

RF TEST REPORT

FCC ID: 2A7EH-P2

Test Report No.....: RF260327006-01-016

Product(s) Name.....: Car Dash Cam

Model(s).....: P2, P2A, P2B, P2C, P2D

Trade Mark.....: VANTRUE

Applicant.....: Shenzhen Sanjiang Lechuang Technology Co., Ltd.

Address.....: 25th Floor, Jinluan International Business Building, No. 98 Heping East Road, Sanlian Community, Longhua Street, Longhua District, Shenzhen, China.

Receipt Date.....: 2026.03.31

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Standards.....: 47 CFR FCC Part 15, Subpart C(Section 15.247)
ANSI C63.10: 2020

Testing Laboratory.....: Shenzhen Haiyun Standard Technical Co., Ltd.

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HISTORY OF THIS TEST REPORT

Original Report Issue Date: 2026.05.21

- No additional attachment
- Additional attachments were issued following record

Attachment No.	Issue Date	Description

1.. 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	-----	N/A	-----
15.247(d) 15.205(a) 15.209(a)	Radiated Emission	APPENDIX A APPENDIX B APPENDIX C	PASS	-----
15.247 (a)(1)(iii)	Number of Hopping Frequency	APPENDIX D	PASS	-----
15.247 (a)(1)(iii)	Average Time of Occupancy	APPENDIX E	PASS	-----
15.247(a)(1)	Hopping Channel Separation	APPENDIX F	PASS	-----
15.247(a)(1)	Bandwidth	APPENDIX G	PASS	-----
15.247(a)(1)	Maximum Output Power	APPENDIX H	PASS	-----
15.247(d)	Conducted Spurious Emission	APPENDIX I	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.

1.1. TEST FACILITY

Company:	Shenzhen Haiyun Standard Technical Co., Ltd.
Address:	No. 110-113, 115, 116, Block B, Jinyuan Business Building, Bao'an District, Shenzhen, China
CNAS Registration Number:	CNAS L18252
CAB identifier:	CN0145
A2LA Certificate Number:	6823.01

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))

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	±102kHz
RF power conducted	±0.243dB
Power Spectral Density	±0.743dB
Conducted Spurious Emission	±1.328dB
Time	±0.19%
Conducted emission(9kHz~30MHz) AC main	±2.68dB
Radiated emission(9kHz~30MHz)	±3.50dB
Radiated emission (30MHz~1GHz)	±4.20dB
Radiated emission (1GHz~18GHz)	±5.10dB
Radiated emission (18GHz~40GHz)	±5.26dB

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

1.3. TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
Radiated Emissions-9 kHz to 30 MHz	24.4°C	53%	DC 12V	Keith Huang
Radiated Emissions-30 MHz to 1000 MHz	24.4°C	53%	DC 12V	Keith Huang
Radiated Emissions-Above 1000 MHz	24.4°C	53%	DC 12V	Keith Huang
Bandwidth	23.1°C	45%	DC 12V	Lemon He
Maximum Output Power	23.1°C	45%	DC 12V	Lemon He
Conducted Spurious Emission	23.1°C	45%	DC 12V	Lemon He
Number of Hopping Frequency	23.1°C	45%	DC 12V	Lemon He
Average Time of Occupancy	23.1°C	45%	DC 12V	Lemon He
Hopping Channel Separation	23.1°C	45%	DC 12V	Lemon He

Note: The car charger is powered by DC 12V.

2.. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

Sample No.	POC260327006-S001, POC260327006-S002
Product name	Car Dash Cam
Model name	P2, P2A, P2B, P2C, P2D
Test model	P2
Model difference	Only the model name, product appearance and colors are different
Trade Mark	VANTRUE
Power supply	DC 12-24V from car charger
Operate temperature	-20℃~60℃
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Bit Rate of Transmitter	1Mbps, 2Mbps, 3Mbps
Max. Output Power	3Mbps: 1.78dBm (0.0015W)
Antenna gain	1.34dBi
Antenna type	FPC Antenna

Note:

1. 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. 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_3Mbps Channel 00/39/78
Mode 4	TX Mode_1Mbps Channel 00

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

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 4	TX Mode_3Mbps Channel 39

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	TX Mode_1Mbps Channel 00/39/78
Mode 3	TX Mode_3Mbps Channel 00/39/78

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
Mode 3	TX Mode_3Mbps 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
Mode 3	TX Mode_3Mbps Channel 00/39/78

Note:

- (1) The measurements for Output Power were tested with DH1/3/5 during 1Mbps, 2Mbps and 3Mbps, the worst case were 1Mbps (DH5), 2Mbps (DH5) and 3Mbps (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 radiated spurious emissions below 1 GHz test, the 1Mbps Channel 00 are found to be the worst case and recorded.

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	MobaXterm		
Frequency (MHz)	2402	2441	2480
1Mbps	Default	Default	Default
2Mbps	Default	Default	Default
3Mbps	Default	Default	Default

2.4. SUPPORT UNITS

No.	Equipment	Model	Manufacturer	Series No
1	PC	M4500T	Thinkpad	M032004854IT
2	Car charger	/	Vantrue	/
3	Earphone	E1	/	/

3.. AC POWER LINE CONDUCTED EMISSIONS

3.1. 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.

3.2. 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.

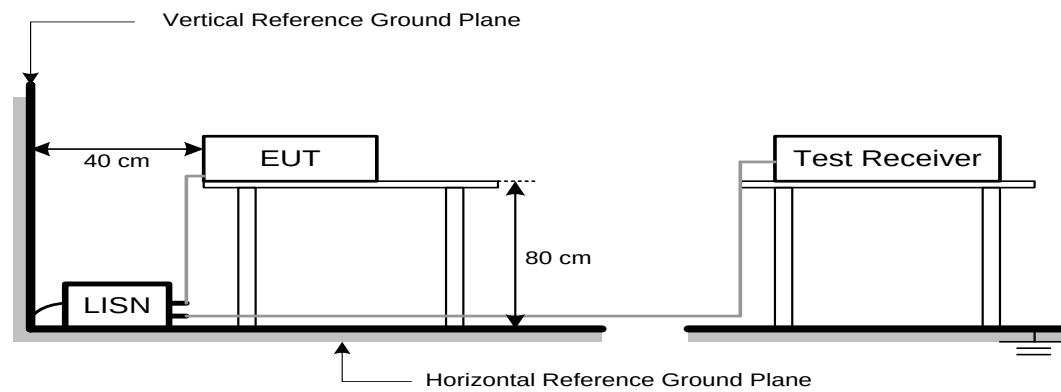
The following table is the setting of the receiver:

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

3.3. DEVIATION FROM TEST STANDARD

No deviation.

3.4. TEST SETUP



3.5. 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.

3.6. TEST RESULTS

The EUT is powered by car battery, so this test item is not applicable for the EUT.

4.. RADIATED EMISSIONS

4.1. 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).

4.2. TEST PROCEDURE

- a. 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)
- b. 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)
- c. 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.
- d. 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).
- e. 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.
- f. 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.
- g. 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)
- h. 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)
- i. 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

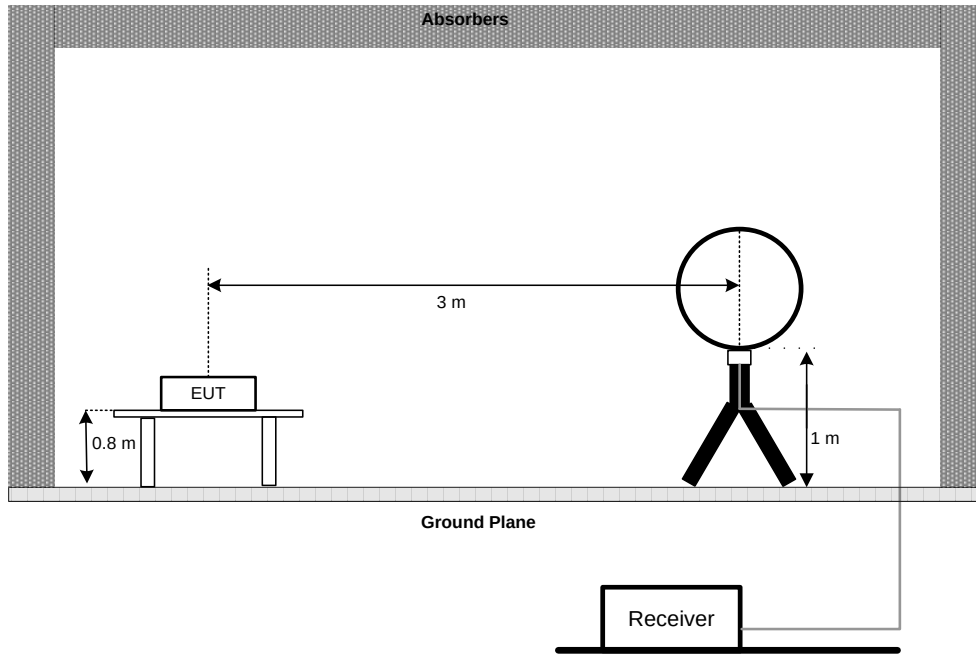
Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector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

4.3. DEVIATION FROM TEST STANDARD

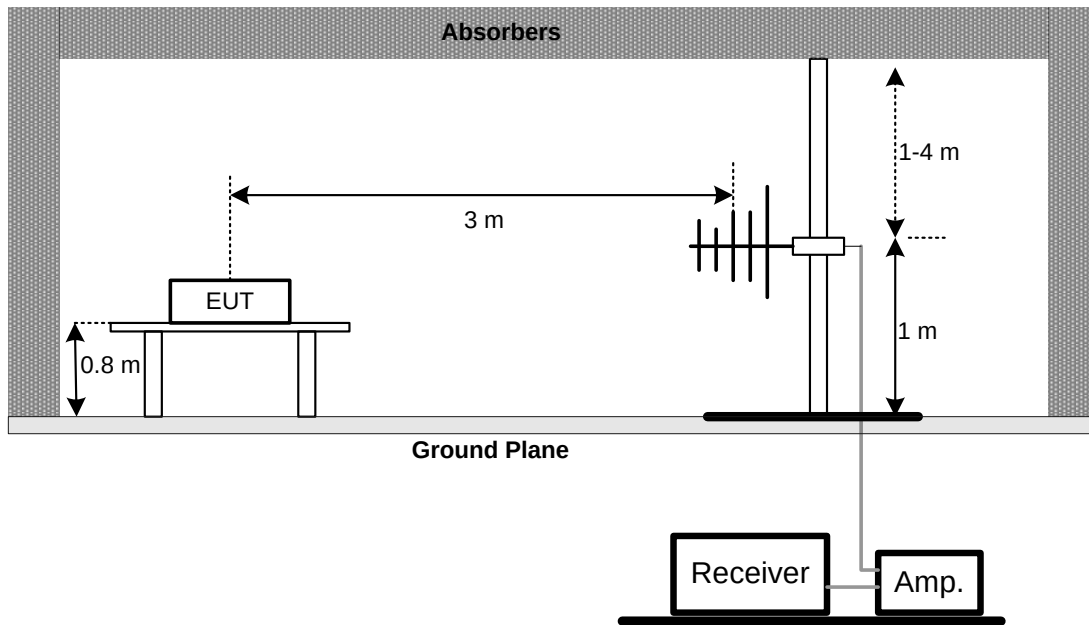
No deviation.

4.4. TEST SETUP

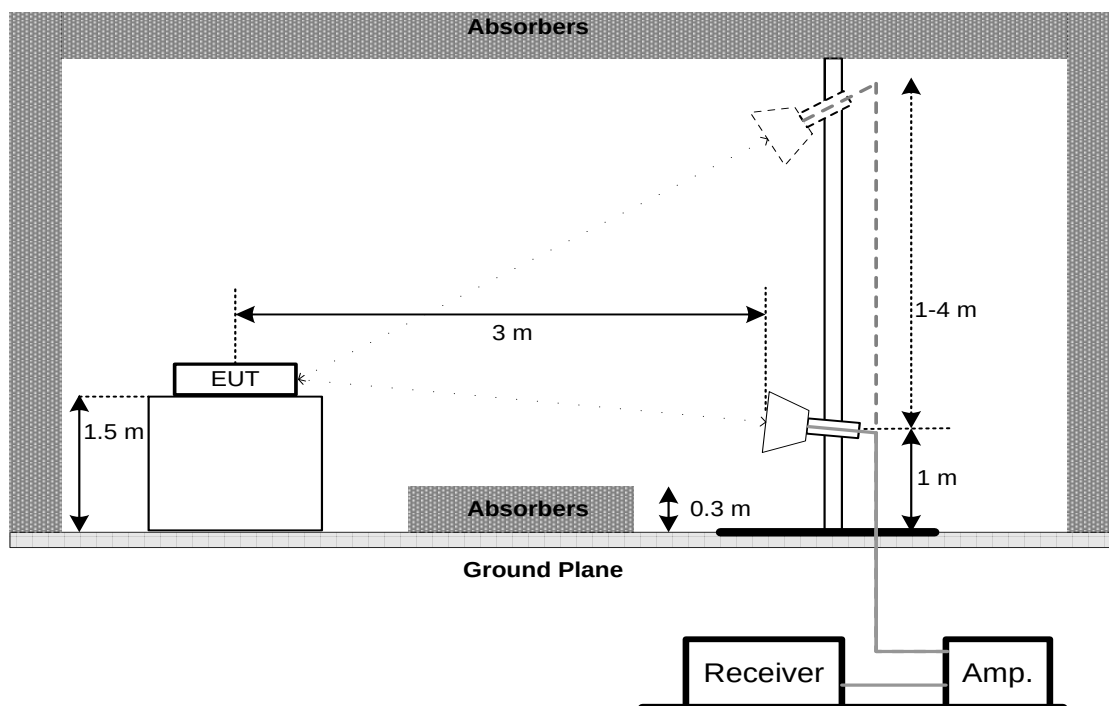
9 kHz to 30 MHz



30 MHz to 1 GHz



Above 1 GHz



4.5. EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

4.6. TEST RESULTS - 9 kHz TO 30 MHz

Please refer to the APPENDIX A.

Remark:

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

4.7. TEST RESULTS - 30 MHz TO 1000 MHz

Please refer to the APPENDIX B.

4.8. TEST RESULTS - ABOVE 1000 MHz

Please refer to the APPENDIX C.

Remark:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

5.. NUMBER OF HOPPING FREQUENCY

5.1. LIMIT

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

5.2. TEST PROCEDURE

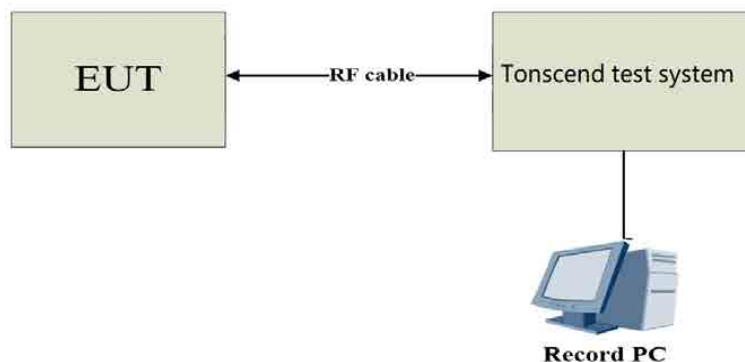
- The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

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

5.3. DEVIATION FROM STANDARD

No deviation.

5.4. TEST SETUP



5.5. EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6. TEST RESULTS

Please refer to the APPENDIX D.

6.. AVERAGE TIME OF OCCUPANCY

6.1. LIMIT

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

6.2. TEST PROCEDURE

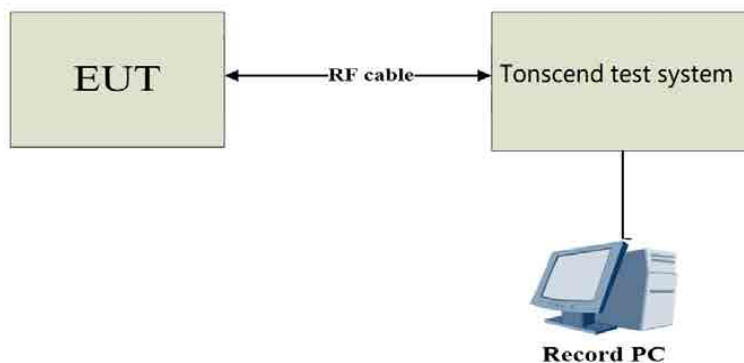
- Set the EUT for DH1, DH3 and DH5 packet transmitting.
- Measure the maximum time duration of one single pulse.
- DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ 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

6.3. DEVIATION FROM STANDARD

No deviation.

6.4. TEST SETUP



6.5. EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

6.6. TEST RESULTS

Please refer to the APPENDIX E.

7.. HOPPING CHANNEL SEPARATION

7.1. 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.

7.2. TEST PROCEDURE

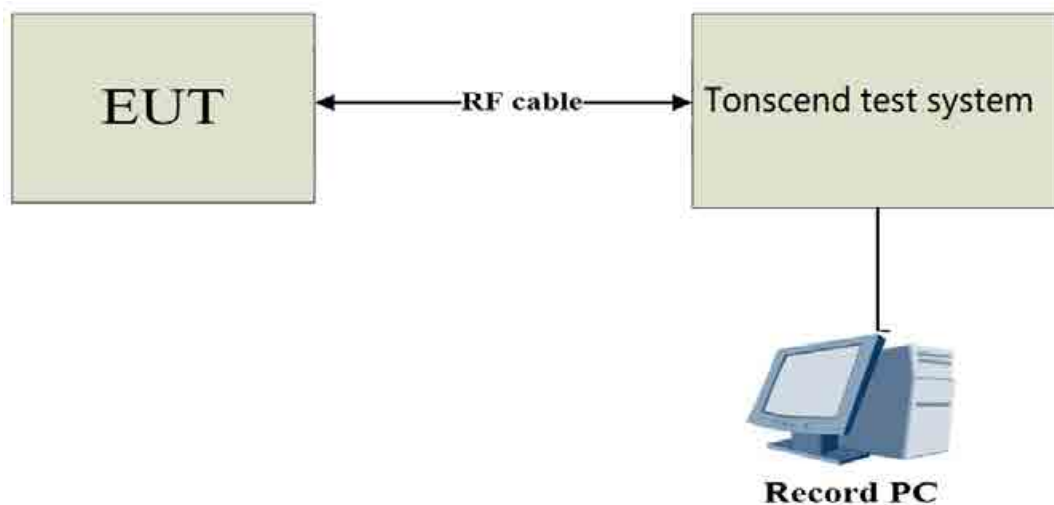
- a. The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

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

7.3. DEVIATION FROM STANDARD

No deviation.

7.4. TEST SETUP



7.5. EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.6. TEST RESULTS

Please refer to the APPENDIX F.

