Prüfbericht-Nr.: *Test report No.:*	**50049186 001**	**Auftrags-Nr.:** *Order No.:*	164062055	Seite 1 von 27 *Page 1 of 27*
Kunden-Referenz-Nr.: *Client reference No.:*	466337	**Auftragsdatum:** *Order date.:*	28.04.2016	
Auftraggeber: *Client:*	**Lightcomm Technology Co., Ltd.** RM 1808 18/F, FO TAN INDUSTRIAL CENTRE, NOS. 26-28 AU PUI WAN STREET, FO TAN SHATIN NEW TERRITORIES HONG KONG			
Prüfgegenstand: *Test item:*	7 Inch Quad Core Tablet			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	MID721-RB, DL721-RB, DL721-** (** means different color) (DIGILAND)			
Auftrags-Inhalt: *Order content:*	FCC approval			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209			

Wareneingangsdatum: *Date of receipt:*	01.06.2016	Refer to photo documents
Prüfmuster-Nr.: *Test sample No.:*	A000368549-007	
Prüfzeitraum: *Testing period:*	08.06.2016 - 15.06.2016	
Ort der Prüfung: *Place of testing:*	Emtek (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von / *tested by:*			**kontrolliert von** / *reviewed by:*		
08.07.2016	Andy Yan / Project Manager		08.07.2016	Sam Lin / Technical Certifier	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges / *Other:*

Only evaluate the Bluetooth 4.0 (Dual mode) function in this test report.
FCC ID: XMF-MID721RB

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged:*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhalt
	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) = falled a.m. test specifications(s)	N/A = not applicable	N/T = not tested

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

5.1.6 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.7 20DB BANDWIDTH
RESULT: Pass

5.1.8 CARRIER FREQUENCY SEPARATION
RESULT: Pass

5.1.9 NUMBER OF HOPPING FREQUENCY
RESULT: Pass

5.1.10 TIME OF OCCUPANCY
RESULT: Pass

Contents

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 4.0 (Dual mode) of Conducted Testing

Appendix B: Test Results of Bluetooth 4.0 (Dual mode) of Radiated Testing

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

Test site Industry Canada No.: 4480A-2

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

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**
Spectrum Analyzer	R&S	FSV40	132.1-3008K39-100967-AP	17.05.2017
Spectrum Analyzer	Agilent	E4407B	88156318	17.05.2017
Spectrum Analyzer	Agilent	N9010A	My53470879	17.05.2017
Conducted Emission				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
Test Receiver	R&S	ESCI	26115-010-0027	17.05.2017
L.I.S.N.	R&S	ENV216	101161	17.05.2017
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	17.05.2017
Voltage Probe	R&S	ESH2-Z3	100122	17.05.2017
Spurious Emission				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
EMI Test Receiver	R&S	ESU	1302.6005.26	17.05.2017
Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	17.05.2017
Pre-Amplifier	HP	8447F	2944A07999	17.05.2017
Bilog Antenna	Schwarzbeck	VULB9163	142	17.05.2017
Pre-Amplifier	A.H.	PAM-0126	1415261	17.05.2017
Horn Antenna	Schwarzbeck	BBHA 9120	707	17.05.2017
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	17.05.2017
Cable	N/A	3M SF104-26.5	295838/4	17.05.2017
Cable	N/A	6M SF104-26.5	295840/4	17.05.2017
Cable	Schwarzbeck	AK9513	ACRX1	17.05.2017
Cable	Rosenberger	N/A	FP2RX2	17.05.2017
Cable	Schwarzbeck	AK9513	CRPX1	17.05.2017
Cable	Schwarzbeck	AK9513	CRRX2	17.05.2017
Cable	H+B	0.5M SF104-26.5	289147/4	17.05.2017
Cable	H+B	3M SF104-26.5	295838/4	17.05.2017
Cable	H+B	6M SF104-26.5	295840/4	17.05.2017

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 basics 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
Radio Spectrum	± 1.0 dB
All emission, radiated	± 3.0 dB
Conducted Emission	± 2.0 dB
Radiated Emission	± 2.0 dB
Antenna Port Emission	± 3.0 dB
Temperature	± 0.5 ℃
Humidity	± 3.0 %

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 '7 Inch Quad Core Tablet' device. It supports Bluetooth 4.0 (Dual mode) and 2.4GHz Wi-Fi 802.11 b/g/n(HT20) wireless 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 No. and appearance are 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

Technical Specification	Value
Kind of Equipment	7 Inch Quad Core Tablet
Type Designation	MID721-RB, DL721-RB, DL721-** (** means different color)
Trade Mark	DIGILAND
FCC ID	XMF-MID721RB
Operating Frequency	2402 - 2480 MHz
Operating Temperature Range	0 °C ~ +40 °C
Operating Voltage	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery DC 5.0V 1.5A via AC/DC adapter for charging
Testing Voltage	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery DC 5.0V 1.5A via AC/DC adapter for charging
Adapter	Model: TEKA006-0501500UKU Input: AC 100-240V ~ 50/60Hz 0.3A Max. Output: DC 5.0V ~ 1.5A
Type of Modulation	GFSK, π/4DQPSK, 8DPSK
Channel Number	BDR & EDR mode:79 channels; Low Energy mode:40 channels
Channel Separation	BDR & EDR mode:1MHz; Low Energy mode:2MHz
Wireless Technology	Bluetooth 4.0 (Dual mode)
Antenna Type	PIFA Antenna
Antenna Gain	1.14 dBi

Table 3: 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 4: RF Channel and Frequency of Bluetooth Low Energy

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	**2402.00**	10	2424.00	20	2444.00	30	2464.00
01	2404.00	11	2426.00	21	2446.00	31	2466.00
02	2406.00	12	2428.00	22	2448.00	32	2468.00
03	2408.00	13	2430.00	23	2450.00	33	2470.00
04	2410.00	14	2432.00	24	2452.00	34	2472.00
05	2412.00	15	2434.00	25	2454.00	35	2474.00
06	2414.00	16	2436.00	26	2456.00	36	2476.00
07	2416.00	17	2438.00	27	2458.00	37	2478.00
08	2418.00	**18**	**2440.00**	28	2460.00	**38**	**2480.00**
09	2420.00	19	2442.00	29	2462.00	--	--

Table 5: Frequency Hopping Information

Technical Specification	Description
Hopping Range	Hereby we declare that the maximum frequency of this device is: 2402-2480MHz. This is according the Bluetooth Core Specification for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04-E).
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 mode (BDR & EDR mode)
      a. Transmitting
         1) Low Channel
         2) Middle Channel
         3) High Channel
      b. Receiving
   2. Bluetooth mode (Low Energy mode)
      a. Transmitting
         1) Low Channel
         2) Middle Channel
         3) High Channel
      b. Receiving

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
- Block Diagram
- ID Label and Location Info
- Model Difference Letter
- Operation Description
- Parts List
- PCB Layout
- Photo Document
- Schematics
- 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.

According to clause 3.1, all tests were performed on model MID721-RB in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 6: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Notebook	Lenovo	WB0205140E	WB06355728	120-240V/50-60Hz

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)

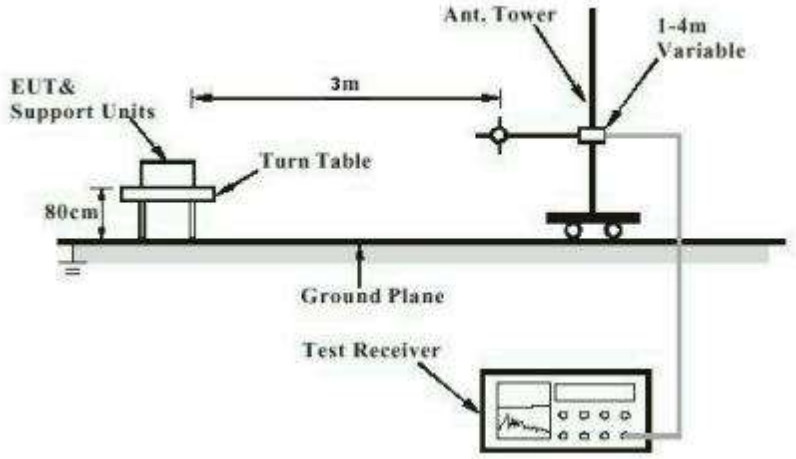


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

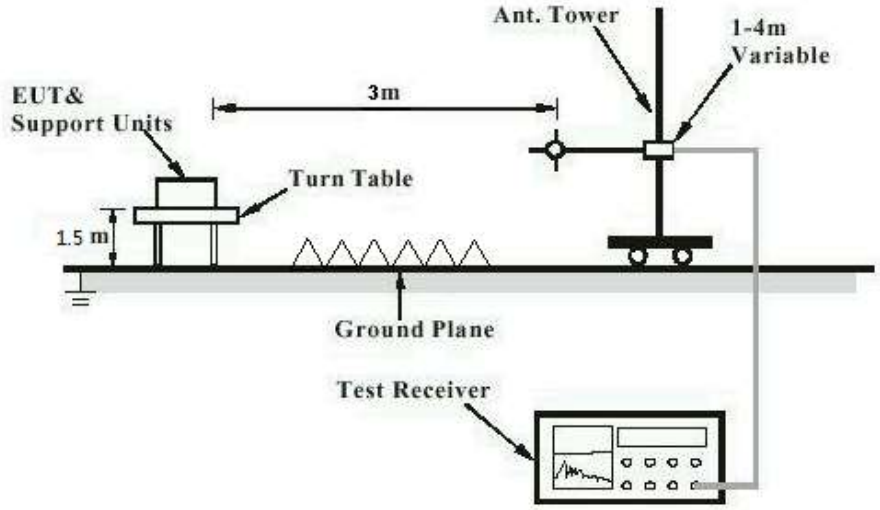


Diagram of Measurement Configuration for Mains Conduction Measurement

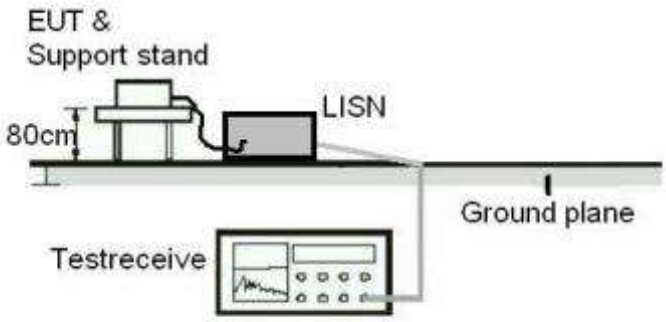
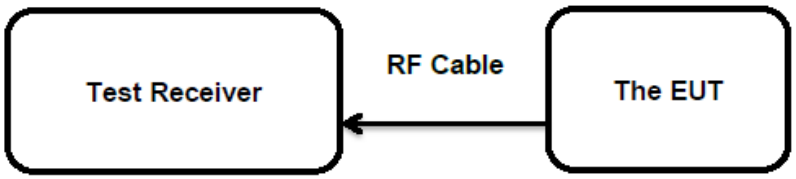


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 1.14 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)(1)&(3)
Basic standard	:	ANSI C63.10: 2013
Limits	:	FHSS < 0.125 Watts, DSSS < 1.0 Watts
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	A.1.a, A.2.a
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Table 7: Test Result of Maximum Peak Conducted Output Power

Test Mode	Channel Frequency (MHz)	Measured Peak Output Power		Limit (W)
		(dBm)	(W)	
BDR	2402	1.297	0.00135	< 0.125
	2441	2.368	0.00173	
	2480	2.910	0.00195	
EDR	2402	1.786	0.00151	< 0.125
	2441	2.859	0.00193	
	2480	3.408	0.00219	
Low Energy	2402	1.387	0.00138	< 1.0
	2440	2.263	0.00168	
	2480	2.906	0.00195	
Maximum Measured Value		3.41	0.00219	/

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

For the measurement records, refer to the appendix A.

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	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	A.2.a
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Table 8: Test Result of Power Spectral Density, Low Energy

Test Mode	Test Channel (MHz)	Power Spectrum Density(dBm/3kHz)	Limit (dBm/3kHz)
Low Energy	2402	-13.438	< 8.0
	2440	-12.938	
	2480	-12.955	
Maximum Measured Value		-12.94	

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	:	More than 500 KHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	A.2.a
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Test Channel (MHz)	-6dB Bandwidth (kHz)
2402	678.90

Table 9: Test Result of 6dB Bandwidth, Low Energy

Test Mode			Limit (kHz)
Low Energy			> 500
	2440	681.80	
	2480	686.40	
Minimum Measured Value		678.90	

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

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	:	12.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	A.1,a, A.2.a
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
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.

5.1.6 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	:	15.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery DC 5.0V 1.5A via AC/DC adapter for charging
Operation mode	:	A.1,a, A.2.a
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
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 mode at the low (2402 MHz), middle (2441 MHz) and high (2480 MHz) channel with different data packet. Compliance test in continuous transmitting mode with BDR mode (DH5) as the worst case was found.

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

For the measurement records, refer to the appendix B.

5.1.7 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	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	A.1,a
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Table 10: Test Result of 20dB Bandwidth

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
BDR	2402	940.90	627.267	/
	2441	938.60	625.733	
	2480	940.40	626.933	
EDR	2402	1427.00	951.333	/
	2441	1422.00	948.000	
	2480	1425.00	950.000	
Maximum Measured Value		1427.00	951.333	/

For the measurement records, refer to the appendix A.

5.1.8 Carrier Frequency Separation

RESULT: **Pass**

Test Specification

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

Test Setup

Date of testing	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Table 11: Test Result of Carrier Frequency Separation

Channel	Channel Frequency (MHz)	Measured Channel Separation (KHz)	Limit (kHz)	Result
Low Channel	2402	1000.0	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
Adjacency Channel	2403			
Middle Channel	2441	1000.0		Pass
Adjacency Channel	2442			
High Channel	2480	1000.0		Pass
Adjacency Channel	2479			

Note:
The limit is maximum 2/3 of the 20 dB bandwidth: 951.333 KHz.

For the measurement records, refer to the appendix A.

5.1.9 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	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	B
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Table 12: 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.

5.1.10 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	:	08.06.2016
Input voltage	:	DC 3.7V 2700mAh via internal rechargeable Li-Poly battery
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	24 ℃
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Table 13: 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	0.376	0.120	< 0.4s
		DH3	1.631	0.261	
		DH5	2.880	0.307	
	2441	DH1	0.376	0.120	
		DH3	1.631	0.261	
		DH5	2.880	0.307	
	2480	DH1	0.372	0.119	
		DH3	1.631	0.261	
		DH5	2.880	0.307	
EDR mode	2402	3DH1	0.384	0.123	
		3DH3	1.638	0.262	
		3DH5	2.890	0.308	
	2441	3DH1	0.388	0.124	
		3DH3	1.638	0.262	
		3DH5	2.890	0.308	
	2480	3DH1	0.384	0.123	
		3DH3	1.638	0.262	
		3DH5	2.890	0.308	
Maximum Measured Value			2.890	0.308	

Note:

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

Period = 0.4 (seconds/ channel) x 79 (channel) = 31.6 seconds

For the measurement records, refer to the appendix A.

