FCC - TEST REPORT

Report Number	:	**68.950.19.2757.01**	Date of Issue:	Sept 9, 2019
Model	:	**HVN: ED100, HVN: MD44014**		
Product Type	:	Mobile POS System		
Applicant	:	NumberFour AG		
Address	:	Schoenhauser Allee 8, 10119 Berlin, Germany		
Manufacturer	:	NumberFour AG		
Address	:	Schoenhauser Allee 8, 10119 Berlin, Germany		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**52**		

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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
FCC Registration Number:	CN5009
FCC Registration No.:	514049
Telephone:	86 755 8828 6998
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3 Description of the Equipment under Test

Product:	Mobile POS System
Model no.:	HVN: ED100, HVN: MD44014
FCC ID:	2ANTM-MD44014
Options and accessories:	Charger and power Cable
Rating:	3.85VDC, 2810mAh, (Supplied by Rechargeable Li-ion Battery) or 5VDC (Supplied by external adapter for Charging rechargeable battery)
Adapter information:	Model: DSA-18QFB FUS A Input:100-240VAC 50/60Hz, 0.8A, Output:5VDC,3A or 9V 2A or 12V 1.5A Manufacturer: Dee Van Enterprise Co., Ltd
RF Transmission Frequency:	13.56MHz for NFC 2402MHz-2480MHz for Bluetooth 2412MHz-2462MHz for 802.11b/g/n20/n40 (WIFI) 5150-5350, 5470-5825MHz for 802.11a/n20/n40/ac20/ac40/ac80 (WIFI)
No. of Operated Channel:	1 for NFC 79 for Bluetooth 11 for 802.11b/g/n20/n40 (WIFI) 43 for 802.11a/n20/n40/ac20/ac40/ac80 (WIFI)
Modulation:	ASK for NFC GFSK, π/4-DQPSK, 8DPSK for Bluetooth DSSS, OFDM for WIFI
Antenna Type:	FPC antenna
Antenna Gain:	1.2dBi max for 2.4GHz 2.0dBi max for 5GHz
Description of the EUT:	The Equipment Under Test (EUT) is a Mobile POS System which support WIFI at 2.4GHz and 5GHz, Bluetooth function operated at 2.4GHz

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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).

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5 Summary of Test Results

Test Condition		Test Result	Test Site
§15.207	Conducted emission AC power port	Pass	Site 1
§15.247(b)(1)	Conducted AV output power for FHSS	N/A	--
§15.247(b)(3)	Conducted peak output power & EIRP	Pass	Site 1
§15.247(e)	Power spectral density	Pass	Site 1
§15.247(a)(2)	6dB bandwidth	Pass	Site 1
§15.247(a)(1)	20dB Occupied bandwidth	N/A	--
--	99% Occupied Bandwidth	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	Pass	Site 1
§15.247(d)	Band edge	Pass	Site 1
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	Pass	Site 1
§15.203	Antenna requirement	See note 2	--

Note 1: N/A – Not Applicable.
Note 2: The EUT uses an FPC antenna, which gain is 1.2dBi. 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
This submittal(s) (test report) is intended for FCC ID: 2ANTM-MD44014, complies with Section 15.207, 15.209, 15.205, 15.247 of the FCC Part 15, Subpart C.
HVN: ED100 is a Mobile POS System with Bluetooth Low Energy/Bluetooth BDR+EDR/WIFI/NFC/GPS/UMTS/LTE function. HVN: ED100 with camera models HZPV4197(Manufacturer: SHENZHEN HEZHONG IMAGE TECHNOLOGY CO. Ltd) and YGA0711(Manufacturer: Shenzhen Yigao Photoelectric Technology Limited), with internal storage models KMQE60013M-B318 (Manufacturer: Sumsung) and H9TQ17ABJTCCUR-KUM (Manufacturer: hynix).
HVN: MD44014 is identical with model: HVN: ED100 except model name and trademark (HVN: MD44014 for MEDION, HVN: ED100 for enforeDonner), unless otherwise Specification the model: HVN: ED100 was choose as representative model to perform all test items, and model: HVN: MD44014 was deemed to fulfil relevant EMC requirements without further testing.

This report is for the WIFI 2.4GHz part.

SUMMARY:
All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

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

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

Sample Received Date: August 15, 2019

Testing Start Date: August 15, 2019

Testing End Date: September 6, 2019

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

Reviewed by:	Prepared by:	Tested by:
John Zhi	Joe Gu	Tree Zhan
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

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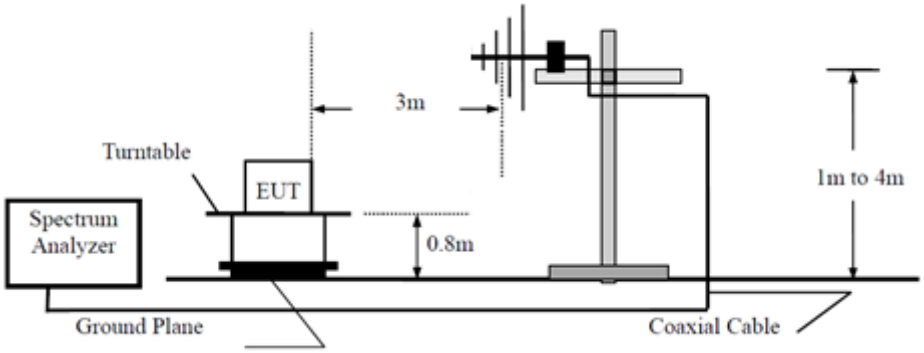
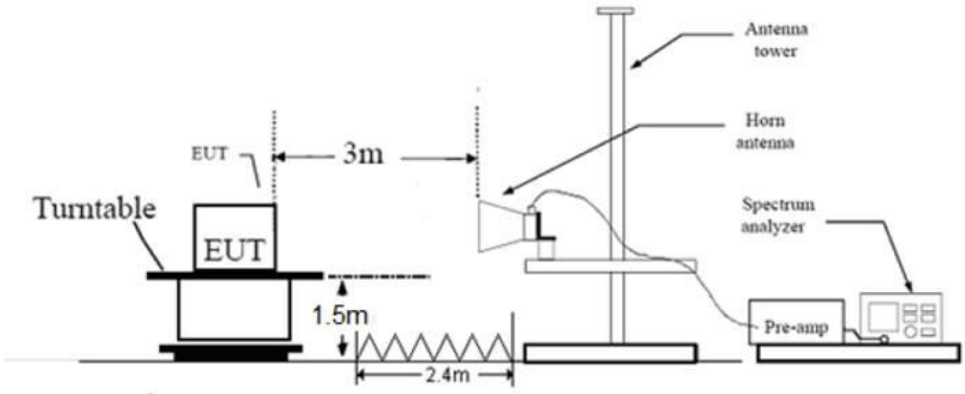
7 Test Setups

7.1 Radiated test setups

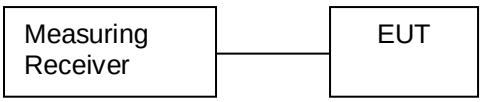
Below 1GHz



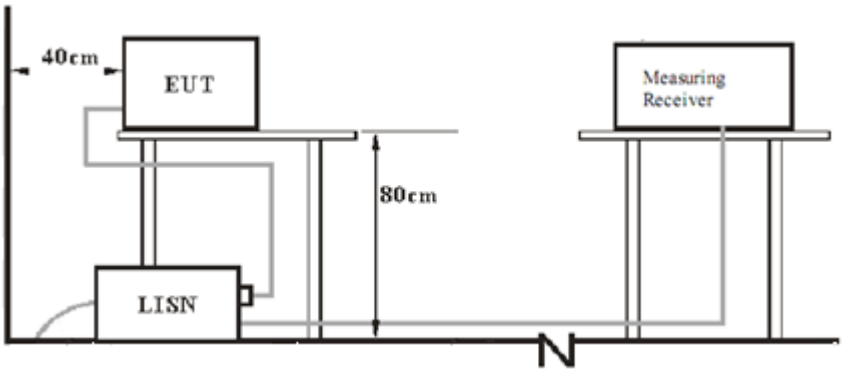
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Laptop	Lenovo	T460S	---

Test software information:

Test Software Version	QRCT (V3.0-00230) from QUALCOMM	
Modulation	Setting TX Power	Data Rate
802.11b	17	11b LONG 1 Mbps
802.11g	15	11g 6 Mbps
802.11n HT20	14	MCS0 6.5 Mbps
802.11n HT40	13.5	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

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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 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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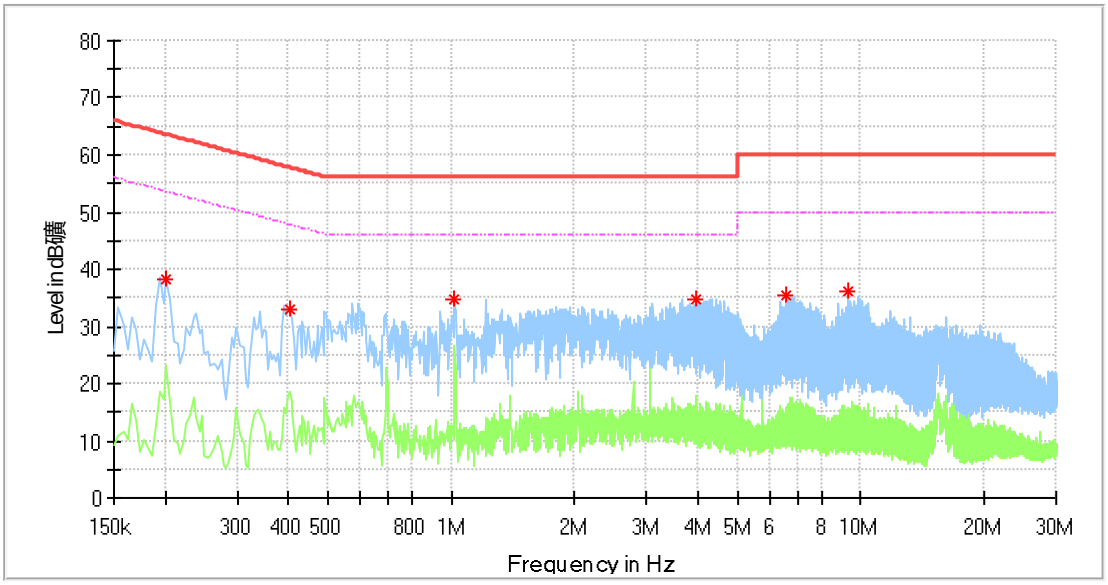
Conducted Emission

Product Type	:	Mobile POS System
M/N	:	HVN: ED100
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)
0.202000	38.29	---	63.53	25.23	L1	10.2
0.402000	32.96	---	57.81	24.85	L1	10.3
1.018000	34.64	---	56.00	21.36	L1	10.3
3.954000	34.76	---	56.00	21.24	L1	10.4
6.582000	35.43	---	60.00	24.57	L1	10.5
9.326000	35.98	---	60.00	24.02	L1	10.6

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)

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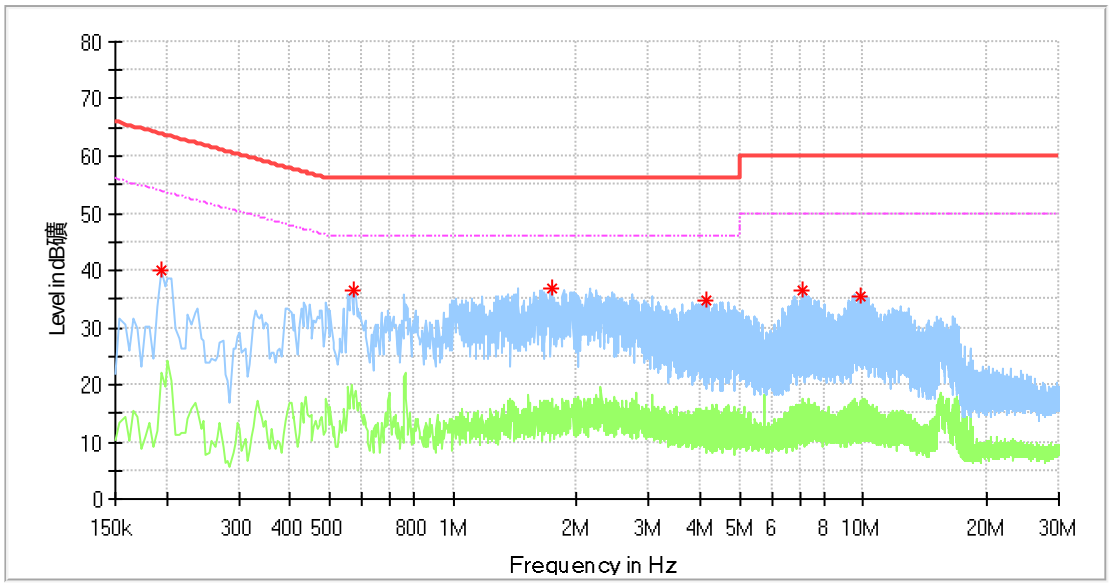
Conducted Emission

Product Type	:	Mobile POS System
M/N	:	HVN: ED100
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)
0.194000	40.01	---	63.86	23.86	N	10.2
0.574000	36.56	---	56.00	19.44	N	10.3
1.734000	36.99	---	56.00	19.01	N	10.3
4.166000	34.77	---	56.00	21.23	N	10.4
7.094000	36.62	---	60.00	23.38	N	10.6
9.874000	35.33	---	60.00	24.67	N	10.7

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)

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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	15.24	Pass
Middle channel 2437MHz	15.72	Pass
High channel 2462MHz	15.60	Pass

802.11g_SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	13.60	Pass
Middle channel 2437MHz	14.47	Pass
High channel 2462MHz	14.40	Pass

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802.11n20_ SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	12.93	Pass
Middle channel 2437MHz	13.84	Pass
High channel 2462MHz	13.75	Pass

802.11n40_ SISO modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	Result
Low channel 2412MHz	14.42	Pass
Middle channel 2437MHz	14.43	Pass
High channel 2462MHz	14.14	Pass

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9.3 6dB 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 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 ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

TestMode	Channel [MHz]	DTS BW [MHz]	Limit [MHz]	Verdict
11B	2412	8.160	≥500	PASS
	2437	8.640	≥500	PASS
	2462	9.120	≥500	PASS
11G	2412	16.400	≥500	PASS
	2437	16.440	≥500	PASS
	2462	16.400	≥500	PASS
11N20SISO	2412	17.400	≥500	PASS
	2437	17.680	≥500	PASS
	2462	17.680	≥500	PASS
11N40SISO	2422	35.280	≥500	PASS
	2437	35.280	≥500	PASS
	2452	35.520	≥500	PASS

