation No.: CN1260

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Radio Spectrum Testing (TS8997)				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Signal Analyzer	R&S	FSV 40	101441	20.08.2020
OSP	R&S	OSP 150	101017	17.12.2020
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Power Meter	R&S	NRP2	107105	17.12.2020
Wideband Power Sensor	R&S	NRP-Z81	105350	17.12.2020

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.

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	± 2.5 dB
Temperature	± 1 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

2.6 Location of Original Data

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

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 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 Nordzone™ System – Active Air Quality System, which provides air purification solutions for cars, and supports Bluetooth 5.0 technology.

According to the declaration of the applicant, the electrical circuit design, PCB layout and components used are identical for all models, only the model number is different.

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	Nordzone™ System – Active Air Quality System
Type Designation	9001 011 01, 9001 011 02, 9001 011 03, 9001 011 04, 9001 011 05, 9001 011 06, 9001 011 07, 9001 011 08, 9001 011 09, 9001 011 10, 9001 011 11, 9001 011 12, 9001 011 13, 9001 011 14, 9001 011 15, 9001 011 16, 9001 011 17
Trade Mark	Nordzone™ System
FCC ID	2AXCNNZAQS1STD
Operating Voltage	DC 8-16V
Testing Voltage	DC 12V
Technical Specification of BLE	
Frequency Range	2402 MHz to 2480 MHz
Type of Modulation	GFSK
Channel Number	40 channels
Data Rate	1 Mbps, 2Mbps
Channel Separation	2MHz
Antenna Type	Chip Antenna
Antenna Gain	0.716 dBi

Table 3: RF Channel and Frequency of BLE

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

Test frequencies are lowest channel: 2402 MHz, middle channel: 2440 MHz and highest channel: 2480 MHz for BLE

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth Low Energy transmitting mode
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- FCC/IC Label and Location Info
- 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 tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model 9001 011 01 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Mobile phone	APPLE	iPhone8	F4HVR93QJC6C	N/A

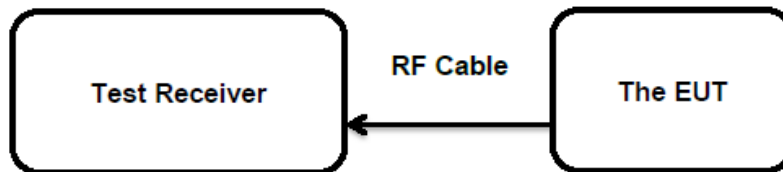
4.4 Countermeasures to Achieve EMC Compliance

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 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 internal antenna, the directional gain of antenna is 0.716 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.

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)(3)
 Basic standard : ANSI C63.10: 2013
 Limits : 1.0 Watts
 Kind of test site : Shielded Room

Test Setup

Date of testing : 12.06.2020
 Input voltage : DC 12V
 Operation mode : A
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 5: Test Result of Maximum Peak Conducted Output Power, BLE

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
GFSK (BLE)	1 Mbps	2402	-4.80	0.0003	< 1.0
		2440	-4.95	0.0003	
		2480	-4.59	0.0003	
	2 Mbps	2402	-4.59	0.0003	
		2440	-5.07	0.0003	
		2480	-4.39	0.0004	
Maximum Measured Value			-4.39	0.0004	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 0.716 dBi,

5.1.3 Conducted Power Spectral Density

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(e)
 Basic standard : ANSI C63.10: 2013
 Limits : < 8 dBm / 3kHz
 Kind of test site : Shielded Room

Test Setup

Date of testing : 12.06.2020
 Input voltage : DC 12V
 Operation mode : B
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 6: Test Result of Power Spectral Density, BLE

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
GFSK (BLE)	1 Mbps	2402	-25.10	8 dBm / 3kHz
		2440	-26.06	
		2480	-23.28	
	2 Mbps	2402	-27.34	
		2440	-26.42	
		2480	-25.88	
Maximum Measured Value			-23.28	

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

For the measurement records, refer to the appendix A.

5.1.4 6dB Bandwidth

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(a)(2)
 Basic standard : ANSI C63.10: 2013
 Limits : > 500 KHz
 Kind of test site : Shielded Room

Test Setup

Date of testing : 12.06.2020
 Input voltage : DC 12V
 Operation mode : B
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 7: Test Result of 6dB Bandwidth, BLE

Test Mode	Data Rate	Test Channel (MHz)	-6dB Bandwidth (KHz)	Limit (kHz)
GFSK (BLE)	1 Mbps	2402	731.300	> 500
		2440	731.300	
		2480	731.300	
	2 Mbps	2402	1150.800	
		2440	1146.900	
		2480	1150.800	
Minimum Measured Value			731.30	

For the measurement records, refer to the appendix A.

5.1.5 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);
In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result
Input voltage : DC 12V
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 test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A.

6 List of Tables

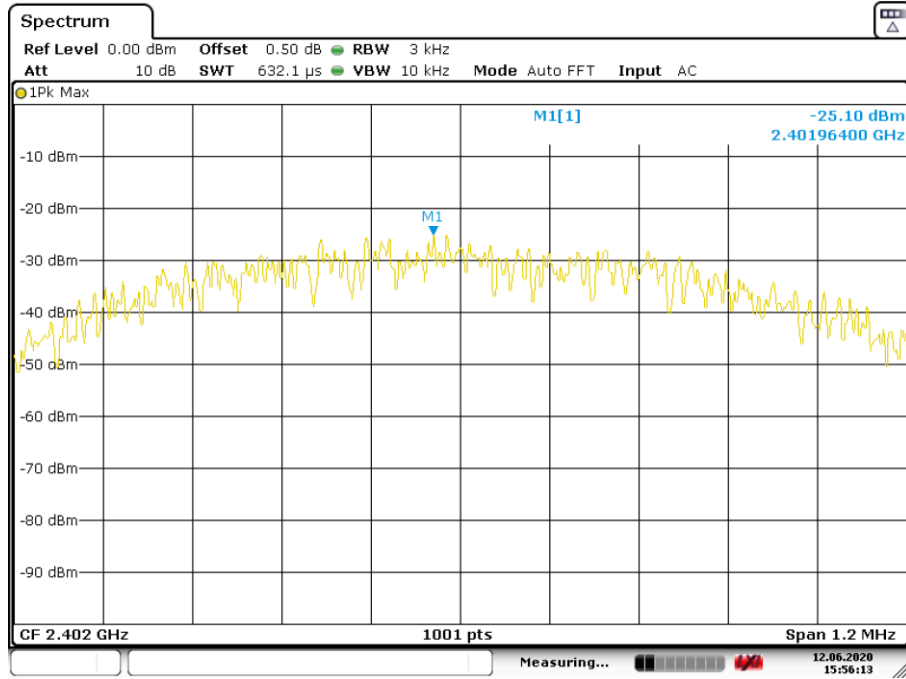
Table 1: List of Test and Measurement Equipment	5
Table 2: Technical Specification of EUT	7
Table 3: RF Channel and Frequency of BLE.....	8
Table 4: List of Accessories and Auxiliary Equipment.....	9
Table 5: Test Result of Maximum Peak Conducted Output Power, BLE	12
Table 6: Test Result of Power Spectral Density, BLE.....	13
Table 7: Test Result of 6dB Bandwidth, BLE.....	14

