

FCC TEST REPORT

For

Embed International Pty Ltd

smartTouch Swipe

Test Model: STS-001

Prepared for : Embed International Pty Ltd
Address : 2 Neil Street, Osborne Park Perth, Western Australia 6017
Australia

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
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Date of receipt of test sample : April 06, 2016
Number of tested samples : 1
Sample number : Prototype
Date of Test : April 06, 2016 - April 11, 2016, 2016
Date of Report : April 12, 2016

FCC TEST REPORT
FCC CFR 47 PART 15 C(15.247): 2015

Report Reference No. : **LCS1603302631E**
Date of Issue : April 12, 2016

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
 Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure : Full application of Harmonised standards
 Partial application of Harmonised standards
 Other standard testing method

Applicant's Name..... : **Embed International Pty Ltd**
Address : 2 Neil Street, Osborne Park Perth, Western Australia 6017
 Australia

Test Specification
Standard : FCC CFR 47 PART 15 C(15.247): 2015 / ANSI C63.10: 2013
Test Report Form No...... : LCSEMC-1.0
TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF..... : Dated 2011-03

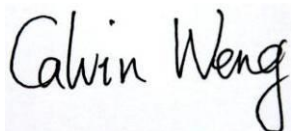
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Test Item Description. : **smartTouch Swipe**
Trade Mark : smartTouch™
Test Model : STS-001
Ratings : DC 12V/1A
Result : **Positive**

Compiled by:

Supervised by:

Approved by:





Calvin Weng/ File administrators

Glin Lu/ Technique principal

Gavin Liang/ Manager

FCC -- TEST REPORT

| | |
|---|--|
| Test Report No. : LCS1603302631E | <u>April 12, 2016</u> Date of issue |
|---|--|

| | |
|--|---|
| Test Model..... | : STS-001 |
| EUT..... | : smartTouch Swipe |
| Applicant..... : Embed International Pty Ltd | |
| Address..... | : 2 Neil Street, Osborne Park Perth, Western Australia 6017 Australia |
| Telephone..... | : / |
| Fax..... | : / |
| Manufacturer..... : Embed International Pty Ltd | |
| Address..... | : 2 Neil Street, Osborne Park Perth, Western Australia 6017 Australia |
| Telephone..... | : / |
| Fax..... | : / |
| Factory..... : Embed International Pty Ltd | |
| Address..... | : 2 Neil Street, Osborne Park Perth, Western Australia 6017 Australia |
| Telephone..... | : / |
| Fax..... | : / |

| | |
|--------------------|-----------------|
| Test Result | Positive |
|--------------------|-----------------|

The test report merely corresponds to the test sample.
 It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

| Revision | Issue Date | Revisions | Revised By |
|----------|------------|---------------|-------------|
| 00 | 2016-04-12 | Initial Issue | Gavin Liang |
| | | | |
| | | | |

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

| | |
|---------------------|--|
| EUT | : smartTouch Swipe |
| Test Model | : STS-001 |
| Hardware Version | : 5.0 |
| Software Version | : 1.0 |
| Power Supply | : DC 12V/1A |
| EUT Supports | : 2.4GHz WIFI/RFID(13.56MHz) |
| Radios Application | |
| RFID Technology | : |
| Operating Frequency | : 13.56MHz |
| Channel Number | : 1 |
| Modulation Type | : ASK |
| Antenna Description | : Loop Antenna, 2.0dBi(Max.) |
| WIFI(2.4GHz Band) | : |
| Operating Frequency | : 2412-2462MHz |
| Channel Spacing | : 5MHz |
| Channel Number | : 11 Channel for 20MHz bandwidth(2412~2462MHz) 7 channels for 40MHz bandwidth(2422~2452MHz) |
| Modulation Type | : 802.11b: DSSS; 802.11g/n: OFDM |
| Antenna Description | : PCB Antenna, 2.0dBi(Max.) |

1.2. Support Equipment List

| Manufacturer | Description | Model | Serial Number | Certificate |
|------------------------------------|-------------|---------|---------------|-------------|
| MEAN WELL ENTERPRISES CO LTD | Adapter | GS18B12 | / | VOC |

1.3. External I/O

| I/O Port Description | Quantity | Cable |
|-------------------------------|----------|------------------|
| Connector J7 – IO Redemption | 1 | 0.8m, unshielded |
| Connector J9 – IO Expansion | 1 | N/A |
| Connector J8 – USB Power Port | 1 | N/A |

1.4. Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

There is one 3m semi-anechoic chamber and one line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10: 2013 and CISPR 22/EN 55022/ CISPR 16-1-4:2010 SVSWR requirements.

1.5. List Of Measuring Equipments

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Cal Date | Due Date |
|--------------------------|----------------|----------------------------------|-------------|-----------------|---------------|---------------|
| EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz – 2.75GHz | June 18,2015 | June 17,2016 |
| Signal analyzer | Agilent | E4448A(External mixers to 40GHz) | US44300469 | 9kHz~40GHz | July 16,2015 | July 15,2016 |
| LISN | MESS Tec | NNB-2/16Z | 99079 | 9KHz-30MHz | June 18,2015 | June 17,2016 |
| LISN (Support Unit) | EMCO | 3819/2NM | 9703-1839 | 9KHz-30MHz | June 18,2015 | June 17,2016 |
| RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9KHz-30MHz | June 18,2015 | June 17,2016 |
| ISN | SCHAFFNER | ISN ST08 | 21653 | 9KHz-30MHz | June 18,2015 | June 17,2016 |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 30M-1GHz 3m | June 18,2015 | June 17,2016 |
| Amplifier | SCHAFFNER | COA9231A | 18667 | 9kHz-2GHz | June 18,2015 | June 17,2016 |
| Amplifier | Agilent | 8449B | 3008A02120 | 1GHz-26.5GHz | July 16,2015 | July 15,2016 |
| Amplifier | MITEQ | AMF-6F-260400 | 9121372 | 26.5GHz-40GHz | July 16,2015 | July 15,2016 |
| Spectrum Analyzer | Agilent | E4407B | MY41440292 | 9k-26.5GHz | July 16,2015 | July 15,2016 |
| MAX Signal Analyzer | Agilent | N9020A | MY50510140 | 20Hz~26.5GHz | Oct. 27, 2015 | Oct. 26, 2016 |
| Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9k-30MHz | June 18,2015 | June 17,2016 |
| By-log Antenna | SCHWARZBECK | VULB9163 | 9163-470 | 30MHz-1GHz | June 10,2015 | June 09,2016 |
| Horn Antenna | EMCO | 3115 | 6741 | 1GHz-18GHz | June 10,2015 | June 09,2016 |
| Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170154 | 15GHz-40GHz | June 10,2015 | June 09,2016 |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz-1GHz | June 18,2015 | June 17,2016 |
| RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-HY | 1GHz-40GHz | June 18,2015 | June 17,2016 |
| Spectrum Meter | R&S | FSP 30 | 100023 | 9kHz-30GHz | July 16,2015 | July 15,2016 |
| Power Meter | R&S | NRVS | 100444 | DC-40GHz | June 18,2015 | June 17,2016 |
| Power Sensor | R&S | NRV-Z51 | 100458 | DC-30GHz | June 18,2015 | June 17,2016 |
| Power Sensor | R&S | NRV-Z32 | 10057 | 30MHz-6GHz | June 18,2015 | June 17,2016 |
| RF CABLE-1m | JYE Bao | RG142 | CB034-1m | 20MHz-7GHz | June 18,2015 | June 17,2016 |
| RF CABLE-2m | JYE Bao | RG142 | CB035-2m | 20MHz-1GHz | June 18,2015 | June 17,2016 |

Note: All equipment through GRGT EST calibration

1.6. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.7. Measurement Uncertainty

| Test Item | Frequency Range | Uncertainty | Note |
|------------------------|-----------------|-------------|------|
| Radiation Uncertainty | 9KHz~30MHz | 3.10dB | (1) |
| | 30MHz~200MHz | 2.96dB | (1) |
| | 200MHz~1000MHz | 3.10dB | (1) |
| | 1GHz~26.5GHz | 3.80dB | (1) |
| | 26.5GHz~40GHz | 3.90dB | (1) |
| Conduction Uncertainty | 150kHz~30MHz | 1.63dB | (1) |
| Power disturbance | 30MHz~300MHz | 1.60dB | (1) |

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

1.8. Description Of Test Modes

The EUT has been tested under operating condition.

For pre-testing, when performed power line conducted emission measurement, the input Voltage/Frequency AC 120V/60Hz and AC 240V/60Hz were used. Only recorded the worst case in this report.

The EUT was set to transmit at 100% duty cycle. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was determined to be 802.11g mode(TX-Low Channel).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was determined to be 802.11g mode(TX-Low Channel).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

802.11b Mode: 1 Mbps, DSSS.

802.11g Mode: 6 Mbps, OFDM.

802.11n Mode HT20: MCS0, OFDM.

802.11n Mode HT40: MCS0, OFDM.

***Note: Using a temporary antenna connector for the EUT when the conducted measurements are performed.

Channel List & Frequency
802.11b/g/n(HT20)

| Frequency Band | Channel No. | Frequency(MHz) | Channel No. | Frequency(MHz) |
|----------------|-------------|----------------|-------------|----------------|
| 2412~2462MHz | 1 | 2412 | 7 | 2442 |
| | 2 | 2417 | 8 | 2447 |
| | 3 | 2422 | 9 | 2452 |
| | 4 | 2427 | 10 | 2457 |
| | 5 | 2432 | 11 | 2462 |
| | 6 | 2437 | -- | -- |

802.11n(HT40)

| Frequency Band | Channel No. | Frequency(MHz) | Channel No. | Frequency(MHz) |
|----------------|-------------|----------------|-------------|----------------|
| 2422~2452MHz | 1 | -- | 7 | 2442 |
| | 2 | -- | 8 | 2447 |
| | 3 | 2422 | 9 | 2452 |
| | 4 | 2427 | 10 | -- |
| | 5 | 2432 | 11 | -- |
| | 6 | 2437 | -- | -- |

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10: 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

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 that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

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

According to FCC's request, Test Procedure KDB558074 D01 DTS Meas Guidance v03r04 is required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

According to the requirements in Section 6.2 of ANSI C63.10: 2013, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2013

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmit condition.

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

| Applied Standard: FCC Part 15 Subpart C | | |
|---|---|-----------|
| FCC Rules | Description of Test | Result |
| §15.247(b)(3) | Maximum Conducted Output Power | Compliant |
| §15.247(e) | Power Spectral Density | Compliant |
| §15.247(a)(2) | 6dB Bandwidth | Compliant |
| §15.209, §15.247(d) | Radiated and Conducted Spurious Emissions | Compliant |
| §15.205 | Emissions at Restricted Band | Compliant |
| §15.207(a) | Line Conducted Emissions | Compliant |
| §15.203 | Antenna Requirements | Compliant |

5. TEST RESULT

5.1. Maximum Conducted Output Power Measurement

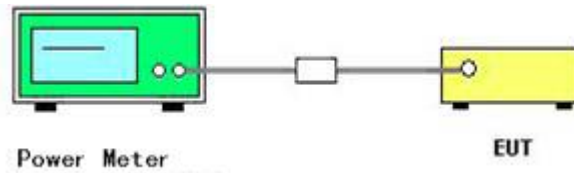
5.1.1. Standard Applicable

According to § 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt.

5.1.2. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

5.1.3. Test Setup Layout



5.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.1.5. Test Result of Maximum Conducted Output Power

| | | | |
|---------------|--------|----------------|-------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Calvin | Configurations | 802.11b/g/n |

| Mode | Channel | Frequency (MHz) | Conducted Power (dBm, Peak) | Max. Limit (dBm) | Result |
|-----------------|---------|-----------------|-----------------------------|------------------|----------|
| 802.11b | 1 | 2412 | 13.37 | 30 | Complies |
| | 6 | 2437 | 13.07 | 30 | Complies |
| | 11 | 2462 | 14.32 | 30 | Complies |
| 802.11g | 1 | 2412 | 11.17 | 30 | Complies |
| | 6 | 2437 | 11.14 | 30 | Complies |
| | 11 | 2462 | 11.50 | 30 | Complies |
| 802.11n HT20 | 1 | 2412 | 12.02 | 30 | Complies |
| | 6 | 2437 | 11.23 | 30 | Complies |
| | 11 | 2462 | 11.63 | 30 | Complies |
| 802.11n HT40 | 3 | 2422 | 9.86 | 30 | Complies |
| | 6 | 2437 | 10.11 | 30 | Complies |
| | 9 | 2452 | 10.00 | 30 | Complies |

5.2. Power Spectral Density Measurement

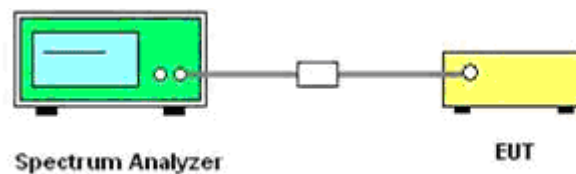
5.2.1. Standard Applicable

According to §15.247(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.

5.2.2. Test Procedures

- 1) The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
- 2) The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
- 3) Set the RBW = 3 kHz.
- 4) Set the VBW $\geq 3 \times$ RBW
- 5) Set the span to 1.5 times the DTS channel bandwidth.
- 6) Detector = peak.
- 7) Sweep time = auto couple.
- 8) Trace mode = max hold.
- 9) Allow trace to fully stabilize.
- 10) Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

5.2.3. Test Setup Layout



5.2.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

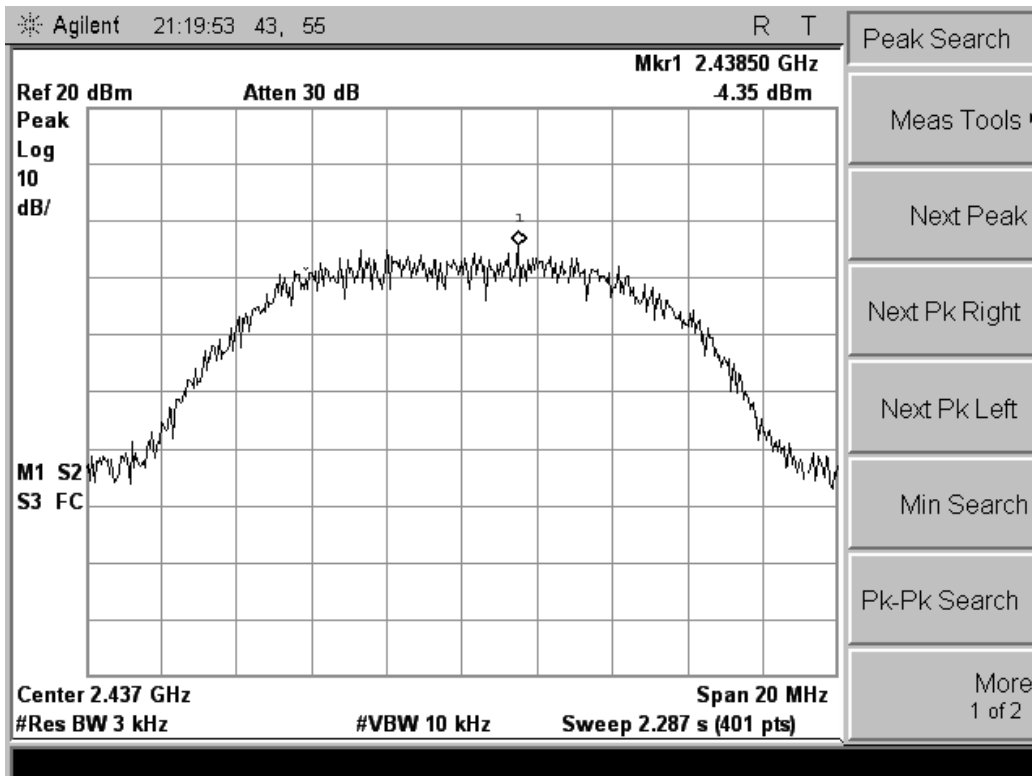
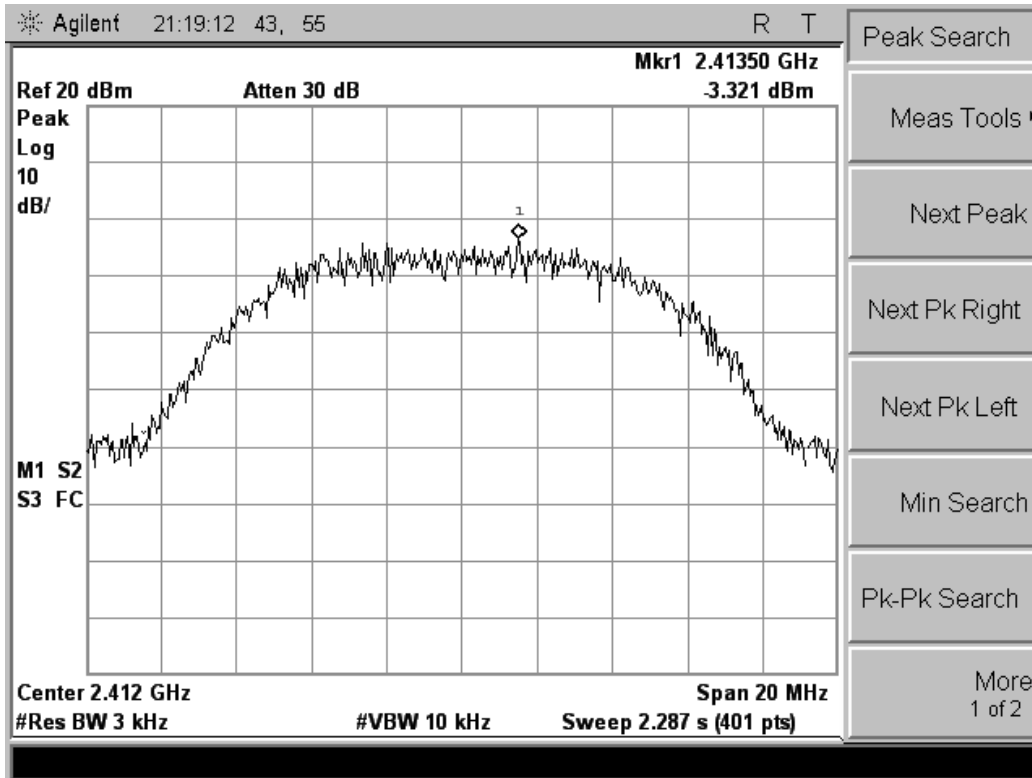
5.2.5. Test Result of Power Spectral Density

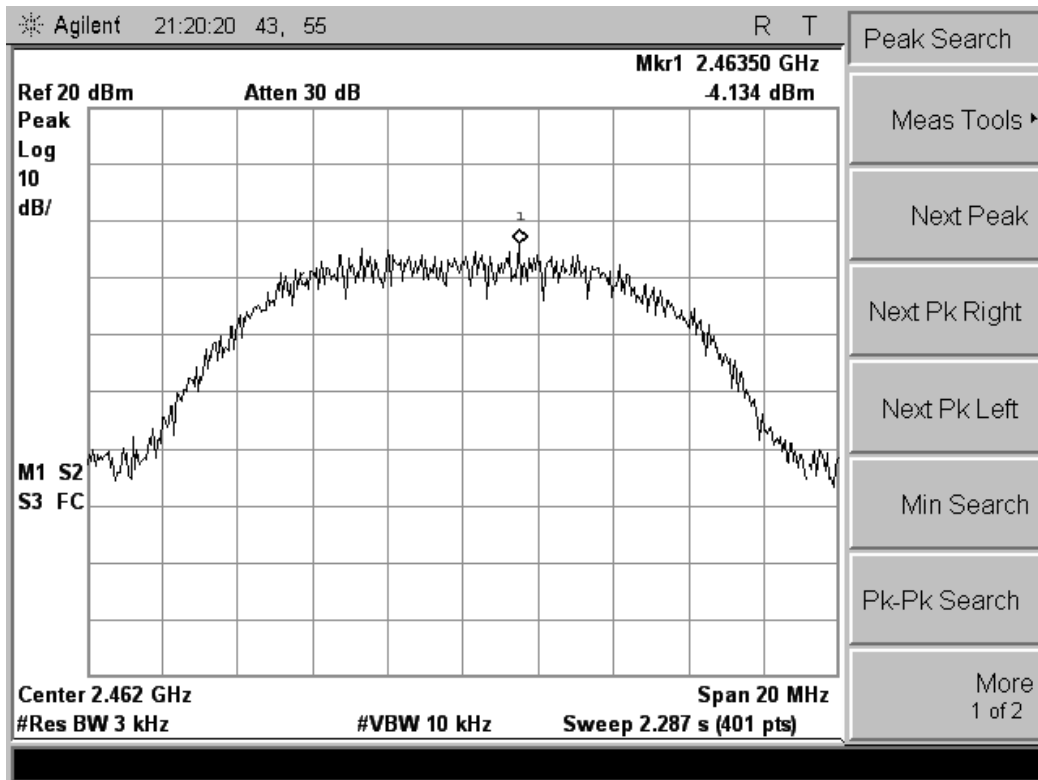
| | | | |
|---------------|--------|----------------|-------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Calvin | Configurations | 802.11b/g/n |

| Mode | Channel | Frequency (MHz) | Power Density (dBm/3KHz) | Max. Limit (dBm/3KHz) | Result |
|-----------------|---------|-----------------|--------------------------|-----------------------|----------|
| 802.11b | 1 | 2412 | -3.321 | 8 | Complies |
| | 6 | 2437 | -4.350 | 8 | Complies |
| | 11 | 2462 | -4.134 | 8 | Complies |
| 802.11g | 1 | 2412 | -7.797 | 8 | Complies |
| | 6 | 2437 | -7.751 | 8 | Complies |
| | 11 | 2462 | -8.758 | 8 | Complies |
| 802.11n HT20 | 1 | 2412 | -15 | 8 | Complies |
| | 6 | 2437 | -14.85 | 8 | Complies |
| | 11 | 2462 | -14.84 | 8 | Complies |
| 802.11n HT40 | 3 | 2422 | -15.107 | 8 | Complies |
| | 6 | 2437 | -13.72 | 8 | Complies |
| | 9 | 2452 | -14.46 | 8 | Complies |