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Test Graphs

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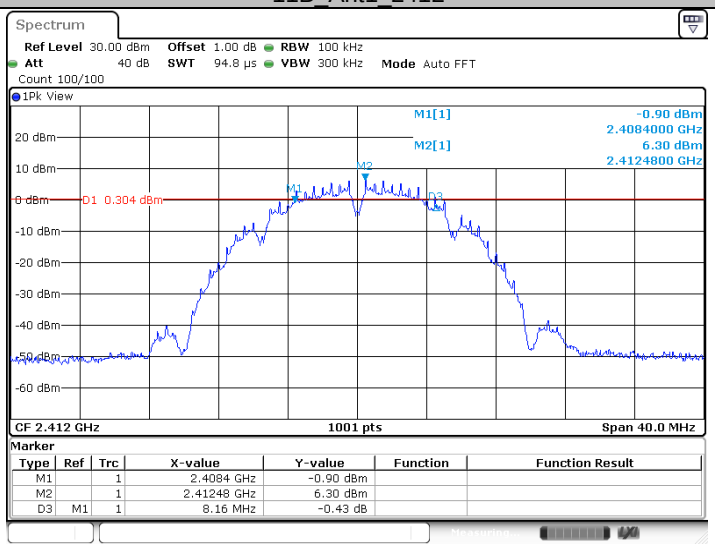

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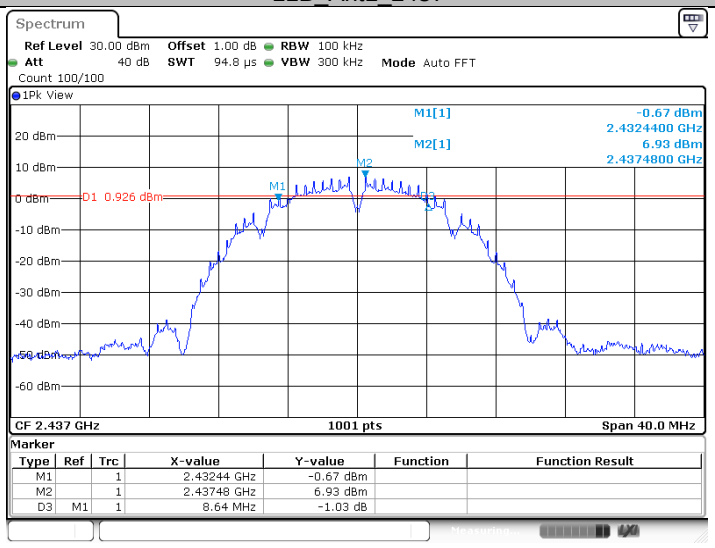

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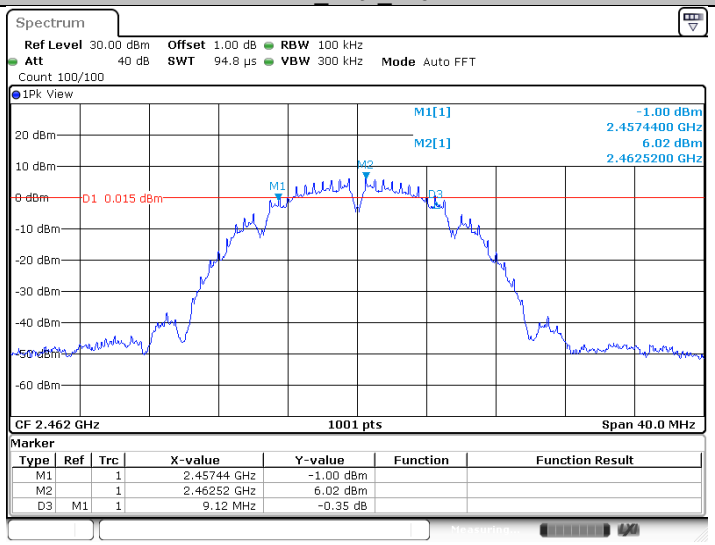

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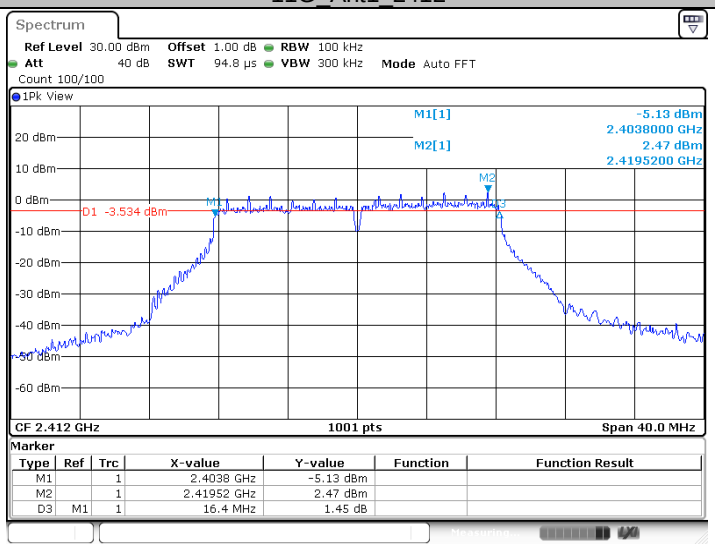

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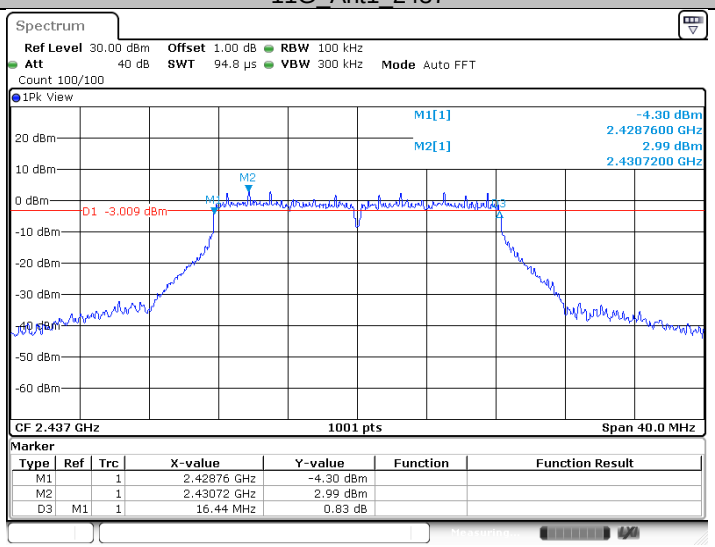

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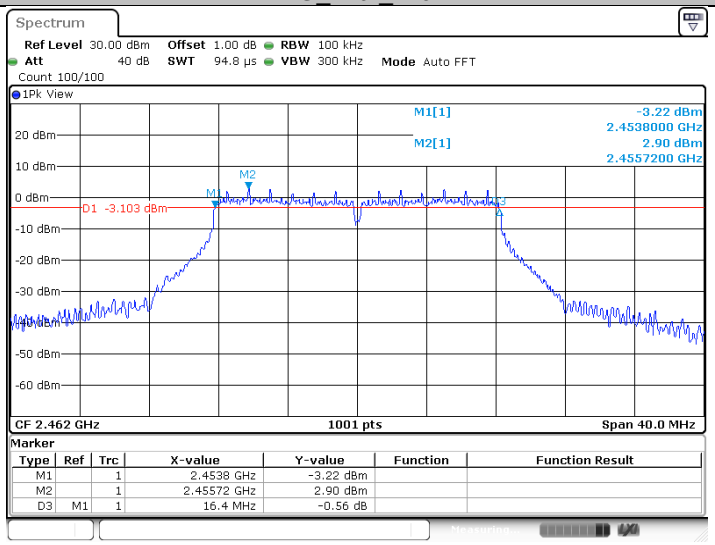

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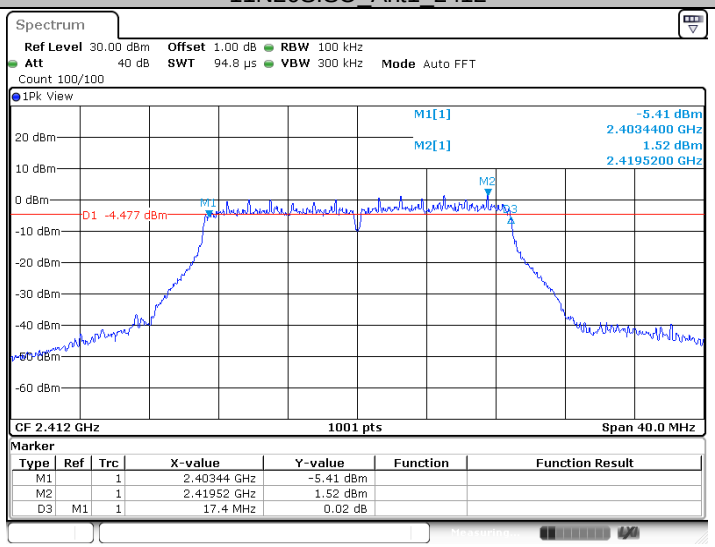

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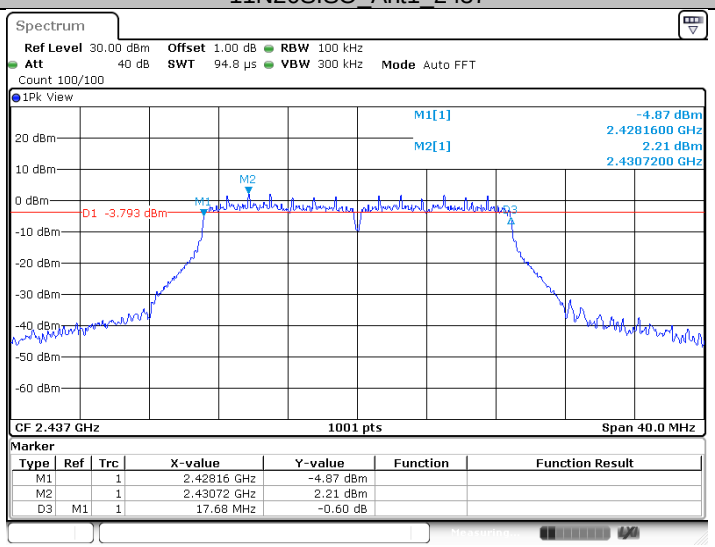

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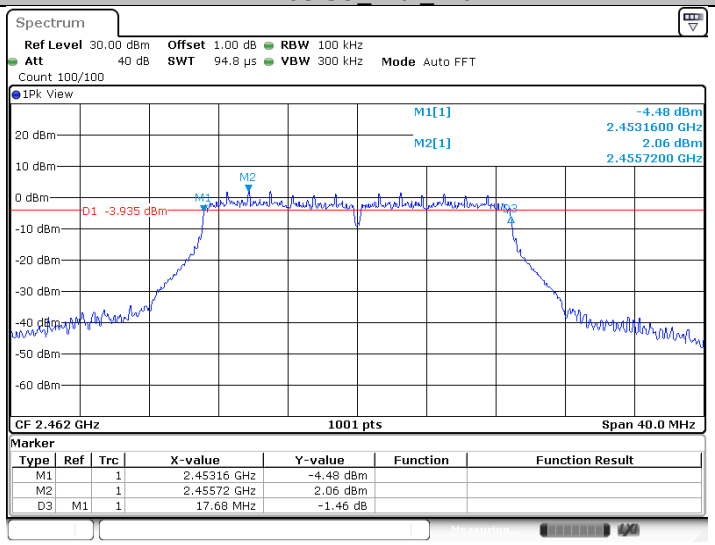

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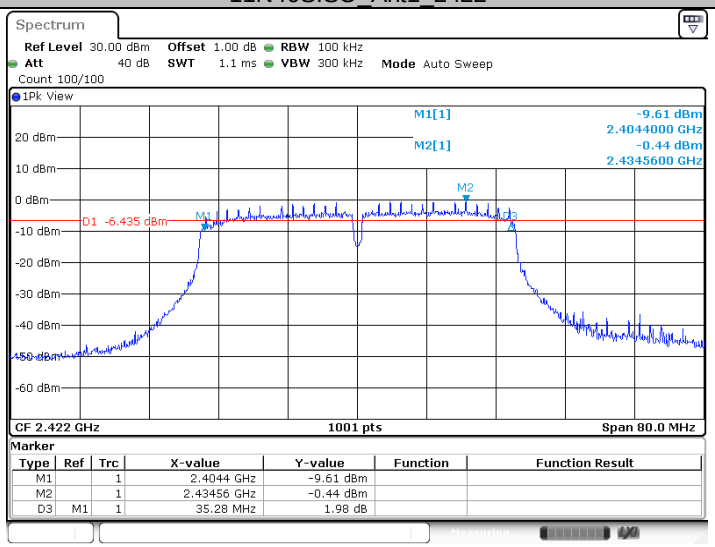

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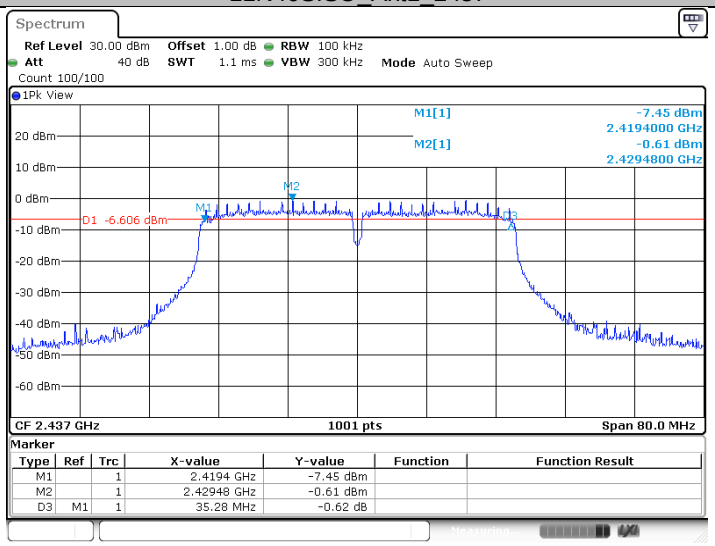

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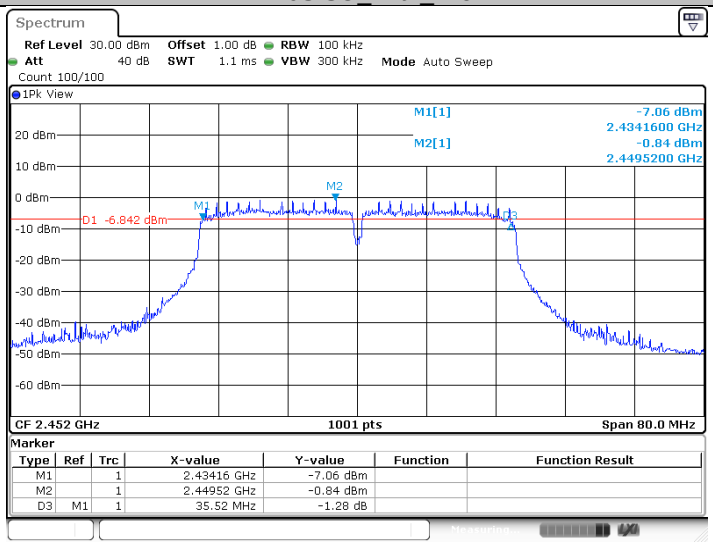

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9.4 99% bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW≥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]
--

Test Result

TestMode	Channel [MHz]	OCB [MHz]	Limit [MHz]	Verdict
11B	2412	13.027	---	PASS
	2437	13.067	---	PASS
	2462	13.147	---	PASS
11G	2412	17.782	---	PASS
	2437	17.862	---	PASS
	2462	17.902	---	PASS
11N20SISO	2412	18.621	---	PASS
	2437	18.741	---	PASS
	2462	18.661	---	PASS
11N40SISO	2422	36.603	---	PASS
	2437	36.843	---	PASS
	2452	36.843	---	PASS

