# **TEST REPORT**

## FCC DTS Test for ADB11H6GG

## Certification

APPLICANT HYUNDAI MOBIS CO., LTD

**REPORT NO.** HCT-RF-1911-FC027

DATE OF ISSUE November 22, 2019

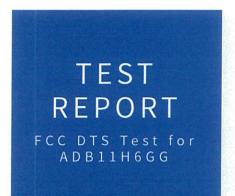
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#### HCT Co., Ltd.



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FCC ID TQ8-ADB11H6GG

Applicant

HYUNDAI MOBIS CO., LTD 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, South Korea

Eut Type Model Name	Car Audio System ADB11H6GG
Modulation type	CCK/DSSS/OFDM
 FCC Classification	Digital Transmission System(DTS)
FCC Rule Part(s)	Part 15.247
	The result shown in this test report refer only to the sample(s) tested unless

otherwise stated.

This test results were applied only to the test methods required by the standard.

Tested by Jung Ki Lim Technical Manager Jong Seok Lee

HCT CO., LTD. Soo Chan Lee





## **REVISION HISTORY**

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description		
0	November 22, 2019	Initial Release		

**Engineering Statement:** 

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.



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## **1. EUT DESCRIPTION**

Model	ADB11H6GG		
Additional Model	ADB10H6IG, ADB11H6IG, ADB10H6GG, ADB13H6GG, ADB12H6GG, ADB10H6GN, ADB10H6MG, ADB10H6EG, ADB10H6EP, ADB11H6EP, ADB12H6EP, ADB10H6GP, ADB14H6GG		
EUT Type	Car Audio System		
Power Supply	DC 14.4 V		
Frequency Range	2412 MHz - 2462 MHz		
Max. RF Output Power	Peak Power	802.11b: 11.70 dBm 802.11g: 20.02 dBm 802.11n(HT20): 20.77 dBm 802.11b: 8.33 dBm	
	Average Power	802.11D. 8.33 dBm 802.11g: 8.78 dBm 802.11n(HT20): 8.67 dBm	
Modulation Type	DSSS/CCK : 802.11b / OFDM : 802.11g, 802.11n(HT20)		
Number of Channels	11 Channels		
Antenna Specification	Antenna type: Pattern Antenna Peak Gain: -0.01 dBi		
Date(s) of Tests	October 21, 2019 ~ November 18, 2019		



## 2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled "guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices'.

#### EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpse of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### GENERAL TEST PROCEDURES

#### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

#### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)



#### **DESCRIPTION OF TEST MODES**

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

## **3. INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

## 4. FACILITIES AND ACCREDITATIONS

#### FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil,

Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032 ).

#### EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."





#### **5. ANTENNA REQUIREMENTS**

#### According to FCC 47 CFR § 15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of § 15.203

## 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of

ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the *U*<sub>CISPR</sub> measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ( $\pm$ dB)		
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82		
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40		
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80		
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70		
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05		



## 7. DESCRIPTION OF TESTS

#### 7.1. Duty Cycle

#### **Test Configuration**

EUT Spectrum Analyzer Coax cable
-------------------------------------

#### **Test Procedure**

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method.

The largest availble value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if T  $\leq$  6.25 microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

- 1. RBW = 8 MHz (the largest availble value)
- 2. VBW = 8 MHz ( $\geq$  RBW)
- 3. SPAN = 0 Hz
- 4. Detector = Peak
- 5. Number of points in sweep > 100
- 6. Trace mode = Clear write
- 7. Measure T<sub>total</sub> and T<sub>on</sub>
- 8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor = 10log(1/Duty Cycle)

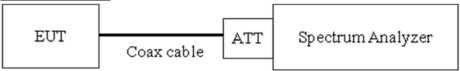


#### 7.2. 6dB Bandwidth

#### Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

#### **Test Configuration**



#### **Test Procedure**

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW  $\geq$  3 x RBW
- 3) Detector = Peak
- 4) Trace mode = max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

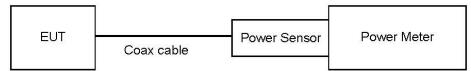


#### 7.3. Output Power

#### Limit

The maximum permissible conducted output power is 1 Watt.

#### **Test Configuration**



#### **Test Procedure**

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
- : Measure the peak power of the transmitter.

• Average Power (Procedure 11.9.2.3 in ANSI 63.10-2013)

- 1) Measure the duty cycle.
- 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- 3) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

#### Sample Calculation

- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

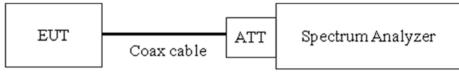


#### 7.4. Power Spectral Density

#### Limit

The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

#### **Test Configuration**



#### **Test Procedure**

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Span = 1.5 times the DTS channel bandwidth.
- 3) RBW = 3 kHz  $\leq$  RBW  $\leq$  100 kHz.
- 4) VBW  $\geq$  3 x RBW.
- 5) Sweep = auto couple
- 6) Detector = peak
- 7) Trace Mode = max hold
- 8) Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
   If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### **Sample Calculation**

Power Spectral Density = Reading Value + ATT loss + Cable loss

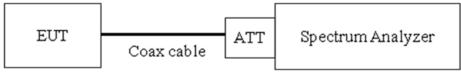


#### 7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

#### Limit

The maximum conducted (Average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz. [Conducted > 20 dBc]

#### **Test Configuration**



#### **Test Procedure**

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW  $\geq$  3 x RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points  $\geq$  2 x Span/RBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.



## Factors for frequency

Freq(MHz)	Factor(dB)
30	11.30
100	9.83
200	10.19
300	10.13
400	10.23
500	10.25
600	10.32
700	10.35
800	10.35
900	10.34
1000	10.39
2000	10.64
2400	10.65
2500	10.67
3000	10.68
4000	10.89
5000	11.07
6000	11.06
7000	11.35
8000	11.32
9000	11.48
10000	11.56
11000	11.56
12000	11.68
13000	11.83
14000	11.90
15000	11.98
16000	12.04
17000	12.02
18000	12.08
19000	12.07
20000	12.14
21000	12.17
22000	12.31
23000	12.60
24000	12.34
25000	12.53
26000	11.07
27000	11.30

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss

3. Additional cable loss is 0.5 dB.



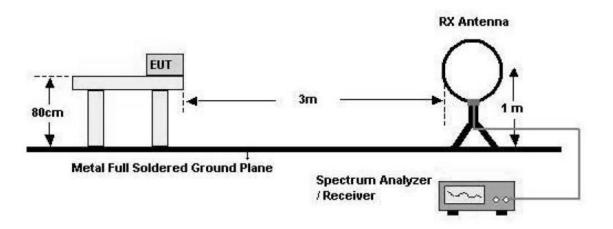
#### 7.6. Radiated Test

#### Limit

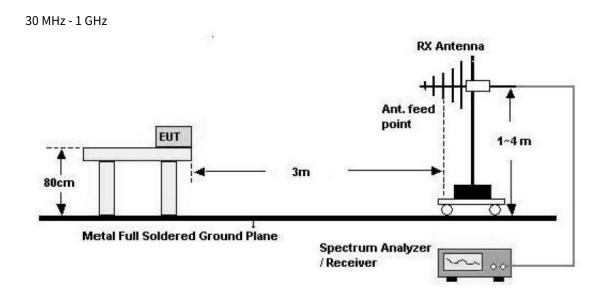
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)	
0.009 - 0.490	2400/F(kHz)	300	
0.490 – 1.705	24000/F(kHz)	30	
1.705 – 30	30	30	
30-88	100	3	
88-216	150	3	
216-960	200	3	
Above 960	500	3	

## **Test Configuration**

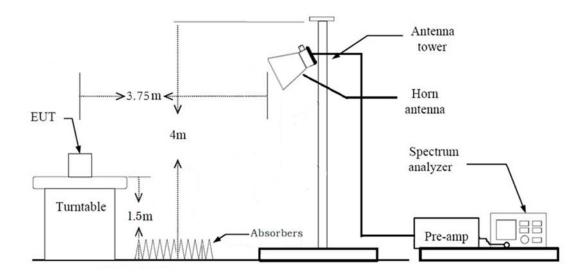
Below 30 MHz







Above 1 GHz





#### Test Procedure of Radiated spurious emissions(Below 30 MHz)

- 1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
- 2. The loop antenna was placed at a location 3m from the EUT
- 3. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
- 5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 6. Distance Correction Factor(0.009 MHz 0.490 MHz) = 40log(3 m/300 m) = 80 dB Measurement Distance : 3 m
- 7. Distance Correction Factor(0.490 MHz 30 MHz) = 40log(3 m/30 m) = 40 dB

Measurement Distance : 3 m

- 8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 9 kHz
  - VBW  $\geq$  3 x RBW

9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

#### KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.



#### Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.

- 2. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

5. Spectrum Setting

- (1) Measurement Type(Peak):
  - Measured Frequency Range : 30 MHz 1 GHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 100 kHz
  - VBW  $\geq$  3 x RBW
- (2) Measurement Type(Quasi-peak):
  - Measured Frequency Range : 30 MHz 1 GHz
  - Detector = Quasi-Peak
  - RBW = 120 kHz
- In general, (1) is used mainly
- 6. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

7. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

#### Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
  - Distance extrapolation factor = 20log (test distance / specific distance) (dB)
- 6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.



