



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.D

**Date/s Tested** : 29-Jan-2021 - 25-Feb-2021  
**Report Issue Date** : 23-Sept-2022  
**Manufacturer/Location** : Motorola Solutions Malaysia Sdn Bhd  
Plot 2A, Medan Bayan Lepas, Mukim 12 SWD,  
11900, Bayan Lepas, Penang, Malaysia  
**Requestor** : SZE KEAT NG  
**Product Type** : Mobile  
**Product Version (PMN)** : APX 6500  
**Model Number (HVIN)** : M25VRS9PW1CN  
**Frequency Band** : 2.412-2.462 GHz  
**Max RF Output Power** : 802.11b - 39.8 mWatts  
802.11g - 15.8 mWatts  
802.11n - 12.58 mWatts  
**Applicant Name** : Motorola Solutions Inc  
**Applicant Address** : 8000 West Sunrise Boulevard,  
Fort Lauderdale, Florida 33322  
**FCC Registrations** : 461337  
**ISED Registrations** : MY0001  
**Firmware Version (FVIN)** : D23.50.04



The equipment was tested accordance to the requirement listed below:

(2.4GHz Wi-Fi)  
47CFR Part 15C  
ISED RSS 247 Issue 2  
February 2017

PASS

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Prepared By:

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### REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	<b>26-Feb-2021</b>	<b>Gan Boon Teong</b>
Rev. B	Update Model Number (HVIN)	<b>22-Jul-2022</b>	<b>Gan Boon Teong</b>
Rev. C	Update Product Version (PMN) and Include Chipset Referencing Note	<b>19-Aug-2022</b>	<b>Gan Boon Teong</b>
Rev. D	Remove Antenna Selection Note	<b>23-Sept-2022</b>	<b>Gan Boon Teong</b>

## 1.0. General Information

### EUT Description:

<b>Technologies</b>	2.4GHz Wi-Fi
<b>TX Frequency range</b>	2412MHz – 2462MHz
<b>Modulation Type</b>	DSSS, OFDM
<b>Connector type</b>	PROGRAMMING, TEST & ALIGNMENT CABLE
<b>Antenna type</b>	STUBBY (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
ANTENNA, STUBBY,WIFI/GNSS, M-CYCLE, QMA, 6FT, LMR195, FLEXIBLE, PVC FREE GPS WIFI ROOF 2400MHz - 2500MHz; 4900MHz - 5900MHz	MOTOROLA	AN000163A02
ANTENNA, STAMPED METAL, VEHICLE MOUNT 3DB LOW PROFILE ANTENNA KIT 764-870 MHz(7800 BAND); 806-941 MHZ(8900 BAND)	MOTOROLA	HAF4013A
Water Resistant Microphone	MOTOROLA	HMN1089C
13 Watt Speaker (Motorcycle) - Non EPP Compliant	MOTOROLA	HSN6003C
MCYCLE POWER CABLE	MOTOROLA	HKN6032A
CABLE, DATA, USB, 1-1/2M, XTL5000	MOTOROLA	HKN6163C
Motorcycle Remote Cable for 05 CH	MOTOROLA	3075217A02
O5 CONTROL HEAD (ENGLISH)	MOTOROLA	PHCN4000E
ASSY,KIT,CH END REM	MOTOROLA	PHLN1002A

### 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

### Modifications to EUT

For RF conducted measurements a pigtail was soldered out of the board while for radiated measurements there were no modifications to the device

### 2.0. Summary of Test Results

FCC Clause	IC Clause	Test Item	Result	Remark	Serial number tested	Tested by
15.247 (a)(2)	RSS-247 5.2(a)	DTS & 99% Channel Bandwidth	Pass		471TXB1902	Gan
15.247 (b)(3)	RSS-247 5.4(d)	Conducted RF Output Power (Average)	Pass	Highest output power: 802.11b: 15.273 dBm (33.67 mW) 802.11g: 11.423 dBm(13.88 mW) 802.11n: 10.604 dBm(11.49 mW)	471TXB1902	Gan
15.247(e)	RSS-247 5.2(b)	Maximum Power Spectral Density	Pass	References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124	NA	NA
15.247(d)	RSS-247 5.5	Conducted Spurious Emissions	Pass	References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124	NA	NA
15.247 (d)	RSS-247 5.5	Band edge Conducted Spurious Emission	Pass	References data from FCC ID AZ492FT7124 / ISED 109U-92FT7124	NA	NA
15.205, 15.209, 15.247 (d)	RSS-247 5.5	Radiated Emission within Restricted Bands	Pass	Worst case emission: 49.06dB $\mu$ V/m	471TXB1942	Nazrin&Amaluddin
15.207	RSS-Gen 8.8	AC Power Line Conducted Emission	NA	Device does not operate on AC	NA	NA
15.203		Antenna requirement	NA	Internal antenna is not accessible to the end-user	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	Expanded Uncertainty (k=1.96) ( $\pm$ 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
Conducted Spurious Emissions	9kHz ~ 12.75GHz	2.82

#### 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-Apr-20	19-Apr-21
CHAMBER	SH-641	92002639	8-Dec-20	8-Dec-21
POWER SUPPLY ( 0-20V / 0-25A )	6652A	3541A02565	26-Jun-20	26-Jun-21
SPECTRUM ANALYZER	E4445A	MY45301089	7-Sep-19	7-Sep-21
N to N RF Cable # 1	SF126/11N/11N	NA	NA	NA

##### Radiated Emission Station (SW Version: EMC FCC RE v1.6.1)

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	566	22-Oct-19	22-Oct -21
POWER SUPPLY	6032A	2615A01178	21-May-20	21-May-21
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101750	15-Jan-21	15-Jan-22
EMI TEST RECEIVER	ESIB26	100017	19-Jul-19	19-Mar-21
5m SEMI-ANECHOIC CHAMBER	S800-HX	J2308	Not Required	Not Required
BILOG ANTENNA	CBL6112B	2964	23-Apr-19	23-Apr-21
BILOG ANTENNA	CBL6112B	2950	8-Jul-19	8-Jul-21
DATA LOGGER	SDL500	A.016776	4-Jun-20	4-Jun-21
SYSTEM CONTROLLER	SC104V	050806-1	Not Required	Not Required
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	Not Required	Not Required
ANTENNA POSITIONING TOWER	TLT2	NA	Not Required	Not Required
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170143	15-Jul-20	15-Jul-21
18 - 40GHz PREAMPLIFIER	MITEQ Hi GAIN SUCOFLEX	2006313	Not Required	Not Required
PREAMPLIFIER	PAM-0118	269	24-May-19	24-May-22
LOOP ANTENNA	6502	00208416	15-Sep-20	15-Sep-21

#### 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	11	SISO	23.2°C, 69.3%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	23.2°C, 69.3%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	23.2°C, 69.3%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	11	SISO	23.2°C, 69.3%RH
Test Mode	802.11g	1 to 11	1,6,11	OFDM	BPSK	6	SISO	23.2°C, 69.3%RH
Test Mode	802.11n (HT20)	1 to 11	1,6,11	OFDM	BPSK	6.5	SISO CDD (MIMO)	23.2°C, 69.3%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	11	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 : Duty cycle of test signal is  $\geq 98\%$ . (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.

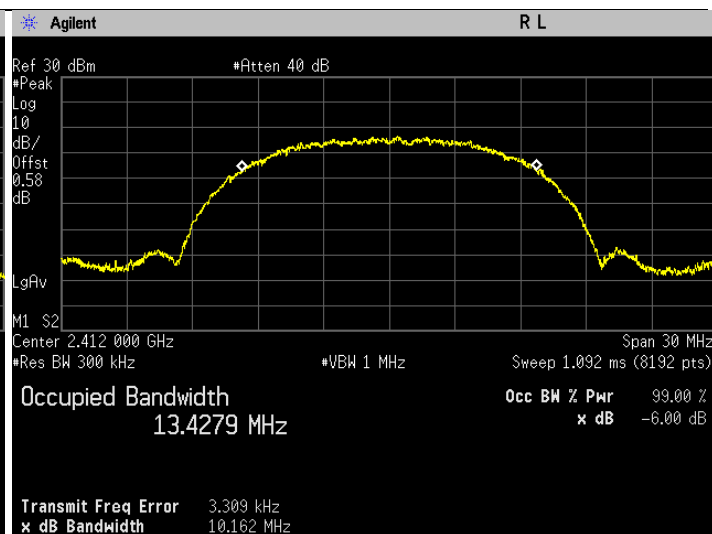
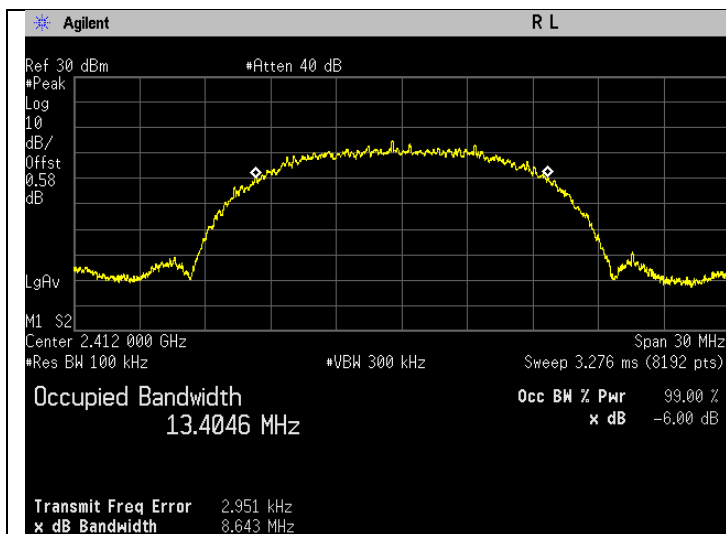
#### 6.1.2. Test Limits:

