
FCC PART 15 SUBPART C MEASUREMENT AND TEST REPORT

For

Shenzhen Spreadview Century Technology Co., Ltd

**13-A1, Shijhaoting Mansion, Chegongmiao, Futian District, Shenzhen,
518040, P.R.China**

E.U.T.: SMART Pico

Model Name: P96, D5, FHD-90a, SMT-80

Brand Name: Juneto, Axer, Lumex, Sooall

FCC ID: 2ACZZP96

Report Number: NTC1408101F-1

Test Date(s): August 20, 2014 to September 04, 2014

Report Date(s): September 04, 2014

Prepared by

Dongguan Nore Testing Center Co., Ltd.

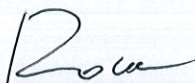
**Building D, Gaosheng Science and Technology Park, Hongtu Road,
Nancheng District, Dongguan City, Guangdong, China**

Tel: +86-769-22022444

Fax: +86-769-22022799

Prepared By

Approved & Authorized Signer


Rose Hu / Engineer


Sunm Lv / Q.A. Director

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Dongguan Nore Testing Center Co., Ltd. The test results referenced from this report are relevant only to the sample tested.



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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

This device is a smart projector with WIFI, BT and project, etc functions. It's powered by DC 5V come from Adapter or DC 3.7V internal Li-ion battery. For more details features, please refer to User's Manual.

Manufacturer : Shenzhen Spreadview Century Technology Co., Ltd

Address : 13-A1, Shijhaoting Mansion, Chegongmiao, Futian District, Shenzhen, 518040, P.R.China

Power Supply : DC 5V com from Adapter,
Adapter M/N: GP303U-050-300
Input: AC 100-240V 50/60Hz 0.8A
Output: DC 5V 3A
DC 3.7V Li-ion battery

Model name : P96, D5, FHD-90a, SMT-80

Note: : All models have the same circuitry, electrical mechanical and physical construction. Their differences in model name and trade mark for trading purpose.

Technical parameters

For WIFI Function

| | |
|-------------------|---|
| Frequency Range | : 2412-2462MHz for 802.11b/g/n(HT20) |
| Modulation | : CCK, DQPSK, DBPSK for 802.11b OFDM for 802.11g/n |
| Number of Channel | : 11 for 802.11b/g/n(HT20) |
| Channel space | : 5MHz |
| Date Rate | : 802.11b:1~11Mbps, 802.11g:6~54Mbps 802.11n: 6.5~65Mbps |
| Antenna Type | : PCB |
| Antenna Gain | : 0 dBi (declared by manufacturer) |

For BT function

| | |
|-------------------|---|
| BT Version | : BLE and backward compatible 3.0HS, 2.1+EDR version. We prepare version BLE and 2.1+EDR for RF test. |
| Frequency: | : 2402-2480MHz |
| Modulation | : For V2.1+EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK For V4.0: GFSK |
| Number of Channel | : For V2.1+EDR: 79; For V4.0: 40 |
| Channel space | : For V2.1+EDR: 1MHz; For V4.0: 2MHz |
| Antenna Type | : PCB |
| Antenna Gain | : 0dBi (declaration by manufacturer) |
| Note | : N/A |

WIFI Function Channel List

| 802.11 b/g/n(HT20) | |
|---------------------------|----------------------|
| Channel | Frequency MHz |
| 1 | 2412 |
| 2 | 2417 |
| 3 | 2422 |
| 4 | 2427 |
| 5 | 2432 |
| 6 | 2437 |
| 7 | 2442 |
| 8 | 2447 |
| 9 | 2452 |
| 10 | 2457 |
| 11 | 2462 |

Note: According to section 15.31(m), regards to the operating frequency range over 10MHz, the Lowest, middle, and the Highest frequency of channel were selected to perform the test. The selected frequency see below:

| 802.11b/g/n(HT20) | |
|--------------------------|----------------------|
| Channel | Frequency MHz |
| 1 | 2412 |
| 6 | 2437 |
| 11 | 2462 |

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2ACZZP96 filing to comply with Section 15.247 of the FCC Part 15(2013), Subpart C Rule.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009) and KDB558074 (v03r02). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters. All other measurements were made in accordance with the procedures in 47 CFR part 2.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

Mouse : Manufacturer: HP
M/N: MODGUO
S/N: PSA1104008298
Data Cable: 1.5m Shielded
CE, FCC: DOC



1.6 Test Facility and Location

Listed by FCC, August 02, 2011
 The Certificate Registration Number is 665078.
 Listed by Industry Canada, July 01, 2011
 The Certificate Registration Number is 46405-9743.

Dongguan NTC Co., Ltd.
 (Full Name: Dongguan Nore Testing Center Co., Ltd.)

Building D, Gaosheng Science and Technology Park, Hongtu Road,
 Nancheng District, Dongguan City, Guangdong, China
 (Full Name: Building D, Gaosheng Science & Technology Park,
 Zhouxi Longxi Road, Nancheng District, Dongguan, Guangdong, China.

1.7 Summary of Test Results

| FCC Rules | Description Of Test | Result |
|-----------------------------|--|------------|
| §15.207 (a) | AC Power Conducted Emission | Compliance |
| §15.247(b)(3) | Max. Conducted Output Power | Compliance |
| §15.247(a)(2) | 6dB Bandwidth | Compliance |
| §15.247(e) | Power Spectral Density | Compliance |
| §15.247(d) | Band Edge and Conducted Spurious Emissions | Compliance |
| §15.247(d),§15.209, §15.205 | Radiated Spurious Emissions and Restricted Bands | Compliance |
| §15.203 | Antenna Requirement | Compliance |

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Special Accessories

Not available for this EUT intended for grant.

2.3 Description of test modes

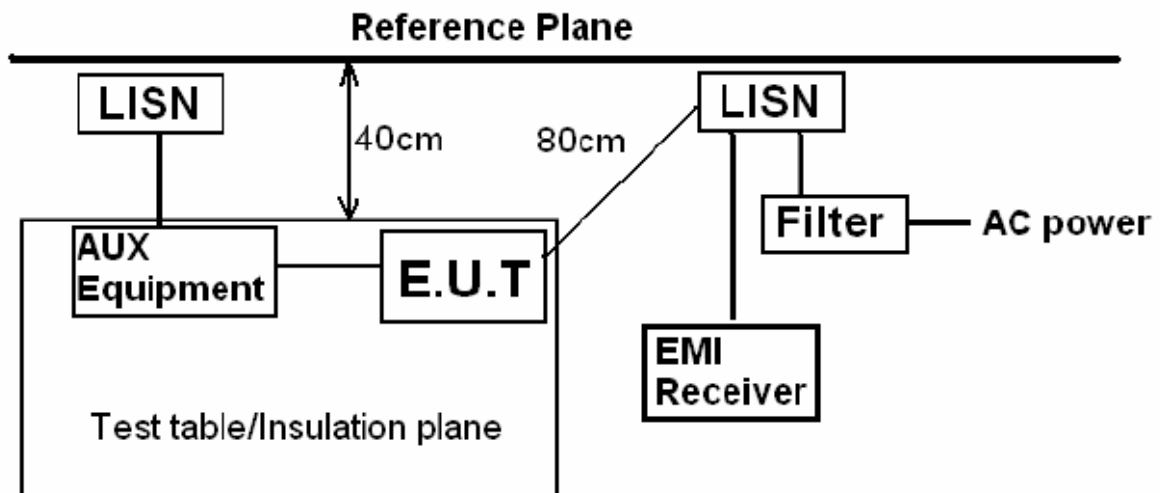
The EUT has been tested under continuous operating condition. Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type CCK, DQPSK, DBPSK, OFDM and all data rate were tested. But only the worst case data is shown in this report.

2.4 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

3. Conducted Emissions Test

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: Charging+WIFI Mode

3.3 Measurement Results

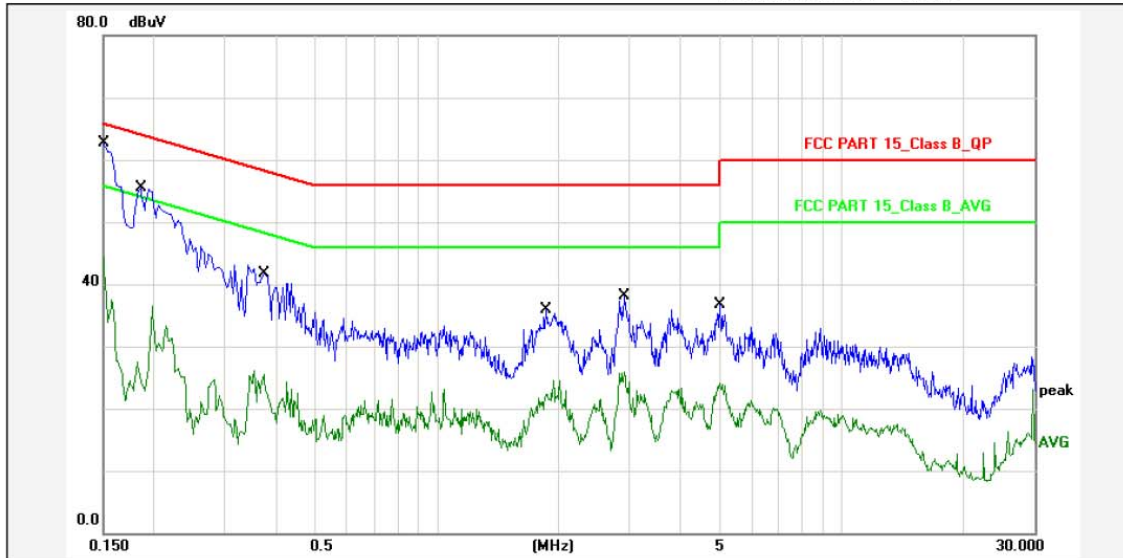
Please refer to following the worst case (802.11b) plots.



Dongguan NTC Co., Ltd.
 Tel: +86-769-22022444 Fax: +86-769-22022799
 Web: <http://www.ntc-c.com>

Site: Conduction

Test Time: 2014-8-21 9:06:25



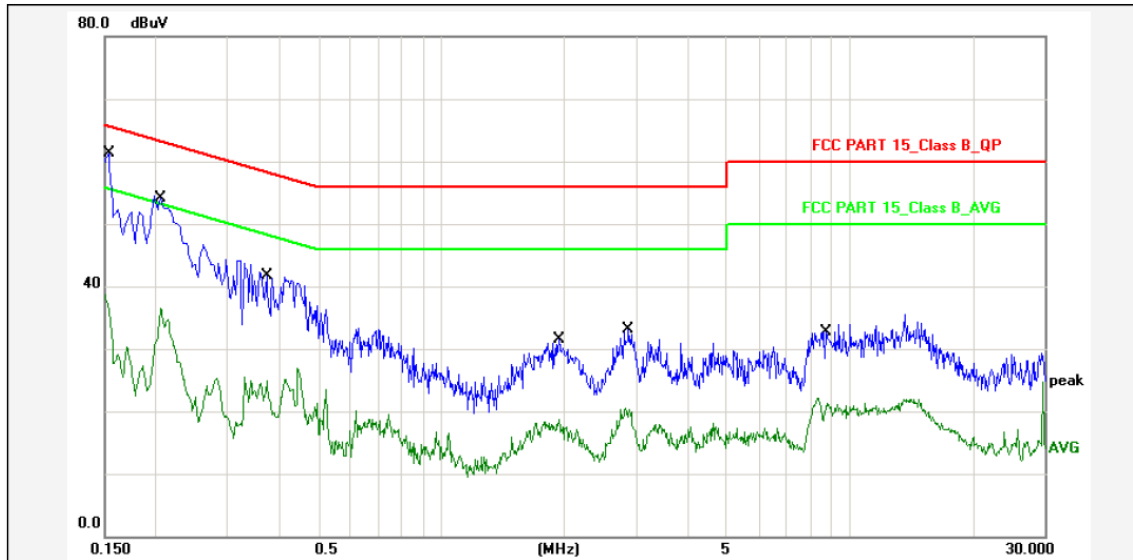
Report No.: P96
 Test Standard: FCC PART 15_Class B_QP
 Test item: Conducted Emission
 Applicant: Spreadview century
 Product: SMART Pico
 Model No.: P96

Phase: L1
 Temp.()/Hum.(%): 25(C) / 46 %
 Power Rating: AC 120V/60Hz
 Test Engineer: Sance

Test Mode: Charging+WIFI Mode
 Remark: 802.11b

| No. | Frequency (MHz) | Factor (dBuV) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|---------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1 | 0.1500 | 10.80 | 49.99 | 60.79 | 65.99 | -5.20 | QP | P | |
| 2 | 0.1500 | 10.80 | 30.48 | 41.28 | 55.99 | -14.71 | AVG | P | |
| 3 | 0.1859 | 10.80 | 41.67 | 52.47 | 64.21 | -11.74 | QP | P | |
| 4 | 0.1859 | 10.80 | 22.76 | 33.56 | 54.21 | -20.65 | AVG | P | |
| 5 | 0.3738 | 10.80 | 27.87 | 38.67 | 58.41 | -19.74 | QP | P | |
| 6 | 0.3738 | 10.80 | 12.30 | 23.10 | 48.41 | -25.31 | AVG | P | |
| 7 | 1.8660 | 10.80 | 22.14 | 32.94 | 56.00 | -23.06 | QP | P | |
| 8 | 1.8660 | 10.80 | 10.65 | 21.45 | 46.00 | -24.55 | AVG | P | |
| 9 | 2.9140 | 10.80 | 24.36 | 35.16 | 56.00 | -20.84 | QP | P | |
| 10 | 2.9140 | 10.80 | 12.06 | 22.86 | 46.00 | -23.14 | AVG | P | |
| 11 | 5.0179 | 10.80 | 22.96 | 33.76 | 60.00 | -26.24 | QP | P | |
| 12 | 5.0179 | 10.80 | 10.26 | 21.06 | 50.00 | -28.94 | AVG | P | |

Note: Level=Reading+Factor.
 Margin=Limit-Level.



Report No.: P96
 Test Standard: FCC PART 15_Class B_QP
 Test item: Conducted Emission
 Applicant: Spreadview century
 Product: SMART Pico
 Model No.: P96
 Test Mode: Charging+WIFI Mode
 Remark: 802.11b

Phase: N
 Temp.()/Hum.(%): 25(C) / 46 %
 Power Rating: AC 120V/60Hz
 Test Engineer: Sance

| No. | Frequency (MHz) | Factor (dBuV) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|---------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1 | 0.1539 | 10.80 | 47.54 | 58.34 | 65.78 | -7.44 | QP | P | |
| 2 | 0.1539 | 10.80 | 24.81 | 35.61 | 55.78 | -20.17 | AVG | P | |
| 3 | 0.2072 | 10.80 | 39.59 | 50.39 | 63.31 | -12.92 | QP | P | |
| 4 | 0.2072 | 10.80 | 22.62 | 33.42 | 53.31 | -19.89 | AVG | P | |
| 5 | 0.3738 | 10.80 | 27.96 | 38.76 | 58.41 | -19.65 | QP | P | |
| 6 | 0.3738 | 10.80 | 12.72 | 23.52 | 48.41 | -24.89 | AVG | P | |
| 7 | 1.9420 | 10.80 | 17.68 | 28.48 | 56.00 | -27.52 | QP | P | |
| 8 | 1.9420 | 10.80 | 4.81 | 15.61 | 46.00 | -30.39 | AVG | P | |
| 9 | 2.8740 | 10.80 | 19.27 | 30.07 | 56.00 | -25.93 | QP | P | |
| 10 | 2.8740 | 10.80 | 6.70 | 17.50 | 46.00 | -28.50 | AVG | P | |
| 11 | 8.7418 | 10.80 | 18.88 | 29.68 | 60.00 | -30.32 | QP | P | |
| 12 | 8.7418 | 10.80 | 8.32 | 19.12 | 50.00 | -30.88 | AVG | P | |

Note: Level=Reading+Factor.
 Margin=Limit-Level.

4. Max. Conducted Output Power

4.1 Measurement Procedure

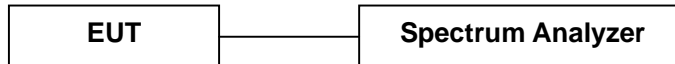
Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v03r02):

Maximum conducted (Average) output power:

1. Set the RBW = 1-5% of the OBW, not to exceed 1MHz.
2. Set the VBW $\geq 3 \times$ RBW
3. Set the span $\geq 1.5 \times$ OBW
4. Detector = RMS
5. Sweep time = auto couple.
6. Number of points in sweep $\geq 2 \times$ span/RBW. (This gives bin-to-bin spacing ≤ 2 , so that narrowband signals are not lost between frequency bins.)
7. Trace mode = Trace average at least 100 traces in power averaging (i.e., RMS) mode.
8. If transmit duty cycle $< 98\%$, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
9. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

4.2 Test SET-UP (Block Diagram of Configuration)



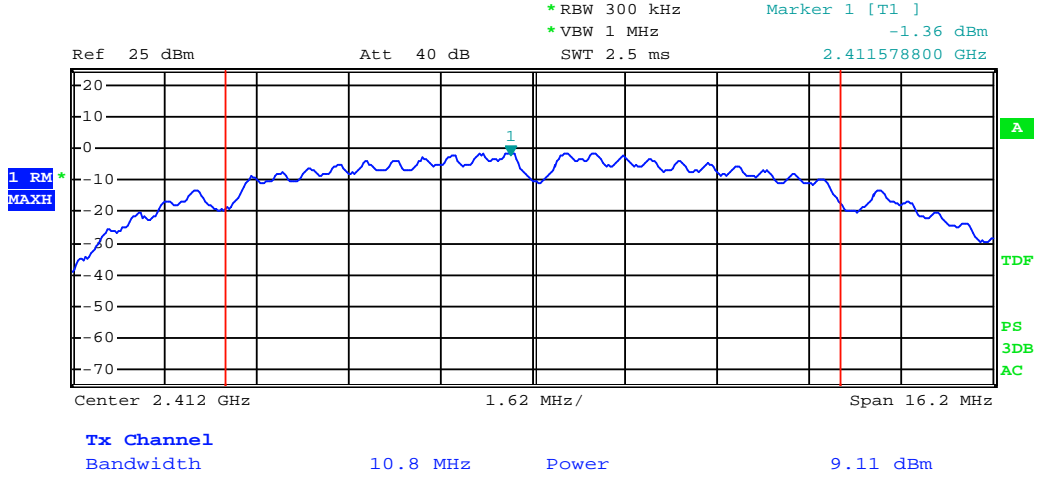
4.3 Measurement Results

Pass

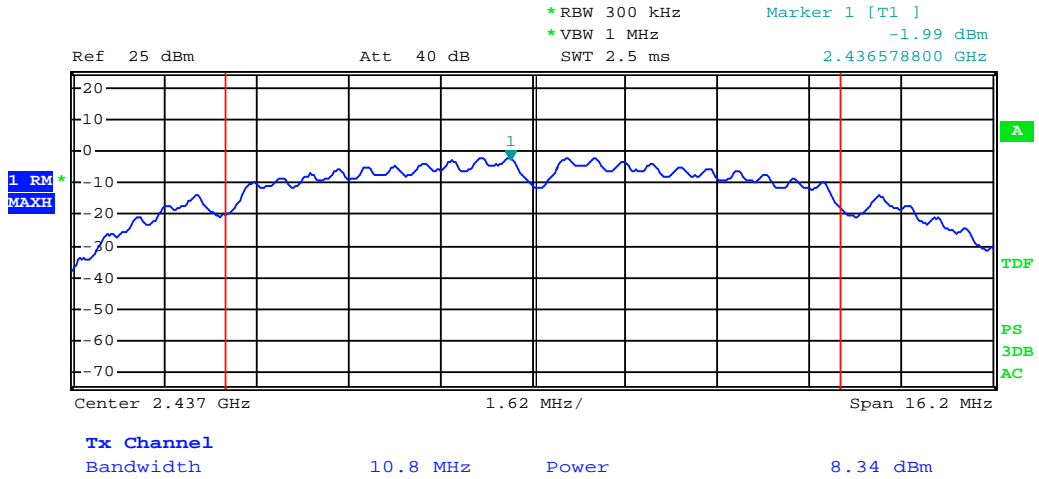
Please refer to following table and plots.

