

	    CERTIFICATE 2518.08 MS ISO/IEC 17025 TESTING SAMMNO. 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																																										
<table><tr><td>Date/s Tested</td><td>: 24-Dec-2019 - 04-Jan-2020</td><td rowspan="10"></td></tr><tr><td>Report Issue Date</td><td>: 24-Feb-2020</td></tr><tr><td>Manufacturer/Location</td><td>: Motorola Solutions – Penang</td></tr><tr><td>Requestor</td><td>: TANG, GARY</td></tr><tr><td>Product Type</td><td>: Mobile</td></tr><tr><td>Product Version (PMN)</td><td>: APX6500</td></tr><tr><td>Model Number (HVIN)</td><td>: M25QSS9PW1BN</td></tr><tr><td>Frequency Band</td><td>: 2.412-2.462 GHz</td></tr><tr><td>Max RF Output Power</td><td>: 802.11b - 39.8 mWatts 802.11g - 15.8 mWatts 802.11n (HT20) -12.58 mWatts</td></tr><tr><td>Applicant Name</td><td>: Motorola Solutions Inc</td></tr><tr><td>Applicant Address</td><td>: 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322.</td></tr><tr><td>FCC Registrations</td><td>: 461337</td><td rowspan="3"></td></tr><tr><td>ISED Registrations</td><td>: MY0001</td></tr><tr><td>Firmware Version (FVIN)</td><td>: R02.10.08.0000</td></tr><tr><td colspan="3">The equipment was tested accordance to the requirement listed below:</td></tr><tr><td colspan="2">(2.4GHz Wifi)</td><td>PASS</td></tr><tr><td colspan="2">47CFR Part 15C</td><td></td></tr><tr><td colspan="2">ISED RSS 247 Issue 2</td><td></td></tr></table>		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 802.11g - 15.8 mWatts 802.11n (HT20) -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)	: R02.10.08.0000	The equipment was tested accordance to the requirement listed below:			(2.4GHz Wifi)		PASS	47CFR Part 15C			ISED RSS 247 Issue 2		
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 802.11g - 15.8 mWatts 802.11n (HT20) -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)	: R02.10.08.0000																																										
The equipment was tested accordance to the requirement listed below:																																											
(2.4GHz Wifi)		PASS																																									
47CFR Part 15C																																											
ISED RSS 247 Issue 2																																											
This report shall not be reproduced without written approval from an officially designated representative of the Motorola Penang Adv. Comm. Laboratory. The results and statements contained in this report pertain only to the device(s) evaluated.																																											
<table><tr><td>Prepared By:</td><td>Approved Signatory:</td></tr><tr><td></td><td></td></tr><tr><td>GAN BOON TEONG</td><td>VINCENT FOONG CHUEN KIT</td></tr><tr><td>Test Personnel</td><td>Deputy Technical Manager</td></tr></table>			Prepared By:	Approved Signatory:			GAN BOON TEONG	VINCENT FOONG CHUEN KIT	Test Personnel	Deputy Technical Manager																																	
Prepared By:	Approved Signatory:																																										
																																											
GAN BOON TEONG	VINCENT FOONG CHUEN KIT																																										
Test Personnel	Deputy Technical Manager																																										

Table of Contents

1.0. General Information.....	3
1.1. Channel number and frequency information:	3
2.0. Summary of Test Results	4
3.0. Measurement Uncertainty	5
4.0. Equipment List.....	6
5.0. Test Mode Applicability and Test Channel Detail	7
6.0. Transmitter Test Parameters	10
6.1. 6dB Channel Bandwidth	10
6.1.1. Test Setup	10
6.1.2. Test Limits:	10
6.1.3. Test Data:	10
6.2. Conducted RF Output Power	11
6.2.1. Test Setup	11
6.2.2. Test Limits:	11
6.2.3. Test Data:	12
6.3. Duty Cycle of the test signal	15
6.3.1. Test Setup	15
6.3.2. Test Data	16
6.4. Maximum Peak Power Spectral Density	19
6.4.1. Test Setup	19
6.4.2. Test Limits	19
6.4.3. Test Result	19
6.5. Conducted Spurious Emission	20
6.5.1. Test Setup	20
6.5.2. Test Limits:	20
6.5.3. Test Result	20
6.6. Band edge Conducted Spurious Emission	21
6.6.1. Test Setup	21
6.6.2. Test Limits:	21
6.6.3. Test Result	21
6.7. Radiated Emission within restricted Bands	22
6.7.1. Test Setup	22
6.7.2. Test Limits:	23
6.7.3. Test Data:	24
6.8. AC Powerline Conducted Emission.....	32
6.8.1. Test Setup	32
6.8.2. Test Limits:	32
6.8.3. Test Result	33

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	Expanded 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

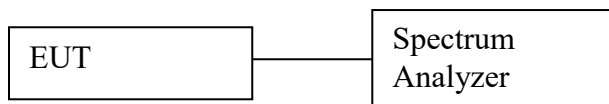
Duty Cycle of Test Signal

802.11b, 802.11g and 802.11n HT20: Duty cycle of test signal is $\geq 98\%$. (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:

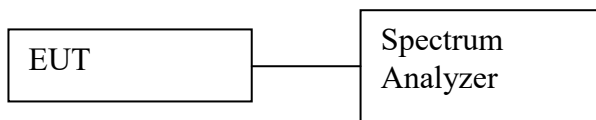
Normal Condition (25 ° C)
≥ 500 kHz

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 $\geq [3 \times \text{RBW}]$.
 - 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:

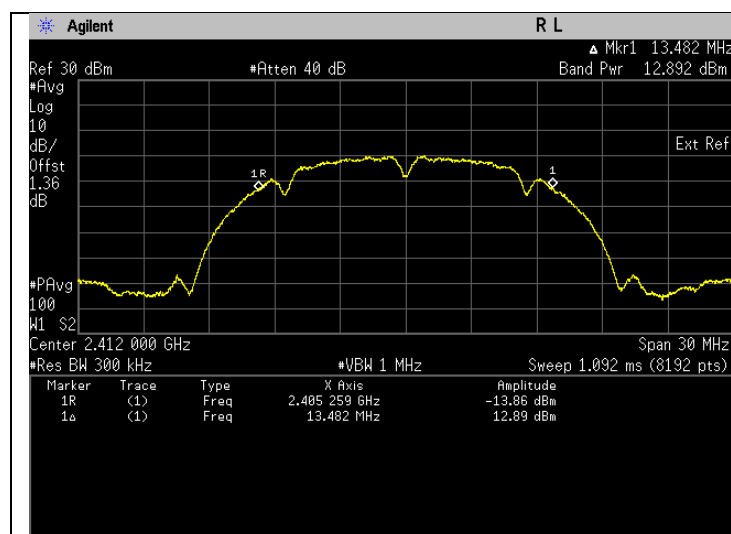
Normal Condition (25 ° C)
$\leq 1 \text{ Watt}(30 \text{ dBm})$

