MOTOROLA SOLUTIONS

CERTIFICATE 2518.08

MS ISO/IEC 17025 TESTING SAMM NO. 0825

**MOTOROLA PENANG ADV. COMM. LABORATORY**
**Motorola Solutions Malaysia Sdn. Bhd.**
**Plot 2A Medan Bayan Lepas,**
**Mukim 12, S.W.D. 11900 Bayan Lepas,**
**Penang, Malaysia.**

**FCC / ISED TEST REPORT**
**Report Revision : Rev.C**

| | | |
|---|---|---|
| **Date/s Tested** | : | 24-Dec-2019 - 04-Jan-2020 |
| **Report Issue Date** | : | 24-Feb-2020 |
| **Manufacturer/Location** | : | Motorola Solutions – Penang |
| **Requestor** | : | TANG, GARY |
| **Product Type** | : | Mobile |
| **Product Version (PMN)** | : | APX6500 |
| **Model Number (HVIN)** | : | M25QSS9PW1BN |
| **Frequency Band** | : | 2.412-2.462 GHz |
| **Max RF Output Power** | : | 802.11b - 39.8 mWatts<br>802.11g - 15.8 mWatts<br>802.11n (HT20) -12.58 mWatts |
| **Applicant Name** | : | Motorola Solutions Inc |
| **Applicant Address** | : | 8000 West Sunrise Boulevard,<br>Fort Lauderdale, Florida 33322. |
| **FCC Registrations** | : | 461337 |
| **ISED Registrations** | : | MY0001 |
| **Firmware Version (FVIN)** | : | R02.10.08.0000 |

**The equipment was tested accordance to the requirement listed below:**

| | |
|---|---|
| **(2.4GHz Wifi)**<br>**47CFR Part 15C**<br>**ISED RSS 247 Issue 2** | **PASS** |



Prepared By:

**GAN BOON TEONG**
**Test Personnel**

Approved Signatory:

**VINCENT FOONG CHUEN KIT**
**Deputy Technical Manager**

# Table of Contents



REVISION HISTORY

| Revision History | Description | Date | Originator |
|---|---|---|---|
| Rev. A | Initial Report | **23-Feb-2020** | **Gan Boon Teong** |
| Rev. B | Updated radiated worst case data | **13-Apr-2020** | **Vincent Foong** |
| Rev. C | Updated Summary Table and Reference to other FCC ID | **14-May-2020** | **Vincent Foong** |

## 1.0. General Information

### EUT Description:

| | |
|---|---|
| **Technologies** | 2.4GHz Wi-Fi |
| **TX Frequency range** | 2412MHz – 2462MHz |
| **Modulation Type** | DSSS, OFDM |
| **Connector type** | PROGRAMMING, TEST & ALIGNMENT CABLE |
| **Antenna type** | Motorcycle (AN000163A02) |

### 1.1. Channel number and frequency information:

There are two bandwidth systems.
For 20MHz Bandwidth systems (802.11b, 802.11g, 802.11n), use channel 1 ~ channel 11
For 40MHz Bandwidth systems (802.11n), use channel 3 ~ channel 9

| Channel | Frequency | Channel | Frequency |
|---|---|---|---|
| 1 | 2412 | 7 | 2442 |
| 2 | 2417 | 8 | 2447 |
| 3 | 2422 | 9 | 2452 |
| 4 | 2427 | 10 | 2457 |
| 5 | 2432 | 11 | 2462 |
| 6 | 2437 | | |

The EUT contains following accessory devices and data cable:

| Item | Brand | Model or P/N |
|---|---|---|
| ASSY,CBL,PWR | MOTOROLA | HKN4191B-2 |
| CABLE, DATA, USB, 1-1/2M, XTL5000 | MOTOROLA | HKN6163C-2 |
| 15 Watt Speaker (Water Resistant) | MOTOROLA | HSN4040A |
| Keypad Microphone | MOTOROLA | HMN4079G-4 |
| ANTENNA, STUBBY,WIFI/GNSS LOW LOSS LMR240 (2.4/5 GHZ WI-FI/BT AND GNSS BT/WiFi/GPS Antenna) | MOTOROLA | AN000163A01 |
| ANTENNA, WHIP,3DB MCYCLE 764-870 MHZ 762-870 MHZ | MOTOROLA | AN000197A10 |
| O7 Control Head (English) | MOTOROLA | PMHN4194C |
| O2 Control Head (Grey) | MOTOROLA | PMHN4193F |
| ANTENNA, STUBBY,WIFI/GNSS, M-CYCLE, QMA, 6FT, LMR195, FLEXIBLE, PVC FREE GPS WIFI | MOTOROLA | AN000163A02 |
| ANT 5.0DB 380-420 MHZ MAXRAD 380 Mhz - 433 MHz | MOTOROLA | HAE6011A |
| Water Resistant Microphone | MOTOROLA | HMN1089C |
| 13 Watt Speaker (Motorcycle) - Non EPP Compliant | MOTOROLA | HSN6003C |

**General Description of Applied Standards**
The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

**FCC 47 CFR Part 15 Subpart C**
**KDB 558074 D01 15.247 Meas Guidance v05**
**ANSI C63.10-2013**

**Deviation from standard**
Not applicable as no deviation from standard test method

## **2.0.** Summary of Test Results

| FCC Clause | IC Clause | Test Item | Result | Remark | Serial number tested |
|---|---|---|---|---|---|
| 15.247 (a)(2) | RSS-247 5.2(a) | DTS & 99% Channel Bandwidth | NA | References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124 | NA |
| 15.247 (b)(3) | RSS-247 5.4(d) | Conducted RF Output Power (Average) | Pass | Highest output power: 802.11b: 15.625 dBm 802.11g: 11.693 dBm 802.11n: 10.838 dBm | 471TVZ0887 |
| 15.247(e) | RSS-247 5.2(b) | Maximum Power Spectral Density | NA | References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124 | NA |
| 15.247(d) | RSS-247 5.5 | Conducted Spurious Emissions | NA | References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124 | NA |
| 15.247 (d) | RSS-247 5.5 | Band edge Conducted Spurious Emission | NA | References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124 | NA |
| 15.205, 15.209, 15.247 (d) | RSS-247 5.5 | Radiated Emission within Restricted Bands | Pass | Worst case emission: 48.1439 dBµV/m | 471TVZ0920 |
| 15.207 | RSS-Gen 8.8 | AC Power Line Conducted Emission | NA | Device does not operate on AC | NA |
| 15.203 | | Antenna requirement | NA | | NA |

NA → Not Available

***NOTE: The WiFi chipset is identical to FCC ID AZ492FT7124 / ISED 109U-92FT7124. The rest of conducted measurements are by similarity. Only worst case configuration of radiated emission based on FCC ID AZ492FT7124 / ISED 109U-92FT7124 is tested. As per KDB 484596 D01v01, the applicant takes full responsibility that data referenced represents compliance to the relevant rules for this current FCC ID.**

## 3.0. Measurement Uncertainty

| Measurement | Frequency | Expended Uncertainty (k=1.96) (±dB) |
|---|---|---|
| AC Power Line Conducted Spurious Emission | 150KHz ~ 30MHz | 3.43 |
| Radiated Emissions up to 1 GHz | 30MHz ~ 200MHz | 5.01 |
| | 200MHz ~ 1000MHz | 5.01 |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz | 5.01 |
| | 18GHz ~ 25GHz | 5.01 |

## **4.0.** Equipment List

### Bluetooth ATE # 1 (SW Version: Ate Main_3.1.10_R2)

| Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| SPECTRUM ANALYZER | FSEK30 | 838495/014 | 19-Jul-19 | 19-Jul-20 |
| SPECTRUM ANALYZER | E4443A | MY46181974 | 9-Aug-18 | 9-Aug-20 |
| POWER SUPPLY | 6033A | 3004A05137 | 24-Jul-18 | 24-Jul-20 |
| CHAMBER | SH-641 | 92003821 | 26-Sep-19 | 26-Sep-20 |
| N to N RF Cable # 1 | SF126/11N/11N | NA | NA | NA |

**EMC Chamber 1**

| DESCRIPTION | MODEL | SERIAL NUMBER | CALIBRATION DATE | CALIBRATION DUE DATE |
|---|---|---|---|---|
| DRG HORN FREQ. | SAS-571 | 720 | 21-Mar-19 | 21-Mar-21 |
| DRG HORN FREQ. | SAS-571 | 1143 | 14-Feb-19 | 14-Feb-21 |
| POWER SUPPLY ( 0-60V / 0-50A, 1000W ) | 6032A | MY41001736 | 25-May-19 | 25-May-20 |
| SIGNAL GENERATOR | SMB 100A | 181117 | 8-Nov-18 | 8-Nov-21 |
| EMI TEST RECEIVER | ESW44 | 101750 | 24-Jul-19 | 24-Jul-20 |
| EMI TEST RECEIVER | ESIB26 | 100017 | 19-Jul-19 | 19-Jul-20 |
| 5m Semi-anechoic Chamber | S800-HX | J2308 | No Cal. Req'd | No Cal. Req'd |
| BILOG ANTENNA | CBL6112D | 30991 | 5-Aug-19 | 5-Aug-20 |
| BILOG ANTENNA | CBL6112B | 2950 | 8-Jul-19 | 8-Jul-21 |
| DATA LOGGER | SDL500 | A.016776 | 5-Apr-19 | 5-Apr-20 |
| SYSTEM CONTROLLER | SC104V | 050806-1 | No Cal. Req'd | No Cal. Req'd |
| TURNTABLE FLUSH MOUNT 2M | FM2011 | NA | No Cal. Req'd | No Cal. Req'd |
| ANTENNA POSITIONING TOWER | TLT2 | NA | No Cal. Req'd | No Cal. Req'd |
| BROAD-BAND HORN ANTENNA | BBHA9170 | BBHA9170143 | 23-Jun-19 | 23-Jun-20 |
| 18 - 40GHz PREAMPLIFIER | Miteq Hi Gain Sucoflex | 002 | 12-Jun-19 | 12-Jun-22 |
| PREAMPLIFIER | PAM-0118 | 269 | 24-May-19 | 24-May-22 |
| LOOP ANTENNA | 6502 | 00208416 | 5-Sep-19 | 5-Sep-20 |
| Test Software | EMC_FCC_IC_Bluetooth_RE_Test | | | |
| Version | EMC_FCC_RE_v1.6.1 | | | |

