

FCC CERTIFICATION TEST REPORT

FOR

Applicant	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	:	Wireless Speaker
Model No.	:	CITATION 500
Trade Mark	:	harman/kardon
FCC ID	:	APIHKCT500A
Manufacturer	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park,
Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, **E-mail:** ddt@dgddt.com, <http://www.dgddt.com>

REPORT

Table of Contents

	Test report declares.....	4
1.	Summary of Test Results.....	7
2.	General Test Information	8
2.1.	Description of EUT	8
2.2.	Accessories of EUT.....	9
2.3.	Assistant equipment used for test.....	9
2.4.	Block diagram of EUT configuration for test	10
2.5.	Deviations of test standard.....	11
2.6.	Test environment conditions	11
2.7.	Test laboratory	11
2.8.	Measurement uncertainty.....	12
3.	Equipment Used During Test.....	13
4.	26dB Bandwidth	15
4.1.	Block diagram of test setup.....	15
4.2.	Limits	15
4.3.	Test procedure	15
4.4.	Test result.....	16
4.5.	Test graphs	19
5.	6dB Bandwidth	63
5.1.	Block diagram of test setup.....	63
5.2.	Limits	63
5.3.	Test procedure	63
5.4.	Test result.....	64
5.5.	Test graphs	65
6.	99% Bandwidth	75
6.1.	Block diagram of test setup.....	75
6.2.	Limits	75
6.3.	Test procedure	75
6.4.	Test result.....	76
6.5.	Test graphs	79
7.	Duty Cycle	123
7.1.	Block diagram of test setup.....	123
7.2.	Limit	123
7.3.	Test procedure	123
7.4.	Test result.....	124
7.5.	Test graphs	127
8.	Maximum Output Power.....	171

8.1.	Block diagram of test setup.....	171
8.2.	Limits	171
8.3.	Test procedure	171
8.4.	Test result channel power	172
9.	Power Spectral Density	175
9.1.	Block diagram of test setup.....	175
9.2.	Limits	175
9.3.	Test procedure	175
9.4.	Test result.....	176
9.5.	Test graphs	180
10.	Frequency Stability Measurement	228
10.1.	Limit of Frequency Stability	228
10.2.	Measuring Instruments.....	228
10.3.	Test procedures	228
10.4.	Test setup.....	228
10.5.	Test result.....	229
11.	Dynamic Frequency Selection	254
11.1.	Applicability of DFS requirements.....	254
11.2.	Limit.....	255
11.3.	Parameters of radar test waveforms.....	256
11.4.	Calibration of radar waveform	256
11.5.	Channel closing transmission time, channel move time and non-occupancy period	259
11.6.	Test setup.....	260
11.7.	Test result.....	261
12.	Emissions in Restricted Frequency Bands	262
12.1.	Block diagram of test setup.....	262
12.2.	Limit.....	263
12.3.	Test Procedure.....	264
12.4.	Test result.....	266
13.	Band Edge Compliance	295
13.1.	Block diagram of test setup.....	295
13.2.	Limit.....	295
13.3.	Test Procedure.....	295
13.4.	Test result.....	296
14.	Power Line Conducted Emission	385
14.1.	Block diagram of test setup.....	385
14.2.	Power Line Conducted Emission Limits	385
14.3.	Test Procedure.....	385

14.4.	Test Result	386
15.	Antenna Requirements	389
15.1.	Limit	389
15.2.	Result	389
16.	Test Setup Photograph	390
17.	Photos of the EUT	392

Test Report Declare

Applicant	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	:	Wireless Speaker
Model No.	:	CITATION 500
Trade Mark	:	harman/kardon
Manufacturer	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart E.

Test procedure used:

ANSI C63.10:2013, 789033 D02 General U-NII Test Procedures New Rules v02r01, 662911
D01 Multiple Transmitter Output v02r01

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	DDT-RE23082222-2E04		
Date of Receipt:	Sep. 04, 2023	Date of Test:	Sep. 04, 2023 ~ Sep. 25, 2023

Prepared By:**Johnny Wang/Engineer****Approved By:****Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Sep. 25, 2023	

