D-PL-12111-01-01

CNAS L0447

Registration No.910917

TEST REPORT

Report No.: SRTC2015-9004(F)-0011

Product Name: GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi

Product Model: Philips S309

Applicant: Shenzhen Sang Fei Consumer Communications Co.,Ltd.

Manufacturer: Shenzhen Sang Fei Consumer Communications Co.,Ltd

Specification: FCC Part 15, Subpart C (April 22, 2015 edition)

FCC ID: VQRCTS309

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-68009202 Fax: 86-10-6800920

CONTENTS

1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	No.80 Beilishi Road, Xicheng District
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Wang Junfeng
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Email:	wangjf@srrc.org.cn / wangjunfeng@srtc.org.cn

1.3 Applicant's details

Company:	Shenzhen Sang Fei Consumer Communications Co.,Ltd.
Address:	11 Science & Technology Rd., Shenzhen Hi-tech Industrial Park, Nanshan District
City:	Shenzhen
Country or Region:	P.R.China
Grantee Code:	VQRCT
Contacted person:	Helen.Lin
Tel:	0755-33308888
Fax:	0755-26614979
Email:	Helen.Lin@sangfei.com

1.4 Manufacturer's details

Company:	Shenzhen Sang Fei Consumer Communications Co.,Ltd.
Address:	11 Science & Technology Rd., Shenzhen Hi-tech Industrial Park, Nanshan District
City:	Shenzhen
Country or Region:	P.R.China
Contacted person:	Helen.Lin
Tel:	0755-33308888
Fax:	0755-26614979
Email:	Helen.Lin@sangfei.com

1.5 Application details

Date of Receipt of test sample at SRTC:	2015.05.04
Testing Start Date:	2015.05.05
Testing End Date:	2015.05.20

1.6 Reference specification

FCC Part 15, Subpart C (April 22, 2015 edition)

1.7 Information of EUT

1.7.1 General information

Frequency Range	2.4GHz~2.4835GHz
Number of Channel	11
Modulation Type	DBPSK/DQPSK/CCK/BPSK/QPSK/16QAM/64QAM
Duplex Mode	TDD
Channel Spacing	5MHz
Data Rate	1Mbps/2Mbps/5.5Mbps/11Mbps/6Mbps/9Mbps/12Mbps /18Mbps/24Mbps/36Mbps/48Mbps/54Mbps/6.5Mbps /13.0Mbps/13.5Mbps/19.5Mbps/26.0Mbps/27.0Mbps /39.0Mbps/40.5Mbps/52.0Mbps/58.5Mbps/65Mbps /81.0Mbps/108.0Mbps/121.5Mbps/135.0Mbps
Duty Cycles	98%
Antenna Type	Fixed Internal
Power Supply	Battery or Charger
Rated Power Supply Voltage	3.8V
HW Version	WMCSa
SW Version	Philips_S309_1516_V01T03_AG
IMEI	866636020005512

1.7.2 Auxiliary equipment details

The following support equipment was used to exercise the EUT during testing:

Equipment	Battery
Manufacturer	SHENZHEN CYCLELONG POWER-TECH CO.,Ltd.
Model Number	AB1600DWML
Serial Number	----

2. TEST INFORMATION

2.1 Summary of the test results

No.	Test case	FCC reference	Verdict
1	Peak Power Output	15.247(b)(3)	Pass
2	Occupied Bandwidth	15.247(a)(2)	Pass
3	Transmitter Power Spectral Density	15.247(e)	Pass
4	Conducted Out of band emission measurement	15.247(d)	Pass
5	Spurious Radiated Emissions	15.247(d)/15.35(b)/15.209	Pass

This Test Report Is Issued by: Ms. Xu Qiaochun	Checked by: Mr. Li Bin
Tested by: Mr. Jiang Shuo	Issued date: 2015.05.21

2.2 Test result

2.2.1 Peak Power Output

2.2.1.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

2.2.1.2 Test Description

A transmitter antenna terminal of EUT is connected to the power meter. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies.

2.2.1.3 Test limit

Fcc Part15.247(b)(3)
The maximum permissible conducted output power is 1 Watt.
Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW)
==> Maximum Output Power: 30 dBm

2.2.1.4 Test Procedure Used

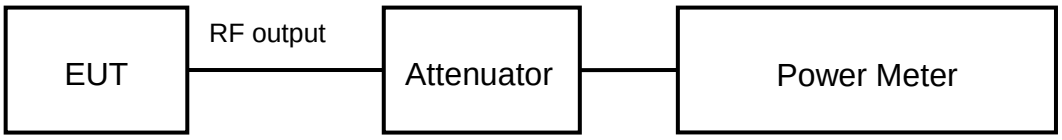
KDB 558074 D01 v03r02 – Section 9.1.2

2.2.1.5 Test Settings

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

2.2.1.6 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



2.2.1.7 Test result

Modulation type		Average power output (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462MHz (Ch11)
11b	1 Mbps	18.05	17.92	18.06
	2 Mbps	17.85	17.82	17.97
	5.5 Mbps	17.82	17.67	17.81
	11 Mbps	17.36	17.56	17.72
11g	6 Mbps	13.72	14.80	14.08
	9 Mbps	13.53	14.55	13.98
	12 Mbps	13.14	14.21	13.67
	18 Mbps	12.80	13.96	13.20
	24 Mbps	12.44	13.56	12.78
	36 Mbps	11.89	13.02	12.34
	48 Mbps	11.45	12.56	11.92
	54 Mbps	11.03	12.12	11.45
11n HT20	6.5 Mbps	13.72	14.56	13.80
	13 Mbps	13.43	14.22	13.67
	19.5 Mbps	13.02	13.98	13.21
	26 Mbps	12.67	13.67	12.92
	39 Mbps	12.03	13.22	12.52
	52 Mbps	11.78	12.91	12.01
	58.5 Mbps	11.23	12.45	11.75
	65 Mbps	10.92	12.02	11.41

Modulation type		Average power output (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2462MHz (Ch11)
11n HT40	13.5 Mbps	10.87	13.13	13.10
	27 Mbps	10.47	12.89	12.87
	40.5 Mbps	9.77	12.23	12.01
	54 Mbps	9.23	11.59	11.66
	81 Mbps	8.91	10.91	10.91
	108 Mbps	8.56	10.47	10.56
	121.5 Mbps	8.02	9.99	10.02
	135 Mbps	7.71	9.60	9.79

Modulation type		Peak power output (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462MHz (Ch11)
11b	1 Mbps	**20.41**	**20.37**	**20.45**
	2 Mbps	20.22	20.11	20.34
	5.5 Mbps	20.13	20.15	20.12
	11 Mbps	20.12	20.33	20.43
11g	6 Mbps	**23.09**	**23.56**	**23.61**
	9 Mbps	22.98	23.21	23.11
	12 Mbps	22.79	23.14	23.41
	18 Mbps	22.70	23.21	22.88
	24 Mbps	22.81	23.04	22.90
	36 Mbps	22.56	23.41	23.34
	48 Mbps	22.91	23.16	23.01
	54 Mbps	22.67	23.19	23.07
11n HT20	6.5 Mbps	**22.75**	**23.22**	**23.30**
	13 Mbps	22.56	23.11	22.98
	19.5 Mbps	22.43	23.02	23.12
	26 Mbps	22.67	23.17	23.22
	39 Mbps	22.12	22.98	23.07
	52 Mbps	22.34	22.91	23.04
	58.5 Mbps	22.54	23.01	22.99
	65 Mbps	22.31	23.06	22.85

Modulation type		Peak power output (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2462MHz (Ch11)
11n HT40	13.5 Mbps	**20.51**	**21.82**	**22.01**
	27 Mbps	20.12	21.76	21.78
	40.5 Mbps	20.34	21.44	21.89
	54 Mbps	20.14	21.03	21.56
	81 Mbps	19.97	21.45	21.44
	108 Mbps	20.01	20.99	21.81
	121.5 Mbps	20.22	21.02	21.66
	135 Mbps	19.66	20.75	21.04

* The data rate 1Mbps, 6Mbps, 6.5Mbps, 13.5Mbps are selected as worse condition, and the following cases are performed with this condition.

2.2.2 Occupied Bandwidth

2.2.2.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

2.2.2.2 Test Description

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer and Bluetooth test set via a power splitter with a known loss. Which connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

2.2.2.3 Test limit

FCC Part15.247(a)(2)
The minimum permissible 6dB bandwidth is 500 kHz

2.2.2.4 Test Procedure Used

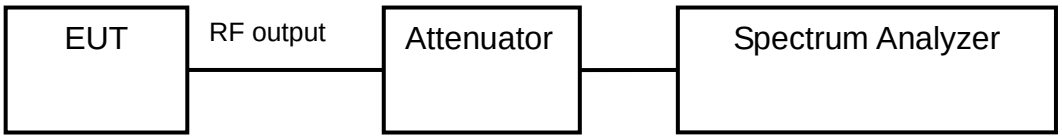
KDB 558074 D01 v03r02 – Section 8.1 Option 1

2.2.2.5 Test Settings

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 x RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

2.2.2.6 Test Setup

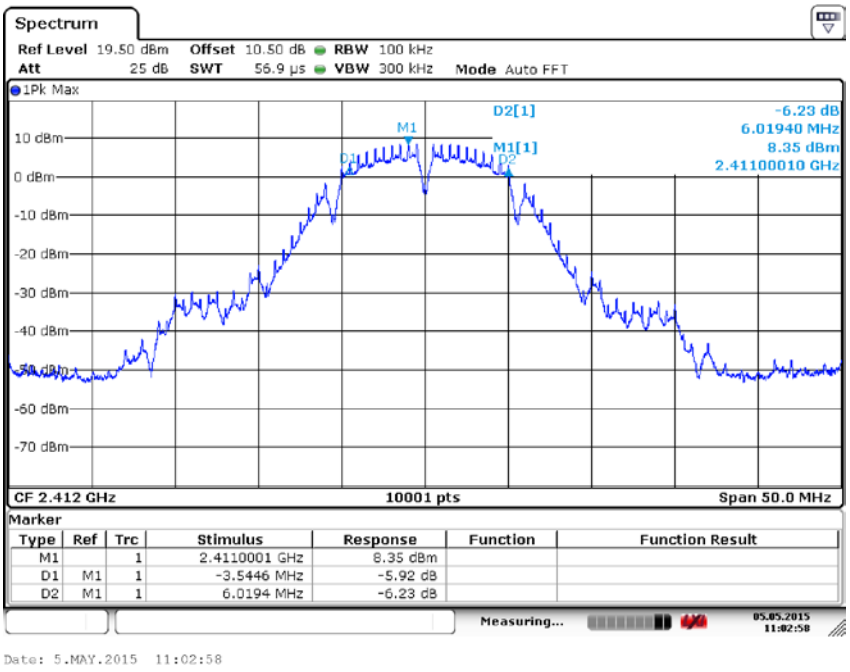
The EUT and measurement equipment were set up as shown in the diagram below.



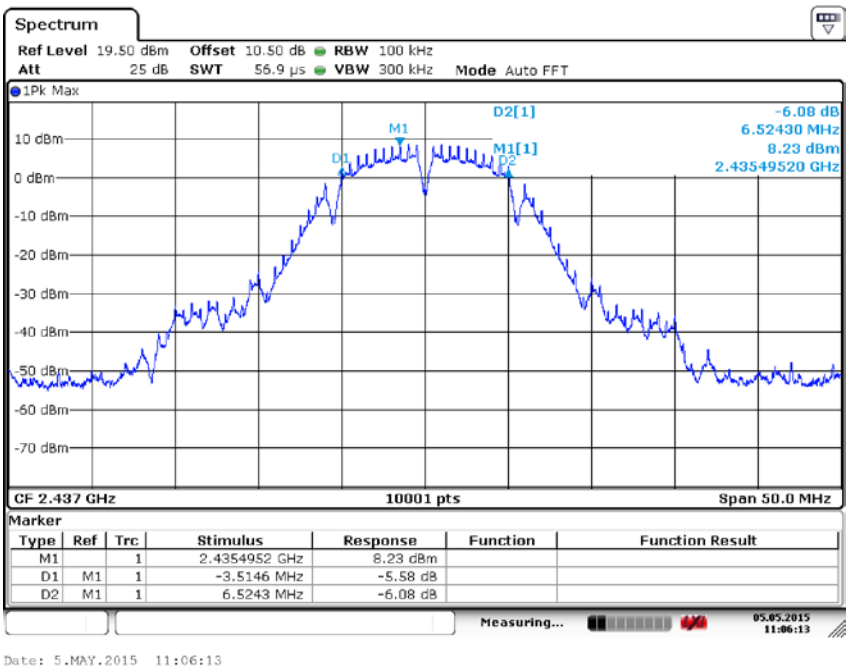
2.2.2.7 Test result

Test Mode: 802.11b

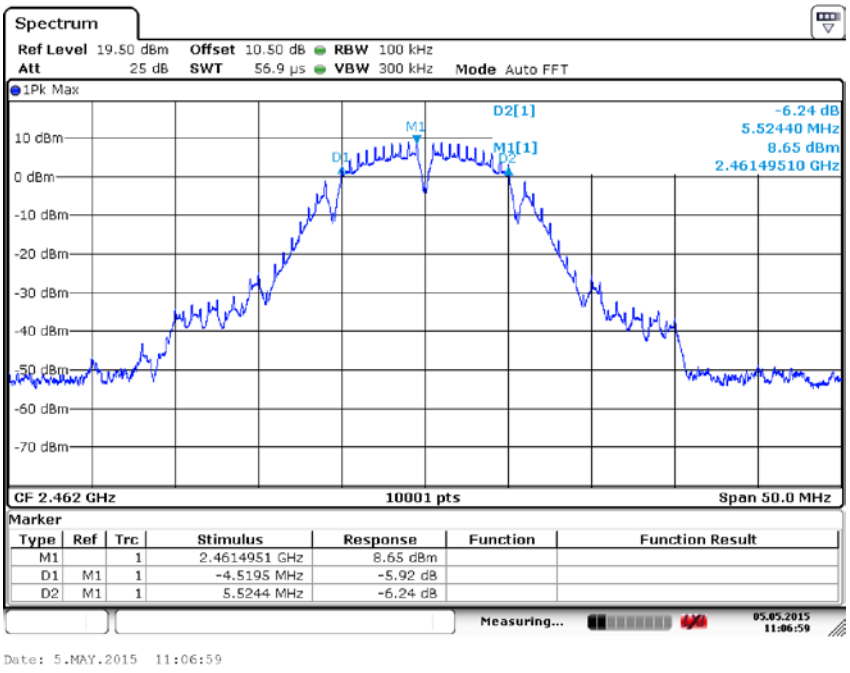
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2412	1	9.56
2437	6	10.03
2462	11	10.03



Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b



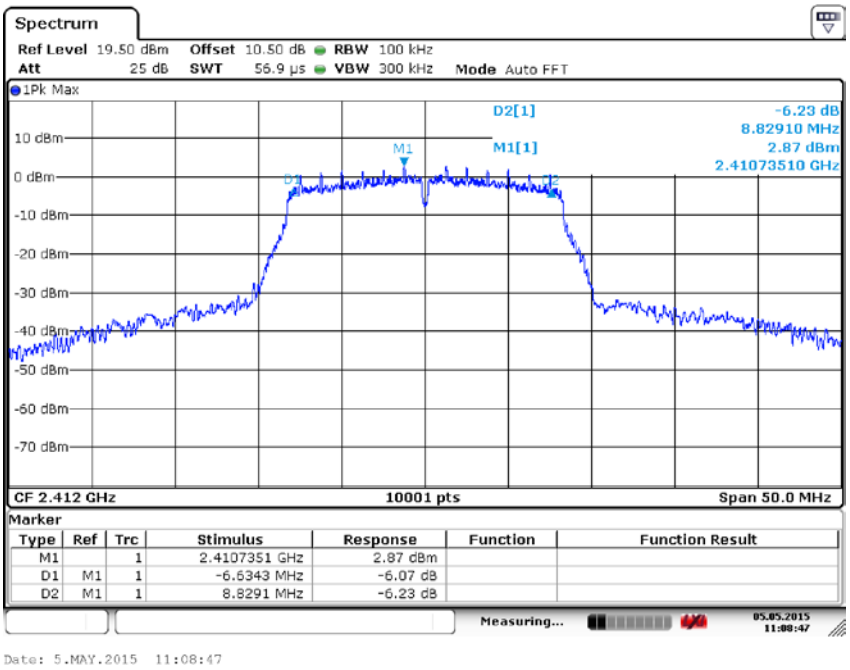
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11b



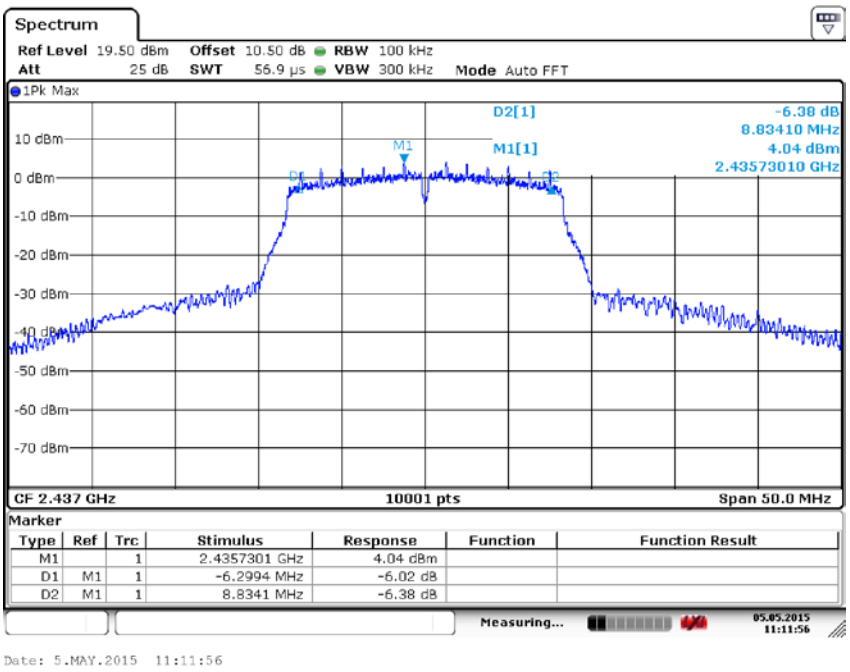
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b

Test Mode: 802.11g

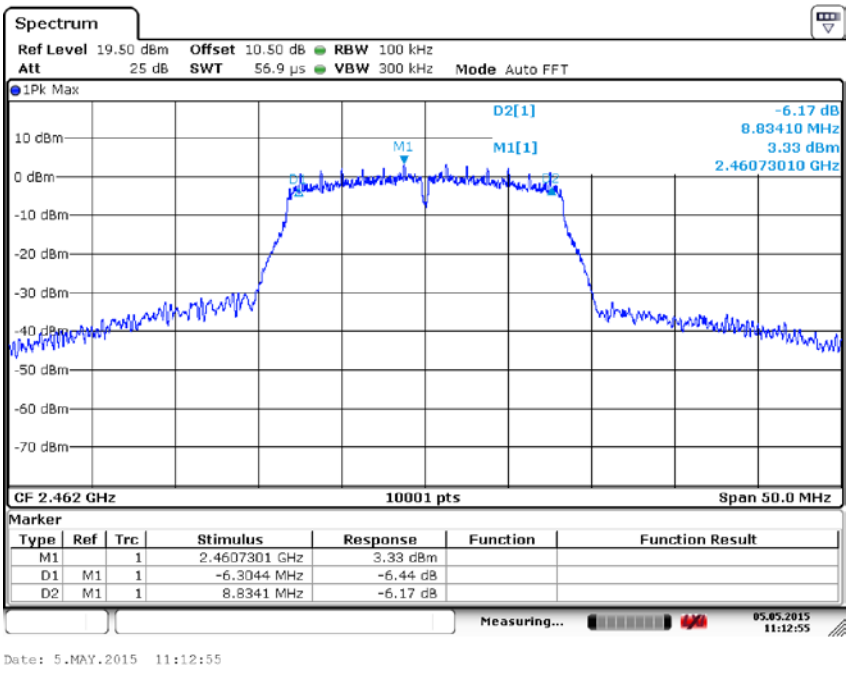
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2412	1	15.46
2437	6	15.12
2462	11	15.13



Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g



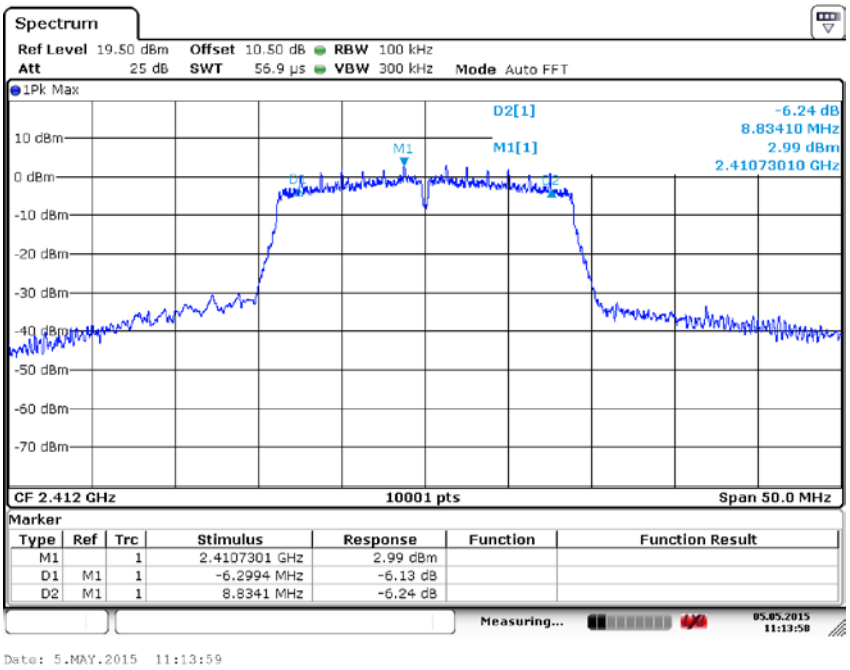
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11g



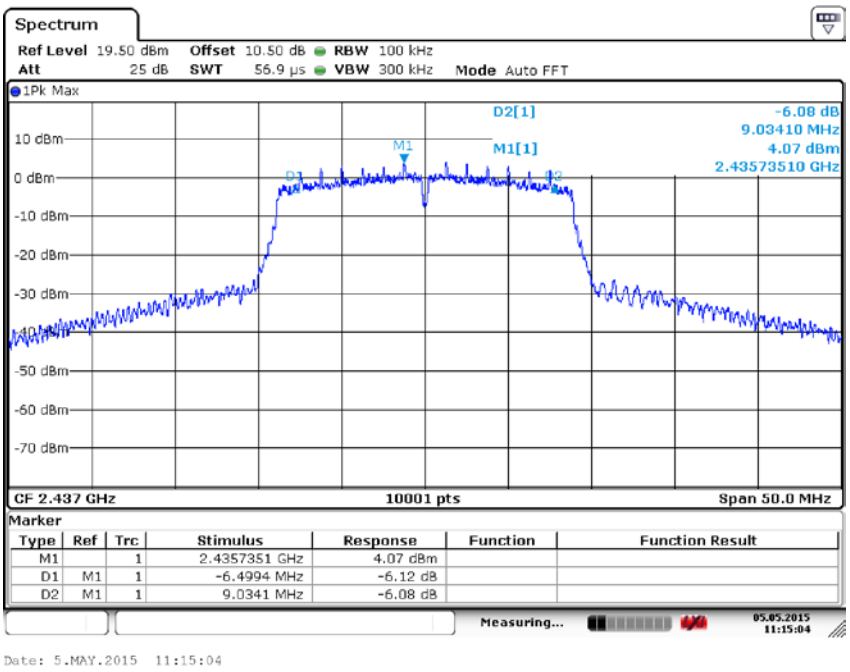
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g

Test Mode: 802.11n(HT20)

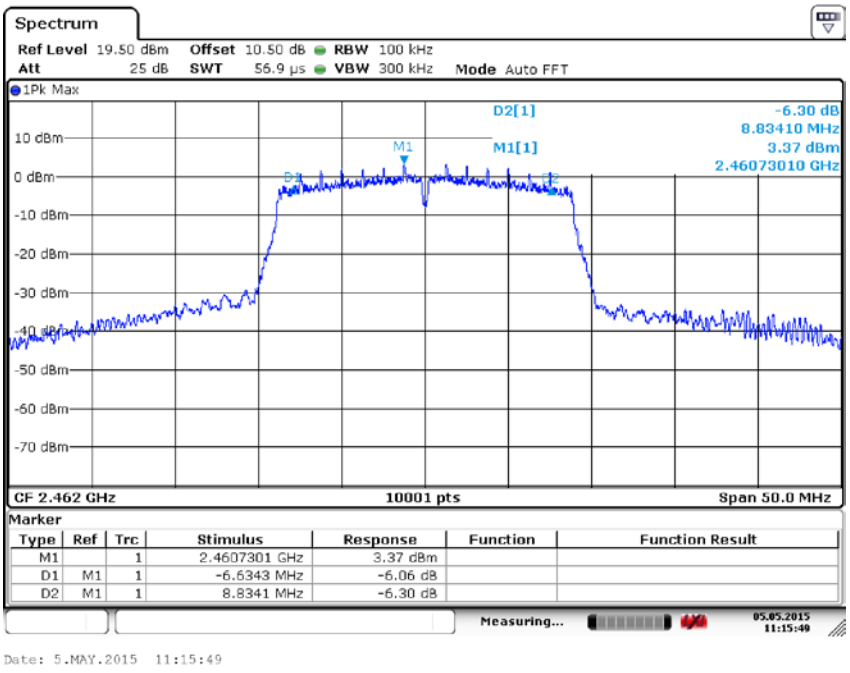
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2412	1	15.12
2437	6	15.52
2462	11	15.46



Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)



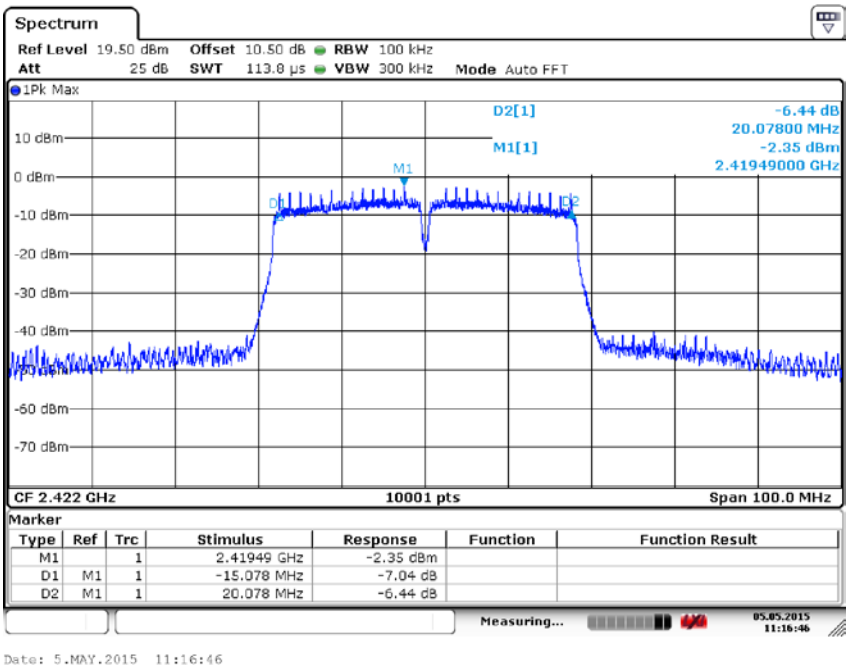
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n(HT20)



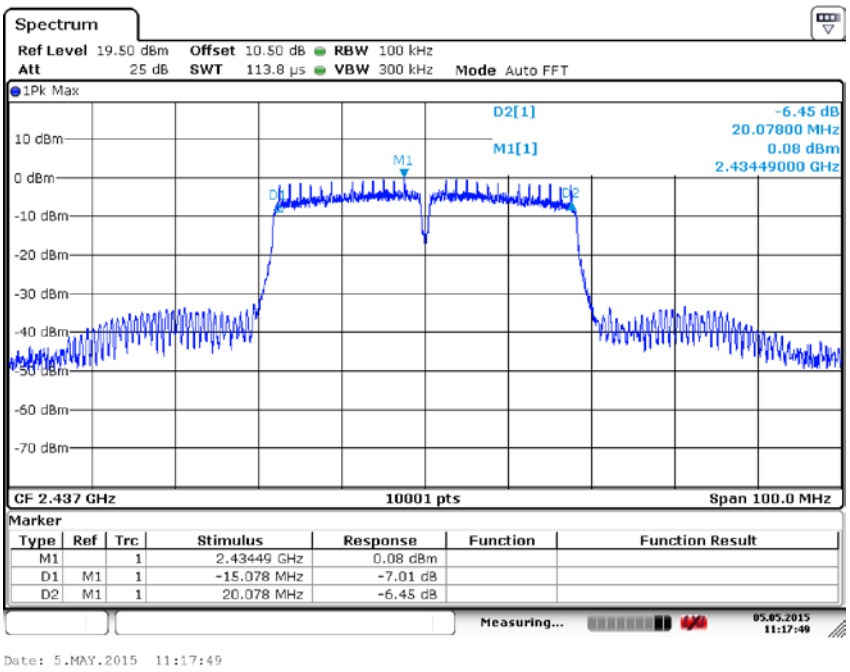
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)

Test Mode: 802.11n(HT40)

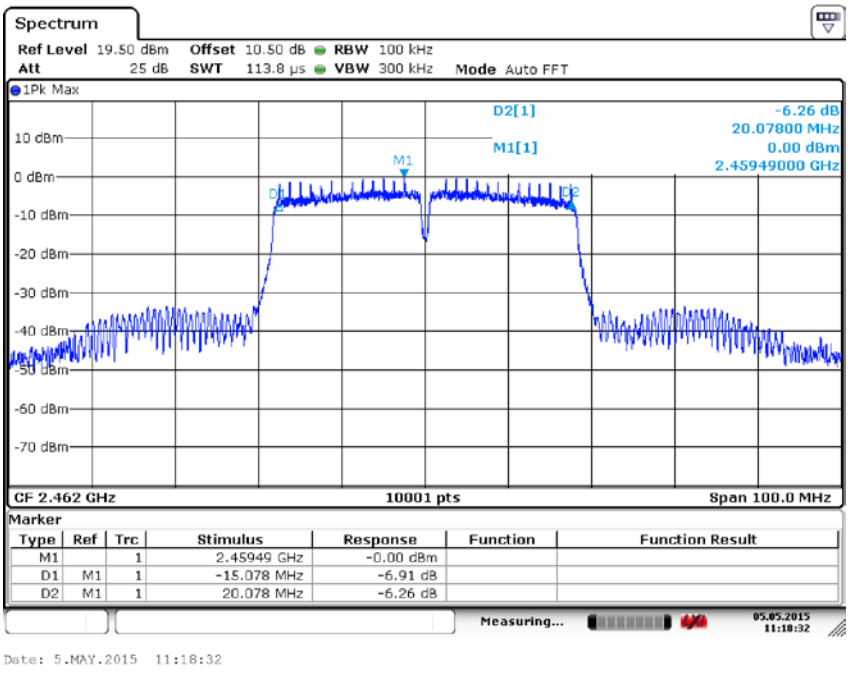
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2422	3	35.14
2437	6	35.14
2462	11	35.14



Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n(HT40)



Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n(HT40)



Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT40)

2.2.3 Transmitter Power Spectral Density

2.2.3.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

2.2.3.2 Test Description

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies. All data rates were investigated and the worst case configuration results are reported in this section.