## 5.0. Test Mode Applicability and Test Channel Detail

The device employs MIMO technology. Below are the possible configurations.

| WLAN Configurations | | Mode | | | | | |
|---|---|---|---|---|---|---|---|
| | | SISO | | Spatial Diversity Multiplexing (MIMO) | | Cyclic Delay Diversity (MIMO) | |
| | Antenna | Primary | Secondary | Primary | Secondary | Primary | Secondary |
| 2.4GHz | 802.11b | √ | √ | x | x | x | x |
| | 802.11g | √ | √ | x | x | x | x |
| | 802.11n (HT20) | √ | √ | x | x | x | x |
| | 802.11n (HT40) | x | x | x | x | x | x |

**√ = Support;**
**x = NOT Support**

**Note:** This Device supports simultaneous transmission operation, which allows for two SISO or two MIMO channels to operate independent of one another in the 2.4GHz band on each antenna. 802.11n mode is capable of transmitting simultaneously on two antennas using Cyclic Delay Diversity and Spatial Diversity Multiplexing (2x2 MIMO).
The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report.

**Radiated Emission Test (Above 1GHz)**

☒Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Modulation | Available Channel | Tested Channel | Modulation Technology | Data Modulation Type | Date Rate (Mbps) | Mode | Environmental Conditions |
|---|---|---|---|---|---|---|---|---|
| Test Mode | 802.11b | 1 to 11 | 1,6,11 | DSSS | QPSK | 1 | SISO | 23.4°C, 79.8%RH |
| Test Mode | 802.11g | 1 to 11 | 1,6,11 | OFDM | BPSK | 6 | SISO | 23.4°C, 79.8%RH |
| Test Mode | 802.11n (HT20) | 1 to 11 | 1,6,11 | OFDM | BPSK | 6.5 | SISO CDD (MIMO) | 23.4°C, 79.8%RH |
| Test Mode | 802.11n (HT40) | 3 to 9 | 3,6,9 | OFDM | BPSK | 6.5 | SISO CDD (MIMO) | NA |

**Radiated Emission Test (Below 1GHz)**

☒Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Modulation | Available Channel | Tested Channel | Modulation Technology | Data Modulation Type | Date Rate (Mbps) | Mode | Environmental Conditions |
|---|---|---|---|---|---|---|---|---|
| Test Mode | 802.11b | 1 to 11 | 1,6,11 | DSSS | QPSK | 1 | SISO | 23.4°C, 79.8%RH |
| Test Mode | 802.11g | 1 to 11 | 1,6,11 | OFDM | BPSK | 6 | SISO | 23.4°C, 79.8%RH |
| Test Mode | 802.11n (HT20) | 1 to 11 | 1,6,11 | OFDM | BPSK | 6.5 | SISO CDD (MIMO) | 23.4°C, 79.8%RH |
| Test Mode | 802.11n (HT40) | 3 to 9 | 3,6,9 | OFDM | BPSK | 6.5 | SISO CDD (MIMO) | NA |

**Power Line Conducted Emission Test**

☐Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☐Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Modulation | Available Channel | Tested Channel | Modulation Technology | Data Modulation Type | Date Rate (Mbps) | Environmental Conditions |
|---|---|---|---|---|---|---|---|
| Application Mode | 802.11bgn mixed | 1 to 11 | AUTO | DSSS, OFDM | AUTO | AUTO | NA |

**Antenna Port Conducted Measurement:**

☒This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒Following channel(s) was (were) selected for the final test as listed below.

| EUT Configure Mode | Modulation | Available Channel | Tested Channel | Modulation Technology | Data Modulation Type | Data Rate (Mbps) | Mode | Environmental Conditions |
|---|---|---|---|---|---|---|---|---|
| Test Mode | 802.11b | 1 to 11 | 1,6,11 | DSSS | QPSK | 1 | SISO | 25°C, 54.8%RH |
| Test Mode | 802.11g | 1 to 11 | 1,6,11 | OFDM | BPSK | 6 | SISO | 25°C, 54.8%RH |
| Test Mode | 802.11n (HT20) | 1 to 11 | 1,6,11 | OFDM | BPSK | 6.5 | SISO CDD (MIMO) | 25°C, 54.8%RH |
| Test Mode | 802.11n (HT40) | 1 to 11 | 3,6,9 | OFDM | BPSK | 6.5 | SISO CDD (MIMO) | NA |

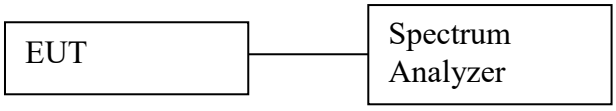
**Duty Cycle of Test Signal**

**802.11b, 802.11g and 802.11n HT20: Duty cycle of test signal is ≥98%. (Refer to Clause 6.3 for duty cycle test signal)**

# 6.0. Transmitter Test Parameters

## 6.1. 6dB Channel Bandwidth

### 6.1.1. Test Setup




a) Check and ensure the spectrum analyzer well calibrate.
b) Turn on the DUT and set DUT to transmit maximum power.
c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
d) Setting of Spectrum analyzer :
    a. RBW = 100 kHz
    b. VBW = 300 kHz
    c. Detector mode = Peak
    d. Trace = Max hold
    e. Sweep = auto
e) Measure the freq different of two frequencies that were attenuated 6dB from peak of the emission & record the frequency difference as the emission bandwidth.
f) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.1.2. Test Limits:

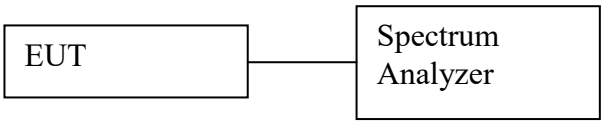
| Normal Condition (25 º C) |
|---|
| ≥500 kHz |

### 6.1.3. Test Data:

**N/A**

## 6.2. Conducted RF Output Power

### 6.2.1. Test Setup




Average

a) Check and ensure the spectrum analyzer well calibrate.
b) Turn on the DUT and set DUT to transmit maximum power.
c) Measure the duty cycle of transmitter output signal.
d) Setting of Spectrum analyzer :
    a. Set the RBW = 300 kHz.
    b. Set the VBW ≥ [3 × RBW].
    c. Set the span ≥ [1.5 × OBW bandwidth].
    d. Detector = average.
    e. Sweep time = auto couple.
    f. Trace mode = free run.
    g. Allow trace to fully stabilize.
e) Add in duty cycle correction into final test result.
f) Duty cycle correction is calculated as below:
    10 log (1/x)
g) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.2.2. Test Limits:

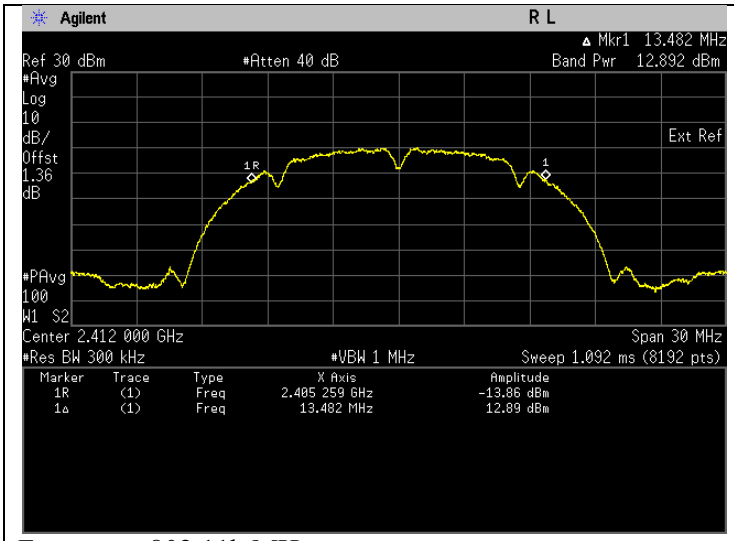
| Normal Condition (25 º C) |
|---|
| ≤1 Watt(30 dBm) |

