



# Test Report

## FCC Part15 Subpart C

Product Name : Q TV Engine  
Model No. : QP-168  
FCC ID : 2AA45-QP168

Applicant : Q-Point Technology Inc  
Address : 6F.-17, No.73, Sec. 2, Xinsheng N. Rd.,  
Zhongshan Dist., Taipei City 104, Taiwan

Date of Receipt : 13/09/2013  
Test Date : 13/09/2013~29/09/2013  
Issued Date : 11/10/2013  
Report No. : 139S041R-RF-US-P06V01  
Report Version : V2.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF, CNAS or any agency of the Government.

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# Test Report Certification

Issued Date : 11/10/2013

Report No. : 139S041R-RF-US-P06V01



Product Name : Q TV Engine

Applicant : Q-Point Technology Inc

Address : 6F.-17, No.73, Sec. 2, Xinsheng N. Rd., Zhongshan Dist.,  
Taipei City 104, Taiwan

Manufacturer : Kunshan Heisei Electronics Co.,Ltd.

Address : No.758 Zhenchuan East Rd.,Kunshan City, China

Model No. : QP-168

FCC ID : 2AA45-QP168

EUT Voltage : 5V  $\Rightarrow$  2A

Brand Name : Q-Point

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2012  
ANSI C63.4: 2009  
KDB 558074 D01 DTS Meas Guidance v03r01

Test Result : Complied

Performed Location : Suzhou EMC Laboratory  
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## Laboratory Information

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| <b>Norway</b>        | <b>:</b> | <b>Nemko, DNV</b>     |
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## 1. General Information

### 1.1. EUT Description

|                         |                                                                             |
|-------------------------|-----------------------------------------------------------------------------|
| Product Name            | Q TV Engine                                                                 |
| Model No.               | QP-168                                                                      |
| Device Category         | Portable                                                                    |
| RF Exposure Environment | Uncontrolled                                                                |
| Antenna Type            | PCB                                                                         |
| <b>Wi-Fi</b>            |                                                                             |
| Wi-Fi Frequency         | 802.11g/n: OFDM                                                             |
| Type of modulation      | 802.11g: 6/9/12/18/24/36/48/54 Mbps                                         |
| Data Rate               | 802.11b: 1/2/5.5/11 Mbps                                                    |
|                         | 802.11n: up to 150 Mbps                                                     |
|                         | 802.11g/n: OFDM                                                             |
| Peak Antenna Gain       | 2.23dBi                                                                     |
| <b>Bluetooth</b>        |                                                                             |
| Bluetooth Frequency     | 2402~2480MHz                                                                |
| Bluetooth Version       | V3.0 + HS+V4.0                                                              |
| Type of modulation      | V3.0+HS: GFSK, Pi/4 DQPSK, 8DPSK<br>V4.0: GFSK                              |
| Data Rate               | V3.0+HS: 1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)<br>V4.0: 1Mbps(GFSK) |
| Antenna Gain            | 2.23dBi                                                                     |
| <b>Components</b>       |                                                                             |
| Battery                 | M/N: BX0502000<br>Input: 100V-240V-50/60Hz<br>Output: 5V 2000mA DC          |

### For 2.4GHz Band

| 802.11b/g/n(20MHz) Working Frequency of Each Channel: |           |         |           |         |           |         |           |
|-------------------------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                                               | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 01                                                    | 2412 MHz  | 02      | 2417 MHz  | 03      | 2422 MHz  | 04      | 2427 MHz  |
| 05                                                    | 2432 MHz  | 06      | 2437 MHz  | 07      | 2442 MHz  | 08      | 2447 MHz  |
| 09                                                    | 2452 MHz  | 10      | 2457 MHz  | 11      | 2462 MHz  | N/A     | N/A       |
| 802.11b/g/n(40MHz) Working Frequency of Each Channel: |           |         |           |         |           |         |           |
| Channel                                               | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| N/A                                                   | N/A       | N/A     | N/A       | 03      | 2422 MHz  | 04      | 2427 MHz  |
| 05                                                    | 2432 MHz  | 06      | 2437 MHz  | 07      | 2442 MHz  | 08      | 2447 MHz  |
| 09                                                    | 2452 MHz  | N/A     | N/A       | N/A     | N/A       | N/A     | N/A       |

## Power Parameter Value of the test software

| Test Mode      | Test Channel | Power Setting Value | Duty Cycle |
|----------------|--------------|---------------------|------------|
| 802.11b        | 2412         | 47                  | 99%        |
|                | 2437         | 46                  | 99%        |
|                | 2462         | 46                  | 99%        |
| 802.11g        | 2412         | 41                  | 98%        |
|                | 2437         | 44                  | 98%        |
|                | 2462         | 40                  | 98%        |
| 802.11n(20MHz) | 2412         | 39                  | 98%        |
|                | 2437         | 44                  | 98%        |
|                | 2462         | 38                  | 98%        |
| 802.11n(40MHz) | 2422         | 39                  | 95%        |
|                | 2437         | 38                  | 95%        |
|                | 2452         | 38                  | 95%        |

## 1.2. Mode of Operation

Quietek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

| Test Mode                           |
|-------------------------------------|
| Mode 1: Transmit by 802.11b         |
| Mode 2: Transmit by 802.11g         |
| Mode 3: Transmit by 802.11n (20MHz) |
| Mode 4: Transmit by 802.11n (40MHz) |

Note:

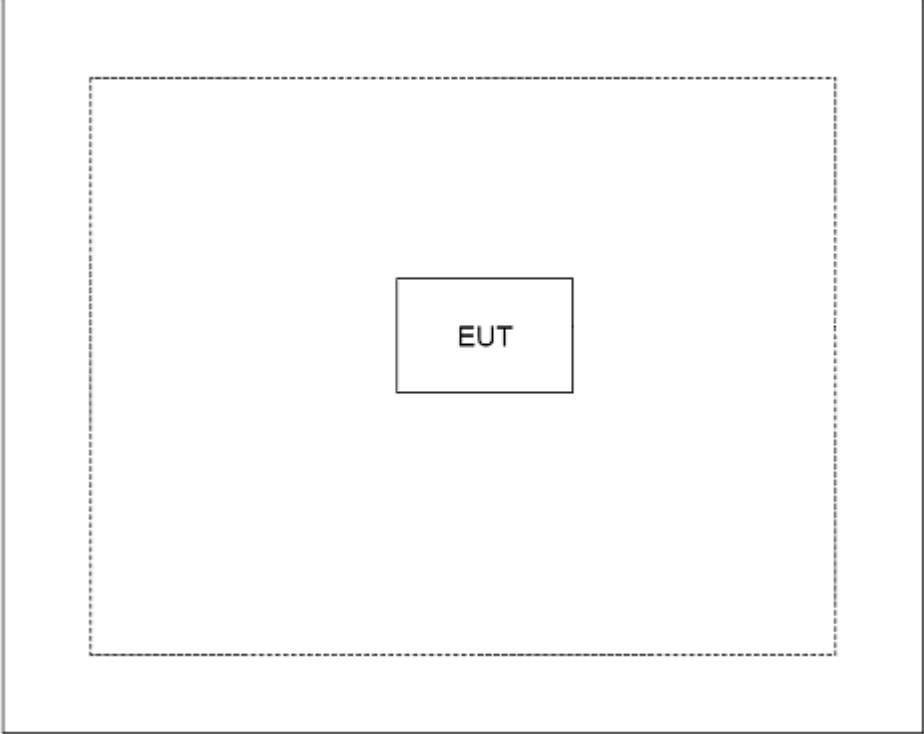
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. This device is a composite device in accordance with Part 15 Subpart B regulations. The function for the receiver was measured and made a test report that the report number is 139S041R-IT-US-P01V02.

### 1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product |     | Manufacturer | Model No. | Serial No. | Power Cord |
|---------|-----|--------------|-----------|------------|------------|
| 1       | N/A | N/A          | N/A       | N/A        | N/A        |

1.4. Configuration of Tested System

| Connection Diagram                                                                  |                          |
|-------------------------------------------------------------------------------------|--------------------------|
|  |                          |
| Signal Cable Type                                                                   | Signal cable Description |

**1.5. EUT Exercise Software**

|   |                                                                                            |
|---|--------------------------------------------------------------------------------------------|
| 1 | Setup the EUT and simulators as shown on above.                                            |
| 2 | Turn on the power of equipment.                                                            |
| 3 | Run the RF test software, and set the test mode and channel, then start continue transmit. |

## 2. Technical Test

### 2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

| Performed Test Item                         | Normative References                                          | Test Performed | Deviation |
|---------------------------------------------|---------------------------------------------------------------|----------------|-----------|
| Conducted Emission                          | FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.207       | Yes            | No        |
| Radiated Emission                           | FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.209       | Yes            | No        |
| RF Antenna Conducted Spurious               | FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(d)    | Yes            | No        |
| Radiated Emission Band Edge                 | FCC CFR Title 47 Part 15 Subpart C: 2012 15.247(d)            | Yes            | No        |
| Operation Frequency Range of 20dB Bandwidth | FCC CFR Title 47 Part 15 Subpart C: 2012 15.215(c)            | Yes            | No        |
| Occupied Bandwidth                          | FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(a)(2) | Yes            | No        |
| Power Output                                | FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(b)(3) | Yes            | No        |
| Power Spectral Density                      | FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(e)    | Yes            | No        |

## 2.2. Test Environment

| Items                      | Required (IEC 68-1) | Actual   |
|----------------------------|---------------------|----------|
| Temperature (°C)           | 15-35               | 21       |
| Humidity (%RH)             | 25-75               | 50       |
| Barometric pressure (mbar) | 860-1060            | 950-1000 |

### 3. Conducted Emission

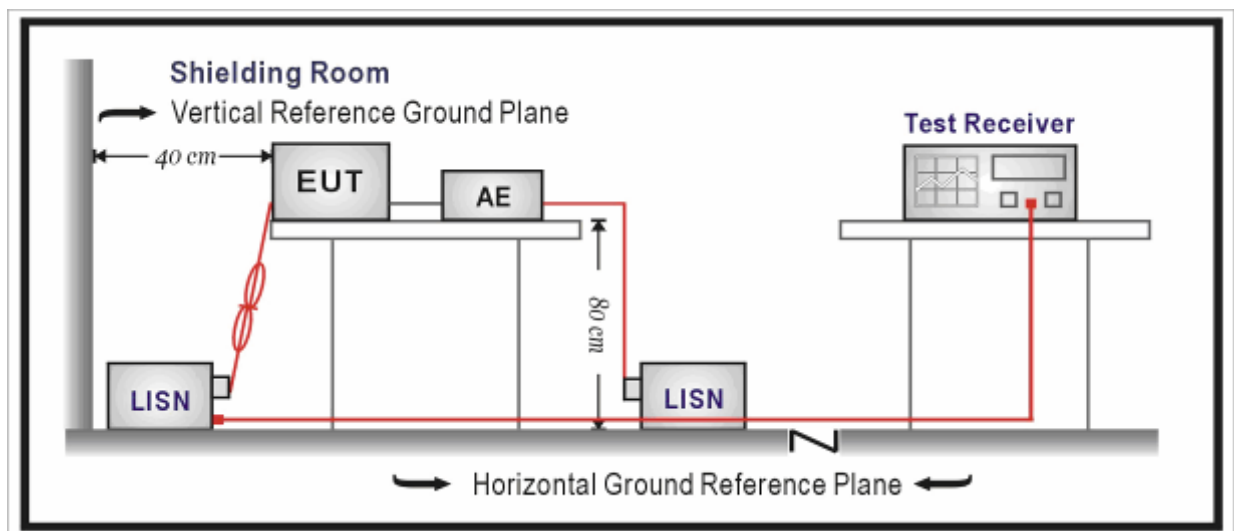
#### 3.1. Test Equipment

Conducted Emission / TR-1

| Instrument                 | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|----------------------------|--------------|----------|------------|---------------|
| EMI Test Receiver          | R&S          | ESCI     | 100726     | 2014.03.30    |
| Two-Line V-Network         | R&S          | ENV216   | 100043     | 2014.03.30    |
| Two-Line V-Network         | R&S          | ENV216   | 100044     | 2014.09.16    |
| 50ohm Coaxial Switch       | Anritsu      | MP59B    | 6200464462 | 2014.03.01    |
| 50ohm Termination          | SHX          | TF2      | 07081401   | 2014.09.16    |
| Temperature/Humidity Meter | zhicheng     | ZC1-2    | TR1-TH     | 2014.01.10    |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

#### 3.2. Test Setup



### 3.3. Limit

| FCC Part 15 Subpart C Paragraph 15.207 Limits |           |           |
|-----------------------------------------------|-----------|-----------|
| Frequency (MHz)                               | QP (dBuV) | AV (dBuV) |
| 0.15 - 0.50                                   | 66 - 56   | 56 – 46   |
| 0.50 - 5.0                                    | 56        | 46        |
| 5.0 - 30                                      | 60        | 50        |

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

### 3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

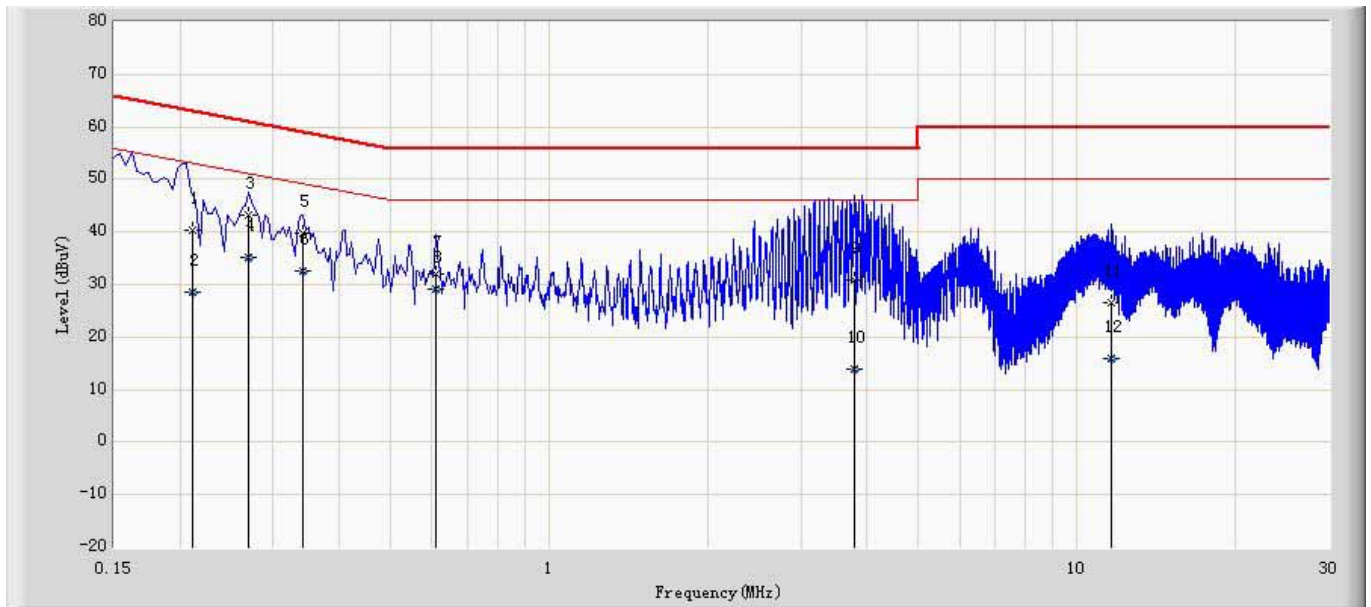
The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

### 3.5. Uncertainty

The measurement uncertainty is defined as  $\pm 2.02$  dB

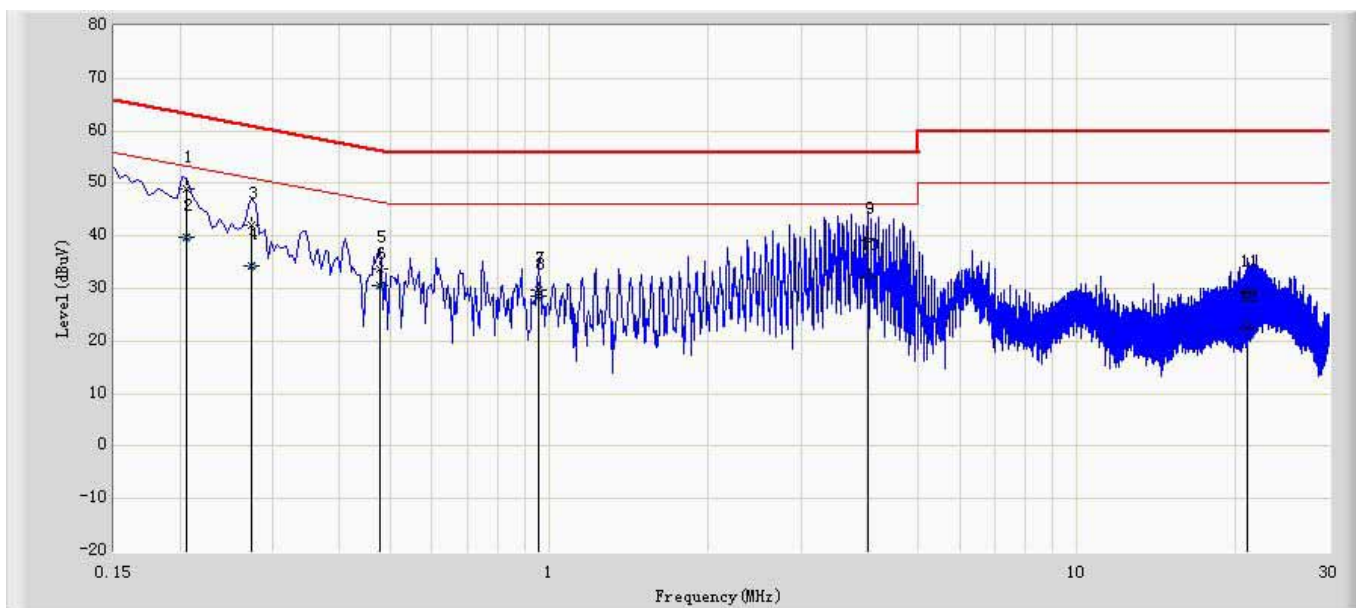
### 3.6. Test Result

|                                          |                          |
|------------------------------------------|--------------------------|
| Engineer: Milo                           |                          |
| Site: TR1                                | Time: 2013/09/29 - 17:03 |
| Limit: FCC_Part15.207_CE_AC Power_ClassB | Margin: 0                |
| Probe: ENV216_101044(0.009-30MHz)        | Polarity: Neutral        |
| EUT: Q TV Engine                         | Power: AC 120V/60Hz      |
| Note: Mode1                              |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|----|------|-----------------|----------------------|----------------------|-----------------|--------------|-------------|------|
| 1  |      | 0.211           | 40.362               | 30.448               | -22.804         | 63.166       | 9.914       | QP   |
| 2  |      | 0.211           | 28.462               | 18.548               | -24.704         | 53.166       | 9.914       | AV   |
| 3  |      | 0.270           | 43.254               | 33.319               | -17.864         | 61.118       | 9.935       | QP   |
| 4  | *    | 0.270           | 35.266               | 25.331               | -15.852         | 51.118       | 9.935       | AV   |
| 5  |      | 0.342           | 39.632               | 29.661               | -19.523         | 59.155       | 9.971       | QP   |
| 6  |      | 0.342           | 32.666               | 22.695               | -16.489         | 49.155       | 9.971       | AV   |
| 7  |      | 0.610           | 31.992               | 22.031               | -24.008         | 56.000       | 9.961       | QP   |
| 8  |      | 0.610           | 29.021               | 19.060               | -16.979         | 46.000       | 9.961       | AV   |
| 9  |      | 3.790           | 30.849               | 20.805               | -25.151         | 56.000       | 10.044      | QP   |
| 10 |      | 3.790           | 13.960               | 3.916                | -32.040         | 46.000       | 10.044      | AV   |
| 11 |      | 11.650          | 26.444               | 16.126               | -33.556         | 60.000       | 10.318      | QP   |
| 12 |      | 11.650          | 15.914               | 5.596                | -34.086         | 50.000       | 10.318      | AV   |

|                                          |                          |
|------------------------------------------|--------------------------|
| Engineer: Milo                           |                          |
| Site: TR1                                | Time: 2013/09/29 - 17:04 |
| Limit: FCC_Part15.207_CE_AC Power_ClassB | Margin: 0                |
| Probe: ENV216_101044(0.009-30MHz)        | Polarity: Line           |
| EUT: Q TV Engine                         | Power: AC 120V/60Hz      |
| Note: Mode1                              |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|----|------|-----------------|----------------------|----------------------|-----------------|--------------|-------------|------|
| 1  |      | 0.206           | 48.911               | 39.050               | -14.454         | 63.365       | 9.861       | QP   |
| 2  | *    | 0.206           | 39.811               | 29.950               | -13.554         | 53.365       | 9.861       | AV   |
| 3  |      | 0.274           | 42.118               | 32.248               | -18.878         | 60.996       | 9.870       | QP   |
| 4  |      | 0.274           | 34.422               | 24.552               | -16.574         | 50.996       | 9.870       | AV   |
| 5  |      | 0.478           | 33.676               | 23.768               | -22.698         | 56.374       | 9.908       | QP   |
| 6  |      | 0.478           | 30.472               | 20.564               | -15.902         | 46.374       | 9.908       | AV   |
| 7  |      | 0.954           | 29.832               | 20.016               | -26.168         | 56.000       | 9.816       | QP   |
| 8  |      | 0.954           | 28.693               | 18.877               | -17.307         | 46.000       | 9.816       | AV   |
| 9  |      | 4.014           | 39.079               | 29.242               | -16.921         | 56.000       | 9.837       | QP   |
| 10 |      | 4.014           | 32.263               | 22.426               | -13.737         | 46.000       | 9.837       | AV   |
| 11 |      | 20.954          | 29.008               | 18.473               | -30.992         | 60.000       | 10.535      | QP   |
| 12 |      | 20.954          | 22.607               | 12.072               | -27.393         | 50.000       | 10.535      | AV   |

## 4. Radiated Emission

### 4.1. Test Equipment

#### Radiated Emission / AC-2

| Instrument                 | Manufacturer | Type No.     | Serial No. | Cal. Due Date |
|----------------------------|--------------|--------------|------------|---------------|
| EMI Test Receiver          | R&S          | ESCI         | 100573     | 2014.04.30    |
| Loop Antenna               | R&S          | HFH2-Z2      | 833799/003 | 2013.11.17    |
| Bilog Antenna              | Teseq GmbH   | CBL6112D     | 27611      | 2013.10.15    |
| Coaxial Cable              | Huber+Suhner | SUCOFLEX 106 | AC2-C      | 2014.03.01    |
| Temperature/Humidity Meter | Zhicheng     | ZC1-2        | AC2-TH     | 2014.01.09    |

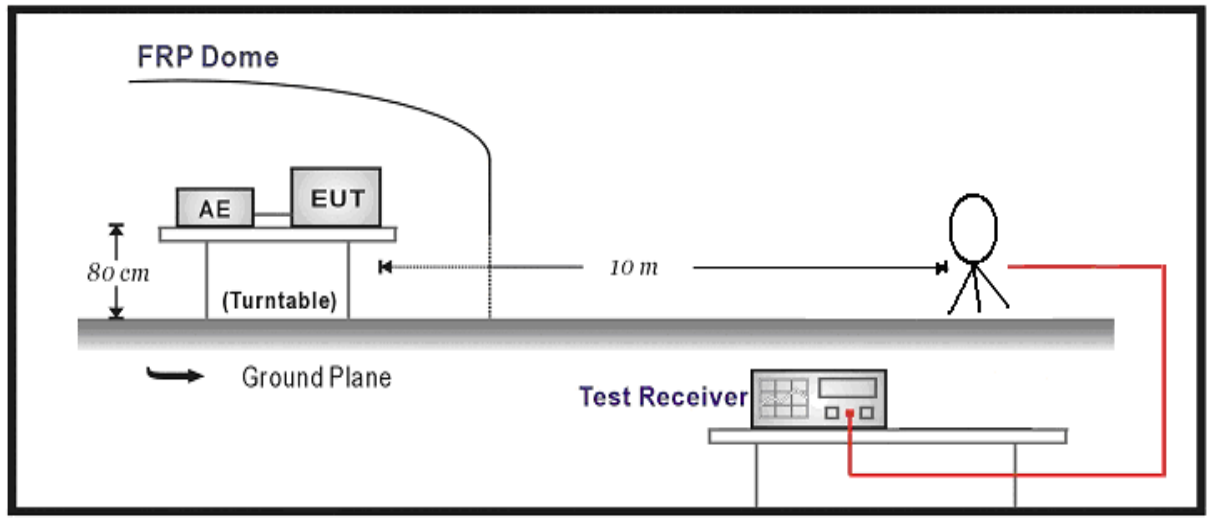
#### Radiated Emission / AC-5

| Instrument                 | Manufacturer | Type No.     | Serial No.  | Cal. Due Date |
|----------------------------|--------------|--------------|-------------|---------------|
| Spectrum Analyzer          | Agilent      | N9010A       | MY48030494  | 2014.03.30    |
| Preamplifier               | Miteq        | NSP1800-25   | 1364185     | 2014.05.03    |
| Preamplifier               | Quietek      | AP-040G      | CHM-0906001 | 2014.05.03    |
| Bilog Antenna              | Teseq GmbH   | CBL6112D     | 27612       | 2013.10.15    |
| Broad-Band Horn Antenna    | Schwarzbeck  | BBHA9120D    | 499         | 2014.06.08    |
| Broad-Band Horn Antenna    | Schwarzbeck  | BBHA9170     | 294         | 2013.11.24    |
| Coaxial Cable              | Huber+Suhner | SUCOFLEX 106 | AC5-C1      | 2014.03.01    |
| Coaxial Cable              | Huber+Suhner | SUCOFLEX 106 | AC5-C2      | 2014.03.01    |
| Coaxial Cable              | Huber+Suhner | SUCOFLEX 102 | AC5-C3      | 2014.03.01    |
| Temperature/Humidity Meter | Zhicheng     | ZC1-2        | AC5-TH      | 2014.01.11    |

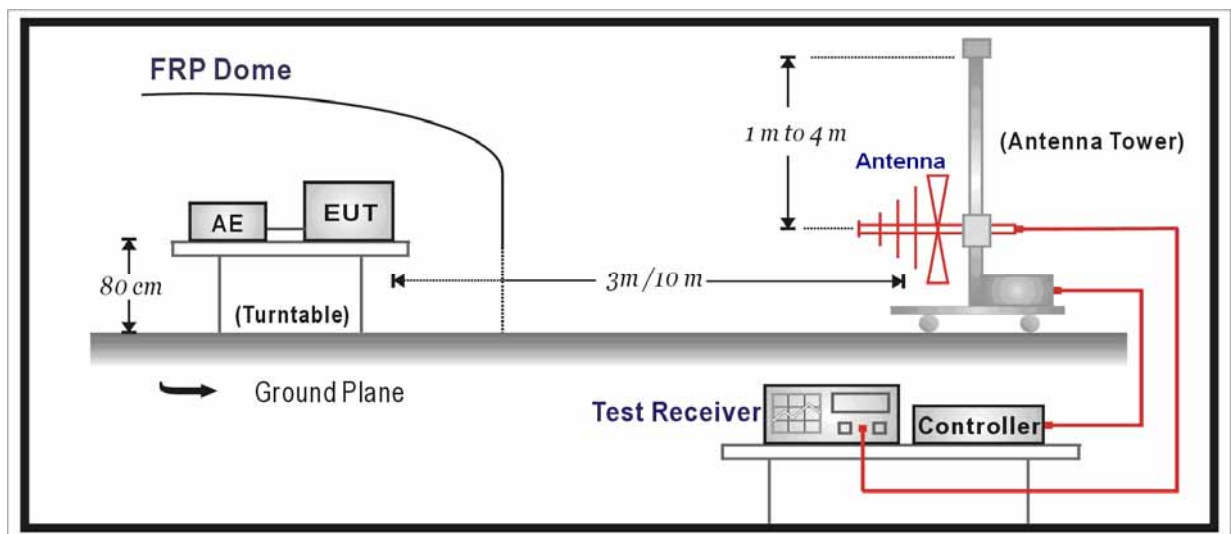
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 4.2. Test Setup

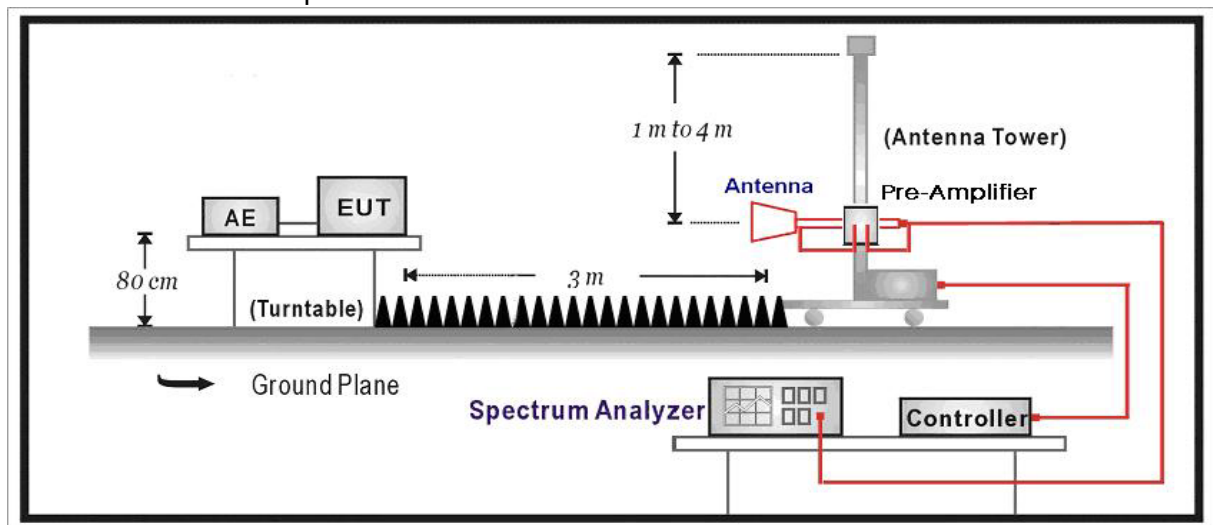
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



### 4.3. Limit

| FCC Part 15 Subpart C Paragraph 15.209 |              |                |
|----------------------------------------|--------------|----------------|
| Frequency (MHz)                        | Distance (m) | Level (dBuV/m) |
| 30 - 88                                | 3            | 40             |
| 88 - 216                               | 3            | 43.5           |
| 216 - 960                              | 3            | 46             |
| Above 960                              | 3            | 54             |

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

### 4.4. Test Procedure

The EUT was setup according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the

maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the "cone of radiation" of EUT. The 3dB beamwidth is 60 degrees for H-plane and 90 degrees for E-plane.

