

FCC RF TEST REPORT

APPLICANT

Fourier Systems Inc

PRODUCT NAME

Tablet PC

MODEL NAME

ENTAB2, einstein II+, E892

TRADE NAME

einstein

BRAND NAME

einstein

FCC ID

2AAKDEINSX02

STANDARD(S)

47 CFR Part 15 Subpart C

ISSUE DATE

2016-11-15

SHENZHEN MORLAB COMMUNICATIONS ECHNOLOGY Co., Ltd.

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	Change History					
Issue	Issue Date Reason for change					
1.0	1.0 2016-11-15 First edition					
, as	-RLAB	MORE MO. NE . LELAN MORE MO. NE W.				



TEST REPORT DECLARATION

Applicant	Fourier Systems Inc		
Applicant Address	16 Hamelacha Street, Rosh Ha'ayin 48091,Israel		
Manufacturer Address	Shenzhen Chuangwei Electronic Appliance Tech Co., Ltd.		
Manufacturer	4/F,6/F South, Skyworth Industrial Park, Shiyan Bao'an District, Shenzhen, Guangdong		
Product Name	Tablet PC		
Model Name	ENTAB2, einstein II+, E892		
Brand Name	einstein		
HW Version	V10		
SW Version	5.1.1		
Test Standards	47 CFR Part 15 Subpart C		
Test Date	2016-10-31 to 2016-11-16		
Test Result	PASS		

Tested by	· · ·	Zou	-am	
		Zou Jia	an	

Qiu Xiaojum Reviewed by

Qju Xiaojun

Approved by Peng Huarui



1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

Company:	Fourier Systems Inc
Address	16 Hamelacha Street, Rosh Ha'ayin 48091,Israel

1.2 Equipment under Test (EUT) Description

Brand Name:	einstein
Trade Name:	einstein
Model Name:	ENTAB2, einstein II+, E892
Frequency Range:	802.11b/g/n-20MHz: 2.412GHz - 2.462GHz
Channel Number:	802.11b/g/n-20MHz: 11
Modulation Type:	DSSS, OFDM
Antenna Type:	FPC Antenna
Antenna Gain:	2.57 dBi

NOTE:

 The EUT is a Tablet PC, it's 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).

- 2. The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT continuous transmission.
- 3. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

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	V10	5.1.1



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	Document Title
ď	1	47 CFR Part 15	Radio Frequency Devices
	a RI	(10-1-15 Edition)	INC. AE GRIAL MORL

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	Oct 31, 2016	PASS
3	15.247(a)	Bandwidth	Oct 31, 2016	PASS
4,0	15.247(d)	Conducted Spurious Emission and Band Edge	Oct 31, 2016	PASS
5	15.247(d)	Restricted Frequency Bands	Nov 11&16, 2016	PASS
6	15.207	Conducted Emission	Nov 11, 2016	PASS
7 MOR	15.209 ,15.247(d)	Radiated Emission	Nov 11&16, 2016	PASS
8	15.247(e)	Power spectral density (PSD)	Oct 31, 2016	PASS

The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013 and KDB558074 D01 v03r05 (04/08/2016).

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



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 exceed 1 Watt.

2.2.2 Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

A. Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; 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:

Please reference ANNEX A(1.5)





2.2.3 Test Result

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

2.2.3.1 802.11b Test Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Vordict
		dBm	W	dBm	W	Verdict
) 1 _(R)	2412	16.12	0.0409	30	AB	PASS
6	2437	16.35	0.0432		10 ⁸ 1	PASS
11	2462	16.45	0.0442		al	PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
aLA 1	2412	13.74	0.0237	Mo.	- al	PASS
6	2437	13.97	0.0249	30	1,10	PASS
11	2462	14.02	0.0252	OB W	LAB	PASS

2.2.3.2 802.11g Test mode

Channal	Fragues ev (MHz)	Measured C	output Peak Power	Limi	t	\/ordiot
Channel	Frequency (MHz)	dBm	W	dBm	W	Verdict
1	2412	21.68	0.1472	Bry	-0	PASS
6	2437	21.97	0.1574	30	1	PASS
311	2462	21.89	0.1545	MORE	du ,	PASS

Channel	Frequency (MHz)	Measure	d Output Average Power	Limi	t	Verdict
		dBm	W	dBm	W	
A [©] 1	2412	13.05	0.0202	MORE	HU.	PASS
6	2437	13.16	0.0207	30	108	PASS
11	2462	13.13	0.0206	Mo	o.B	PASS



2.2.3.3 802.11n-20MHz Test mode

	`honnol	Fragues ov (MHz)	Measured C	Output Peak Power	Limi	t	\/ordiot
	Channel	Frequency (MHz)	dBm	W	dBm	W	Verdict
	1	2412	20.83	0.1211	ORLA	Mole	PASS
OR!	6	2437	20.73	0.1183	30	1 081	PASS
N.	11	2462	20.67	0.1167	MORL	S W	PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1,48	2412	12.15	0.0164	MORE	Z W	PASS
6	2437	11.92	0.0156	30	1	PASS
11 📣	2462	11.88	0.0154	AL MO	A.B	PASS



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 EUT.