### 6.2.3. **Test Data:**

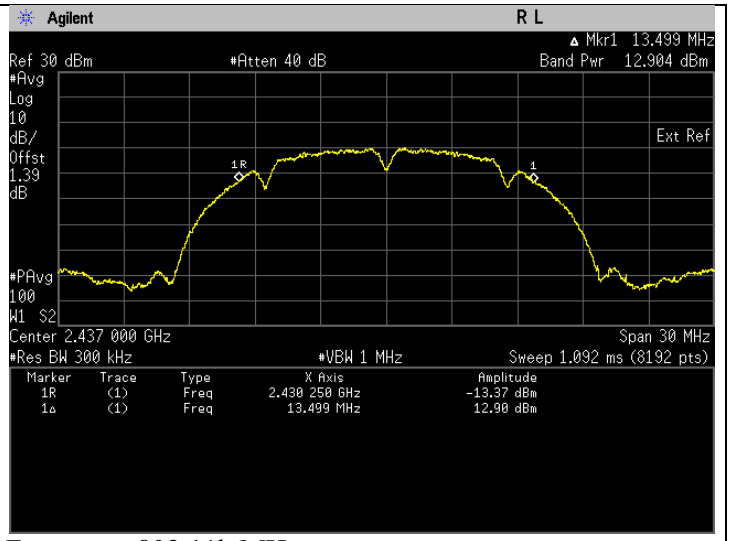
**802.11b**

Output Power = Band Power + Duty Cycle Factor
= Band Power + 0.002dBm

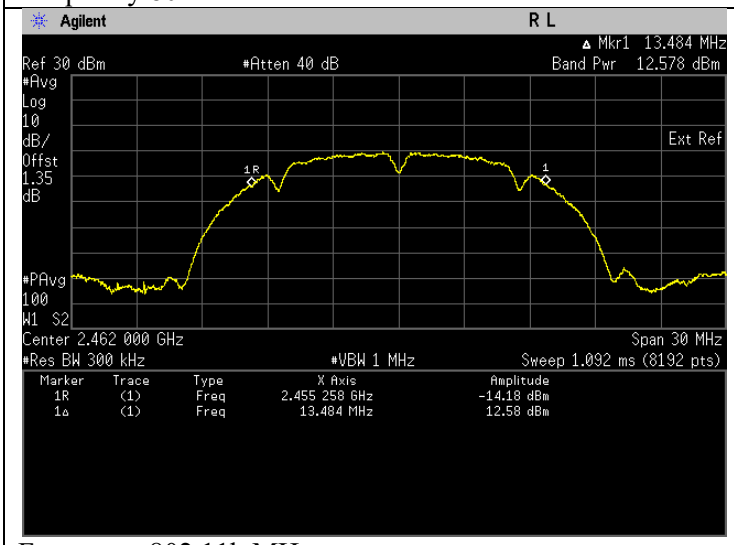
| Test Conditions | | | | Test Frequency | Results | |
|---|---|---|---|---|---|---|
| Standard | Modulation Type | Modulation Technology | Data Rate (mbps) | Tx (MHz) | Output Power (dBm) | Status |
| 802.11b | DSSS | QPSK | 1 | 2412 | 12.757 | Pass |
| 802.11b | DSSS | QPSK | 1 | 2437 | 15.625 | Pass |
| 802.11b | DSSS | QPSK | 1 | 2462 | 12.462 | Pass |



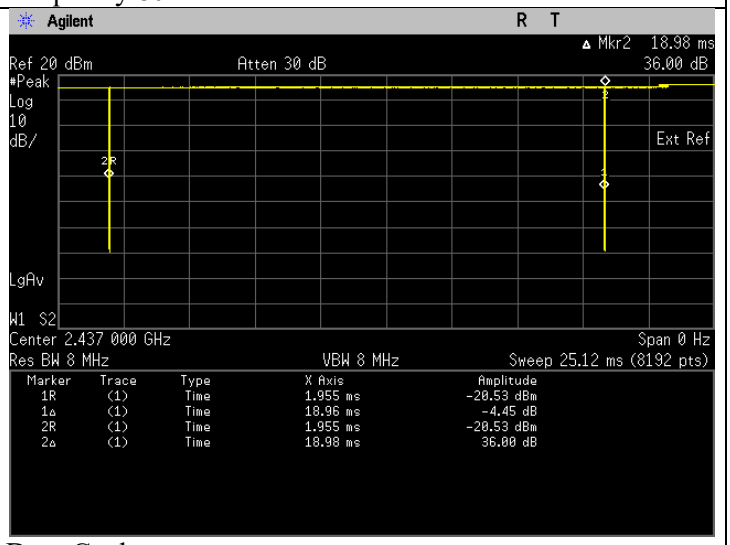
Frequency 802.11b MHz



Frequency 802.11b MHz



Frequency 802.11b MHz

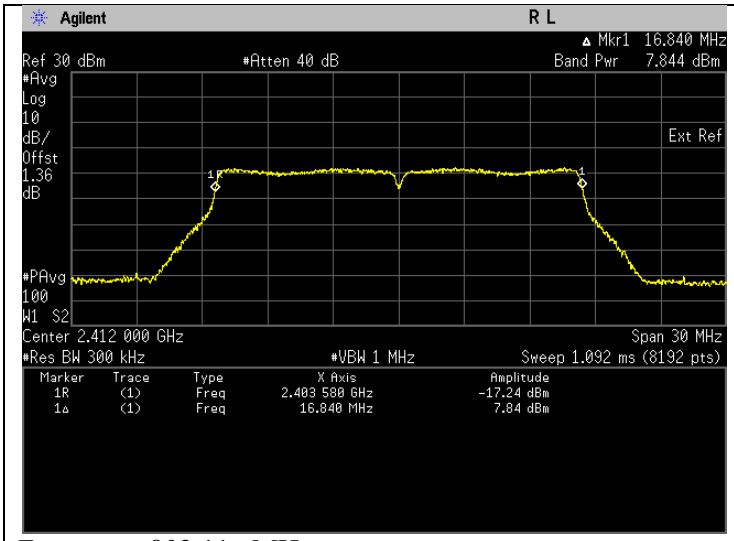


Duty Cycle

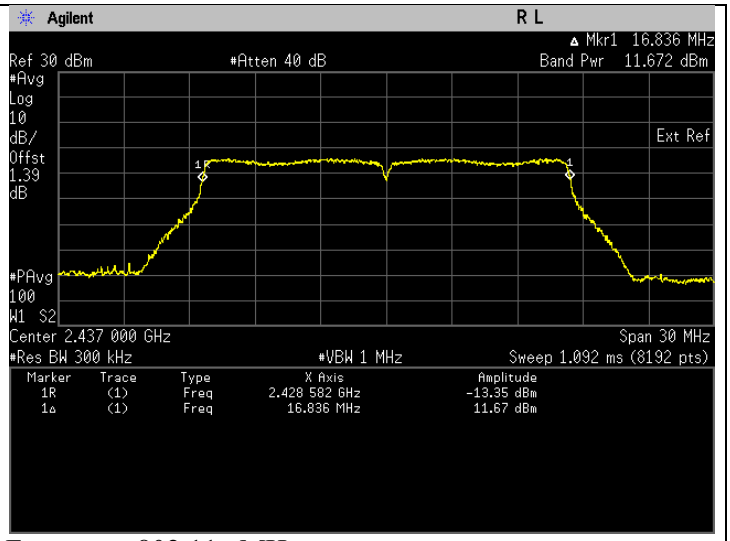
**802.11g**

Output Power = Band Power + Duty Cycle Factor
= Band Power + 0.021dBm

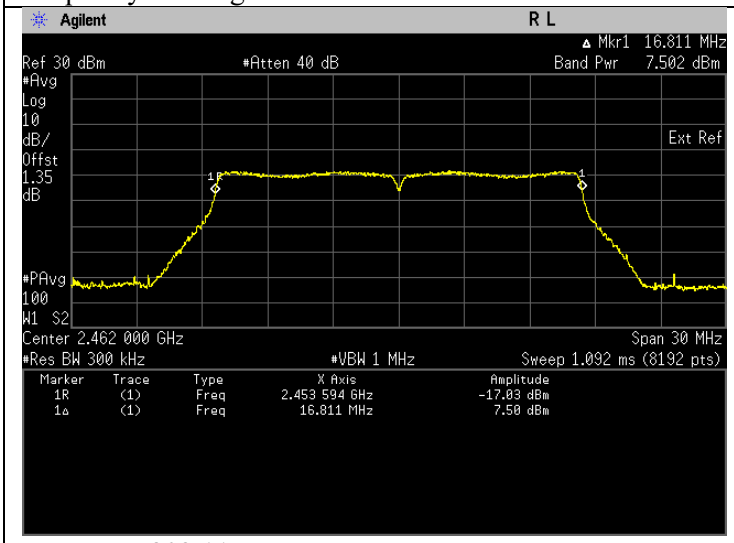
| Test Conditions | | | | Test Frequency | Results | |
|---|---|---|---|---|---|---|
| Standard | Modulation Type | Modulation Technology | Data Rate (mbps) | Tx (MHz) | Output Power (dBm) | Status |
| 802.11g | OFDM | BPSK | 6 | 2412 | 7.865 | Pass |
| 802.11g | OFDM | BPSK | 6 | 2437 | 11.693 | Pass |
| 802.11g | OFDM | BPSK | 6 | 2462 | 7.523 | Pass |



