FCC/IC - TEST REPORT

Report Number	:	**68.950.19.0005.01**	Date of Issue:	**January 17, 2019**
Model	:	E70532, E70534		
Product Type	:	Element 7 HV, Element 9 HV		
Applicant	:	Raymarine UK Limited		
Address	:	Marine House, Cartwright Drive, Segensworth, Fareham, Hamsphire, United Kingdom, PO15 5RJ		
Manufacturer	:	Raymarine UK Limited		
Address	:	Marine House, Cartwright Drive, Segensworth, Fareham, Hamsphire, United Kingdom, PO15 5RJ		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**38**		

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TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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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 No.:	514049
IC Registration No.:	10320A
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3 Description of the Equipment Under Test

Product:	Element 7 HV, Element 9 HV
Model no.:	E70532, E70534
FCC ID:	PJ5-ELEMDISP
IC:	4069B-ELEMDISP
HVIN:	E70532, E70534
PMN:	Raymarine multifunction display
FVIN:	N/A
Brand Name:	Raymarine
Options and accessories:	NIL
Rating:	DC 12V, 3A Max
RF Transmission Frequency:	2412-2462MHz
No. of Operated Channel:	11
Modulation:	DSSS, OFDM
Antenna Type:	Internal Antenna
Antenna Gain:	2dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Raymarine multifunction display which support WiFi function operated at 2.4GHz

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2018 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 5 April 2018	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB 558074 D01 DTS Measurement Guidance v05 DTS Measurement Guidance and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C/ RSS-247 Issue 2/RSS-Gen Issue 5						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207 & RSS-GEN 8.8	Conducted emission AC power port	---	---	☐	☐	☒
§15.247 (b) (1) & RSS-247 5.4(d)	Conducted peak output power	10	Site 1	☒	☐	☐
§15.247(a)(1) & RSS-247 5.1(b)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1) & RSS-247 5.1(b)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii) & RSS-247 5.1(d)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii) & RSS-247 5.1(d)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2) & RSS-247 5.2(a) & RSS-GEN 6.7	6dB bandwidth and 99% Occupied Bandwidth	11	Site 1	☒	☐	☐
§15.247(e) & RSS-247 5.2(b)	Power spectral density	18	Site 1	☒	☐	☐
§15.247(d) & RSS-247 5.5	Spurious RF conducted emissions	19	Site 1	☒	☐	☐
§15.247(d) & RSS-247 5.5	Band edge	31	Site 1	☒	☐	☐
§15.247(d) & §15.209 & RSS-247 5.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	34	Site 1	☒	☐	☐
§15.203 & RSS-Gen 6.8	Antenna requirement	See note 2		☒	☐	☐

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an internal antenna, which gain is 2dBi. In accordance to §15.203 and RSS-Gen 6.8, 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: PJ5-ELEMDISP, IC: 4069B-ELEMDISP complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

<E70532, E70534> is a <Element 7HV, Element 9HV > with Wi-Fi b, g, n-HT20 mode. The TX and RX range is 2412MHz-2462MHz.

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: January 4, 2019

Testing Start Date: January 5, 2019

Testing End Date: January 17, 2019

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

Reviewed by:	Prepared by:	Tested by:
John Zhi	Moon Xiong	Louise Liu
Section Manager	Project Engineer	Test Engineer

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Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District,
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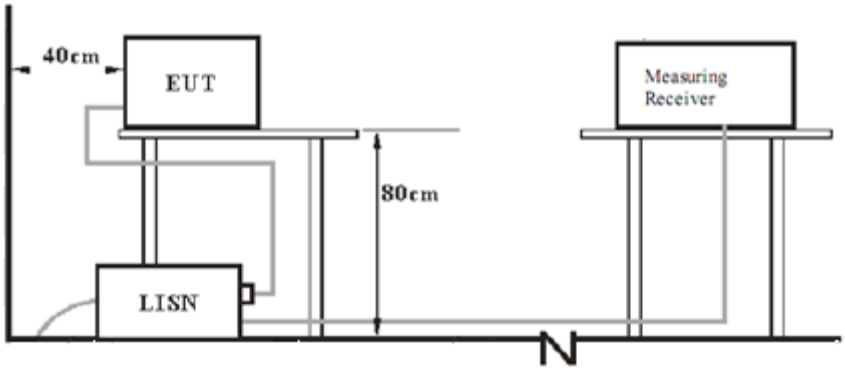
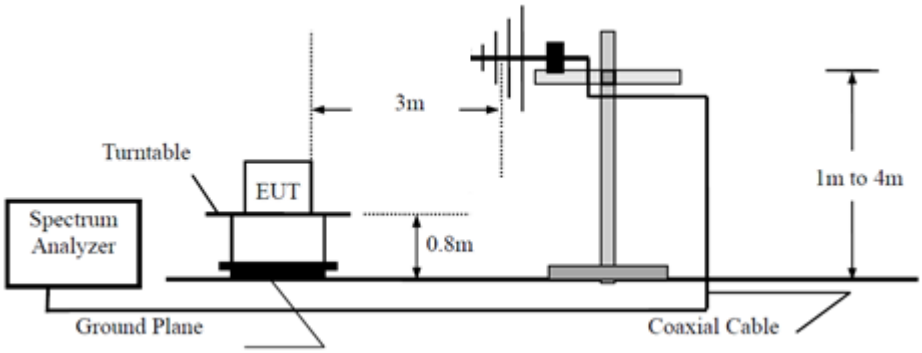
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

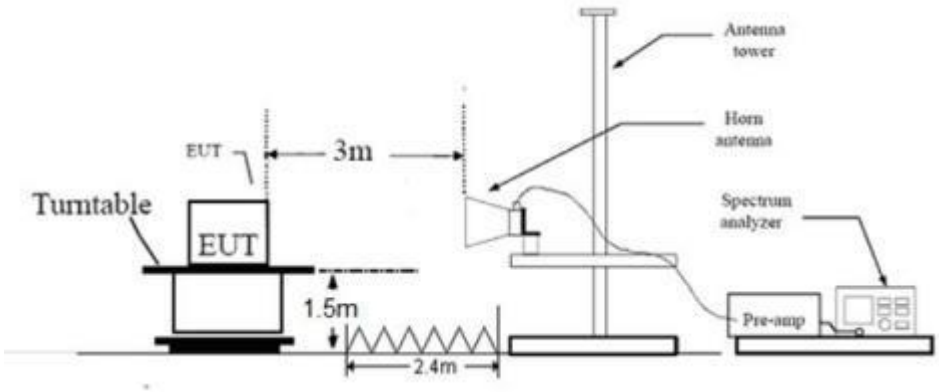


7.2 Radiated test setups

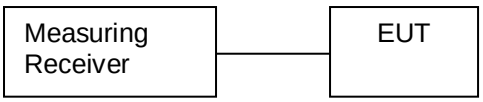
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

Through pre-scan all kind of modulation and all kind of rates, find the 1Mbps of rate is the worst case of 802.11b; the 6Mbps of rate is the worst case of 802.11g; the 6.5Mbps of rate is the worst case of 802.11N20, only the worst case transmitter rate data mode in recorded in the report.

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9 Technical Requirement

9.1 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. 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

Limits

According to §15.247 (b) (1) & RSS-247 5.4(d), 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 modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Low channel 2412MHz	14.2	16.2	30	Pass
Middle channel 2437MHz	13.2	15.2	30	Pass
High channel 2462MHz	12.4	14.4	30	Pass

802.11g modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Low channel 2412MHz	12.6	14.6	30	Pass
Middle channel 2437MHz	11.3	13.3	30	Pass
High channel 2462MHz	10.5	12.5	30	Pass

802.11n20 modulation Test Result

Frequency (MHz)	Conducted Peak Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Low channel 2412MHz	12.8	14.8	30	Pass
Middle channel 2437MHz	11.8	13.8	30	Pass
High channel 2462MHz	10.9	12.9	30	Pass

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9.2 6dB bandwidth and 99% Occupied Bandwidth

Test Method for 6 dB Bandwidth

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.

Test Method for 99 % Bandwidth

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]
≥500

802.11b modulation Test Result

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (MHz)	Result
Low channel 2412MHz	7.160	12.268	0.5	Pass
Middle channel 2437MHz	7.160	12.268	0.5	Pass
High channel 2462MHz	7.160	12.268	0.5	Pass

802.11g modulation Test Result

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (MHz)	Result
Low channel 2412MHz	16.440	17.942	0.5	Pass
Middle channel 2437MHz	16.440	17.942	0.5	Pass
High channel 2462MHz	16.440	17.902	0.5	Pass

802.11n-HT20 modulation Test Result

Frequency (MHz)	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (MHz)	Result
Low channel 2412MHz	17.640	18.741	0.5	Pass
Middle channel 2437MHz	17.640	18.741	0.5	Pass
High channel 2462MHz	17.680	18.741	0.5	Pass

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6 dB Bandwidth

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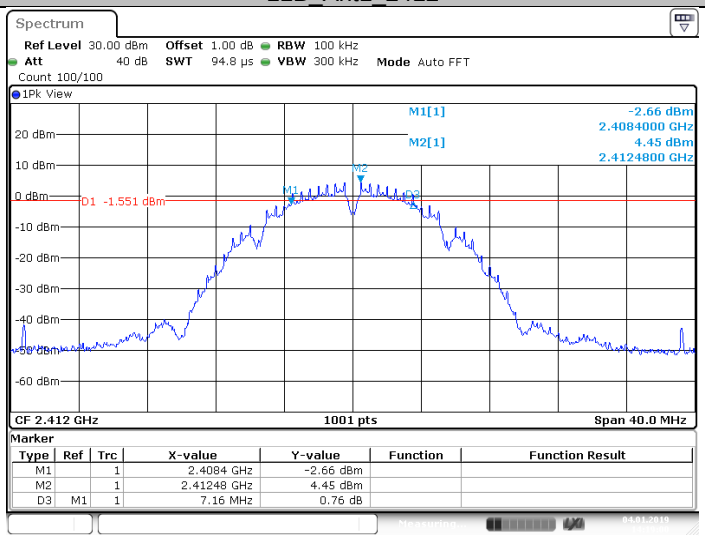