| Temperature : | 27 °C | Humidity : | 55% |
|---|----------------|---------------------|--------------------|
| Test By: | Sance | Test Date : | September 04, 2014 |
| Test Result: | PASS | | |
| Frequency MHz | Data Rate Mbps | AV Output Power dBm | Limit dBm |
| IEEE 802.11b Mode (CCK, Antenna Gain=0dBi) | | | |
| Low Channel: 2412 | 1 | 9.11 | 30 |
| Middle Channel: 2437 | 1 | 8.34 | 30 |
| High Channel: 2462 | 1 | 7.81 | 30 |
| IEEE 802.11g Mode (OFDM, Antenna Gain=0dBi) | | | |
| Low Channel: 2412 | 6 | 8.62 | 30 |
| Middle Channel: 2437 | 6 | 8.09 | 30 |
| High Channel: 2462 | 6 | 7.51 | 30 |
| IEEE 802.11n(HT20) Mode (OFDM, Antenna Gain=0dBi) | | | |
| Low Channel: 2412 | 6.5 | 7.44 | 30 |
| Middle Channel: 2437 | 6.5 | 6.96 | 30 |
| High Channel: 2462 | 6.5 | 6.50 | 30 |

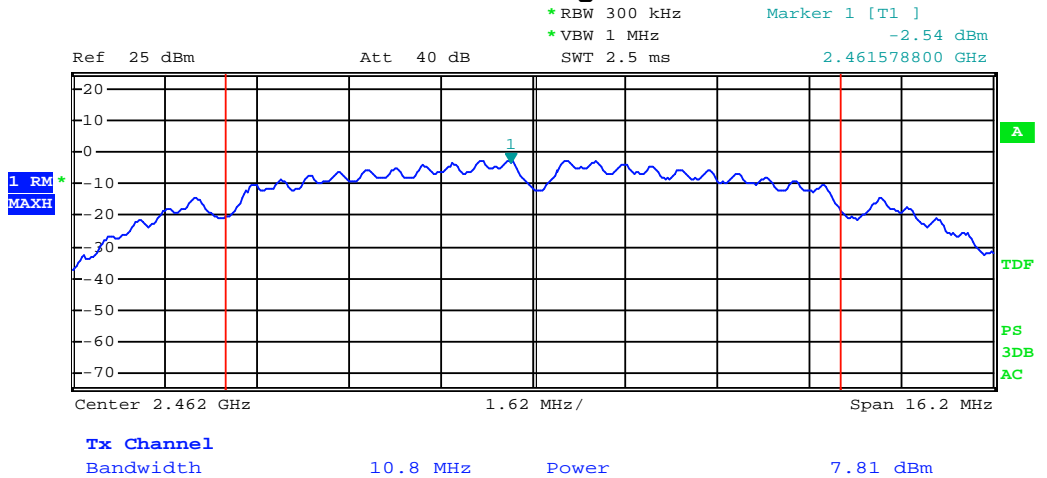
Maximum Average Conducted Output Power 802.11b Low Channel



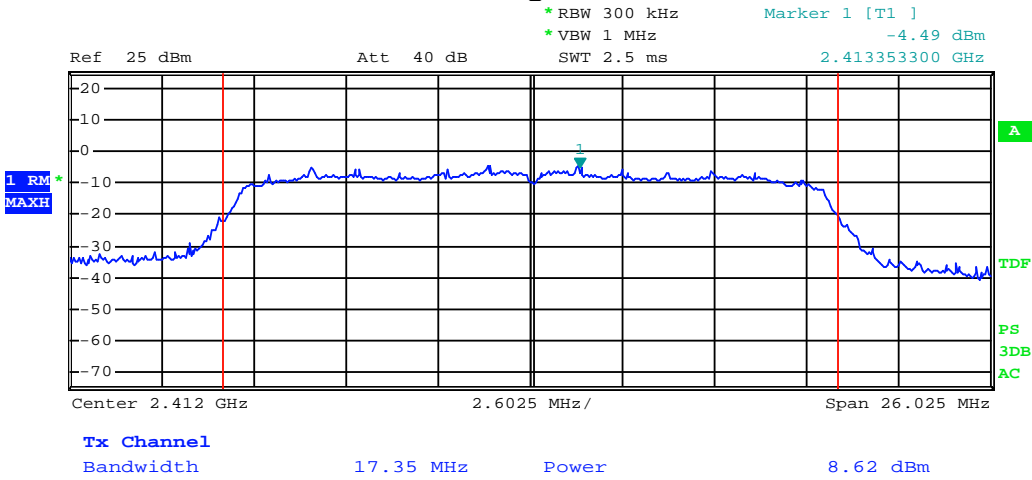
802.11b Middle Channel



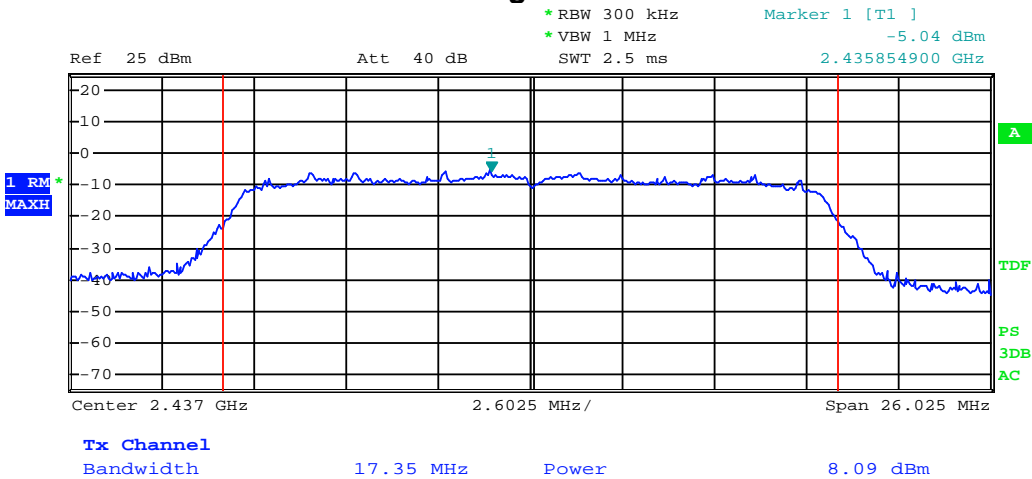
802.11b High Channel



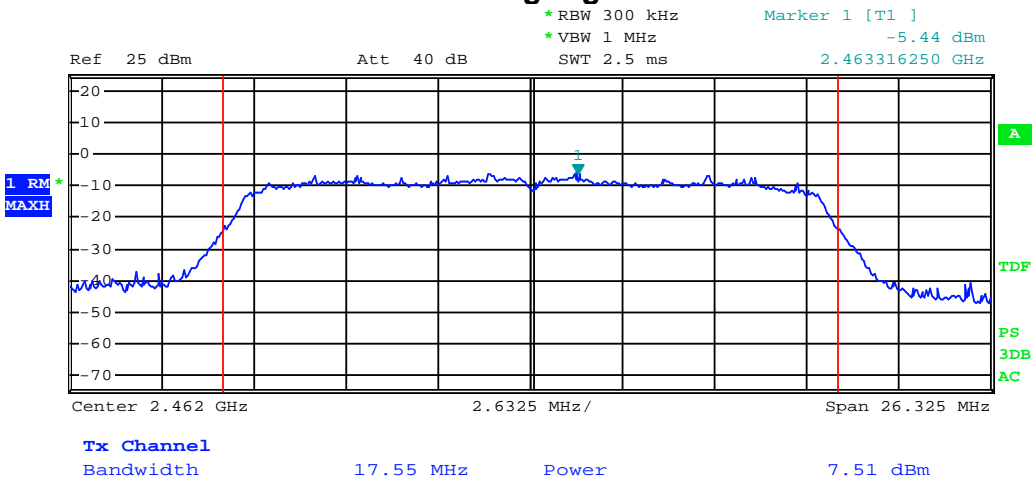
802.11g Low Channel



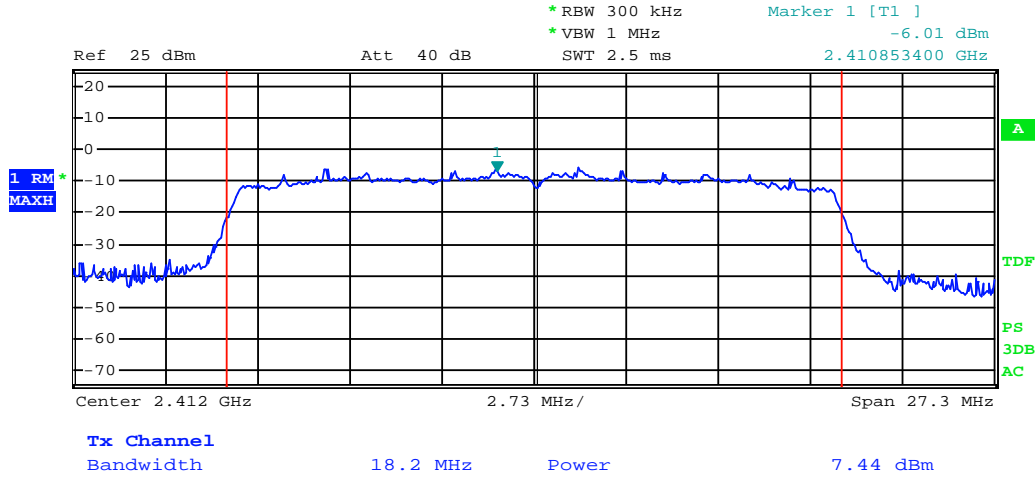
802.11g Middle Channel



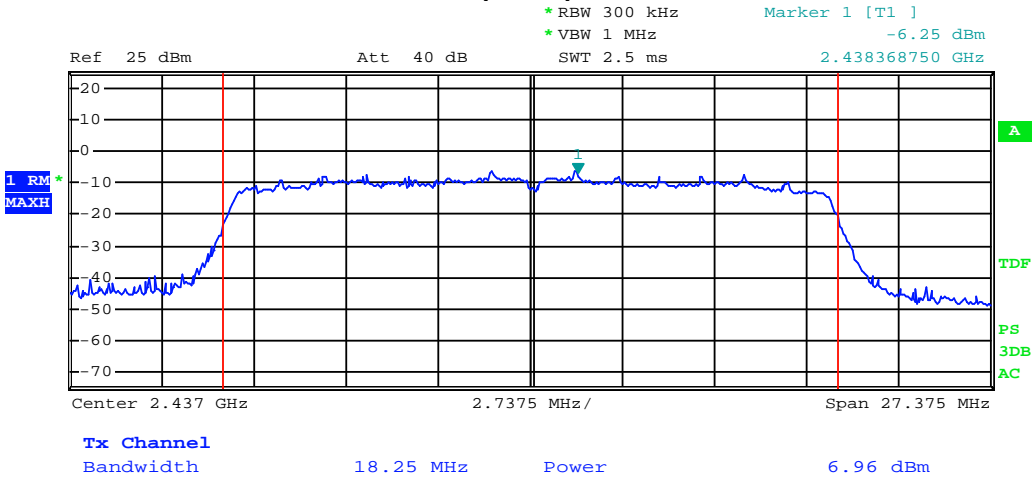
802.11g High Channel



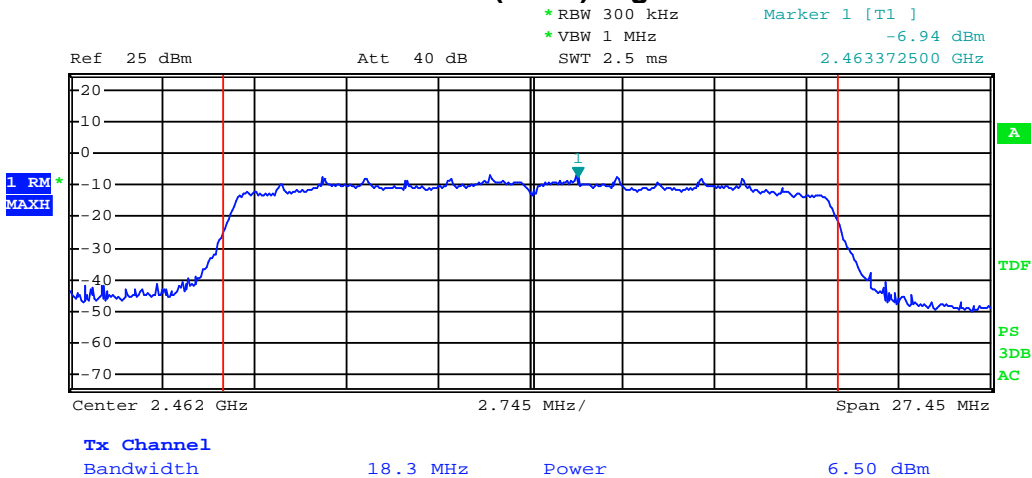
802.11n(HT20) Low Channel



802.11n(HT20) Middle Channel



802.11n(HT20) High Channel



5. 6dB&20dB Bandwidth

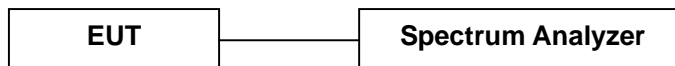
5.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v03r02):

1. Set the RBW = 100KHz.
2. Set the VBW \geq 3 x RBW
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. 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.

5.2 Test SET-UP (Block Diagram of Configuration)



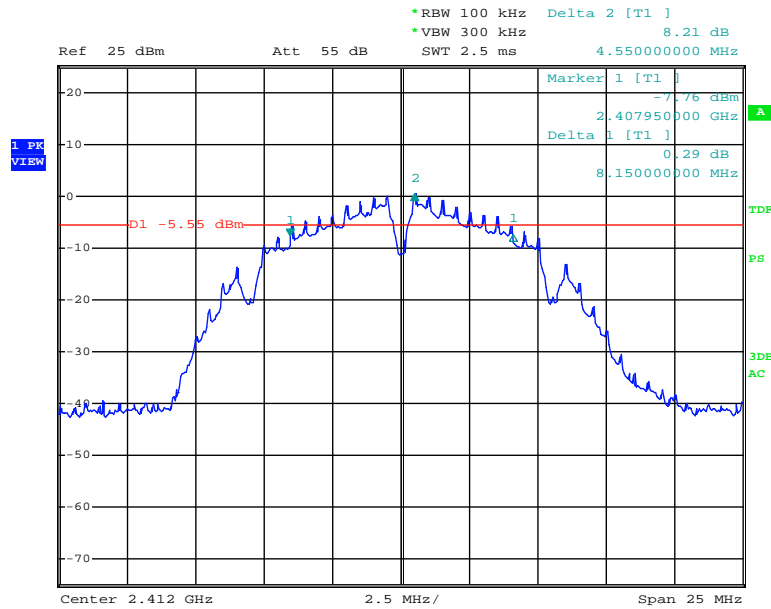
5.3 Measurement Results

Pass

Please refer to following table and plots.

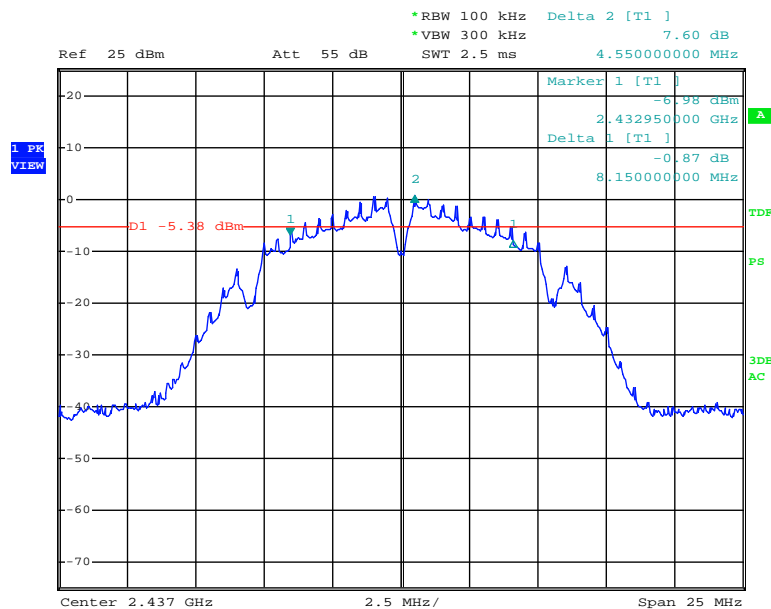
| Temperature : | 27 °C | Humidity : 55 % | | |
|--------------------------------|----------------|--------------------------------|--------------------|---------|
| Test By: | Sance | Test Date : September 03, 2014 | | |
| Test Result: | PASS | | | |
| Frequency MHz | Data Rate Mbps | 6dB Bandwidth MHz | 20dB Bandwidth MHz | Limit |
| IEEE 802.11b Mode (CCK) | | | | |
| Low Channel: 2412 | 1 | 8.15 | 10.80 | >500KHz |
| Middle Channel: 2437 | 1 | 8.15 | 10.80 | >500KHz |
| High Channel: 2462 | 1 | 8.15 | 10.80 | >500KHz |
| IEEE 802.11g Mode (OFDM) | | | | |
| Low Channel: 2412 | 6 | 15.25 | 17.35 | >500KHz |
| Middle Channel: 2437 | 6 | 15.25 | 17.35 | >500KHz |
| High Channel: 2462 | 6 | 15.25 | 17.55 | >500KHz |
| IEEE 802.11n(HT20) Mode (OFDM) | | | | |
| Low Channel: 2412 | 6.5 | 15.25 | 18.20 | >500KHz |
| Middle Channel: 2437 | 6.5 | 15.25 | 18.25 | >500KHz |
| High Channel: 2462 | 6.5 | 15.25 | 18.30 | >500KHz |