Appendix A: Test Results of Conducted Testing

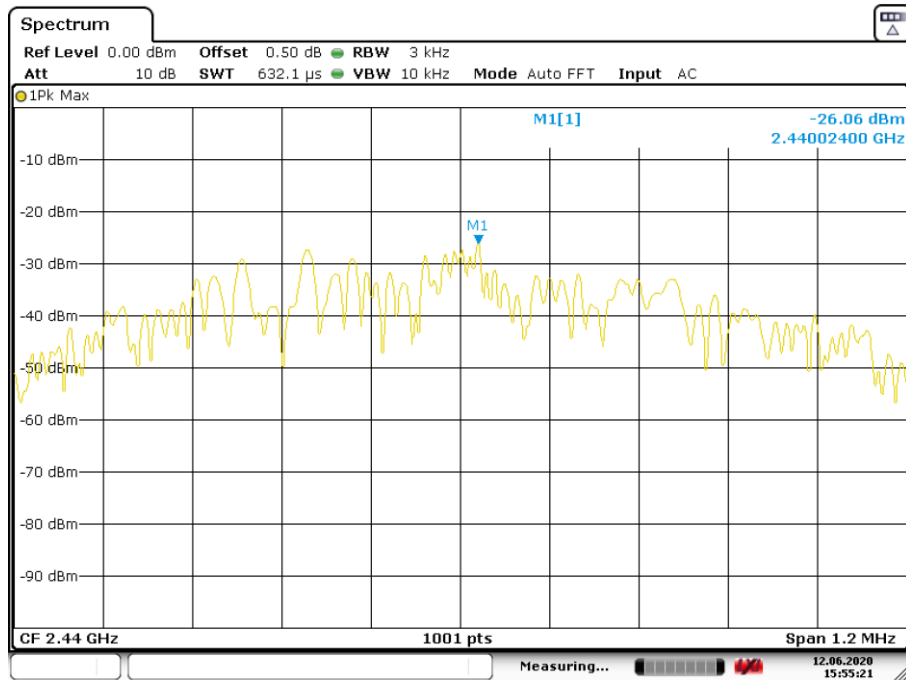
APPENDIX A: TEST RESULTS OF CONDUCTED TESTING	1
APPENDIX A.1: TEST RESULTS OF CONDUCTED POWER SPECTRAL DENSITY	2
<i>GFSK(BLE) Mode, 1Mbps</i>	2
<i>GFSK(BLE) Mode, 2Mbps</i>	3
APPENDIX A.2: TEST RESULTS OF 6dB BANDWIDTH	5
<i>GFSK(BLE) Mode, 1Mbps</i>	5
<i>GFSK(BLE) Mode, 2Mbps</i>	6
APPENDIX A.3: TEST RESULTS OF CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH	8
<i>GFSK(BLE) Mode, 1Mbps</i>	8
<i>GFSK(BLE) Mode, 2Mbps</i>	12

Appendix A1: Test Results of Conducted Power Spectral Density

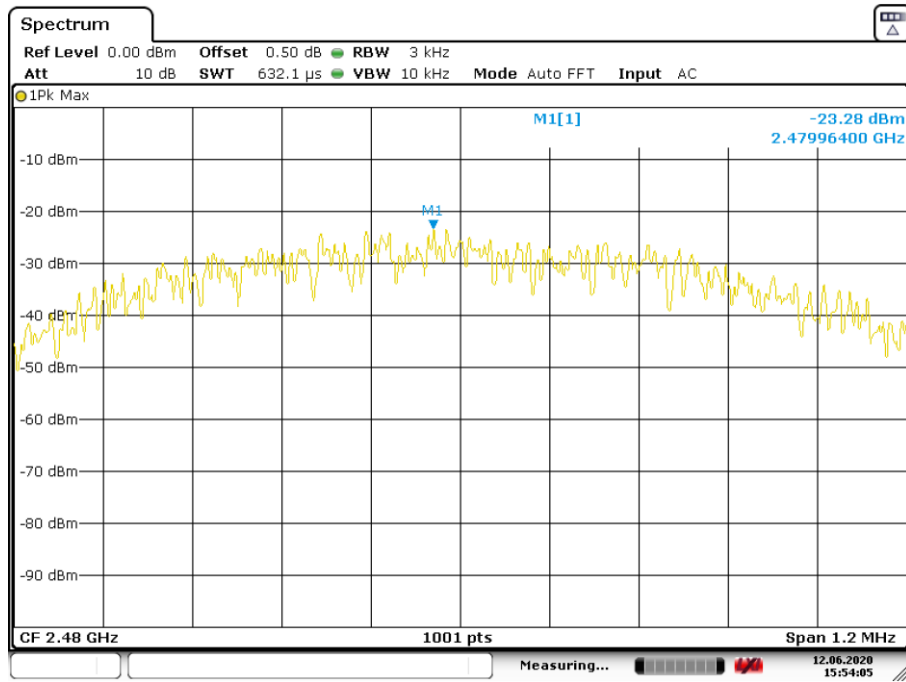
GFSK(BLE) Mode, 1Mbps



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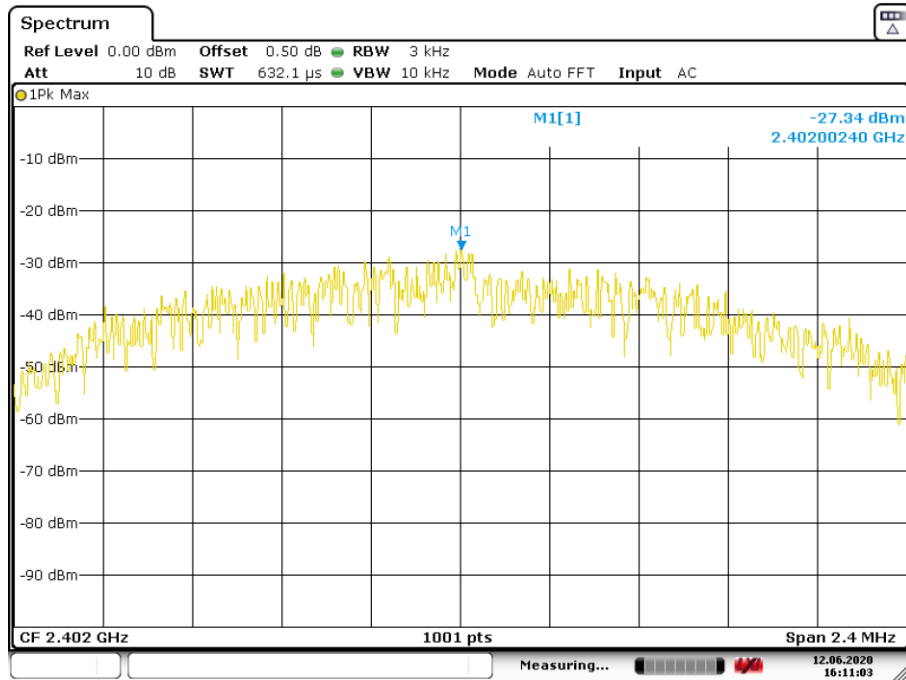


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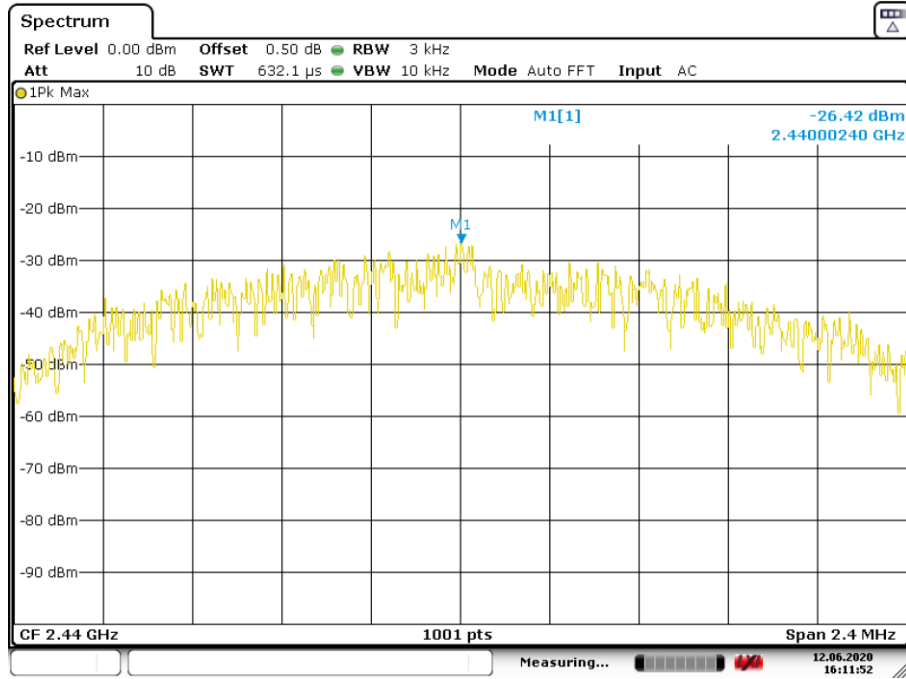


