# RF Test Report

Report No.: AGC00552190301EE05

| | | |
|---|---|---|
| **PRODUCT DESIGNATION** | : | Smart Phone |
| **BRAND NAME** | : | CUBOT |
| **MODEL NAME** | : | R15 |
| **APPLICANT** | : | Shenzhen Huafurui Technology Co., Ltd. |
| **DATE OF ISSUE** | : | Mar. 21, 2019 |
| **STANDARD(S)** | : | EN 300 328 V2.1.1 (2016-11) |
| **REPORT VERSION** | | V1.0 |

*A*ttestation of *G*lobal *C*ompliance (Shenzhen) Co., Ltd

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## Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | Mar. 21, 2019 | Valid | Initial release |

# TABLE OF CONTENTS

## 1. TEST REPORT CERTIFICATION

| | |
|---|---|
| **Applicant** | Shenzhen Huafurui Technology Co., Ltd. |
| **Address** | Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China |
| **Manufacturer** | Shenzhen Huafurui Technology Co., Ltd. |
| **Address** | Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China |
| **Factory Name** | Shenzhen Huafurui Technology Co., Ltd. |
| **Address** | Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China |
| **Product Designation** | Smart Phone |
| **Brand Name** | CUBOT |
| **Test Model** | R15 |
| **Date of test** | Mar. 13, 2019 to Mar. 20, 2019 |
| **Deviation** | None |
| **Condition of Test Sample** | Normal |
| **Report Template** | AGCRT-EC-BGN/RF |

We, Attestation of Global Compliance (Shenzhen) Co., Ltd., for compliance with the requirements set forth in the European Standard ETSI EN EN 300 328 V2.1.1. The results of testing in this report apply to the product /system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

The test results of this report relate only to the tested sample identified in this report.

Tested By Jeast

Jeast Zhan(Zhan Jiangdong) Mar. 20, 2019

Reviewed By Bart Xie

Bart Xie(Xie Xiaobin) Mar. 21, 2019

Approved By Forrest Lei

Forrest Lei(Lei Yonggang)
Authorized Officer Mar. 21, 2019

# 2. GENERAL INFORMATION

## 2.1. DESCRIPTION OF EUT

Note: the following data is based on the information by the applicant.

| | | |
|---|---|---|
| **Hardware Version** | WE625B_MB_V1.0_20181226 | |
| **Software Version** | CUBOT_R15_9031C_V02_20190223 | |
| **Operating Frequency** | 2.412 GHz～2.472GHz | |
| **Support Channels** | 13 Channels (IEEE802.11(20)b/g/n)& 9 Channels (IEEE802.11(40)n) | |
| **Modulation** | CCK,OFDM,BPSK,GPSK,16-QAM,64-QAM | |
| **Adaptive / non-adaptive equipment** | Adaptive Equipment | |
| **Antenna Type** | PIFA antenna | |
| **Antenna Gain** | 2.1dBi | |
| **Power Supply** | Normal Voltage: DC 3.8V | |
| **Channels Frequency** | 01: 2412MHZ<br>02: 2417MHZ<br>03: 2422MHZ<br>04: 2427MHZ<br>05: 2432MHZ<br>06: 2437MHZ<br>07: 2442MHZ | 08: 2447MHZ<br>09: 2452MHZ<br>10: 2457MHZ<br>11: 2462MHZ<br>12: 2467MHZ<br>13: 2472MHZ |

**Note:**

1. For 802.11b, 802.11g, 802.11n 20MHZ bandwidth system use Channel 1 to Channel 13.
2. For 802.11n 40MHZ bandwidth system use Channel 3 to Channel 11.
3. Please refer to the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

## 2.2. OBJECTIVE

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the RED Directive (2014/53/EU) for the WLAN of the EUT.

## 2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 300 328 V2.1.1

| | |
|---|---|
| **ETSI EN 300 328 V2.1.1 (2016-11)** | Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU |

## 2.4. TEST ITEMS AND THE RESULTS

| No. | Basic Standard | Test Type | Result |
|---|---|---|---|
| 1 | ETSI EN 300 328 4.3.2.2 | RF Output Power | Pass |
| 2 | ETSI EN 300 328 4.3.2.3 | Power Spectral Density | Pass |
| 3 | ETSI EN 300 328 4.3.2.4 | Duty Cycle, Tx-sequence, Tx-gap | N/A |
| 4 | ETSI EN 300 328 4.3.2.5 | Medium Utilisation(MU) factor | N/A |
| 5 | ETSI EN 300 328 4.3.2.6 | Adaptivity | Pass |
| 6 | ETSI EN 300 328 4.3.2.7 | Occupied Channel Bandwidth | Pass |
| 7 | ETSI EN 300 328 4.3.2.8 | Transmitter unwanted emissions in the out-of-band domain | Pass |
| 8 | ETSI EN 300 328 4.3.2.9 | Transmitter unwanted emissions in the spurious domain | Pass |
| 9 | ETSI EN 300 328 4.3.2.10 | Receiver spurious emissions | Pass |
| 10 | ETSI EN 300 328 4.3.2.11 | Receiver Blocking | Pass |

**Note:**

1. N/A- Not Applicable.
2. The latest versions of basic standards are applied.

## 2.5. ENVIRONMENTAL CONDITIONS

- Temperature: -20-55ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

## 3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Radio Frequency, Uc=±1 x 10-7
- Uncertainty of total RF power, conducted, Uc = ±0.8dB
- Uncertainty of RF power density, conducted, Uc = ±2.6dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of spurious emissions, radiated, Uc = ±5.4dB
- Uncertainty of Temperature: ±0.5˚C
- Uncertainty of Humidity: ±1 %
- Uncertainty of DC and low frequency voltages: ±2%

## 4. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

| | |
|---|---|
| Company Name: | Attestation of Global Compliance (Shenzhen) Co., Ltd. |
| Address | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao 'an District, Shenzhen, Guangdong, China |

**List of Equipments Used**

| Description | Manufacturer | Model No. | Calibration Date | Calibration Due. |
|---|---|---|---|---|
| SIGNAL ANALYZER | Agilent | N9020A | Sep. 20, 2018 | Sep. 19, 2019 |
| SIGNAL GENERATOR | Agilent | N5182A | Sep. 20, 2018 | Sep. 19, 2019 |
| SIGNAL GENERATOR | Agilent | E8257D | Sep. 20, 2018 | Sep. 19, 2019 |
| USB Wideband Power Sensor | Agilent | U2021XA | Sep. 20, 2018 | Sep. 19, 2019 |
| USB Wideband Power Sensor | Agilent | U2021XA | Sep. 20, 2018 | Sep. 19, 2019 |
| USB Wideband Power Sensor | Agilent | U2021XA | Sep. 20, 2018 | Sep. 19, 2019 |
| USB Wideband Power Sensor | Agilent | U2021XA | Sep. 20, 2018 | Sep. 19, 2019 |
| USB Simultaneous Sampling Multifunction DAQ | Agilent | U2531A | Sep. 20, 2018 | Sep. 19, 2019 |
| 2.4 GHz Filter | Micro-Tronics | BRM50702 | Feb. 27, 2019 | Feb. 26, 2020 |
| VECTOR ANALYZER | Agilent | E4440A | Jun. 12,2018 | Jun. 11,2019 |
| Trilog-Broadband Antenna | SCHWARZBEK | VULB 9168 | Mar. 01, 2018 | Feb. 28, 2020 |
| Trilog-Broadband Antenna | SCHWARZBEK | VULB 9168 | Mar. 01, 2018 | Feb. 28, 2020 |
| Amplifier | EM | EM30180 | Feb. 27, 2019 | Feb. 26, 2020 |
| ANTENNA | A.H. | SAS-521-4 | Mar. 01, 2018 | Feb. 28, 2020 |
| ANTENNA | Schwarzbeck | 9168 | Mar. 01, 2018 | Feb. 28, 2020 |
| HORN ANTENNA | E.M. | EM-AH-10180 | Mar. 01, 2018 | Feb. 28, 2020 |
| HORN ANTENNA | ETS | 3117 | Mar. 01, 2018 | Feb. 28, 2020 |
| Horn Ant (18G-40GHz) | Schwarzbeck | BBHA 9170 | Mar. 01, 2018 | Feb. 28, 2020 |

| | | | | |
|---|---|---|---|---|
| Horn Ant (18G-40GHz) | ETS | QWH_SL_18_40_K_SG | Mar. 01, 2018 | Feb. 28, 2020 |
| UNIVERSAL RADIO CO MMUNICAION TESTER | R&S | CMW500 | July 13, 2018 | July 12, 2019 |
| Adjustable attenuator | warison | WATT-6SR1211(1dB, 10dB) | June 12, 2018 | June 11, 2019 |
| Attenuator | Weinachel Corp | 58-30-33(30dB) | June 12, 2018 | June 11, 2019 |
| Power divider | Mini-Circults | SF781901412 | July 13, 2018 | July 12, 2019 |
| Directional Coupler | Werlatone | C5571-10 | June 12, 2018 | June 11, 2019 |

# 5. ETSI EN 300 328 REQUIREMENTS

## 5.1. RF OUTPUT POWER

### 5.1.1 LIMIT

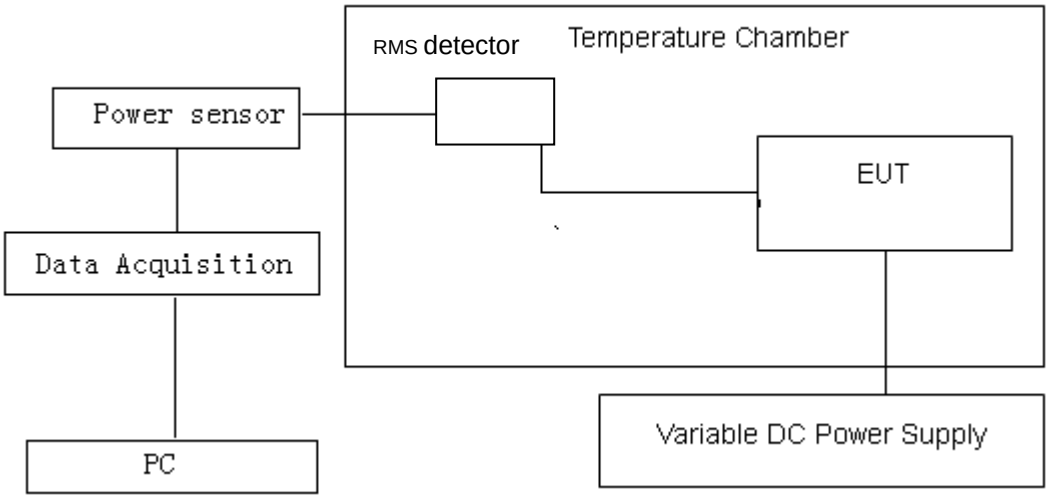
RF Output Power <= 100mW (20dBm) over Normal and Extreme conditions.

### 5.1.2 MEASUREMENT PROCEDURE

1) Use a fast power sensor and set the samples speed 1MS/s or faster.
2) Connect one power sensor to each transmit port, Trigger the power sensors so that they start sampling at the same time. For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.
3) Find the start and stop times of each burst in the stored measurement samples.
4) Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.
5) The highest of all Pburst values (Value “A” in dBm) will be used for maximum e.i.r.p calculations.
6) The cable loss and attenuator factor shall be considered to the value “A”.
6) Add the (stated) antenna assembly gain “G” in dBi of the individual antenna. If applicable, add the additional beamforming gain “Y” in dB.
7) The RF output power (P) shall be calculated using the formula: P=A+G+Y

### 5.1.3 TEST CONFIGURATION

**Temperature and Voltage Measurement (under normal and extreme test conditions)**



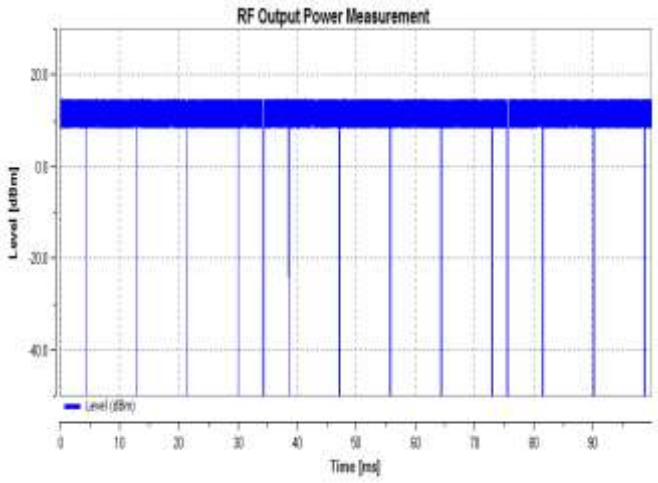
### 5.1.4 MEASUREMENT RESULTS

| | | | |
|---|---|---|---|
| **Operation Mode** | Single TX | **Test Date** | Mar. 19, 2019 |
| **Temperature** | 23.3°C | **Tested by** | Jeast |
| **Humidity** | 54.3 % RH | **Polarity** | -- |
| **Antenna assembly Gain** | | =2.1dBi | |
| **Cable Loss** | | =1.0dB | |
| **Beamforming gain** | | =0dB | |
| **EIRP** | | = P+ Gain+Y | |

| TEST CONDITIONS | | IEEE 802.11b TRANSMITTER POWER (dBm) | | |
|---|---|---|---|---|
| | | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | VOL / POWER | DC 3.8V | DC 3.8V | DC 3.8V |
| CH 01 | EIRP | 13.42 | 13.37 | 13.24 |
| CH 07 | EIRP | **13.68** | 13.48 | 13.42 |
| CH 13 | EIRP | 13.02 | 13.25 | 13.12 |
| Limit | | 20dBm | | |
| Measurement uncertainty | | + 0.28dB / - 0.30dB | | |
| Note | | Only the worst case data is reported as below. | | |

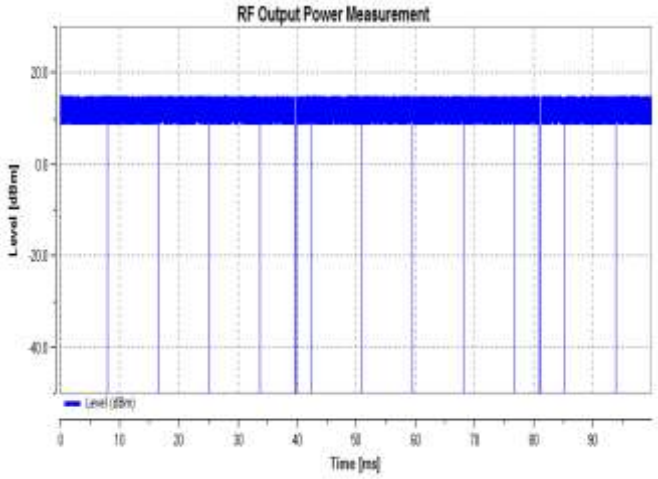
## 1*802.11 b:CH Low-2412: ( Temp - Normal )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Low-2412 | Normal | 11.32 | 13.42 |



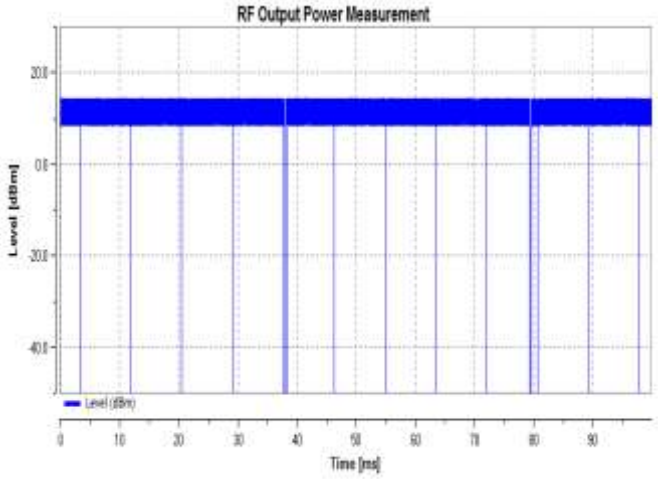
## 2*802.11 b:CH Mid-2442: ( Temp - Normal )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Mid-2442 | Normal | 11.58 | 13.68 |