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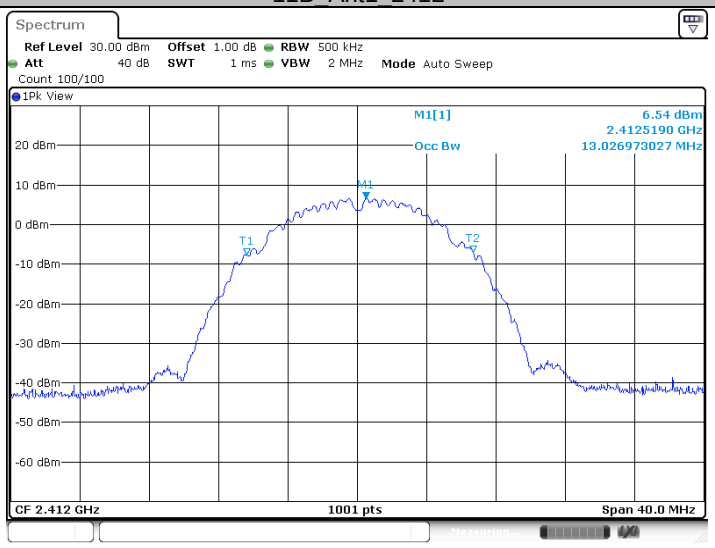
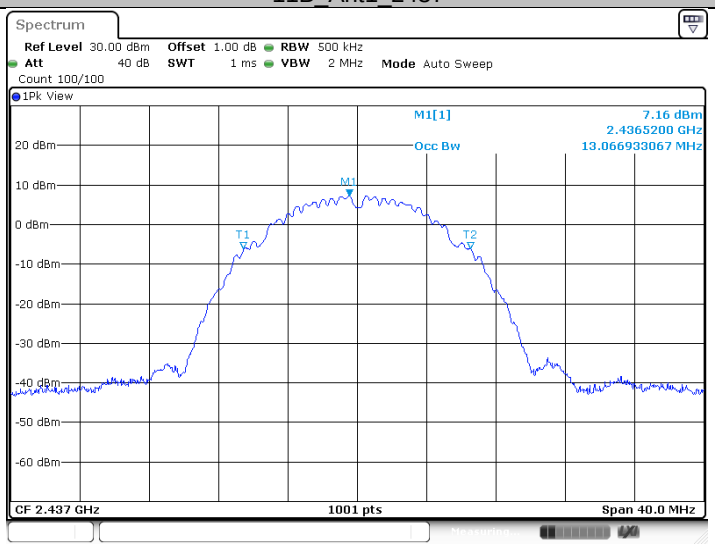
Test Graphs

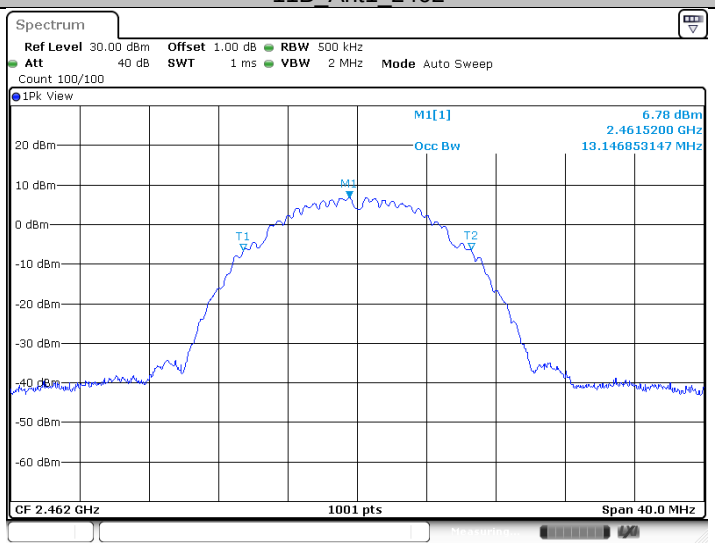
11B_Ant1_2412



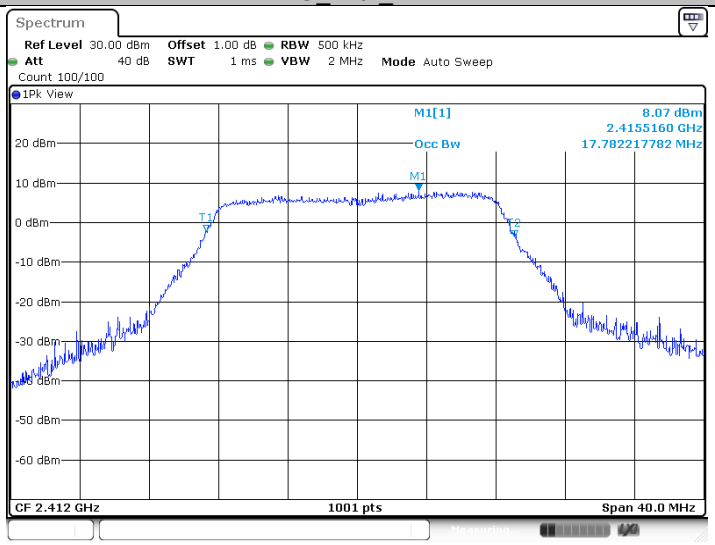
11B_Ant1_2437



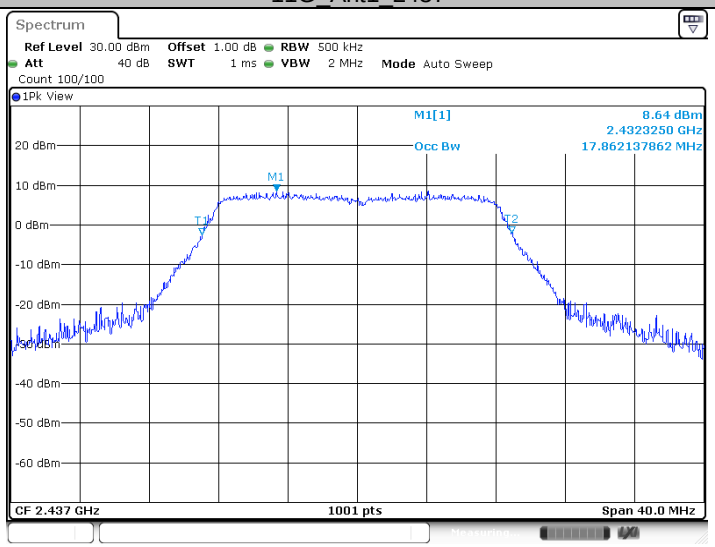
11B_Ant1_2462



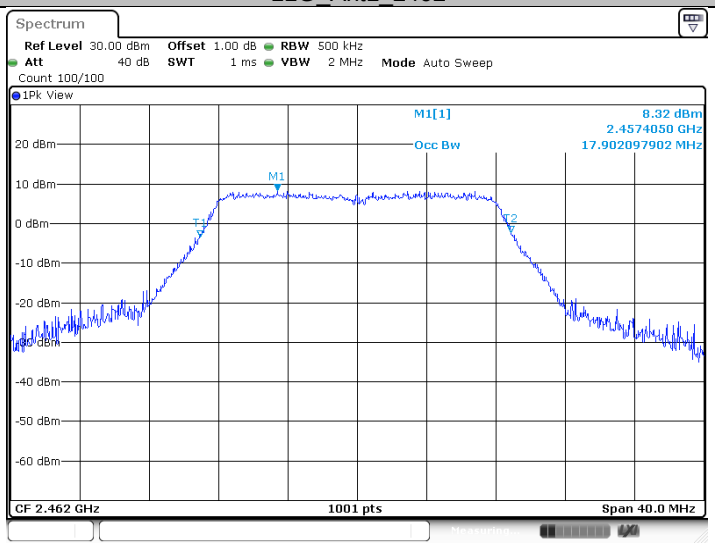
11G_Ant1_2412



11G_Ant1_2437



11G_Ant1_2462



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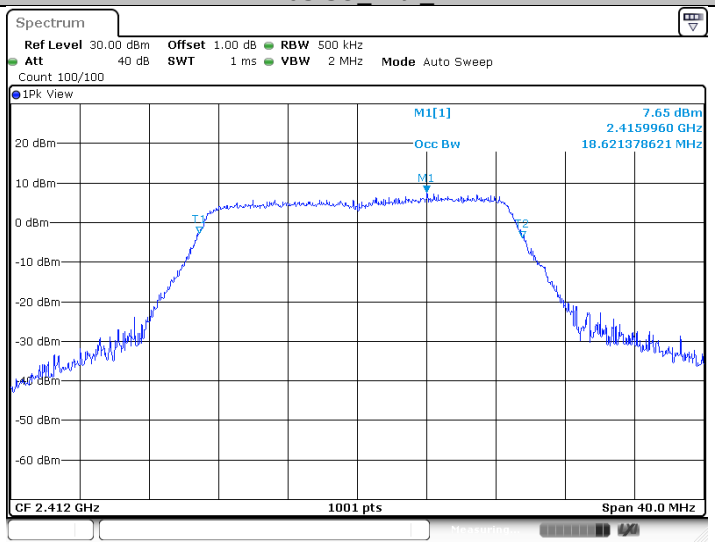
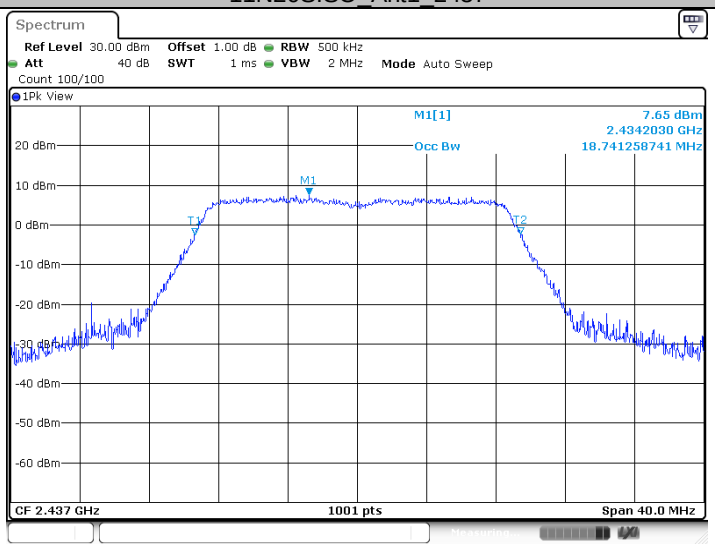
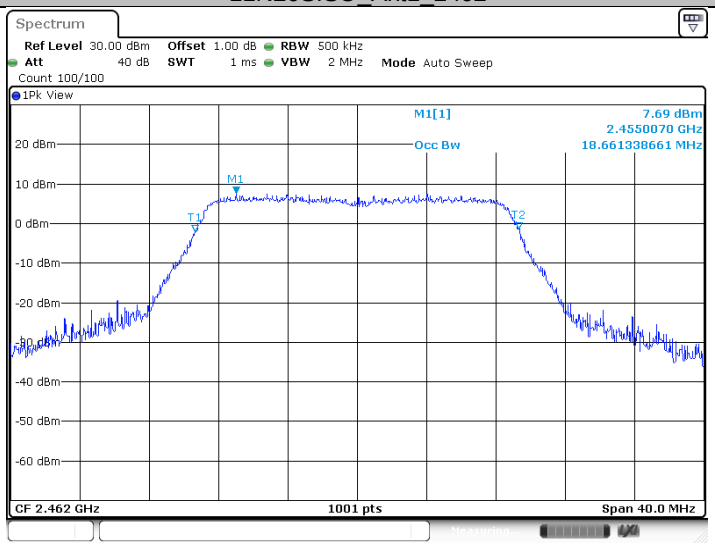
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462



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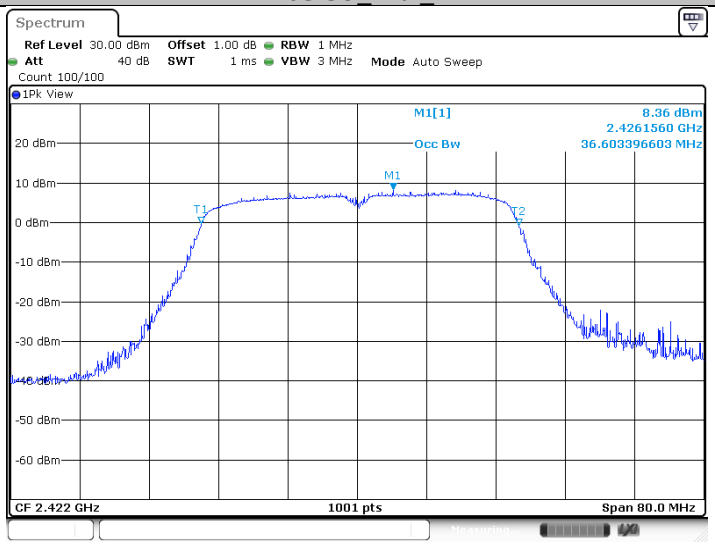
11N40SISO_Ant1_2422



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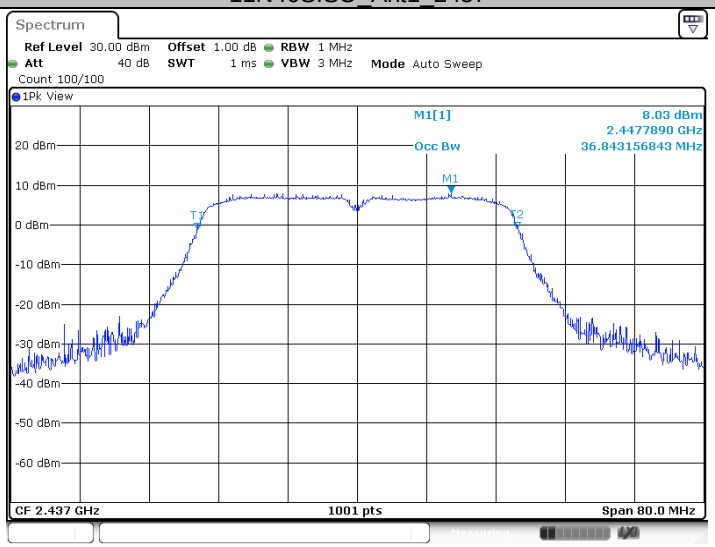
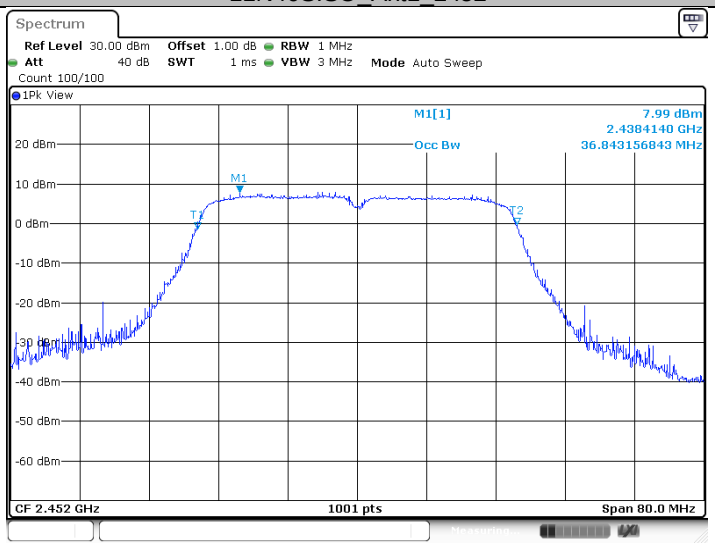


