FCC TEST REPORT

Product Name:	ANDROID SET TOP BOX
Trade Mark:	LSP.mini , GIEC
Model No.:	LSPs912-G1-1703
Report Number:	170329002RFC-4
Test Standards:	FCC 47 CFR Part 15 Subpart E
FCC ID:	2AF98-LSPMINIS912
Test Result:	PASS
Date of Issue:	May 31, 2017

Prepared for:

LIFE STYLE PANEL PTY LTD
7 7Logistics Place,Larapinta,Queensland,Australia

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
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Tested by: _____ Kevin Liang, Senior Engineer

Reviewed by: _____ Jim Long, Senior Engineer

Approved by: _____ Billy Li, Technical Director

Date: May 31, 2017

Version

Version No.	Date	Description
V1.0	May 31, 2017	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	LIFE STYLE PANEL PTY LTD
Address of Applicant:	7 7Logistics Place,Larapinta,Queensland,Australia
Manufacturer:	SHENZHEN GIEC DIGITAL CO., LTD
Address of Manufacturer:	No.1 Building,Factory,No.7 District,Dayang Development Areas,FuYongStreet,Baoan,Shenzhen,Guangdong,China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	ANDROID SET TOP BOX		
Model No.:	LSPs912-G1-1703		
Add. Model No.:	GK-MP1125, GK-MP1129 (see note 1)		
Trade Mark:	GIEC, LSP.mini		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth: V4.1	
	5 GHz U-NII Bands:	5 180 MHz to 5 240 MHz	IEEE 802.11a/n/ac
		5 260 MHz to 5 320 MHz	IEEE 802.11a/n/ac
		5 500 MHz to 5 700 MHz	IEEE 802.11a/n/ac
		5 745 MHz to 5 805 MHz	IEEE 802.11a/n/ac
Software Version:	V1.0.1.20161201		
Hardware Version:	RM-MPEG-172G VER1.0-1		
Sample Received Date:	March 30, 2017		
Sample Tested Date:	April 1, 2017 to May 4, 2017		

Note 1: Following are the diffrences of these three models. After evaluation, the differences between these models have no influence for RF test.

Model name	Trade name	Description
GK-MP1125	GIEC	All three models are with the same circuit and PCB layout. Color, silk screen and trademark of these three models are different. Model LSPs912-G1-1703 has no AV interface, and model GK-MP1129 has different shell with that of the other two models.
LSPs912-G1-1703	LSP.mini	
GK-MP1129	GIEC	

1.2.2 Description of Accessories

Adapter	
Trade Mark:	LSP.
Model No.:	TY0500420A1mn
Input:	100-240 V~50/60 Hz 0.8 A
Output:	5.0 V ⎓ 4.2 A
AC Cable:	N/A
DC Cable:	1.50 Meter, Unshielded without ferrite

Cable	
Trade Mark:	N/A
Model No.:	N/A
Description:	HDMI Cable
Cable Type:	Shielded without ferrite
Length:	1.50 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Range:	5180 MHz to 5240 MHz	
	5260 MHz to 5320 MHz	
	5500 MHz to 5700 MHz	
	5 745 MHz to 5 805 MHz	
Support Standards:	IEEE 802.11a/n/ac	
TPC Function:	Not Support	
DFS Operational mode:	Slave without radar Interference detection function	
Type of Modulation:	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)	
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)	
	IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)	
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz	
	IEEE 802.11n-HT40/ac-VHT40: 40 MHz	
	IEEE 802.11ac-VHT80/: 80 MHz	
Data Rate:	IEEE 802.11a: Up to 54 Mbps	
	IEEE 802.11n-HT20: Up to MCS15	
	IEEE 802.11n-HT40: Up to MCS15	
	IEEE 802.11ac-VHT20: Up to MCS8	
	IEEE 802.11ac-VHT40: Up to MCS9	
	IEEE 802.11ac-VHT80: Up to MCS9	
Number of Channels:	5180 MHz to 5240 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40)/ac-VHT40 1 for IEEE 802.11acVHT80	
	5260 MHz to 5320 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40)/ac-VHT40 1 for IEEE 802.11acVHT80	
	5500 MHz to 5700 MHz: 11 for IEEE 802.11a/n-HT20/ac-VHT20 5 for IEEE 802.11n-HT40/ac-VHT40 2 for IEEE 802.11ac-VHT80	
	5745 MHz to 5805 MHz: 5 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40/ac-VHT40 1 for IEEE 802.11ac-VHT80	
Antenna Type:	Chain 0	Integral Antenna
	Chain 1	Integral Antenna
Antenna Gain:	Chain 0	5180 MHz to 5240 MHz: 2 dBi
		5260 MHz to 5320 MHz: 2 dBi
		5500 MHz to 5700 MHz: 2 dBi

		5745 MHz to 5805 MHz: 2 dBi
	Chain 1	5180 MHz to 5240 MHz: 2 dBi
		5260 MHz to 5320 MHz: 2 dBi
		5500 MHz to 5700 MHz: 2 dBi
		5745 MHz to 5805 MHz: 2 dBi

Maximum Output Power (dBm):	**SISO_Chain 0**	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	14.81	14.44	13.64	13.54
	IEEE 802.11n-HT20:	13.61	13.16	12.05	13.18
	IEEE 802.11n-HT40:	11.76	11.78	9.59	10.98
	IEEE 802.11ac-VHT20:	13.20	13.11	12.03	13.10
	IEEE 802.11ac-VHT40:	11.70	11.69	9.51	10.89
	IEEE 802.11ac-VHT80:	11.02	10.19	8.56	10.25
	SISO_Chain 1	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	14.96	14.74	13.95	13.51
	IEEE 802.11n-HT20:	13.63	13.59	12.75	13.25
	IEEE 802.11n-HT40:	12.28	11.66	11.03	11.78
	IEEE 802.11ac-VHT20:	13.58	13.53	12.64	13.21
	IEEE 802.11ac-VHT40:	12.22	11.60	10.98	11.74
	IEEE 802.11ac-VHT80:	11.23	11.21	10.32	10.97
	MIMO_Chain 0+1	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
	IEEE 802.11a:	--	--	--	--
	IEEE 802.11n-HT20:	16.63	16.39	15.43	16.23
	IEEE 802.11n-HT40:	15.04	14.35	13.38	14.41
	IEEE 802.11ac-VHT20:	16.22	16.34	15.36	16.17
	IEEE 802.11ac-VHT40:	14.98	14.27	13.32	14.35
	IEEE 802.11ac-VHT80:	14.14	13.74	12.54	13.64
Normal Test Voltage:	120 V~60 Hz				
Extreme Test Voltage:	100 to 140 Vdc				
Extreme Test Temperature:	-10 °C to +40 °C				

1.4 OTHER INFORMATION

Operation Frequency Each of Channel							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
For IEEE 802.11a/n-HT20/ac-VHT20 operation in the 5150 MHz to 5350 MHz band							
36	5180 MHz	44	5220 MHz	52	5260 MHz	60	5300 MHz
40	5200 MHz	48	5240 MHz	56	5280 MHz	64	5320 MHz
For IEEE 802.11a/n-HT20/ac-VHT20 operation in the 5470 MHz to 5725 MHz band							
100	5500 MHz	112	5560 MHz	124	5620 MHz	136	5680 MHz
104	5520 MHz	116	5580 MHz	128	5640 MHz	140	5700 MHz
108	5540 MHz	120	5600 MHz	132	5660 MHz	--	--
For IEEE 802.11a/n-HT20/ac-VHT20 operation in the 5725 MHz to 5850 MHz band							
149	5745MHz	153	5765MHz	157	5785MHz	161	5805MHz
For IEEE 802.11n-HT40/ac-VHT40 operation in the 5150 MHz to 5350 MHz band							
38	5190 MHz	46	5230 MHz	54	5270 MHz	62	5310 MHz
For IEEE 802.11n-HT40/ac-VHT40 operation in the 5470 MHz to 5725 MHz band							
102	5510 MHz	110	5550 MHz	118	5590 MHz	126	5630 MHz