6dB Bandwidth 802.11b Low Channel



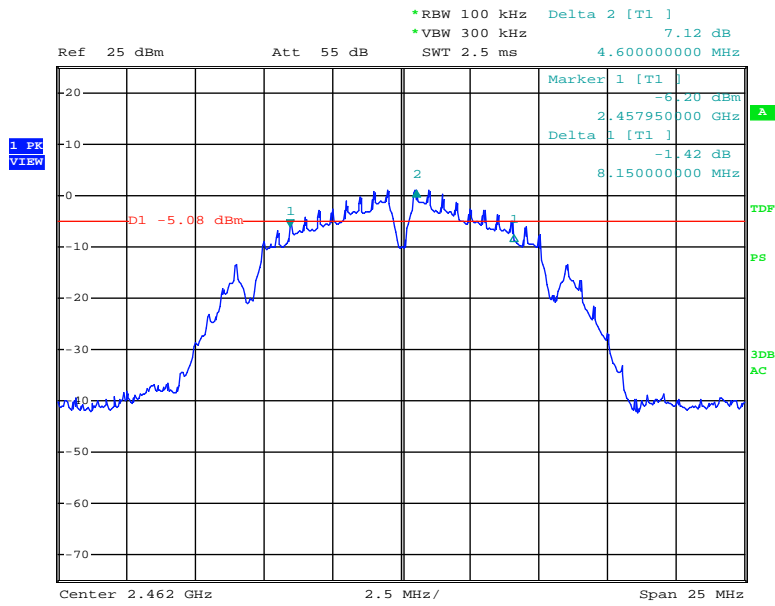
Date: 3.SEP.2014 17:12:30

802.11b Middle Channel



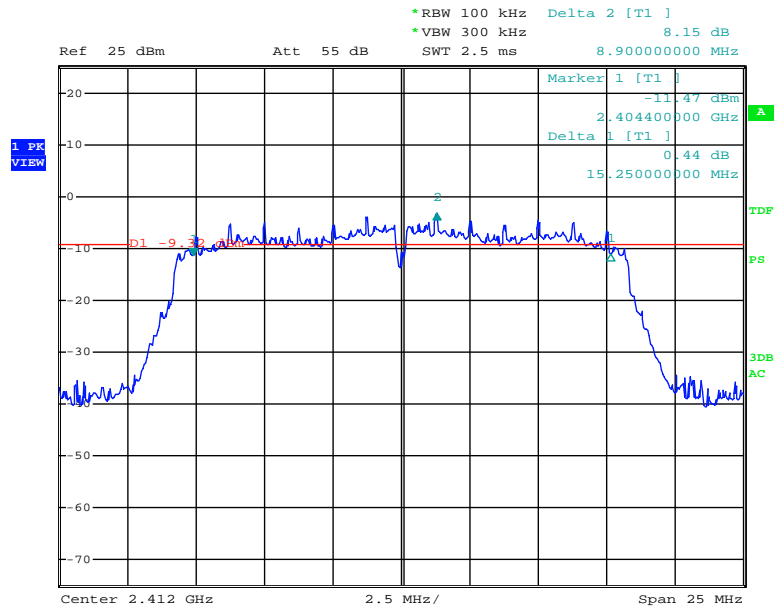
Date: 3.SEP.2014 17:15:30

802.11b High Channel



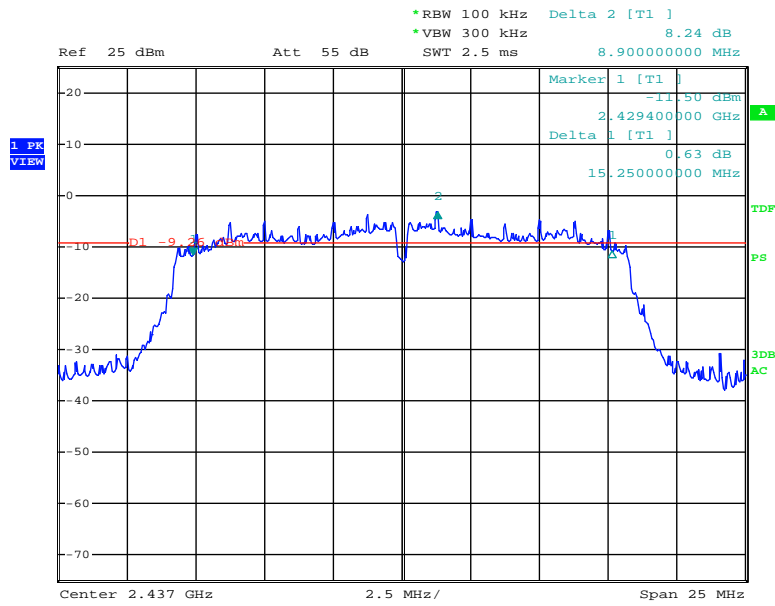
Date: 3.SEP.2014 17:17:42

802.11g Low Channel



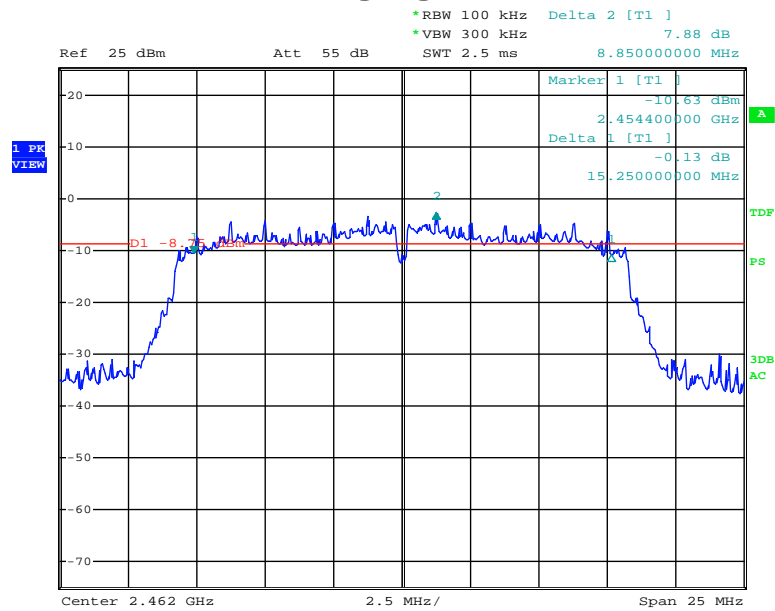
Date: 3.SEP.2014 17:19:54

802.11g Middle Channel



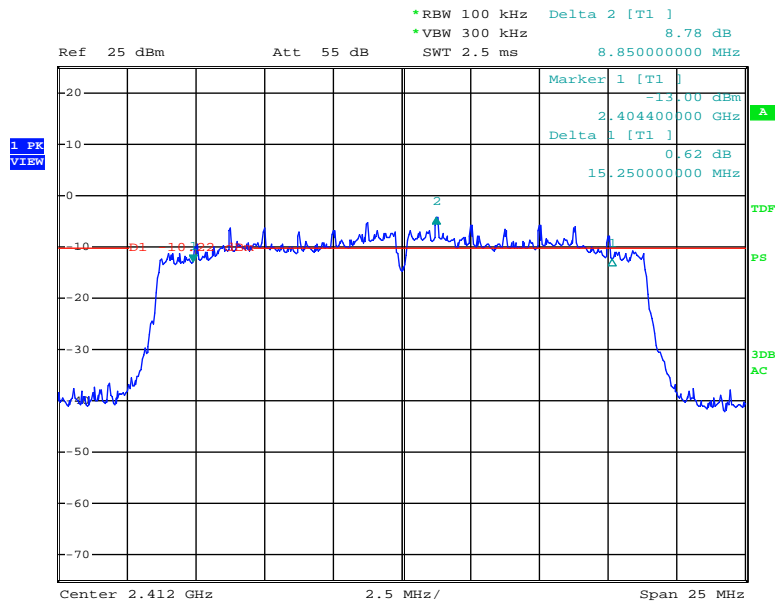
Date: 3.SEP.2014 17:21:22

802.11g High Channel



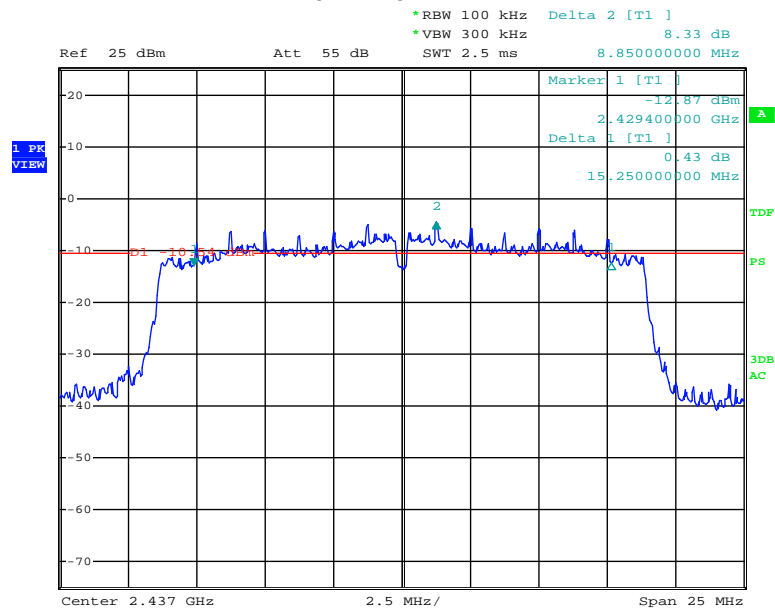
Date: 3.SEP.2014 17:22:39

802.11n(HT20) Low Channel



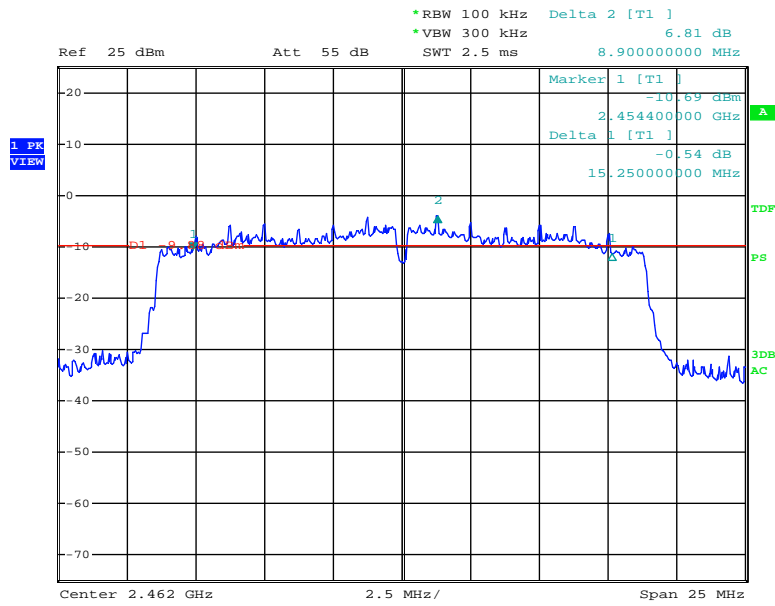
Date: 3.SEP.2014 17:24:09

802.11n(HT20) Middle Channel



Date: 3.SEP.2014 17:25:36

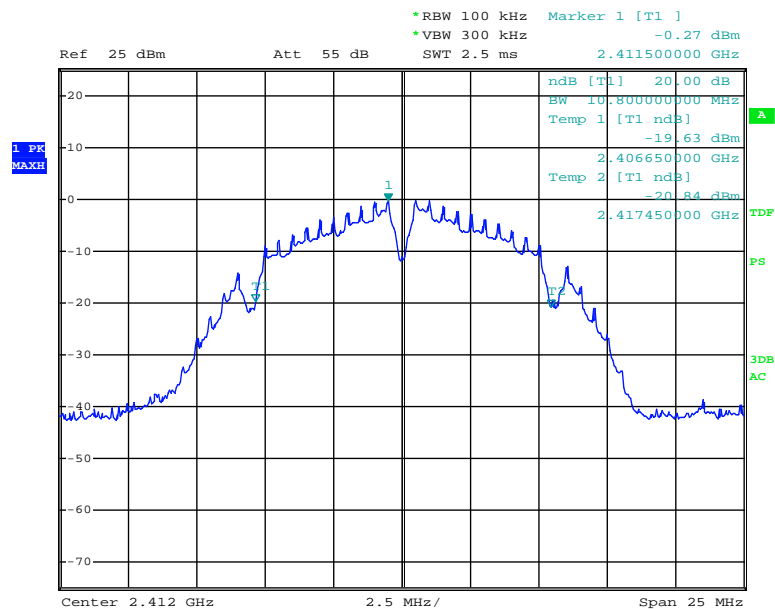
802.11n(HT20) High Channel



Date: 3.SEP.2014 17:28:36

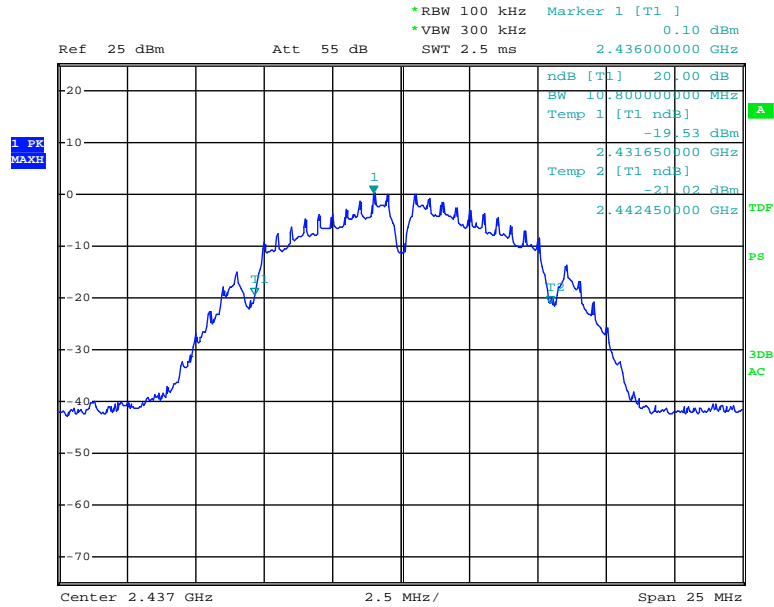
20dB Bandwidth

802.11b Low Channel



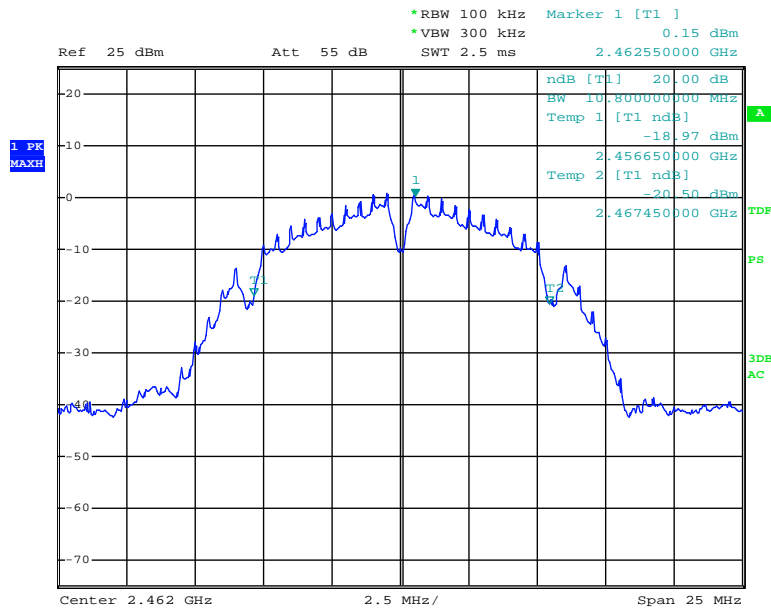
Date: 3.SEP.2014 17:54:47

802.11b Middle Channel



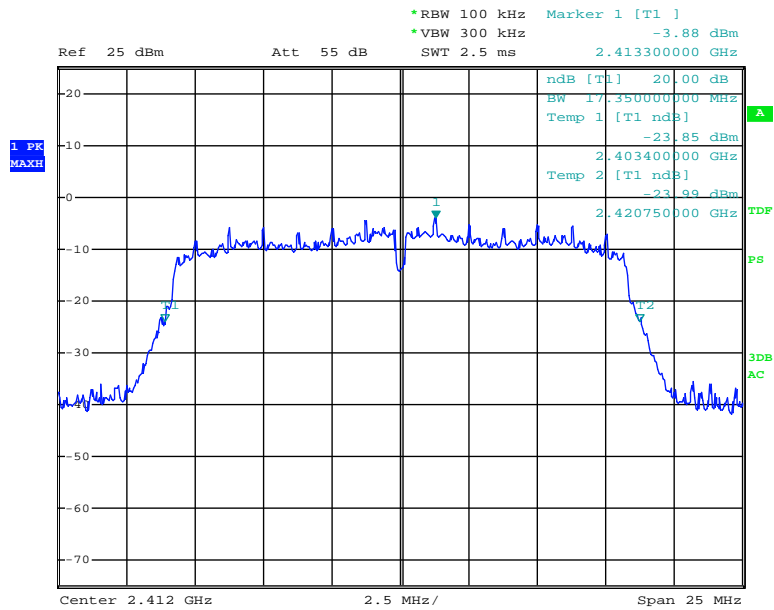
Date: 3.SEP.2014 17:55:29

802.11b High Channel



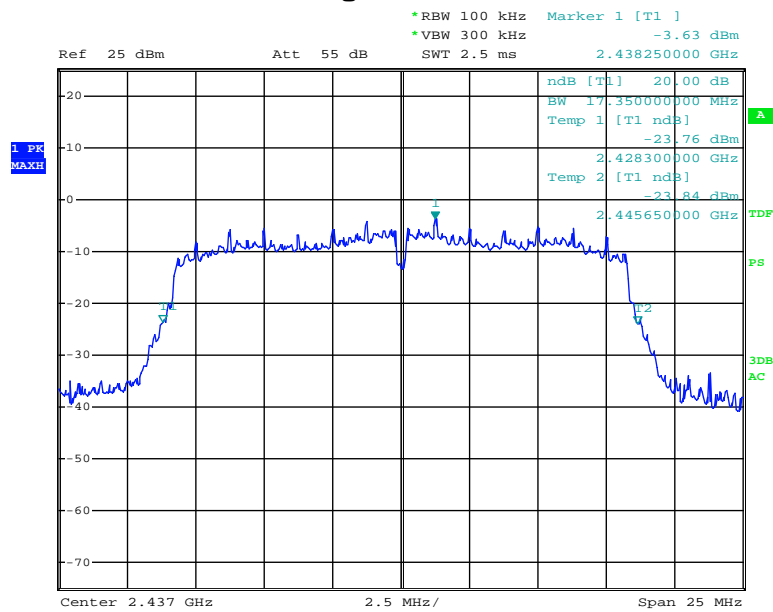
Date: 3.SEP.2014 17:57:44

802.11g Low Channel



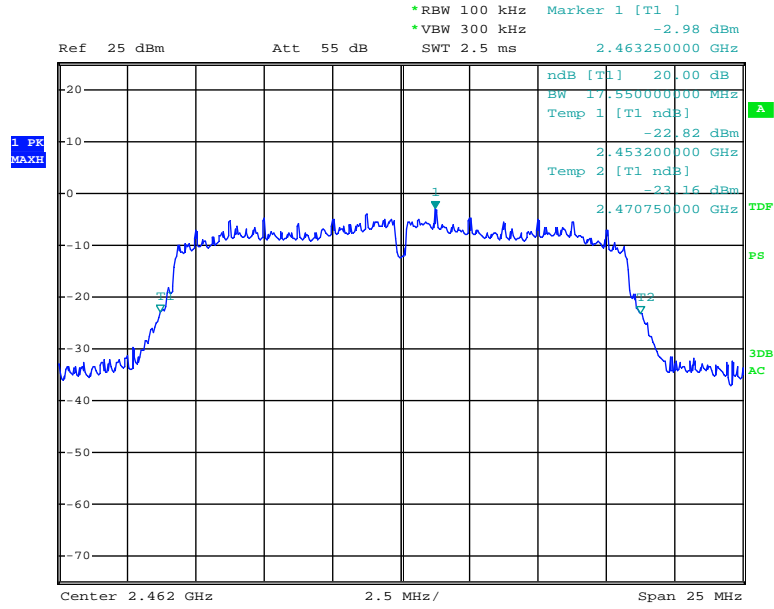
Date: 3.SEP.2014 17:58:21

802.11g Middle Channel



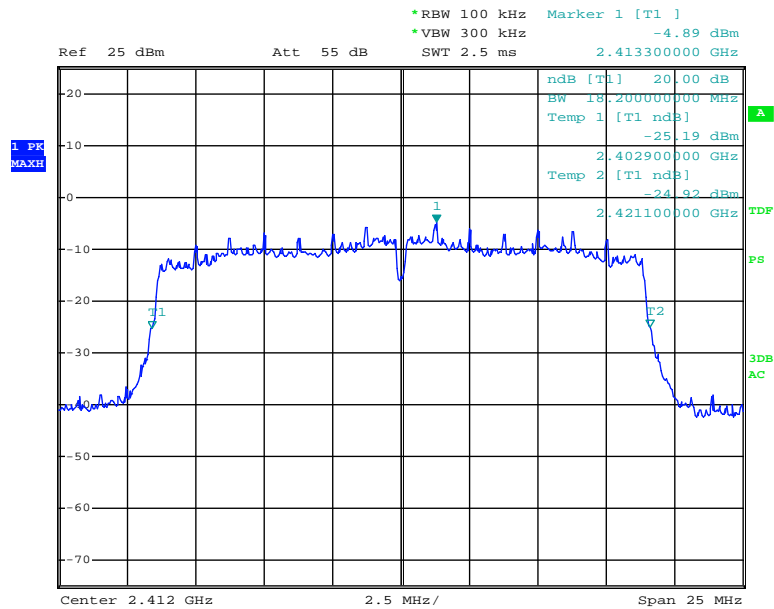
Date: 3.SEP.2014 17:59:03

802.11g High Channel



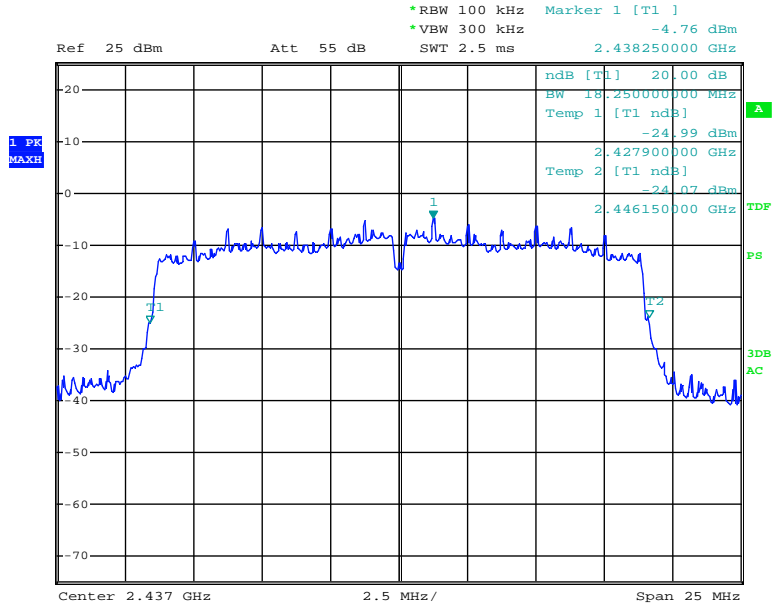
Date: 3.SEP.2014 18:00:12

802.11n(HT20) Low Channel



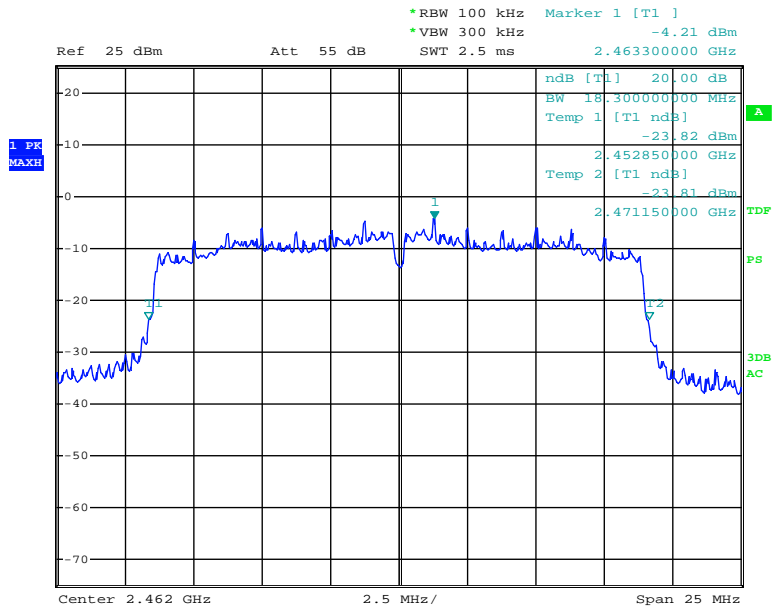
Date: 3.SEP.2014 18:00:54

802.11n(HT20) Middle Channel



Date: 3.SEP.2014 18:01:39

802.11n(HT20) High Channel



Date: 3.SEP.2014 18:02:21

6. Power Spectral Density

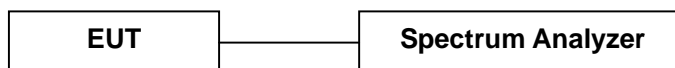
6.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v03r02):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{KHz}$
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Results

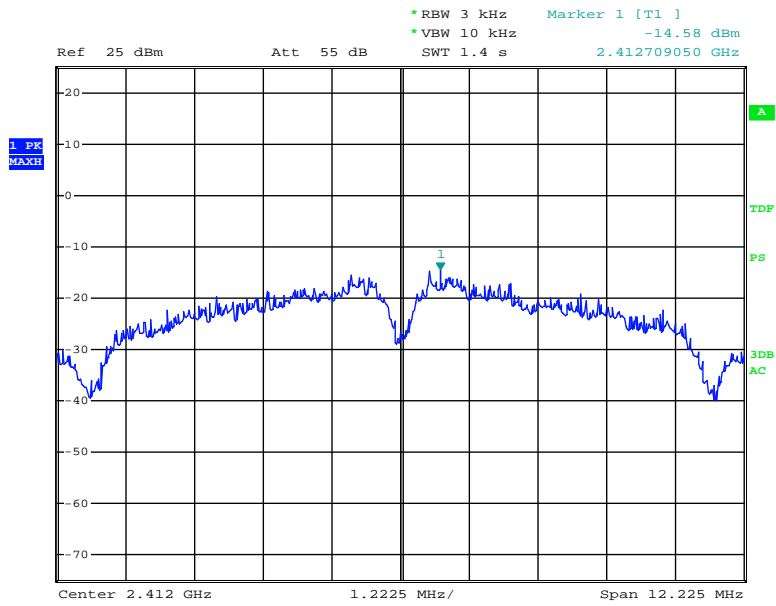
