CTC Laboratories, Inc.

2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

Tel: +86-755- 27521059 Fax: +86-755- 27521011 Http://www.sz-ctc.com.cn

TEST REPORT

Report No. ·····:	CTC20192143E01
FCC ID ·····:	2AUXHDS200
Applicant·····:	Delta Innovation Technology Co., Ltd
Address·····:	No.1003-8, 10F, Building 1st, Road Xinxi 28th,Haidian,Beijing
Manufacturer·····:	Delta Innovation Technology Co., Ltd.
Address·····:	No.1003-8, 10F, Building 1st, Road Xinxi 28th,Haidian,Beijing
Product Name·····:	Bluetooth Headset
Trade Mark·····:	smartisan
Model/Type reference·····:	DS200
Listed Model(s) ·····:	/
Standard·····:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 RSS-GEN Issue 5 RSS-247 Issue 2 ANSI C63.10-2013
Date of receipt of test sample…:	2019-10-28
Date of testing……..:	2019-10-28 to 2019-11-04
Date of issue……....:	2019-11-04
Result……:	PASS

Compiled by: (Printed name+signature)	Torny Fang	Torny Fang
Supervised by: (Printed name+signature)	Eric Zhang	Eric Zhang
Approved by: (Printed name+signature)	Walter Chen	Walter Chen

Testing Laboratory Name.....	**CTC Laboratories, Inc.**
Address.....	2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

Table of Contents Page

1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.
RSS 247 Issue 2: Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	2019-11-04	Original

1.3. Test Description

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 5				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203	/	Pass	Terry Su
Conducted Emission	15.207	RSS-GEN 7.2.2	Pass	Terry Su
Restricted Bands	15.205	RSS-Gen 7.2.3	Pass	Terry Su
Hopping Channel Separation	15.247(a)(1)	RSS 247 5.1 (2)	Pass	Terry Su
Dwell Time	15.247(a)(1)	RSS 247 5.1 (4)	Pass	Terry Su
Peak Output Power	15.247(b)(1)	RSS 247 5.4 (2)	Pass	Terry Su
Number of Hopping Frequency	15.247(b)(1)	RSS 247 5.1 (4)	Pass	Terry Su
Band Edge Emissions	15.247(d)	RSS 247 5.5	Pass	Terry Su
Radiated Spurious Emission	15.247(c)&15.209	RSS 247 5.5	Pass	Terry Su
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)	RSS 247 5.1 (1)	Pass	Terry Su

Note: The tests documented in this report were performed in accordance with KDB 558074 D01 DTS Meas Guidance v05, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

The measurement uncertainty is not included in the test result.

1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

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

CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories(identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: CN1208

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: CN0029

The 3m alternate test site of CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0029 on Dec, 2018.

FCC-Registration No.: 951311

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 951311, Aug 26, 2017

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen General Testing & Inspection Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for CTC Laboratories, Inc

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Delta Innovation Technology Co., Ltd
Address:	No.1003-8, 10F, Building 1st, Road Xinxi 28th,Haidian,Beijing
Manufacturer:	Delta Innovation Technology Co., Ltd.
Address:	No.1003-8, 10F, Building 1st, Road Xinxi 28th,Haidian,Beijing
Factory	Cirque Audio Technology Co., Ltd
Address:	No. 2, Road Beiyiheng, Huangjiabao Industrial Park, Shipai Town, Dongguan City, Guangdong Province, China 523347

2.2. General Description of EUT

Product Name:	Bluetooth Headset
Model/Type reference:	DS200
Listed Model(s):	/
Model Difference:	/
Power supply:	DC 3.7V
Hardware version:	SH25_V0.4
Software version:	goowi_sh25_v25_20190827_0944
Bluetooth 5.0+EDR	
Modulation:	GFSK, π/4-DQPSK, 8-DPSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	1.56dBm(π /4-DQPSK)
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	1.5dBi

3. Operation state

3.1. Operation Frequency List:

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Channel	Frequency (MHz)
00	**2402**
01	2403
⋮	⋮
38	2440
39	**2441**
40	2442
⋮	⋮
77	2479
78	**2480**

Note: The display in grey were the channel selected for testing.

3.2. The Worse Case Power Setting Parameter:

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		goowi_sh25_v25_20190827_0944		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 39	CH 78
GFSK	1	1	1	1
π/4-DQPSK	1	1	1	1
8DPSK	1	1	1	1

Note: “1” is the setting value of Power Lever on the fixed frequency software. Set according to the requirements of the applicant.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	101kPa

3.4. Test mode:

Test Methodology

The tests documented in this report were performed in accordance with KDB 558074 D01 DTS Meas Guidance v05, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T460S	SL10K24796 JS

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	0.15	/

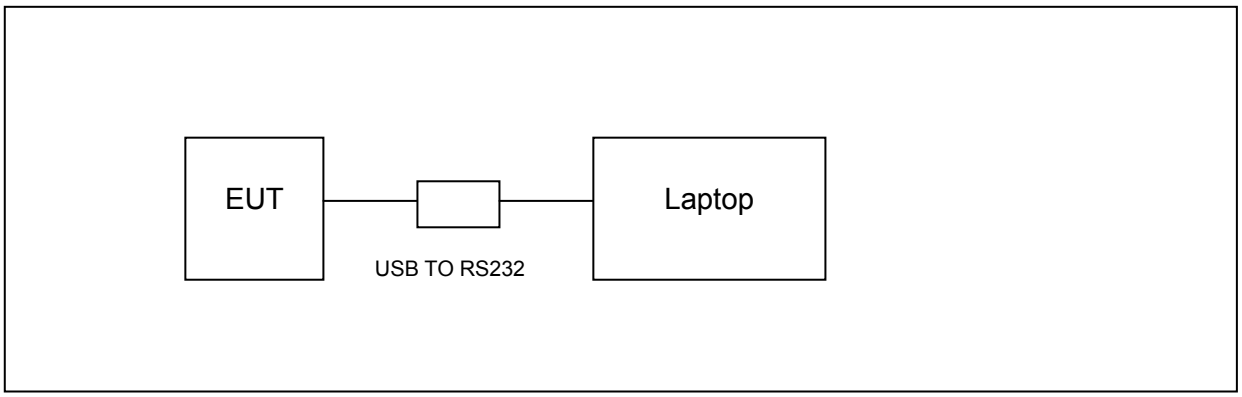
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	/	/	/

TEST SETUP:

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

SETUP DIAGRAM FOR TESTS



4. Measurement Instruments List

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 28, 2019
2	LISN	R&S	ENV216	101113	Dec. 28, 2019
3	EMI Test Receiver	R&S	ESCI	100920	Dec. 28, 2019
4	ISN CAT6	Schwarzbeck	NTFM 8158	8158-0046	Dec. 28, 2019

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28 2019
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 28 2019
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 28 2019
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 28 2019
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 28 2019
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 28 2019
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 28 2019
8	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 28 2019
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 28 2019
10	Climate Chamber	ESPEC	MT3065	/	Dec. 28 2019
11	300328 v2.1.1 test system	TONSCEND	v2.6	/	/

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 28 2019
2	High pass filter	micro-tranics	HPM50111	142	Dec. 28 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28 2019
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 28 2019
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 28 2019
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 28 2019
	Horn Antenna	Rohde & Schwarz	Sep-60	69483	Dec. 28 2019
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28 2019
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28 2019
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28 2019
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 28 2019

14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28 2019
15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 28 2019
16	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 28 2019
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 28 2019
18	Attenuator	Chengdu E-Microwave	EMCAXX-10R NZ-3	---	Dec. 28 2019

Note:1. The Cal. Interval was one year.
2. The cable loss has calculated in test result which connection between each test instruments.

5. Conducted Emission

Limit

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8.

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

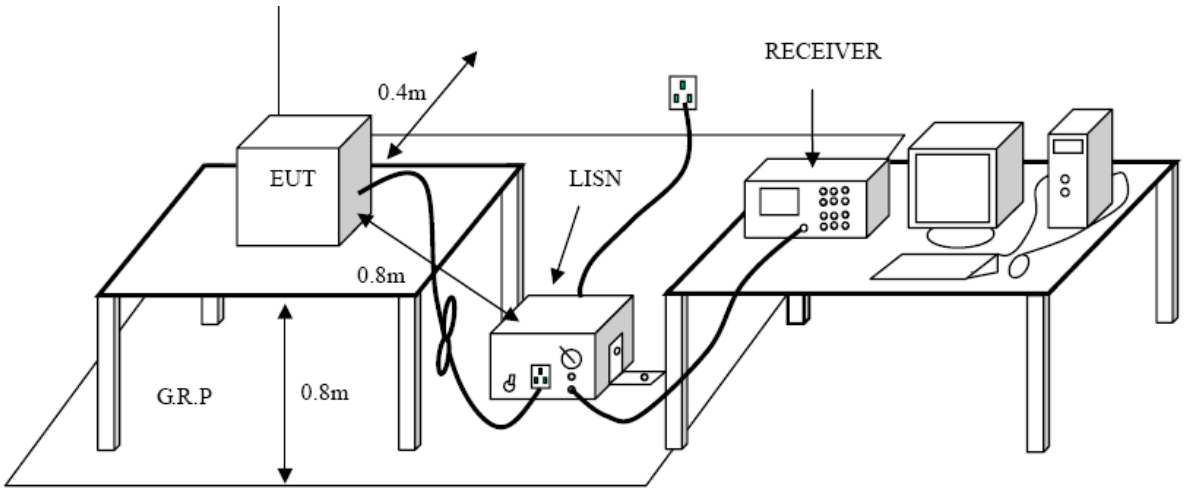
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment.
   The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

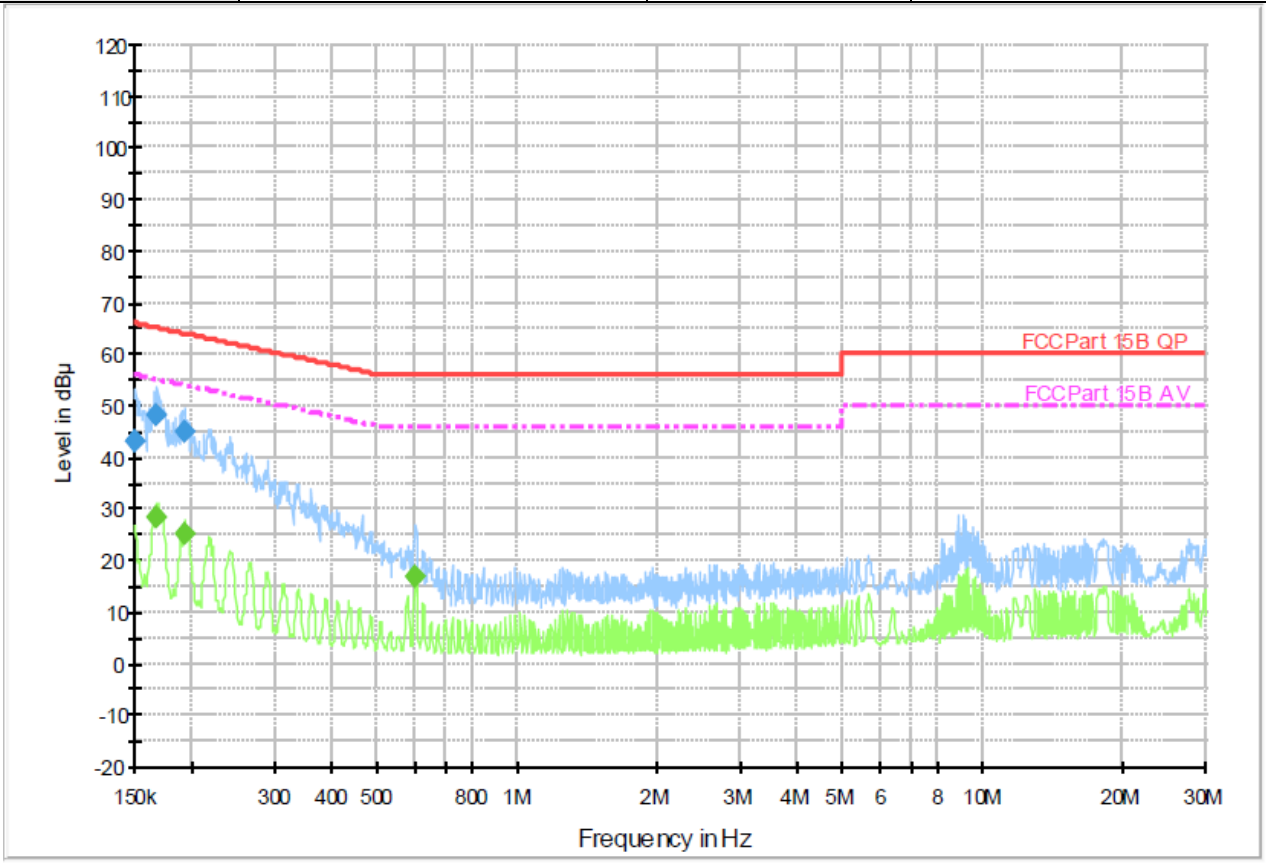
Test Mode:

Please refer to the clause 3.4

Test Results

Only show worst adapter data.

Temperature：	23.5℃	Relative Humidity：	56%
Pressure：	101kPa	Test Mode：	GFSK
Test Voltage:	AC 120V/60Hz	Phase：	L

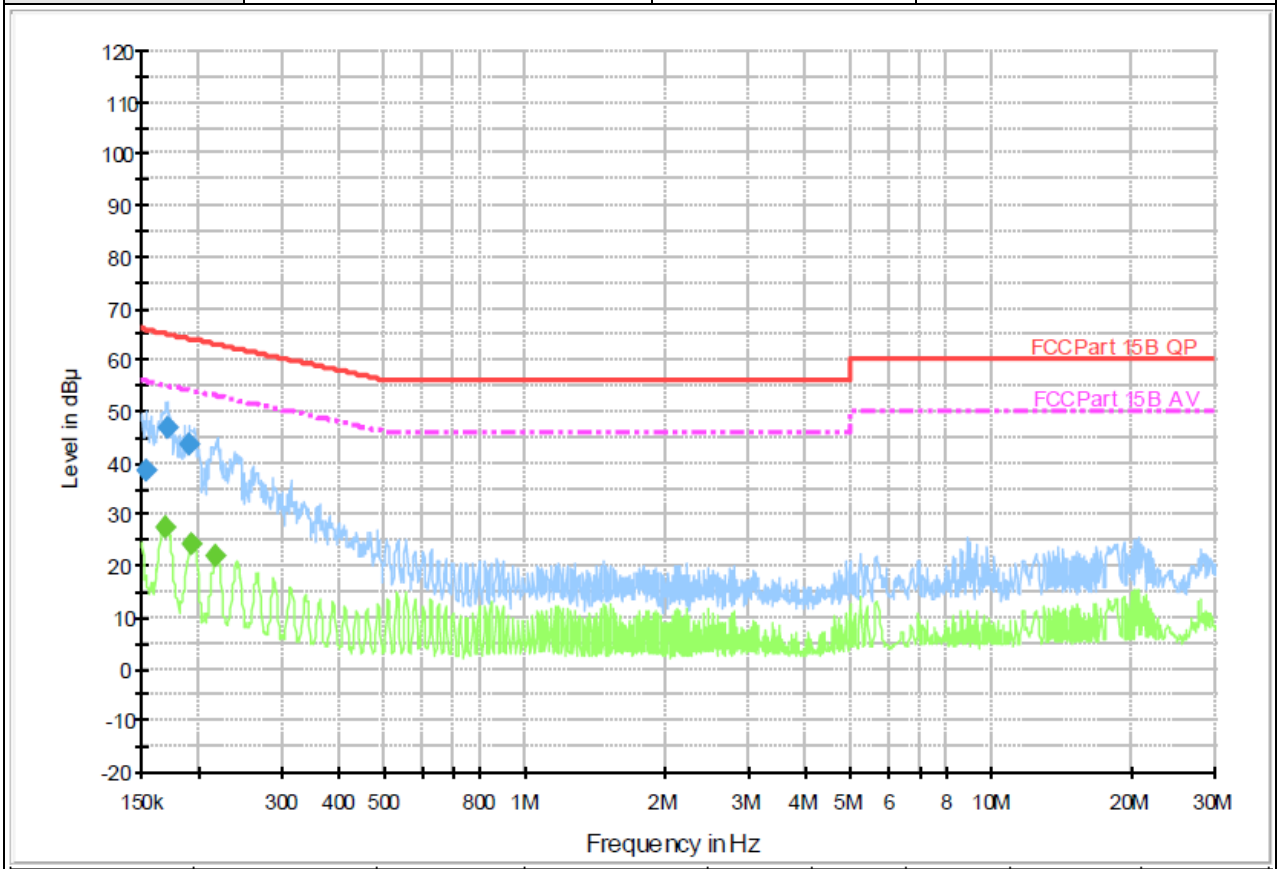


Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.150600	43.2	1000.00	9.000	On	L1	9.4	22.8	66.0
0.167070	48.1	1000.00	9.000	On	L1	9.4	17.0	65.1
0.192120	45.0	1000.00	9.000	On	L1	9.4	18.9	63.9

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.167070	28.4	1000.00	9.000	On	L1	9.4	26.7	55.1
0.192120	25.2	1000.00	9.000	On	L1	9.4	28.7	53.9
0.601760	17.0	1000.00	9.000	On	L1	9.4	29.0	46.0

Emission Level= Read Level+ Correct Factor

Temperature：	23.5℃	Relative Humidity：	56%
Pressure：	101kPa	Test Mode：	GFSK
Test Voltage:	AC 120V/60Hz	Phase：	N



Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.153640	38.5	1000.00	9.000	On	N	9.4	27.4	65.8
0.170440	46.9	1000.00	9.000	On	N	9.4	18.0	64.9
0.189840	43.4	1000.00	9.000	On	N	9.4	20.6	64.0

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)
0.169080	27.3	1000.00	9.000	On	N	9.4	27.7	55.0
0.192890	24.3	1000.00	9.000	On	N	9.4	29.6	53.9
0.216570	21.9	1000.00	9.000	On	N	9.4	31.0	52.9

Emission Level= Read Level+ Correct Factor

6. Radiated Emission

Limit

Please refer to CFR 47 FCC §15.205 and §15.209

Please refer to ISED RSS-GEN Clause 8.9 and Clause 8.10

Radiation Disturbance Test Limit for FCC (Class B)(9kHz-1GHz)

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/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

Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

IC Restricted bands please refer to ISED RSS-GEN Clause 8.10

Table 7 – Restricted frequency bands Note 1

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

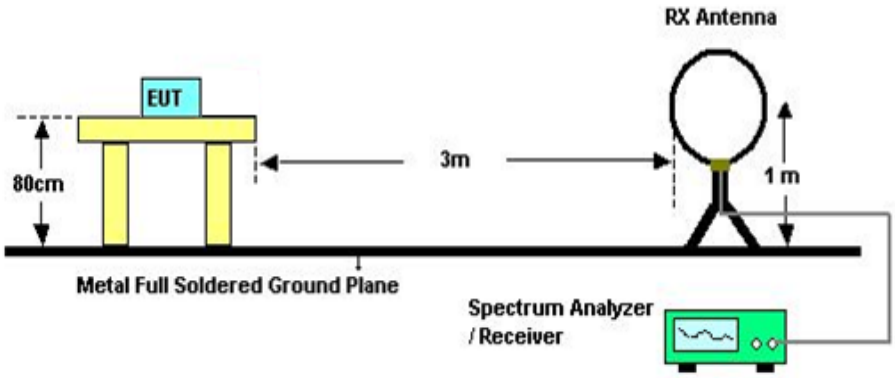
Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

TEST SETUP AND PROCEDURE
Below 30MHz



The setting of the spectrum Analyzer

RBW	200Hz (From 9kHz to 0.15MHz)/ 9kHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9kHz (From 0.15MHz to 30MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm meter above ground.