2.3.3.1 802.11b Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1_RLA	2412	9.057	≥500	PASS
6	2437	8.581	≥500	PASS
11	2462	9.055	≥500	PASS



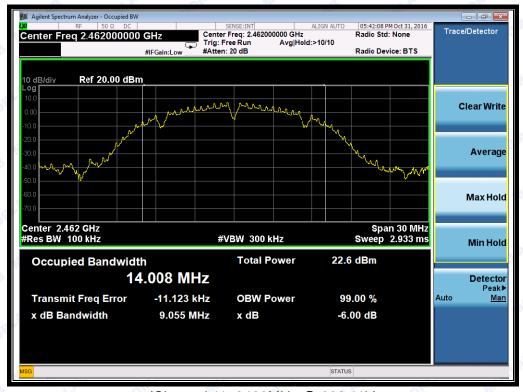
(Channel 1: 2412MHz @ 802.11b)







(Channel 6: 2437 MHz @ 802.11b)



(Channel 11: 2462MHz @ 802.11b)

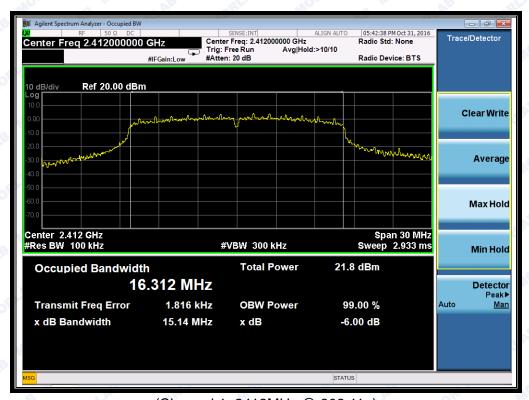




2.3.3.2 802.11g Test mode

A. Test Verdict:

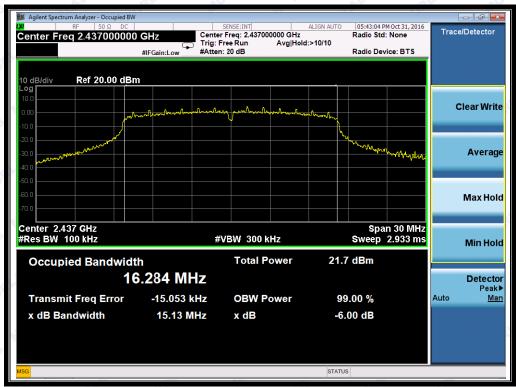
Channal	Frequency	6 dB Bandwidth	Limits	Dogult
Channel	(MHz)	(MHz)	(kHz)	Result
ALA	2412	15.14	≥500	PASS
6	2437	15.13	≥500	PASS
11,108	2462	15.13	≥500	PASS



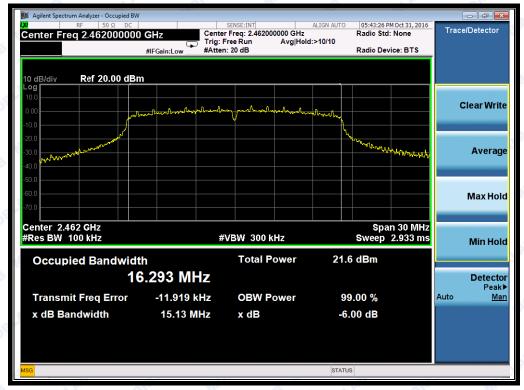
(Channel 1: 2412MHz @ 802.11g)







(Channel 6: 2437MHz @ 802.11g)



(Channel 11: 2462MHz @ 802.11g)

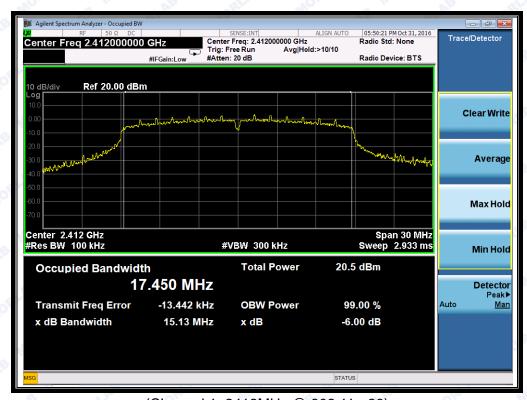




2.3.3.3 802.11n-20 Test mode

A. Test Verdict:

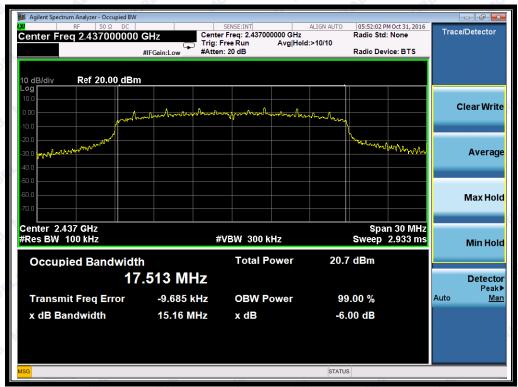
Channel	Frequency	6 dB Bandwidth	Limits	Result
	(MHz)	(MHz)	(kHz)	
1 _{RLA}	2412	15.13	≥500	PASS
6	2437	15.16	≥500	PASS
11 ,,1019	2462	15.14	≥500	PASS



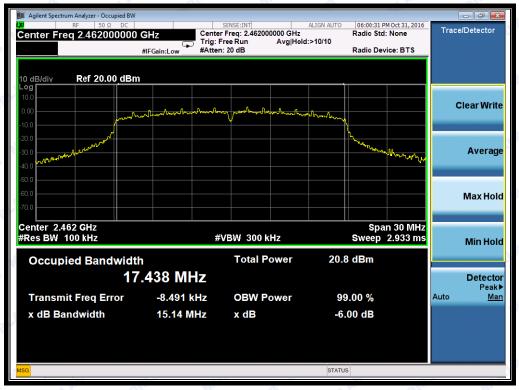
(Channel 1: 2412MHz @ 802.11n-20)







(Channel 6: 2437MHz @ 802.11n-20)



(Channel 11: 2462MHz @ 802.11n-20)





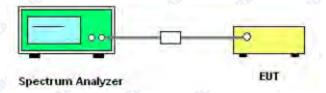
2.4 Conducted Spurious Emissions and Band Edge

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.



