

FCC - TEST REPORT

Report Number : **68.950.19.0506.01** Date of Issue: May 13, 2019

Model : **SPCC1**

Product Type : Camera

Applicant : GoPro, Inc.

Address : 3000 Clearview Way, San Mateo, CA 94402, USA

Production Facility : GoPro, Inc.

Address : 3000 Clearview Way, San Mateo, CA 94402, USA

Test Result : **n Positive o Negative**

Total pages including Appendices : **55**

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1 Table of Contents

1	Table of Contents	2
2	Details about the Test Laboratory	3
3	Description of the Equipment under Test	4
4	Summary of Test Standards	5
5	Summary of Test Results.....	6
6	General Remarks	7
7	Test Setups	8
8	Systems test configuration	9
9	Technical Requirement.....	10
9.1	Conducted Emission	10
9.2	Conducted peak output power & EIRP	13
9.3	6dB bandwidth	15
9.4	99% bandwidth	21
	Test Graphs	22
9.5	Power spectral density	27
9.5.1	Test Graphs	28
9.6	Spurious RF conducted emissions	33
9.7	Band edge	47
9.8	Spurious radiated emissions for transmitter	51
10	Test Equipment List	54
11	System Measurement Uncertainty	55



2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: CN5009

FCC Registration No.: 514049

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3 Description of the Equipment under Test

Product:	Camera
Model no.:	SPCC1
FCC ID:	CNFSPCC1
Rating:	3.85VDC
RF Transmission Frequency:	2412MHz-2462MHz for 802.11b/g/n HT20 2422MHz-2452MHz for 802.11n HT40
No. of Operated Channel:	11
Modulation:	802.11b: BPSK, QPSK, CCK, 802.11g/802.11n HT20/40: BPSK, QPSK, 16-QAM, 64-QAM
Antenna Type:	Internal Integrated Metal antenna
Antenna Gain:	0.1dBi max for 2.4GHz
Description of the EUT:	The Equipment Under Test (EUT) is a Camera supports 2.4GHz Bluetooth/WIFI, 5GHz WIFI functions.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2018Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Result	Test Site
§15.207	Conducted emission AC power port	10	Pass	Site 1
§15.247(b)(1)	Conducted AV output power for FHSS	--	N/A	--
§15.247(b)(3)	Conducted peak output power & EIRP	13	Pass	Site 1
§15.247(e)	Power spectral density	27	Pass	Site 1
§15.247(a)(2)	6dB bandwidth	15	Pass	Site 1
§15.247(a)(1)	20dB Occupied bandwidth	--	N/A	--
--	99% Occupied Bandwidth	21	Pass	Site 1
§15.247(a)(1)	Carrier frequency separation	--	N/A	--
§15.247(a)(1)(iii)	Number of hopping frequencies	--	N/A	--
§15.247(a)(1)(iii)	Dwell Time	--	N/A	--
§15.247(d)	Spurious RF conducted emissions	33	Pass	Site 1
§15.247(d)	Band edge	47	Pass	Site 1
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	51	Pass	Site 1
§15.203	Antenna requirement	See note 2	Pass	--

Note 1: N/A – Not Applicable.

Note 2: The EUT uses an internal antenna, which gain is 0.1dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: CNFSPCC1, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15 rules.

The Model: SPCC1 supports Bluetooth Low Energy/WIFI/GPS & Galileo receiving functions, power by 3.85Vdc, 1600mAh supplied by an rechargeable Lithium Ion Battery or 5Vdc supplied by USB type C port.

The TX and RX range is 2402MHz-2480MHz for Bluetooth, 2412MHz – 2462MHz for 2.4GHzWIFI, 5180MHz – 5320MHz, 5500MHz – 5700MHz, 5745MHz – 5825MHz for 5GHzWIFI, 1575.42MHz for GNSS (only GPS and Galileo) Receiver; supported highest resolutions: 5.6K.

This report is for the WIFI 2.4GHz part.

SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: April 30, 2019

Testing Start Date: April 30, 2019

Testing End Date: May 10, 2019

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:



John Zhi
EMC Project Manager



Joe Gu
EMC Project Engineer

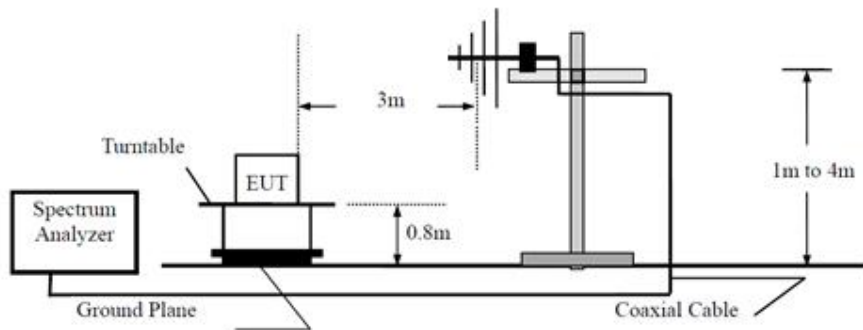


Tree Zhan
EMC Test Engineer

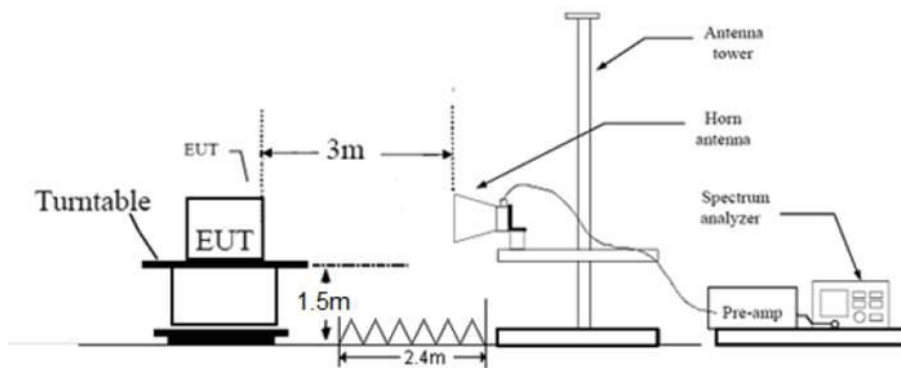
7 Test Setups

7.1 Radiated test setups

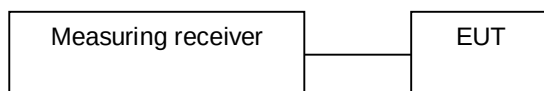
Below 1GHz



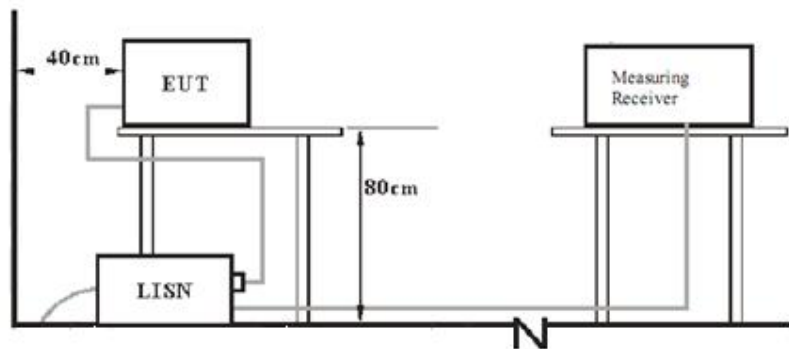
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Laptop	Lenovo	T460S	---
USB Type C cable	GoPro	0.55m (Length)	---
AC Adapter	Apple	A1401	---

Test software information:

Test Software Version	QRCT (V3.0-00230) from QUALCOMM	
Modulation	Setting TX Power	Data Rate
802.11b	16	11b LONG 1 Mbps
802.11g	18	11g 6 Mbps
802.11n HT20	18	MCS0 6.5 Mbps
802.11n HT40	19	MCS0 13.5 Mbps (40MHz)

Test Channel information:

Test Mode	Channel (MHz)		
802.11b	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11g	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11n HT20	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11n HT40	CH 3: 2422MHz	CH 6: 2437MHz	CH 9: 2452MHz

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively

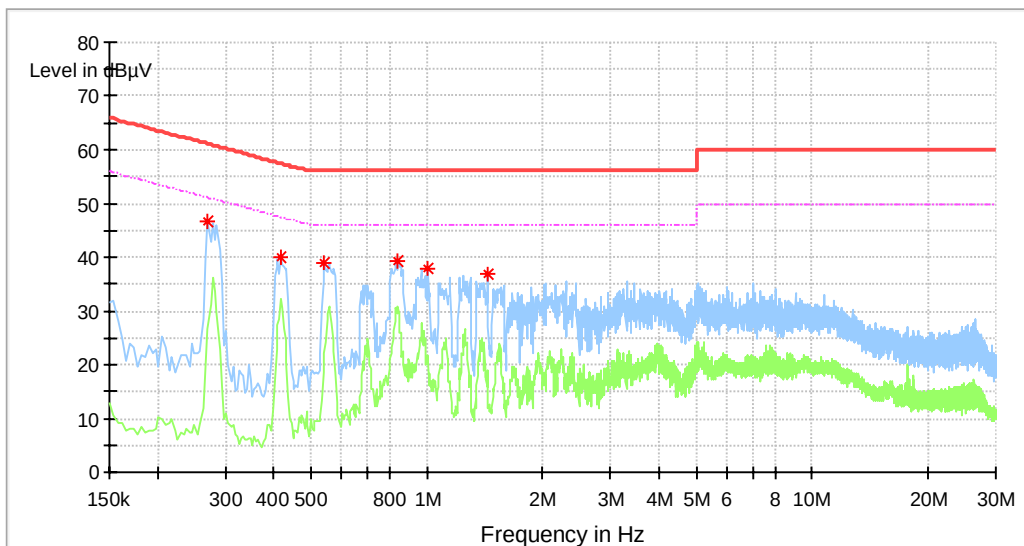
Limit According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : Camera
 M/N : SPCC1
 Operating Condition : Charging + TX
 Test Specification : Power Line, Live
 Comment : AC 120V/60Hz (External adapter)



Frequency (MHz)	MaxPeak* (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. ** (dB)
0.270000	46.74	---	61.12	14.38	L1	10.2
0.418000	40.09	---	57.49	17.40	L1	10.3
0.542000	38.99	---	56.00	17.01	L1	10.3
0.842000	39.37	---	56.00	16.63	L1	10.3
1.006000	37.85	---	56.00	18.15	L1	10.3
1.438000	36.82	---	56.00	19.18	L1	10.3

Remark :

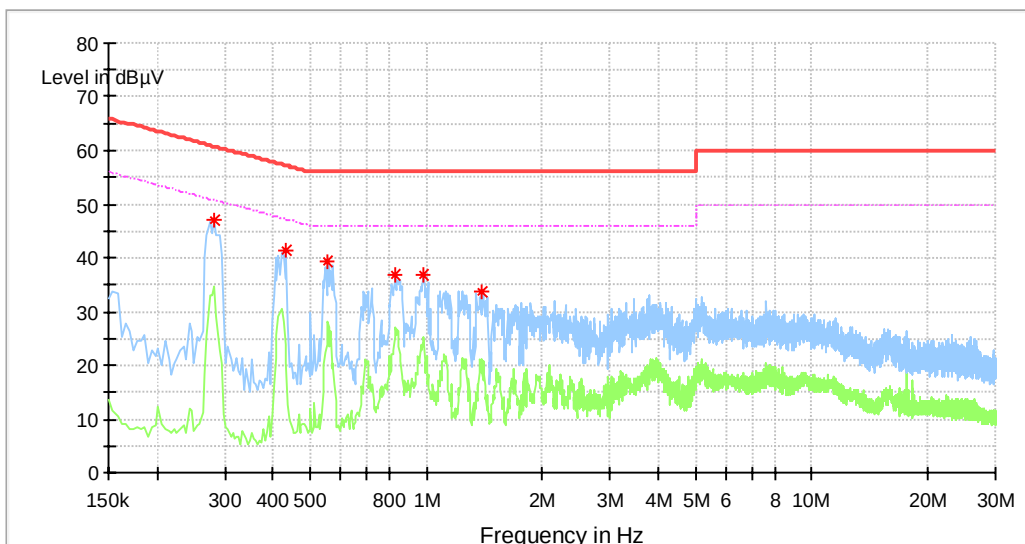
*Level=Reading Level + Correction Factor

**Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Product Type : Camera
 M/N : SPCC1
 Operating Condition : Charging + TX
 Test Specification : Power Line, Neutral
 Comment : AC 120V/60Hz (External adapter)



Frequency (MHz)	MaxPeak* (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. ** (dB)
0.282000	46.90	---	60.76	13.86	N	10.2
0.434000	41.42	---	57.18	15.76	N	10.3
0.554000	39.25	---	56.00	16.75	N	10.3
0.830000	36.74	---	56.00	19.26	N	10.3
0.986000	36.76	---	56.00	19.24	N	10.3
1.394000	33.78	---	56.00	22.22	N	10.3

Remark :

*Level=Reading Level + Correction Factor

**Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

9.2 Conducted peak output power & EIRP

Test Method

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following test receiver settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW > the 20dB bandwidth of the emission being measured, VBW ≥ RBW,
Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power and record the results in the test report.
5. Repeat above procedures until all frequencies measured were complete.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

802.11b SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	17.4	Pass
Middle channel 2437MHz	17.7	Pass
High channel 2462MHz	17.7	Pass

802.11g SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	18.5	Pass
Middle channel 2437MHz	18.8	Pass
High channel 2462MHz	18.7	Pass

802.11n20_SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	18.2	Pass
Middle channel 2437MHz	18.6	Pass
High channel 2462MHz	18.4	Pass

802.11n40_SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	19.4	Pass
Middle channel 2437MHz	19.4	Pass
High channel 2462MHz	19.5	Pass

9.3 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq$ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

