FCC - TEST REPORT

Report Number	:	**64.790.18.04286.01-1**	Date of Issue:	November 30, 2018
Model	:	D04012		
Product Type	:	Smart Access Point Lite		
Applicant	:	ABB Genway Xiamen Electrical Equipment Co.,Ltd		
Manufacturer	:	ABB Genway Xiamen Electrical Equipment Co.,Ltd		
Address	:	No.7 Fangshan South Road, Torch High Technology,Development Zone (Xiang An), Industrial Zone, 361000 Xiamen S.E.Z, Fujian Province, PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	**n Positive** **o Negative**		
Total pages including Appendices	:	48		

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1 Table of Contents

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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

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

FCC Registration No.: 514049
IC registration number: 10320A

3 Description of the Equipment Under Test

Product:	Smart Access Point Lite
Model no.:	D04012
FCC ID:	2AEBL-D04012
Options and accessories:	Nil
Rating Input:	DC 24V
RF Transmission Frequency:	2412MHz-2462MHz
No. of Operated Channel:	802.11b/g/n20: 11 channel 802.11n40: 7 channel
Modulation:	802.11b: CCK DSSS 802.11g: OFDM 802.11n20: OFDM 802.11n40: OFDM
Antenna Type:	Internal antenna
Antenna Gain:	ANT1:3.6dBi ANT2:3.6dBi
Description of the EUT:	The EUT is a Smart Access Point Lite of a door entry system.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2017 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 v05r02 issued by August 24, 2018 and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Pages	Test Result
§15.207	Conducted emission AC power port	10	Pass
§15.247(b)(1)	Conducted peak output power	13	Pass
§15.247(e)	Power spectral density	14	Pass
§15.247(a)(2)	6dB bandwidth	15	Pass
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	--	N/A
§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	21	Pass
§15.247(d)	Band edge	38	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter	43	Pass
§15.203	Antenna requirement	See note 1	Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses two internal antennas (antenna 1 support 802.11b/g/n(20)/n(40); antenna 2 only support 802.11n(20)), both gains are 3.6dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

EUT supports Wi-Fi functions: 2412MHz - 2472MHz for 2.4GHz Wi-Fi; 5150 - 5250 MHz, 5250 - 5350 MHz, 5470 - 5725 MHz and 5725-5850 MHz for 5GHz Wi-Fi. There are two antennas for 2.4GHz Wi-Fi band: antenna 2.4G-1 supports 802.11b/g/n(20)/n(40), antenna 2.4G-2 only support 802.11n(20).
This submittal(s) (test report) is intended for FCC ID:2AEBL-D04012 and only for the 2.4GHz Wi-Fi band. It complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

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: 2018-07-10

Testing Start Date: 2018-07-13

Testing End Date: 2018-07-17

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Reviewed by:	Prepared by:	Tested by:
Tony Liu	Kevin Ouyang	Louise Liu

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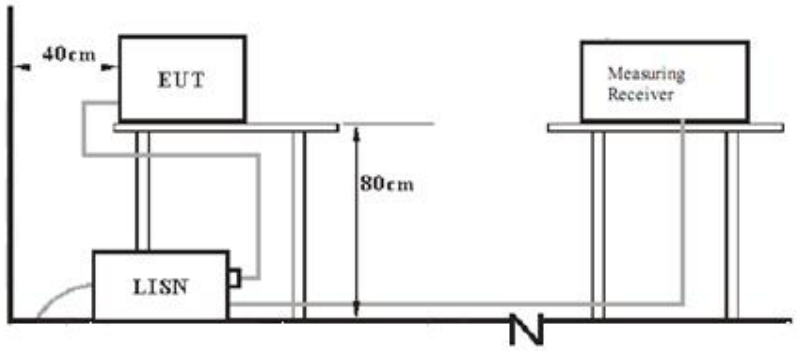
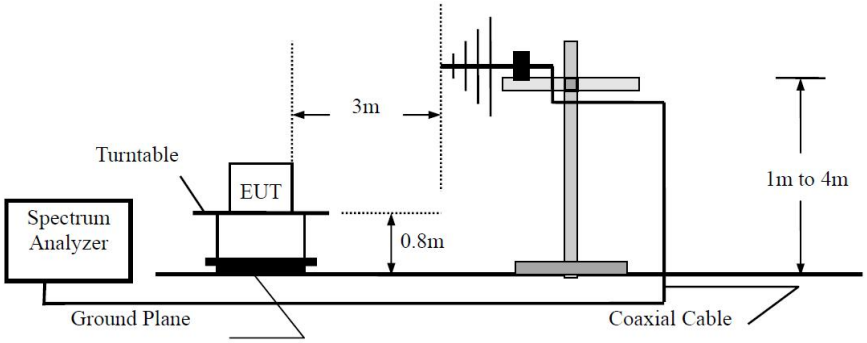
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

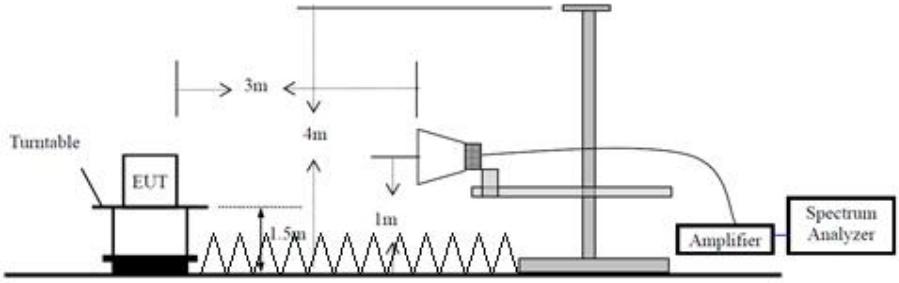


7.2 Radiated test setups

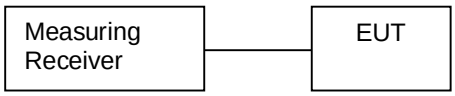
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MODEL NO.(SHIELD)	MANUFACTURER
Laptop	T460S	LENOVO
Software	TI_Wireless_Tools_3.0.2.1	/
IP touch 7, LAN + Wireless, with induction loop	H82364-.	ABB
Interface module	52361EX	ABB
ABB Welcome IP pushbutton video outdoor station	H81381P.-.	ABB
ABB Welcome IP keypad video outdoor station	H8138.K-.	ABB
ABB Welcome IP touch 5" video outdoor station	H8138.T-.	ABB
Outdoor station A/V module	H85138.M-S	ABB
Outdoor station touch 5" module	H85138.DP	ABB
Outdoor station Bar pushbutton module	5138.SP.	ABB
Outdoor station Round pushbutton module	5138.RP.	ABB
Outdoor station keypad module	5138.K-.	ABB
IP Actuator	H8304	ABB
Guard unit	H8303	ABB
System controller	YSM01	ABB
POE Switch	TL-SL1218P	TP-LINK

Test channel & mode:
The was Interactive Tablet configured using a proprietary communication interface provided by the client. The interface allows channel control required to support the evaluation.

Duty cycle during test: 100%

802.11b/802.11g/802.11n-HT20

Test mode	Channel	Frequency(MHz)
TX	1	2412
TX	6	2437
TX	11	2462

802.11n-HT40

Test mode	Channel	Frequency(MHz)
TX	3	2422
TX	6	2437
TX	9	2452

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

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

Decreasing linearly with logarithm of the frequency

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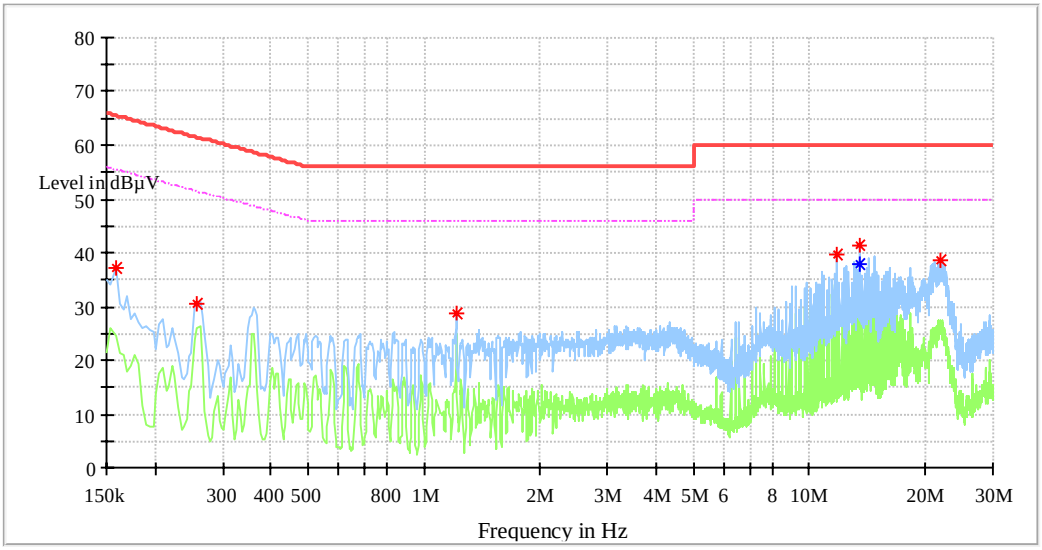
Test data:

Conducted Emission

Product Type	:	Smart Access Point Lite
M/N	:	D04012
Operating Condition	:	WiFi function on.
Test Specification	:	L
Comment	:	AC 120V/60Hz
Test date	:	2018-07-10



No significant emission was detected within 10 dB to limit

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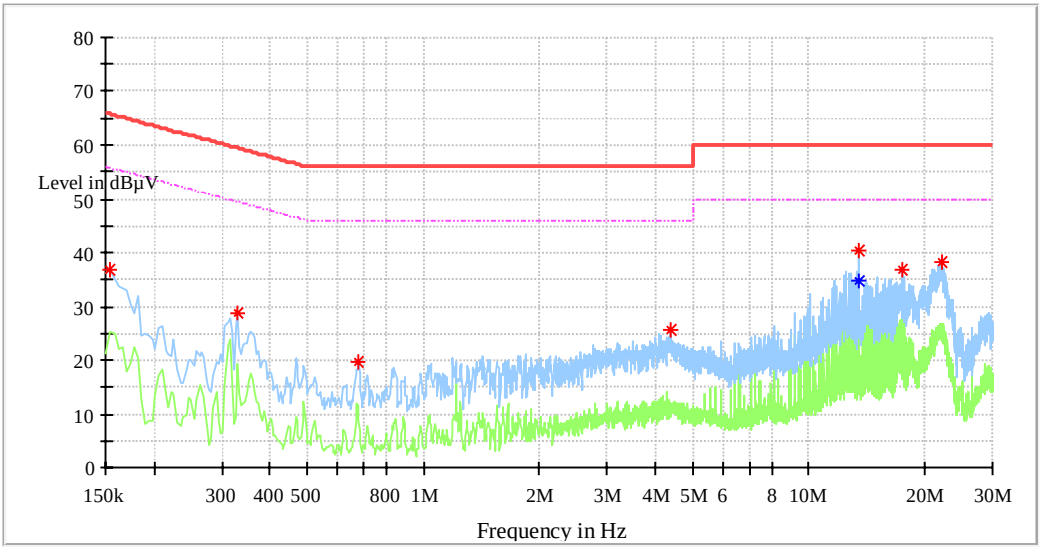
Conducted Emission

Product Type	:	Smart Access Point Lite
M/N	:	D04012
Operating Condition	:	WiFi function on.
Test Specification	:	N
Comment	:	AC 120V/60Hz
Test date	:	2018-07-10



No significant emission was detected within 10 dB to limit

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9.2 Conducted peak output power

Test Method

1. Connect the power meter to the EUT
a) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
b) At all times the EUT is transmitting at its maximum power control level.
c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Adjust the measurement in dBm by adding 10log (1/x), where x is the duty cycle to the measurement result.

Limits

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

Conducted peak output power

TestMode	Antenna	Channel (MHz)	Peak power		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Verdict
			Chain1 (dBm)	Chain2 (dBm)				
11B	Ant1	2412	12.95			12.95	30	PASS
		2437	13.51			13.51	30	PASS
		2462	13.31			13.31	30	PASS
11G	Ant1	2412	18.89			18.89	30	PASS
		2437	18.67			18.67	30	PASS
		2462	18.53			18.53	30	PASS
11N20	Ant1&2	2412	17.46	18.48	126.2	21.01	28	PASS
		2437	17.70	18.91	136.7	21.36	28	PASS
		2462	17.47	18.95	134.3	21.28	28	PASS
11N40	Ant1	2422	17.82			17.82	30	PASS
		2437	17.87			17.87	30	PASS
		2452	17.85			17.85	30	PASS

Remark:
Chain1(antenna 2.4G-1) supports 802.11b/g/n(20)/n(40), Chain2(antenna 2.4G-2) only support 802.11n(20).
Per KDB 662911, the conducted powers Chain1 and Chain2 were first measured separately during MIMO transmission as shown in section above. The measured values were then summed in linear power units then converted back to dBm.
Note: For 11N20, directional gain shall be calculated as the sum of 10 log (number of array elements) plus the directional gain of the element having the highest gain. directional gain= 10log(2)+3.6 dBi = 6.6 dBi > 6 dBi, the limit of 11N20 shall be reduced by 2dB.

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9.3 Power spectral density

Test Method

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

1. 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
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed

Limit

Limit
≤ 8 dBm/3KHz

TestMode	Antenna	Channel (MHz)	PSD measured		Total PSD (dBm/3KHz)	Limit (dBm/3KHz)	Verdict
			Chain1 (dBm/3KHz)	Chain2 (dBm/3KHz)			
11B	Ant1	2412	-12		-12	8	PASS
		2437	-0.6		-0.6	8	PASS
		2462	-11.72		-11.72	8	PASS
11G	Ant1	2412	-14.32		-14.32	8	PASS
		2437	-15.28		-15.28	8	PASS
		2462	-14.75		-14.75	8	PASS
11N20	Ant1&2	2412	-15.32	-4.6	-4.24	6	PASS
		2437	-14.14	-4.17	-3.75	6	PASS
		2462	-16.24	-4.23	-3.96	6	PASS
11N40	Ant1	2422	-18.12		-18.12	8	PASS
		2437	-17.94		-17.94	8	PASS
		2452	-19.8		-19.8	8	PASS

Remark: For 11N20, directional gain shall be calculated as the sum of 10 log (number of array elements) plus the directional gain of the element having the highest gain.
So directional gain= 10log(2)+3.6 dBi = 6.6 dBi > 6 dBi, the limit of 11N20 shall be reduced by 2dB.