7 List of Tables

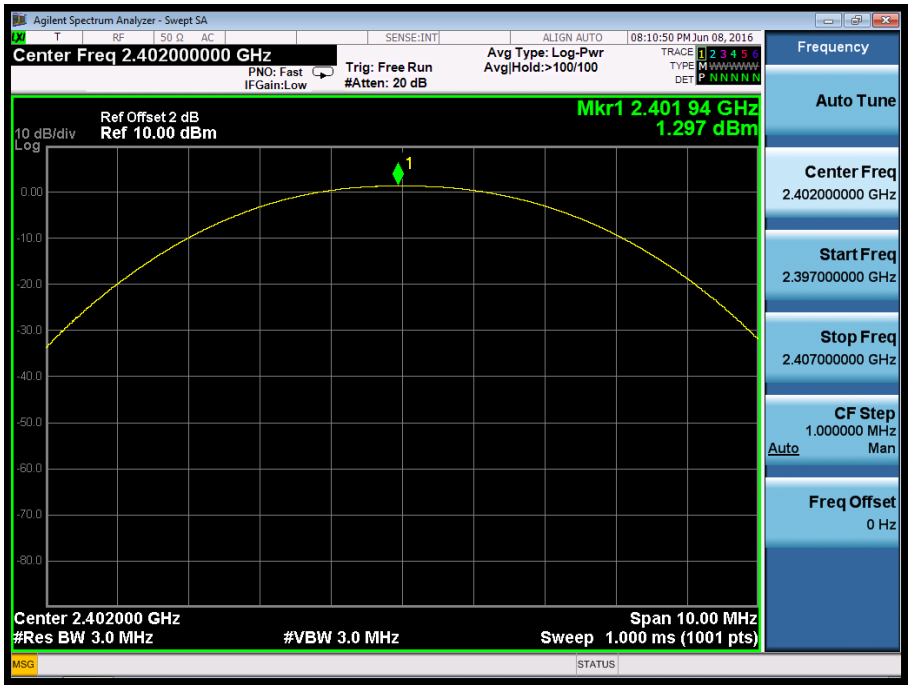
8 List of Photographs

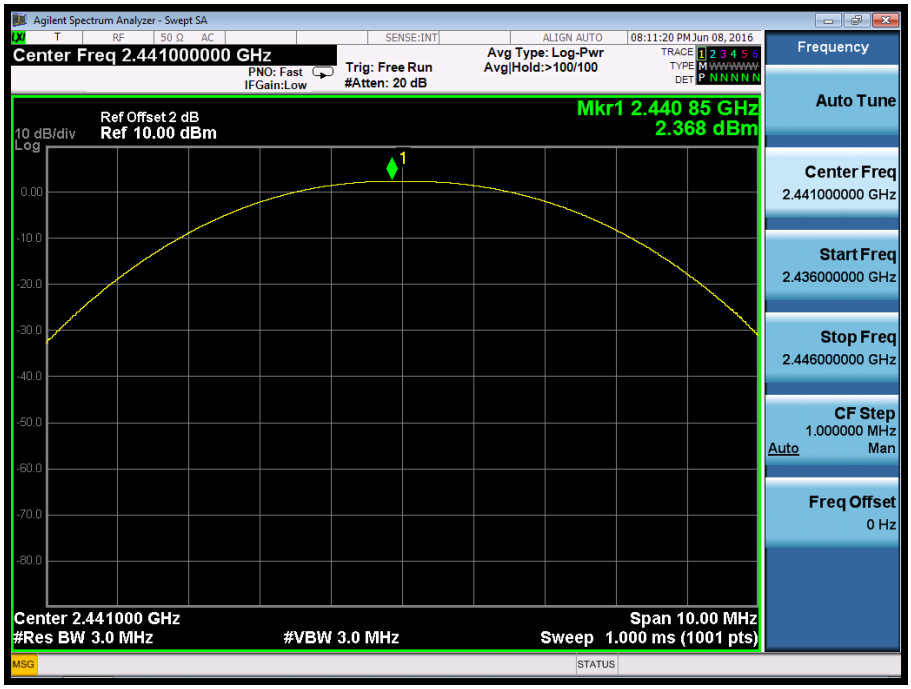
Appendix A

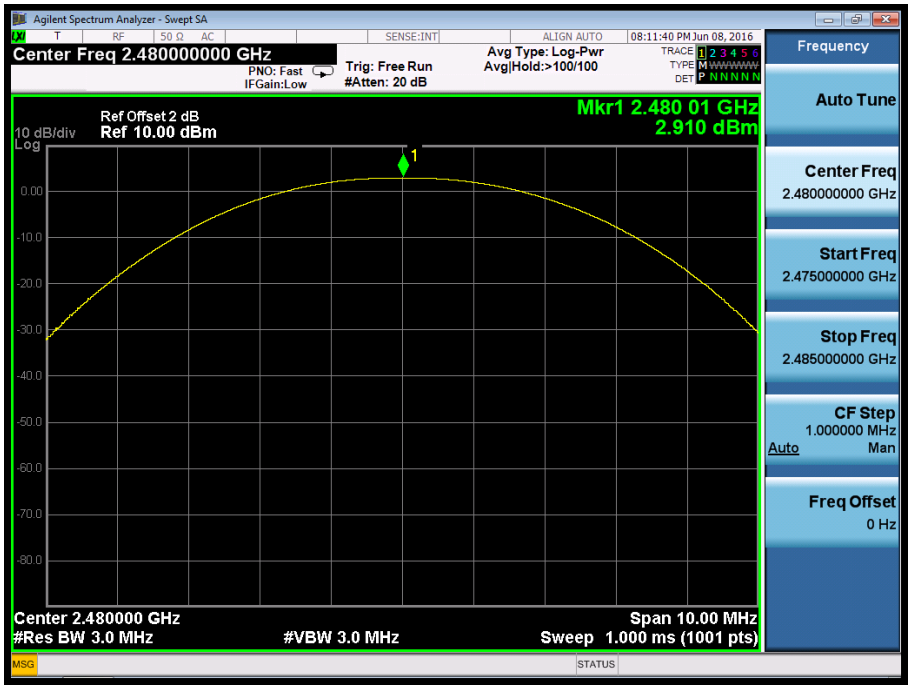
Test Results of Bluetooth 4.0 (Dual mode) of Conducted Testing

