



TEST REPORT

Report No.: SRTC2013-H024-E0006

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

Product Model: ZTE R239

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 15, Subpart C (October 9, 2012 edition)

FCC ID: SRQ-ZTER239

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

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1. General information

1.1 Notes of the test report

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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, Beijing China
City: Beijing
Country or Region: China
Contacted person: Wang Junfeng
Tel: +86 10 68009181 +86 10 68009202
Fax: +86 10 68009195 +86 10 68009205
Email: wangjf@srrc.org.cn / wangjunfeng@srtc.org.cn

1.3 Applicant's details

Company: ZTE Corporation
Address: ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,
Nanshan District, 518057
City: Shenzhen
Country or Region: P.R.China
Grantee Code: SRQ
Contacted person: Min Zhang
Tel: +86-021-68897541
Fax: +86-021-50801070
Email: zhang.min13@zte.com.cn

1.4 Manufacturer's details

Company: ZTE Corporation
Address: Zhongxing Bldg, Hi-Tech Park, NanShan District, 518057
City: Shenzhen
Country or Region: P.R.China
Contacted person: Li Dezi
Tel: +86-021-68895196
Fax: +86-021-50801070
Email: li.dezi@zte.com.cn

1.5 Application details

Date of reception of test sample: 18th Apr 2013

Date of test: 22nd May 2013 to 11th Jul 2013

1.6 Reference specification

FCC Part 15, Subpart C (October 9, 2012 edition)

1.7 Information of EUT

1.7.1 General information

Name of EUT	GSM/GPRS/EDGE Digital Mobile Phone with Bluetooth and WiFi
FCC ID	SRQ-ZTER239
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
Antenna Type	Fixed Internal
Power Supply	Battery or Charger
Rated Power Supply Voltage	3.8V
HW Version	GMBA
SW Version	ZTE-CN-QS-P150A40V1.0.0

1.7.2 EUT details

Name	Model	IMEI
GSM/GPRS/EDGE Digital Mobile Phone with Bluetooth and WiFi	ZTE R239	355278040000310

1.7.3 Auxiliary equipment details

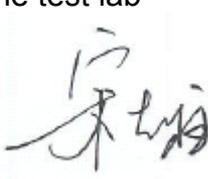
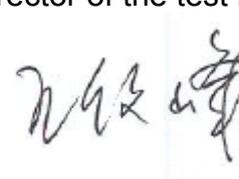
Equipment	Charger
Manufacturer	ZTE CORPORATION
Model Number	STC-A22O50I400M5-C
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Battery
Manufacturer	ZTE CORPORATION
Model Number	Li3706T42P3h453756
Capacity	670mAh
Rated Voltage	3.7V d.c.

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	Spurious RF Conducted Emissions	15.247(d)	Pass
5	Spurious Radiated Emissions	15.247(d)/15.209(a)	Pass
6	Band Edge Compliance	15.247(d)	Pass

This Test Report Is Issued by: Mr. Song Qizhu Director of the test lab 	Checked by: Mr. Wang Junfeng Deputy director of the test lab 
Tested by: Mr. Li Bin Test engineer 	Issued date: 2013.07.11

2.2 Test result

2.2.1 Peak power output

2.2.1.1 Ambient condition:

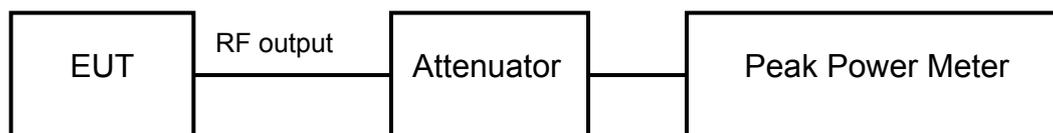
Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

2.2.1.2 Test Description

The measurement is made according to ANSI C63.10-2009.

WIFI is operating in 100% Duty Factor mode.

Set the RBW \geq 6 dB bandwidth of the emission, or use a peak power meter. A peak power meter is required if the 6 dB bandwidth is greater than the capability of the spectrum analyzer (typically 3 MHz RBW).



2.2.1.3 Test limit

FCC Part15.247(b)(3):

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW)

==> Maximum Output Power: 30 dBm

2.2.1.4 Test result:

Test Mode	Data Rate (Mbps)	Detector Type	Test Result(dBm)			
			2412MHz (Ch1)	2437MHz (Ch6)	2462MHz (Ch11)	
802.11b	1*	Avg	11.61	12.80	12.65	
		Peak	16.52	16.03	15.68	
	2	Avg	11.68	12.81	12.65	
		Peak	16.42	16.01	15.75	
	5.5	Avg	11.76	12.84	12.71	
		Peak	15.87	15.48	15.09	
	11	Avg	11.76	12.87	12.68	
		Peak	16.28	15.82	15.43	
	802.11g	6	Avg	8.44	9.87	9.78
			Peak	18.75	18.15	18.75
9		Avg	8.39	9.59	9.77	
		Peak	17.68	17.71	18.93	
12		Avg	8.43	9.61	9.72	
		Peak	18.19	18.13	18.47	
18		Avg	8.48	9.67	9.80	
		Peak	17.63	17.23	17.71	
24*		Avg	8.38	9.56	9.87	
		Peak	18.87	18.76	18.76	
36		Avg	8.30	9.49	9.85	
		Peak	17.94	18.84	18.77	
48		Avg	8.39	9.54	9.92	
		Peak	18.12	18.47	18.33	
54		Avg	8.35	9.51	9.89	
		Peak	17.90	17.92	18.56	
802.11n (20HT)		6.5	Avg	8.60	9.59	9.95
			Peak	18.61	17.87	18.22
	13	Avg	8.56	9.37	9.91	
		Peak	17.96	17.92	18.31	
	19.5	Avg	8.65	9.45	10.00	
		Peak	17.92	18.13	18.55	
	26	Avg	8.62	9.41	10.00	
		Peak	18.04	18.26	18.54	
	39	Avg	8.92	9.41	10.18	
		Peak	18.07	17.99	18.24	
	52	Avg	8.87	9.42	10.16	
		Peak	18.04	17.86	17.99	
	58.5*	Avg	8.89	9.41	10.17	
		Peak	19.34	18.98	18.99	
	65	Avg	9.10	9.41	10.13	
		Peak	18.55	18.37	18.60	

Test Mode	Data Rate (Mbps)	Detector Type	Test Result(dBm)		
			2422MHz (Ch3)	2442MHz (Ch7)	2462 MHz (Ch11)
802.11n (40HT)	13.5	Avg	9.17	9.40	10.85
		Peak	17.83	17.39	17.84
	27	Avg	9.11	9.20	10.85
		Peak	17.21	17.07	17.39
	40.5	Avg	9.78	9.18	10.81
		Peak	16.97	16.73	16.84
	54	Avg	9.05	9.12	10.84
		Peak	17.29	17.57	17.63
	81	Avg	9.07	9.15	10.84
		Peak	17.19	16.99	17.15
	108*	Avg	8.99	9.13	10.78
		Peak	17.84	17.68	17.87
	121.5	Avg	9.04	9.20	10.85
		Peak	17.02	17.02	17.23
	135	Avg	9.26	9.13	10.73
		Peak	16.70	16.32	17.03

*The data rate 1Mbps(802.11b), 24Mbps(802.11g), 58.5Mbps(802.11n(HT20)) 108Mbps(802.11n(HT40)) 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%	101.1kPa

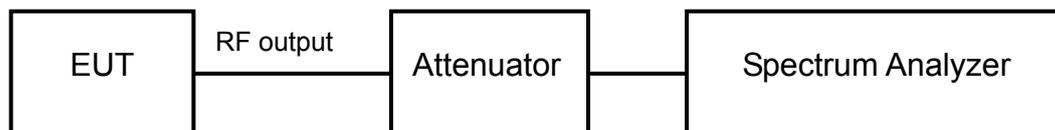
2.2.2.2 Test Description

The measurement is made according to ANSI C63.4-2009.

The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produces the worst-case (widest) occupied bandwidth.



2.2.2.3 Test limit

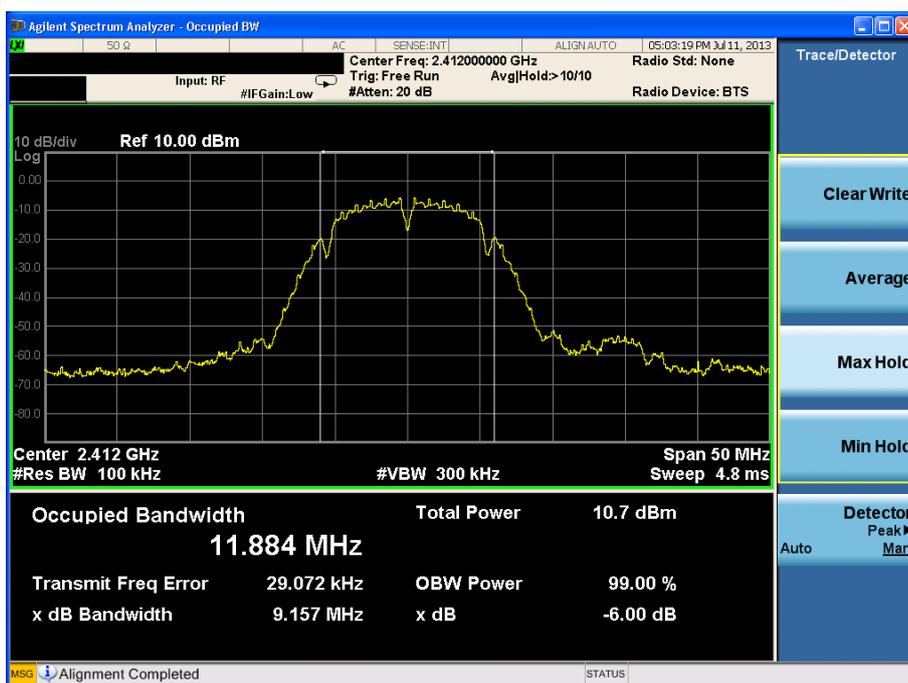
FCC Part15.247(a)(2)

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

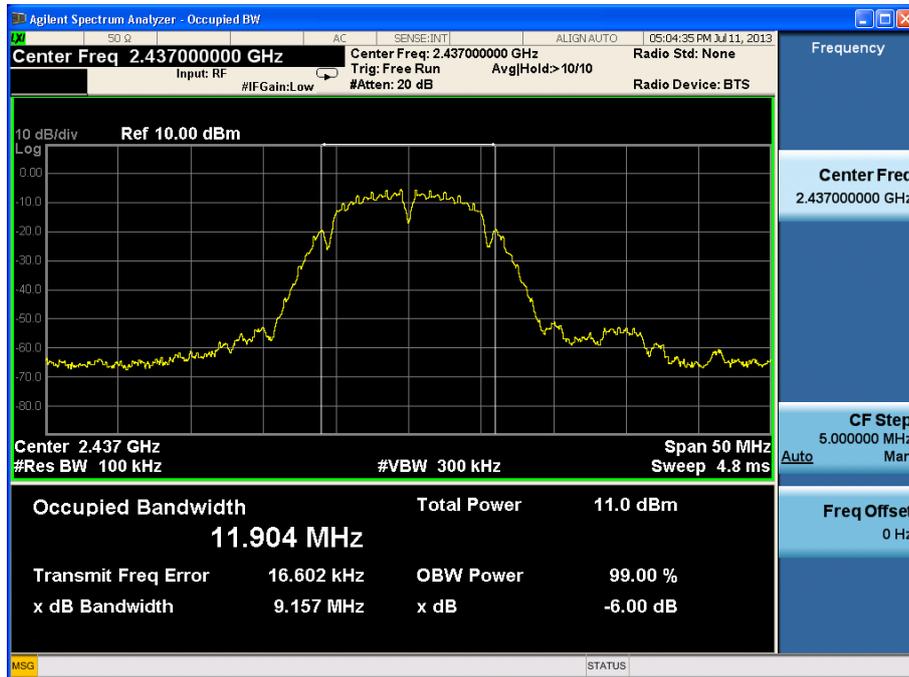
2.2.2.4 Test result

Test Mode: 802.11b

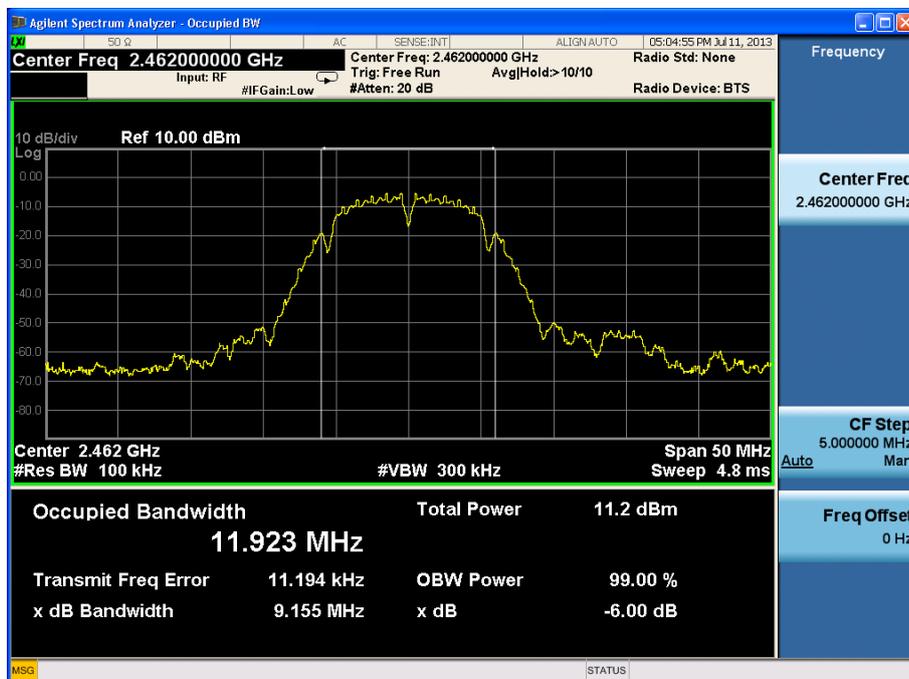
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2412	1	9.16
2437	6	9.16
2462	11	9.16



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



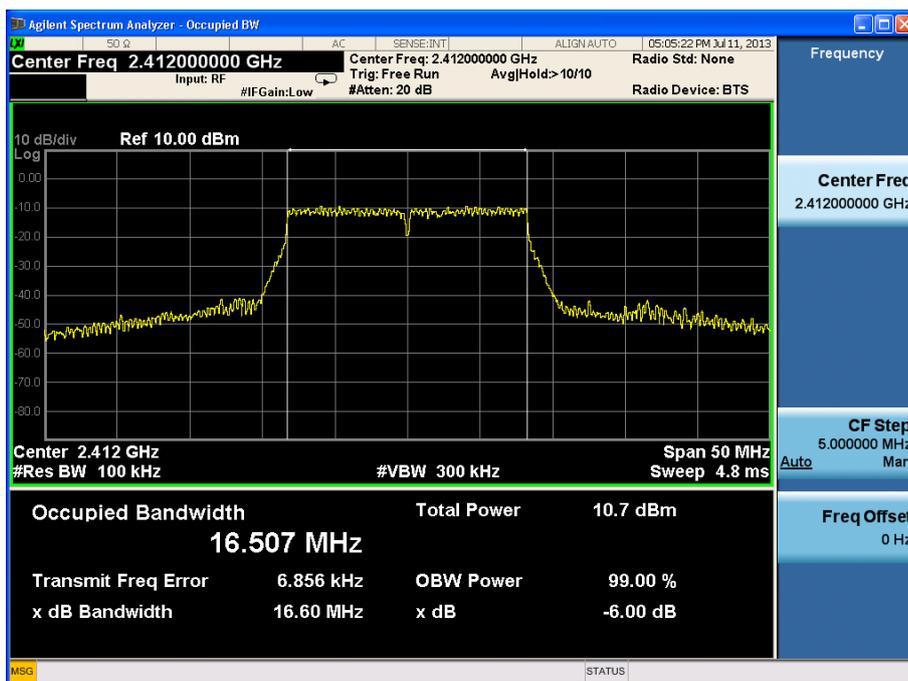
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11b



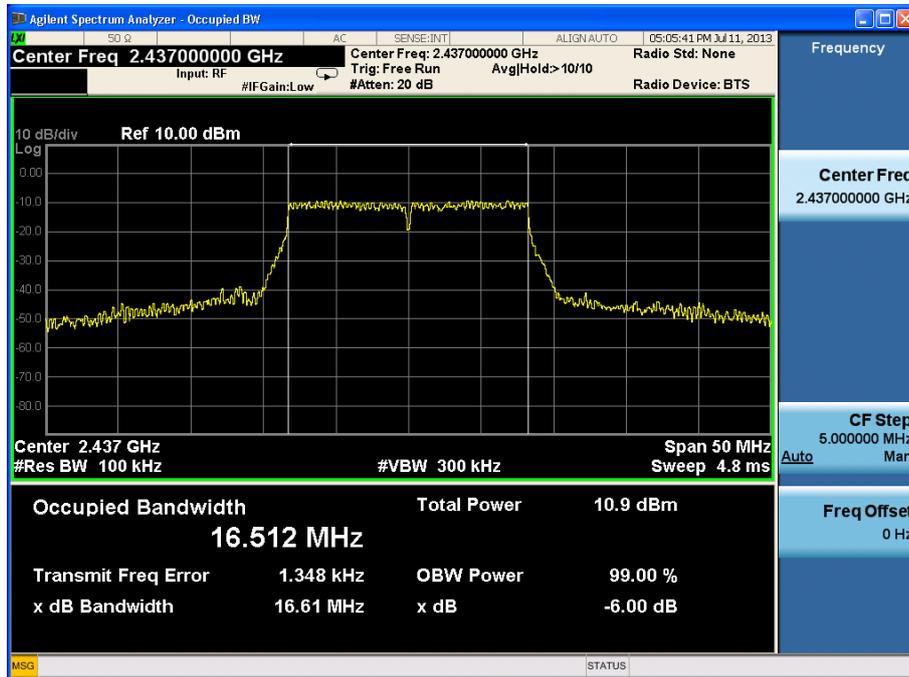
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11b

