

FCC RF TEST REPORT

| APPLICANT | : | Pycom Ltd |
|-----------------|------------------|---|
| PRODUCT NAME | : | LoPy |
| MODEL NAME | : | LoPy1.0r |
| TRADE NAME | : | LoPy |
| BRAND NAME | : | Pycom |
| FCC ID | : | 2AJMTLOPY1R |
| STANDARD(S) | • | 47 CFR Part 15 Subpart C |
| ISSUE DATE | | 2016-10-09 |
| SHENZHEN MORLAB | Ponds Quality By | Certification MUNICATIONS TECHNOLOGY Co., 4, System Certification |

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Http://www.morlab.com E-mail: service@morlab.cn

Tel: 86-755-36698555

Fax: 86-755-36698525

Ltd.



TEST REPORT DECI

ARATION

REPORT No.: SZ16080189W08A

DIRECTORY

TECHNICAL INFORMATION 1. 1.1 APPLICANT INFORMATION ······5 1.2 EQUIPMENT UNDER TEST (EUT) DESCRIPTION ······ 1.2.1 IDENTIFICATION OF ALL USED EUTS ····· ...6 1.3 TEST STANDARDS AND RESULTS6 1.3.1 **TEST ENVIRONMENT CONDITIONS**.....

| 2.1 | ANTENNA REQUIREMENT······7 | |
|-------|--|--|
| 2.1.1 | ANTENNA REQUIREMENT··································· | |
| 2.1.2 | RESULT: COMPLIANT | |
| 2.2 | PEAK OUTPUT POWER ···································· | |
| 2.2.1 | REQUIREMENT | |
| 2.2.2 | TEST DESCRIPTION ······7 | |
| 2.2.3 | TEST RESULT ······· | |
| 2.3 | TEST RESULT | |
| 2.3.1 | REQUIREMENT | |
| 2.3.2 | TEST DESCRIPTION ···································· | |
| 2.3.3 | Test Result | |
| 2.4 | CONDUCTED SPURIOUS EMISSIONS AND BAND EDGE | |
| 2.4.1 | | |
| 2.4.2 | Test Description ······· | |
| 2.4.3 | TEST RESULT | |
| 2.5 | POWER SPECTRAL DENSITY (PSD)···································· | |
| 2.5.1 | REQUIREMENT······32 | |
| 2.5.2 | TEST DESCRIPTION ···································· | |
| 2.5.3 | TEST RESULT ···································· | |
| 2.6 | RESTRICTED FREQUENCY BANDS | |
| 2.6.1 | RECHUREMENT | |
| 2.6.2 | TEST DESCRIPTION ···································· | |
| 2.6.3 | TEST RESULT ···································· | |
| 2.6.3 | I EST RESULT ······42 | |

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

MORLAB REPORT No.: SZ16080189W08A 2.7 CONDUCTED EMISSION ······ REQUIREMENT 2.7.153 2.7.2 2.1.1 TEST RESULT ······ ..54 2.8 RADIATED EMISSION ·······56 REQUIREMENT-------56 2.8.1 TEST DESCRIPTION ····· 2.8.2 ..57 2.8.3 TEST RESULT ······

| | | Change History | | | |
|------------------------------|------------|----------------|--|--|--|
| Issue Date Reason for change | | | | | |
| 1.0 | 2016-10-09 | First edition | | | |
| 1.0 | 2016-10-09 | First edition | | | |

 MORLAB GROUP
 FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,

 Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Http://www.morlab.com



TEST REPORT DECLARATION

| Applicant | Pycom Ltd | | | | |
|----------------------|--|--|--|--|--|
| Applicant Address | Registered Office 57 Avenue Road Cranleigh, Surrey GU6 7LJ UK | | | | |
| Manufacturer Address | In-Tech Electronics Ltd | | | | |
| Manufacturer | 2/F Rhythm Home,119 Shazui Road, Futian, Shenzhen, Guangdong, P.R.China | | | | |
| Product Name | LoPy | | | | |
| Model Name | LoPy1.0r | | | | |
| Brand Name | Pycom | | | | |
| HW Version | 1.0r | | | | |
| SW Version | 1.0 | | | | |
| Test Standards | 47 CFR Part 15 Subpart C | | | | |
| Test Date | 2016-09-19 to 2016-09-30 | | | | |
| Test Result | PASS | | | | |

Zou Jian Zou Jian Tested by Qiu Xiaojun Reviewed by Qiu Xiaojun

Approved by

Peng Huarui

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Http://www.morlab.com

Tel: 86-755-36698555

Page 4 Of 74



1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

| Company: | Pycom Ltd | |
|----------|---|-----|
| Address | Registered Office 57 Avenue Road Cranleigh, Surrey GU6 7LJ UK | LAB |

1.2 Equipment under Test (EUT) Description

| Brand Name: | Pycom |
|------------------|--|
| Trade Name: | LoPy |
| Model Name: | LoPy1.0r |
| Frequency Range: | 802.11b/g/n-20MHz: 2.412GHz - 2.462GHz |
| | 802.11n-40MHz: 2.422GHz - 2.452GHz |
| Channel Number: | 802.11b/g/n-20MHz: 11 |
| | 802.11n-40MHz: 7 |
| Modulation Type: | DSSS, OFDM |
| Antenna Type: | Ceramic Antenna |
| Antenna Gain: | -0.5 dBi |
| | |

NOTE:

1. The EUT is a LoPy, it contains WIFI Module operating at 2.4GHz ISM; it supports 802.11b, 802.11g, 802.11n and they are all tested in this report.

For 802.11b/g/n-20MHz (2.4GHz band), the frequencies allocated is F (MHz) =2412+5*(n-1) (1<=n<=11). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).

For 802.11n-40MHz, the frequencies allocated is F (MHz) = $2412+5^{*}(n-1)$ (3<=n<=9). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 3 (2422MHz), 6 (2437MHz) and 9 (2452MHz).

- 2. The EUT connected to the serial port of the computer with a serial communication cable, and then use the dedicated software to control the EUT into the test mode.
- 3. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.
- The antenna connector of EUT is designed with permanent attachment and no consideration of replacement.

MORLAB GROUP FL1-3, Building A, Fei Yan Block67, BaoAn District,

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



1.2.1 Identification of all used EUTs

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

| EUT Identity | Hardware Version | Software Version | | |
|--------------|------------------|------------------|--|--|
| A01 | 1.0r | 1.0 | | |

1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

| No. Identity | | Identity | Document Title | |
|--------------|---|-------------------|-------------------------|--|
| è | 1 | 47 CFR Part 15 | Radio Frequency Devices | |
| | | (10-1-15 Edition) | LAB JORLE MON AB M | |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Result |
|-----|-------------------|---|--------------|--------|
| 1 | 15.203 | Antenna Requirement | N.A | PASS |
| 2 | 15.247(b) | Peak Output Power | Sep 19, 2016 | PASS |
| 3 | 15.247(a) | Bandwidth | Sep 19, 2016 | PASS |
| 4 | 15.247(d) | Conducted Spurious Emission and Band Edge | Sep 19, 2016 | PASS |
| 5 | 15.247(d) | Restricted Frequency Bands | Sep 28, 2016 | PASS |
| 6 | 15.207 | Conducted Emission | Sep 22, 2016 | PASS |
| 7 | 15.209 ,15.247(d) | Radiated Emission | Sep 22, 2016 | PASS |
| 8 | 15.247(e) | Power spectral density (PSD) | Sep 19, 2016 | PASS |

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

1.3.1 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

| Temperature (°C): | 15 - 35 |
|-----------------------------|---------|
| Relative Humidity (%): | 30 -60 |
| Atmospheric Pressure (kPa): | 86-106 |

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



2. 47 CFR PART 15C REQUIREMENTS

2.1 Antenna requirement

2.1.1 Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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.

2.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2 Peak Output Power

2.2.1 Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed1 Watt.

2.2.2 Test Description

The measured output power was calculated by the reading of the Power Meter and calibration.

A. Test Setup:



The EUT (Equipment under the test) which is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading, all test result in power meter.

B. Equipments List:

MORLAB GROUP

Please reference ANNEX A(1.5).

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

2.2.3 Test Result

MORLAE

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

2.2.3.1 802.11b Test Mode

| Channel | | Measured Output Peak Power | | Limit | | Vordiat |
|---------|-----------------|----------------------------|--------|-------|--------|---------|
| Channel | Frequency (MHz) | dBm | W | dBm | W | Verdict |
| 1 | 2412 | 12.34 | 0.0171 | 30 | MORLAR | PASS |
| 6 | 2437 | 12.26 | 0.0168 | | | PASS |
| 11 | 2462 | 12.14 | 0.0164 | | 12 | PASS |

| 2 | Channel Frequency (MHz) | | Measured Output Average Power | | Limit | | Verdict |
|---|-------------------------|------|----------------------------------|--------|--------|------|---------|
| | | | dBm | W | dBm | W | |
| | RLAP1 | 2412 | 10.72 | 0.0118 | MO. AB | al a | PASS |
| 6 | 6 🔬 | 2437 | 10.64 | 0.0116 | 30 | 1 | PASS |
| | 11 | 2462 | 10.45 | 0.0111 | NB 0 | LAB | PASS |

2.2.3.2 802.11g Test mode

MORL

AB GROUP

| 5 | Channel Frequency (I | | Measured Output Peak Power | | Limit | | Verdict |
|---|----------------------|------|----------------------------|--------|----------|-----|---------|
| | | | dBm | W | dBm | W | Verdict |
| ~ | 1 | 2412 | 19.51 | 0.0893 | RL-1 MOT | | PASS |
| | 6 | 2437 | 19.18 | 0.0828 | 30 | A1 | PASS |
| | 11 | 2462 | 19.20 | 0.0832 | MORIE | MAL | PASS |

| | Channel | Frequency (MHz) | Measured | Measured Output Average Power | | t | Verdict |
|---|------------------|-----------------|----------|----------------------------------|------|------|---------|
| | | | dBm | W | dBm | W | |
| | A ⁶ 1 | 2412 | 10.75 | 0.0119 | MOR | M | PASS |
| 5 | 6 | 2437 | 10.37 | 0.0109 | 30 | 1,08 | PASS |
| | 11 | 2462 | 10.31 | 0.0107 | a MO | AB | PASS |

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



| 2.2.3.3 | ouz. I III-zuwinz lest | mode | | | | |
|---------|------------------------|------------|-------------------|------|-----|---------|
| Channel | | Measured C | Output Peak Power | Limi | t | Vardiat |
| Channel | Frequency (MHz) | dBm | W | dBm | W | Verdict |
| _1 | 2412 | 18.66 | 0.0735 | ORLA | MOR | PASS |
| 6 | 2437 | 18.45 | 0.0700 | 30 | 1 | PASS |
| 11 | 2462 | 18.48 | 0.0705 | MORI | BMC | PASS |
| .0 | Mr. B | | Ok. M | . 6 | LA. | OF |

| 2.2.3.3 | 802.11n-20MHz Test mode |
|---------|-------------------------|
| 2.2.3.3 | |

| 4 | Channel | Frequency (MHz) | | Output Average Power | Limi | t | Verdict |
|---|---------|-----------------|-------|-------------------------|--------|------|---------|
| | | | dBm | W | dBm | W | |
| | 1,50 | 2412 | 10.60 | 0.0115 | MORE | a me | PASS |
| | 6 | 2437 | 10.49 | 0.0112 | 30 | 1 | PASS |
| 2 | 11 💉 | 2462 | 10.20 | 0.0105 | Rt MO. | AB | PASS |

2.2.3.4 802.11n-40MHz Test mode

MORL

| 2 | Channel | | Measured C | utput Peak Power | Limi | t | Vardiat |
|----|---------|-----------------|------------|------------------|--------|-------|---------|
| | Channel | Frequency (MHz) | dBm | W | dBm | W | Verdict |
| | 3 | 2422 | 18.18 | 0.0658 | MO. NB | al al | PASS |
| n. | 6 | 2437 | 17.97 | 0.0627 | 30 | 1 | PASS |
| | 9 | 2452 | 17.76 | 0.0597 | AB M | LAB | PASS |

| | Channel | Frequency (MHz) | Measured | d Output Average Power | Limi | t | Verdict |
|------|---------|-----------------|----------|---------------------------|------|------|---------|
| arc. | | | dBm | W | dBm | W | |
| | 3 | 2422 | 10.58 | 0.0114 | 3 | LAB | PASS |
| 2 | 6 | 2437 | 10.39 | 0.0109 | 30 🔊 | 1 | PASS |
| 1 | 9 | 2452 | 10.25 | 0.0106 | AB | ORLA | PASS |

AB GROUP FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



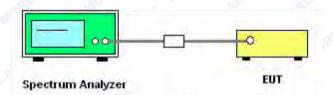
2.3 Bandwidth

2.3.1 Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2 Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

KDB 558074 Section 8.1 Option 1 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.5).