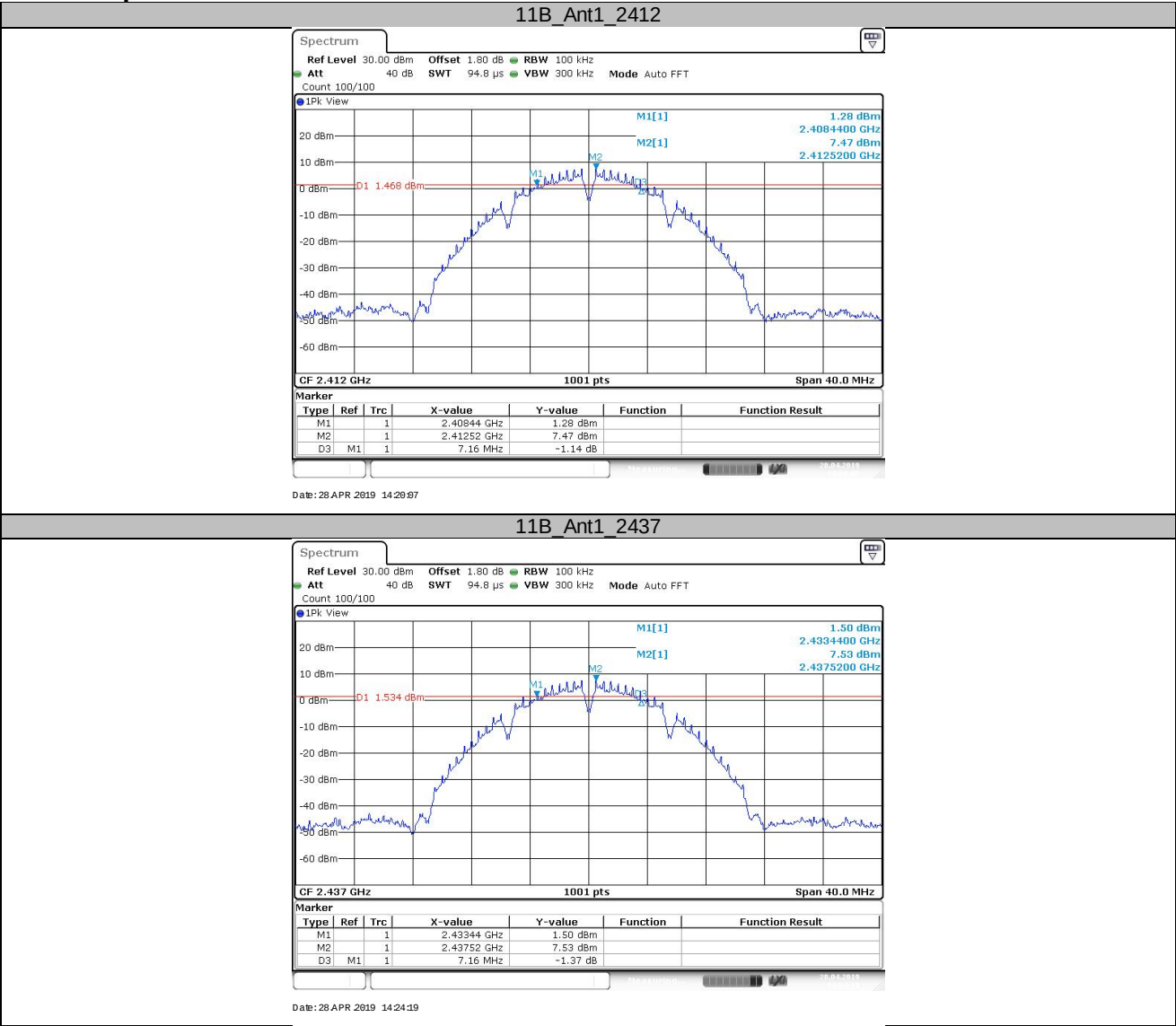
≥ 500

Test result

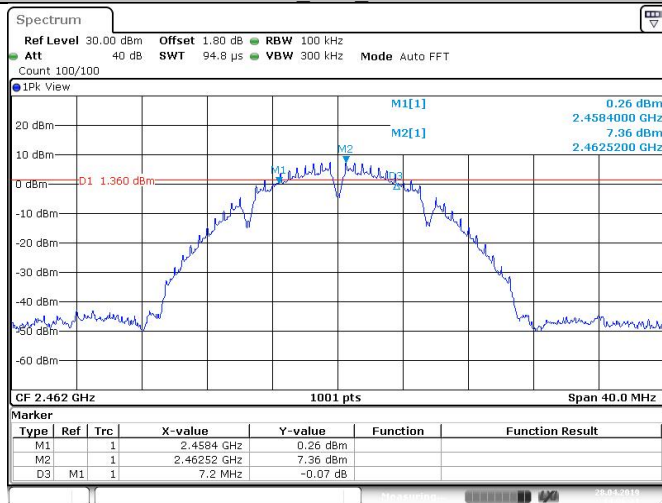
TestMode	Channel	DTS BW [MHz]	Limit [MHz]	Verdict
11B	2412	7.160	≥ 500	PASS
	2437	7.160	≥ 500	PASS
	2462	7.200	≥ 500	PASS
11G	2412	15.200	≥ 500	PASS
	2437	15.200	≥ 500	PASS
	2462	15.200	≥ 500	PASS
11N20SISO	2412	15.200	≥ 500	PASS
	2437	15.200	≥ 500	PASS
	2462	15.200	≥ 500	PASS
11N40SISO	2422	35.280	≥ 500	PASS
	2437	35.280	≥ 500	PASS
	2452	35.280	≥ 500	PASS



Test Graphs

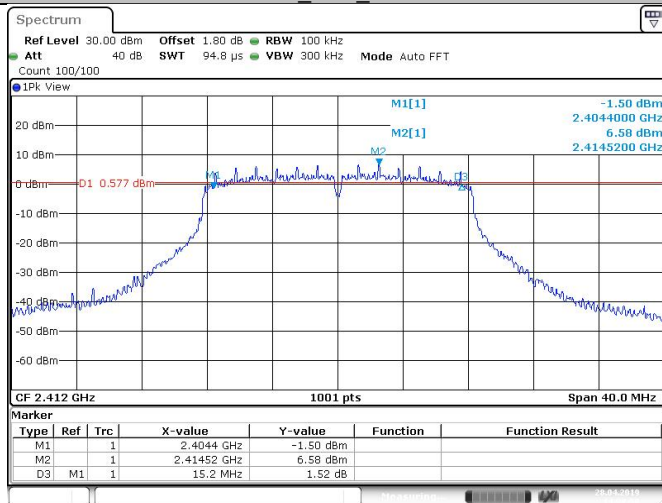


11B_Ant1_2462



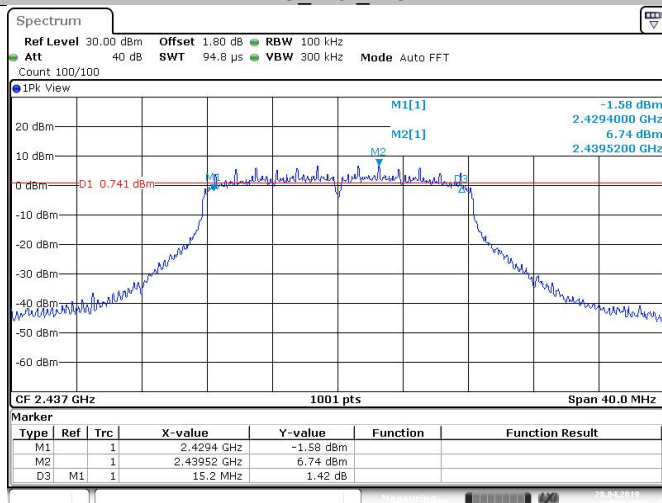
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11G_Ant1_2412



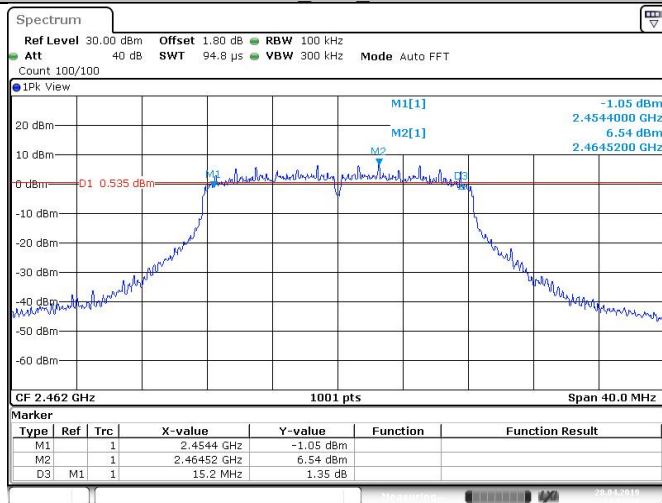
Date: 28 APR 2019 14:28:58

11G_Ant1_2437



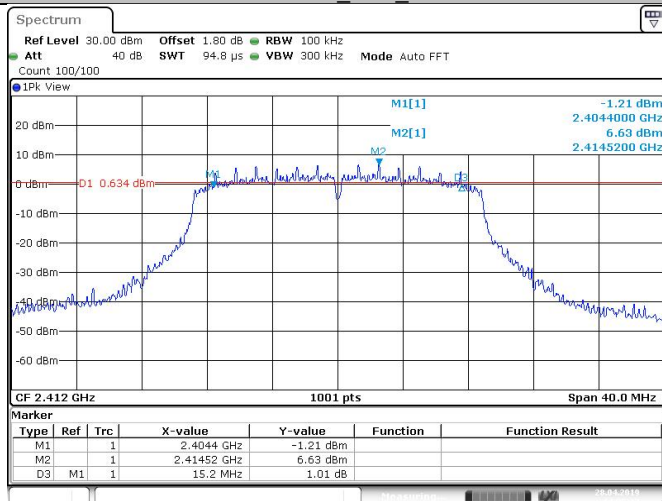
Date: 28 APR 2019 14:31:54

11G_Ant1_2462



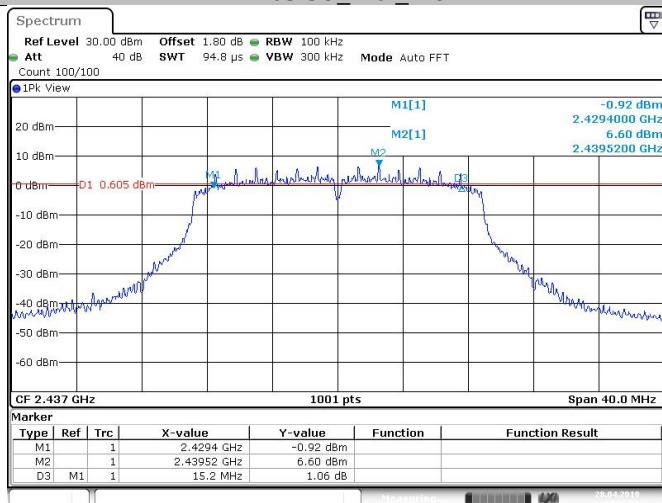
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11N20SISO_Ant1_2412



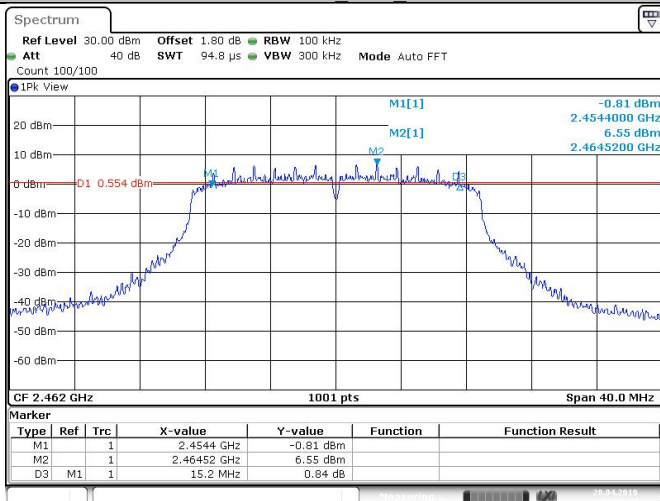
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11N20SISO_Ant1_2437



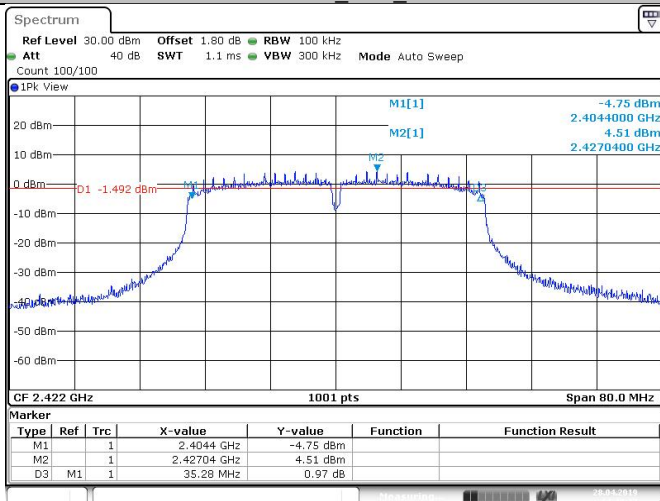
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11N20SISO_Ant1_2462



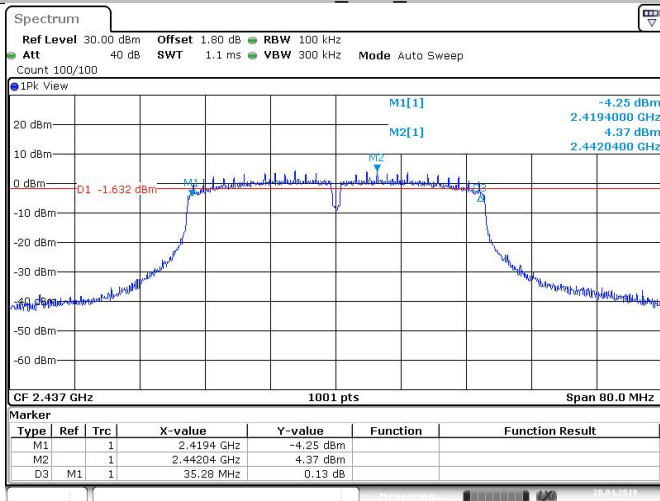
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11N40SISO_Ant1_2422

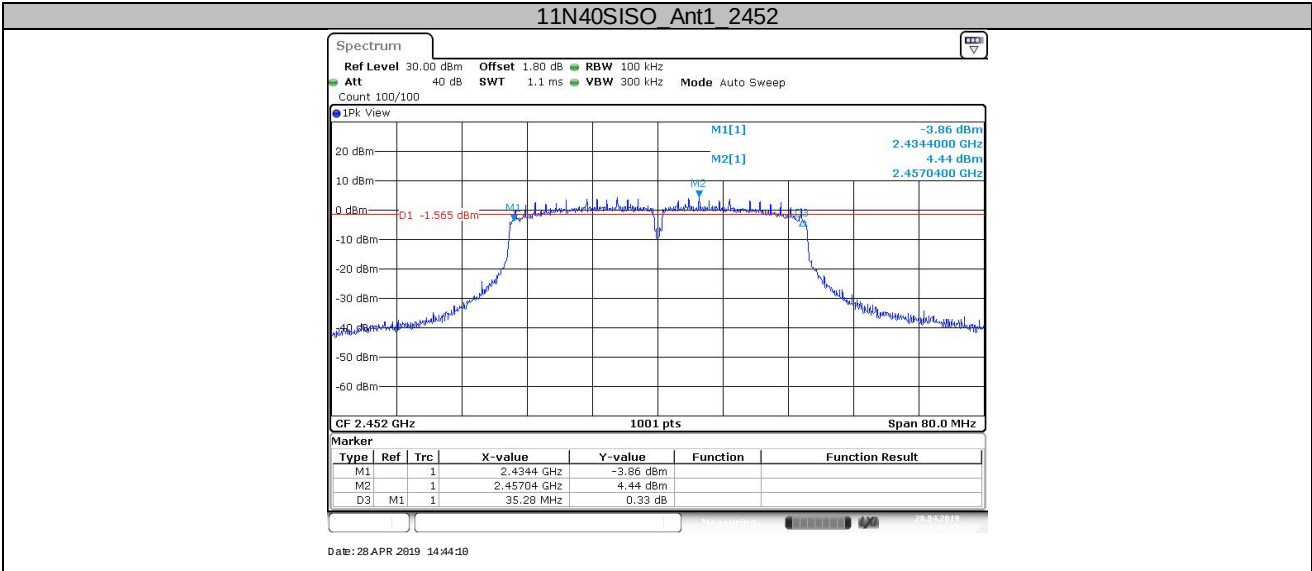


Date: 28 APR 2019 14:40:47

11N40SISO_Ant1_2437



Date: 28 APR 2019 14:42:38



9.4 99% bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW $\geq$ 3RBW, Sweep = auto,
Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