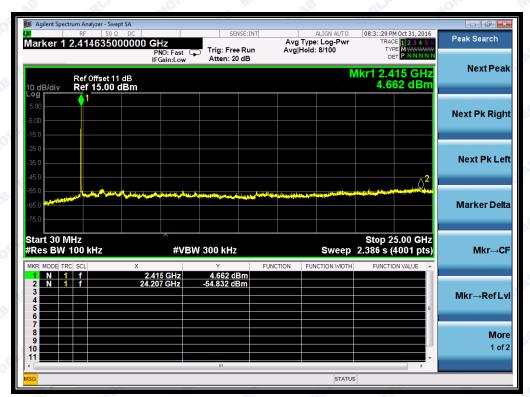
2.4.3.1 802.11b Test mode

A. Test Verdict:

Fraguenov		Measured Max.	Limit	t (dBm)	
Channel	Frequency	Out of Band	Carrier	Calculated	Verdict
	(MHz)	Emission (dBm)	Level	-20dBc Limit	
1 1	2412	-54.83	4.66	-15.34	PASS
6	2437	-50.99	4.25	-15.75	PASS
11	2462	-52.86	4.06	-15.94	PASS

B. Test Plots:

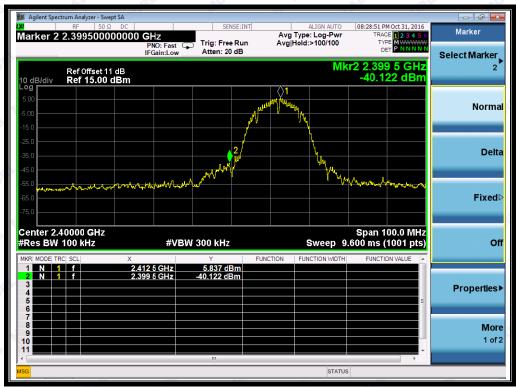
Note: the power of the Module transmitting frequency should be ignored.



(Channel = 1, 30MHz to 25GHz)







(Band Edge @ Channel = 1)

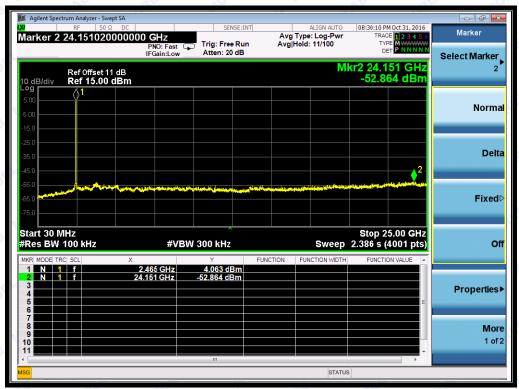


(Channel = 6, 30MHz to 25GHz)









(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)





802.11g Test mode 2.4.3.2

A. Test Verdict:

Fraguenov		Measured Max.	Limit	(dBm)	
Channel	Frequency (MHz)	Out of Band	Carrier	Calculated	Verdict
	(IVI□Z)	Emission (dBm)	Level	-20dBc Limit	
1, 1	2412	-54.91	0.13	-19.87	PASS
6	2437	-50.88	-0.44	-20.44	PASS
11 🔎	2462	-53.59	-0.61	-20.61	PASS

B. Test Plots:

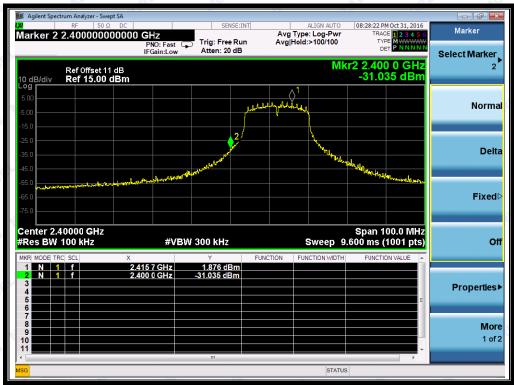
Note: the power of the Module transmitting frequency should be ignored.