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9.4 6 dB Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥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, 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]
≥500

TestMode	Antenna	Channel (MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Verdict
11B	Ant1	2412	10.160	2406.920	2417.080	PASS
		2437	10.160	2431.920	2442.080	PASS
		2462	10.160	2456.920	2467.080	PASS
11G	Ant1	2412	15.200	2404.400	2419.600	PASS
		2437	15.200	2429.400	2444.600	PASS
		2462	15.200	2454.400	2469.600	PASS
11N20	Ant1	2412	15.200	2404.400	2419.600	PASS
		2437	15.200	2429.400	2444.600	PASS
		2462	15.200	2454.400	2469.600	PASS
11N40	Ant1	2422	35.280	2404.400	2439.680	PASS
		2437	35.280	2419.400	2454.680	PASS
		2452	35.280	2434.400	2469.680	PASS
11N20	Ant2	2412	15.200	2404.400	2419.600	PASS
		2437	15.200	2429.400	2444.600	PASS
		2462	15.200	2454.400	2469.600	PASS

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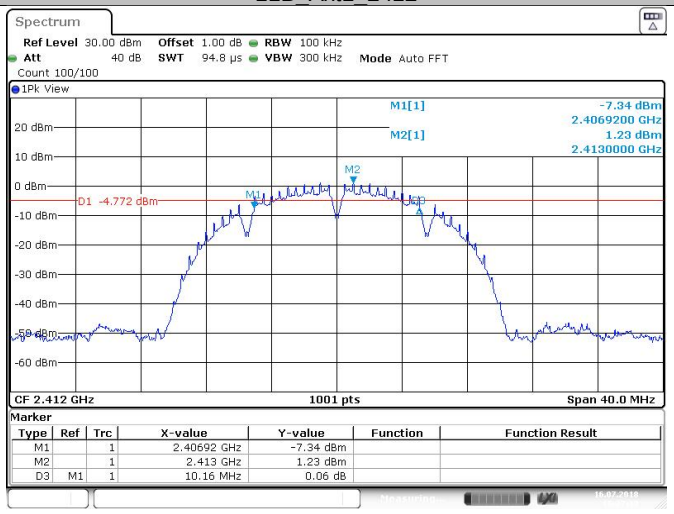
Test Graphs

11B_Ant1_2412



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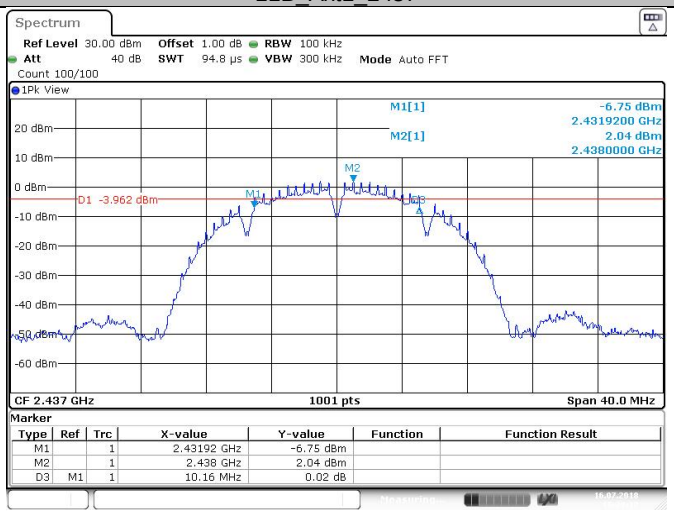

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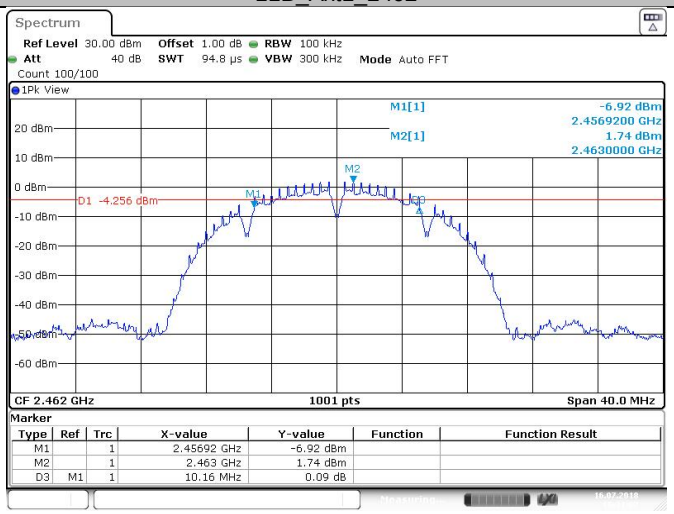

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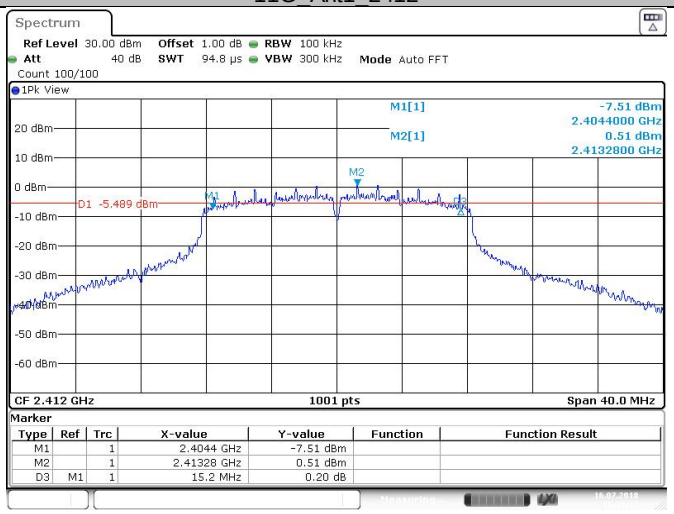
11G_Ant1_2412



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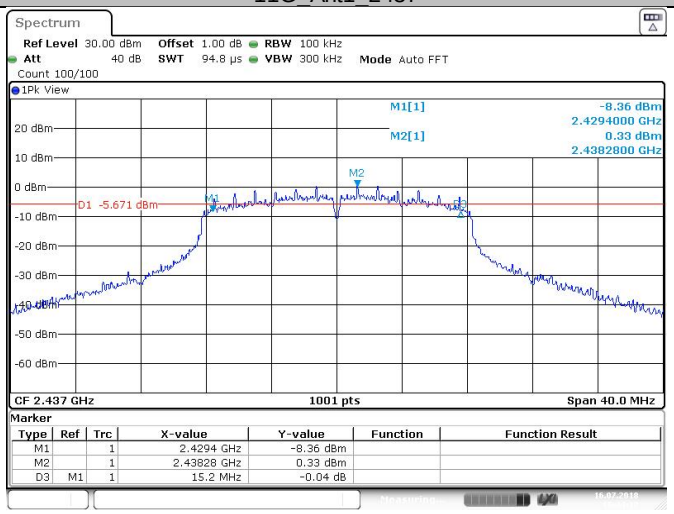

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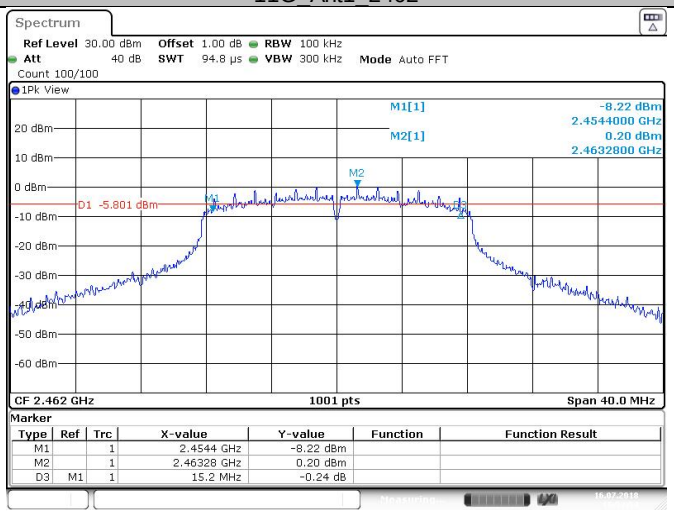

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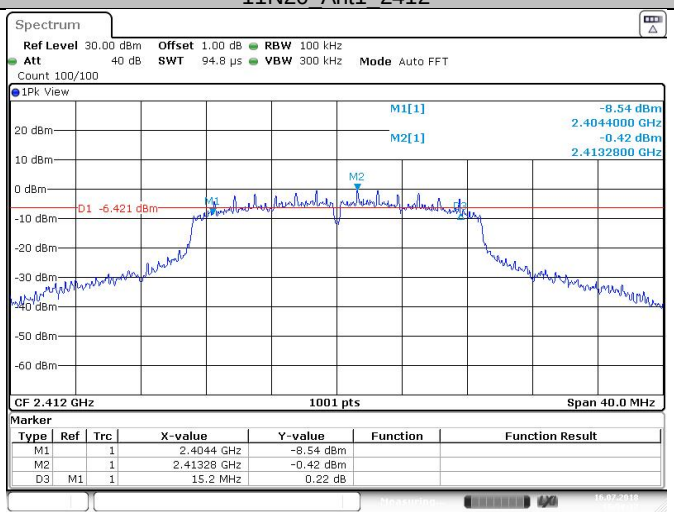
11N20_Ant1_2412



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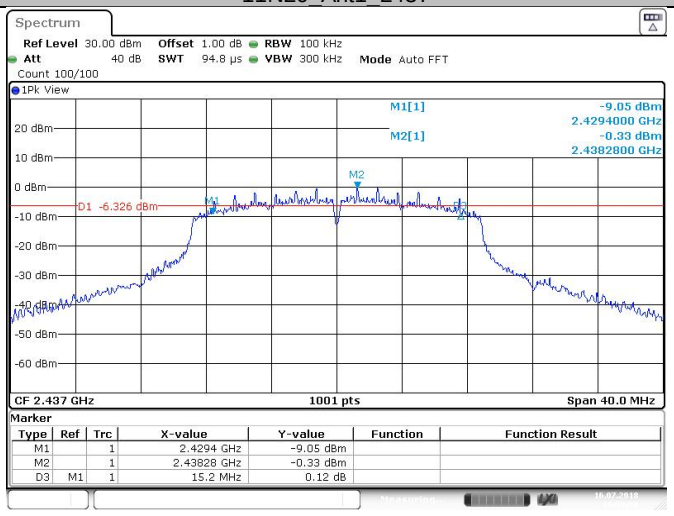

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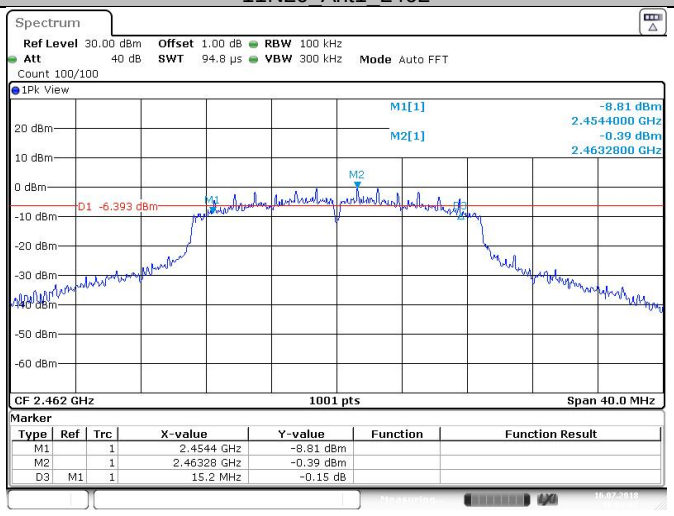

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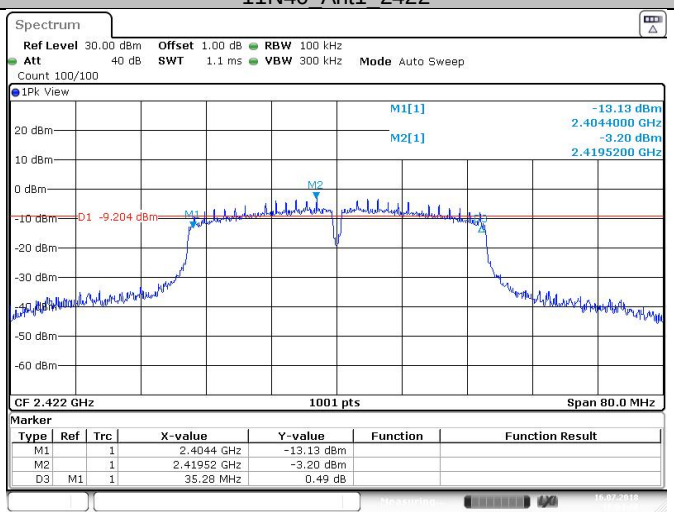
11N40_Ant1_2422



