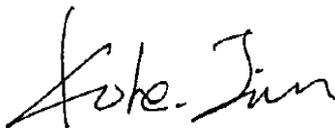


TEST REPORT

Application No.: GZEM2006013099CR
Applicant: Shenzhen Xinglong new plastic products limited company
Address of Applicant: 1-3 floor, No.10, quanwei, xikeng Community, henggang, longgang District, Shenzhen, China
Manufacturer: The same as applicant
Address of Manufacturer: The same as applicant
Factory: The same as applicant
Address of Factory: The same as applicant
Equipment Under Test (EUT):
EUT Name: Nova Bluetooth Headphone
Model No.: CVS-18, LS-HB2001 ☐
☐ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
FCC ID: 2AG5CCVS-18
Trade Mark: iHip, Liangzhisheng
Standard(s): 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2020-06-17
Date of Test: 2020-07-02 to 2020-07-16
Date of Issue: 2020-07-23

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-07-23		Original

Authorized for issue by:			
Tested By			2020-07-02 to 2020-07-16
	Curry_Wu /Project Engineer		Date
Checked By			2020-07-23
	Ricky_Liu /Reviewer		Date



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

Declaration of EUT Family Grouping:

Model No.: CVS-18, LS-HB2001

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on the outer appearance, color and model No.

Therefore only one model CVS-18 was tested in this report.



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4 General Information

4.1 Details of E.U.T.

Power Supply:	Powered by built-in battery as below: Model: TWZ 302030 Rated: DC 3.7V, 200mAh, 0.74Wh DC 5V for charging mode
Test Voltage:	DC 3.7V
Antenna Gain:	0dBi
Antenna Type:	PCB Antenna
Channel Spacing:	1MHz
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Sample NO.	A1
Max TX power	6.372dBm (Software Setting value:2)
Firmware	SV1.0
BT version	Bluetooth 5.0 classic mode only

4.2 Description of Support Units

Description	Manufacturer	Model No.	SN/Certificate NO
Software	N/A	N/A	BT_tool V1.0.5
Hardware	N/A	N/A	A348_REV 1.1



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4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 5.5 \times 10^{-8}$
2	Duty cycle	$\pm 0.57\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF Conducted power	$\pm 0.68\text{dB}$
5	RF Power Density	$\pm 1.50\text{dB}$
6	Conducted Spurious Emissions	$\pm 1.04\text{dB}$
7	RF Radiated Power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious Emission Test	$\pm 4.5\text{dB}$ (30MHz-1GHz)
		$\pm 4.8\text{dB}$ (1GHz-18GHz)
9	Temperature	$\pm 0.4^\circ\text{C}$
10	Humidity	$\pm 1.3\%$
11	Supply Voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
 198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
 Guangzhou, China 510663

Tel: +86 20 82155555

Fax: +86 20 82075059

No tests were sub-contracted.



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4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

● **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

● **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

● **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

● **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

● **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

● **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

● **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Carrier Frequencies Separation					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Hopping Channel Number					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Dwell Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01



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MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01
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Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Conducted Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB26	EMC0522	2020-01-10	2021-01-09
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2020-01-10	2021-01-09
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna 25MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	EMC2174	2018-09-06	2021-09-05
Bi-log Type Antenna	Schaffner Chase	CBL6143	EMC0519	2020-06-08	2023-06-07
Horn Antenna	SCHWARZBECKME SS-ELEKTRONIK	BBHA 9120D	EMC2016	2019-09-25	2022-09-24
Horn Antenna 1GHz-18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2020-01-10	2021-01-09
Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2019-11-18	2020-11-17
Active Loop Antenna	EMCO	6502	EMC0523	2018-03-05	2021-03-04
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2020-01-10	2021-01-09
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2020-01-10	2021-01-09
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2017-12-19	2020-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2019-11-18	2020-11-17



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EXA Signal Analyzer	Keysight	N9010A	EMC2138	2019-11-18	2020-11-17
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Radiated Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB26	EMC0522	2020-01-10	2021-01-09
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2020-01-10	2021-01-09
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna 25MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	EMC2174	2018-09-06	2021-09-05
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Bi-log Type Antenna	Schaffner Chase	CBL6143	EMC0519	2020-06-08	2023-06-07
Horn Antenna 1GHz-18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2020-01-10	2021-01-09
Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2019-11-18	2020-11-17
Active Loop Antenna	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2020-01-10	2021-01-09
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2020-01-10	2021-01-09
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2017-12-19	2020-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2019-11-18	2020-11-17
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2019-11-18	2020-11-17
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2019-07-16	2020-07-15
DMM	Fluke	73	EMC0007	2019-07-16	2020-07-15



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna photo please refer to Internal photo.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.



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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: $2^9 - 1 = 511$ bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum bands



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7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

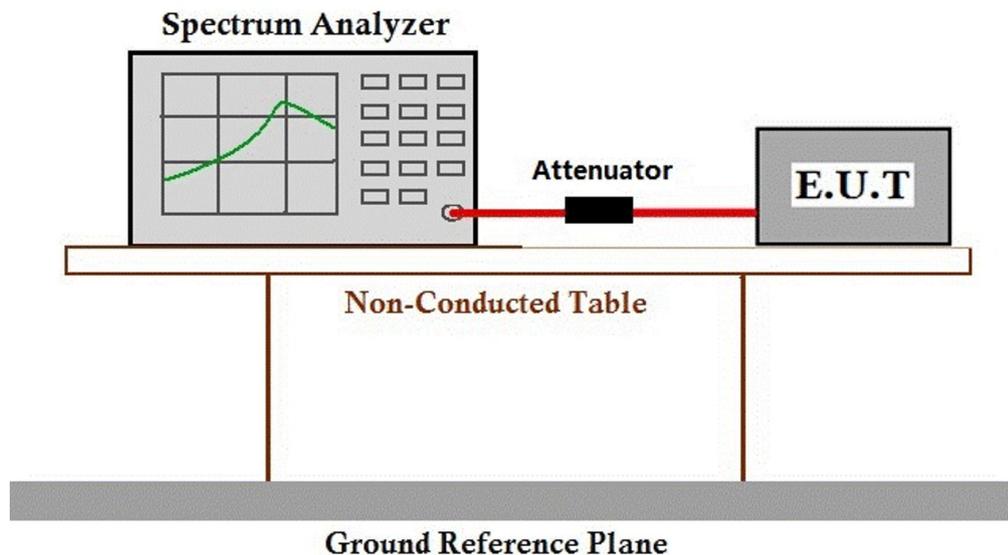
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.8 °C Humidity: 53.6 % RH Atmospheric Pressure: 1020 mbar

Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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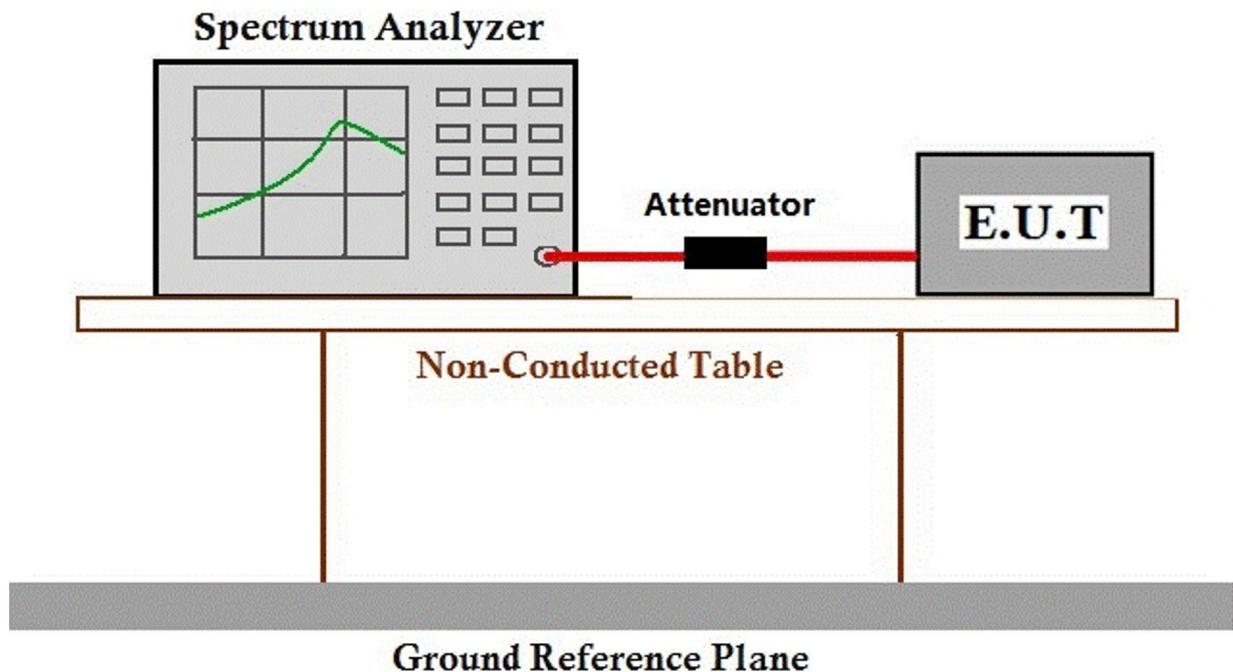
7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)
 Test Method: ANSI C63.10 (2013) Section 7.8.7

7.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.8 °C Humidity: 53.5 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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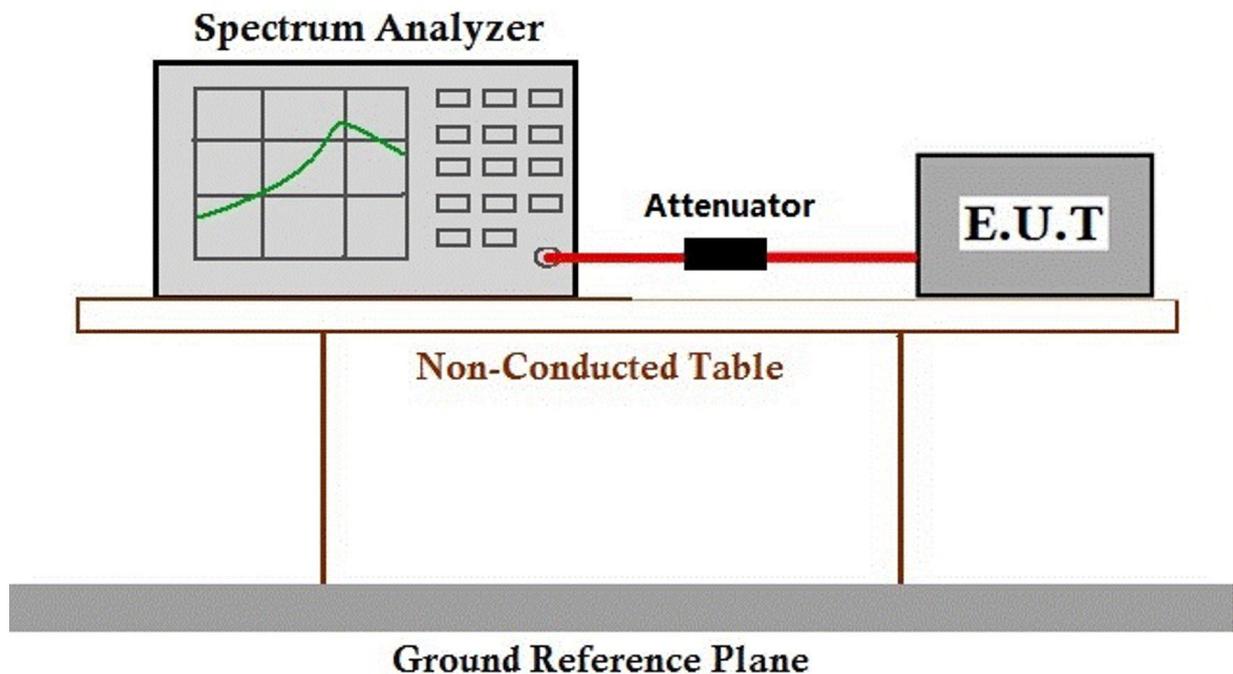
7.3 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)
 Test Method: ANSI C63.10 (2013) Section 7.8.2
 Limit: 2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

7.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.8 °C Humidity: 53.6 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



7.4 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

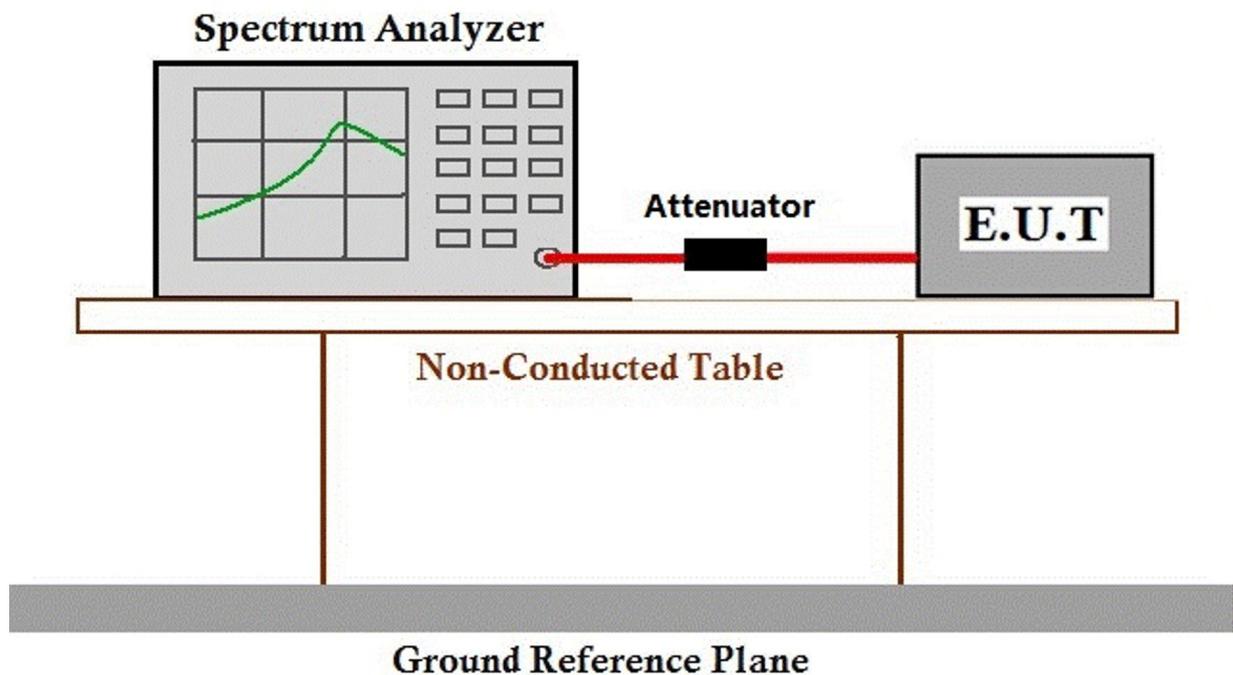
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.8 °C Humidity: 53.6 % RH Atmospheric Pressure: 1020 mbar

Test Mode: a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.5 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)
 Test Method: ANSI C63.10 (2013) Section 7.8.4
 Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

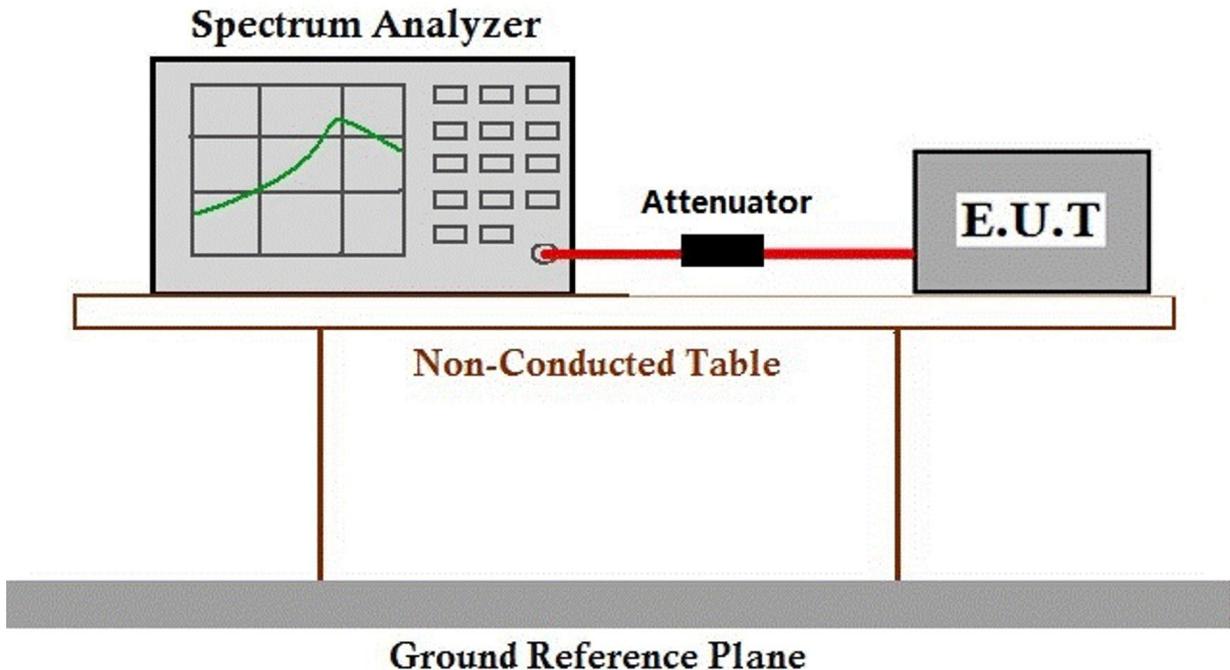
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25.8 °C Humidity: 53.6 % RH Atmospheric Pressure: 1020 mbar

Test Mode: a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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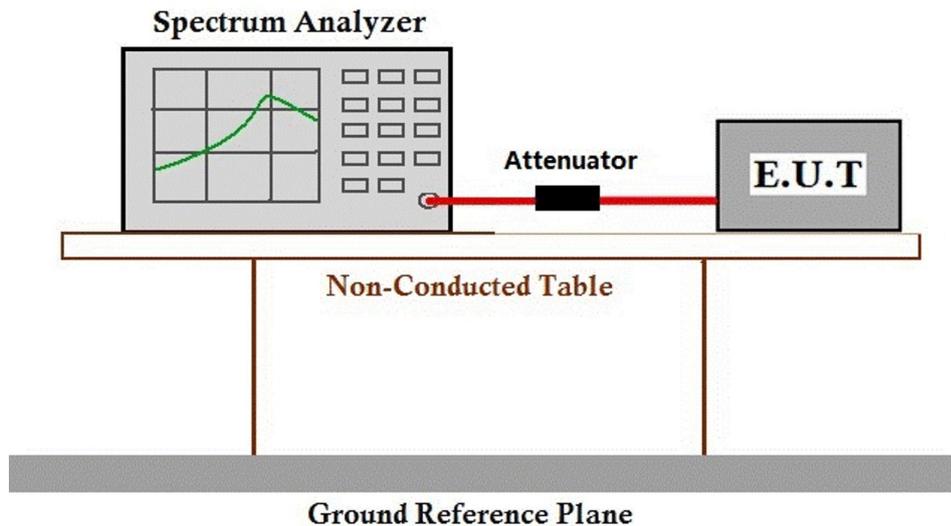
7.6 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
 Test Method: ANSI C63.10 (2013) Section 7.8.6
 Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

7.6.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.8 °C Humidity: 53.6 % RH Atmospheric Pressure: 1020 mbar
 Test mode:
 a:TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
 b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, $\pi/4$ DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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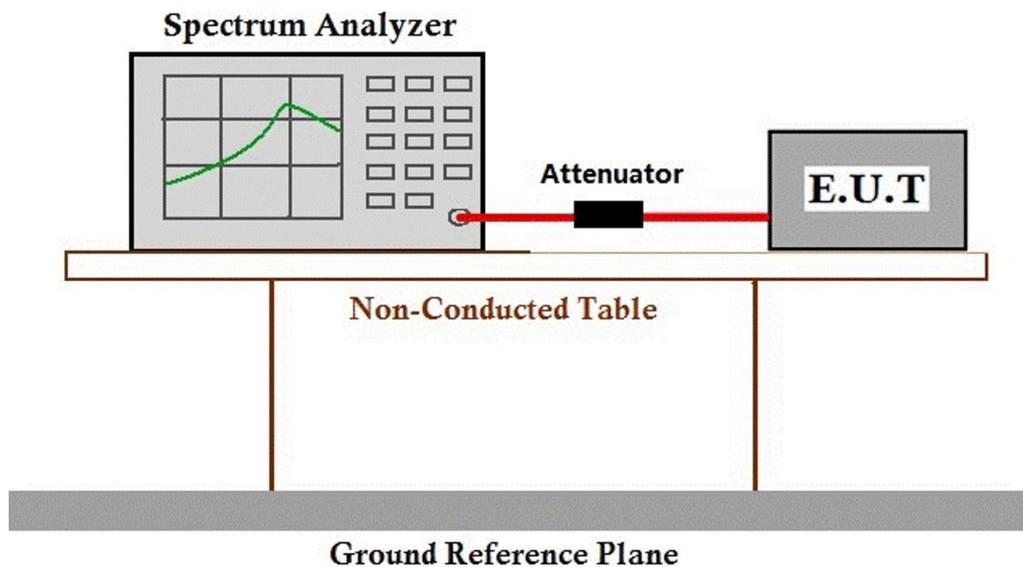
7.7 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 7.8.8
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

7.7.1 E.U.T. Operation

Operating Environment:
Temperature: 25.8 °C **Humidity:** 53.6 % RH **Atmospheric Pressure:** 1020 mbar
Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.8 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
 Test Method: ANSI C63.10 (2013) Section 6.10.5
 Measurement Distance: 3m
 Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

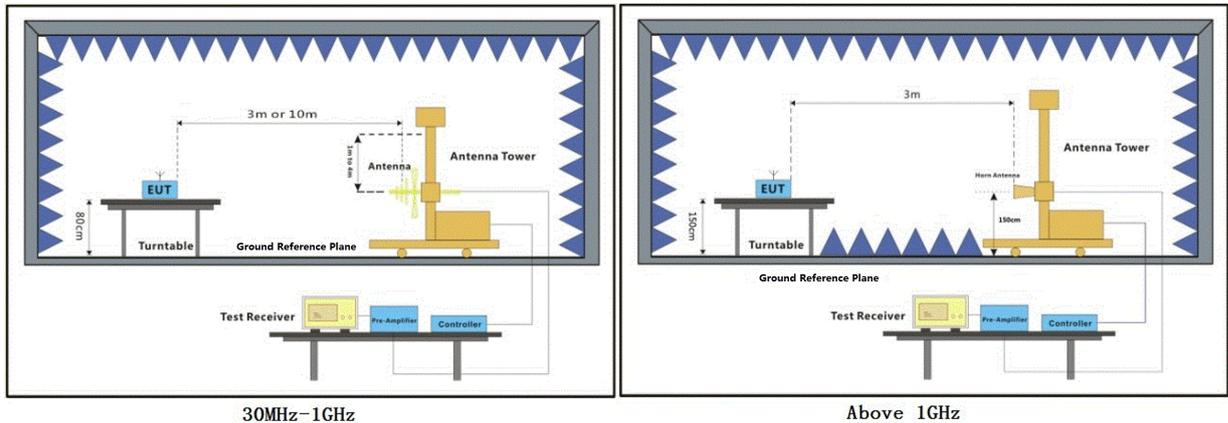
7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.8.2 Test Setup Diagram



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7.8.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