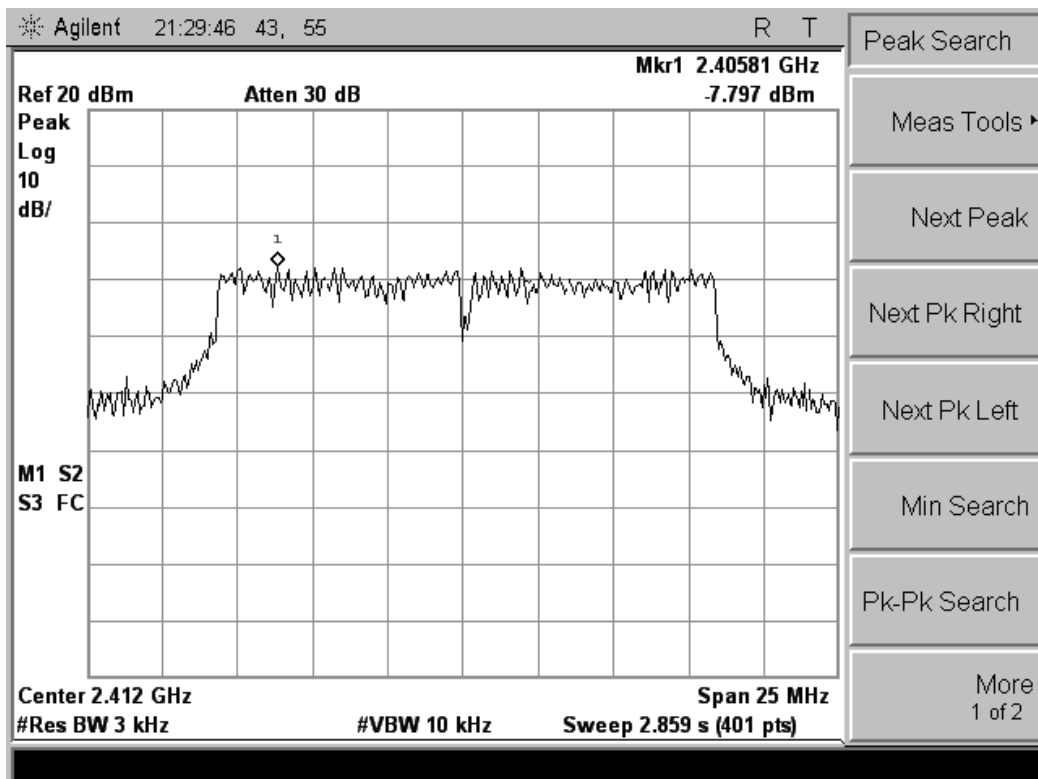
Note: The measured power density (dBm) has the offset with cable loss already.

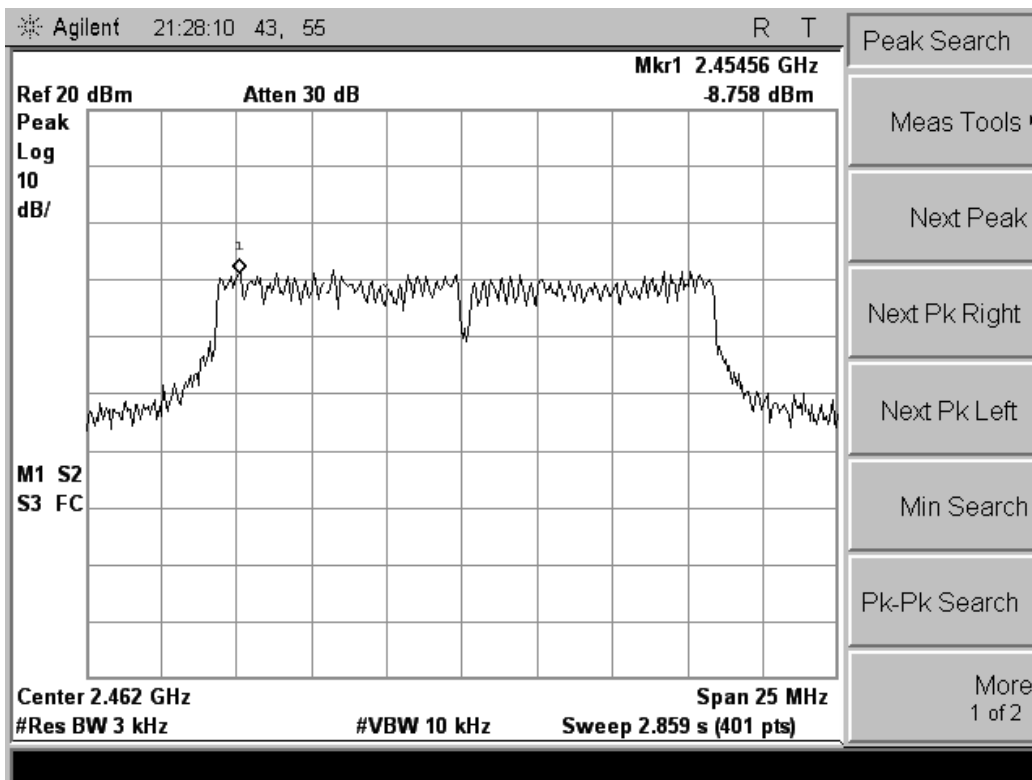
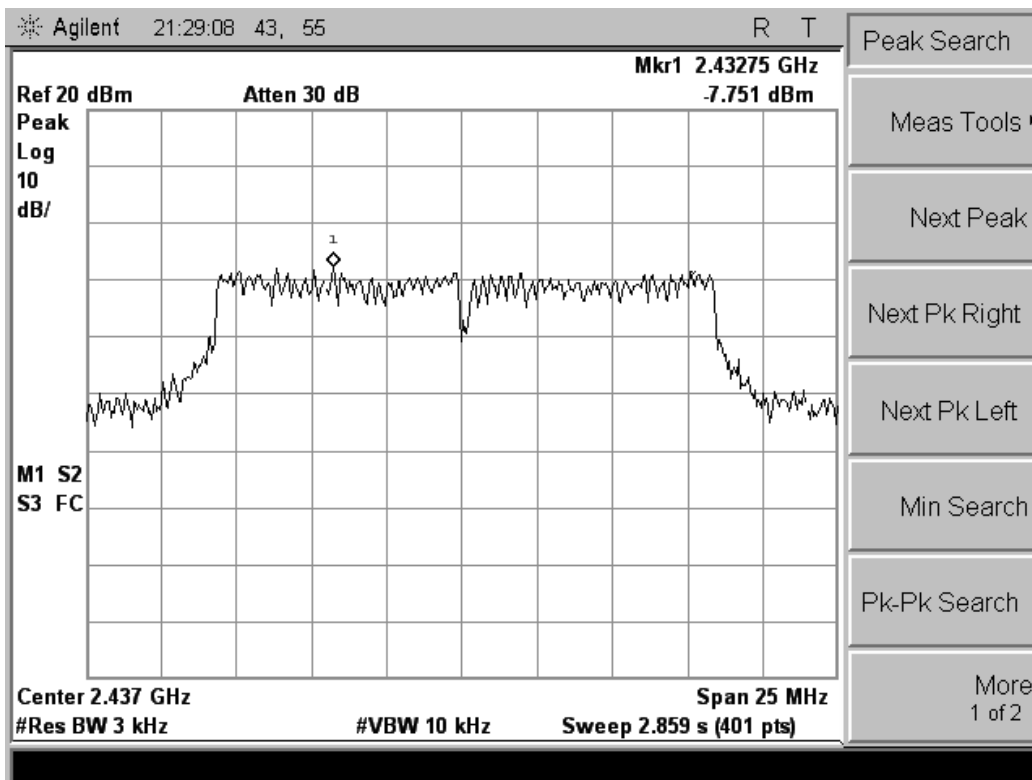
802.11b power density



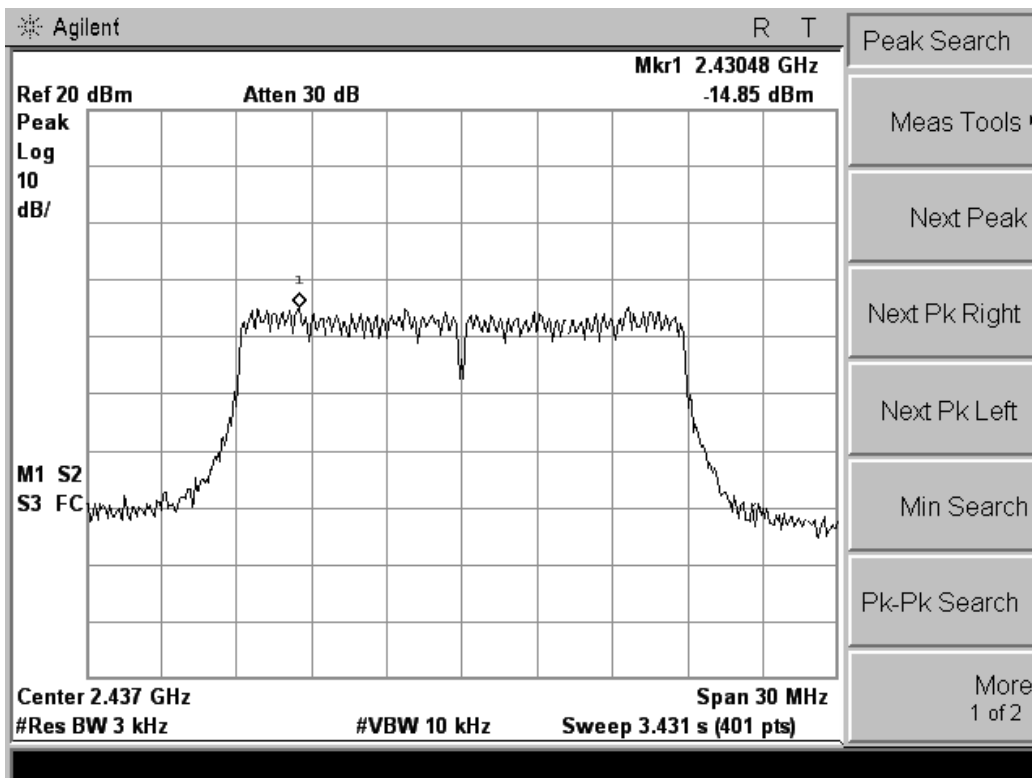
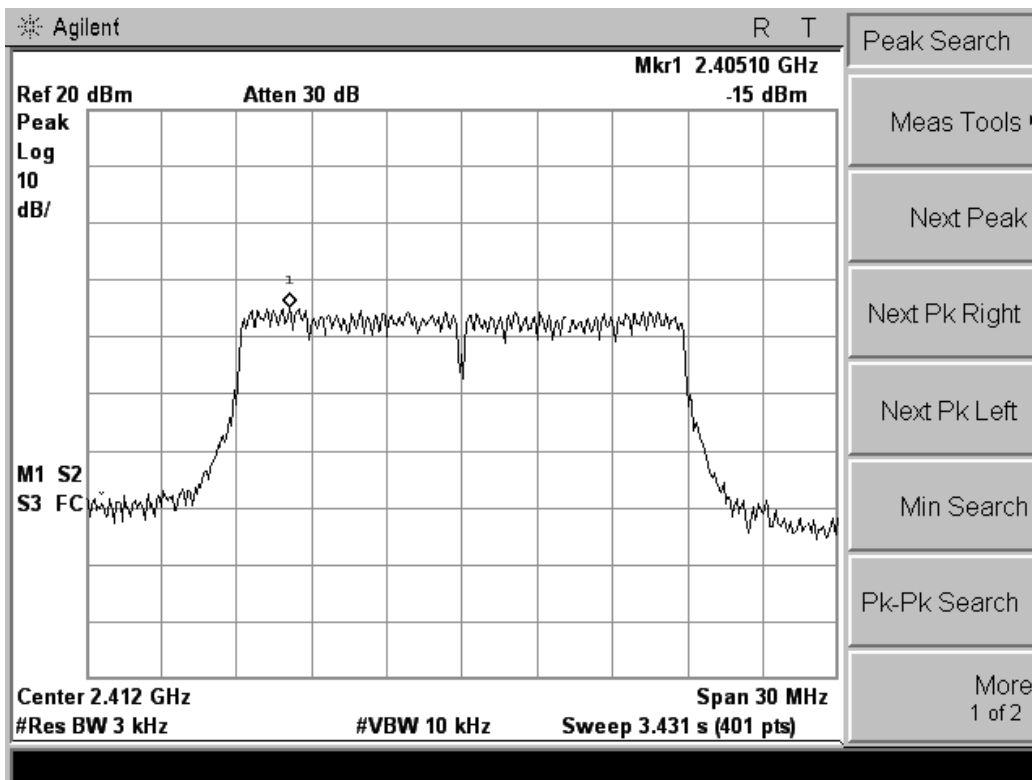


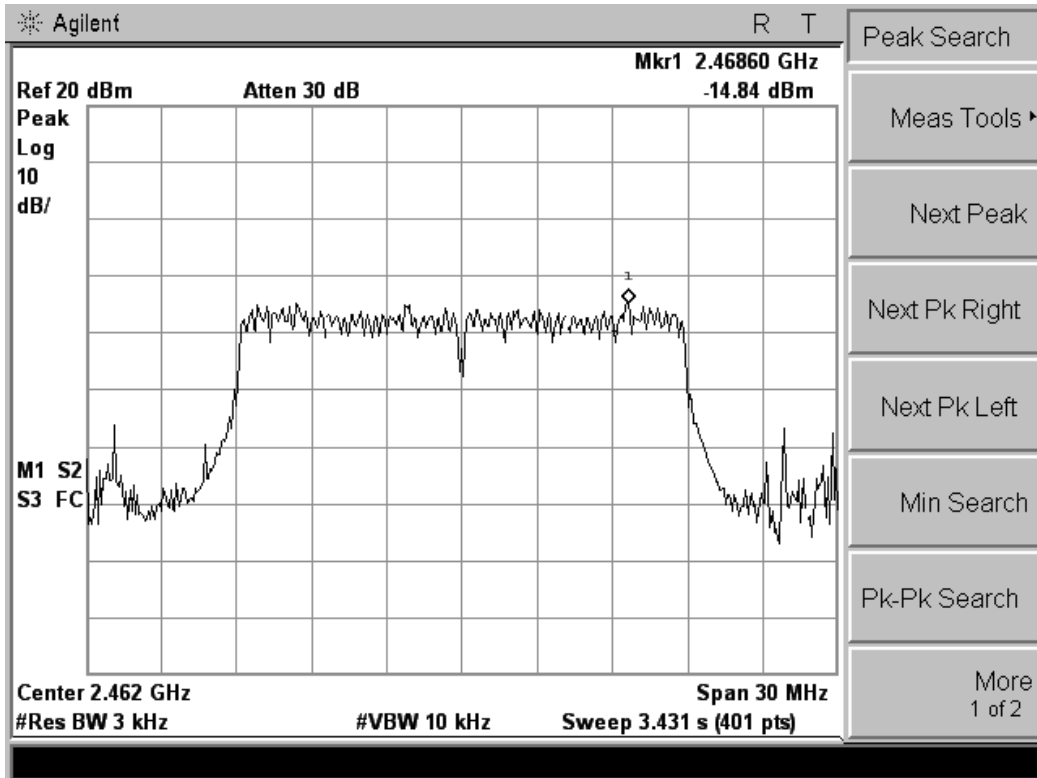
802.11g power density



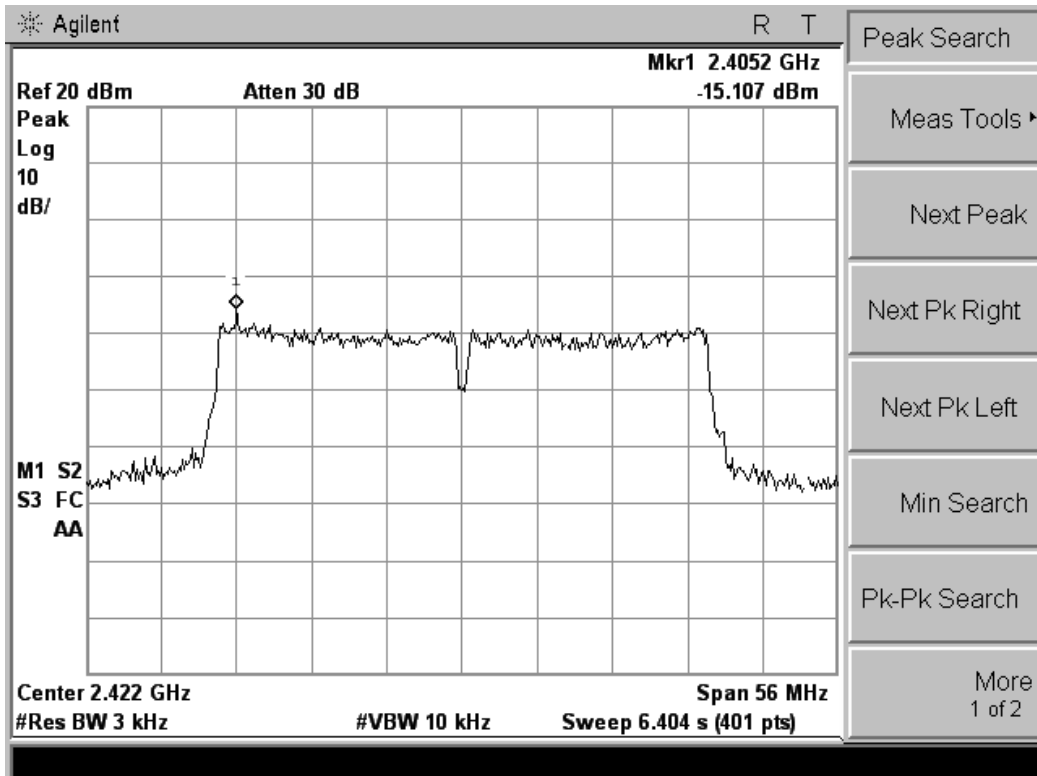


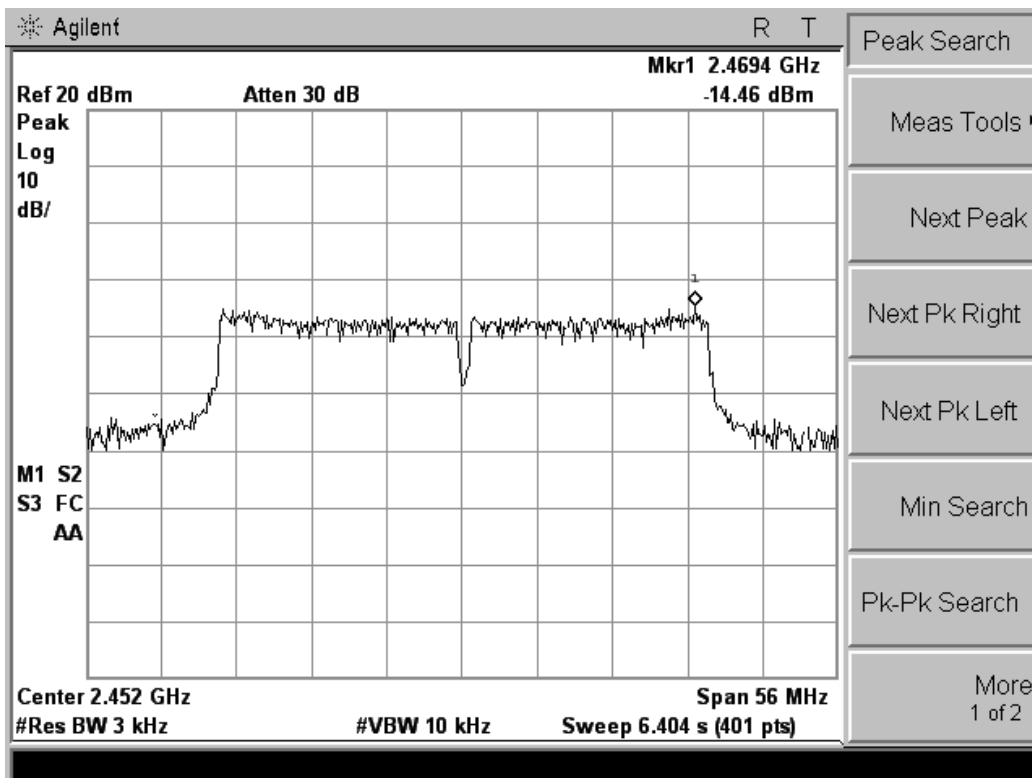
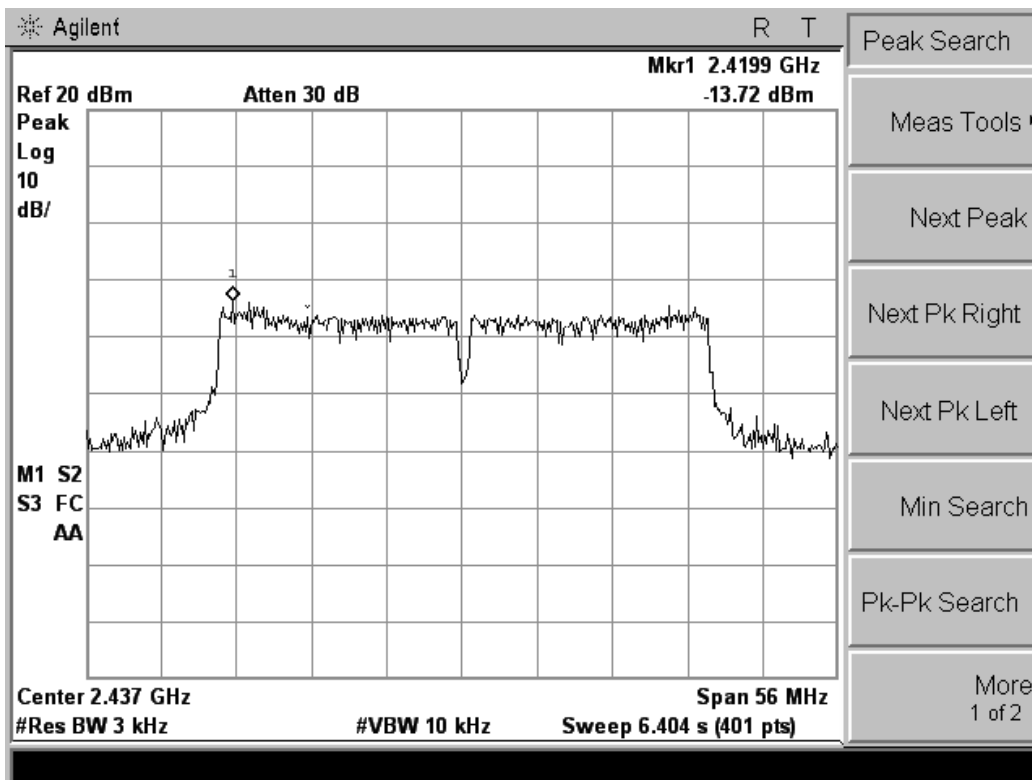
802.11n HT20 power density





802.11n HT40 power density





5.3. 6 dB Spectrum Bandwidth Measurement

5.3.1. Standard Applicable

According to §15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.3.2. Instruments Setting

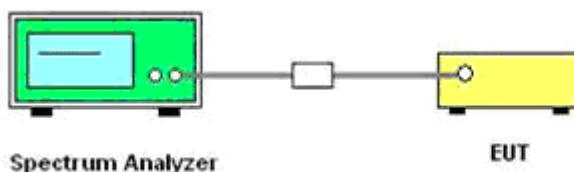
The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameter | Setting |
|--------------------|----------|
| Attenuation | Auto |
| Span Frequency | > RBW |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | 100ms |

5.3.3. Test Procedures

- 1) The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- 2) The resolution bandwidth and the video bandwidth were set according to KDB558074 D01 DTS Meas. Guidance v03r04.
- 3) Measured 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 6dB relative to the maximum level measured in the fundamental emission.