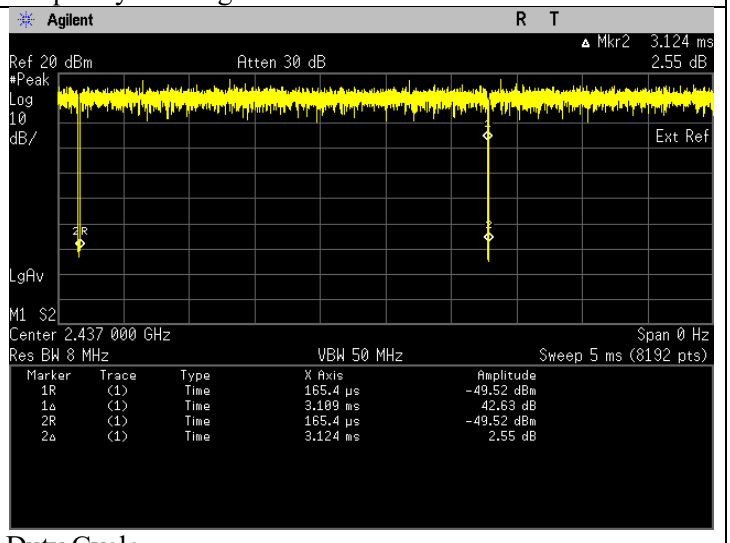

Frequency 802.11g MHz




Frequency 802.11g MHz




Frequency 802.11g MHz

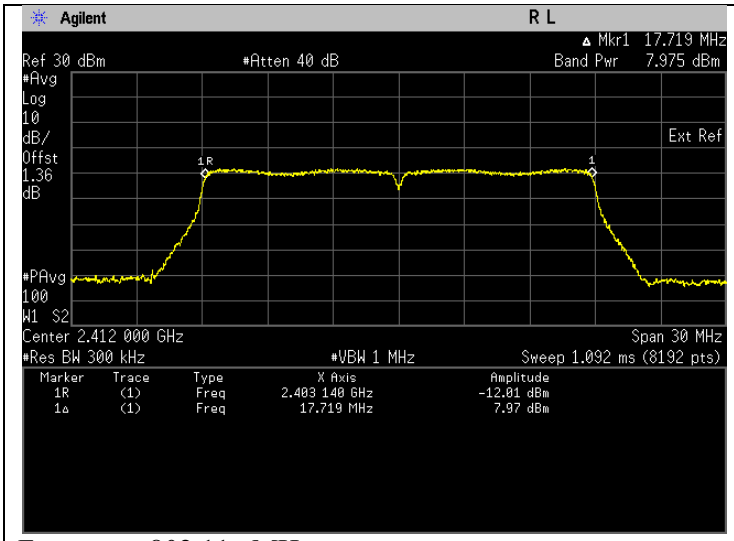



Duty Cycle

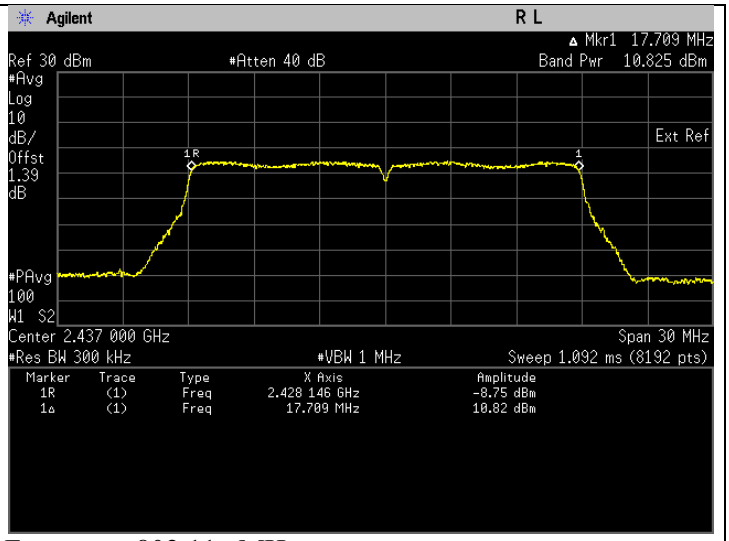
## 802.11n (HT20)

Output Power = Band Power + Duty Cycle Factor
= Band Power + 0.013dBm

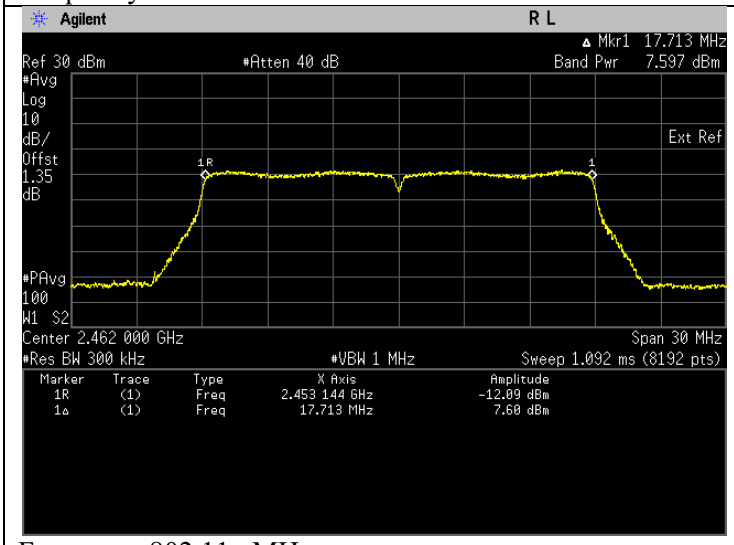
| Test Conditions | | | | Test Frequency | Results | |
|---|---|---|---|---|---|---|
| Standard | Modulation Type | Modulation Technology | Data Rate (mbps) | Tx (MHz) | Output Power (dBm) | Status |
| 802.11n | OFDM | BPSK | 6.5 | 2412 | 7.988 | Pass |
| 802.11n | OFDM | BPSK | 6.5 | 2437 | 10.838 | Pass |
| 802.11n | OFDM | BPSK | 6.5 | 2462 | 7.610 | Pass |



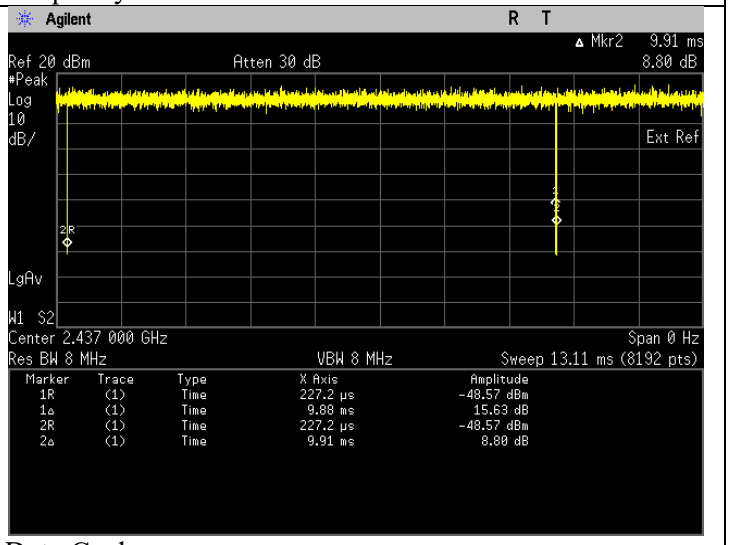

Frequency 802.11n MHz




Frequency 802.11n MHz



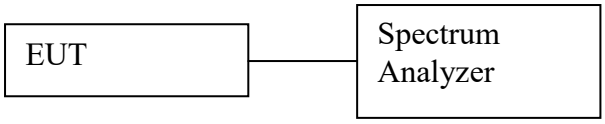

Frequency 802.11n MHz




Duty Cycle

## 6.3.Duty Cycle of the test signal

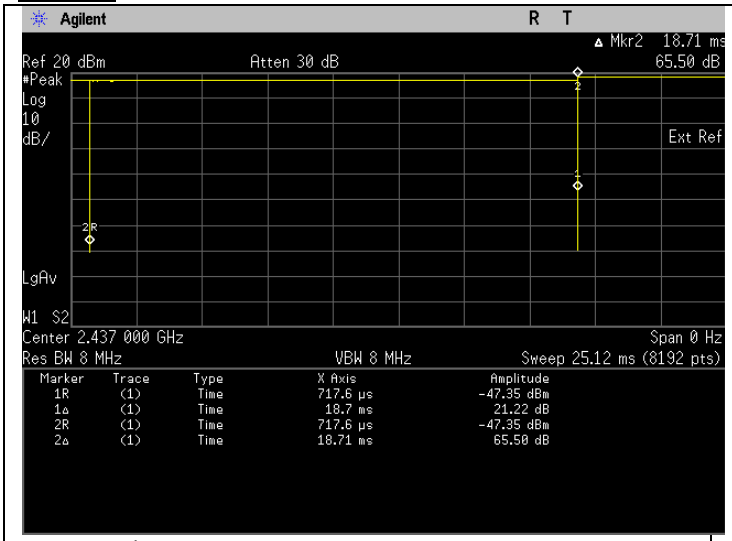
### 6.3.1. Test Setup




1) Check and ensure the spectrum analyzer well calibrate.
2) Turn on the DUT and set DUT to transmit maximum power.
3) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
4) Setting of Spectrum analyzer :
    a. Set the RBW = 10 MHz or the highest RBW available on spectrum analyzer.
    b. Set the VBW ≥ RBW.
    c. Set the span ≥ [1.5 × DTS bandwidth].
    d. Detector = Peak.
    e. Sweep time = 10ms or others that allow to measure accurate duty cycle.
    f. Trace mode = max hold.
    g. Allow trace to fully stabilize.
5) Record the duty cycle as X and save the plot.
6) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.3.2. **Test Data**

**802.11b**

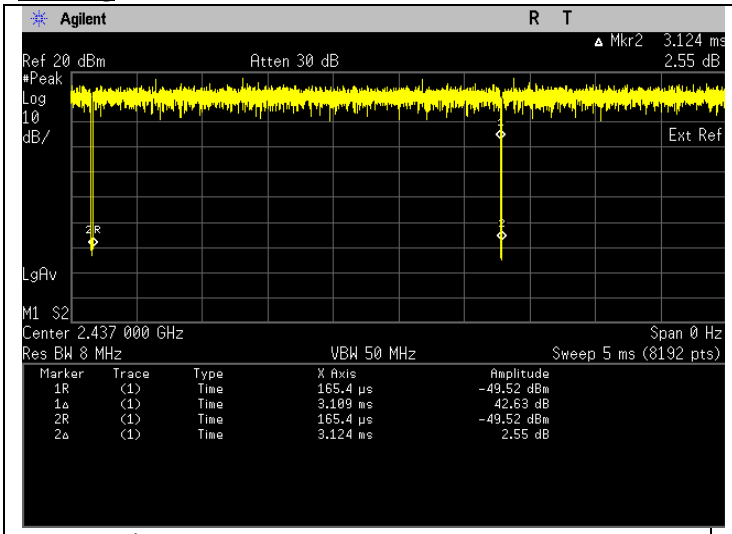



Duty Cycle

| | |
|---|---|
| On time (ms) | 18.7 |
| On + Off Time (ms) | 18.71 |
| Duty cycle | 0.9995 |
| Duty Cycle factor | 0.002 |