6.2.3. Test Data:

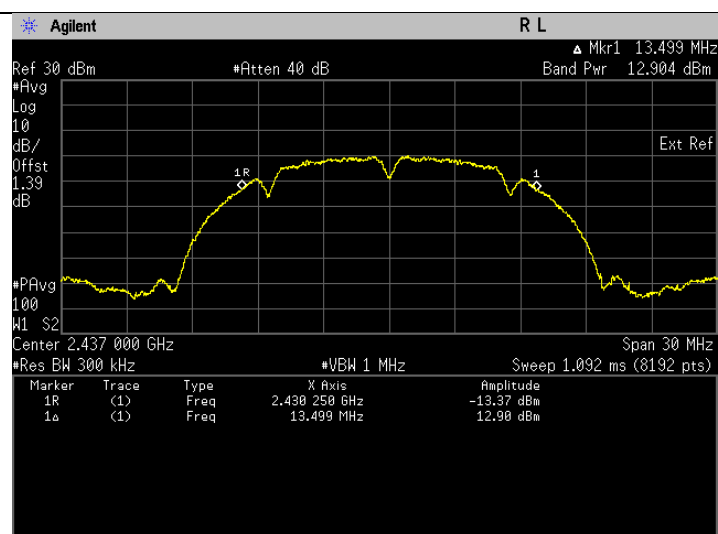
802.11b

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

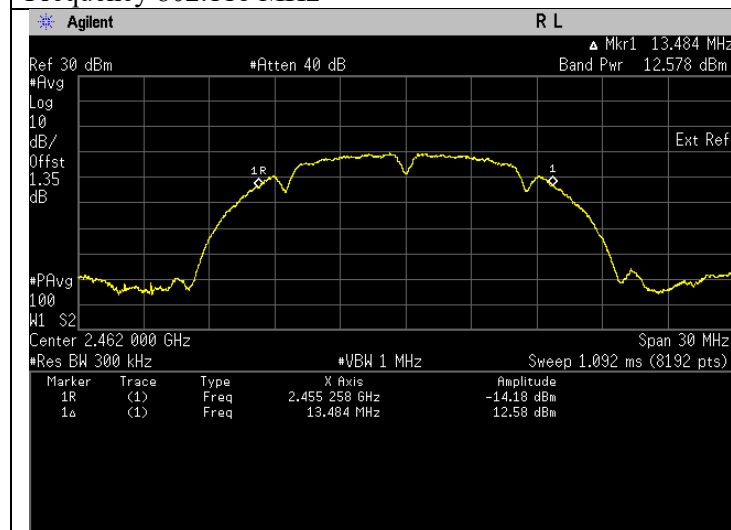
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11b	DSSS	QPSK	1	2412	12.757	Pass
802.11b	DSSS	QPSK	1	2437	15.625	Pass
802.11b	DSSS	QPSK	1	2462	12.462	Pass



