| | | | | |
|---|---|---|---|---|
| **Prüfbericht-Nr.:**<br>*Test Report No.*: | **50095018 001** | **Auftrags-Nr.:**<br>*Order No.*: | 114066102 | **Seite 1 von 57**<br>*Page 1 of 57* |
| **Kunden-Referenz-Nr.:**<br>*Client Reference No.*: | N/A | **Auftragsdatum:**<br>*Order date*: | 13-Jun-2017 | |
| **Auftraggeber:**<br>*Client*: | RIFO TECHNOLOGY CO., LTD.<br>13F.-1, No.5, Sec. 3, Hsinpei Blvd., Xinzhuang Dist., New Taipei City 24250, Taiwan. | | | |
| **Prüfgegenstand:**<br>*Test item*: | WiFi Microcontroller Module | | | |
| **Bezeichnung / Typ-Nr.:**<br>*Identification / Type No.*: | TC3200-S-ANT | | | |
| **Auftrags-Inhalt:**<br>*Order content*: | FCC Part 15C Test report | | | |
| **Prüfgrundlage:**<br>*Test specification*: | FCC 47CFR Part 15: Subpart C Section 15.247 | | | |

| | |
|---|---|
| **Wareneingangsdatum:**<br>*Date of receipt*: | 31-Jul-2017 |
| **Prüfmuster-Nr.:**<br>*Test sample No.*: | A000573628-001<br>A000573628-002 |
| **Prüfzeitraum:**<br>*Testing period*: | 02-Aug-2017 - 08-Aug-2017 |
| **Ort der Prüfung:**<br>*Place of testing*: | EMC Laboratory Taipei |
| **Prüflaboratorium:**<br>*Testing laboratory*: | TUV Rheinland Taiwan Ltd. |
| **Prüfergebnis*:**<br>*Test result**: | Pass |

**Report Date /** *tested by*:

04-Sep-2017 Amy S.R.Hsu /Project Engineer

| **Datum**<br>*Date* | **Name / Stellung**<br>*Name / Position* | **Unterschrift**<br>*Signature* |
|---|---|---|

**kontrolliert von /** *reviewed by*:

04-Sep-2017 Arvin Ho/Vice General Manager

| **Datum**<br>*Date* | **Name / Stellung**<br>*Name / Position* | **Unterschrift**<br>*Signature* |
|---|---|---|

**Sonstiges /** *Other*:

| | |
|---|---|
| **Zustand des Prüfgegenstandes bei Anlieferung:**<br>*Condition of the test item at delivery*: | Prüfmuster vollständig und unbeschädigt<br>*Test item complete and undamaged* |

| | | | | | |
|---|---|---|---|---|---|
| * Legende: | 1 = sehr gut | 2 = gut | 3 = befriedigend | 4 = ausreichend | 5 = mangelhaft |
| | P(ass) = entspricht o.g. Prüfgrundlage(n) | | F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | N/A = nicht anwendbar | N/T = nicht getestet |
| *Legend:* | *1 = very good* | *2 = good* | *3 = satisfactory* | *4 = sufficient* | *5 = poor* |
| | *P(ass) = passed a.m. test specification(s)* | | *F(ail) = failed a.m. test specification(s)* | *N/A = not applicable* | *N/T = not tested* |

# TEST SUMMARY

**4.1.1 ANTENNA REQUIREMENT**
*RESULT: Passed*

**4.1.2 PEAK OUTPUT POWER**
*RESULT: Passed*

**4.1.3 6DB BANDWIDTH AND 99% BANDWIDTH**
*RESULT: Passed*

**4.1.4 POWER DENSITY**
*RESULT: Passed*

**4.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100KHZ BANDWIDTH**
*RESULT: Passed*

**4.1.6 SPURIOUS EMISSION**
*RESULT: Passed*

**4.2.1 MAINS CONDUCTED EMISSIONS**
*RESULT: Passed*

**5.1.1 ELECTROMAGNETIC FIELDS**
*RESULT: Passed*

# Contents

GENERAL REMARKS ..... 5
1.1 COMPLEMENTARY MATERIALS ..... 5
1. TEST SITES ..... 6
1.1 TEST FACILITIES ..... 6
1.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS ..... 7
1.3 TRACEABILITY ..... 8
1.4 CALIBRATION ..... 8
1.5 MEASUREMENT UNCERTAINTY ..... 8
2. GENERAL PRODUCT INFORMATION ..... 9
2.1 PRODUCT FUNCTION AND INTENDED USE ..... 9
2.2 SYSTEM DETAILS AND RATINGS ..... 9
2.3 INDEPENDENT OPERATION MODES ..... 10
2.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS ..... 10
2.5 SUBMITTED DOCUMENTS ..... 10
3. TEST SET-UP AND OPERATION MODES ..... 11
3.1 PRINCIPLE OF CONFIGURATION SELECTION ..... 11
3.2 TEST OPERATION AND TEST SOFTWARE ..... 11
3.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT ..... 12
3.4 COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE ..... 12
3.5 TEST SETUP DIAGRAM ..... 12
4. TEST RESULTS ..... 14
4.1 TRANSMITTER REQUIREMENT & TEST SUITES ..... 14
*4.1.1 Antenna Requirement ..... 14*
*4.1.2 Peak Output Power ..... 15*
*4.1.3 6dB Bandwidth and 99% Bandwidth ..... 17*
*4.1.4 Power Density ..... 32*
*4.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth ..... 40*
*4.1.6 Spurious Emission ..... 50*
4.2 MAINS EMISSIONS ..... 51
*4.2.1 Mains Conducted Emissions ..... 51*
5. SAFETY HUMAN EXPOSURE ..... 52
5.1 RADIO FREQUENCY EXPOSURE COMPLIANCE ..... 52
*5.1.1 Electromagnetic Fields ..... 52*

**6. PHOTOGRAPHS OF THE TEST SET-UP ..... 53**

**7. LIST OF TABLES ..... 57**

**8. LIST OF PHOTOGRAPHS ..... 57**

# General Remarks

## 1.1 Complementary Materials

The following attachments are integral parts of this test report:

**Appendix P: Photo Documentation**
**(File Name: 50095018 001APPENDIX P)**
**Appendix D: Test Result of Radiated Emissions**
**(File Name: 50095018 001APPENDIX D)**

Test Specifications

The following standards were applied (in bold: product standards, otherwise: basic standards).

### Table 1: Applied Standard and Test Levels

| **Radio** |
|---|
| FCC CFR47 Part 15: Subpart C Section 15.247<br>ANSI C63.10:2013<br>KDB558074 D01 DTS Meas Guidance v03r05 |

# 1. Test Sites

## 1.1 Test Facilities

TUV Rheinland Taiwan Ltd.
Taipei Office

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC RegistrationNo.: 340738
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2016-Jul-1st to 2019-Jun-30th

## 1.2 List of Test and Measurement Instruments

### Table 2: List of Test and Measurement Equipment

| Kind of Equipment | Manu-facturer | Type | S/N | Last Calibration | Next Calibration |
|---|---|---|---|---|---|
| Test Software | Farad | EZ_EMC | Ver. TUV3A1 | N/A | N/A |
| EMI Test Receiver | R&S | ESR7 | 101062 | 2016/09/12 | 2017/09/12 |
| Spectrum Analyzer | R&S | FSV 40 | 100921 | 2017/05/02 | 2018/05/01 |
| Spectrum Analyzer | Agilent | N9010A | MY53470241 | 2017/05/23 | 2018/05/22 |
| Preamplifier (30MHz -1GHz) | HP | 8447D | 2944A06641 | 2016/12/28 | 2017/12/28 |
| Preamplifier (18 GHz -40 GHz) | COM-POWER | PAM-840 | 461257 | 2016/12/01 | 2017/12/01 |
| Pre-Amplifier (1GHz~18GHz) | EM Electronics | EM01G18G | 060558 | 2016/11/17 | 2017/11/17 |
| Bilog Antenna | TESEQ | CBL6111D | 29802 | 2017/07/12 | 2018/07/12 |
| Horn Antenna | ETS-Lindgren | 3117 | 138160 | 2017/05/25 | 2018/05/25 |
| Horn Antenna (18GHz~40GHz) | COM-POWER | AH-840 | 101031 | 2016/11/22 | 2017/11/22 |
| Loop Antenna | Schwarzbeck | FMZB 1513 | 1513-076 | 2017/06/14 | 2018/06/14 |
| EMI Test Receiver | R&S | ESCI7 | 100797 | 2016/12/30 | 2017/12/30 |
| Spectrum Analyzer | R&S | FSL3 | 101943 | 2015/09/07 | 2017/09/07 |
| Temp. & Humid. Chamber | WISEWIND | 1509 | 509Q24R | 2017/05/24 | 2018/05/24 |
| LISN (1 phase) | R&S | ENV216 | 101243 | 2017/06/18 | 2018/06/18 |
| LISN | R&S | ENV216 | 101262 | 2017/06/22 | 2018/06/21 |

## 1.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 1.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

## 1.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

### Table 3: Emission Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| RF power, conducted | ± 1.5 dB |
| Adjacent channel power | ± 3 dB |
| Radiated emission of transmitter, valid up to 26 GHz | ± 6 dB |
| Radiated emission of receiver, valid up to 26 GHz | ± 6 dB |
| Temperature | ± 2 ºC |
| Humidity | ± 10 % |

# 2. General Product Information

## 2.1 Product Function and Intended Use

The EUT is a WiFi Microcontroller Module. It contains a WiFi b/g/n compatible module enabling the user to communicate data through a Wireless interface.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

## 2.2 System Details and Ratings

### Table 4: Basic Information of EUT

| Item | EUT information |
|---|---|
| Kind of Equipment | WiFi Microcontroller Module |
| Type Designation | TC3200-S-ANT |
| FCC ID | 2AEQ402 |

### Table 5: Technical Specification of EUT

| Technical Specification | Value |
|---|---|
| Operating Frequencies | 2412 MHz ~ 2462 MHz |
| Channel Spacing | 5 MHz |
| Channel number | 11 Ch for 802.11b/g/n20 |
| Operation Voltage | 3.3V |
| Modulation | 802.11b: DSSS 802.11g/n: OFDM with BPSK, QPSK, QAM |
| Antenna gain | 3.52 dBi |

## 2.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Receiving
C. Standby
D. Off

## 2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

## 2.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Technical Description
- Circuit Diagram
- Instruction Manual
- Rating Label

# 3. Test Set-up and Operation Modes

## 3.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

## 3.2 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB to SPI interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 2.3 as appropriate.