2.2.3.3 Test limit

Fcc Part15.247(e)
The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

2.2.3.4 Test Procedure Used

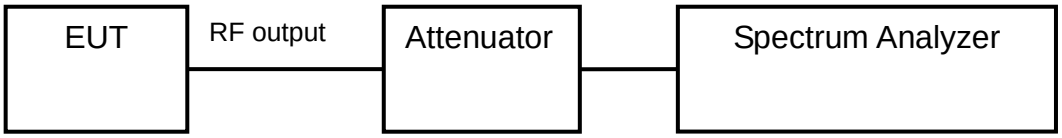
KDB 558074 D01 v03r02 Section 10.2.

2.2.3.5 Test Settings

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

2.2.3.6 Test Setup

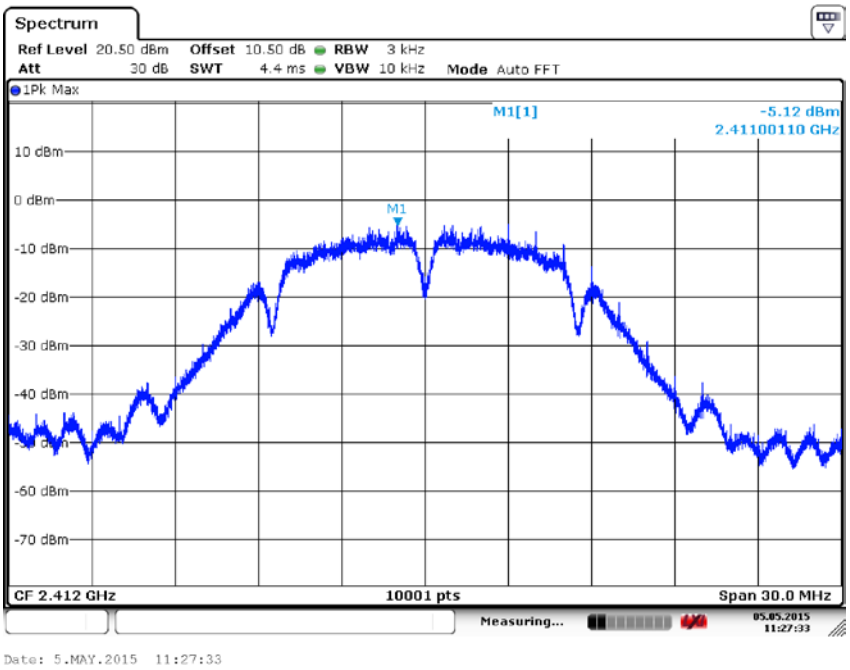
The EUT and measurement equipment were set up as shown in the diagram below.



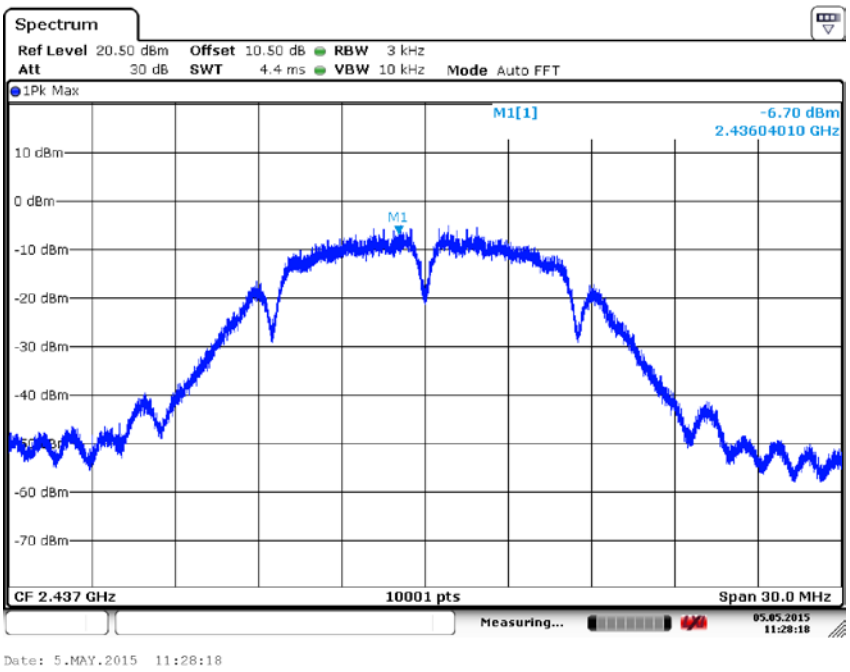
2.2.3.7 Test result

Test Mode: 802.11b

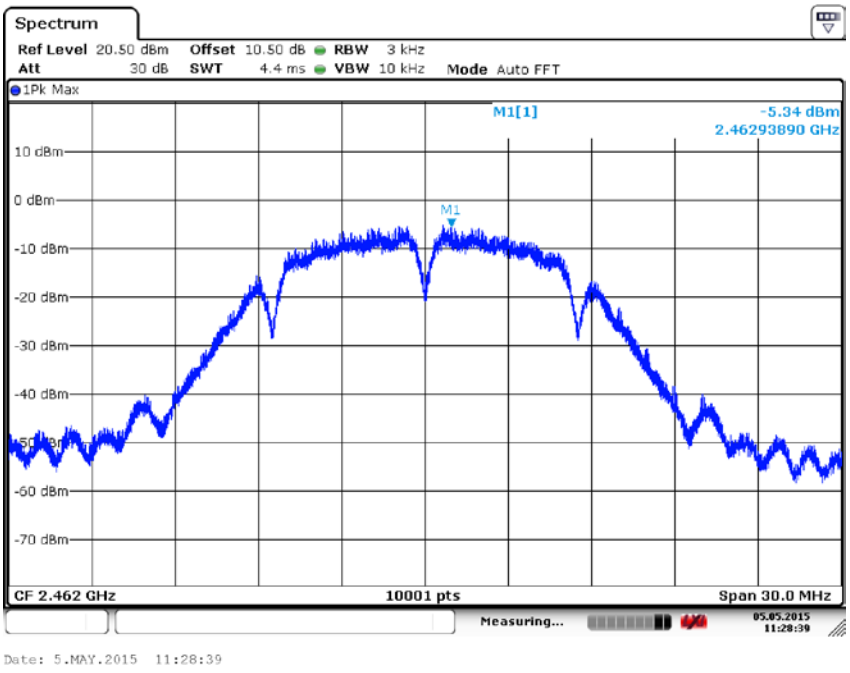
Carrier frequency (MHz)	Channel No	Power Density (dBm)
2412	1	-5.12
2437	6	-6.70
2462	11	-5.34



Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11b



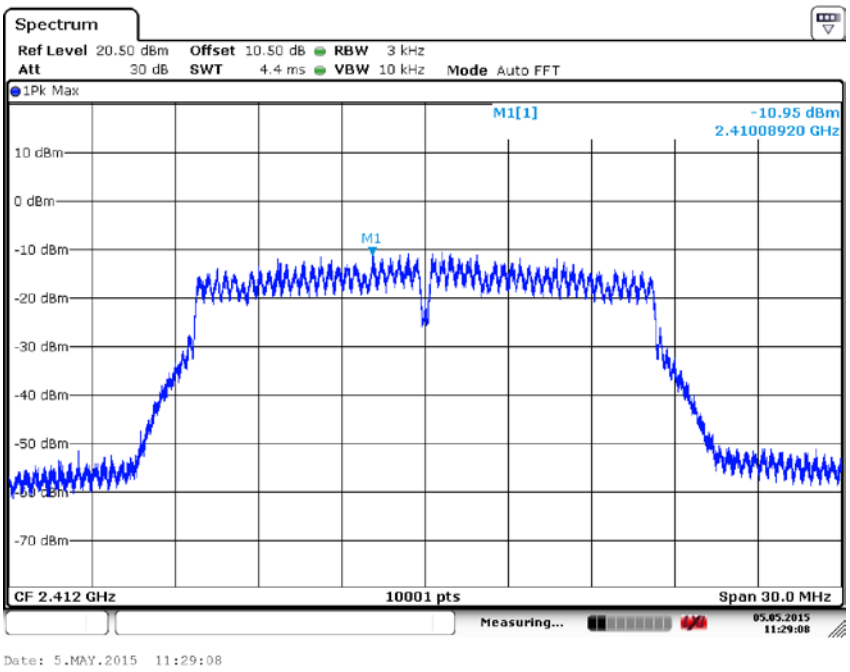
Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11b



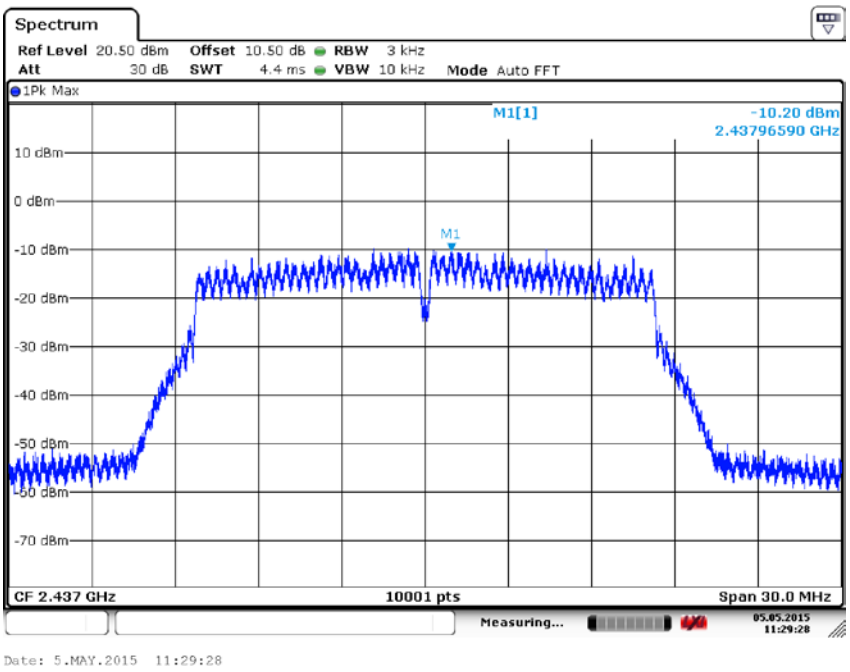
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11b

Test Mode: 802.11g

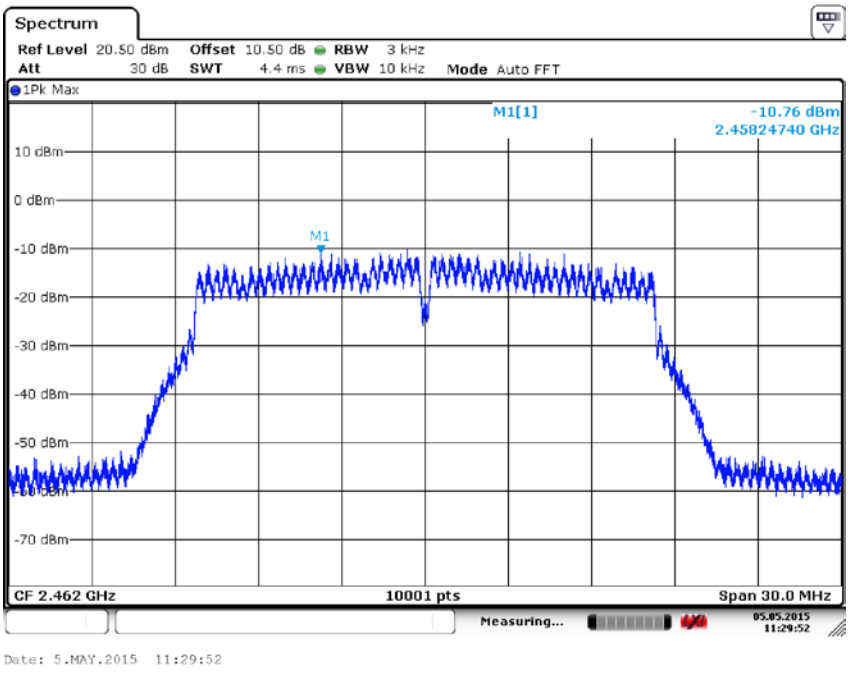
Carrier frequency (MHz)	Channel No	Power Density (dBm)
2412	1	-10.95
2442	6	-10.20
2472	11	-10.76



Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11g



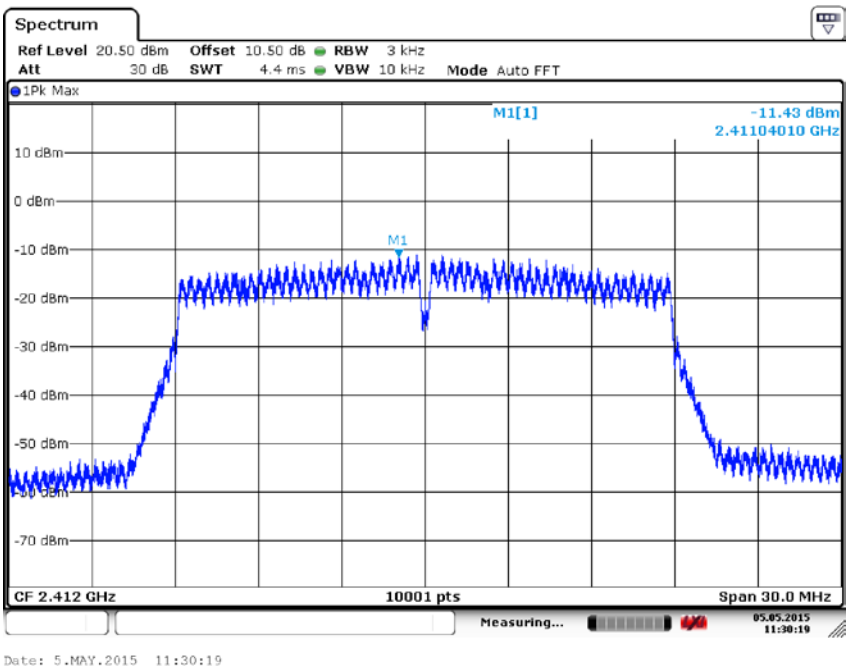
Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11g