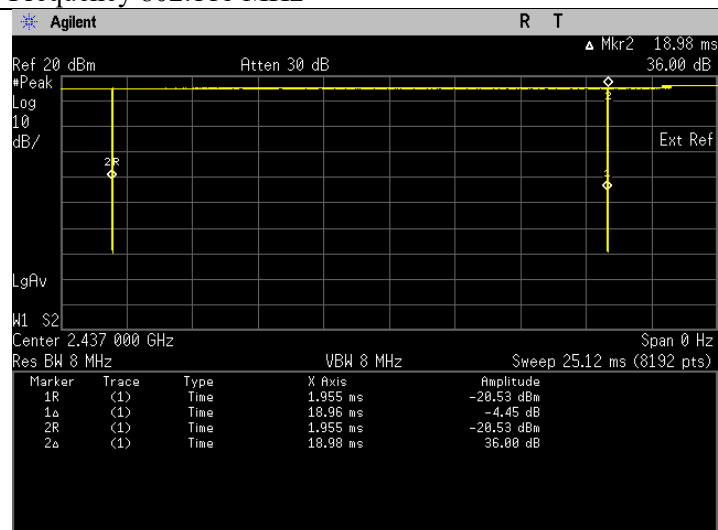
Frequency 802.11b MHz



Frequency 802.11b MHz



Frequency 802.11b MHz

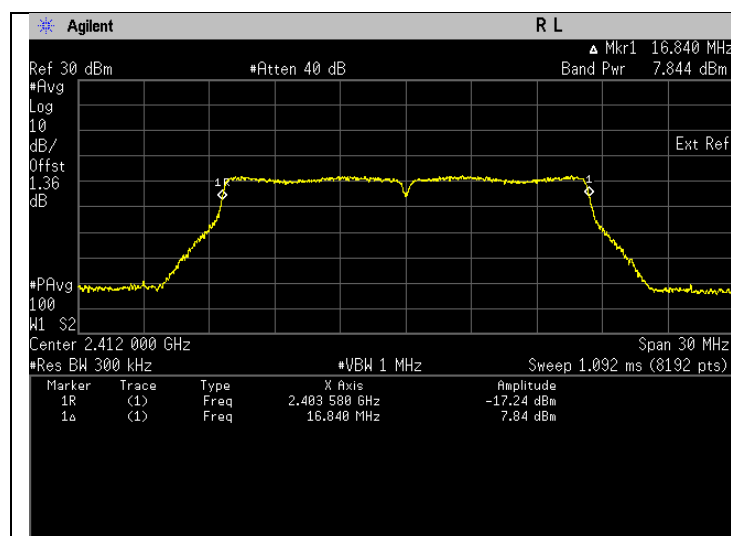


Duty Cycle

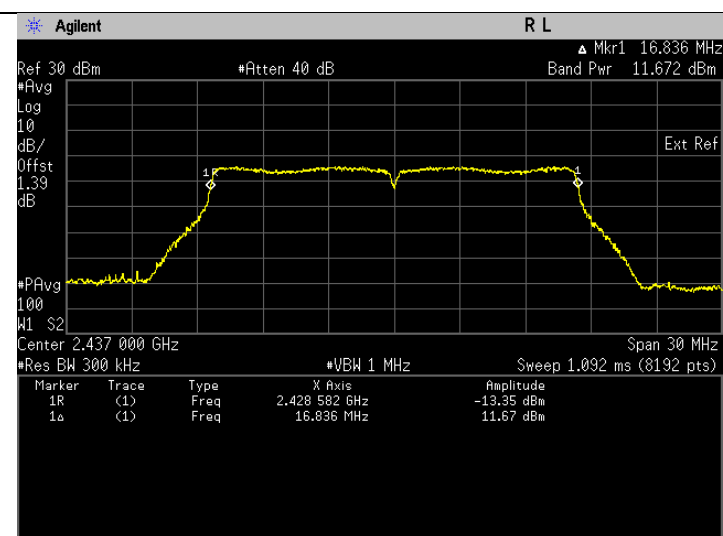
802.11g

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

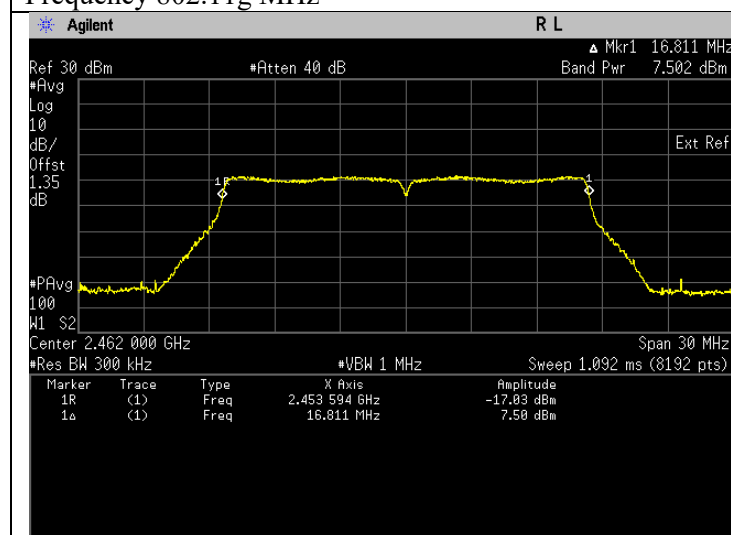
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11g	OFDM	BPSK	6	2412	7.865	Pass
802.11g	OFDM	BPSK	6	2437	11.693	Pass
802.11g	OFDM	BPSK	6	2462	7.523	Pass



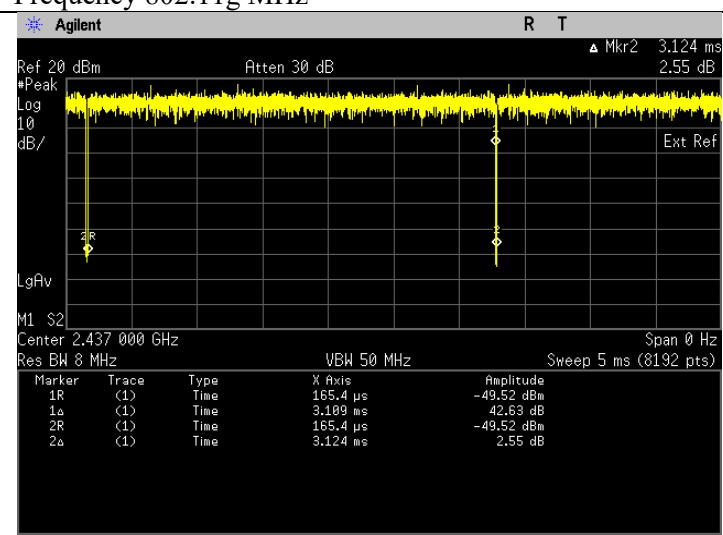