## 3*802.11 b:CH High-2472: ( Temp –Low )

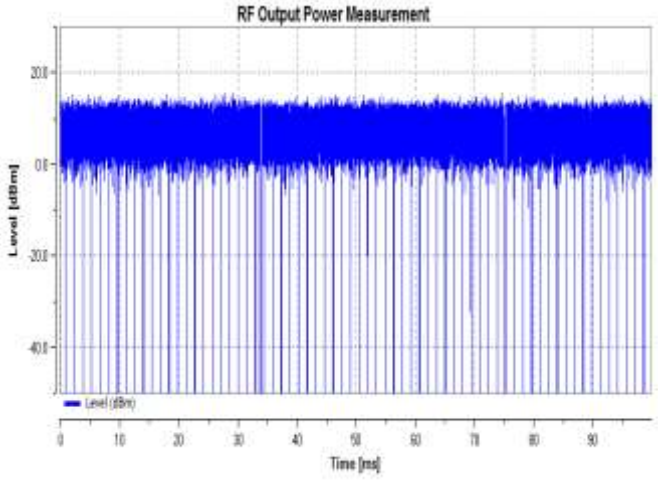
| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH High-2472 | High | 11.15 | 13.25 |



| TEST CONDITIONS | | IEEE 802.11g TRANSMITTER POWER (dBm) | | |
|---|---|---|---|---|
| | | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | VOL / POWER | DC 3.8V | DC 3.8V | DC 3.8V |
| CH 01 | EIRP | 9.13 | 9.27 | 9.01 |
| CH 07 | EIRP | **9.92** | 9.80 | 9.74 |
| CH 13 | EIRP | 9.30 | 9.18 | 9.12 |
| Limit | | 20dBm | | |
| Measurement uncertainty | | + 0.28dB / - 0.30dB | | |
| Note | | Only the worst case data is reported as below. | | |

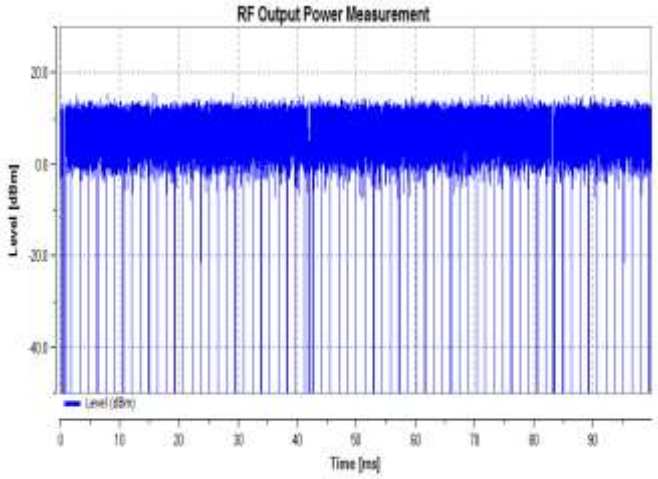
## 4*802.11 g:CH Low-2412: ( Temp - Low )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Low-2412 | Normal | 7.17 | 9.27 |



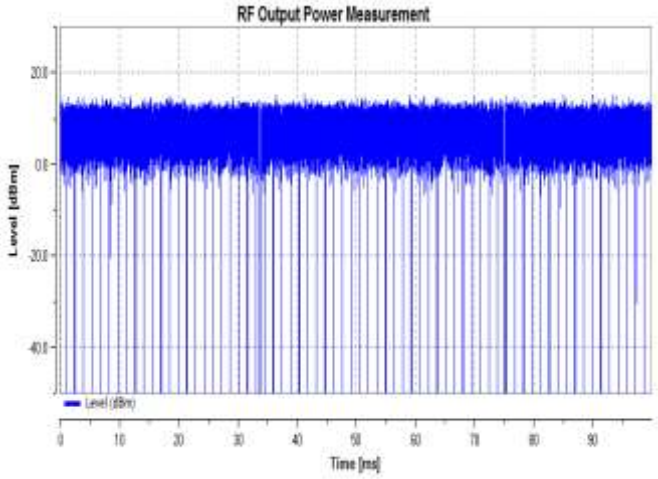
## 5*802.11 g:CH Mid-2442: ( Temp - Normal )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Mid-2442 | Normal | 7.82 | 9.92 |




## 6*802.11 g:CH High-2472: ( Temp - Normal )

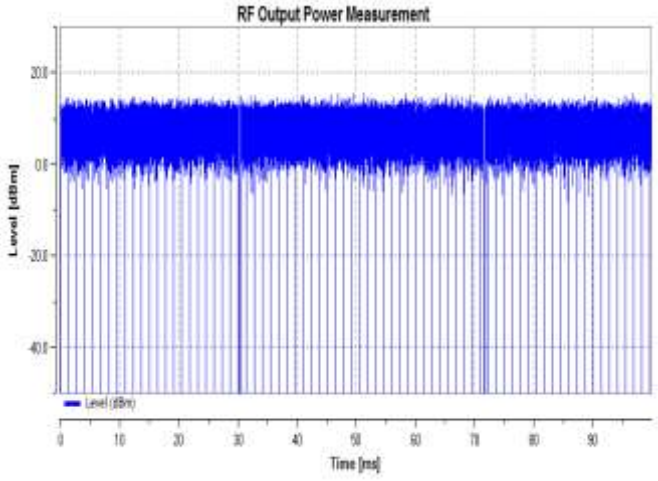
| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH High-2472 | Normal | 7.2 | 9.3 |



| TEST CONDITIONS | | IEEE 802.11n(20) TRANSMITTER POWER (dBm) | | |
|---|---|---|---|---|
| | | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | VOL / POWER | DC 3.8V | DC 3.8V | DC 3.8V |
| CH 01 | EIRP | **9.41** | 9.13 | 9.13 |
| CH 07 | EIRP | 8.95 | 9.00 | 9.15 |
| CH 13 | EIRP | 9.28 | 9.04 | 9.20 |
| Limit | | 20dBm | | |
| Measurement uncertainty | | + 0.28dB / - 0.30dB | | |
| Note | | Only the worst case data is reported as below. | | |

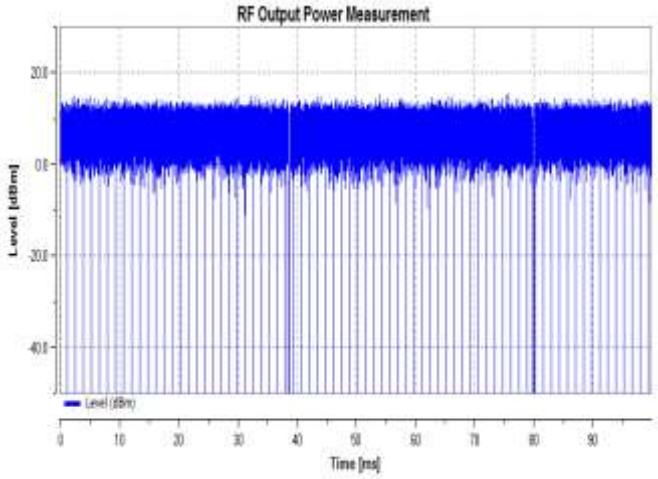
## 7*802.11 n20:CH Low-2412: ( Temp - Normal )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Low-2412 | Normal | 7.31 | 9.41 |



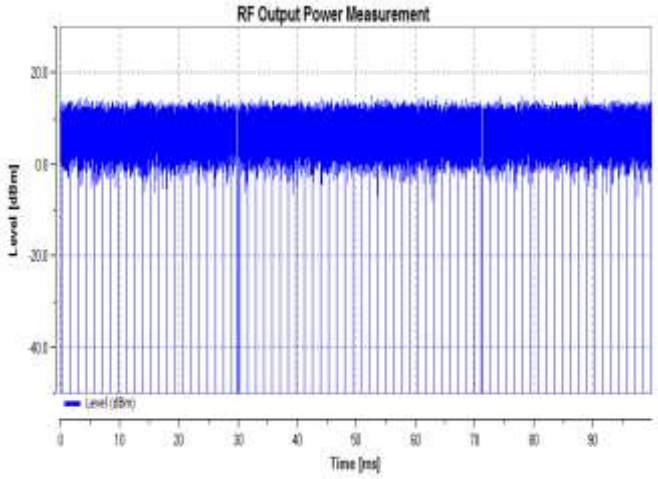
## 8*802.11 n20:CH Mid-2442: ( Temp - High )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Mid-2442 | Normal | 7.05 | 9.15 |




## 9*802.11 n20:CH High-2472: ( Temp - Normal )

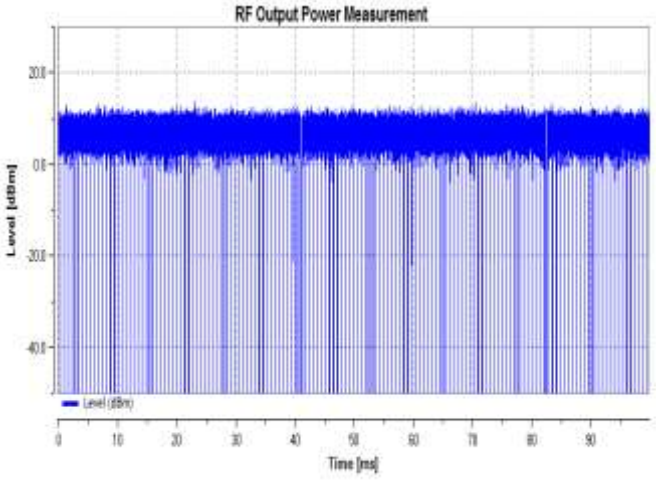
| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH High-2472 | Normal | 7.18 | 9.28 |



| TEST CONDITIONS | | IEEE 802.11n(40) TRANSMITTER POWER (dBm) | | |
|---|---|---|---|---|
| | | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | VOL / POWER | DC 3.8V | DC 3.8V | DC 3.8V |
| CH 03 | EIRP | 8.64 | 8.67 | 8.48 |
| CH 07 | EIRP | **9.09** | 8.79 | 9.02 |
| CH 11 | EIRP | 8.99 | 8.87 | 8.77 |
| Limit | | 20dBm | | |
| Measurement uncertainty | | + 0.28dB / - 0.30dB | | |
| Note | | Only the worst case data is reported as below. | | |

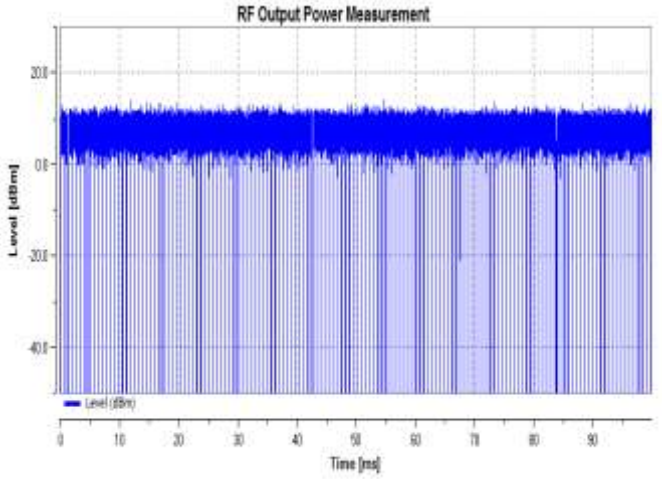
## 10*802.11 n40:CH Low-2422: ( Temp - Low )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Low-2422 | Normal | 6.57 | 8.67 |



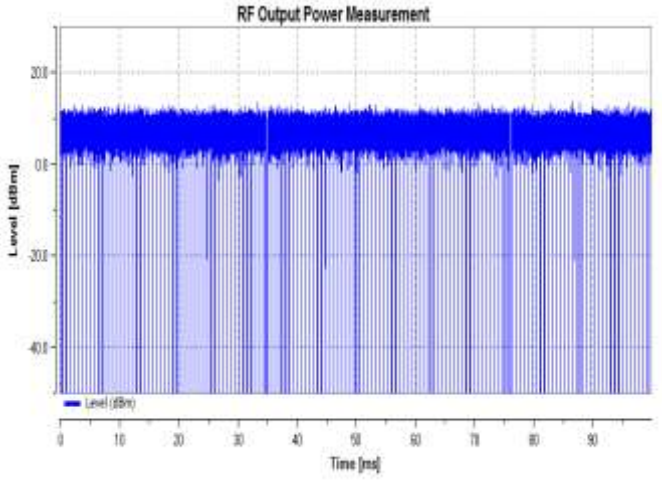
## 11*802.11 n40:CH Mid-2442: ( Temp - Normal )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH Mid-2442 | Normal | 6.99 | 9.09 |




## 12*802.11 n40:CH High-2462: ( Temp - Normal )

| Channel | Voltage | Conducted Power (dBm) | EIRP (dBm) |
|---|---|---|---|
| CH High-2462 | Normal | 6.89 | 8.99 |




**Conclusion: PASS**

## 5.2. POWER SPECTRAL DENSITY

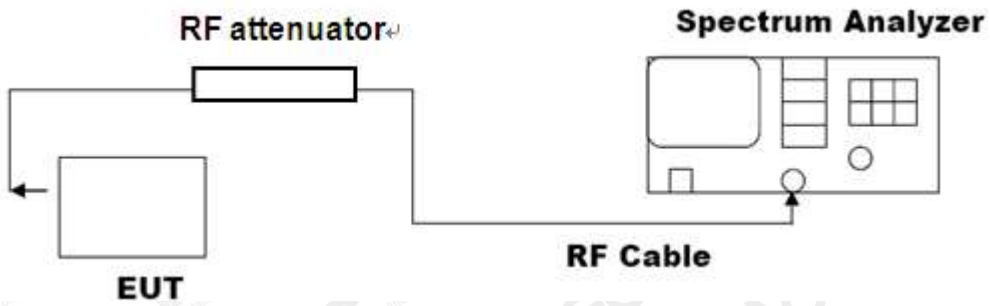
### 5.2.1 LIMIT

For non-adaptive equipment using wide band modulations other than FHSS, The maximum Power spectral density is limited to 10dBm Per MHz

### 5.2.2 TEST PROCEDURE

1) Set the frequency from 2400MHz to 2483.5MHz, use 10kHz RBW and 30kHz VBW for pre-scan. The number of sweep points shall be more than 8350. Wait for the trace to be completed and save the (trace) data set to a file.
2) Add up the values for amplitude (power) for all the samples in the file.
3) Normalize the individual values for amplitude so that the sum is equal to the RF Output Power(e.i.r.p) measured in 5.1.
4)Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p) for the first 1MHz segment which shall be recorded.
5) Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 4(i.e. sample #2 to #101).
6) Repeat step 5 until the end of the data set and record the radiated power spectral Density values for each of the 1MHz segments.
7) The cable loss and attenuator factor shall be considered to the test result.
8) The highest value shall be recorded in the test report.

### 5.2.3 TEST CONFIGURATION



**TEST PROCEDURE**

1. Please refer to ETSI EN 300 328 (V2.1.1) clause 5.4.3.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.1.1) clause 5.4.3.2 for the measurement method.
3 The equipment setting as following

Start Frequency: 2 400 MHz

- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: >8350

Detector: RMS

- Trace Mode: Max Hold
- Sweep time: 10s

**5.2.4 TEST RESULTS**

| IEEE 802.11b Power Spectral Density | | | |
|---|---|---|---|
| **Channel Tested** | **Power Density (dBm/MHz)** | **Test Limit (dBm/MHz)** | **Pass / Fail** |
| CH 01 | 4.90 | 10 | Pass |
| CH 07 | 4.23 | 10 | Pass |
| CH 13 | 3.60 | 10 | Pass |

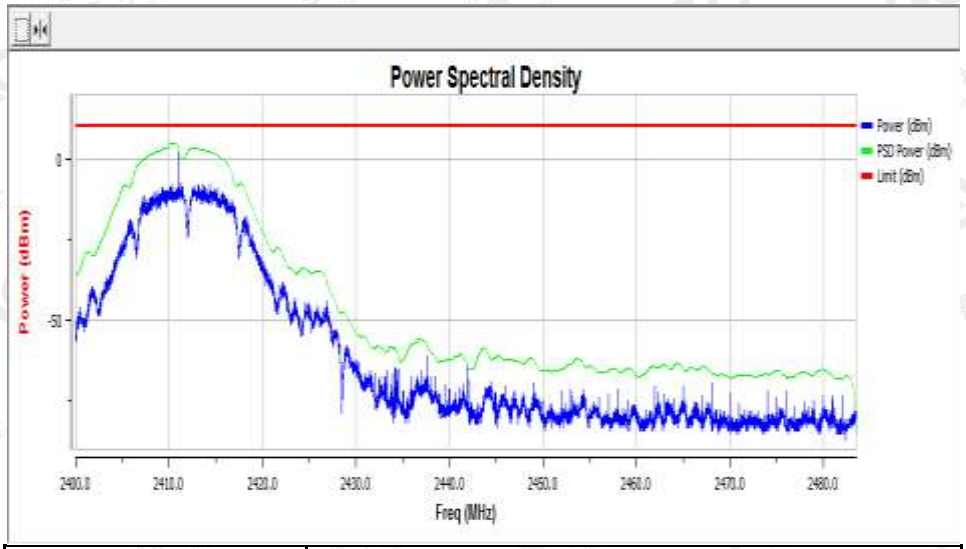
| IEEE 802.11g Power Spectral Density | | | |
|---|---|---|---|
| **Channel Tested** | **Power Density (dBm/MHz)** | **Test Limit (dBm/MHz)** | **Pass / Fail** |
| CH 01 | -2.14 | 10 | Pass |
| CH 07 | -1.70 | 10 | Pass |
| CH 13 | -2.04 | 10 | Pass |

| IEEE 802.11n(20) Power Spectral Density | | | |
|---|---|---|---|
| **Channel Tested** | **Power Density (dBm/MHz)** | **Test Limit (dBm/MHz)** | **Pass / Fail** |
| CH 01 | -2.33 | 10 | Pass |
| CH 07 | -2.30 | 10 | Pass |
| CH 13 | -2.28 | 10 | Pass |