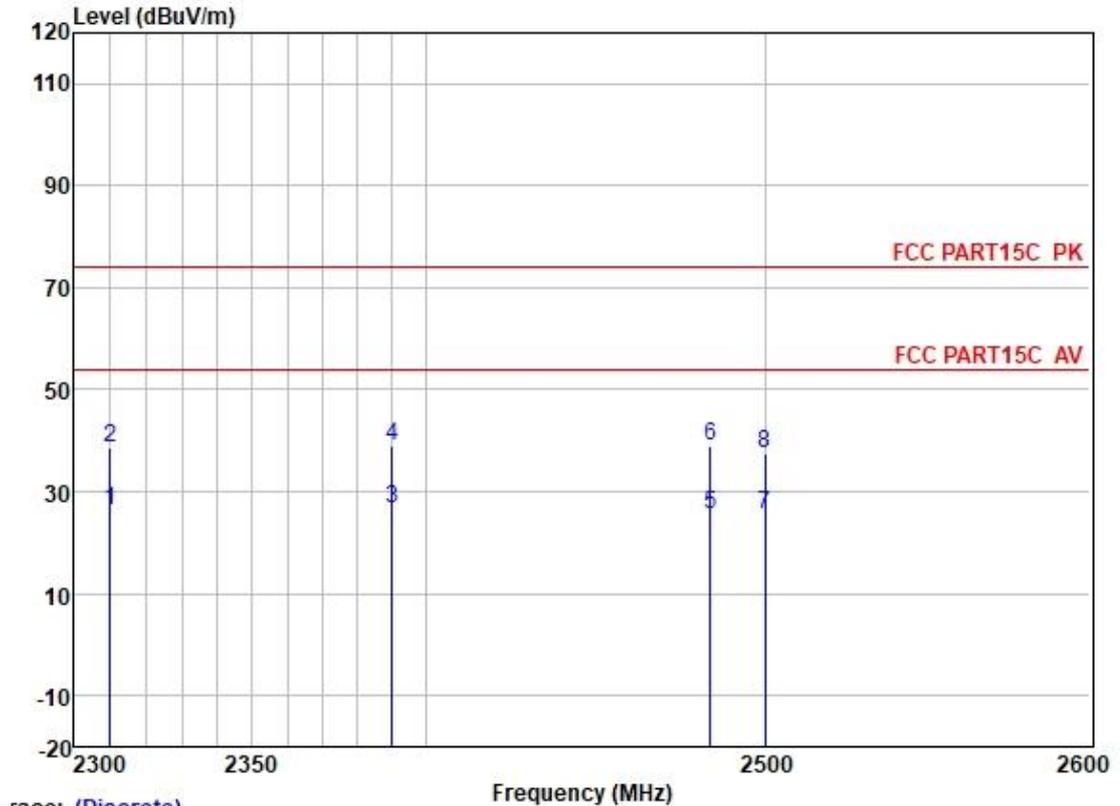
Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor



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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



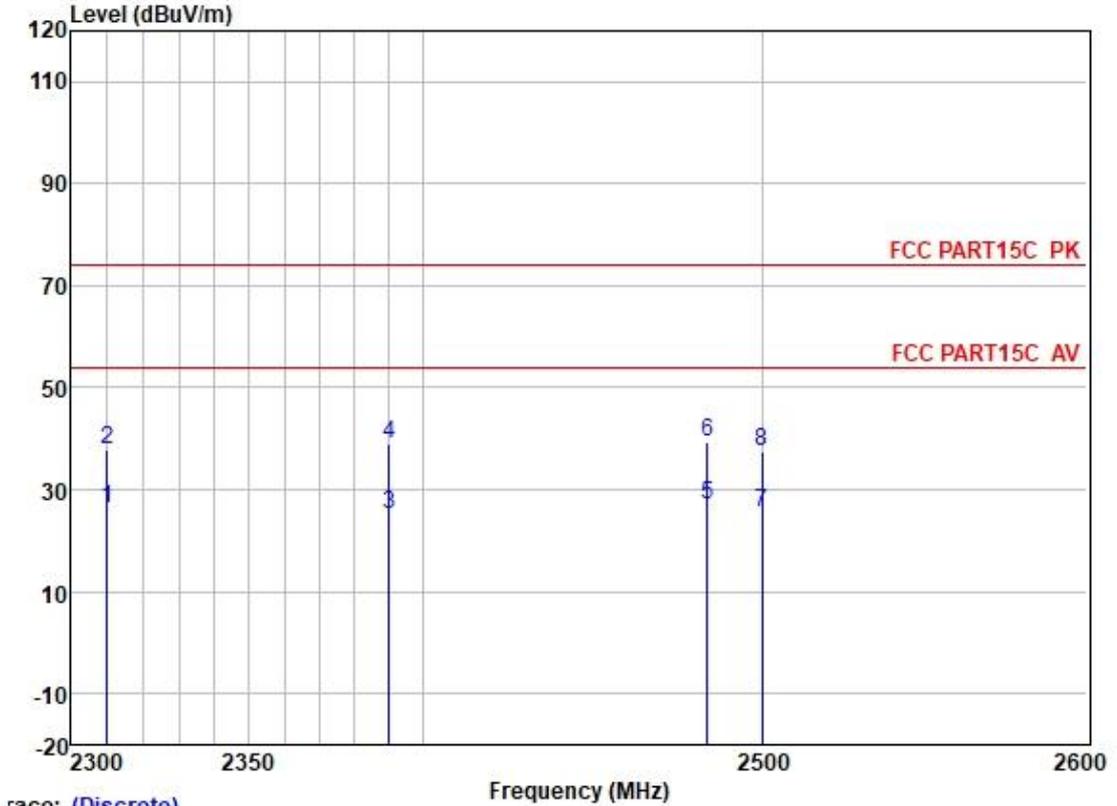
Trace: (Discrete)

	Read	Antenna	Cable	Preamp	Limit	Over				
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	32.75	27.15	3.32	36.94	26.28	54.00	-27.72	HORIZONTAL	Average
2	2310.000	45.21	27.15	3.32	36.94	38.74	74.00	-35.26	HORIZONTAL	Peak
3	2390.000	32.79	27.33	3.48	36.92	26.68	54.00	-27.32	HORIZONTAL	Average
4	2390.000	45.24	27.33	3.48	36.92	39.13	74.00	-34.87	HORIZONTAL	Peak
5	2483.500	31.59	27.48	3.53	36.90	25.70	54.00	-28.30	HORIZONTAL	Average
6	2483.500	44.86	27.48	3.53	36.90	38.97	74.00	-35.03	HORIZONTAL	Peak
7	2500.000	31.63	27.50	3.40	36.89	25.64	54.00	-28.36	HORIZONTAL	Average
8	2500.000	43.48	27.50	3.40	36.89	37.49	74.00	-36.51	HORIZONTAL	Peak



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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



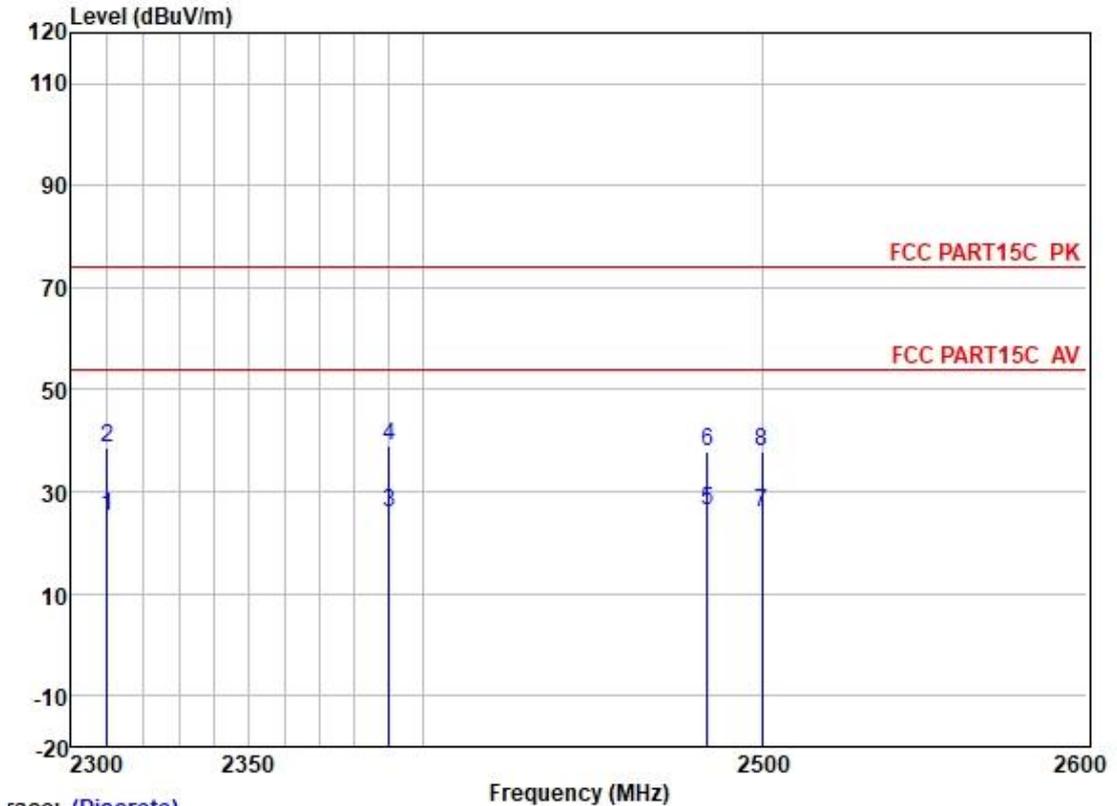
Trace: (Discrete)

	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	32.85	27.15	3.32	36.94	26.38	54.00	-27.62	VERTICAL Average
2	2310.000	44.36	27.15	3.32	36.94	37.89	74.00	-36.11	VERTICAL Peak
3	2390.000	31.46	27.33	3.48	36.92	25.35	54.00	-28.65	VERTICAL Average
4	2390.000	45.12	27.33	3.48	36.92	39.01	74.00	-34.99	VERTICAL Peak
5	2483.500	32.80	27.48	3.53	36.90	26.91	54.00	-27.09	VERTICAL Average
6	2483.500	45.22	27.48	3.53	36.90	39.33	74.00	-34.67	VERTICAL Peak
7	2500.000	31.51	27.50	3.40	36.89	25.52	54.00	-28.48	VERTICAL Average
8	2500.000	43.65	27.50	3.40	36.89	37.66	74.00	-36.34	VERTICAL Peak



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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



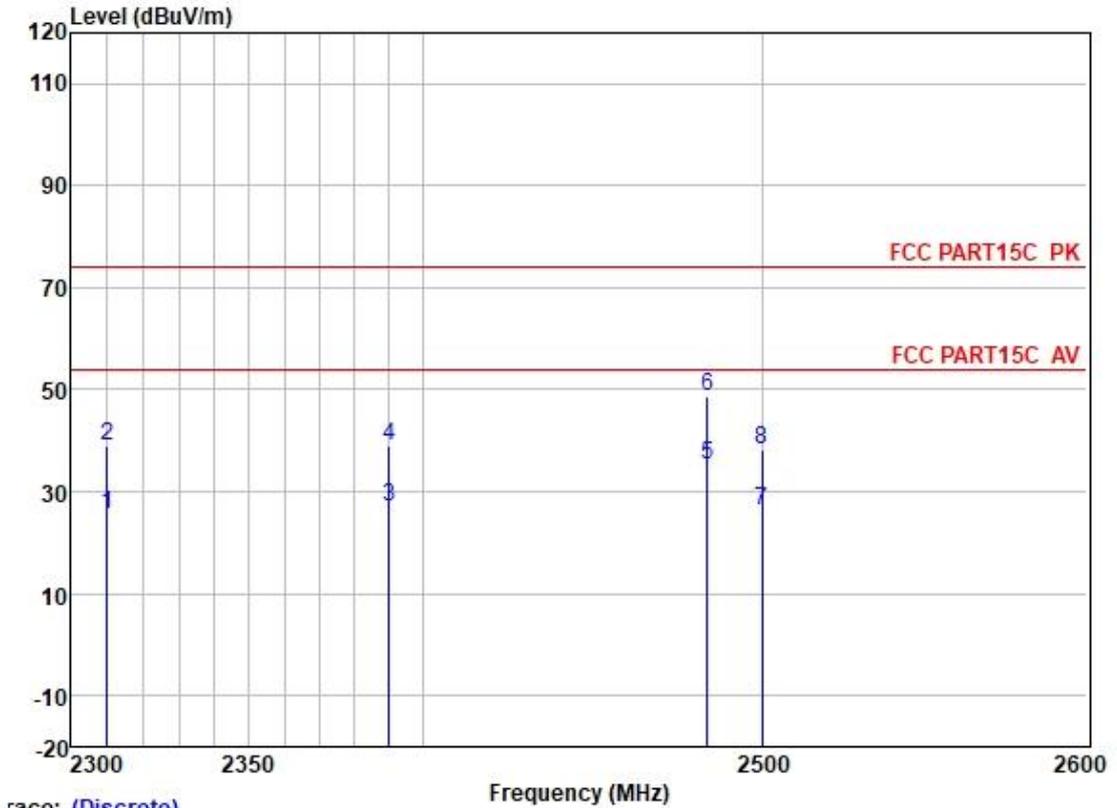
Trace: (Discrete)

	Read	Antenna	Cable	Preamp	Limit	Over				
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	31.71	27.15	3.32	36.94	25.24	54.00	-28.76	HORIZONTAL	Average
2	2310.000	45.15	27.15	3.32	36.94	38.68	74.00	-35.32	HORIZONTAL	Peak
3	2390.000	31.87	27.33	3.48	36.92	25.76	54.00	-28.24	HORIZONTAL	Average
4	2390.000	44.99	27.33	3.48	36.92	38.88	74.00	-35.12	HORIZONTAL	Peak
5	2483.500	32.21	27.48	3.53	36.90	26.32	54.00	-27.68	HORIZONTAL	Average
6	2483.500	43.86	27.48	3.53	36.90	37.97	74.00	-36.03	HORIZONTAL	Peak
7	2500.000	32.06	27.50	3.40	36.89	26.07	54.00	-27.93	HORIZONTAL	Average
8	2500.000	43.80	27.50	3.40	36.89	37.81	74.00	-36.19	HORIZONTAL	Peak



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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Trace: (Discrete)

	Read	Antenna	Cable	Preamp	Level	Limit	Over		
	Freq	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	32.19	27.15	3.32	36.94	25.72	54.00	-28.28	VERTICAL Average
2	2310.000	45.27	27.15	3.32	36.94	38.80	74.00	-35.20	VERTICAL Peak
3	2390.000	33.11	27.33	3.48	36.92	27.00	54.00	-27.00	VERTICAL Average
4	2390.000	45.26	27.33	3.48	36.92	39.15	74.00	-34.85	VERTICAL Peak
5	2483.500	40.98	27.48	3.53	36.90	35.09	54.00	-18.91	VERTICAL Average
6	2483.500	54.40	27.48	3.53	36.90	48.51	74.00	-25.49	VERTICAL Peak
7	2500.000	32.40	27.50	3.40	36.89	26.41	54.00	-27.59	VERTICAL Average
8	2500.000	44.29	27.50	3.40	36.89	38.30	74.00	-35.70	VERTICAL Peak



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7.9 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.9.1 E.U.T. Operation

Operating Environment:

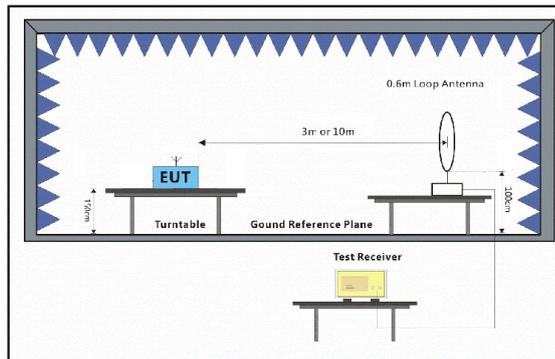
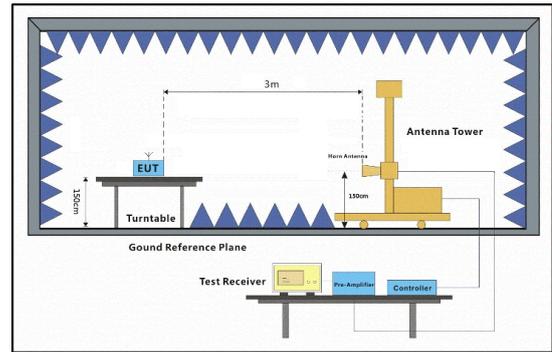
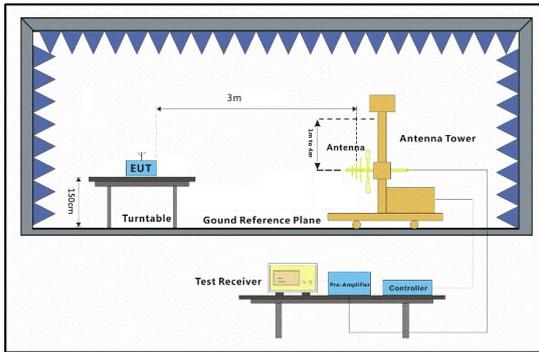
Temperature: 22 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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7.9.2 Test Setup Diagram



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7.9.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

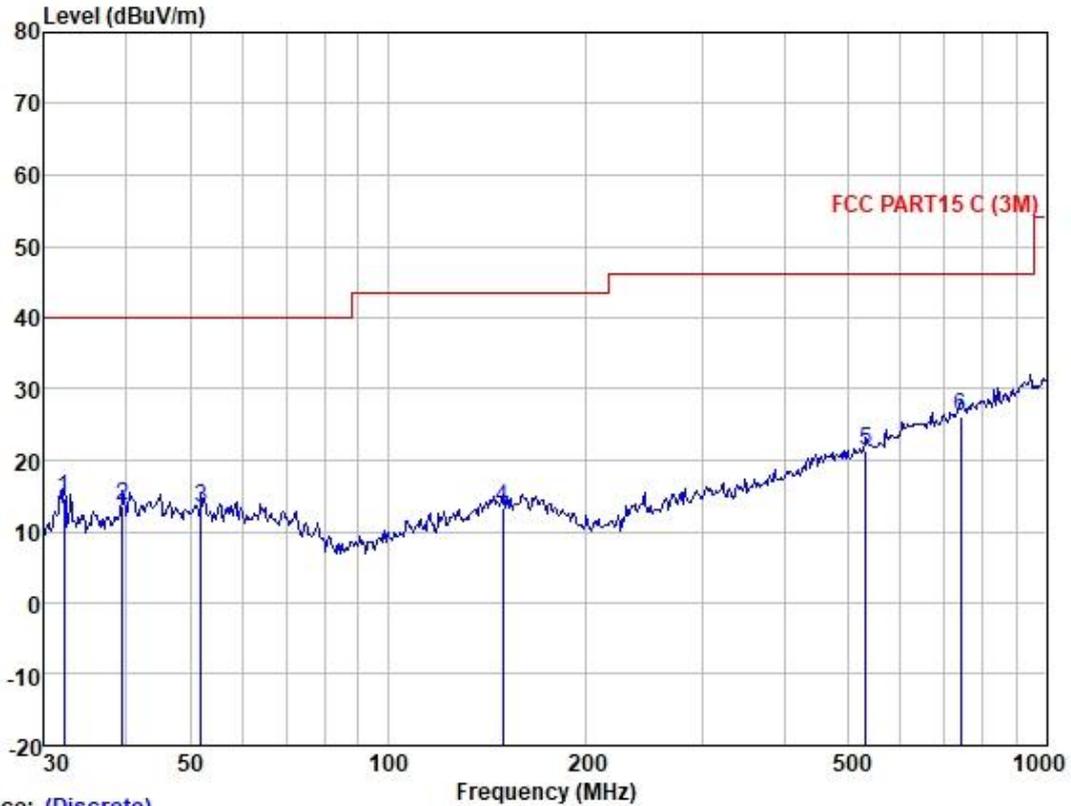
- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown



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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



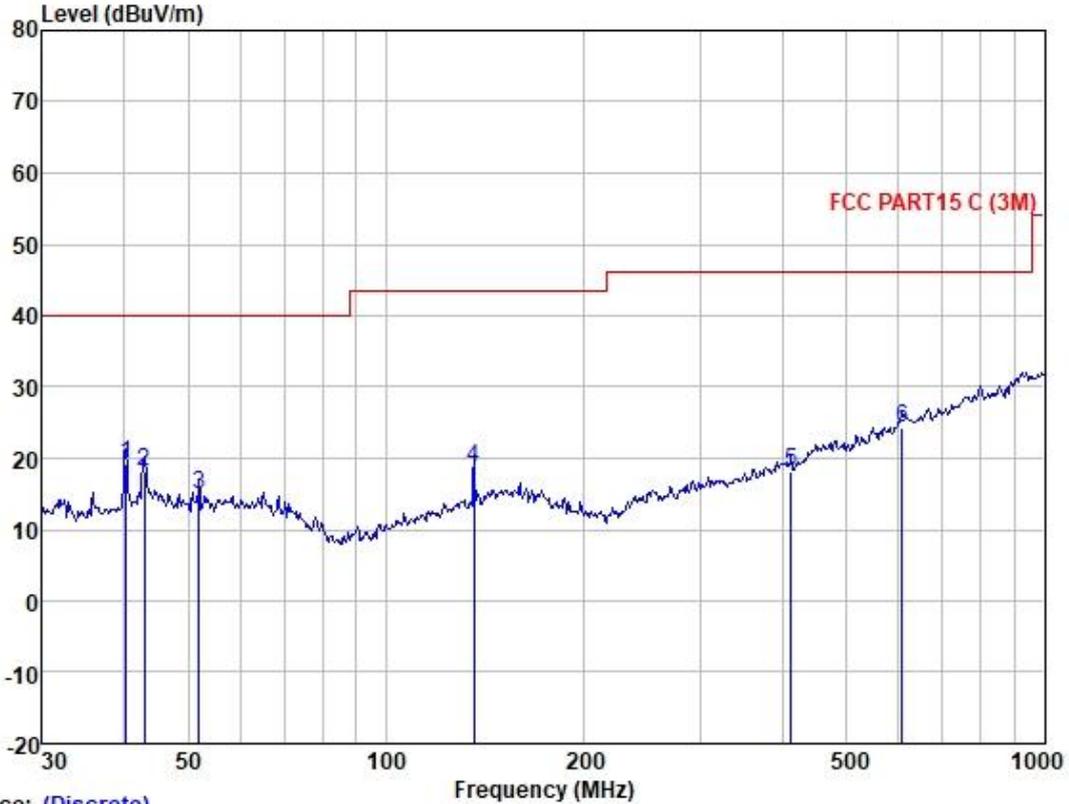
Trace: (Discrete)

	Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Limit Level	Over Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB		
1	32.179	28.27	12.71	1.01	27.19	14.80	40.00	-25.20	HORIZONTAL QP
2	39.437	26.28	13.46	1.06	27.18	13.62	40.00	-26.38	HORIZONTAL QP
3	51.843	25.24	13.99	1.22	27.17	13.28	40.00	-26.72	HORIZONTAL QP
4	148.963	24.39	13.75	2.05	26.89	13.30	43.50	-30.20	HORIZONTAL QP
5	531.964	26.85	18.32	4.13	28.05	21.25	46.00	-24.75	HORIZONTAL QP
6	739.661	27.12	22.00	5.24	28.11	26.25	46.00	-19.75	HORIZONTAL QP



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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



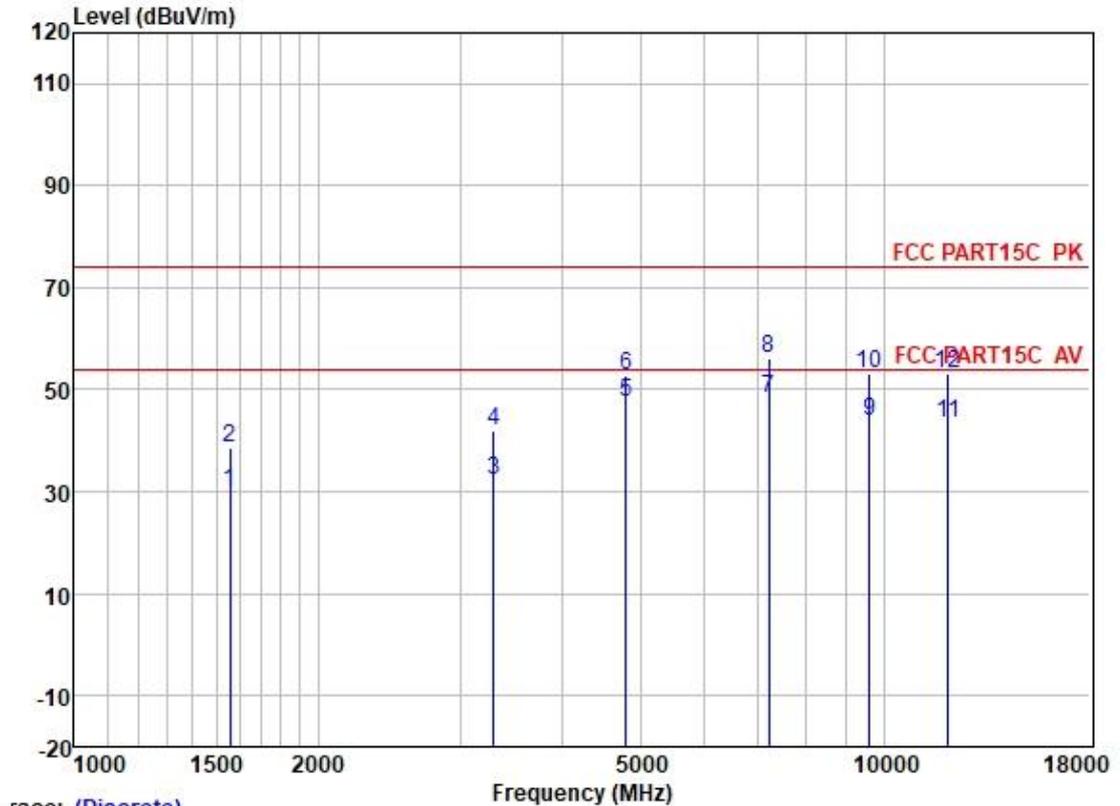
Trace: (Discrete)

	Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Limit Level	Over Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB		
1	40.276	31.86	13.52	1.07	27.18	19.27	40.00	-20.73	VERTICAL QP
2	42.900	30.54	13.75	1.14	27.17	18.26	40.00	-21.74	VERTICAL QP
3	51.843	26.96	13.99	1.22	27.17	15.00	40.00	-25.00	VERTICAL QP
4	135.982	30.89	12.80	1.91	26.99	18.61	43.50	-24.89	VERTICAL QP
5	411.824	26.42	15.97	3.68	27.93	18.14	46.00	-27.86	VERTICAL QP
6	607.787	27.34	20.24	4.84	28.07	24.35	46.00	-21.65	VERTICAL QP



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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



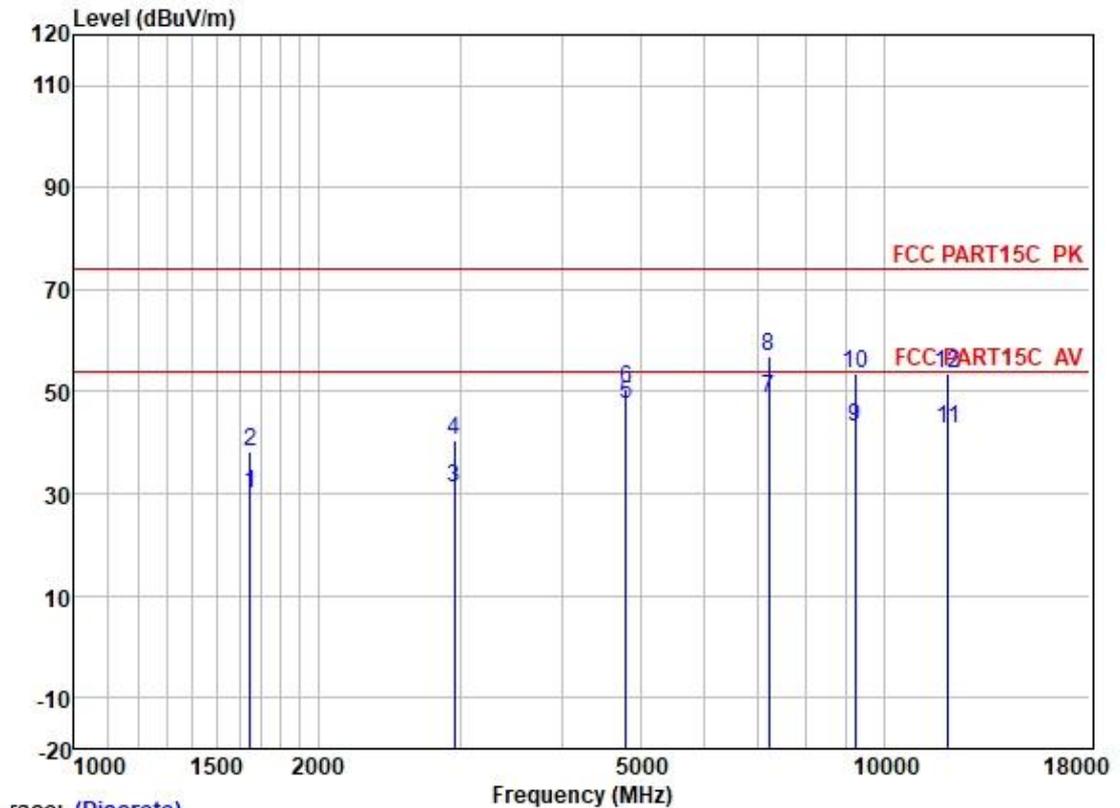
Trace: (Discrete)

	Read	Antenna	Cable	Preamp	Limit	Over				
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1556.169	38.64	25.54	2.80	37.09	29.89	54.00	-24.11	HORIZONTAL	Average
2	1556.169	47.30	25.54	2.80	37.09	38.55	74.00	-35.45	HORIZONTAL	Peak
3	3299.344	35.84	28.75	4.06	36.49	32.16	54.00	-21.84	HORIZONTAL	Average
4	3299.344	45.69	28.75	4.06	36.49	42.01	74.00	-31.99	HORIZONTAL	Peak
5	4804.110	47.40	31.42	5.40	36.48	47.74	54.00	-6.26	HORIZONTAL	Average
6	4804.110	52.61	31.42	5.40	36.48	52.95	74.00	-21.05	HORIZONTAL	Peak
7	7205.869	43.70	35.54	5.98	36.75	48.47	54.00	-5.53	HORIZONTAL	Average
8	7205.869	51.26	35.54	5.98	36.75	56.03	74.00	-17.97	HORIZONTAL	Peak
9	9608.684	34.72	38.37	7.07	36.36	43.80	54.00	-10.20	HORIZONTAL	Average
10	9608.684	44.27	38.37	7.07	36.36	53.35	74.00	-20.65	HORIZONTAL	Peak
11	12010.220	32.64	38.90	8.19	36.40	43.33	54.00	-10.67	HORIZONTAL	Average
12	12010.220	42.44	38.90	8.19	36.40	53.13	74.00	-20.87	HORIZONTAL	Peak



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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Trace: (Discrete)

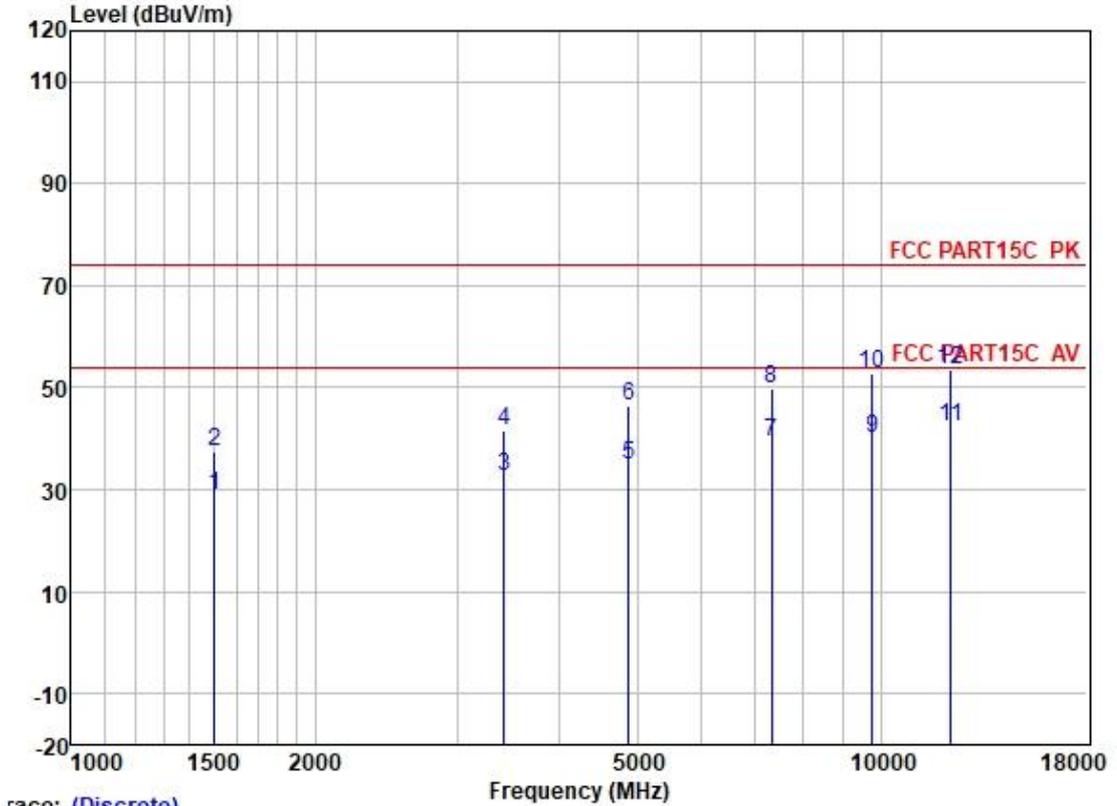
	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Preamp Factor	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB		
1	1648.778	38.65	25.63	2.80	37.06	30.02	54.00	-23.98	VERTICAL Average
2	1648.778	47.03	25.63	2.80	37.06	38.40	74.00	-35.60	VERTICAL Peak
3	2947.623	35.69	28.35	3.75	36.60	31.19	54.00	-22.81	VERTICAL Average
4	2947.623	44.93	28.35	3.75	36.60	40.43	74.00	-33.57	VERTICAL Peak
5	4804.516	47.38	31.42	5.40	36.48	47.72	54.00	-6.28	VERTICAL Average
6	4804.516	50.12	31.42	5.40	36.48	50.46	74.00	-23.54	VERTICAL Peak
7	7205.609	43.86	35.54	5.98	36.75	48.63	54.00	-5.37	VERTICAL Average
8	7205.609	52.05	35.54	5.98	36.75	56.82	74.00	-17.18	VERTICAL Peak
9	9206.710	34.58	37.73	7.39	36.44	43.26	54.00	-10.74	VERTICAL Average
10	9206.710	44.86	37.73	7.39	36.44	53.54	74.00	-20.46	VERTICAL Peak
11	12010.580	32.17	38.90	8.19	36.40	42.86	54.00	-11.14	VERTICAL Average
12	12010.580	42.70	38.90	8.19	36.40	53.39	74.00	-20.61	VERTICAL Peak



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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Trace: (Discrete)

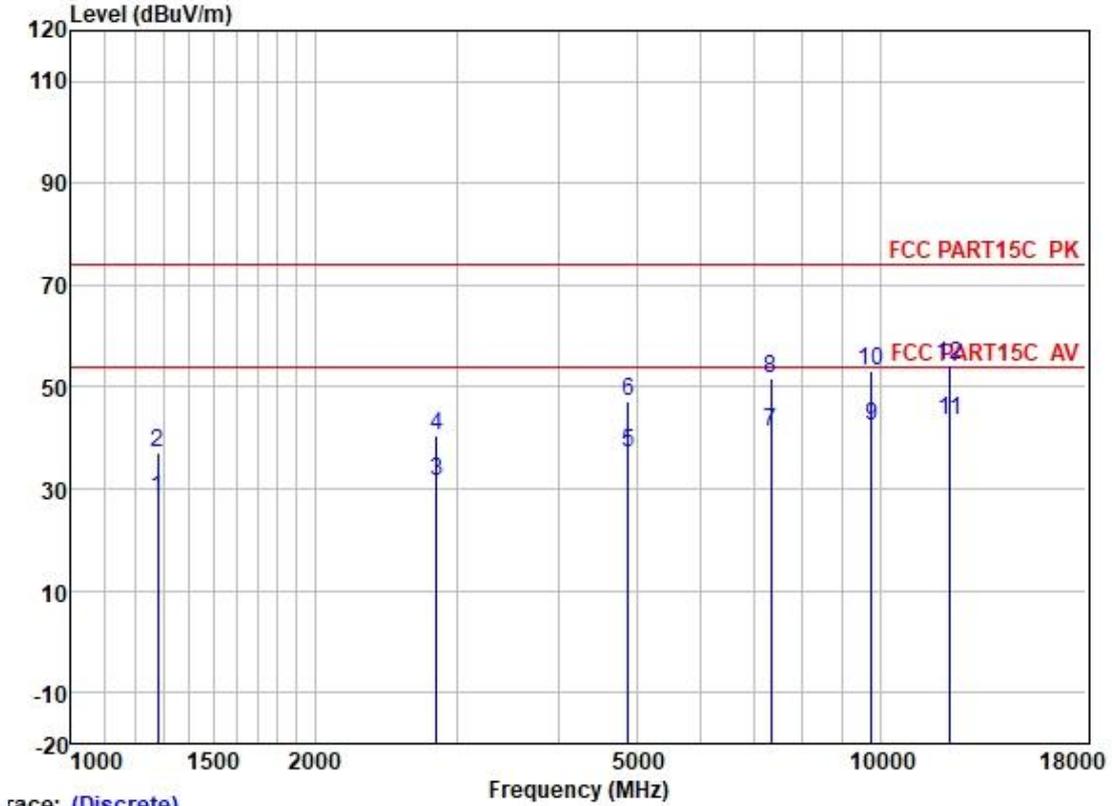
	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1503.119	37.81	25.50	2.80	37.11	29.00	54.00	-25.00	HORIZONTAL	Average
2	1503.119	46.35	25.50	2.80	37.11	37.54	74.00	-36.46	HORIZONTAL	Peak
3	3425.675	35.91	28.86	4.15	36.46	32.46	54.00	-21.54	HORIZONTAL	Average
4	3425.675	44.97	28.86	4.15	36.46	41.52	74.00	-32.48	HORIZONTAL	Peak
5	4882.151	34.17	31.56	5.52	36.50	34.75	54.00	-19.25	HORIZONTAL	Average
6	4882.151	45.84	31.56	5.52	36.50	46.42	74.00	-27.58	HORIZONTAL	Peak
7	7323.015	34.17	36.00	6.13	36.76	39.54	54.00	-14.46	HORIZONTAL	Average
8	7323.015	44.33	36.00	6.13	36.76	49.70	74.00	-24.30	HORIZONTAL	Peak
9	9764.603	31.06	38.50	7.02	36.33	40.25	54.00	-13.75	HORIZONTAL	Average
10	9764.603	43.70	38.50	7.02	36.33	52.89	74.00	-21.11	HORIZONTAL	Peak
11	12205.130	31.74	38.74	8.08	36.30	42.26	54.00	-11.74	HORIZONTAL	Average
12	12205.130	42.96	38.74	8.08	36.30	53.48	74.00	-20.52	HORIZONTAL	Peak



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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Trace: (Discrete)

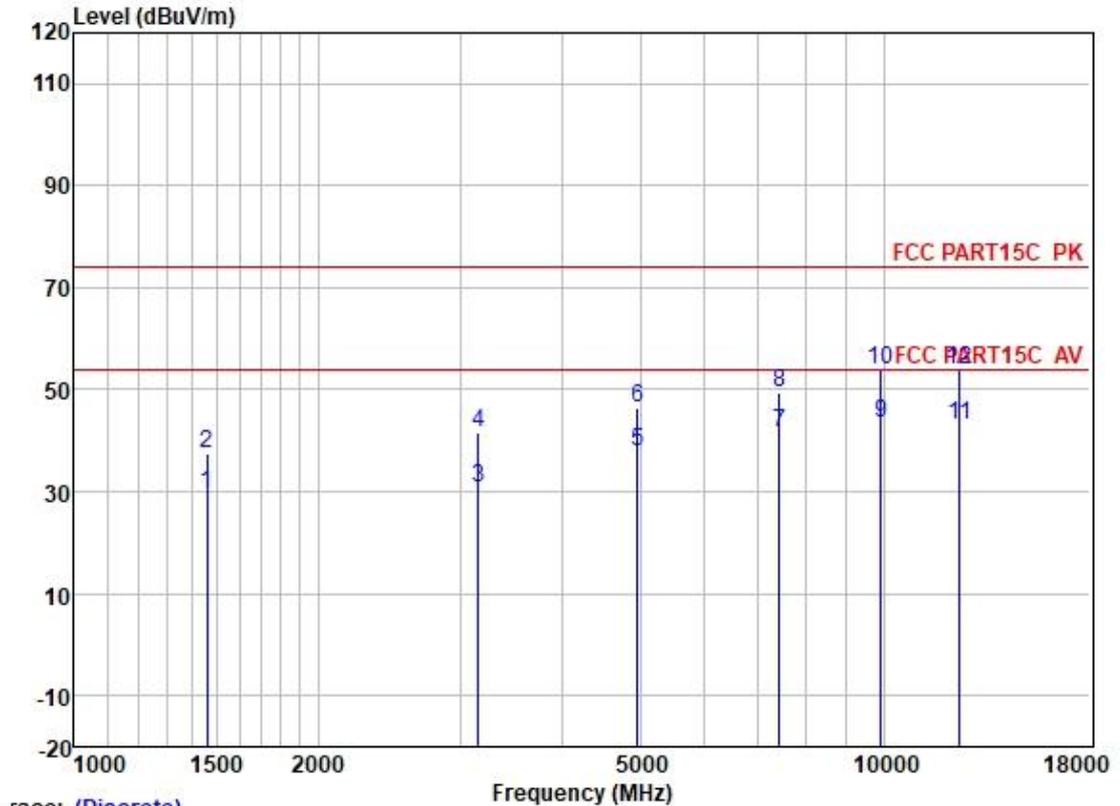
	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1278.492	37.84	25.14	2.50	37.32	28.16	54.00	-25.84	VERTICAL	Average
2	1278.492	46.76	25.14	2.50	37.32	37.08	74.00	-36.92	VERTICAL	Peak
3	2830.728	36.49	28.20	3.70	36.70	31.69	54.00	-22.31	VERTICAL	Average
4	2830.728	45.37	28.20	3.70	36.70	40.57	74.00	-33.43	VERTICAL	Peak
5	4882.515	36.49	31.56	5.52	36.50	37.07	54.00	-16.93	VERTICAL	Average
6	4882.515	46.65	31.56	5.52	36.50	47.23	74.00	-26.77	VERTICAL	Peak
7	7323.122	35.95	36.00	6.13	36.76	41.32	54.00	-12.68	VERTICAL	Average
8	7323.122	46.13	36.00	6.13	36.76	51.50	74.00	-22.50	VERTICAL	Peak
9	9764.689	33.19	38.50	7.02	36.33	42.38	54.00	-11.62	VERTICAL	Average
10	9764.689	44.09	38.50	7.02	36.33	53.28	74.00	-20.72	VERTICAL	Peak
11	12205.950	33.08	38.74	8.08	36.30	43.60	54.00	-10.40	VERTICAL	Average
12	12205.950	43.77	38.74	8.08	36.30	54.29	74.00	-19.71	VERTICAL	Peak



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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Trace: (Discrete)

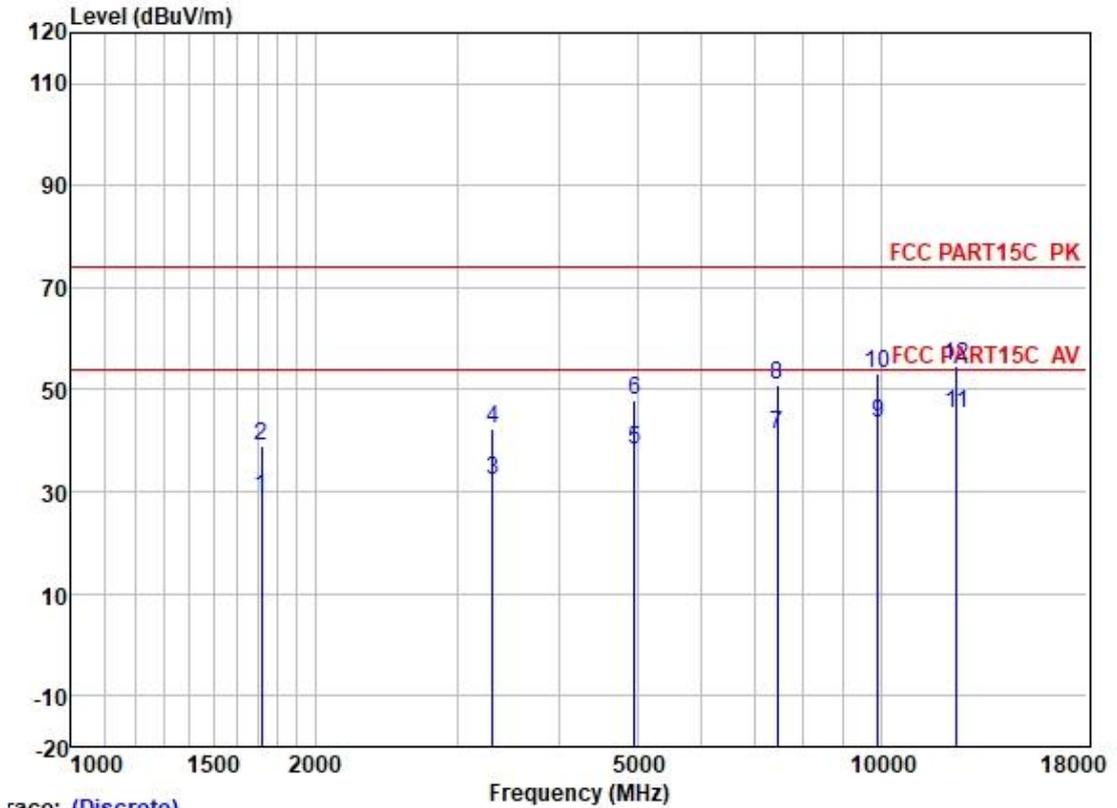
	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1460.295	38.59	25.46	2.73	37.14	29.64	54.00	-24.36	HORIZONTAL	Average
2	1460.295	46.31	25.46	2.73	37.14	37.36	74.00	-36.64	HORIZONTAL	Peak
3	3159.355	34.74	28.54	3.97	36.52	30.73	54.00	-23.27	HORIZONTAL	Average
4	3159.355	45.46	28.54	3.97	36.52	41.45	74.00	-32.55	HORIZONTAL	Peak
5	4960.751	36.96	31.65	5.65	36.52	37.74	54.00	-16.26	HORIZONTAL	Average
6	4960.751	45.75	31.65	5.65	36.52	46.53	74.00	-27.47	HORIZONTAL	Peak
7	7440.461	35.87	36.27	6.22	36.77	41.59	54.00	-12.41	HORIZONTAL	Average
8	7440.461	43.77	36.27	6.22	36.77	49.49	74.00	-24.51	HORIZONTAL	Peak
9	9920.221	34.10	38.65	6.96	36.31	43.40	54.00	-10.60	HORIZONTAL	Average
10	9920.221	44.48	38.65	6.96	36.31	53.78	74.00	-20.22	HORIZONTAL	Peak
11	12400.950	32.86	38.57	7.97	36.17	43.23	54.00	-10.77	HORIZONTAL	Average
12	12400.950	43.46	38.57	7.97	36.17	53.83	74.00	-20.17	HORIZONTAL	Peak



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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Trace: (Discrete)

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB		
1	1716.864	37.42	25.76	2.82	37.04	28.96	-25.04	VERTICAL	Average
2	1716.864	47.26	25.76	2.82	37.04	38.80	-35.20	VERTICAL	Peak
3	3318.471	35.87	28.77	4.07	36.48	32.23	-21.77	VERTICAL	Average
4	3318.471	46.16	28.77	4.07	36.48	42.52	-31.48	VERTICAL	Peak
5	4960.993	37.48	31.65	5.65	36.52	38.26	-15.74	VERTICAL	Average
6	4960.993	47.18	31.65	5.65	36.52	47.96	-26.04	VERTICAL	Peak
7	7440.914	35.69	36.27	6.22	36.77	41.41	-12.59	VERTICAL	Average
8	7440.914	45.38	36.27	6.22	36.77	51.10	-22.90	VERTICAL	Peak
9	9920.450	34.25	38.65	6.96	36.31	43.55	-10.45	VERTICAL	Average
10	9920.450	44.04	38.65	6.96	36.31	53.34	-20.66	VERTICAL	Peak
11	12400.750	34.79	38.57	7.97	36.17	45.16	-8.84	VERTICAL	Average
12	12400.750	44.37	38.57	7.97	36.17	54.74	-19.26	VERTICAL	Peak