2.3.3 Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

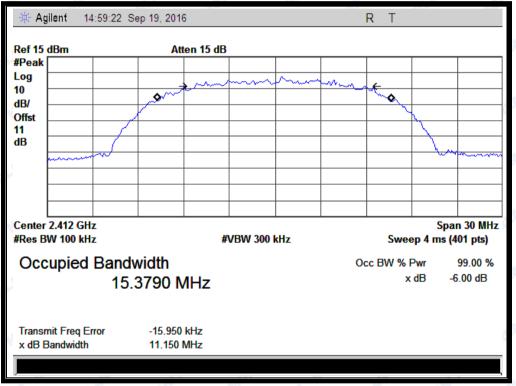


2.3.3.1 802.11b Test mode

A. Test Verdict:

| Channel | Frequency | 6 dB Bandwidth | Limits(kHz) | Result | |
|---------|----------------------------|----------------|-------------|--------|--|
| 1 | (MHz) (MHz) 2412 11.150 | | ≥500 | PASS | |
| 6 | 2437 | 10.203 | ≥500 | PASS | |
| 11 📣 | 2462 | 10.217 | ≥500 | PASS | |

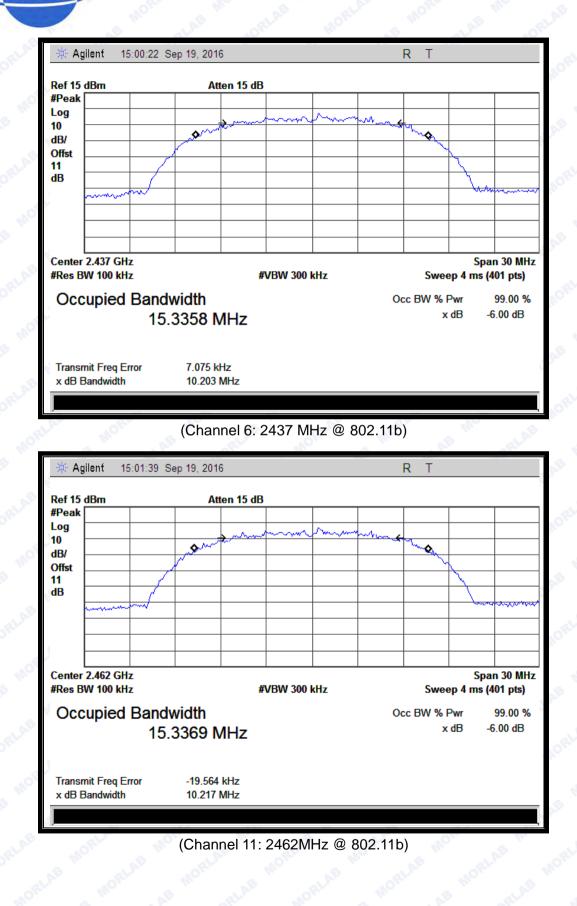
B. Test Plots



(Channel 1: 2412MHz @ 802.11b)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

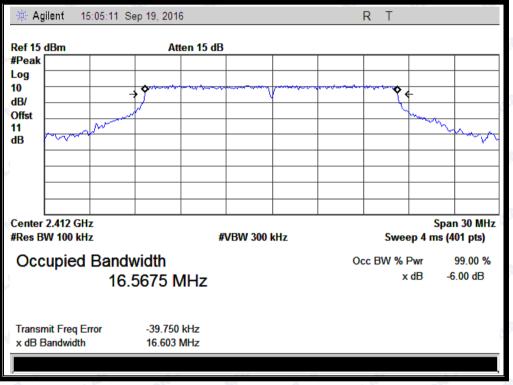


2.3.3.2 802.11g Test mode

A. Test Verdict:

| | Frequency | 6 dB Bandwidth | Limits | |
|---------|-----------|----------------|--------|--------|
| Channel | (MHz) | (MHz) | (kHz) | Result |
| 11.0 | 2412 | 16.603 | ≥500 | PASS |
| 6 | 2437 | 16.616 | ≥500 | PASS |
| 11 | 2462 | 16.608 | ≥500 | PASS |

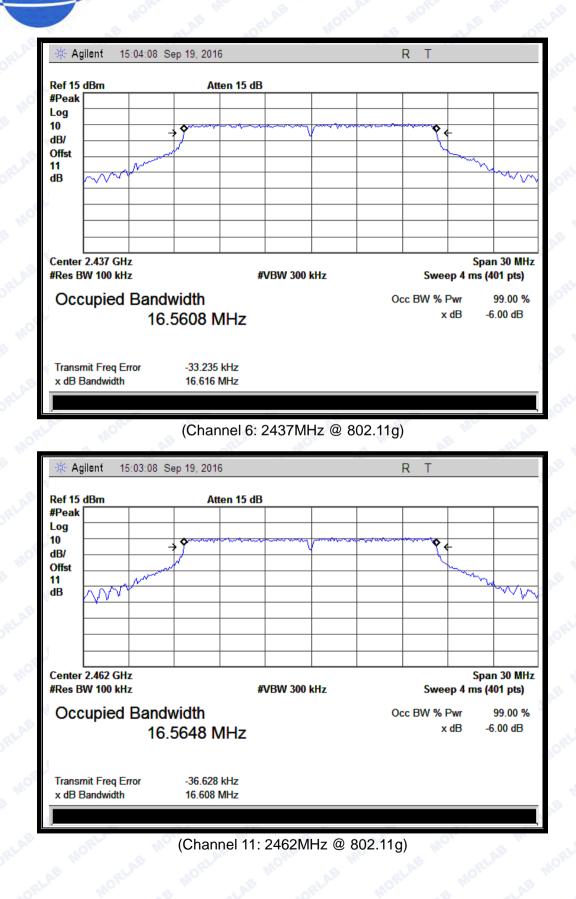
B. Test Plots:



(Channel 1: 2412MHz @ 802.11g)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

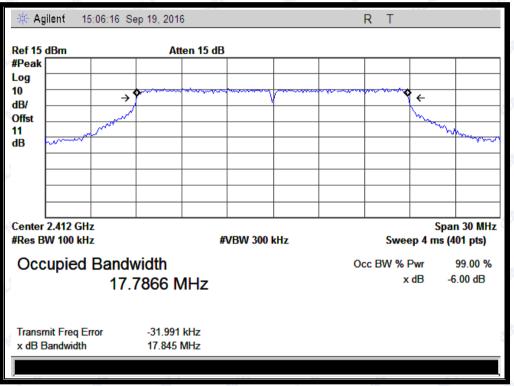


2.3.3.3 802.11n-20 Test mode

A. Test Verdict:

| Channel | Frequency | 6 dB Bandwidth | Limits | Result |
|---------|-----------|----------------|--------|--------|
| Channel | (MHz) | (MHz) | (kHz) | Result |
| 1 alas | 2412 | 17.845 | ≥500 | PASS |
| 6 | 2437 | 17.839 | ≥500 | PASS |
| 11 | 2462 | 17.836 | ≥500 | PASS |
| | | | | |

B. Test Plots:



(Channel 1: 2412MHz @ 802.11n-20)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

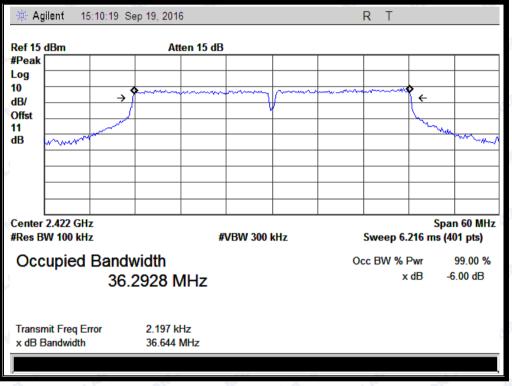


2.3.3.4 802.11n-40 Test mode

A. Test Verdict:

| Channel | Frequency | 6 dB Bandwidth | Limits | Result |
|---------|-----------|----------------|--------|--------|
| Charmer | (MHz) | (MHz) | (kHz) | Result |
| 3 | 2422 | 36.644 | ≥500 | PASS |
| 6 | 2437 | 36.597 | ≥500 | PASS |
| 9 | 2452 | 36.621 | ≥500 | PASS |
| | | | | |

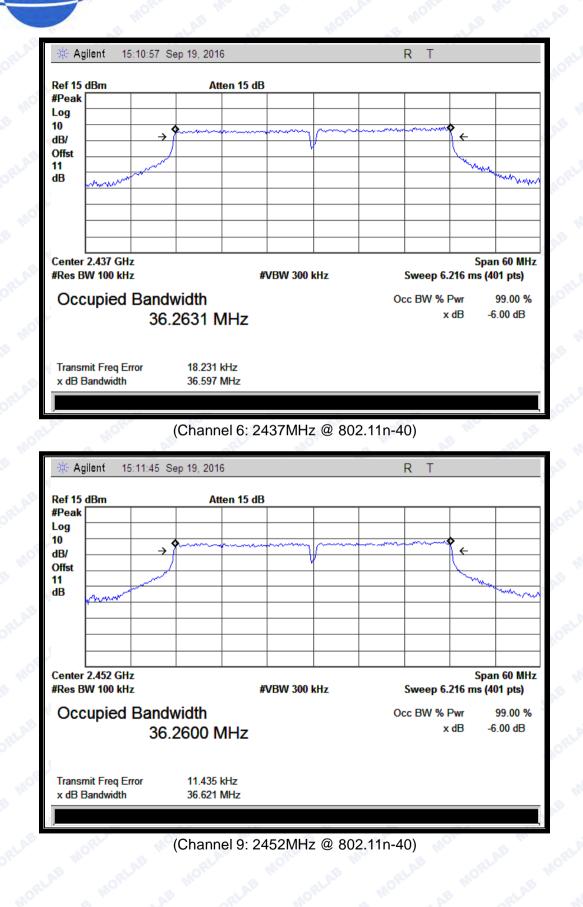
B. Test Plots:



(Channel 3: 2422Mz @ 802.11n-40)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



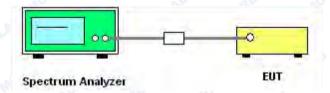
2.4 Conducted Spurious Emissions and Band Edge

2.4.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.4.2 Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

KDB 558074 Section 11.0 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.5).

2.4.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



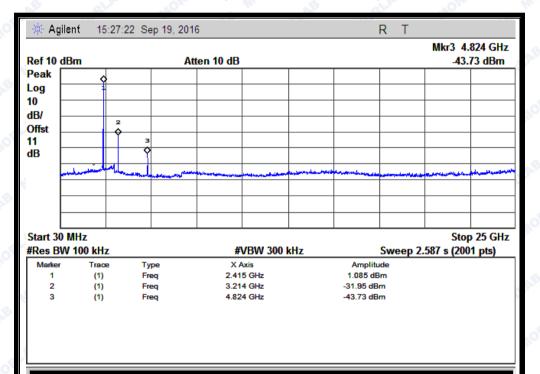
2.4.3.1 802.11b Test mode

A. Test Verdict:

| | Fraguanay | | Measured Max. | Limit | | |
|---|-----------|--------------------|----------------|---------|--------------|---------|
| | Channel | Frequency (MHz) | Out of Band | Carrier | Calculated | Verdict |
| 3 | | (IVITZ) | Emission (dBm) | Level | -20dBc Limit | |
| | 1 | 2412 | -31.95 | 1.09 | -18.91 | PASS |
| | 6 | 2437 | -31.70 | -0.13 | -20.13 | PASS |
| < | 11 🔊 | 2462 | -33.44 | 0.72 | -19.28 | PASS |

B. Test Plots:

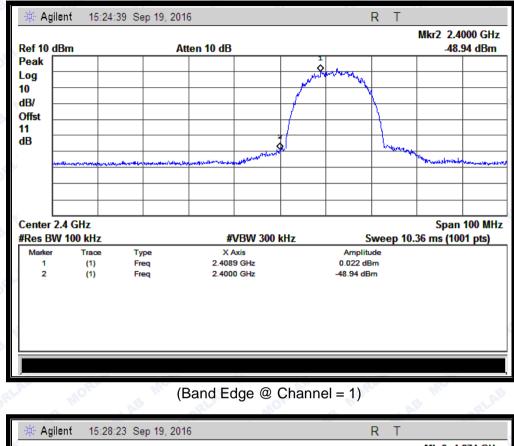
Note: the power of the Module transmitting frequency should be ignored.

