

Test Report

FCC ID: 2AG3G-M618

Date of issue: Dec. 27, 2016

Sample Description: Set Top Box

Model(s): M618

Applicant: Value Platforms Limited

Address: Room213-214, 2/F, Sino Industrial Plaza, 9 Kai Cheung Road, Kowloon Bay, Hong Kong

Date of Test: Nov. 26, 2016 to Dec. 27, 2016

Shenzhen Microtest Co., Ltd.
<http://www.mtitest.com>



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Test Result Certification	
Applicant's name:	Value Platforms Limited
Address:	Room213-214, 2/F, Sino Industrial Plaza, 9 Kai Cheung Road, Kowloon Bay, Hong Kong
Manufacture's Name:	Huizhou Tena Electronics Co., Ltd.
Address:	No. 105 East New Road Dongjiang High-tech Industrial Park in Dongxing District, Zhongkai high tech Zone, Huizhou, Guangdong, China
Product name:	Set Top Box
Trademark:	Picazzo
Model name:	M618
Standards:	FCC Part 15.407
Test Procedure:	ANSI C63.10-2013 789033 D02 General U-NII Test Procedures New Rules v01r03

This device described above has been tested by Shenzhen Toby Technology Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Tested by:

David Chen

David Chen

Dec. 27, 2016

Reviewed by:

Leon Chen

Leon Chen

Dec. 27, 2016

Approved by:

Ares Liu

Ares Liu

Dec. 27, 2016

Summary of Test Result

Item	FCC Part No.	Description of Test	Result
1	15.203	Antenna requirement	Pass
2	15.207	AC power line conducted emission	Pass
3	15.247(b)(3)	Maximum output power	Pass
4	15.407 (e)	6dB emission bandwidth	Pass
5	15.407 (2)	26dB emission bandwidth	Pass
6	15.407(a) (1).(2).(3).(4).(5)	Power spectral density (PSD)	Pass
7	15.247(d), 15.205, 15.209	Radiated emission	Pass

1 General description

1.1 Feature of equipment under test (EUT)

Product name:	Set Top Box
Model name:	M618
Operating frequency range:	For 802.11a/n20/ac20: 5180~5240MHz, 5745~5825MHz For 802.11n40/ac40: 5190~5230MHz, 5755~5795MHz For 802.11acT80: 5210MHz, 5775MHz
Modulation type:	OFDM
Power source:	DC 5V from adapter
Adapter information:	Model:SYS1531-1205-W2 Inout:AC100-240V, 1.0A MAX, 50-60Hz Output:5V-2.4A
Antenna designation:	ANT 1: Chip antenna (Antenna Gain: 2dBi) ANT 2: PIFA antenna (Antenna Gain: 2dBi)
Remark:	All the models above are identical in interior structure, electrical circuits and components; just model names and appearance are different for marking requirement.

1.2 Test frequency channel

Test Chanel	802.11a/n20/ac20		802.11n40/ac40		802.11ac80	
Low	36	5180MHz	38	5190MHz	/	/
Middle	40	5200MHz	/	/	42	5210MHz
High	48	5240MHz	46	5230MHz	/	/
Low	149	5745MHz	155	5755MHz	/	/
Middle	157	5785MHz	/	/	155	5775MHz
High	165	5825MHz	159	5795MHz	/	/

1.3 EUT operation mode

During testing, RF test program provided by the manufacture to control the Tx operation followed the test requirement. The EUT is configured to transmit continuously (duty cycle > 98 %) at the maximum power control level.

1.4 Test conditions

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

- Temperature: 20°C~30°C
- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

1.5 Testing site

Test Site	Shenzhen Toby Technology Co., Ltd.
Test Site Location	1 A/F., Bldg.6, Yusheng Industrial Zone The National Road No.107 Xixiang Section 467, Shenzhen, Guangdong, China
FCC Registration No.:	811562
CNAS Registration No.:	CNAS L5813

1.6 Ancillary equipment list

Equipment	Model	S/N	Manufacturer	Certificate type
/	/	/	/	/

1.7 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2 \times U_c(y)$

RF frequency	1×10^{-7}
RF power, conducted	± 1 dB
Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	± 1 degree
Humidity	± 5 %

2 List of test equipment

For AC power line conducted emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
LISN	R&S	ENV216	101313	2017.12.06
LISN	SCHWARZBECK	NNLK 8129	8129245	2017.12.25
Pulse Limiter	SCHWARZBECK	VTSD 9561F	9716	2017.12.25
Test Cable	N/A	N/A	C01	2017.12.06
EMI Test Receiver	R&S	ESCI	101160	2017.12.06

For Radiated emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Log-Bicon Antenna	MESS-ELEKTRO NIK	VULB 9160	3058	2017.12.11
Horn Antenna	Schwarzbeck	BBHA 9120D	631	2017.12.05
Horn Antenna	Schwarzbeck	BBHA 9170	373	2017.12.05
Test Cable	United Microwave	57793	1m	2017.12.05
Test Cable	United Microwave	A30A30-5006	10m	2017.12.05
Microwave Pre_amplifier	Agilent	8449B	3008A01714	2017.12.05
Pre-Amplifier	Anritsu	MH648A	M09961	2017.12.05
EMI Test Receiver	R&S	ESPI-7	101318	2017.12.05
Spectrum analyzer	Agilent	E4470B	MY41441082	2017.06.01

For RF conducted emission:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Spectrum analyzer	Agilent	E4470B	MY41441082	2017.06.01
Power meter	Anritsu	ML2495A	1005002	2017.09.11
Power Sensor	Anritsu	MA2411B	0917070	2017.09.11

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

3 Test Result

3.1 Conducted emission

3.1.1 Limit

Frequency (MHz)	Limit	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

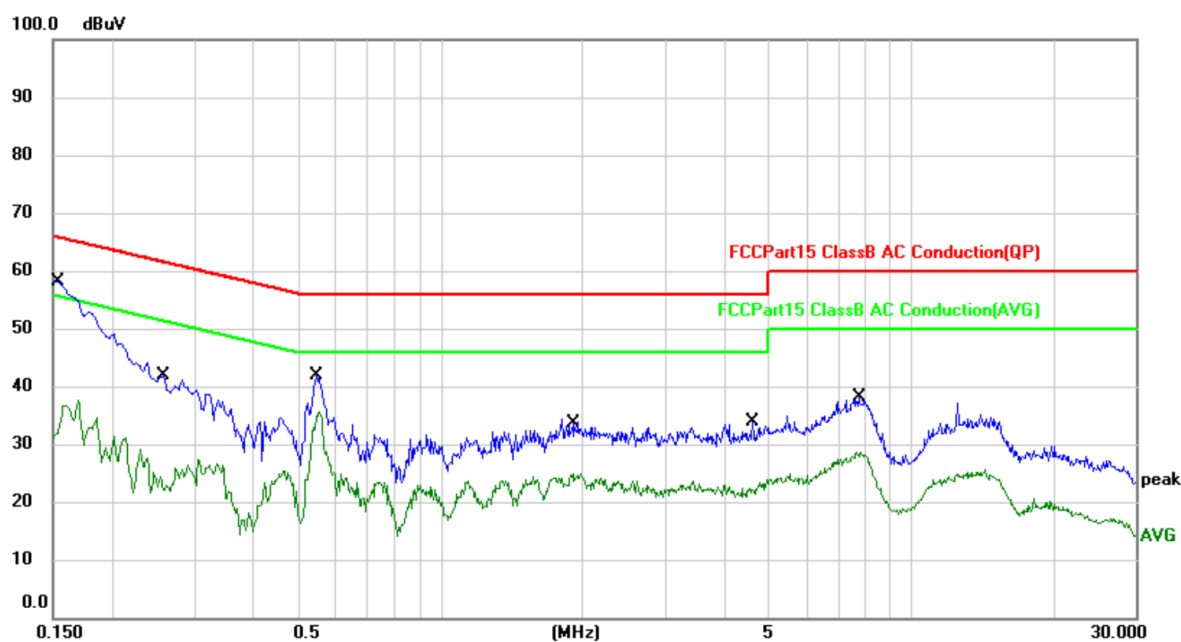
Note: Decreases with the logarithm of the frequency from 0.15MHz to 0.5MHz.

3.1.2 Test method

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN is at least 80 cm from nearest part of EUT chassis.
5. The resolution bandwidth of EMI test receiver is set at 9 kHz.

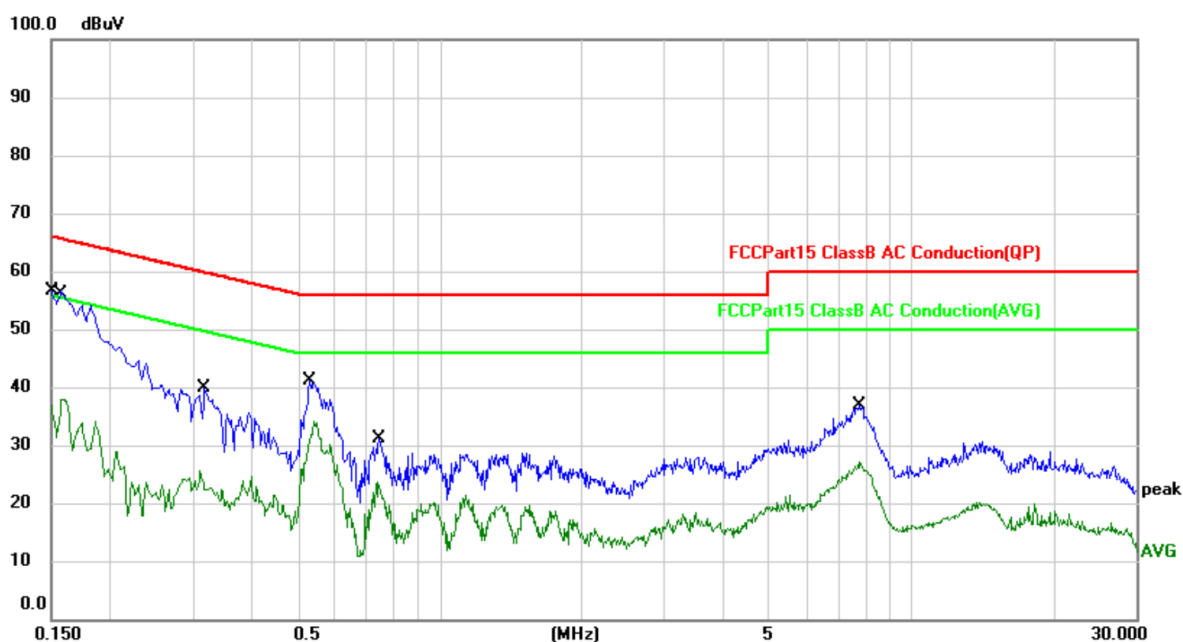
3.1.3 Test Result

Temperature:	25°C	Relative	55%
Pressure:	101kPa	Polarization:	L
Test voltage:	AC 120V/60Hz	Test mode:	Transmitting