Appendix A.1: Maximum Peak Conducted Output Power

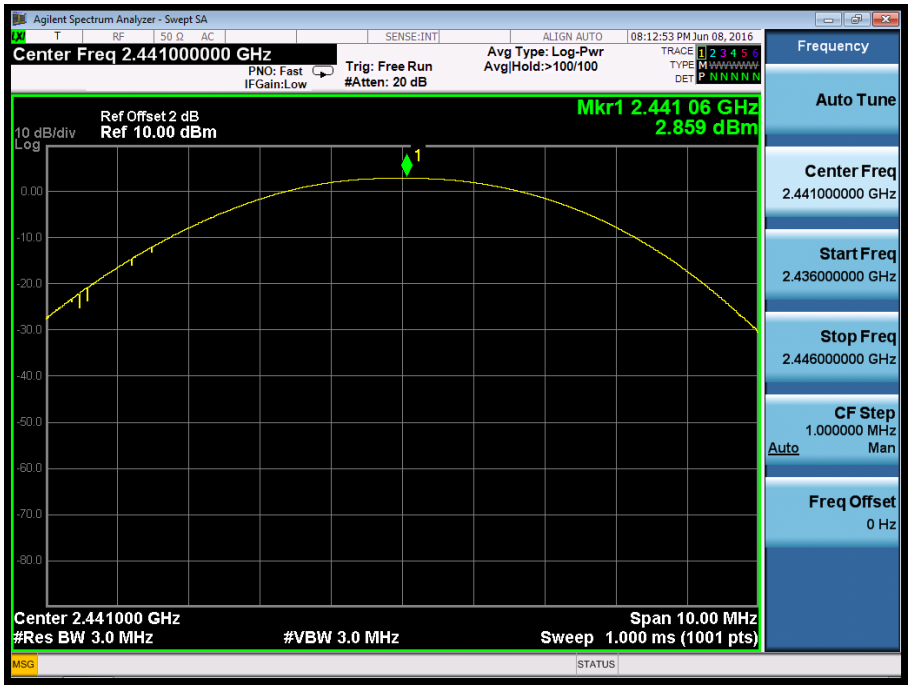
BDR Mode, DH1

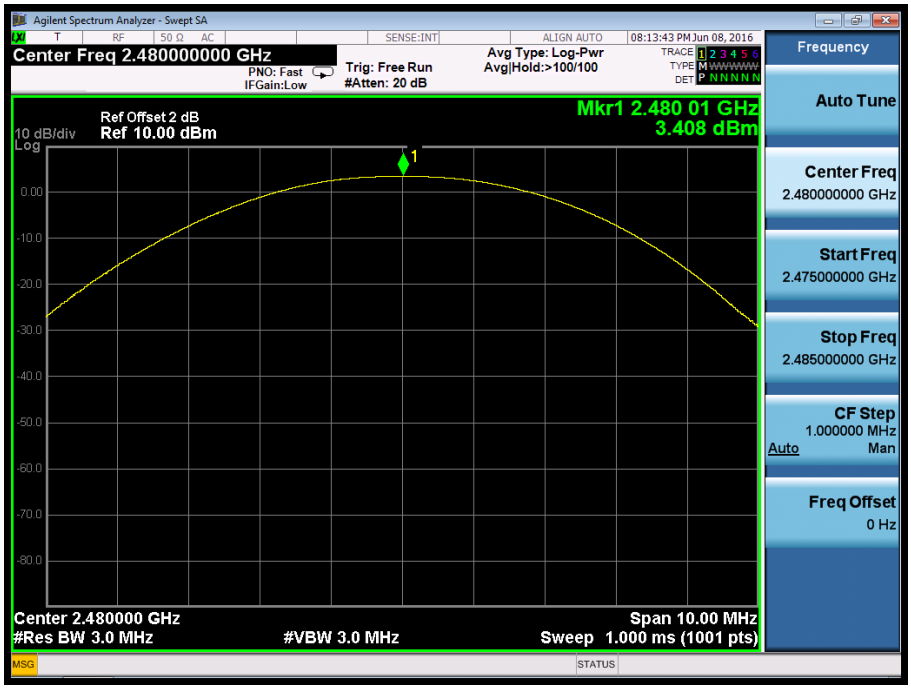




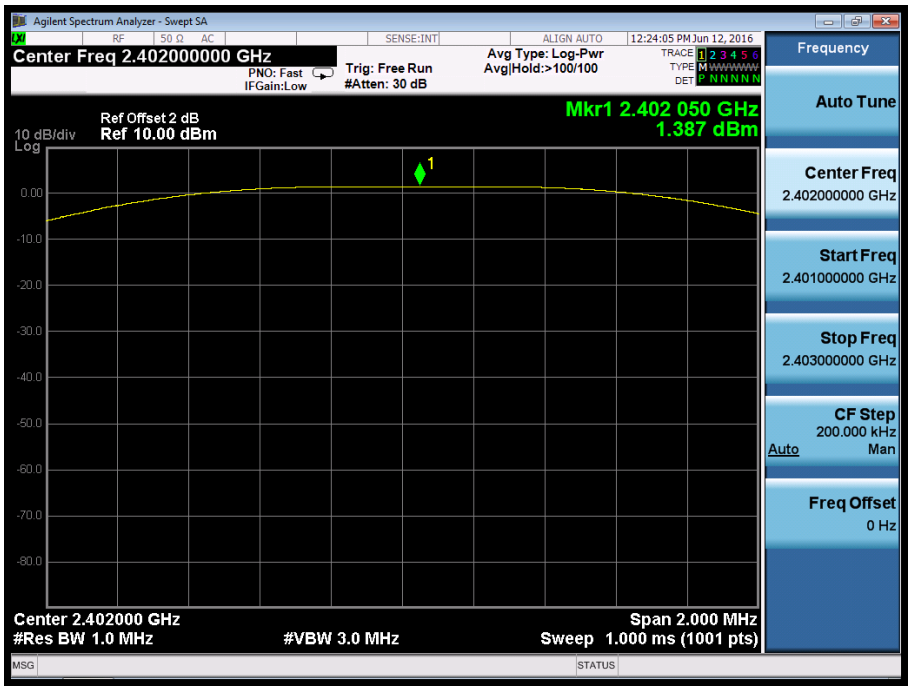


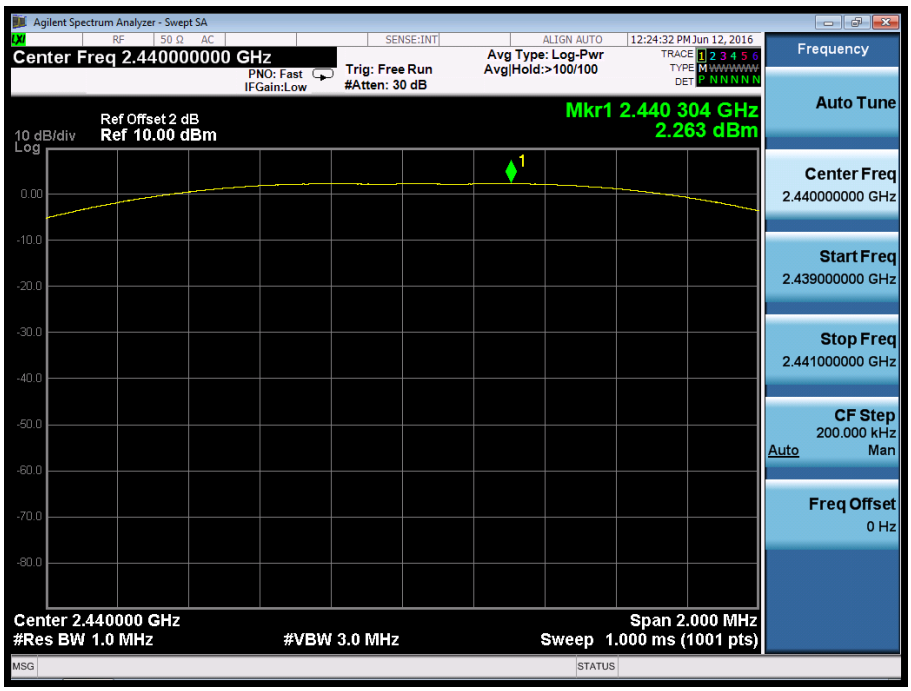
EDR Mode, 3DH1

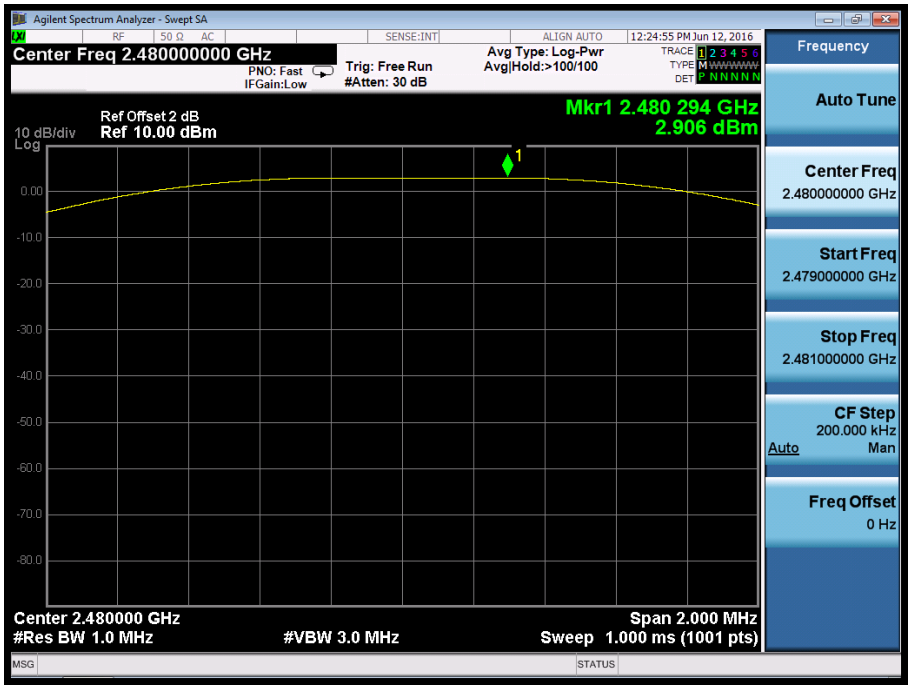

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:12:53 PM Jun 08, 2016
Frequency
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.441 06 GHz
2.859 dBm
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.436000000 GHz
Stop Freq
2.446000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.441000 GHz
#Res BW 3.0 MHz
#VBW 3.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:13:43 PM Jun 08, 2016
Frequency
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.480 01 GHz
3.408 dBm
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.475000000 GHz
Stop Freq
2.485000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 3.0 MHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)

Low Energy Mode

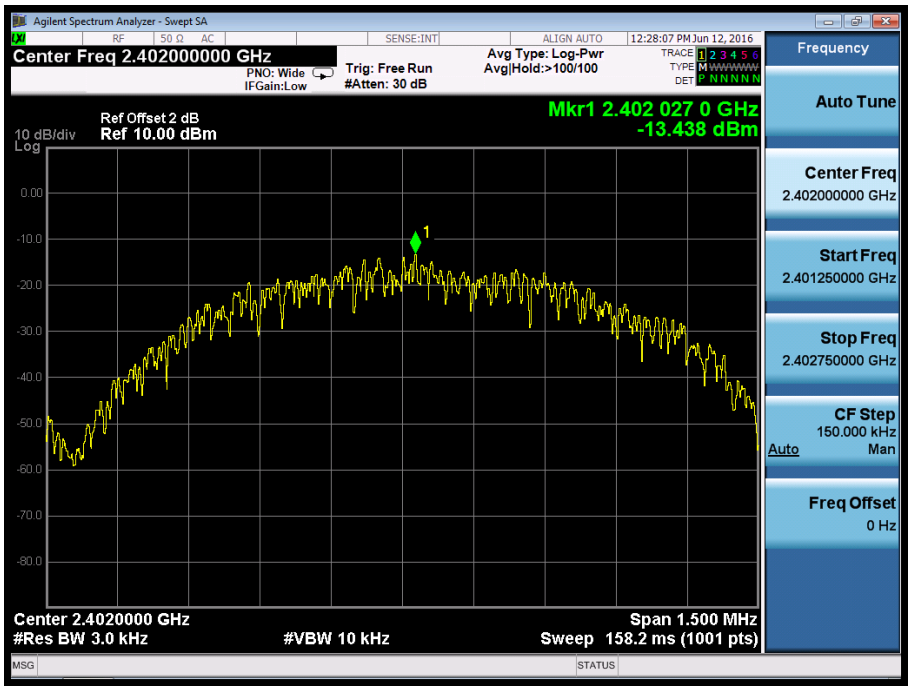


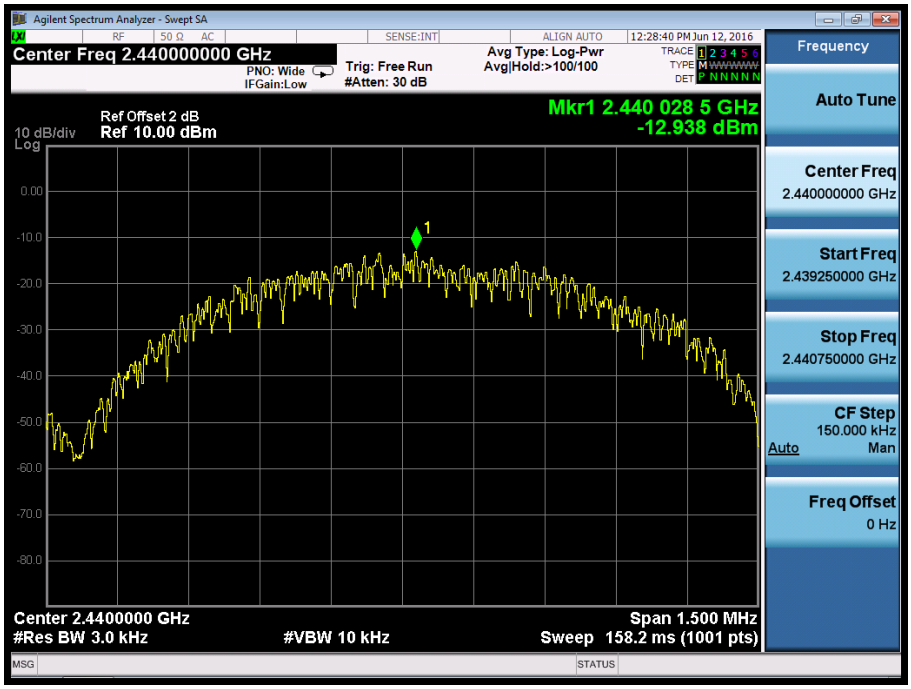


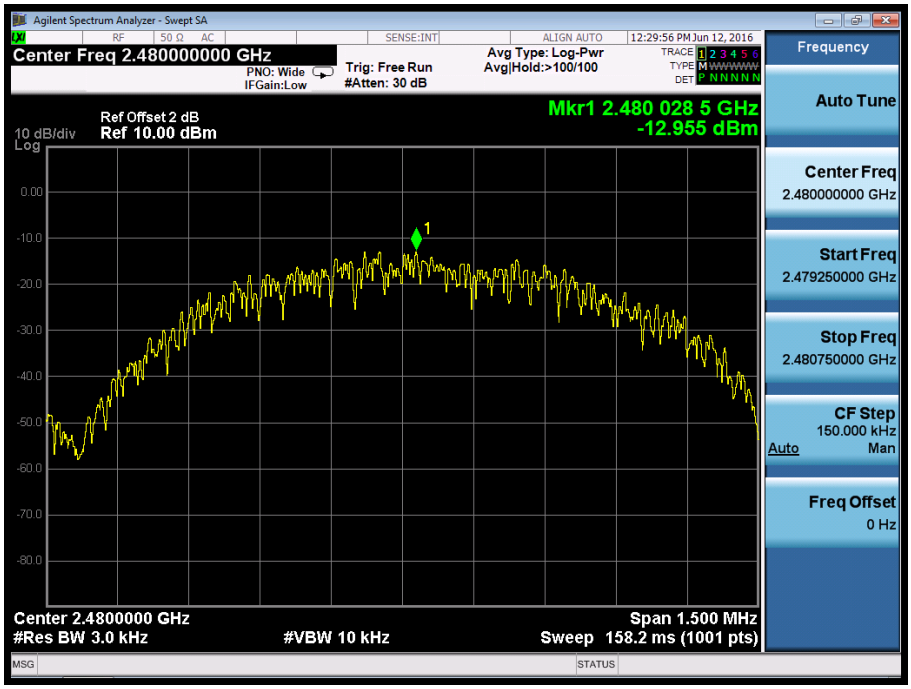


Appendix A.2: Conducted Power Spectral Density

Low Energy Mode

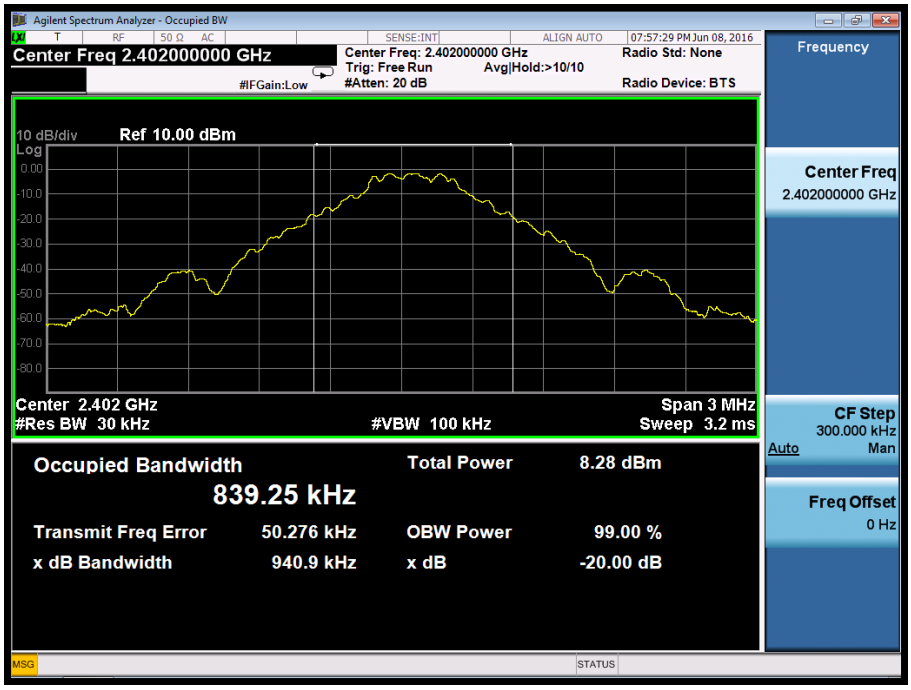


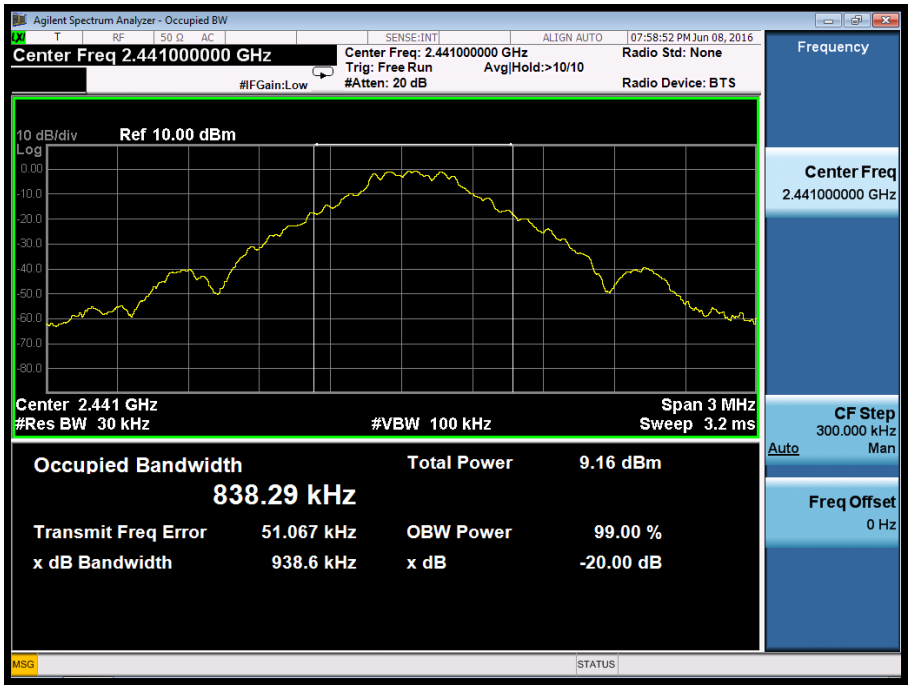

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.440000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
12:28:40 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.440 028 5 GHz
-12.938 dBm
Center 2.4400000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.500 MHz
Sweep 158.2 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.440000000 GHz
Start Freq
2.439250000 GHz
Stop Freq
2.440750000 GHz
CF Step
150.000 kHz
Auto
Man
Freq Offset
0 Hz

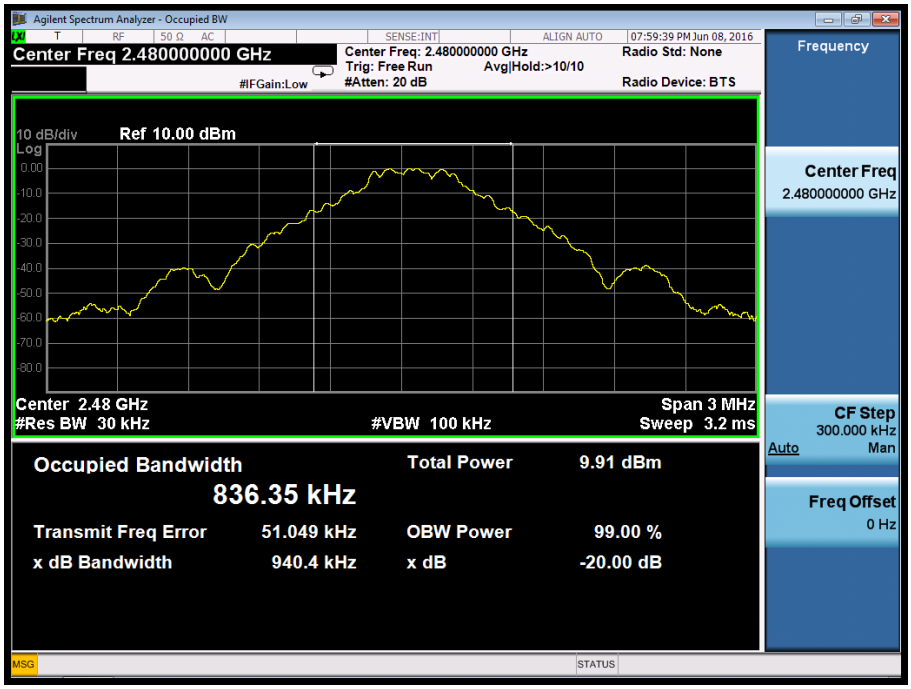

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
12:29:56 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 2.480 028 5 GHz
-12.955 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.500 MHz
Sweep 158.2 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479250000 GHz
Stop Freq
2.480750000 GHz
CF Step
150.000 kHz
Auto
Man
Freq Offset
0 Hz