<b>Normal Condition (25 ° C)</b>
<b>≥500 kHz</b>

6.1.3. Test Data:

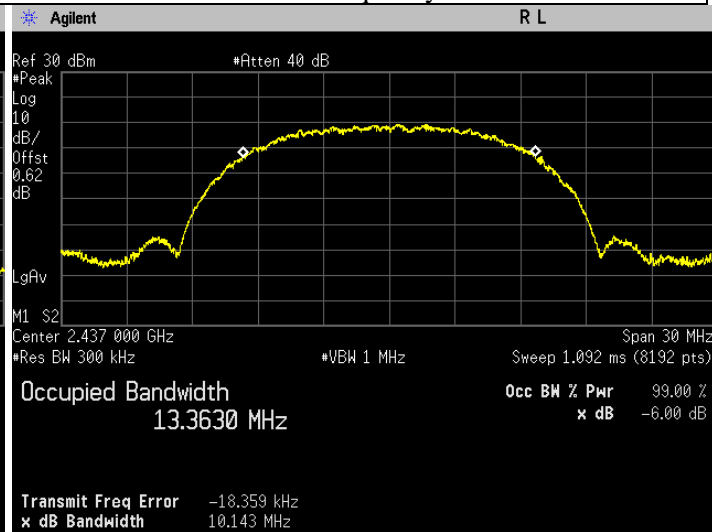
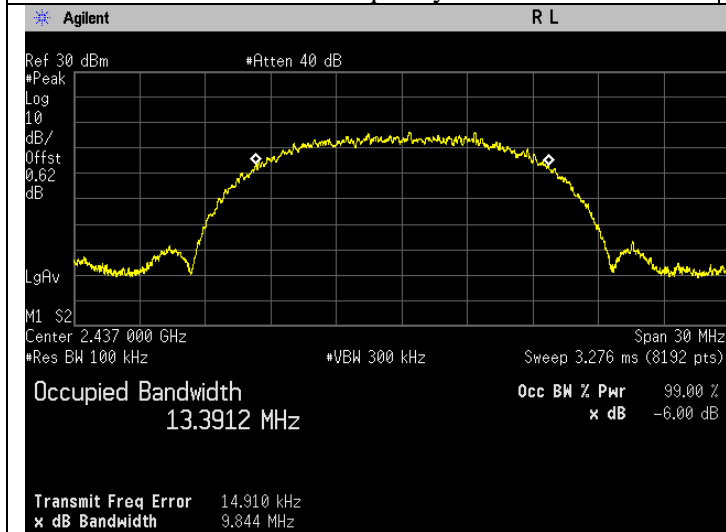
**802.11 b**

Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11b	DSSS	DBPSK	11	2412	8.643	13.428	Pass
802.11b	DSSS	DBPSK	11	2437	9.844	13.363	Pass
802.11b	DSSS	DBPSK	11	2462	8.659	13.415	Pass



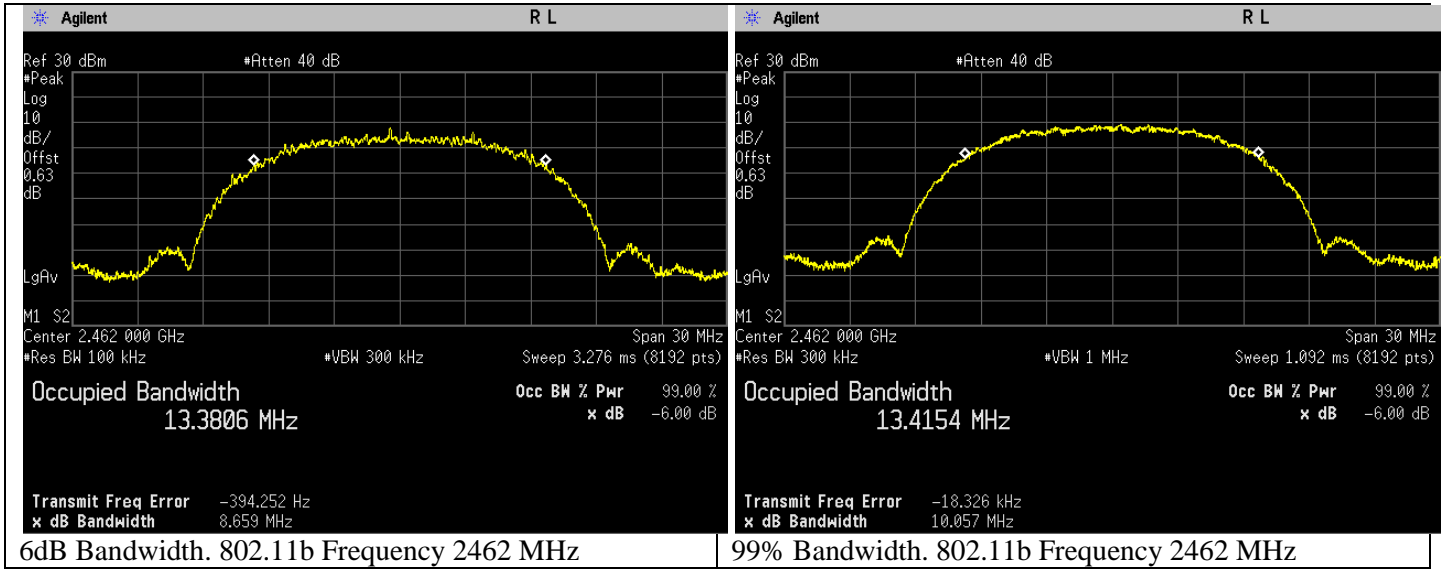
6dB Bandwidth. 802.11b Frequency 2412 MHz

99% Bandwidth. 802.11b Frequency 2412 MHz



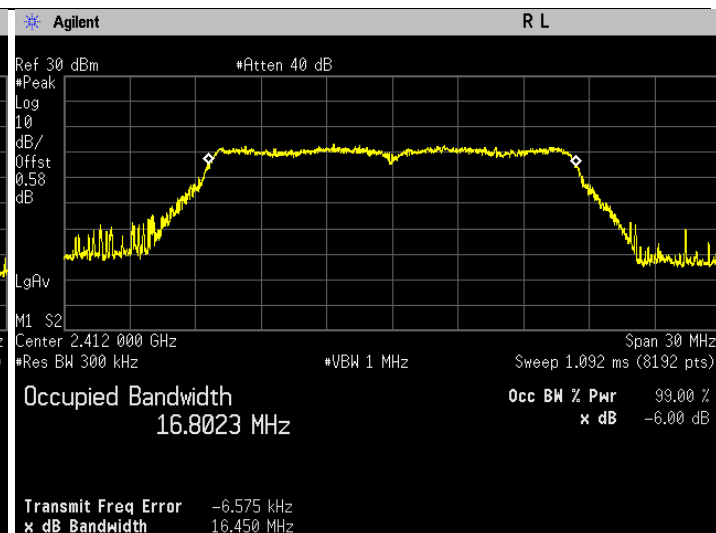
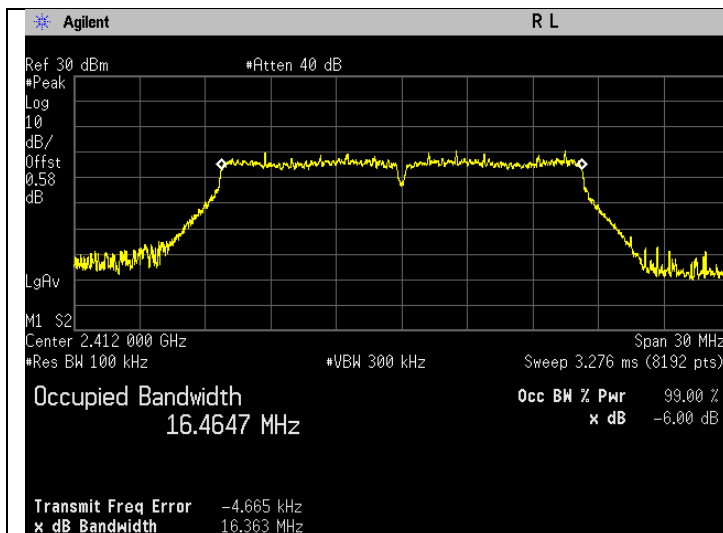
6dB Bandwidth. 802.11b Frequency 2437 MHz

99% Bandwidth. 802.11b Frequency 2437 MHz



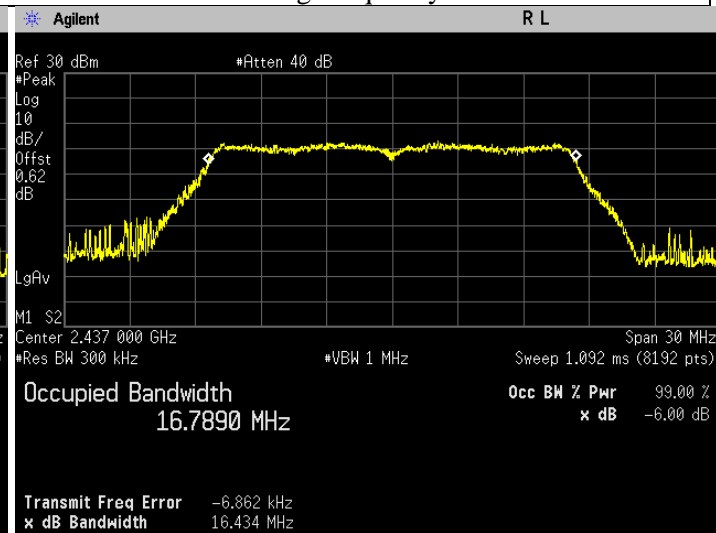
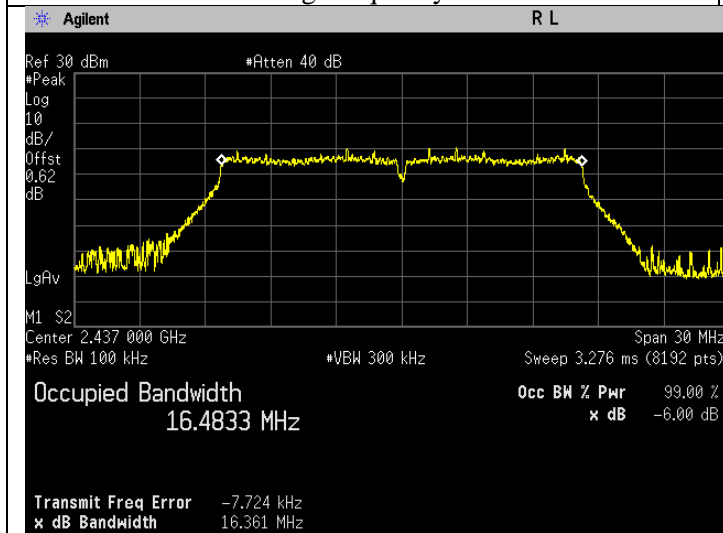
**802.11 g**

Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11g	DSSS	DBPSK	6	2412	16.363	16.802	Pass
802.11g	DSSS	DBPSK	6	2437	16.361	16.789	Pass
802.11g	DSSS	DBPSK	6	2462	16.371	16.789	Pass