134	5670 MHz	--	--	--	--	--	--
For IEEE 802.11n-HT40/ac-VHT40 operation in the 5725 MHz to 5825 MHz band							
151	5755 MHz	159	5795 MHz	--	--	--	--
For IEEE 802.11ac-VHT80 operation in the 5150 MHz to 5350 MHz band							
42	5210 MHz	58	5290 MHz	--	--	--	--
For IEEE 802.11ac-VHT80 operation in the 5470 MHz to 5725 MHz band							
106	5530 MHz	122	5610 MHz	--	--	--	--
For IEEE 802.11ac-VHT80 operation in the 5 725 MHz to 5 850 MHz band							
155	5775 MHz	--	--	--	--	--	--

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
LCD monitor	DELL	P2416Db	CN-ONDY73-74261-5C9-OLVS	UnionTrust
--	--	--	--	--

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.30 Meter	UnionTrust
--	--	--	--	--

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

Tests were sub-contracted. (FCC 47 CFR Part 15.207, FCC 47 CFR Part 15.209)
Compliance Certification Services (Shenzhen) Inc.

Address: No.10-1 Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town, Baoan Distr, Shenzhen, Guangdong, China.
Telephone: +86 (0) 755 28055000 Fax: +86 (0) 755 29055221

1.7 TEST FACILITY

Shenzhen UnionTrust Quality and Technology Co., Ltd.

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a

year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

Compliance Certification Services (Shenzhen) Inc.

FCC Registration Number is 441872.

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.2878 dB
2	Conducted emission 150KHz-30MHz	±3.2878 dB
3	Radiated emission 30MHz-200Hz	±3.8928 dB
4	Radiated emission 200MHz-1GHz	±3.8753 dB
5	Radiated emission 1GHz-8GHz	±5.3112 dB
6	Radiated emission Above 8GHz	±5.3493 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart E Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart C Section 15.407(a)(1) (2)	ANSI C63.10-2013	PASS
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v01r03 Section C.1	PASS
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v01r03 Section C.2	PASS
Maximum conducted output power	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v01r03 Section E.3.a(Method PM)	PASS
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v01r03 Section F	PASS
Frequency stability	FCC 47 CFR Part 15 Subpart E Section 15.407 (g)	ANSI C63.10-2013	PASS
Radiated Emissions and Band Edge Measurement	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205	KDB 789033 D02 v01r03 Section G.3, G.4, G.5, and G.6	PASS*
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	PASS*
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS*
Note: 1) N/A: In this whole report not application. 2) "*": In this whole report "*" means tests were sub-contracted Item.			

For Dynamic Frequency Selection

Test Case	Result
Channel Availability Check Time	N/A[1]
U-NII Detection Bandwidth	N/A[1]
Channel Closing Transmission Time	PASS
Channel Move Time	PASS
DFS Detection Threshold	N/A[1]
Non- Occupancy Period	N/A[1]
Note: 1) The EUT is slave, NA In this whole report not application.	

3. EQUIPMENT LIST

Radiated Emission Test Equipment List 966(1)						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	Amplifier	HP	8447D	2944A08999	Feb. 12, 2017	Feb. 11, 2018
☑	Antenna	SCHAFFNER	CBL6143	5082	Feb. 12, 2017	Feb. 11, 2018
☑	Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
☑	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI	101026	Feb. 12, 2017	Feb. 11, 2018
☑	Temp. / Humidity Meter	Anymetre	JR913	N/A	Feb. 15, 2017	Feb. 14, 2018
☑	Test S/W	FARAD	EZ-EMC/ CCS-03A1			

Radiated Emission Test Equipment List 966(2)						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	Feb. 17, 2017	Feb. 16, 2018
☑	High Noise Amplifier	Agilent	8449B	3008A01838	Feb. 11, 2017	Feb. 10, 2018
☑	Horn Antenna	SCHWARZBECK	BBHA9120	D286	Feb. 12, 2017	Feb. 11, 2018
☑	Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	Feb. 11, 2017	Feb. 10, 2018
☑	Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
☑	Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
☑	Controller	CT	N/A	N/A	N.C.R	N.C.R
☑	Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
☑	Temp. / Humidity Meter	Anymetre	JR913	N/A	Feb. 15, 2017	Feb. 14, 2018
☑	Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	Feb. 11, 2017	Feb. 10, 2018
☑	LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	Feb. 11, 2017	Feb. 10, 2018
☑	LISN	EMCO	3825/2	8901-1459	Feb. 12, 2017	Feb. 11, 2018
☑	Temp. / Humidity Meter	VICTOR	HTC-1	N/A	Feb. 15, 2017	Feb. 14, 2018
☑	Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☑	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Dec. 22, 2016	Dec. 22, 2017
☐	EXG-B RF Analog Signal Generator	KEYSIGHT	N5171B	MY53051777	Jan. 09, 2016	Jan. 08, 2018

☑	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	Jan. 08, 2016	Jan. 07, 2018
☐	4ch. Simultaneous Sampling 14 Bits 2MS/s	KEYSIGHT	U2531A	TW55193502	Nov. 09, 2015	Nov. 08,2017
☑	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 21, 2016	Sep. 20, 2017
☑	Temp & Humidity chamber	Ispec	GL(U)04KA(W)	1692H201P3	Sep. 21, 2016	Sep. 20, 2017
☐	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50716	G1868	Jun. 15, 2016	Jun. 14, 2017
☐	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50702	G248	Jun. 21, 2016	Jun. 20, 2017

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	120	20 to 75
TL/VL	-10	100	20 to 75
TH/VL	+40	100	20 to 75
TL/VH	-10	140	20 to 75
TH/VH	+40	140	20 to 75

Remark:

1) The EUT just work in such extreme temperature of -10 °C to +40 °C and the extreme voltage of 100 V to 140 V, so here the EUT is tested in the temperature of -10 °C to +40 °C and the voltage of 100 V to 140 V.
2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)	Tested by
AC Power Line Conducted Emission	23.6	54	100.2	Tiny You
26 dB emission bandwidth	25.2	62	99.8	Tiny You
Maximum conducted output power	25.2	62	99.8	Tiny You
Peak Power Spectral Density	25.2	62	99.8	Tiny You
6 dB bandwidth	25.2	62	99.8	Tiny You
Frequency stability	25.2	62	99.8	Tiny You
Dynamic Frequency Selection	24.6	64	100.1	Tiny You
Radiated Emissions and Band Edge Measurement	24.8	59	99.8	Tiny You

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Channel 36	Channel 44	Channel 48
		5180 MHz	5220 MHz	5240 MHz
	5250 MHz to 5350 MHz	Channel 52	Channel 60	Channel 64
		5260 MHz	5300 MHz	5320 MHz
	5470 MHz to 5725 MHz	Channel 100	Channel 116	Channel 140
		5500 MHz	5580 MHz	5700 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 161
		5745 MHz	5785 MHz	5805 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5250 MHz to 5350 MHz	Channel 54	--	Channel 62
		5270 MHz	--	5310 MHz
	5470 MHz to 5725 MHz	Channel 102	Channel 110	Channel 134
		5510 MHz	5550 MHz	5670 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz
IEEE 802.11ac-VHT80	5150 MHz to 5250 MHz	--	Channel 42	--
		--	5210 MHz	--
	5250 MHz to 5350 MHz	--	Channel 58	--
		--	5290 MHz	--
	5470 MHz to 5725 MHz	Channel 106	--	Channel 122
		5530 MHz	--	5610 MHz
	5725 MHz to 5850 MHz	--	Channel 155	--
		--	5775 MHz	--