8.. BANDWIDTH

8.1. LIMIT

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

8.2. TEST PROCEDURE

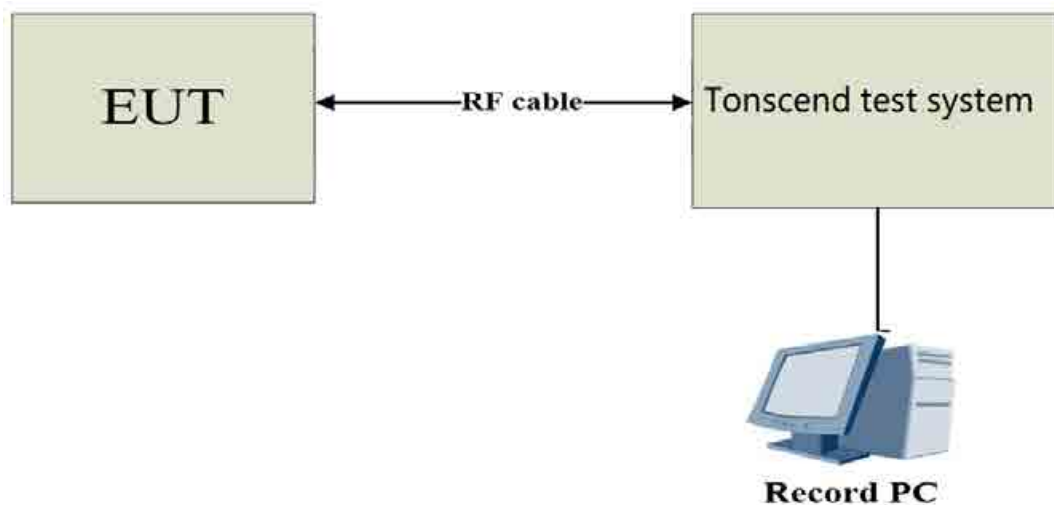
- The EUT was directly connected to the tonskend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

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

8.3. DEVIATION FROM STANDARD

No deviation.

8.4. TEST SETUP



8.5. EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.6. TEST RESULTS

Please refer to the APPENDIX G.

9.. MAXIMUM OUTPUT POWER

9.1. LIMIT

Section	Test Item	Limit
FCC 15.247(a)(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.

9.2. TEST PROCEDURE

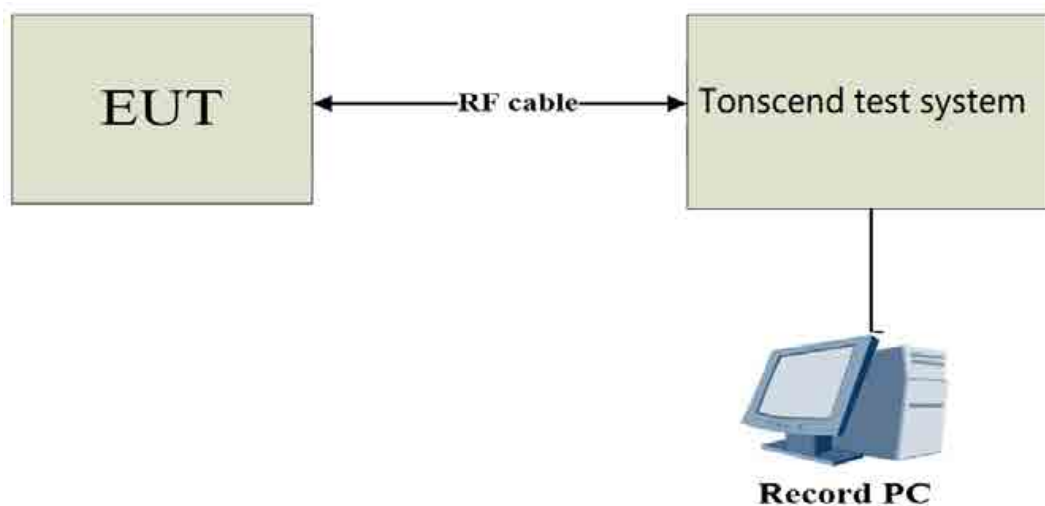
- The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	Approximately five times the 20 dB bandwidth, centered on a hopping channel.
RBW	3 MHz
VBW	8 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

9.3. DEVIATION FROM STANDARD

No deviation.

9.4. TEST SETUP



9.5. EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

9.6. TEST RESULTS

Please refer to the APPENDIX H.

10.. CONDUCTED SPURIOUS EMISSION

10.1. 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.

10.2. TEST PROCEDURE

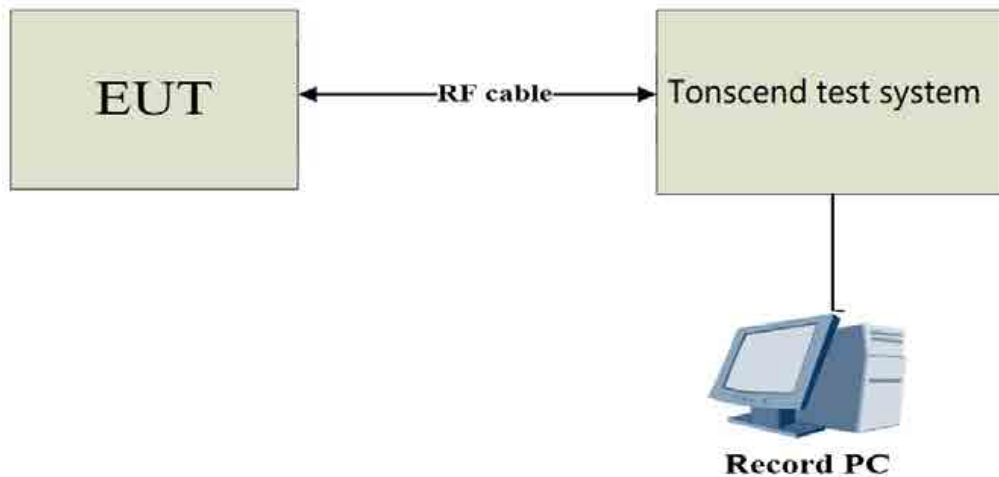
- a. The EUT was directly connected to the tonscend test system and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

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

10.3. DEVIATION FROM STANDARD

No deviation.

10.4. TEST SETUP



10.5. EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

10.6. TEST RESULTS

Please refer to the APPENDIX I.

11.. MEASUREMENT INSTRUMENTS LIST

No.	Name of Equipment	Manufacturer	Model Number	Serial Number	Inventory No.	Last Calibration	Due Calibration
Radiated Emission							
1	Test receiver	Rohde&Schwarz	ESU	100184	JLE011	2026/2/27	2027/2/26
2	Log periodic antenna	Schwarzbeck	VULB 9168	1151	JLE012	2025/4/12	2028/4/11
3	Low frequency amplifier	/	LNA 0920N	2014	JLE023	2026/2/27	2027/2/26
4	High frequency amplifier	Schwarzbeck	BBV 9718	9718-284	JLE024	2026/2/27	2027/2/26
5	Horn Antenna	SCHWARZBECK	BBHA 9120 D	02670	JLE028	2025/4/12	2028/4/11
6	Temp&Humidity Recorder	Meideshi	JR900	/	JLE021	2026/4/08	2027/4/07
7	Horn Antenna	SCHWARZBECK	BBHA 9170	9170#685	JLE029	2024/7/15	2027/7/14
8	Loop Antenna	SCHWARZBECK	FMZB1519B	00029	JLE030	2024/7/15	2027/7/14
9	Broadband preamplifier	Schwarzbeck	BBV9721	9721-019	JLE025	2026/2/27	2027/2/26
10	Test software	Farad Technology Co., Ltd	EZ-EMC Ver.TW-03A2				
RF Conducted Emissions							
1	MXA Signal Analyzer	Keysight	N9010A	MY51440158	JLE087	2025/9/15	2026/9/14
2	MXA Signal Analyzer	Agilent	N9020A	MY52220022	JLE090	2026/1/19	2027/1/18
3	RF Control Unit	dsusoft	JS0806-2	21G8060449	JLE053	2026/2/27	2027/2/26
4	power supply unit	dsusoft	JS0806-4ADC	N/A	JLE055	2026/2/27	2027/2/26
5	VXG Signal Generator	Keysight	N5182B	MY59100855	JLE068	2026/4/14	2027/4/13
6	EXG Analog Signal Generator	Keysight	N5173B	MY59101282	JLE052	2026/2/27	2027/2/26
7	Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	1201.0002K5 0-116064-Dt	JLE054	2026/2/27	2027/2/26
8	Test software	dsusoft	JS1120-3 Ver.3.2.22.0				

12.. ANTENNA REQUIREMENT

Test standard: FCC part 15.203

According to the manufacturer declared, the EUT has one FPC antenna, the antenna gain is 1.34dBi and the antenna connector is designed with permanent attachment.

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

Refer to EUT Photo for further details.

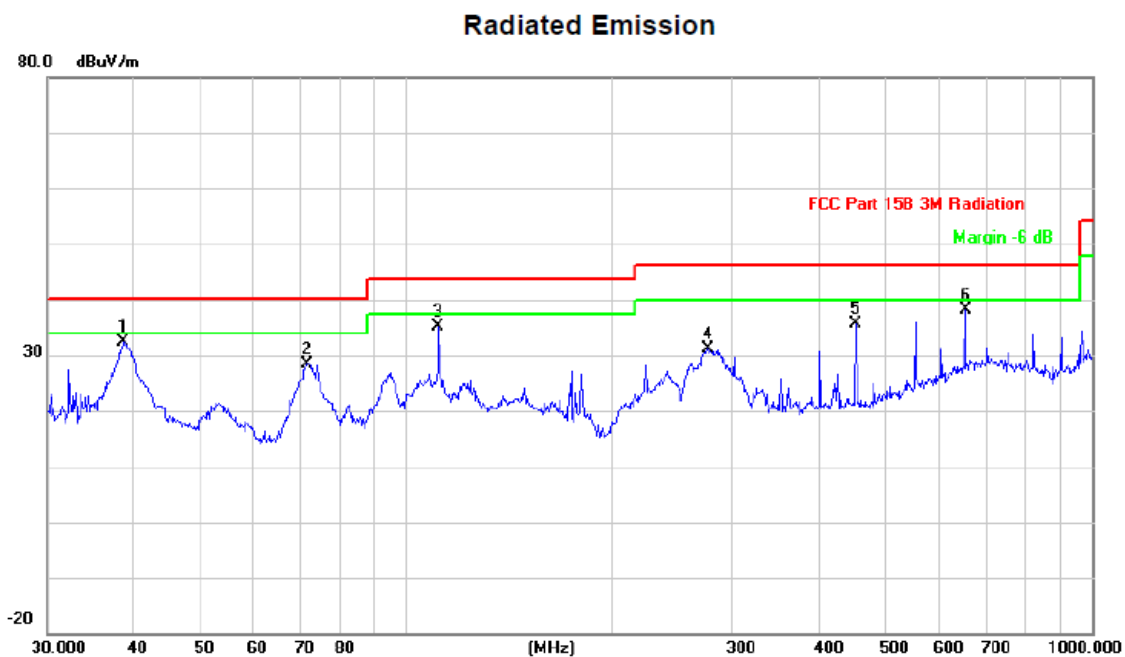
APPENDIX A - RADIATED EMISSION - 9 KHZ TO 30 MHZ

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

APPENDIX B - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

Test Mode	TX Mode_3Mbps Channel 39	Polarization	Vertical
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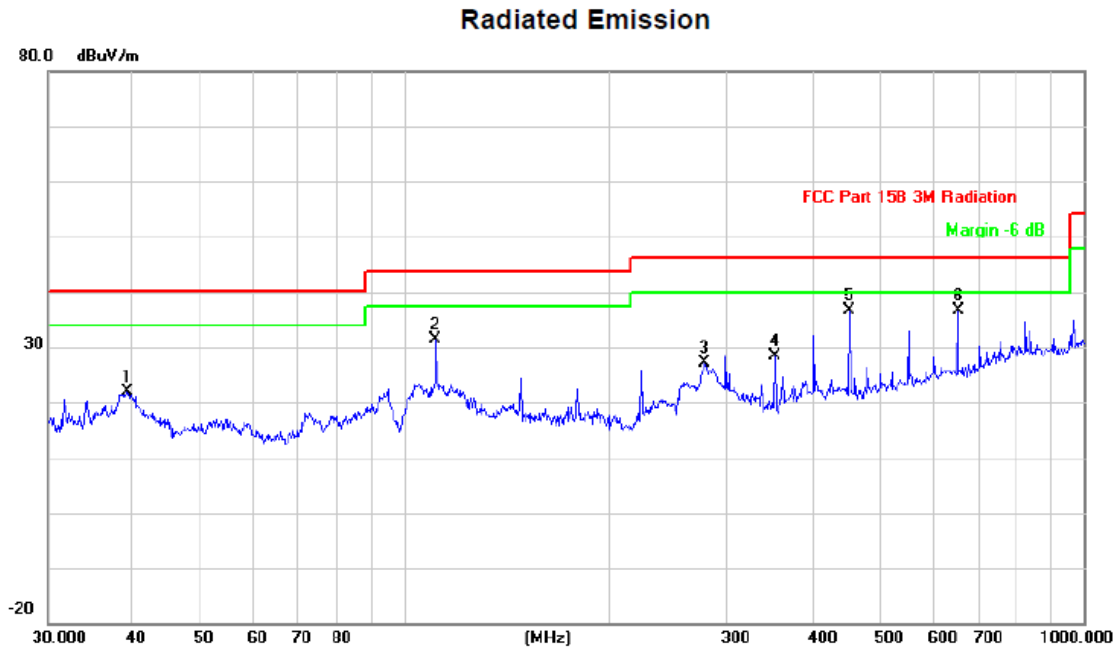
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	38.7616	43.39	-11.00	32.39	40.00	-7.61	peak		
2		71.8948	42.83	-14.37	28.46	40.00	-11.54	peak		
3		111.4930	46.88	-11.65	35.23	43.50	-8.27	peak		
4		275.7681	42.10	-10.90	31.20	46.00	-14.80	peak		
5		452.3607	41.39	-5.86	35.53	46.00	-10.47	peak		
6		653.9540	39.68	-1.57	38.11	46.00	-7.89	peak		

REMARKS:

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

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

Test Mode	TX Mode_3Mbps Channel 39	Polarization	Horizontal
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No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		39.3096	32.48	-10.64	21.84	40.00	-18.16	peak		
2		111.4930	42.97	-11.65	31.32	43.50	-12.18	peak		
3		277.7107	37.77	-10.71	27.06	46.00	-18.94	peak		
4		351.3401	37.41	-8.93	28.48	46.00	-17.52	peak		
5		452.3607	42.46	-5.86	36.60	46.00	-9.40	peak		
6 *		653.9540	38.20	-1.57	36.63	46.00	-9.37	peak		

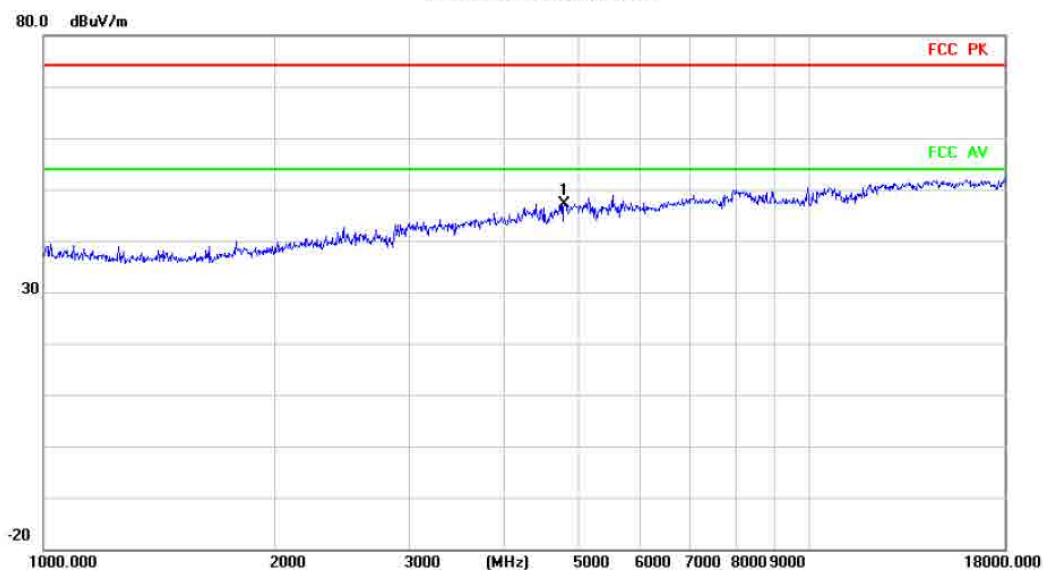
REMARKS:

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

APPENDIX C - RADIATED EMISSION - ABOVE 1000 MHZ

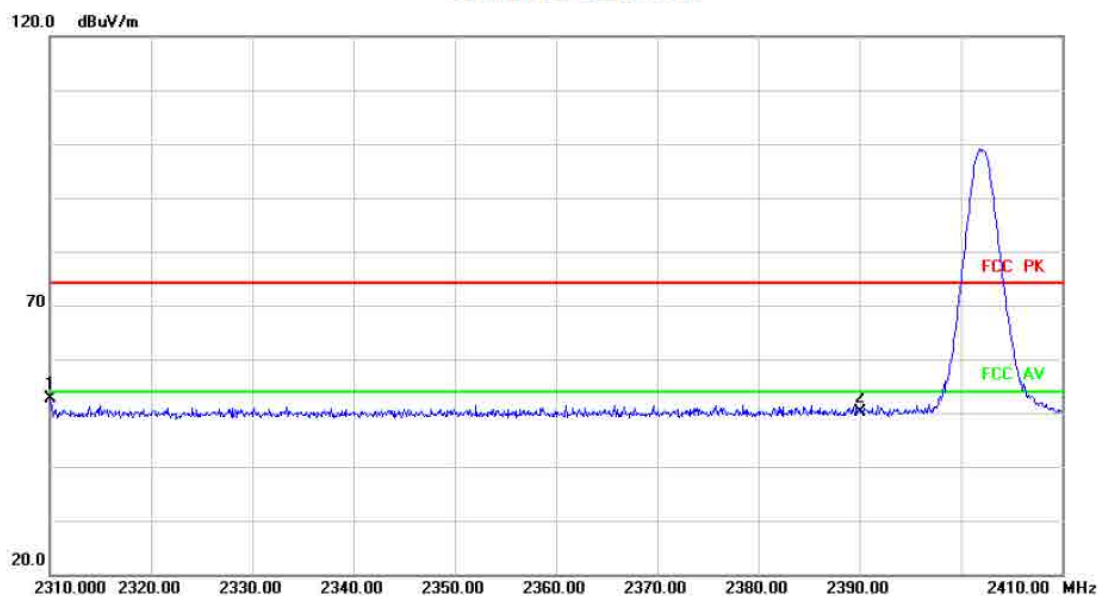
Test Mode	TX Mode_1Mbps Channel 00	Polarization	Vertical
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree
1	*	4804.000	51.06	-3.94	47.12	74.00	-26.88	peak	

