FCC TEST REPORT

For

WeTek Electronics Limited

Android tv box

Test Model: RL

List Model No.: RL2, RL3, RL4, RL x, RL xx (x represents character A-Z, 0-9)

Prepared for: WeTek Electronics LimitedAddress: Level 10, Central Building, 1-3 Pedder Street, Central, Hong China	g Kong,
Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.	
Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd.,	Bao'an
District, Shenzhen, Guangdong, China	
Tel : (+86)755-82591330	
Fax : (+86)755-82591332	
Web : www.LCS-cert.com	
Mail : webmaster@LCS-cert.com	
Date of receipt of test sample : December 11, 2017	
Number of tested samples : 2	
Serial number : Prototype	
Date of Test : December 11, 2017~January 15, 2018	
Date of Report : January 15, 2018	

FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

FCC	FCC TEST REPORT CFR 47 PART 15 E(15.407): 2017
Report Reference No	: LCS171211025AEE
Date of Issue	January 15, 2018
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure :	Full application of Harmonised standards
	Partial application of Harmonised standards
	Other standard testing method
Applicant's Name	WeTek Electronics Limited
Address	Level 10, Central Building, 1-3 Pedder Street, Central, Hong Kong, China
Test Specification	
Standard :	FCC CFR 47 PART 15 E(15.407): 2017
Test Report Form No	LCSEMC-1.0
TRF Originator :	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF :	Dated 2011-03
This publication may be reproduced Shenzhen LCS Compliance Testing I material. Shenzhen LCS Compliance	g Laboratory Ltd. All rights reserved. in whole or in part for non-commercial purposes as long as the Laboratory Ltd. is acknowledged as copyright owner and source of the e Testing Laboratory Ltd. takes no responsibility for and will not g from the reader's interpretation of the reproduced material due to its
EUT Description	Android tv box
Trade Mark :	RL
Test Model :	RL
Ratings	DC 5V by AC/DC ADAPTER
Result:	Positive
Compiled by:	Supervised by: Approved by:
Jeo Jee	Dick Su Gains Piang

Leo Lee/ File administrators

Dick Su/ Technique principal

Gavin Liang/ Manager

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 2 of 67

Г

FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

FCC -- TEST REPORT

Test Report No. :	LCS171211025AEE	<u>January 15, 2018</u> Date of issue
		I
EUT	: Android tv box	
Test Model	. : RL	
Applicant	: WeTek Electronics Li	mited
Address	: Level 10, Central Build China	ing, 1-3 Pedder Street, Central, Hong Kong,
Telephone	: /	
Fax	: /	
Manufacturer	: WeTek Electronics Li	mited
Address	: Level 10, Central Build China	ing, 1-3 Pedder Street, Central, Hong Kong,
Telephone	: /	
Fax	: /	
Factory	: WeTek Electronics Li	mited
Address	: Level 10, Central Build China	ing, 1-3 Pedder Street, Central, Hong Kong,
Telephone	: /	
Fax	: /	

Test Result: Positive

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.
 FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

Revision History

Revision	Issue Date	Revisions	Revised By
000	January 15, 2018	Initial Issue	Gavin Liang

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.
Page 4 of 67

TABLE OF CONTENTS

1. GENERAL INFORMATION	
1.1. DESCRIPTION OF DEVICE (EUT)	6
1.2. HOST SYSTEM CONFIGURATION LIST AND DETAILS	7
1.3. External I/O Port 1.4. Description of Test Facility	7
1.5. STATEMENT OF THE MEASUREMENT UNCERTAINTY	
1.6. MEASUREMENT UNCERTAINTY.	
1.7. DESCRIPTION OF TEST MODES	
2. TEST METHODOLOGY	10
2.1. EUT CONFIGURATION	10
2.2. EUT EXERCISE	10
2.3. GENERAL TEST PROCEDURES	
3. SYSTEM TEST CONFIGURATION	11
3.1. JUSTIFICATION	
3.2. EUT EXERCISE SOFTWARE	
3.3. Special Accessories	
3.5. EQUIPMENT MODIFICATIONS	11
3.6. TEST SETUP	
4. SUMMARY OF TEST RESULTS	12
5. TEST RESULT	13
5.1. ON TIME AND DUTY CYCLE	13
5.2. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT	
5.3. POWER SPECTRAL DENSITY MEASUREMENT.	
5.4. 6DB Occupied Bandwidth Measurement 5.5. Radiated Emissions Measurement	25
5.6. POWER LINE CONDUCTED EMISSIONS	
5.7 UNDESIRABLE EMISSIONS MEASUREMENT	46
5.8. ANTENNA REQUIREMENTS	64
6. LIST OF MEASURING EQUIPMENTS	66
7. TEST SETUP PHOTOGRAPHS OF EUT	67
8. EXTERIOR PHOTOGRAPHS OF THE EUT	67
9. INTERIOR PHOTOGRAPHS OF THE EUT	67

1. GENERAL INFORMATION

1.1. Description of Device (EU	T)
--------------------------------	----

EUT	: Android tv box
Model Number	: RL, RL2, RL3, RL4, RL x, RL xx (x represents character A-Z, 0-9)
Model Declaration	: PCB board, structure and internal of these model(s) are the same, Only the model name is different for these models.
Test Model	: RL
Power Supply	: DC 5V by AC/DC ADAPTER
Hardware Version	: Wetek_core_V3.0
Software Version	: 6.0.1
Bluetooth	:
Frequency Range	: 2402-2480MHz
Channel Number	: 79 channels for Bluetooth V4.1 (BDR/EDR) 40 channels for Bluetooth V4.1 (BT LE)
Channel Spacing	: 1MHz for Bluetooth V4.1 (BDR/EDR) 2MHz for Bluetooth V4.1 (BT LE)
Modulation Type	: GFSK, π /4-DQPSK, 8-DPSK for Bluetooth V4.1 (BDR/EDR) GFSK for Bluetooth V4.1 (BT LE)
Bluetooth Version	: V4.1
WIFI(2.4G Band)	:
Frequency Range	: 2412-2462MHz
Channel Spacing	: 5MHz
Channel Number	: 11 channels for 20MHz bandwidth(2412~2462MHz) 7 channels for 40MHz bandwidth(2422~2452MHz)
Modulation Type	: 802.11b: DSSS(CCK,DQPSK,DBPSK); 802.11g/n: OFDM(64QAM, 16QAM, QPSK, BPSK)
WIFI(5.2G Band)	:
Frequency Range	: 5180-5240MHz
Channel Number	 4 channels for 20MHz bandwidth(5180-5240MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	: 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
WIFI(5.8G Band)	:
Frequency Range	: 5745-5825MHz
Channel Number	 5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	: 802.11a/n/ac: OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Description	:
	Two same PIFA Antenna; ANT0 used for WIFI TX/RX, 2.0dBi(Max.); ANT1 used for WIFI/Bluetooth TX/RX, 2.0dBi(Max.)

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 6 of 67

FCC ID: 2AF9R-RL

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
SONY	TV Set	KDL-32W700B	2011083	DOC
SHENZHEN FUJIA	SWITCHING ADAPTER	FJ-SW1904000F	1	DOC
APPLIANCE CO., LTD	(for TV Set)	FJ-5W1904000F	/	DOC
SHEN ZHEN KEYU				
POWER SUPPLY	AC/DC ADAPTER	KA23-0502000DES	/	VOC
TECHNOLOGY CO., LTD				

1.3. External I/O Port

I/O Port Description	Quantity	Cable
A/V OUTPUT Port	1	N/A
LAN Port	1	N/A
HDMI Port	1	1.5m, unshielded
DC 5V IN Port	1	N/A
MICRO SD Card Slot	1	N/A
USB Port (Type A)	2	N/A

1.4. Description of Test Facility

FCC Registration Number. is 254912. Industry Canada Registration Number. is 9642A-1. ESMD Registration Number. is ARCB0108. UL Registration Number. is 100571-492. TUV SUD Registration Number, is SCN1081. TUV RH Registration Number. is UA 50296516-001 NVLAP Registration Code is 600167-0

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
		9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
Radiation Uncertainty	:	200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±3.80dB	(1)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Worst-case mode and channel used for 150 KHz-30 MHz power line conducted emissions was the mode and channel with the highest output power that was determined to be IEEE 802.11n HT20 mode (Low Channel, Combined Antenna Chain0 and Antenna Chain1).

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be IEEE 802.11n HT20 mode (Low Channel, Combined Antenna Chain0 and Antenna Chain1).

Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

IEEE 802.11a Mode: 6 Mbps, OFDM. IEEE 802.11ac VHT20 Mode: MCS0 IEEE 802.11n HT20 Mode: MCS0, OFDM. IEEE 802.11ac VHT40 Mode: MCS0, OFDM. IEEE 802.11n HT40 Mode: MCS0, OFDM. IEEE 802.11ac VHT80 Mode: MCS0, OFDM.

Antenna	Antenna Chain0 (ANT0)			С	hain1 (ANT1)	Simultaneously
Bandwidth Mode	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz	/
IEEE 802.11a	\checkmark						
IEEE 802.11n	V	$\mathbf{\nabla}$		\checkmark	\checkmark		
IEEE 802.11ac	$\mathbf{\nabla}$	$\mathbf{\nabla}$	$\mathbf{\nabla}$	$\mathbf{\nabla}$	$\mathbf{\nabla}$	\mathbf{N}	\square

Antenna & Bandwidth

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 8 of 67

Channel & Frequency:

	· · · · · · · · · · · · · · · · · · ·				
Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)	
	149	5745	155	5775	
5745~5825MHz	151	5755	159	5795	
	153	5765	161	5805	
	157	5785	165	5825	
For IEEE 802.11a/n HT20/ac VHT20, Channel 149, 157 and 165 were tested.					
For IEEE 802.11n HT40/ac VHT40, Channel 151 and 159 were tested.					