The samples were used as follows:
Conducted: A000573628-001
Radiation: A000573628-002
Full test was applied on all test modes, but only worst case was shown

IEEE 802.11b mode:
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE 802.11g mode:
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 mode:
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

### 3.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

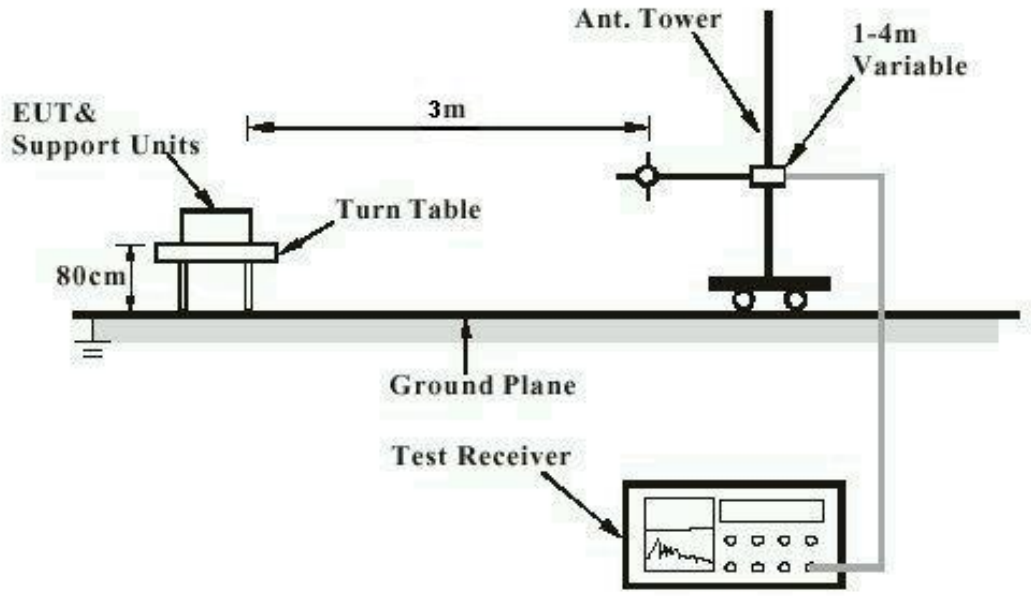
| Description | Manufacturer | Model No. | Serial No. |
|---|---|---|---|
| Notebook(EMC-06) | Lenovo | TP00048A | PB-0F8B2 |

## 3.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

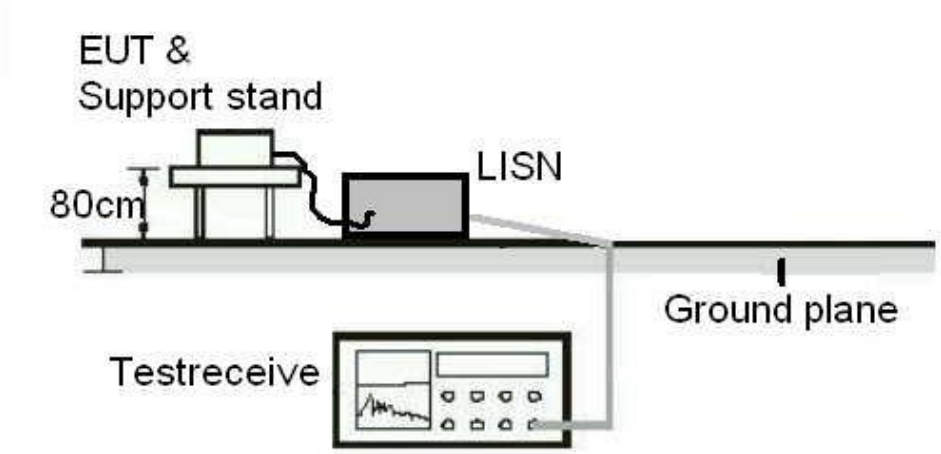
## 3.5 Test Setup Diagram

**Diagram of Measurement Configuration for Radiation Test**

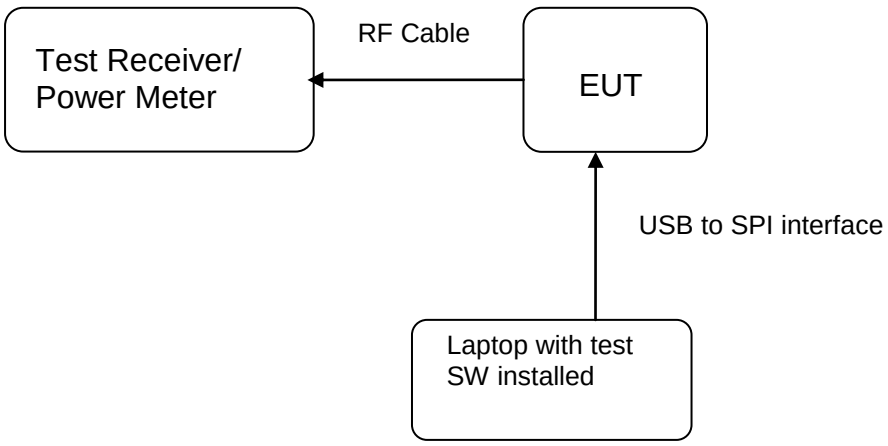



Note: Measurements above 1 GHz are done with a table height of 1.5m.

## Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)




## Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



# 4. Test Results

## 4.1 Transmitter Requirement & Test Suites

### 4.1.1 Antenna Requirement

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | LP0002(2016): 3.10.1.3<br>FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 8.3 |
| Limit | : | the use of antennas with directional gains that do not exceed 6 dBi |

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 3.52 dBi .The antenna a Chip Antenna soldered to the PCB with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

## 4.1.2 Peak Output Power

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | LP0002(2016): 3.10.1.2<br>FCC Part 15.247(b)(3), RSS-247 5.4(4) |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Limit | : | 1 Watt |
| Kind of test site | : | Shielded room |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation Mode | : | A |

| | | |
|---|---|---|
| Ambient temperature | : | 22-26 °C |
| Relative humidity | : | 50-65 % |
| Atmospheric pressure | : | 100-103 kPa |

**Table 6: Test result of Peak Output Power (802.11b)**

| Channel | Channel Frequency (MHz) | Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | (W) |
| Low Channel | 2412 | 15.20 | 0.03311 | 1 |
| Middle Channel | 2437 | 17.59 | 0.05741 | 1 |
| High Channel | 2462 | 16.23 | 0.04198 | 1 |

**Table 7: Test result of Peak Output Power (802.11g)**

| Channel | Channel Frequency (MHz) | Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | (W) |
| Low Channel | 2412 | 13.12 | 0.02051 | 1 |
| Middle Channel | 2437 | 15.28 | 0.03373 | 1 |
| High Channel | 2462 | 14.74 | 0.02979 | 1 |

## Table 8: Test result of Peak Output Power (802.11n HT20)

| Channel | Channel Frequency (MHz) | Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | (W) |
| Low Channel | 2412 | 14.45 | 0.02786 | 1 |
| Middle Channel | 2437 | 15.47 | 0.03524 | 1 |
| High Channel | 2462 | 14.71 | 0.02958 | 1 |

## 4.1.3 6dB Bandwidth and 99% Bandwidth

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | LP0002(2016): 3.10.1.6,(2)(A)<br>FCC Part 15.247(a)(2), RSS-247 5.2(1) |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Kind of test site | : | Shielded room |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation Mode | : | A |
| Ambient temperature | : | 22-26°C |
| Relative humidity | : | 50-65% |
| Atmospheric pressure | : | 100-103 kPa |

### Table 9: Test result of 6dB Bandwidth (802.11b)

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|
| Low Channel | 2412 | 9.107 | 0.5 | Pass |
| Mid Channel | 2437 | 10.03 | 0.5 | Pass |
| High Channel | 2462 | 9.102 | 0.5 | Pass |

### Table 10: Test result of 6dB Bandwidth (802.11g)

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|
| Low Channel | 2412 | 15.07 | 0.5 | Pass |
| Mid Channel | 2437 | 15.12 | 0.5 | Pass |
| High Channel | 2462 | 15.13 | 0.5 | Pass |

### Table 11: Test result of 6dB Bandwidth (802.11n HT20)

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|
| Low Channel | 2412 | 15.13 | 0.5 | Pass |
| Mid Channel | 2437 | 15.11 | 0.5 | Pass |
| High Channel | 2462 | 15.13 | 0.5 | Pass |

### Table 12: Test result of 99% Bandwidth (802.11b)

| Channel | Channel Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low Channel | 2412 | 14.063 |
| Mid Channel | 2437 | 14.015 |
| High Channel | 2462 | 14.072 |

### Table 13: Test result of 99% Bandwidth (802.11g)

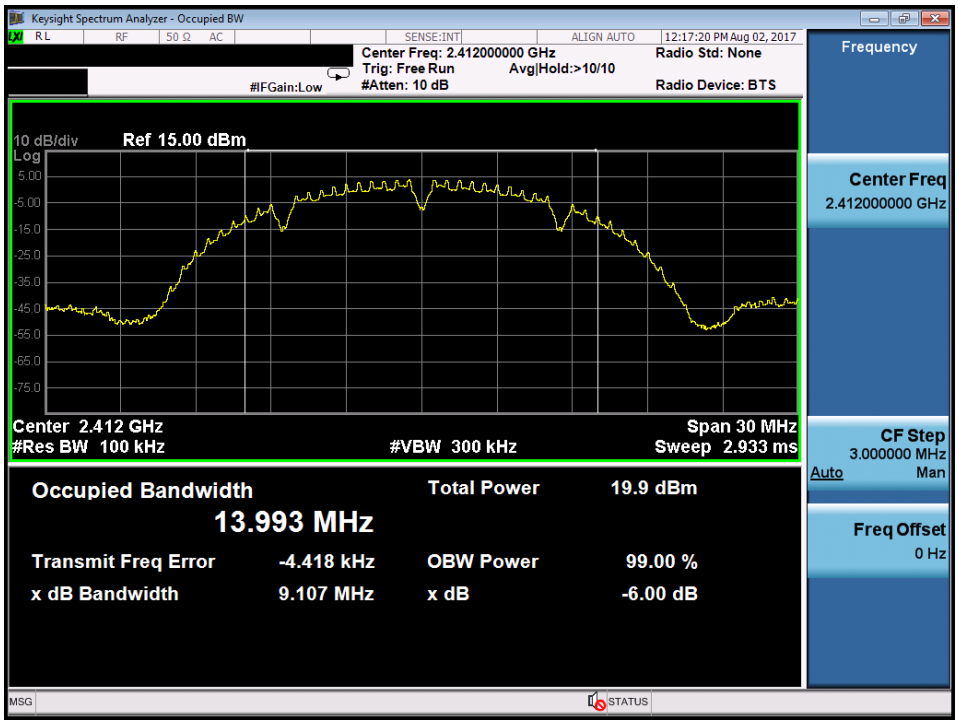
| Channel | Channel Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low Channel | 2412 | 16.527 |
| Mid Channel | 2437 | 16.558 |
| High Channel | 2462 | 16.580 |

### Table 14: Test result of 99% Bandwidth (802.11n HT20)

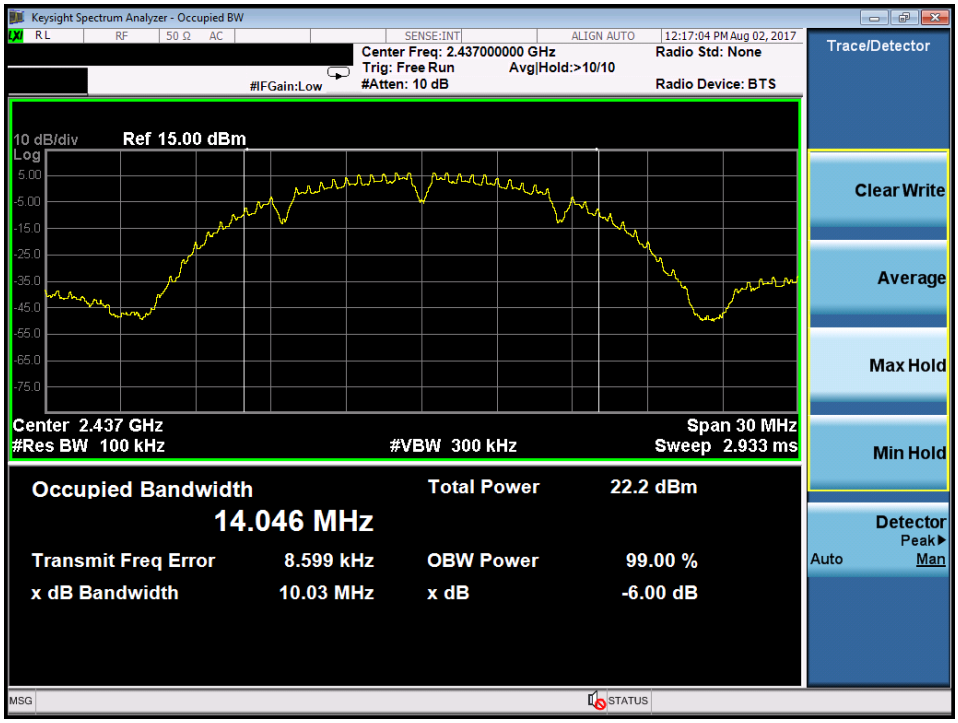
| Channel | Channel Frequency (MHz) | 99% Bandwidth (MHz) |
|---|---|---|
| Low Channel | 2412 | 17.706 |
| Mid Channel | 2437 | 17.637 |
| High Channel | 2462 | 17.629 |