#### **4.5. Uncertainty**

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB

below 1G is defined as  $\pm 3.8$  dB

#### 4.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor - Preamplifier Gain

Mode1: Transmit at 802.11b

| CH | Antenna | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|------------------------|-------------|------------------------|----------------|-------------|----------|
| 1  | H       | 4825.0          | 50.7                   | -6.2        | 44.5                   | 54(note3)      | -9.5        | PK       |
|    | V       | 4825.0          | 50.0                   | -6.2        | 43.8                   | 54(note3)      | -10.2       | PK       |
|    | H       | 7239.0          | 45.5                   | -1.6        | 43.9                   | 54(note3)      | -10.1       | PK       |
|    | V       | 7239.0          | 46.4                   | -1.6        | 44.8                   | 54(note3)      | -9.2        | PK       |
|    | H       | 9648.0          | 34.0                   | 4.9         | 38.9                   | 54(note3)      | -15.1       | PK       |
|    | V       | 9648.0          | 34.1                   | 4.9         | 39.0                   | 54(note3)      | -15.0       | PK       |
| 6  | H       | 4876.0          | 48.8                   | -6.2        | 42.6                   | 54(note3)      | -11.4       | PK       |
|    | V       | 4876.0          | 52.5                   | -6.2        | 46.3                   | 54(note3)      | -7.7        | PK       |
|    | H       | 7307.0          | 46.1                   | -1.4        | 44.7                   | 54(note3)      | -9.3        | PK       |
|    | V       | 7307.0          | 48.5                   | -1.4        | 47.1                   | 54(note3)      | -6.9        | PK       |
|    | H       | 9748.0          | 34.8                   | 5.0         | 39.8                   | 54(note3)      | -14.2       | PK       |
|    | V       | 9748.0          | 33.8                   | 5.1         | 38.9                   | 54(note3)      | -15.1       | PK       |
| 11 | H       | 4927.0          | 46.4                   | -6.2        | 40.2                   | 54(note3)      | -13.8       | PK       |
|    | V       | 4927.0          | 51.9                   | -6.1        | 45.8                   | 54(note3)      | -8.2        | PK       |
|    | H       | 7383.5          | 44.9                   | -1.1        | 43.8                   | 54(note3)      | -10.2       | PK       |
|    | V       | 7383.5          | 48.5                   | -1.1        | 47.4                   | 54(note3)      | -6.6        | PK       |
|    | H       | 9848.0          | 35.2                   | 5.2         | 40.4                   | 54(note3)      | -13.6       | PK       |
|    | V       | 9848.0          | 33.8                   | 5.3         | 39.1                   | 54(note3)      | -14.9       | PK       |

Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

## Mode2: Transmit at 802.11g

| CH | Antenna | Frequency<br>(MHz) | Reading<br>Level<br>(dBuV/m) | Factor<br>(dB) | Measure<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Detector |
|----|---------|--------------------|------------------------------|----------------|------------------------------|-------------------|----------------|----------|
| 1  | H       | 4824.0             | 43.9                         | -6.2           | 37.7                         | 54(note3)         | -16.3          | PK       |
|    | V       | 4824.0             | 47.2                         | -6.2           | 41.0                         | 54(note3)         | -13.0          | PK       |
|    | H       | 7236.0             | 39.5                         | -1.6           | 37.9                         | 54(note3)         | -16.1          | PK       |
|    | V       | 7236.0             | 40.4                         | -1.6           | 38.8                         | 54(note3)         | -15.2          | PK       |
|    | H       | 9648.0             | 33.4                         | 4.9            | 38.3                         | 54(note3)         | -15.7          | PK       |
|    | V       | 9648.0             | 33.9                         | 4.9            | 38.8                         | 54(note3)         | -15.2          | PK       |
| 6  | H       | 4874.0             | 44.0                         | -6.2           | 37.8                         | 54(note3)         | -16.2          | PK       |
|    | V       | 4874.0             | 45.7                         | -6.2           | 39.5                         | 54(note3)         | -14.5          | PK       |
|    | H       | 7311.0             | 41.5                         | -1.4           | 40.1                         | 54(note3)         | -13.9          | PK       |
|    | V       | 7315.5             | 44.4                         | -1.4           | 43.0                         | 54(note3)         | -11.0          | PK       |
|    | H       | 9748.0             | 34.1                         | 5.0            | 39.1                         | 54(note3)         | -14.9          | PK       |
|    | V       | 9748.0             | 34.1                         | 5.1            | 39.2                         | 54(note3)         | -14.8          | PK       |
| 11 | H       | 4924.0             | 42.6                         | -6.2           | 36.4                         | 54(note3)         | -17.6          | PK       |
|    | V       | 4924.0             | 43.6                         | -6.1           | 37.5                         | 54(note3)         | -16.5          | PK       |
|    | H       | 7386.0             | 39.8                         | -1.0           | 38.8                         | 54(note3)         | -15.2          | PK       |
|    | V       | 7386.0             | 40.7                         | -1.0           | 39.7                         | 54(note3)         | -14.3          | PK       |
|    | H       | 9848.0             | 35.8                         | 5.2            | 41.0                         | 54(note3)         | -13.0          | PK       |
|    | V       | 9848.0             | 34.0                         | 5.3            | 39.3                         | 54(note3)         | -14.7          | PK       |

Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

## Mode3: Transmit at 802.11n (20MHz)

| CH | Antenna | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|------------------------|-------------|------------------------|----------------|-------------|----------|
| 1  | H       | 4824.0          | 46.2                   | -6.2        | 40.0                   | 54(note3)      | -14.0       | PK       |
|    | V       | 4824.0          | 45.6                   | -6.2        | 39.4                   | 54(note3)      | -14.6       | PK       |
|    | H       | 7236.0          | 41.6                   | -1.6        | 40.0                   | 54(note3)      | -14.0       | PK       |
|    | V       | 7236.0          | 40.1                   | -1.6        | 38.5                   | 54(note3)      | -15.5       | PK       |
|    | H       | 9648.0          | 34.4                   | 4.9         | 39.3                   | 54(note3)      | -14.7       | PK       |
|    | V       | 9648.0          | 34.5                   | 4.9         | 39.4                   | 54(note3)      | -14.6       | PK       |
| 6  | H       | 4874.0          | 46.2                   | -6.2        | 40.0                   | 54(note3)      | -14.0       | PK       |
|    | V       | 4874.0          | 47.0                   | -6.2        | 40.8                   | 54(note3)      | -13.2       | PK       |
|    | H       | 7311.0          | 44.8                   | -1.4        | 43.4                   | 54(note3)      | -10.6       | PK       |
|    | V       | 7307.0          | 49.5                   | -1.4        | 48.1                   | 54(note3)      | -5.9        | PK       |
|    | H       | 9748.0          | 35.7                   | 5.0         | 40.7                   | 54(note3)      | -13.3       | PK       |
|    | V       | 9748.0          | 35.8                   | 5.1         | 40.9                   | 54(note3)      | -13.1       | PK       |
| 11 | H       | 4924.0          | 44.4                   | -6.2        | 38.2                   | 54(note3)      | -15.8       | PK       |
|    | V       | 4924.0          | 45.0                   | -6.1        | 38.9                   | 54(note3)      | -15.1       | PK       |
|    | H       | 7386.0          | 41.0                   | -1.0        | 40.0                   | 54(note3)      | -14.0       | PK       |
|    | V       | 7386.0          | 41.7                   | -1.0        | 40.7                   | 54(note3)      | -13.3       | PK       |
|    | H       | 9848.0          | 35.8                   | 5.2         | 41.0                   | 54(note3)      | -13.0       | PK       |
|    | V       | 9848.0          | 36.0                   | 5.3         | 41.3                   | 54(note3)      | -12.7       | PK       |

Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

## Mode4: Transmit at 802.11n (40MHz)

| CH | Antenna | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|----|---------|-----------------|------------------------|-------------|------------------------|----------------|-------------|----------|
| 3  | H       | 4844.0          | 44.6                   | -6.1        | 38.5                   | 54(note3)      | -15.5       | PK       |
|    | V       | 4844.0          | 47.5                   | -6.2        | 41.3                   | 54(note3)      | -12.7       | PK       |
|    | H       | 7266.0          | 40.8                   | -1.6        | 39.2                   | 54(note3)      | -14.8       | PK       |
|    | V       | 7266.0          | 40.8                   | -1.6        | 39.2                   | 54(note3)      | -14.8       | PK       |
|    | H       | 9688.0          | 35.5                   | 5.0         | 40.5                   | 54(note3)      | -13.5       | PK       |
|    | V       | 9688.0          | 35.4                   | 5.1         | 40.5                   | 54(note3)      | -13.5       | PK       |
| 6  | H       | 4874.0          | 45.6                   | -6.2        | 39.4                   | 54(note3)      | -14.6       | PK       |
|    | V       | 4874.0          | 45.7                   | -6.2        | 39.5                   | 54(note3)      | -14.5       | PK       |
|    | H       | 7311.0          | 42.3                   | -1.4        | 40.9                   | 54(note3)      | -13.1       | PK       |
|    | V       | 7311.0          | 43.1                   | -1.4        | 41.7                   | 54(note3)      | -12.3       | PK       |
|    | H       | 9748.0          | 35.7                   | 5.0         | 40.7                   | 54(note3)      | -13.3       | PK       |
|    | V       | 9748.0          | 35.3                   | 5.1         | 40.4                   | 54(note3)      | -13.6       | PK       |
| 9  | H       | 4904.0          | 44.1                   | -6.2        | 37.9                   | 54(note3)      | -16.1       | PK       |
|    | V       | 4904.0          | 44.2                   | -6.2        | 38.0                   | 54(note3)      | -16.0       | PK       |
|    | H       | 7356.0          | 42.6                   | -1.2        | 41.4                   | 54(note3)      | -12.6       | PK       |
|    | V       | 7356.0          | 42.0                   | -1.2        | 40.8                   | 54(note3)      | -13.2       | PK       |
|    | H       | 9818.0          | 36.5                   | 5.1         | 41.6                   | 54(note3)      | -12.4       | PK       |
|    | V       | 9818.0          | 36.1                   | 5.1         | 41.2                   | 54(note3)      | -12.8       | PK       |

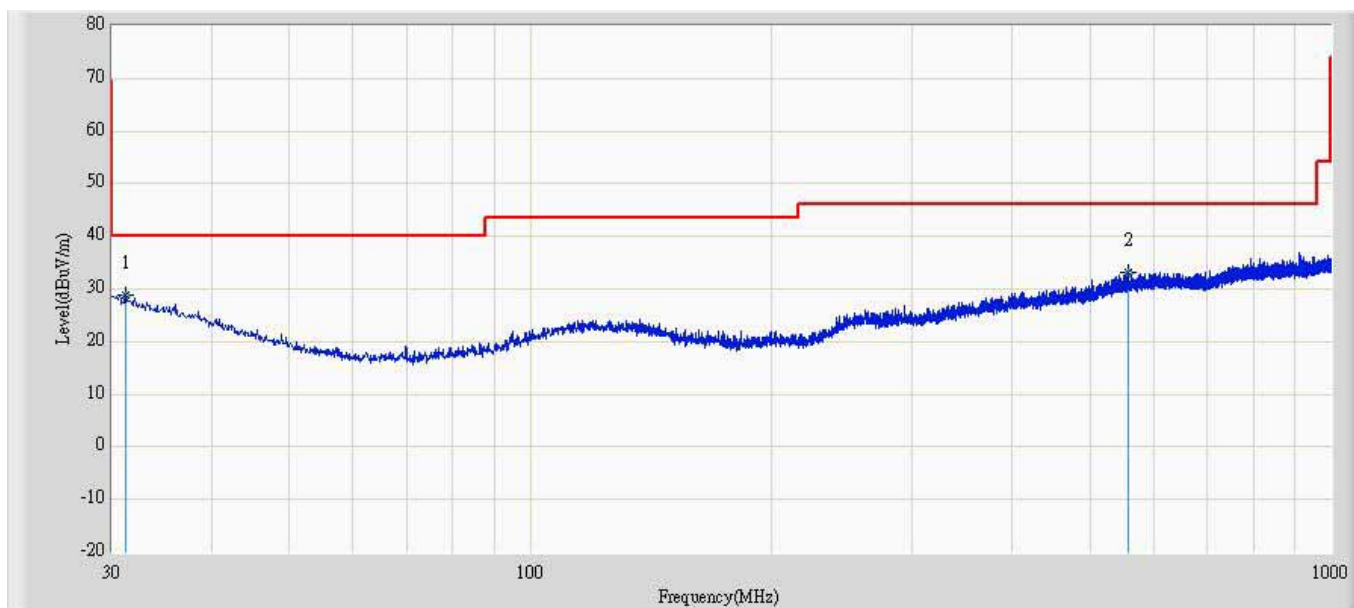
Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

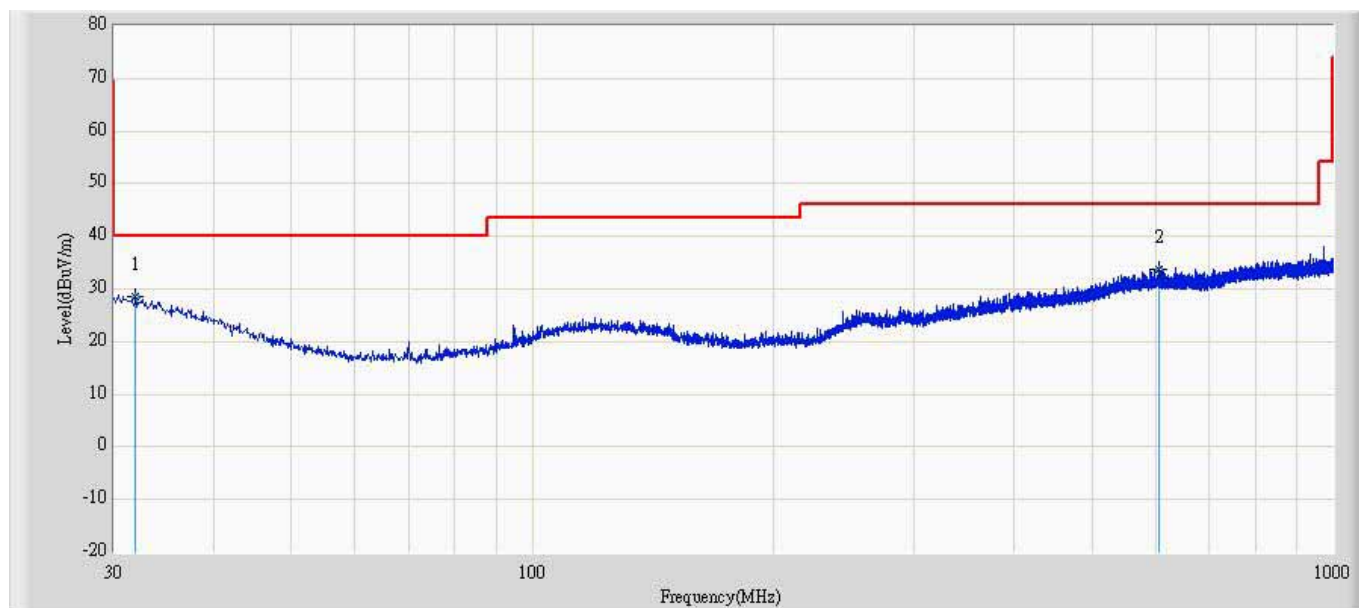
## The worst case of Radiated Emission below 1GHz:

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC2                                           | Time: 2013/09/24 - 14:28 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe: CBL6112D_27613(30-1000MHz)                   | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2437MHz by 802.11b |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|--------|------|
| 1  | *    | 31.212          | 28.971                 | 5.443                | -11.029         | 40.000         | 23.527 | QP   |
| 2  |      | 558.165         | 33.069                 | 5.614                | -12.931         | 46.000         | 27.455 | QP   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC2                                           | Time: 2013/09/24 - 14:50 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe: CBL6112D_27613(30-1000MHz)                   | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2437MHz by 802.11b |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|--------|------|
| 1  | *    | 31.940          | 28.574                 | 5.364                | -11.426         | 40.000         | 23.210 | QP   |
| 2  |      | 606.544         | 33.618                 | 5.910                | -12.382         | 46.000         | 27.709 | QP   |

## 5. RF Antenna Conducted Spurious

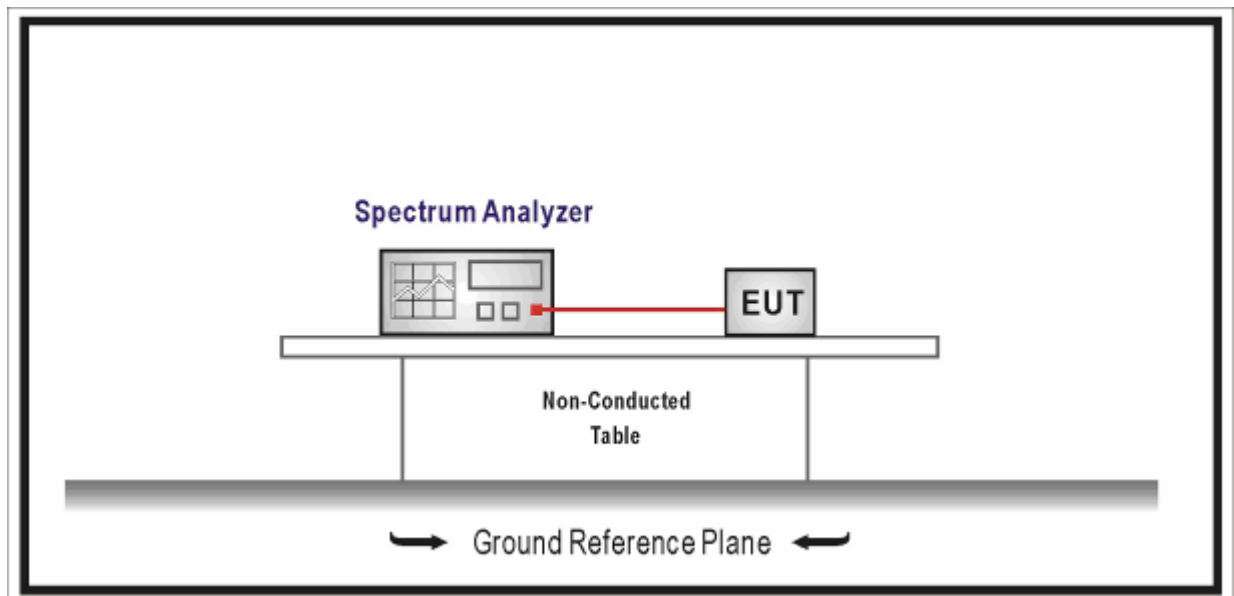
### 5.1. Test Equipment

RF Antenna Conducted Spurious / TR-8

| Instrument                 | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|----------------------------|--------------|----------|------------|---------------|
| Spectrum Analyzer          | Agilent      | N9020A   | MY49100159 | 2014.03.30    |
| Temperature/Humidity Meter | zhicheng     | ZC1-2    | TR8-TH     | 2014.05.08    |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 5.2. Test Setup



### 5.3. Limit

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

#### **5.4. Test Procedure**

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW >3\* RBW, scan up through 10th harmonic.

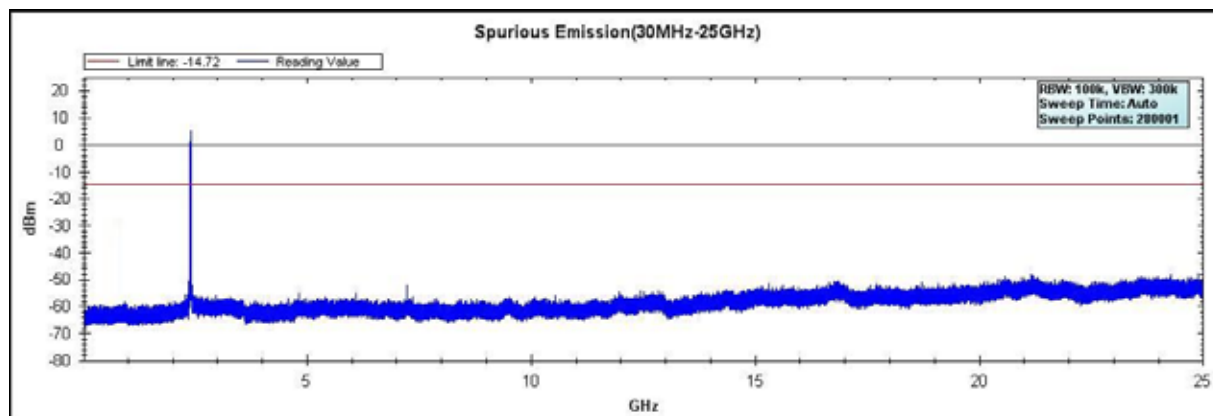
#### **5.5. Uncertainty**

The measurement uncertainty is defined as  $\pm 1.27$  dB

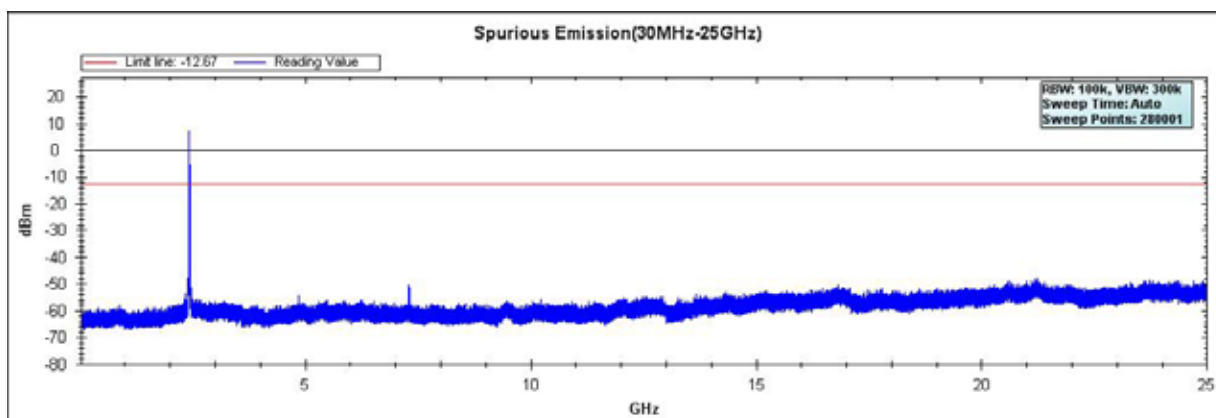
## 5.6. Test Result

|           |   |                               |
|-----------|---|-------------------------------|
| Product   | : | Q TV Engine                   |
| Test Item | : | RF Antenna Conducted Spurious |
| Test Site | : | TR-8                          |
| Test Mode | : | Mode 1: Transmit by 802.11b   |

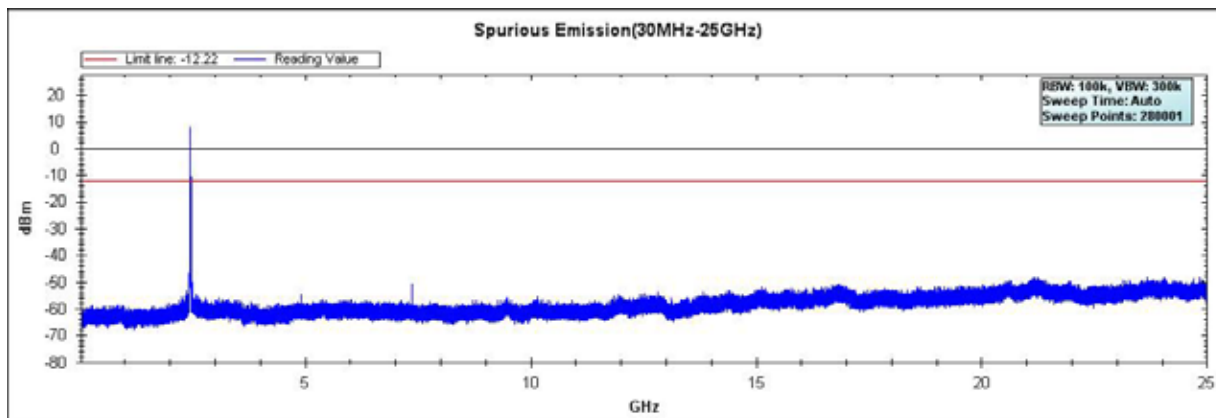
Channel 01 (2412MHz)



Channel 06 (2437MHz)

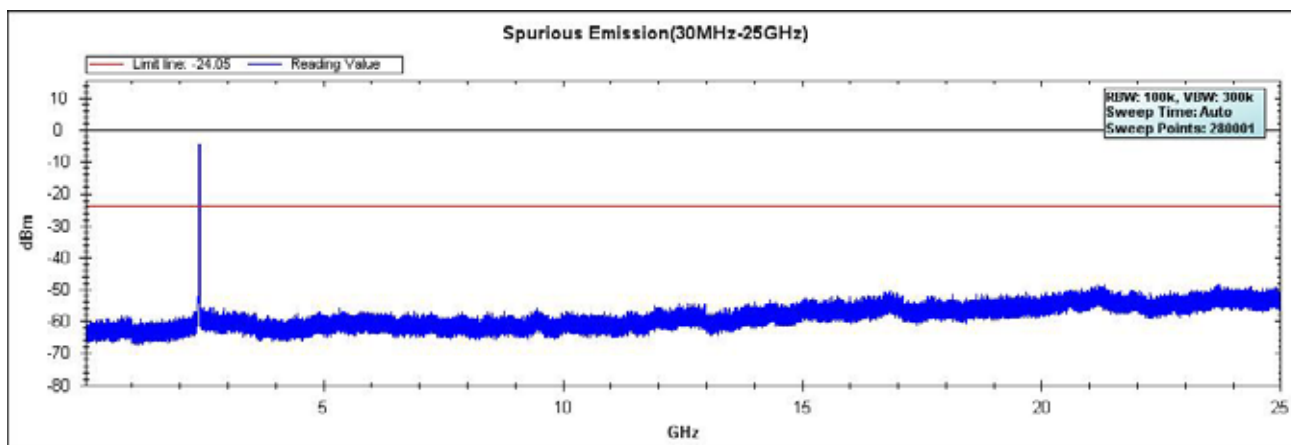


Channel 11 (2462MHz)

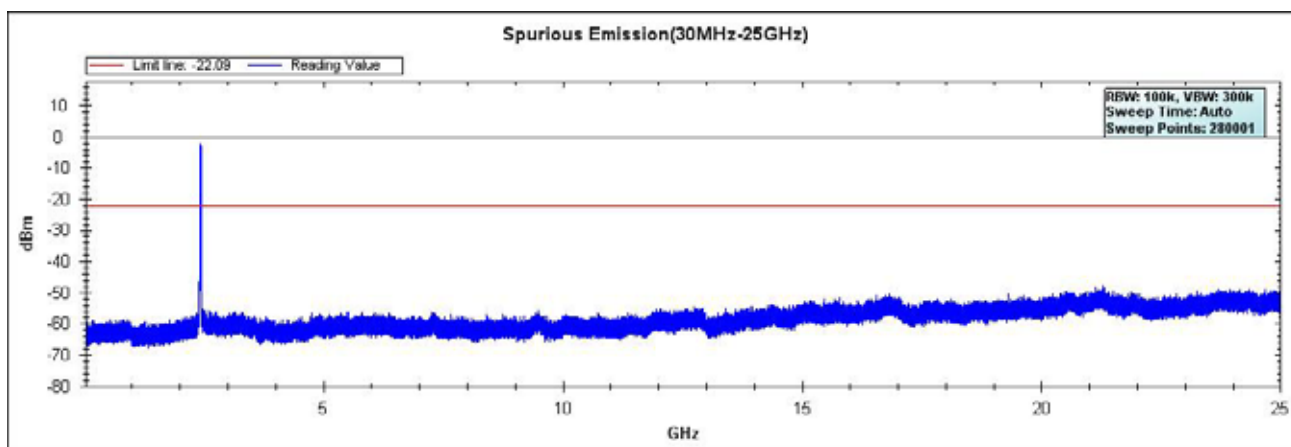


|           |   |                               |
|-----------|---|-------------------------------|
| Product   | : | Q TV Engine                   |
| Test Item | : | RF Antenna Conducted Spurious |
| Test Site | : | TR-8                          |
| Test Mode | : | Mode 2: Transmit by 802.11g   |