For IEEE 802.11ac VHT80, Channel 155 was tested.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 9 of 67

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

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

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure 789033 D02 General UNII Test Procedures New Rules v01r03 and KDB 662911 D01 Multiple Transmitter Output v02r01 is required to be used for this kind of FCC 15.407 UII device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (rftesttool-cn) provided by application.

3.3. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
1	TV Set	SONY	KDL-32W700B	2011083	/	/	DOC
2	SWITCHING ADAPTER (for TV Set)	SHENZHEN FUJIA APPLIANCE CO., LTD	FJ-SW1904000F	/	1.00m	unshielded	DOC

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

A	Applied Standard: FCC Part 15 Subpart E							
FCC Rules	Description of Test	Result						
§15.407(a)	Maximum Conducted Output Power	Compliant						
§15.407(a)	Power Spectral Density	Compliant						
§15.407(e)	6dB Bandwidth	Compliant						
§15.407(b)	Radiated Emissions	Compliant						
§15.407(b)	Band edge Emissions	Compliant						
§15.407(g)	Frequency Stability	Note						
§15.207(a)	Line Conducted Emissions	Compliant						
§15.203	Antenna Requirements	Compliant						
§2.1093	RF Exposure	Compliant						

Note: The customer declared frequency stability is better than 20ppm which ensures that the signal remains in the allocated bands under all operational conditions stated in the user manual.

FCC ID: 2AF9R-RL

5. TEST RESULT

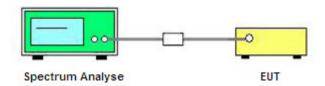
- 5.1. On Time and Duty Cycle
- 5.1.1. Standard Applicable

None; for reporting purpose only.

5.1.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of the spectrum analyzer.

- 5.1.3. Test Procedures
- 1. Set the Centre frequency of the spectrum analyzer to the transmitting frequency;
- 2. Set the span=0MHz, RBW=8MHz, VBW=50MHz, Sweep time=5ms;
- 3. Detector = peak;
- 4. Trace mode = Single hold.
- 5.1.4. Test Setup Layout



5.1.5. EUT Operation during Test

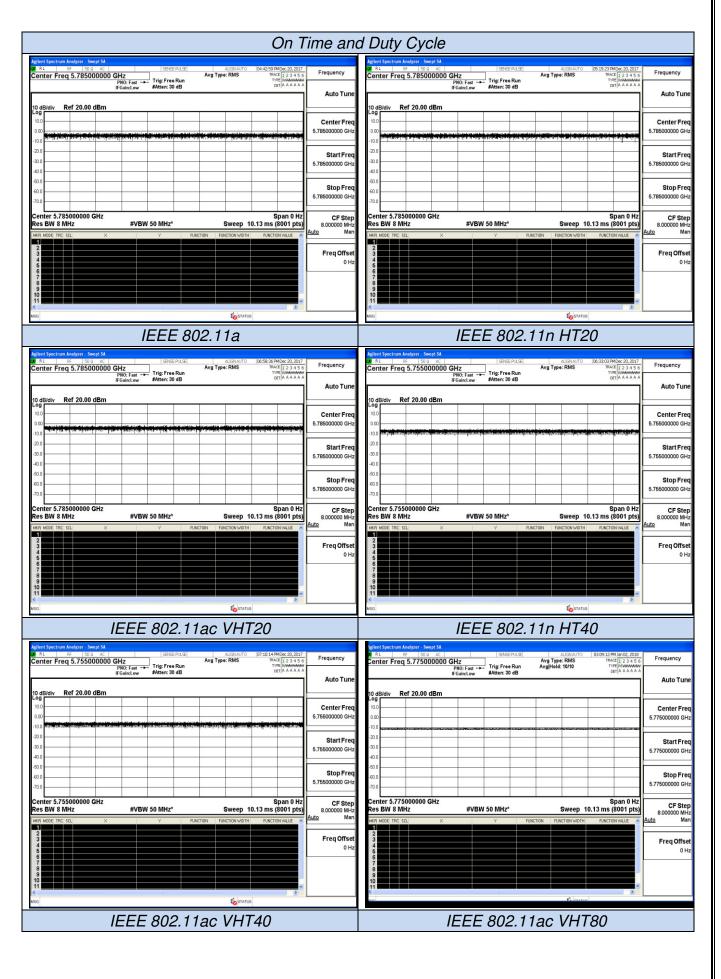
The EUT was programmed to be in continuously transmitting mode.

5.1.6. Test result

Mode	On Time B (ms)	Period (ms)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW(KHz)		
IEEE 802.11a	5.0	5.0	1	100%	0	0.01		
IEEE 802.11n HT20	5.0	5.0	1	100%	0	0.01		
IEEE 802.11ac VHT20	5.0	5.0	1	100%	0	0.01		
IEEE 802.11n HT40	5.0	5.0	1	100%	0	0.01		
IEEE 802.11ac VHT40	5.0	5.0	1	100%	0	0.01		
IEEE 802.11ac VHT80	5.0	5.0	1	100%	0	0.01		
Note: Duty Cycle Correction Factor=10log(1/Duty cycle)								

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 14 of 67

5.2. Maximum Conducted Output Power Measurement

5.2.1. Standard Applicable

For 5725~5850MHz

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.2.2. Measuring Instruments and Setting

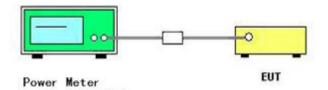
Please refer to equipment list in this report. The following table is the setting of the power meter.

5.2.3. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

According to KDB 789033 D02 Section 3 (a) Method PM (Measurement using an RF average power meter):

- (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
 - The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
 - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
 - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.
- (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- 5.2.4. Test Setup Layout



5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 15 of 67

FCC ID: 2AF9R-RL

5.2.6. Test Result of Maximum Conducted Output Power

Temperature	25 ℃	Humidity	60%	
Test Engineer	Tom Liu	Configurations	IEEE 802.11a/n/ac	

Test Mode	Channel	Frequency (MHz)	AVG Conducted Power (dBm)		Duty Cycle Factor	Report Conducted Power (dBm)			Maximum Limit	Result	
			Chain0	Chain1	Sum	(dB)	Chain0	Chain1	Sum	(dBm)	
IEEE	149	5745	13.52	13.22	/	0.000	13.52	13.22	/		
802.11a	157	5785	13.01	13.02	/	0.000	13.01	13.02	/	30	Complies
002.11a	165	5825	12.64	12.61	/	0.000	12.64	12.61	/		
IEEE	149	5745	13.90	13.79	16.86	0.000	13.90	13.79	16.86	30	Complies
802.11n	157	5785	13.14	13.06	16.11	0.000	13.14	13.06	16.11		
HT20	165	5825	12.94	12.84	15.90	0.000	12.94	12.84	15.90		
IEEE	149	5745	13.88	13.45	16.68	0.000	13.88	13.45	16.68		Complies
802.11ac	157	5785	12.95	12.54	15.76	0.000	12.95	12.54	15.76	30	
VHT20	165	5825	12.88	12.49	15.70	0.000	12.88	12.49	15.70		
IEEE 802.11n	151	5755	13.83	13.84	16.85	0.000	13.83	13.84	16.85	30	Complian
HT40	159	5795	13.35	13.15	16.26	0.000	13.35	13.15	16.26	30	Complies
IEEE	151	5755	13.98	13.77	16.89	0.000	13.98	13.77	16.89		0 "
802.11ac VHT40	159	5795	13.04	13.01	16.04	0.000	13.04	13.01	16.04	30	Complies
IEEE 802.11ac VHT80	155	5775	9.18	9.23	12.22		9.18	9.23	12.22	30	Complies

Remark:

- 1. Measured output power at difference data rate for each mode and recorded worst case for each mode.
- 2. Test results including cable loss;
- 3. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;
- 4. Report conducted power = Measured conducted average power + Duty Cycle factor;
- The EUT used two same PIFA antenna for WIFI TX/RX, the directional gain=2.0+10*log(2)=5.01dBi. So the power limits of IEEE 802.11n HT20, IEEE 802.11 n HT40, IEEE 802.11 ac VHT20, IEEE 802.11 ac VHT40 and IEEE 802.11 ac VHT80 for MIMO with CDD technology should not be reduced.

5.3. Power Spectral Density Measurement

5.3.1. Standard Applicable

For 5725~5850MHz

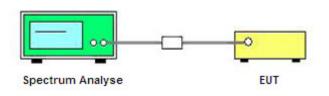
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

5.3.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of Spectrum Analyzer.