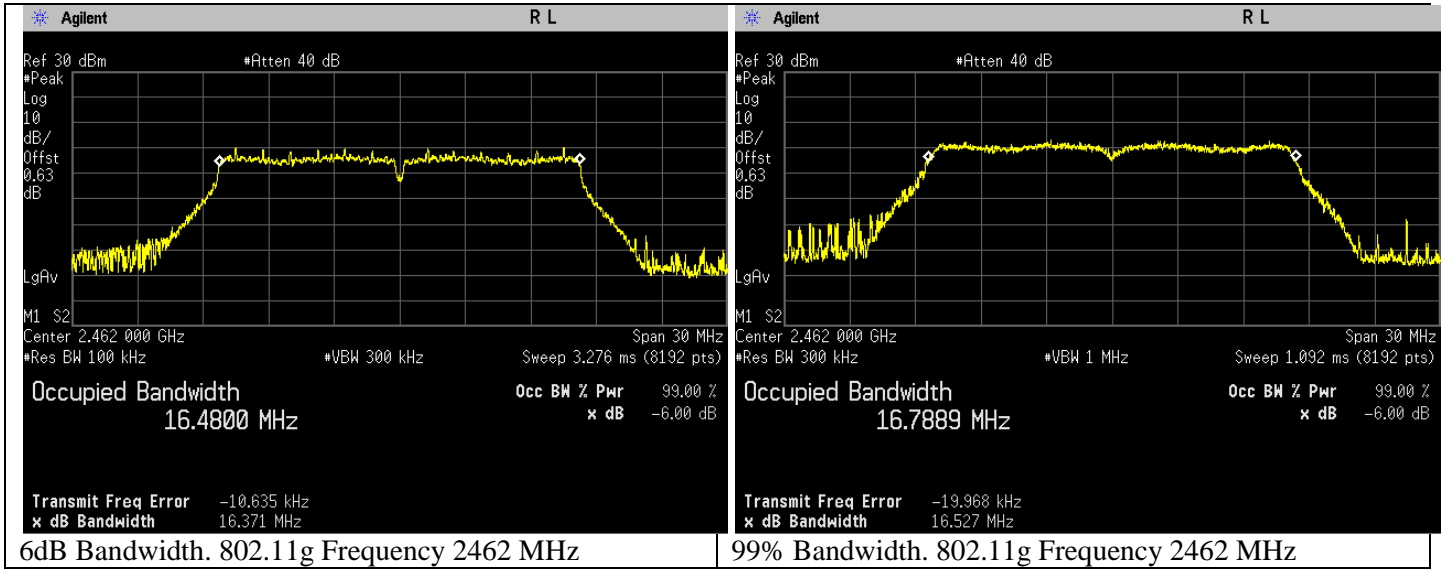
6dB Bandwidth. 802.11g Frequency 2412 MHz

99% Bandwidth. 802.11g Frequency 2412 MHz



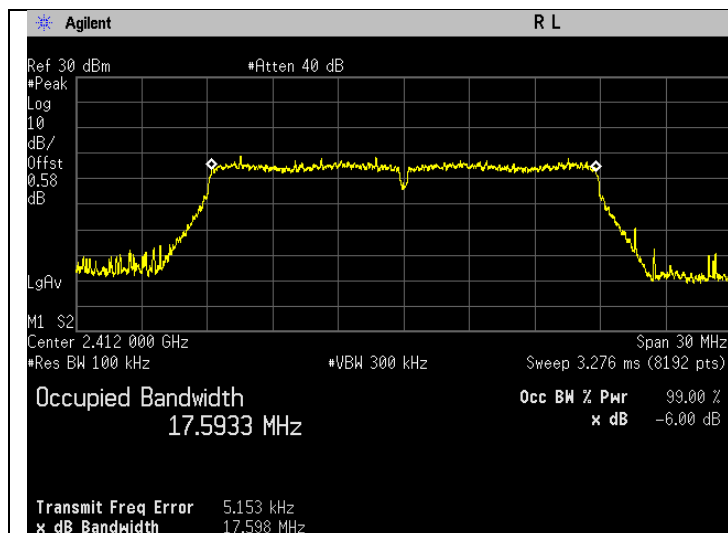
6dB Bandwidth. 802.11g Frequency 2437 MHz

99% Bandwidth. 802.11g Frequency 2437 MHz

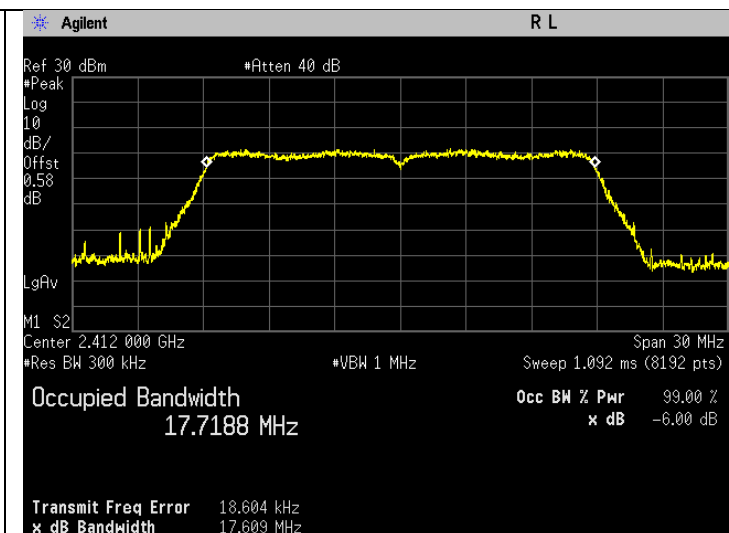


**802.11n (HT20)**

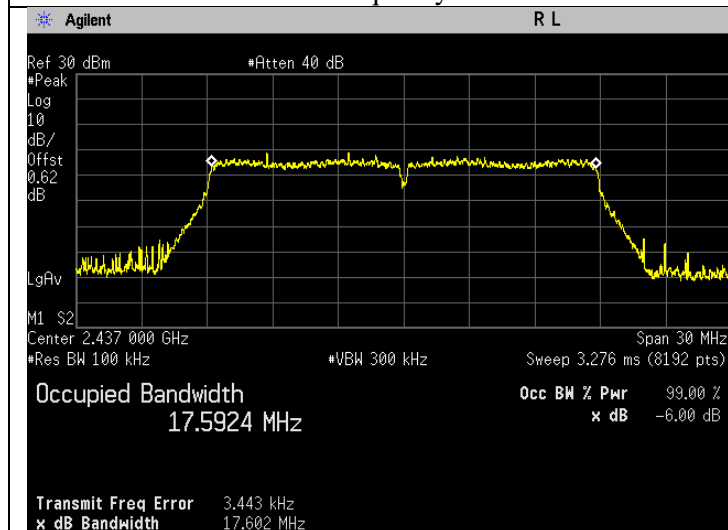
Test Conditions				Test Frequency	Results		
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Status
802.11n	DSSS	DBPSK	6.5	2412	17.598	17.719	Pass
802.11n	DSSS	DBPSK	6.5	2437	17.602	17.692	Pass
802.11n	DSSS	DBPSK	6.5	2462	17.577	17.723	Pass



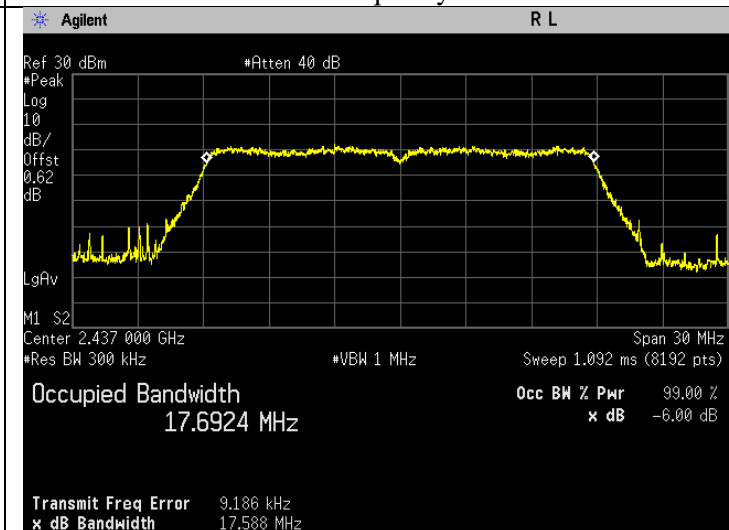
6dB Bandwidth. 802.11n Frequency 2412 MHz



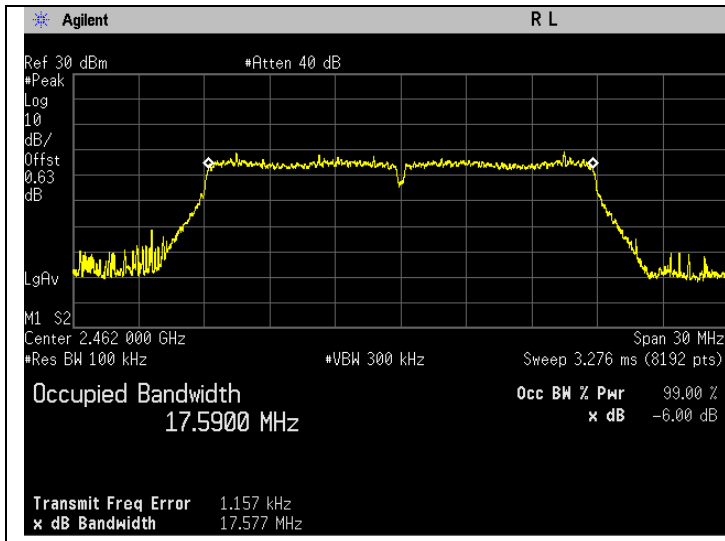
99% Bandwidth. 802.11n Frequency 2412 MHz