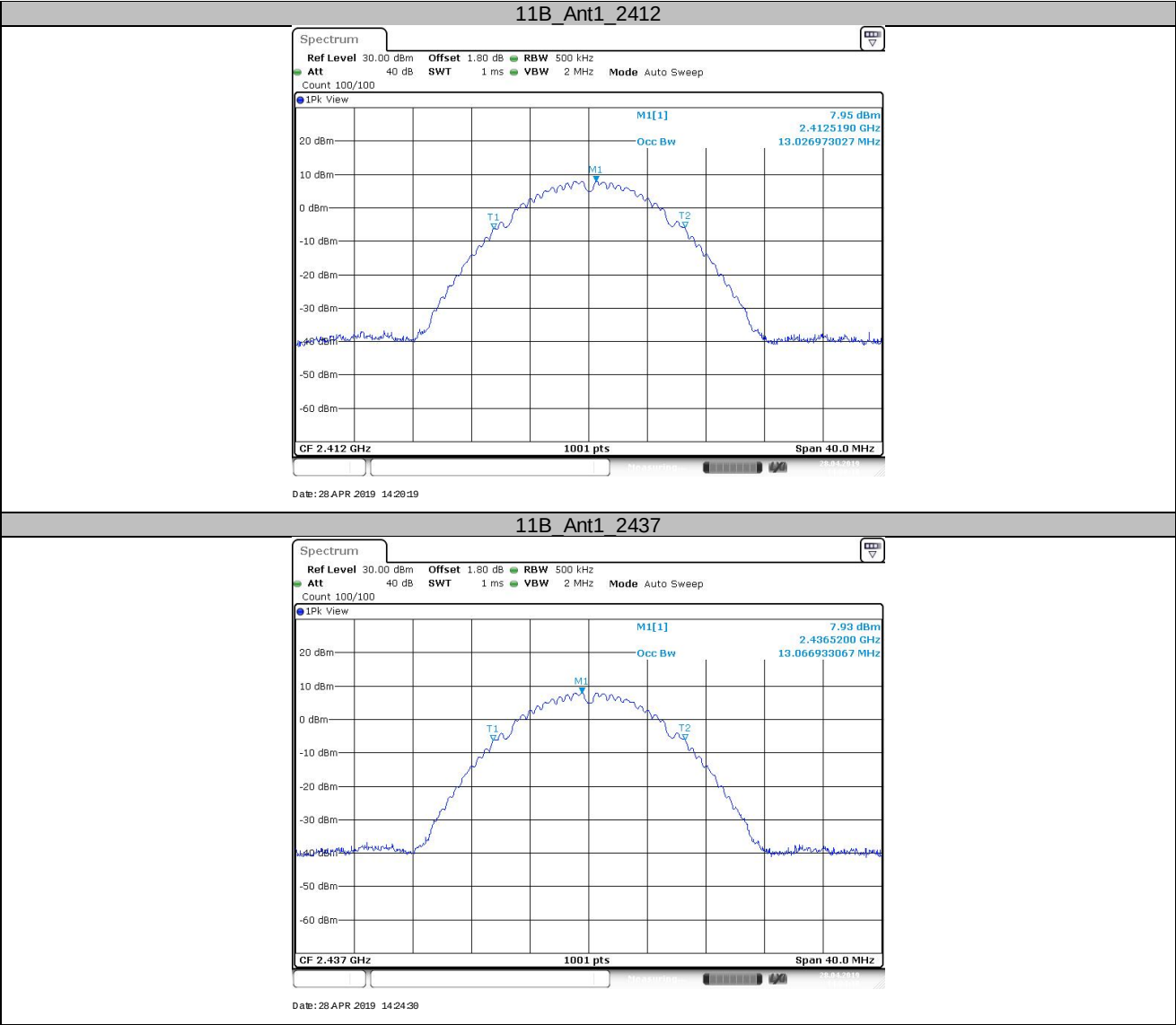
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Test Result

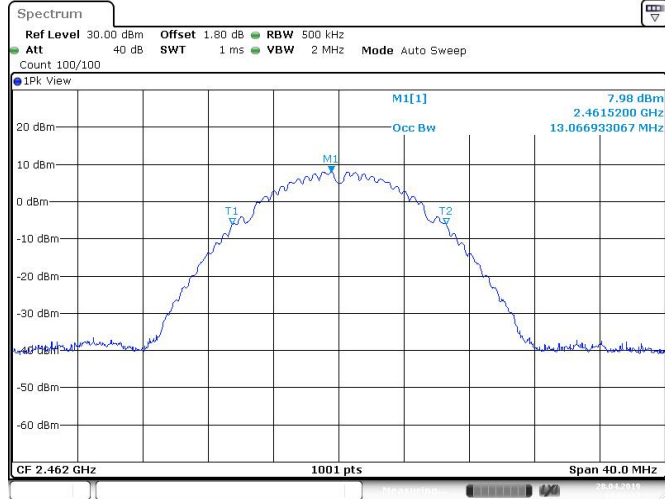
TestMode	Channel	OCB [MHz]	Limit[MHz]	Verdict
11B	2412	13.027	---	PASS
	2437	13.067	---	PASS
	2462	13.067	---	PASS
11G	2412	16.543	---	PASS
	2437	16.583	---	PASS
	2462	16.543	---	PASS
11N20SISO	2412	17.582	---	PASS
	2437	17.582	---	PASS
	2462	17.582	---	PASS
11N40SISO	2422	36.044	---	PASS
	2437	36.044	---	PASS
	2452	36.044	---	PASS



Test Graphs

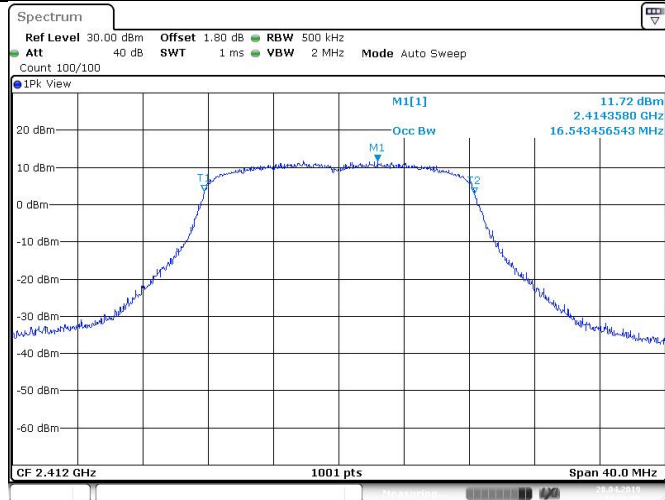


11B Ant1 2462



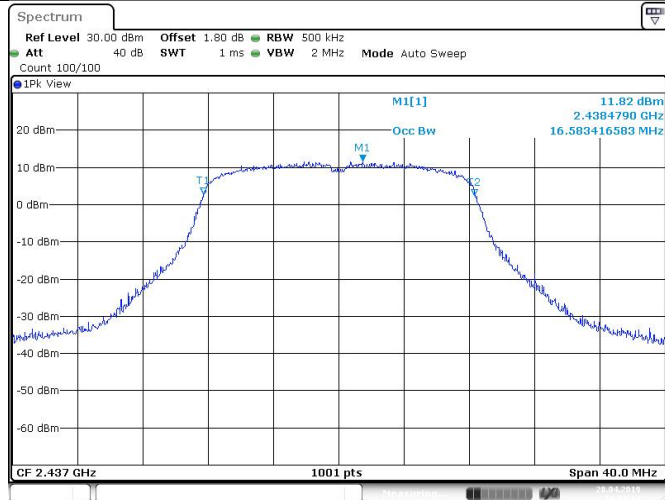
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11G Ant1 2412



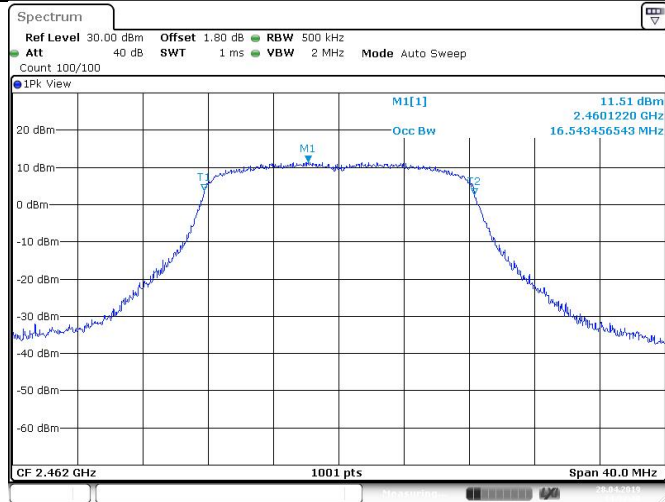
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11G Ant1 2437



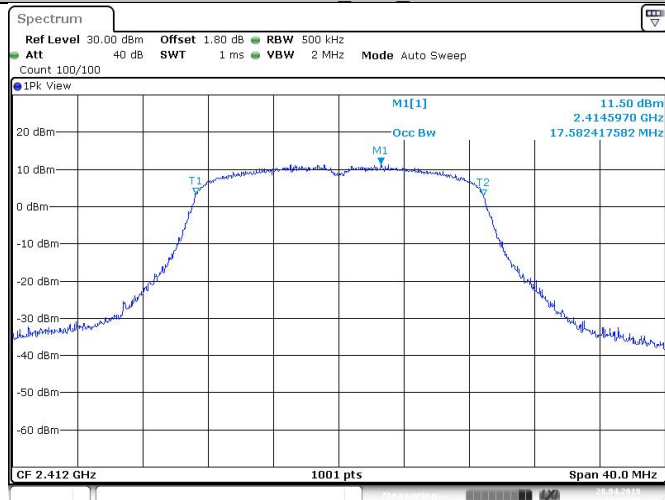
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11G Ant1 2462



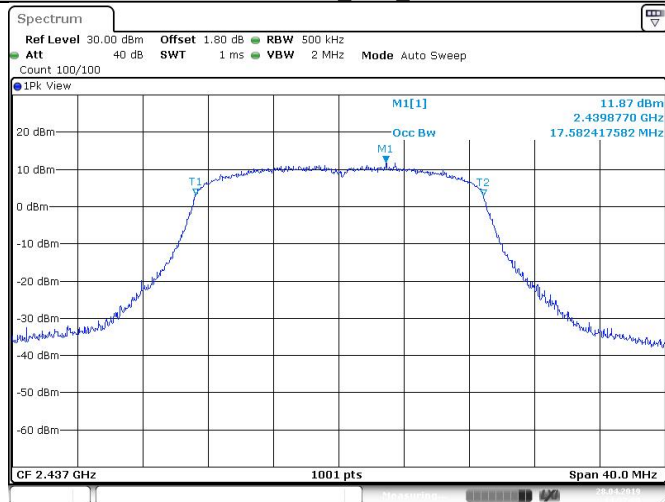
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11N20SISO Ant1 2412

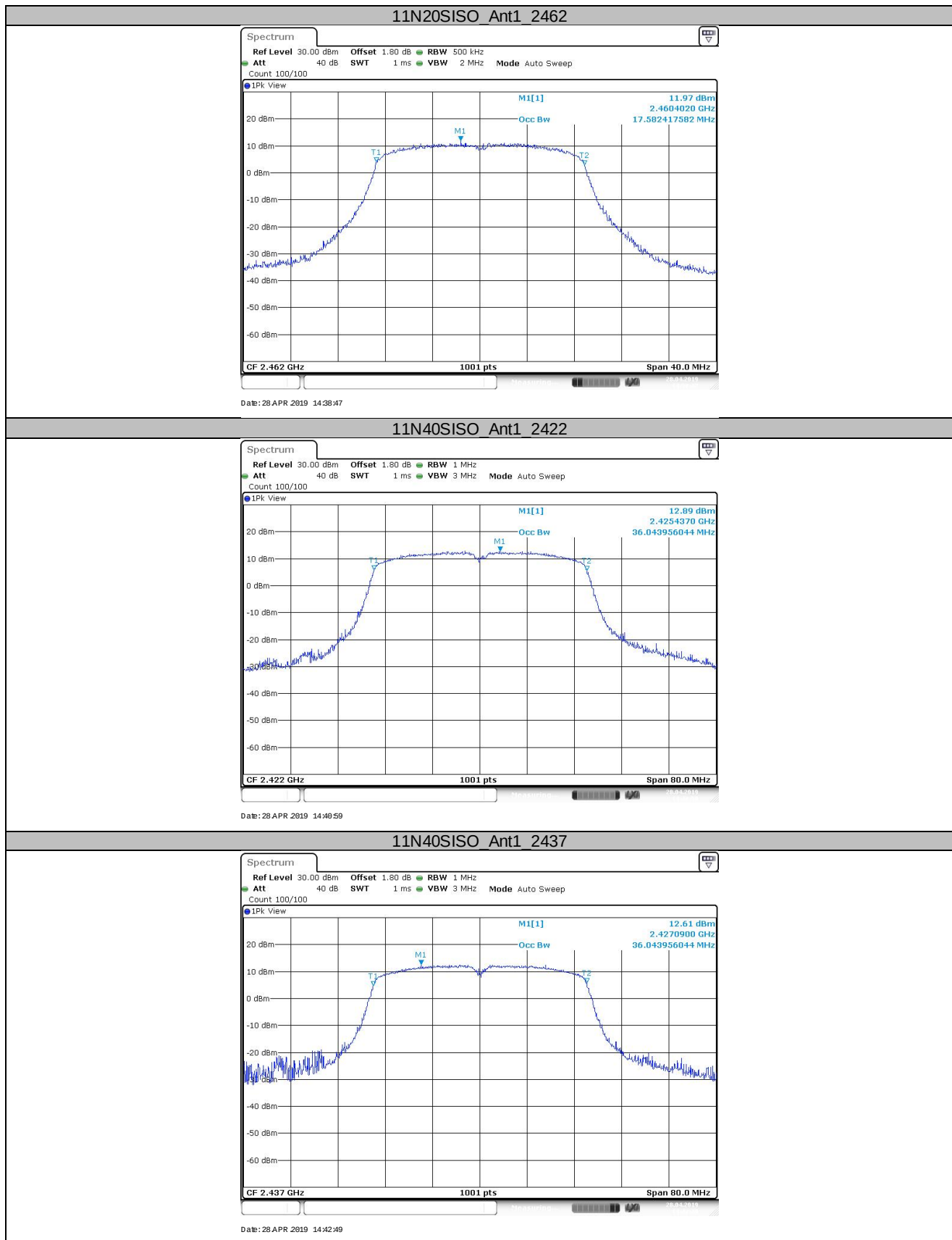


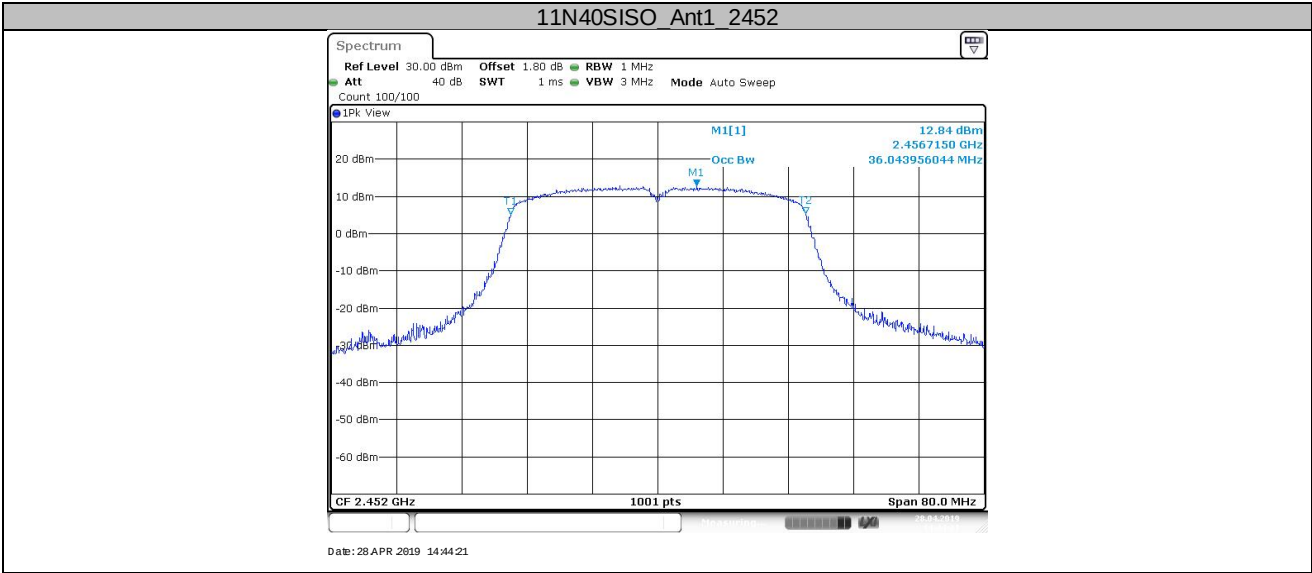
Date: 28 APR 2019 14:35:28

11N20SISO Ant1 2437



Date: 28 APR 2019 14:37:18





9.5 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. The RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
3. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
4. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3KHz]