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1556	53.24	-0.04	53.20	65.69	-12.49	QP	
2		0.1556	33.11	-0.04	33.07	55.69	-22.62	AVG	
3		0.2584	36.75	-0.03	36.72	61.48	-24.76	QP	
4		0.2584	23.14	-0.03	23.11	51.48	-28.37	AVG	
5		0.5441	38.51	-0.03	38.48	56.00	-17.52	QP	
6		0.5441	32.85	-0.03	32.82	46.00	-13.18	AVG	
7		1.8806	27.54	-0.05	27.49	56.00	-28.51	QP	
8		1.8806	21.87	-0.05	21.82	46.00	-24.18	AVG	
9		4.6148	27.24	-0.06	27.18	56.00	-28.82	QP	
10		4.6148	21.08	-0.06	21.02	46.00	-24.98	AVG	
11		7.7170	32.69	-0.06	32.63	60.00	-27.37	QP	
12		7.7170	26.92	-0.06	26.86	50.00	-23.14	AVG	

Temperature:	25°C	Relative	55%
Pressure:	101kPa	Polarization:	N
Test voltage:	AC 120V/60Hz	Test mode:	Transmitting



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1505	54.23	-0.04	54.19	65.97	-11.78	QP	
2		0.1505	33.87	-0.04	33.83	55.97	-22.14	AVG	
3	*	0.1547	54.42	-0.04	54.38	65.74	-11.36	QP	
4		0.1547	34.89	-0.04	34.85	55.74	-20.89	AVG	
5		0.3187	34.07	-0.03	34.04	59.74	-25.70	QP	
6		0.3187	23.89	-0.03	23.86	49.74	-25.88	AVG	
7		0.5330	37.08	-0.03	37.05	56.00	-18.95	QP	
8		0.5330	31.35	-0.03	31.32	46.00	-14.68	AVG	
9		0.7352	27.05	-0.03	27.02	56.00	-28.98	QP	
10		0.7352	21.90	-0.03	21.87	46.00	-24.13	AVG	
11		7.7644	31.50	-0.07	31.43	60.00	-28.57	QP	
12		7.7644	25.43	-0.07	25.36	50.00	-24.64	AVG	

3.2 Antenna requirement

3.2.1 Requirement defined in FCC 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.2.2 EUT antenna description

The WIFI antennas of EUT are two permanently attached Chip antenna and PIFA antenna, the maximum gain of the chip antenna is 2dBi, and the maximum gain of the PIFA antenna is 2dBi. So the antennas meets the requirement of this part.

3.3 Maximum output power

3.3.1 Limits

Conducted output power limit is 1W (30dBm).

3.3.2 Test Method

The maximum conducted output power may be measured using a broadband RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

3.3.3 Test Result

For Frequency band 5150~5250MHz:

Frequency (MHz)	Maximum peak output power (dBm)			Limit (dBm)
	ANT 1	ANT 2	Total Power	
802.11a				
5180	15.41	15.18	/	30
5200	15.35	15.42	/	
5240	15.29	15.37	/	
802.11ac20				
5180	10.21	10.05	13.14	30
5200	10.12	10.26	13.20	
5240	10.09	10.12	13.12	
802.11n20				
5180	9.89	10.12	13.02	30
5200	9.93	10.34	13.15	
5240	10.05	10.28	13.18	
802.11ac40				
5190	9.35	9.12	12.25	30
5230	9.29	9.37	12.34	
802.11n40				
5190	9.22	9.42	12.33	30
5230	9.12	9.24	12.19	
802.11ac80				
5210	8.35	8.46	11.42	30

For Frequency band 5725~5850MHz:

Frequency (MHz)	Maximum peak output power (dBm)			Limit (dBm)
	ANT 1	ANT 2	Total Power	
802.11a				
5745	15.15	15.26	/	30
5785	15.23	15.35	/	
5825	15.09	15.27	/	
802.11ac20				
5745	10.13	10.24	13.20	30
5785	10.08	10.31	13.21	
5825	10.19	10.28	13.25	
802.11n20				
5745	10.21	10.11	13.17	30
5785	10.28	10.16	13.23	
5825	10.22	10.12	13.18	
802.11ac40				
5755	9.28	9.46	12.38	30
5795	9.31	9.33	12.33	
802.11n40				
5755	9.13	9.34	12.25	30
5795	9.27	9.39	12.34	
802.11ac80				
5775	8.53	8.67	11.61	30

3.4 26dB emission bandwidth

3.4.1 Limits

N/A.

3.4.2 Test method

Use the following spectrum analyzer settings:

Set RBW = approximately 1% of the emission bandwidth.

Set the VBW > RBW.

Detector = Peak.

Trace mode = max hold.

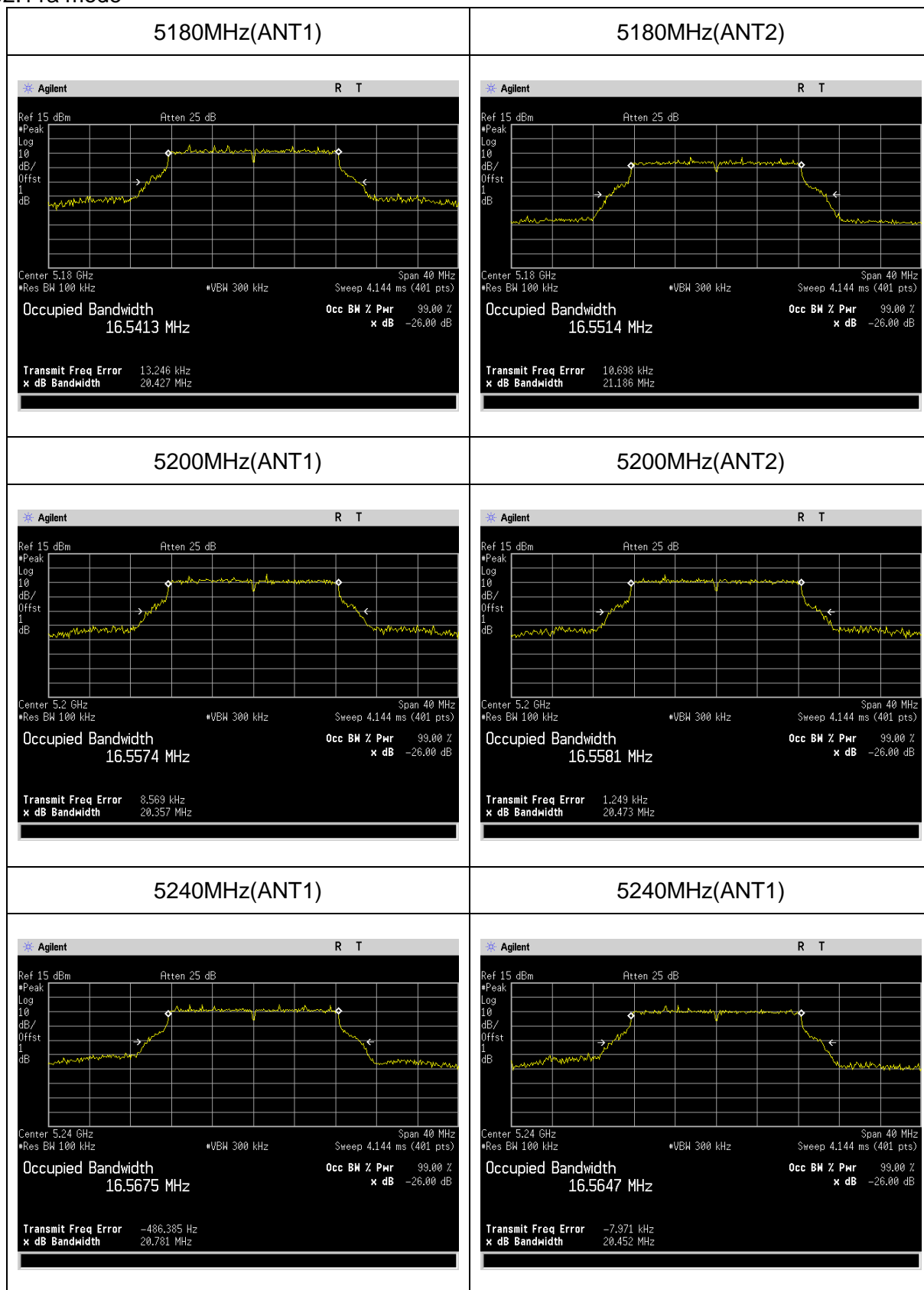
Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%. The marker-delta reading at this point is the 26 dB bandwidth and 99% Occupied Bandwidth of the emission