4.3 EUT TEST STATUS

Mode	Tx/Rx Function	Description
IEEE 802.11a/n/ac	1Tx/1Rx or 2Tx/2Rx	1. Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

4.4 PRE-SCAN

4.4.1 Pre-scan under all rates

Mode and Frequency	Maximum Conducted Average Power (dBm) for Data Rates (Mbps)							
IEEE 802.11a 5180 MHz	6	9	12	18	24	36	48	54
	14.96	14.80	14.75	14.73	12.37	12.15	12.14	10.82
IEEE 802.11n-HT20 5180 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	13.63	13.36	13.02	10.88	10.64	10.40	9.22	8.33
	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
	13.23	12.92	12.70	10.40	10.21	10.20	9.13	8.09
IEEE 802.11n-HT40 5190 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	12.28	11.64	11.52	9.86	9.70	9.41	8.41	6.66
	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
	12.13	11.31	11.09	9.56	9.21	9.05	7.57	6.13
IEEE 802.11ac-VHT20 5180 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	13.20	12.89	12.67	10.37	10.18	10.17	9.10	8.06
	MCS8							
	6.10							
IEEE 802.11ac-VHT40 5190 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	12.22	11.69	11.57	9.91	9.75	9.46	8.46	6.71
	MCS8	MCS9						
	4.79	4.09						
IEEE 802.11ac-VHT80 5210 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	11.23	10.16	9.92	8.53	8.26	8.06	6.71	5.30
	MCS8	MCS9						
	3.19	3.26						

4.4.2 Worst-case data rates

Mode	Worst-case data rates
IEEE 802.11a	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0
IEEE 802.11ac-VHT20	MCS0
IEEE 802.11ac-VHT40	MCS0
IEEE 802.11ac-VHT80	MCS0

4.4.3 Worst-case antenna port of SISO mode

Mode	Worst-case antenna port of SISO mode	
	Chain 0	Chain 1
IEEE 802.11a	☐	☑
IEEE 802.11n-HT20	☐	☑
IEEE 802.11n-HT40	☐	☑
IEEE 802.11ac-VHT20	☐	☑
IEEE 802.11ac-VHT40	☐	☑
IEEE 802.11ac-VHT80	☐	☑

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

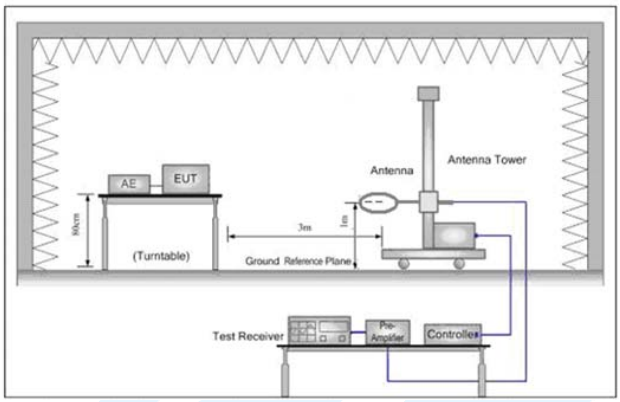


Figure 1. Below 30MHz

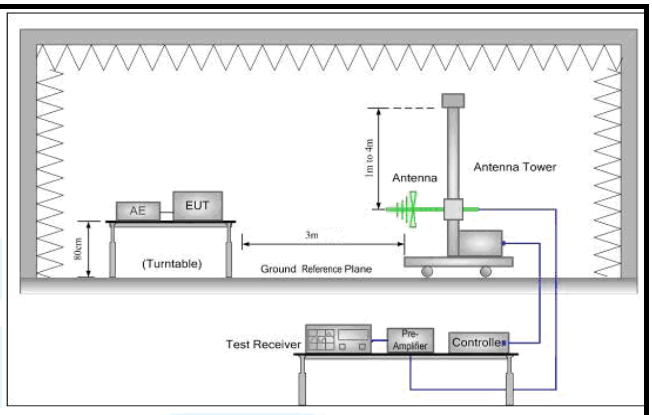


Figure 2. 30MHz to 1GHz

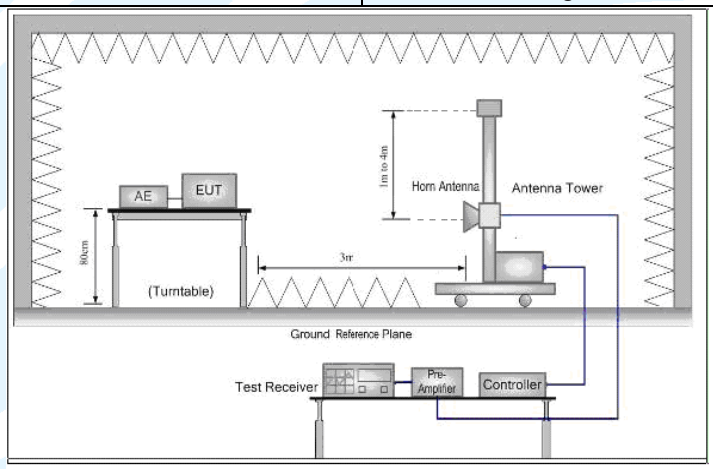
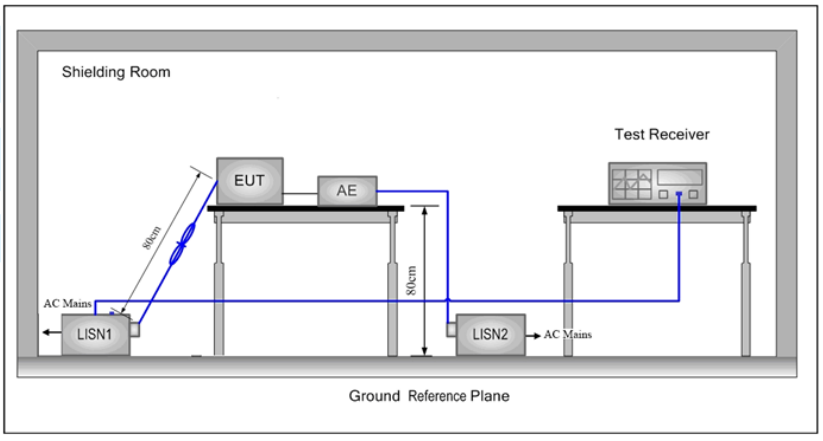


