

Product Name: Charging portable adapter	Report No: FCC022022-6064RF6
Product Model: SPQ01	Security Classification: Open
Version: V1.0	Total Page: 75

TIRT Testing Report

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FCC Radio Test Report

FCC ID: 2A9VR-SPQ01

This report concerns: Original Grant

Equipment : Charging portable adapter
Brand Name : /
Test Model : SPQ01
Series Model : /
Applicant : Dongguan Jiugao Electronic Technology Co., Ltd
Address : Room 401, Building 2, No. 853, Jienan Road, Humen Town, Dongguan City, Guangdong Province, China
Manufacturer : Dongguan Jiugao Electronic Technology Co., Ltd
Address : Room 401, Building 2, No. 853, Jienan Road, Humen Town, Dongguan City, Guangdong Province, China
Date of Receipt : 2022.11.24
Date of Test : 2022.11.25-12.10
Issued Date : 2022.12.15
Report Version : V1.0
Test Sample : Engineering Sample No.: 20221124020547
Standard(s) : FCC CFR Title 47, Part 15, Subpart C
FCC KDB 558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2013

- The test result referred exclusively to the presented test model /sample.
- Without written approval of TIRT Inc. the test report shall not reproduced except in full.

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Table of Contents	Page
REPORT ISSUED HISTORY	6
1. SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	8
2. GENERAL INFORMATION	9
2.1 GENERAL DESCRIPTION OF EUT	9
2.2 DESCRIPTION OF TEST MODES	10
2.3 PARAMETERS OF TEST SOFTWARE	11
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.5 SUPPORT UNITS	11
3. ANTENNA REQUIREMENT	12
4. AC POWER LINE CONDUCTED EMISSIONS	13
4.1 LIMIT	13
4.2 TEST PROCEDURE	13
4.3 DEVIATION FROM TEST STANDARD	13
4.4 TEST SETUP	14
4.5 EUT OPERATING CONDITIONS	14
4.6 TEST RESULTS	14
5. RADIATED EMISSIONS	15
5.1 LIMIT	15
5.2 TEST PROCEDURE	16
5.3 DEVIATION FROM TEST STANDARD	17
5.4 TEST SETUP	17
5.5 EUT OPERATING CONDITIONS	18
5.6 TEST RESULTS - 9 kHz TO 30 MHz	18
5.7 TEST RESULTS - 30 MHz TO 1000 MHz	18
5.8 TEST RESULTS - ABOVE 1000 MHz	18
6. NUMBER OF HOPPING FREQUENCY	19
6.1 LIMIT	19
6.2 TEST PROCEDURE	19
6.3 DEVIATION FROM STANDARD	19
TEST SETUP	19
6.4 EUT OPERATION CONDITIONS	19

Table of Contents

Page

6.5 TEST RESULTS.....	19
7. AVERAGE TIME OF OCCUPANCY	20
7.1 LIMIT	20
7.2 TEST PROCEDURE	20
7.3 DEVIATION FROM STANDARD	20
7.4 TEST SETUP	20
7.5 EUT OPERATION CONDITIONS	20
7.6 TEST RESULTS.....	20
8. HOPPING CHANNEL SEPARATION	21
8.1 LIMIT	21
8.2 TEST PROCEDURE	21
8.3 DEVIATION FROM STANDARD	21
8.4 TEST SETUP	21
8.5 EUT OPERATION CONDITIONS	21
8.6 TEST RESULTS.....	21
9. BANDWIDTH.....	22
9.1 LIMIT	22
9.2 TEST PROCEDURE	22
9.3 DEVIATION FROM STANDARD	22
9.4 TEST SETUP	22
9.5 EUT OPERATION CONDITIONS	22
9.6 TEST RESULTS.....	22
10. CONDUCTED PEAK OUTPUT POWER.....	23
10.1 LIMIT	23
10.2 TEST PROCEDURE	23
10.3 DEVIATION FROM STANDARD	23
10.4 TEST SETUP	23
10.5 EUT OPERATION CONDITIONS	23
10.6 TEST RESULTS.....	23
11. CONDUCTED SPURIOUS EMISSION	25
11.1 LIMIT	25
11.2 TEST PROCEDURE	25
11.3 DEVIATION FROM STANDARD	25
11.4 TEST SETUP	25

Table of Contents	Page
11.5 EUT OPERATION CONDITIONS	25
11.6 TEST RESULTS.....	25
12. MEASUREMENT INSTRUMENTS LIST	26
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	27
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	30
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ.....	31
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ.....	34
APPENDIX E - NUMBER OF HOPPING FREQUENCY	43
APPENDIX F - AVERAGE TIME OF OCCUPANCY.....	45
APPENDIX G - HOPPING CHANNEL SEPARATION.....	50
APPENDIX H - BANDWIDTH.....	52
APPENDIX I - CONDUCTED PEAK OUTPUT POWER	60
APPENDIX J - CONDUCTED SPURIOUS EMISSION AND CONDUCTED BAND EDGE.....	65

REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
FCC022022-6064RF6	V1.0	Original Report.	2022.12.15	Valid

11. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC CFR Title 47, Part 15, Subpart C				
Standard(s) Section	Test Item	Test Result	Judgment	Remark
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS	-----
15.247(d) 15.205(a) 15.209(a)	Radiated Emission	APPENDIX B APPENDIX C APPENDIX D	PASS	-----
15.247 (a)(1)(iii)	Number of Hopping Frequency	APPENDIX E	PASS	-----
15.247 (a)(1)(iii)	Average Time of Occupancy	APPENDIX F	PASS	-----
15.247(a)(1)	Hopping Channel Separation	APPENDIX G	PASS	-----
15.247(a)(1)	Bandwidth	APPENDIX H	PASS	-----
15.247(b)(1)	Conducted Peak Output Power	APPENDIX I	PASS	-----
15.247(d)	Conducted Spurious Emission	APPENDIX J	PASS	-----
15.203	Antenna Requirement	-----	PASS	Note(2)

Note:

- (1) "N/A" denotes test is not applicable in this test report
- (2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.

1.11.1 TEST FACILITY

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1.2 1.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

The TIRT measurement uncertainty as below table:

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 142.12\text{kHz}$
RF power conducted	$\pm 0.74\text{dB}$
RF power radiated	$\pm 3.25\text{dB}$
Spurious emissions, conducted	$\pm 1.78\text{dB}$
Spurious emissions, radiated (30MHz~1GHz)	$\pm 4.6\text{dB}$
Spurious emissions, radiated (1GHz ~ 18GHz)	$\pm 4.9\text{dB}$
Conduction Emissions(150kHz~30MHz)	$\pm 3.1\text{dB}$
Humidity	$\pm 4.6\%$
Temperature	$\pm 0.7^{\circ}\text{C}$
Time	$\pm 1.25\%$

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	22. 3°C	52%	AC 120V/60Hz	Stone Tang
Radiated Emissions-9 kHz to 30 MHz	22. 5°C	55%	DC 5V	Stone Tang
Radiated Emissions-30 MHz to 1000 MHz	22. 2°C	52%	DC 5V	Stone Tang
Radiated Emissions-Above 1000 MHz	22. 1°C	51%	DC 5V	Stone Tang
Number of Hopping Frequency	22. 3°C	54%	DC 5V	Stone Tang
Average Time of Occupancy	22. 3°C	54%	DC 5V	Stone Tang
Hopping Channel Separation	22. 3°C	54%	DC 5V	Stone Tang
Bandwidth	22. 3°C	54%	DC 5V	Stone Tang
Maximum Output Power	22. 3°C	54%	DC 5V	Stone Tang
Conducted Spurious Emission	22. 3°C	54%	DC 5V	Stone Tang

22. GENERAL INFORMATION

2.1 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Charging portable adapter
Brand Name	/
Test Model	SPQ01
Series Model	/
Model Difference(s)	/
Power Source	Supplied from PC USB port.
Power Rating	DC 5V
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK, $\pi/4$ -DQPSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Antenna Type	Chip Antenna
Antenna Gain (dBi)	3
Max. Peak Output Power	2Mbps: 4.31 dBm (0.0027W)

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

2.2 2.2 DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/39/78
Mode 2	TX Mode_2Mbps Channel 00/39/78
Mode 3	TX Mode_2Mbps Channel 78
Mode 4	TX Mode_2Mbps Channel 00/78

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test	
Final Test Mode	Description
Mode 3	TX Mode_2Mbps Channel 78

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 3	TX Mode_2Mbps Channel 78

Radiated emissions test - Above 1GHz (Bandedge)	
Final Test Mode	Description
Mode 4	TX Mode_2Mbps Channel 00/78

Radiated emissions test - Above 1GHz (Harmonic)	
Final Test Mode	Description
Mode 4	TX Mode_2Mbps Channel 00/78

Maximum Output Power	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/39/78
Mode 2	TX Mode_2Mbps Channel 00/39/78

Other Conducted test	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/39/78
Mode 2	TX Mode_2Mbps Channel 00/39/78

Note:

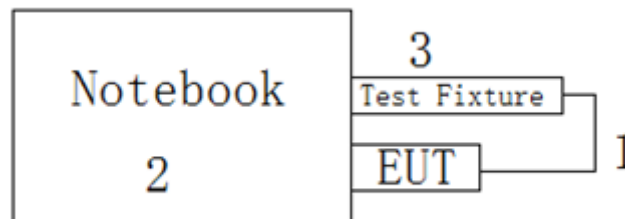
- (1) The measurements for Output Power were tested with DH1/3/5 during 1Mbps, 2Mbps , the worst case were 1Mbps (DH5) and 2Mbps (DH5), only worst case were documented for other test items except Average Time of Occupancy.
- (2) For radiated emission above 1 GHz test, the spurious points of 1GHz~26.5GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.
- (3) This product has the mode of BT AFH, which was considered during testing. 800/20/X(X = 2 of DH1, X = 4 of DH3 or X = 6 of DH5) with 20, 10 or 6.67 hops per second in a channel, and then multiply 0.4*20 (20 # of hopping). But this mode is not the worst case mode as duration of the packet is same, and this report only shows the worst case mode.
- (4) For AC power line conducted emissions and radiated spurious emissions below 1 GHz test, the 2Mbps Channel 78 is found to be the worst case and recorded.

2.3 2.3 PARAMETERS OF TEST SOFTWARE

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software Version	FCC Asssist (1.0.0.2)		
Frequency (MHz)	2402	2441	2480
1Mbps	7	7	7
2Mbps	7	7	7

2.4 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 2.5 SUPPORT UNITS

Support Equipment				
No.	Equipment	Brand Name	Model Name	Remarks
1	Data Cable	NO	NO	0.2m
2	Notebook	Lenovo	M4500T	NA
3	Test Fixture	N/A	N/A	N/A

33. ANTENNA REQUIREMENT

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

According to the manufacturer's declaration letter and antenna report, the EUT has a chip antenna, the antenna gain is 3dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement.

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

Refer to EUT Photo for further details.

44. AC POWER LINE CONDUCTED EMISSIONS

4.1 4.1 LIMIT

Frequency of Emission (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

4.24.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

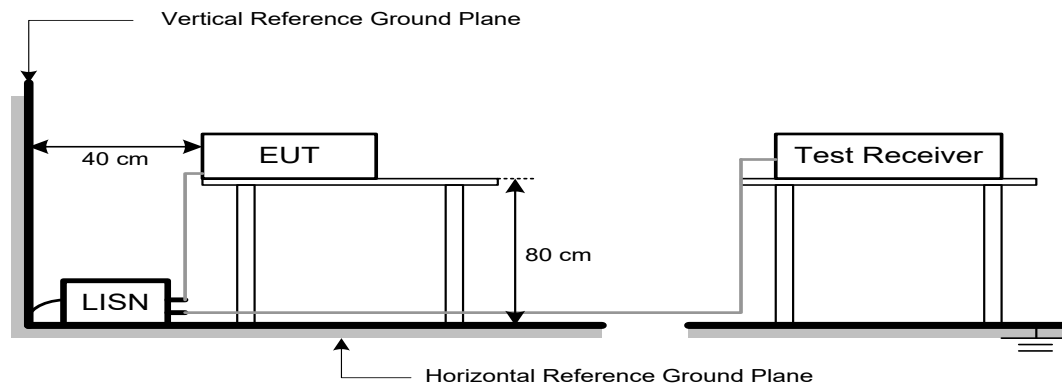
The following table is the setting of the receiver:

Receiver Parameters	Setting
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.3 4.3 DEVIATION FROM TEST STANDARD

No deviation.

4.4 4.4 TEST SETUP



4.5 4.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical function (as a customer would normally use it), EUT was programmed to be in continuously transmitting data or hopping on mode.

4.6 4.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform in this case, a "*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.

55. RADIATED EMISSIONS

5.1 5.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000 MHz)

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

Note:

- (1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

5.2 5.2 TEST PROCEDURE

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1 GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1 GHz)
- The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
(below 1 GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

The following table is the setting of the receiver:

Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

Spectrum Parameters	Setting
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1 MHz / 3 MHz for PK value 1 MHz / 1/T Hz for AVG value

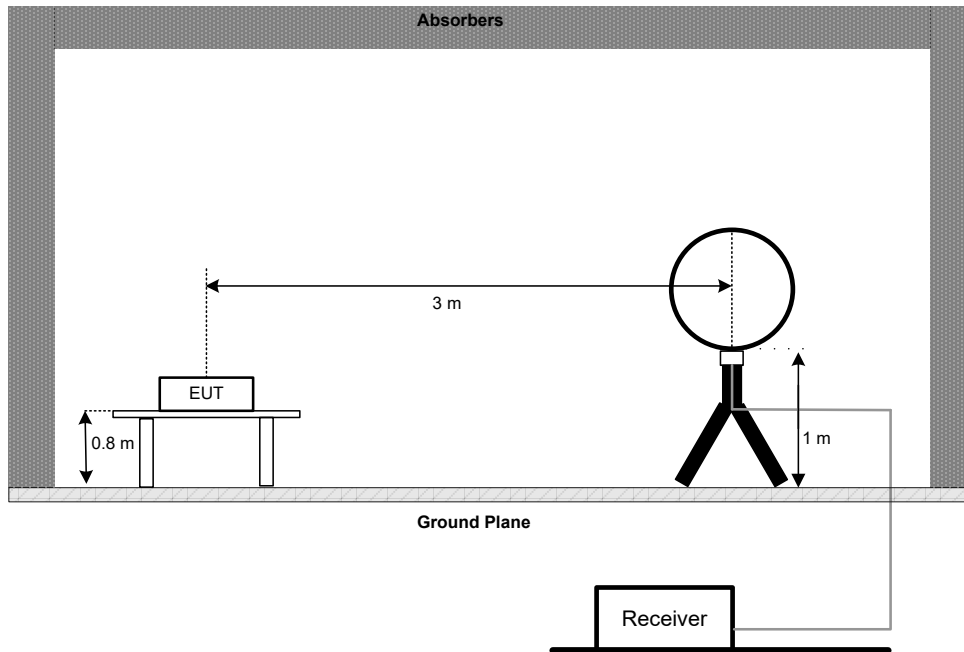
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector
Start ~ Stop Frequency	1 GHz~18 GHz for PK/AVG detector
Start ~ Stop Frequency	18 GHz~26.5 GHz for PK/AVG detector

5.3 5.3 DEVIATION FROM TEST STANDARD

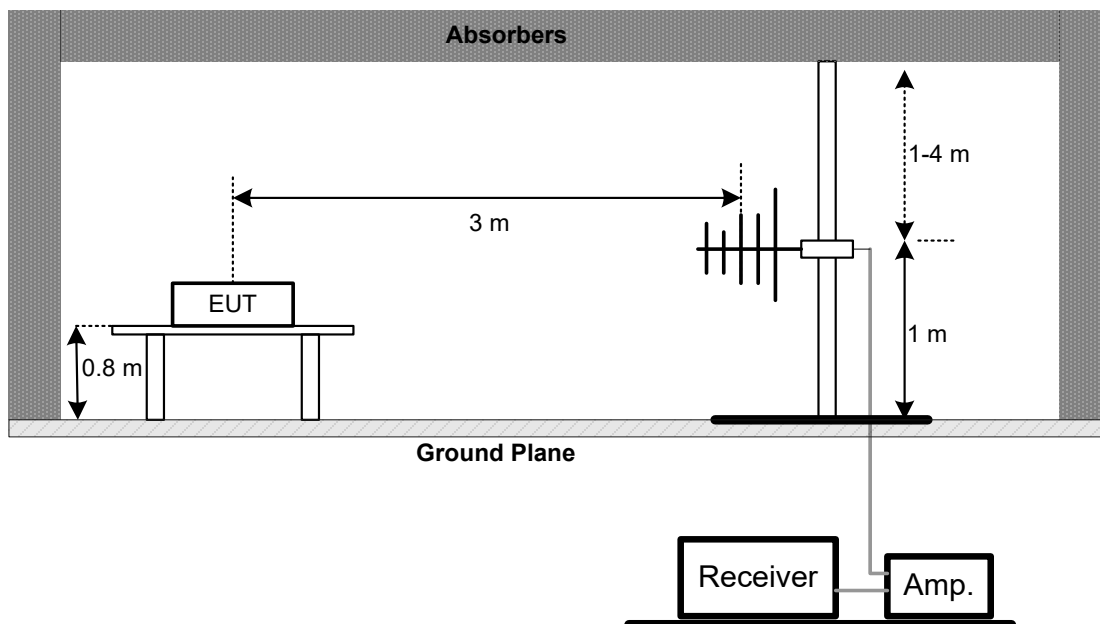
No deviation.

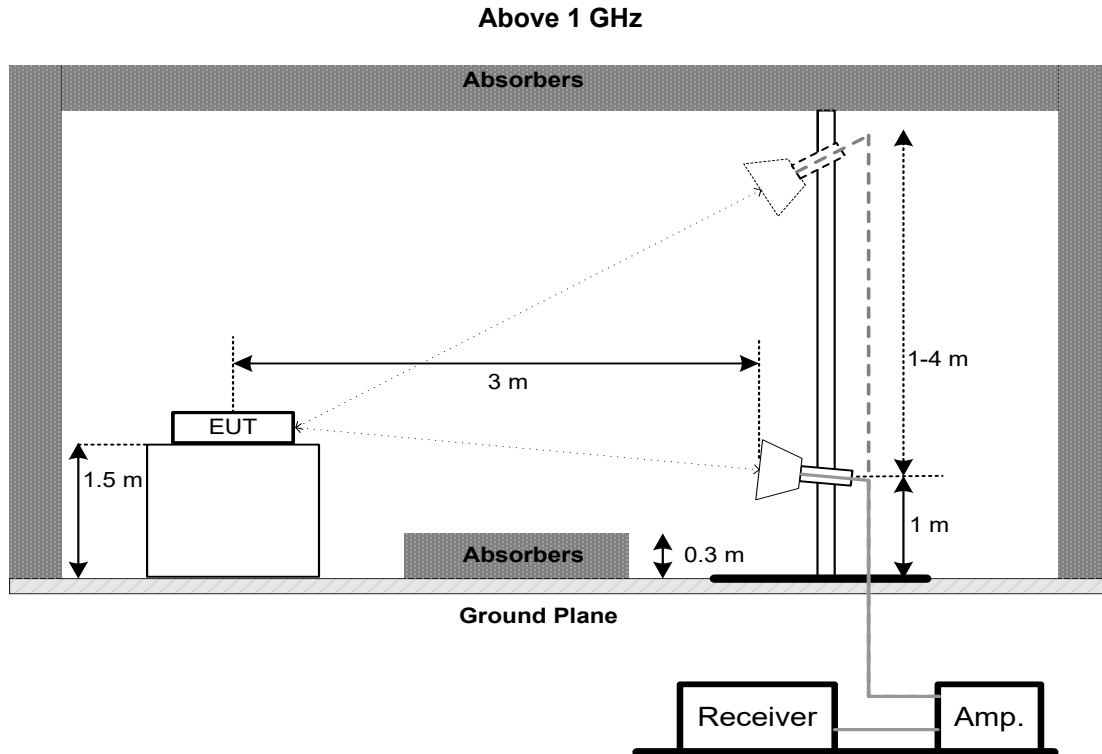
5.4 5.4 TEST SETUP

9 kHz to 30 MHz



30 MHz to 1 GHz





5.5 5.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6 5.6 TEST RESULTS - 9 kHz TO 30 MHz

Please refer to the APPENDIX B.

Remark:

- (1) Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

5.7 5.7 TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

5.8 5.8 TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX D.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.
- (2) The high frequency, which started from 18GHz to 25GHz, was pre-scanned and the result which was 20dB lower than the limit line was not recored in this report.

66. NUMBER OF HOPPING FREQUENCY

6.1 6.1 LIMIT

Section	Test Item	Limit
FCC 15.247(a)(1)(iii)	Number of Hopping Frequency	15

6.2 6.2 TEST PROCEDURE

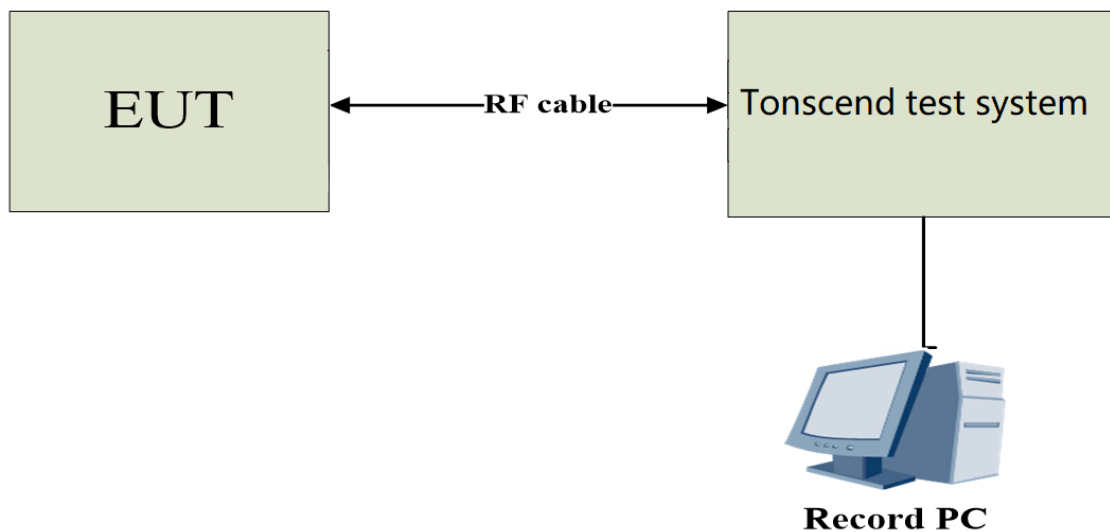
- The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	> Operating Frequency Range
RBW	300 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.3 6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 6.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6 6.5 TEST RESULTS

Please refer to the APPENDIX E.