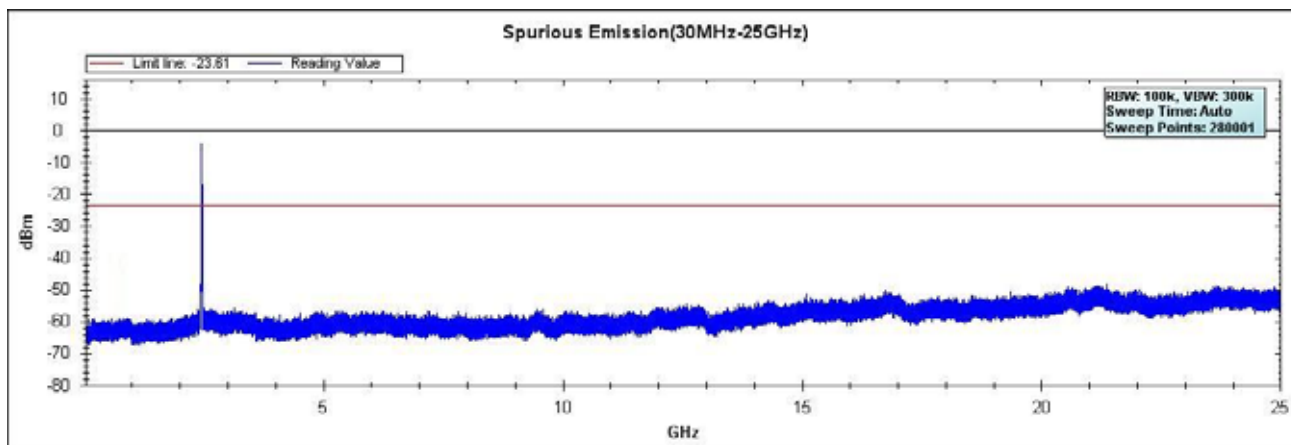
## Channel 01 (2412MHz)



## Channel 06 (2437MHz)

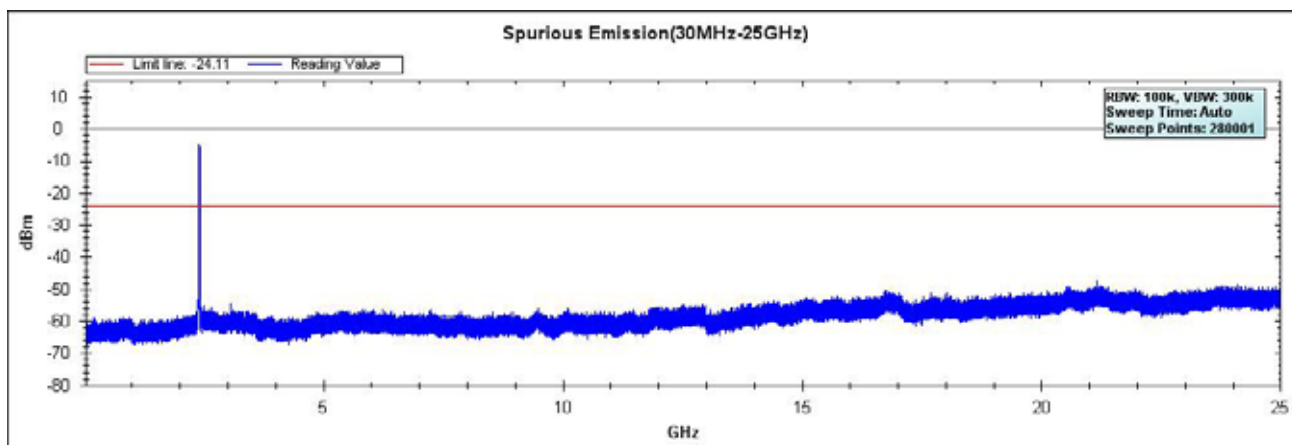


## Channel 11 (2462MHz)

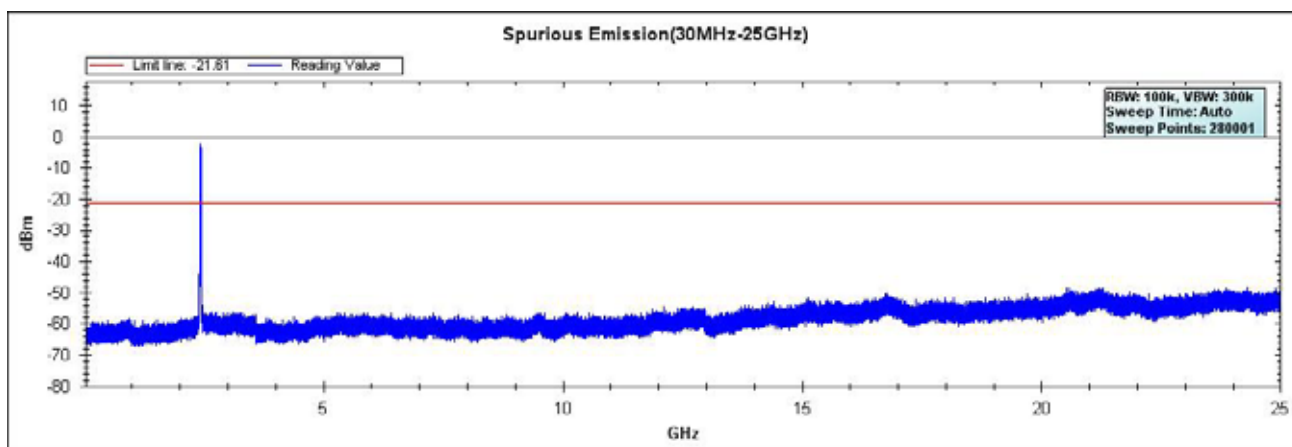


|           |   |                                     |
|-----------|---|-------------------------------------|
| Product   | : | Q TV Engine                         |
| Test Item | : | RF Antenna Conducted Spurious       |
| Test Site | : | TR-8                                |
| Test Mode | : | Mode 3: Transmit by 802.11n (20MHz) |

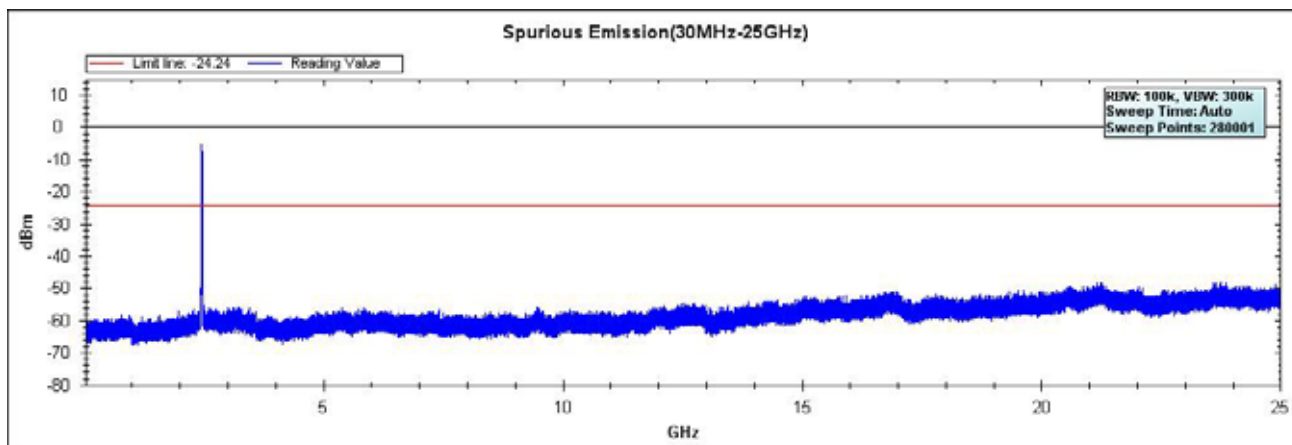
## Channel 01 (2412MHz)



## Channel 06 (2437MHz)

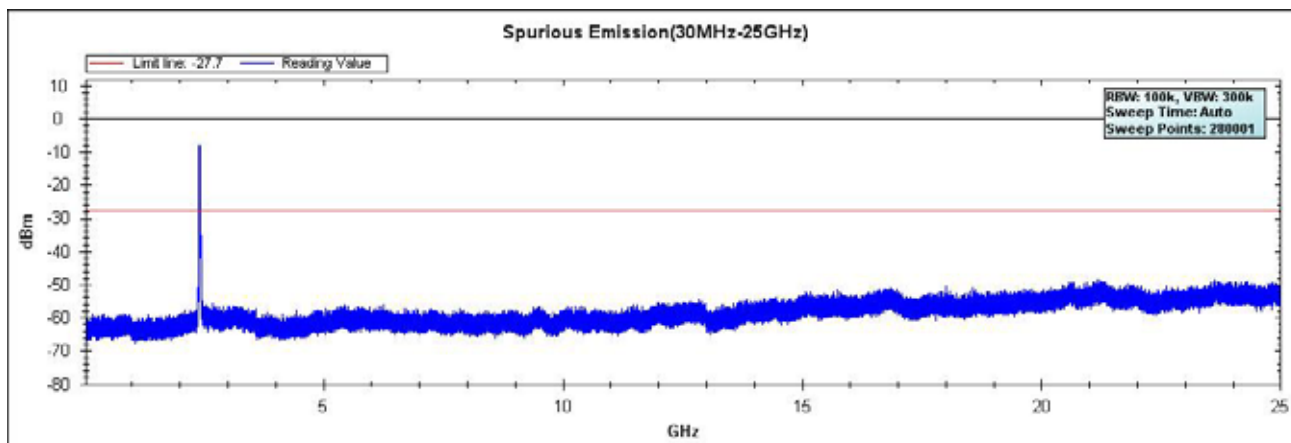


## Channel 11 (2462MHz)

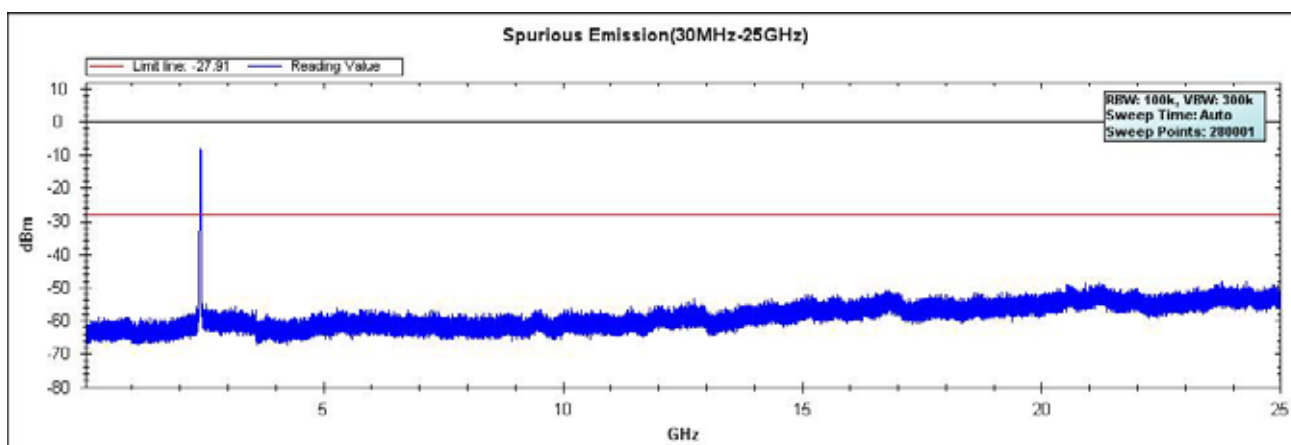


|           |   |                                     |
|-----------|---|-------------------------------------|
| Product   | : | Q TV Engine                         |
| Test Item | : | RF Antenna Conducted Spurious       |
| Test Site | : | TR-8                                |
| Test Mode | : | Mode 4: Transmit by 802.11n (40MHz) |

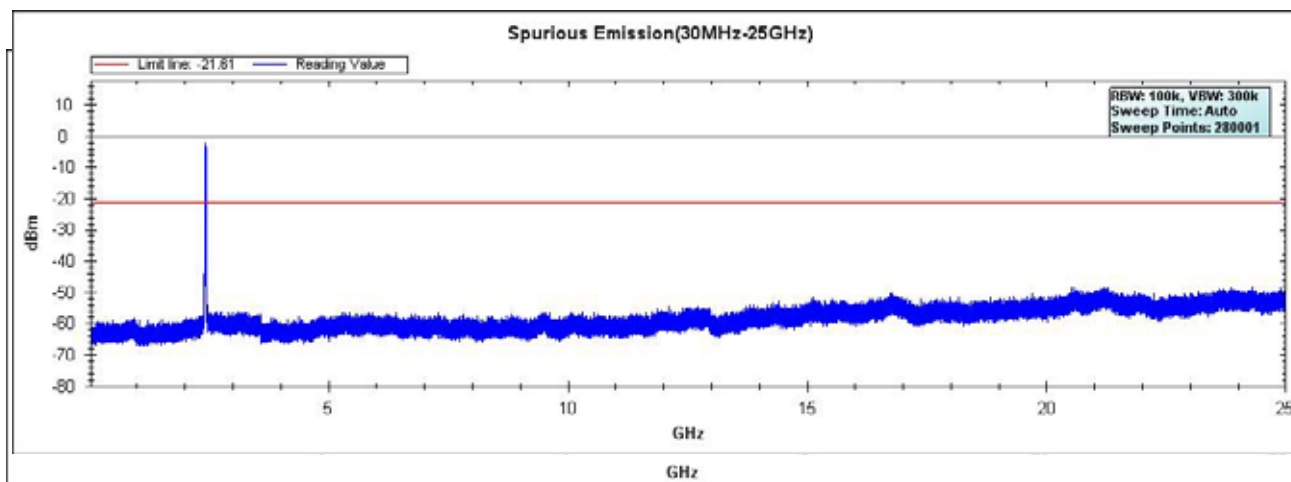
### Channel 03 (2422MHz)



### Channel 06 (2437MHz)



### Channel 09 (2452MHz)



## 6. Radiated Emission Band Edge

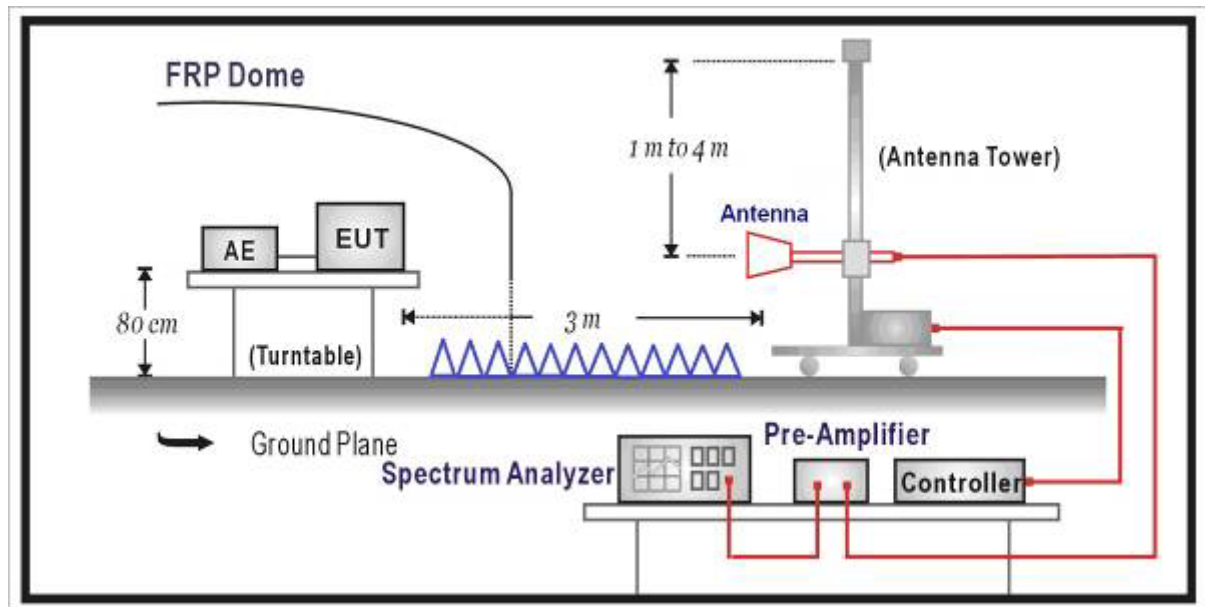
### 6.1. Test Equipment

☒ Radiated Emission Band Edge / AC-5

| Instrument                 | Manufacturer | Type No.   | Serial No.  | Cali. Due Date |
|----------------------------|--------------|------------|-------------|----------------|
| Spectrum Analyzer          | Agilent      | N9010A     | MY48030494  | 2014.01.21     |
| EMI Test Receiver          | R&S          | ESCI       | 100573      | 2014.01.21     |
| Preamplifier               | Miteq        | NSP1800-25 | 1364185     | 2014.05.03     |
| Preamplifier               | Quietek      | AP-040G    | CHM-0906001 | 2014.05.03     |
| Bilog Type Antenna         | Schaffner    | CBL6112B   | 2932        | 2013.10.15     |
| Broad-Band Horn Antenna    | Schwarzbeck  | BBHA9120D  | 499         | 2014.06.08     |
| 50ohm Coaxial Switch       | Anritsu      | MP59B      | 6200464462  | 2014.03.01     |
| Temperature/Humidity Meter | zhicheng     | ZC1-2      | AC5-TH      | 2014.01.10     |

Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 6.2. Test Setup



## 6.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 6.4. Test Procedure

The EUT was setup according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 on radiated measurement.

## 6.5. Uncertainty

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB

## 6.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

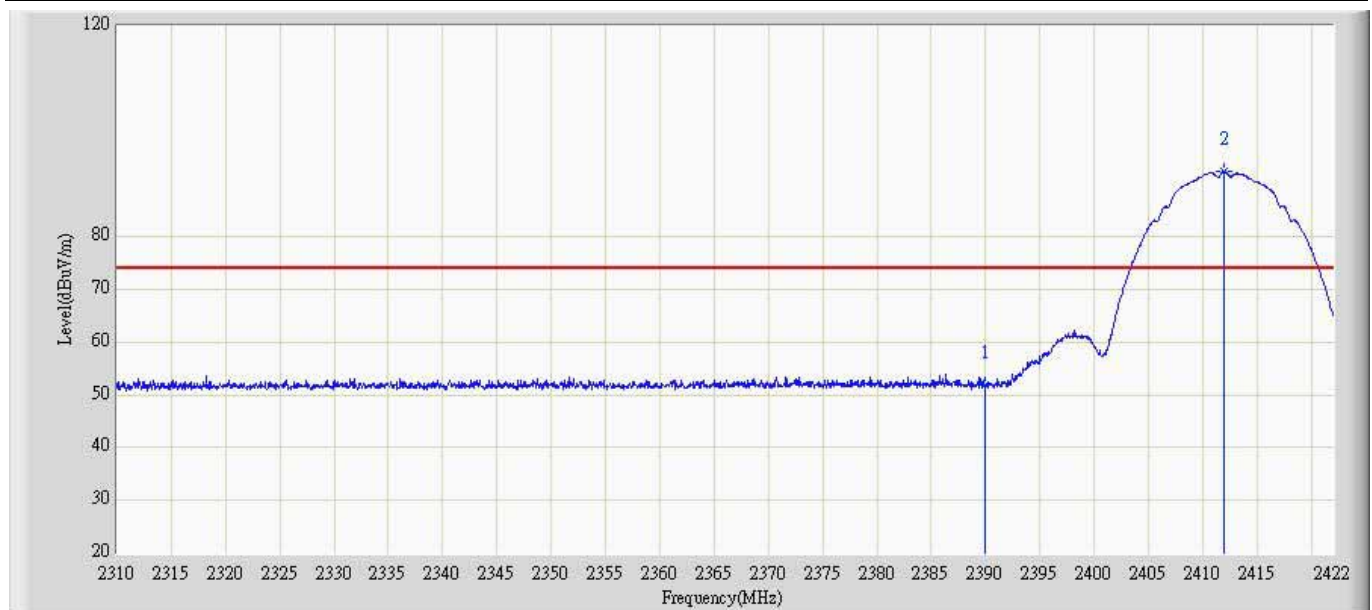
Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor - Preamplifier Gain

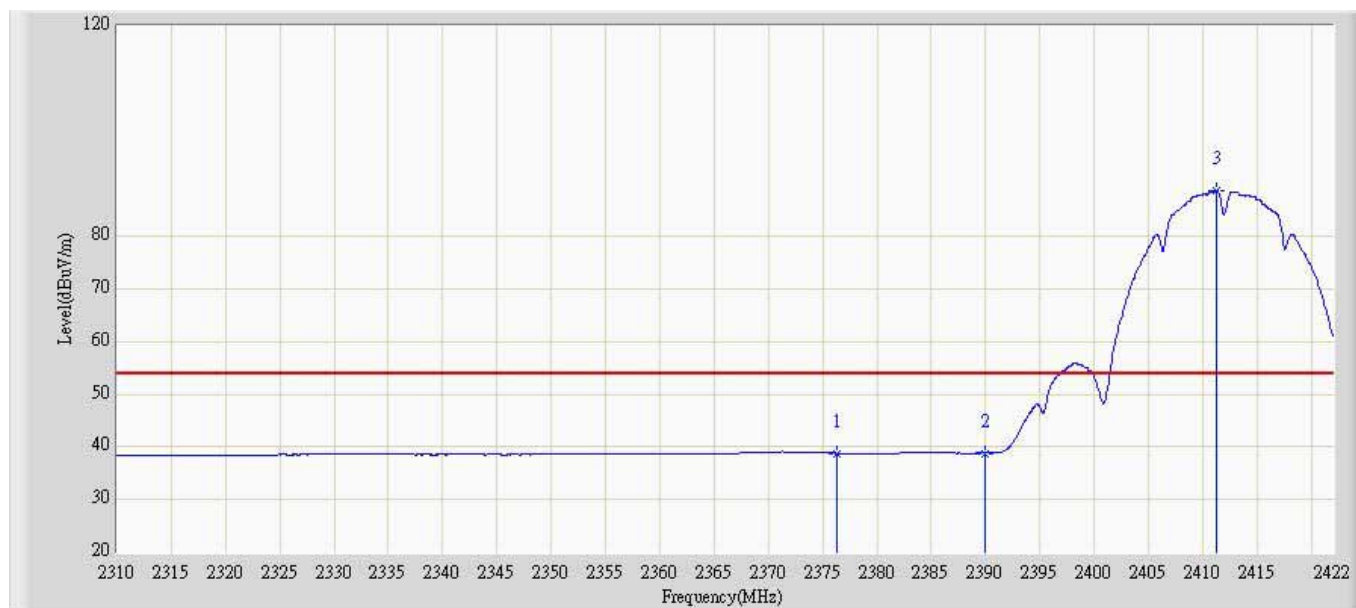
In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice will be followed.

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site:AC5                                            | Time: 2013/09/17 - 10:37 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2412MHz by 802.11b |                          |



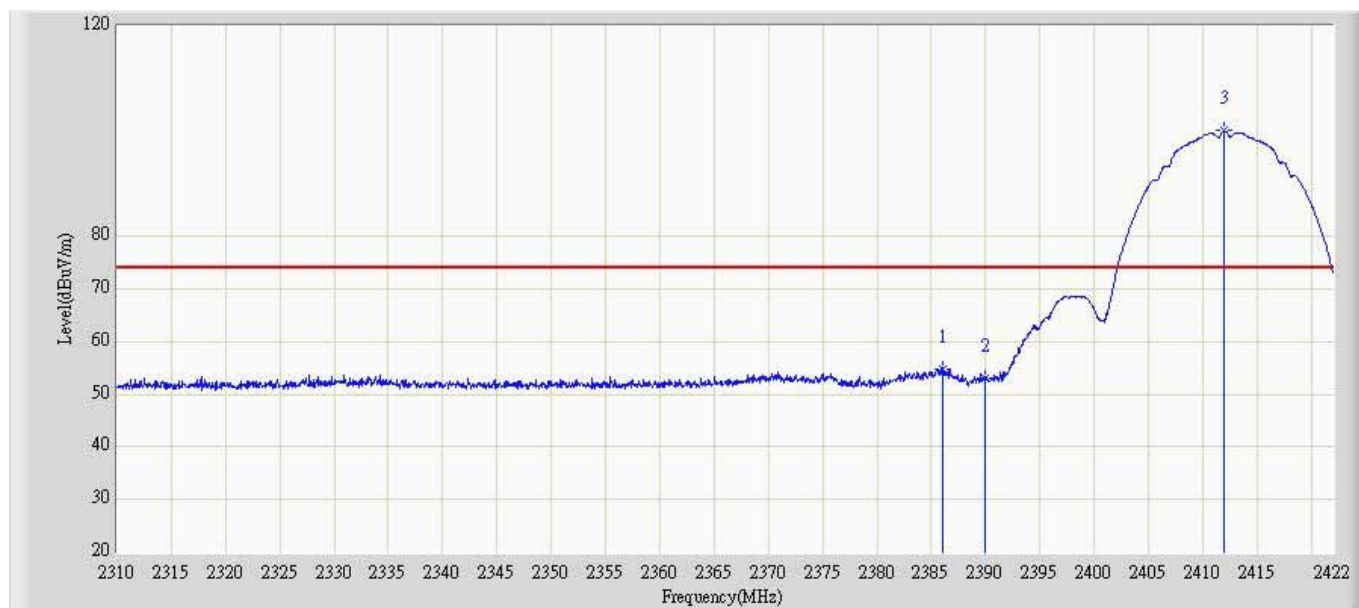
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 51.925                 | 24.243               | -22.075         | 74.000         | 27.682      | PK   |
| 2  | *    | 2411.976        | 92.524                 | 64.754               | N/A             | N/A            | 27.770      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site:AC5                                            | Time: 2013/09/17 - 11:25 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2412MHz by 802.11b |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2376.360        | 38.796                 | 11.165               | -15.204         | 54.000         | 27.631      | AV   |
| 2  |      | 2390.000        | 38.818                 | 11.136               | -15.182         | 54.000         | 27.682      | AV   |
| 3  | *    | 2411.248        | 88.790                 | 61.023               | N/A             | N/A            | 27.767      | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:27 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2412MHz by 802.11b |                          |



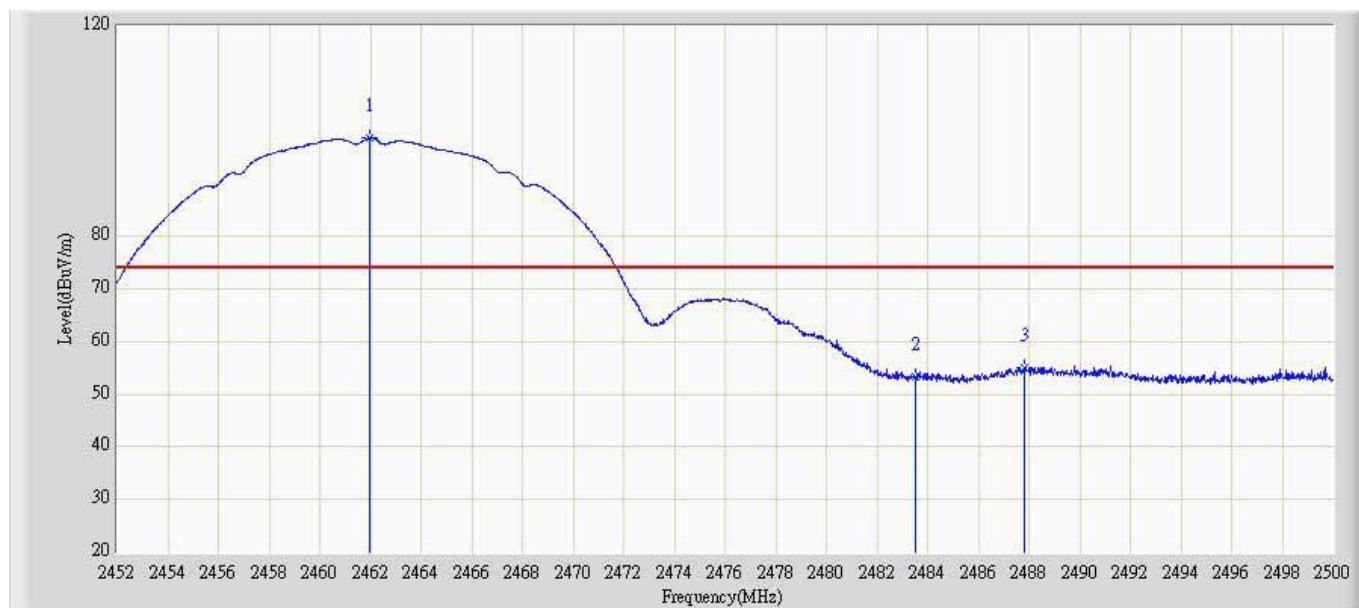
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2385.992        | 54.772                 | 27.105               | -19.228         | 74.000         | 27.667      | PK   |
| 2  |      | 2390.000        | 53.176                 | 25.494               | -20.824         | 74.000         | 27.682      | PK   |
| 3  | *    | 2411.976        | 100.030                | 72.260               | N/A             | N/A            | 27.770      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:35 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2412MHz by 802.11b |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2385.992        | 43.057                 | 15.390               | -10.943         | 54.000         | 27.667      | AV   |
| 2  |      | 2390.000        | 40.433                 | 12.751               | -13.567         | 54.000         | 27.682      | AV   |
| 3  | *    | 2411.416        | 95.967                 | 68.199               | N/A             | N/A            | 27.768      | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:36 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2462MHz by 802.11b |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2461.960        | 98.691                 | 70.715               | N/A             | N/A            | 27.976      | PK   |
| 2  |      | 2483.500        | 53.355                 | 25.298               | -20.645         | 74.000         | 28.057      | PK   |
| 3  |      | 2487.832        | 55.171                 | 27.097               | -18.829         | 74.000         | 28.074      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:40 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2462MHz by 802.11b |                          |



| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2461.144           | 95.087                    | 67.114                  | N/A                | N/A               | 27.973         | AV   |
| 2  |      | 2483.500           | 40.719                    | 12.662                  | -13.281            | 54.000            | 28.057         | AV   |
| 3  |      | 2487.952           | 43.670                    | 15.596                  | -10.330            | 54.000            | 28.074         | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:41 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2462MHz by 802.11b |                          |