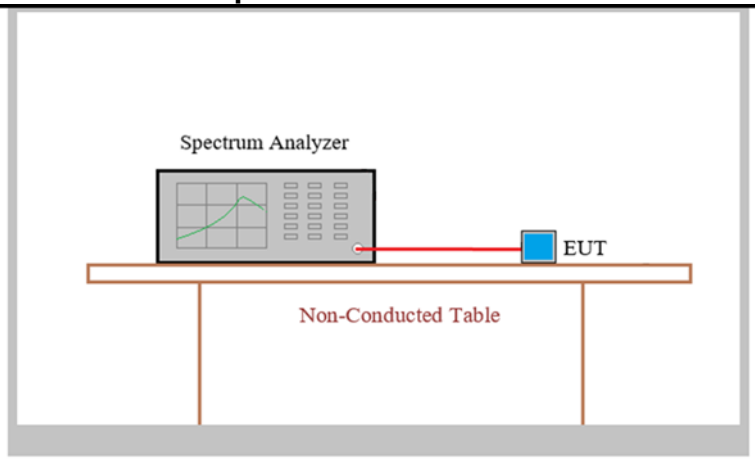
Figure 3. Above 1GHz

4.5.2 For Conducted Emissions test setup

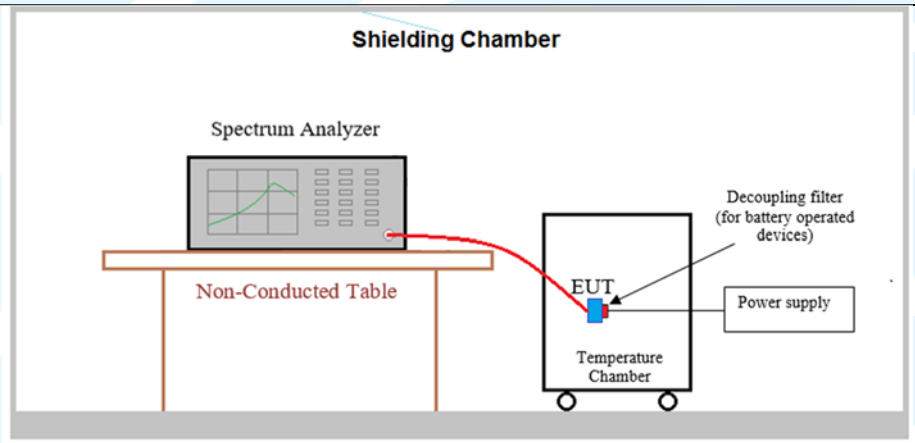
Figure 3. Conducted Emissions setup



4.5.3 For Conducted RF test setup



Normal Environment



Extreme Environment

4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 120V~60Hz. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	Z axis
	1TX	Chain 1	Z axis
	2TX	Chain 0+1	Z axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

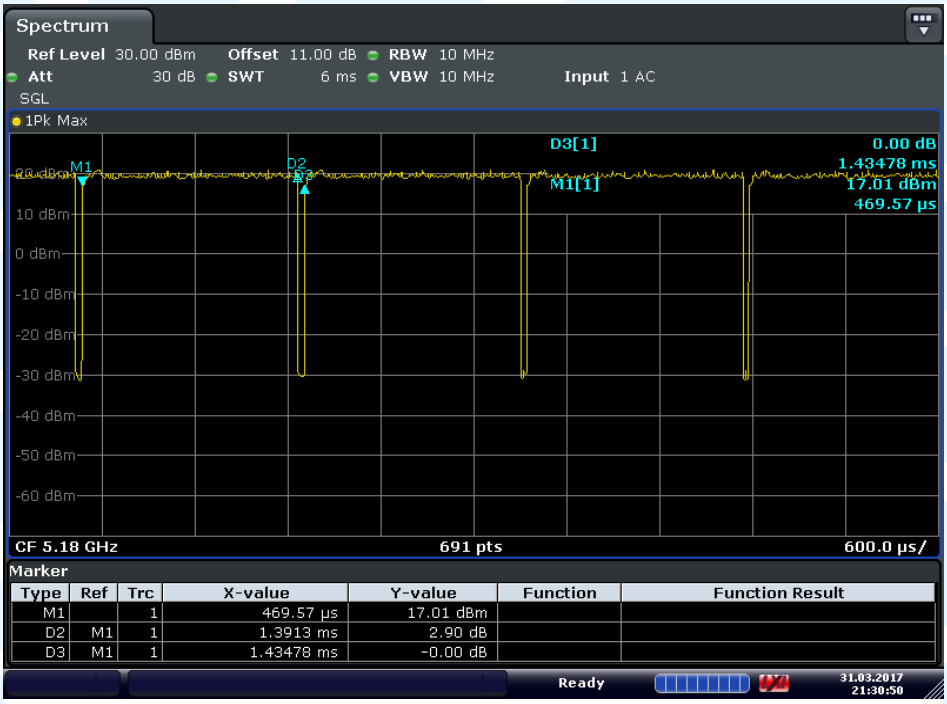
4.7 DUTY CYCLE

Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	6	1.3913	1.43478	0.97	96.97	0.13	0.72	-0.27
IEEE 802.11n-HT20	MCS0	1.30435	1.34783	0.97	96.77	0.14	0.77	-0.28
IEEE 802.11n-HT40	MCS0	0.65217	0.6913	0.94	94.34	0.25	1.53	-0.51
IEEE 802.11ac-VHT20	MCS0	1.31739	1.35652	0.97	97.12	0.13	0.76	-0.25
IEEE 802.11ac-VHT40	MCS0	0.65652	0.69565	0.94	94.38	0.25	1.52	-0.50
IEEE 802.11ac-VHT80	MCS0	0.32609	0.36522	0.89	89.29	0.49	3.07	-0.98

Remark:
1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);
3) Average factor = 20 $\log_{10}$ Duty Cycle.