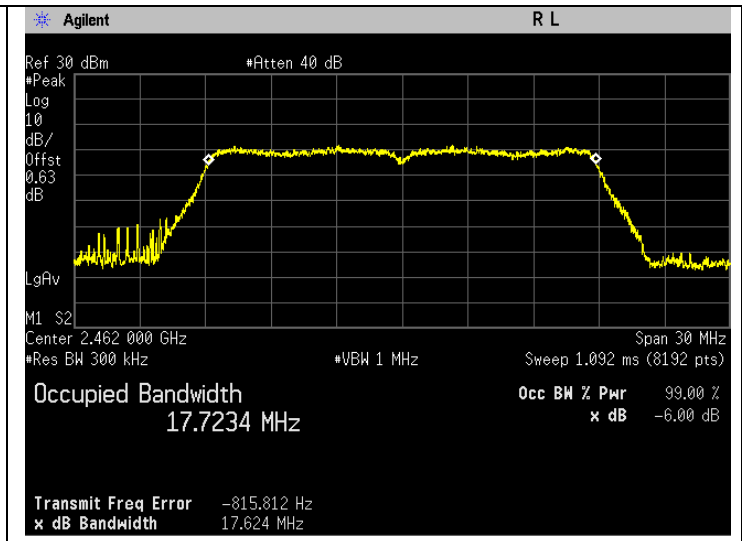
6dB Bandwidth. 802.11n Frequency 2437 MHz



99% Bandwidth. 802.11n Frequency 2437 MHz



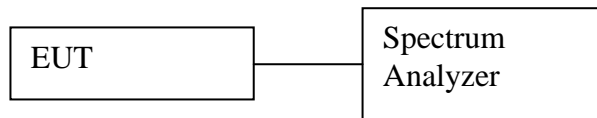
6dB Bandwidth. 802.11n Frequency 2462 MHz



99% Bandwidth. 802.11n Frequency 2462 MHz

## 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  $\geq [3 \times \text{RBW}]$ .
  - c. Set the span  $\geq [1.5 \times \text{OBW bandwidth}]$ .
  - 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:

<b>Normal Condition (25 ° C)</b>
<b><math>\leq 1 \text{ Watt}(30 \text{ dBm})</math></b>



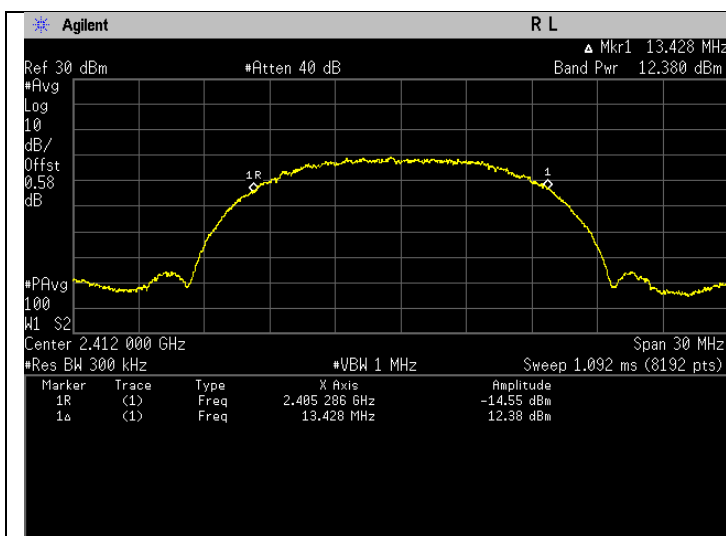
6.2.3. Test Data:

**802.11b**

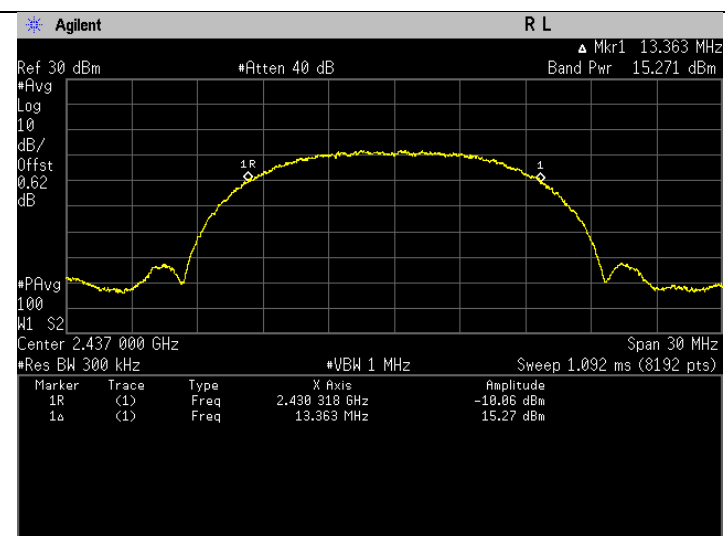
$$\text{Output Power} = \text{Band Power} + \text{Duty Cycle Factor}$$

$$= \text{Band Power} + 0.002\text{dBm}$$

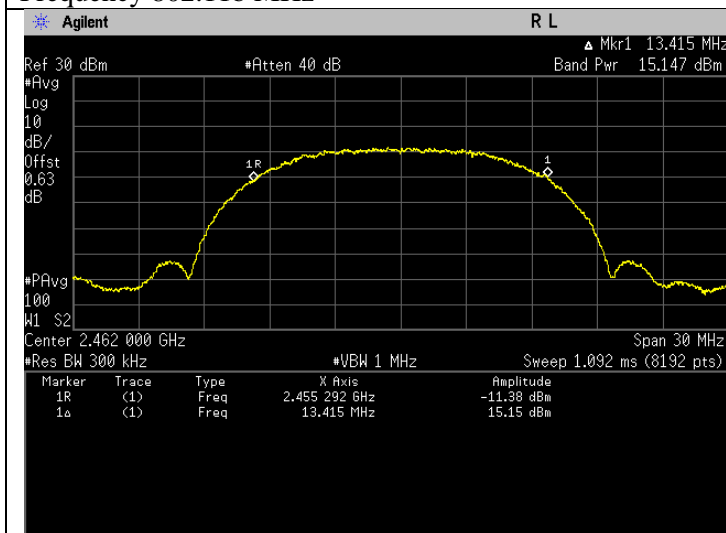
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11b	DSSS	DBPSK	11	2412	12.382	Pass
802.11b	DSSS	DBPSK	11	2437	15.273	Pass
802.11b	DSSS	DBPSK	11	2462	15.149	Pass



Frequency 802.11b MHz



Frequency 802.11b MHz



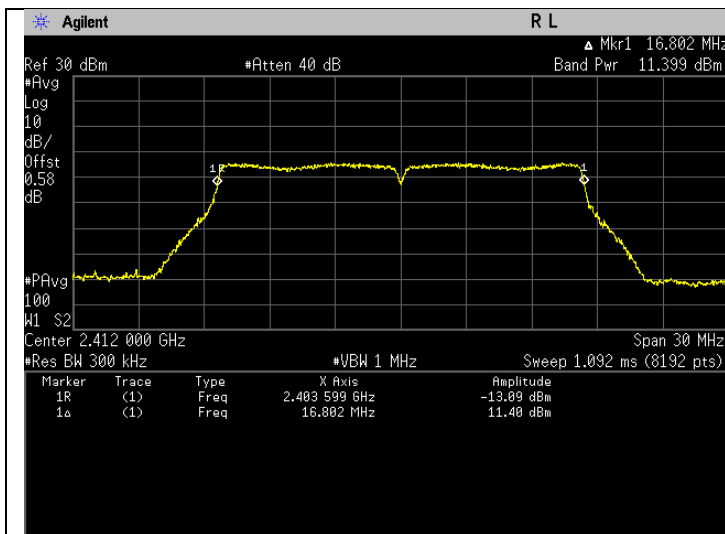
Frequency 802.11b MHz

**802.11g**

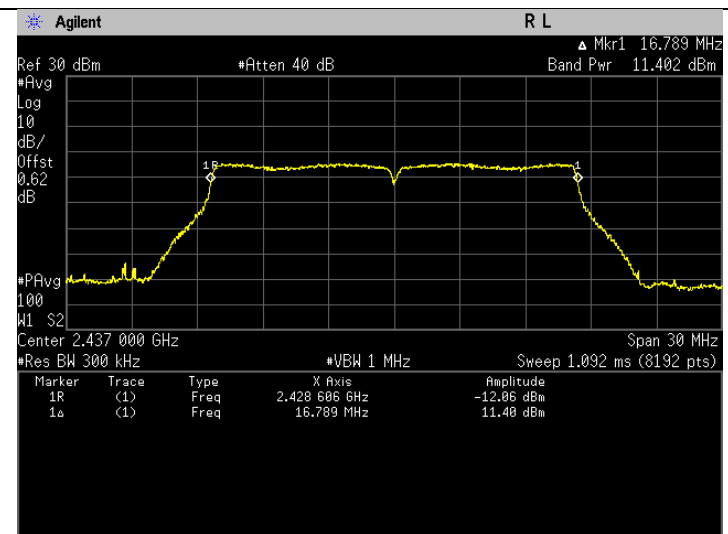
$$\text{Output Power} = \text{Band Power} + \text{Duty Cycle Factor}$$

$$= \text{Band Power} + 0.021\text{dBm}$$

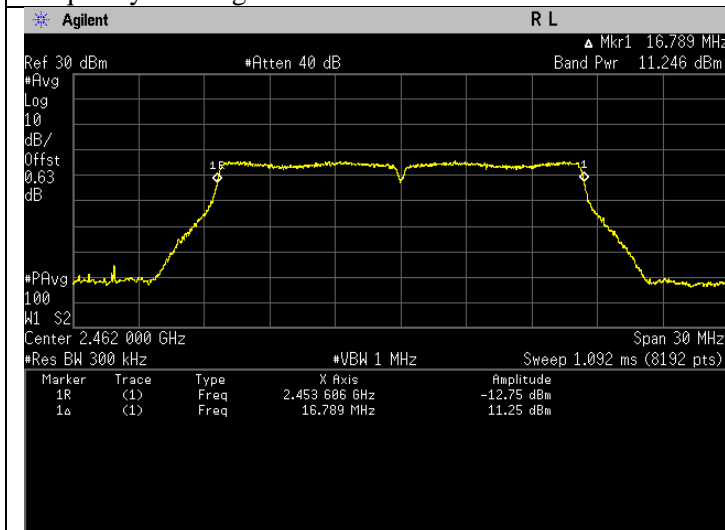
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11g	DSSS	DBPSK	6	2412	11.420	Pass
802.11g	DSSS	DBPSK	6	2437	11.423	Pass
802.11g	DSSS	DBPSK	6	2462	11.267	Pass