3.4.3 Test result

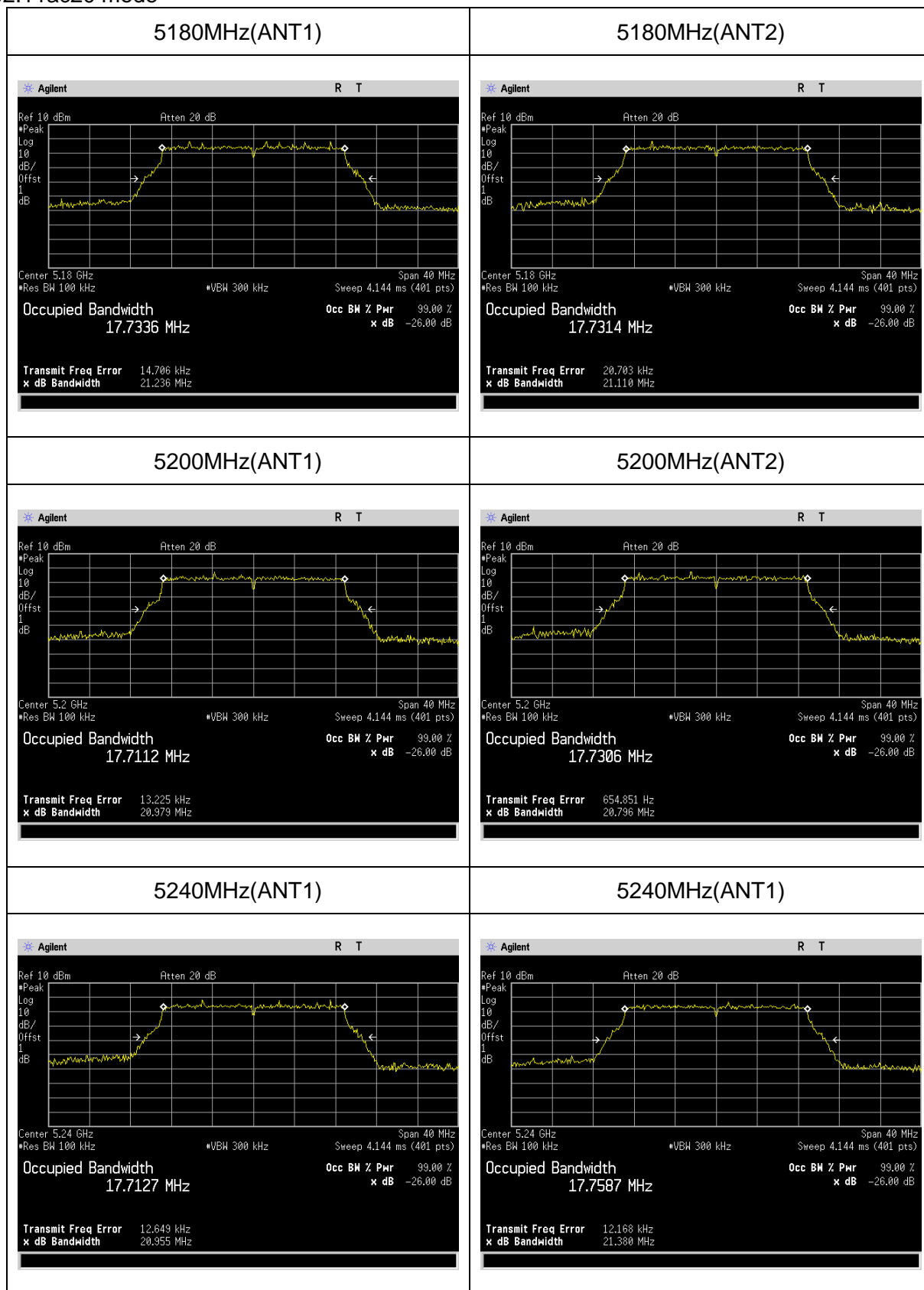
Frequency (MHz)	26dB emission bandwidth (MHz)		99% Occupied Bandwidth	
	ANT1	ANT2	ANT1	ANT2
802.11a				
5180	20.427	21.186	16.5413	16.5514
5200	20.357	20.743	16.5574	16.5581
5240	20.781	20.452	16.5675	16.5647
802.11ac20				
5180	21.236	21.11	17.7336	17.7314
5200	20.979	20.796	17.7112	17.7306
5240	20.955	21.38	17.7127	17.7587
802.11n20				
5180	20.979	20.914	17.7605	17.7127
5200	20.967	20.75	17.7276	17.7399
5240	21.290	21.083	17.7305	17.7652
802.11ac40				
5190	39.969	39.82	36.1689	36.1735
5230	39.872	39.74	36.1989	36.1631
802.11n40				
5190	39.721	39.757	36.2621	36.2593
5230	40.115	39.653	36.2255	36.2261
802.11ac80				
5210	80.398	79.928	75.5912	75.6264

See the test plots on the next pages:

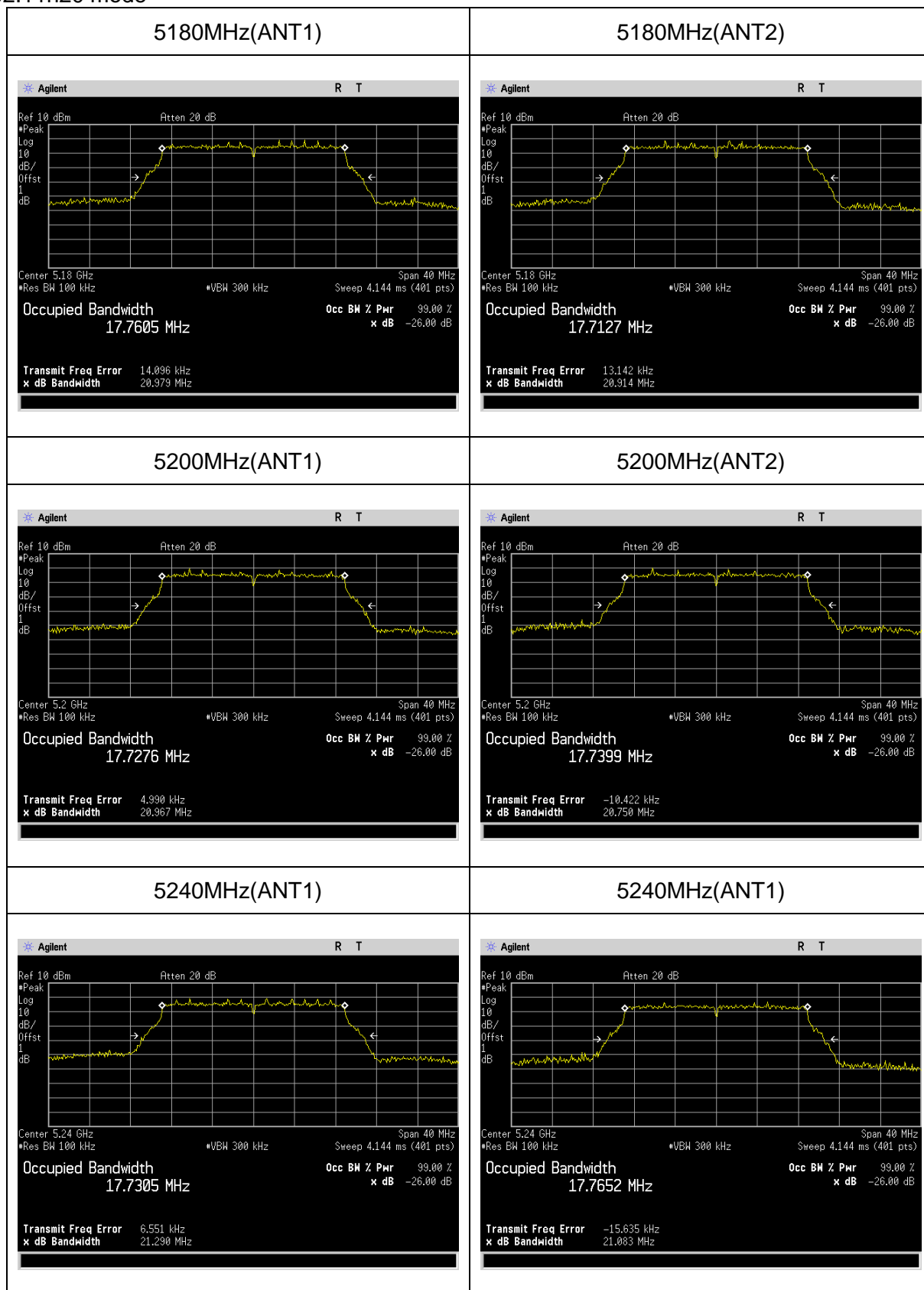
802.11a mode



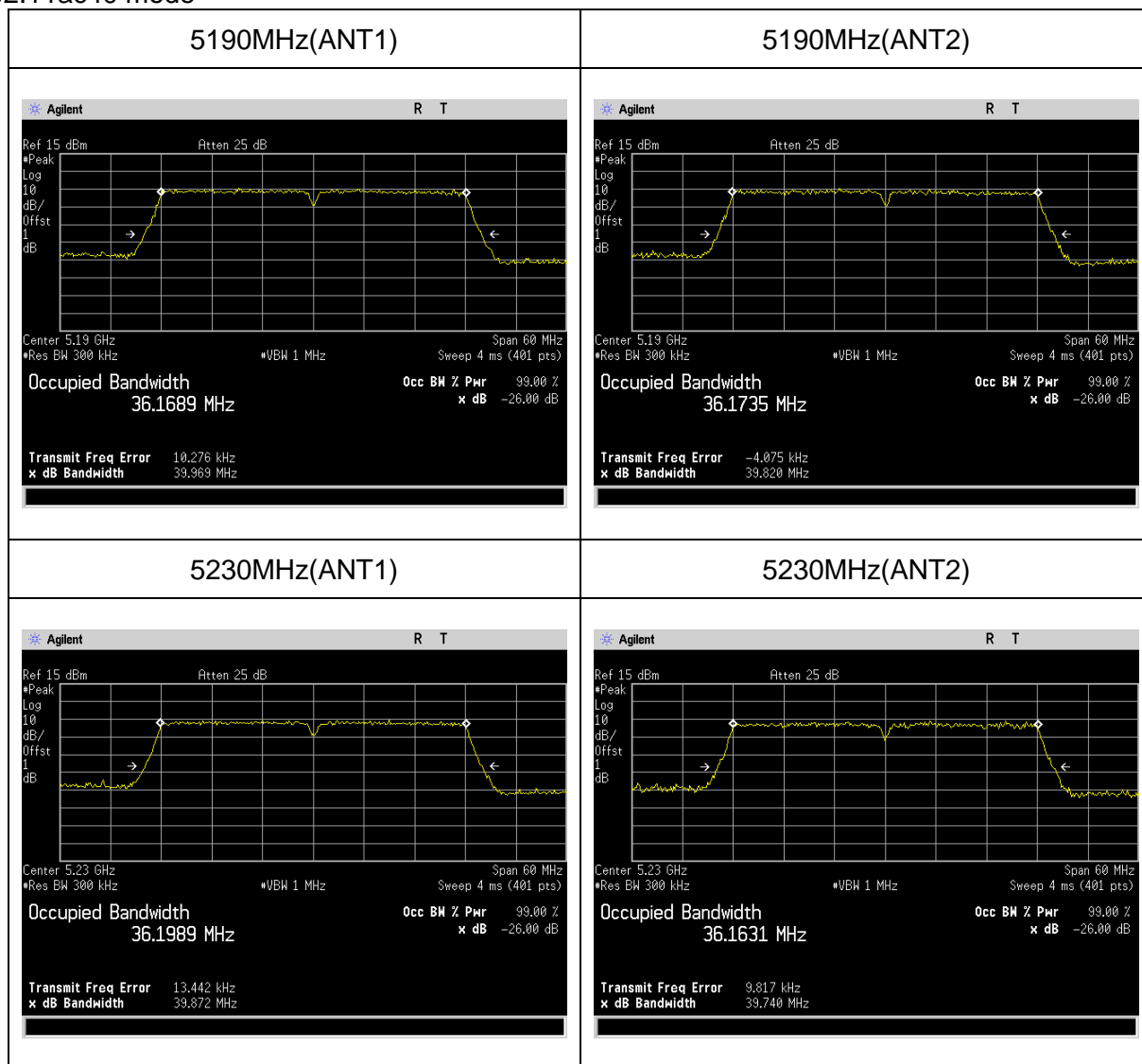
802.11ac20 mode



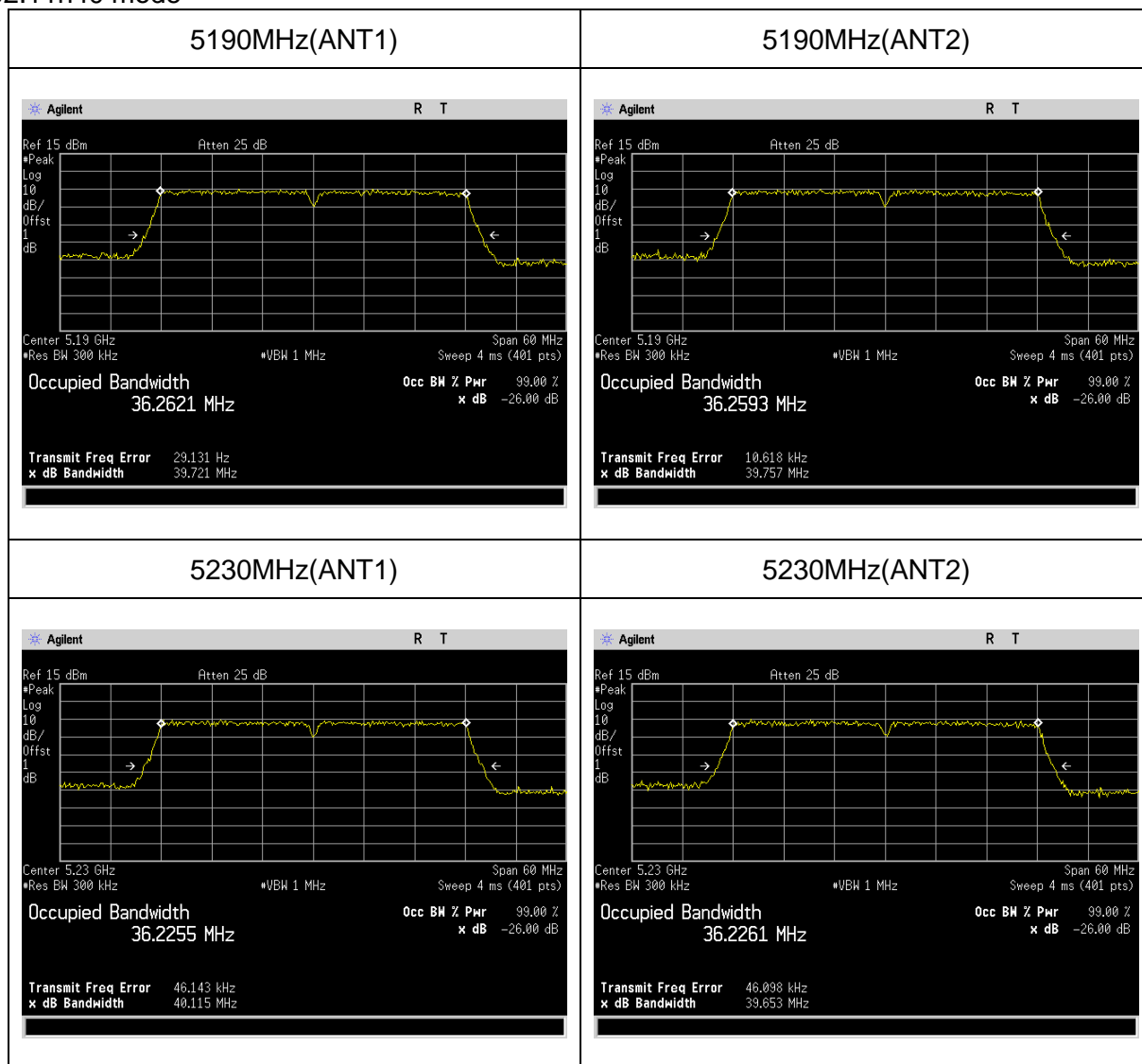
802.11n20 mode



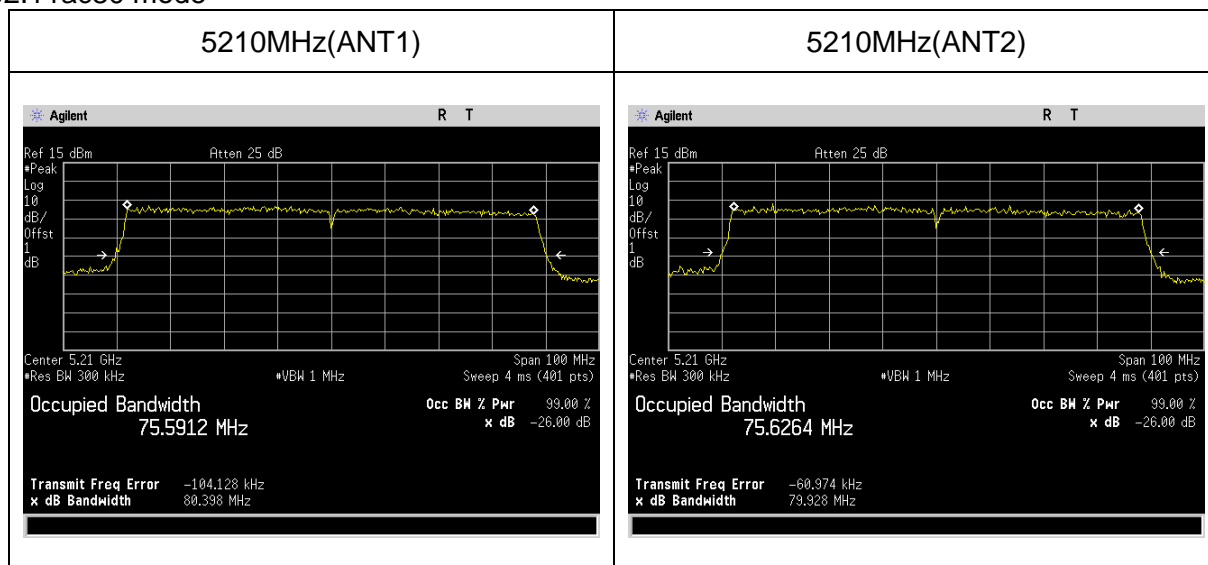
802.11ac40 mode



802.11n40 mode



802.11ac80 mode



3.5 6dB emission bandwidth

3.5.1 Limits

The minimum 6 dB bandwidth shall be at least 500 kHz

3.5.2 Test method

Set RBW = 100 kHz.

Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

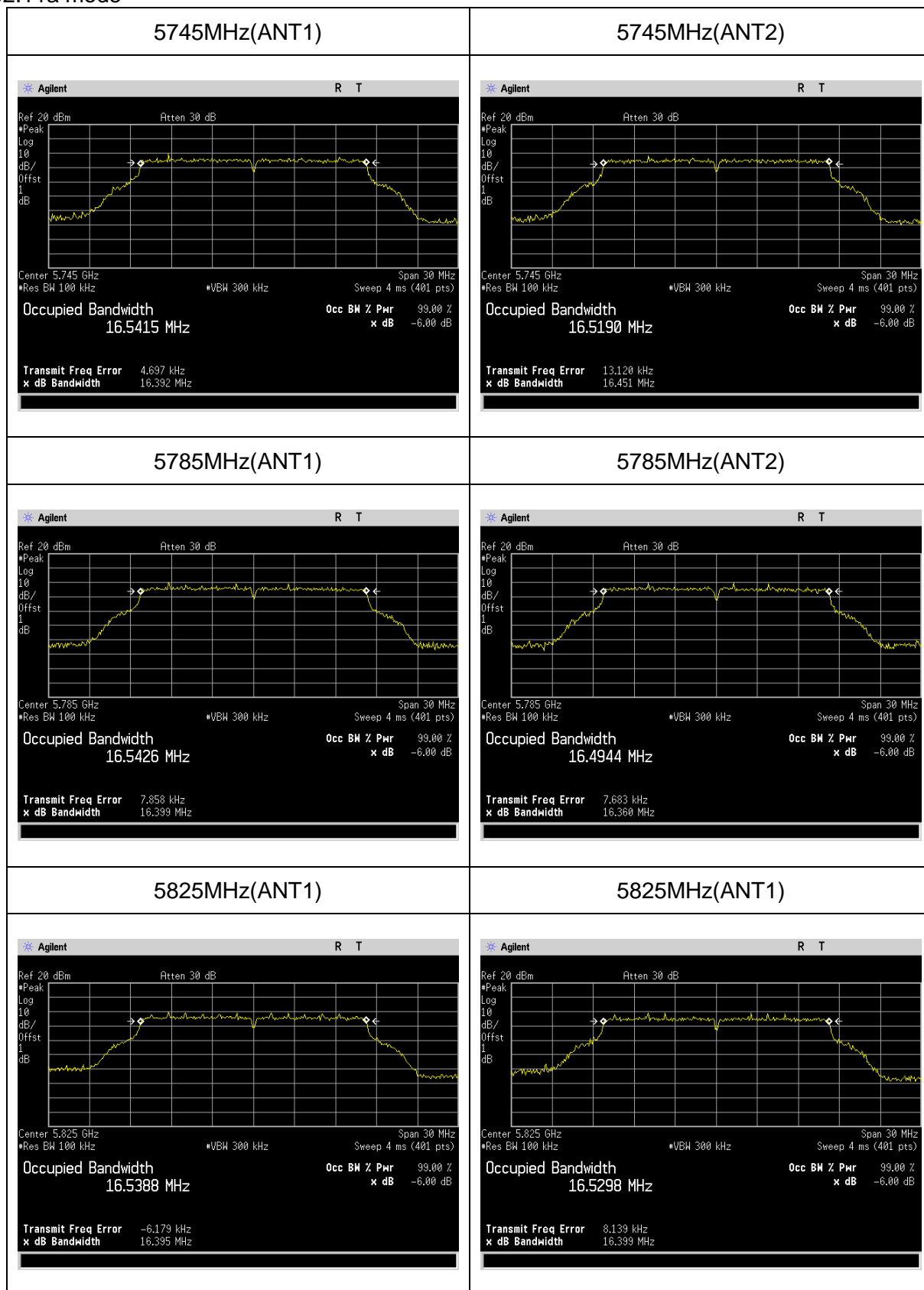
Allow the trace to stabilize.