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

**802.11g**

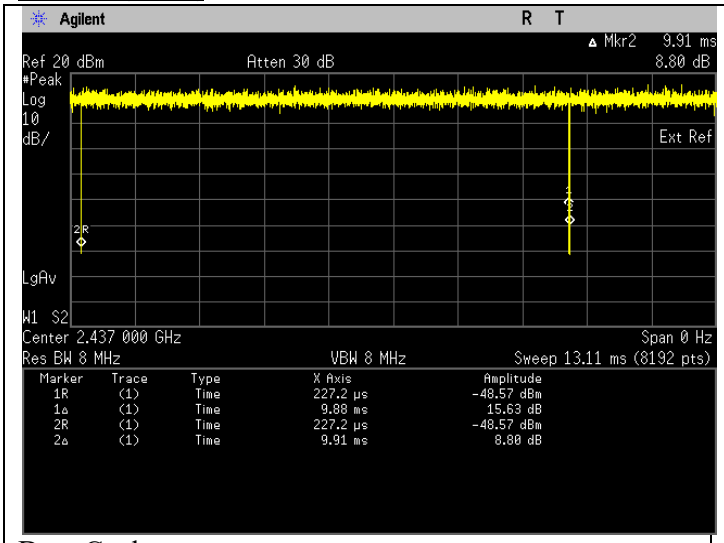



Duty Cycle

| | |
|---|---|
| On time (ms) | 3.109 |
| On + Off Time (ms) | 3.124 |
| Duty cycle | 0.9952 |
| Duty Cycle factor | 0.021 |

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

## 802.11n (HT20)



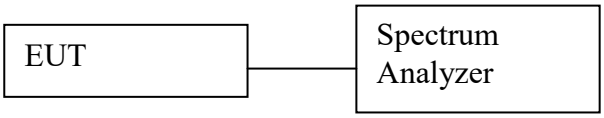

Duty Cycle

| | |
|---|---|
| On time (ms) | 9.88 |
| On + Off Time (ms) | 9.91 |
| Duty cycle | 0.997 |
| Duty Cycle factor | 0.013 |

*Duty cycle = On time/ On +off time
*Duty Cycle factor = 10*log(1/Duty Cycle)

## 6.4. Maximum Peak Power Spectral Density

### 6.4.1. Test Setup




Maximum Peak

a) Check and ensure the spectrum analyzer well calibrate.
b) Turn on the DUT and set DUT to transmit maximum power.
c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
d) Setting of Spectrum analyzer :
    a. Set analyzer center frequency to DTS channel center frequency.
    b. Set the span to 1.5 times the DTS bandwidth.
    c. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
    d. Set the VBW ≥ [3 × RBW].
    e. Detector = peak.
    f. Sweep time = auto couple.
    g. Trace mode = max hold.
    h. Allow trace to fully stabilize.
    i. Use the peak marker function to determine the maximum amplitude level within the RBW.
    j. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.
e) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.4.2. Test Limits

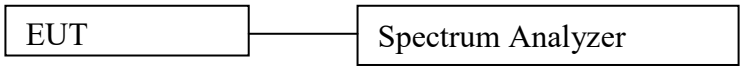
| Normal Condition (25 º C) |
|---|
| **≤ 8 dBm/3kHz** |

### 6.4.3. Test Result

**N/A**

## 6.5. Conducted Spurious Emission

### 6.5.1. Test Setup




a) Check and ensure the spectrum analyzer well calibrate.
b) Turn on the DUT and set DUT to transmit maximum power.
c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
d) Setting of Spectrum analyzer :
    a. RBW = 100 kHz
    b. VBW = 300 kHz
    c. Detector mode = Peak
    d. Trace = Max Hold
    e. Sweep = auto
e) Use the peak marker function to measure highest emission and scan up to 10$^{th}$ harmonic.
f) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.5.2. Test Limits:

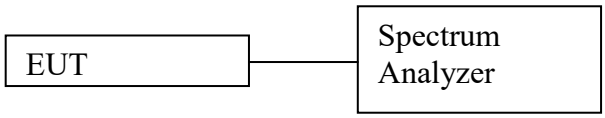
| **Normal Condition (25 º C)** |
|---|
| **Shall be at least 30 dB below peak (max) power.** |

### 6.5.3. Test Result

**N/A**

## 6.6. Band edge Conducted Spurious Emission

### 6.6.1. Test Setup




a) Check and ensure the spectrum analyzer well calibrate.
b) Turn on the DUT and set DUT to transmit maximum power.
c) Connect DUT's antenna terminal to spectrum analyzer with a low loss cable.
d) Setting of Spectrum analyzer :
    a. RBW = 100 kHz
    b. VBW = 300 kHz
    c. Detector mode = Peak
    d. Trace = Max Hold
    e. Sweep = auto
e) Use the peak marker function to measure highest emission.
f) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.6.2. Test Limits:

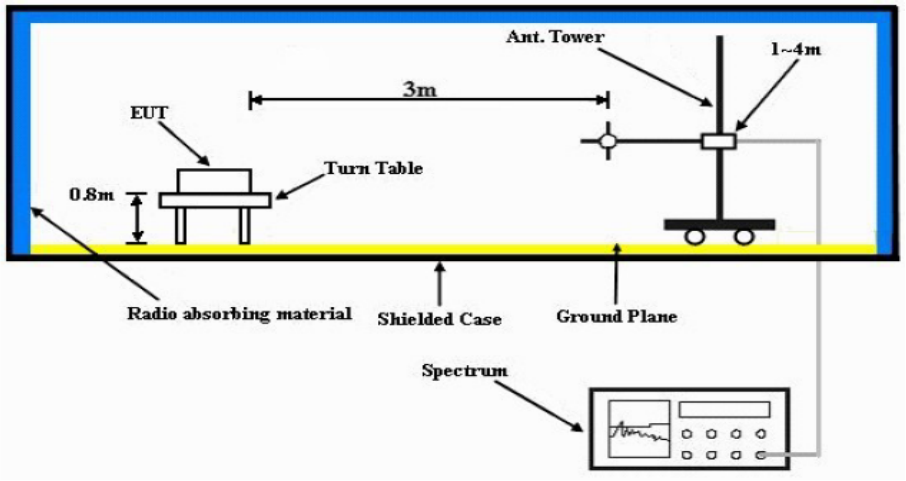
| **Normal Condition (25 º C)** |
|---|
| **Shall be at least 30 dB below peak (max) power.** |

### 6.6.3. Test Result

**N/A**

## 6.7. Radiated Emission within restricted Bands

### 6.7.1. Test Setup




a. The EUT is placed on the top of a rotating table 0.8m above the ground (<1GHz) and 1.5m above the ground (>1GHz) at a 3m semi-anechoic chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
b. The EUT is set 3m away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
c. The antenna is Bilog/Horn antenna depend on which frequency range uses, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT is arranged to its worst case and then the antenna is tuned to heights from 1m to 4m and the rotatable table is turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system is set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode is fall within the range of 10dB from the limit specified, the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Otherwise, the testing could be stopped and the peak values of the EUT would be reported.

**NOTE:**

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1 GHz.
c. All modes of operation were investigated and the worst-case emissions are reported.

### 6.7.2. **Test Limits:**

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power.

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100** | 3 |
| 88-216 | 150** | 3 |
| 216-960 | 200** | 3 |
| Above 960 | 500 | 3 |

**NOTE:**

a. The lower limit shall apply at the transition frequencies.
b. Emission level (dBuV/m) = 20 log Emission level (uV/m).
c. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

## 6.7.3. Test Data:

**Test: WIFI SAC Transmitter Radiated Emission**
**Model#: M25QSS9PW1BN S/N: 471TVZ0920 EMC SR ID#: 18807-EMC-00035**
**Battery: NA Accessory: HAE6011A-C1, AN000163A02-C4, HMN1089C-C2, HSN6003C-CF2, HKN6032A-CF1, 3466-HKN6163C-1, 3075217A02-C1, PHCN4000E-CF3, PHLN1002A-CF2, PMUN1083A-C5**
**Test Channel: Low Test Frequency: 2412.0000 MHz Test Standard: ANSI C63.10-2013**
**Worst Case Plane: Y-Plane (802.11b)**