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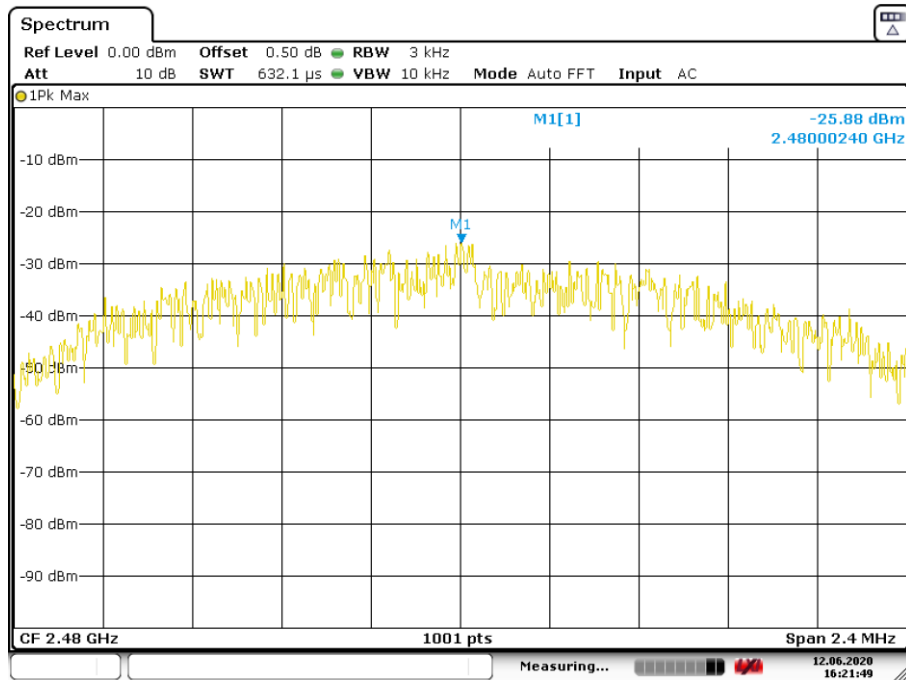
GFSK(BLE) Mode, 2Mbps



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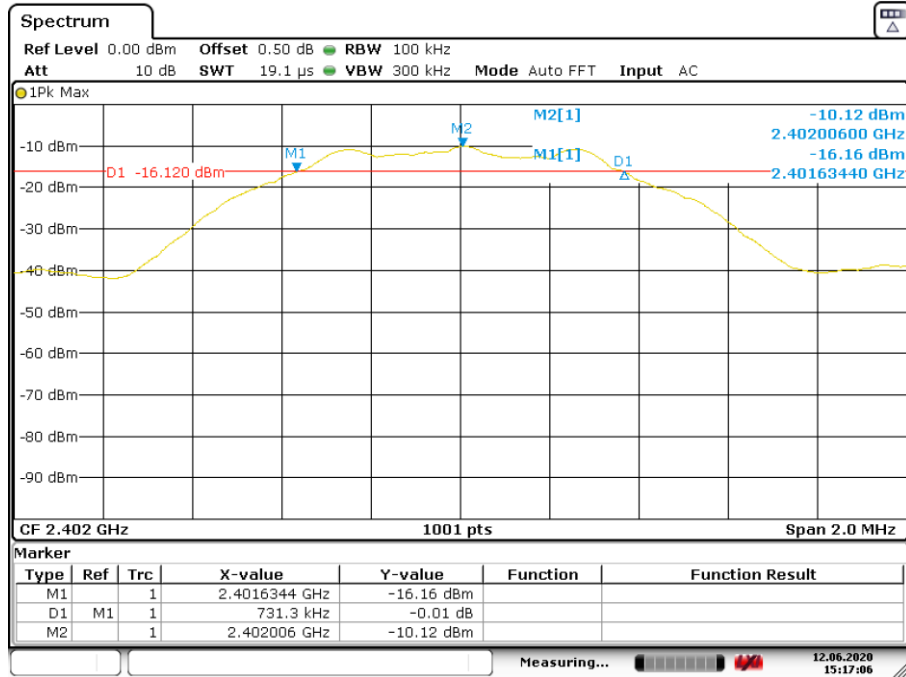
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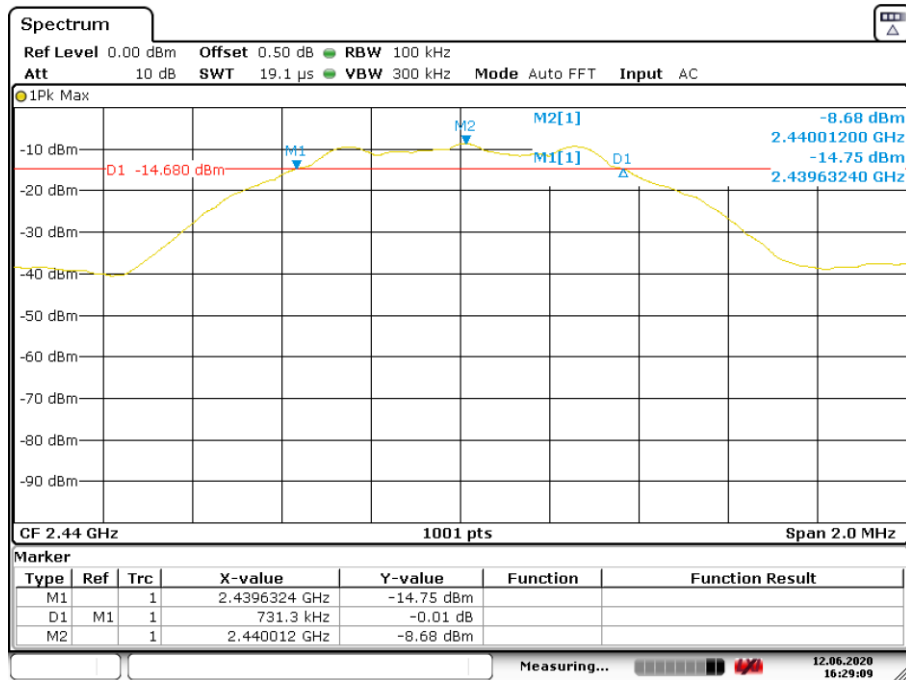
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Appendix A2: Test Results of 6dB Bandwidth