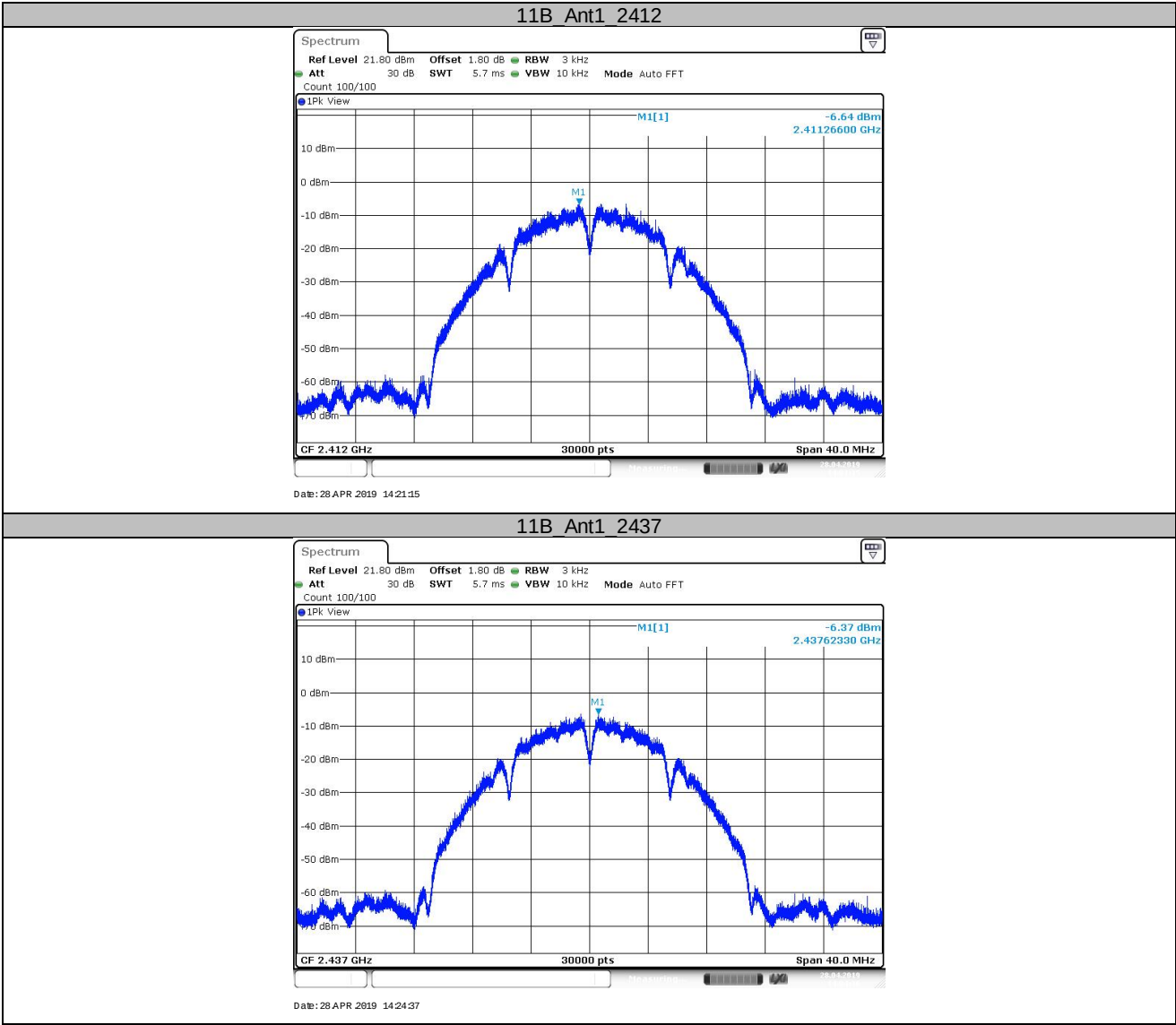
≤8

Test result

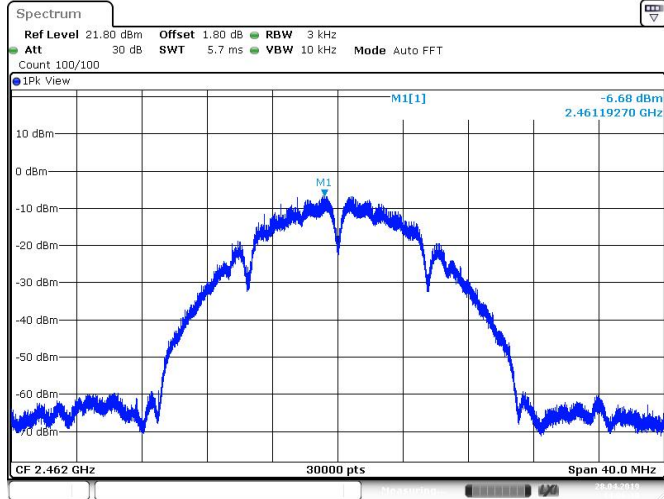
TestMode	Channel	Result(dBm/3KHz)	Limit(dBm/3KHz)	Verdict
11B	2412	-6.64	≤8	PASS
	2437	-6.37	≤8	PASS
	2462	-6.68	≤8	PASS
11G	2412	-7.7	≤8	PASS
	2437	-7.14	≤8	PASS
	2462	-6.97	≤8	PASS
11N20SISO	2412	-7.72	≤8	PASS
	2437	-7.72	≤8	PASS
	2462	-7.89	≤8	PASS
11N40SISO	2422	-9.54	≤8	PASS
	2437	-9.88	≤8	PASS
	2452	-9.98	≤8	PASS



9.5.1 Test Graphs

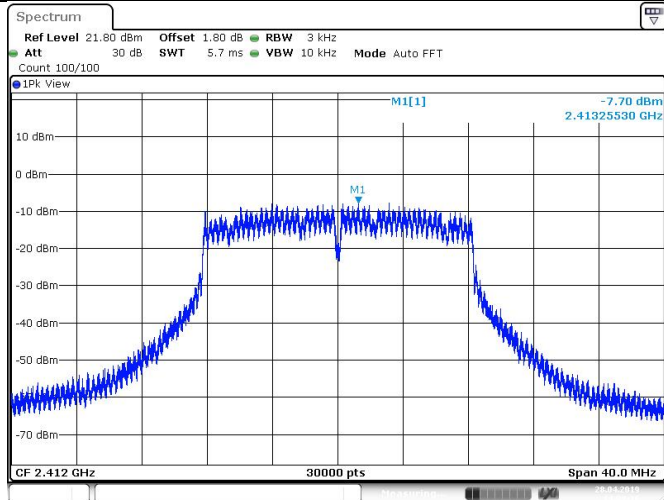


11B Ant1 2462



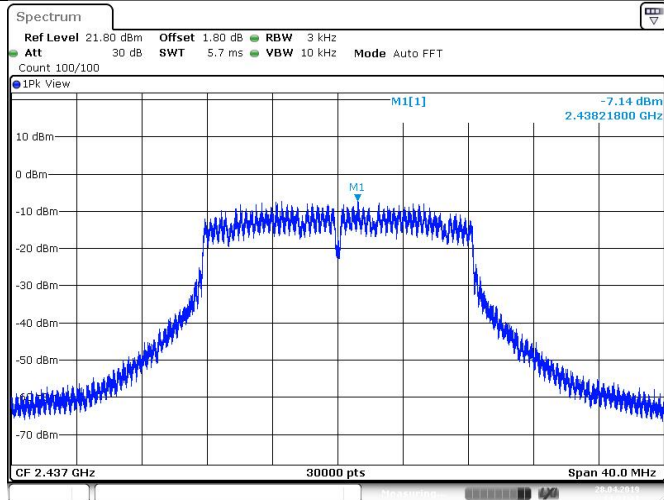
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11G Ant1 2412



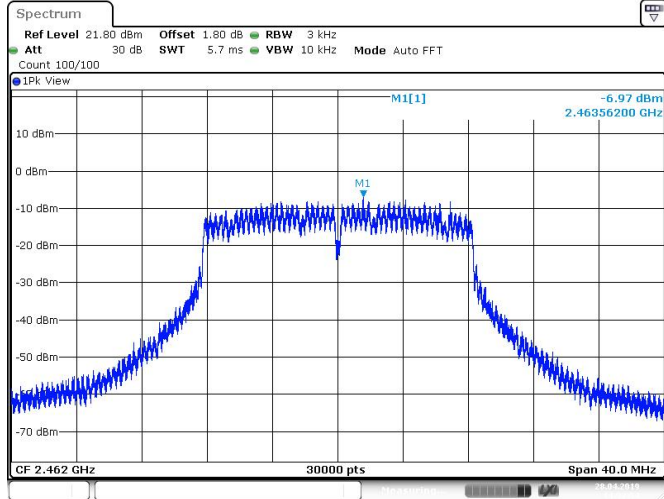
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11G Ant1 2437



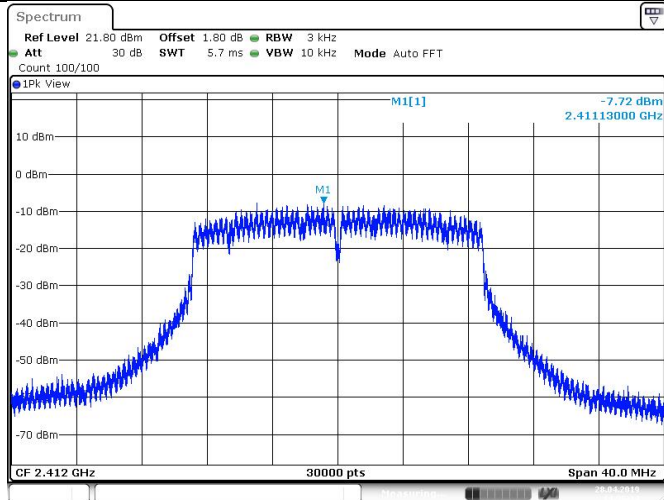
Date: 28 APR 2019 14:31:21

11G Ant1 2462



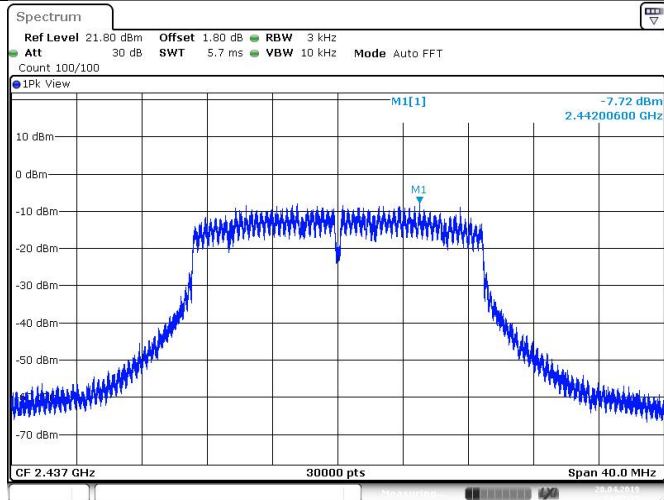
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11N20SISO Ant1 2412