5.3.3. Test Procedures

- 1). The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
- 2). The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
- 3). Set the RBW = 300 kHz
- 4). Set the VBW \geq 3*RBW
- 5). Span=Encompass the entire emissions bandwidth (EBW) of the signal
- 6). Detector = RMS.
- 7). Sweep time = auto couple.
- 8). Trace mode = max hold.
- 9). Allow trace to fully stabilize.
- 10). If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- 11). If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- 12). Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
- 5.3.4. Test Setup Layout



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 17 of 67

FCC ID: 2AF9R-RL

5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.3.6. Test Result of Power Spectral Density

Temperature	25 ℃	Humidity	60%	
Test Engineer	Tom Liu	Configurations	IEEE 802.11a/n/ac	

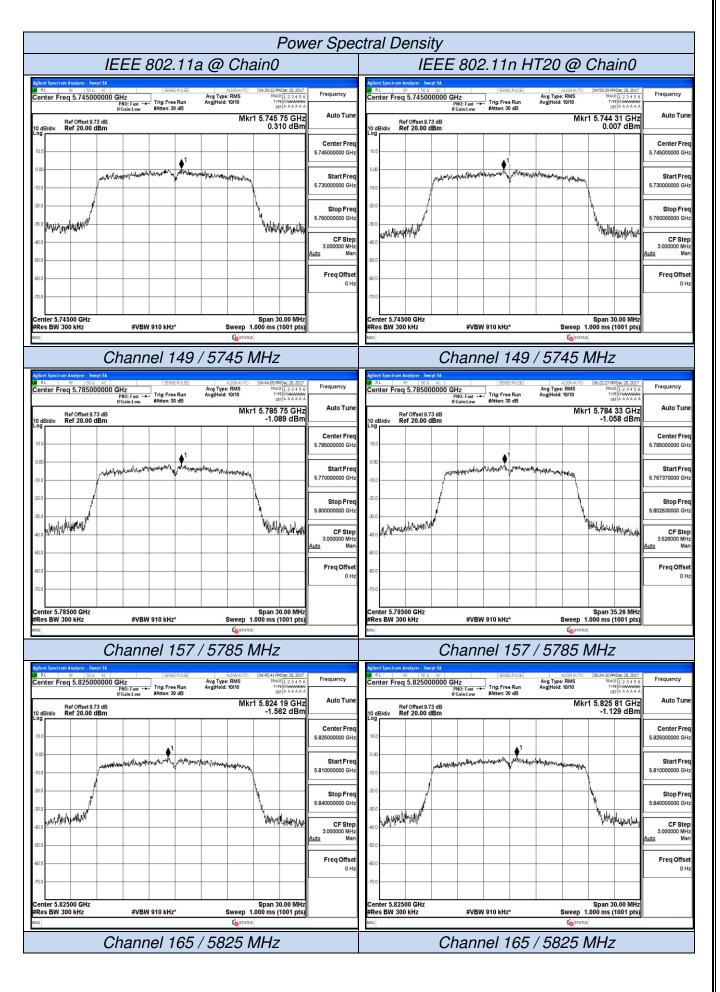
Test Mode	Channel	Frequency (MHz)	Power Density (dBm/ 300KHz)		Duty cycle factor	RBW factor	Report conducted PSD dBm/ 500KHz)			Maximum Limit (dBm/	Result	
		~ /	Chain0	Chain1	Sum	(dB)	(dB)	Chain0	Chain1	Sum	500KHz)	
IEEE	149	5745	0.31	-0.11	/	0.000	2.218	2.53	2.11	/		
802.11a	157	5785	-1.09	-1.15	/	0.000	2.218	1.13	1.07	/	30	Complies
002.11a	165	5825	-1.56	-1.76	/	0.000	2.218	0.66	0.46	/	1	
IEEE	149	5745	0.01	-0.20	2.92	0.000	2.218	2.23	2.02	5.14		
802.11n	157	5785	-1.06	-1.05	1.96	0.000	2.218	1.16	1.17	4.18	30	Complies
HT20	165	5825	-1.13	-1.21	1.84	0.000	2.218	1.09	1.01	4.06]	
IEEE	149	5745	0.01	-0.13	2.95	0.000	2.218	2.23	2.09	5.17		
802.11ac	157	5785	-1.06	-1.27	1.85	0.000	2.218	1.16	0.95	4.07	30	Complies
VHT20	165	5825	-1.13	-1.71	1.60	0.000	2.218	1.09	0.51	3.82		
IEEE	151	5755	-4.02	-3.55	-0.77	0.000	2.218	-1.80	-1.33	1.45		
802.11n HT40	159	5795	-4.16	-4.26	-1.20	0.000	2.218	-1.94	-2.04	1.02	30	Complies
IEEE	151	5755	-3.21	-3.74	-0.46	0.000	2.218	-0.99	-1.52	1.76		
802.11ac VHT40	159	5795	-4.68	-4.21	-1.43	0.000	2.218	-2.46	-1.99	0.79	30	Complies
IEEE 802.11ac VHT80	155	5775	-11.25	-10.80	-8.01	0.000	2.218	-9.03	-8.58	-5.79	30	Complies

Remark:

- 1. Measured power spectrum density at difference data rate for each mode and recorded worst case for each mode.
- 2. Test results including cable loss;
- 3. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;
- 4. Report conducted PSD = measured conducted PSD + Duty Cycle factor + RBW factor;
- 5. RBW factor = 10 log (500 KHz / 300 KHz) = 2.218 dB;
- 6. Please refer to following test plots;

FCC ID: 2AF9R-RL

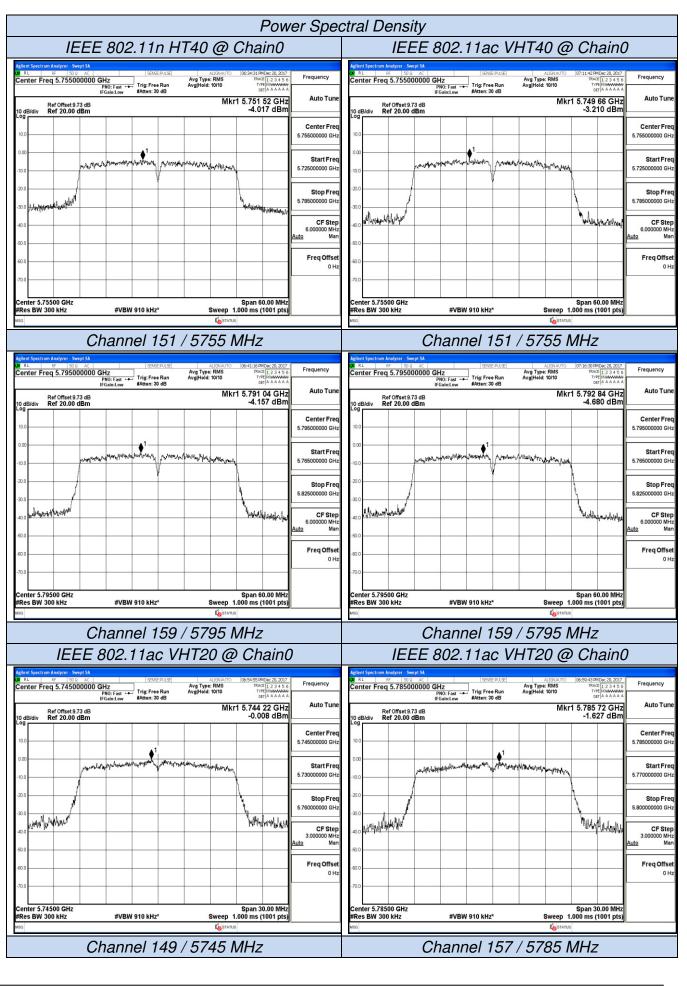
Report No.: LCS171211025AEE



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 19 of 67

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

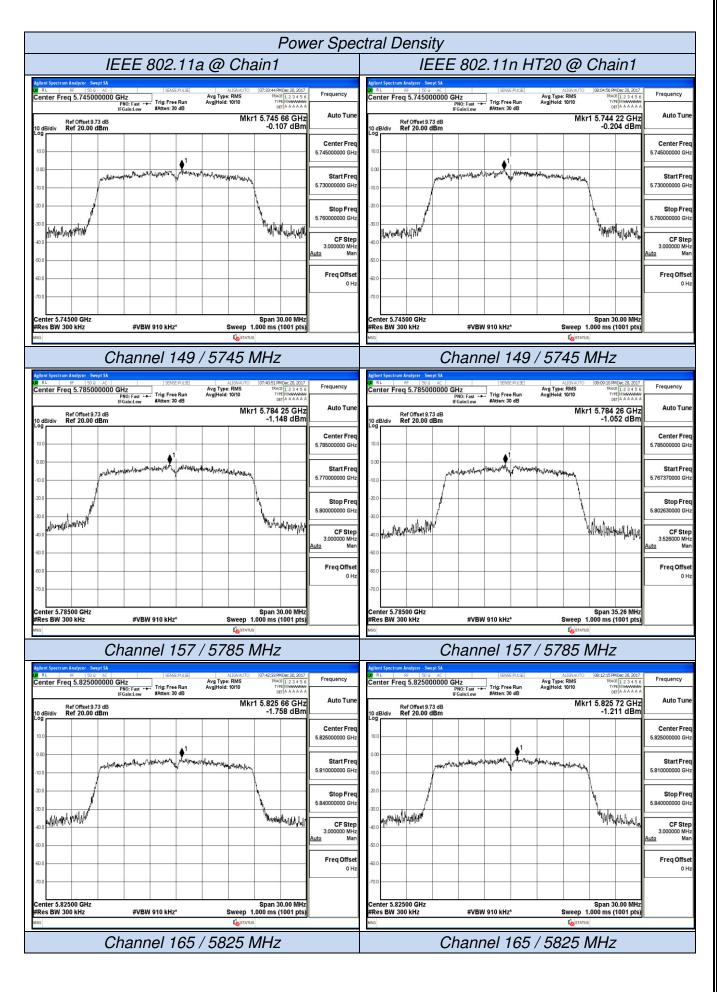


This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 20 of 67 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