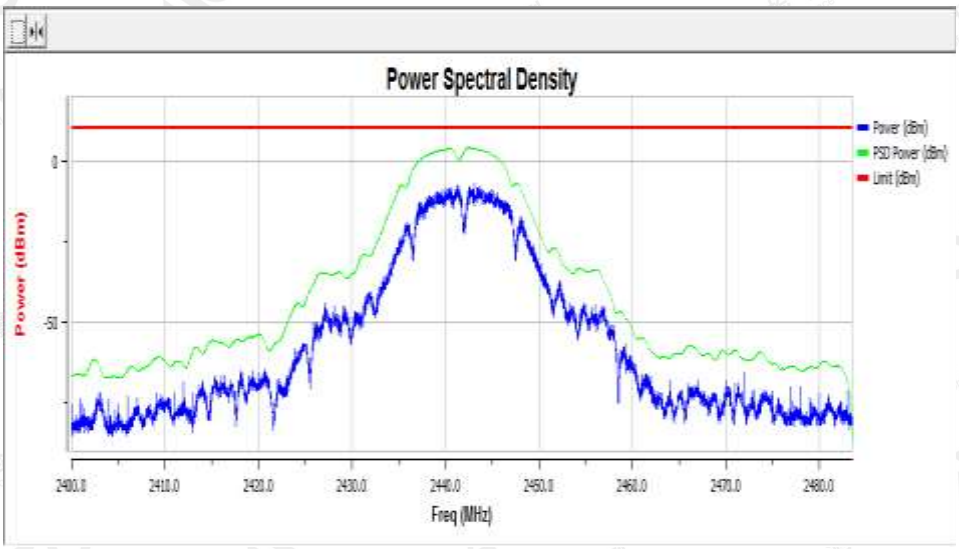
| IEEE 802.11n(40) Power Spectral Density | | | |
|---|---|---|---|
| Channel Tested | Power Density (dBm/MHz) | Test Limit (dBm/MHz) | Pass / Fail |
| CH 03 | -6.63 | 10 | Pass |
| CH 07 | -5.98 | 10 | Pass |
| CH 11 | -6.02 | 10 | Pass |

## 2.1 Test Detial - Power Spectral Density

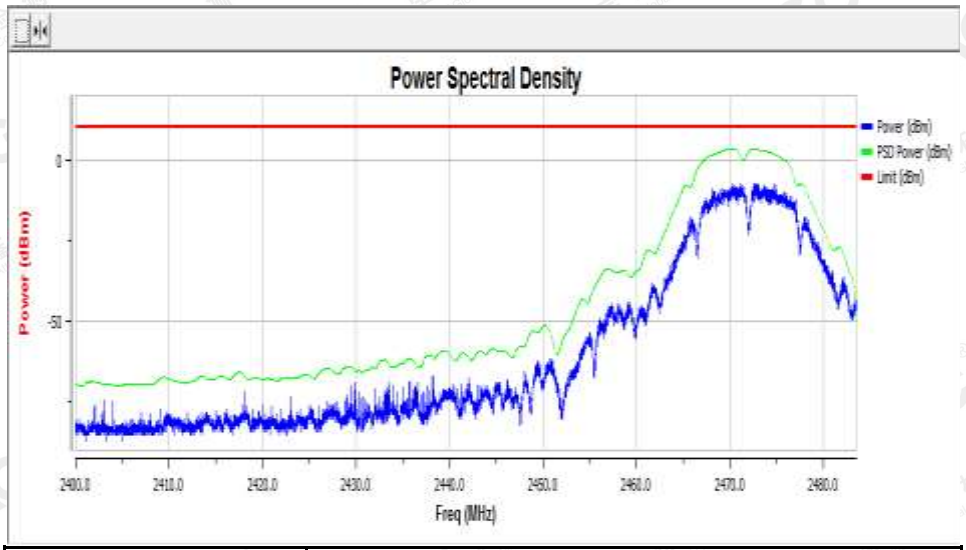
| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Low-2412 | 4.90 |



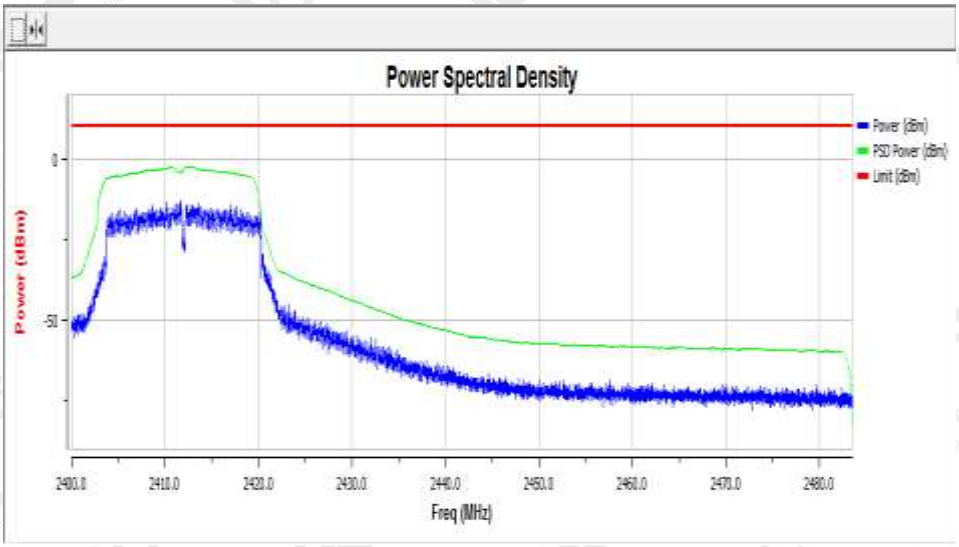

| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Mid-2442 | 4.23 |



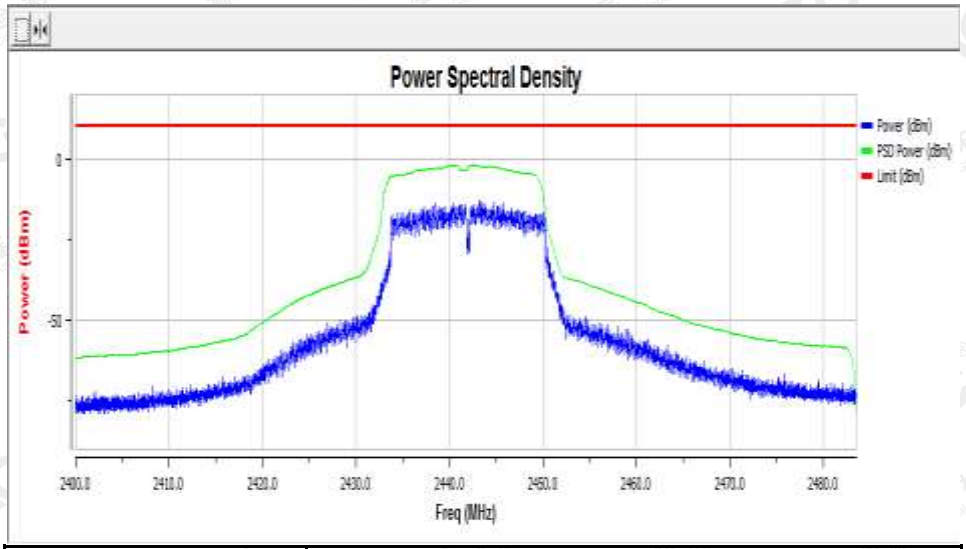
| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH High-2472 | 3.60 |



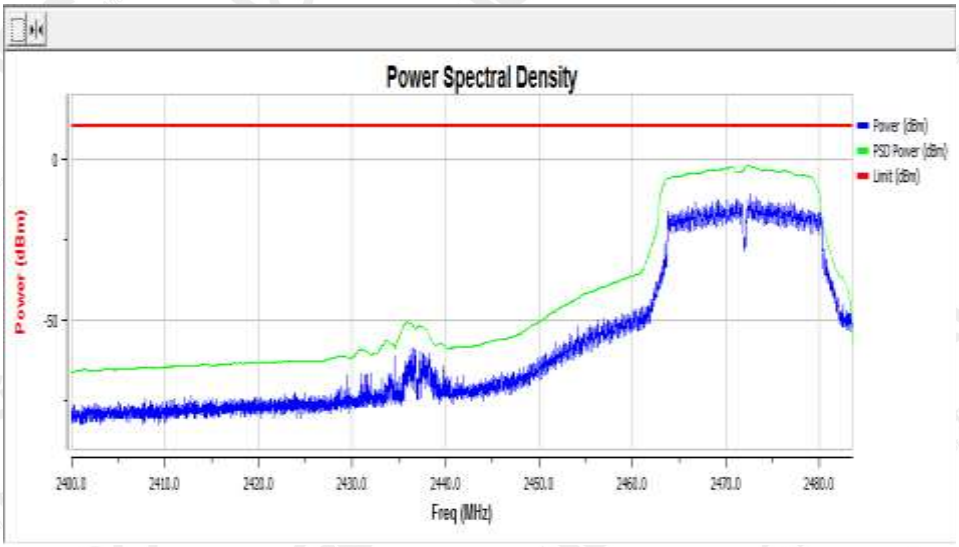

| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Low-2412 | -2.14 |



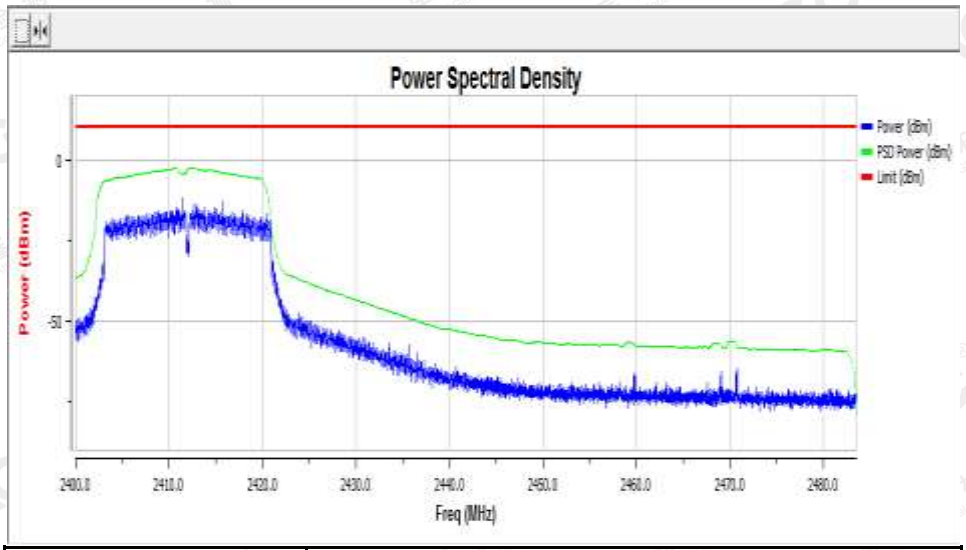
| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Mid-2442 | -1.70 |



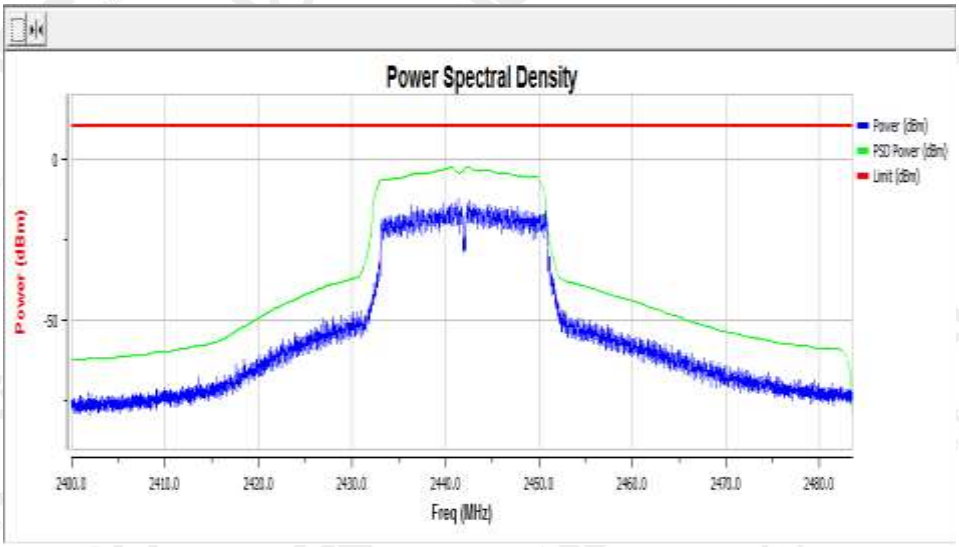

| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH High-2472 | -2.04 |



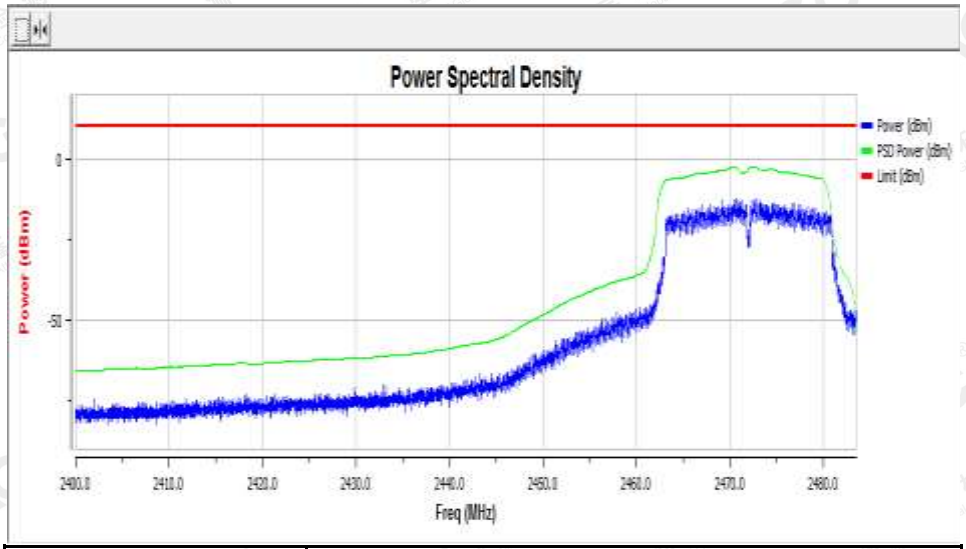
| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Low-2412 | -2.33 |