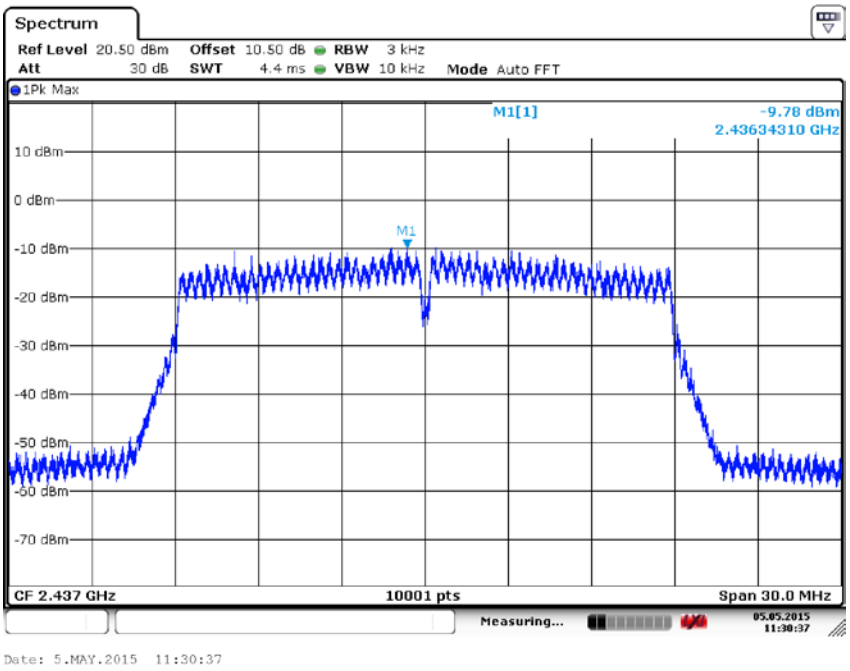
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11g

Test Mode: 802.11n(HT20)

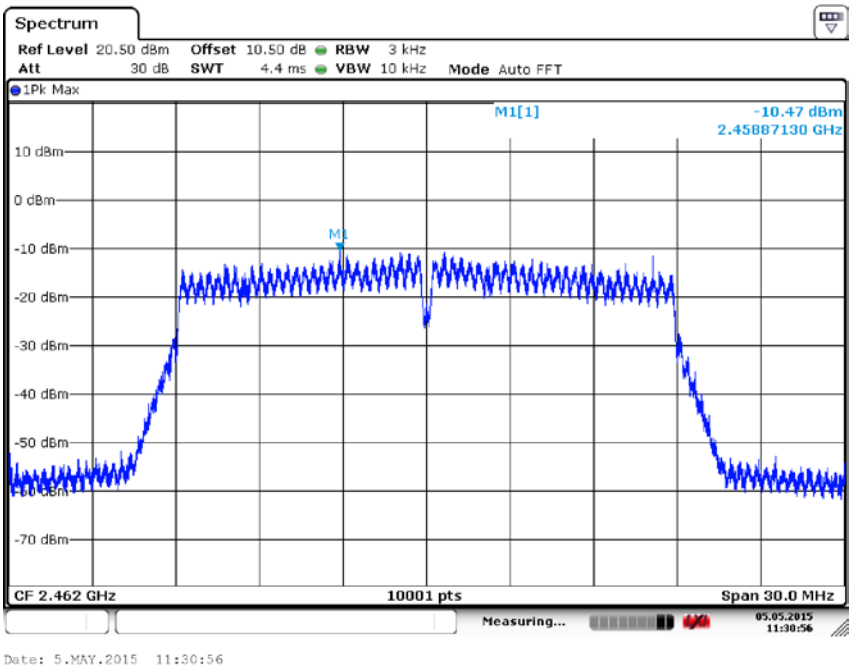
Carrier frequency (MHz)	Channel No	Power Density (dBm)
2412	1	-11.43
2437	6	-9.78
2462	11	-10.47



Carrier frequency (MHz): 2412
Channel No.1
Test Mode: 802.11n(HT20)



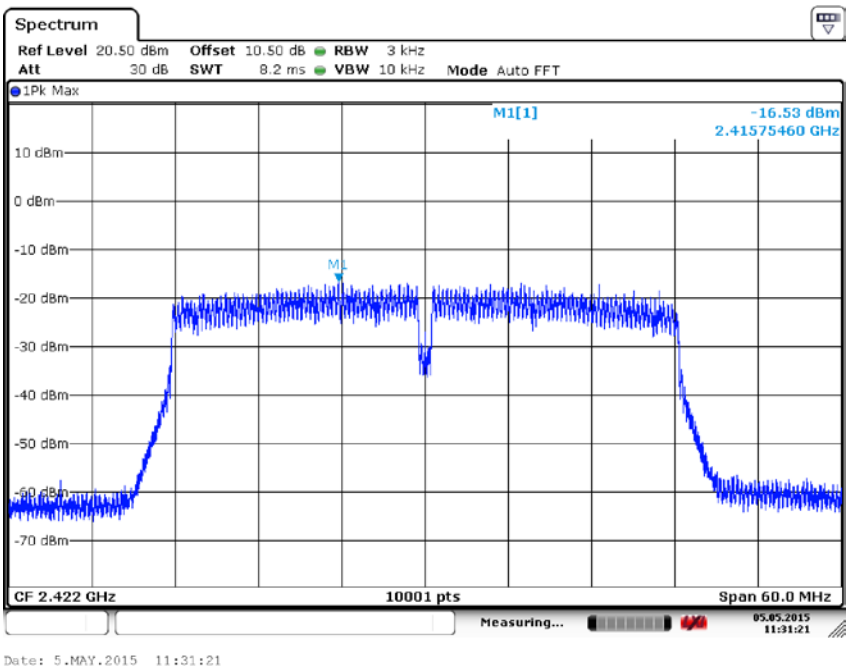
Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n(HT20)



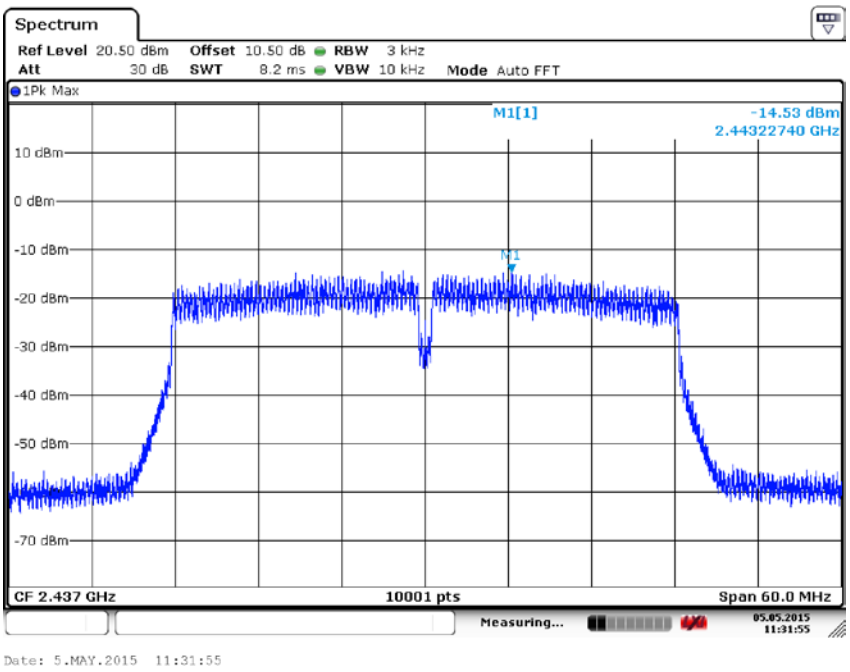
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n(HT20)

Test Mode: 802.11n(HT40)

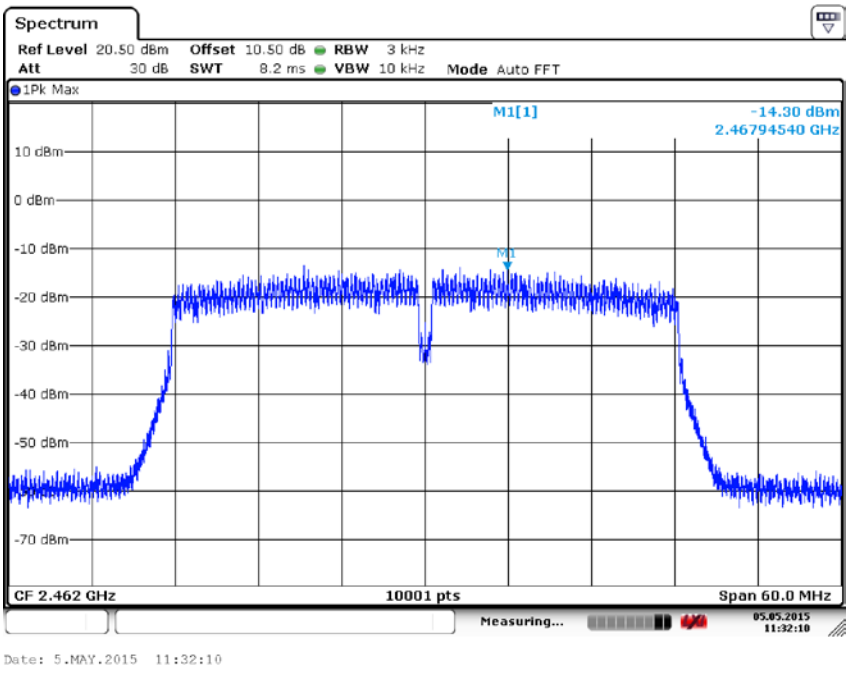
Carrier frequency (MHz)	Channel No	Power Density (dBm)
2422	3	-16.53
2437	6	-14.53
2462	11	-14.30



Carrier frequency (MHz): 2422
Channel No.3
Test Mode: 802.11n(HT40)



Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n(HT40)



Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n(HT40)

2.2.4 Conducted Out of band emission measurement

2.2.4.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

2.2.4.2 Test Description

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration.

2.2.4.3 Test limit

FCC Part 15.247(d)
The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth.

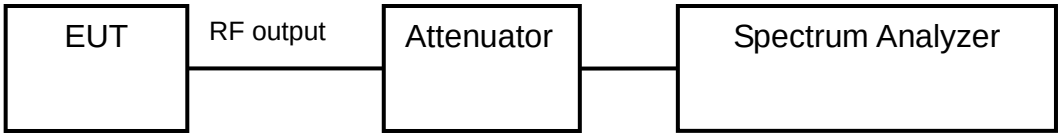
2.2.4.4 Test Procedure Used

KDB 558074 D01 v03r02 Section 11.3

2.2.4.5 Test Settings

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100kHz.
c) Set the VBW ≥ 300kHz.
d) Detector = peak.
e) Set span to encompass the spectrum to be examined
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level.

