



FCC - TEST REPORT

Report Number : **68.910.16.027.01** Date of Issue: April 22, 2016

Model : Koogeek-S1

Product Type : Bluetooth wi-fi smart health scale

Applicant : Shenzhen Belter Health Measurement and Analysis Technology Co., Ltd.

Address : 702, 704, Block C, Tsinghua Unis Science Park, Hi-Tech Industrial Park North, Nanshan

Production Facility : Shenzhen Belter Health Measurement and Analysis Technology Co., Ltd.

Address : 702, 704, Block C, Tsinghua Unis Science Park, Hi-Tech Industrial Park North, Nanshan

Test Result : **Positive** **Negative**

Total pages including Appendices : 26

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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, 518052,
Shenzhen, P.R.C.

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

FCC Registration Number: 502708

3 Description of the Equipment Under Test

Product:	Bluetooth wi-fi smart health scale
Model no.:	Koogeek-S1
FCC ID:	2AAEEE656
Options and accessories:	NIL
Rating:	DC6.0V (Supplied by 4xAA batteries)
RF Transmission Frequency:	2412-2462MHz
No. of Operated Channel:	11
Modulation:	GFSK
Antenna Type:	PCB
Antenna Gain:	0.9dBi
Description of the EUT:	The Equipment Under Test (EUT) is a scale with BLE and 2.4G wifi function.

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2015 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to FCC KDB 558074 D01 DTS Meas Guidance and ANSI C63.10-2013.

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	---	---	N/A
§15.247(b)(1)	Conducted peak output power	10	Site 1	Pass
§15.247(e)	Power spectral density	11	Site 1	Pass
§15.247(a)(2)	6dB bandwidth	13	Site 1	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	14	Site 1	Pass
§15.247(d)	Band edge	18	Site 1	Pass
§15.247(d) & §15.209 & 15.205	Spurious radiated emissions for transmitter	23	Site 1	Pass
§15.203	Antenna requirement	See note 2		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses a permanently PCB antenna, which gain is 0.9dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AAEEE656 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

■ - Performed

□ - **Not** Performed

The Equipment under Test

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

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

Sample Received Date: 15 January, 2016

Testing Start Date: 15 January, 2016

Testing End Date: 15 April, 2016

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

Reviewed by:

Prepared by:

Tested by:



Phoebe Hu
EMC Project Manager



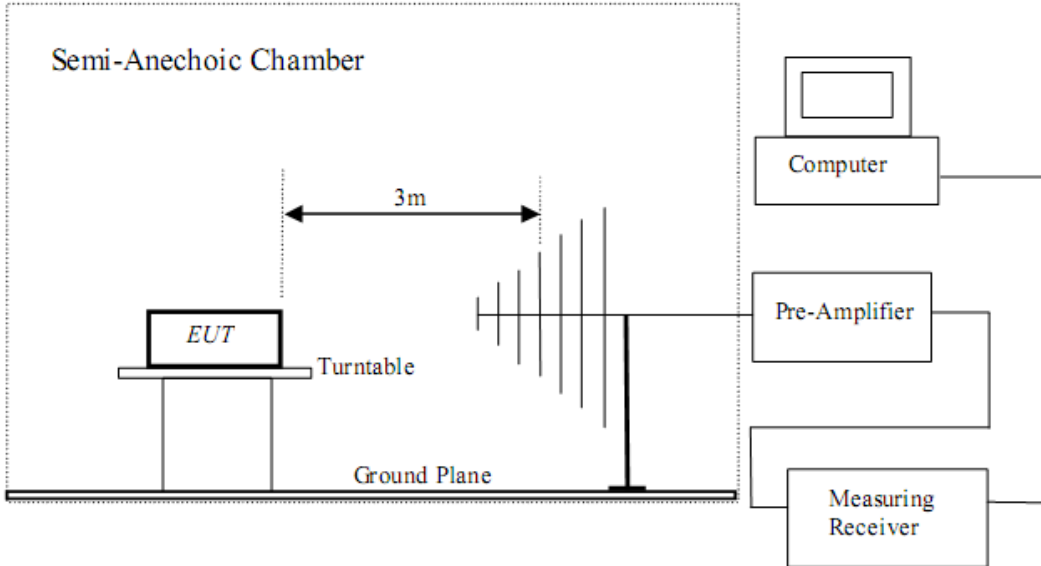
Felix Li
EMC Project Engineer



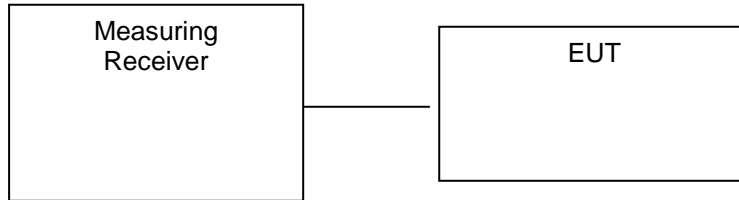
Leon Zhang
EMC Test Engineer

7 Test Setups

7.1 Radiated test setups



7.2 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
PC	Lenovo	X220	---

The system was configured to low channel, middle channel, and high channel for the test.

9 Technical Requirement

9.1 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
RBW > the 6 dB bandwidth of the emission being measured, VBW \geq 3RBW, Span \geq 3RBW
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), conducted peak output power limit as below:

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

Test Result

802.11b

Frequency MHz	Conducted Peak Output Power dBm
Low channel 2412MHz	15.54
Middle channel 2437MHz	15.56
High channel 2462MHz	15.69

802.11g

Frequency MHz	Conducted Peak Output Power dBm
Low channel 2412MHz	12.21
Middle channel 2437MHz	12.22
High channel 2462MHz	12.28

802.11n20

Frequency MHz	Conducted Peak Output Power dBm
Low channel 2412MHz	12.71
Middle channel 2437MHz	12.31
High channel 2462MHz	12.66

802.11n40

Frequency MHz	Conducted Peak Output Power dBm
Low channel 2422MHz	13.53
Middle channel 2442MHz	13.53
High channel 2462MHz	14.01

9.2 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

Test Result

802.11b test result

Frequency MHz	Power spectral density dBm
Low channel 2412MHz	-12.89
Middle channel 2437MHz	-14.96
High channel 2462MHz	-15.02

802.11g test result

Frequency MHz	Power spectral density dBm
Low channel 2412MHz	-17.61
Middle channel 2437MHz	-18.78
High channel 2462MHz	-17.09

802.11n20 test result

Frequency MHz	Power spectral density dBm
Low channel 2412MHz	-20.13
Middle channel 2437MHz	-18.53
High channel 2462MHz	-19.88

802.11n40 test result

Frequency MHz	Power spectral density dBm
Low channel 2422MHz	-22.35
Middle channel 2442MHz	-22.40
High channel 2462MHz	-22.51

9.3 6 dB Bandwidth

Test Method

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

Limit

Limit [kHz]

≥ 500

802.11b test result

Frequency MHz	6 dB Bandwidth MHz
Low channel 2412MHz	9.074
Middle channel 2437MHz	9.074
High channel 2462MHz	9.074

802.11g test result

Frequency MHz	6 dB Bandwidth MHz
Low channel 2412MHz	16.45
Middle channel 2437MHz	16.49
High channel 2462MHz	16.41

802.11n20 test result

Frequency MHz	6 dB Bandwidth MHz
Low channel 2412MHz	17.17
Middle channel 2437MHz	17.27
High channel 2462MHz	17.06

802.11n40 test result

Frequency MHz	6 dB Bandwidth MHz
Low channel 2422MHz	36.29
Middle channel 2442MHz	36.29
High channel 2462MHz	36.38

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.

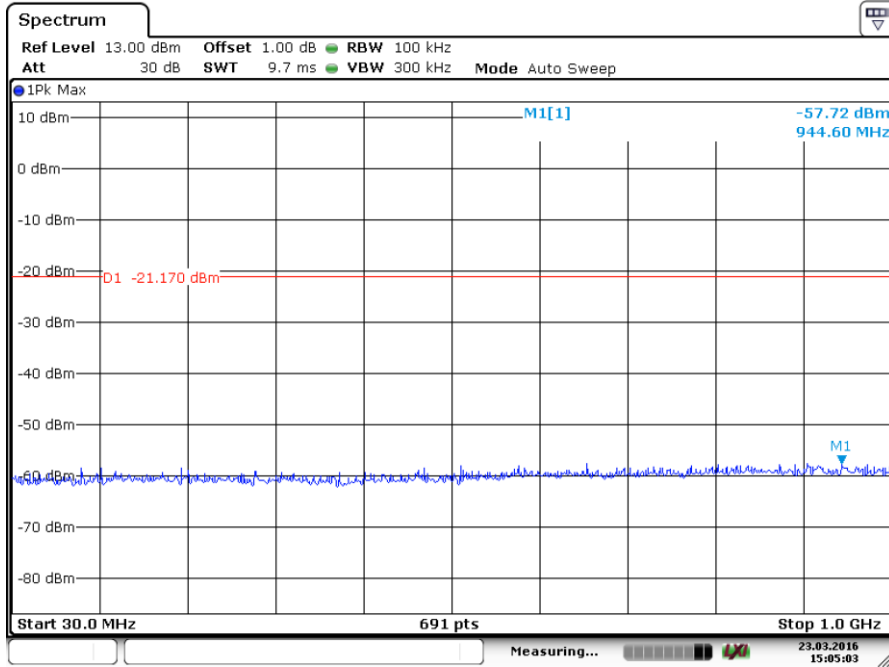
Limit

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

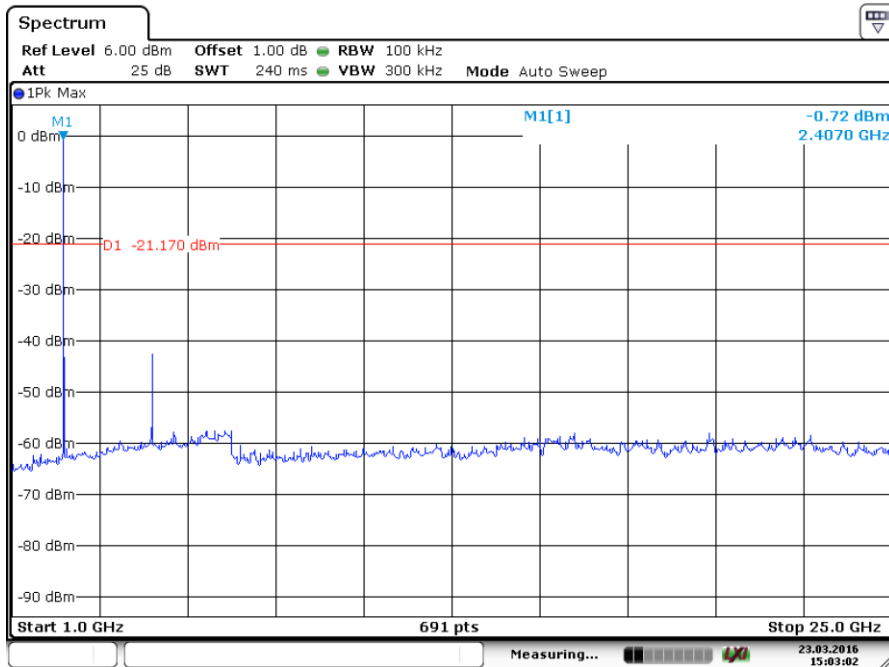
Spurious RF conducted emissions

802.11b (the worst case)

2412MHz

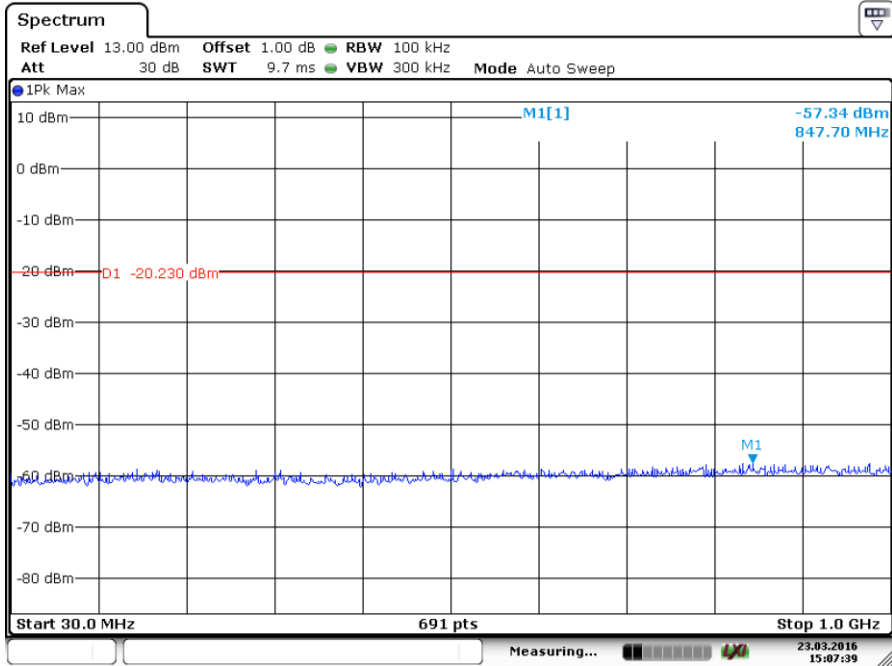


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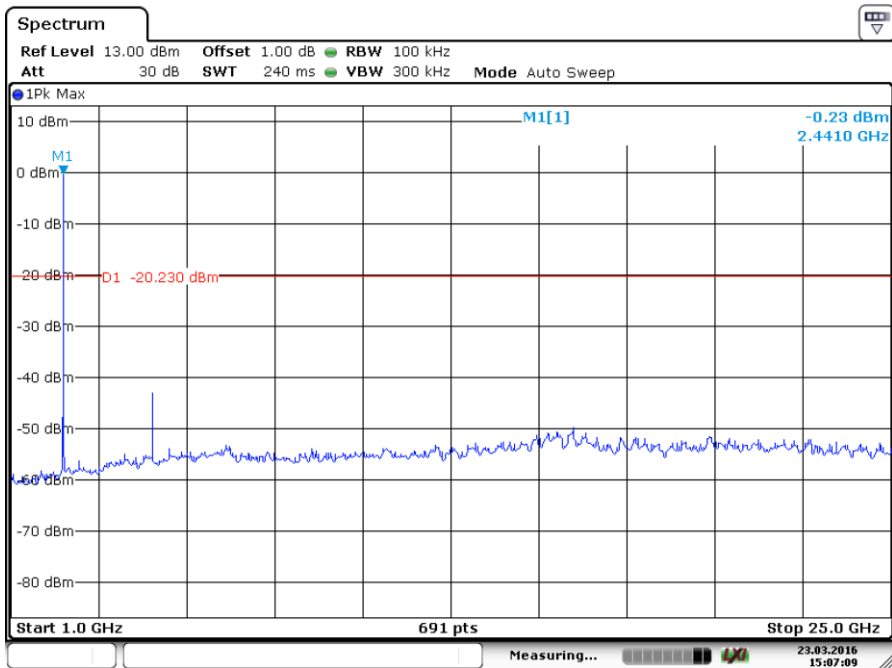


Date: 23.MAR.2016 15:03:03

2437MHz

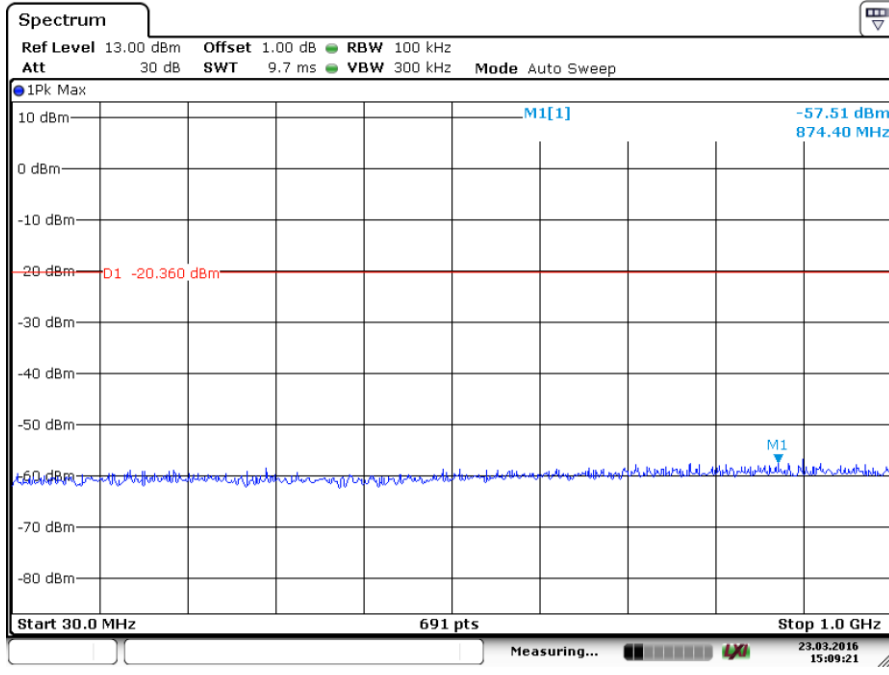


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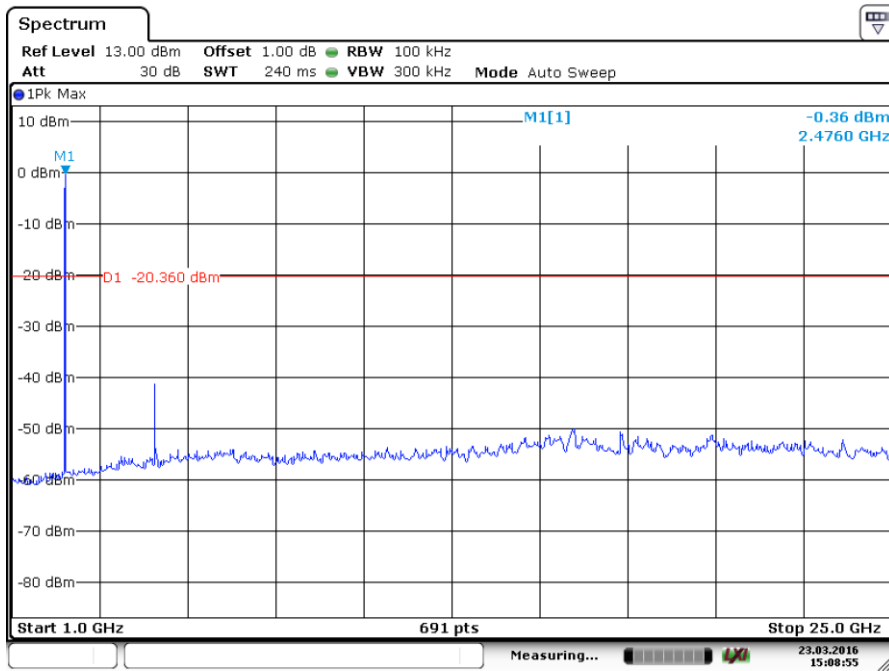


Date: 23. MAR 2016 15:07:10

2472MHz



Date: 23. MAR 2016 15:09:21



Date: 23. MAR 2016 15:08:55

9.5 Band edge testing

Test Method

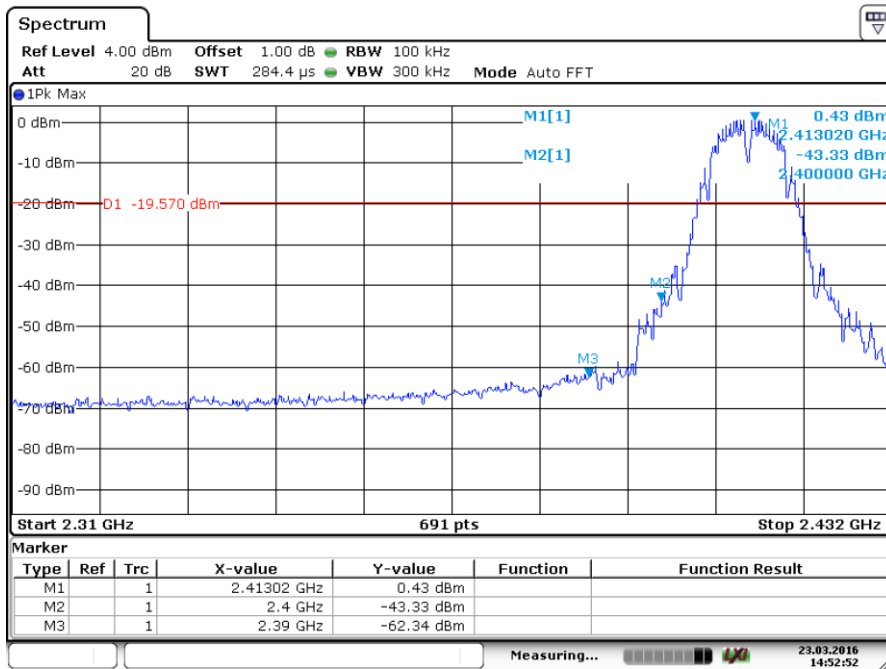
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record 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:

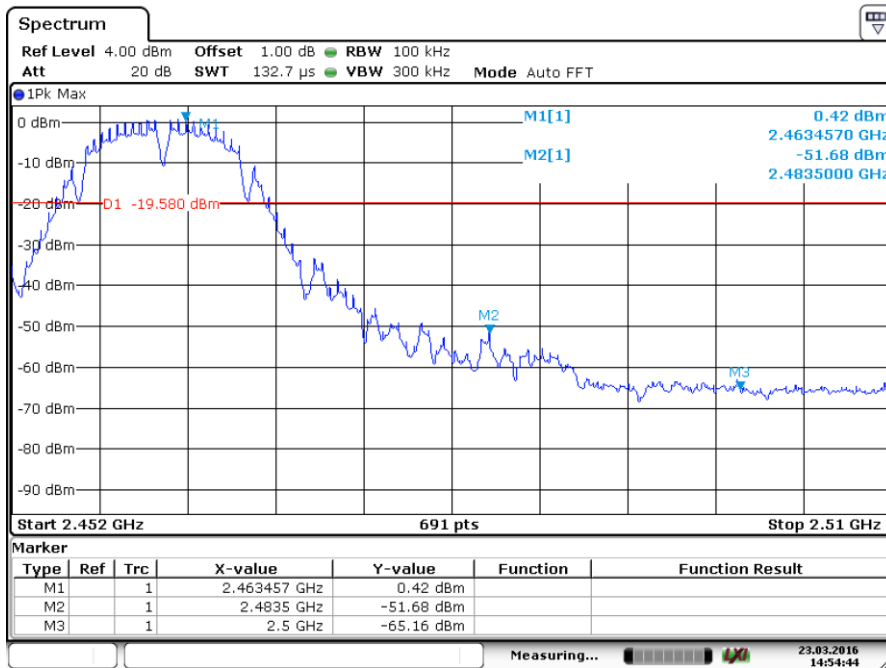
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

Band edge testing

802.11b

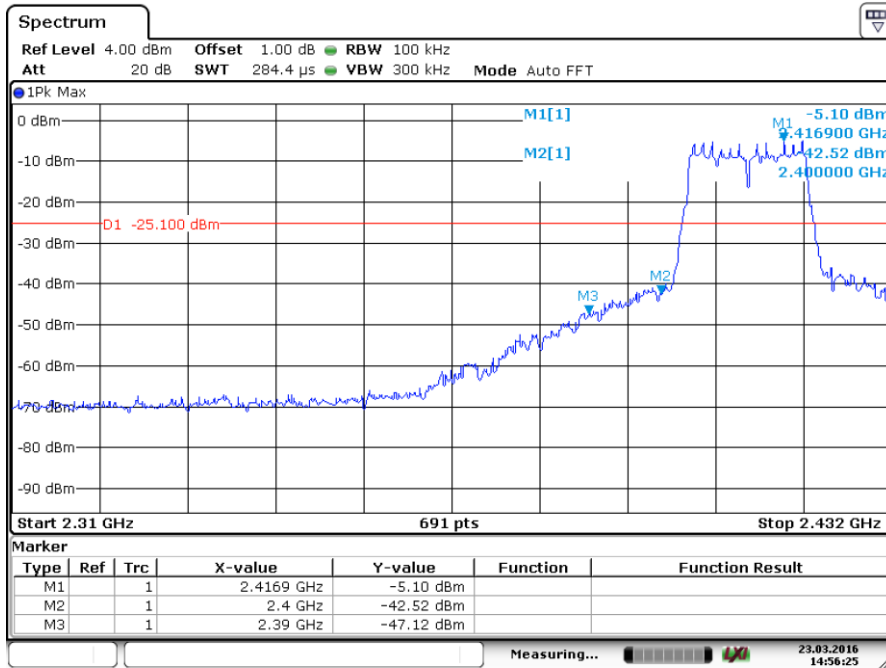


Date: 23.MAR.2016 14:52:52

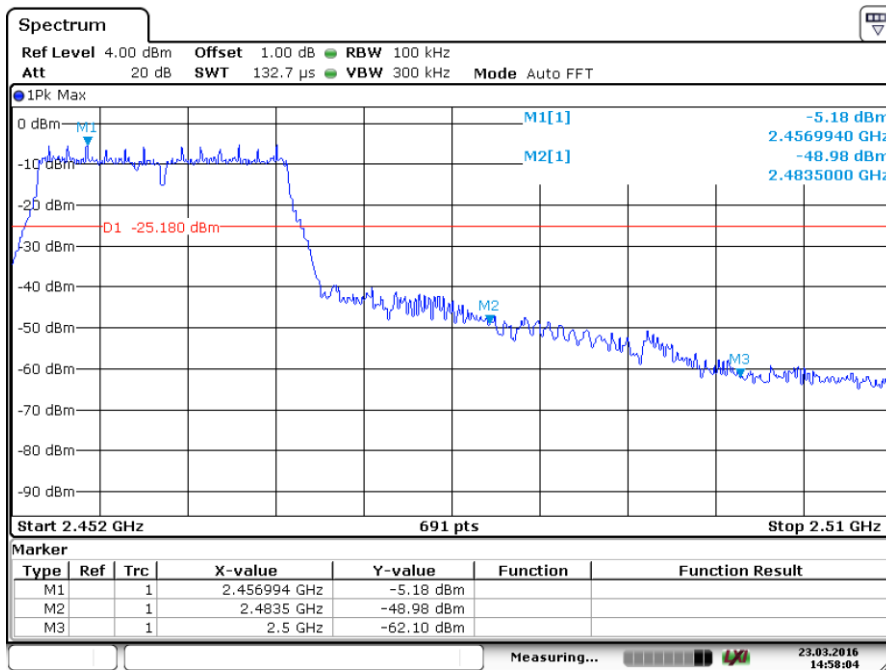


Date: 23.MAR.2016 14:54:45

802.11g

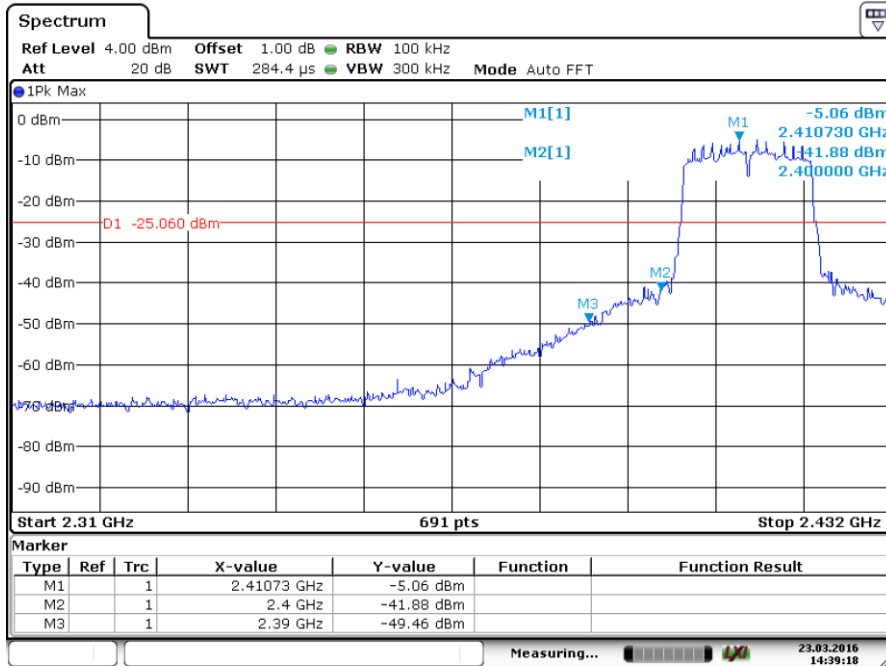


Date: 23.MAR.2016 14:56:25

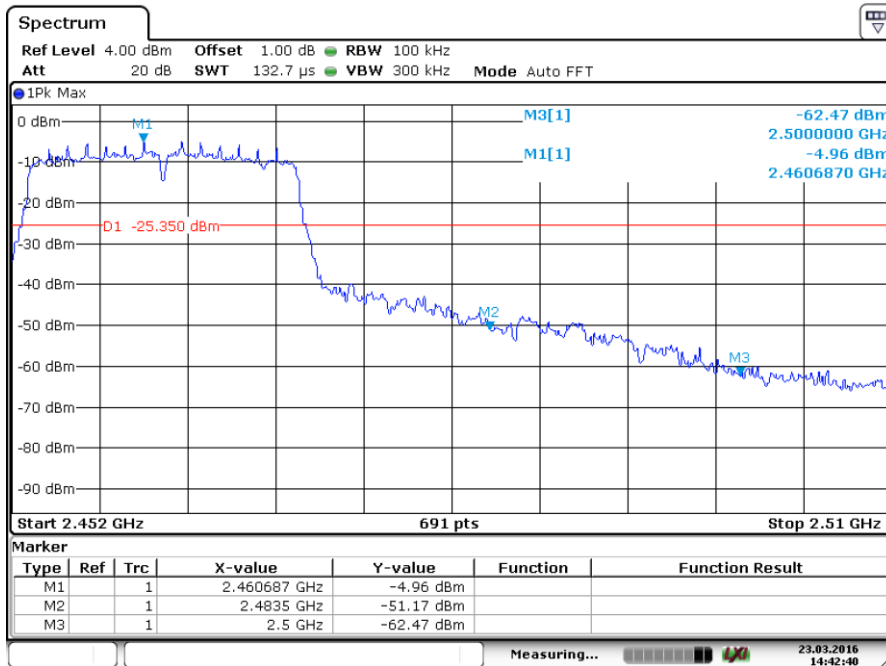


Date: 23.MAR.2016 14:58:04

802.11n20

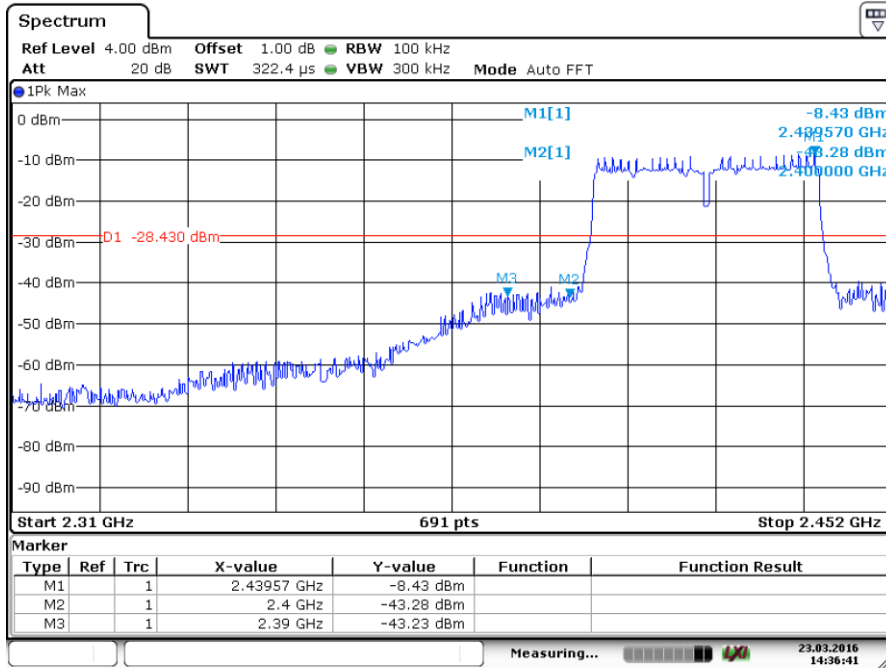


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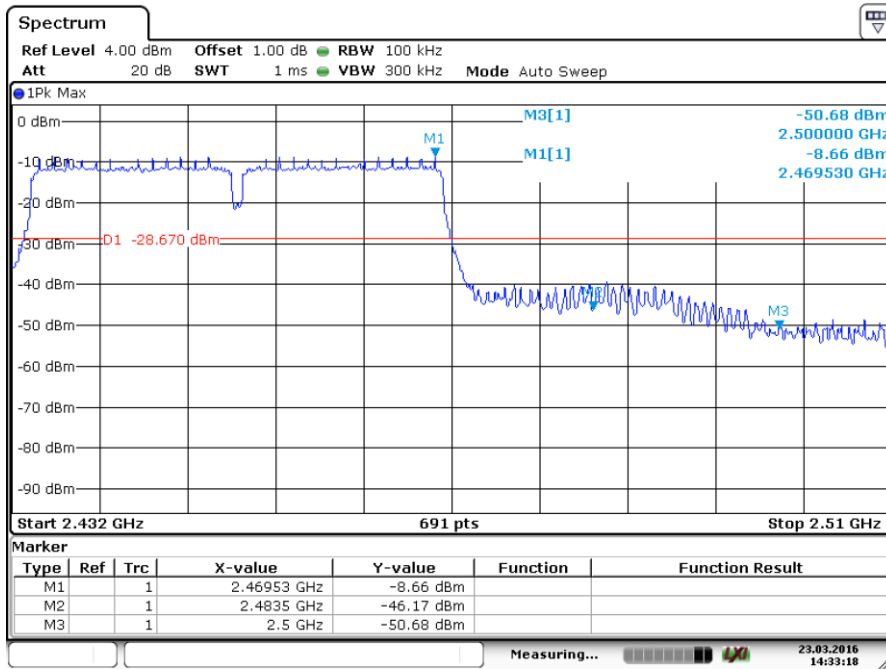


Date: 23.MAR.2016 14:42:41

802.11n40



Date: 23.MAR.2016 14:36:41



Date: 23.MAR.2016 14:33:18

9.6 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{duty cycle}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

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

Spurious radiated emissions for transmitter

Transmitting spurious emission test result as below:

802.11b(the worst case)

2412MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Result
MHz	dBuV/m		dB μ V/m		
30-1000	--	Horizontal	--	QP	Pass
30-1000	--	Vertical	--	QP	Pass
*4804	52.80	Horizontal	74	PK	Pass
*4804	33.51	Horizontal	54	AV	Pass
*4804	56.28	Vertical	74	PK	Pass
*4804	36.27	Vertical	54	AV	Pass

2437MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Result
MHz	dBuV/m		dB μ V/m		
*4880	54.34	Horizontal	74	PK	Pass
*4880	35.55	Horizontal	54	AV	Pass
*4880	56.74	Vertical	74	PK	Pass
*4880	44.13	Vertical	74	AV	Pass

2472MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Result
MHz	dBuV/m		dB μ V/m		
*4960	56.51	Horizontal	74	PK	Pass
*4960	37.69	Horizontal	54	AV	Pass
*4960	58.75	Vertical	74	PK	Pass
*4960	45.28	Vertical	54	AV	Pass

Remark:

- (1) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (2) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Generator	Rohde & Schwarz	SMB100A	108272	2016-7-24
RE	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2016-7-24
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2016-7-24
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/10085 1	2016-7-24
	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2016-8-14
	Horn Antenna	Rohde & Schwarz	HF907	102294	2016-7-24
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2016-7-24
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

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

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

Items	Extended Uncertainty
Radiated spurious emission	4.32dB (30MHz-1GHz) 2.27dB (1GHz -25GHz)
Conducted spurious emission	2.10dB(30MHz-25GHz)
Bandwidth test	1×10^{-9}
Conducted emission	2.4dB