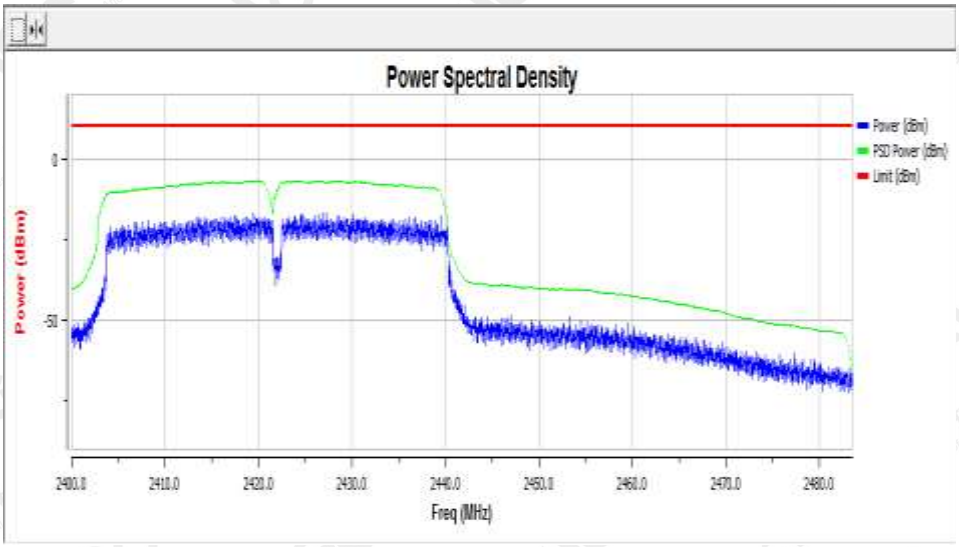

| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Mid-2442 | -2.30 |



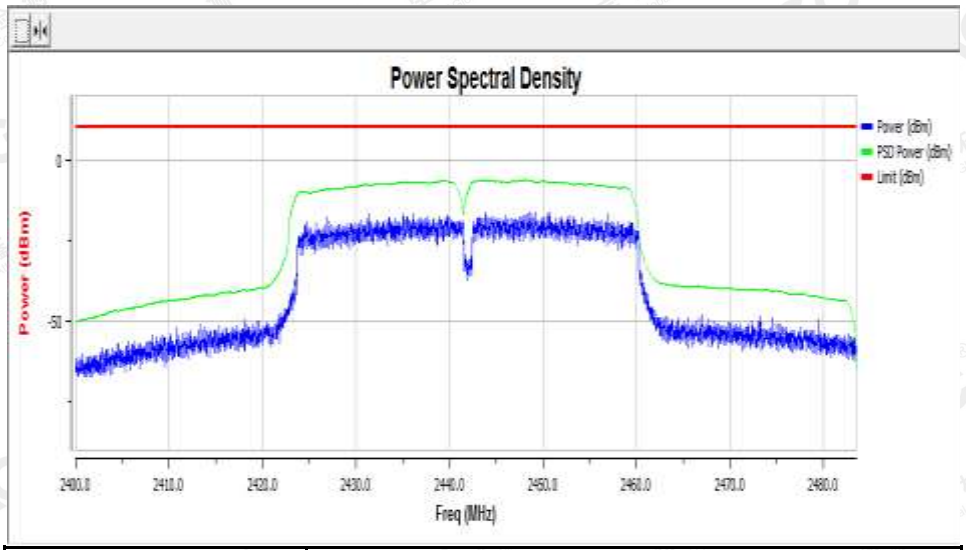
| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH High-2472 | -2.28 |



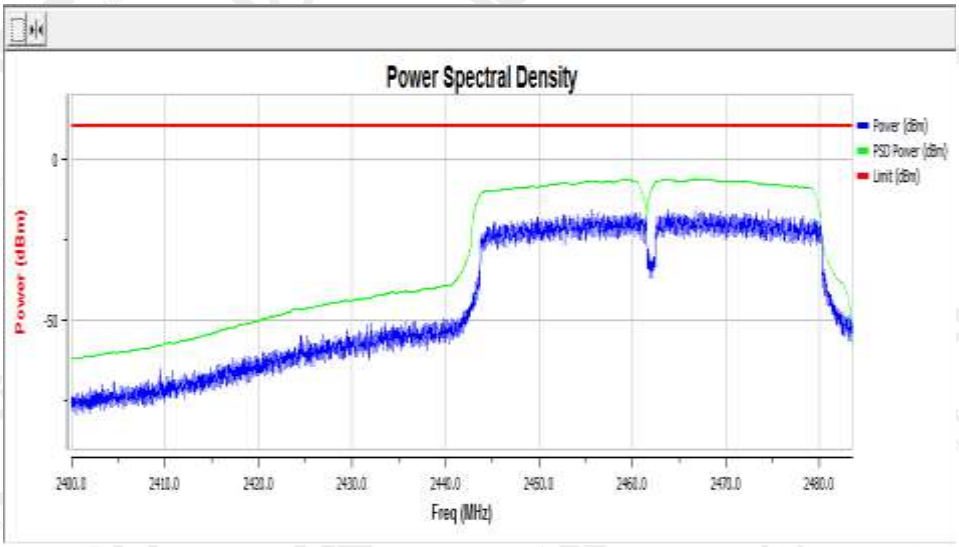

| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Low-2422 | -6.63 |



| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH Mid-2442 | -5.98 |




| Channel | Max Power Spectral Density Level (dBm) |
|---|---|
| CH High-2462 | -6.02 |



## 5.3. ADAPTIVITY AND RECEIVER BLOCKING

The method of adaptivity is using LBT based DAA

### 5.3.1 LIMIT

The Channel Occupancy Time shall be less than 13ms (the value of q equal to 32 which declared by manufacturer).

If implemented, Short Control Signalling Transmissions of adaptive equipment using wide band modulations other than FHSS shall have a maximum duty cycle of 10 % within an observation period of 50 ms.

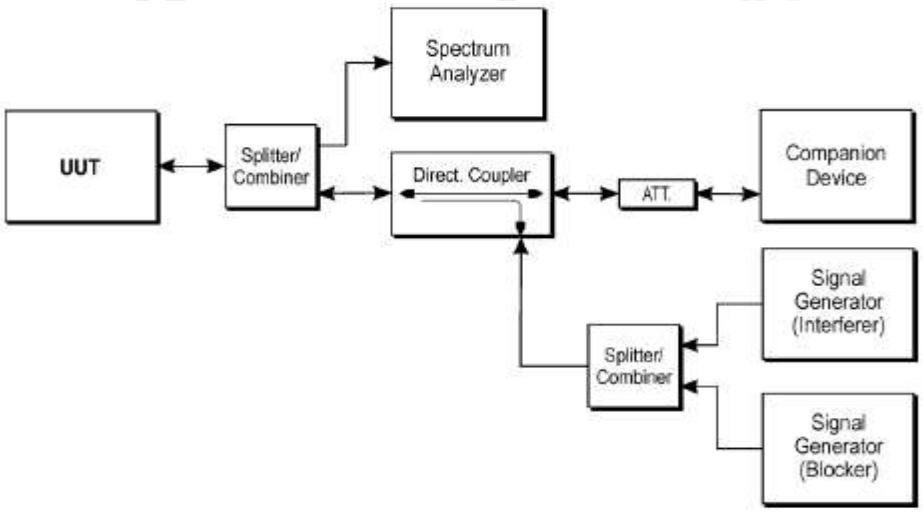
**Table 2: Unwanted Signal parameters**

| Wanted signal meanpower from companiondevice | Unwantedsignal frequency (MHz) | Unwanted CWsignal power(dBm) |
|---|---|---|
| sufficient to maintain thelink (see note2) | 2 395 or 2488,5 (see note1) | -35 (see note3) |
| NOTE 1: The highest frequency shall be used for testing operatingchannels within the range 2 400 MHz to 2 442 MHz, while thelowest frequency shall be used for testing operating channels withinthe range 2 442 MHz to 2 483,5 MHz. See clause5.4.6.1.<br>NOTE 2: A typical value which can be used in most cases is -50dBm/MHz.<br>NOTE 3:The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected bythe actual antenna assembly gain. | | |

### 5.3.2 TEST PROCEDURE

1) The EuT connect to a companion device during the test. Adjust the received signal level at the EuT to the value of -50dBm/MHz.
2) the analyzer shall be set as below: RBW>=Occupied Channel Bandwidth and VBW>=3×RBW.
3) Configure the EuT for normal transmission with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested.
4) Adding the interference signal and blocking signal.
5) Record the data.

### 5.3.3 TEST CONFIGURATION

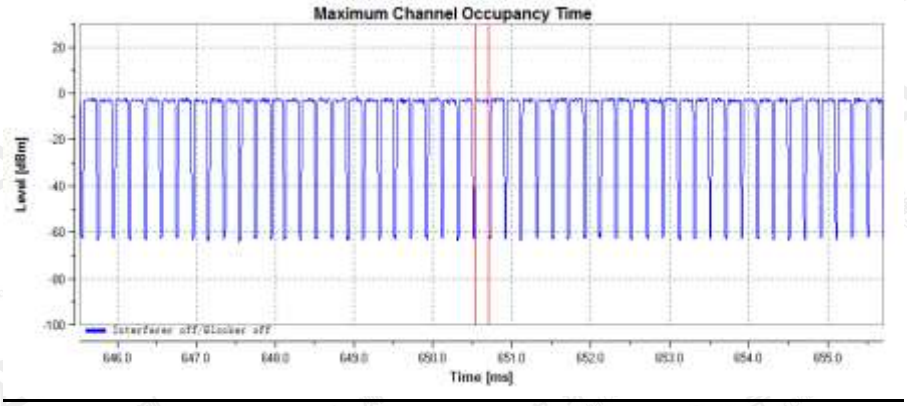


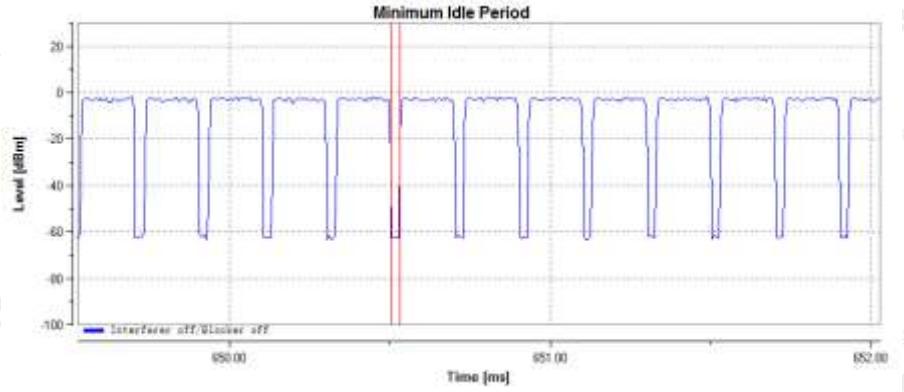
**The analyser shall be set as follows:**

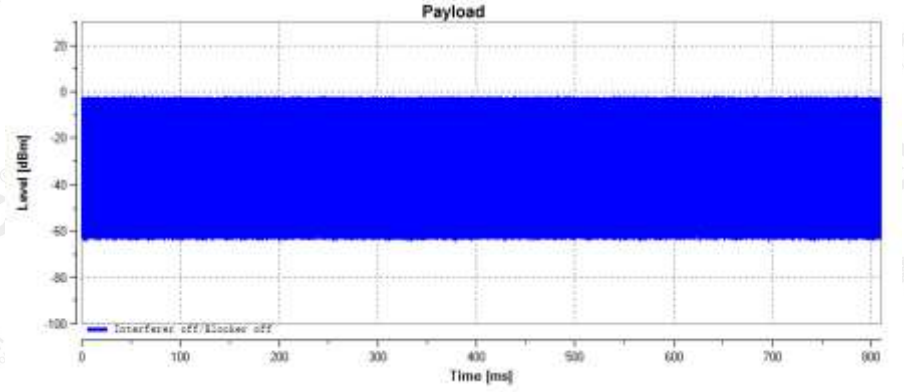
- RBW: use next available RBW setting below the measured Occupied Channel Bandwidth
- Filter type: Channel Filter
- VBW: ≥ RBW
- Detector Mode: RMS
- Centre Frequency: Equal to the hopping frequency to be tested
- Span: 0 Hz
- Sweep time: > Channel Occupancy Time of the UUT. If the Channel Occupancy Time is non-contiguous (non-LBT based equipment), the sweep time shall be sufficient to cover the period over which the Channel Occupancy Time is spread out.
- Trace Mode: Clear/Write
- Trigger Mode: Video

### 5.3.4 TEST RESULTS

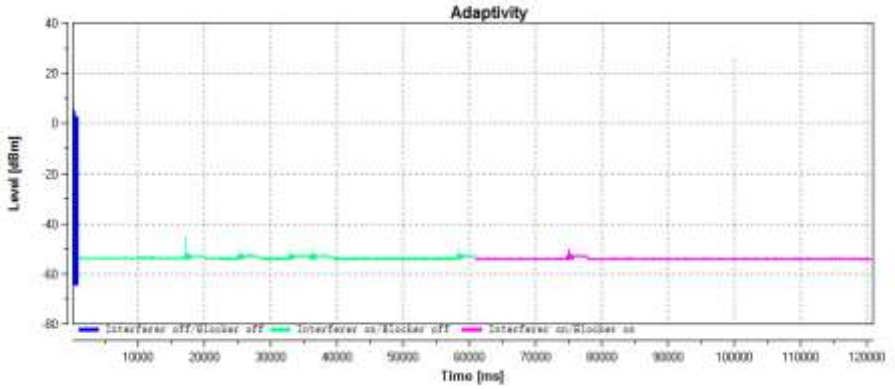
| IEEE802.11b Low Channel | |
|---|---|
| Threshold Level (dBm/MHz) | -63.42 |
| Blocking Interference Level (dBm) | -35 |
| Max COT Time (ms) | 0.537ms |
| Minimum Idle Time (ms) | 0.172ms |
| Duty Cycle (%) after adding the interference signal 50ms | 0.00 |
| Duty Cycle (%) after adding the blocking signal with the interfering signal 50ms | 0.00 |

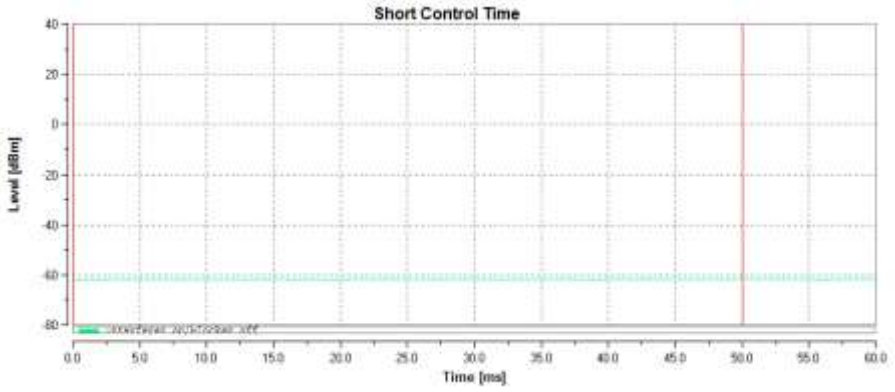


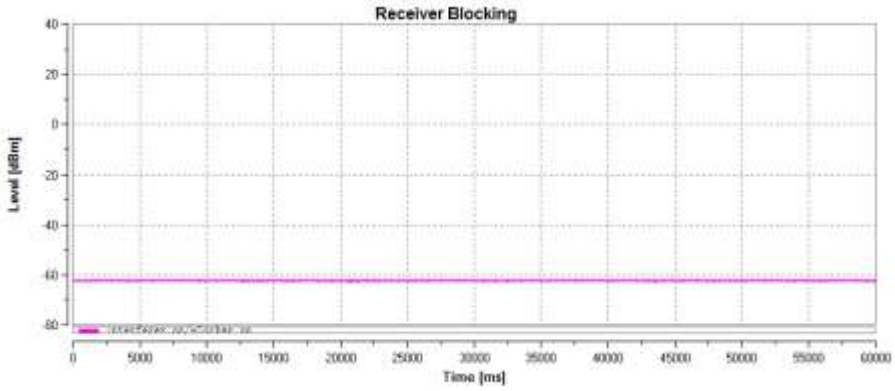



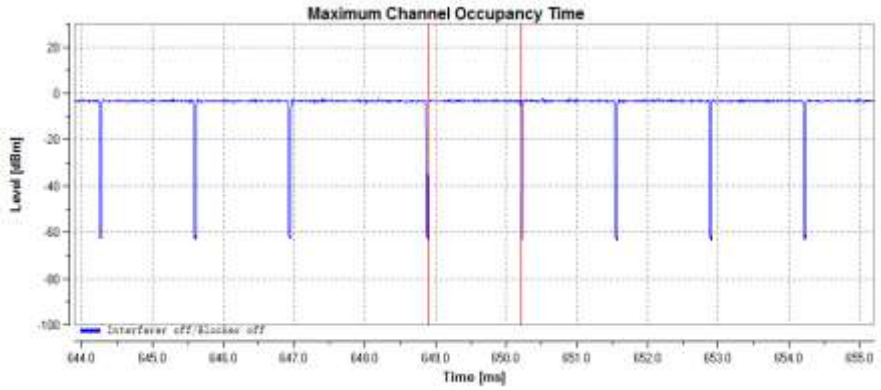
**Adding the interference signal(Green line) and the unwanted signal(Red line)**