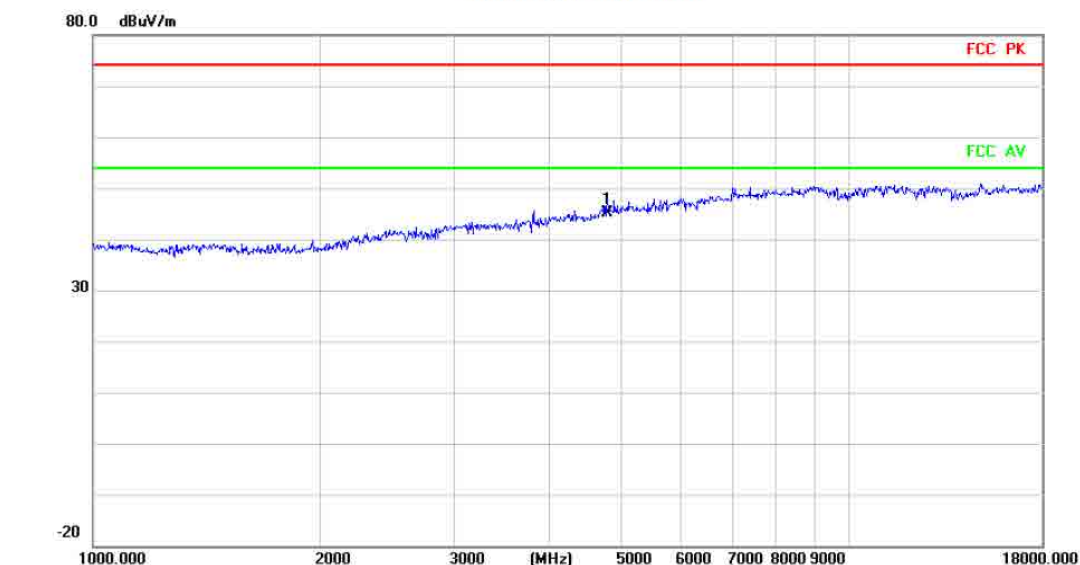
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree
1	*	2310.000	54.72	-1.98	52.74	74.00	-21.26	peak	
2		2390.000	51.78	-1.58	50.20	74.00	-23.80	peak	

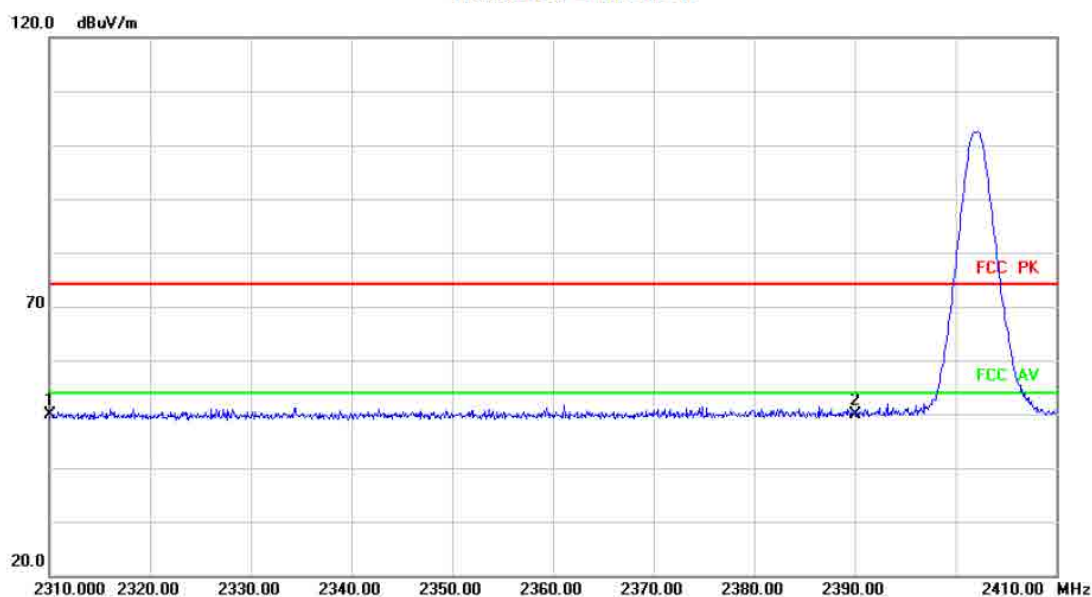
Test Mode	TX Mode_1Mbps Channel 00	Polarization	Horizontal
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	4804.000	48.96	-3.94	45.02	74.00	-28.98	peak		

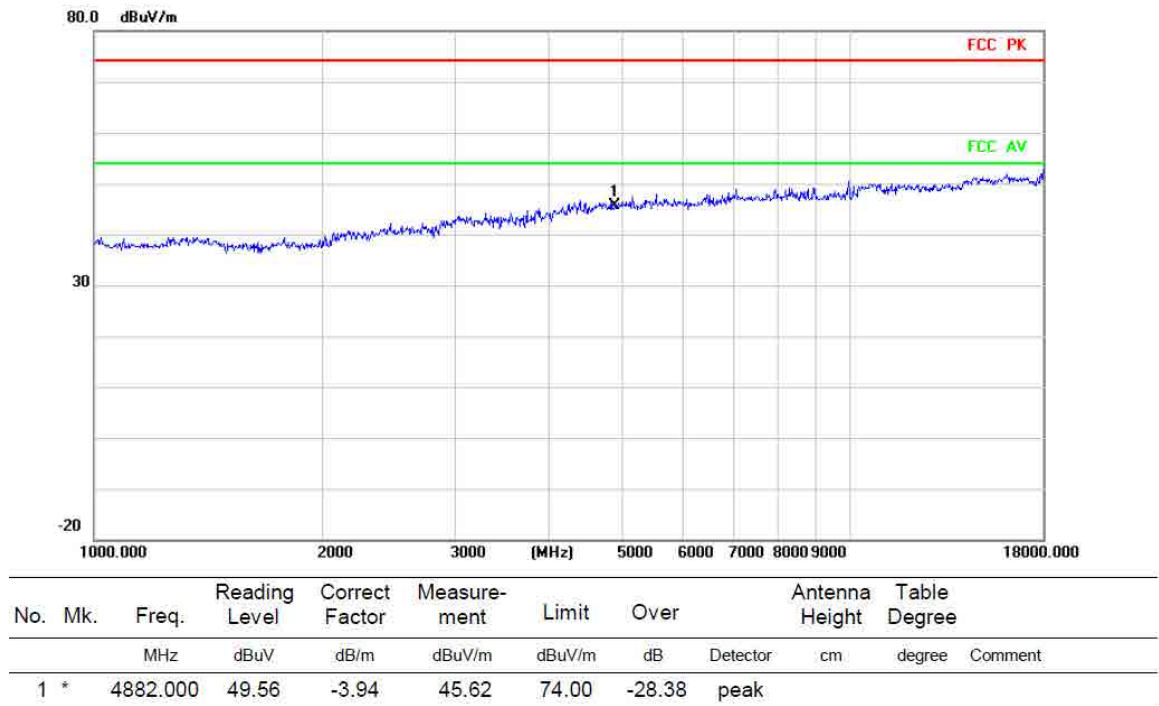
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	2310.000	51.84	-1.98	49.86	74.00	-24.14	peak		
2		2390.000	51.35	-1.58	49.77	74.00	-24.23	peak		

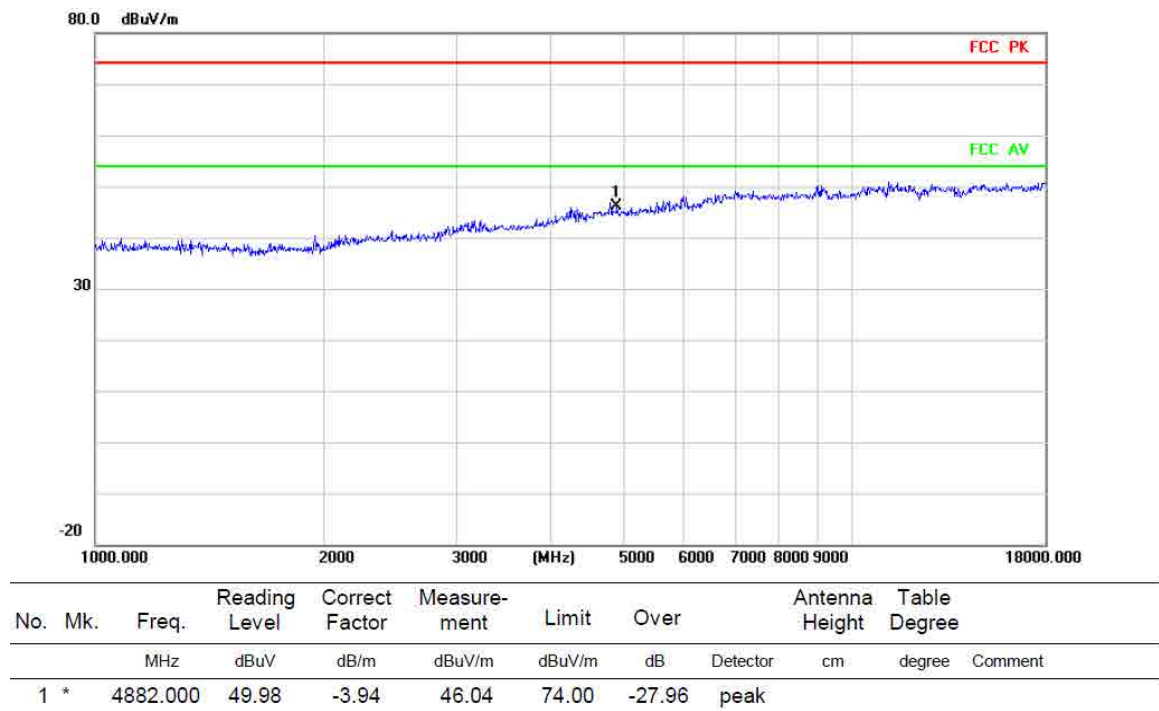
Test Mode	TX Mode_1Mbps Channel 39	Polarization	Vertical
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Radiated Emission



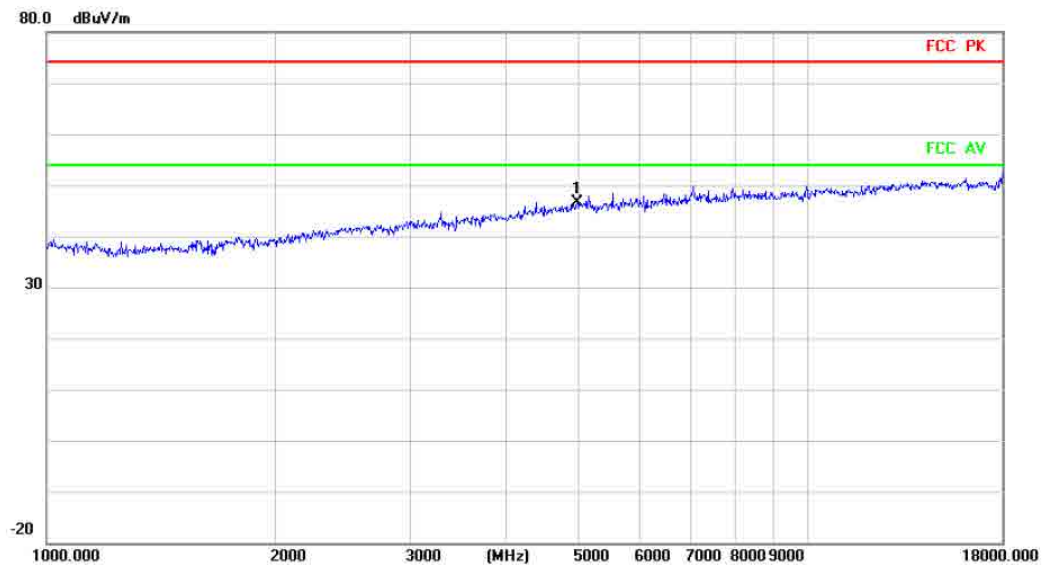
Test Mode	TX Mode_1Mbps Channel 39	Polarization	Horizontal
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Radiated Emission



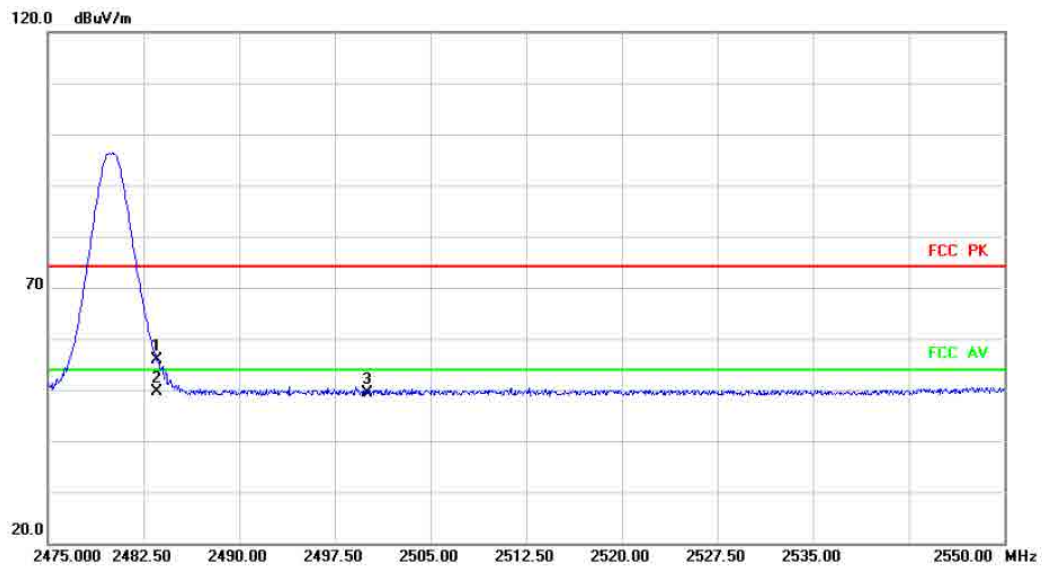
Test Mode	TX Mode_1Mbps Channel 79	Polarization	Vertical
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	4960.000	50.61	-3.91	46.70	74.00	-27.30	peak		

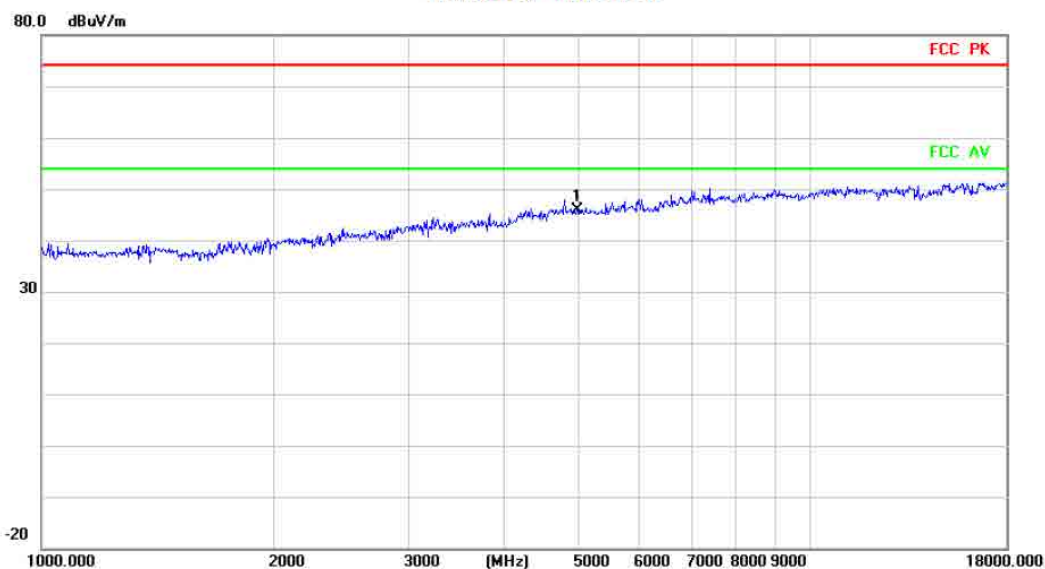
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2483.500	56.56	-0.62	55.94	74.00	-18.06	peak		
2	*	2483.500	50.28	-0.62	49.66	54.00	-4.34	AVG		
3		2500.000	49.81	-0.45	49.36	74.00	-24.64	peak		

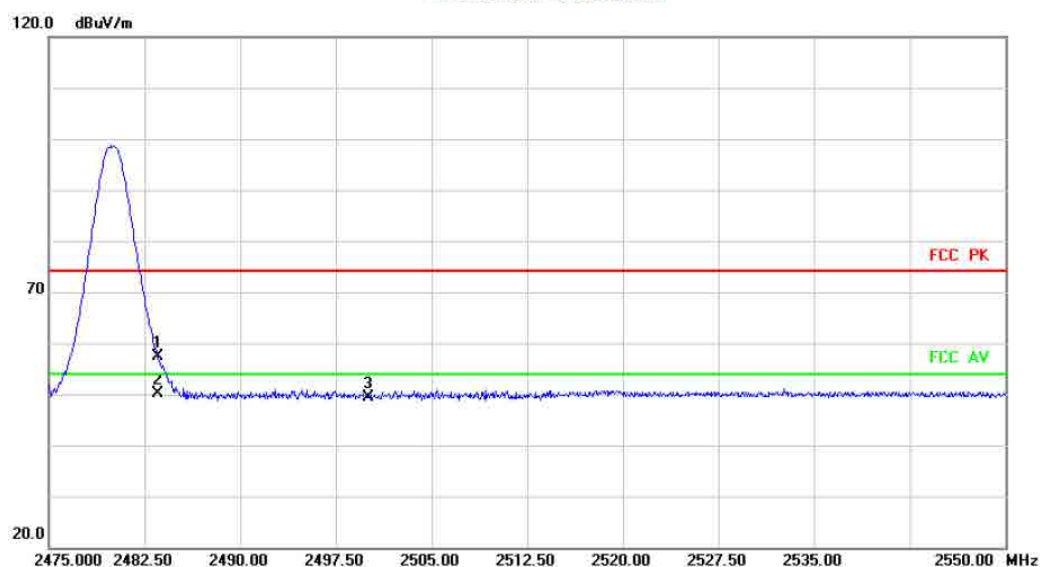
Test Mode	TX Mode_1Mbps Channel 79	Polarization	Horizontal
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	4960.000	49.77	-3.91	45.86	74.00	-28.14	peak		

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2483.500	57.93	-0.62	57.31	74.00	-16.69	peak		
2	*	2483.500	50.83	-0.62	50.21	54.00	-3.79	AVG		
3		2500.000	49.88	-0.45	49.43	74.00	-24.57	peak		