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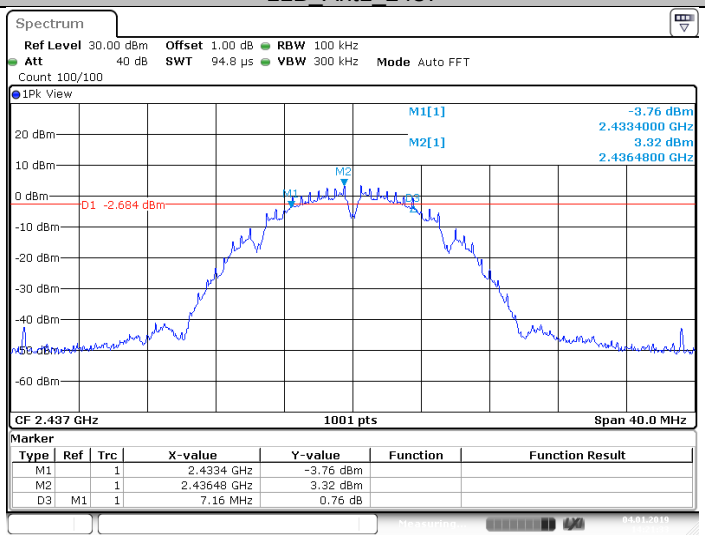

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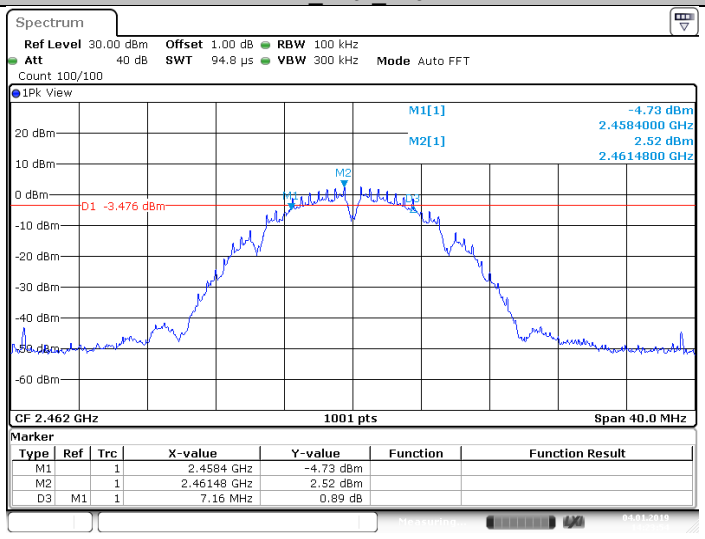

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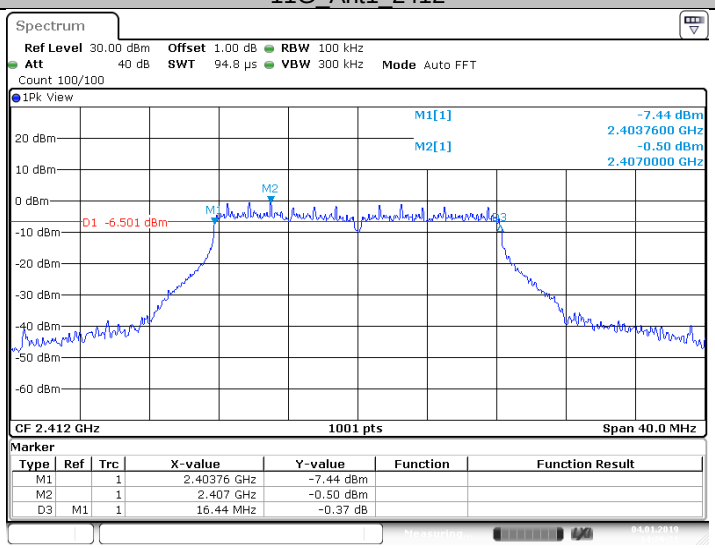

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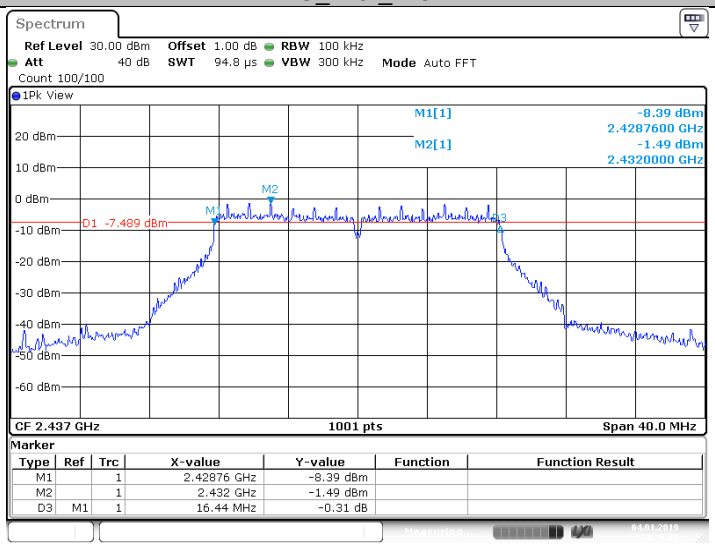

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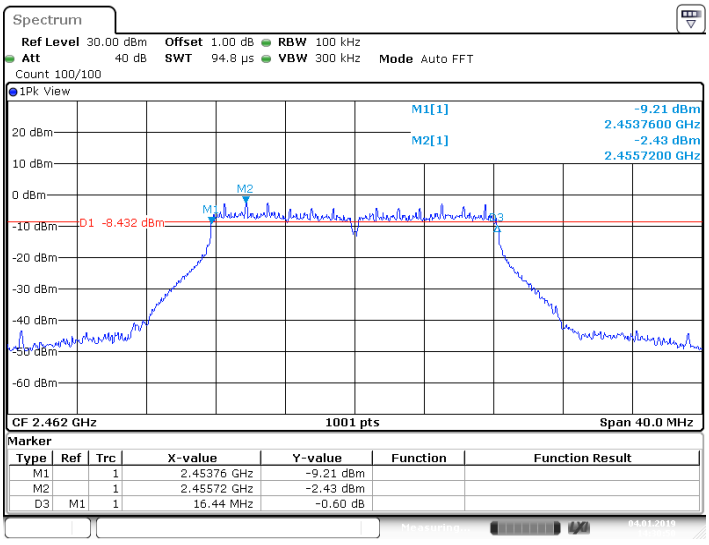

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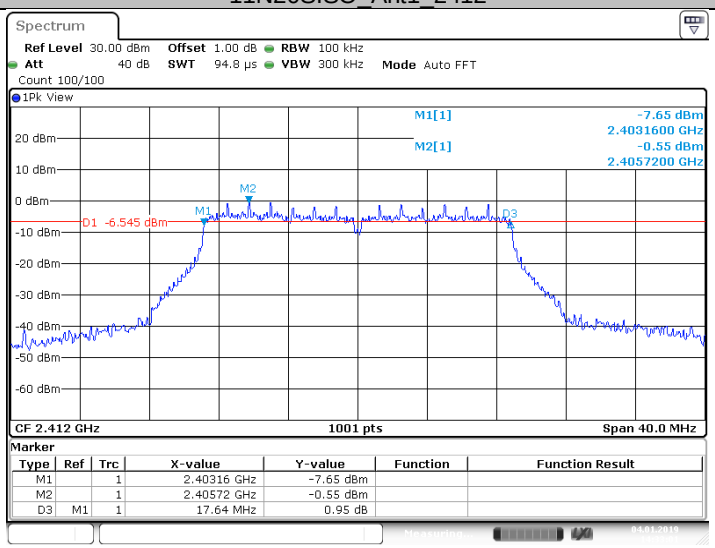

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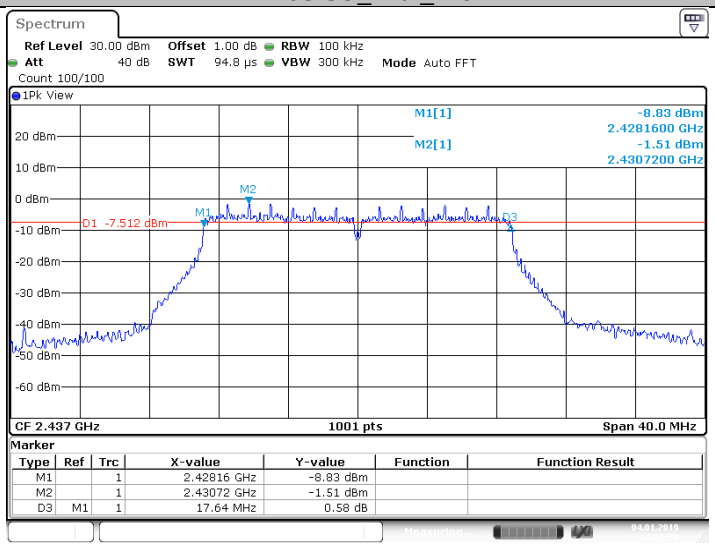

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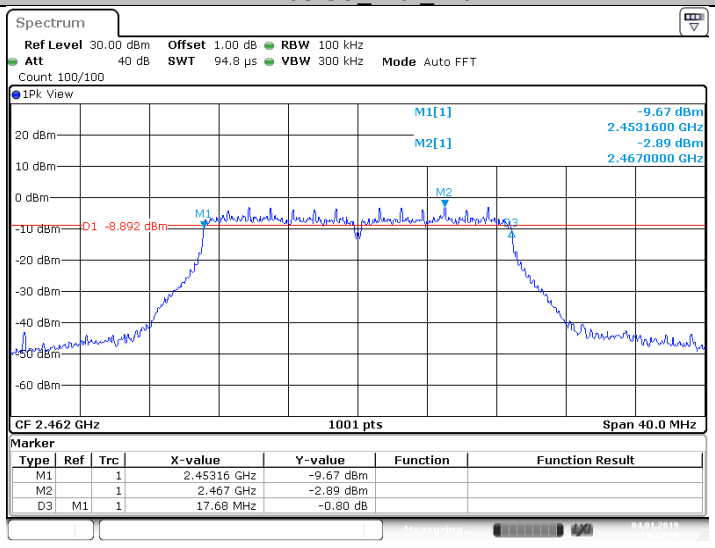