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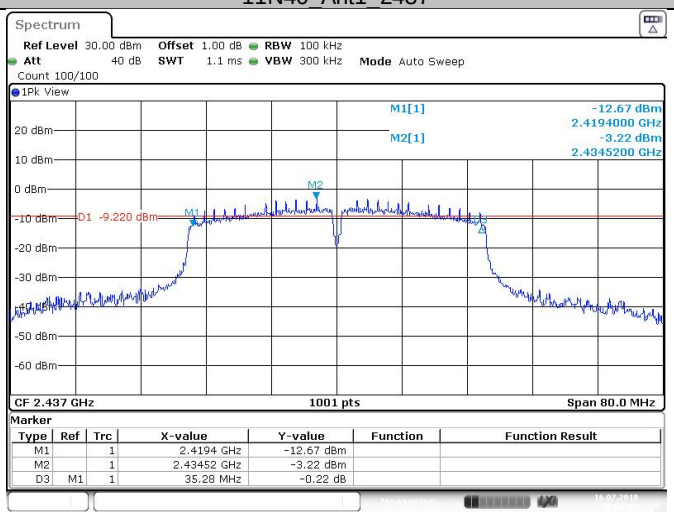
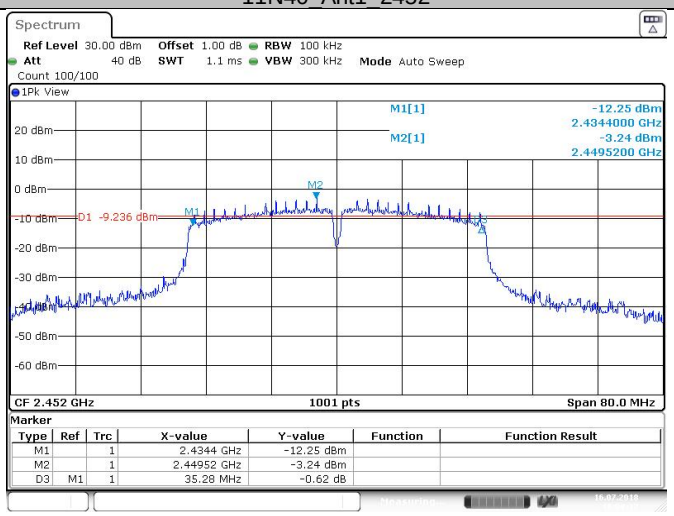


11N40_Ant1_2452



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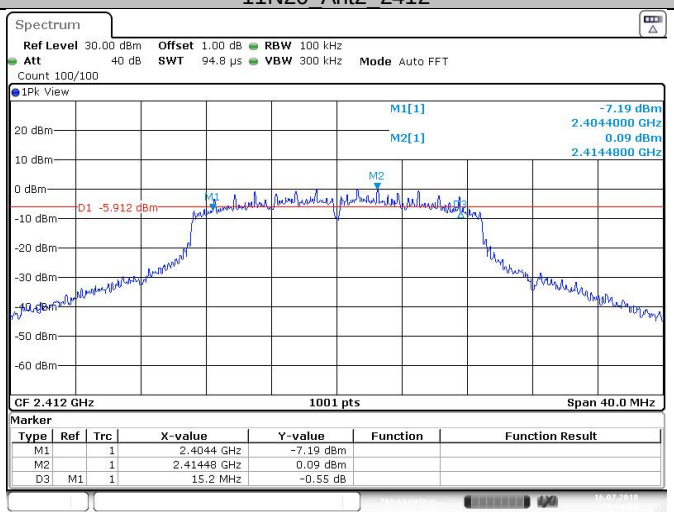
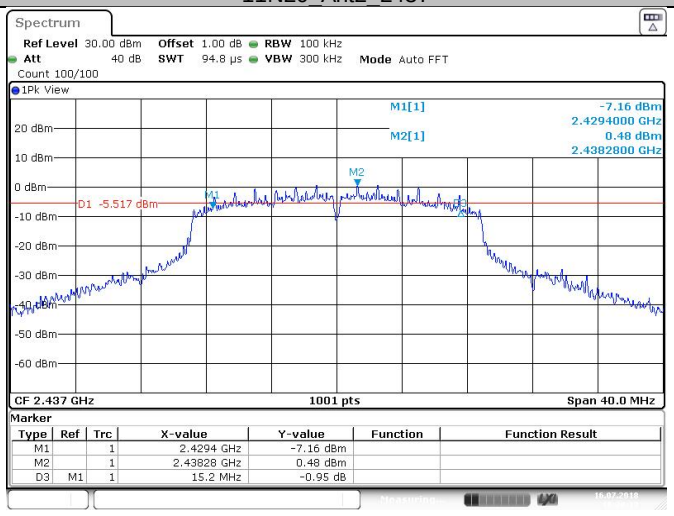
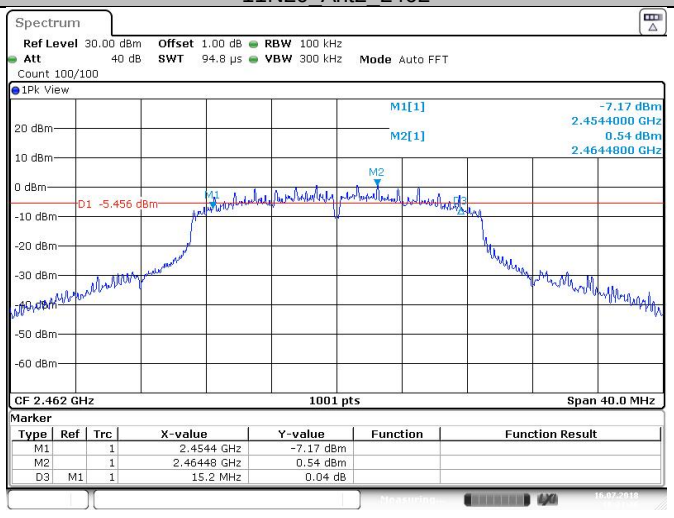
11N20_Ant2_2412



11N20_Ant2_2437



11N20_Ant2_2462



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9.5 Spurious RF conducted emissions

Test Method

1. 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
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

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

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Spurious RF conducted emissions

Test Result

TestMode	Antenna	Channel (MHz)	FreqRange (MHz)	RefLevel (dBm)	Result (dBm)	Limit (dBm)	Verdict
11B	Ant1	2412	Reference	1.34	1.34	---	PASS
		2412	30~1000	1.34	-69.42	-18.66	PASS
		2412	1000~26500	1.34	-46.73	-18.66	PASS
		2437	Reference	1.90	1.90	---	PASS
		2437	30~1000	1.90	-69.17	-18.1	PASS
		2437	1000~26500	1.90	-49.59	-18.1	PASS
		2462	Reference	1.55	1.55	---	PASS
		2462	30~1000	1.55	-68.51	-18.45	PASS
		2462	1000~26500	1.55	-48.72	-18.45	PASS
11G	Ant1	2412	Reference	0.51	0.51	---	PASS
		2412	30~1000	0.51	-69.05	-19.49	PASS
		2412	1000~26500	0.51	-53.08	-19.49	PASS
		2437	Reference	0.26	0.26	---	PASS
		2437	30~1000	0.26	-68.73	-19.74	PASS
		2437	1000~26500	0.26	-52.43	-19.74	PASS
		2462	Reference	0.15	0.15	---	PASS
		2462	30~1000	0.15	-69.21	-19.85	PASS
		2462	1000~26500	0.15	-52.97	-19.85	PASS
11N20	Ant1	2412	Reference	-0.55	-0.55	---	PASS
		2412	30~1000	-0.55	-68.36	-20.55	PASS
		2412	1000~26500	-0.55	-52.5	-20.55	PASS
		2437	Reference	-0.30	-0.30	---	PASS
		2437	30~1000	-0.30	-68.73	-20.3	PASS
		2437	1000~26500	-0.30	-53.42	-20.3	PASS
		2462	Reference	-0.35	-0.35	---	PASS
		2462	30~1000	-0.35	-68.78	-20.35	PASS
		2462	1000~26500	-0.35	-52.3	-20.35	PASS
11N40	Ant1	2422	Reference	-3.51	-3.51	---	PASS
		2422	30~1000	-3.51	-69.17	-23.51	PASS
		2422	1000~26500	-3.51	-52.66	-23.51	PASS
		2437	Reference	-3.56	-3.56	---	PASS
		2437	30~1000	-3.56	-69.04	-23.56	PASS
		2437	1000~26500	-3.56	-53.4	-23.56	PASS
		2452	Reference	-3.22	-3.22	---	PASS
		2452	30~1000	-3.22	-67.93	-23.22	PASS
		2452	1000~26500	-3.22	-52.93	-23.22	PASS
11N20	Ant2	2412	Reference	0.06	0.06	---	PASS
		2412	30~1000	0.06	-69.13	-19.94	PASS
		2412	1000~26500	0.06	-52.7	-19.94	PASS
		2437	Reference	0.58	0.58	---	PASS
		2437	30~1000	0.58	-68.96	-19.42	PASS
		2437	1000~26500	0.58	-52.97	-19.42	PASS
		2462	Reference	0.52	0.52	---	PASS
		2462	30~1000	0.52	-68.78	-19.48	PASS
		2462	1000~26500	0.52	-53.17	-19.48	PASS

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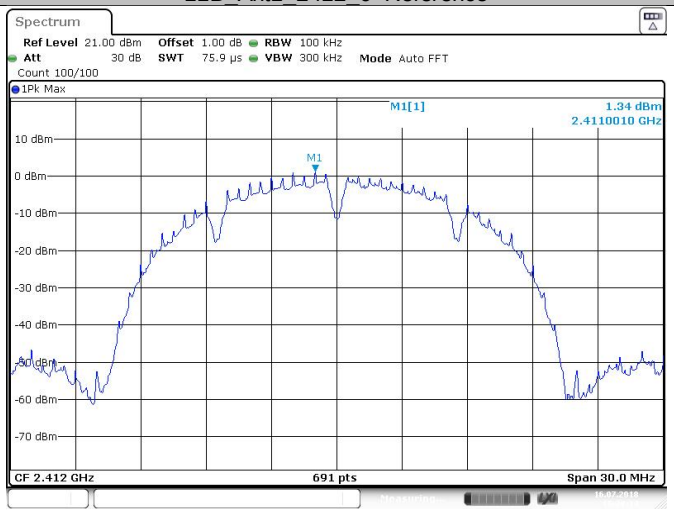
Test Graphs

11B_Ant1_2412_0~Reference



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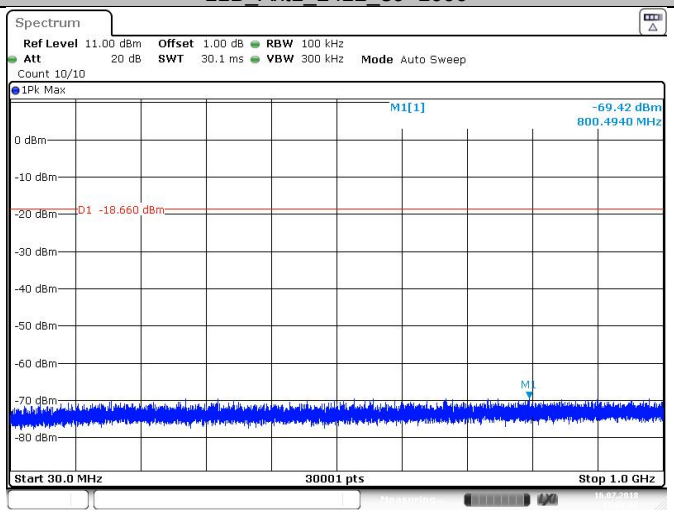
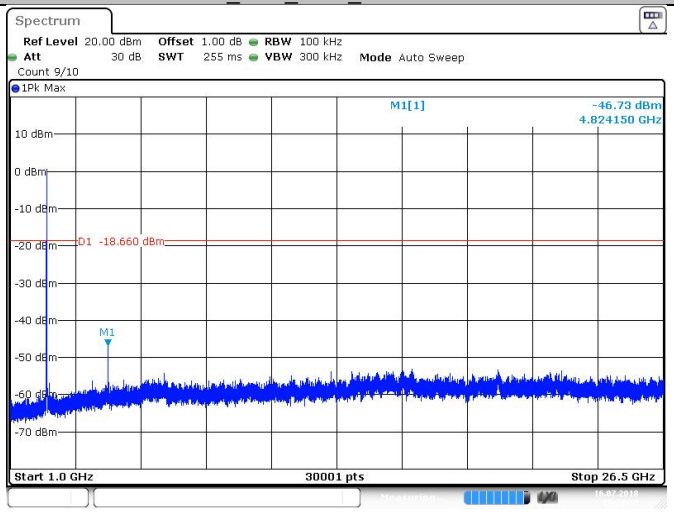


11B_Ant1_2412_1000~26500



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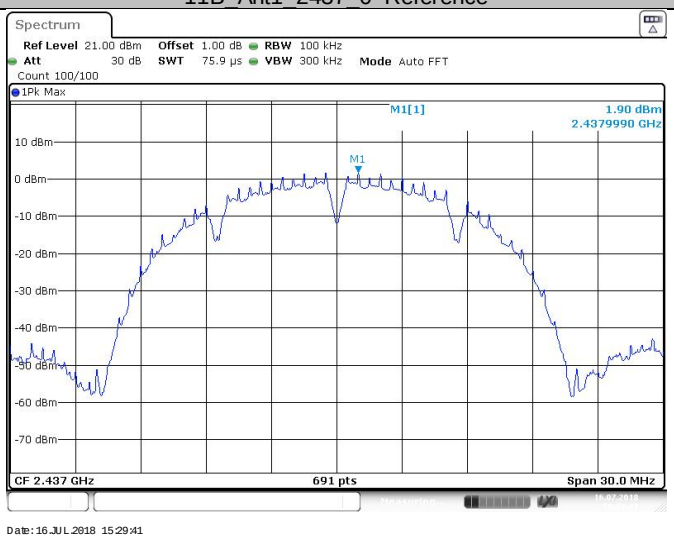
11B_Ant1_2437_0~Reference