Power	Speci	ctral Density
IEEE 802.11ac VHT20 @ Chain0		IEEE 802.11ac VHT80 @ Chain0
PN0: Fast Trig: Free Run Avg Hold: 10/10 TYPE MWWWW	Frequency	Splittin Spectrum Analyzer - Swept SA EL BF SD 0 Ac SPEEPLLSE ALSPIR/TO DD:30/SPIFilinD2 2018 Frequency Center Freq 5.775000000 GHz PR00; Fast -+ Trig: Free Run Avg Type: RMS Trig: Free Run Avg Type: Run Trig: Free Run <td< td=""></td<>
IF Gain:Low #Atten: 30 dB CETIA GAGAGA Ref Offset 9.73 dB Mkr1 5.825 75 GHz 10 dB/div Ref 20.00 dBm -1.070 dBm	Auto Tune	Ref Offset 373 dB Mkr1 5.765 28 GHz 10 dB/div Ref 20.00 dBm -11.253 dBm
	Center Freq 25000000 GHz	
000	Start Freq 10000000 GHz	otartited
300	Stop Freq 40000000 GHz	
00 MARLAN MART	CF Step 3.000000 MHz Man	
800	Freq Offset 0 Hz	Reutine Consection of the Cons
Center 5.82500 GHz Span 30.00 MHz		P00 Center 5.77500 GHz Span 120.0 MHz Res BW 300 kHz #VBW 910 kHz* Sweep 1.667 ms (1001 pts)
#Res BW 300 kHz #VBW 910 kHz* Sweep 1.000 ms (1001 pts)		Res BW 300 kHz #VBW 910 kHz* Sweep 1.667 ms (1001 pts)
Channel 165 / 5825 MHz	Channel 155 / 5775 MHz	

FCC ID: 2AF9R-RL

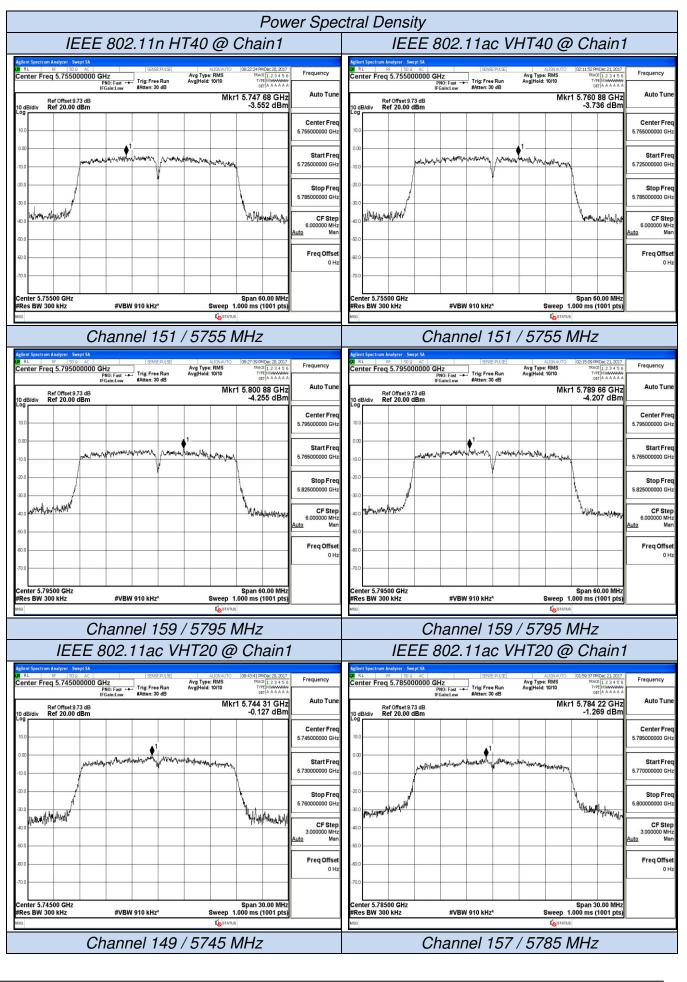
Report No.: LCS171211025AEE



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 22 of 67

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 23 of 67 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

Power Sp	Power Spectral Density							
IEEE 802.11ac VHT20 @ Chain1	IEEE 802.11ac VHT80 @ Chain1							
Agilent Spectrum Analyzer: Swept SA ISBNE PLISE ALIGNATIO 0220115PMDec 21,2017 IB RL RF ISSNE PLISE ALIGNATIO 0220115PMDec 21,2017 Center Freq 5.825000000 GHz Trig: Free Run IFGaintew Trig: Free Run #Atten: 30 dB Avg Type: RMS IMACT [2: 2: 4: 5: 6] Ref Offset5.73 dB Mkr1 5.825 84 GHz Auto Ti	Bef Officet 9 73 dB IVIKET 5.776 68 GHZ							
10 4B/div Ref 20.00 dBm -1.708 dBm Center F 10 0								
000 5.81000000 5.81000000 5.81000000								
300 Stop F 5.84000000	eq 200 Stop Freq							
200 der/Ugahr/201001	PD The second sec							
-000 Freq01	tet 60 FreqOffset Hz 0 0 Hz 700 0 0 Hz							
Center 5.82500 GHz Span 30.00 MHz #Res BW 300 kHz #VBW 910 kHz* Sweep 1.000 ms (1001 pts) wsg	Center 5.77500 GHz Res BW 300 kHz #VBW 910 kHz* Sweep 1.667 ms (1001 pts) Statement							
Channel 165 / 5825 MHz	Channel 155 / 5775 MHz							

5.4. 6dB Occupied Bandwidth Measurement

5.4.1. Standard Applicable

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.4.2. Measuring Instruments and Setting

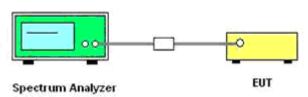
Please refer to equipment list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span	> 26dB Bandwidth
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.4.3. Test Procedures

- 1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
- 2. The resolution bandwidth of 100 KHz and the video bandwidth of 300 KHz were used.
- 3. Measured the spectrum width with power higher than 6dB below carrier.

5.4.4. Test Setup Layout



5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6. Test Result of 6dB Occupied Bandwidth

Temperature	25 ℃	Humidity	60%	
Test Engineer	Tom Liu	Configurations	IEEE 802.11a/n/ac	

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

Test Mode	Channel	Frequency	6dB Bandw		Limits	Verdict
		(MHz)	Chain0	Chain1	(MHz)	
	149	5745	17.64	17.63		
IEEE 802.11a	157	5785	17.63	17.61	≥0.500	Complies
	163	5825	17.64	17.64		
IEEE 802.11n	149	5745	17.61	17.62		
HT20	157	5785	17.63	17.63	≥0.500	Complies
1120	163	5825	17.63	17.64		
IEEE	149	5745	17.61	17.63		Complies
802.11ac	157	5785	17.65	17.64	≥0.500	
VHT20	163	5825	17.63	17.65		
IEEE 802.11n	151	5755	36.39	36.41		Complian
HT40	159	5795	36.38	36.36	≥0.500	Complies
IEEE 802.11ac	151	5755	36.38	36.38	≥0.500	Complies
VHT40	159	5795	36.37	36.39	_0.000	Complice
IEEE 802.11ac VHT80	155	5775	75.47	75.42	≥0.500	Complies

Remark:

1.Measured 6dB bandwidth at difference data rate for each mode and recorded worst case for each mode.

2. Test results including cable loss;

3. Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;