# Test Plot of 6dB Bandwidth (802.11b)

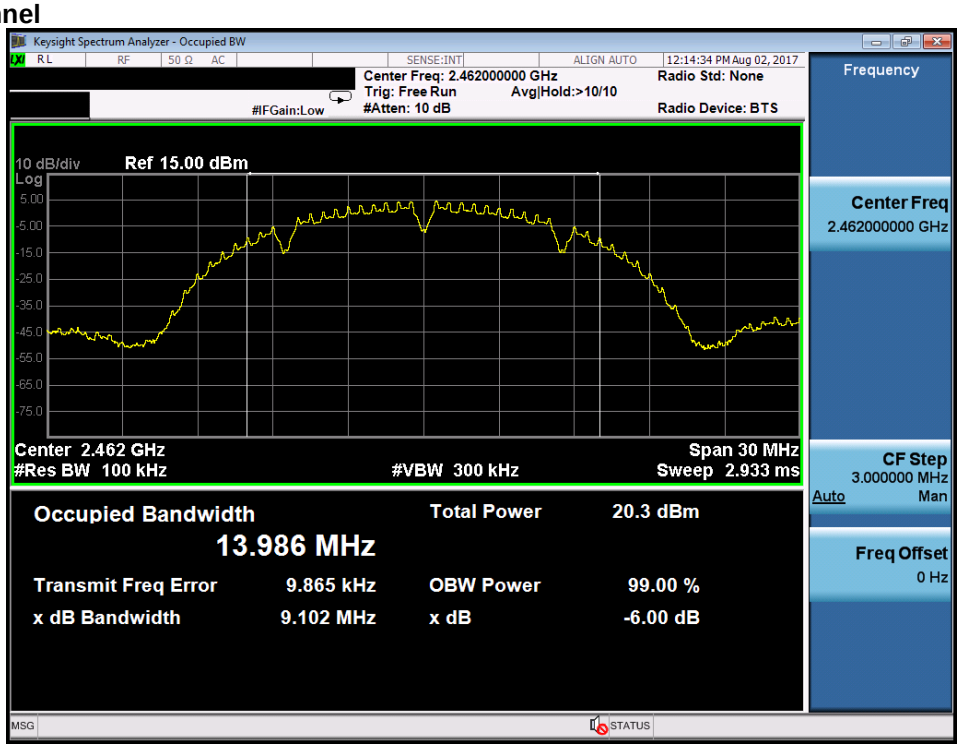
## Low Channel




## Middle Channel

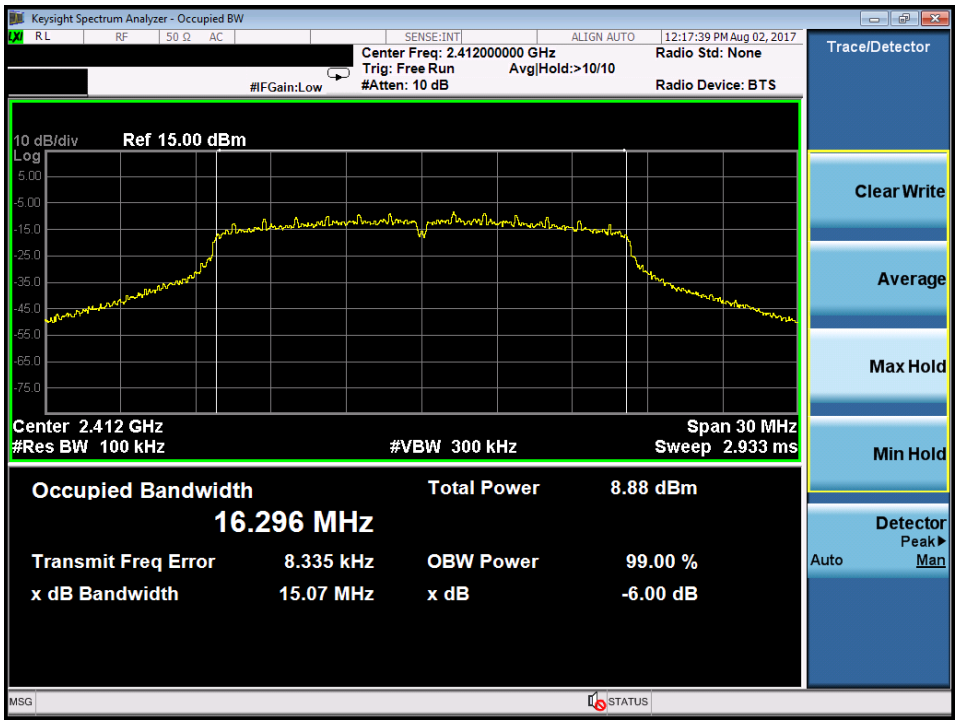


**High Channel**

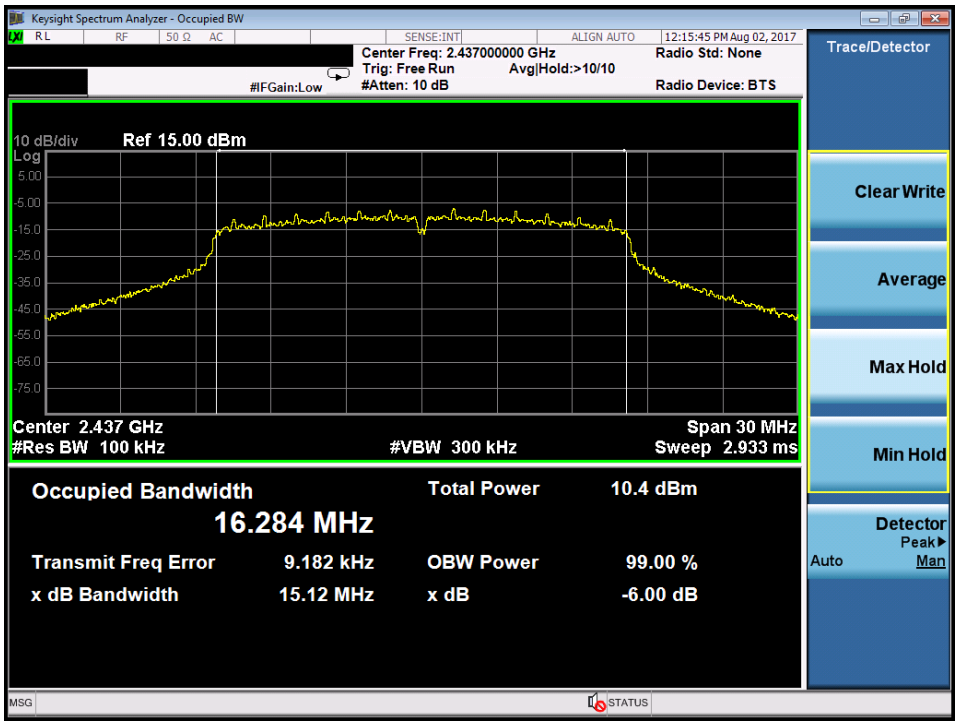


# Test Plot of 6dB Bandwidth (802.11g)

## Low Channel



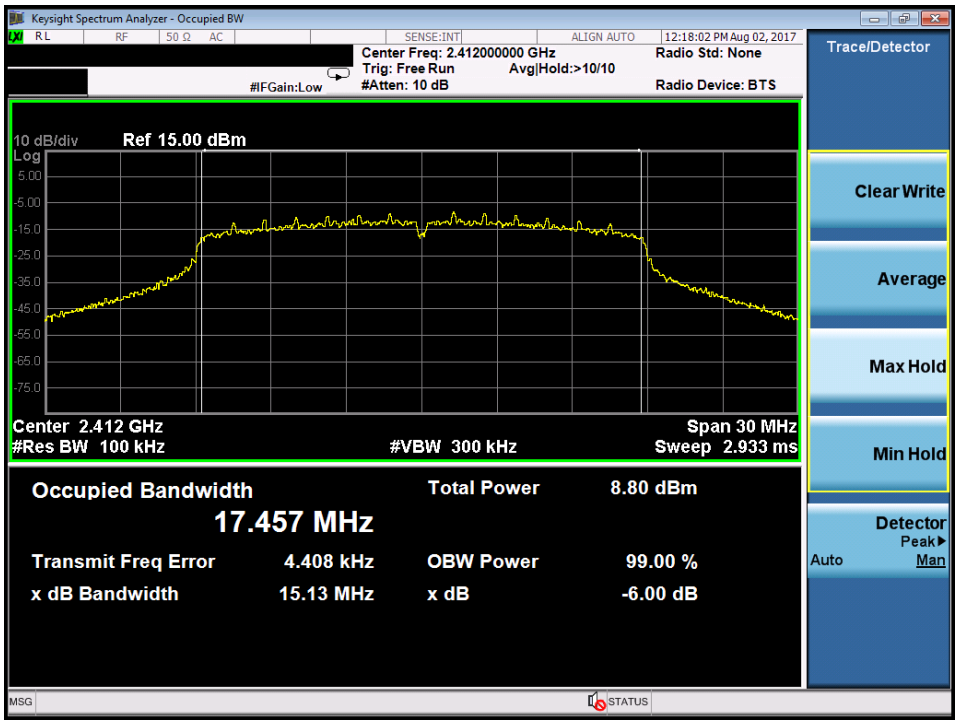

## Middle Channel



**High Channel**

# Test Plot of 6dB Bandwidth (802.11n HT20)

## Low Channel

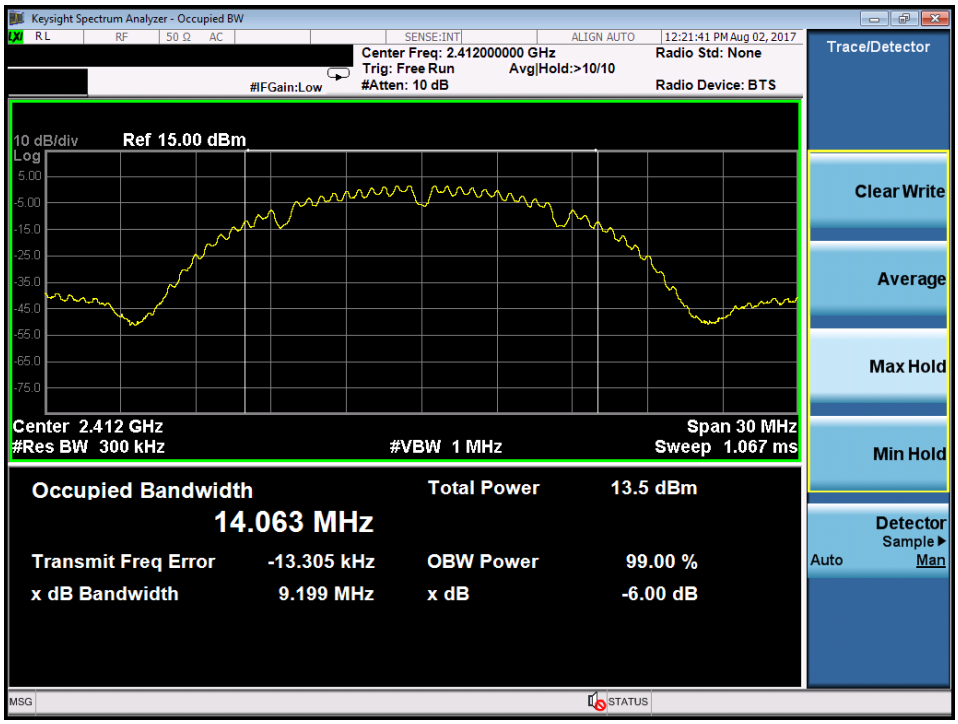



## Middle Channel

**High Channel**

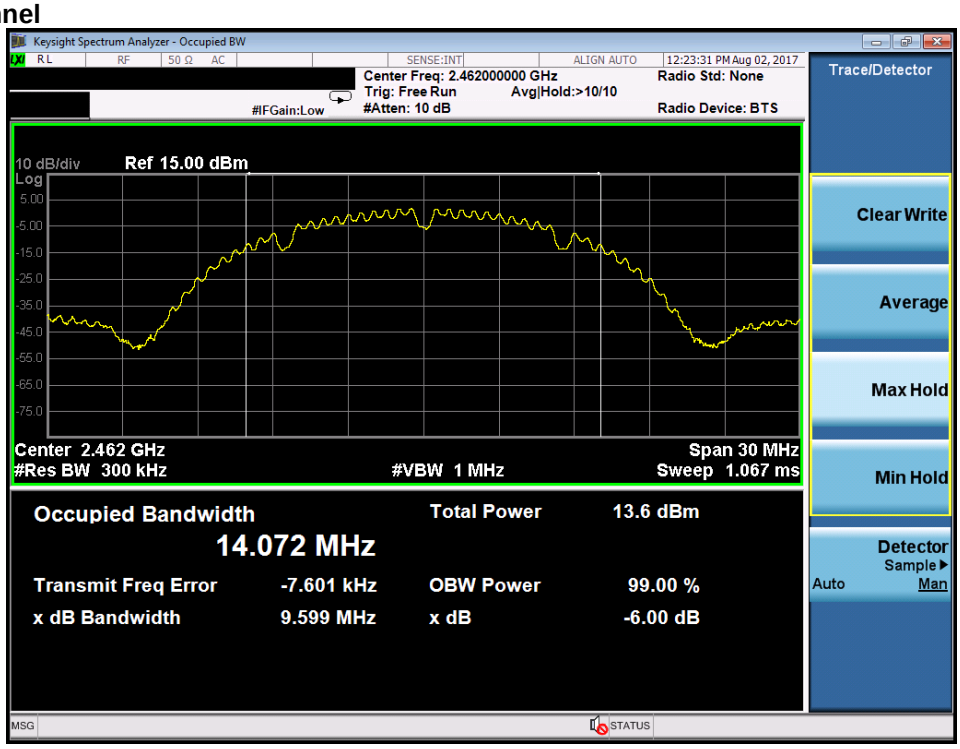
# Test Plot of 99% Bandwidth (802.b)

## Low Channel



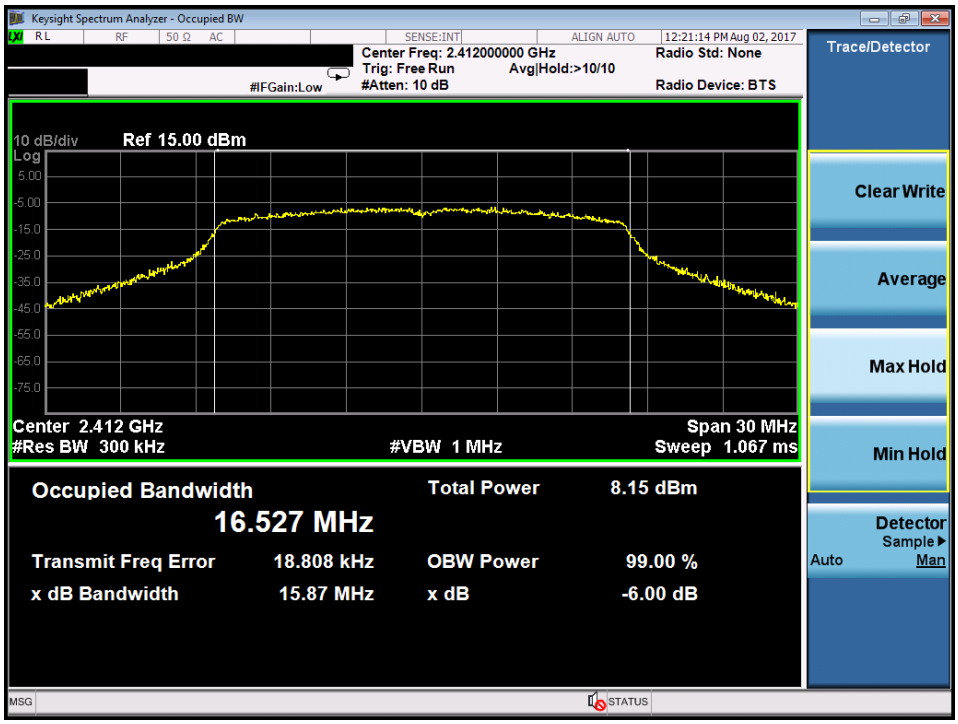

## Middle Channel

**High Channel**



# Test Plot of 99% Bandwidth (802.g)

## Low Channel



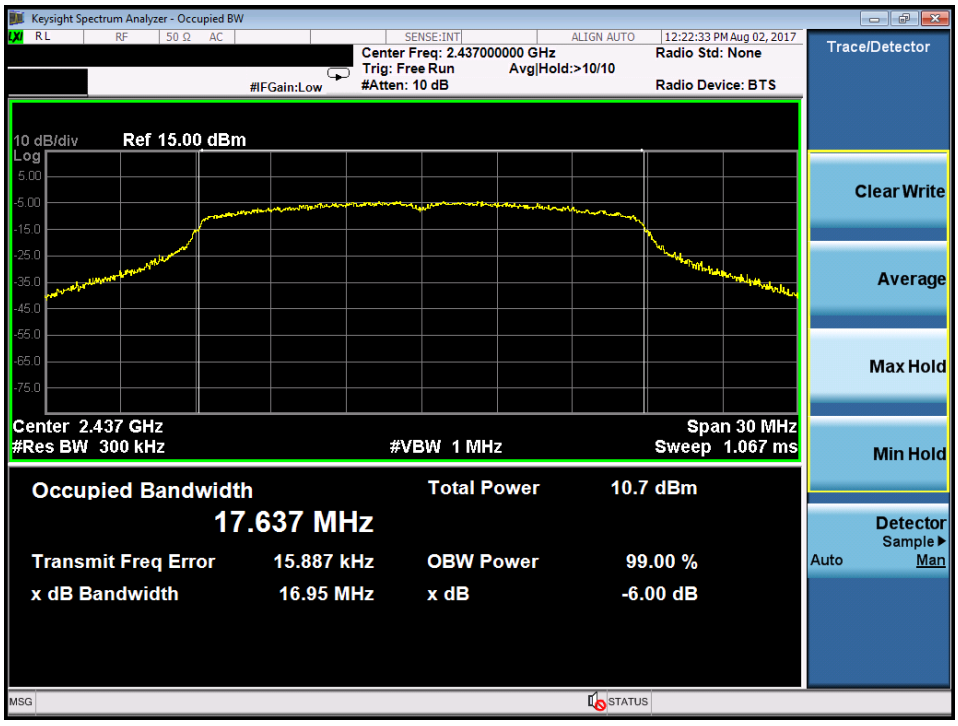

## Middle Channel

**High Channel**

# Test Plot of 99% Bandwidth (802.11HT20)

## Low Channel


## Middle Channel



**High Channel**

## 4.1.4 Power Density

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | LP0002(2016): 3.10.1.6,(2)(B)<br>FCC Part 15.247(e) , RSS-247 5.2(2) |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Kind of test site | : | Shielded room |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation Mode | : | A |