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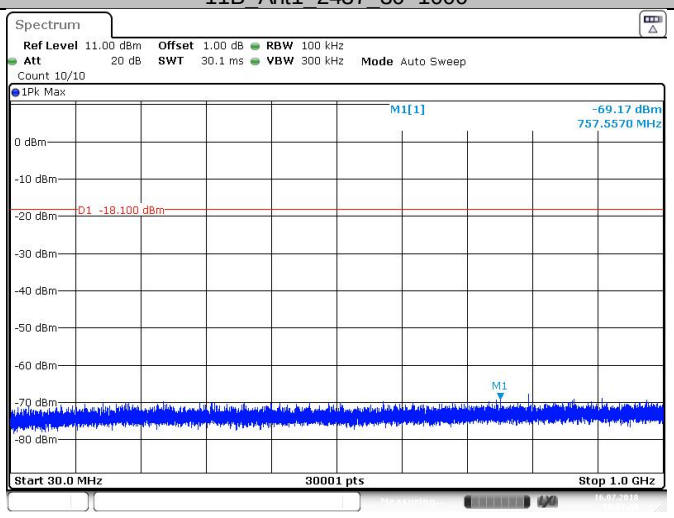

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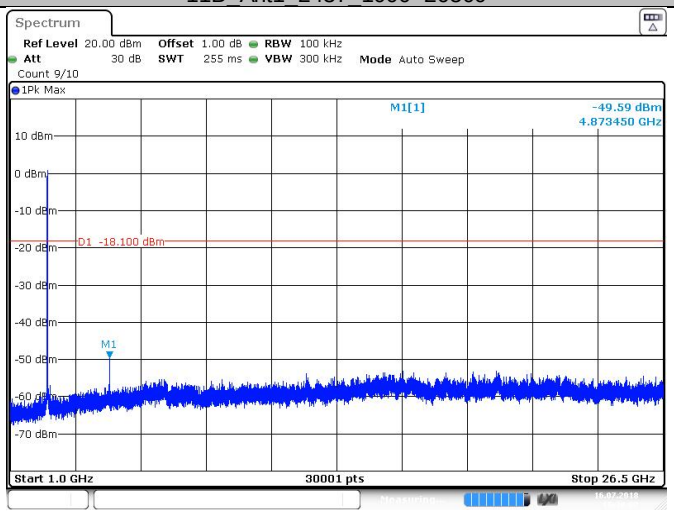

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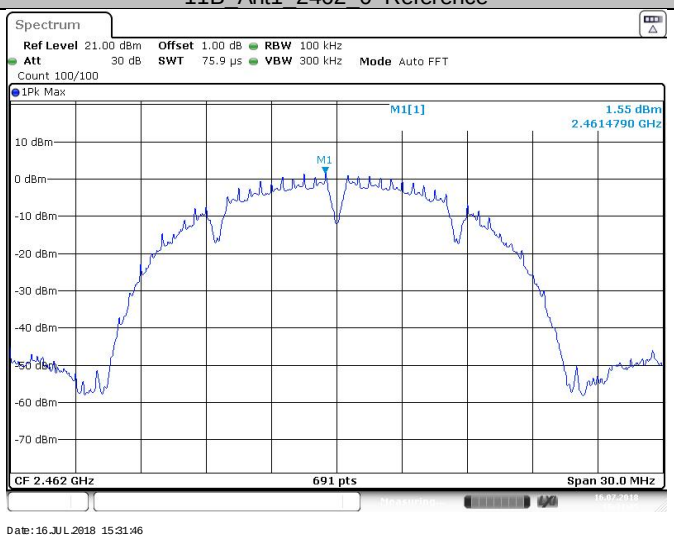

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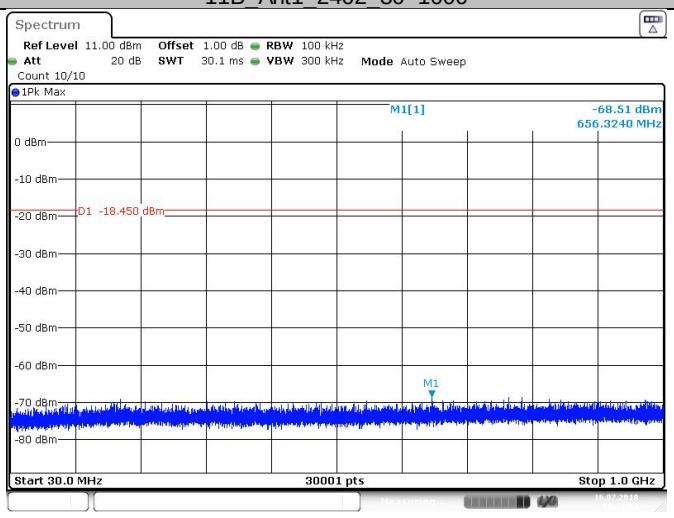

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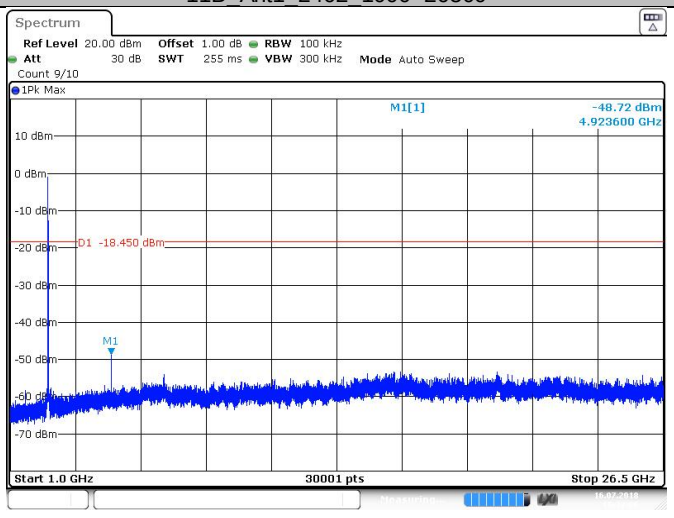

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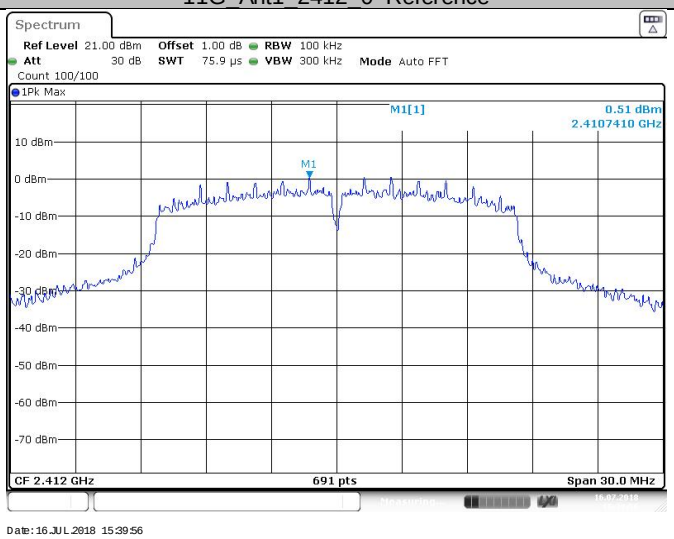
11G_Ant1_2412_0~Reference

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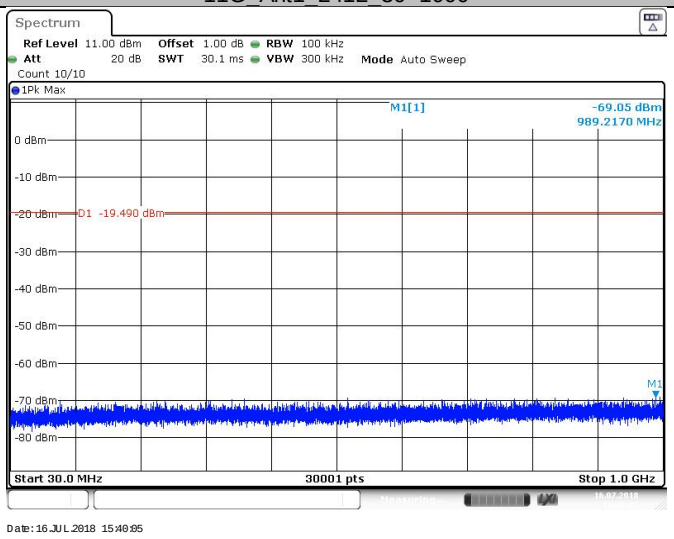
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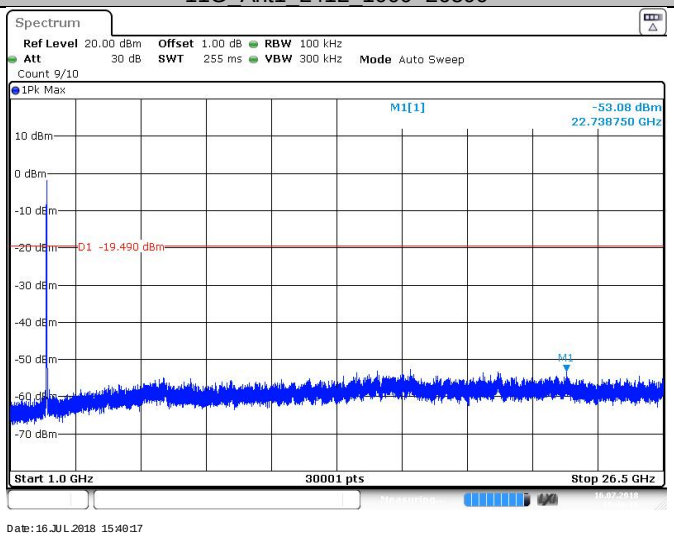

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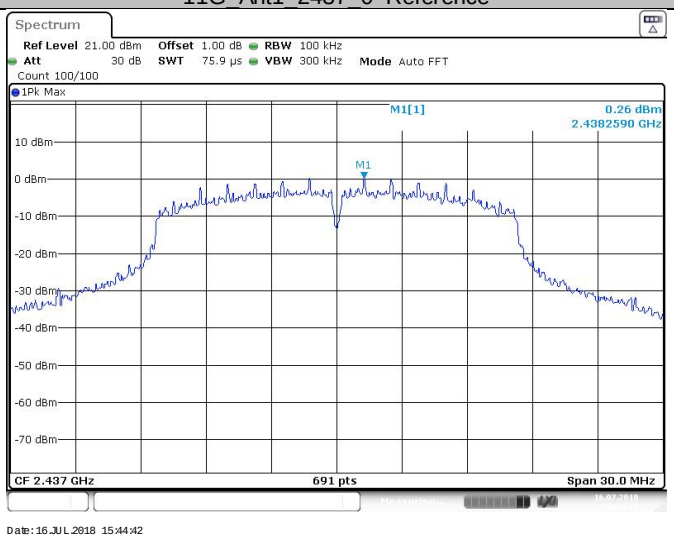
11G_Ant1_2437_0~Reference


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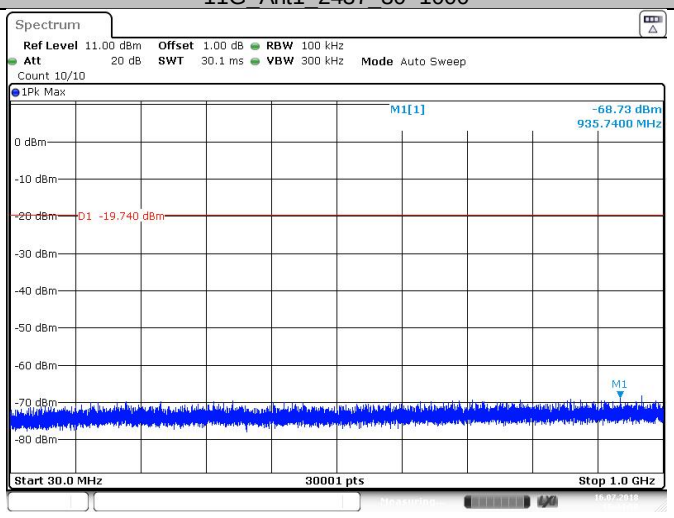

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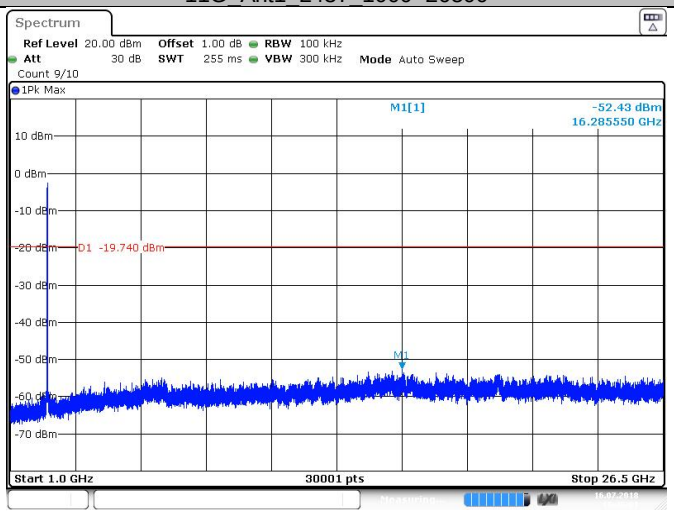

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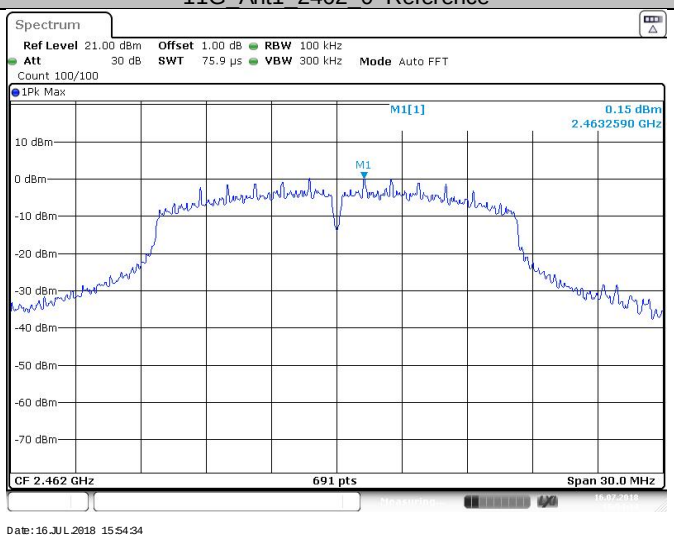
11G_Ant1_2462_0~Reference