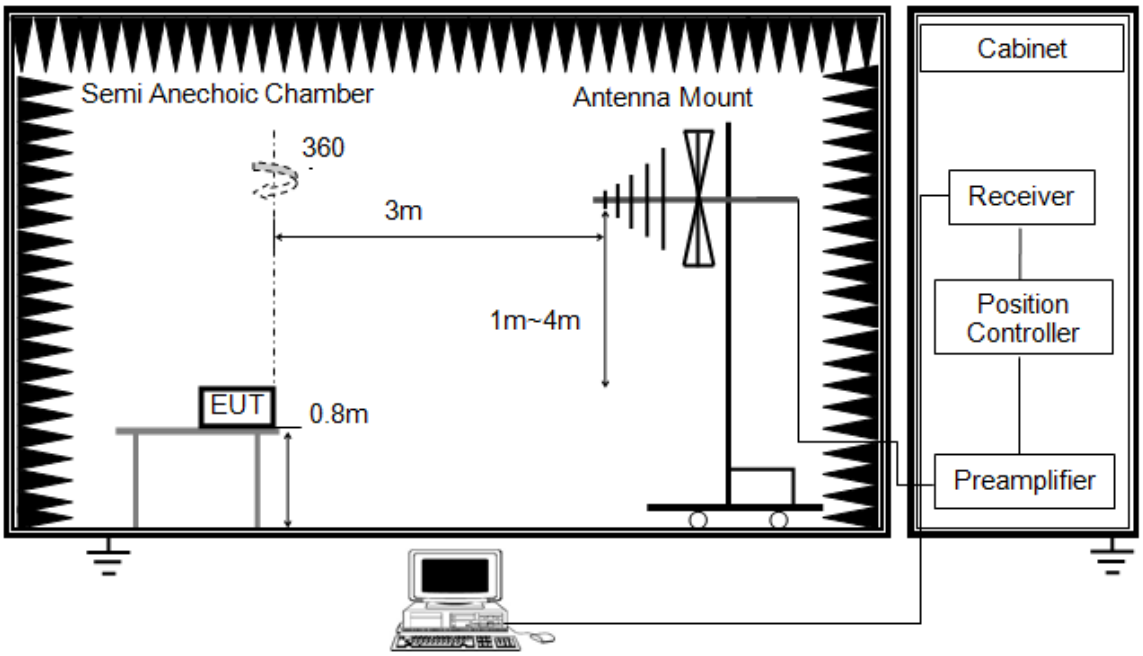
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m OFS. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G and above 30MHz



The setting of the spectrum Analyzer

RBW	120K
VBW	300K
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

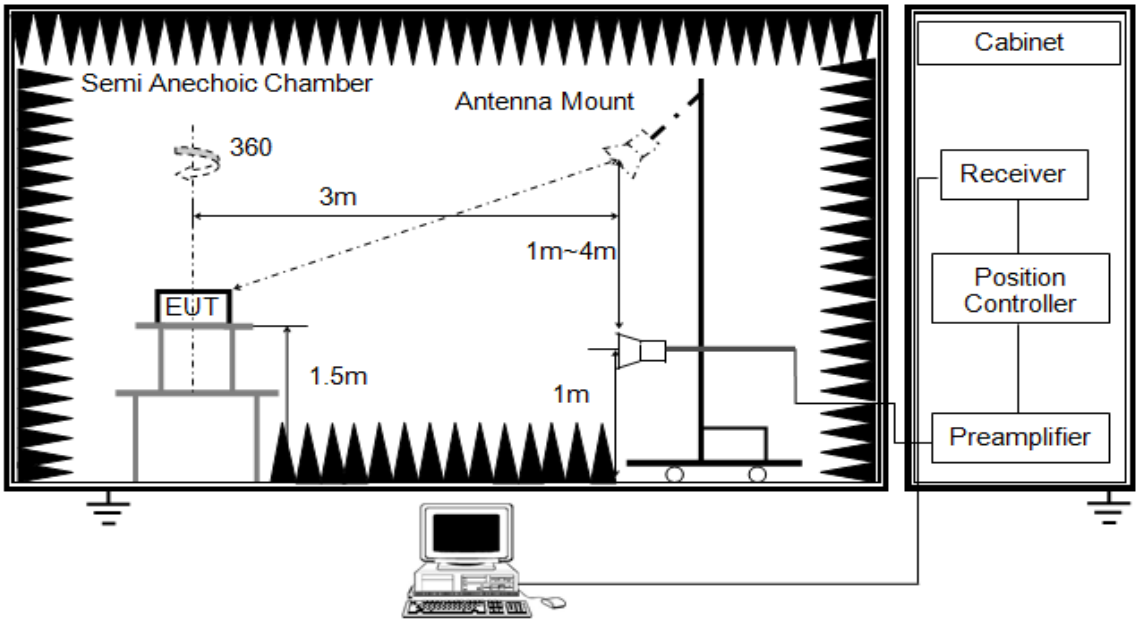
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1G



RBW	1M
VBW	PEAK: 3M AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

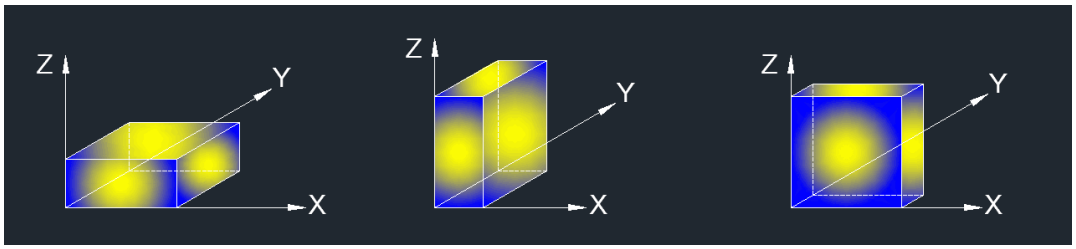
3. The EUT was placed on a turntable with 150cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector. For the Duty Cycle please refer to clause 6.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

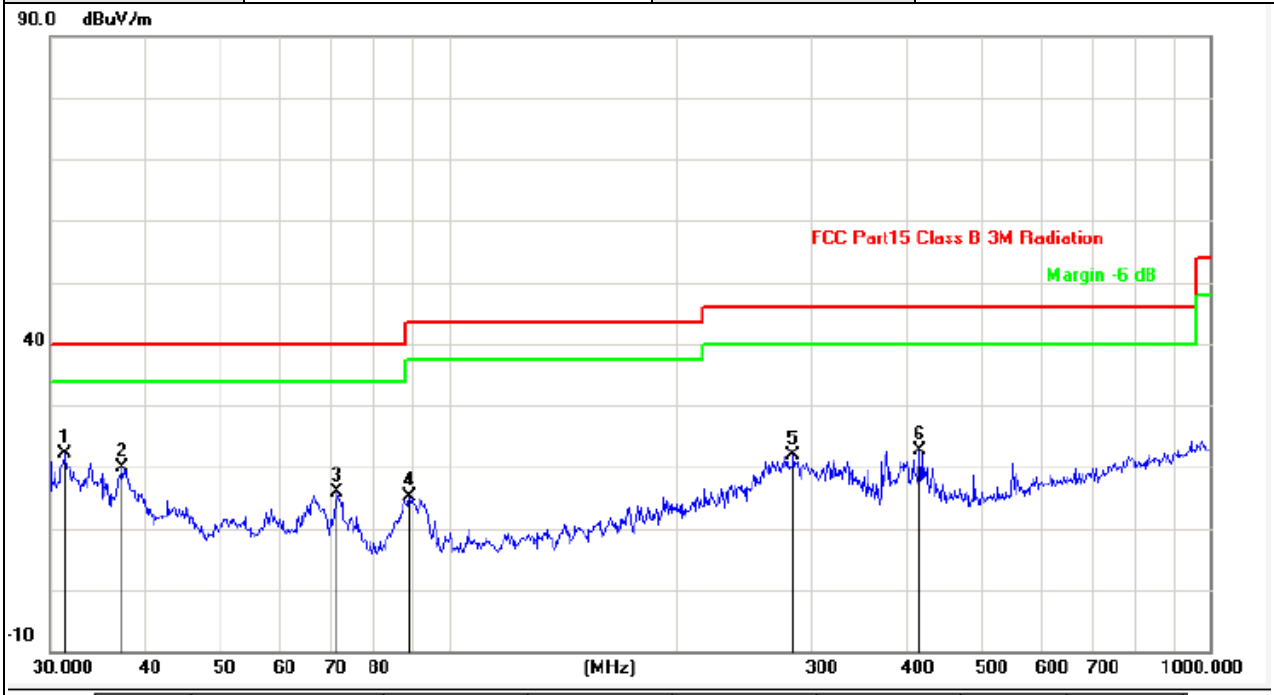
Note 2: The EUT was fully exercised with external accessories during the test. In the case of multiple accessory external ports, an external accessory shall be connected to one of each type of port.

6.1. Spurious Emissions

30MHz-1GHz

Only show worse case: GFSK

Temperature:	24.2℃	Relative Humidity:	57%
Pressure:	101kPa	Test Mode:	GFSK
Polarization:	Vertical	Test Power:	AC 120V/60Hz



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	31.3992	-19.13	41.25	22.12	40.00	-17.88	QP
2	37.2854	-18.53	38.53	20.00	40.00	-20.00	QP
3	71.3300	-20.91	36.82	15.91	40.00	-24.09	QP
4	88.9637	-22.72	37.75	15.03	43.50	-28.47	QP
5	283.9791	-18.71	40.67	21.96	46.00	-24.04	QP
6	416.1791	-15.36	37.96	22.60	46.00	-23.40	QP

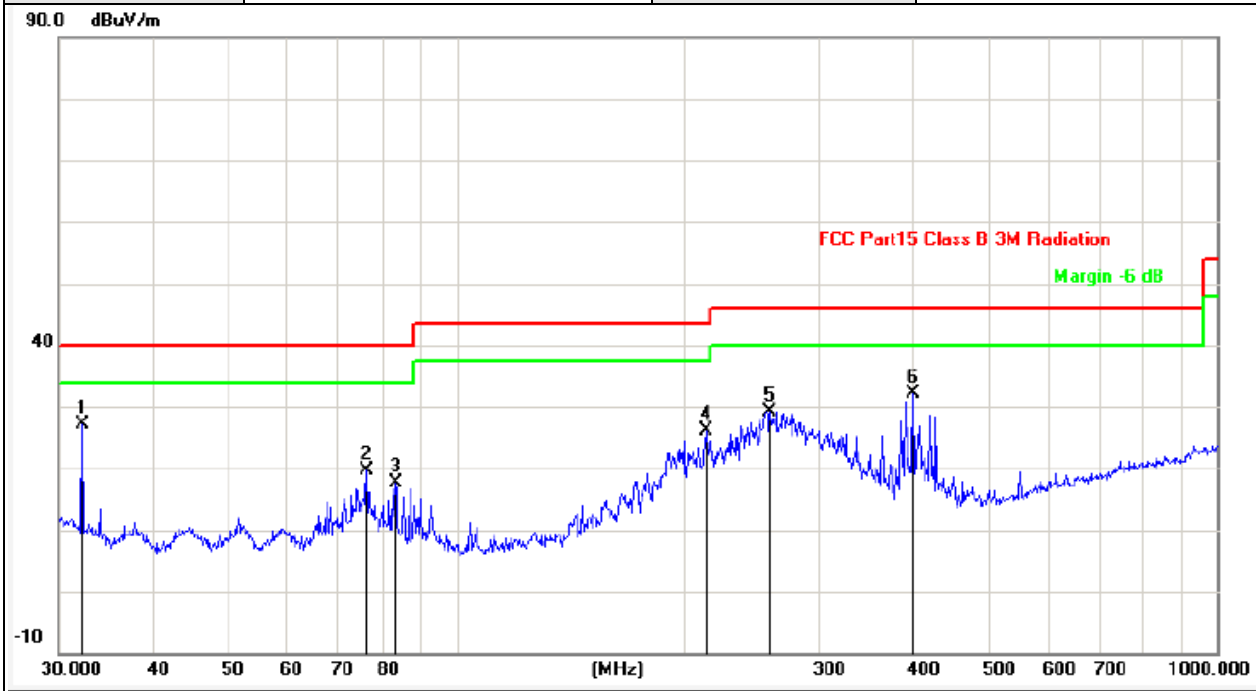
30~1000MHz

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Temperature:	24.2℃	Relative Humidity:	57%
Pressure:	101kPa	Test Mode:	GFSK
Polarization:	Horizontal	Test Power:	AC 120V/60Hz



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.1795	-19.08	46.27	27.19	40.00	-12.81	QP
2	76.2442	-21.91	41.47	19.56	40.00	-20.44	QP
3	83.2298	-22.70	40.34	17.64	40.00	-22.36	QP
4	213.0151	-21.78	47.83	26.05	43.50	-17.45	QP
5	258.3264	-19.65	48.81	29.16	46.00	-16.84	QP
6	399.0302	-15.84	47.88	32.04	46.00	-13.96	QP

30~1000MHz

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Adobe 1GHz

Only show worse case:GFSK

No report for the emission which more than 10 dB below the prescribed limit.

Test Mode: GFSK - 2402MHz							
Frequency (MHz)	**Reading (dBuV)**	**Antenna Factor (dB/m)**	**Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Pole (V/H)**	**Remark**
4804	45.32	3.09	48.41	74	-25.59	V	peak
7206	46.32	5.21	51.53	74	-22.47	V	peak
4804	45.98	3.09	49.07	74	-24.93	H	peak
7206	42.26	5.21	47.47	74	-26.53	H	peak

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Test Mode: GFSK - 2441MHz							
Frequency (MHz)	**Reading (dBuV)**	**Antenna Factor (dB/m)**	**Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Pole (V/H)**	**Remark**
4882	46.32	3.37	49.69	74	-24.31	V	peak
7323	45.98	5.56	51.54	74	-22.46	V	peak
4882	46.11	3.37	49.48	74	-24.52	H	peak
4882	46.38	3.37	49.75	74	-24.25	V	peak

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Test Mode: GFSK - 2480MHz							
Frequency (MHz)	**Reading (dBuV)**	**Antenna Factor (dB/m)**	**Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Pole (V/H)**	**Remark**
4960	46.22	3.44	49.66	74	-24.34	V	peak
7440	45.31	5.64	50.95	74	-23.05	V	peak
4960	46.12	3.44	49.56	74	-24.44	H	peak
7440	45.69	5.64	51.33	74	-22.67	H	peak

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

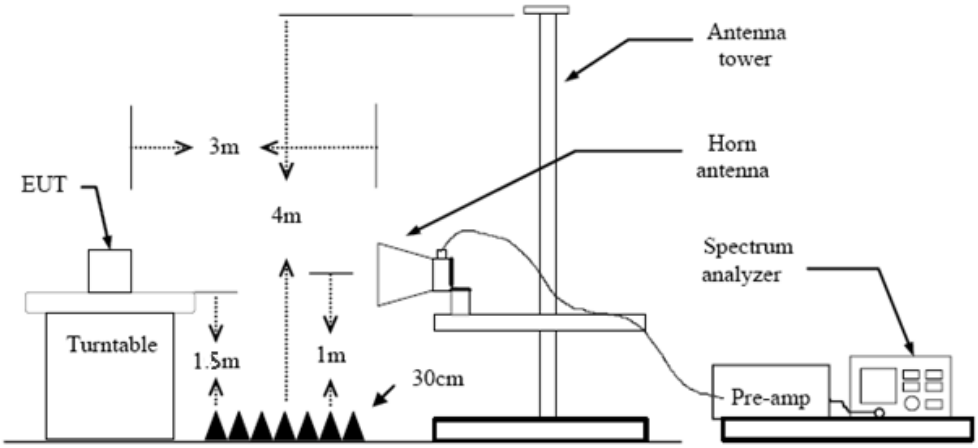
2.Margin value = Level -Limit value

6.2. Band Edge Emissions

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54
Note: All restriction bands have been tested, only the worst case is reported.		