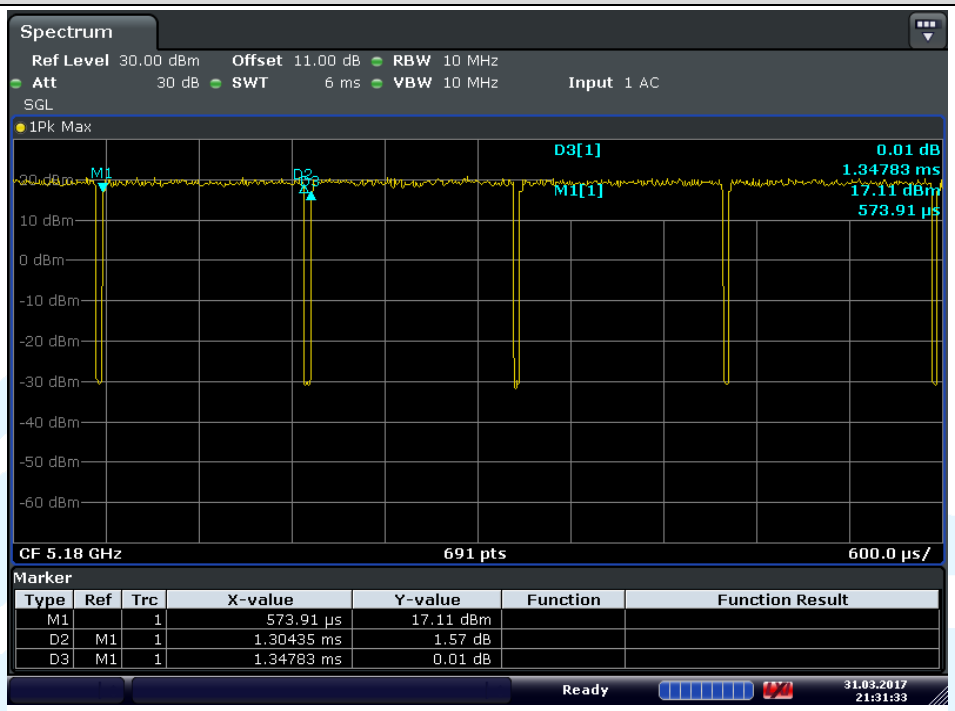
The test plot as follows

IEEE 802.11a



Date: 31.MAR.2017 21:30:50

IEEE 802.11n-HT20



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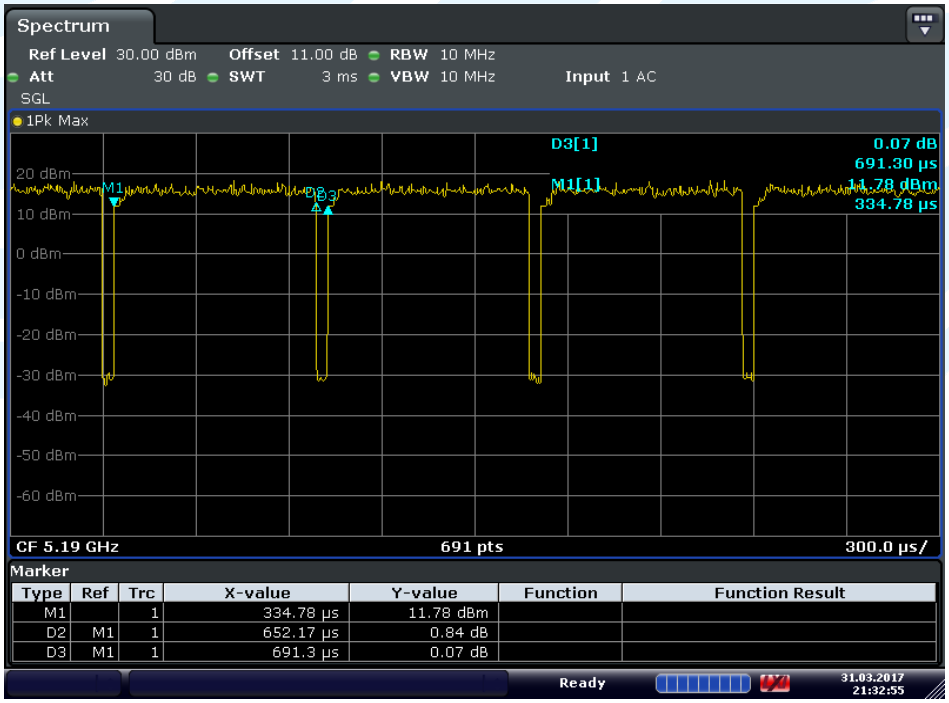
IEEE 802.11n-HT40



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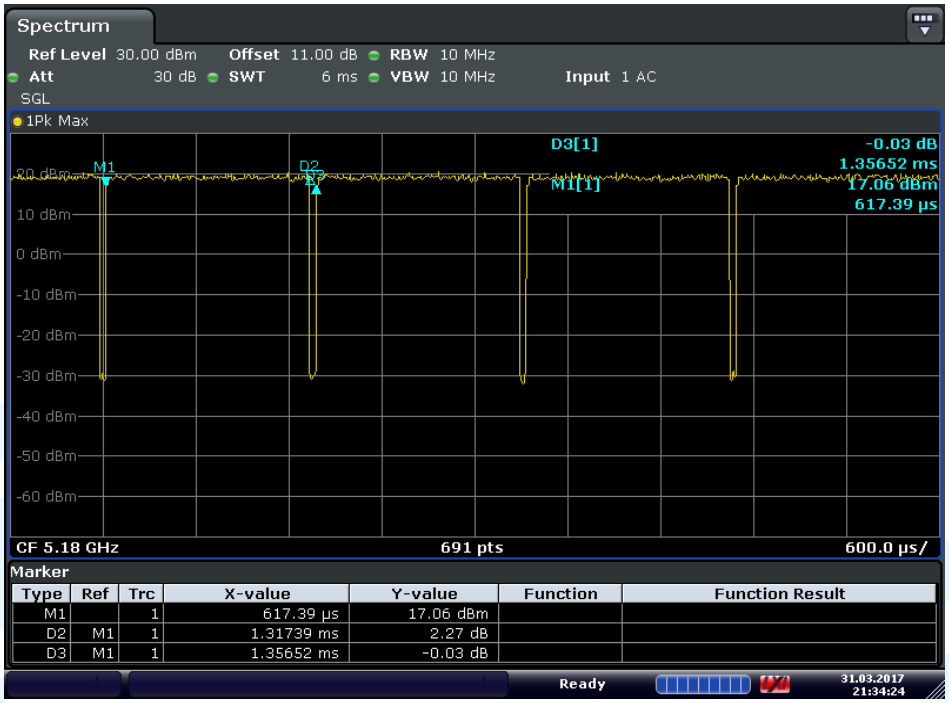
IEEE 802.11ac-VHT20



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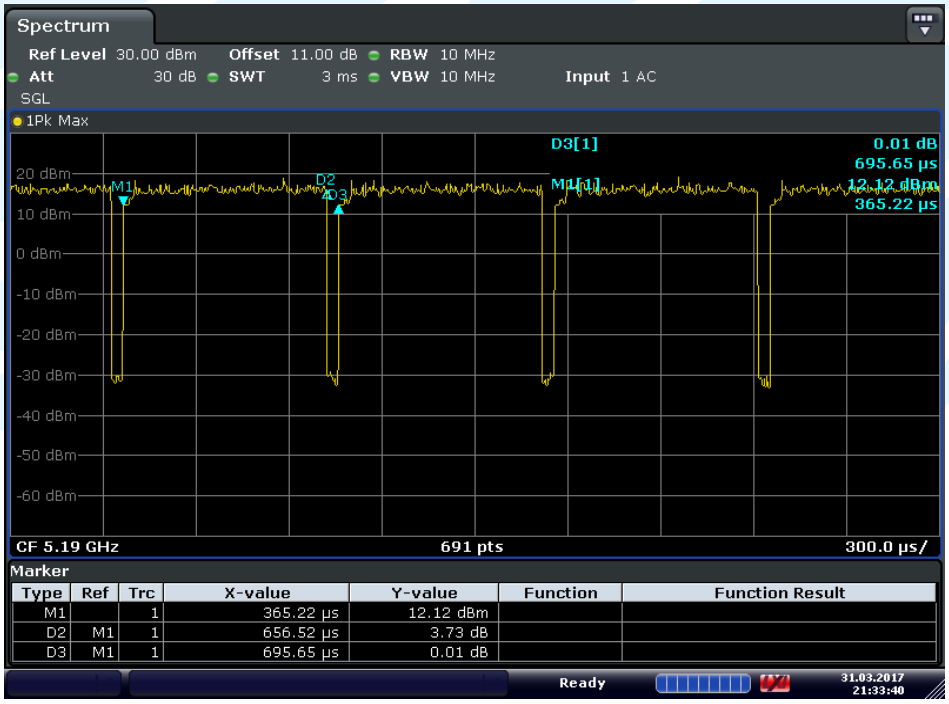
IEEE 802.11ac-VHT40