5.3.4. Test Setup Layout



5.3.5. EUT Operation during Test

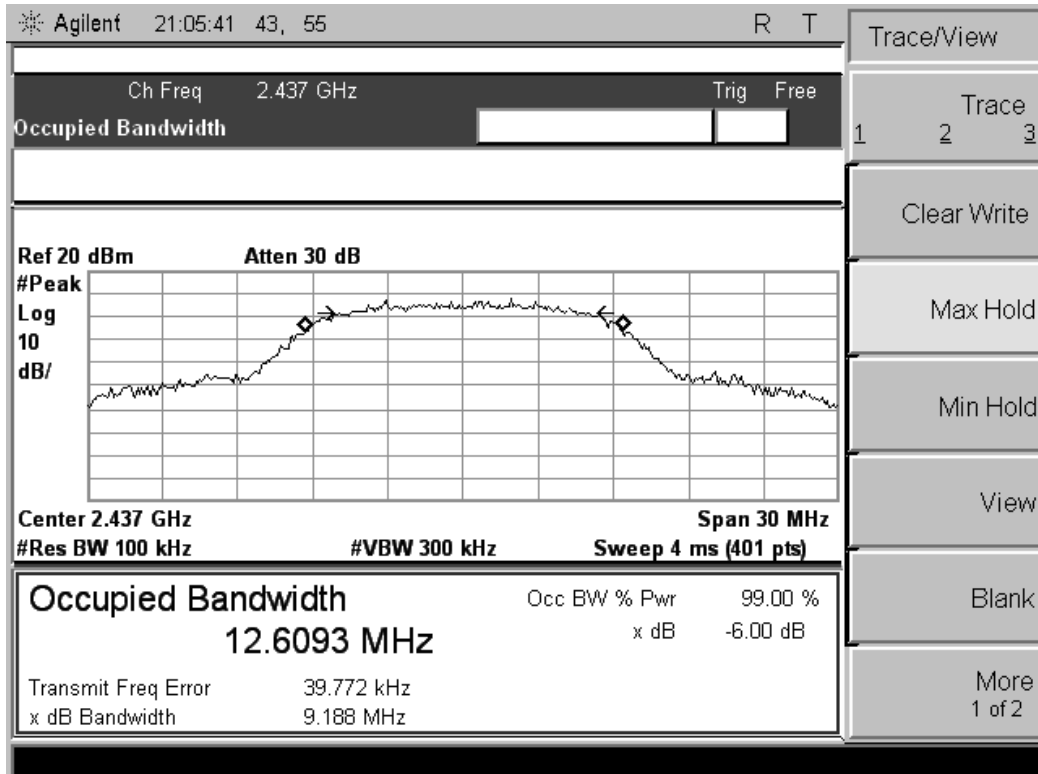
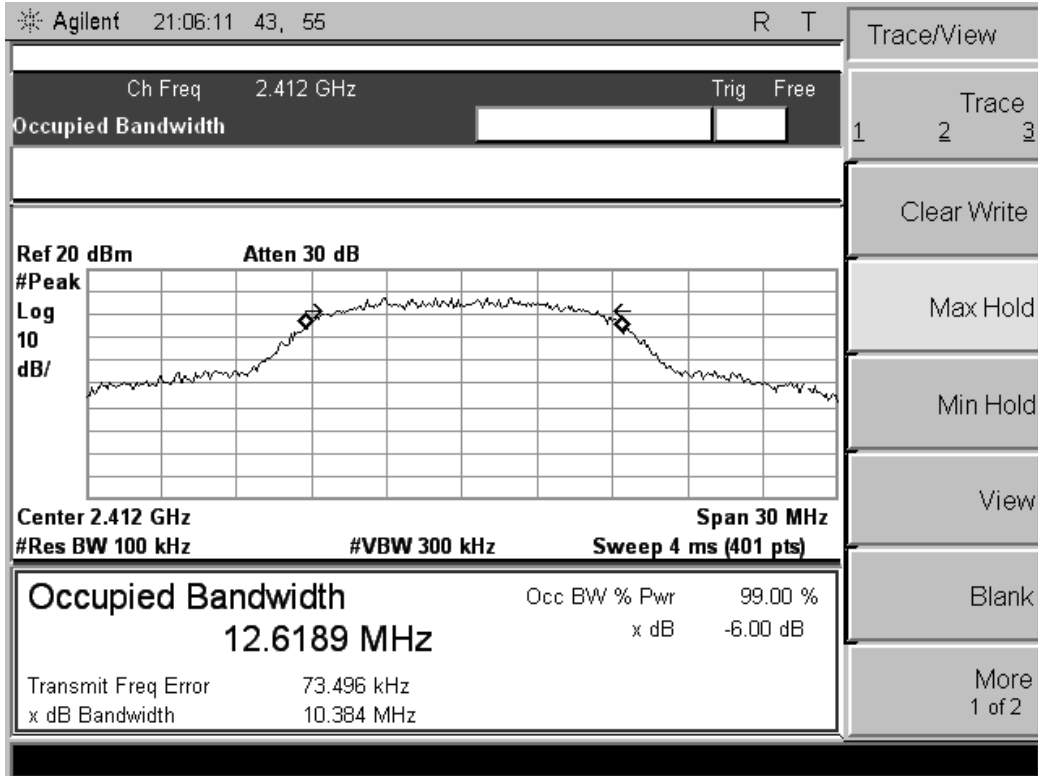
The EUT was programmed to be in continuously transmitting mode.

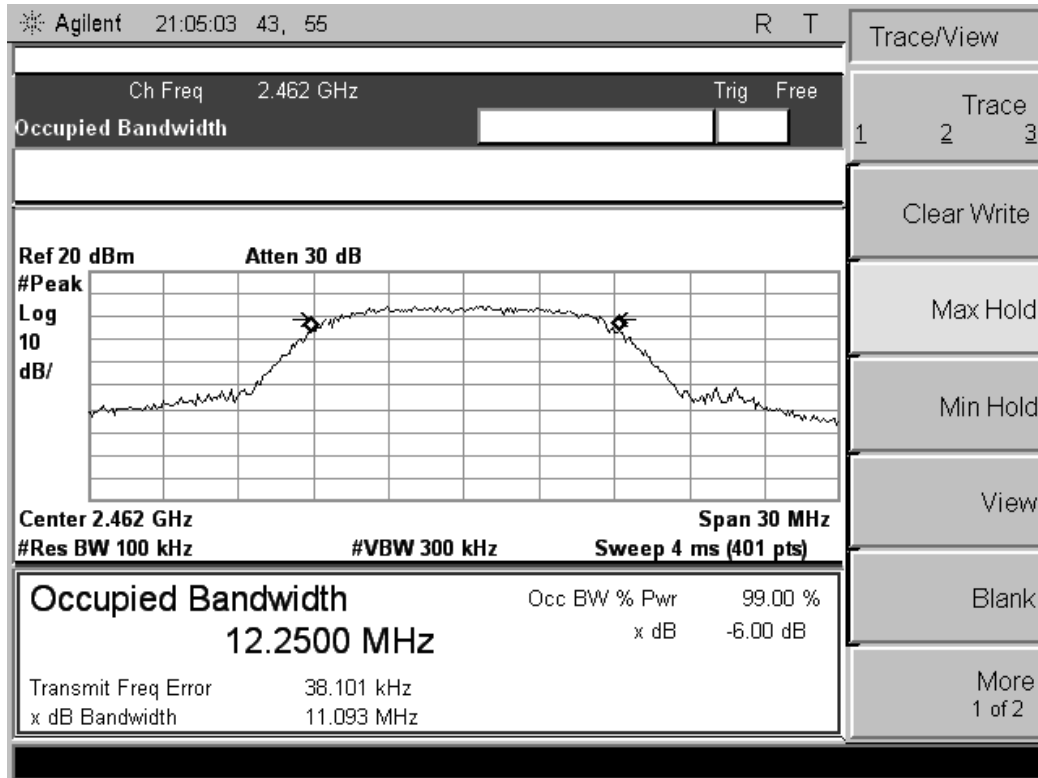
5.3.6. Test Result of Spectrum Bandwidth

| | | | |
|---------------|--------|----------------|-------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Calvin | Configurations | 802.11b/g/n |

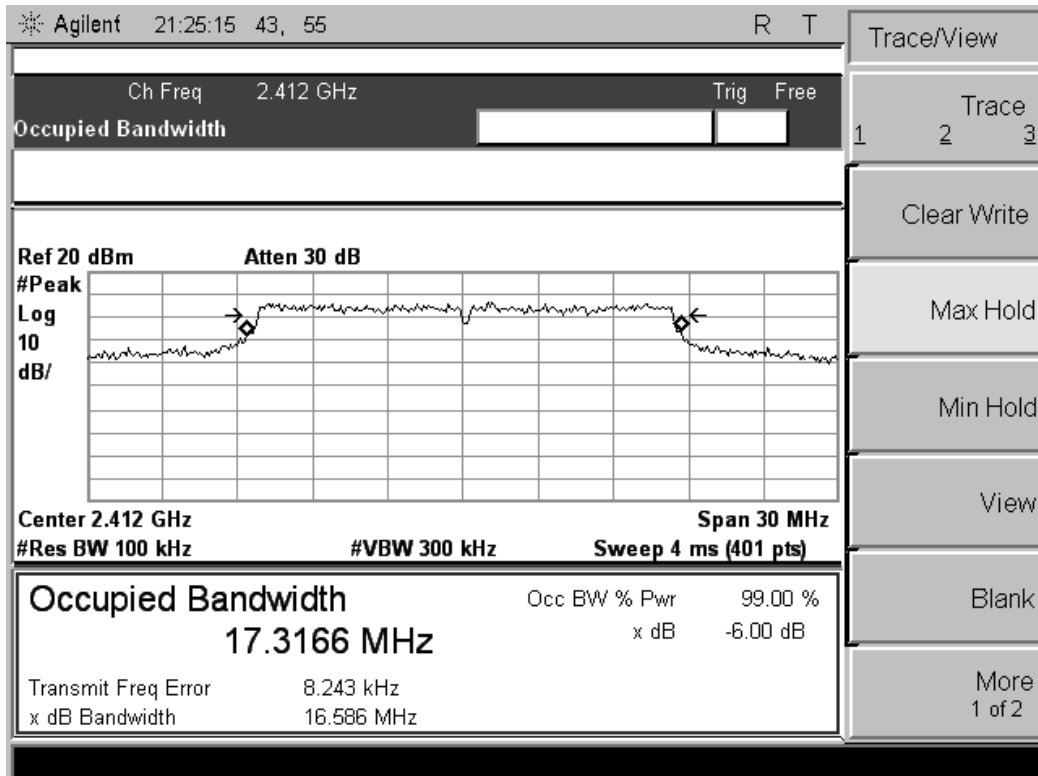
| Mode | Channel | Frequency | 6dB Bandwidth (MHz) | Min. Limit (kHz) | Result |
|-----------------|---------|-----------|---------------------|------------------|----------|
| 802.11b | 1 | 2412 | 10.38 | 500 | Complies |
| | 6 | 2437 | 9.19 | 500 | Complies |
| | 11 | 2462 | 11.09 | 500 | Complies |
| 802.11g | 1 | 2412 | 16.59 | 500 | Complies |
| | 6 | 2437 | 16.59 | 500 | Complies |
| | 11 | 2462 | 16.61 | 500 | Complies |
| 802.11n HT20 | 1 | 2412 | 17.69 | 500 | Complies |
| | 6 | 2437 | 17.73 | 500 | Complies |
| | 11 | 2462 | 17.76 | 500 | Complies |
| 802.11n HT40 | 3 | 2422 | 36.68 | 500 | Complies |
| | 6 | 2437 | 36.70 | 500 | Complies |
| | 9 | 2452 | 36.67 | 500 | Complies |

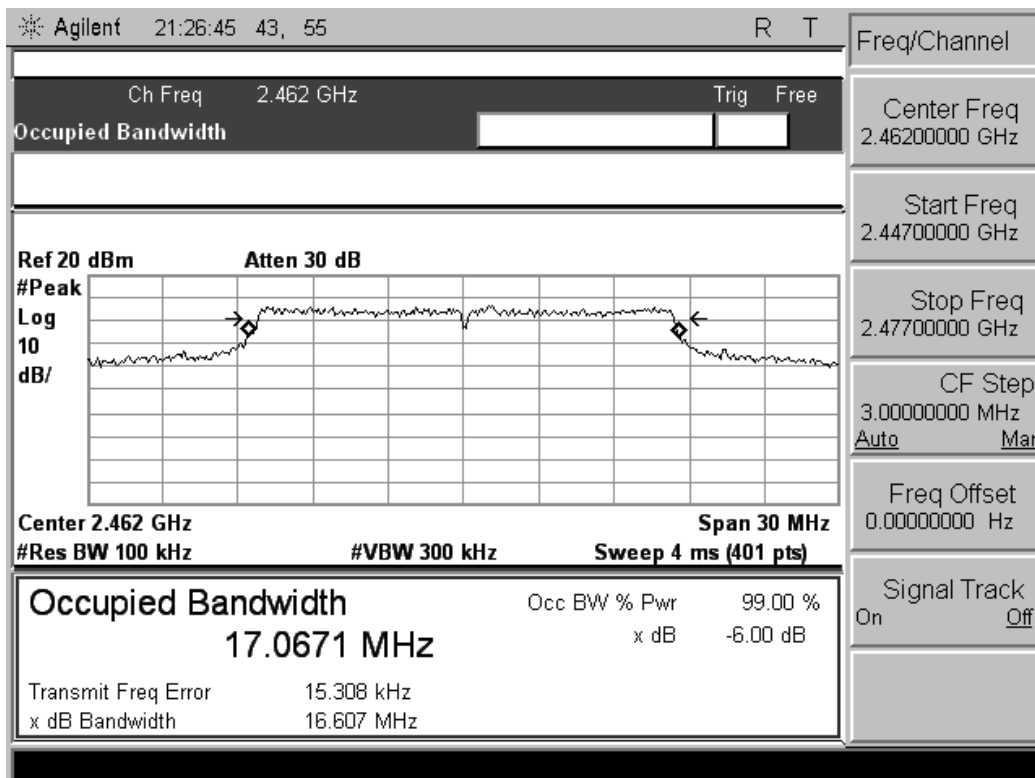
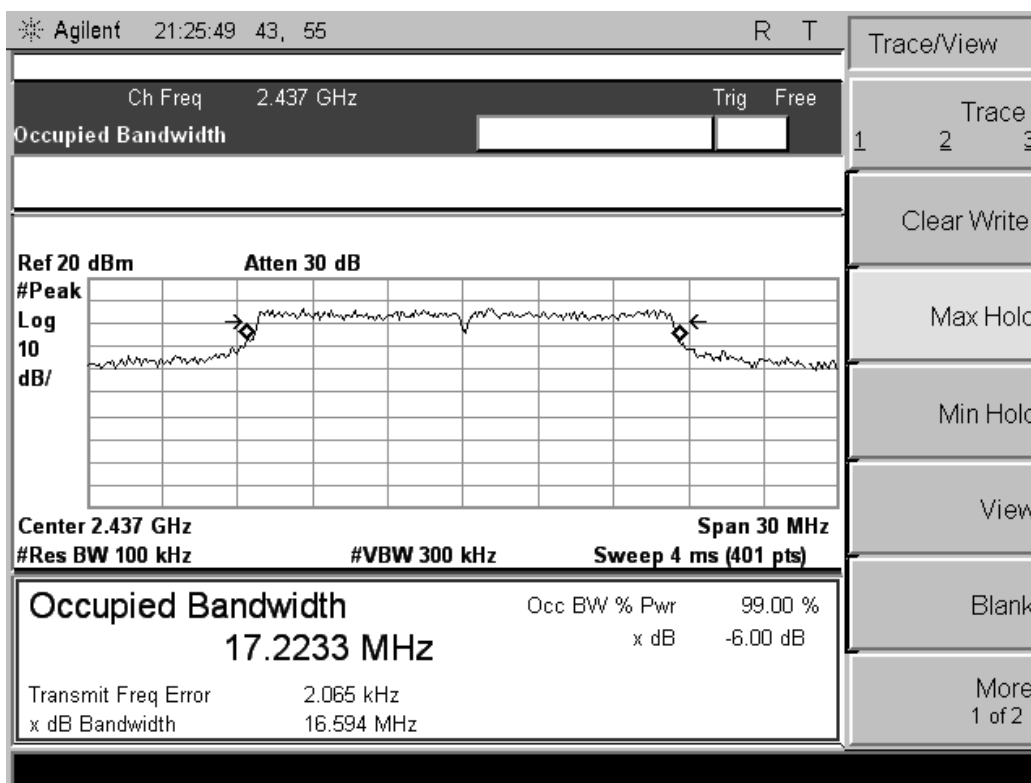
802.11b channel, 6dB bandwidth



