ETSI EN 301 893 V2.1.1 (2017-05)

TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD.

6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

Tested Model: AC10

Report Type:	**Product Type:**
Original Report	AC1200 MU-MIMO Dual Band Gigabit WiFi Router

Report Number: RDG171102009-22B

Report Date: 2017-11-23

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RF Engineer

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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		AC1200 MU-MIMO Dual Band Gigabit WiFi Router
EUT Model:		AC10
Multiple Models:		N/A
Rated Input Voltage:		DC 12V from adapter
Nominal Adapter Information	**Model:**	BN036-A12012E
	Input:	100-240V~50/60Hz 0.4A
	Output:	12V,1.0A
External Dimension:		Length (27.3cm)*Width (16.2cm)*High (5.9cm) Length (27.3cm)*Width (16.2cm)*High (22.3cm) with Antenna
Serial Number:		171102009
EUT Received Date:		2017.11.03

Objective

This report is prepared on behalf of *SHENZHEN TENDA TECHNOLOGY CO.,LTD.* in accordance with ETSI EN 301 893 V2.1.1 (2017-05), 5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

The objective is to determine the compliance of EUT with ETSI EN 301 893 V2.1.1 (2017-05).

Related Submittal(s)/Grant(s)

N/A

Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 893 V2.1.1 (2017-05).

Measurement Uncertainty

According to the requirements of ETSI EN301 893, F_{lab} (the value of the measurement uncertainty according to the requirements of ETSI TR 100 028) shall be, for each measurement, equal to or lower than the figure in the following table:

SN	Parameter	F_{lab}	Maximum allowable uncertainty
1	RF Frequency	$\pm 1\times10^{-6}$	$\pm 1\times10^{-5}$
2	RF power conducted	±0.61dB	±1,5dB
3	RF power radiated	±3.62dB	±6dB
4	Spurious emissions, conducted	±2.47dB	±3dB
5	Spurious emissions, radiated	±3.62dB	±6dB
6	Temperature	±1℃	±2℃
7	Humidity	±5%	±5%
8	Time	1%	±10%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

The system support 802.11a/n ht20/n ht40/ac vht20/ac vht40/ac vht80.

For 5150~5250MHz band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 802.11a, 802.11n ht20 and 802.11ac20, channel 36 were tested, for 802.11n ht40 and 802.11ac40, channel 38 were tested, for 802.11ac80, Channel 42 was tested.

EUT Exercise Software

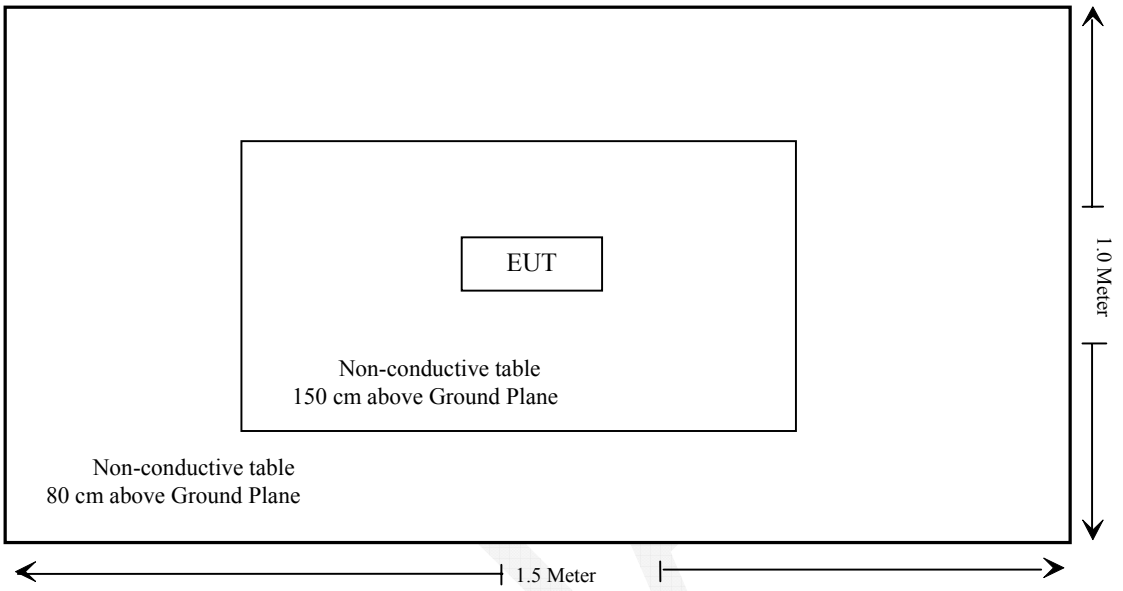
The software "MP_TEST.exe" was used for testing, which was provided by manufacturer. The worst condition (maximum power with 100% duty cycle) was setting by the software as following table:

Antenna 0/ Antenna 1				
Test Mode	Test Software Version	MP_TEST.exe		
802.11A	Test Frequency	5180MHz	5200MHz	5240MHz
	Data Rate	OFDM 6M	OFDM 6M	OFDM 6M
	Power Level Setting	27/30	/	/
802.11n ht20	Test Frequency	5180MHz	5200MHz	5240MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	22/25	/	/
802.11n AC20	Test Frequency	5180MHz	5200MHz	5240MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	22/25	/	/
802.11n ht40	Test Frequency	5190MHz	5230MHz	/
	Data Rate	MCS0	MCS0	/
	Power Level Setting	25/27	/	/
802.11n AC40	Test Frequency	5190MHz	5230MHz	/
	Data Rate	MCS0	MCS0	/
	Power Level Setting	25/28	/	/
802.11n AC80	Test Frequency	5210MHz	/	/
	Data Rate	NSS1 MCS0	/	/
	Power Level Setting	25/28	/	/

Equipment Modifications

No modifications were made to the EUT.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

ETSI EN 301 893 V2.1.1 (2017-05)	Description of Test	Test Result
§ 4.2.1	Centre Frequencies	Compliance
§ 4.2.2	Nominal Channel Bandwidth and Occupied Channel Bandwidth	Compliance
§ 4.2.3	RF output power	Compliance
§ 4.2.3	Transmit Power Control (TPC)	Not Applicable
§ 4.2.3	Power Density	Compliance
§ 4.2.4.1	Transmitter unwanted emissions outside the 5 GHz RLAN bands	Compliance
§ 4.2.4.2	Transmitter unwanted emissions within the 5 GHz RLAN bands	Compliance
§ 4.2.5	Receiver spurious emissions	Compliance
§ 4.7	Dynamic Frequency Selection (DFS)	Not Applicable
§ 4.2.7	Adaptivity	Compliance
§ 4.2.8	Receiver Blocking	Compliance
§ 4.2.9	User Access Restrictions	Compliance*
§ 4.2.10	Geo-location capability	Not Applicable

Note: Compliance *: Please refer to the product information declared by the manufacturer.
Not Applicable: The device has no this function.

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.1-NOMINAL CENTRE FREQUENCIES

Definition

The centre frequency is the centre of the channel declared by the manufacturer as part of the declared channel plan(s).

Limits

The actual centre frequency for any given channel declared by the manufacturer shall be maintained within the range fc ± 20 ppm.

Test Procedure

Test conditions

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.2

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
R&S	EMI Test Receiver	ESPI	100120	2016-12-08	2017-12-08
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.5 ℃
Relative Humidity:	64 %
ATM Pressure:	100.8 kPa

The testing was performed by Swim Lv on 2017-11-13.

Test Result: Compliance (Test performed at antenna 0)

Please refer to following table.

Frequency Bands	Mode	f_c MHz	Temperature (℃)	Voltage (Vdc)	f (MHz)	Frequency Error (ppm)	Limit (ppm)
5150-5250 MHz	802.11a	5180	25	12	5179.9600	7.72	±20
			0	12	5179.965	6.76	±20
			40	12	5180.086	-16.60	±20

FINAL

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.2- NOMINAL CHANNEL BANDWIDTH AND OCCUPIED CHANNEL BANDWIDTH

Definition

The Nominal Channel Bandwidth is the widest band of frequencies, inclusive of guard bands, assigned to a single channel.

The Occupied Channel Bandwidth is the bandwidth containing 99 % of the power of the signal.

When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with an actual Nominal Channel Bandwidth of 'n' times the individual Nominal Channel Bandwidth where 'n' is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

Limits

The *Nominal Channel Bandwidth* for a single *Operating Channel* shall be 20 MHz.

Alternatively, equipment may implement a lower *Nominal Channel Bandwidth* with a minimum of 5 MHz, providing they still comply with the *Nominal Centre Frequencies* defined in clause 4.2.1 (20 MHz raster). The *Occupied Channel Bandwidth* shall be between 80 % and 100 % of the *Nominal Channel Bandwidth*. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

The *Occupied Channel Bandwidth* might change with time/payload.

During a *Channel Occupancy Time (COT)*, equipment may operate temporarily with an *Occupied Channel Bandwidth* of less than 80 % of its *Nominal Channel Bandwidth* with a minimum of 2 MHz.

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.3

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2016/12/8	2017/12/8
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.1 ℃
Relative Humidity:	59 %
ATM Pressure:	101 kPa

The testing was performed by Swim Lv on 2017-11-17.

Test Result: Compliant.

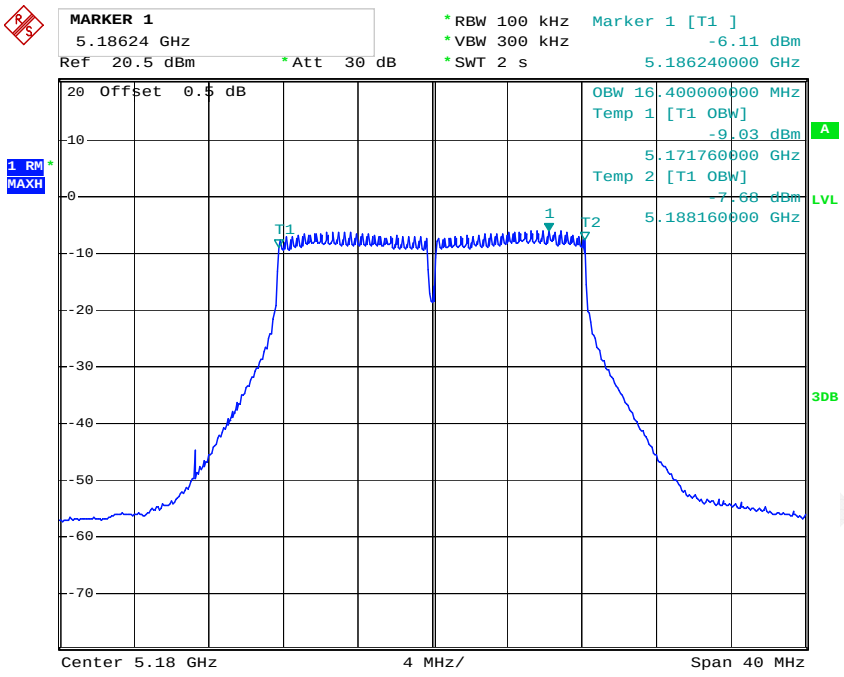
Please refer to following table and plots.

Test Mode: Transmitting

Test performed at antenna 0

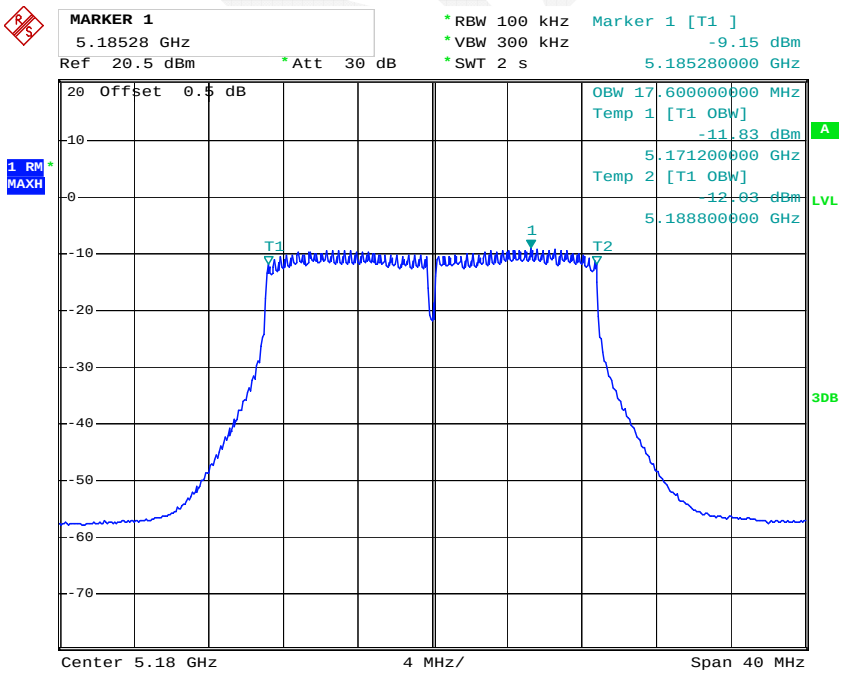
Mode	f_c (MHz)	Nominal Channel Bandwidth (MHz)	99% Occupied Channel Bandwidth (MHz)	Limit (MHz)
802.11a	5180	20	16.40	16-20
802.11n ht20	5180	20	17.60	16-20
802.11ac vht20	5180	20	17.60	16-20
802.11n ht40	5190	40	36.16	32-40
802.11ac vht40	5190	40	36.16	32-40
802.11ac vht80	5210	80	75.52	64-80

802.11a, 5180 MHz



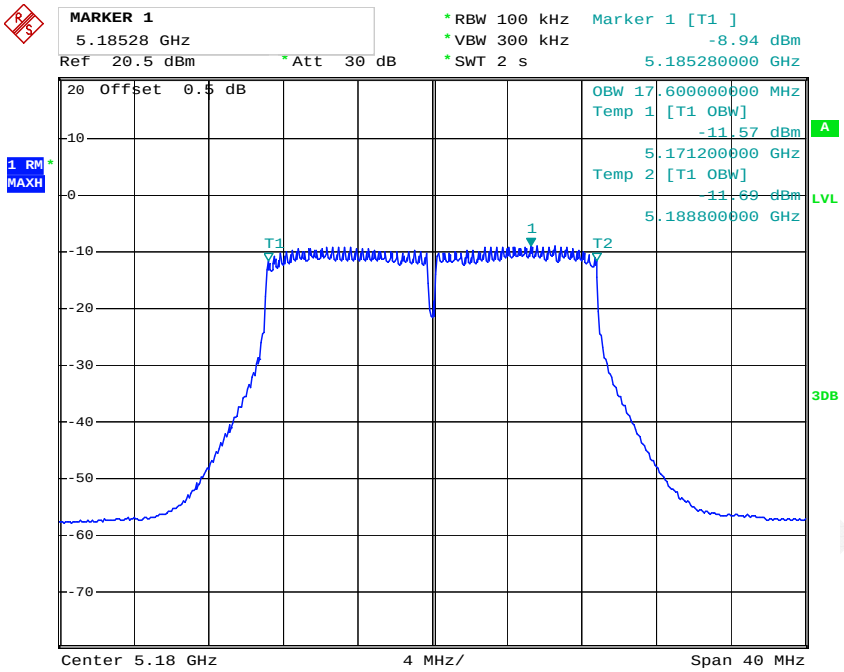
Date: 17.NOV.2017 10:30:08

802.11n20, 5180 MHz



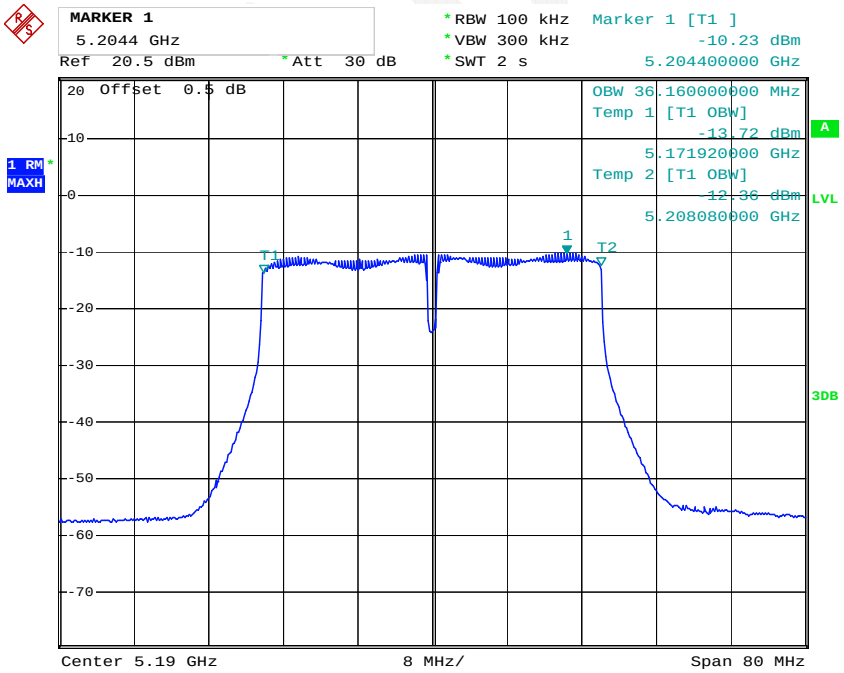
Date: 17.NOV.2017 10:31:54

802.11ac20, 5180 MHz



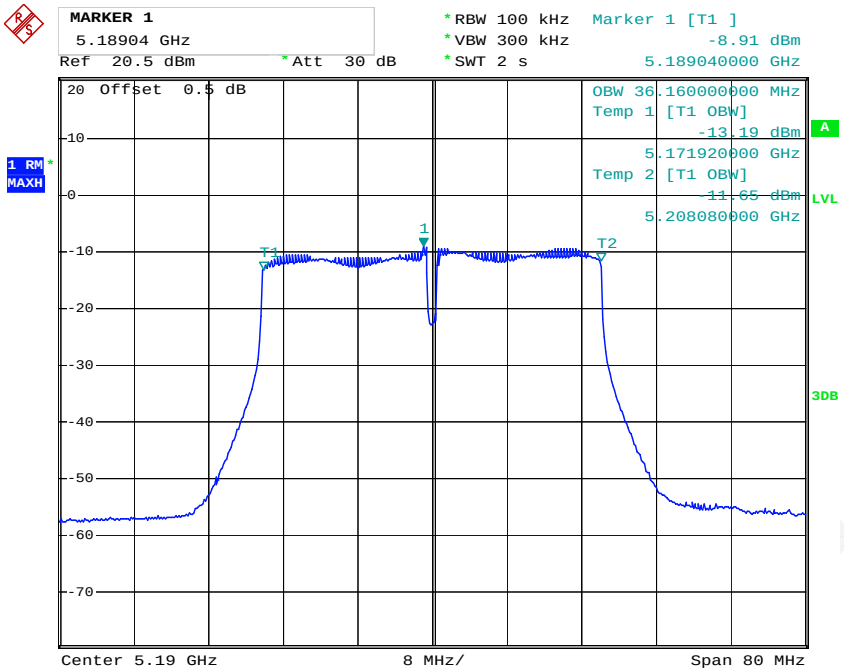
Date: 17.NOV.2017 10:31:06

802.11n40, 5190 MHz



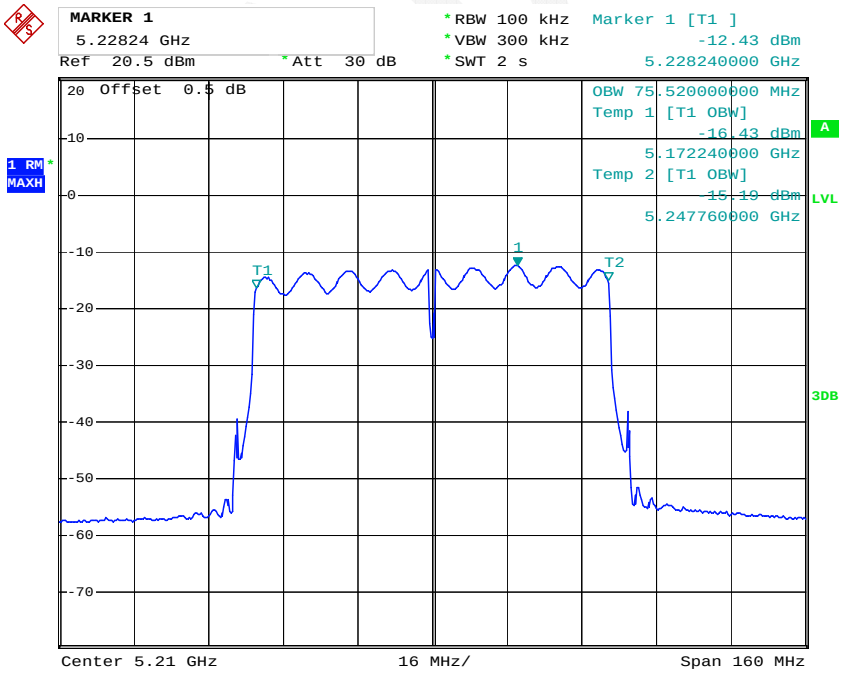
Date: 17.NOV.2017 10:36:23

802.11ac40, 5190 MHz



Date: 17.NOV.2017 10:37:34

802.11ac80, 5210 MHz



Date: 17.NOV.2017 10:39:10

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.3- RF OUTPUT POWER, TRANSMIT POWER CONTROL (TPC) AND POWER DENSITY

Definition

RF Output Power:

The RF Output Power is the mean equivalent isotropically radiated power (e.i.r.p.) during a transmission burst.

Transmit Power Control (TPC):

Transmit Power Control (TPC) is a mechanism to be used by the RLAN device to ensure a mitigation factor of at least 3 dB on the aggregate power from a large number of devices. This requires the RLAN device to have a TPC range from which the lowest value is at least 6 dB below the values for mean e.i.r.p. given in table 1 for devices with TPC.

Power Density:

The Power Density is the mean Equivalent Isotropically Radiated Power (e.i.r.p.) density during a transmission burst.

Limits

TPC is not required for channels whose nominal bandwidth falls completely within the band 5150 MHz to 5250 MH

For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in table 1.

Devices are allowed to operate without TPC. See table 1 for the applicable limits in this case.

Table 1: Mean e.i.r.p. limits for RF output power and power density at the highest power level

Frequency range	Mean e.i.r.p. limit		Mean e.i.r.p. density limit	
	dBm		dBm/MHz	
MHz	with TPC	without TPC	with TPC	without TPC
5150 to 5350	23	20 / 23 (see note 1)	10	7 / 10 (see note 2)
5470 to 5725	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)

NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.
NOTE 3: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.

For devices using TPC, the RF output power during a transmission burst when configured to operate at the west stated power level of the TPC range shall not exceed the levels given in table 2. For devices without TPC, the limits in table 2 do not apply.

Table 2: Mean e.i.r.p. limits for RF output power at the lowest power level of the TPC range

Frequency range	Mean e.i.r.p. (dBm)
5250 MHz to 5350 MHz	17
5470 MHz to 5725 MHz	24 (see note)
NOTE: Slave devices without a Radar Interference Detection function shall comply with the limits for the band 5 250 MHz to 5 350 MHz.	

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.4

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54210016	2017-11-03	2018-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2017-11-03	2018-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2017-11-03	2018-11-03
R&S	EMI Test Receiver	ESPI	100120	2016-12-08	2017-12-08
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.5 ℃
Relative Humidity:	64 %
ATM Pressure:	100.8 kPa

The testing was performed by Swim Lv on 2017-11-13.

Test Result: Compliant. Please refer to following data tables.

Note: According to EN301893 Table 9(note 1: In case of more than one channel plan has been declared, testing of these specific requirements need only be performed using one of the declared channel plans.).

Test Mode	f_c MHz	Temperature ℃	Voltage Vdc	Reading (dBm)		Antenna gain dBi	E.I.R.P (dBm)		Limit dBm
				Antenna 0	Antenna 1		Antenna 0	Antenna 1	
802.11a	5180	25	12	14.57	14.79	5	19.57	19.79	23
		0	12	14.64	14.86	5	19.64	19.86	
		40	12	14.51	14.54	5	19.51	19.54	

Test Mode	f_c MHz	Temperature ℃	Voltage Vdc	Reading (dBm)		Antenna gain dBi	E.I.R.P (dBm)	Limit dBm
				Antenna 0	Antenna 1			
802.11n ht20	5180	25	12	13.22	13.25	5	21.25	23
		0	12	13.10	13.24	5	21.18	
		40	12	13.08	13.46	5	21.28	
802.11ac vht20	5180	25	12	13.38	13.33	5	21.37	23
		0	12	13.22	13.22	5	21.23	
		40	12	13.38	13.34	5	21.37	
802.11n ht40	5190	25	12	14.91	14.73	5	22.83	23
		0	12	14.88	14.79	5	22.85	
		40	12	14.75	14.66	5	22.72	
802.11ac vht40	5190	25	12	14.88	14.89	5	22.90	23
		0	12	14.70	14.92	5	22.82	
		40	12	14.95	14.71	5	22.84	
802.11ac vht80	5210	25	12	14.78	14.60	5	22.7	23
		0	12	14.71	14.56	5	22.65	
		40	12	14.97	14.57	5	22.78	

Power density

Mode	f_c	Reading		Antenna gain	e.i.r.p. density		Limit
		Antenna 0	Antenna 1		Antenna 0	Antenna 1	
	MHz	dBm/MHz		dBi	dBm/MHz		dBm/MHz
802.11a	5180	4.76	4.53	5	9.76	9.53	10

Mode	f_c	Reading		Antenna gain	e.i.r.p. density	Limit
		Antenna 0	Antenna 1			
	MHz	dBm/MHz		dBi	dBm/MHz	dBm/MHz
802.11n ht20	5180	1.69	1.35	5	9.53	10
802.11ac vht20	5180	1.62	1.47	5	9.56	10
802.11n ht40	5190	0.16	-1.32	5	7.49	10
802.11ac vht40	5190	0.22	-1.17	5	7.59	10
802.11ac vht80	5210	-1.84	-2.02	4	5.08	10

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.4.1- TRANSMITTER UNWANTED EMISSIONS OUTSIDE THE 5 GHZ RLAN BANDS

Definition

Transmitter unwanted emissions outside the 5 GHz RLAN bands are radio frequency emissions outside the 5 GHz RLAN bands defined in clause 3.1.

Limits

The level of transmitter unwanted emissions outside the 5 GHz RLAN bands shall not exceed the limits given in table 4.

Table 4: Transmitter unwanted emission limits outside the 5 GHz RLAN bands

Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 5,15 GHz	-30 dBm	1 MHz
5,35 GHz to 5,47 GHz	-30 dBm	1 MHz
5,725 GHz to 26 GHz	-30 dBm	1 MHz

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.5

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Signal Generator	E8247C	MY43321350	2017/9/23	2018/9/23
R&S	EMI Test Receiver	ESCI	100224	2017/9/1	2018/9/1
Sunol Sciences	Antenna	JB3	A060611-1	2017/11/10	2020/11/10
HP	Amplifier	8447D	2727A05902	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-NJNJ-50	C-0400-01	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-NJNJ-50	C-0075-01	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-NJNJ-50	C-1000-01	2017/9/5	2018/9/5
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016/12/8	2017/12/8
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016/1/5	2019/1/5
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-SJSJ-50	C-0800-01	2017/9/5	2018/9/5
Farad	Test Software	EZ-EMC	V1.1.42	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24.3~25.8 °C
Relative Humidity:	28.5~38 %
ATM Pressure:	100.8~101.3 kPa

The testing was performed by Steven Zuo &Blake Yang from 2017-11-13 to 2017-11-15.

Test Mode: Transmitting

Test Result: Compliant.

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Operating Mode :802.11 a				**frequency:**	5180.000	**MHz**		
10360.000	H	46.85	-51.6	13.5	0.4	-38.5	-30.0	8.5
10360.000	V	47.67	-50.2	13.5	0.4	-37.1	-30.0	7.1
6916.000	H	48.23	-54.1	13.7	1.8	-42.2	-30.0	12.2
6916.000	V	52.62	-49.6	13.7	1.8	-37.7	-30.0	7.7
358.000	H	43.50	-62.9	0.0	0.6	-63.5	-36.0	27.5
412.000	V	44.60	-63.5	0.0	0.6	-64.1	-36.0	28.1
Operating Mode :802.11n ht20				**frequency:**	5180.000	**MHz**		
10360.000	H	46.98	-51.5	13.5	0.4	-38.4	-30.0	8.4
10360.000	V	47.54	-50.4	13.5	0.4	-37.3	-30.0	7.3
6916.000	H	48.42	-53.9	13.7	1.8	-42.0	-30.0	12.0
6916.000	V	52.51	-49.7	13.7	1.8	-37.8	-30.0	7.8
286.000	H	43.60	-65.2	0.0	0.5	-65.7	-36.0	29.7
403.000	V	44.70	-63.4	0.0	0.6	-64.0	-36.0	28.0
Operating Mode :802.11 ac vht20				**frequency:**	5180.000	**MHz**		
10360.000	H	47.05	-51.4	13.5	0.4	-38.3	-30.0	8.3
10360.000	V	47.85	-50.1	13.5	0.4	-37.0	-30.0	7.0
6916.000	H	48.13	-54.2	13.7	1.8	-42.3	-30.0	12.3
6916.000	V	52.45	-49.8	13.7	1.8	-37.9	-30.0	7.9
328.000	H	43.10	-64.5	0.0	0.5	-65.0	-36.0	29.0
433.000	V	44.20	-63.7	0.0	0.6	-64.3	-36.0	28.3
Operating Mode :802.11n ht40				**frequency:**	5190.000	**MHz**		
10380.000	H	46.84	-51.6	13.4	0.4	-38.6	-30.0	8.6
10380.000	V	47.85	-50	13.4	0.4	-37.0	-30.0	7.0
6916.000	H	48.92	-53.4	13.7	1.8	-41.5	-30.0	11.5
6916.000	V	52.86	-49.4	13.7	1.8	-37.5	-30.0	7.5
452.000	H	44.30	-60.2	0.0	0.7	-60.9	-36.0	24.9
265.000	V	45.30	-66.6	0.0	0.5	-67.1	-36.0	31.1
Operating Mode :802.11 ac vht40				**frequency:**	5190.000	**MHz**		
10380.000	H	47.02	-51.4	13.4	0.4	-38.4	-30.0	8.4
10380.000	V	47.62	-50.3	13.4	0.4	-37.3	-30.0	7.3
6916.000	H	48.43	-53.9	13.7	1.8	-42.0	-30.0	12.0
6916.000	V	52.56	-49.7	13.7	1.8	-37.8	-30.0	7.8
263.000	H	45.80	-63.3	0.0	0.5	-63.8	-36.0	27.8
429.000	V	47.10	-60.8	0.0	0.6	-61.4	-36.0	25.4

Operating Mode :802.11 ac vht80				frequency:	5210.000	MHz		
10420.000	H	47.03	-51.4	13.4	0.3	-38.3	-30.0	8.3
10420.000	V	47.48	-50.3	13.4	0.3	-37.2	-30.0	7.2
6916.000	H	48.14	-54.2	13.7	1.8	-42.3	-30.0	12.3
6916.000	V	52.54	-49.7	13.7	1.8	-37.8	-30.0	7.8
263.000	H	45.80	-63.3	0.0	0.5	-63.8	-36.0	27.8
429.000	V	47.10	-60.8	0.0	0.6	-61.4	-36.0	25.4

Note:
Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

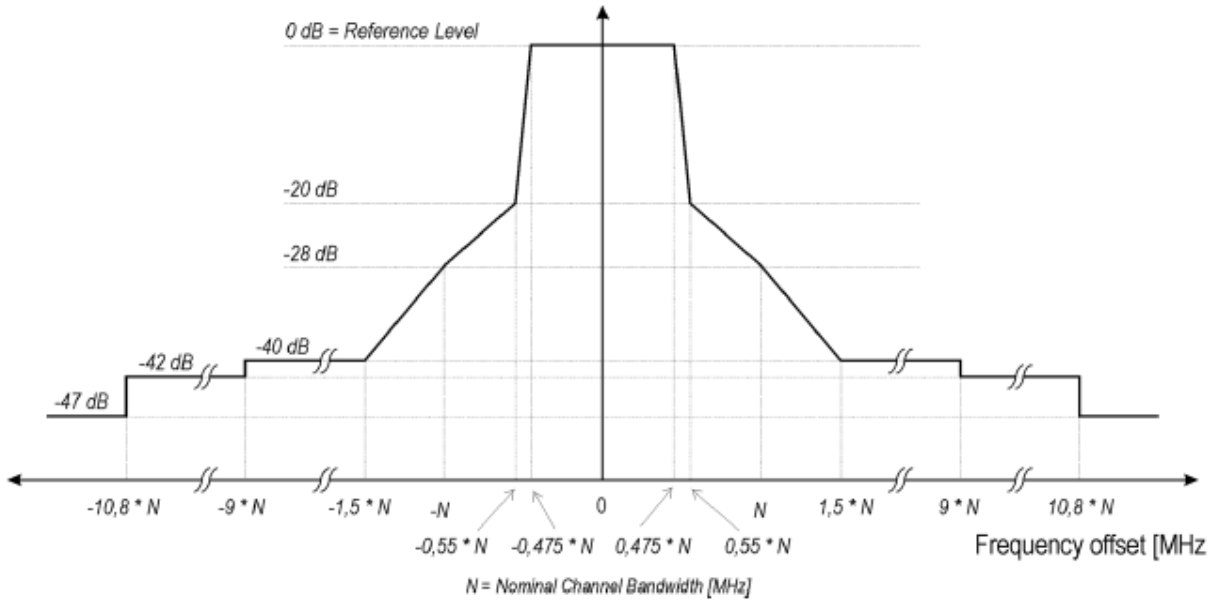
FINAL

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.4 .2–TRANSMITTER UNWANTED EMISSIONS WITHIN THE 5 GHZ RLAN BANDS

Definition

These are radio frequency emissions within the 5 GHz RLAN bands.

Limits



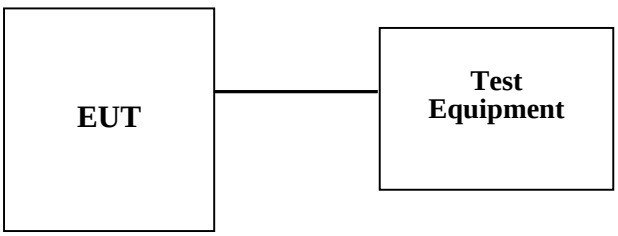
NOTE: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal.

Figure 1: Transmit spectral power mask

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.6

Test Set up Block diagram



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2016/12/8	2017/12/8
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.1 °C
Relative Humidity:	59 %
ATM Pressure:	101.1 kPa

The testing was performed by Swim Lv from 2017-11-18.

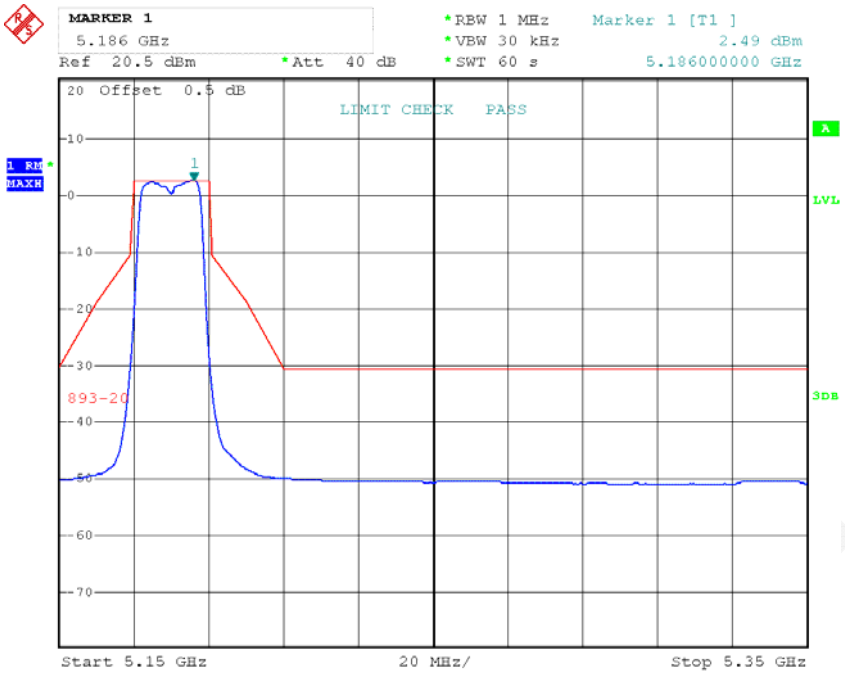
Test mode: Transmitting (Test performed at antenna 0)

Test Result: Compliant.

Please refer to following plots.

FINAL

802.11a, 5180MHz



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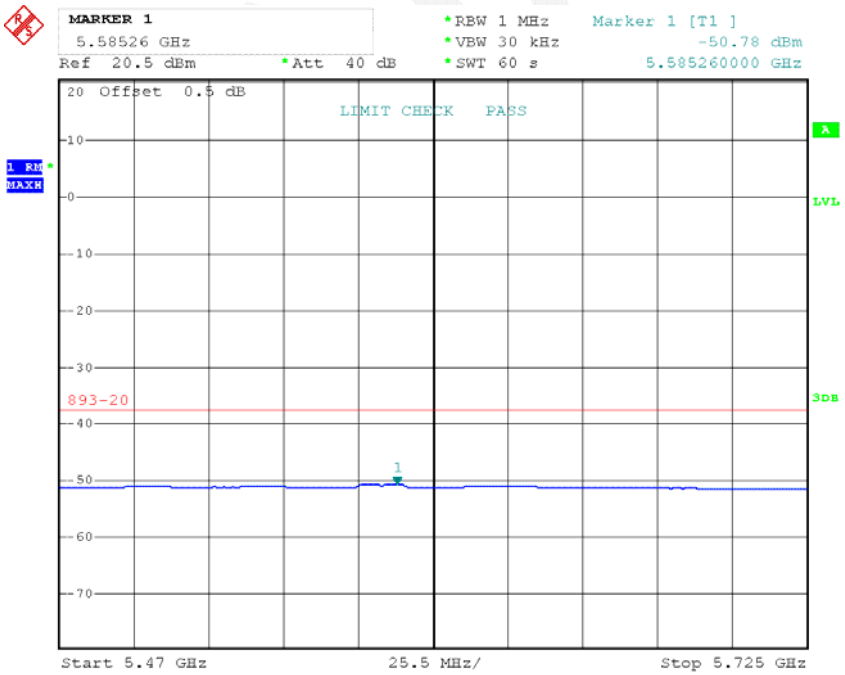

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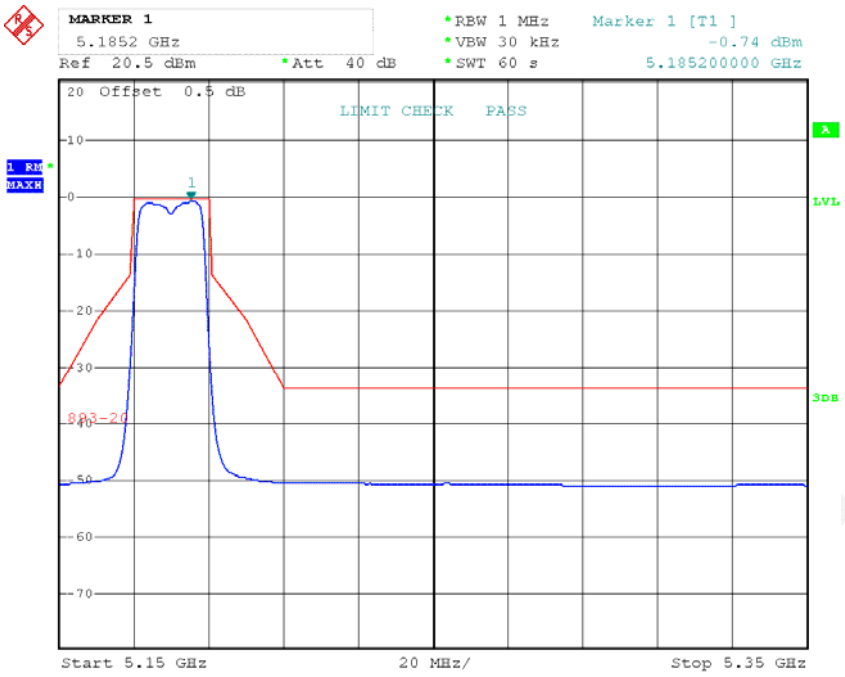
802.11n ht20, 5180MHz



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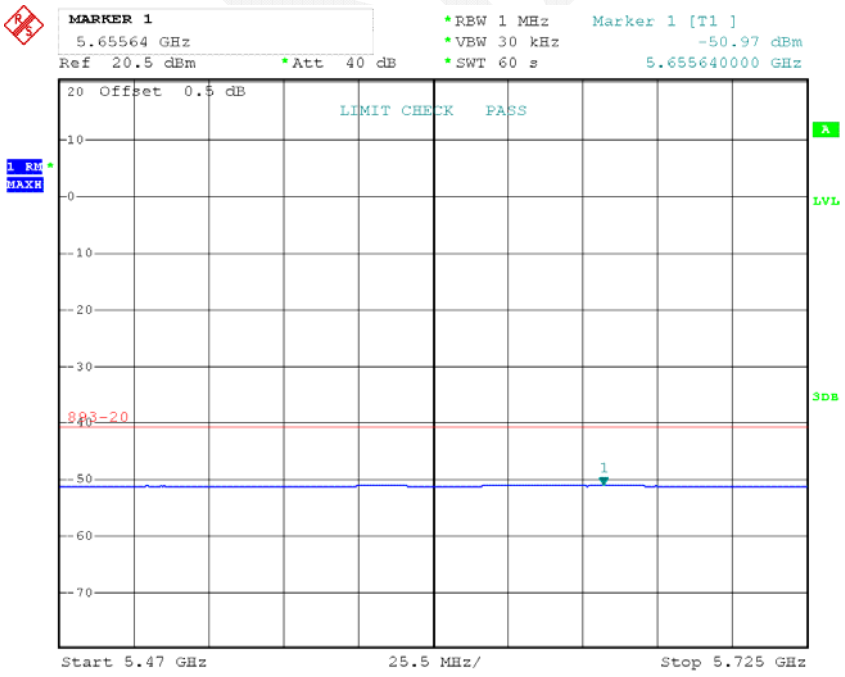

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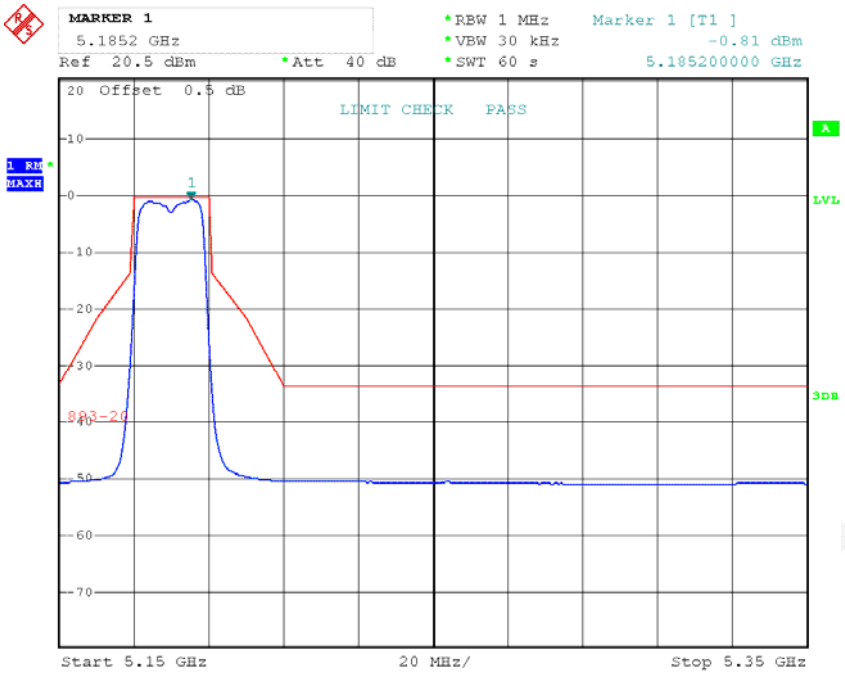
802.11ac vht20, 5180MHz



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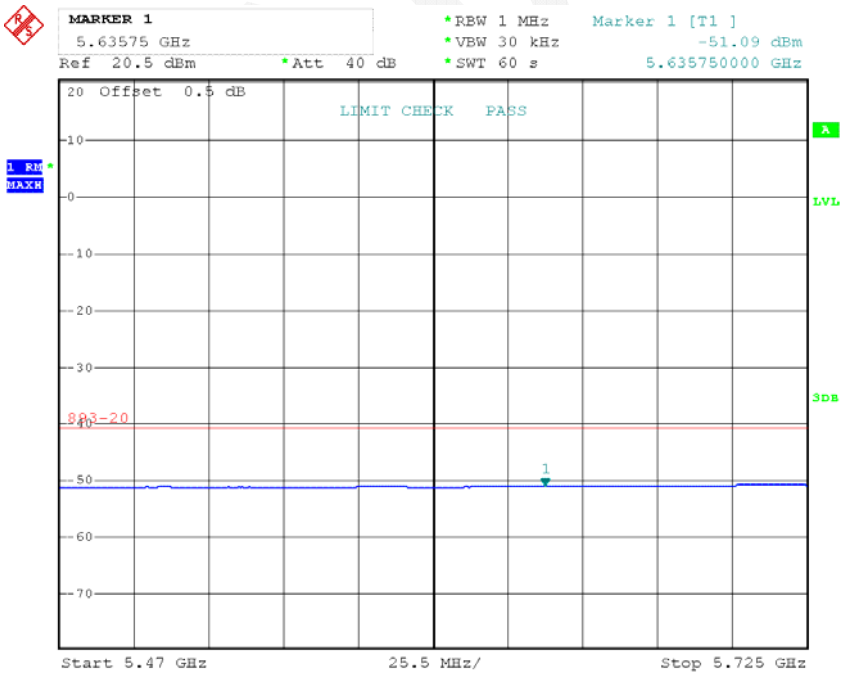

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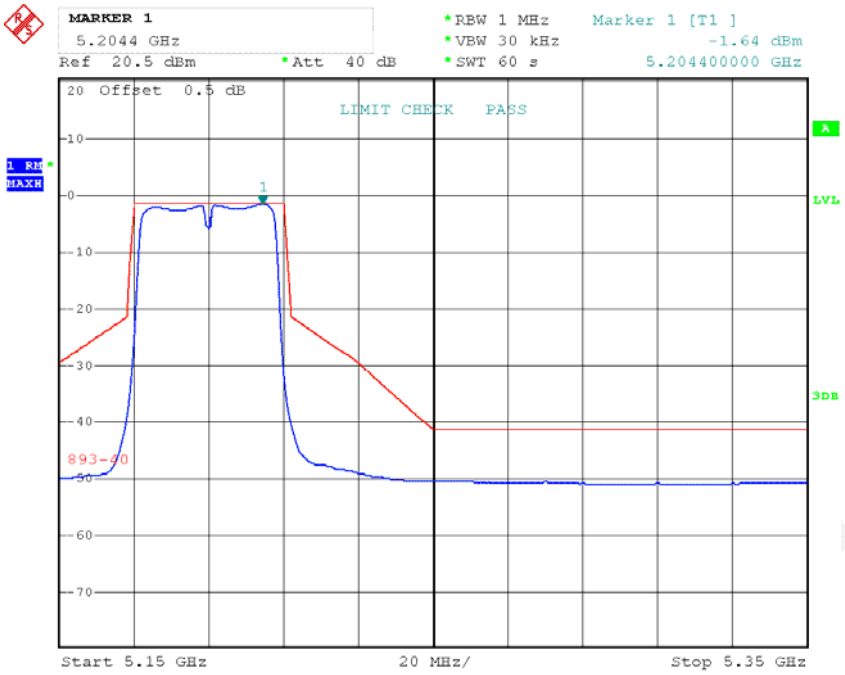
802.11n ht40, 5190MHz



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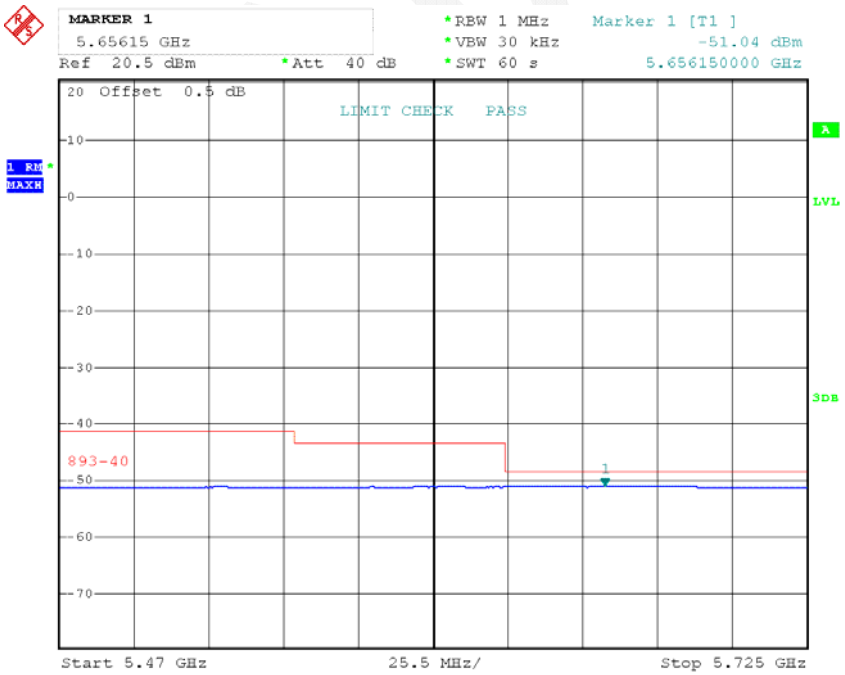

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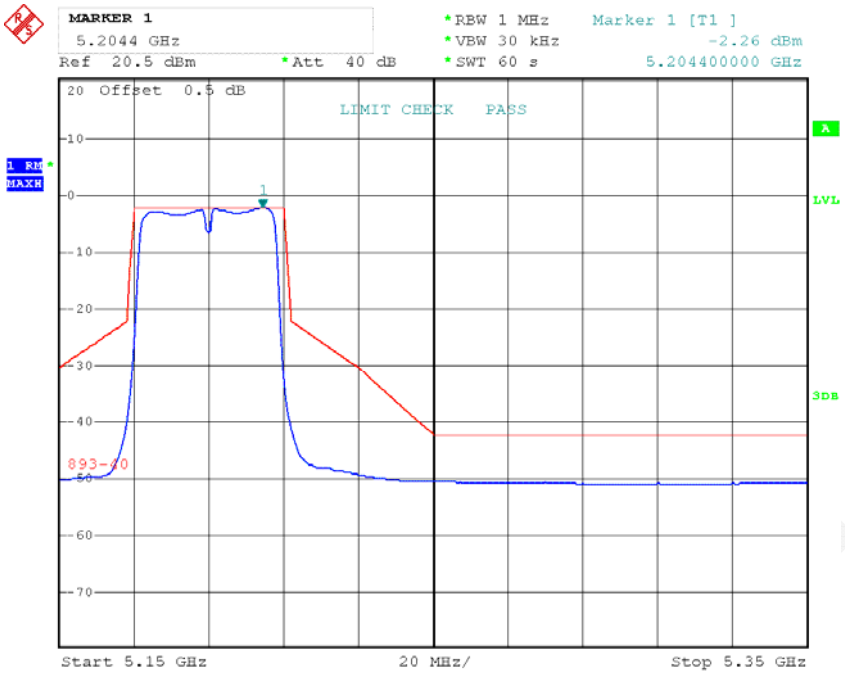
802.11ac vht40, 5190MHz



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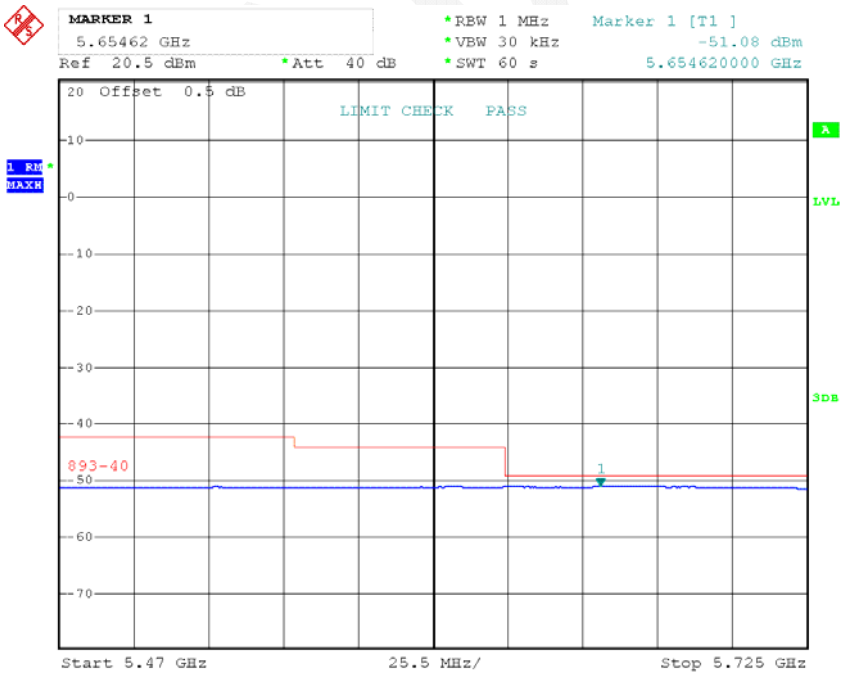

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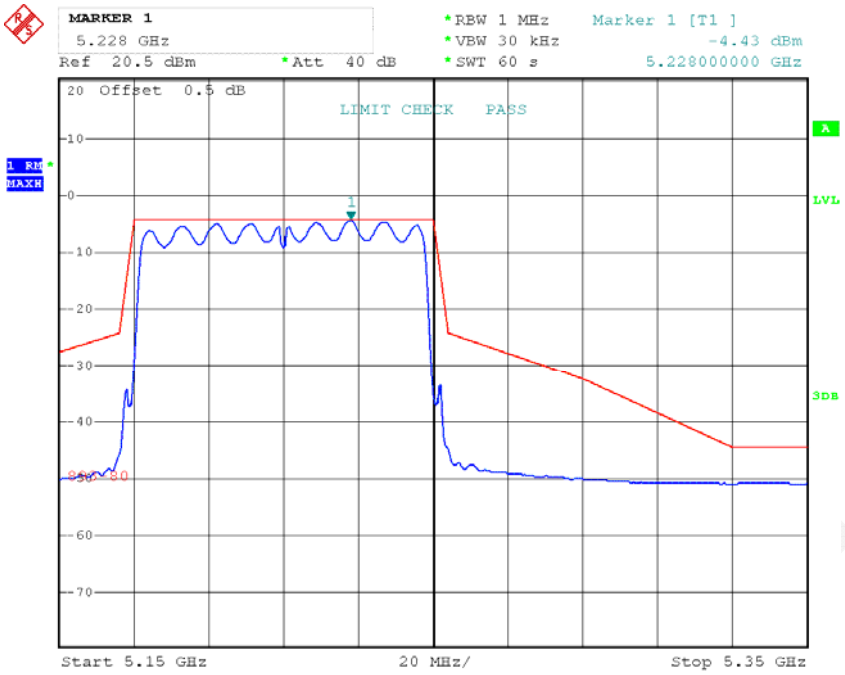
802.11ac vht80, 5210MHz



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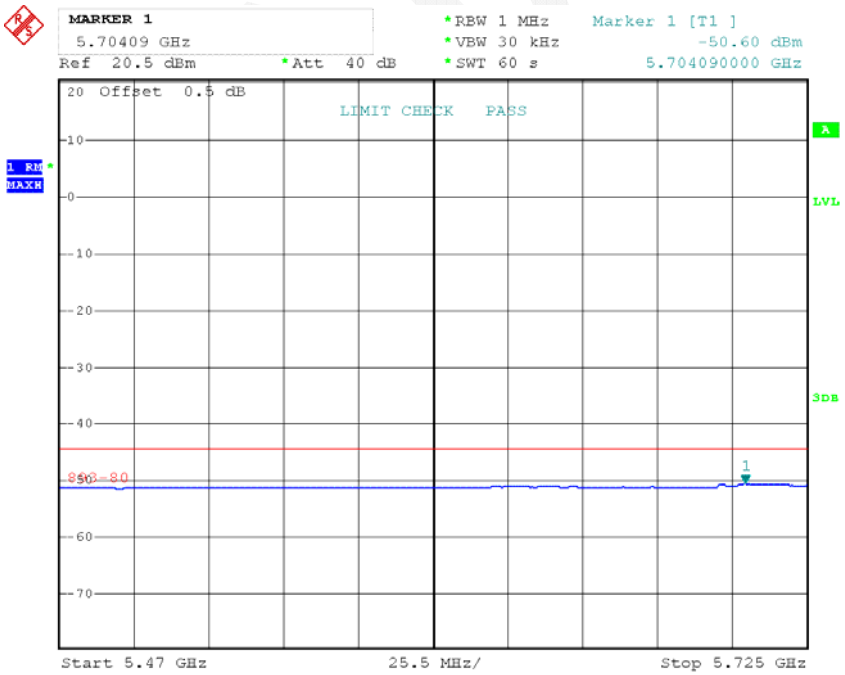


Date: 18.NOV.2017 18:08:32

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.5 – RECEIVER SPURIOUS EMISSIONS

Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

Limits

.

Table 4: Spurious radiated emission limits

Frequency range	Maximum power, ERP	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26 GHz	-47 dBm	1 MHz

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) §5.4.7

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Signal Generator	E8247C	MY43321350	2017/9/23	2018/9/23
R&S	EMI Test Receiver	ESCI	100224	2017/9/1	2018/9/1
Sunol Sciences	Antenna	JB3	A060611-1	2017/11/10	2020/11/10
HP	Amplifier	8447D	2727A05902	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-NJNJ-50	C-0400-01	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-NJNJ-50	C-0075-01	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-NJNJ-50	C-1000-01	2017/9/5	2018/9/5
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016/12/8	2017/12/8
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016/1/5	2019/1/5
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-SJSJ-50	C-0800-01	2017/9/5	2018/9/5
Farad	Test Software	EZ-EMC	V1.1.42	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24.3~25.8 °C
Relative Humidity:	28.5~38 %
ATM Pressure:	100.8~101.3 kPa

The testing was performed by Steven Zuo &Blake Yang from 2017-11-13 to 2017-11-15.

*Test Mode: Receiving (*Pre-scan with all antennas and all modes, the worst case as below*)*

Test Result: Compliant.

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1435.000	H	45.62	-68.3	9.1	1.3	-60.5	-47.0	13.5
1435.000	V	46.37	-68	9.1	1.3	-60.2	-47.0	13.2
462.000	H	34.30	-70.2	0.0	0.7	-70.9	-57.0	13.9
242.000	V	35.20	-77.1	0.0	0.5	-77.6	-57.0	20.6

Note:

Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.7 – ADAPTIVITY (CHANNEL ACCESS MECHANISM)

Applicable Standard

According to ETSI EN 301 893 V2.1.1 (2017-05)§4.2.7, *Adaptivity (Channel Access Mechanism)* is an automatic mechanism by which a device limits its transmissions and gains access to an *Operating Channel*.

§4.2.7.3.2 Load Based Equipment:

Load based Equipment shall implement a *Listen Before Talk (LBT)* based *Channel Access Mechanism* to detect the presence of other RLAN transmissions on an *Operating Channel.*

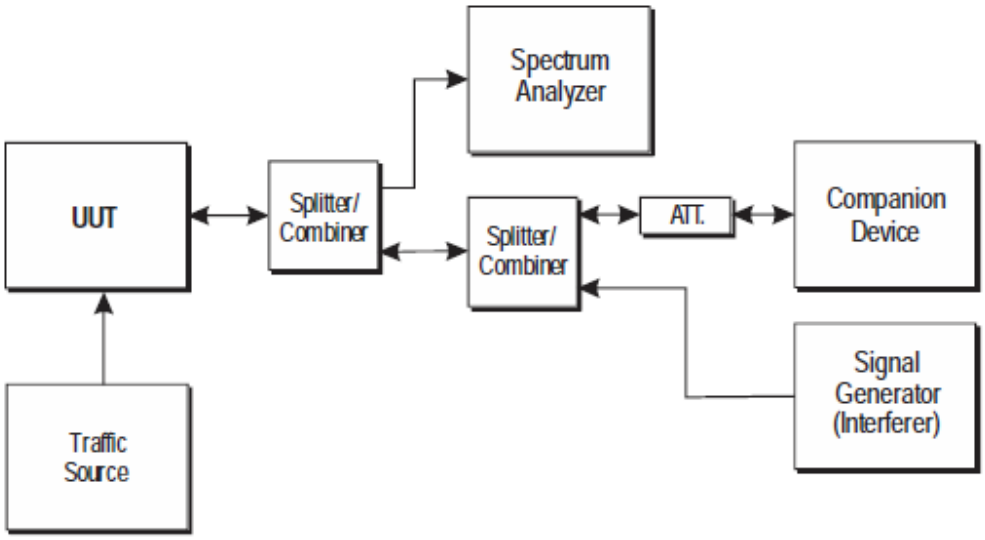
Limit:

According to ETSI EN 301 893 V2.1.1 (2017-05) &4.2.7.3.2

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) &5.4.9.3.2

Block Diagram of Test Setup



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2016-12-8	2017-12-8
Agilent	MXG Vector Signal Generator	N51828	MY51350142	2017-05-10	2018-05-10
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.1~27.3 °C
Relative Humidity:	53~59 %
ATM Pressure:	100.9~101 kPa

The testing was performed by Swim Lv from 2017-11-17 to 2017-11-24.

Test mode: Transmitting

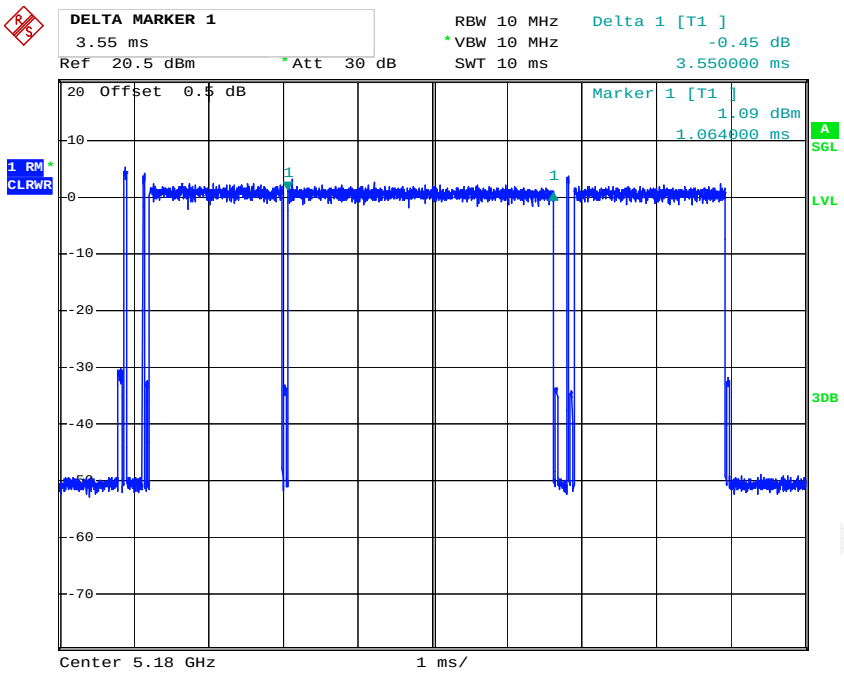
Test Result: Compliant

20M:

Test Mode	Measurement	Limit
Maximum Channel Occupancy Time (ms)	3.55	< 6
Minimum Clear Channel Assessment (μs)	30	> 9

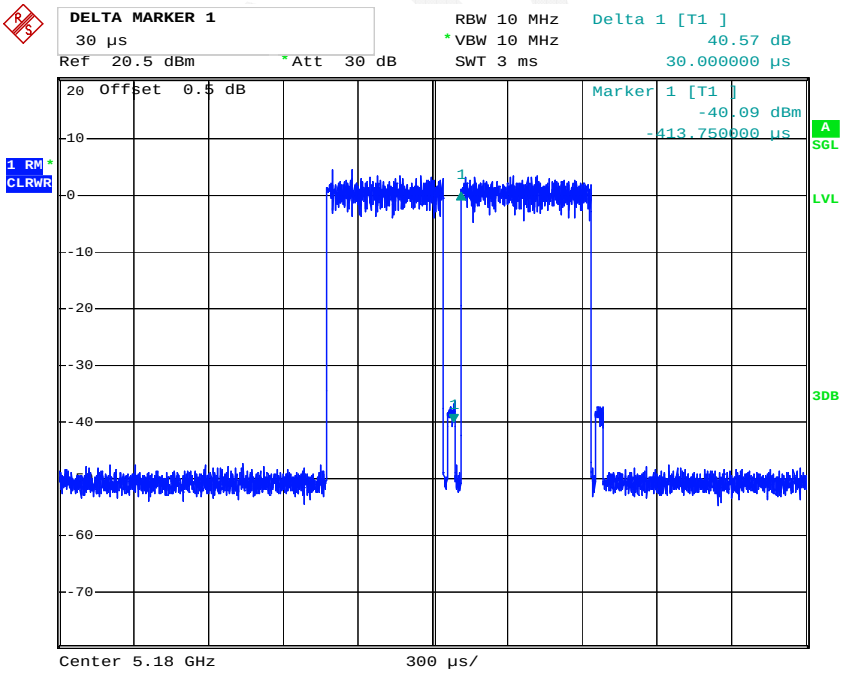
Test Mode	Interference Signal Type	Measurement	Limit
Short Control Signalling Transmissions in 50ms (ms)	AWGN	0.5	< 2.5
	OFDM	2.2	< 2.5
	LTE	2.2	< 2.5
Number of Short Control Signalling Transmissions in 50ms	AWGN	1	< 50
	OFDM	1	< 50
	LTE	1	< 50

COT



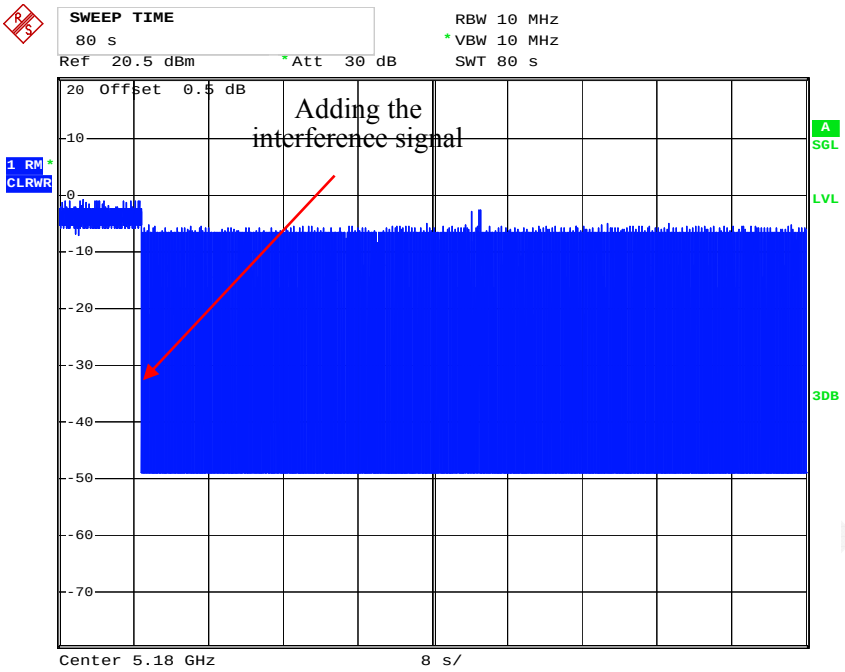
Date: 17.NOV.2017 14:25:16

CCA



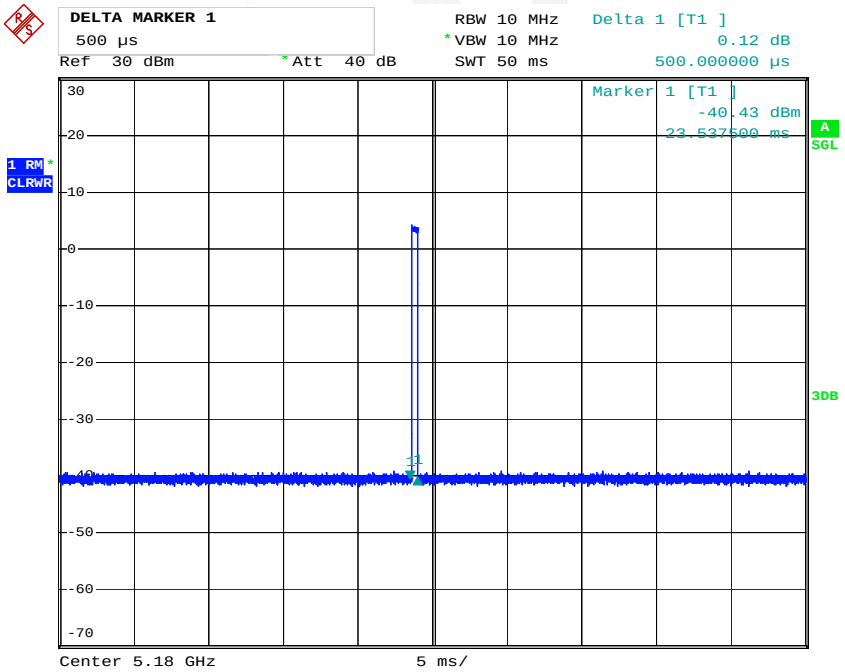
Date: 17.NOV.2017 14:09:24

Reaction to the AWGM interference signal



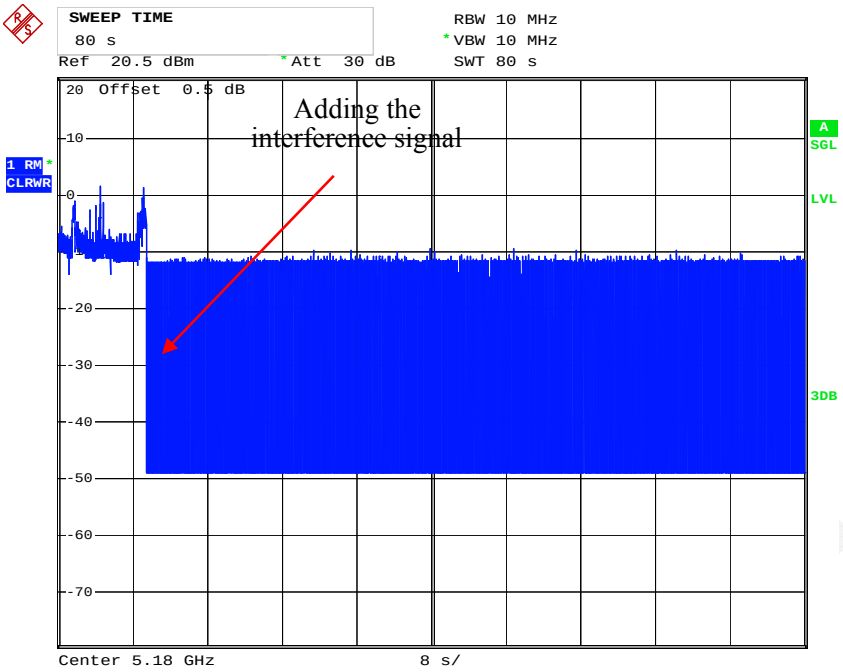
Date: 17.NOV.2017 11:02:16

Short Control Signalling Transmissions



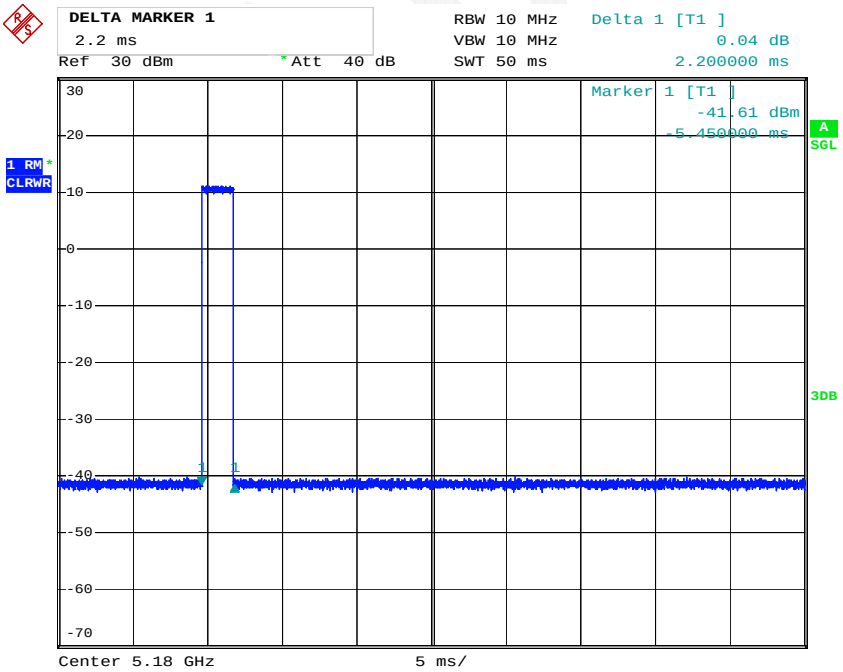
Date: 24.NOV.2017 17:40:26

Reaction to the OFDM interference signal



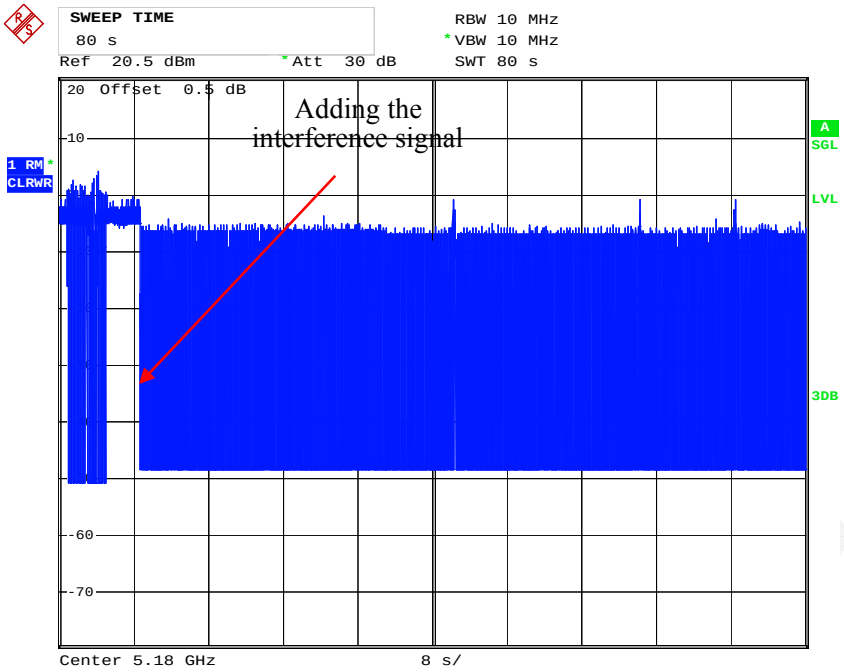
Date: 17.NOV.2017 13:29:45

Short Control Signalling Transmissions



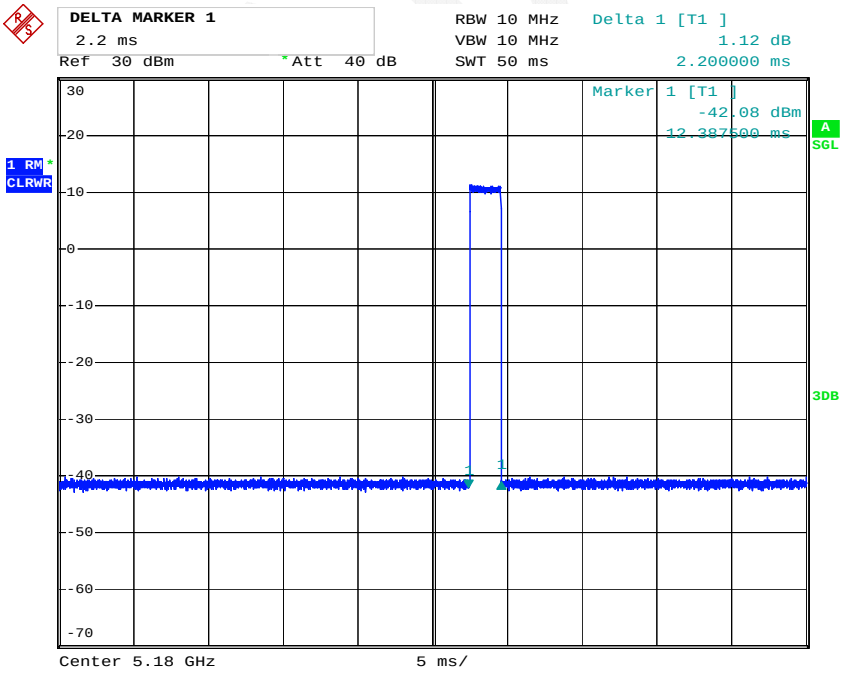
Date: 18.NOV.2017 13:04:35

Reaction to the LTE interference signal



Date: 17.NOV.2017 11:16:12

Short Control Signalling Transmissions



Date: 18.NOV.2017 13:00:45

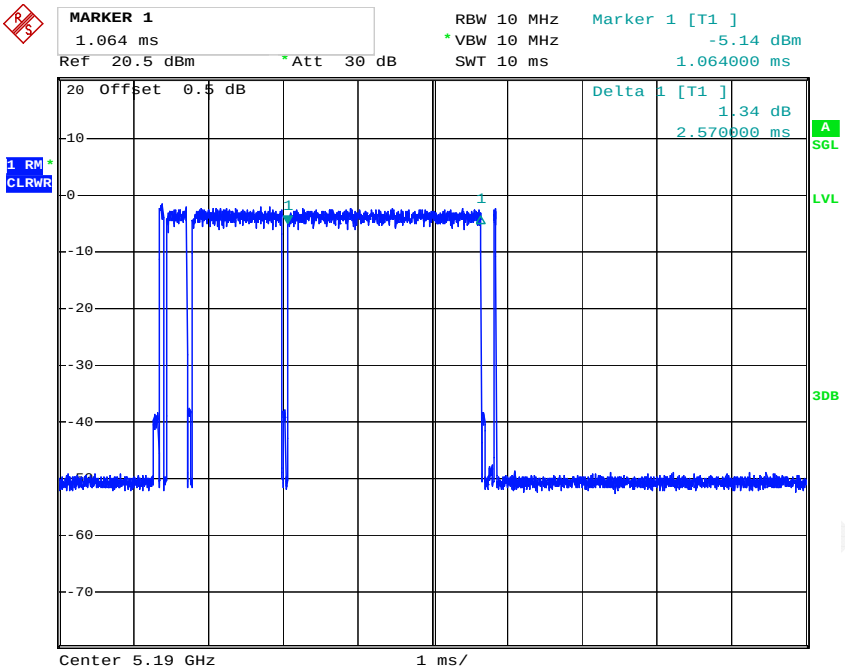
40M:

Test Mode	Measurement	Limit
Maximum Channel Occupancy Time (ms)	1.064	< 6
Minimum Clear Channel Assessment (μs)	24.0	>9

Test Mode	Interference Signal Type	Measurement	Limit
Short Control Signalling Transmissions in 50ms (ms)	AWGN	0	< 2.5
	OFDM	0	< 2.5
	LTE	0	< 2.5
Number of Short Control Signalling Transmissions in 50ms	AWGN	0	< 50
	OFDM	0	< 50
	LTE	0	< 50

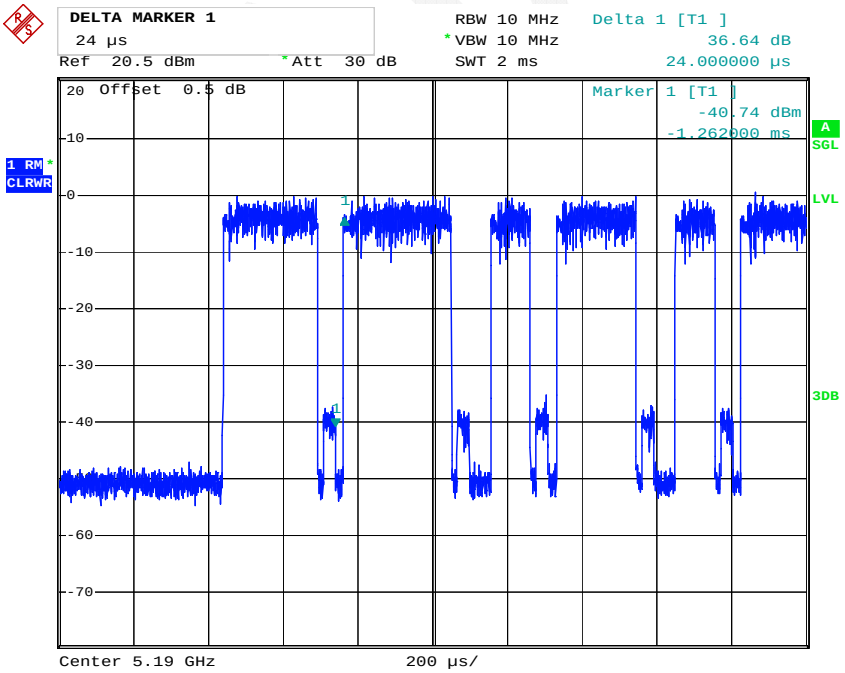
FINAL

COT



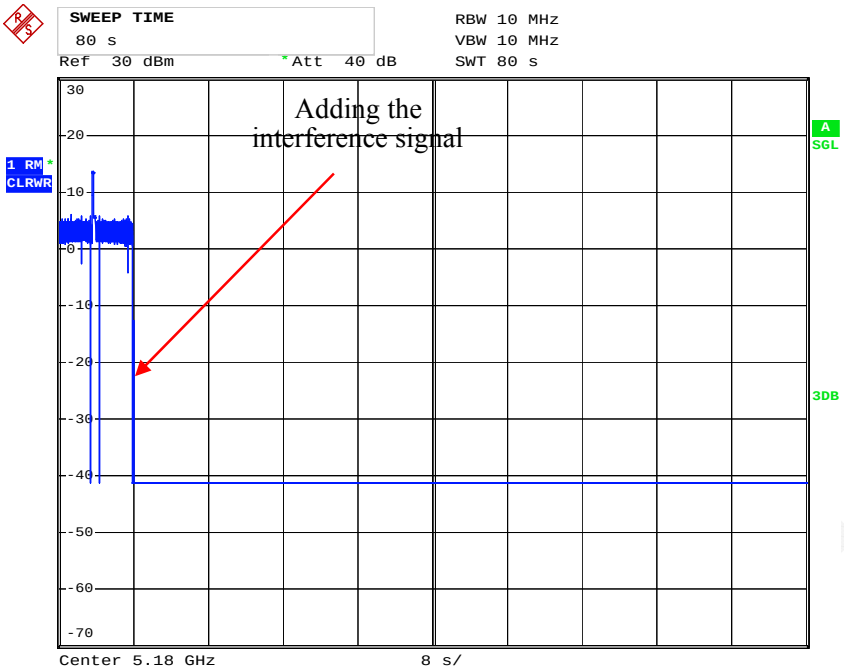
Date: 17.NOV.2017 14:24:09

CCA



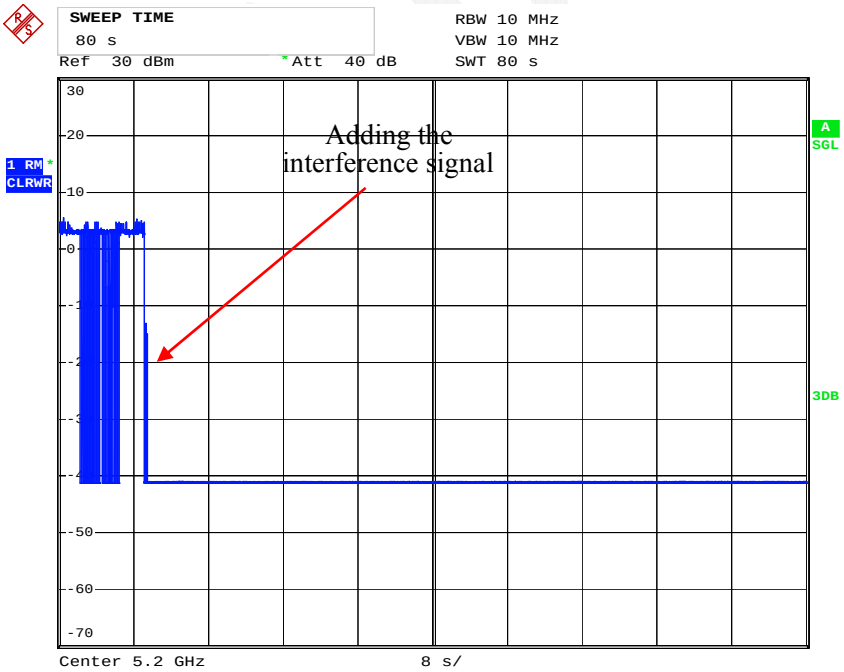
Date: 17.NOV.2017 14:29:48

Reaction to the AWGM interference signal - 5810WHz



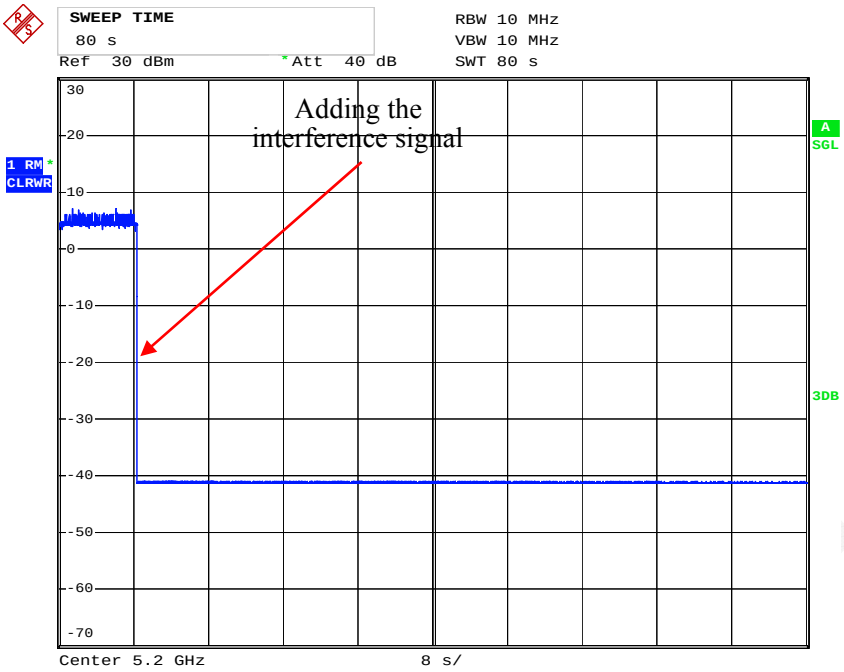
Date: 18.NOV.2017 11:45:29

Reaction to the AWGM interference signal - 5200WHz



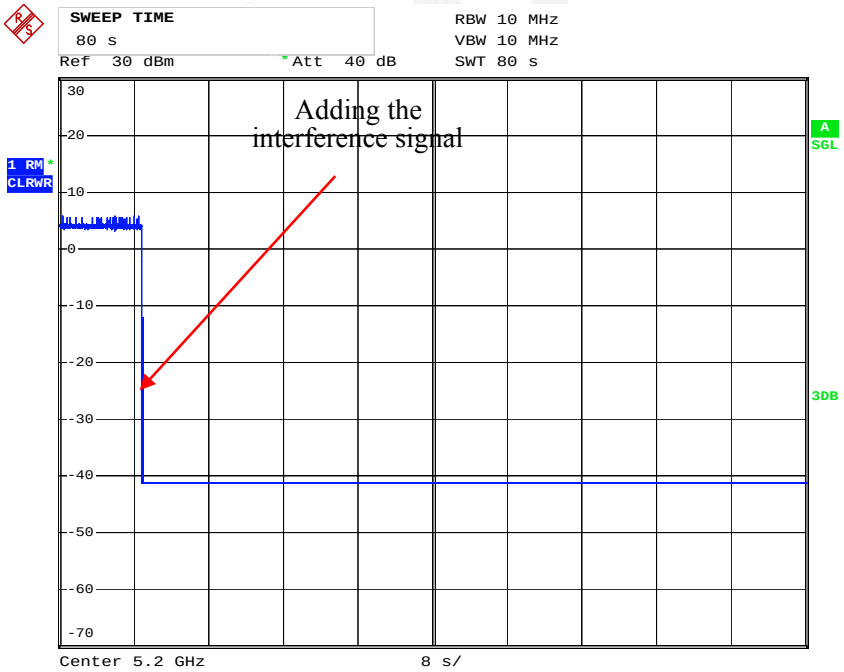
Date: 18.NOV.2017 11:53:22

Reaction to the OFDM interference signal



Date: 18.NOV.2017 11:55:28

Reaction to the LTE interference signal



Date: 18.NOV.2017 11:58:10

ETSI EN 301 893 V2.1.1 (2017-05) §4.2.8 – RECEIVER BLOCKING

Applicable Standard

According to ETSI EN 301 893 V2.1.1 (2017-05) §4.2.8, Receiver blocking is a measure of the capability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) on frequencies other than those of the operating bands provided in table 1.

Limit:

The minimum performance criterion shall be a PER of less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment

While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 7.

Table 7: Receiver Blocking parameters

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.				

Test Procedure

According to ETSI EN 301 893 V2.1.1 (2017-05) &5.4.10

Block Diagram of Test Setup

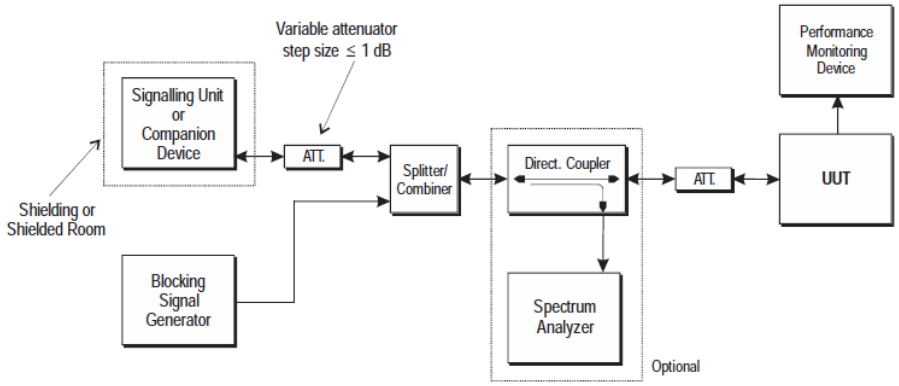


Figure 14: Test Set-up for receiver blocking

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2016/12/8	2017/12/8
N/A	Coaxial Cable	C-SJ00-0010	C0010/04	Each Time	
HP	Attenuator	8494B	1510A05007	Each Time	
/	ATKKPING	V1.9.9.10	/	/	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	27.5 °C
Relative Humidity:	64 %
ATM Pressure:	100.8 kPa

The testing was performed by Swim Lv on 2017-11-13.

Test mode: Receiving

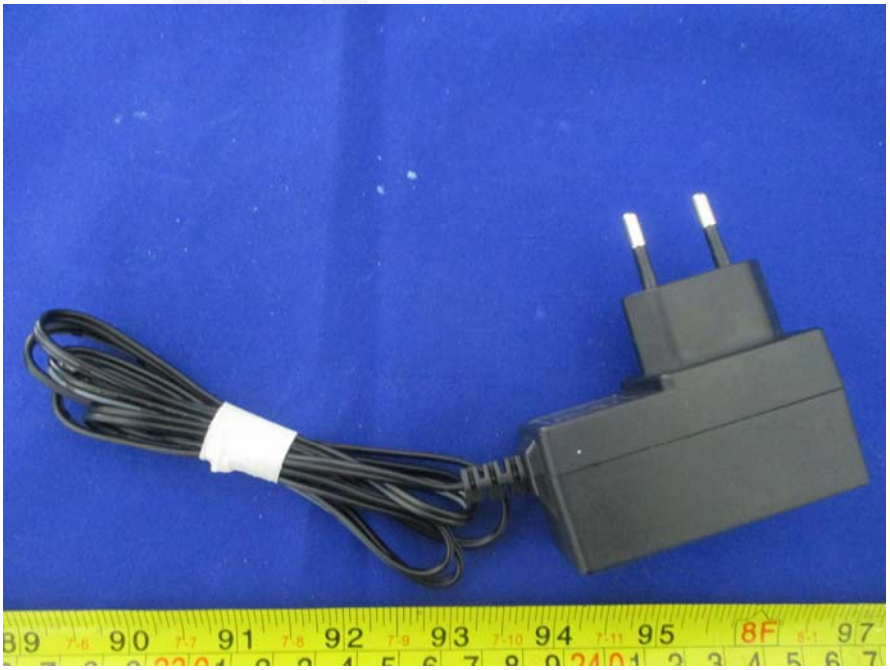
Test Result: Compliant

Channel Frequency (MHz)	Blocking Signal Frequency (MHz)	Blocking type	PER (%)	Limit (%)
802.11a mode 5180	5100	CW	2.11	≤10
	4900	CW	0.15	
	5000	CW	3.12	
	5975	CW	0.64	

EXHIBIT A - EUT PHOTOGRAPHS

EUT – All View

EUT – Adapter Top View



EUT – Adapter Bottom View

EUT – Adapter Label View

EUT – Top View

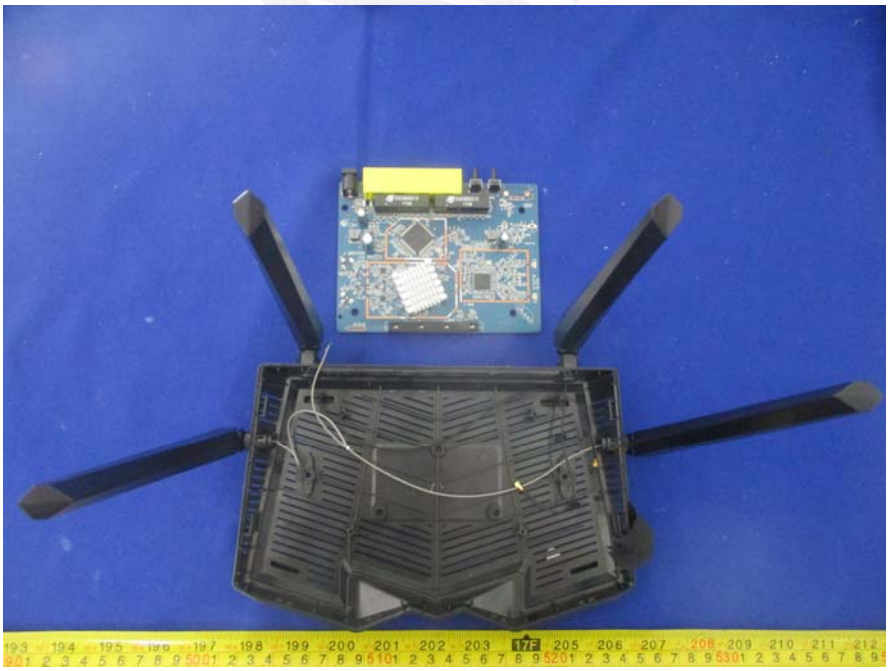
EUT – Bottom View

EUT – Port View

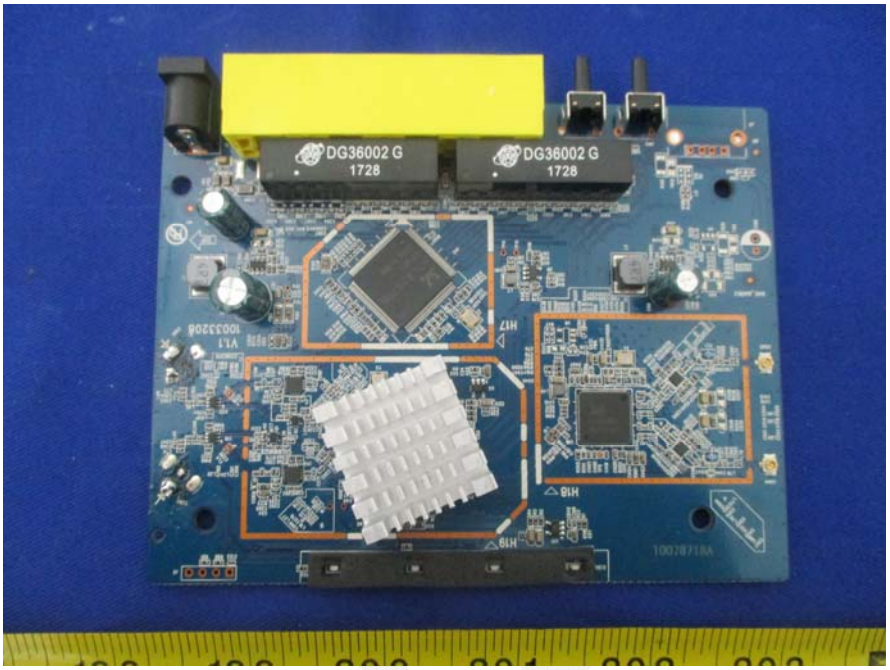
EUT – ANT View

EUT – Uncover View

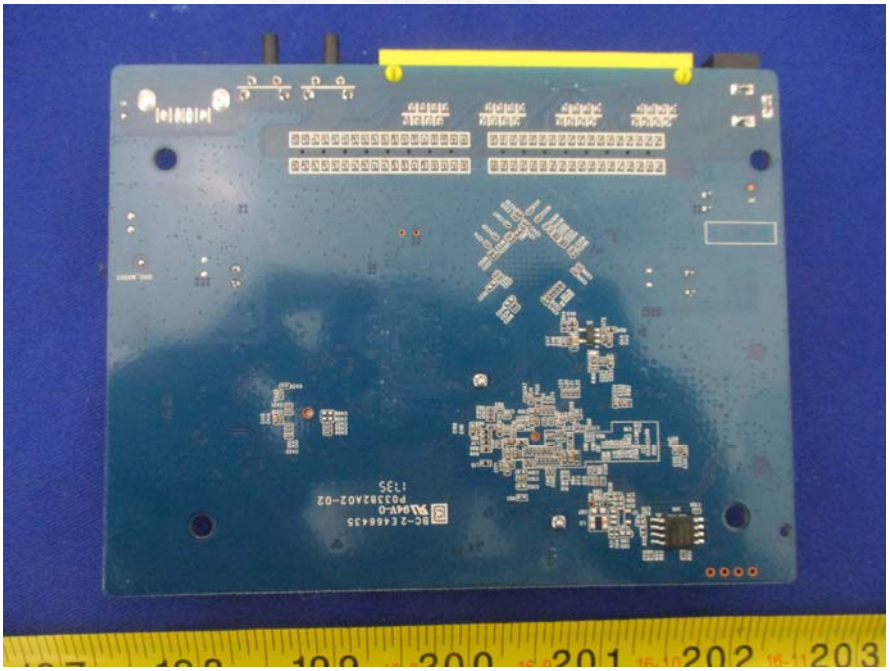
EUT – Uncover View



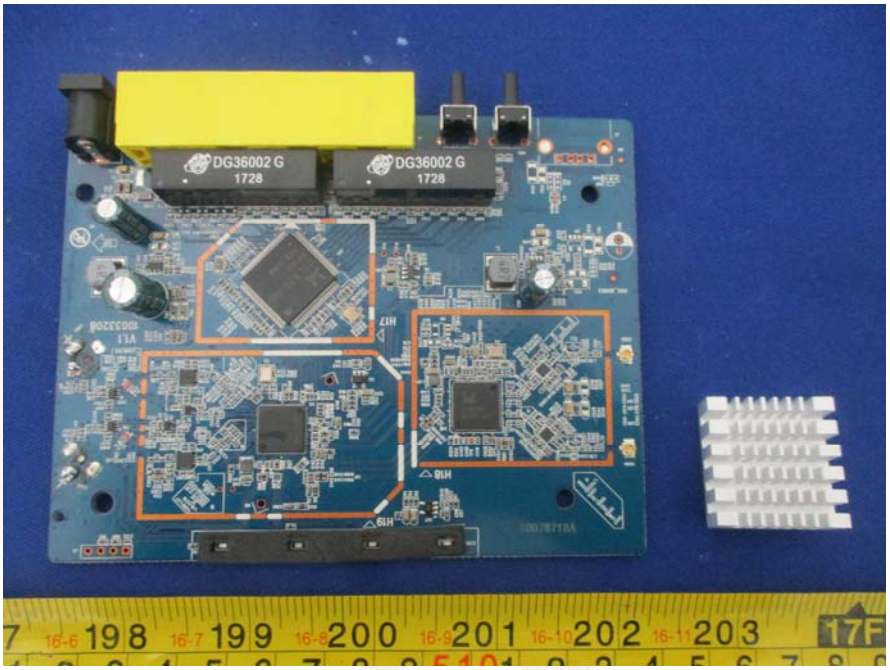
EUT – PCB Top View



EUT – PCB Bottom View

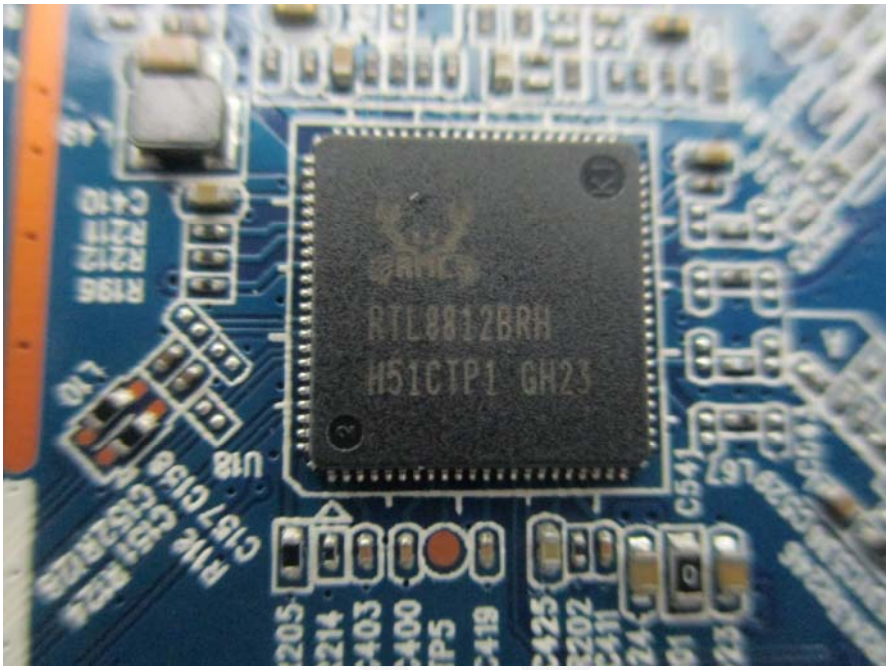


EUT – Uncover View



EUT – Main Chip View

EUT – 5G Chip View



EUT – 2.4G Chip View

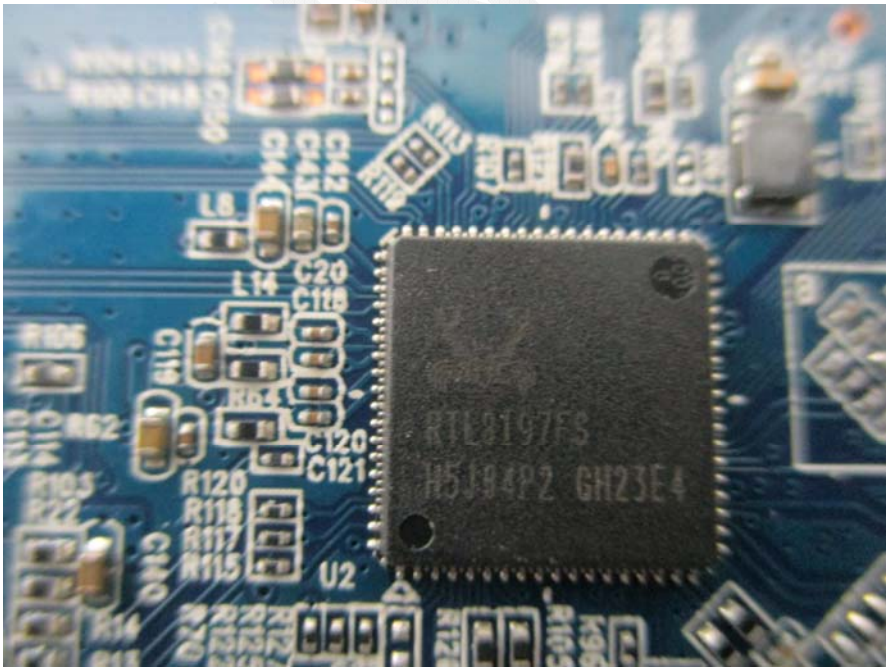
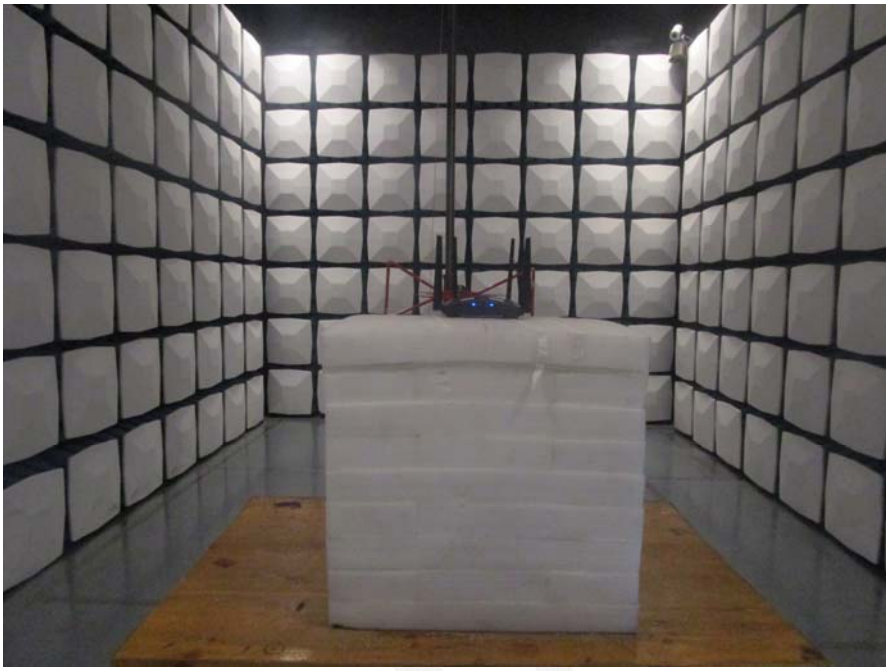


EXHIBIT B - TEST SETUP PHOTOGRAPHS

Radiated Emissions - Below 1GHz View



Radiated Emissions - Above 1GHz View

*******END OF REPORT*******