

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (1) / (248) Pages

1. Client

- Name : KAONMEDIA Co., Ltd.
- Address : KAONMEDIA Building, 884-3 Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
- Date of Receipt : 2018-10-11

2. Manufacturer

- Name : KAONMEDIA Co., Ltd.
- Address : KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model: SETTOP BOX / VM3011C



5. Date of Test : 2018-10-11 to 2018-10-26

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.407

7. Testing Environment: Temp.: (24 ± 5) °C, Humidity: (50 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by		Technical Manager	
	Ji-Hye Kim: (Signature)		Won-Jae, Hwang: (Signature)	

2018-10-26

Republic of KOREA **CTK Co., Ltd.**



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (2) / (248) Pages

REPORT REVISION HISTORY

Date	Revision	Page No
2018-10-26	Issued (CTK-2018-03453)	all

This report shall not be reproduced except in full, without the written approval of CTK Co., Ltd. This document may be altered or revised by CTK Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CTK Co., Ltd. will constitute fraud and shall nullify the document.



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (3) / (248) Pages

CONTENTS

1. General Product Description	4
1.1 Client Information	4
1.2 Product Information.....	4
1.3 Peripheral Devices	5
2. Facility and Accreditations.....	6
2.1 Test Facility.....	6
2.2 Laboratory Accreditations and Listings	6
2.3 Calibration Details of Equipment Used for Measurement	6
3. Test Specifications	7
3.1 Standards.....	7
3.2 Mode of operation during the test.....	8
3.3 Device Modifications	9
3.4 Maximum Measurement Uncertainty	9
3.5 Test Software.....	9
4. Technical Characteristic Test.....	10
4.1 6dB Bandwidth.....	10
4.2 26 dB Bandwidth and 99% Bandwidth.....	23
4.3 OUTPUT POWER	74
4.4 Power Spectral Density	134
4.5 Frequency Stability	194
4.6 Unwanted Emissions	195
4.7 AC Conducted Emissions	245
APPENDIX A – Test Equipment Used For Tests	248



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (4) / (248) Pages

1. General Product Description

1.1 Client Information

Company	KAONMEDIA Co., Ltd.
Contact Point	KAONMEDIA Building, 884-3 Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Contact Person	Name : Kim hang seob E-mail : khs79@kaonmedia.com Tel : +82-31-724-8668 Fax : +82-31-724-8999

1.2 Product Information

FCC ID	WQTVM3011C
Product Description	SETTOP BOX
Model name	VM3011C
Variant Model name	-
Operating Frequency	UNII 1 : 5 180 MHz – 5 240 MHz (20 MHz_BW) 5 190 MHz – 5 230 MHz (40 MHz_BW) 5 210 MHz (80 MHz_BW) UNII 2A : 5 260 MHz – 5 320 MHz (20 MHz_BW) 5 270 MHz – 5 310 MHz (40 MHz_BW) 5 290 MHz (80 MHz_BW) UNII 2C : 5 500 MHz – 5 720 MHz (20 MHz_BW) 5 510 MHz – 5 710 MHz (40 MHz_BW) 5 530 MHz – 5 690 MHz (80 MHz_BW) UNII 3 : 5 745 MHz – 5 825 MHz (20 MHz_BW) 5 755 MHz – 5 795 MHz (40 MHz_BW) 5 775 MHz (80 MHz)
RF Output Power	802.11a : 26.70 dBm (467.21 mW) 802.11n_HT20 : 26.63 dBm (460.40 mW) 802.11n_HT40 : 26.97 dBm (497.73 mW) 802.11ac_VHT20 : 26.60 dBm (456.95 mW) 802.11ac_VHT40 : 26.87 dBm (486.01 mW) 802.11ac_VHT80 : 23.00 dBm (199.59 mW)
Antenna Specification	Antenna type : PCB Antenna Peak Gain : 2.0 dBi
Type of Modulation	OFDM
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 600 Mbps 802.11ac : up to 1.7 Gbps
Power Source	DC 12 V (Adaptor)
Hardware Rev	v1.0
Software Rev	00.00.00.01



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (5) / (248) Pages

1.3 Peripheral Devices





Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6N
AC/DC Adapter	HP	HSTNN-CA40	-
Switching Mode Power Adaptor	SHENZHEN FRECOM ELECTRONICS CO., LTD.	F18L16-120150SPAU	-

2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
CANADA	ISED	ISED EMI (3/10m test site)	8737A-2	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	MSIP	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (7) / (248) Pages

3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Limit	Status (Note 1)	Test Condition
15.407(e)	6 dB Bandwidth	> 500 kHz	C	Conducted
15.407(a)	26 dB Bandwidth and 99% Bandwidth	NA	C	
15.407(a)(1)	Conducted Output Power	< 250 mW (5 150 - 5 250 MHz) < 250 mW (5 250 - 5 350 MHz, 5 470 - 5 725 MHz) < 1 W (5 725 - 5 850 MHz)	C	
15.407(a)(1)	Power Spectral Density	< 11 dBm/MHz (5 150 - 5 250 MHz) < 11 dBm/MHz (5 250 - 5 350 MHz, 5 470 - 5 725 MHz) < 30 dBm/500 KHz (5 725 - 5 850 MHz)	C	
15.407(g)	Frequency Stability	NA	C	
15.407 (b)	Undesirable emission	< -27 dBm/MHz EIRP (5 150 - 5 250 MHz, 5250 - 5350 MHz, 5470 - 5725 MHz) < -17 dBm/MHz EIRP (5715 - 5725 MHz, 5 850 - 5 860 MHz) < -27 dBm/MHz EIRP outside (5 715 - 5 850 MHz)	C	Radiated
15.205, 15.407 (b)(5),(6)	Radiated Spurious Emission	15.209(a)	C	
15.207	AC Conducted Emissions	15.207(a)	C	Line Conducted

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

Note 3: The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013

Note 4: The tests were performed according to the method of measurements prescribed in KDB No.789033.



3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments. During at testing, system components were manipulated within the confines of typical usage to maximize each emission. For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit. All modulation modes were tests. The results are only attached worst cases.

Test Frequency

- 802.11a, 802.11n_HT20, 802.11ac_VHT20

	Lowest channel	Middle channel	Highest channel
UNII 1	5 180 MHz	5 200 MHz	5 240 MHz
UNII 2A	5 260 MHz	5 300 MHz	5 320 MHz
UNII 2C	5 500 MHz	5 600 MHz	5 720 MHz
UNII 3	5 745 MHz	5 785 MHz	5 825 MHz

- 802.11n_HT40, 802.11ac_VHT40

	Lowest channel	Middle channel	Highest channel
UNII 1	5 190 MHz	-	5 230 MHz
UNII 2A	5 270 MHz	-	5 310 MHz
UNII 2C	5 510 MHz	5 590 MHz	5 710 MHz
UNII 3	5 755 MHz	-	5 795 MHz

- 802.11ac_VHT80

	Lowest channel	Middle channel	Highest channel
UNII 1	5 210 MHz	-	-
UNII 2A	5 290 MHz	-	-
UNII 2C	5 530 MHz	-	5 690 MHz
UNII 3	5 775 MHz	-	-

Test mode

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	DSSS	1 Mbps	95.6 %	0.20 dB
802.11n_HT20	OFDM	MCS 0	95.2 %	0.21 dB
802.11n_HT40	OFDM	MCS 0	90.6 %	0.43 dB
802.11ac_VHT20	OFDM	MNSS 0	95.3 %	0.21 dB
802.11ac_VHT40	OFDM	MNSS 0	90.8 %	0.42 dB
802.11ac_VHT80	OFDM	MNSS 0	82.4 %	0.84 dB



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (9) / (248) Pages

3.3 Device Modifications

The following modifications were necessary for compliance:

Not applicable

3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.

Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	± 1.5 dB
Power Spectral Density	± 1.5 dB
Occupied Bandwidth	± 0.1 MHz
Unwanted Emission(conducted)	± 3.0 dB
Radiated Emissions ($f \leq 1$ GHz)	± 4.0 dB
Radiated Emissions ($f > 1$ GHz)	± 5.0 dB

3.5 Test Software

Conducted Test	Ics Pro Ver. 6.0.3
Radiated Test	TOYO EMI software EP5RE Ver. 5.1.0
Line Conducted Test	ESCI7, ESCI3 : EMC32 Ver. 8.50.0 ESR7 : EMC32 Ver. 8.53.0



CTK Co., Ltd.

(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (10) / (248) Pages

4. Technical Characteristic Test

4.1 6dB Bandwidth

Test Procedures

KDB 789033 – Section C.2
ANSI C63.10-2013 - Section 6.9.2

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.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 100 kHz
- b) VBW $\geq 3 \times$ RBW
- c) Detector = peak
- d) Trace mode = Max hold
- e) Sweep = auto couple
- f) Allow trace to fully stabilize
- g) 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.

Minimum Standard:

6 dB Bandwidth > 500 kHz



Test Data:

ANT1

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	16.41	17.60	17.59
5 785 MHz	16.39	17.60	17.63
5 825 MHz	16.40	17.60	17.62
Measurement uncertainty	± 0.1 MHz		

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	36.35	36.40
5 795 MHz	36.37	36.37
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	76.34
Measurement uncertainty	± 0.1 MHz

ANT2

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	16.38	17.61	17.65
5 785 MHz	16.40	17.62	17.62
5 825 MHz	16.38	17.62	17.61
Measurement uncertainty	± 0.1 MHz		



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (12) / (248) Pages

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	36.40	36.40
5 795 MHz	36.39	36.32
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	76.31
Measurement uncertainty	± 0.1 MHz

ANT3

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	16.37	17.64	17.63
5 785 MHz	16.40	17.59	17.59
5 825 MHz	16.44	17.63	17.61
Measurement uncertainty	± 0.1 MHz		

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	36.41	36.34
5 795 MHz	36.38	36.39
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	76.33
Measurement uncertainty	± 0.1 MHz



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (13) / (248) Pages

ANT4

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	16.39	17.62	17.60
5 785 MHz	16.39	17.61	17.62
5 825 MHz	16.44	17.61	17.60
Measurement uncertainty	± 0.1 MHz		

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	36.38	36.45
5 795 MHz	36.35	36.37
Measurement uncertainty	± 0.1 MHz	

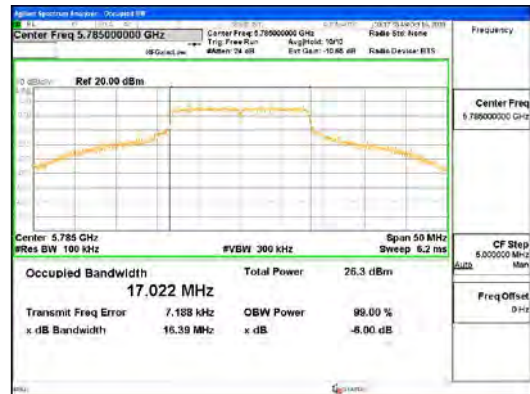
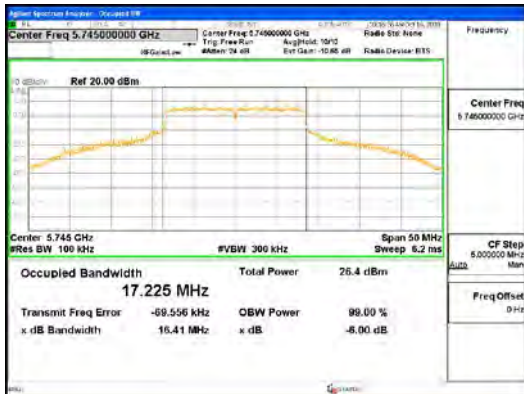
6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	76.34
Measurement uncertainty	± 0.1 MHz

See next pages for actual measured spectrum plots.

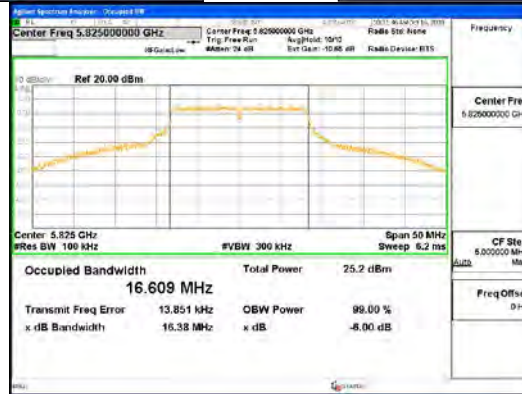
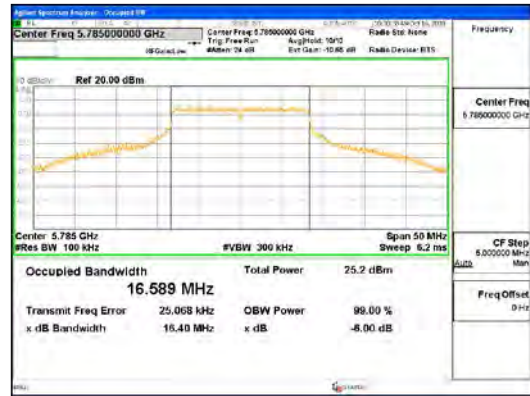
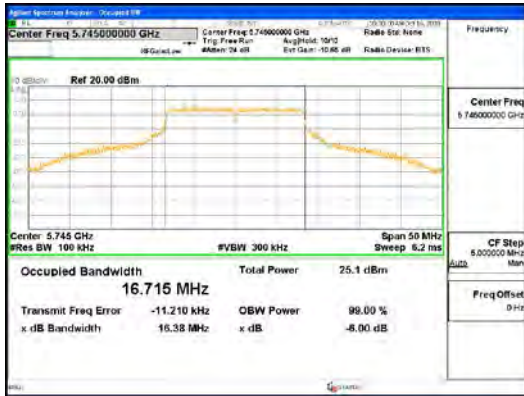


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (14) / (248) Pages



ANT1_802.11a

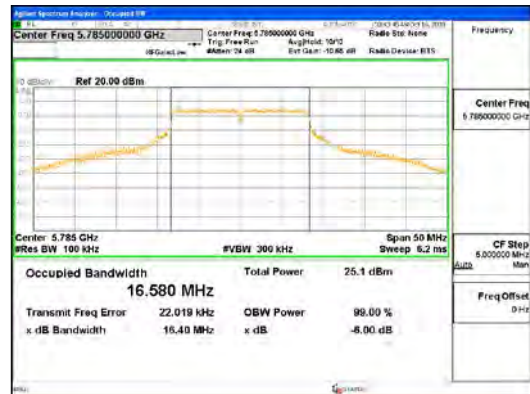
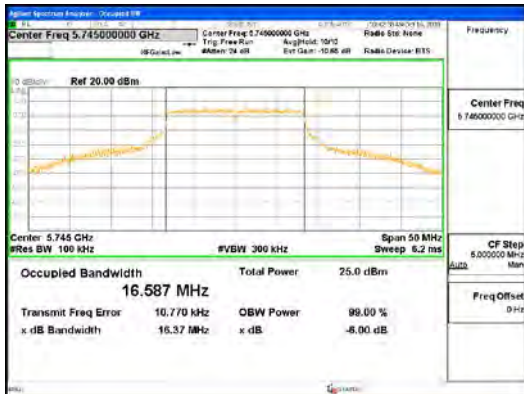


ANT2_802.11a

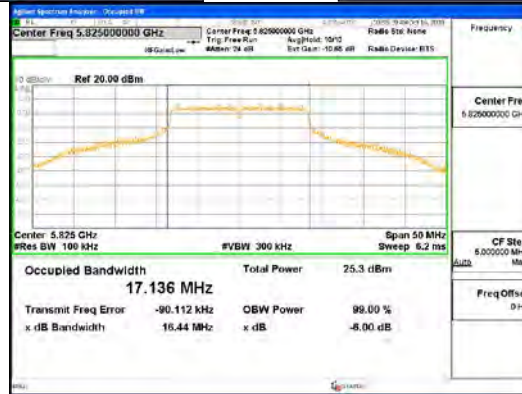
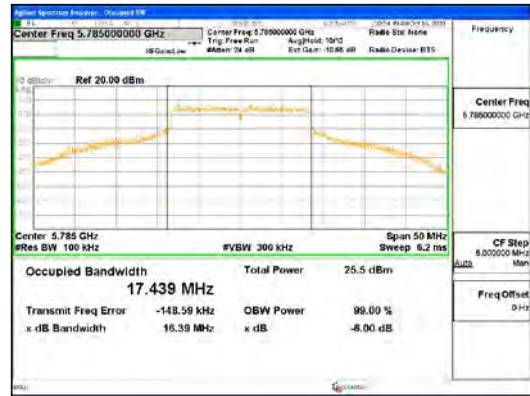
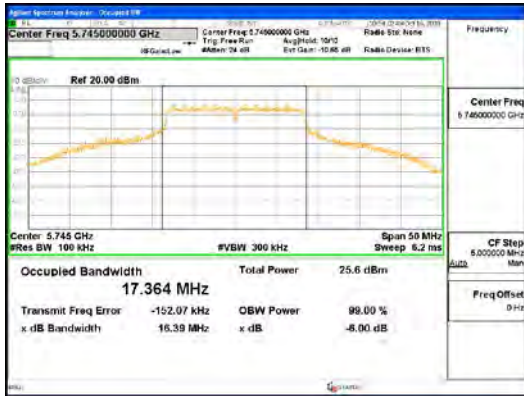