(Channel = 1, 30MHz to 25GHz)







(Band Edge @ Channel = 1)

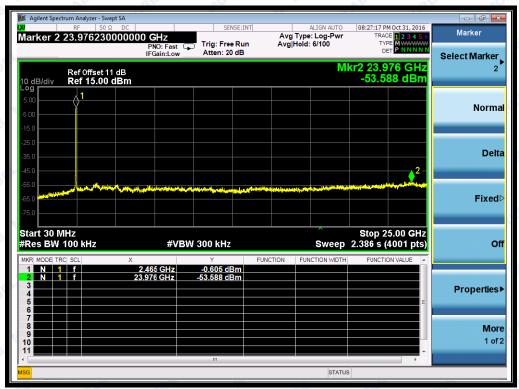


(Channel = 6, 30MHz to 25GHz)









(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)





2.4.3.3 802.11n -20MHz Test mode

A. Test Verdict:

		Measured Max.	Limit	(dBm)	
Channel	Frequency	Out of Band	Carrier	Calculated	Verdict
	(MHz)	Emission (dBm)	Level	-20dBc Limit	
1, 1	2412	-53.06	-1.66	-21.66	PASS
6	2437	-52.88	-1.89	-21.89	PASS
11 🔎	2462	-52.88	-0.97	-20.97	PASS

B. Test Plots:

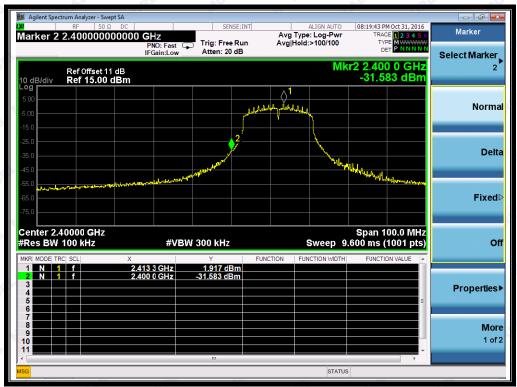
Note: the power of the Module transmitting frequency should be ignored.



(Channel = 1, 30MHz to 25GHz)







(Band Edge @ Channel = 1)

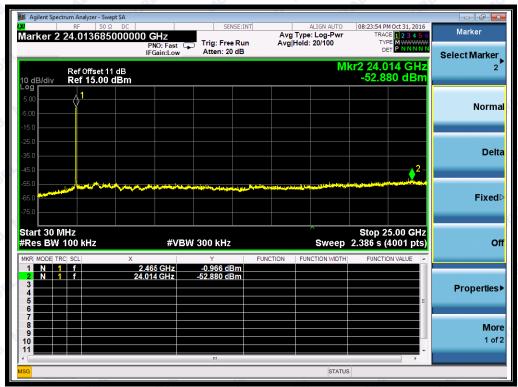


(Channel = 6, 30MHz to 25GHz)









(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)





2.5 Power spectral density (PSD)

2.5.1 Requirement

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.

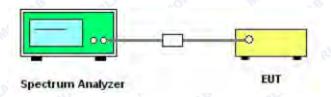
2.5.2 Test Description

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:

Please reference ANNEX A(1.5).



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						
1.0	2412	-6.80		PASS						
6	2437	-6.74	8	PASS						
11	2462	-6.04	8	PASS						
Measurement uncertainty: ±1.3dB										



(Channel = 1 @ 802.11b)







(Channel = 6 @ 802.11b)



(Channel = 11 @ 802.11b)

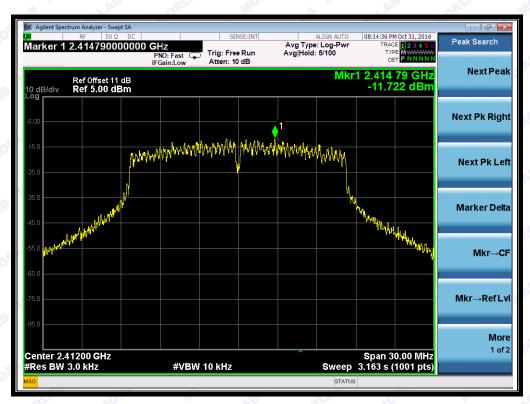




2.5.3.2 802.11g Test mode

A. Test Verdict:

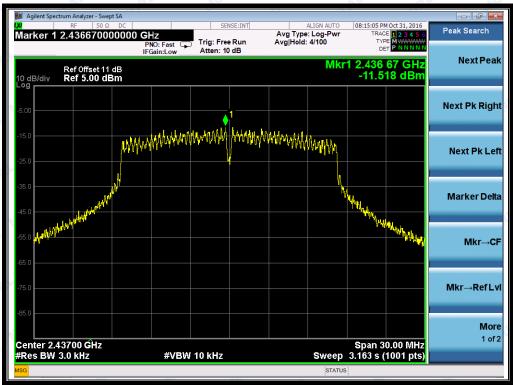
Spectral power density (dBm/3kHz)								
Channel Frequency (MHz)		Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict				
1	2412	-11.72	8	PASS				
6	2437	-11.52	8	PASS				
11 2462		-10.60	8	PASS				
Measurement uncertainty: ±1.3dB								



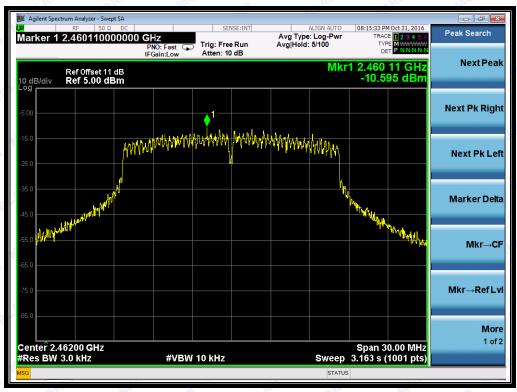
(Channel = 1 @ 802.11g)







(Channel = 6 @ 802.11g)



(Channel = 11 @ 802.11g)





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	-12.70	8	PASS			
6	2437	-12.54	8	PASS			
11	2462	-13.19	8	PASS			
Measurement uncertainty: ±1.3dB							