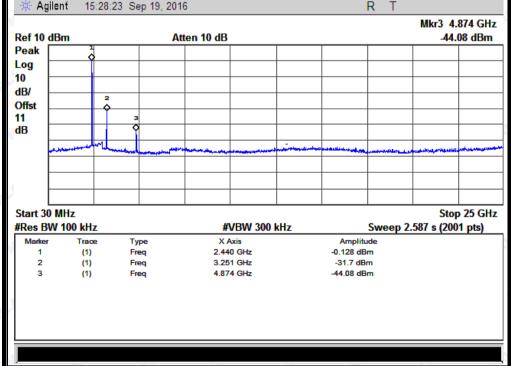


(Channel = 1, 30MHz to 25GHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



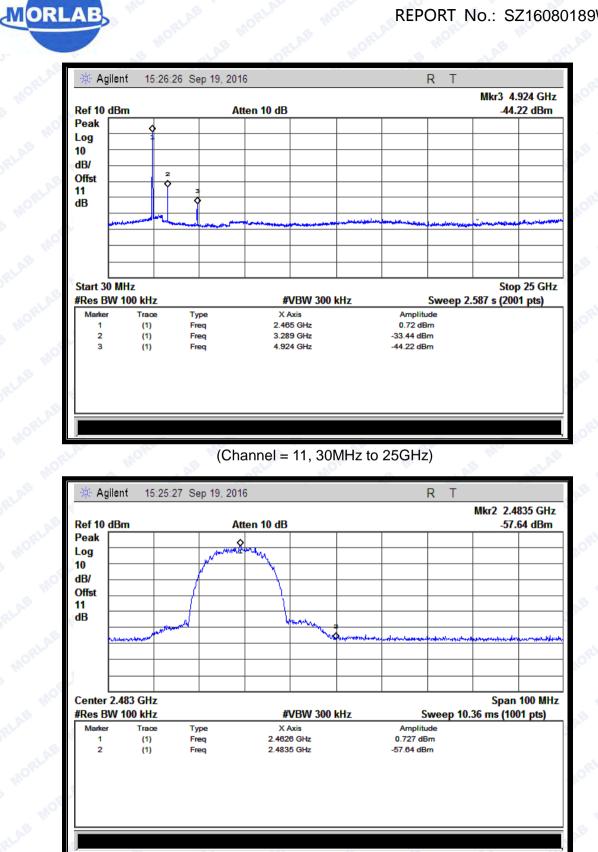


(Channel = 6, 30MHz to 25GHz)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



(Band Edge @ Channel = 11)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



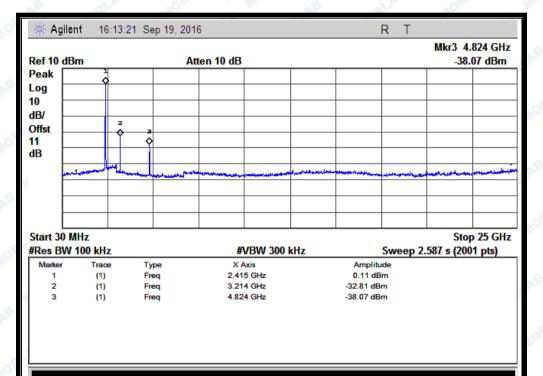
2.4.3.2 802.11g Test mode

A. Test Verdict:

| 3 | Channel | Frequency | Measured Max. | Limit (dBm) | | |
|---|---------|-----------|----------------|-------------|--------------|---------|
| | | | Out of Band | Carrier | Calculated | Verdict |
| | | (MHz) | Emission (dBm) | Level | -20dBc Limit | |
| 8 | 1 | 2412 | -32.81 | 0.11 | -19.89 | PASS |
| | 6 | 2437 | -34.03 | -1.58 | -21.58 | PASS |
| Ľ | 11 | 2462 | -35.24 | -0.68 | -20.68 | PASS |

B. Test Plots:

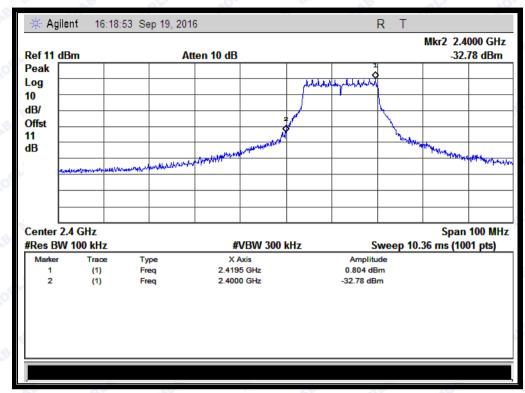
Note: the power of the Module transmitting frequency should be ignored.



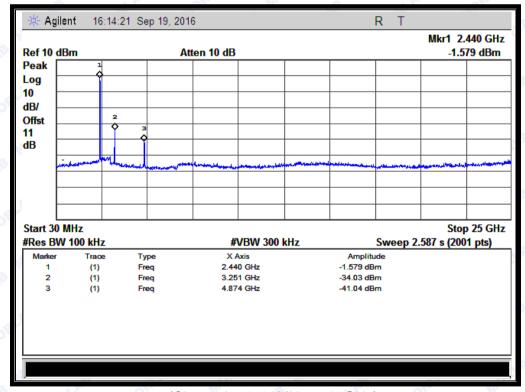
(Channel = 1, 30MHz to 25GHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



(Band Edge @ Channel = 1)

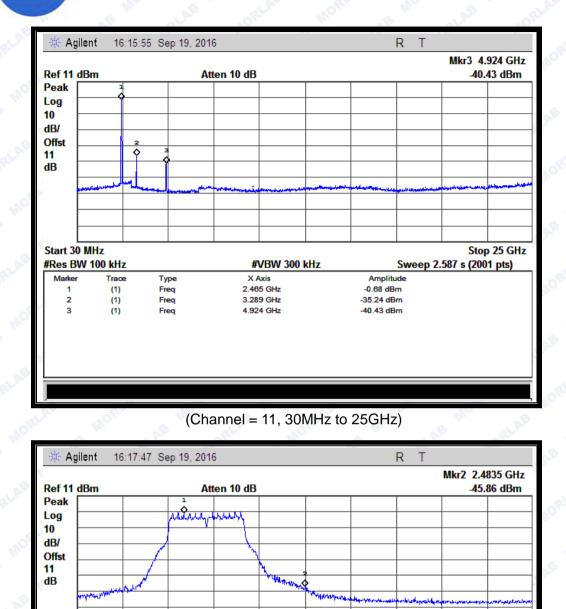


(Channel = 6, 30MHz to 25GHz)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



(Band Edge @ Channel = 11)

#VBW 300 kHz

X Axis

2.4570 GHz

2.4835 GHz

MORLAB GROUP

Center 2.483 GHz

#Res BW 100 kHz

Trace

(1)

(1)

Туре

Freq

Freq

Marker

1

2

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

Span 100 MHz

Sweep 10.36 ms (1001 pts)

Amplitude

0.18 dBm

-45.86 dBm



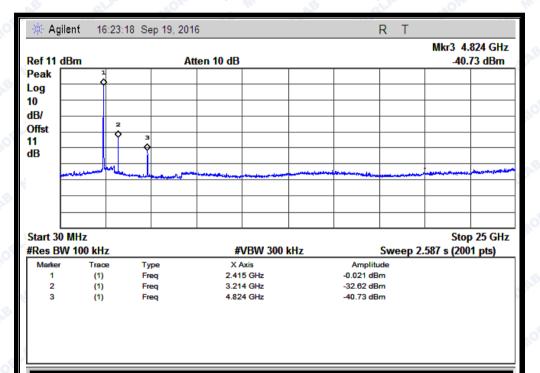
2.4.3.3 802.11n -20MHz Test mode

A. Test Verdict:

| 2 | Channel | Frequency | Measured Max. | Limit (dBm) | | |
|---|---------|-----------|----------------|-------------|--------------|---------|
| | | | Out of Band | Carrier | Calculated | Verdict |
| | | (MHz) | Emission (dBm) | Level | -20dBc Limit | |
| 8 | 1 | 2412 | -32.62 | -0.02 | -20.02 | PASS |
| | 6 | 2437 | -39.83 | -0.97 | -20.97 | PASS |
| | 11 | 2462 | -38.62 | -1.45 | -21.45 | PASS |

B. Test Plots:

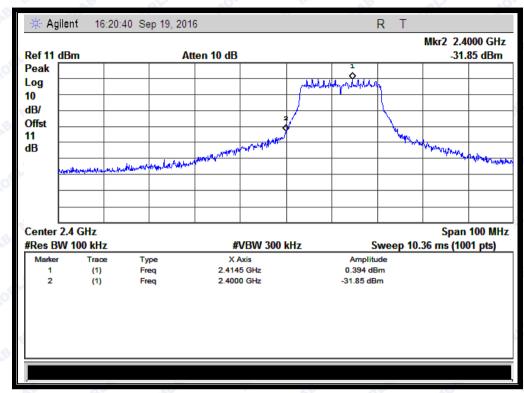
Note: the power of the Module transmitting frequency should be ignored.



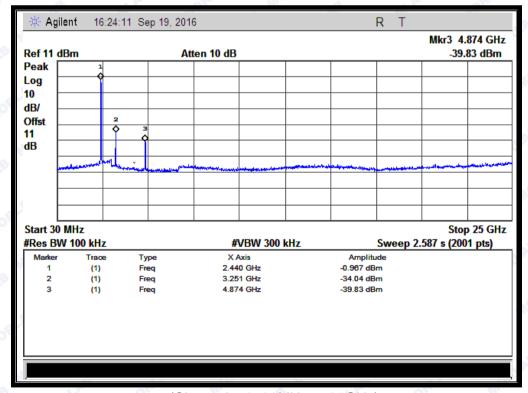
(Channel = 1, 30MHz to 25GHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



(Band Edge @ Channel = 1)

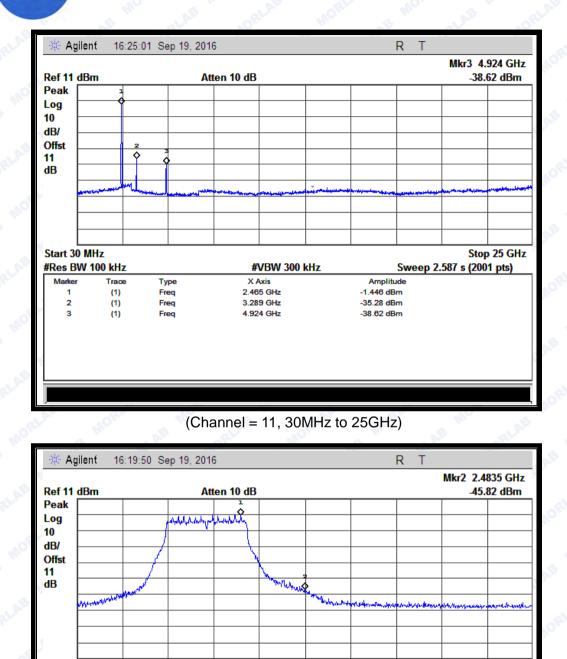


(Channel = 6, 30MHz to 25GHz)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



(Band Edge @ Channel = 11)

#VBW 300 kHz

X Axis

2.4695 GHz

2.4835 GHz

MORLAB GROUP

Center 2.483 GHz

#Res BW 100 kHz

Trace

(1)

(1)

Туре

Freq

Freq

Marker

1

2

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

Span 100 MHz

Sweep 10.36 ms (1001 pts)

Amplitude

0.45 dBm

-45.82 dBm



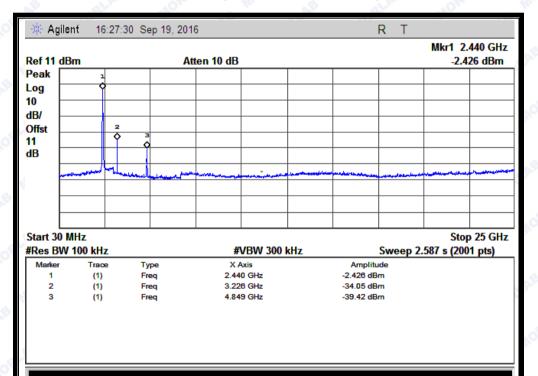
2.4.3.4 802.11n -40MHz Test mode

A. Test Verdict:

| | | | Measured Max. | Limit | t (dBm) | Verdict |
|--|---------|-----------|----------------|---------|--------------|-------------------------|
| | Channel | Frequency | Out of Band | Carrier | Calculated | Verdict |
| | | (MHz) | Emission (dBm) | Level | -20dBc Limit | Verdict PASS PASS |
| | 3 | 2422 | -34.05 | -2.43 | -22.43 | PASS |
| | 6 | 2437 | -33.12 | -3.94 | -23.94 | PASS |
| | 9 | 2452 | -34.32 | -4.07 | -24.07 | PASS |

B. Test Plots:

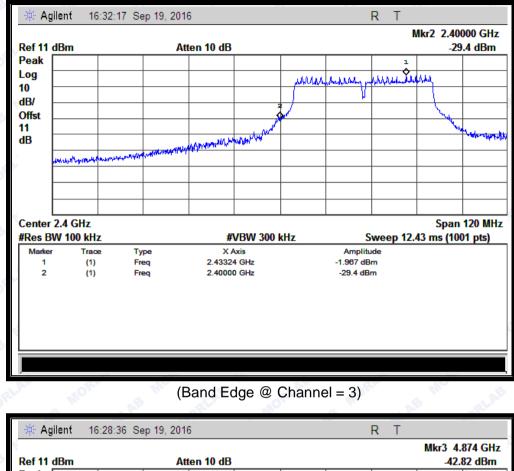
Note: the power of the Module transmitting frequency should be ignored.