Frequency 802.11g MHz



Frequency 802.11g MHz



Frequency 802.11g MHz

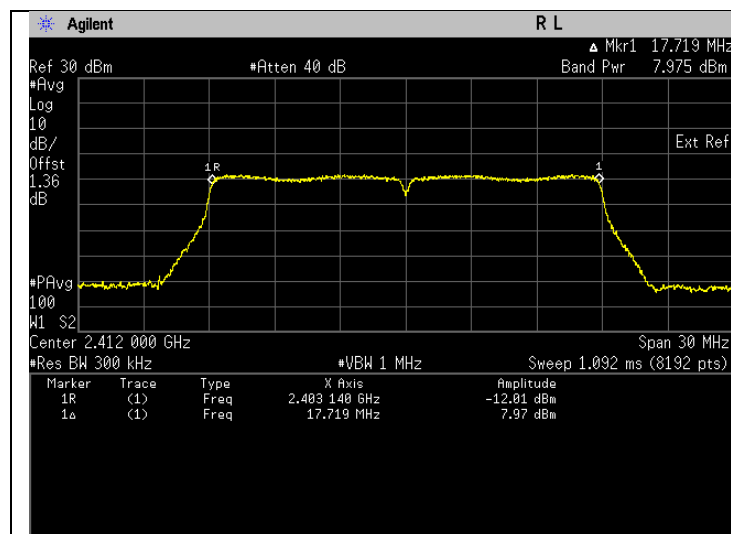


Duty Cycle

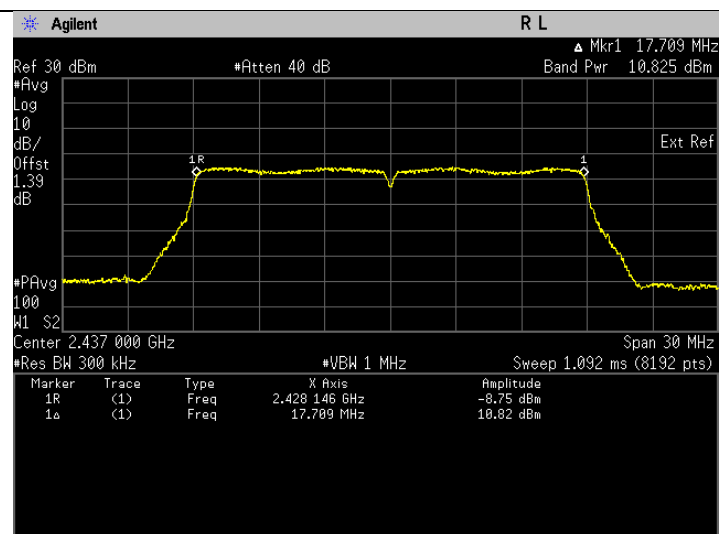
802.11n (HT20)

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

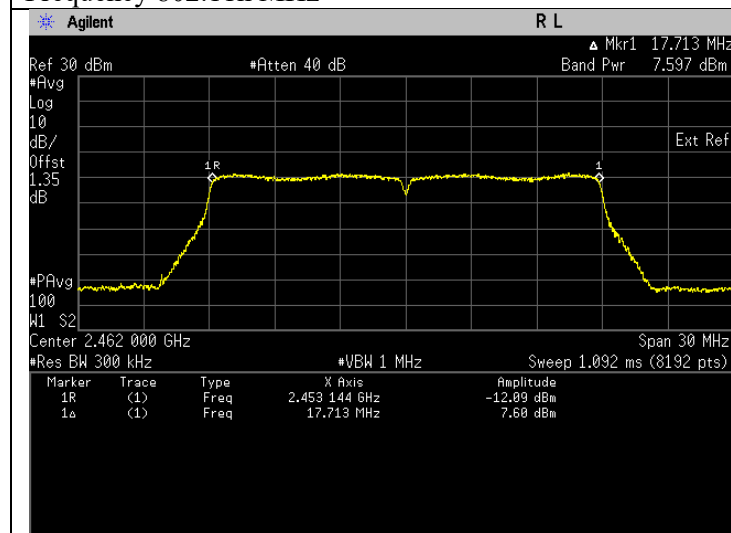
Test Conditions				Test Frequency	Results	
Standard	Modulation Type	Modulation Technology	Data Rate (mbps)	Tx (MHz)	Output Power (dBm)	Status
802.11n	OFDM	BPSK	6.5	2412	7.988	Pass
802.11n	OFDM	BPSK	6.5	2437	10.838	Pass
802.11n	OFDM	BPSK	6.5	2462	7.610	Pass