- 8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)
  - (1) Measurement Type(Peak):
    - Measured Frequency Range : 1 GHz 25 GHz
    - Detector = Peak
    - Trace = Maxhold
    - RBW = 1 MHz
    - VBW  $\geq$  3 x RBW
  - (2) Measurement Type(Average): Duty cycle  $\geq$  98%
    - Measured Frequency Range : 1 GHz 25 GHz
    - Detector = RMS
    - Averaging type = power (*i.e.*, RMS)
    - RBW = 1 MHz
    - VBW  $\geq$  3 x RBW
    - Sweep time = auto.
    - Trace mode = average (at least 100 traces).
- 9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 10. Total(Measurement Type : Peak)
  - = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) Amp Gain(G) + Distance Factor(D.F)

Total (Measurement Type : Average, Duty cycle  $\geq$  98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)



#### Test Procedure of Radiated Restricted Band Edge

- 1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
- 2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
- 3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor( reference distance : 3 m).
  - Distance extrapolation factor = 20log (test distance / specific distance) (dB)
- 6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 8. Spectrum Setting
  - (1) Measurement Type(Peak):
    - Measured Frequency Range : 2310 MHz  $\sim$  2390 MHz/ 2483.5 MHz  $\sim$  2500 MHz
    - Detector = Peak
    - Trace = Maxhold
    - RBW = 1 MHz
    - VBW  $\geq$  3 x RBW
  - (2) Measurement Type(Average): Duty cycle  $\geq$  98%,
    - Measured Frequency Range : 2310 MHz  $\sim$  2390 MHz/ 2483.5 MHz  $\sim$  2500 MHz
    - Detector = RMS
    - Averaging type = power (*i.e.*, RMS)
    - RBW = 1 MHz
    - VBW  $\geq$  3 x RBW
    - Sweep time = auto.
    - Trace mode = average (at least 100 traces).
- 9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.



10. Total(Measurement Type : Peak)

```
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – AMP Gain (A.G)+Attenuator(ATT)
```

Total (Measurement Type : Average, Duty cycle  $\geq$  98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – AMP Gain (A.G) +Attenuator(ATT)

Total(Measurement Type : Average, Duty cycle < 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – AMP Gain (A.G) +Attenuator(ATT) + Duty Cycle Factor



## 7.7. AC Power line Conducted Emissions

#### <u>Limit</u>

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

	Limits (dBµV)		
Frequency Range (MHz)	Quasi-peak	Average	
0.15 to 0.50	66 to 56 <sup>(a)</sup>	56 to 46 <sup>(a)</sup>	
0.50 to 5	0.50 to 5 56		
5 to 30	60	50	

<sup>(a)</sup>Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

#### **Test Configuration**

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

#### Test Procedure

- 1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
- 2. The EUT is connected via LISN to a test power supply.
- 3. The measurement results are obtained as described below:
- 4. Detectors : Quasi Peak and Average Detector.

#### **Sample Calculation**

Quasi-peak(Final Result) = Reading Value + Correction Factor



#### 7.9. Worst case configuration and mode

#### **Radiated test**

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone
- 2. EUT Axis
  - Radiated Spurious Emissions : X
  - Radiated Restricted Band Edge : X
- 3. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
  - Position : Horizontal, Vertical, Parallel to the ground plane

4. ADB11H6GG, ADB10H6IG, ADB11H6IG, ADB10H6GG, ADB13H6GG, ADB12H6GG, ADB10H6GN, ADB10H6MG, ADB10H6EG, ADB10H6EP, ADB11H6EP, ADB12H6EP, ADB10H6GP, ADB14H6GG were tested and the worst case results are reported. (Worst case : ADB11H6GG)

#### AC Power line Conducted Emissions

1. We don't perform powerline conducted emission test. Because this EUT is used with vehicle.

#### Conducted test

1. The EUT was configured with data rate of highest power.

2. ADB11H6GG, ADB10H6IG, ADB11H6IG, ADB10H6GG, ADB13H6GG, ADB12H6GG, ADB10H6GN, ADB10H6MG, ADB10H6EG, ADB10H6EP, ADB11H6EP, ADB12H6EP, ADB10H6GP, ADB14H6GG were tested and the worst case results are reported. (Worst case : ADB11H6GG)



## 8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz		PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band Conducted		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 20 dBc	nducted > 20 dBc	
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		N/A
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Dellated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS

#### Note:

We don't perform AC Conducted Emissions test. Because this  $\mathsf{EUT}$  is used with vehicle.



## 9. TEST RESULT

#### 9.1 DUTY CYCLE

Mada	Data Rate	Ton	T <sub>total</sub>	Durtes Cosala	Duty Cycle Factor
Mode	(Mbps)	(ms)	(ms)	Duty Cycle	(dB)
	1	12.421	12.522	0.992	0.035
802.11b	2	6.211	6.302	0.986	0.063
802.11D	5.5	2.321	2.412	0.962	0.167
	11	1.208	1.302	0.928	0.324
	6	2.064	2.166	0.953	0.211
	9	1.386	1.485	0.933	0.300
	12	1.041	1.143	0.911	0.406
802.11g	18	0.705	0.807	0.875	0.582
802.11g	24	0.533	0.633	0.842	0.747
	36	0.363	0.465	0.781	1.075
	48	0.276	0.378	0.730	1.366
	54	0.248	0.349	0.711	1.484
	6.5 (MCS0)	1.919	2.021	0.950	0.224
	13 (MCS1)	0.980	1.081	0.906	0.427
	19.5 (MCS2)	0.663	0.765	0.868	0.617
802.11n	26 (MCS3)	0.508	0.608	0.834	0.787
(HT20)	39 (MCS4)	0.352	0.454	0.776	1.101
	52 (MCS5)	0.272	0.374	0.728	1.378
	58.5 (MCS6)	0.248	0.349	0.711	1.481
	65 (MCS7)	0.228	0.329	0.693	1.590



#### Test Plots

enter Fr	RF 50Ω req 2.412000	DOO GHz PNO: Fast	INT RE	#Avg	ALIGNAUTO J Type: RMS	01:57:04 PM Oct 22, 2019 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P P P P P P	Frequency
0 dB/div	Ref Offset 11.2 Ref 30.00 dB		Atten: 30 dB		Δ	Mkr3 12.52 ms -0.11 dB	Auto Tur
0.00		X				3∆4	Center Fr 2.412000000 G
10.0 20.0 30.0							<b>Start Fr</b> 2.412000000 G
10.0 50.0 50.0							<b>Stop Fr</b> 2.412000000 G
enter 2.4 es BW 8			N 8.0 MHz	FUNCTION	Sweep 2	Span 0 Hz 0.05 ms (1000 pts)	CF St 8.000000 M <u>Auto</u> M
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t	12.42 ms (∆ 5.679 ms 12.52 ms (∆ 5.679 ms	13.73 dBm				Freq Offs 0
6 7 8 9 0 1							
G			Ш		<b>I</b> STATUS	>	

## Duty cycle plot (802.11b(1Mbps))

## Duty cycle plot (802.11g(6Mbps))

Agilent Spectrum Analyzer - Swept S							
X         RL         RF         50 Ω         A0           Center Freq 2.4120000         Center Freq 2.41200000         Center Freq 2.4120000         CenteFreq 7.41200000         Center Freq 7.41200000		INT REF	#Avg Typ	ALIGNAUTO e: RMS	TRAC	1 Oct 22, 2019	Frequency
Conton Hod 2H 20000	PNO: Fast ++	Trig: Free Run Atten: 24 dB			TYP	TPPPPP	
	IFGain:Low	Atten: 24 GD		Λ	Mkr3 2.	166 me	Auto Tune
Ref Offset 11.2 d 10 dB/div Ref 25.00 dBr				4		0.20 dB	
Log 15.0 and the state of the s	and the And March of	Valendorson eksteleis	mulumpikada	Anna that		3∆4	Center Freq
5.00	and the second	X <sup>alloglummat</sup> letders 2	Version and a second second	alatic harden un e		- of lace Matrix a	2.412000000 GHz
-5.00							
-15.0							Otort From
-25.0							Start Freq 2.412000000 GHz
-35.0							2.412000000 0112
-45.0	4	N			կլվ		
-55.0							Stop Freq 2.412000000 GHz
-65.0							2.412000000 GH2
Center 2.412000000 GHz					8	pan 0 Hz	CF Step
Res BW 8 MHz		8.0 MHz	:	Sweep 4	.462 ms (	1000 pts)	8.000000 MHz
MKR MODE TRC SCL	×	Y	FUNCTION   FUN	NCTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Man
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.064 ms (∆) 1.827 ms	1.97 dB 11.03 dBm					
3 Δ4 1 t (Δ) 4 F 1 t	2.166 ms (∆) 1.827 ms	-0.20 dB 11.03 dBm					Freq Offset
5	1.027 1113					=	0 Hz
6 7							
9							
10							
<		III					
MSG							



Agilent Spectrum Analyzer - Swept SA			
Center Freq 2.412000000 0		ALIGNAUTO 02:01 #Avg Type: RMS	:53PM Oct 22, 2019         Frequency           TRACE         1 2 3 4 5 6           TYPE         WWWWWWW
Ref Offset 11.2 dB 10 dB/div Ref 25.00 dBm	PNO: Fast + Trig: Free Run IFGain:Low Atten: 24 dB	ΔMkr	B 2.021 ms 0.47 dB
15.0 (14- 24-14-14-14-14-14-14-14-14-14-14-14-14-14	ton to provide the second s	(3∆4 เราไหม่ในส่งแสดคุณอย่างแห่งคุณปต่างจากหน่าย	Center Fred 2.412000000 GH:
-15.0			2.412000000 GH
-45.0			<b>Stop Fre</b> 2.412000000 GH
Center 2.412000000 GHz Res BW 8 MHz	#VBW 8.0 MHz	Sweep 4.063 r	Span 0 Hz ns (1000 pts) INCTION VALUE
2 F 1 t	1.919 ms         (Δ)         4.45 dB           227.7 μs         10.29 dBm           2.021 ms         (Δ)         0.47 dB           227.7 μs         10.29 dBm		Freq Offse
7 8 9 10 11			
< MSG	ш	<b>I</b> STATUS	<u>)</u>

## Duty cycle plot (802.11n(MCS0))

## Note:

In order to simplify the report, attached plots were only the most lowest datarate.