4. Please refer to following test plots;

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 26 of 67

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

6dB C	Occupie	d Bandwidth	
IEEE 802.11a @ Chain0		IEEE 802.11n HT20 @ Chain0	
glient Spectrum Analyzer - Occupied IIW SPICE PLASE ALIS/AUTO IO IO SE3 IMDoc 20, 2017 LL FF ISS 9 A.C Center Freq. 5.745000000 GHz Radio Std: None Center Freq. 5.745000000 GHz Center Freq. 5.745000000 GHz Radio Std: None #FiGaint.ow #Atten: 30 dB Radio Device: BTS	Frequency	Agilant Spectrum Andyzer - Occupied DW ISBREPALSE ALIGNATIO Oscillation Oscillation <t< th=""><th>Frequency</th></t<>	Frequency
Ref Offset 9.73 dB Ref 20.00 dBm Log Ref 20.00 dBm 00	Center Freq 5.745000000 GHz	Ref Original Ref 20.00 dBm Log	Center Fre 5.745000000 Gł
Center 5.745 GHz Span 40 MHz #Res BW 100 kHz WBW 300 kHz Sweep 3.867 ms Occupied Bandwidth Total Power 15.6 dBm 17.596 MHz Transmit Freq Error -1.542 kHz OBW Power 99.00 % x dB Bandwidth 17.64 MHz x dB -6.00 dB	CF Step 4.000000 MHz Man Freq Offset 0 Hz	Center 5.745 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms Occupied Bandwidth Total Power 15.2 dBm 17.573 MHz Transmit Freq Error 931 Hz OBW Power 99.00 % x dB Bandwidth 17.61 MHz x dB -6.00 dB	CF Ste 4.000000 Mi Mi Freq Offs 0 1
Channel 149 / 5745 MHz		Channel 149 / 5745 MHz	
Agleni Spectrum Analyzer - Occupied UNI ALISHAUTO [0643:15 PMCde: 20, 2017 R.L 150 320 Center Freq 5.785000000 GHz Radio Stat. None Center Freq 5.785000000 GHz Center Freq 5.785000000 GHz Radio Stat. None Trip: Freq None Radio Stat. None If Figure Run Augustation State: Stat. None Radio Device: BTS Radio Device: BTS Ref Offset 9.73 dB Ref 20.00 dB Max Ref 20.00 dB Ref 20.00 dB	Frequency	Applient Spectrum Analyzer - Occupied IIII Spectrum Analyzer - Occupied IIII AllSHAUTO (26:15:39 PM/Dec 20, 2017) Center Freq 5.785000000 GHz Center Freq 5.785000000 GHz Center Freq 5.785000000 GHz Radio Std: None III Fraint.ov Frig. Freq S.000000 GHz Radio Device: BTS Ref Offset 9.73 dB Freq 20.00 dBm Freq 20.00 dBm	Frequency
Log Log 100 100 100 100 100 100 100 10	Center Freq 5.78500000 GHz	Log	Center Fri 5.785000000 Gi
Occupied Bandwidth Total Power 14.1 dBm	CF Step 4.000000 MHz <u>Auto</u> Man	Occupied Bandwidth Total Power 14.0 dBm	CF Sto 4.000000 M uto M
17.586 MHz Transmit Freq Error 5.031 kHz OBW Power 99.00 % x dB Bandwidth 17.63 MHz x dB -6.00 dB	Freq Offset 0 Hz	17.580 MHz Transmit Freq Error 1.162 kHz OBW Power 99.00 % x dB Bandwidth 17.63 MHz x dB -6.00 dB	Freq Offs 0
Channel 157 / 5785 MHz		Channel 157 / 5785 MHz	
Identifyee DW Identifyee DW RL SF SD SC SEREENLSE AUSIAUTO IOse4450 SMDe: 20, 2017 Center Freq 5.825000000 GHz Center Freq 5.82500000 GHz Radio Std: None Radio Std: None Radio Std: None #Effective #FG almst.ow #Atten: 30 dB Radio Device: BTS Ref Offset 9.73 dB Ref 20.00 dBm Ref 20.00 dBm	Frequency	Adjunt Spectrum Andyzer: Occupied INV Spectrum Andyzer: Occupied INV Adjoint Spectrum Andyzer: Occupied INV Adjoint Spectrum Andyzer: Occupied INV Operating Spectrum Andyzer: Occupied INV Operating Spectrum Andyzer: Operating Spec	Frequency
Log	Center Freq 5.825000000 GHz	Log	Center Fr 5.825000000 Gi
Center 5.825 GHz Span 40 MHz #Res BW 100 kHz \$Weep 3.867 ms	CF Step 4.000000 MHz <u>Auto</u> Man	Center 5.825 GHz Span 40 MHz Sweep 3.867 ms	CF Ste 4.000000 M uto M
Occupied Bandwidth Total Power 13.7 dBm 17.598 MHz Transmit Freq Error -338 Hz OBW Power 99.00 % x dB Bandwidth 17.64 MHz x dB -6.00 dB	Freq Offset 0 Hz	Occupied Bandwidth Total Power 14.0 dBm 17.584 MHz Transmit Freq Error -1.750 kHz OBW Power 99.00 % x dB Bandwidth 17.63 MHz x dB -6.00 dB	Freq Offs 0
itans		MSO Contraction of the status	
Channel 165 / 5825 MHz		Channel 165 / 5825 MHz	

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 27 of 67

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

6dB Occupie	ed Bandwidth
IEEE 802.11n HT40 @ Chain0	IEEE 802.11ac VHT40 @ Chain0
Agilent Spectrum Anelyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied BW
M RF SD Q AC SPREPAUSE ALISHAUTO D6:33:25 PMDe: 20, 2017 Center Freq 5.75500000 GHz Center Freq: 5.75500000 GHz Frequency Radio Stat: None Frequency	# R.L RF Stop AL Stop Stop <thstop< th=""> Stop Stop</thstop<>
#IFGain:Low #Atten: 30 dB Radio Device: BTS Ref Offset 9.73 dB	#FGaint.ow #Atten: 30 dB Radio Device: BTS Ref Offset 9.73 dB
10 dB/div Ref 20.00 dBm	10 dB/div Ref 20.00 dBm
0.00 5.755000000 GHz	0.00 5.755000000 GHz
10.0	
300 with hand have with the second se	300 and the service of the service o
40.0	500
70.0	10.0
Center 5.755 GHz Span 80 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms	Center 5.755 GHz Span 80 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms
Occupied Bandwidth Total Power 15.2 dBm	Occupied Bandwidth Total Power 15.3 dBm
36.193 MHz Freq Offset	35.941 MHz FreqOffset
Transmit Freq Error -50.565 kHz OBW Power 99.00 % 0 Hz x dB Bandwidth 36.39 MHz x dB -6.00 dB	Transmit Freq Error -34.503 kHz OBW Power 99.00 % 0 Hz x dB Bandwidth 36.38 MHz x dB -6.00 dB
and A local	
Channel 151 / 5755 MHz	Channel 151 / 5755 MHz
Image: Name Ref 1909 AC Image: Name ALISNAT/TO Image: Name Name Product of Name	MR NF SD Q AC 1996/EFALEE ALISMATIC D01355/37400c20,2027 Frequency Center Freq 5.7950000000 GHz Center Freq 5.750000000 Hz Radio Std: None Frequency #Real-top Trig: Free Run Avg Hold: 1/1 Radio Std: None Frequency
Ref Offset 9.73 dB	Ref Offset 9.73 dB
10 dB/div Ref 20.00 dBm	10 dB/div Ref 20.00 dBm
0.00 5.795000000 GHz	0.00 5.795000000 GHz
100	
30.0 40.0 	300
	000
700	70.0
Center 5.795 GHz Span 80 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms 8.00000 MHz	Center 5.795 GHz Span 80 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms 8.00000 MHz 8.000000 MHz
Occupied Bandwidth Total Power 14.6 dBm Auto Man	Occupied Bandwidth Total Power 14.4 dBm Auto Man
35.925 MHz FreqOffset	35.934 MHz Freq Offset
Transmit Freq Error -36.833 kHz OBW Power 99.00 % 0 Hz x dB Bandwidth 36.38 MHz x dB -6.00 dB	Transmit Freq Error -40.954 kHz OBW Power 99.00 % 0 Hz x dB Bandwidth 36.37 MHz x dB -6.00 dB
MSG Contraction	Million Construction
Channel 159 / 5795 MHz	Channel 159 / 5795 MHz
IEEE 802.11ac VHT20 @ Chain0	IEEE 802.11ac VHT20 @ Chain0
Agilant Spectrum Analyzer - Occupied BW Spectrum Analyzer - Occupied BW 0 R.L FF SD Q AC SPIGE PULSE ALIGNAUTO 06:54:05 PMDec 20, 2017	Agilent Spectrum Analyzer - Occupied BW JU R.L RF 55.0 AC SPIGE PULSE ALIGHAUTO 06:59:53 PMDec 20, 2017
Center Freq 5.745000000 GHz + Trig: Free Run Avg Hold: 1/1 #IFGaint.ow 04B Radio Device: BTS	Center Freq 5.785000000 GHz Center Freq 5.785000000 GHz Frequency #Frequency #Atten: 30 dB Radio State None #Frequency #Atten: 30 dB Radio Device: BTS
Ref Offset 9.73 dB 10 dB/div Ref 20.00 dBm	Ref Offset 9.73 dB 10 dB/div Ref 20.00 dBm
Log	Log Center Freq
000 5.74500000 GHz	0.00 5.78500000 GHz
	-200
-20 mountained and the second and th	400 ministration of the second
80.0	40.0
-700 Center 5.745 GHz Span 40 MHz	700 Center 5.785 GHz Span 40 MHz 57 51-51
#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz	#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz
Occupied Bandwidth Total Power 15.3 dBm	Occupied Bandwidth Total Power 14.0 dBm
I7.303 IVI⊓∠ FreqOffset Transmit Freq Error 1.947 kHz OBW Power 99.00 % 0 Hz	I1.3/1 Freq Offset Transmit Freq Error -888 Hz OBW Power 99.00 % 0 Hz
x dB Bandwidth 17.61 MHz x dB -6.00 dB	x dB Bandwidth 17.65 MHz x dB -6.00 dB
MSG Contraction Contraction	MSG Cartona
Channel 149 / 5745 MHz	Channel 157 / 5785 MHz

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 28 of 67 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