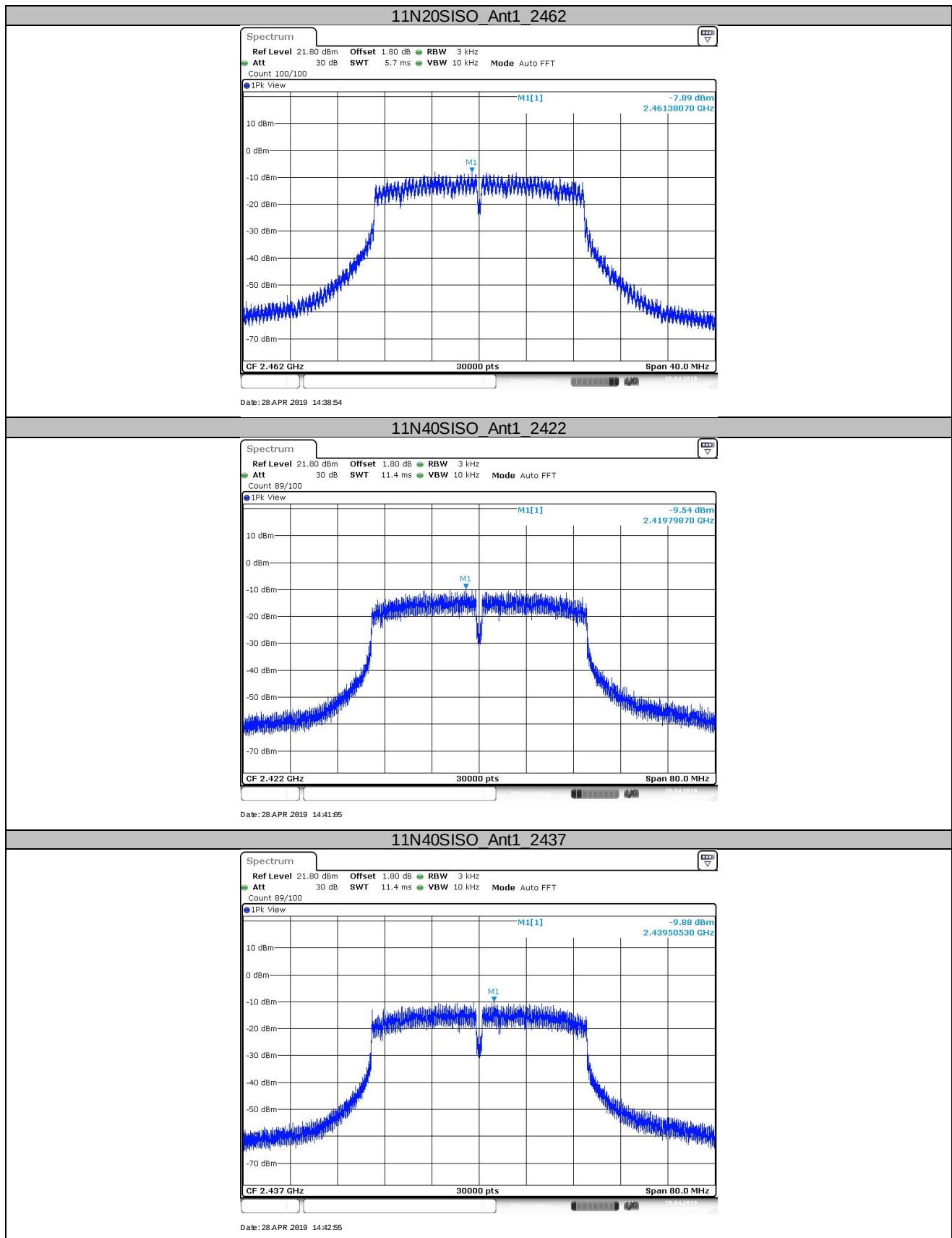


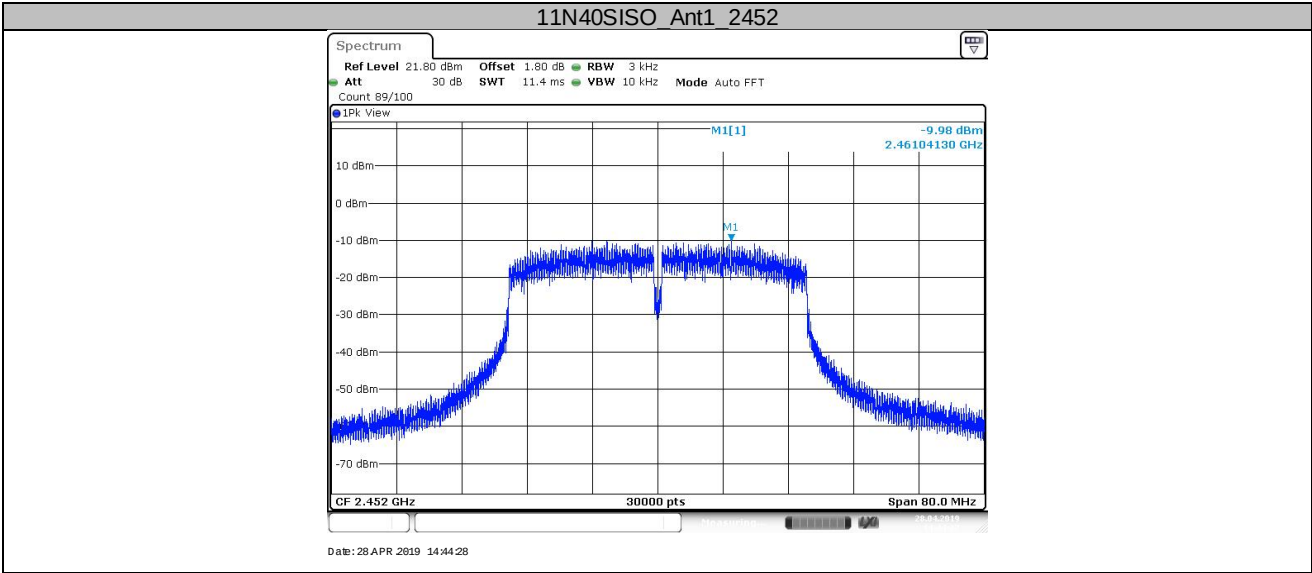
Date: 28 APR 2019 14:35:35

11N20SISO Ant1 2437



Date: 28 APR 2019 14:37:16





9.6 Spurious RF conducted emissions

Test Method

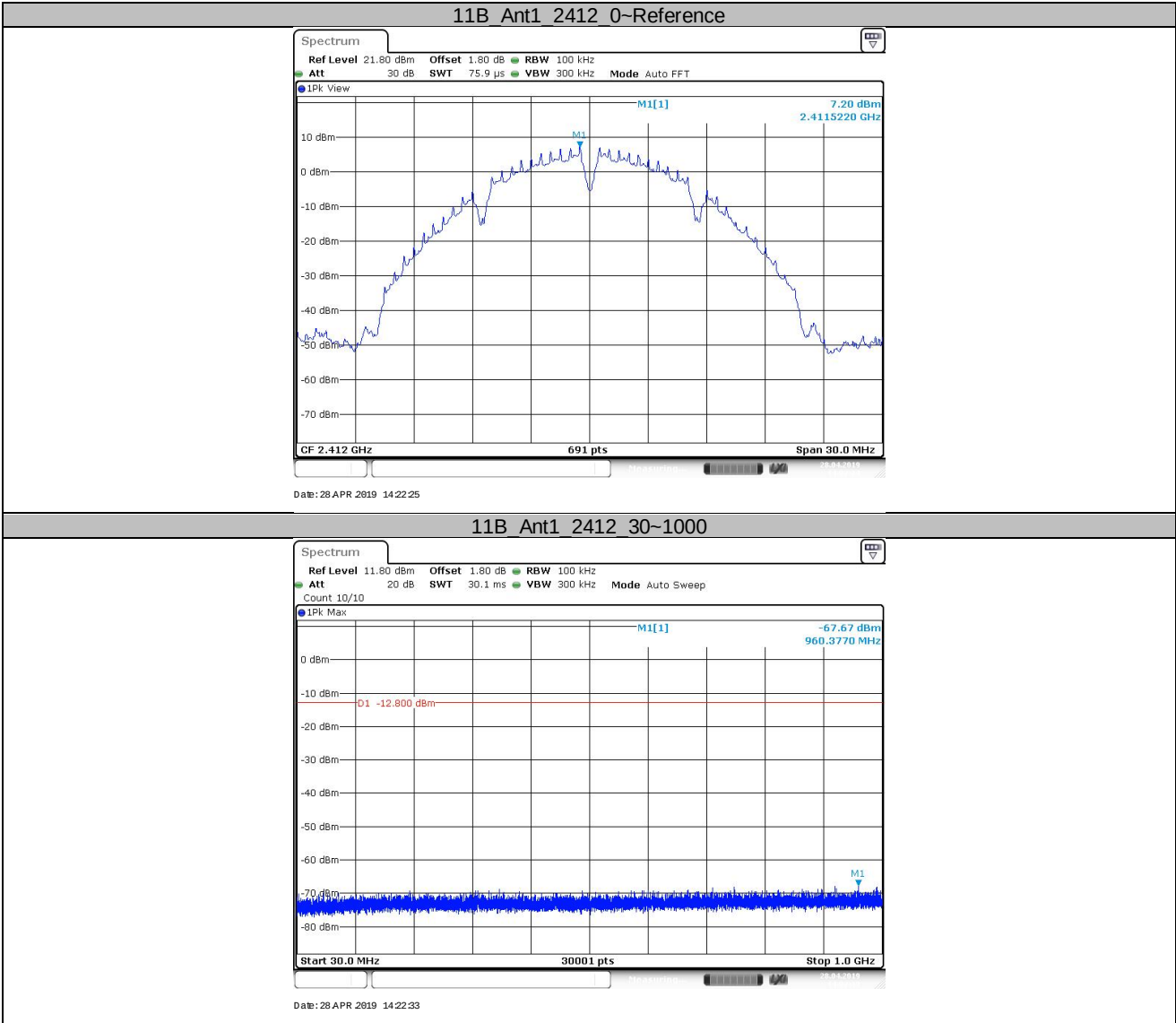
1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
4. The level displayed must comply with the limit specified in this Section. Submit these plots.
5. Repeat above procedures until all frequencies measured were complete.

Limit

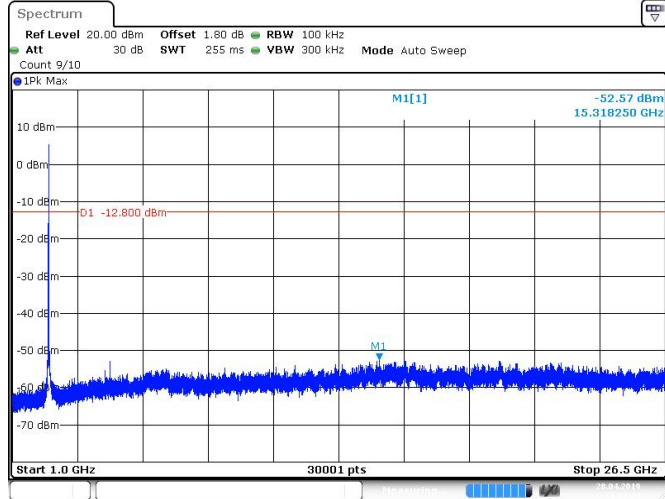
Frequency Range MHz	Limit (dBc)
30-25000	-20