Test Mode: 802.11g

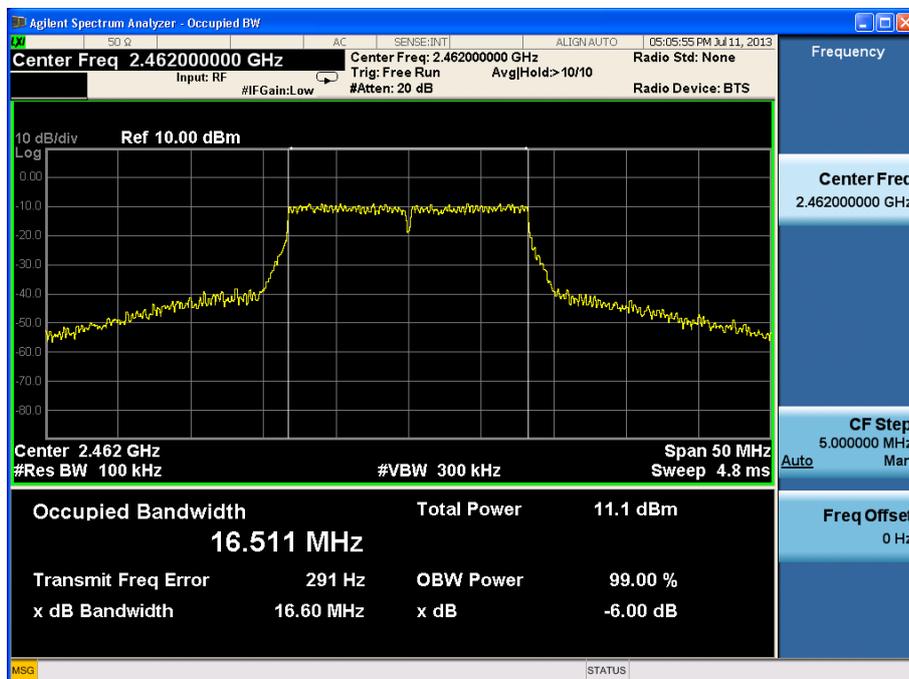
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2412	1	16.60
2437	6	16.61
2462	11	16.52



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



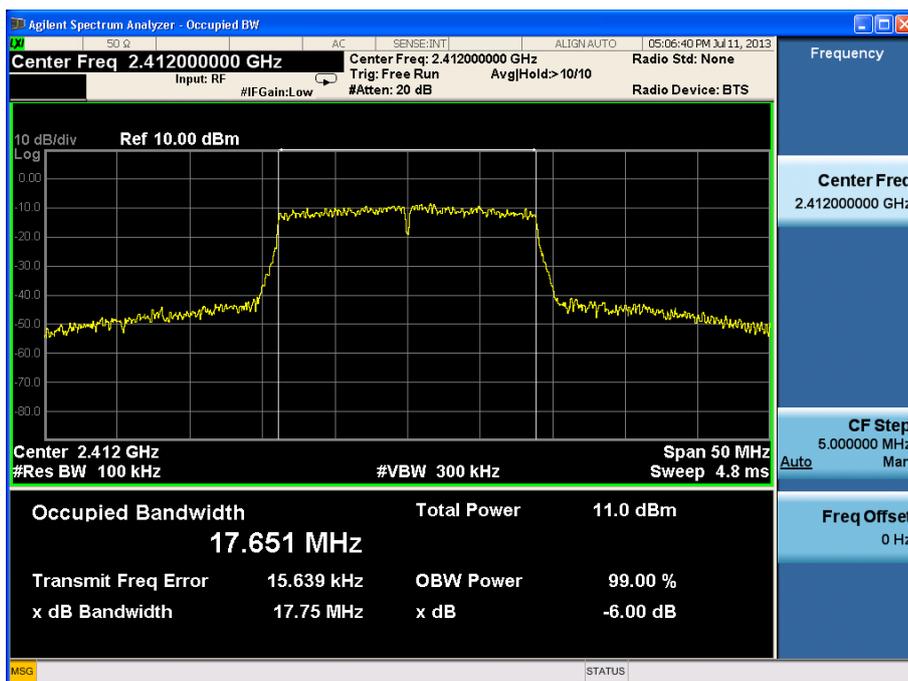
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11g



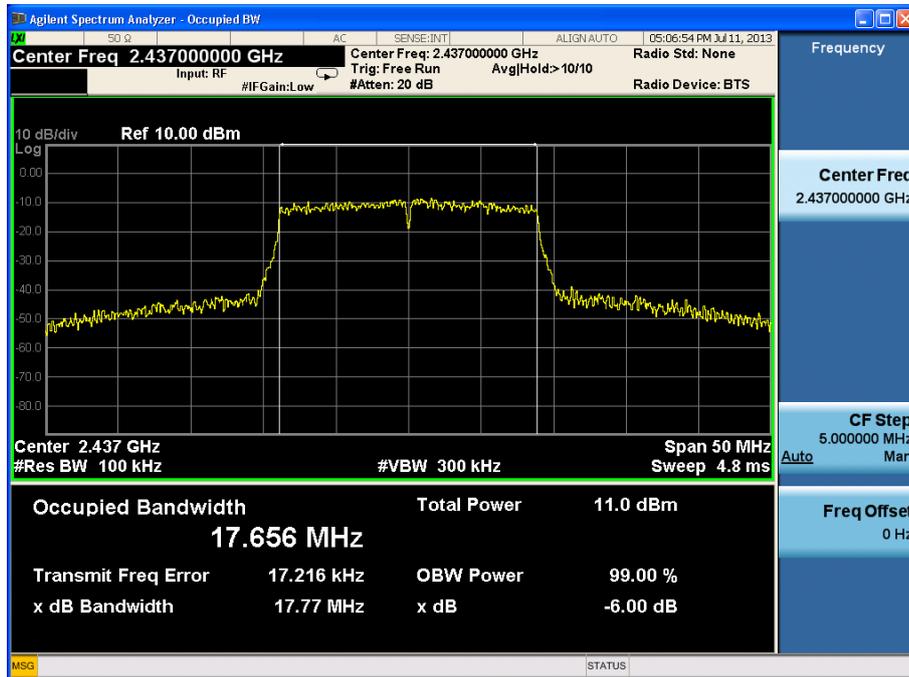
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11g

Test Mode: 802.11n(HT20)

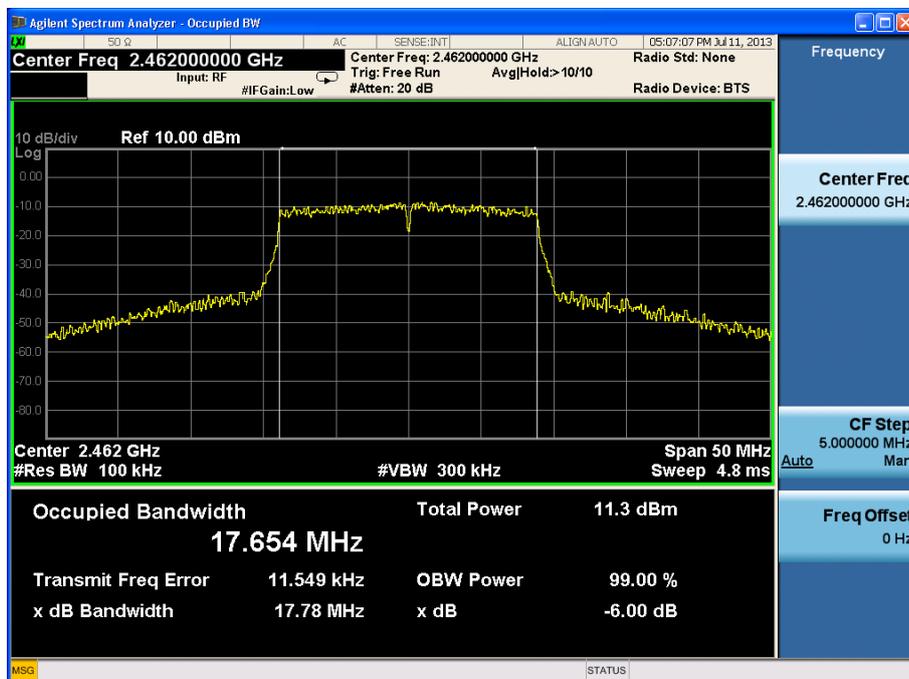
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2412	1	17.75
2437	6	17.77
2462	11	17.78



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



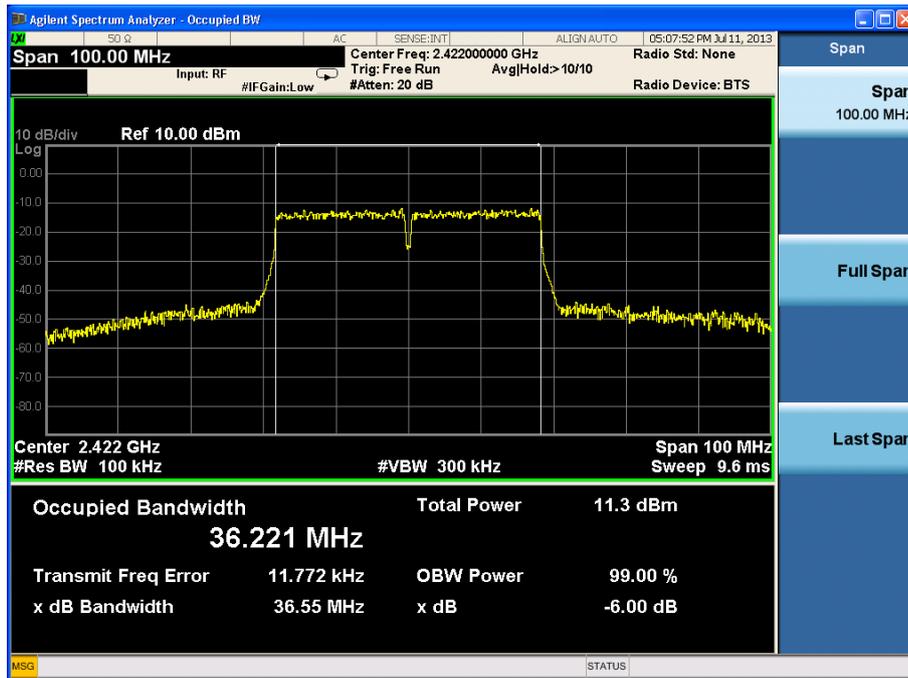
Carrier frequency (MHz): 2437
Channel No.:6
Test Mode: 802.11n(HT20)



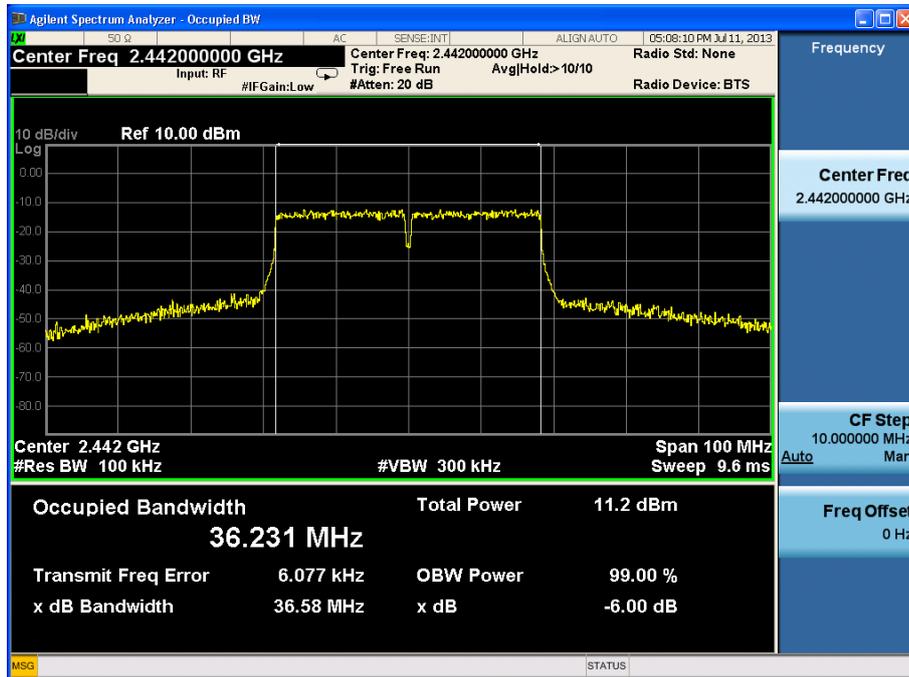
Carrier frequency (MHz): 2462
Channel No.:11
Test Mode: 802.11n(HT20)

Test Mode: 802.11n(HT40)

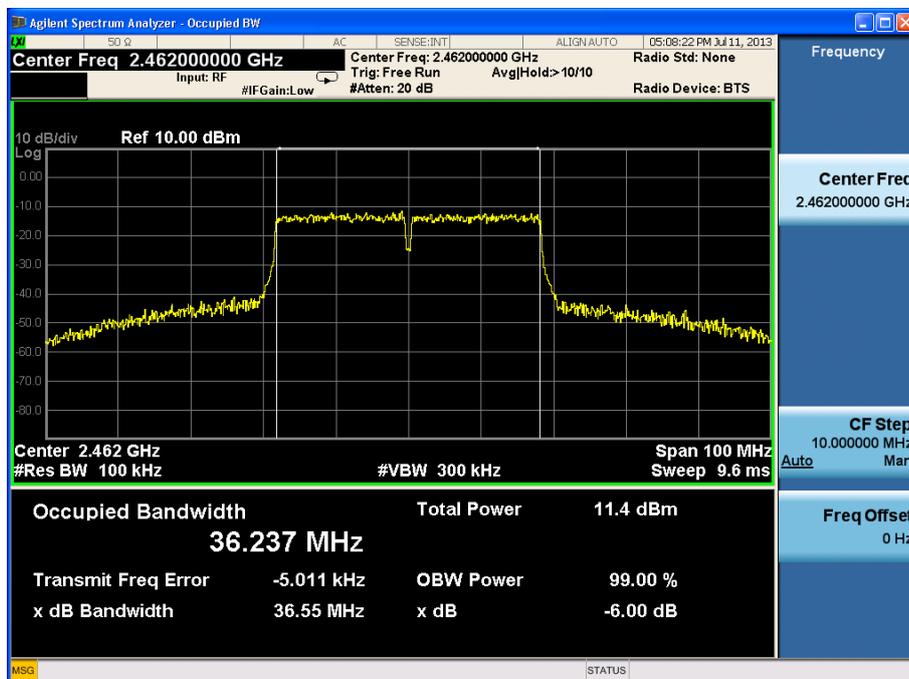
Carrier frequency (MHz)	Channel No.	6 dB bandwidth(MHz)
2422	3	36.55
2442	7	36.58
2462	11	36.55



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



Carrier frequency (MHz): 2442
Channel No.:7
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%	101.1kPa

2.2.3.2 Test Description

The measurement is made according to ANSI C63.4-2009.

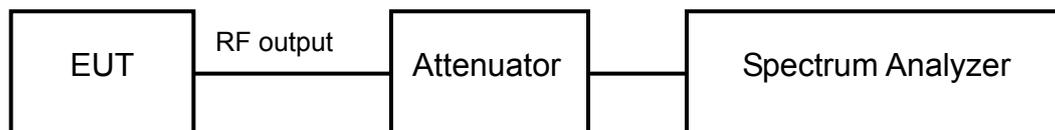
The Equipment Under Test (EUT) was set up in a shielded room to perform the Power Spectral Density measurements.

The resolution bandwidth for measuring the output power was 3kHz.

The trace set to max hold.

The span set to 1.5MHz.

The sweep time set to 500s.