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
   RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

Test Mode

Please refer to the clause 3.4

Test Results

(1) Radiation Test

Only show worse case:GFSK

BDR			2402MHz				
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2390	48.32	3.28	51.6	74	-22.4	Vertical	Peak
2400	49.32	3.85	53.17	74	-20.83	Vertical	Peak
2390	53.26	3.02	56.28	74	-17.72	Horizontal	Peak
2400	48.23	3.67	51.9	74	-22.1	Horizontal	Peak
2390	46.69	3.28	49.97	54	-4.03	Vertical	Average
2400	43.98	3.85	47.83	54	-6.17	Vertical	Average
2390	42.68	3.02	45.7	54	-8.3	Horizontal	Average
2400	39.62	3.67	43.29	54	-10.71	Horizontal	Average

BDR			2480MHz				
Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Polarization	Test value
2483.5	49.68	3.79	53.47	74	-20.53	Vertical	Peak
2500	50.21	4.09	54.3	74	-19.7	Vertical	Peak
2483.5	50.34	3.65	53.99	74	-20.01	Horizontal	Peak
2500	47.26	3.95	51.21	74	-22.79	Horizontal	Peak
2483.5	41.23	3.79	45.02	54	-8.98	Vertical	Average
2500	36.87	4.09	40.96	54	-13.04	Vertical	Average
2483.5	40.26	3.65	43.91	54	-10.09	Horizontal	Average
2500	40.25	3.95	44.2	54	-9.8	Horizontal	Average

Remark:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

(2) Conducted Test

Test Result

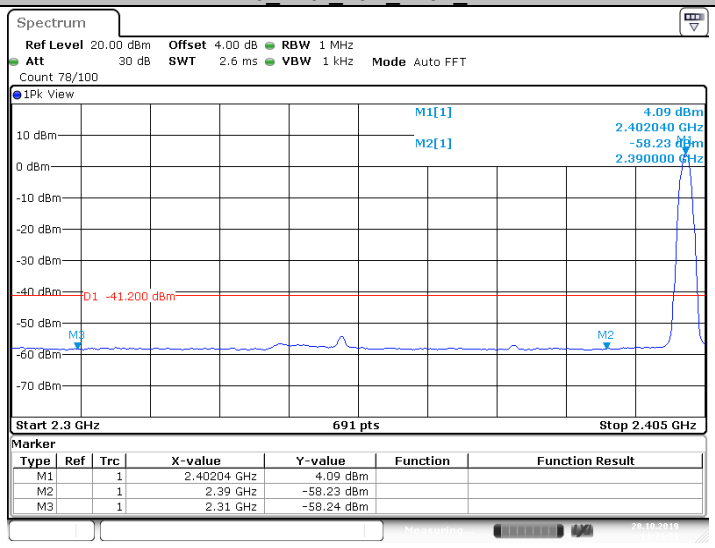
TestMode	Antenna	ChName	Channel	Detector	Freq	Result	Limit	Verdict
DH5	Ant1	Low	2402	AV	2310.000	-58.24	<=-41.20	PASS
				AV	2390.000	-58.23	<=-41.20	PASS
				Peak	2310.000	-46.66	<=-21.20	PASS
				Peak	2390.000	-47.27	<=-21.20	PASS
		High	2480	AV	2483.500	-57.42	<=-41.20	PASS
				AV	2500.000	-58.07	<=-41.20	PASS
				Peak	2483.500	-49.03	<=-21.20	PASS
				Peak	2500.000	-47.54	<=-21.20	PASS
		Low	Hop_2402	Peak	2310.000	-48.02	<=-27.00	PASS
				Peak	2390.000	-48.07	<=-27.00	PASS
		High	Hop_2480	Peak	2483.500	-48.85	<=-27.00	PASS
				Peak	2500.000	-46.73	<=-27.00	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-58.38	<=-41.20	PASS
				AV	2390.000	-58.35	<=-41.20	PASS
				Peak	2310.000	-48.3	<=-21.20	PASS
				Peak	2390.000	-47.17	<=-21.20	PASS
		High	2480	AV	2483.500	-57.72	<=-41.20	PASS
				AV	2500.000	-57.99	<=-41.20	PASS
				Peak	2483.500	-47.74	<=-21.20	PASS
				Peak	2500.000	-48.47	<=-21.20	PASS
		Low	Hop_2402	Peak	2310.000	-47.73	<=-27.00	PASS
				Peak	2390.000	-48.38	<=-27.00	PASS
		High	Hop_2480	Peak	2483.500	-49.03	<=-27.00	PASS
				Peak	2500.000	-47.21	<=-27.00	PASS
3DH5	Ant1	Low	2402	AV	2310.000	-58.3	<=-41.20	PASS
				AV	2390.000	-58.53	<=-41.20	PASS
				Peak	2310.000	-47.92	<=-21.20	PASS
				Peak	2390.000	-47.52	<=-21.20	PASS
		High	2480	AV	2483.500	-57.66	<=-41.20	PASS
				AV	2500.000	-58.21	<=-41.20	PASS
				Peak	2483.500	-48.38	<=-21.20	PASS
				Peak	2500.000	-47.64	<=-21.20	PASS
		Low	Hop_2402	Peak	2310.000	-46.18	<=-27.00	PASS
				Peak	2390.000	-48.17	<=-27.00	PASS
		High	Hop_2480	Peak	2483.500	-48.44	<=-27.00	PASS
				Peak	2500.000	-48.2	<=-27.00	PASS

Note：

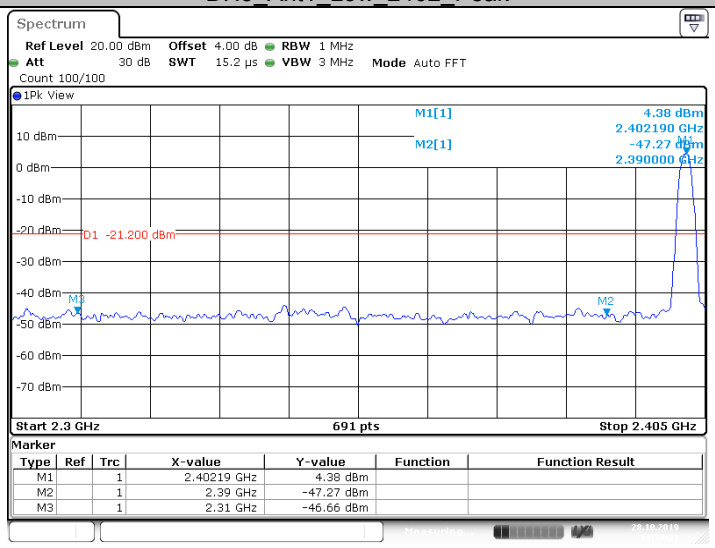
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