#### 9.2 6dB BANDWIDTH

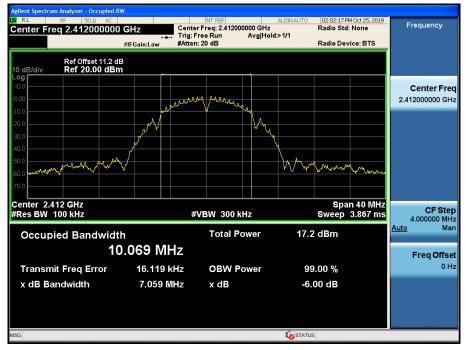
802.11b Mode		Management David State [MU-]	Minimum Donducidth [MI]-1	
Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	
2412	1	7.059	0.5	
2437	6	7.114	0.5	
2462	11	7.112	0.5	

802.11g Mode		Measured Denduidth [MU]	Minimum Dandwidth [MU-]	
Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz	
2412	1	16.34	0.5	
2437	6	16.34	0.5	
2462	11	16.35	0.5	

802.11n Mode		Management Damphuridth [MU]	Minimum Dandwidth [MI]=]	
Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	
2412	1	17.57	0.5	
2437	6	17.56	0.5	
2462	11	17.11	0.5	



#### Test Plots



#### 6dB Bandwidth plot (802.11b-CH 1)

#### 6dB Bandwidth plot (802.11g-CH 6)

Agilent Spectrum Analyzer - Occupied	BW				
<b>LXI RL</b> RF 50Ω AC		INT REF	ALIGNAUTO 02:21:06 P	M Oct 25, 2019	
Center Freq 2.43700000		er Freq: 2.437000000 GHz	Radio Std	: None	Frequency
	Trig:	FreeRun Avg Hol n:20 dB	d: 1/1 Radio Dev	vice: BTS	
	#IFGain:Low #Atte	n. 20 dB	Radio Der	nce. B15	
Ref Offset 11.2 10 dB/div Ref 15.00 dE					
Log					
5.00					Center Freq
-5.00	to a la allo allo and have	and mound have been from	η		2.437000000 GHz
-15.0	We down on the second s	Y			
	Avera and a second s		4. K.		
-25.0	and the second s		Y		
-35.0					
-45.0 man man when when when			"hand when the	and the second sec	
-55.0				month and the second second	
-65.0					
-75.0					
Center 2.437 GHz			Sna	n 40 MHz	
#Res BW 100 kHz	-	#VBW 300 kHz		3.867 ms	CF Step
THE BUY TOO KITZ	7	74D44 300 KHZ	омеер	5.007 1115	4.000000 MHz
Occupied Bandwic	lth	Total Power	16.6 dBm		<u>Auto</u> Man
1	6.411 MHz				Freq Offset
Tarana it Fara a Farana	4.040 141-	004	00.00.0/		0 Hz
Transmit Freq Error	1.342 kHz	OBW Power	99.00 %		0112
x dB Bandwidth	16.34 MHz	x dB	-6.00 dB		
MSG			STATUS		
			-		



Aglient Spectrum Analyzer - Occupied BV DXI RL RF 50.0 AC Center Freq 2.462000000 Ref Offset 11.2 dE	GHz Cente Trig: F #IFGain:Low #Atter	INT REF er Freq: 2.462000000 GHz Free Run Avg Hol h: 20 dB	Radio Sto		Frequency
10 dB/div Ref 15.00 dBm					
Log 5.00 -5.00	malantanton	mannetwelmetre	hne		Center Freq 2.462000000 GHz
-15.0			- Kong		
-35.0 -45.0 -55.0			- Wannan Warden	www.walwyw	
-65.0 -65.0 -75.0					
Center 2.462 GHz #Res BW 100 kHz	#	VBW 300 kHz		an 40 MHz 3.867 ms	CF Step 4.000000 MHz
Occupied Bandwidtl	h	Total Power	16.0 dBm		<u>Auto</u> Man
17	.613 MHz				Freq Offset
Transmit Freq Error	6.226 kHz	OBW Power	99.00 %		0 Hz
x dB Bandwidth	17.11 MHz	x dB	-6.00 dB		
MSG			STATUS		

## 6dB Bandwidth plot (802.11n\_HT20-CH 11)

## Note:

In order to simplify the report, attached plots were only the most narrow 6 dB BW channel.



#### 9.3 OUTPUT POWER

#### **Peak Power**

1. Power Meter offset = Attenuator loss + Cable loss

2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest twentieth dB. So, 10.7 dB is offset for 2.4 GHz Band. And, additional cable loss is 0.5 dB.

802.11b Mod	de		Measured	Limit
Frequency[MHz]	Channel No.	Rate (Mbps)	Power(dBm)	(dBm)
		1	11.70	30
2412	1	2	11.33	30
2412	T	5.5	11.34	30
		11	11.37	30
		1	11.20	30
2437		2	11.05	30
2431	6	5.5	11.00	30
		No.         Power(dBm)           1         11.70           2         11.33           5.5         11.34           11         11.37           1         11.20           2         11.05	30	
		1	11.06	30
2462	11	2	10.67	30
2462	11	5.5	10.66	30
		11	10.78	30



802.11g Mod	de		Measured	Limit
Frequency[MHz]	Channel No.	Rate (Mbps)	(dBm)	
		6	20.02	30
		9	19.87	30
	Frequency[MHz]     Channel No.     Rate (Mbps)       9     12       11     12       12     18       12     36       36     48       54     54       9     12       18     54       54     9       12     18       136     18       148     18       154     18       16     14       17     18       18     12       19     12       11     12	19.38	30	
2412	1	Rate (Mbps)         Power(dBm)           6         20.02           9         19.87           12         19.38           18         18.64           24         18.42           36         18.31           48         19.45           54         18.23           6         19.24           9         19.07           12         18.51           18         18.31           24         17.72           36         17.51           48         19.05           54         17.02           6         19.42           18         18.68           19.05         1           48         19.05           54         17.62           36         17.53           48         19.17	30	
2412	2412 1 9 12 18 12 18 36 48 54 54 9 12 54 9 12 18 54 54 54 54 54 54 54 54 54 54	24	18.42	30
		36	18.31	30
		48	19.45	30
		54	18.23	19.873019.383018.643018.423018.423019.453019.453019.243019.073018.513018.313017.723017.513019.053019.423019.303018.6830
		6	19.24	30
	c	9	19.07	30
		12	18.51	30
2427		18	18.31	30
2431	0	24	17.72	30
		36	17.51	30
	6         20.02           9         19.87           12         19.38           18         18.64           24         18.42           36         18.31           48         19.45           54         18.23           6         19.24           9         19.07           12         18.51           18         18.31           6         19.24           9         19.07           12         18.51           18         18.31           6         19.24           9         19.07           12         18.51           18         18.31           24         17.72           36         17.51           48         19.05           54         17.02           6         19.42           9         19.30           12         18.68           18         18.47           24         17.62           36         17.53           48         19.17	30		
		54	17.02	30
		6	19.42	30
		9	19.30	30
		12	18.68	30
2462	11	18	18.47	30
2462	11	24	17.62	30
		36	17.53	30
		48	19.17	30
		54	17.11	30