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99% Bandwidth

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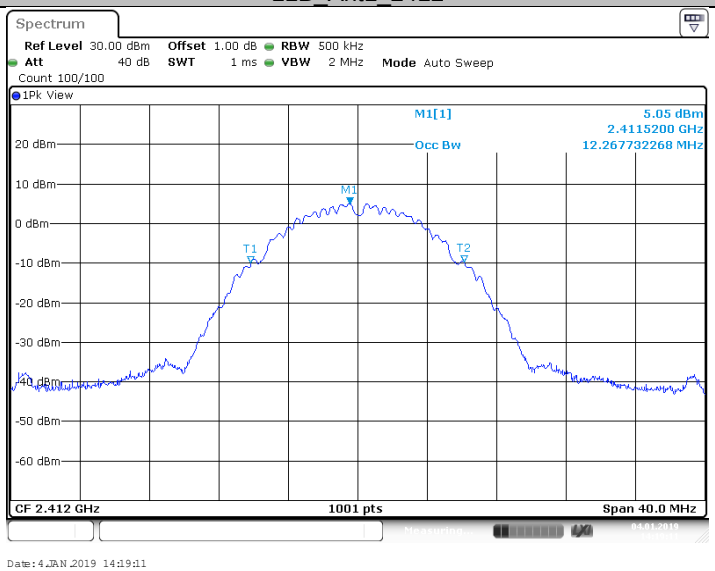

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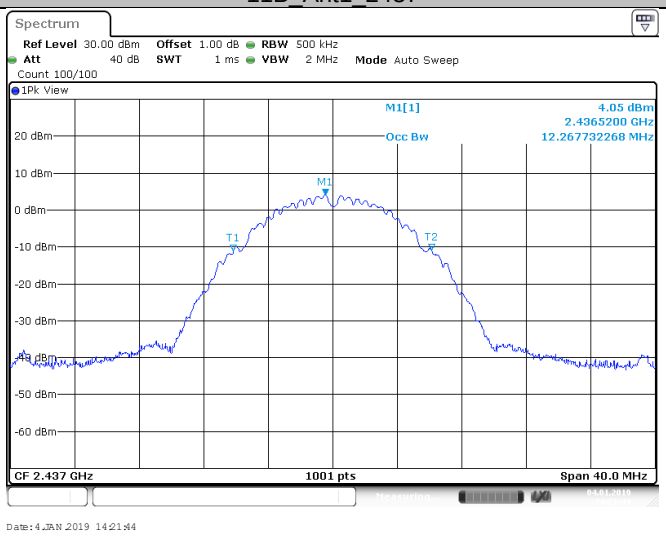

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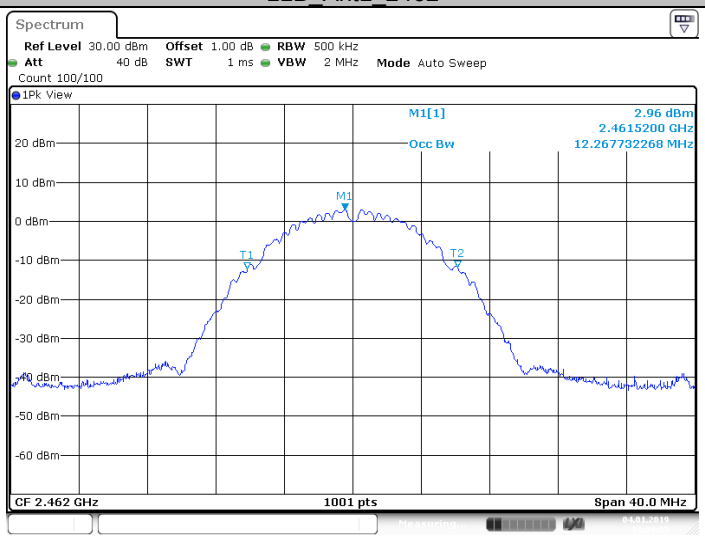

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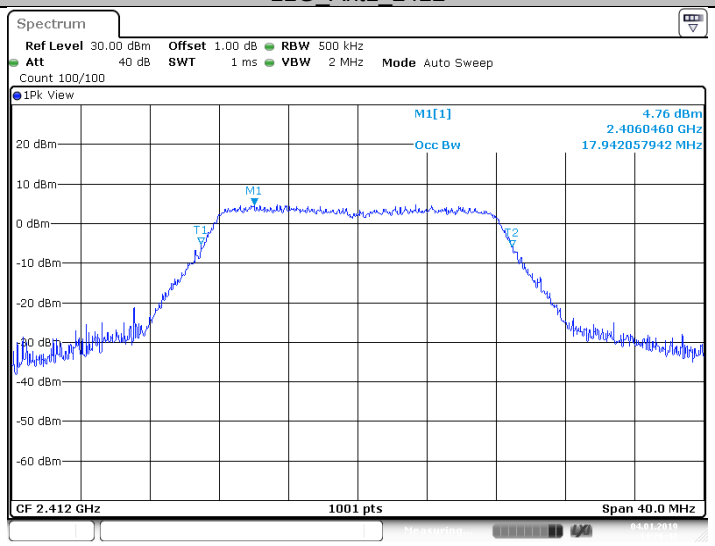
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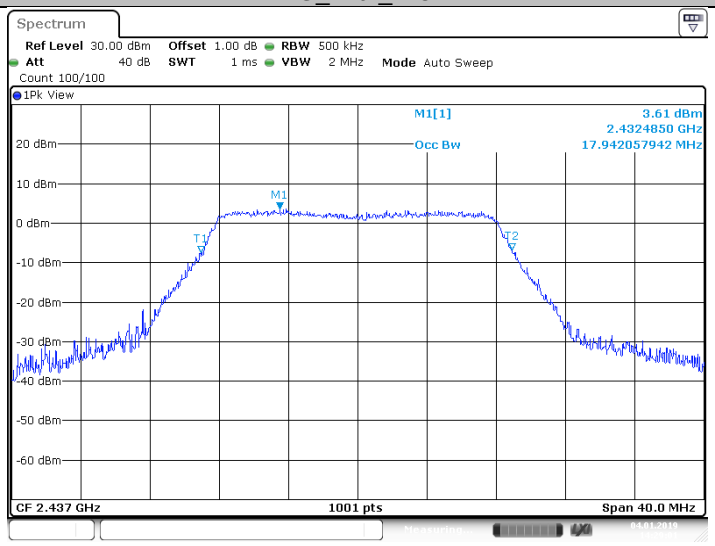
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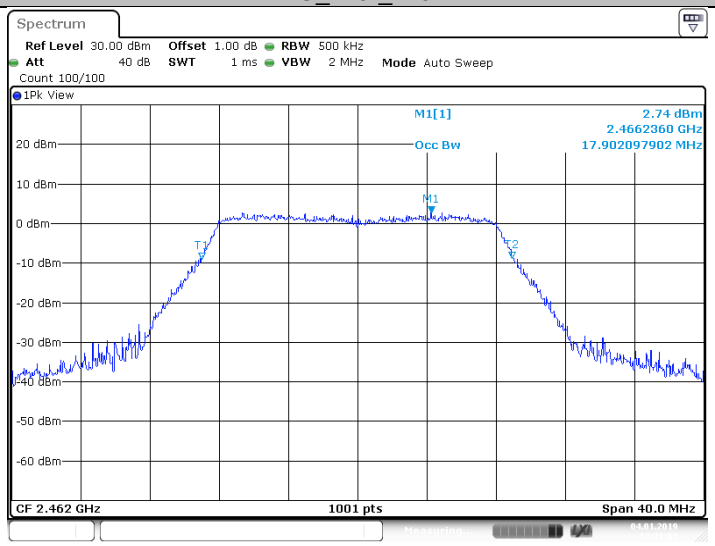

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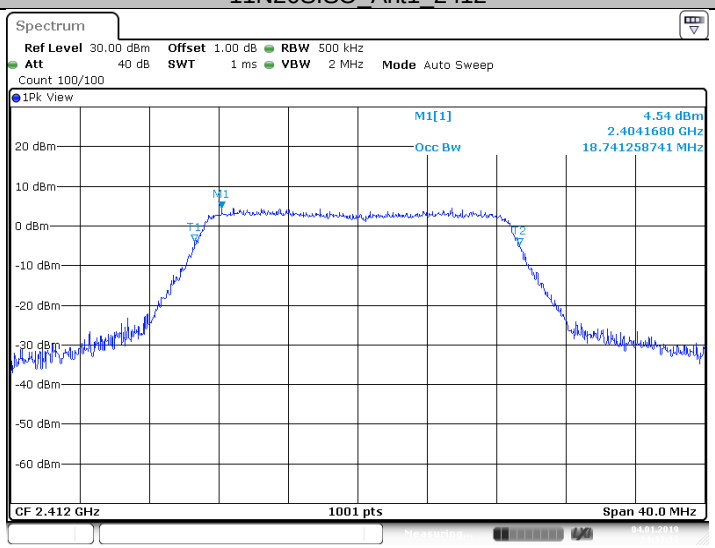

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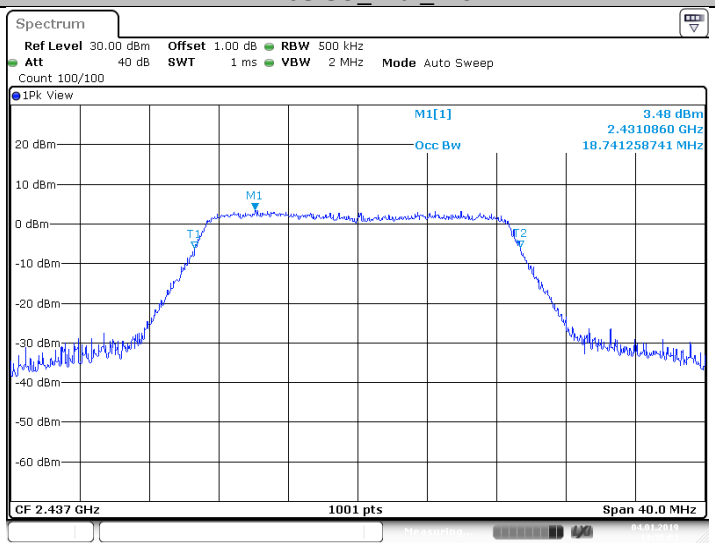