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

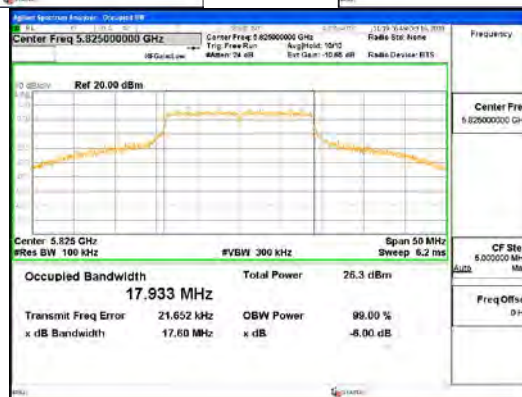
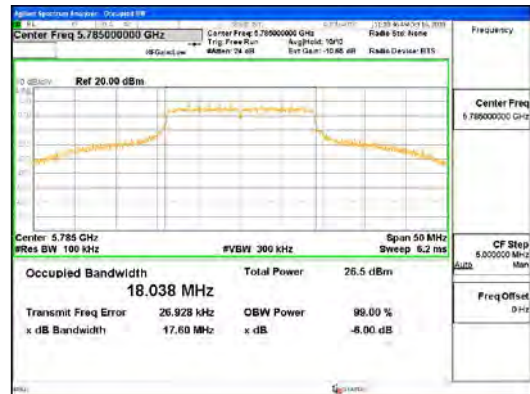
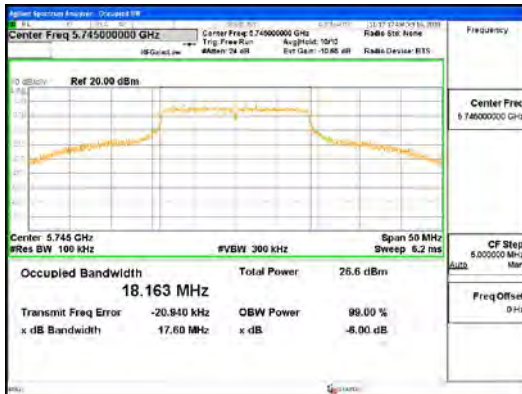
Report No.:
 CTK-2018-03453
 Page (15) / (248) Pages



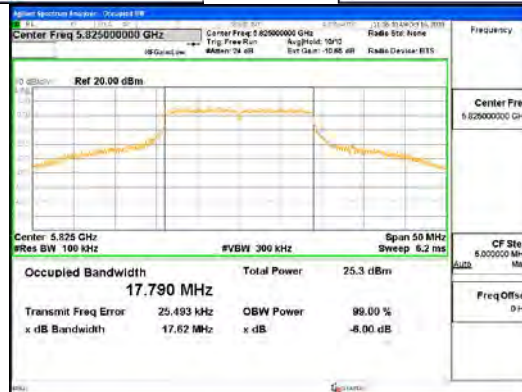
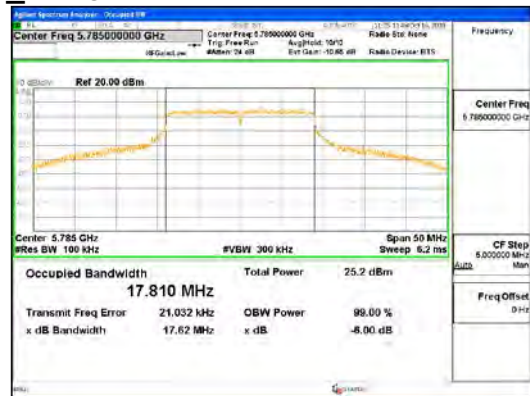
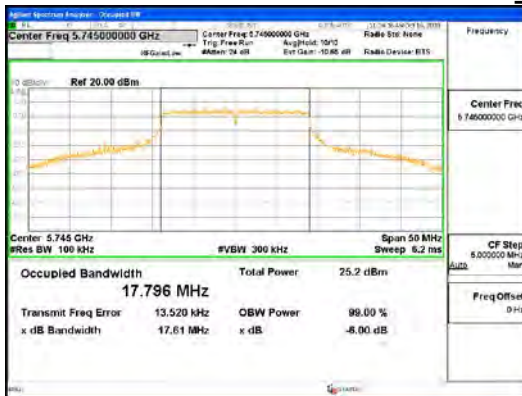
ANT3_802.11a



ANT4_802.11a



ANT1_802.11n_HT20

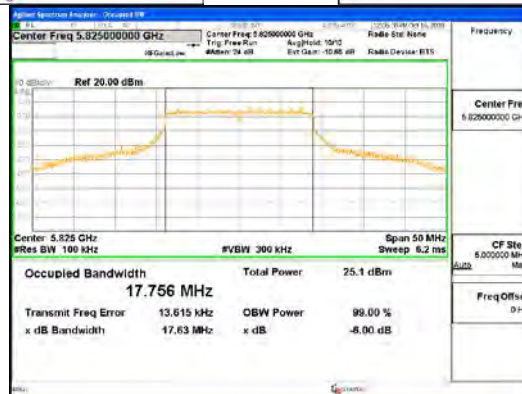
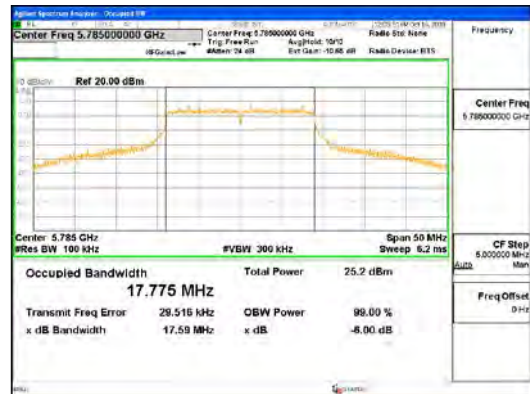
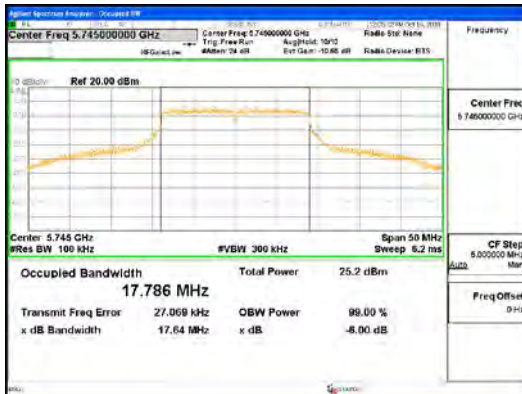


ANT2_802.11n_HT20

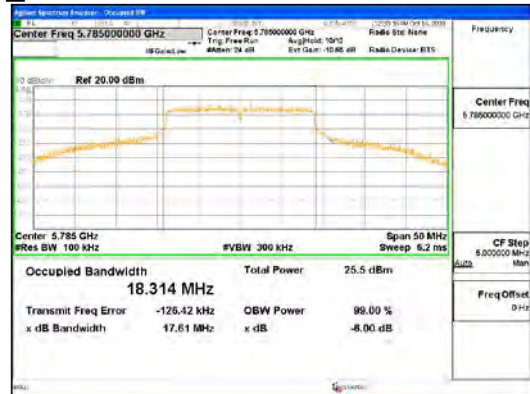
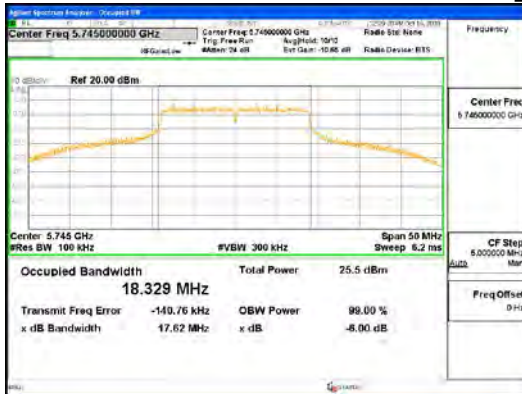


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (17) / (248) Pages



ANT3_802.11n_HT20

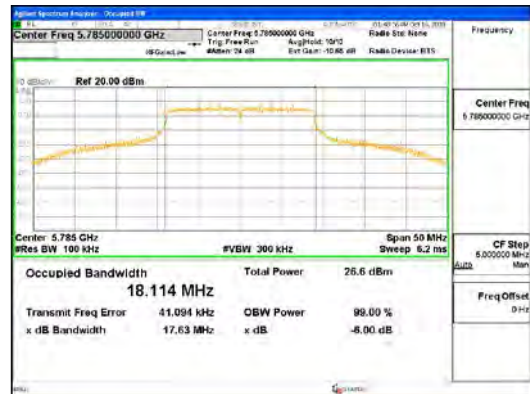
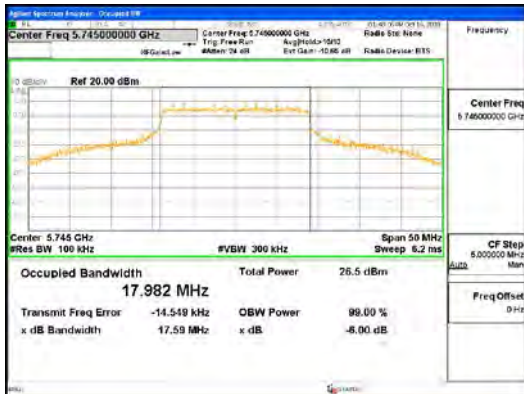


ANT4_802.11n_HT20

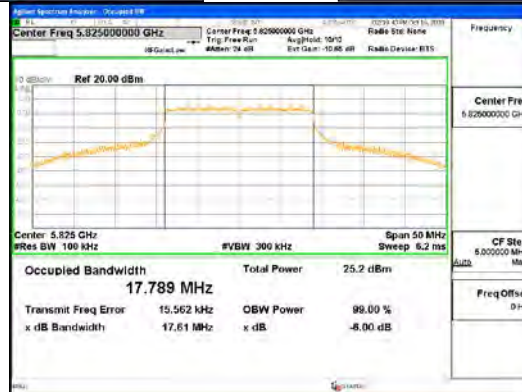
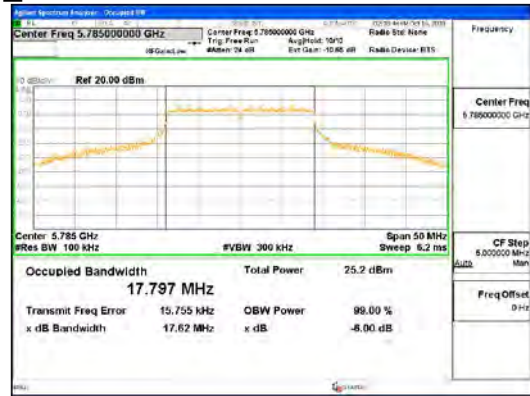
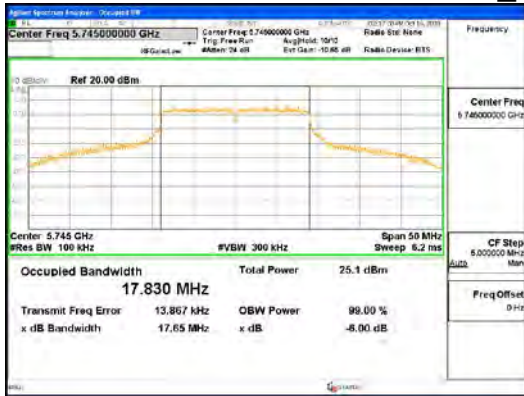


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (18) / (248) Pages



ANT1_802.11ac_VHT20

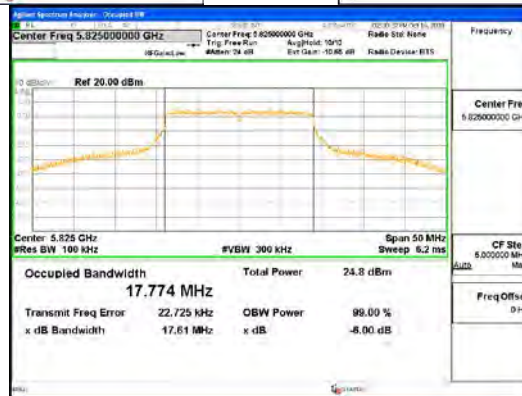
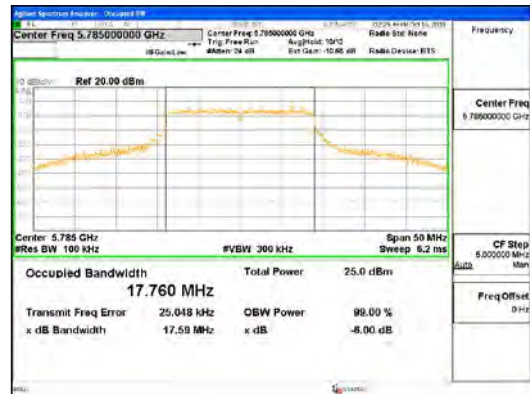
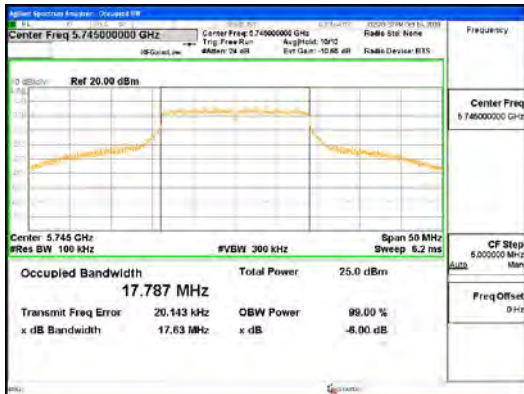


ANT2_802.11ac_VHT20

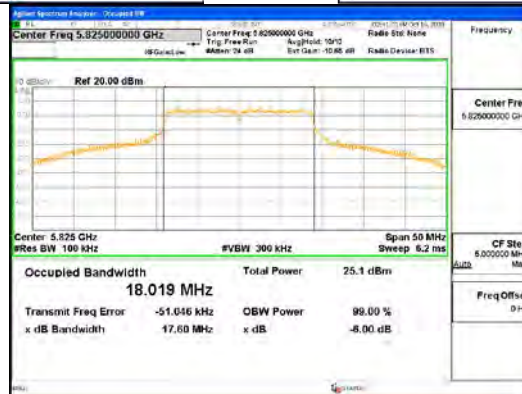
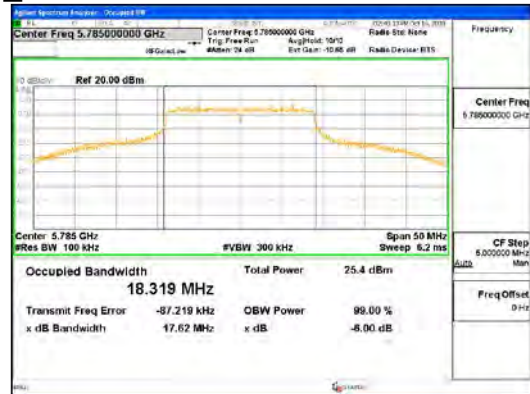
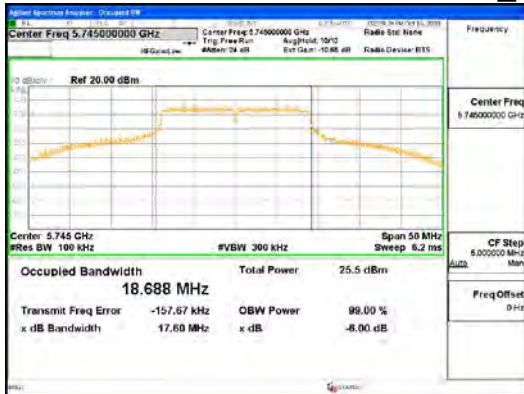


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (19) / (248) Pages



ANT3_802.11ac_VHT20

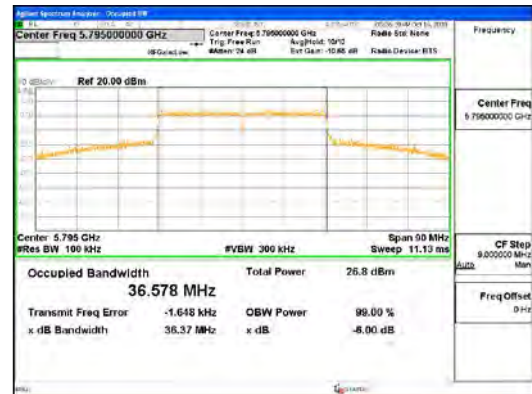


ANT4_802.11ac_VHT20

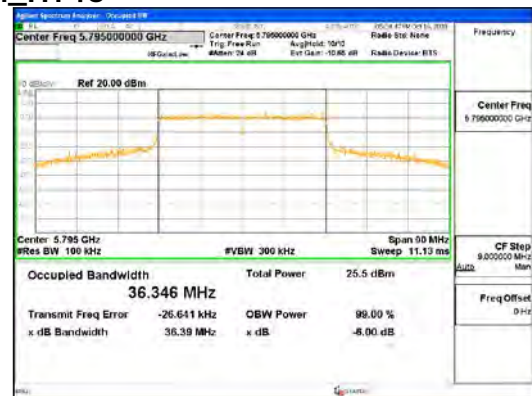
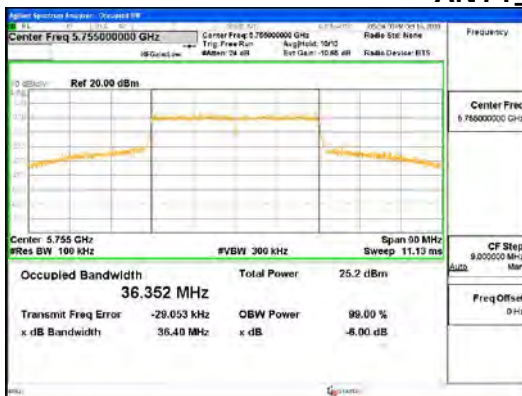


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

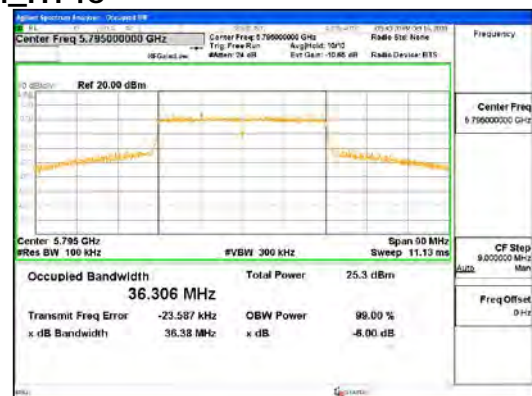
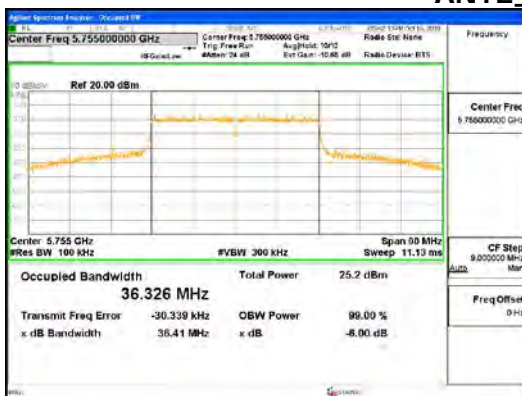
Report No.:
 CTK-2018-03453
 Page (20) / (248) Pages