802.11n(HT20)	Mode		Measured	Limit
Frequency[MHz]	Channel No.	MCS Index	Measured Power(dBm)           20.33           19.11           20.51           20.10           19.81           20.77           20.13           19.88           20.12           20.12           20.12           19.74           19.39           19.14           20.30           20.00           18.86           19.35           19.66           18.99           19.39	(dBm)
		0	20.33	30
		1	19.11	30
		MCS Index         Power(dBm)         (dBm           0         20.33         30           1         19.11         30           2         20.51         30           3         20.10         30           4         19.81         30           5         20.77         30           6         20.13         30           7         19.88         30           0         20.12         30           1         20.22         30           1         20.22         30           1         20.22         30           1         20.22         30           2         19.74         30           3         19.39         30           4         19.14         30           5         20.30         30           6         20.00         30           7         18.86         30           0         19.35         30           1         19.66         30           2         18.99         30           3         19.39         30           3         19.39         30	30	
2412	1	3	20.10	30
2412	L	4	CS Index         Power(dBm)         (dBn)           0         20.33         30           1         19.11         30           2         20.51         30           3         20.10         30           4         19.81         30           5         20.77         30           6         20.13         30           7         19.88         30           0         20.12         30           1         20.22         30           1         20.22         30           1         20.22         30           1         20.22         30           1         20.22         30           2         19.74         30           3         19.39         30           4         19.14         30           5         20.30         30           6         20.00         30           7         18.86         30           1         19.66         30           2         18.99         30           3         19.39         30           4         18.68         30	30
		5	20.77	30
		6         20.13         30           7         19.88         30           0         20.12         30           1         20.22         30           2         19.74         30	30	
		7	19.88	1       30         1       30         0       30         1       30         0       30         1       30         7       30         3       30         3       30         3       30         2       30         2       30         4       30         9       30         4       30         0       30         6       30         5       30         6       30         9       30
		0	20.12	30
	2 1 2 1 3 7 6 1 1 1 1 1 1 1 1 1 1 1 1 1	1	20.22	30
		2	19.74	30
2437		3	19.39	30
2451		4	19.14	30
		5	20.30	30
		6	MCS Index         Power(dBm)         (dl           0         20.33         3           1         19.11         3           2         20.51         3           3         20.10         3           4         19.81         3           5         20.77         3           6         20.13         3           7         19.88         3           0         20.12         3           1         20.22         3           1         20.22         3           1         20.22         3           1         20.22         3           3         19.39         3           4         19.14         3           5         20.30         3           6         20.00         3           7         18.86         3           0         19.35         3           1         19.66         3           3         19.39         3           3         19.39         3           3         19.39         3           3         19.39         3           3	30
		7	18.86	30
		0	19.35	30
		1	19.66	30
		2	18.99	30
2462	11	3	19.39	30
	1 11	4	18.68	30
		5	19.99	30
		6	19.12	30
		7	19.15	30



# Average Power

1. Power Meter offset = Attenuator loss + Cable loss

2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest twentieth dB. So, 10.7 dB is offset for 2.4 GHz Band. And, additional cable loss is 0.5 dB.

802.11b Mc	802.11b Mode		Measured	Duty	Measured Power(dBm)									
Frequency [MHz]	Channel No.	Rate (Mbps)	Power (dBm)	Cycle Factor	+ Duty Cycle Factor	Limit (dBm)								
		1	8.30	0.035	8.33	30								
2412	1	2	7.88	0.063	7.94	30								
2412	1	5.5	7.71	0.167	7.88	30								
		11	7.52	0.324	7.84	30								
			1	7.64	0.035	7.67	30							
2437	6	2	7.55	0.063	7.61	30								
2437	0	5.5	7.43	0.167	7.60	30								
										11	7.33	0.324	7.65	30
		1	7.58	0.035	7.61	30								
2462	11	2	7.18	0.063	7.24	30								
2402	11	5.5	7.05	0.167	7.22	30								
		11	6.96	0.324	7.28	30								



802.11g Mc	802.11g Mode				Measured	
Frequency [MHz]	Channel No.	Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Power(dBm) + Duty Cycle	Limit (dBm)
		C	0.50	0.211		20
		6				30
		9				30
		12				30
2412	1	18				30
		24				30
		36	7.22	1.075	8.30	30
		48	7.02	1.366	8.39	30
		54	6.84	1.484	8.32	30
		6	7.78	0.211	7.99	30
		9	7.66	0.300	7.96	30
		12	7.59	0.406	8.00	30
2427	6	18	7.00	0.582	7.58	30
2437	6	24	6.73	0.747	7.48	30
		36	6.47	1.075	7.55	30
		48	6.28	1.366	7.65	30
		54	6.07	(dBm)FactorDuty Cycle Factor8.520.2118.738.420.3008.728.370.4068.787.400.5827.987.490.7478.247.221.0758.307.021.3668.396.841.4848.327.780.2117.997.660.3007.967.590.4068.007.000.5827.586.730.7477.486.471.0757.556.281.3667.65	30	
		6	7.52	0.211	7.73	30
		9	7.42	0.300	7.72	30
		12	7.35	0.406	7.76	30
2462	11	18	7.00	0.582	7.58	30
2462	11	24	6.72	0.747	7.47	30
		36	6.42	1.075	7.50	30
		48	6.26	1.366	7.63	30
		54	6.02	1.484	7.50	30



802.11n(HT20) Mode					Measured	
Frequency [MHz]	Channel No.	MCS Index	Measured	Duty	Power(dBm)	Limit (dBm)
			Power	Cycle	+ Duty Cycle	
			(dBm)	Factor	Duty Cycle	
		0	7.74	0.224	Factor 7.96	30
2412	1	1	7.49	0.224	7.90	30
		2	7.32	0.617	7.94	30
		3	7.53	0.787	8.32	30
		4	7.26	1.101	8.36	30
		5	7.01	1.378	8.39	30
		6	7.19	1.481	8.67	30
		7	6.77	1.590	8.36	30
2437	6	0	7.39	0.224	7.61	30
		1	7.14	0.427	7.57	30
		2	6.98	0.617	7.60	30
		3	6.78	0.787	7.57	30
		4	6.51	1.101	7.61	30
		5	6.27	1.378	7.65	30
		6	6.77	1.481	8.25	30
		7	6.05	1.590	7.64	30
2462	11	0	7.06	0.224	7.28	30
		1	6.83	0.427	7.26	30
		2	6.67	0.617	7.29	30
		3	6.75	0.787	7.54	30
		4	6.48	1.101	7.58	30
		5	6.23	1.378	7.61	30
		6	6.38	1.481	7.86	30
		7	6.03	1.590	7.62	30



# 9.4 POWER SPECTRAL DENSITY

			Test F	Result
Mode	Frequency (MHz)	Channel No.	Measured PSD (dBm)	Limit (dBm)
	2412	1	-12.428	
802.11b	2437	6	-12.935	
	2462	11	-12.839	
	2412	1	-13.167	
802.11g	2437	6	-13.895	8
	2462	11	-14.402	
	2412	1	-15.783	
802.11n(HT20)	2437	6	-15.432	
	2462	11	-15.952	

# Note :

1. Spectrum reading values are not plot data.

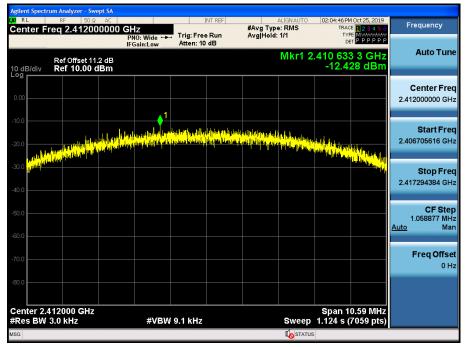
The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset = Attenuator loss + Cable loss

3. 10.7 dB is offset for 2.4 GHz Band. And, additional cable loss is 0.5 dB.

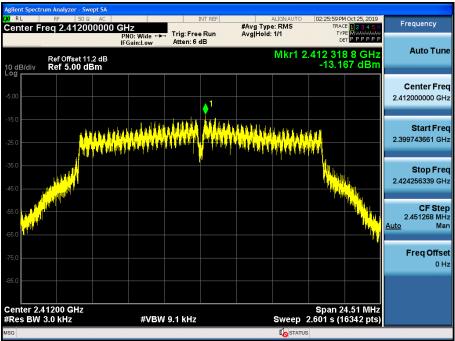


# Test Plots



Power Spectral Density (802.11b-CH 1)

## Power Spectral Density (802.11g-CH 1)





	rum Analyzer - Sw									
N.L.	RF 50 Ω req 2.43700				NT REF	#Avg Type Avg[Hold:			E 1 2 3 4 5 6 E M	Frequency
			NO: Wide 🔸 Gain:Low	Atten: 6		Arginola.				Auto Tun
0 dB/div	Ref Offset 11 Ref 5.00 di	.2 dB Bm					Mkr1 2	.441 966 -15.43	6 1 GHz 32 dBm	Auto Tuli
										Center Fre
5.00							1			2.437000000 GH
15.0						ا داري د				Start Fre
25.0	<u>///</u>					<u>umn</u>		<u> / // / /</u>		2.423826826 GH
		ant <sup>h</sup> ai	alle de	M. Lunary	n an	Part of the	PH PH			
35.0					,					<b>Stop Fre</b> 2.450173174 GH
45.0										2.430173174 61
55.0								, 'I	<mark>y,</mark> uj	CF Ste 2.634635 MH
5.0 <b>J</b>	<mark>/</mark> *								The second	Auto Ma
all the second sec									The state	Erog Offer
75.0										Freq Offse 0 H
35.0										
enter 2.4 Res BW	43700 GHz 3.0 kHz		#VBW	9.1 kHz			Sweep	Span 2 2.796 s (1	6.35 MHz 7564 pts)	
SG							STATUS			

# Power Spectral Density (802.11n\_HT20 -CH 6)

# Note :

In order to simplify the report, attached plots were only the worstcase PSD channel.