11N40SISO_Ant1_2452



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

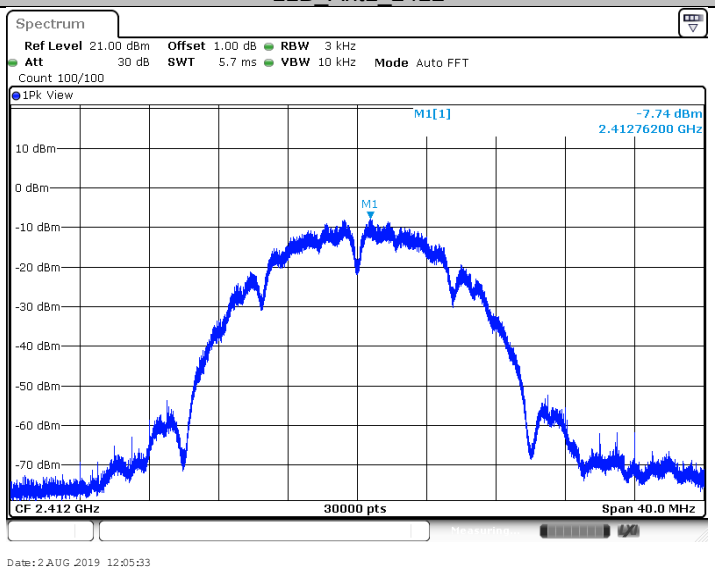
Limit [dBm]
≤8

Test result

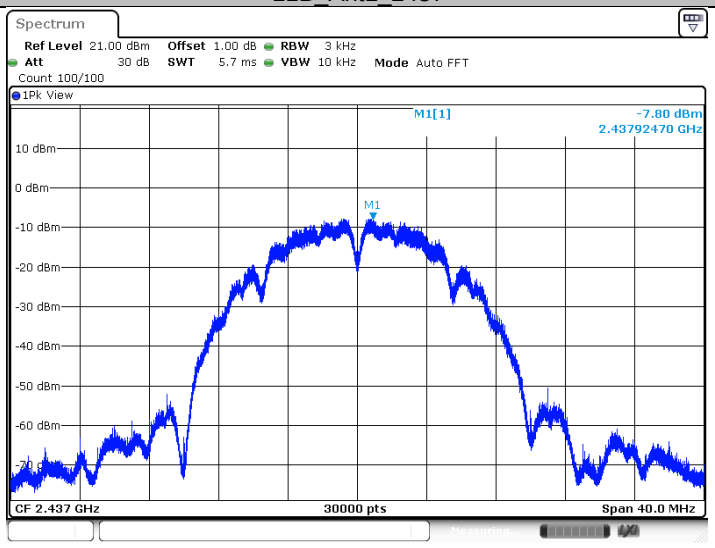
TestMode	Channel [MHz]	Result [dBm]	Limit [dBm]	Verdict
11B	2412	-7.74	<=8	PASS
	2437	-7.80	<=8	PASS
	2462	-7.75	<=8	PASS
11G	2412	-10.89	<=8	PASS
	2437	-10.34	<=8	PASS
	2462	-10.67	<=8	PASS
11N20SISO	2412	-11.78	<=8	PASS
	2437	-11.59	<=8	PASS
	2462	-11.91	<=8	PASS
11N40SISO	2422	-14.88	<=8	PASS
	2437	-14.64	<=8	PASS
	2452	-13.68	<=8	PASS

Test Graphs

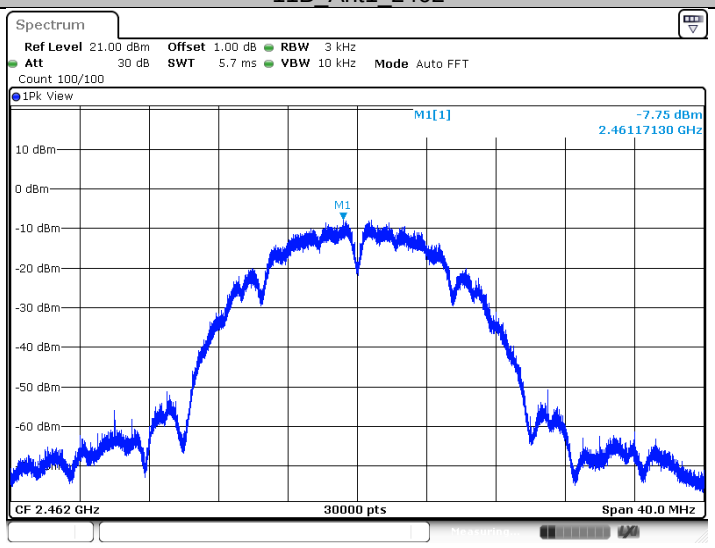
11B_Ant1_2412



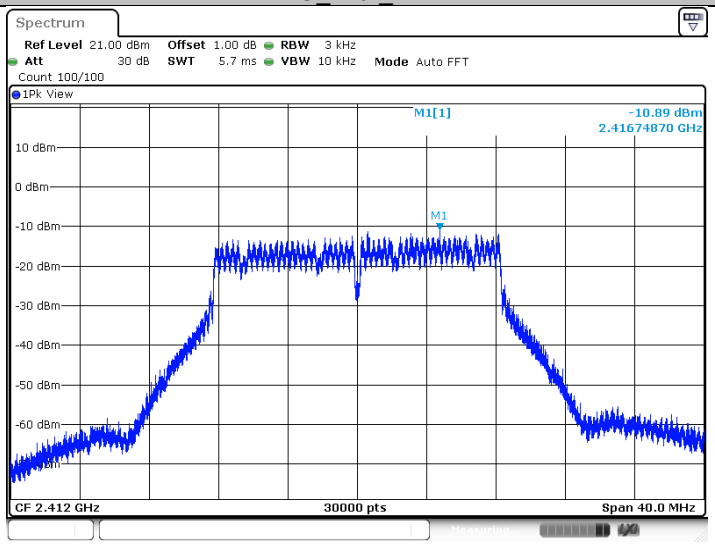
11B_Ant1_2437



11B_Ant1_2462



11G_Ant1_2412



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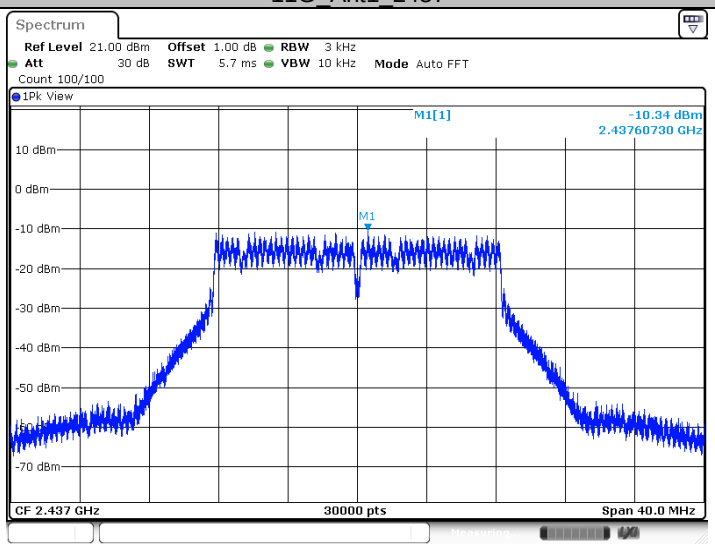
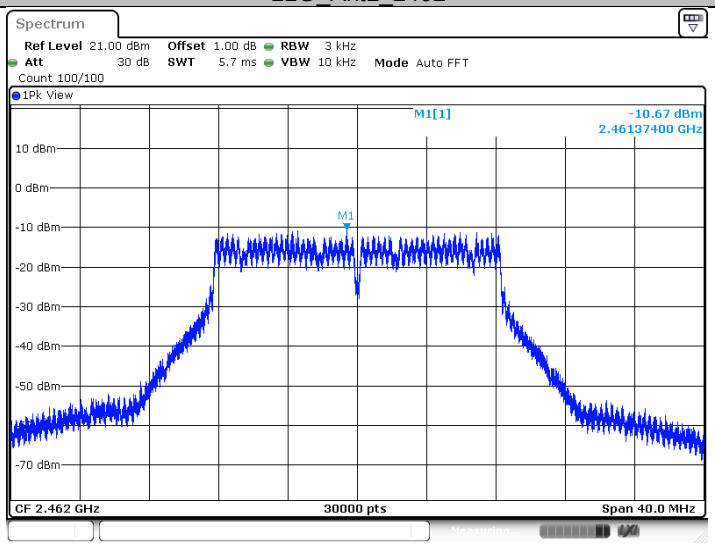


11G_Ant1_2462



11N20SISO_Ant1_2412

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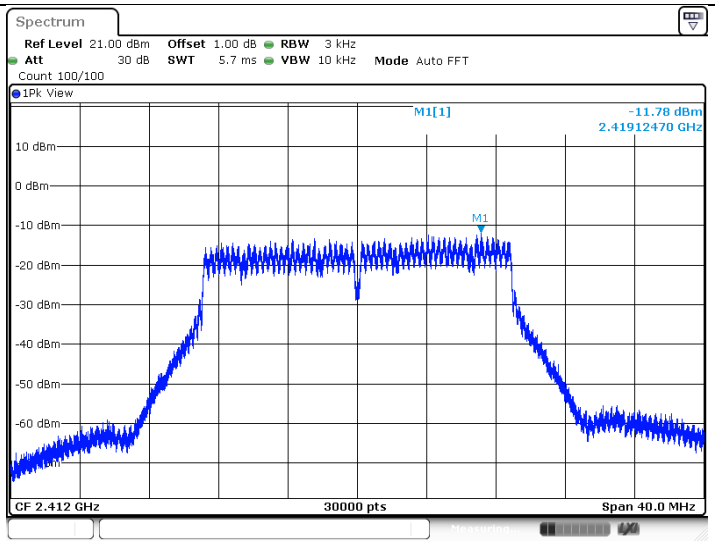

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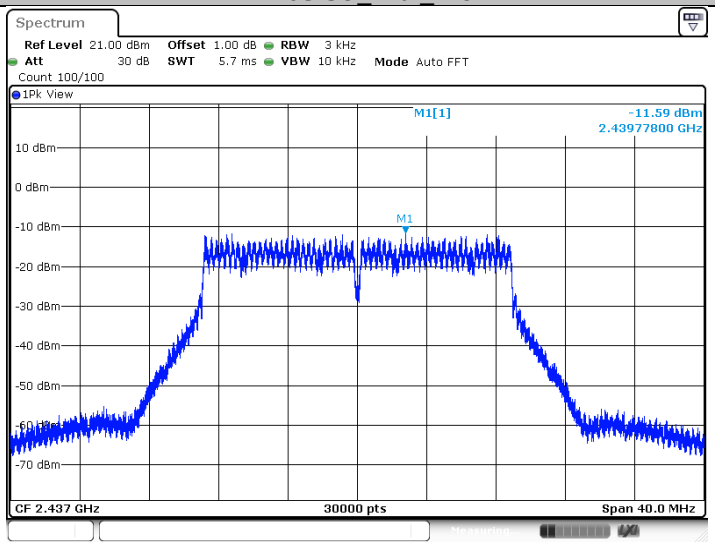

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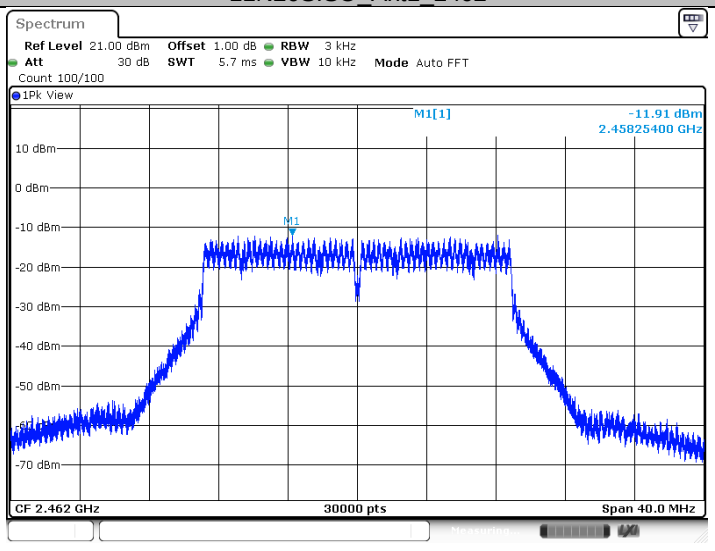
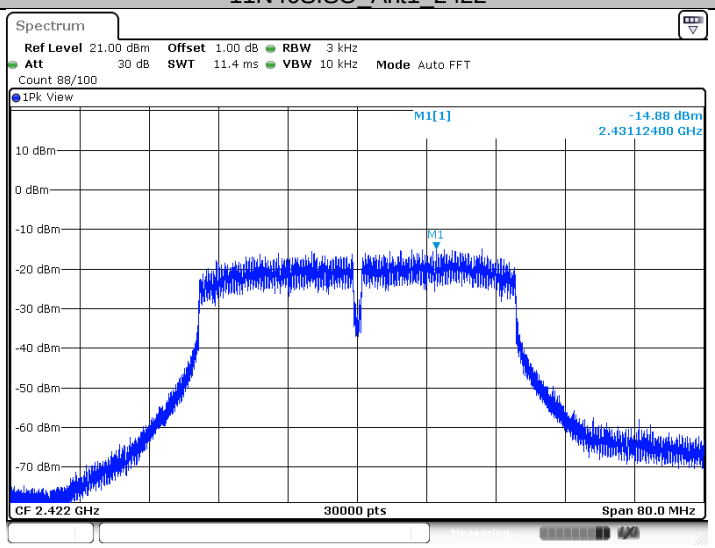
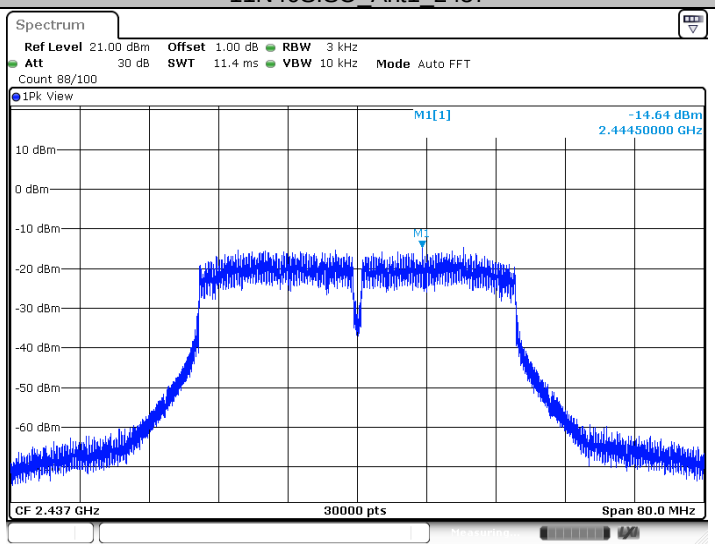