Pass

Please refer to following table and plots.



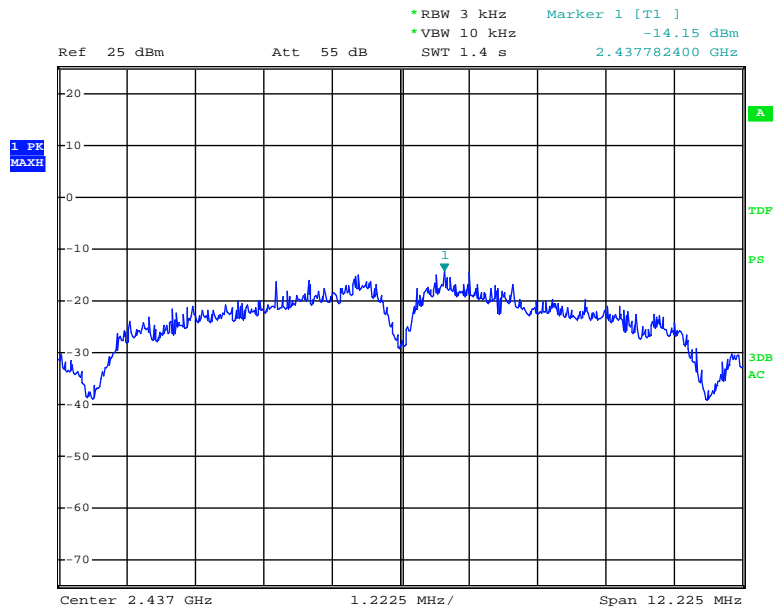
| | | | |
|--------------------------------|-------------------|-------------|--------------------|
| Temperature : | 27 °C | Humidity : | 55 % |
| Test By: | Sance | Test Date : | September 03, 2014 |
| Test Result: | PASS | | |
| Frequency MHz | Data Rate Mbps | PSD dBm | Limit dBm |
| IEEE 802.11b Mode (CCK) | | | |
| Low Channel: 2412 | 1 | -14.58 | 8 |
| Middle Channel: 2437 | 1 | -14.15 | 8 |
| High Channel: 2462 | 1 | -14.51 | 8 |
| IEEE 802.11g Mode (OFDM) | | | |
| Low Channel: 2412 | 6 | -18.32 | 8 |
| Middle Channel: 2437 | 6 | -18.92 | 8 |
| High Channel: 2462 | 6 | -17.56 | 8 |
| IEEE 802.11n(HT20) Mode (OFDM) | | | |
| Low Channel: 2412 | 6.5 | -19.79 | 8 |
| Middle Channel: 2437 | 6.5 | -19.30 | 8 |
| High Channel: 2462 | 6.5 | -19.14 | 8 |

802.11b Low Channel



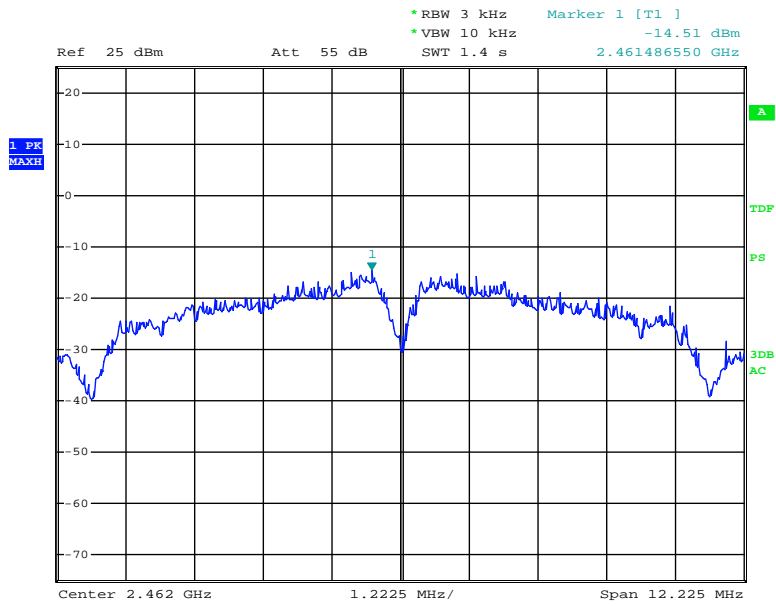
Date: 3.SEP.2014 17:46:20

802.11b Middle Channel



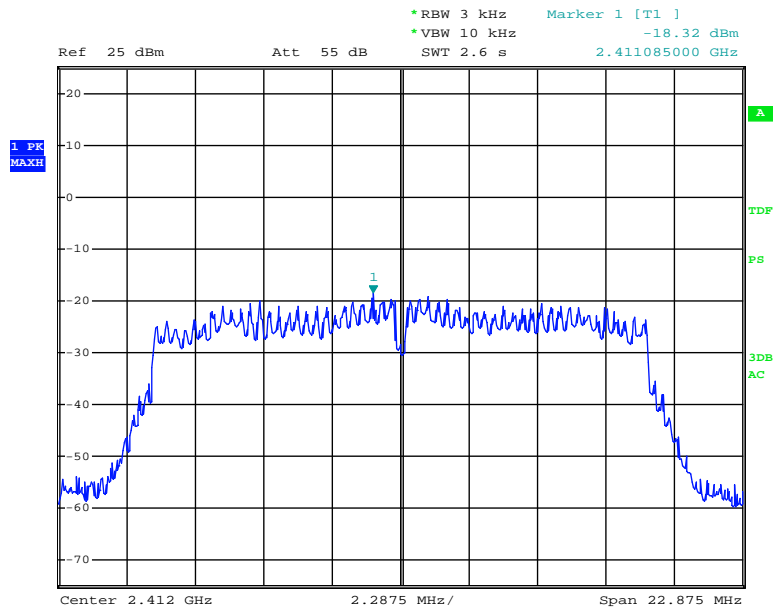
Date: 3.SEP.2014 17:46:42

802.11b High Channel



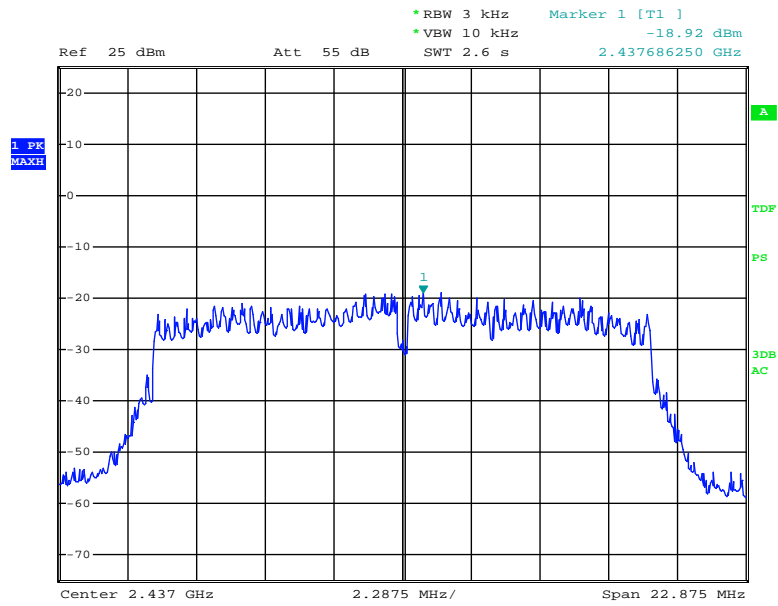
Date: 3.SEP.2014 17:46:59

802.11g Low Channel



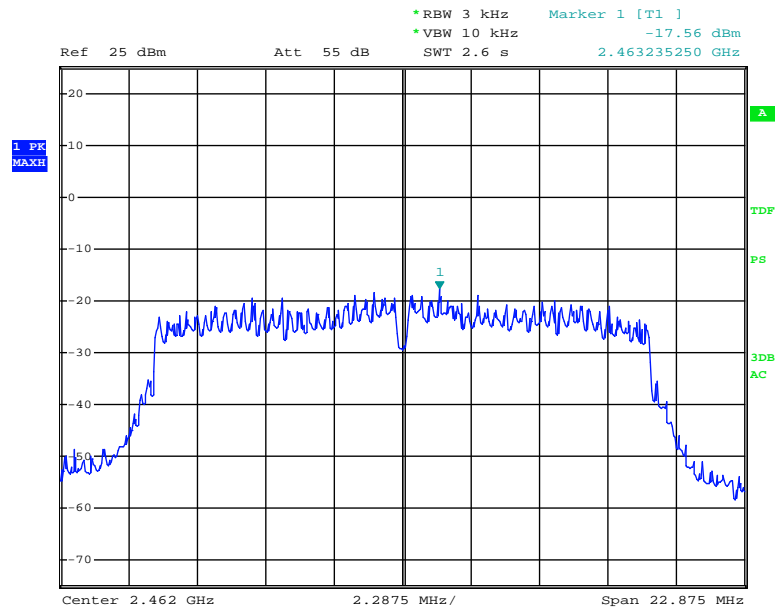
Date: 3.SEP.2014 17:47:34

802.11g Middle Channel



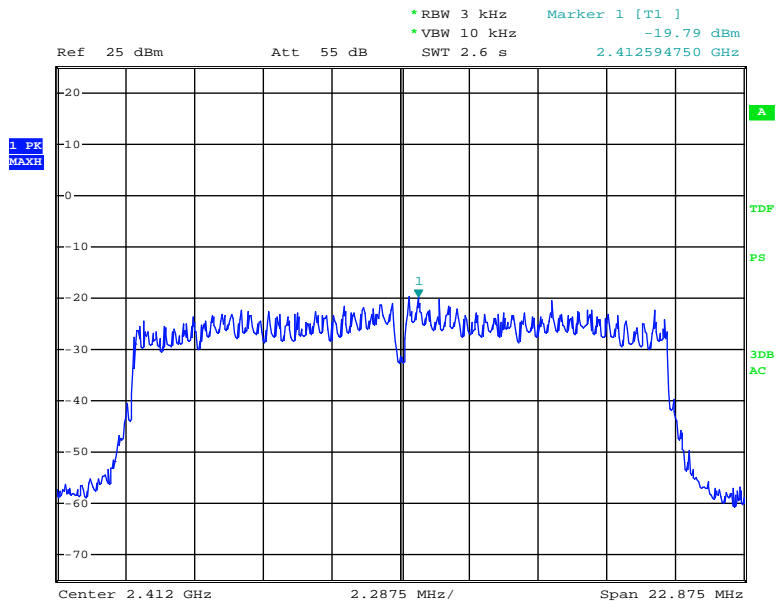
Date: 3.SEP.2014 17:47:57

802.11g High Channel



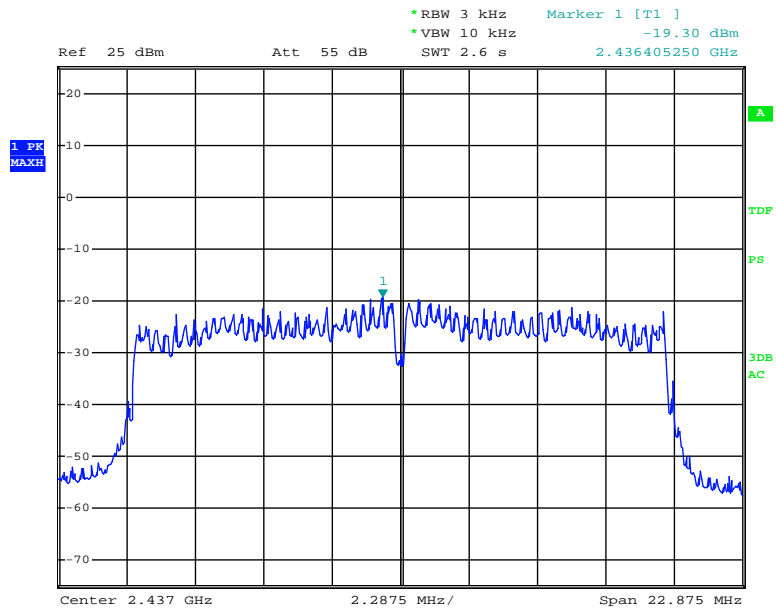
Date: 3.SEP.2014 17:48:17

802.11n(HT20) Low Channel



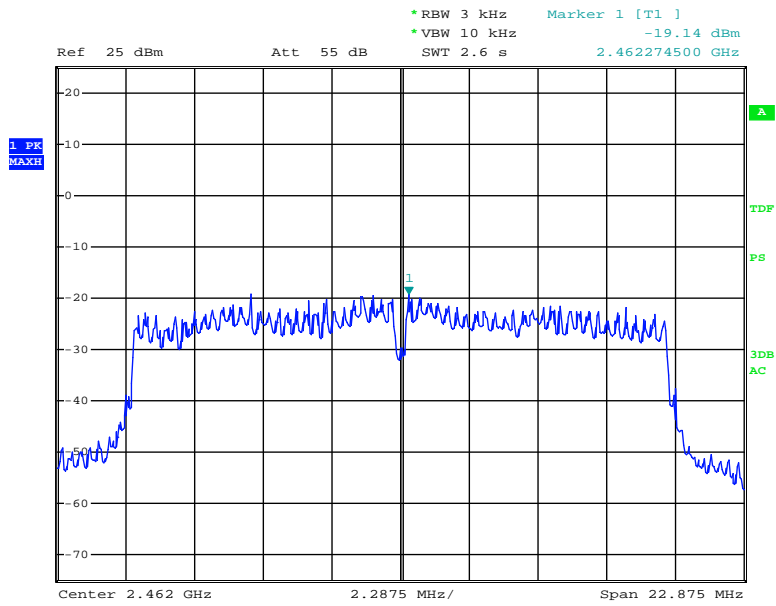
Date: 3.SEP.2014 17:48:38

802.11n(HT20) Middle Channel



Date: 3.SEP.2014 17:49:04

802.11n(HT20) High Channel



Date: 3.SEP.2014 17:49:26

7. Band Edge and Conducted Spurious Emissions

7.1 Requirement and Measurement Procedure

Out of Band Conducted Emissions, FCC Rule 15.247(d):

The transmitter output is connected to spectrum analyzer. The resolution bandwidth is set to 100KHz, and the video bandwidth set to 300KHz.