2.2.4.6 Test Setup

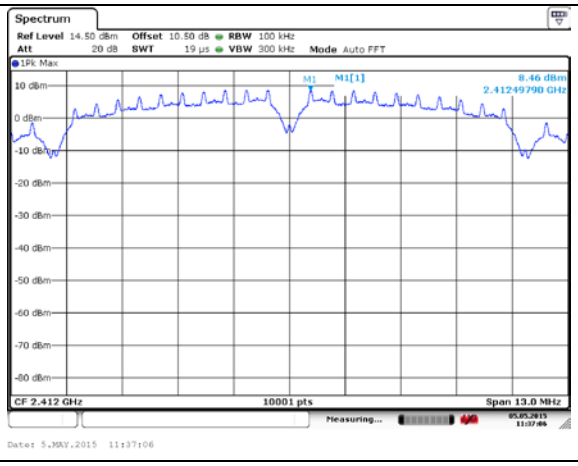


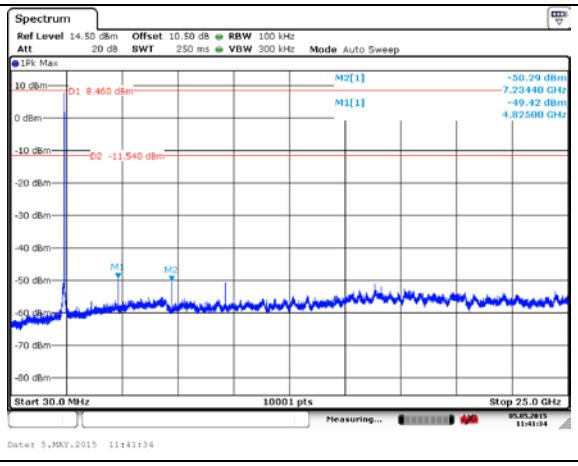
2.2.4.7 Test result

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

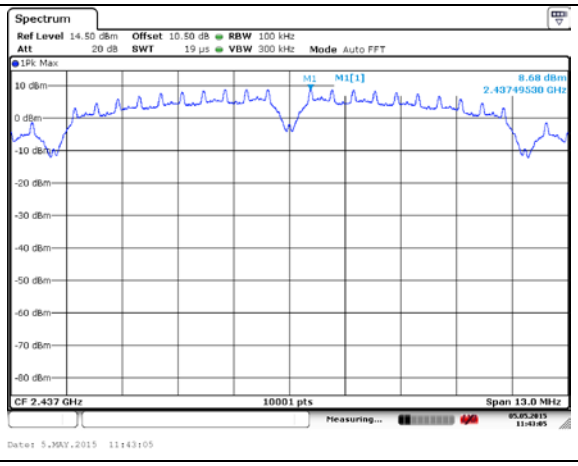
802.11b

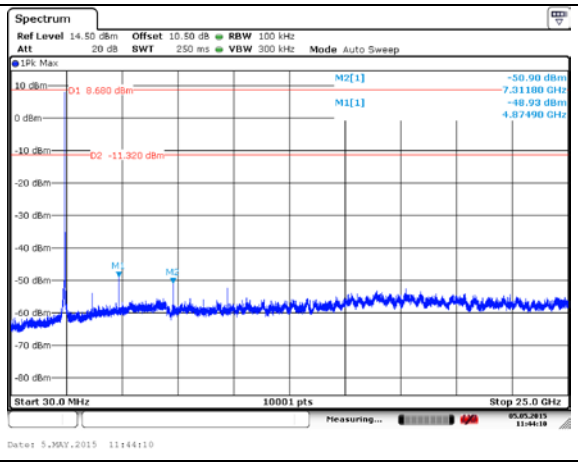
CH1



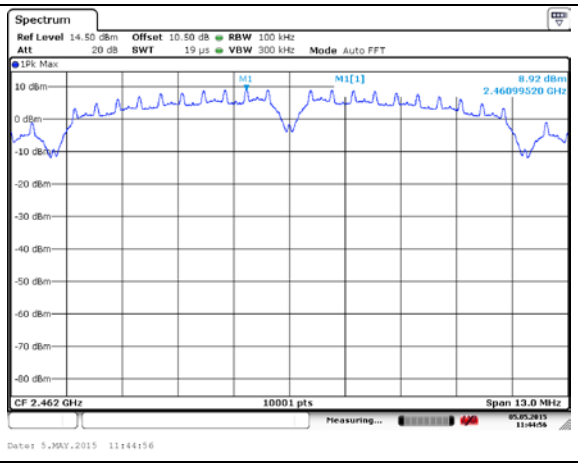


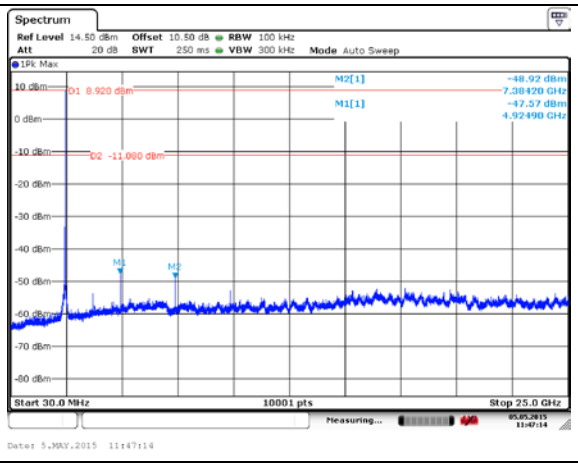
CH6





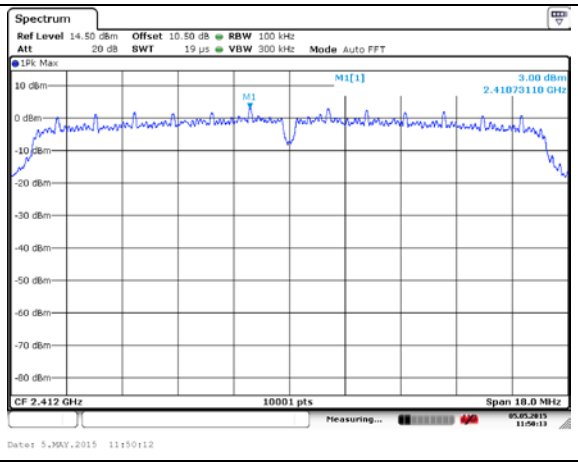
CH11

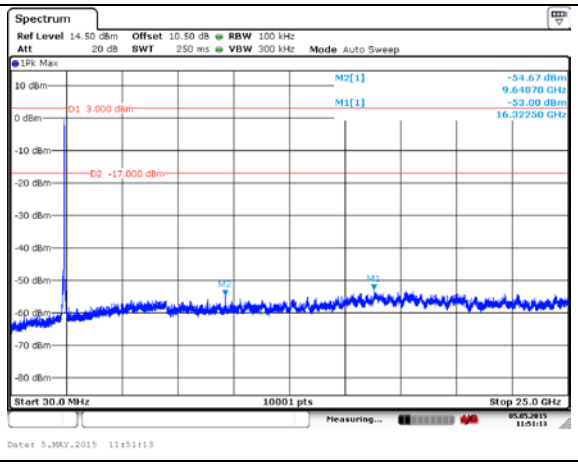




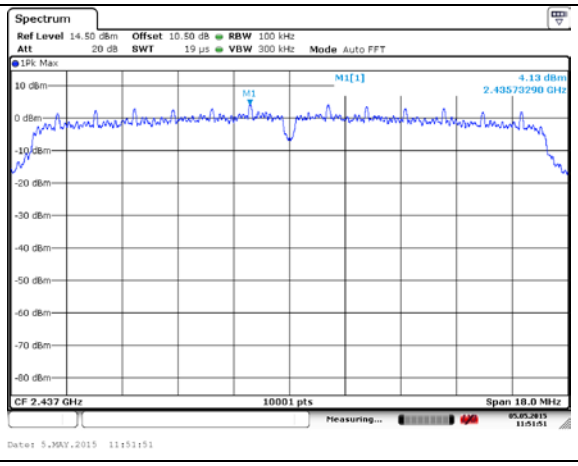
802.11g

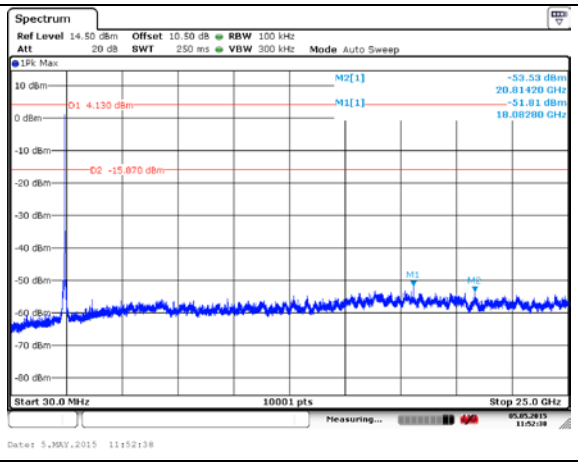
CH1



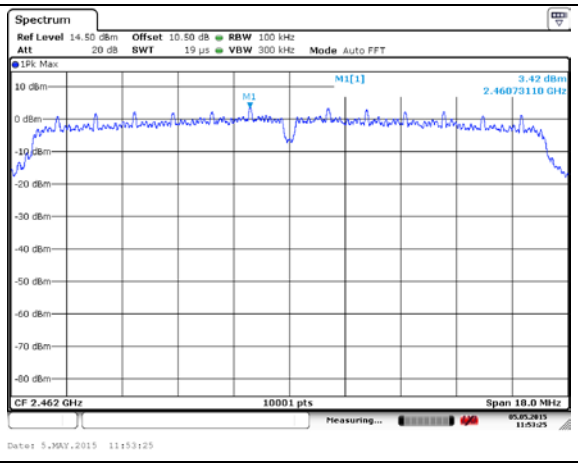


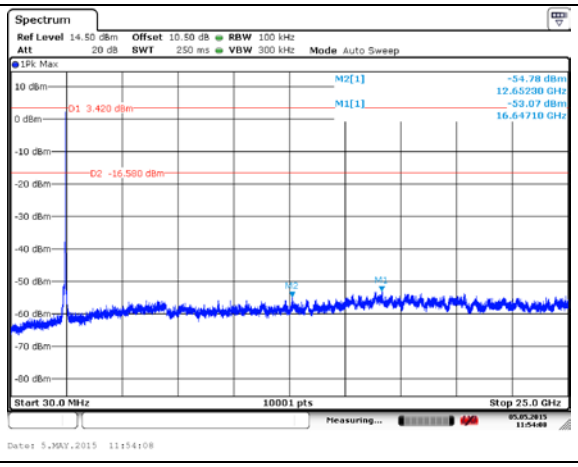
CH6





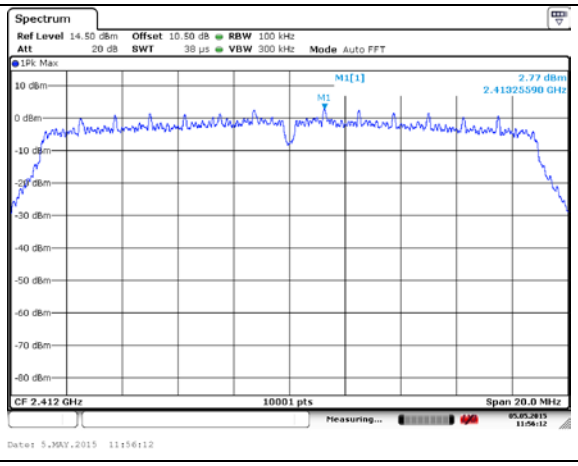
CH11

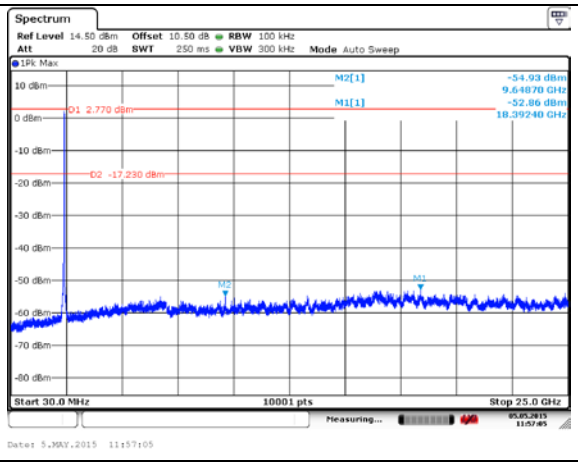




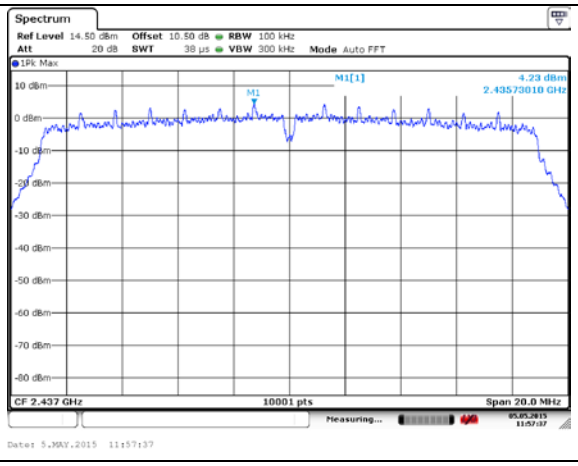
802.11n(20MHz)

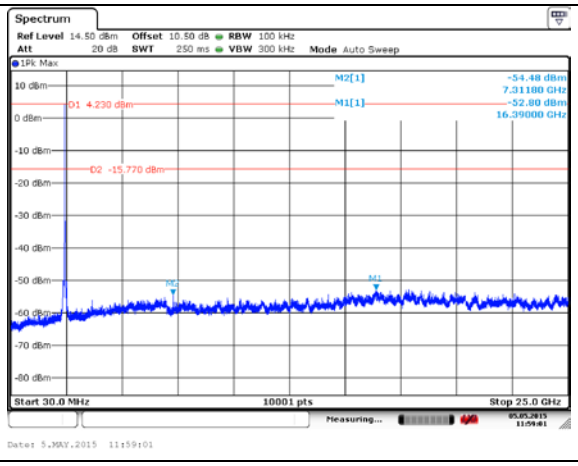
CH1



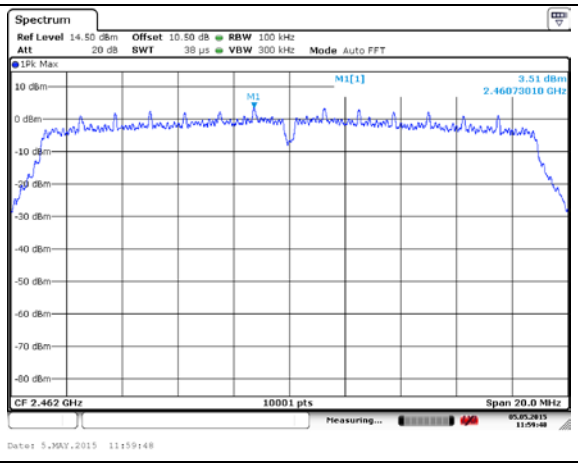


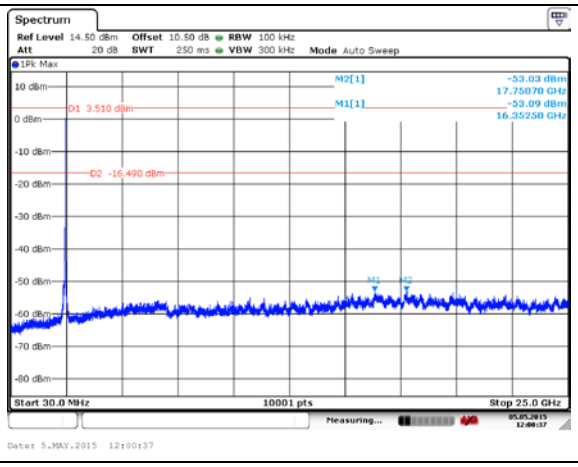
CH6





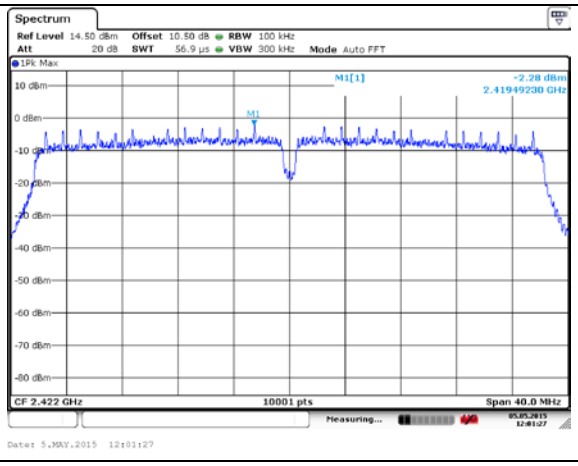
CH11

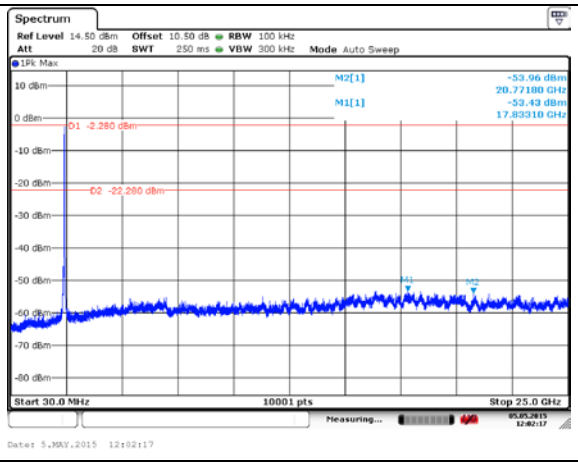




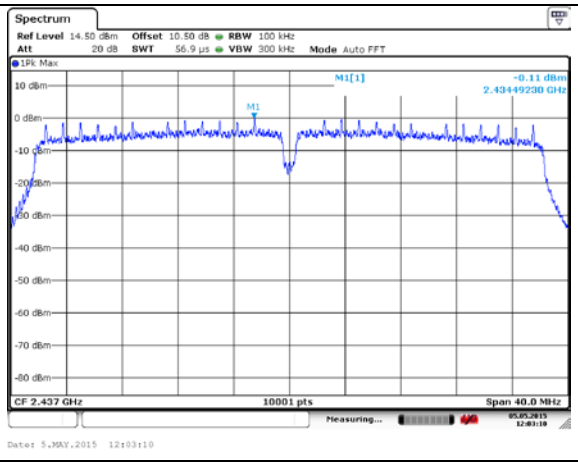
802.11n(40MHz)

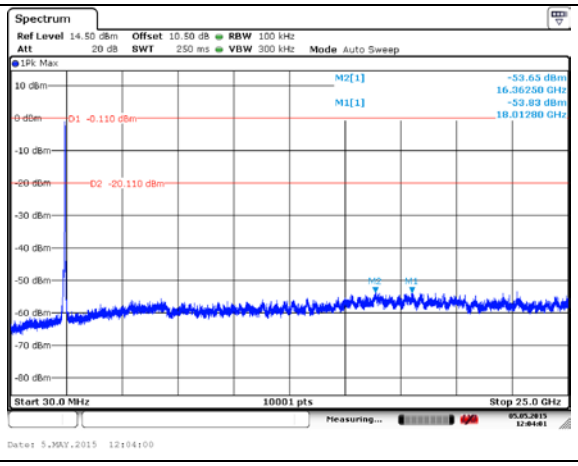
CH1



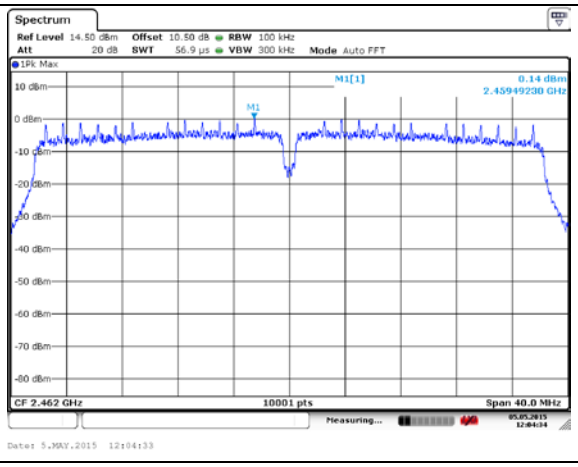


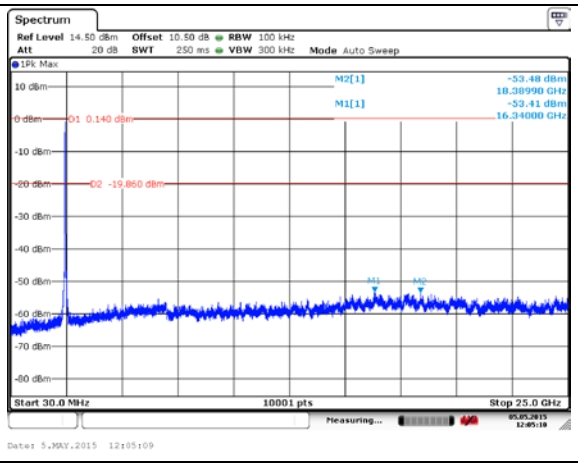
CH6





CH11





2.2.5 Spurious Radiated Emissions

2.2.5.1 Ambient condition

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

2.2.5.2 Test Description

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

2.2.5.3 Test limit

FCC Part15.205, 15.209, 15.247(d);

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in below Table per Section 15.209.