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8 Appendix

8.1 Appendix 15.247

Cable Loss=0.9dB

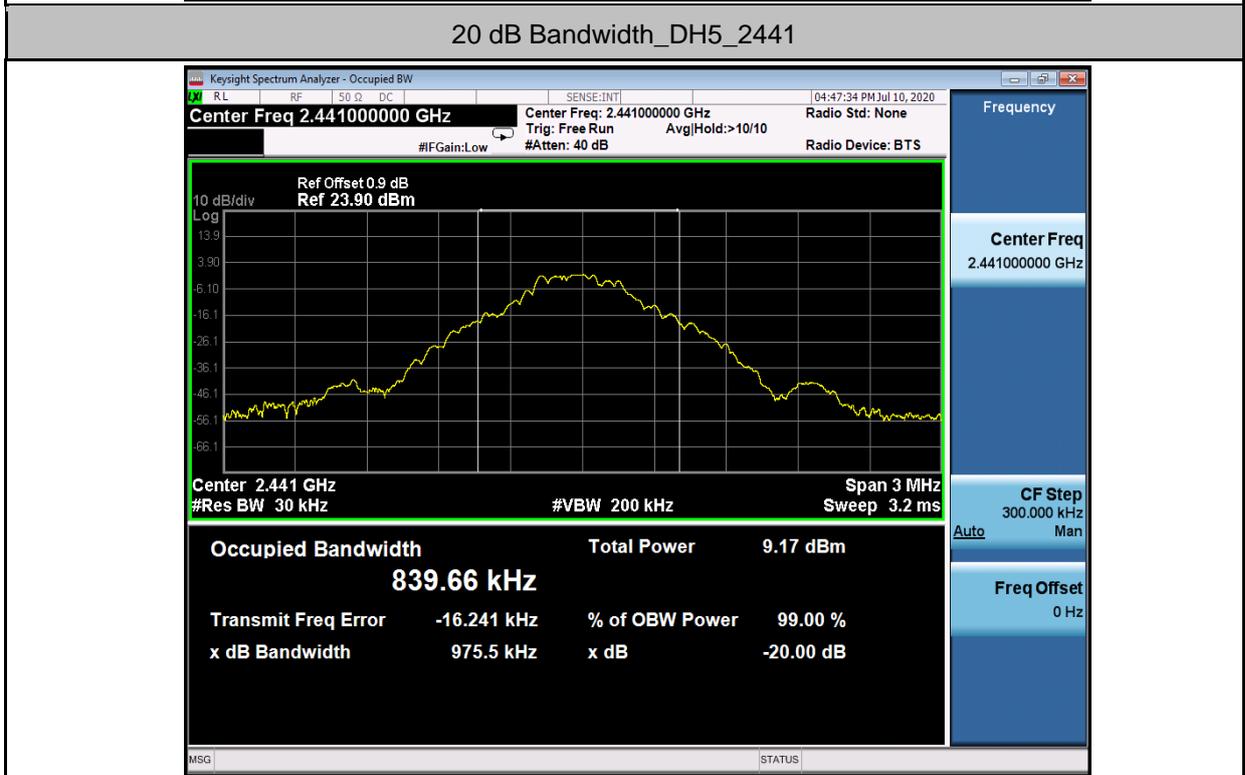
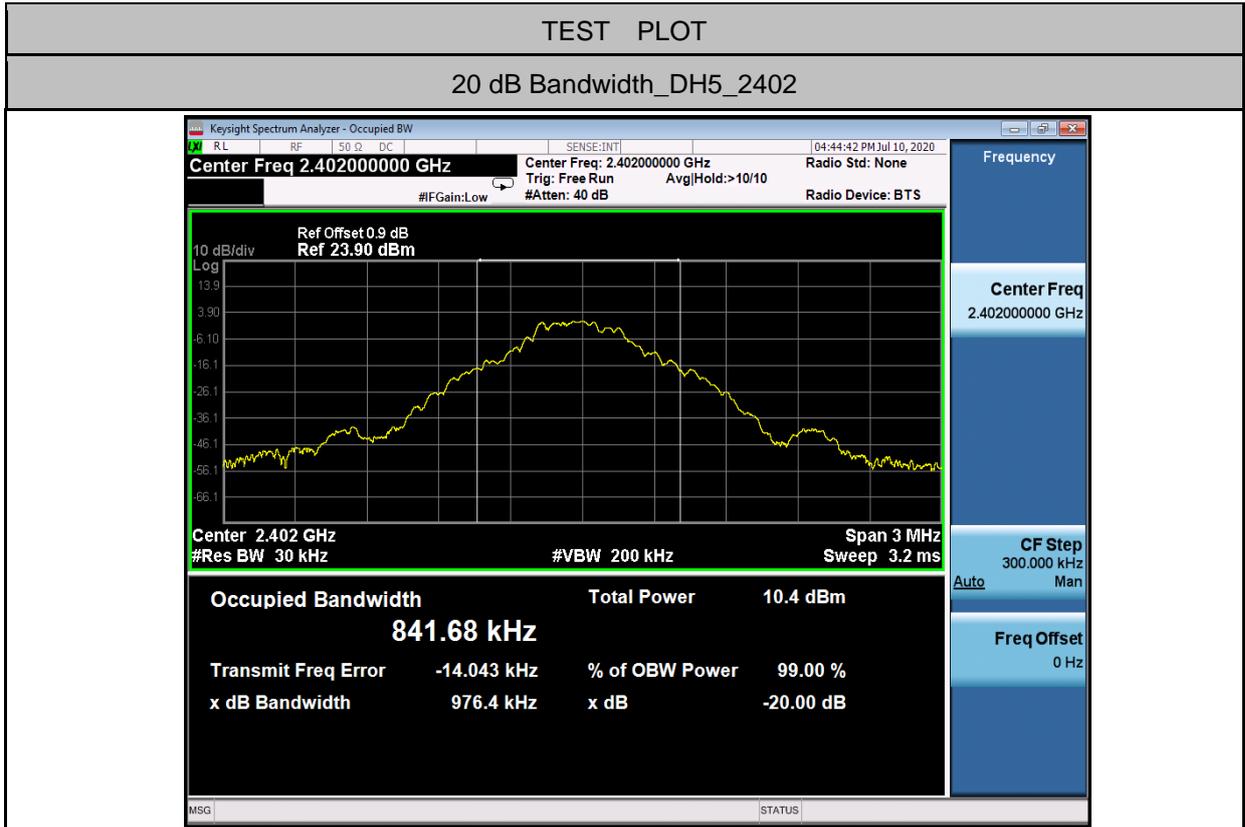
1. 20 dB Bandwidth

Test Mode	Test Channel	20 dB Bandwidth [MHz]	Limit[MHz]	Verdict
DH5	2402	0.9764	---	PASS
DH5	2441	0.9755	---	PASS
DH5	2480	0.9603	---	PASS
2DH5	2402	1.287	---	PASS
2DH5	2441	1.310	---	PASS
2DH5	2480	1.312	---	PASS
3DH5	2402	1.289	---	PASS
3DH5	2441	1.289	---	PASS
3DH5	2480	1.290	---	PASS



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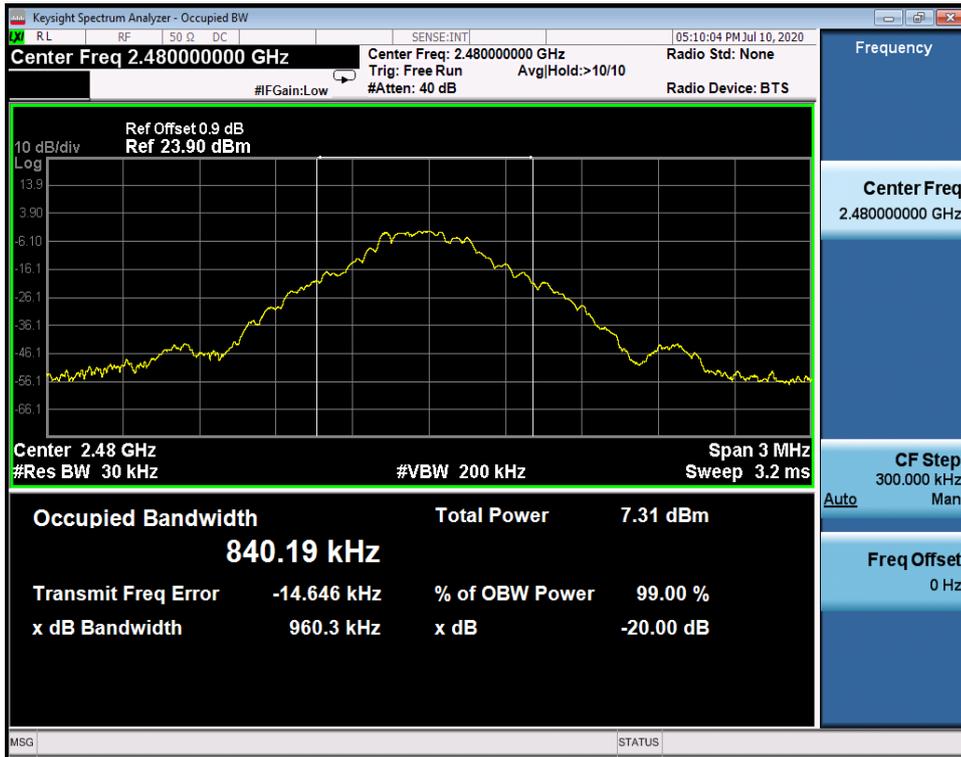
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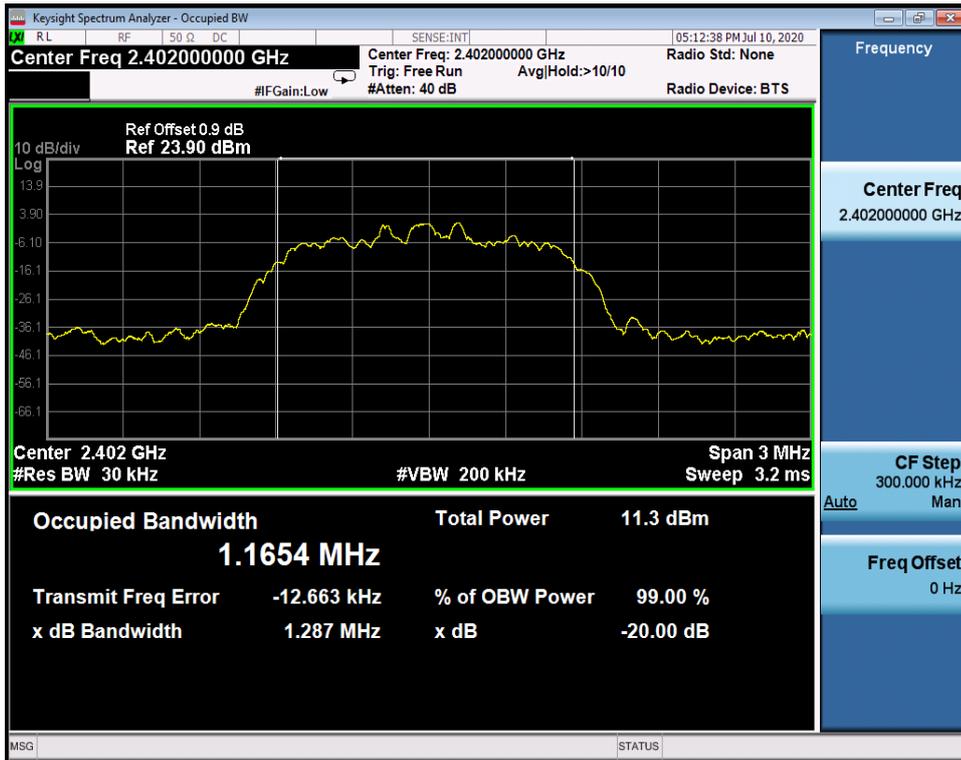
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20 dB Bandwidth_DH5_2480

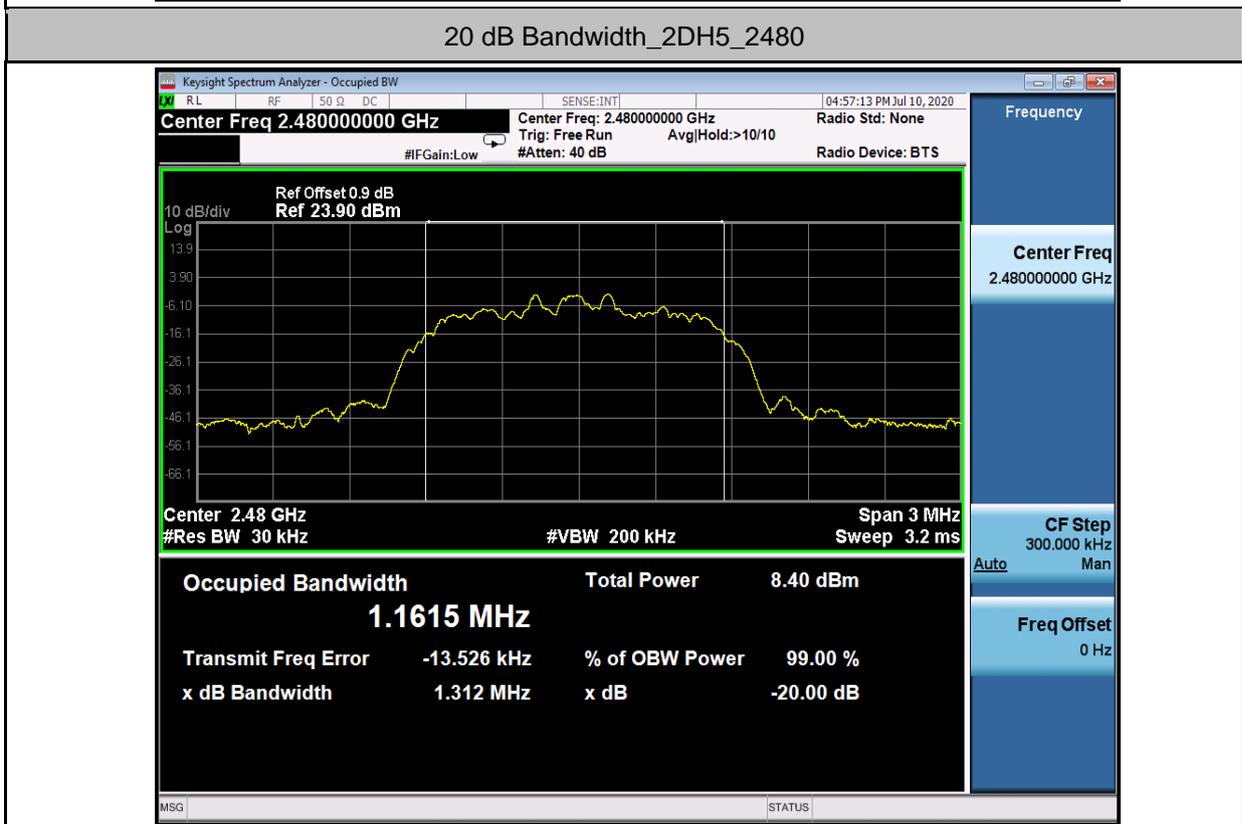
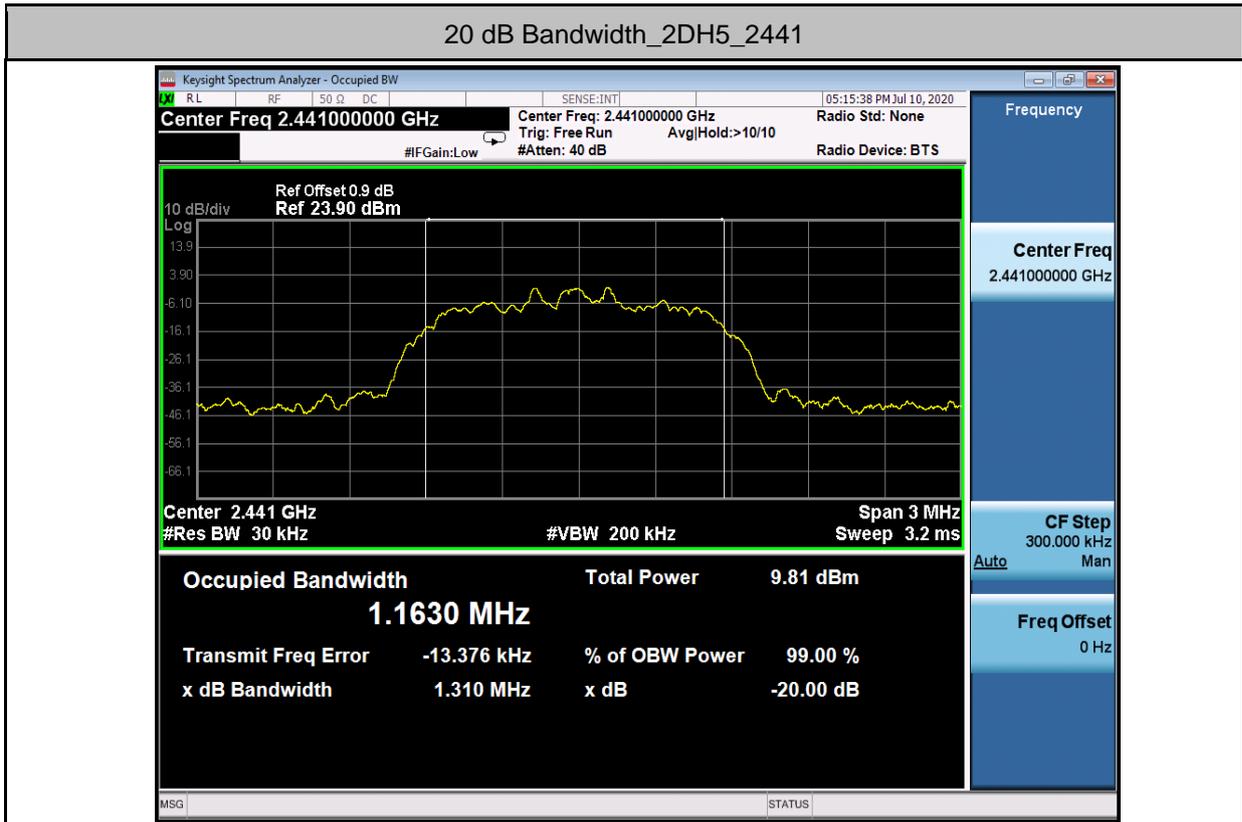


20 dB Bandwidth_2DH5_2402



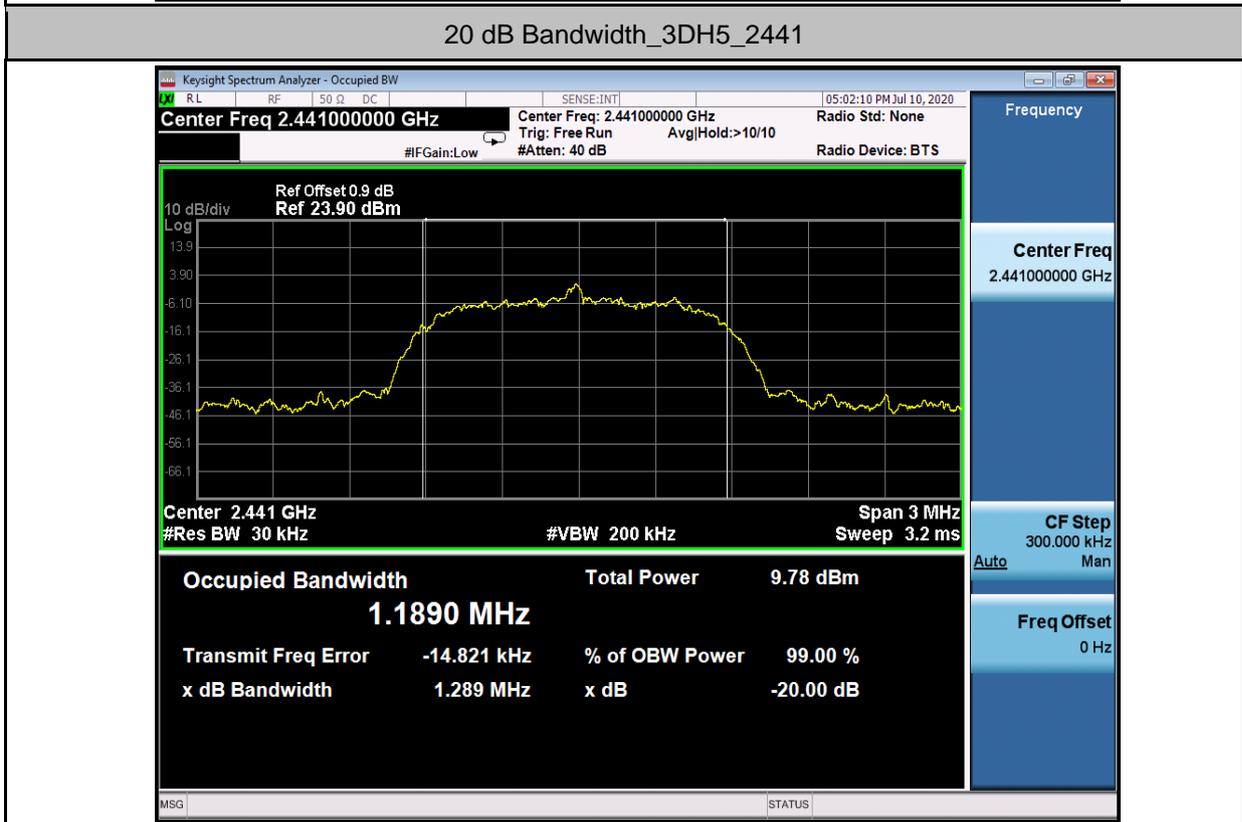
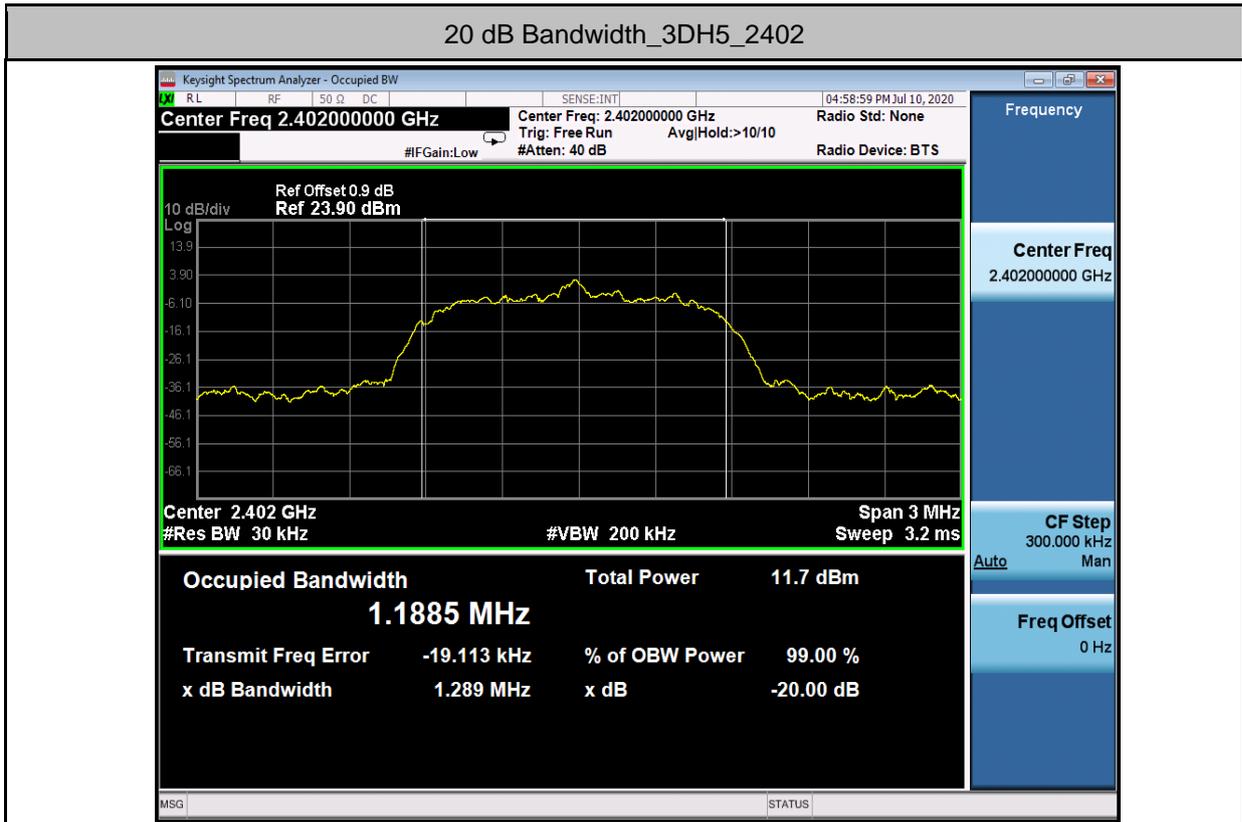
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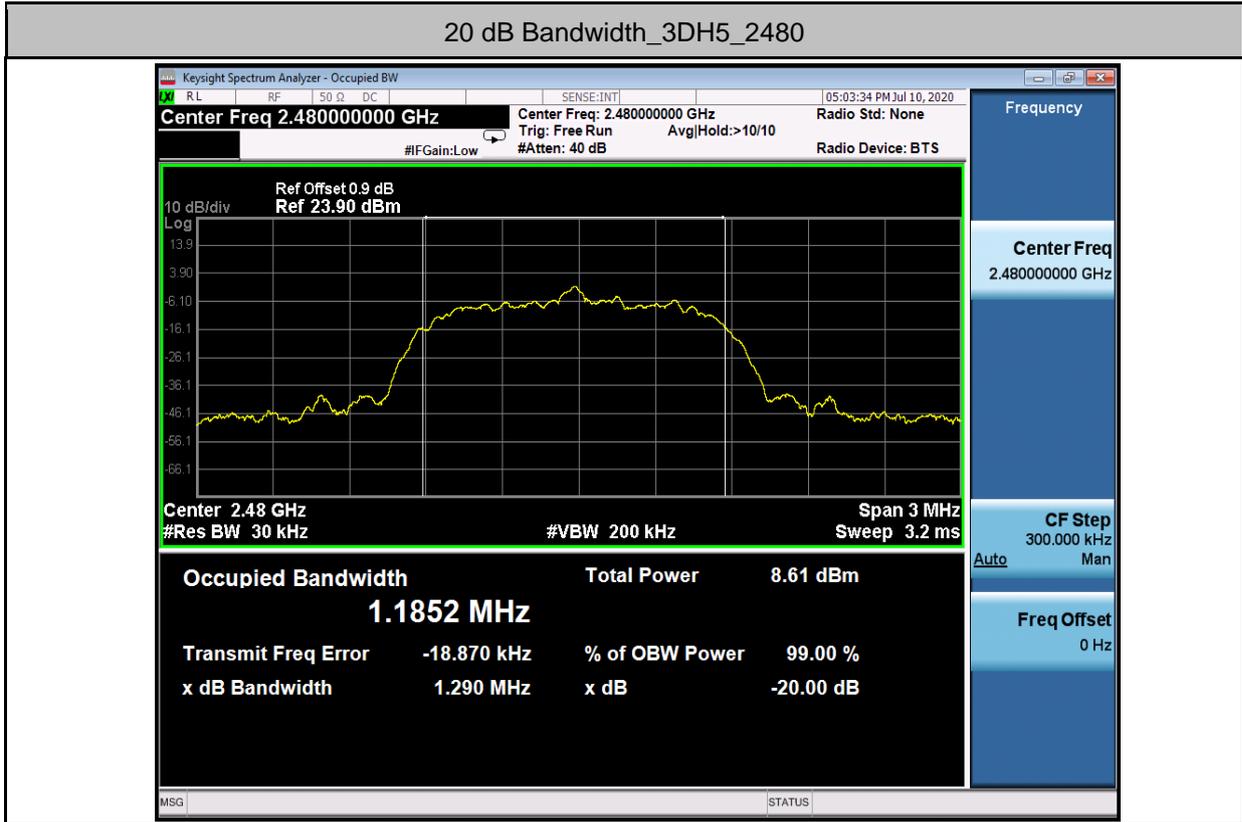
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2. Conducted Peak Output Power

Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
DH5	2402	3.21	21	PASS
DH5	2441	1.919	21	PASS
DH5	2480	0.077	21	PASS
2DH5	2402	5.551	21	PASS
2DH5	2441	3.95	21	PASS
2DH5	2480	2.547	21	PASS
3DH5	2402	6.372	21	PASS
3DH5	2441	4.835	21	PASS
3DH5	2480	3.109	21	PASS



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TEST PLOT

Conducted Peak Output Power_DH5_2402



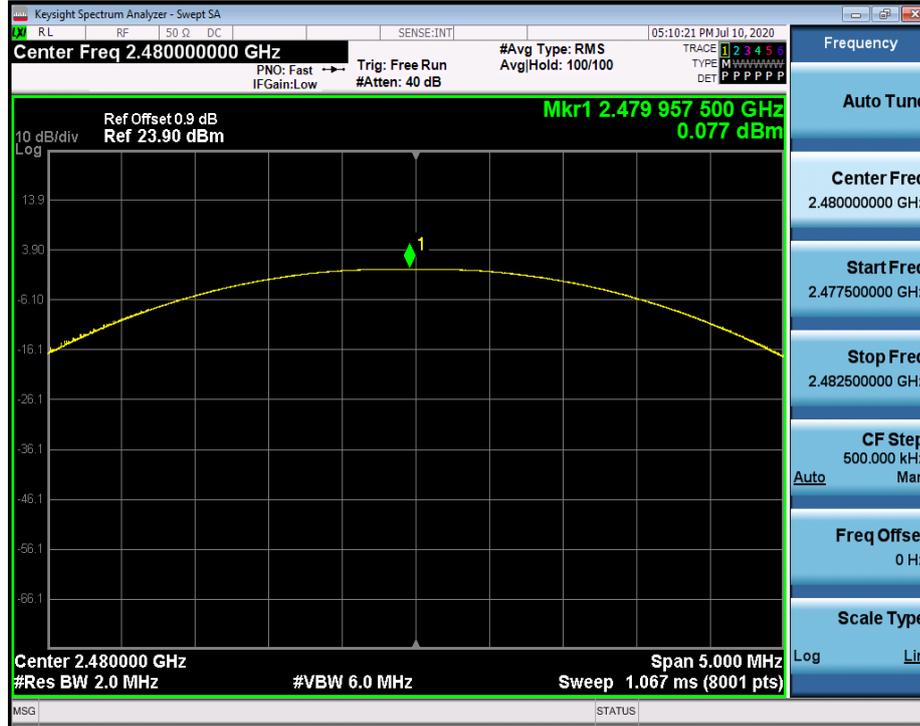
Conducted Peak Output Power_DH5_2441



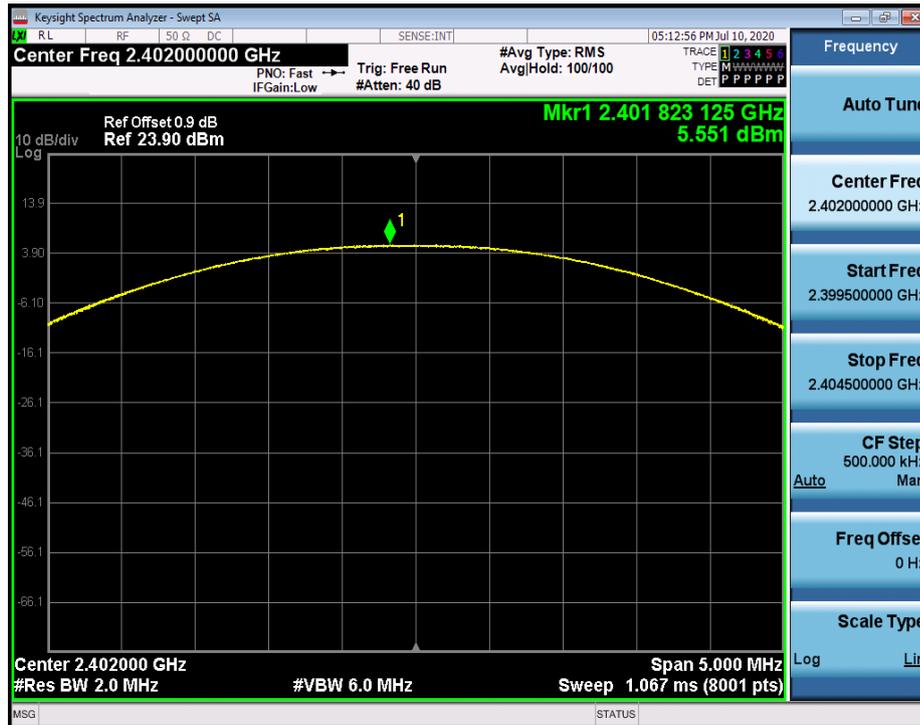
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Conducted Peak Output Power_DH5_2480



Conducted Peak Output Power_2DH5_2402



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Conducted Peak Output Power_2DH5_2441



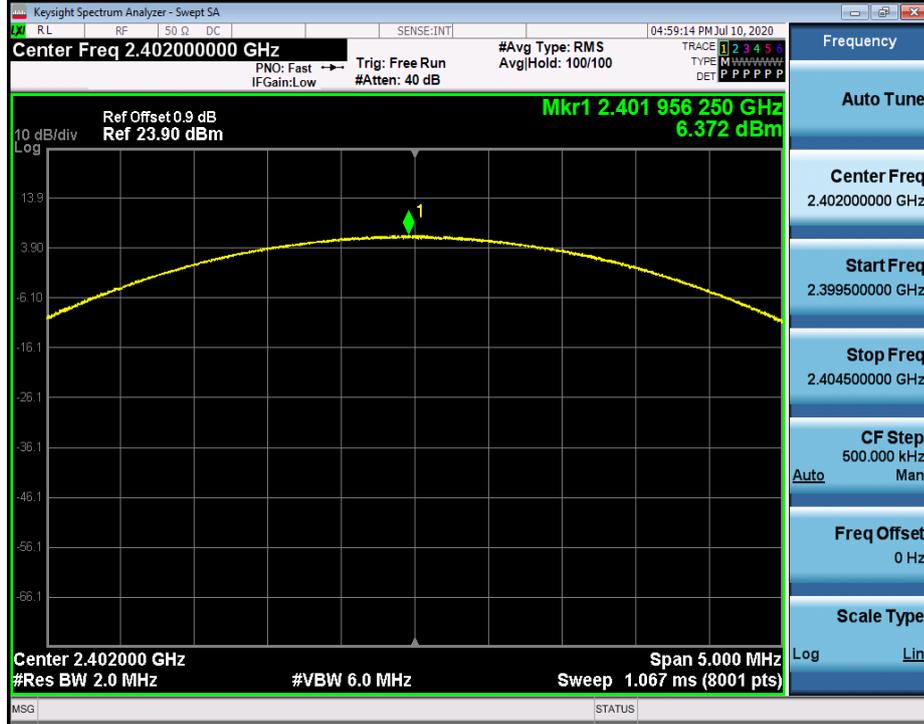
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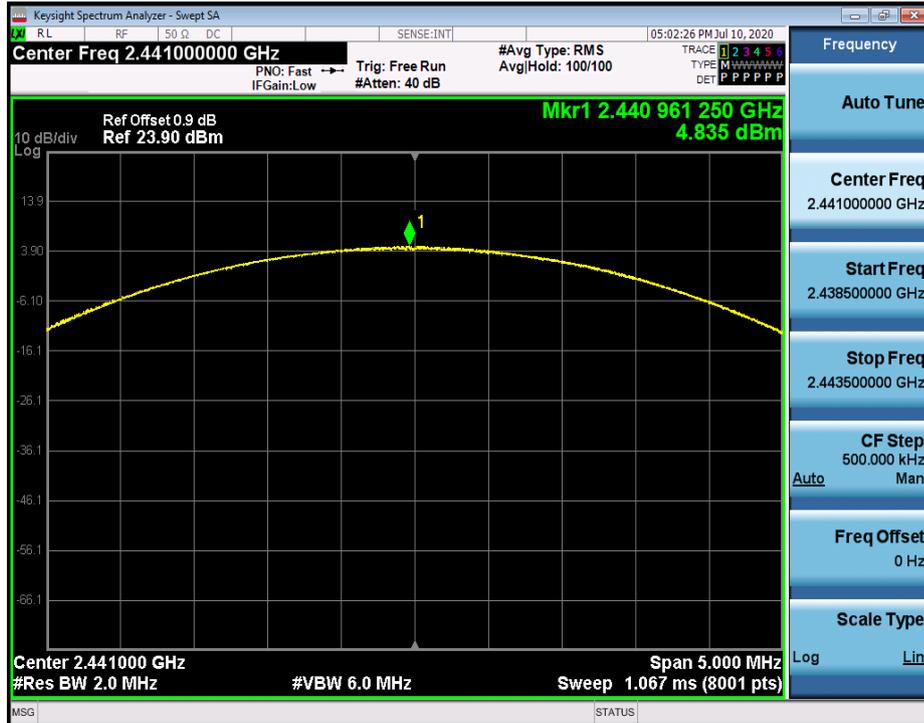
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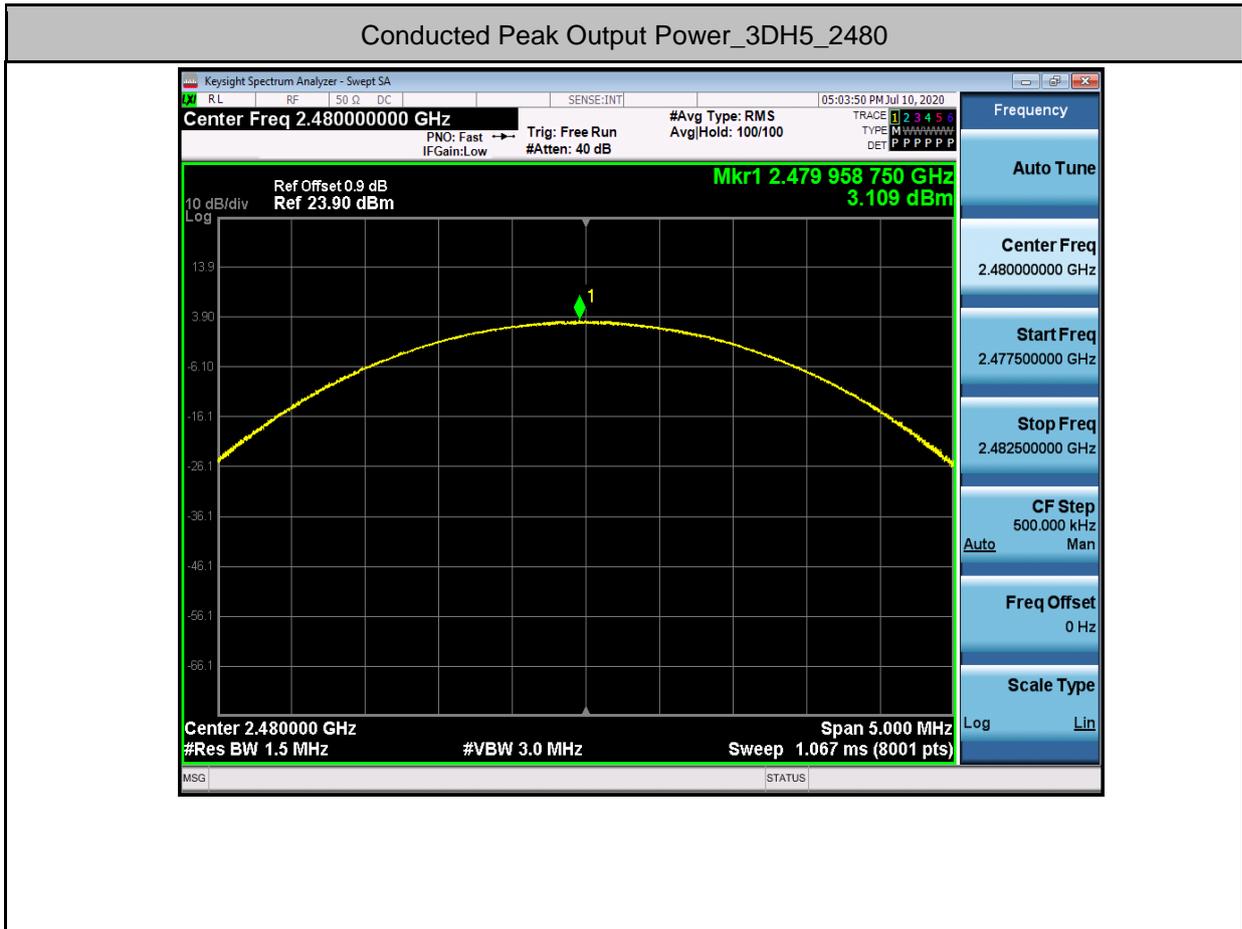
Conducted Peak Output Power_3DH5_2402



Conducted Peak Output Power_3DH5_2441



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3.Carrier Frequency Separation

Test Mode	Test Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	2402	0.963	0.651	PASS
DH5	2441	0.714	0.650	PASS
DH5	2480	0.988	0.640	PASS



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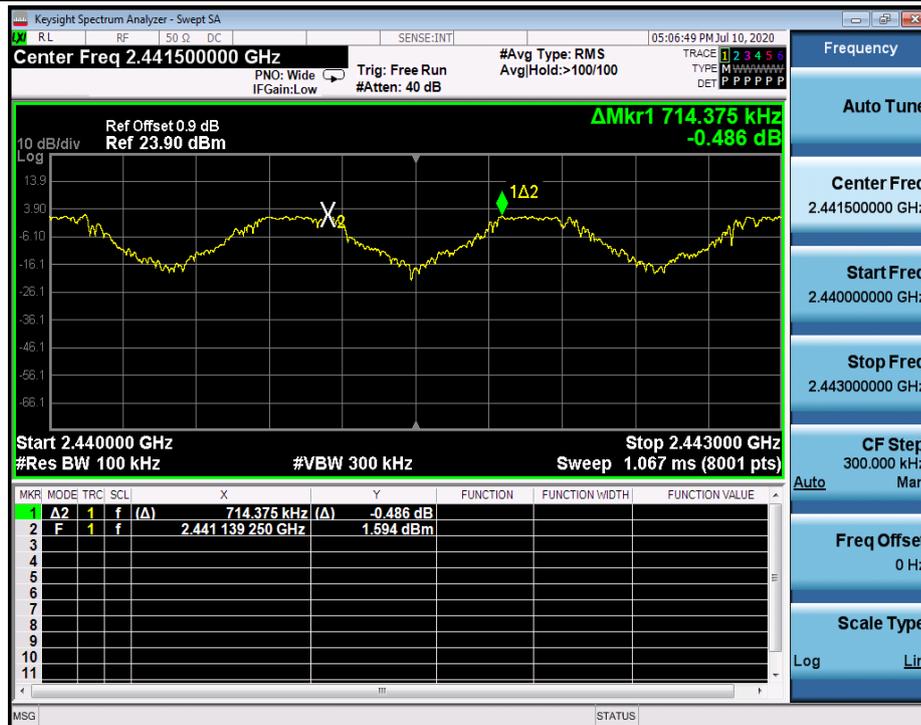
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TEST PLOT

Carrier Frequency Separation_DH5_2402

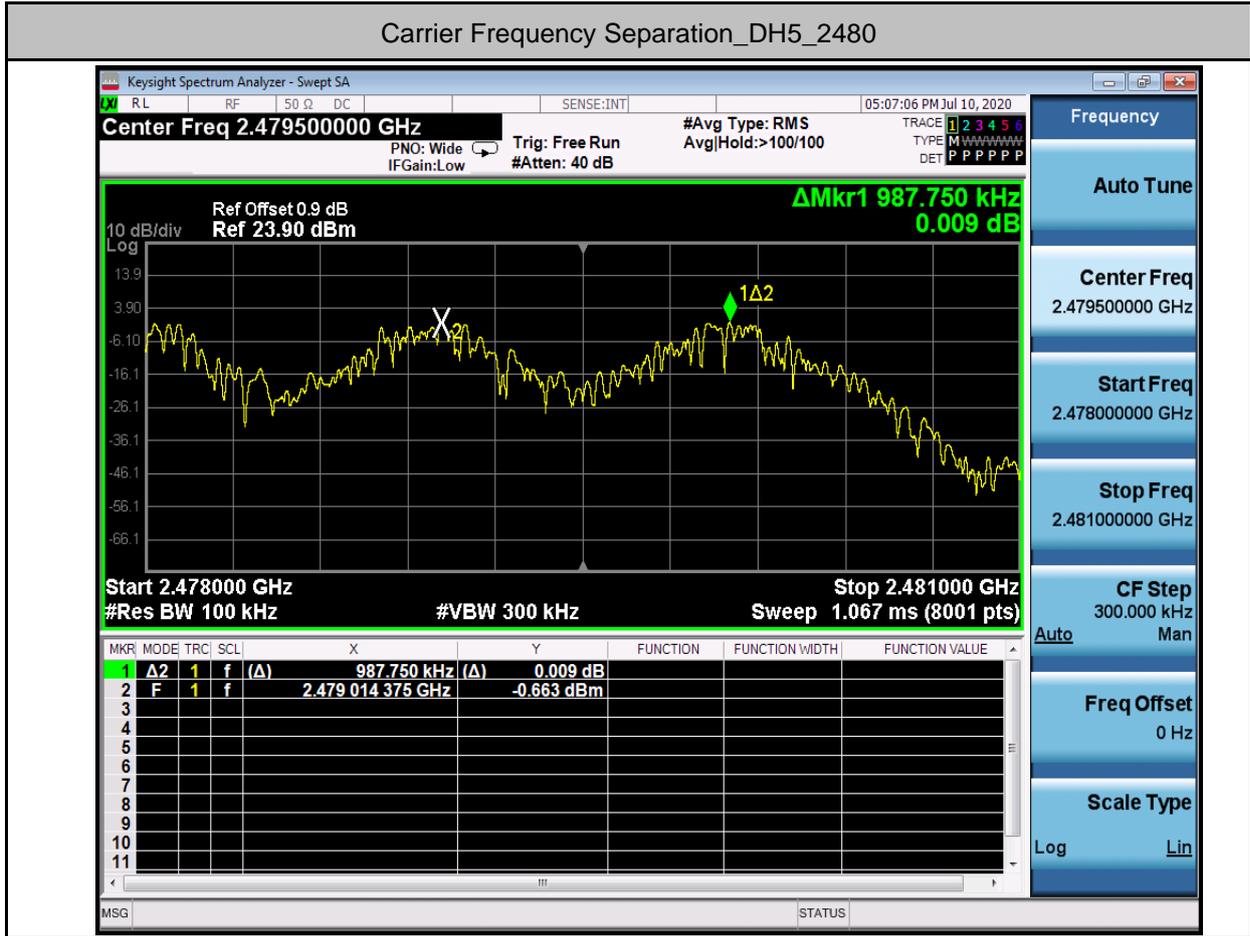


Carrier Frequency Separation_DH5_2441



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Carrier Frequency Separation_DH5_2480



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4.Dwell Time

Test Mode	Test Channel	Burst Width[ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit[s]	Verdict
DH1	2402	0.39	320	0.12	0.4	PASS
DH1	2441	0.39	320	0.12	0.4	PASS
DH1	2480	0.39	320	0.12	0.4	PASS
DH3	2402	1.65	100	0.17	0.4	PASS
DH3	2441	1.65	130	0.21	0.4	PASS
DH3	2480	1.65	150	0.25	0.4	PASS
DH5	2402	2.90	120	0.35	0.4	PASS
DH5	2441	2.90	110	0.32	0.4	PASS
DH5	2480	2.90	130	0.38	0.4	PASS
2DH1	2402	0.40	320	0.13	0.4	PASS
2DH1	2441	0.40	320	0.13	0.4	PASS
2DH1	2480	0.40	320	0.13	0.4	PASS
2DH3	2402	1.65	150	0.25	0.4	PASS
2DH3	2441	1.65	130	0.21	0.4	PASS
2DH3	2480	1.65	220	0.36	0.4	PASS
2DH5	2402	2.90	70	0.20	0.4	PASS
2DH5	2441	2.90	70	0.20	0.4	PASS
2DH5	2480	2.90	130	0.37	0.4	PASS
3DH1	2402	0.40	320	0.13	0.4	PASS
3DH1	2441	0.40	320	0.13	0.4	PASS
3DH1	2480	0.40	320	0.13	0.4	PASS
3DH3	2402	1.65	110	0.18	0.4	PASS
3DH3	2441	1.65	140	0.23	0.4	PASS
3DH3	2480	1.65	140	0.23	0.4	PASS
3DH5	2402	2.90	70	0.20	0.4	PASS
3DH5	2441	2.90	80	0.23	0.4	PASS
3DH5	2480	2.90	120	0.35	0.4	PASS