Test Result

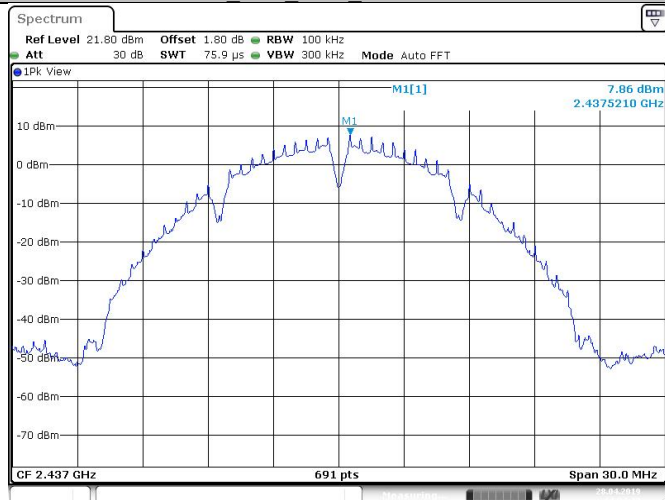


11B Ant1 2412 1000~26500



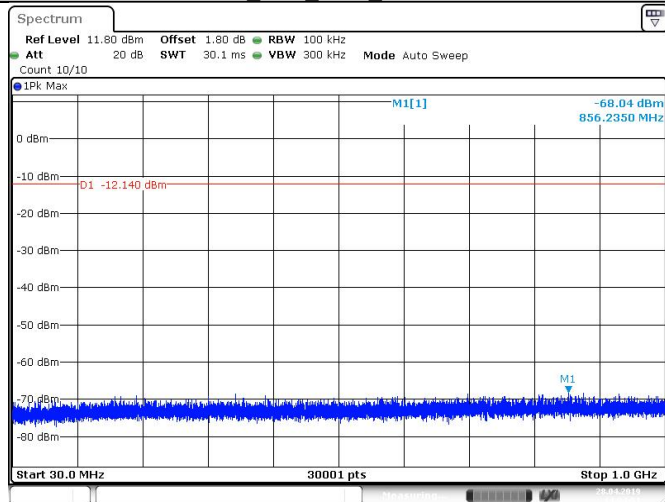
Date: 28 APR 2019 14:22:45

11B Ant1 2437 0~Reference



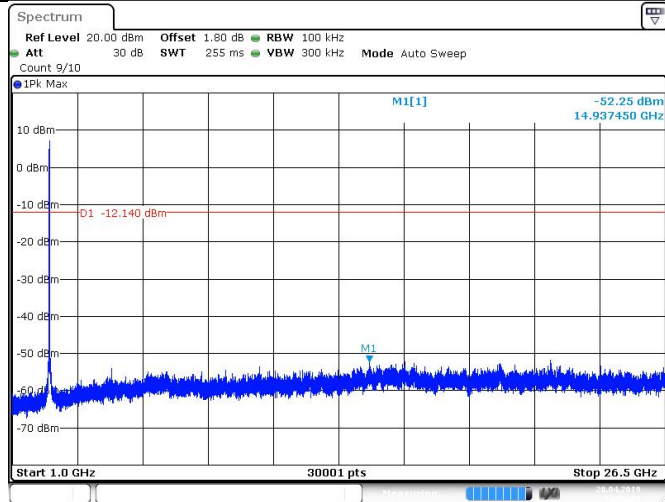
Date: 28 APR 2019 14:24:43

11B Ant1 2437 30~1000



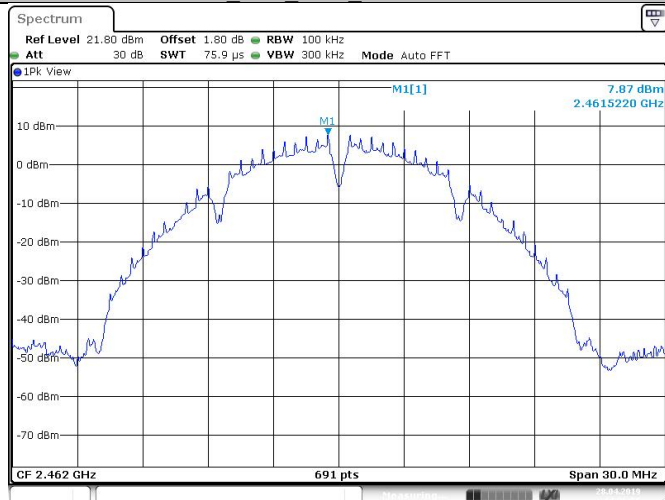
Date: 28 APR 2019 14:24:52

11B Ant1 2437 1000~26500



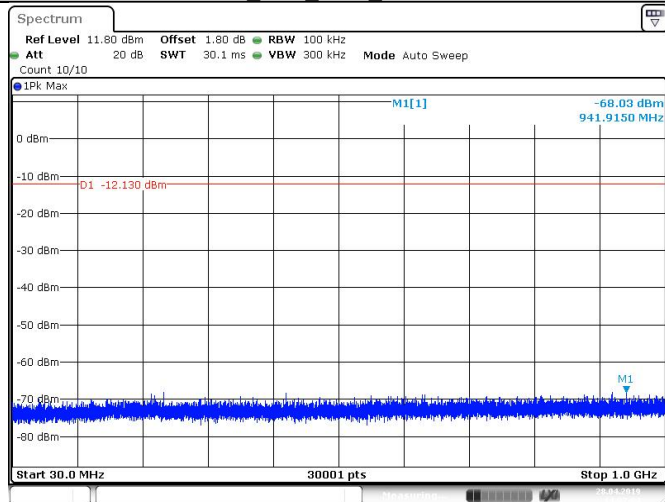
Date: 28 APR 2019 14:25:03

11B Ant1 2462 0~Reference



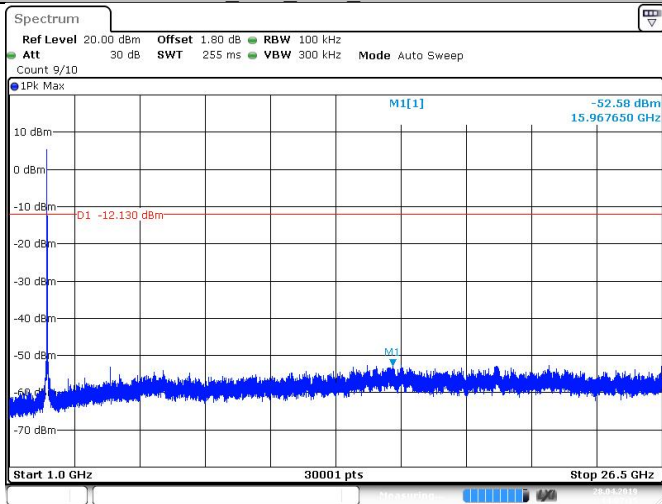
Date: 28 APR 2019 14:26:55

11B Ant1 2462 30~1000



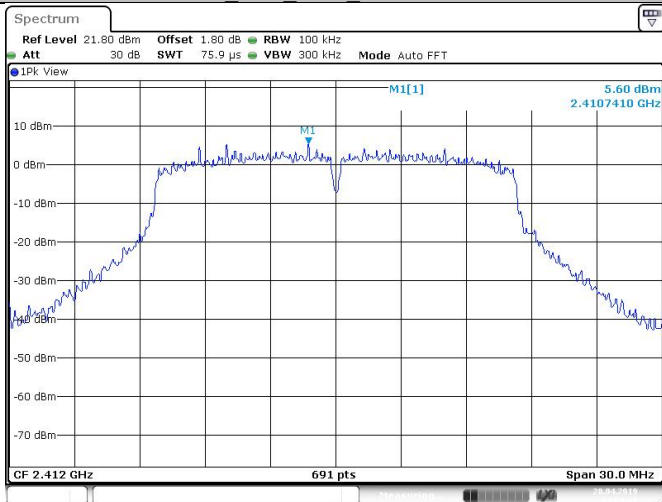
Date: 28 APR 2019 14:27:04

11B Ant1 2462 1000~26500



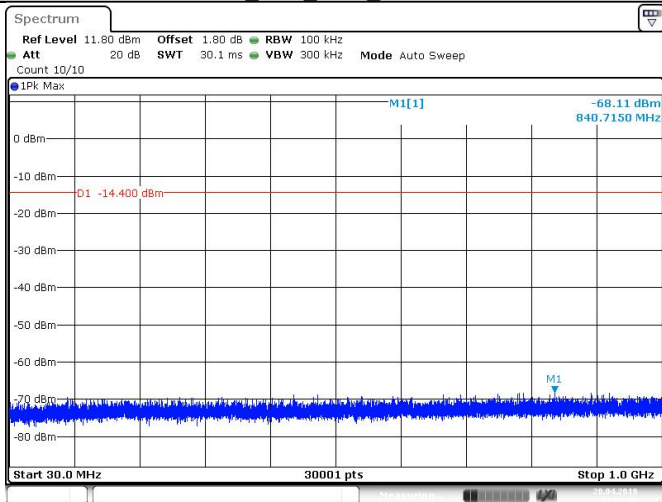
Date: 28 APR 2019 14:27:16

11G Ant1 2412 0~Reference



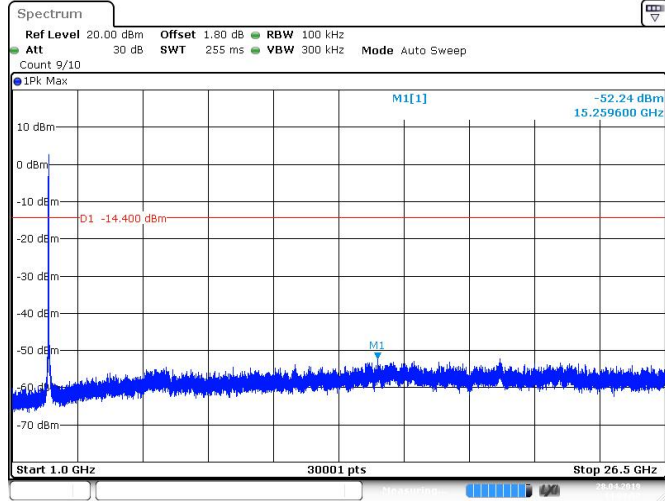
Date: 28 APR 2019 14:29:32

11G Ant1 2412 30~1000



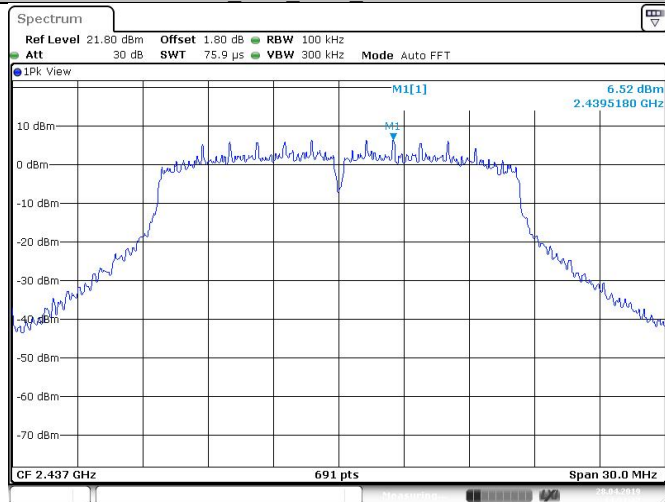
Date: 28 APR 2019 14:29:41

11G Ant1 2412 1000~26500



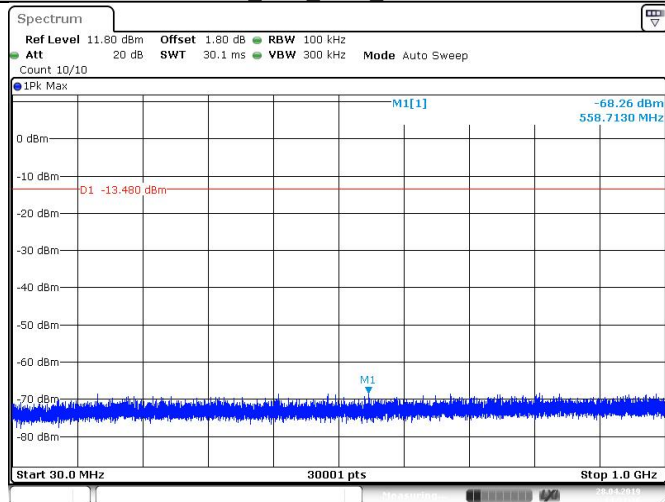
Date: 28 APR 2019 14:29:52

11G Ant1 2437 0~Reference

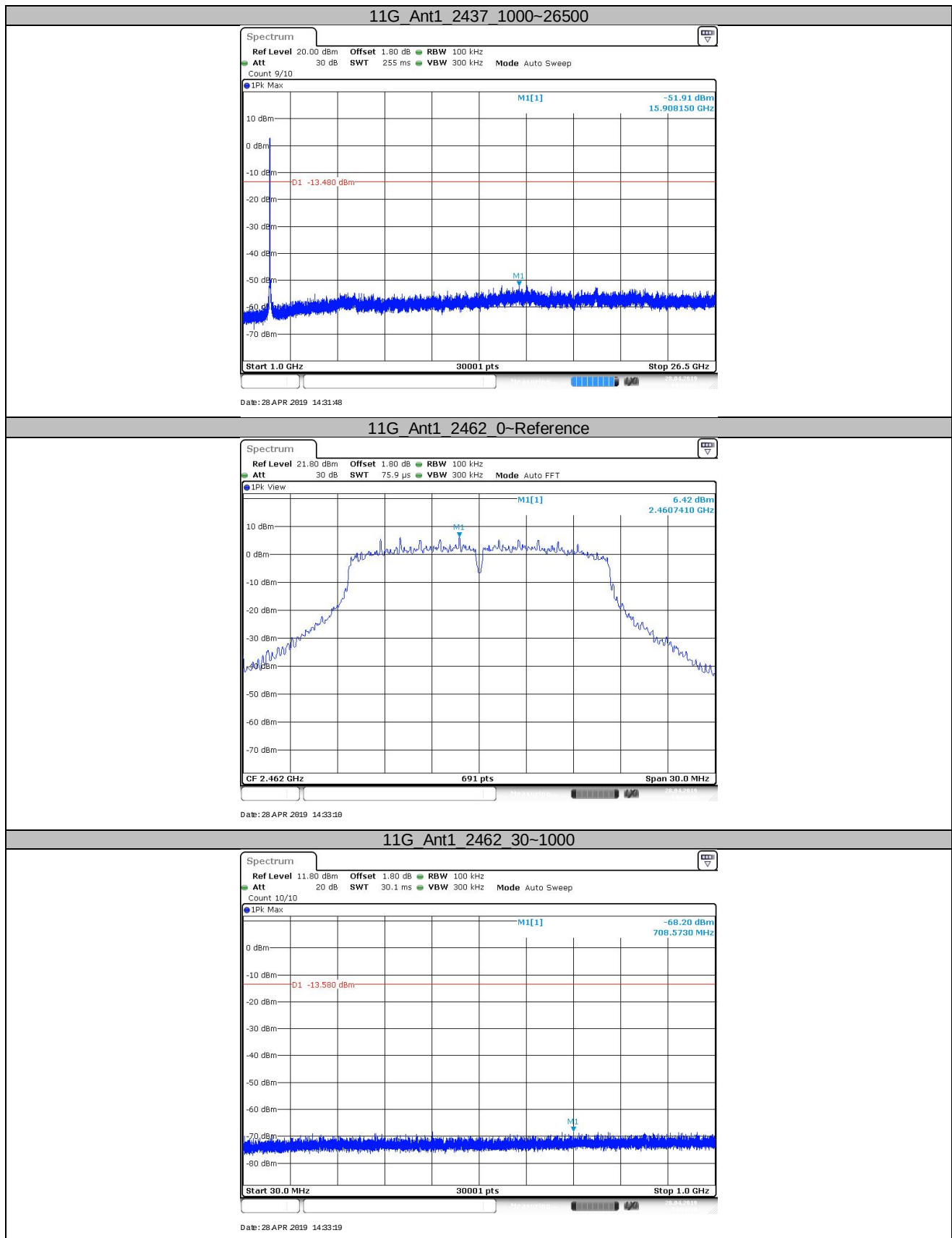


Date: 28 APR 2019 14:31:27

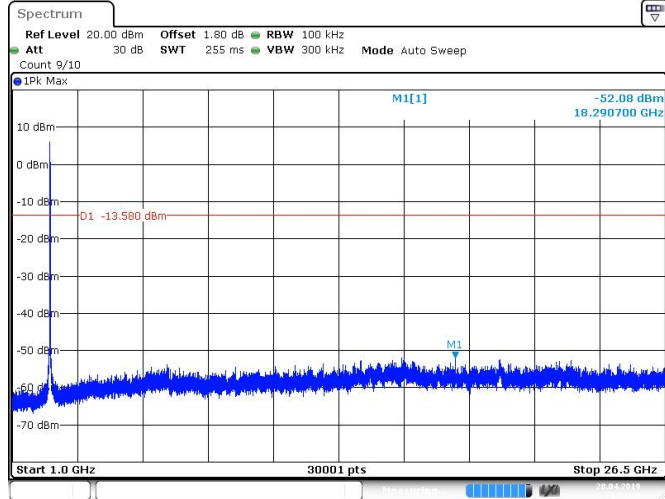
11G Ant1 2437 30~1000



Date: 28 APR 2019 14:31:36

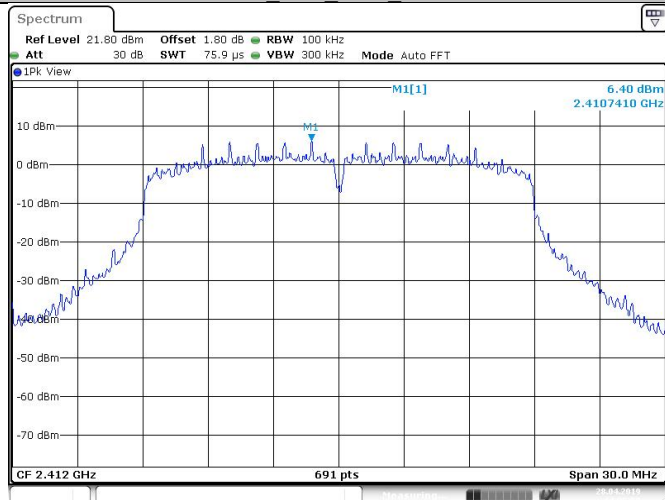


11G Ant1 2462 1000-26500



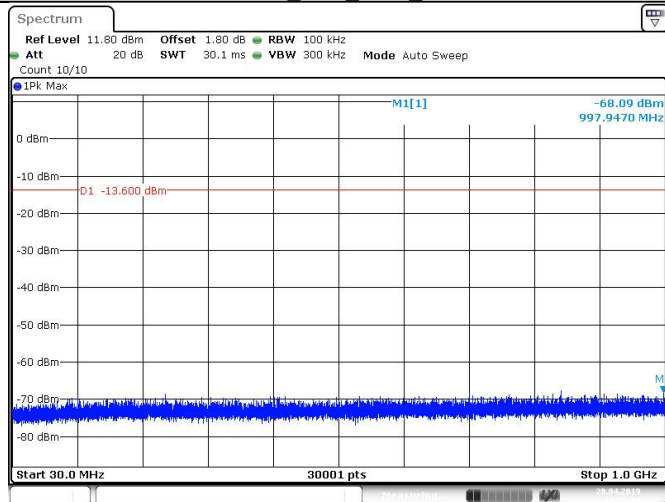
Date: 28 APR 2019 14:33:39

11N20SISO Ant1 2412 0-Reference



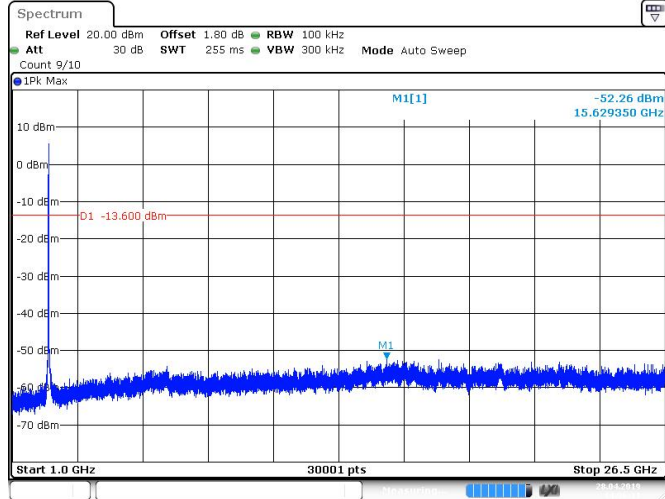
Date: 28 APR 2019 14:35:51

11N20SISO Ant1 2412 30-1000



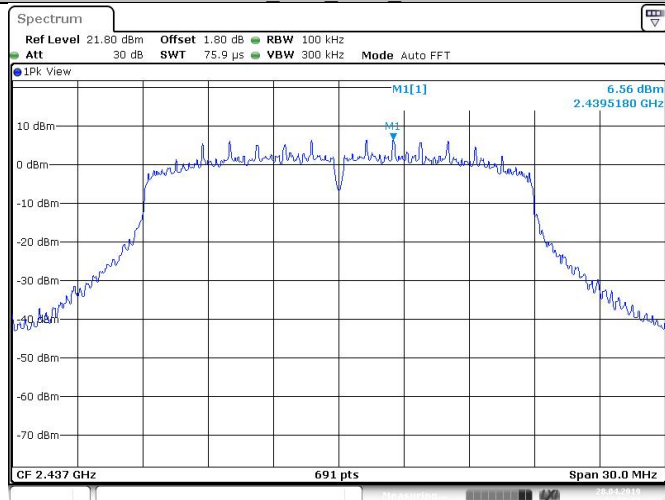
Date: 28 APR 2019 14:35:59

11N20SISO Ant1 2412 1000~26500



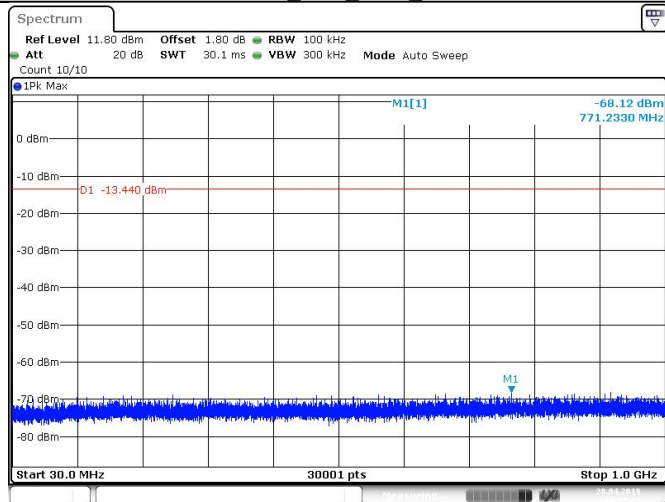
Date: 28 APR 2019 14:36:11

11N20SISO Ant1 2437 0-Reference



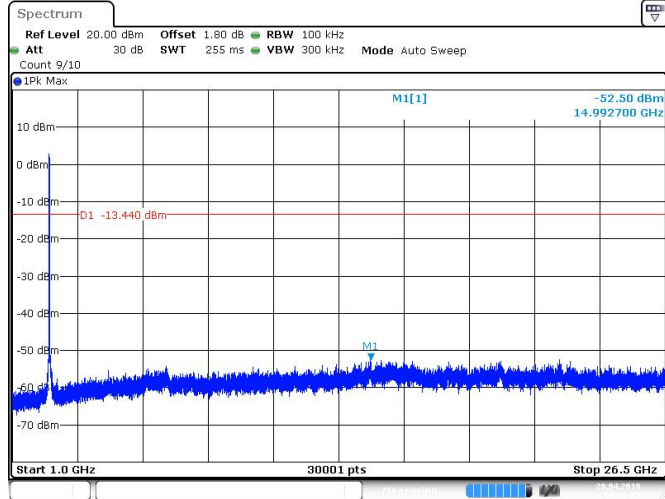