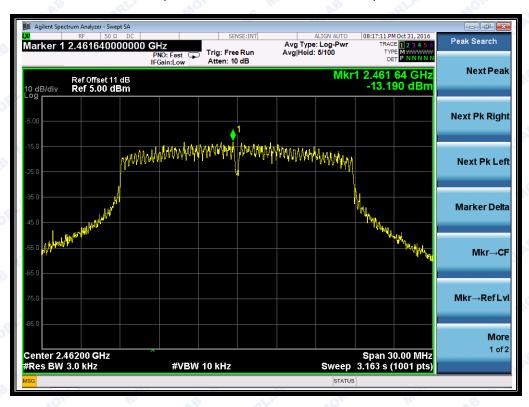


(Channel = 1 @ 802.11n-20MHz)





(Channel = 6 @ 802.11n-20MHz)



(Channel = 11 @ 802.11n-20MHz)



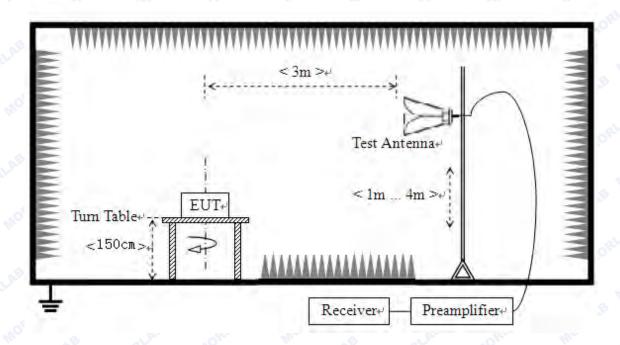
2.6 Restricted Frequency Bands

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 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:

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).





2.6.3 Test Result

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

The measurement results are obtained as below:

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

A_T: Total correction Factor except Antenna

 U_R : Receiver Reading G_{preamp} : Preamplifier Gain A_{Factor} : Antenna Factor at 3m

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

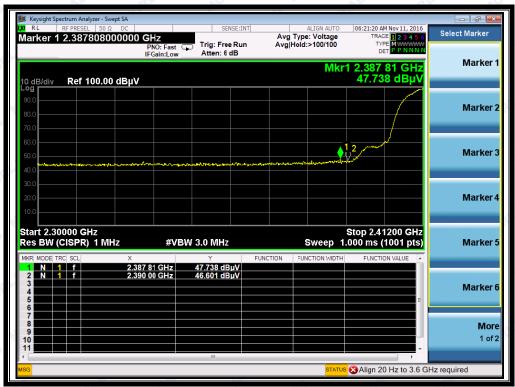
The lowest and highest channels are tested to verify the band edge emissions

A. Test Verdict:

С	Channel	Frequency (MHz)	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
C			PK/ AV	U _R (dBuV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	
	1LAE	2387.81	PK	47.74	-33.63	32.56	46.67	74	Pass
3	1 _{MOR}	2389.38	AV	35.38	-33.63	32.56	34.31	54	Pass
ORL	11	2488.49	PK	48.20	-33.18	32.5	47.52	74	Pass
	11	2488.90	AV	34.54	-33.18	32.5	33.86	54	Pass



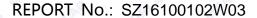




(Plot A1: Channel = 1 PEAK @ 802.11b)



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







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



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





2.6.3.2 802.11g Test mode

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

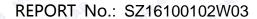
A. Test Verdict:

Channel	Frequency	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
Channel (MHz)		PK/ AV	U _R (dBuV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	verdict
JRLAE	2389.04	PK	62.15	-33.63	32.56	61.08	74	Pass
MOLLAR	2389.71	AV	39.17	-33.63	32.56	38.10	54	Pass
11 1100	2486.32	PK	60.05	-33.18	32.5	59.37	74	Pass
11	2483.81	AV	39.33	-33.18	32.5	38.65	54	Pass

B. Test Plots:



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







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



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





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

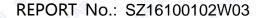
2.6.3.3 802.11n-20MHz Test mode

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

A. Test Verdict:

Channel	Frequency	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
	(MHz)	PK/ AV	U _R (dBuV)	(dB)	(dB@3m)	E (dB μ V/m)	(dBµV/m)	
1 ₁₁₁ 0R	2389.15	PK	60.05	-33.63	32.56	58.98	74	Pass
RLA 1	2388.93	AV	39.16	-33.63	32.56	38.09	54	Pass
11	2484.94	PK	56.34	-33.18	32.5	55.66	74	Pass
11	2483.88	AV	39.23	-33.18	32.5	38.55	54	Pass

B. Test Plots:



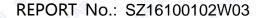




(Plot E1: Channel = 1 PEAK @ 802.11n-20)



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







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



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



2.7 Conducted Emission

2.7.1 Requirement

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 $50\mu\text{H}/50\Omega$ line impedance stabilization network (LISN).

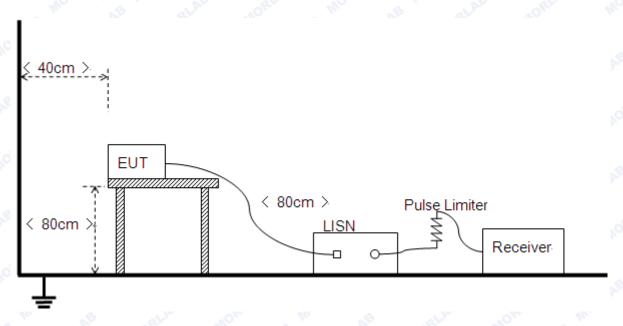
Frequency range	Conducted Limit (dBµV)				
(MHz)	Quai-peak	Average			
0.15 - 0.50	66 to 56	56 to 46			
0.50 - 5	56	46			
5 - 30	60	50			

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:



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.