Appendix A.3: 20dB Bandwidth

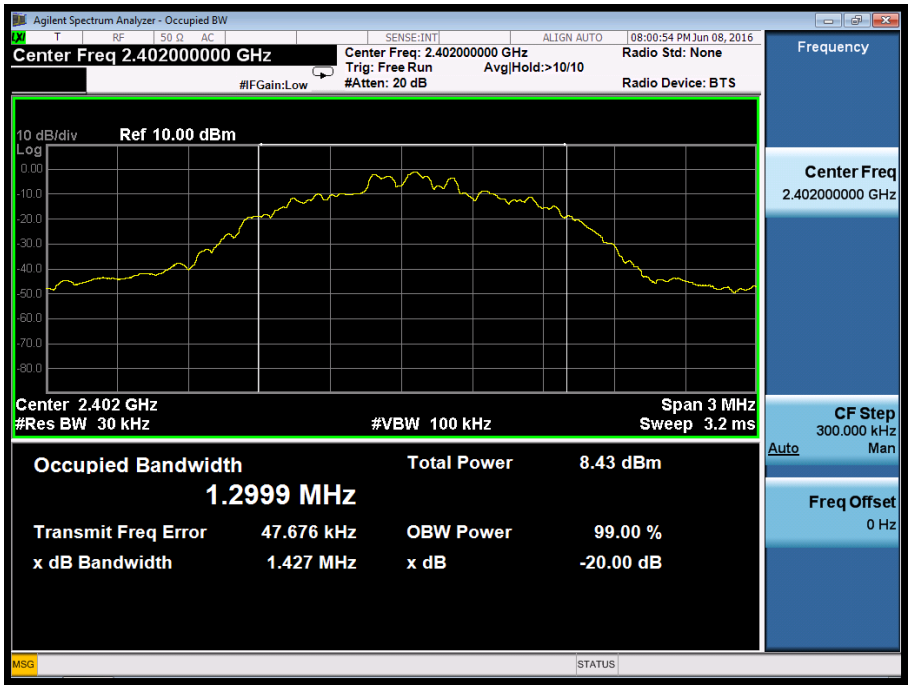
BDR Mode, DH1

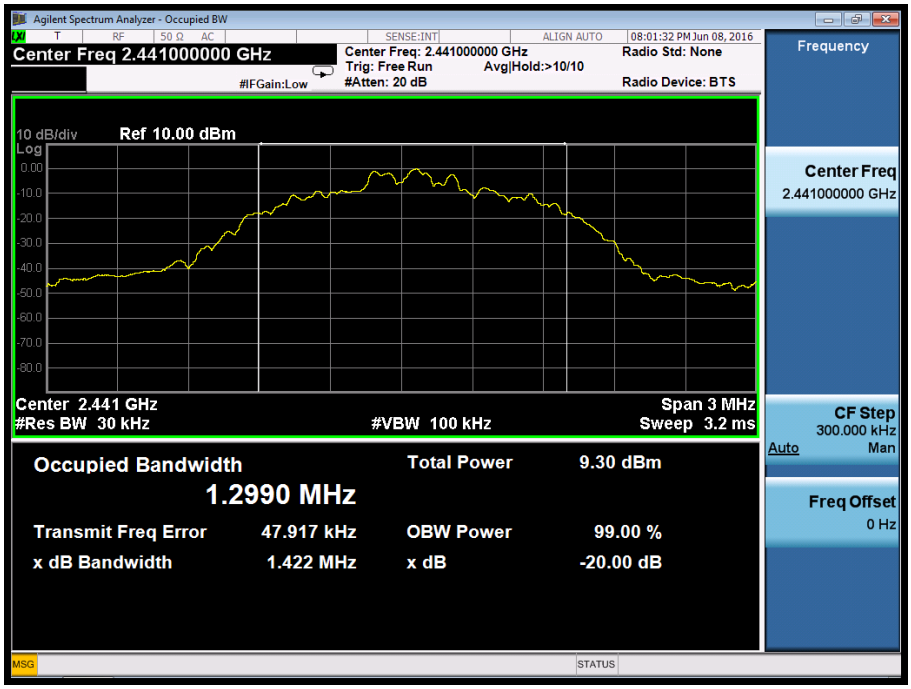


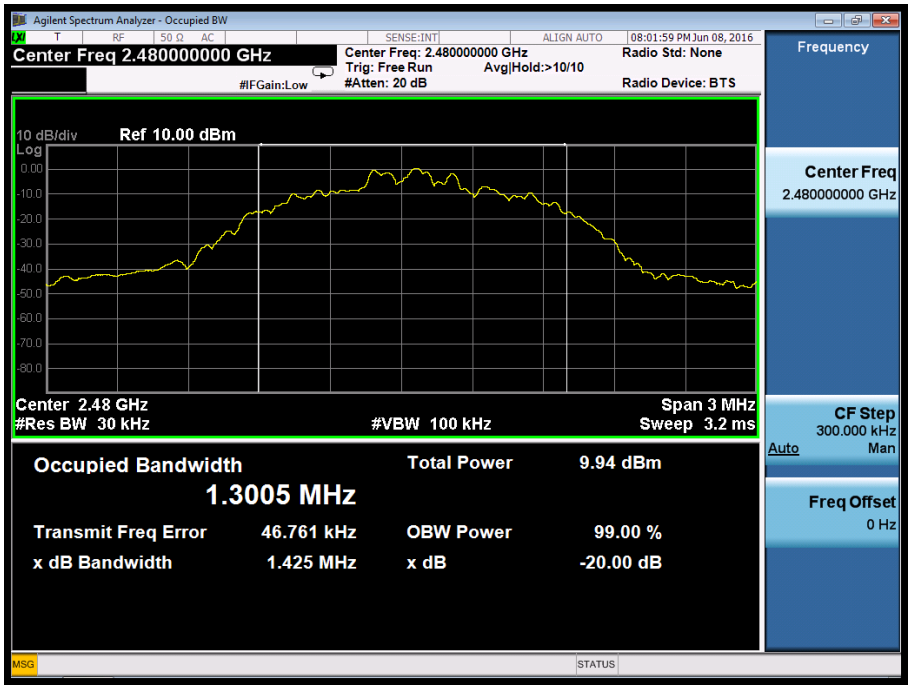




EDR Mode, 3DH1

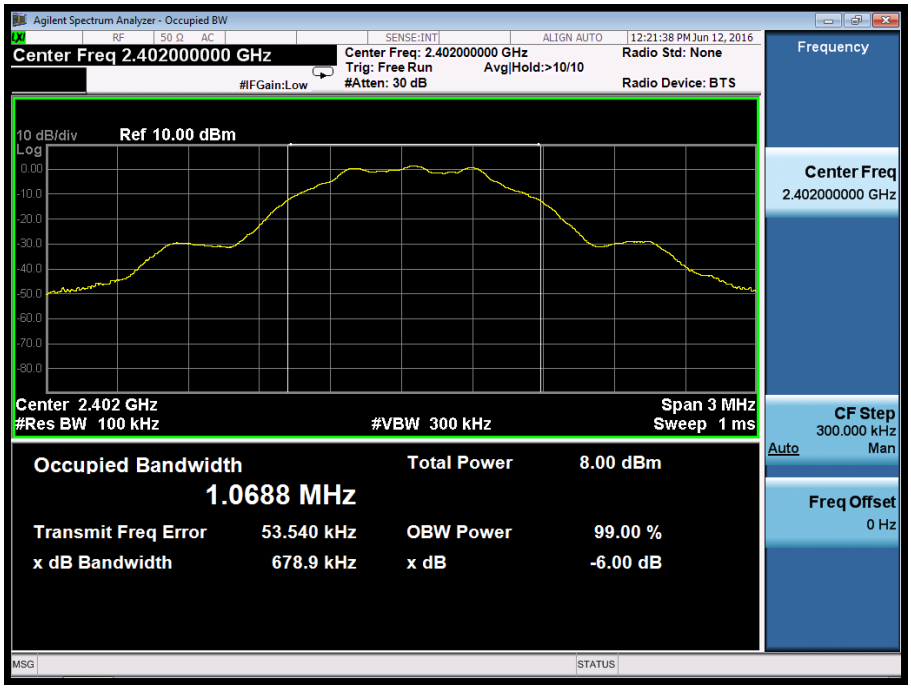


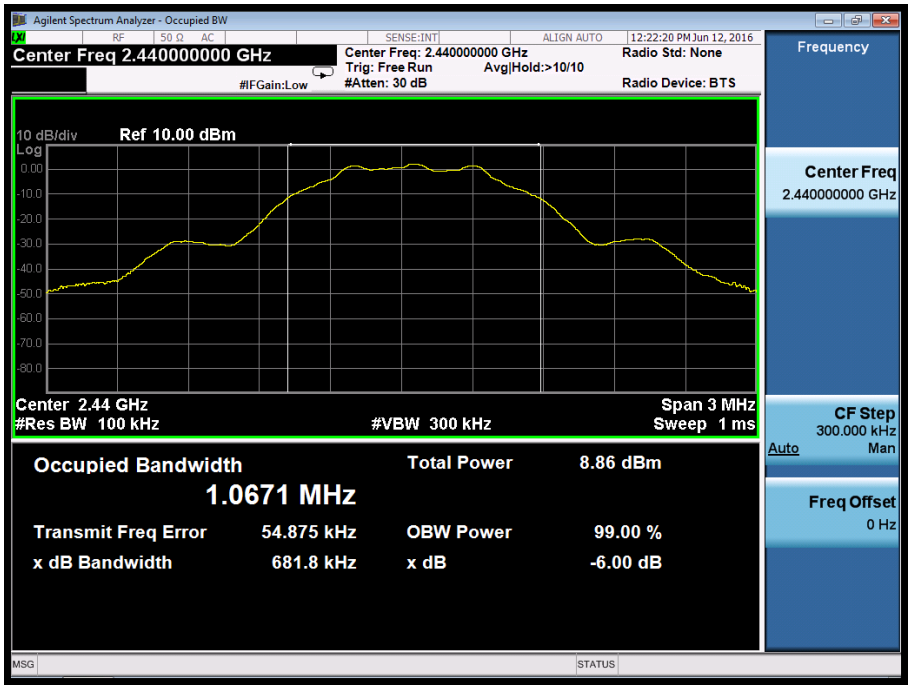

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.441000000 GHz
Center Freq: 2.441000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
08:01:32 PM Jun 08, 2016
10 dB/div
Log
Ref 10.00 dBm
Center 2.441 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
Occupied Bandwidth
1.2990 MHz
Total Power
9.30 dBm
Transmit Freq Error
47.917 kHz
OBW Power
99.00 %
x dB Bandwidth
1.422 MHz
x dB
-20.00 dB
Frequency
Center Freq
2.441000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

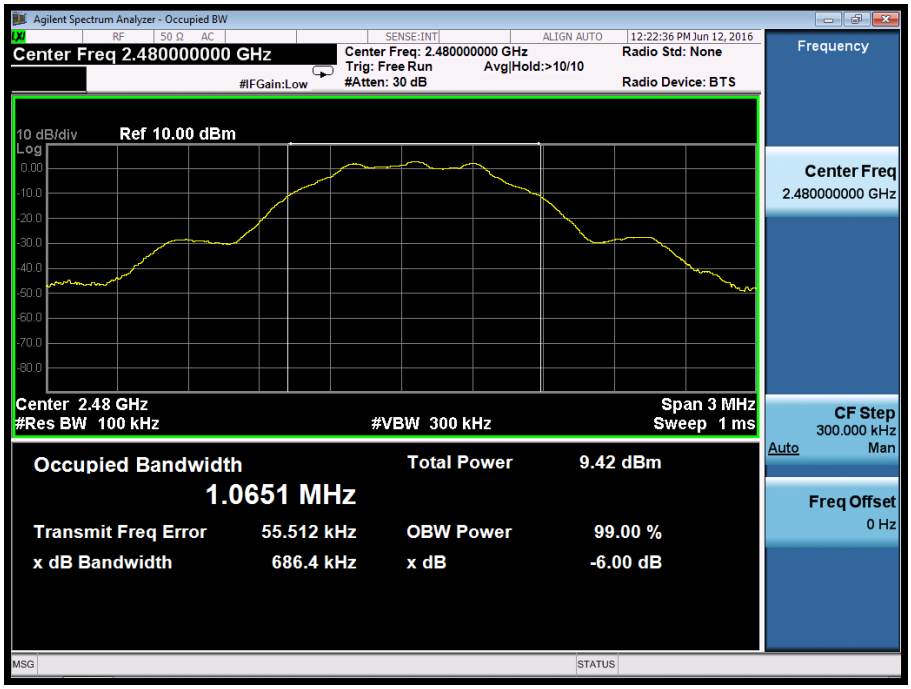

Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
08:01:59 PM Jun 08, 2016
10 dB/div
Log
Ref 10.00 dBm
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
Occupied Bandwidth
1.3005 MHz
Total Power
9.94 dBm
Transmit Freq Error
46.761 kHz
OBW Power
99.00 %
x dB Bandwidth
1.425 MHz
x dB
-20.00 dB
Frequency
Center Freq
2.480000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

Appendix A.4: 6dB Bandwidth

Low Energy Mode







Appendix A.5: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

BDR Mode, DH1


Agilent Spectrum Analyzer - Swept SA
Start Freq 30.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 48/100
11:54:48 AM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 21.767 5 GHz
-41.584 dBm
-17.71 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (20000 pts)
Frequency
Auto Tune
Center Freq
12.515000005 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000010 GHz
CF Step
2.497000001 GHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Start Freq 30.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 74/100
11:55:56 AM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
Mkr1 21.767 5 GHz
-41.584 dBm
-17.19 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (20000 pts)
Frequency
Auto Tune
Center Freq
12.515000005 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000010 GHz
CF Step
2.497000001 GHz
Auto
Man
Freq Offset
0 Hz