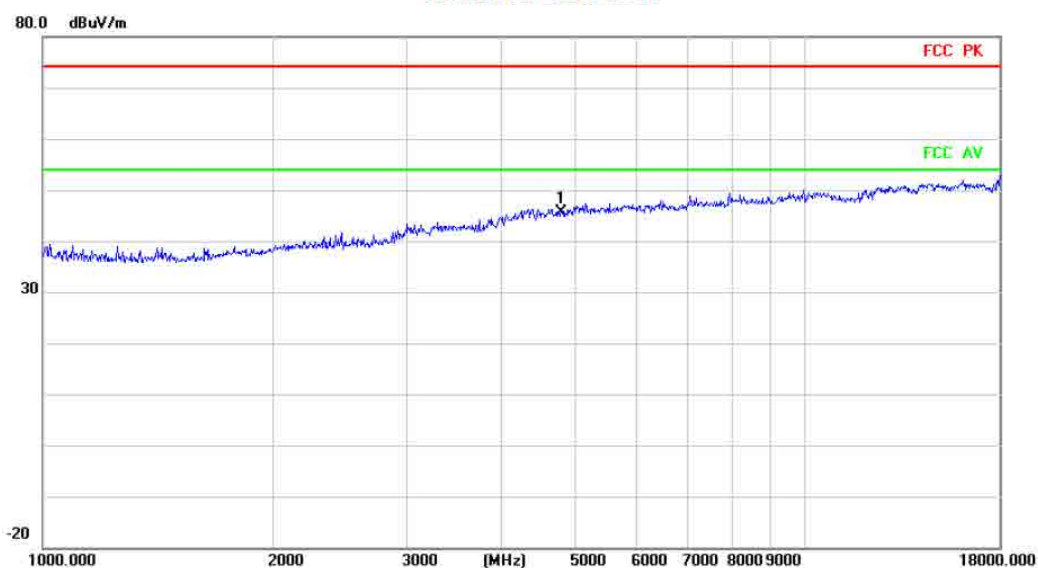
REMARKS:

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

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

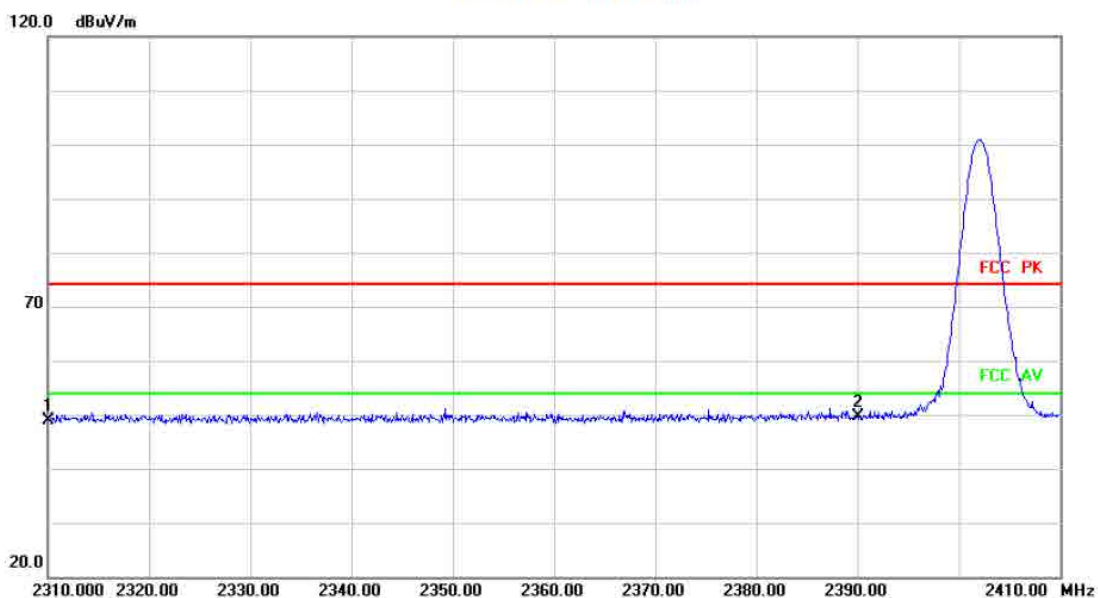
Test Mode	TX Mode_3Mbps Channel 00	Polarization	Vertical
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	4804.000	49.56	-3.94	45.62	74.00	-28.38	peak		

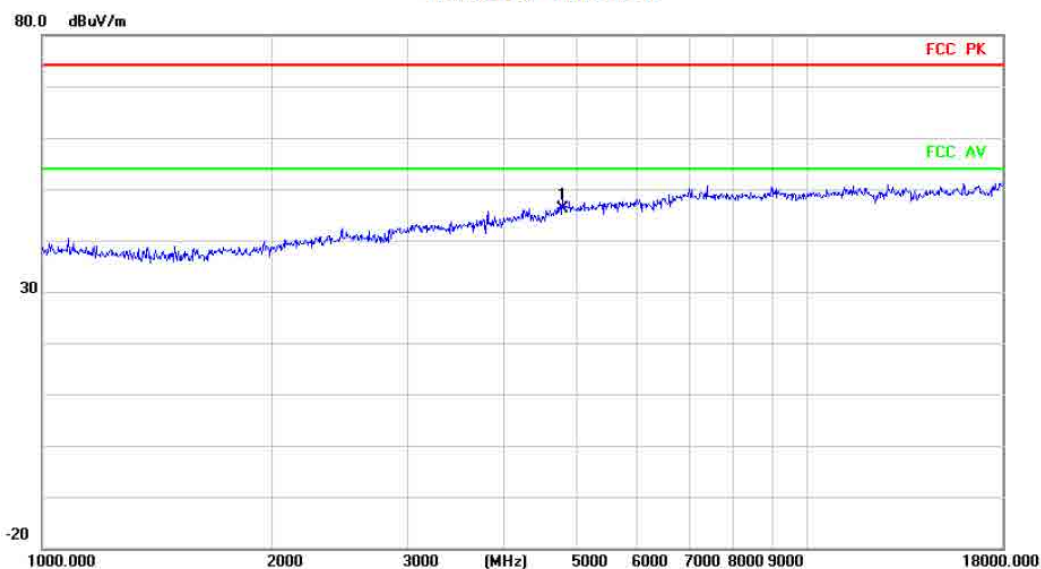
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2310.000	50.85	-1.98	48.87	74.00	-25.13	peak		
2	*	2390.000	51.17	-1.58	49.59	74.00	-24.41	peak		

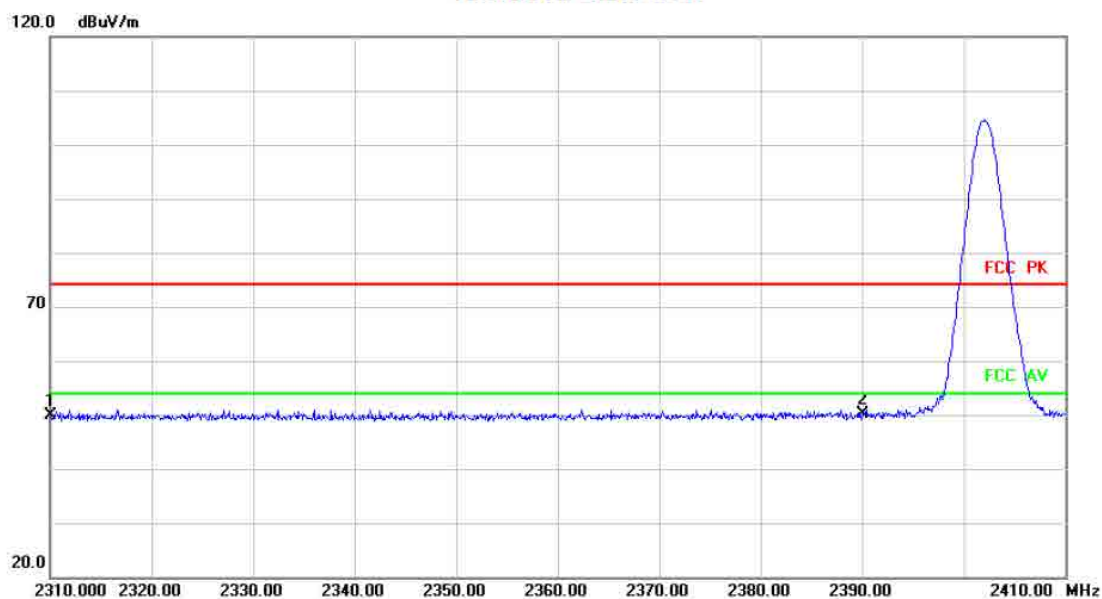
Test Mode	TX Mode_3Mbps Channel 00	Polarization	Horizontal
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	4804.000	49.96	-3.94	46.02	74.00	-27.98	peak		

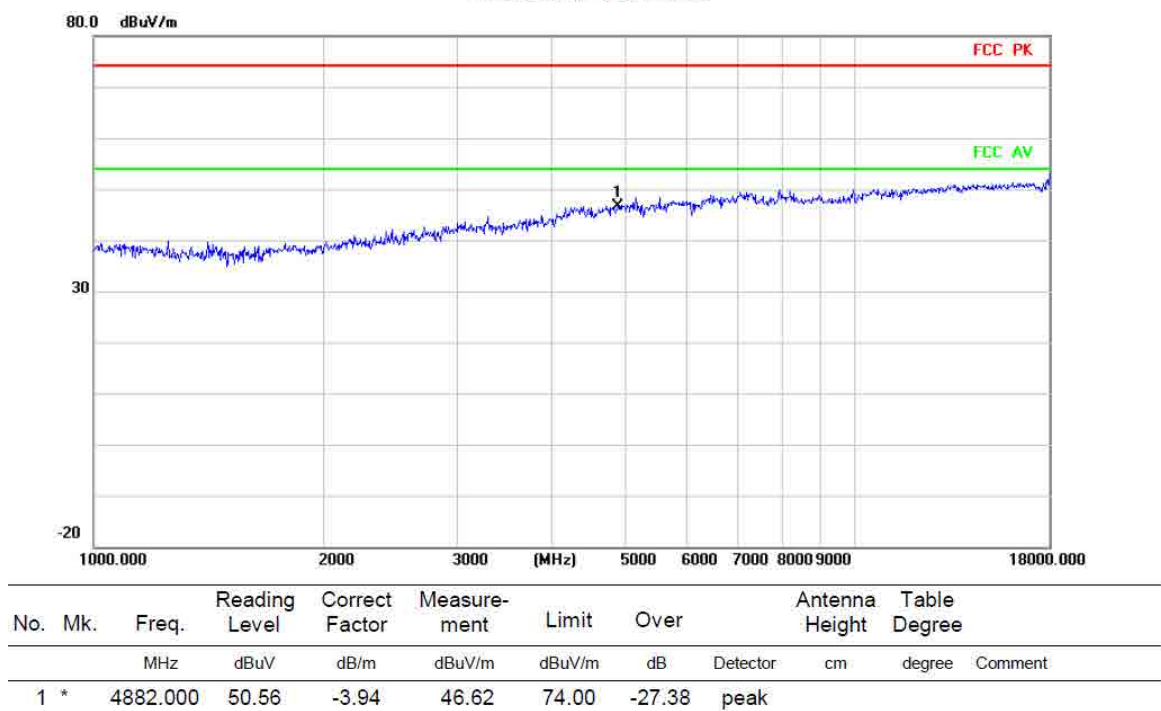
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2310.000	51.89	-1.98	49.91	74.00	-24.09	peak		
2	*	2390.000	51.59	-1.58	50.01	74.00	-23.99	peak		

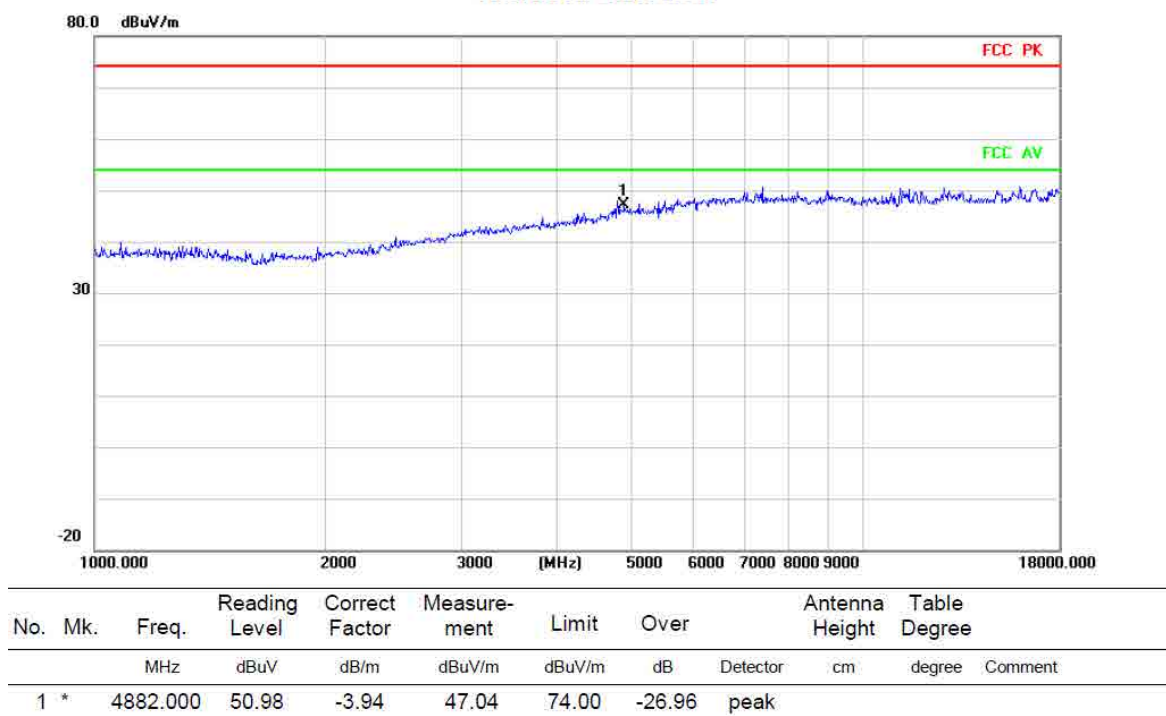
Test Mode	TX Mode_3Mbps Channel 39	Polarization	Vertical
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Radiated Emission



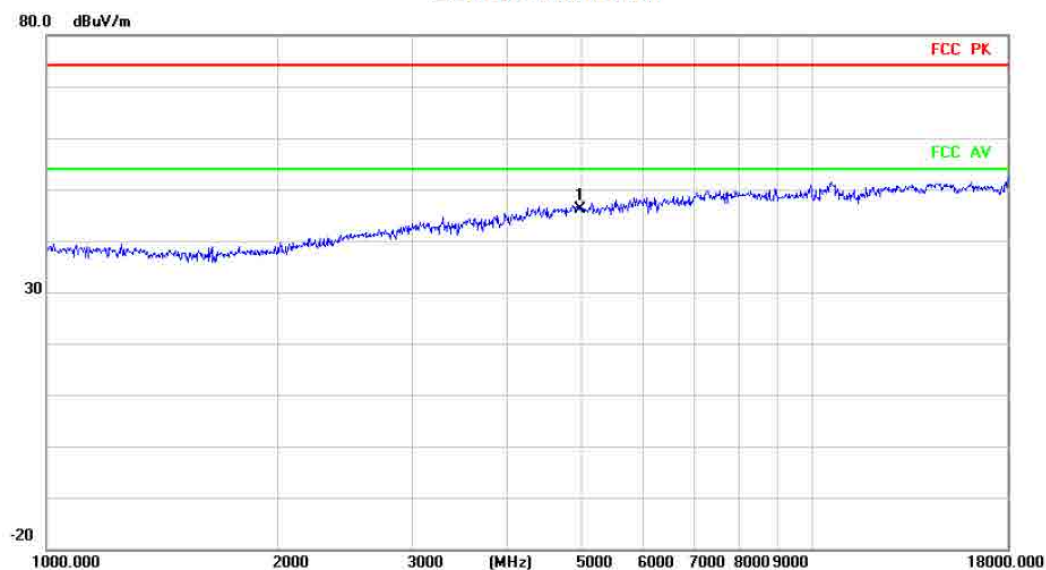
Test Mode	TX Mode_3Mbps Channel 39	Polarization	Horizontal
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Radiated Emission



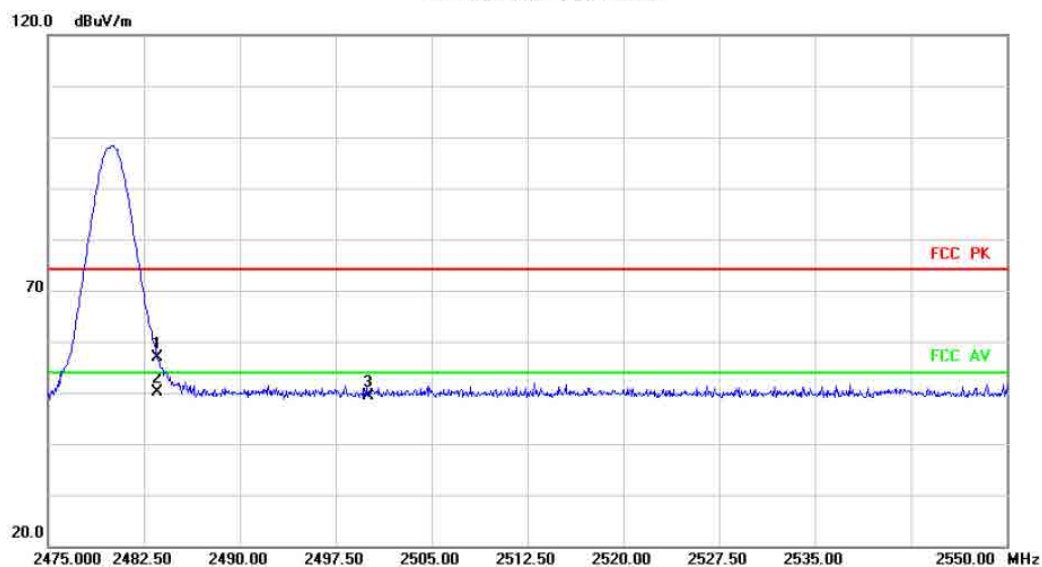
Test Mode	TX Mode_3Mbps Channel 79	Polarization	Vertical
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	4960.000	50.11	-3.91	46.20	74.00	-27.80	peak		Comment

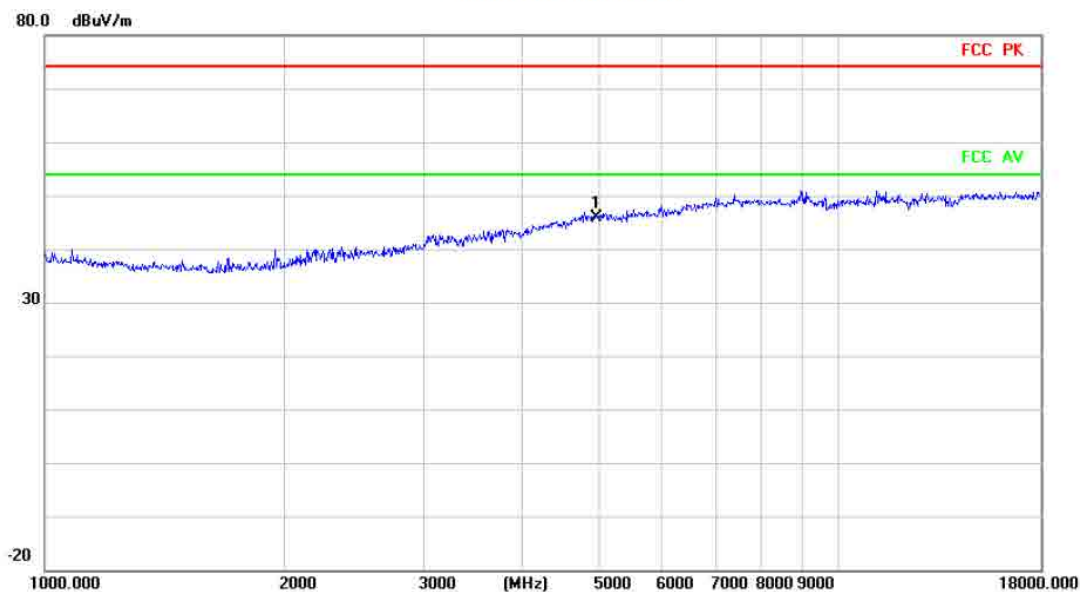
Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2483.500	57.43	-0.62	56.81	74.00	-17.19	peak		Comment
2	*	2483.500	50.79	-0.62	50.17	54.00	-3.83	AVG		
3		2500.000	49.77	-0.45	49.32	74.00	-24.68	peak		