| Ambient temperature | : | 22-26°C |
| Relative humidity | : | 50-65% |
| Atmospheric pressure | : | 100-103 kPa |

### Table 15: Test result of Power Density (802.11b)

| Channel | Channel Frequency (MHz) | Power Density | Limit |
|---|---|---|---|
| | | (dBm) | (dBm) |
| Low Channel | 2412 | 4.18 | 8 |
| Middle Channel | 2437 | 5.24 | 8 |
| High Channel | 2462 | 4.30 | 8 |

### Table 16: Test result of Power Density (802.11g)

| Channel | Channel Frequency (MHz) | Power Density | Limit |
|---|---|---|---|
| | | (dBm) | (dBm) |
| Low Channel | 2412 | -8.96 | 8 |
| Middle Channel | 2437 | -7.19 | 8 |
| High Channel | 2462 | -7.90 | 8 |

### Table 17: Test result of Power Density (802.11n HT20)

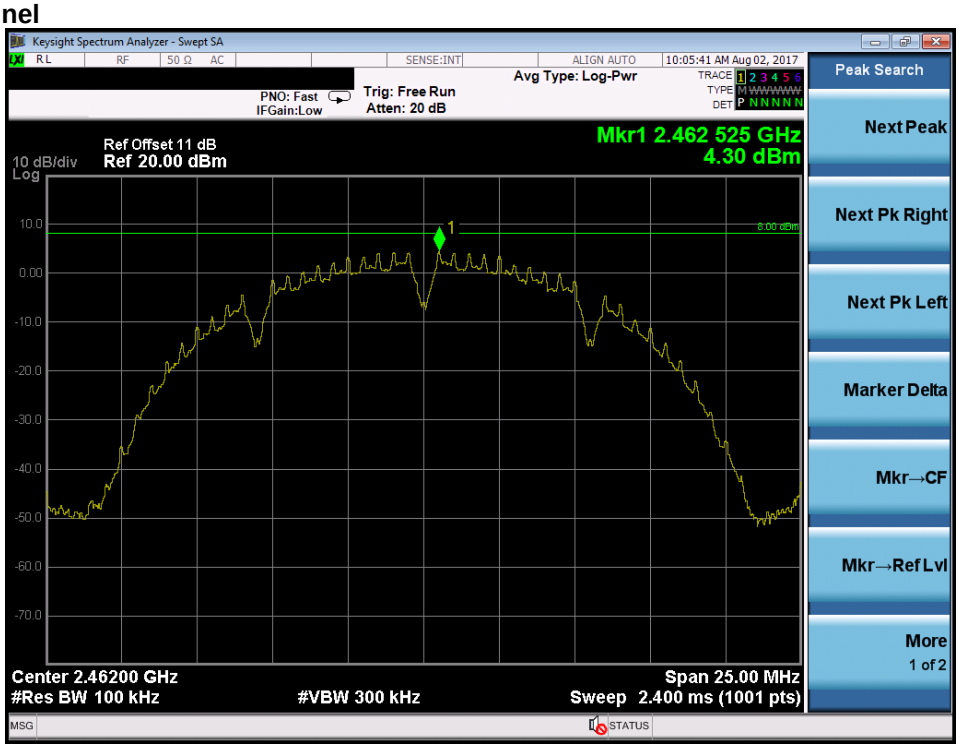
| Channel | Channel Frequency (MHz) | Power Density | Limit |
|---|---|---|---|
| | | (dBm) | (dBm) |
| Low Channel | 2412 | -8.37 | 8 |
| Middle Channel | 2437 | -6.19 | 8 |
| High Channel | 2462 | -6.44 | 8 |