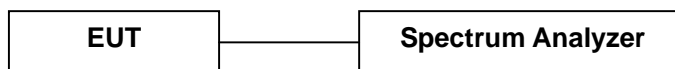
A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

- 1.The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300KHz for Quasi-peak detection at frequency below 1GHz.
- 2.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
- 3.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for average detection(AV) at below at frequency above 1GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Function | Resolution Bandwidth | Video Bandwidth |
|----------------------|----------|----------------------|-----------------|
| 30 to 1000 | QP | 120 kHz | 300 kHz |
| Above 1000 | Peak | 1 MHz | 3 MHz |
| | Average | 1 MHz | 10 Hz |

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Results

The test plots showed that all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below tables and plots.



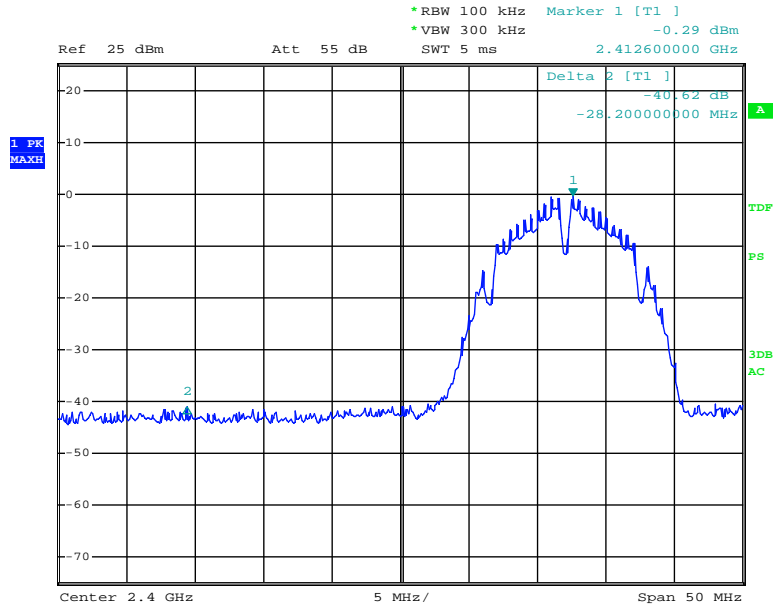
Spurious Emission in restricted band:

Operation Mode: TX Test Date : August 15, 2014
 Frequency Range: Above 1GHz Temperature : 26 °C
 Test Result: PASS Humidity : 50 %
 Measured Distance: 3m Test By: Sance

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---------------------------------|----------|----------------------|-------|------------------|-------|------------|--------|
| | H/V | PK | AV | PK | AV | PK | AV |
| Test Mode: 802.11b | | | | | | | |
| 2399.370 | H | 52.05 | 43.42 | 74.00 | 54.00 | -21.95 | -10.58 |
| 2399.250 | V | 53.22 | 42.45 | 74.00 | 54.00 | -20.78 | -11.55 |
| 2484.650 | H | 45.15 | 36.65 | 74.00 | 54.00 | -28.85 | -17.35 |
| 2484.710 | V | 48.28 | 37.71 | 74.00 | 54.00 | -25.72 | -16.29 |
| Test Mode: 802.11g | | | | | | | |
| 2395.430 | H | 51.24 | 39.37 | 74.00 | 54.00 | -22.76 | -14.63 |
| 2395.460 | V | 43.44 | 38.23 | 74.00 | 54.00 | -30.56 | -15.77 |
| 2483.750 | H | 45.21 | 34.88 | 74.00 | 54.00 | -28.79 | -19.12 |
| 2484.010 | V | 42.15 | 36.04 | 74.00 | 54.00 | -31.85 | -17.96 |
| Test Mode: 802.11n(HT20) | | | | | | | |
| 2398.720 | H | 56.57 | 40.15 | 74.00 | 54.00 | -17.43 | -13.85 |
| 2395.510 | V | 50.12 | 41.95 | 74.00 | 54.00 | -23.88 | -12.05 |
| 2485.560 | H | 50.16 | 33.03 | 74.00 | 54.00 | -23.84 | -20.97 |
| 2485.630 | V | 51.26 | 33.19 | 74.00 | 54.00 | -22.74 | -20.81 |

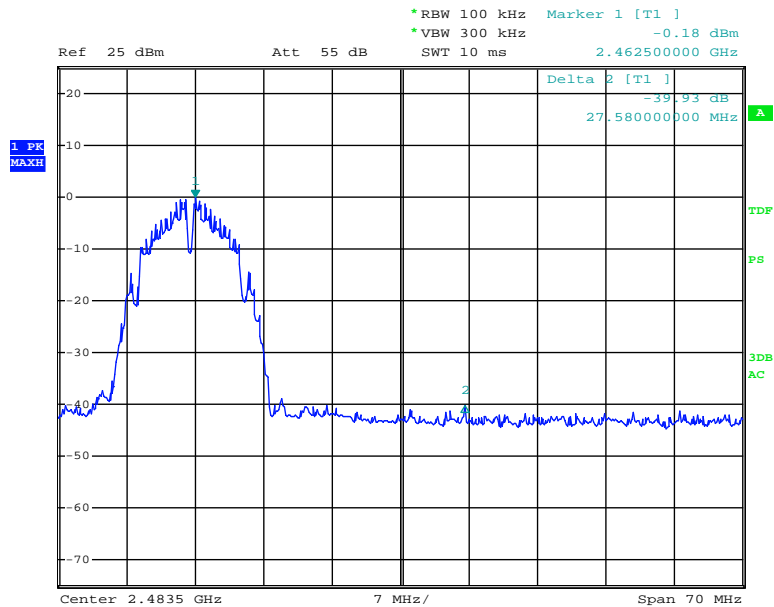
Note: (1) All Readings are Peak Value and AV.
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss
 (3) Measurement uncertainty : ±3.7dB

Band Edge 802.11b Low Channel



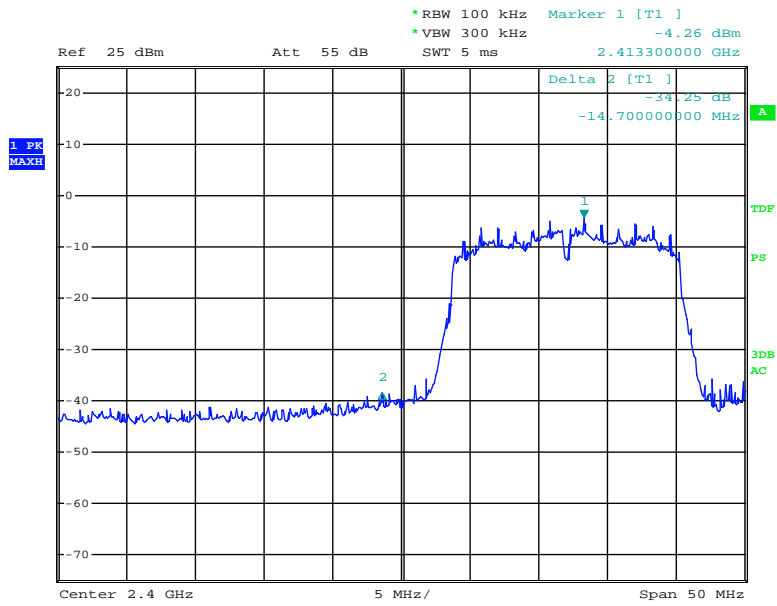
Date: 3.SEP.2014 17:50:40

802.11b High Channel



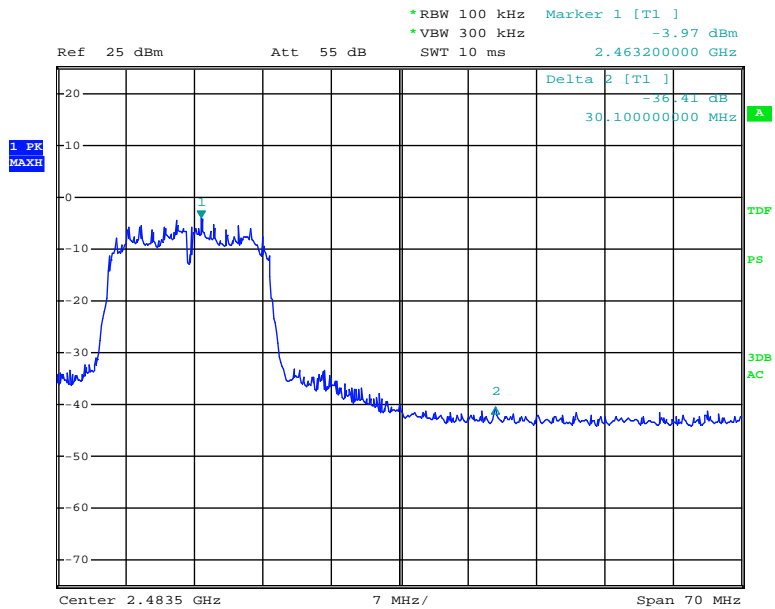
Date: 3.SEP.2014 17:51:20

802.11g Low Channel



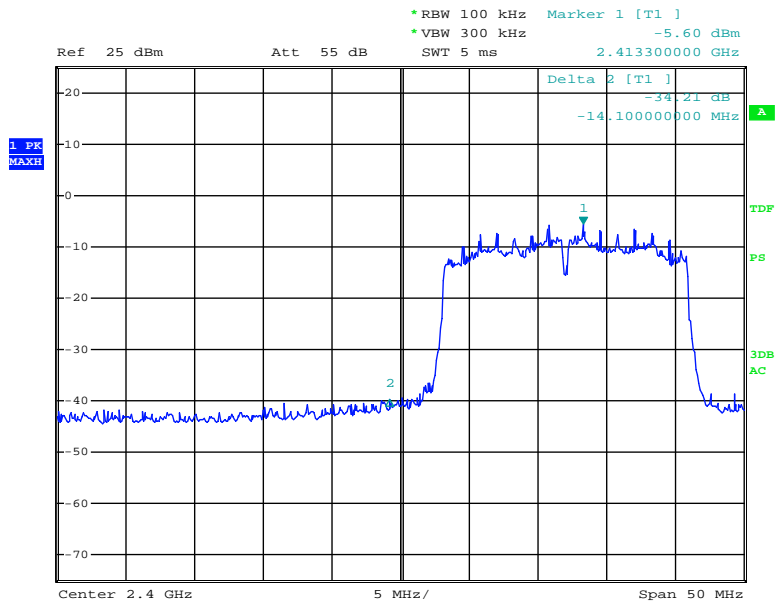
Date: 3.SEP.2014 17:52:07

802.11g High Channel



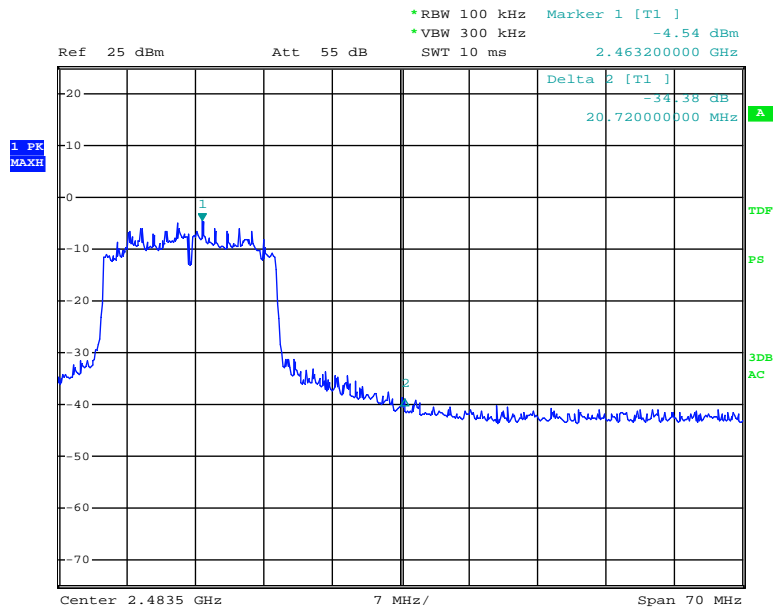
Date: 3.SEP.2014 17:52:54

802.11n(HT20) Low Channel



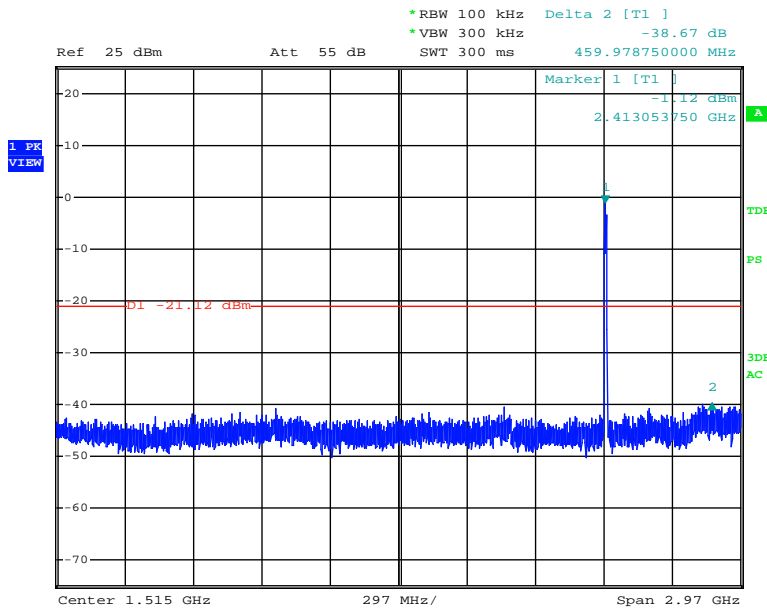
Date: 3.SEP.2014 17:53:40

802.11n(HT20) High Channel



Date: 3.SEP.2014 18:55:05

Conducted Spurious Emissions The worst case: 802.11b Low Channel



Date: 3.SEP.2014 18:12:55

Agilent 15:48:42 Sep 5, 2014 R T

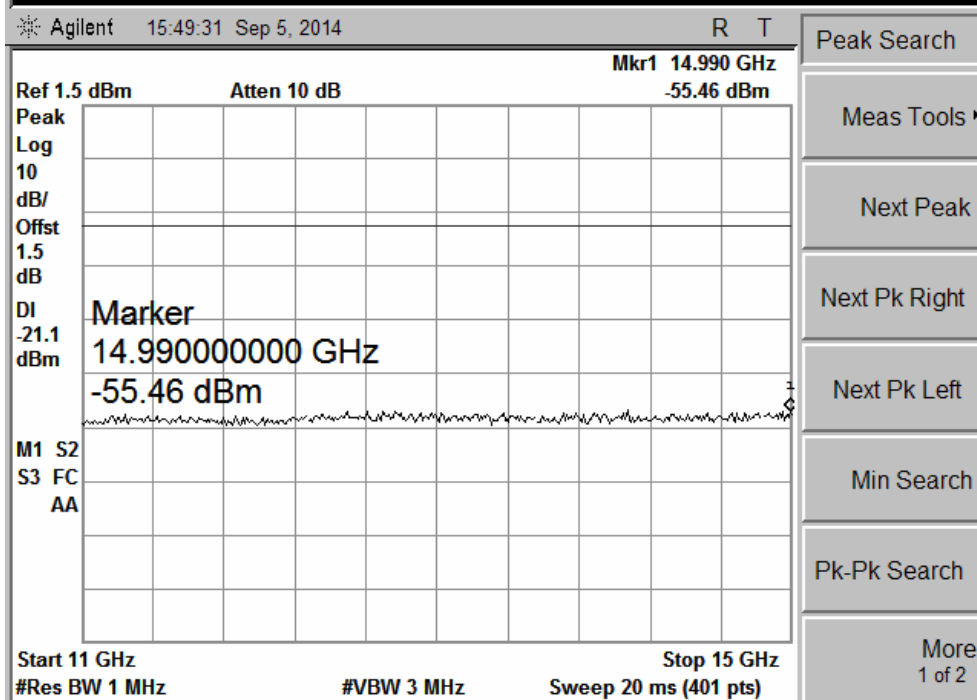
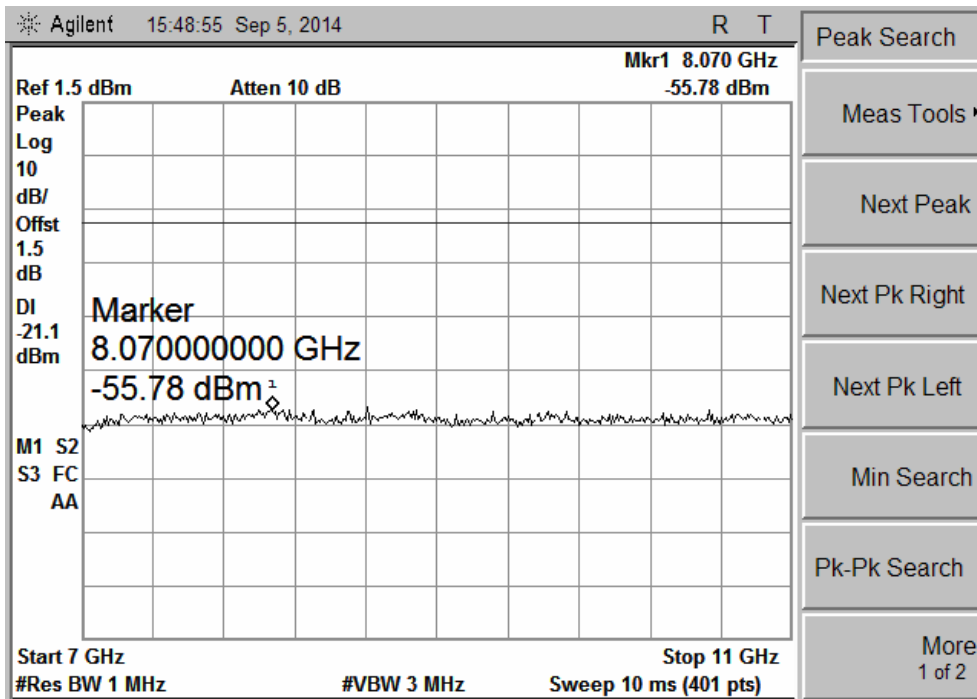
Mkr1 3.050 GHz
-55.01 dBm