77. AVERAGE TIME OF OCCUPANCY

7.1 7.1 LIMIT

Section	Test Item	Limit
FCC 15.247(a)(1)(iii)	Average Time of Occupancy	0.4sec

7.2 7.2 TEST PROCEDURE

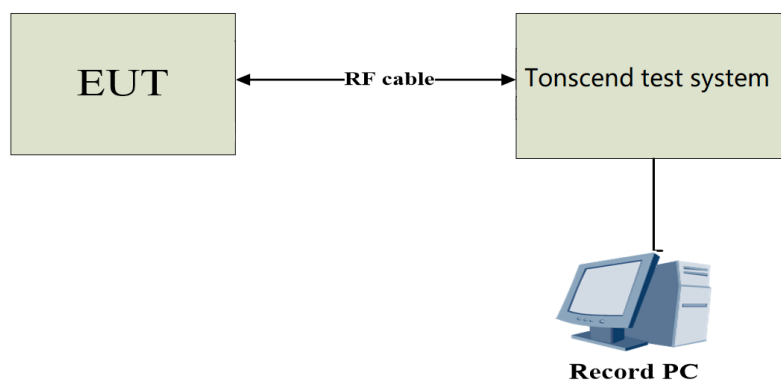
- Set the EUT for DH1, DH3 and DH5 packet transmitting.
- Measure the maximum time duration of one single pulse.
- DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds.
- DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds.
- DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds.
- The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	0 MHz
RBW	1 MHz
VBW	1 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	As necessary to capture the entire dwell time per hopping channel

7.3 7.3 DEVIATION FROM STANDARD

No deviation.

7.4 7.4 TEST SETUP



7.5 7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6 7.6 TEST RESULTS

Please refer to the APPENDIX F.

88. HOPPING CHANNEL SEPARATION

8.1 8.1 LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

8.2 8.2 TEST PROCEDURE

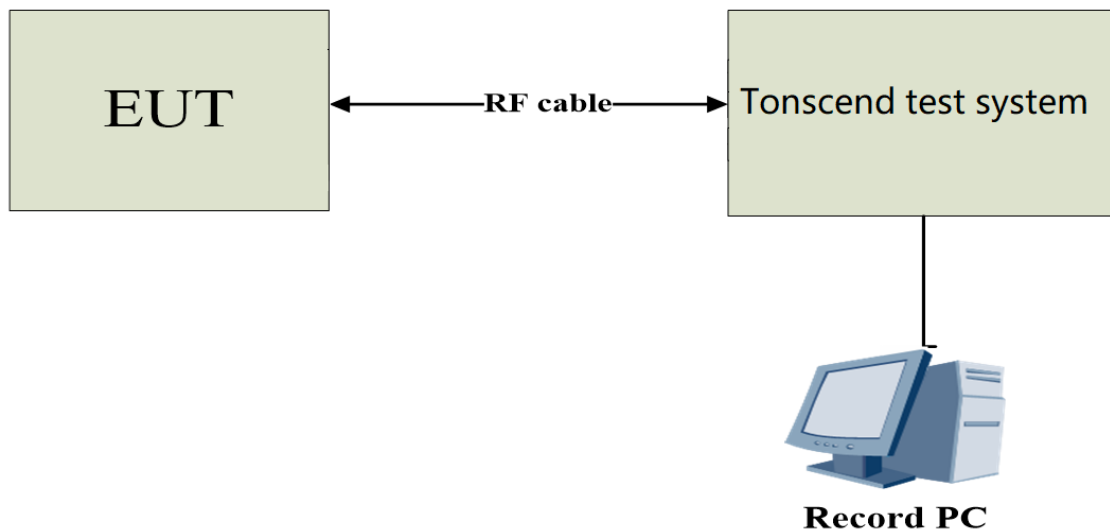
- The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	Wide enough to capture the peaks of two adjacent channels
RBW	300 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.3 8.3 DEVIATION FROM STANDARD

No deviation.

8.4 8.4 TEST SETUP



8.5 8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.6 8.6 TEST RESULTS

Please refer to the APPENDIX G.

99. BANDWIDTH

9.1 9.1 LIMIT

Section	Test Item
FCC 15.247(a)(1)	Bandwidth

9.2 9.2 TEST PROCEDURE

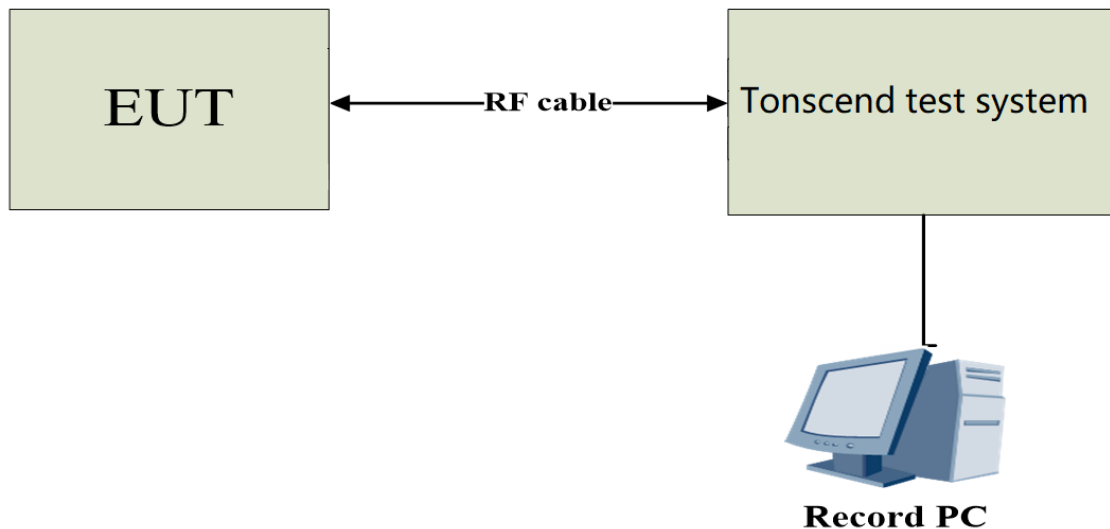
- The EUT was directly connected to the tonskend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	> Measurement Bandwidth
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

9.3 9.3 DEVIATION FROM STANDARD

No deviation.

9.4 9.4 TEST SETUP



9.5 9.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

9.6 9.6 TEST RESULTS

Please refer to the APPENDIX H.

1010. CONDUCTED PEAK OUTPUT POWER

10.1 10.1 LIMIT

Section	Test Item	Limit
FCC 15.247(b)(1)	Maximum Output Power	0.1250 Watt or 20.97 dBm

Note: Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

10.2 10.2 TEST PROCEDURE

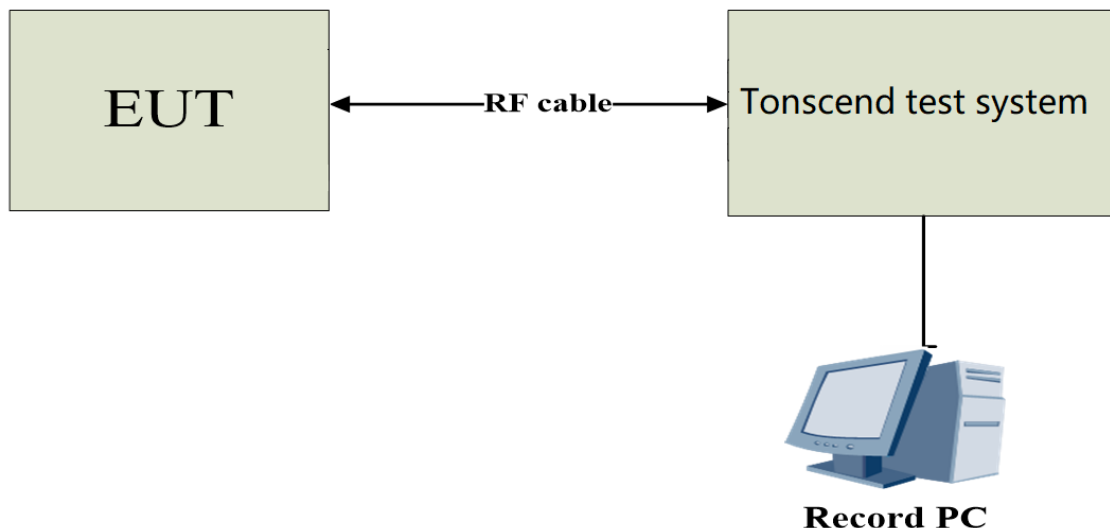
- The EUT was directly connected to the tonscond test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span	3MHz
RBW	1MHz
VBW	3MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

10.3 10.3 DEVIATION FROM STANDARD

No deviation.

10.4 10.4 TEST SETUP



10.5 10.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

10.6 10.6 TEST RESULTS

Please refer to the APPENDIX I.

1111. CONDUCTED SPURIOUS EMISSION

11.1 11.1 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 Output Power limits. If the transmitter complies with the Output 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 Section 15.209(a) is not required.

11.2 11.2 TEST PROCEDURE

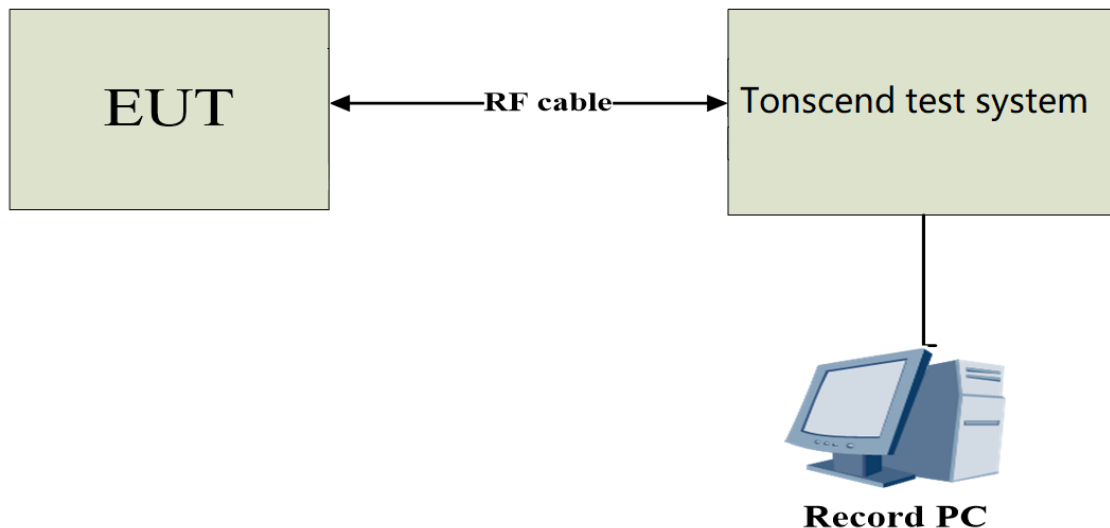
- The EUT was directly connected to the tonscond test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Start Frequency	30 MHz
Stop Frequency	26.5 GHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

11.3 11.3 DEVIATION FROM STANDARD

No deviation.

11.4 11.4 TEST SETUP



11.5 11.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

11.6 11.6 TEST RESULTS

Please refer to the APPENDIX J.

1212. MEASUREMENT INSTRUMENTS LIST

No.	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EMI Receiver	Rohde&Schwarz	ESCI	1166.5950.03	2023/10/14
2	AMN	Rohde&Schwarz	ENV216	3560.6550.05	2023/10/14
3	AMN	Schwarzbeck	NSLK8127	#829	2023/10/14
4	ECSI RF IN RF Cable	Rohde&Schwarz	RP-X1	\	2023/10/14
5	ECSI RF IN RF Cable	Rohde&Schwarz	Sapre sm	\	2023/10/14
6	EMI Receiver	Rohde&Schwarz	ESR7	102013	2023/10/14
7	Spectrum analyzer	Rohde&Schwarz	FSV30	103741	2023/10/17
8	EMI receiver	Rohde&Schwarz	ESU	100184	2023/07/20
9	Spectrum analyzer	KEYSIGHT	N9010A-44	MY51440158	2023/10/17
10	Loop Antenna*	Schwarzbeck	FMZB1519B	00029	2025/07/03
11	Integral Antenna	Schwarzbeck	VULB 9163	VULB 9163-361	2023/10/20
12	Integral Antenna	Schwarzbeck	BBHA 9120D	BBHA 9120D 1201	2023/10/15
13	Integral Antenna	Schwarzbeck	BBHA 9170	9170#685	2023/10/14
14	Preamplifier	CD Systems Inc	PAP-03036-30	85060000	2023/10/15
15	Preamplifier	Schwarzbeck	BBV9721	9721-019	2023/10/15
16	Preamplifier	emci	EMC012645 SE	980417	2023/10/16
17	ECSI RF IN RF Cable	Rohde&Schwarz	AP-X1	\	2023/10/14
18	Power Collection Unit	Tonscend	JS0806-2	188060134	2023/5/4
19	Tonscend Test System	Tonscend	2.6.77.0518	NA	NA
20	10dB Attenuator	Tonscend	10dB	NA	NA
21	Temp&Humidity Recorder	Anymetre	JR900	NA	2023/12/14
22	Filter	STI	STI15-9845	N/A	N/A
23	Filter	STI	5.1G	N/A	N/A
24	Filter	STI	STI15-9845	N/A	N/A
25	Testing Software	EZ-EMC	TW-03A2	N/A	N/A

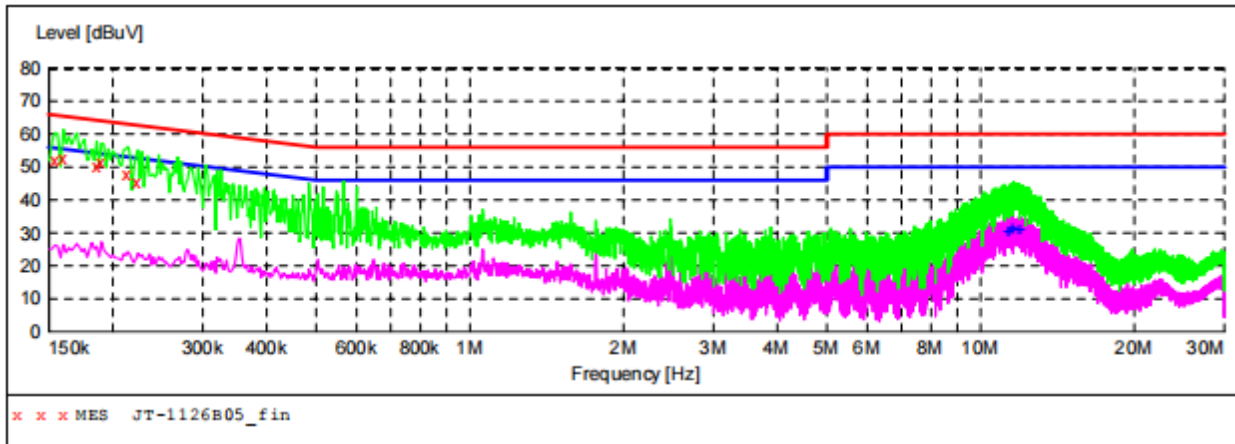
Remark "N/A" denotes no model name, serial no. or calibration specified.

"**" calibration period of equipment list is three year.

Except * item, all calibration period of equipment list is one year.

APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

Test Mode	TX Mode_2Mbps Channel 78	Phase	Line
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MEASUREMENT RESULT: "JT-1126B05_fin"

2022-11-26 17:11

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.154000	52.00	10.1	66	13.8	QP	L1	GND
0.160000	52.60	10.1	66	12.9	QP	L1	GND
0.186000	50.40	10.1	64	13.8	QP	L1	GND
0.190000	51.60	10.1	64	12.4	QP	L1	GND
0.214000	48.10	10.1	63	14.9	QP	L1	GND
0.224000	45.40	10.1	63	17.3	QP	L1	GND

MEASUREMENT RESULT: "JT-1126B05_fin2"

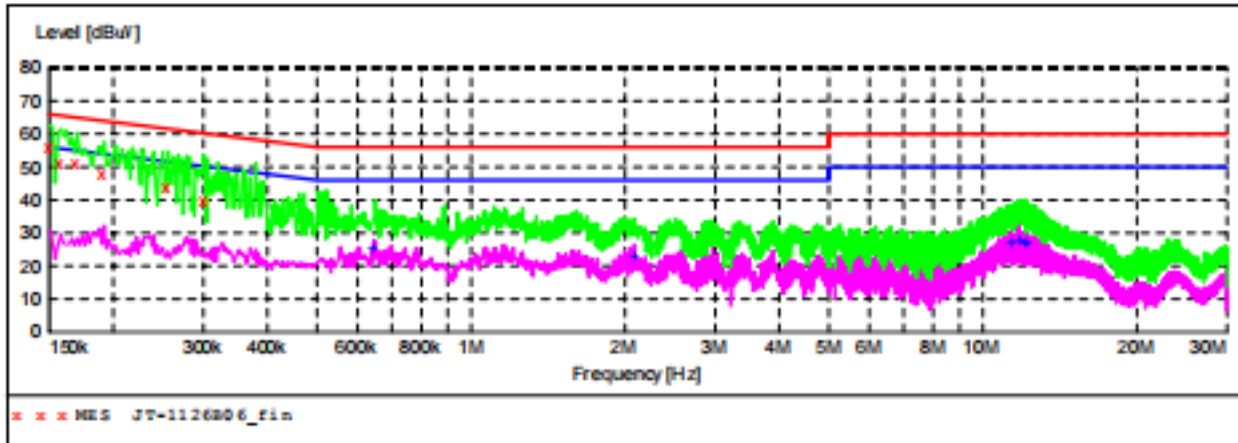
2022-11-26 17:11

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
11.319500	30.30	10.5	50	19.7	AV	L1	GND
11.405000	30.20	10.5	50	19.8	AV	L1	GND
11.535500	31.20	10.5	50	18.8	AV	L1	GND
11.580500	31.40	10.5	50	18.6	AV	L1	GND
11.877500	30.70	10.5	50	19.3	AV	L1	GND
12.017000	30.70	10.5	50	19.3	AV	L1	GND

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX Mode_2Mbps Channel 78	Phase	Neutral
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MEASUREMENT RESULT: "JT-1126B06_fin"

2022-11-26 17:14

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.150000	55.70	10.1	66	10.3	QP	N	GND
0.158000	51.00	10.1	66	14.6	QP	N	GND
0.170000	50.90	10.1	65	14.1	QP	N	GND
0.192000	48.30	10.1	64	15.6	QP	N	GND
0.256000	43.70	10.2	62	17.9	QP	N	GND
0.300000	40.20	10.2	60	20.0	QP	N	GND

MEASUREMENT RESULT: "JT-1126B06_fin2"

2022-11-26 17:14

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.646000	25.30	10.4	46	20.7	AV	N	GND
2.085500	23.20	10.2	46	22.8	AV	N	GND
11.364500	26.80	10.5	50	23.2	AV	N	GND
11.756000	27.60	10.5	50	22.4	AV	N	GND
12.093500	27.10	10.5	50	22.9	AV	N	GND
12.224000	27.10	10.5	50	22.9	AV	N	GND

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

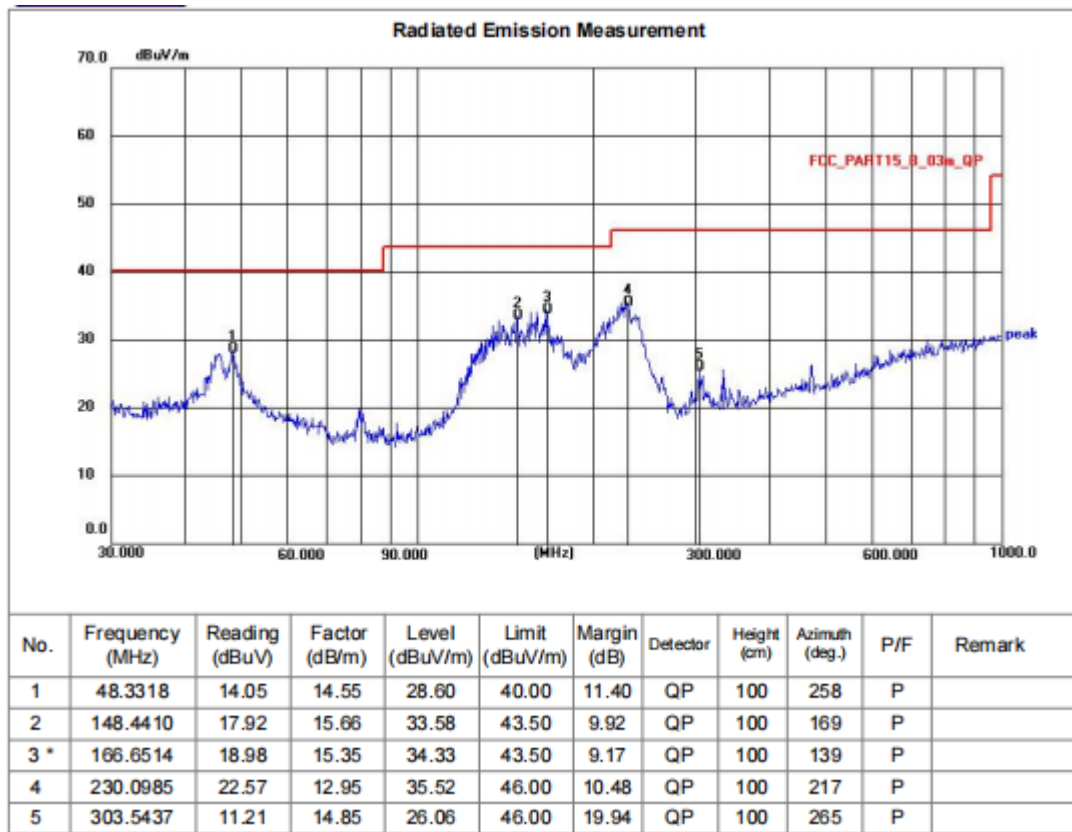
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ

Test Mode	TX Mode_2Mbps Channel 78
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The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