2.2.3.3 Test limit

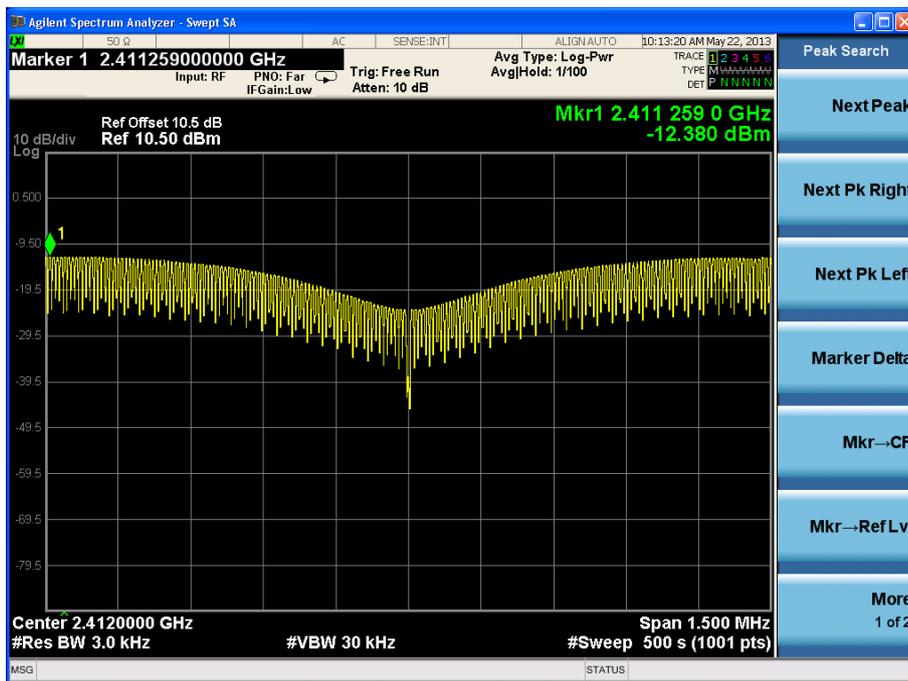
FCC Par15.247(e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

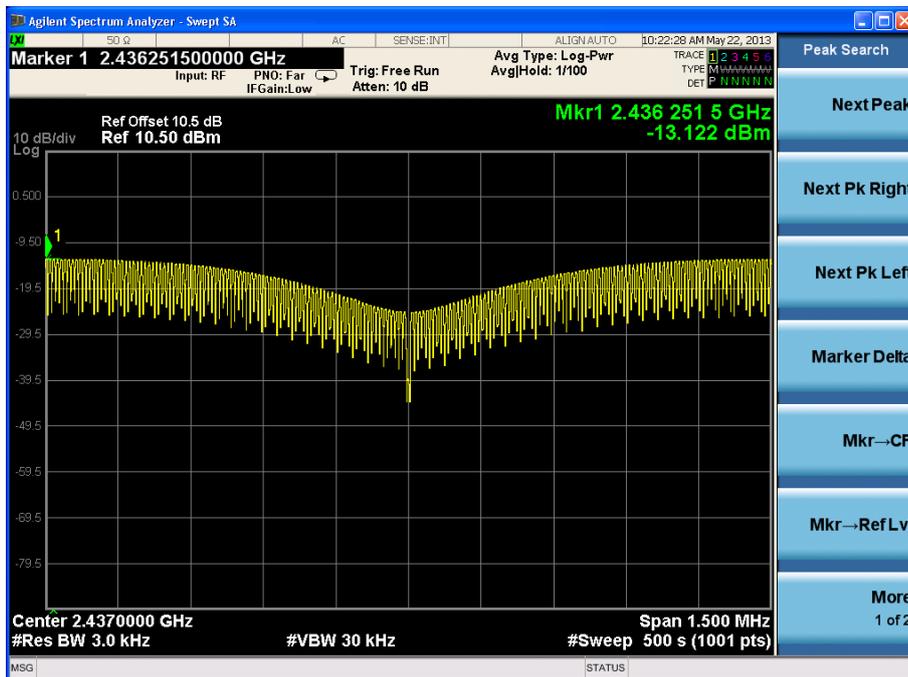
2.2.3.4 Test result:

Test Mode: 802.11b

Carrier frequency (MHz)	Channel No	Power Density
2412	1	-12.38
2437	6	-13.12
2462	11	-13.52



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



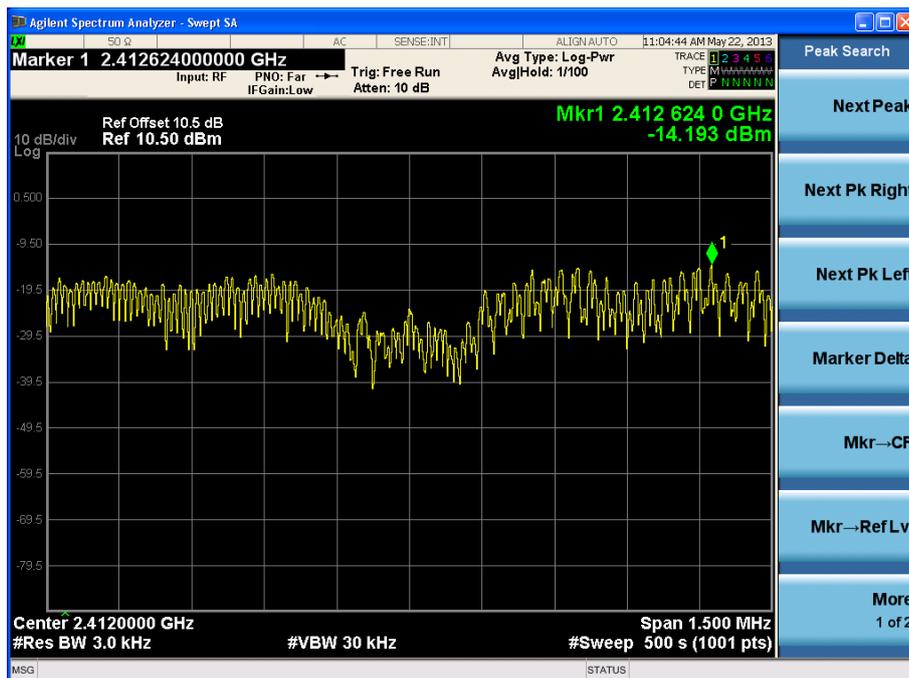
Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11b



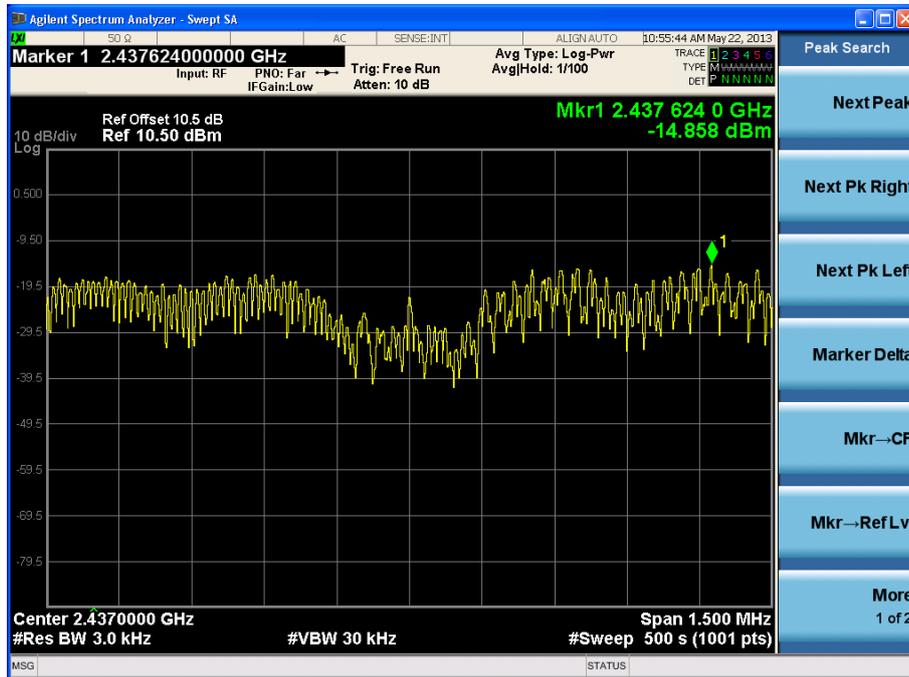
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11b

Test Mode: 802.11g

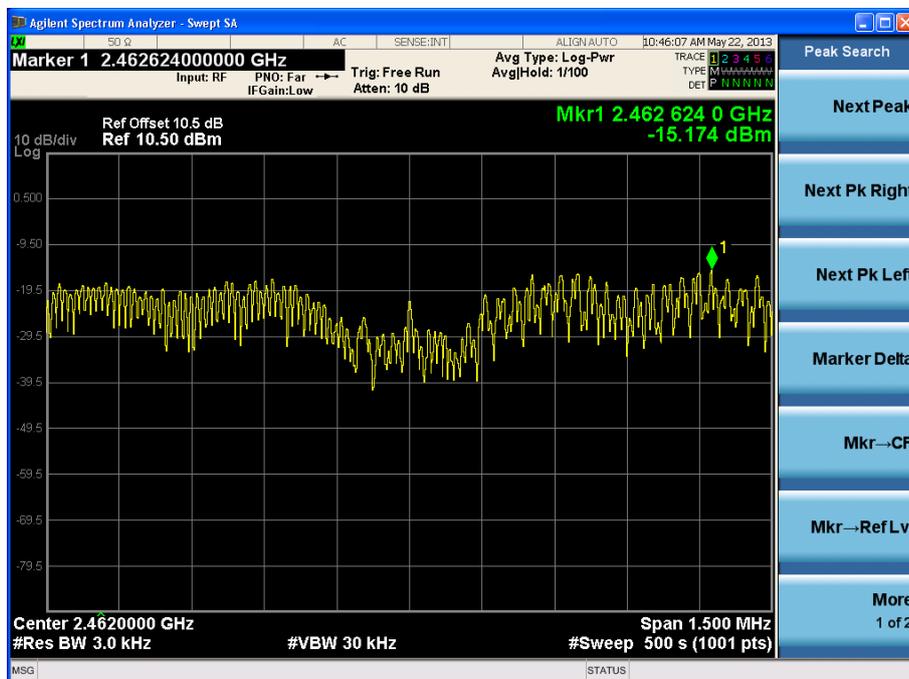
Carrier frequency (MHz)	Channel No	Power Density
2412	1	-14.19
2442	6	-14.86
2472	11	-15.17



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
2412	1	-14.61
2437	6	-19.22
2472	11	-19.38



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



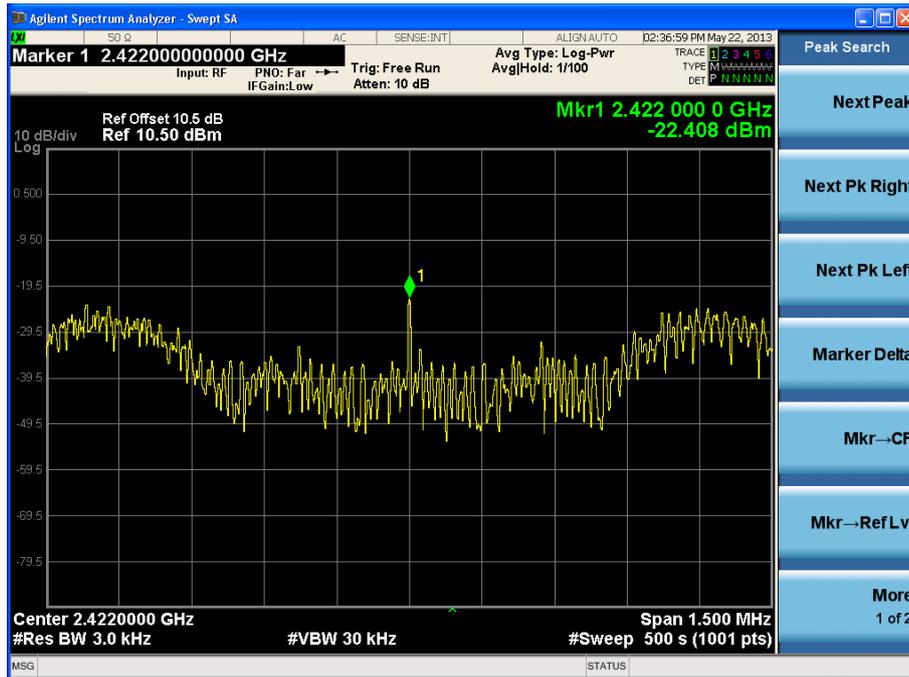
Carrier frequency (MHz): 2437
Channel No.6
Test Mode: 802.11n(HT20)



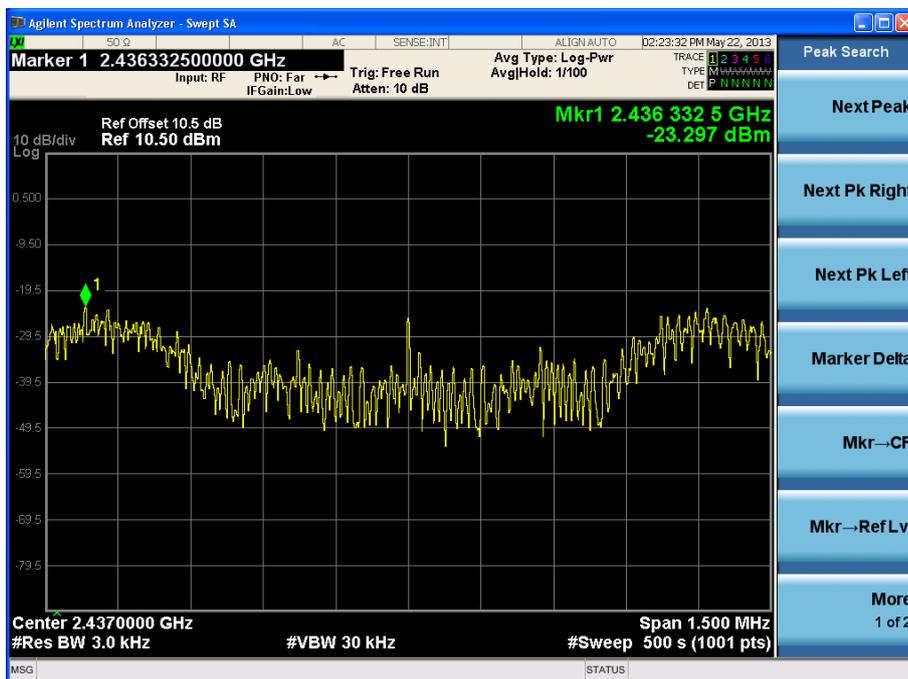
Carrier frequency (MHz): 2462
Channel No.11
Test Mode: 802.11n(HT20)

Test Mode: 802.11n(HT40)

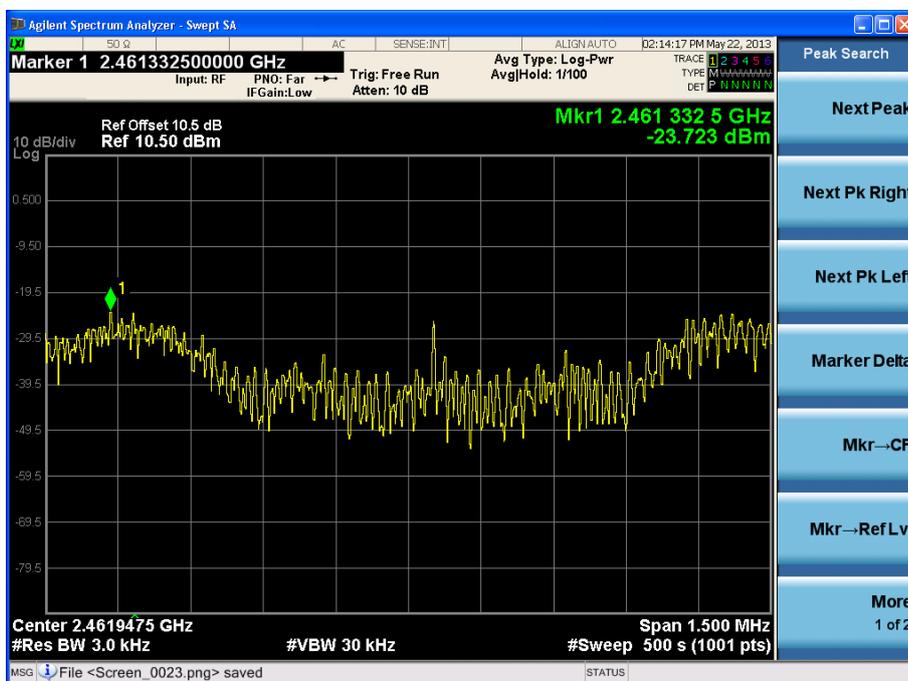
Carrier frequency (MHz)	Channel No	Power Density
2422	3	-22.41
2442	7	-23.30
2472	11	-23.72



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



Carrier frequency (MHz): 2442
Channel No.7
Test Mode: 802.11n(HT40)



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

2.2.4 Spurious RF Conducted Emissions

2.2.4.1 Ambient condition:

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

2.2.4.2 Test Description

The measurement is made according to ANSI C63.4-2009.

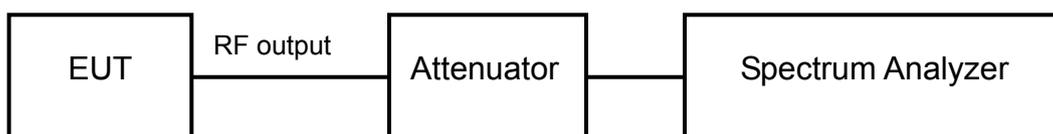
The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements.

The EUT was connected to the spectrum analyzer and WiFi set via a power splitter with a known loss.

Analyzer settings:

- Detector: Peak-Maxhold
- Frequency range: 30 ~25000 MHz
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz

The reference value for the measurement of the spurious RF conducted emissions is determined during the test “band edge compliance” (cf. chapter 4.5). This value is used to calculate the 20 dBc limit.