Frequency [MHz]	Field strength [μV/m]	Measured Distance [meters]
30～88	100	3
88～216	150	3
216～960	200	3
Above 960	500	3

Radiated Limits

FCC Part15.35(b):

There is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit

Used conversion factor: Limit (dBμV/m) = 20 log (Limit (μV/m)/1μV/m)

Frequency [MHz]	Detector	Unit (dBμV/m)
30～88	Quasi-peak	40.0
88～216	Quasi-peak	43.5
216～960	Quasi-peak	46.0
960～1000	Quasi-peak	54.0
1000～5th harmonic of the highest frequency or 40GHz, whichever is lower	Average	54.0
	Peak	74.0

Conversion Radiated limits

2.2.5.4 Test Procedure Used

KDB 558074 D01 v03r02 – Section 12.2.5 (average power measurements)
KDB 558074 D01 v03r02 – Section 12.2.4 (peak power measurements)

2.2.5.5 Test Settings

Average Field Strength Measurements per Section 12.2.5.1 of KDB 558074 v03r01

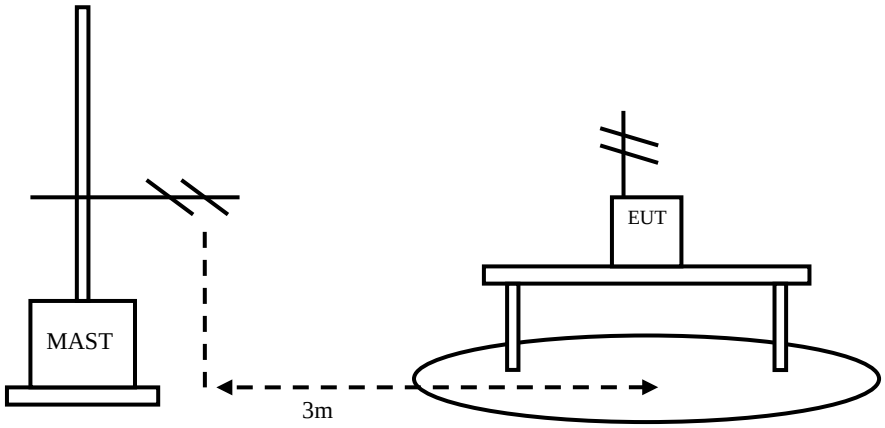
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be > 2 x span/RBW)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces

Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 v03r01

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

2.2.5.6 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below



The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration. Then start the test software ES-K1. Sweep the whole frequency band through the range from 30MHz to 1GHz or above, using receive log period antenna

HL562 or Ridge horn antenna HF906.
During the test, the antenna height and EUT azimuth were varied in order to identify the maximum level of emission from the EUT. The height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees. The measurements shall be repeated with orthogonal polarization of the test antenna. The results shall be showed the worst case of the three orthogonal axes.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

2.2.5.7 Test result
The worst case attitude: The mobile lay down.

Peak detector：RBW=1MHz,VBW=3MHz,sweep time=200ms；
Average detector：RBW=1MHz,VBW=10Hz,sweep time=auto；

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	103.24	69.24	N/A	N/A	8.90	25.10
2	2390	58.65	24.65	-15.35	74.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	99.24	65.24	N/A	N/A	8.90	25.10
2	2390	56.73	22.73	-17.27	74.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	94.34	60.34	N/A	N/A	8.90	25.10
2	2390	38.34	4.34	-15.66	54.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	90.21	56.21	N/A	N/A	8.90	25.10
2	2390	37.62	3.62	-16.38	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	102.58	68.58	N/A	N/A	8.90	25.10
2	2483.5	57.48	23.48	-16.52	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	100.78	66.78	N/A	N/A	8.90	25.10
2	2483.5	55.65	21.65	-18.35	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	93.84	59.84	N/A	N/A	8.90	25.10
2	2483.5	36.84	2.84	-17.16	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	91.24	57.24	N/A	N/A	8.90	25.10
2	2483.5	37.14	3.14	-16.86	54.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity: Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	105.20	71.20	N/A	N/A	8.90	25.10
2	2390	59.36	25.36	-14.64	74.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	97.40	63.40	N/A	N/A	8.90	25.10
2	2390	56.59	22.59	-17.41	74.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity: Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	96.00	62.00	N/A	N/A	8.90	25.10
2	2390	36.89	2.89	-17.11	54.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	92.01	58.01	N/A	N/A	8.90	25.10
2	2390	37.27	3.27	-16.73	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity: Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	104.57	70.57	N/A	N/A	8.90	25.10
2	2483.5	59.77	25.77	-14.23	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	99.85	65.85	N/A	N/A	8.90	25.10
2	2483.5	57.70	23.70	-16.30	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity: Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	93.64	59.64	N/A	N/A	8.90	25.10
2	2483.5	37.15	3.15	-16.85	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	89.83	55.83	N/A	N/A	8.90	25.10
2	2483.5	35.81	1.81	-18.19	54.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	103.40	69.40	N/A	N/A	8.90	25.10
2	2390	57.71	23.71	-16.29	74.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	97.45	63.45	N/A	N/A	8.90	25.10
2	2390	58.14	24.14	-15.86	74.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	95.79	61.79	N/A	N/A	8.90	25.10
2	2390	37.62	3.62	-16.38	54.00	8.90	25.10

Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2412	88.84	54.84	N/A	N/A	8.90	25.10
2	2390	36.07	2.07	-17.93	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	101.59	67.59	N/A	N/A	8.90	25.10
2	2483.5	58.28	24.28	-15.72	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	97.52	63.52	N/A	N/A	8.90	25.10
2	2483.5	55.26	21.26	-18.74	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity: Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	95.24	61.24	N/A	N/A	8.90	25.10
2	2483.5	38.72	4.72	-15.28	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	91.40	57.40	N/A	N/A	8.90	25.10
2	2483.5	36.54	2.54	-17.46	54.00	8.90	25.10

Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n(HT40)
Polarity: Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2422	102.18	68.18	N/A	N/A	8.90	25.10
2	2390	58.38	24.38	-15.62	74.00	8.90	25.10

Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n(HT40)
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2422	99.37	65.37	N/A	N/A	8.90	25.10
2	2390	56.91	22.91	-17.09	74.00	8.90	25.10

Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n(HT40)
Polarity: Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2422	95.22	61.22	N/A	N/A	8.90	25.10
2	2390	39.42	5.42	-14.58	54.00	8.90	25.10

Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n(HT40)
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2422	88.24	54.24	N/A	N/A	8.90	25.10
2	2390	39.09	5.09	-14.91	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT40)
Polarity: Vertical
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	101.92	67.92	N/A	N/A	8.90	25.10
2	2483.5	60.46	26.46	-13.54	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT40)
Polarity:Horizontal
Detector: Peak

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	97.96	63.96	N/A	N/A	8.90	25.10
2	2483.5	58.30	24.30	-15.70	74.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT40)
Polarity: Vertical
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	93.86	59.86	N/A	N/A	8.90	25.10
2	2483.5	39.48	5.48	-14.52	54.00	8.90	25.10

Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n(HT40)
Polarity:Horizontal
Detector: Average

No	Frequency （MHz）	Measure Level （dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuv/m)	cable loss (dB)	antenna factor (dB)
1	2462	91.98	57.98	N/A	N/A	8.90	25.10
2	2483.5	38.99	4.99	-15.01	54.00	8.90	25.10

Sample Calculations

Determining Spurious Emissions Levels

A “reference path loss” is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

Result= $P_{mea} + A_{Rpl}$

The worst case attitude: The mobile lay down.

For 802.11b

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity
33.65	22.14	19.2	2.94	Vertical
79.24	25.28	9.8	15.48	Vertical
99.86	27.33	12	15.33	Vertical
112.02	23.32	12.7	10.62	Vertical
600.20	27.27	23.1	4.17	Vertical
952.91	32.42	28.3	4.12	Vertical

For 802.11g

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity
36.73	22.08	17.7	4.38	Vertical
81.20	25.08	9.9	15.18	Vertical
100.00	27.01	12	15.01	Vertical
149.70	22.26	10.4	11.86	Vertical
619.24	27.34	23.2	4.14	Vertical
908.82	32.67	28	4.67	Vertical

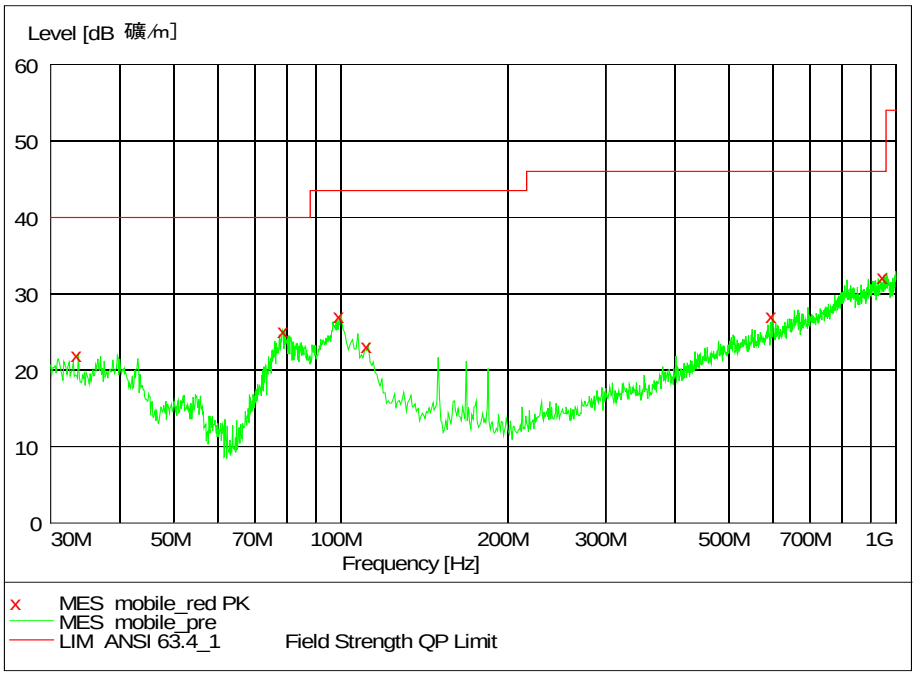
For 802.11n(HT20)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity
31.12	22.66	20.5	2.16	Vertical
78.82	25.55	9.7	15.85	Vertical
100.00	26.8	12	14.8	Vertical
149.70	21.81	10.4	11.41	Vertical
638.28	26.8	23.9	2.9	Vertical
950.90	32.63	28.2	4.43	Vertical

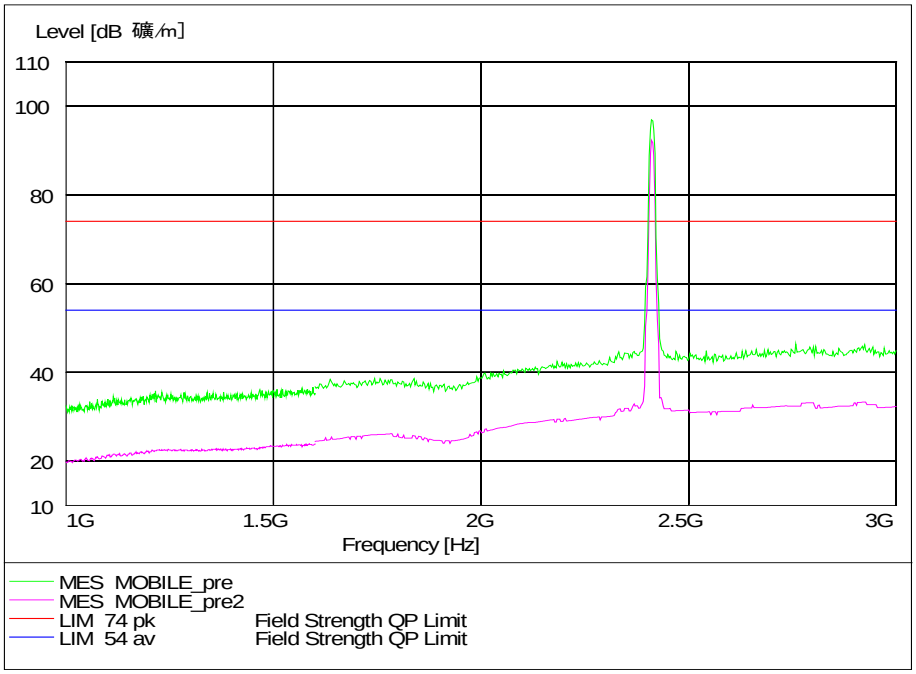
For 802.11n(HT40)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity
70.96	19.42	8.3	11.12	Vertical
87.94	23.85	10.8	13.05	Vertical
99.58	26.4	12	14.4	Vertical
463.13	23.98	20.2	3.78	Vertical
609.22	27.02	23	4.02	Vertical
905.81	32.62	28.1	4.52	Vertical