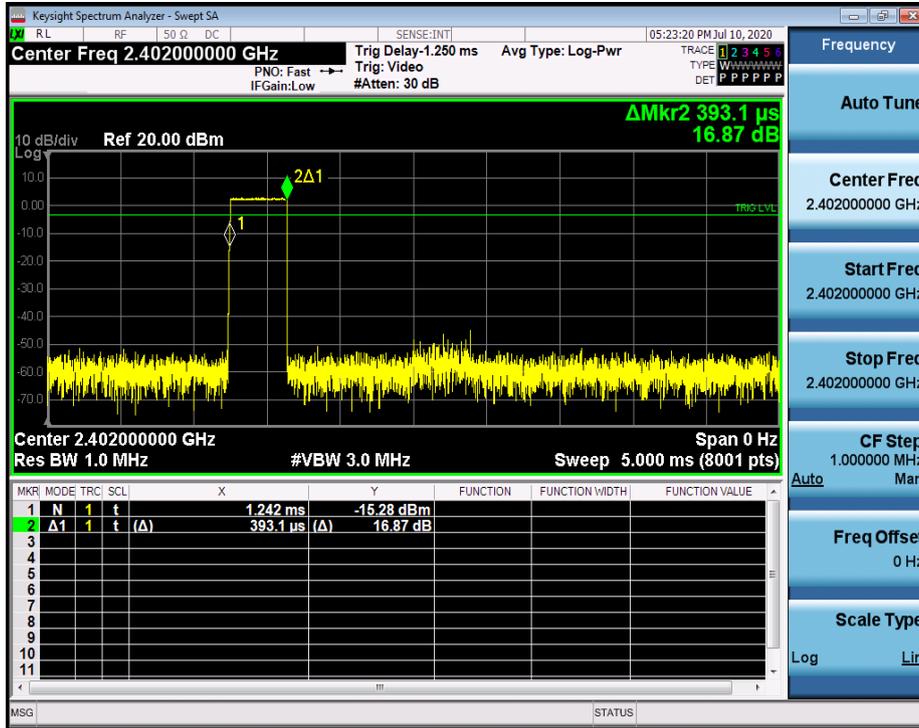


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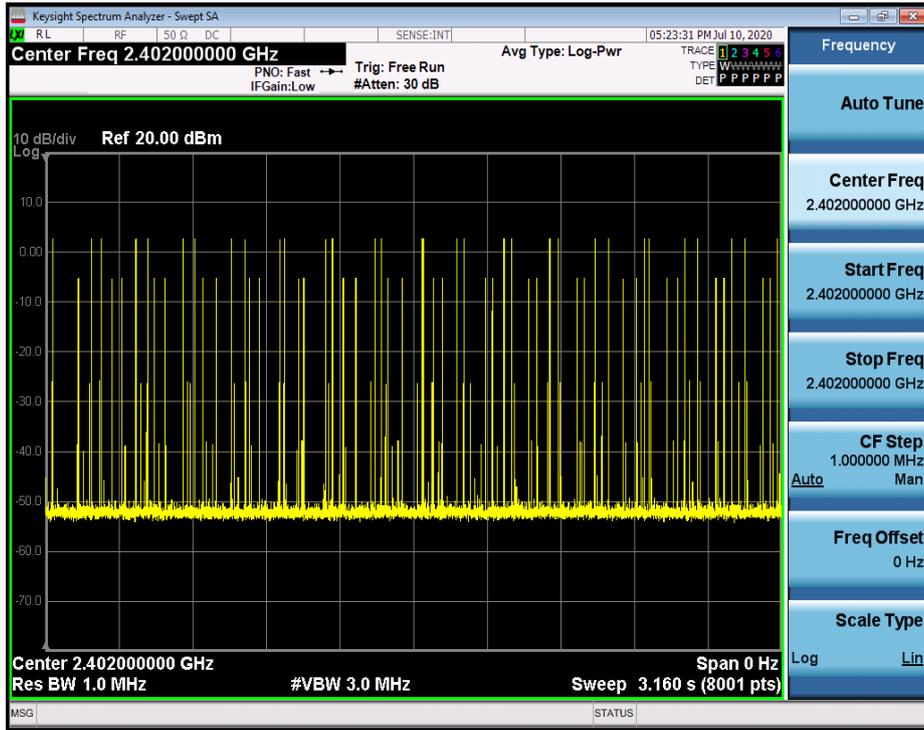
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Dwell Time_DH1_2402



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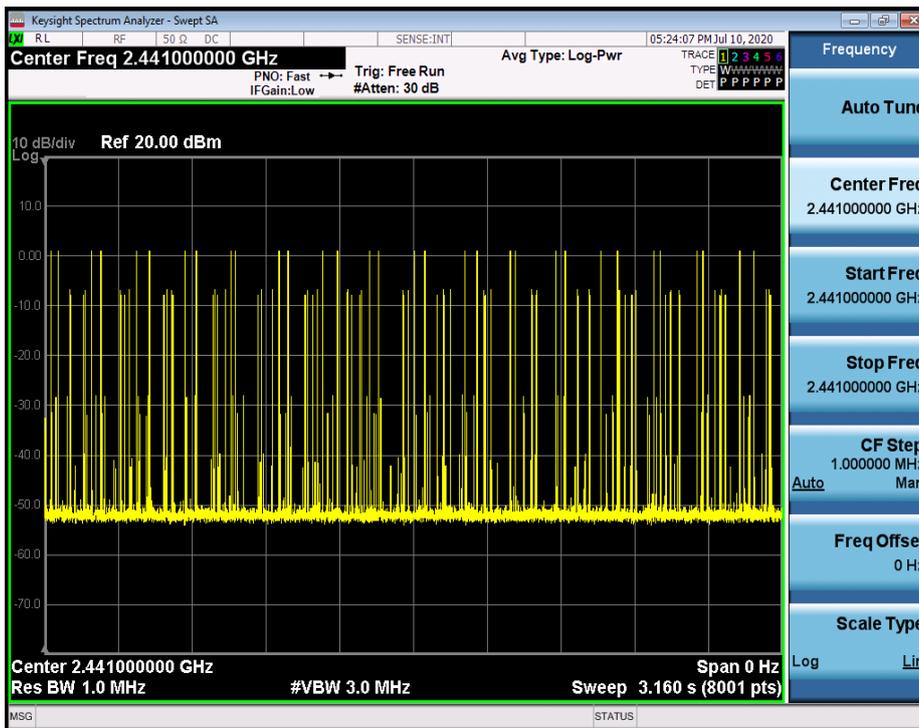
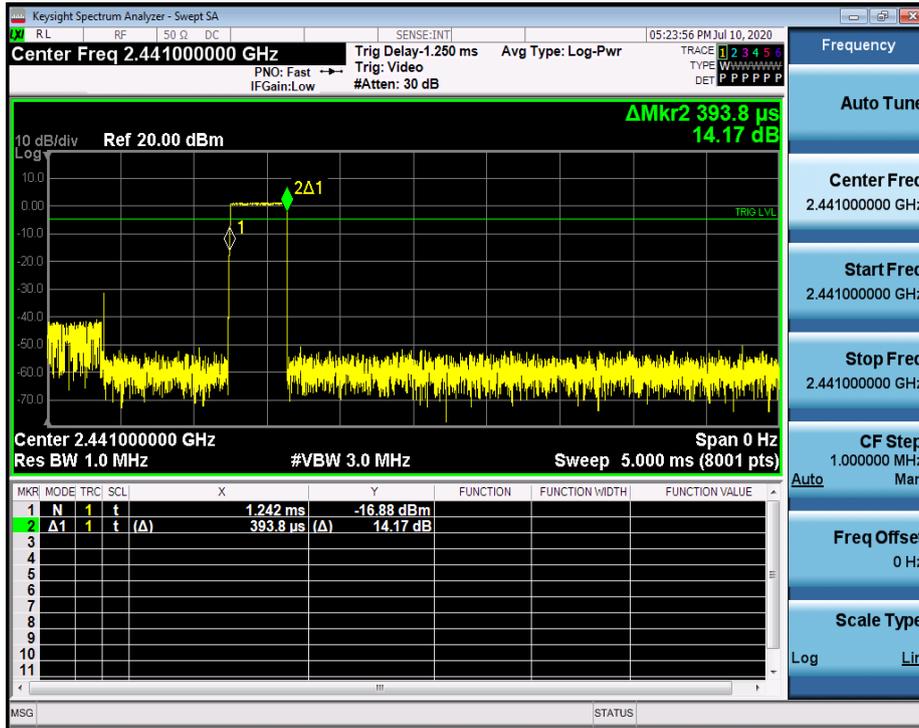


Dwell Time_DH1_2441



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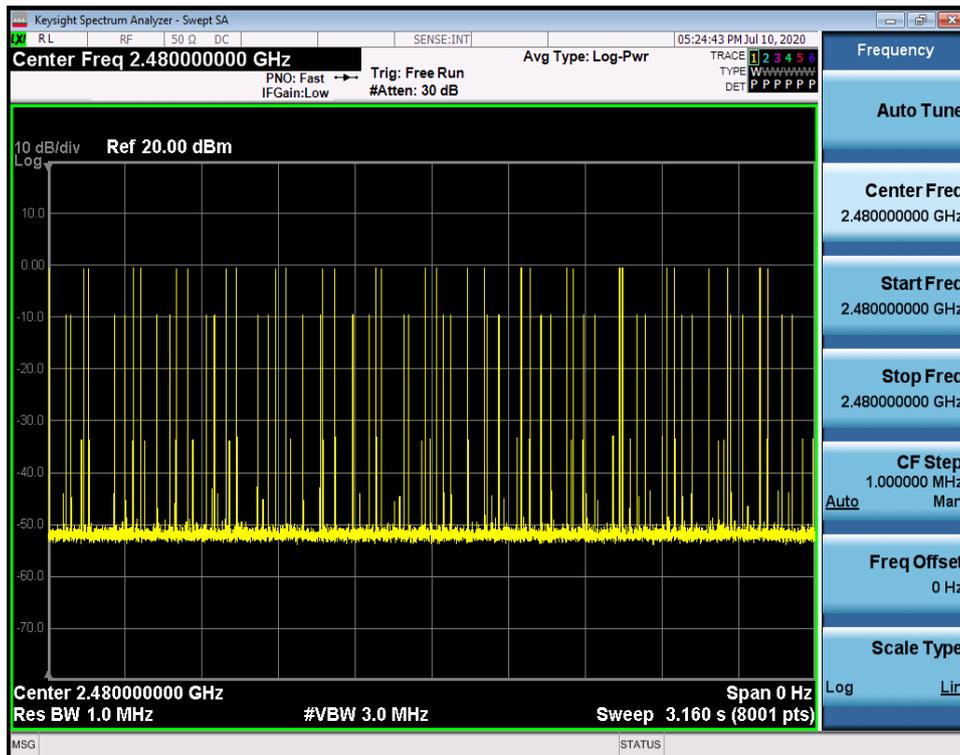
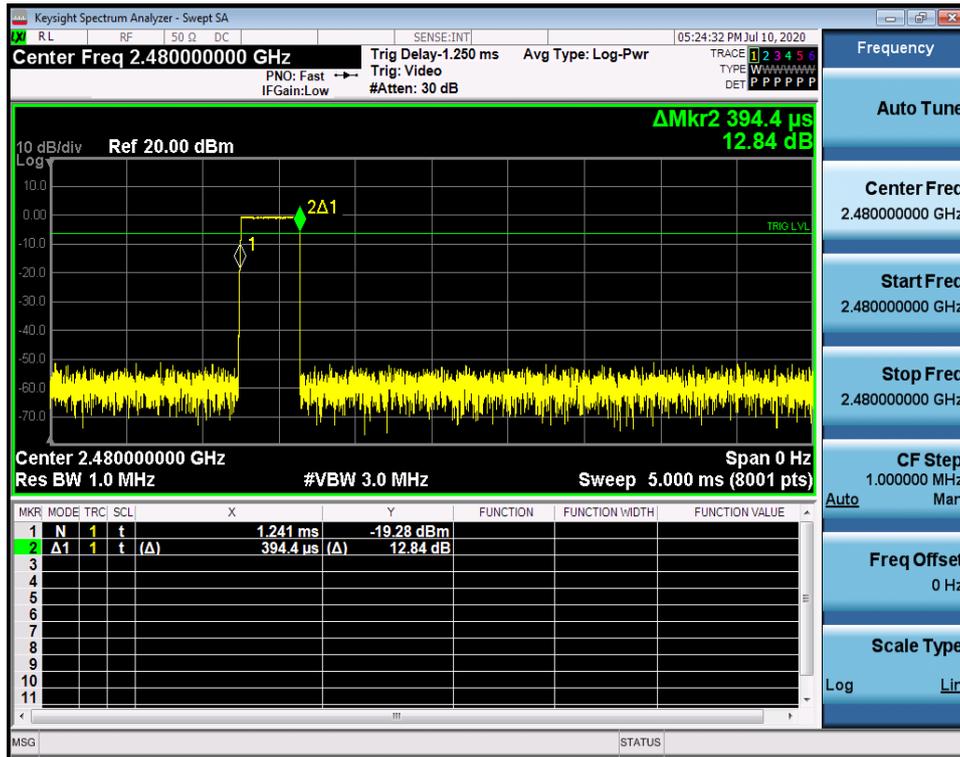
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Dwell Time_DH1_2480



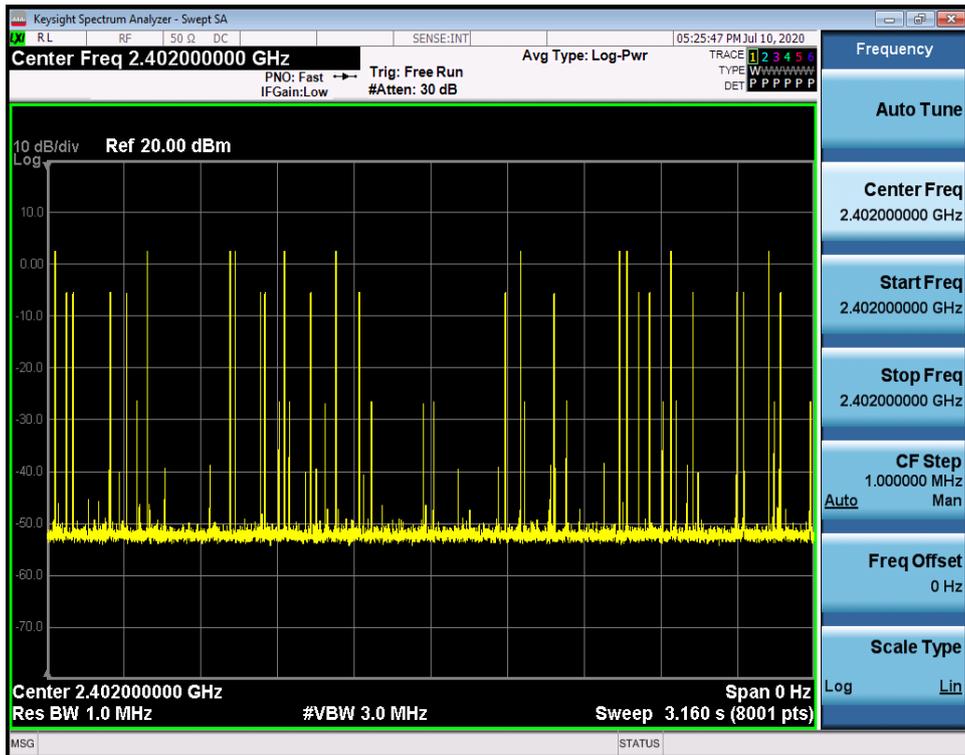
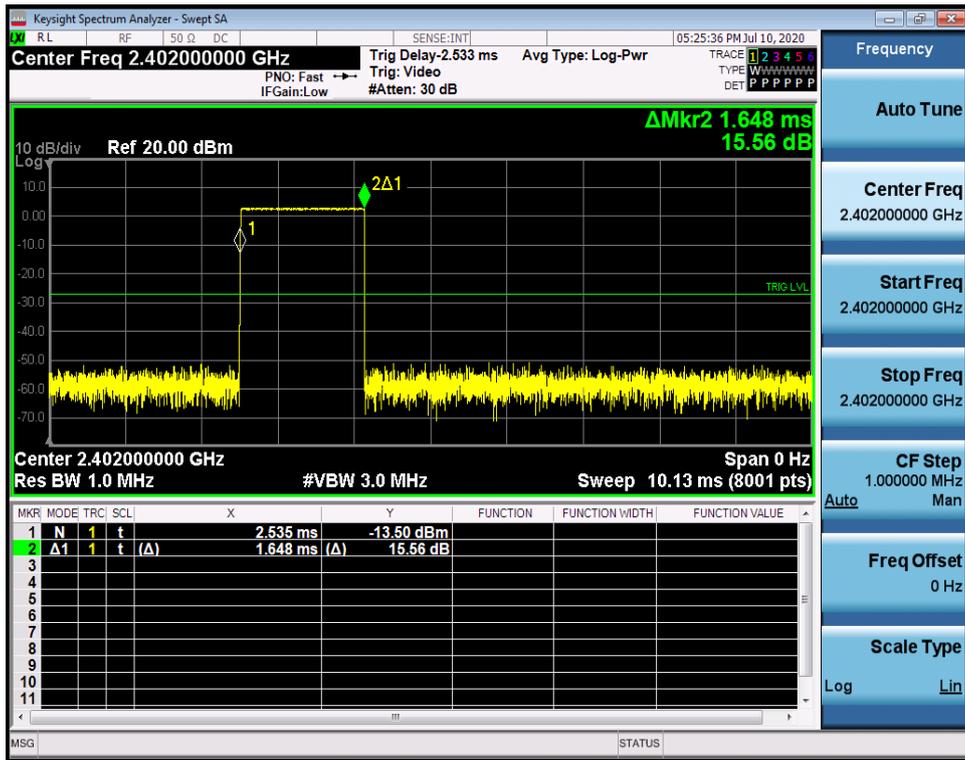
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Dwell Time_DH3_2402



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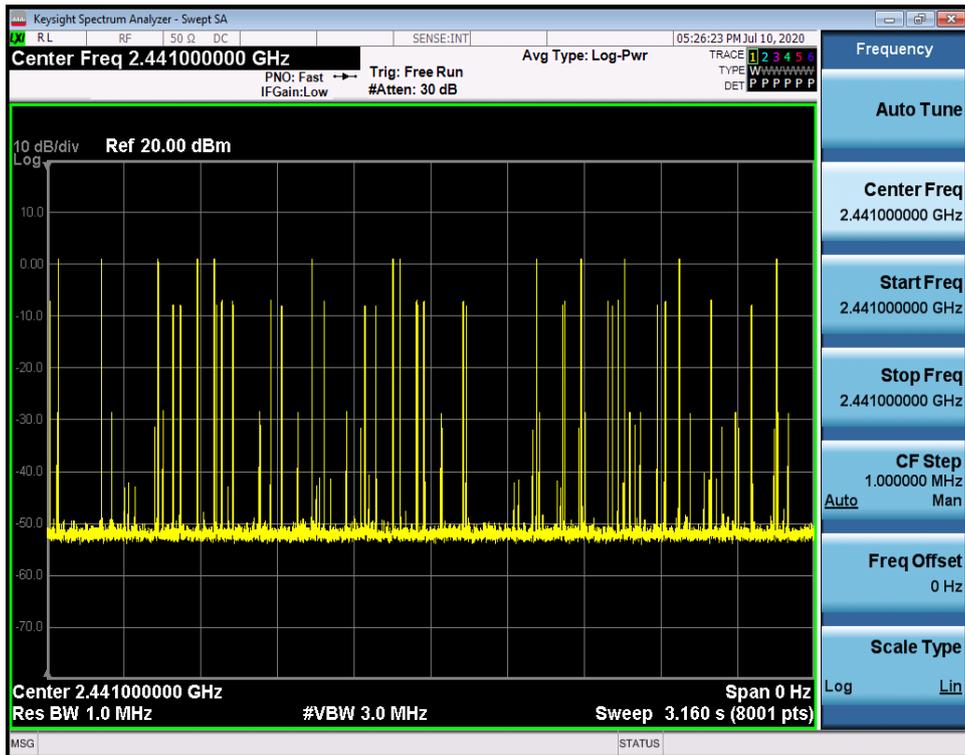
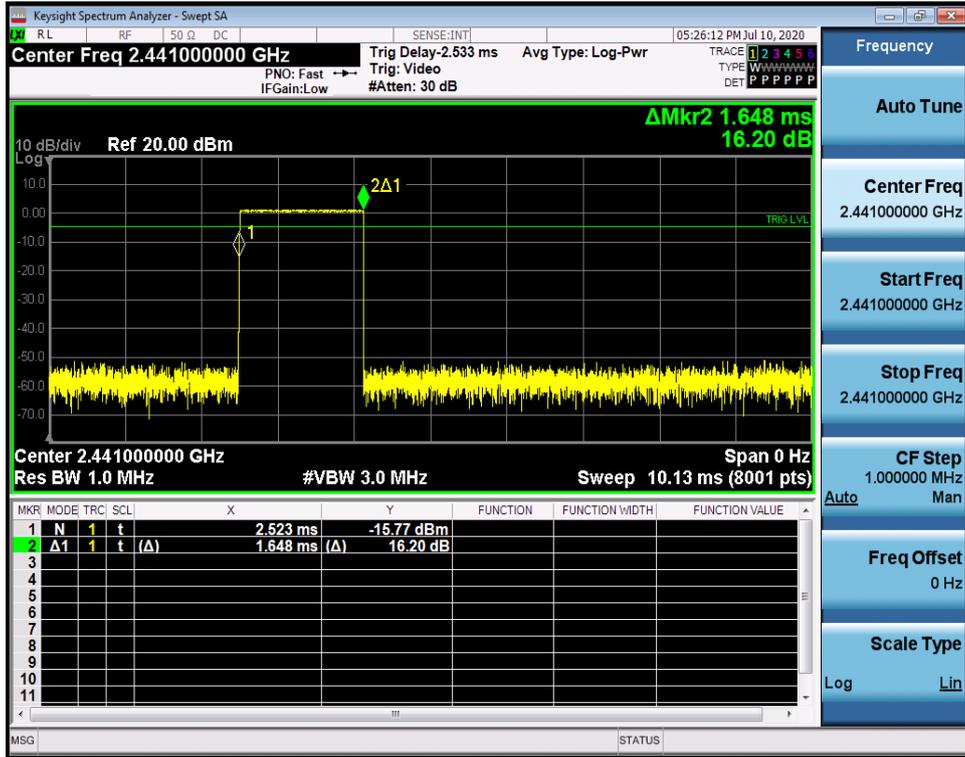


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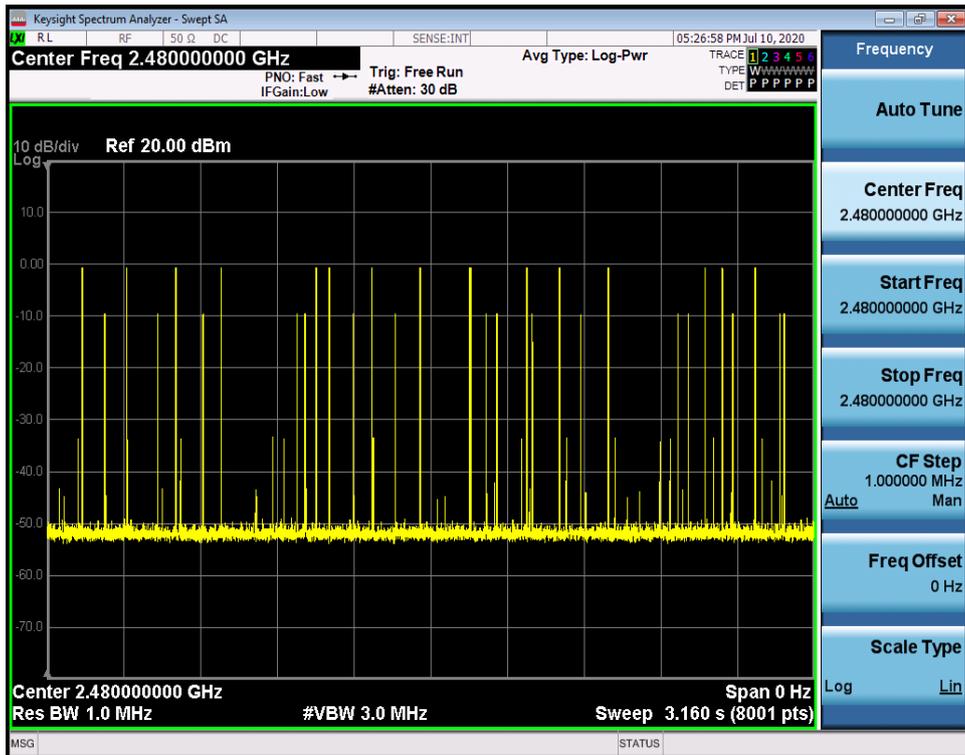
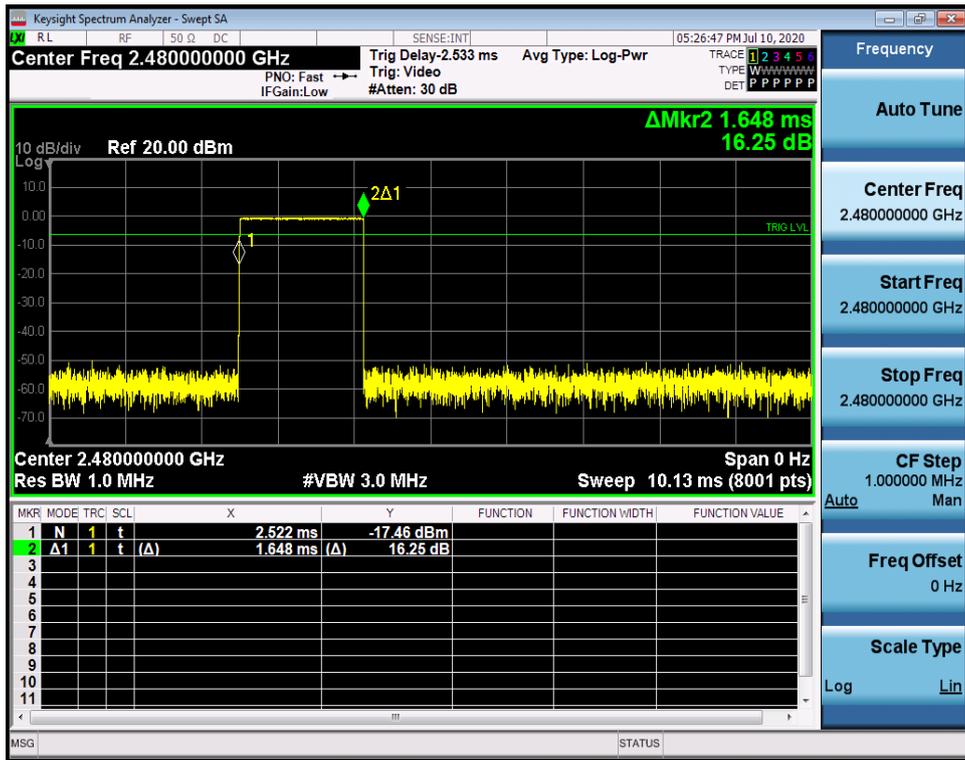