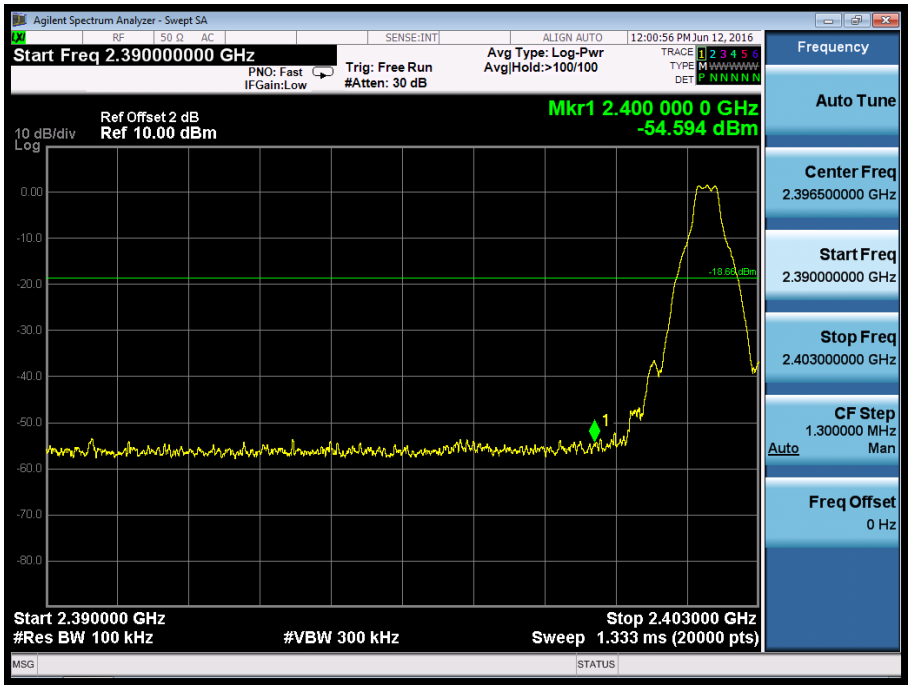
EDR Mode, 3DH1

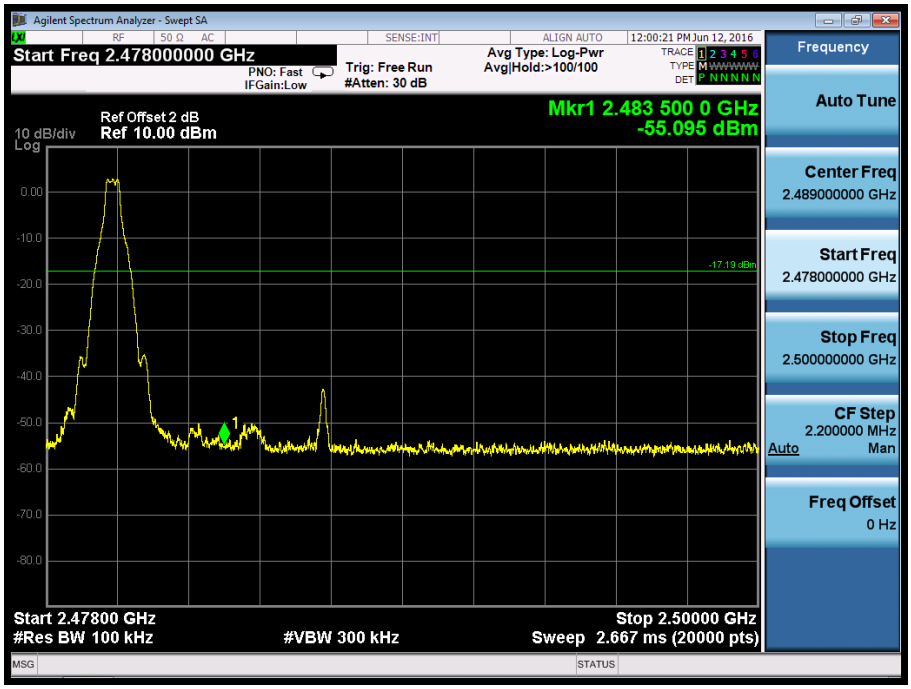
Low Energy Mode


Agilent Spectrum Analyzer - Swept SA
Start Freq 30.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 20/100
12:37:09 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Ref 10.00 dBm
Mkr1 23.355 6 GHz
-41.519 dBm
-17.93 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (20000 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz

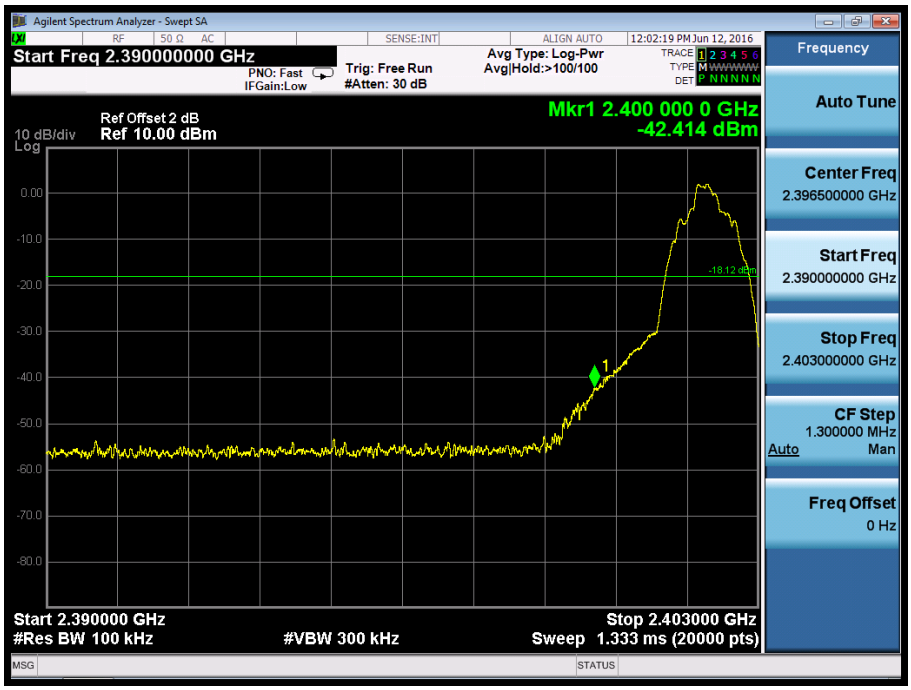

Agilent Spectrum Analyzer - Swept SA
Start Freq 30.000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 28/100
12:37:28 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Ref 10.00 dBm
Mkr1 23.355 6 GHz
-41.519 dBm
-17.38 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (20000 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz

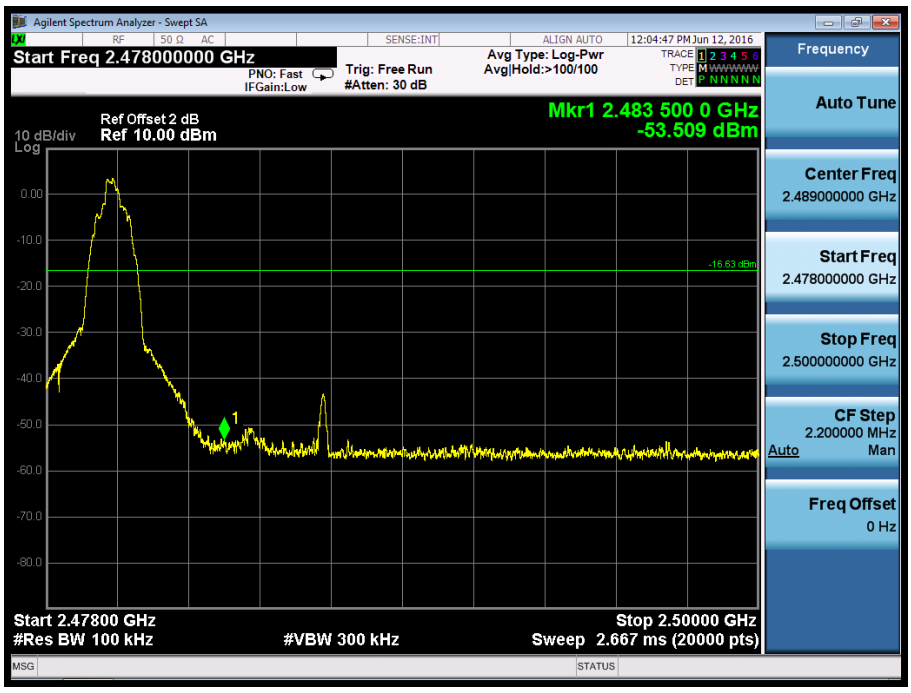
BDR Mode, Band Edge



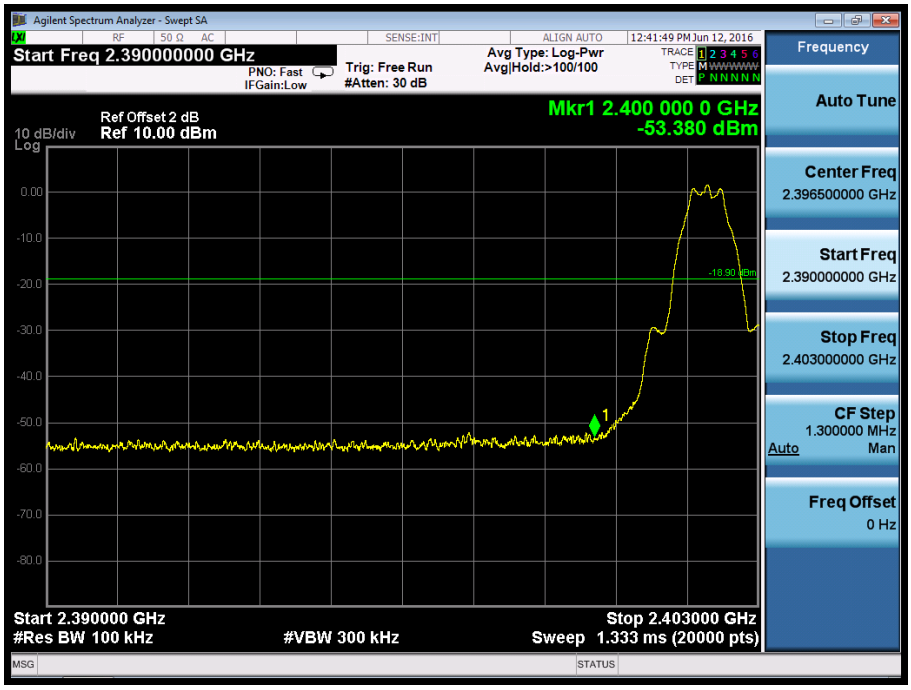


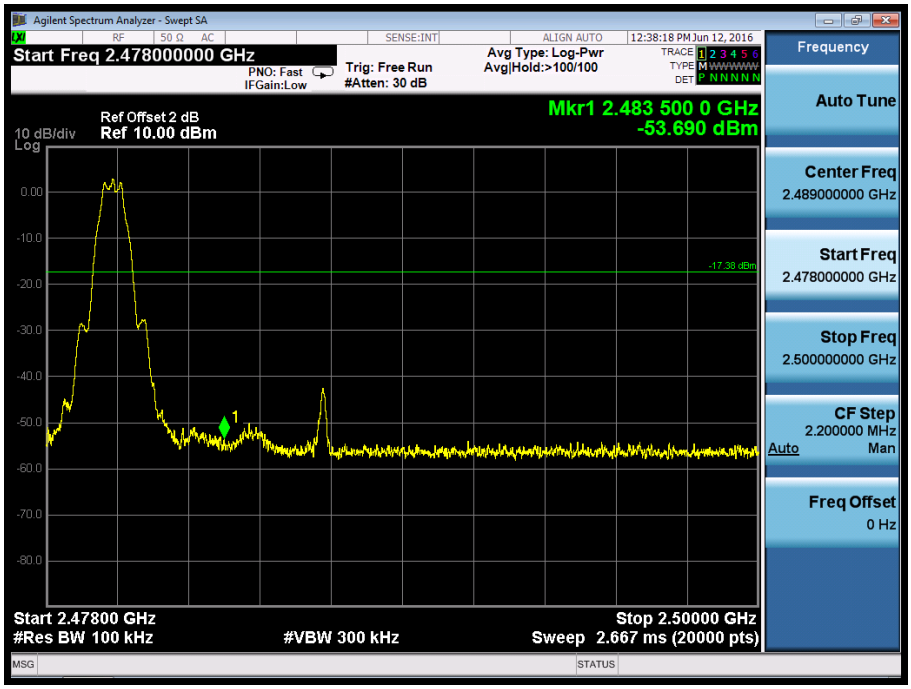
EDR Mode, Band Edge





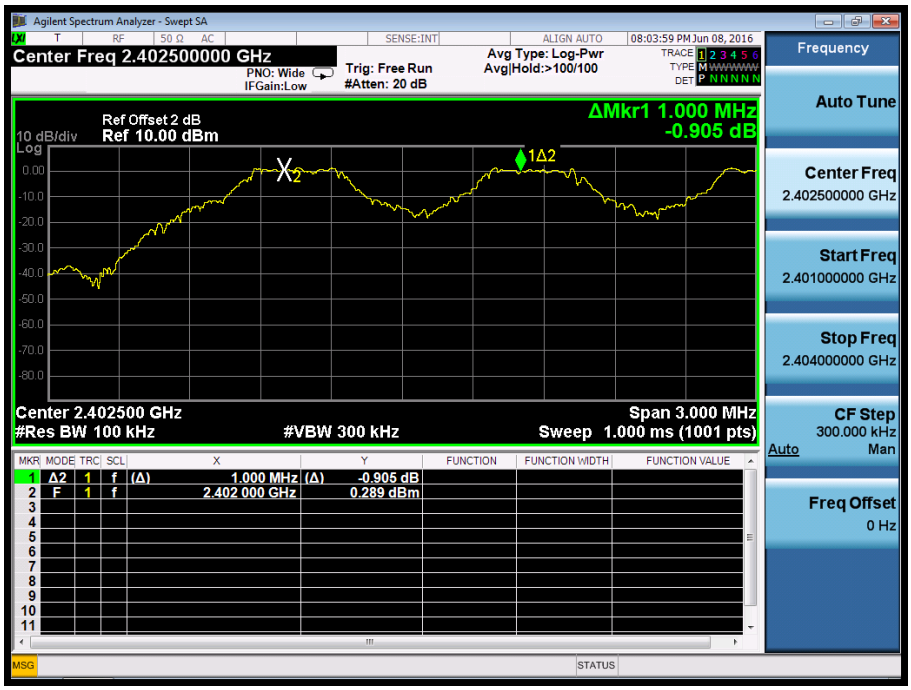
Low Energy Mode, Band Edge

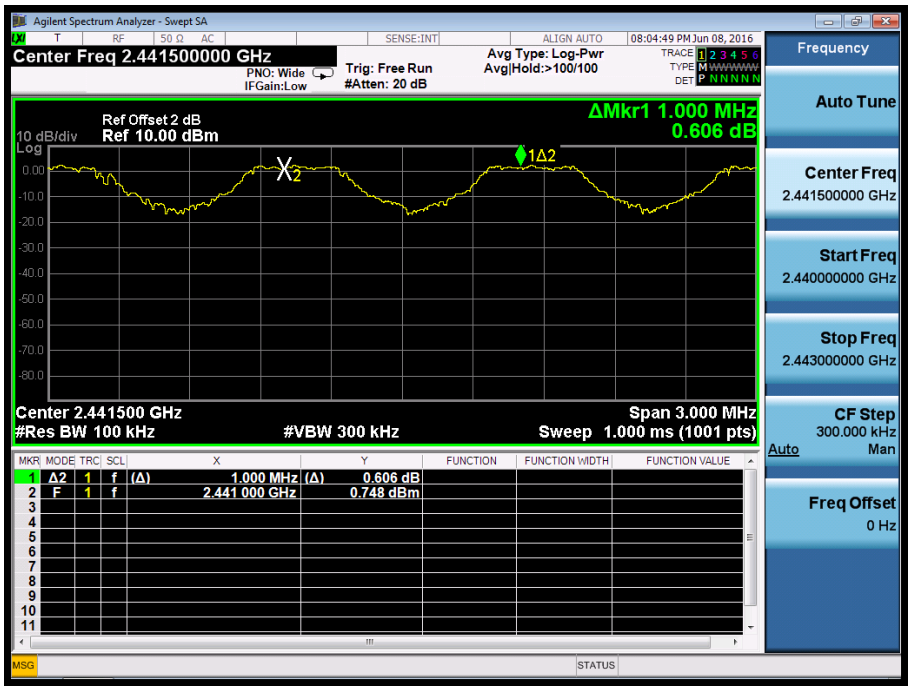


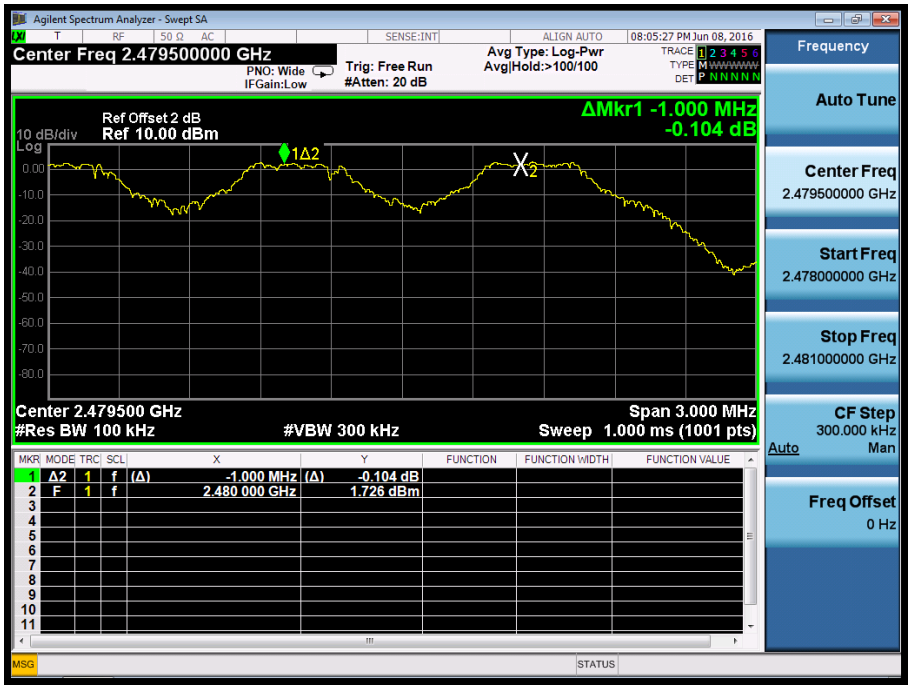


Appendix A.6: Carrier Frequency Separation

Hopping Mode

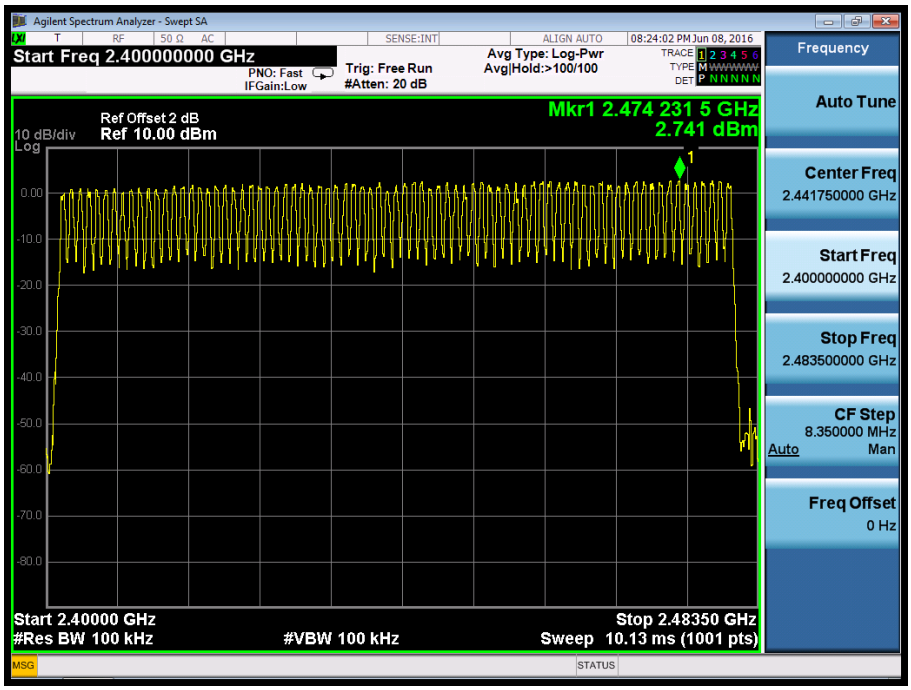






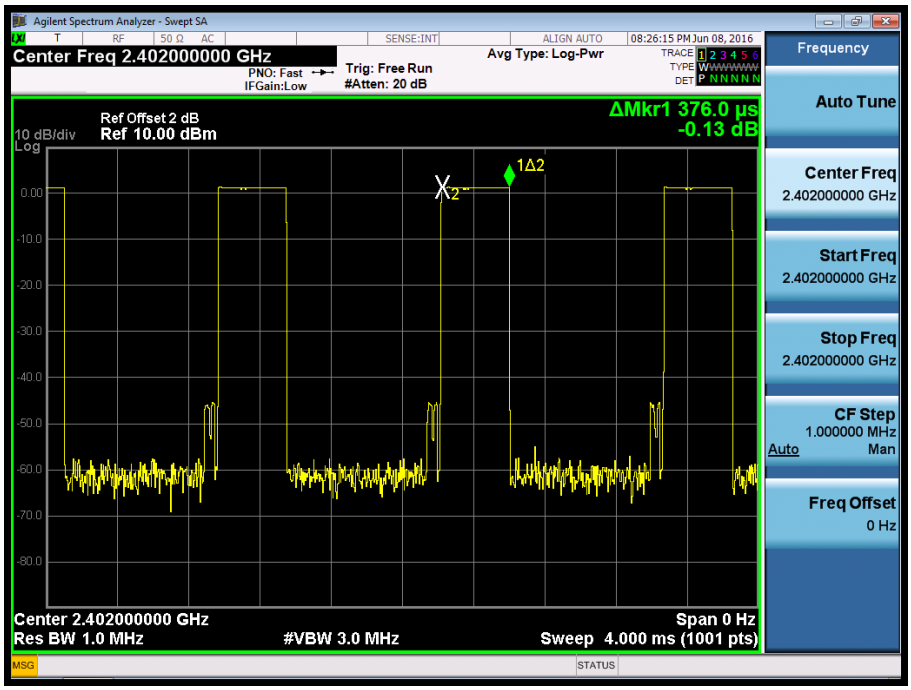
Appendix A.7: Number of Hopping Frequency