Date: 28 APR 2019 14:37:22

11N20SISO Ant1 2437 30~1000



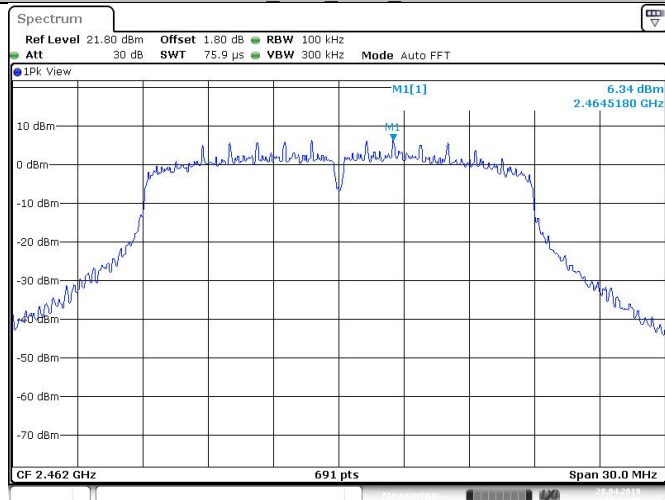
Date: 28 APR 2019 14:37:31

11N20SISO_Ant1_2437_1000~26500



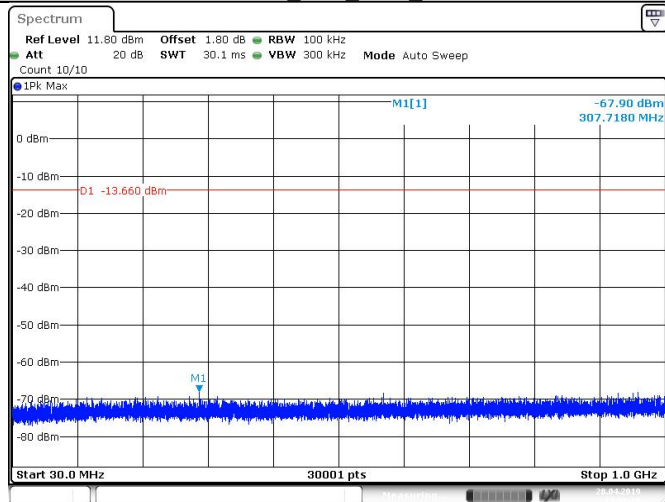
Date: 28 APR 2019 14:37:43

11N20SISO_Ant1_2462_0-Reference



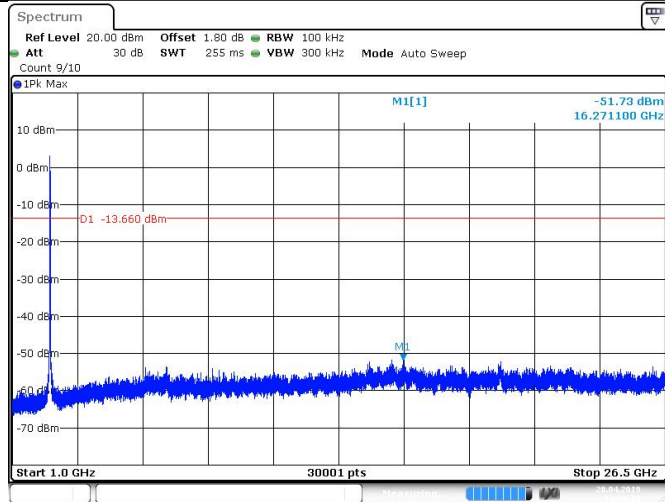
Date: 28 APR 2019 14:39:19

11N20SISO_Ant1_2462_30~1000



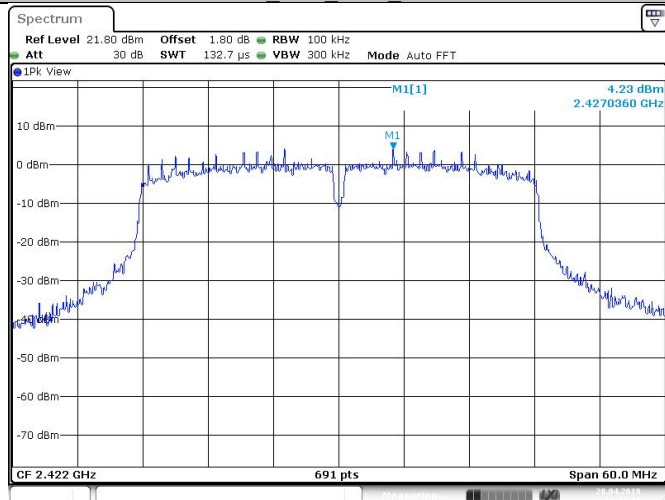
Date: 28 APR 2019 14:39:18

11N20SISO Ant1 2462 1000~26500



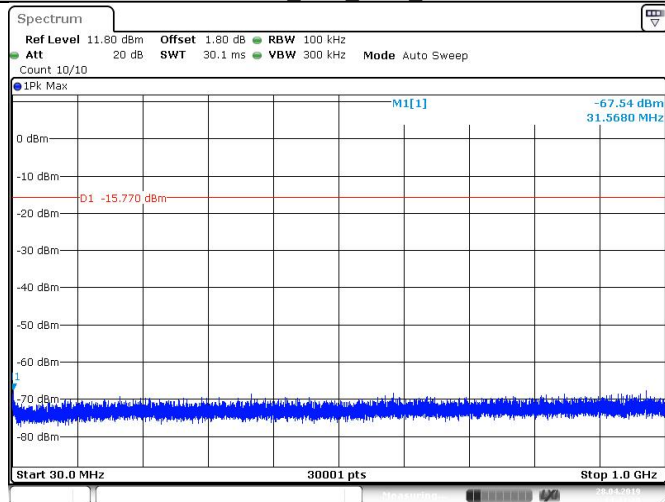
Date: 28 APR 2019 14:39:30

11N40SISO Ant1 2422 0-Reference



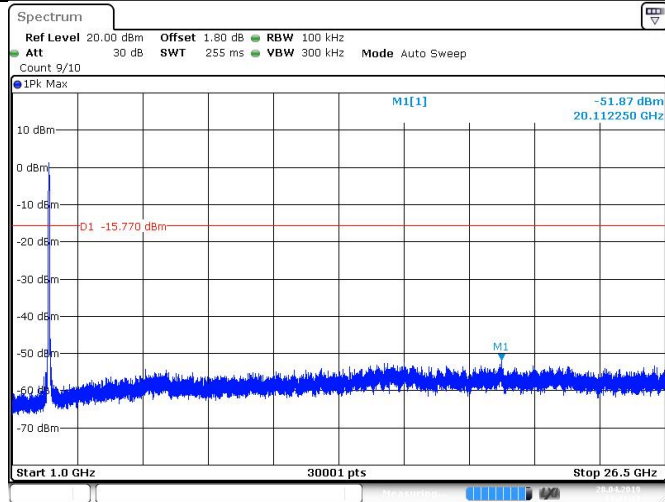
Date: 28 APR 2019 14:41:21

11N40SISO Ant1 2422 30~1000



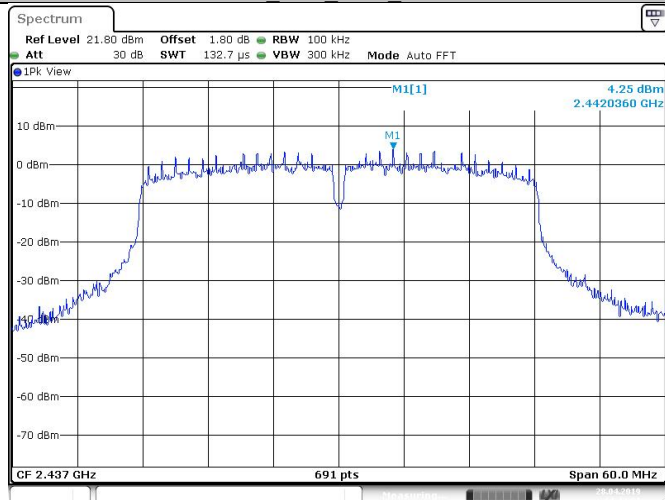
Date: 28 APR 2019 14:41:30

11N40SISO_Ant1_2422_1000~26500



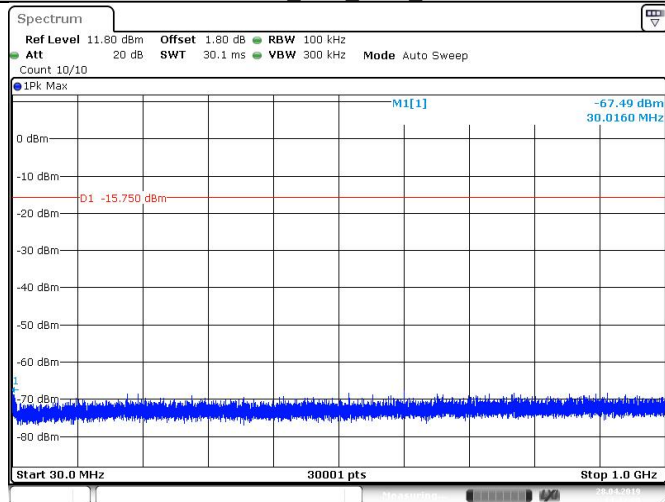
Date: 28 APR 2019 14:41:41

11N40SISO_Ant1_2437_0-Reference



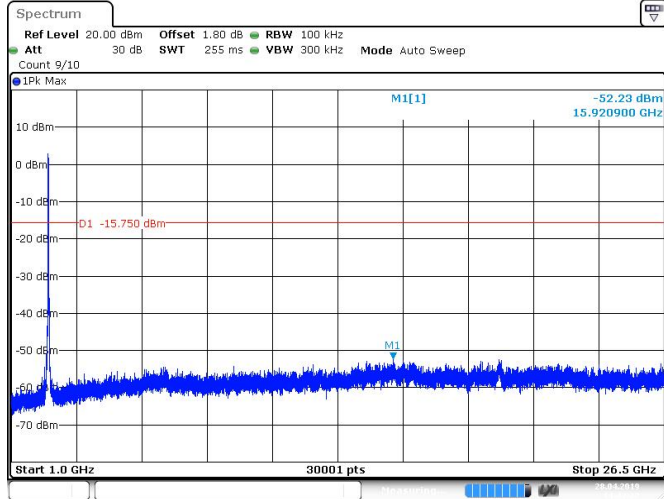
Date: 28 APR 2019 14:43:01

11N40SISO_Ant1_2437_30~1000



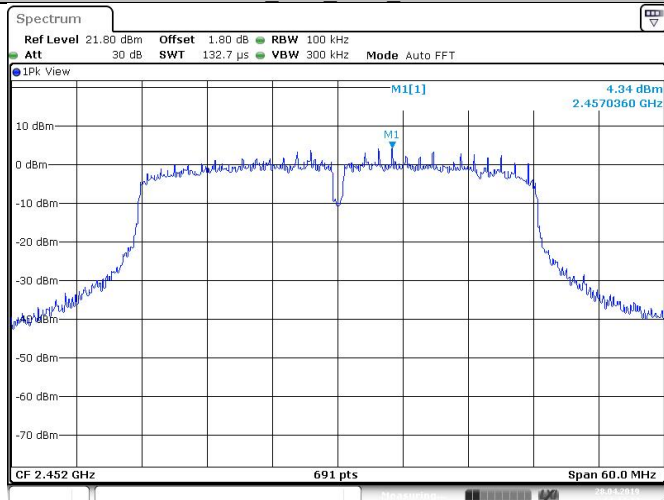
Date: 28 APR 2019 14:43:18

11N40SISO_Ant1_2437_1000~26500



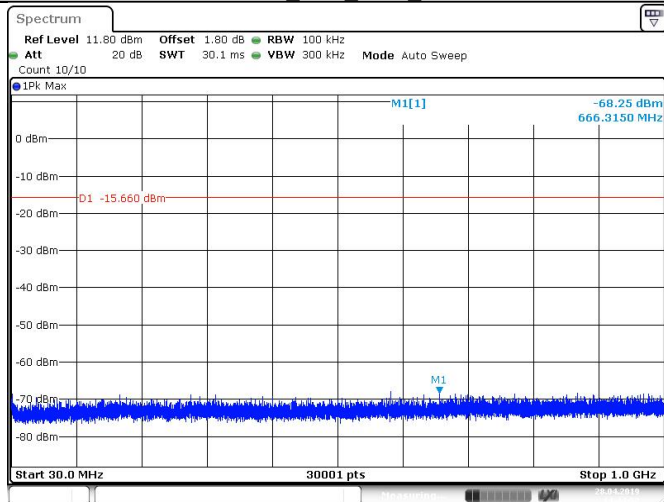
Date: 28 APR 2019 14:43:22

11N40SISO_Ant1_2452_0-Reference

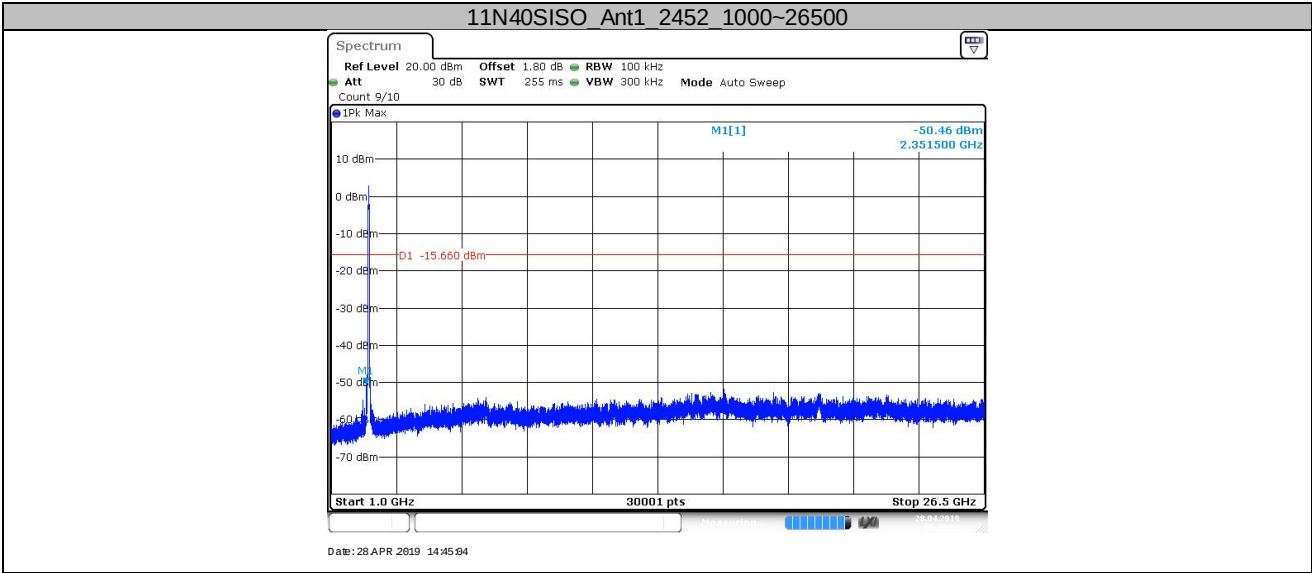


Date: 28 APR 2019 14:44:44

11N40SISO_Ant1_2452_30~1000



Date: 28 APR 2019 14:44:53



9.7 Band edge

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW $\geq$ RBW, Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize, use the peak and delta measurement to record the result. The level displayed must comply with the limit specified in this Section.
4. The level displayed must comply with the limit specified in this Section.
5. Repeat the test at the hopping off and hopping on mode, submit all the plots.