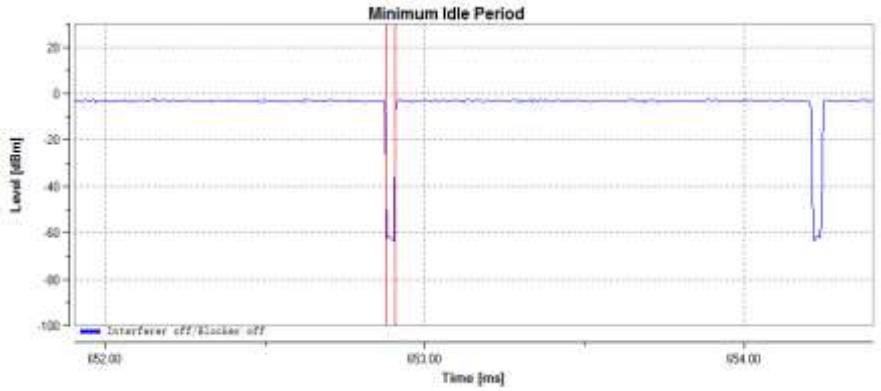


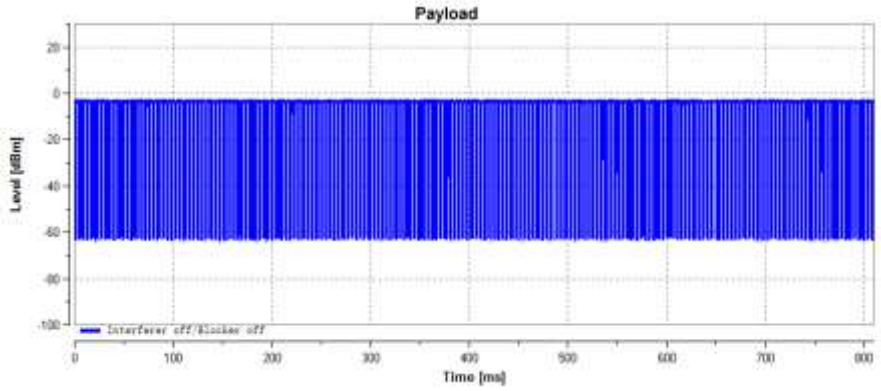



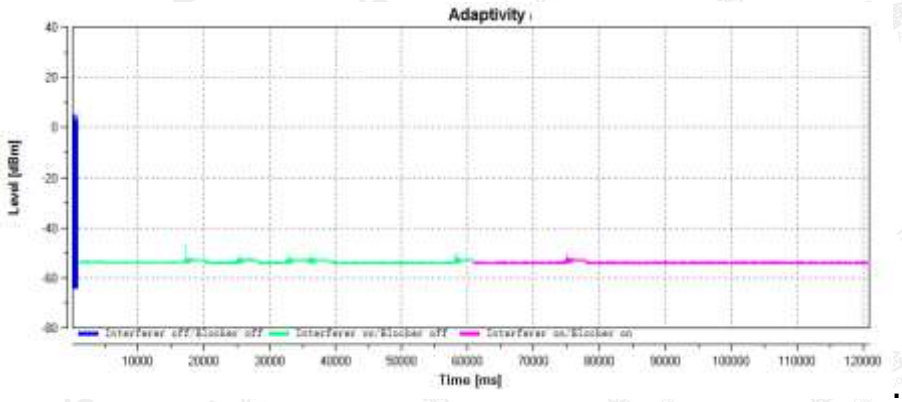
| IEEE802.11b High Channel | |
|---|---|
| Threshold Level (dBm/MHz) | -63.25 |
| Blocking Interference Level (dBm) | -35 |
| Max COT Time (ms) | 1.632ms |
| Minimum Idle Time (ms) | 0.139ms |
| Duty Cycle (%) after adding the interference signal 50ms | 0.00 |
| Duty Cycle (%) after adding the blocking signal with the interfering signal 50ms | 0.00 |

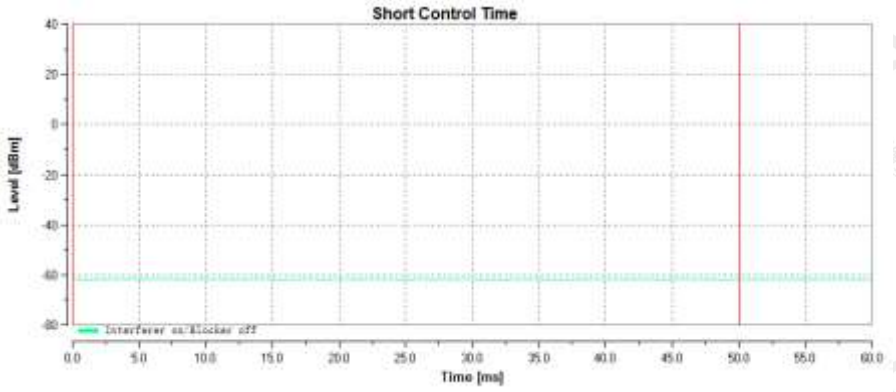


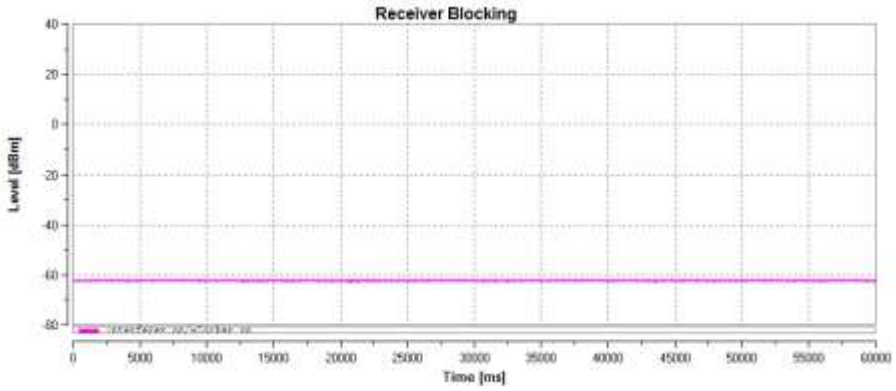



**Adding the interference signal(Green line) and the unwanted signal(Red line)**




**Note:** 1) 802.11g, 802.11n(20) , 802.11n(40)Mode output Power less than 10dBm, no need to be tested.

2)When removal of the interference and blocking signal the UUT will be transmitting again on this channel.

**Conclusion: PASS**

## 5.4. OCCUPIED CHANNEL BANDWIDTH

### 5.4.1 LIMIT

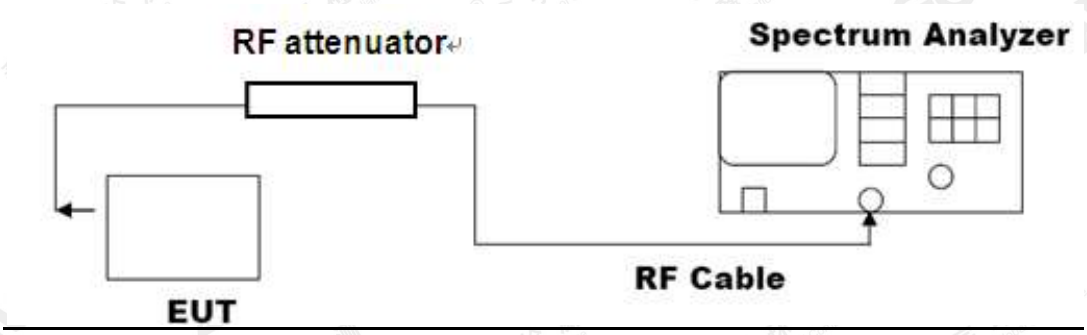
The Occupied Channel Bandwidth shall fall completely within the band 2400MHz to 2483.5MHz.

### 5.4.2 TEST PROCEDURE

The spectrum analyser shall be used the following settings:

- Centre Frequency: The centre frequency of the channel under test
- Resolution BW: ~ 1 % of the span without going below 1 %
- Video BW: 3 × RBW
- Frequency Span for frequency hopping equipment: Lowest frequency separation that is used within the hopping sequence
- Frequency Span for other types of equipment: 2 × Nominal Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep time: 1 s

### 5.4.3 TEST CONFIGURATION



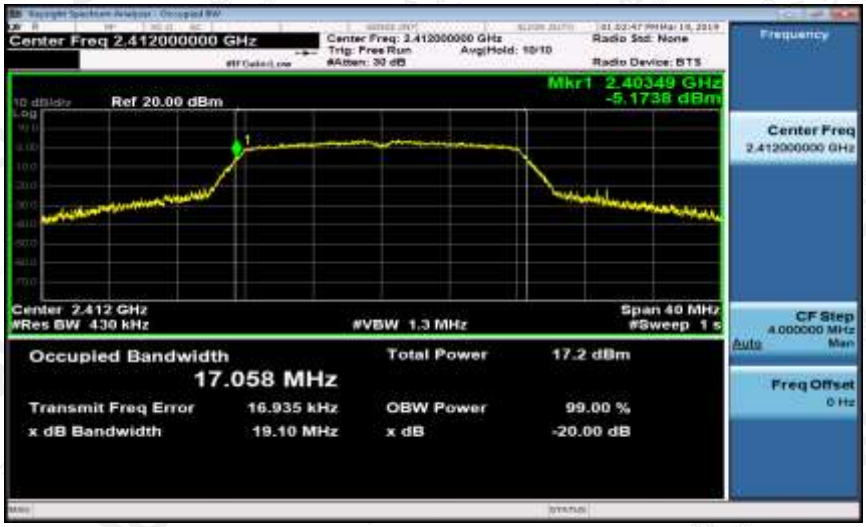
### 5.4.4 TEST RESULTS

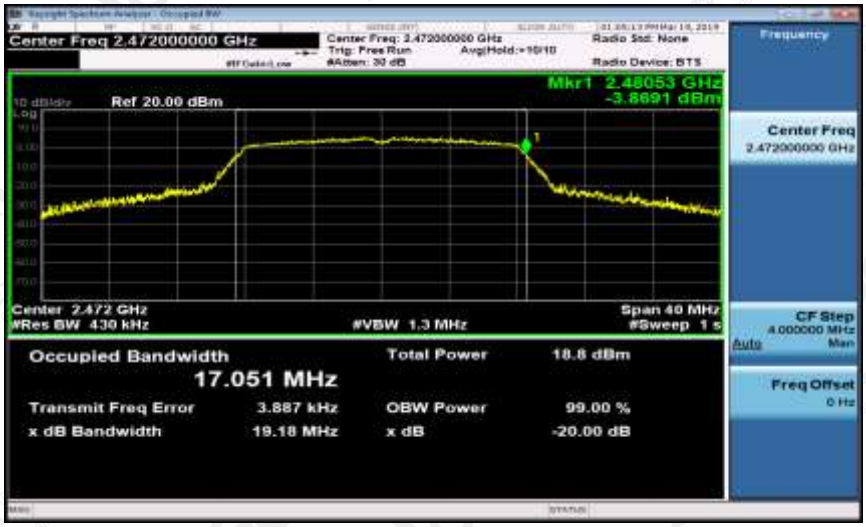
| TEST ITEM | 99% BANDWIDTH |
|---|---|
| TEST MODE | 802.11b with data rate 11 |

| LIMITS AND MEASUREMENT RESULT | | | |
|---|---|---|---|
| Applicable Limits | Applicable Limits | | |
| | Test Data (MHz) | | Criteria |
| 2400MHz-2483.5MHz | Low Channel | 13.003 | PASS |
| | High Channel | 13.099 | PASS |


| | |
|---|---|
| **TEST ITEM** | 99% BANDWIDTH |
| **TEST MODE** | 802.11g with data rate 54 |

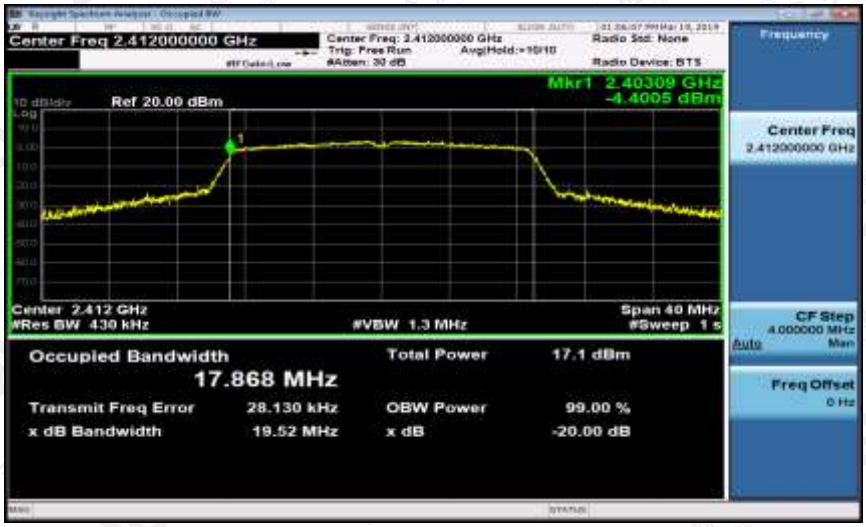
| **LIMITS AND MEASUREMENT RESULT** | | | |
|---|---|---|---|
| **Applicable Limits** | **Applicable Limits** | | |
| | **Test Data (MHz)** | | **Criteria** |
| 2400MHz-2483.5MHz | Low Channel | 17.058 | PASS |
| | High Channel | 17.051 | PASS |

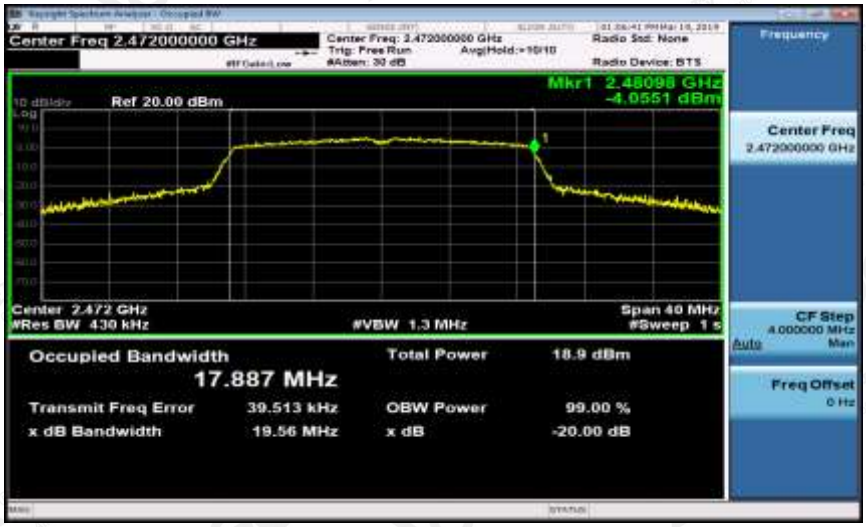


| | |
|---|---|
| **TEST ITEM** | 99% BANDWIDTH |
| **TEST MODE** | 802.11n(20) with data rate 65 |

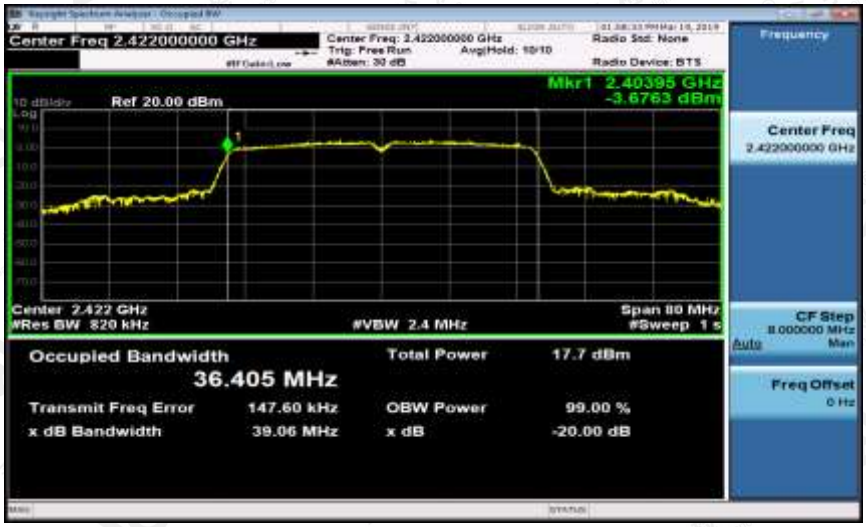
| **LIMITS AND MEASUREMENT RESULT** | | | |
|---|---|---|---|
| **Applicable Limits** | **Applicable Limits** | | |
| | **Test Data (MHz)** | | **Criteria** |
| 2400MHz-2483.5MHz | Low Channel | 17.868 | PASS |
| | High Channel | 17.887 | PASS |

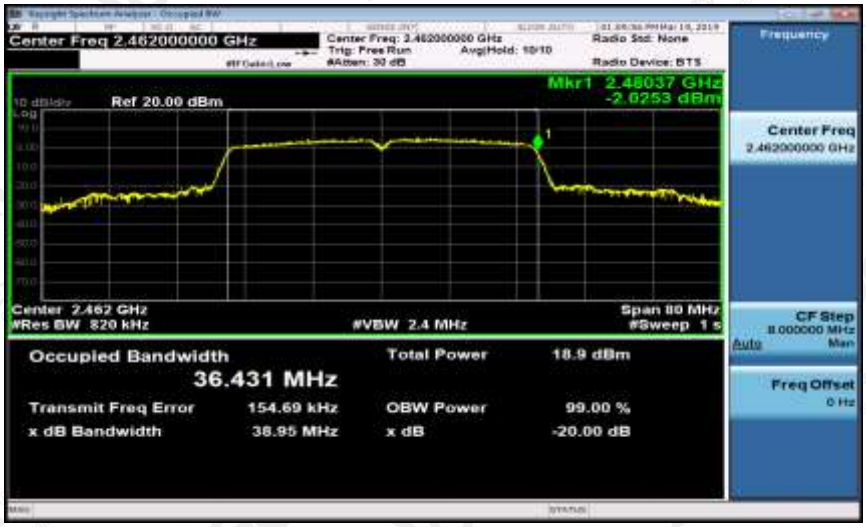


| | |
|---|---|
| **TEST ITEM** | 99% BANDWIDTH |
| **TEST MODE** | 802.11n(40) with data rate 135 |

| **LIMITS AND MEASUREMENT RESULT** | | | |
|---|---|---|---|
| **Applicable Limits** | **Applicable Limits** | | |
| | **Test Data (MHz)** | | **Criteria** |
| 2400MHz-2483.5MHz | Low Channel | 36.405 | PASS |
| | High Channel | 36.431 | PASS |



## 5.5. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

### 5.5.1 LIMIT

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask.