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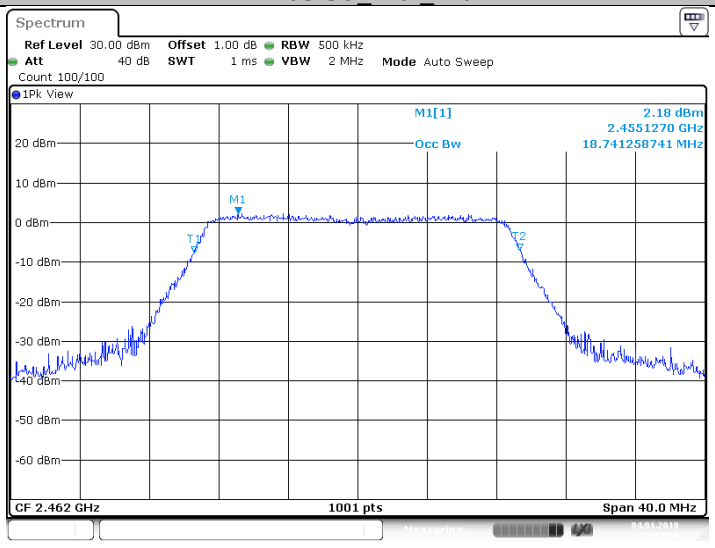

9.3 Power spectral density

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 [dBm]
≤8

802.11b modulation Test Result

Frequency (MHz)	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2412MHz	-9.33	8	Pass
Middle channel 2437MHz	-10.5	8	Pass
High channel 2462MHz	-11.73	8	Pass

802.11g modulation Test Result

Frequency (MHz)	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2412MHz	-13.71	8	Pass
Middle channel 2437MHz	-15.06	8	Pass
High channel 2462MHz	-15.96	8	Pass

802.11n-HT20 modulation Test Result

Frequency (MHz)	Power spectral density (dBm)	Limit (dBm)	Result
Low channel 2412MHz	-13.72	8	Pass
Middle channel 2437MHz	-14.94	8	Pass
High channel 2462MHz	-16.28	8	Pass

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9.4 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

TestMode	Antenna	Channel	FreqRange	RefLevel	Result	Limit	Verdict
11B	Ant1	2412	Reference	4.43	4.43	---	PASS
		2412	30~1000	4.43	-68.81	-15.57	PASS
		2412	1000~26500	4.43	-32.09	-15.57	PASS
		2437	Reference	3.60	3.60	---	PASS
		2437	30~1000	3.60	-68.72	-16.4	PASS
		2437	1000~26500	3.60	-32.72	-16.4	PASS
		2462	Reference	2.27	2.27	---	PASS
		2462	30~1000	2.27	-68.92	-17.73	PASS
		2462	1000~26500	2.27	-35.74	-17.73	PASS
11G	Ant1	2412	Reference	-0.61	-0.61	---	PASS
		2412	30~1000	-0.61	-67.74	-20.61	PASS
		2412	1000~26500	-0.61	-45.39	-20.61	PASS
		2437	Reference	-1.93	-1.93	---	PASS
		2437	30~1000	-1.93	-68.42	-21.93	PASS
		2437	1000~26500	-1.93	-42.97	-21.93	PASS
		2462	Reference	-2.92	-2.92	---	PASS
		2462	30~1000	-2.92	-68.06	-22.92	PASS
		2462	1000~26500	-2.92	-44.49	-22.92	PASS
11N20SISO	Ant1	2412	Reference	-1.40	-1.40	---	PASS
		2412	30~1000	-1.40	-68.08	-21.4	PASS
		2412	1000~26500	-1.40	-45.84	-21.4	PASS
		2437	Reference	-1.76	-1.76	---	PASS
		2437	30~1000	-1.76	-69.27	-21.76	PASS
		2437	1000~26500	-1.76	-43.55	-21.76	PASS
		2462	Reference	-3.07	-3.07	---	PASS
		2462	30~1000	-3.07	-68.91	-23.07	PASS
		2462	1000~26500	-3.07	-46.07	-23.07	PASS

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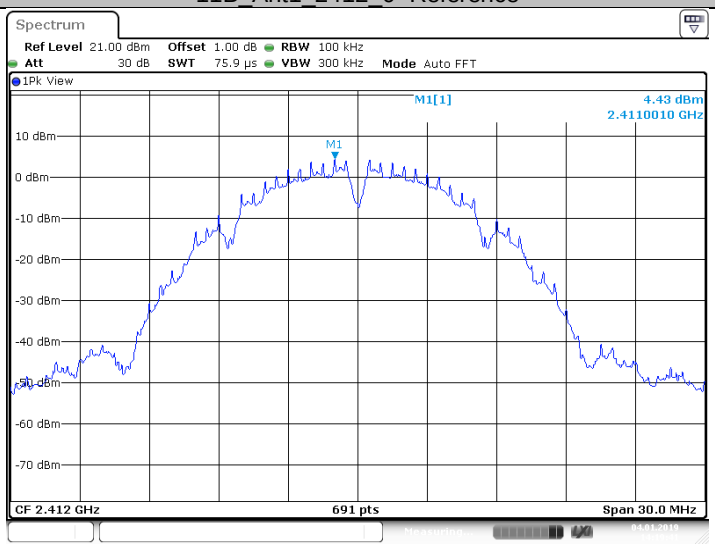
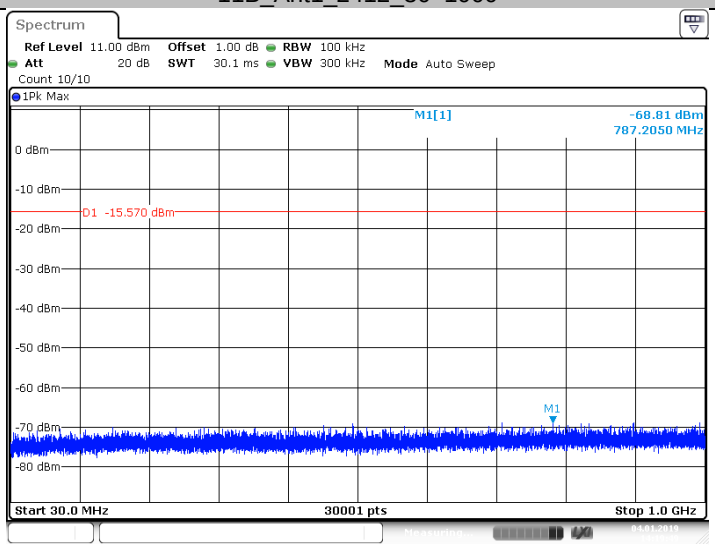
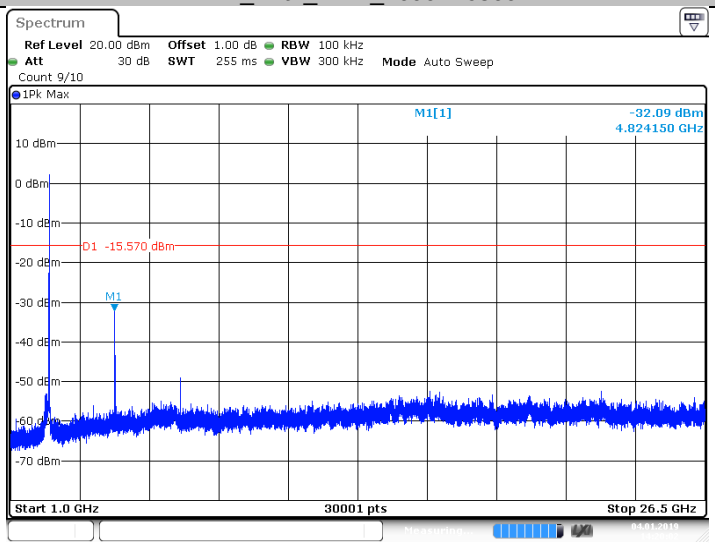
11B_Ant1_2412_0~Reference



11B_Ant1_2412_30~1000



11B_Ant1_2412_1000~26500



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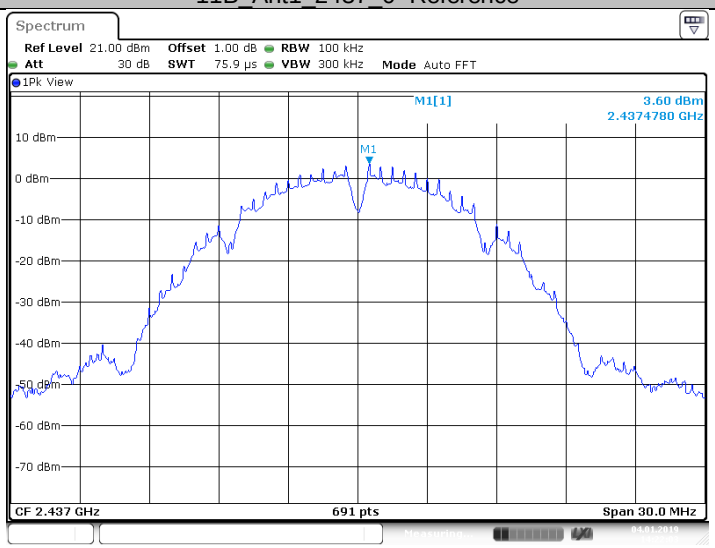
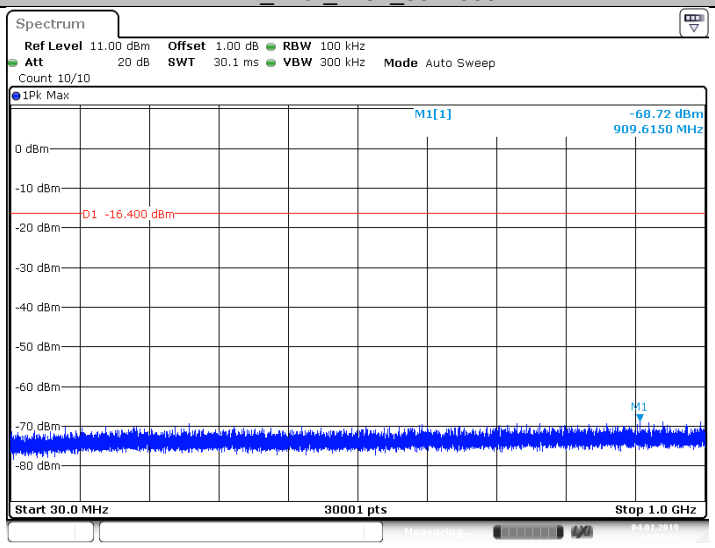
11B_Ant1_2437_0~Reference



11B_Ant1_2437_30~1000



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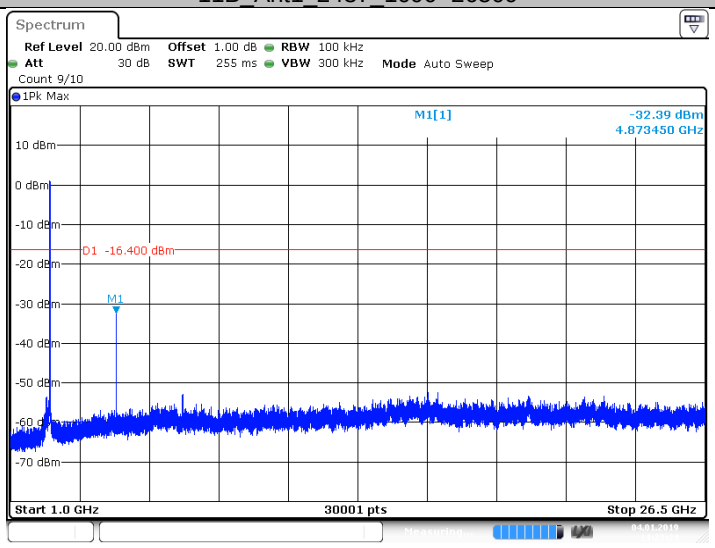

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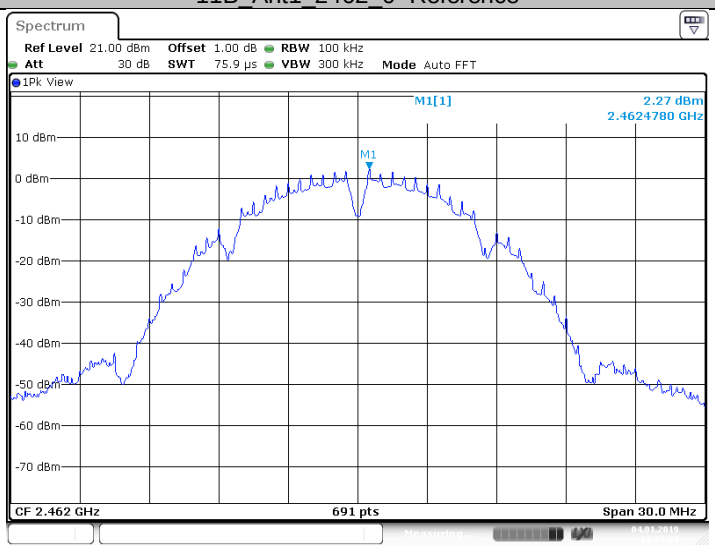
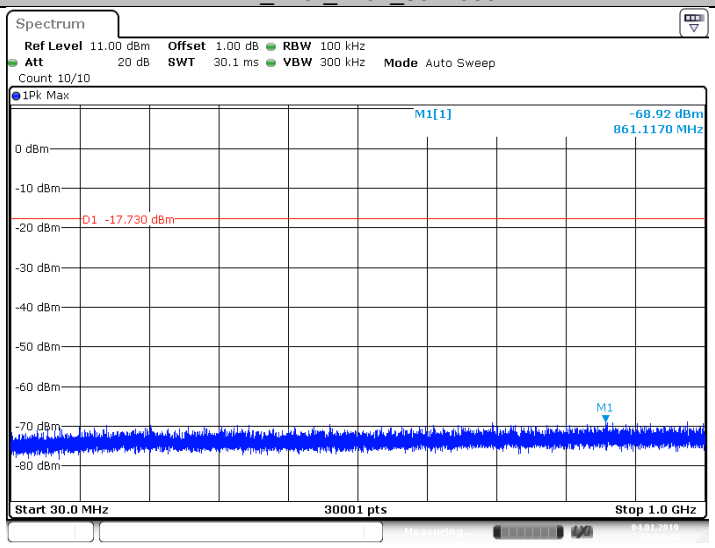
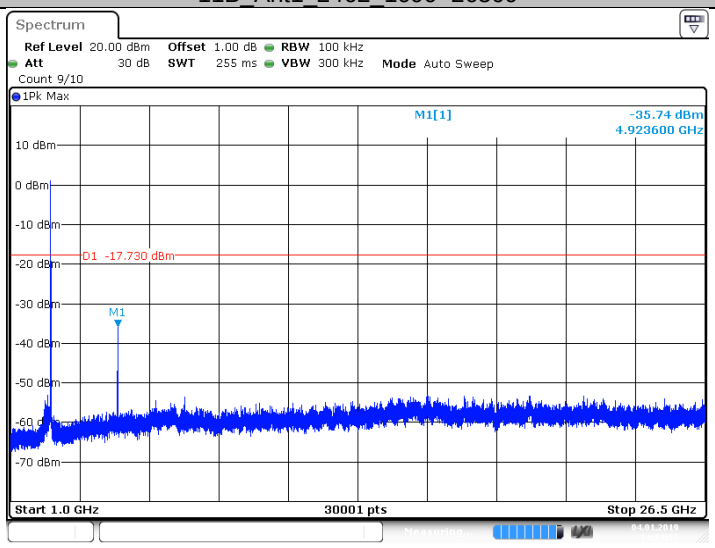
11B_Ant1_2462_0~Reference



11B_Ant1_2462_30~1000



11B_Ant1_2462_1000~26500



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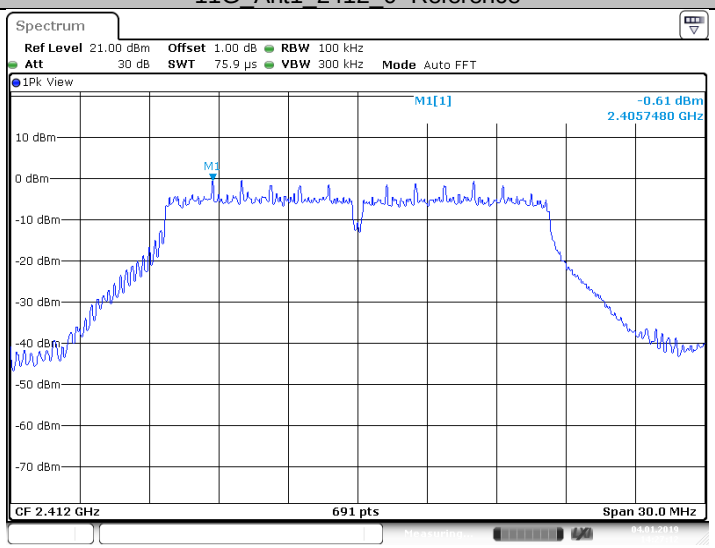
11G_Ant1_2412_0~Reference

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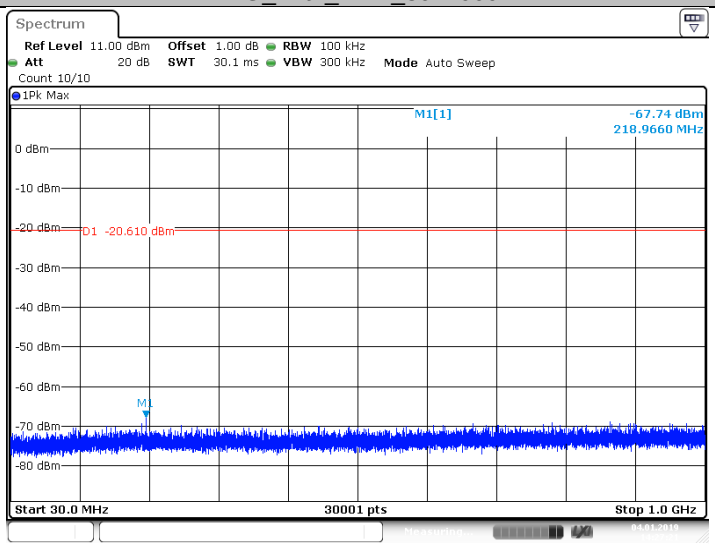
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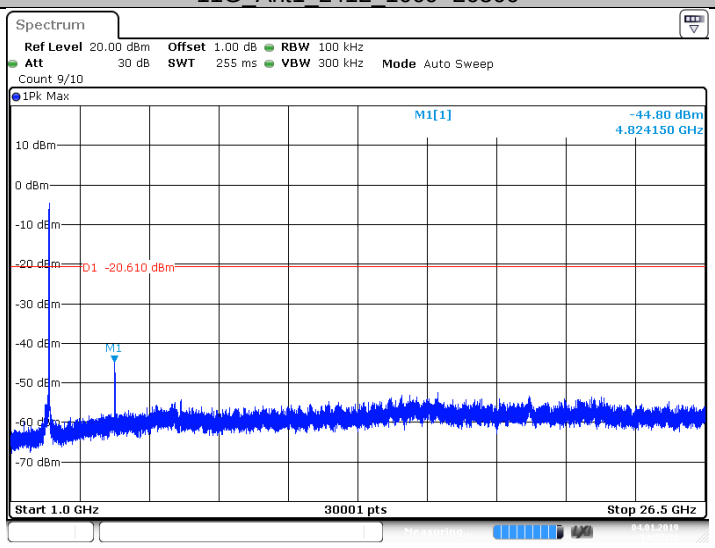