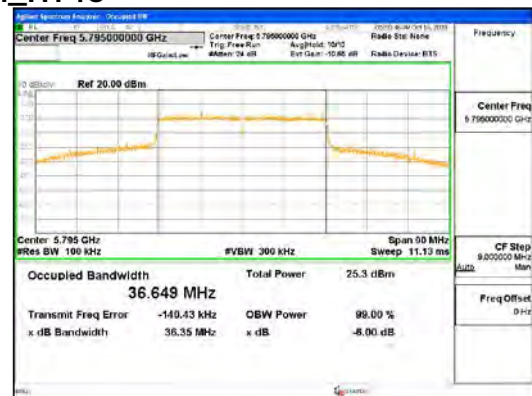
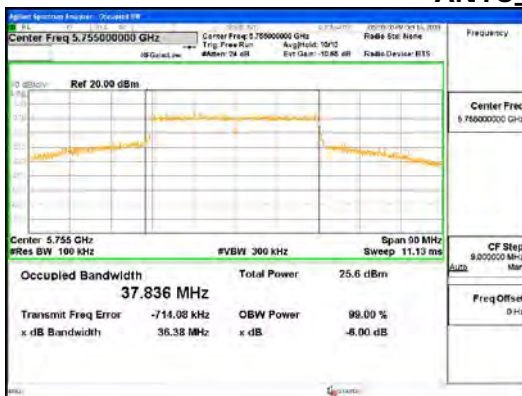
ANT1_802.11n_HT40



ANT2_802.11n_HT40



ANT3_802.11n_HT40

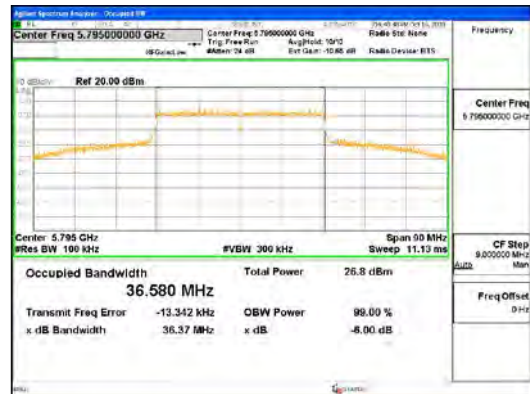
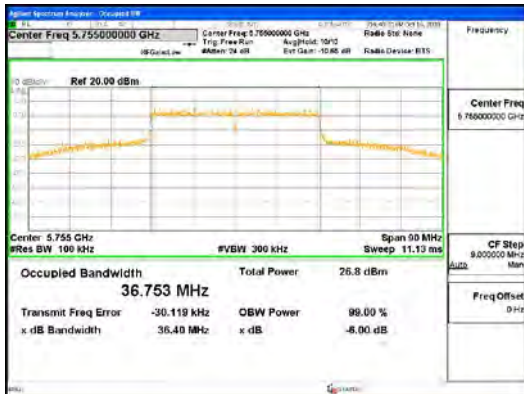


ANT4_802.11n_HT40

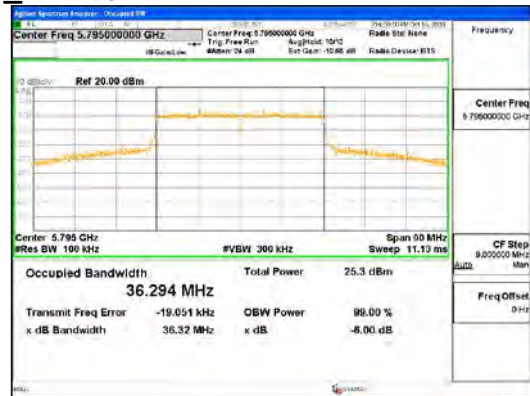
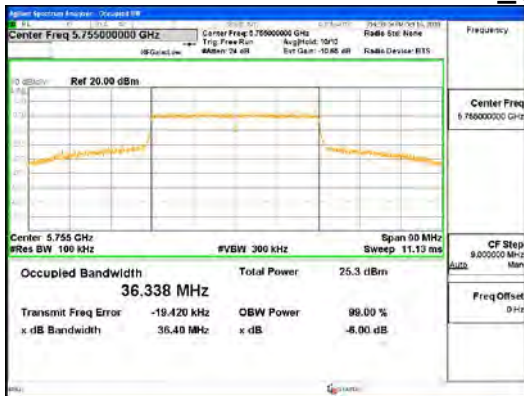


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

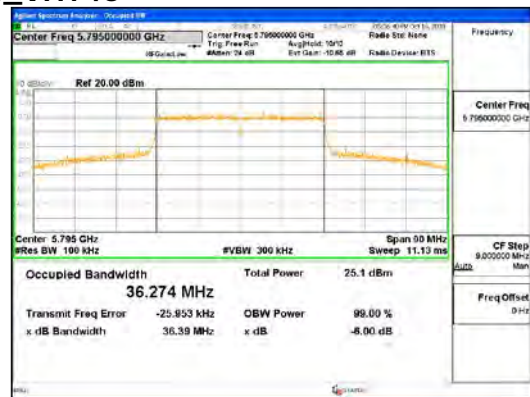
Report No.:
 CTK-2018-03453
 Page (21) / (248) Pages



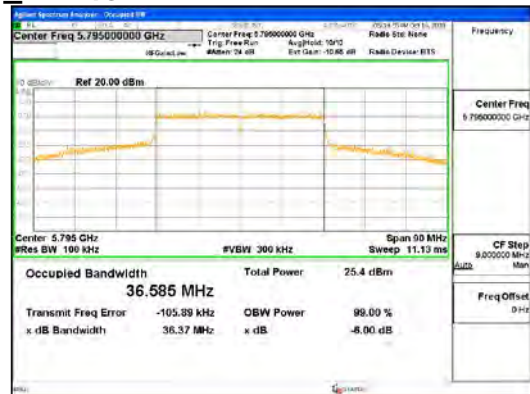
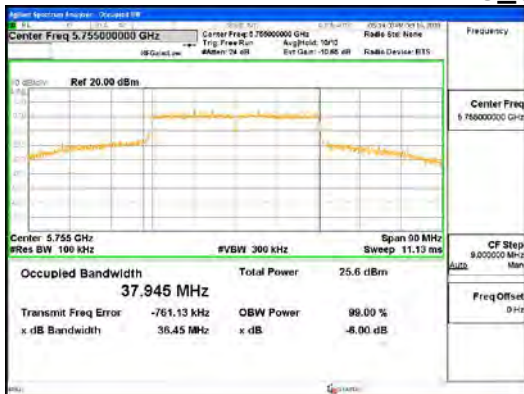
ANT1_802.11ac_VHT40



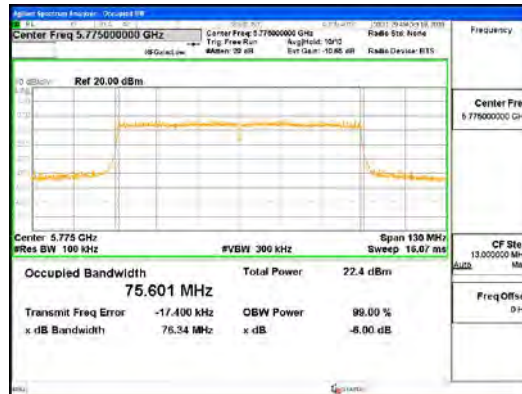
ANT2_802.11ac_VHT40



ANT3_802.11ac_VHT40



ANT4_802.11ac_VHT40



ANT1_802.11ac_VHT80



ANT2_802.11ac_VHT80



ANT3_802.11ac_VHT80



ANT4_802.11ac_VHT80



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-03453
Page (23) / (248) Pages

4.2 26 dB Bandwidth and 99% Bandwidth

Test Procedures

KDB 789033 – Section C.1
ANSI C63.10-2013 - Section 6.9.2

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.

Test Procedures

KDB 789033 – Section C.1
ANSI C63.10-2013 - Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = approximately 1 % of the emission bandwidth
- b) VBW \geq RBW
- c) Detector = peak
- d) Trace mode = Max hold
- e) 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%.

Minimum Standard:

NA



Test Data:

ANT1

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)					
	802.11a		802.11n_HT20		802.11ac_VHT20	
	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	22.36	18.15	22.63	18.96	22.57	18.99
5 200 MHz	22.31	18.10	22.80	19.00	22.74	18.91
5 240 MHz	22.43	18.07	22.78	18.99	22.70	18.92
5 260 MHz	22.36	18.10	22.69	18.98	22.37	18.95
5 300 MHz	22.33	18.08	22.46	18.92	22.68	19.05
5 320 MHz	22.45	18.00	22.76	18.97	22.85	19.01
5 500 MHz	22.35	18.10	22.72	19.03	22.68	19.05
5 600 MHz	22.39	18.11	22.81	19.04	22.80	19.00
5 720 MHz	22.43	18.12	22.36	19.03	22.81	18.98
5 745 MHz	34.53	19.44	40.33	19.78	39.72	19.52
5 785 MHz	36.71	19.18	42.46	19.79	41.77	19.76
5 825 MHz	34.56	18.73	39.10	19.34	39.12	19.28
Measurement uncertainty	± 0.1 MHz					

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)			
	802.11n_HT40		802.11ac_VHT40	
	26 dB	99 %	26 dB	99 %
5 190 MHz	40.98	36.64	40.63	36.71
5 230 MHz	40.76	36.64	40.84	36.65
5 270 MHz	40.93	36.69	40.82	36.62
5 310 MHz	40.69	36.68	40.66	36.66
5 510 MHz	40.70	36.70	40.70	36.68
5 590 MHz	40.60	36.73	40.69	36.67
5 710 MHz	40.73	36.77	40.91	36.69
5 755 MHz	81.97	38.88	85.17	38.90
5 795 MHz	80.13	38.11	80.79	37.89
Measurement uncertainty	± 0.1 MHz			



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (25) / (248) Pages

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	81.48	75.76
5 290 MHz	82.00	75.82
5 530 MHz	81.79	75.82
5 690 MHz	81.31	75.83
5 775 MHz	81.22	75.75
Measurement uncertainty	± 0.1 MHz	

ANT2

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11a		802.11n_HT20		802.11ac_VHT20	
Frequency	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	22.56	18.06	22.62	18.98	22.75	19.01
5 200 MHz	22.41	18.01	22.62	19.00	22.75	18.94
5 240 MHz	22.49	18.09	22.79	19.01	22.71	18.97
5 260 MHz	22.53	18.07	22.85	18.99	22.82	19.01
5 300 MHz	22.40	18.04	22.70	18.93	22.77	19.04
5 320 MHz	22.43	18.05	22.51	18.97	22.65	18.94
5 500 MHz	22.44	18.07	22.69	19.01	22.50	19.03
5 600 MHz	22.63	18.11	22.70	19.00	22.81	19.05
5 720 MHz	22.49	18.11	22.56	19.05	22.80	19.04
5 745 MHz	32.12	18.29	36.96	19.03	40.66	19.05
5 785 MHz	31.79	18.18	38.32	19.03	36.74	19.03
5 825 MHz	29.46	18.10	32.41	18.93	34.86	18.92
Measurement uncertainty	± 0.1 MHz					



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (26) / (248) Pages

26 dB Bandwidth and 99% Bandwidth (MHz)				
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 190 MHz	40.68	36.70	40.68	36.71
5 230 MHz	40.90	36.68	40.63	36.66
5 270 MHz	40.77	36.70	40.59	36.74
5 310 MHz	40.99	36.65	40.75	36.71
5 510 MHz	40.71	36.68	40.85	36.72
5 590 MHz	40.89	36.74	40.63	36.71
5 710 MHz	40.81	36.70	40.65	36.71
5 755 MHz	70.97	36.97	76.64	36.90
5 795 MHz	66.19	36.93	67.53	36.82
Measurement uncertainty	± 0.1 MHz			

26 dB Bandwidth and 99% Bandwidth (MHz)		
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	81.41	75.80
5 290 MHz	81.48	75.77
5 530 MHz	81.51	75.78
5 690 MHz	81.29	75.86
5 775 MHz	81.40	75.78
Measurement uncertainty	± 0.1 MHz	



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (27) / (248) Pages

ANT3

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)					
	802.11a		802.11n_HT20		802.11ac_VHT20	
	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	22.46	18.06	22.67	18.97	22.75	18.99
5 200 MHz	22.51	18.07	22.68	18.98	22.84	18.98
5 240 MHz	22.47	18.08	22.68	18.98	22.69	19.00
5 260 MHz	22.63	18.10	22.81	19.04	22.84	19.00
5 300 MHz	22.50	18.11	22.81	19.01	22.66	18.97
5 320 MHz	22.48	18.03	22.86	19.01	22.48	18.93
5 500 MHz	22.59	18.11	22.88	18.95	22.66	19.05
5 600 MHz	22.47	18.13	22.73	18.97	22.79	19.05
5 720 MHz	22.42	18.20	22.72	18.99	22.90	18.96
5 745 MHz	29.47	17.92	36.23	18.87	35.11	18.82
5 785 MHz	28.62	17.94	35.84	18.82	32.72	18.87
5 825 MHz	29.08	17.86	30.56	18.76	33.67	18.72
Measurement uncertainty	± 0.1 MHz					

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)			
	802.11n_HT40		802.11ac_VHT40	
	26 dB	99 %	26 dB	99 %
5 190 MHz	40.59	36.64	40.94	36.69
5 230 MHz	40.90	36.69	40.68	36.71
5 270 MHz	40.96	36.81	40.61	36.70
5 310 MHz	40.48	36.64	40.73	36.64
5 510 MHz	40.65	36.63	40.75	36.72
5 590 MHz	40.49	36.63	40.80	36.63
5 710 MHz	40.73	36.69	40.72	36.71
5 755 MHz	73.43	36.82	70.52	36.83
5 795 MHz	70.42	36.71	56.49	36.67
Measurement uncertainty	± 0.1 MHz			



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (28) / (248) Pages

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	81.57	75.82
5 290 MHz	81.12	75.78
5 530 MHz	81.54	75.83
5 690 MHz	81.49	75.80
5 775 MHz	81.10	75.77
Measurement uncertainty	± 0.1 MHz	

ANT4

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11a		802.11n_HT20		802.11ac_VHT20	
Frequency	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	22.55	18.09	22.64	19.01	22.57	18.99
5 200 MHz	22.51	18.08	22.69	18.98	22.57	18.97
5 240 MHz	22.72	18.02	22.76	18.99	22.60	19.02
5 260 MHz	22.54	18.04	22.68	18.96	22.64	19.05
5 300 MHz	22.51	18.17	22.46	18.95	22.94	19.00
5 320 MHz	22.47	18.09	22.65	18.93	22.74	18.92
5 500 MHz	22.41	18.09	22.91	18.99	22.95	18.99
5 600 MHz	22.46	18.17	22.83	18.97	22.76	19.11
5 720 MHz	22.53	18.00	22.72	19.11	22.47	19.03
5 745 MHz	35.41	19.69	39.22	20.65	42.08	20.99
5 785 MHz	37.13	19.84	41.57	20.16	38.46	20.02
5 825 MHz	35.37	19.12	38.80	19.57	41.18	19.64
Measurement uncertainty	± 0.1 MHz					



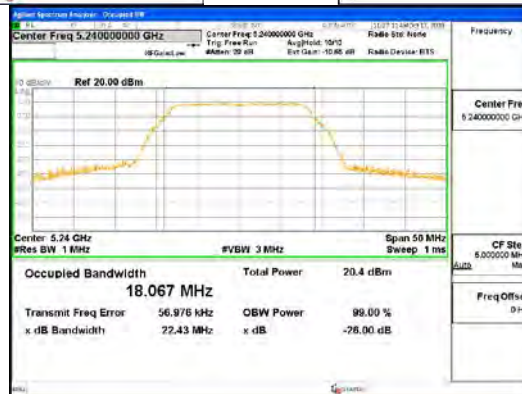
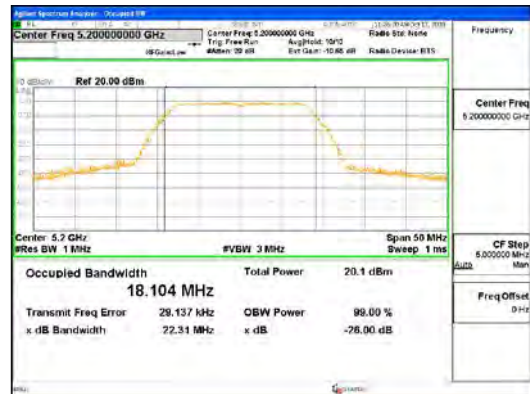
CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (29) / (248) Pages

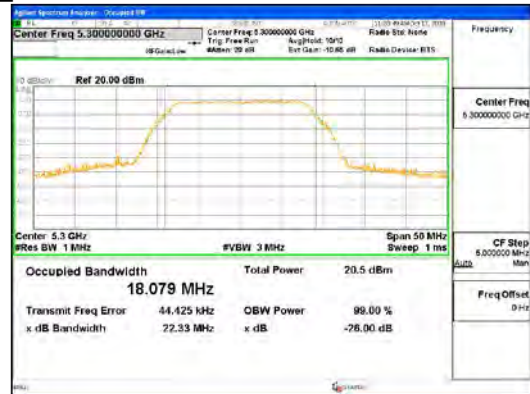
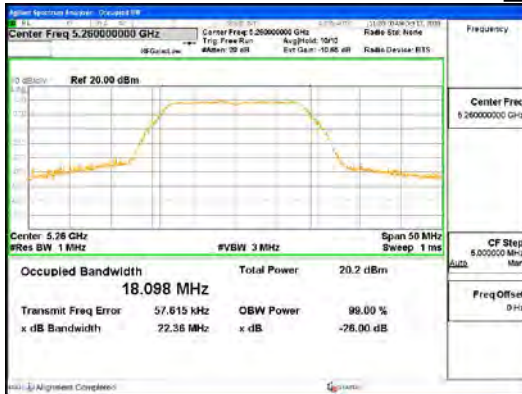
26 dB Bandwidth and 99% Bandwidth (MHz)				
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 190 MHz	40.81	36.73	40.76	36.64
5 230 MHz	40.81	36.70	40.97	36.67
5 270 MHz	40.66	36.71	40.55	36.68
5 310 MHz	40.70	36.68	40.78	36.68
5 510 MHz	40.64	36.76	40.62	36.70
5 590 MHz	40.53	36.72	40.83	36.69
5 710 MHz	40.59	36.67	40.90	36.69
5 755 MHz	81.57	42.06	79.79	42.80
5 795 MHz	76.91	38.78	81.43	39.31
Measurement uncertainty	± 0.1 MHz			

26 dB Bandwidth and 99% Bandwidth (MHz)		
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	81.07	75.80
5 290 MHz	81.29	75.84
5 530 MHz	82.24	75.82
5 690 MHz	81.59	75.79
5 775 MHz	81.12	75.74
Measurement uncertainty	± 0.1 MHz	

See next pages for actual measured spectrum plots.