### 5.5.2 TEST PROCEDURE

1) The spectrum analyser shall be used the following settings:
- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Mode: Continuous
- Sweep Points: Sweep Time [s] / (1 µs) or 5 000 whichever is greater
- Trigger Mode: Video trigger
- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

2) (segment 2 483.5 MHz to 2 483.5 MHz + BW)
Adjust the trigger level to select the transmissions with the highest power level.
Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483.5 MHz to 2 483.5 MHz + BW.

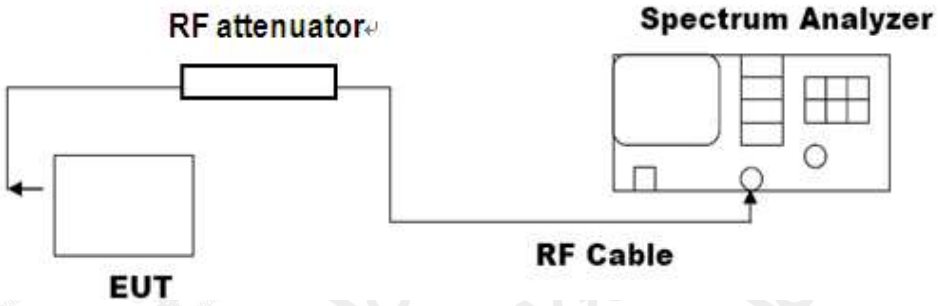
3) Segment 2 483.5 MHz + BW to 2 483.5 MHz + 2BW
Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483.5 MHz + BW to 2 483.5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW – 0.5 MHz. (which means this may partly overlap with the previous 1 MHz segment).

4) Segment 2 400 MHz - BW to 2 400 MHz
Change the centre frequency of the analyser to 2 399.5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5 MHz. (which means this may partly overlap with the previous 1 MHz segment).

5) Segment 2 400 MHz - 2BW to 2 400 MHz - BW
Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5 MHz. (which means this may partly overlap with the previous 1 MHz segment).

6) The cable loss and attenuator factor shall be considered to the test result.

### 5.5.3 TEST CONFIGURATION



### 5.5.4 TEST RESULT

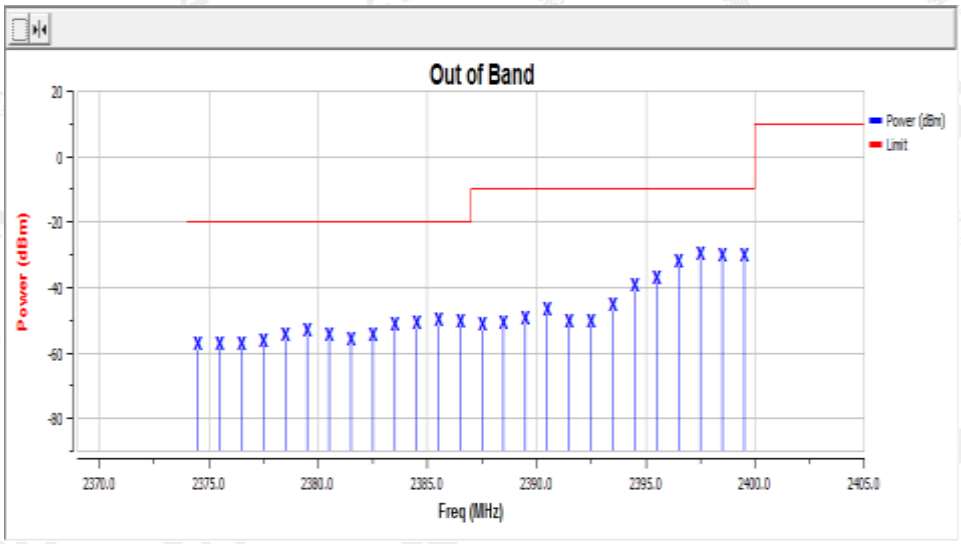
| TEST CONDITIONS | IEEE 802.11b OUT-OF-BAND DOMAIN | | |
|---|---|---|---|
| | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | DC 3.8V | DC 3.8V | DC 3.8V |
| Low channel | PASS | PASS | PASS |
| High channel | PASS | PASS | PASS |

| TEST CONDITIONS | IEEE 802.11g OUT-OF-BAND DOMAIN | | |
|---|---|---|---|
| | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | DC 3.8V | DC 3.8V | DC 3.8V |
| Low channel | PASS | PASS | PASS |
| High channel | PASS | PASS | PASS |

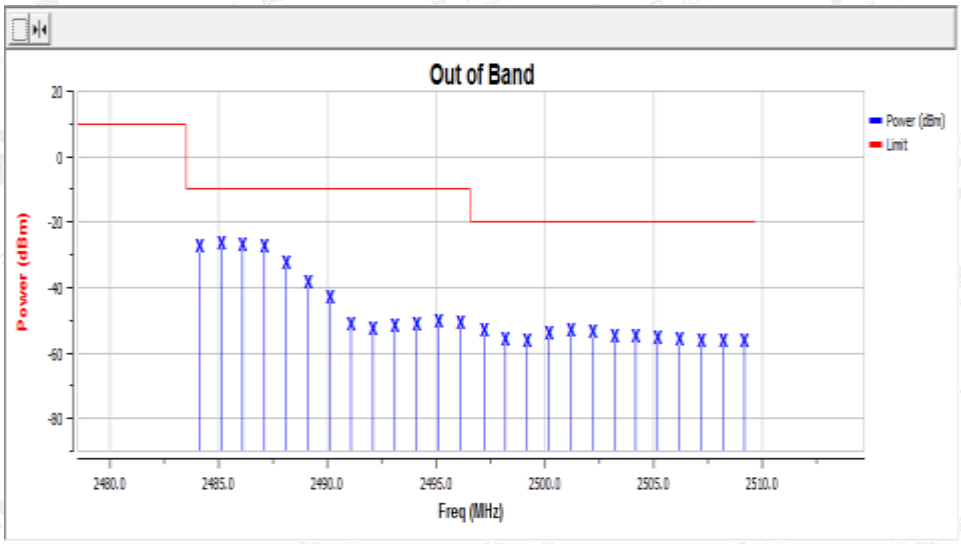
| TEST CONDITIONS | IEEE 802.11n(20) OUT-OF-BAND DOMAIN | | |
|---|---|---|---|
| | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | DC 3.8V | DC 3.8V | DC 3.8V |
| Low channel | PASS | PASS | PASS |
| High channel | PASS | PASS | PASS |

| TEST CONDITIONS | IEEE 802.11(40) OUT-OF-BAND DOMAIN | | |
|---|---|---|---|
| | Temp (25)°C | Temp (-20)°C | Temp (55)°C |
| CHANNEL | DC 3.8V | DC 3.8V | DC 3.8V |
| Low channel | PASS | PASS | PASS |
| High channel | PASS | PASS | PASS |

CH Low-2412（802.11b）




CH High-2472（802.11b）




**Note:** All the modes had been tested, but only the worst data recorded in the report.

## 5.6 TRANSMITTER SPURIOUS EMISSIONS

Spurious emissions are emissions outside the frequency range(s) of the equipment as defined

in Clause 4.3.1.10.Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain as indicated in figure 1 when the equipment is in Transmit mode.

The spurious emissions of the transmitter shall not exceed the values in tables in the indicated bands: Limit

| Frequency Range | Maximum Power e.r.p(<=1GHz)/e.i.r.p(>1GHz) | Bandwidth |
|---|---|---|
| 30MHZ to 47MHZ | -36dBm | 100kHz |
| 47MHZ to 74MHZ | -54dBm | 100kHz |
| 74MHZ to 87.5MHZ | -36dBm | 100kHz |
| 87.5MHZ to 118MHZ | -54dBm | 100kHz |
| 118MHZ to 174MHZ | -36dBm | 100kHz |
| 174 MHZ to 230MHZ | -54dBm | 100kHz |
| 230 MHZ to 470MHZ | -36dBm | 100kHz |
| 470 MHZ to 862MHZ | -54dBm | 100kHz |
| 862 MHZ to 1GHZ | -36dBm | 100kHz |
| 1 GHZ to 12.75GHZ | -30dBm | 1MHz |

Note: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

**TEST PROCEDURE**

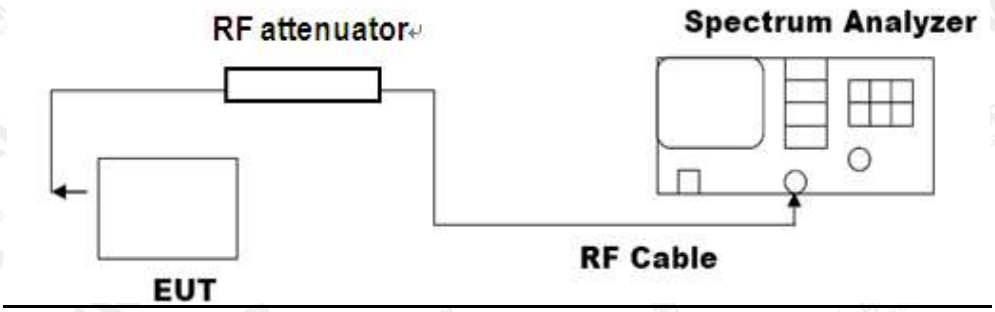
Refer to chapter 5.4.9.2 of ETSI EN 300 328 V2.1.1

**Measurement**

| Measurement | |
|---|---|
| ☒Conducted measurement | ☒Radiated measurement |

## CONDUCTED MEASUREMENT

## TEST CONFIGURATION

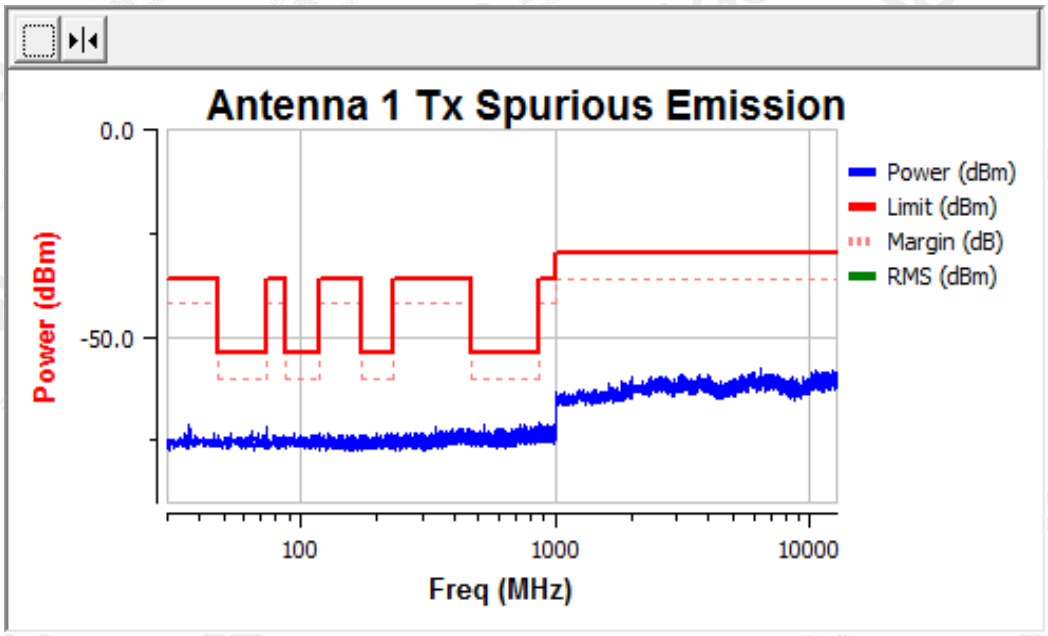


**TEST RESULT**

**(Worst Case: Low channel, 11B)**

| Channel | Peak Result | RMS Result |
|---|---|---|
| CH Low-2412 | Pass | - |

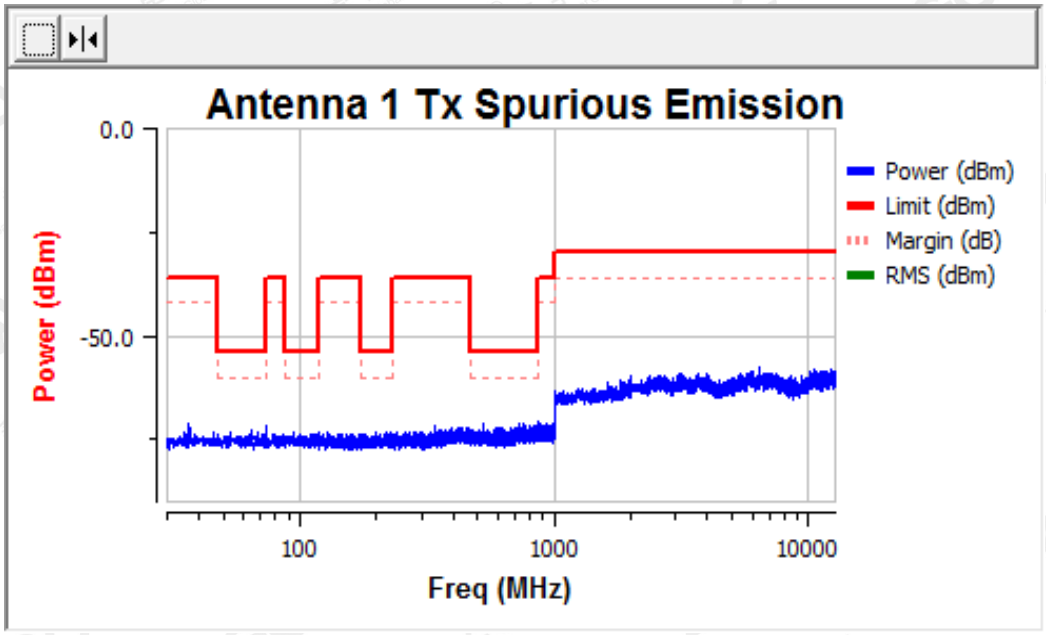
| Freq | RMS Level (dBm) | Limit (dBm) | Over Limit (dB) | Status |
|---|---|---|---|---|
| 524.048 | -70.75 | -54.00 | -16.75 | Pass |
| 524.145 | -70.76 | -54.00 | -16.76 | Pass |
| 10535.000 | -57.74 | -30.00 | -27.74 | Pass |
| 12193.000 | -57.74 | -30.00 | -27.74 | Pass |



**(Worst Case: High channel, 11B)**

| Channel | Peak Result | RMS Result |
|---|---|---|
| CH High-2472 | Pass | - |

| Freq | RMS Level (dBm) | Limit (dBm) | Over Limit (dB) | Status |
|---|---|---|---|---|
| 729.431 | -70.73 | -54.00 | -16.73 | Pass |
| 756.868 | -70.72 | -54.00 | -16.72 | Pass |
| 12231.000 | -57.70 | -30.00 | -27.70 | Pass |
| 12267.000 | -57.49 | -30.00 | -27.49 | Pass |




*Note: 1. All the modes had been test but only the worst data record in the report.*

*2. The 2.4G fundamental frequency is filtered out.*

*3. The effective radiated power has been considered in this test.*

**Conclusion: PASS**

**RADIATED MEASUREMENT**

**TEST SETUP**

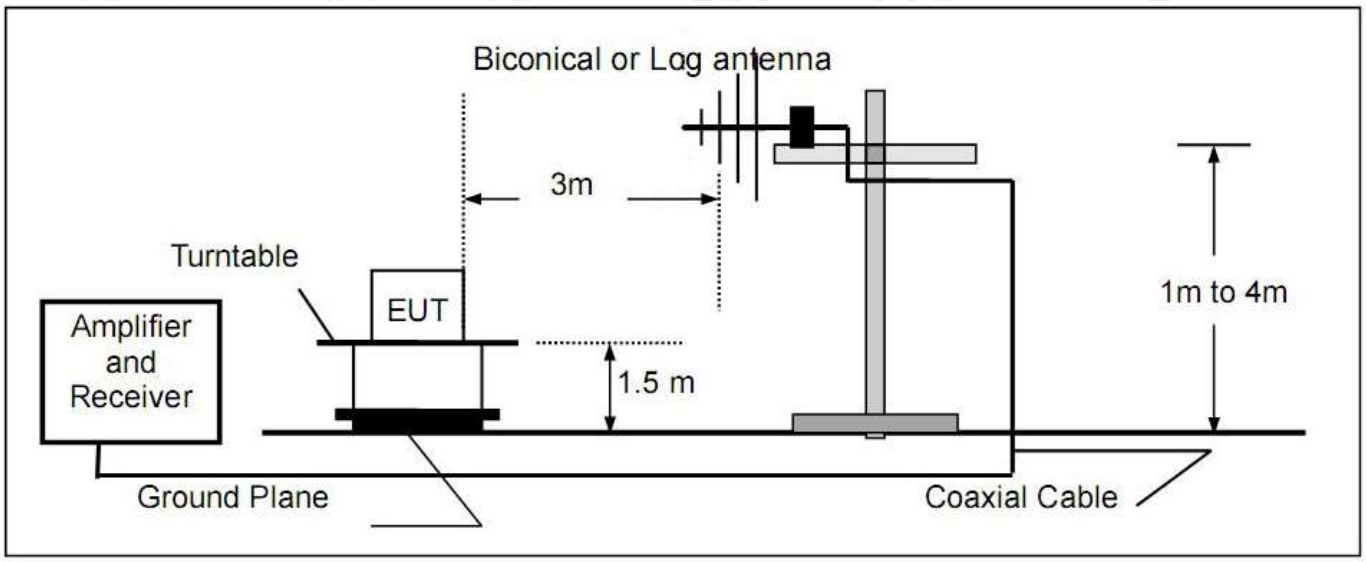
1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

2. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.