2.2.4.3 Test limit

FCC Part15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

2.2.4.4 Test result

Carrier frequency (MHz): 2412

Channel No.:1

Test Mode: 802.11b

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2437

Channel No.:6

Test Mode: 802.11b

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

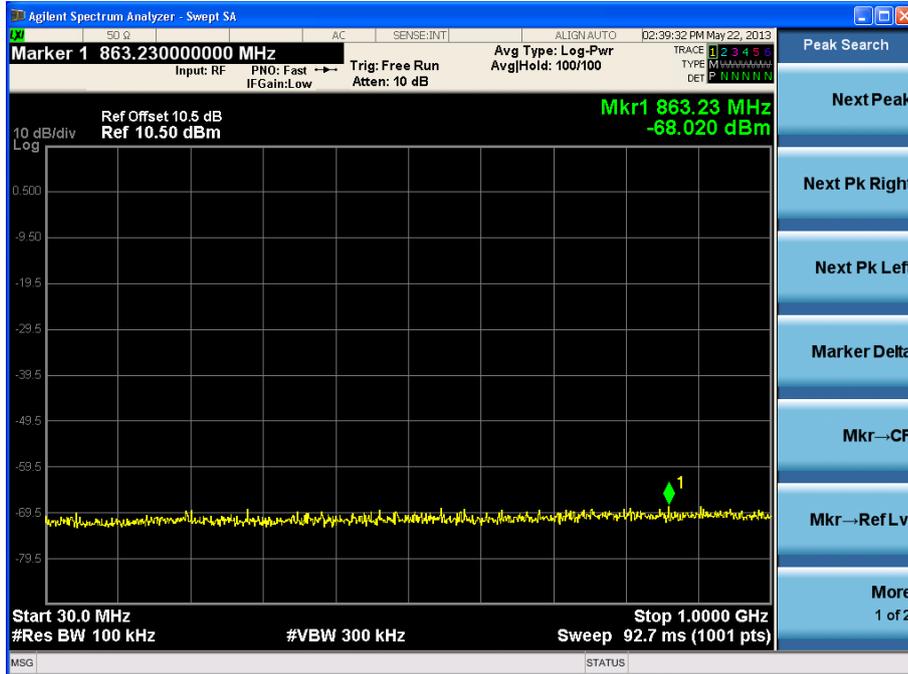
Carrier frequency (MHz): 2462

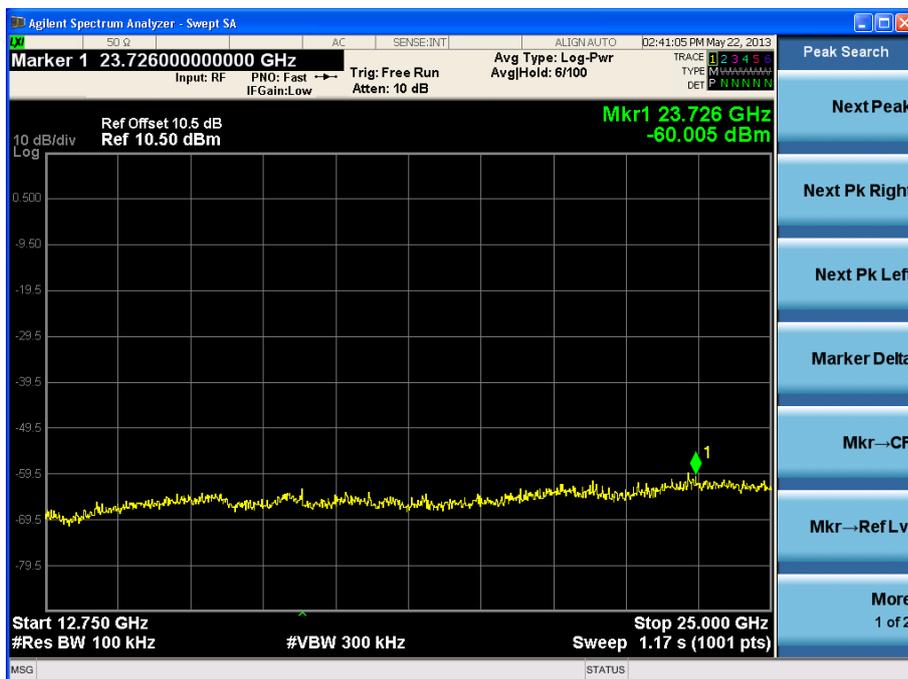
Channel No.:11

Test Mode: 802.11b

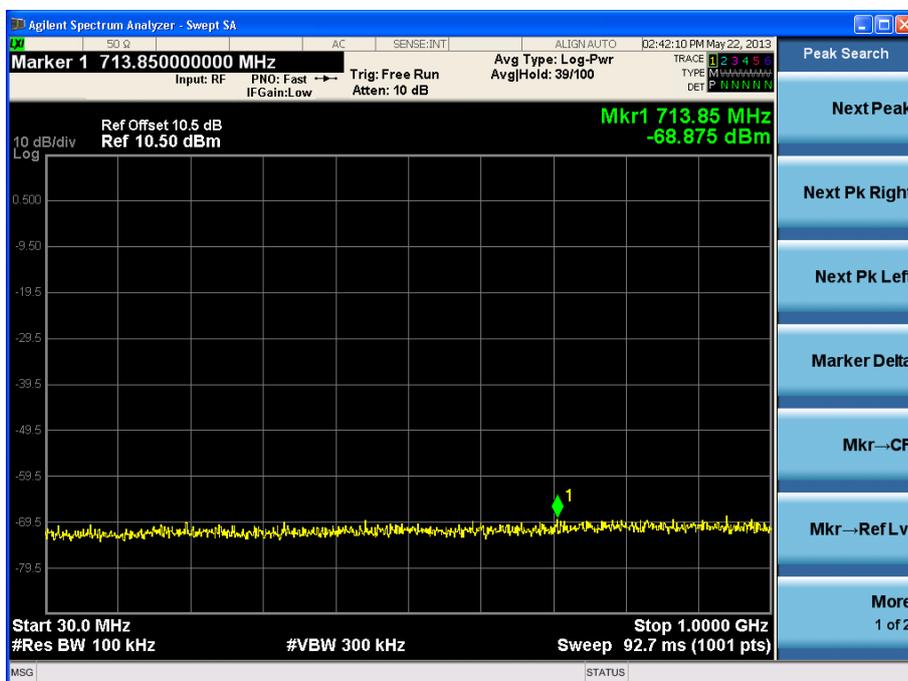
Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

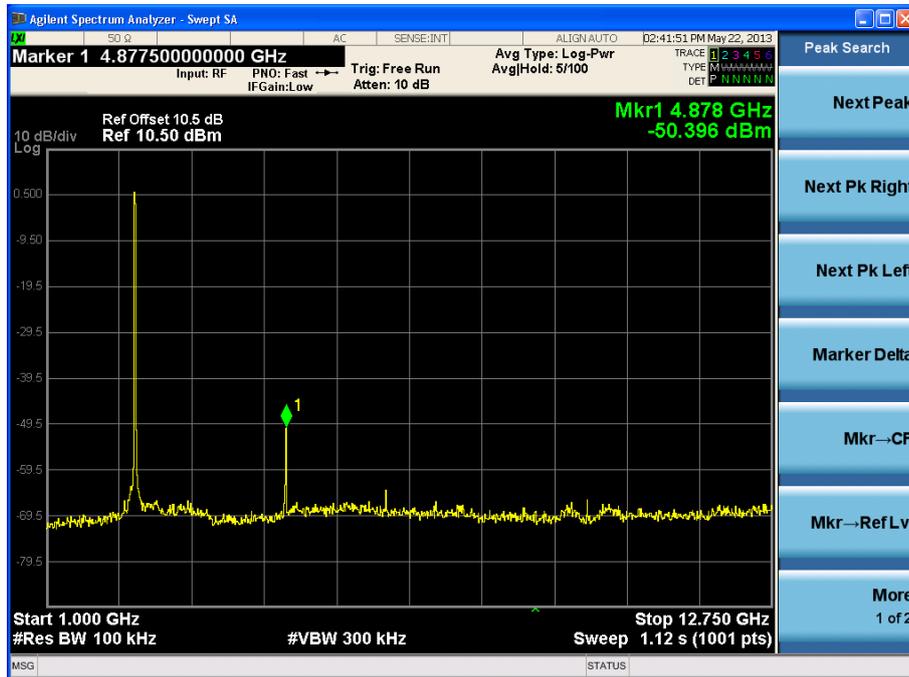
Note: The Reference value see 2.2.6 Band edge compliance



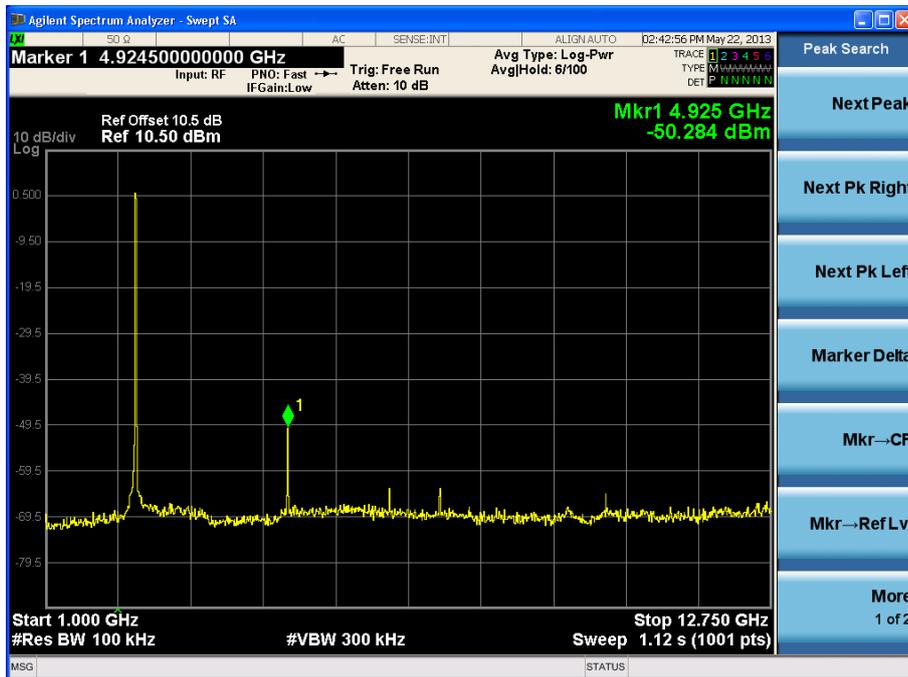
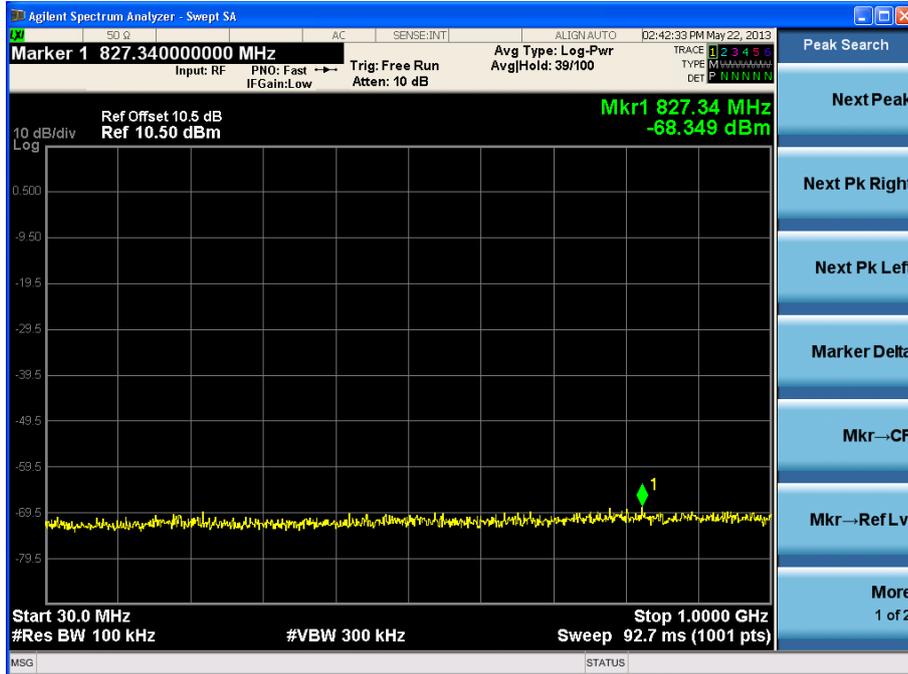


Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11b





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





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

Carrier frequency (MHz): 2412

Channel No.:1

Test Mode: 802.11g

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2437

Channel No.:6

Test Mode: 802.11g

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

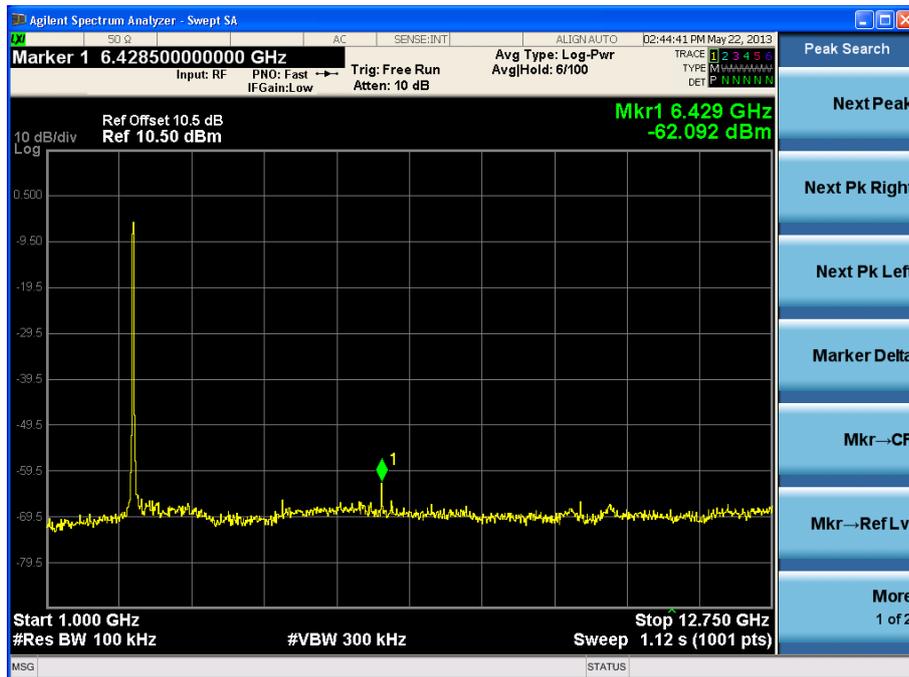
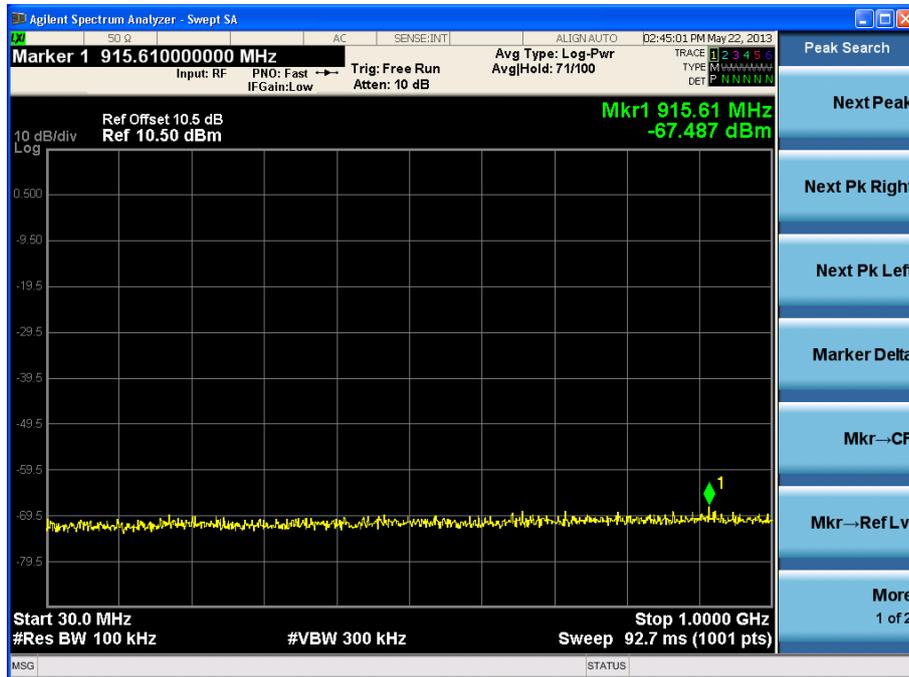
Carrier frequency (MHz): 2462

Channel No.:11

Test Mode: 802.11g

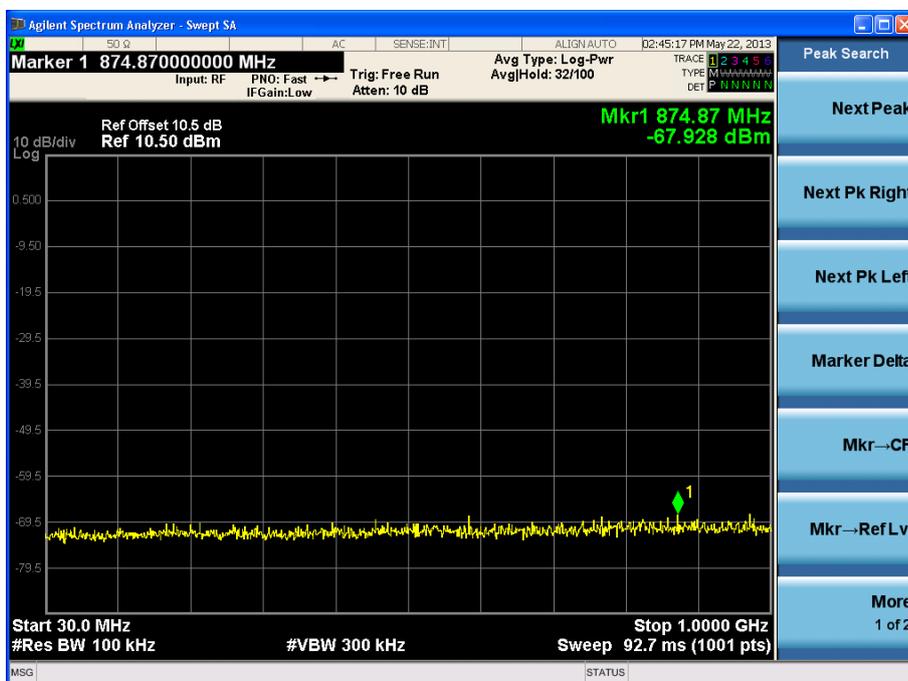
Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

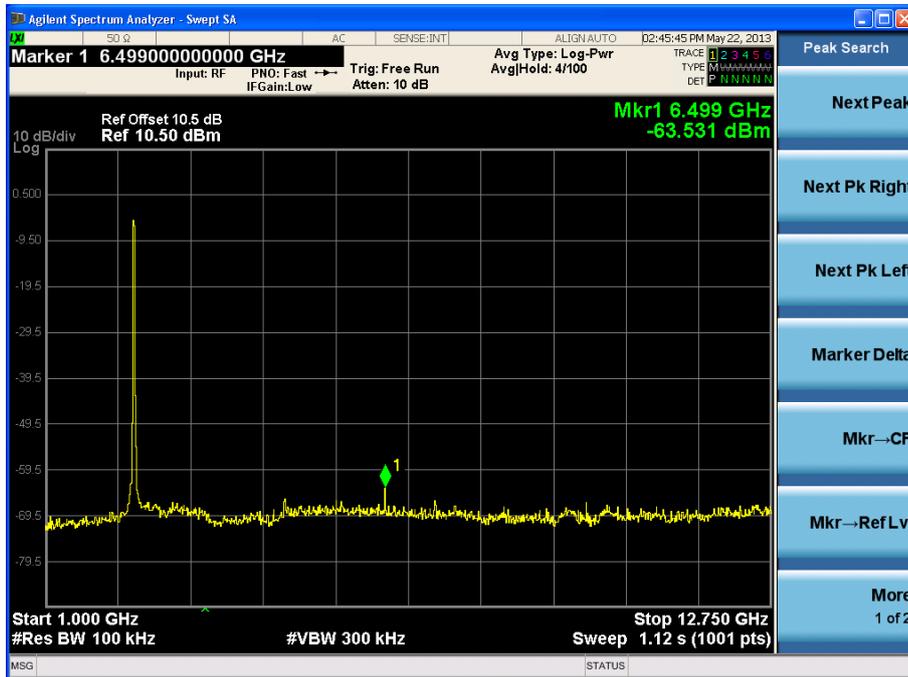
Note: The Reference value see 2.2.6 Band edge compliance