Frequency 802.11g MHz



Frequency 802.11g MHz



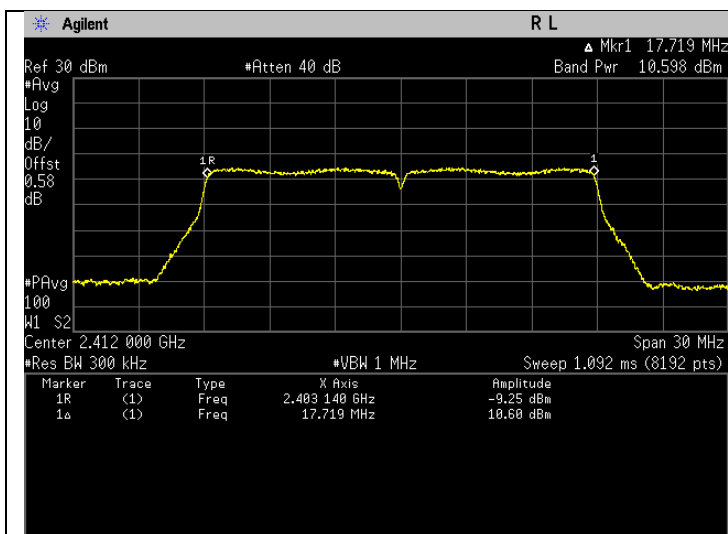
Frequency 802.11g MHz

**802.11n (HT20)**

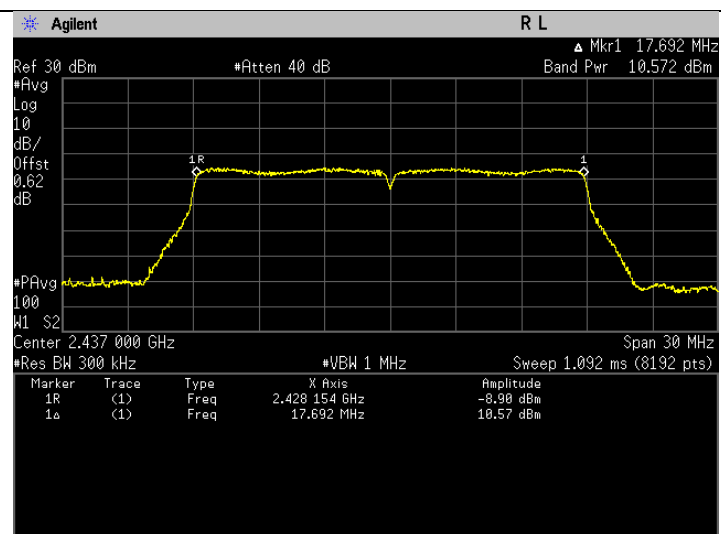
$$\text{Output Power} = \text{Band Power} + \text{Duty Cycle Factor}$$

$$= \text{Band Power} + 0.006\text{dBm}$$

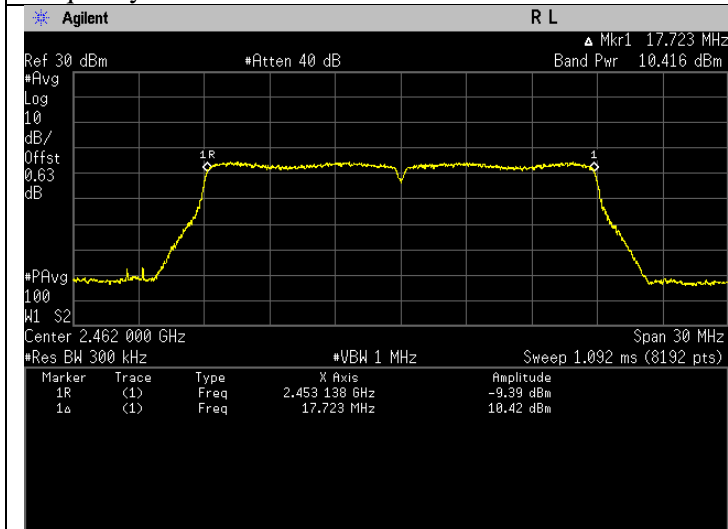
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11n	DSSS	DBPSK	6.5	2412	10.604	Pass
802.11n	DSSS	DBPSK	6.5	2437	10.578	Pass
802.11n	DSSS	DBPSK	6.5	2462	10.422	Pass



Frequency 802.11n MHz



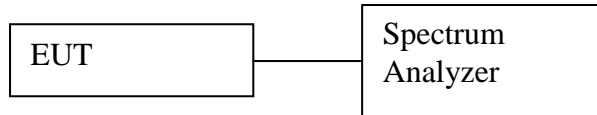
Frequency 802.11n MHz



Frequency 802.11n MHz

### 6.3.Duty Cycle of the test signal

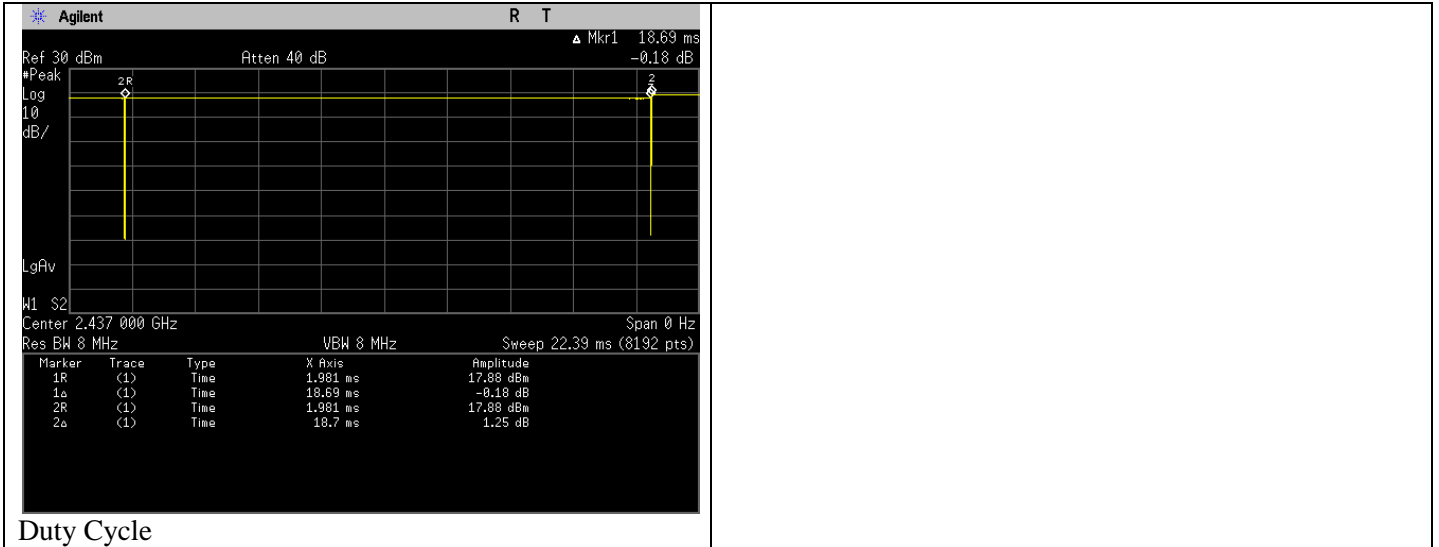
#### 6.3.1. Test Setup



- 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  $\geq$  RBW.
  - c. Set the span  $\geq$  [1.5  $\times$  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

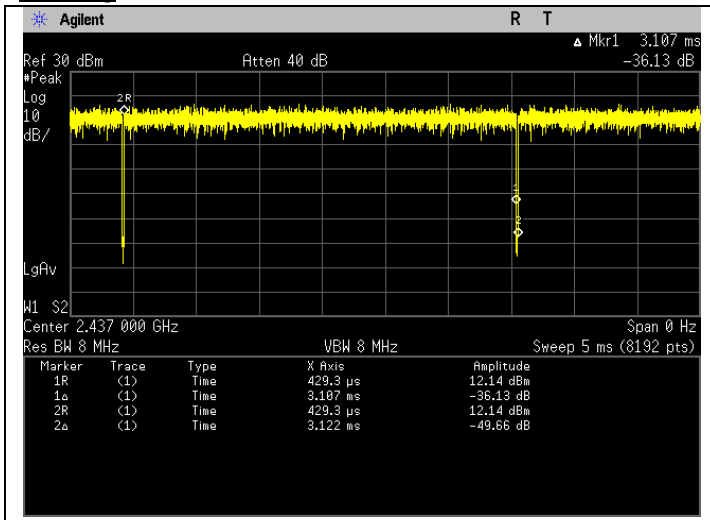


On time (ms)	18.69
On + Off Time (ms)	18.7
Duty cycle	0.9995
Duty Cycle factor	0.002

\*Duty cycle = On time/ On +off time

\*Duty Cycle factor = 10\*log(1/Duty Cycle)

**802.11g**



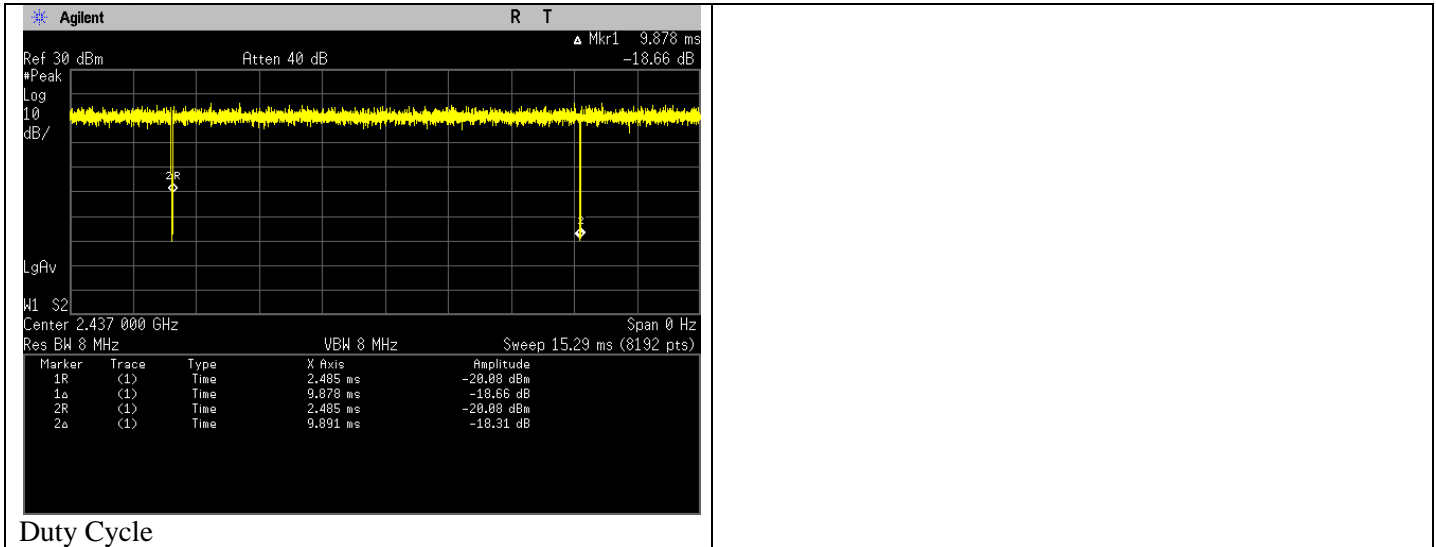
Duty Cycle

On time (ms)	3.107
On + Off Time (ms)	3.122
Duty cycle	0.9952
Duty Cycle factor	0.021