ANT1_802.11a_UNII 1

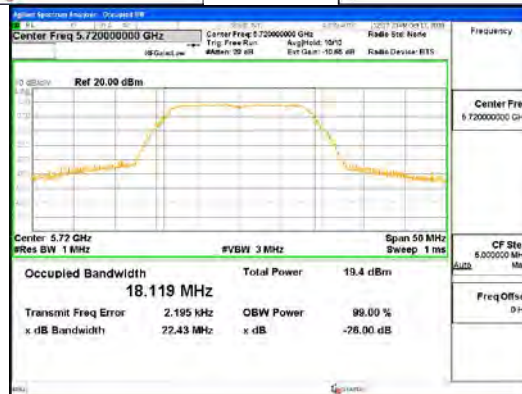
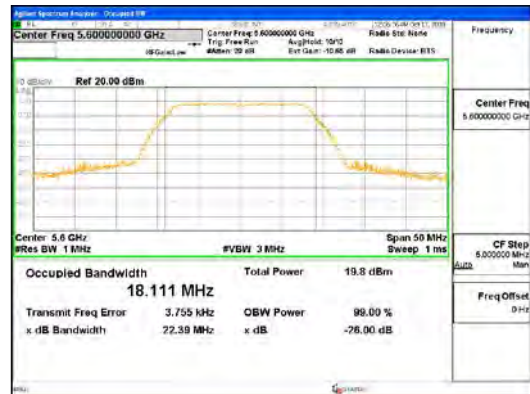
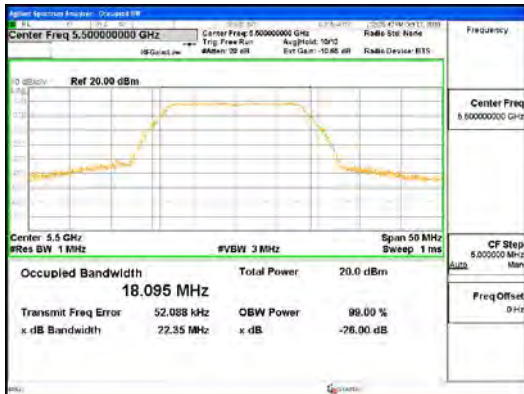


ANT1_802.11a_UNII 2A

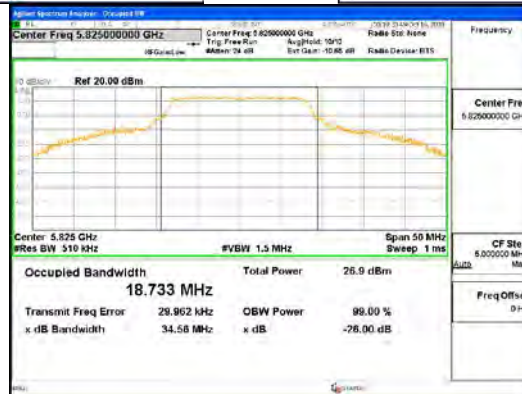
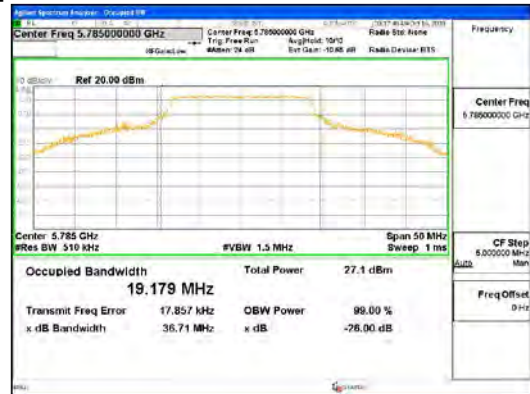
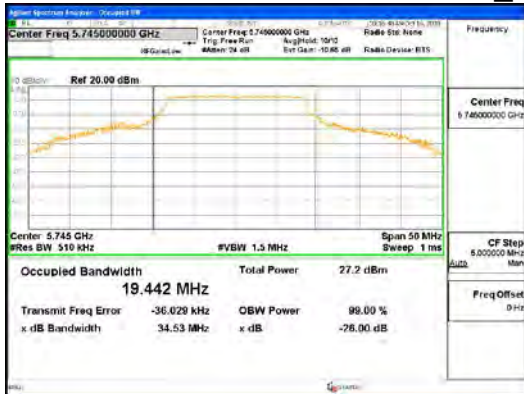


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (31) / (248) Pages



ANT1_802.11a_UNII 2C

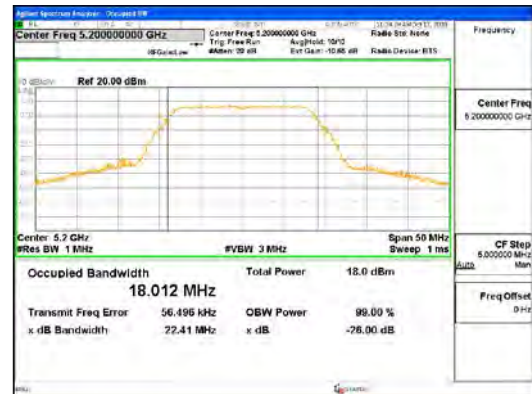


ANT1_802.11a_UNII 3

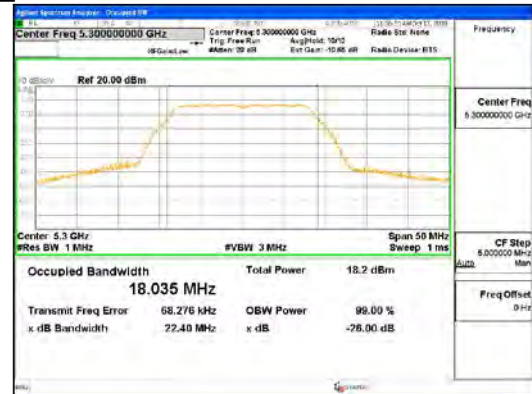
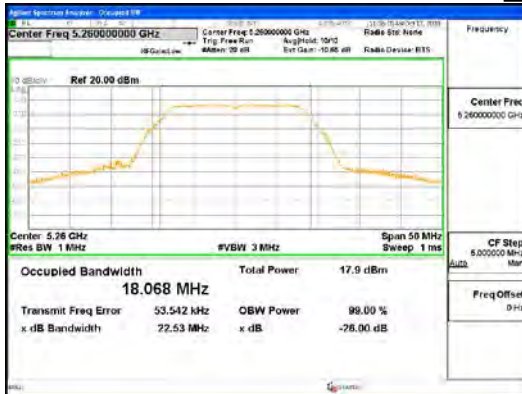


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (32) / (248) Pages



ANT2_802.11a_UNII 1

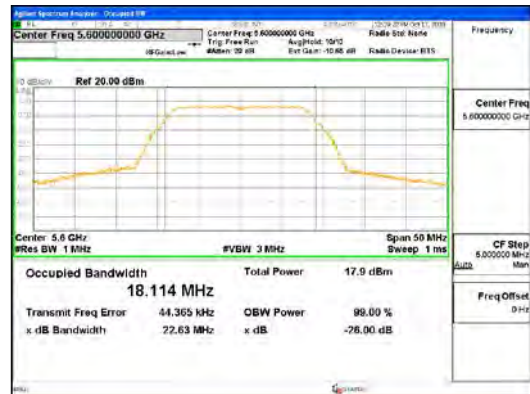
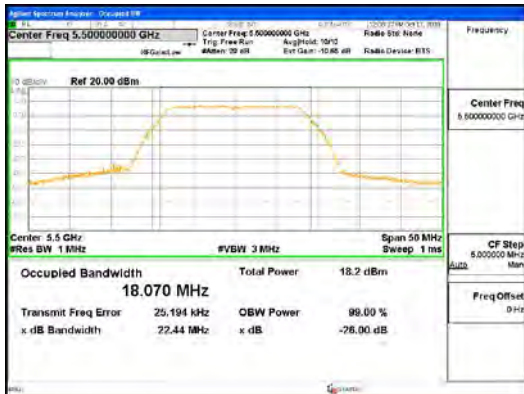


ANT2_802.11a_UNII 2A

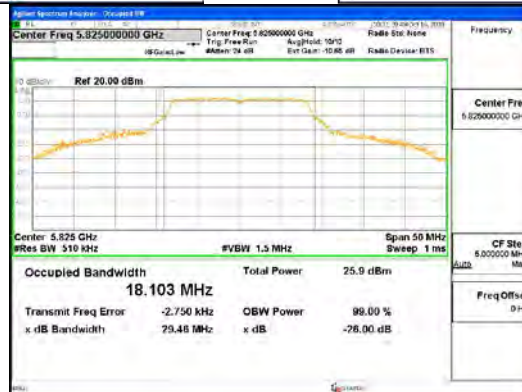
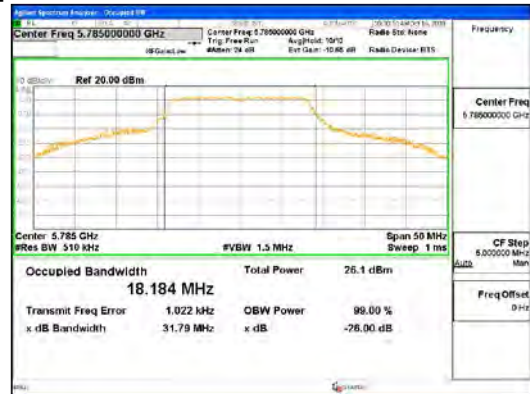
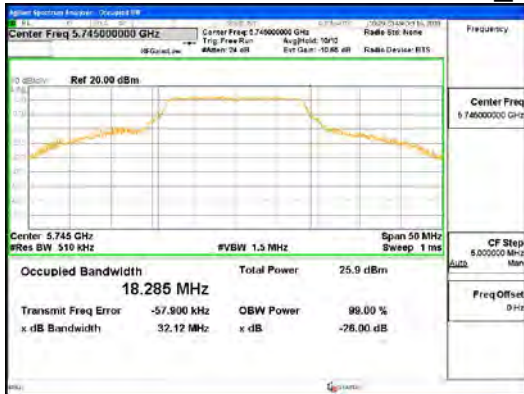


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (33) / (248) Pages



ANT2_802.11a_UNII 2C

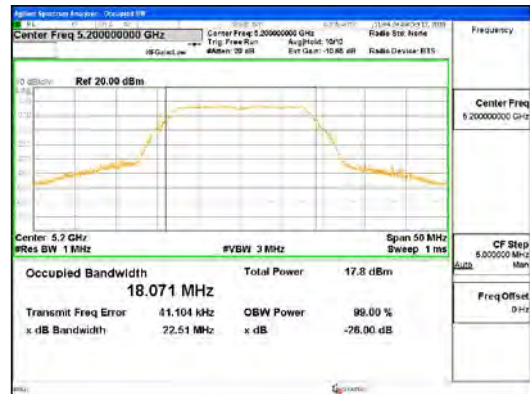
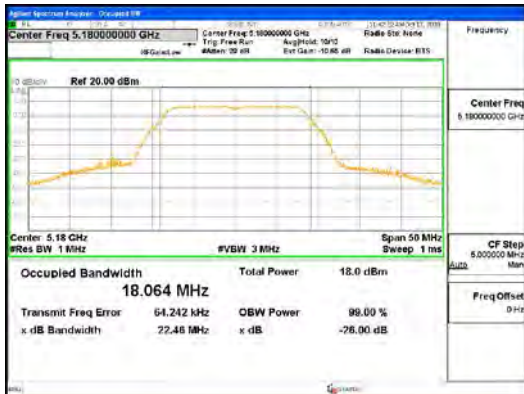


ANT2_802.11a_UNII 3

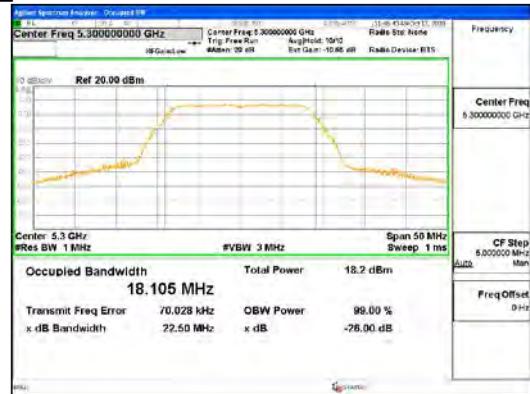
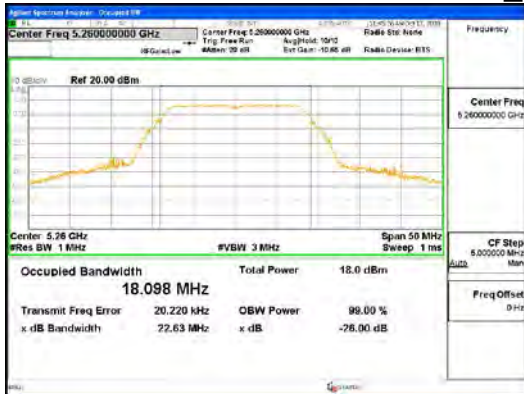


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (34) / (248) Pages



ANT3_802.11a_UNII 1

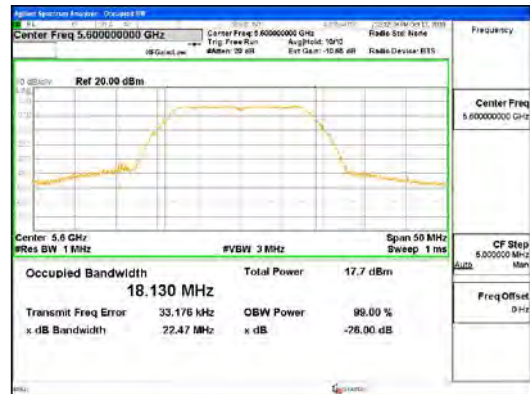


ANT3_802.11a_UNII 2A

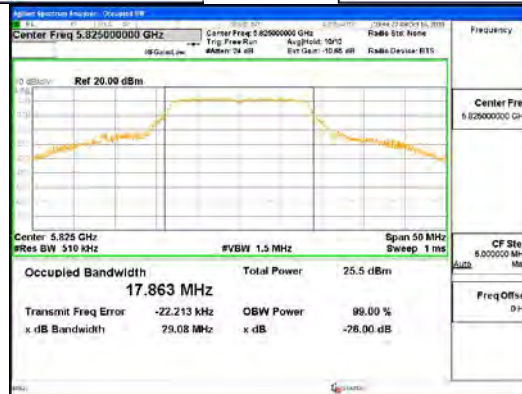
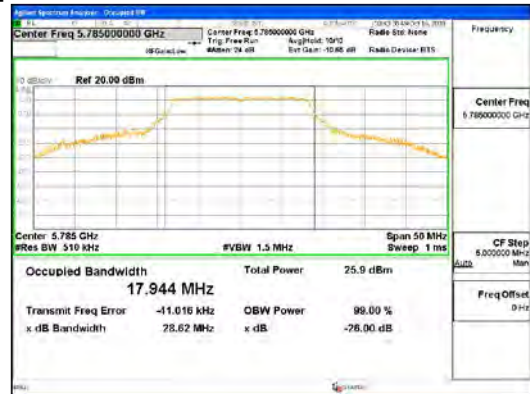
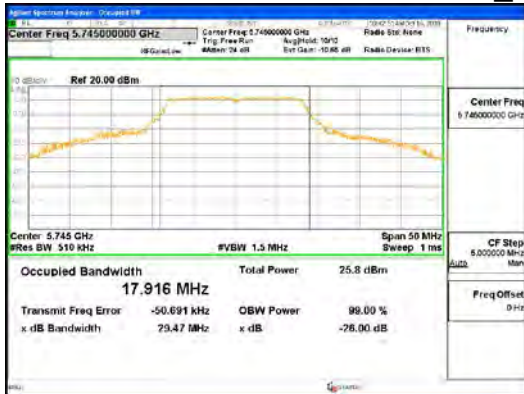


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (35) / (248) Pages



ANT3_802.11a_UNII 2C

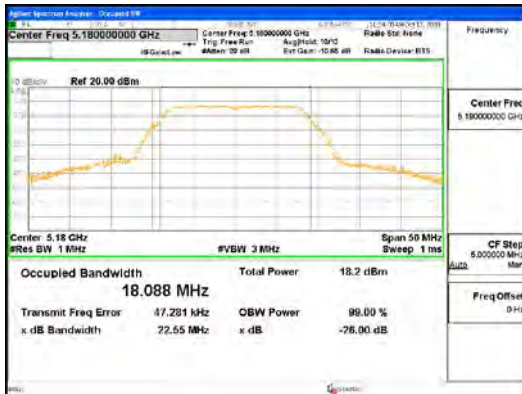


ANT3_802.11a_UNII 3

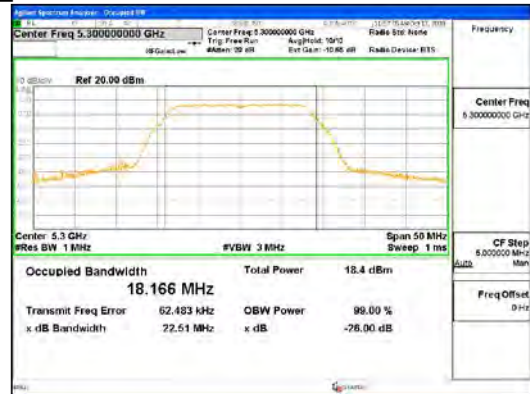
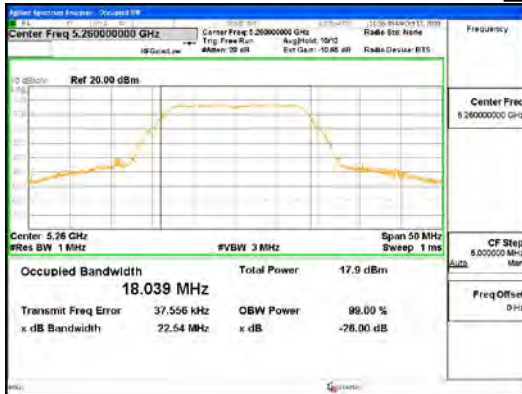