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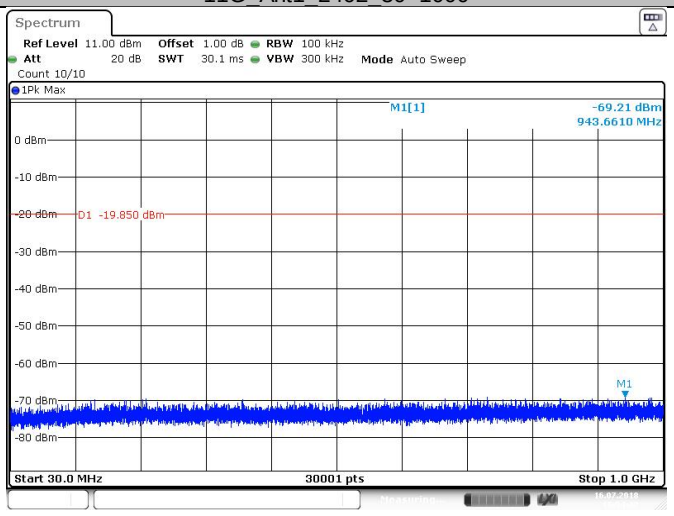

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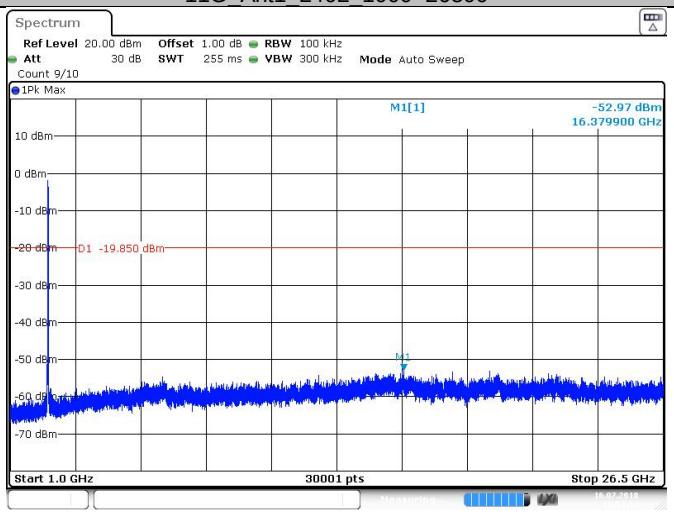

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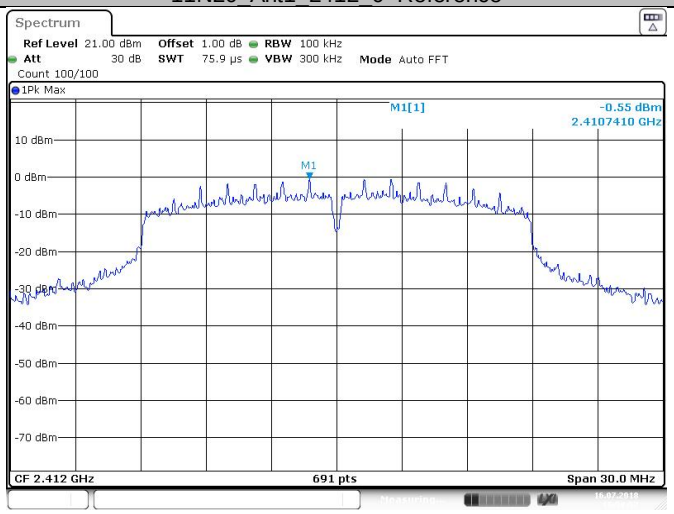
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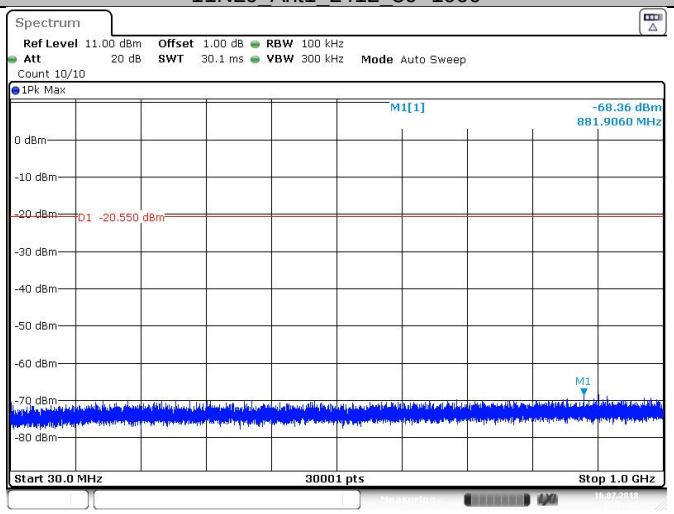
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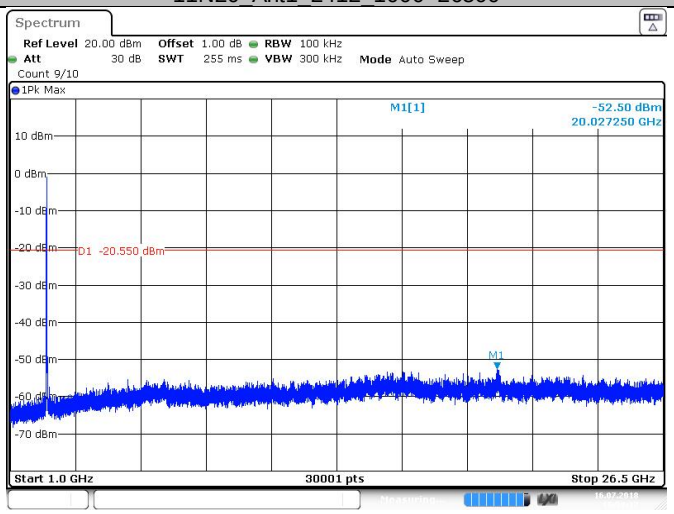

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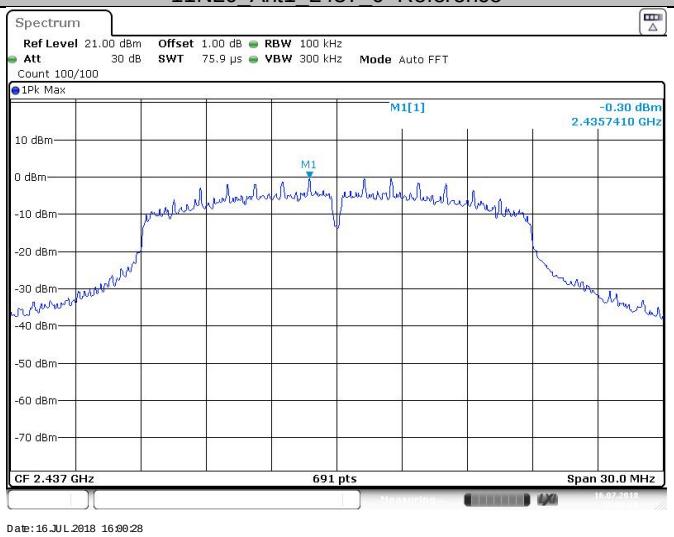
11N20_Ant1_2437_0~Reference

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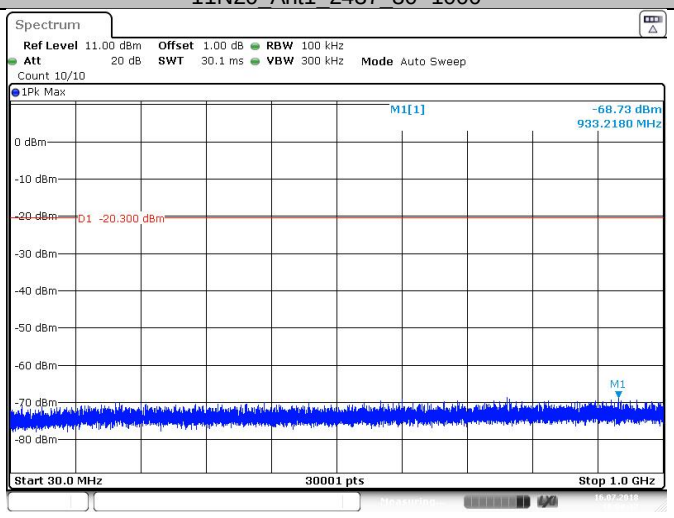
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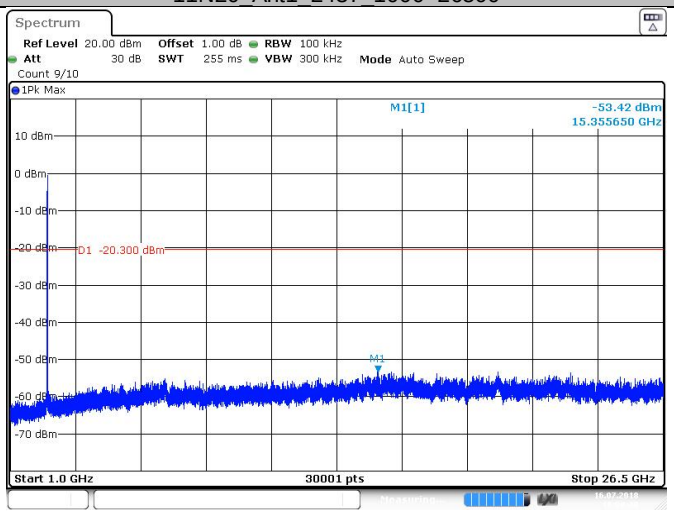

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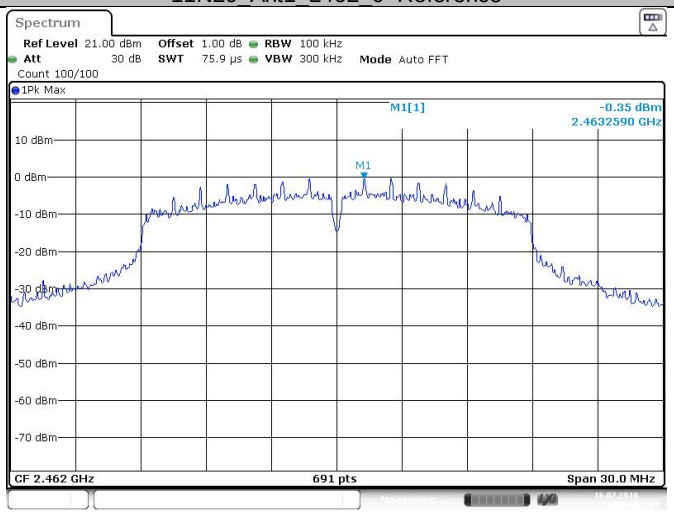
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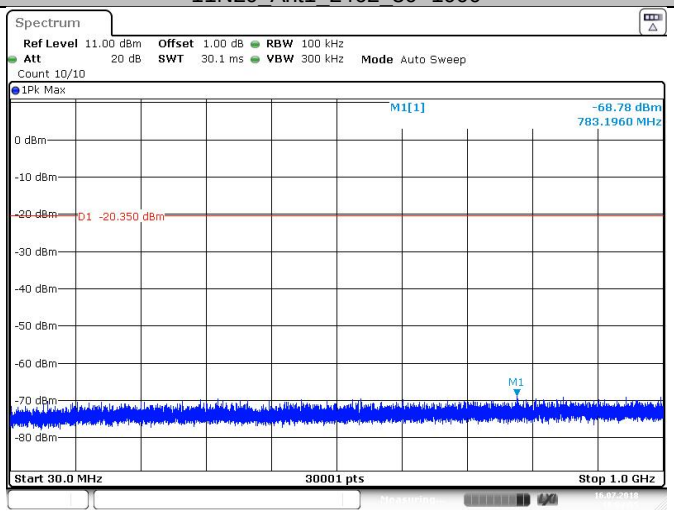
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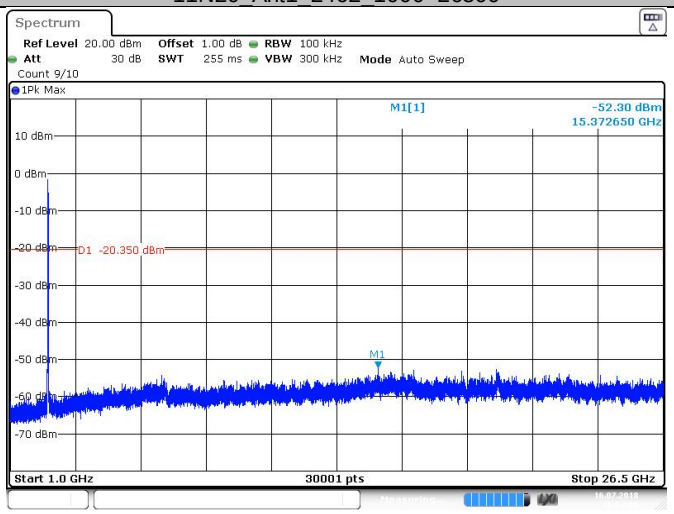

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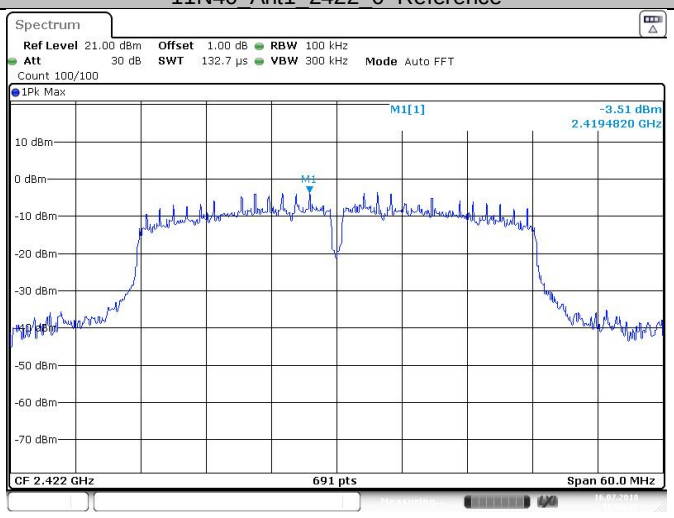
11N40_Ant1_2422_0~Reference