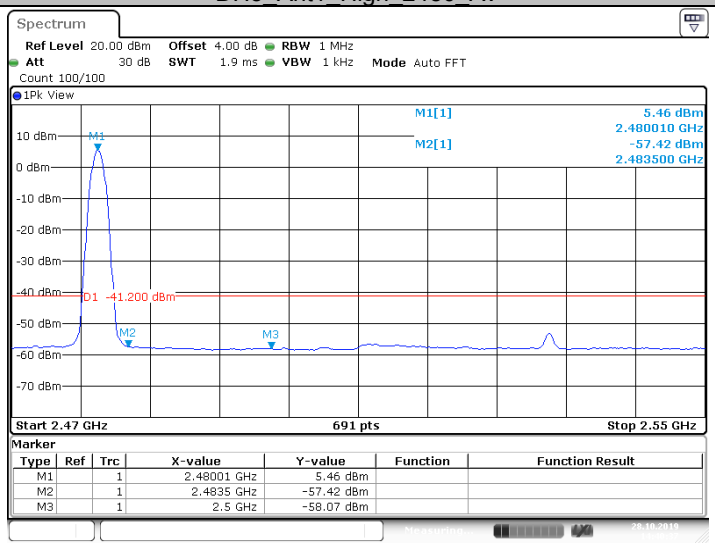
DH5_Ant1_Low_2402_AV



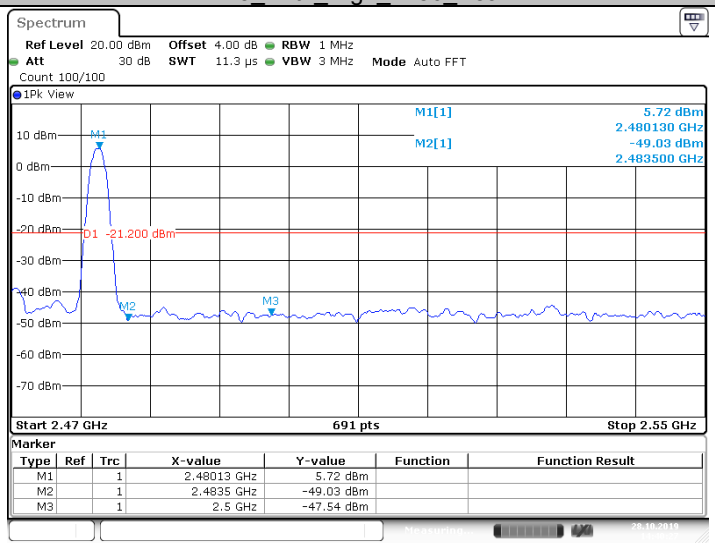
DH5_Ant1_Low_2402_Peak



DH5_Ant1_High_2480_AV

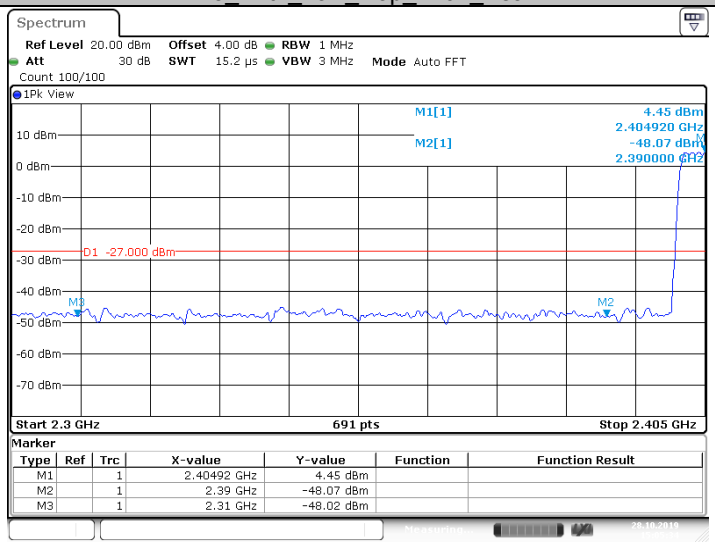


DH5_Ant1_High_2480_Peak



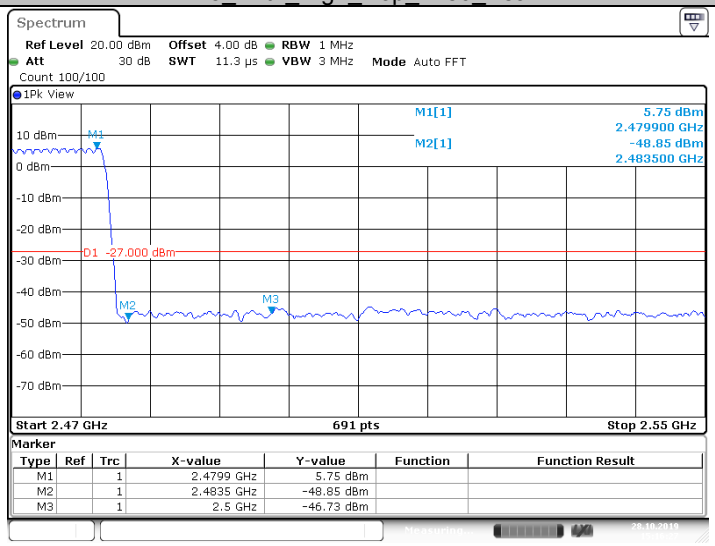
Date: 28.OCT.2019 14:40:27

DH5_Ant1_Low_Hop_2402_Peak



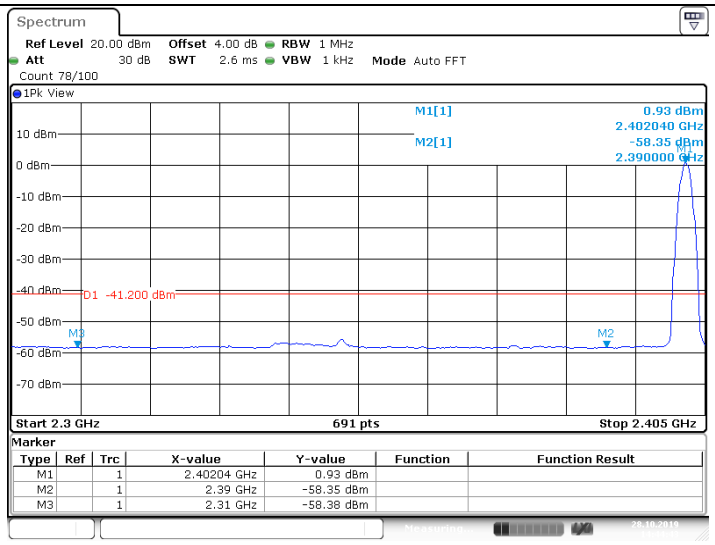
Date: 28.OCT.2019 15:05:34

DH5_Ant1_High_Hop_2480_Peak

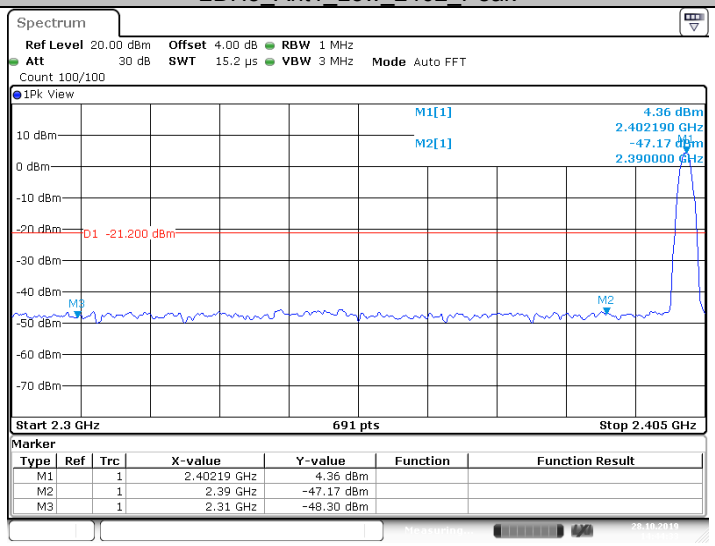


Date: 28.OCT.2019 15:16:27

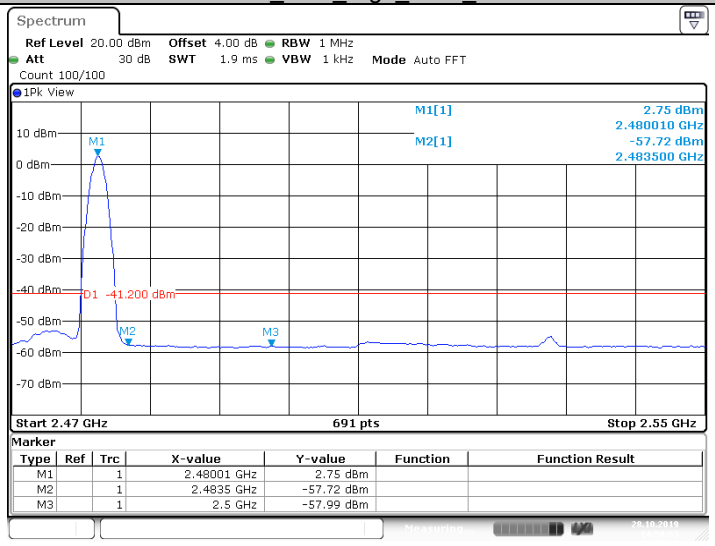
2DH5_Ant1_Low_2402_AV



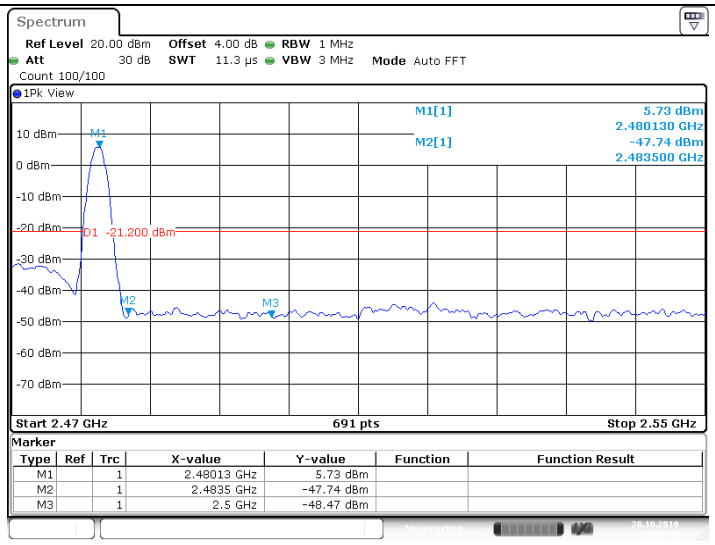
2DH5_Ant1_Low_2402_Peak



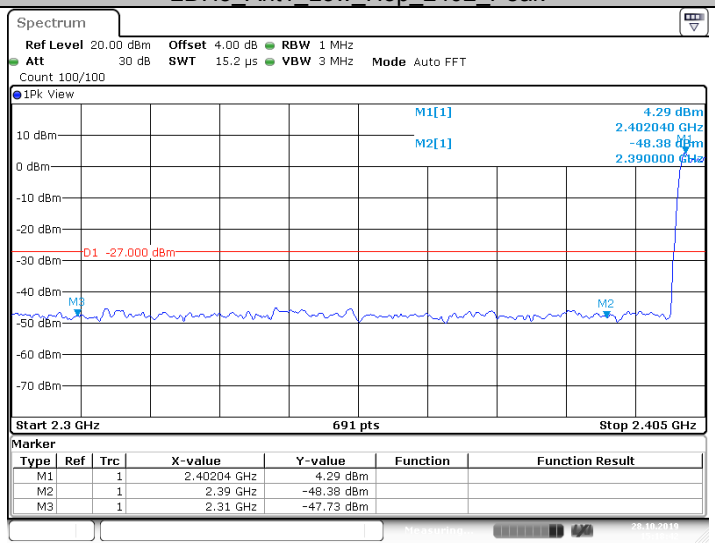
2DH5_Ant1_High_2480_AV



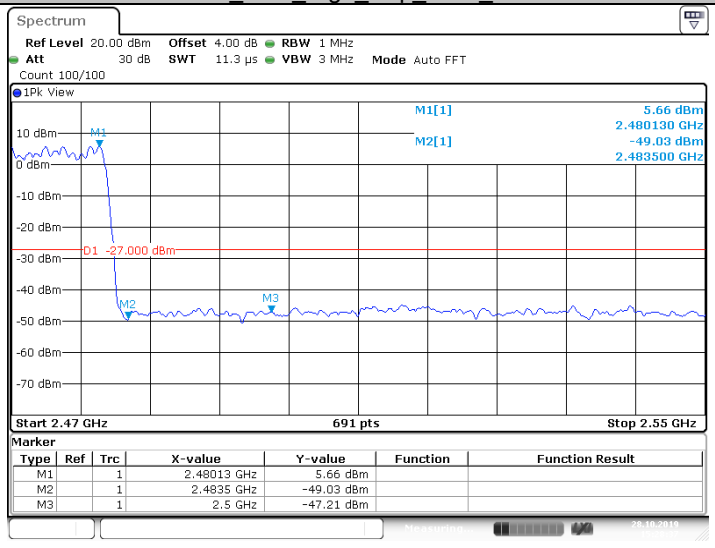
2DH5_Ant1_High_2480_Peak



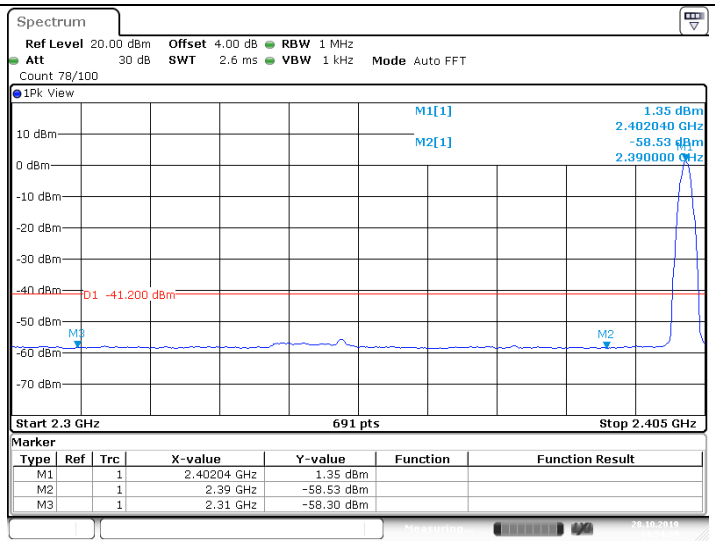
2DH5_Ant1_Low_Hop_2402_Peak



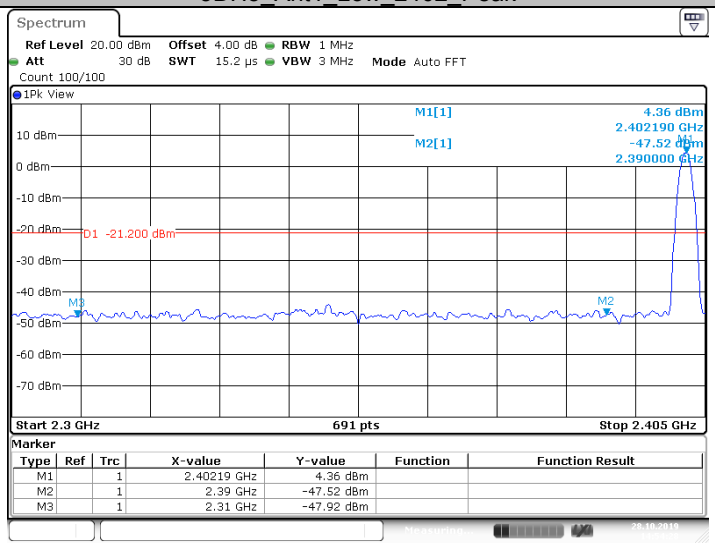
2DH5_Ant1_High_Hop_2480_Peak



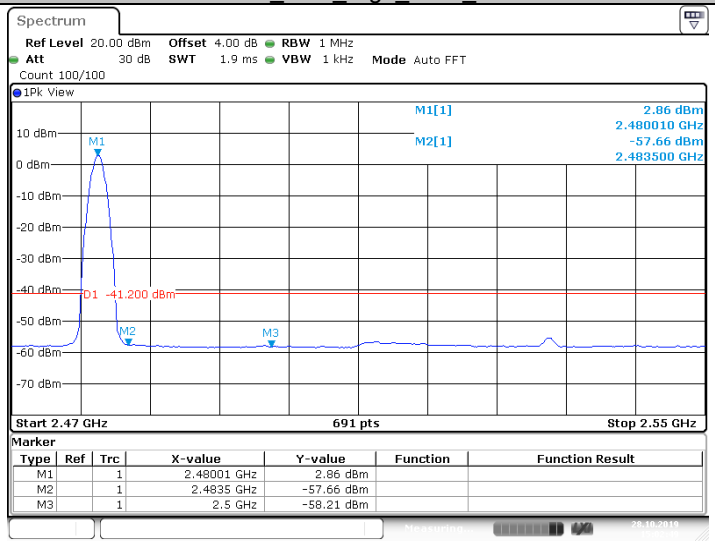
3DH5_Ant1_Low_2402_AV



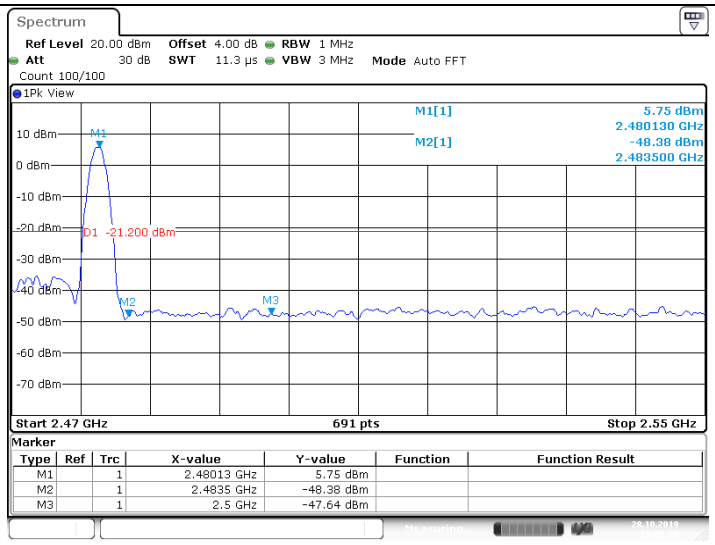
3DH5_Ant1_Low_2402_Peak



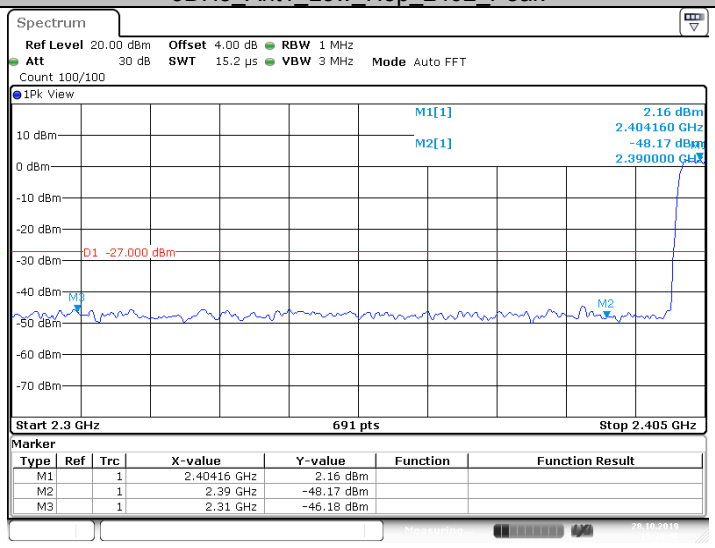
3DH5_Ant1_High_2480_AV



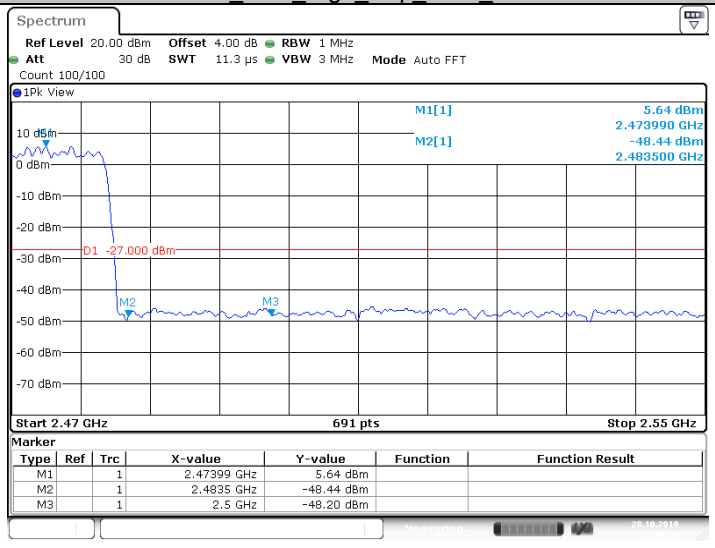
3DH5_Ant1_High_2480_Peak



3DH5_Ant1_Low_Hop_2402_Peak



3DH5_Ant1_High_Hop_2480_Peak

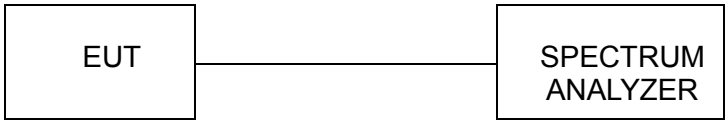


7.Channel Separation and Bandwidth

Limit

CFR 47FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) RSS-247 Clause 5.1 (a)	20dB Occupied Bandwidth	/	2400-2483.5
ISED RSS-Gen Clause 6.6	99% Occupied Bandwidth	/	2400-2483.5

Test Configuration



Test Procedure

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 20dB Occupied Bandwidth:1% of the 20 dB bandwidth For 99% Occupied Bandwidth: 1% to 5% of the occupied bandwidth
VBW	For 20dB Occupied Bandwidth: ≥ RBW For 99% Occupied Bandwidth: approximately 3×RBW
Span	approximately 2 to 3 times the 20 dB bandwidth
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB and 99% relative to the maximum level measured in the fundamental emission.

Test Mode

Please refer to the clause 3.4

Test Results

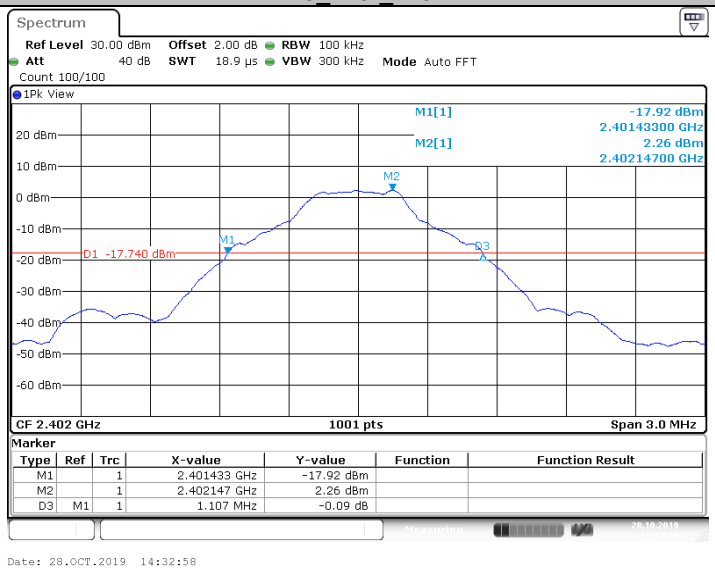
20dB Emission Bandwidth:

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	1.107	2401.433	2402.540	---	PASS
		2441	1.107	2440.433	2441.540	---	PASS
		2480	1.107	2479.433	2480.540	---	PASS
2DH5	Ant1	2402	1.317	2401.328	2402.645	---	PASS
		2441	1.320	2440.325	2441.645	---	PASS
		2480	1.320	2479.325	2480.645	---	PASS
3DH5	Ant1	2402	1.338	2401.322	2402.660	---	PASS
		2441	1.341	2440.322	2441.663	---	PASS
		2480	1.344	2479.319	2480.663	---	PASS

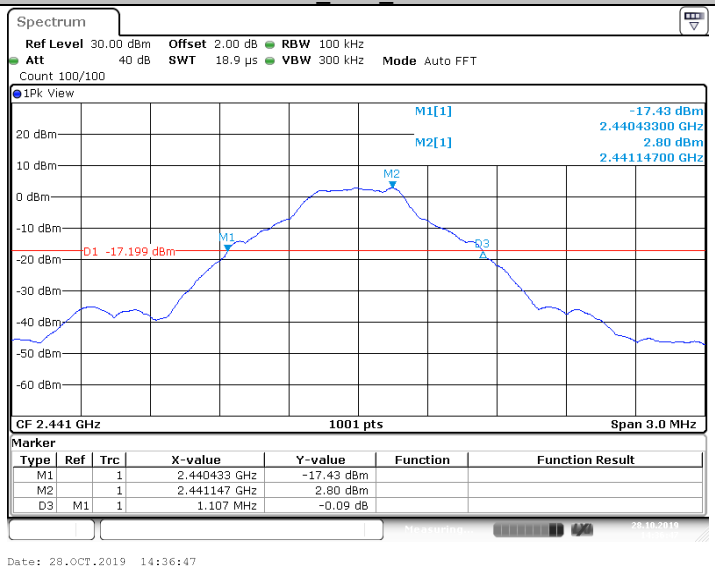
Note: Spectrum analyzer compensation: offset = attenuator + line loss