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.

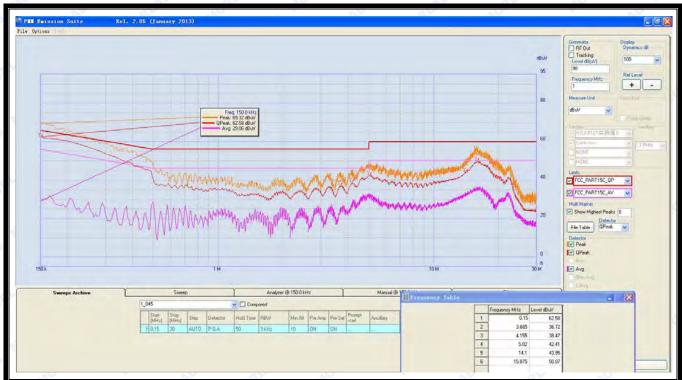
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)





(Plot B: N Phase)



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 R. HO.
88 - 216	150	3 LAD ORL
216 - 960	200	3 110
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)



2.8.2 Test Description

A. Test Setup:

1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz





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:

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



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. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The test 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 test antenna elevation shall be that which maximizes the emissions. The test 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 emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

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.

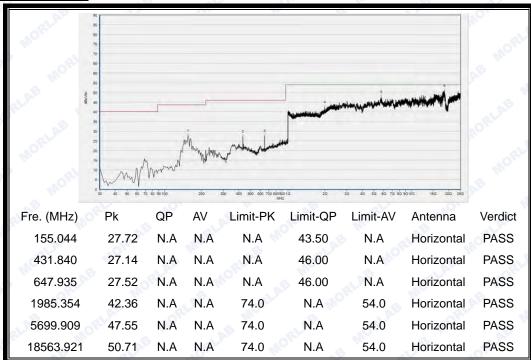
The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



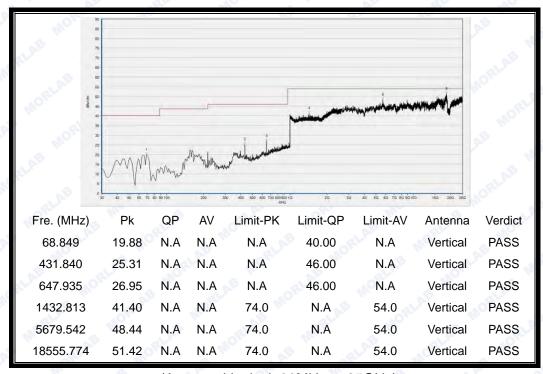
2.8.3.1 802.11b Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

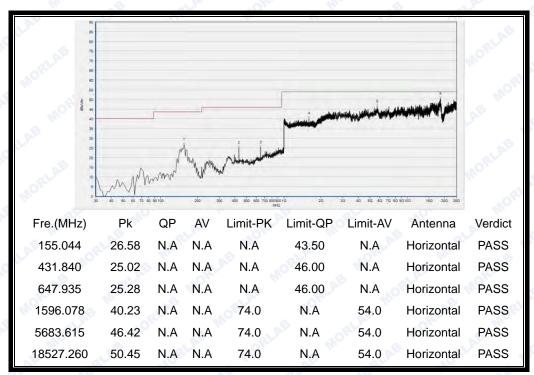


(Antenna Horizontal, 30MHz to 25GHz)

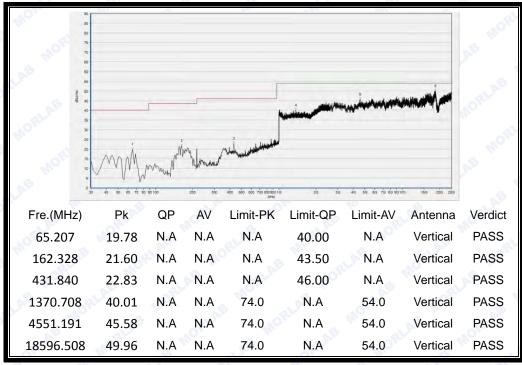


(Antenna Vertical, 30MHz to 25GHz)



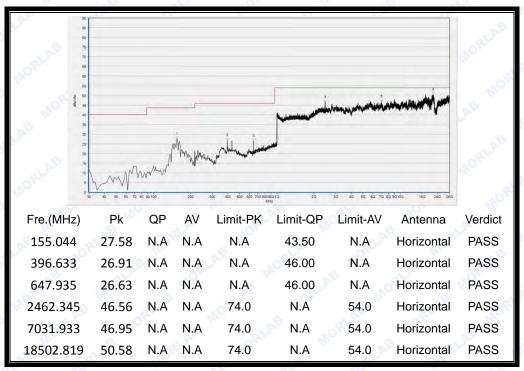


(Antenna Horizontal, 30MHz to 25GHz)