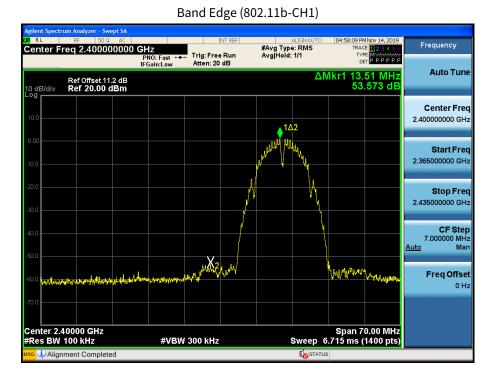


# 9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

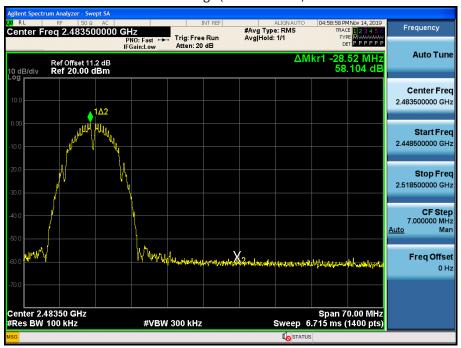
Test Result : please refer to the plot below. In order to simplify the report, attached plots were only the worst case channel and data rate.



# Test Plots(BandEdge)



Band Edge (802.11b-CH11)





	rum Analyzer - Swept SA					
XI RL Center F	RF 50 Ω AC req 2.40000000		INT REF Trig: Free Run Atten: 14 dB	ALIGN AUTO #Avg Type: RMS Avg Hold: 1/1	04:59:48 PMNov 14, 2019 TRACE 123456 TYPE M	Frequency
10 dB/div	Ref Offset 11.2 dB Ref 15.00 dBm		Attell: 14 4D	Δ	Mkr1 13.76 MHz 35.977 dB	Auto Tuno
- <b>og</b>				1∆2		<b>Center Free</b> 2.400000000 GH
5.00						<b>Start Fre</b> 2.365000000 GH
35.0						<b>Stop Fre</b> 2.435000000 GH
45.0		under the state of	hadden waard and a second and a s		manth all man all man	CF Ste 7.000000 MH <u>Auto</u> Ma
	striketyletotetetetetetetetetetetetetetetetetete	logiot.da.				Freq Offs 0 F
	40000 GHz 100 kHz	#\/B\A	300 kHz	Swaan	Span 70.00 MHz 6.715 ms (1400 pts)	
INGE ENV			-000-1112	STATU		

Band Edge (802.11g-CH1)

Band Edge (802.11g-CH11)

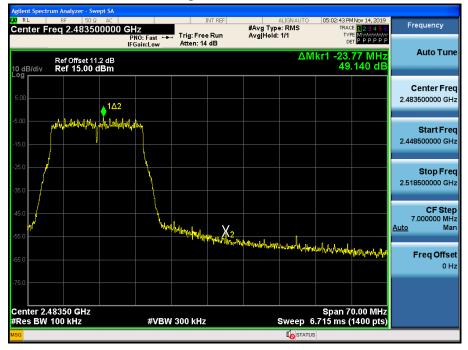




	um Analyzer - Swept SA							
Center Fr	RF 50 Ω AC reg 2.400000000	GHz	INT RE	#Avg Ty	ALIGNAUTO pe: RMS	TRAC	4Nov 14, 2019 E <b>1 2 3 4 5 6</b>	Frequency
10 dB/div	Ref Offset 11.2 dB Ref 15.00 dBm	PNO: Fast +++ IFGain:Low	Trig: Free Run Atten: 14 dB	Avg Hol		/kr1 13.	46 MHz .227 dB	Auto Tun
5.00					1∆2			Center Fre 2.400000000 G⊦
15.0			 	yudadhahadaalaadhaa	hallanteatra	1		<b>Start Fre</b> 2.365000000 GF
25.0 35.0								<b>Stop Fre</b> 2.435000000 GF
45.0 <b></b>	martinety Vistolitican	and further and the	nutritingenural X2			Mangh Willy	Yerispileraputat	<b>CF Ste</b> 7.000000 MI <u>Auto</u> Mi
	nan heren i Valleden i Ander							Freq Offs 0 F
2enter 2.4	10000 GHz 100 kHz	#VBW	300 kHz		Sweep 6	Span 7	0.00 MHz 1400 pts)	
SG					STATUS		p/	

#### Band Edge (802.11n\_HT20 -CH1)

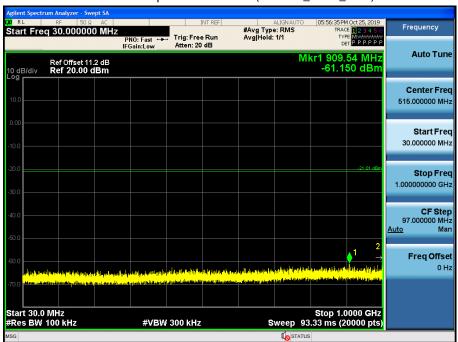
Band Edge (802.11n\_HT20 -CH11)





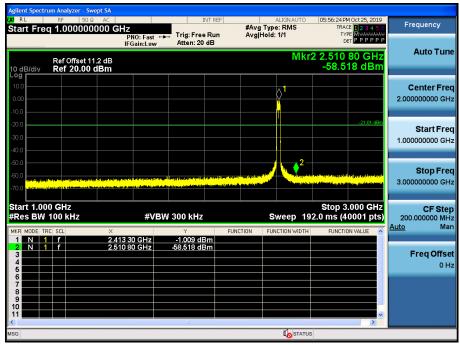
# Test Plots(Conducted Spurious Emission)

#### 30 MHz ~ 1 GHz



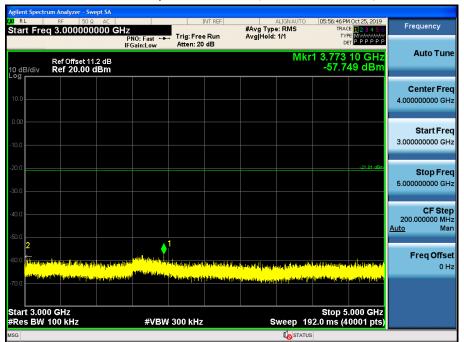
# Conducted Spurious Emission (802.11n\_HT20\_Ch.1)

1 GHz ~ 3 GHz





#### $3 \text{ GHz} \sim 5 \text{ GHz}$



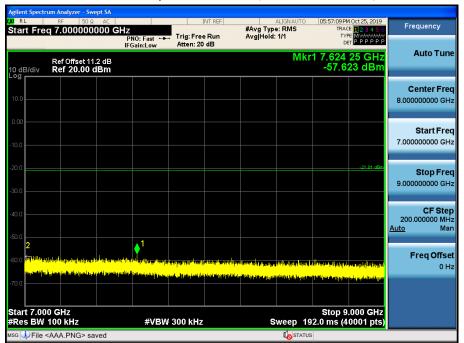
#### Conducted Spurious Emission (802.11n\_HT20\_Ch.1)

#### 5 GHz ~ 7 GHz

RL	RF	50 Ω	AC			INT REF		ALIGN AUTO	05:56:58 PM	1 Oct 25, 2019	_
tart Fre	q 5.000	00000		Z PNO:Fast ↔ FGain:Low	Trig: Free		#Avg Type Avg Hold:		TRAC TYP DE	E 123456 E M W M M M M M T P P P P P P	Frequency
) dB/div	Ref Off Ref 20	set 11.2 0.00 dE	dB	I Gam.cow				Mkr	1 6.168 -58.5	30 GHz 99 dBm	Auto Tun
og											Center Fre 6.000000000 GH
0.00											Start Fre 5.000000000 GF
10.0										-21.01 dBm	<b>Stop Fre</b> 7.000000000 GF
10.0											CF Ste 200.000000 Mi <u>Auto</u> Mi
			for the second	an frage specification of the second se				- C		1 A A A A A A A A A A A A A A A A A A A	Freq Offs 01
tart 5.00	0 GHz								Stop 7	.000 GHz	
Res BW		G> save		#VBV	V 300 kHz		S	weep 19		0001 pts)	



#### 7 GHz ~ 9 GHz



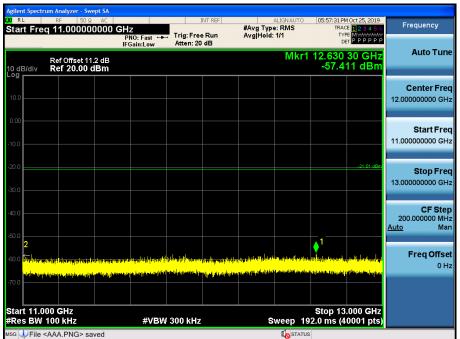
#### Conducted Spurious Emission (802.11n\_HT20\_Ch.1)