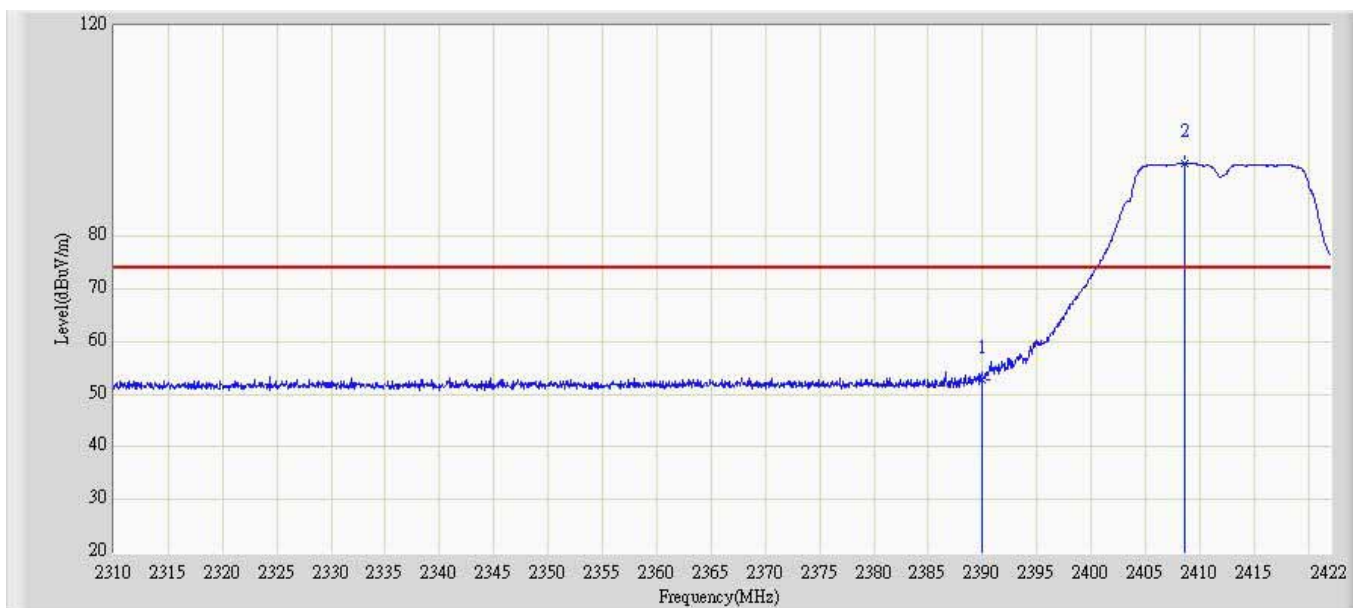
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2461.960        | 103.845                | 75.869               | N/A             | N/A            | 27.976      | PK   |
| 2  |      | 2483.500        | 55.193                 | 27.136               | -18.807         | 74.000         | 28.057      | PK   |
| 3  |      | 2487.976        | 57.844                 | 29.770               | -16.156         | 74.000         | 28.074      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:44 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode1: Transmit at channel 2462MHz by 802.11b |                          |



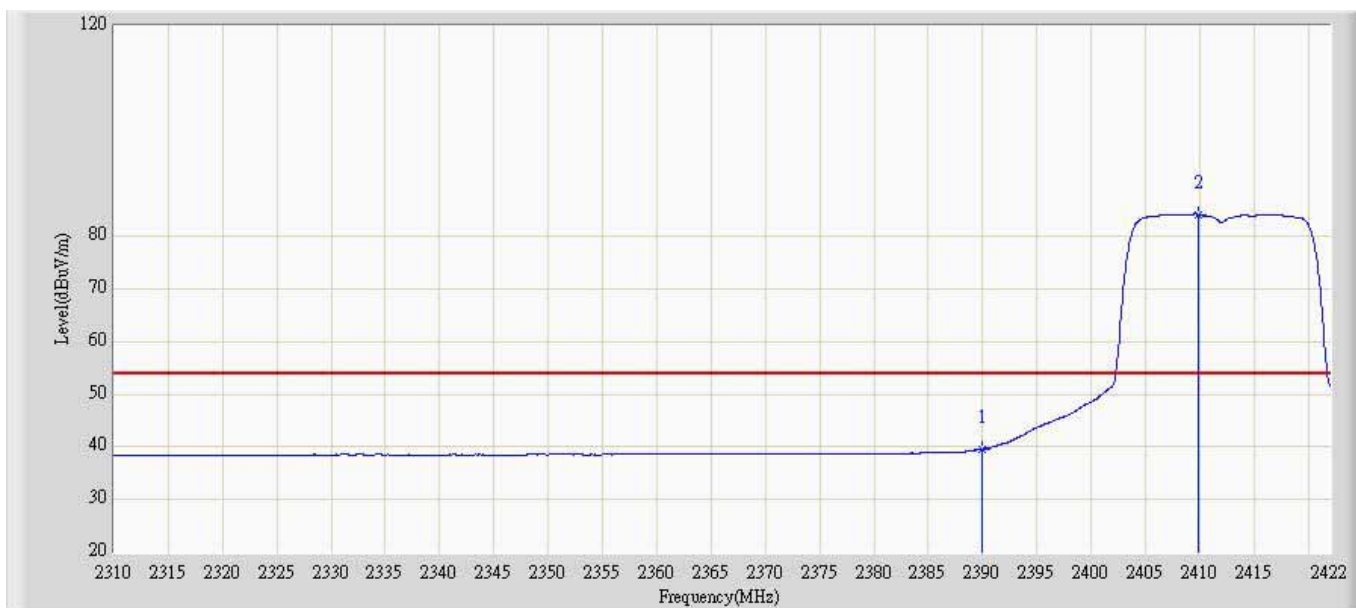
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2461.360           | 100.071                   | 72.098                  | N/A                | N/A               | 27.974         | AV   |
| 2  |      | 2483.500           | 44.011                    | 15.954                  | -9.989             | 54.000            | 28.057         | AV   |
| 3  |      | 2488.792           | 48.818                    | 20.741                  | -5.182             | 54.000            | 28.077         | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:46 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2412MHz by 802.11g |                          |



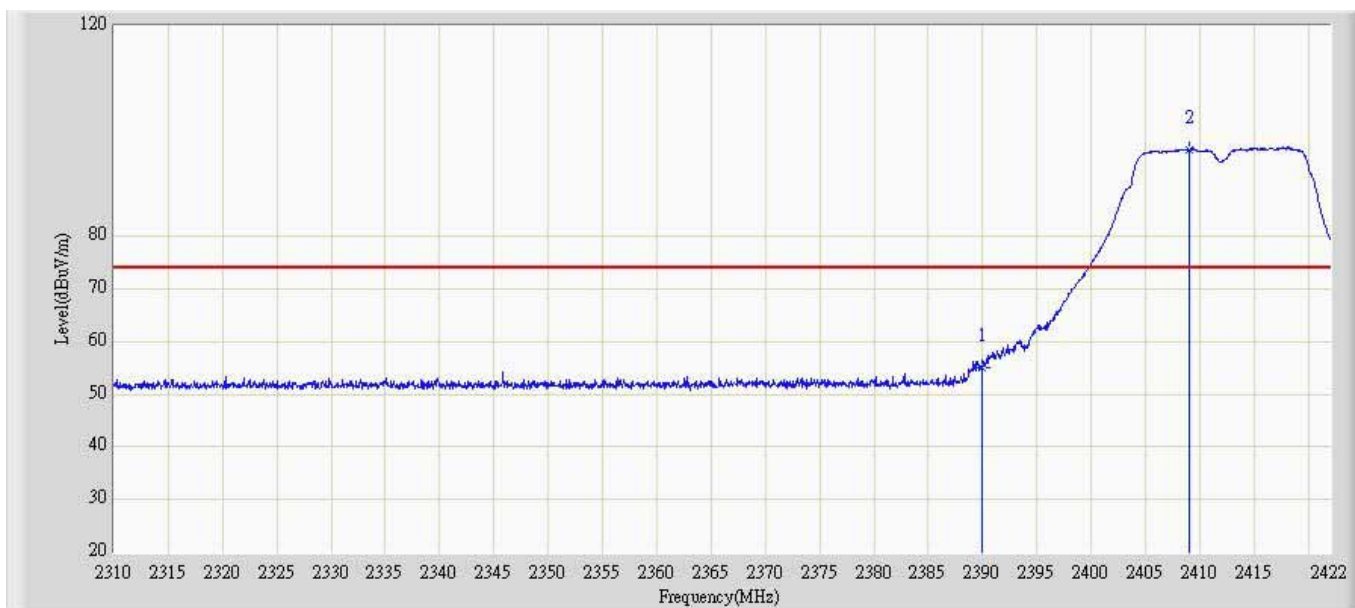
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  |      | 2390.000           | 52.722                    | 25.040                  | -21.278            | 74.000            | 27.682         | PK   |
| 2  | *    | 2408.616           | 93.798                    | 66.042                  | N/A                | N/A               | 27.756         | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:51 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2412MHz by 802.11g |                          |



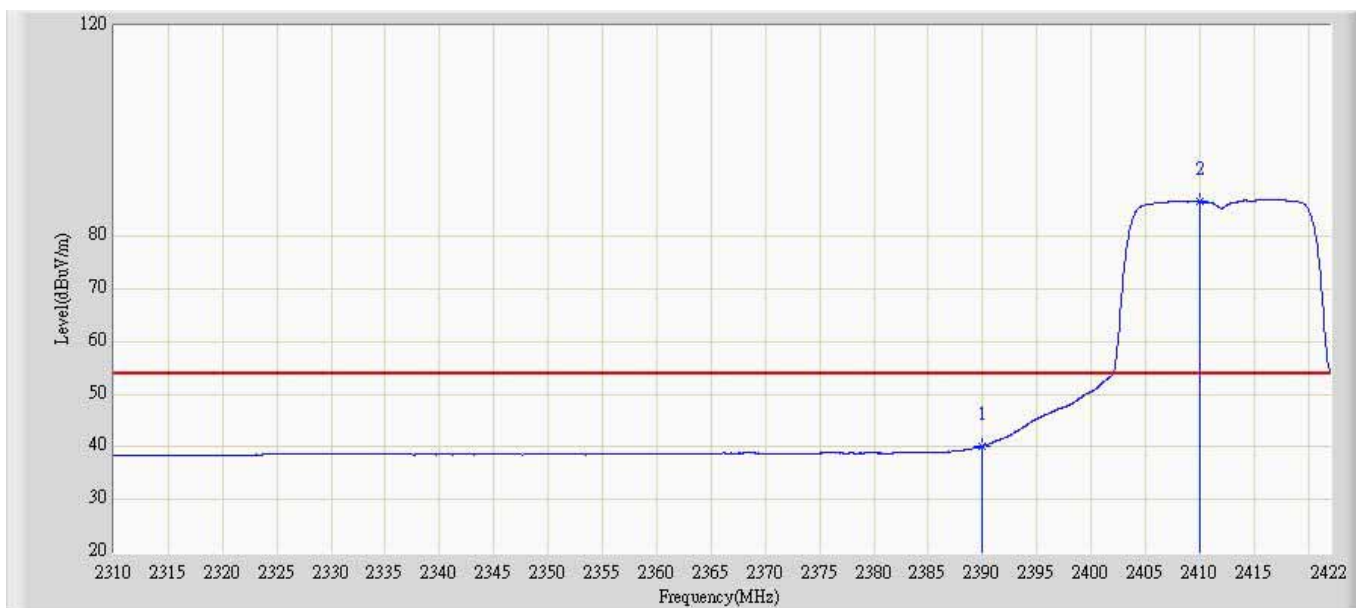
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 39.587                 | 11.905               | -14.413         | 54.000         | 27.682      | AV   |
| 2  | *    | 2409.848        | 84.169                 | 56.408               | N/A             | N/A            | 27.762      | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:52 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2412MHz by 802.11g |                          |



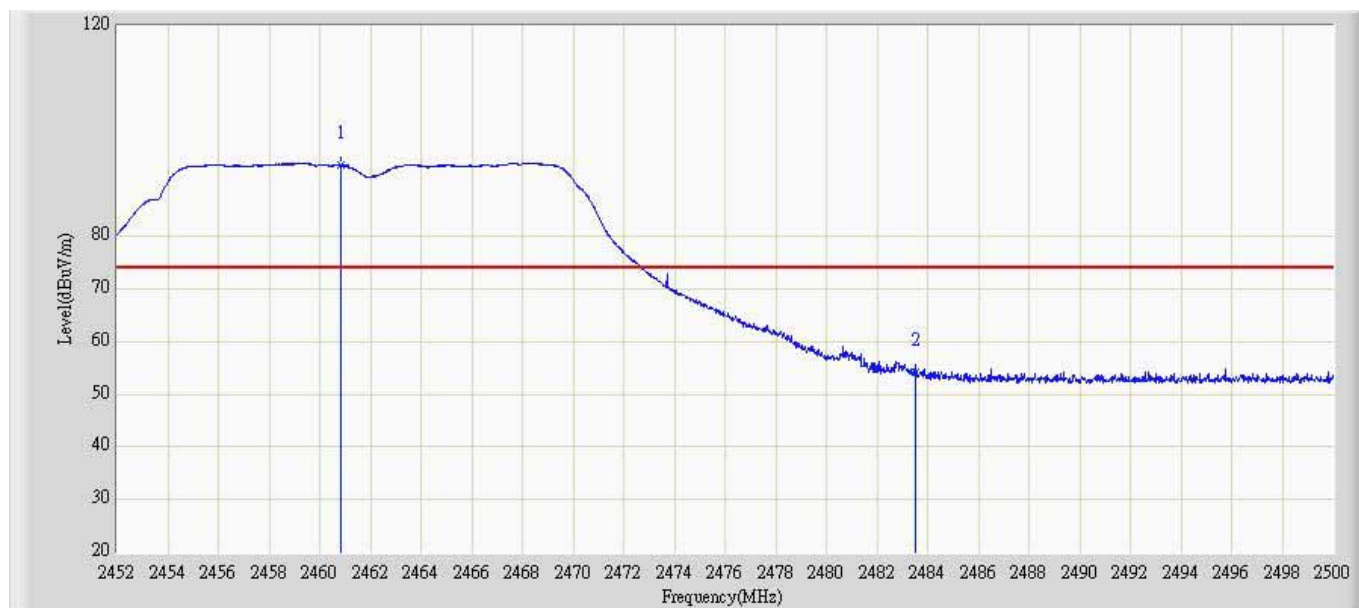
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 55.024                 | 27.342               | -18.976         | 74.000         | 27.682      | PK   |
| 2  | *    | 2409.064        | 96.554                 | 68.796               | N/A             | N/A            | 27.759      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 11:56 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2412MHz by 802.11g |                          |



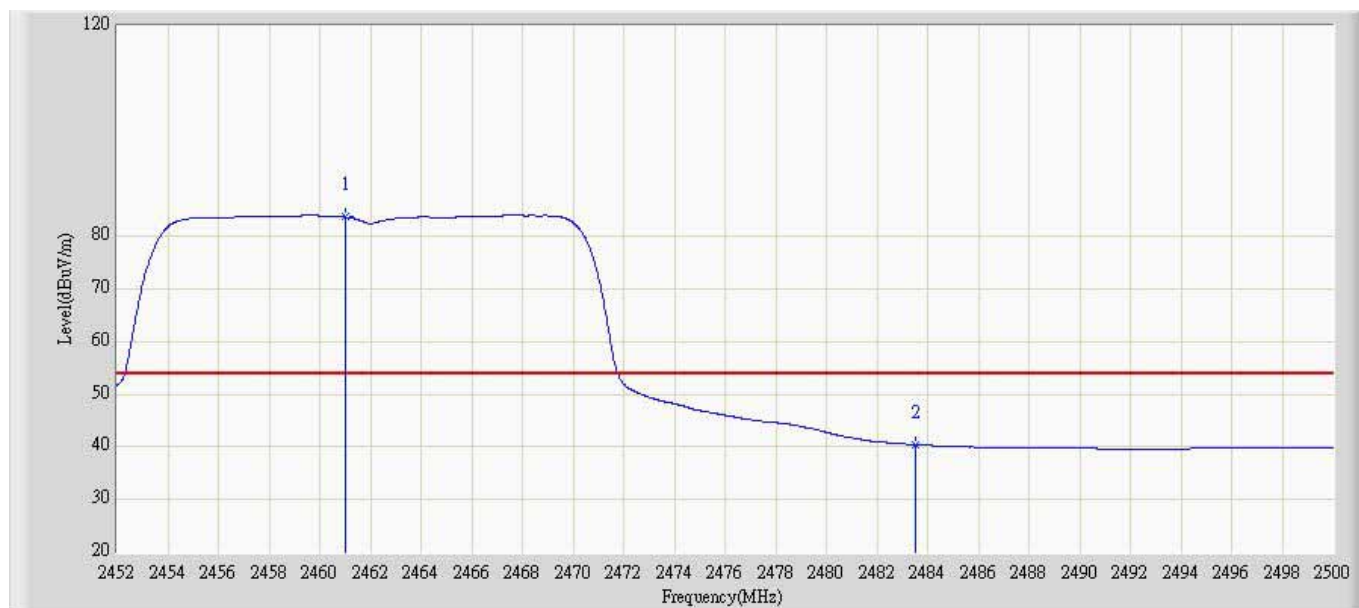
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  |      | 2390.000           | 40.159                    | 12.477                  | -13.841            | 54.000            | 27.682         | AV   |
| 2  | *    | 2410.016           | 86.636                    | 58.874                  | N/A                | N/A               | 27.762         | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 13:11 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2462MHz by 802.11g |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2460.832        | 93.530                 | 65.559               | N/A             | N/A            | 27.972      | PK   |
| 2  |      | 2483.500        | 54.091                 | 26.034               | -19.909         | 74.000         | 28.057      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 13:19 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Vertical       |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2462MHz by 802.11g |                          |



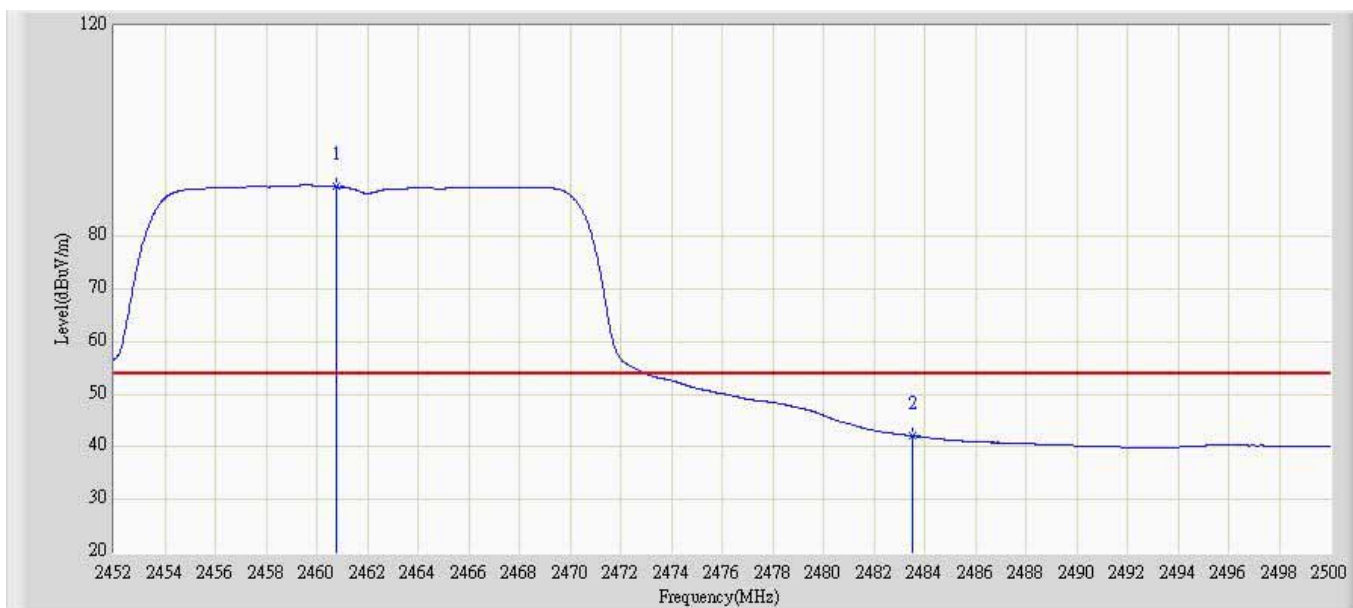
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2461.000           | 83.662                    | 55.690                  | N/A                | N/A               | 27.972         | AV   |
| 2  |      | 2483.500           | 40.419                    | 12.362                  | -13.581            | 54.000            | 28.057         | AV   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 13:19 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2462MHz by 802.11g |                          |



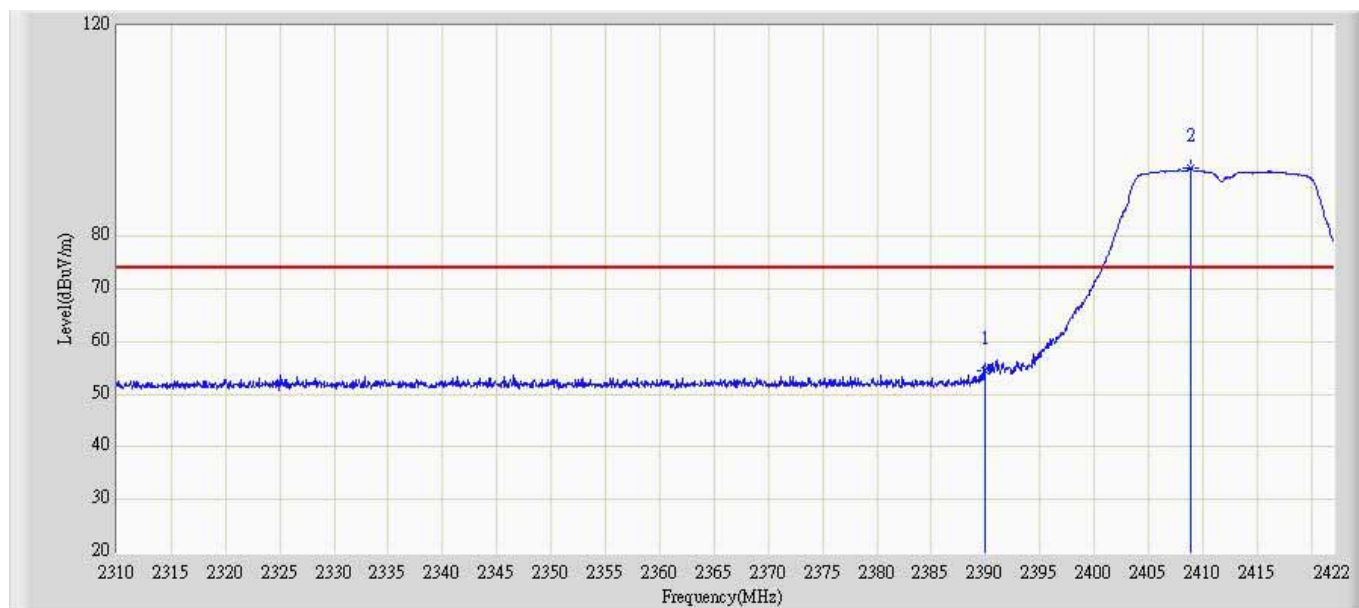
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2460.688        | 99.119                 | 71.148               | N/A             | N/A            | 27.971      | PK   |
| 2  |      | 2483.500        | 57.689                 | 29.632               | -16.311         | 74.000         | 28.057      | PK   |

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| Engineer: Toms                                      |                          |
| Site: AC5                                           | Time: 2013/09/17 - 13:22 |
| Limit: FCC_Part15.209_RE(3m)                        | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                        | Polarity: Horizontal     |
| EUT: Q TV Engine                                    | Power: AC 120V/60Hz      |
| Note: Mode2: Transmit at channel 2462MHz by 802.11g |                          |



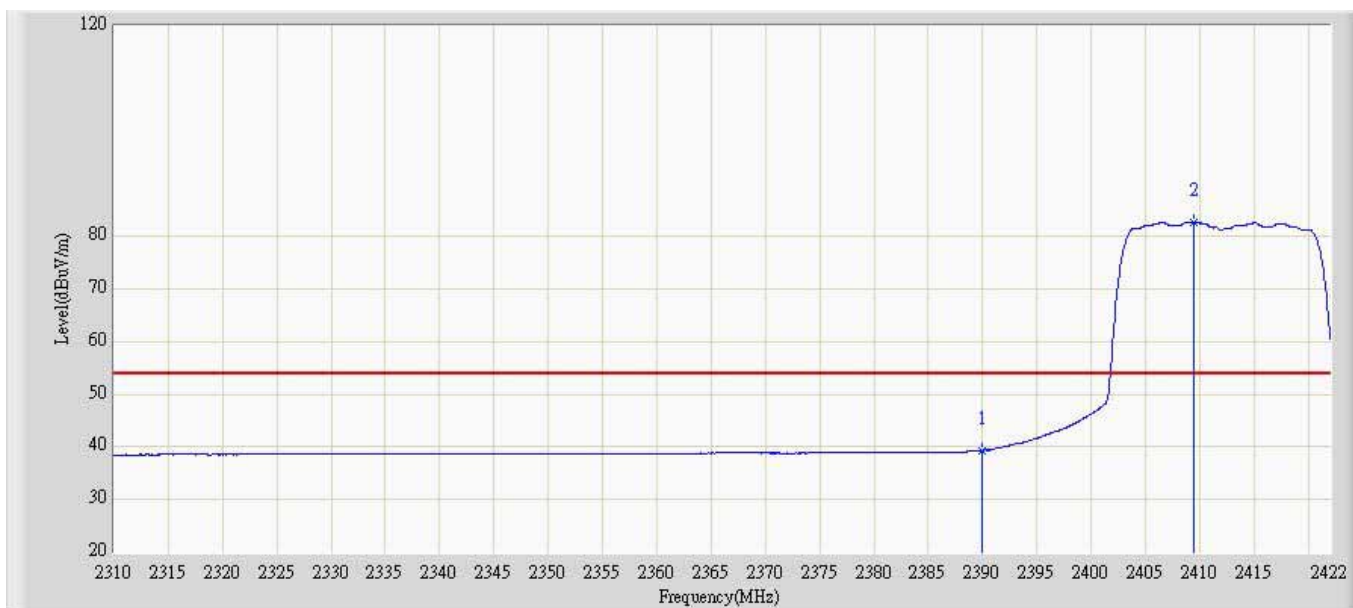
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2460.760        | 89.411                 | 61.440               | N/A             | N/A            | 27.971      | AV   |
| 2  |      | 2483.500        | 42.145                 | 14.088               | -11.855         | 54.000         | 28.057      | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:23 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2412MHz by 802.11n20 |                          |



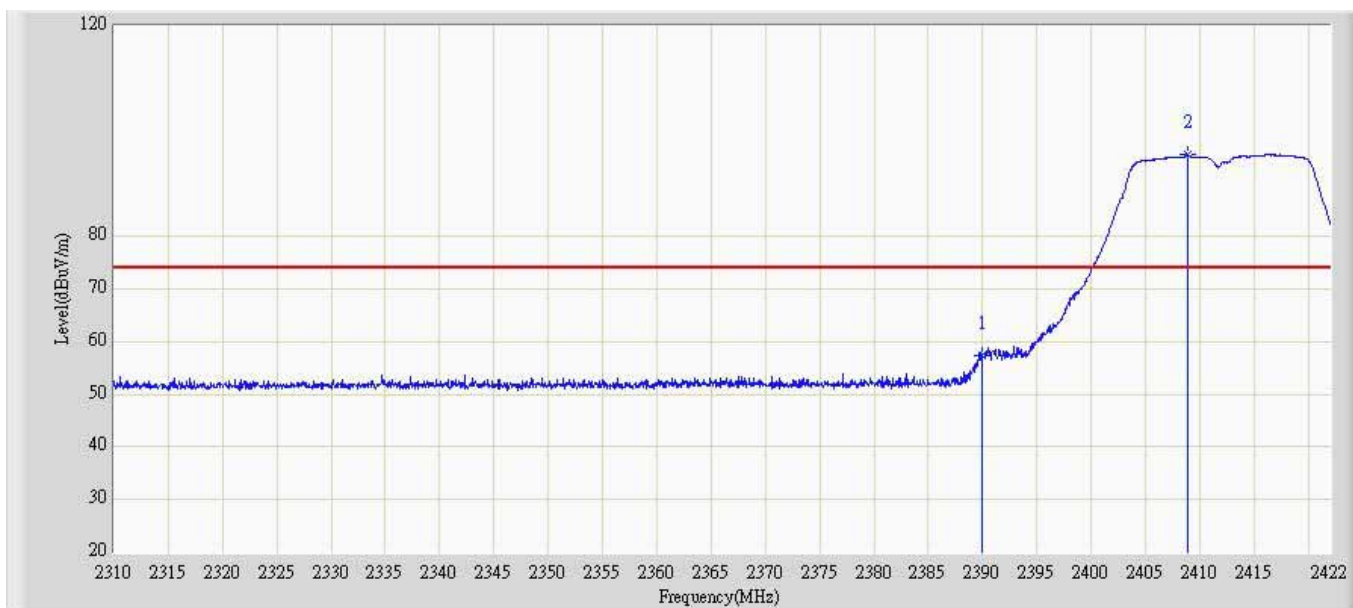
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 54.552                 | 26.870               | -19.448         | 74.000         | 27.682      | PK   |
| 2  | *    | 2408.952        | 92.962                 | 65.204               | N/A             | N/A            | 27.758      | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:27 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2412MHz by 802.11n20 |                          |



| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  |      | 2390.000           | 39.367                    | 11.685                  | -14.633            | 54.000            | 27.682         | AV   |
| 2  | *    | 2409.512           | 82.605                    | 54.845                  | N/A                | N/A               | 27.760         | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:29 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2412MHz by 802.11n20 |                          |