1. Summary of Test Results

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	Standard	Results
6/26db Bandwidth and 99% Bandwidth	FCC 15.407 (e) ANSI C63.10:2013	Pass
Maximum Conducted Output Power	FCC 15.407 (a) ANSI C63.10:2013	Pass
Power Spectral Density	FCC 15.407 (a) ANSI C63.10:2013	Pass
Frequency Stability Measurement	FCC 15.407 (g) ANSI C63.10:2013	Pass
Emissions in restricted frequency bands	FCC 15.407 (a) FCC 15.209 FCC 15.205 ANSI C63.10:2013	Pass
Band Edge Compliance	FCC 15.407 (a) FCC 15.209 FCC 15.205 ANSI C63.10:2013	Pass
Power Line Conducted Emission	FCC 15.207 ANSI C63.10:2013	Pass
Antenna requirement	FCC 15.203 ANSI C63.10:2013	Pass
Dynamic Frequency Selection	FCC 15.407 (h) ANSI C63.10:2013	Pass

2. General Test Information

2.1. Description of EUT

EUT Name	: Wireless Speaker
Model Number	: CITATION 500
EUT function description	: Please reference user manual of this device
Power Supply	: 100-240V~, 50/60Hz, 200W
Radio Technology	: IEEE 802.11a/n/ac
Operation frequency	: IEEE 802.11a: 5180MHz-5240MHz, 5260MHz-5320MHz, 5500MHz-5720MHz, 5745MHz-5825MHz IEEE 802.11n HT20: 5180MHz-5240MHz, 5260MHz-5320MHz, 5500MHz-5720MHz, 5745MHz-5825MHz IEEE 802.11n HT40: 5190MHz-5230MHz, 5270MHz-5310MHz, 5510MHz-5710MHz, 5755MHz-5795MHz IEEE 802.11ac VHT20: 5180MHz-5240MHz, 5260MHz-5320MHz, 5500MHz-5720MHz, 5745MHz-5825MHz IEEE 802.11ac VHT40: 5190MHz-5230MHz, 5270MHz-5310MHz, 5510MHz-5710MHz, 5755MHz-5795MHz IEEE 802.11ac VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz
Modulation	: IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Transmitter rate	: IEEE 802.11a: up to 54 Mbps IEEE 802.11n HT20: up to 144.4 Mbps IEEE 802.11n HT40: up to 300 Mbps IEEE 802.11ac VHT20: up to 173.4 Mbps IEEE 802.11ac VHT40: up to 400 Mbps IEEE 802.11ac VHT80: up to 866.6 Mbps
Antenna	: Antenna 1: FPC antenna, Maximum PK gain: 4.51 dBi Antenna 2: FPC antenna, Maximum PK gain: 3.28 dBi
TPC	: ☐ Support ☒ Not support
SISO Mode	: ☒ 11a ☒ 11n ☒ 11ac
MIMO Mode	: ☐ 11a ☒ 11n ☒ 11ac
Sample Number	: S23082222-01 for conductive, S23082222-02 for radiation

Note 1: EUT is the abbreviation of equipment under test.

Note 2: "☑" means to be chosen or applicable; "☐" means don't to be chosen or not applicable;
This note applies to entire report.

Antenna information			
	Ant1 gain	Ant2 gain	MIMO
IEEE 802.11a	4.51	3.28	/
IEEE 802.11n HT20	4.51	3.28	6.95
IEEE 802.11n HT40	4.51	3.28	6.95
IEEE 802.11ac VHT20	4.51	3.28	6.95
IEEE 802.11ac VHT40	4.51	3.28	6.95
IEEE 802.11ac VHT80	4.51	3.28	6.95

Channel information					
IEEE 802.11a IEEE 802.11n (HT20) IEEE 802.11ac (VHT20)		IEEE 802.11n (HT40) IEEE 802.11ac (VHT40)		IEEE 802.11ac (VHT80)	
UNII-1					
CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230	/	/
44	5220	/	/	/	/
48	5240	/	/	/	/
UNII-2A					
52	5260	54	5270	58	5290
56	5280	62	5310		/
60	5300	/	/	/	/
64	5320	/	/	/	/
UNII-2C					
100	5500	102	5510	106	5530
104	5520	110	5550	122	5610
108	5540	118	5590	138	5690
112	5560	126	5630	/	/
116	5580	134	5670	/	/
120	5600	142	5710	/	/
124	5620	/	/	/	/
128	5640	/	/	/	/
132	5660	/	/	/	/
136	5680	/	/	/	/
140	5700	/	/	/	/
144	5720				
UNII-3					
149	5745	151	5755	155	5775
153	5765	159	5795	/	/
157	5785	/	/	/	/
161	5805	/	/	/	/
165	5825	/	/	/	/