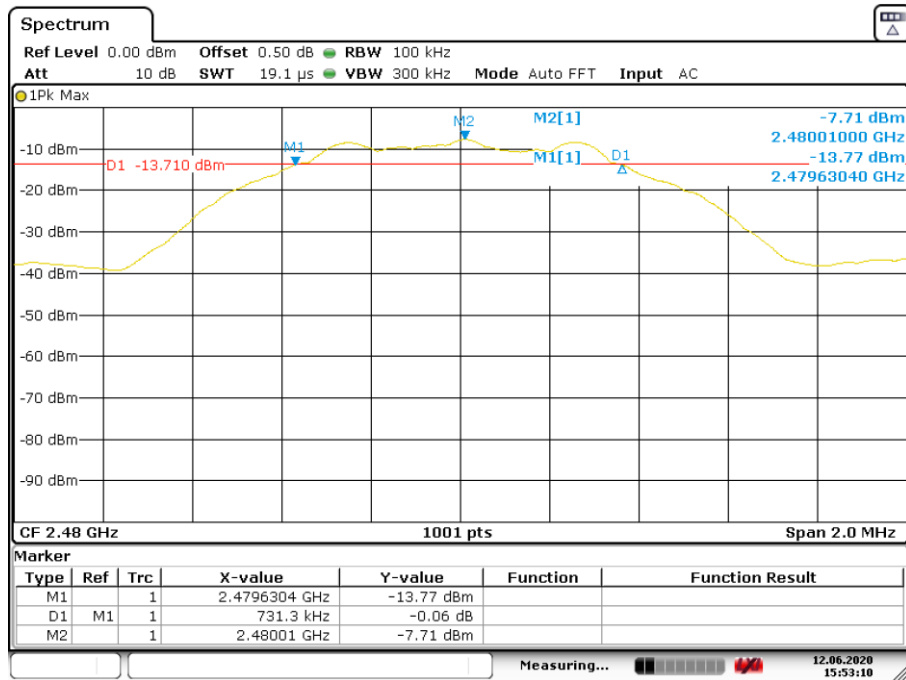
GFSK(BLE) Mode, 1Mbps



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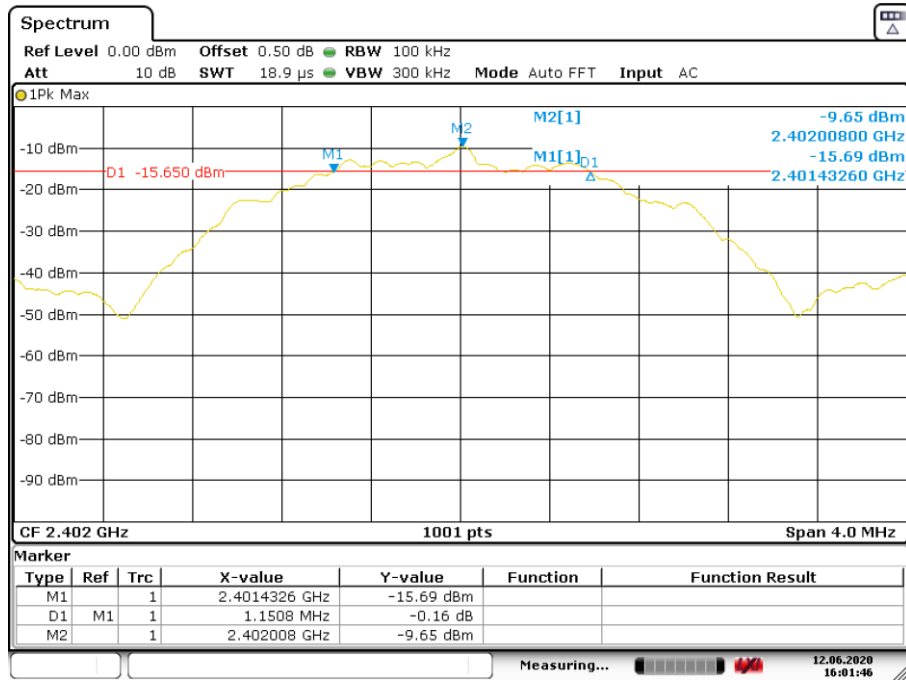


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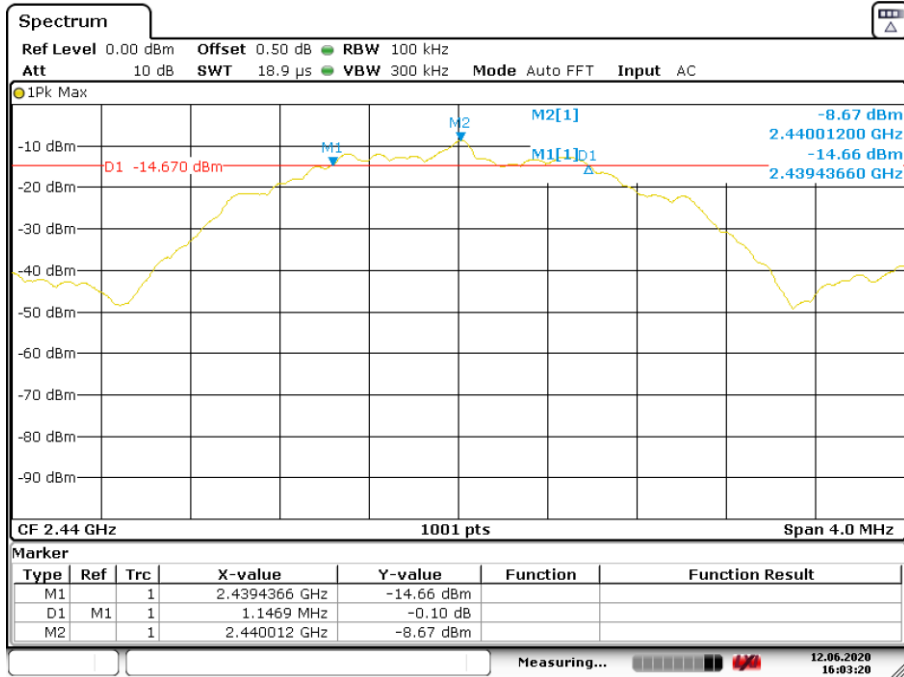


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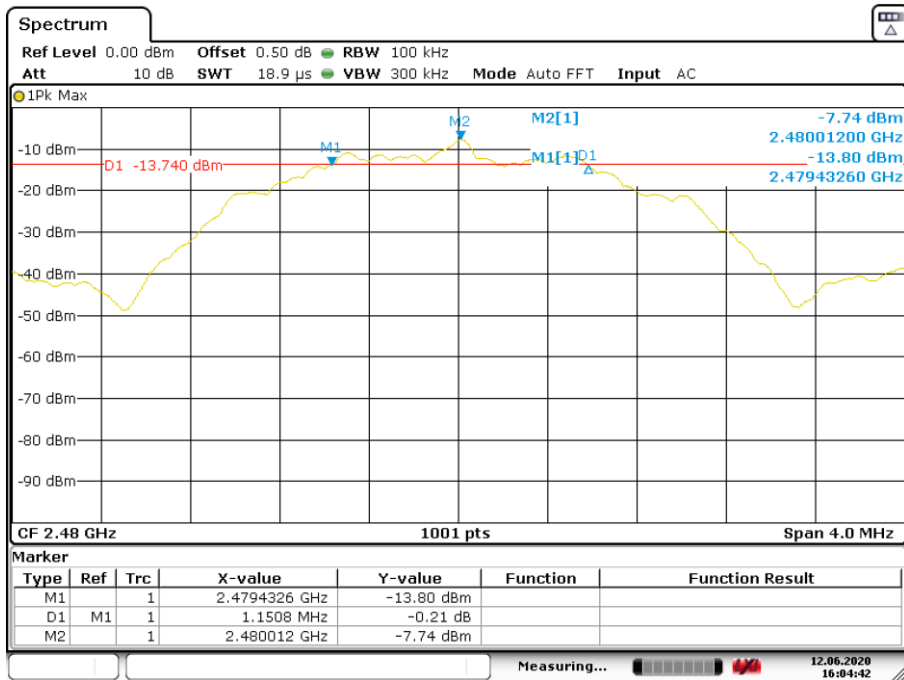
GFSK(BLE) Mode, 2Mbps