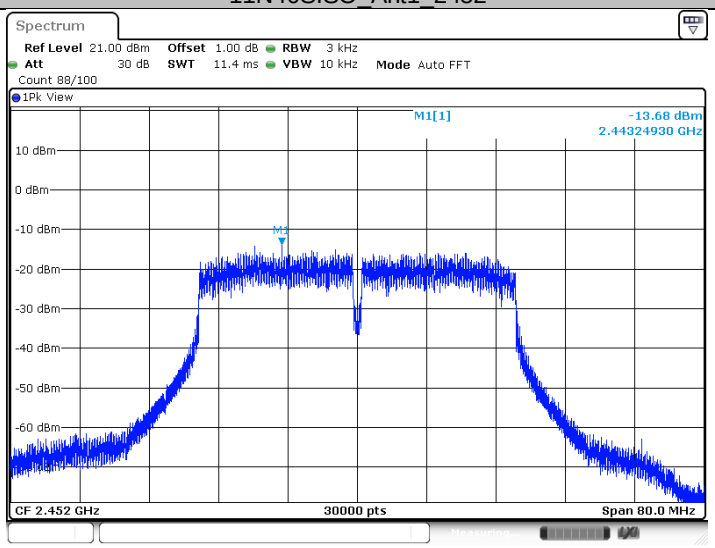
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



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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

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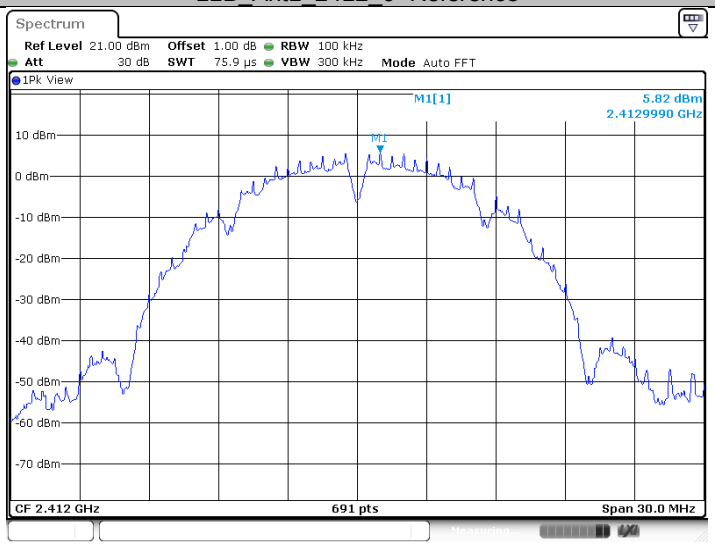
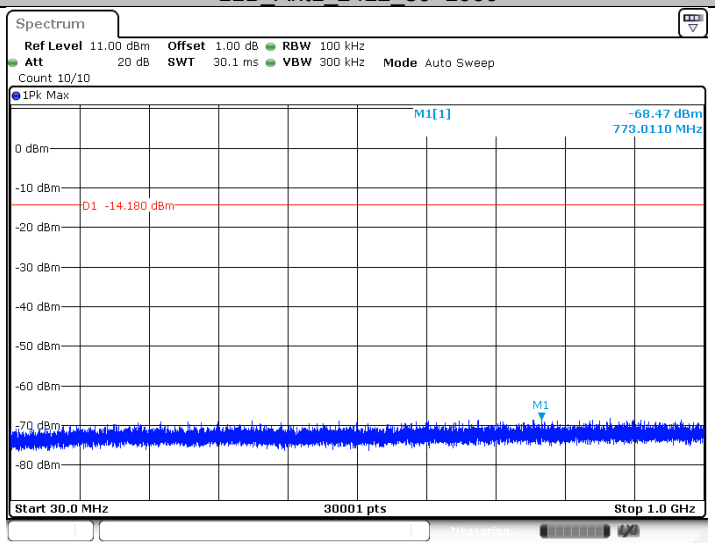
Test Result

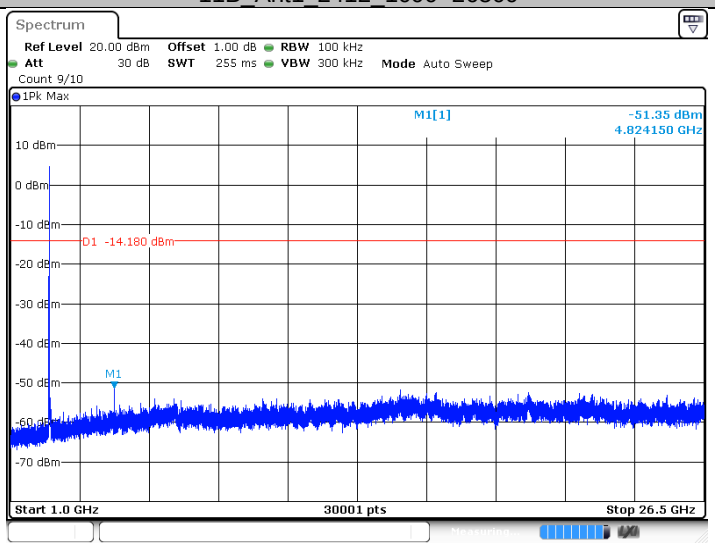
11B_Ant1_2412_0~Reference



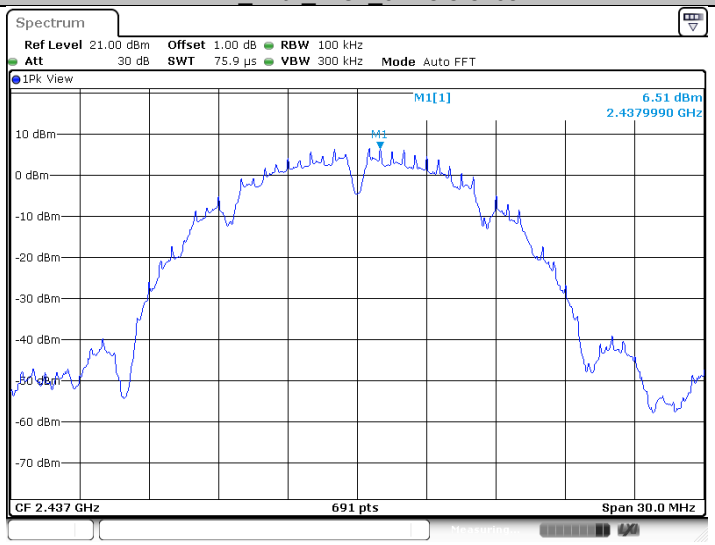
11B_Ant1_2412_30~1000



11B_Ant1_2412_1000~26500



11B_Ant1_2437_0~Reference



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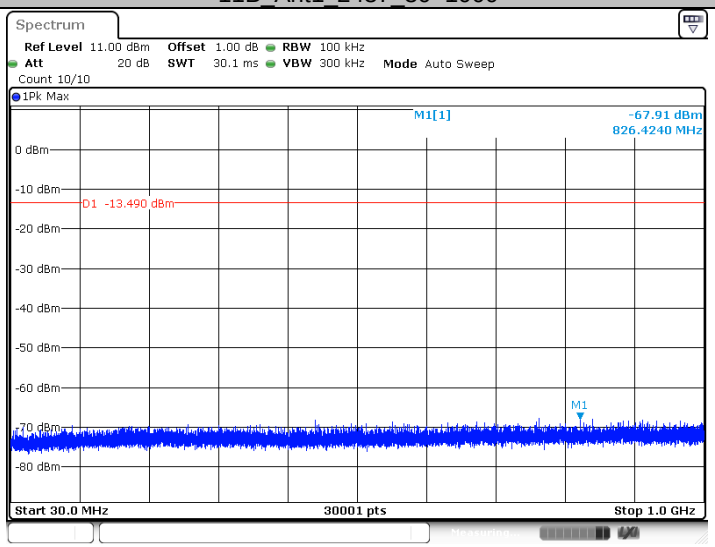

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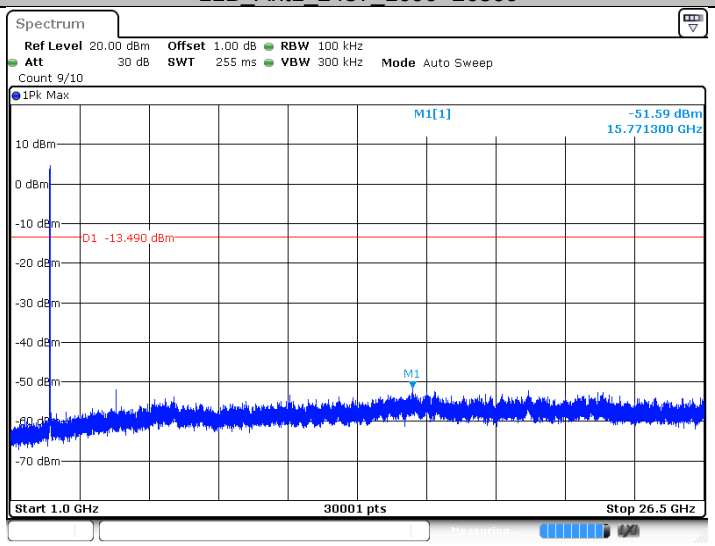

11B_Ant1_2462_0~Reference

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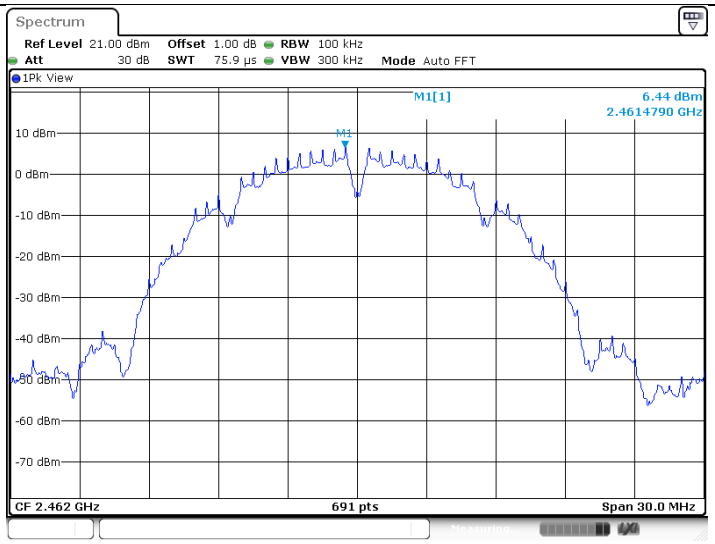

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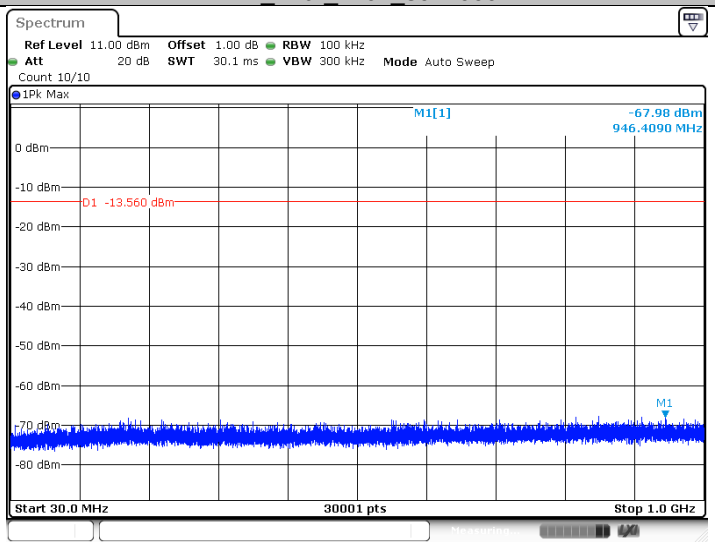
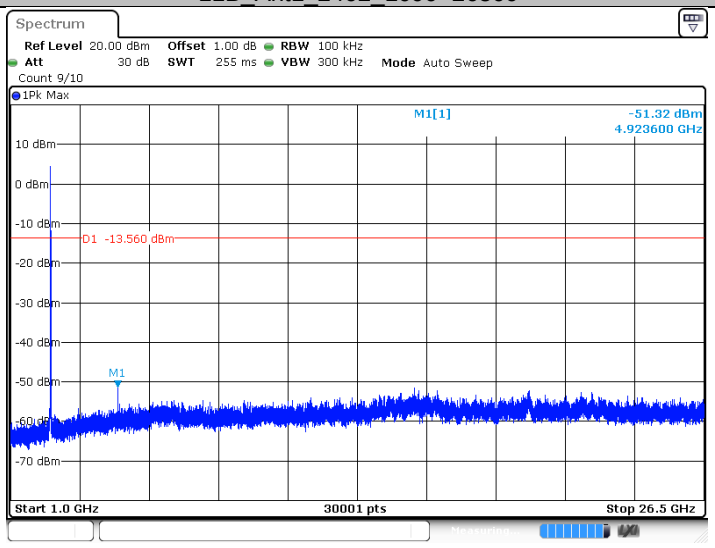


11B_Ant1_2462_1000~26500



11G_Ant1_2412_0~Reference

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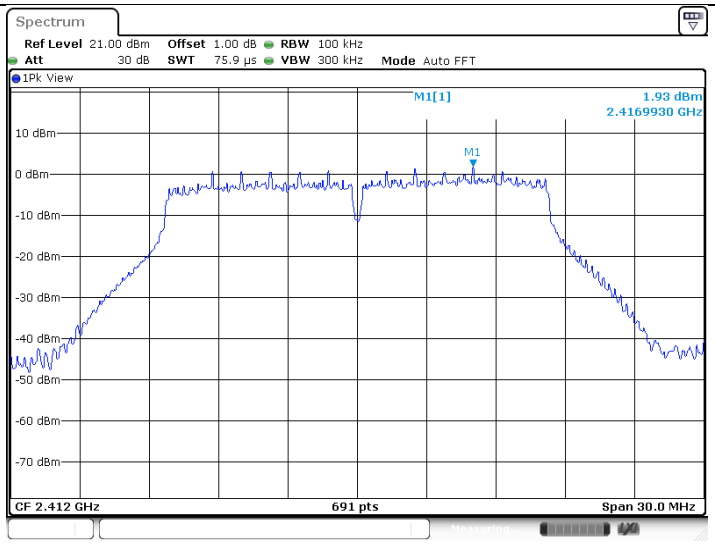