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
N/A	N/A	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
NoteBook	Lenovo	i7-4810MQ	N/A	00331-1000-00001-AA816

2.4. Block diagram of EUT configuration for test



Test software: Putty.exe

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

The pathloss of external cable: 2 dB (According to the manufacturer's claims)

Tested mode, channel, and data rate information					
Mode	Setting Tx Power		data rate (Mbps) (see Note)	Channel	Frequency (MHz)
	ANT1	ANT2			
IEEE 802.11a	Default	Default	6	CH36	5180
	Default	Default	6	CH40	5200
	Default	Default	6	CH48	5240
	Default	Default	6	CH52	5260
	Default	Default	6	CH56	5280
	Default	Default	6	CH64	5320
	Default	Default	6	CH100	5500
	Default	Default	6	CH116	5580
	Default	Default	6	CH140	5700
	Default	Default	6	CH144	5720
	Default	Default	6	CH149	5745
	Default	Default	6	CH157	5785
	Default	Default	6	CH165	5825
IEEE 802.11n HT20	Default	Default	MCS 8	CH36	5180
	Default	Default	MCS 8	CH40	5200
	Default	Default	MCS 8	CH48	5240
	Default	Default	MCS 8	CH52	5260
	Default	Default	MCS 8	CH56	5280
	Default	Default	MCS 8	CH64	5320
	Default	Default	MCS 8	CH100	5500
	Default	Default	MCS 8	CH116	5580
	Default	Default	MCS 8	CH140	5700
	Default	Default	MCS 8	CH144	5720
	Default	Default	MCS 8	CH149	5745
	Default	Default	MCS 8	CH157	5785
	Default	Default	MCS 8	CH165	5825
IEEE 802.11n HT40	Default	Default	MCS 8	CH38	5190
	Default	Default	MCS 8	CH46	5230
	Default	Default	MCS 8	CH54	5270
	Default	Default	MCS 8	CH62	5310
	Default	Default	MCS 8	CH102	5510
	Default	Default	MCS 8	CH110	5550
	Default	Default	MCS 8	CH134	5670
	Default	Default	MCS 8	CH142	5710
	Default	Default	MCS 8	CH151	5755
	Default	Default	MCS 8	CH159	5795
IEEE 802.11 ac VHT20	Default	Default	MCS 0	CH36	5180
	Default	Default	MCS 0	CH40	5200
	Default	Default	MCS 0	CH48	5240

	Default	Default	MCS 0	CH52	5260
	Default	Default	MCS 0	CH56	5280
	Default	Default	MCS 0	CH64	5320
	Default	Default	MCS 0	CH100	5500
	Default	Default	MCS 0	CH116	5580
	Default	Default	MCS 0	CH140	5700
	Default	Default	MCS 0	CH144	5720
	Default	Default	MCS 0	CH149	5745
	Default	Default	MCS 0	CH157	5785
	Default	Default	MCS 0	CH165	5825
IEEE 802.11 ac VHT40	Default	Default	MCS 0	CH38	5190
	Default	Default	MCS 0	CH46	5230
	Default	Default	MCS 0	CH54	5270
	Default	Default	MCS 0	CH62	5310
	Default	Default	MCS 0	CH102	5510
	Default	Default	MCS 0	CH110	5550
	Default	Default	MCS 0	CH134	5670
	Default	Default	MCS 0	CH142	5710
	Default	Default	MCS 0	CH151	5755
	Default	Default	MCS 0	CH159	5795
IEEE 802.11ac VHT80	Default	Default	MCS 0	CH42	5210
	Default	Default	MCS 0	CH58	5290
	Default	Default	MCS 0	CH106	5530
	Default	Default	MCS 0	CH122	5610
	Default	Default	MCS 0	CH138	5690
	Default	Default	MCS 0	CH155	5775

Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

2.5. Deviations of test standard

No Deviation.