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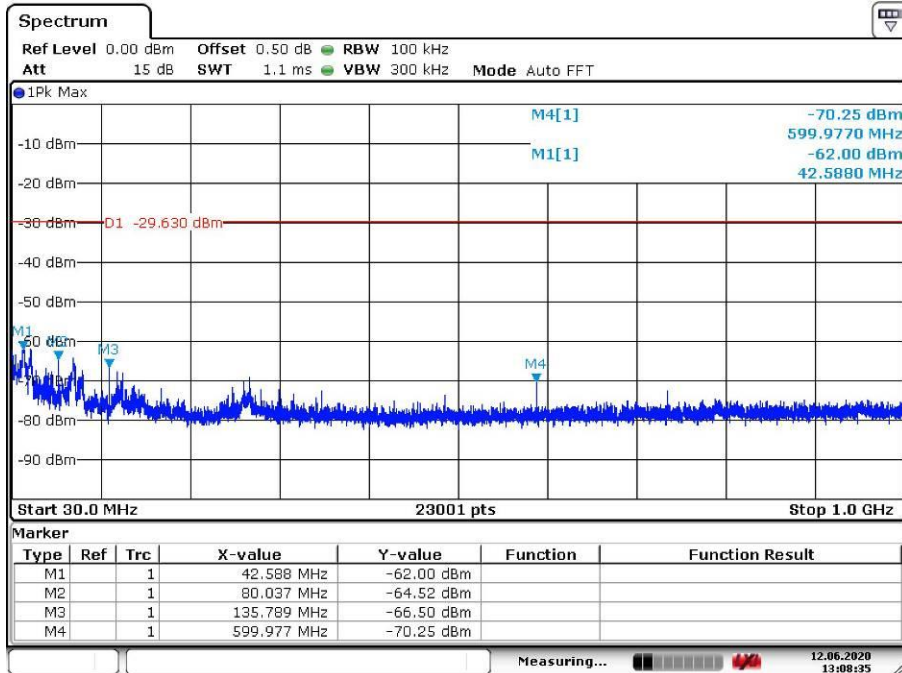
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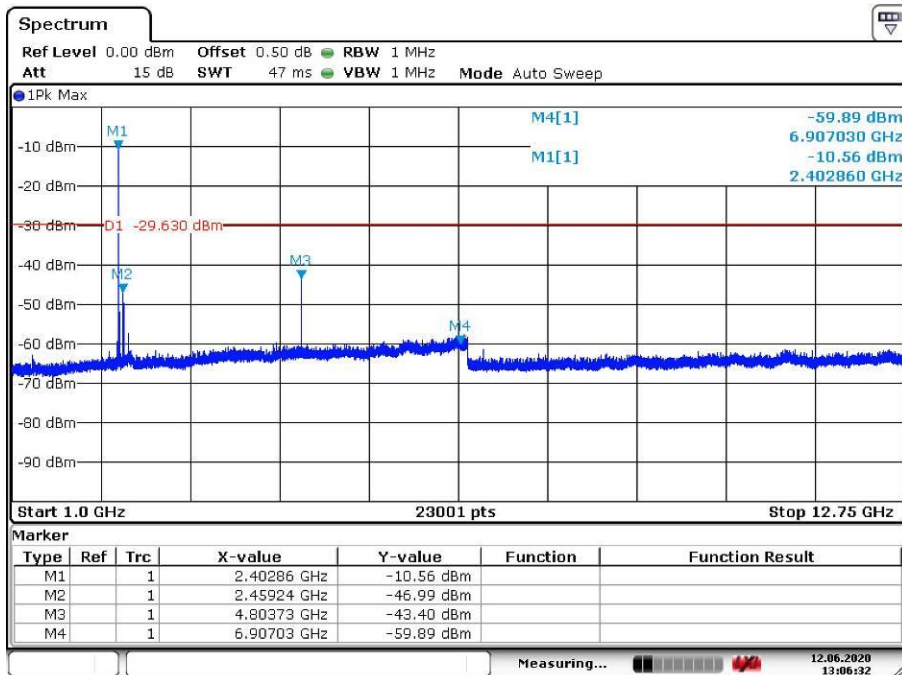
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Appendix A3: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