### Radiated Emission (Low Channel) tabular data

| Vertical Radiated Emission Result | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Spur Freq (MHz) | Spur level QPK (dBµV/m) | Spur level PK (dBµV/m) | Spur level AV (dBµV/m) | Limit QPK (dBµV/m) | Limit PK (dBµV/m) | Limit AV (dBµV/m) | Margin QPK (dBµV/m) | Margin PK (dBµV/m) | Margin AV (dBµV/m) | Carrier PK Power (dBµV/m) |
| 168.0060 | 33.6800 | - | - | 40.0000 | - | - | 6.3200 | - | - | - |
| 4824.0000 | - | 59.0761 | 47.2192 | - | 74.0000 | 54.0000 | - | 14.9239 | 6.7808 | - |
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| **Horizontal Radiated Emission Result** | | | | | | | | | | |
| 167.8422 | 28.0167 | - | - | 40.0000 | - | - | 11.9833 | - | - | - |
| 4823.6400 | - | 52.9787 | 40.9138 | - | 74.0000 | 54.0000 | - | 21.0213 | 13.0862 | - |
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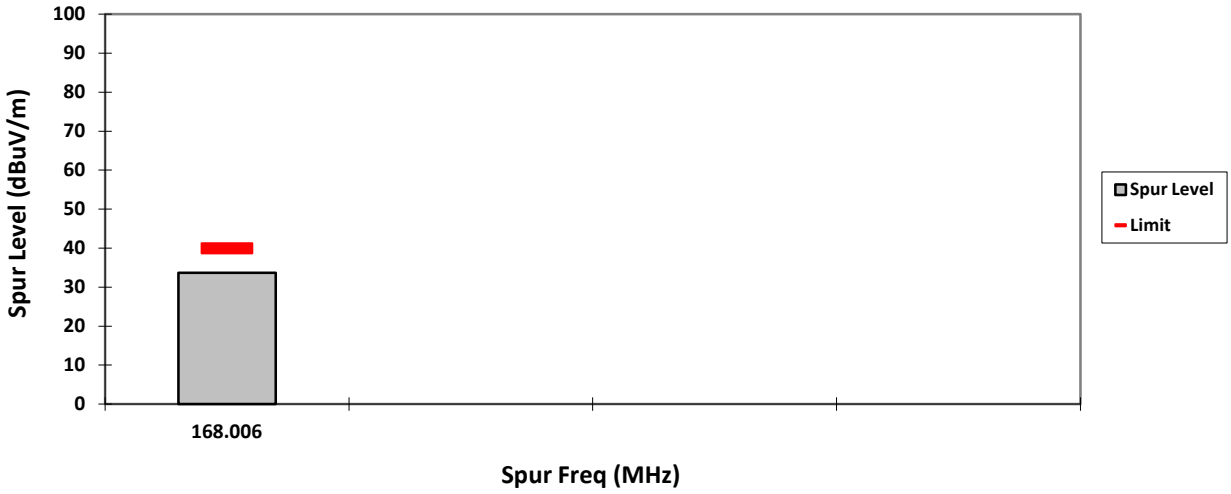
| Remarks: Pass Result | Marginal Result | Fail Result |
|---|---|---|

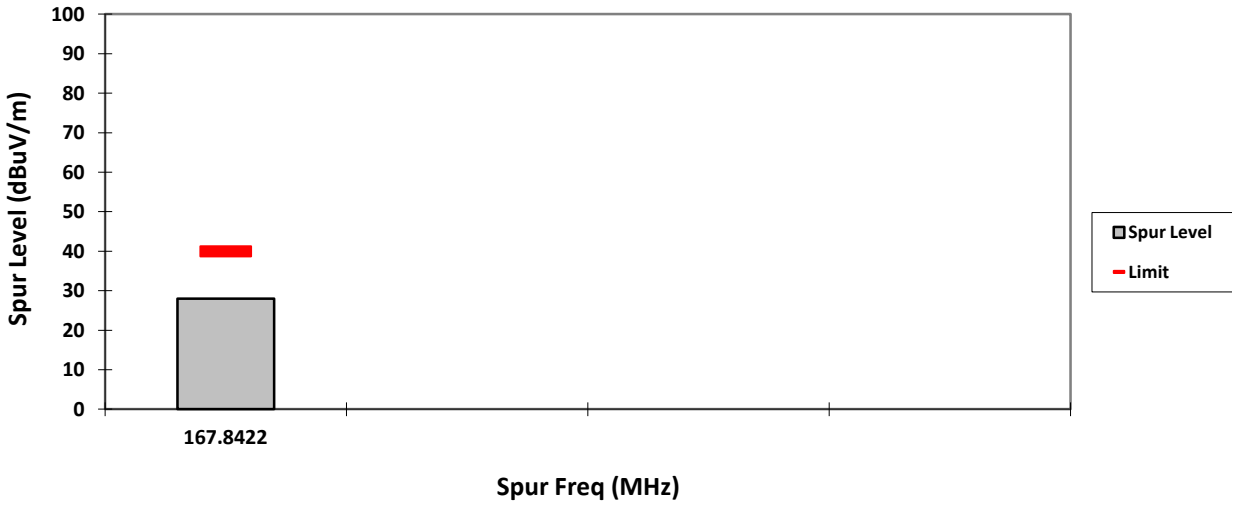
**Temperature (degC): 23.6 Humidity (%): 69.8**
**Test Performed by: Qawiman Test Date: Thu, Apr 02, 2020 System MU: 4.03dB**

**Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.**
***Pursuant to CFR 47 Part 2.1057 ( c ), emissions attenuated more than 20 dB below the permissible limit are not reported.**