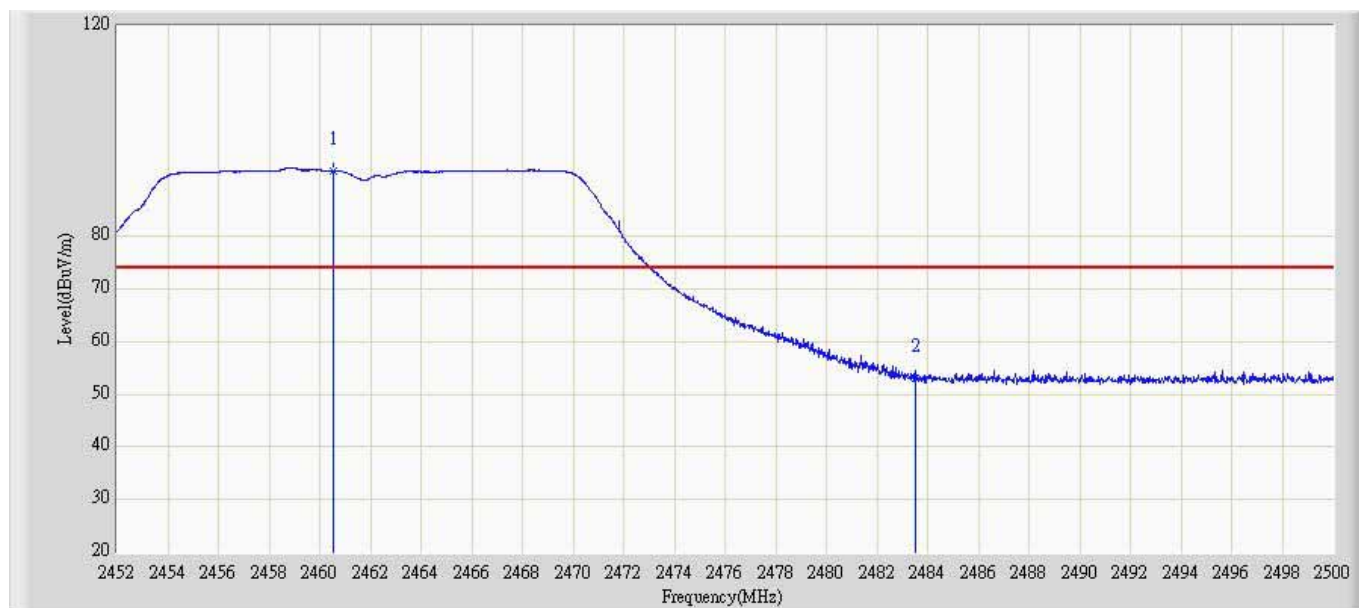
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 57.285                 | 29.603               | -16.715         | 74.000         | 27.682      | PK   |
| 2  | *    | 2408.952        | 95.542                 | 67.784               | N/A             | N/A            | 27.758      | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:31 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2412MHz by 802.11n20 |                          |



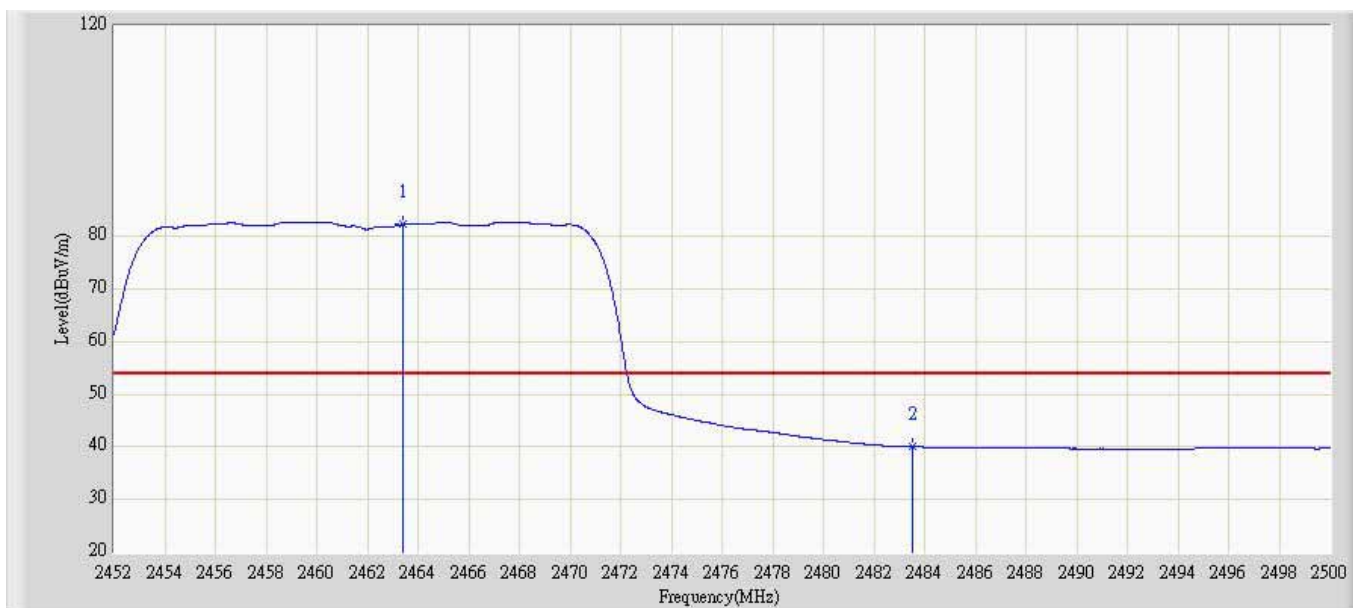
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 39.793                 | 12.111               | -14.207         | 54.000         | 27.682      | AV   |
| 2  | *    | 2409.680        | 85.213                 | 57.452               | N/A             | N/A            | 27.761      | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:33 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2462MHz by 802.11n20 |                          |



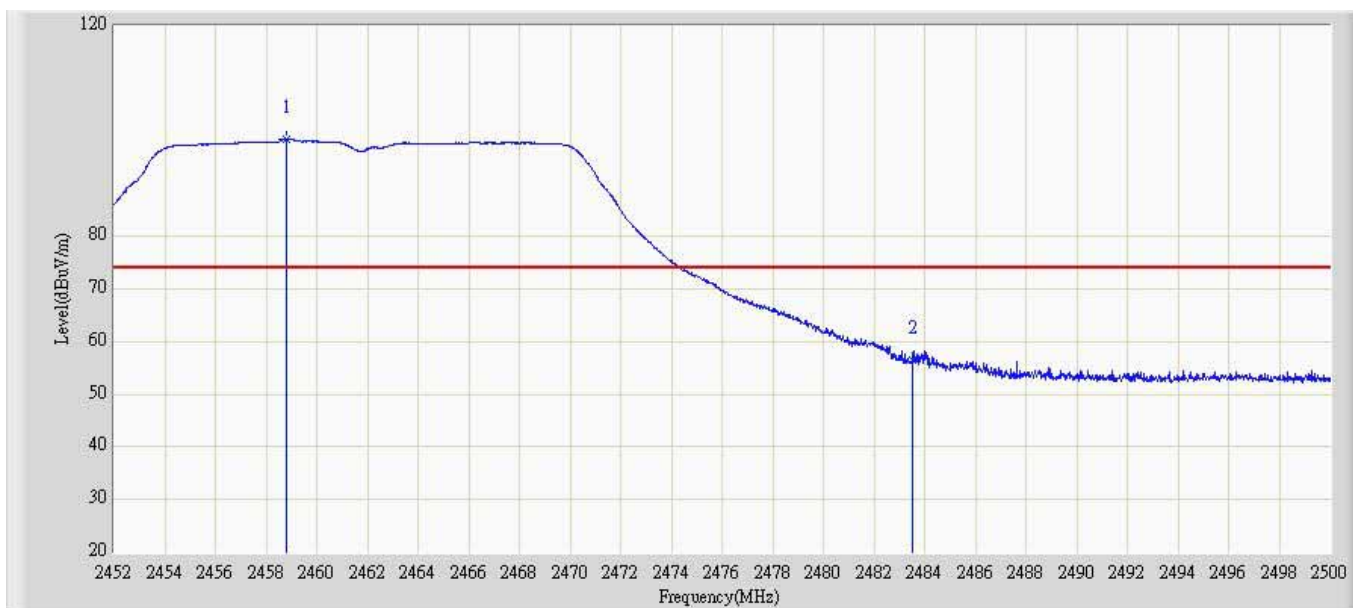
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2460.544           | 92.480                    | 64.510                  | N/A                | N/A               | 27.970         | PK   |
| 2  |      | 2483.500           | 53.122                    | 25.065                  | -20.878            | 74.000            | 28.057         | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:36 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2462MHz by 802.11n20 |                          |



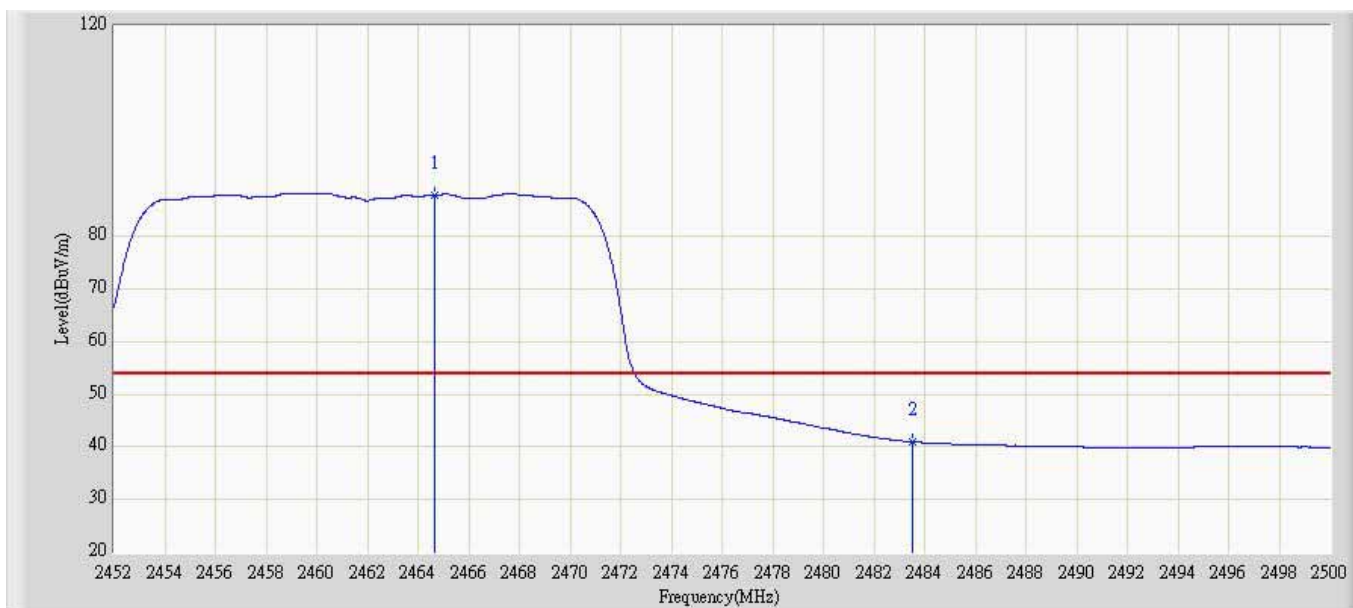
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2463.424           | 82.269                    | 54.288                  | N/A                | N/A               | 27.981         | AV   |
| 2  |      | 2483.500           | 40.038                    | 11.981                  | -13.962            | 54.000            | 28.057         | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:37 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2462MHz by 802.11n20 |                          |



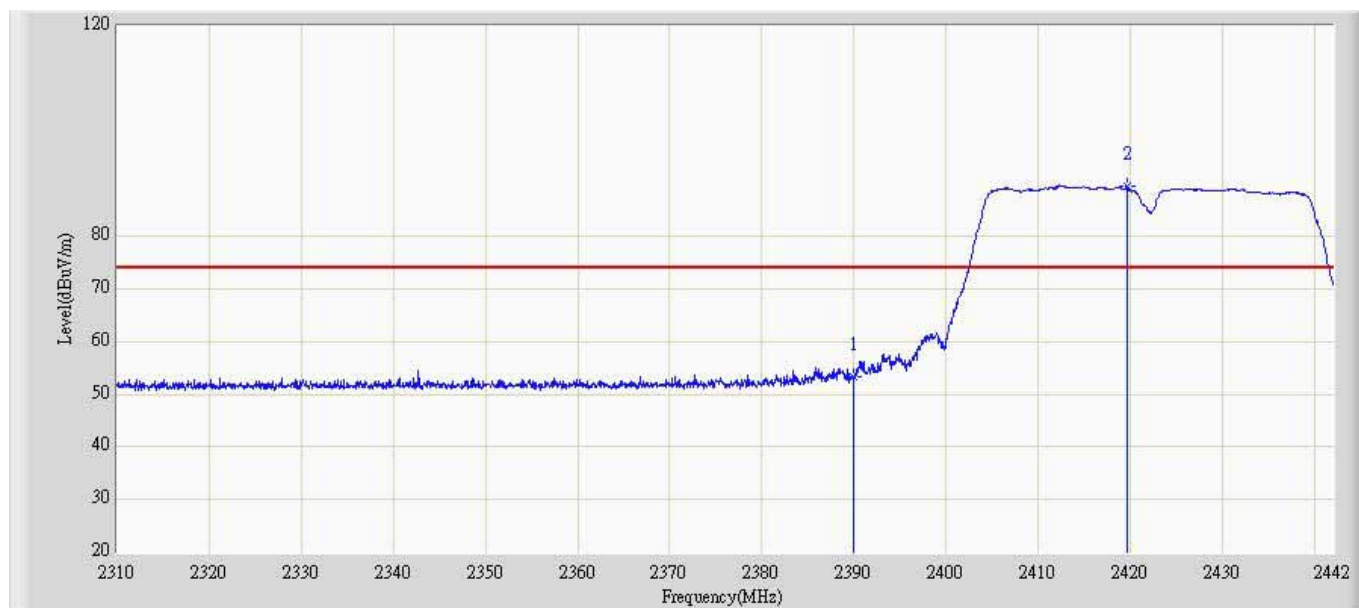
| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2458.816           | 98.557                    | 70.594                  | N/A                | N/A               | 27.964         | PK   |
| 2  |      | 2483.500           | 56.413                    | 28.356                  | -17.587            | 74.000            | 28.057         | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:40 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode3: Transmit at channel 2462MHz by 802.11n20 |                          |



| No | Mark | Frequency<br>(MHz) | Measure Level<br>(dBuV/m) | Reading Level<br>(dBuV) | Over Limit<br>(dB) | Limit<br>(dBuV/m) | Factor<br>(dB) | Type |
|----|------|--------------------|---------------------------|-------------------------|--------------------|-------------------|----------------|------|
| 1  | *    | 2464.672           | 87.840                    | 59.854                  | N/A                | N/A               | 27.986         | AV   |
| 2  |      | 2483.500           | 40.987                    | 12.930                  | -13.013            | 54.000            | 28.057         | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:41 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2422MHz by 802.11n40 |                          |



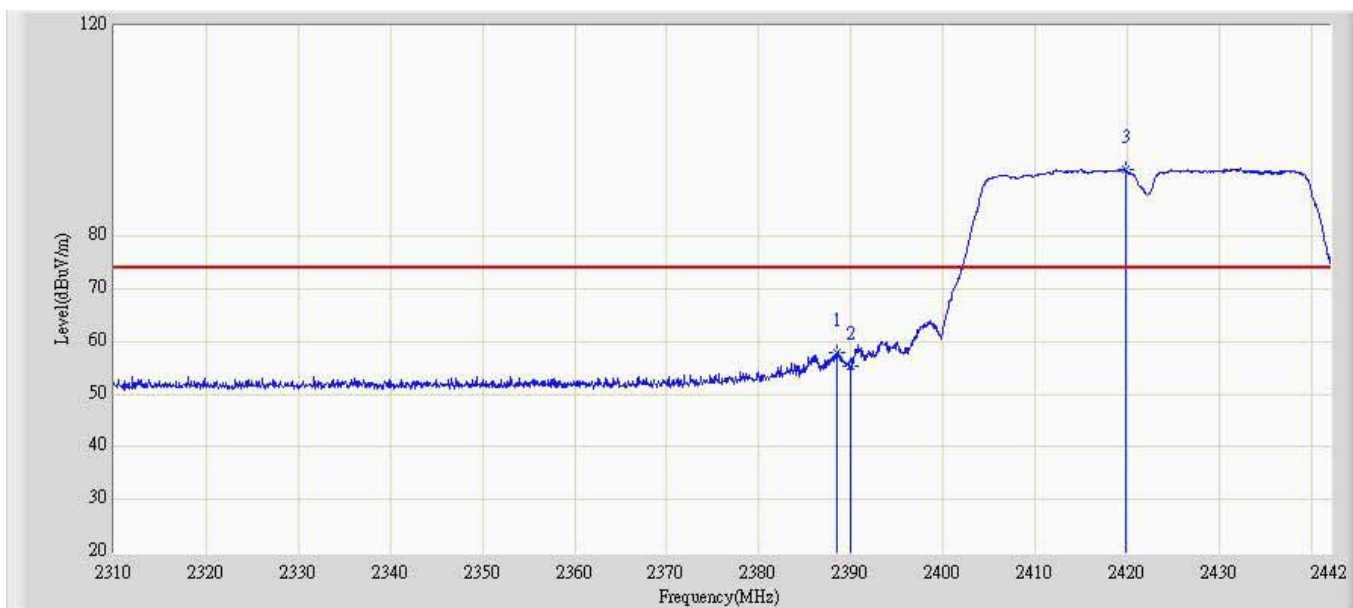
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 53.412                 | 25.730               | -20.588         | 74.000         | 27.682      | PK   |
| 2  | *    | 2419.626        | 89.477                 | 61.675               | N/A             | N/A            | 27.802      | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:45 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2422MHz by 802.11n40 |                          |



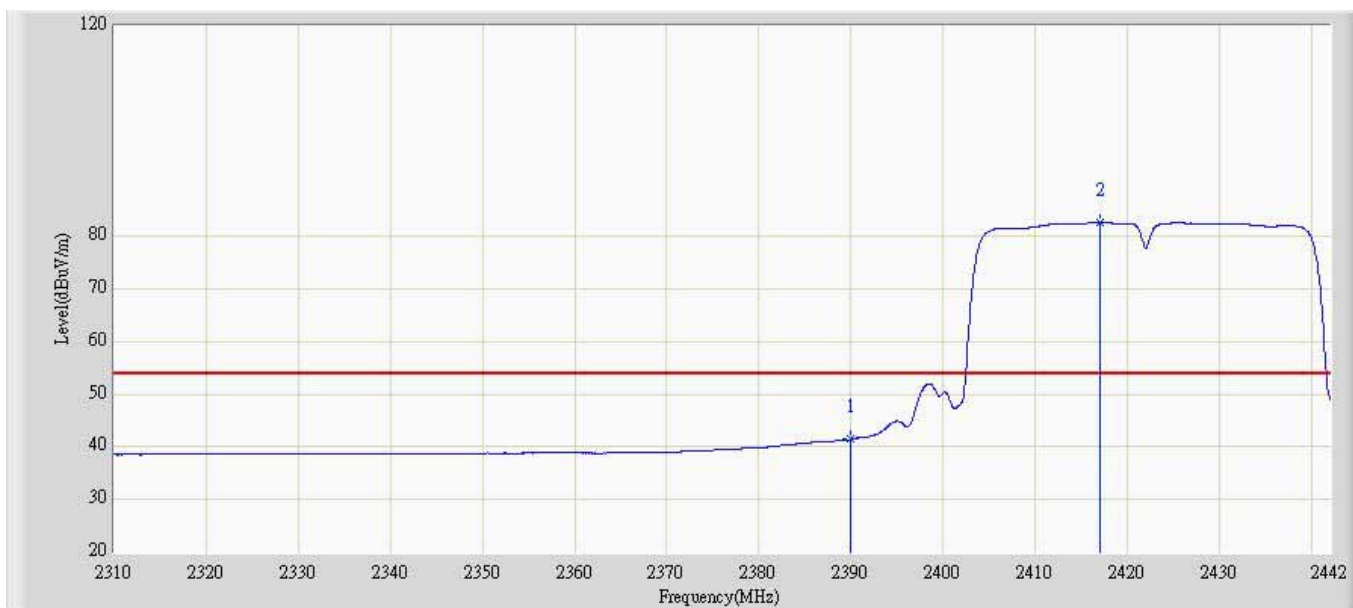
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 40.493                 | 12.811               | -13.507         | 54.000         | 27.682      | AV   |
| 2  | *    | 2418.570        | 79.170                 | 51.372               | N/A             | N/A            | 27.797      | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:46 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2422MHz by 802.11n40 |                          |



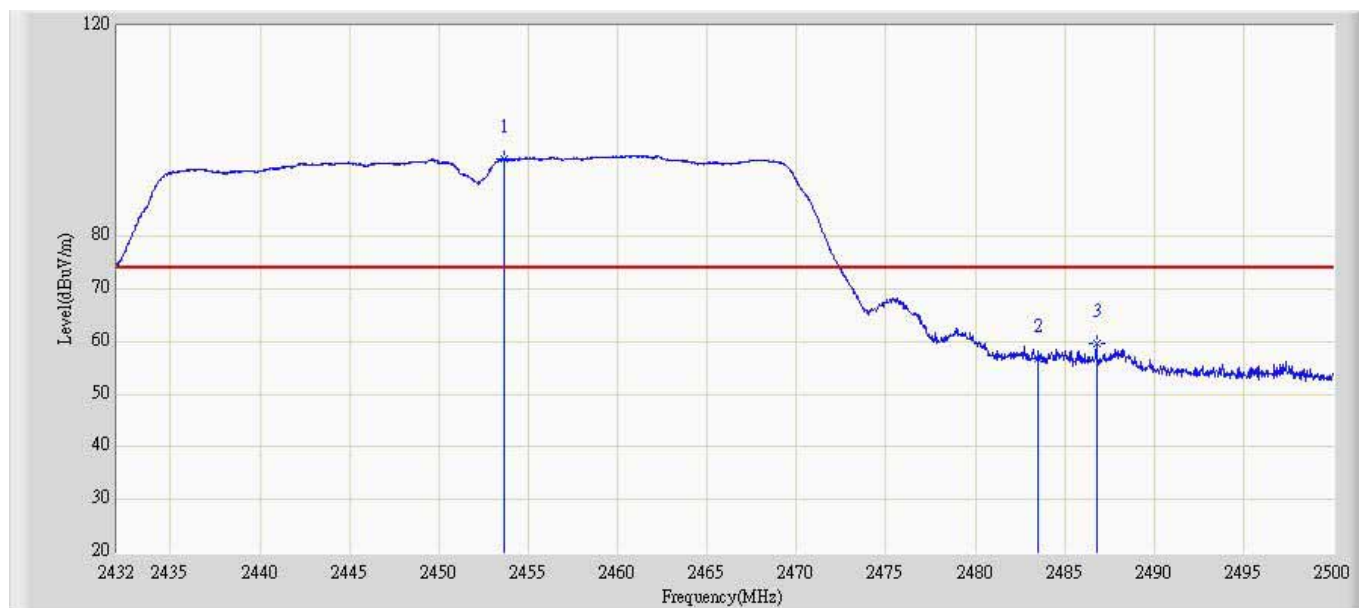
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2388.540        | 57.913                 | 30.237               | -16.087         | 74.000         | 27.676      | PK   |
| 2  |      | 2390.000        | 55.301                 | 27.619               | -18.699         | 74.000         | 27.682      | PK   |
| 3  | *    | 2419.824        | 92.683                 | 64.880               | N/A             | N/A            | 27.803      | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:50 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2422MHz by 802.11n40 |                          |



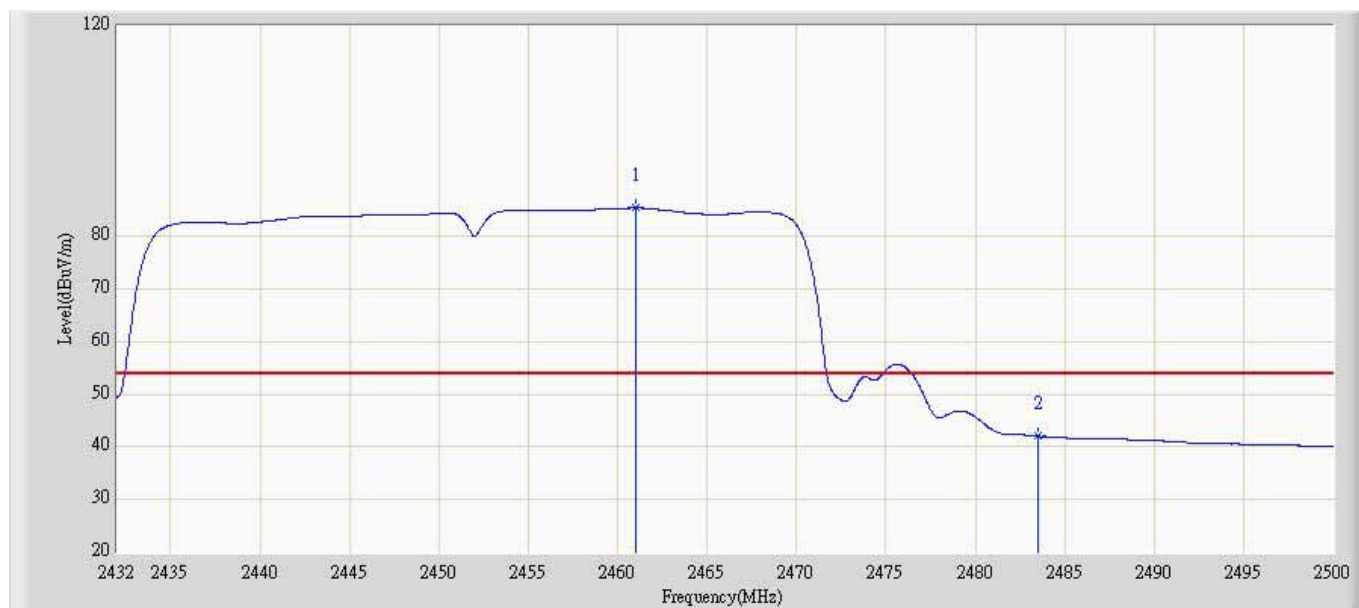
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  |      | 2390.000        | 41.436                 | 13.754               | -12.564         | 54.000         | 27.682      | AV   |
| 2  | *    | 2417.118        | 82.625                 | 54.833               | N/A             | N/A            | 27.792      | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:51 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2452MHz by 802.11n40 |                          |



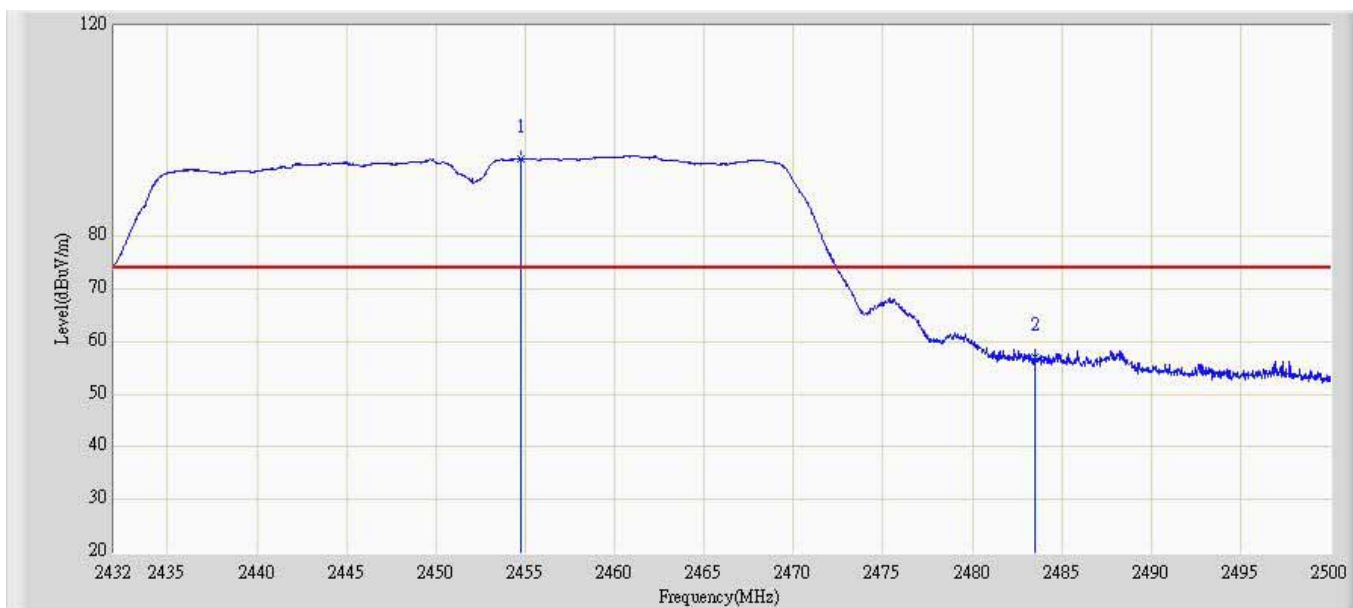
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2453.692        | 94.718                 | 66.775               | N/A             | N/A            | 27.943      | PK   |
| 2  |      | 2483.500        | 56.659                 | 28.602               | -17.341         | 74.000         | 28.057      | PK   |
| 3  |      | 2486.774        | 59.660                 | 31.590               | -14.340         | 74.000         | 28.070      | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:56 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Vertical       |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2452MHz by 802.11n40 |                          |