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (36) / (248) Pages



ANT4_802.11a_UNII 1

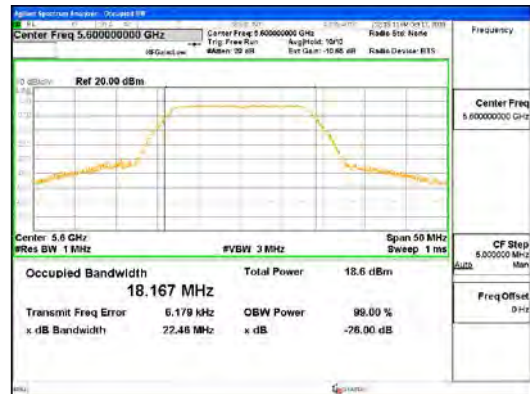
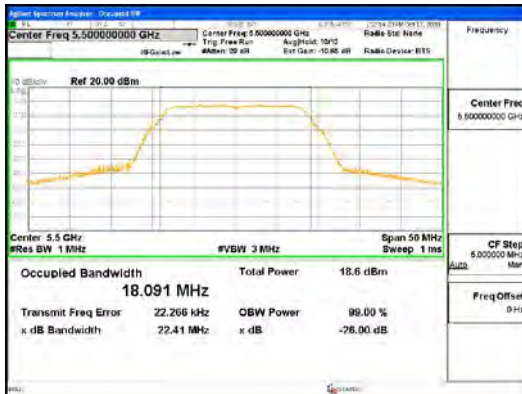


ANT4_802.11a_UNII 2A

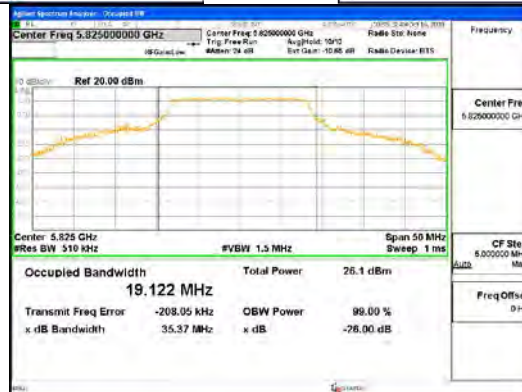
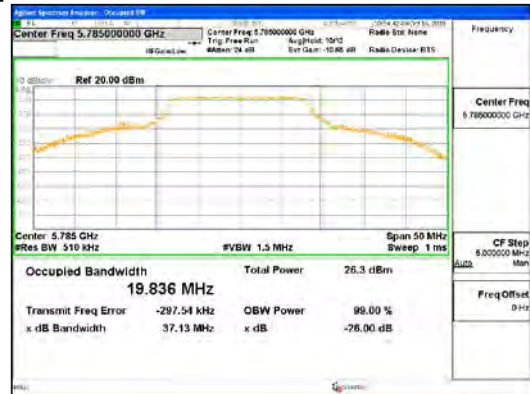
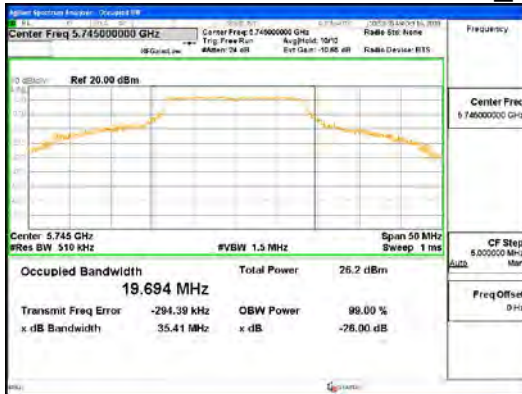


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (37) / (248) Pages



ANT4_802.11a_UNII 2C

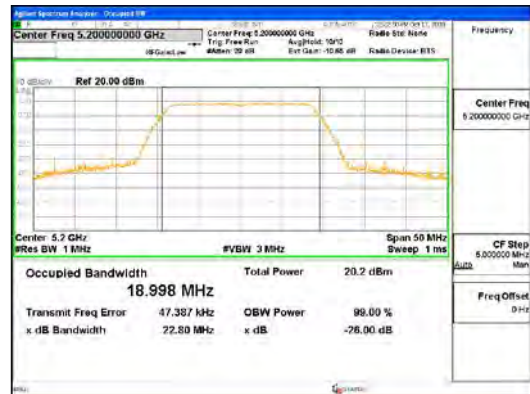
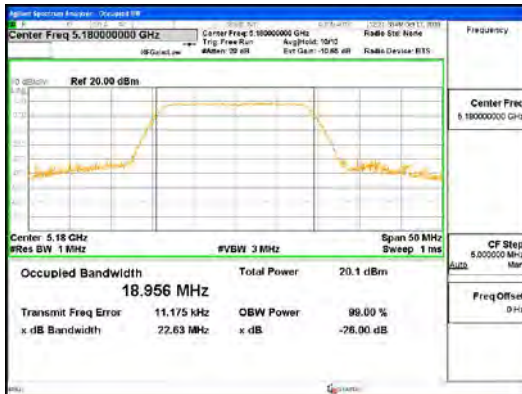


ANT4_802.11a_UNII 3

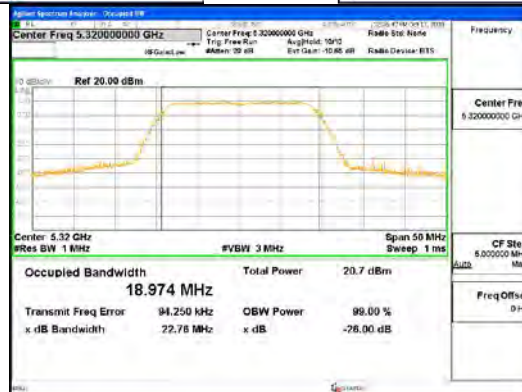
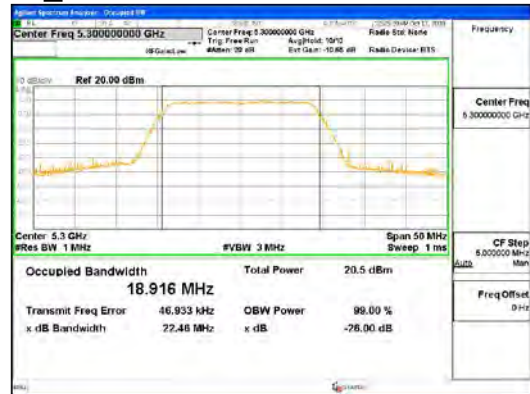
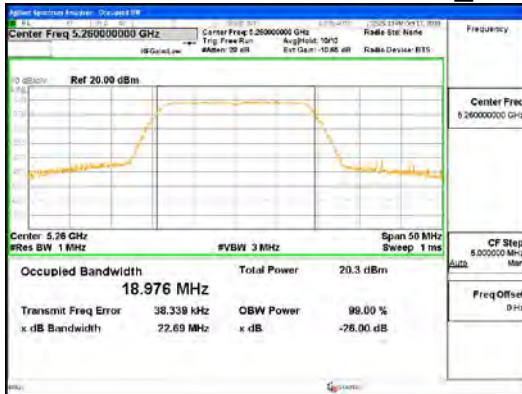


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (38) / (248) Pages



ANT1_802.11n_HT20_UNII 1

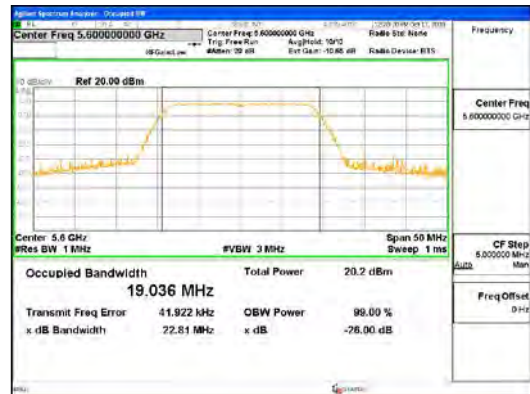
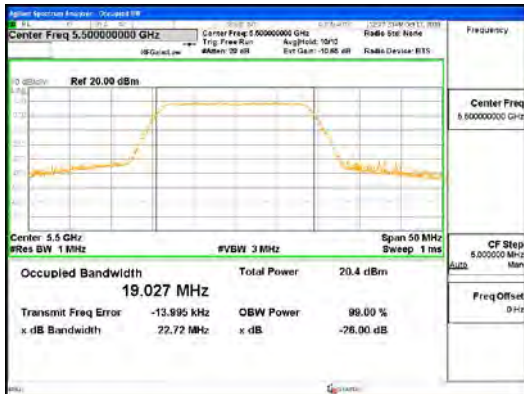


ANT1_802.11n_HT20_UNII 2A

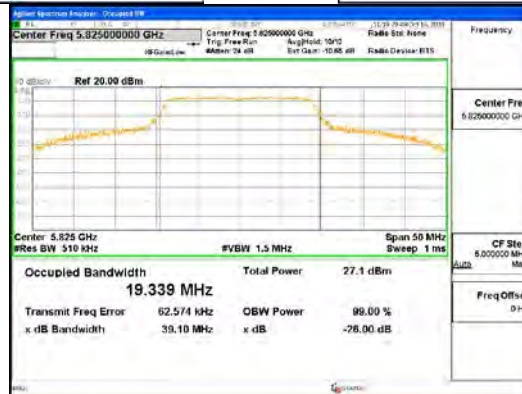
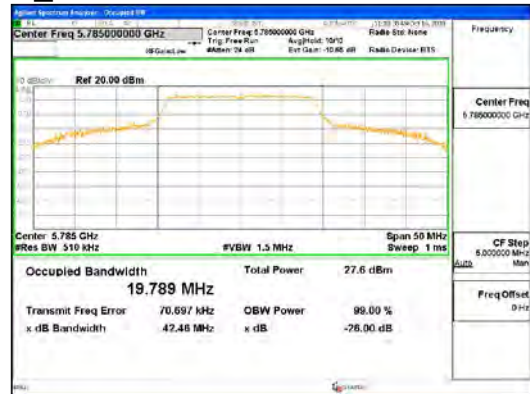
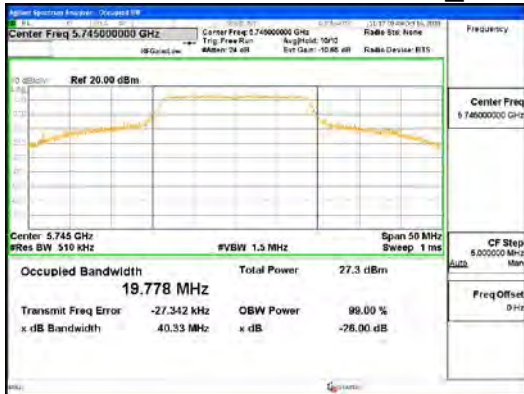


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (39) / (248) Pages



ANT1_802.11n_HT20_UNII 2C

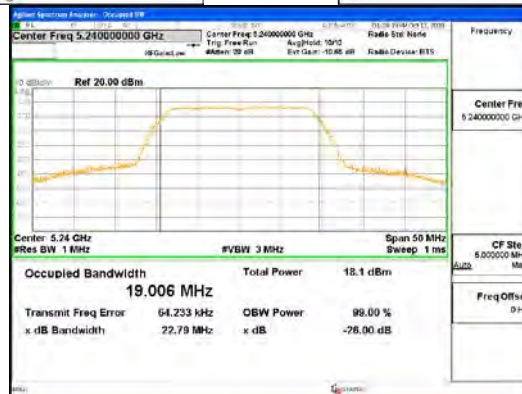
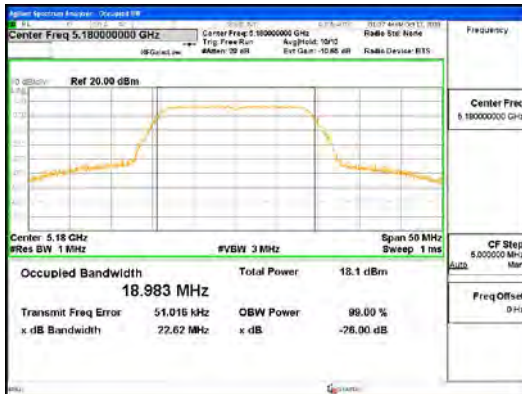


ANT1_802.11n_HT20_UNII 3

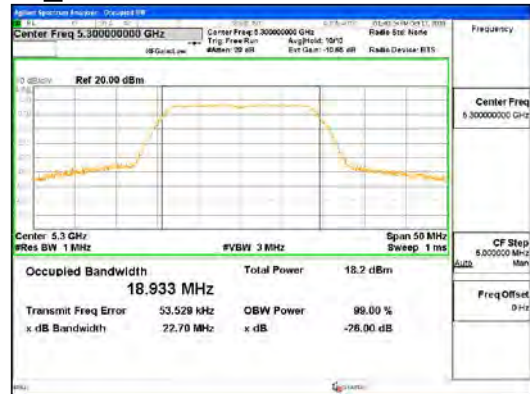
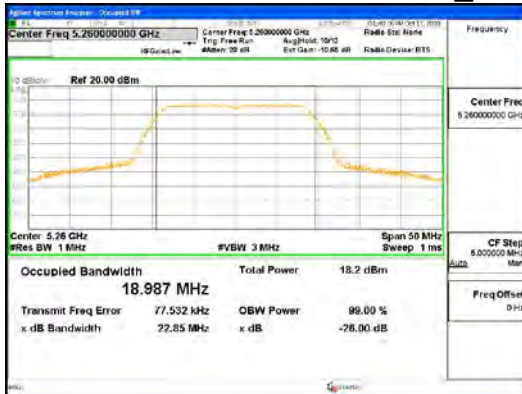


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (40) / (248) Pages



ANT2_802.11n_HT20_UNII 1

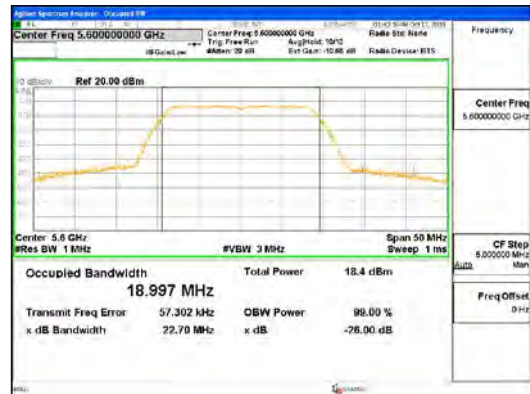
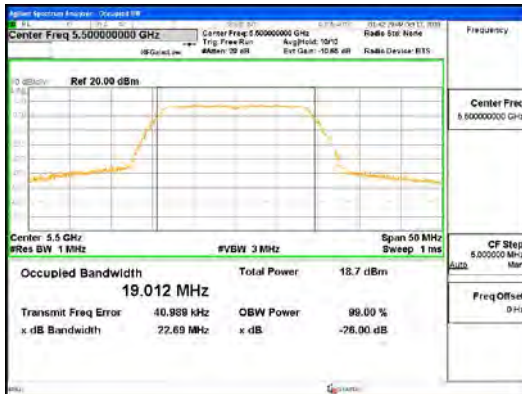


ANT2_802.11n_HT20_UNII 2A

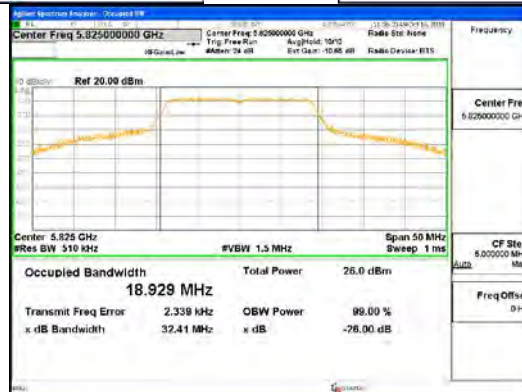
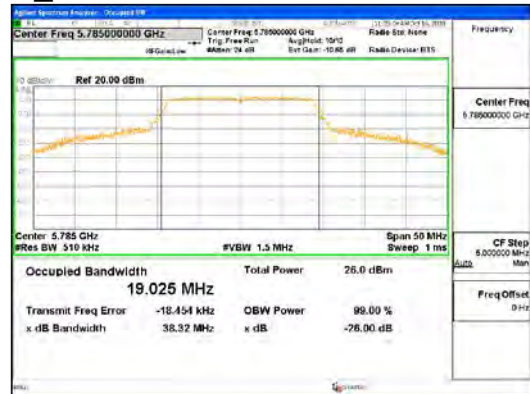
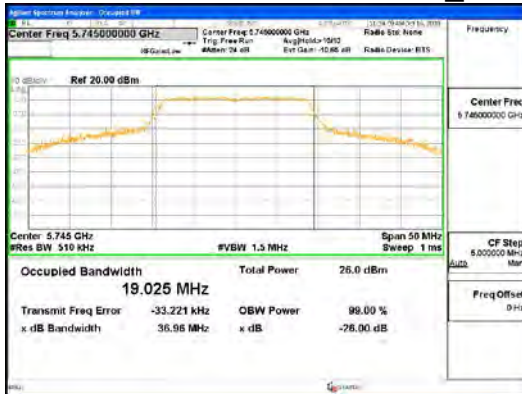