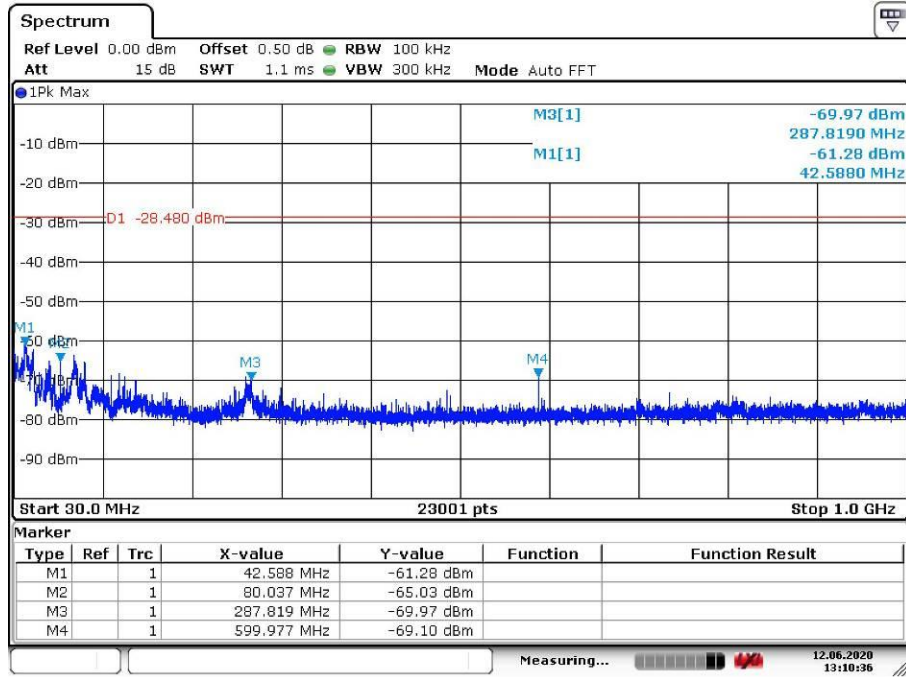
GFSK(BLE) Mode, 1Mbps



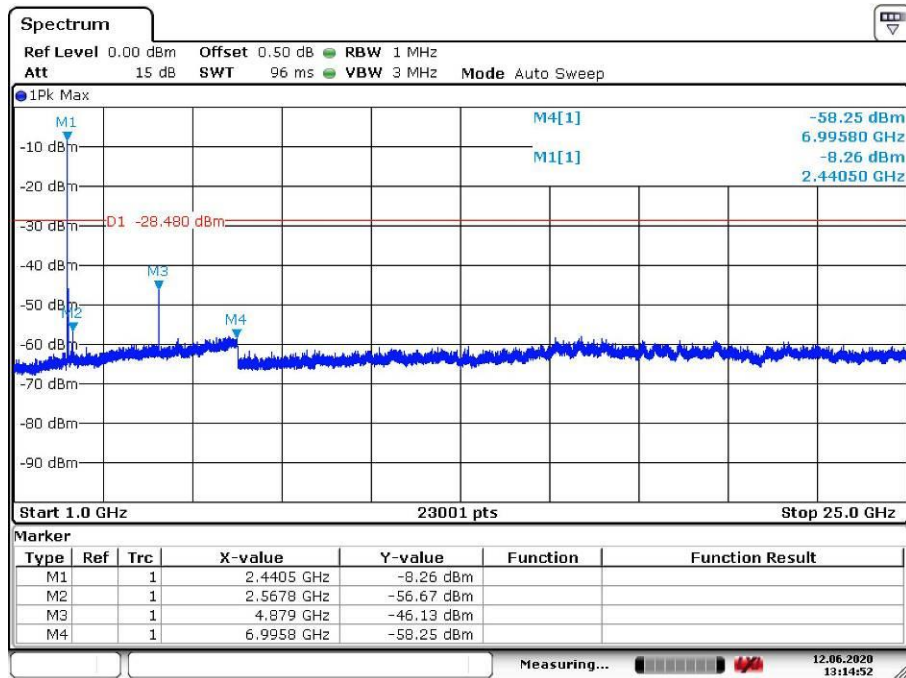
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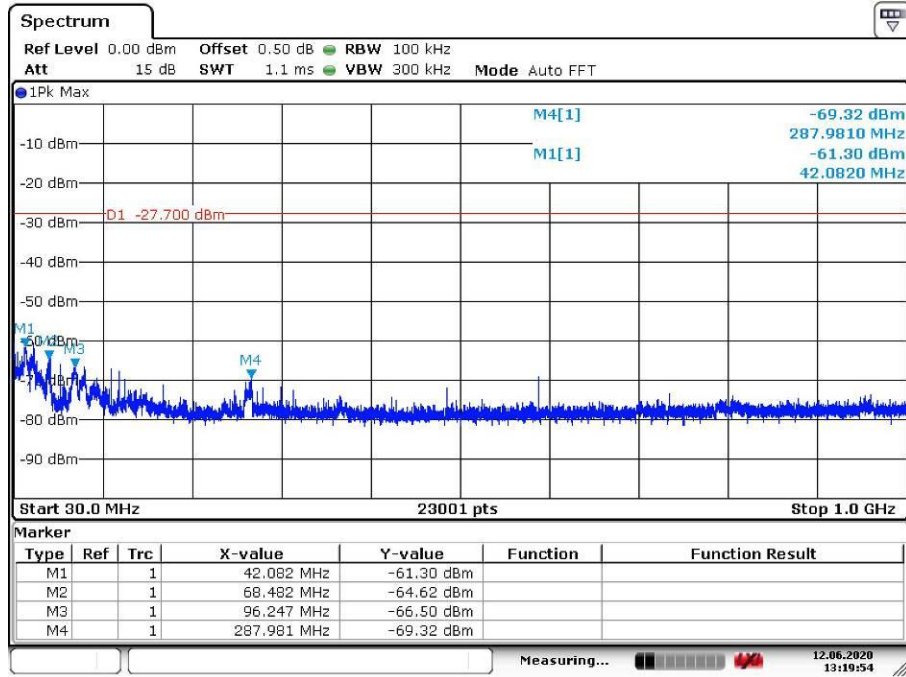
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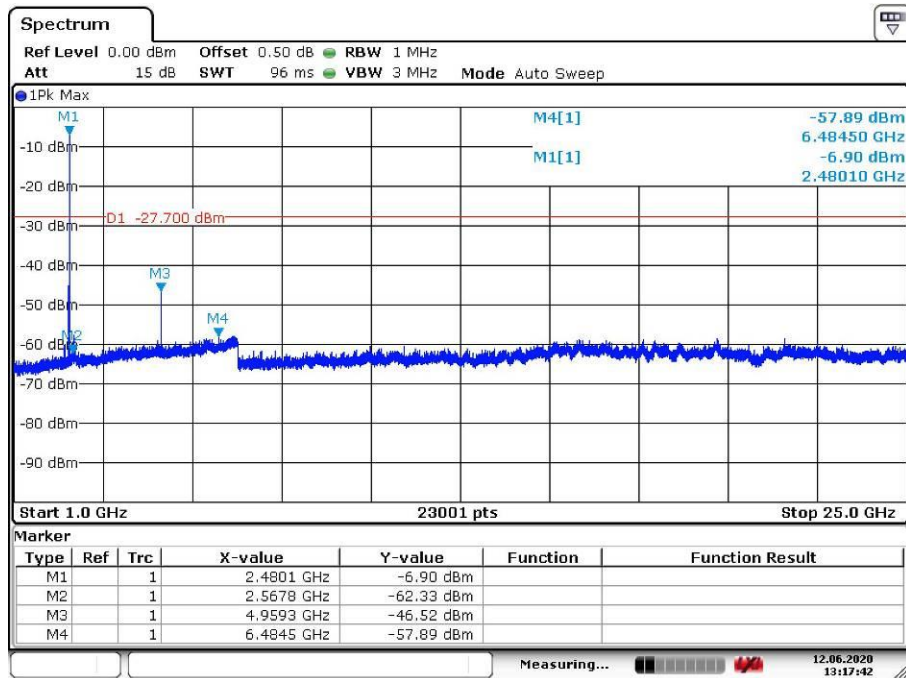
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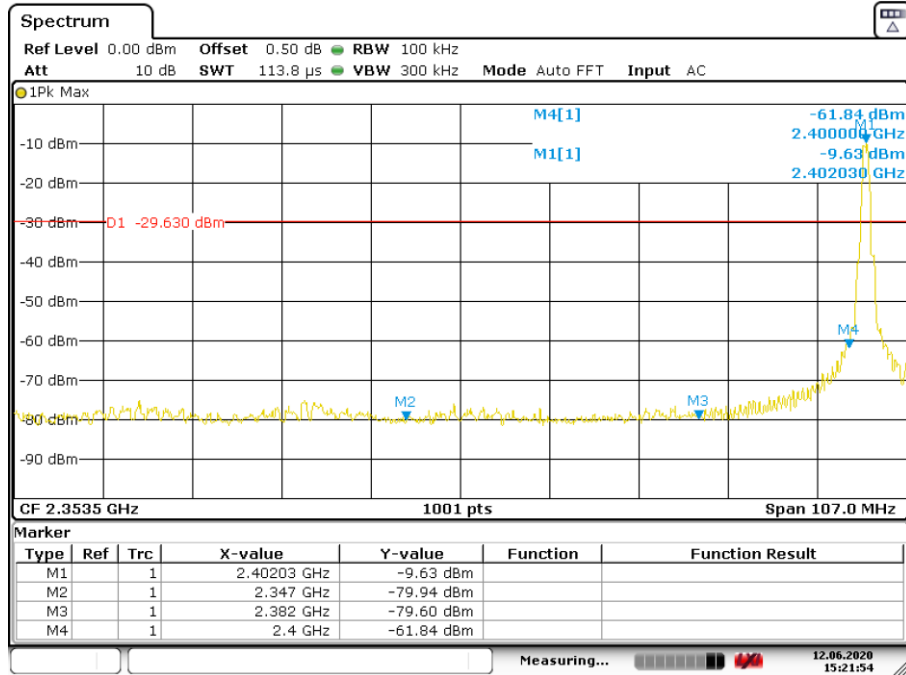


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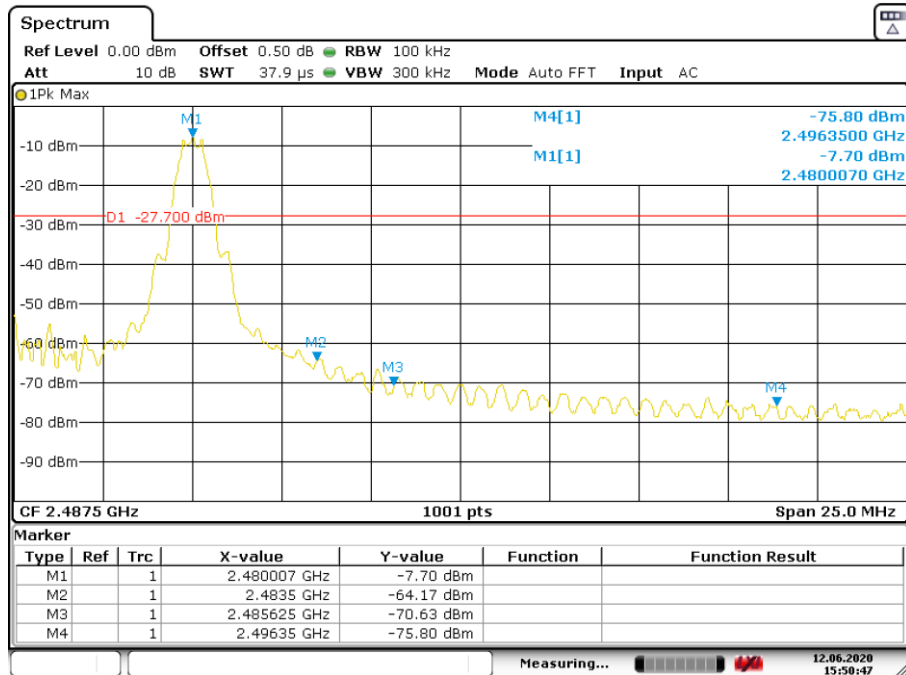