# Test Plot of Power Density (802.11b)

## Low Channel


## Middle Channel

**High Channel**

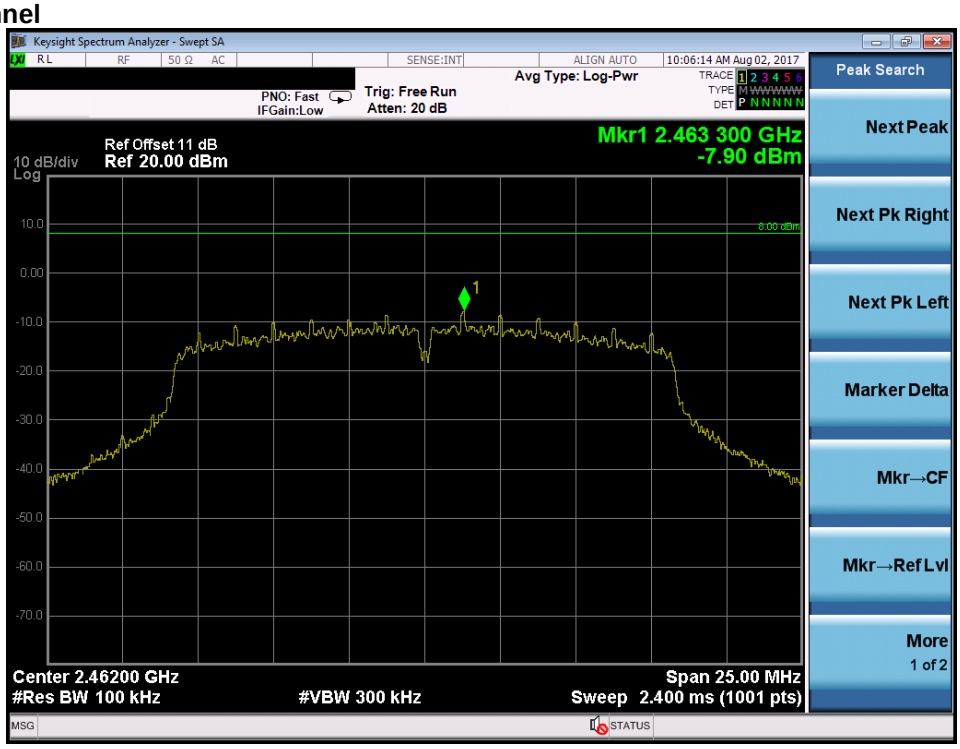


# Test Plot of Power Density (802.11g)

## Low Channel


## Middle Channel

**High Channel**



# Test Plot of Power Density (802.11n HT20)

## Low Channel


## Middle Channel

**High Channel**

## 4.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | LP0002(2016): 3.10.1.5<br>FCC part 15.247(d), RSS-247 5.5 |
| Basic standard | : | ANSI C63.10:2009, KDB558074 |
| Limit | : | 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power) |
| Kind of test site | : | Shielded room |

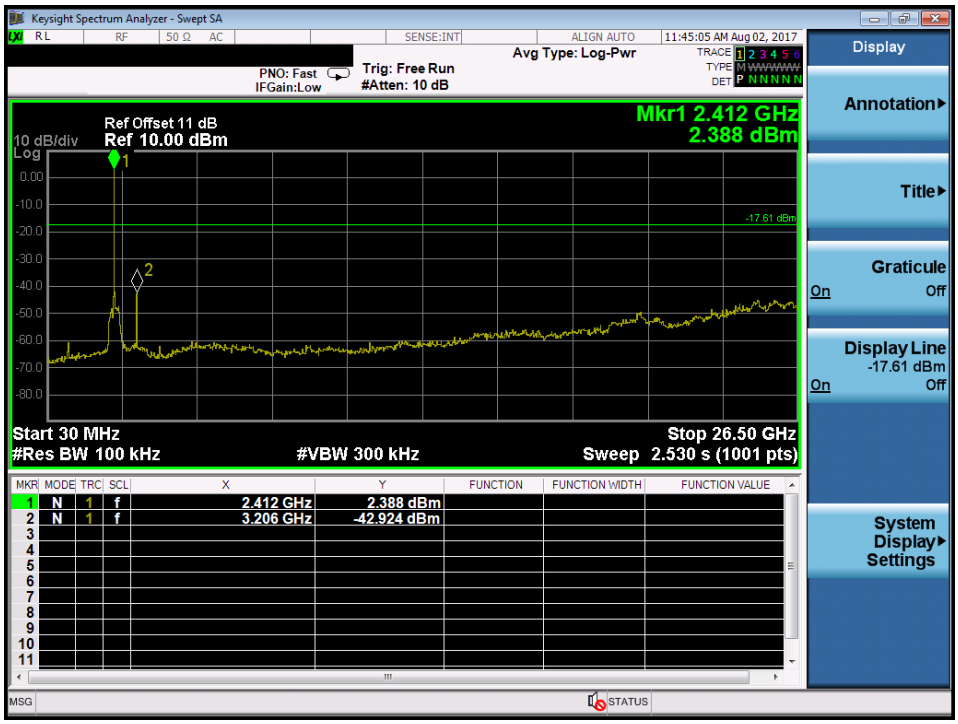
**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ High |
| Operation mode | : | A |
| Ambient temperature | : | 22-26°C |
| Relative humidity | : | 50-65% |
| Atmospheric pressure | : | 100-103 kPa |

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achieved as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