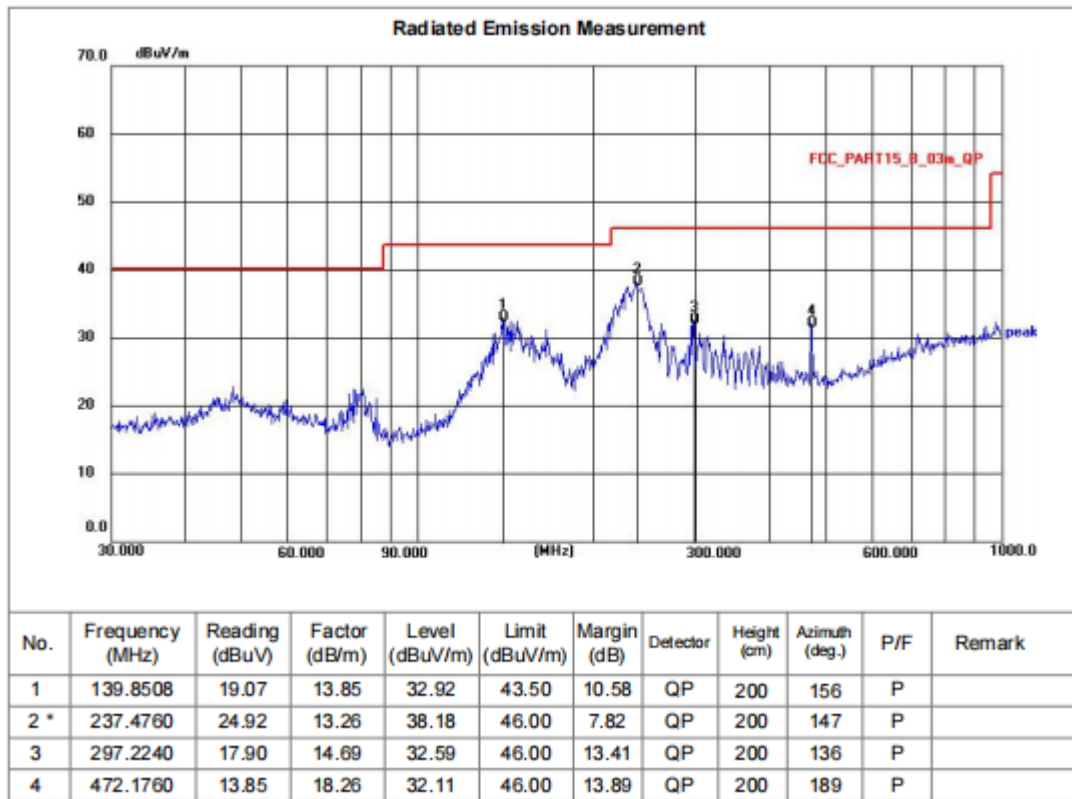
Test Mode	TX Mode_2Mbps Channel 78	Polarization	Vertical
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REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX Mode_2Mbps Channel 78	Polarization	Horizontal
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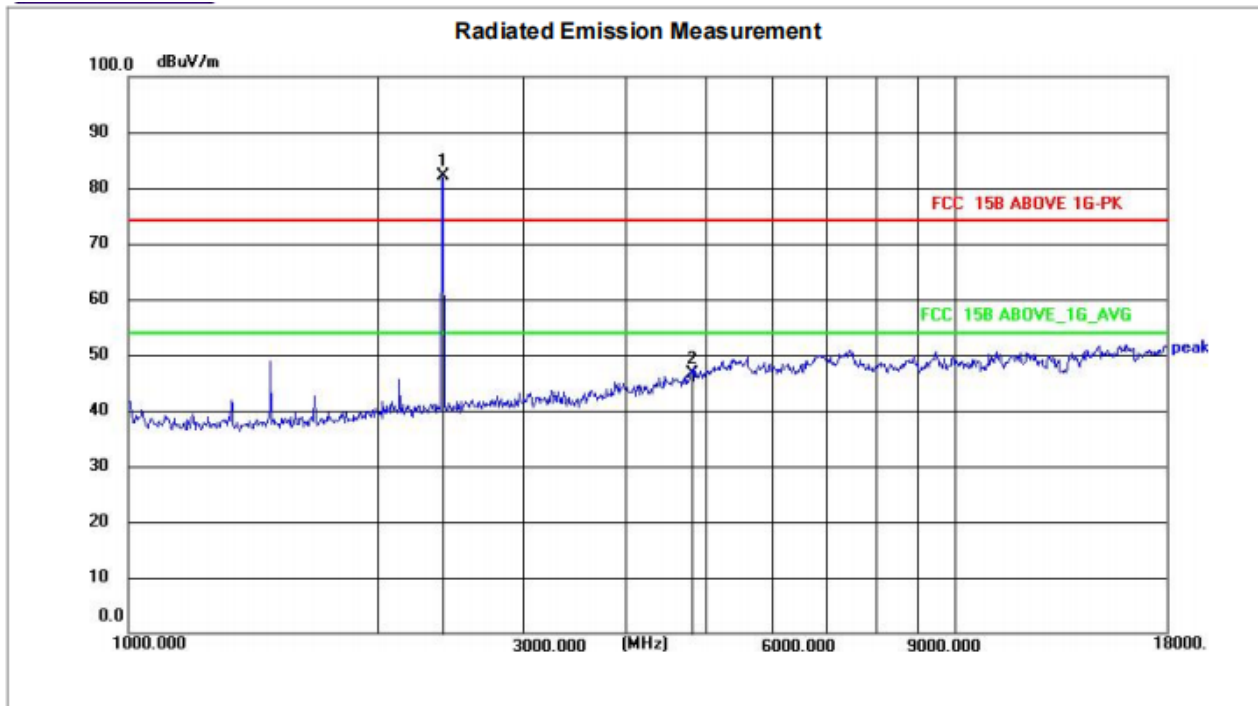


REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ

Test Mode	TX 2402 MHz _CH0_2Mbps	Polarization	Vertical
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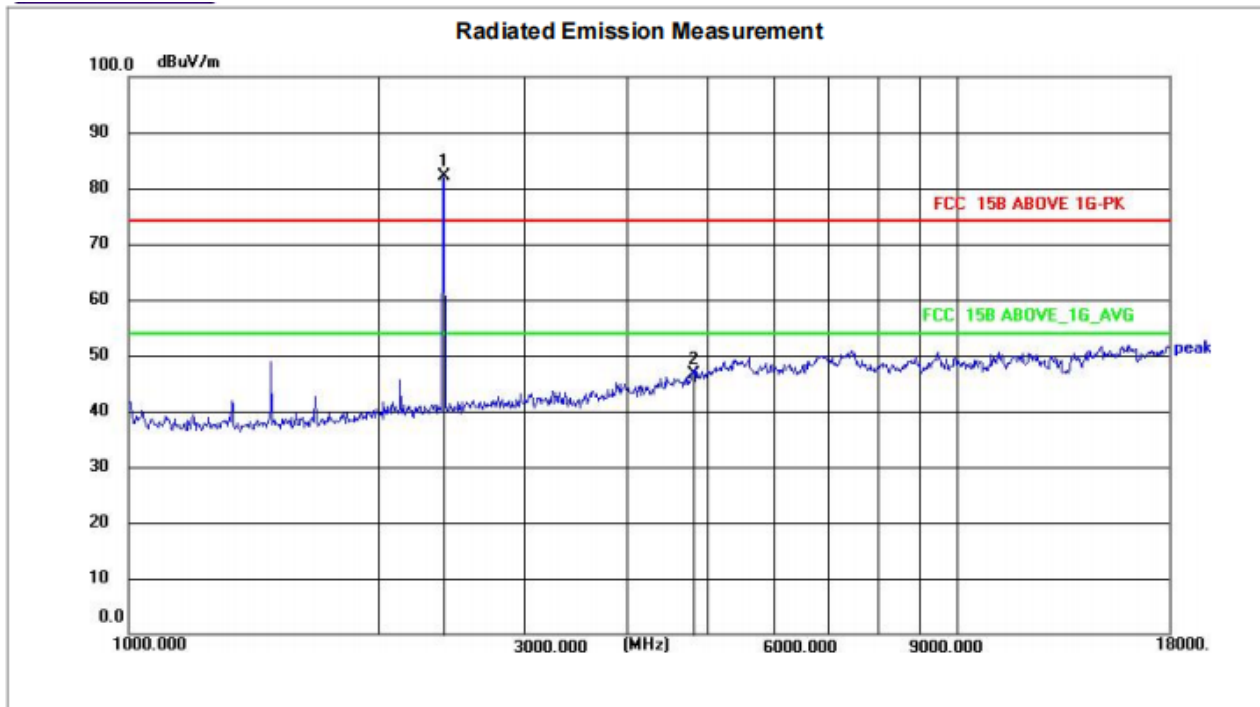


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	2399.667	92.08	-9.96	82.12	74.00	-8.12	peak				
2	4804.000	51.72	-5.01	46.71	74.00	27.29	peak				

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2402 MHz _CH0_2Mbps	Polarization	Horizontal
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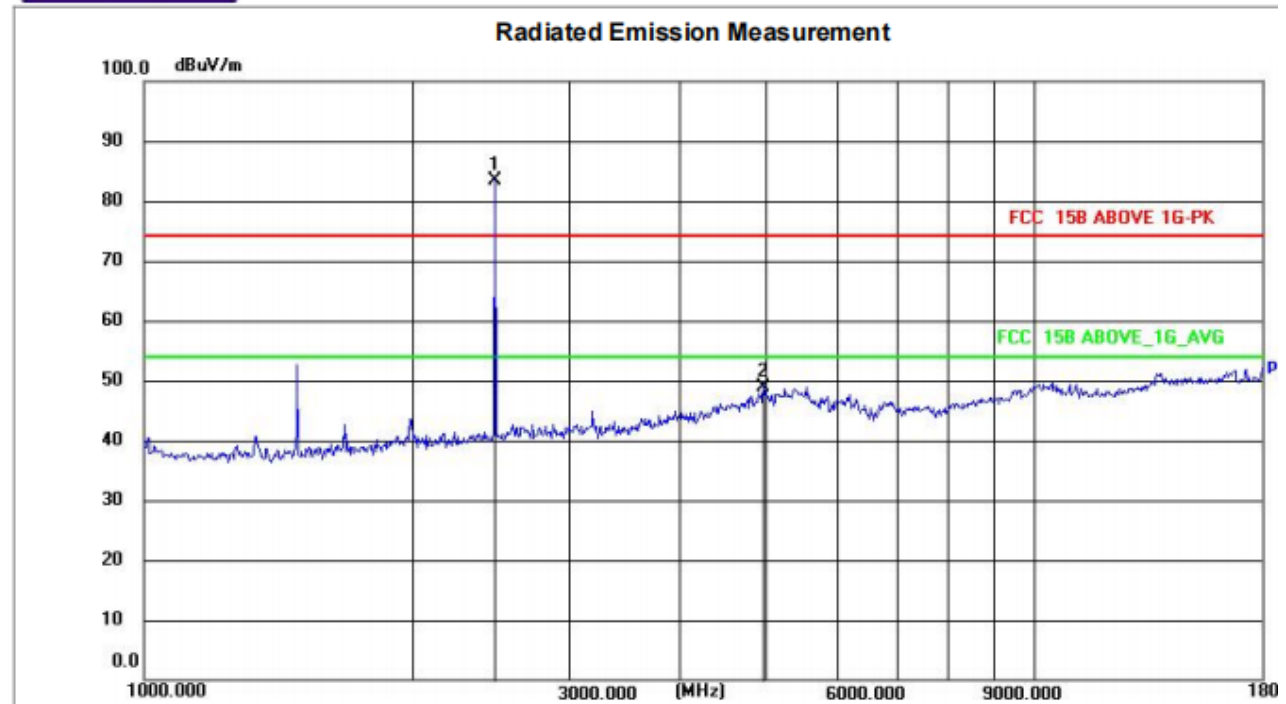


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	2399.667	92.08	-9.96	82.12	74.00	-8.12	peak				
2	4804.000	51.72	-5.01	46.71	74.00	27.29	peak				

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2480 MHz _CH78_2Mbps	Polarization	Vertical
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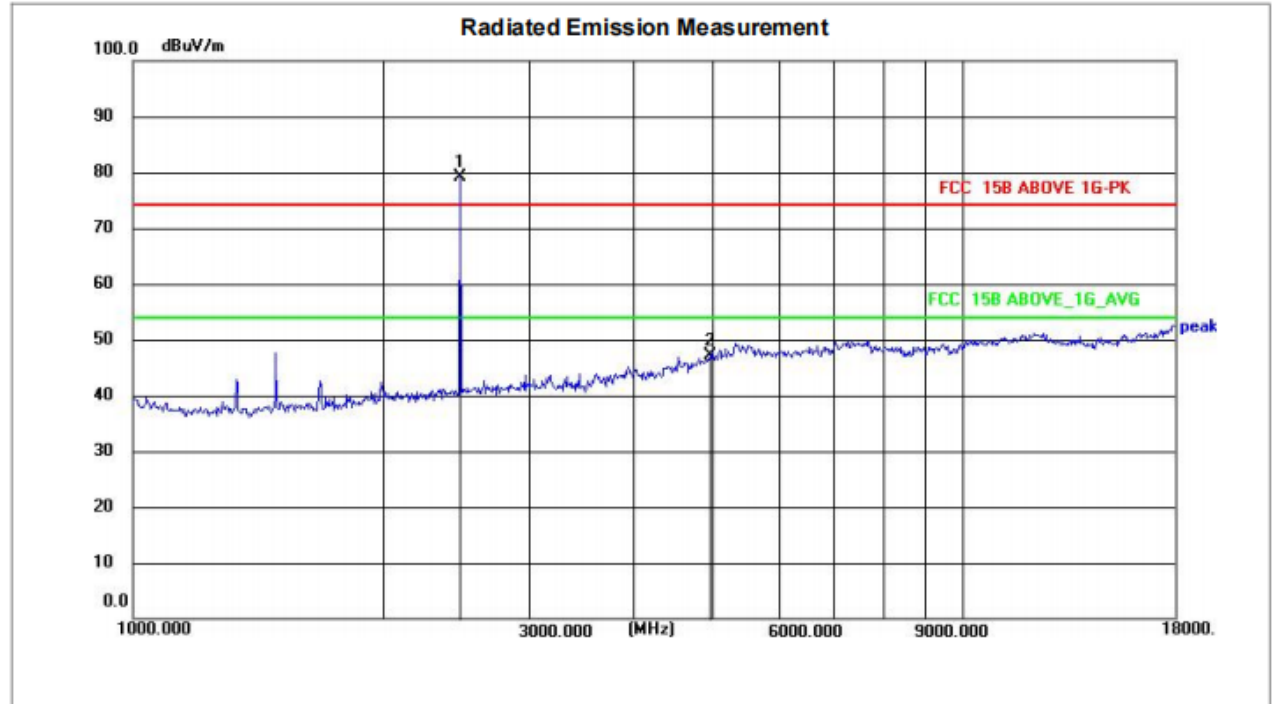
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remar
1 *	2479.000	93.25	-9.76	83.49	74.00	-9.49	peak				
2	4960.000	53.39	-4.60	48.79	74.00	25.21	peak				

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2480 MHz _CH78_2Mbps	Polarization	Horizontal
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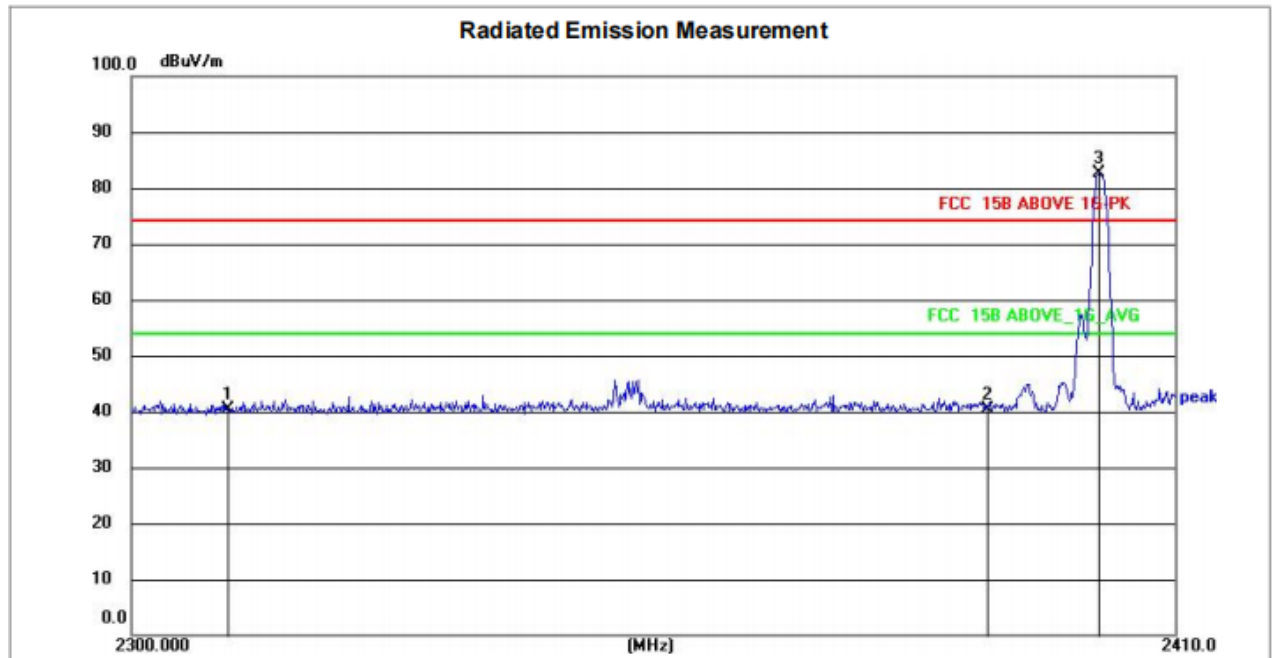


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	2479.000	88.80	-9.76	79.04	74.00	-5.04	peak				
2	4960.000	51.75	-4.60	47.15	74.00	26.85	peak				

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2402 MHz _CH0_2Mbps	Polarization	Vertical
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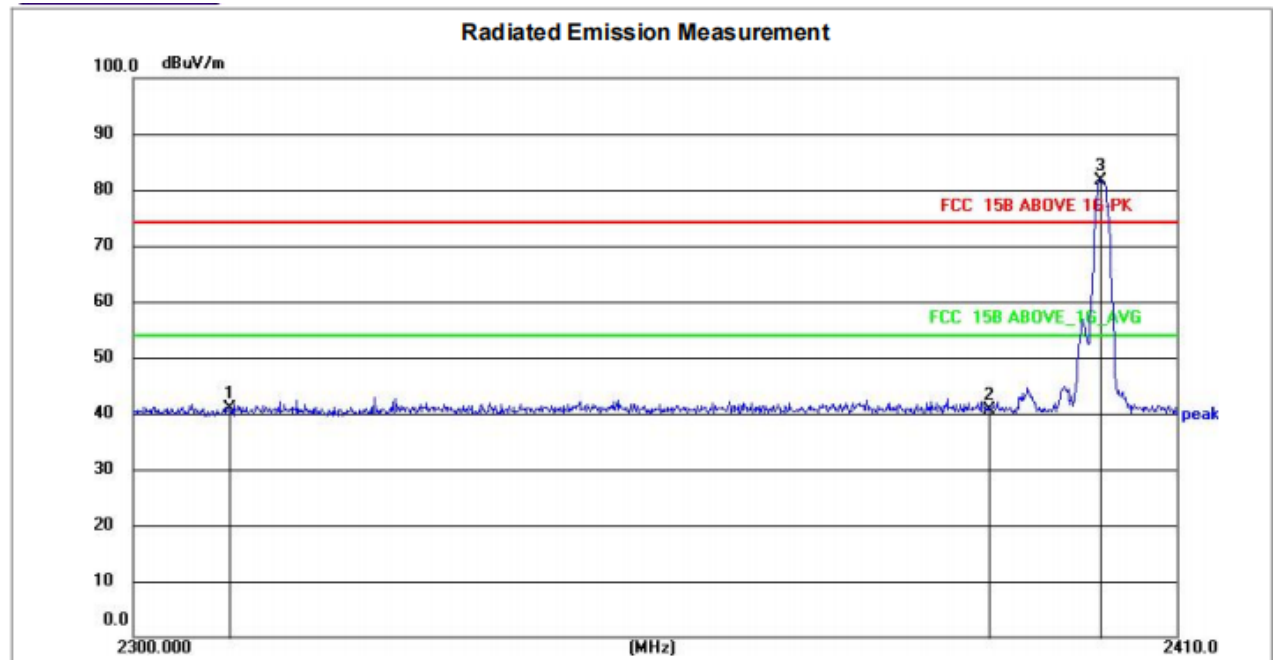
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	50.46	-10.19	40.27	74.00	33.73	peak				
2	2390.000	50.31	-9.99	40.32	74.00	33.68	peak				
3 *	2401.823	92.47	-9.96	82.51	74.00	-8.51	peak				

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2402 MHz _CH0_2Mbps	Polarization	Horizontal
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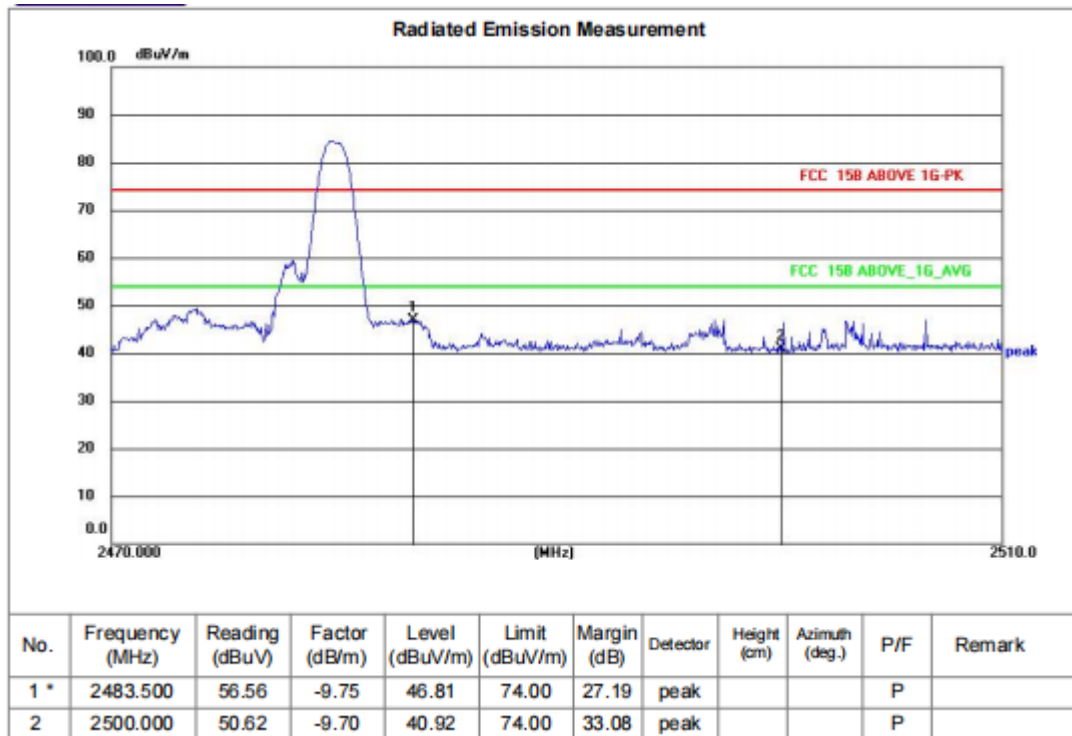
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	51.08	-10.19	40.89	74.00	33.11	peak				
2	2390.000	50.60	-9.99	40.61	74.00	33.39	peak				
3 *	2401.787	91.57	-9.96	81.61	74.00	-7.61	peak				

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

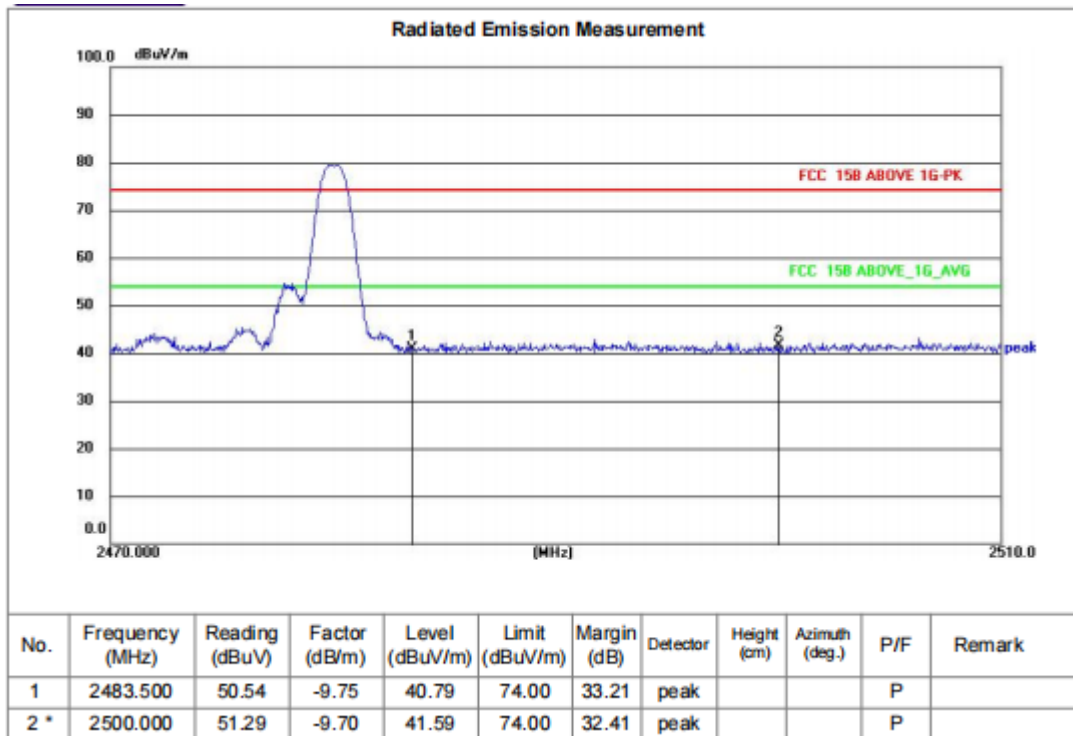
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2480 MHz _CH78_2Mbps	Polarization	Vertical
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REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX 2480 MHz _CH78_2Mbps	Polarization	Horizontal
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REMARKS:

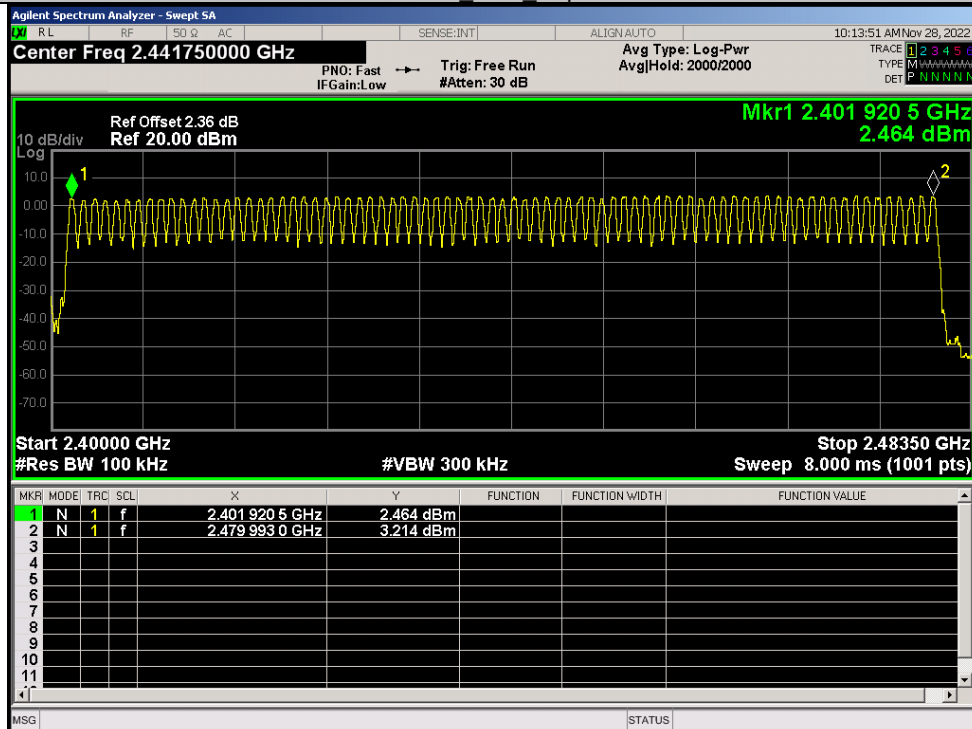
(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

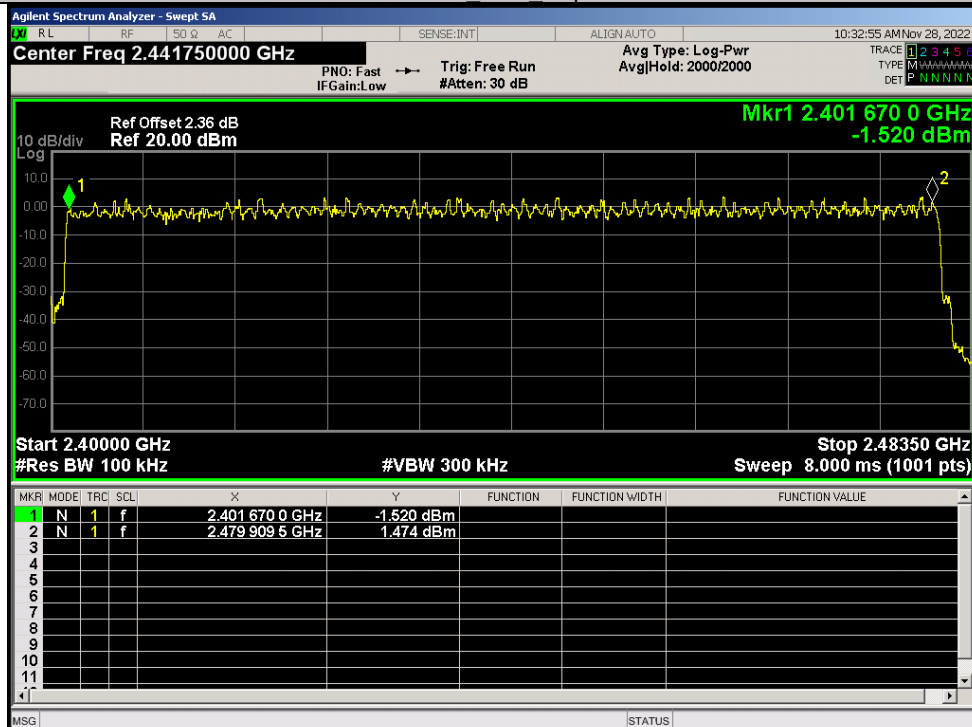
APPENDIX E - NUMBER OF HOPPING FREQUENCY

Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS

DH5 Ant1 Hop



3DH5 Ant1 Hop

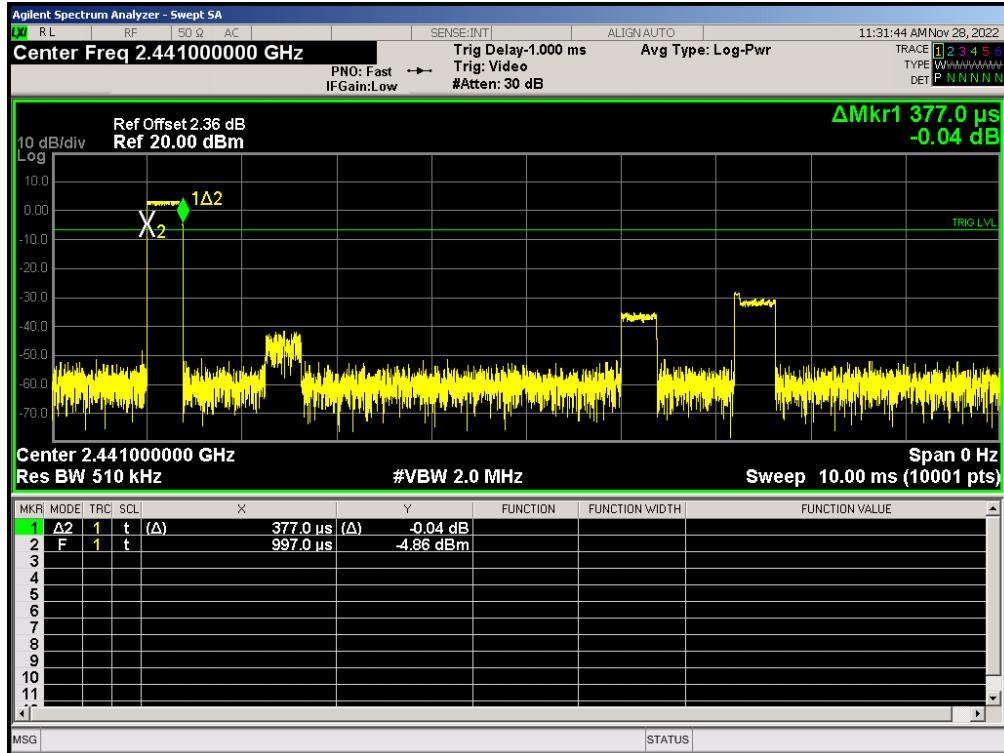


APPENDIX F - AVERAGE TIME OF OCCUPANCY

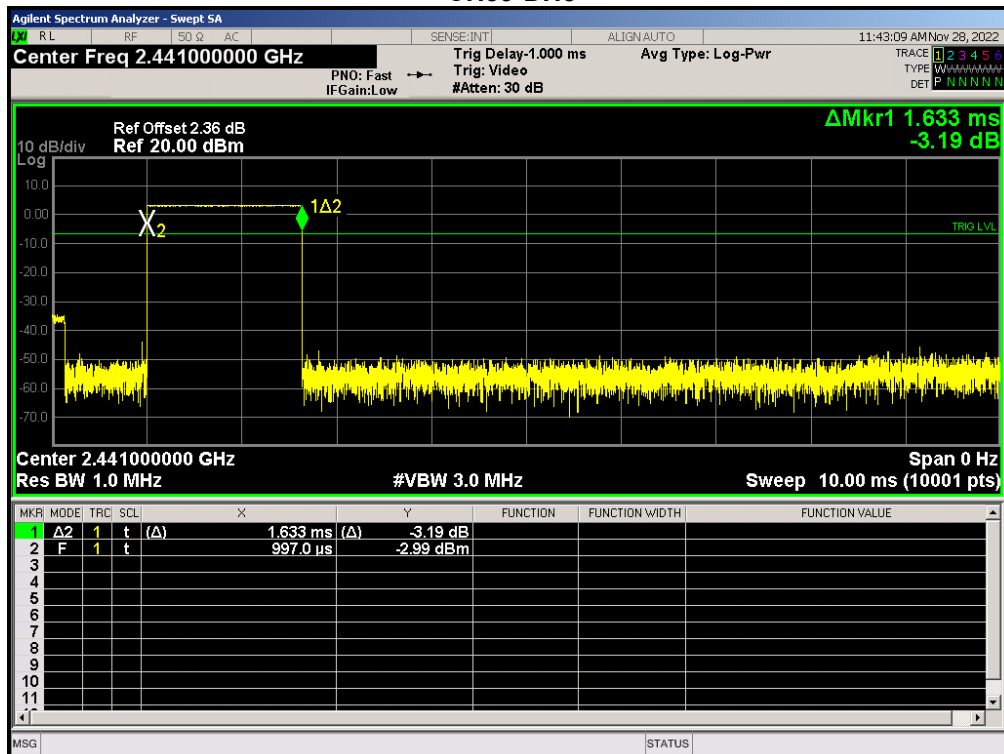
Test Mode	Hopping Mode_1Mbps, 2Mbps
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Data Packet	Frequency (MHz)	Burst Width [ms]	Total Hops [Num]	Dwell Time (ms)	Limits (s)	Test Result
DH1	2441	0.377	320	120.64	0.4000	Pass
DH3	2441	1.633	160	261.12	0.4000	Pass
DH5	2441	2.881	107	307.31	0.4000	Pass
2DH1	2441	0.385	320	123.2	0.4000	Pass
2DH3	2441	1.638	160	262.08	0.4000	Pass
2DH5	2441	2.886	107	307.84	0.4000	Pass

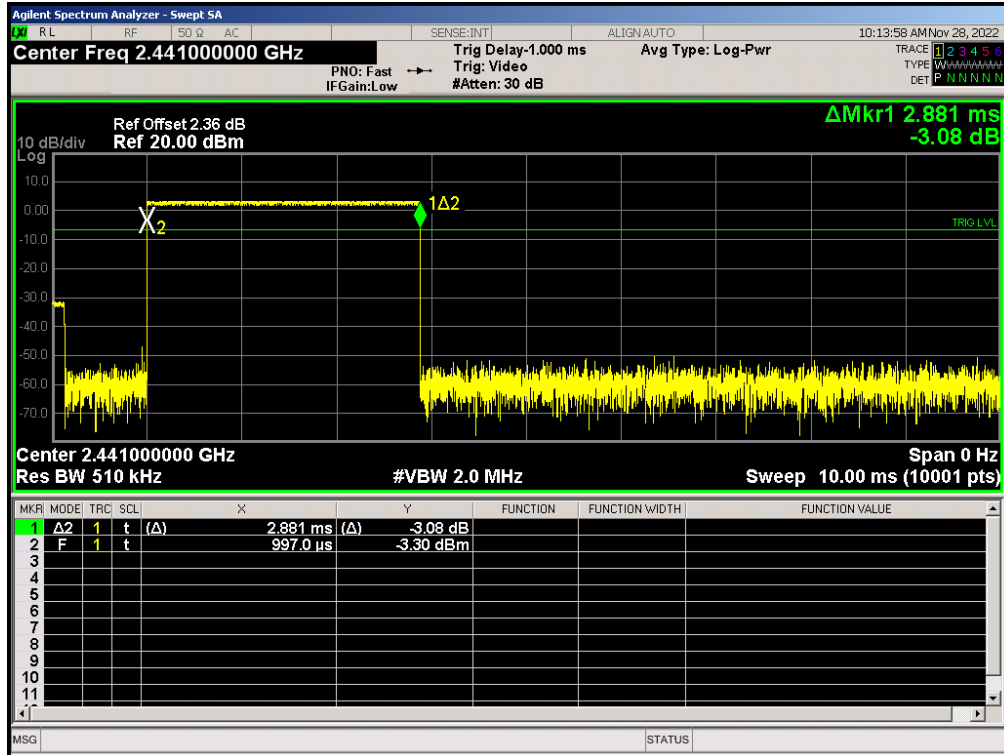
CH39-DH1



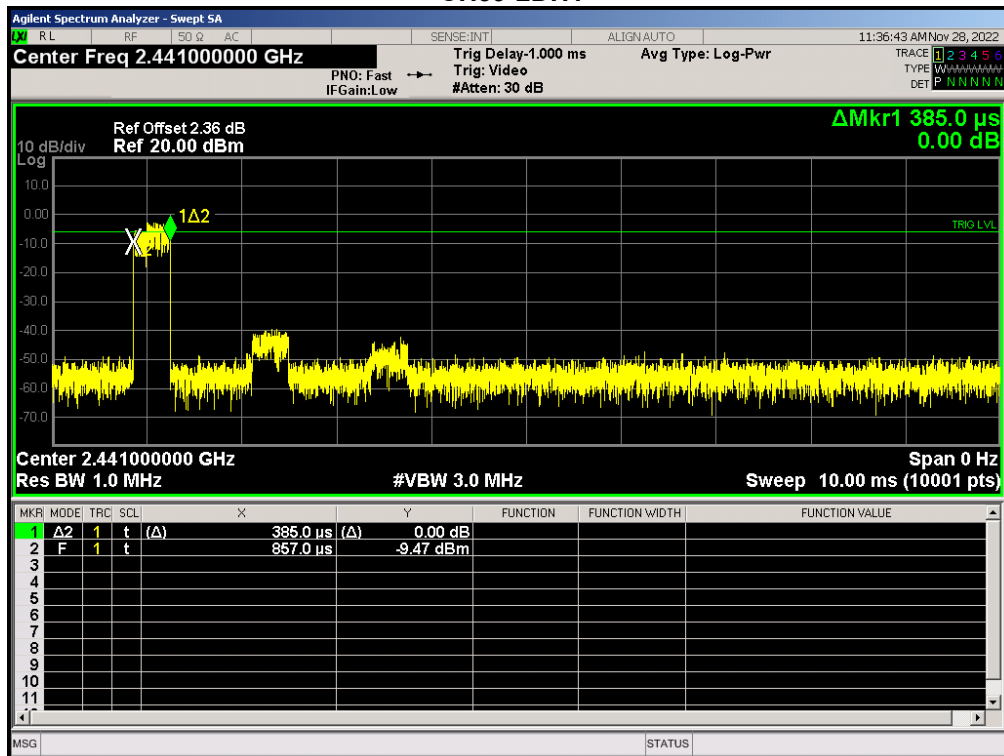
CH39-DH3



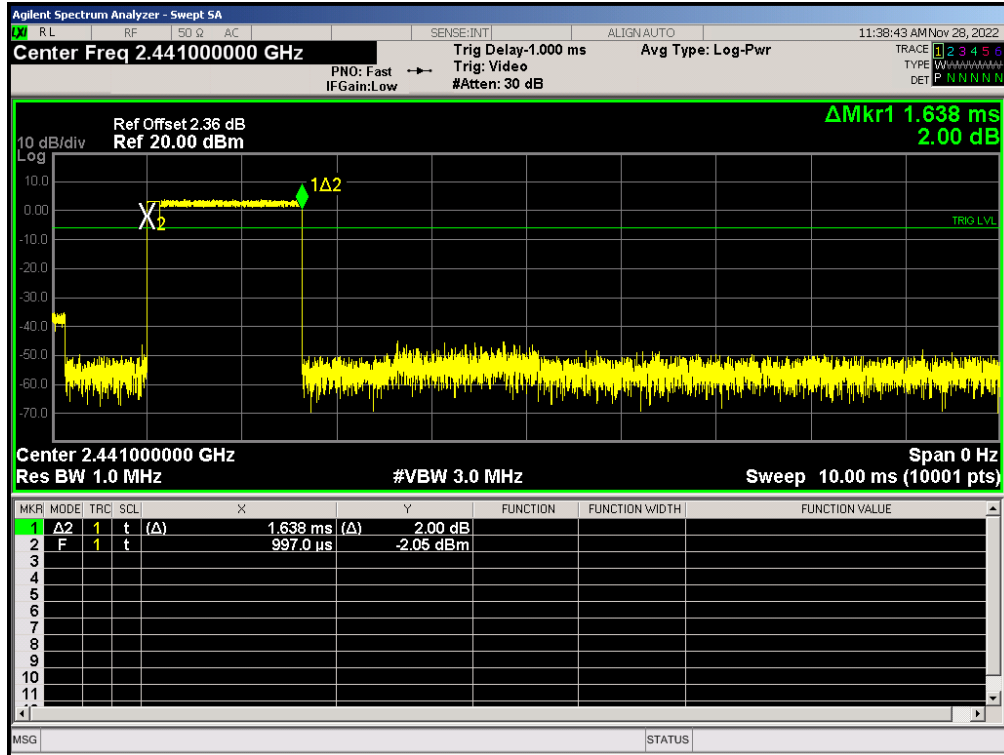
CH39-DH5



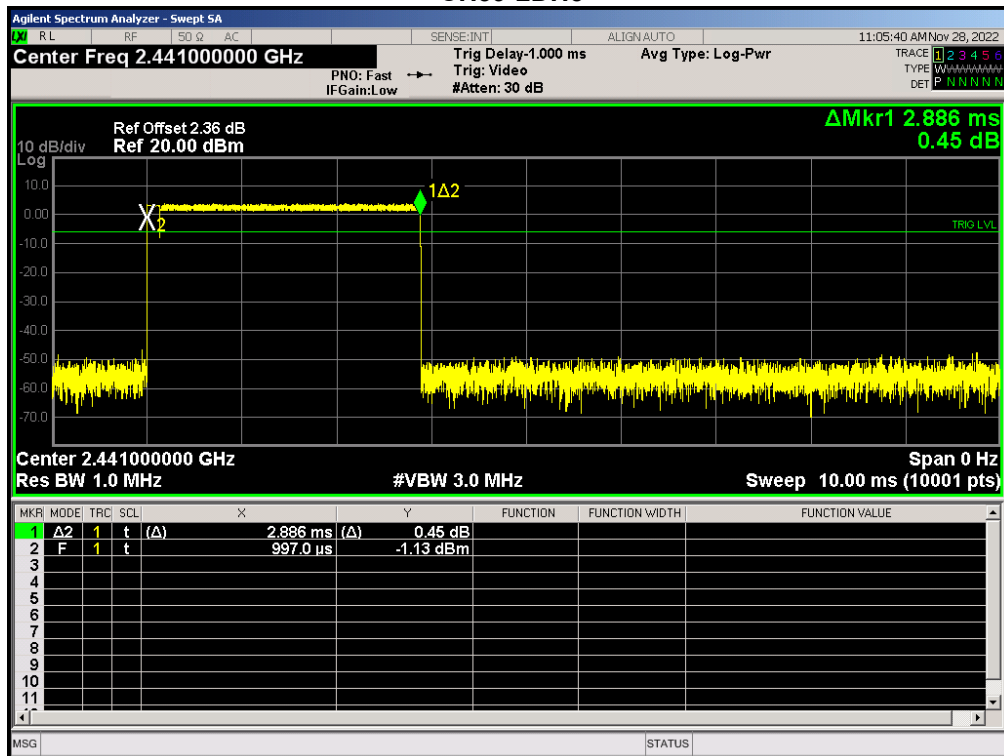
CH39-2DH1



CH39-2DH3



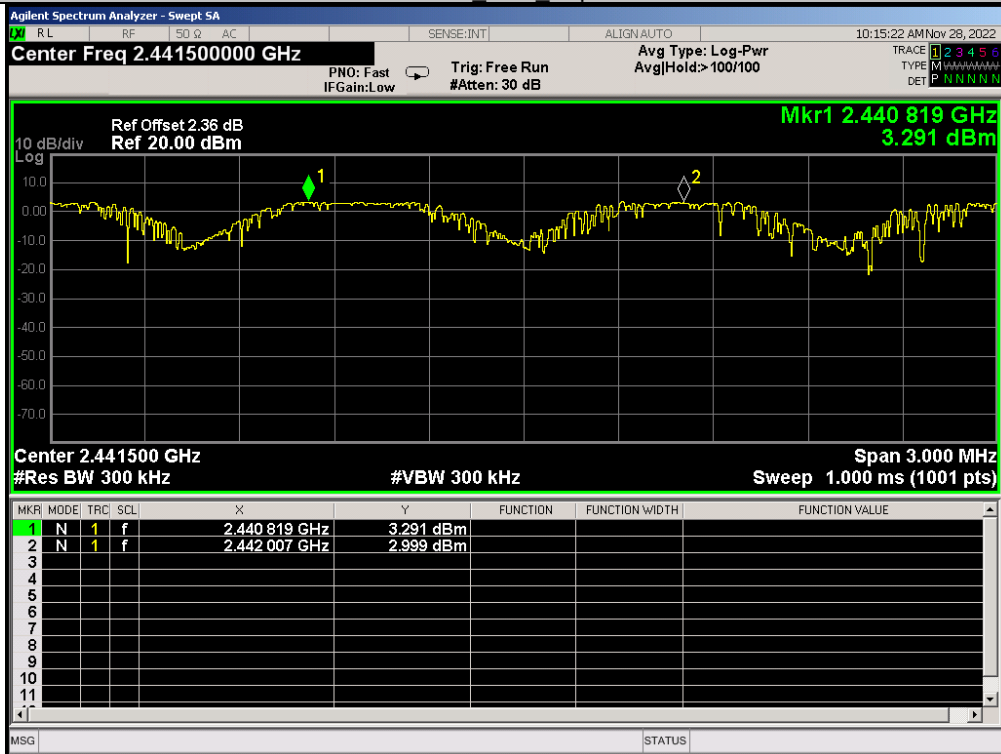
CH39-2DH5



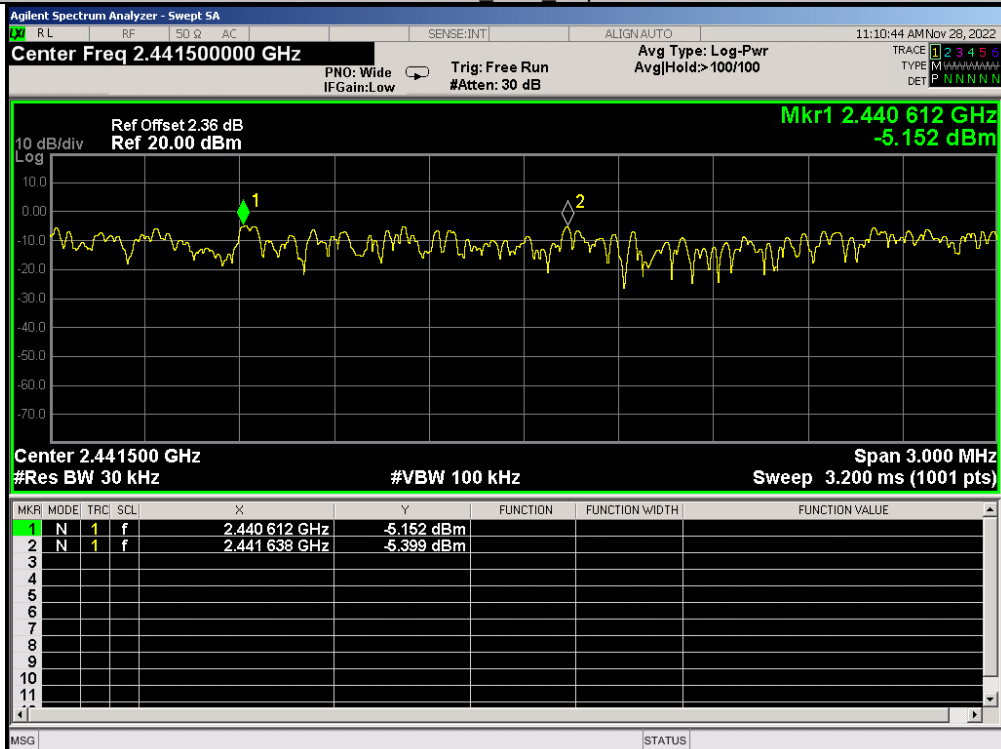
APPENDIX G - HOPPING CHANNEL SEPARATION

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	1.118	≥0.631	PASS
2DH5	Ant1	Hop	1.026	≥0.874	PASS