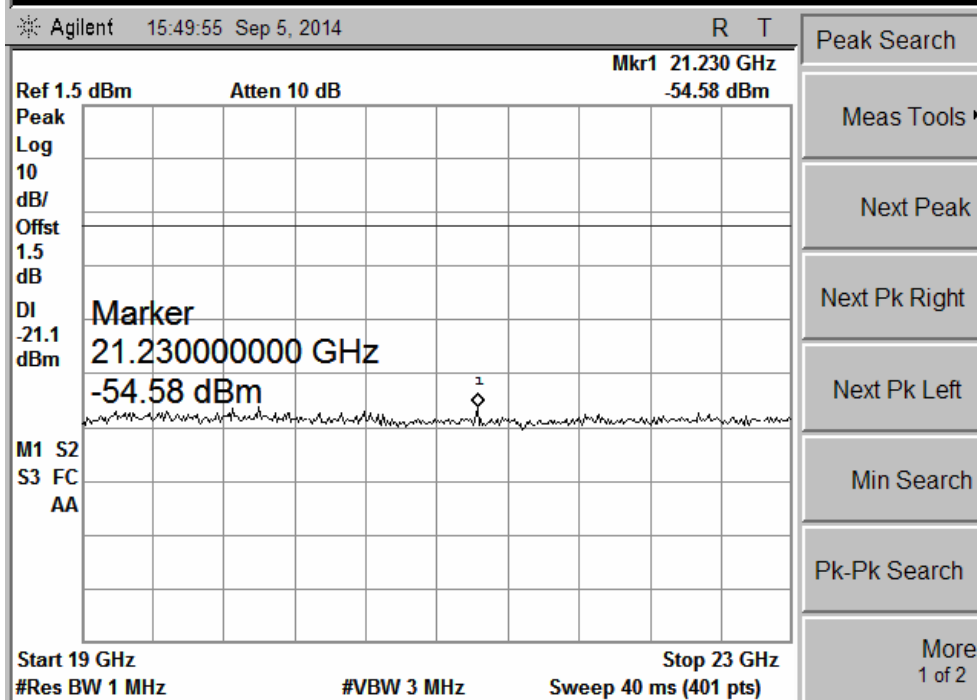
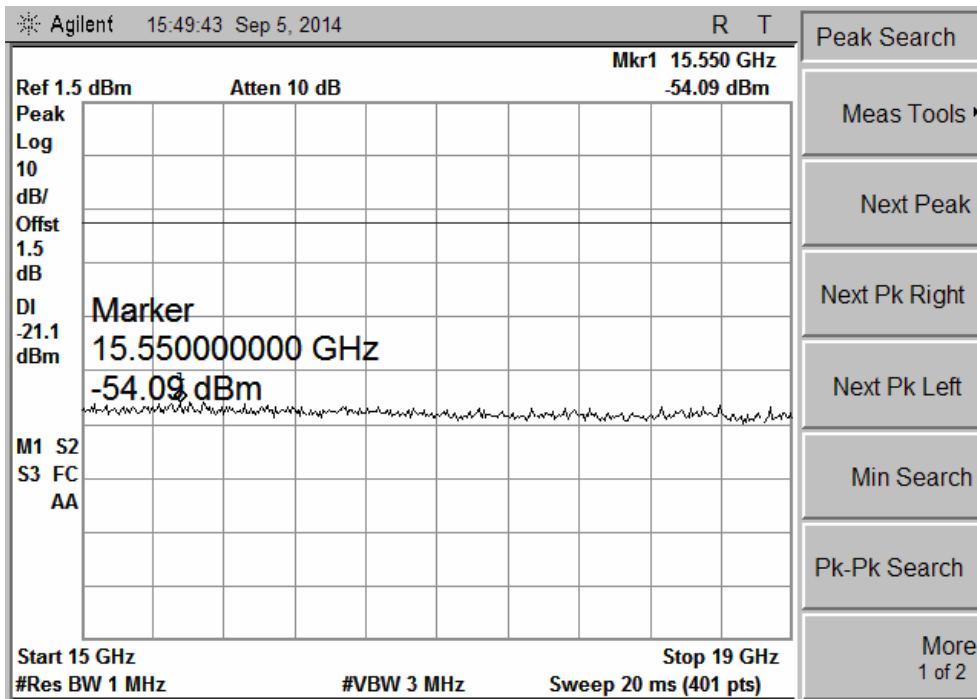
Ref 1.5 dBm Atten 10 dB

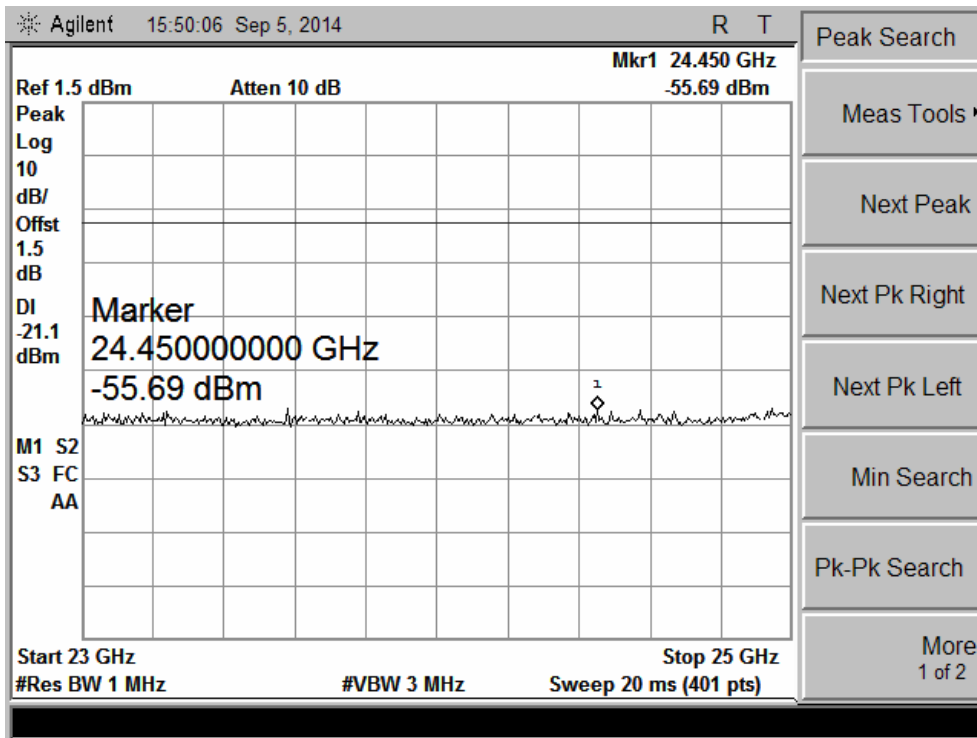
| | |
|-------|-----------------|
| Peak | |
| Log | |
| 10 | |
| dB/ | |
| Offst | |
| 1.5 | |
| dB | |
| DI | Marker |
| -21.1 | 3.050000000 GHz |
| dBm | 55.01 dBm |
| M1 S2 | |
| S3 FC | |
| AA | |

Start 3 GHz Stop 7 GHz
 #Res BW 1 MHz #VBW 3 MHz Sweep 10 ms (401 pts)

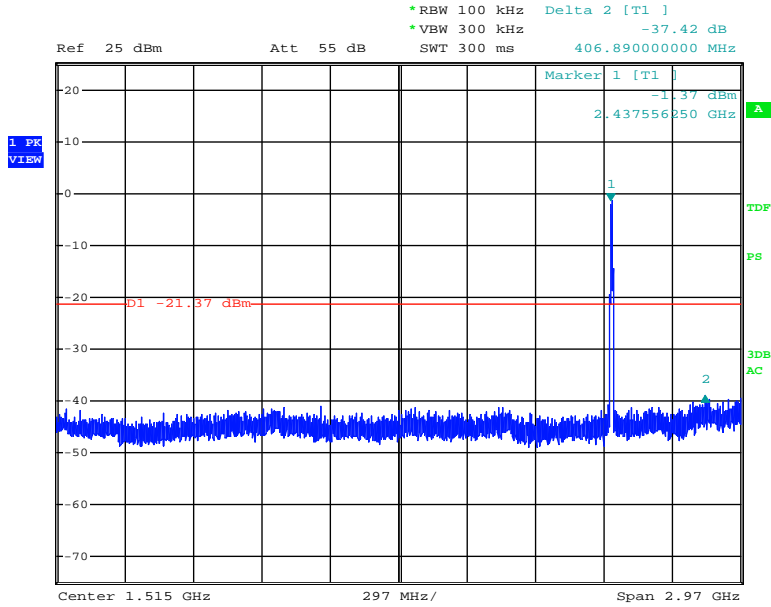
Peak Search
 Meas Tools ▾
 Next Peak
 Next Pk Right
 Next Pk Left
 Min Search
 Pk-Pk Search
 More
 1 of 2







Middle Channel



Date: 3.SEP.2014 18:13:34

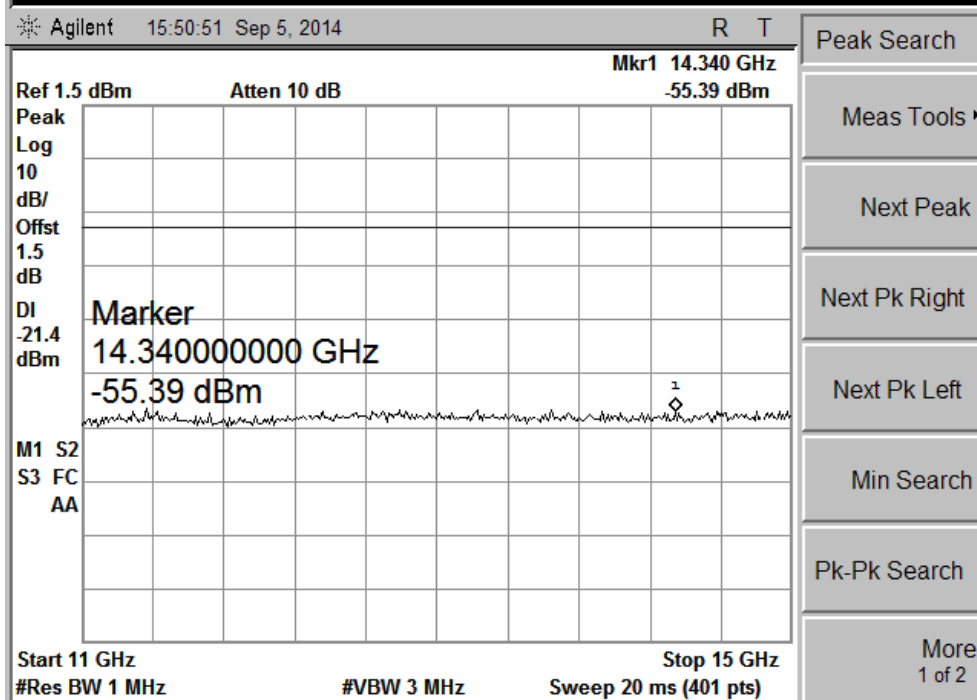
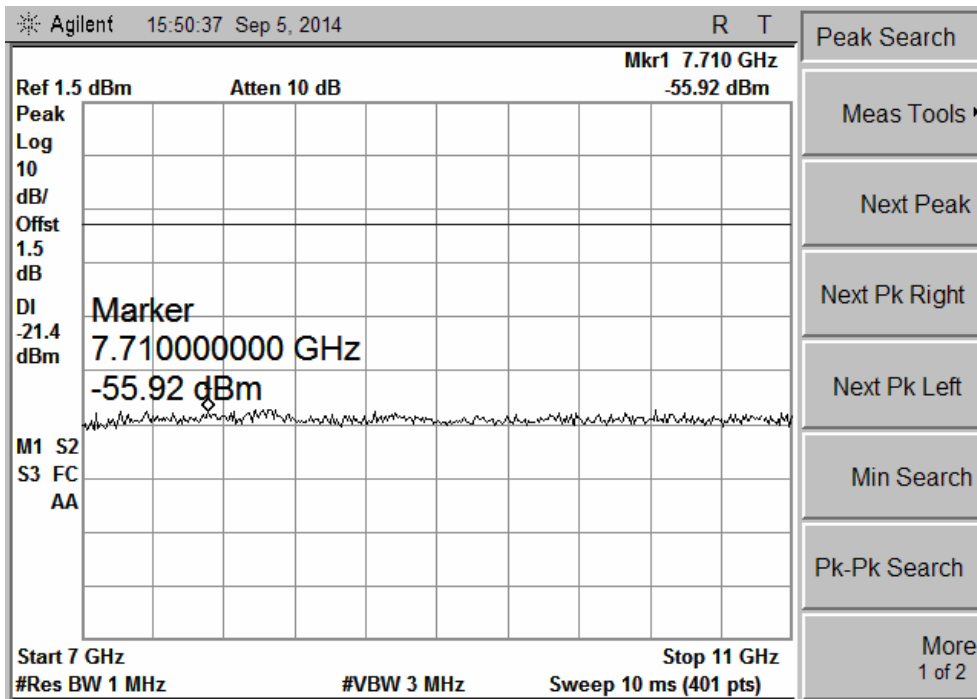
Agilent 15:50:26 Sep 5, 2014 R T

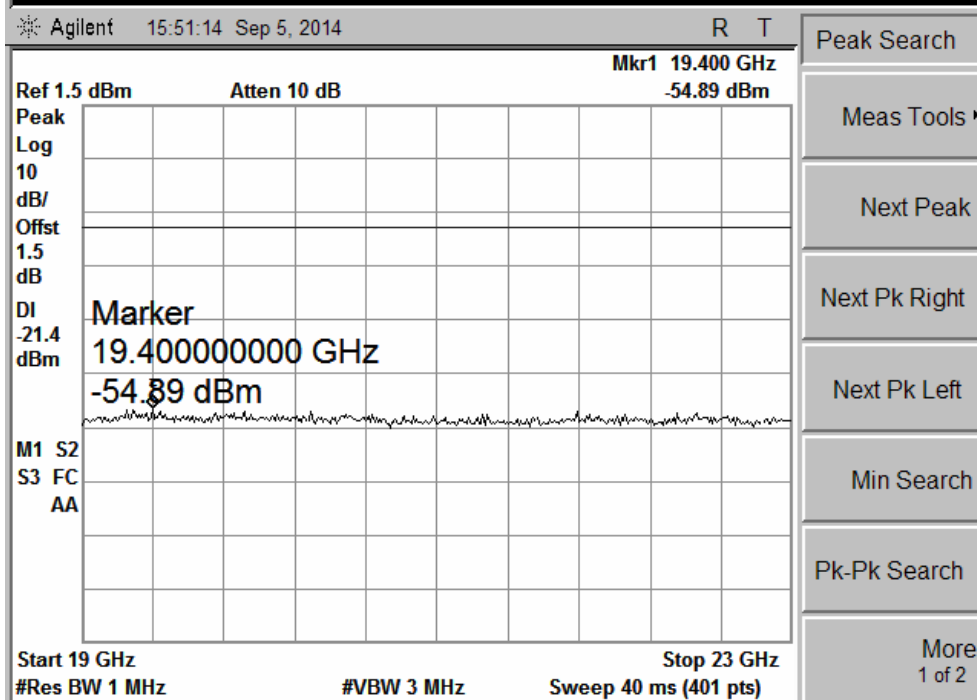
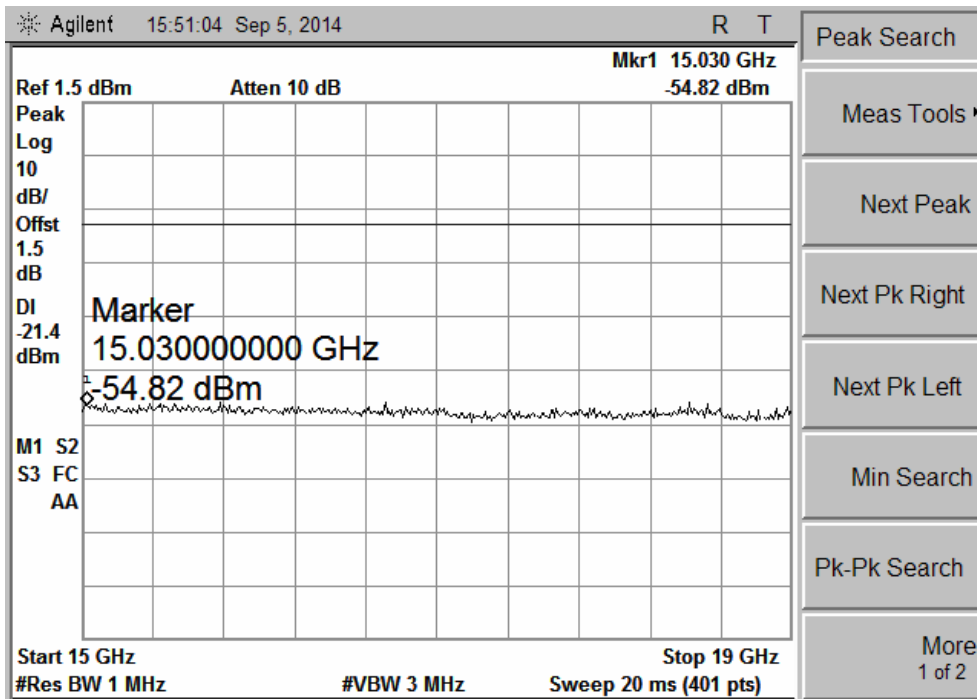
Ref 1.5 dBm Atten 10 dB Mkr1 3.530 GHz
-55.33 dBm