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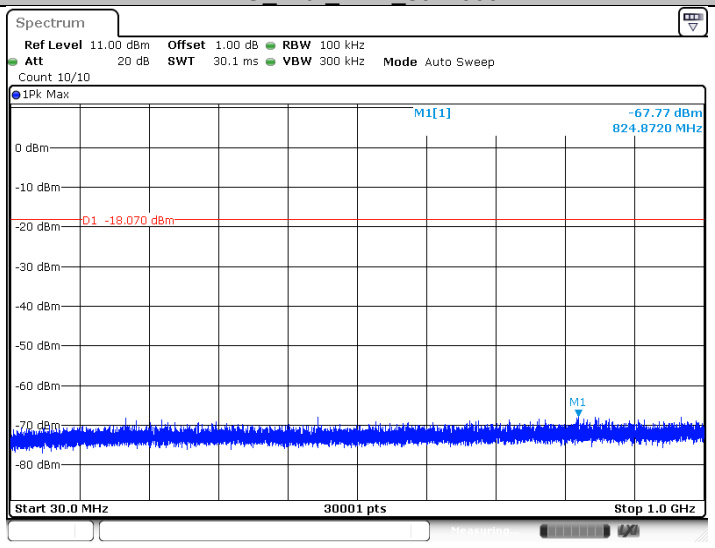
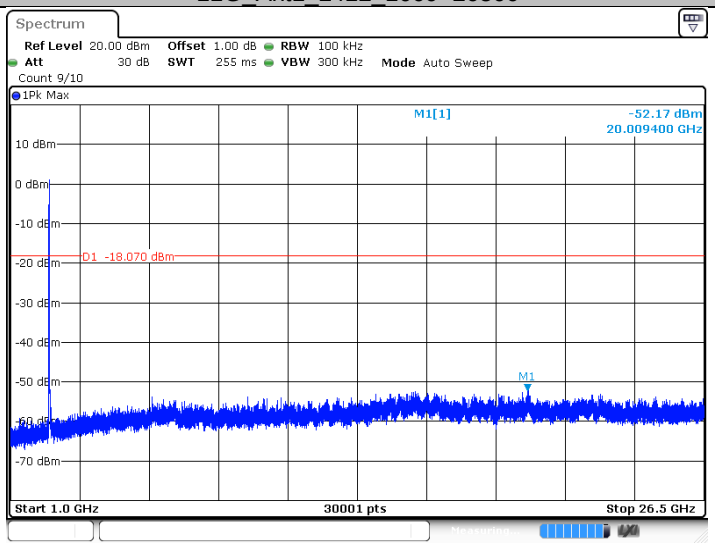


11G_Ant1_2412_1000~26500



11G_Ant1_2437_0~Reference

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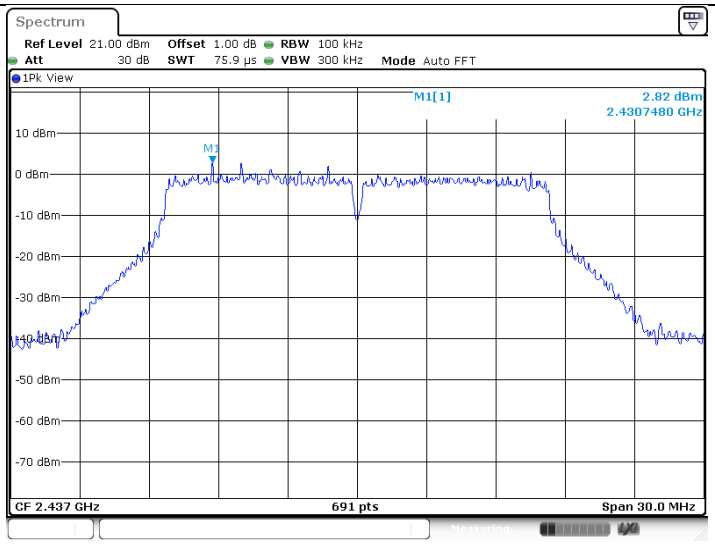
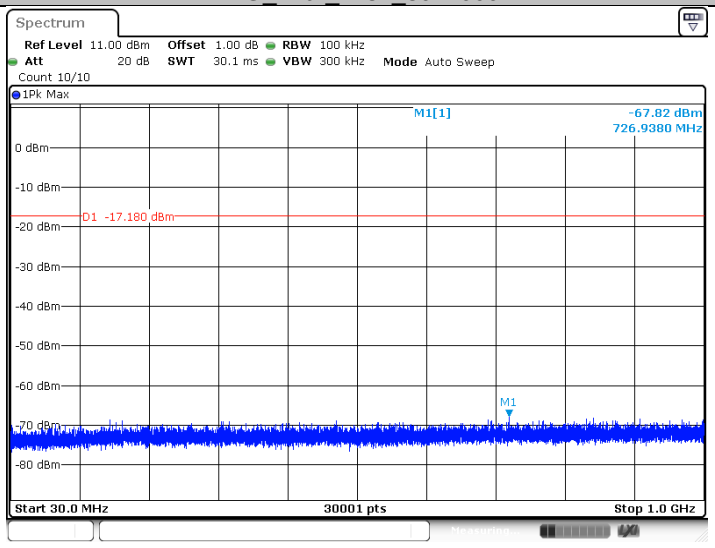
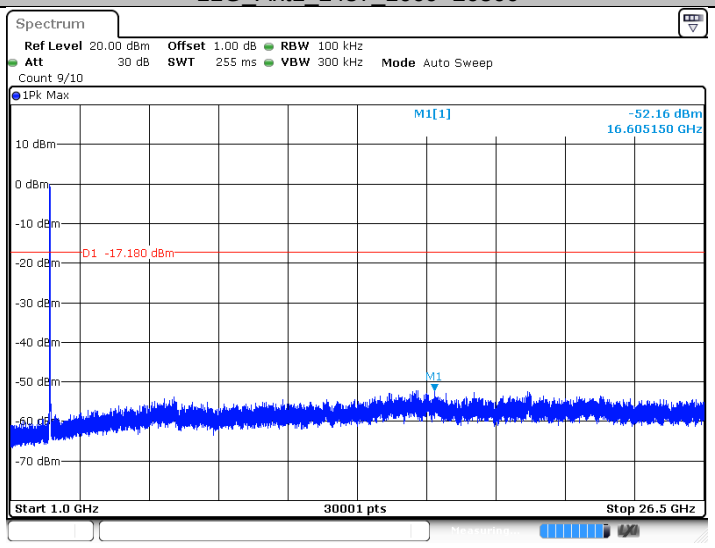


11G_Ant1_2437_30~1000



11G_Ant1_2437_1000~26500



11G_Ant1_2462_0~Reference

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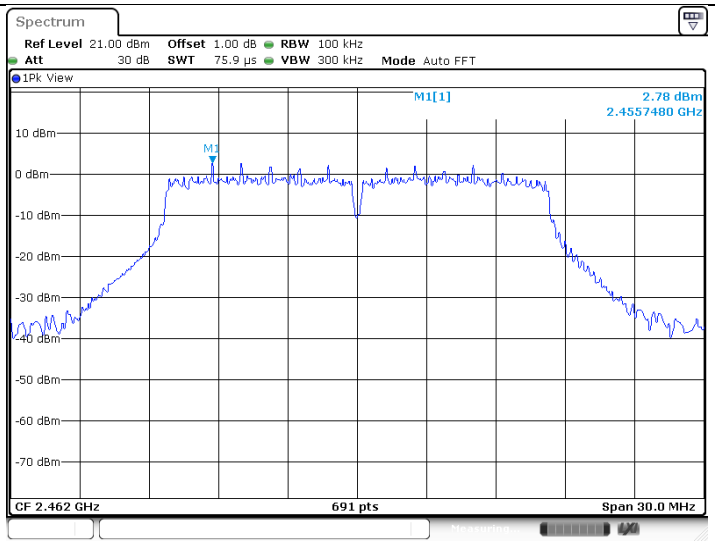
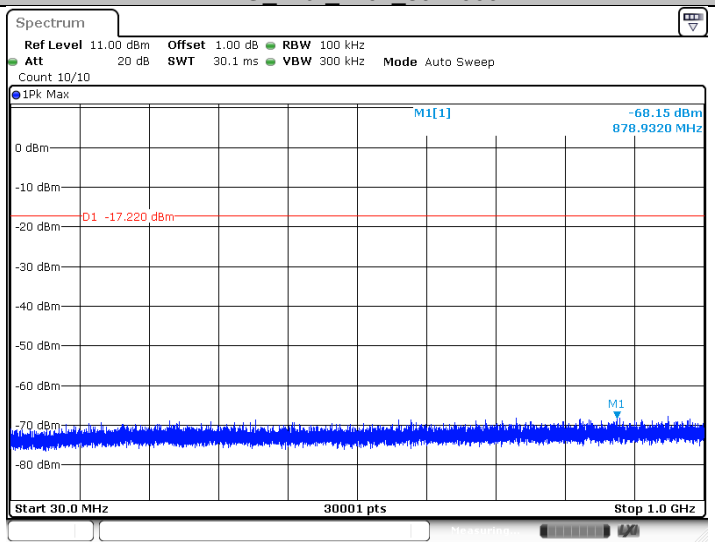
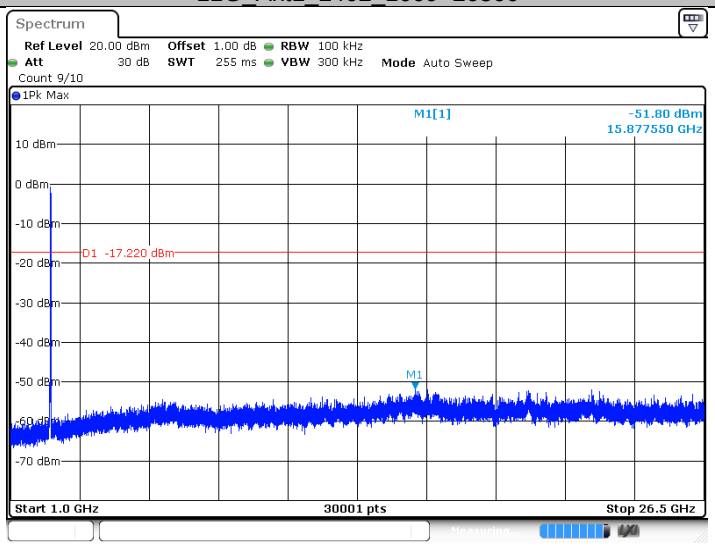


11G_Ant1_2462_30~1000



11G_Ant1_2462_1000~26500



11N20SISO_Ant1_2412_0~Reference

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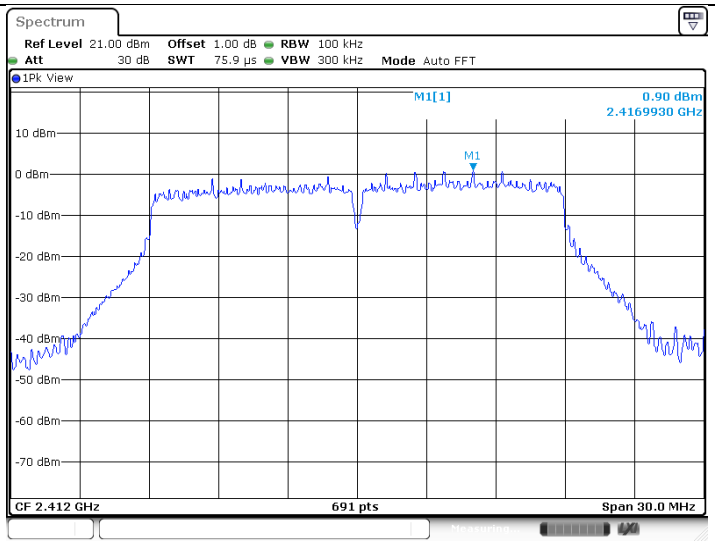
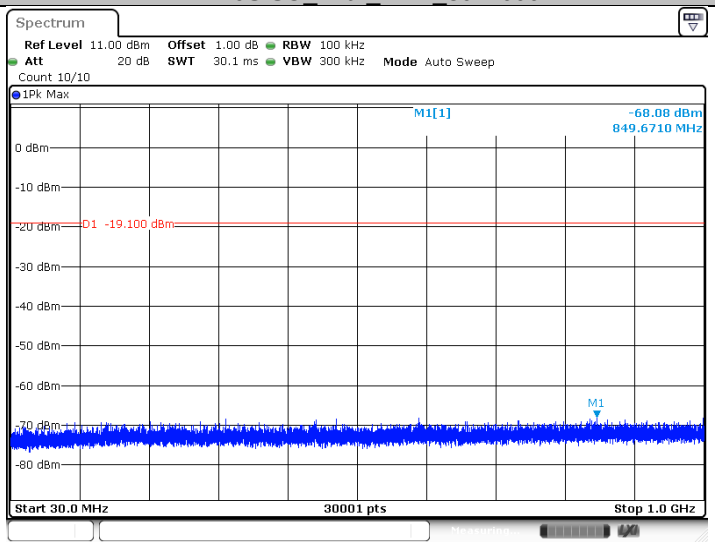


11N20SISO_Ant1_2412_30~1000



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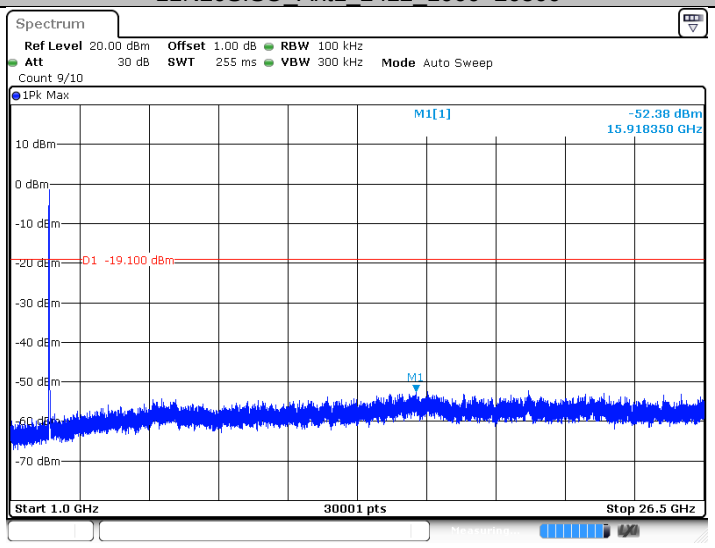

11N20SISO_Ant1_2437_0~Reference

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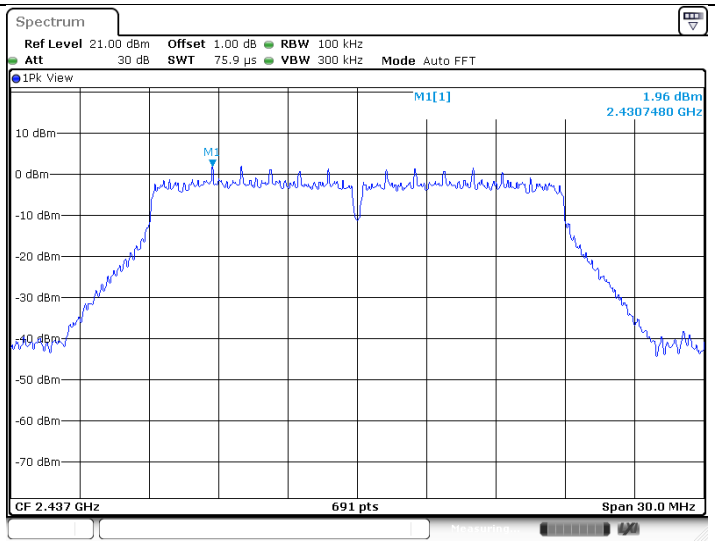