DH5 Ant1 Hop



2DH5 Ant1 Hop

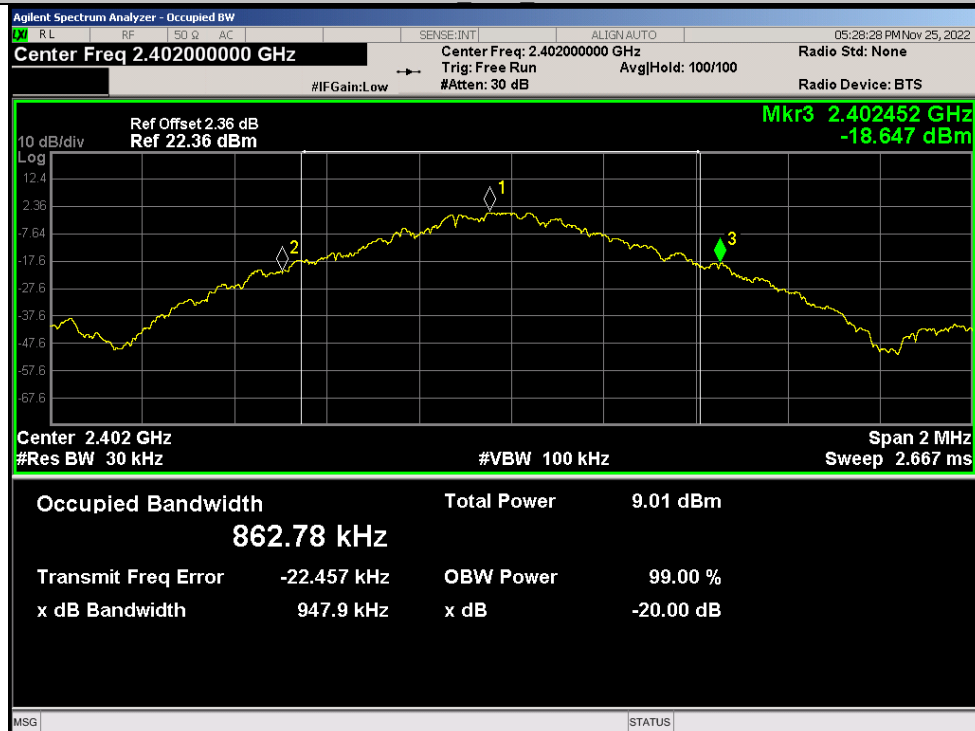


APPENDIX H - BANDWIDTH

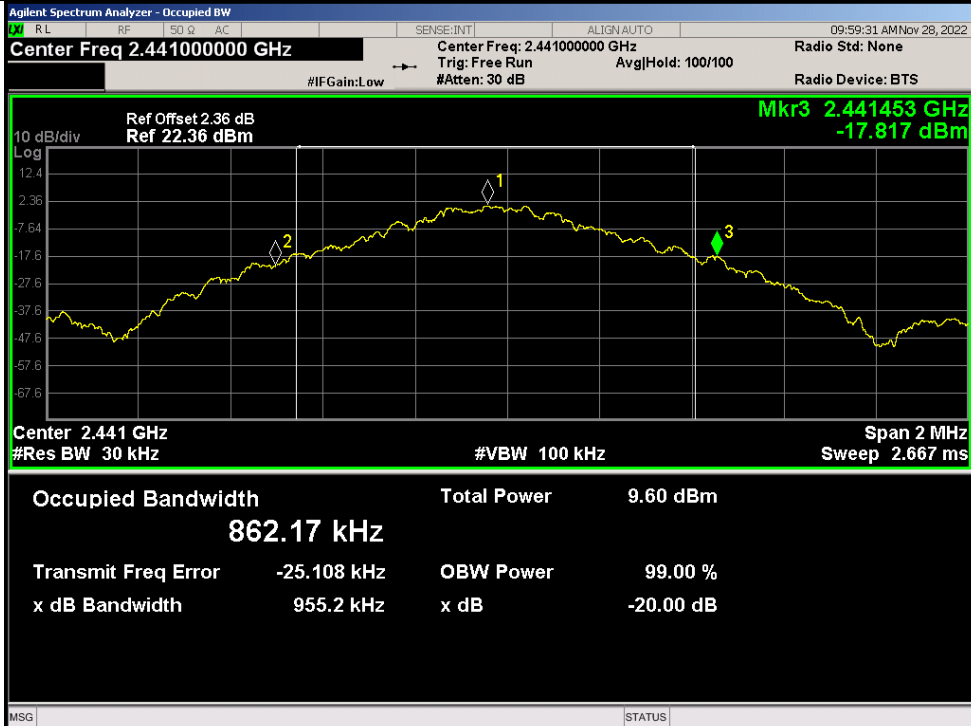
Test Mode	Antenna	Channel	20db EBW[MHz]	OCB [MHz]
DH5	Ant1	2402	0.948	0.863
		2441	0.955	0.855
		2480	0.948	0.858
2DH5	Ant1	2402	1.308	1.202
		2441	1.311	1.186
		2480	1.311	1.199