\*Duty cycle = On time/ On +off time

\*Duty Cycle factor =  $10 \cdot \log(1/\text{Duty Cycle})$

**802.11n (HT20)**



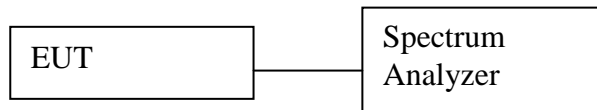
On time (ms)	9.878
On + Off Time (ms)	9.891
Duty cycle	0.9987
Duty Cycle factor	0.006

\*Duty cycle = On time/ On +off time

\*Duty Cycle factor =  $10 \cdot \log(1/\text{Duty Cycle})$

## 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  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
  - d. Set the VBW  $\geq [3 \times \text{RBW}]$ .
  - 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

<b>Normal Condition (25 ° C)</b>
<b><math>\leq 8 \text{ dBm/3kHz}</math></b>

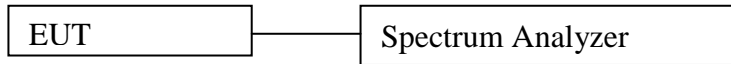
### 6.4.3. Test Result

NA



## 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<sup>th</sup> harmonic.
- f) Measure every antenna port by repeat the step above for MIMO measurement.

### 6.5.2. Test Limits:

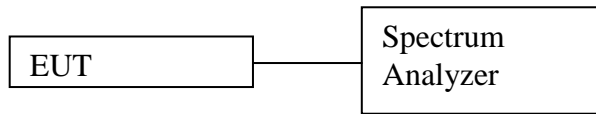
<b>Normal Condition (25 ° C)</b>
<b>Shall be at least 30 dB below peak (max) power.</b>

### 6.5.3. Test Result

NA

## 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:

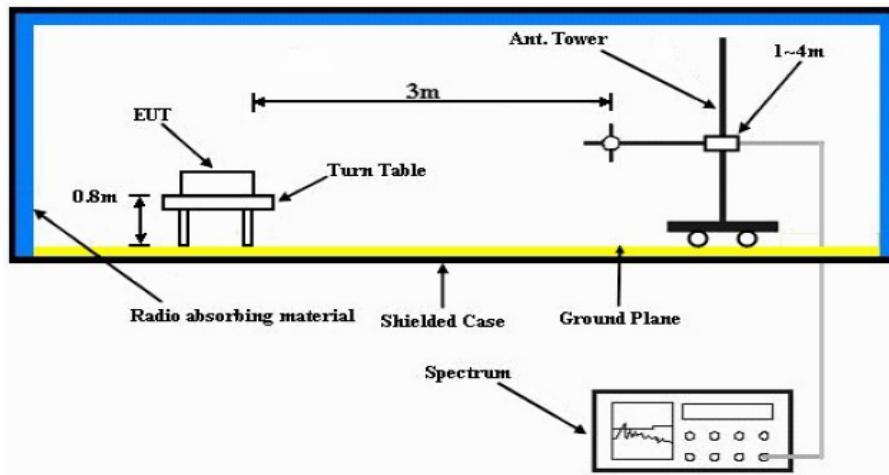
<b>Normal Condition (25 ° C)</b>
<b>Shall be at least 30 dB below peak (max) power.</b>

### 6.6.3. Test Result

NA

## 6.7. Radiated Emission within restricted Bands

### 6.7.1. Test Setup



- 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.
- The EUT is set 3m away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system is set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
- 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.
- 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#:** M25VRS9PW1BN      **S/N:** 471TXB1942      **EMC SR ID#:** 24823-EMC-00041  
**Battery:** NA      **Accessory:** AN000163A02, HAF4013A, HMN1089C-C3, HSN6003C-CF2, HKN6032A-CF1, 3466-HKN6163C-6, 3075217A02-C2, PHCN4000E-C4, PHLN1002A-C1, PMUN1083A-CF6  
**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)
167.9970	29.2712	-	-	43.5000	-	-	14.2288	-	-	-
4824.2100	-	60.7989	49.0587	-	74.0000	54.0000	-	13.2011	4.9413	-
Horizontal Radiated Emission Result										
168.0030	32.0267	-	-	43.5000	-	-	11.4733	-	-	-
4824.0000	-	52.2207	39.4366	-	74.0000	54.0000	-	21.7793	14.5634	-

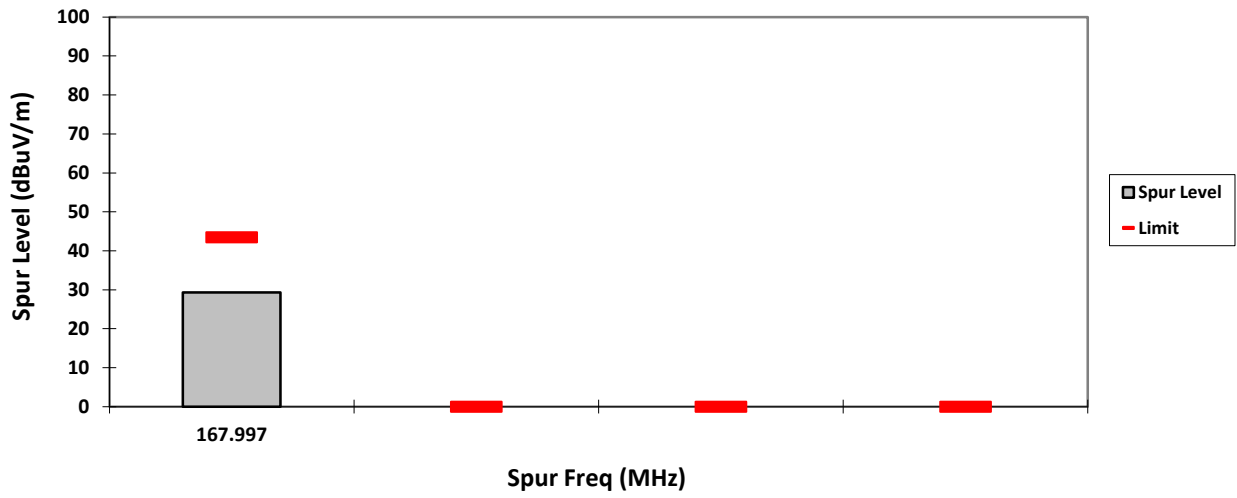
Remarks: Pass Result	Marginal Result	Fail Result
-------------------------	-----------------	-------------

Temperature (degC): 23.2  
 Test Performed by: Nazrin&Amaluddin  
 System MU: 4.03dB

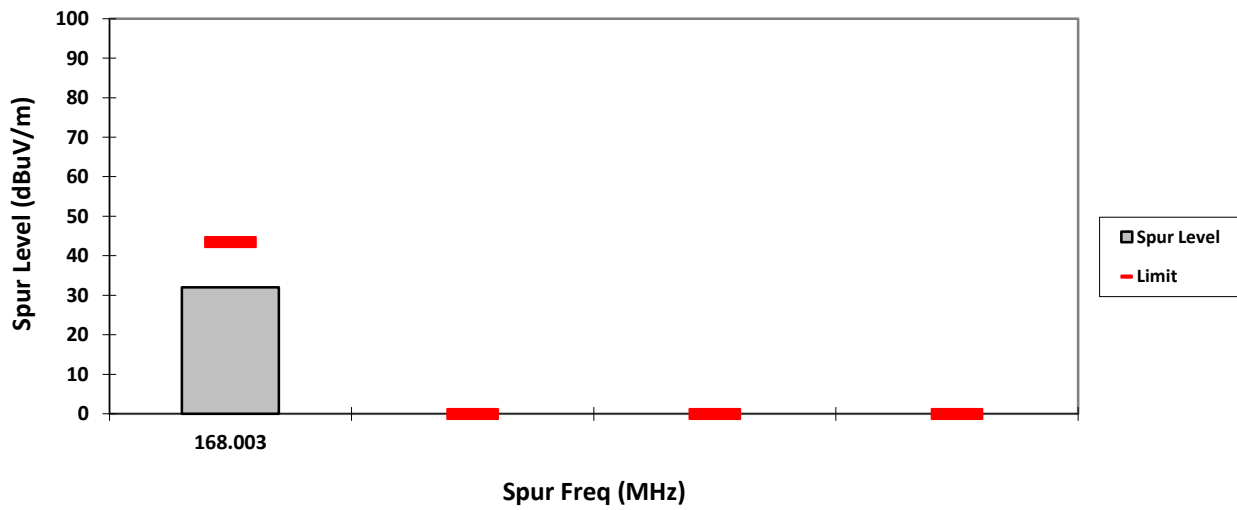
Humidity (%): 69.3  
 Test Date: Tue, 23 Feb, 2021

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.