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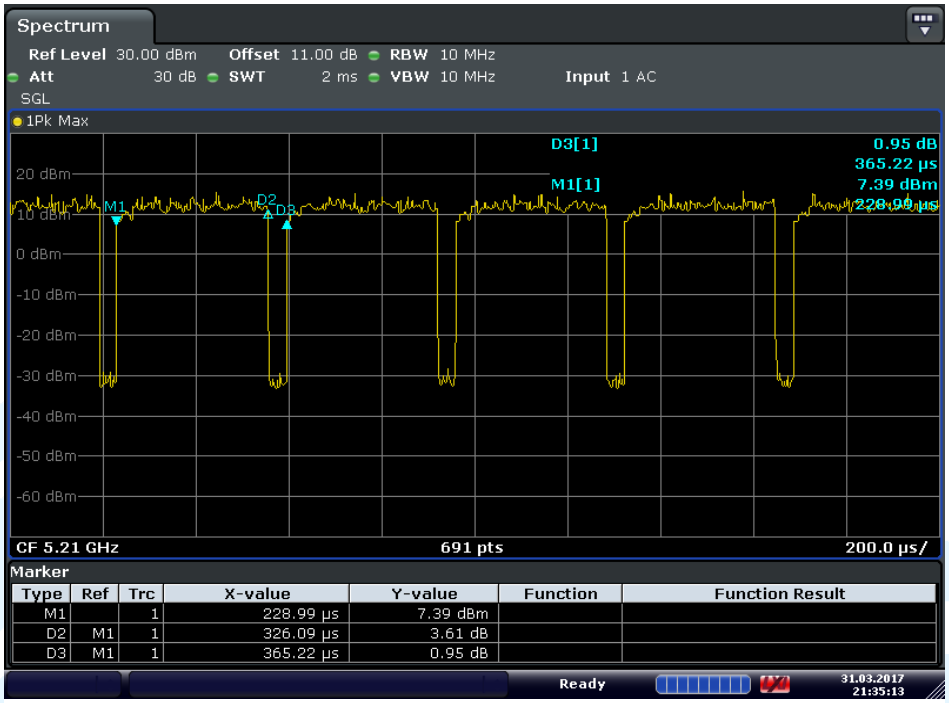
IEEE 802.11ac-VHT80



5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices
4	KDB 789033 D02 General U-NII Test Procedures New Rules v01r03	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15 subpart E
5	905462 D06 802.11 Channel Plans New Rules v02	Operation in U-NII bands -802.11 channel PLAN(§15.407)
6	KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02	Compliance measurement procedures for Unlicensed –National Information Infrastructure devices operates in the frequency bands 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz bands incorporating dynamic frequency selection
7	KDB 905462 D03 Client Without DFS New Rules v01r02	U-NII client devices without radar detection capability
8	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.407(a)(1) (2) requirement:** The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:
Both antenna in the interior of the equipment and no consideration of replacement. The transmit signals are correlated with each other and the antenna gain of both chains is completely consistent, the best case directional gain of the antenna is 5.01 dBi (See section 5.6).

5.3 26 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart E Section 15.407 (a) (2)(5)

Test Method: KDB 789033 D02 v01r03 Section C.1

Limit: None; for reporting purposes only.

Test Procedure:

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum analyzer.

Spectrum analyzer according to the following Settings:
a) Set RBW = approximately 1 % of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Mode	Channel	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
The worst case test data			
IEEE 802.11a	36 (5180)	22.45	17.894
	44 (5220)	22.31	18.206
	48 (5240)	22.28	17.958
	52 (5260)	22.38	17.891
	60 (5300)	22.27	17.746
	64 (5320)	22.20	17.816
	100 (5500)	22.48	17.974
	116 (5580)	22.14	17.868
	140 (5700)	22.25	17.738
IEEE 802.11n-HT20	36 (5180)	22.57	18.718
	44 (5220)	22.08	18.575
	48 (5240)	22.59	18.663
	52 (5260)	22.17	18.611
	60 (5300)	22.47	18.704
	64 (5320)	22.70	18.874
	100 (5500)	22.65	18.552
	116 (5580)	22.60	18.735
	140 (5700)	22.29	18.633
IEEE 802.11n-HT40	38 (5190)	40.48	36.567
	46 (5230)	40.58	36.565
	54 (5270)	40.15	35.524
	62 (5310)	40.50	36.659
	102 (5510)	40.39	36.544
	110 (5550)	40.75	36.645

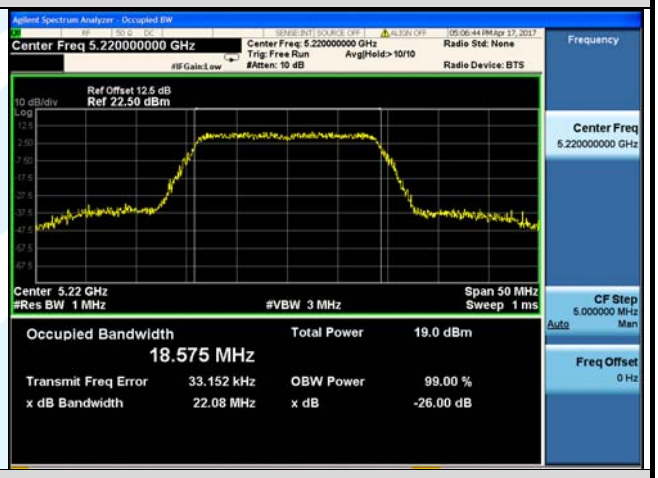
	134 (5670)	40.45	36.639
IEEE 802.11ac-VHT20	36 (5180)	22.47	18.744
	44 (5220)	22.62	18.767
	48 (5240)	22.58	18.813
	52 (5260)	22.79	18.929
	60 (5300)	22.79	18.775
	64 (5320)	22.63	18.749
	100 (5500)	22.23	18.704
	116 (5580)	22.79	18.708
	140 (5700)	22.88	18.800
IEEE 802.11ac-VHT40	38 (5190)	40.48	36.560
	46 (5230)	40.25	36.574
	54 (5270)	40.24	36.557
	62 (5310)	40.36	36.518
	102 (5510)	40.45	36.585
	110 (5550)	40.67	36.683
	134 (5670)	40.17	36.565
IEEE 802.11ac-VHT80	42 (5230)	81.17	75.871
	58 (5290)	80.83	75.869
	106 (5530)	81.32	75.864
	122 (5610)	81.42	75.757

The test plot as follows:

IEEE 802.11a	
Channel 36	**Channel 44**
	

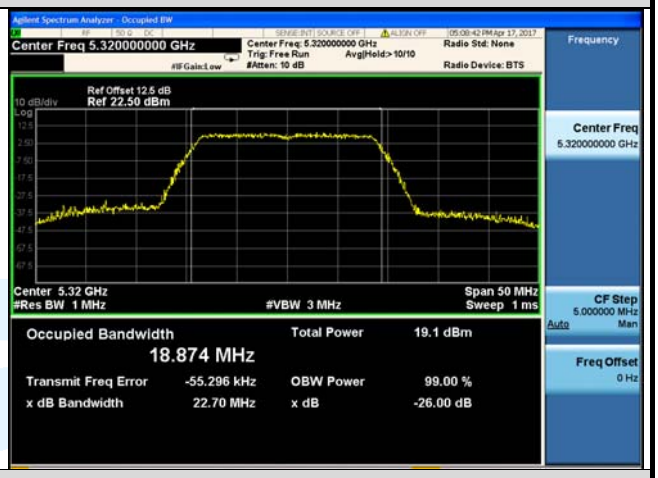
Channel 48	Channel 52
	
Channel 60	**Channel 64**
	
Channel 100	**Channel 116**
	

Channel 140


IEEE 802.11n-HT20	
Channel 36	Channel 44
	
Channel 48	Channel 52
	

Channel 60

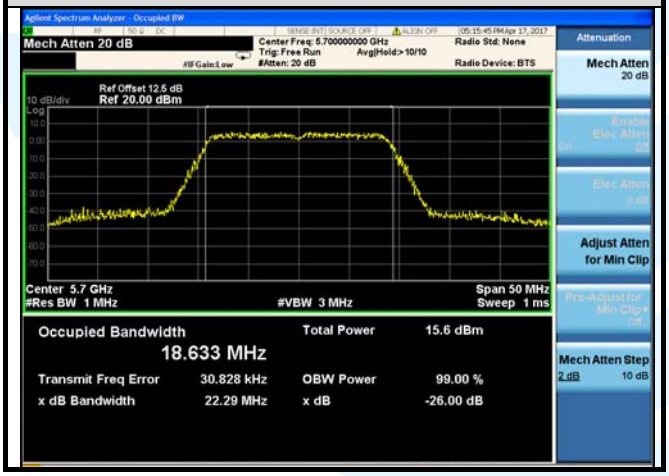
Channel 64

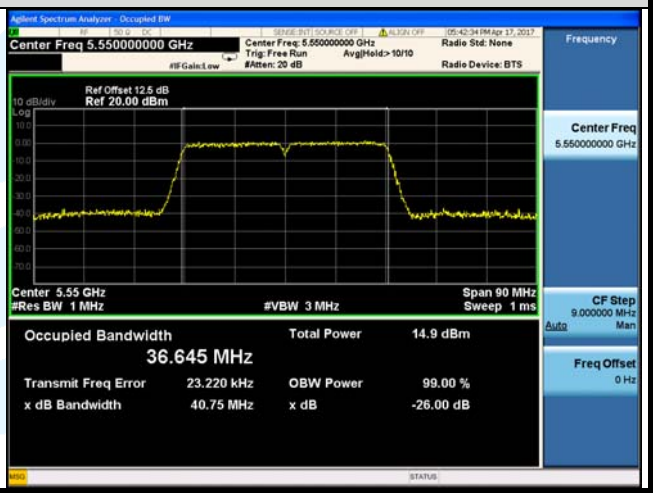


Channel 100

Channel 116

Channel 140



IEEE 802.11n-HT40	
Channel 38	**Channel 46**
	
Channel 54	**Channel 62**
	
Channel 102	**Channel 110**
	

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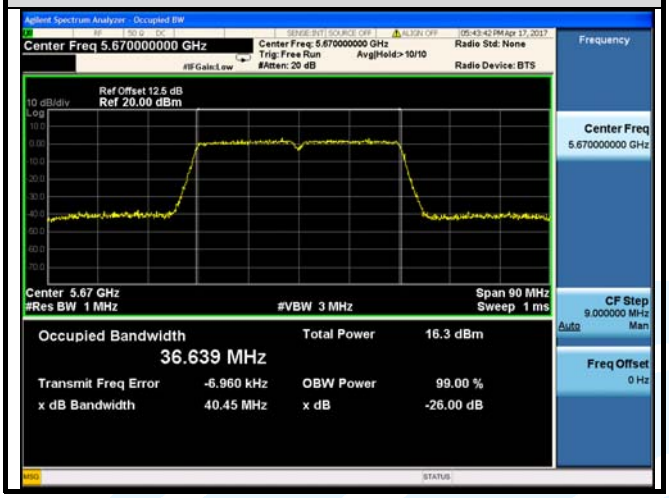
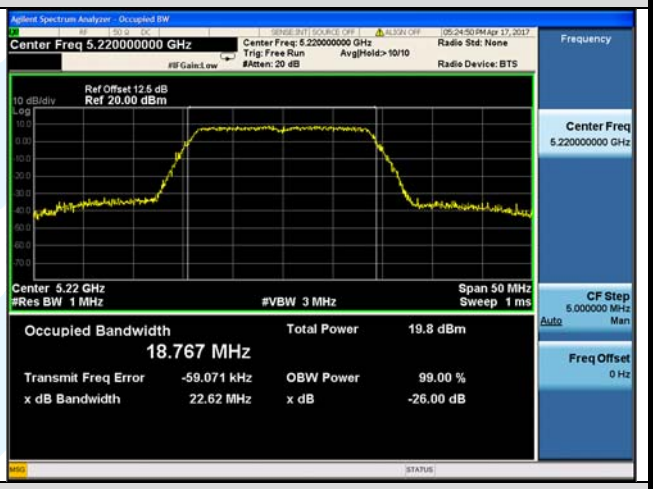
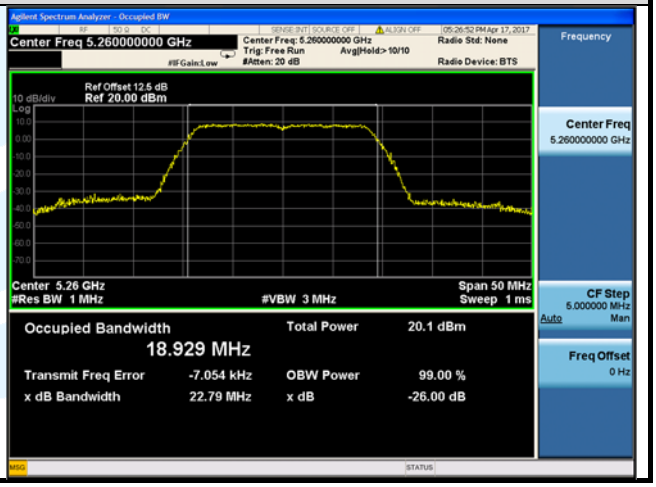
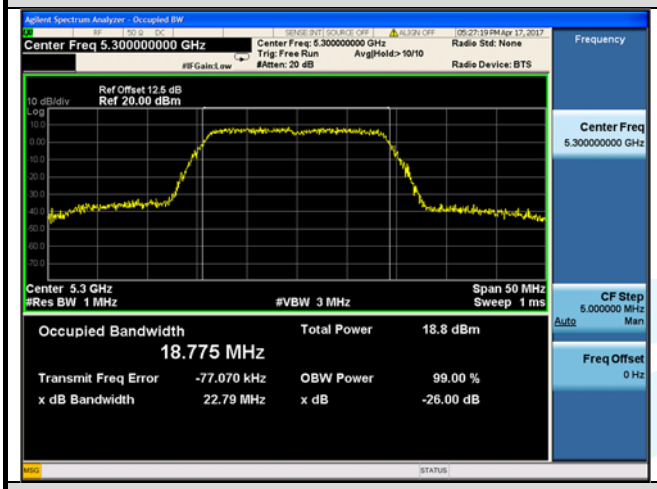
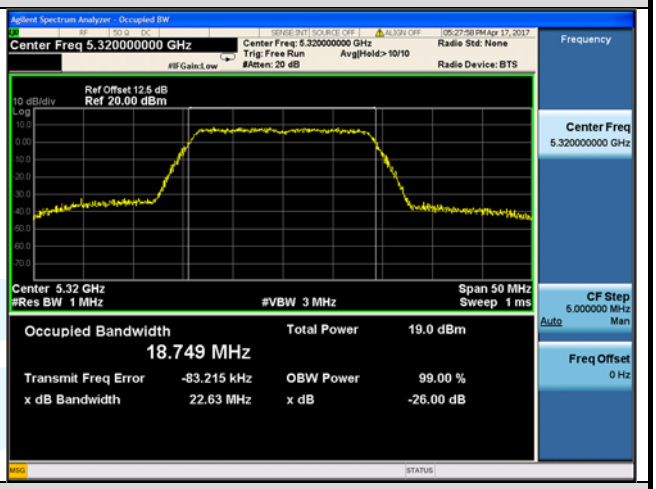