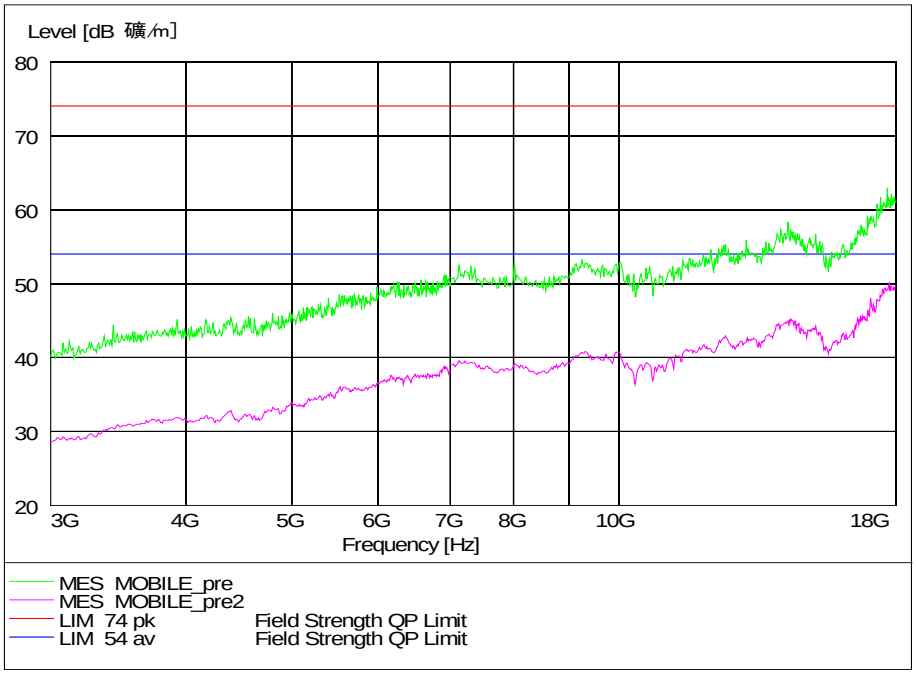
Carrier frequency (MHz): 2437
Channel No.:6



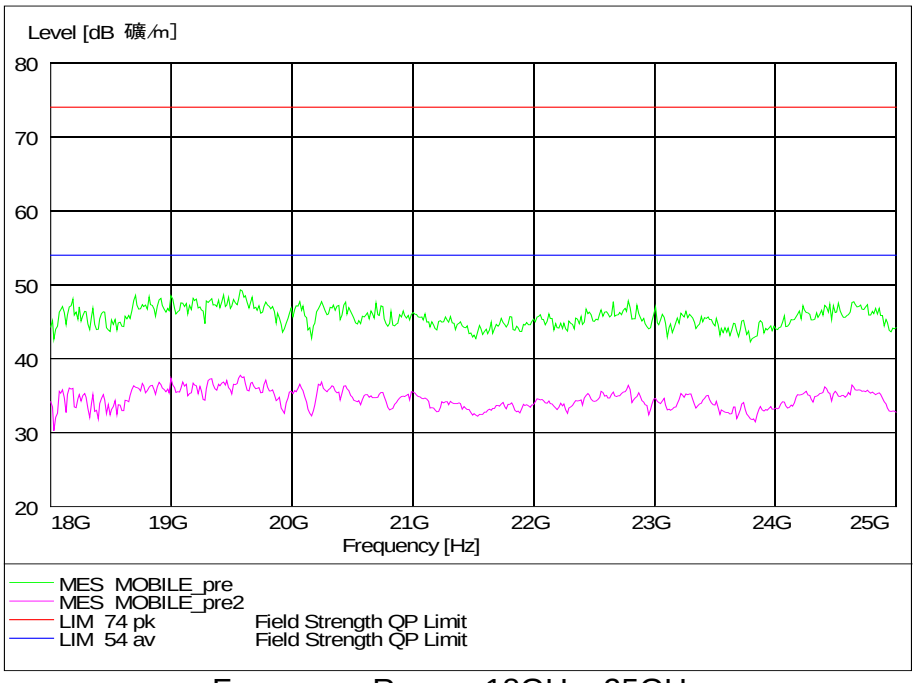
Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11b



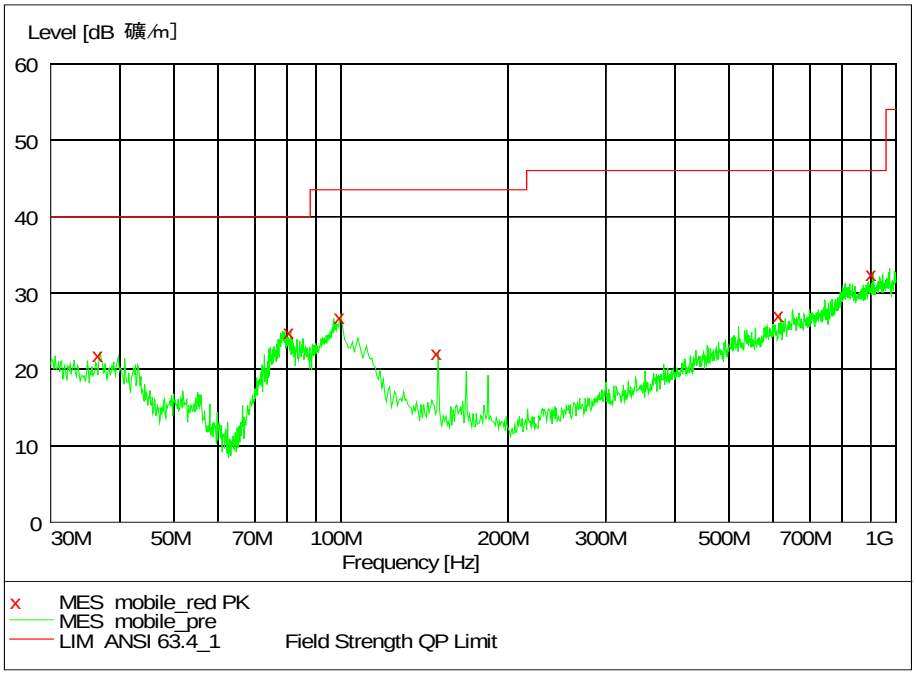
Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



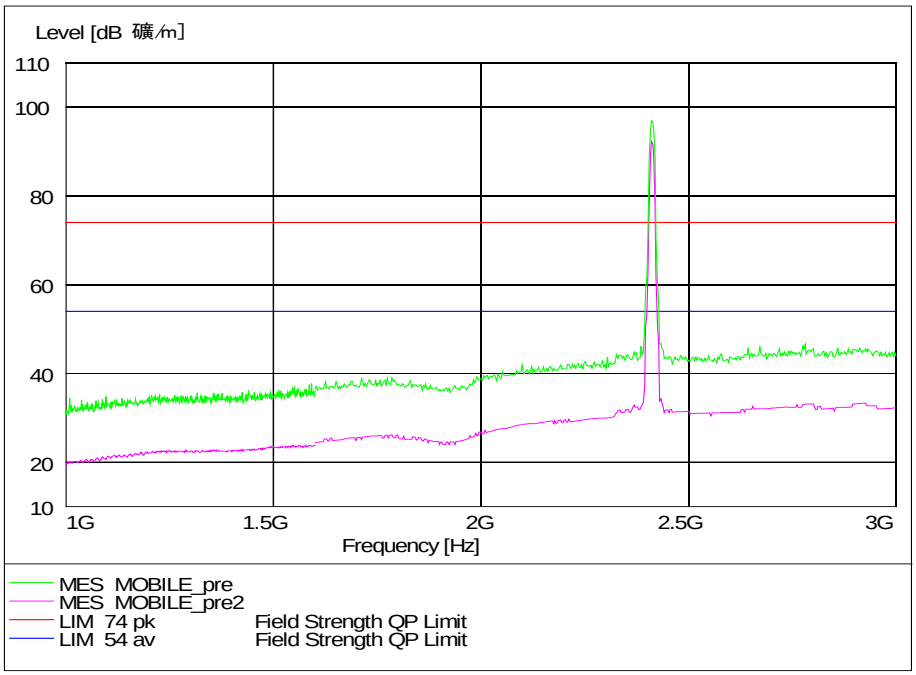
Frequency Range: 3GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



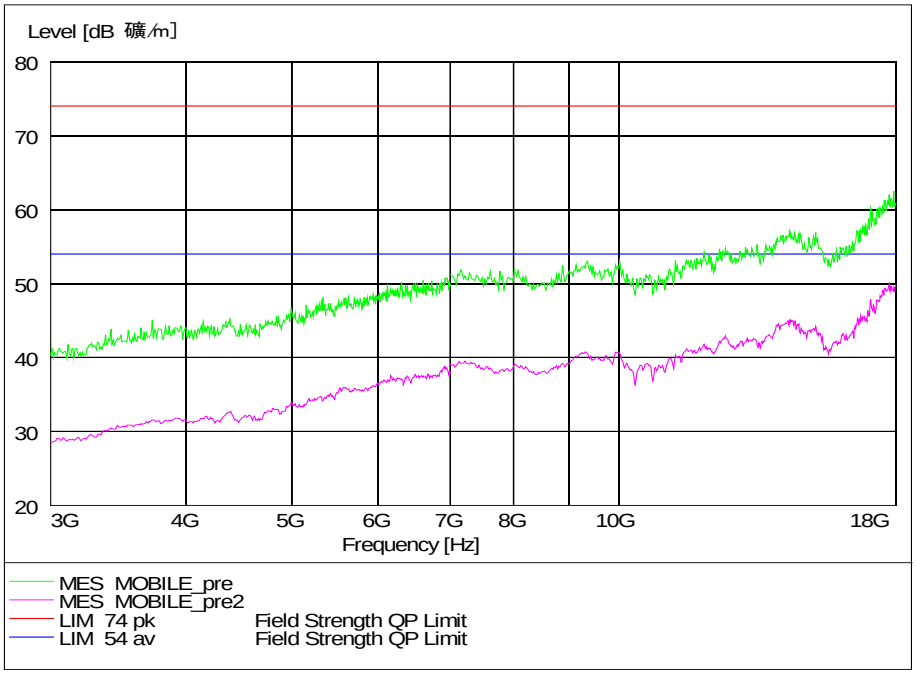
Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11b



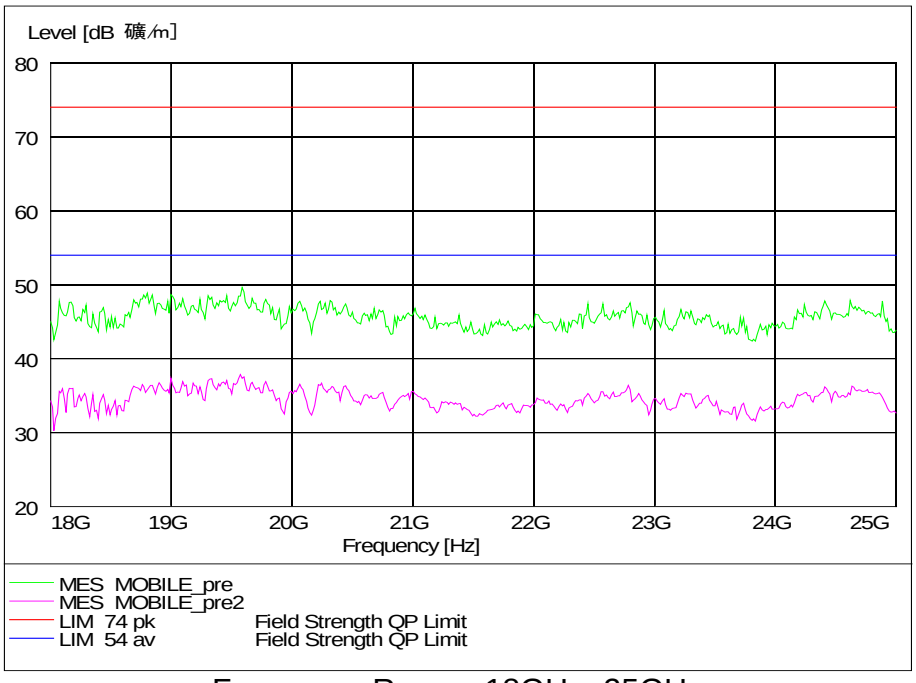
Frequency Range: 30MHz -1GHz
Detector: QP mode
Modulation type: 802.11g



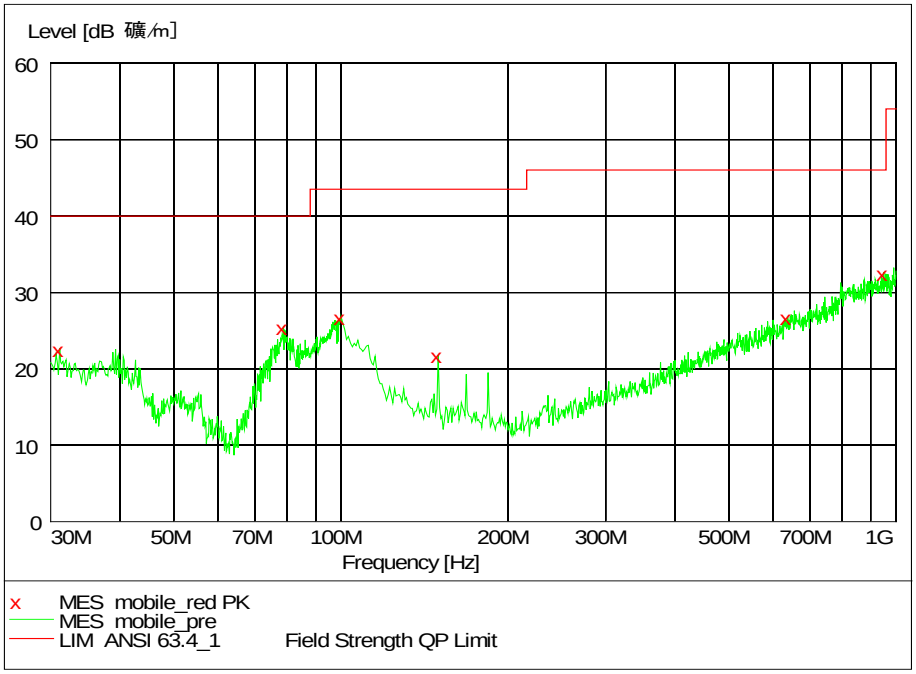
Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



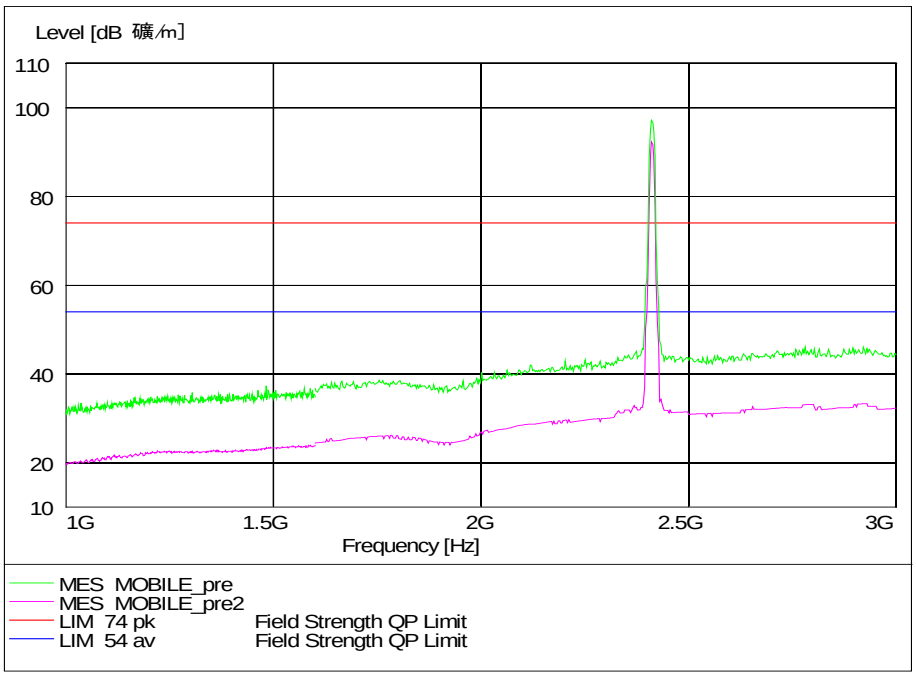
Frequency Range: 3GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