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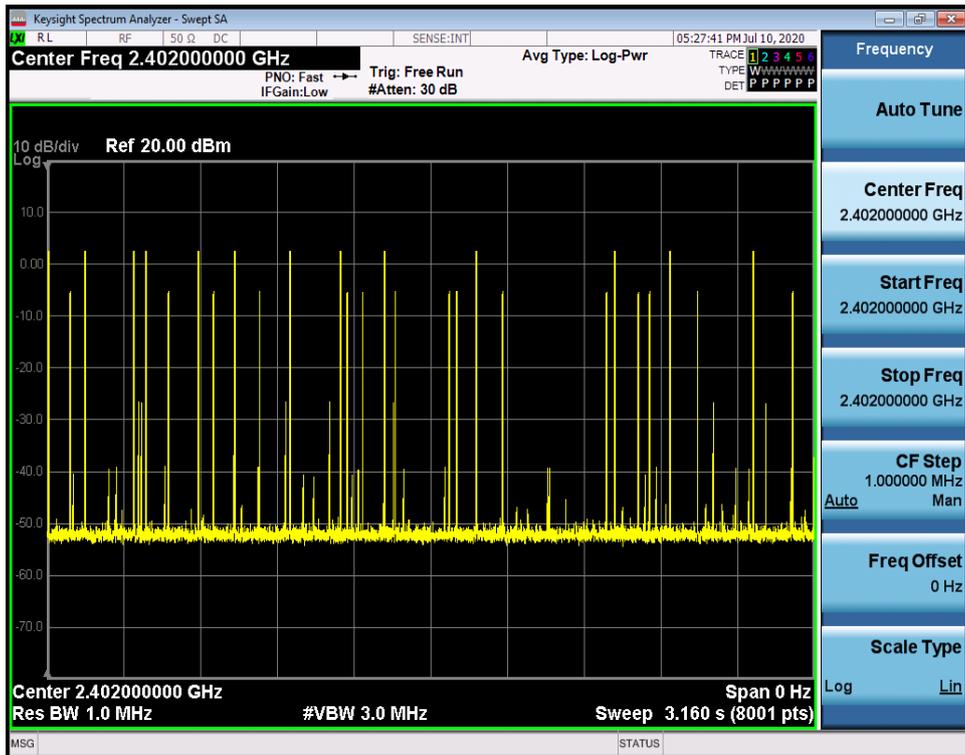
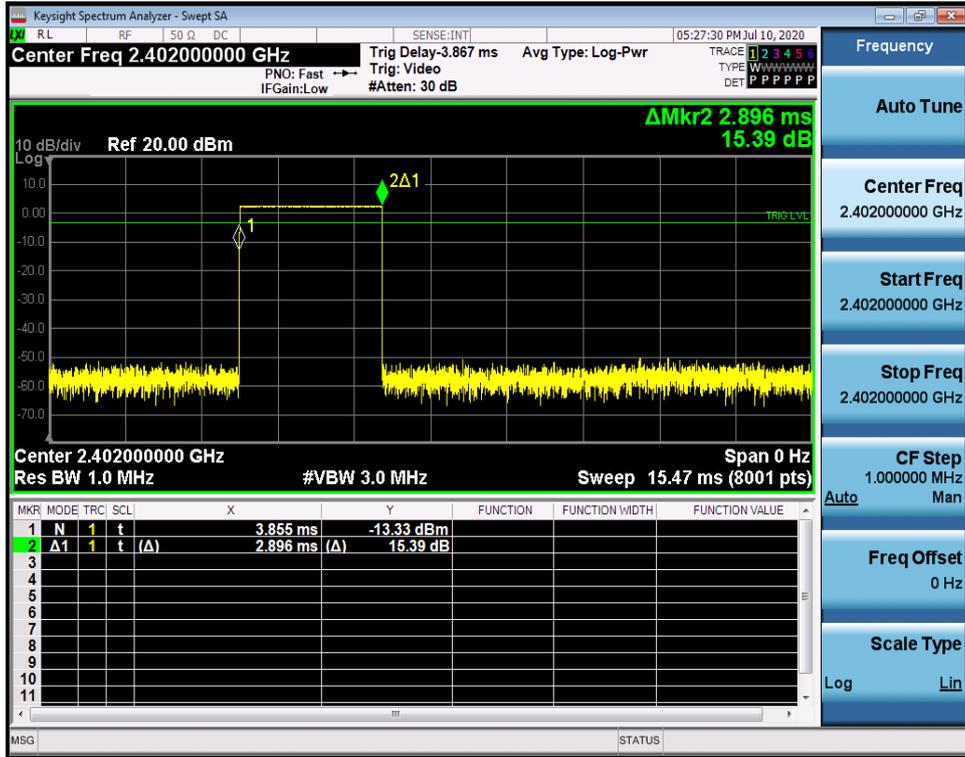


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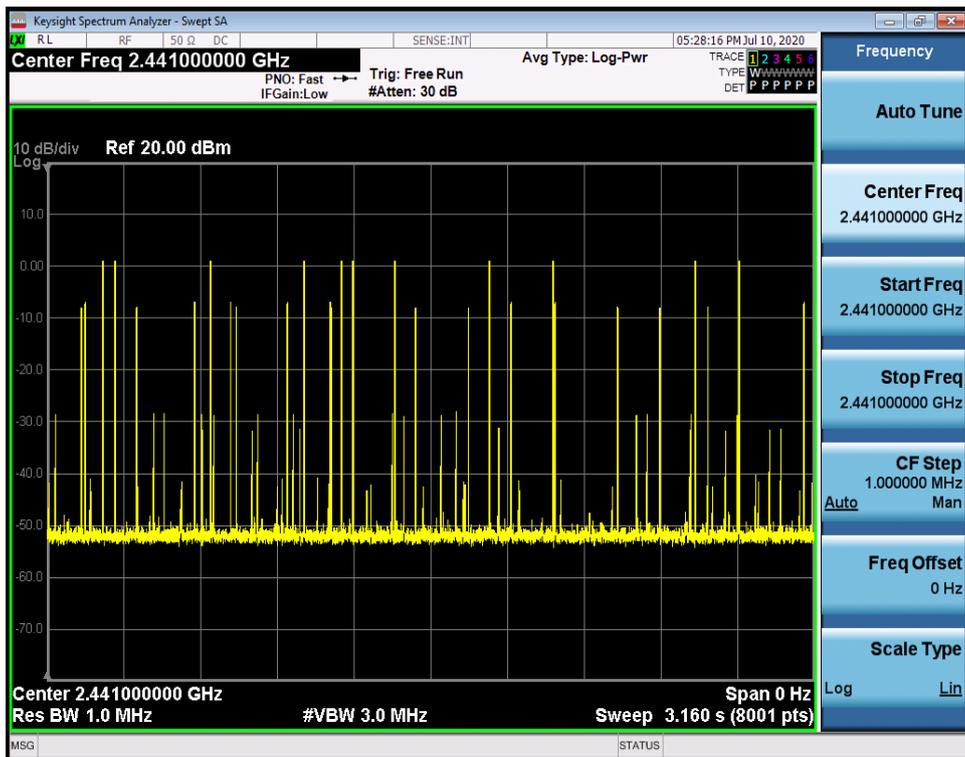
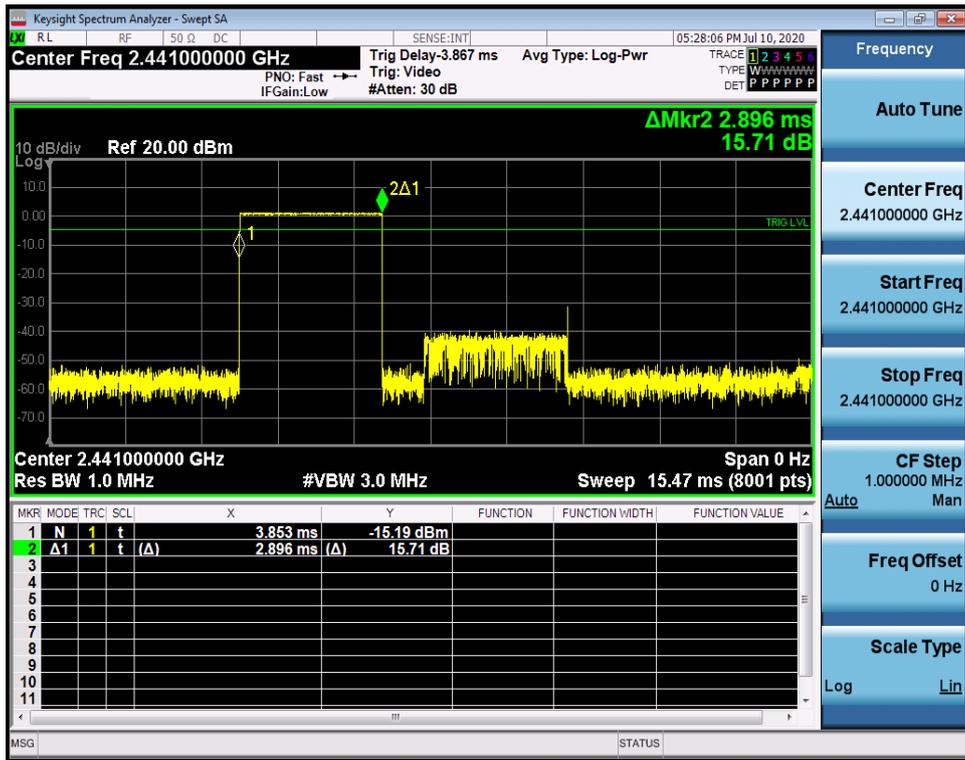


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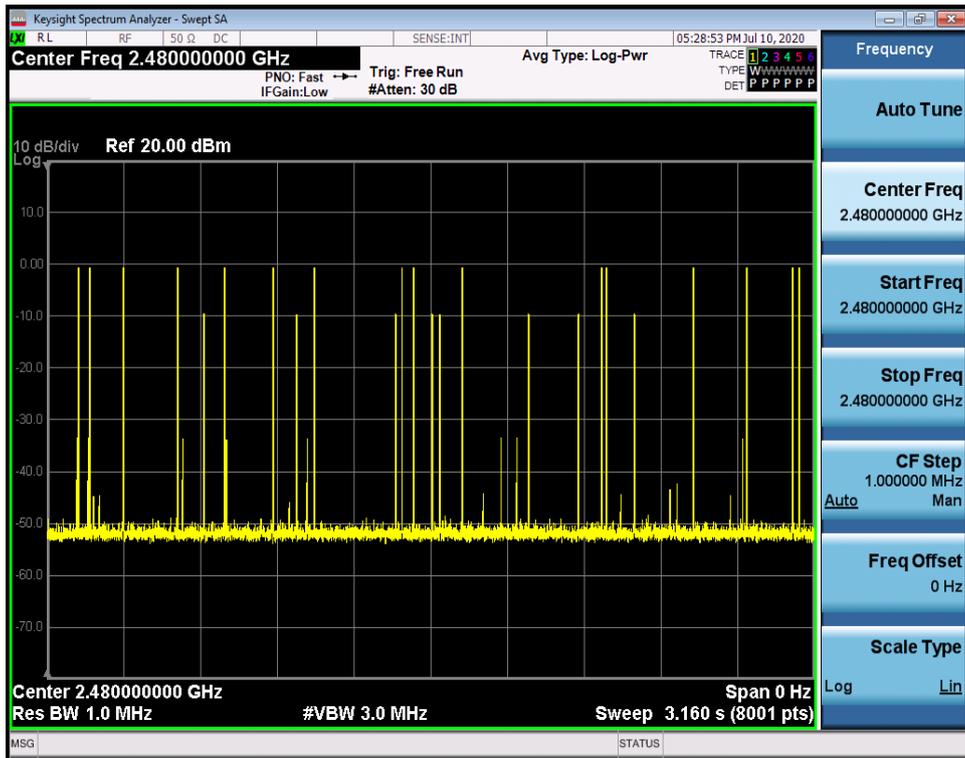
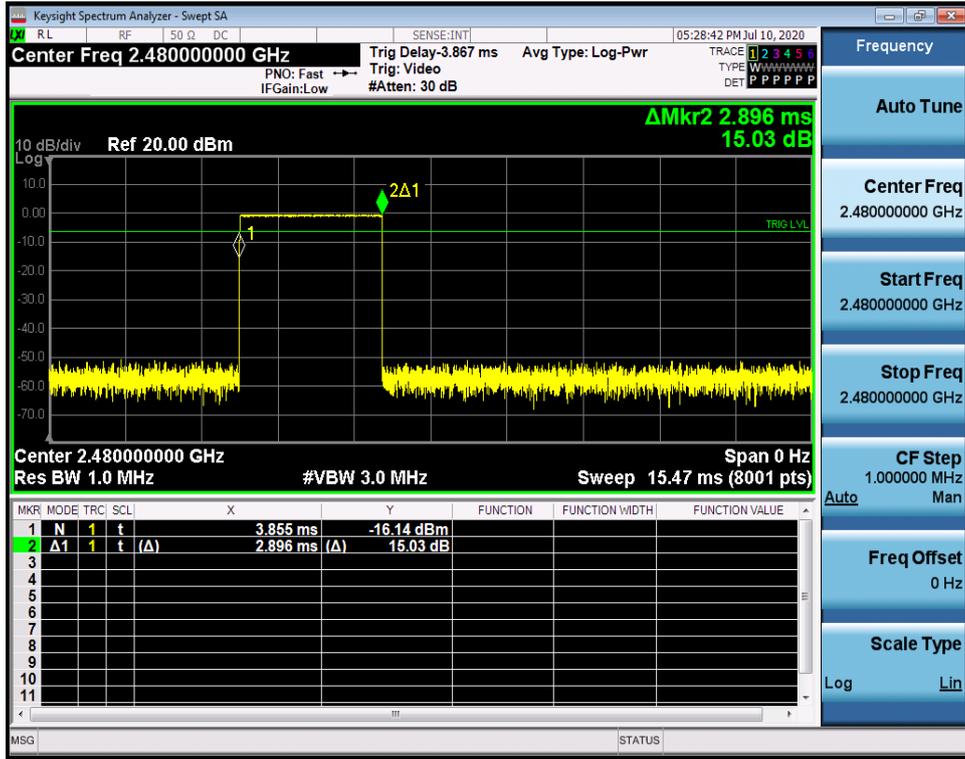


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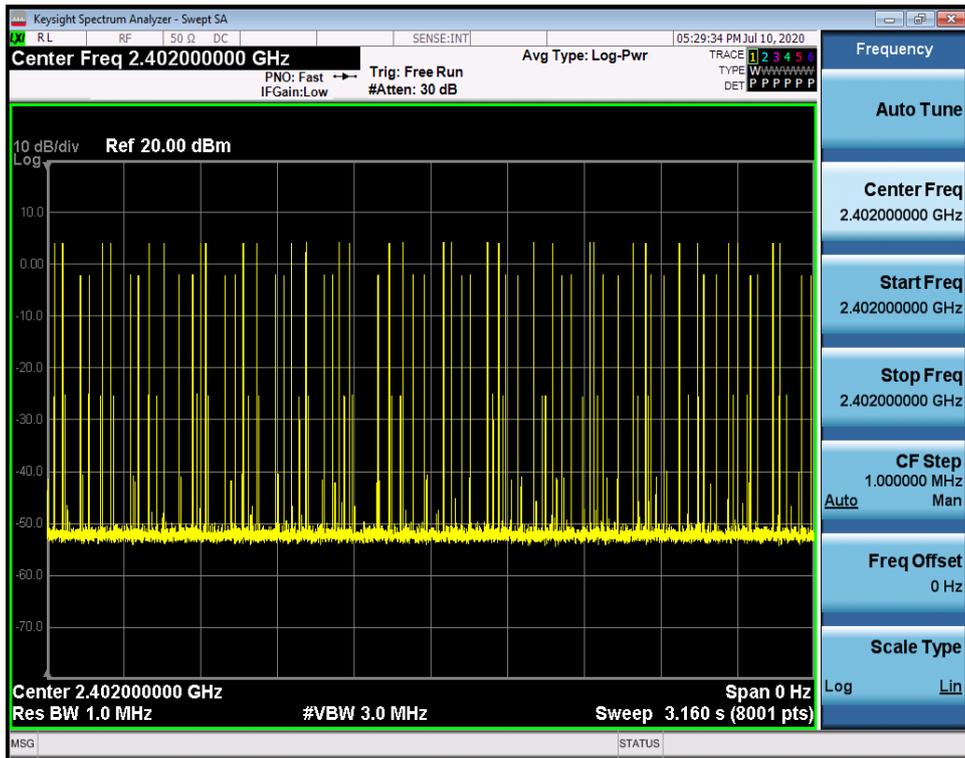
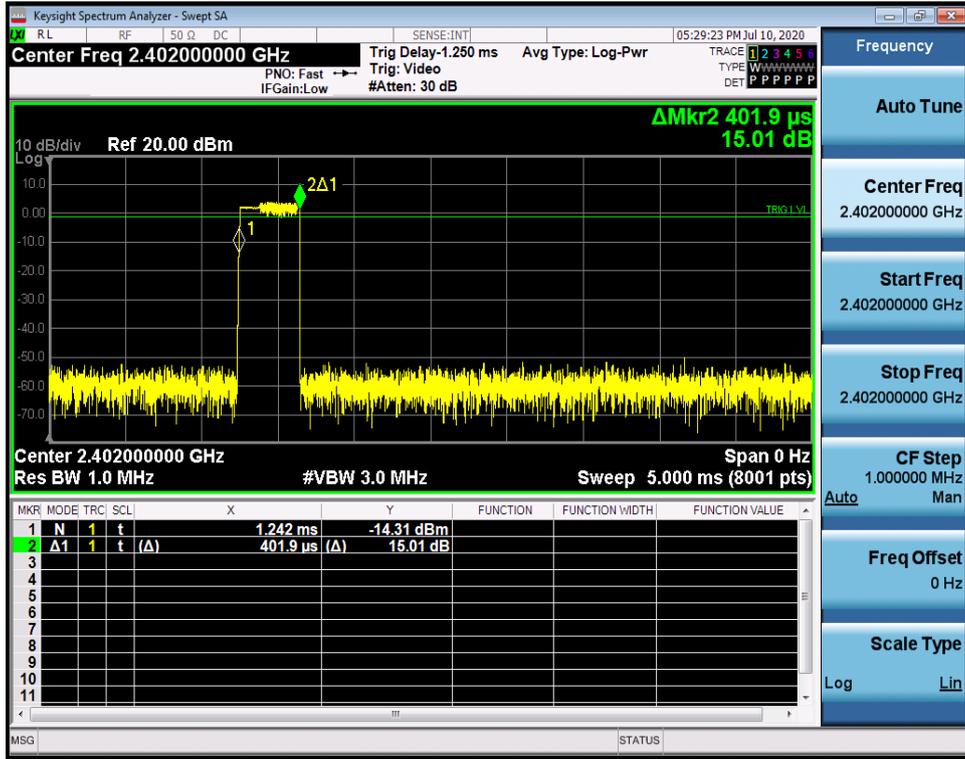