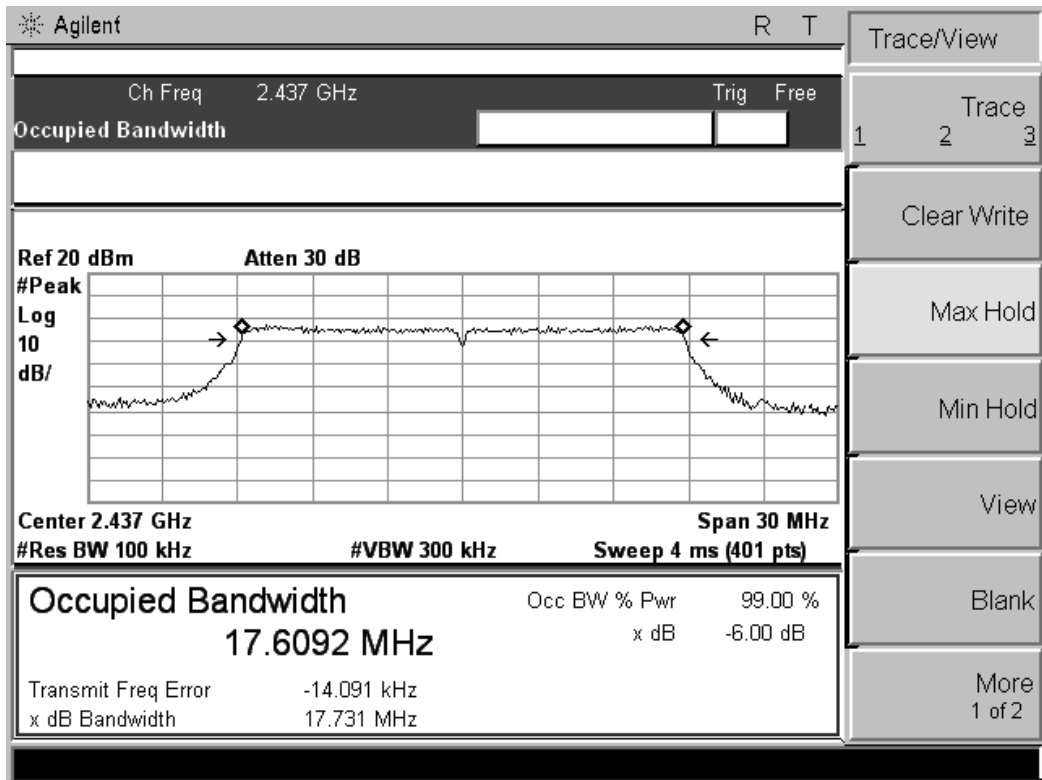
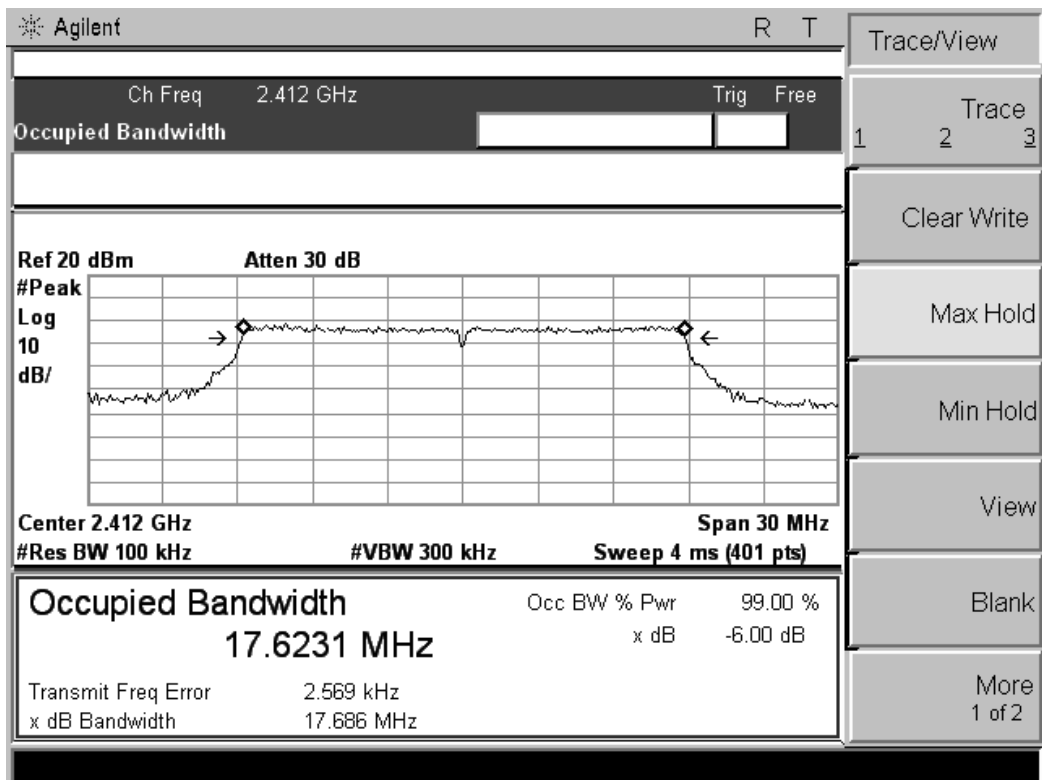


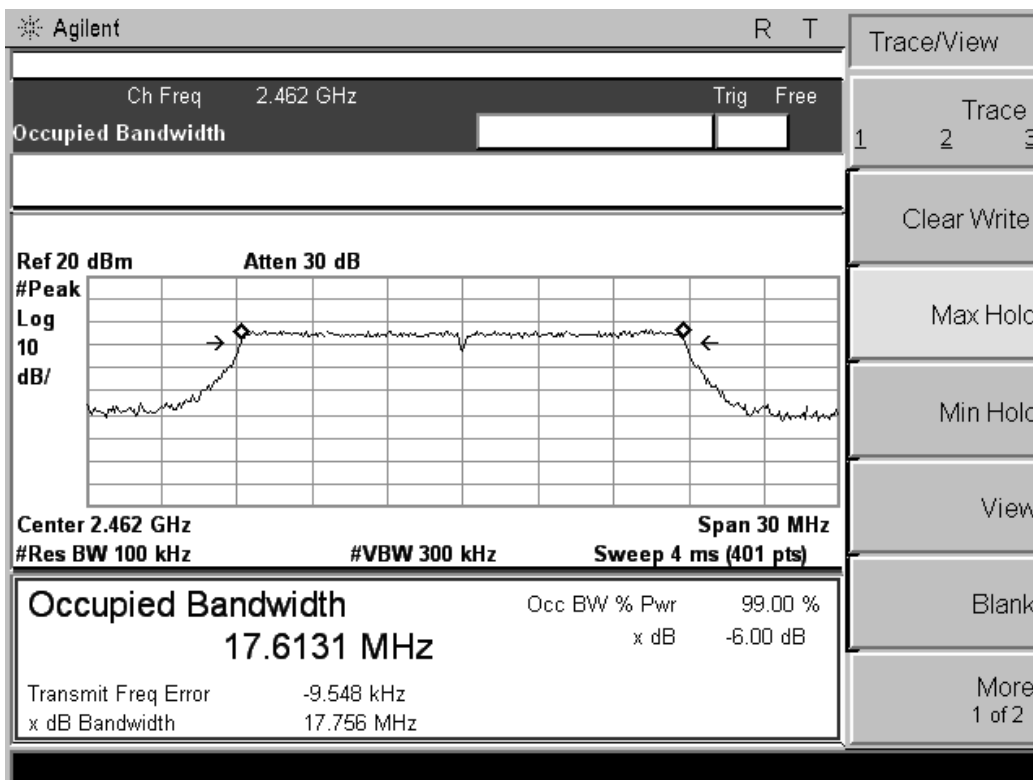
802.11g channel, 6dB bandwidth



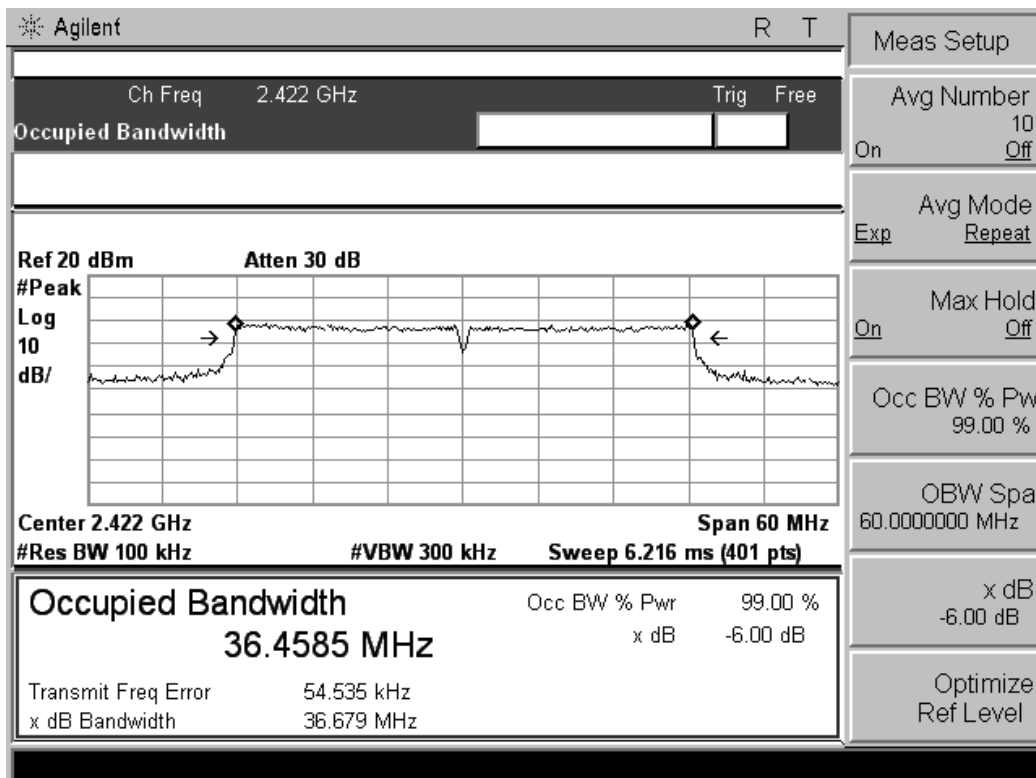


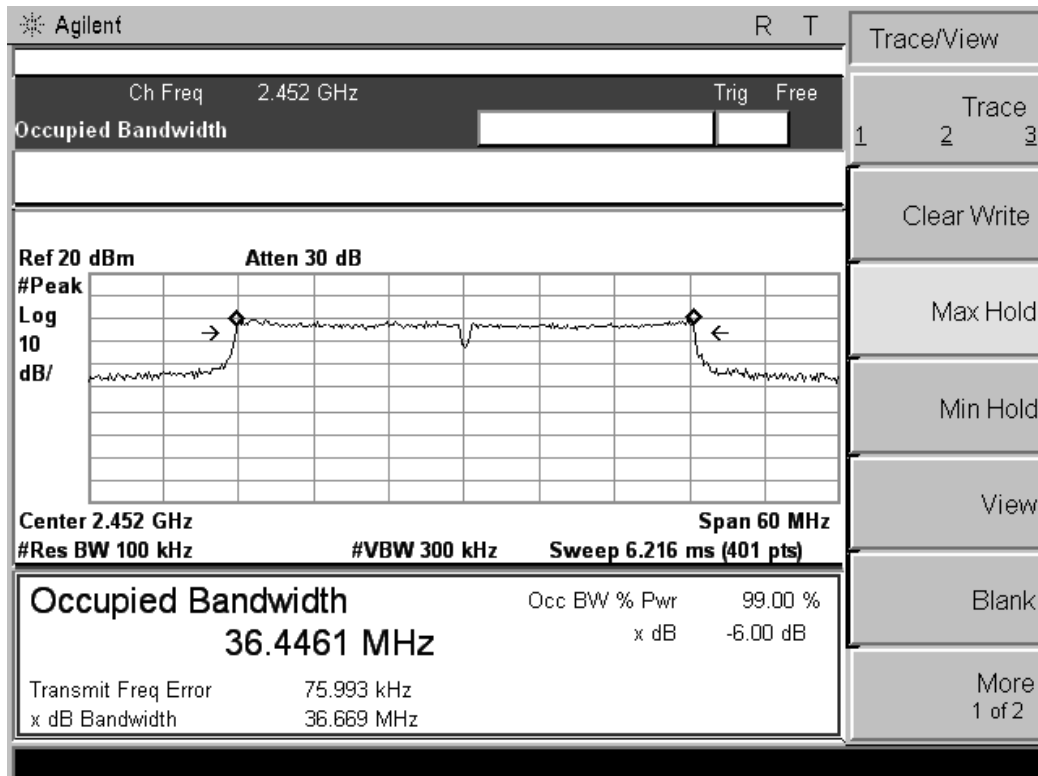
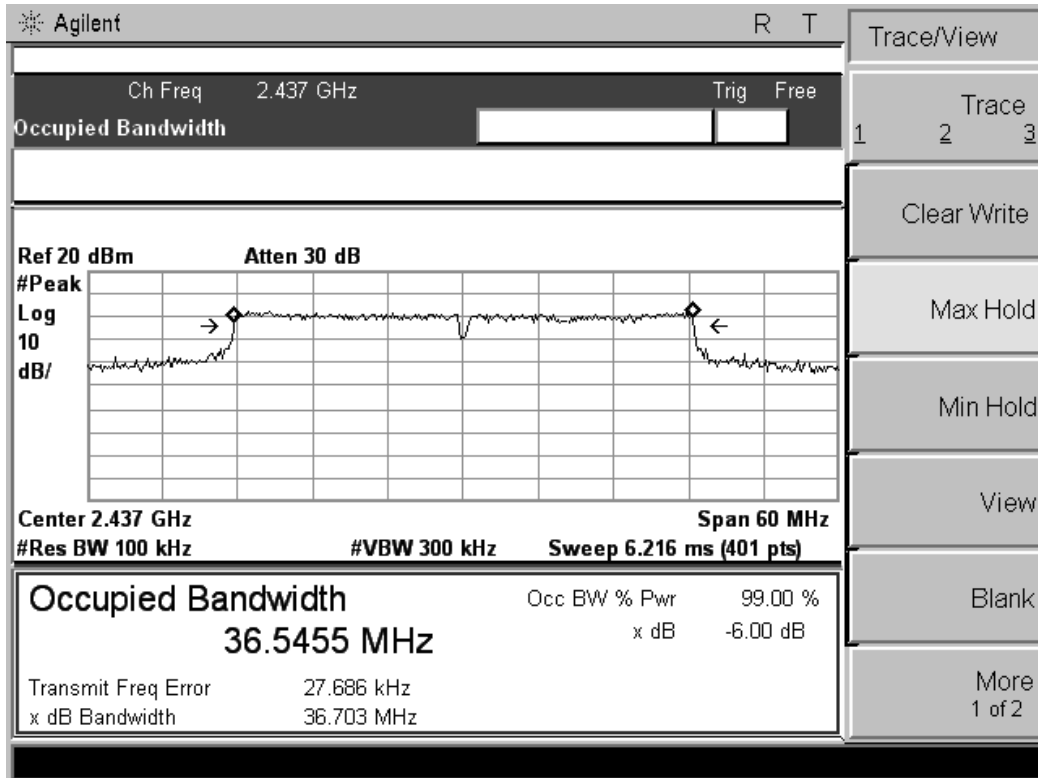
802.11n HT20 channel, 6dB bandwidth





802.11n HT40 channel, 6dB bandwidth





5.4. Radiated Emissions Measurement

5.4.1. Standard Applicable

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies(MHz) | Field Strength(microvolts/meter) | Measurement Distance(meters) |
|------------------|----------------------------------|------------------------------|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

5.4.2. Instruments Setting

The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|--|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

| Receiver Parameter | Setting |
|------------------------|----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 100kHz for QP |

5.4.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0 ° to 315 ° using 45 ° steps.
- The antenna height is 0.8 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0 ° to 360 °) and by rotating the elevation axes (0 ° to 360 °).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0 ° to 315 ° using 45 ° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0 ° to 315 ° using 45 ° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

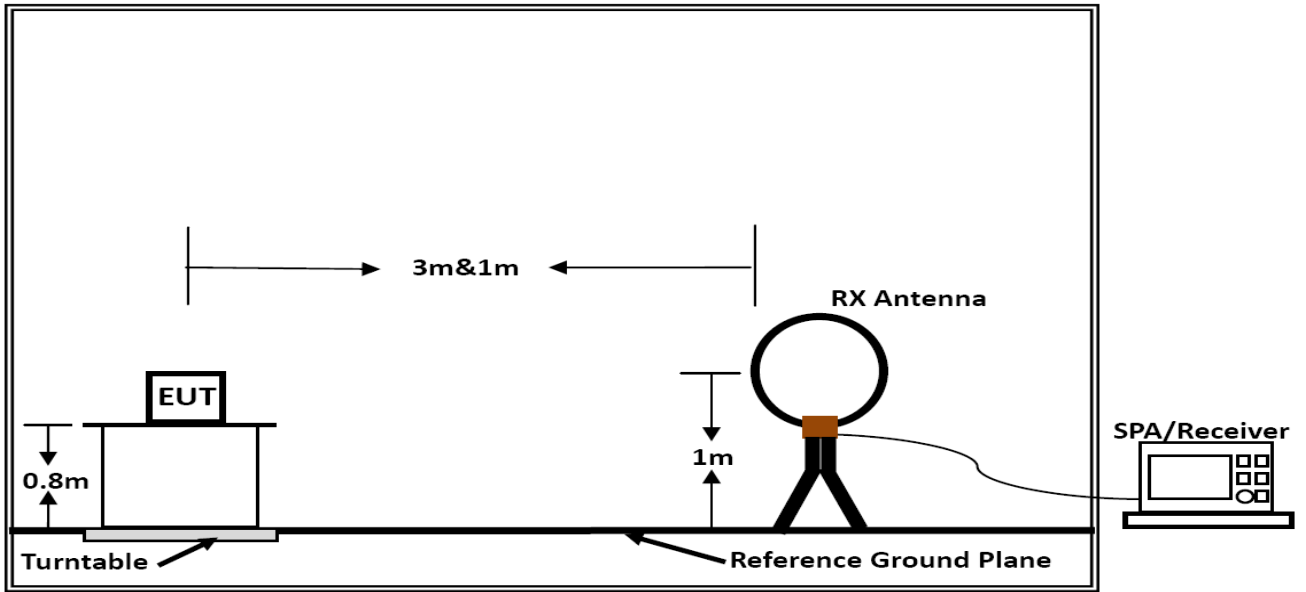
Premeasurement:

- The antenna is moved spherical over the EUT in different polarisations of the antenna.

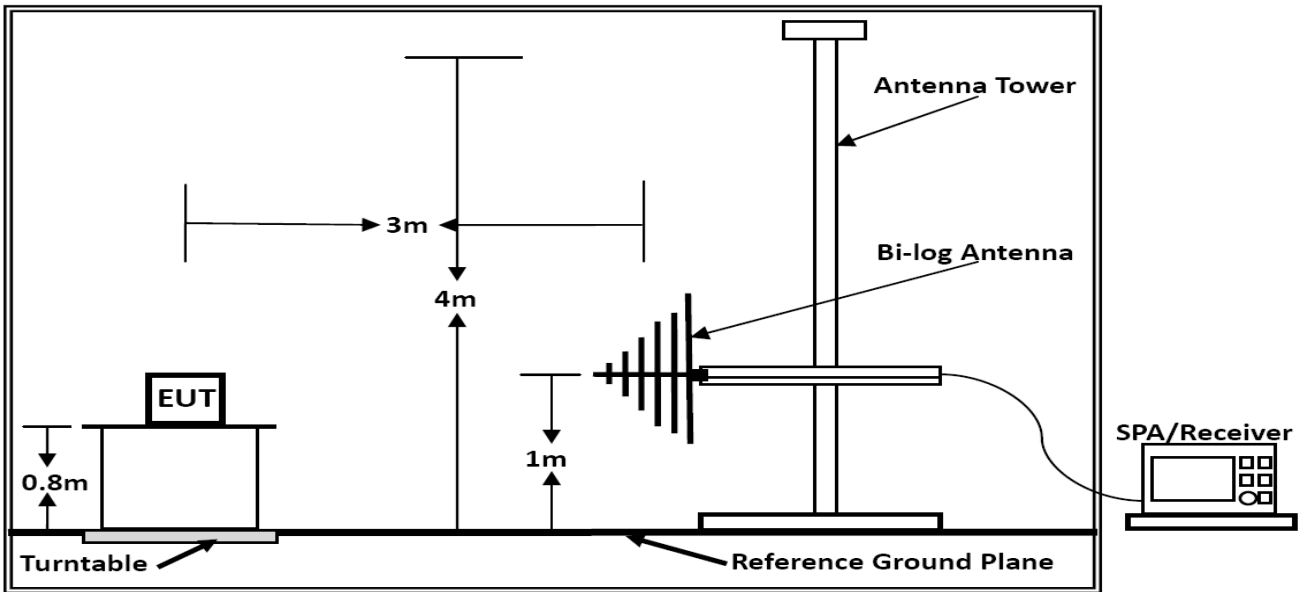
Final measurement:

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

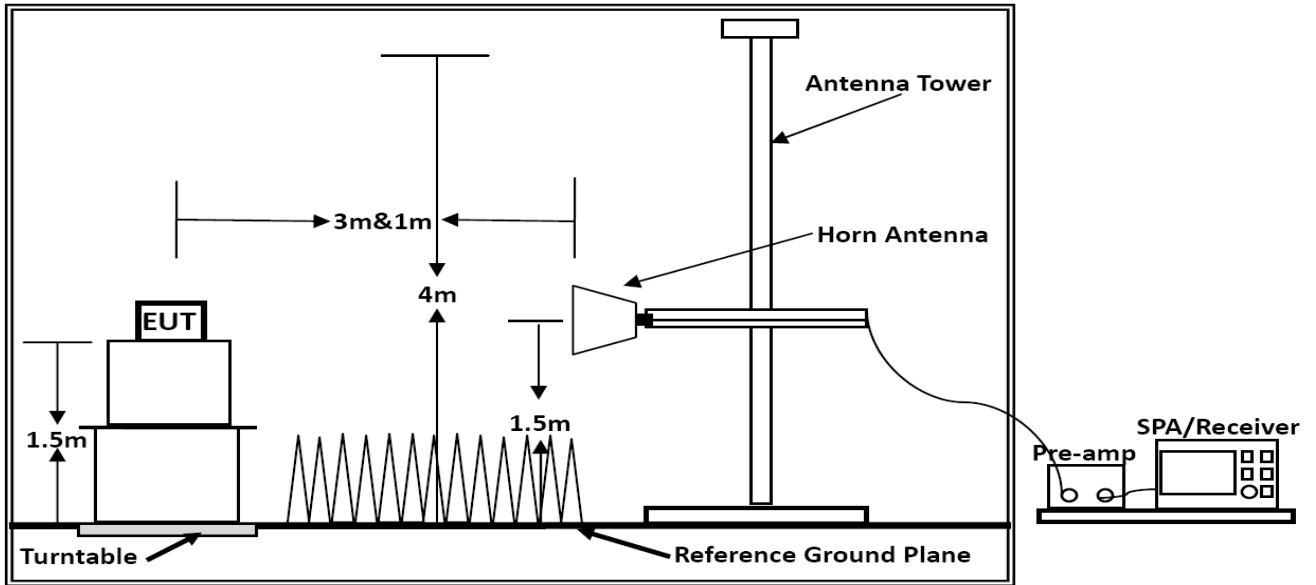
5.4.4. Test Setup Layout



Below 30MHz



Below 1GHz



Above 1GHz

5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6. Results of Radiated Emissions (9kHz~30MHz)

| | | | |
|---------------|--------|----------------|-------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Calvin | Configurations | 802.11b/g/n |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|-------------|--------------|-----------------|-------------------|----------|
| - | - | - | - | See Note |

Note:

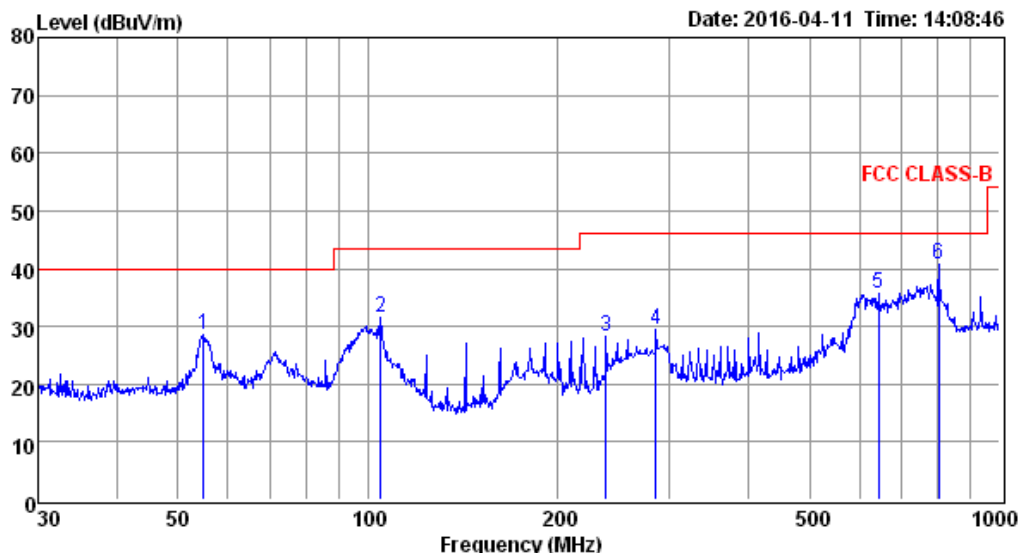
The radiated emissions from 9kHz to 30MHz are at least 20dB below the official limit and no need to report.

Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.4.7. Results of Radiated Emissions (30MHz~1GHz)

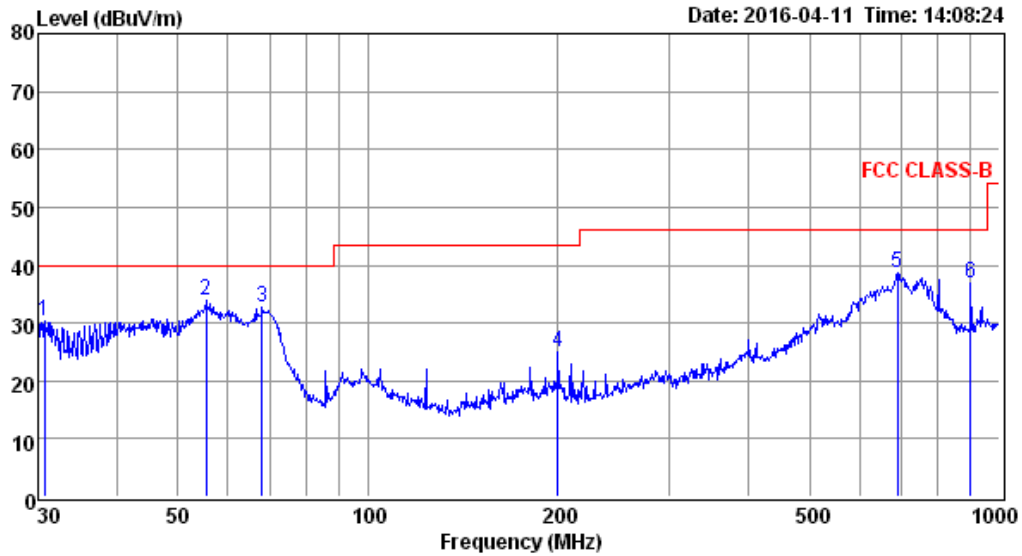
| | | | |
|---------------|--------|----------------|-----------------------|
| Temperature | 25°C | Humidity | 60% |
| Test Engineer | Calvin | Configurations | 802.11g (Low Channel) |



Env./Ins: 24°C/56%
 EUT: Embed
 M/N:
 Power Rating: AC 120V/60Hz
 Test Mode: On
 Operator: Calvin
 Memo:
 pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|--------|---------|--------|--------|----------|--------|--------|--------|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 54.83 | 15.11 | 0.46 | 13.03 | 28.60 | 40.00 | -11.40 | QP |
| 2 | 104.54 | 18.20 | 0.61 | 12.75 | 31.56 | 43.50 | -11.94 | QP |
| 3 | 238.31 | 15.19 | 0.96 | 12.01 | 28.16 | 46.00 | -17.84 | QP |
| 4 | 285.98 | 15.66 | 1.00 | 12.79 | 29.45 | 46.00 | -16.55 | QP |
| 5 | 642.86 | 15.46 | 1.55 | 18.60 | 35.61 | 46.00 | -10.39 | QP |
| 6 | 801.79 | 18.99 | 1.72 | 20.08 | 40.79 | 46.00 | -5.21 | QP |

- Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that are 20db below the official limit are not reported



Env./Ins: 24°C/56%
 EUT: Embed
 M/N:
 Power Rating: AC 120V/60Hz
 Test Mode: On
 Operator: Calvin
 Memo:
 pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|--------|---------|--------|--------|----------|--------|--------|--------|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 30.75 | 17.54 | 0.39 | 12.33 | 30.26 | 40.00 | -9.74 | QP |
| 2 | 55.41 | 20.42 | 0.47 | 12.99 | 33.88 | 40.00 | -6.12 | QP |
| 3 | 67.91 | 22.74 | 0.51 | 9.51 | 32.76 | 40.00 | -7.24 | QP |
| 4 | 199.99 | 13.53 | 0.84 | 10.57 | 24.94 | 43.50 | -18.56 | QP |
| 5 | 689.56 | 18.43 | 1.60 | 18.77 | 38.80 | 46.00 | -7.20 | QP |
| 6 | 900.15 | 14.02 | 1.88 | 21.09 | 36.99 | 46.00 | -9.01 | QP |

Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db blow the official limit are not reported

***Note:

Pre-scan all mode and recorded the worst case results in this report (802.11b (TX-High Channel)).

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.4.8. Results for Radiated Emissions (Above 1GHz)

Note: Only recorded the worst test result.

802.11b

TX-Low Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4824.12 | 46.92 | 33.06 | 35.04 | 3.94 | 48.88 | 74 | -25.12 | Peak | Horizontal |
| 4824.15 | 36.80 | 33.06 | 35.04 | 3.94 | 38.76 | 54 | -15.24 | Average | Horizontal |
| 4824.12 | 48.29 | 33.06 | 35.04 | 3.94 | 50.25 | 74 | -23.75 | Peak | Vertical |
| 4824.15 | 38.46 | 33.06 | 35.04 | 3.94 | 40.42 | 54 | -13.58 | Average | Vertical |

TX-Middle Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4874.17 | 48.23 | 33.16 | 35.15 | 3.96 | 50.20 | 74 | -23.80 | Peak | Horizontal |
| 4874.20 | 38.82 | 33.16 | 35.15 | 3.96 | 40.79 | 54 | -13.21 | Average | Horizontal |
| 4874.17 | 49.75 | 33.16 | 35.15 | 3.96 | 51.72 | 74 | -22.28 | Peak | Vertical |
| 4874.20 | 40.18 | 33.16 | 35.15 | 3.96 | 42.15 | 54 | -11.85 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4924.23 | 47.81 | 33.26 | 35.14 | 3.98 | 49.91 | 74 | -24.09 | Peak | Horizontal |
| 4924.25 | 35.97 | 33.26 | 35.14 | 3.98 | 38.07 | 54 | -15.93 | Average | Horizontal |
| 4924.23 | 48.73 | 33.26 | 35.14 | 3.98 | 50.83 | 74 | -23.17 | Peak | Vertical |
| 4924.25 | 39.88 | 33.26 | 35.14 | 3.98 | 41.98 | 54 | -12.02 | Average | Vertical |

802.11g

TX-Low Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4824.10 | 47.32 | 33.06 | 35.04 | 3.94 | 49.28 | 74 | -24.72 | Peak | Horizontal |
| 4824.13 | 37.36 | 33.06 | 35.04 | 3.94 | 39.32 | 54 | -14.68 | Average | Horizontal |
| 4824.10 | 48.60 | 33.06 | 35.04 | 3.94 | 50.56 | 74 | -23.44 | Peak | Vertical |
| 4824.13 | 38.91 | 33.06 | 35.04 | 3.94 | 40.87 | 54 | -13.13 | Average | Vertical |

TX-Middle Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4874.21 | 48.88 | 33.16 | 35.15 | 3.96 | 50.85 | 74 | -23.15 | Peak | Horizontal |
| 4874.23 | 39.90 | 33.16 | 35.15 | 3.96 | 41.87 | 54 | -12.13 | Average | Horizontal |
| 4874.21 | 50.53 | 33.16 | 35.15 | 3.96 | 52.50 | 74 | -21.50 | Peak | Vertical |
| 4874.23 | 41.04 | 33.16 | 35.15 | 3.96 | 43.01 | 54 | -10.99 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4924.24 | 46.04 | 33.26 | 35.14 | 3.98 | 48.14 | 74 | -25.86 | Peak | Horizontal |
| 4924.27 | 36.19 | 33.26 | 35.14 | 3.98 | 38.29 | 54 | -15.71 | Average | Horizontal |
| 4924.24 | 47.27 | 33.26 | 35.14 | 3.98 | 49.37 | 74 | -24.63 | Peak | Vertical |
| 4924.27 | 37.60 | 33.26 | 35.14 | 3.98 | 39.70 | 54 | -14.30 | Average | Vertical |

802.11n HT20

TX-Low Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4824.17 | 48.54 | 33.06 | 35.04 | 3.94 | 50.50 | 74 | -23.50 | Peak | Horizontal |
| 4824.20 | 38.18 | 33.06 | 35.04 | 3.94 | 40.14 | 54 | -13.86 | Average | Horizontal |
| 4824.17 | 49.15 | 33.06 | 35.04 | 3.94 | 51.11 | 74 | -22.89 | Peak | Vertical |
| 4824.20 | 39.44 | 33.06 | 35.04 | 3.94 | 41.40 | 54 | -12.60 | Average | Vertical |

TX-Middle Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4874.31 | 49.87 | 33.16 | 35.15 | 3.96 | 51.84 | 74 | -22.16 | Peak | Horizontal |
| 4874.33 | 39.39 | 33.16 | 35.15 | 3.96 | 41.36 | 54 | -12.64 | Average | Horizontal |
| 4874.31 | 50.31 | 33.16 | 35.15 | 3.96 | 52.28 | 74 | -21.72 | Peak | Vertical |
| 4874.33 | 40.50 | 33.16 | 35.15 | 3.96 | 42.47 | 54 | -11.53 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4924.37 | 46.06 | 33.26 | 35.14 | 3.98 | 48.16 | 74 | -25.84 | Peak | Horizontal |
| 4924.40 | 36.67 | 33.26 | 35.14 | 3.98 | 38.77 | 54 | -15.23 | Average | Horizontal |
| 4924.37 | 47.36 | 33.26 | 35.14 | 3.98 | 49.46 | 74 | -24.54 | Peak | Vertical |
| 4924.40 | 38.05 | 33.26 | 35.14 | 3.98 | 40.15 | 54 | -13.85 | Average | Vertical |

802.11n HT40

TX-Low Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4844.15 | 47.42 | 33.06 | 35.04 | 3.94 | 49.38 | 74 | -24.62 | Peak | Horizontal |
| 4844.17 | 37.26 | 33.06 | 35.04 | 3.94 | 39.22 | 54 | -14.78 | Average | Horizontal |
| 4844.15 | 48.83 | 33.06 | 35.04 | 3.94 | 50.79 | 74 | -23.21 | Peak | Vertical |
| 4844.17 | 38.84 | 33.06 | 35.04 | 3.94 | 40.80 | 54 | -13.20 | Average | Vertical |

TX-Middle Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4874.23 | 48.02 | 33.16 | 35.15 | 3.96 | 49.99 | 74 | -24.01 | Peak | Horizontal |
| 4874.25 | 37.91 | 33.16 | 35.15 | 3.96 | 39.88 | 54 | -14.12 | Average | Horizontal |
| 4874.23 | 49.14 | 33.16 | 35.15 | 3.96 | 51.11 | 74 | -22.89 | Peak | Vertical |
| 4874.25 | 39.02 | 33.16 | 35.15 | 3.96 | 40.99 | 54 | -13.01 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuv | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuv/m | Limit dBuv/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 4904.34 | 46.55 | 33.26 | 35.14 | 3.98 | 48.65 | 74 | -25.35 | Peak | Horizontal |
| 4904.37 | 36.98 | 33.26 | 35.14 | 3.98 | 39.08 | 54 | -14.92 | Average | Horizontal |
| 4904.34 | 47.76 | 33.26 | 35.14 | 3.98 | 49.86 | 74 | -24.14 | Peak | Vertical |
| 4904.37 | 38.51 | 33.26 | 35.14 | 3.98 | 40.61 | 54 | -13.39 | Average | Vertical |

Notes:

1. Measuring frequencies from 9k~10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2. Radiated emissions measured in frequency range from 30MHz~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.
3. The radiated emissions from 18GHz to 25GHz are at least 20dB below the official limit and no need to report.

5.4.9. Results of Band Edges Test (Radiated)

Note: Only recorded the worst test result.

802.11b

TX-Low Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2377.34 | 44.98 | 32.89 | 35.16 | 3.51 | 46.22 | 74 | -27.78 | Peak | Horizontal |
| 2377.37 | 35.34 | 32.90 | 35.16 | 3.51 | 36.59 | 54 | -17.41 | Average | Horizontal |
| 2390.00 | 48.30 | 32.92 | 35.16 | 3.54 | 49.60 | 74 | -24.40 | Peak | Horizontal |
| 2389.97 | 37.76 | 32.92 | 35.16 | 3.54 | 39.06 | 54 | -14.94 | Average | Horizontal |
| 2400.00 | 54.38 | 32.92 | 35.16 | 3.54 | 55.68 | 74 | -18.32 | Peak | Horizontal |
| 2399.97 | 44.03 | 32.92 | 35.16 | 3.54 | 45.33 | 54 | -8.67 | Average | Horizontal |
| 2377.34 | 45.82 | 32.89 | 35.16 | 3.51 | 47.06 | 74 | -26.94 | Peak | Vertical |
| 2377.37 | 36.29 | 32.90 | 35.16 | 3.51 | 37.54 | 54 | -16.46 | Average | Vertical |
| 2390.00 | 48.45 | 32.92 | 35.16 | 3.54 | 49.75 | 74 | -24.25 | Peak | Vertical |
| 2389.97 | 38.50 | 32.92 | 35.16 | 3.54 | 39.80 | 54 | -14.20 | Average | Vertical |
| 2400.00 | 56.28 | 32.92 | 35.16 | 3.54 | 57.58 | 74 | -16.42 | Peak | Vertical |
| 2399.97 | 49.36 | 32.92 | 35.16 | 3.54 | 50.66 | 54 | -3.34 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2483.50 | 46.72 | 33.06 | 35.18 | 3.60 | 48.20 | 74 | -25.80 | Peak | Horizontal |
| 2483.53 | 35.98 | 33.08 | 35.18 | 3.60 | 37.48 | 54 | -16.52 | Average | Horizontal |
| 2487.51 | 44.58 | 33.08 | 35.18 | 3.62 | 46.10 | 74 | -27.90 | Peak | Horizontal |
| 2487.54 | 33.90 | 33.08 | 35.18 | 3.62 | 35.42 | 54 | -18.58 | Average | Horizontal |
| 2483.50 | 48.18 | 33.06 | 35.18 | 3.60 | 49.66 | 74 | -24.34 | Peak | Vertical |
| 2483.53 | 37.09 | 33.08 | 35.18 | 3.60 | 38.59 | 54 | -15.41 | Average | Vertical |
| 2487.51 | 45.42 | 33.08 | 35.18 | 3.62 | 46.94 | 74 | -27.06 | Peak | Vertical |
| 2487.54 | 36.11 | 33.08 | 35.18 | 3.62 | 37.63 | 54 | -16.37 | Average | Vertical |

802.11g

TX-Low Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2377.67 | 46.17 | 32.89 | 35.16 | 3.51 | 47.41 | 74 | -26.59 | Peak | Horizontal |
| 2377.70 | 36.00 | 32.90 | 35.16 | 3.51 | 37.25 | 54 | -16.75 | Average | Horizontal |
| 2390.00 | 49.67 | 32.92 | 35.16 | 3.54 | 50.97 | 74 | -23.03 | Peak | Horizontal |
| 2389.97 | 39.40 | 32.92 | 35.16 | 3.54 | 40.70 | 54 | -13.30 | Average | Horizontal |
| 2400.00 | 53.50 | 32.92 | 35.16 | 3.54 | 54.80 | 74 | -19.20 | Peak | Horizontal |
| 2399.97 | 43.00 | 32.92 | 35.16 | 3.54 | 44.30 | 54 | -9.70 | Average | Horizontal |
| 2377.67 | 47.66 | 32.89 | 35.16 | 3.51 | 48.90 | 74 | -25.10 | Peak | Vertical |
| 2377.70 | 37.51 | 32.90 | 35.16 | 3.51 | 38.76 | 54 | -15.24 | Average | Vertical |
| 2390.00 | 51.02 | 32.92 | 35.16 | 3.54 | 52.32 | 74 | -21.68 | Peak | Vertical |
| 2389.97 | 39.48 | 32.92 | 35.16 | 3.54 | 40.78 | 54 | -13.22 | Average | Vertical |
| 2400.00 | 55.13 | 32.92 | 35.16 | 3.54 | 56.43 | 74 | -17.57 | Peak | Vertical |
| 2399.97 | 48.81 | 32.92 | 35.16 | 3.54 | 50.11 | 54 | -3.89 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2483.50 | 45.69 | 33.06 | 35.18 | 3.60 | 47.17 | 74 | -26.83 | Peak | Horizontal |
| 2483.53 | 34.82 | 33.08 | 35.18 | 3.60 | 36.32 | 54 | -17.68 | Average | Horizontal |
| 2486.74 | 47.64 | 33.08 | 35.18 | 3.62 | 49.16 | 74 | -24.84 | Peak | Horizontal |
| 2486.77 | 35.40 | 33.08 | 35.18 | 3.62 | 36.92 | 54 | -17.08 | Average | Horizontal |
| 2483.50 | 45.77 | 33.06 | 35.18 | 3.60 | 47.25 | 74 | -26.75 | Peak | Vertical |
| 2483.53 | 35.69 | 33.08 | 35.18 | 3.60 | 37.19 | 54 | -16.81 | Average | Vertical |
| 2486.74 | 48.09 | 33.08 | 35.18 | 3.62 | 49.61 | 74 | -24.39 | Peak | Vertical |
| 2486.77 | 37.00 | 33.08 | 35.18 | 3.62 | 38.52 | 54 | -15.48 | Average | Vertical |

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TX-Low Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2377.51 | 47.12 | 32.89 | 35.16 | 3.51 | 48.36 | 74 | -25.64 | Peak | Horizontal |
| 2377.53 | 35.54 | 32.9 | 35.16 | 3.51 | 36.79 | 54 | -17.21 | Average | Horizontal |
| 2390.00 | 49.51 | 32.92 | 35.16 | 3.54 | 50.81 | 74 | -23.19 | Peak | Horizontal |
| 2389.97 | 38.48 | 32.92 | 35.16 | 3.54 | 39.78 | 54 | -14.22 | Average | Horizontal |
| 2400.00 | 55.64 | 32.92 | 35.16 | 3.54 | 56.94 | 74 | -17.06 | Peak | Horizontal |
| 2399.97 | 45.38 | 32.92 | 35.16 | 3.54 | 46.68 | 54 | -7.32 | Average | Horizontal |
| 2377.51 | 47.55 | 32.89 | 35.16 | 3.51 | 48.79 | 74 | -25.21 | Peak | Vertical |
| 2377.53 | 36.99 | 32.9 | 35.16 | 3.51 | 38.24 | 54 | -15.76 | Average | Vertical |
| 2390.00 | 49.75 | 32.92 | 35.16 | 3.54 | 51.05 | 74 | -22.95 | Peak | Vertical |
| 2389.97 | 39.61 | 32.92 | 35.16 | 3.54 | 40.91 | 54 | -13.09 | Average | Vertical |
| 2400.00 | 56.86 | 32.92 | 35.16 | 3.54 | 58.16 | 74 | -15.84 | Peak | Vertical |
| 2399.97 | 49.07 | 32.92 | 35.16 | 3.54 | 50.37 | 54 | -3.63 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2483.50 | 44.91 | 33.06 | 35.18 | 3.60 | 46.39 | 74 | -27.61 | Peak | Horizontal |
| 2483.53 | 35.65 | 33.08 | 35.18 | 3.60 | 37.15 | 54 | -16.85 | Average | Horizontal |
| 2488.61 | 47.37 | 33.08 | 35.18 | 3.62 | 48.89 | 74 | -25.11 | Peak | Horizontal |
| 2488.64 | 36.06 | 33.08 | 35.18 | 3.62 | 37.58 | 54 | -16.42 | Average | Horizontal |
| 2483.50 | 42.62 | 33.06 | 35.18 | 3.60 | 44.10 | 74 | -29.90 | Peak | Vertical |
| 2483.53 | 36.09 | 33.08 | 35.18 | 3.60 | 37.59 | 54 | -16.41 | Average | Vertical |
| 2488.61 | 47.29 | 33.08 | 35.18 | 3.62 | 48.81 | 74 | -25.19 | Peak | Vertical |
| 2488.64 | 36.85 | 33.08 | 35.18 | 3.62 | 38.37 | 54 | -15.63 | Average | Vertical |