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (41) / (248) Pages



ANT2_802.11n_HT20_UNII 2C

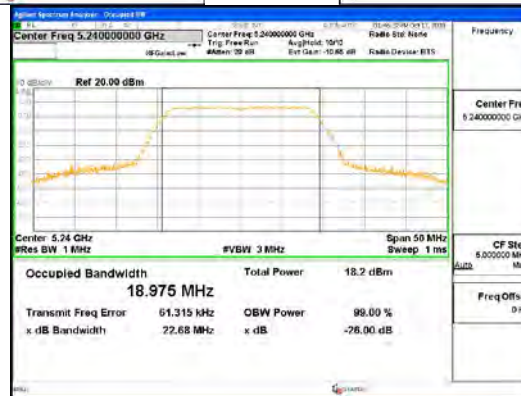
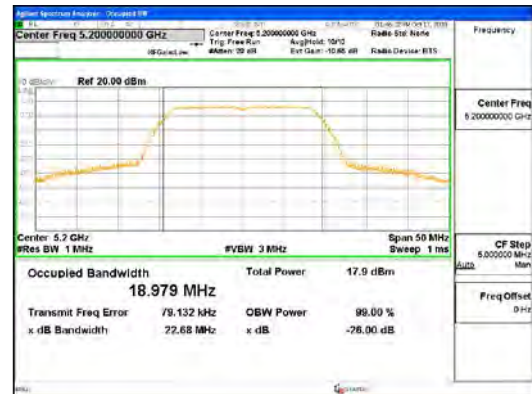
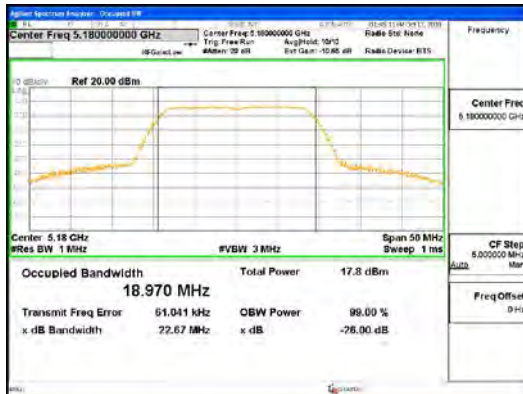


ANT2_802.11n_HT20_UNII 3

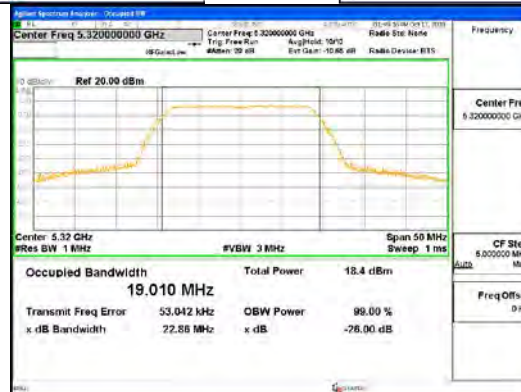
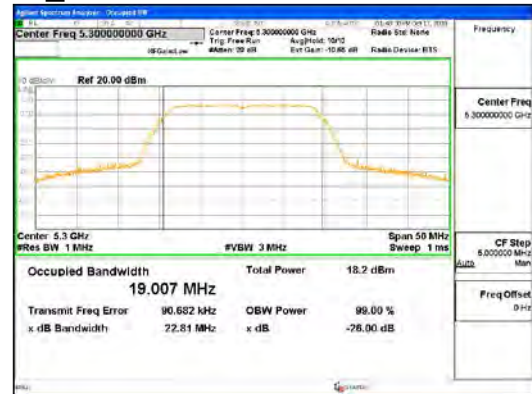
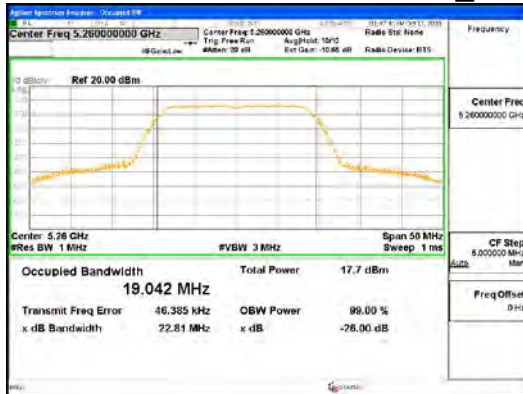


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (42) / (248) Pages



ANT3_802.11n_HT20_UNII 1

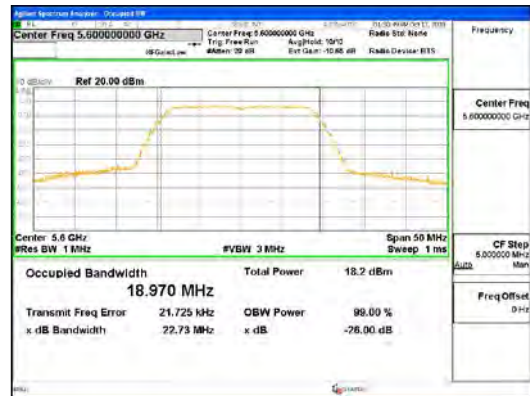
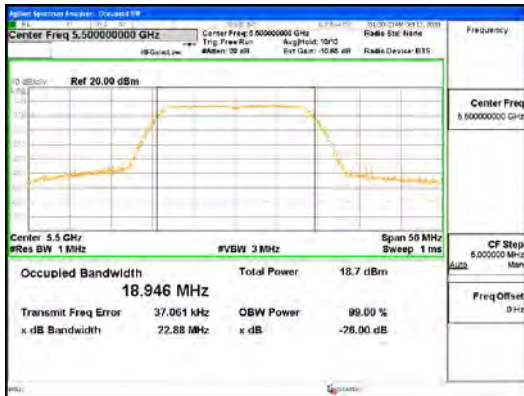


ANT3_802.11n_HT20_UNII 2A

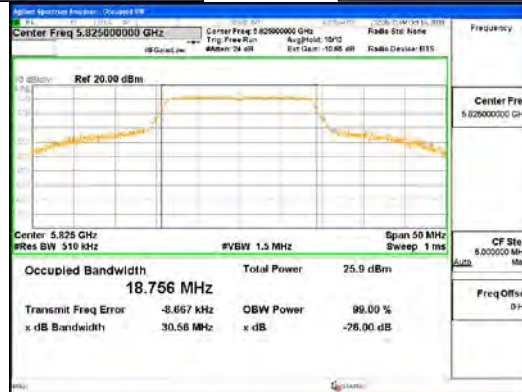
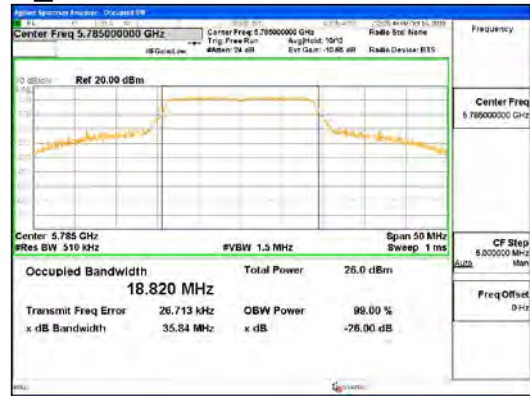
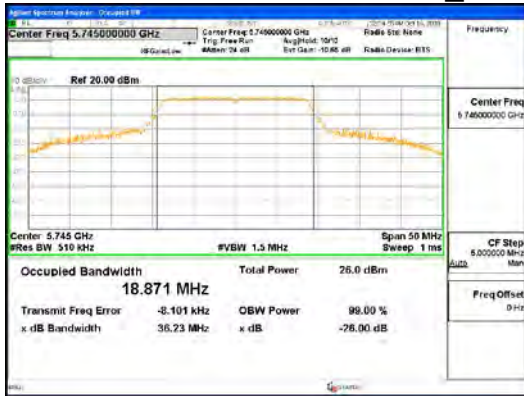


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (43) / (248) Pages



ANT3_802.11n_HT20_UNII 2C

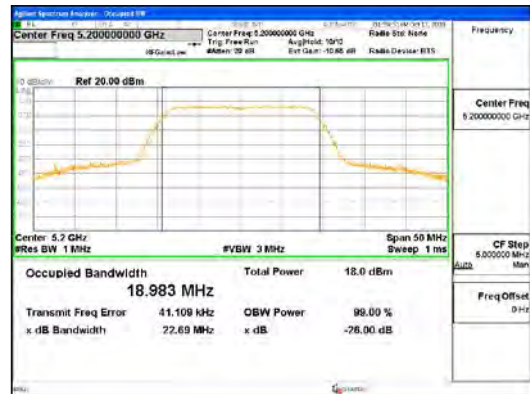
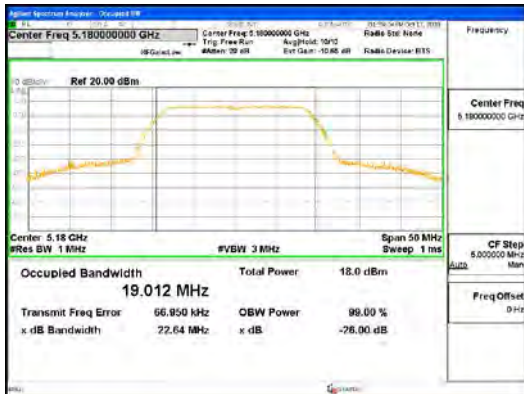


ANT3_802.11n_HT20_UNII 3

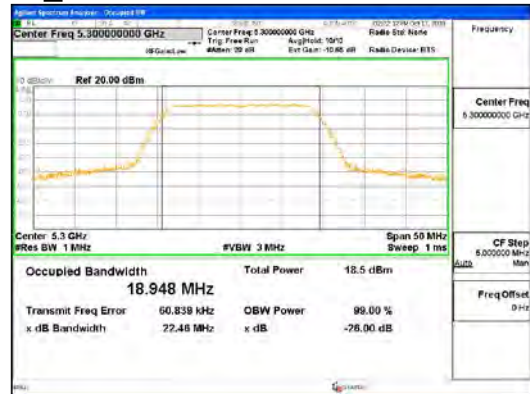
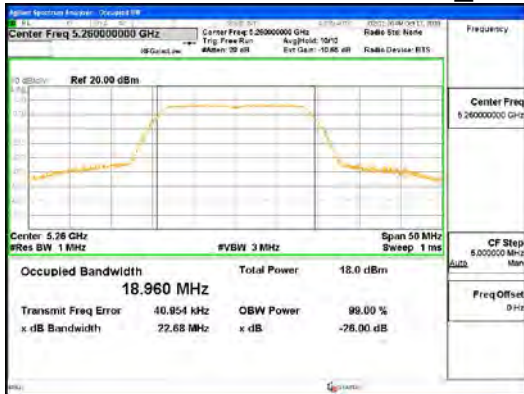


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (44) / (248) Pages



ANT4_802.11n_HT20_UNII 1

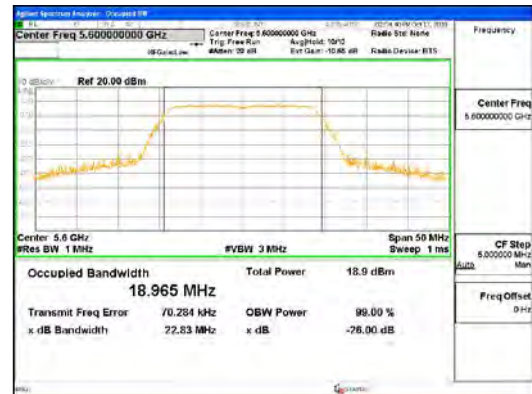
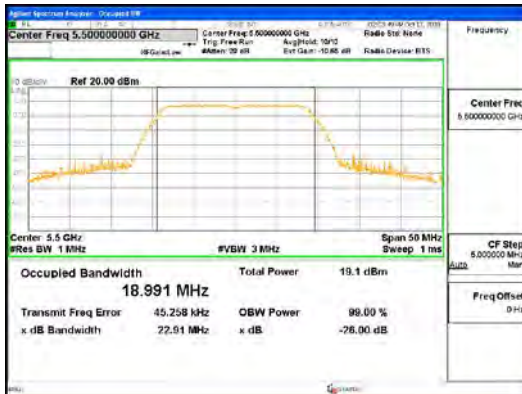


ANT4_802.11n_HT20_UNII 2A

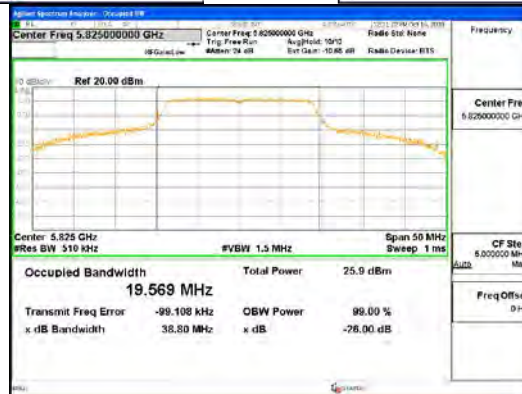
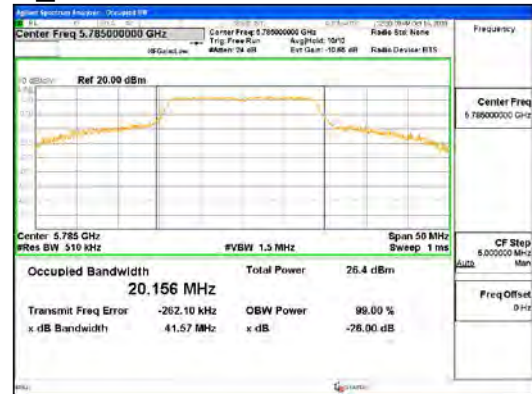
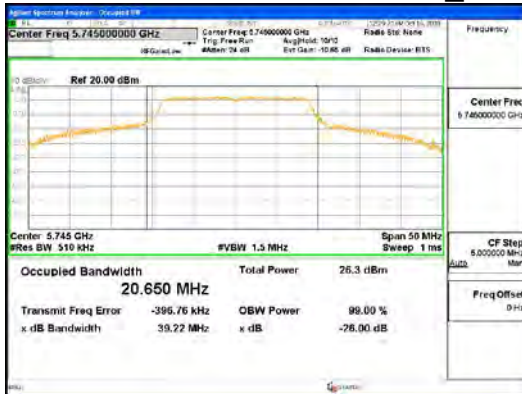


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (45) / (248) Pages



ANT4_802.11n_HT20_UNII 2C

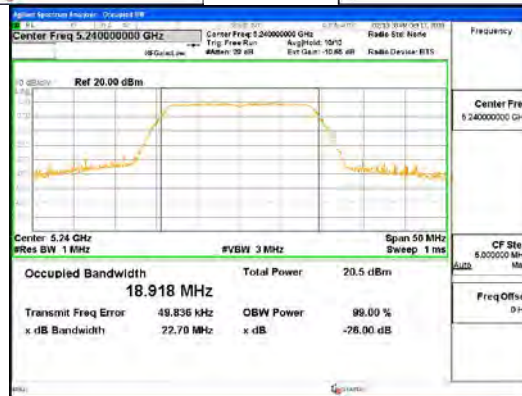
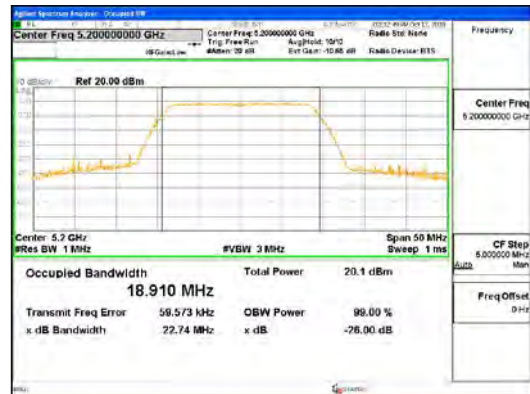
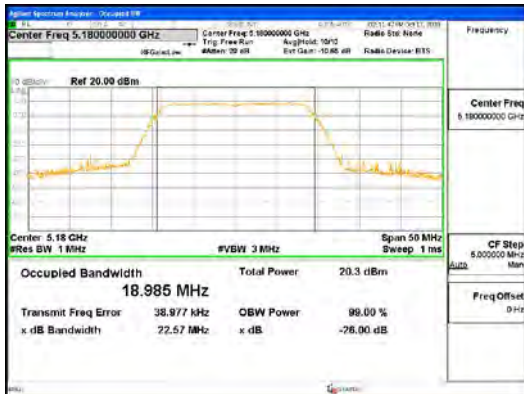


ANT4_802.11n_HT20_UNII 3

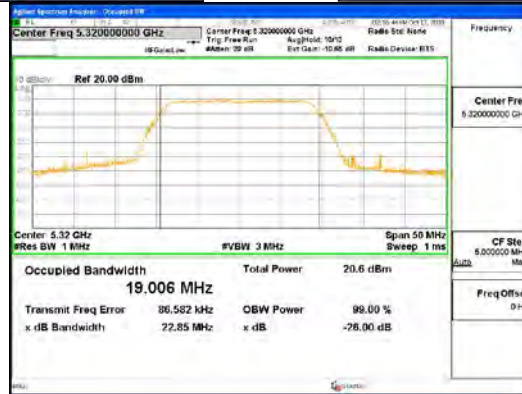
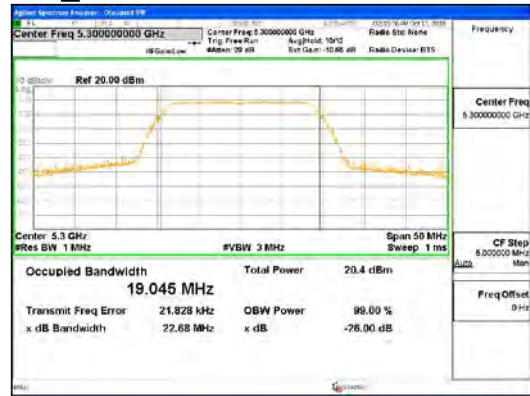
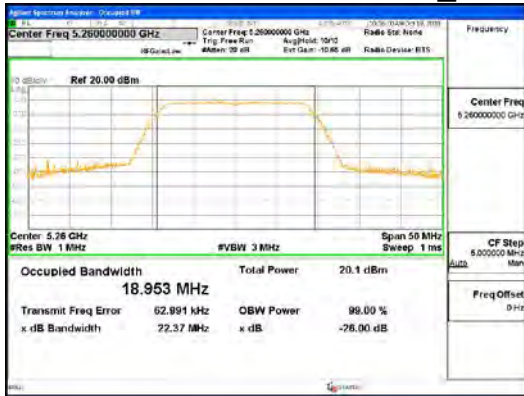