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 6 dB relative to the maximum level measured in the fundamental emission.

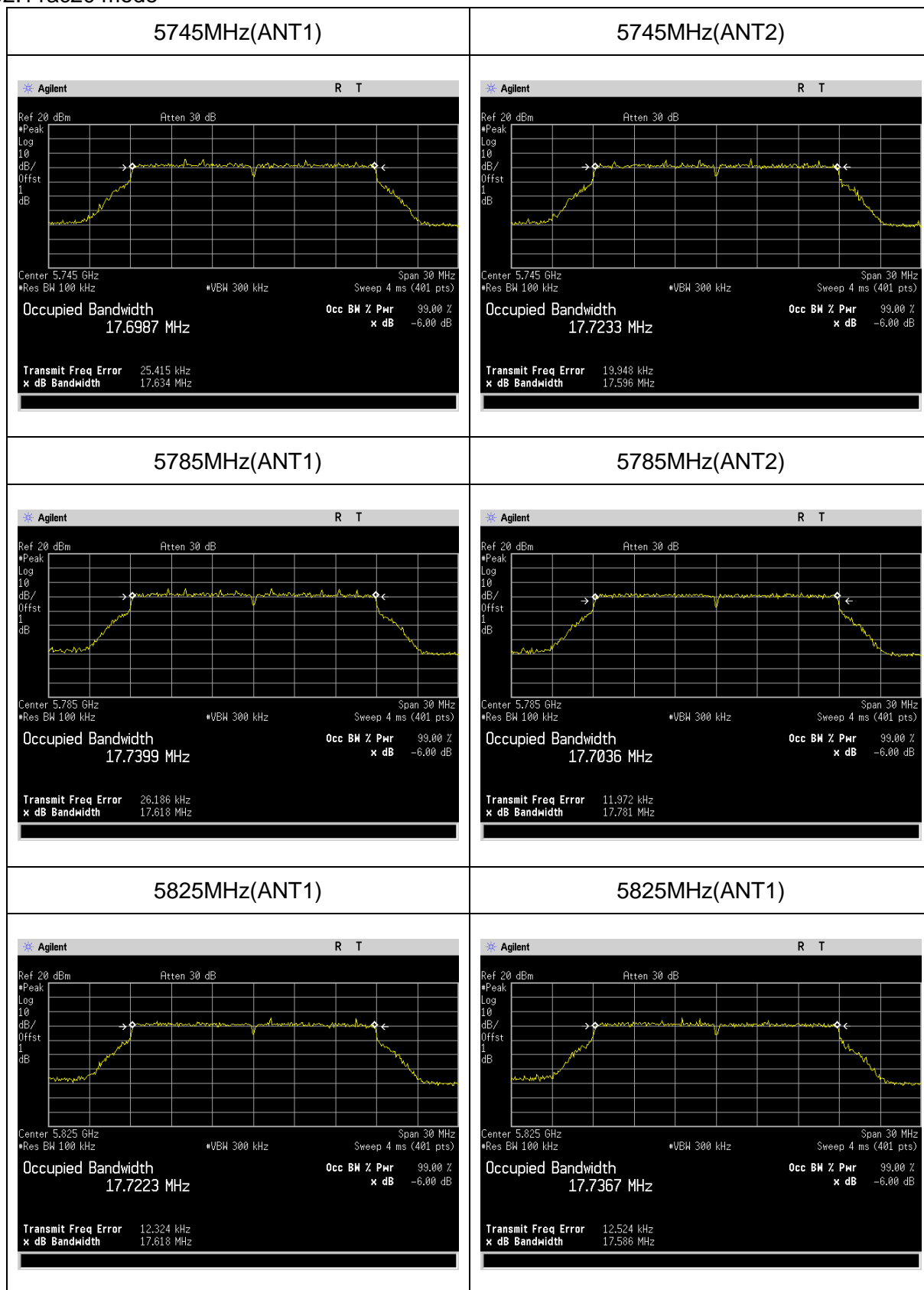
3.5.3 Test result

Frequency (MHz)	6dB emission bandwidth (MHz)		Limit
	ANT1	ANT2	
802.11a			
5745	16.392	16.451	500kHz
5785	16.399	16.36	
5825	16.395	16.399	
802.11ac20			
5745	17.634	17.596	500kHz
5785	17.618	17.781	
5825	17.618	17.586	
802.11n20			
5745	17.568	17.559	500kHz
5785	17.574	17.636	
5825	17.636	17.606	
802.11ac40			
5755	36.443	36.008	500kHz
5795	36.444	36.411	
802.11n40			
5755	36.336	36.363	500kHz
5795	36.417	35.838	
802.11ac80			
5775	75.938	76.034	500kHz