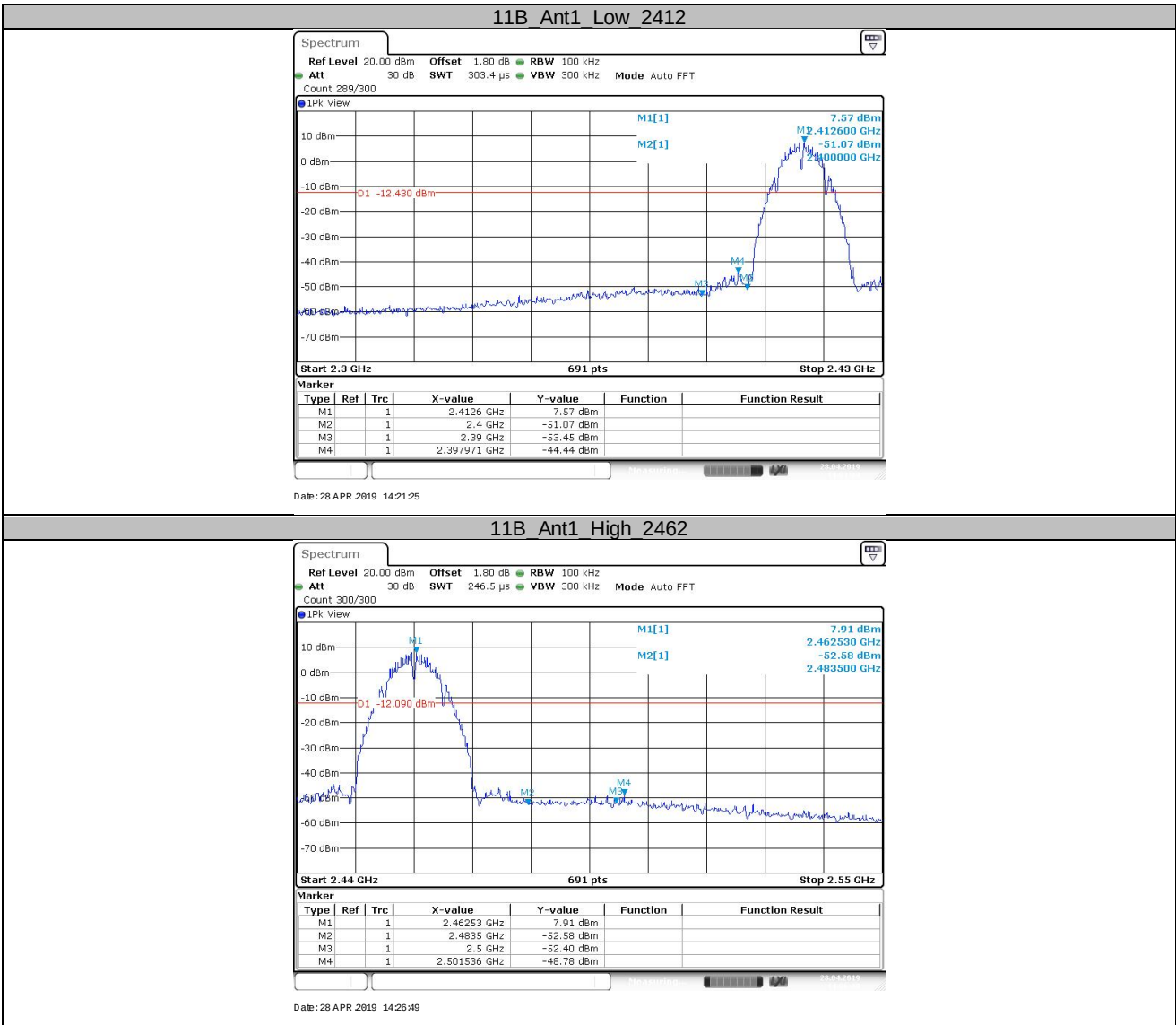
Limit:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

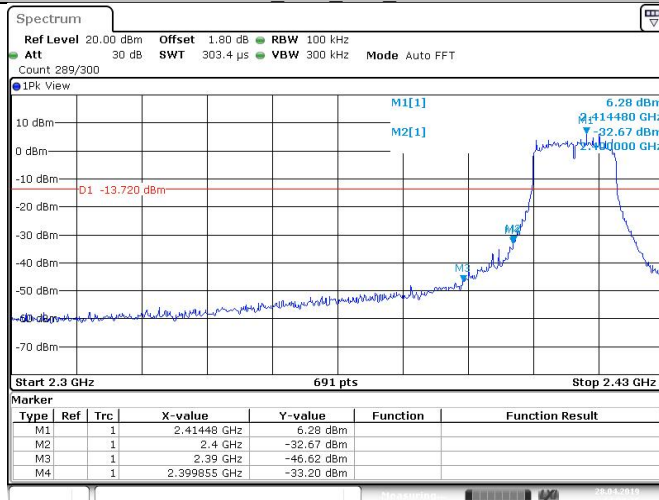
Frequency Range MHz	Limit (dBc)
30-25000	-20



Test result

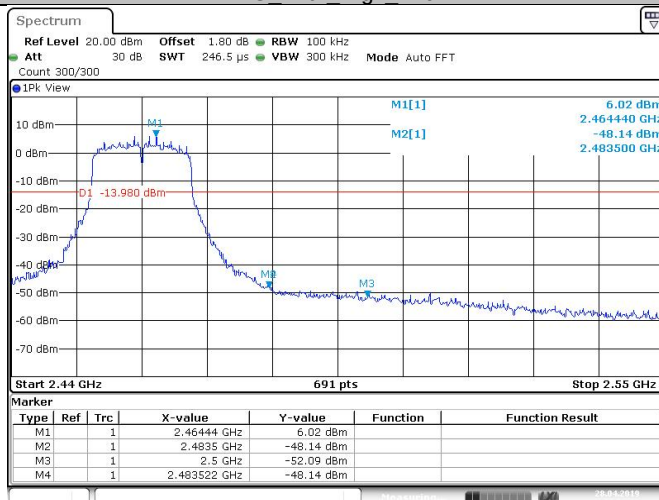


11G Ant1 Low 2412



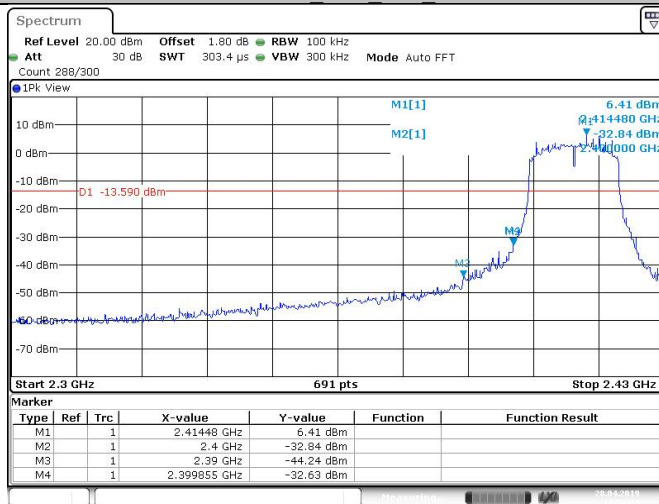
Date: 28 APR 2019 14:29:26

11G Ant1 High 2462



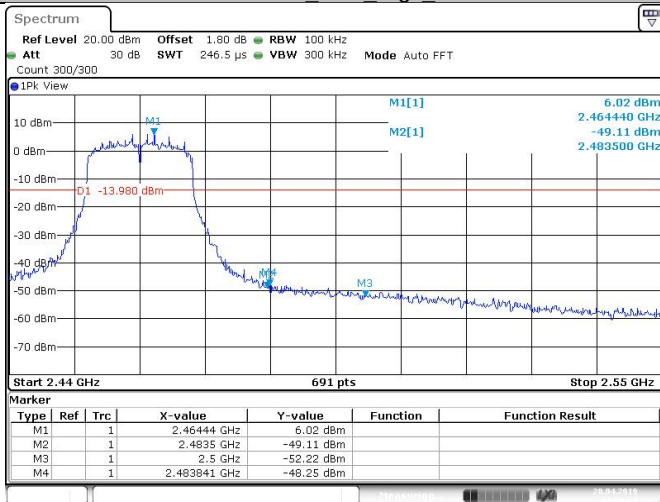
Date: 28 APR 2019 14:33:04

11N20SISO Ant1 Low 2412

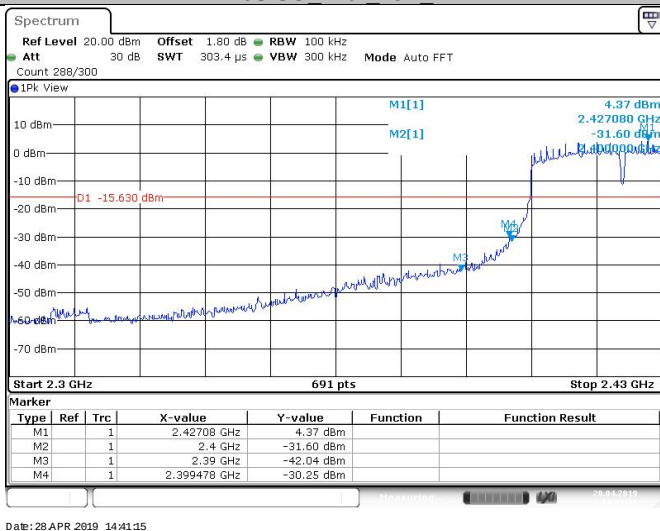


Date: 28 APR 2019 14:35:44

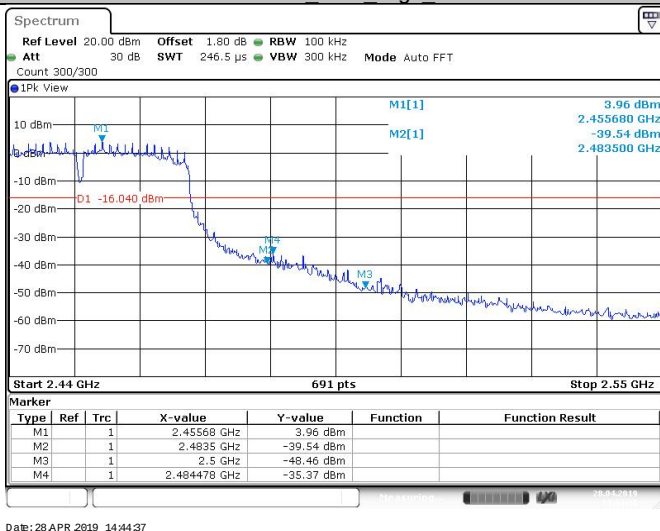
11N20SISO Ant1 High 2462



11N40SISO Ant1 Low 2422



11N40SISO Ant1 High 2452



9.8 Spurious radiated emissions for transmitter

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW $\geq$ RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW $\geq$ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

- 6: Repeat above procedures until all frequencies measured were complete.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($20\log(1/\text{duty cycle})$).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (802.11B_2437MHz) test result is listed in the report.

Transmitting spurious emission test result as below:

802.11B Modulation 2437MHz Test Result

Frequency Band	Frequency MHz	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Margin dBuV/m	Correct factor (dB)	Result
30-1000MHz	54.14	21.96	H	40	QP	18.04	-25.2	Pass
	591.68	28.30	H	46	QP	17.70	-19.9	Pass
	885.22	37.43	H	46	QP	8.57	-15.8	Pass
	Other frequency	---	H	---	QP	---	---	Pass
	44.1	21.66	V	40	QP	18.34	-25.0	Pass
	58.78	20.32	V	46	QP	19.68	-26.9	Pass
	898.79	33.81	V	46	QP	12.19	-15.6	Pass
	Other frequency	---	V	---	QP	---	---	Pass
1000-25000MHz	1250.81	31.50	H	74	PK	42.50	-12.1	Pass
	1778.63	27.69	H	74	PK	46.31	-10.1	Pass
	*2375.38	35.03	H	74	PK	38.97	-6.1	Pass
	9508.59	41.60	H	74	PK	32.40	3.7	Pass
	Other Frequency	---	H	74	---	---	---	Pass
	*1090.81	36.96	V	74	PK	37.04	-12.7	Pass
	*1593.75	28.67	V	74	PK	45.33	-10.8	Pass
	*2371.81	34.33	V	74	PK	39.67	-6.1	Pass
	*9436.41	40.65	V	74	PK	33.35	8.9	Pass
	Other Frequency	---	V	74	---	---	---	Pass

Remark:

- (1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.
- (3) Level= Reading Level + Correction Factor
- (4) Correction factor = Antenna Factor + Cable Loss- Amplifier Gain.
(The Reading Level is recorded by software which is not shown in the sheet)

10 Test Equipment List

Conducted Emission Test

Description	Manufacturer	Model no.	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2019-7-6
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2019-6-28
Horn Antenna	Rohde & Schwarz	HF907	102295	2019-6-28
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2019-7-12
Pre-amplifier	Rohde & Schwarz	SCU 40A	100398	2019-7-6
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2019-7-6
Attenuator	Agilent	8491A	MY39264334	2019-7-6
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

RF conducted test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2019-7-6
Power Splitter	Weinschel	1580	SC319	2019-7-5
Test software	Tonscend	System for BT/WIFI	Version 2.6	N/A

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.21dB
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 5.05dB; Vertical: 5.04dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%