6dB (Occupie	ed Bandwidth
IEEE 802.11ac VHT20 @ Chain0		IEEE 802.11ac VHT80 @ Chain0
Agilent Spectrum Analyzer / Occupied Intr SPGE PLLSE ALISAUTO OF00.30P40ec 20,2017 M 8 L RF 59.02 AC SPGE PLLSE ALISAUTO OF00.30P40ec 20,2017 Center Freq 5.825000000 GHz Center Freq 5.825000000 Hz Radio Std: None Radio Std: None Trg: Free Run Avg Hold: 1/1 Radio Device: BTS Ref Offset 9.73 dB 10 dB/div Ref 20.00 dBm	Frequency	Uptent Spectrum Analyzer Occupied BW ISPREPLUSE ALIGNA/TO D29258 PM Jan02, 2008 If RL #F \$50 a. AC ISPREPLUSE ALIGNA/TO D29258 PM Jan02, 2008 Center Freq 5.775000000 GHz Genter Freq 5.775000000 GHz Radio Std: None Frequency #FGain:Low #Atten: 30 dB Radio Device: BTS Radio Device: BTS 10 dB/div Ref 20.00 dBm
	Center Freq 5.825000000 GHz	000 5.775000000 G
		300 400 500 500 500 500 500 500 5
Center 5.825 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms	CF Step 4.000000 MHz	Center 5.775 GHz Span 160 MHz SPan 160 MHz CF Stte Res BW 100 kHz #VBW 300 kHz Sweep 15.33 ms
Occupied Bandwidth Total Power 13.9 dBm 17.592 MHz Transmit Freq Error 222 Hz OBW Power 99.00 % x dB Bandwidth 17.63 MHz x dB -6.00 dB	Auto Man Freq Offset 0 Hz	Occupied Bandwidth Total Power 12.0 dBm Auto Ma 75.408 MHz Freq Offs
MSG BATATUS		and Alexand
Channel 165 / 5825 MHz		Channel 155 / 5775 MHz

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

IEEE 802.11a @ Chain1	pied Bandwidth
	IEEE 802.11n HT20 @ Chain1
Agilent Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied BW
RL RF ISU & AC ISINSFRUSE AUGWAUTO (07:32:53 MMDe: 20, 2017) Center Freq 5.745000000 GHz Center Freq: 5745000000 GHz Radio Std: None Frequer	cy Center Freq 5.745000000 GHz Center Freq: 5.745000000 GHz Radio Std: None Frequency
#IFGain:Low #Atten: 30 dB Radio Device: BTS	#IFGain:Low #Atten: 30 dB Radio Device: BTS
Ref Offset 9.73 dB 10 dB/div Ref 20.00 dBm Log	10 B/div Ref 075et 3.73 dB 10 dB/div Ref 20.00 dBm Log
100 Center 000 5.7450000	
10.0 marganetic frances and marganetic and a second	-10.0
20 percent with with percent	40.0 page much entropy and the second and a second and as second and a second and as second and a second and as second and
80.0	-60.0
70.0	-70.0
Center 5.745 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.0000	Step Center 5.745 GHz Span 40 MHz CF Ste #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.00000 Mi
Occupied Bandwidth Total Power 15.4 dBm	Man Occupied Bandwidth Total Power 15.3 dBm Auto Ma
17.578 MHz Freq	
Transmit Freq Error -1.861 kHz OBW Power 99.00 %	^{0 Hz} Transmit Freq Error -1.707 kHz OBW Power 99.00 %
x dB Bandwidth 17.63 MHz x dB -6.00 dB	x dB Bandwidth 17.62 MHz x dB -6.00 dB
ASG Lossatus	MSG Loss
Channel 149 / 5745 MHz	Channel 149 / 5745 MHz
Agilant Spectrum Analyzer - Occupied BW	Agilent Spectrum Analyzer - Occupied BW
2 RL RF 50 Ω AC S995ERU.S AUGNAUTO [07-4000 PMDec 20, 2017] Center Freq 5.785000000 GHz Center Freq 5.785000000 GHz Radio Std: None Frequer Trig: Freq Sun Avg[Hold: 1/1]	Trig: Free Run ArgHold: 1/1
#IFGain:Low #Atten: 30 dB Radio Device: BTS	#IFGain:Low #Atten: 30 dB Radio Device: BTS
Ref Offset 9.73 dB 10 dB/div Ref 20.00 dBm	Ref Offset 9.73 dB 10 dB/div Ref 20.00 dBm
100 Center	
0.00 5.7850000	00 GHz 0.00 5.785000000 GH
200	20.0
300	20.0 and an and a second as a second
-50.0	-50.0
600 700	600
Center 5.785 GHz Span 40 MHz	Center 5.785 GHz Span 40 MHz CF Stee 3.785 GHz CF Stee 3.785 GHz Start 2.585 ms 3.967 ms CF Stee 3.967 ms 3.967 ms CF Stee 3.967 ms 3.967
4,000 Auto	00 MHz ##000 00 KHz 000 KHz 000 KHz 0000 MH Man Auto Ma
Occupied Bandwidth Total Power 14.2 dBm 17.584 MHz	Occupied Bandwidth Total Power 13.9 dBm
Transmit Freq Error 4.333 kHz OBW Power 99.00 %	Offset I / . 303 IVI⊓∠ Freq Offse ⁰ Hz Transmit Freq Error 6.330 kHz OBW Power 99.00 % 0 ⁺
x dB Bandwidth 17.61 MHz x dB -6.00 dB	x dB Bandwidth 17.63 MHz x dB -6.00 dB
ASG LostATUS	MSG
Channel 157 / 5785 MHz	Channel 157 / 5785 MHz
Algilant Spectrum Analyzer - Occupied DW 2 R.L. RF 590 (S.R.L.) ALIONAUTO (07-41-43 PMDec 20, 2017) 2 R.L. RF 590 (S.R.L.) ALIONAUTO (07-41-43 PMDec 20, 2017) 2 R.L. R.F. 5.925 (S.O.D.C.L.) Cautor Erzer 5.95500000 (Alz) Rulia Strict Name	Agilent Spectrum Analyzer - Occupied DW Question - Registry - Occupied DW
Center Freq 5.825000000 GHz #IFGain:Low #Atten: 30 dB Radio Device: BTS	Center Freq 5.825000000 GHz Center Freq 5.825000000 GHz Radio Std: None #IFGain:Low #Attain: 30 dB Radio Device: BTS
Ref Offset 9.73 dB	Ref Offset 9.73 dB
10 dB/div Ref 20.00 dBm	Log Center Ere
0.00 5.8250000	00 GHz 0.00 5.825000000 GH
100	
300	
40.0 //www.hullen.web.hullen.edu//web.hullen.edu//web.hullen.edu//web.hullen.edu//web.hullen.edu//web.hullen.edu	400 White was not a feature of the second
80.0	60.0
70.0 Center 5.825 GHz Span 40 MHz	70.0 Center 5.825 GHz Span 40 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.0000	Step #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.000000 MHz 4.000000 MHz
Occupied Bandwidth Total Power 13.7 dBm	Man Occupied Bandwidth Total Power 13.8 dBm Auto Ma
17.589 MHz Freq	
Transmit Freq Error -4.634 kHz OBW Power 99.00 % x dB Bandwidth 17.64 MHz x dB -6.00 dB	0 Hz Transmit Freq Error -604 Hz OBW Power 99.00 % 0 H x dB Bandwidth 17.64 MHz x dB -6.00 dB <t< td=""></t<>
A GB Bandwidun 17.04 WHZ X GB -0.00 GB	
50 6 97705	ма
Channel 165 / 5825 MHz	Channel 165 / 5825 MHz