Test Graphs

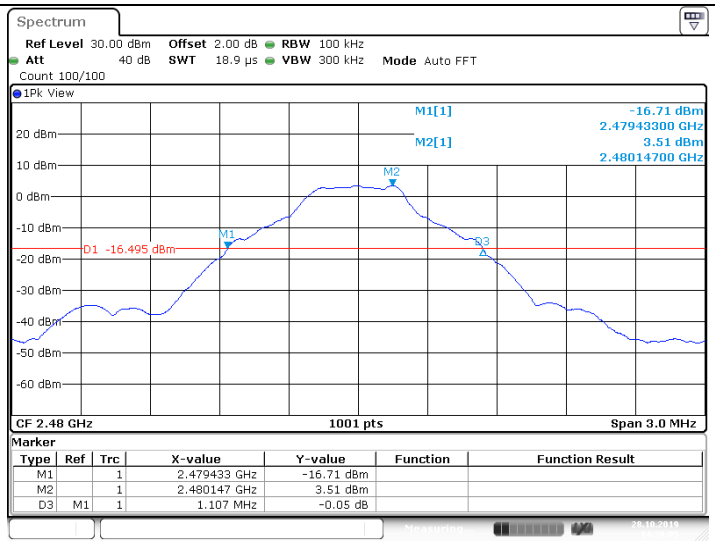
DH5_Ant1_2402



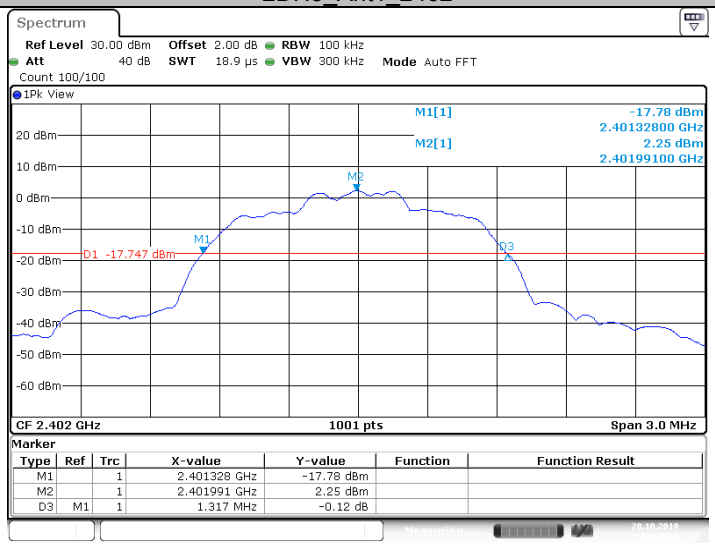
DH5_Ant1_2441



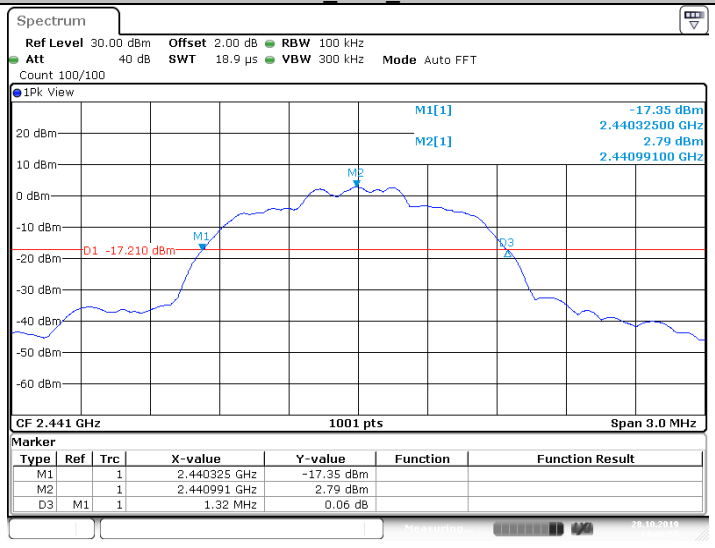
DH5_Ant1_2480



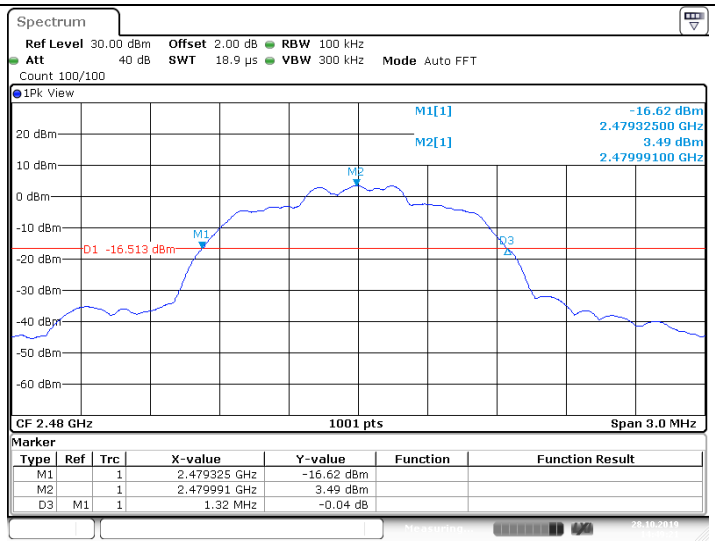
2DH5_Ant1_2402



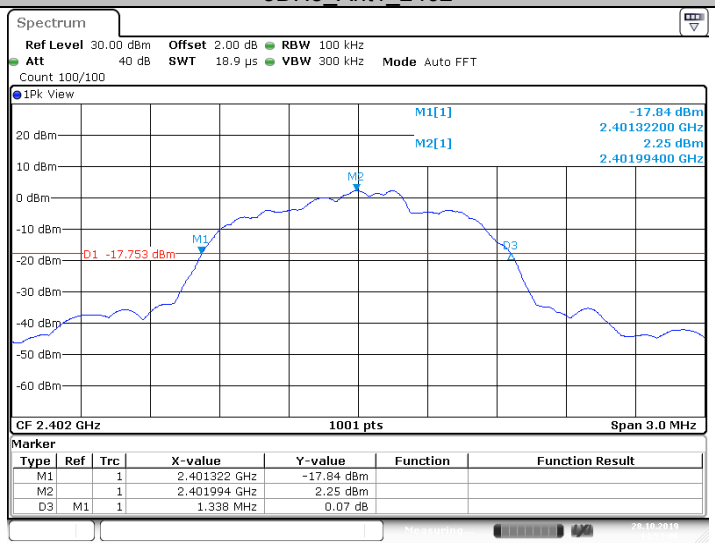
2DH5_Ant1_2441



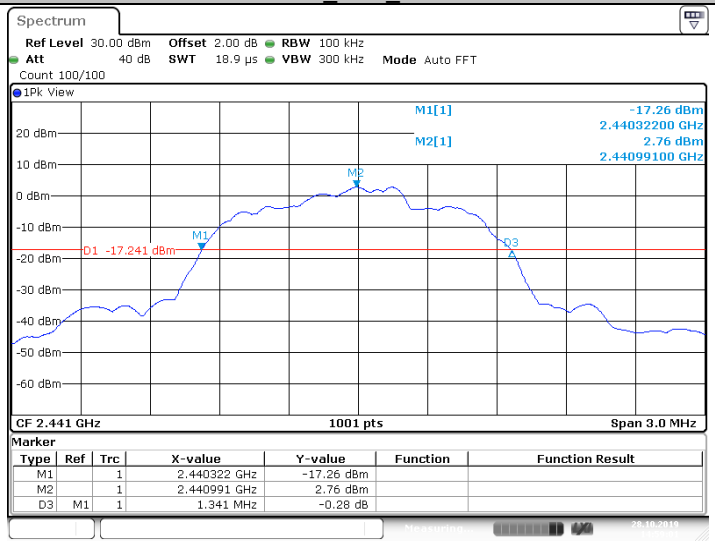
2DH5_Ant1_2480



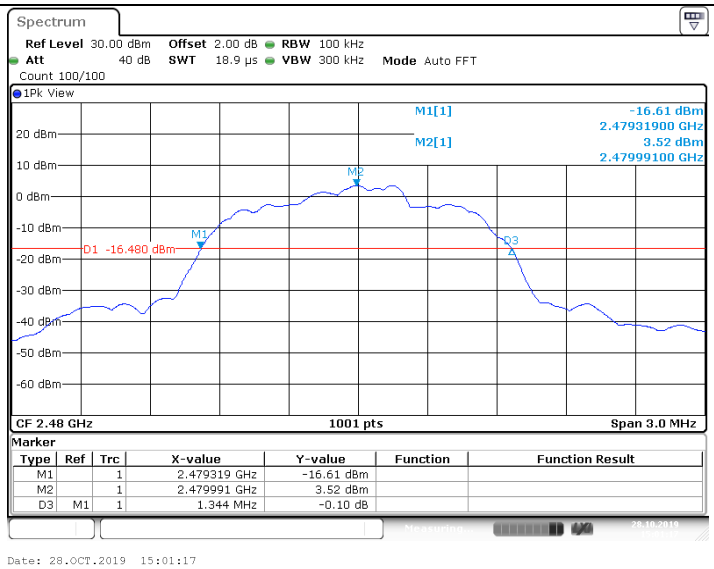
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



99%Occupied Channel Bandwidth:

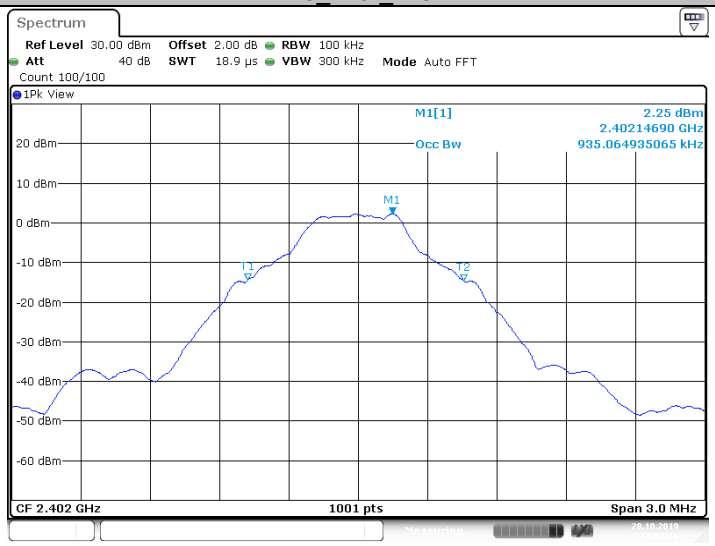
Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.935	2401.520	2402.456	---	PASS
		2441	0.938	2440.517	2441.456	---	PASS
		2480	0.938	2479.517	2480.456	---	PASS
2DH5	Ant1	2402	1.157	2401.407	2402.563	---	PASS
		2441	1.157	2440.407	2441.563	---	PASS
		2480	1.16	2479.404	2480.563	---	PASS
3DH5	Ant1	2402	1.175	2401.395	2402.569	---	PASS
		2441	1.181	2440.392	2441.572	---	PASS
		2480	1.175	2479.395	2480.569	---	PASS

Note: Spectrum analyzer compensation: offset = attenuator + line loss

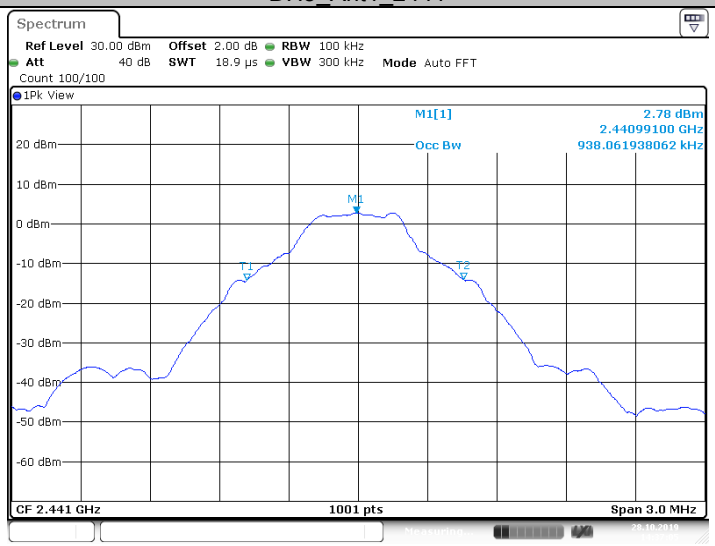
Test Graphs

DH5_Ant1_2402



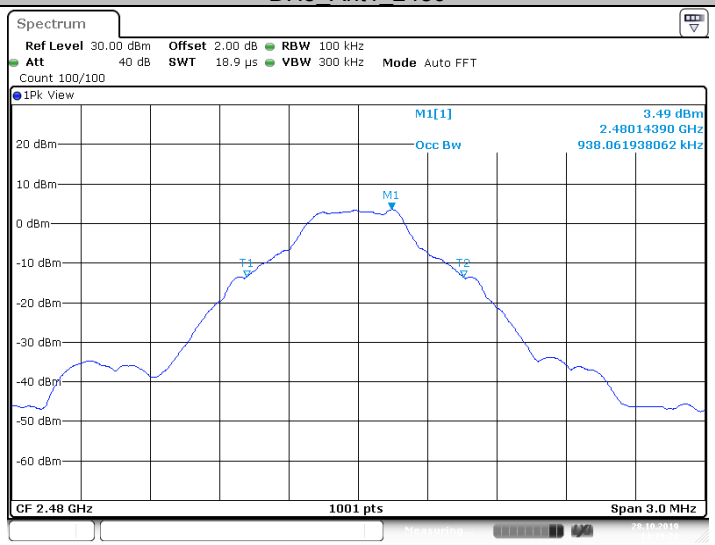
Date: 28.OCT.2019 14:33:15

DH5_Ant1_2441



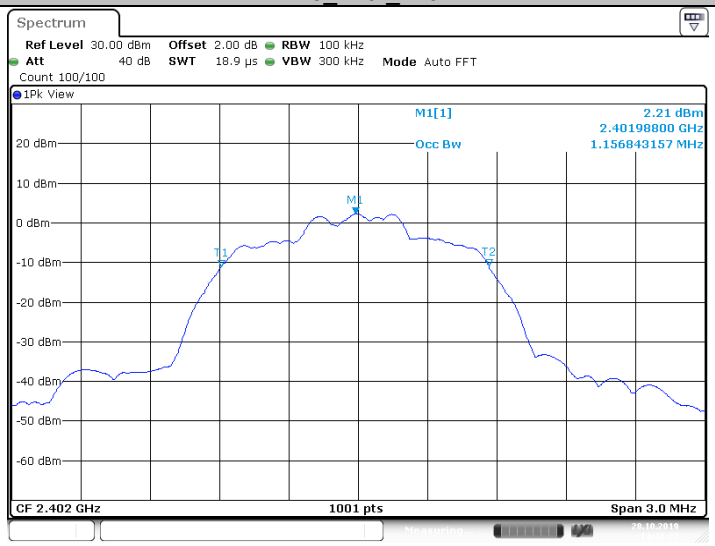
Date: 28.OCT.2019 14:37:04

DH5_Ant1_2480

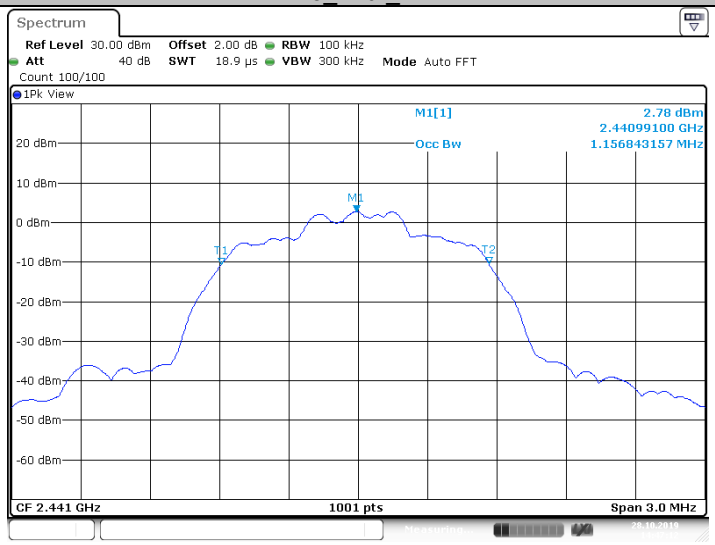


Date: 28.OCT.2019 14:39:22

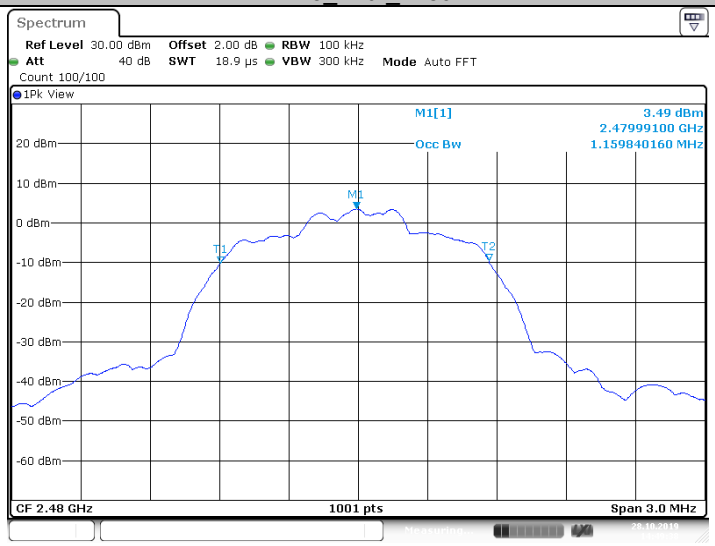
2DH5_Ant1_2402



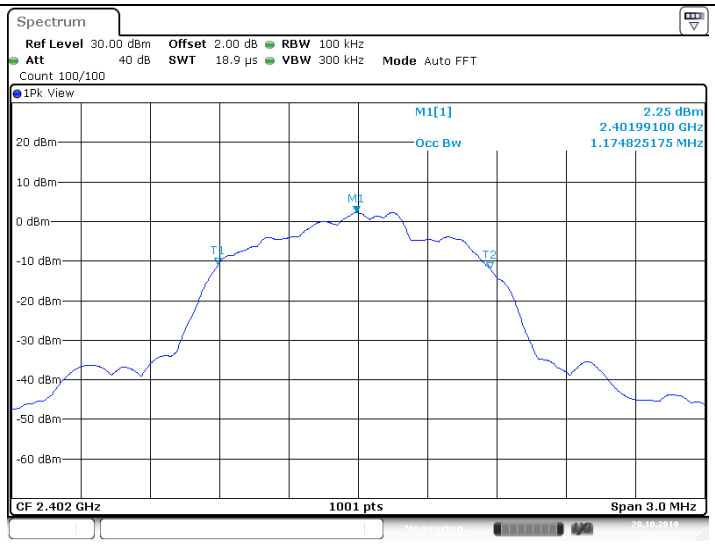
2DH5_Ant1_2441



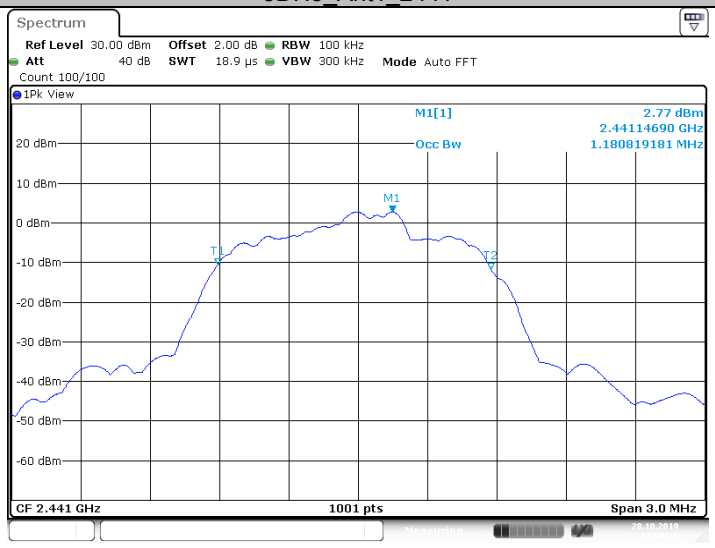
2DH5_Ant1_2480



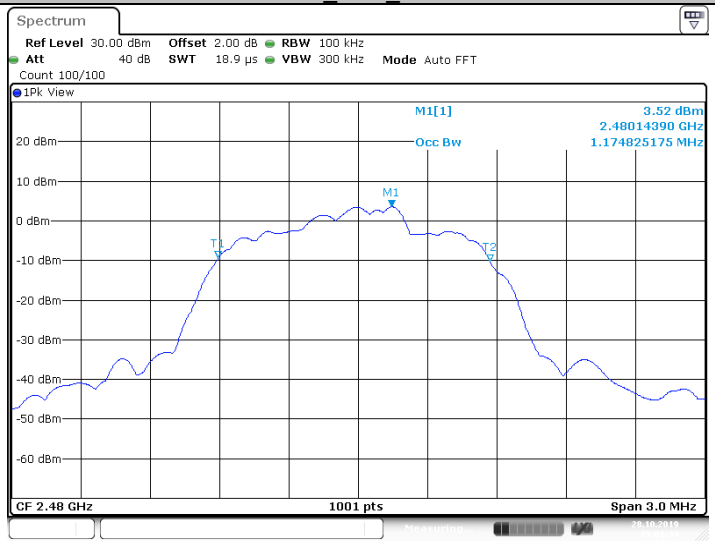
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



Carrier frequency separation:

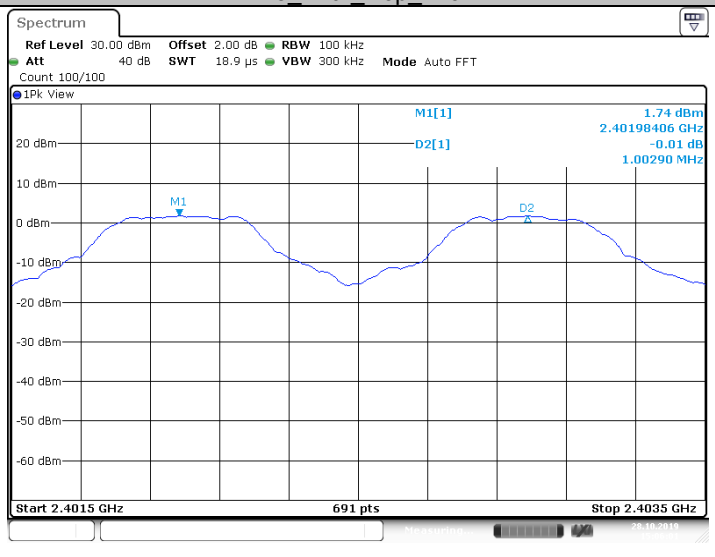
Test Result

TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop_2402	1.003	>=0.738	PASS
		Hop_2441	1.061	>=0.738	PASS
		Hop_2480	1.009	>=0.738	PASS
2DH5	Ant1	Hop_2402	1	>=0.880	PASS
		Hop_2441	0.986	>=0.880	PASS
		Hop_2480	1.165	>=0.880	PASS
3DH5	Ant1	Hop_2402	1.026	>=0.896	PASS
		Hop_2441	1.157	>=0.896	PASS
		Hop_2480	1.162	>=0.896	PASS