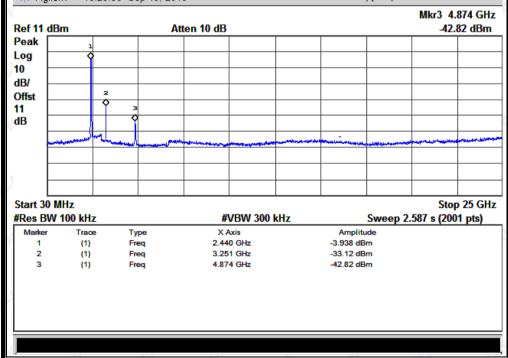


(Channel = 3, 30MHz to 25GHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



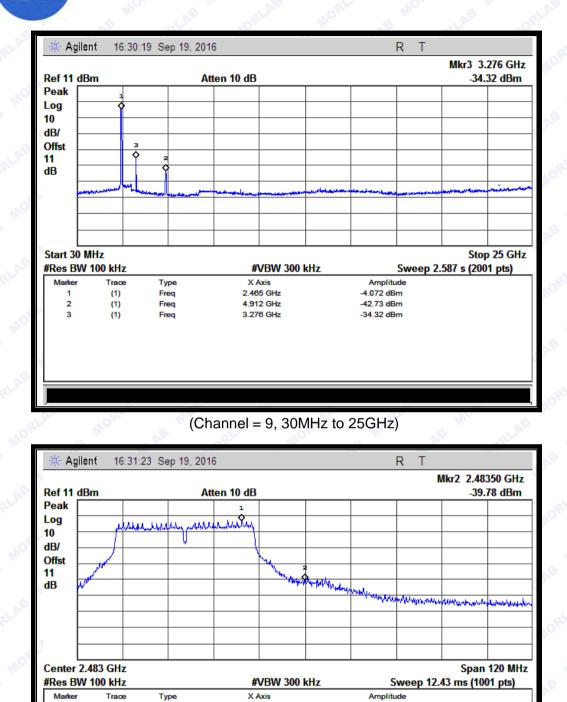


(Channel = 6, 30MHz to 25GHz)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

(Band Edge @ Channel = 9)

2.46694 GHz

2.48350 GHz

(1)

(1)

1

2

MORLAB GROUP

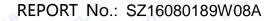
Freq

Freq

-2.525 dBm

-39.78 dBm

Tel: 86-755-36698555 Http://www.morlab.com



2.5 Power spectral density (PSD)

2.5.1 Requirement

MORLAB

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.5.2 Test Description

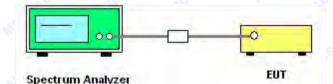
A. Test procedure

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

- a) Set analyzer center frequency to channel center frequency.
- b) Set the span to 30MHz
- c) Set the RBW to 3 kHz
- d) Set the VBW to 10KHz
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

B. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

KDB 558074 Section 10.2 was used in order to prove compliance.

C. Equipments List:

MORLAB GROUP

Please reference ANNEX A(1.5).

FL1-3, Building A, Fei Yang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Http://www.morlab.com



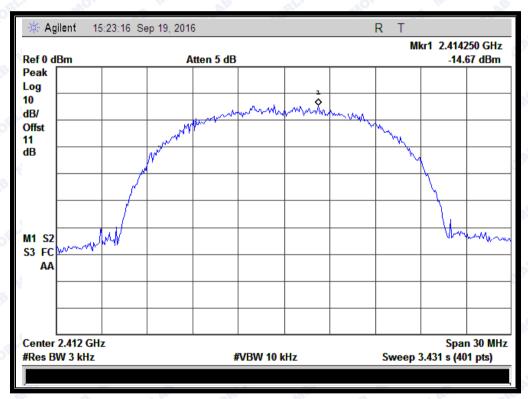
2.5.3 Test Result

2.5.3.1 802.11b Test mode

A. Test Verdict:

| | Spectral power density (dBm/3kHz) | | | | | | |
|----------|-----------------------------------|----------------------------|---------------------|---------|--|--|--|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict | | | |
| 1 | 2412 | -14.67 | 8 | PASS | | | |
| 6 | 2437 | -15.03 | 8 | PASS | | | |
| 11 | 2462 | -14.60 | 8 | PASS | | | |
| Measurem | ent uncertainty: | ±1.3dB | RLAIL MORL | MO | | | |

B. Test Plots:



(Channel = 1 @ 802.11b)

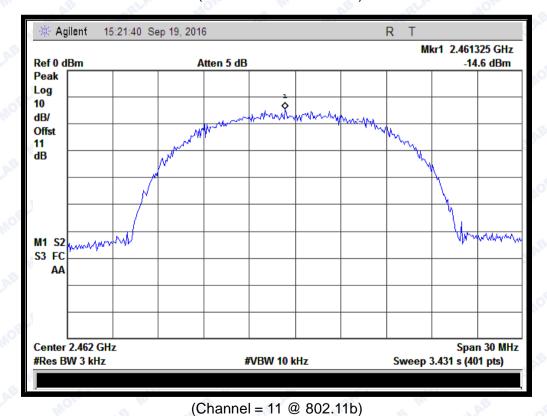
MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

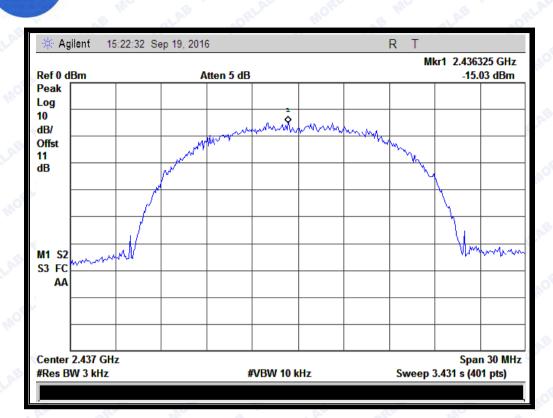
MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com Fax: 86-755-36698525 E-mail: service@morlab.cn



(Channel = 6 @ 802.11b)



REPORT No.: SZ16080189W08A

Page 34 Of 74

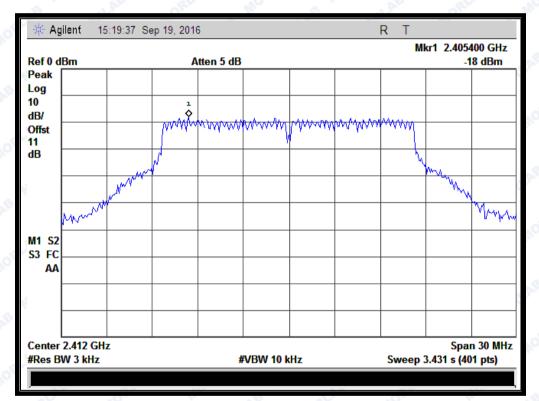


2.5.3.2 802.11g Test mode

A. Test Verdict:

| Spectral power density (dBm/3kHz) | | | | | |
|-----------------------------------|--------------------|----------------------------|---------------------|---------|--|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict | |
| 1 | 2412 | -18.00 | 8 | PASS | |
| 6 | 2437 | -18.39 | 8 | PASS | |
| 11 | 2462 | -18.52 | 8 | PASS | |
| Measurement uncertainty: ±1.3dB | | | | | |

B. Test Plots:



(Channel = 1 @ 802.11g)

MORLAB GROUP

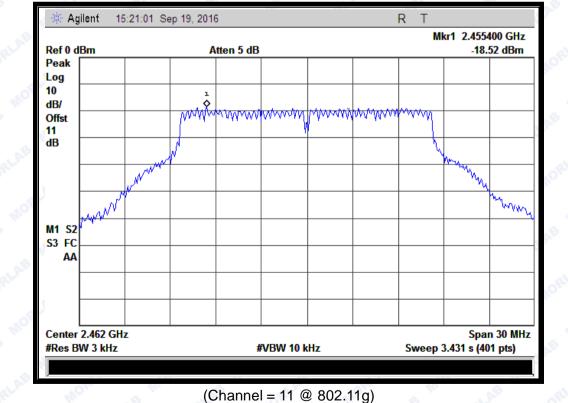
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

MORLAB GROUP

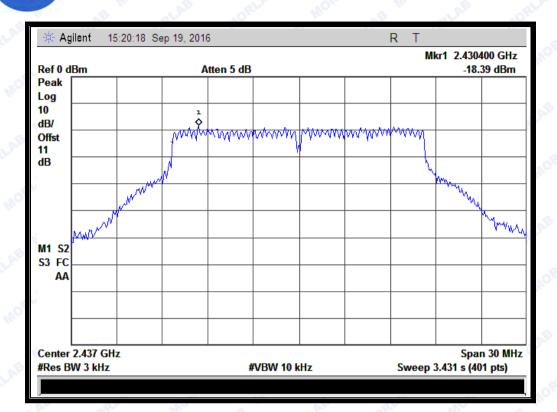
MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

Fax: 86-755-36698525 E-mail: service@morlab.cn



(Channel = 6 @ 802.11g)



REPORT No.: SZ16080189W08A

Page 36 Of 74

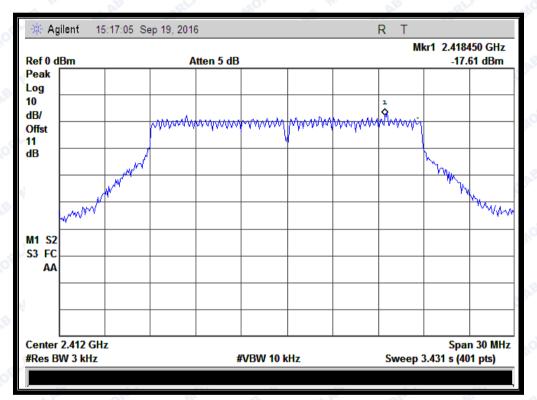


2.5.3.3 802.11n-20MHz Test mode

A. Test Verdict:

| | Spectral power density (dBm/3kHz) | | | | | | | | | | | |
|-----------|-----------------------------------|----------------------------|---------------------|---------|--|--|--|--|--|--|--|--|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict | | | | | | | | |
| 1 1 | 2412 | -17.61 | 8 | PASS | | | | | | | | |
| 6 | 2437 | -16.60 | 8 | PASS | | | | | | | | |
| 11 | 2462 | -16.42 | 8 | PASS | | | | | | | | |
| Measureme | ent uncertainty: | ±1.3dB | MC | aLAL | | | | | | | | |

B. Test Plots:



(Channel = 1 @ 802.11n-20MHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

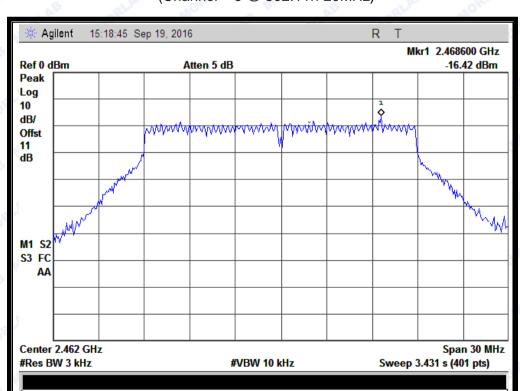
MORLAB GROUP

MORLAE

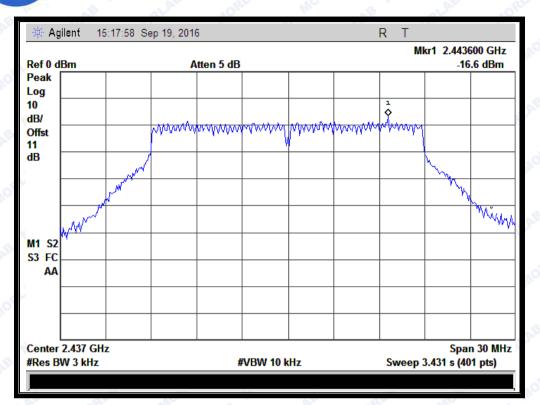
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