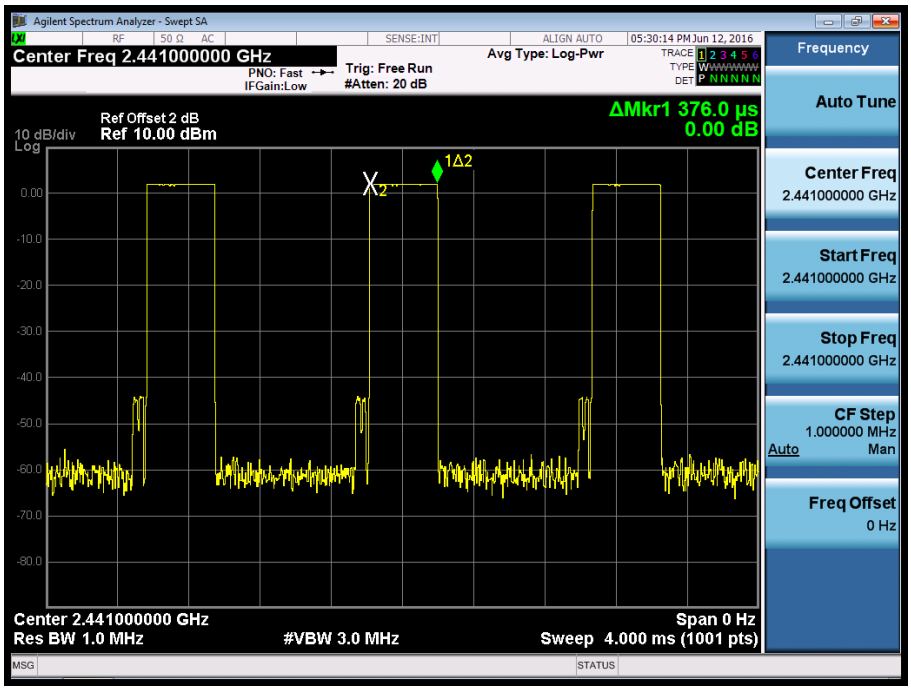
Hopping Mode

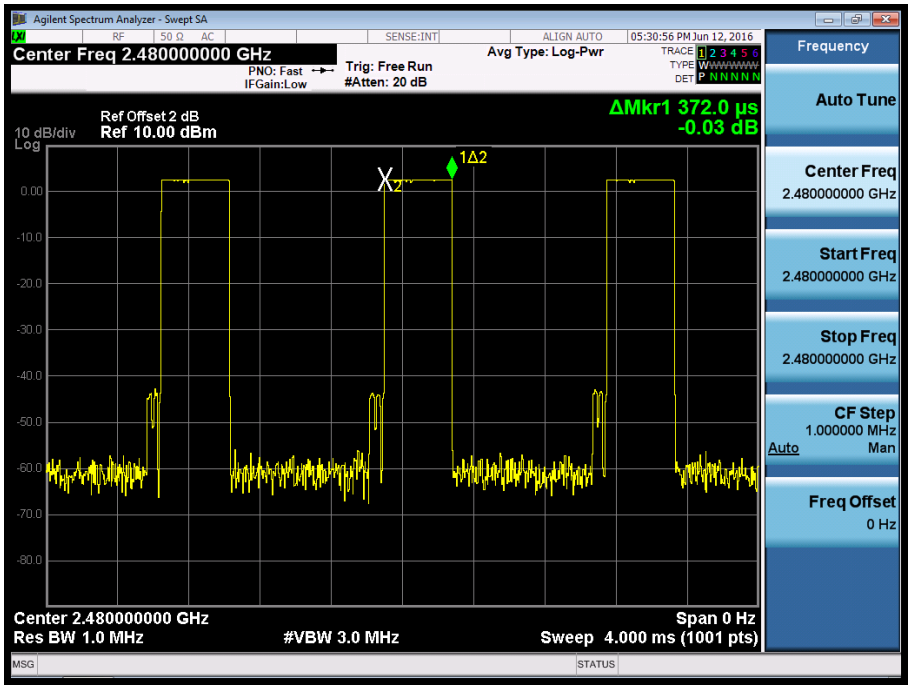


Appendix A.8: Time of Occupancy

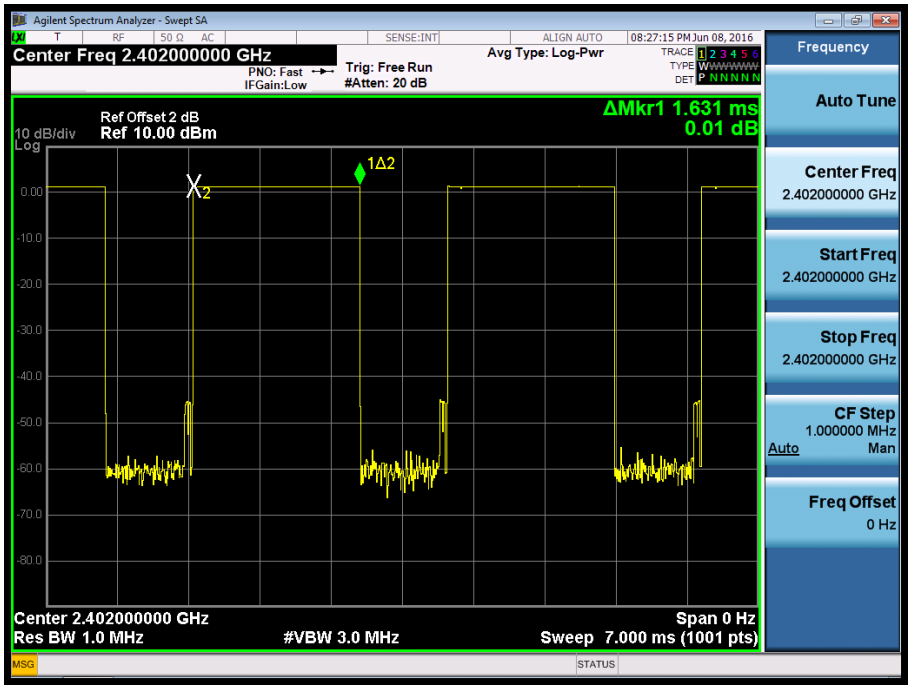
BDR Mode, DH1

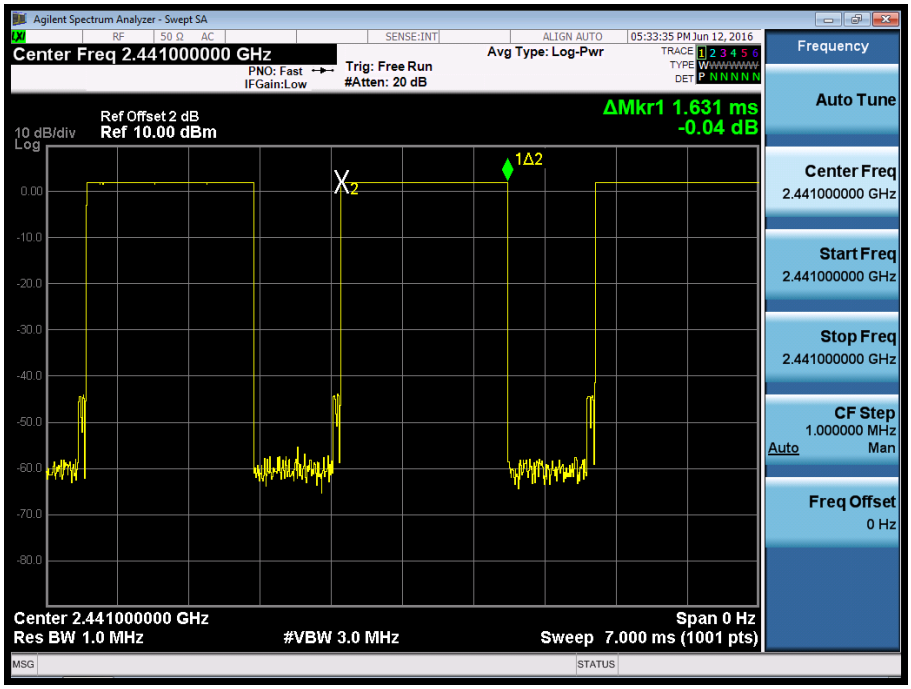


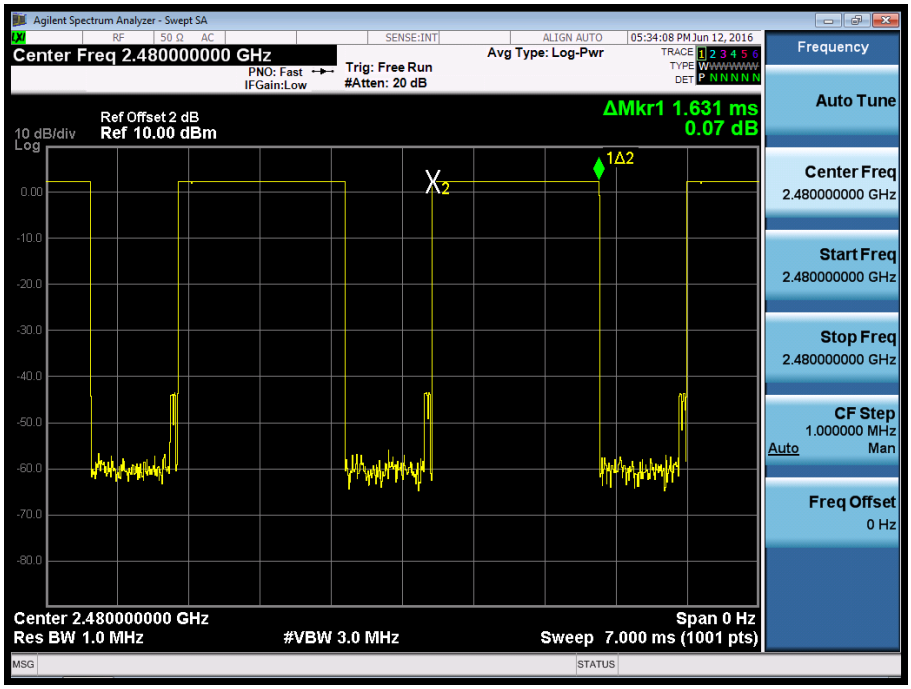



Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:30:56 PM Jun 12, 2016
Frequency
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 372.0 µs
-0.03 dB
1Δ2
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)
MSG
STATUS

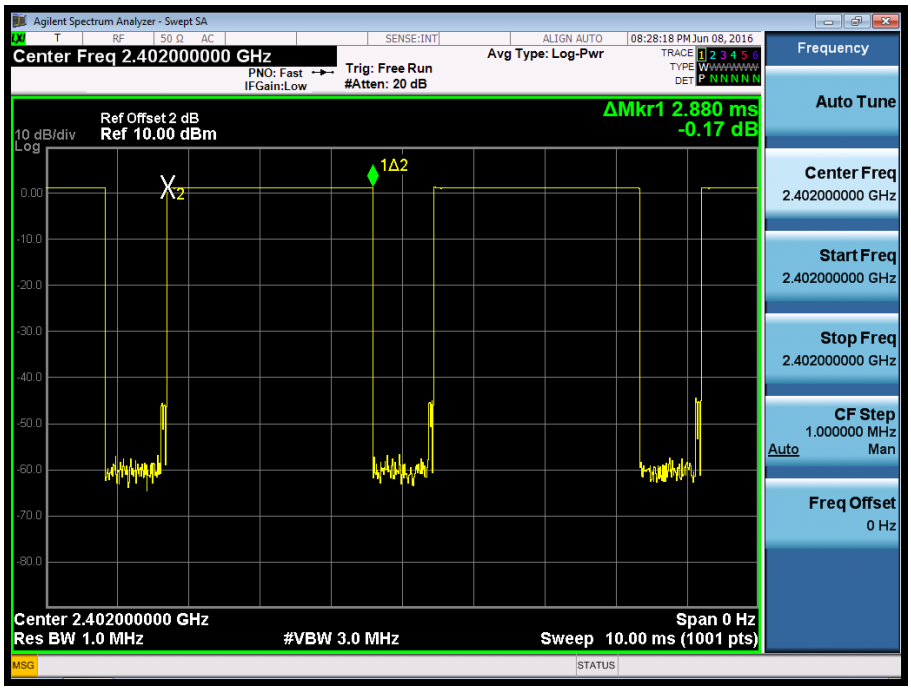
BDR Mode, DH3

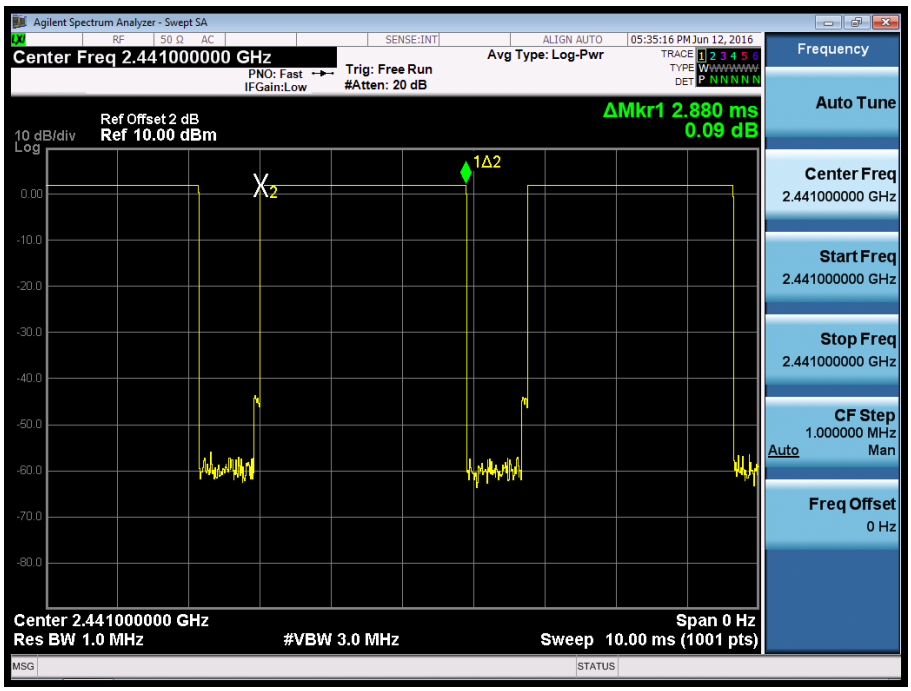

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.402000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
08:27:15 PM Jun 08, 2016
Frequency
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 1.631 ms
0.01 dB
1Δ2
Auto Tune
Center Freq
2.402000000 GHz
Start Freq
2.402000000 GHz
Stop Freq
2.402000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.402000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 7.000 ms (1001 pts)
MSG
STATUS

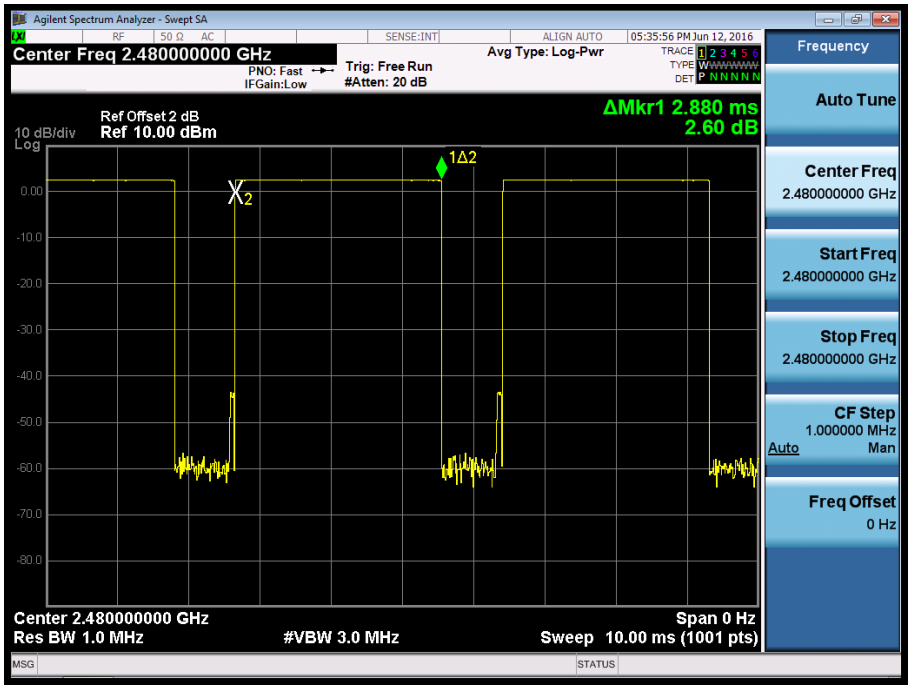

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:33:35 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 1.631 ms
-0.04 dB
1Δ2
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 7.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:34:08 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 1.631 ms
0.07 dB
1Δ2
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 7.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

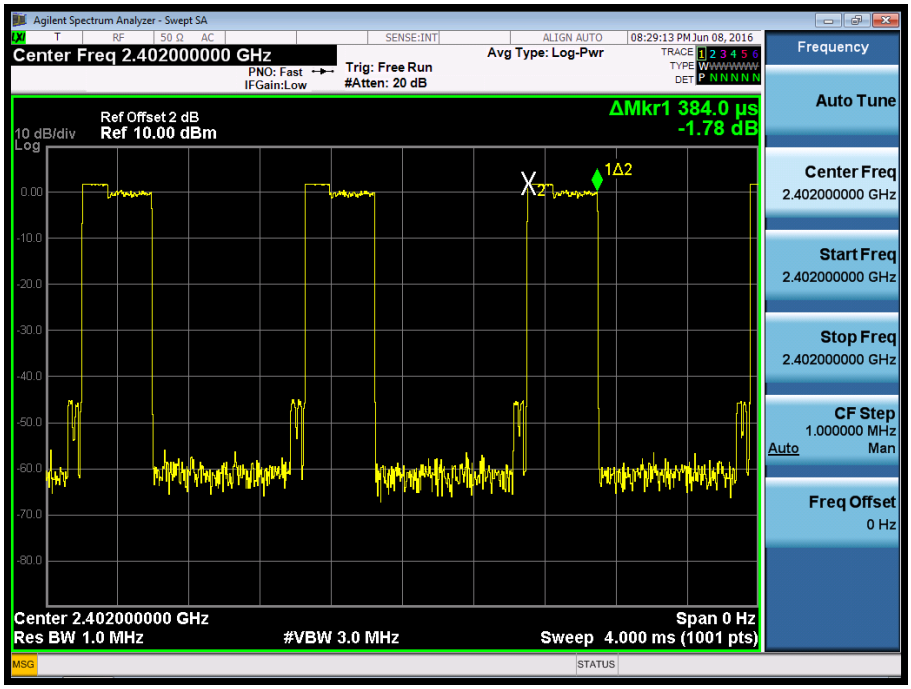
BDR Mode, DH5

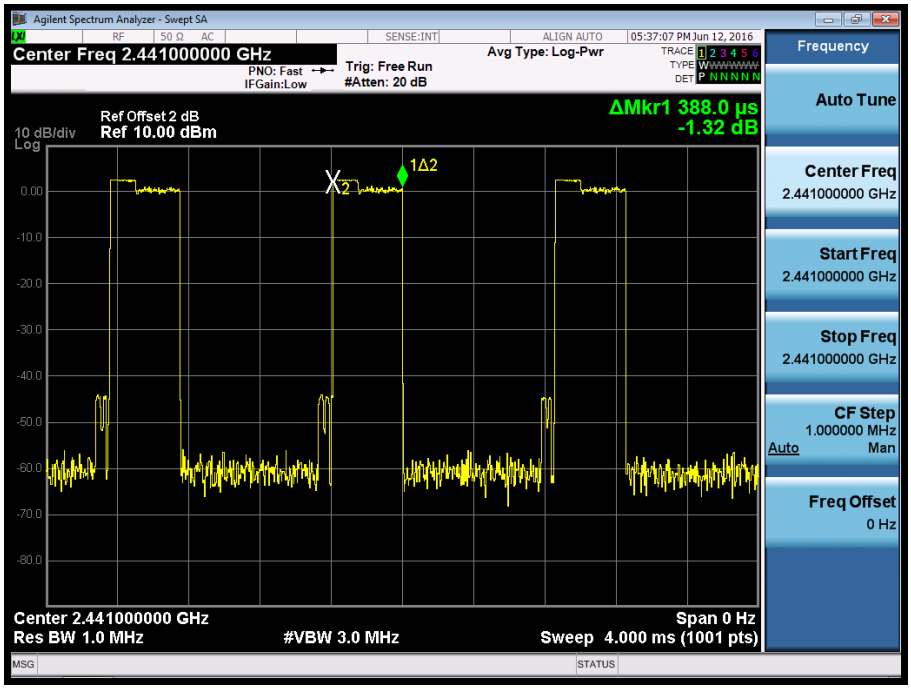

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.402000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
08:28:18 PM Jun 08, 2016
Frequency
Auto Tune
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 2.880 ms
-0.17 dB
1Δ2
Center Freq
2.402000000 GHz
Start Freq
2.402000000 GHz
Stop Freq
2.402000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.402000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.00 ms (1001 pts)
MSG
STATUS