20 dB Bandwidth

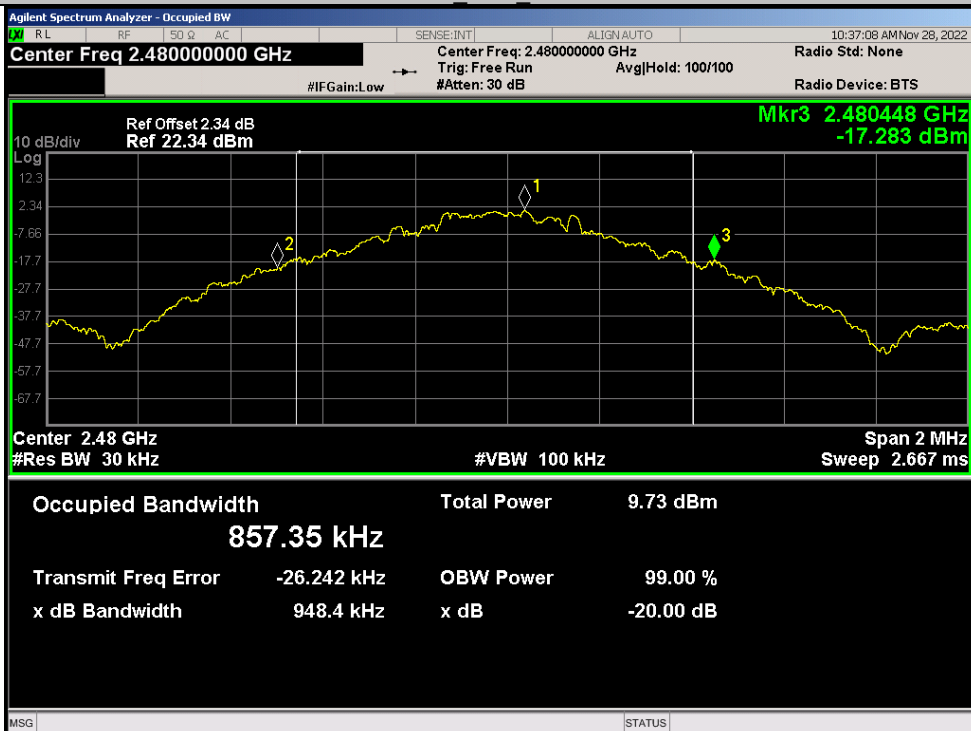
DH5 Ant1 2402



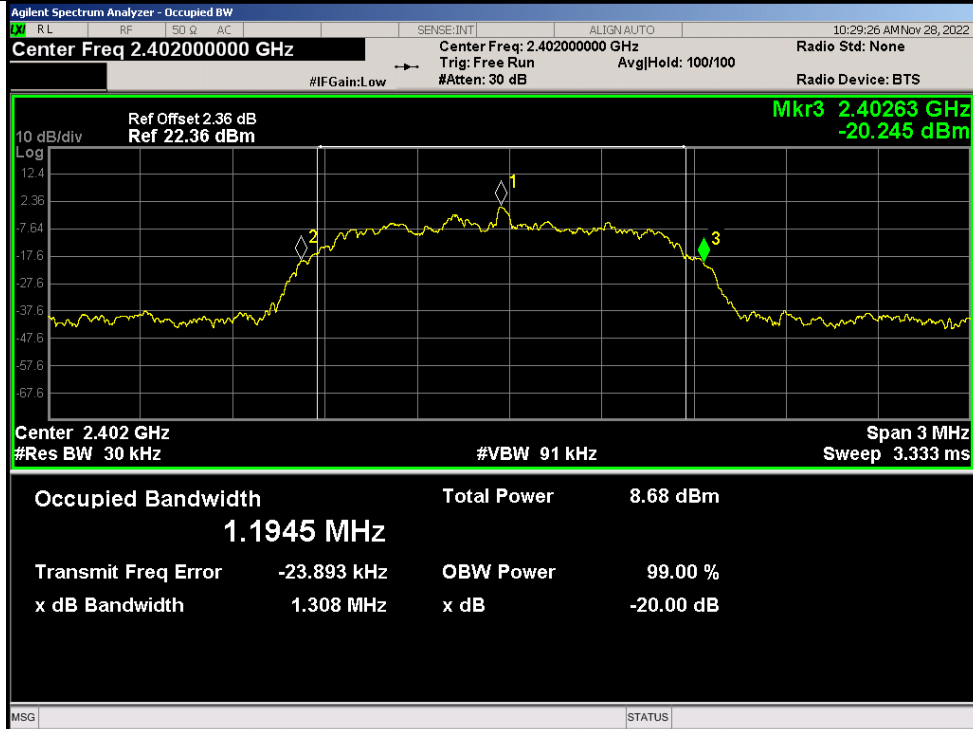
DH5 Ant1 2441



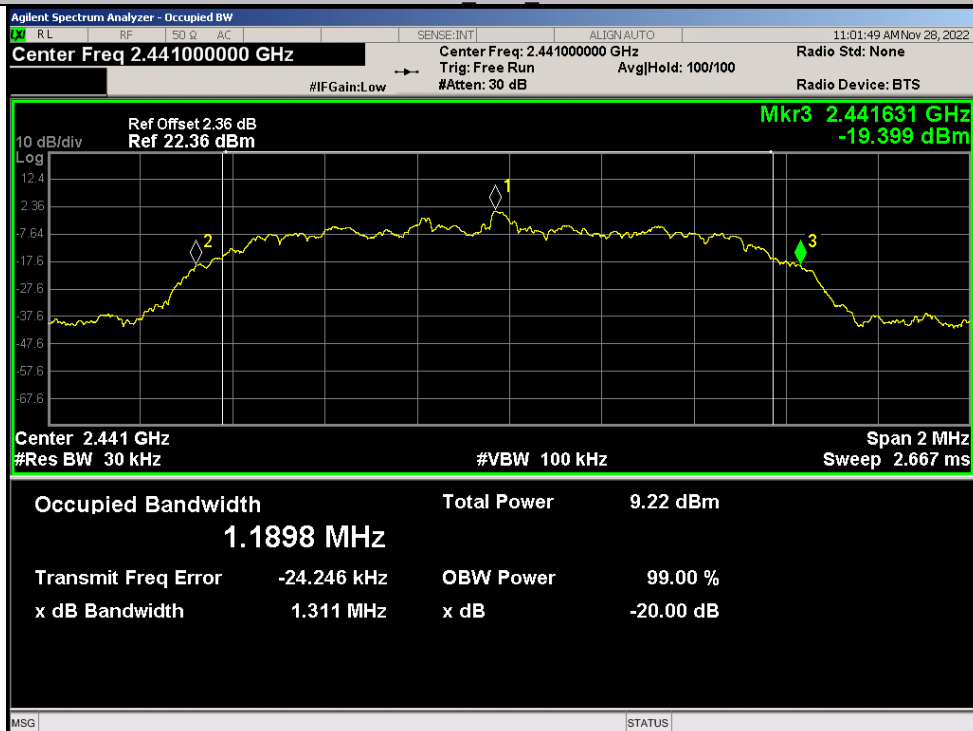
DH5 Ant1 2480

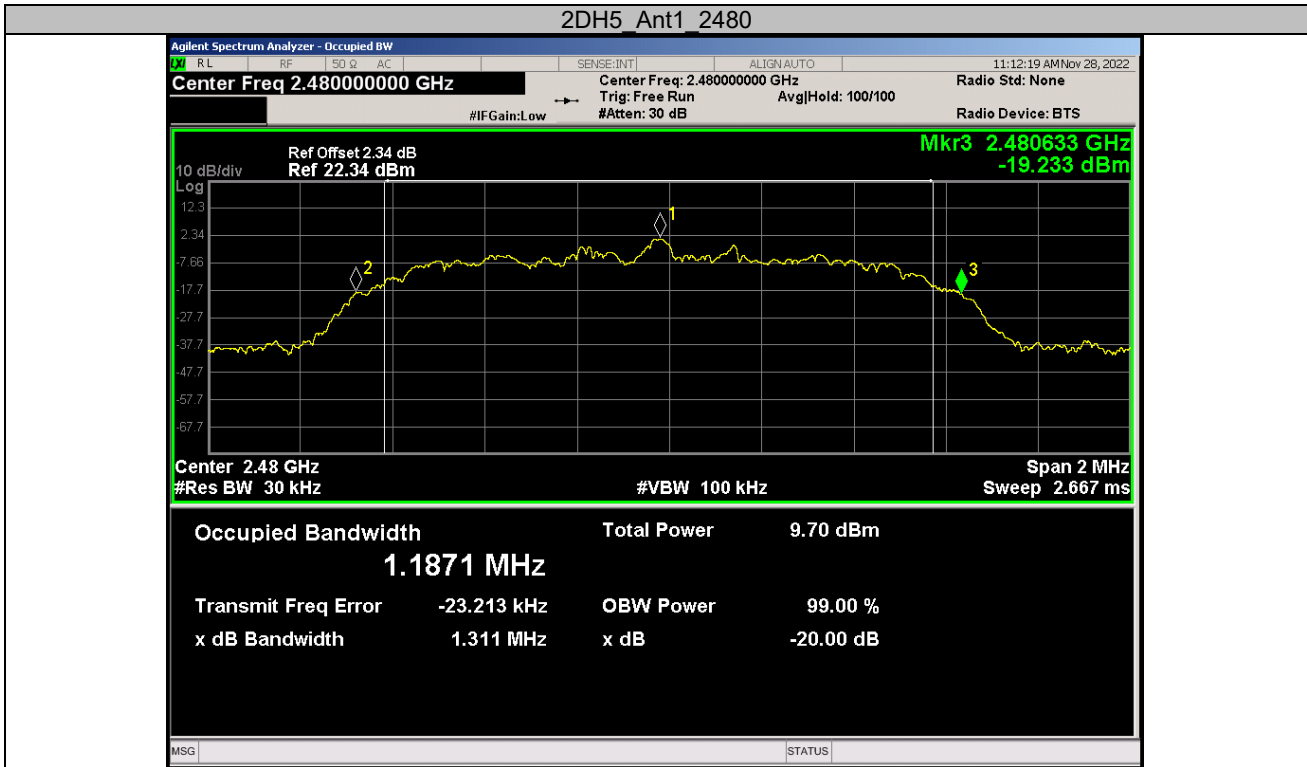


2DH5 Ant1 2402

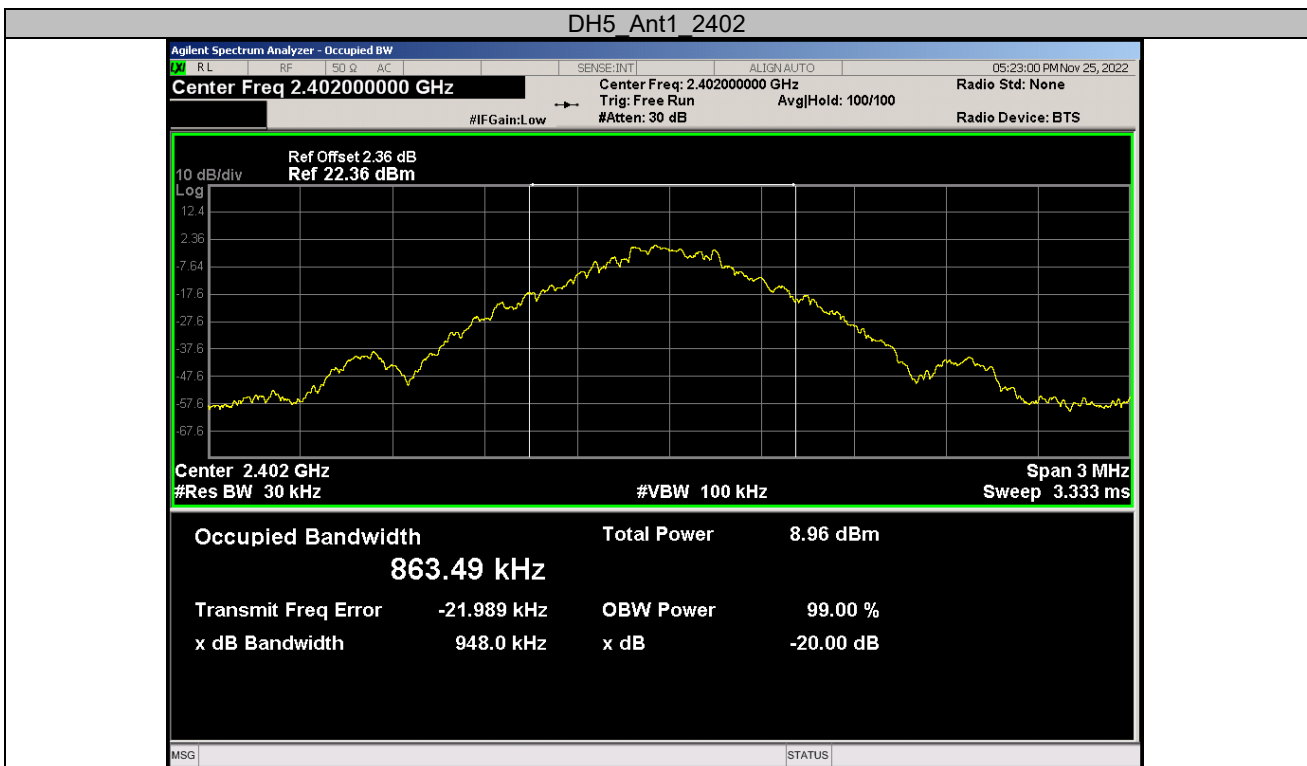


2DH5 Ant1 2441

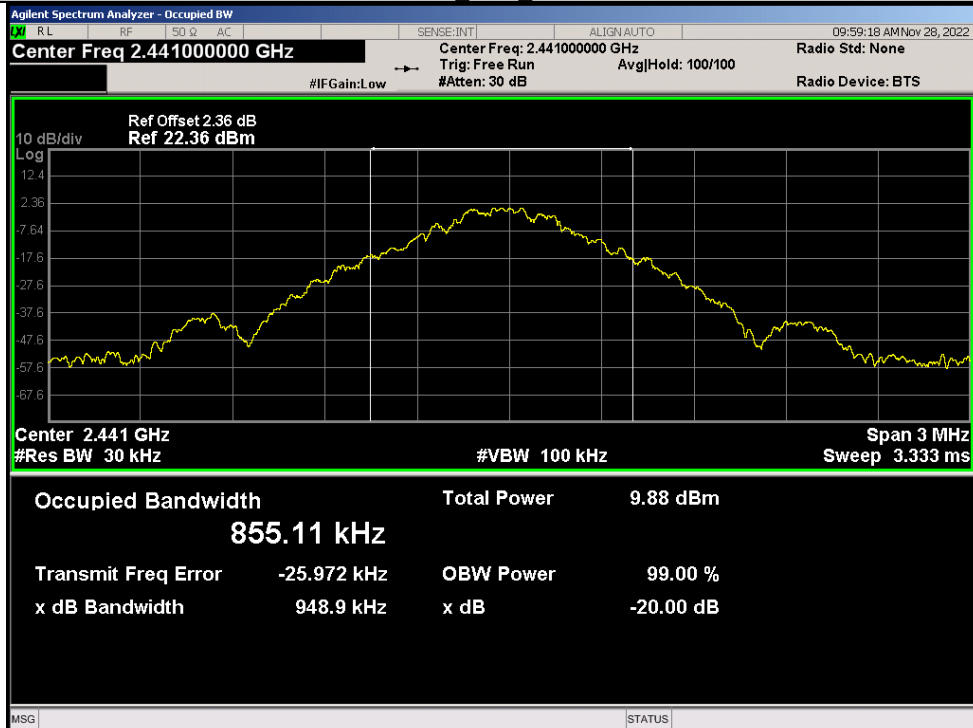




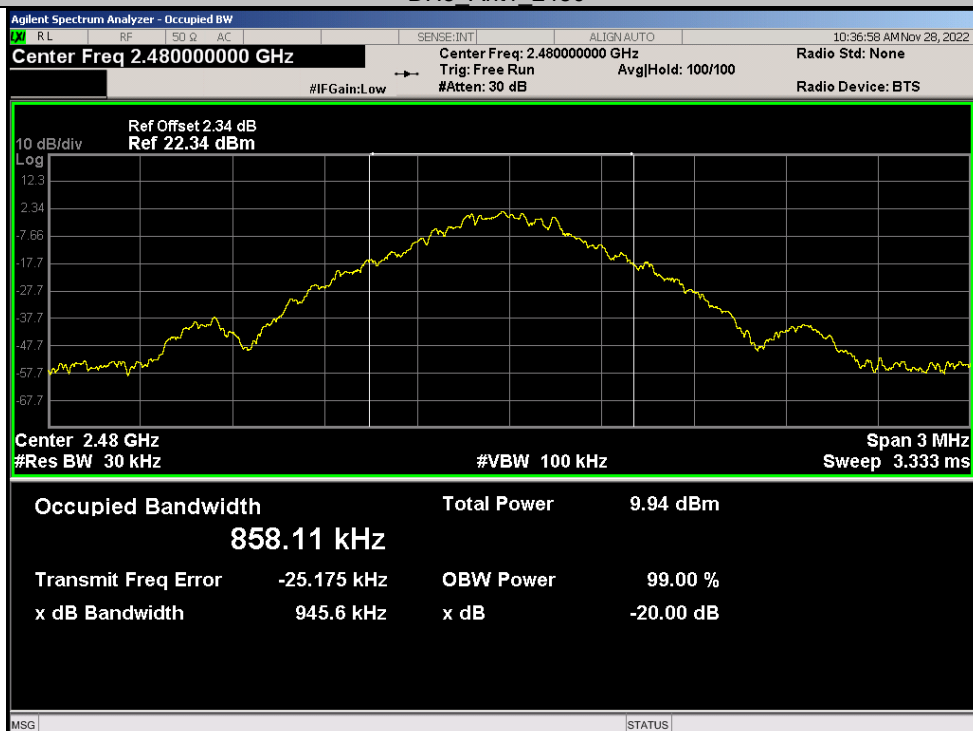
99 % Occupied Bandwidth



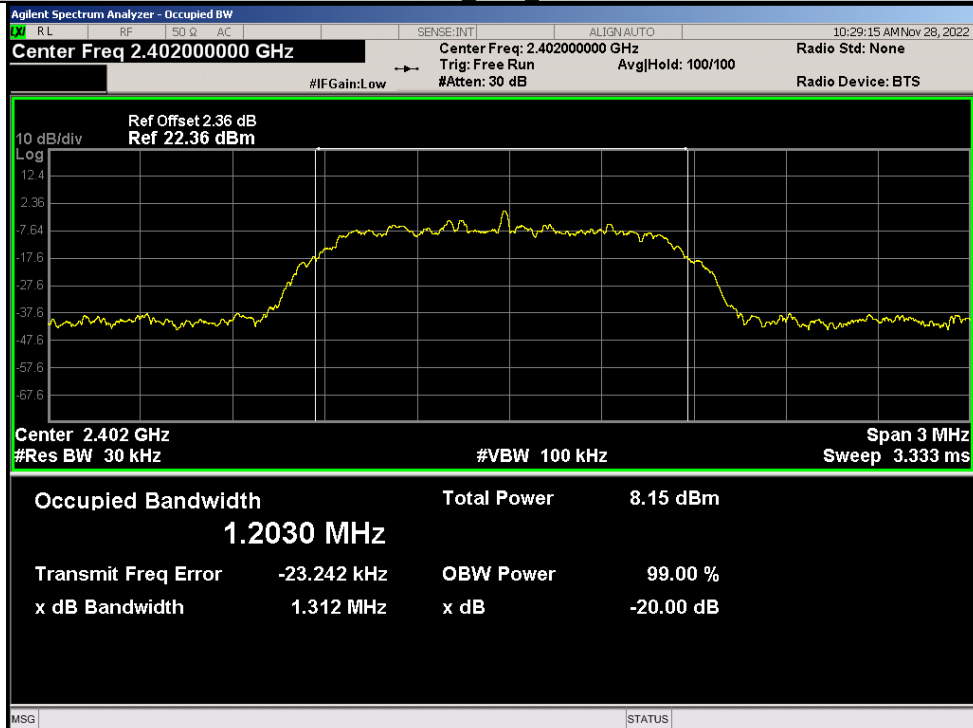
DH5 Ant1 2441



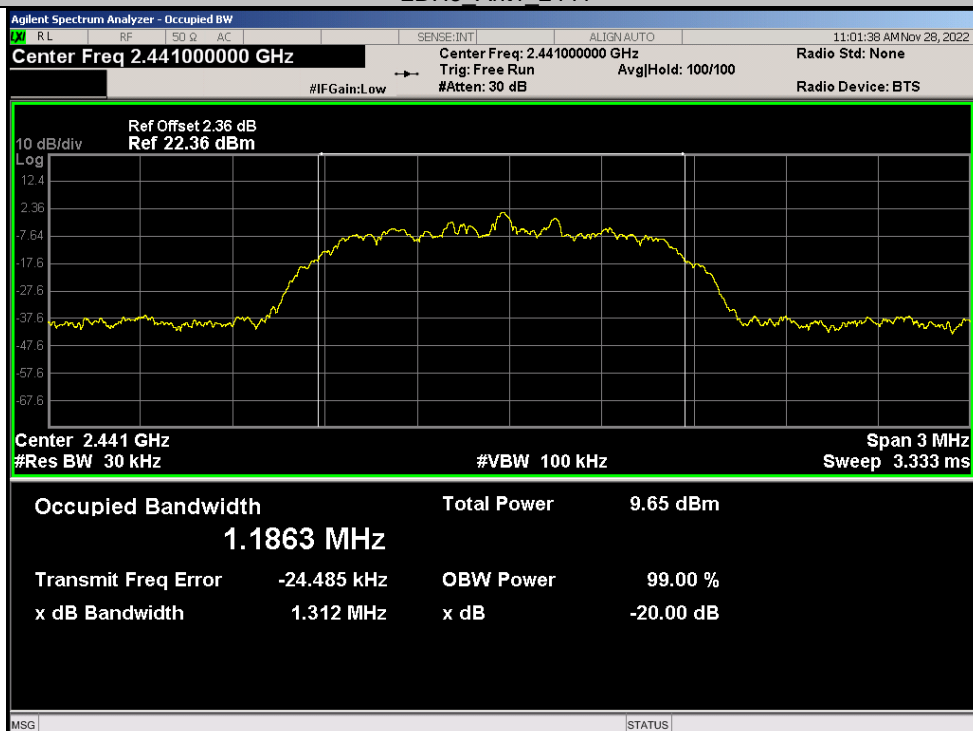
DH5 Ant1 2480

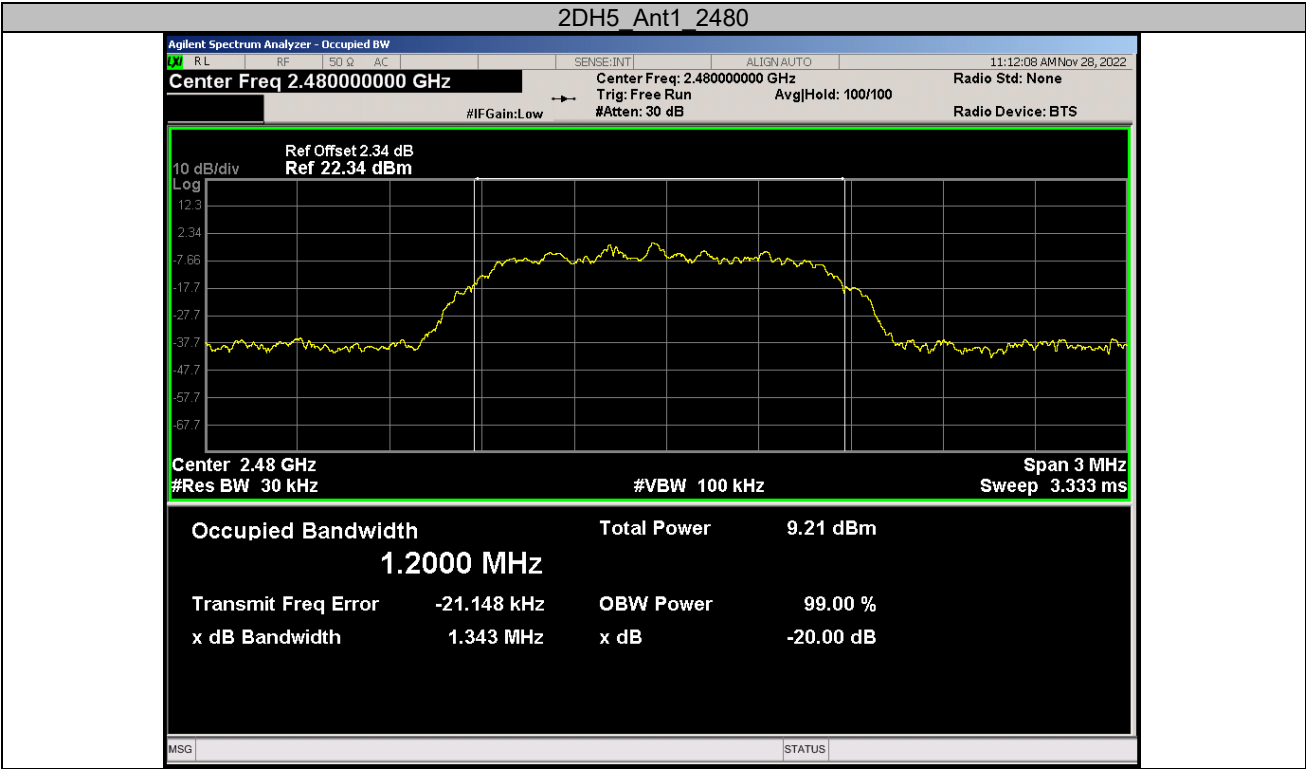


2DH5 Ant1 2402



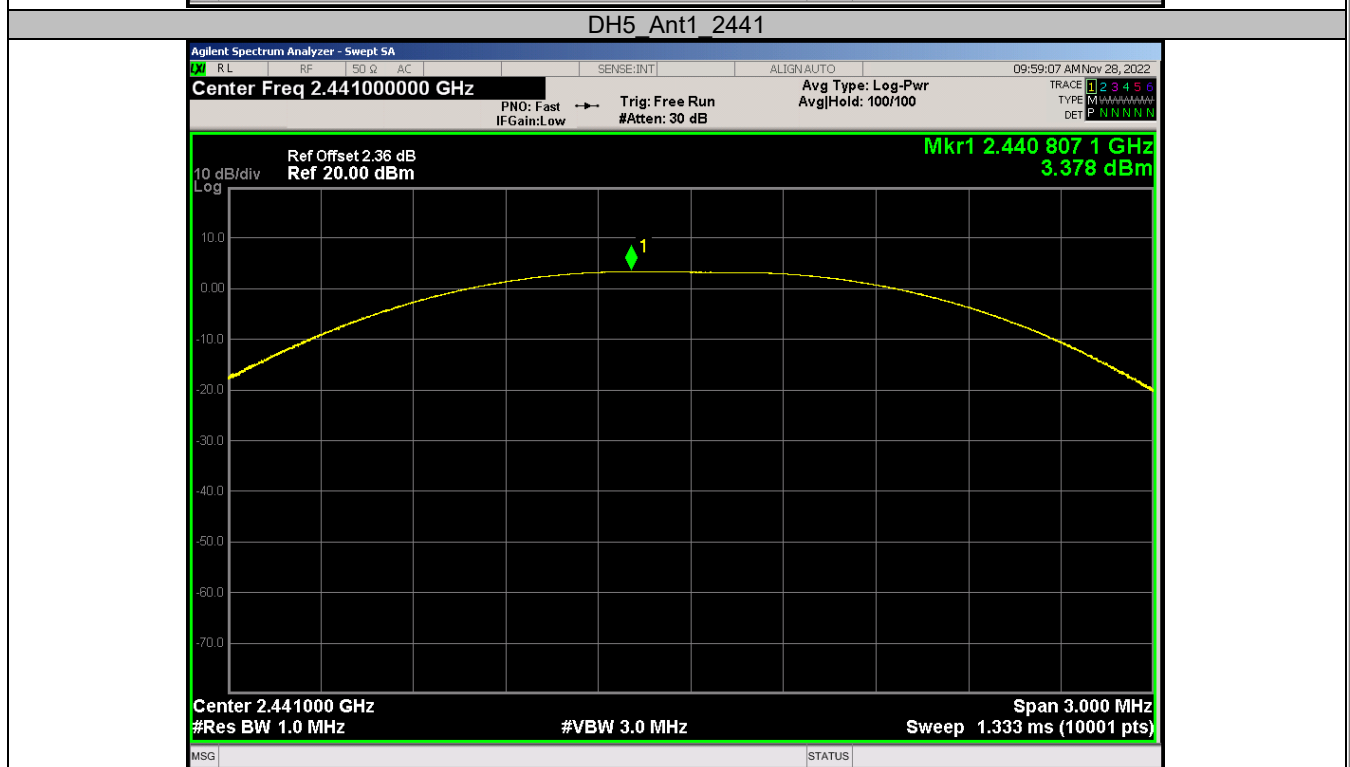
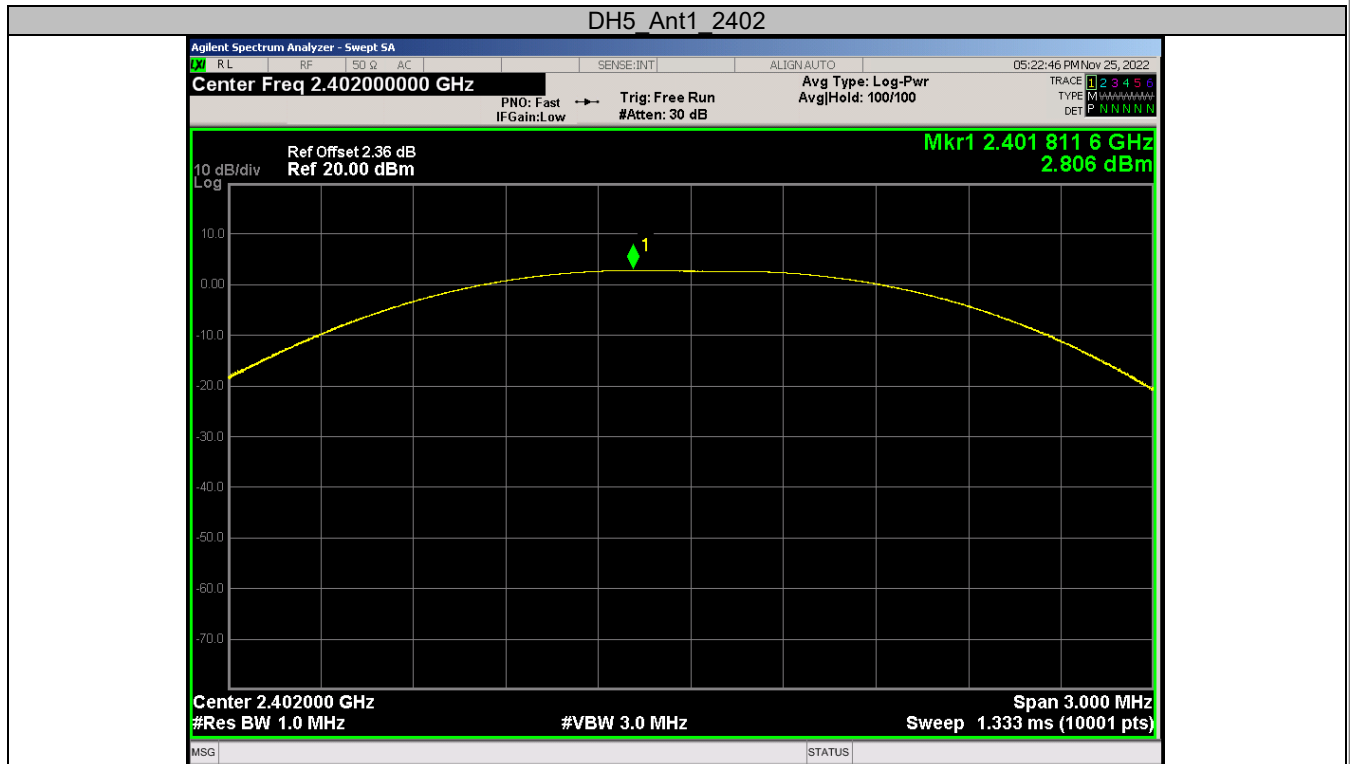
2DH5 Ant1 2441

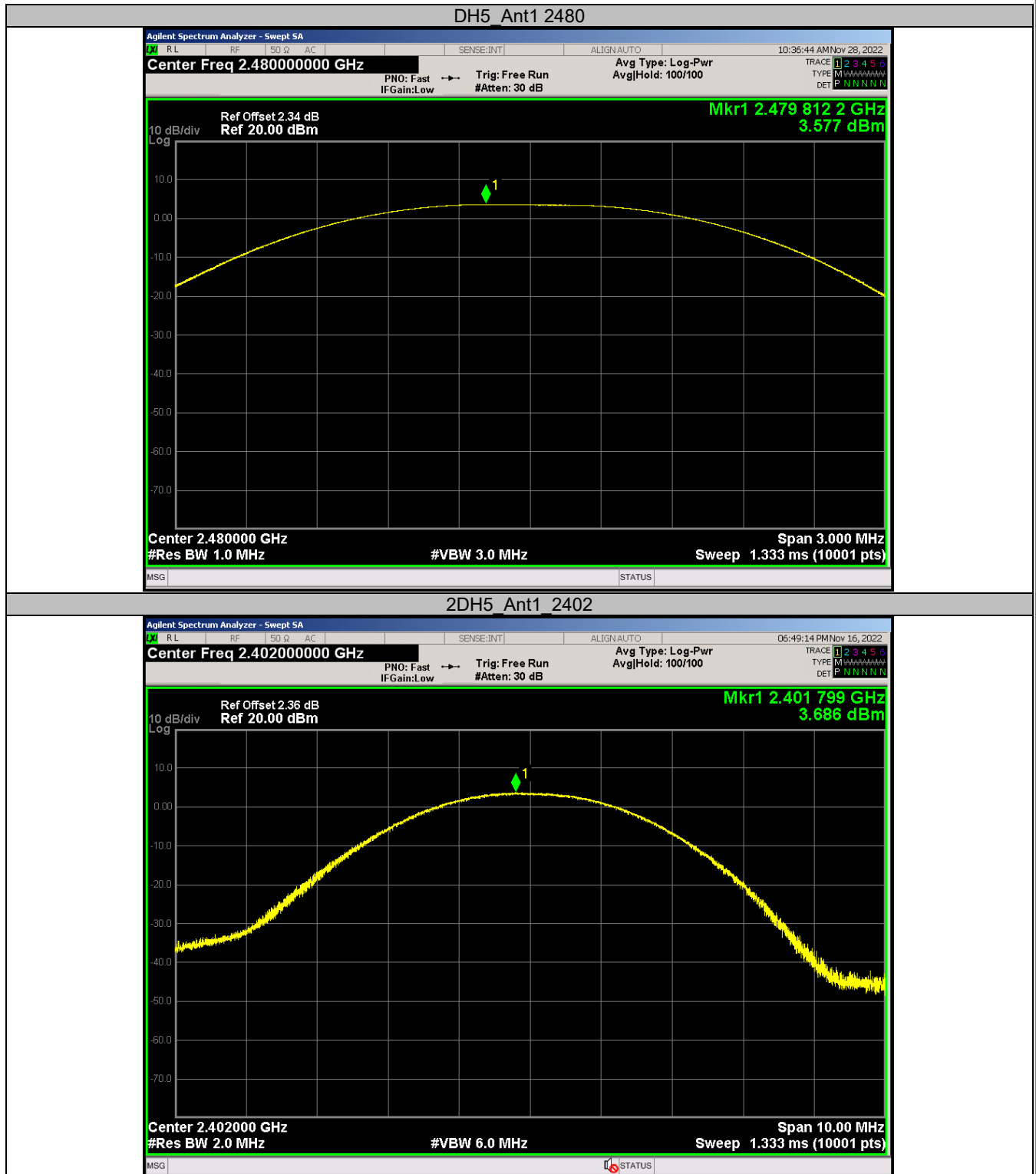




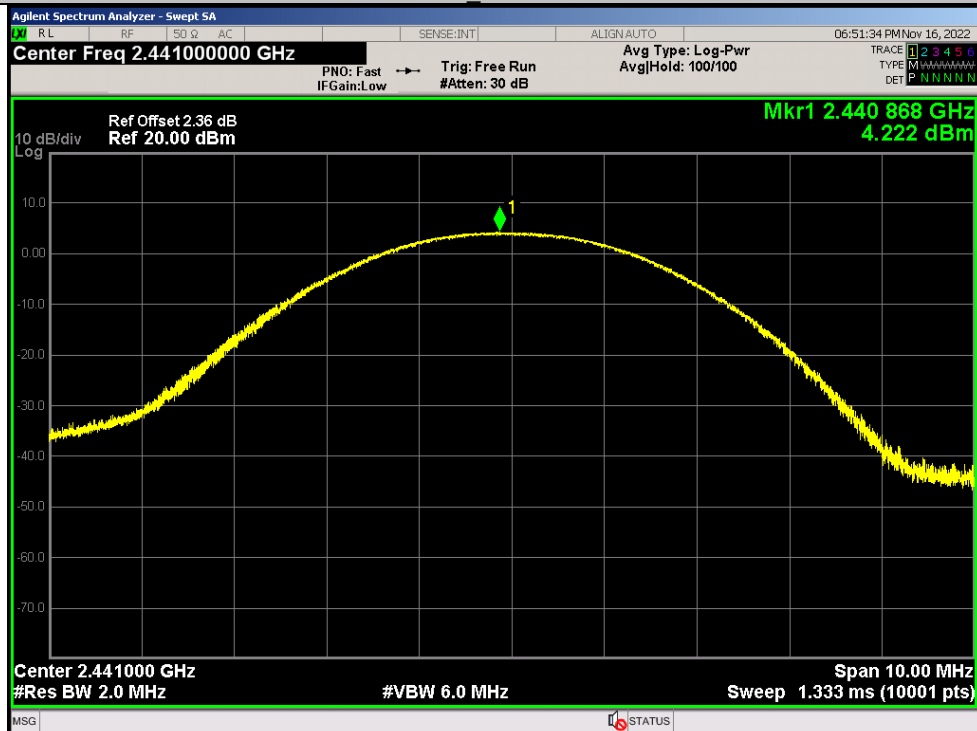
APPENDIX I - CONDUCTED PEAK OUTPUT POWER

Test Mode	Antenna	Channel	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	2.81	≤20.97	PASS
		2441	3.38	≤20.97	PASS
		2480	3.58	≤20.97	PASS
2DH5	Ant1	2402	3.69	≤20.97	PASS
		2441	4.22	≤20.97	PASS
		2480	4.31	≤20.97	PASS