#### 9 GHz ~ 11 GHz

								m Analyzer - Sw	• •
Frequency	05:57:20 PM Oct 25, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P		#Avg Typ Avg Hold		. Trig: Free	PNO: Fast ++		RF 50 ເ 9.000000	tart Fre
Auto Tune	10.947 20 GHz -57.652 dBm	Mkr1		) dB	Atten: 20	FGain:Low	.2 dB	Ref Offset 11 Ref 20.00	0 dB/div
Center Fred 10.000000000 GH;									.og
Start Free 9.000000000 GH:									0.00
Stop Free 11.000000000 GH									30.0
<b>CF Stej</b> 200.000000 MH <u>Auto</u> Ma									40.0
Freq Offse 0 H	a da ma de la companya de la productiva de la decentra de la companya de la companya de la decentra de la decen		and helping of the life		a na ka	IPAL MET THE PARTY OF A		er for til <b>a la stor i k</b> and et st	2 50.0 <del>(-</del>
	Stop 11.000 GHz					in the property in the second seco			70.0 <b>1000</b> Start 9.00
	2.0 ms (40001 pts)	weep 19	S		300 kHz	#VBW	wod	00 kHz AAA.PNG> sa	Res BW



## 11 GHz ~ 13 GHz



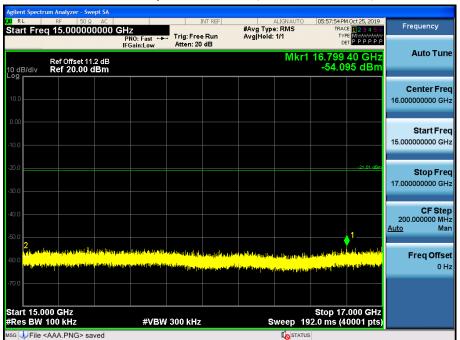
#### Conducted Spurious Emission (802.11n\_HT20\_Ch.1)

#### 13 GHz ~ 15 GHz

N RL	rum Analyzer - Swept RF 50 Ω				INT REF		ALIGN AUTO	05:57:43 PM	1 Oct 25, 2019	
	q 13.000000	00 GH	z 10: Fast 🔸		Run	#Avg Typ Avg Hold:	e: RMS	TRAC		Frequency
10 dB/div	Ref Offset 11.2 Ref 20.00 dB	dB	Jam.cow				Mkr1		90 GHz 11 dBm	Auto Tun
10.0										Center Fre 14.000000000 GH
10.0										Start Fre 13.000000000 G⊦
30.0									-21.01 dBm	Stop Fre 15.000000000 G⊦
40.0									1	CF Ste 200.000000 MH <u>Auto</u> Ma
2 60 0 0	in terrar and the provident of the		politik aldalara	ululusis kositi	o postas fest (11) o		eg attelen ta data <mark>19 av 101 i <sup>sud</sup>a avet</mark>	an di la mala la la di National di Cara	n sang kada sing pata sang kada sing k	Freq Offs 0 H
/0.0		an de de de de	llooneen leve							
Start 13.0 Res BW			#VBW	300 kHz		s	weep 19	Stop 15 2.0 ms (4	.000 GHz 0001 pts)	
sg 🛈 File	<aaa.png> save</aaa.png>	d					STATUS			



## 15 GHz ~ 17 GHz



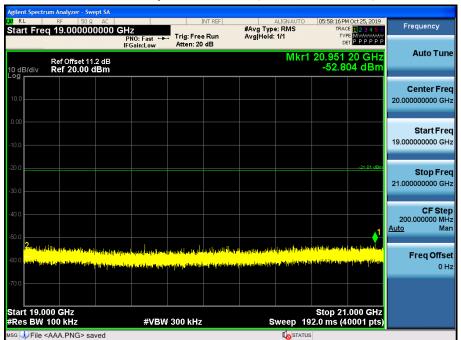
#### Conducted Spurious Emission (802.11n\_HT20\_Ch.1)

#### 17 GHz ~ 19 GHz

	um Analyzer - Swept SA								
Start Fre	RF 50 Ω AC q 17.000000000	GHz		Run	#Avg Type Avg Hold:		TRAC	1 Oct 25, 2019 E 1 2 3 4 5 6 E Management	Frequency
	Ref Offset 11.2 dB	PNO: Fast 🔸 IFGain:Low	Atten: 20		inglinea.		18.426	15 GHz	Auto Tune
10 dB/div	Ref 20.00 dBm						-51.9	29 dBm	
10.0									Center Freq 18.00000000 GHz
0.00									Start Freq
-10.0								-21.01.dBp	17.00000000 GHz
-20.0								-21.01 000	Stop Fred 19.000000000 GHz
40.0									CF Step 200.000000 MH;
-50.0 2	6 ideals manufacture in 100 million and 1940	yan bahayan daga dada ya manga da Malay	hade ale and hade and some	harmi si si kalanta			والمعاد أخذار والمع	ath han a dad	<u>Auto</u> Mar
	<mark>hainen neihieksi, ilehipikusen meseren</mark>	nen geschwarze (nie weise eine die ster die seine d	an a	termenti ettik hiki	<mark>pes più le pilitite</mark>	na shekara ya ku ma	a ten sen fa hendidi	n seine s	Freq Offsel 0 Hz
-70.0									
Start 17.0 #Res BW		#VBW	300 kHz		s	weep 19	Stop 19 2.0 ms (4	.000 GHz 0001 pts)	
wsg 🧼 File 🕯	<aaa.png> saved</aaa.png>						5		



#### 19 GHz ~ 21 GHz



Conducted Spurious Emission (802.11n\_HT20\_Ch.1)

#### 21 GHz ~ 23 GHz

	um Analyzer - Swept S									
Start Fre	RF 50 Ω A q 21.0000000	00 GHz	):Fast ↔		Run	#Avg Type Avg[Hold:		TRAC	4 Oct 25, 2019 CE 1 2 3 4 5 6 PE Mutatatuta	Frequency
	Ref Offset 11.2 d	IFGa IB	in:Low	Atten: 20				⊳ 22.879	60 GHz	Auto Tune
10 dB/div Log	Ref 20.00 dBr	m						-01.0		Center Freq
10.0										22.000000000 GHz
-10.0										Start Fred 21.000000000 GHz
-20.0									-21.01 dBm	Stop Fred
-30.0										23.000000000 GH: CF Step
-40.0									<b>↓</b> 1	200.000000 MH Auto Mar
	ginleferen falle sedat familiet Referense og sen attentenen					laderaraanila Magilaathaan			de specification o por name da tanto da f	Freq Offset
-70.0										
Start 21.0 #Res BW			#VBW	300 kHz		s	weep <u>19</u>		.000 GHz 0001 pts)	
мsg 🗼 File •	<aaa.png> saved</aaa.png>	ł					<b>I</b> STATUS	6		



#### 23 GHz ~ 25 GHz

RL	RF 50 Ω	AC		I	NT REF		ALIGN AUTC	05:58:39 P	4 Oct 25, 2019	_
tart Fre	q 23.000000	000 GH	Z NO:Fast ↔ Gain:Low		Run	#Avg Type Avg Hold:		TRA	CE 123456 PE MULLION ET P P P P P P	Frequency
0 dB/div	Ref Offset 11.2 Ref 20.00 dE	dB	Sam.Low	Atten. 20			Mkr	1 24.199 -46.7	85 GHz 86 dBm	Auto Tune
10.0										Center Fred 24.000000000 GH
10.0										Start Free 23.000000000 GH
20.0									-21.01-dBm	<b>Stop Free</b> 25.000000000 GH
40.0	ente esta la participat de la constancia de				بەرائا <sup>ر</sup> ئەرىيە يەرىپ	1		und has been all and the set		CF Step 200.000000 MH <u>Auto</u> Mar
<b>9. J</b> hu) 60.0 <mark>(jailuu</mark> )	ng na pang ting ang kilang di king di king di kang ting bang bang bang bang bang bang bang ba	alaterik (da s	ling and a second second	nasa nabitaranta h	<mark>peneris petitis</mark>	ilijindiki poteseli	halayan alimba	daayaa ay baaddiintiintii	dynefalinatti götöllingy),	<b>Freq Offse</b> 0 H
70.0										
tart 23.0	100 GHZ 100 kHz			300 kHz		_		Stop 25 192.0 ms (4	.000 GHz	



# 9.6 RADIATED SPURIOUS EMISSIONS

## Frequency Range : 9 kHz – 30MHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin		
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB		
No Critical peaks found									

#### Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

- 2. Distance extrapolation factor = 40log (specific distance / test distance) (dB)
- 3. Limit line = specific Limits (dBuV) + Distance extrapolation factor

# Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin	
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB	
No Critical peaks found								

#### Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.