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Band Edge

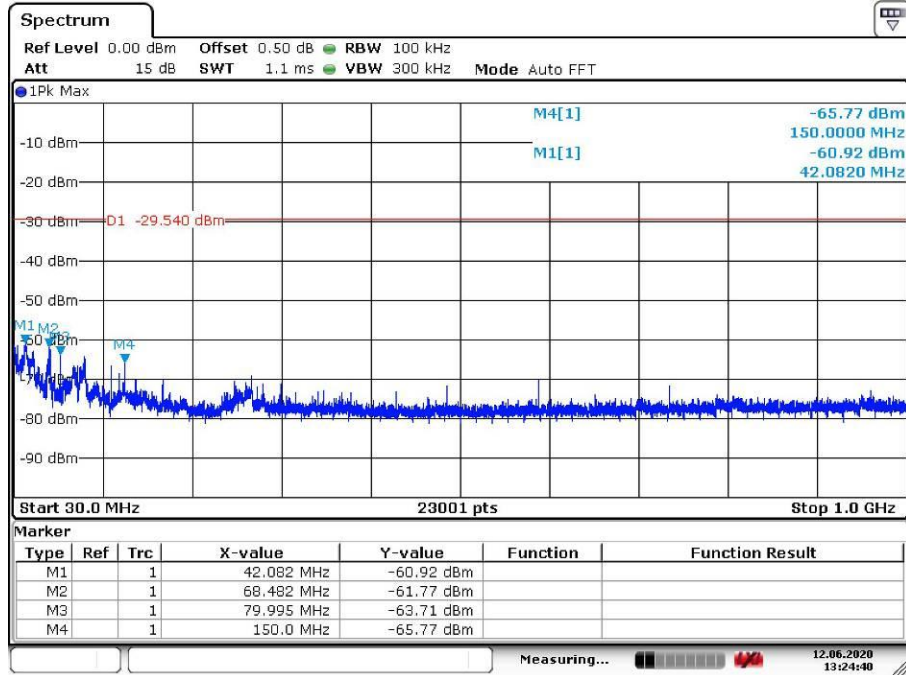


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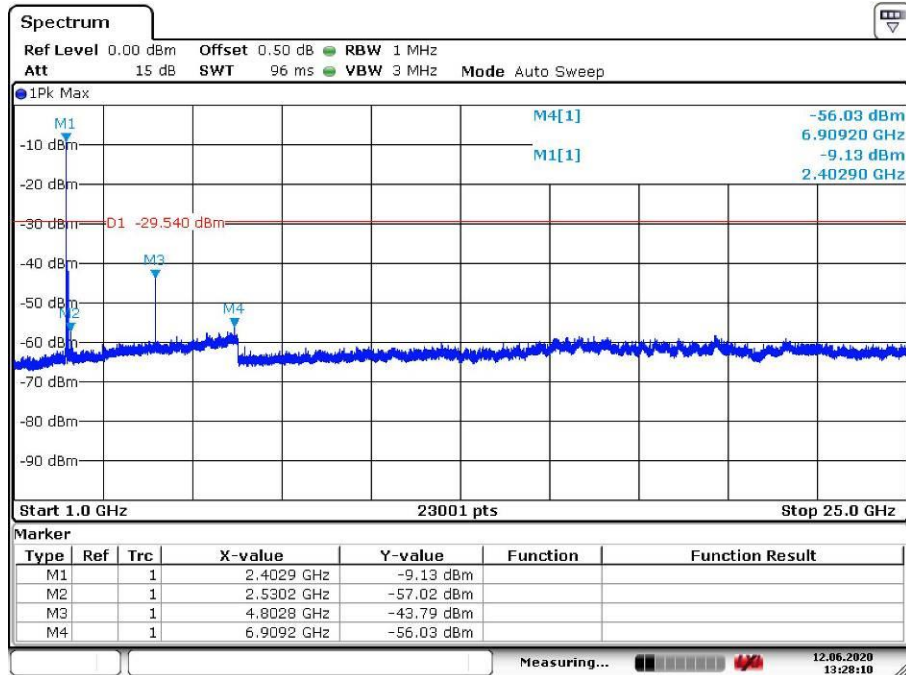


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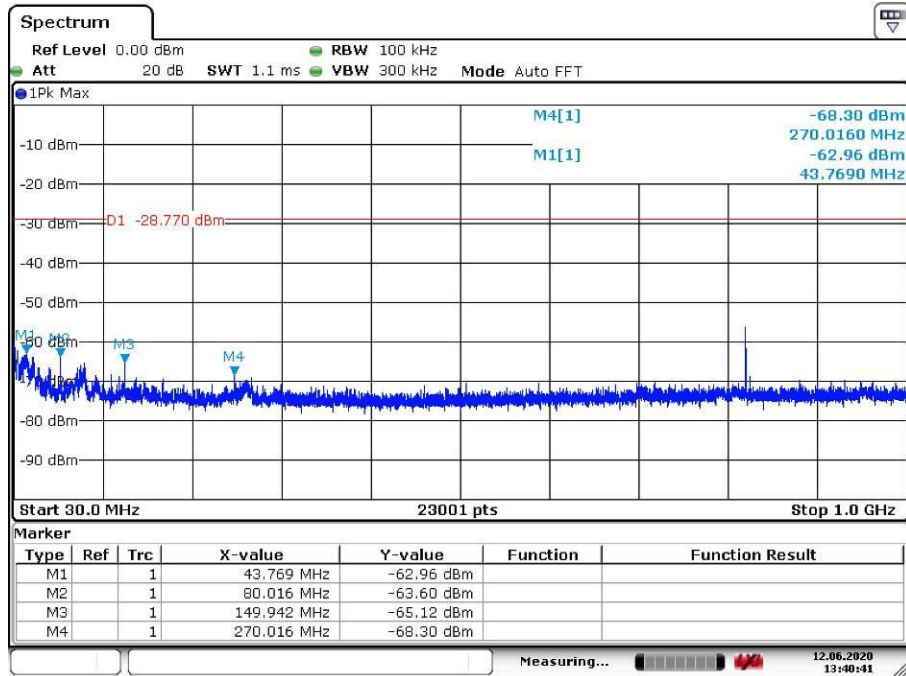
GFSK(BLE) Mode, 2Mbps