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 30 of 67

FCC ID: 2AF9R-RL

Report No.: LCS171211025AEE

6dB (Occupie	d Bandwidth
IEEE 802.11n HT40 @ Chain1	í í	IEEE 802.11ac VHT40 @ Chain1
Agitant Spectrum Analyzer - Occupied IW SPACE PRIJE AllSPLATTO De2:119 PMDec 20, 2017 08 R.L 85 930 - AC SPACE PRIJE AllSPLATTO De2:119 PMDec 20, 2017 Canturar Encore 5 75 500 DDD 00 CBLr Canturar Encore 5 75 500 DDD 00 CBLr Radio Std: None Radio Std: None	Frequency	Aglent Spectrum Andyzer - Occupied IW Streep 1.95 AU320A070 D0210-472000e-21, 2007 B RL 55 19.9 ac Streep 1.95 AU320A070 D0210-472000e-21, 2007 Constant Encours 7556000000 GHz Constant Encours Frequency
Radio Device: BTS Radio Device	Center Freq 5.75500000 GHz	Ref Offset 9 73 dB Trig: Free Run Avg Hold: 1/1 10 dBdiv Ref Offset 9 73 dB Radio Device: BTS 10 dBdiv Ref Offset 9 73 dB Ref Offset 9 73 dB Ref Offset 9 73 dB 10 dBdiv Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB 10 dBdiv Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB 10 dBdiv Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB 10 dBdiv Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB Ref 0 76 set 9 73 dB 10 dBdiv Ref 0 76 set 9 73 dB Ref 0 76 set 9 75 set 9 800000 GHz Ref 0 76 set 9 76 set 9 800000 GHz 10 dBdiv Ref 0 76 set 9 76 set 9 800000 GHz Ref 0 76 set 9 76 set 9 800000 GHz Ref 0 76 set 9 800000 GHz Ref 0 76 set 9 800000 GHz 10 dBdiv Ref 0 76 set 9 800000 GHz 10 dBdiv Ref 0 76 set 9 800000 GHz 10 dBdiv Ref 0 76 set 9 800000 GHz Ref 0 76 set 9 8000000 GHz Ref 0 76 set 9 8000000 GHz
Center 5.755 GHz Span 80 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms	CF Step 8.000000 MHz	Center 5.755 GHz Span 80 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms 8.00000 MHz
Occupied Bandwidth Total Power 15.2 dBm 35.961 MHz Transmit Freq Error -40.071 kHz OBW Power 99.00 % x dB Bandwidth 36.41 MHz x dB -6.00 dB	Freq Offset 0 Hz	Occupied Bandwidth Total Power 15.1 dBm Auto Man 35.936 MHz Freq Offset Freq Offset 0Hz 0Hz <td< td=""></td<>
MSO STATUS		MSO Contractor Contrac
Channel 151 / 5755 MHz		Channel 151 / 5755 MHz
Adjent Spectram Analyzer - Occupied DW All R2 R2 R2 R2 Center Freq 5.7950000000 GHz #IF Gaint.ow #IF Gaint.ow Radio Device: BTS Ref Offset 9.73 dB	Frequency	Aglinnt Spectrum Andyzer, Occupied BW AL 65 1500 AC ISBNE FRLSS ALSON OCCUPACION AND ALSON OF TRADING AND ALSON
10 dBdiv Ref 20.00 dBm	Center Freq 5.795000000 GHz	10 detailin Ref 20.00 dBm Log 10 10 10 10 10 10 10 10 10 10
Center 5.795 GHz Span 80 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms	8.000000 MHz	Center 5.795 GHz Span 80 MHz CF Step #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms 8.000000 MHz
Occupied Bandwidth Total Power 14.4 dBm 35.913 MHz Transmit Freq Error -26.163 kHz OBW Power 99.00 % x dB Bandwidth 36.36 MHz x dB -6.00 dB	Auto Man Freq Offset 0 Hz	Occupied Bandwidth Total Power 14.3 dBm Auto Man 35.927 MHz Transmit Freq Error -43.954 kHz OBW Power 99.00 % x dB Bandwidth 36.39 MHz x dB -6.00 dB
Channel 159 / 5795 MHz		Channel 159 / 5795 MHz
IEEE 802.11ac VHT20 @ Chaini	1	IEEE 802.11ac VHT20 @ Chain1
Aptent Spectrum Analyzer - Oscupied HW States FLASE Adjourn 0 0844250 PMDec 20, 2017 21 RL FF 55 0 0 AC States FLASE Adjourn 0 0844250 PMDec 20, 2017 21 RL FF 5745500000 ODG HZ Center Freq. 5.745500000 OHz Radio Std: None If GainsLow #FGainsLow Ref Offset 9.73 dB	Frequency	Applent Spectrum Andyzer : Occupied INV Categorie International Control (Control (Contro) (Contro) (Control (Control (Control (Contro) (Control (Contro)
10 dB/div Ref 20.00 dBm	Center Freq 5.745000000 GHz	10 distoliv Ref 20.00 dBm Log 10 Center Freq 5 78500000 GHz 5 78500000 GHz
Center 5.745 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms	CF Step 4.000000 MHz Auto Man	Center 5.785 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms 4.00000 MHz Auto Man
Occupied Bandwidth Total Power 15.0 dBm 17.588 MHz Transmit Freq Error 1.613 kHz OBW Power 99.00 % x dB Bandwidth 17.63 MHz x dB -6.00 dB	Freq Offset 0 Hz	Occupied Bandwidth Total Power 13.7 dBm 17.658 MHz Freq Offset Transmit Freq Error 1.304 kHz X dB Bandwidth 17.64 MHz x dB -6.00 dB
MSG GSTATUS	L	MSG Contraction Contraction
Channel 149 / 5745 MHz		Channel 157 / 5785 MHz

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 31 of 67 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

6dB (Occupie	ed Bandwidth
IEEE 802.11ac VHT20 @ Chain1	1	IEEE 802.11ac VHT80 @ Chain1
Agilent Spectrum Andyzer: Occupied UW EBSEERLSE ALSHAUTO 0220027PMDec21.037 RL RF SSG AC EBSEERLSE ALSHAUTO 0220027PMDec21.037 Center Freq 5.825000000 GHz Center Freq 5.825000000 GHz Radio Std: None Radio Std: None sFG ainclow #Atten: 30 dB Radio Device: BTS Radio Device: BTS	Frequency	(glent Spectrum Analyzer - Occupied HW Ell FF Store ALIONAUTO D2:38:50 PM JanD2, 2018 Frequency Center Freq 5.775000000 GHz Center Freq: 5.775000000 GHz Radio Stcl. None Frequency #IFGaln.tow #Atten: 30 dB Radio Device: BTS Radio Device: BTS
10 dBdiv Ref 20.00 dBm	Center Freq 5.825000000 GHz	0.00 5.775000000 GHz
		100 200 300 400 500 500 500 500 500 500 5
Center 5.825 GHz Span 40 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 3.867 ms	CF Step 4.000000 MHz	Center 5.775 GHz Span 160 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 15.33 ms 15.00000 HHz 15.00000 HHz
Occupied Bandwidth Total Power 13.5 dBm 17.593 MHz 0BW Power 99.00 % Transmit Freq Error 3.407 kHz OBW Power 99.00 % x dB Bandwidth 17.65 MHz x dB -6.00 dB	Auto Man Freq Offset 0 Hz	Occupied Bandwidth Total Power 12.0 dBm Auto Man 75.429 MHz Freq Offset
MSG 🕼 STATUS	L]	eal filment
Channel 165 / 5825 MHz		Channel 155 / 5775 MHz

FCC ID: 2AF9R-RL

5.5. Radiated Emissions Measurement

5.5.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. 2 Above 38.6

\2\ Above 38.6

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of -27 dBm/MHz(68.2dBuV/m at 3m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz(105.2dBuV/m at 3m) at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6(110.8dBuV/m at 3m) dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz(122.2dBuV/m at 3m) at the band edge.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.5.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10 ^m carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 33 of 67

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

5.5.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- --- If the EUT is a floor standing device, it is placed on the ground.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

Premeasurement:

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- --- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

Premeasurement:

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position $(\pm 45^{\circ})$ and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- --- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

Premeasurement:

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

- --- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- --- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- --- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- --- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- --- The measurement distance is 1 meter.
- --- The EUT was set into operation.

Premeasurement:

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

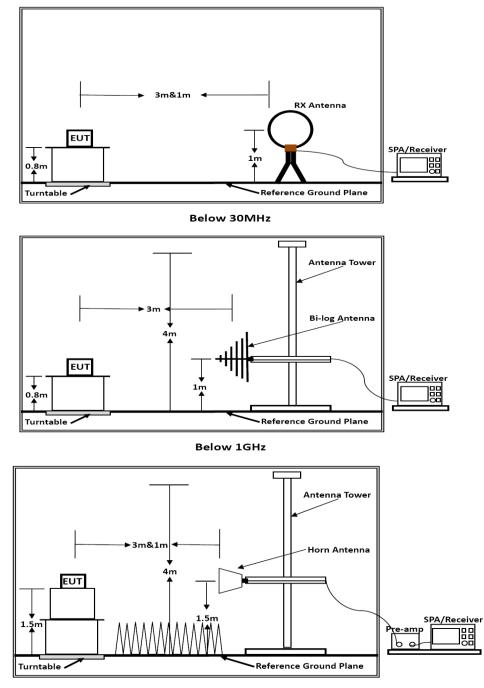
Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.5.4. Test Setup Layout

For radiated emissions below 30MHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 38 of 67

FCC ID: 2AF9R-RL

5.5.6. Results of Radiated Emissions (9 KHz~30 MHz)

Temperature	25 ℃	Humidity	60%
Test Engineer	Tom Liu	Configurations	IEEE 802.11a/n/ac

Freq.	Level	Over Limit	Over Limit	Remark
(MHz)	(dBuV)	(dB)	(dB)	
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

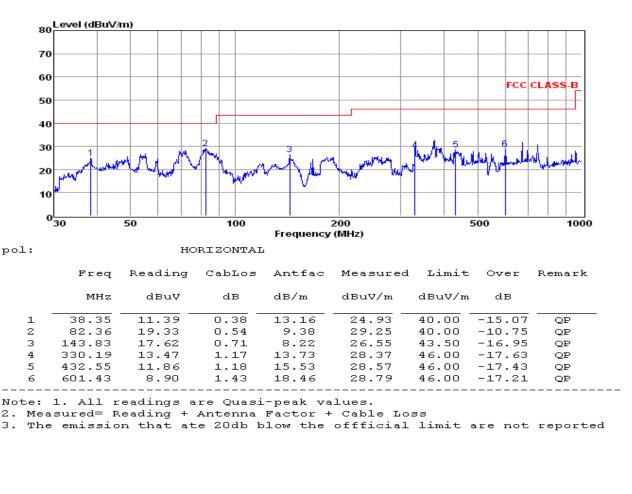
Limit line = specific limits (dBuV) + distance extrapolation factor.