(Channel = 11 @ 802.11n-20MHz)

Tel: 86-755-36698555 Http://www.morlab.com Fax: 86-755-36698525 E-mail: service@morlab.cn



(Channel = 6 @ 802.11n-20MHz)



REPORT No.: SZ16080189W08A

Page 38 Of 74

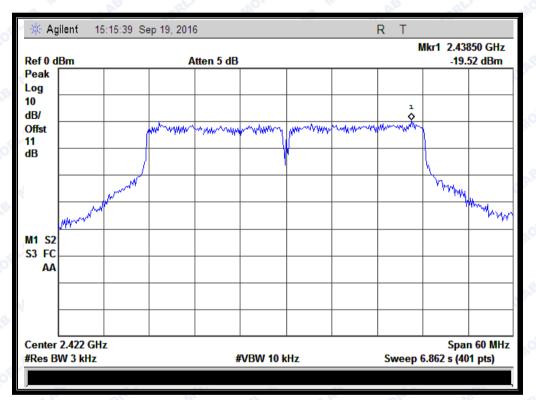


2.5.3.4 802.11n-40MHz Test mode

A. Test Verdict:

| | Spe | ectral power density (dB | Sm/3kHz) | |
|-----------|--------------------|----------------------------|---------------------|---------|
| Channel | Frequency (MHz) | Measured PSD (dBm/3kHz) | Limit (dBm/3kHz) | Verdict |
| 3 | 2422 | -19.52 | 8 | PASS |
| 6 | 2437 | -19.67 | 8 | PASS |
| 9 | 2452 | -20.49 | 8 | PASS |
| Measureme | ent uncertainty: | ±1.3dB | MC | aLAP |

B. Test Plots:



(Channel = 3 @ 802.11n-40MHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

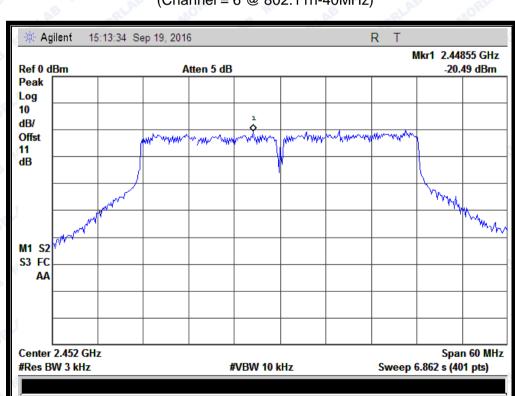
MORLAB GROUP

MORLAE

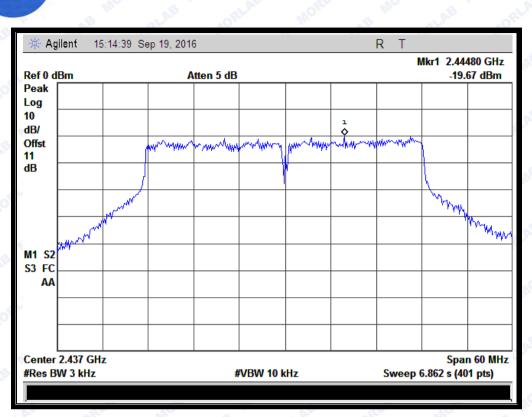
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

(Channel = 9 @ 802.11n-40MHz)

Tel: 86-755-36698555 Http://www.morlab.com Fax: 86-755-36698525 E-mail: service@morlab.cn



(Channel = 6 @ 802.11n-40MHz)



REPORT No.: SZ16080189W08A



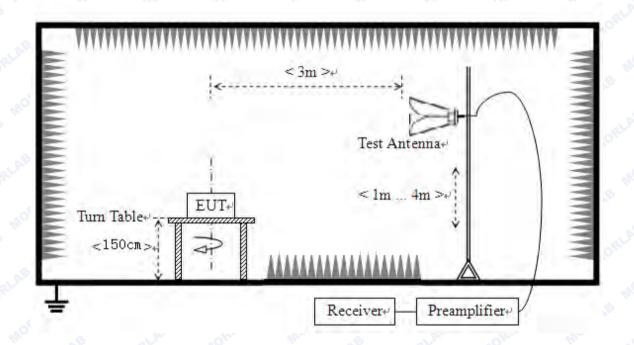
2.6 Restricted Frequency Bands

2.6.1 Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.6.2 Test Description

A. Test Setup



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

KDB 558074 Section 12.1 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.5).

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



2.6.3 Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

E [dB μ V/m] =U_R + A_T + A_{Factor} [dB]; A_T =L_{Cable loss} [dB]-G_{preamp} [dB]

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

2.6.3.1 802.11b Test mode

The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

| _ | | | | | | | | | | |
|----------------|---------|-----------|----------|--------------------------|----------------|---------------------|------------------|----------|---------|--|
| | Channel | Frequency | Detector | Receiver Reading | Α _τ | A _{Factor} | Max. Emission | Limit | Verdict | |
| | | (MHz) | PK/ AV | U _R (dBuV) | (dB) | (dB@3m) | E (dBµV/m) | (dBµV/m) | veruiet | |
| | 1.AB | 2390.00 | PK | 44.43 | -33.63 | 32.56 | 43.36 | 74 | Pass | |
| 3 | 1 MOR | 2390.00 | AV | 33.96 | -33.63 | 32.56 | 32.89 | 54 | Pass | |
| 0 ^R | 11 | 2484.38 | PK | 43.90 | -33.18 | 32.5 | 43.22 | 74 | Pass | |
| | 11 | 2484.38 | AV | 33.14 | -33.18 | 32.5 | 32.46 | 54 | Pass | |

B. Test Plots:

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

| ight Spectrum Analyzer - Swept SA RF PRESEL 50 Ω DC | SENS | ALIGN AUT | 0 06:18:42 AM Sep 28, 2016 | |
|--|---|---|---|--------------|
| er 2 2.390000000000 | | Avg Type: Voltage un Avg Hold:>100/100 | TRACE 123456 | Marker |
| /div Ref 106.00 dBµV | in our meon | | kr2 2.390 00 GHz 44.428 dBµV | Select Marke |
| | | | - And a second | Norr |
| a dat e salke e de sales es | | \$ ¹ | 2 | De |
| | | | | Fixe |
| 2.30000 GHz BW (CISPR) 1 MHz | #VBW 3.0 MHz | Sweep | Stop 2.41200 GHz 1.000 ms (1001 pts) | |
| | Y 184 45 GHz 46.542 dBu 190 00 GHz 44.428 dBu | | TH FUNCTION VALUE | Propertie |
| | | | | - |
| | | | | Me 1 c |

MORLAE

(Plot A1: Channel = 1 PEAK @ 802.11b)



(Plot A2: Channel = 1 AVG @ 802.11b)

 MORLAB GROUP
 FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,

 Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Http://www.morlab.com



MORLAB

(Plot B1: Channel = 11 PEAK @ 802.11b)



(Plot B2: Channel = 11 AVG @ 802.11b)

MORLAB GROUP HL1-3, Building A, Fei Yang Scier Block67, BaoAn District, Shenz

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen, GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

MORLAB

REPORT No.: SZ16080189W08A

2.6.3.2 802.11g Test mode

The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

| | | | <i>G</i> , | <u>o.</u> | | | | 2 | | |
|---|---------|-----------|------------|-------------------------------|----------------|---------------------|------------------|----------|---------|--|
| 2 | Channel | Frequency | Detector | Receiver Reading | A _T | A _{Factor} | Max. Emission | Limit | Vordict | |
| P | Channer | nel (MHz) | PK/ AV | U _R (dB) (dBuV) | | (dB@3m) | E (dBµV/m) | (dBµV/m) | Verdict | |
| 2 | SRLAS | 2390.00 | PK | 44.66 | -33.63 | 32.56 | 43.59 | 74 | Pass | |
| 2 | maline | 2390.00 | AV | 33.64 | -33.63 | 32.56 | 32.57 | 54 | Pass | |
| 0 | 11 | 2484.38 | PK | 43.84 | -33.18 | 32.5 | 43.16 | 74 | Pass | |
| 1 | 11 | 2484.38 | AV | 33.16 | -33.18 | 32.5 | 32.48 | 54 | Pass | |

B. Test Plots:



(Plot C1: Channel = 1 PEAK @ 802.11g)

MORLAB GROUP Block67, BaoAn District, She

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

| Keysight Spectrum Analyzer | | SENSE:INT | ALIGN AUTO | 06:21:33 AM Sep 28, 2016 | |
|--|--------------|----------------------------|--------------------------------------|-------------------------------|--------------|
| Video BW 10 Hz | PNO: Fast | Trig: Free Run | Avg Type: Voltage Avg Hold: 1/100 | TRACE 123456 TYPE MWWWWW | BW |
| | IFGain:Low | Atten: 6 dB | | DEI | Res E |
| 10 dB/div Ref 100. | 00 dBµV | | Mkr | 2 2.390 00 GHz 33.642 dBµV | Auto N |
| 90.0 | | | | | Video B |
| 80.0 | | | | | 10 |
| 70.0 | | | | | Auto M |
| 60.0 | | | | | VBW:3dB R |
| 50.0 | | | | | VEW.JUBRE |
| | | | .1 | 2 | Auto N |
| 40.0 | | | | | |
| 30.0 | | | | | Sport Site R |
| 20.0 | | | | | |
| 10.0 | | | | | |
| Start 2.30000 GHz | | | ^ | Stop 2.41200 GHz | |
| Res BW (CISPR) 1 | MHz #VE | SW 10 Hz | Sweep | 12.84 s (1001 pts) | REV/Comp |
| MKR MODE TRC SCL | X | Y FI | UNCTION FUNCTION WIDTH | FUNCTION VALUE | |
| 1 N 1 f | 2.384 45 GHz | 33.663 dBµV 33.642 dBµV | | | |
| 2 N 1 f | 2.390 00 GHz | 33.642 dBµV | | | |
| 4 | | | | | |
| 5 | | | | | |
| 5 | | | | | |
| | | | | | |
| 6 20 20 20 20 20 20 20 20 20 20 20 20 20 | | | | | |
| 6 7 8 | | | | | |
| 6 7 8 9 10 | | m. | | * | |

MORLAE

MORLAB GROUP

(Plot C2: Channel = 1 AVG @ 802.11g)



(Plot D1: Channel = 11 PEAK @ 802.11g)

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

| RL RF PRESEL 50 Ω DC Video BW 10 Hz | PNO: Fast | SENSE(IN | Avg | ALIGN AUTO Type: Voltage Hold: 2/100 | 06:36:55 AM Sep 28, 20 TRACE 12 3 4 TYPE M WWW DET P. P. N. N | 5 6 WW | BW |
|---|------------------------|---|--------------|--|--|--------------|-----------------------|
| 0 dB/div Ref 100.00 dBµV | IFGain:Low | Atten: 6 dB | | Mkr2 | 2.484 380 GF 33.164 dBµ | 2 | Res BV 1 MH Mai |
| .og 90.0 80.0 | | | | | | Auto | Video BI 10 H |
| 70.0 | | | | | | VBW | 3dB RB |
| 40.0 | | Q ¹ | ² | | | Auto | Ma Line Rei |
| 20.0 | | | | | | 445 | |
| Start 2.46200 GHz Res BW (CISPR) 1 MHz | #VBV | N 10 Hz | | Sweep | Stop 2.50000 GH 4.357 s (1001 pt | iz s) ABI | |
| | 1 684 GHz 4 380 GHz | Y <u>33.657 dBµ</u> V 33.164 dBµV | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | Î | |
| 5 6 7 8 | | | | | | E | |
| 9 | | | | | | | |

(Plot D2: Channel = 11 AVG @ 802.11g)