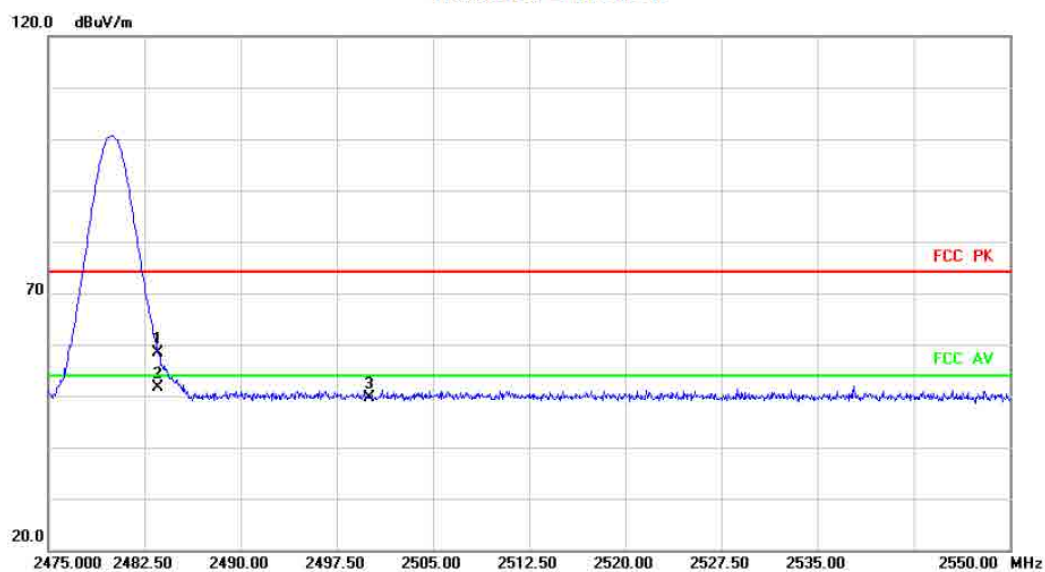
Test Mode	TX Mode_3Mbps Channel 79	Polarization	Horizontal
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Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment

Radiated Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2483.500	59.01	-0.62	58.39	74.00	-15.61	peak		
2	*	2483.500	52.28	-0.62	51.66	54.00	-2.34	AVG		
3		2500.000	50.00	-0.45	49.55	74.00	-24.45	peak		

REMARKS:

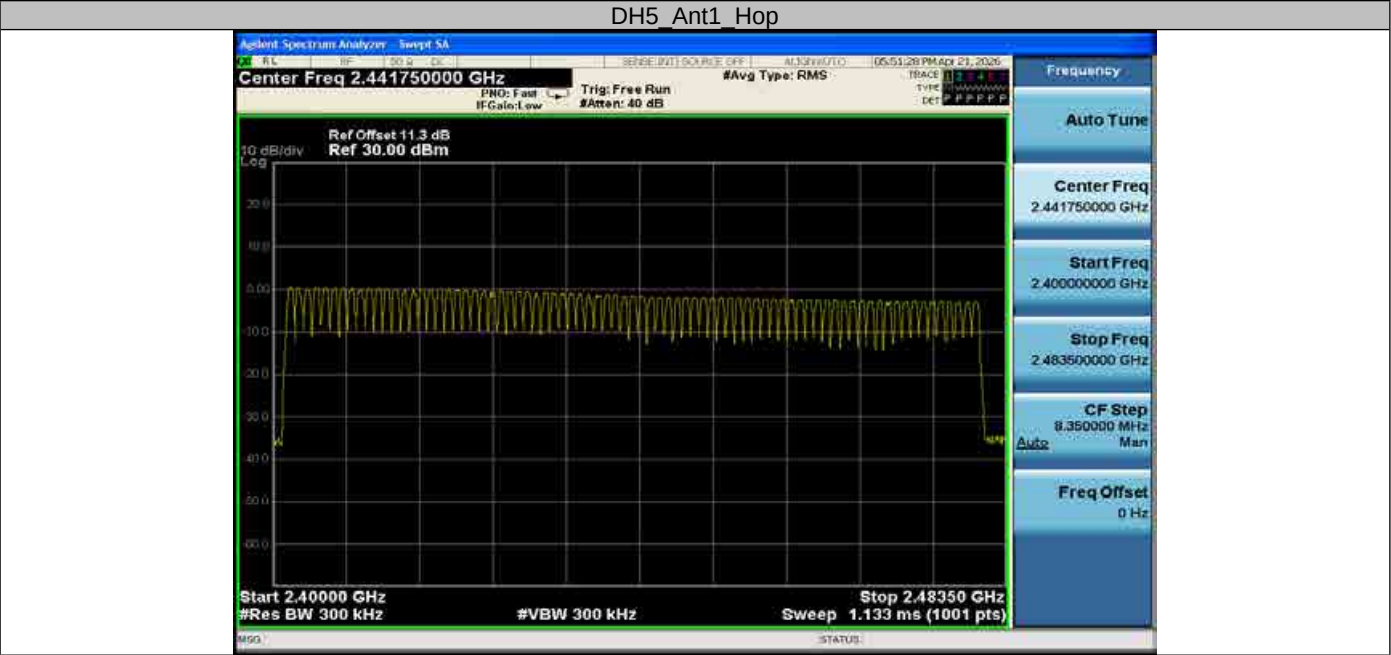
(1) Measurement Value = Reading Level + Correct Factor.

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

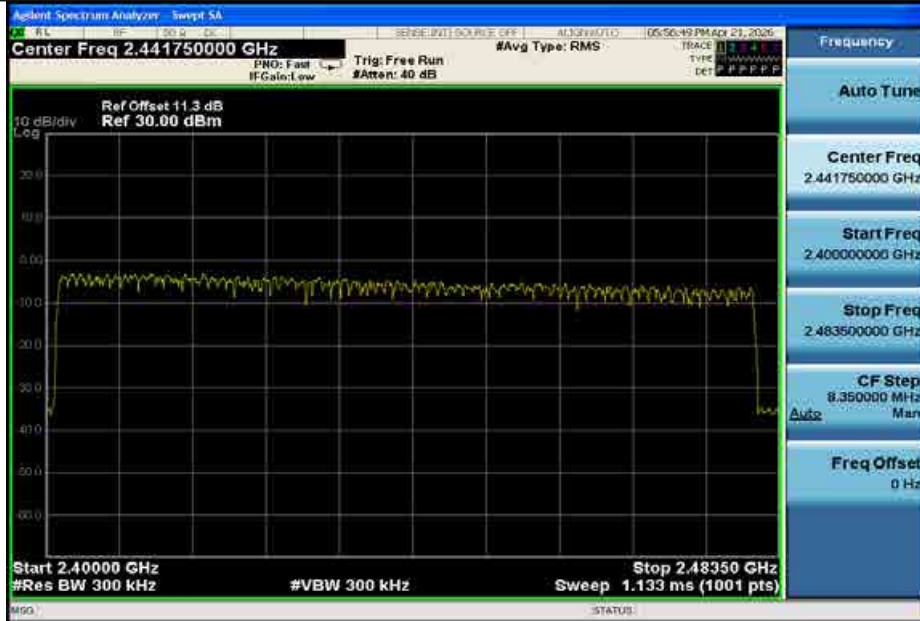
APPENDIX D - NUMBER OF HOPPING FREQUENCY

Test Mode	Antenna	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

Test Graphs



2DH5 Ant1_Hop



3DH5 Ant1_Hop

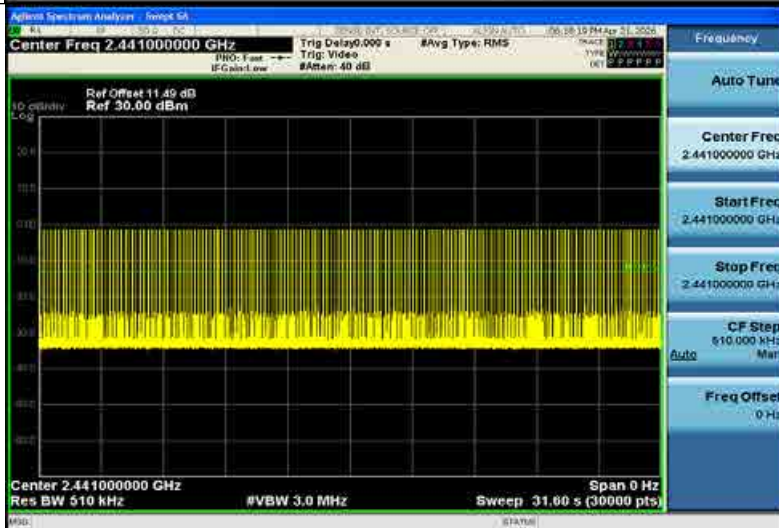
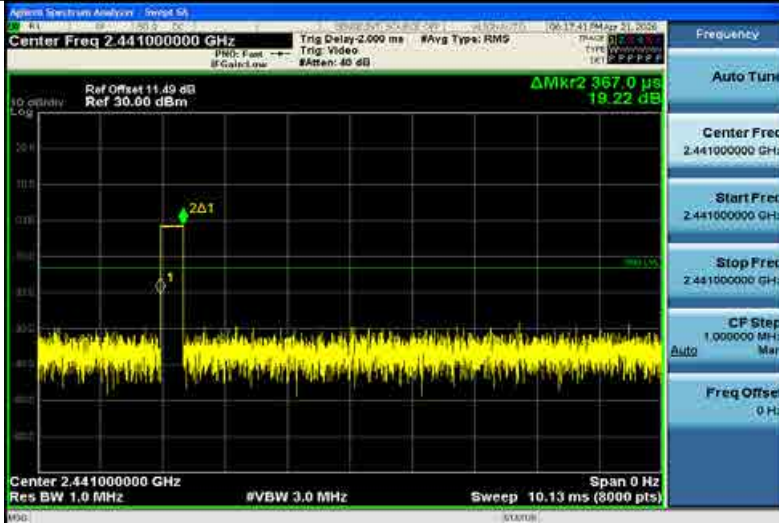


APPENDIX E - AVERAGE TIME OF OCCUPANCY

Test Mode	Antenna	Frequency[MHz]	Burst Width [ms]	Total Hops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.367	318	0.117	≤0.4	PASS
DH3	Ant1	Hop	1.623	166	0.269	≤0.4	PASS
DH5	Ant1	Hop	2.870	108	0.31	≤0.4	PASS
2DH1	Ant1	Hop	0.376	319	0.12	≤0.4	PASS
2DH3	Ant1	Hop	1.628	155	0.252	≤0.4	PASS
2DH5	Ant1	Hop	2.877	120	0.345	≤0.4	PASS
3DH1	Ant1	Hop	0.376	317	0.119	≤0.4	PASS
3DH3	Ant1	Hop	1.628	171	0.278	≤0.4	PASS
3DH5	Ant1	Hop	2.878	114	0.328	≤0.4	PASS

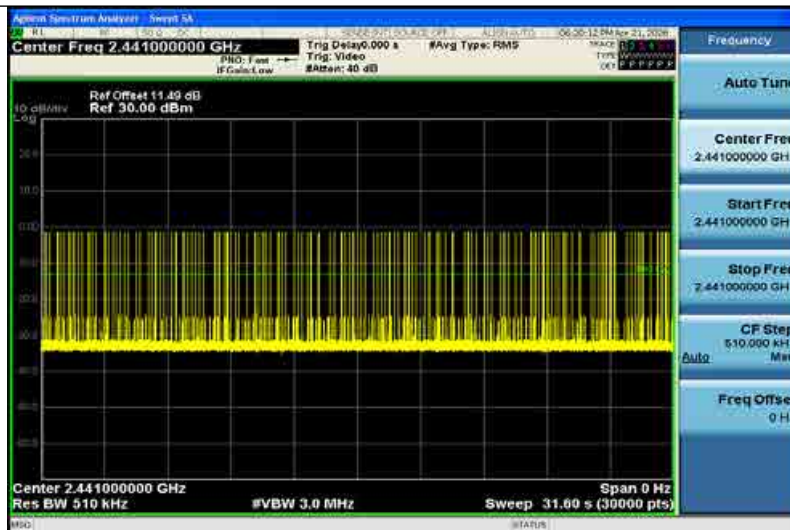
Test Graphs

DH1_Ant1_Hop

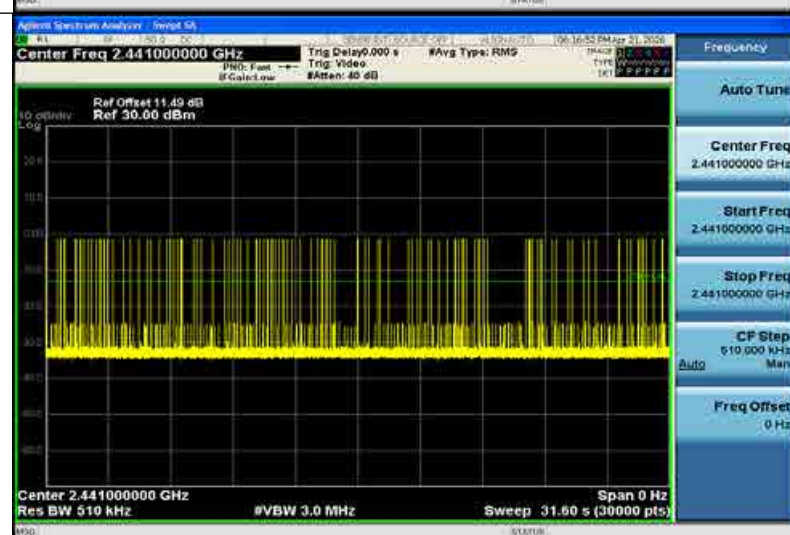
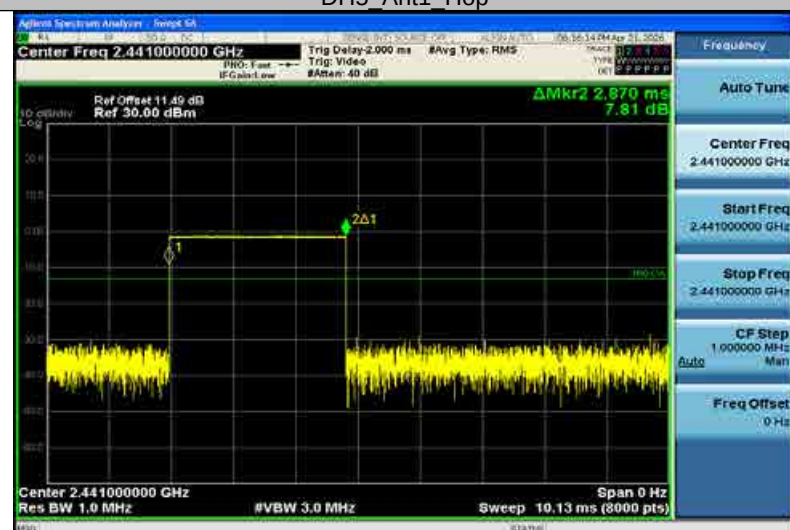


DH3_Ant1_Hop

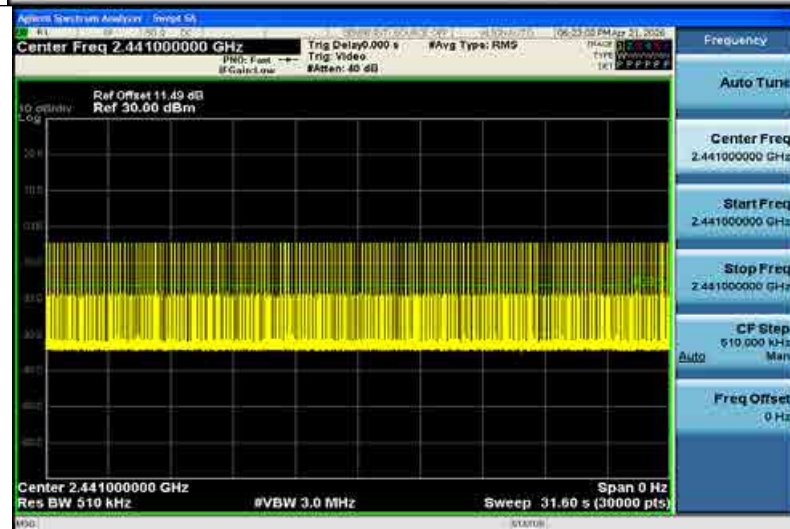
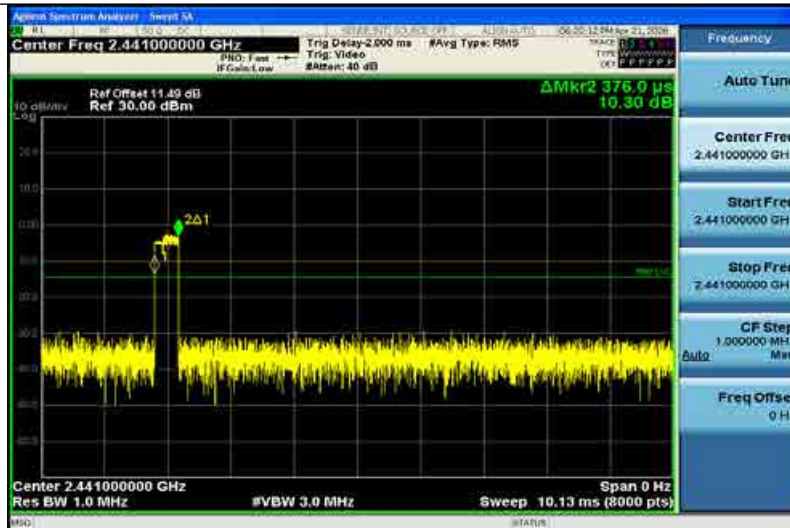