5.4.7. Results of Radiated Emissions (30 MHz~1 GHz)

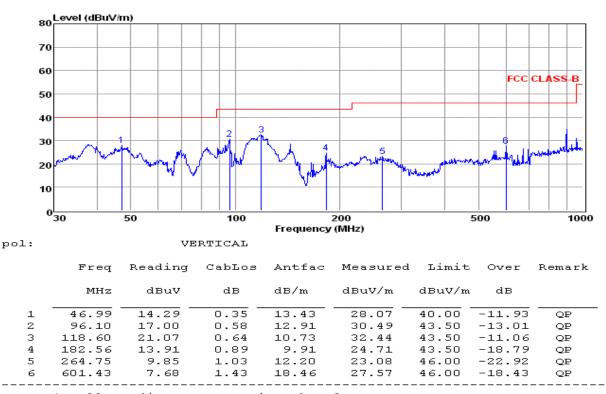
Temperature	25 ℃	Humidity	60%
Test Engineer	Tom Liu	Configurations	IEEE 802.11n HT20

Test result for IEEE 802.11n HT20 mode (Low Channel, Combined Antenna Chain0 and Antenna Chain1)

Horizontal:



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 39 of 67 Vertical:



Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that ate 20db blow the offficial limit are not reported

Note:

Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11n HT20 mode (Low Channel, Combined Antenna Chain0 and Antenna Chain1)). Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

IEEE 802.11a (Worst Case at Antenna Chain0)

Channel 149 / 5745 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.235	61.74	33.23	35.04	3.91	63.84	68.20	-4.36	Peak	Horizontal
17.235	43.13	33.23	35.04	3.91	45.23	54.00	-8.77	Average	Horizontal
17.235	58.47	33.23	35.04	3.91	60.57	68.20	-7.63	Peak	Vertical
17.235	41.38	33.23	35.04	3.91	43.48	54.00	-10.52	Average	Vertical

Channel 157 / 5785 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.355	59.62	33.27	35.15	3.93	61.67	68.20	-6.53	Peak	Horizontal
17.355	42.60	33.27	35.15	3.93	44.65	54.00	-9.35	Average	Horizontal
17.355	57.63	33.27	35.15	3.93	59.68	68.20	-8.52	Peak	Vertical
17.355	41.85	33.27	35.15	3.93	43.90	54.00	-10.10	Average	Vertical

Channel 163 / 5825 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.475	62.03	33.32	35.14	3.97	64.18	68.20	-4.02	Peak	Horizontal
17.475	46.39	33.32	35.14	3.97	48.54	54.00	-5.46	Average	Horizontal
17.475	59.14	33.32	35.14	3.97	61.29	68.20	-6.91	Peak	Vertical
17.475	41.94	33.32	35.14	3.97	44.09	54.00	-9.91	Average	Vertical

IEEE 802.11n HT20 (Combine with Antenna Chain0 and Antenna Chain1)

Channel 149 / 5745 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.235	62.14	33.23	35.04	3.91	64.24	68.20	-3.96	Peak	Horizontal
17.235	42.48	33.23	35.04	3.91	44.58	54.00	-9.42	Average	Horizontal
17.235	57.83	33.23	35.04	3.91	59.93	68.20	-8.27	Peak	Vertical
17.235	42.74	33.23	35.04	3.91	44.84	54.00	-9.16	Average	Vertical

Channel 157 / 5785 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.355	60.80	33.27	35.15	3.93	62.85	68.20	-5.35	Peak	Horizontal
17.355	41.22	33.27	35.15	3.93	43.27	54.00	-10.73	Average	Horizontal
17.355	58.70	33.27	35.15	3.93	60.75	68.20	-7.45	Peak	Vertical
17.355	41.31	33.27	35.15	3.93	43.36	54.00	-10.64	Average	Vertical

Channel 163 / 5825 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.475	59.99	33.32	35.14	3.97	62.14	68.20	-6.06	Peak	Horizontal
17.475	46.91	33.32	35.14	3.97	49.06	54.00	-4.94	Average	Horizontal
17.475	60.11	33.32	35.14	3.97	62.26	68.20	-5.94	Peak	Vertical
17.475	42.98	33.32	35.14	3.97	45.13	54.00	-8.87	Average	Vertical

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 41 of 67

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: 2AF9R-RL Report No.: LCS171211025AEE

IEEE 802.11ac VHT20 (Combine with Antenna Chain0 and Antenna Chain1)

Channel 149 / 5745 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.235	61.79	33.23	35.04	3.91	63.89	68.20	-4.31	Peak	Horizontal
17.235	44.62	33.23	35.04	3.91	46.72	54.00	-7.28	Average	Horizontal
17.235	56.04	33.23	35.04	3.91	58.14	68.20	-10.06	Peak	Vertical
17.235	42.83	33.23	35.04	3.91	44.93	54.00	-9.07	Average	Vertical

Channel 157 / 5785 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.355	59.36	33.27	35.15	3.93	61.41	68.20	-6.79	Peak	Horizontal
17.355	41.69	33.27	35.15	3.93	43.74	54.00	-10.26	Average	Horizontal
17.355	57.90	33.27	35.15	3.93	59.95	68.20	-8.25	Peak	Vertical
17.355	39.77	33.27	35.15	3.93	41.82	54.00	-12.18	Average	Vertical

Channel 163 / 5825 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.475	63.09	33.32	35.14	3.97	65.24	68.20	-2.96	Peak	Horizontal
17.475	44.75	33.32	35.14	3.97	46.90	54.00	-7.10	Average	Horizontal
17.475	59.38	33.32	35.14	3.97	61.53	68.20	-6.67	Peak	Vertical
17.475	42.96	33.32	35.14	3.97	45.11	54.00	-8.89	Average	Vertical

IEEE 802.11n HT40 (Combine with Antenna Chain0 and Antenna Chain1)

Channel 151 / 5755 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.265	60.11	33.23	35.04	3.91	62.21	68.20	-5.99	Peak	Horizontal
17.265	43.20	33.23	35.04	3.91	45.30	54.00	-8.70	Average	Horizontal
17.265	58.85	33.23	35.04	3.91	60.95	68.20	-7.25	Peak	Vertical
17.265	43.79	33.23	35.04	3.91	45.89	54.00	-8.11	Average	Vertical

Channel 159 / 5795 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.385	59.93	33.23	35.04	3.91	62.03	68.20	-6.17	Peak	Horizontal
17.385	43.28	33.23	35.04	3.91	45.38	54.00	-8.62	Average	Horizontal
17.385	57.19	33.23	35.04	3.91	59.29	68.20	-8.91	Peak	Vertical
17.385	43.28	33.23	35.04	3.91	45.38	54.00	-8.62	Average	Vertical

IEEE 802.11ac VHT40 (Combine with Antenna Chain0 and Antenna Chain1)

Channel 151 / 5755 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.265	57.29	33.23	35.04	3.91	59.39	68.20	-8.81	Peak	Horizontal
17.265	42.21	33.23	35.04	3.91	44.31	54.00	-9.69	Average	Horizontal
17.265	58.27	33.23	35.04	3.91	60.37	68.20	-7.83	Peak	Vertical
17.265	38.33	33.23	35.04	3.91	40.43	54.00	-13.57	Average	Vertical

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 42 of 67

Report No.: LCS171211025AEE

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
17.385	58.55	33.23	35.04	3.91	60.65	68.20	-7.55	Peak	Horizontal
17.385	42.91	33.23	35.04	3.91	45.01	54.00	-8.99	Average	Horizontal
17.385	55.94	33.23	35.04	3.91	58.04	68.20	-10.16	Peak	Vertical
17.385	38.58	33.23	35.04	3.91	40.68	54.00	-13.32	Average	Vertical

IEEE 802.11ac VHT80 (Combine with Antenna Chain0 and Antenna Chain1)

Channel 155 / 5775 MHz

Freq GHz	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Measured Level dBuV	Limit Line dBuV/m	Over limit dB	Remark	Pol
17.325	57.89	33.27	35.15	3.93	59.94	68.20	-8.26	Peak	Horizontal
17.325	41.29	33.27	35.15	3.93	43.34	54.00	-10.66	Average	Horizontal
17.325	59.71	33.27	35.15	3.93	61.76	68.20	-6.44	Peak	Vertical
17.325	41.71	33.27	35.15	3.93	43.76	54.00	-10.24	Average	Vertical

Notes:

- 1). Measuring frequencies from 9 KHz ~ 40 GHz, No emission found between lowest internal used/generated frequency to 30MHz.
- 2). Radiated emissions measured in frequency range from 9 KHz ~ 40 GHz were made with an instrument using Peak detector mode.
- 3). 18~40GHz at least have 20dB margin. No recording in the test report.
- 4). Worst case data at 6Mbps at IEEE 802.11a; MCS0 at IEEE 802.11n HT20, IEEE 802.11n HT40, IEEE 802.11a VHT20, IEEE 802.11ac VHT40 and IEEE 802.11ac VHT80;
- 5). Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 6). Pre-scan at Antenna0 and Antenna1 for IEEE 802.11a mode, pre-scan at Antenna0, Antenna1 and Combined Antenna 0 and Antenna 1 for IEEE 802.11n and IEEE 802.11ac, recorded worst case.

5.6. Power line conducted emissions

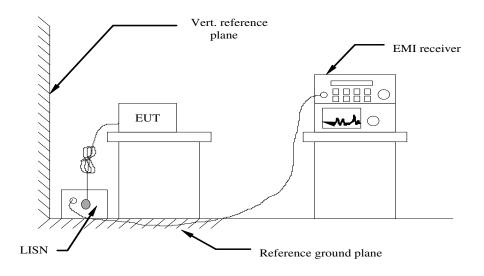
5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range	Limits (dBµV)				
(MHz)	Quasi-peak	Average			
0.15 to 0.50	66 to 56*	56 to 46*			
0.50 to 5	56	46			
5 to 30	60	50			

* Decreasing linearly with the logarithm of the frequency

5.6.2 Block Diagram of Test Setup



5.6.3 Test Results

PASS.

The test data please refer to following page.