2.6.3.3 802.11n-20MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

MORLAE

| 2 | Channel | Frequency (MHz) | Detector | Receiver Reading U _R | A _T (dB) | A _{Factor} (dB@3m) | Max. Emission E | Limit (dBµV/m) | Verdict |
|---|---------|--------------------|----------|---------------------------------------|------------------------|--------------------------------|-----------------------|-------------------|---------|
| | | | PK/ AV | (dBuV) | | | (dBµV/m) | | |
| | 1,108 | 2390.00 | PK | 44.41 | -33.63 | 32.56 | 43.34 | 74 | Pass |
| ø | RLA 1 | 2390.00 | AV | 33.63 | -33.63 | 32.56 | 32.56 | 54 | Pass |
| ~ | 11 | 2484.38 | PK 🔬 | 43.90 | -33.18 | 32.5 | 43.22 | 74 | Pass |
| | 11 | 2484.38 | AV | 33.15 | -33.18 | 32.5 | 32.47 | 54 | Pass |

B. Test Plots:

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

| Marker | 5:22:29 AM Sep 28, 2016 | | | ENSE:INT | SI | | - Swept SA 50 Ω DC | PRESEL | RF | RL |
|--------------|---|----------------------------------|--------|------------|--|--|-----------------------|----------------|-------|----------------|
| Select Marke | TRACE 123456 TYPE MWWWWW DET PPNNNN | : Voltage >100/100 | | | Trig: Fre | CHZ PNO: Fast IFGain:Low | 0000000 | .3900 | r 2 2 | rker |
| ocicormant | .390 00 GHz I4.406 dBµV | Mkr2 | | | | | .00 dBµV | Ref 10 | iv | dB/di |
| Norm | | | | | | | | | | |
| De | - Andrewski | ∆ 1 ↓ ² | | er Martine | and the second | ารายการการการการการการการการการการการการการก | und April Marked | montphe | monte | |
| Fixe | | | | | | | | | | |
| | p 2.41200 GHz 0 ms (1001 pts) | Sweep 1.0 | | z | W 3.0 MH: | #VB | | 00 GH: SPR) | V (CI | s BV |
| | FUNCTION VALUE | ICTION WIDTH | NCTION | | Y 44.818 d 44.406 d | 80 42 GHz 90 00 GHz | | SCL f | E TRC | MODI N N |
| Propertie | E. | | | | | | | | | |
| Mo 1 c | | | | | | | | | | |
| T C | | | | | m | | | | | |

(Plot E1: Channel = 1 PEAK @ 802.11n-20)



(Plot E2: Channel = 1 AVG @ 802.11n-20)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



(Plot F1: Channel = 11 PEAK @ 802.11n-20)



(Plot F2: Channel = 11 AVG @ 802.11n-20)

MORLAB GROUP

MORLAB

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

MORLAB,

REPORT No.: SZ16080189W08A

2.6.3.4 802.11n-40MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

| 2 | Channel | Frequency | Detector | Receiver Reading | A _T | A _{Factor} | Max. Emission | Limit | Verdict |
|---|---------|-----------|----------|--------------------------|----------------|---------------------|------------------|----------|---------|
| P | | (MHz) | PK/ AV | U _R (dBuV) | (dB) | (dB@3m) | E (dBµV/m) | (dBµV/m) | |
| ~ | 3 | 2390.00 | PK | 43.60 | -33.63 | 32.56 | 42.53 | 74 | Pass |
| | 3 | 2390.00 | AV | 33.63 | -33.63 | 32.56 | 32.56 | 54 | Pass |
| 0 | 9 | 2484.38 | РК | 42.78 | -33.18 | 32.5 | 42.1 | 74 | Pass |
| 2 | 9 | 2484.38 | AV | 33.15 | -33.18 | 32.5 | 32.47 | 54 | Pass |
| | at Ar | oh | nn- | 2 | | Official | NI C | | |

B. Test Plots:

MORLAB GROUP



(Plot E1: Channel = 3 PEAK @ 802.11n-40)

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

| Video BW 10 Hz PNO: Fast PNO: Fast Free Run Atten: 6 dB 10 dB/div Ref 100.00 dBµV Log | RL | | nalyzer - Sv EL 50 S | | | | | SENSE:IN | т | A | LIGN AUTO | | AM Sep 28, 2 | | | |
|---|--|-----|-------------------------|--------|---------------|---------|---------|----------|----------|------|-------------|--------------------|--------------------|-----------|------|--------------------|
| 0 dB/div Ref 100.00 dBµV 33.632 dBµV 0 dB/div Ref 100.00 dBµV 33.632 dBµV 0 dB/div Image: Constraint of the second | ideo BV | | | | PNO: IFGai | :Fast G | | | | | | TF | TYPE MAAAAA | WWW | | BW Res E |
| 900 900 <th>) dB/div</th> <th>Ref</th> <th>100.0</th> <th>0 dBµ\</th> <th>/</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Mkr</th> <th>2 2.39 33.6</th> <th>0 00 GI 32 dBj</th> <th>Hz JV</th> <th>Auto</th> <th>1 M M</th> |) dB/div | Ref | 100.0 | 0 dBµ\ | / | | | | | | Mkr | 2 2.39 33.6 | 0 00 GI 32 dBj | Hz JV | Auto | 1 M M |
| 700 | 90.0 | | | | | | | | | | | | 1 | | Auto | Video E 10 M |
| 600 1 2 Auto 400 1 2 Auto 300 1 1 2 300 1 1 2 1 1 1 2 1 1 1 2 1 1 1 2 1 1 1 2 1 1 1 2 3 3 3 3 4 1 1 1 6 1 1 1 | | | | | | | | | | | | | | | - | - |
| 400 300 400 <td>50.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>۸1</td> <td>2</td> <td></td> <td></td> <td></td> <td>1.500 KE 1 N</td> | 50.0 | | | | | | | | | | ۸ 1 | 2 | | | | 1.500 KE 1 N |
| 10.0 Stop 2.41200 GHz Res BW (CISPR) 1 MHz #VBW 10 Hz Sweep 12.34 s (1001 pts) MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH 1 1 1 2.380.42 GHz 33.255 dBµV 1000 GHz 2 N 1 f 2.390.00 GHz 33.632 dBµV 1000 GHz 3 4 4 4 4 4 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 <td>11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>◊</td> <td>-</td> <td></td> <td></td> <td>Epo</td> <td>1 SHE RE</td> | 11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1 | | | | | | | | | | ◊ | - | | | Epo | 1 SHE RE |
| Xes BW (CISPR) 1 MHz #VBW 10 Hz Sweep 12.84 s (1001 pts) MKR MODE TRC SCL X Y FUNCTION FUNCTION VALUE 1 N 1 f 2.380 42 GHz 33.255 dBµV FUNCTION VIDTH FUNCTION VALUE 2 N 1 f 2.390 00 GHz 33.632 dBµV E 3 4 5 | | | | | | | | | | | | | | | aue. | |
| 1 N 1 f 2.380.42 GHz 33.255 dBµV 2 N 1 f 2.390.00 GHz 33.632 dBµV 3 | | | | IHz | | #VBV | V 10 Hz | | <u>`</u> | | Sweep | Stop 2. 12.84 s | 41200 G (1001 p | Hz ts) | | A Come |
| | | | | | 80 42 0 | GHz | | dBµV | FUNCTION | FUNC | CTION WIDTH | FUNC | TION VALUE | ŕ | | |
| | 3 | 1 f | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | н | | |
| | 8 | | | | | | | | | | | | | | | |
| | - | | | | | | III - | | | | | | | - | | |

(Plot E2: Channel = 3 AVG @ 802.11n-40)



(Plot F1: Channel = 9 PEAK @ 802.11n-40)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

| Keysight Spectrum Analyzer - Swept SA RL RF PRESEL 50 Ω DC Video BW 10 Hz | PNO: Fast | SENSE:II | Avg | ALIGN AUTO Type: Voltage Hold: 1/100 | 06:38:31 AM Sep 28, 2 TRACE 1234 TYPE MWWW DET P. P. N. | 5.6 | BW |
|---|--------------------|----------------------------|----------|--|--|------|-----------------------|
| 10 dB/div Ref 100.00 dBµV | IFGain:Low | Atten: 6 dB | | and a set | 2.484 380 G 33.147 dB | | Res BI 1 M⊢ Ma |
| 900 800 | | | | | | Auto | Video B 10 F Ma |
| 70.0 60.0 50.0 | | | | | | VBV | V:3dB RB 10 Ma |
| 40.0 30.0 20.0 | | | 2 | | | | n Chie Re Th |
| 10.0 Start 2.46200 GHz Res BW (CISPR) 1 MHz | #//₽ | V 10 Hz | | Guyaan | Ŝtop 2.50000 G 4.357 s (1001 p | Hz | ni A Contri |
| | #VDV | Y TU HZ | FUNCTION | FUNCTION WIDTH | 4.337 S (1001 p | | |
| 2 N 1 f 2.484 | 216 GHz 380 GHz | 33.272 dBµV 33.147 dBµV | | | | | |
| 4 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 | | | | | | E | |
| 8 9 9 10 | | | | | | 1 | |
| 11 | | m | | | | | |

(Plot F2: Channel = 9 AVG @ 802.11n-40)

MORLAB GROUP

MORLAE

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

2.7 Conducted Emission

2.7.1 Requirement

MORLAE

According to FCC section 15.207, 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μ H/50 Ω line impedance stabilization network (LISN).

| Frequency range | Conducted Limit (dBµV) | | | | |
|-----------------|------------------------|----------|--|--|--|
| (MHz) | Quai-peak | Average | | | |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 | | | |
| 0.50 - 5 | 56 | 46 | | | |
| 5 - 30 | 60 | 50 | | | |

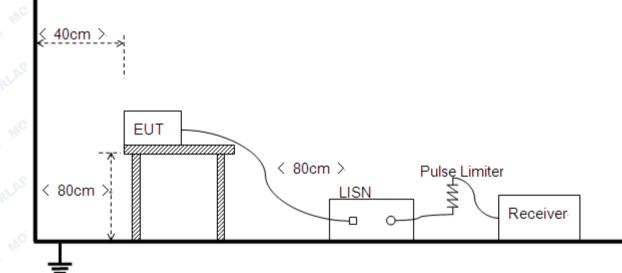
NOTE:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 0.50MHz.

2.7.2 Test Description

A. Test Setup:

MORLAB GROUP



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10 2013.

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

MORLAB

REPORT No.: SZ16080189W08A

B. Equipments List:

Please reference ANNEX A(1.5).

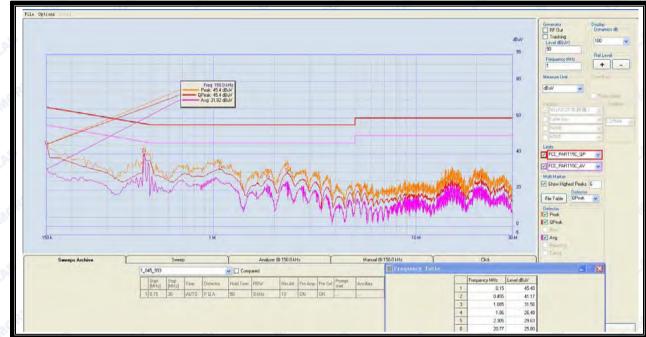
2.1.1 Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

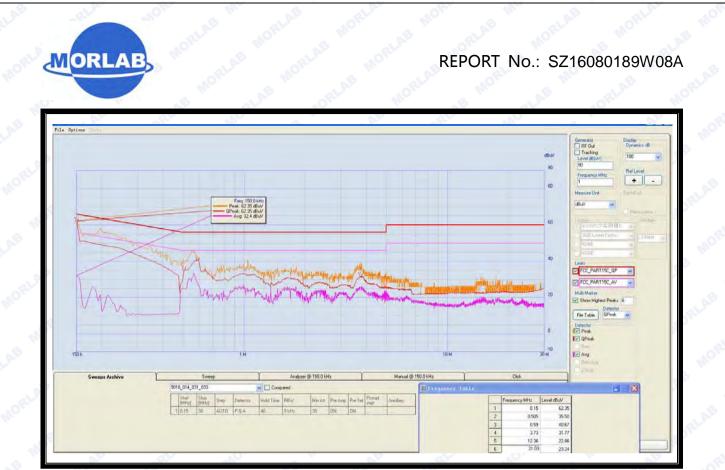
A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

B. Test Plots:



(Plot A: L Phase)



(Plot B: N Phase)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



2.8 Radiated Emission 2.8.1 Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

- For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
- For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