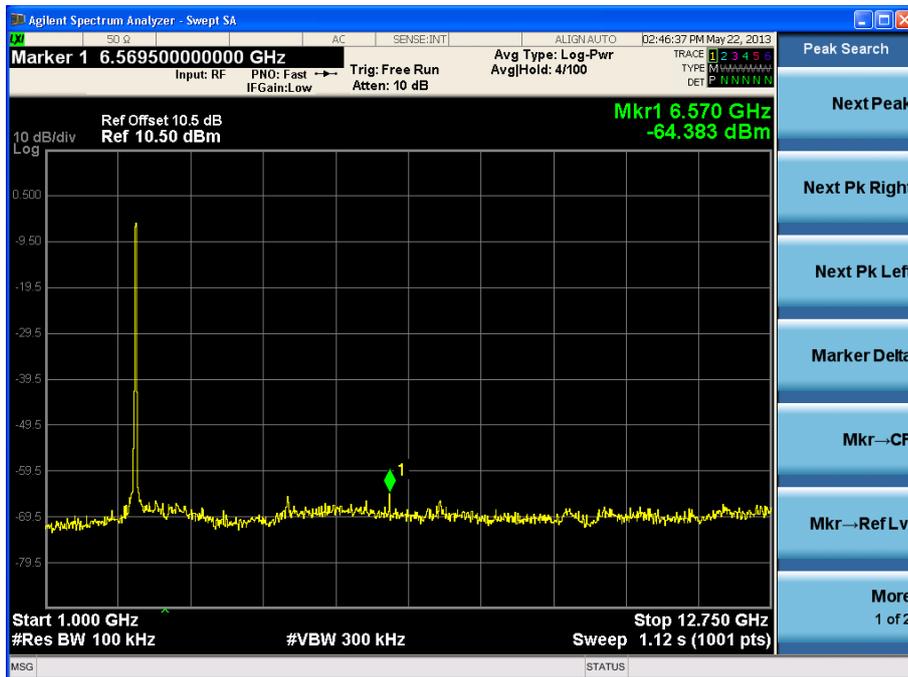
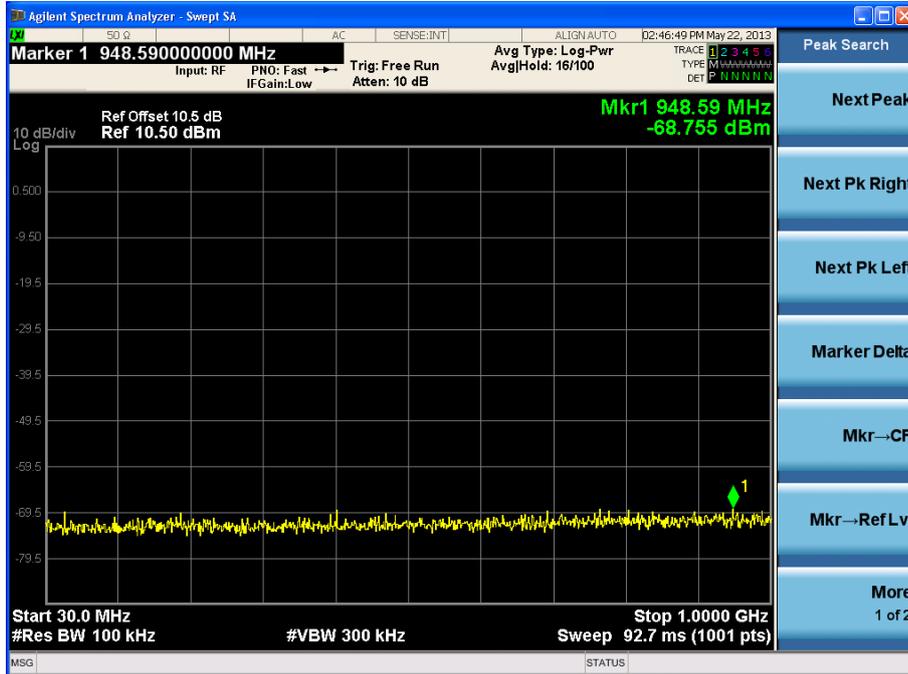


Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11g





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





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

Carrier frequency (MHz): 2412

Channel No.:1

Test Mode: 802.11n(HT20)

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2437

Channel No.:6

Test Mode: 802.11n(HT20)

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

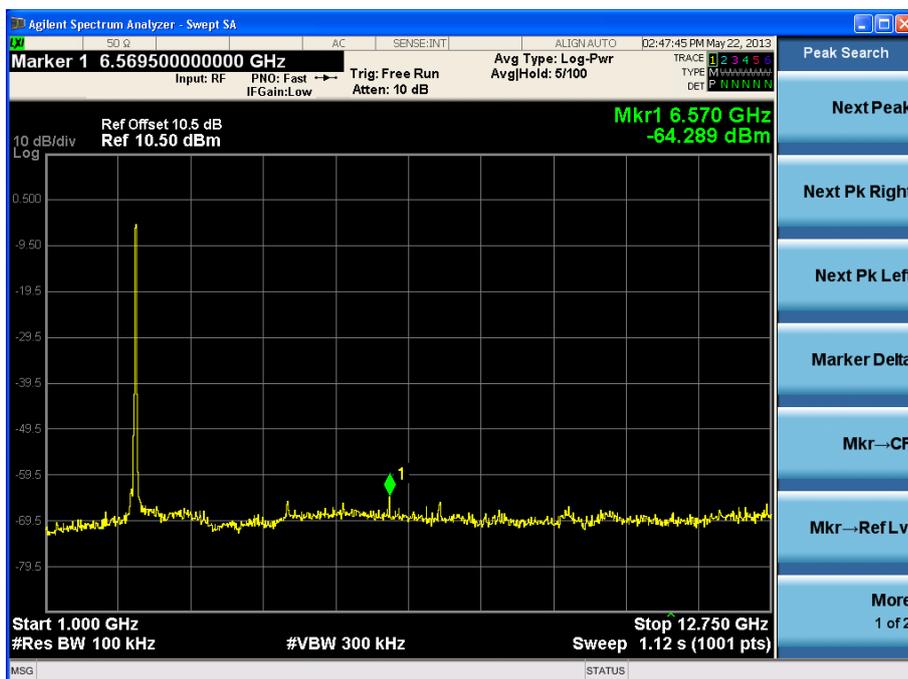
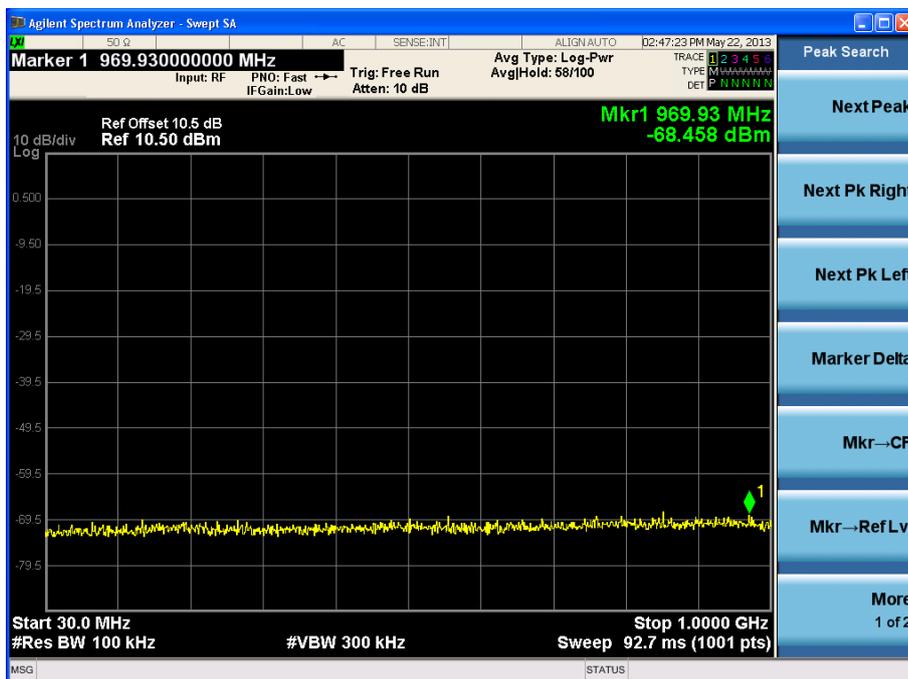
Carrier frequency (MHz): 2462

Channel No.:11

Test Mode: 802.11n(HT20)

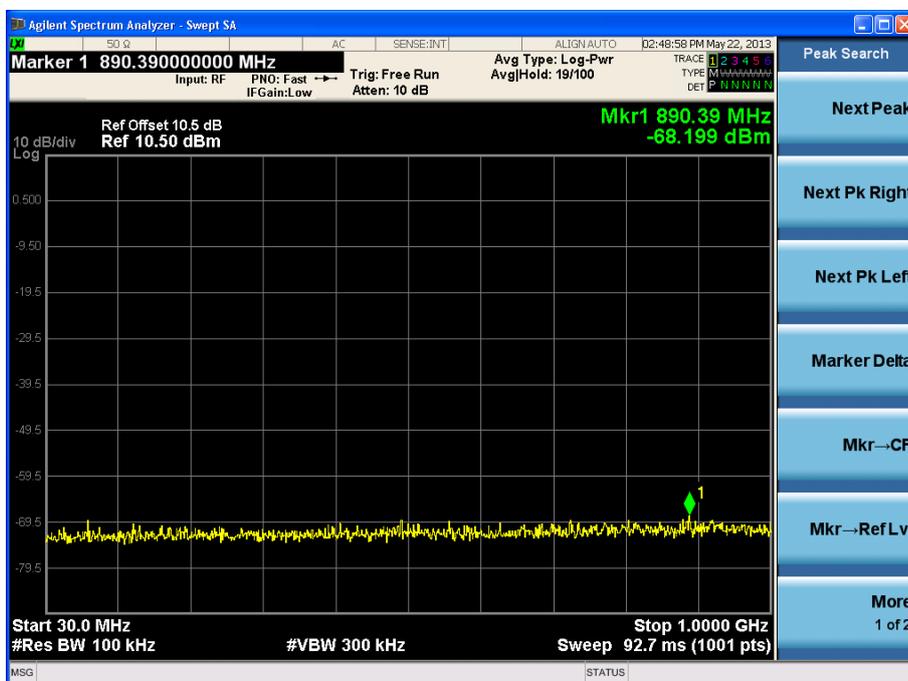
Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

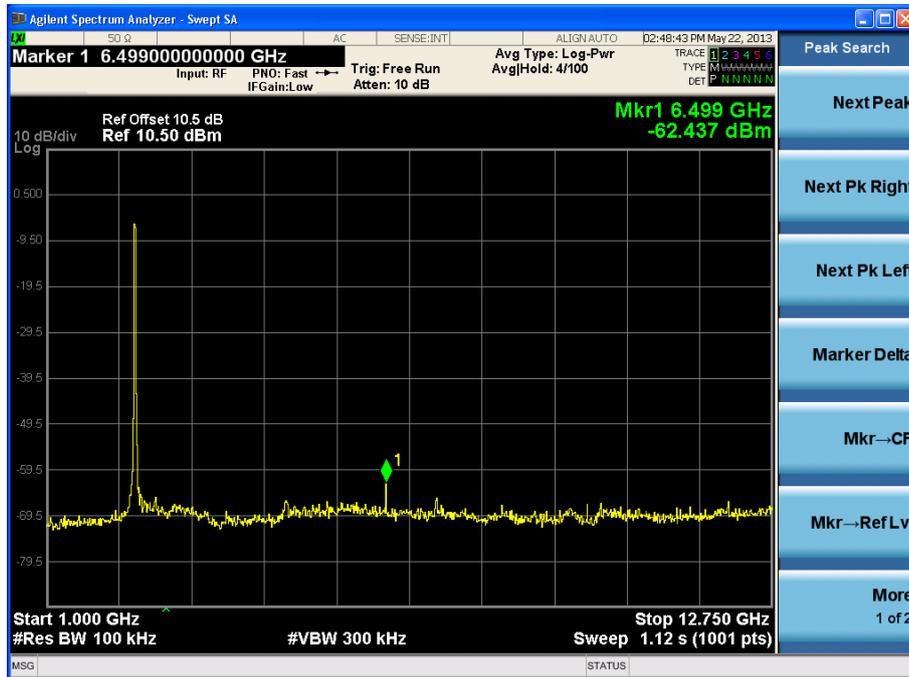
Note: The Reference value see 2.2.6 Band edge compliance



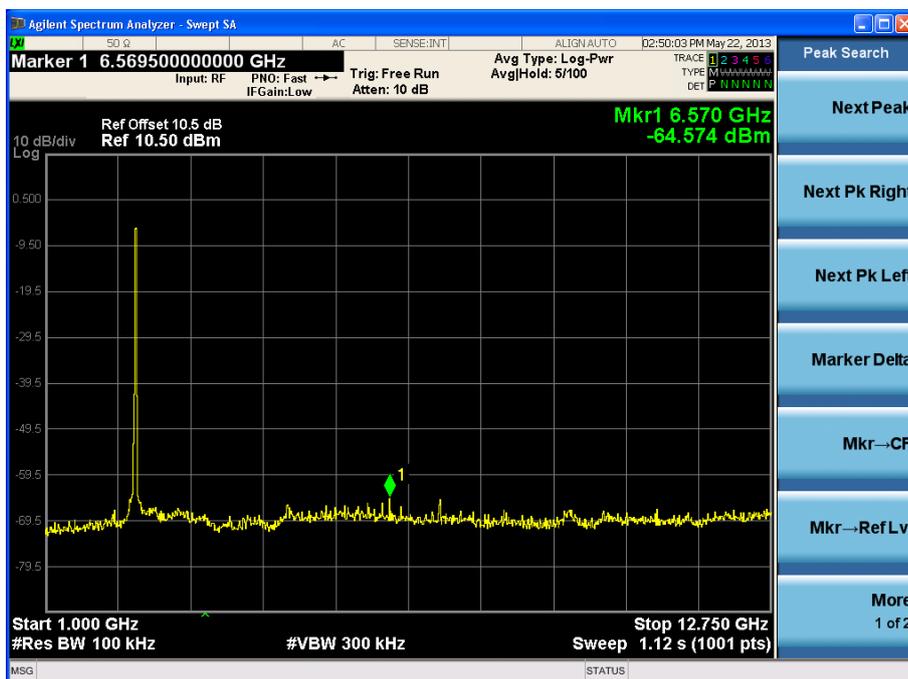
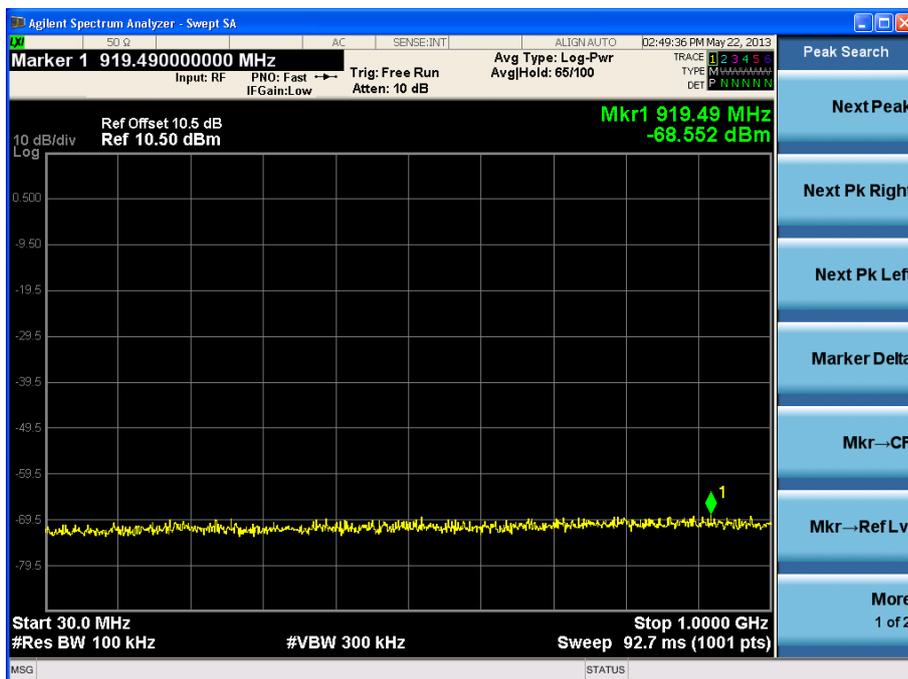


Carrier frequency (MHz): 2412
Channel No.:1
Test Mode: 802.11n(HT20)





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





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

Carrier frequency (MHz): 2422

Channel No.:3

Test Mode: 802.11n(HT40)

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

Carrier frequency (MHz): 2442

Channel No.:7

Test Mode: 802.11n(HT40)