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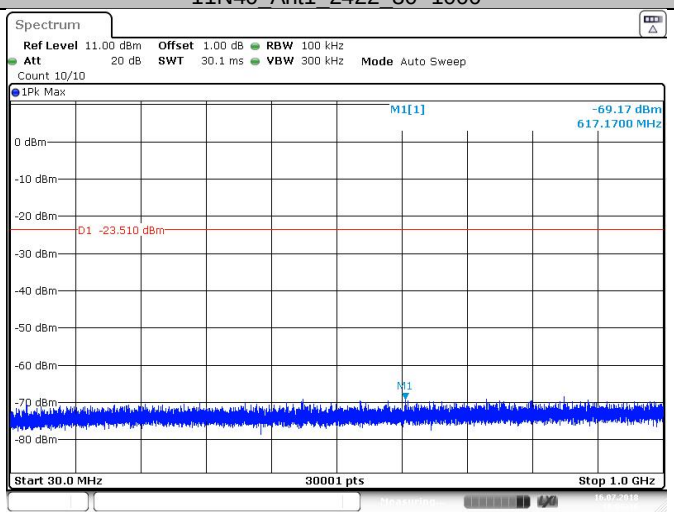
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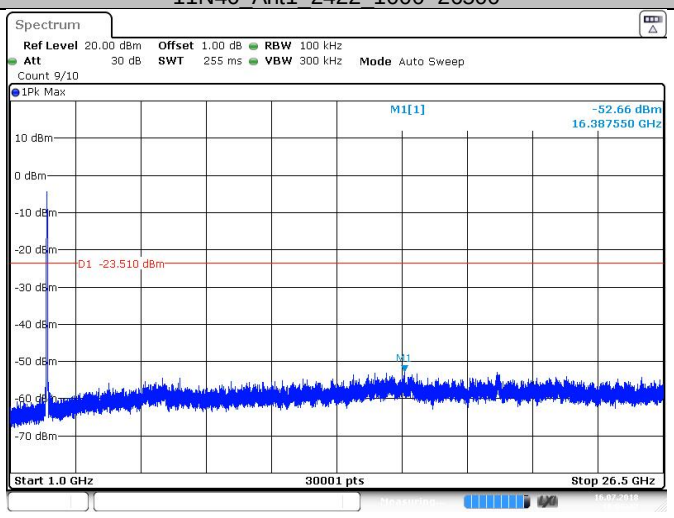

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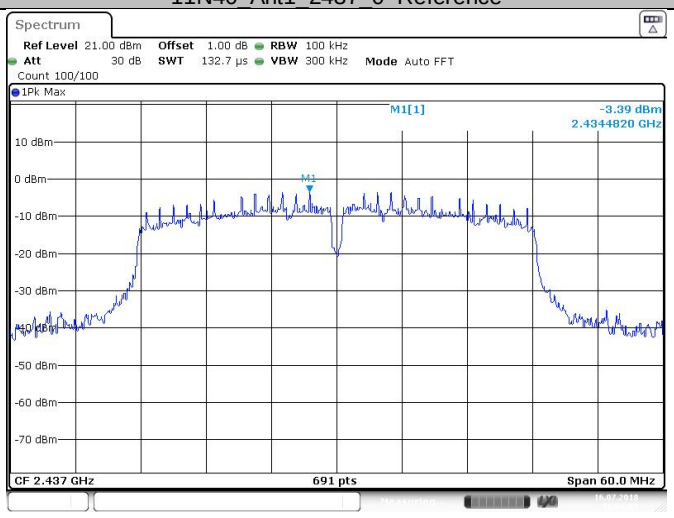
11N40_Ant1_2437_0~Reference

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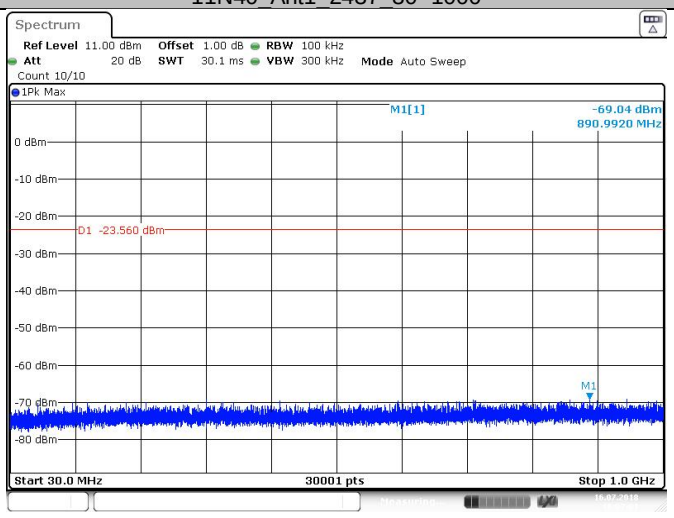
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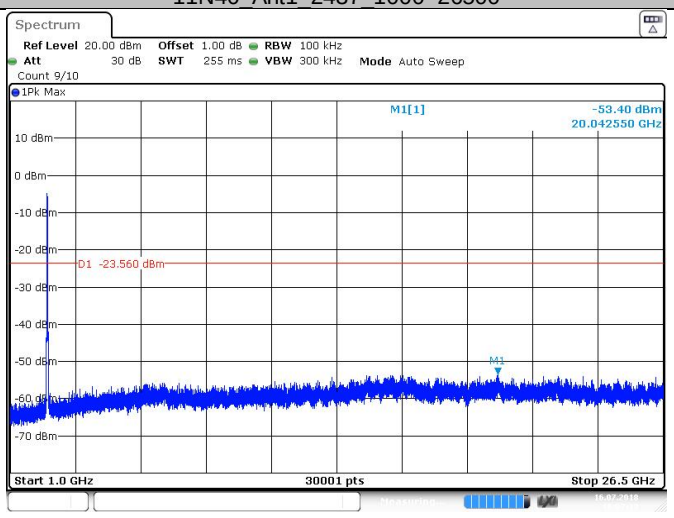

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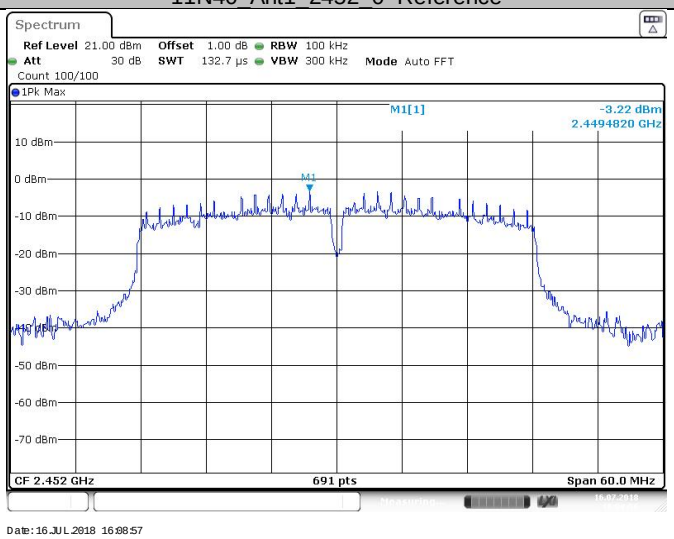
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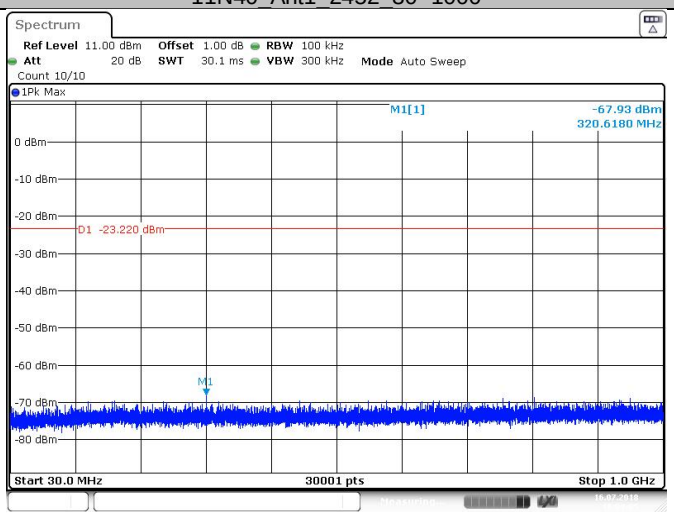
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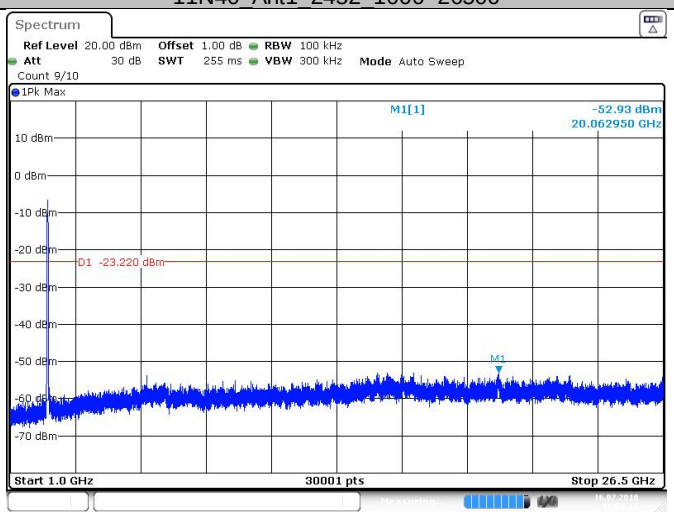

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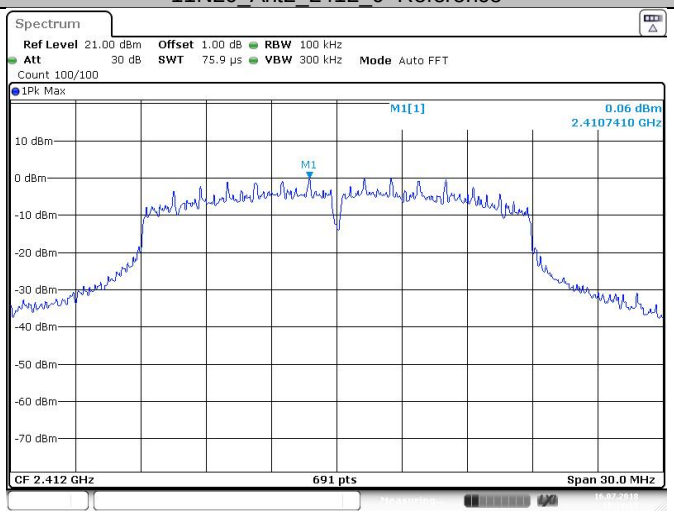
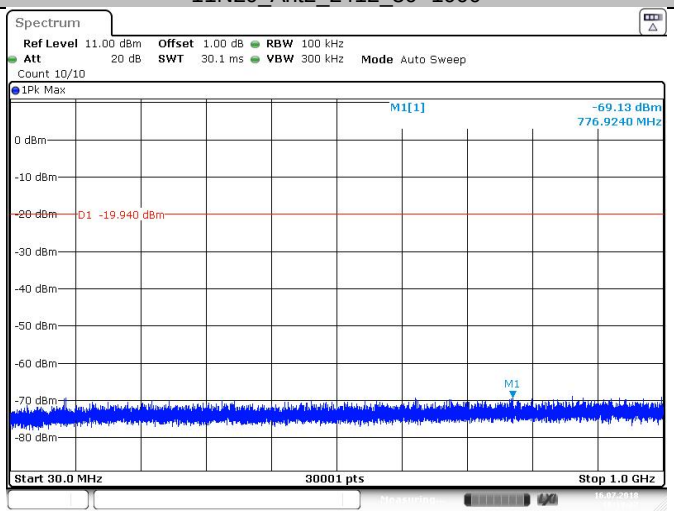
11N20_Ant2_2412_0~Reference



Date: 16.JUL.2018 16:19:18

11N20_Ant2_2412_30~1000



Date: 16.JUL.2018 16:19:27

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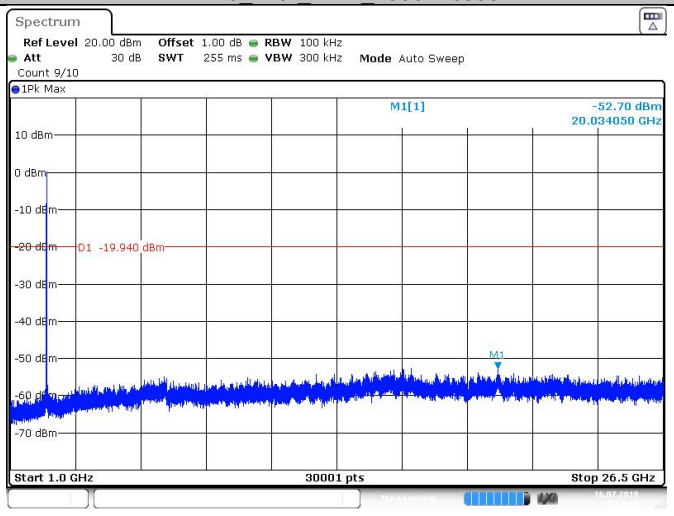

Date: 16.JUL.2018 16:19:38

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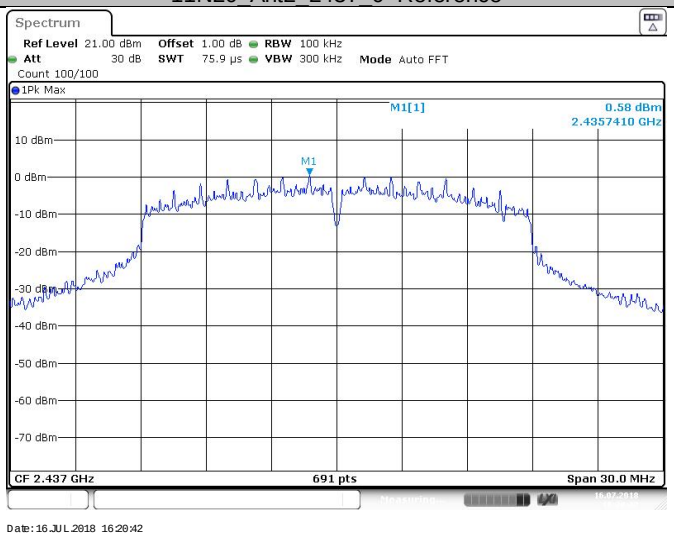