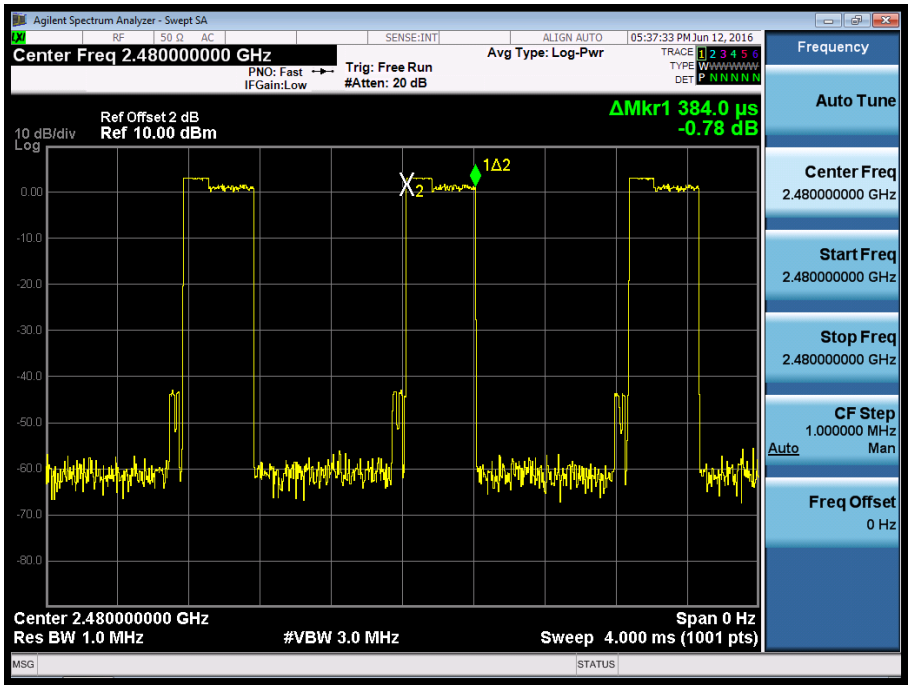

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:35:16 PM Jun 12, 2016
Frequency
Auto Tune
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 2.880 ms
0.09 dB
1Δ2
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.00 ms (1001 pts)
MSG
STATUS



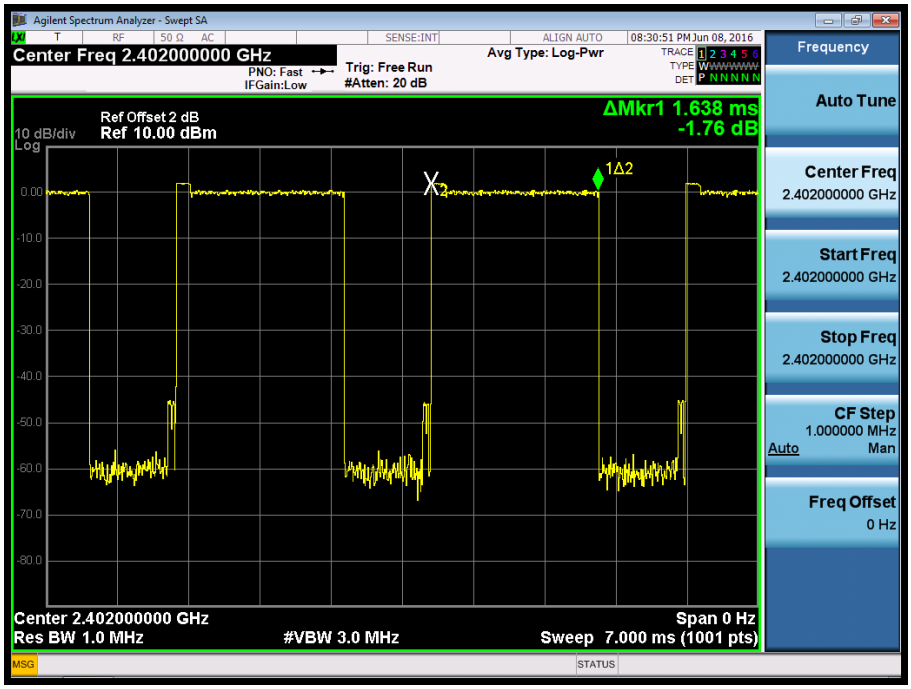
EDR Mode, 3DH1

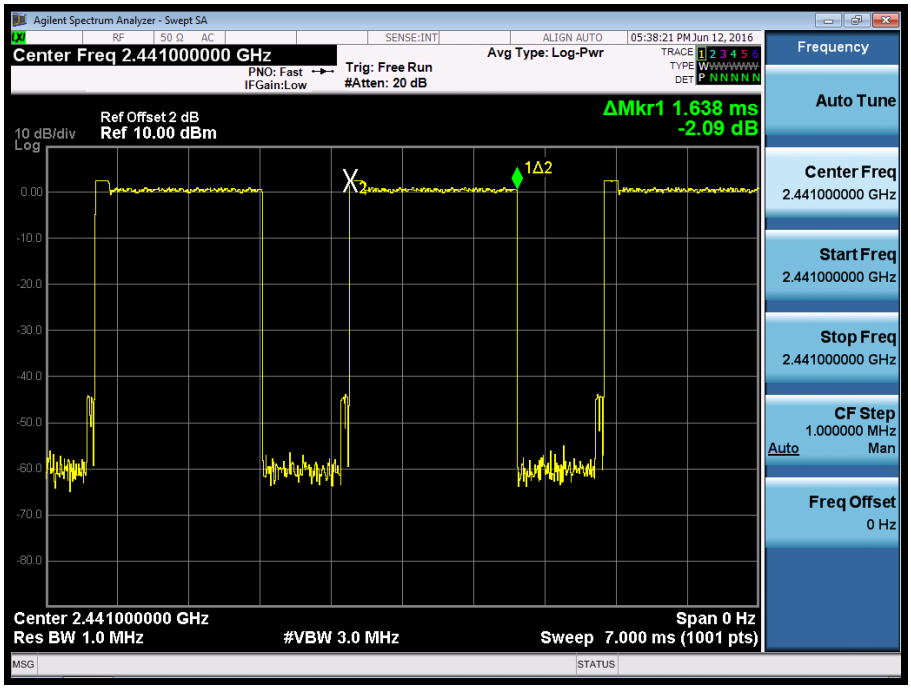


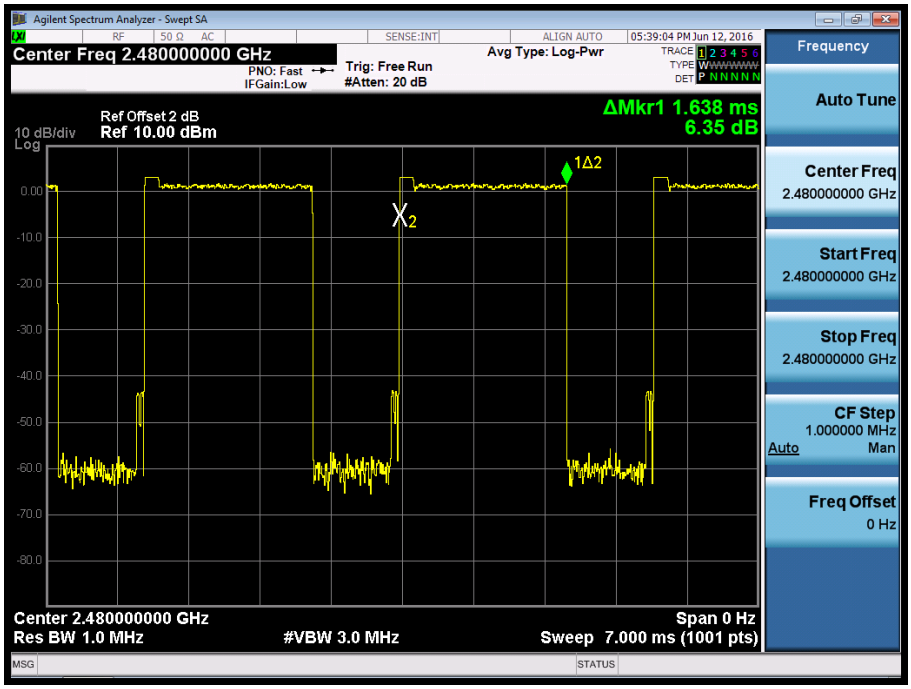

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:37:07 PM Jun 12, 2016
Frequency
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 388.0 µs
-1.32 dB
1Δ2
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:37:33 PM Jun 12, 2016
Frequency
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 384.0 µs
-0.78 dB
1Δ2
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 4.000 ms (1001 pts)

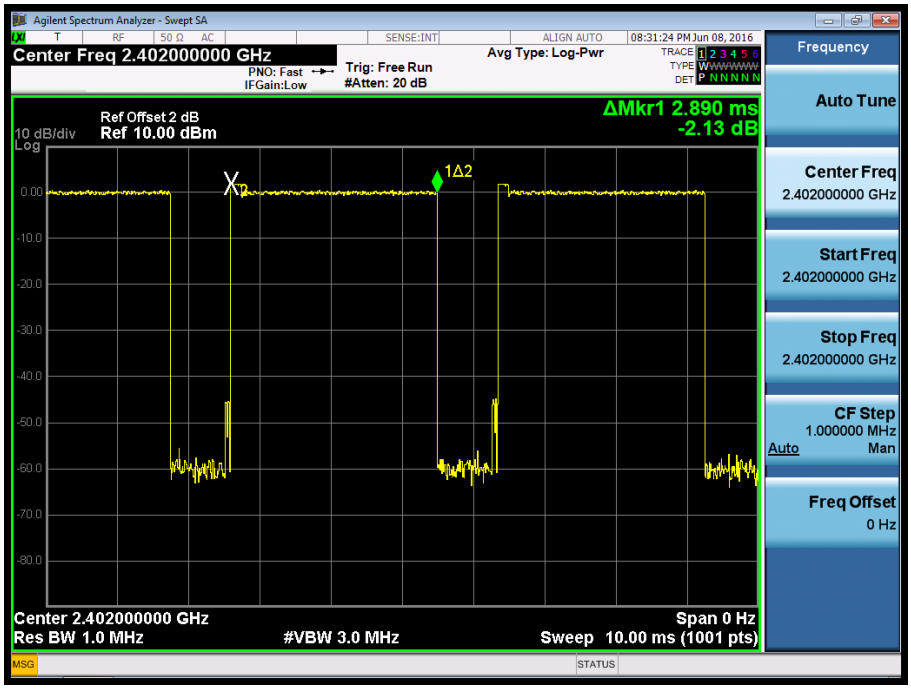
EDR Mode, 3DH3

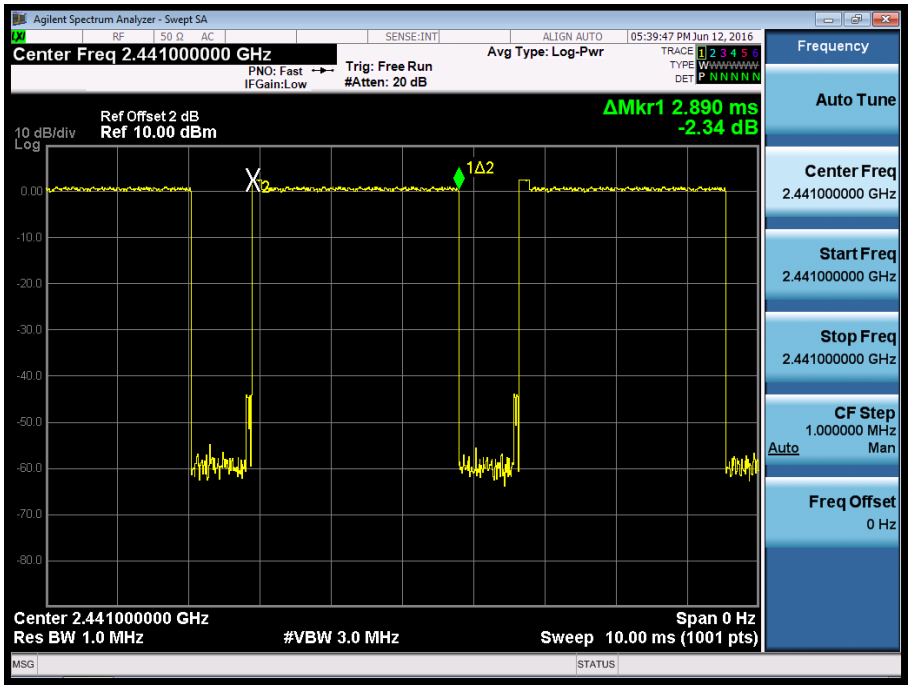


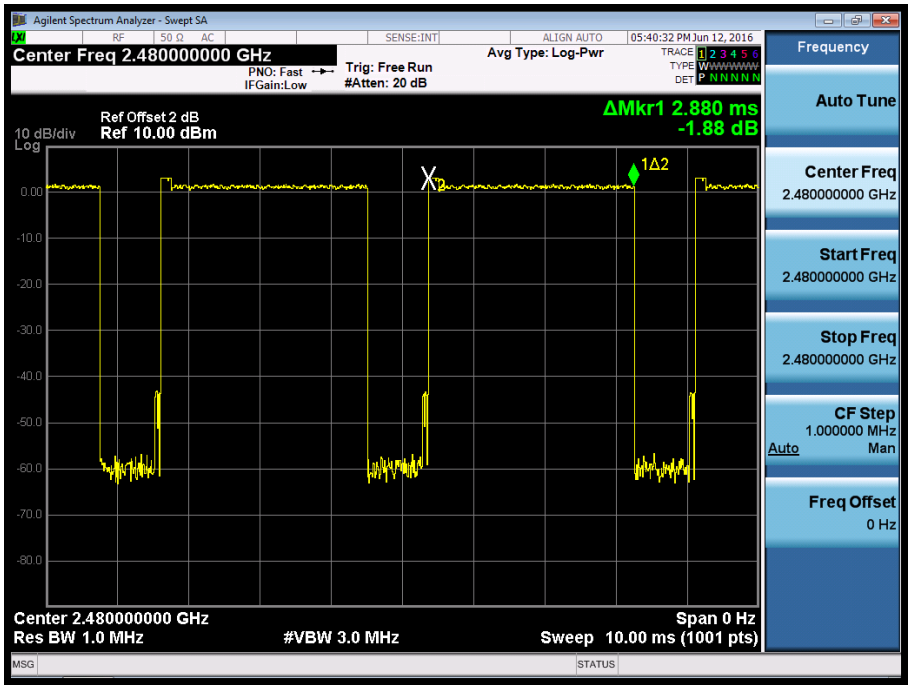




EDR Mode, 3DH5




Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:39:47 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 2.890 ms
-2.34 dB
1Δ2
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
05:40:32 PM Jun 12, 2016
Ref Offset 2 dB
10 dB/div
Log
Ref 10.00 dBm
ΔMkr1 2.880 ms
-1.88 dB
1Δ2
Center 2.480000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz