

SparkLAN Communications, Inc.

TEST REPORT

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180400410TWN-001

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Jul. 16, 2018

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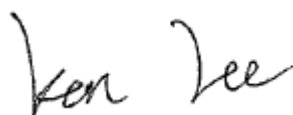
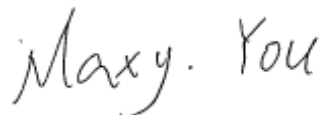
Radio Spectrum TEST REPORT

Applicant:	SparkLAN Communications, Inc. 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei, Taiwan
Product:	802.11ac/b/g/n USB module
Model No.:	WUBM-273ACN
Brand Name:	SparkLAN
FCC ID:	RYK-WUBM273ACN
Test Method/ Standard:	47 CFR FCC Part 15.247 & ANSI C63.10 2013 KDB 558074 D01 v04 KDB 662911 D01 v02r01
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan



Prepared and Checked by:

Approved by:

Ken Lee
Senior Engineer

Maxy You
Engineer

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Revision History

Report No.	Issue Date	Revision Summary
180400410TWN-001	Jul. 16, 2018	Add anntennas and antenna gain is smaller than original device, after engineer judgment and comparing the version, test items were shown in the test summary.

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Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Maximum Peak Conducted Output Power	15.247(b)(3)	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass
Emission On The Band Edge	15.247(d), 15.205	Pass
Antenna Requirement	15.203	Pass

1. General Information

1.1 Identification of the EUT

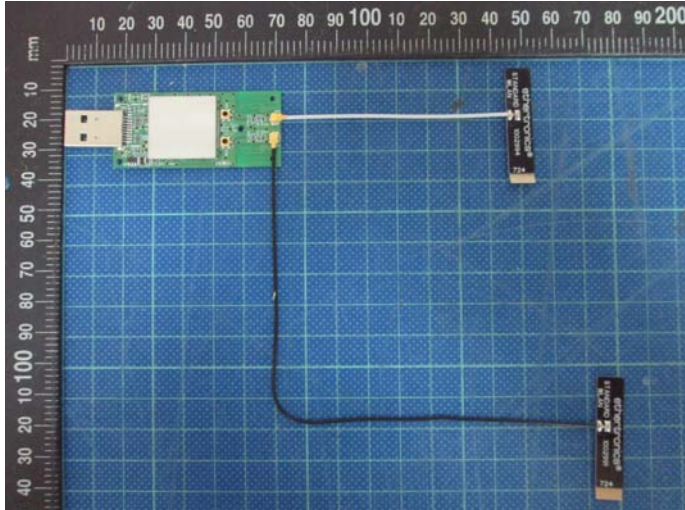
Product:	802.11ac/b/g/n USB module
Model No.:	WUBM-273ACN
Operating Frequency:	1. 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20 2. 2422 MHz ~ 2452 MHz for 802.11n HT40
Channel Number:	1. 11 channels for 2412 MHz ~ 2462 MHz 2. 7 channels for 2422 MHz ~ 2452 MHz
Access scheme:	DSSS, OFDM
Rated Power:	DC 5V
Power Cord:	N/A
Sample receiving date:	Apr. 27, 2018
Sample condition:	Workable
Test Date(s):	May 09, 2018 ~ Jun. 01, 2018

1.2 Description of the EUT

Modulation mode	Transmit path	
	Chain 0 / Main	Chain 1 / AUX
802.11b	V	V
802.11g	V	V
802.11 n (HT20)	V	V
802.11 n (HT40)	V	V

1.3 Antenna description

P/N1002994 + P/N1002991



Antenna 1

(P/N1002994)

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

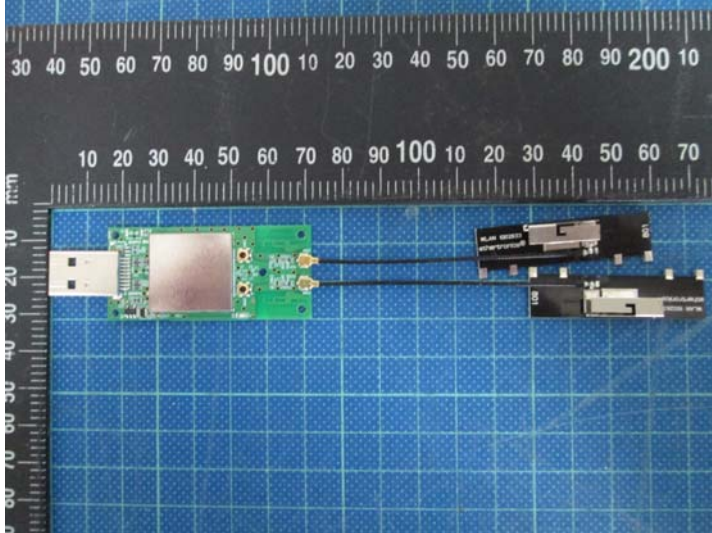
Antenna Gain : 3.75 dBi
Antenna Type : PIFA antenna
Connector Type : I-Pex

Antenna 2

(P/N1002991)

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 3.85 dBi
Antenna Type : PIFA antenna
Connector Type : I-Pex

P/N1002633 + P/N1002635**Antenna 1****(P/N1002633)**

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 2 dBi
Antenna Type : PIFA antenna
Connector Type : I-Pex

Antenna 2**(P/N1002635)**

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 1.5 dBi
Antenna Type : PIFA antenna
Connector Type : I-Pex

1.4 Operation mode

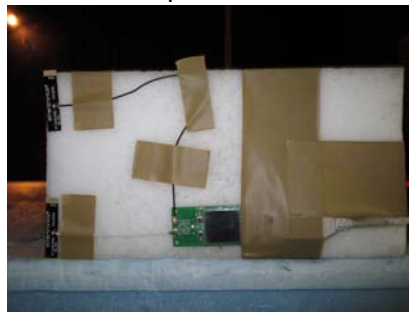
TX-MODE is based on the “MT7662 QA V1.0.3.2” and the program can select different frequency and modulation.

P/N1002994 + P/N1002991

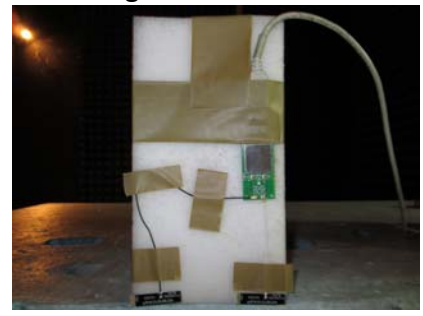
The signal is maximized through rotation and placement in the three orthogonal axes.



X axis



Y axis

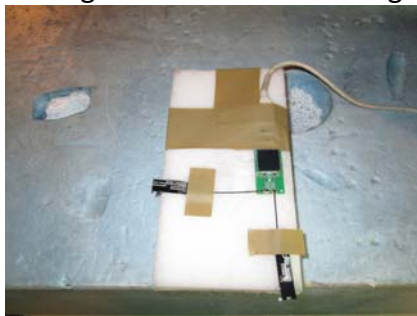


Z axis

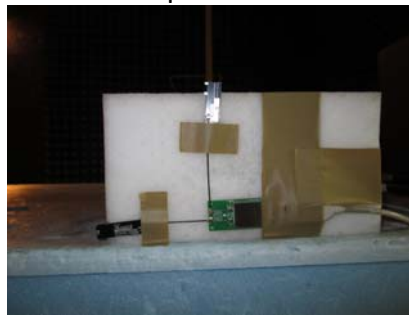
After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

P/N1002633 + P/N1002635

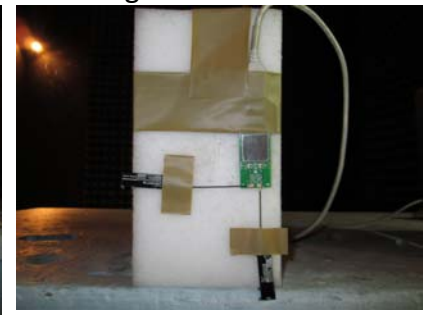
The signal is maximized through rotation and placement in the three orthogonal axes.



X axis



Y axis



Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at X axis. The final test data was executed under this configuration.

With individual verifying, the maximum output power were found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 13 Mbps data rate for 802.11n(HT20) MIMO mode, and 27 Mbps data rate for 802.11n(HT40) MIMO mode, the final tests were executed under these conditions recorded in this report individually.

1.5 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	ProBook 440 G3	5CD8021S9H	USB shielded cable 1 meter× 1

2. Maximum Peak Conducted Output Power

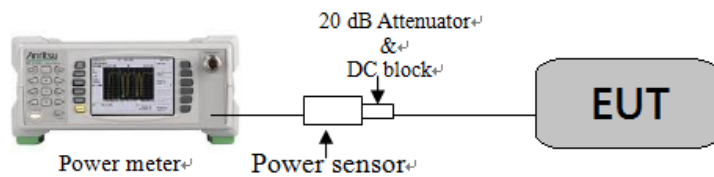
2.1 Instrument Setting

Power Meter Parameter	Setting
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak & Average

2.2 Test Procedure

Test procedures refer to clause 9.1.3 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01.

2.3 Test Diagram



2.4 Limit

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

2.5 Operating Environment Condition

Temperature (°C) :	25
Relative Humidity (%) :	50
Atmospheric Pressure (hPa) :	1008
Test Date :	2018/06/01

2.6 Test Results

P/N1002994 + P/N1002991

Single Tx

Chain 0

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	15.91	38.99	20.9	123.03	30	-9.10
	6	2437	16.07	40.46	21.23	132.74	30	-8.77
	11	2462	16.07	40.46	21.35	136.46	30	-8.65
802.11g	1	2412	13.99	25.06	21.56	143.22	30	-8.44
	6	2437	14.83	30.41	22.02	159.22	30	-7.98
	11	2462	14.27	26.73	21.76	149.97	30	-8.24

Chain 1

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	15.51	35.56	20.48	111.69	30	-9.52
	6	2437	15.61	36.39	20.07	101.62	30	-9.93
	11	2462	15.48	35.32	20.05	101.16	30	-9.95
802.11g	1	2412	13.58	22.80	21.14	130.02	30	-8.86
	6	2437	13.61	22.96	21.58	143.88	30	-8.42
	11	2462	12.76	18.88	21.11	129.12	30	-8.89

P/N1002994 + P/N1002991

MIMO

Mode	Channel	Frequency (MHz)	Output Power (dBm)				Output Power (mW)				Total Power (dBm)				Limit (dBm)	Margin (dB)
			Chian 0		Chain 1		Chain 0		Chian 1		AV		PK			
			AV	PK	AV	PK	AV	PK	AV	PK	0+1 (mW)	0+1 (dBm)	0+1 (mW)	0+1 (dBm)		
802.11n (HT20)	1	2412	14.84	23.91	14.37	23.49	30.48	246.04	27.35	223.36	57.83	17.62	469.39	26.72	30	-3.28
	6	2437	14.83	24.04	14.26	23.81	30.41	253.51	26.67	240.44	57.08	17.56	493.95	26.94	30	-3.06
	11	2462	14.99	24.12	14.46	23.77	31.55	258.23	27.93	238.23	59.48	17.74	496.46	26.96	30	-3.04

MIMO

Mode	Channel	Frequency (MHz)	Output Power (dBm)				Output Power (mW)				Total Power (dBm)				Limit (dBm)	Margin (dB)
			Chian 0		Chain 1		Chain 0		Chian 1		AV		PK			
			AV	PK	AV	PK	AV	PK	AV	PK	0+1 (mW)	0+1 (dBm)	0+1 (mW)	0+1 (dBm)		
802.11n (HT40)	3	2422	13.71	21.76	12.82	21.11	23.50	149.97	19.14	129.12	42.64	16.30	279.09	24.46	30	-5.54
	6	2437	13.36	21.89	12.71	21.03	21.68	154.53	18.66	126.77	40.34	16.06	281.29	24.49	30	-5.51
	9	2452	13.65	21.85	12.75	21.05	23.17	153.11	18.84	127.35	42.01	16.23	280.46	24.48	30	-5.52

P/N1002633 + P/N1002635
Single Tx
Chain 0

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	15.91	38.99	20.9	123.03	30	-9.10
	6	2437	16.07	40.46	21.23	132.74	30	-8.77
	11	2462	16.07	40.46	21.35	136.46	30	-8.65
802.11g	1	2412	13.99	25.06	21.56	143.22	30	-8.44
	6	2437	14.83	30.41	22.02	159.22	30	-7.98
	11	2462	14.27	26.73	21.76	149.97	30	-8.24

Chain 1

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
802.11b	1	2412	15.51	35.56	20.48	111.69	30	-9.52
	6	2437	15.61	36.39	20.07	101.62	30	-9.93
	11	2462	15.48	35.32	20.05	101.16	30	-9.95
802.11g	1	2412	13.58	22.80	21.14	130.02	30	-8.86
	6	2437	13.61	22.96	21.58	143.88	30	-8.42
	11	2462	12.76	18.88	21.11	129.12	30	-8.89

P/N1002633 + P/N1002635

MIMO

Mode	Channel	Frequency (MHz)	Output Power (dBm)				Output Power (mW)				Total Power (dBm)				Limit (dBm)	Margin (dB)
			Chian 0		Chain 1		Chain 0		Chian 1		AV		PK			
			AV	PK	AV	PK	AV	PK	AV	PK	0+1 (mW)	0+1 (dBm)	0+1 (mW)	0+1 (dBm)		
802.11n (HT20)	1	2412	14.84	23.91	14.37	23.49	30.48	246.04	27.35	223.36	57.83	17.62	469.39	26.72	30	-3.28
	6	2437	14.83	24.04	14.26	23.81	30.41	253.51	26.67	240.44	57.08	17.56	493.95	26.94	30	-3.06
	11	2462	14.99	24.12	14.46	23.77	31.55	258.23	27.93	238.23	59.48	17.74	496.46	26.96	30	-3.04

MIMO

Mode	Channel	Frequency (MHz)	Output Power (dBm)				Output Power (mW)				Total Power (dBm)				Limit (dBm)	Margin (dB)
			Chian 0		Chain 1		Chain 0		Chian 1		AV		PK			
			AV	PK	AV	PK	AV	PK	AV	PK	0+1 (mW)	0+1 (dBm)	0+1 (mW)	0+1 (dBm)		
802.11n (HT40)	3	2422	13.71	21.76	12.82	21.11	23.50	149.97	19.14	129.12	42.64	16.30	279.09	24.46	30	-5.54
	6	2437	13.36	21.89	12.71	21.03	21.68	154.53	18.66	126.77	40.34	16.06	281.29	24.49	30	-5.51
	9	2452	13.65	21.85	12.75	21.05	23.17	153.11	18.84	127.35	42.01	16.23	280.46	24.48	30	-5.52

3. Emissions in Restricted Frequency Bands (Radiated emission measurements)

3.1 Instrument Setting

Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

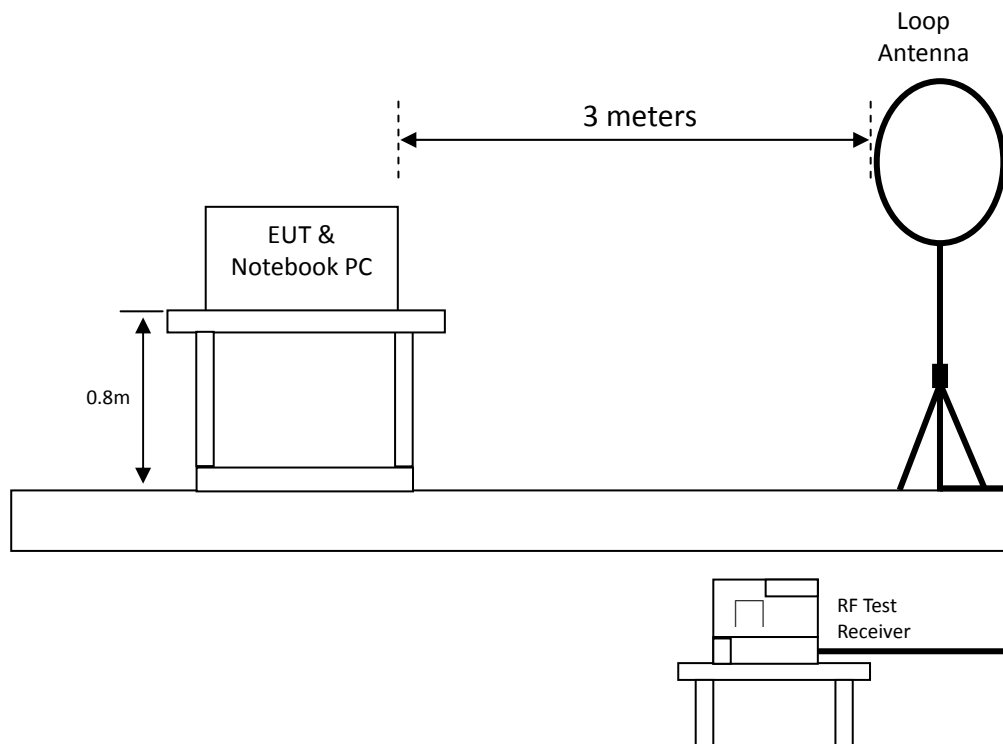
3.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter (below 1GHz) and 1.5 meter (above 1GHz) above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
Step 2	Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
Step 3	The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization.
Step 4	If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.
Step 5	Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
Step 6	For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
Step 7	If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.
Step 8	For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

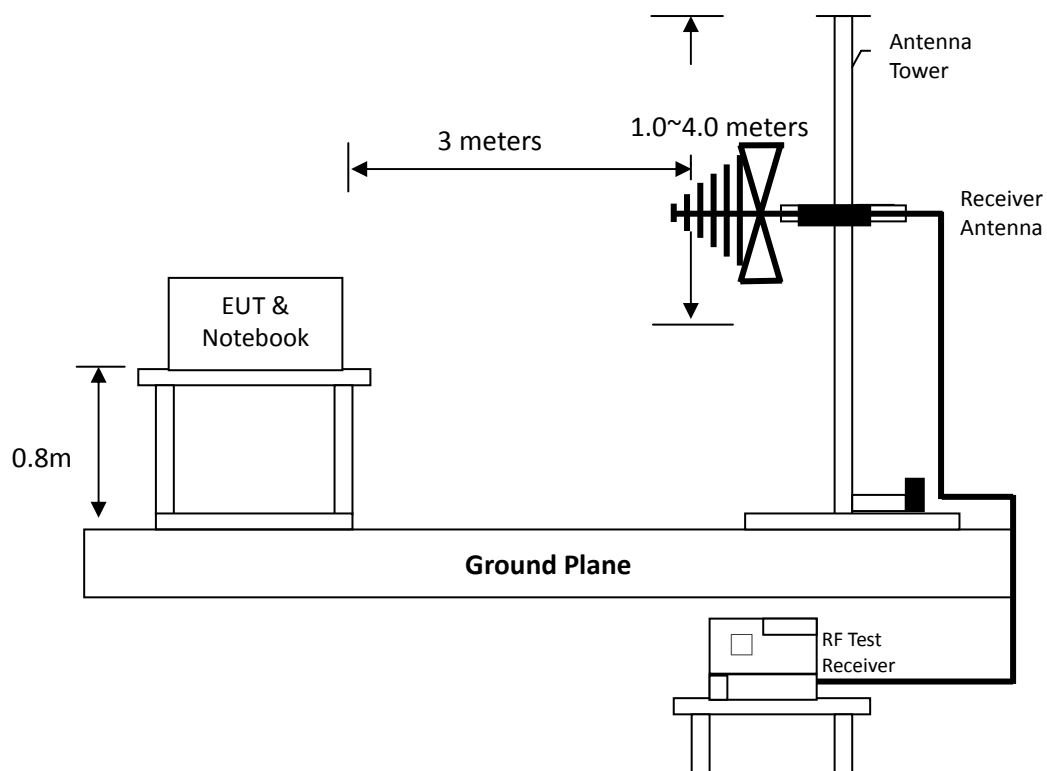
Step 9	In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.
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3.3 Test Diagram

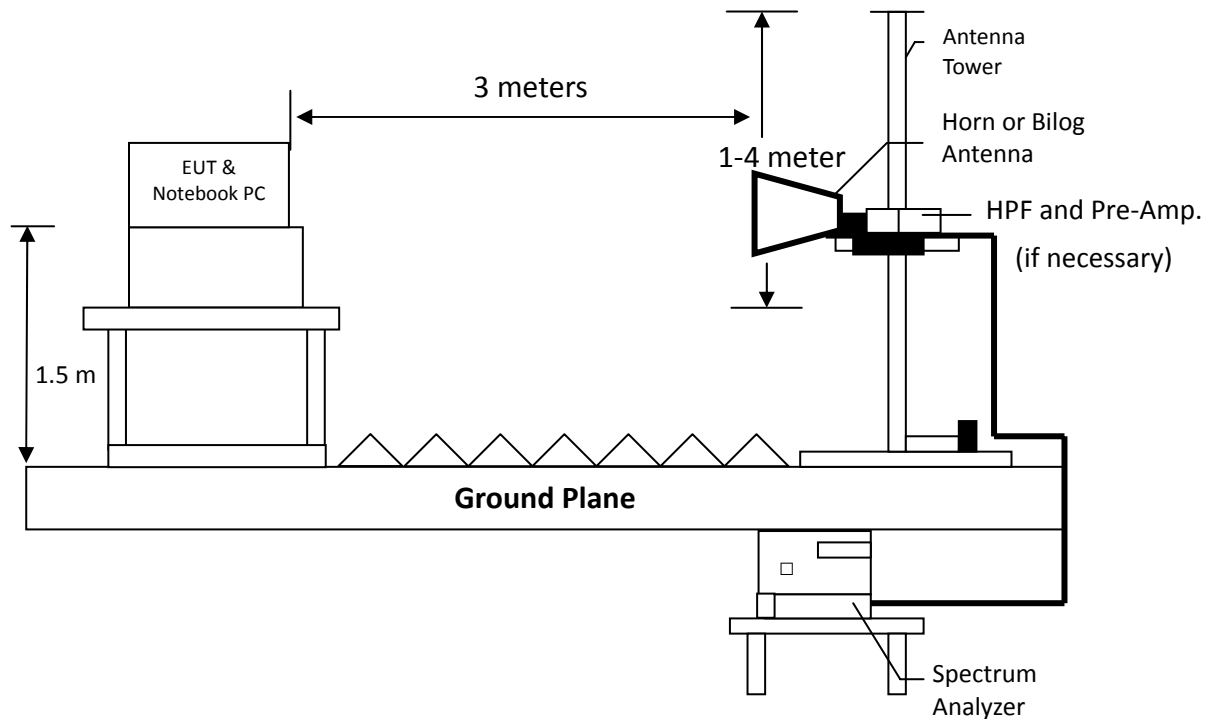
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



3.4 Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

3.5 Operating Environment Condition

Temperature (°C) :	25
Relative Humidity (%) :	50
Atmospheric Pressure (hPa) :	1008
Test Date :	2018/5/22~2018/6/1

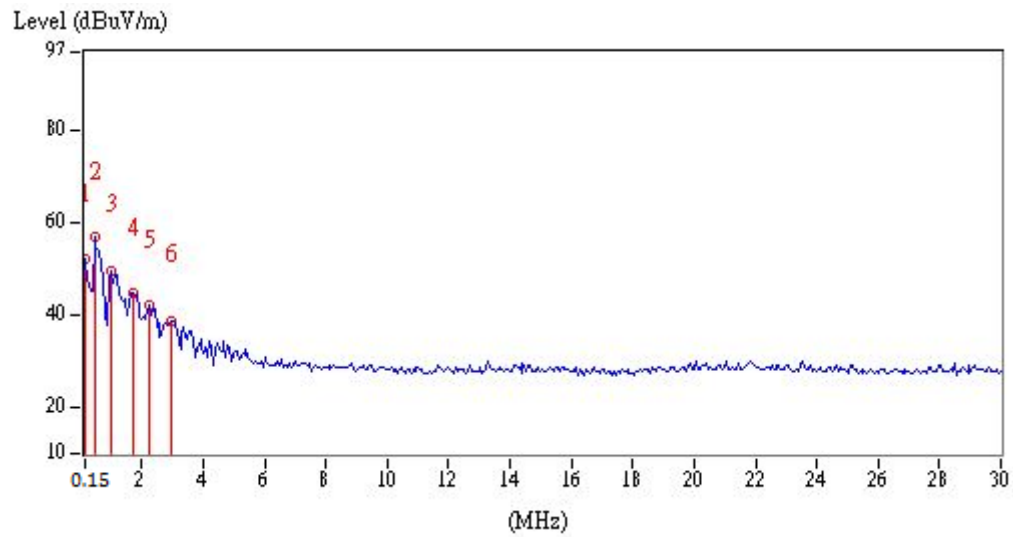
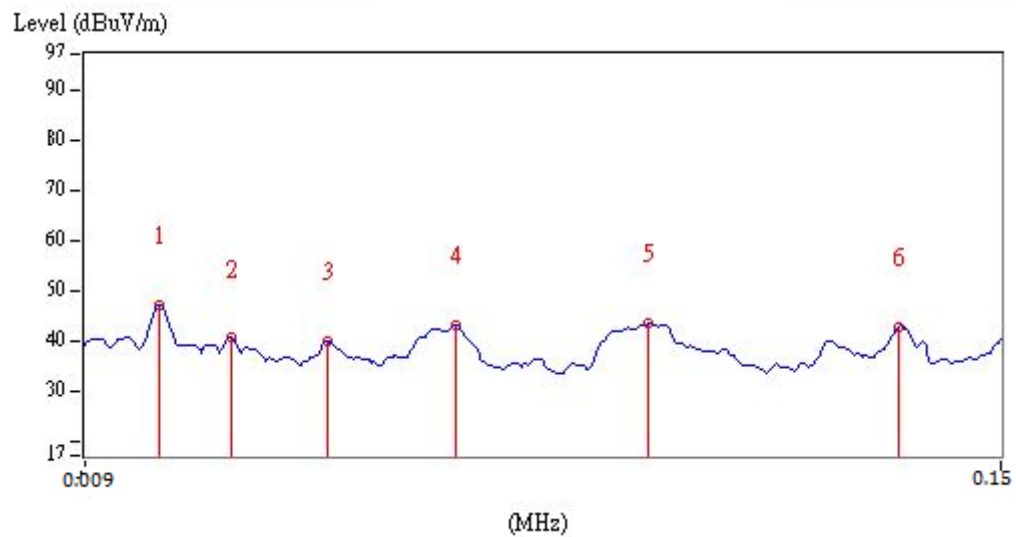
3.6 Test Result

3.6.1 Measurement results: frequencies 9kHz to 30MHz

P/N1002994 + P/N1002991

Mode	Chain	Channel	Detector	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (HT20)	Chain0+1	11	PK	0.02	19.25	27.91	47.16	121.58	-74.42
802.11n (HT20)	Chain0+1	11	PK	0.03	19.5	20.96	40.46	118.06	-77.6
802.11n (HT20)	Chain0+1	11	PK	0.05	19.13	20.8	39.93	113.62	-73.69
802.11n (HT20)	Chain0+1	11	PK	0.07	18.94	24.06	43.01	110.7	-67.69
802.11n (HT20)	Chain0+1	11	QP	0.10	18.77	24.65	43.42	107.6	-64.18
802.11n (HT20)	Chain0+1	11	PK	0.13	18.74	23.92	42.65	105.33	-62.68
802.11n (HT20)	Chain0+1	11	PK	0.15	18.73	33.43	52.16	104.08	-51.92
802.11n (HT20)	Chain0+1	11	PK	0.45	18.67	38.14	56.81	94.54	-37.73
802.11n (HT20)	Chain0+1	11	QP	0.99	18.61	30.99	49.6	67.69	-18.09
802.11n (HT20)	Chain0+1	11	QP	1.70	18.55	26.16	44.71	63	-18.29
802.11n (HT20)	Chain0+1	11	QP	2.24	18.5	23.48	41.97	70	-28.03
802.11n (HT20)	Chain0+1	11	QP	2.96	18.42	20.41	38.83	70	-31.17

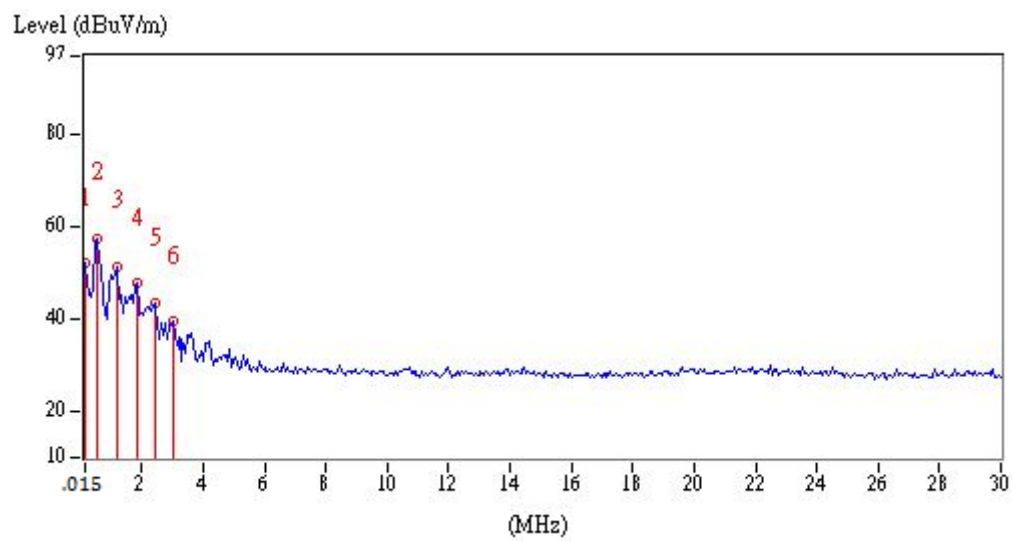
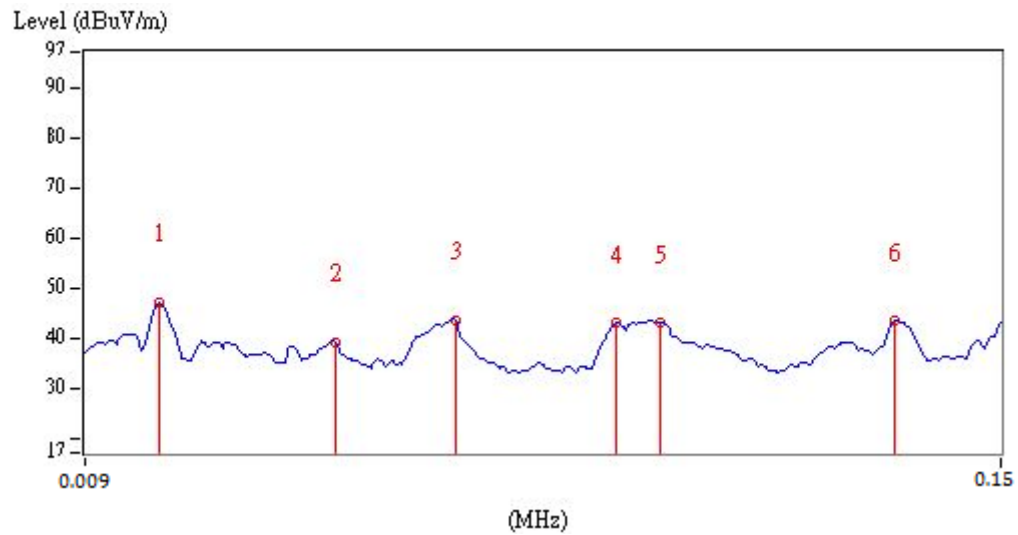
Remark: Corr. Factor = Antenna Factor + Cable Loss



P/N1002633 + P/N1002635

Mode	Chain	Channel	Detector	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBμV/m)	Margin (dB)
802.11b	Chain0	11	PK	0.02	19.26	27.81	47.07	121.58	-74.51
802.11b	Chain0	11	PK	0.05	19.1	19.94	39.04	113.62	-74.58
802.11b	Chain0	11	PK	0.07	18.94	24.59	43.53	110.7	-67.17
802.11b	Chain0	11	PK	0.09	18.8	24.09	42.88	108.52	-65.64
802.11b	Chain0	11	QP	0.10	18.75	24.21	42.96	107.6	-64.64
802.11b	Chain0	11	PK	0.13	18.74	24.58	43.32	105.33	-62.01
802.11b	Chain0	11	PK	0.15	18.73	33.35	52.08	104.08	-52.00
802.11b	Chain0	11	QP	0.57	18.63	38.89	57.52	72.49	-14.97
802.11b	Chain0	11	QP	1.16	18.6	32.88	51.48	66.32	-14.84
802.11b	Chain0	11	QP	1.82	18.54	29.18	47.71	70	-22.29
802.11b	Chain0	11	QP	2.42	18.48	24.95	43.43	70	-26.57
802.11b	Chain0	11	QP	3.02	18.43	21.08	39.51	70	-30.49

Remark: Corr. Factor = Antenna Factor + Cable Loss



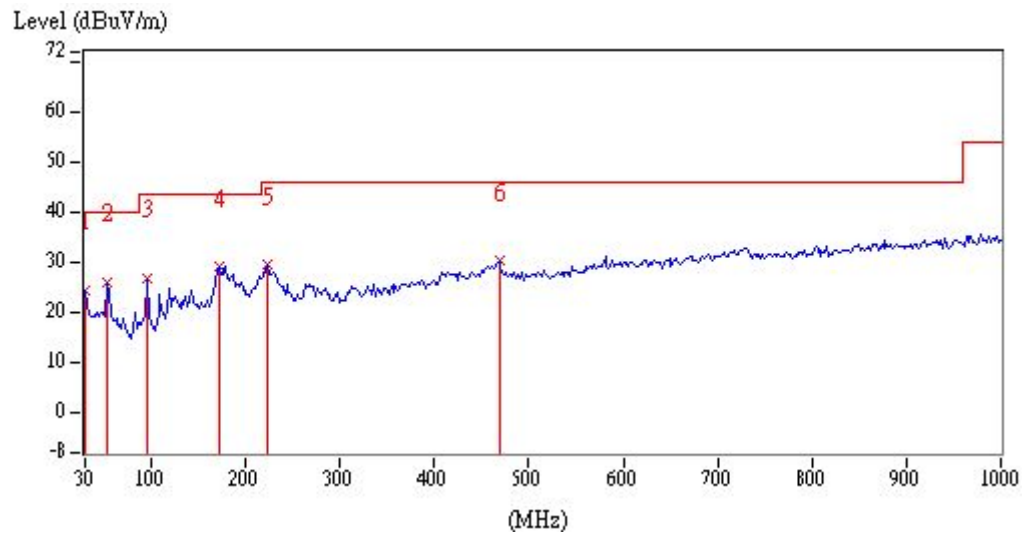
3.6.2 Measurement results: frequencies below 1 GHz

P/N1002994 + P/N1002991

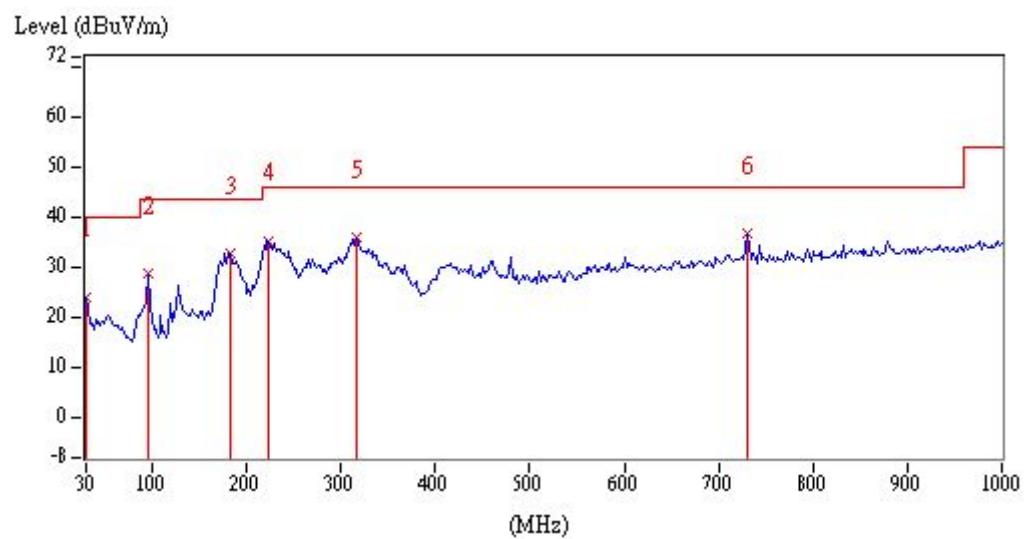
Mode	Chain	Channel	Ant Polarity	Detector	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (HT20)	Chain0+1	11	H	QP	30	19.04	5.08	24.12	40	-15.88
802.11n (HT20)	Chain0+1	11	H	QP	95.96	14.99	13.76	28.75	43.5	-14.75
802.11n (HT20)	Chain0+1	11	H	QP	183.26	18.9	13.79	32.69	43.5	-10.81
802.11n (HT20)	Chain0+1	11	H	QP	224	19.43	15.83	35.26	46	-10.74
802.11n (HT20)	Chain0+1	11	H	QP	317.12	22.16	13.64	35.8	46	-10.2
802.11n (HT20)	Chain0+1	11	H	QP	730.34	31.17	5.52	36.69	46	-9.31
802.11n (HT20)	Chain0+1	11	V	QP	30	19.04	5.46	24.49	40	-15.51
802.11n (HT20)	Chain0+1	11	V	QP	53.28	20.4	5.61	26.01	40	-13.99
802.11n (HT20)	Chain0+1	11	V	QP	95.96	14.99	11.84	26.83	43.5	-16.67
802.11n (HT20)	Chain0+1	11	V	QP	171.62	20.35	8.78	29.13	43.5	-14.37
802.11n (HT20)	Chain0+1	11	V	QP	224	19.43	10.02	29.44	46	-16.56
802.11n (HT20)	Chain0+1	11	V	QP	468.44	26.15	4.12	30.27	46	-15.73

Remark: Corr. Factor = Antenna Factor + Cable Loss

Vertical



Horizontal

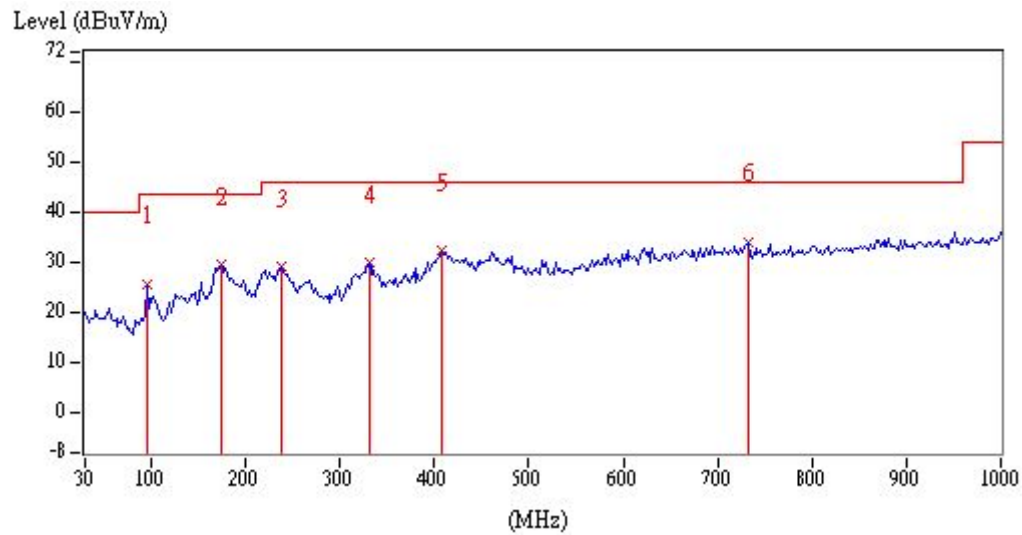


P/N1002633 + P/N1002635

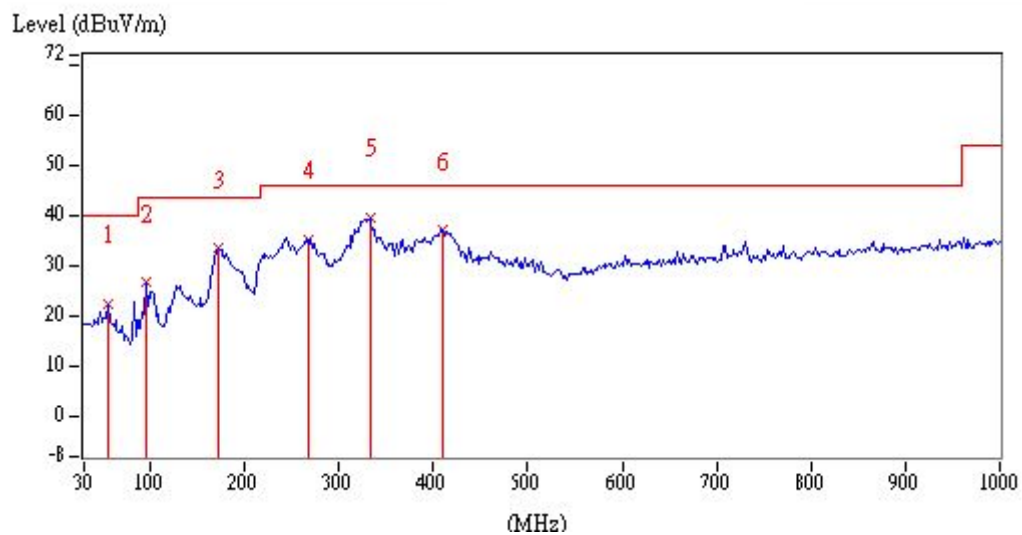
Mode	Chain	Channel	Ant Polarity	Detector	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBμV/m)	Margin (dB)
802.11b	Chain0	11	H	QP	55.22	20.28	2.25	22.54	40	-17.46
802.11b	Chain0	11	H	QP	95.96	14.99	11.62	26.6	43.5	-16.9
802.11b	Chain0	11	H	QP	171.62	20.35	13.17	33.52	43.5	-9.98
802.11b	Chain0	11	H	QP	268.62	20.95	14.25	35.21	46	-10.79
802.11b	Chain0	11	H	QP	332.64	22.53	17.12	39.64	46	-6.36
802.11b	Chain0	11	H	QP	410.24	24.65	12.5	37.15	46	-8.85
802.11b	Chain0	11	V	QP	95.96	14.99	10.62	25.61	43.5	-17.89
802.11b	Chain0	11	V	QP	173.56	20.1	9.45	29.55	43.5	-13.95
802.11b	Chain0	11	V	QP	237.58	20.25	8.94	29.19	46	-16.81
802.11b	Chain0	11	V	QP	330.7	22.48	7.51	29.99	46	-16.01
802.11b	Chain0	11	V	QP	408.3	24.59	7.63	32.21	46	-13.79
802.11b	Chain0	11	V	QP	732.28	31.21	2.96	34.18	46	-11.82

Remark: Corr. Factor = Antenna Factor + Cable Loss

Vertical



Horizontal



3.6.3 Measurement results: frequency above 1GHz to 25GHz

P/N1002994 + P/N1002991

Mode	Chain	Ch	Ant Polarity	Detect or	Freq. (MHz)	Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11b	Chain0	11	H	PK	4920	6.16	40.94	47.09	74	-26.91
802.11b	Chain0	11	H	PK	7620	13.83	28.66	42.49	74	-31.51
802.11b	Chain0	11	H	PK	9855	17.27	29.77	47.04	74	-26.96
802.11b	Chain0	11	V	PK	2000	35.94	16.52	52.46	74	-21.54
802.11b	Chain0	11	V	PK	2524	35.29	16.05	51.34	74	-22.66
802.11b	Chain0	11	V	PK	2664	35.78	13.96	49.74	74	-24.26
802.11b	Chain0	11	V	PK	3285	1.74	45.69	47.43	74	-26.57
802.11b	Chain0	11	V	PK	4920	6.16	41.79	47.95	74	-26.05
802.11b	Chain0	11	V	PK	9855	17.27	27.64	44.9	74	-29.1
802.11g	Chain0	6	H	PK	4875	5.97	38.92	44.89	74	-29.11
802.11g	Chain0	6	H	PK	9750	17	29.14	46.14	74	-27.86
802.11g	Chain0	6	V	AV	1996	35.89	-2.09	33.8	54	-20.2
802.11g	Chain0	6	V	PK	1996	35.89	22	57.89	74	-16.11
802.11g	Chain0	6	V	PK	4005	3.54	39.94	43.48	74	-30.52
802.11g	Chain0	6	V	PK	4875	5.97	39.14	45.11	74	-28.89
802.11g	Chain0	6	V	PK	9690	16.84	26.59	43.44	74	-30.56
802.11n (HT20)	Chain0+1	11	H	PK	4920	6.16	40.11	46.27	74	-27.73
802.11n (HT20)	Chain0+1	11	H	PK	9840	17.23	28.28	45.51	74	-28.49
802.11n (HT20)	Chain0+1	11	V	AV	2000	35.94	-3.27	32.67	54	-21.33
802.11n (HT20)	Chain0+1	11	V	PK	2000	35.94	20.54	56.48	74	-17.52
802.11n (HT20)	Chain0+1	11	V	PK	4920	6.16	42.95	49.11	74	-24.89
802.11n (HT40)	Chain0+1	6	H	PK	4875	5.97	38.47	44.44	74	-29.56
802.11n (HT40)	Chain0+1	6	H	PK	9750	17	28.45	45.45	74	-28.55
802.11n (HT40)	Chain0+1	6	V	AV	2904	36.63	-6.52	30.11	54	-23.89
802.11n (HT40)	Chain0+1	6	V	PK	1996	35.89	16.12	52.01	74	-21.99

TEST REPORT

Mode	Chain	Ch	Ant Polarity	Detect or	Freq. (MHz)	Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (HT40)	Chain0+1	6	V	PK	2904	36.63	17.46	54.09	74	-19.91
802.11n (HT40)	Chain0+1	6	V	PK	2936	36.74	15.77	52.51	74	-21.49
802.11n (HT40)	Chain0+1	6	V	PK	4875	5.97	41.49	47.46	74	-26.54

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

TEST REPORT
P/N1002633 + P/N1002635

Mode	Chain	Ch	Ant Polarity	Detect or	Freq. (MHz)	Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11b	Chain0	11	H	PK	3285	1.74	45.71	47.45	74	-26.55
802.11b	Chain0	11	H	PK	4920	6.16	40.21	46.37	74	-27.63
802.11b	Chain0	11	V	AV	1996	35.89	-1.23	34.66	54	-19.34
802.11b	Chain0	11	V	PK	1996	35.89	20.74	56.64	74	-17.36
802.11b	Chain0	11	V	PK	2668	35.8	16.28	52.08	74	-21.92
802.11b	Chain0	11	V	PK	3285	1.74	45.46	47.21	74	-26.79
802.11b	Chain0	11	V	PK	3975	3.45	42.98	46.43	74	-27.57
802.11b	Chain0	11	V	PK	4260	3.99	44.79	48.78	74	-25.22
802.11b	Chain0	11	V	PK	4920	6.16	37.37	43.53	74	-30.47
802.11b	Chain0	11	V	PK	9855	17.27	29.55	46.81	74	-27.19
802.11g	Chain0	6	H	PK	4875	5.97	35.51	41.48	74	-32.52
802.11g	Chain0	6	H	PK	7305	12.62	28.3	40.92	74	-33.08
802.11g	Chain0	6	H	PK	9570	16.54	27.06	43.6	74	-30.4
802.11g	Chain0	6	V	AV	1996	35.89	0.31	36.2	54	-17.8
802.11g	Chain0	6	V	PK	1996	35.89	19.6	55.5	74	-18.5
802.11g	Chain0	6	V	PK	2124	35.76	15.44	51.2	74	-22.8
802.11g	Chain0	6	V	PK	2656	35.75	16.49	52.24	74	-21.76
802.11g	Chain0	6	V	PK	3990	3.5	39.13	42.63	74	-31.37
802.11g	Chain0	6	V	PK	7320	12.68	28.57	41.26	74	-32.74
802.11g	Chain0	6	V	PK	9750	17	27.68	44.68	74	-29.32
802.11n (HT20)	Chain0+1	11	H	PK	3990	3.5	37.01	40.51	74	-33.49
802.11n (HT20)	Chain0+1	11	H	PK	4935	6.22	41.35	47.57	74	-26.43
802.11n (HT20)	Chain0+1	11	V	AV	1992	35.85	2.67	38.52	54	-15.48
802.11n (HT20)	Chain0+1	11	V	PK	1992	35.85	22.52	58.37	74	-15.63
802.11n (HT20)	Chain0+1	11	V	PK	4260	3.99	39.23	43.22	74	-30.78
802.11n (HT20)	Chain0+1	11	V	PK	4920	6.16	40.98	47.14	74	-26.86
802.11n (HT40)	Chain0+1	6	V	AV	2000	35.94	-0.2	35.74	54	-18.26
802.11n (HT40)	Chain0+1	6	V	PK	2000	35.94	19.39	55.33	74	-18.67

Mode	Chain	Ch	Ant Polarity	Detect or	Freq. (MHz)	Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)
802.11n (HT40)	Chain0+1	6	V	PK	4005	3.54	37.41	40.95	74	-33.05
802.11n (HT40)	Chain0+1	6	V	PK	4875	5.97	37.73	43.7	74	-30.3
802.11n (HT40)	Chain0+1	6	V	PK	9750	17	28.51	45.5	74	-28.5

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

4. Emission on Band Edge

4.1 Instrument Setting

Spectrum Function	Setting
Detector	Peak and Average
RBW	1MHz
VBW	3MHz
Sweep	Auto couple
Restrict bands	2310 MHz ~ 2390 MHz 2483.5 MHz ~ 2500 MHz
Attenuation	Auto

4.2 Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

4.3 Operating Environment Condition

Temperature (°C) :	25
Relative Humidity (%) :	50
Atmospheric Pressure (hPa) :	1008
Test Date :	2018/06/01

4.4 Test Results

P/N1002994 + P/N1002991

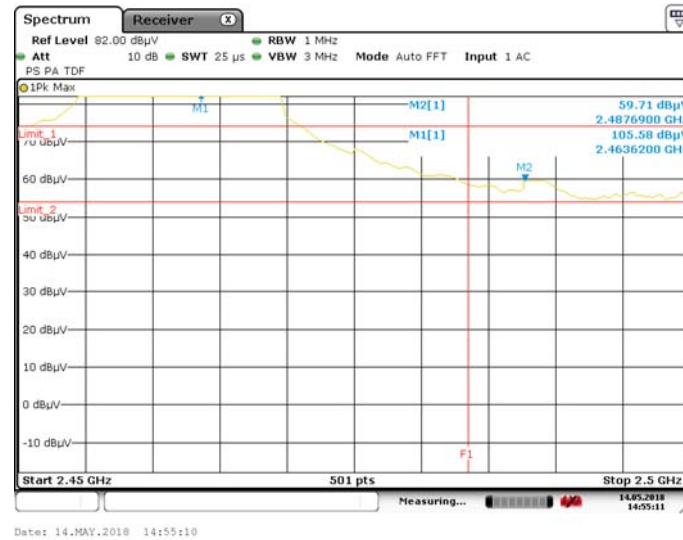
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b Chain0	2487.69	PK	V	35.09	24.62	59.71	74	-14.29	2483.5~2500
	2486.79	AV	V	35.09	11.40	46.49	54	-7.51	
	2368.93	PK	V	35.03	21.40	56.43	74	-17.57	2310~2390
	2375.63	AV	V	35.04	8.74	43.78	54	-10.22	
802.11n (HT20) Chain0+1	2484.00	PK	V	35.09	36.85	71.94	74	-2.06	2483.5~2500
	2483.50	AV	V	35.09	13.76	48.85	54	-5.15	
	2390.00	PK	V	35.04	28.76	63.80	74	-10.20	2310~2390
	2390.00	AV	V	35.04	13.82	48.86	54	-5.14	

P/N1002633 + P/N1002635

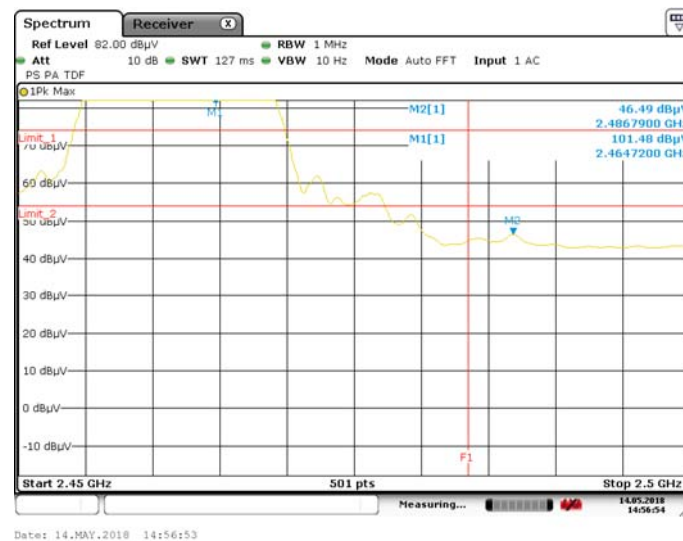
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b Chain0	2484.20	PK	H	35.09	22.02	57.11	74	-16.89	2483.5~2500
	2486.79	AV	H	35.09	12.39	47.48	54	-6.52	
	2355.51	PK	H	35.03	21.39	56.42	74	-17.58	2310~2390
	2375.87	AV	H	35.04	8.97	44.01	54	-9.99	
802.11n (HT20) Chain0+1	2483.90	PK	H	35.09	27.35	62.44	74	-11.56	2483.5~2500
	2483.50	AV	H	35.09	14.28	49.37	54	-4.63	
	2390.00	PK	H	35.04	33.12	68.16	74	-5.84	2310~2390
	2390.00	AV	H	35.04	7.32	42.36	54	-11.64	