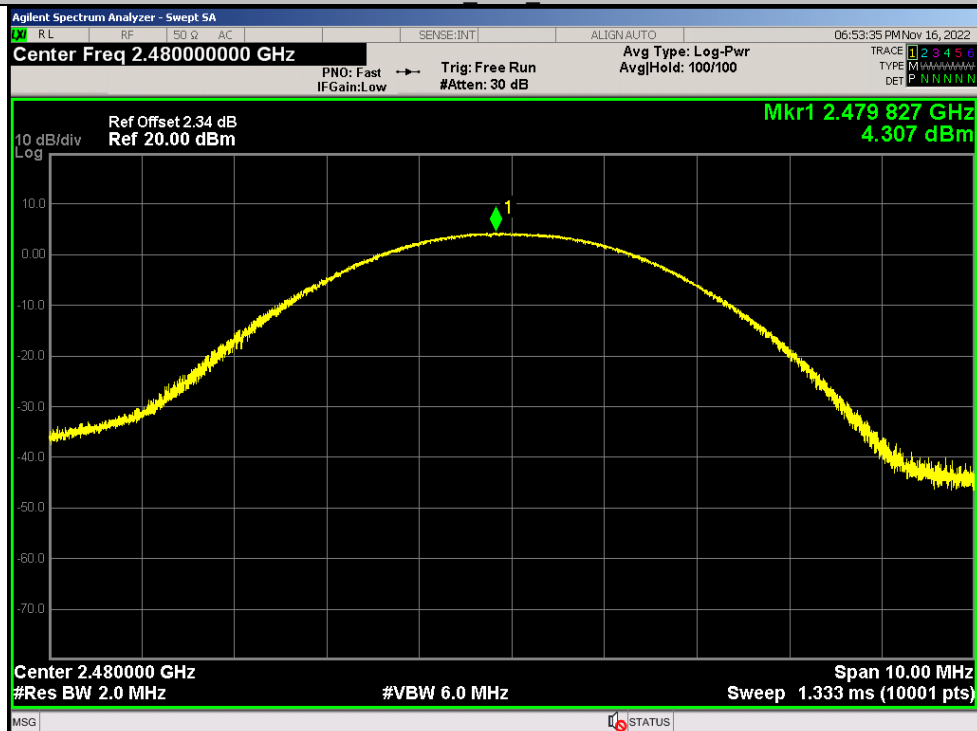




2DH5 Ant1 2441



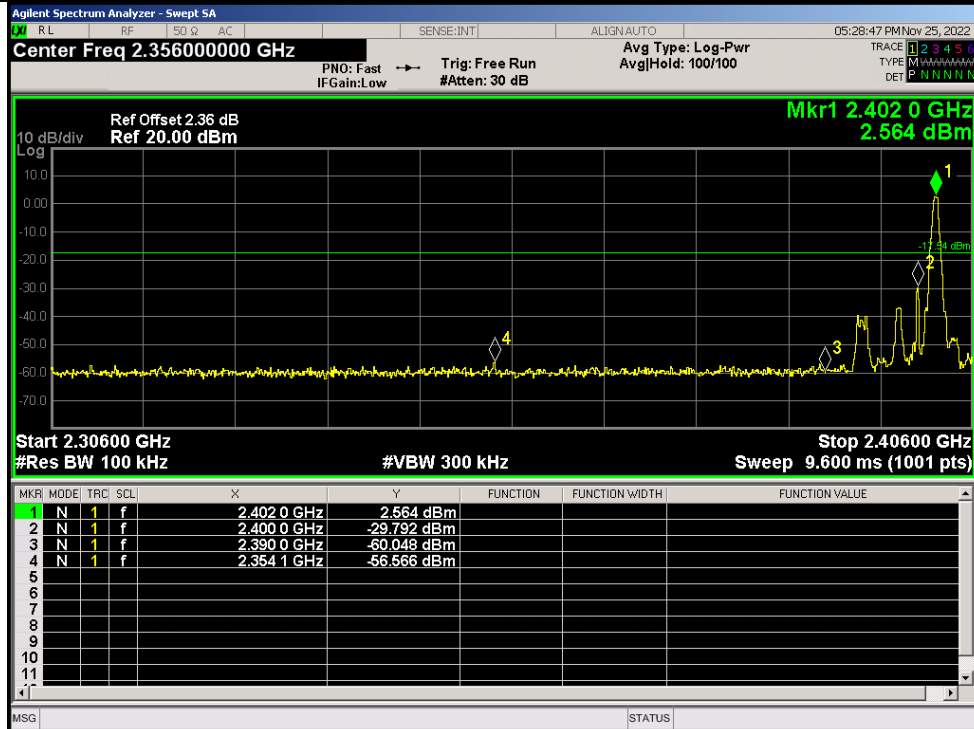
2DH5 Ant1 2480



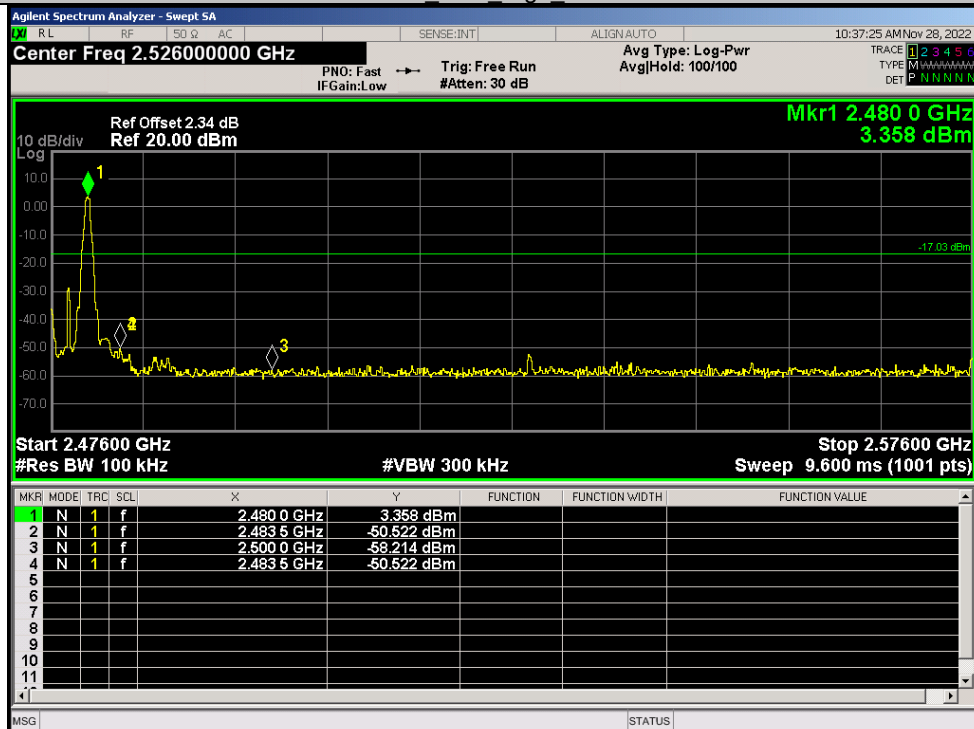
APPENDIX J - CONDUCTED SPURIOUS EMISSION AND CONDUCTED BAND EDGE

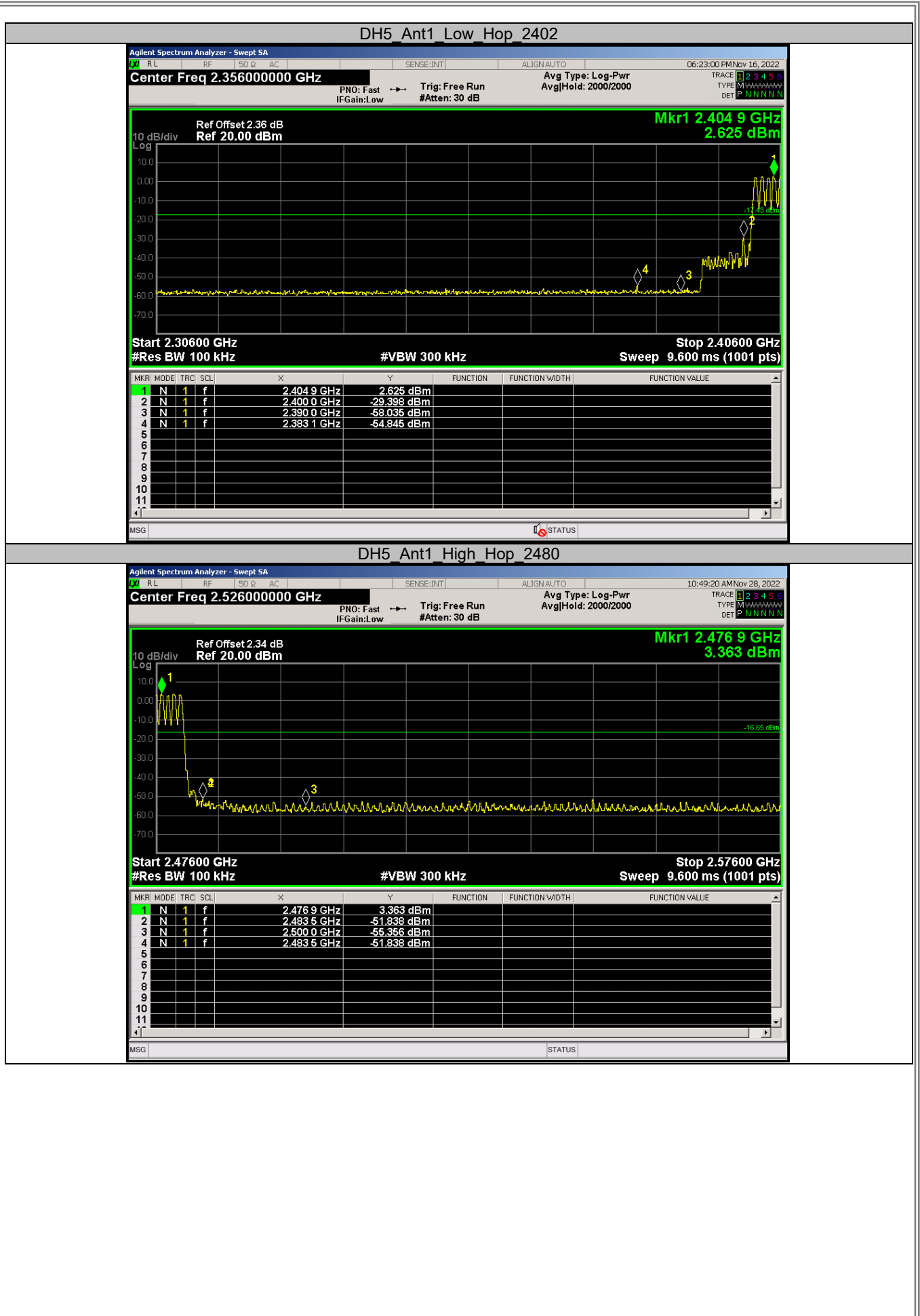
Band edge

DH5 Ant1 Low 2402

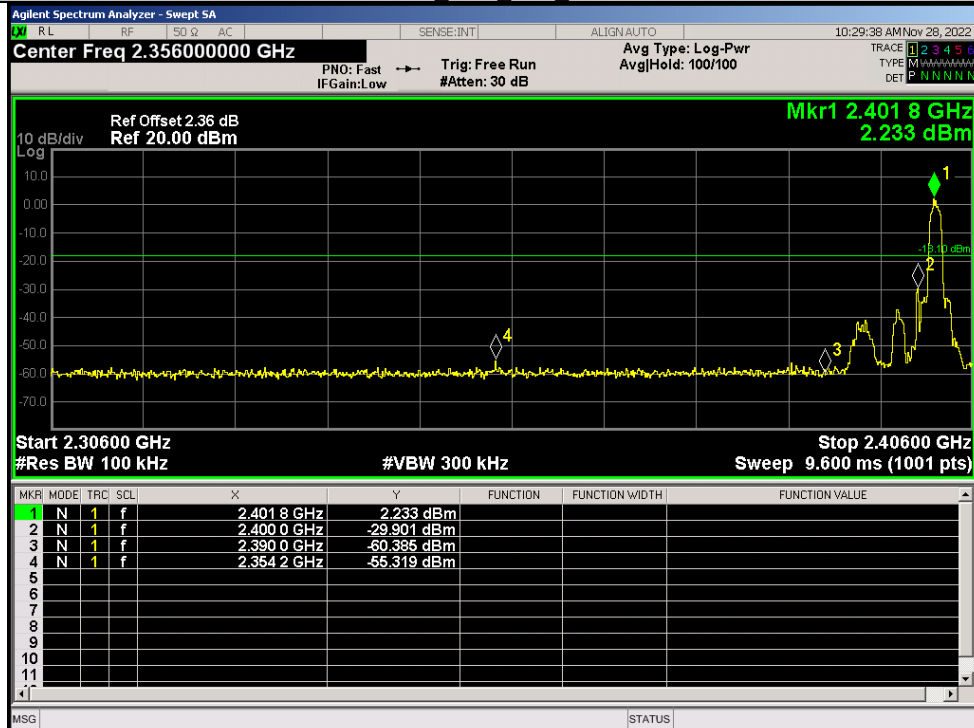


DH5 Ant1 High 2480

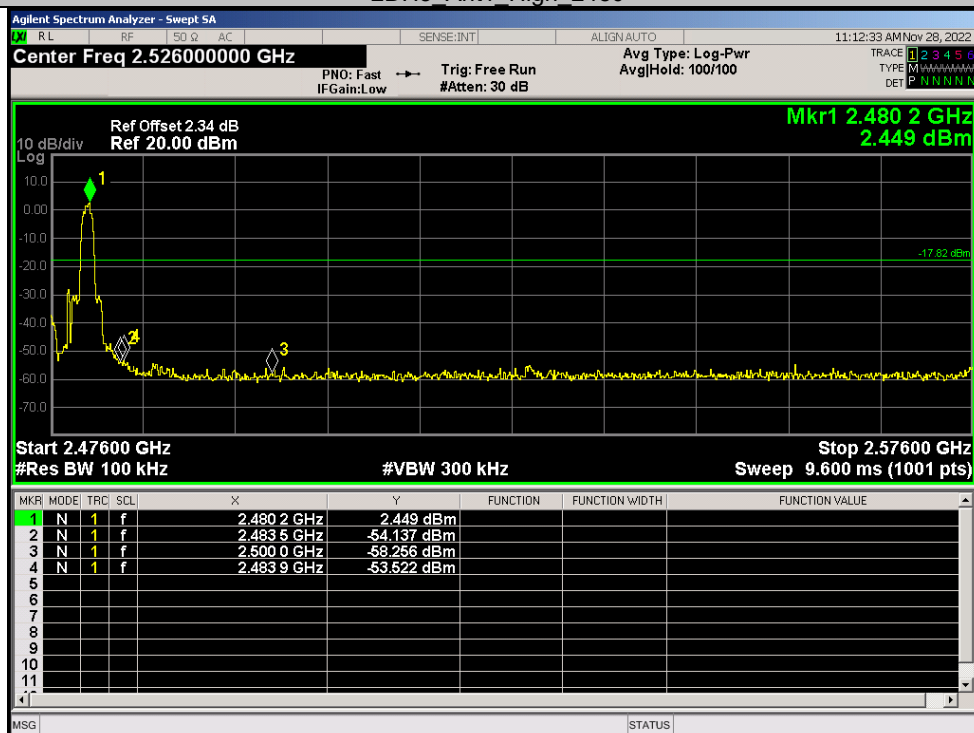




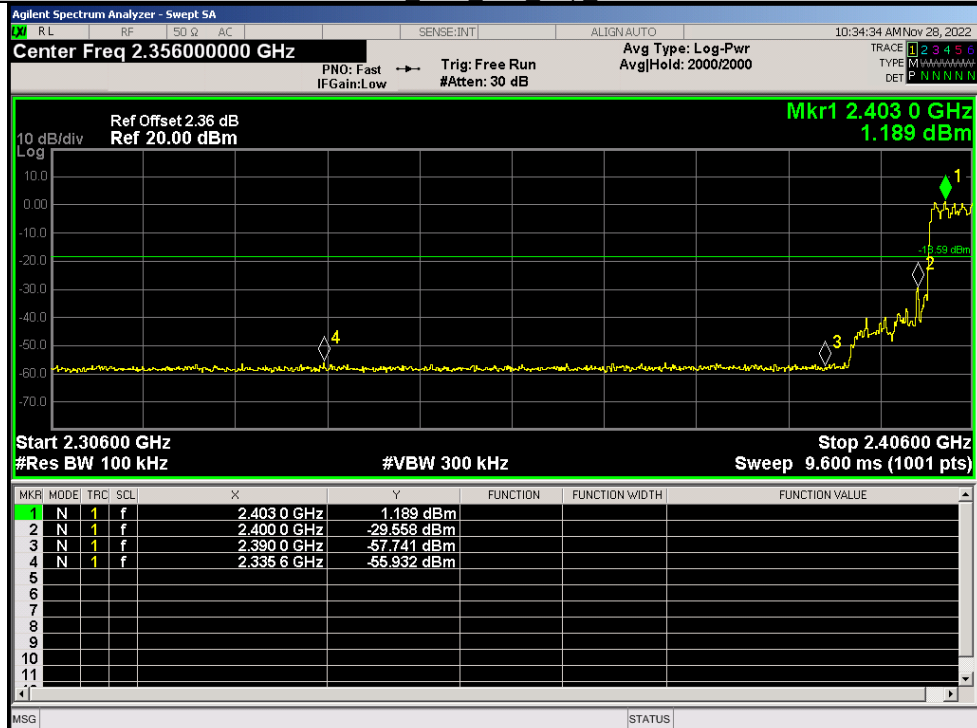
2DH5 Ant1 Low 2402



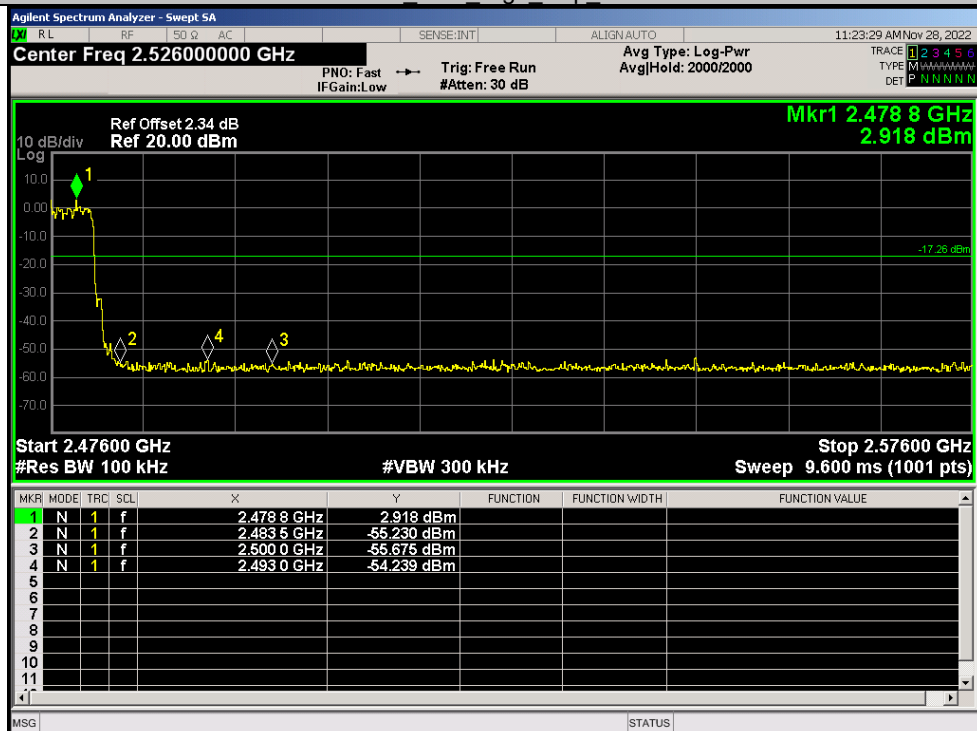
2DH5 Ant1 High 2480



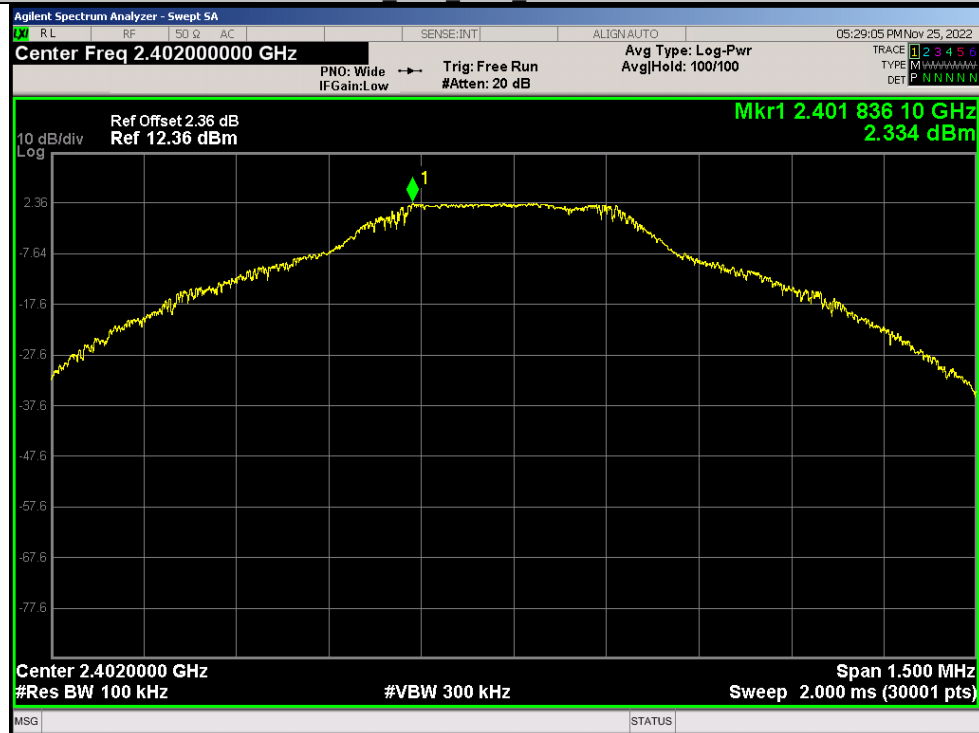