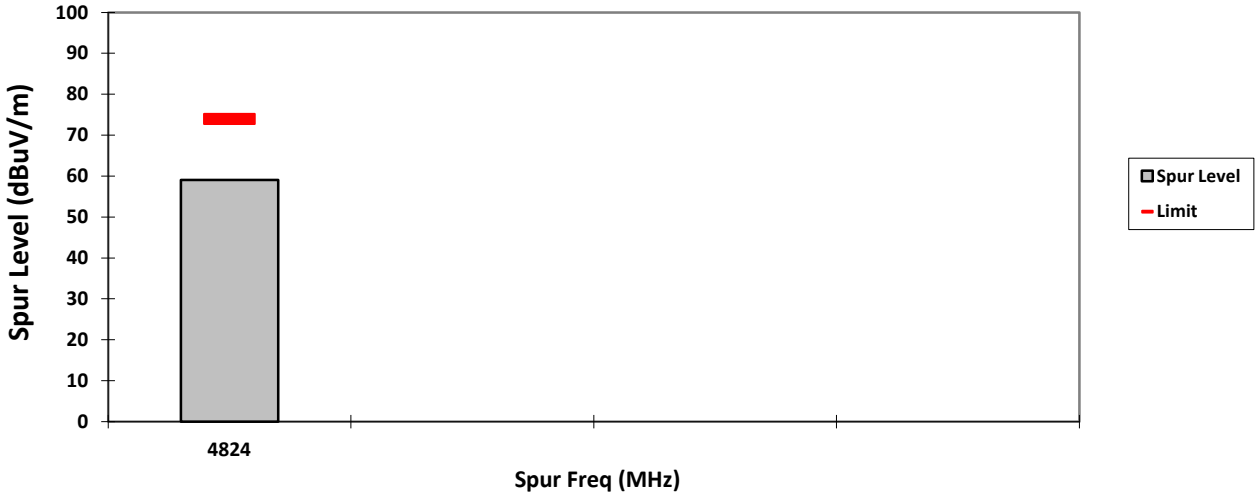
**VERTICAL, QPK**



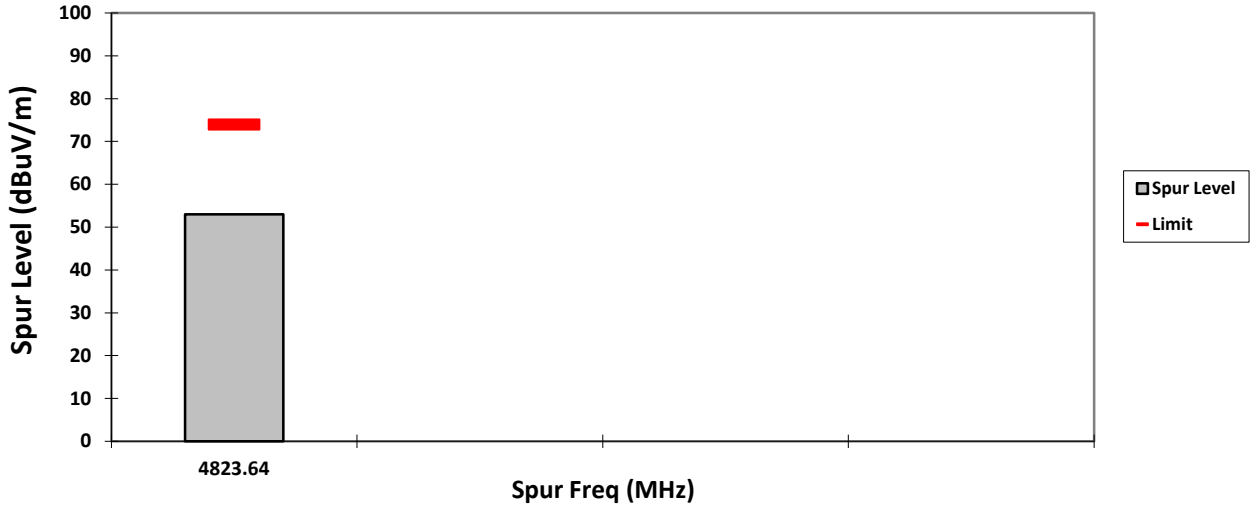

**HORIZONTAL, QPK**



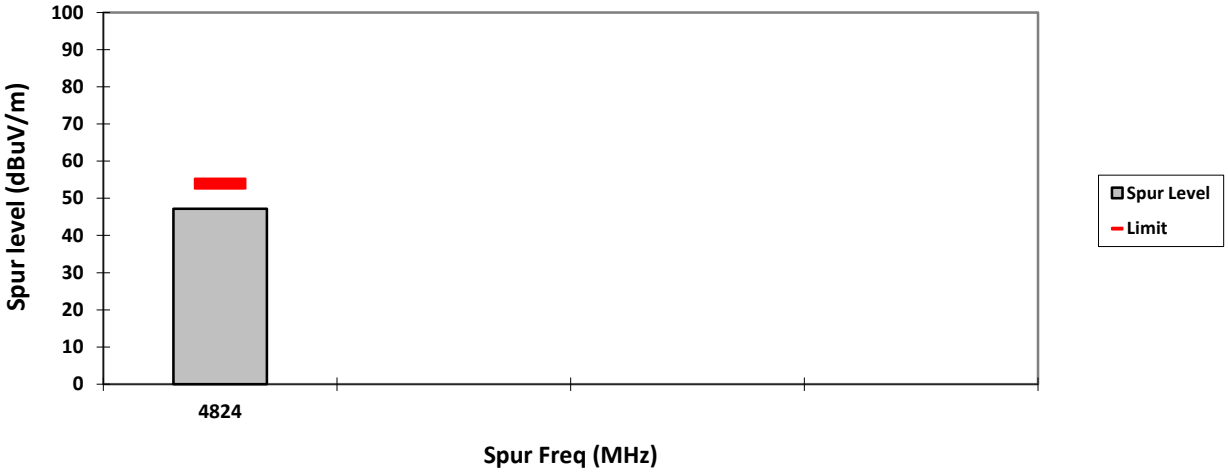
**VERTICAL, PK**



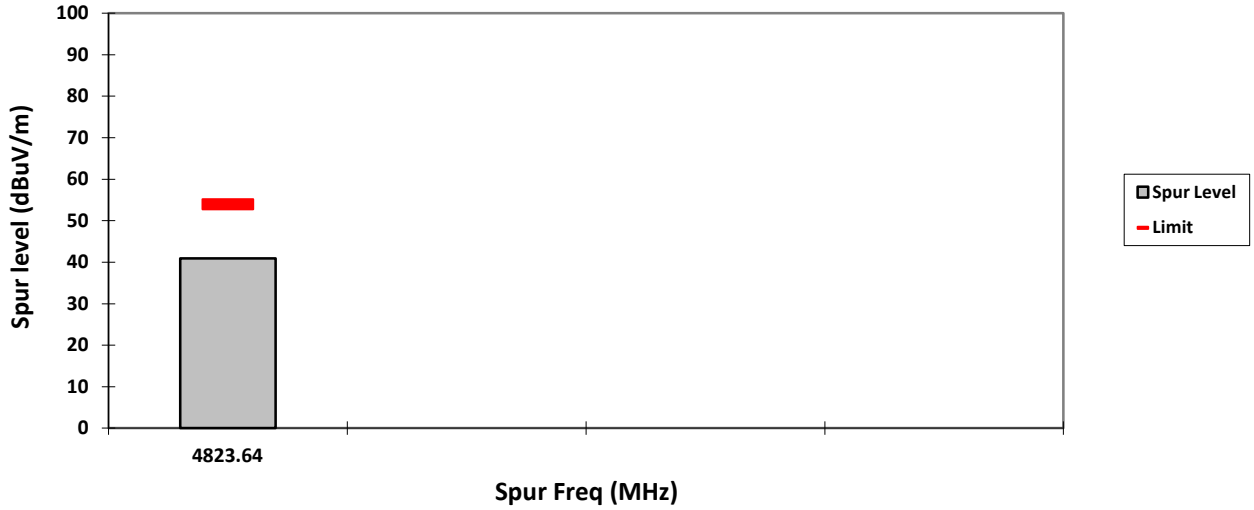

**HORIZONTAL, PK**



**VERTICAL, AV**




**HORIZONTAL, AV**



**Test: WIFI SAC Restricted Band Edge**
**Model Number: M25QSS9PW1BN S/N: 471TVZ0920 EMC SR ID#: 18807-EMC-00035**
**Battery: NA Accessory: HAE6011A-C1, AN000163A02-C4, HMN1089C-C2, HSN6003C-CF2, HKN6032A-CF1, 3466-HKN6163C-1, 3075217A02-C1, PHCN4000E-CF3, PHLN1002A-CF2, PMUN1083A-C5**
**Test Channel: High Test Frequency: 2462.0000 MHz Test Standard: ANSI C63.10-2013**
**Worst Case Plane: Y-Plane (802.11g)**

## Restricted Band Edge (High Channel) tabular data

| Vertical Radiated Emission Result | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Spur Freq (MHz) | Spur level QPK (dBµV/m) | Spur level PK (dBµV/m) | Spur level AV (dBµV/m) | Limit QPK (dBµV/m) | Limit PK (dBµV/m) | Limit AV (dBµV/m) | Margin QPK (dBµV/m) | Margin PK (dBµV/m) | Margin AV (dBµV/m) | Carrier PK Power (dBµV/m) |
| 2483.5000 | - | 64.2874 | 48.1439 | - | 74.0000 | 54.0000 | - | -9.7126 | -5.8561 | - |
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| **Horizontal Radiated Emission Result** | | | | | | | | | | |
| 2483.5000 | - | 57.1332 | 46.6935 | - | 74.0000 | 54.0000 | - | -16.8668 | -7.3065 | - |
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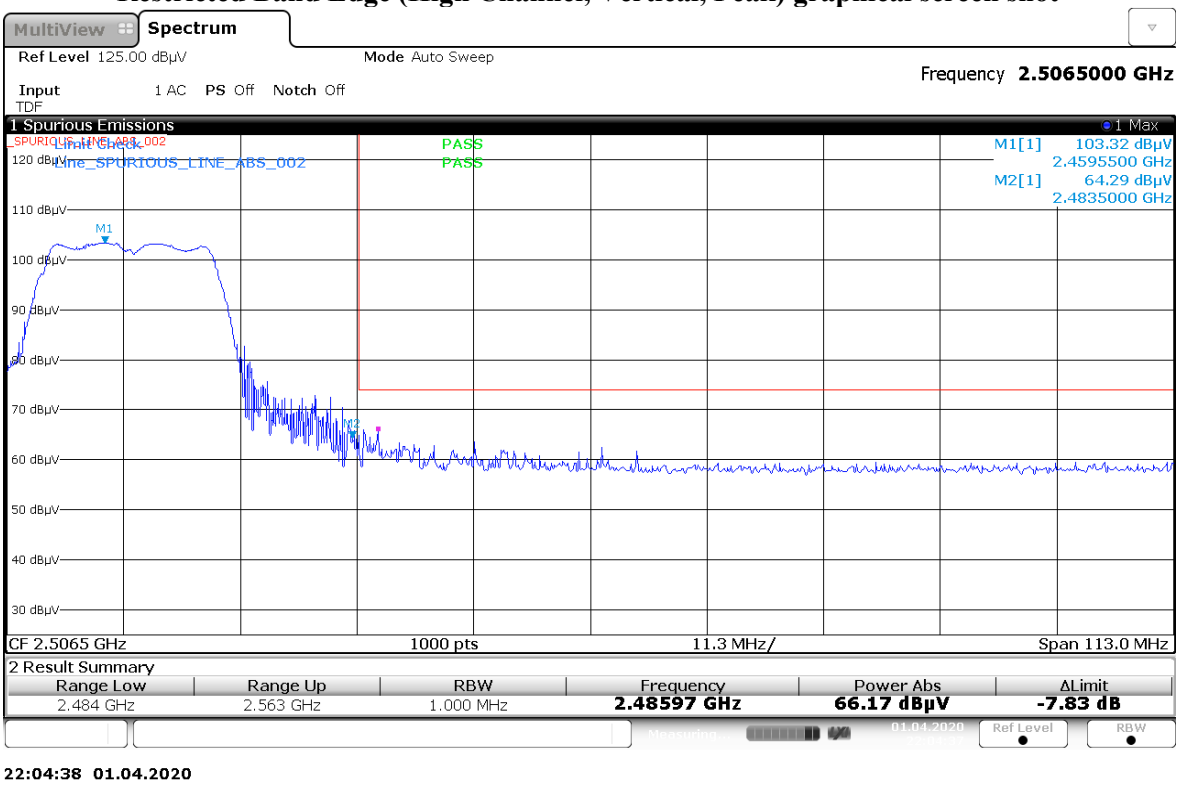
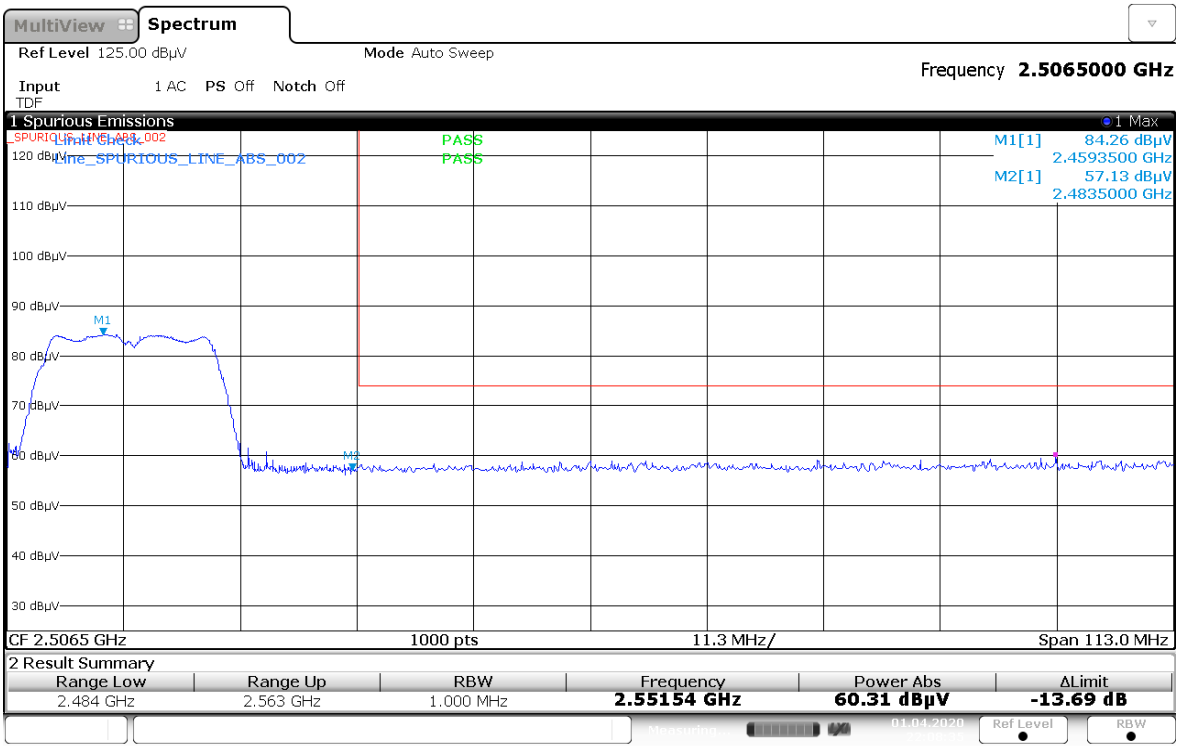
| Remarks: Pass Result | Marginal Result | Fail Result |
|---|---|---|