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TX-Low Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2378.13 | 45.07 | 32.89 | 35.16 | 3.51 | 46.31 | 74 | -27.69 | Peak | Horizontal |
| 2378.15 | 34.24 | 32.90 | 35.16 | 3.51 | 35.49 | 54 | -18.51 | Average | Horizontal |
| 2390.00 | 46.81 | 32.92 | 35.16 | 3.54 | 48.11 | 74 | -25.89 | Peak | Horizontal |
| 2389.98 | 35.74 | 32.92 | 35.16 | 3.54 | 37.04 | 54 | -16.96 | Average | Horizontal |
| 2400.00 | 52.69 | 32.92 | 35.16 | 3.54 | 53.99 | 74 | -20.01 | Peak | Horizontal |
| 2399.97 | 42.74 | 32.92 | 35.16 | 3.54 | 44.04 | 54 | -9.96 | Average | Horizontal |
| 2378.13 | 46.02 | 32.89 | 35.16 | 3.51 | 47.26 | 74 | -26.74 | Peak | Vertical |
| 2378.15 | 36.42 | 32.90 | 35.16 | 3.51 | 37.67 | 54 | -16.33 | Average | Vertical |
| 2390.00 | 47.74 | 32.92 | 35.16 | 3.54 | 49.04 | 74 | -24.96 | Peak | Vertical |
| 2389.98 | 37.45 | 32.92 | 35.16 | 3.54 | 38.75 | 54 | -15.25 | Average | Vertical |
| 2400.00 | 55.51 | 32.92 | 35.16 | 3.54 | 56.81 | 74 | -17.19 | Peak | Vertical |
| 2399.97 | 48.75 | 32.92 | 35.16 | 3.54 | 50.05 | 54 | -3.95 | Average | Vertical |

TX-High Channel

| Freq. MHz | Reading dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 2483.50 | 48.39 | 33.06 | 35.18 | 3.60 | 49.87 | 74 | -24.13 | Peak | Horizontal |
| 2483.53 | 38.30 | 33.08 | 35.18 | 3.60 | 39.80 | 54 | -14.20 | Average | Horizontal |
| 2489.57 | 49.48 | 33.08 | 35.18 | 3.62 | 51.00 | 74 | -23.00 | Peak | Horizontal |
| 2489.60 | 38.88 | 33.08 | 35.18 | 3.62 | 40.40 | 54 | -13.60 | Average | Horizontal |
| 2483.50 | 49.03 | 33.06 | 35.18 | 3.60 | 50.51 | 74 | -23.49 | Peak | Vertical |
| 2483.53 | 38.93 | 33.08 | 35.18 | 3.60 | 40.43 | 54 | -13.57 | Average | Vertical |
| 2489.57 | 49.80 | 33.08 | 35.18 | 3.62 | 51.32 | 74 | -22.68 | Peak | Vertical |
| 2489.60 | 39.93 | 33.08 | 35.18 | 3.62 | 41.45 | 54 | -12.55 | Average | Vertical |

5.5. Conducted Spurious Emissions and Band Edges Test

5.5.1. Standard Applicable

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.5.2. Instruments Setting

The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting |
|---|---------------|
| Detector | Peak |
| Attenuation | Auto |
| RB / VB (Emission in restricted band) | 100KHz/300KHz |
| RB / VB (Emission in non-restricted band) | 100KHz/300KHz |

5.5.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9kHz to 26.5GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

5.5.4. Test Setup Layout

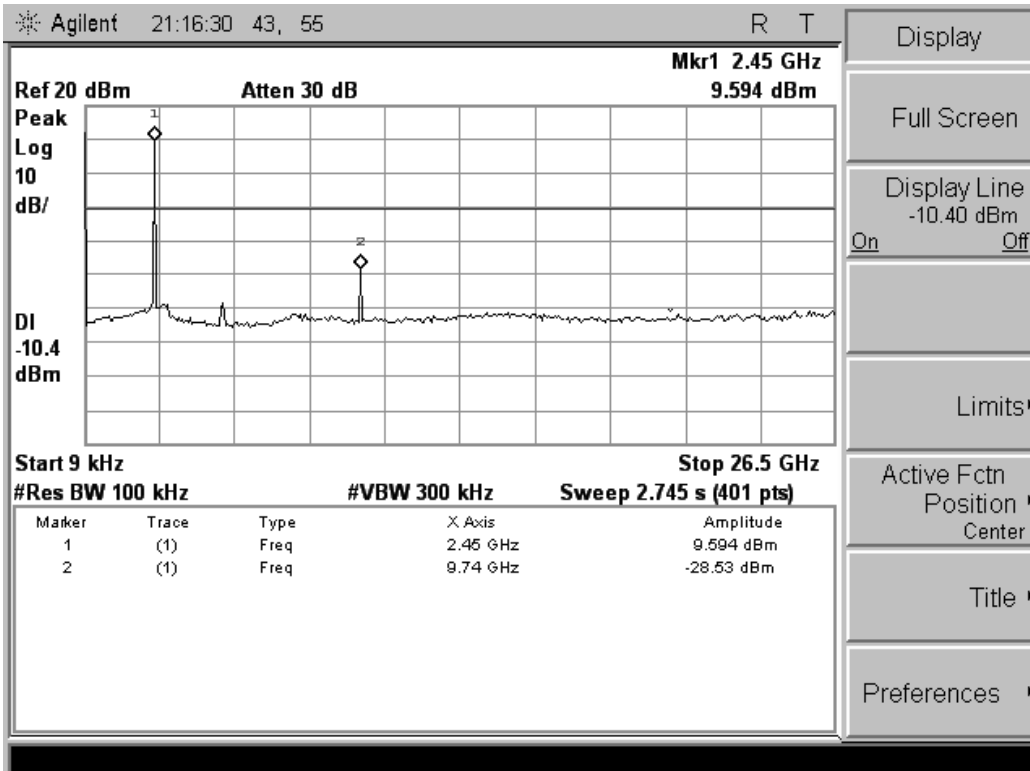
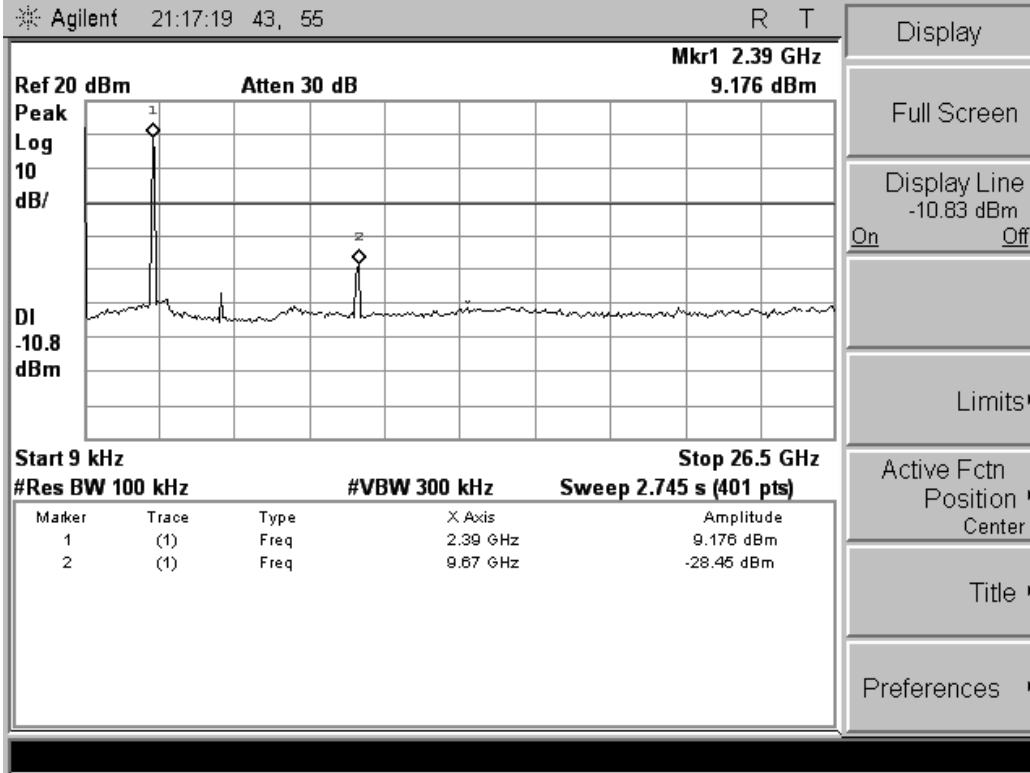
This test setup layout is the same as that shown in section 5.3.4.

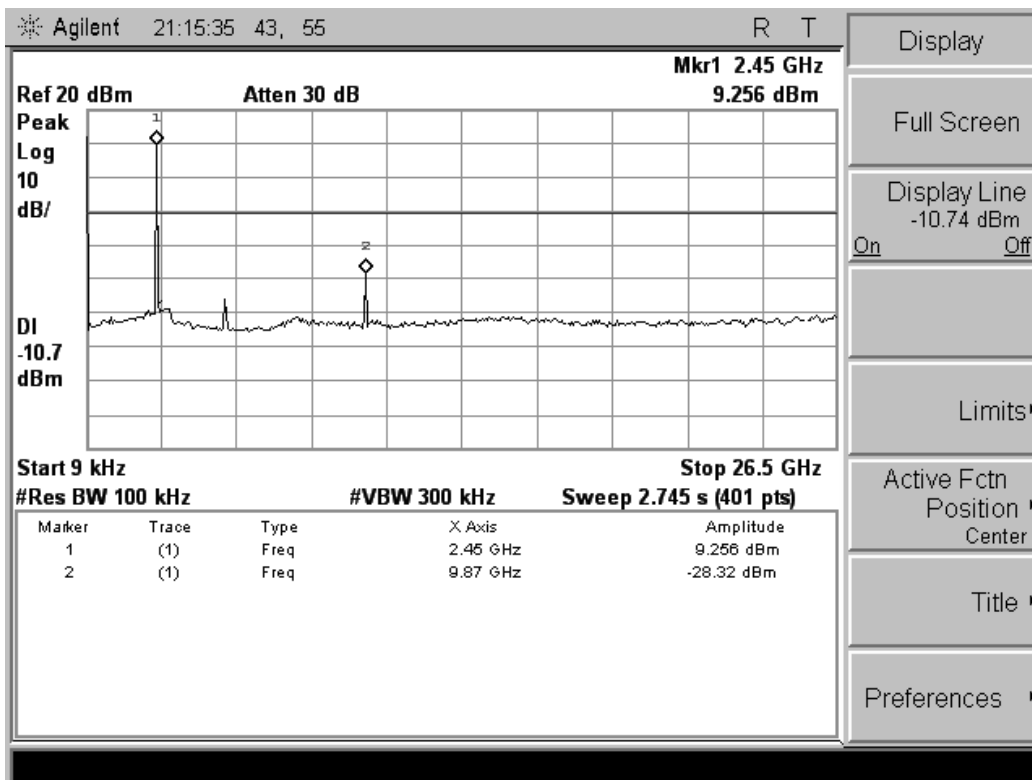
5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

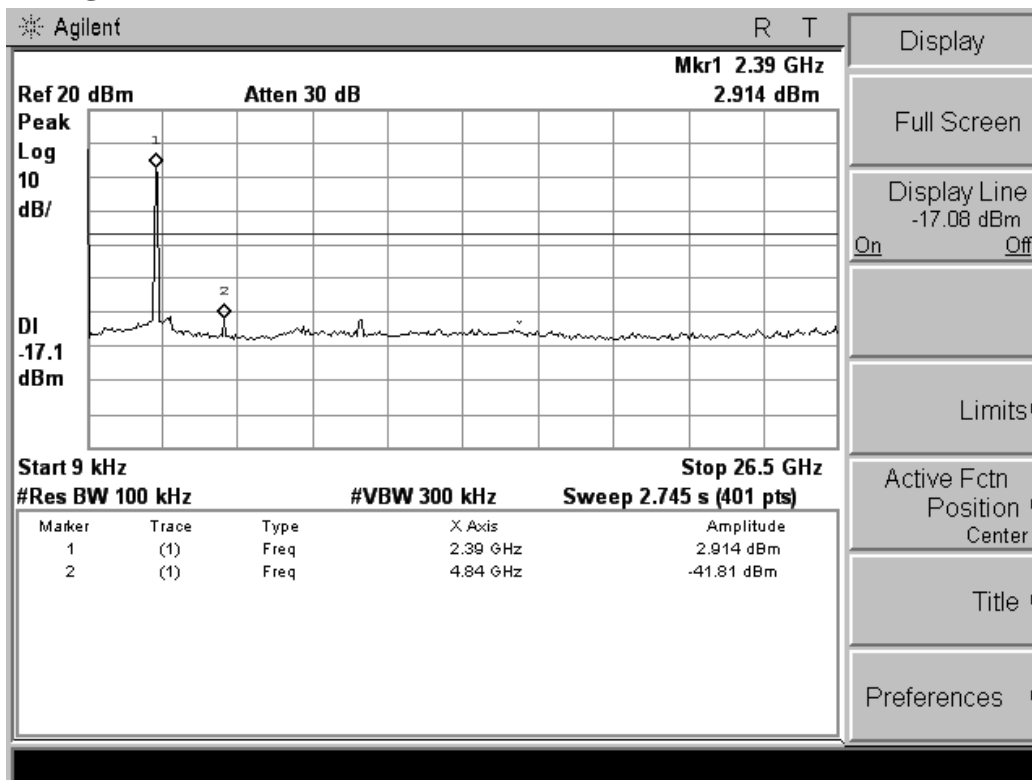
5.5.6. Test Results of Conducted Spurious Emissions

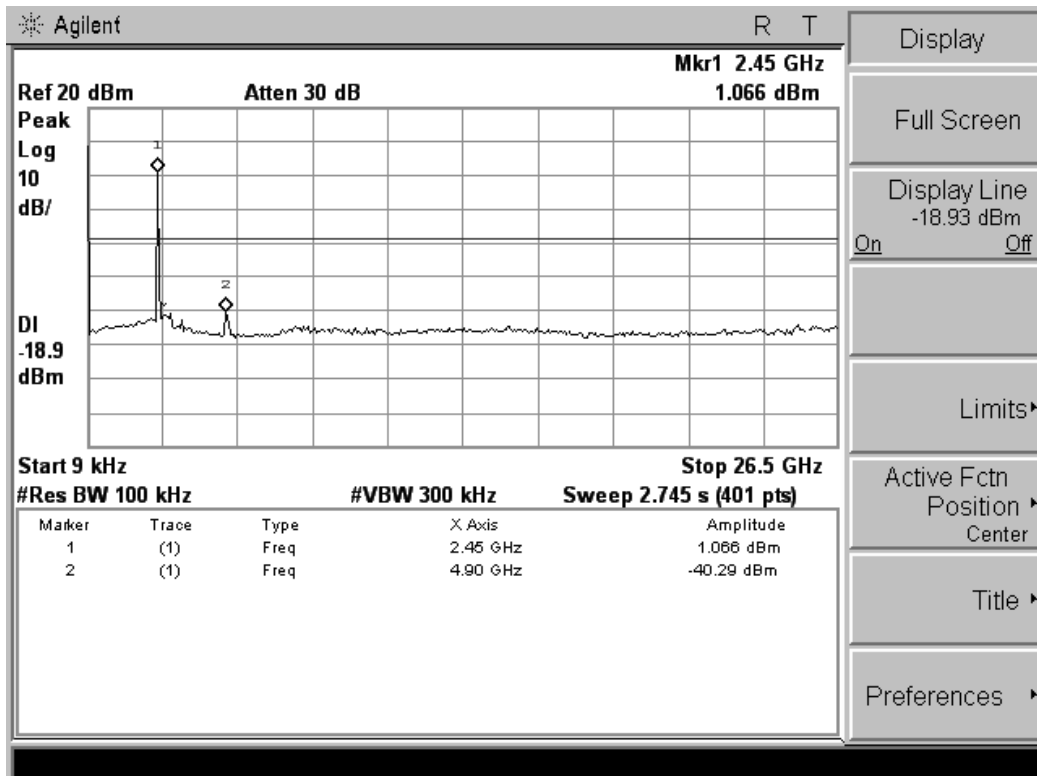
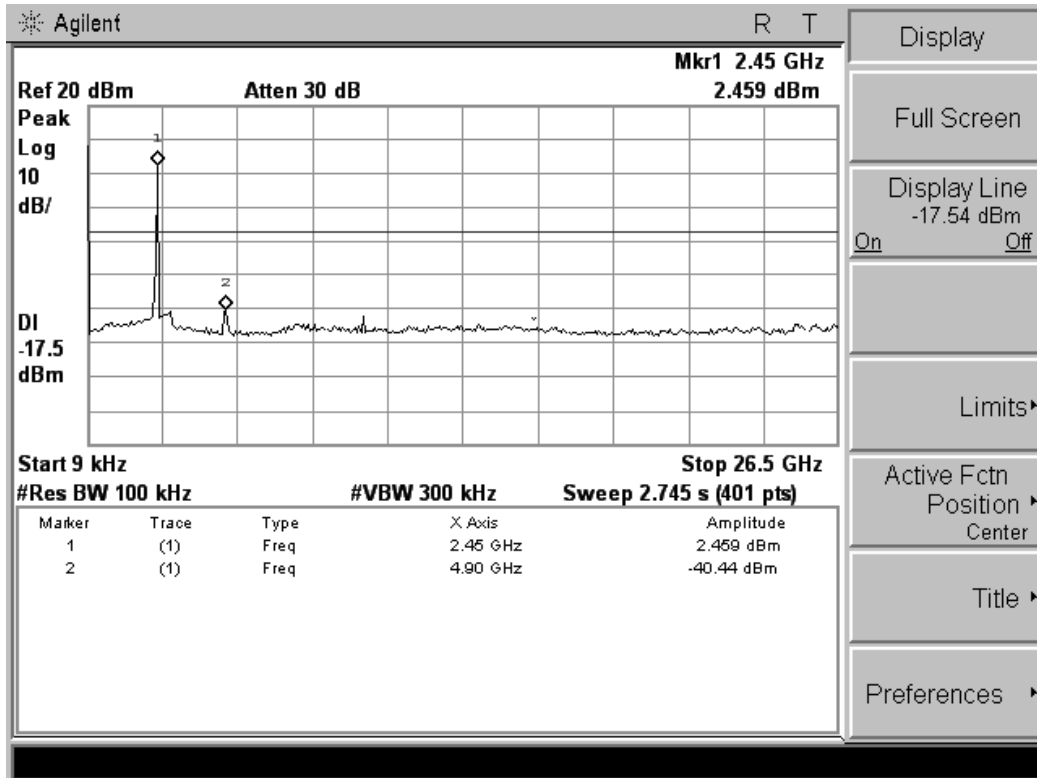
802.11b