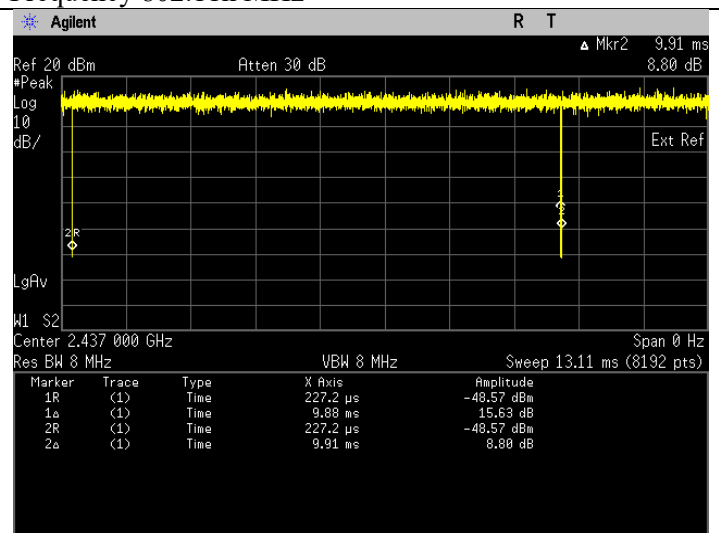
Frequency 802.11n MHz



Frequency 802.11n MHz



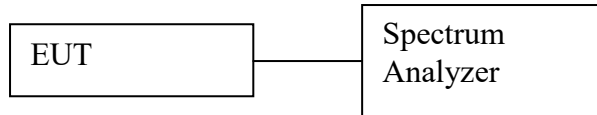
Frequency 802.11n MHz



Duty Cycle

6.3.Duty Cycle of the test signal

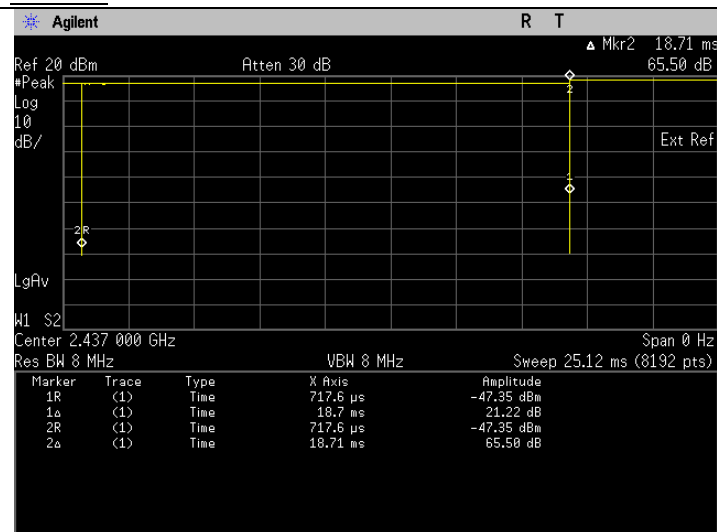
6.3.1. Test Setup



- 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 $\geq$ RBW.
 - c. Set the span $\geq [1.5 \times \text{DTS bandwidth}]$.
 - 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



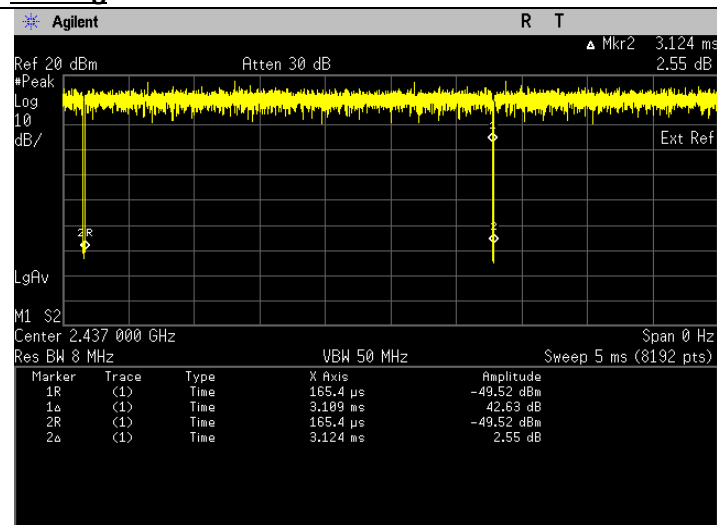
Duty Cycle

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

802.11g



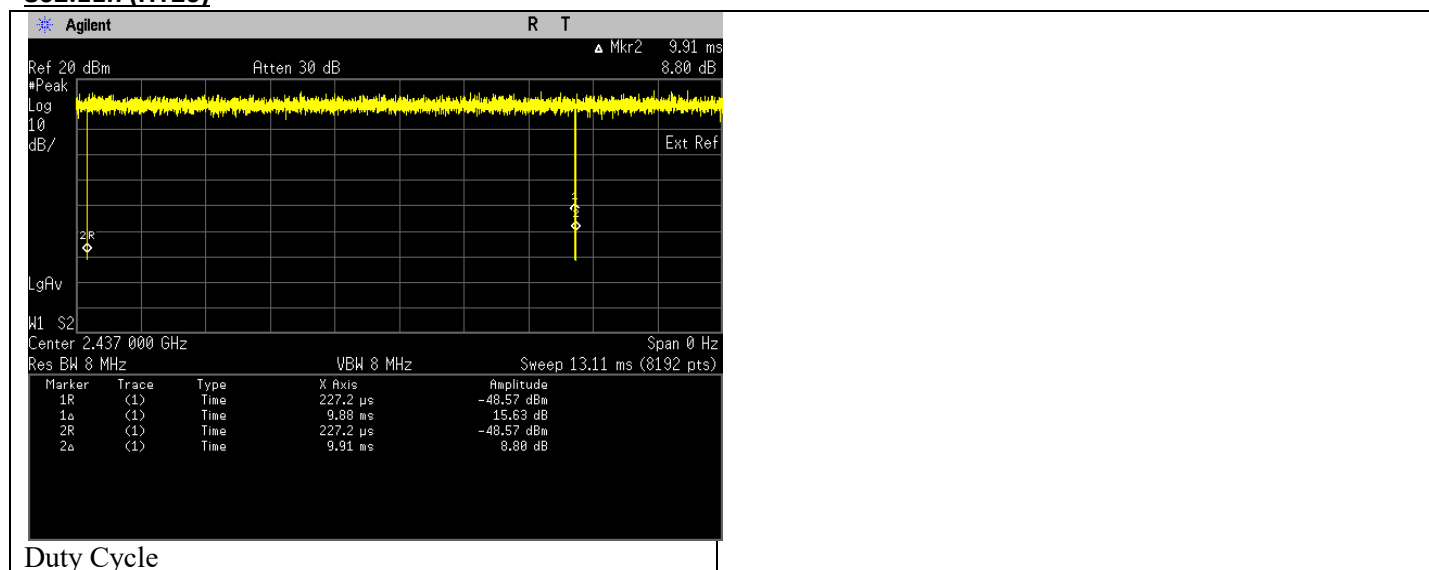
Duty Cycle

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)