2.6. Test environment conditions

Temperature range:	+15℃ to +35 ℃
Humidity range:	20% to 75%
Pressure range:	86 kPa to 106 kPa

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City,
Guangdong Province, China, 523808

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

2.8. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Frequencies Stability	6.7×10^{-8} (Antenna couple method) 5.5×10^{-8} (Conducted method)
Conducted spurious emissions	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.40 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$) 1.66 dB ($8 \text{ GHz} \leq f < 26.5 \text{ GHz}$)
Uncertainty for radio frequency (RBW < 20 kHz)	3×10^{-8}
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission test (9 kHz – 30 MHz)	3.44 dB
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V) 4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz - 40 GHz)	4.10 dB (1 - 6 GHz) 4.40 dB (6 GHz - 18 GHz) 3.54 dB (18 GHz - 26 GHz) 4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power line conduction emission test	3.34dB (150KHz-30MHz) 3.72dB (9KHz-150KHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

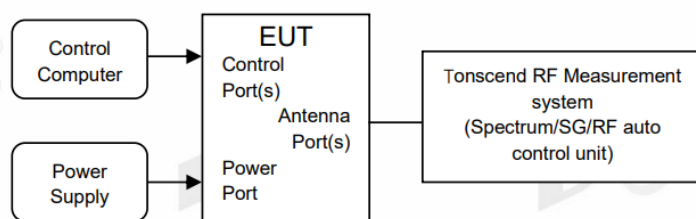
3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
☑RF Connected Test (Tonscend RF Measurement System 4#)					
Signal & Spectrum analyzer	R&S	FSV3044	101173	Apr. 23, 2023	1 Year
Wideband Radio Communication tester	R&S	CMW500	168801	Apr. 27, 2023	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Apr. 27, 2023	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 28, 2022	1 Year
RF Control Unit	Tonsend	JS0806-2	2118060485	Apr. 27, 2023	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	May 15, 2023	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.3.2.22	N/A	N/A
☑Radiation 3#chamber					
EMI Test Receiver	R&S	ESU26	100472	Apr. 23, 2023	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Apr. 23, 2023	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 29, 2022	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	01429	Jul. 12, 2023	2 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120 D	02468	Sep. 29, 2022	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 26, 2023	1 Year
Pre-amplifier	COM-POWER	PAM-118A	18040084	Jul. 15, 2023	1 Year
Pre-amplifier	COM-POWER	PAM-840A	461369	Apr. 27, 2023	1 Year
RE Cable	N/A	W23.02 CP1-X2 + W23.09 AP1-X8+ JCT26S-NJ-NJ-1.5M	4.5M+8M+1.5M	Apr. 21, 2023	1 Year
RF Cable	Yuhu Technology	JCTB810-NJ-NJ-9M+ ZT26S-SMAJ-SMAJ-1M	21123964	Apr. 23, 2023	1 Year
Micro-Tronics filters	REBES	BRM50702	G555	N/A	N/A
Micro-Tronics filters	REBES	BRM50716	G392	N/A	N/A
High Pass filter	XB	XBLBQ-GTA67	210820-2-3	N/A	N/A
Test software	Tonscend	JS32-RE	V 5.0.0.1	N/A	N/A
☑Power Line Conducted Emissions Test 3#					
Test Receiver	R&S	ESCI	101028	Jul. 12, 2023	1 Year
LISN 1	R&S	ENV216	101725	Jul. 12, 2023	1 Year

LISN 2	R&S	ENV216	101726	Jul. 12, 2023	1 Year
LISN 3	SCHWARZBECK	NSLK 8163	00017	Jul. 12, 2023	1 Year
Pulse Limiter	SCHWARZBECK	VTSD 9561	102766	Jul. 15, 2023	1 Year
CE Cable 3	HUBSER	Z806-NJ-NJ-6M	21070275	Jul. 15, 2023	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4. 26dB Bandwidth

4.1. Block diagram of test setup



4.2. Limits

FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
26 dB Bandwidth	---	5150 - 5250
	---	5250 - 5350
	---	5470 - 5725

4.3. Test procedure

Connect EUT's antenna output to spectrum analyzer by RF cable.

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	approximately 1% of the emission bandwidth.
VBW	> RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