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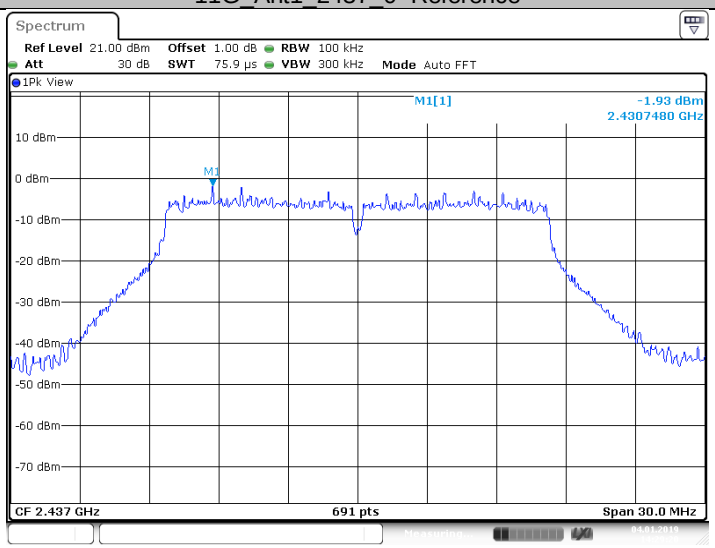
11G_Ant1_2437_0~Reference



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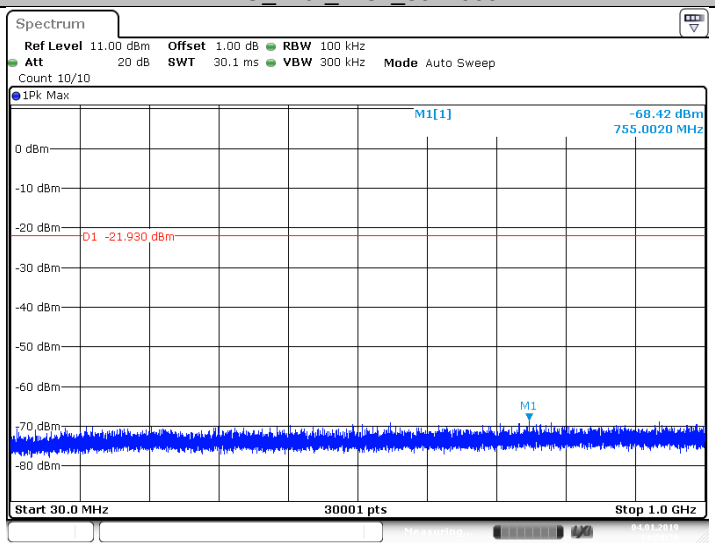
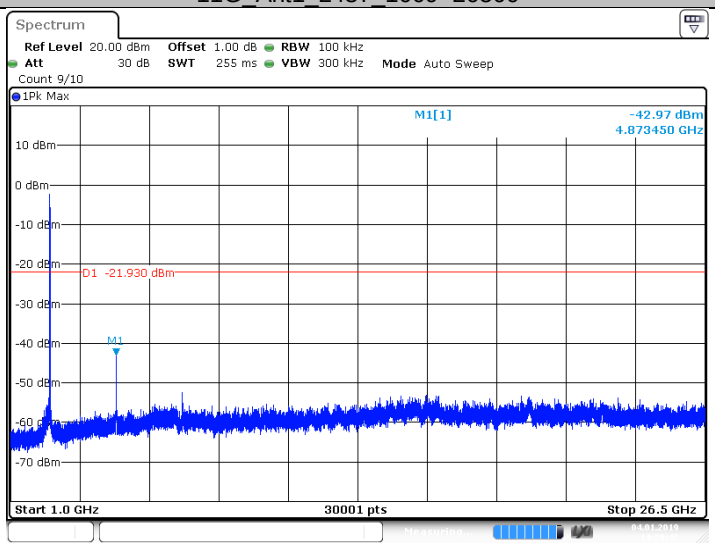


11G_Ant1_2437_1000~26500



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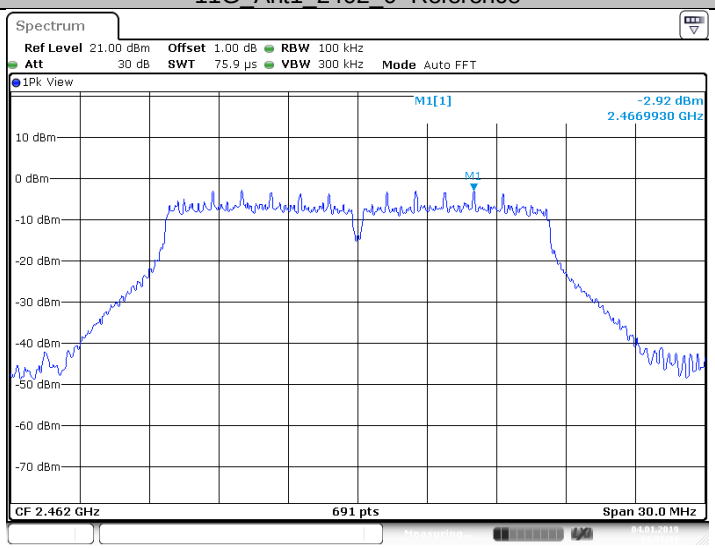
11G_Ant1_2462_0~Reference

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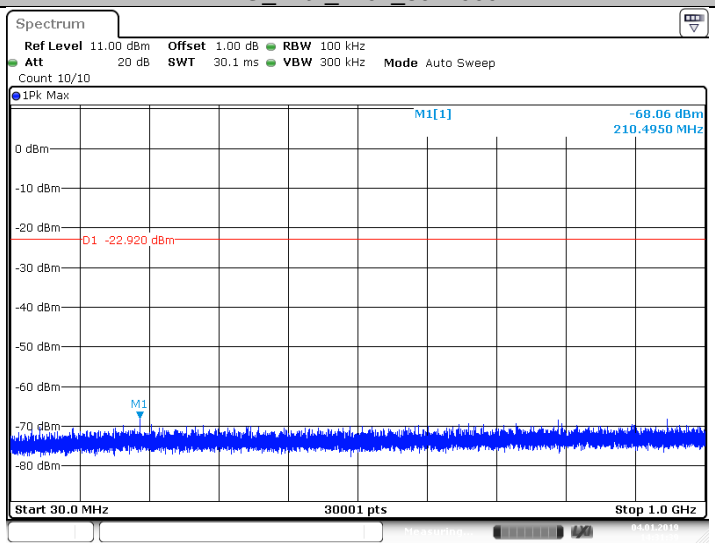
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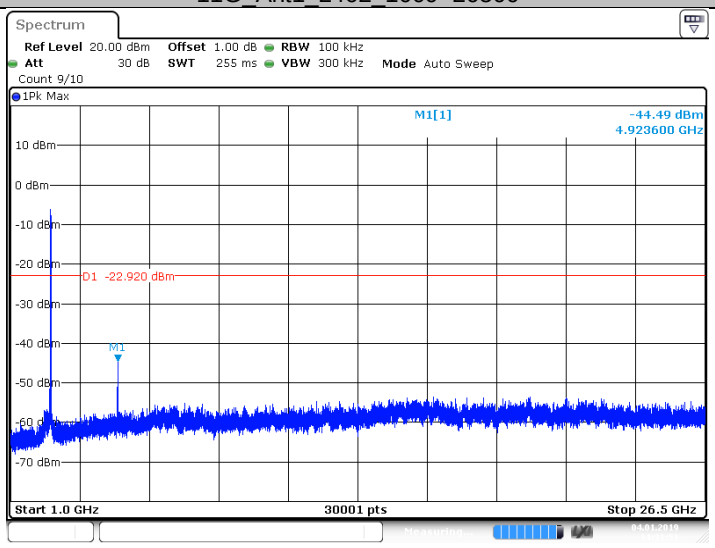

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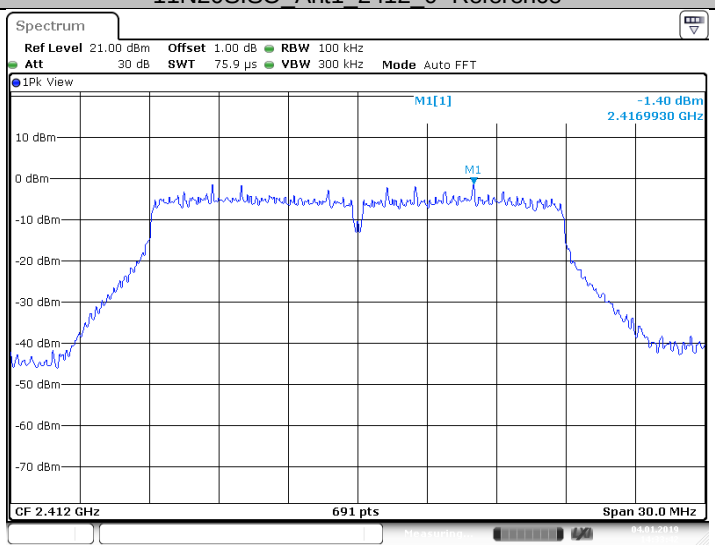
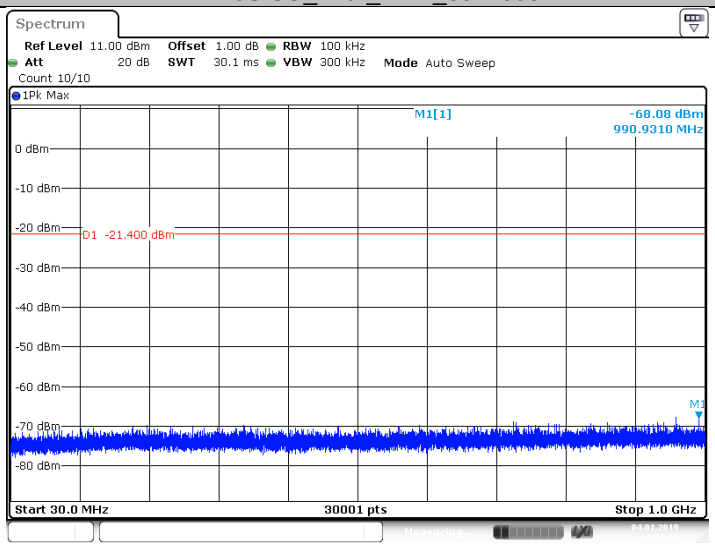
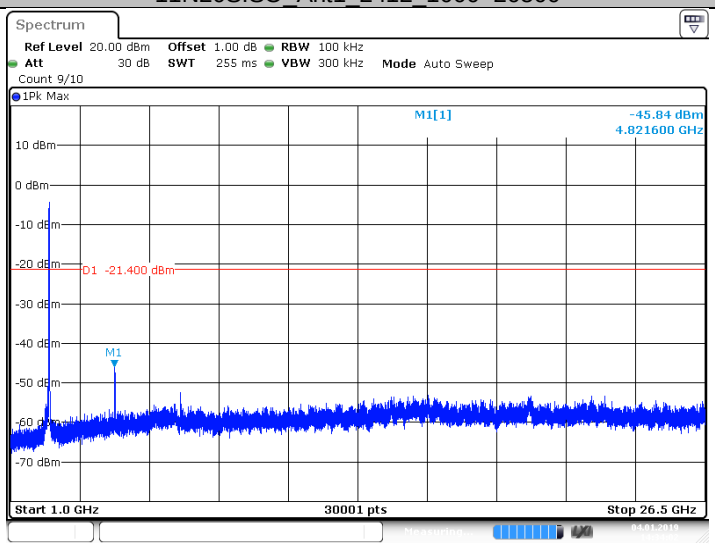
11N20SISO_Ant1_2412_0~Reference