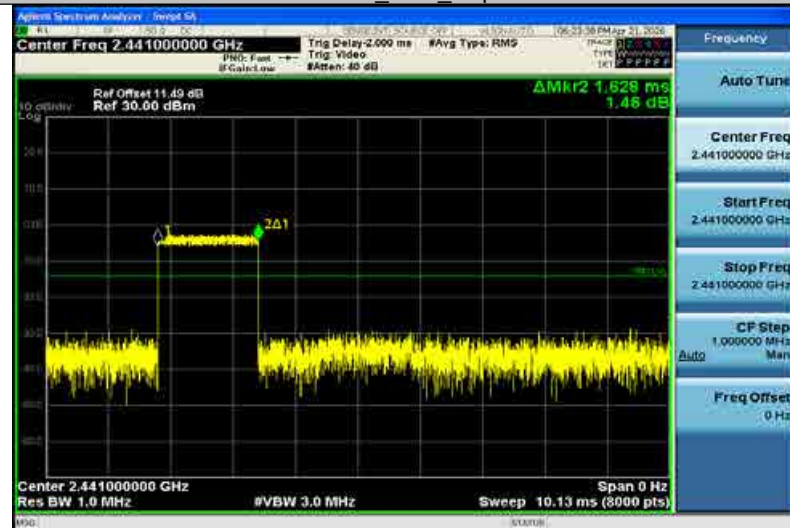
DH5_Ant1_Hop

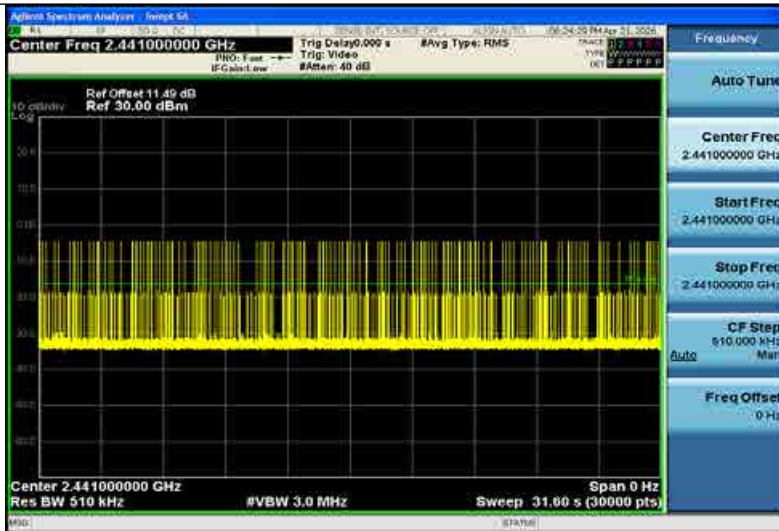


2DH1_Ant1_Hop

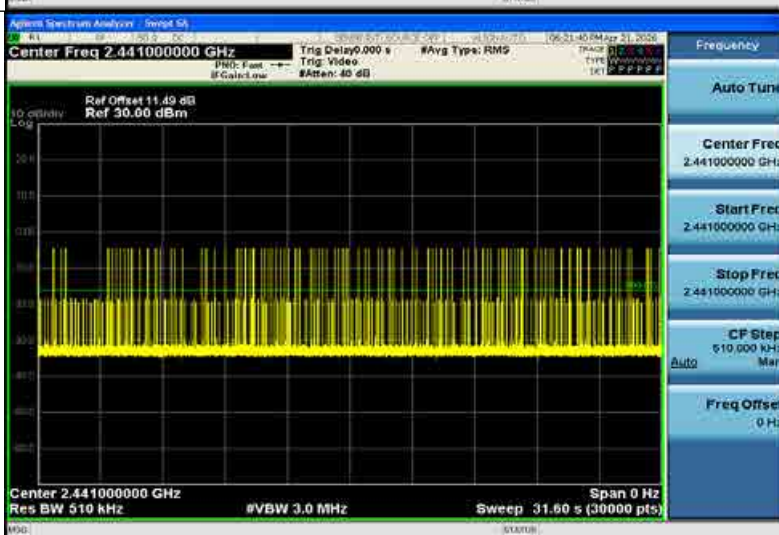
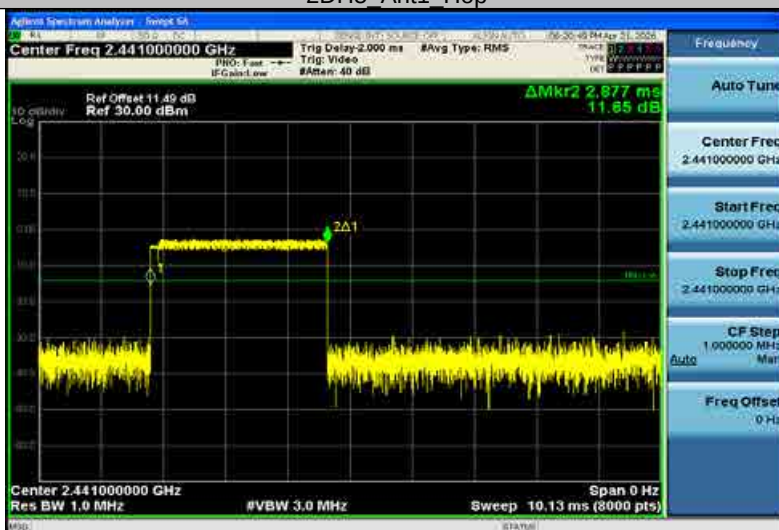


2DH3_Ant1_Hop

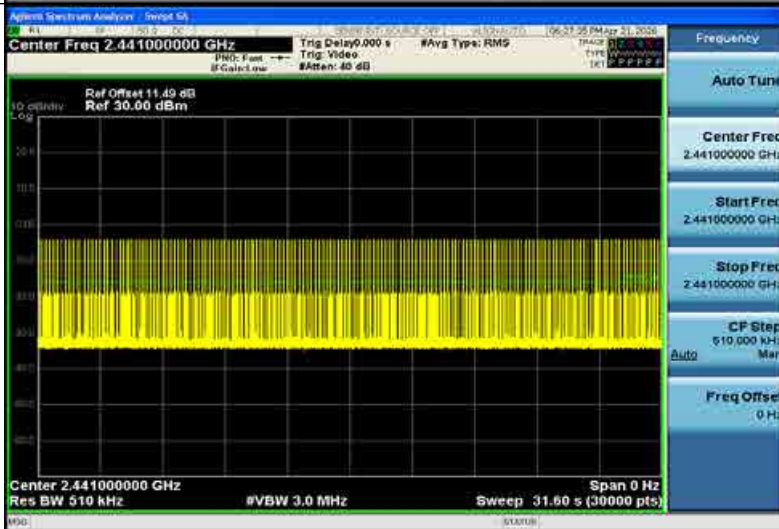
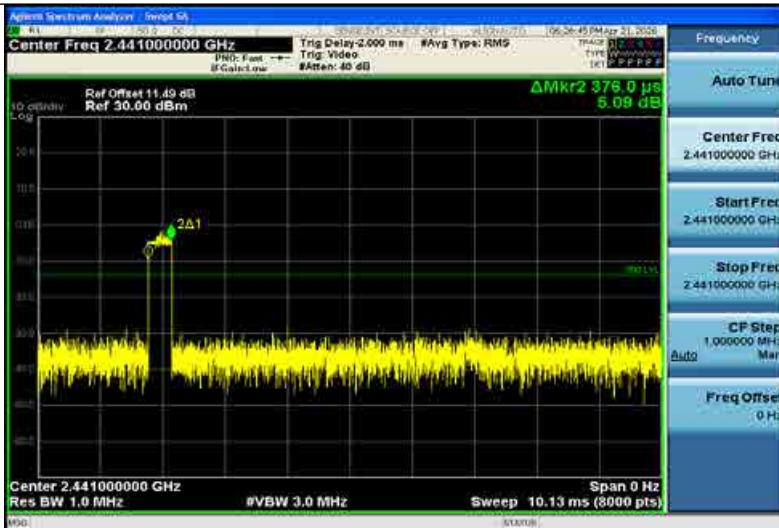




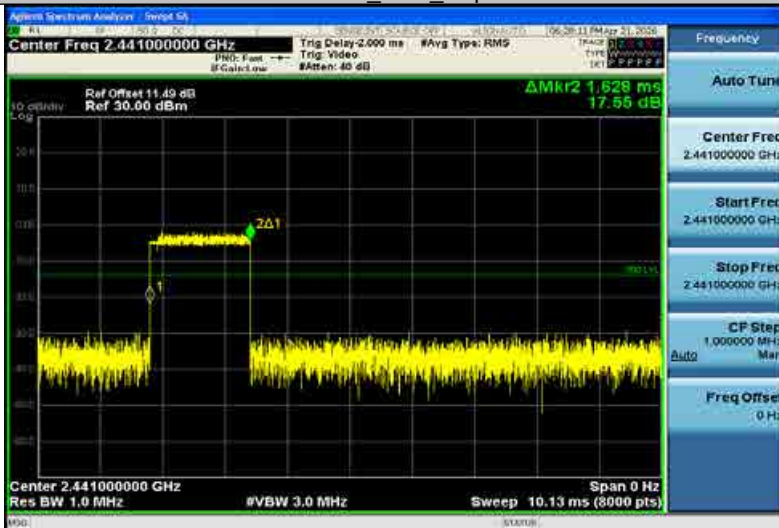
2DH5_Ant1_Hop

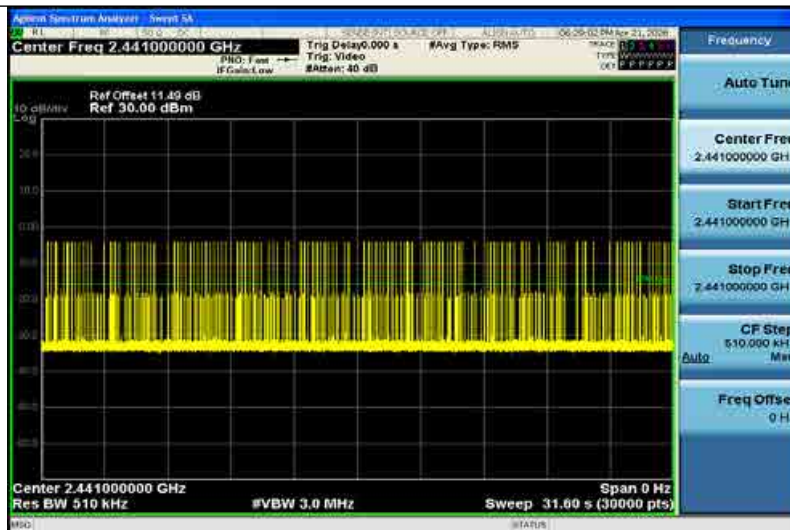


3DH1_Ant1_Hop

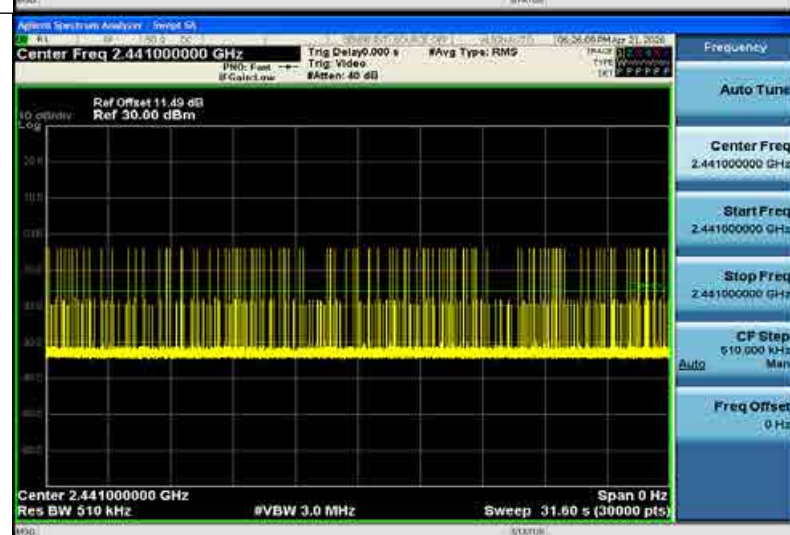
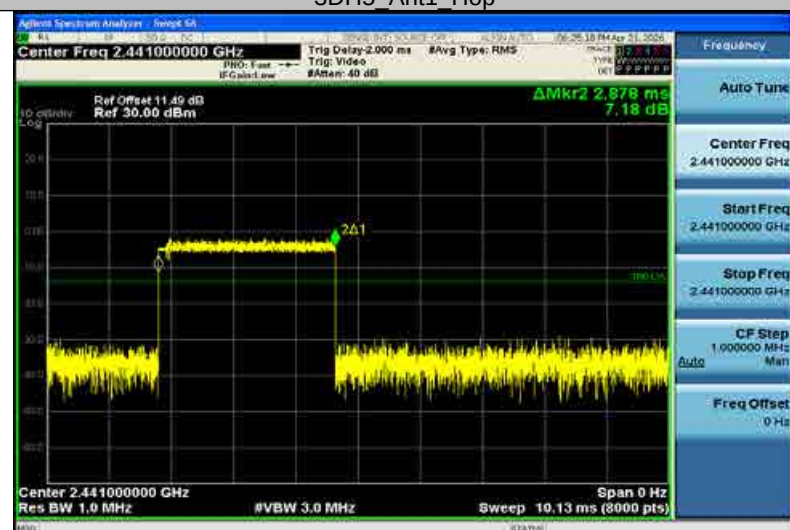


3DH3_Ant1_Hop





3DH5 Ant1 Hop



APPENDIX F - HOPPING CHANNEL SEPARATION

2DH5 Ant1_Hop



3DH5 Ant1_Hop



APPENDIX G - BANDWIDTH

20dB Emission Bandwidth

Test Mode	Antenna	Frequency[MHz]	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.954	2401.529	2402.483	---	---
DH5	Ant1	2441	0.939	2440.532	2441.471	---	---
DH5	Ant1	2480	0.960	2479.526	2480.486	---	---
2DH5	Ant1	2402	1.317	2401.340	2402.657	---	---
2DH5	Ant1	2441	1.329	2440.325	2441.654	---	---
2DH5	Ant1	2480	1.317	2479.331	2480.648	---	---
3DH5	Ant1	2402	1.332	2401.331	2402.663	---	---
3DH5	Ant1	2441	1.338	2440.325	2441.663	---	---
3DH5	Ant1	2480	1.314	2479.337	2480.651	---	---

Test Graphs

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



2DH5_Ant1_2402



2DH5 Ant1_2441



2DH5 Ant1_2480



3DH5 Ant1_2402



3DH5 Ant1 2441



3DH5 Ant1 2480



Occupied Channel Bandwidth

Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.86045	2401.5661	2402.4265	---	---
DH5	Ant1	2441	0.86694	2440.5621	2441.4290	---	---
DH5	Ant1	2480	0.85955	2479.5672	2480.4267	---	---
2DH5	Ant1	2402	1.1853	2401.3990	2402.5843	---	---
2DH5	Ant1	2441	1.1935	2440.3933	2441.5868	---	---
2DH5	Ant1	2480	1.2026	2479.3909	2480.5935	---	---
3DH5	Ant1	2402	1.1963	2401.3960	2402.5923	---	---
3DH5	Ant1	2441	1.1977	2440.3930	2441.5907	---	---
3DH5	Ant1	2480	1.2021	2479.3891	2480.5912	---	---