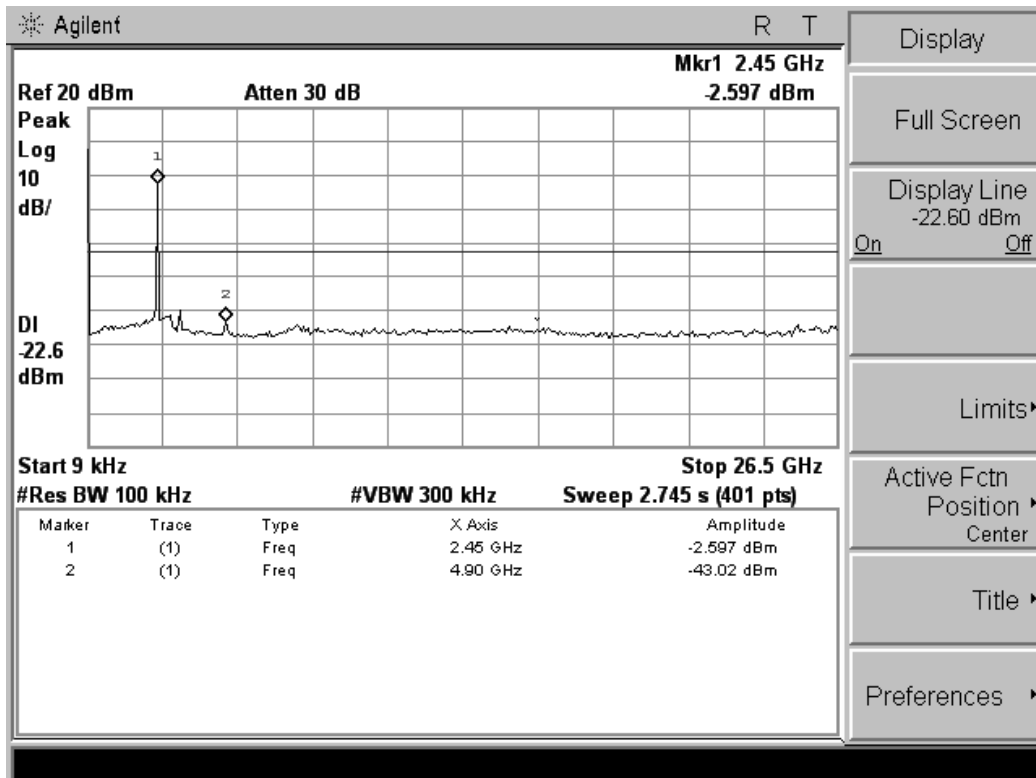
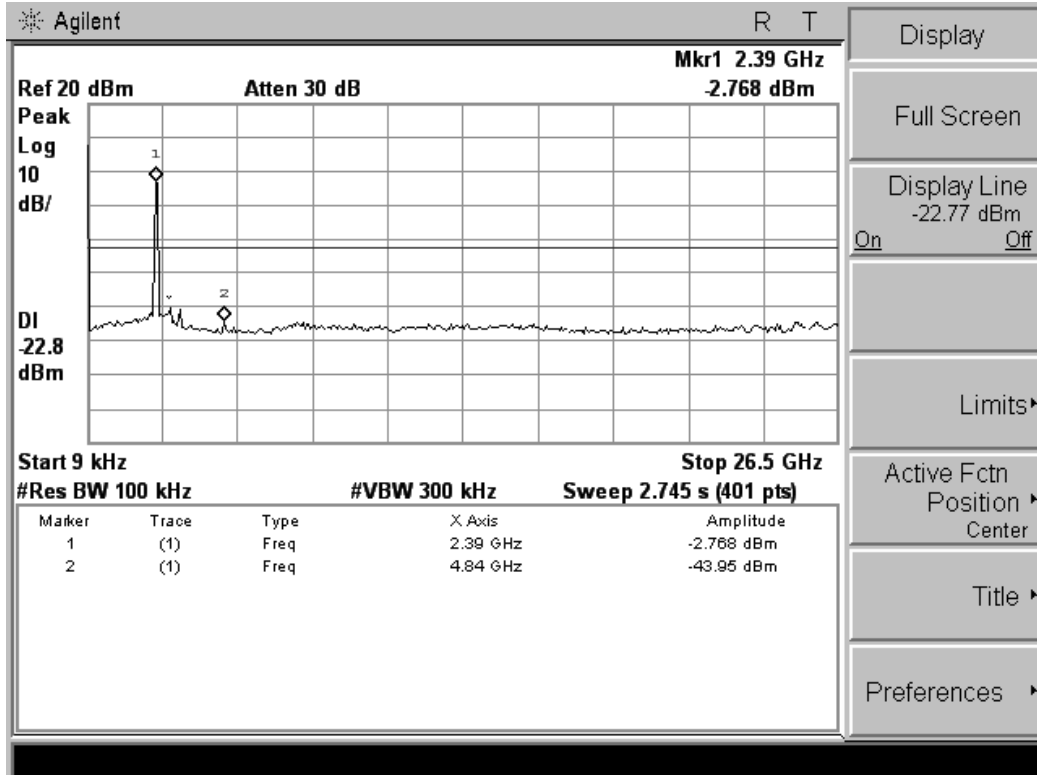


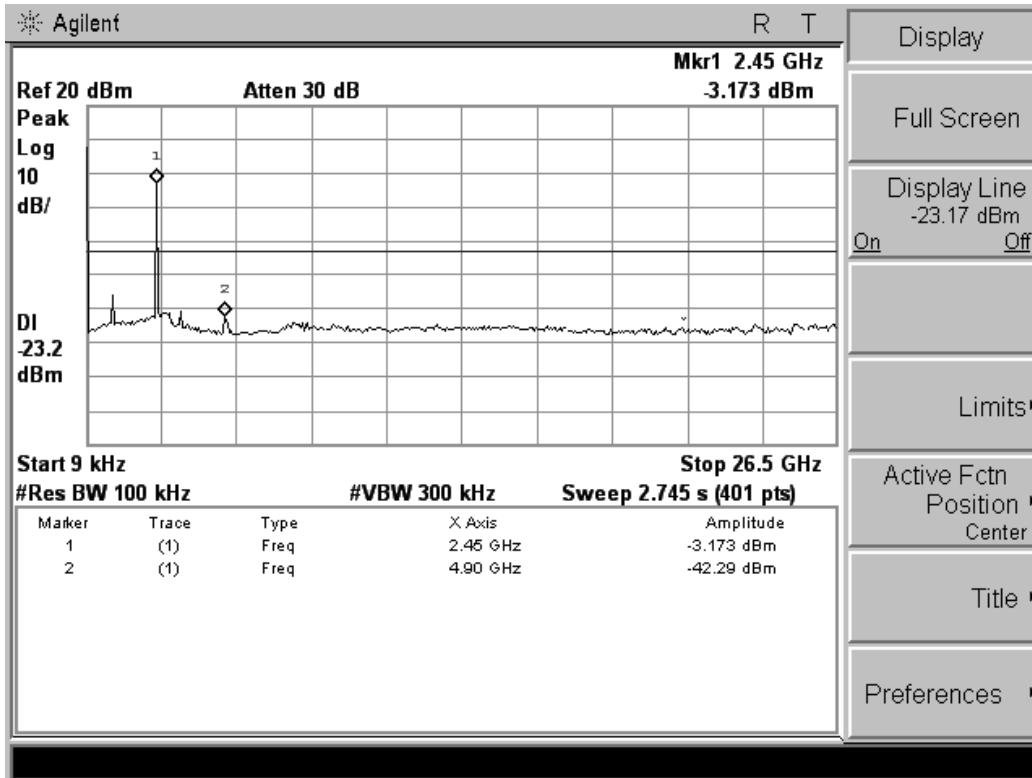
802.11g



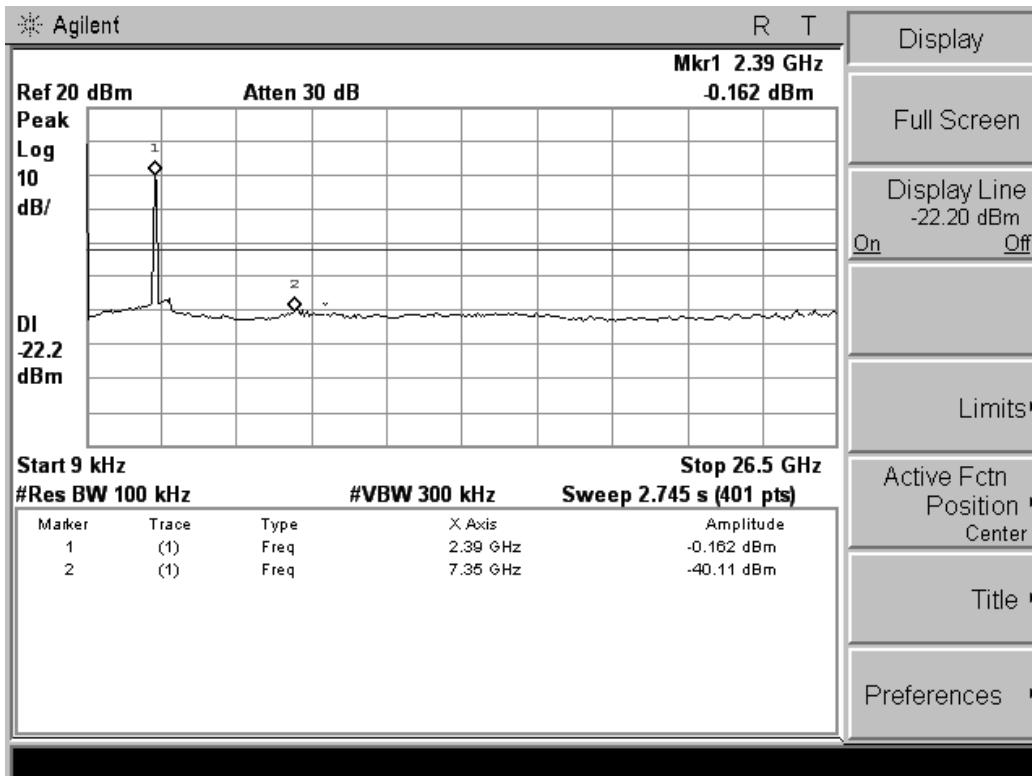


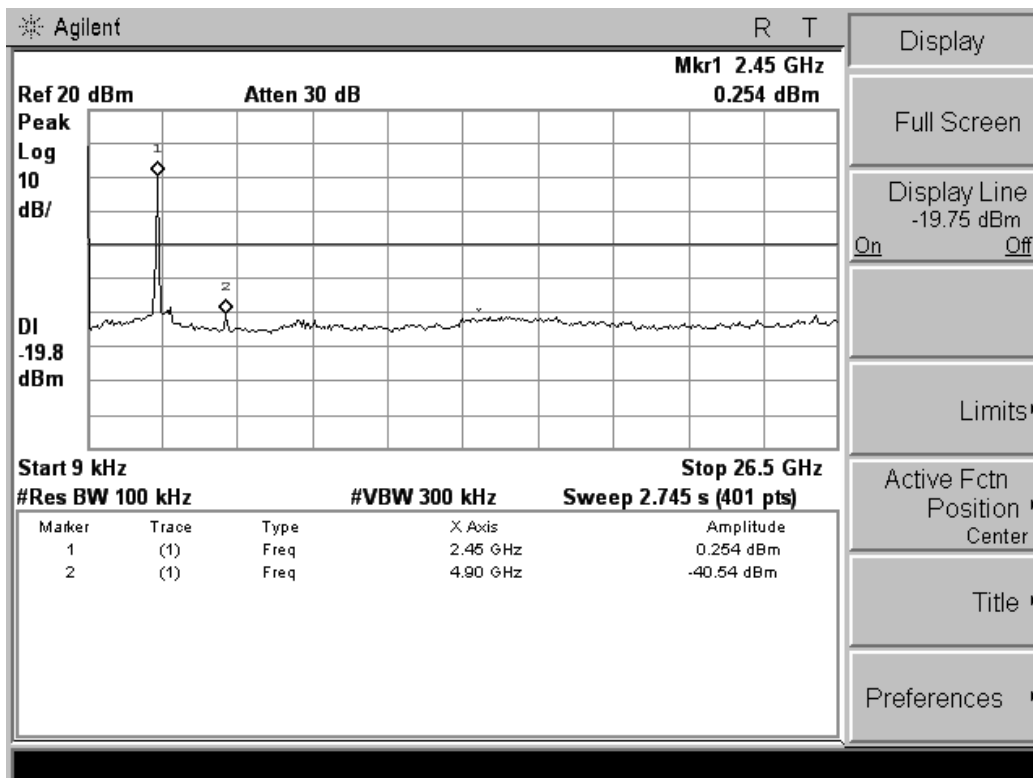
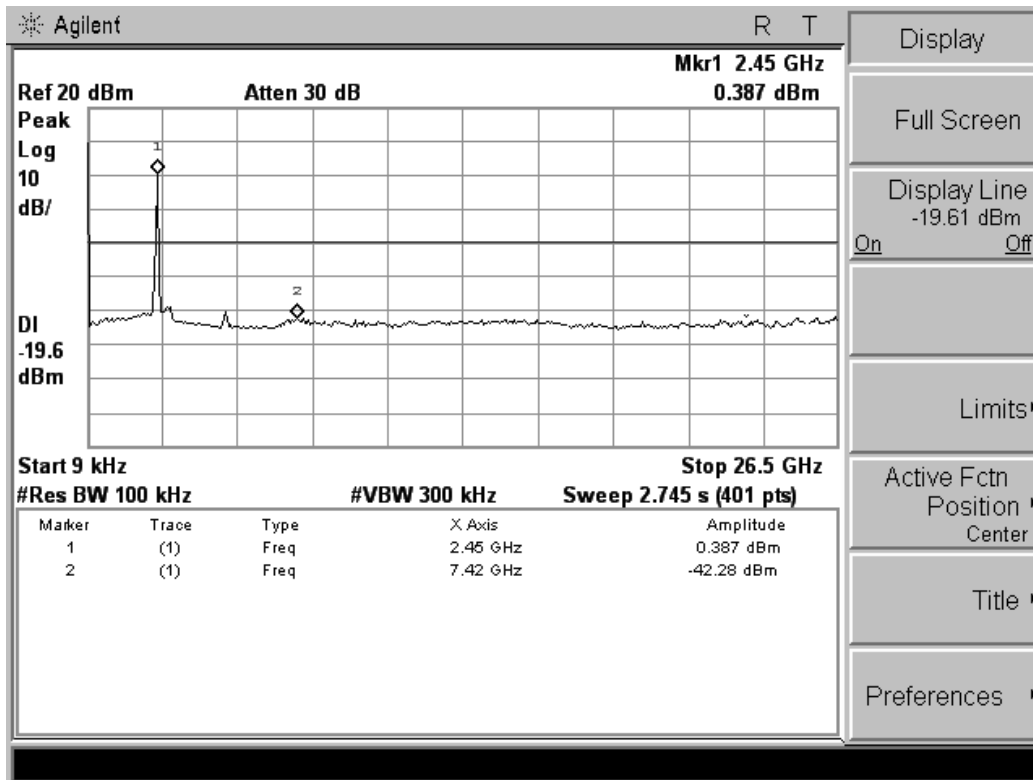
802.11n HT20





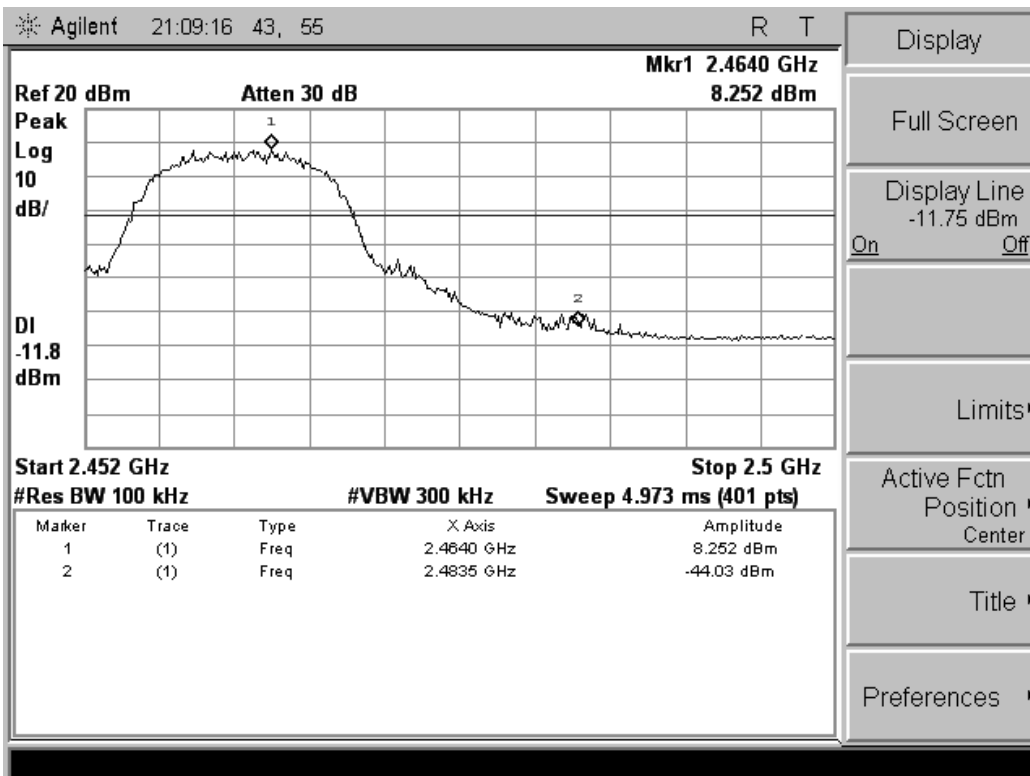
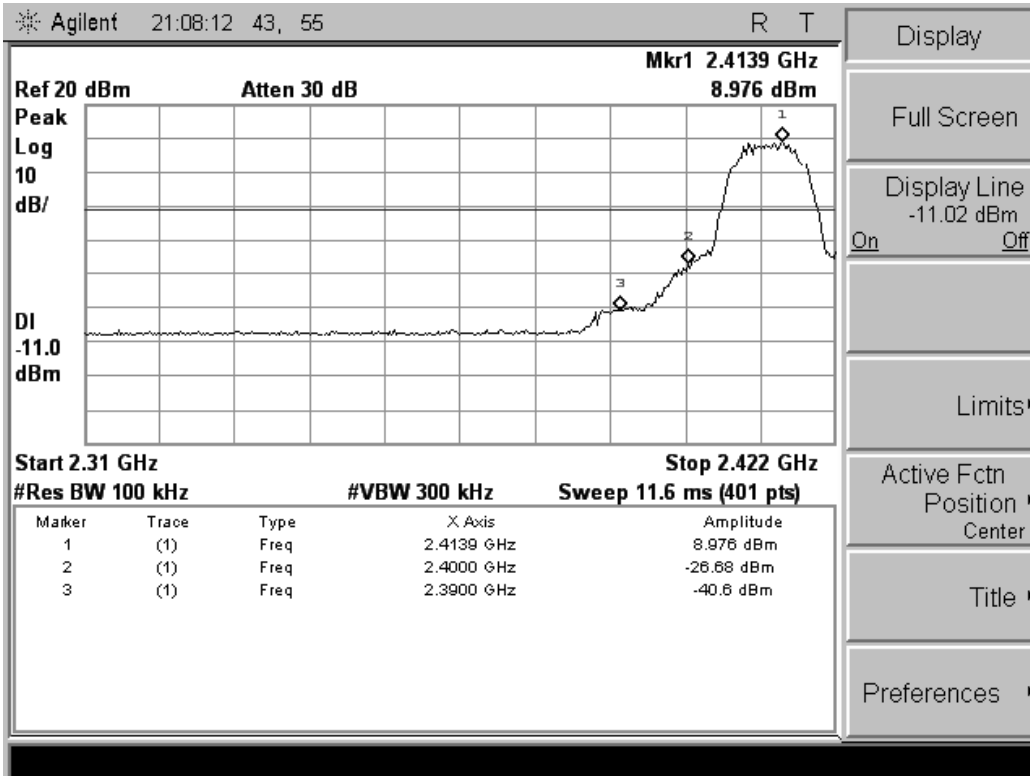
802.11n HT40



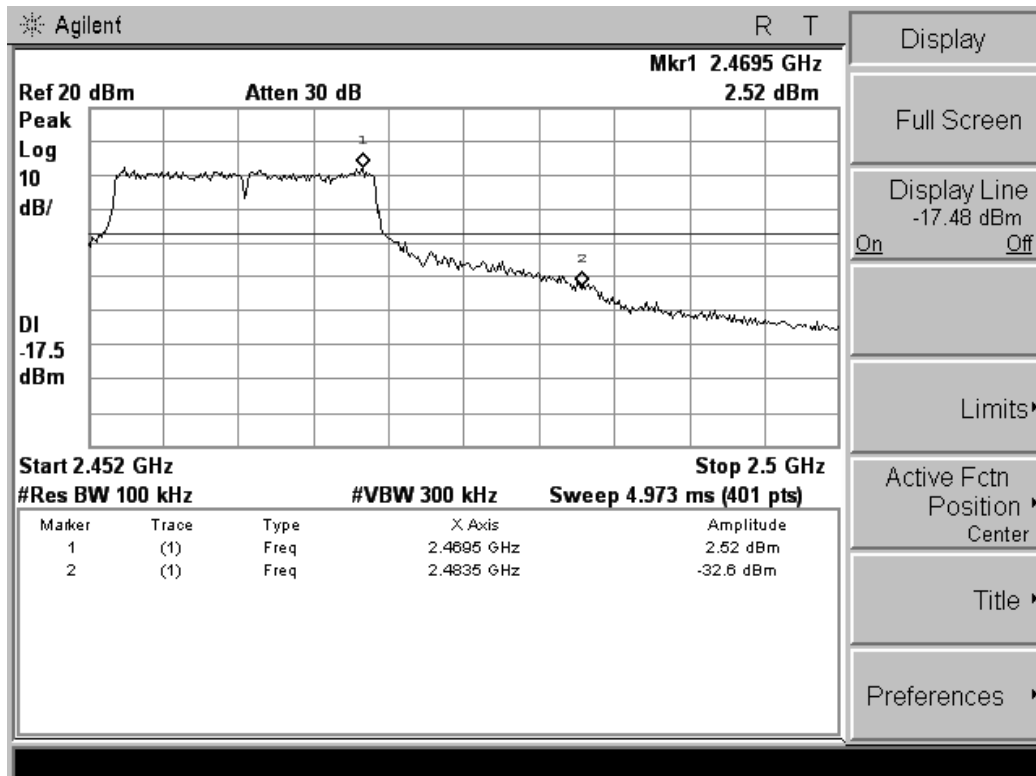
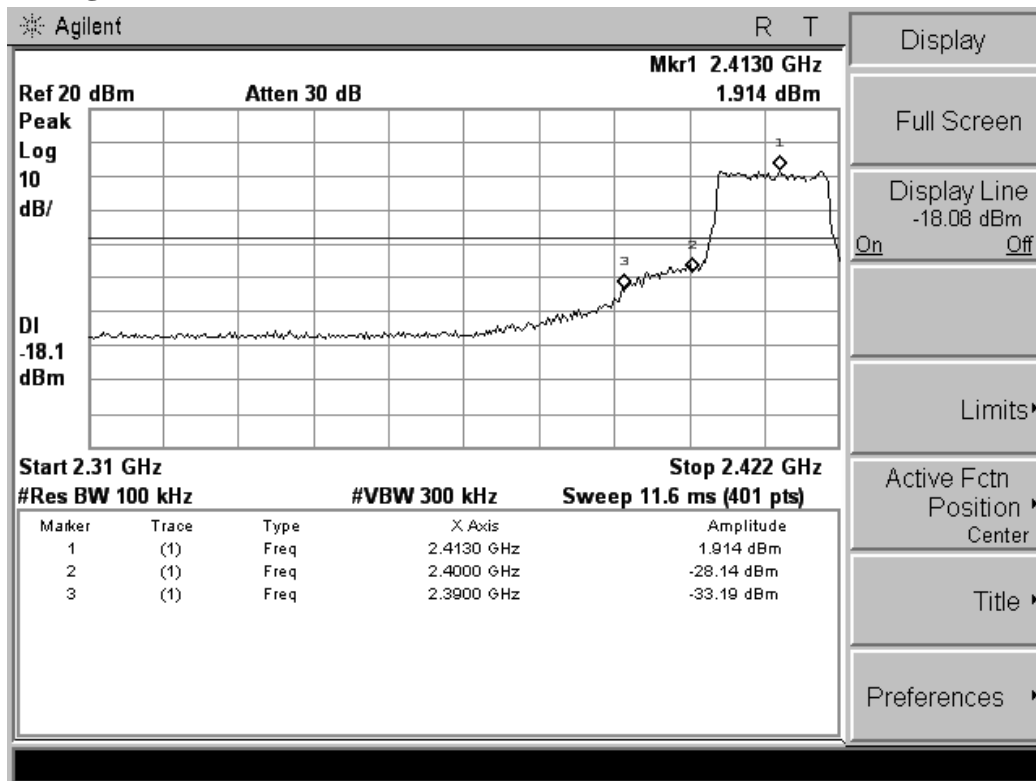