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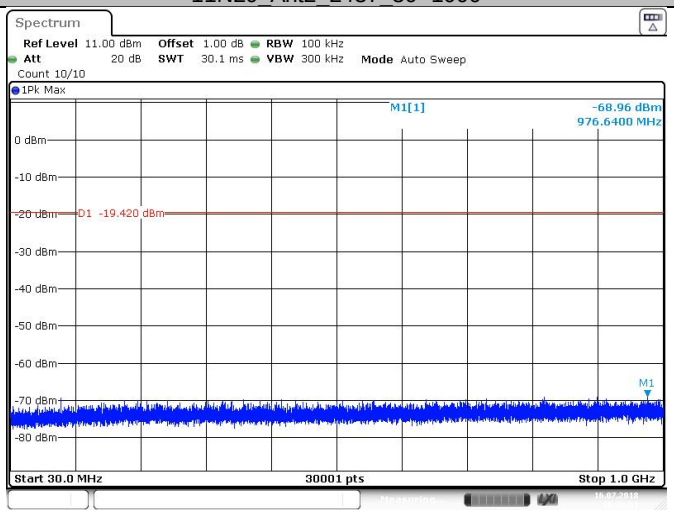
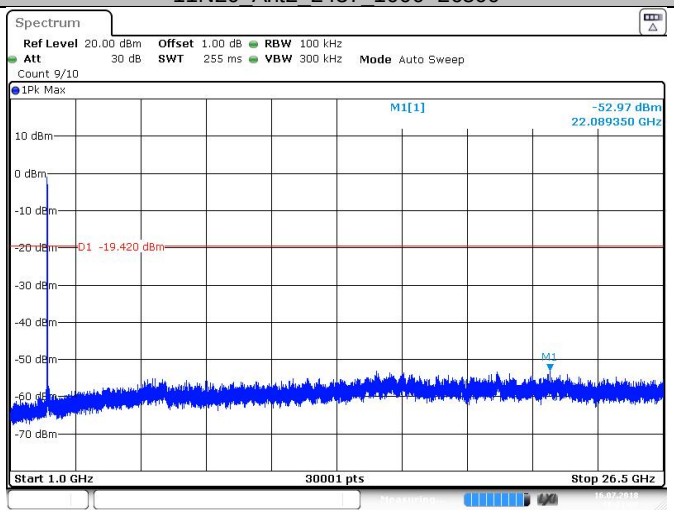


11N20_Ant2_2437_1000~26500


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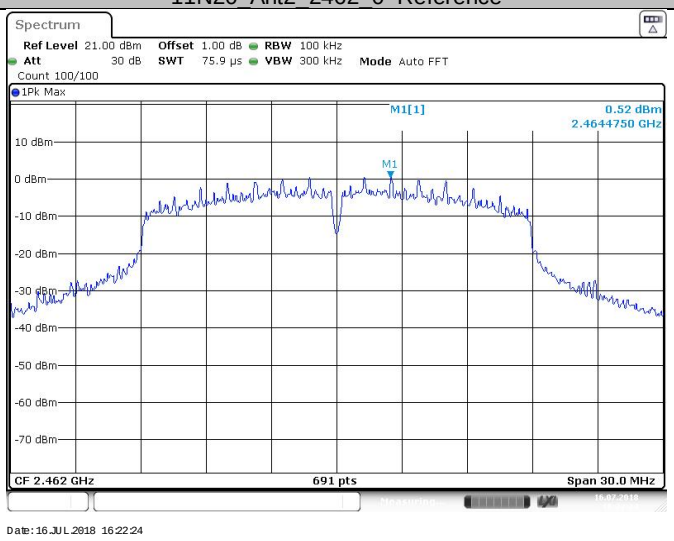
11N20_Ant2_2462_0~Reference

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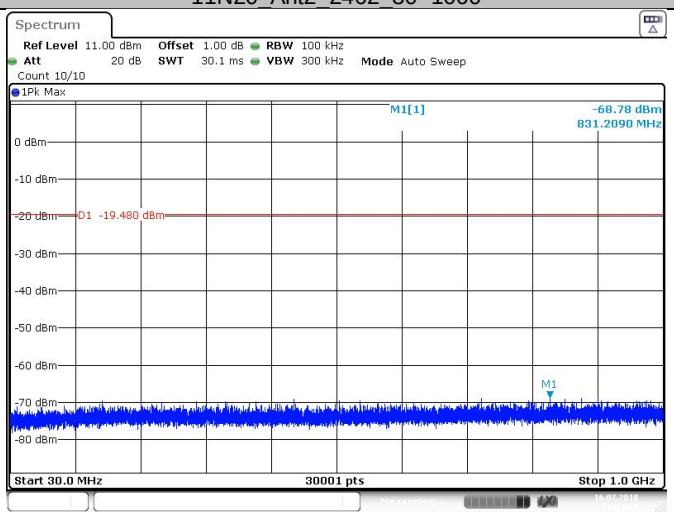
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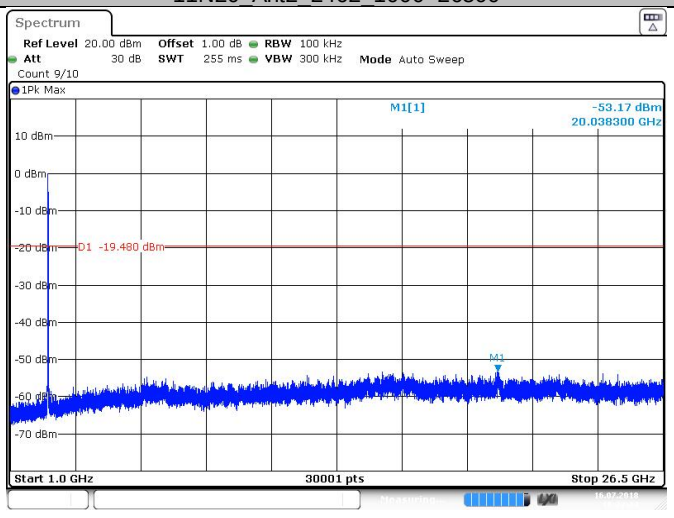

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9.6 Band edge testing

Test Method

1 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≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section. .
4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the100 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 that the transmitter demonstrates compliance with the peak conducted power limits.

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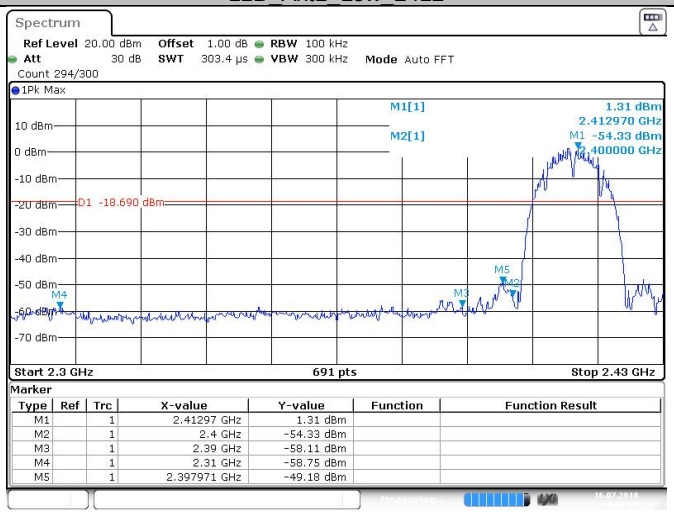
Band edge testing

Test result

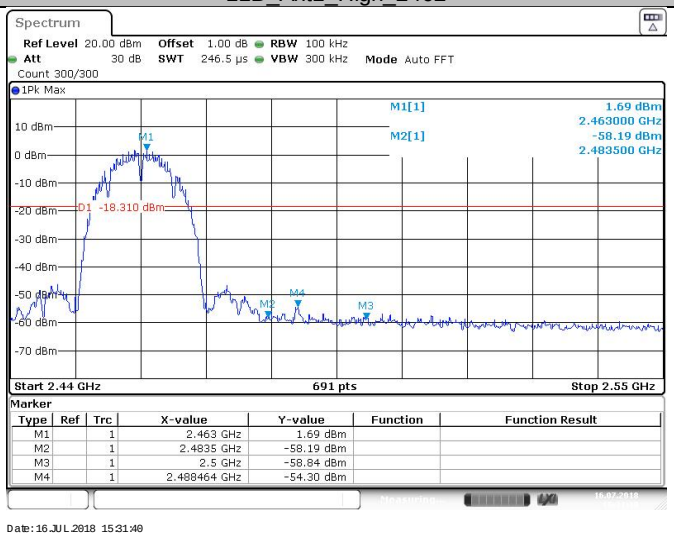
TestMode	Antenna	ChName	Channel (MHz)	RefLevel (dBm)	Result (dBm)	Limit (dBm)	Verdict
11B	Ant1	Low	2412	1.31	-49.18	-18.69	PASS
		High	2462	1.69	-54.3	-18.31	PASS
11G	Ant1	Low	2412	0.58	-30.07	-19.42	PASS
		High	2462	0.14	-48.06	-19.86	PASS
11N20	Ant1	Low	2412	-0.71	-28.97	-20.71	PASS
		High	2462	-0.41	-43.35	-20.41	PASS
11N40	Ant1	Low	2422	-3.30	-35.82	-23.3	PASS
		High	2452	-3.19	-38.92	-23.19	PASS
11N20	Ant2	Low	2412	-0.10	-29	-20.1	PASS
		High	2462	0.43	-47.2	-19.57	PASS

Test Graphs

11B_Ant1_Low_2412



11B_Ant1_High_2462



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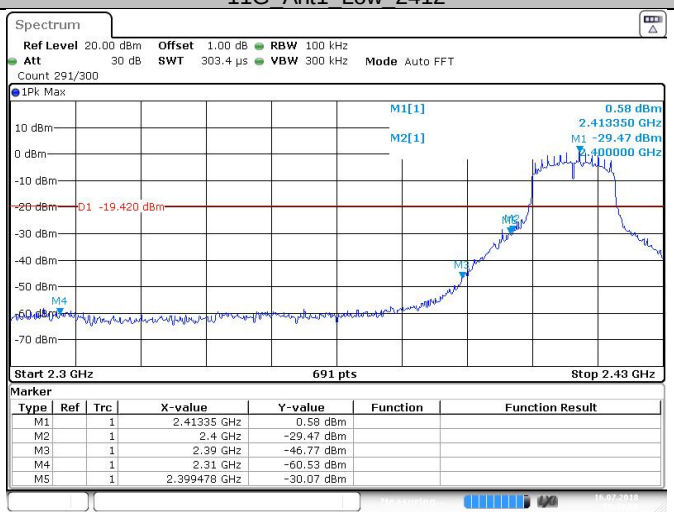
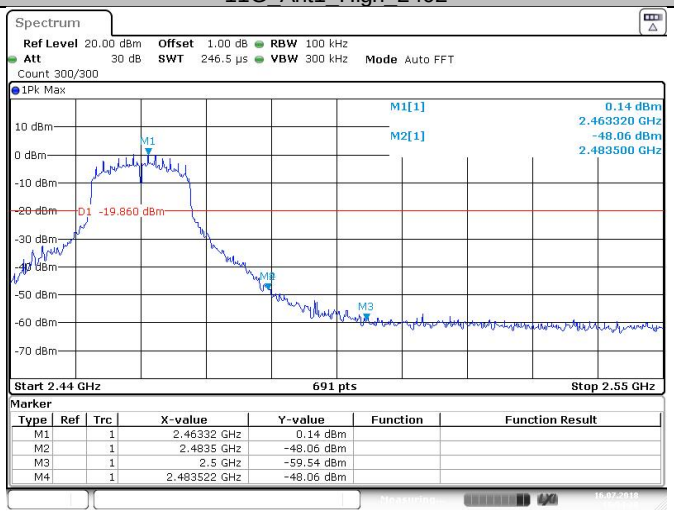
11G_Ant1_Low_2412