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

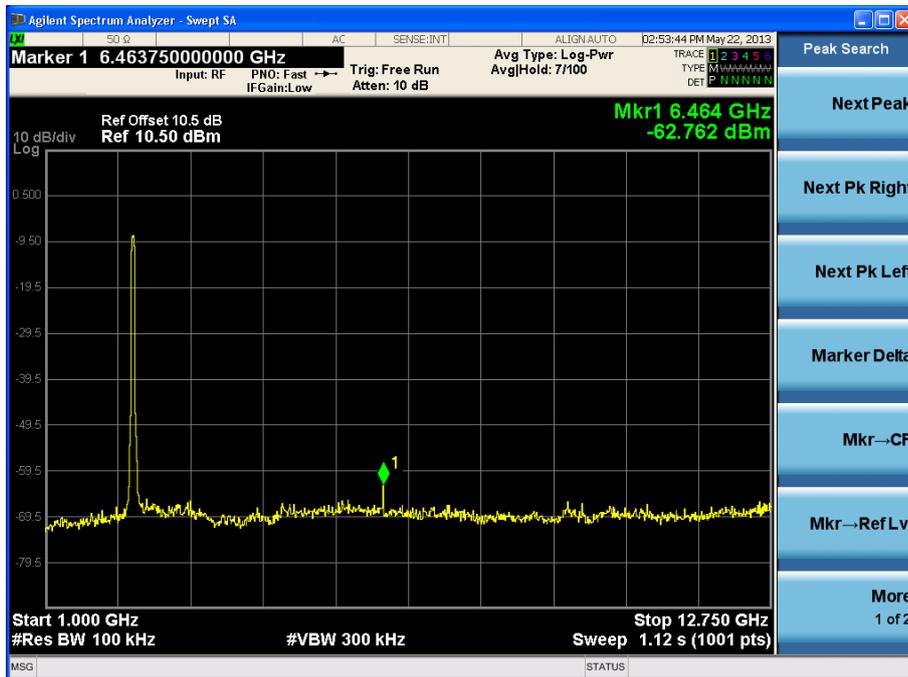
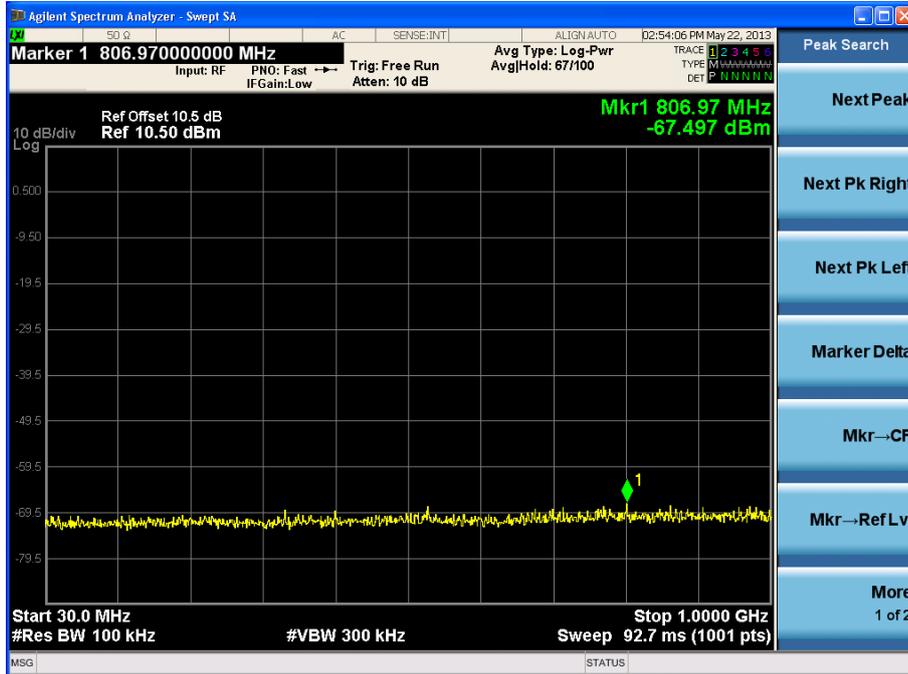
Carrier frequency (MHz): 2462

Channel No.:11

Test Mode: 802.11n(HT40)

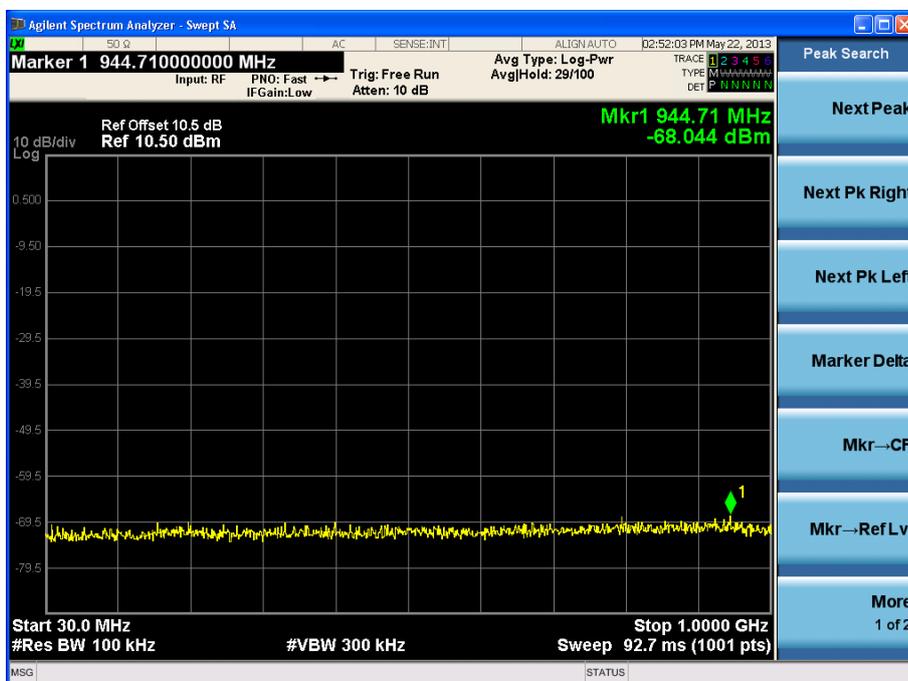
Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
---	---	---	---	---
---	---	---	---	---

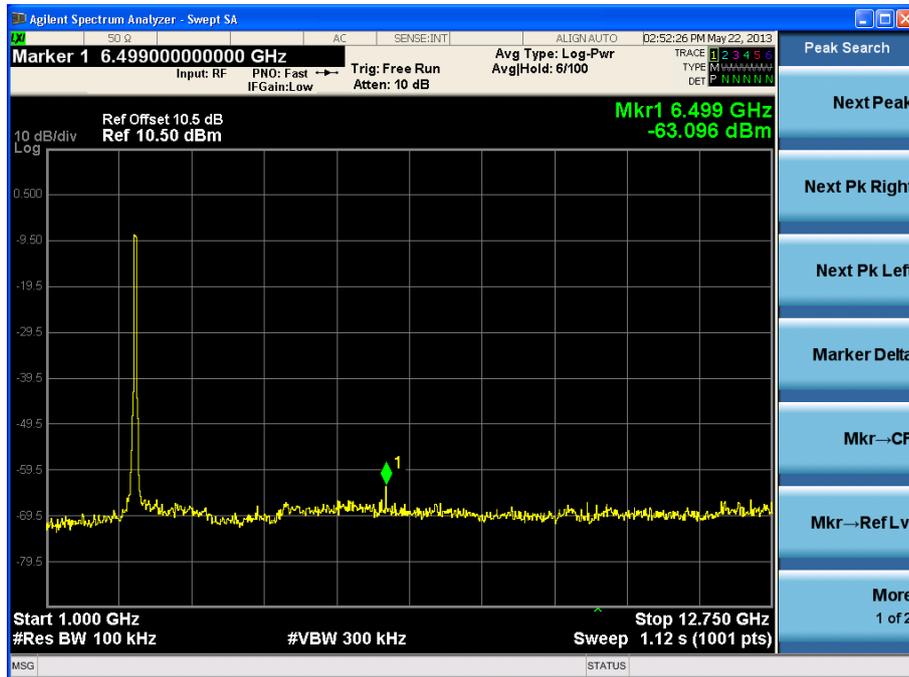
Note: The Reference value see 2.2.6 Band edge compliance



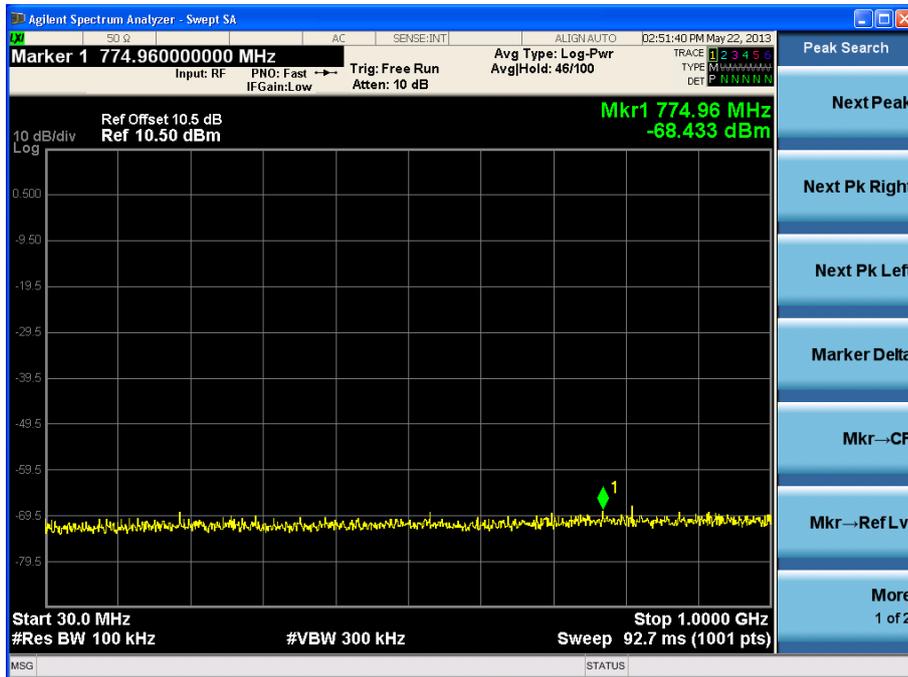


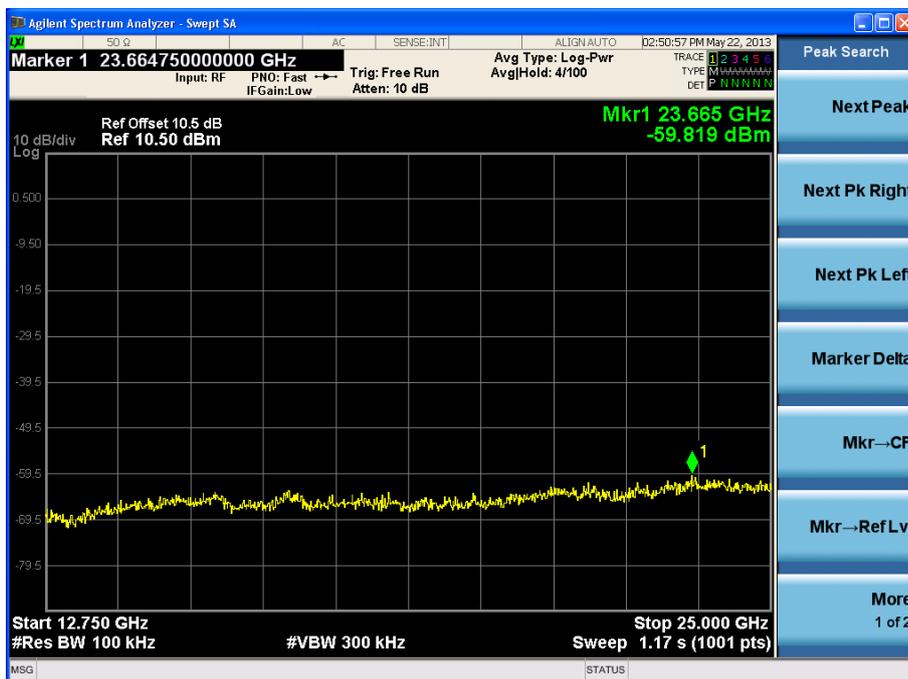
Carrier frequency (MHz): 2422
Channel No.:3
Test Mode: 802.11n(HT40)





Carrier frequency (MHz): 2442
Channel No.:7
Test Mode: 802.11n(HT40)





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

2.2.5 Spurious Radiated Emissions

2.2.5.1 Ambient condition

Temperature	Relative humidity	Pressure
17.6°C	32.4%	100.2kPa

2.2.5.2 Test Description

The measurement is made according to ANSI C63.4-2009.

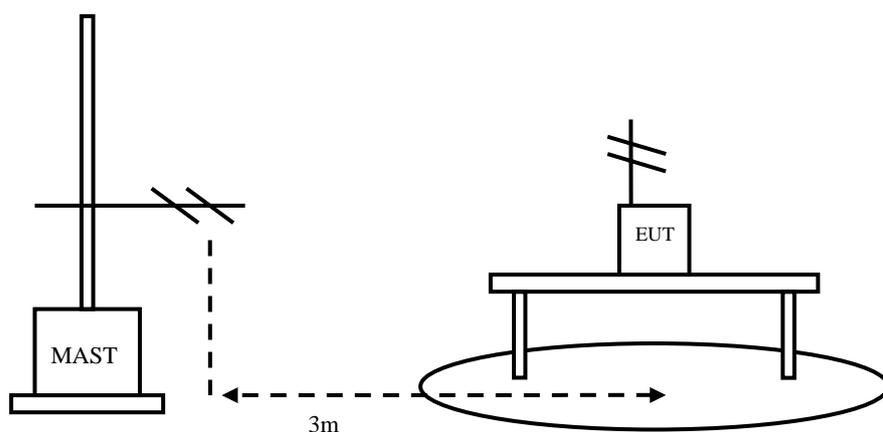
The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

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 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 for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The results (reference to 2.2.5.4) 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.



2.2.5.3 Test limit

FCC Part15.247(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)).

FCC Part15.209(a), Radiated Emission Limits

Frequency Range (MHz)	Class B Limit (dBμV/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

2.2.5.4 Test result

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.

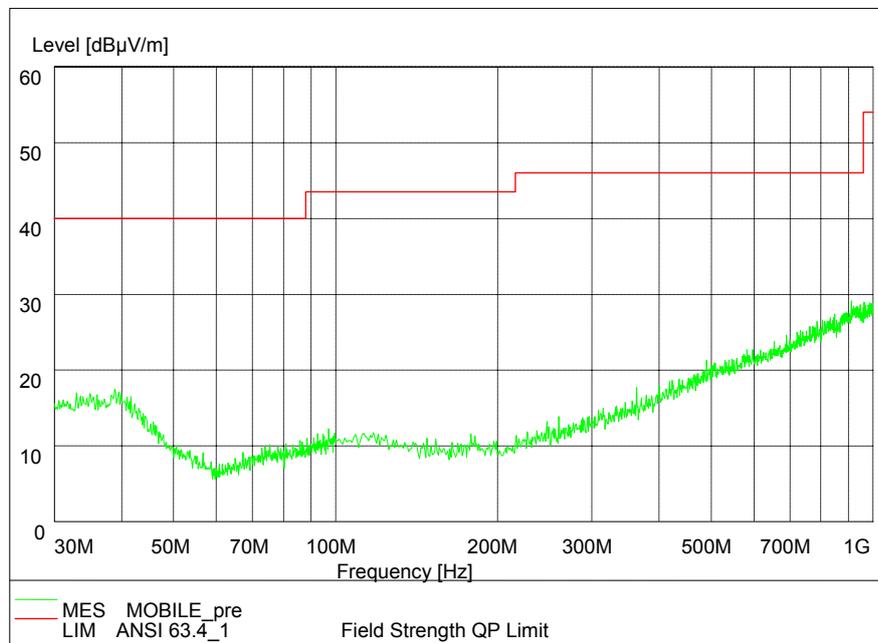
The measurement results are obtained as described below:

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

The worst case attitude: The mobile lay down.