Test Graphs

DH5_Ant1_2402



DH5_Ant1_2441



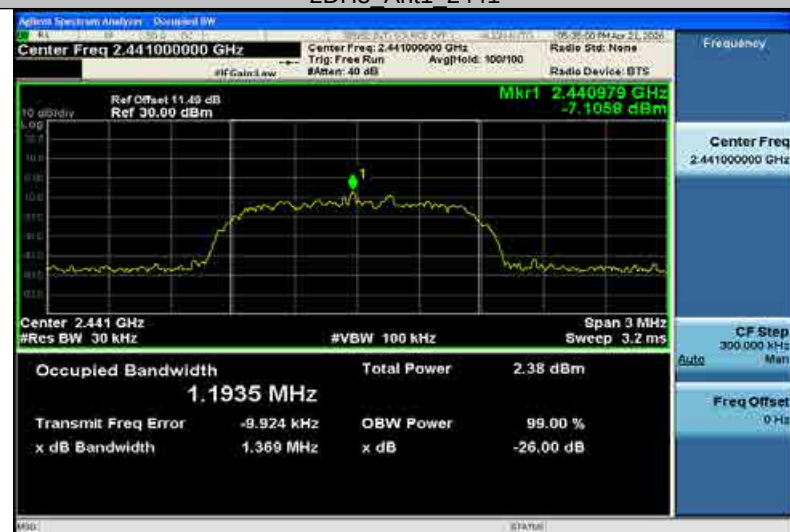
DH5_Ant1_2480



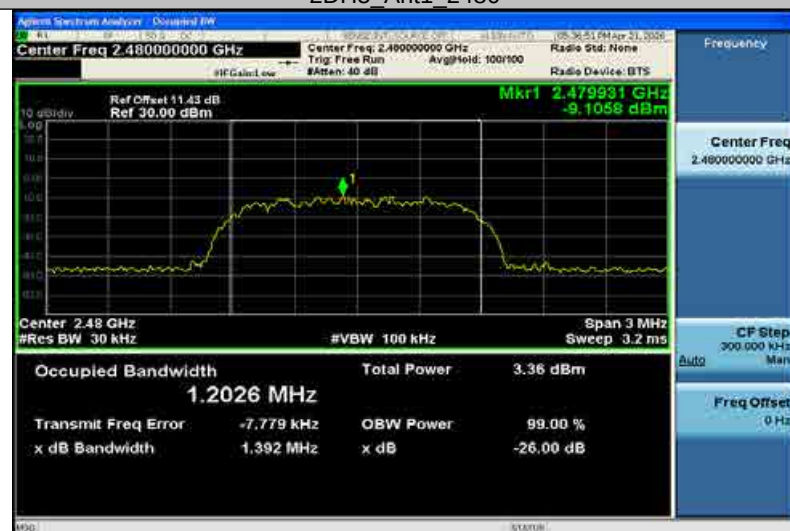
2DH5_Ant1_2402



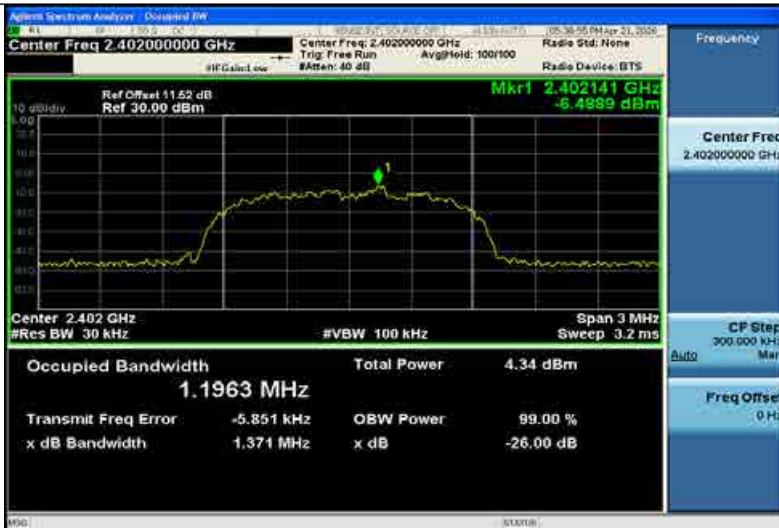
2DH5 Ant1_2441



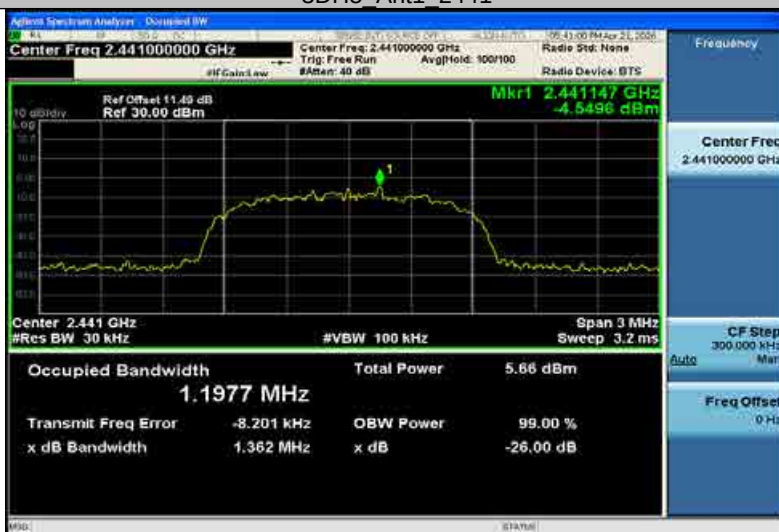
2DH5 Ant1_2480



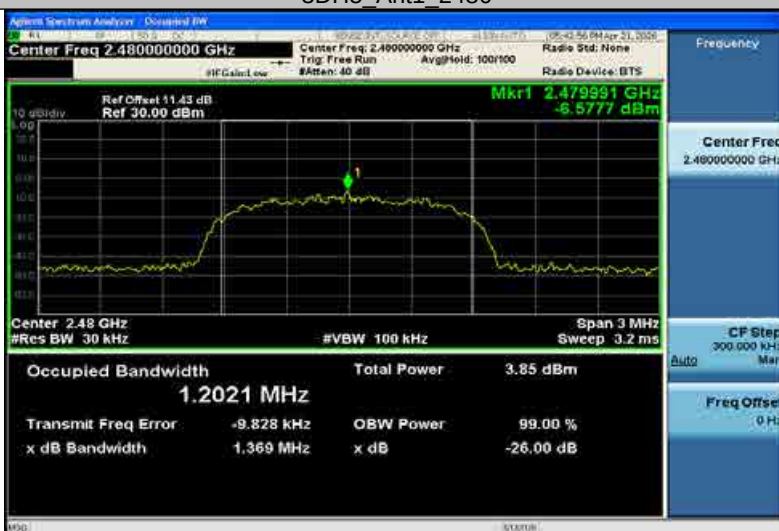
3DH5 Ant1_2402



3DH5 Ant1 2441



3DH5 Ant1 2480



APPENDIX H - MAXIMUM OUTPUT POWER

Test Mode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	1.03	≤20.97	PASS
		2441	-0.97	≤20.97	PASS
		2480	-2.57	≤20.97	PASS
2DH5	Ant1	2402	0.44	≤20.97	PASS
		2441	-1.76	≤20.97	PASS
		2480	-0.38	≤20.97	PASS
3DH5	Ant1	2402	0.84	≤20.97	PASS
		2441	1.78	≤20.97	PASS
		2480	-0.10	≤20.97	PASS

Test Graphs

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



2DH5_Ant1_2402



2DH5 Ant1 2441



2DH5 Ant1 2480



3DH5 Ant1 2402



3DH5 Ant1 2441



3DH5 Ant1 2480



APPENDIX I - CONDUCTED SPURIOUS EMISSION

Test Mode	Antenna	Frequency[MHz]	Freq Range [MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	0~Reference	-0.17	-0.17	---	PASS
DH5	Ant1	2402	30~1000	-0.17	-70.61	≤-20.17	PASS
DH5	Ant1	2402	1000~26500	-0.17	-44.85	≤-20.17	PASS
DH5	Ant1	2441	0~Reference	-2.31	-2.31	---	PASS
DH5	Ant1	2441	30~1000	-2.31	-71.39	≤-22.31	PASS
DH5	Ant1	2441	1000~26500	-2.31	-44.71	≤-22.31	PASS
DH5	Ant1	2480	0~Reference	-4.00	-4.00	---	PASS
DH5	Ant1	2480	30~1000	-4.00	-71.17	≤-24	PASS
DH5	Ant1	2480	1000~26500	-4.00	-45.29	≤-24	PASS
2DH5	Ant1	2402	0~Reference	-4.88	-4.88	---	PASS
2DH5	Ant1	2402	30~1000	-4.88	-71.71	≤-24.88	PASS
2DH5	Ant1	2402	1000~26500	-4.88	-44.85	≤-24.88	PASS
2DH5	Ant1	2441	0~Reference	-7.63	-7.63	---	PASS
2DH5	Ant1	2441	30~1000	-7.63	-69.36	≤-27.63	PASS
2DH5	Ant1	2441	1000~26500	-7.63	-44.57	≤-27.63	PASS
2DH5	Ant1	2480	0~Reference	-4.56	-4.56	---	PASS
2DH5	Ant1	2480	30~1000	-4.56	-70.25	≤-24.56	PASS
2DH5	Ant1	2480	1000~26500	-4.56	-45.29	≤-24.56	PASS
3DH5	Ant1	2402	0~Reference	-4.79	-4.79	---	PASS
3DH5	Ant1	2402	30~1000	-4.79	-70.18	≤-24.79	PASS
3DH5	Ant1	2402	1000~26500	-4.79	-44.79	≤-24.79	PASS
3DH5	Ant1	2441	0~Reference	-3.17	-3.17	---	PASS
3DH5	Ant1	2441	30~1000	-3.17	-71.43	≤-23.17	PASS
3DH5	Ant1	2441	1000~26500	-3.17	-42.65	≤-23.17	PASS
3DH5	Ant1	2480	0~Reference	-5.43	-5.43	---	PASS
3DH5	Ant1	2480	30~1000	-5.43	-71.45	≤-25.43	PASS
3DH5	Ant1	2480	1000~26500	-5.43	-45.38	≤-25.43	PASS

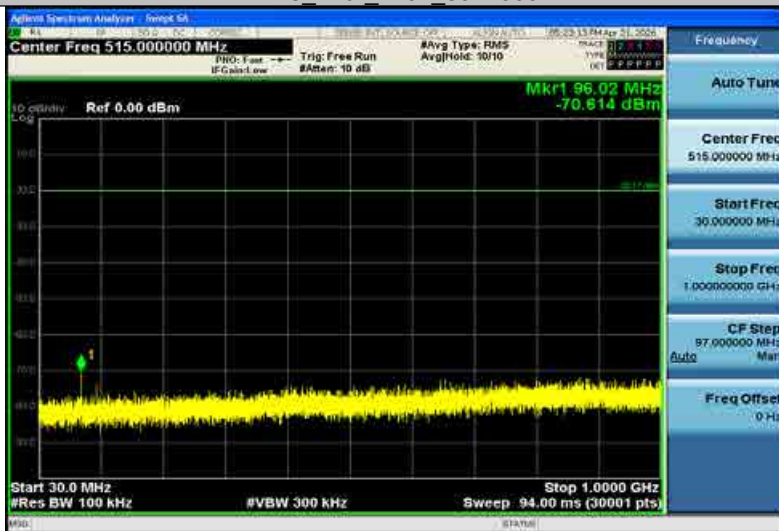
Test Mode	Antenna	Ch Name	Frequency[MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	0.41	-47.28	≤-19.59	PASS
DH5	Ant1	High	2480	-3.41	-47.38	≤-23.41	PASS
DH5	Ant1	Low	Hop_2402	0.08	-46.43	≤-19.92	PASS
DH5	Ant1	High	Hop_2480	-3.10	-46.82	≤-23.1	PASS
2DH5	Ant1	Low	2402	-4.92	-47.34	≤-24.92	PASS
2DH5	Ant1	High	2480	-4.38	-47.68	≤-24.38	PASS
2DH5	Ant1	Low	Hop_2402	-5.46	-47.23	≤-25.46	PASS
2DH5	Ant1	High	Hop_2480	-7.41	-45.86	≤-27.41	PASS
3DH5	Ant1	Low	2402	-3.86	-47.72	≤-23.86	PASS
3DH5	Ant1	High	2480	-4.92	-47.56	≤-24.92	PASS
3DH5	Ant1	Low	Hop_2402	-5.01	-47.14	≤-25.01	PASS
3DH5	Ant1	High	Hop_2480	-6.80	-46.67	≤-26.8	PASS