Note: Spectrum analyzer compensation: offset = attenuator + line loss

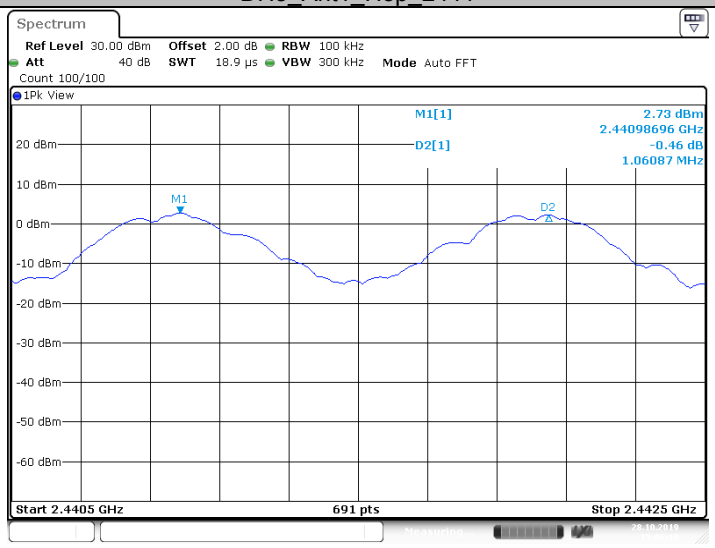
Test Graphs

DH5_Ant1_Hop_2402



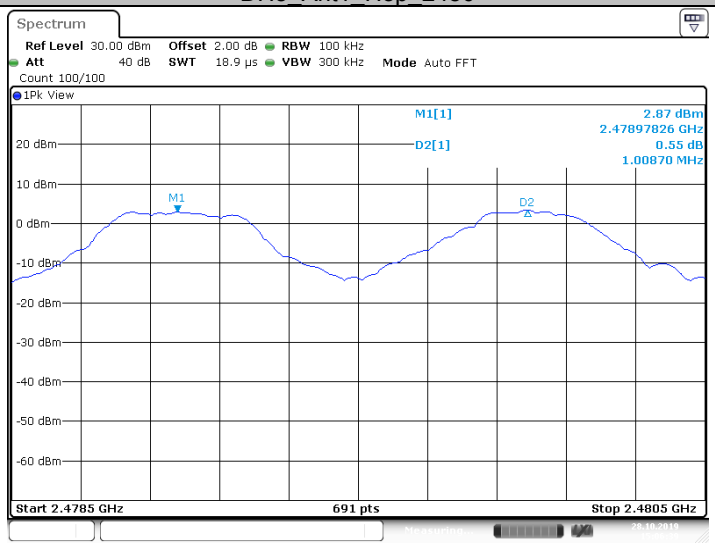
Date: 28.OCT.2019 15:06:01

DH5_Ant1_Hop_2441



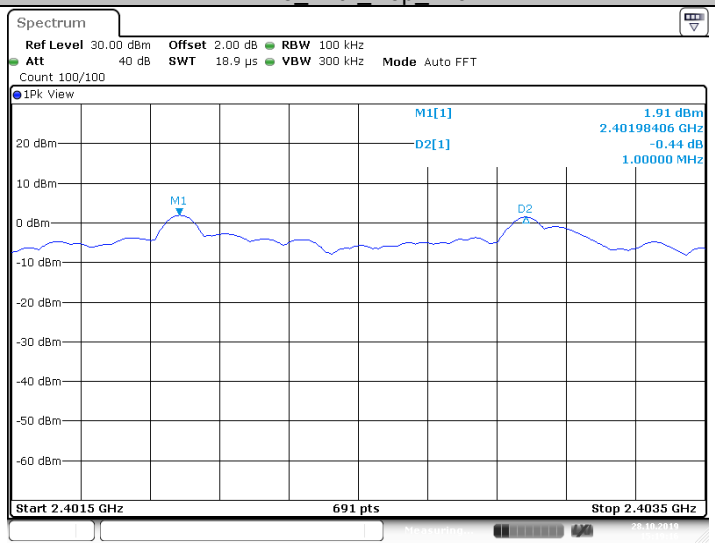
Date: 28.OCT.2019 15:06:19

DH5_Ant1_Hop_2480

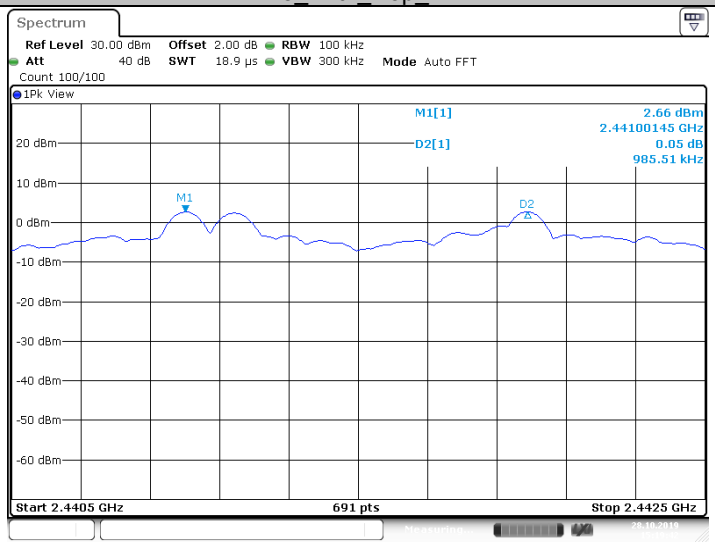


Date: 28.OCT.2019 15:06:39

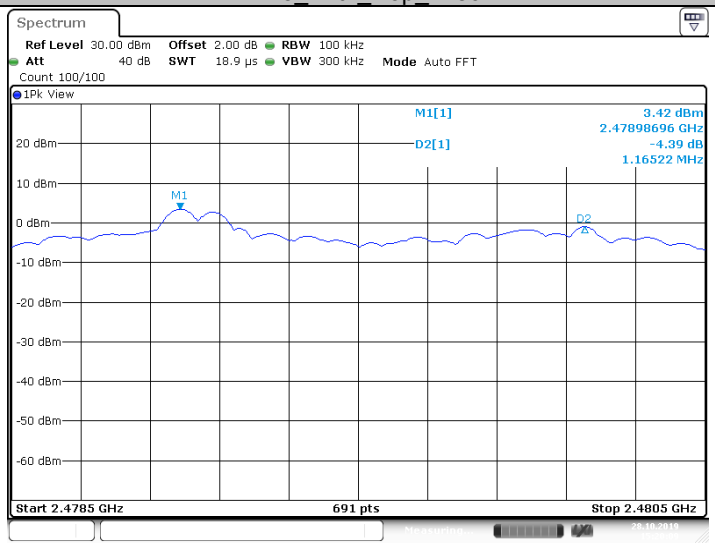
2DH5_Ant1_Hop_2402



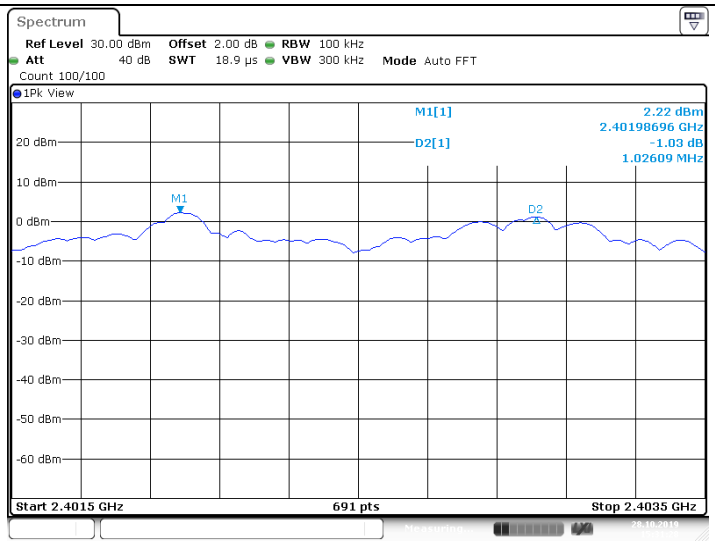
2DH5_Ant1_Hop_2441



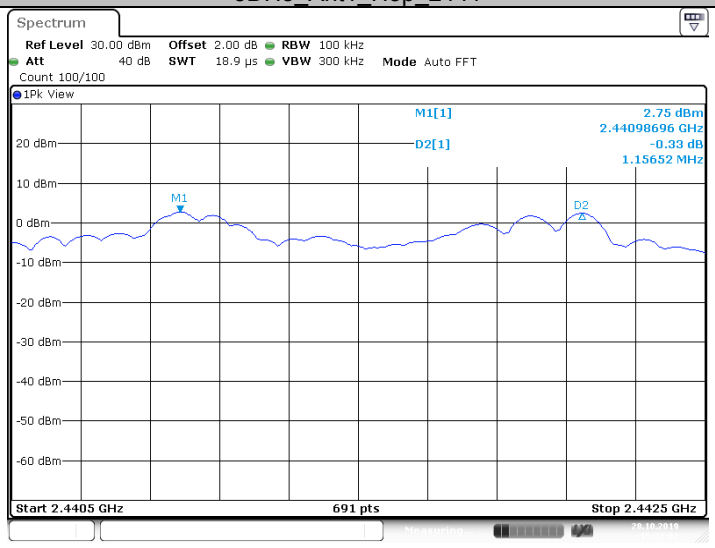
2DH5_Ant1_Hop_2480



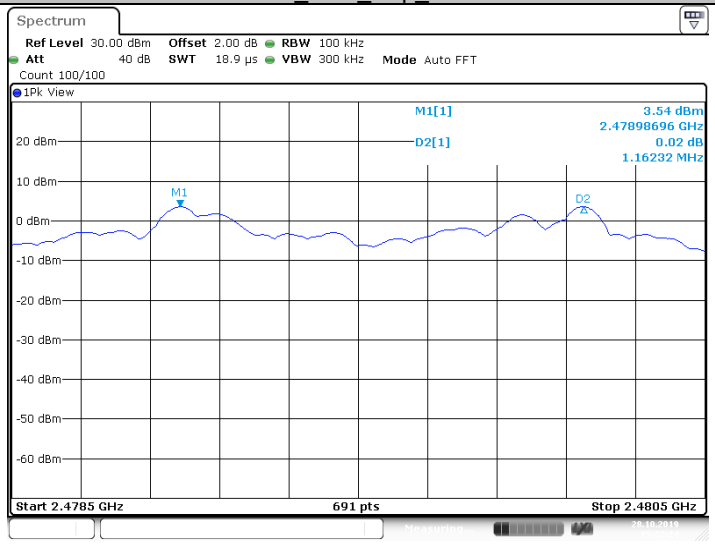
3DH5_Ant1_Hop_2402



3DH5_Ant1_Hop_2441



3DH5_Ant1_Hop_2480

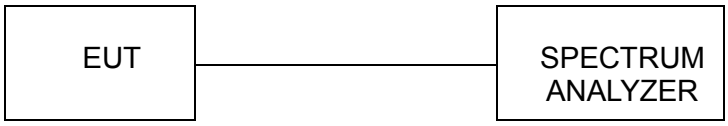


8. Number of Hopping Channel

Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW□RBW, Sweep time= Auto.

Test Mode

Please refer to the clause 3.4

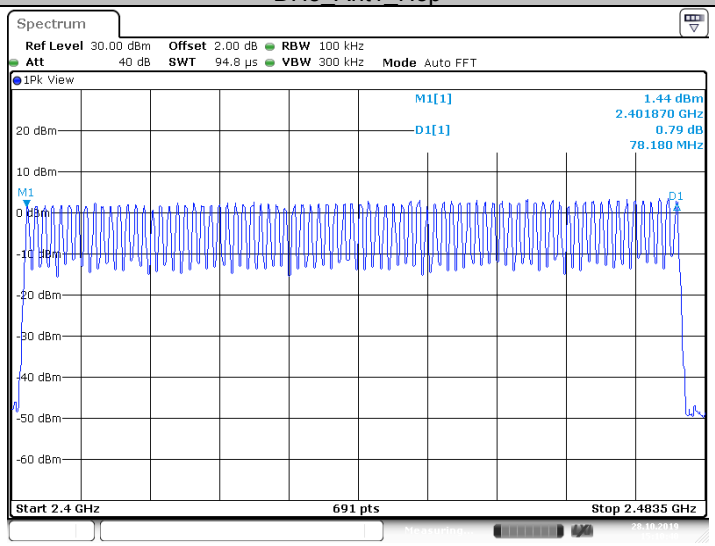
Test Result

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	>=15	PASS
2DH5	Ant1	Hop	79	>=15	PASS
3DH5	Ant1	Hop	79	>=15	PASS

Note: Spectrum analyzer compensation: offset = attenuator + line loss

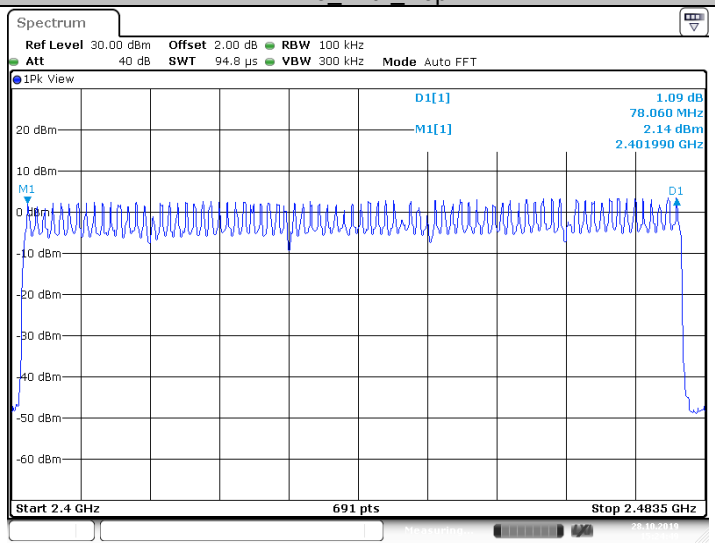
Test Graphs

DH5_Ant1_Hop



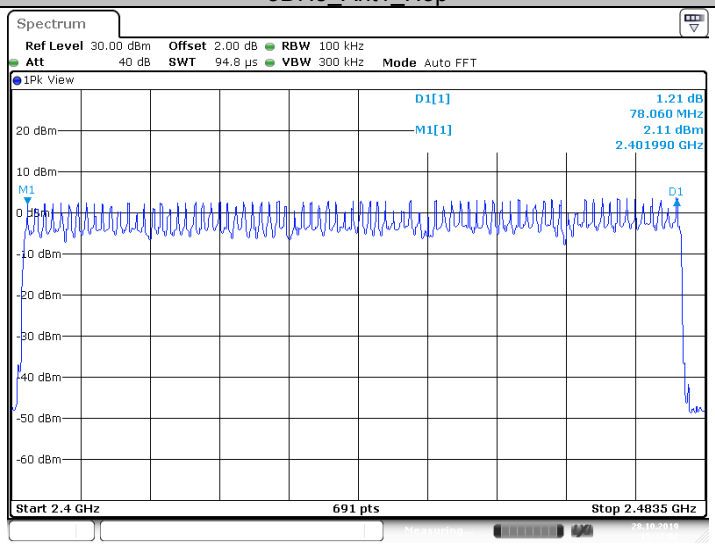
Date: 28.OCT.2019 15:10:39

2DH5_Ant1_Hop



Date: 28.OCT.2019 15:24:49

3DH5_Ant1_Hop



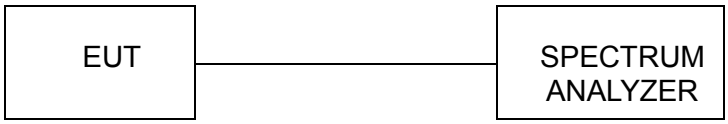
Date: 28.OCT.2019 15:37:02

9. Dwell Time

Limit

Section	Test Item	Limit
15.247(a)(1)/ RSS-210 Annex 8(A8.1d)	Average Time of Occupancy	0.4 sec

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Spectrum Setting: RBW=1MHz, VBW□RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

Test Mode

Please refer to the clause 2.2

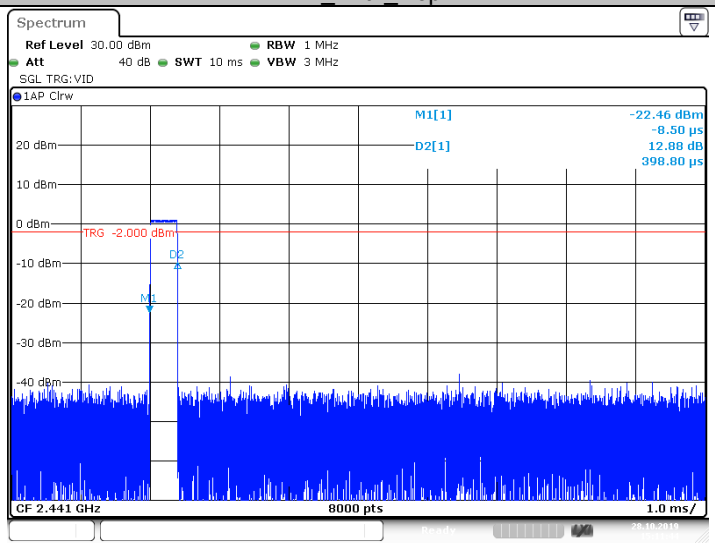
Test Result

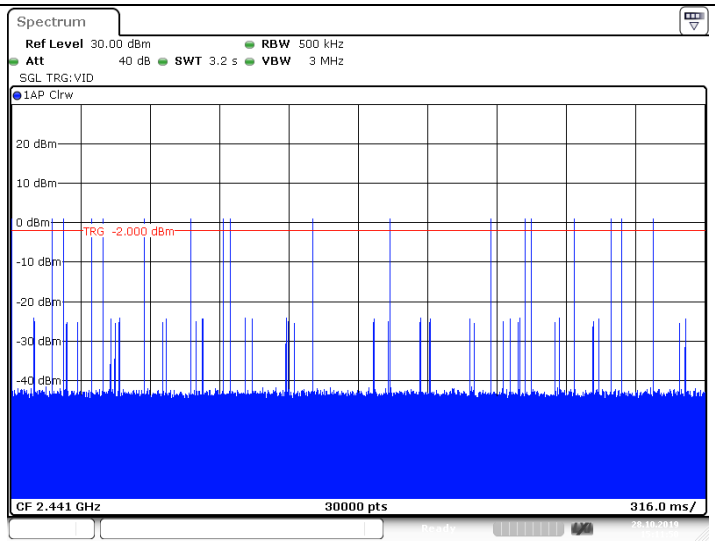
TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.40	180	0.072	<=0.4	PASS
DH3	Ant1	Hop	1.65	150	0.247	<=0.4	PASS
DH5	Ant1	Hop	2.90	70	0.203	<=0.4	PASS
2DH1	Ant1	Hop	0.41	190	0.077	<=0.4	PASS
2DH3	Ant1	Hop	1.65	150	0.248	<=0.4	PASS
2DH5	Ant1	Hop	2.90	100	0.29	<=0.4	PASS
3DH1	Ant1	Hop	0.41	160	0.065	<=0.4	PASS
3DH3	Ant1	Hop	1.65	120	0.198	<=0.4	PASS
3DH5	Ant1	Hop	2.90	100	0.29	<=0.4	PASS