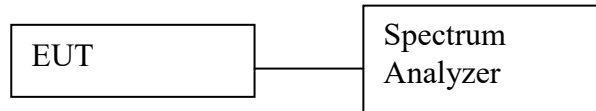
On time (ms)	9.88
On + Off Time (ms)	9.91
Duty cycle	0.997
Duty Cycle factor	0.013

*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 $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
 - 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

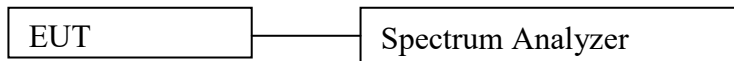
Normal Condition (25 ° C)
$\leq 8 \text{ dBm/3kHz}$

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 10th harmonic.
- f) Measure every antenna port by repeat the step above for MIMO measurement.

6.5.2. Test Limits:

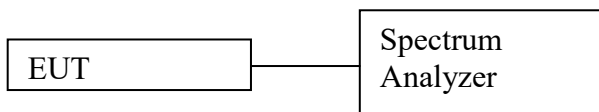
Normal Condition (25 ° C)
Shall be at least 30 dB below peak (max) power.

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:

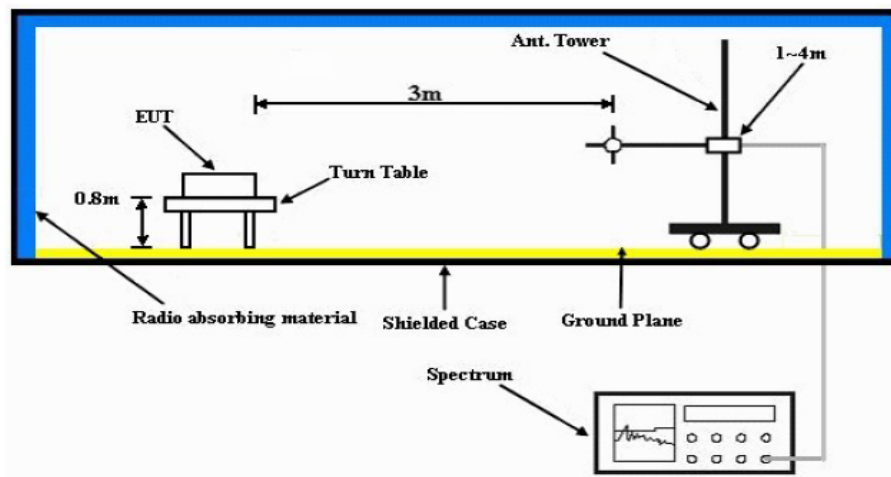
Normal Condition (25 ° C)
Shall be at least 30 dB below peak (max) power.

6.6.3. Test Result

N/A

6.7. Radiated Emission within restricted Bands

6.7.1. Test Setup



- 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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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.

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)

Vertical Radiated Emission Result

Horizontal Radiated Emission Result

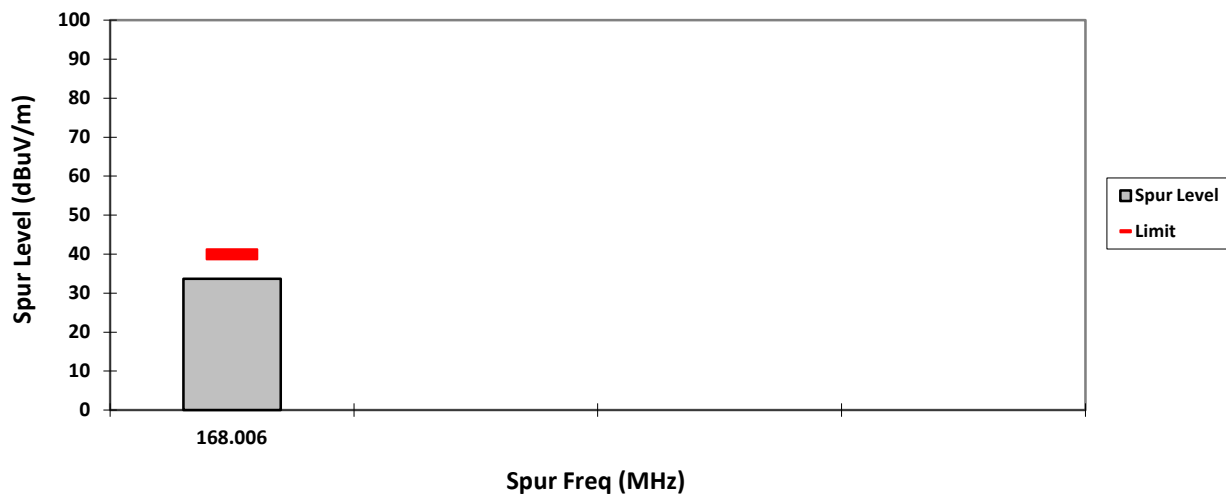
Temperature (degC): 23.6
Test Performed by: Qawiman

Humidity (%): 69.8
Test Date: Thu, Apr 02, 2020

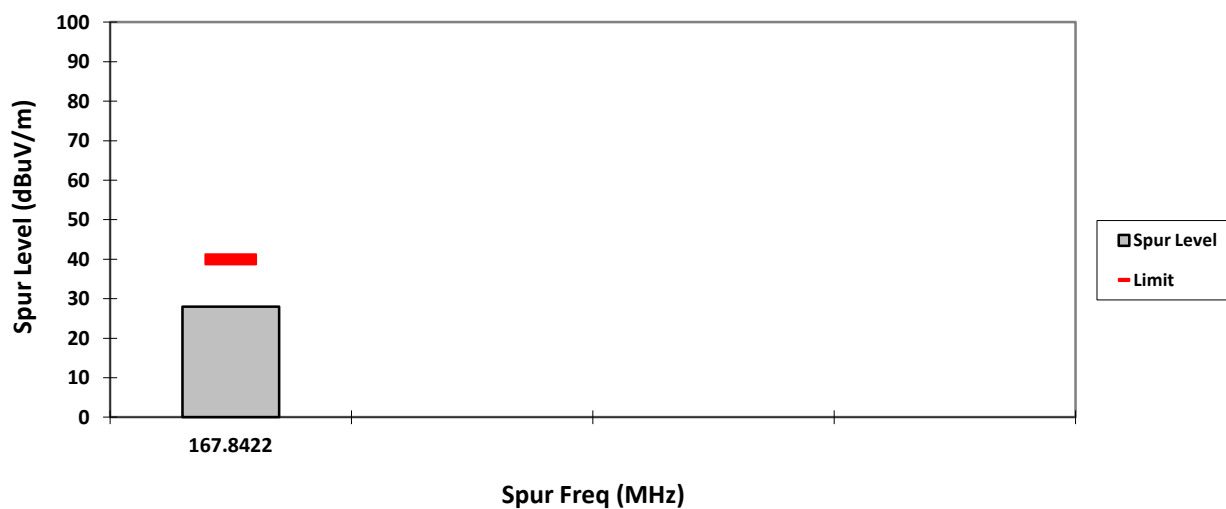
System MU:

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.