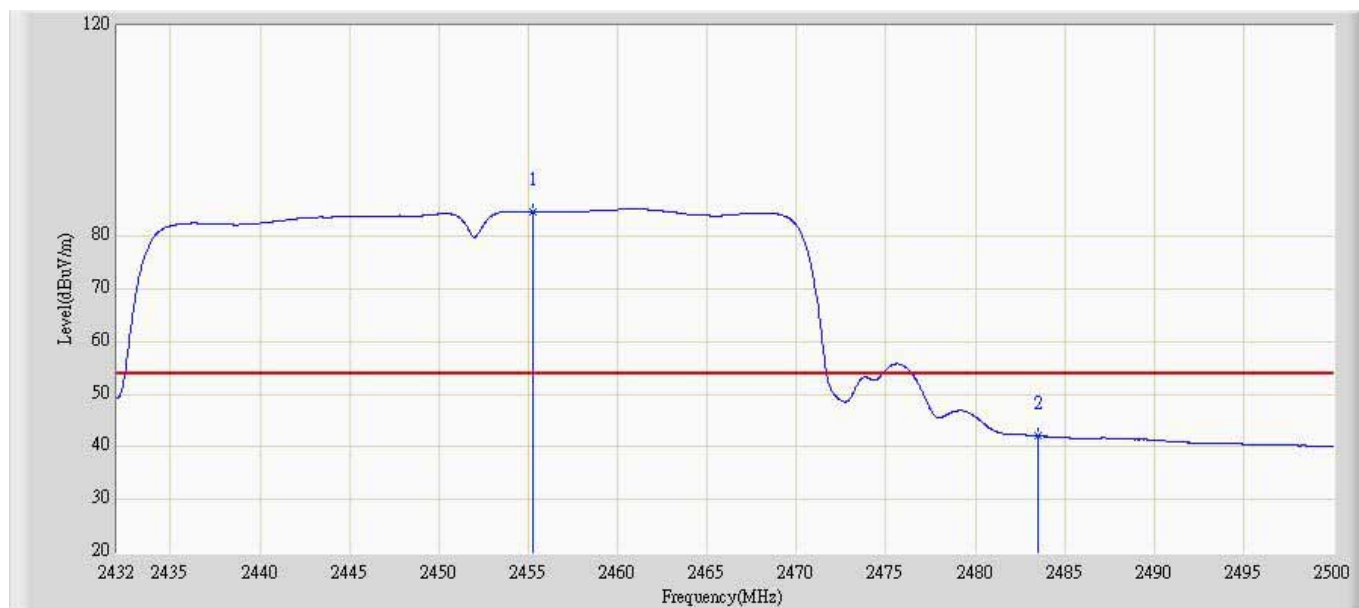
| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2461.002        | 85.415                 | 57.443               | N/A             | N/A            | 27.972      | AV   |
| 2  |      | 2483.500        | 42.003                 | 13.946               | -11.997         | 54.000         | 28.057      | AV   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 13:57 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2452MHz by 802.11n40 |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2454.746        | 94.786                 | 66.839               | N/A             | N/A            | 27.947      | PK   |
| 2  |      | 2483.500        | 56.951                 | 28.894               | -17.049         | 74.000         | 28.057      | PK   |

|                                                       |                          |
|-------------------------------------------------------|--------------------------|
| Engineer: Toms                                        |                          |
| Site: AC5                                             | Time: 2013/09/17 - 14:01 |
| Limit: FCC_Part15.209_RE(3m)                          | Margin: 0                |
| Probe:Horn_3117_988(1-18GHz)                          | Polarity: Horizontal     |
| EUT: Q TV Engine                                      | Power: AC 120V/60Hz      |
| Note: Mode4: Transmit at channel 2452MHz by 802.11n40 |                          |



| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|----|------|-----------------|------------------------|----------------------|-----------------|----------------|-------------|------|
| 1  | *    | 2455.256        | 84.764                 | 56.815               | N/A             | N/A            | 27.949      | AV   |
| 2  |      | 2483.500        | 42.075                 | 14.018               | -11.925         | 54.000         | 28.057      | AV   |

## 7. Operation Frequency Range of 20dB Bandwidth

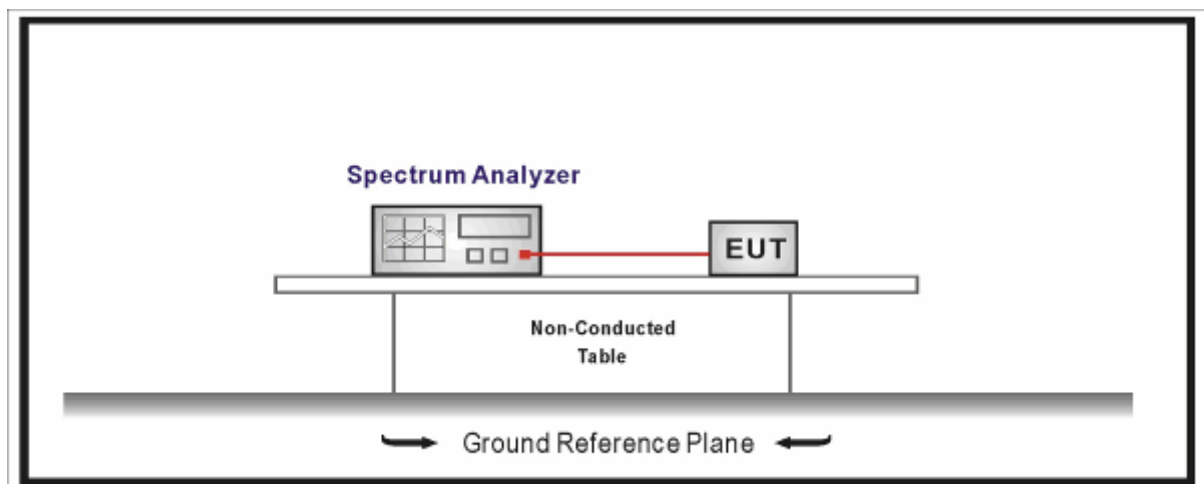
### 7.1. Test Equipment

Operation Frequency Range of 20dB Bandwidth / TR-8

| Instrument                 | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|----------------------------|--------------|----------|------------|---------------|
| Spectrum Analyzer          | Agilent      | E4446A   | MY45300103 | 2014.01.21    |
| Temperature/Humidity Meter | zhicheng     | ZC1-2    | TR8-TH     | 2014.05.08    |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 7.2. Test Setup



### 7.3. Limit

20 dB bandwidth of the emission is contained within the operation frequency band.

### 7.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

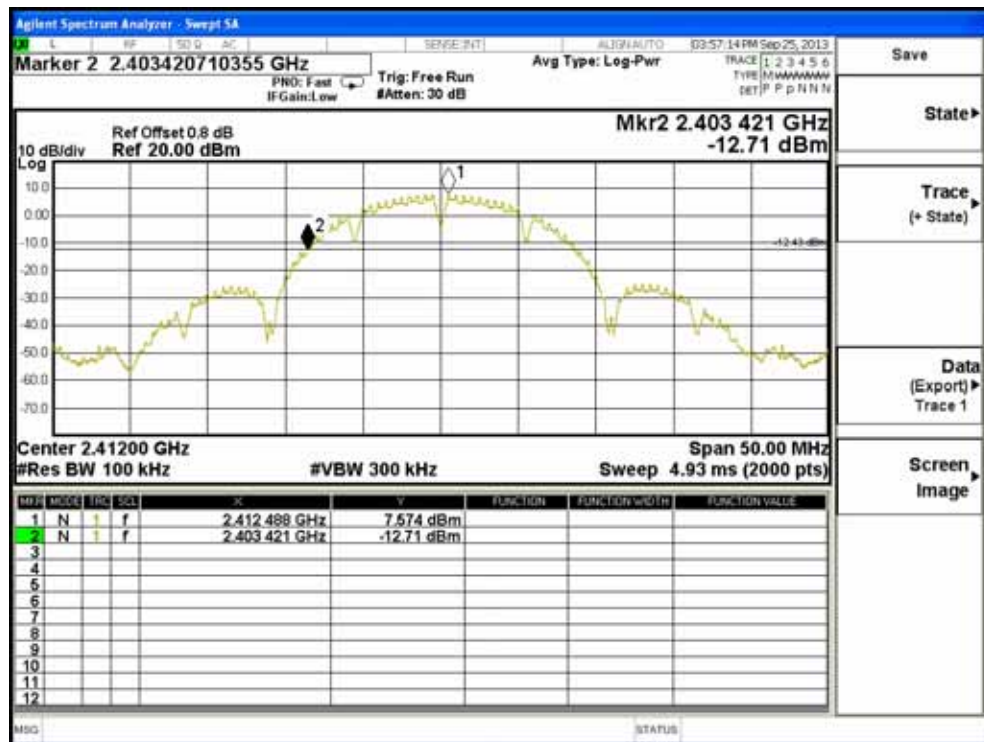
### 7.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1$  kHz

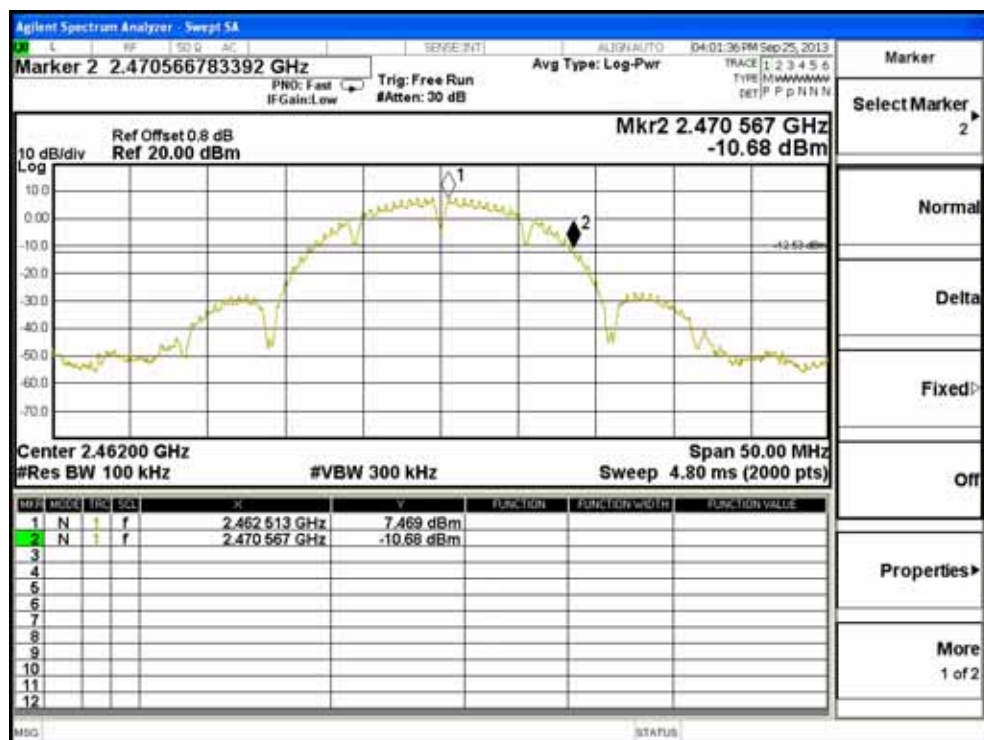
## 7.6. Test Result

|           |   |                                             |
|-----------|---|---------------------------------------------|
| Product   | : | Q TV Engine                                 |
| Test Item | : | Operation Frequency Range of 20dB Bandwidth |
| Test Site | : | TR-8                                        |
| Test Mode | : | Mode 1: Transmit by 802.11b                 |

### Channel 01 (2412MHz)

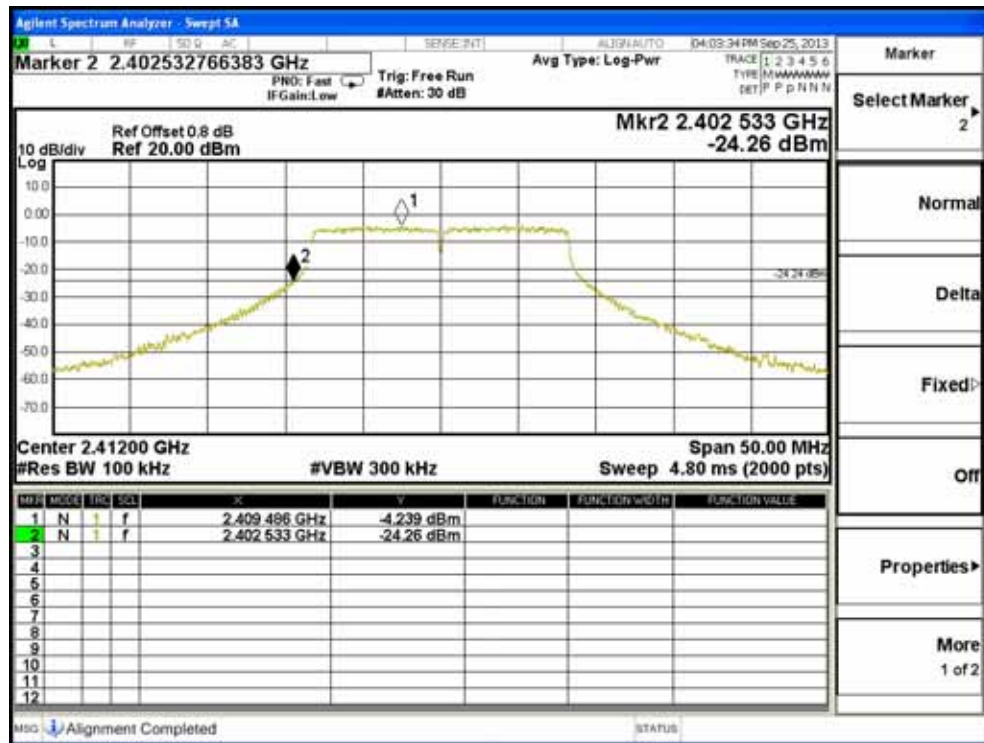


### Channel 11 (2462MHz)

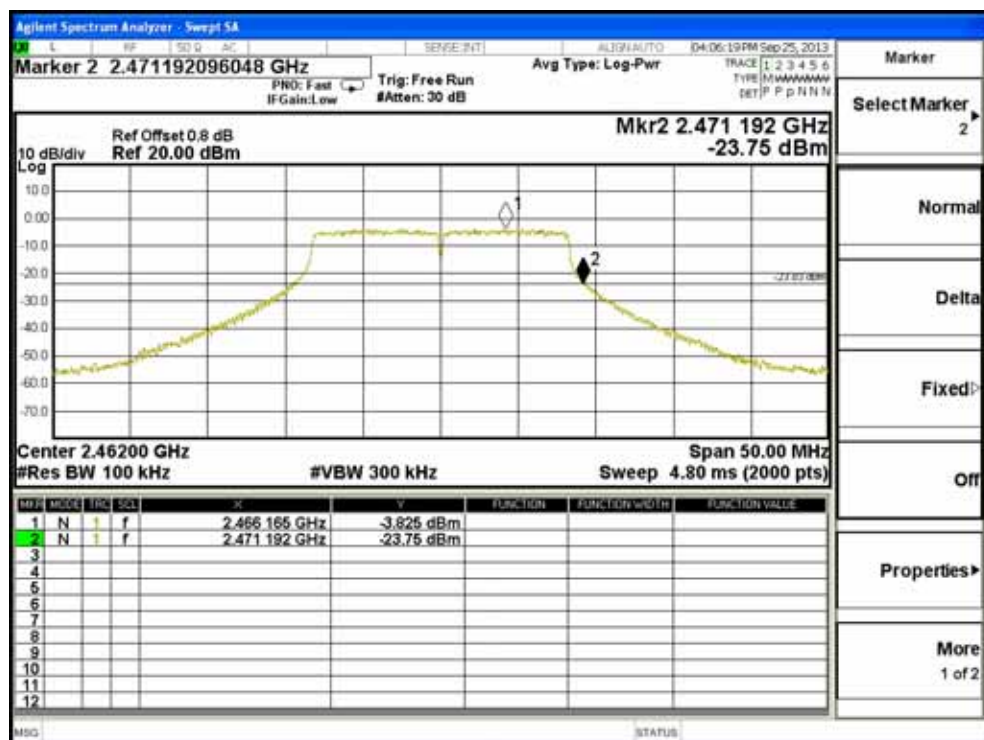


|           |   |                                             |
|-----------|---|---------------------------------------------|
| Product   | : | Q TV Engine                                 |
| Test Item | : | Operation Frequency Range of 20dB Bandwidth |
| Test Site | : | TR-8                                        |
| Test Mode | : | Mode 2: Transmit by 802.11g                 |

## Channel 01 (2412MHz)

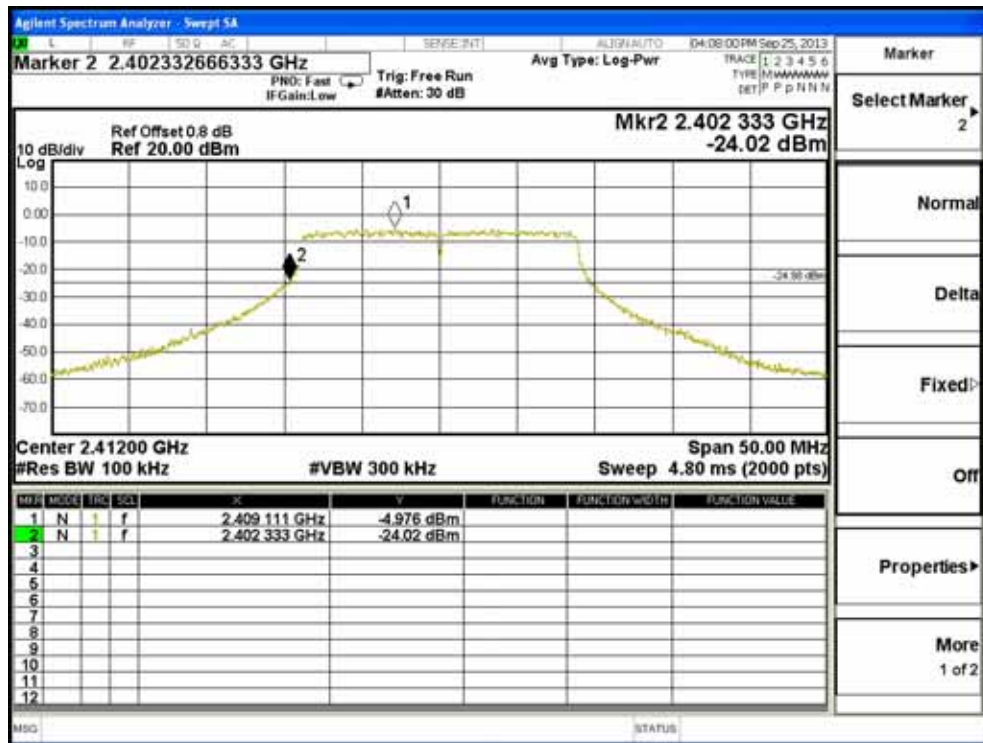


## Channel 11 (2462MHz)

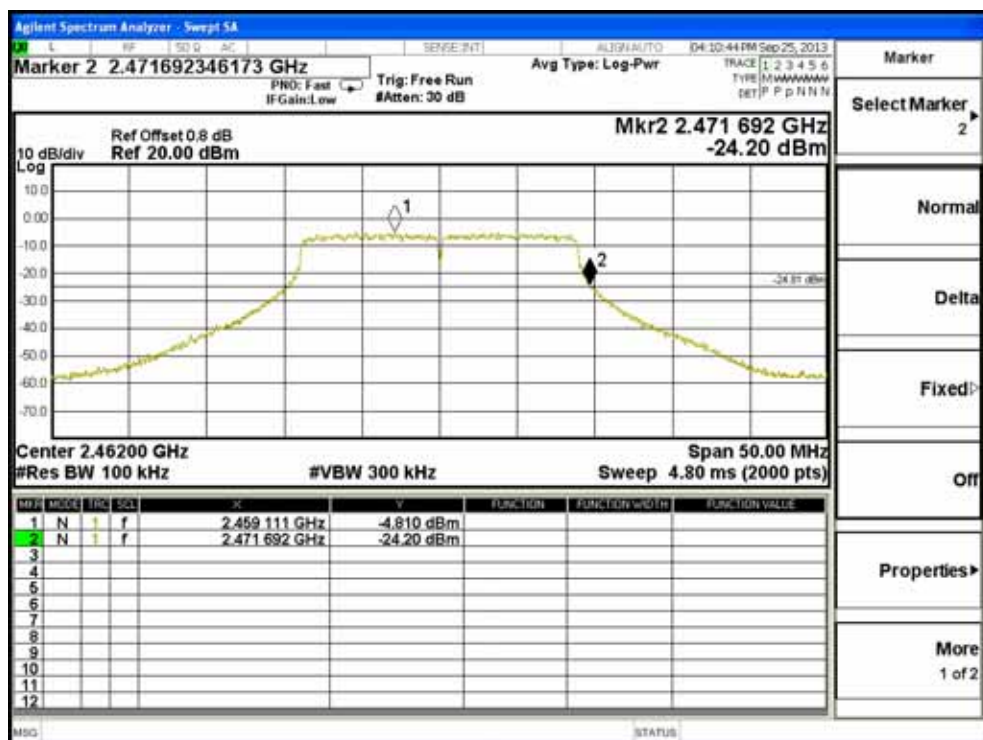


|           |   |                                             |
|-----------|---|---------------------------------------------|
| Product   | : | Q TV Engine                                 |
| Test Item | : | Operation Frequency Range of 20dB Bandwidth |
| Test Site | : | TR-8                                        |
| Test Mode | : | Mode 3: Transmit by 802.11n (20MHz)         |

## Channel 01 (2412MHz)

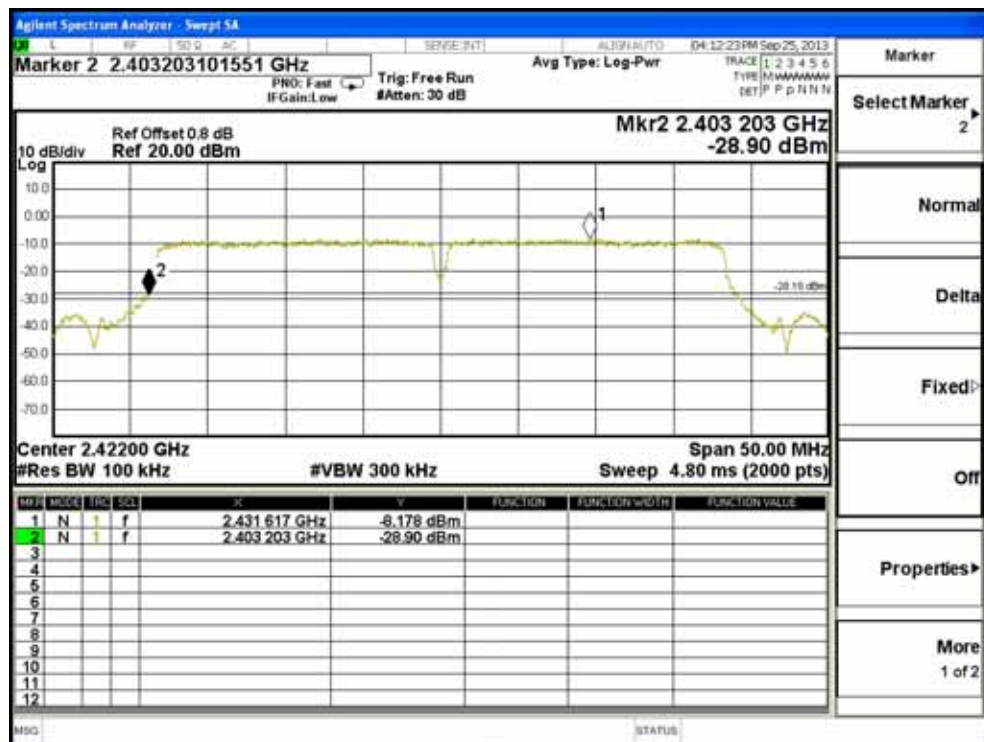


## Channel 11 (2462MHz)

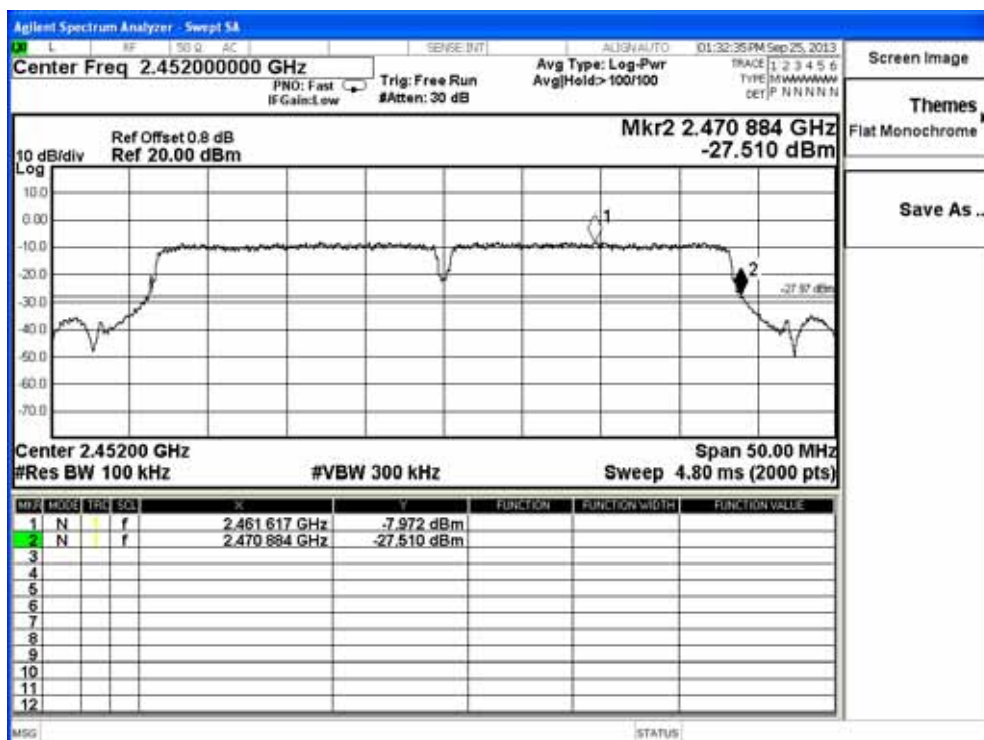


|           |   |                                             |
|-----------|---|---------------------------------------------|
| Product   | : | Q TV Engine                                 |
| Test Item | : | Operation Frequency Range of 20dB Bandwidth |
| Test Site | : | TR-8                                        |
| Test Mode | : | Mode 4: Transmit by 802.11n (40MHz)         |

## Channel 03 (2422MHz)



## Channel 09 (2452MHz)



## 8. Occupied Bandwidth

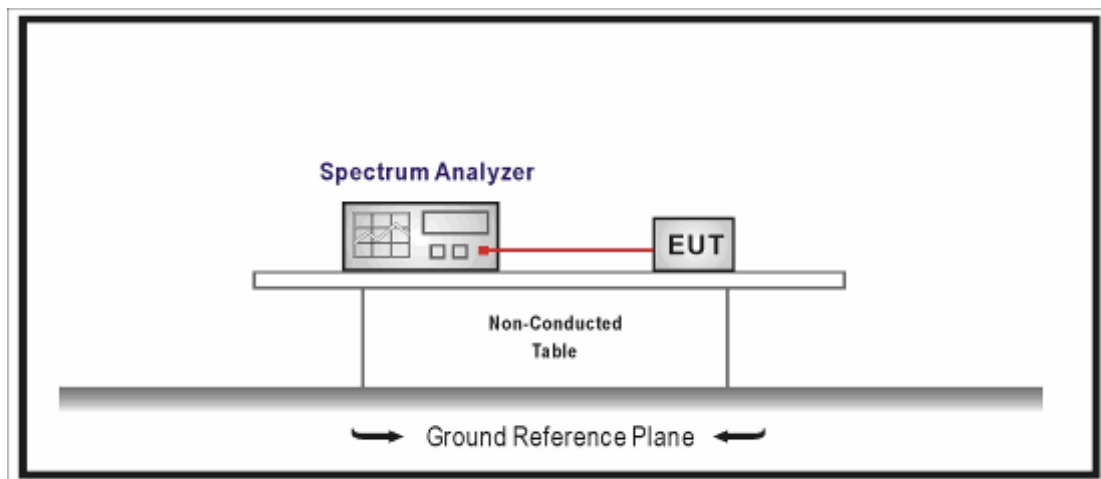
### 8.1. Test Equipment

Occupied Bandwidth / TR-8

| Instrument                 | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|----------------------------|--------------|----------|------------|---------------|
| Spectrum Analyzer          | Agilent      | E4446A   | MY45300103 | 2014.01.21    |
| Temperature/Humidity Meter | zhicheng     | ZC1-2    | TR8-TH     | 2014.05.08    |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 8.2. Test Setup