Note: Spectrum analyzer compensation: offset = attenuator + line loss

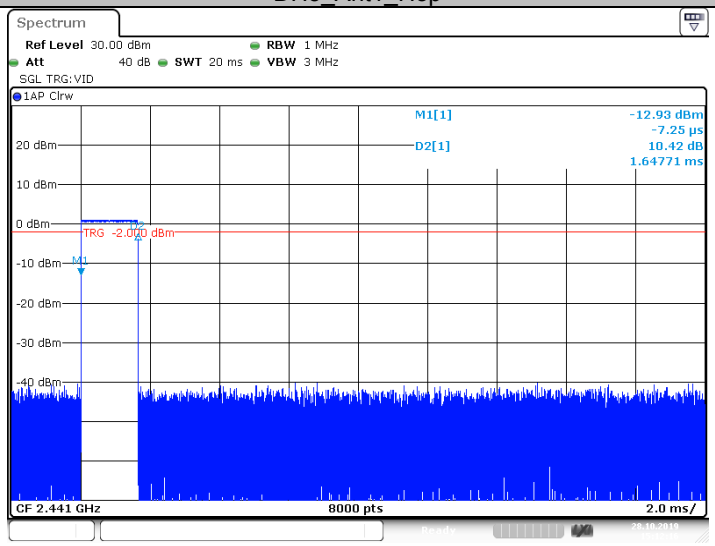
Test Graphs

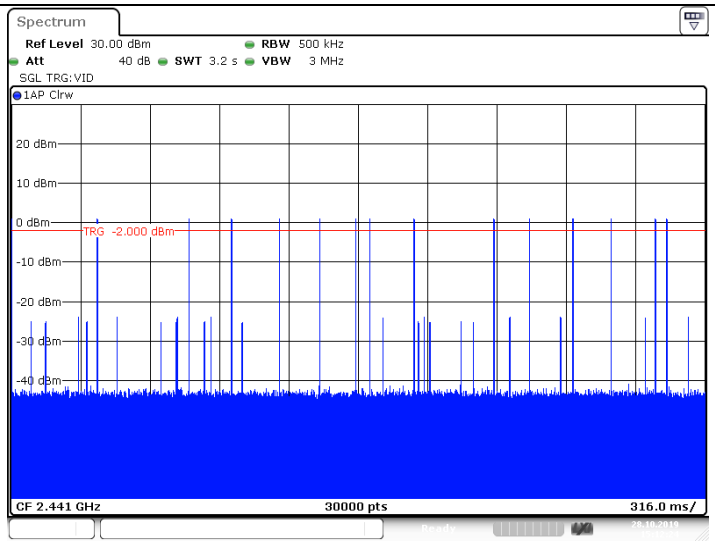
DH1_Ant1_Hop



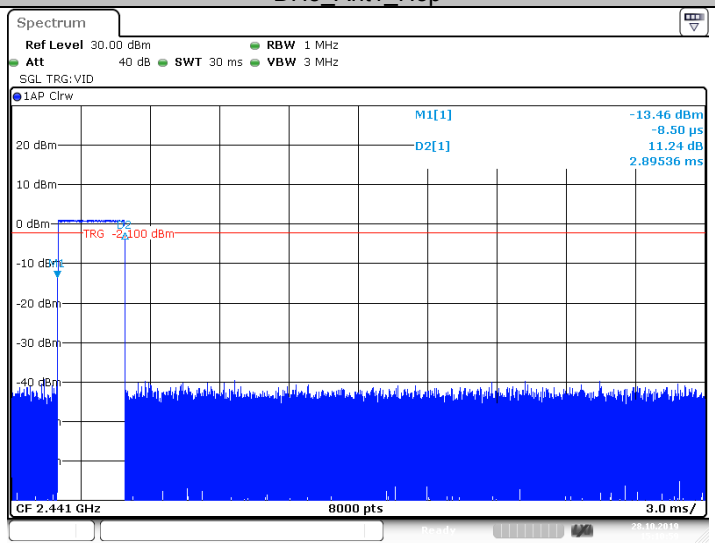


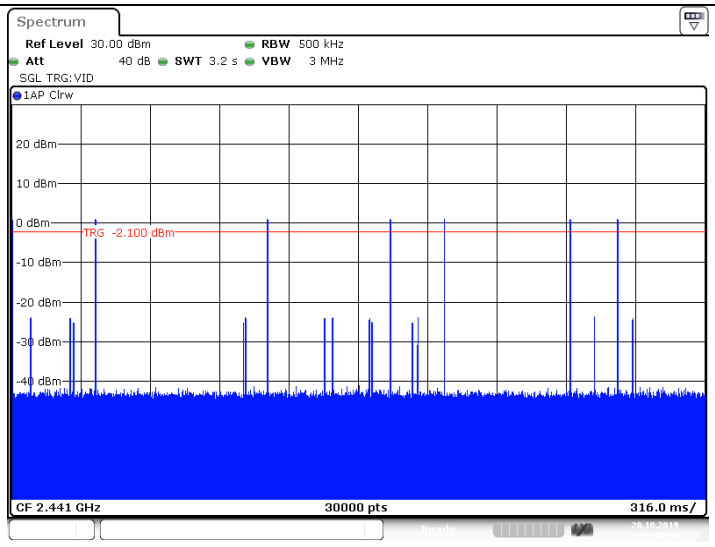
DH3_Ant1_Hop



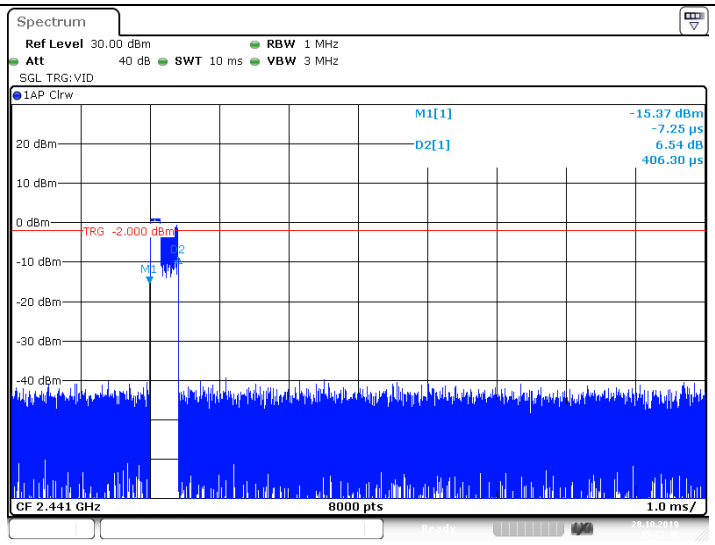


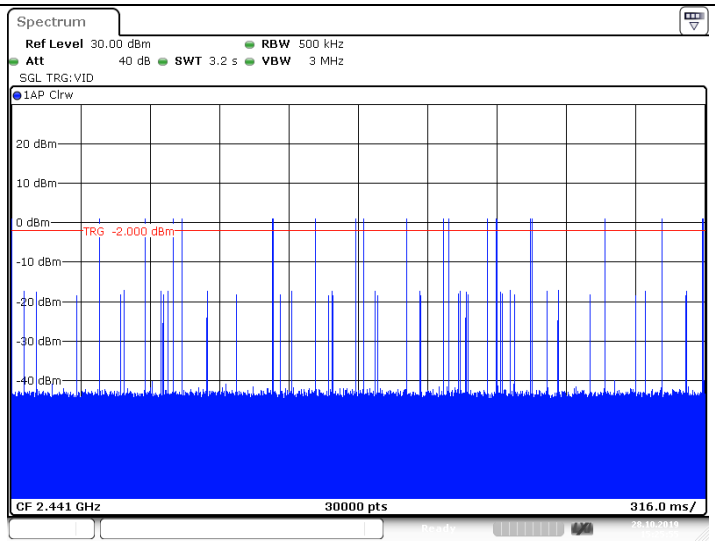
DH5_Ant1_Hop



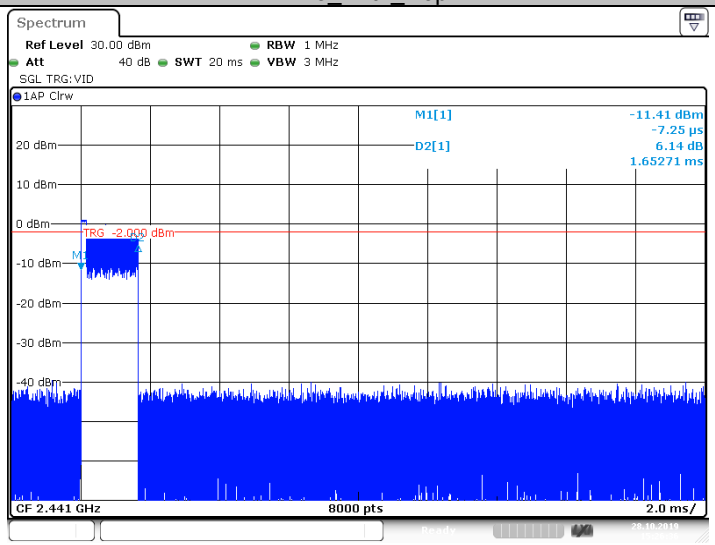


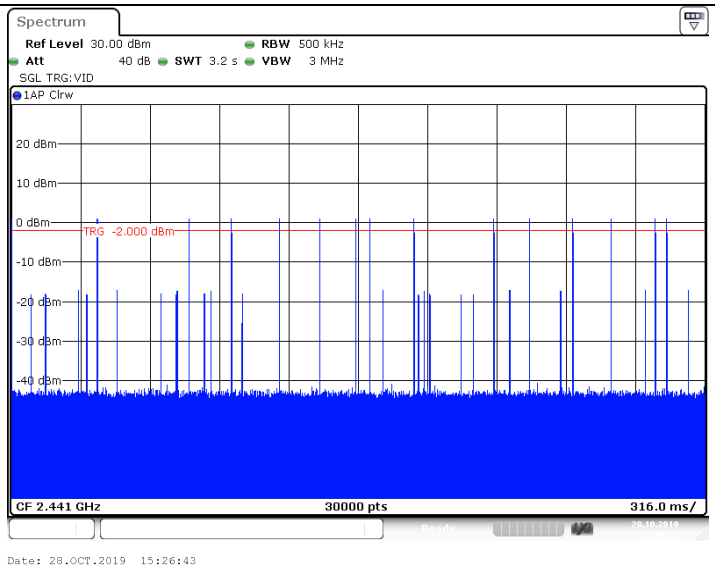
2DH1_Ant1_Hop



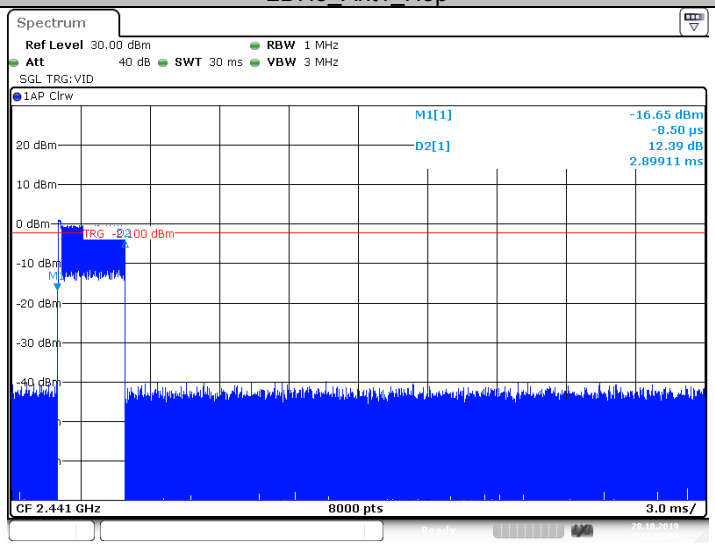


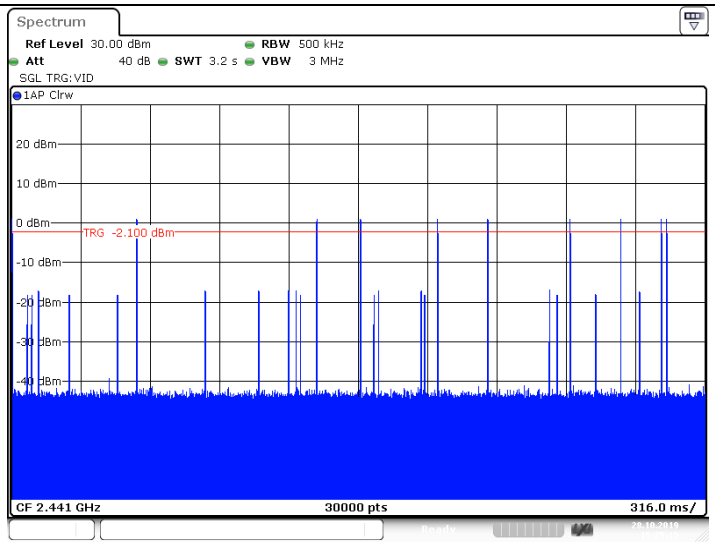
2DH3_Ant1_Hop



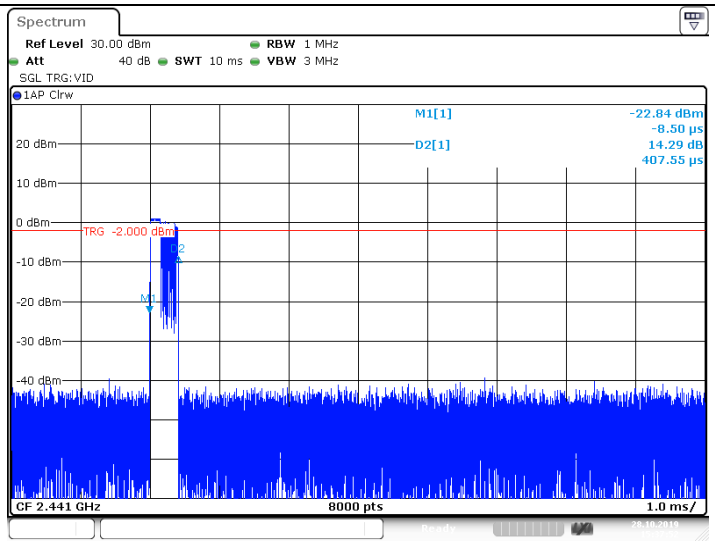


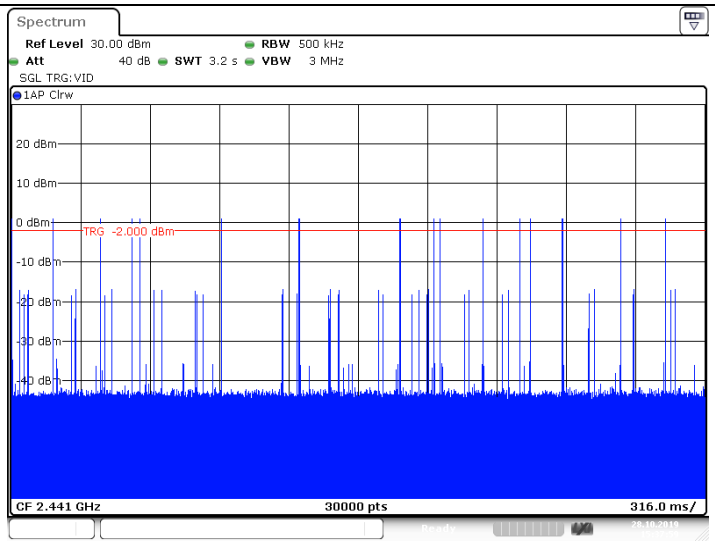
2DH5_Ant1_Hop



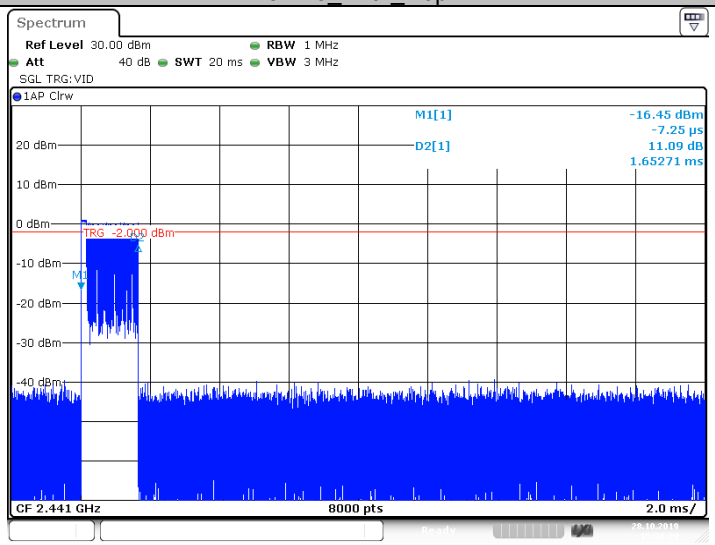


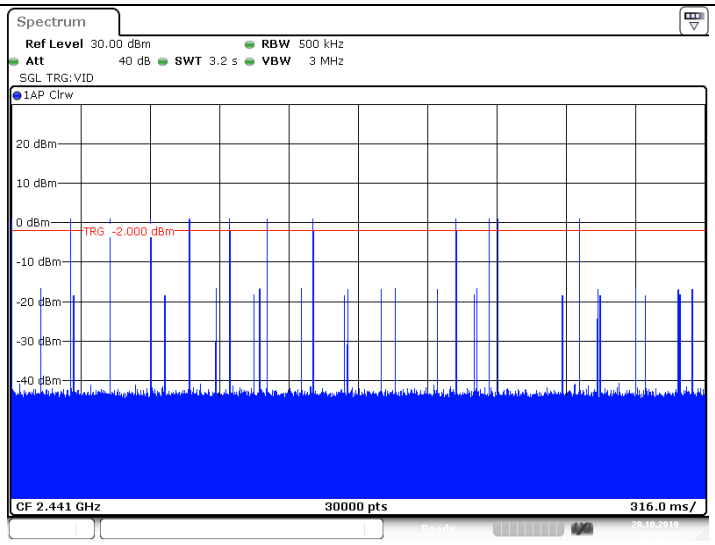
3DH1_Ant1_Hop



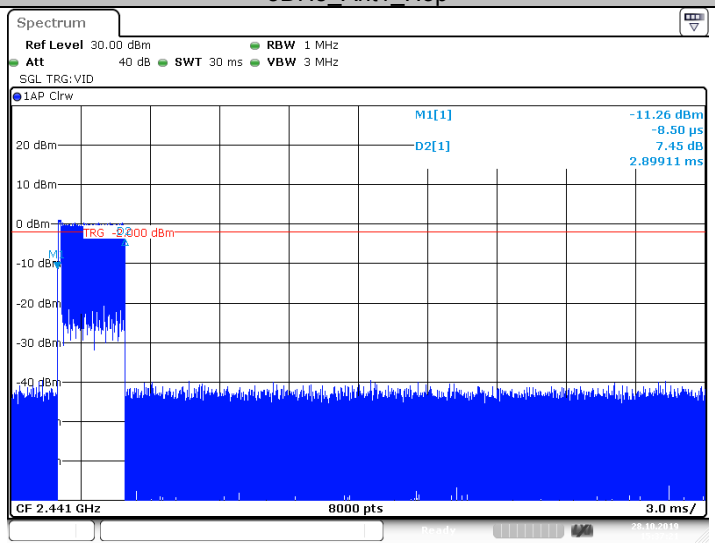


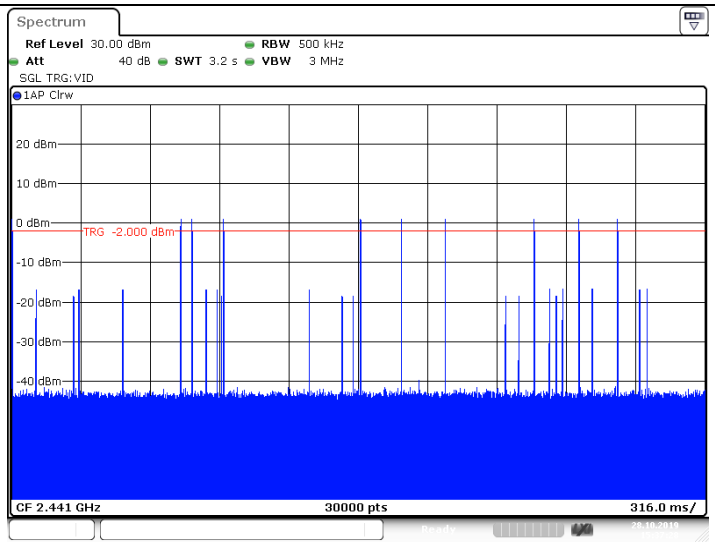
3DH3_Ant1_Hop





3DH5_Ant1_Hop



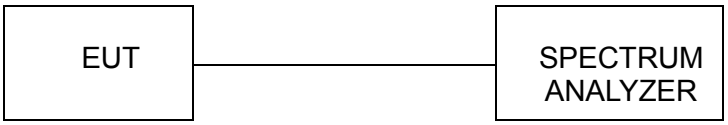


10. Peak Output Power

Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz.
   RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

Test Mode

Please refer to the clause 2.2

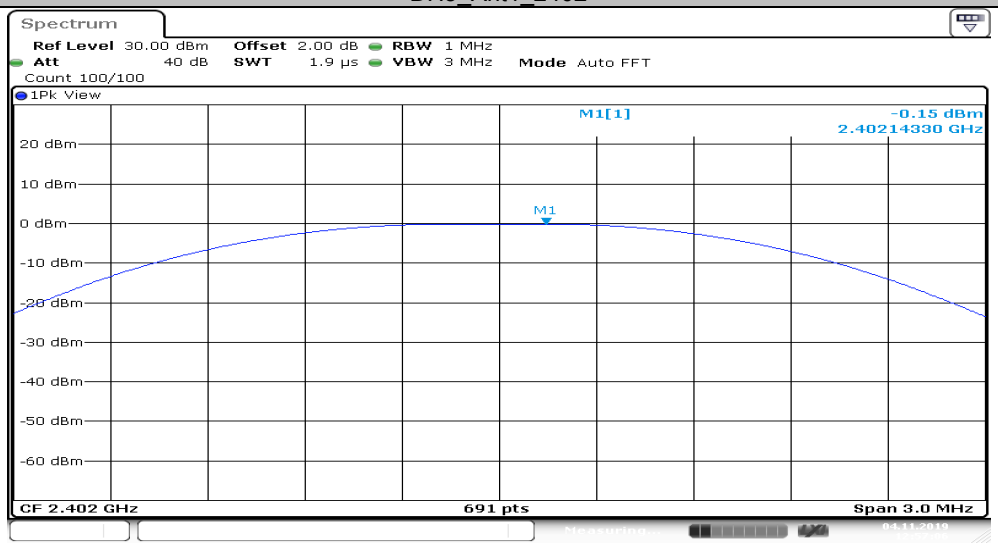
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	-0.15	<=20.97	PASS