5.5.7. Test Results of Band Edges Test

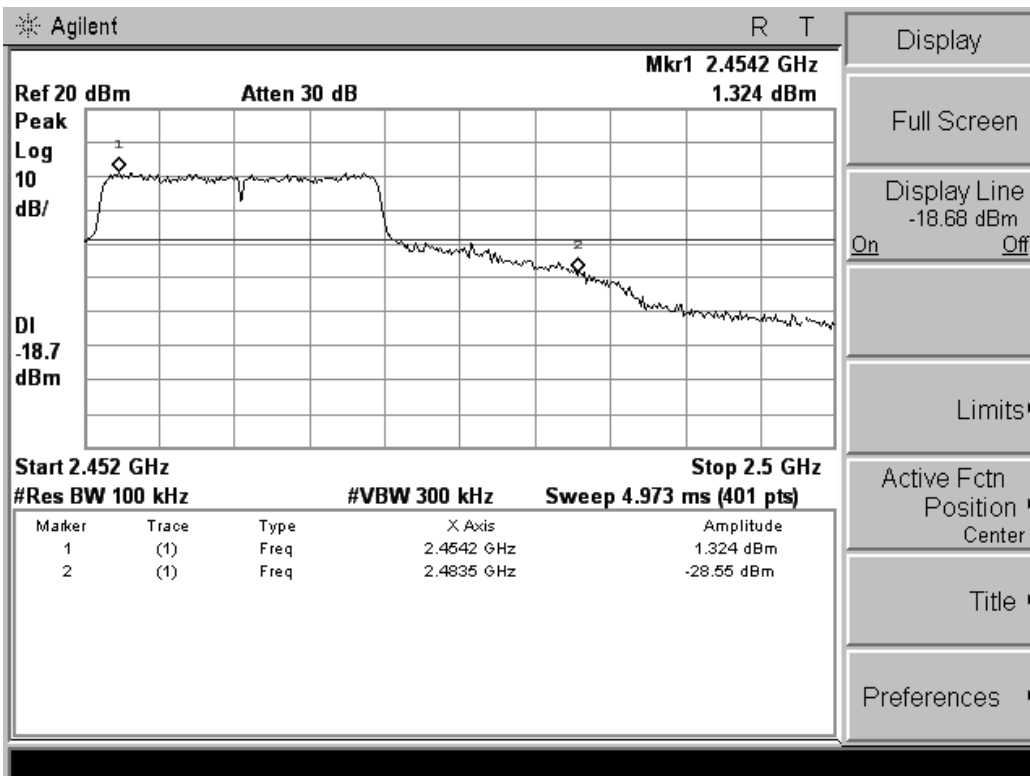
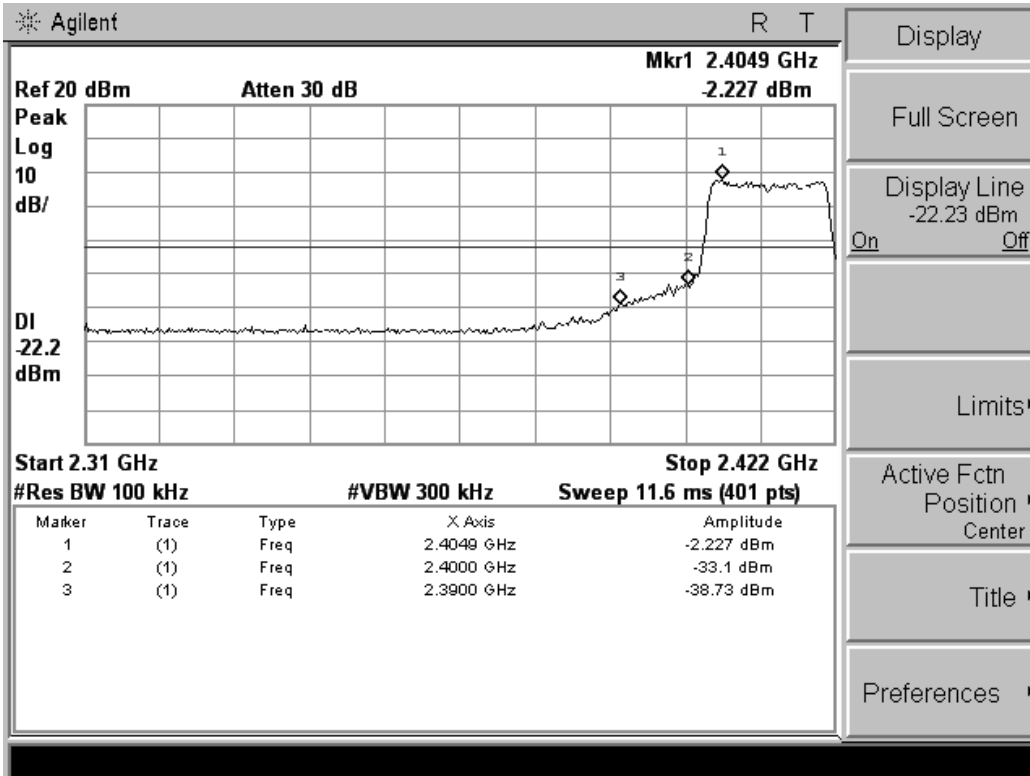
802.11b



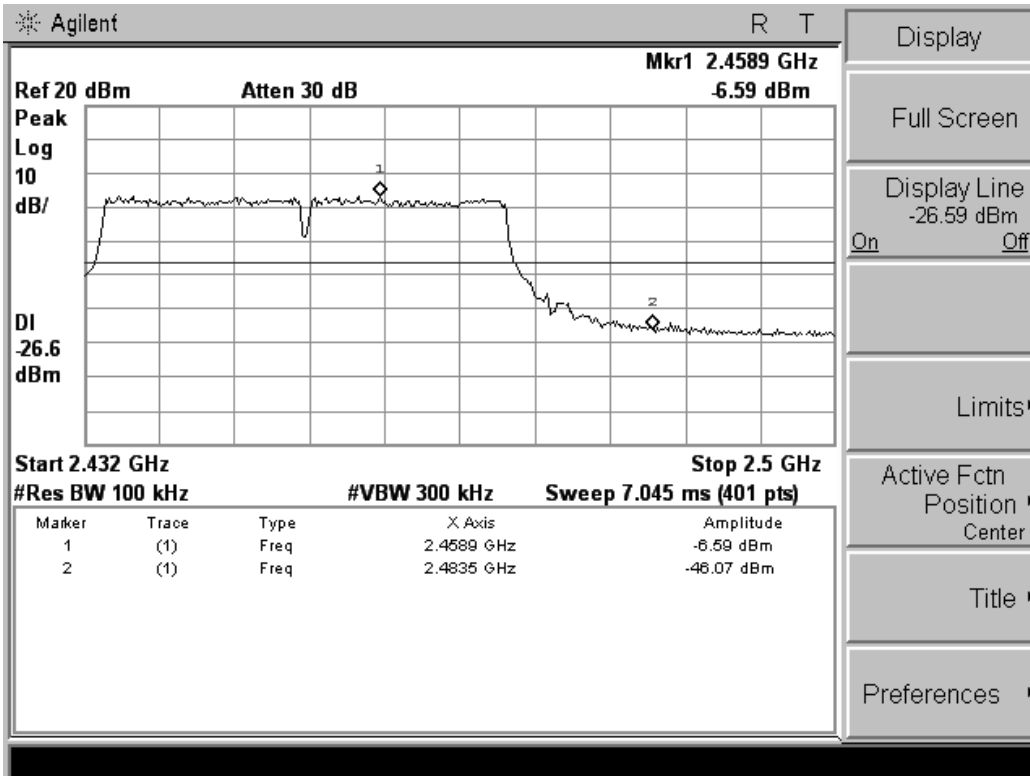
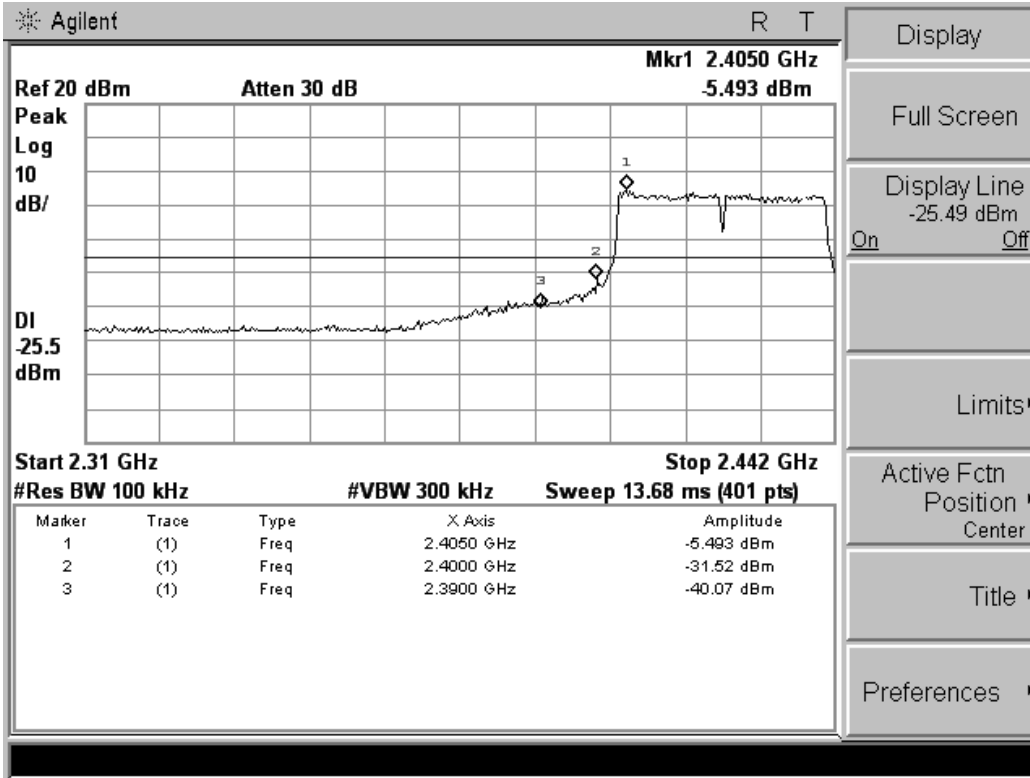
802.11g



802.11n HT20



802.11n HT40



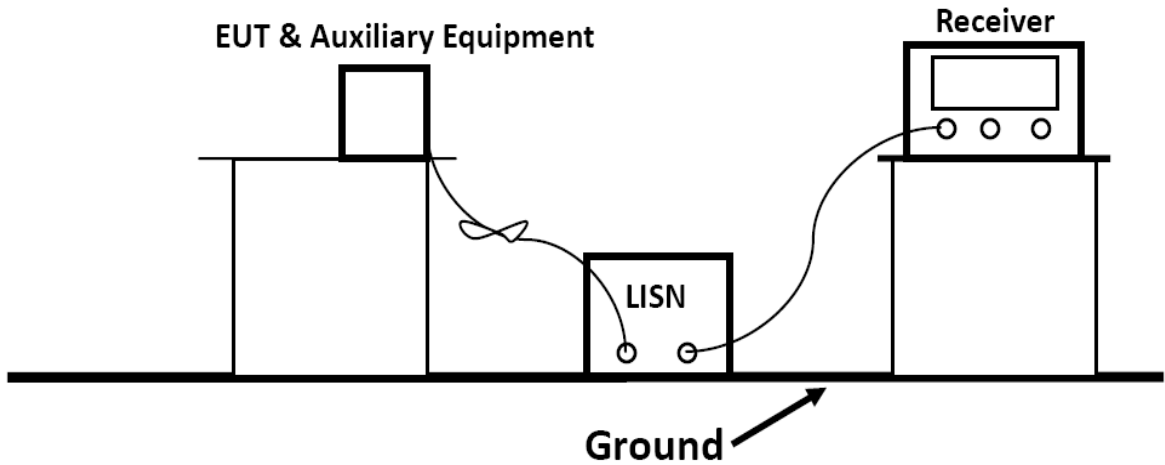
5.6. Power line conducted emissions

5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dBµV) | |
|-----------------------|---------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

5.6.2 Block Diagram of Test Setup

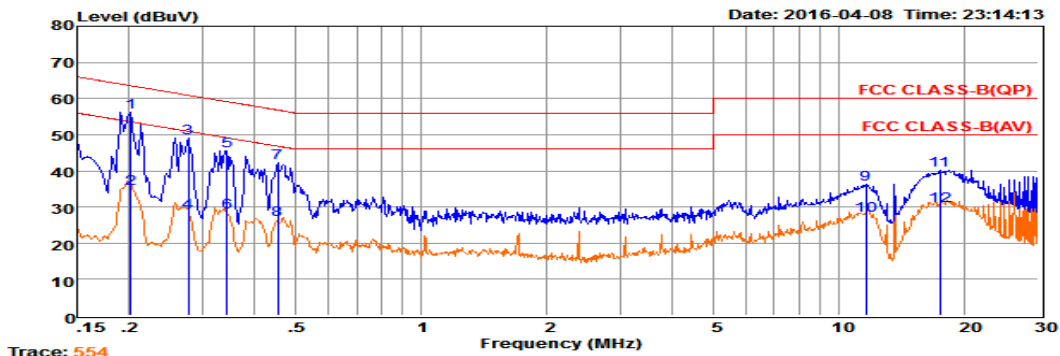


5.6.3 Test Results

PASS.

The test data please refer to following page.

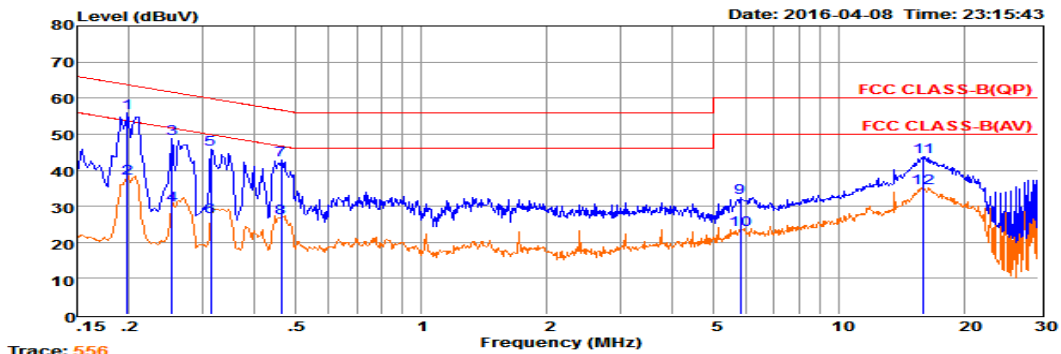
Test Result For Line Power Input AC 120V/60Hz (Worst Case)



Trace: 554
 Env. Ins: 24*/56%
 EUT: Embed
 M/N:
 Power Rating: AC 120V/60Hz
 Test Mode: On
 Operator: Calvin
 Memo:
 Pol: LINE

| Freq | Reading | LisnFac | CabLos | Atten_Fac | Measured | Limit | Over | Remark | |
|------|------------|---------|--------|-----------|----------|-------|-------|--------|---------|
| MHz | dBuV | dB | dB | dB | dBuV | dBuV | dB | | |
| 1 | 0.20181 | 36.65 | 9.63 | 0.02 | 10.00 | 56.30 | 63.54 | -7.24 | QP |
| 2 | 0.20191 | 15.50 | 9.63 | 0.02 | 10.00 | 35.15 | 53.53 | -18.38 | Average |
| 3 | 0.27734 | 29.40 | 9.63 | 0.03 | 10.00 | 49.06 | 60.90 | -11.84 | QP |
| 4 | 0.27744 | 8.85 | 9.63 | 0.03 | 10.00 | 28.51 | 50.89 | -22.38 | Average |
| 5 | 0.34281 | 25.97 | 9.62 | 0.03 | 10.00 | 45.62 | 59.13 | -13.51 | QP |
| 6 | 0.34291 | 8.97 | 9.62 | 0.03 | 10.00 | 28.62 | 49.13 | -20.51 | Average |
| 7 | 0.45395 | 22.62 | 9.62 | 0.04 | 10.00 | 42.28 | 56.80 | -14.52 | QP |
| 8 | 0.45405 | 6.79 | 9.62 | 0.04 | 10.00 | 26.45 | 46.80 | -20.35 | Average |
| 9 | 111.62082 | 16.39 | 9.70 | 0.09 | 10.00 | 36.18 | 60.00 | -23.82 | QP |
| 10 | 111.62182 | 7.96 | 9.70 | 0.09 | 10.00 | 27.75 | 50.00 | -22.25 | Average |
| 11 | 1117.47496 | 20.37 | 9.74 | 0.11 | 10.00 | 40.22 | 60.00 | -19.78 | QP |
| 12 | 1217.47596 | 10.63 | 9.74 | 0.11 | 10.00 | 30.48 | 50.00 | -19.52 | Average |

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
 2. The emission levels that are 20dB below the official limit are not reported.



Trace: 556
 Env. Ins: 24*/56%
 EUT: Embed
 M/N:
 Power Rating: AC 120V/60Hz
 Test Mode: On
 Operator: Calvin
 Memo:
 Pol: NEUTRAL

| Freq | Reading | LisnFac | CabLos | Atten_Fac | Measured | Limit | Over | Remark | |
|------|------------|---------|--------|-----------|----------|-------|-------|--------|---------|
| MHz | dBuV | dB | dB | dB | dBuV | dBuV | dB | | |
| 1 | 0.19758 | 36.29 | 9.59 | 0.02 | 10.00 | 55.90 | 63.71 | -7.81 | QP |
| 2 | 0.19768 | 18.16 | 9.59 | 0.02 | 10.00 | 37.77 | 53.71 | -15.94 | Average |
| 3 | 0.25345 | 29.28 | 9.60 | 0.03 | 10.00 | 48.91 | 61.64 | -12.73 | QP |
| 4 | 0.25355 | 10.84 | 9.60 | 0.03 | 10.00 | 30.47 | 51.64 | -21.17 | Average |
| 5 | 0.31328 | 26.17 | 9.60 | 0.03 | 10.00 | 45.80 | 59.88 | -14.08 | QP |
| 6 | 0.31338 | 7.57 | 9.60 | 0.03 | 10.00 | 27.20 | 49.88 | -22.68 | Average |
| 7 | 0.46122 | 23.02 | 9.62 | 0.04 | 10.00 | 42.68 | 56.67 | -13.99 | QP |
| 8 | 0.46132 | 7.17 | 9.62 | 0.04 | 10.00 | 26.83 | 46.67 | -19.84 | Average |
| 9 | 5.80500 | 12.64 | 9.67 | 0.06 | 10.00 | 32.37 | 60.00 | -27.63 | QP |
| 10 | 5.80600 | 3.83 | 9.67 | 0.06 | 10.00 | 23.56 | 50.00 | -26.44 | Average |
| 11 | 1115.96977 | 23.94 | 9.75 | 0.11 | 10.00 | 43.80 | 60.00 | -16.20 | QP |
| 12 | 1215.97077 | 15.12 | 9.75 | 0.11 | 10.00 | 34.98 | 50.00 | -15.02 | Average |

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten_Fac.
 2. The emission levels that are 20dB below the official limit are not reported.

***Note: Pre-scan all mode and recorded the worst case results in this report (802.11b (TX-High Channel)).

5.7. Antenna Requirements

5.7.1. Standard Applicable

According to § 15.203, 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 shall be considered sufficient to comply with the provisions of this section. 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.

5.7.2. Antenna Connector Construction

The PCB antenna (2.0dBi Max.) used for transmitting is permanently attached and no consideration of replacement. Please see EUT photo for details.

5.8.3. Results: Compliance.

-----THE END OF REPORT-----