# Frequency Range : Above 1 GHz

Operation Mode:	802.11b		
Transfer Rate:	1 Mbps		
Operating Frequency	2412		
Channel No.	01 Ch		

Frequency	Reading	A.F.+C.LA.G+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4824	48.43	0.25	V	48.68	73.98	25.30	PK
4824	36.69	0.25	V	36.94	53.98	17.04	AV
7236	48.40	8.63	V	57.03	73.98	16.96	PK
7236	39.45	8.63	V	48.08	53.98	5.90	AV
4824	47.68	0.25	Н	47.93	73.98	26.05	PK
4824	36.60	0.25	Н	36.85	53.98	17.13	AV
7236	46.89	8.63	Н	55.52	73.98	18.47	PK
7236	37.45	8.63	Н	46.08	53.98	7.90	AV

Operation Mode:	802.11b		
Transfer Rate:	1 Mbps		
Operating Frequency	2437		
Channel No.	06 Ch		

Frequency	Reading	A.F.+C.LA.G+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4874	46.74	0.13	V	46.87	73.98	27.12	PK
4874	35.17	0.13	V	35.30	53.98	18.69	AV
7311	48.59	8.70	V	57.29	73.98	16.69	PK
7311	39.40	8.70	V	48.10	53.98	5.88	AV
4874	46.49	0.13	Н	46.62	73.98	27.37	PK
4874	35.03	0.13	Н	35.16	53.98	18.83	AV
7311	48.03	8.70	Н	56.73	73.98	17.25	PK
7311	38.40	8.70	Н	47.10	53.98	6.88	AV



Operation M	1ode:	80	)2.11b				
Transfer Rat	te:	1	1 Mbps				
Operating F	requency	24	62		-		
Channel No		11	. Ch		-		
Frequency	Reading	A.F.+C.LA.G+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4924	47.97	-0.45	V	47.52	73.98	26.46	PK
4924	36.45	-0.45	V	36.00	53.98	17.98	AV
7386	47.38	8.87	V	56.25	73.98	17.73	PK
7386	37.61	8.87	V	46.48	53.98	7.50	AV
4924	47.56	-0.45	Н	47.11	73.98	26.87	PK
4924	36.40	-0.45	Н	35.95	53.98	18.03	AV
7386	47.42	8.87	Н	56.29	73.98	17.69	PK
7386	36.84	8.87	Н	45.71	53.98	8.27	AV



Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequenc y	Readin g	Duty Cycle Factor	A.F.+C.L. - A.G+D.F.	ANT. POL	Total	Limit	Margin [dB]	Measure ment Type
[MHz]	[dBuV]		[dB]	[H/V]	[dBuV/m]	[dBuV/m]		
4824	47.59	0.000	0.25	V	47.84	73.98	26.14	PK
4824	36.72	0.211	0.25	V	37.18	53.98	16.80	AV
7236	54.64	0.000	8.63	V	63.27	73.98	10.72	PK
7236	35.33	0.211	8.63	V	44.17	53.98	9.81	AV
4824	48.39	0.000	0.25	Н	48.64	73.98	25.34	PK
4824	36.65	0.211	0.25	Н	37.11	53.98	16.87	AV
7236	54.10	0.000	8.63	Н	62.73	73.98	11.26	PK
7236	35.19	0.211	8.63	Н	44.03	53.98	9.95	AV

Operation Mode: Transfer Rate: Operating Frequency Channel No.

802.11g	
6 Mbps	
2437	
06 Ch	

Frequenc y	Readin g	Duty Cycle Factor	A.F.+C.L. - A.G+D.F.	ANT. POL	Total	Limit	Margin [dB]	Measure ment Type
[MHz]	[dBuV]		[dB]	[H/V]	[dBuV/m]	[dBuV/m]		туре
4874	47.95	0.000	0.13	V	48.08	73.98	25.91	PK
4874	35.20	0.211	0.13	V	35.54	53.98	18.44	AV
7311	56.57	0.000	8.70	V	65.27	73.98	8.71	PK
7311	35.35	0.211	8.70	V	44.26	53.98	9.72	AV
4874	47.88	0.000	0.13	Н	48.01	73.98	25.98	PK
4874	35.17	0.211	0.13	Н	35.51	53.98	18.47	AV
7311	55.79	0.000	8.70	Н	64.49	73.98	9.49	PK
7311	35.21	0.211	8.70	Н	44.12	53.98	9.86	AV



802.11g
6 Mbps
2462
11 Ch

Frequenc y	Readin g	Duty Cycle Factor	A.F.+C.L. - A.G+D.F.	ANT. POL	Total	Limit	Margin [dB]	Measure ment Type
[MHz]	[dBuV]		[dB]	[H/V]	[dBuV/m]	[dBuV/m]		Type
4924	48.24	0.000	-0.45	V	47.79	73.98	26.19	PK
4924	36.58	0.211	-0.45	V	36.34	53.98	17.64	AV
7386	54.07	0.000	8.87	V	62.94	73.98	11.04	PK
7386	34.75	0.211	8.87	V	43.83	53.98	10.15	AV
4924	47.18	0.000	-0.45	Н	46.73	73.98	27.25	PK
4924	36.50	0.211	-0.45	Н	36.26	53.98	17.72	AV
7386	51.98	0.000	8.87	Н	60.85	73.98	13.13	PK
7386	34.32	0.211	8.87	Н	43.40	53.98	10.58	AV



Operation Mode:	802.11n (HT20)		
Transfer MCS Index:	0		
Operating Frequency	2412		
Channel No.	01 Ch		

Frequenc y	Readin g	Duty Cycle Factor	A.F.+C.L. - A.G+D.F.	ANT. POL	Total	Limit	Margin [dB]	Measure ment Type
[MHz]	[dBuV]		[dB]	[H/V]	[dBuV/m]	[dBuV/m]		Type
4824	47.99	0.000	0.25	V	48.24	73.98	25.74	PK
4824	36.55	0.224	0.25	V	37.02	53.98	16.96	AV
7236	57.70	0.000	8.63	V	66.33	73.98	7.66	PK
7236	34.85	0.224	8.63	V	43.70	53.98	10.28	AV
4824	48.15	0.000	0.25	Н	48.40	73.98	25.58	PK
4824	36.60	0.224	0.25	Н	37.07	53.98	16.91	AV
7236	55.94	0.000	8.63	Н	64.57	73.98	9.42	PK
7236	34.77	0.224	8.63	Н	43.62	53.98	10.36	AV

Operation Mode:

Transfer MCS Index:

Operating Frequency

Channel No.

Frequenc y	Readin g	Duty Cycle Factor	A.F.+C.L. - A.G+D.F.	ANT. POL	Total	Limit	Margin [dB]	Measure ment Type
[MHz]	[dBuV]		[dB]	[H/V]	[dBuV/m]	[dBuV/m]		турс
4874	47.11	0.000	0.13	V	47.24	73.98	26.75	PK
4874	35.30	0.224	0.13	V	35.65	53.98	18.33	AV
7311	57.89	0.000	8.70	V	66.59	73.98	7.39	PK
7311	34.97	0.224	8.70	V	43.89	53.98	10.09	AV
4874	46.94	0.000	0.13	Н	47.07	73.98	26.92	PK
4874	35.43	0.224	0.13	Н	35.78	53.98	18.20	AV
7311	56.14	0.000	8.70	Н	64.84	73.98	9.14	PK
7311	34.88	0.224	8.70	Н	43.80	53.98	10.18	AV

802.11n (HT20)
0
2437

06 Ch



Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2462
Channel No.	11 Ch

Frequenc y	Readin g	Duty Cycle Factor	A.F.+C.L. - A.G+D.F.	ANT. POL	Total	Limit	Margin [dB]	Measure ment Type
[MHz]	[dBuV]		[dB]	[H/V]	[dBuV/m]	[dBuV/m]		турс
4924	47.92	0.000	-0.45	V	47.47	73.98	26.51	PK
4924	36.51	0.224	-0.45	V	36.28	53.98	17.70	AV
7386	55.68	0.000	8.87	V	64.55	73.98	9.43	PK
7386	34.30	0.224	8.87	V	43.39	53.98	10.59	AV
4924	47.51	0.000	-0.45	Н	47.06	73.98	26.92	PK
4924	36.47	0.224	-0.45	Н	36.24	53.98	17.74	AV
7386	54.35	0.000	8.87	Н	63.22	73.98	10.76	PK
7386	33.79	0.224	8.87	Н	42.88	53.98	11.10	AV



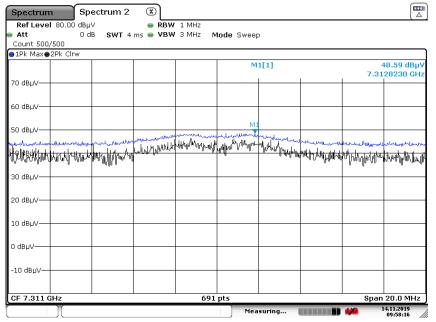
#### Test Plots (Worst case : X-V)

Radiated Spurious Emissions plot – Average Reading (802.11b, Ch.6 3rd Harmonic)

Spectrum Spectrum 2 Ø dBµV ● RBW 1 MHz 0 dB SWT 4 ms ● VBW 3 MHz Ref Level 80.00 dBµV Mode Sweep Att Count 500/500 7.311 GHz ●1Rm View●2Pk Clrw M1[1] 39.40 dBu 7.3098710 GH 70 dBuV-60 dBµV-50 dBµV-had the second 1948#MU.HAMM.www.ha 30 dBµV-20 dBµV-10 dBµV-0 dBµV--10 dBuV· CF 7.311 GHz Span 20.0 MHz 691 pts Measuring... 14.11.2019 09:57:36 

Date: 14.NOV.2019 09:57:36

Radiated Spurious Emissions plot - Peak Reading (802.11b, Ch.6 3rd Harmonic)