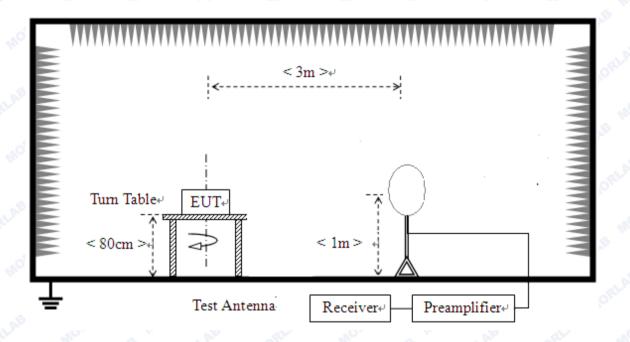


2.8.2 Test Description

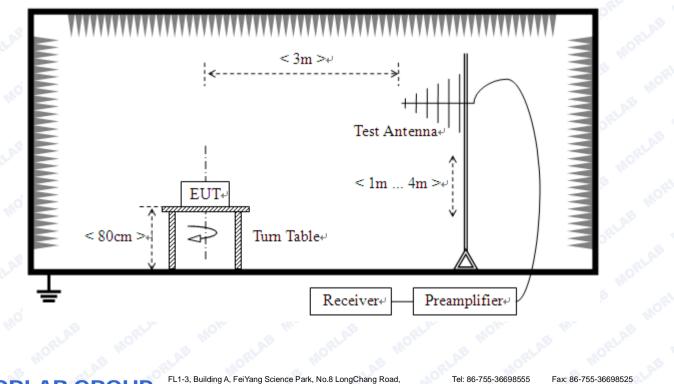
A. Test Setup:

MORLAB GROUP

1) For radiated emissions from 9kHz to 30MHz



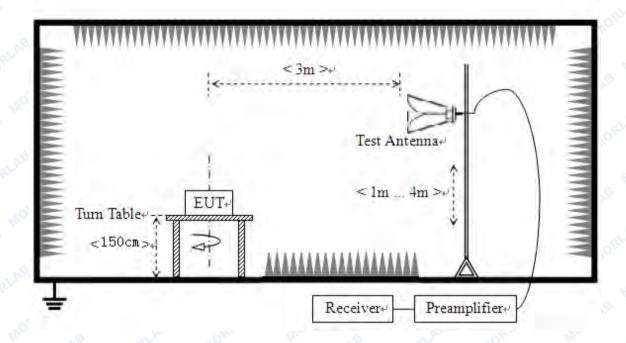
2) For radiated emissions from 30MHz to1GHz



FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading

For the Test Antenna:

MORLAB GROUP

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna.

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

ORLAB

Please reference ANNEX A(1.5).

2.8.3 Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

MORLAB GROUP

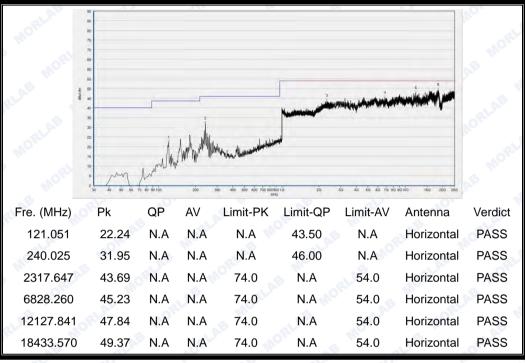
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



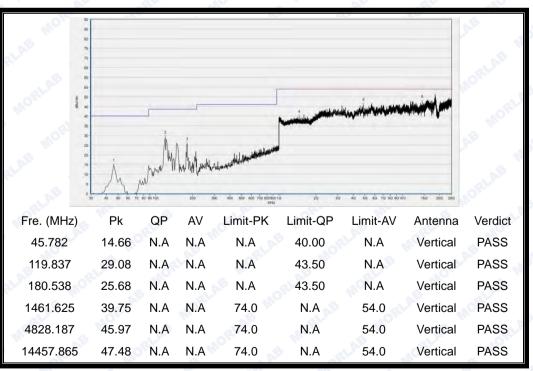
2.8.3.1 802.11b Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



(Antenna Horizontal, 30MHz to 25GHz)



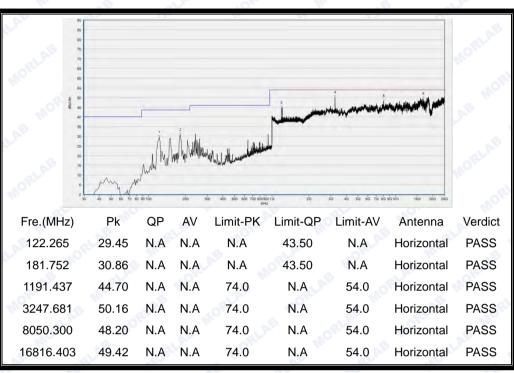
(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

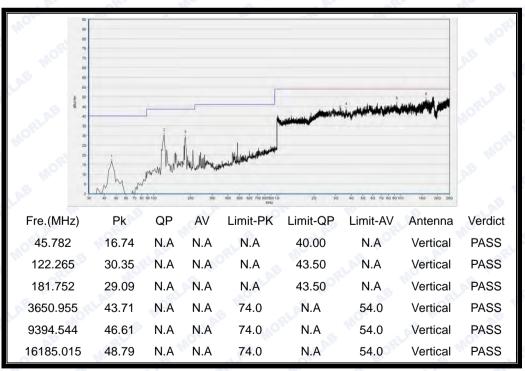
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plot for Channel = 6



(Antenna Horizontal, 30MHz to 25GHz)



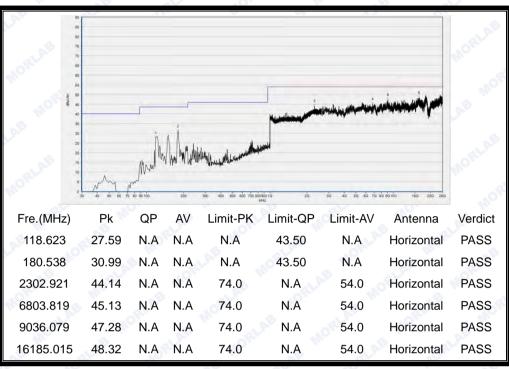
(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

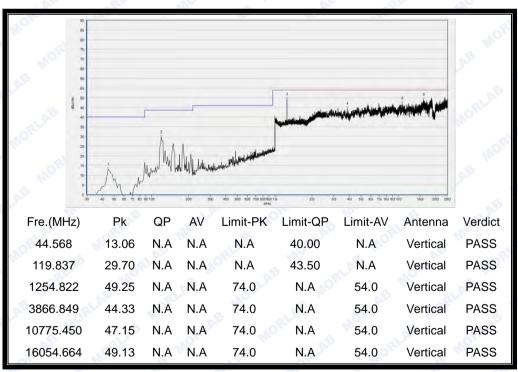
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plot for Channel = 11



(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

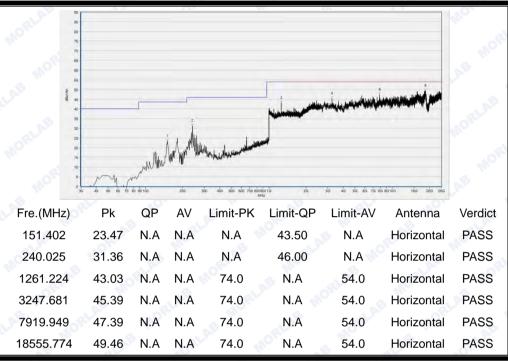
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



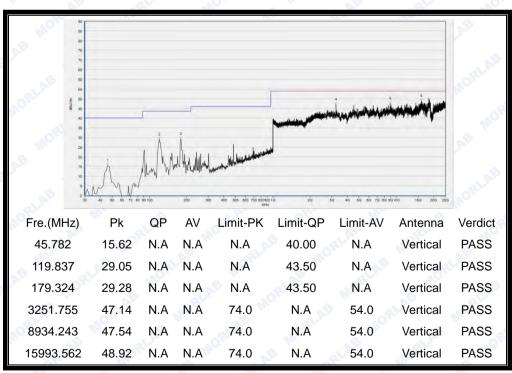
2.8.3.2 802.11g Test mode

A. Test Plots for the Whole Measurement Frequency Range:





(Antenna Horizontal, 30MHz to 25GHz)



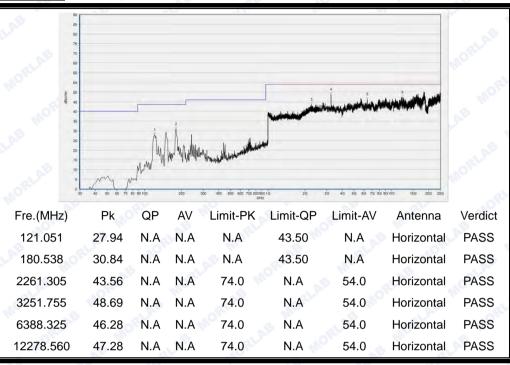
(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

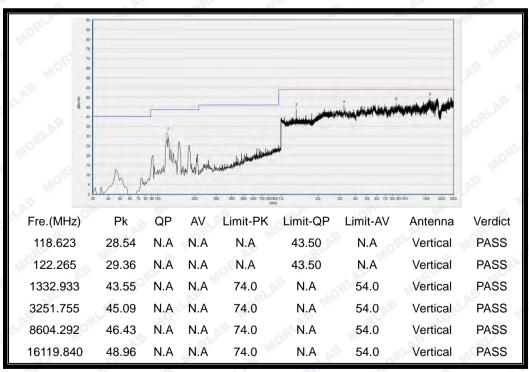
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plot for Channel = 6



(Antenna Horizontal, 30MHz to 25GHz)



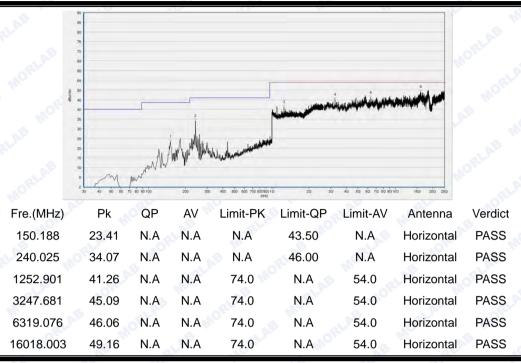
(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

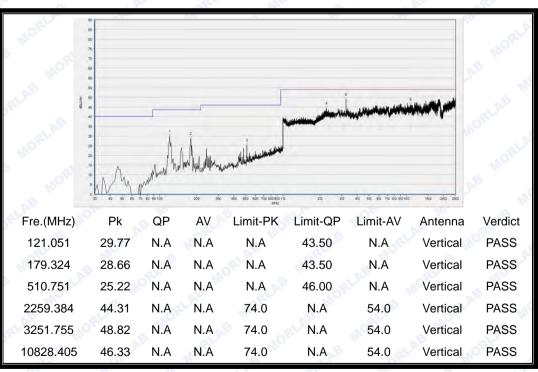
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plot for Channel = 11



(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

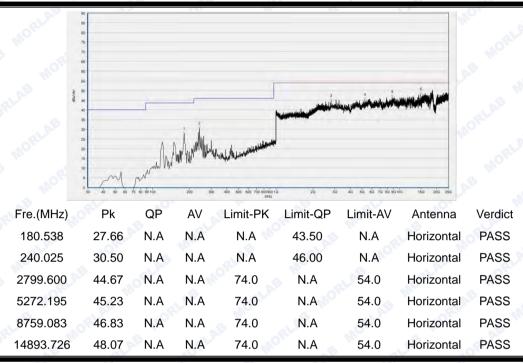
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



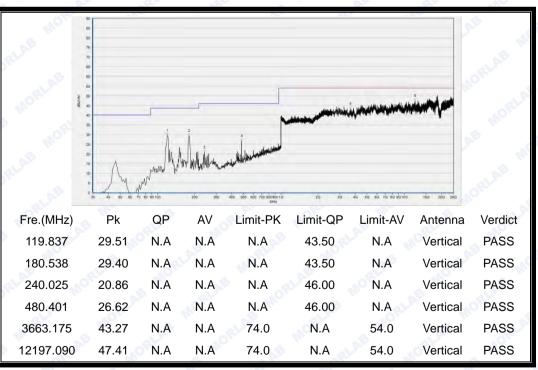
2.8.3.3 802.11n-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



(Antenna Horizontal, 30MHz to 25GHz)



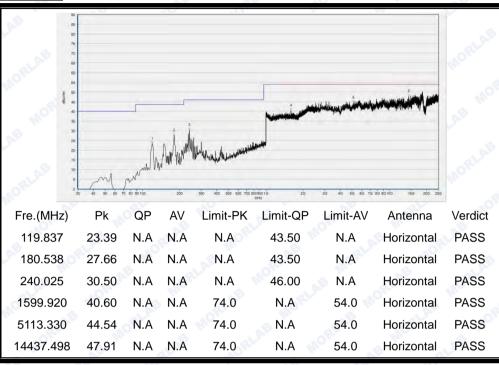
(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