		2441	0.59	<=20.97	PASS
		2480	1.5	<=20.97	PASS
2DH5	Ant1	2402	-0.2	<=20.97	PASS
		2441	0.54	<=20.97	PASS
		2480	1.56	<=20.97	PASS
3DH5	Ant1	2402	-0.21	<=20.97	PASS
		2441	0.6	<=20.97	PASS
		2480	1.52	<=20.97	PASS

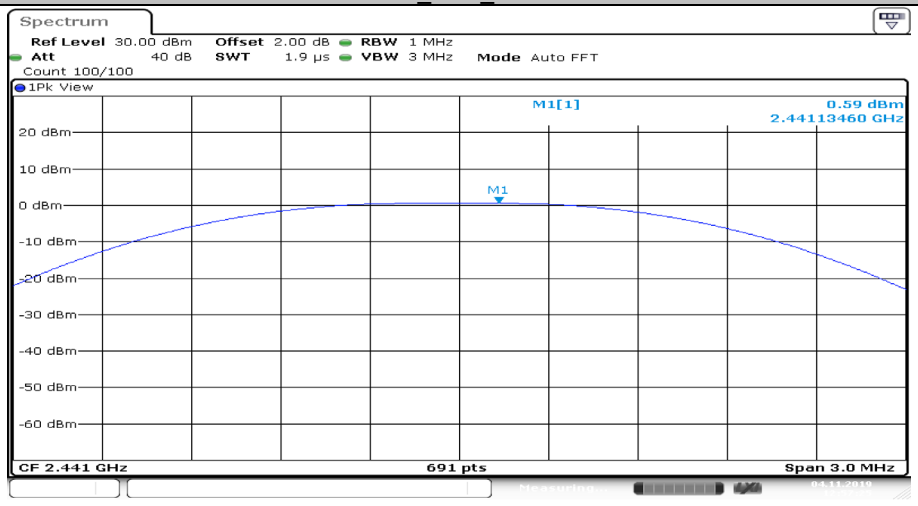
Note: Spectrum analyzer compensation: offset = attenuator + line loss

Test Graphs

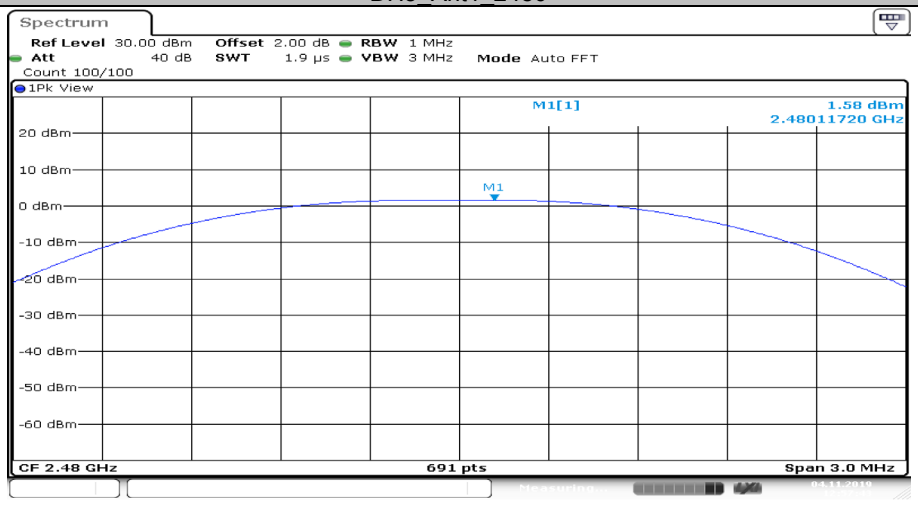
DH5_Ant1_2402



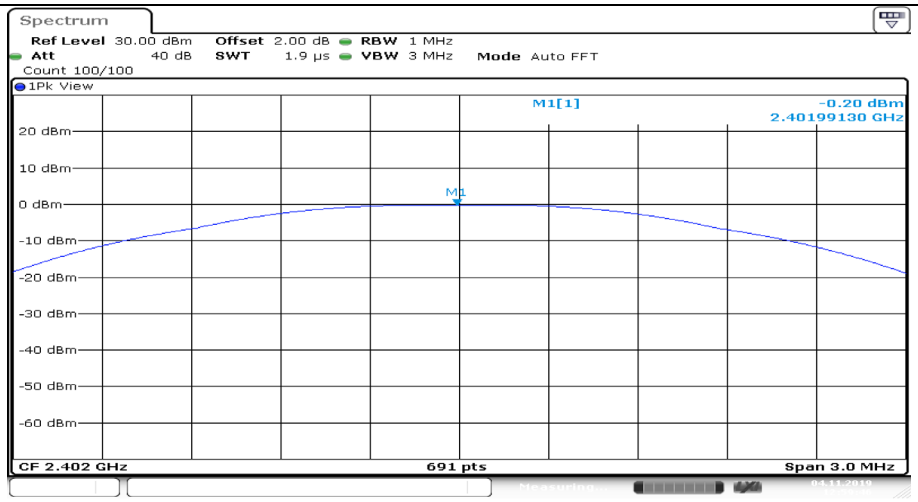
DH5_Ant1_2441



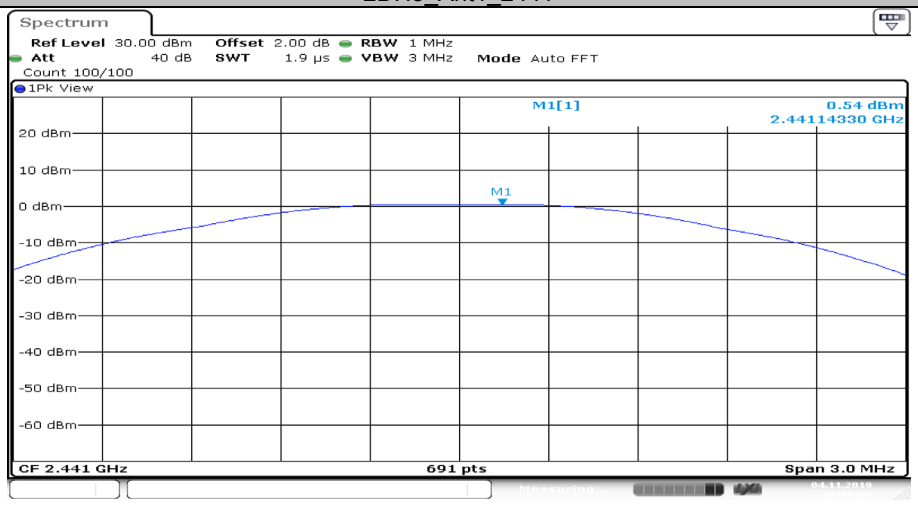
DH5_Ant1_2480



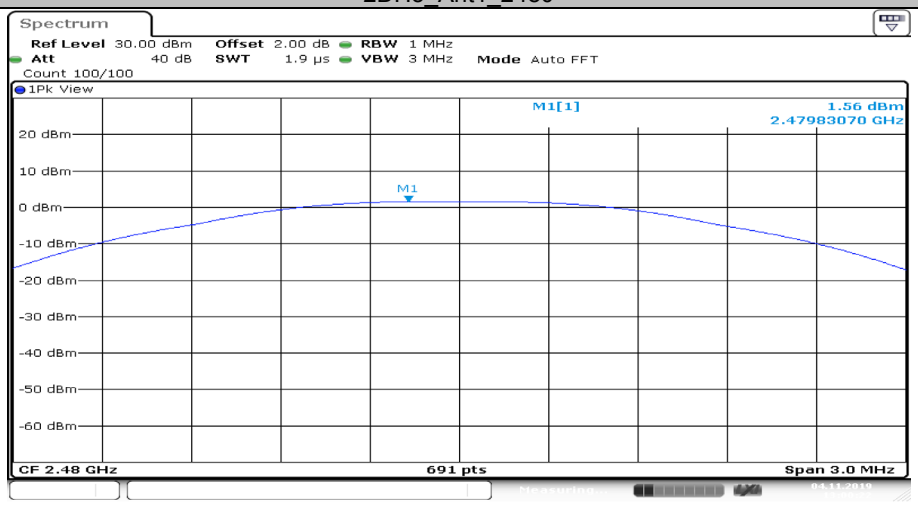
2DH5_Ant1_2402



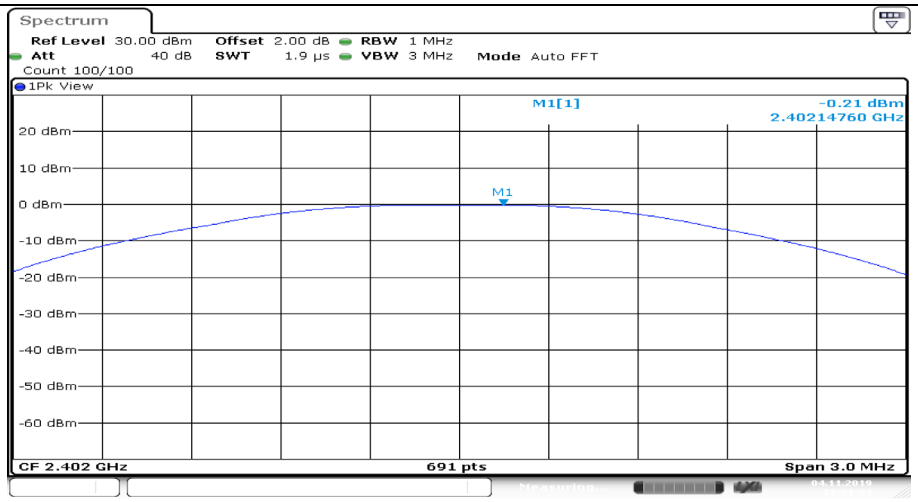
2DH5_Ant1_2441



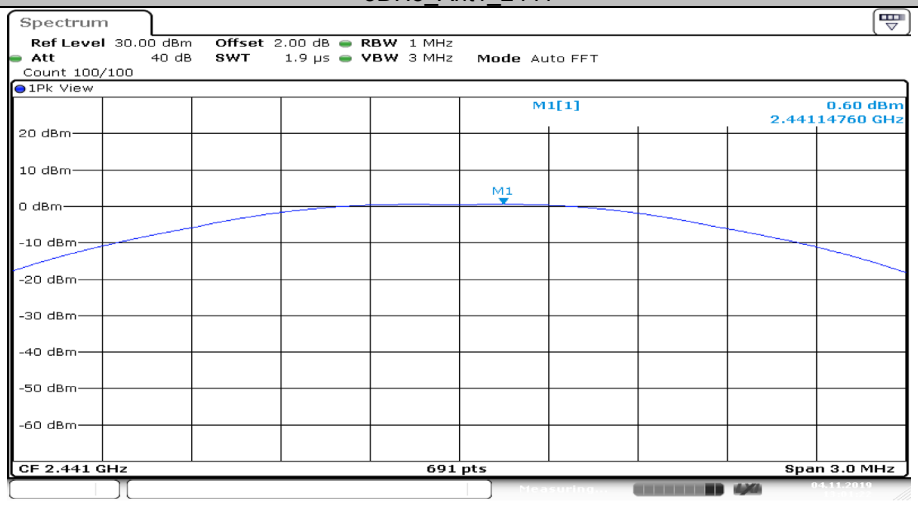
2DH5_Ant1_2480



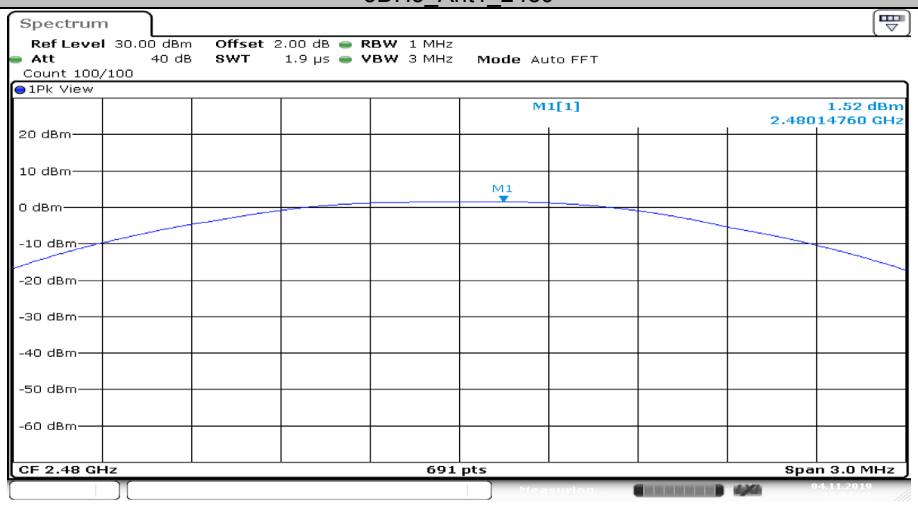
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



11. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The EUT's antenna is soldered to the PCB. The gain of the antenna is 1.5dBi. Meet the standards.

Please reference to the annex: Internal Photographs

12. EUT TEST PHOTOS

Please refer to: Test Photo

13. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Please refer to: External Photographs and Internal Photographs.

**********THE END**********