11N20SISO_Ant1_2412_30~1000



11N20SISO_Ant1_2412_1000~26500



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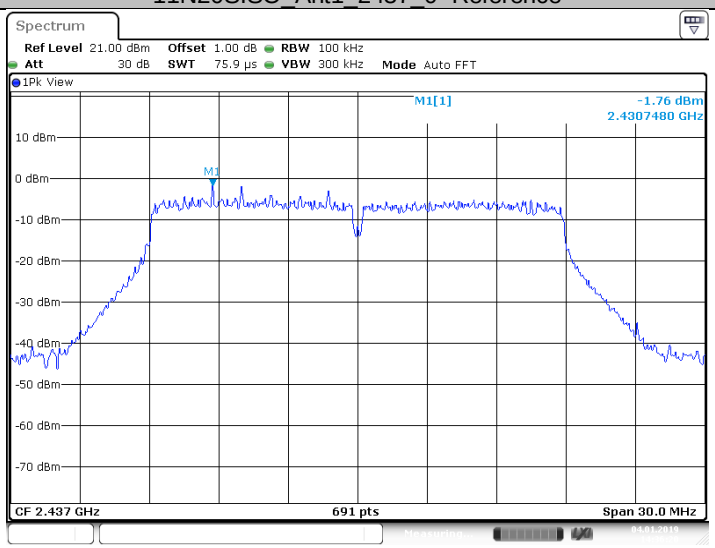
11N20SISO_Ant1_2437_0~Reference

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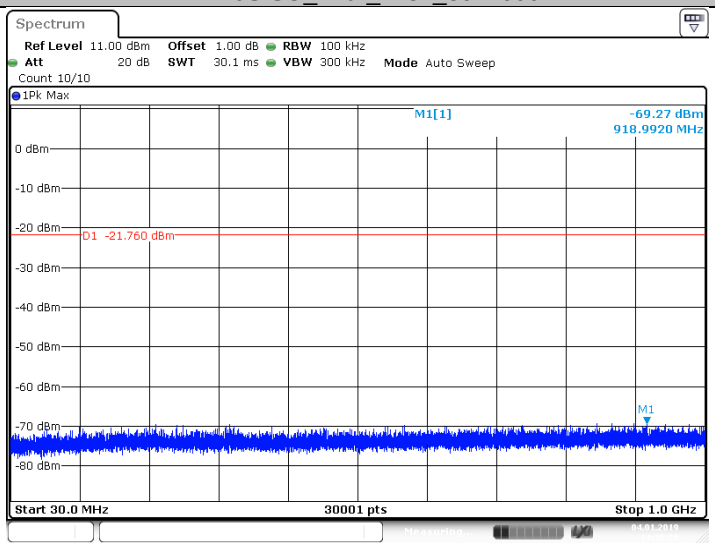
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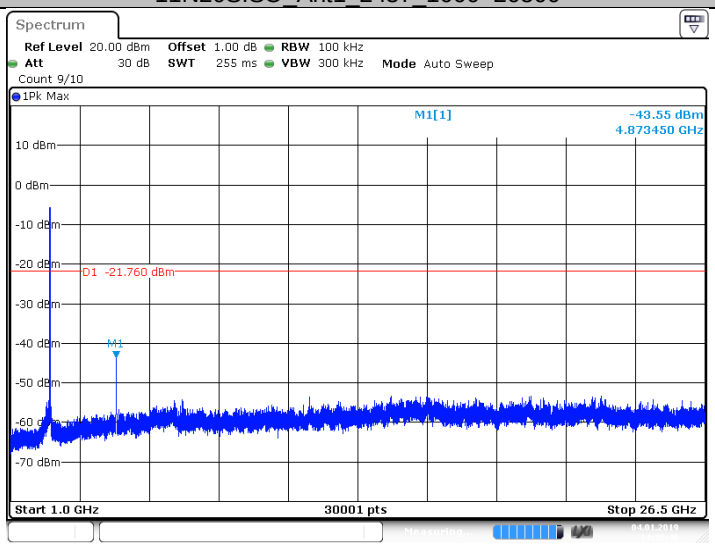

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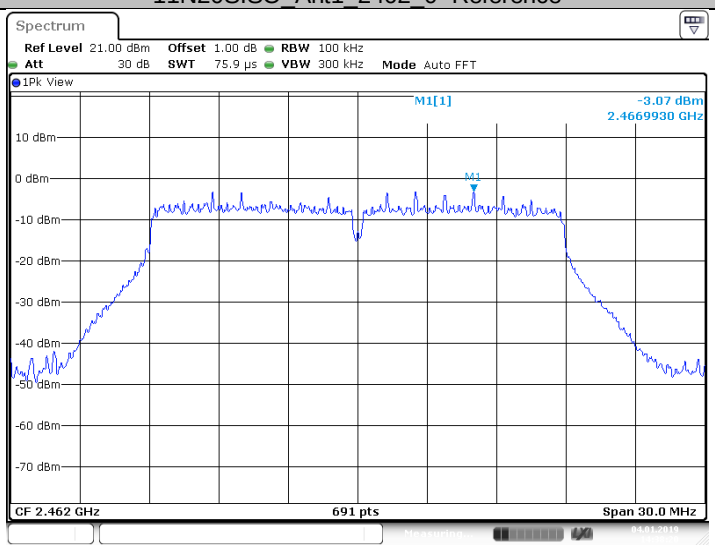
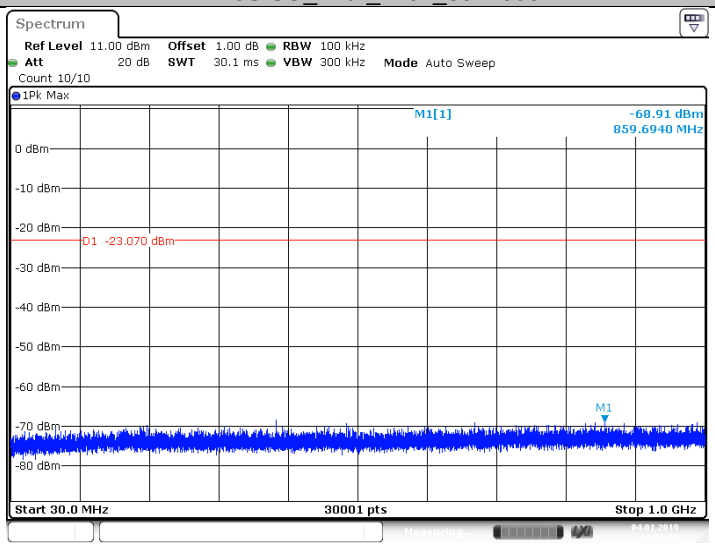

11N20SISO_Ant1_2462_30~1000

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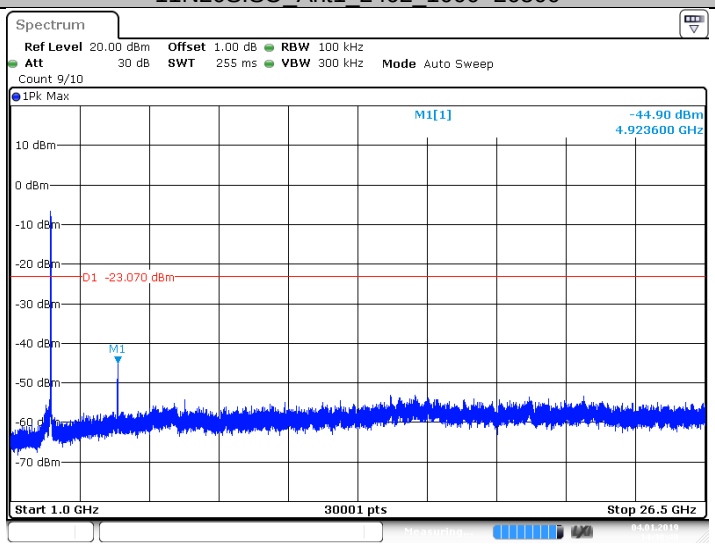

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Remark: Test of above 1GHz were performed with 1MHz RBW, we can't find any burst, so they are considered to fulfill the requirement with 100KHz RBW without further testing.