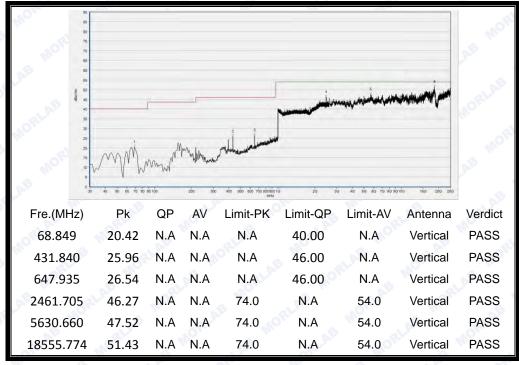


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



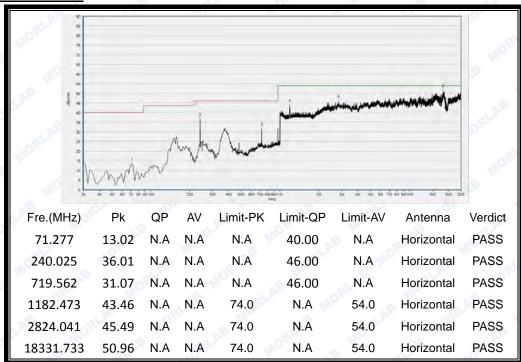
(Antenna Vertical, 30MHz to 25GHz)



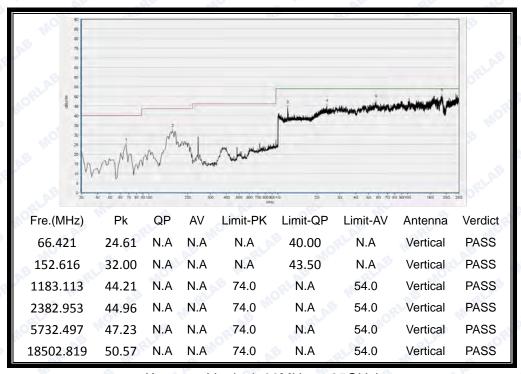
2.8.3.2 802.11g Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

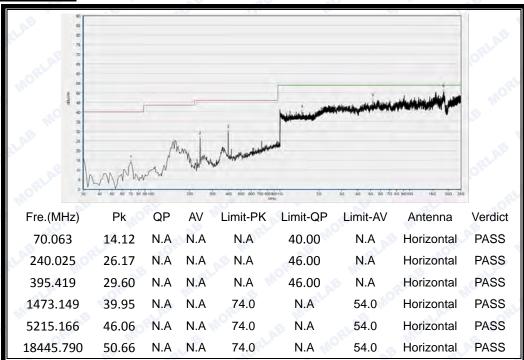


(Antenna Horizontal, 30MHz to 25GHz)

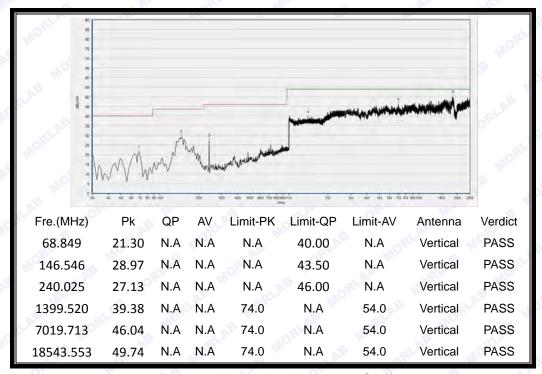


(Antenna Vertical, 30MHz to 25GHz)



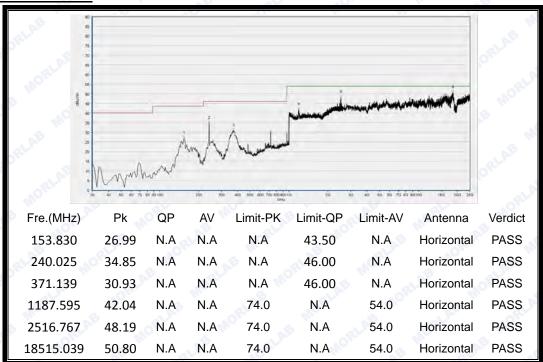


(Antenna Horizontal, 30MHz to 25GHz)

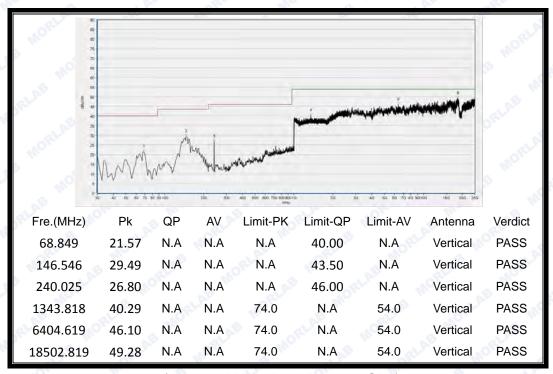


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



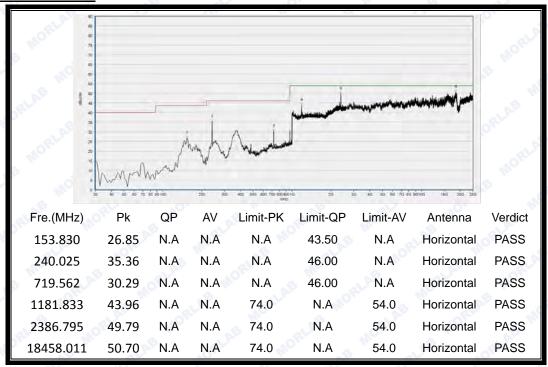
(Antenna Vertical, 30MHz to 25GHz)