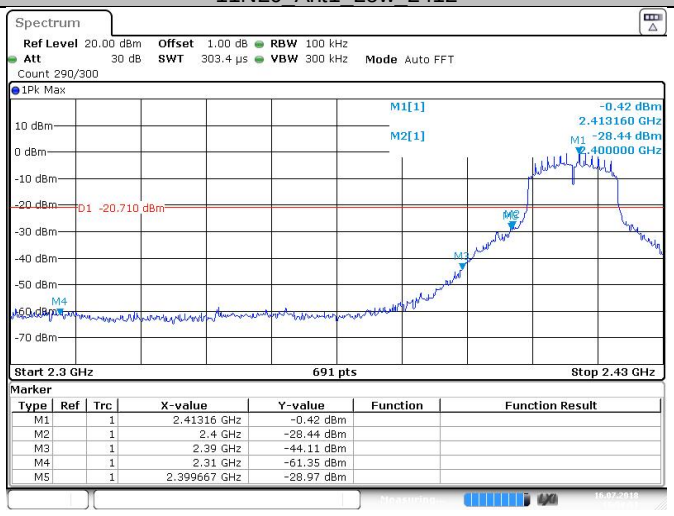
Date: 16.JUL.2018 15:39:50

11G_Ant1_High_2462



Date: 16.JUL.2018 15:54:28

11N20_Ant1_Low_2412



Date: 16.JUL.2018 15:58:51

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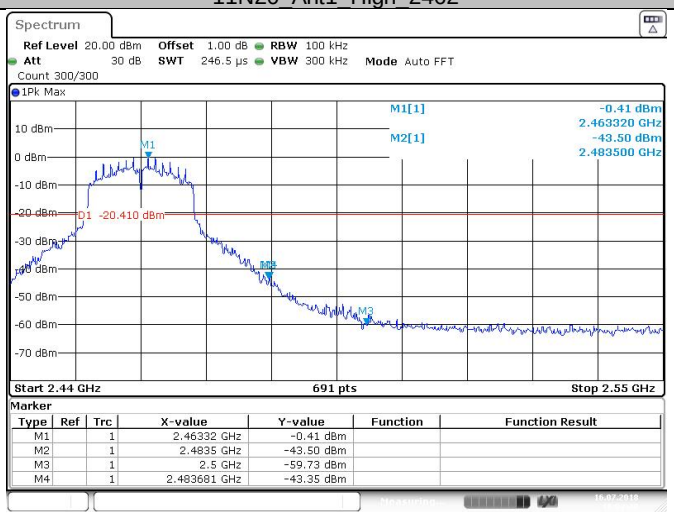
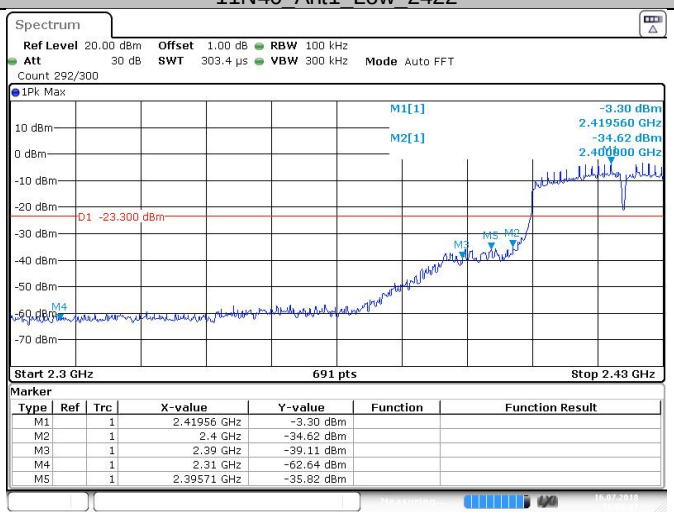
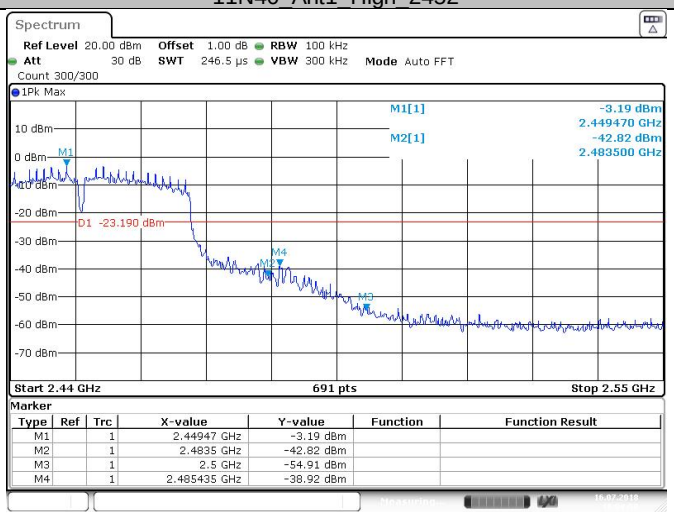
11N20_Ant1_High_2462

11N40_Ant1_Low_2422

11N40_Ant1_High_2452


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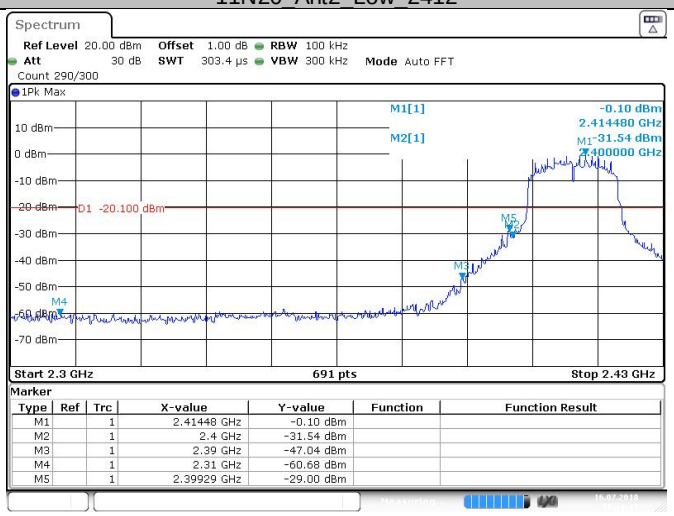
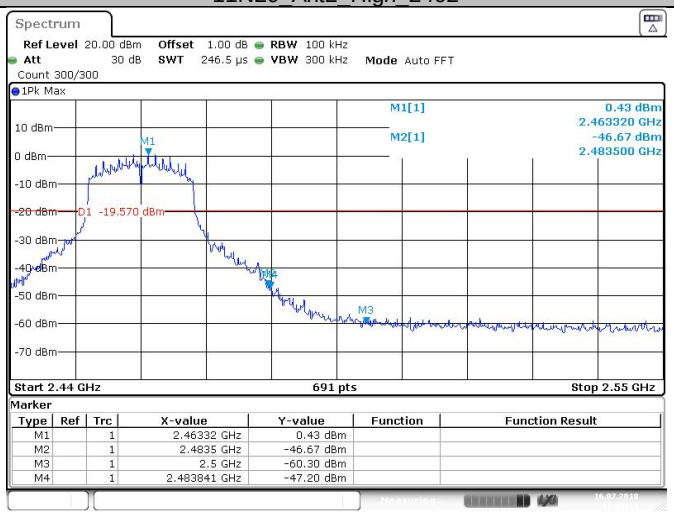
11N20_Ant2_Low_2412


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41448 GHz	-0.10 dBm		
M2		1	2.4 GHz	-31.54 dBm		
M3		1	2.39 GHz	-47.04 dBm		
M4		1	2.31 GHz	-60.68 dBm		
M5		1	2.39929 GHz	-29.00 dBm		

Date: 16.JUL.2018 16:19:12

11N20_Ant2_High_2462


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46332 GHz	0.43 dBm		
M2		1	2.4835 GHz	-46.67 dBm		
M3		1	2.5 GHz	-60.30 dBm		
M4		1	2.483841 GHz	-47.20 dBm		

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9.7 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter 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≥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≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

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 (20log(1/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 section15.205, 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

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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.
Pretest all modulation type, report the data of the worst case.
Transmitting spurious emission test result as below:
ANT1:

Emission below 1GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
39.053333	25.97	40.00	14.03	V	-25.0
349.992222	27.30	46.00	18.70	H	-24.4
873.846111	30.17	46.00	15.83	H	-15.7

Emission between 1G-25GHz

802.11b Modulation:
2412MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
1278.687500	26.38	74.00	47.62	H	-12.0
2310.000000	32.24	74.00	41.76	H	-6.3
2409.250000	33.92	74.00	40.08	H	-5.9
2515.000000	33.41	74.00	40.59	H	-5.4
4823.906250	47.21	74.00	26.79	H	2.6
7497.656250	39.58	74.00	34.42	H	6.6
9477.187500	41.35	74.00	32.65	H	8.8
13627.50000	44.34	74.00	29.66	H	14.5
1225.000000	29.31	74.00	44.69	V	-12.2
1583.937500	29.99	74.00	44.01	V	-9.7
2416.000000	33.23	74.00	40.77	V	-5.8
2514.000000	33.02	74.00	40.98	V	-5.3
4823.906250	40.59	74.00	33.41	V	2.7
7021.875000	38.74	74.00	35.26	V	6.0
9120.468750	41.61	74.00	32.39	V	8.5
11128.59375	43.53	74.00	30.47	V	10.8

2437MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
1225.000000	30.38	74.00	43.62	V	-12.2
2439.750000	35.15	74.00	38.85	V	-5.7
2540.312500	32.59	74.00	41.41	V	-5.3
4874.062500	42.36	74.00	31.64	V	2.6
7488.750000	39.46	74.00	34.54	V	6.7
10106.71875	40.83	74.00	33.17	V	9.7
13626.09375	44.67	74.00	29.33	V	14.7
1000.000000	21.18	54.00	52.82	H	-14.2
1784.437500	29.00	74.00	45.00	H	-8.7
2436.500000	34.75	74.00	39.25	H	-5.9
2540.437500	33.67	74.00	40.33	H	-5.4
4874.062500	44.91	74.00	29.09	H	2.5
7522.500000	40.26	74.00	33.74	H	6.5
10616.25000	42.63	74.00	31.37	H	9.9
13609.21875	44.03	74.00	29.97	H	14.6

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2462MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
1282.375000	27.40	74.00	46.60	H	-12.0
2358.812500	31.26	74.00	42.74	H	-6.1
2461.250000	33.65	74.00	40.35	H	-5.7
2565.687500	33.50	74.00	40.50	H	-5.2
4923.750000	49.64	74.00	24.36	H	2.6
8758.593750	42.15	74.00	31.85	H	8.8
12804.84375	45.89	74.00	28.11	H	12.9
14985.93750	48.44	74.00	25.56	H	18.6
1225.000000	30.89	74.00	43.11	V	-12.2
2359.250000	31.71	74.00	42.29	V	-5.9
2460.000000	32.54	74.00	41.46	V	-5.6
4923.750000	45.03	74.00	28.97	V	2.7
6369.375000	36.86	74.00	37.14	V	4.6
8054.062500	39.58	74.00	34.42	V	7.9
13037.34375	44.78	74.00	29.22	V	13.3

ANT1+ANT2:
802.11n(20) Modulation with two antennas:

Emission below 1GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
72.572222	21.12	40.00	18.88	V	-30.9
525.023333	21.13	46.00	24.87	V	-20.3
71.763889	15.92	40.00	24.08	H	-30.7
374.996667	29.54	46.00	16.46	H	-24.1

Emission between 1G-25GHz

2412MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
1268.562500	30.52	74.00	43.48	V	-11.8
1792.000000	31.11	74.00	42.89	V	-8.4
2414.500000	36.29	74.00	37.71	V	-5.8
3825.000000	35.78	74.00	38.22	V	-0.3
5526.093750	35.19	74.00	38.81	V	3.0
8758.593750	42.08	74.00	31.92	V	8.9
12795.46875	42.35	74.00	31.65	V	13.0
1270.562500	32.53	74.00	41.47	H	-12.0
1781.437500	31.93	74.00	42.07	H	-8.7
2408.250000	35.09	74.00	38.91	H	-5.9
4823.906250	42.97	74.00	31.03	H	2.6
7012.500000	40.33	74.00	33.67	H	5.7
10247.34375	42.14	74.00	31.86	H	9.5
12327.65625	42.77	74.00	31.23	H	12.5

2437MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
1265.750000	32.59	74.00	41.41	H	-12.0
1774.250000	33.34	74.00	40.66	H	-8.7
2444.500000	37.16	74.00	36.84	H	-5.8
4874.062500	41.21	74.00	32.79	H	2.5
6112.968750	37.27	74.00	36.73	H	3.9
7687.031250	38.64	74.00	35.36	H	6.4

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12077.34375	42.84	74.00	31.16	H	11.7
1075.000000	31.62	74.00	42.38	V	-13.5
1282.312500	30.36	74.00	43.64	V	-11.9
1949.187500	28.37	74.00	45.63	V	-7.3
2442.062500	40.13	74.00	33.87	V	-5.7
4751.250000	36.83	74.00	37.17	V	2.2
7529.062500	39.57	74.00	34.43	V	6.6
11028.75000	43.95	74.00	30.05	V	10.5
13537.03125	44.29	74.00	29.71	V	14.4

2462MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Pol	Corr. (dB)
1075.000000	32.53	74.00	41.47	V	-13.5
1281.187500	31.05	74.00	42.95	V	-11.9
2460.750000	39.61	74.00	34.39	V	-5.6
2568.562500	34.89	74.00	39.11	V	-5.1
4741.406250	34.65	74.00	39.35	V	2.2
7071.093750	40.30	74.00	33.70	V	6.1
10079.06250	41.14	74.00	32.86	V	9.8
11840.62500	41.89	74.00	32.11	V	12.2
1075.000000	31.83	74.00	42.17	H	-13.6
1250.812500	32.77	74.00	41.23	H	-12.2
1773.312500	30.84	74.00	43.16	H	-8.7
2460.812500	40.00	74.00	34.00	H	-5.7
4923.750000	40.41	74.00	33.59	H	2.6
6419.062500	37.13	74.00	36.87	H	4.5
8242.031250	41.66	74.00	32.34	H	7.8
11762.81250	43.05	74.00	30.95	H	11.7

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) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

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10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
	LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
	LISN	Rohde & Schwarz	ENV432	101318	2019-7-6
	LISN	Rohde & Schwarz	ENV216	100326	2019-7-6
	ISN	Rohde & Schwarz	ENY81	100177	2019-7-6
	ISN	Rohde & Schwarz	ENY81-CA6	101664	2019-7-6
	High Voltage Probe	Rohde & Schwarz	TK9420(VT9420)	9420-584	2019-6-30
	RF Current Probe	Rohde & Schwarz	EZ-17	100816	2019-6-30
	Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2019-7-6
	Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2019-7-6
	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2019-7-6
	RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2019-7-6
RE	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	102294	2019-6-28
	Loop Antenna	Rohde & Schwarz	HFH2-Z2	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
	Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- 20dB bandwidth and 99% Occupied Bandwidth
- Carrier frequency separation
- Number of hopping frequencies
- Dwell Time
- Power spectral density
- Spurious RF conducted emissions
- Band edge

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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 Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 5.05dB; Vertical: 5.04dB;
Uncertainty for Conducted Emission 150kHz-30MHz	3.21dB
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%
Uncertainty Evaluation for Power Spectral Density Conducted measurement	1.17dB
Uncertainty Evaluation for Spurious emissions Conducted measurement	1.43dB

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