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (46) / (248) Pages



ANT1_802.11ac_VHT20_UNII 1

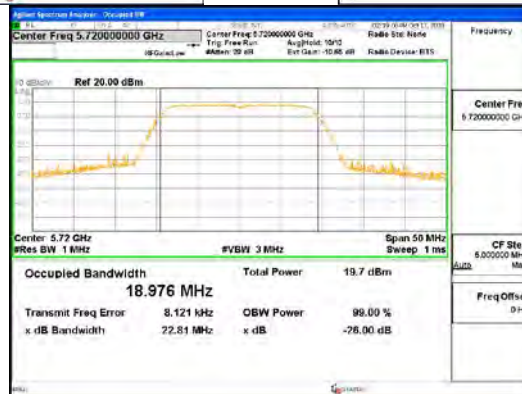
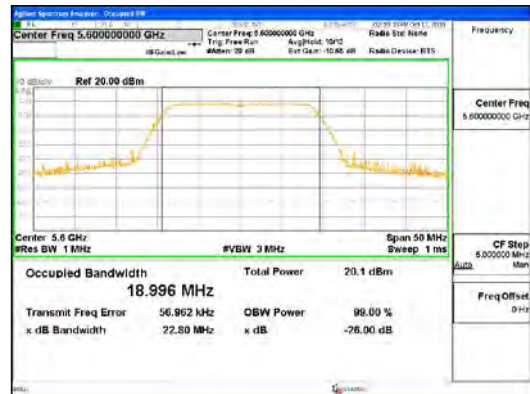
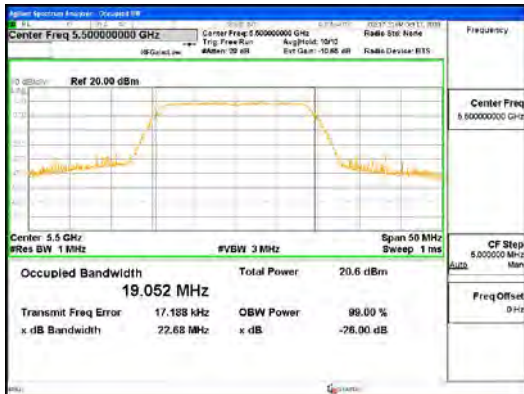


ANT1_802.11ac_VHT20_UNII 2A

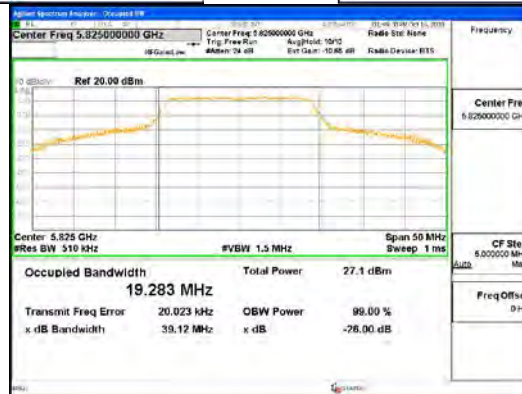
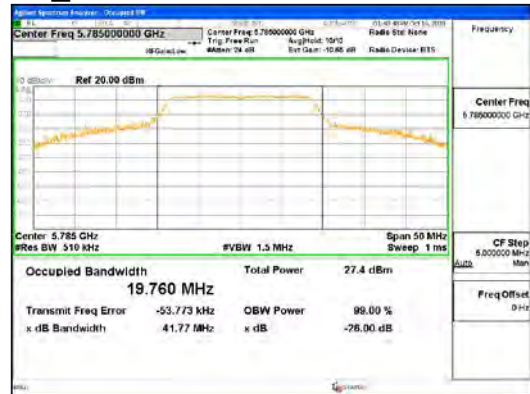
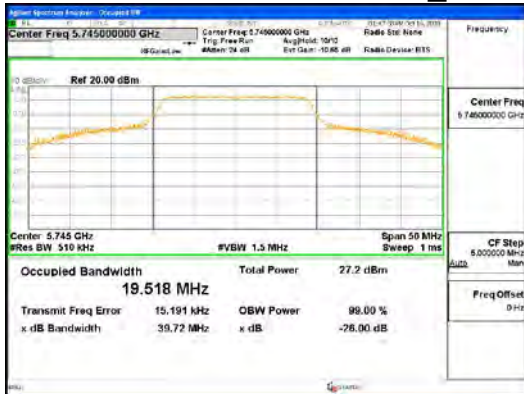


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (47) / (248) Pages



ANT1_802.11ac_VHT20_UNII 2C

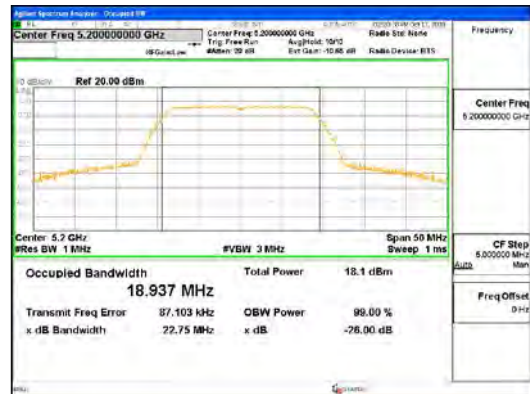
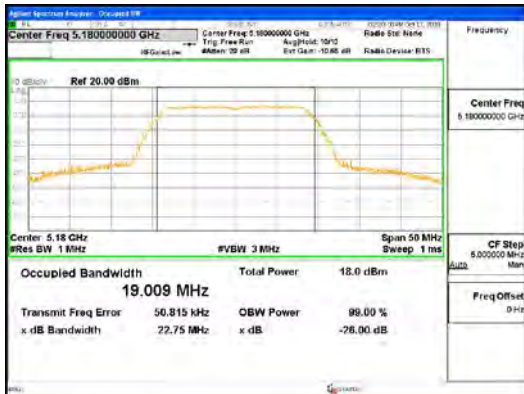


ANT1_802.11ac_VHT20_UNII 3

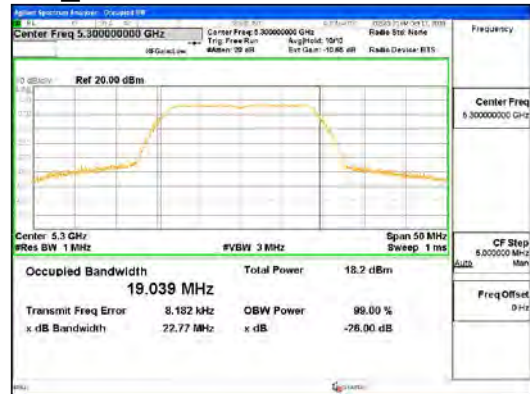
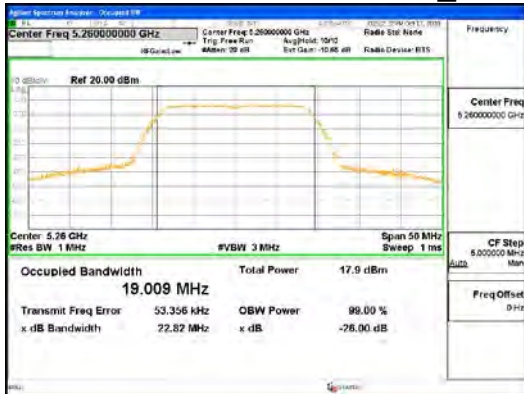


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (48) / (248) Pages



ANT2_802.11ac_VHT20_UNI1 1

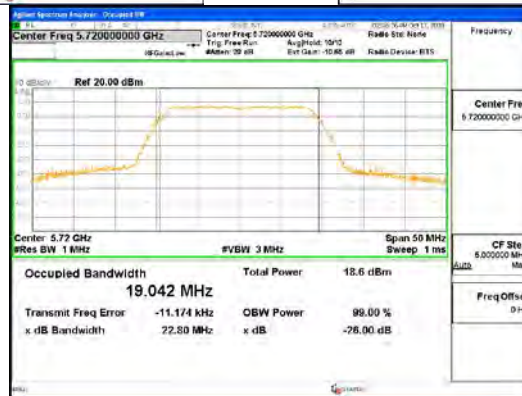
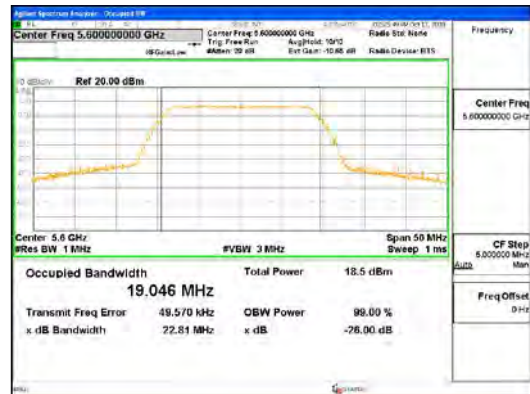
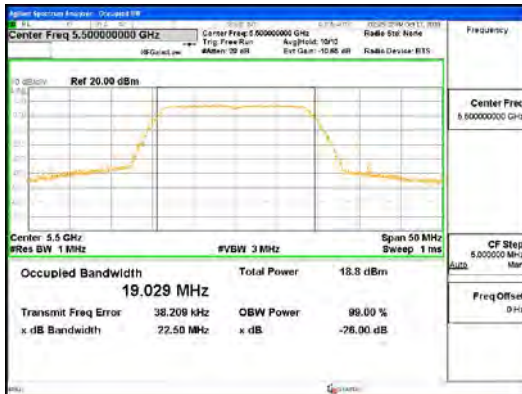


ANT2_802.11ac_VHT20_UNI1 2A

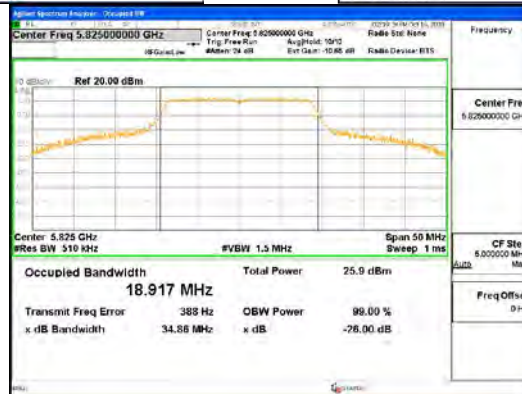
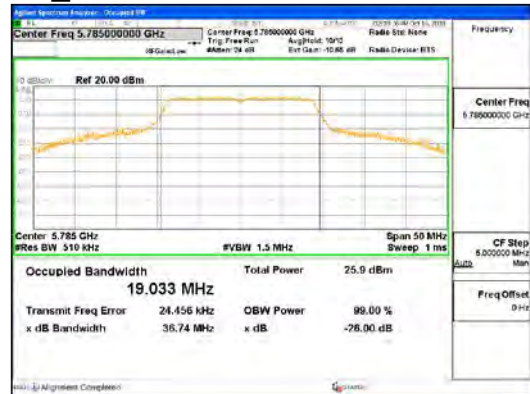
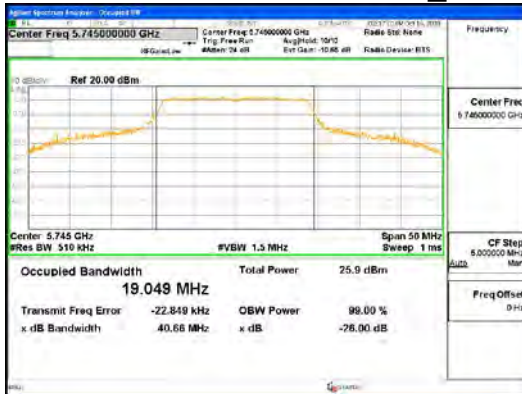


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (49) / (248) Pages



ANT2_802.11ac_VHT20_UNII 2C

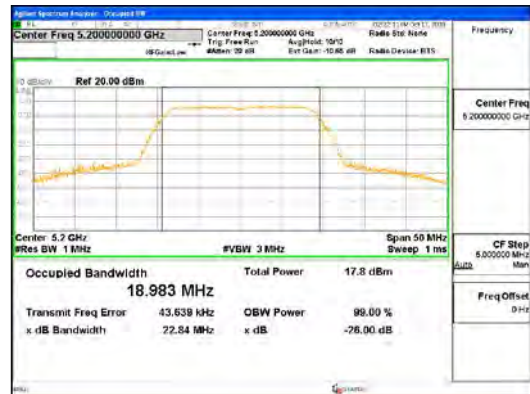
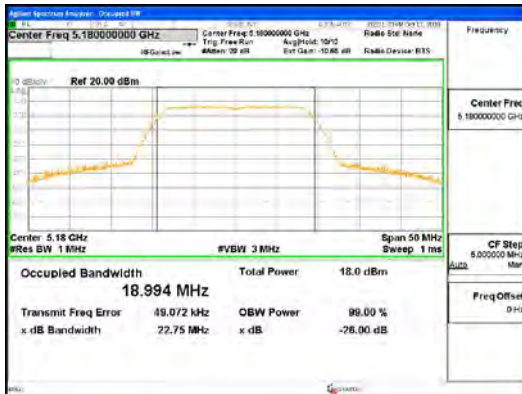


ANT2_802.11ac_VHT20_UNII 3

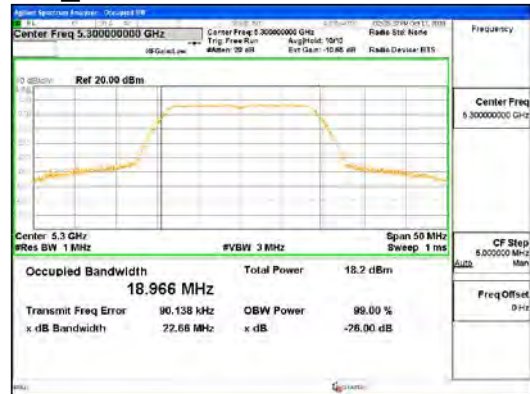
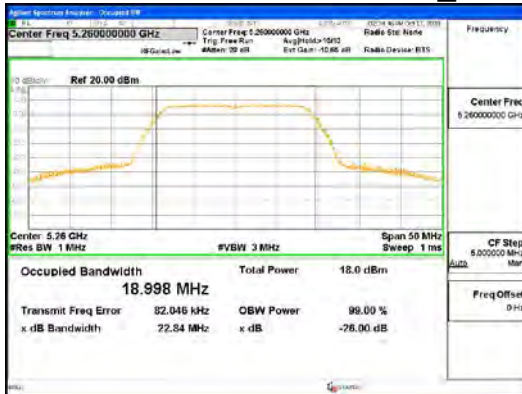


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (50) / (248) Pages



ANT3_802.11ac_VHT20_UNII 1

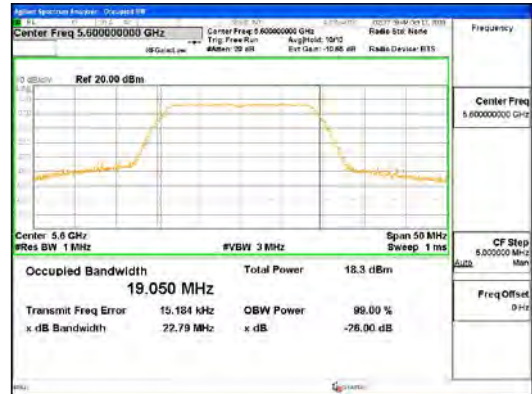
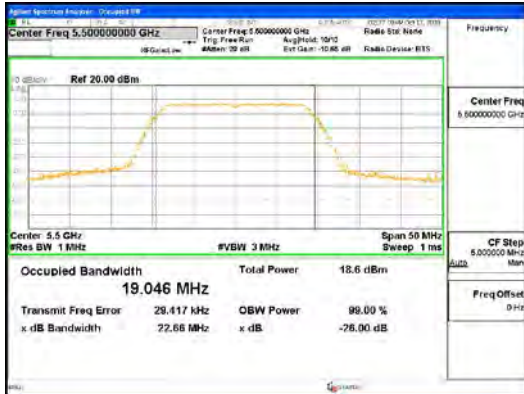


ANT3_802.11ac_VHT20_UNII 2A

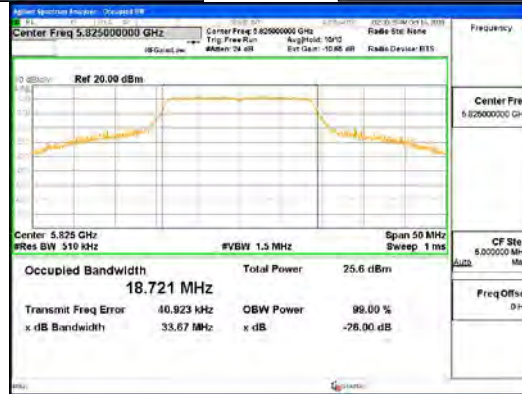
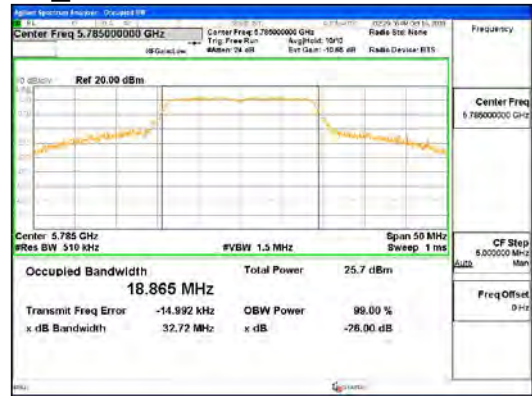
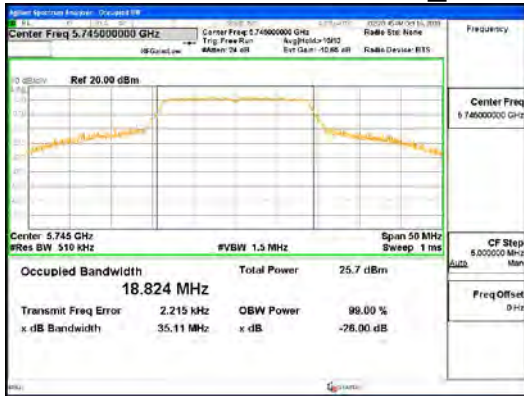