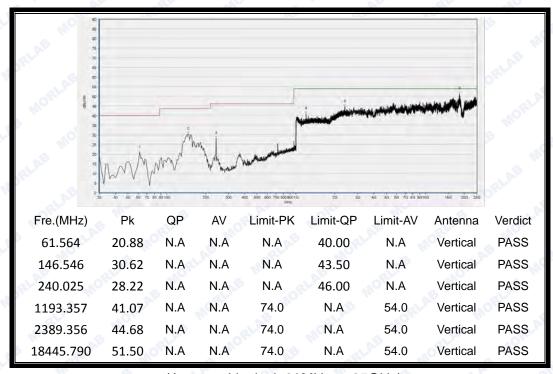
2.8.3.3 802.11n-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

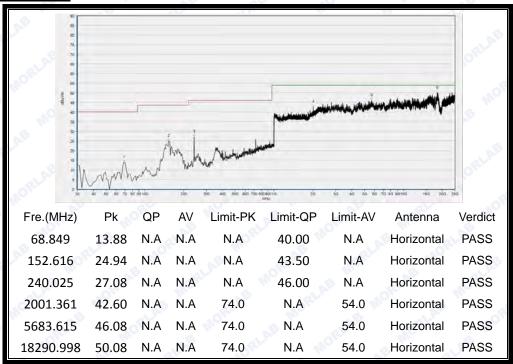


(Antenna Horizontal, 30MHz to 25GHz)

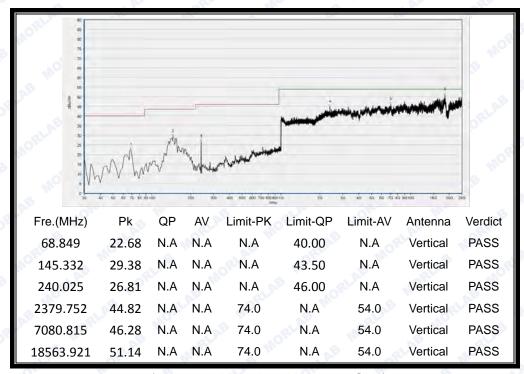


(Antenna Vertical, 30MHz to 25GHz)



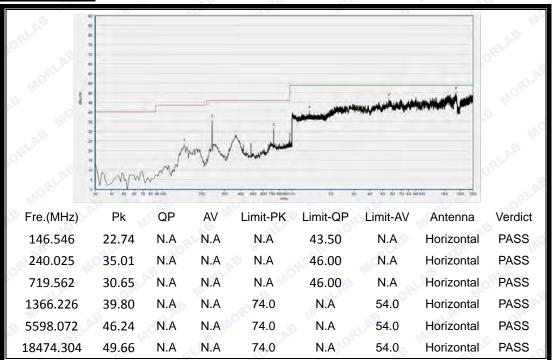


(Antenna Horizontal, 30MHz to 25GHz)

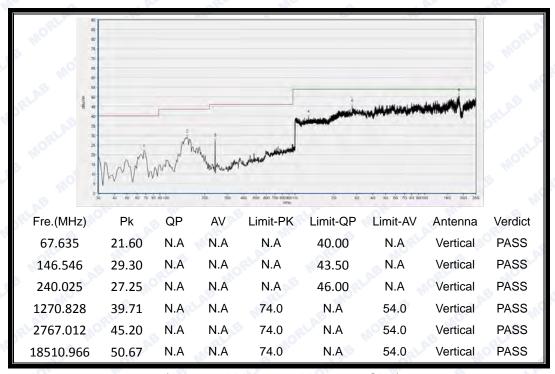


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)



ANNEX A GENERAL INFORMATION

1.1 Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.				
Department:	Morlab Laboratory				
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.
ELAL MORL S MC	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang
	Road, Block 67, BaoAn District, ShenZhen, GuangDong
	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
VE STUDE	30MHz~200MHz	2.93
Dadiated amineigns	200MHz~1000MHz	2.95
Radiated emissions	1GHz~18GHz	2.26
	18GHz~40GHz	1.94



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

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 (30MHz-26GHz)	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

Radia	ated Test Equipment	S				
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
7.0	Coaxial cable(N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
8	Coaxial cable(N male) (30MHz-26GHz)	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

1.5.3 Climate Chamber

Clim	ate Chamber	MOIN	S W	AE ORLA	WOK.	AE LAE
No.	Equipment Name	Serial No.	Туре	Manufacturer	Cal.Date	Cal.Due Date
100	Climate Chamber	2004012	HL4003T	Yinhe	2016.03.02	2017.03.01

1.5.4 Vibration Table

Vibra	tion Table	MOKE	, MC	BLAL	MORE	AB
No.	Equipment Name	Serial No.	Туре	Manufacturer	Cal.Date	Cal.Due Date
OR TAE	Vibration Table	N/A	ACT2000- S015L	СМІ-СОМ	2016.03.02	2017.03.01

1.5.5 Anechoic Chamber

Anechoic Chamber			E RLA	MORL	MO. OB	RLAB	MORL. M
	No.	Equipment Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
OS	1	Anechoic Chamber	N/A	9m*6m*6m	Changning	2016.03.02	2017.03.01

1.5.6 Auxiliary Test Equipment

No.	Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal.Due Date
1	Computer	T430i	Think Pad	Lenovo	N.A	N.A
2	AC Adapter	GSCU2000S 012V24G	GSP	N.A	N.A	N.A