IEEE 802.11ac-VHT20	
Channel 36	Channel 44
	
Channel 48	Channel 52
	

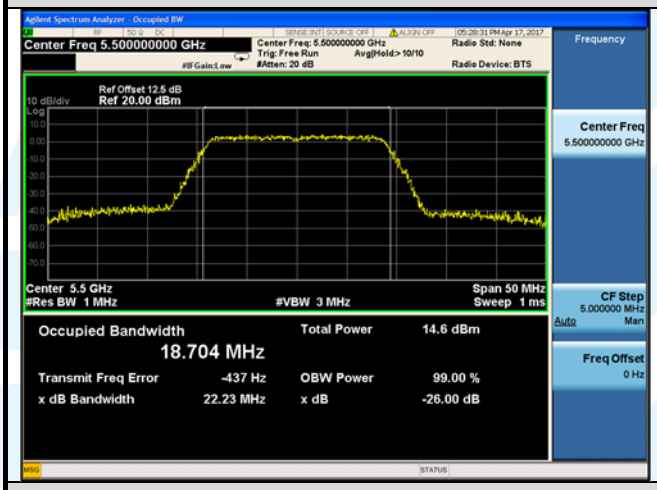
Channel 60



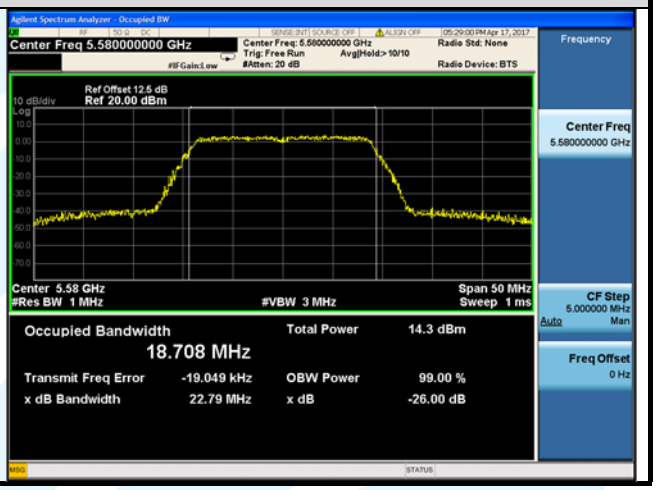
Channel 64



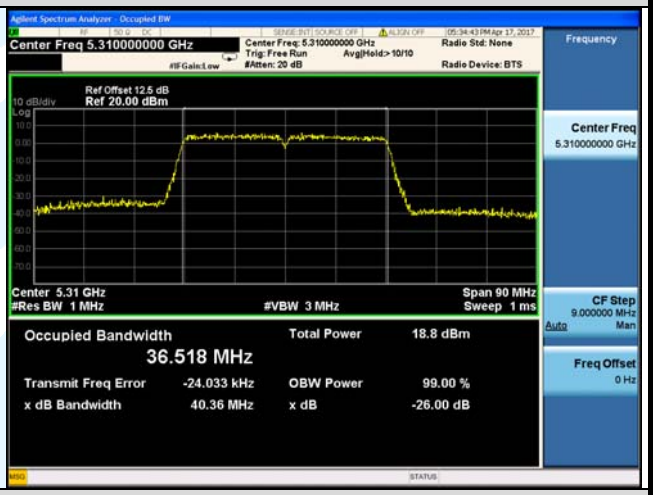
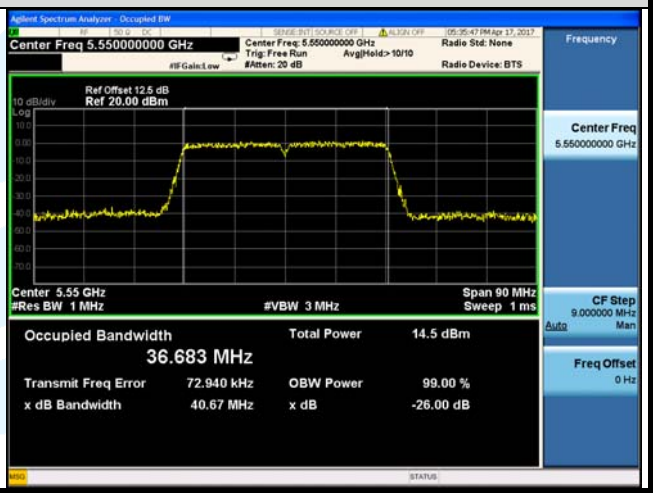
Channel 100

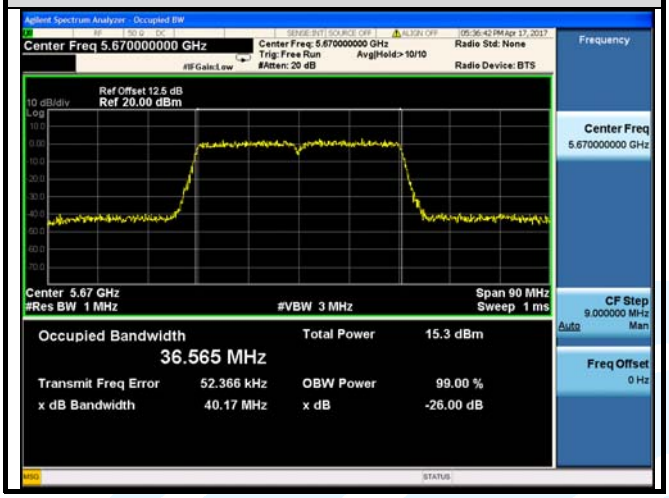


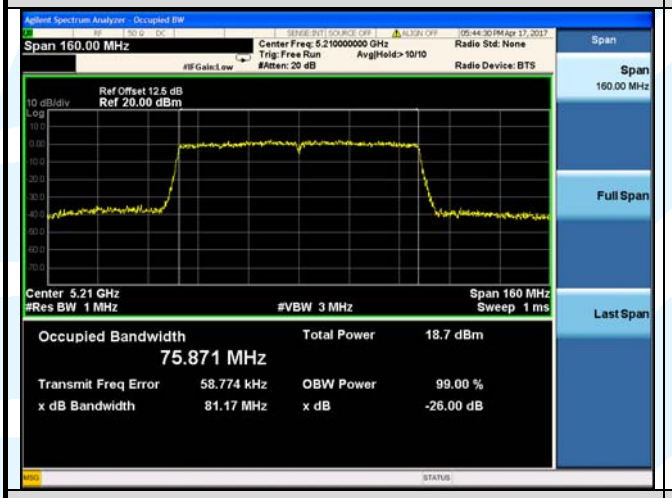
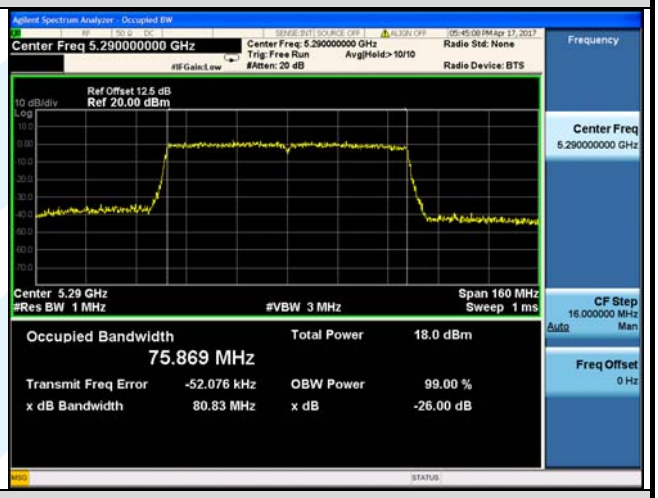
Channel 116



Channel 140

IEEE 802.11ac-VHT40	
Channel 38	Channel 46
	
Channel 54	Channel 62
	
Channel 102	Channel 110
	

Channel 134


IEEE 802.11ac-VHT80	
Channel 42	Channel 58
	
Channel 106	Channel 122