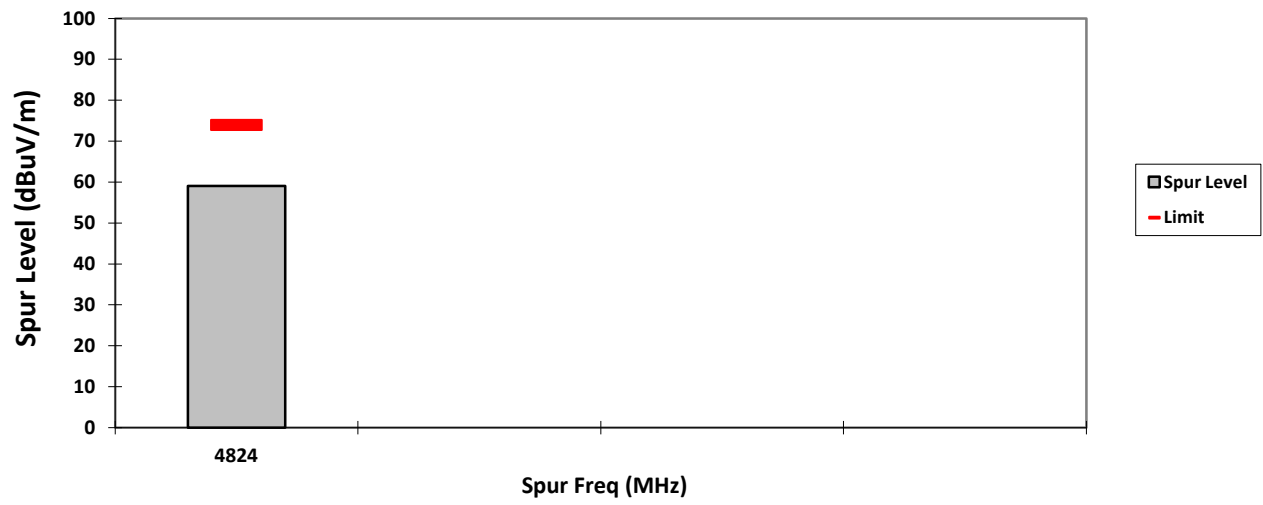
VERTICAL, QPK



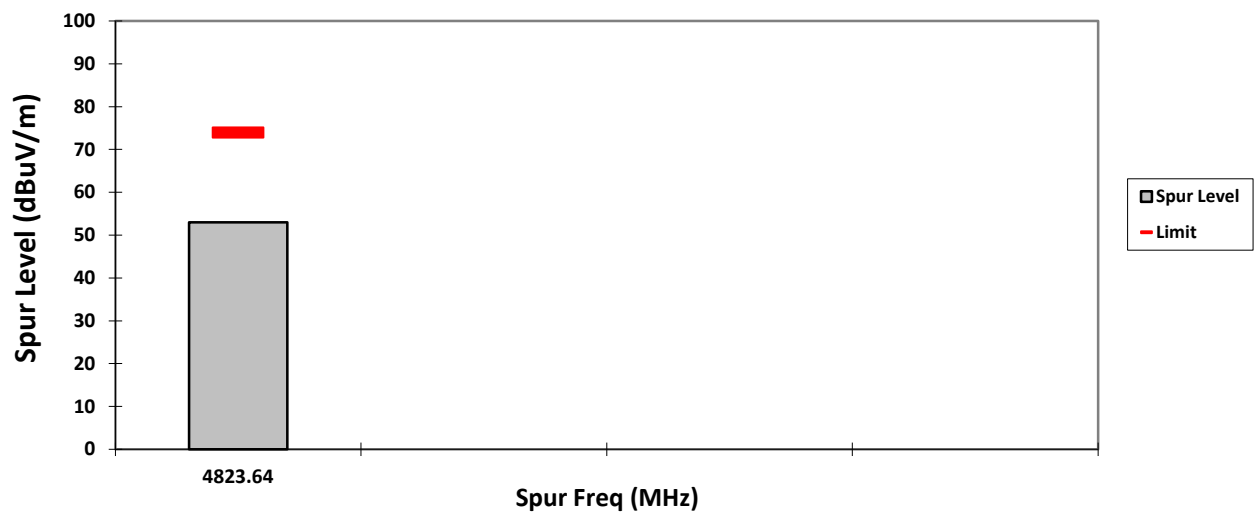
HORIZONTAL, QPK



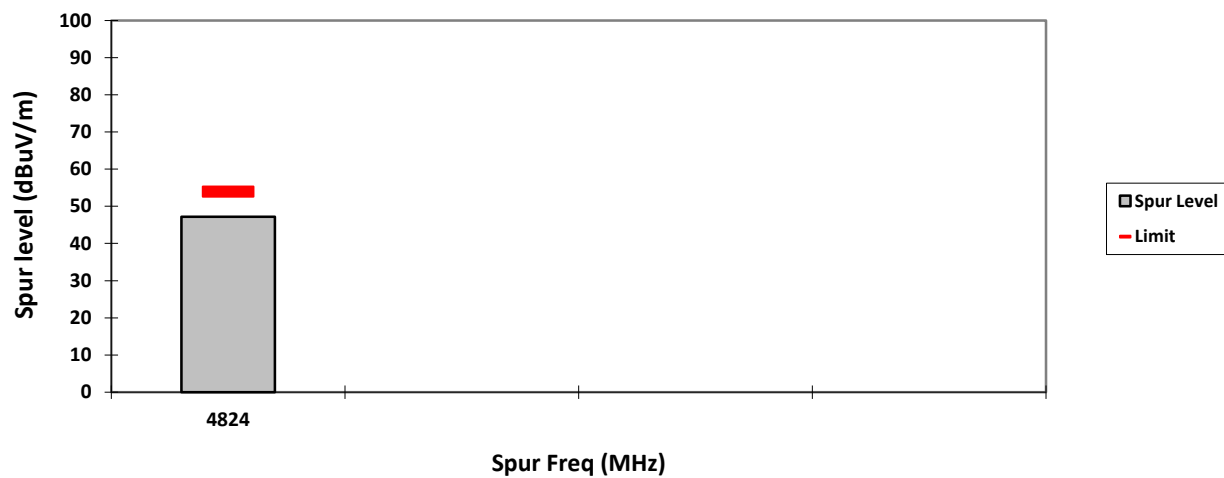
VERTICAL, PK



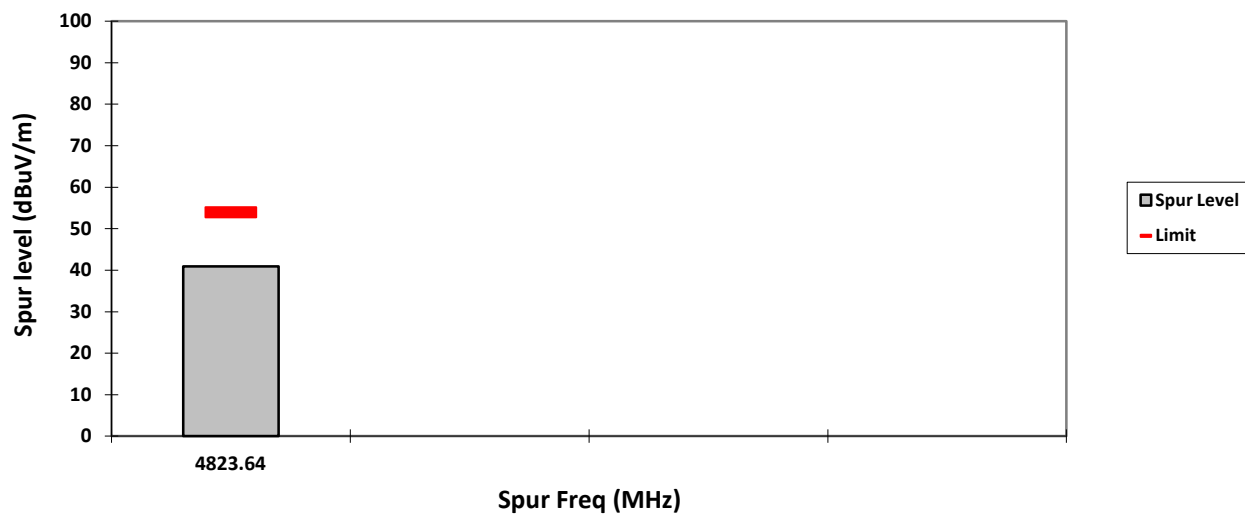
HORIZONTAL, PK



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

[illegible]

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

Temperature (degC):23.6
Test Performed by: Qawiman
4.03dB

Humidity (%): 69.8
Test Date: Wed, Apr 01, 2020

System MU:

MultiView

Spectrum

Ref Level 125.00 dBμV

Mode Auto Sweep

Input 1 AC PS Off Notch Off

Frequency 2.506500 GHz

TDF

1 Spurious Emissions

SPURIOUS LINE ABS_002

Line SPURIOUS_LINE_ABS_002

M1

M2

M1[1] 103.32 dBμV

M2[1] 64.29 dBμV

2.4595500 GHz

2.4835000 GHz

PASS

PASS

CF 2.5065 GHz

1000 pts

11.3 MHz/

Span 113.0 MHz

2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.484 GHz	2.563 GHz	1.000 MHz	2.48597 GHz	66.17 dBμV	-7.83 dB