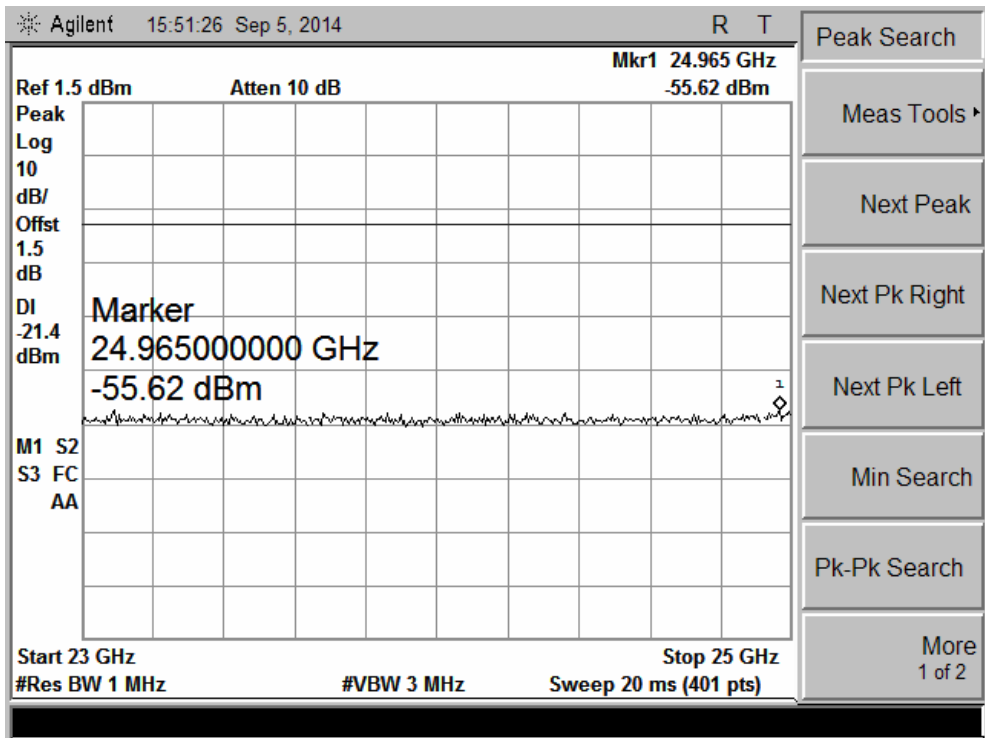
| | |
|-------|-----------------|
| Peak | |
| Log | |
| 10 | |
| dB/ | |
| Offst | |
| 1.5 | |
| dB | |
| DI | Marker |
| -21.4 | 3.530000000 GHz |
| dBm | -55.33 dBm |
| M1 S2 | |
| S3 FC | |
| AA | |

Start 3 GHz #Res BW 1 MHz Stop 7 GHz
 #VBW 3 MHz Sweep 10 ms (401 pts)

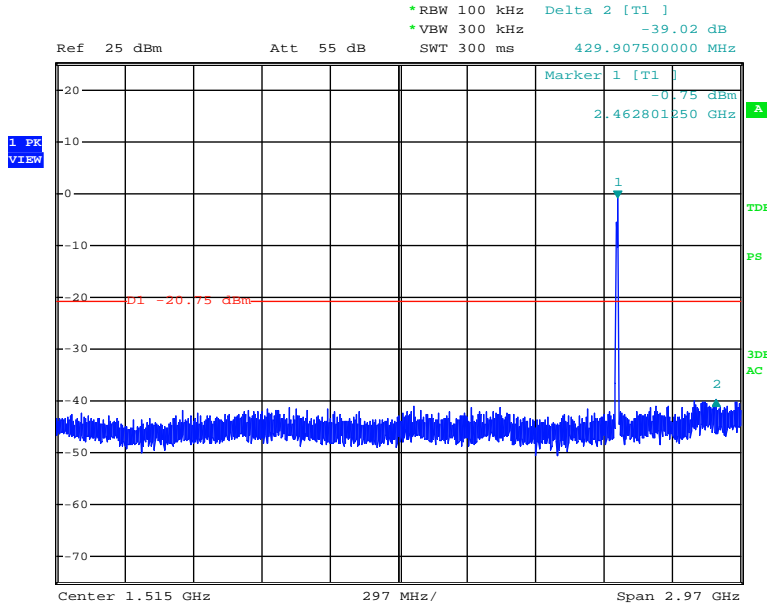
Peak Search
 Meas Tools ▾
 Next Peak
 Next Pk Right
 Next Pk Left
 Min Search
 Pk-Pk Search
 More
 1 of 2







High Channel



Date: 3.SEP.2014 18:14:05

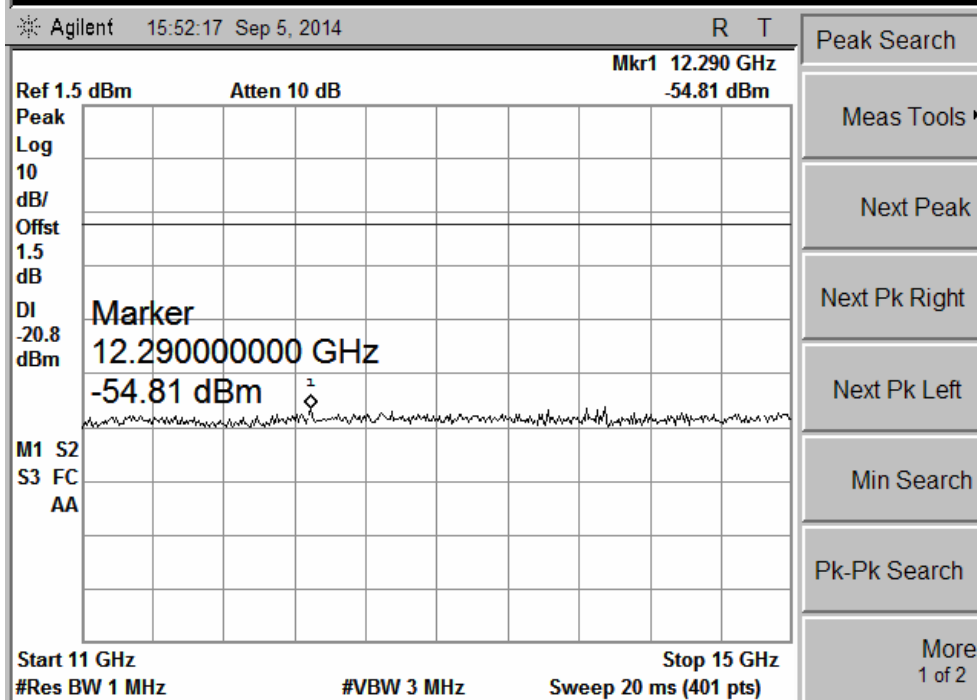
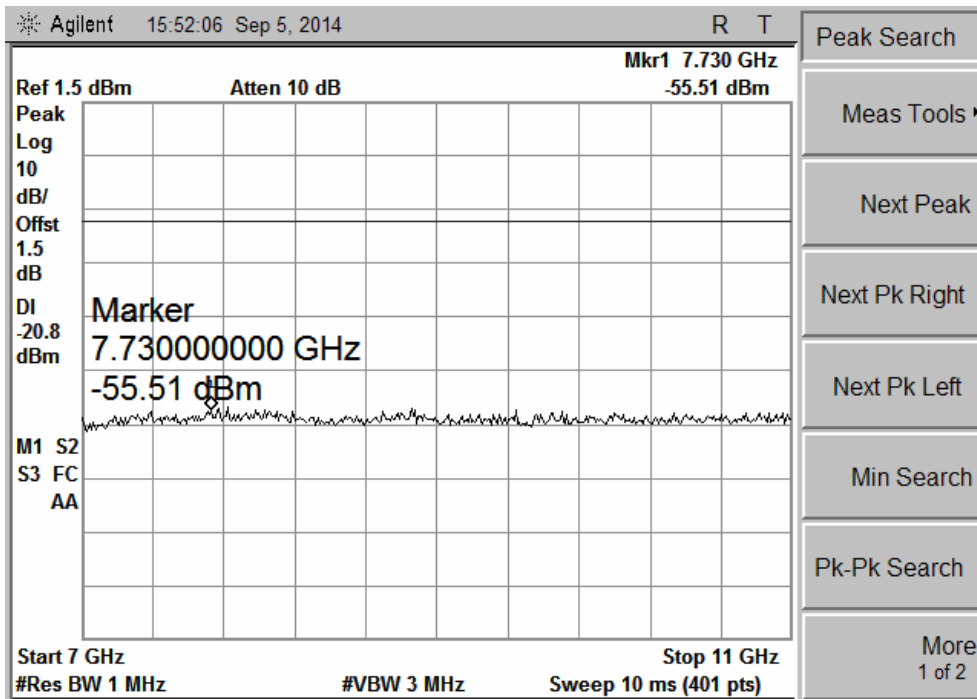
Agilent 15:51:53 Sep 5, 2014 R T

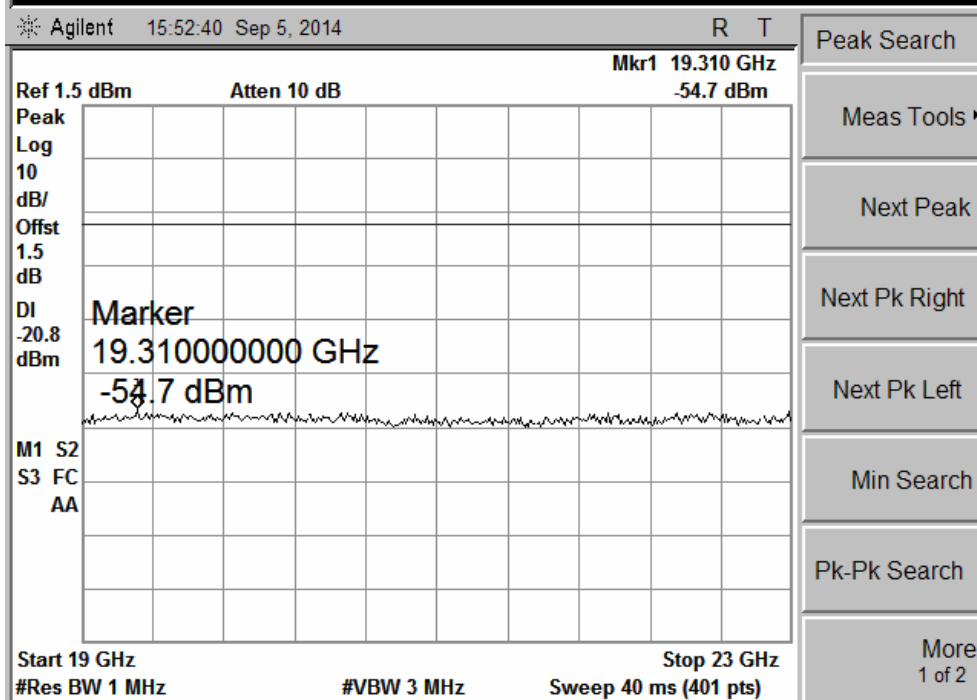
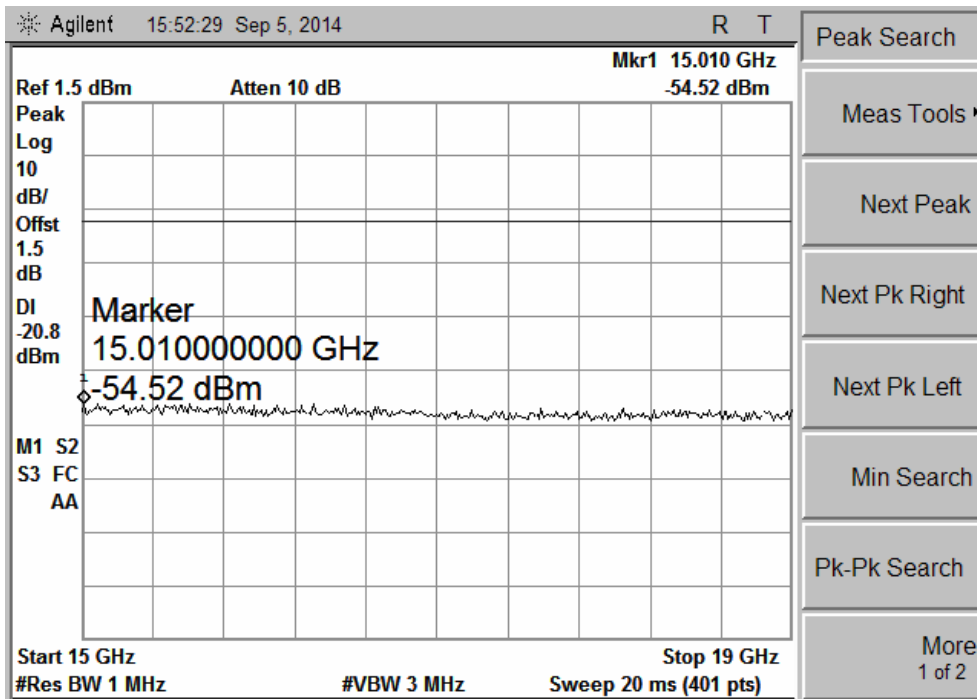
Ref 1.5 dBm Atten 10 dB Mkr1 3.440 GHz
-55.03 dBm

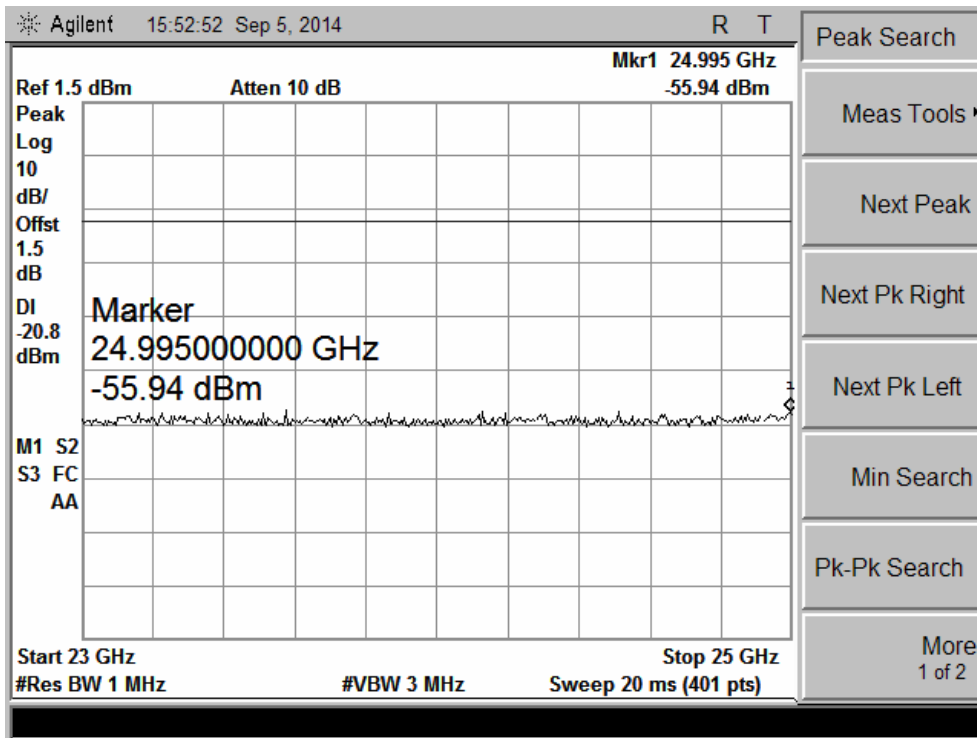
| | |
|-------|-----------------|
| Peak | |
| Log | |
| 10 | |
| dB/ | |
| Offst | |
| 1.5 | |
| dB | |
| DI | Marker |
| -20.8 | 3.440000000 GHz |
| dBm | -55.03 dBm |
| M1 S2 | |
| S3 FC | |
| AA | |

Start 3 GHz Stop 7 GHz
 #Res BW 1 MHz #VBW 3 MHz Sweep 10 ms (401 pts)

Peak Search
 Meas Tools ▾
 Next Peak
 Next Pk Right
 Next Pk Left
 Min Search
 Pk-Pk Search
 More
 1 of 2



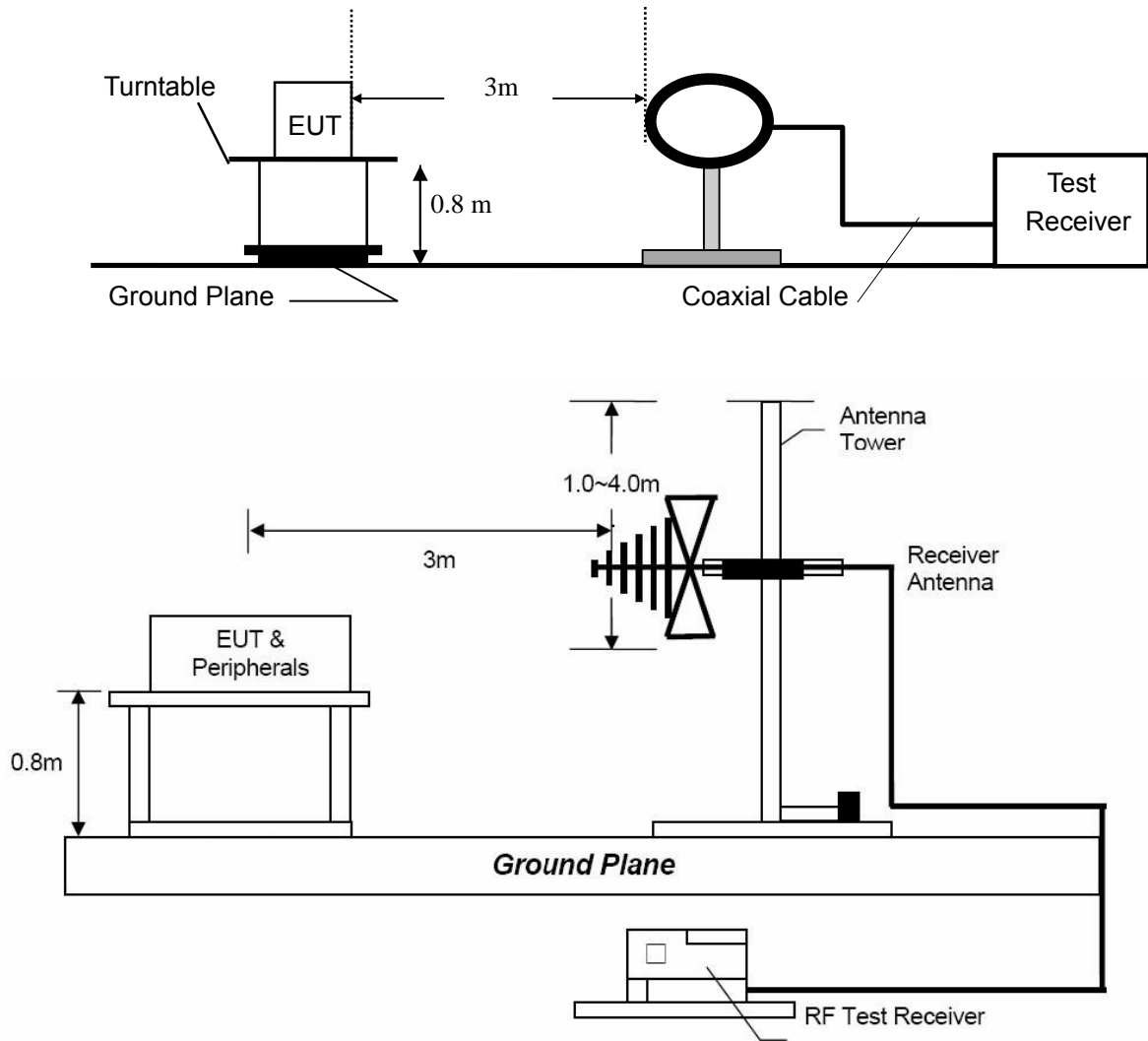




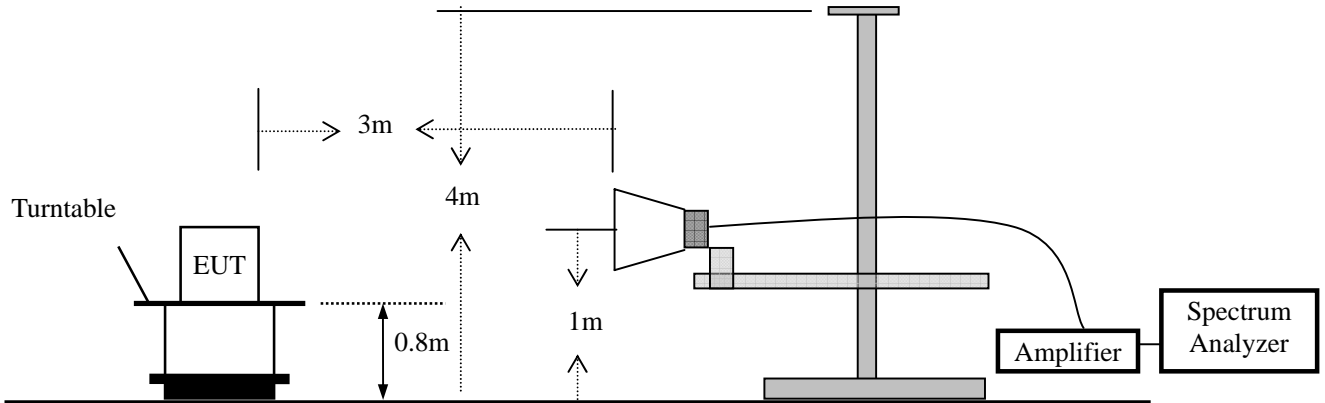
8. Radiated Spurious Emissions and Restricted Bands