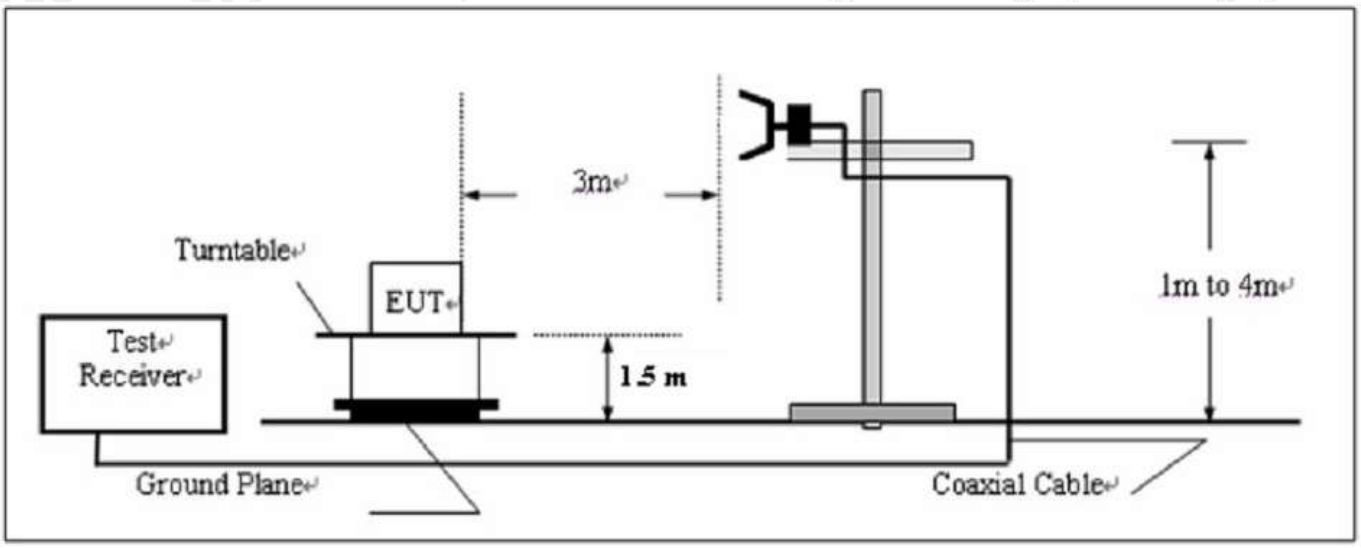
3. The equipment was configured to operate under its worst case situation with respect to output power.

4. The test setup has been constructed as the normal use condition. Controlling software (Button Function) has been activated to set the EUT on specific status.

**Below 1GHz**

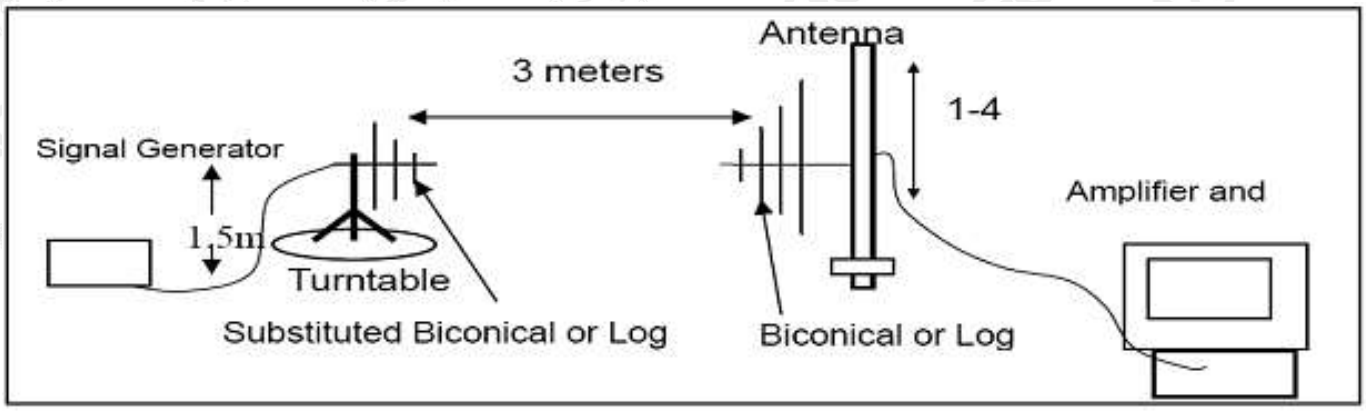



**Above 1GHz**

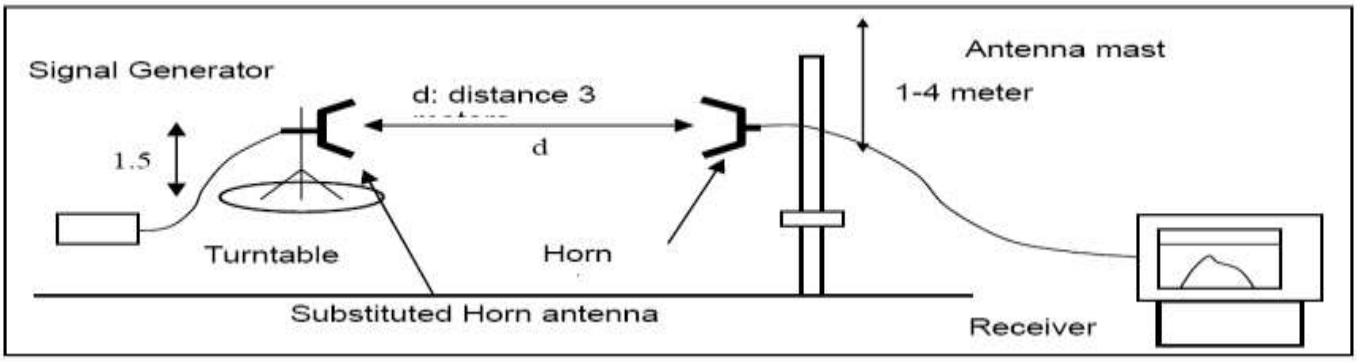


## SUBSTITUTION METHOD: (RADIATED EMISSIONS)

### RADIATED BELOW 1GHZ




### RADIATED ABOVE 1 GHZ



**TEST RESULTS for Radiated Method**

**Transmitter Operating Mode (Worst case: 11B)**

| SPURIOUS EMISSION FREQUENCY RANGE | 30MHz ~ 1GHz | OPERATING CHANNEL | Low | |
|---|---|---|---|---|
| **Frequency (MHz)** | **Antenna Polarization** | **Level (dBm)** | **Limit (dBm)** | **Margin (dB)** |
| 35.54 | H | -63.52 | -36 | -27.52 |
| 65.22 | H | -69.99 | -54 | -15.99 |
| 141.83 | H | -64.76 | -36 | -28.76 |
| 420.66 | H | -70.96 | -36 | -34.96 |
| 632.45 | H | -68.02 | -54 | -14.02 |
| 905.48 | H | -64.76 | -36 | -28.76 |
| 60.28 | V | -69.5 | -54 | -15.5 |
| 203.39 | V | -67.21 | -54 | -13.21 |
| 122.67 | V | -61.72 | -36 | -25.72 |
| 210.36 | V | -68.16 | -54 | -14.16 |
| 241.64 | V | -72.35 | -36 | -36.35 |
| 987.72 | V | -63.51 | -36 | -27.51 |
| 30MHz ~ 1GHz | H | -- | -36 | >10 |
| 30MHz ~ 1GHz | V | -- | -36 | >10 |
| 30MHz ~ 1GHz | H | -- | -54 | >10 |
| 30MHz ~ 1GHz | V | -- | -54 | >10 |

**NOTE:** 1.The emission behavior belongs to narrowband spurious emission.

2. The margins of the other spectrum below 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

| SPURIOUS EMISSION FREQUENCY RANGE | 30MHz ~ 1GHz | OPERATING CHANNEL | High | |
|---|---|---|---|---|
| **Frequency (MHz)** | **Antenna Polarization** | **Level (dBm)** | **Limit (dBm)** | **Margin (dB)** |
| 40.08 | H | -63.88 | -36 | -27.88 |
| 66.52 | H | -70.58 | -54 | -16.58 |
| 154.42 | H | -63.06 | -36 | -27.06 |
| 401.26 | H | -71.48 | -36 | -35.48 |
| 791.57 | H | -67.27 | -54 | -13.27 |
| 962.31 | H | -64.02 | -36 | -28.02 |
| 65.37 | V | -71.21 | -54 | -17.21 |
| 196.37 | V | -68.04 | -54 | -14.04 |
| 158.28 | V | -65.76 | -36 | -29.76 |
| 200.06 | V | -68.27 | -54 | -14.27 |
| 302.07 | V | -71.86 | -36 | -35.86 |
| 973.69 | V | -65.55 | -36 | -29.55 |
| 30MHz ~ 1GHz | H | -- | -36 | >10 |
| 30MHz ~ 1GHz | V | -- | -36 | >10 |
| 30MHz ~ 1GHz | H | -- | -54 | >10 |
| 30MHz ~ 1GHz | V | -- | -54 | >10 |

**NOTE:** 1.The emission behavior belongs to narrowband spurious emission.

2. The margins of the other spectrum below 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

**Standby Mode:**

| NO. | Frequency | Measurement Bandwidth | Level | Limit | Margin |
|---|---|---|---|---|---|
| | **MHz** | **KHz** | **dBm** | **dBm** | **dB** |
| **Standby Mode ,Antenna Polarization: Vertical** | | | | | |
| 1 | 30-1000 | 100 | \ | -54 | >20 |
| 2 | 30-1000 | 100 | \ | -36 | >20 |
| **Standby Mode ,Antenna Polarization: Horizontal** | | | | | |
| 1 | 30-1000 | 100 | \ | -54 | >20 |
| 2 | 30-1000 | 100 | \ | -36 | >20 |

**Conclusion: PASS**

Above 1GHz (1GHz-12.75GHz)

| NO. | Frequency | Measurement Bandwidth | Level | Limit | Margin |
|---|---|---|---|---|---|
| | MHz | KHz | EIRP | dBm | dB |
| **TX:2412MHz ,Antenna Polarization: Vertical** | | | | | |
| 1 | 4824 | 1000 | -52.52 | -30 | >10 |
| 2 | 7236 | 1000 | -54.49 | -30 | >10 |
| 3 | 9648 | 1000 | \ | -30 | >40 |
| 4 | 12060 | 1000 | \ | -30 | >40 |
| 5 | Other(1000-12750) | 1000 | \ | -30 | >40 |
| **TX:2412MHz ,Antenna Polarization: Horizontal** | | | | | |
| 1 | 4824 | 1000 | -55.59 | -30 | >10 |
| 2 | 7236 | 1000 | -56.56 | -30 | >10 |
| 3 | 9648 | 1000 | \ | -30 | >40 |
| 4 | 12060 | 1000 | \ | -30 | >40 |
| 5 | Other(1000-12750) | 1000 | \ | -30 | >40 |
| **TX:2442MHz ,Antenna Polarization: Vertical** | | | | | |
| 1 | 4884 | 1000 | -51.23 | -30 | >10 |
| 2 | 7326 | 1000 | -56.39 | -30 | >10 |
| 3 | 9768 | 1000 | \ | -30 | >40 |
| 4 | 12210 | 1000 | \ | -30 | >40 |
| 5 | Other(1000-12750) | 1000 | \ | -30 | >40 |
| **TX:2442MHz ,Antenna Polarization: Horizontal** | | | | | |
| 1 | 4884 | 1000 | -54.78 | -30 | >10 |
| 2 | 7326 | 1000 | -52.49 | -30 | >10 |
| 3 | 9768 | 1000 | \ | -30 | >40 |
| 4 | 12210 | 1000 | \ | -30 | >40 |
| 5 | Other(1000-12750) | 1000 | \ | -30 | >40 |
| **TX:2472MHz ,Antenna Polarization: Vertical** | | | | | |
| 1 | 4944 | 1000 | -55.17 | -30 | >10 |
| 2 | 7416 | 1000 | -56.38 | -30 | >10 |
| 3 | 9888 | 1000 | \ | -30 | >40 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 12360 | 1000 | \ | -30 | >40 |
| 5 | Other(1000-12750) | 1000 | \ | -30 | >40 |
| **TX:2472MHz ,Antenna Polarization: Horizontal** | | | | | |
| 1 | 4944 | 1000 | -55.23 | -30 | >10 |
| 2 | 7416 | 1000 | -57.67 | -30 | >10 |
| 3 | 9888 | 1000 | \ | -30 | >40 |
| 4 | 12360 | 1000 | \ | -30 | >40 |
| 5 | Other(1000-12750) | 1000 | \ | -30 | >40 |
| Measurement uncertainty:±3.2dB | | | | | |

**Standby Mode:**

| NO. | Frequency | Measurement Bandwidth | Level | Limit | Margin |
|---|---|---|---|---|---|
| | MHz | KHz | dBm | dBm | dB |
| **Standby Mode ,Antenna Polarization: Vertical** | | | | | |
| 1 | 1000-12750 | 1000 | \ | -30 | >20 |
| **Standby Mode ,Antenna Polarization: Horizontal** | | | | | |
| 1 | 1000-12750 | 1000 | \ | -30 | >20 |

**Conclusion: PASS**

## 5.7 RECEIVER SPURIOUS EMISSIONS

The level of spurious emissions shall be measured as, either:
a) Their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) Their effective radiated power when radiated by cabinet and antenna in case of integral antenna equipment with no temporary antenna connectors.
Testing shall be performed when the equipment is in a receive-only mode.