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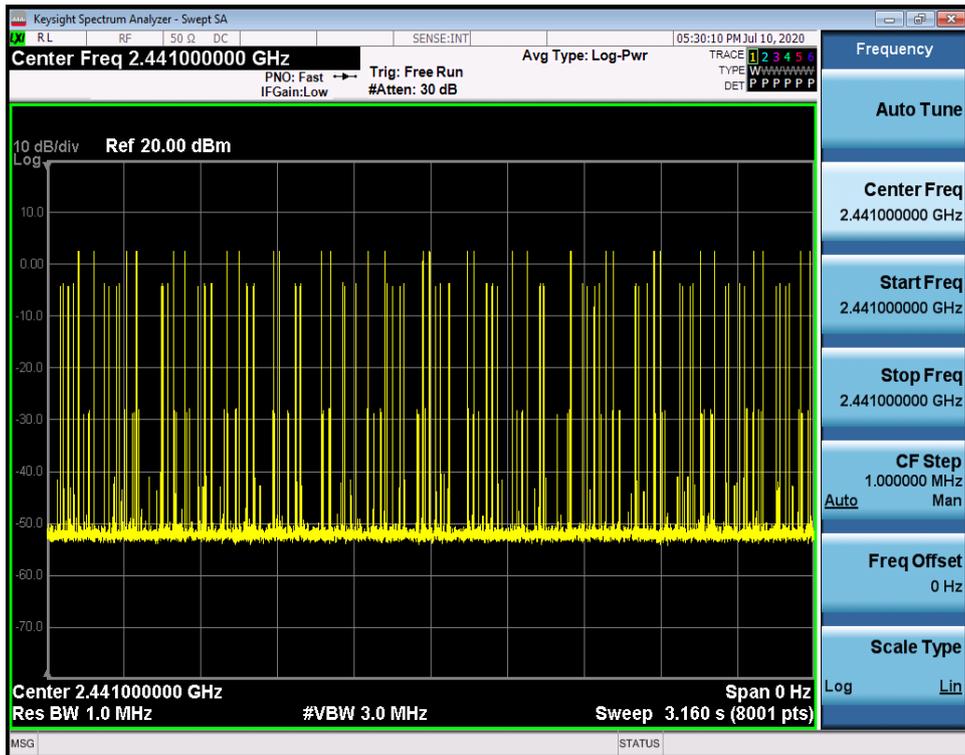
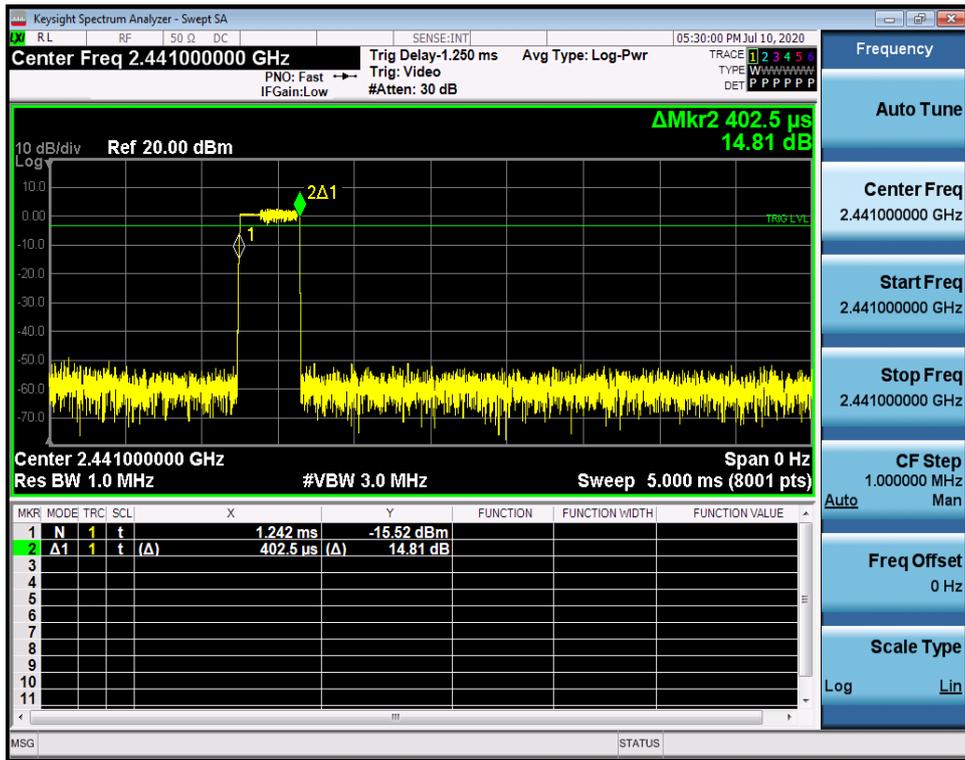
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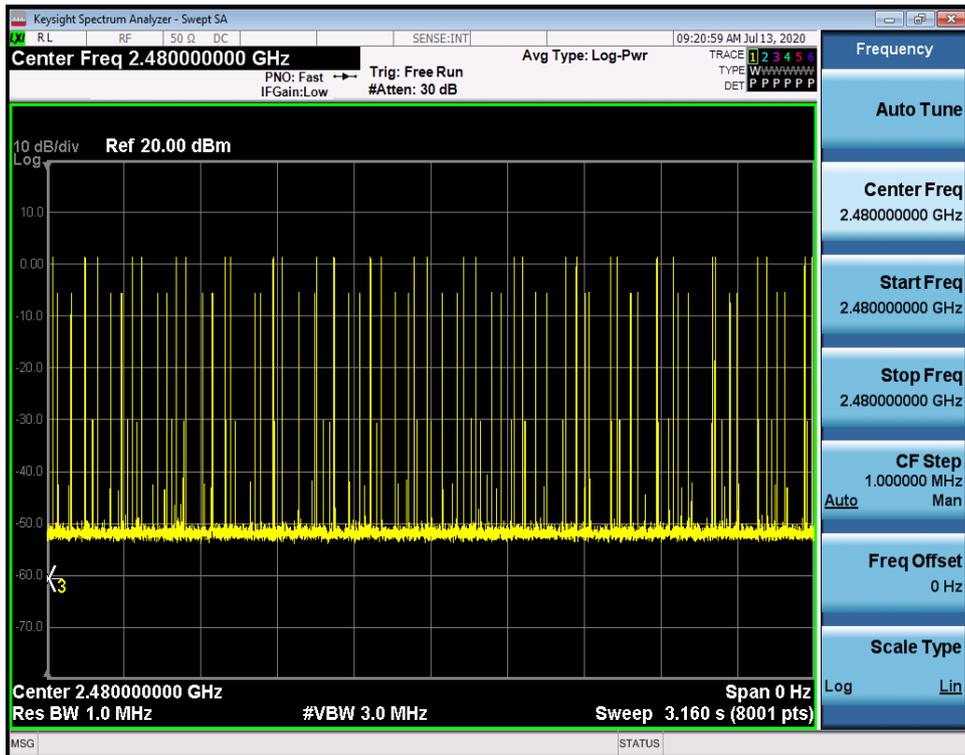
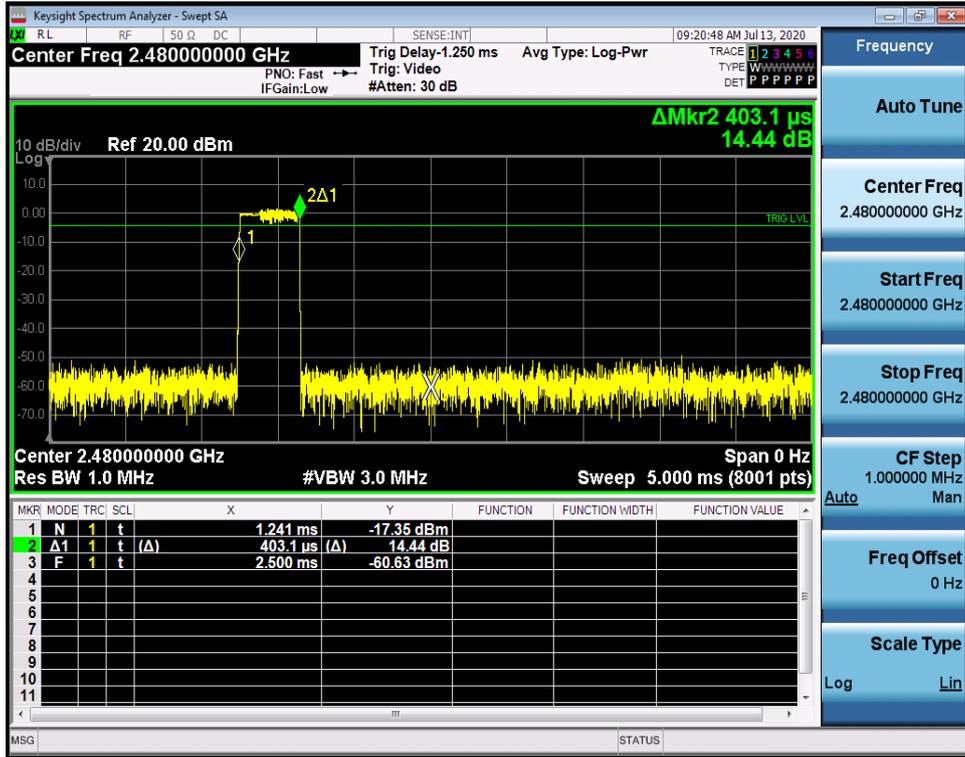


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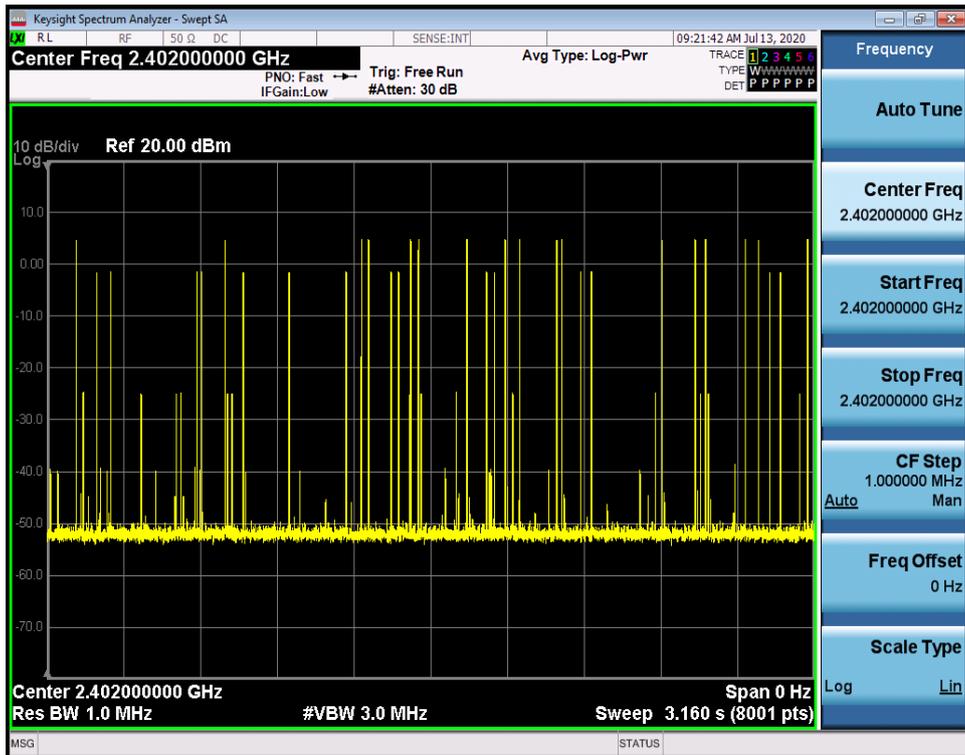
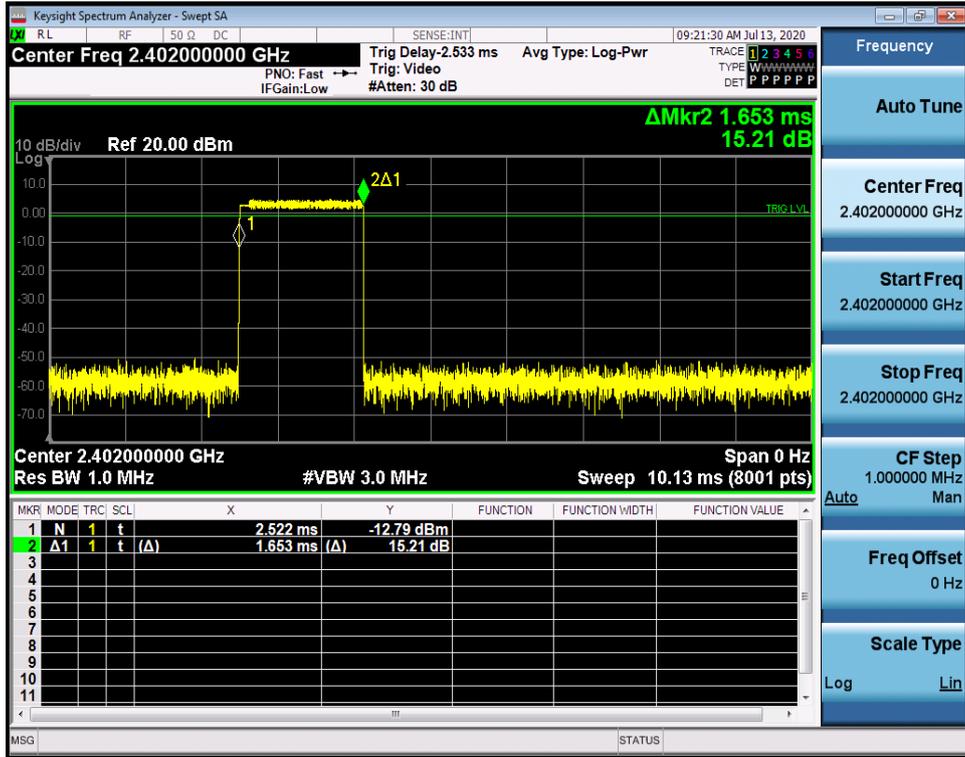


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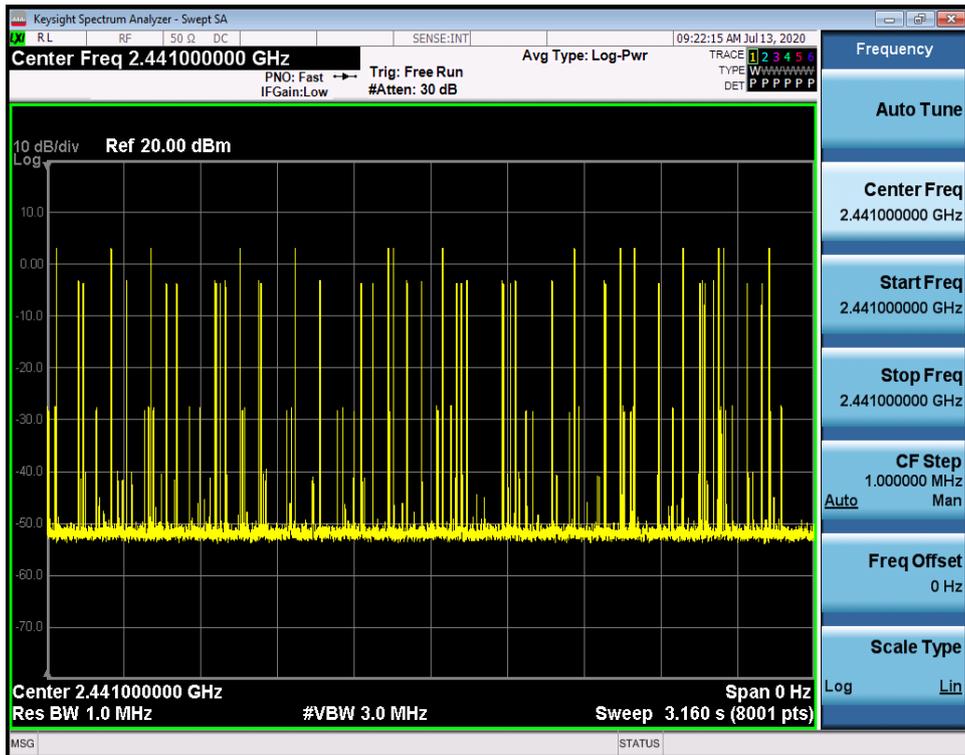
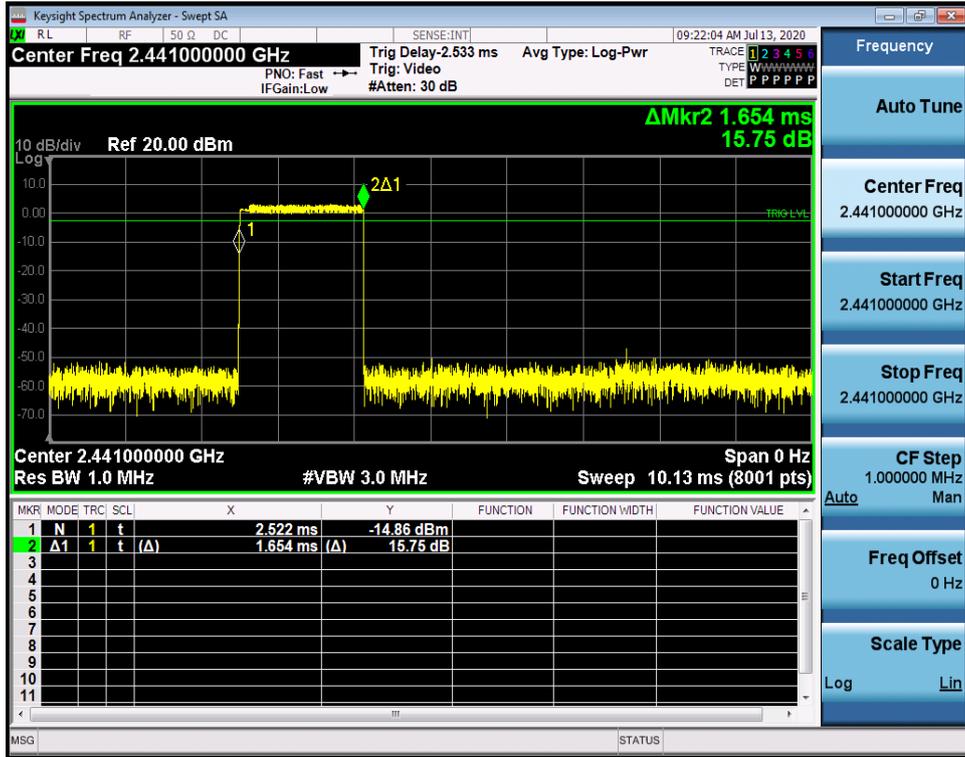


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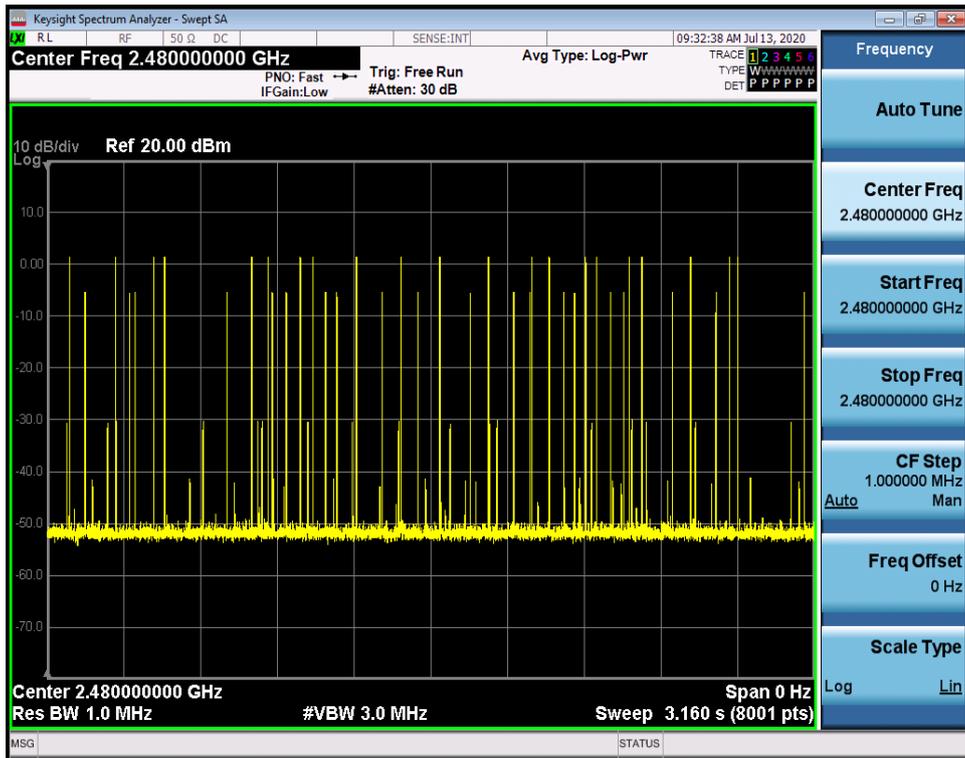
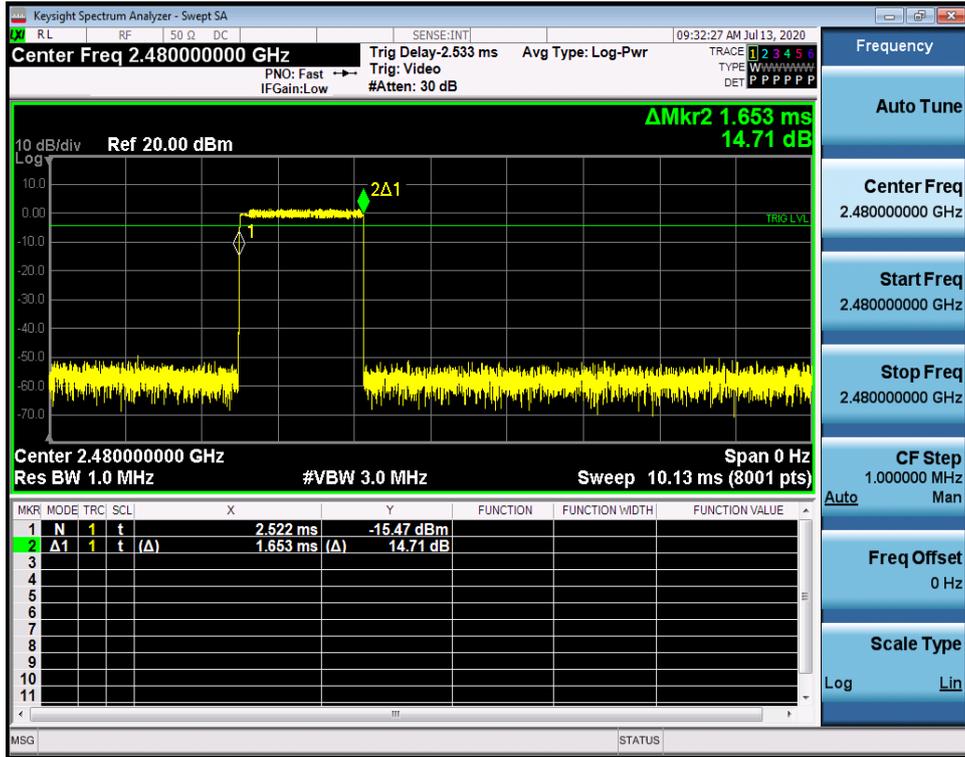


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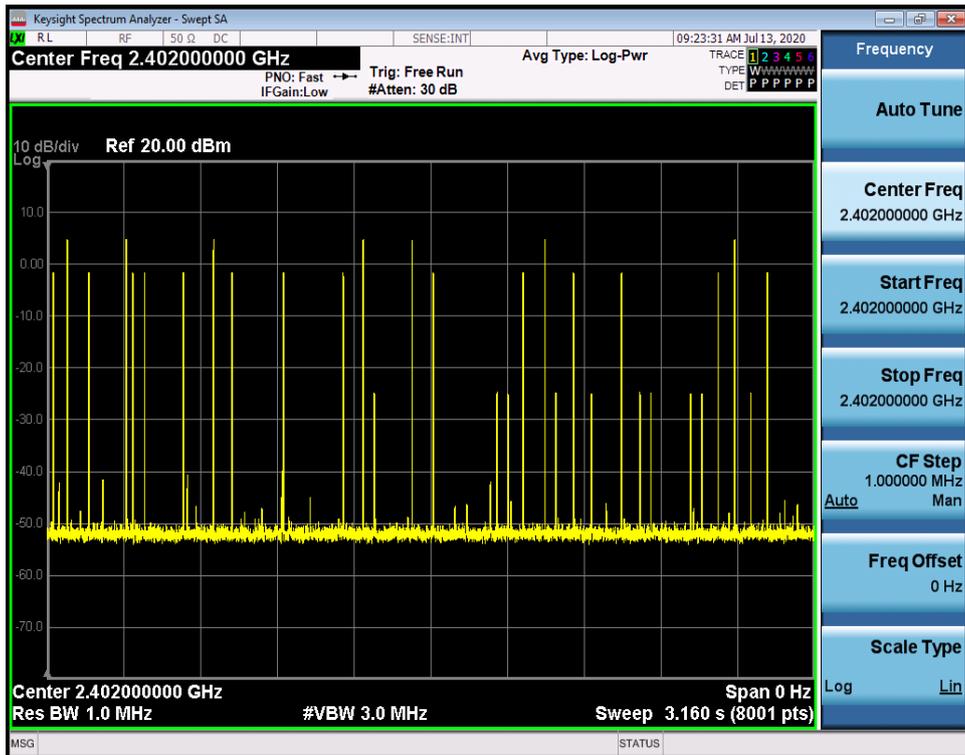
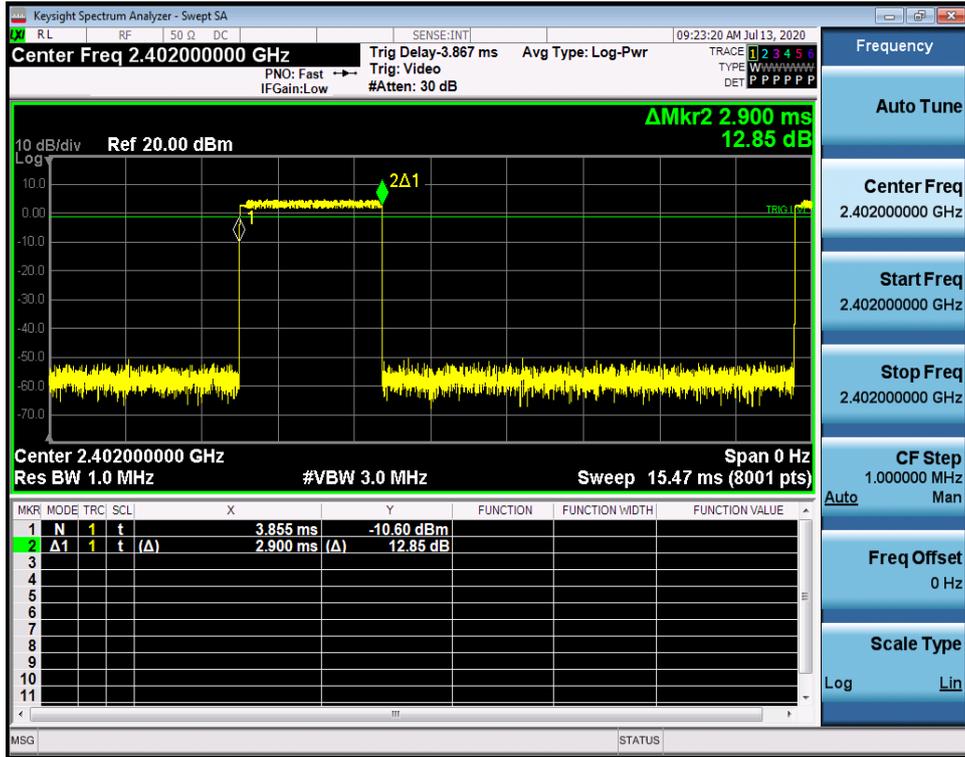


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