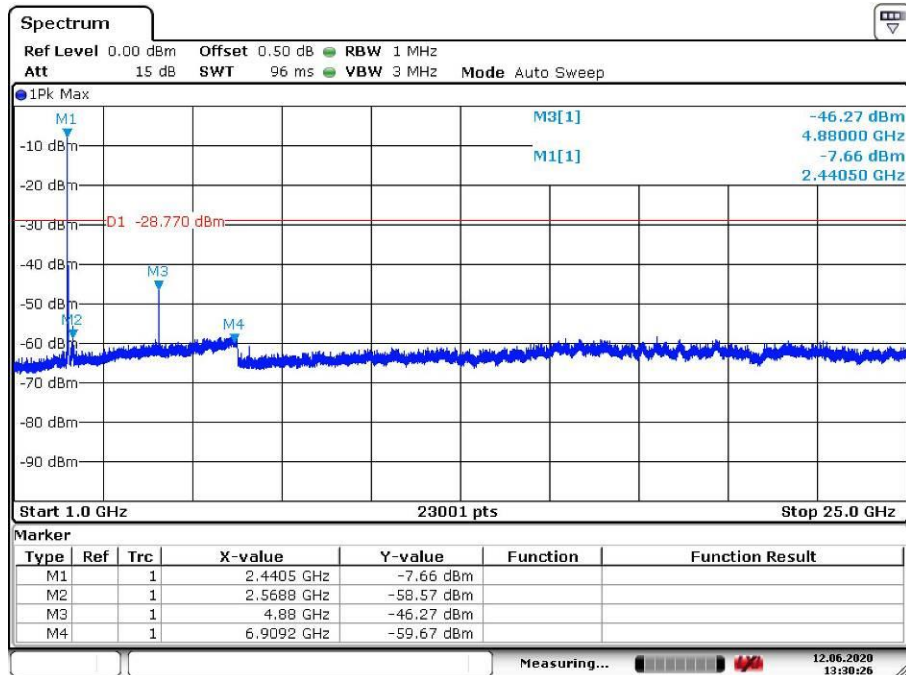
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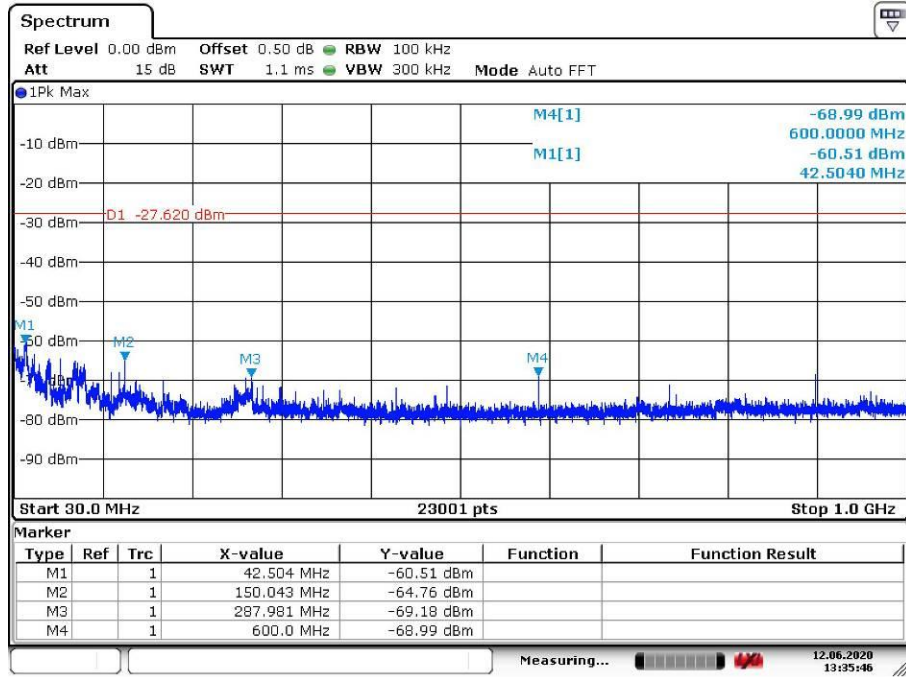
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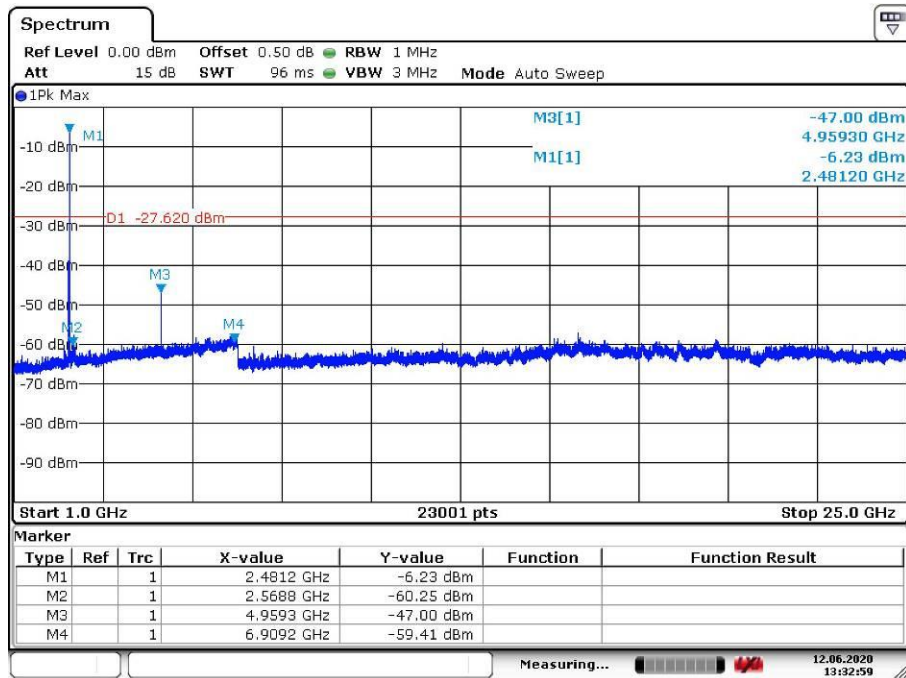
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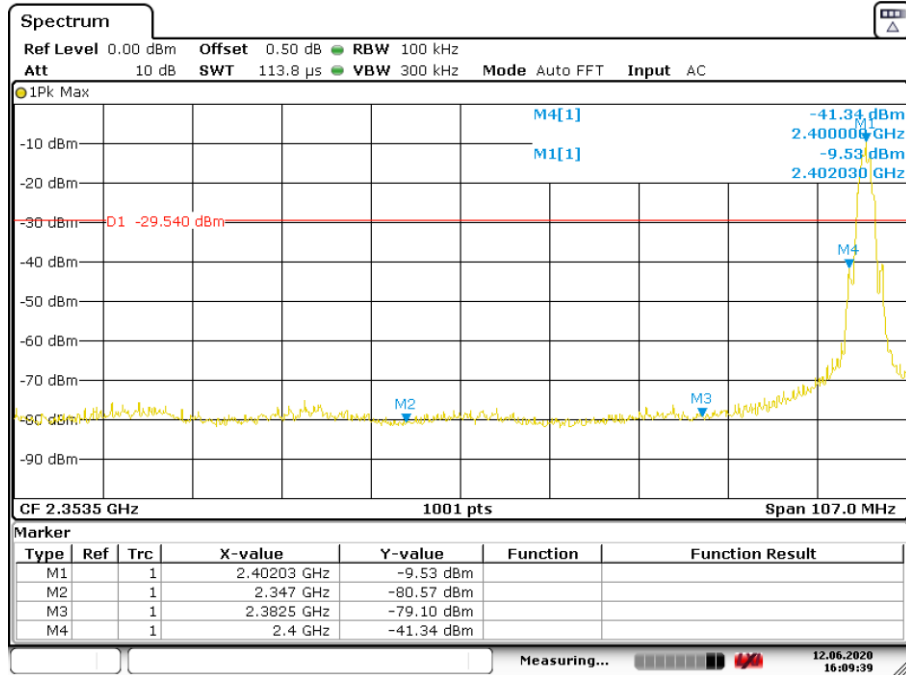


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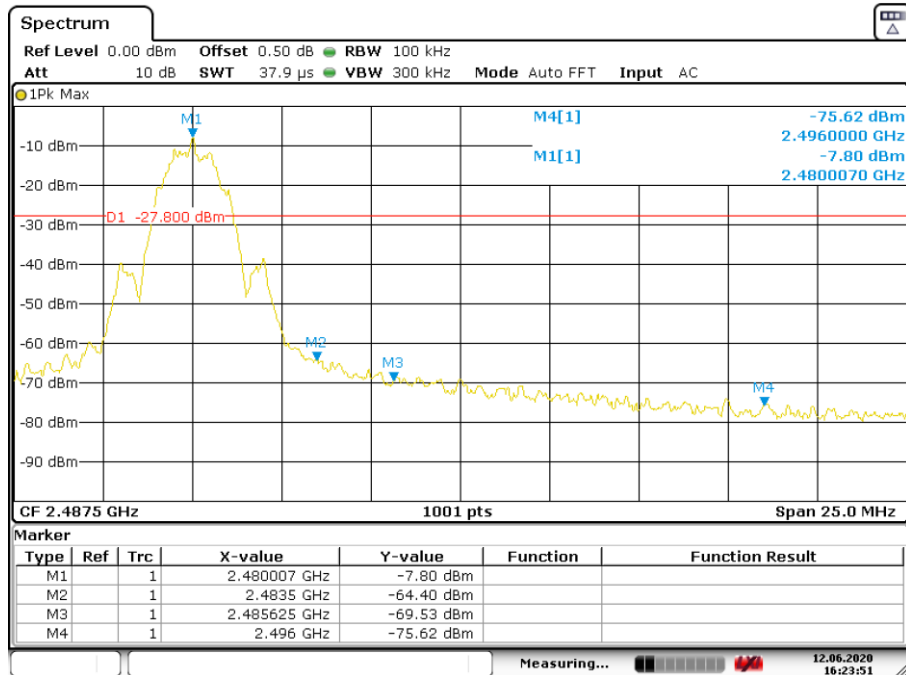


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Date: 12.JUN.2020 16:23:51