### 8.3. Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

### 8.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

### 8.5. Uncertainty

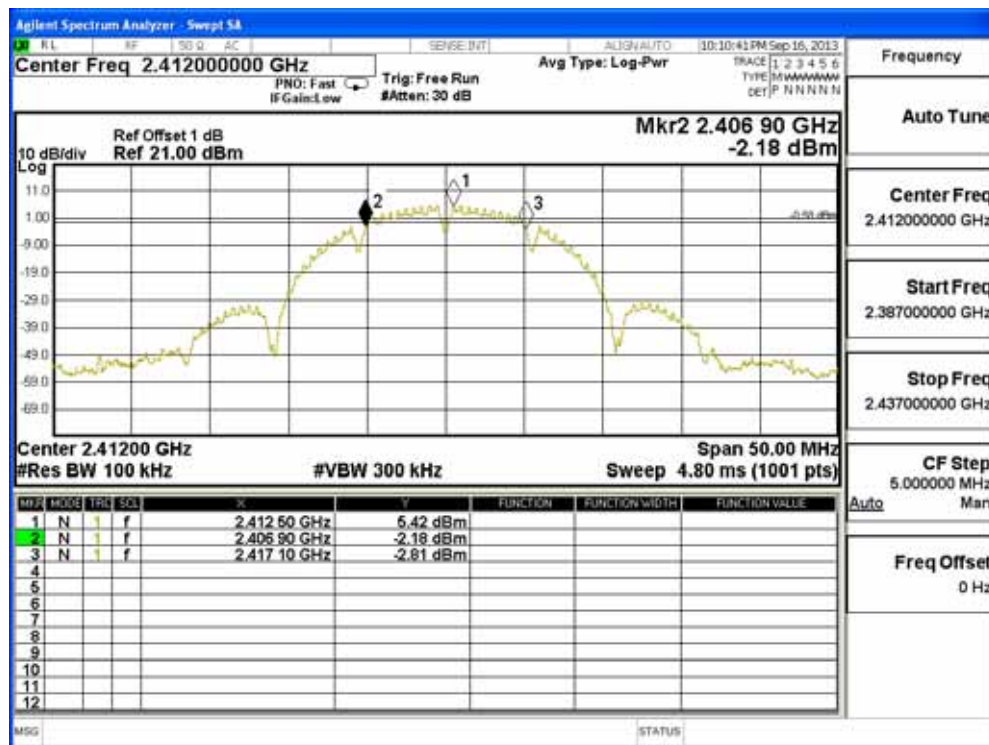
The measurement uncertainty is defined as  $\pm 1$  kHz

## 8.6. Test Result

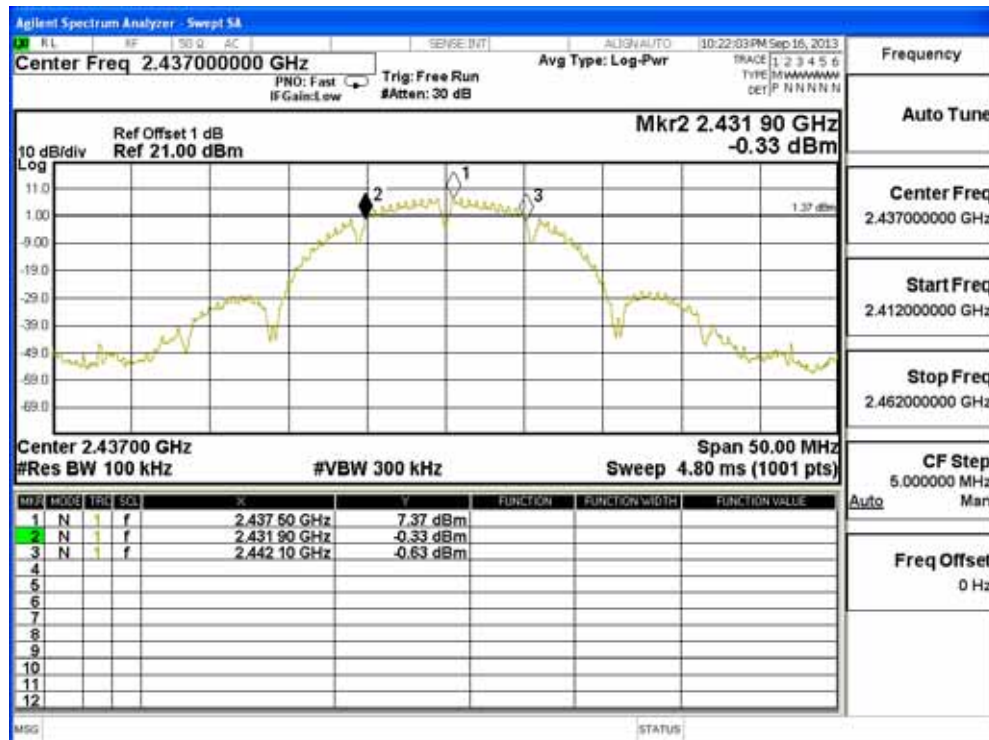
|           |   |                             |
|-----------|---|-----------------------------|
| Product   | : | Q TV Engine                 |
| Test Item | : | 6dB Occupied Bandwidth      |
| Test Site | : | TR-8                        |
| Test Mode | : | Mode 1: Transmit by 802.11b |

| Channel No. | Frequency (MHz) | 6dB Occupied Bandwidth (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------|-------------|--------|
| 01          | 2412            | 10200.0                      | 500         | Pass   |
| 06          | 2437            | 10200.0                      | 500         | Pass   |
| 11          | 2462            | 10200.0                      | 500         | Pass   |

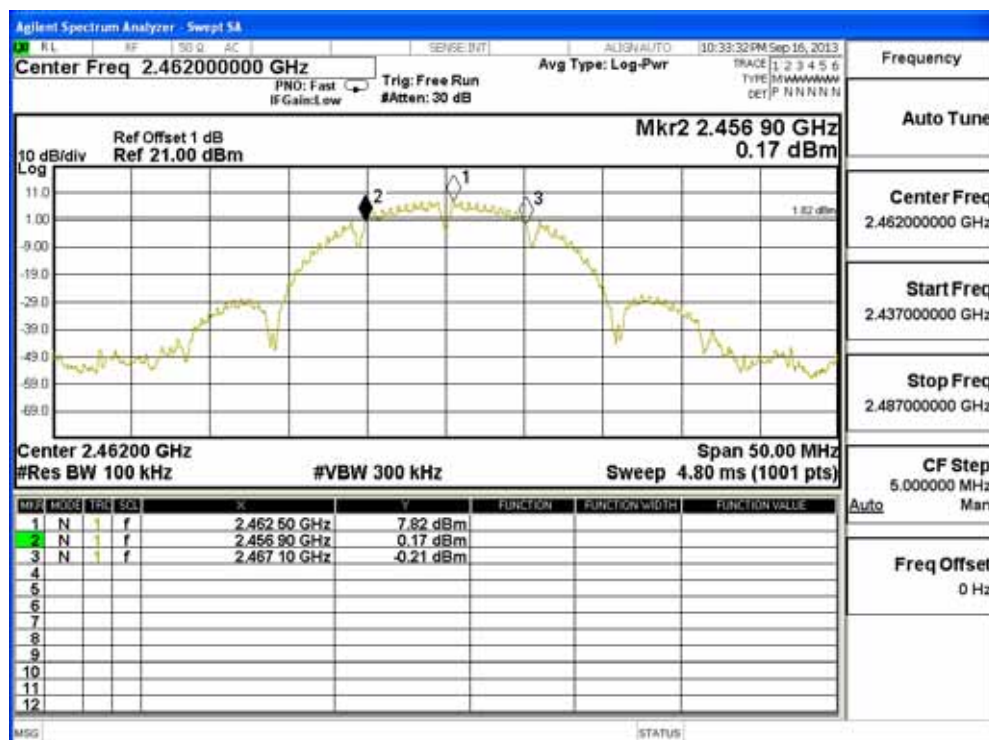
### Channel 01 (2412MHz)



### Channel 06 (2437MHz)



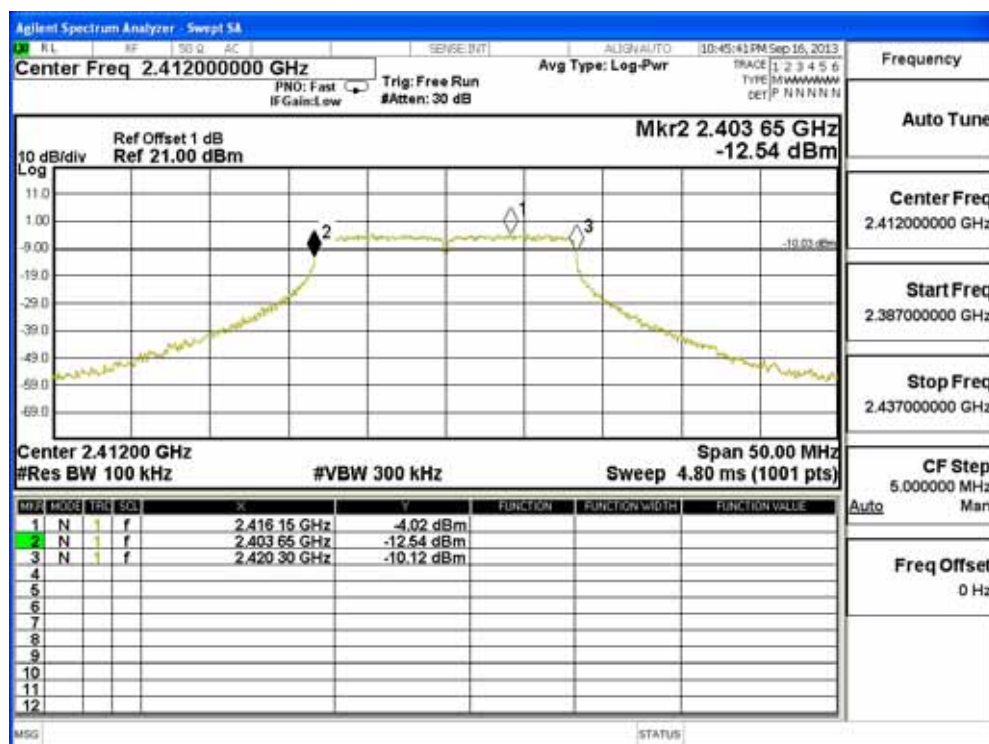
### Channel 11 (2462MHz)



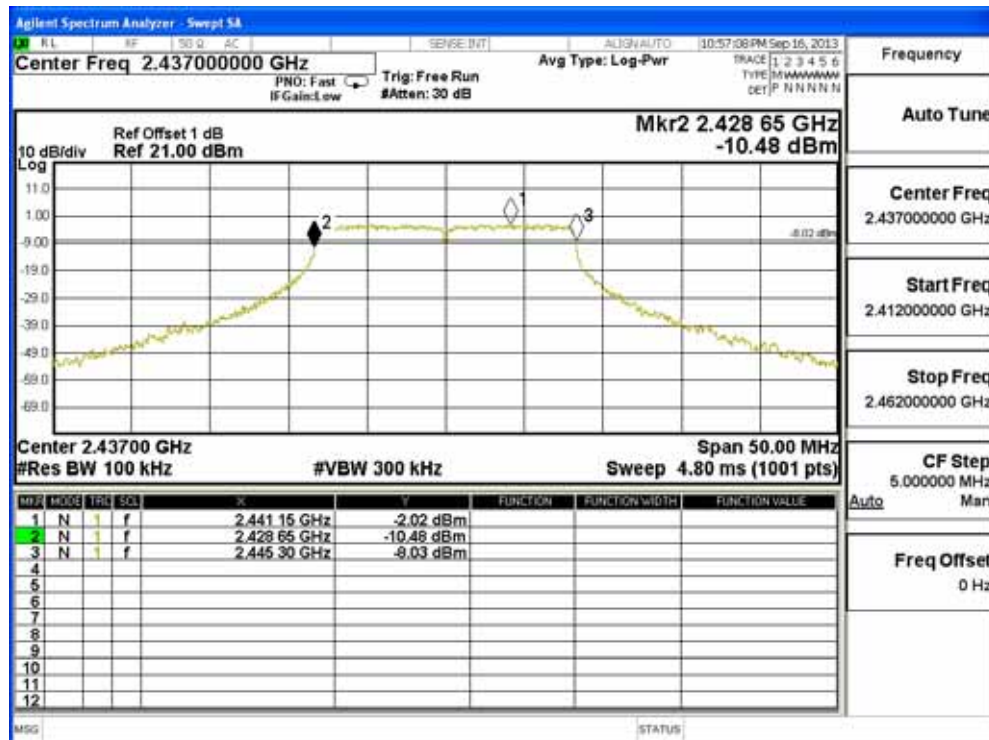
|           |   |                             |
|-----------|---|-----------------------------|
| Product   | : | Q TV Engine                 |
| Test Item | : | 6dB Occupied Bandwidth      |
| Test Site | : | TR-8                        |
| Test Mode | : | Mode 2: Transmit by 802.11g |

| Channel No. | Frequency (MHz) | 6dB Occupied Bandwidth (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------|-------------|--------|
| 01          | 2412            | 16650.0                      | 500         | Pass   |
| 06          | 2437            | 16650.0                      | 500         | Pass   |
| 11          | 2462            | 16650.0                      | 500         | Pass   |

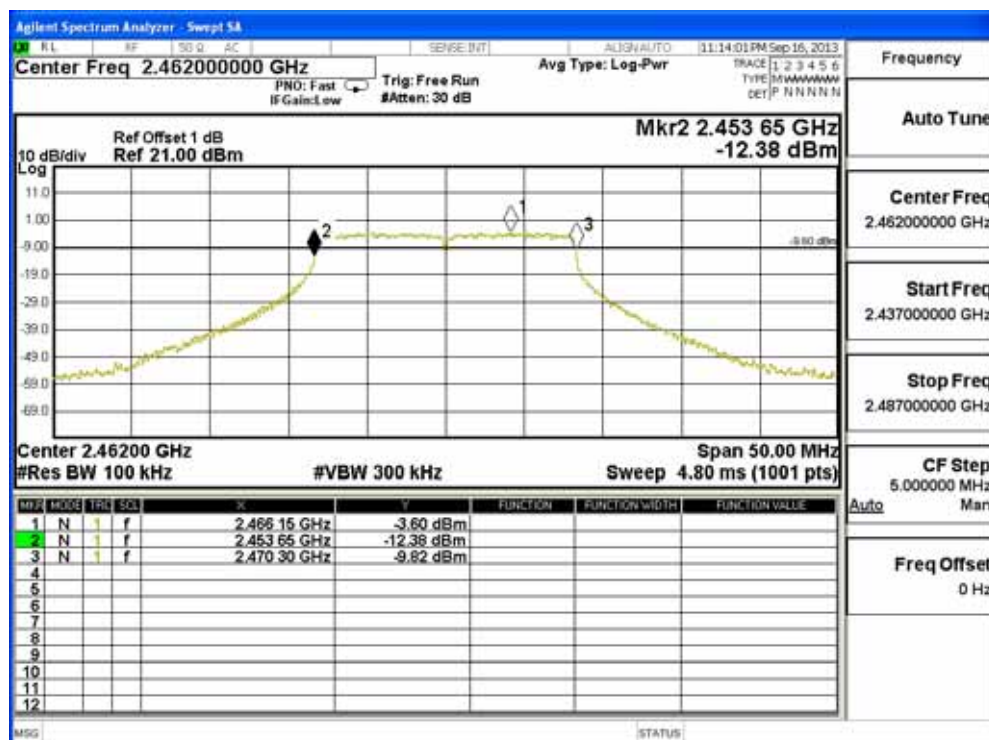
## Channel 01 (2412MHz)



### Channel 06 (2437MHz)



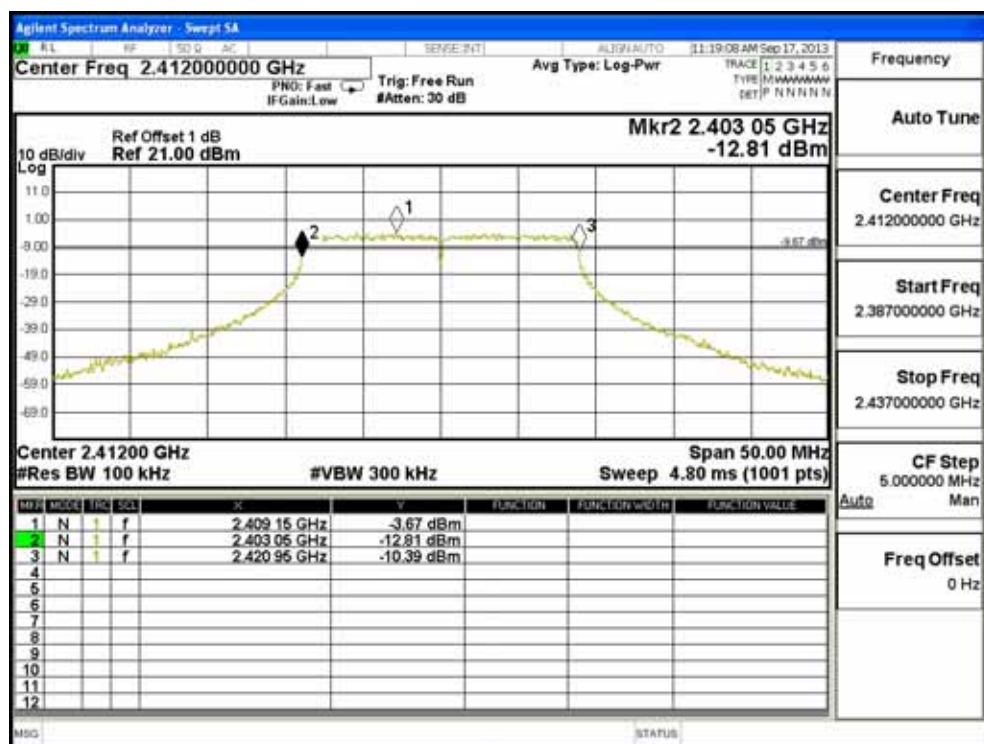
### Channel 11 (2462MHz)



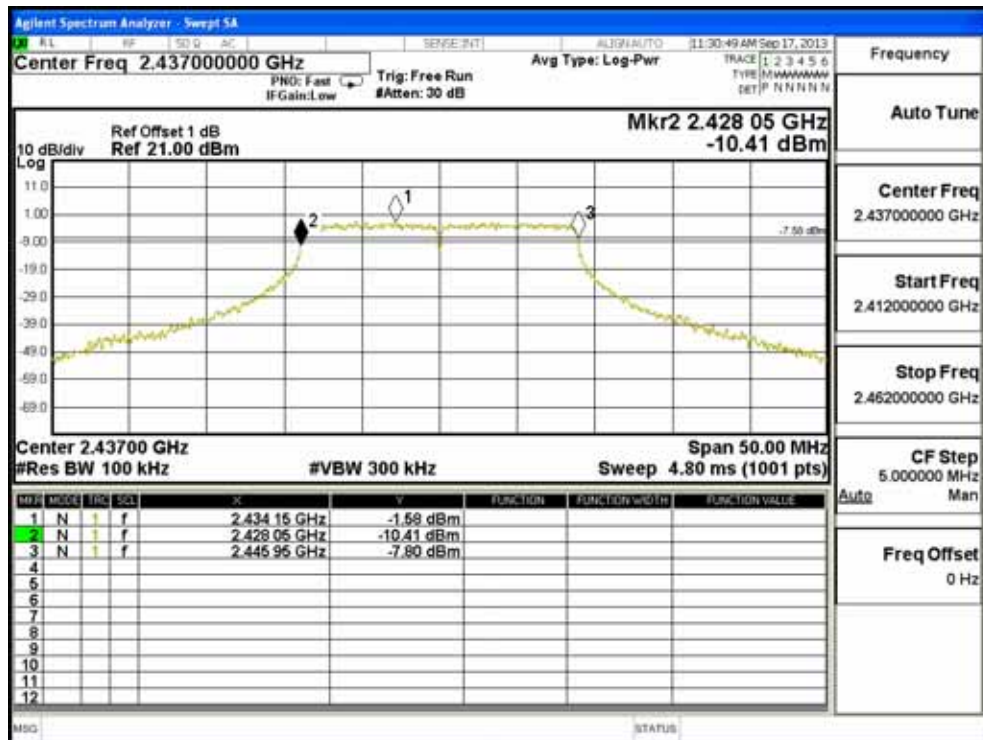
|           |   |                                    |
|-----------|---|------------------------------------|
| Product   | : | Q TV Engine                        |
| Test Item | : | 6dB Occupied Bandwidth             |
| Test Site | : | TR-8                               |
| Test Mode | : | Mode 3: Transmit by 802.11n(20MHz) |

| Channel No. | Frequency (MHz) | 6dB Occupied Bandwidth (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------|-------------|--------|
| 01          | 2412            | 17900.0                      | 500         | Pass   |
| 06          | 2437            | 17900.0                      | 500         | Pass   |
| 11          | 2462            | 17850.0                      | 500         | Pass   |

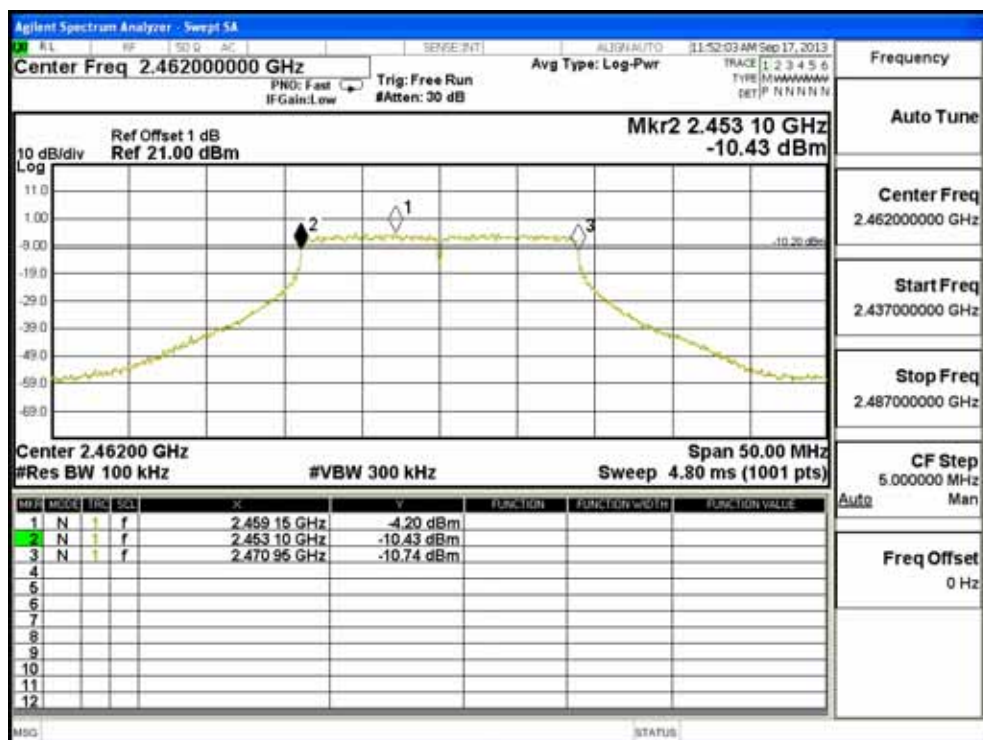
Channel 01 (2412MHz)



### Channel 06 (2437MHz)



### Channel 11 (2462MHz)



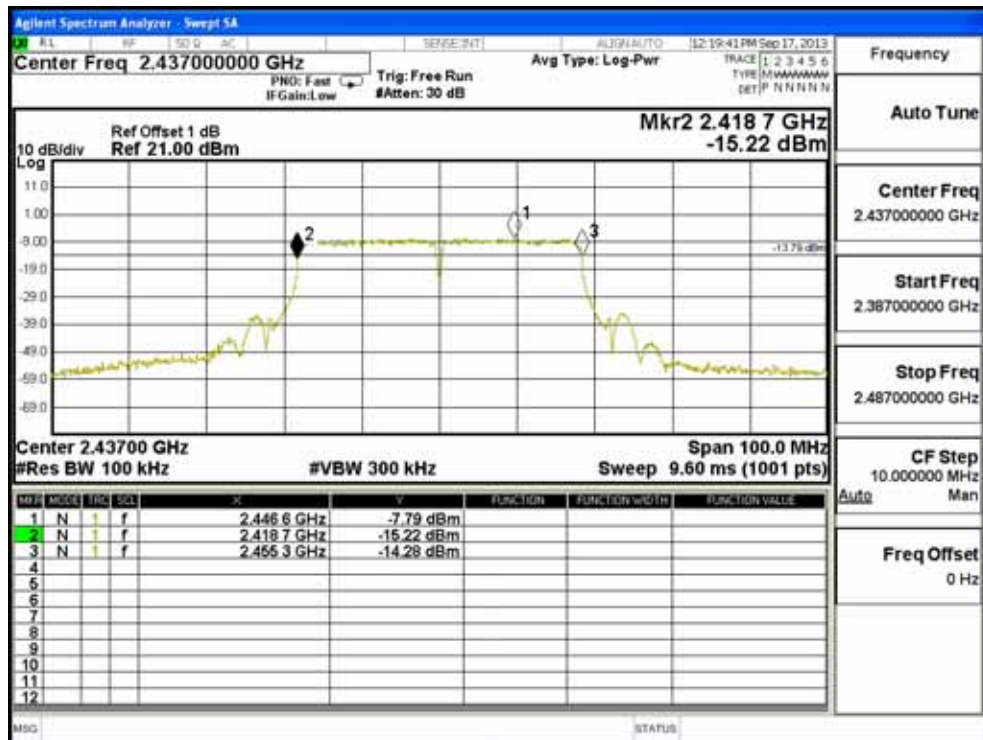
|           |   |                                    |
|-----------|---|------------------------------------|
| Product   | : | Q TV Engine                        |
| Test Item | : | 6dB Occupied Bandwidth             |
| Test Site | : | TR-8                               |
| Test Mode | : | Mode 4: Transmit by 802.11n(40MHz) |

| Channel No. | Frequency (MHz) | 6dB Occupied Bandwidth (kHz) | Limit (kHz) | Result |
|-------------|-----------------|------------------------------|-------------|--------|
| 03          | 2422            | 36600.0                      | 500         | Pass   |
| 06          | 2437            | 36600.0                      | 500         | Pass   |
| 09          | 2452            | 36600.0                      | 500         | Pass   |

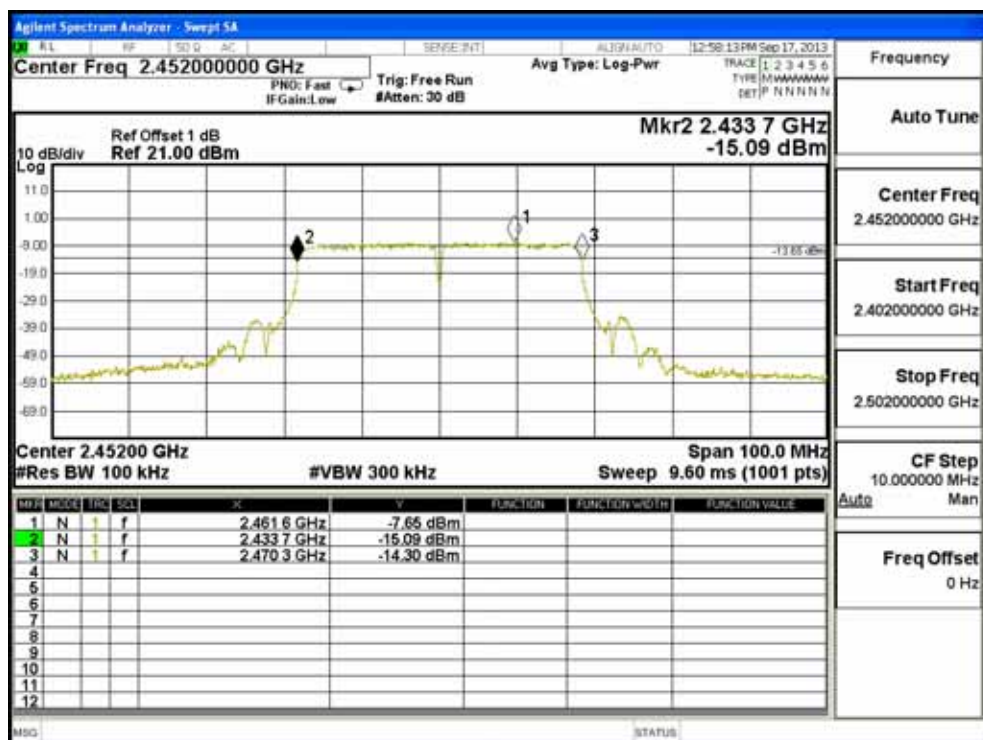
## Channel 01 (2422MHz)



### Channel 06 (2437MHz)



### Channel 09 (2452MHz)



## 9. Power Output

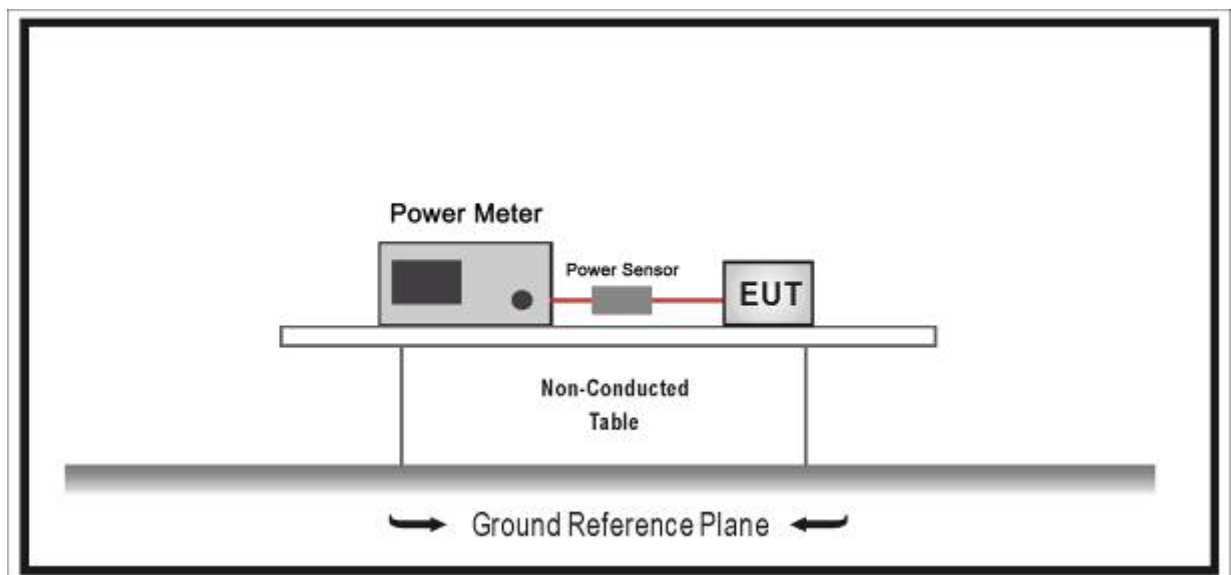
### 9.1. Test Equipment

Power Output / TR-8

| Instrument                 | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|----------------------------|--------------|----------|------------|---------------|
| Wideband Peak Power Meter  | Anritsu      | ML2495A  | 0905006    | 2013.11.10    |
| Power Sensor               | Anritsu      | MA2411B  | 0846014    | 2013.11.10    |
| Temperature/Humidity Meter | zhicheng     | ZC1-2    | TR8-TH     | 2014.05.08    |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 9.2. Test Setup



### 9.3. Limit

The maximum peak power shall be less 1 Watt (30dBm).

Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

#### **9.4. Test Procedure**

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Use the wideband power meter to test peak power and record the result.

#### **9.5. Uncertainty**

The measurement uncertainty is defined as  $\pm 1.27$  dB

## 9.6. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

| MCS<br>Index<br>for<br>802.11n | Spatial<br>Streams | Data Rate (Mbps) |         |                 |          |                 |          |
|--------------------------------|--------------------|------------------|---------|-----------------|----------|-----------------|----------|
|                                |                    | 802.11b          | 802.11g | 20MHz Bandwidth |          | 40MHz Bandwidth |          |
|                                |                    |                  |         | 800ns GI        | 400ns GI | 800ns GI        | 400ns GI |
| 0                              | 1                  | 1                | 6       | 6.5             | 7.2      | 13.5            | 15.0     |
| 1                              | 1                  | 2                | 9       | 13.0            | 14.4     | 27.0            | 30.0     |
| 0                              | 1                  | 5.5              | 12      | 19.5            | 21.7     | 40.5            | 45.0     |
| 1                              | 1                  | 11               | 18      | 26.0            | 28.9     | 54.0            | 60.0     |
| 4                              | 1                  | ---              | 24      | 39.0            | 43.3     | 81.0            | 90.0     |
| 5                              | 1                  | ---              | 36      | 52.0            | 57.8     | 108.0           | 120.0    |
| 6                              | 1                  | ---              | 48      | 58.5            | 65.0     | 121.5           | 135.0    |
| 7                              | 1                  | ---              | 54      | 65.0            | 72.2     | 135.0           | 150.0    |

Power output at various data rates:

| Test Mode | Bandwidth | Frequency (MHz) | Channel | Data Rate | Peak Power (dBm) |
|-----------|-----------|-----------------|---------|-----------|------------------|
| 802.11b   | 20        | 2437            | 6       | 1         | 19.03            |
|           |           |                 |         | 5.5       | 18.92            |
|           |           |                 |         | 11        | 18.75            |
| 802.11g   | 20        | 2437            | 6       | 6         | 19.02            |
|           |           |                 |         | 24        | 18.96            |
|           |           |                 |         | 54        | 18.87            |
| 802.11n20 | 20        | 2437            | 6       | MCS0      | 17.85            |
|           |           |                 |         | MCS4      | 17.47            |
|           |           |                 |         | MCS7      | 17.33            |
| 802.11n40 | 40        | 2437            | 6       | MCS0      | 17.92            |
|           |           |                 |         | MCS4      | 17.85            |
|           |           |                 |         | MCS7      | 17.67            |

|           |   |                             |
|-----------|---|-----------------------------|
| Product   | : | Q TV Engine                 |
| Test Item | : | Power Output                |
| Test Site | : | TR8                         |
| Test Mode | : | Mode 1: Transmit by 802.11b |

| Channel No. | Frequency<br>(MHz) | Measurement<br>Power Output<br>(dBm) | Limit<br>(dBm) | Result |
|-------------|--------------------|--------------------------------------|----------------|--------|
| 1           | 2412               | 19.26                                | 30.00          | Pass   |
| 6           | 2437               | 19.03                                | 30.00          | Pass   |
| 11          | 2462               | 19.74                                | 30.00          | Pass   |

|           |   |                             |
|-----------|---|-----------------------------|
| Product   | : | Q TV Engine                 |
| Test Item | : | Power Output                |
| Test Site | : | TR8                         |
| Test Mode | : | Mode 2: Transmit by 802.11g |

| Channel No. | Frequency<br>(MHz) | Measurement<br>Power Output<br>(dBm) | Limit<br>(dBm) | Result |
|-------------|--------------------|--------------------------------------|----------------|--------|
| 1           | 2412               | 19.02                                | 30.00          | Pass   |
| 6           | 2437               | 20.70                                | 30.00          | Pass   |
| 11          | 2462               | 19.74                                | 30.00          | Pass   |

|           |   |                                    |
|-----------|---|------------------------------------|
| Product   | : | Q TV Engine                        |
| Test Item | : | Power Output                       |
| Test Site | : | TR8                                |
| Test Mode | : | Mode 3: Transmit by 802.11n(20MHz) |

| Channel No. | Frequency (MHz) | Measurement Power Output (dBm) | Limit (dBm) | Result |
|-------------|-----------------|--------------------------------|-------------|--------|
| 1           | 2412            | 17.85                          | 30.00       | Pass   |
| 6           | 2437            | 20.12                          | 30.00       | Pass   |
| 11          | 2462            | 18.22                          | 30.00       | Pass   |

|           |   |                                    |
|-----------|---|------------------------------------|
| Product   | : | Q TV Engine                        |
| Test Item | : | Power Output                       |
| Test Site | : | TR8                                |
| Test Mode | : | Mode 4: Transmit by 802.11n(40MHz) |

| Channel No. | Frequency (MHz) | Measurement Power Output (dBm) | Limit (dBm) | Result |
|-------------|-----------------|--------------------------------|-------------|--------|
| 3           | 2422            | 17.92                          | 30.00       | Pass   |
| 6           | 2437            | 17.80                          | 30.00       | Pass   |
| 9           | 2452            | 18.22                          | 30.00       | Pass   |

## 10. Power Spectral Density

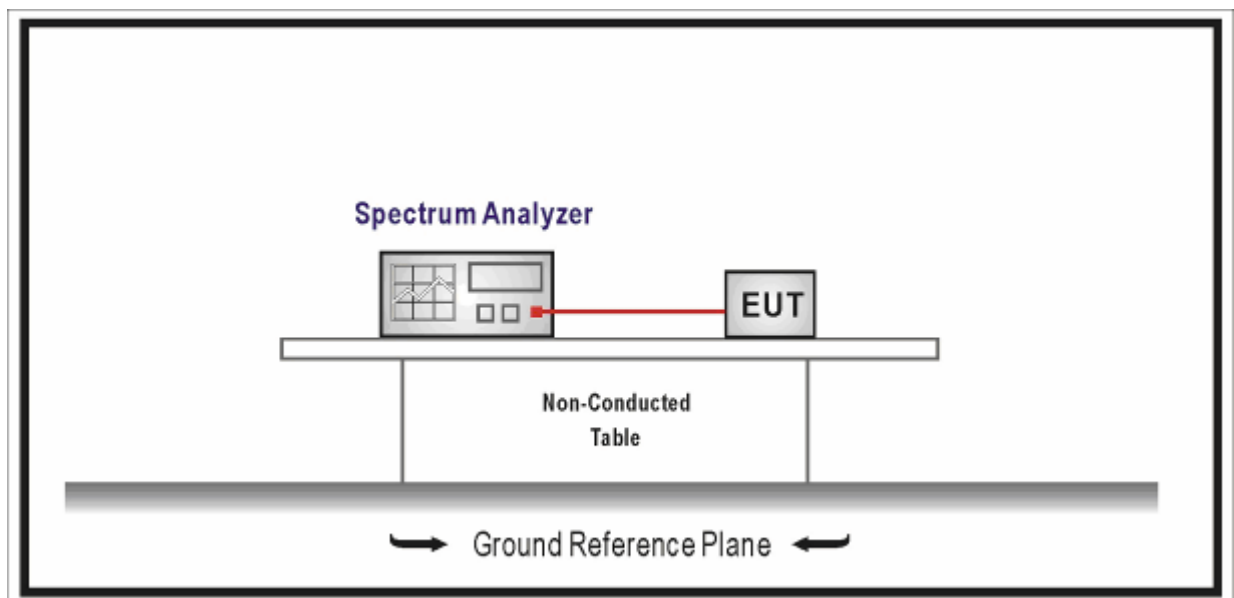
### 10.1. Test Equipment

Power Spectral Density / TR-8

| Instrument                 | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|----------------------------|--------------|----------|------------|---------------|
| Spectrum Analyzer          | Agilent      | E4446A   | MY45300103 | 2014.01.21    |
| Temperature/Humidity Meter | zhicheng     | ZC1-2    | TR8-TH     | 2014.05.08    |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 10.2. Test Setup



### 10.3. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiated to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

#### **10.4. Test Procedure**

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set the Span to 1.5 times the DTS channel bandwidth,  $RBW \geq 3 \text{ kHz}$ ,  $VBW \geq 3*RBW$ , Sweep time = auto couple, detector = Peak, trace mode = max hold, allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level.

#### **10.5. Uncertainty**

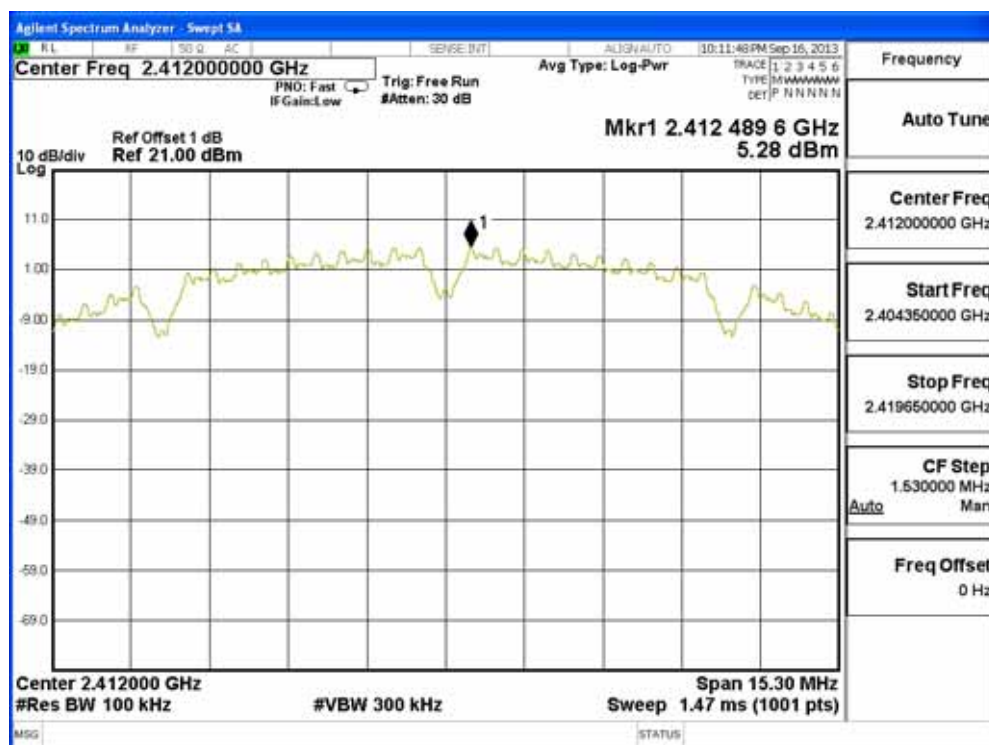
The measurement uncertainty is defined as  $\pm 1.27 \text{ dB}$

## 10.6. Test Result

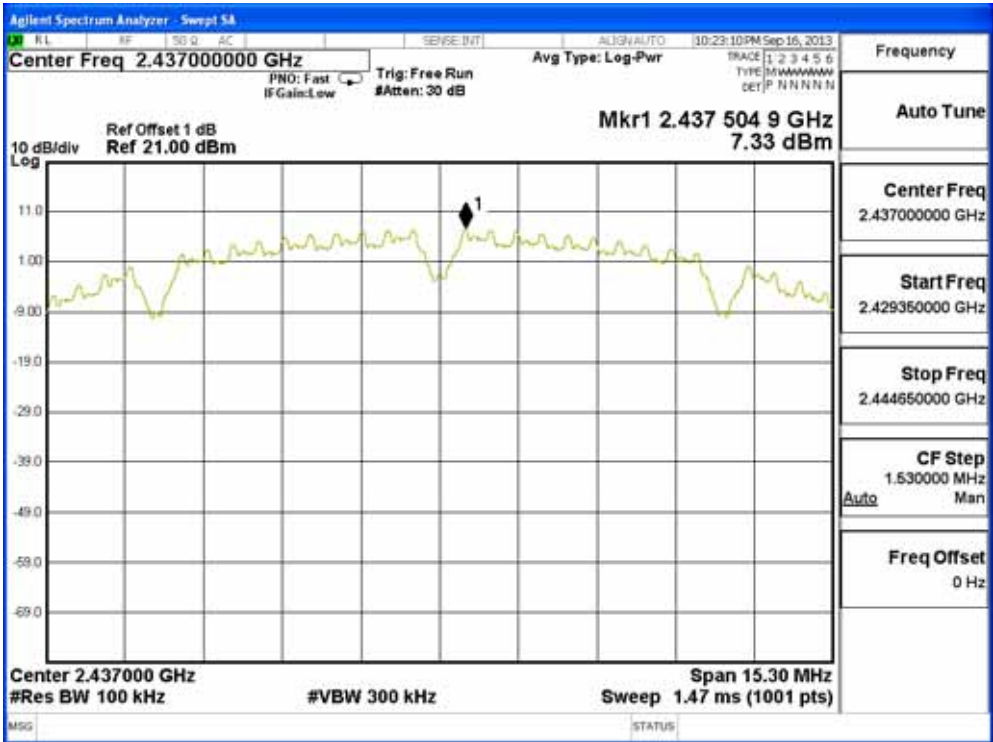
|           |   |                             |
|-----------|---|-----------------------------|
| Product   | : | Q TV Engine                 |
| Test Item | : | Power Spectral Density      |
| Test Site | : | TR-8                        |
| Test Mode | : | Mode 1: Transmit by 802.11b |

| Channel No. | Frequency (MHz) | PSD (dBm) | Limit (dBm) | Result |
|-------------|-----------------|-----------|-------------|--------|
| 01          | 2412            | 5.28      | 8           | Pass   |
| 06          | 2437            | 7.33      | 8           | Pass   |
| 11          | 2462            | 7.77      | 8           | Pass   |

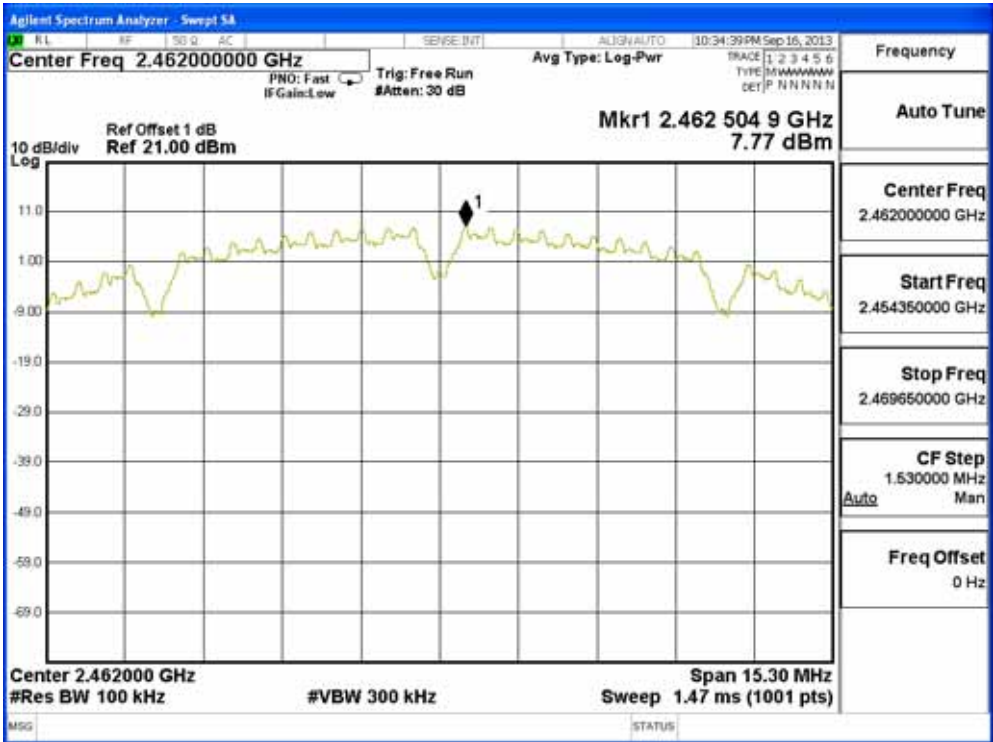
### Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



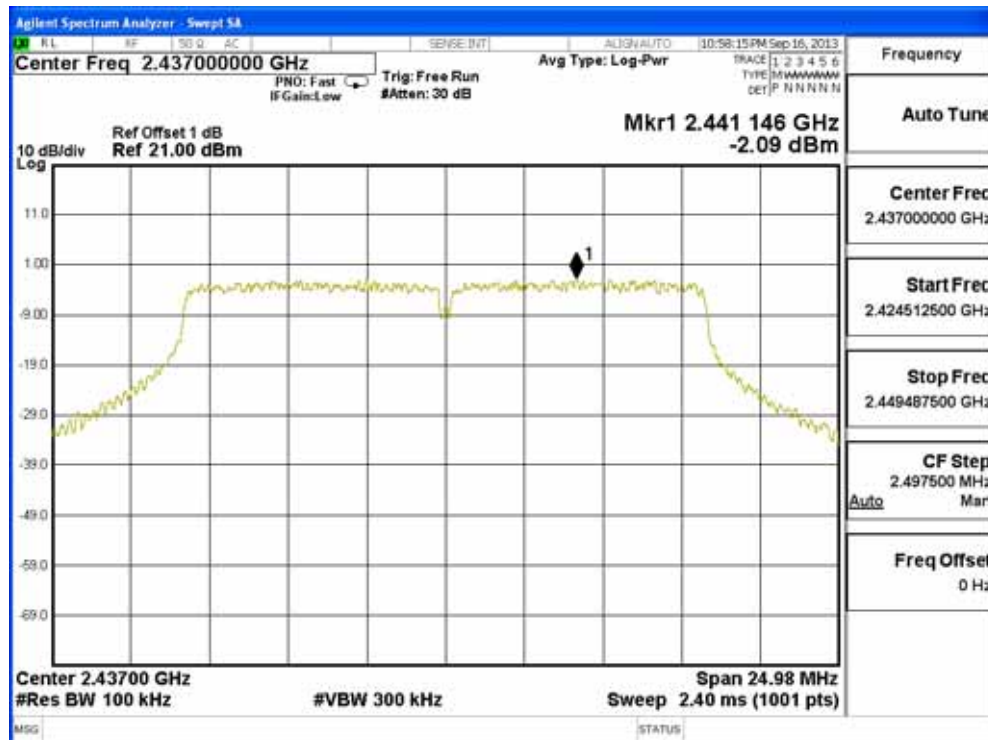
|           |   |                             |
|-----------|---|-----------------------------|
| Product   | : | Q TV Engine                 |
| Test Item | : | Power Spectral Density      |
| Test Site | : | TR-8                        |
| Test Mode | : | Mode 2: Transmit by 802.11g |

| Channel No. | Frequency (MHz) | Reading Value (dBm) | Limit (dBm) | Result |
|-------------|-----------------|---------------------|-------------|--------|
| 01          | 2412            | -4.05               | 8           | Pass   |
| 06          | 2437            | -2.09               | 8           | Pass   |
| 11          | 2462            | -3.61               | 8           | Pass   |

## Channel 01 (2412MHz)



### Channel 06 (2437MHz)



### Channel 11 (2462MHz)



|           |   |                                     |
|-----------|---|-------------------------------------|
| Product   | : | Q TV Engine                         |
| Test Item | : | Power Spectral Density              |
| Test Site | : | TR-8                                |
| Test Mode | : | Mode 3: Transmit by 802.11n (20MHz) |

| Channel No. | Frequency (MHz) | PSD (dBm) | Limit (dBm) | Result |
|-------------|-----------------|-----------|-------------|--------|
| 01          | 2412            | -4.10     | 8           | Pass   |
| 06          | 2437            | -1.61     | 8           | Pass   |
| 11          | 2462            | -4.23     | 8           | Pass   |

## Channel 01 (2412MHz)



### Channel 06 (2437MHz)



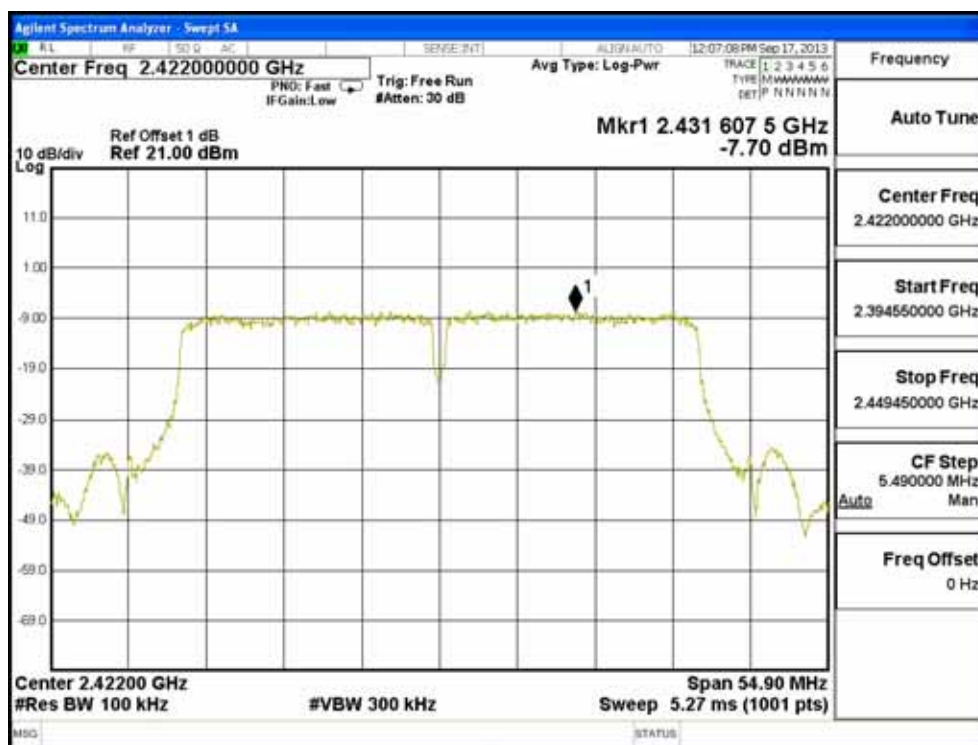
### Channel 11 (2462MHz)



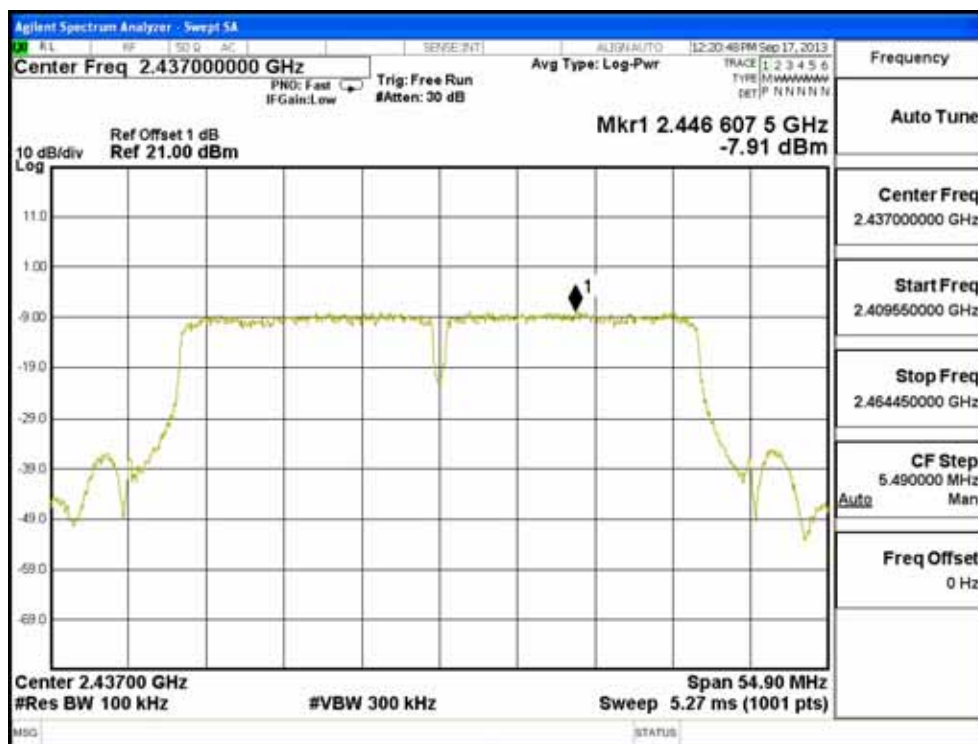
|           |   |                                     |
|-----------|---|-------------------------------------|
| Product   | : | Q TV Engine                         |
| Test Item | : | Power Spectral Density              |
| Test Site | : | TR-8                                |
| Test Mode | : | Mode 4: Transmit by 802.11n (40MHz) |

| Channel No. | Frequency (MHz) | PSD (dBm) | Limit (dBm) | Result |
|-------------|-----------------|-----------|-------------|--------|
| 03          | 2422            | -7.70     | 8           | Pass   |
| 06          | 2437            | -7.91     | 8           | Pass   |
| 09          | 2452            | -7.65     | 8           | Pass   |

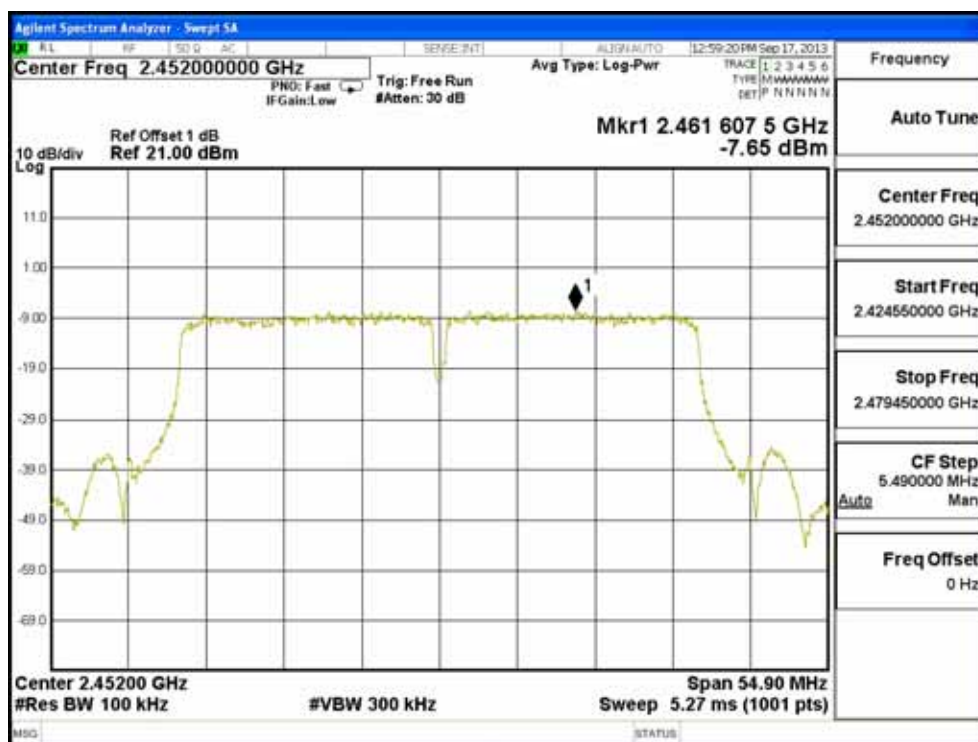
## Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



The End