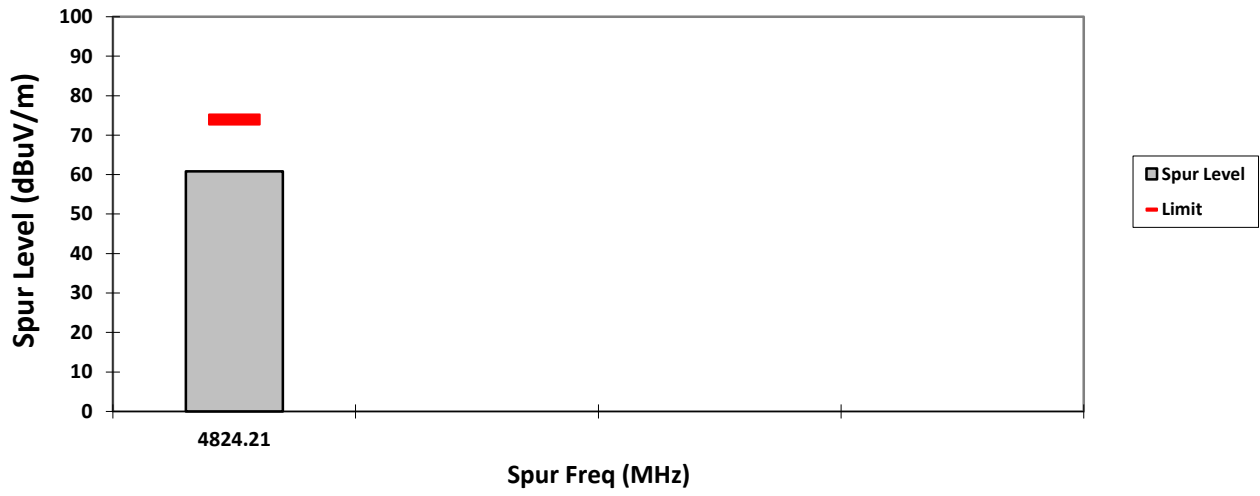
### VERTICAL, QPK



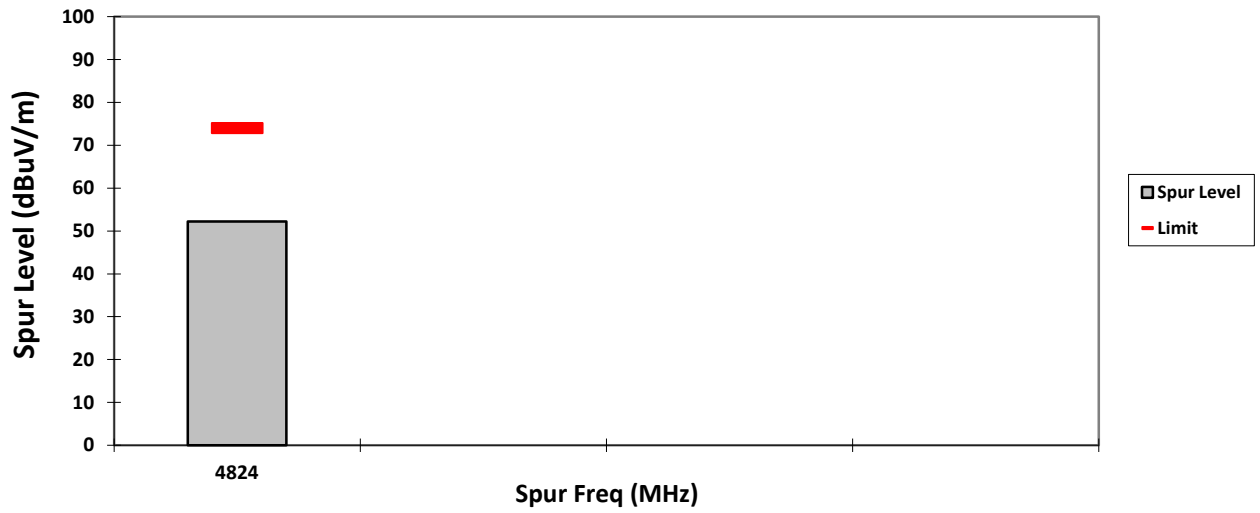
### HORIZONTAL, QPK



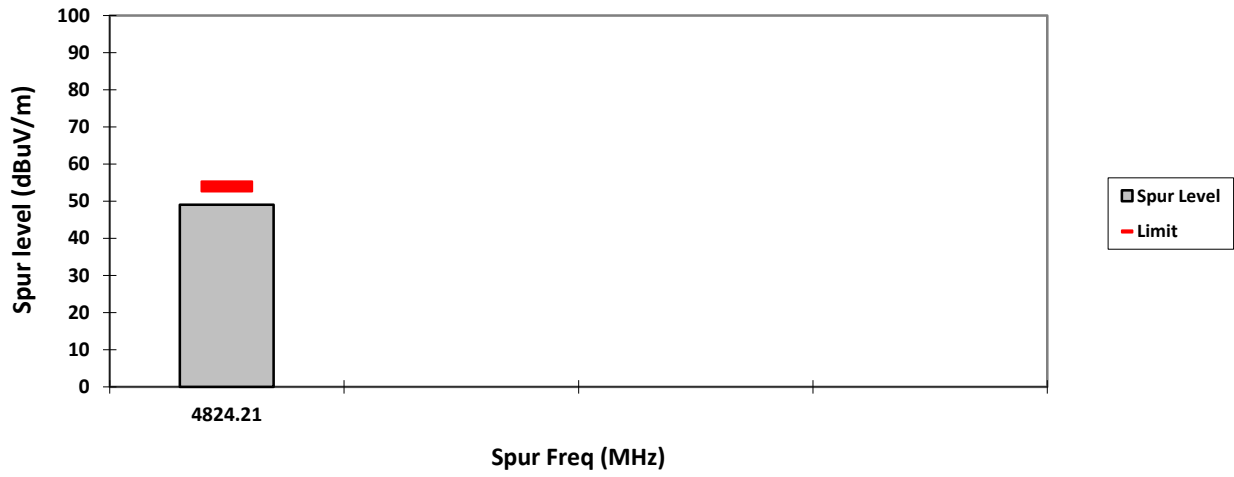
### VERTICAL, PK



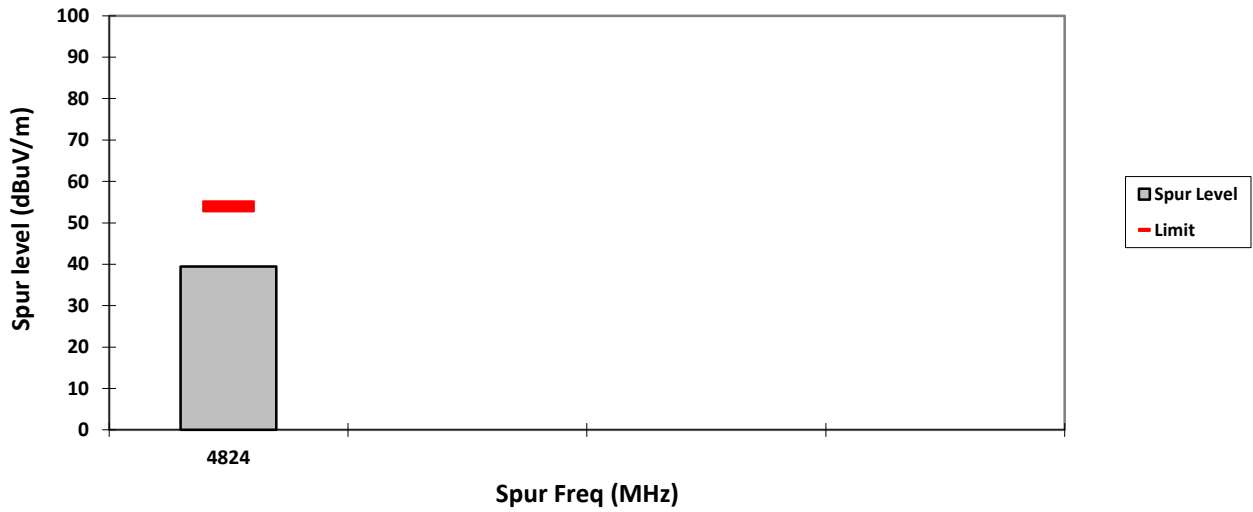
### HORIZONTAL, PK



VERTICAL, AV



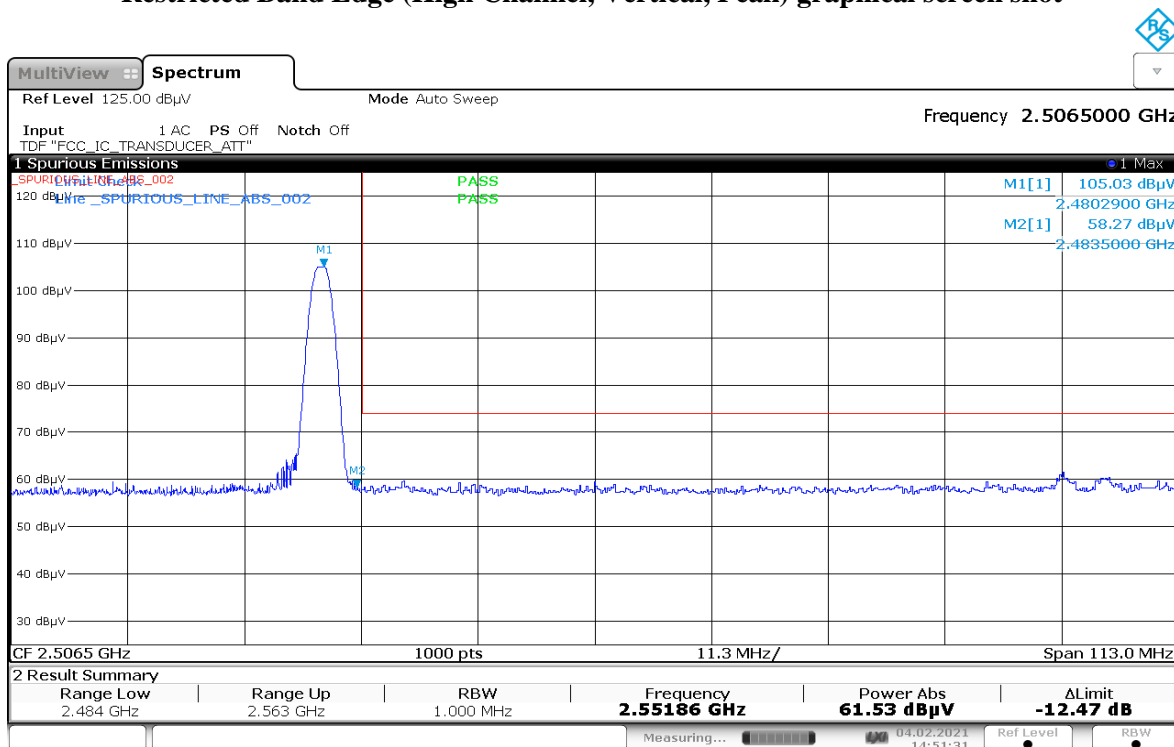
HORIZONTAL, AV





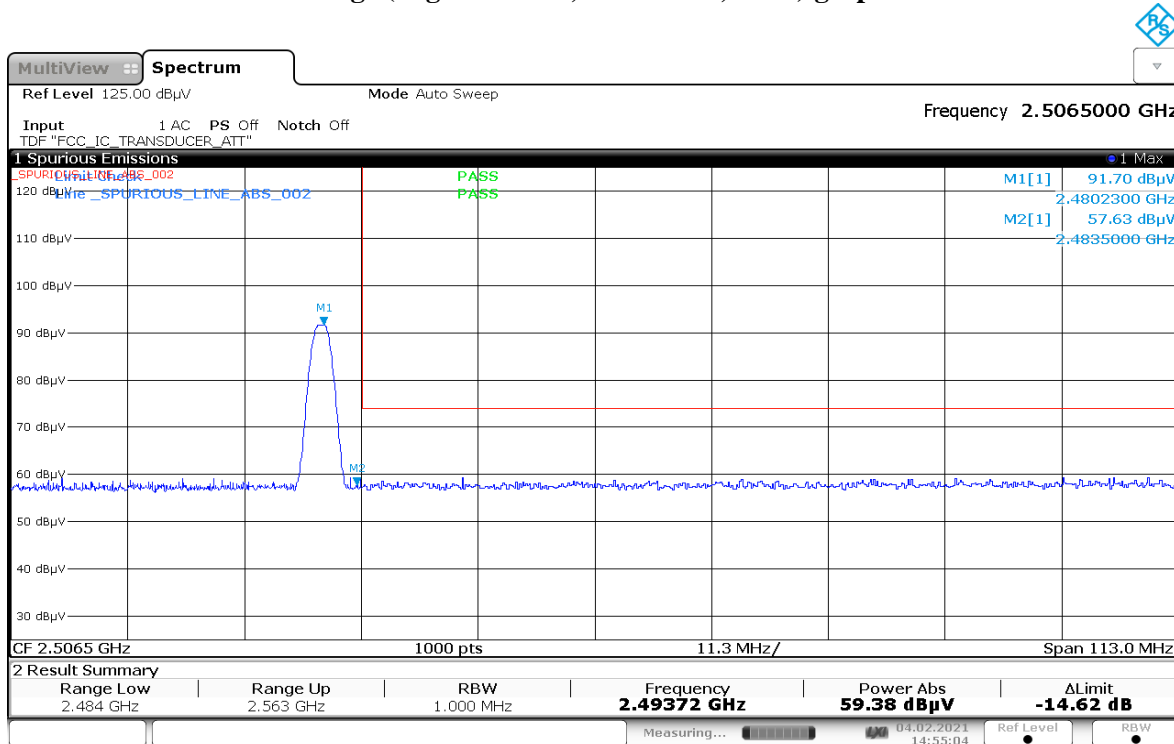


**Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot**



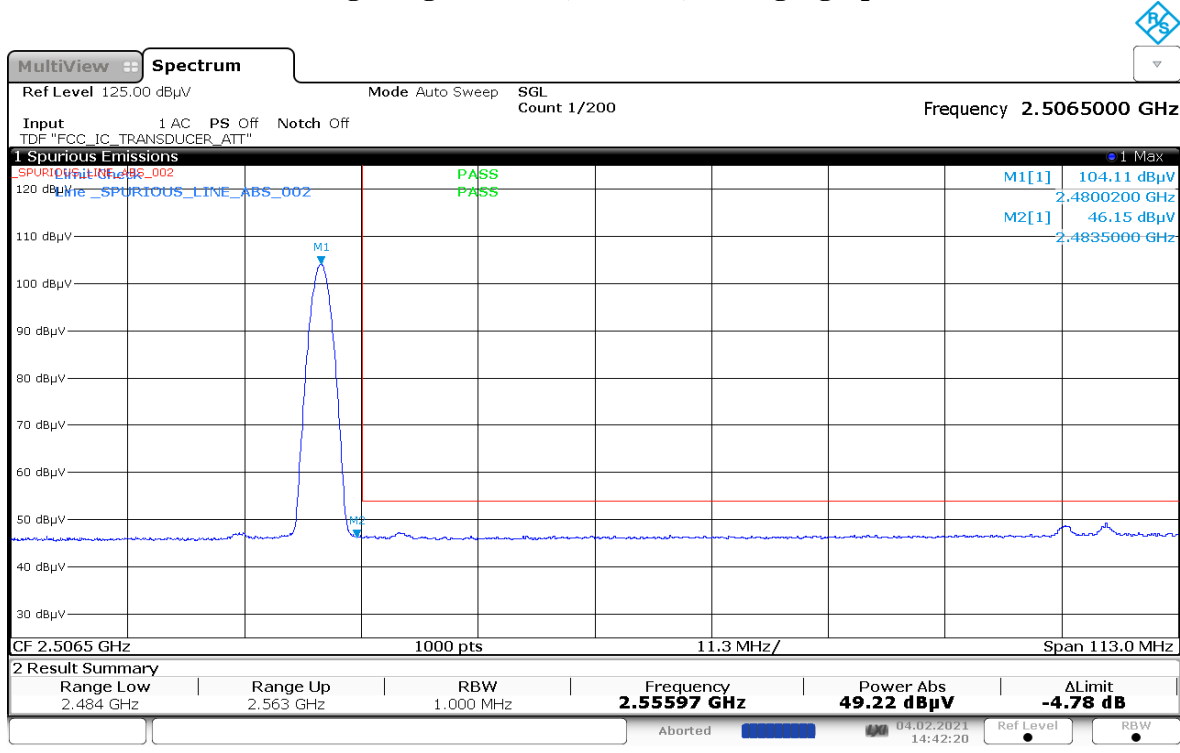
14:51:31 04.02.2021

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