# Test Plot 100kHz Conducted Emissions (802.11b)

## Low Channel

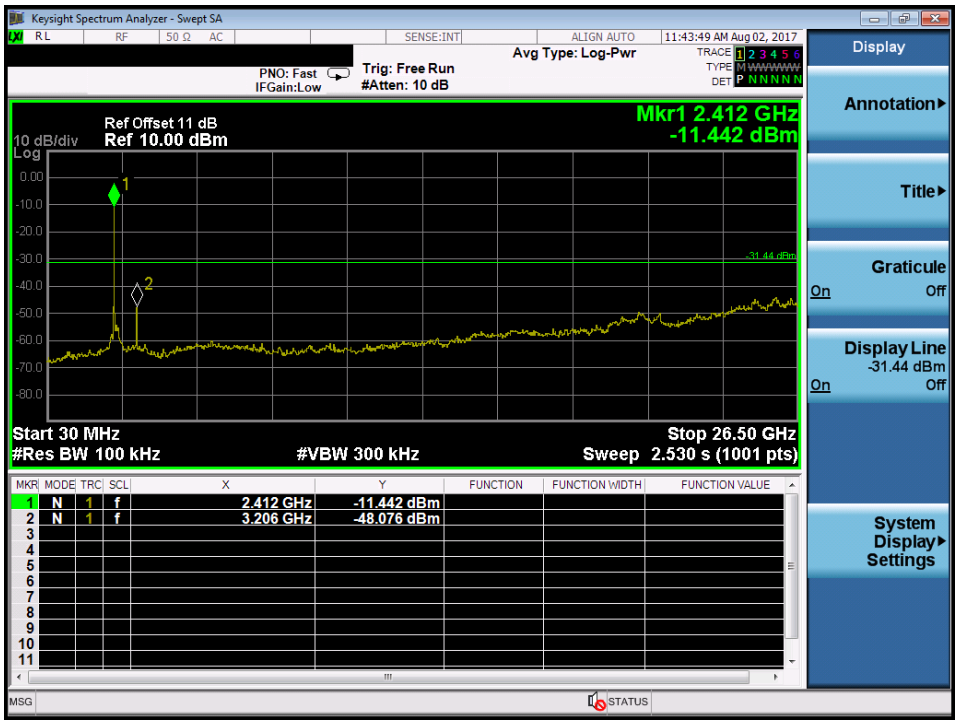



## Middle Channel

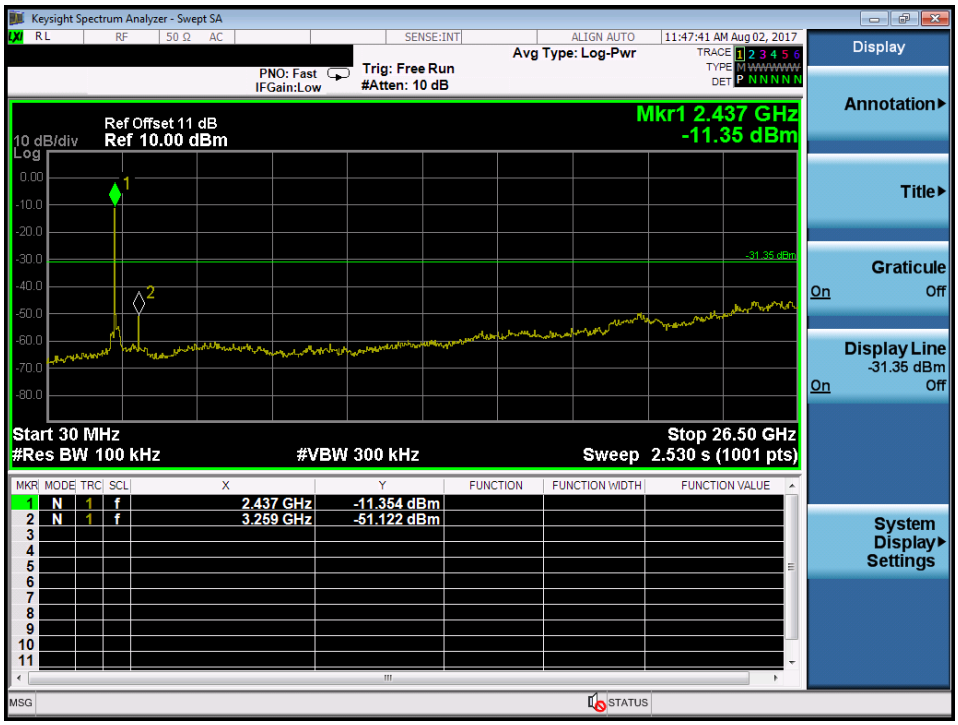
**High Channel**

# Test Plot 100kHz Conducted Emissions (802.11g)

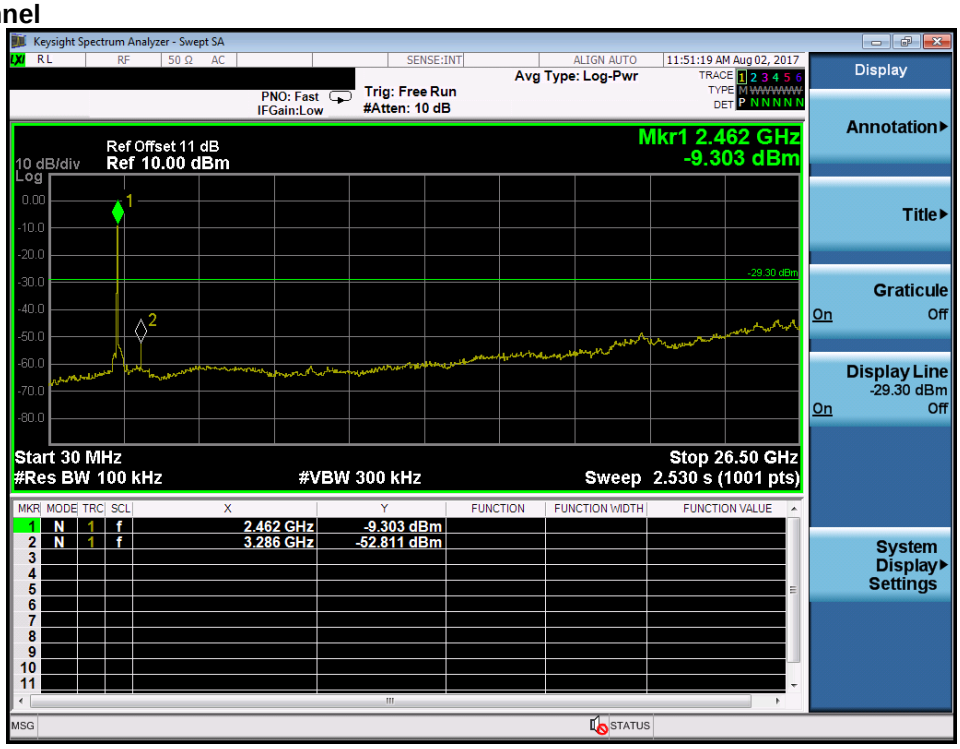
## Low Channel




## Middle Channel

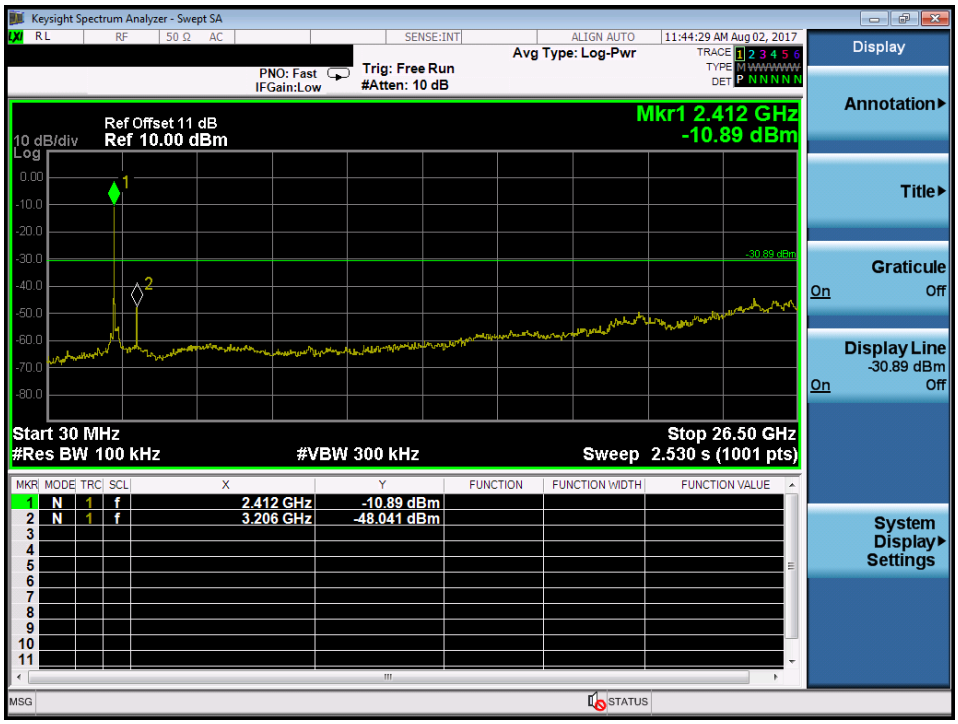


**High Channel**

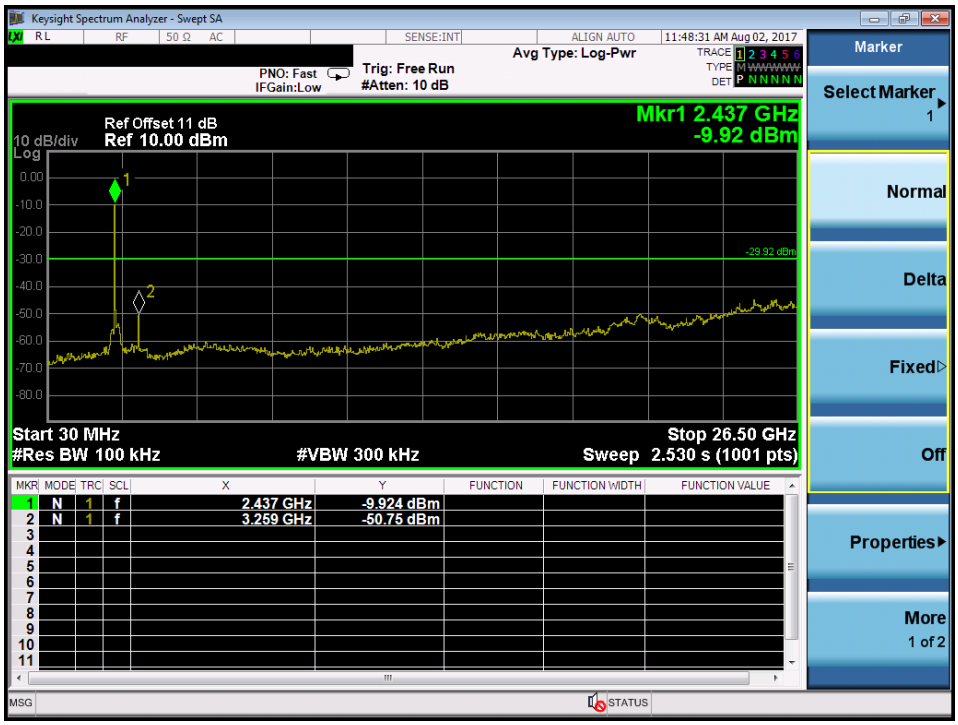


# Test Plot 100kHz Conducted Emissions (802.11n HT20)

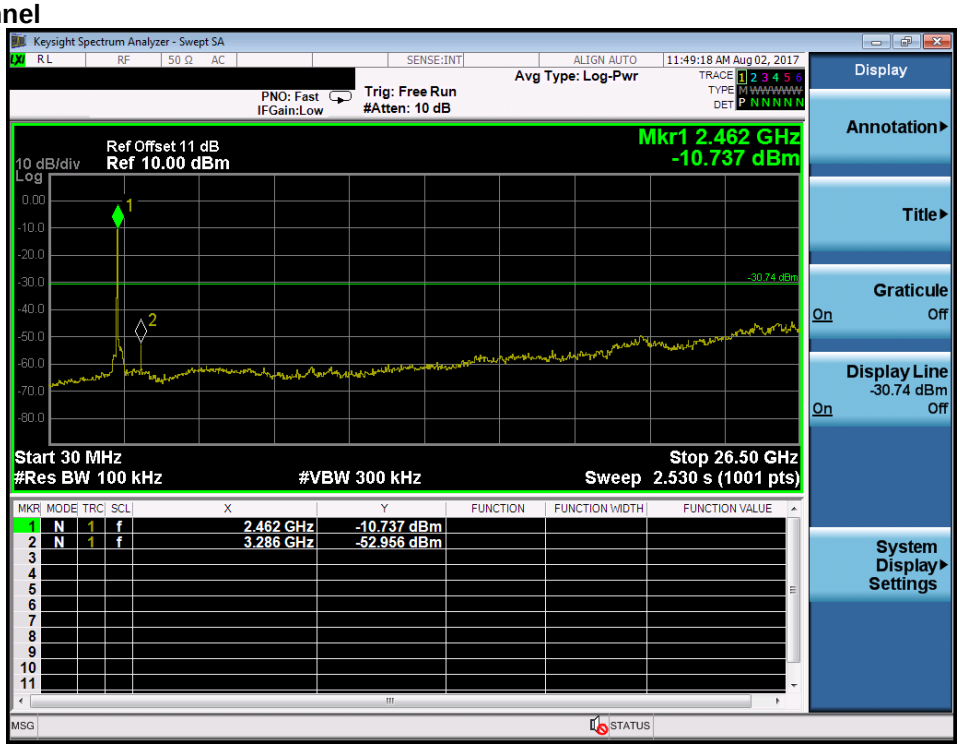
## Low Channel




## Middle Channel

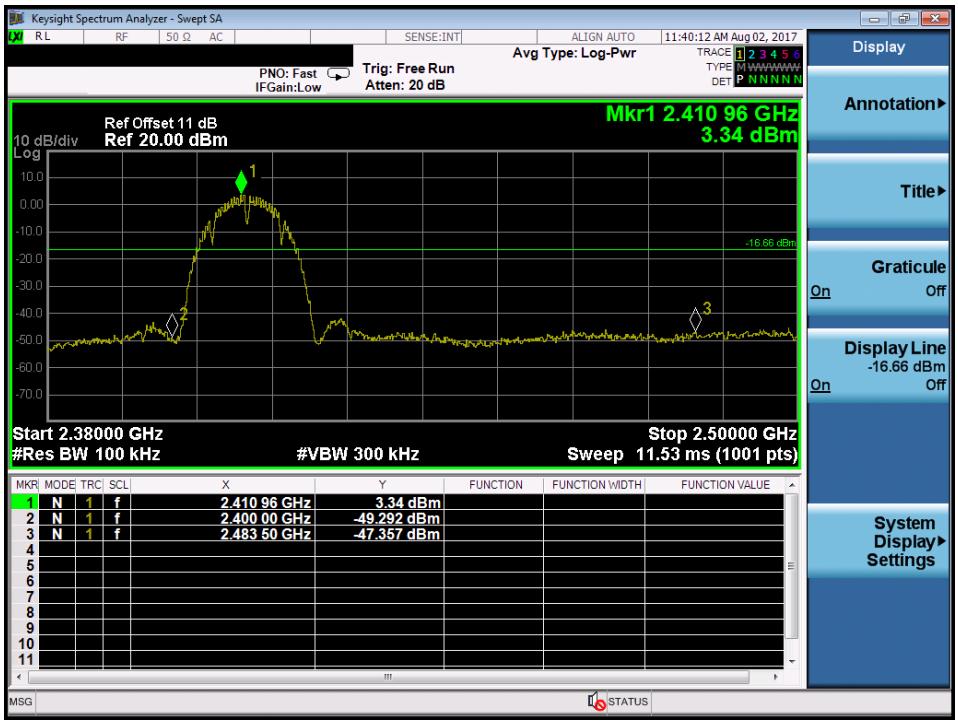


**High Channel**



# Test Plot 100kHz RBW of Band Edge (802.11b)

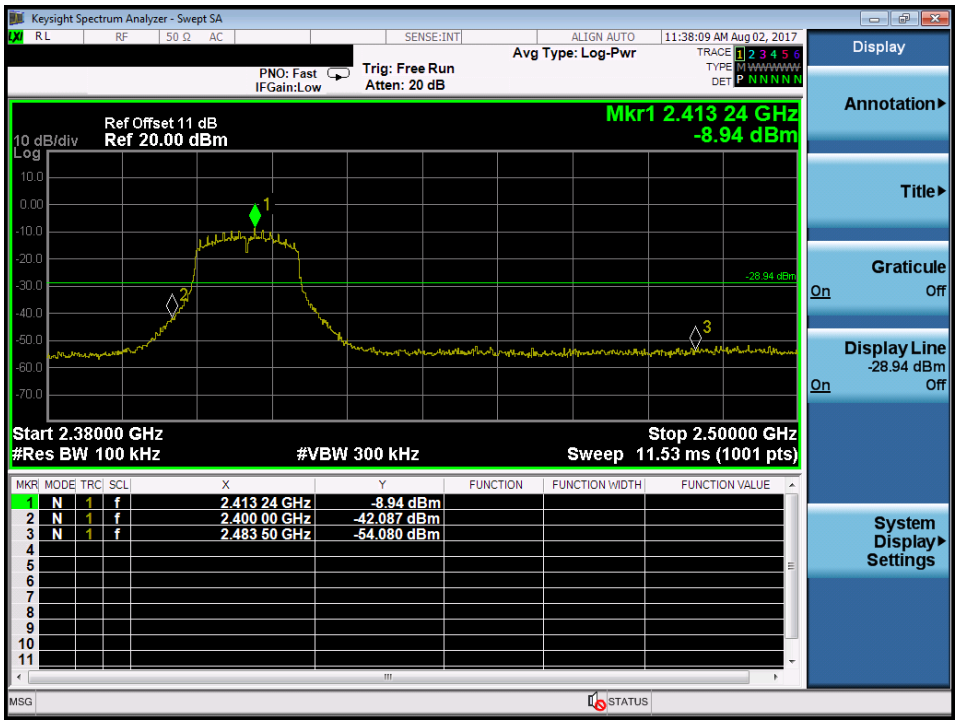
## Low Channel



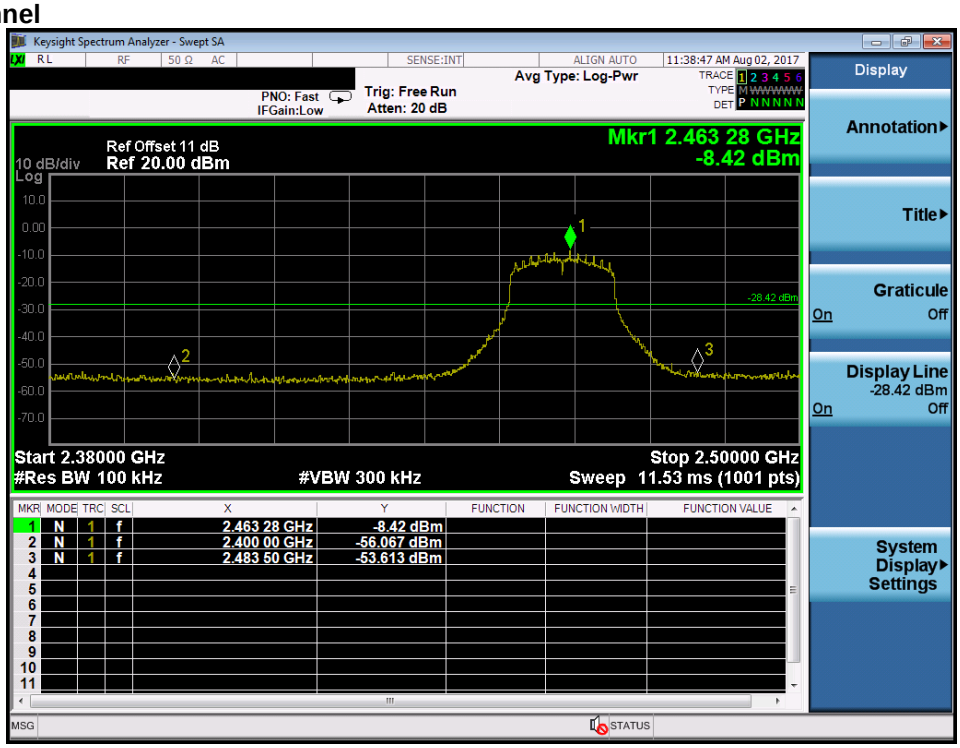

## High Channel

# Test Plot 100kHz RBW of Band Edge (802.11g)

## Low Channel

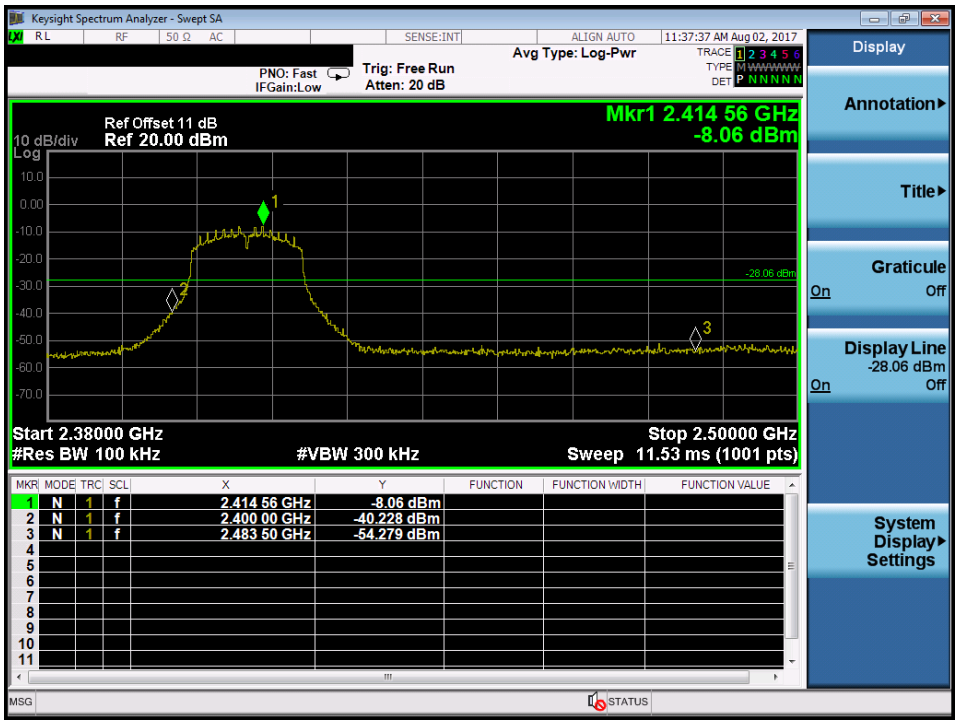



## High Channel



# Test Plot 100kHz RBW of Band Edge (802.11n HT20)

## Low Channel




## High Channel

## 4.1.6 Spurious Emission

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC part 15.247(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-247 5.5 and RSS-Gen 8.9 LP0002(2016): 3.10.1.5 |
| Basic standard | : | ANSI C63.10: 2009 |
| Limits | : | Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen i4, 8.9 (Table 6), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen i4, 8.9 (Table 4 and 5).<br>Radiated emissions which fall in the restricted bands, as defined in LP0002(2016): 2.7 , must comply with the radiated emission limits specified in LP0002(2016): 2.8<br>Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.249(a), RSS-Gen i4, 8.9 (Table 4 and 5) and RSS-210 A2.9(a).<br>Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in LP0002(2016): 2.8 |