P/N1002994 + P/N1002991

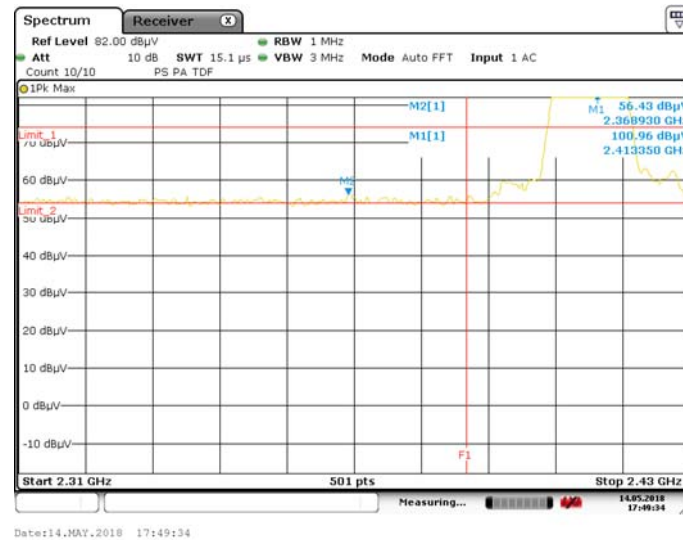
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 PK



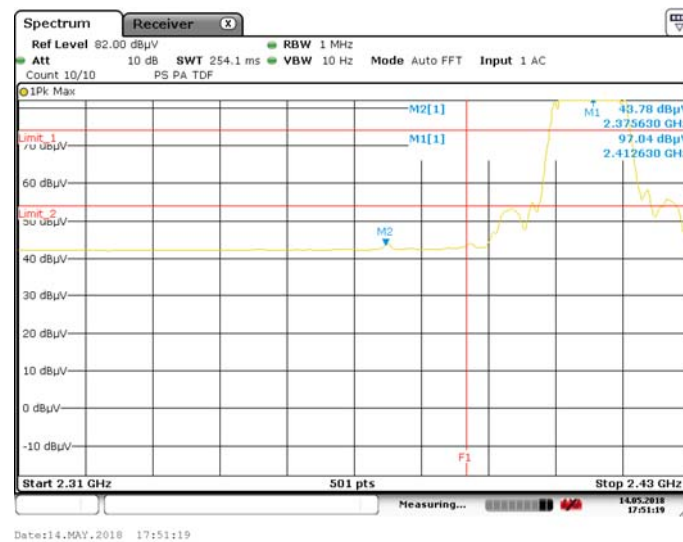
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 AV



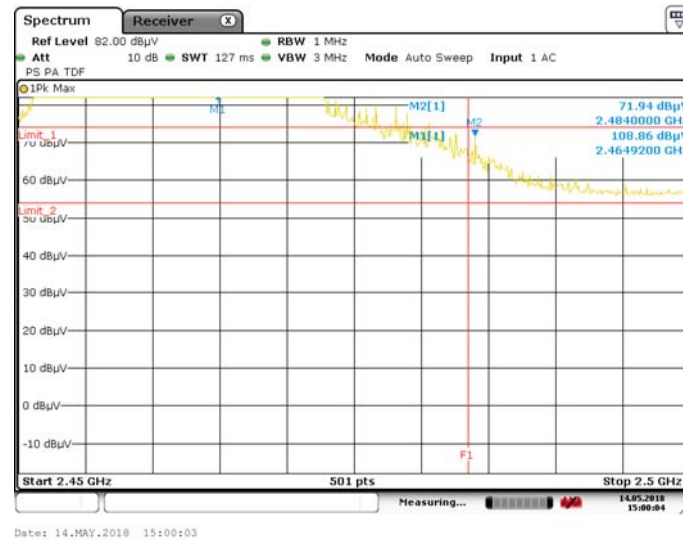
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 PK



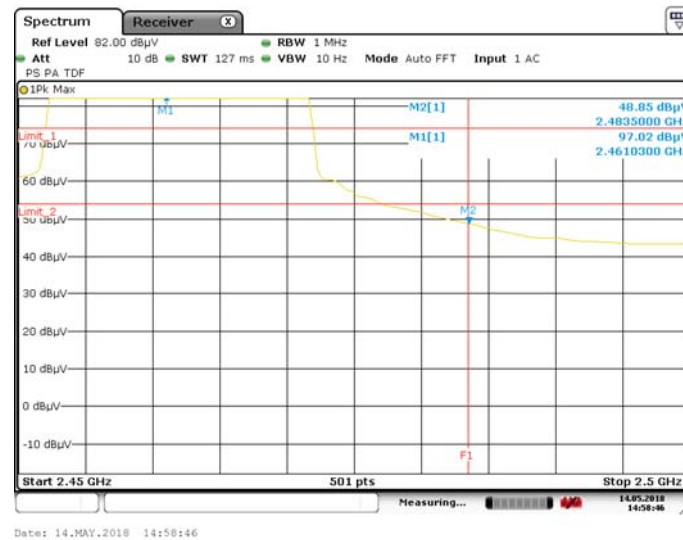
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 AV



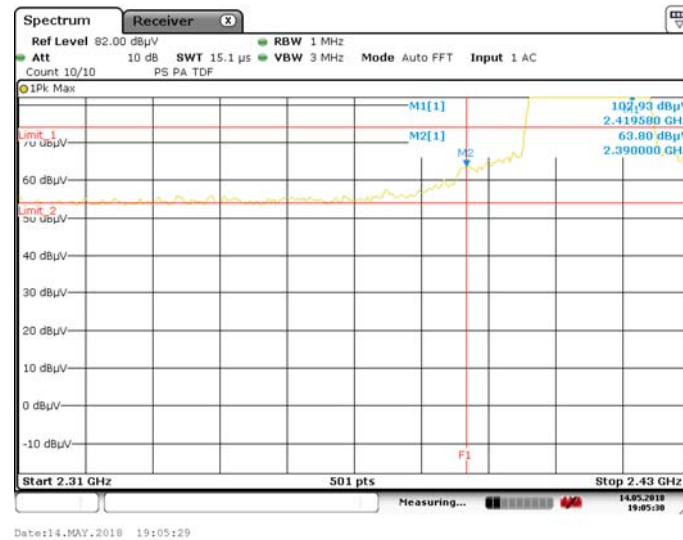
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 PK



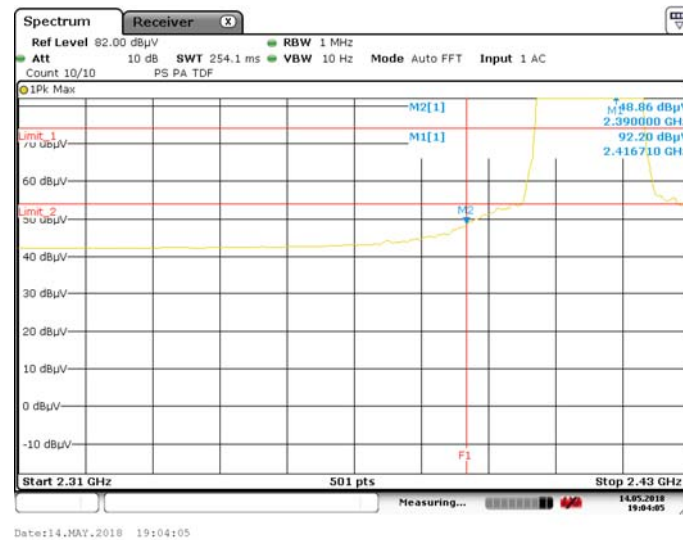
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 AV



Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 PK

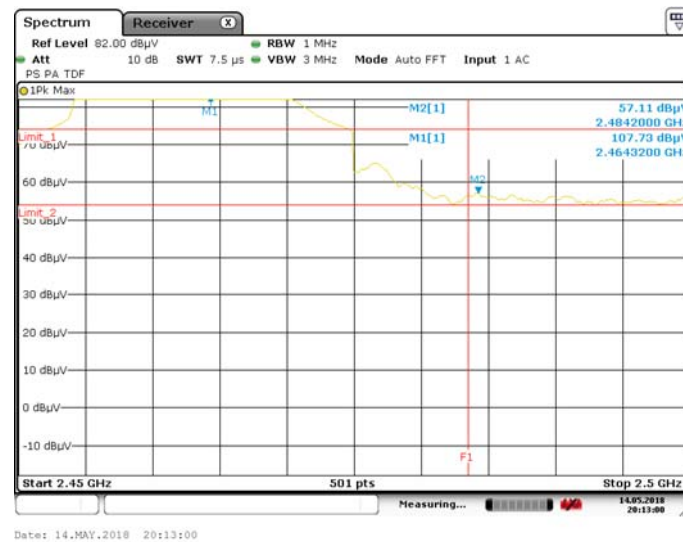


Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 AV

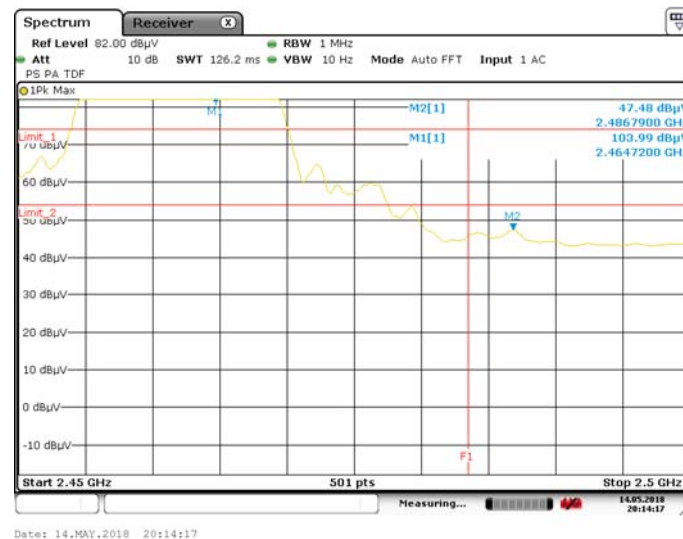


P/N1002633 + P/N1002635

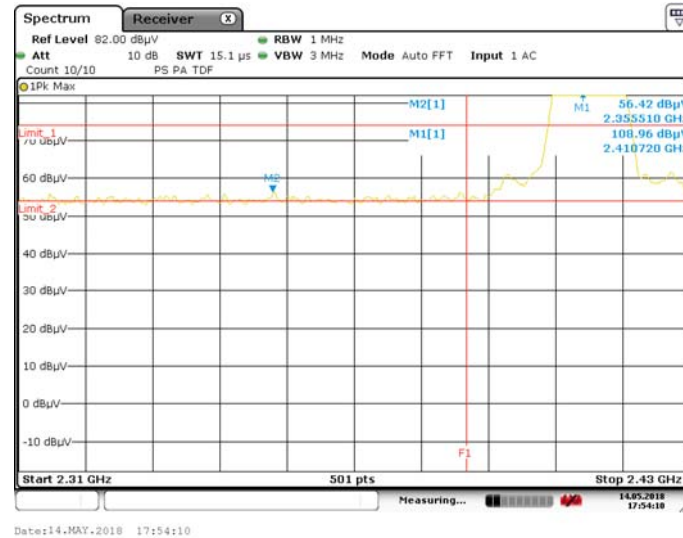
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 PK



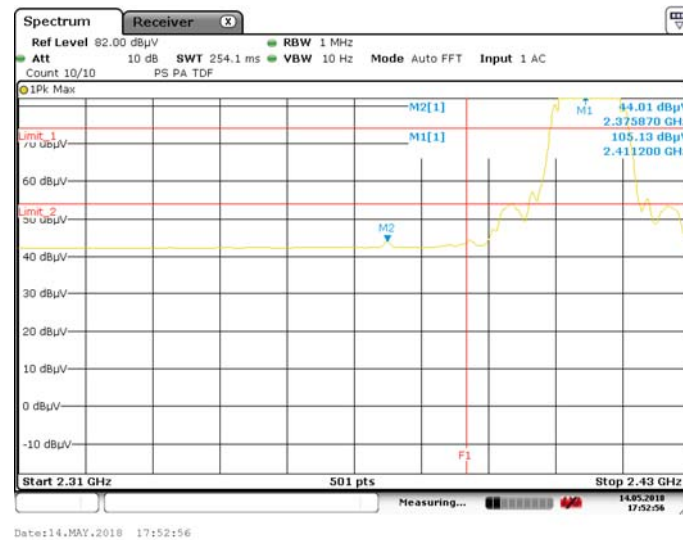
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 AV



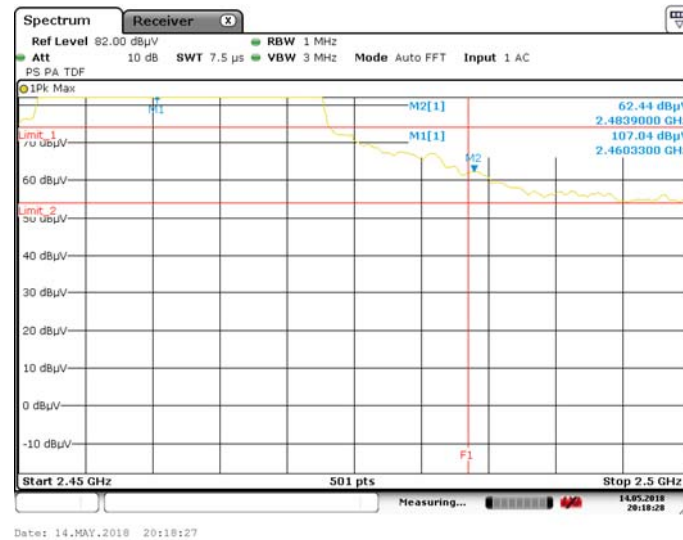
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 PK



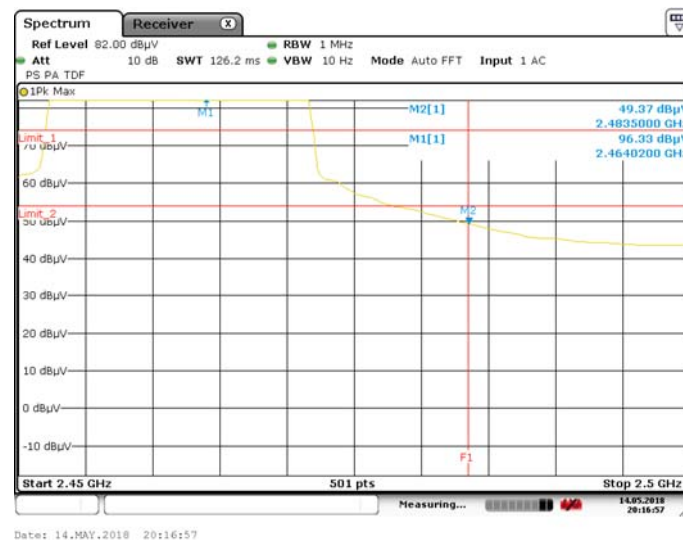
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 AV



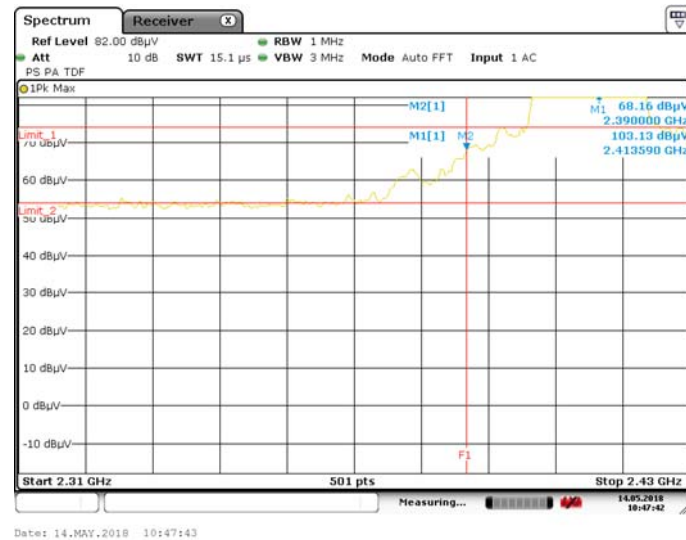
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 PK



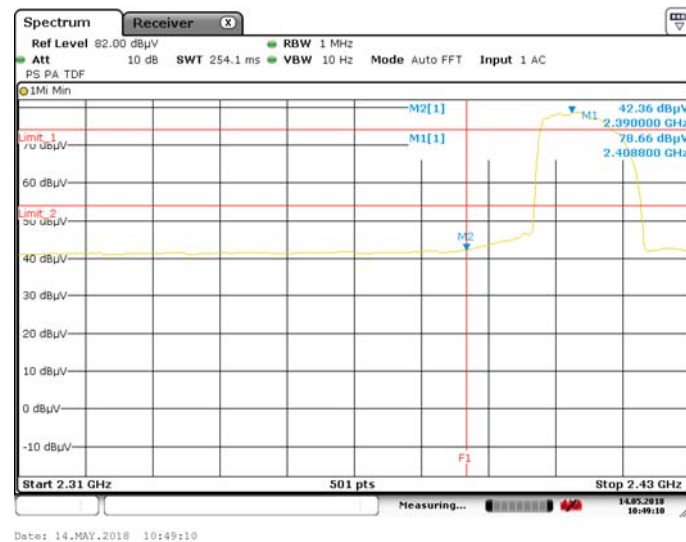
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 AV



Chain0 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 PK



Chain0 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 AV



Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2017/11/21	2018/11/20
Spectrum Analyzer	Rohde & Schwarz	FSP30	100245	2018/02/23	2019/02/22
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2018/01/23	2019/01/22
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2017/09/04	2020/09/02
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2018/04/23	2019/04/22
Pre-Amplifier	EMC Co.	EMC12635SE	980205	2017/11/28	2018/11/27
Pre-Amplifier	MITEQ	JS4-26004000--27-8A	828825	2017/08/23	2018/08/22
Power Meter	Anritsu	ML2495A	0844001	2017/10/18	2018/10/17
Power Sensor	Anritsu	MA2411B	0738452	2017/05/23	2018/05/22
Signal Analyzer	Agilent	N9030A	MY51380492	2017/08/29	2018/08/28
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2017/08/15	2018/08/14
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 104P	CB0005	2017/08/15	2018/08/14
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2017/05/04	2018/05/03
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2017/03/29	2018/03/28
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2018/03/28	2019/03/27
High Pass Filter	Wainwright	WHKX3.0/18G-12SS	N/A	2017/06/02	2018/06/01
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2018/04/17	2019/04/16

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.14 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.22 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.54 dB
Emission on the Band Edge Test	3.64 dB
Maximum Conducted Output Power	0.42 dB