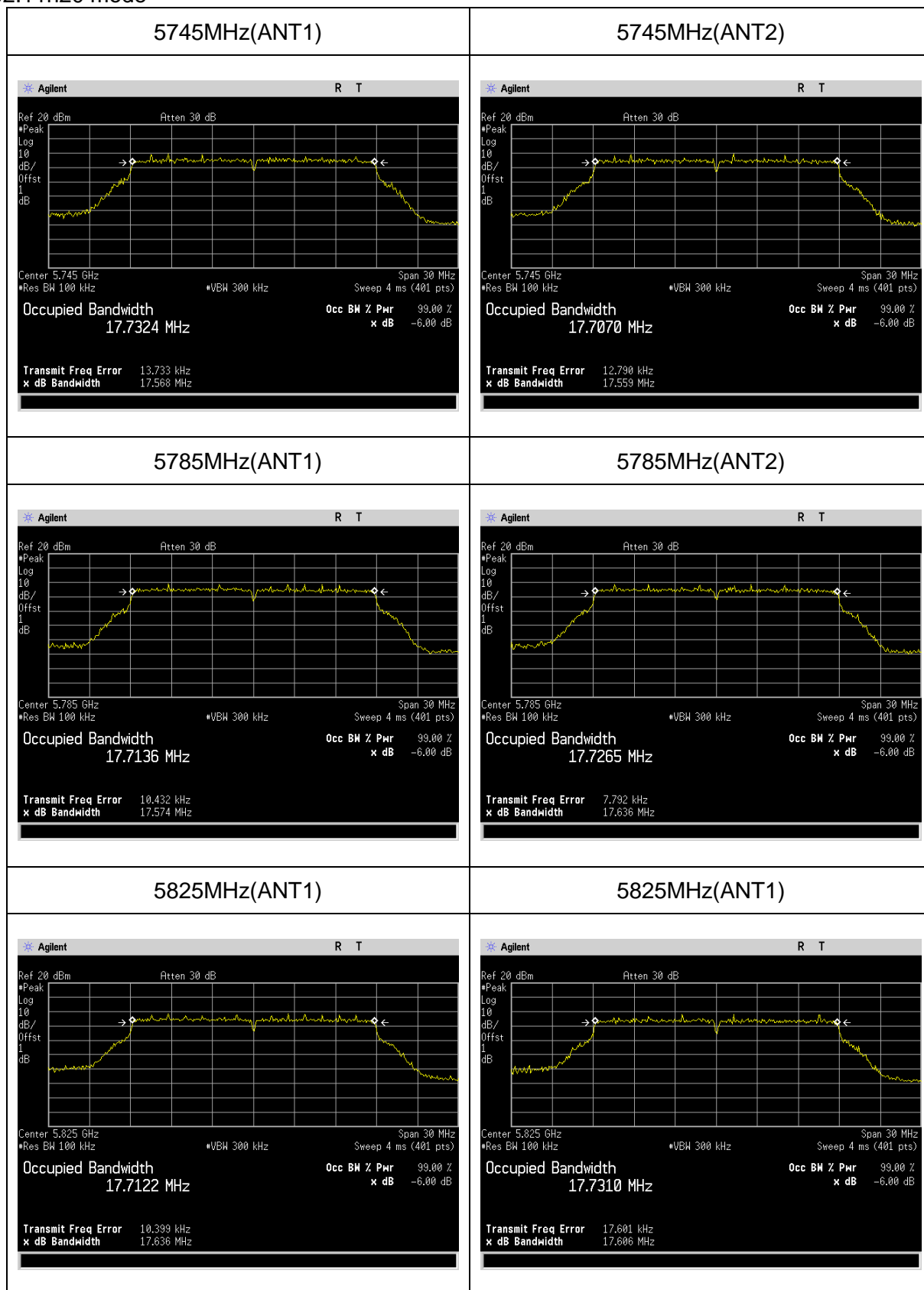
802.11a mode



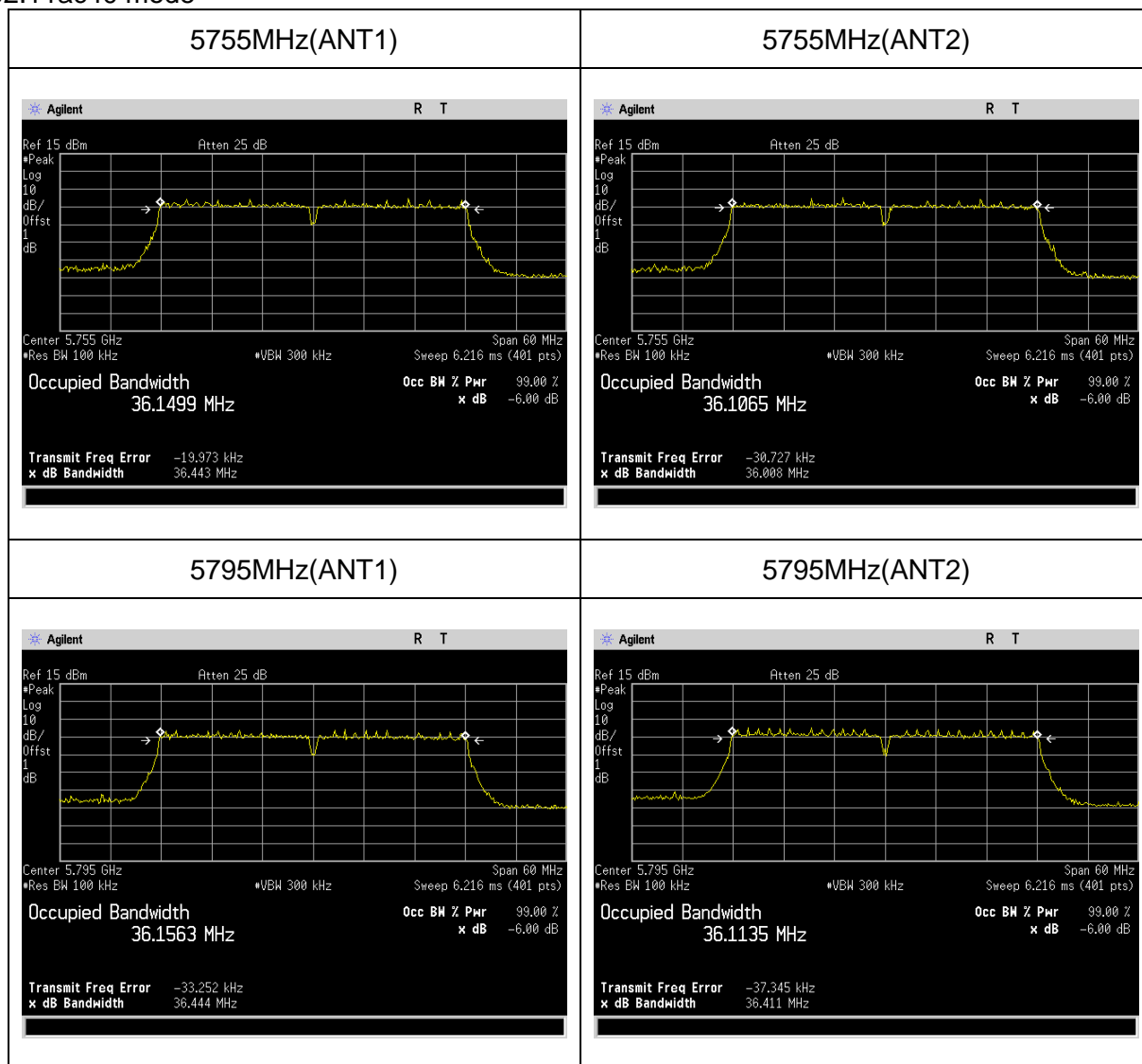
802.11ac20 mode



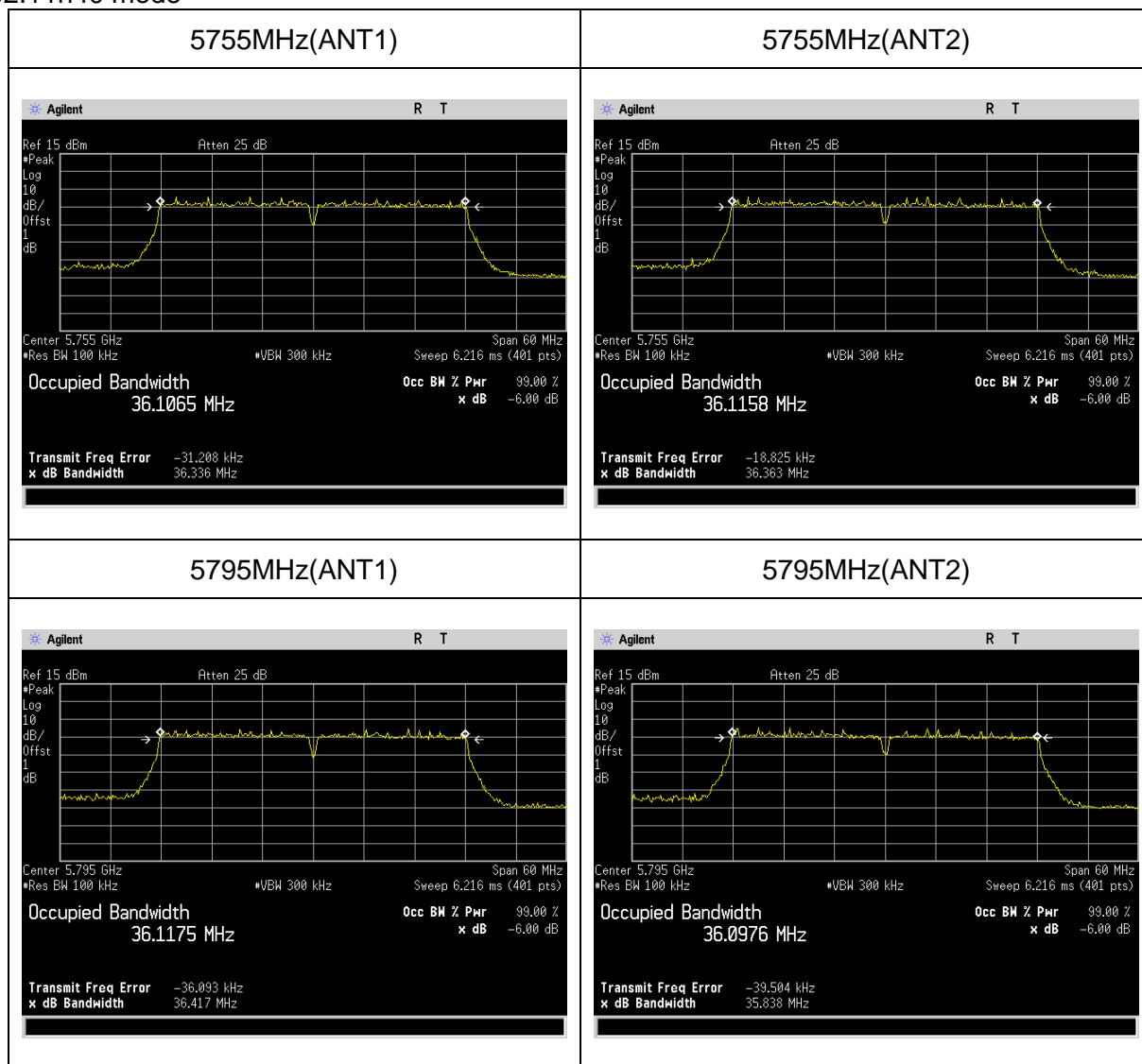
802.11n20 mode



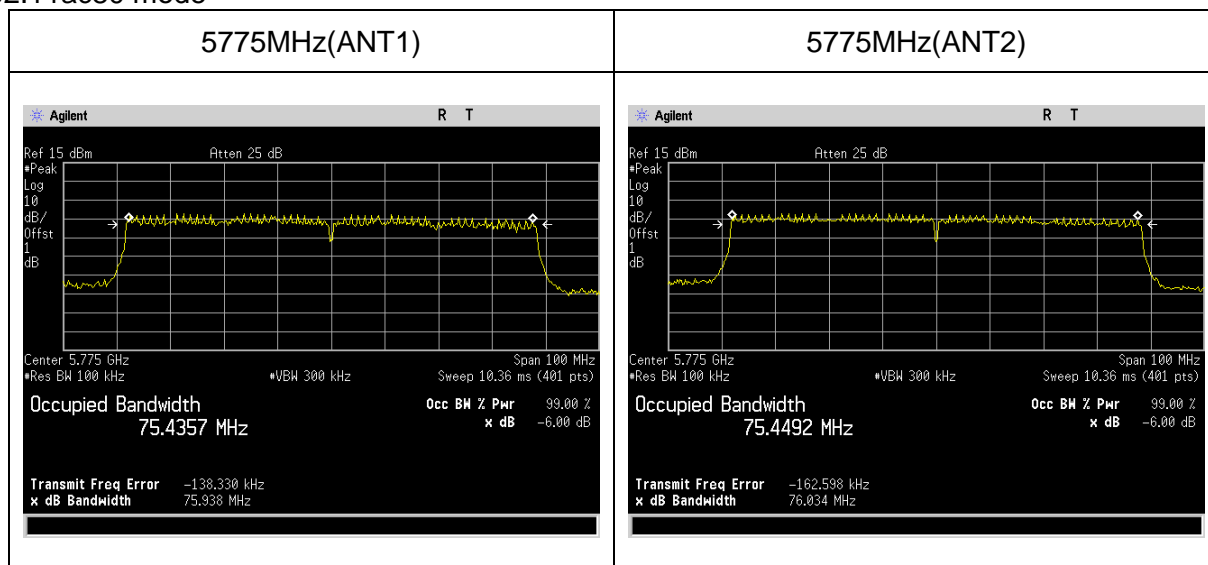
802.11ac40 mode



802.11n40 mode



802.11ac80 mode



3.6 Power spectral density

3.6.1 Limits

For the band 5.150-5.250 GHz, the peak power spectral density shall not exceed 17dBm in any 1MHz band. If transmitting antennas of directional gain greater than 6dBi 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 6dBi.