4.4. Test result

Test Mode	Antenna	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]
11A	Ant1	5180	21.16	5169.44	5190.60
	Ant2	5180	21.12	5169.48	5190.60
	Ant1	5200	21.04	5189.48	5210.52
	Ant2	5200	21.08	5189.40	5210.48
	Ant1	5240	21.16	5229.44	5250.60
	Ant2	5240	21.08	5229.44	5250.52
	Ant1	5260	21.00	5249.52	5270.52
	Ant2	5260	21.12	5249.48	5270.60
	Ant1	5280	21.00	5269.48	5290.48
	Ant2	5280	21.08	5269.48	5290.56
	Ant1	5320	21.08	5309.48	5330.56
	Ant2	5320	21.12	5309.40	5330.52
	Ant1	5500	21.12	5489.48	5510.60
	Ant2	5500	21.32	5489.32	5510.64
	Ant1	5580	21.16	5569.40	5590.56
	Ant2	5580	21.16	5569.40	5590.56
	Ant1	5700	21.08	5689.48	5710.56
	Ant2	5700	21.08	5689.40	5710.48
	Ant1	5720	21.16	5709.40	5730.56
	Ant2	5720	21.24	5709.40	5730.64
	Ant1	5720 UNII-2C	15.6	5709.40	5725
	Ant2	5720 UNII-2C	15.6	5709.40	5725
	Ant1	5720 UNII-3	5.56	5725	5730.56
	Ant2	5720 UNII-3	5.64	5725	5730.64
	Ant1	5745	21.12	5734.48	5755.60
	Ant2	5745	21.08	5734.44	5755.52
	Ant1	5785	21.04	5774.48	5795.52
	Ant2	5785	21.16	5774.40	5795.56
	Ant1	5825	20.96	5814.52	5835.48
	Ant2	5825	21.20	5814.44	5835.64
11N20MIMO	Ant1	5180	21.60	5169.12	5190.72
	Ant2	5180	22.00	5168.72	5190.72
	Ant1	5200	21.68	5189.08	5210.76
	Ant2	5200	21.60	5189.12	5210.72
	Ant1	5240	21.52	5229.20	5250.72
	Ant2	5240	21.64	5229.12	5250.76
	Ant1	5260	21.48	5249.28	5270.76
	Ant2	5260	21.52	5249.16	5270.68
	Ant1	5280	21.32	5269.36	5290.68
	Ant2	5280	21.40	5269.36	5290.76
	Ant1	5320	21.68	5309.20	5330.88
	Ant2	5320	21.48	5309.24	5330.72
	Ant1	5500	21.52	5489.24	5510.76
	Ant2	5500	21.36	5489.36	5510.72
	Ant1	5580	21.60	5569.24	5590.84
	Ant2	5580	21.52	5569.24	5590.76
	Ant1	5700	21.52	5689.16	5710.68
	Ant2	5700	21.48	5689.16	5710.64
	Ant1	5720	21.44	5709.28	5730.72
	Ant2	5720	21.48	5709.28	5730.76
	Ant1	5720 UNII-2C	15.72	5709.28	5725
	Ant2	5720 UNII-2C	15.72	5709.28	5725
	Ant1	5720 UNII-3	5.72	5725	5730.72
	Ant2	5720 UNII-3	5.76	5725	5730.76
	Ant1	5745	21.60	5734.16	5755.76
	Ant2	5745	21.56	5734.24	5755.80
	Ant1	5785	21.40	5774.32	5795.72
	Ant2	5785	21.44	5774.32	5795.76
	Ant1	5825	21.56	5814.28	5835.84
	Ant2	5825	21.48	5814.28	5835.76