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9.5 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:

According to §15.247(d) and RSS-247 5.5, 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) and RSS-Gen 8.10, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

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

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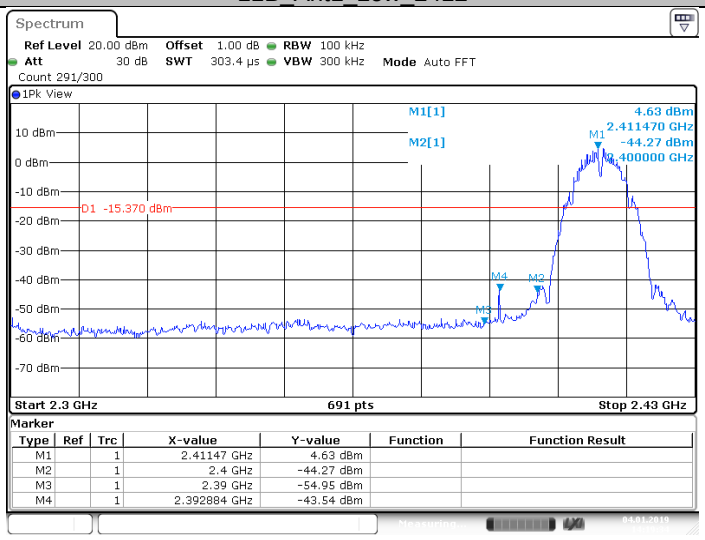
Band edge testing

11B_Ant1_Low_2412

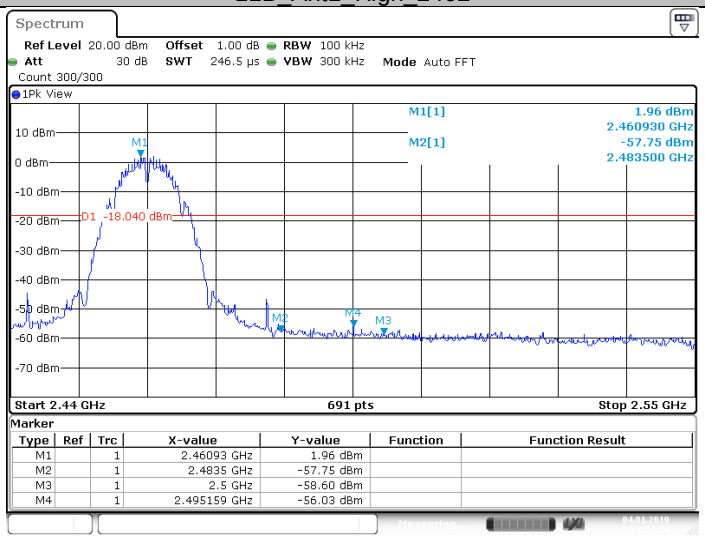


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41147 GHz	4.63 dBm		
M2		1	2.4 GHz	-44.27 dBm		
M3		1	2.39 GHz	-54.95 dBm		
M4		1	2.392884 GHz	-43.54 dBm		

Date: 4.JAN.2019 14:19:35

11B_Ant1_High_2462

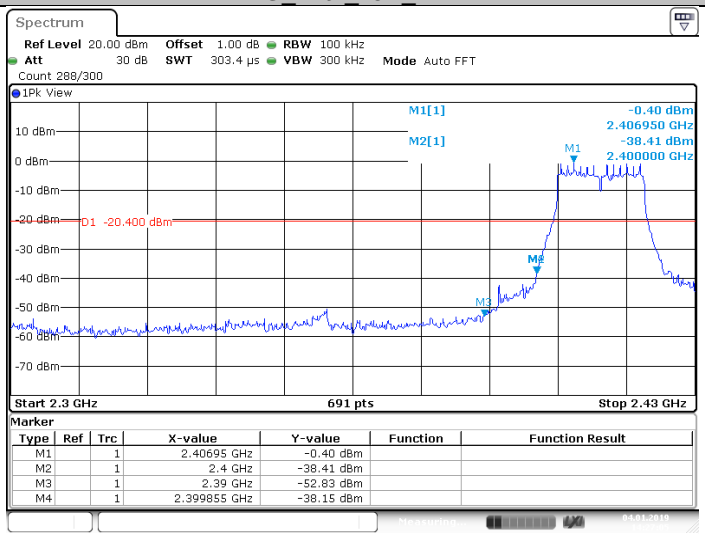


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46093 GHz	1.96 dBm		
M2		1	2.4835 GHz	-57.75 dBm		
M3		1	2.5 GHz	-58.60 dBm		
M4		1	2.495159 GHz	-56.03 dBm		

Date: 4.JAN.2019 14:24:28

11G_Ant1_Low_2412



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40695 GHz	-0.40 dBm		
M2		1	2.4 GHz	-38.41 dBm		
M3		1	2.39 GHz	-52.83 dBm		
M4		1	2.399855 GHz	-38.15 dBm		

Date: 4.JAN.2019 14:27:06

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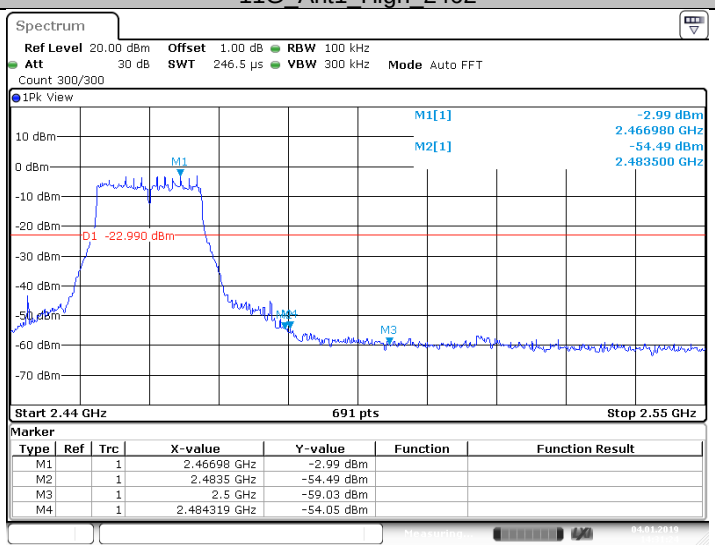
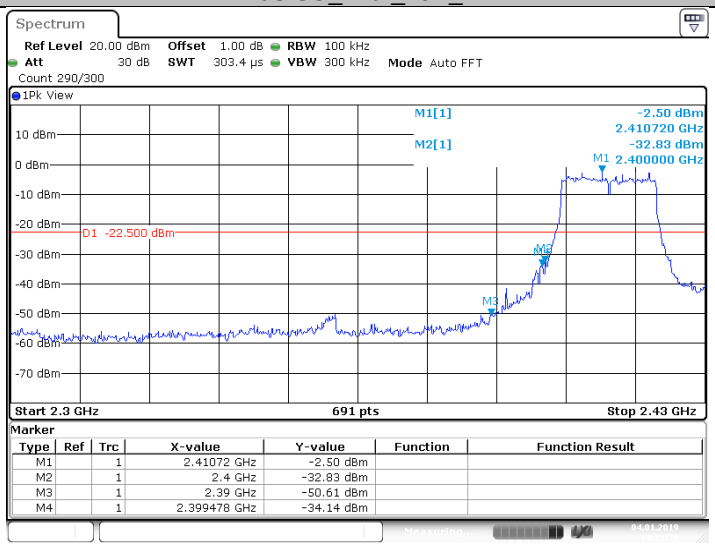
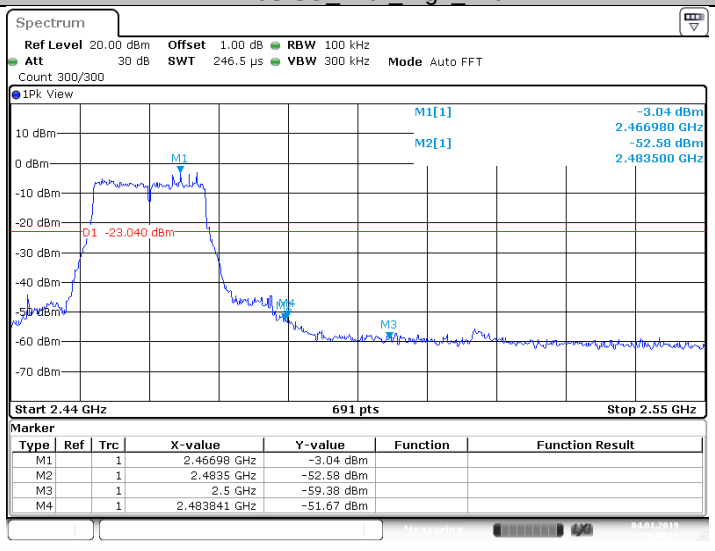
11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412



11N20SISO_Ant1_High_2462



9.6 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 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned
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.

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 Tel. +86 755 8828 6998, Fax: +86 755 8828 5299

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 and RSS-GEN 8.10, 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 mode) 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	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	
30-1000MHz	91.352500	41.12	H	43.5	QP	2.38	Pass
	335.125625	43.22	H	2.78	QP	2.78	Pass
	365.620000	45.14	H	0.86	QP	0.86	Pass
	77.045000	36.50	V	40	QP	3.50	Pass
	91.413125	43.39	V	43.5	QP	0.11	Pass
	152.341250	39.83	V	43.5	QP	3.67	Pass
1000-25000MHz	**4823.906250**	**43.16**	H	74	PK	**30.84**	Pass
	7625.156250	**42.67**	H	74	PK	**31.33**	Pass
	9647.812500	**47.69**	H	74	PK	**26.31**	Pass
	4823.906250	**39.92**	V	74	PK	**34.08**	Pass
	7564.218750	**41.69**	V	74	PK	**32.31**	Pass
	9647.812500	**45.94**	V	74	PK	**28.06**	Pass

802.11B Modulation 2437MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	
1000-25000MHz	5416.406250	37.19	H	74	PK	36.81	Pass
	7597.500000	41.75	H	74	PK	32.25	Pass
	9748.125000	44.75	H	74	PK	29.25	Pass
	4612.500000	36.14	V	74	PK	37.86	Pass
	5055.937500	37.87	V	74	PK	36.13	Pass
	7634.531250	42.09	V	74	PK	31.91	Pass

802.11B Modulation 2462MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
	MHz	dBuV/m		dBµV/m		dBuV/m	
1000-25000MHz	4727.343750	38.34	H	74	PK	35.66	Pass
	6338.906250	39.98	H	74	PK	34.02	Pass
	7609.218750	42.50	H	74	PK	31.50	Pass
	4484.531250	37.23	H	74	PK	36.77	Pass
	5383.593750	37.99	V	74	PK	36.01	Pass
	7607.812500	42.54	V	74	PK	31.46	Pass

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

Radiated Emission Test

Description	Manufacturer	Model no.	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2019-6-28
Horn Antenna	Rohde & Schwarz	HF907	102294	2019-6-28
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2019-7-6
Attenuator	Agilent	8491A	MY39264334	2019-7-6
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

TS8997 Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2019-7-6
10dB Attenuator	Weinschel	4M-10	43152	2019-7-6
Test software	Rohde & Schwarz	EMC32	Version 10.38.00	N/A
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

System Measurement Uncertainty	
Test Items	Extended Uncertainty
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 Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%

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