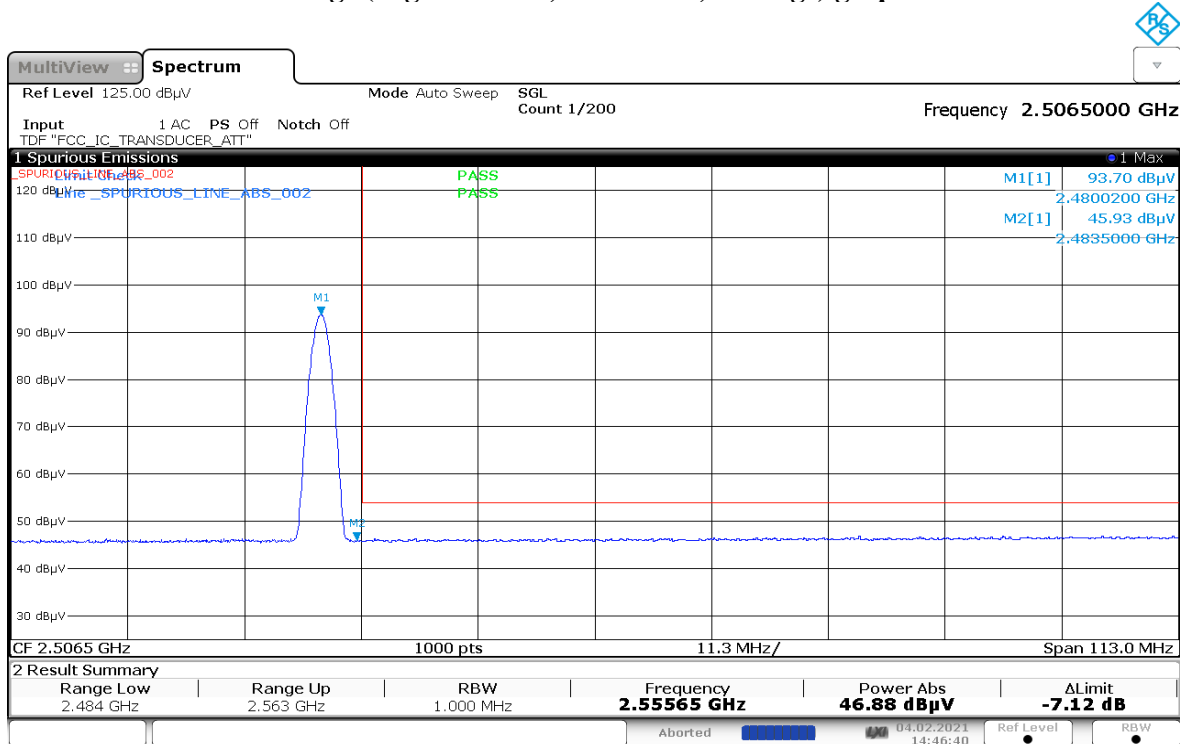
14:55:04 04.02.2021

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



14:42:20 04.02.2021

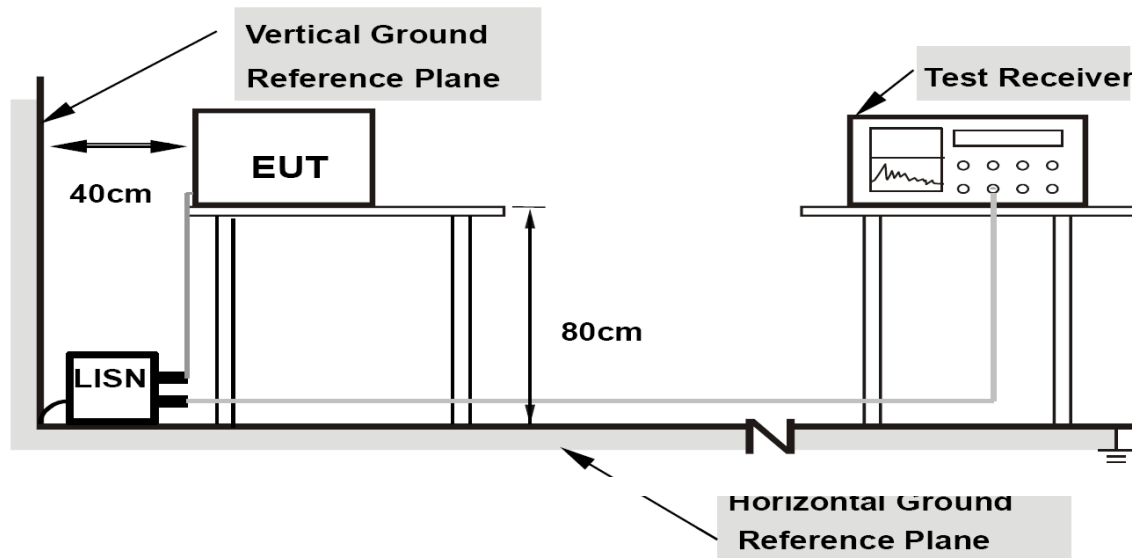
**Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot**



14:46:40 04.02.2021

## 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( $\mu$ V)	
	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( $\mu$ V)	
	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.  
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**