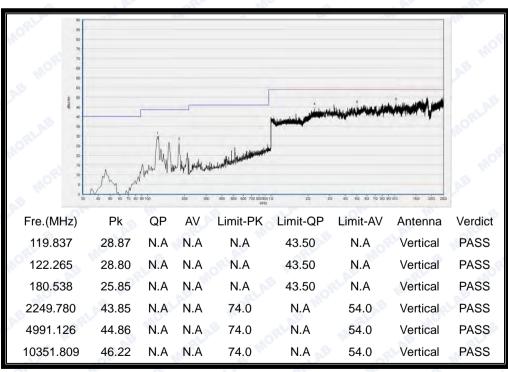
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plot for Channel = 6



(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)

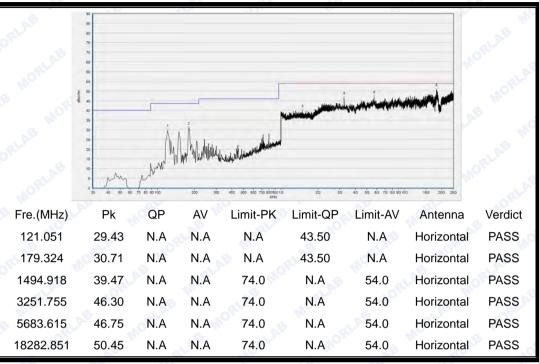
MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

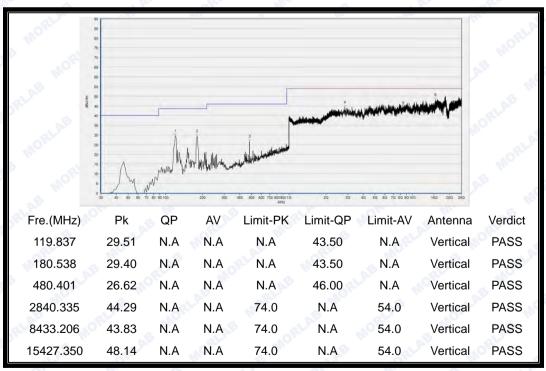
MORLAB

REPORT No.: SZ16080189W08A

Plot for Channel = 11



(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com

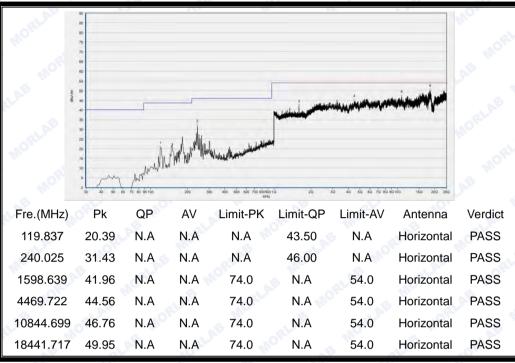
MORLAB

REPORT No.: SZ16080189W08A

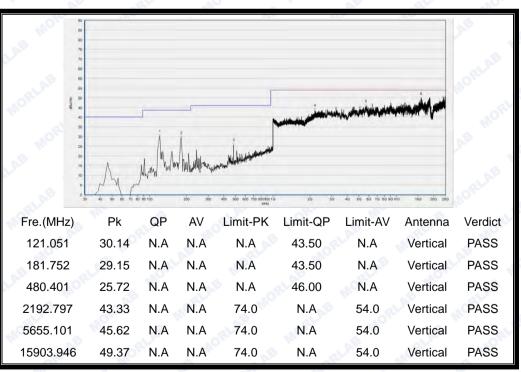
2.8.3.4 802.11n-40MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 3



(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



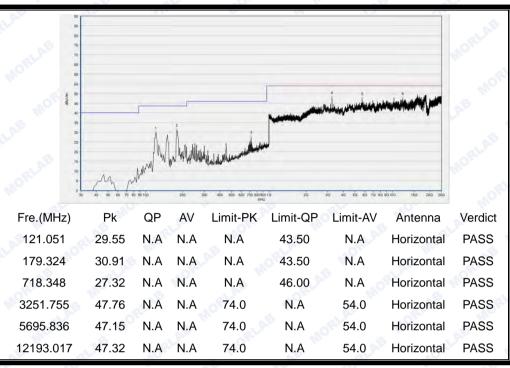
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

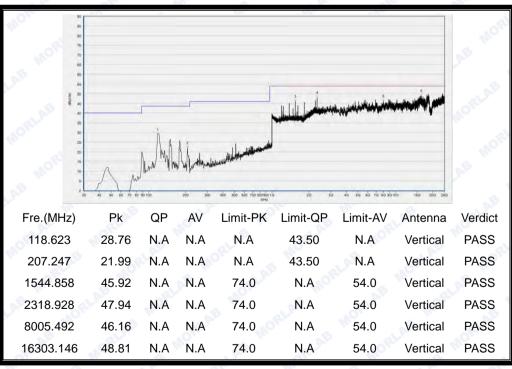
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plots for Channel = 6



(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



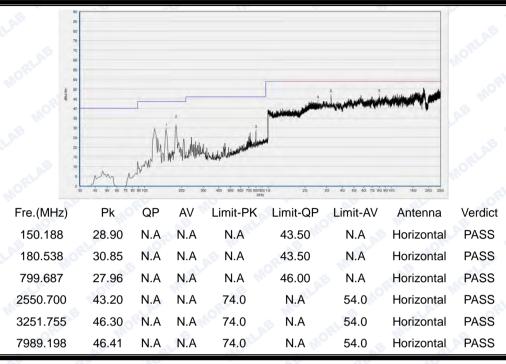
(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

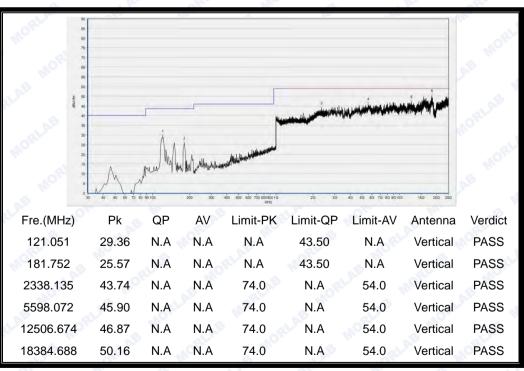
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



Plots for Channel = 9



(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com



ANNEX A GENERAL INFORMATION

1.1 Identification of the Responsible Testing Laboratory

| Company Name: | Shenzhen Morlab Communications Technology Co., Ltd.Morlab Laboratory | | | | |
|-------------------------------|--|--|--|--|--|
| Department: | | | | | |
| Address: | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China | | | | |
| Responsible Test Lab Manager: | Mr. Su Feng | | | | |
| Telephone: | +86 755 36698555 | | | | |
| Facsimile: | +86 755 36698525 | | | | |

1.2 Identification of the Responsible Testing Location

| Name: | Shenzhen Morlab Communications Technology Co., Ltd. |
|---------------|--|
| RLAT MORT S M | Morlab Laboratory |
| Address: | FL.3, Building A, FeiYang Science Park, No.8 LongChang |
| MORL MC A | Road, Block 67, BaoAn District, ShenZhen, GuangDong |
| RLAD MORL | Province, P. R. China |

1.3 Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.1, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10 2013 and CISPR Publication 22; the FCC registration number is 695796.

1.4 Maximum measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

| Measurements | Frequency | Uncertainty |
|-------------------------|----------------|-------------|
| Conducted emissions | 9KHz~30MHz | 2.44dB |
| AB SLAP AOR | 30MHz~200MHz | 2.93 |
| Dedicted whom here with | 200MHz~1000MHz | 2.95 |
| Radiated emissions | 1GHz~18GHz | 2.26 |
| MOT AB MALAB | 18GHz~40GHz | 1.94 |

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com Fax: 86-755-36698525 E-mail: service@morlab.cn

Page 72 Of 74

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

1.5 Test Equipments Utilized

MORLAE

1.5.1 Conducted Test Equipments

| Conducted Test Equipment | | | | | | | | |
|--------------------------|------------------------------|------------|---------|--------------|------------|------------|--|--|
| No. | Equipment Name | Serial No. | Туре | Manufacturer | Cal. Date | Cal. Due | | |
| 1 | Spectrum Analyzer | MY45101810 | E4407B | Agilent | 2016.03.02 | 2017.03.01 | | |
| 2 | USB Wideband Power Sensor | MY54210011 | U2021XA | Agilent | 2016.03.02 | 2017.03.01 | | |
| 3 | EXA Signal Analzyer | MY53470838 | N9010A | Agilent | 2016.03.02 | 2017.03.01 | | |
| 4 | RF cable | CB01 | RF01 | Morlab | N/A | N/A | | |
| 5 | Attenuator | (n.a.) | 10dB | Resnet | N/A | N/A | | |
| 6 | SMA connector Note | CN01 | RF03 | HUBER-SUHNER | N/A | N/A | | |

Note: The SMA antenna connector is soldered on the PCB board in order to perform conducted tests and this SMA antenna connector is listed in the equipment list.

1.5.2 Radiated Test Equipments

| Radiated Test Equipments | | | | | | | | |
|--------------------------|-----------------------------|------------|-------------|---------------|------------|-----------------|--|--|
| No | Equipment Name | Serial No. | Туре | Manufacturer | Cal. Date | Cal.Due Date | | |
| 1 📢 | System Simulator | GB45360846 | 8960-E5515C | Agilent | 2016.03.02 | 2017.03.01 | | |
| 2 | Receiver | MY54130016 | N9038A | Agilent | 2016.03.02 | 2017.03.01 | | |
| 3 | Test Antenna - Bi-Log | N/A | VULB9163 | Schwarzbeck | 2016.03.02 | 2017.03.01 | | |
| 4 | Test Antenna - Horn | 9170C-531 | BBHA9170 | Schwarzbeck | 2016.03.02 | 2017.03.01 | | |
| 5 | Test Antenna - Loop | 1519-022 | FMZB1519 | Schwarzbeck | 2016.03.02 | 2017.03.01 | | |
| 6 | Test Antenna - Horn | 71688 | BBHA 9120D | Schwarzbeck | 2016.03.02 | 2017.03.01 | | |
| 7 | Coaxial cable(N male) | CB02 | EMC02 | Morlab | N/A | N/A | | |
| 8 | Coaxial cable(N male) | CB03 | EMC03 | Morlab | N/A | N/A | | |
| 9 | 1-18GHz pre-Amplifier | MA02 | TS-PR18 | Rohde&Schwarz | 2016.03.02 | 2017.03.01 | | |
| 10 | 18-26.5GHz pre-Amplifier | MA03 | TS-PR18 | Rohde&Schwarz | 2016.03.02 | 2017.03.01 | | |

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com Fax: 86-755-36698525 E-mail: service@morlab.cn

Page 73 Of 74



1.5.3 Climate Chamber

| Clima | te Chamber | .B ORL. | MOL | S M | AB ORLAN | MOL |
|-------|-----------------|------------|---------|--------------|------------|--------------|
| No. | Equipment Name | Serial No. | Туре | Manufacturer | Cal.Date | Cal.Due Date |
| 1 | Climate Chamber | 2004012 | HL4003T | Yinhe | 2016.03.02 | 2017.03.01 |

1.5.4 Vibration Table

| | Vibra | ation Table | BORLA | MON | B M LAB | ORLAN | MOL & M |
|-----|-------|-----------------|------------|-------------------|--------------|------------|--------------|
| | No. | Equipment Name | Serial No. | Туре | Manufacturer | Cal.Date | Cal.Due Date |
| 010 | 1 | Vibration Table | N/A | ACT2000- S015L | CMI-COM | 2016.03.02 | 2017.03.01 |

1.5.5 Anechoic Chamber

| Ane | choic Chamber | A MIL | AB | LAT MORT | A MAC D | BRLAD |
|-----|------------------|------------|----------|--------------|------------|--------------|
| No. | Equipment Name | Serial No. | Туре | Manufacturer | Cal.Date | Cal.Due Date |
| 1 | Anechoic Chamber | N/A | 9m*6m*6m | Changning | 2016.03.02 | 2017.03.01 |

1.5.6 Auxiliary Test Equipment

| Auxil | iary Test Equipment | Nr. | SB. | at a not | Mrs | B at A |
|-------|---------------------|------------|--------|--------------|----------|--------------|
| No. | Equipment Name | Serial No. | Туре | Manufacturer | Cal.Date | Cal.Due Date |
| 1 | Computer | N.A | PU500C | Asus | N.A | N.A |

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

MORLAB GROUP

FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com