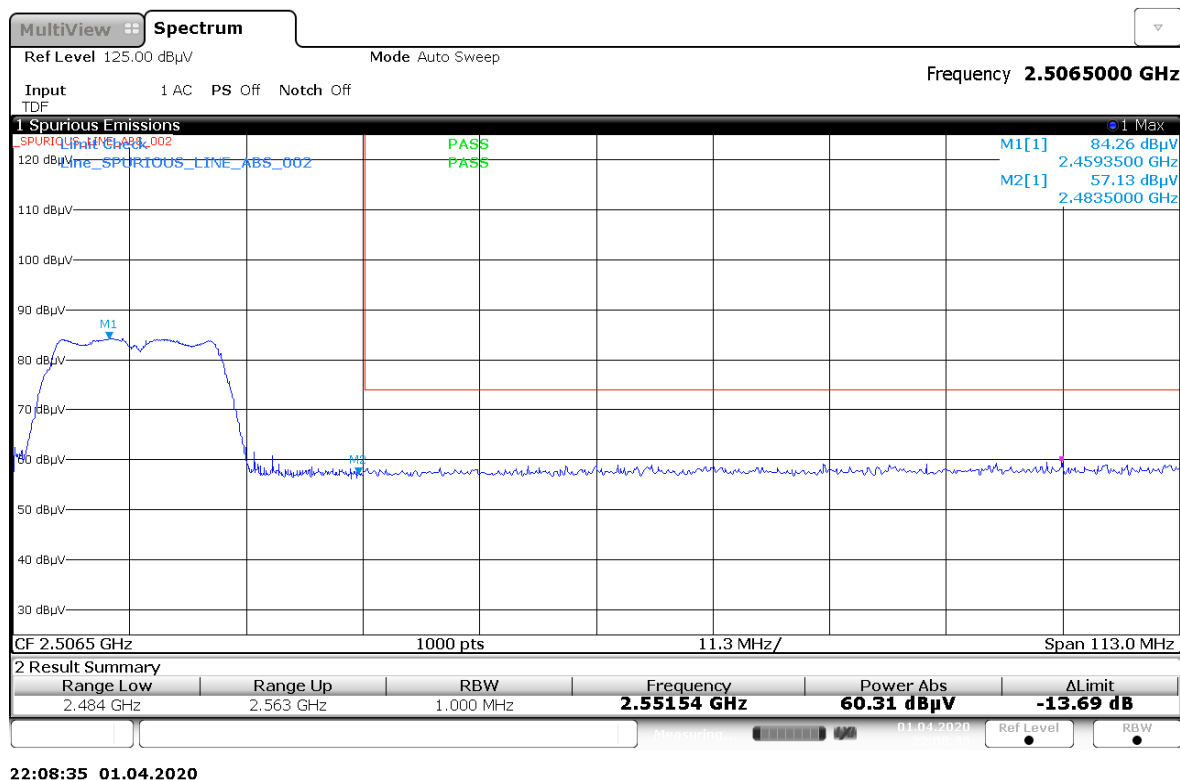
Measuring

01.04.2020

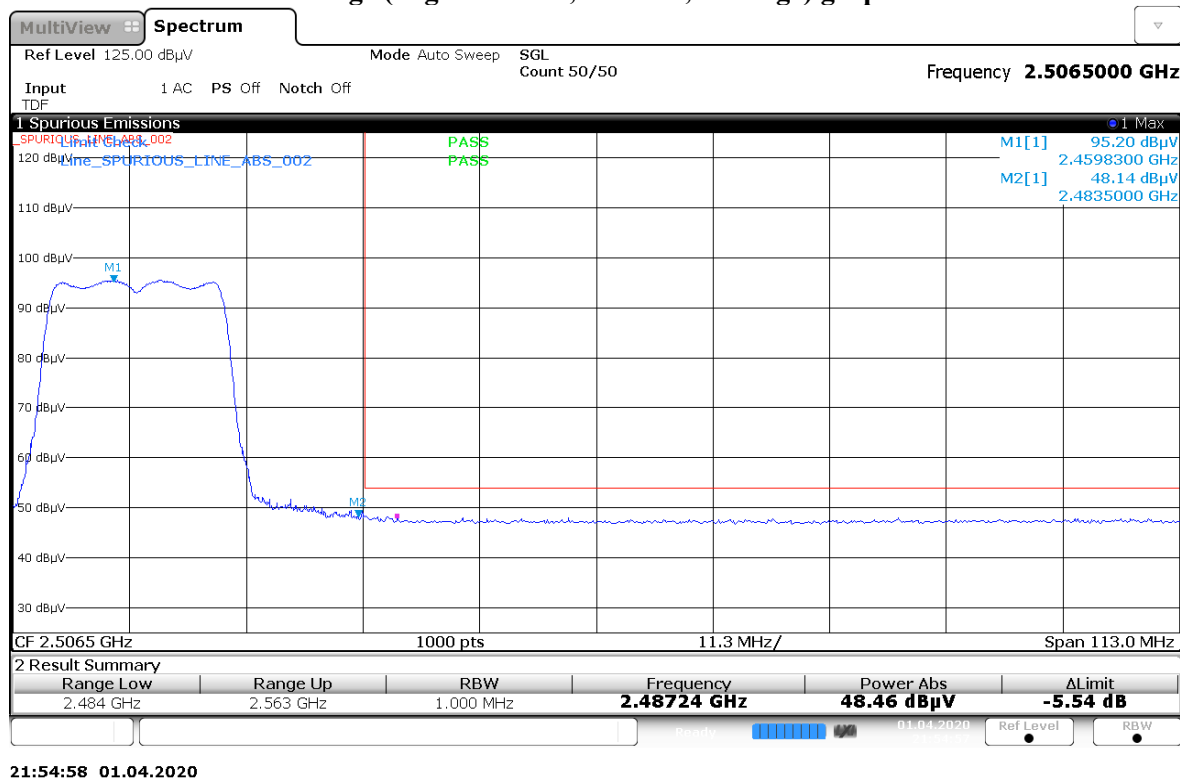
Ref Level

RBW

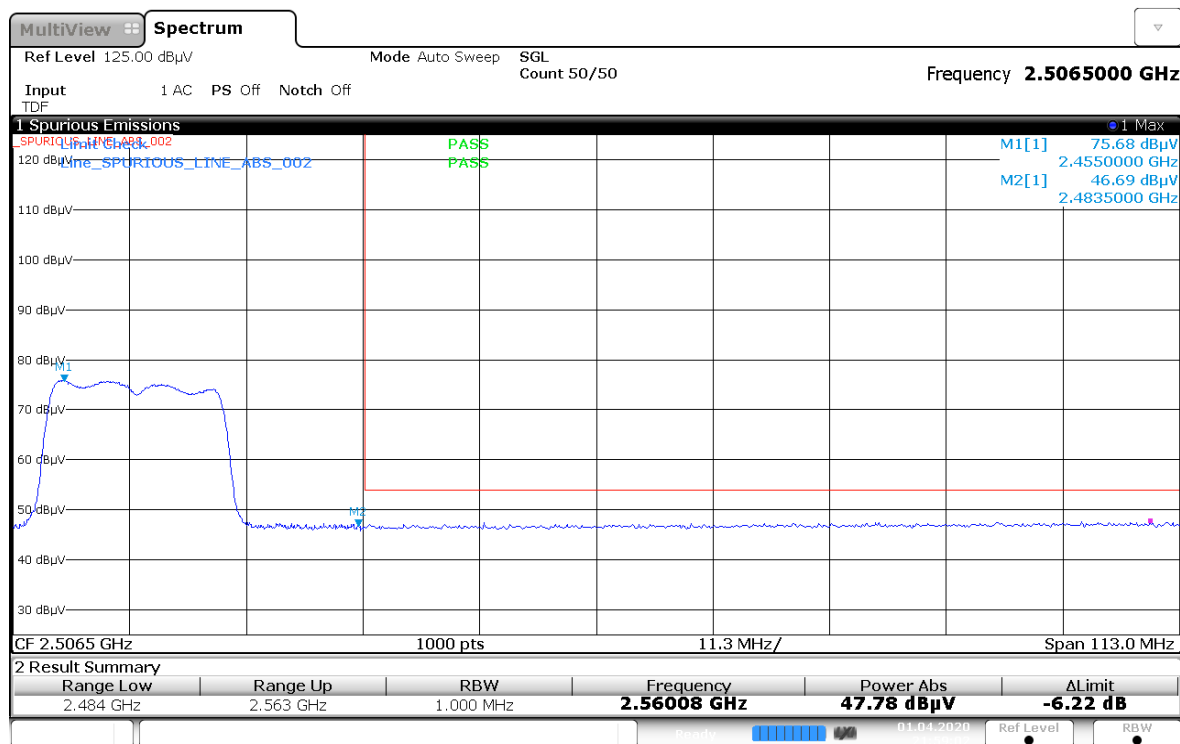
Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot



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



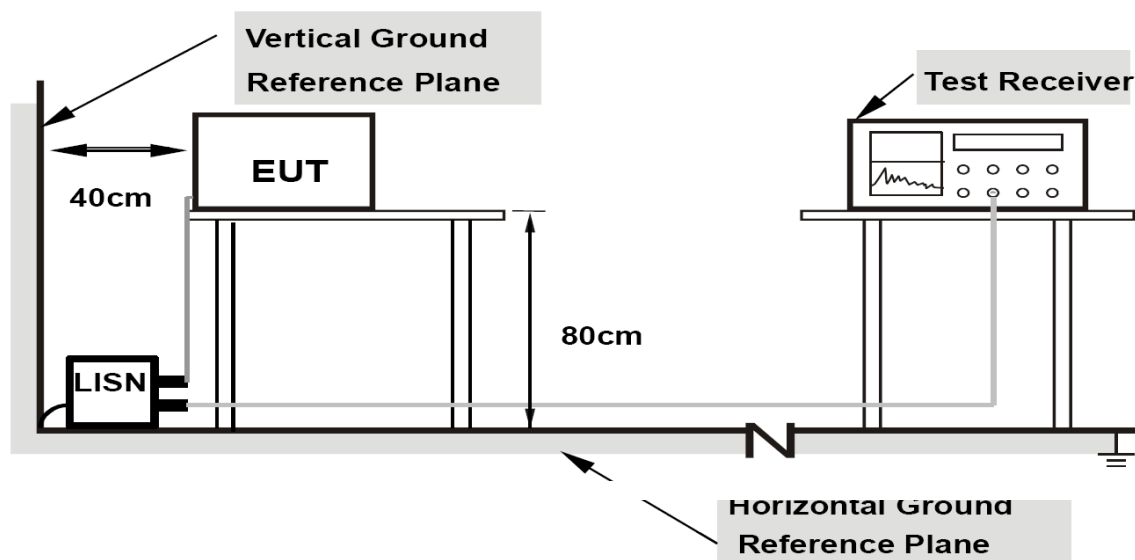
Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



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(μ 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