For the band 5.725-5.850 GHz, the peak power spectral density shall not exceed 30dBm in any 500KHz band. If transmitting antenna directional gain is greater than 6dBi, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3.6.2 Test method

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and 789033 D02 General UNII Test Procedures New Rules v01r03 Page 10 integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.I.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500\text{kHz}/RBW)$ to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log (1\text{MHz}/RBW)$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

3.6.3 Test result

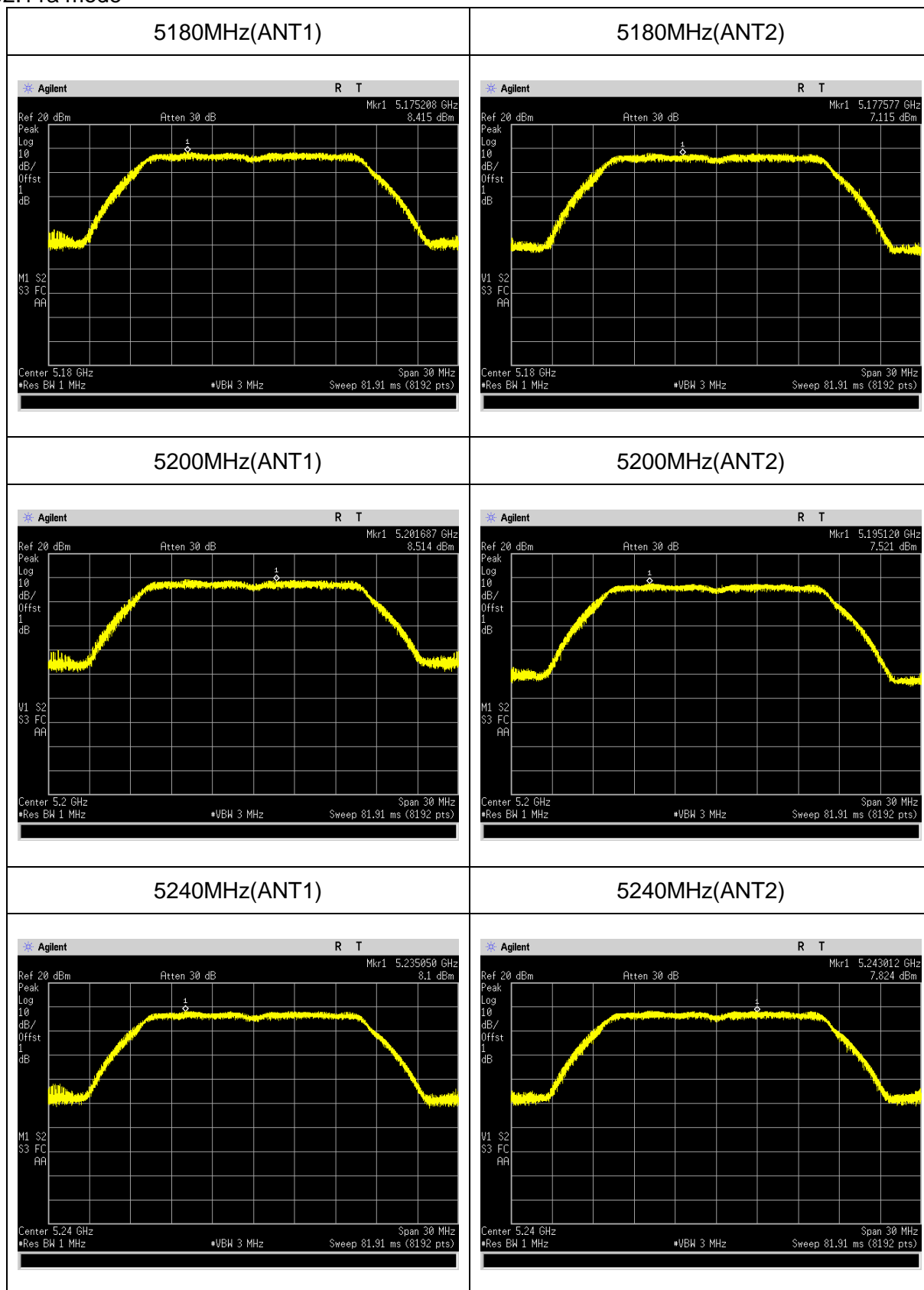
For Frequency band 5150~5250MHz:

Frequency (MHz)	PSD (dBm/MHz)			Limit (dBm/MHz)
	ANT1	ANT2	Total	
802.11a				
5180	8.415	7.115	/	17
5200	8.514	7.521	/	
5240	8.1	7.824	/	
802.11ac20				
5180	6.434	5.599	9.05	17
5200	6.115	5.261	8.72	
5240	6.305	5.85	9.09	
802.11n20				
5180	7.843	6.854	10.39	17
5200	7.314	7.045	10.19	
5240	7.416	6.607	10.04	
802.11ac40				
5190	2.908	2.475	5.71	17
5230	1.79	1.561	4.69	
802.11n40				
5190	3.78	3.386	6.6	17
5230	3.002	2.313	5.68	
802.11ac80				
5210	-0.587	-1.15	2.15	17

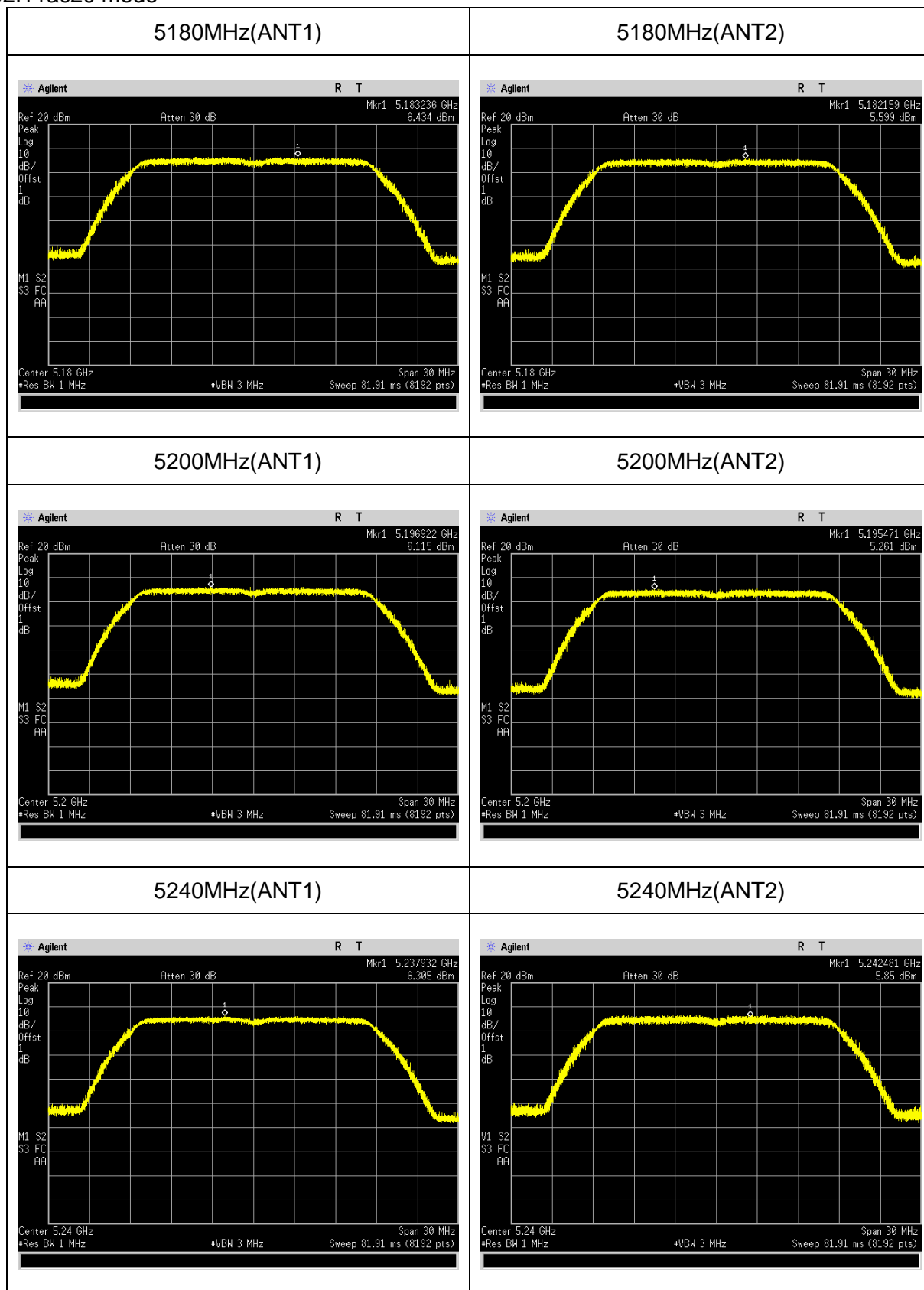
For Frequency band 5725~5850MHz:

Frequency (MHz)	PSD (dBm/MHz)			Limit (dBm/500kHz)
	ANT1	ANT2	Total	
802.11a				
5745	7.631	7.234	/	30
5785	7.61	6.898	/	
5825	6.829	6.382	/	
802.11ac20				
5745	4.534	4.307	7.43	30
5785	4.736	3.97	7.38	
5825	4.221	3.994	7.12	
802.11n20				
5745	5.049	4.741	7.91	30
5785	4.393	4.031	7.23	
5825	4.607	3.655	7.17	
802.11ac40				
5755	-0.967	-1.048	2	30
5795	-1.277	-1.5	1.62	
802.11n40				
5755	0.495	-0.072	3.23	30
5795	-0.127	-0.695	2.61	
802.11ac80				
5775	-3.254	-4.025	-0.61	30