2DH5 Ant1 Low Hop 2402



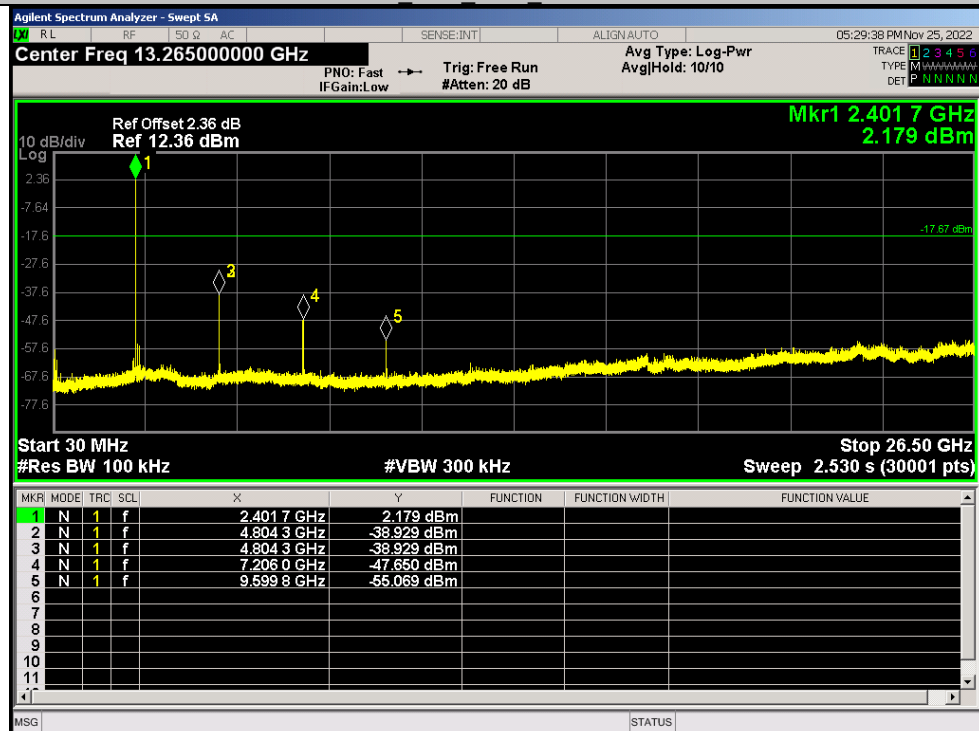
2DH5 Ant1 High Hop 2480

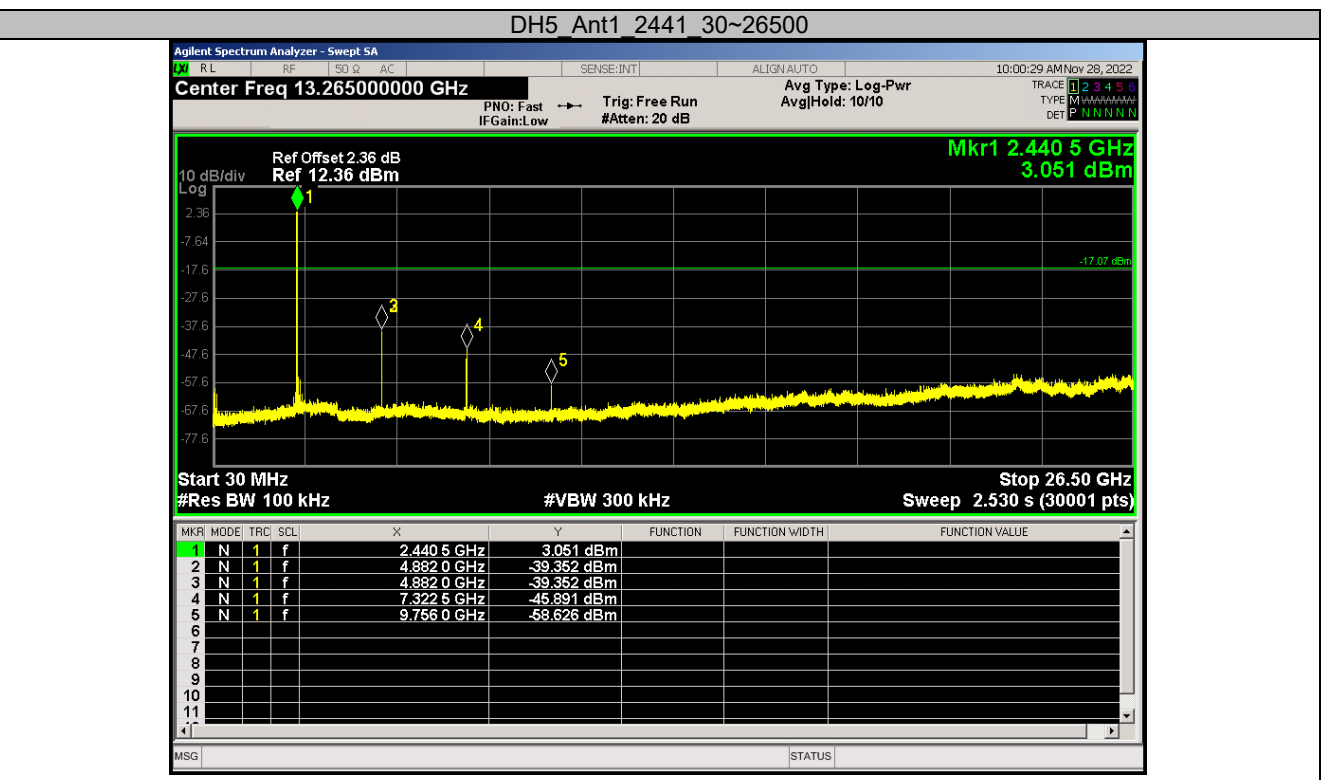
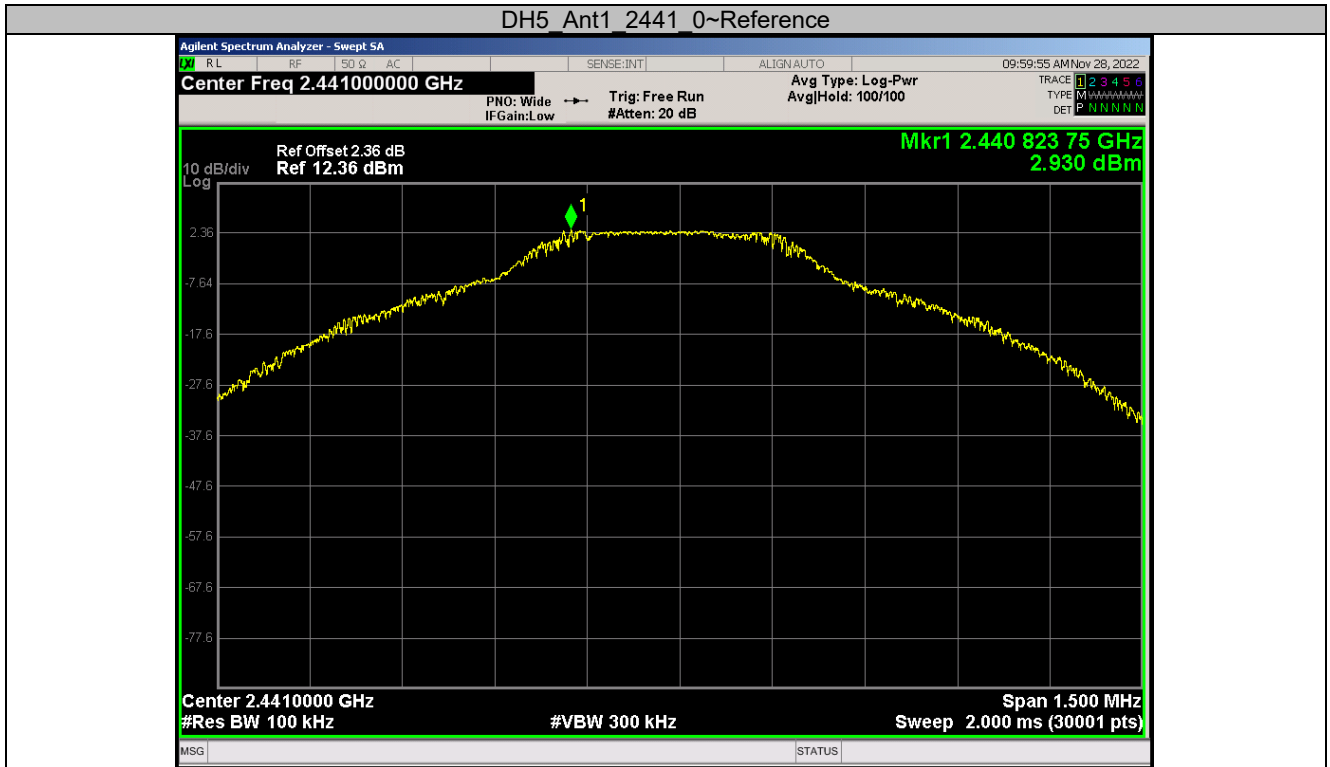


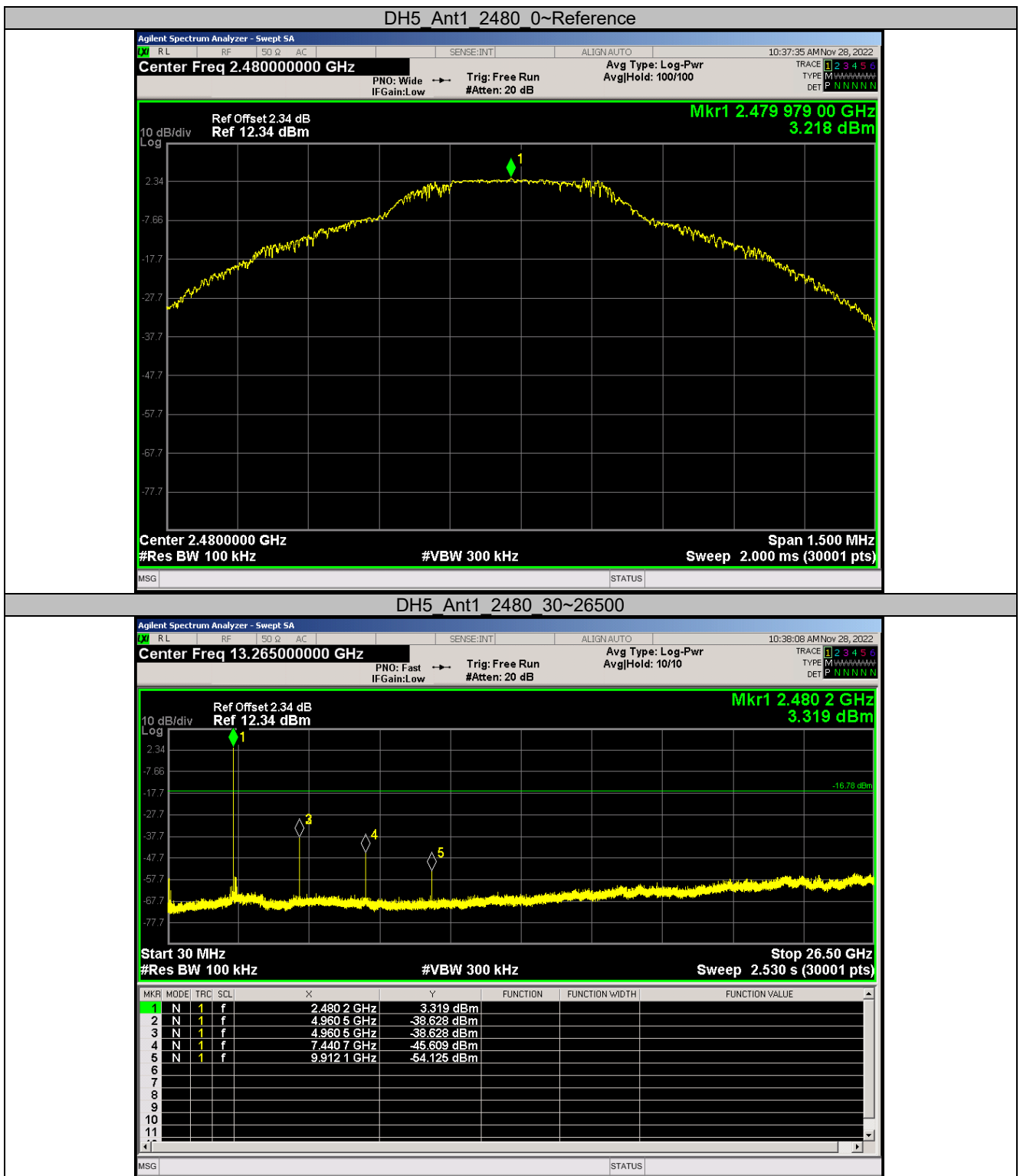
Conducted Spurious Emission DH5_Ant1_2402_0~Reference

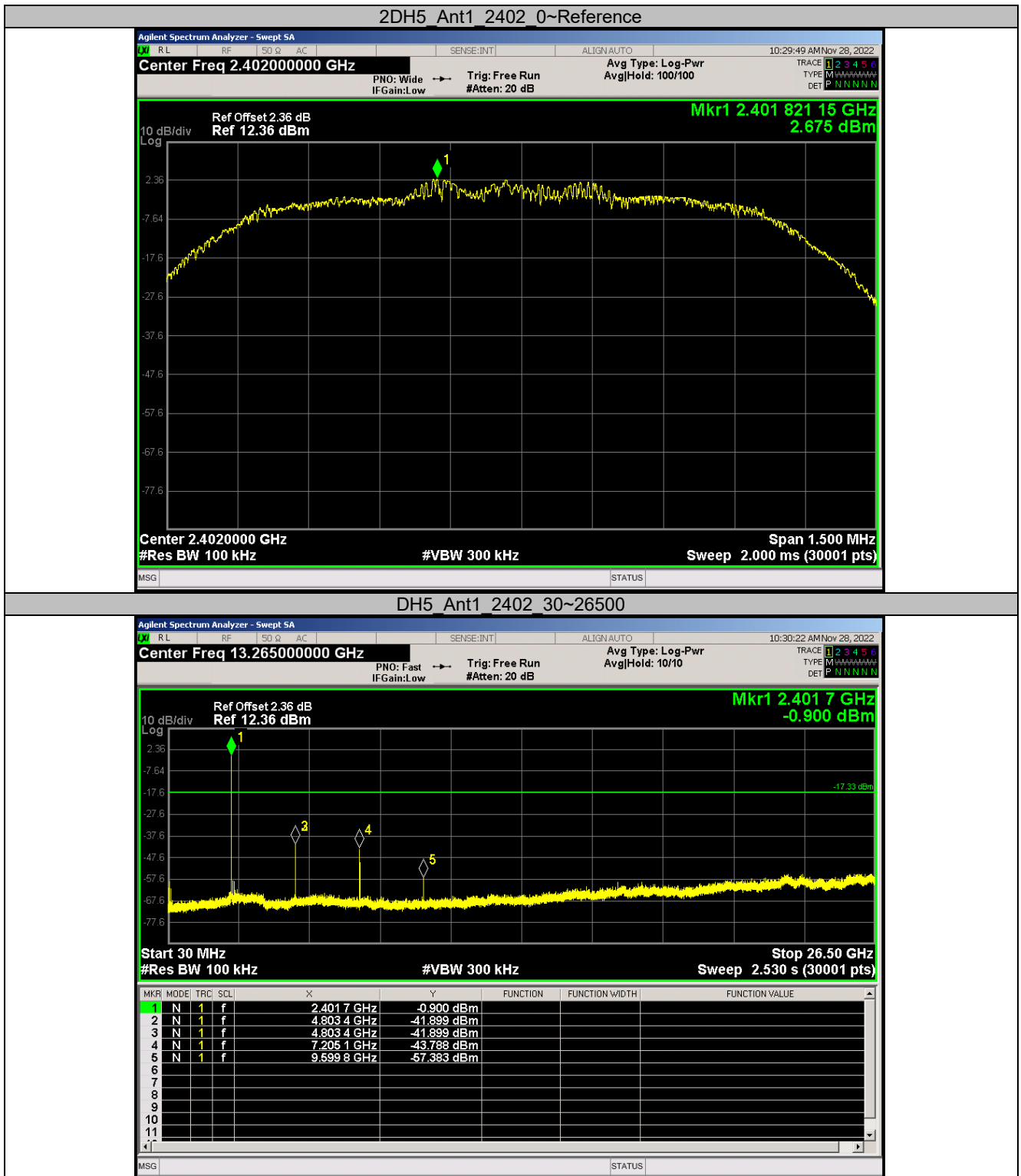


DH5_Ant1_2402_30~26500

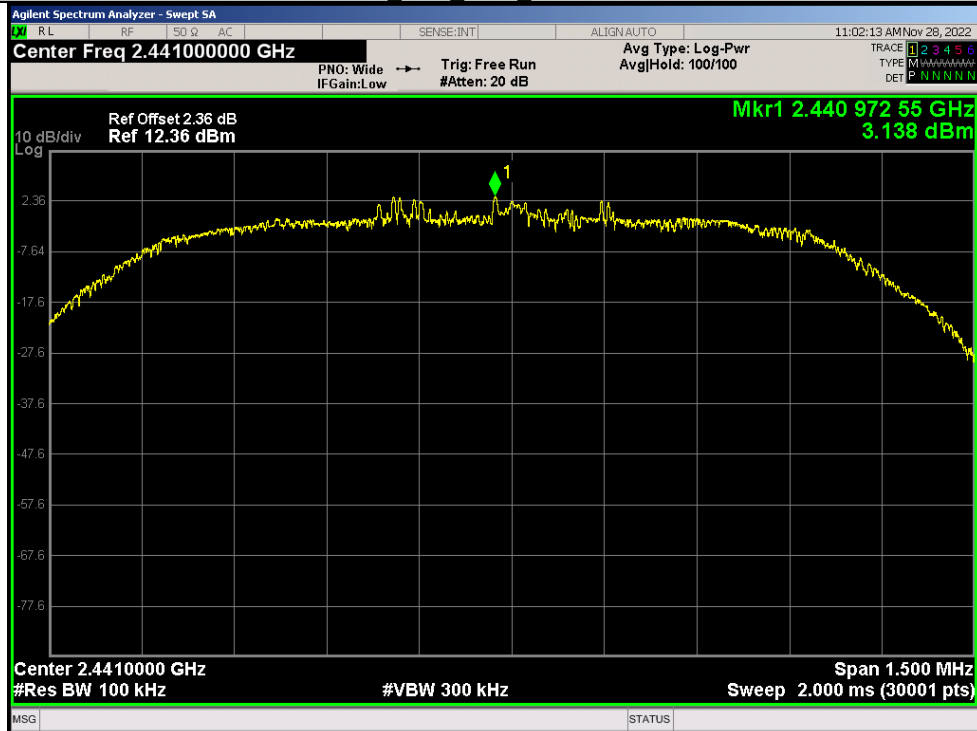




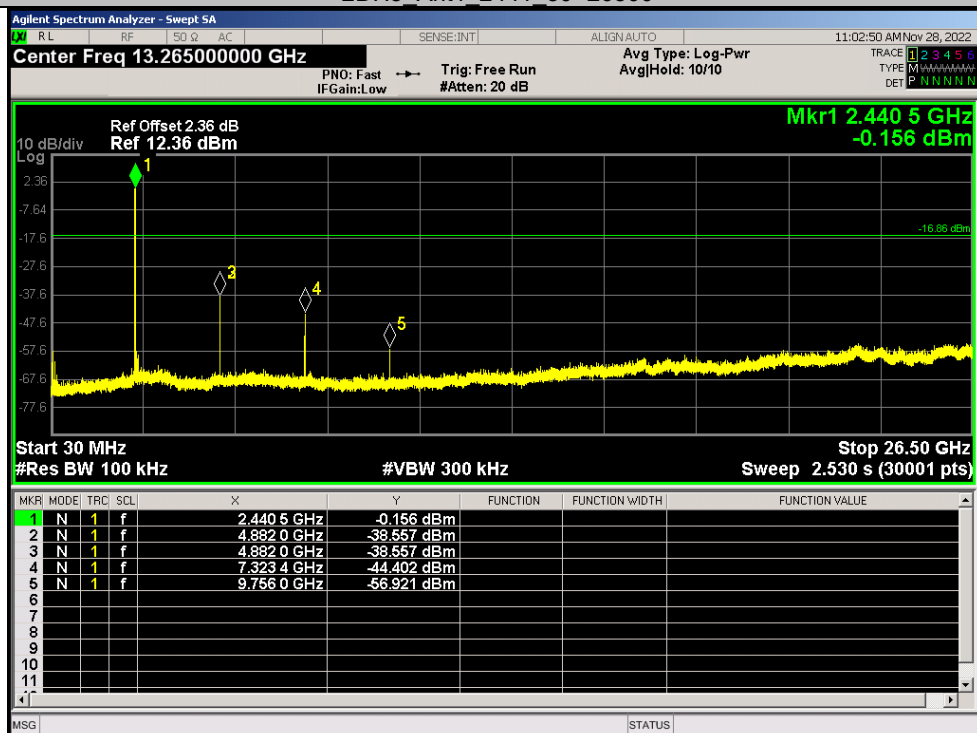


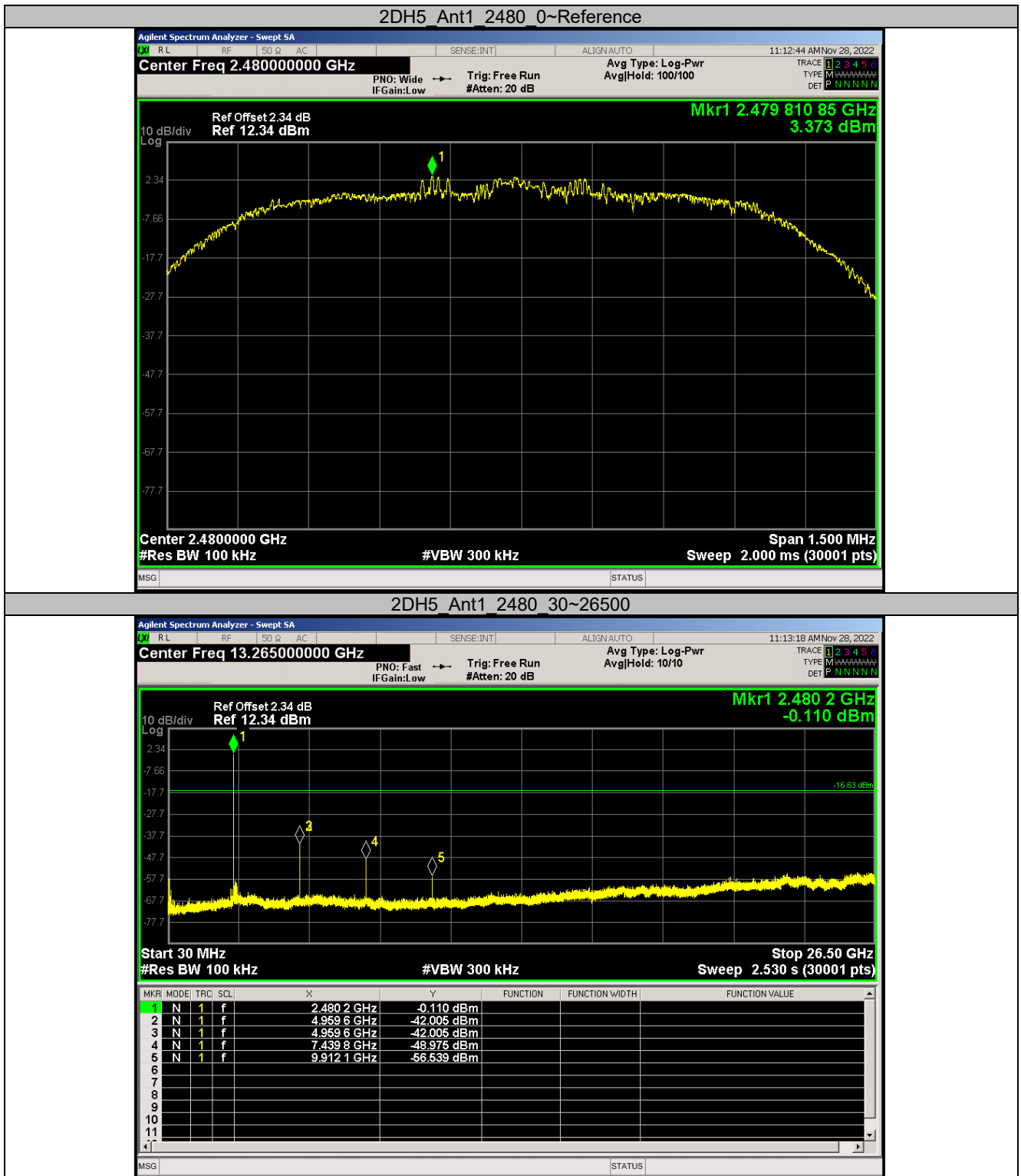


2DH5 Ant1 2441 0~Reference



2DH5 Ant1 2441 30~26500





End of Test Report