Test Graphs

DH5_Ant1_2402_0-Reference



DH5_Ant1_2402_30-1000



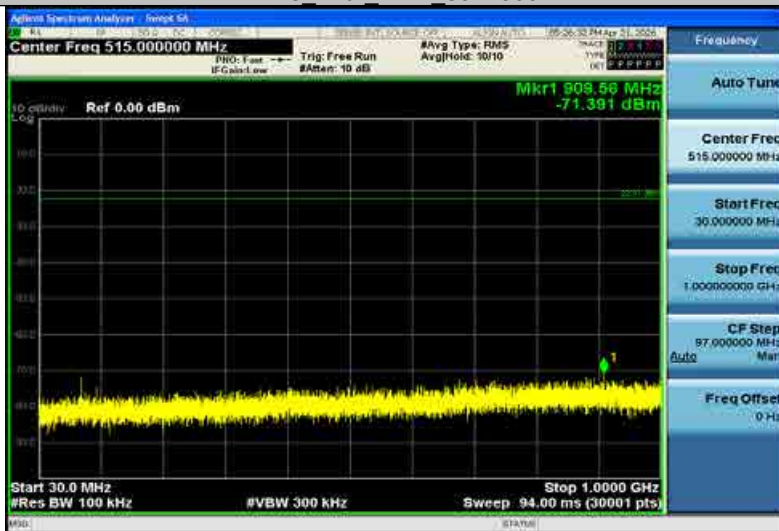
DH5_Ant1_2402_1000-26500



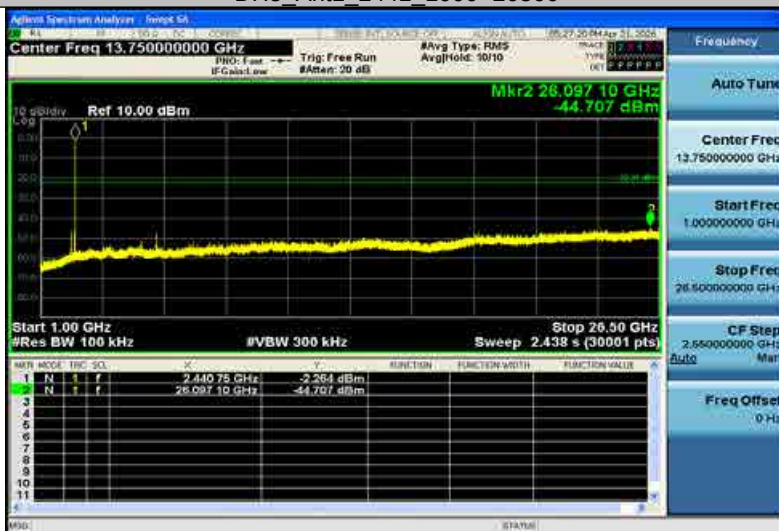
DH5_Ant1_2441_0-Reference



DH5 Ant1 2441 30~1000



DH5 Ant1 2441 1000~26500



DH5 Ant1 2480 0-Reference



DH5 Ant1 2480 30~1000



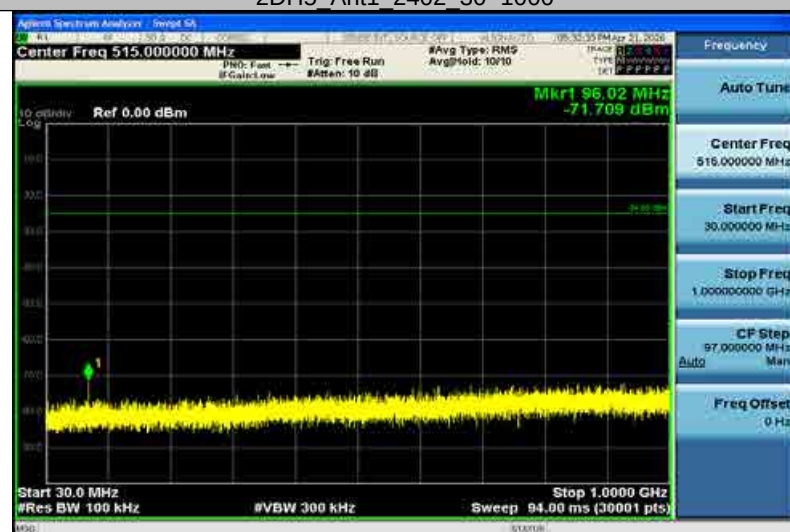
DH5 Ant1 2480 1000~26500



2DH5 Ant1 2402 0~Reference



2DH5 Ant1 2402 30~1000



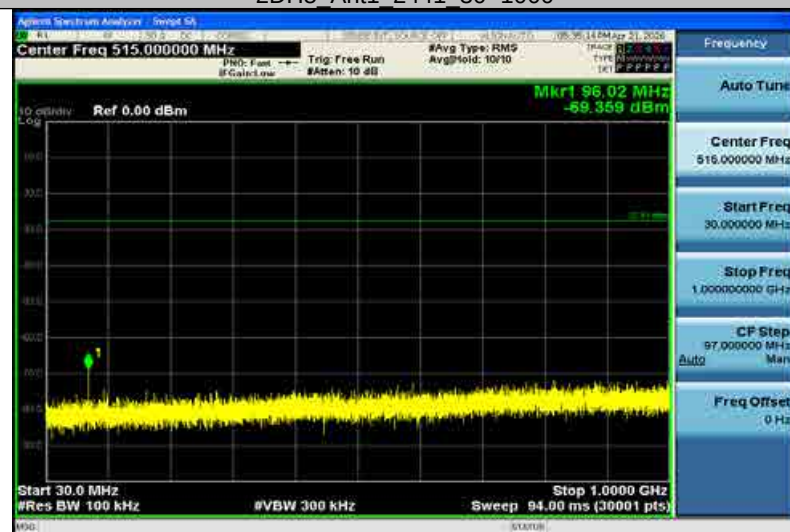
2DH5 Ant1 2402 1000~26500



2DH5 Ant1 2441 0~Reference



2DH5 Ant1 2441 30~1000



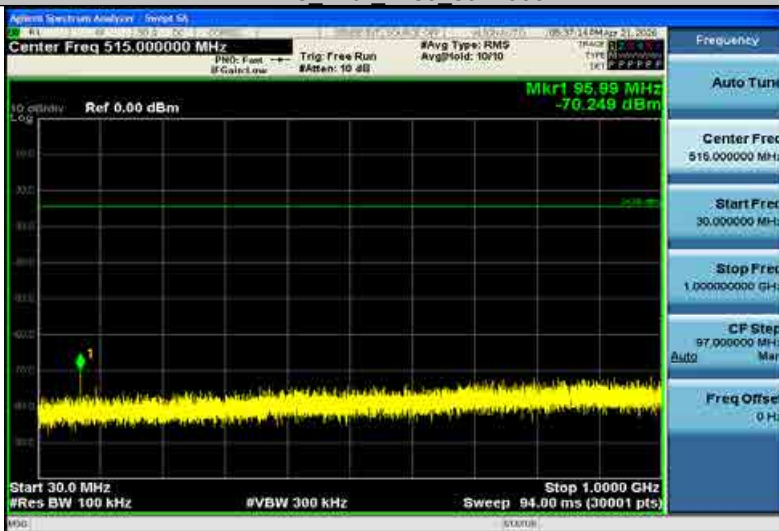
2DH5 Ant1 2441 1000~26500



2DH5 Ant1 2480 0~Reference



2DH5 Ant1 2480 30~1000



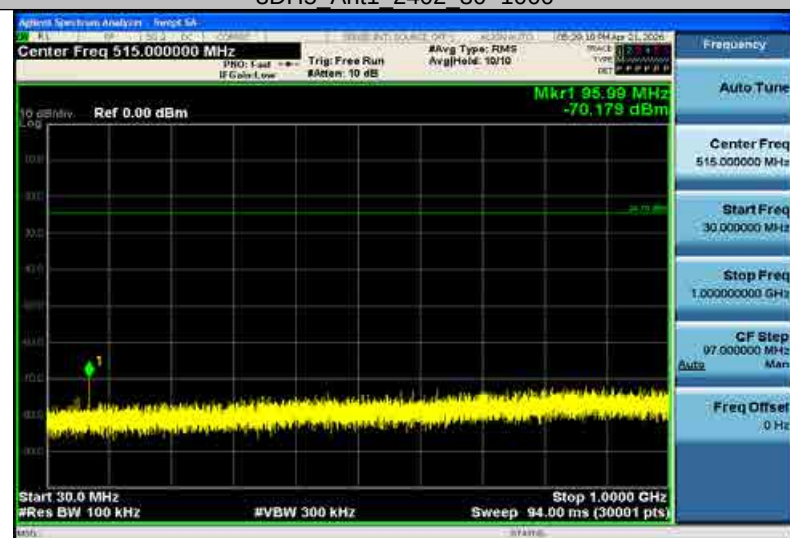
2DH5 Ant1 2480 1000~26500



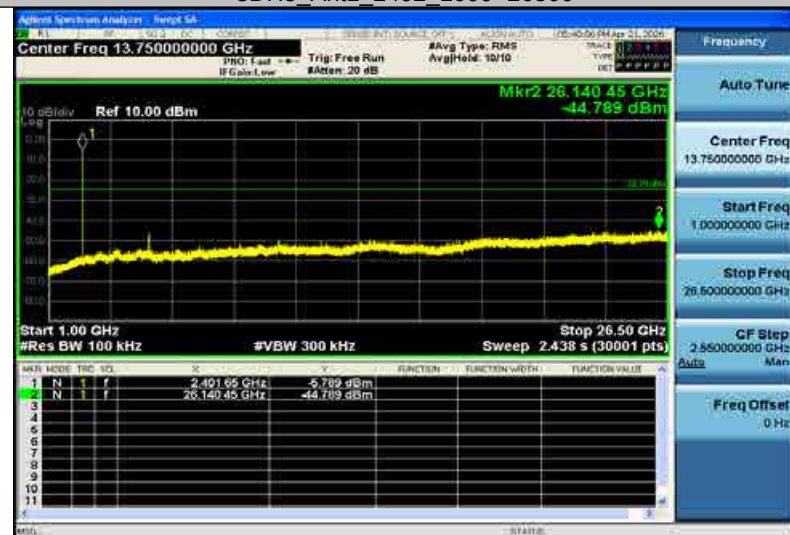
3DH5 Ant1 2402 0~Reference



3DH5_Ant1_2402_30~1000



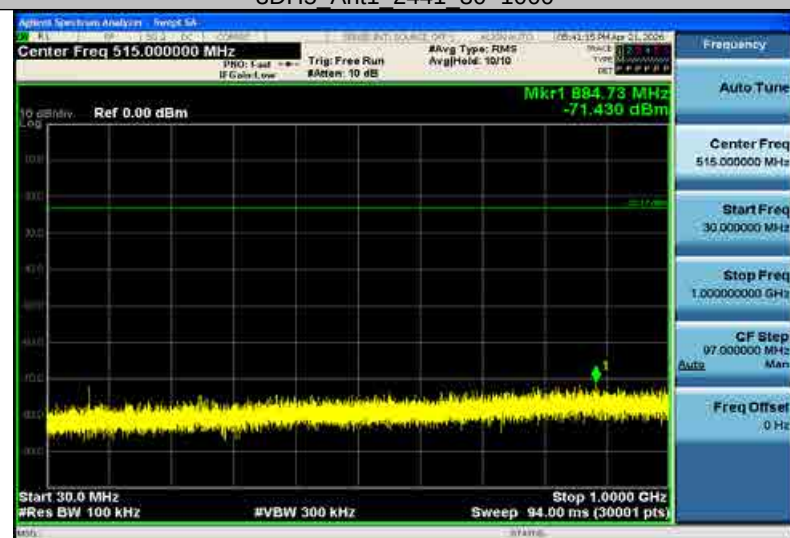
3DH5_Ant1_2402_1000~26500



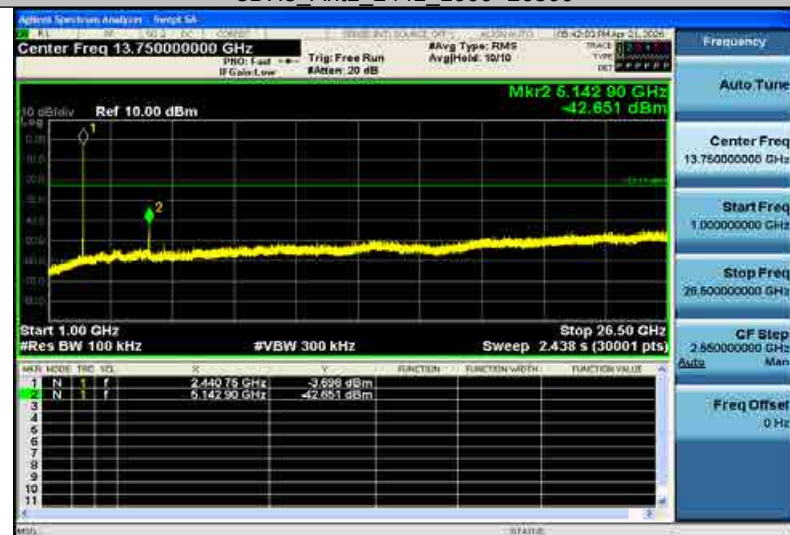
3DH5_Ant1_2441_0-Reference



3DH5_Ant1_2441_30~1000



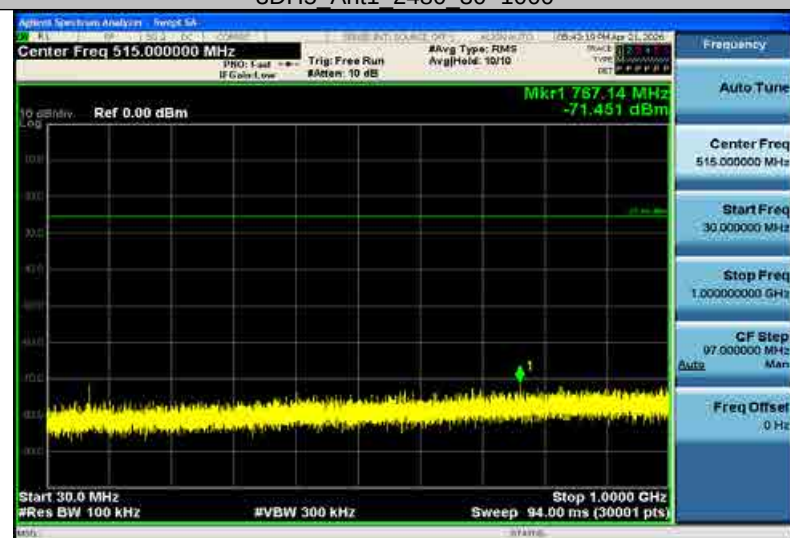
3DH5_Ant1_2441_1000~26500



3DH5_Ant1_2480_0-Reference



3DH5 Ant1 2480 30~1000

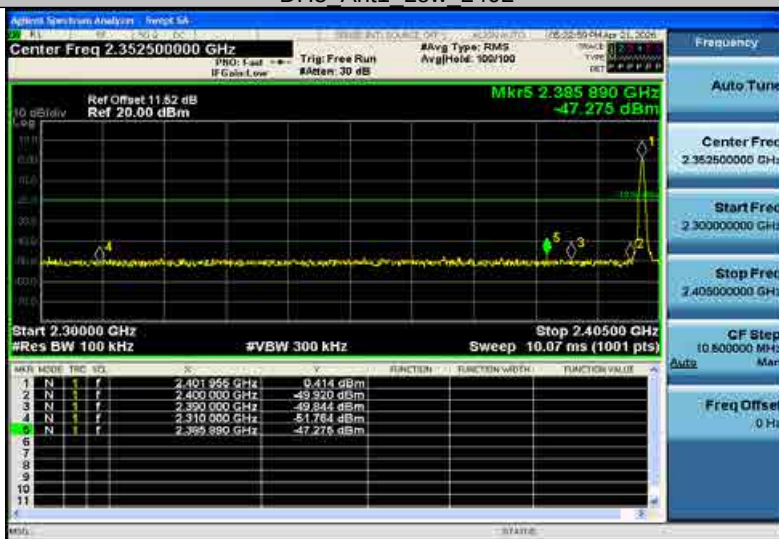


3DH5 Ant1 2480 1000~26500

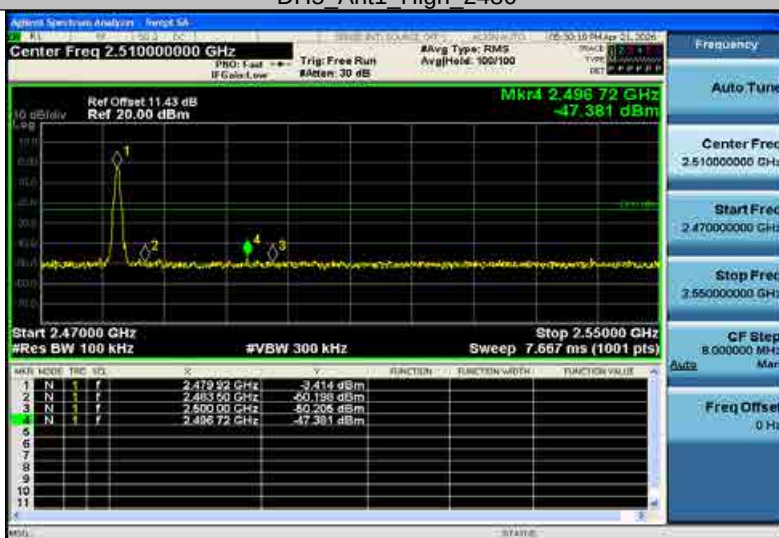


Band edge

DH5_Ant1_Low_2402



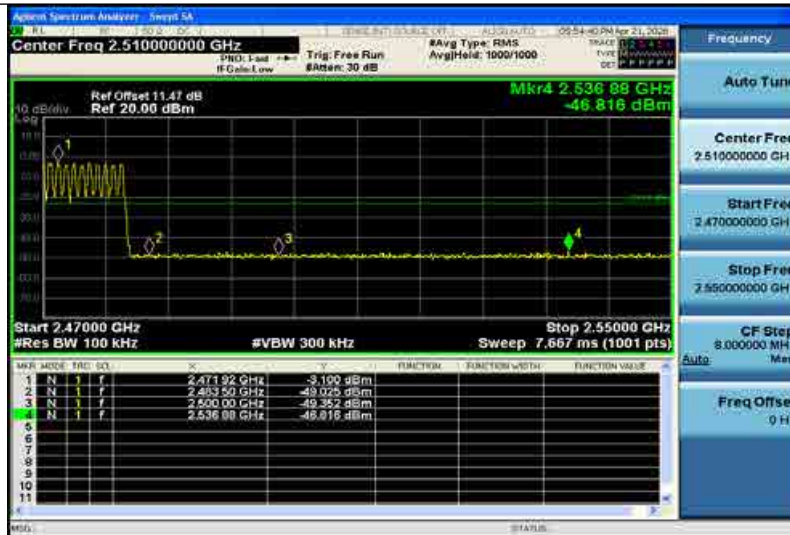
DH5_Ant1_High_2480



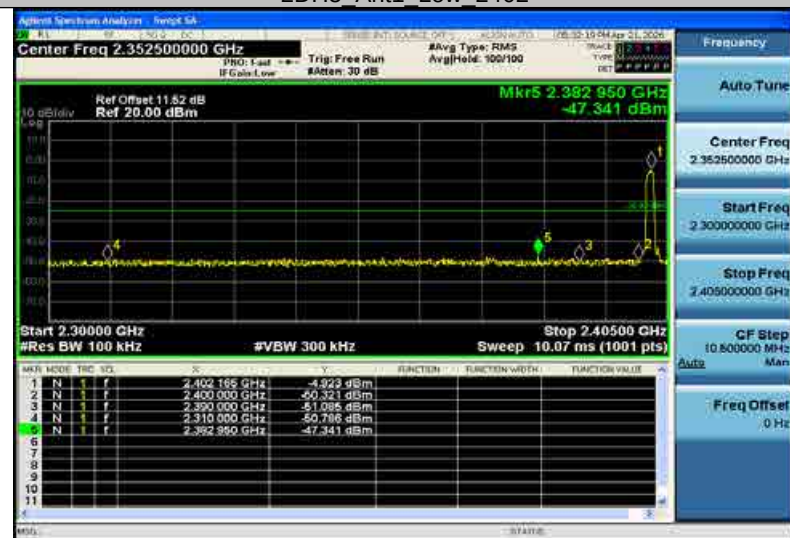
DH5_Ant1_Low_Hop_2402



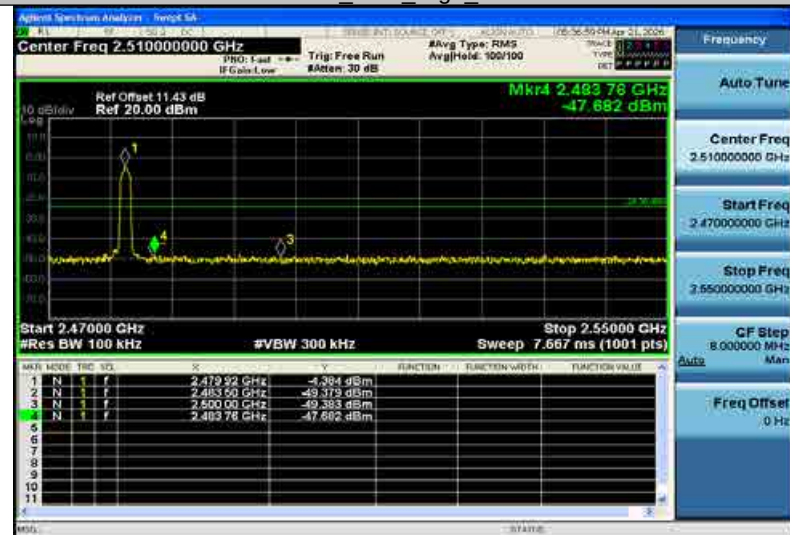
DH5_Ant1_High_Hop_2480



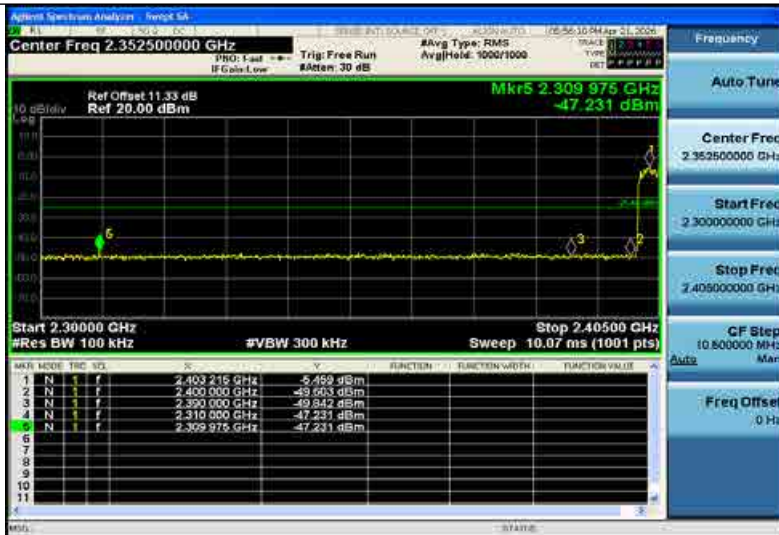
2DH5 Ant1 Low 2402



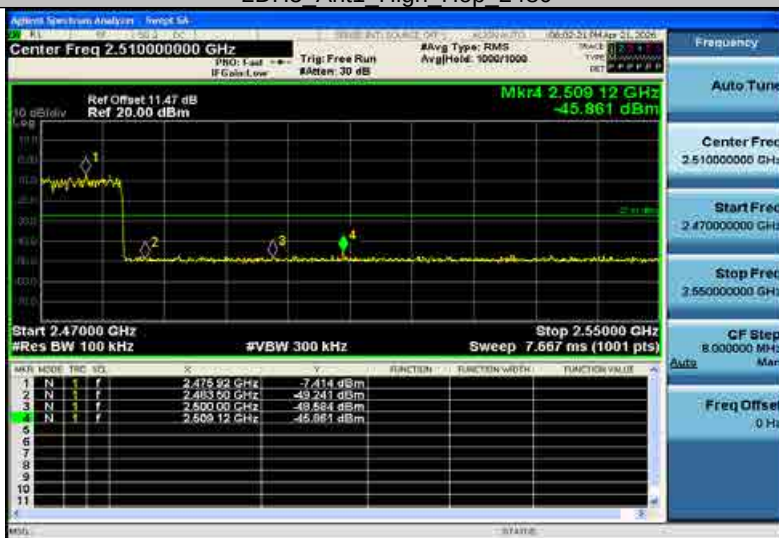
2DH5 Ant1 High 2480



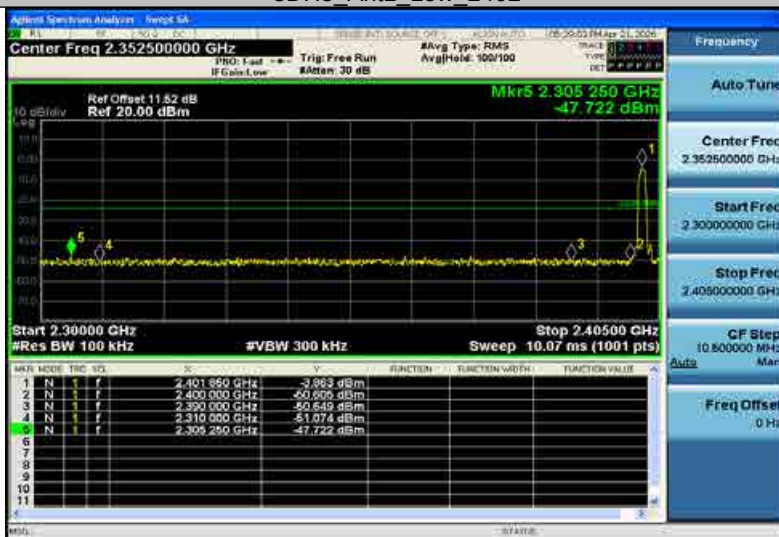
2DH5 Ant1 Low Hop 2402



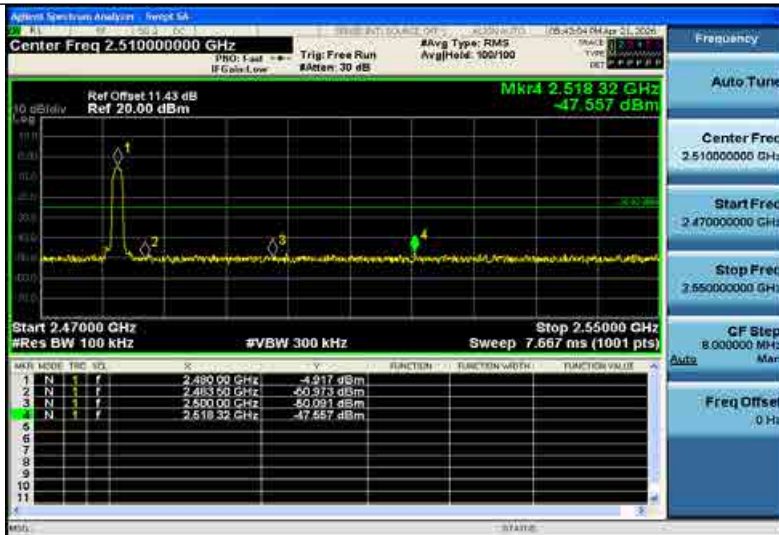
2DH5 Ant1 High Hop 2480



3DH5 Ant1 Low 2402



3DH5 Ant1 High 2480



3DH5 Ant1 Low Hop 2402



3DH5 Ant1 High Hop 2480



APPENDIX J - DECLARATION FOR BLUETOOTH DEVICE

1. Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device has no influence on the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Only a different hopping sequence will be used. For this reason the check of these RF parameters in one op-mode is sufficient.

2. Frequency range of a Bluetooth device:

Hereby we declare that the maximum frequency of this device is: 2402 - 2480MHz. This is according to the Bluetooth Core Specification (+ critical errata) for devices which will be operated in the USA.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04-E). Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification are not supported by this device.

3. Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organised in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from its BD address which is unique for each Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4. Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67, 56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59, 72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75, 09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06, 01, 51, 03, 55, 05, 04

5. Equally average use of frequencies in data mode and behaviour for short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

- a) LAP/UAP of the master of the connection.
- b) Internal master clock.

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS.

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronisation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 μ s. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire.

LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR- operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behaviour:

The first connection between the two devices is established, a hopping sequence was generated. For transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 μ s). The hopping sequence will always differ from the first one.

6. Receiver input bandwidth and behaviour for repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master.

Additionally the type of connection (e.g. single or multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

Statement

1. The report is invalid without the official seal or special seal of Shenzhen Haiyun Standard Technical Co., Ltd. (hereinafter referred to as the unit).
2. The report is invalid without the signature of the approver.
3. The report is invalid if altered arbitrarily.
4. The report shall not be partially copied without the written approval of the unit.
5. The reported test results are only valid for the tested samples.
6. If there is any objection to the test report, it shall be submitted to the test unit within 15 days from the date of receiving the report, and the overdue shall not be accepted.

Shenzhen Haiyun Standard Technical Co., Ltd.

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End of Test Report