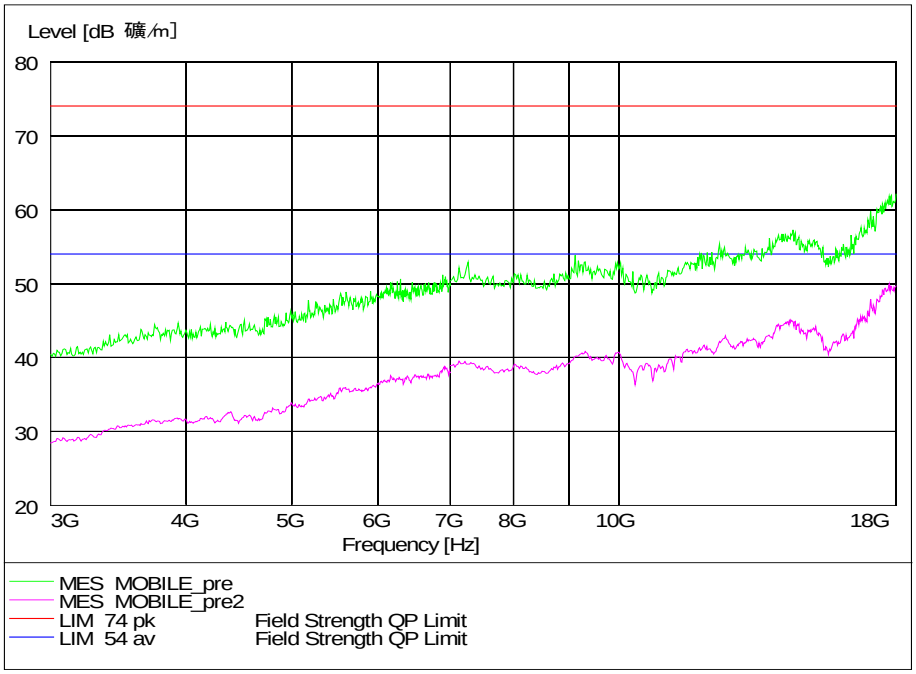
Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11g



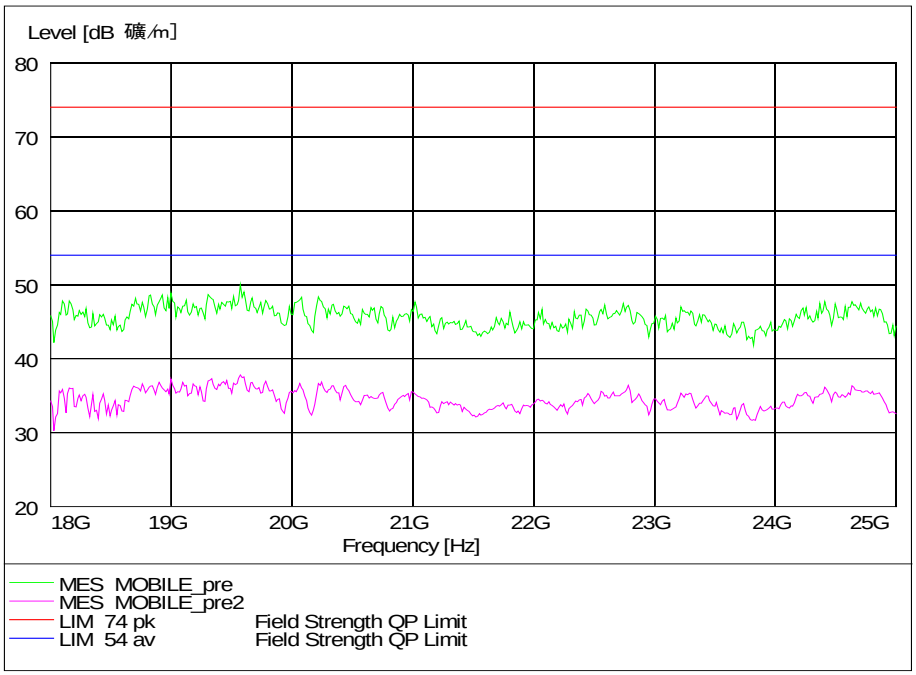
Frequency Range: 30MHz -1GHz
Detector: QP mode
Test Mode: 802.11n(HT20)



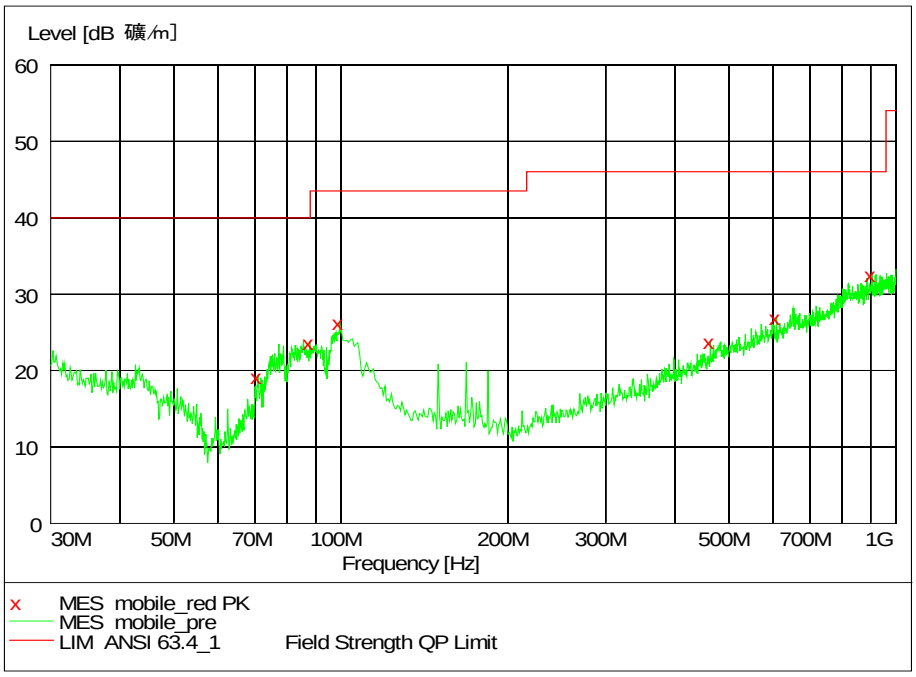
Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)



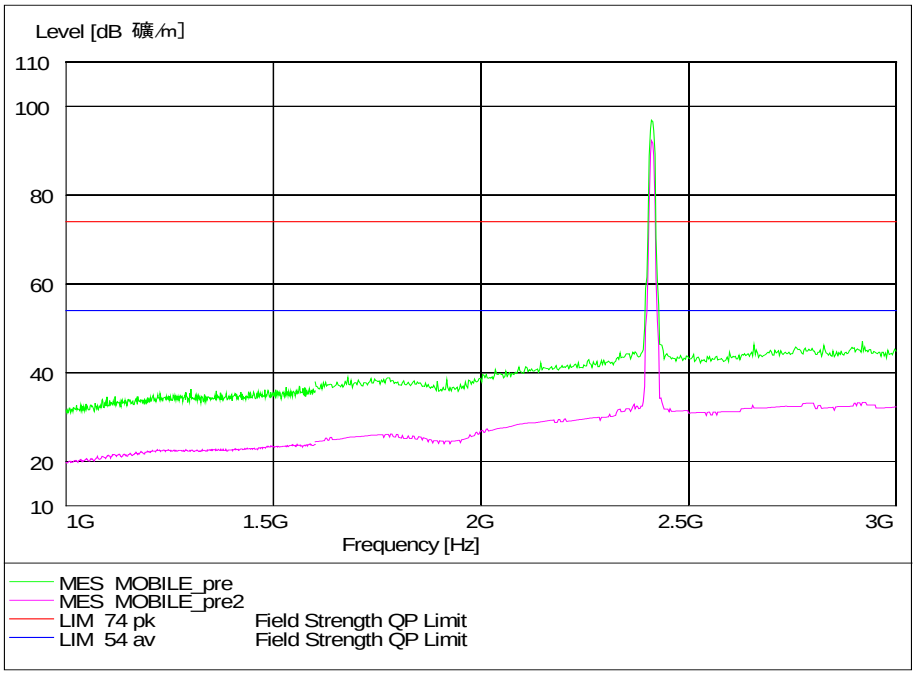
Frequency Range: 3GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)



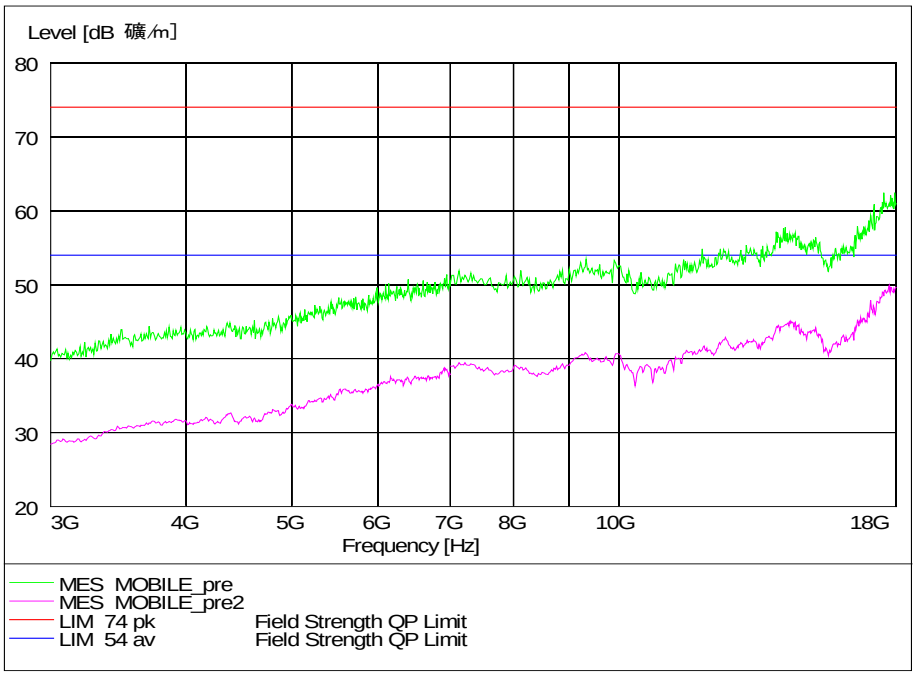
Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT20)



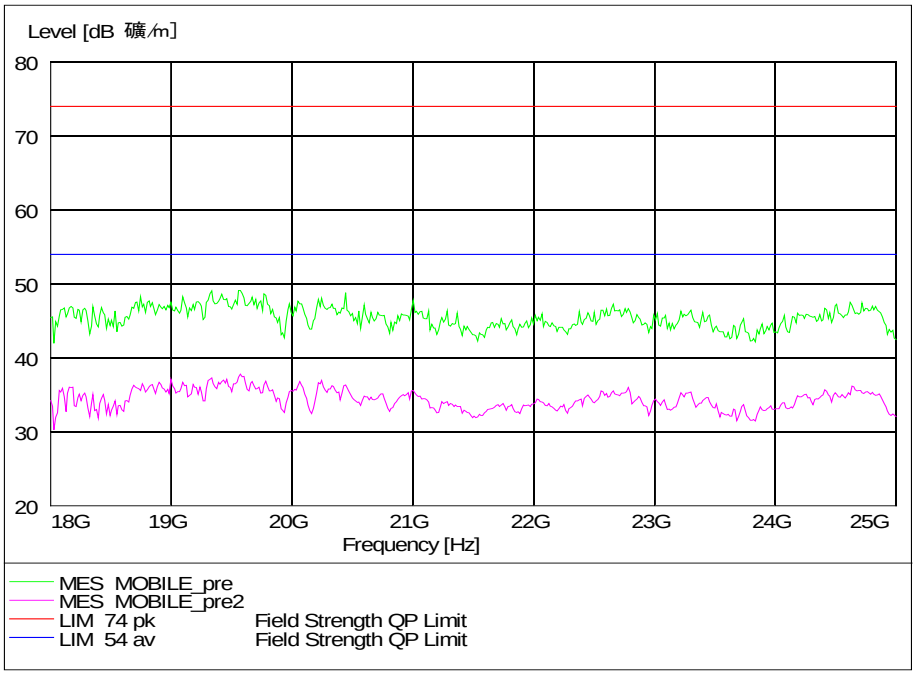
Frequency Range: 30MHz -1GHz
Detector: QP mode
Modulation type: 802.11n(HT40)



Frequency Range: 1GHz -3GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT40)



Frequency Range: 3GHz -18GHz
Detector: Av mode and PK mode
Modulation type: 802.11n(HT40)



Frequency Range: 18GHz -25GHz
Detector: Av mode and PK mode

2.3. Measurement Uncertainty

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Transmitter Power Spectral Density	0.75dB	
Spurious emissions	30MHz～1GHz	2.83dB
	1GHz～12.75GHz	2.50dB
	12.75GHz～25GHz	2.75dB

2.4. List of test equipment

No.	Name/Model	Manufacturer	S/N	Cal Due date
1.	Spectrum Analyzer FSV	ROHDE&SCHWARZ	101065	2015.8
2.	Signal Generator MG3700A	Anritsu	6200677084	2015.8
3.	Attenuation 6810.17.B	HUBER+SUHNER	768710	2015.8
4.	Cable 104EA	SUCOFLEX	9272/4EA	2015.8
5.	Cable 104EA	SUCOFLEX	9266/4EA	2015.8
6.	Power Meter E4416A	Agilent	MY52370013	2015.2
7.	Peak Power Sensor E9327A	Agilent	MY52420006	2015.2
8.	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----
9.	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	-----
10.	Turn table Diameter:1m	HD	-----	-----
11.	Turn table Diameter:5m	HD	-----	-----
12.	Antenna master FAC(MA4.0)	MATURO	-----	-----
13.	Antenna master SAC(MA4.0)	MATURO	-----	-----
14.	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	-----
15.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2015.8
16.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	2015.8
17.	HL562 Ultra log antenna	R&S	100016	2015.8
18.	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2015.8
19.	ESI 40 EMI test receiver	R&S	100015	2015.8
20.	Radio tester	CMU 200	114667	2015.8
21.	ESCS30 EMI test receiver	R&S	100029	2015.8
22.	HL562 Receive antenna	R&S	100167	2015.8
23.	ESH3-Z5 LISN	R&S	100020	2015.8

Appendix

Appendix Test Setup