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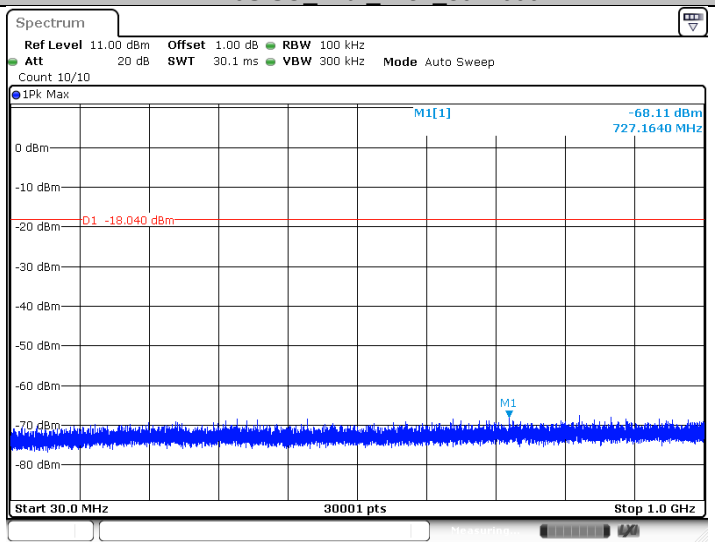

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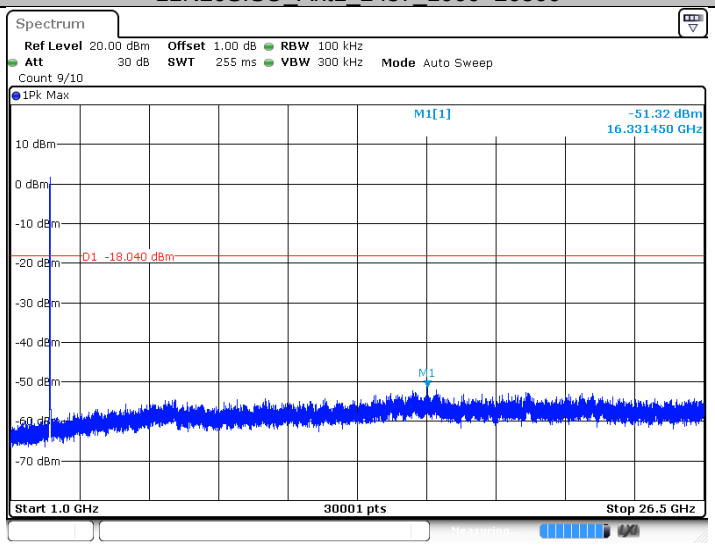

11N20SISO_Ant1_2462_0~Reference

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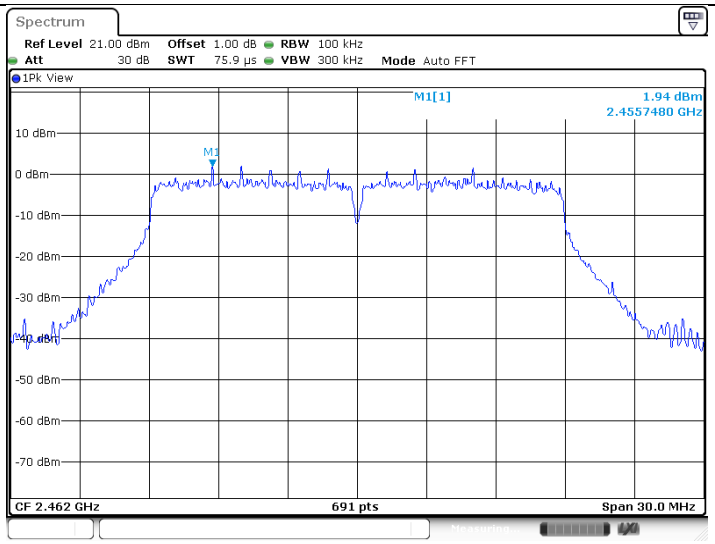

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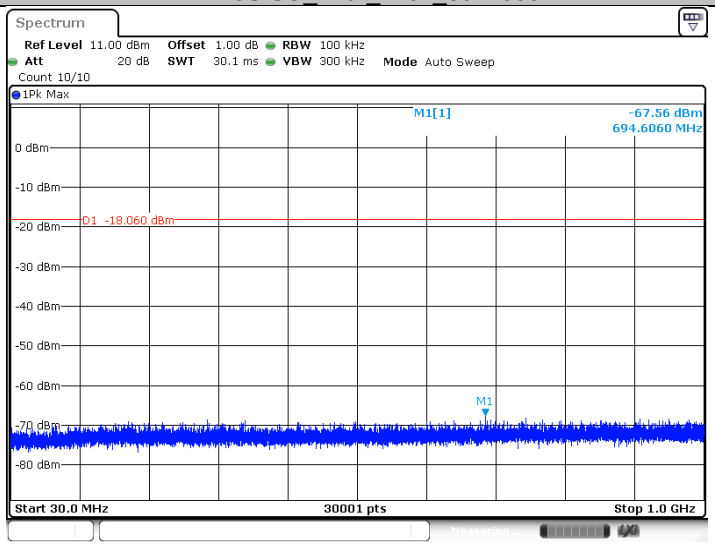

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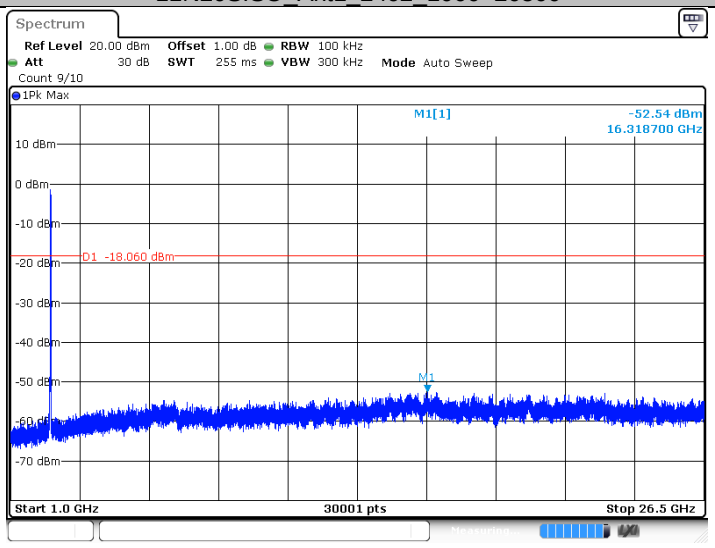

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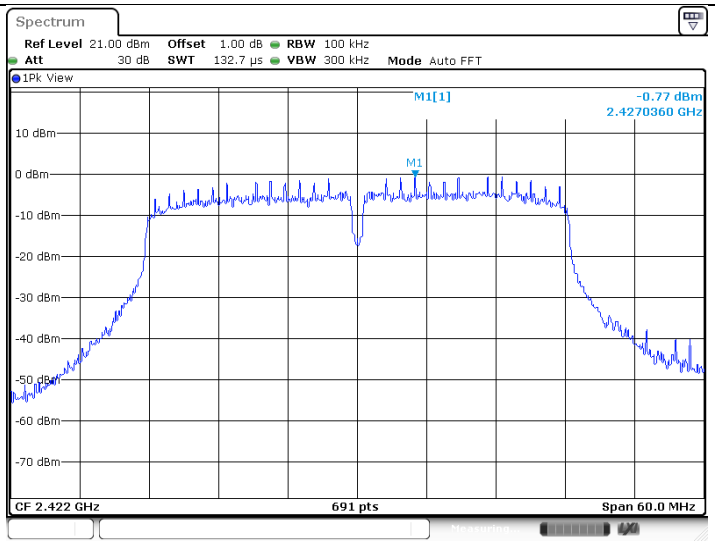

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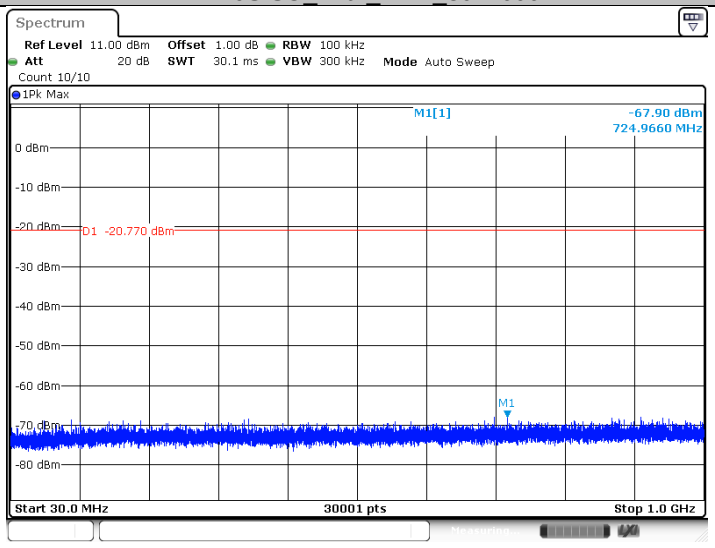

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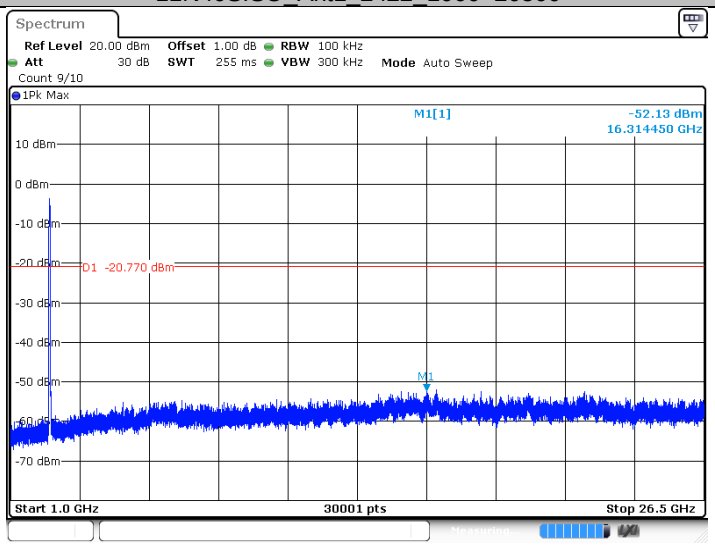

11N40SISO_Ant1_2437_0~Reference

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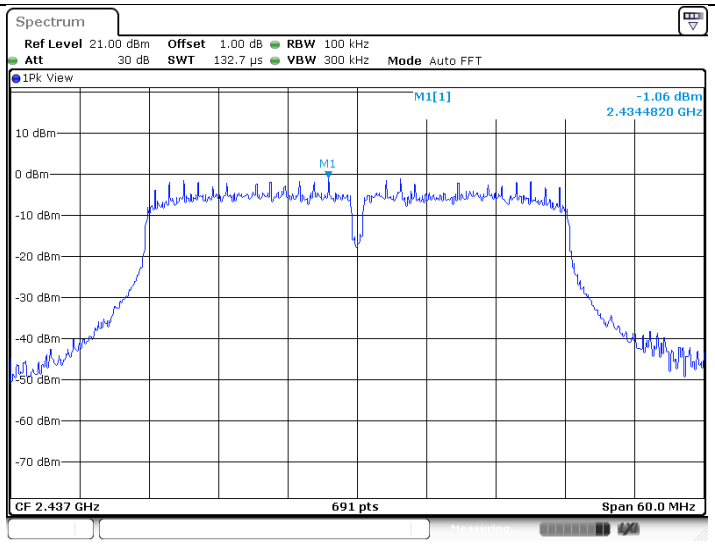

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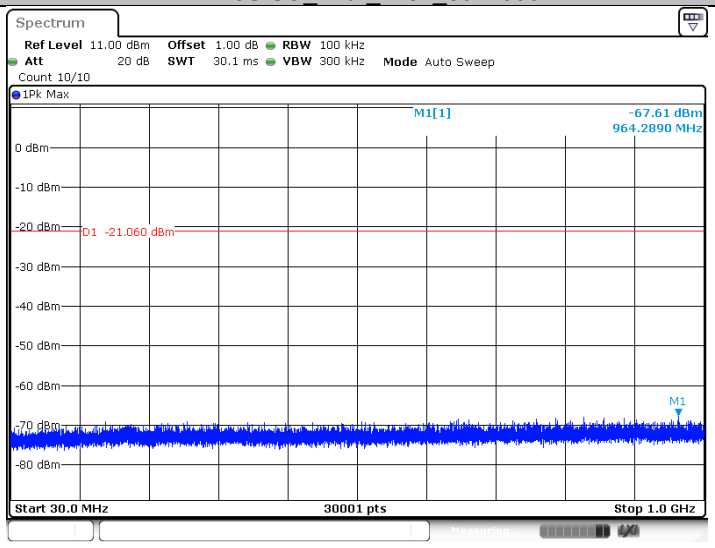

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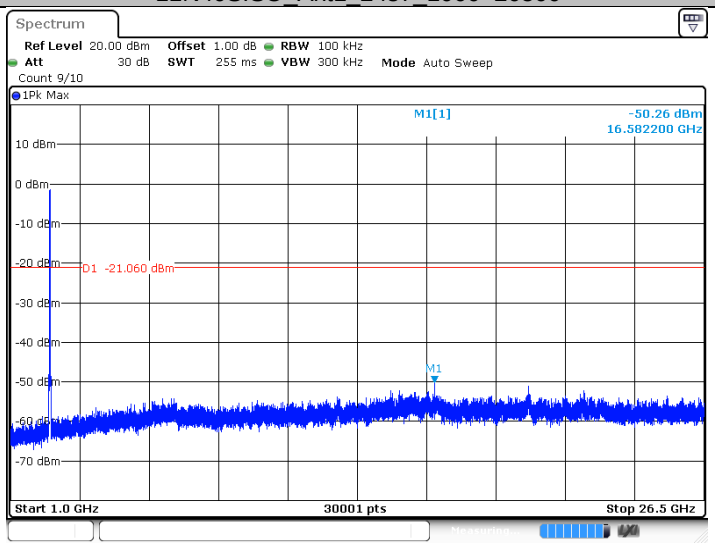

11N40SISO_Ant1_2452_0~Reference

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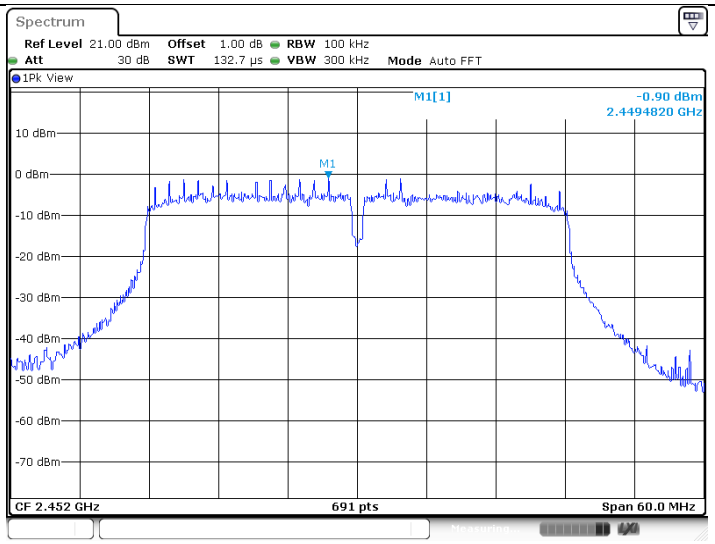