8.1 Test SET-UP (Block Diagram of Configuration)

8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



8.2 Measurement Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- e. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.
 1. The resolution bandwidth of test receiver/spectrum analyzer is 120KHz and video bandwidth is 300KHz for Quasi-peak detection at frequency below 1GHz.
 2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for average detection(AV) at below at frequency above 1GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Function | Resolution Bandwidth | Video Bandwidth |
|----------------------|----------|----------------------|-----------------|
| 30 to 1000 | QP | 120 kHz | 300 kHz |
| Above 1000 | Peak | 1 MHz | 3 MHz |
| | Average | 1 MHz | 10 Hz |

8.3 Limit

| Frequency range MHz | Distance Meters | Field Strengths Limit (15.209) |
|---------------------|-----------------|--------------------------------|
| | | $\mu\text{V/m}$ |
| 0.009 ~ 0.490 | 300 | $2400/F(\text{kHz})$ |
| 0.490 ~ 1.705 | 30 | $24000/F(\text{kHz})$ |
| 1.705 ~ 30 | 30 | 30 |
| 30 ~ 88 | 3 | 100 |
| 88 ~ 216 | 3 | 150 |
| 216 ~ 960 | 3 | 200 |
| Above 960 | 3 | 500 |

- Remark :
- (1) Emission level (dB) $\mu\text{V} = 20 \log$ Emission level $\mu\text{V/m}$
 - (2) The smaller limit shall apply at the cross point between two frequency bands.
 - (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
 - (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
 - (5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.



8.4 Measurement Results

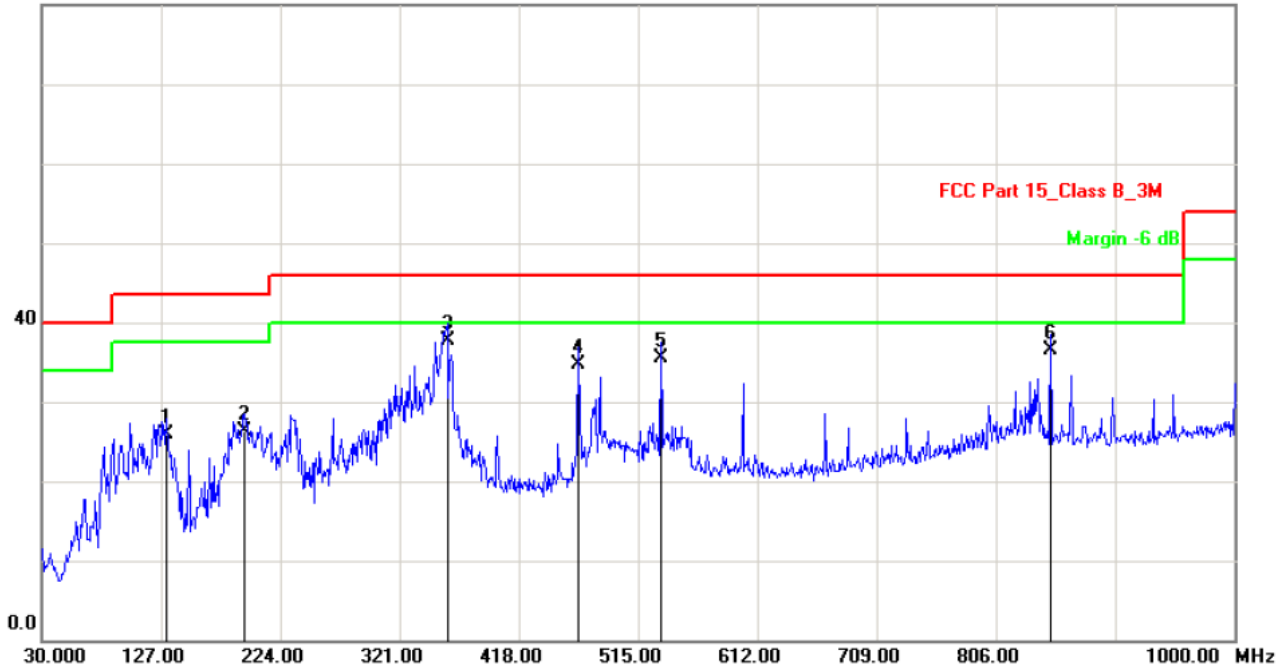
Test Mode: 802.11b(the worst case)
 Frequency Range: Below 1GHz Temperature : 24 °C
 Test Result: PASS Humidity : 56 %
 Measured Distance: 3m Test By: Sance
 Test Date : September 02, 2014

| Freq. (MHz) | Ant.Pol. H/V | Emission Level (dBuV) | Limit 3m (dBuV/m) | Margin (dB) | Note |
|-------------|--------------|-----------------------|-------------------|-------------|------|
| 359.8000 | H | 37.80 | 46.00 | -8.20 | QP |
| 466.5000 | H | 34.80 | 46.00 | -11.20 | QP |
| 533.4299 | H | 35.50 | 46.00 | -10.50 | QP |
| 850.6200 | H | 36.60 | 46.00 | -9.40 | QP |
| --- | | | | | |
| 64.9200 | V | 30.90 | 40.00 | -9.10 | QP |
| 127.9700 | V | 31.50 | 43.50 | -12.00 | QP |
| 236.6100 | V | 30.90 | 46.00 | -15.10 | QP |
| 359.8000 | V | 32.50 | 46.00 | -13.50 | QP |
| 466.5000 | V | 38.40 | 46.00 | -7.60 | QP |
| 533.4299 | V | 35.70 | 46.00 | -10.30 | QP |

- Note:**
- (1) Emission Level= Reading Level + Factor
 - (2) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (3) Measurement uncertainty : ±3.4dB
 - (4) Loop antenna used for the emission below 30MHz.
 - (5) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.

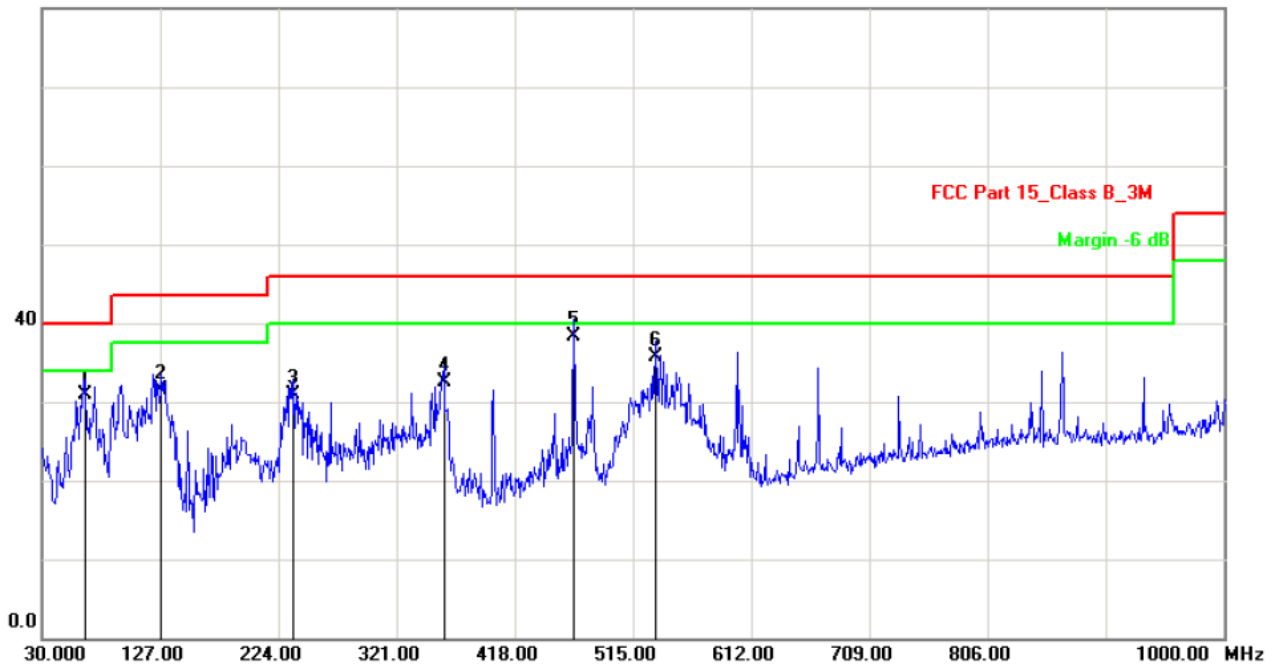
Horizontal

80.0 dBuV/m



Vertical

80.0 dBuV/m





Test Mode: 802.11b Test Date : September 02, 2014
 Frequency Range: Above 1GHz Temperature : 24°C
 Test Result: PASS Humidity : 56 %
 Measured Distance: 3m Test By: Sance

| Freq. (MHz) | Ant.Pol. H/V | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---------------------------------------|-----------------|----------------------|-------|------------------|-------|------------|-------|
| | | PK | AV | PK | AV | PK | AV |
| Operation Mode: TX Mode (Low) | | | | | | | |
| 4824 | V | 62.00 | 49.56 | 74.00 | 54.00 | -12.00 | -4.44 |
| 7236 | V | 65.45 | 50.19 | 74.00 | 54.00 | -8.55 | -3.81 |
| --- | | | | | | | |
| 4824 | H | 57.34 | 48.22 | 74.00 | 54.00 | -16.66 | -5.78 |
| 7236 | H | 64.20 | 50.65 | 74.00 | 54.00 | -9.80 | -3.35 |
| --- | | | | | | | |
| Operation Mode: TX Mode (Mid) | | | | | | | |
| 4874 | V | 63.40 | 47.37 | 74.00 | 54.00 | -10.60 | -6.63 |
| 7311 | V | 65.36 | 46.95 | 74.00 | 54.00 | -8.64 | -7.05 |
| --- | | | | | | | |
| 4874 | H | 56.51 | 48.10 | 74.00 | 54.00 | -17.49 | -5.90 |
| 7311 | H | 65.04 | 50.11 | 74.00 | 54.00 | -8.96 | -3.89 |
| --- | | | | | | | |
| Operation Mode: TX Mode (High) | | | | | | | |
| 4924 | V | 61.24 | 47.80 | 74.00 | 54.00 | -12.76 | -6.20 |
| 7386 | V | 64.95 | 50.04 | 74.00 | 54.00 | -9.05 | -3.96 |
| --- | | | | | | | |
| 4924 | H | 57.95 | 49.95 | 74.00 | 54.00 | -16.05 | -4.05 |
| 7386 | H | 64.96 | 50.06 | 74.00 | 54.00 | -9.04 | -3.94 |
| --- | | | | | | | |

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level + Factor
 - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 - (5) Measurement uncertainty : ±3.7dB.
 - (6) Horn antenna used for the emission over 1000MHz.



Test Mode: 802.11g Test Date : September 02, 2014
 Frequency Range: Above 1GHz Temperature : 24°C
 Test Result: PASS Humidity : 56 %
 Measured Distance: 3m Test By: Sance

| Freq. (MHz) | Ant. Pol. H/V | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---------------------------------------|---------------|----------------------|-------|------------------|-------|------------|--------|
| | | PK | AV | PK | AV | PK | AV |
| Operation Mode: TX Mode (Low) | | | | | | | |
| 4824 | V | 57.77 | 45.46 | 74.00 | 54.00 | -16.23 | -8.54 |
| 7236 | V | 58.38 | 49.61 | 74.00 | 54.00 | -15.62 | -4.39 |
| --- | | | | | | | |
| 4824 | H | 55.27 | 43.84 | 74.00 | 54.00 | -18.73 | -10.16 |
| 7236 | H | 65.20 | 50.61 | 74.00 | 54.00 | -8.80 | -3.39 |
| --- | | | | | | | |
| Operation Mode: TX Mode (Mid) | | | | | | | |
| 4874 | V | 60.23 | 46.61 | 74.00 | 54.00 | -13.77 | -7.39 |
| 7311 | V | 60.47 | 50.82 | 74.00 | 54.00 | -13.53 | -3.18 |
| --- | | | | | | | |
| 4874 | H | 55.89 | 43.48 | 74.00 | 54.00 | -18.11 | -10.52 |
| 7311 | H | 55.14 | 45.78 | 74.00 | 54.00 | -18.86 | -8.22 |
| --- | | | | | | | |
| Operation Mode: TX Mode (High) | | | | | | | |
| 4924 | V | 59.80 | 46.25 | 74.00 | 54.00 | -14.20 | -7.75 |
| 7386 | V | 60.29 | 48.91 | 74.00 | 54.00 | -13.71 | -5.09 |
| --- | | | | | | | |
| 4924 | H | 56.34 | 43.89 | 74.00 | 54.00 | -17.66 | -10.11 |
| 7386 | H | 60.31 | 50.97 | 74.00 | 54.00 | -13.69 | -3.03 |
| --- | | | | | | | |

- Note:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level + Factor
 - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 - (5) Measurement uncertainty : ±3.7dB.
 - (6) Horn antenna used for the emission over 1000MHz.



Test Mode: 802.11n(HT20) Test Date : September 02, 2014
 Frequency Range: Above 1GHz Temperature : 24°C
 Test Result: PASS Humidity : 56 %
 Measured Distance: 3m Test By: Sance

| Freq. (MHz) | Ant.Pol. H/V | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---------------------------------------|-----------------|----------------------|-------|------------------|-------|------------|--------|
| | | PK | AV | PK | AV | PK | AV |
| Operation Mode: TX Mode (Low) | | | | | | | |
| 4824 | V | 58.19 | 45.34 | 74.00 | 54.00 | -15.81 | -8.66 |
| 7236 | V | 60.51 | 46.63 | 74.00 | 54.00 | -13.49 | -7.37 |
| --- | | | | | | | |
| 4824 | H | 55.89 | 43.36 | 74.00 | 54.00 | -18.11 | -10.64 |
| 7236 | H | 55.18 | 41.60 | 74.00 | 54.00 | -18.82 | -12.40 |
| --- | | | | | | | |
| Operation Mode: TX Mode (Mid) | | | | | | | |
| 4874 | V | 55.99 | 43.25 | 74.00 | 54.00 | -18.01 | -10.75 |
| 7311 | V | 55.29 | 51.85 | 74.00 | 54.00 | -18.71 | -2.15 |
| --- | | | | | | | |
| 4874 | H | 59.80 | 45.38 | 74.00 | 54.00 | -14.20 | -8.62 |
| 7311 | H | 54.53 | 46.76 | 74.00 | 54.00 | -19.47 | -7.24 |
| --- | | | | | | | |
| Operation Mode: TX Mode (High) | | | | | | | |
| 4924 | V | 58.29 | 44.94 | 74.00 | 54.00 | -15.71 | -9.06 |
| 7386 | V | 58.49 | 45.27 | 74.00 | 54.00 | -15.51 | -8.73 |
| --- | | | | | | | |
| 4924 | H | 56.14 | 43.60 | 74.00 | 54.00 | -17.86 | -10.40 |
| 7386 | H | 60.57 | 50.11 | 74.00 | 54.00 | -13.43 | -3.89 |
| --- | | | | | | | |

- Not e:**
- (1) All Readings are Peak Value and AV.
 - (2) Emission Level= Reading Level + Factor
 - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
 - (4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
 - (5) Measurement uncertainty : ±3.7dB.
 - (6) Horn antenna used for the emission over 1000MHz.

9. Antenna Application

9.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

9.2 Measurement Results

The antenna is PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 0dBi, So, the antenna is consider meet the requirement.

10. Test Equipment List

| Description | Manufacturer | Model Number | Serial Number | Characteristics | Calibration Date | Calibration Due Date |
|--------------------------------|-----------------|--------------|---------------|-----------------|------------------|----------------------|
| Test Receiver | Rohde & Schwarz | ESCI7 | 100837 | 9KHz~7GHz | Nov. 25, 2013 | Nov. 24, 2014 |
| Antenna | Schwarzbeck | VULB9162 | 9162-010 | 30MHz~7GHz | Nov. 28, 2013 | Nov. 27, 2014 |
| Positioning Controller | UC | UC 3000 | N/A | 0~360° , 1-4m | N/A | N/A |
| Color Monitor | SUNSP0 | SP-140A | N/A | N/A | N/A | N/A |
| Single Phase Power Line Filter | SAEMC | PF201A-32 | 110210 | 32A | N/A | N/A |
| 3 Phase Power Line Filter | SAEMC | PF401A-200 | 110318 | 200A | N/A | N/A |
| DC Power Filter | SAEMC | PF301A-200 | 110245 | 200A | N/A | N/A |
| Cable | Huber+Suhner | CBL2-NN-1M | 22390001 | 9KHz~7GHz | Nov. 09, 2013 | Nov. 08, 2014 |
| Cable | Huber+Suhner | CIL02 | N/A | 9KHz~7GHz | Nov. 09, 2013 | Nov. 08, 2014 |
| Power Amplifier | HP | HP 8447D | 1145A00203 | 100KHz~1.3GHz | Nov. 09, 2013 | Nov. 08, 2014 |
| Horn Antenna | Schwarzbeck | BBHA9170 | 9170-372 | 15GHz~26.5GHz | Oct.24, 2013 | Oct.23, 2014 |
| Horn Antenna | Com-Power | AH-118 | 071078 | 1GHz~18GHz | Nov. 07, 2013 | Nov. 06, 2014 |
| Loop antenna | Daze | ZA30900A | 0708 | 9KHz~30MHz | Oct.11, 2013 | Oct.10, 2014 |
| Spectrum Analyzer | Agilent | E4408B | MY414407D | 9KHz~26.5GHz | Nov. 05, 2013 | Nov. 04, 2014 |
| Pre-Amplifier | Agilent | 8449B | 3008A02964 | 1GHz~26.5GHz | Nov. 05, 2013 | Nov. 04, 2014 |
| L.I.S.N. | Rohde & Schwarz | ENV 216 | 101317 | 9KHz~30MHz | Nov. 09, 2013 | Nov. 08, 2014 |

---End of report---