Carrier frequency (MHz): 2437

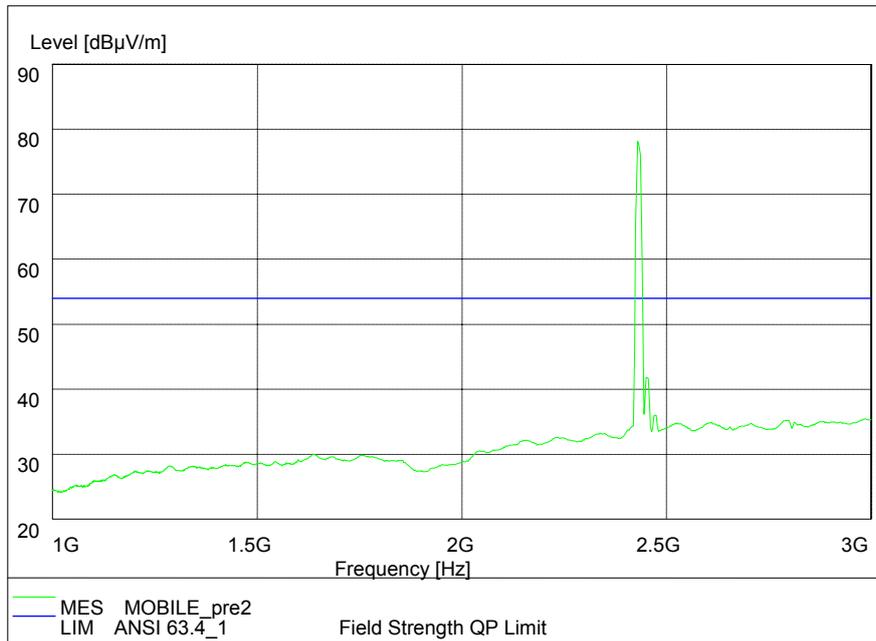
Channel No.:6



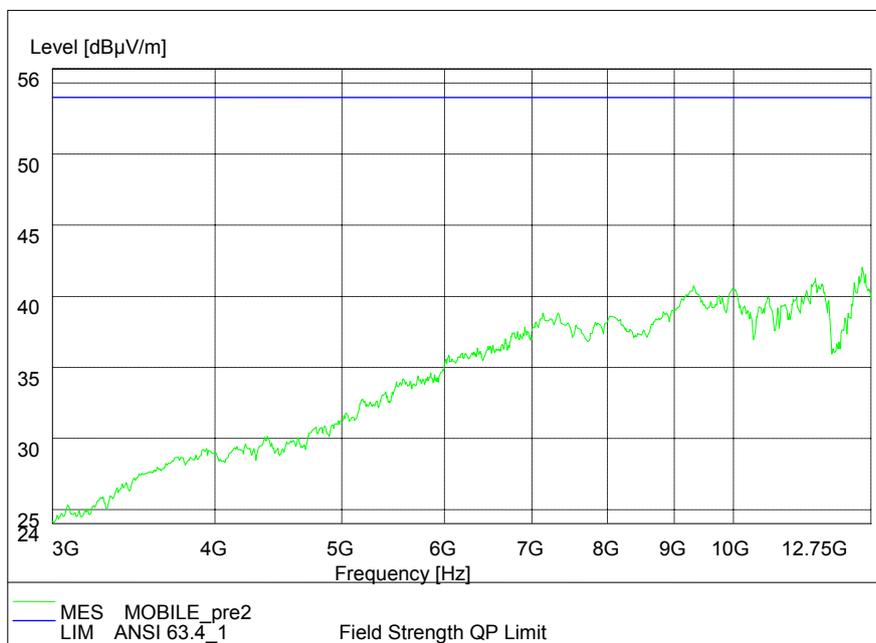
Frequency Range: 30MHz -1GHz

Detector: PK mode

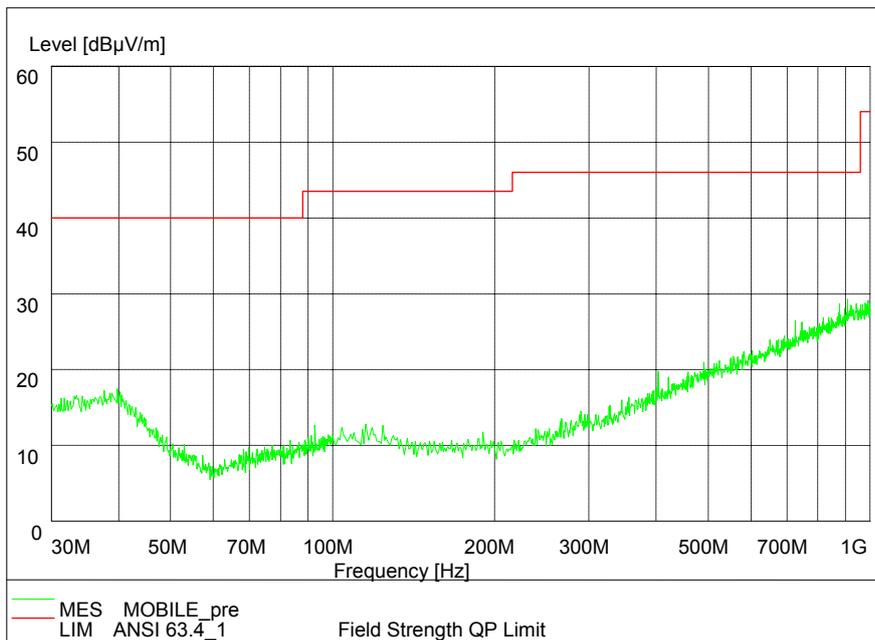
Test Mode: 802.11b



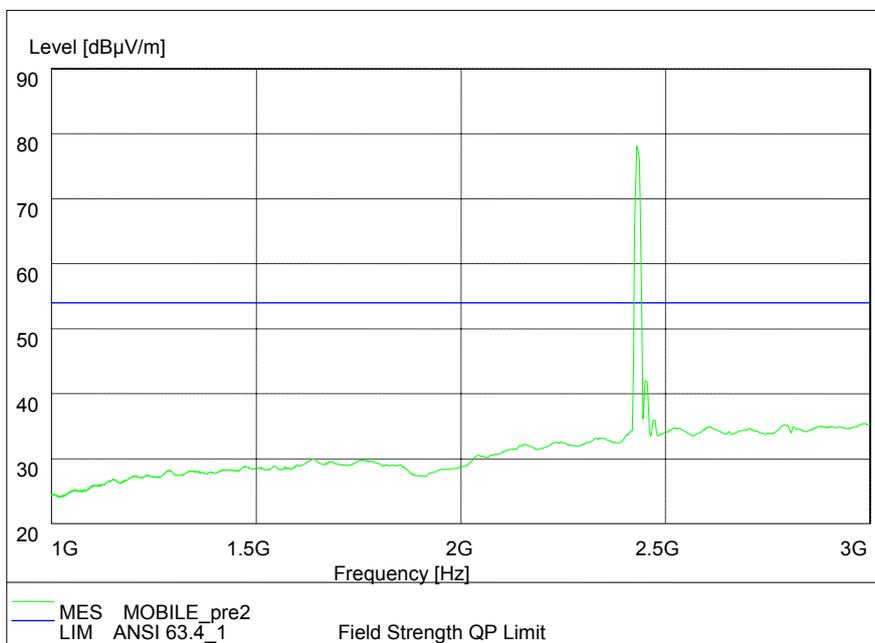
Frequency Range: 1GHz -3GHz
 Detector: PK mode
 Modulation type: 802.11b



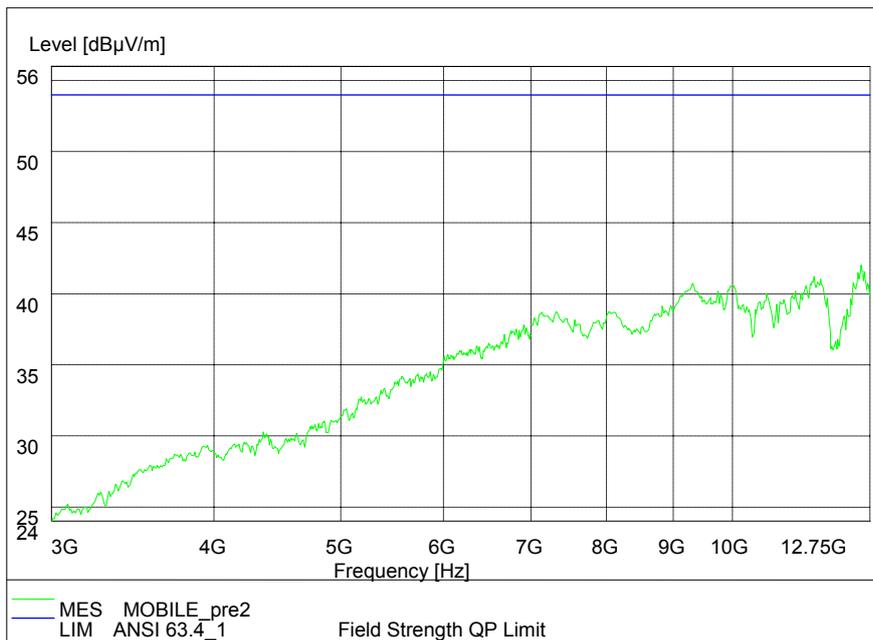
Frequency Range: 3GHz -12.75GHz
 Detector: PK mode
 Modulation type: 802.11b



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



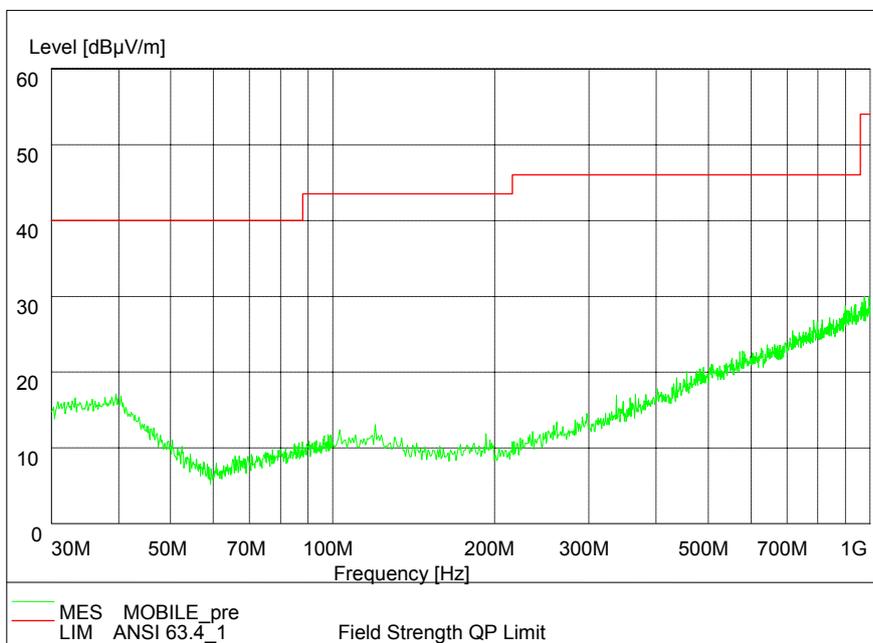
Frequency Range: 1GHz -3GHz
 Detector: PK mode
 Modulation type: 802.11g



Frequency Range: 3GHz -12.75GHz

Detector: PK mode

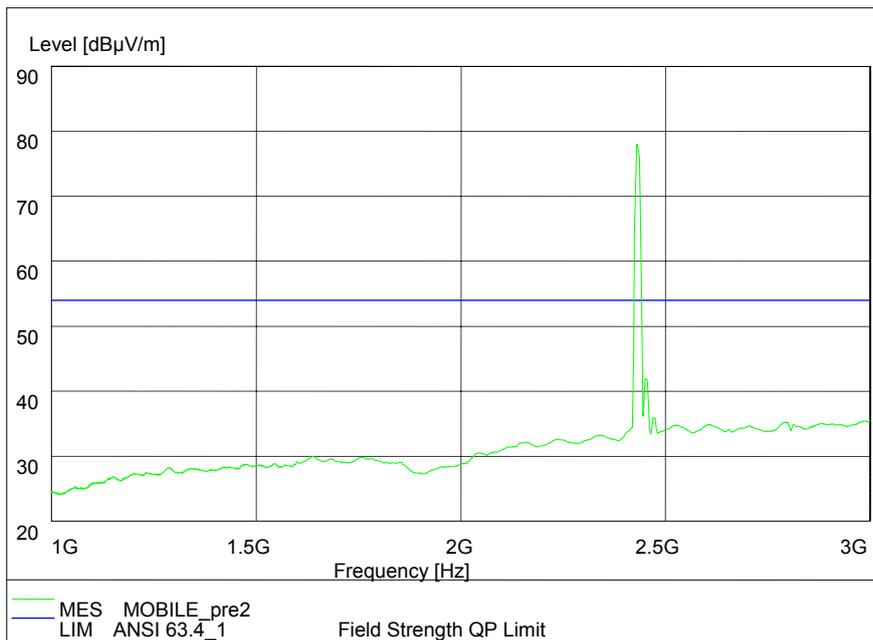
Modulation type: 802.11g



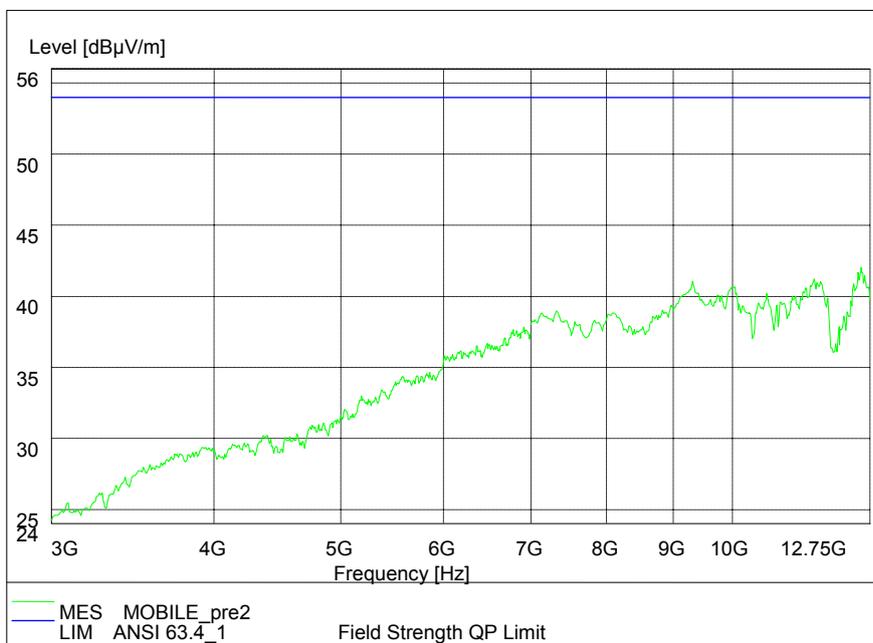
Frequency Range: 30MHz -1GHz

Detector: PK mode

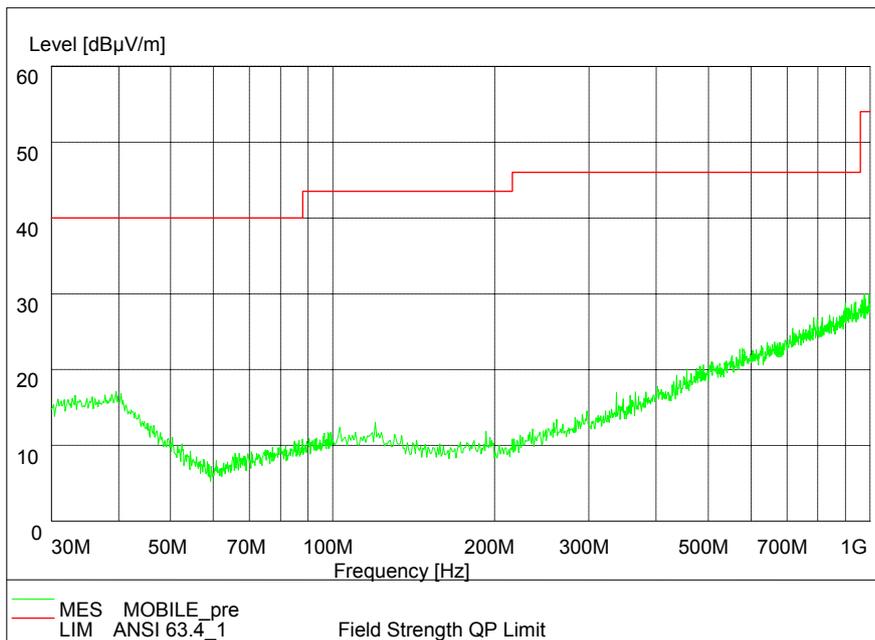
Modulation type: 802.11n(HT20)



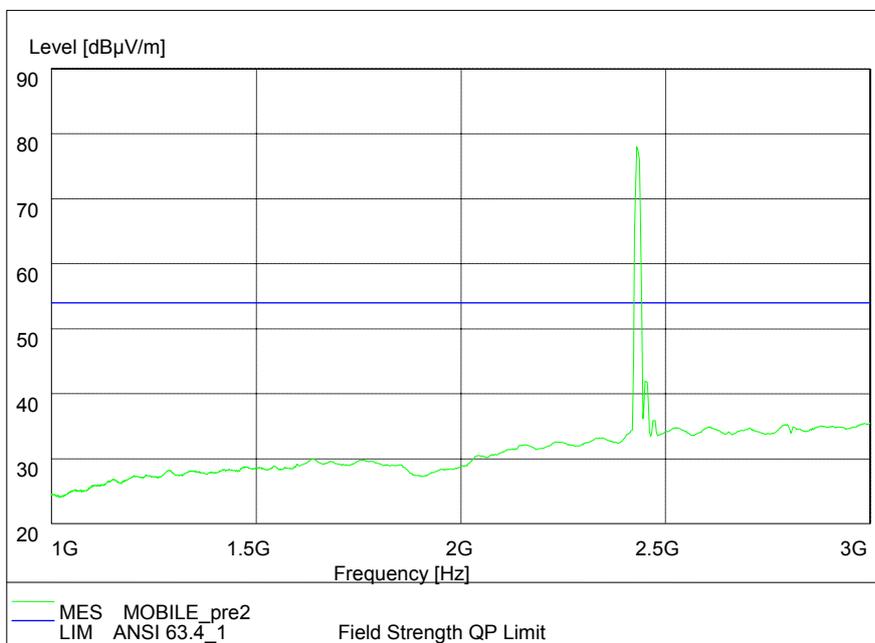
Frequency Range: 1GHz -3GHz
 Detector: PK mode
 Modulation type: 802.11n(HT20)



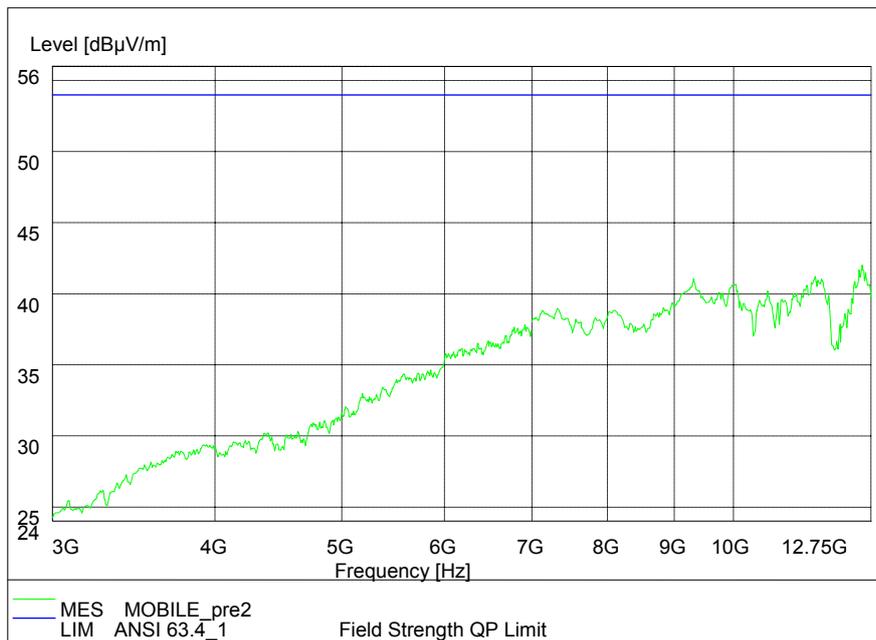
Frequency Range: 3GHz -12.75GHz
 Detector: PK mode
 Modulation type: 802.11n(HT20)



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



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



Frequency Range: 3GHz -12.75GHz

Detector: PK mode

Modulation type: 802.11n(HT40)

2.2.6 Band Edge Compliance

2.2.6.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.1kPa

2.2.6.2 Test Description

The measurement is made according to ANSI C63.10-2009.

2.2.6.2.1 RF Conducted Measurement:

The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements.

The EUT was connected to the spectrum analyzer and WiFi test set via a power splitter with a known loss.

For the first measurement the EUT is set to transmit on the lowest channel (2412 MHz). The lower band edge is 2390 MHz.

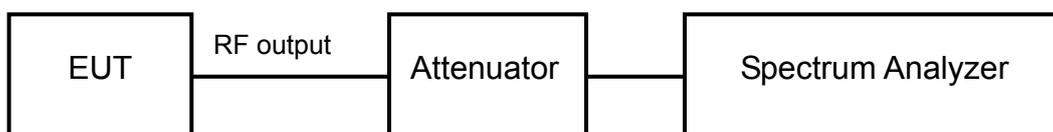
Analyzer settings:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz

For the second measurement the EUT is set to transmit on the highest channel (2472MHz). The higher band edge is 2483.5 MHz.