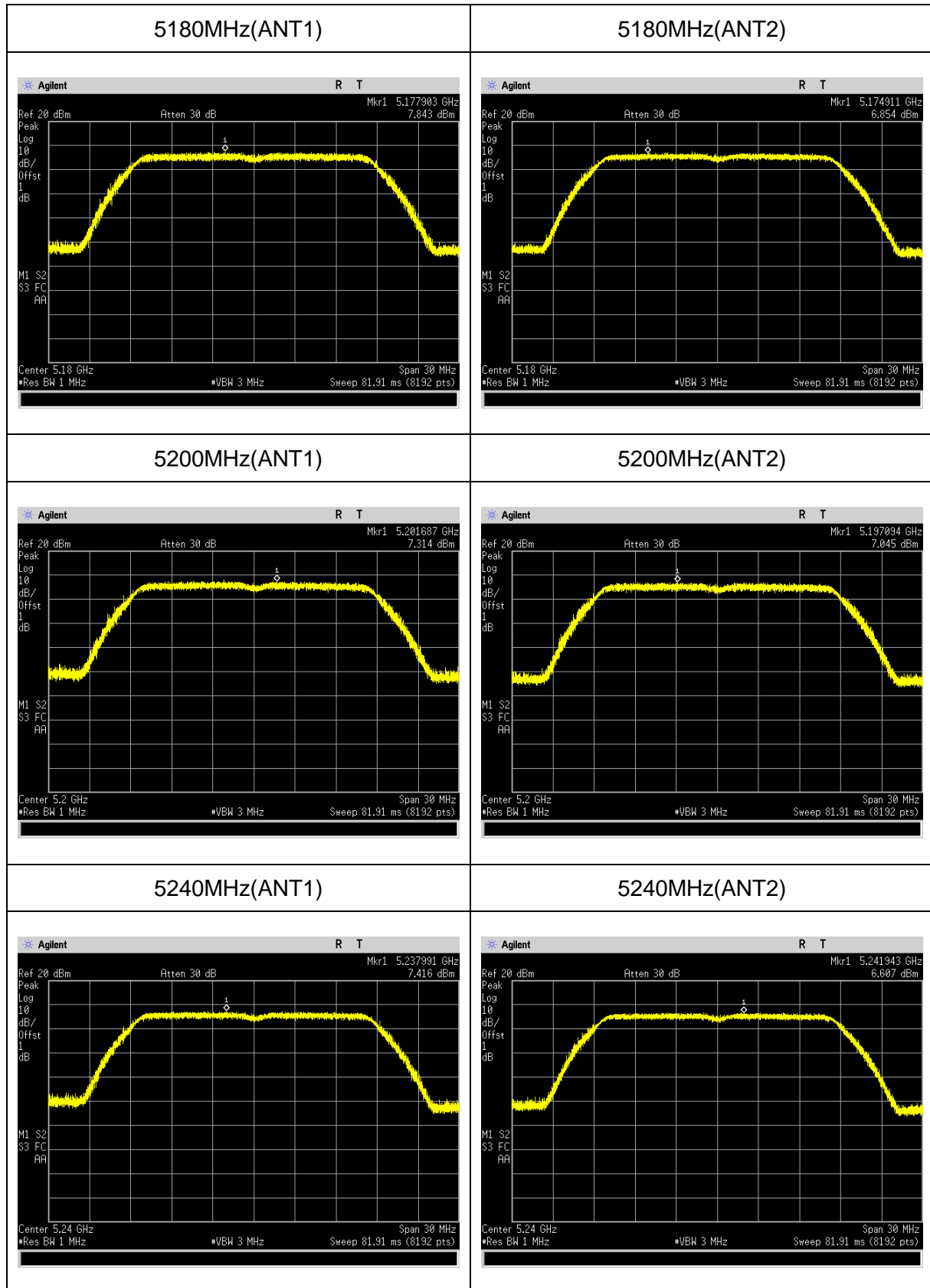
802.11a mode



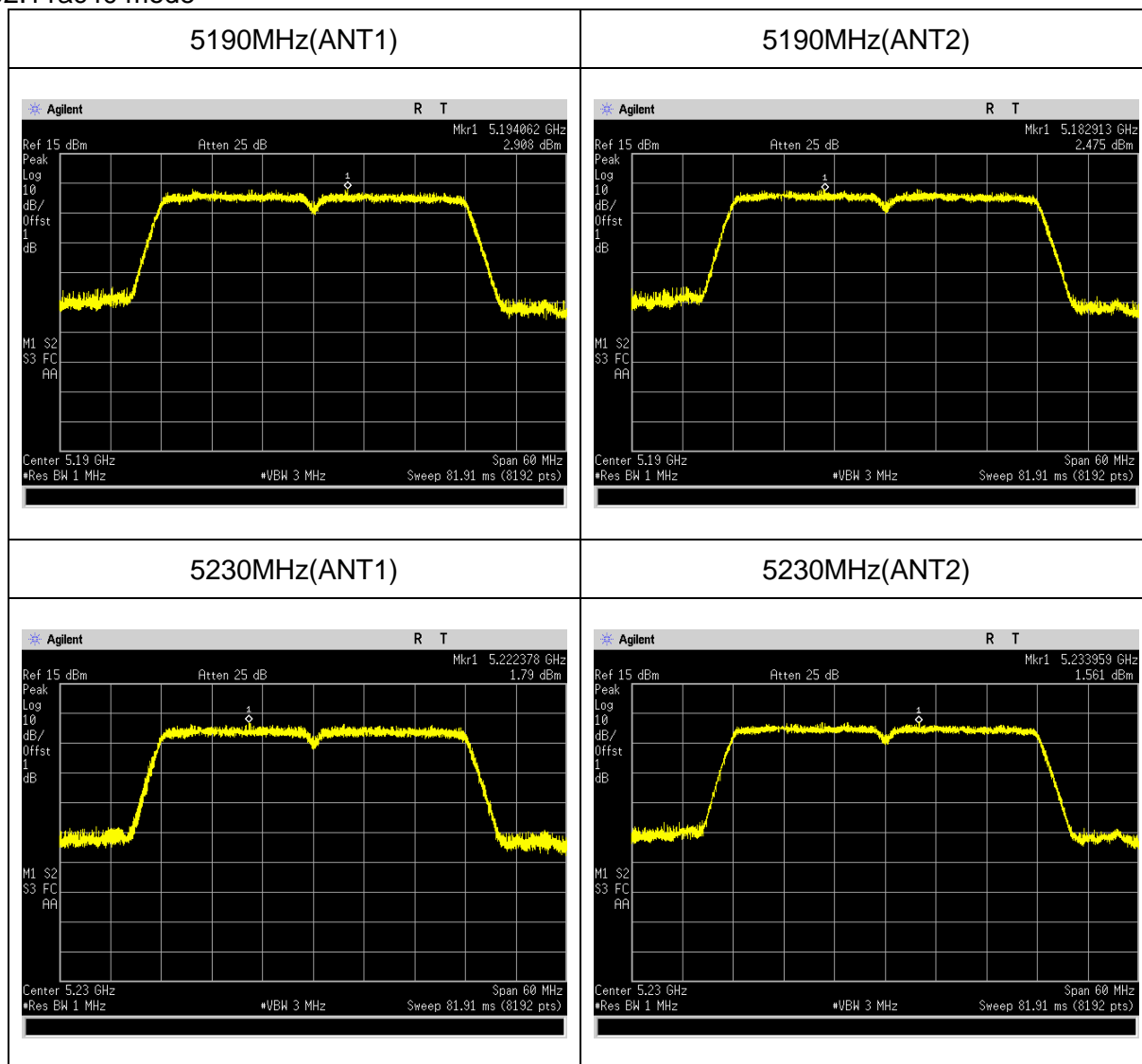
802.11ac20 mode



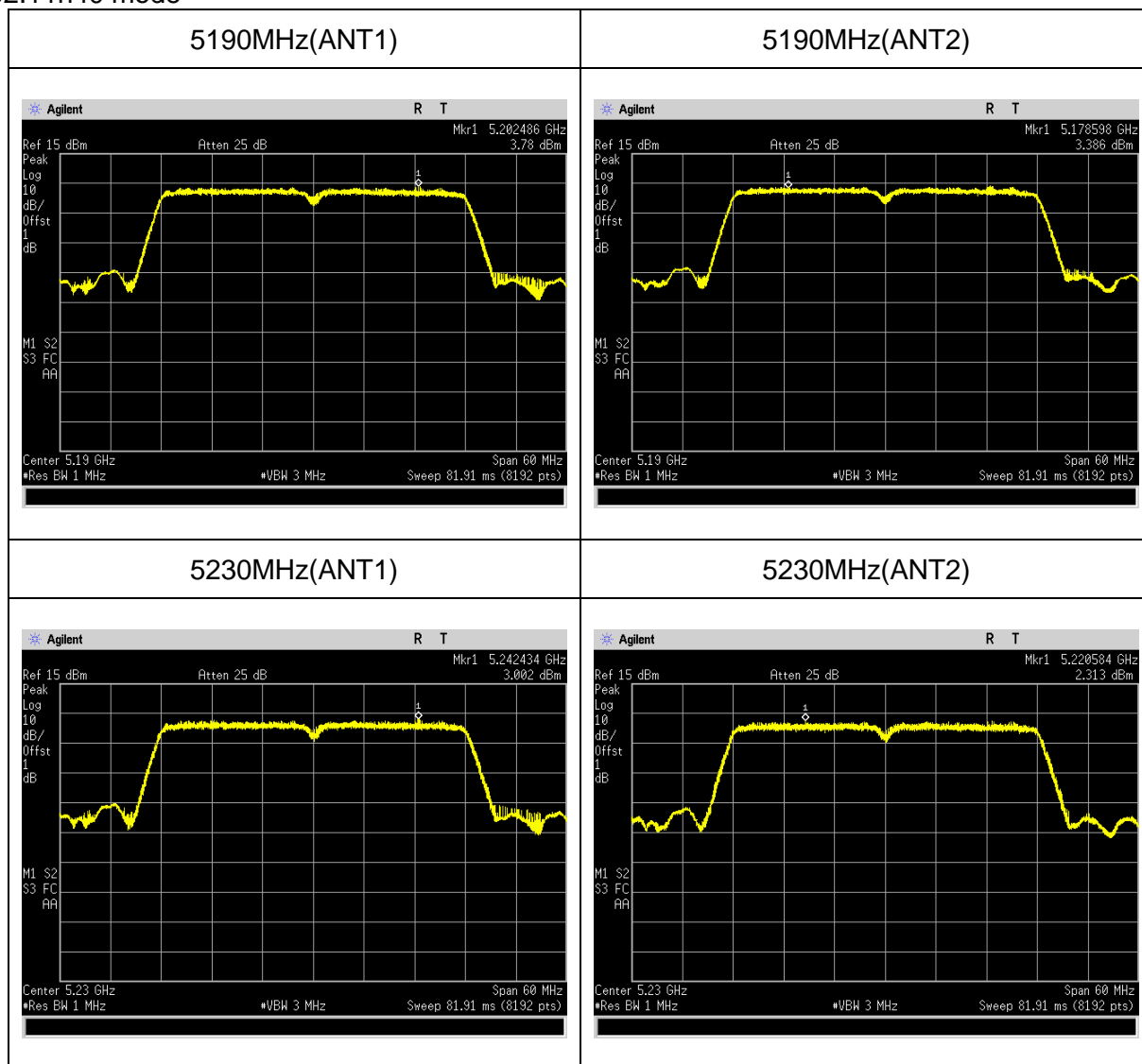
802.11n20 mode



802.11ac40 mode



802.11n40 mode



802.11ac80 mode