**Temperature (degC):23.6 Humidity (%): 69.8**
**Test Performed by: Qawiman Test Date: Wed, Apr 01, 2020 System MU: 4.03dB**

**Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot**

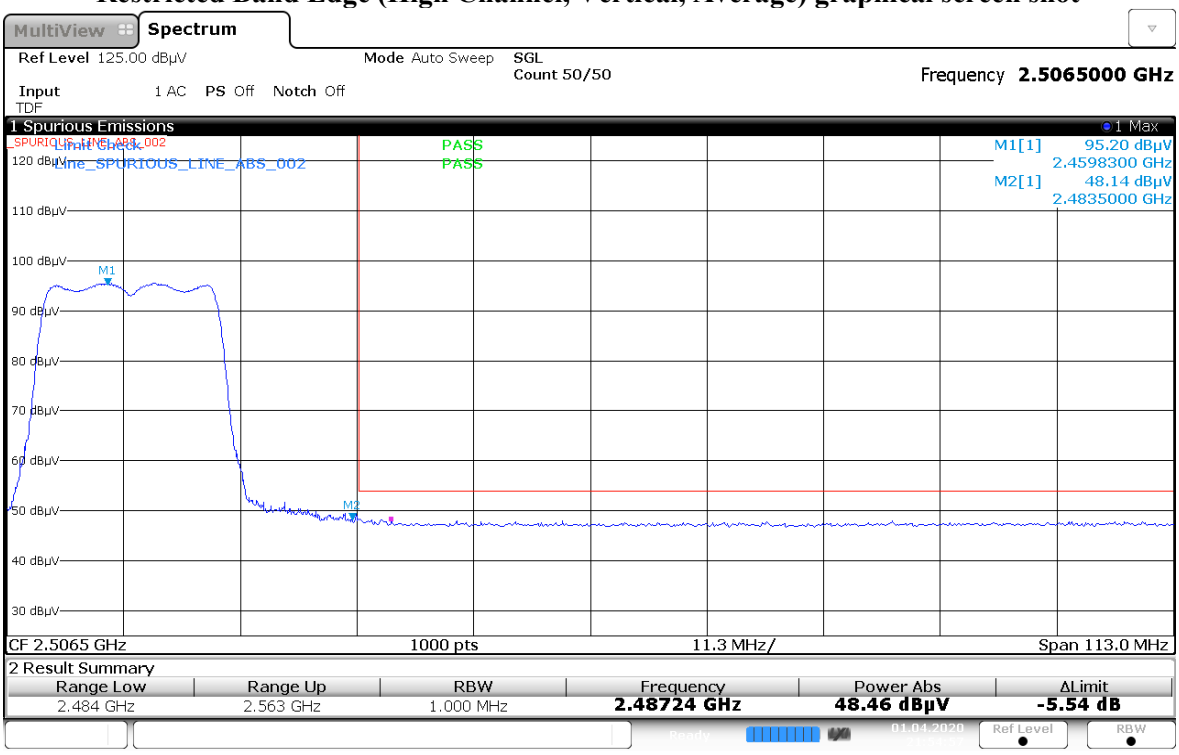



**Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot**



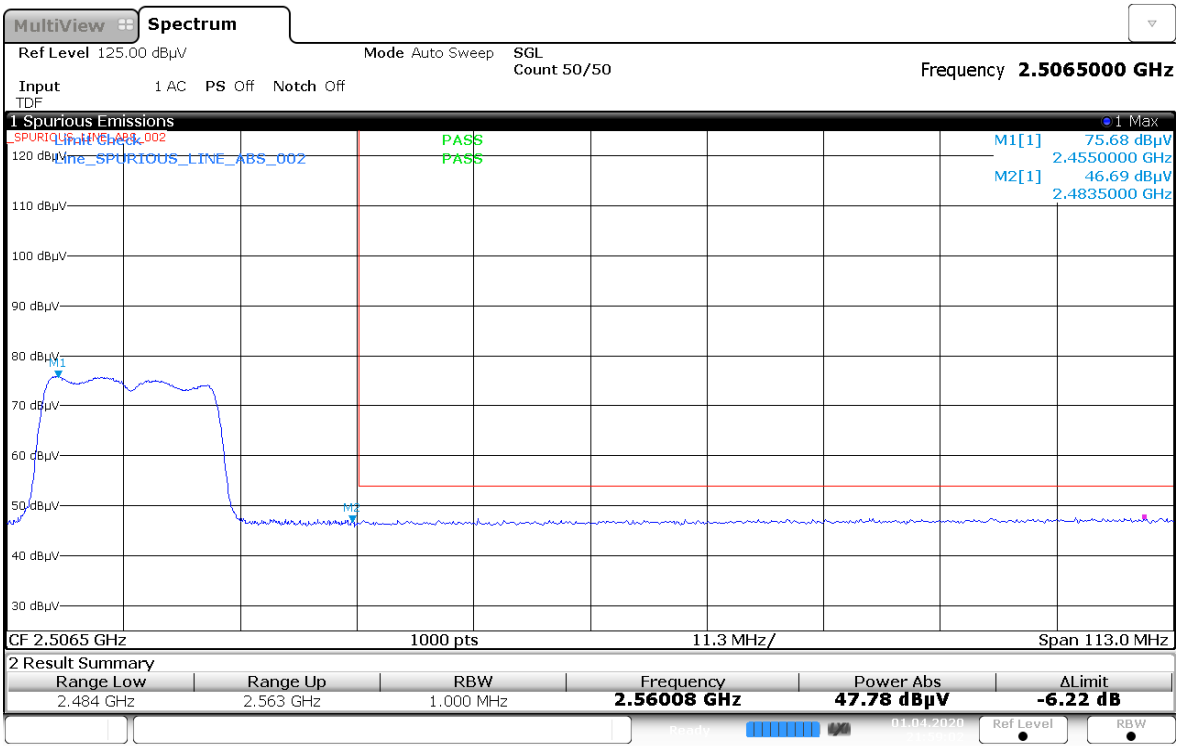

**22:08:35 01.04.2020**

**Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot**




**21:54:58 01.04.2020**

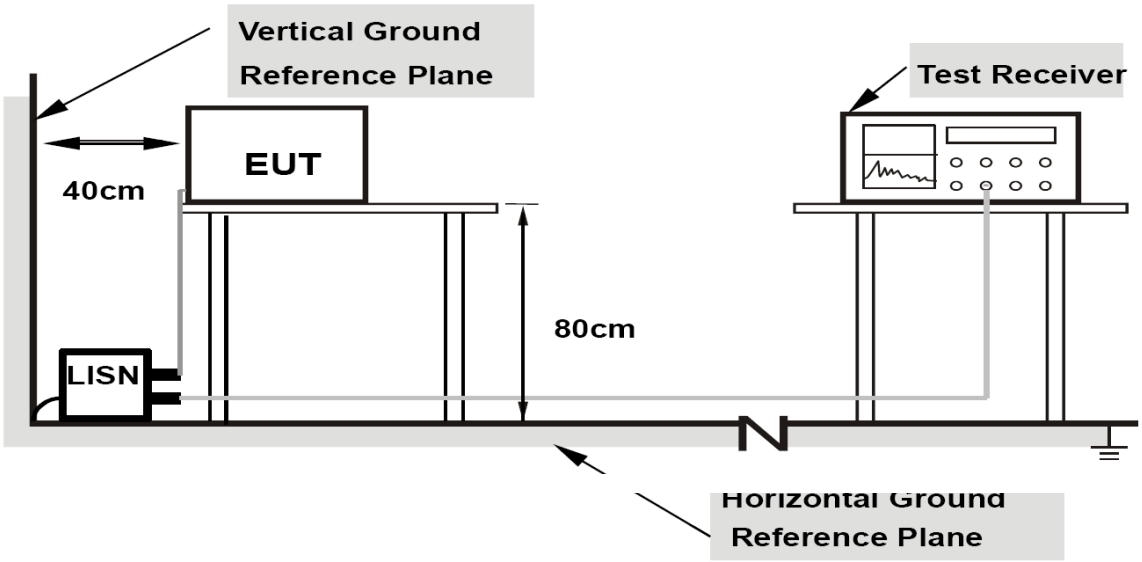
**Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot**




**21:59:03 01.04.2020**

## 6.8. AC Powerline Conducted Emission

### 6.8.1. Test Setup




1) Tests were conducted for both Receive and Transmit Mode of the EUT.
2) The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
3) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
4) The frequency range from 150 kHz to 30MHz was measured.

### 6.8.2. Test Limits:

**For AC Power Line Conducted Test Limit can be Class A or B depends on product classification.**

**Limits for conducted disturbance at the mains ports of class A ITE**

| Frequency range MHz | Limits dB(µV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0,15 to 0,50 | 79 | 66 |
| 0,50 to 30 | 73 | 60 |
| NOTE The lower limit shall apply at the transition frequency. | | |

**Table 1: Limits for Conducted Disturbance at the Mains Ports of Class A ITE.**

**Limits for conducted disturbance at the mains ports of class B ITE**

| Frequency range MHz | Limits dB(µV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0,15 to 0,50 | 66 to 56 | 56 to 46 |
| 0,50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |
| NOTE 1 The lower limit shall apply at the transition frequencies.<br>NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz. | | |

**Table 2: Limits for Conducted Disturbance at the Mains Ports of Class B ITE**

## 6.8.3. Test Result

**Not Applicable. Testing is not required, radio shall turn off during charging mode.**

# END OF TEST REPORT