Date: 14.NOV.2019 09:58:16

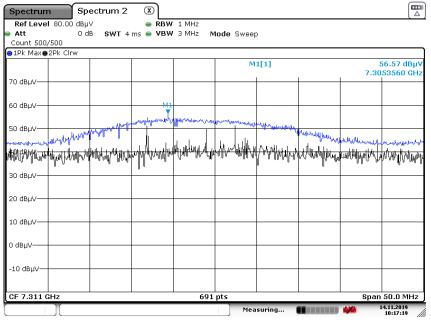


Count 500/	500		ms 👄 VBW		1ode Sweep - <b>7.311</b>				
∋1Rm AvgLir	∎2Pk Clrw								
					M	1[1]			35.35 dBµ\ 89020 GH:
70 dBµV									
60 dBµV									
50 dBµV									
50 uвµv			1			ıl.			
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งกายการการการการการการการการการการการการการก	ովիկում,մ. հ	holp mole	i II) antotro (J. I			ուներվ օկ օր օւ	ւ, սոհախիդ	ll alla lleva a allfh	Allaha Alla Avas
30 dBµV									
20 dBµV									
10 dBµV									
0 dBµV									
10 db 07									
-10 dBµV									

#### Radiated Spurious Emissions plot - Average Reading (802.11g, Ch.6 3rd Harmonic)

Date: 14.NOV.2019 10:17:47

Radiated Spurious Emissions plot – Peak Reading (802.11g, Ch.6 3rd Harmonic)



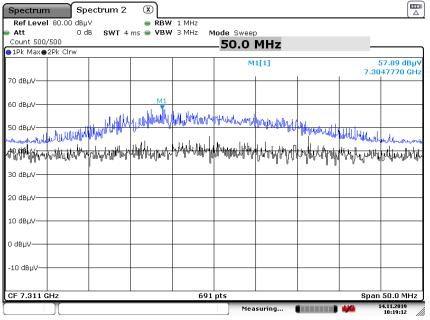
Date: 14.NOV.2019 10:17:19



1Rm AvgLine	00					7.311	GHz			
_	2Pk Clrw					м	1[1]			34.97 dBµV 78890 GHz
70 dBµV										
60 dBµV										
50 dBµV										
*Purfiketori	tuk phaydd	***	ht when when the second se	Hr Auger	w,h	alleft father was	htte	-	www.www	hubhuhu
30 dBµV										
20 dBµV										
10 dBµV										
								1		
10 dBµV 0 dBµV -10 dBµV										

#### Radiated Spurious Emissions plot – Average Reading (802.11n (HT20), Ch.6 3rd Harmonic)

Radiated Spurious Emissions plot - Peak Reading (802.11n (HT20), Ch.6 3rd Harmonic)



Date: 14.NOV.2019 10:19:12

#### Note:

Plot of worst case are only reported.



# 9.7 RADIATED RESTRICTED BAND EDGES

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency	Reading	A.F.+C.L.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	-A.G+ATT [dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	50.72	0.24	Н	50.96	73.98	23.02	PK
2390.0	39.89	0.24	Н	40.13	53.98	13.85	AV
2390.0	52.57	0.24	V	52.81	73.98	21.17	PK
2390.0	40.12	0.24	V	40.36	53.98	13.62	AV
2483.5	51.59	-0.64	Н	50.96	73.98	23.03	PK
2483.5	39.94	-0.64	Н	39.31	53.98	14.68	AV
2483.5	52.54	-0.64	V	51.91	73.98	22.08	PK
2483.5	40.35	-0.64	V	39.72	53.98	14.27	AV

**Operation Mode:** 

Transfer Rate:

Channel No.

Operating Frequency

802.11g	
6 Mbps	
2412 MHz, 2462 MHz	
01 Ch, 11 Ch	

		Duty	A.F.+C.L.+D.F					Measurement
Frequency	Reading	Cycle	-A.G+ATT.	ANT. POL	Total	Limit	Margin	
[MHz]	[dBuV]	Factor	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	57.61	0.000	0.24	Н	57.85	73.98	16.13	PK
2390.0	42.71	0.211	0.24	Н	43.16	53.98	10.82	AV
2390.0	58.25	0.000	0.24	V	58.49	73.98	15.49	PK
2390.0	44.35	0.211	0.24	V	44.80	53.98	9.18	AV
2483.5	52.02	0.000	-0.64	Н	51.39	73.98	22.60	PK
2483.5	40.00	0.211	-0.64	Н	39.58	53.98	14.40	AV
2483.5	57.63	0.000	-0.64	V	57.00	73.98	16.99	PK
2483.5	43.65	0.211	-0.64	V	43.23	53.98	10.75	AV



Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

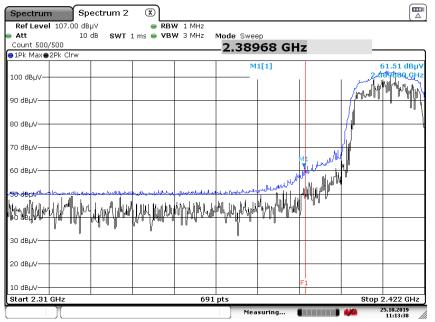
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	60.32	0.000	0.24	Н	60.56	73.98	13.42	PK
2390.0	44.18	0.224	0.24	Н	44.64	53.98	9.34	AV
2390.0	61.51	0.000	0.24	V	61.75	73.98	12.23	PK
2390.0	45.06	0.224	0.24	V	45.52	53.98	8.46	AV
2483.5	60.89	0.000	-0.64	Н	60.26	73.98	13.73	PK
2483.5	41.10	0.224	-0.64	Н	40.69	53.98	13.29	AV
2483.5	63.74	0.000	-0.64	V	63.11	73.98	10.88	PK
2483.5	43.73	0.224	-0.64	V	43.32	53.98	10.66	AV



#### Test Plots (Worst case : X-V)

Radiated Restricted Band Edges plot - Average Reading (802.11n(HT20), Ch.1) Spectrum Spectrum 2 × 0 dBμV ● **RBW** 1 MHz 10 dB **SWT** 1 ms ● **VBW** 3 MHz Ref Level 107.00 dBµV Mode Sween Att Count 500/500 2.366 GHz ●1Rm View●2Pk Clrw M1[1] 45.06 dBu 0000 GH 100 dBµV-ልሀ 90 dBµV-80 dBµV 70 dBµV-60 dBµV-50 dBµV 30 dBµV 20 dBuV-10 dBµV-CF 2.366 GHz 691 pts Span 112.0 MHz 25.10.2019 11:14:24 Measuring... 

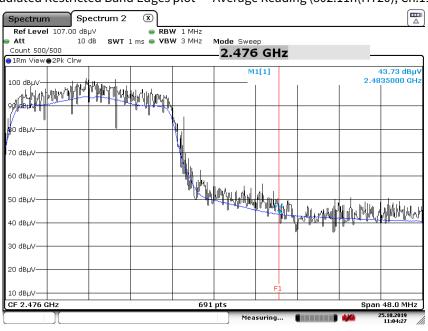
Radiated Restricted Band Edges plot - Peak Reading (802.11n(HT20), Ch.1)



Date: 25.0CT.2019 11:13:38

Date: 25.0CT.2019 11:14:24

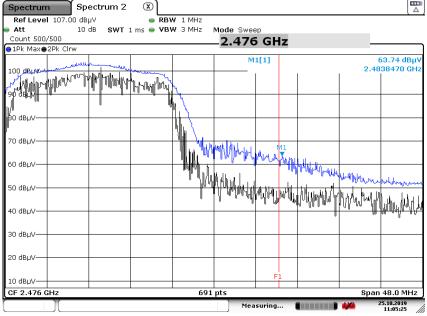




#### Radiated Restricted Band Edges plot - Average Reading (802.11n(HT20), Ch.11)

Date: 25.0CT.2019 11:04:27

Radiated Restricted Band Edges plot – Peak Reading (802.11n(HT20), Ch.11)



Date: 25.0CT.2019 11:05:25

#### Note:

Plot of worst case are only reported.



# **10. LIST OF TEST EQUIPMENT**

## **Conducted Test**

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	Rohde & Schwarz ENV216 / LISN		Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/12/2019	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	01/10/2019	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/24/2019	Annual	101231
Agilent	N1911A / Power Meter	04/10/2019	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/10/2019	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/11/2019	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/24/2019	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/18/2019	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/02/2019	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD. FCC WLAN&BT&BLE Conducted Test Software v3.0		N/A	N/A	N/A

# Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.

2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.



# Radiated Test

Manufacturer	Manufacturer Model / Equipment		Calibration Interval	Serial No.
Innco system	co system CO3000 / Controller(Antenna mast)		N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Audix Turn Table		N/A	N/A
Rohde & Schwarz	Loop Antenna	08/23/2018	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	VULB 9160 / TRILOG Antenna	08/09/2018	Biennial	9160-3368
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	05/09/2019	Annual	100854
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/26/2019	Annual	101068-SZ
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	05/23/2019	Annual	8
Wainwright Instruments	WHKX7.0/18G-8SS / High Pass Filter	05/03/2019	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520- 60/12SS / Band Reject Filter	06/19/2019	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2019	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/04/2019	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/15/2019	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	07/01/2019	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/01/2019	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/03/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/18/2019	Annual	25956

# Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.

2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.



# **11. ANNEX A\_ TEST SETUP PHOTO**

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-1911-FC027-P