Analyzer settings:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz



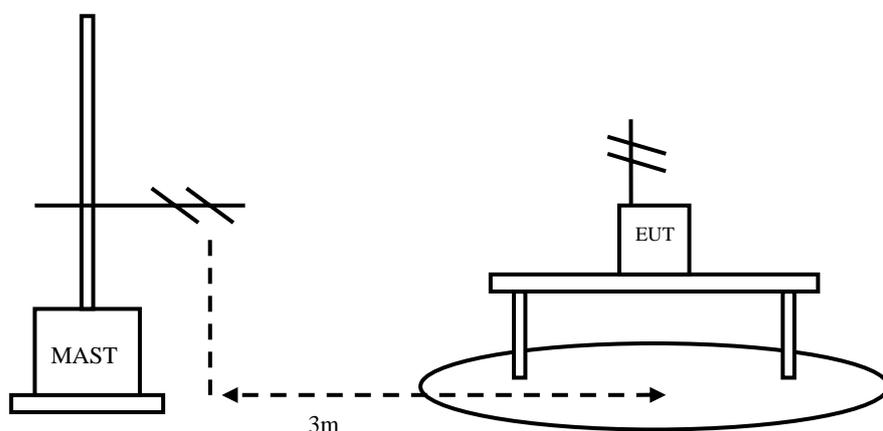
2.2.6.2.2 Radiated Measurement

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.

During the test, 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 for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The results (reference to 2.2.6.5) 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.



2.2.6.3 Test limit

FCC Part15.247(d)

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

2.2.6.4 Test result

2.2.6.4.1 RF Conducted Measurement

Carrier frequency (MHz): 2412

Channel No.:1

Test Mode: 802.11b

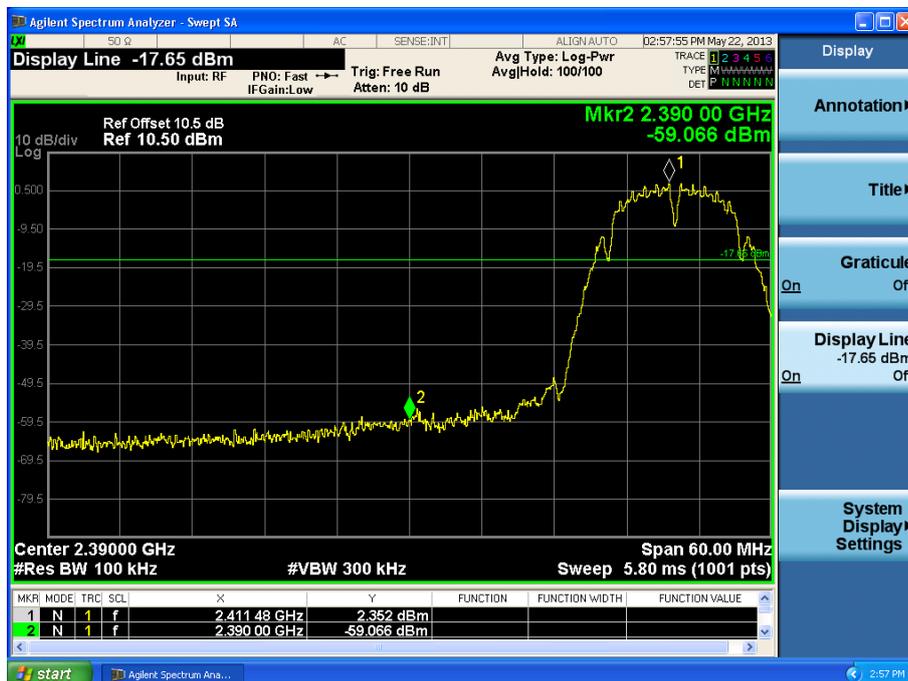
Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2390	-59.07	2.35	-17.65	61.42

Carrier frequency (MHz): 2462

Channel No.:11

Test Mode: 802.11b

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2483.5	-55.79	2.58	-17.42	58.37



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

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

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2390	-53.63	-3.81	-23.81	49.82

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

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2483.5	-48.30	-4.80	-24.80	43.50



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

Carrier frequency (MHz): 2412

Channel No.:1

Test Mode: 802.11n(HT20)

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2390	-52.85	-3.55	-23.55	49.30

Carrier frequency (MHz): 2462

Channel No.:11

Test Mode: 802.11n(HT20)

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2483.5	-46.96	-3.74	-23.74	43.22



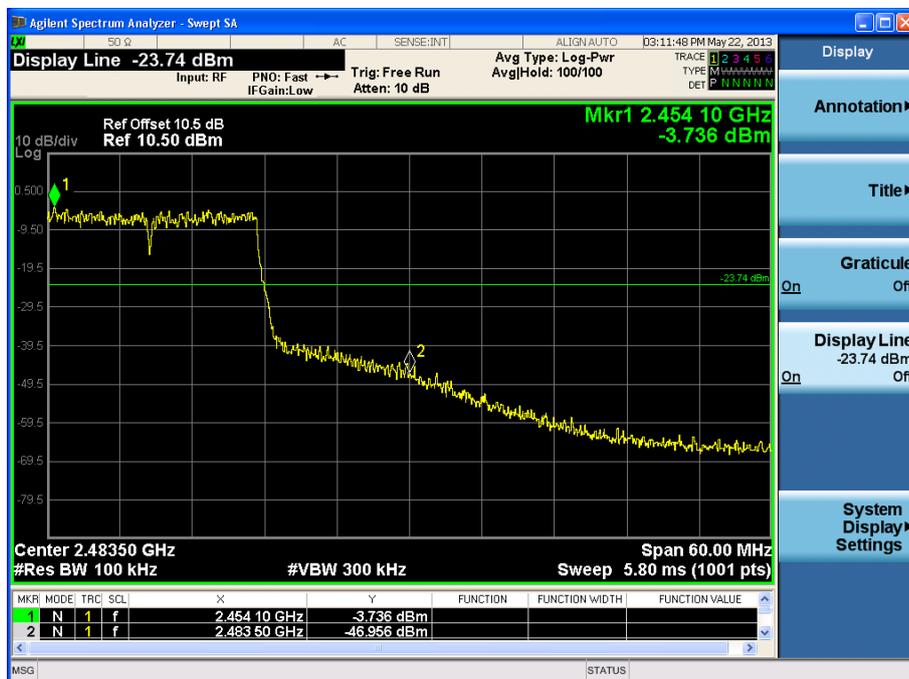
Carrier frequency (MHz): 2412

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)

Carrier frequency (MHz): 2422

Channel No.:3

Test Mode: 802.11n(HT40)

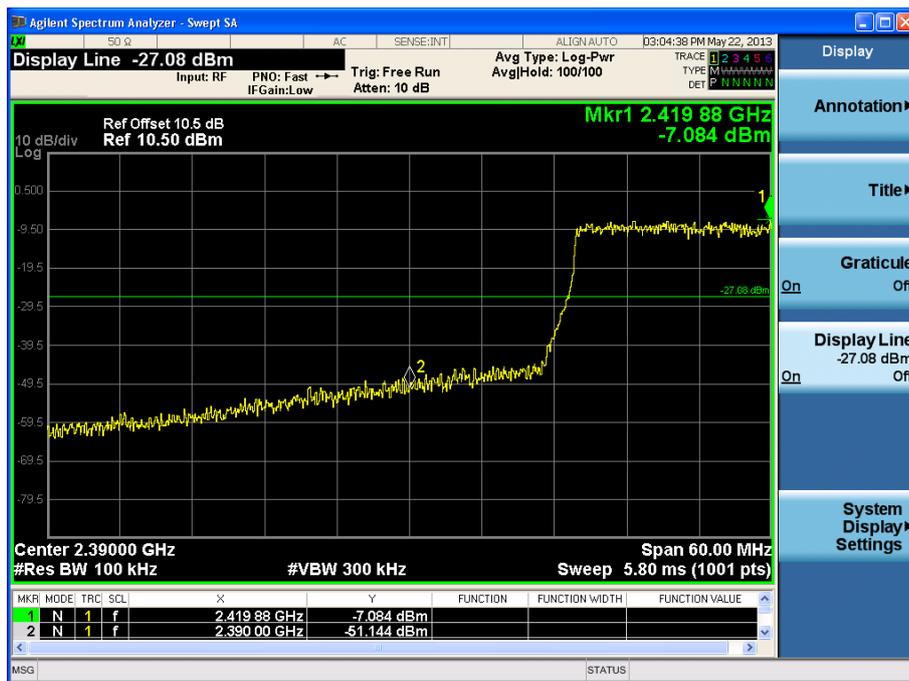
Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2390	-51.14	-7.08	-27.08	44.06

Carrier frequency (MHz): 2462

Channel No.:11

Test Mode: 802.11n(HT40)

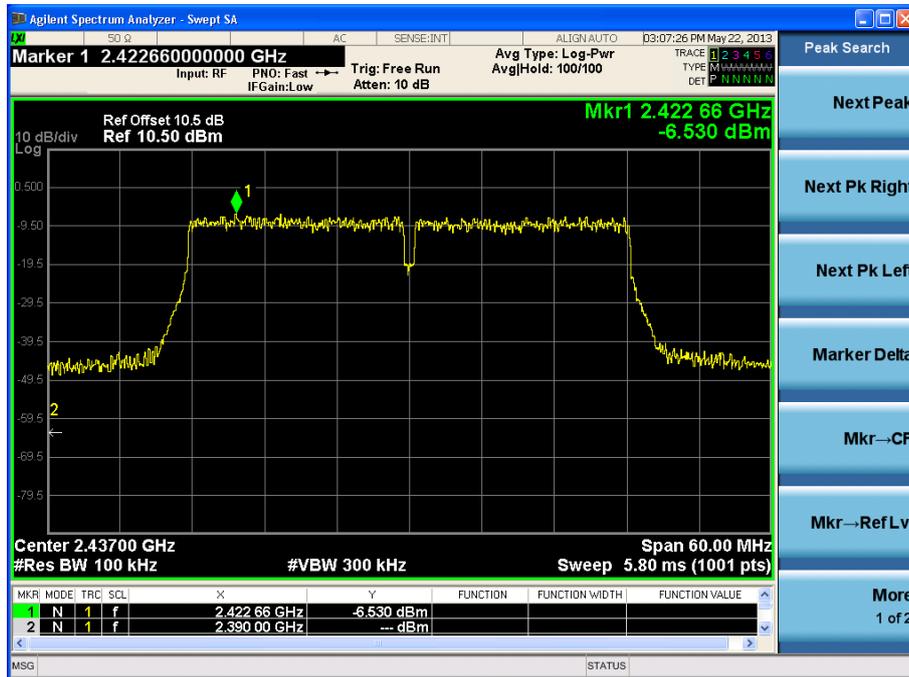
Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta dB
2483.5	-44.14	-6.74	-26.74	37.40



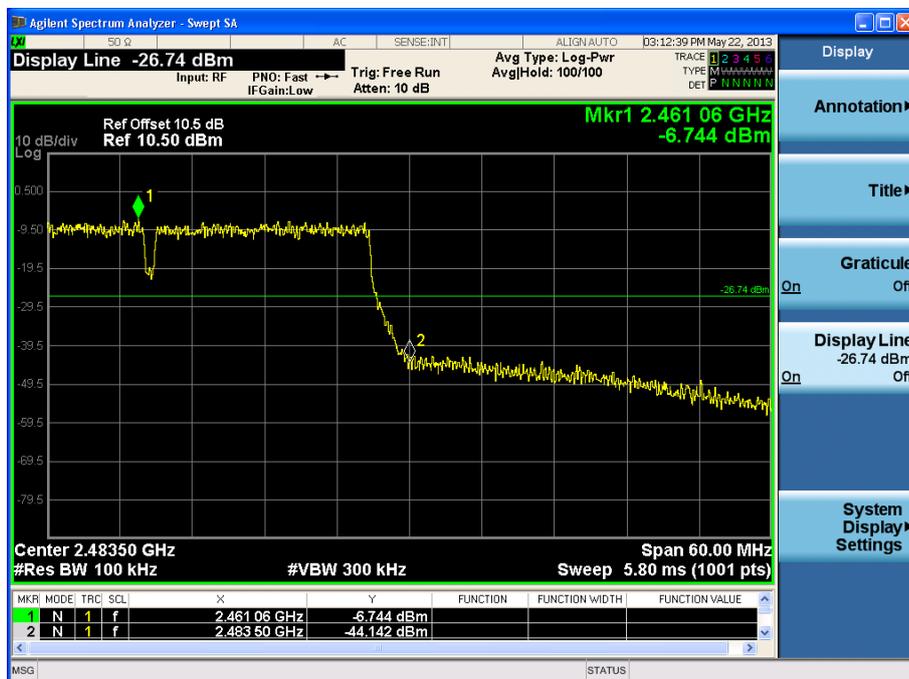
Carrier frequency (MHz): 2422

Channel No.:3

Test Mode: 802.11n(HT40)



Carrier frequency (MHz): 2442
Channel No.:7
Test Mode: 802.11n(HT40)



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

2.2.6.4.2 Radiated Emission Band Edge

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	2413.22	97.96	63.96	N/A	N/A	8.90	25.10
2	2390.00	48.66	14.66	-25.29	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	2411.23	93.02	59.02	N/A	N/A	8.90	25.10
2	2390.00	47.00	13.00	-26.95	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	2412.24	91.99	57.99	N/A	N/A	8.90	25.10
2	2390.00	43.06	9.06	-10.99	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	2411.56	90.93	56.93	N/A	N/A	8.90	25.10
2	2390.00	41.17	7.17	-12.78	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	2462.46	94.27	60.27	N/A	N/A	8.90	25.10
2	2483.50	51.29	17.29	-22.66	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	2461.02	93.61	59.61	N/A	N/A	8.90	25.10
2	2483.50	50.40	16.40	-23.55	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	2461.28	91.94	57.94	N/A	N/A	8.90	25.10
2	2483.50	38.62	4.62	-15.33	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	2460.82	89.28	55.28	N/A	N/A	8.90	25.10
2	2483.50	40.39	6.39	-13.56	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	2416.24	96.37	62.37	N/A	N/A	8.90	25.10
2	2390.00	55.29	21.29	-18.66	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	2418.81	95.43	61.43	N/A	N/A	8.90	25.10
2	2390.00	56.34	22.34	-17.61	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	2417.25	84.33	50.33	N/A	N/A	8.90	25.10
2	2390.00	36.49	2.49	-17.46	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	2406.26	86.39	52.39	N/A	N/A	8.90	25.10
2	2390.00	40.46	6.36	-13.49	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	2468.28	93.46	59.46	N/A	N/A	8.90	25.10
2	2483.50	57.47	23.47	-16.48	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	2457.64	96.53	62.53	N/A	N/A	8.90	25.10
2	2483.50	59.50	25.50	-14.45	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	2468.68	83.41	49.41	N/A	N/A	8.90	25.10
2	2483.50	38.47	4.47	-15.48	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	2457.60	84.26	50.26	N/A	N/A	8.90	25.10
2	2483.50	41.06	7.06	-12.89	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	2413.22	97.99	63.99	N/A	N/A	8.90	25.10
2	2390.00	48.69	14.69	-25.29	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	2411.23	93.05	59.05	N/A	N/A	8.90	25.10
2	2390.00	47.03	13.03	-26.95	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	2412.24	92.02	58.02	N/A	N/A	8.90	25.10
2	2390.00	43.09	9.09	-10.99	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	2411.56	90.96	56.96	N/A	N/A	8.90	25.10
2	2390.00	41.20	7.20	-12.78	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	2462.46	94.30	60.30	N/A	N/A	8.90	25.10
2	2483.50	51.32	17.32	-22.66	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	2461.02	93.64	59.64	N/A	N/A	8.90	25.10
2	2483.50	50.43	16.43	-23.55	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	2461.28	91.97	57.97	N/A	N/A	8.90	25.10
2	2483.50	38.65	4.65	-15.33	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	2460.82	89.31	55.31	N/A	N/A	8.90	25.10
2	2483.50	40.42	6.42	-13.56	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	2416.24	96.40	62.40	N/A	N/A	8.90	25.10
2	2390.00	55.32	21.32	-18.66	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	2418.81	95.46	61.46	N/A	N/A	8.90	25.10
2	2390.00	56.37	22.37	-17.61	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	2417.25	84.36	50.36	N/A	N/A	8.90	25.10
2	2390.00	36.52	2.52	-17.46	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	2406.26	86.42	52.42	N/A	N/A	8.90	25.10
2	2390.00	40.49	6.39	-13.49	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	2468.28	93.49	59.49	N/A	N/A	8.90	25.10
2	2483.50	57.50	23.50	-16.48	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	2457.64	96.56	62.56	N/A	N/A	8.90	25.10
2	2483.50	59.53	25.53	-14.45	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	2468.68	83.44	49.44	N/A	N/A	8.90	25.10
2	2483.50	38.50	4.50	-15.48	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	2457.60	84.29	50.29	N/A	N/A	8.90	25.10
2	2483.50	41.09	7.09	-12.89	54.00	8.90	25.10

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 N9020A	Agilent	MY48010771	2013.08.20
2.	Signal Generator E8257D	Agilent	MY46520645	2013.08.20
3.	Attenuation 779	Narda	04702	2013.08.20
4.	Cable N-N	Spectrum	6-046	2013.08.20
5.	Cable N-N	Spectrum	6-050	2013.08.20
6.	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	----	----
7.	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	----
8.	Turn table Diameter:1m	HD	----	----
9.	Turn table Diameter:5m	HD	----	----
10.	Antenna master FAC(MA4.0)	MATURO	----	----
11.	Antenna master SAC(MA4.0)	MATURO	----	----
12.	9.080m×5.255m×3.525m Shielding room	FRANKONIA	----	----
13.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2013.08.20
14.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	2013.08.20
15.	HL562 Ultra log antenna	R&S	100016	2013.08.20
16.	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2013.08.20
17.	ESI 40 EMI test receiver	R&S	100015	2013.08.20
18.	Radio tester	CMU 200	114667	2013.08.20
19.	ESCS30 EMI test receiver	R&S	100029	2013.08.20
20.	HL562 Receive antenna	R&S	100167	2013.08.20
21.	ESH3-Z5 LISN	R&S	100020	2013.08.20

Appendix

Appendix1 Test Setup