11N40MIMO	Ant1	5190	40.48	5169.76	5210.24
	Ant2	5190	40.00	5170.00	5210.00
	Ant1	5230	40.48	5209.84	5250.32
	Ant2	5230	40.08	5210.00	5250.08
	Ant1	5270	40.64	5249.60	5290.24
	Ant2	5270	40.00	5250.08	5290.08
	Ant1	5310	40.64	5289.76	5330.40
	Ant2	5310	40.08	5289.92	5330.00
	Ant1	5510	40.64	5489.68	5530.32
	Ant2	5510	40.00	5490.00	5530.00
	Ant1	5550	40.72	5529.68	5570.40
	Ant2	5550	39.92	5530.00	5569.92
	Ant1	5670	40.56	5649.76	5690.32
	Ant2	5670	40.00	5650.08	5690.08
	Ant1	5710	40.64	5689.68	5730.32
	Ant2	5710	40.16	5690.00	5730.16
	Ant1	5710 UNII-2C	35.32	5689.68	5725
	Ant2	5710 UNII-2C	35	5690.00	5725
	Ant1	5710 UNII-3	5.32	5725	5730.32
	Ant2	5710 UNII-3	5.16	5725	5730.16
	Ant1	5755	40.32	5734.84	5775.16
	Ant2	5755	40.00	5735.00	5775.00
	Ant1	5795	40.32	5774.84	5815.16
	Ant2	5795	39.68	5775.16	5814.84
11AC20MIMO	Ant1	5180	21.52	5169.24	5190.76
	Ant2	5180	21.76	5169.04	5190.80
	Ant1	5200	21.56	5189.16	5210.72
	Ant2	5200	21.56	5189.24	5210.80
	Ant1	5240	21.48	5229.32	5250.80
	Ant2	5240	21.92	5228.92	5250.84
	Ant1	5260	21.60	5249.32	5270.92
	Ant2	5260	21.64	5249.12	5270.76
	Ant1	5280	21.56	5269.24	5290.80
	Ant2	5280	21.60	5269.16	5290.76
	Ant1	5320	21.56	5309.28	5330.84
	Ant2	5320	21.40	5309.32	5330.72
	Ant1	5500	21.48	5489.32	5510.80
	Ant2	5500	21.48	5489.24	5510.72
	Ant1	5580	21.72	5569.12	5590.84
	Ant2	5580	21.48	5569.36	5590.84
	Ant1	5700	21.60	5689.16	5710.76
	Ant2	5700	21.72	5689.00	5710.72
	Ant1	5720	21.64	5709.20	5730.84
	Ant2	5720	21.44	5709.32	5730.76
	Ant1	5720 UNII-2C	15.8	5709.20	5725
	Ant2	5720 UNII-2C	15.68	5709.32	5725
	Ant1	5720 UNII-3	5.84	5725	5730.84
	Ant2	5720 UNII-3	5.76	5725	5730.76
	Ant1	5745	21.64	5734.20	5755.84
	Ant2	5745	21.52	5734.28	5755.80
	Ant1	5785	21.60	5774.24	5795.84
	Ant2	5785	21.48	5774.28	5795.76
	Ant1	5825	21.52	5814.32	5835.84
	Ant2	5825	21.52	5814.20	5835.72
11AC40MIMO	Ant1	5190	40.40	5169.84	5210.24
	Ant2	5190	40.08	5170.08	5210.16
	Ant1	5230	40.32	5209.92	5250.24
	Ant2	5230	40.00	5210.00	5250.00
	Ant1	5270	40.56	5249.84	5290.40
	Ant2	5270	40.16	5249.92	5290.08
	Ant1	5310	40.56	5289.68	5330.24
	Ant2	5310	39.92	5290.08	5330.00
	Ant1	5510	40.64	5489.76	5530.40
	Ant2	5510	40.00	5490.00	5530.00

	Ant1	5550	40.56	5529.76	5570.32
	Ant2	5550	40.16	5529.92	5570.08
	Ant1	5670	40.00	5650.00	5690.00
	Ant2	5670	39.84	5650.08	5689.92
	Ant1	5710	40.72	5689.76	5730.48
	Ant2	5710	39.92	5690.08	5730.00
	Ant1	5710 UNII-2C	35.24	5689.76	5725
	Ant2	5710 UNII-2C	34.92	5690.08	5725
	Ant1	5710 UNII-3	5.48	5725	5730.48
	Ant2	5710 UNII-3	5	5725	5730.00
	Ant1	5755	40.72	5734.60	5775.32
	Ant2	5755	40.00	5735.00	5775.00
	Ant1	5795	40.24	5774.84	5815.08
	Ant2	5795	39.68	5775.24	5814.92
11AC80MIMO	Ant1	5210	82.72	5168.72	5251.44
	Ant2	5210	82.40	5168.72	5251.12
	Ant1	5290	82.56	5248.72	5331.28
	Ant2	5290	82.24	5248.88	5331.12
	Ant1	5530	82.24	5489.04	5571.28
	Ant2	5530	82.24	5488.88	5571.12
	Ant1	5610	82.72	5568.72	5651.44
	Ant2	5610	82.40	5568.88	5651.28
	Ant1	5690	82.56	5648.88	5731.44
	Ant2	5690	82.56	5649.04	5731.60
	Ant1	5690 UNII-2C	76.12	5648.88	5725
	Ant2	5690 UNII-2C	75.96	5649.04	5725
	Ant1	5690 UNII-3	6.44	5725	5731.44
	Ant2	5690 UNII-3	6.6	5725	5731.60
	Ant1	5775	82.88	5733.88	5816.76
	Ant2	5775	82.40	5733.72	5816.12

4.5. Test graphs









