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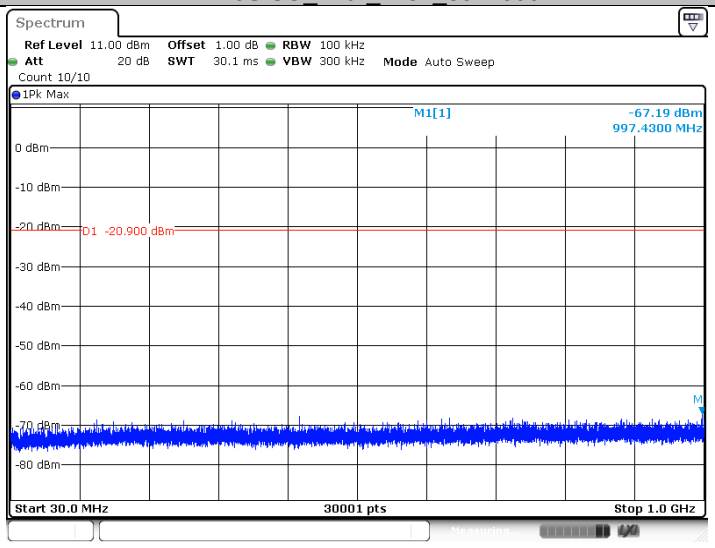

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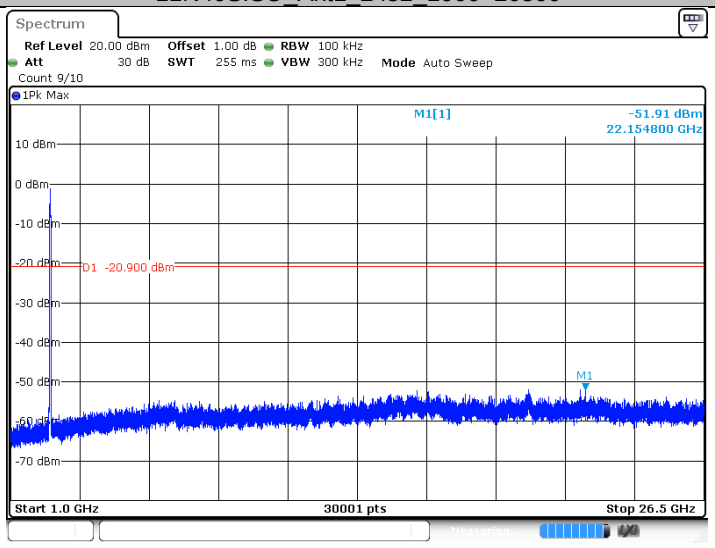

9.7 Band edge

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≥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 in 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

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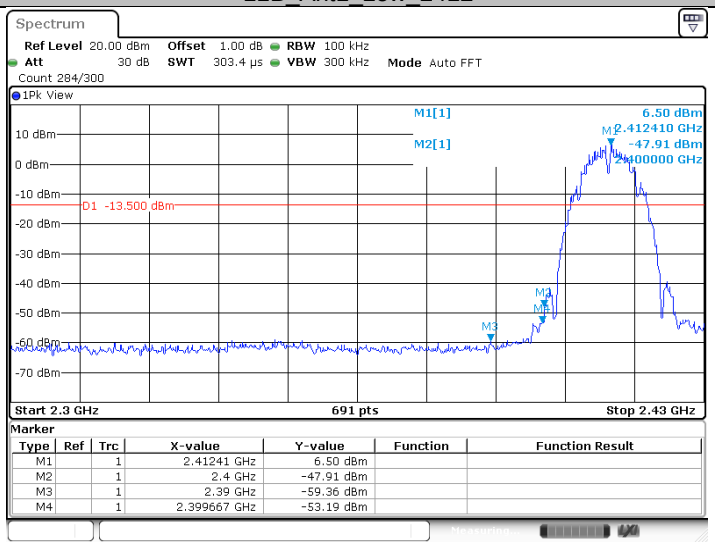
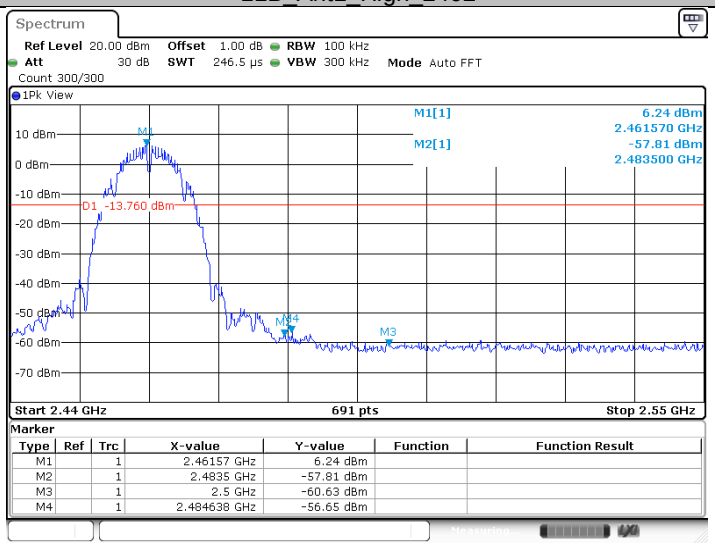
Test result

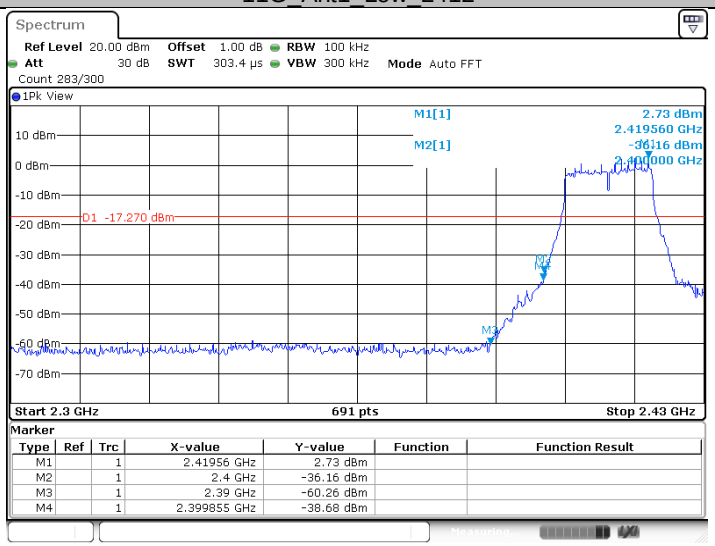
11B_Ant1_Low_2412



11B_Ant1_High_2462



11G_Ant1_Low_2412



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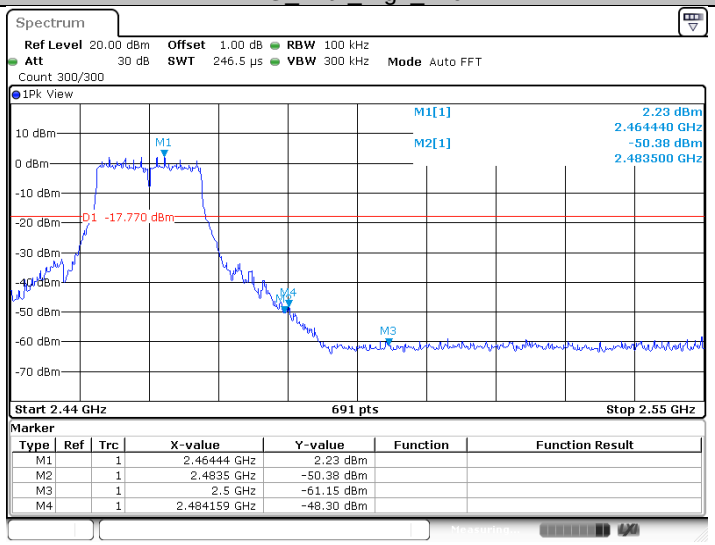
11G_Ant1_High_2462



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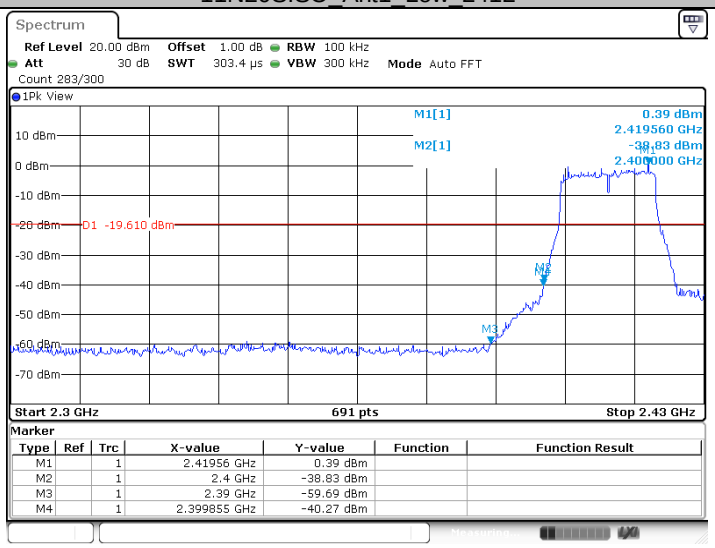

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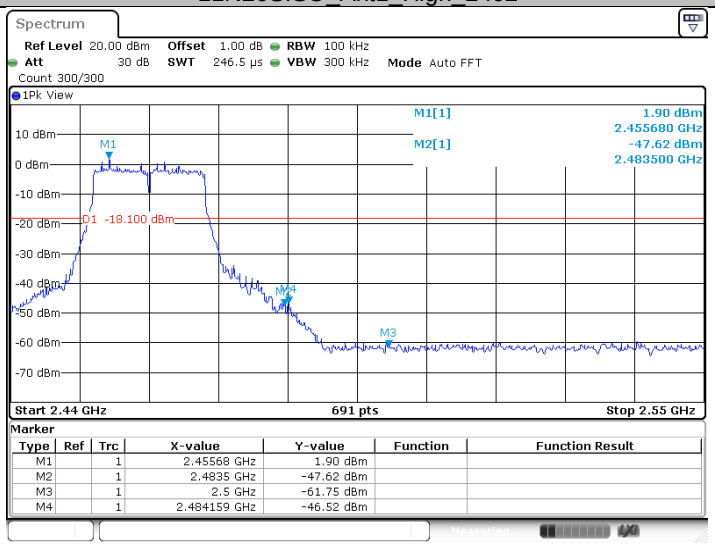

11N40SISO_Ant1_Low_2422

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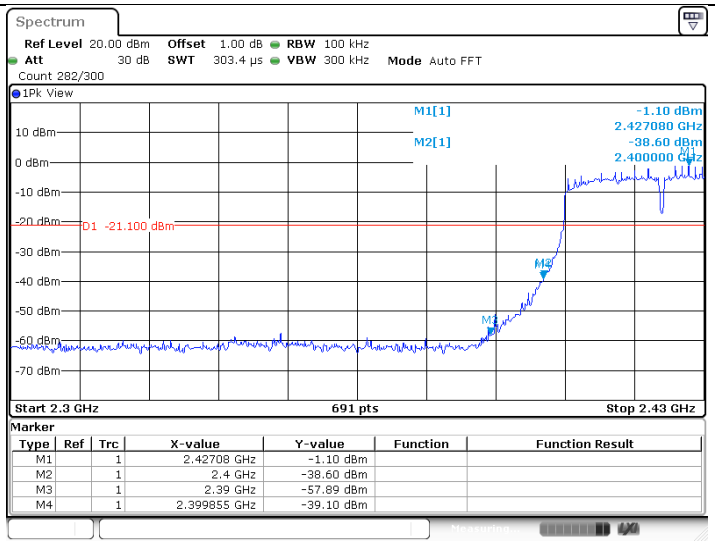
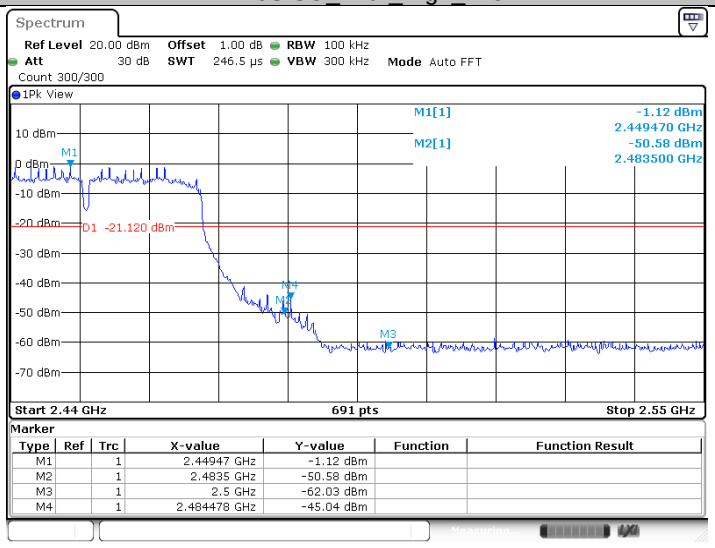


11N40SISO_Ant1_High_2452



9.8 Spurious radiated emissions for transmitter

Test Method

1: 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 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 to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions 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 ,Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1 MHz.
b) VBW \ [3 × RBW].
c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)
e) Sweep time = auto.
f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D,where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty

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cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

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.

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

Transmitting spurious emission test result as below:

802.11B modulation 2412MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	(dB)	
30-1000MHz	44.07	30.67	H	40.00	QP	9.33	-24.8	Pass
	*119.99	29.27	H	43.50	QP	14.23	-29.3	Pass
	173.88	32.88	H	43.50	QP	10.62	-29.7	Pass
	*37.81	36.59	V	40.00	QP	3.41	-26.8	Pass
	59.26	32.36	V	40.00	QP	7.64	-26.8	Pass
	96.07	30.12	V	43.50	QP	13.38	-28.7	Pass
1000-25000MHz	*4823.90	44.62	H	74	PK	29.38	2.8	Pass
	*15806.25	48.04	H	74	PK	25.96	18.2	Pass
	*4823.91	43.27	V	74	PK	30.73	2.8	Pass
	*15490.78	48.02	V	74	PK	25.98	18.1	Pass

802.11B modulation 2437MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	(dB)	
1000-25000MHz	*4874.06	41.27	H	74	PK	32.73	2.9	Pass
	*15008.44	48.05	H	74	PK	25.95	17.0	Pass
	*4874.06	42.03	V	74	PK	31.97	2.9	Pass
	*15834.38	48.54	V	74	PK	25.46	18.2	Pass

802.11B modulation 2462MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	(dB)	
1000-25000MHz	*4923.75	41.46	H	74	PK	32.54	3.1	Pass
	*15345.94	48.32	H	74	PK	25.68	18.5	Pass
	*4923.75	42.18	V	74	PK	31.82	3.1	Pass
	*15807.66	48.32	V	74	PK	25.68	18.2	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) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

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10 Test Equipment List

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
LISN	Rohde & Schwarz	ENV4200	100249	2020-6-28
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2020-6-28
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	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-29
Horn Antenna	Rohde & Schwarz	HF907	102294	2020-6-22
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG		2020-7-12
Pre-amplifier	Rohde & Schwarz	SCU 40A		2020-6-28
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2020-7-7
Attenuator	Agilent	8491A	MY39264334	2020-6-28
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-6-29
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	2020-6-28
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2020-6-28
Power Splitter	Weinschel	1580	SC319	2020-7-7
Test software	Tonscend	System for BT/WIFI	Version 2.6	N/A

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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 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%

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