| Kind of test site | : | 3m Semi-Anechoic Chamber |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Low/ Middle/ High |
| Operation mode | : | A, B |

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic.

For details refer to Appendix D.

The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The X Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

# 4.2 Mains Emissions

## 4.2.1 Mains Conducted Emissions

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | FCC Part 15.207<br>FCC Part 15.107<br>RSS-Gen 8.8<br>LP0002(2016): 2.3 |
| Limits | : | Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified |
| Kind of test site | : | Shielded Room |

**Test setup**

| | | |
|---|---|---|
| Test Channel | : | Middle |
| Operation mode | : | A |

Remark: For details refer to Appendix D.

# 5. Safety Human exposure

## 5.1 Radio Frequency Exposure Compliance

### 5.1.1 Electromagnetic Fields

**RESULT:** **Passed**

Test standard : FCC KDB Publication 447498 D01 v06
RSS--102

Separation distance is more than 20 cm, thus mobile device exposure limits can be applied

**Maximum Exposure:**

| | |
|---|---|
| Power to Antenna (mW) | 57.41 mW |
| Power to Antenna (dBm) | 17.6 dBm |
| Antenna Gain | 3.52 dBi |
| Power+Ant Gain | 129.1 mW |
| Distance | 20 cm |
| S= | 0.026 mW/cm^2 |

Limit FCC:

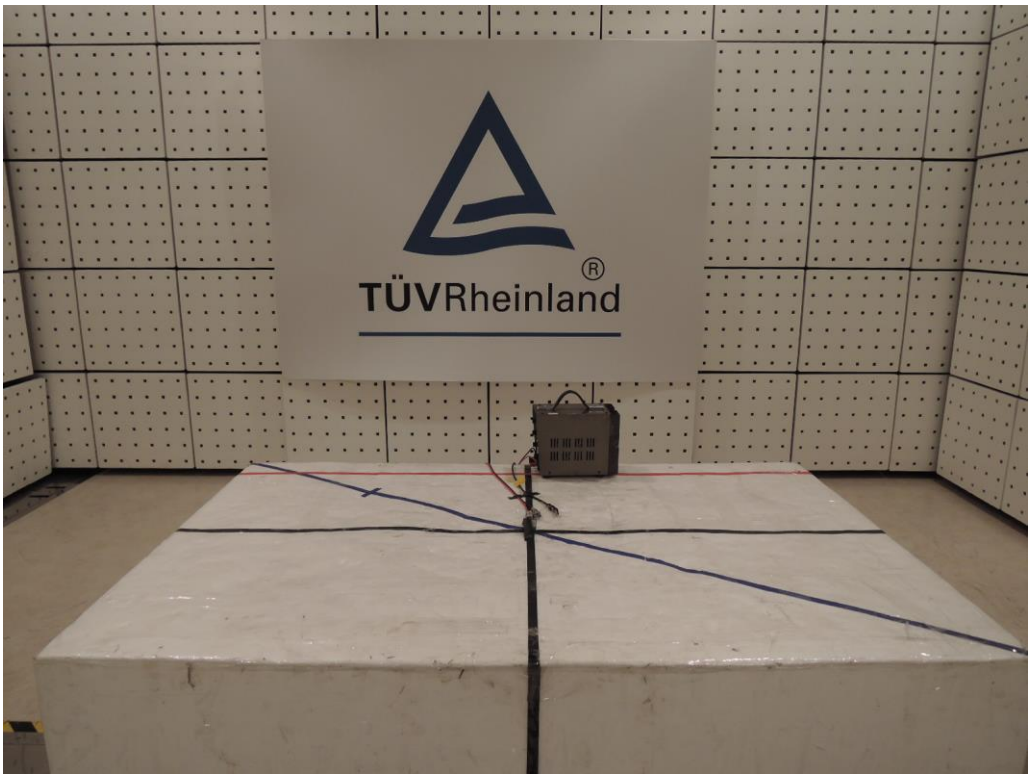
| | |
|---|---|
| 0.3-1.34 MHz | (100) mW/cm$^2$ |
| 1.34-30 MHz | (180/f2) mW/cm$^2$ |
| 30-300 MHz | 0.2 mW/cm$^2$ |
| 300-1500 MHz | f/1500 mW/cm$^2$ |
| **1500-100,000 MHz** | **1.0 mW/cm$^2$** |