**LIMIT**

**Note:** In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

| Frequency range | Maximum power, e.r.p. | Measurement bandwidth |
|---|---|---|
| 30 MHz to 1 GHz | -57 dBm | 100 kHz |
| 1 GHz to 12,75 GHz | -47 dBm | 1 MHz |

**Test Configuration**

Same as section 5.6 in this test report

**TEST PROCEDURE**

Refer to chapter 5.4.10.2 of ETSI EN 300 328 V2.1.1

**Measurement**

| Measurement | |
|---|---|
| ☒Conducted measurement | ☒Radiated measurement |

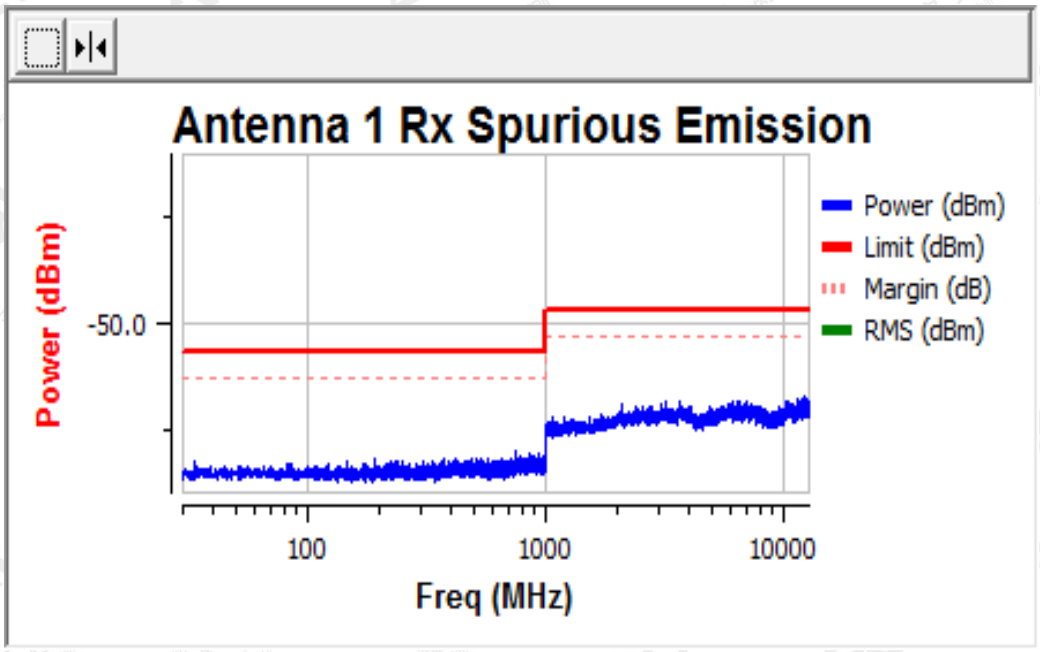
**CONDUCTED MEASUREMENT**

**TEST RESULT**

**(Worst Case: Low channel, 11B)**

| Channel | Peak Result | RMS Result |
|---|---|---|
| CH Low-2412 | Pass | - |

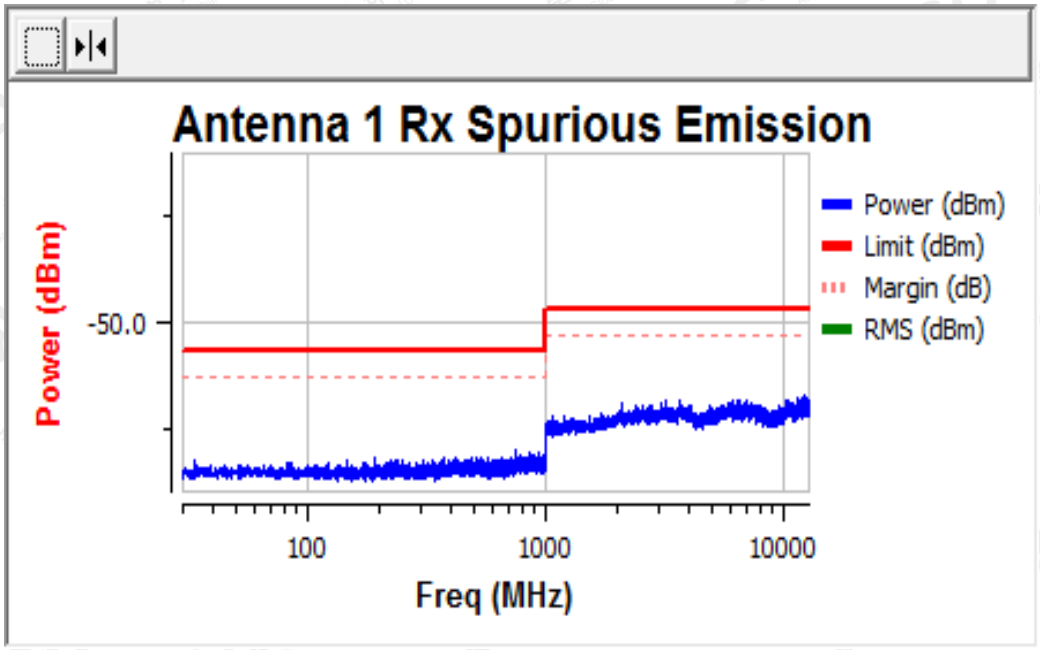
| Freq | RMS Level (dBm) | Limit (dBm) | Over Limit (dB) | Status |
|---|---|---|---|---|
| 789.655 | -80.62 | -57.00 | -23.62 | Pass |
| 856.494 | -80.03 | -57.00 | -23.03 | Pass |
| 11466.000 | -67.42 | -47.00 | -20.42 | Pass |
| 11804.000 | -67.26 | -47.00 | -20.26 | Pass |



**(Worst Case: High channel, 11B)**

| Channel | Peak Result | RMS Result |
|---|---|---|
| CH High-2472 | Pass | - |

| Freq | RMS Level (dBm) | Limit (dBm) | Over Limit (dB) | Status |
|---|---|---|---|---|
| 927.518 | -80.31 | -57.00 | -23.31 | Pass |
| 927.615 | -80.40 | -57.00 | -23.40 | Pass |
| 12186.000 | -67.88 | -47.00 | -20.88 | Pass |
| 12192.000 | -66.42 | -47.00 | -19.42 | Pass |




*Note: 1. All the modes had been test but only the worst data record in the report.*

*2. The effective radiated power has been considered in this test.*

**Conclusion: PASS**

**RADIATED MEASUREMENT**

**TEST SETUP**

1 For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

2 Testing was performed when the equipment was in a receive-only mode.

3 The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.

4 The test setup has been constructed as the normal use condition. Controlling software (Button Function) has been activated to set the EUT on specific status.

**TEST RESULTS for Radiated Method (Worst case :11B)**

**Low Channel**: Receiver Spurious Emission below 1GHz (30MHz-1GHz)

| Frequency | Reading Level | Antenna | S.G. | Cable Loss | Ant.Gain | Emission Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBuv) | Polarization | (dBm) | (dB) | (dBi) | (dBm) | (dBm) | (dB) |
| 84.26 | 30.14 | V | -69.1 | 0.39 | 0.48 | -69.01 | -57 | -12.01 |
| 129.28 | 30.26 | V | -70.21 | 0.29 | 0.26 | -70.24 | -57 | -13.24 |
| 239.52 | 30.67 | V | -69.95 | 0.57 | 0.37 | -70.15 | -57 | -13.15 |
| 325.78 | 29.95 | V | -71.05 | 0.48 | 0.68 | -70.85 | -57 | -13.85 |
| 334.68 | 30.84 | V | -70.19 | 0.49 | 0.15 | -70.53 | -57 | -13.53 |
| 827.15 | 31.26 | V | -71.17 | 0.55 | 1.18 | -70.54 | -57 | -13.54 |
| | | | | | | | | |
| 84.13 | 30.86 | H | -69.46 | 0.36 | 0.07 | -69.75 | -57 | -12.75 |
| 130.15 | 30.98 | H | -69.99 | 0.32 | 0.65 | -69.66 | -57 | -12.66 |
| 242.8 | 30.82 | H | -70.36 | 0.58 | 0.61 | -70.33 | -57 | -13.33 |
| 325.66 | 30.77 | H | -69.61 | 0.47 | 1.05 | -69.03 | -57 | -12.03 |
| 734.78 | 30.92 | H | -69.37 | 0.52 | 0.75 | -69.14 | -57 | -12.14 |
| 827.49 | 30.56 | H | -71.13 | 0.62 | 0.95 | -70.8 | -57 | -13.8 |
| | | | | | | | | |
| 30MHz ~ 1GHz | -- | V | -- | -- | -- | -- | -57 | >10 |
| 30MHz ~ 1GHz | -- | H | -- | -- | -- | -- | -57 | >10 |

Note: The margins of the other spectrum below 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

**High Channel**: Receiver Spurious Emission below 1GHz (30MHz-1GHz)

| Frequency | Reading Level | Antenna | S.G. | Cable Loss | Ant.Gain | Emission Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBuv) | Polarization | (dBm) | (dB) | (dBi) | (dBm) | (dBm) | (dB) |
| 84.3 | 30.14 | V | -69.1 | 0.43 | 0.48 | -69.05 | -57 | -12.05 |
| 129.32 | 30.26 | V | -70.21 | 0.33 | 0.26 | -70.28 | -57 | -13.28 |
| 239.56 | 30.67 | V | -69.95 | 0.61 | 0.37 | -70.19 | -57 | -13.19 |
| 325.82 | 29.95 | V | -71.05 | 0.52 | 0.68 | -70.89 | -57 | -13.89 |
| 334.72 | 30.84 | V | -70.19 | 0.53 | 0.15 | -70.57 | -57 | -13.57 |
| 827.19 | 31.26 | V | -71.17 | 0.59 | 1.18 | -70.58 | -57 | -13.58 |
| | | | | | | | | |
| 84.17 | 30.86 | H | -69.46 | 0.4 | 0.07 | -69.79 | -57 | -12.79 |
| 130.19 | 30.98 | H | -69.99 | 0.36 | 0.65 | -69.7 | -57 | -12.7 |
| 242.84 | 30.82 | H | -70.36 | 0.62 | 0.61 | -70.37 | -57 | -13.37 |
| 325.7 | 30.77 | H | -69.61 | 0.51 | 1.05 | -69.07 | -57 | -12.07 |
| 734.82 | 30.92 | H | -69.37 | 0.56 | 0.75 | -69.18 | -57 | -12.18 |
| 827.53 | 30.56 | H | -71.13 | 0.66 | 0.95 | -70.84 | -57 | -13.84 |
| | | | | | | | | |
| 30MHz ~ 1GHz | -- | V | -- | -- | -- | -- | -57 | >10 |
| 30MHz ~ 1GHz | -- | H | -- | -- | -- | -- | -57 | >10 |

Note: The margins of the other spectrum below 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

**Low Channel**: Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

| Frequency | Reading Level | Antenna | S.G. | Cable Loss | Ant.Gain | Emission Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBuv) | Polarization | (dBm) | (dB) | (dBi) | (dBm) | (dBm) | (dB) |
| 1954.15 | 39.77 | V | -62.69 | 2.37 | 0.52 | -64.54 | -47 | -17.54 |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| | | | | | | | | |
| 2443.44 | 39.04 | H | -62.62 | 2.48 | 0.71 | -64.39 | -47 | -17.39 |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| | | | | | | | | |
| 1GHz-12.75 GHz | -- | V | -- | -- | -- | -- | -47 | >10 |
| 1GHz-12.75 GHz | -- | H | -- | -- | -- | -- | -47 | >10 |

Note: The margins of the other spectrum above 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

**High Channel**: Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)

| Frequency | Reading Level | Antenna | S.G. | Cable Loss | Ant.Gain | Emission Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBuv) | Polarization | (dBm) | (dB) | (dBi) | (dBm) | (dBm) | (dB) |
| 1954.21 | 39.77 | V | -62.69 | 2.37 | 0.52 | -64.54 | -47 | -17.54 |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| -- | -- | V | -- | -- | -- | -- | -- | -- |
| | | | | | | | | |
| 2443.53 | 39.04 | H | -62.62 | 2.48 | 0.71 | -64.39 | -47 | -17.39 |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| -- | -- | H | -- | -- | -- | -- | -- | -- |
| | | | | | | | | |
| 1GHz-12.75 GHz | -- | V | -- | -- | -- | -- | -47 | >10 |
| 1GHz-12.75 GHz | -- | H | -- | -- | -- | -- | -47 | >10 |

Note: The margins of the other spectrum above 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

**Remarks:**

1. The emission behaviour belongs to narrowband spurious emission.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Conclusion: PASS**

## 5.8. RECEIVER BLOCKING

### 5.8.1 LIMIT

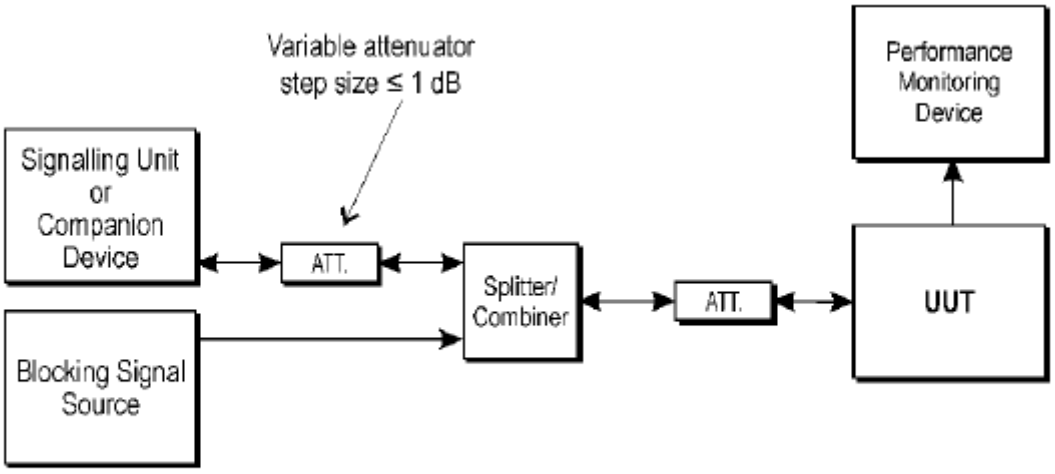
**Receiver Blocking parameters for Receiver Category 1 equipment**

| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power (dBm) (see note 2) | Type of blocking signal |
|---|---|---|---|
| Pmin + 6 dB | 2 380<br>2 503,5 | -53 | CW |
| Pmin + 6 dB | 2 300<br>2 330<br>2 360 | -47 | CW |
| Pmin + 6 dB | 2 523,5<br>2 553,5<br>2 583,5<br>2 613,5<br>2 643,5<br>2 673,5 | -47 | CW |
| NOTE 1: Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in EN 300 328 V2.1.1 clause 4.3.2.11.3 in the absence of any blocking signal.<br>NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain. | | | |

### 5.8.2 TEST PROCEDURE

1) The UUT shall be set to the lowest operating channel.
2) The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.
3) With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in the Test Set-up. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.
This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.
4) The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria is met.
5) Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.
6) Repeat step 2 to step 5 with the UUT operating at the highest operating channel.

### 5.8.3 TEST CONFIGURATION




**Test Set-up for receiver blocking**

### 5.8.4 TEST RESULT

Low Channel

| Wanted Signal Power (MHz) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) | Test Result ( PER) | Limit ( PER) | Result |
|---|---|---|---|---|---|
| $P_{min}$+6dB | 2380 | -53 | 2.82% | 10% | Pass |
| $P_{min}$+6dB | 2503.5 | -53 | 0.73% | 10% | Pass |
| $P_{min}$+6dB | 2300 | -47 | 0.56% | 10% | Pass |
| $P_{min}$+6dB | 2330 | -47 | 0.23% | 10% | Pass |
| $P_{min}$+6dB | 2360 | -47 | 0.65% | 10% | Pass |
| $P_{min}$+6dB | 2 523,5 | -47 | 0.28% | 10% | Pass |
| $P_{min}$+6dB | 2 553,5 | -47 | 0.69% | 10% | Pass |
| $P_{min}$+6dB | 2 583,5 | -47 | 0.46% | 10% | Pass |
| $P_{min}$+6dB | 2 613,5 | -47 | 0.42% | 10% | Pass |
| $P_{min}$+6dB | 2 643,5 | -47 | 0.39% | 10% | Pass |
| $P_{min}$+6dB | 2 673,5 | -47 | 0.49% | 10% | Pass |

High Channel

| Wanted Signal Power (MHz) | Blocking Signal Frequency (MHz) | Blocking Signal Power (dBm) | Test Result ( PER) | Limit ( PER) | Result |
|---|---|---|---|---|---|
| $P_{min}$+6dB | 2380 | -53 | 0.59% | 10% | Pass |
| $P_{min}$+6dB | 2503.5 | -53 | 2.08% | 10% | Pass |
| $P_{min}$+6dB | 2300 | -47 | 0.63% | 10% | Pass |
| $P_{min}$+6dB | 2330 | -47 | 0.42% | 10% | Pass |
| $P_{min}$+6dB | 2360 | -47 | 0.23% | 10% | Pass |
| $P_{min}$+6dB | 2 523,5 | -47 | 1.59% | 10% | Pass |
| $P_{min}$+6dB | 2 553,5 | -47 | 1.17% | 10% | Pass |
| $P_{min}$+6dB | 2 583,5 | -47 | 0.43% | 10% | Pass |
| $P_{min}$+6dB | 2 613,5 | -47 | 0.72% | 10% | Pass |
| $P_{min}$+6dB | 2 643,5 | -47 | 0.63% | 10% | Pass |
| $P_{min}$+6dB | 2 673,5 | -47 | 0.14% | 10% | Pass |

# APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED SPURIOUS EMISSION TEST SETUP

RADIATED SPURIOUS EMISSION-ABOVE 1G TEST SETUP

CONDUCTED TEST SETUP


**----END OF REPORT----**