**Limit Canada:** $0.02619 f^{0.6834}$

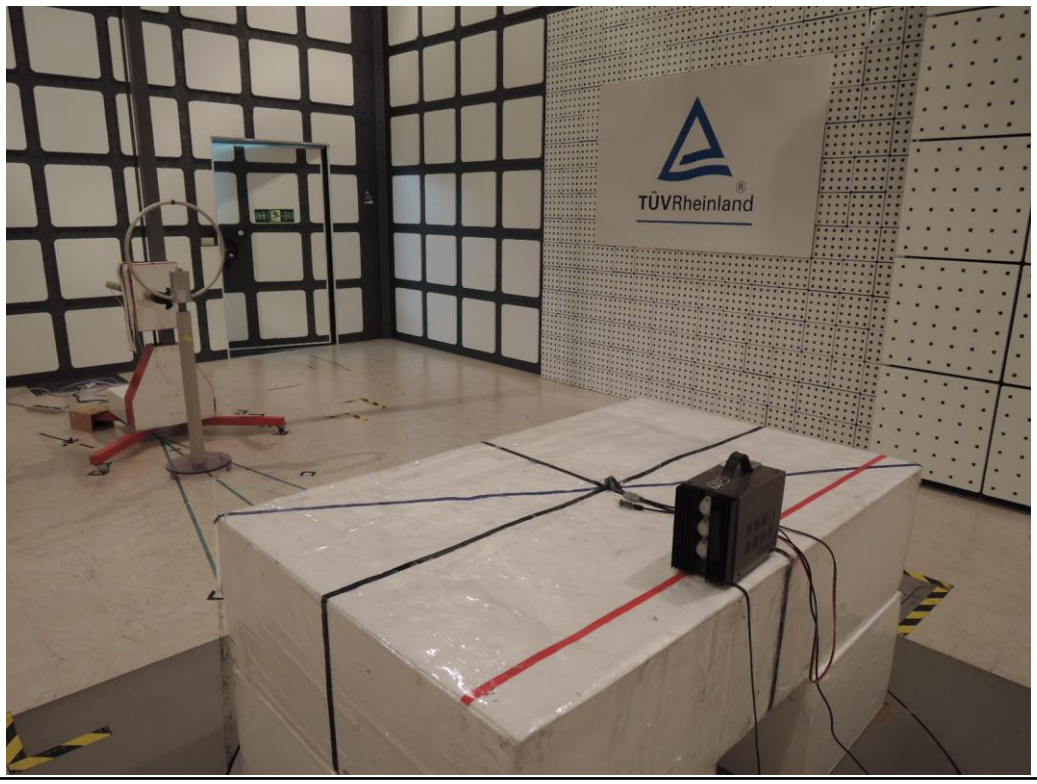
**---End---**

# 6. Photographs of the Test Set-Up

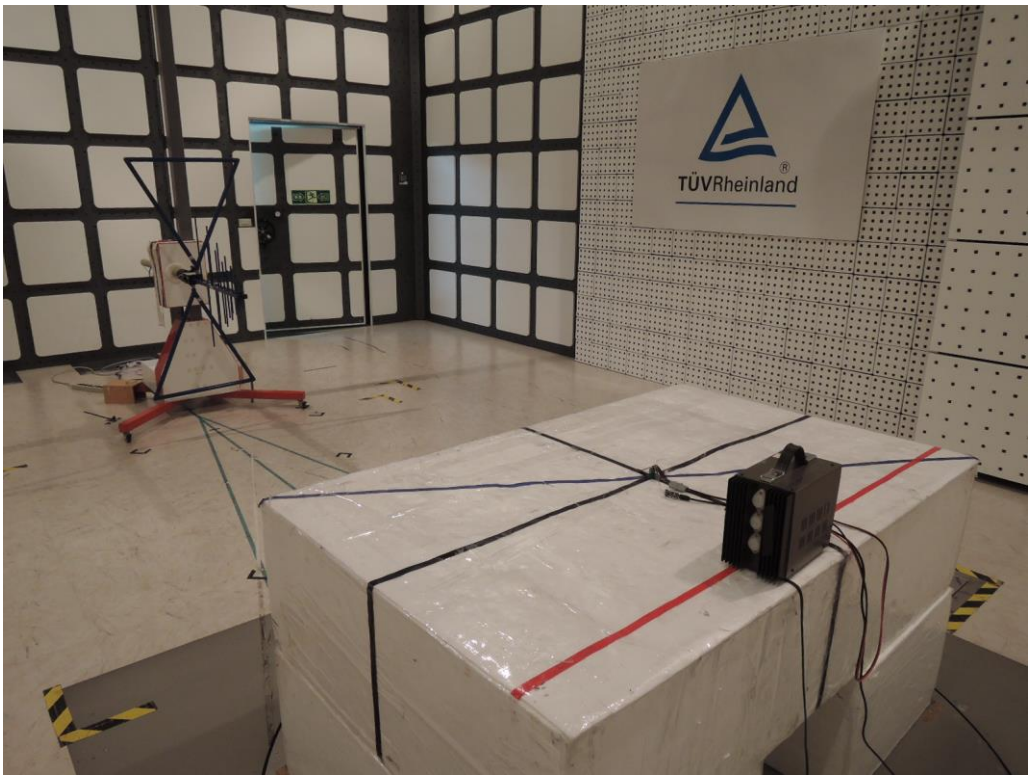
### Photograph 1: Set-up for Spurious Emissions (Front View)



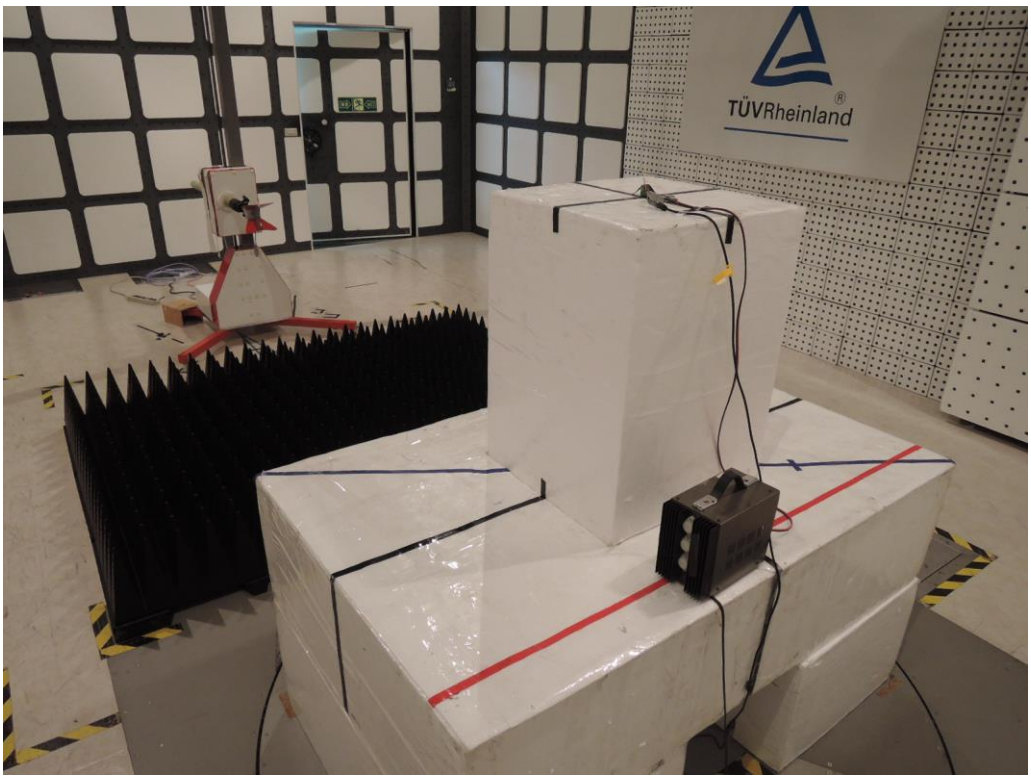

### Photograph 2: Set-up for Spurious Emissions (Back View 1)



**Photograph 3: Set-up for Spurious Emissions (Back View 2)**

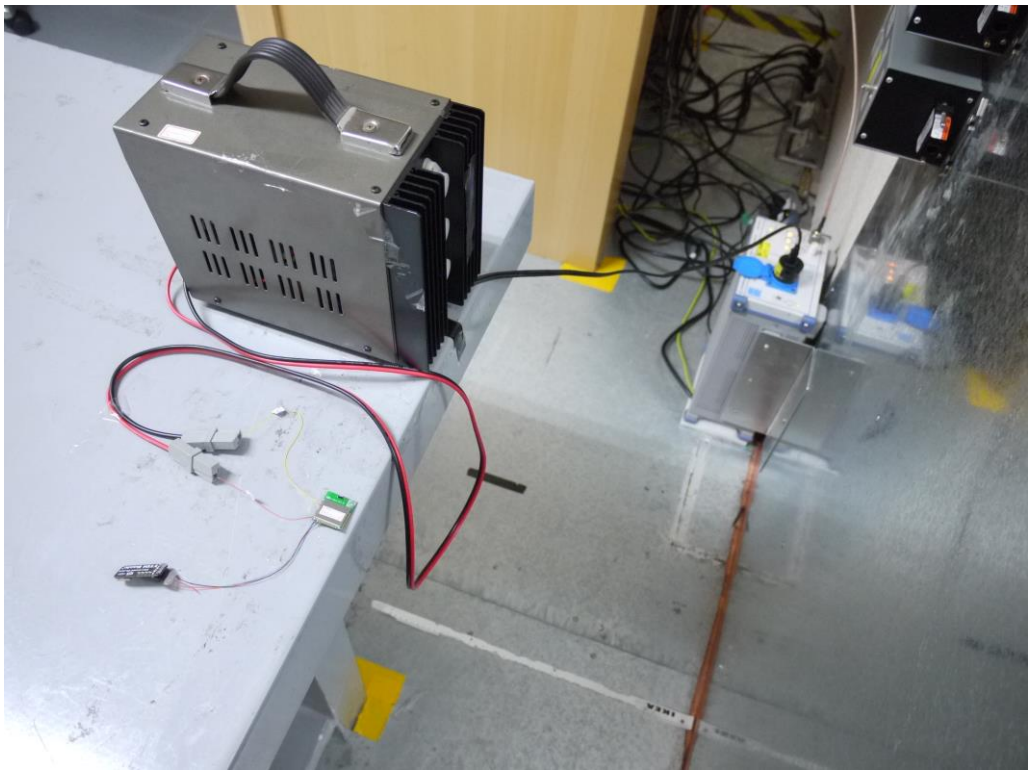



**Photograph 4: Set-up for Spurious Emissions (Back View 3)**



## Photograph 5: Set-up for Conducted testing

## Photograph 6: Set-up for for Mains Conducted testing Back



## Photograph 7: Set-up for for Mains Conducted testing Front

# 7. List of Tables

Table 1: Applied Standard and Test Levels .....5
Table 2: List of Test and Measurement Equipment .....7
Table 3: Emission Measurement Uncertainty.....8
Table 4: Basic Information of EUT .....9
Table 5: Technical Specification of EUT .....9
Table 6: Test result of Peak Output Power (802.11b).....15
Table 7: Test result of Peak Output Power (802.11g).....15
Table 8: Test result of Peak Output Power (802.11n HT20).....16
Table 9: Test result of 6dB Bandwidth (802.11b).....18
Table 10: Test result of 6dB Bandwidth (802.11g).....18
Table 11: Test result of 6dB Bandwidth (802.11n HT20).....18
able 12: Test result of 99% Bandwidth (802.11b).....19
Table 13: Test result of 99% Bandwidth (802.11g).....19
Table 14: Test result of 99% Bandwidth (802.11n HT20).....19
Table 15: Test result of Power Density (802.11b).....33
Table 16: Test result of Power Density (802.11g).....33
Table 17: Test result of Power Density (802.11n HT20).....33

# 8. List of Photographs

Photograph 1: Set-up for Spurious Emissions (Front View).....53
Photograph 2: Set-up for Spurious Emissions (Back View 1).....53
Photograph 3: Set-up for Spurious Emissions (Back View 2).....54
Photograph 4: Set-up for Spurious Emissions (Back View 3).....54
Photograph 5: Set-up for Conducted testing.....55
Photograph 6: Set-up for for Mains Conducted testing Back.....55
Photograph 7: Set-up for for Mains Conducted testing Front.....56