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (51) / (248) Pages



ANT3_802.11ac_VHT20_UNII 2C

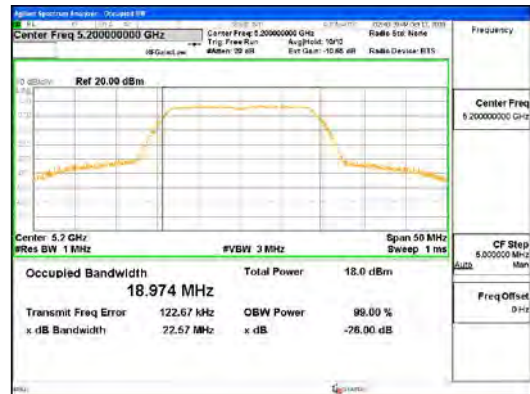
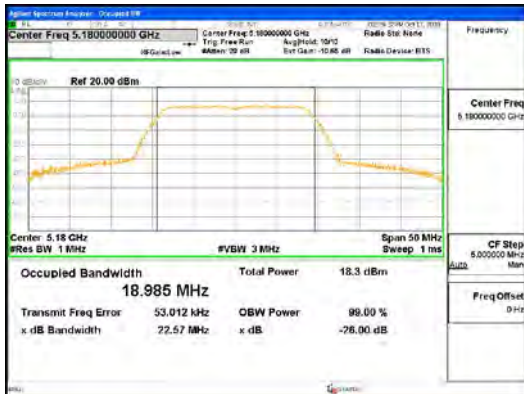


ANT3_802.11ac_VHT20_UNII 3

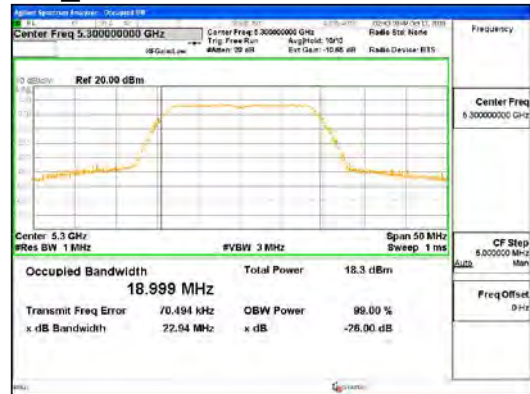
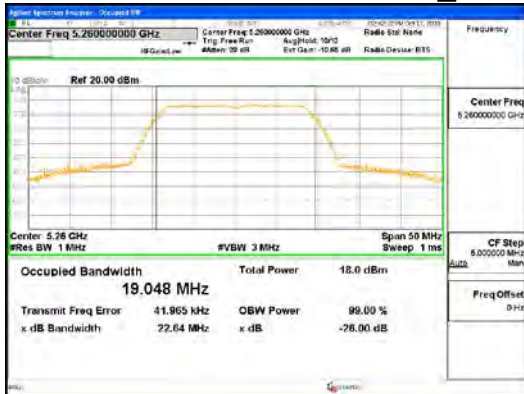


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (52) / (248) Pages



ANT4_802.11ac_VHT20_UNII 1

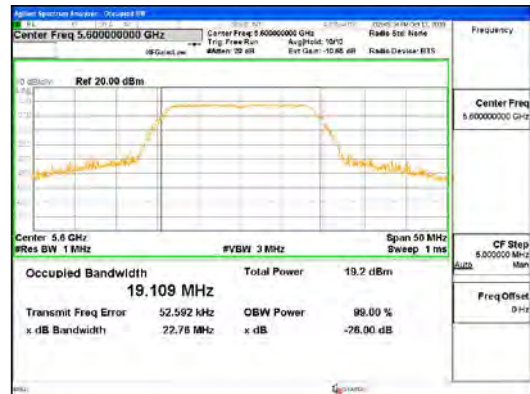
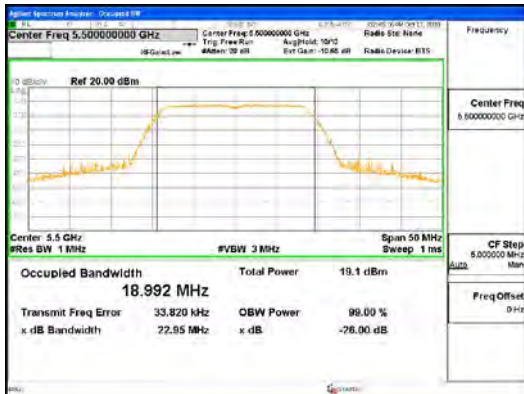


ANT4_802.11ac_VHT20_UNII 2A

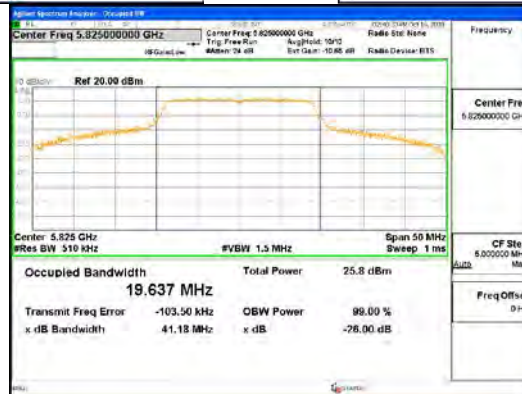
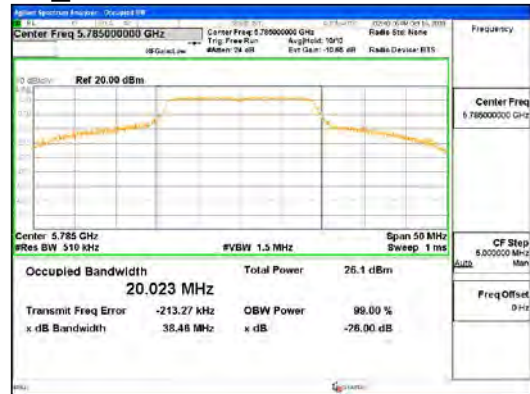
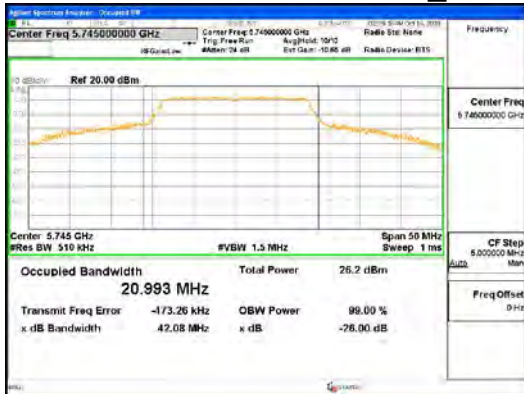


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (53) / (248) Pages



ANT4_802.11ac_VHT20_UNII 2C

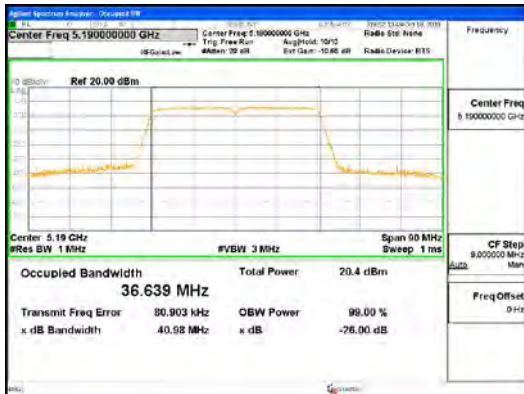


ANT4_802.11ac_VHT20_UNII 3

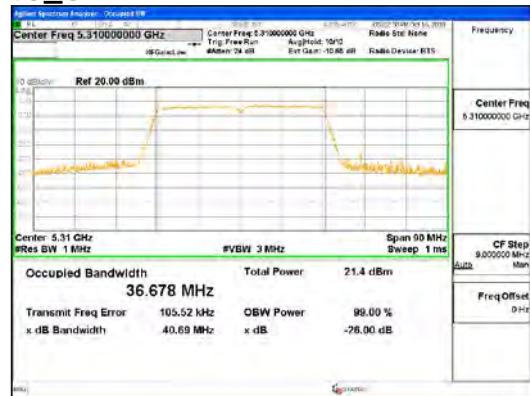
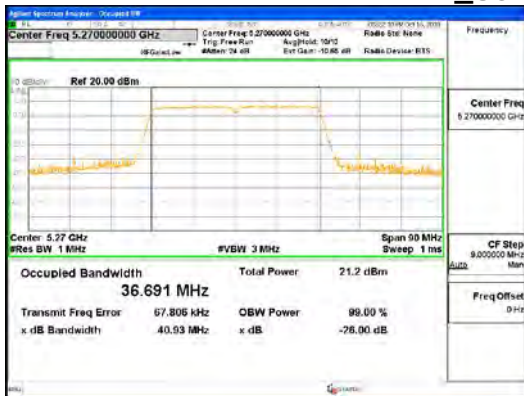


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

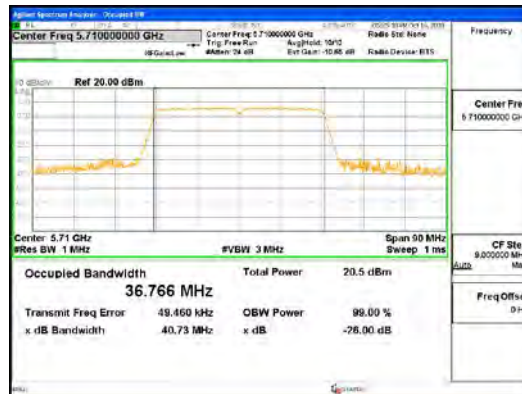
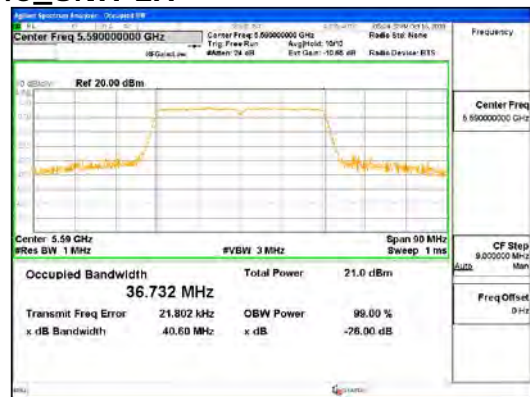
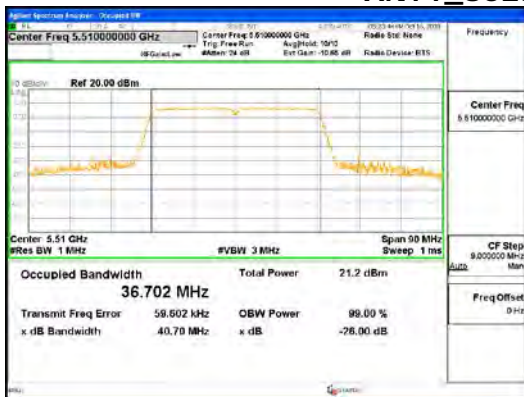
Report No.:
 CTK-2018-03453
 Page (54) / (248) Pages



ANT1_802.11n_HT40_UNI I 1



ANT1_802.11n_HT40_UNI I 2A

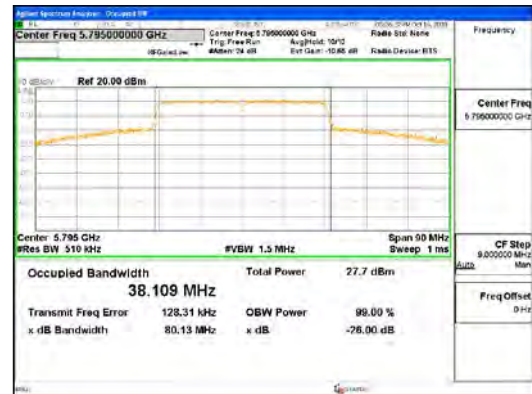
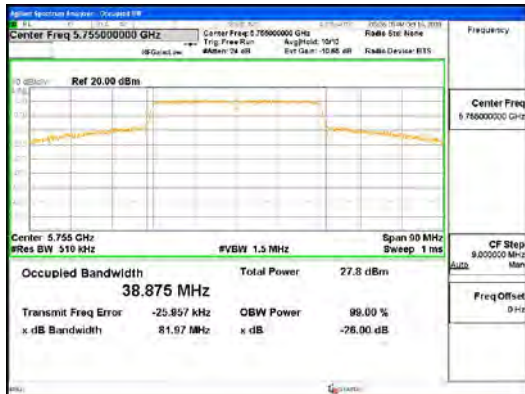


ANT1_802.11n_HT40_UNI I 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (55) / (248) Pages

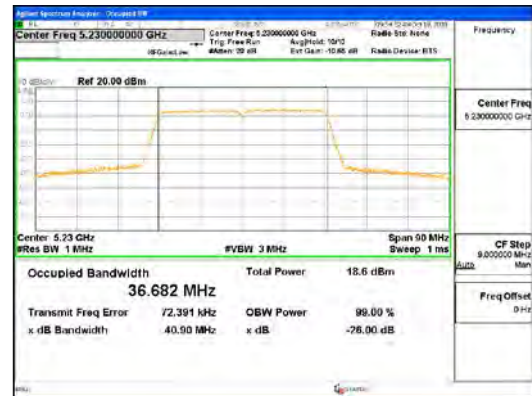
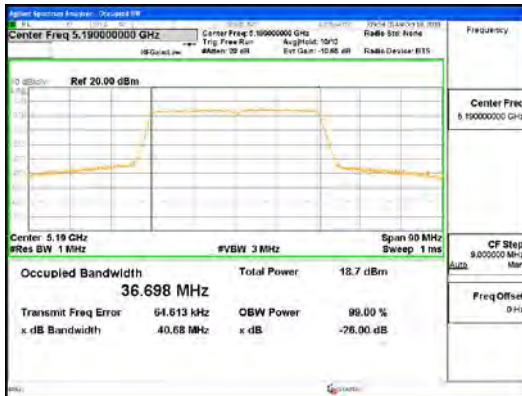


ANT1_802.11n_HT40_UNI1 3

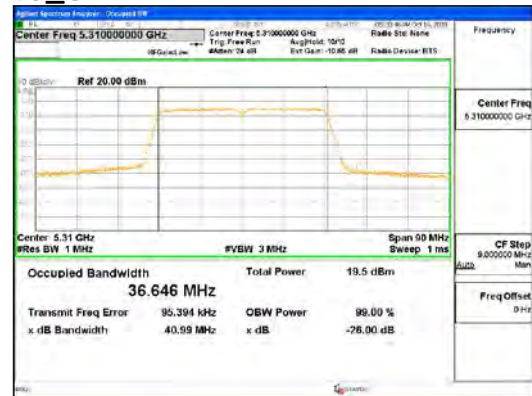
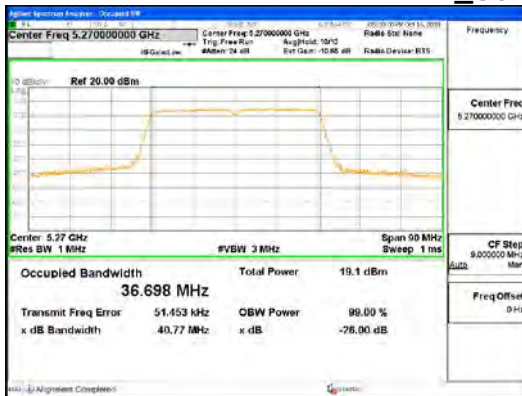


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

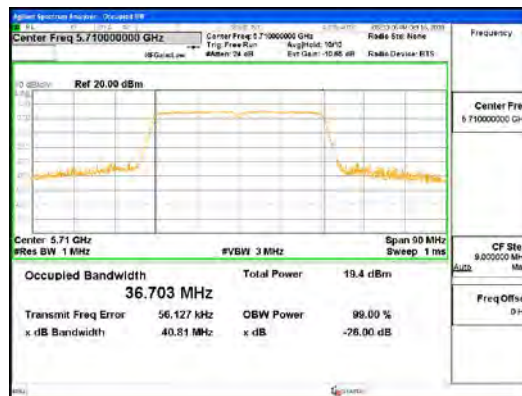
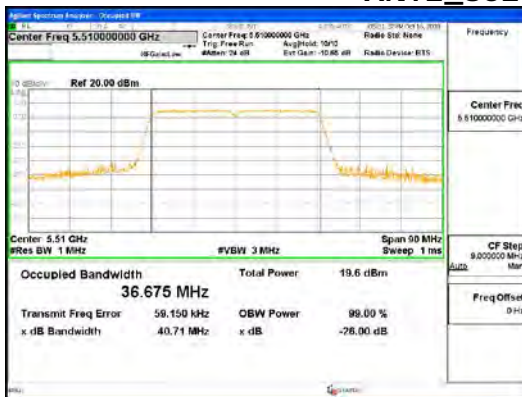
Report No.:
 CTK-2018-03453
 Page (56) / (248) Pages



ANT2_802.11n_HT40_UNI I 1



ANT2_802.11n_HT40_UNI I 2A

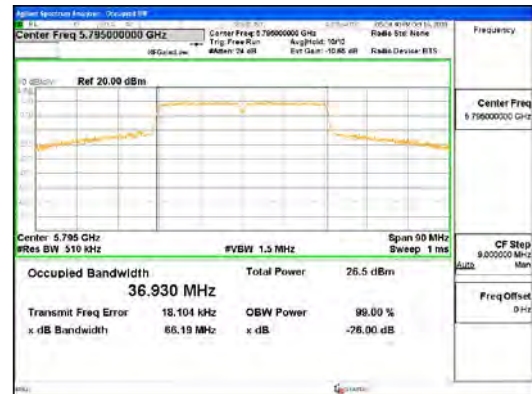
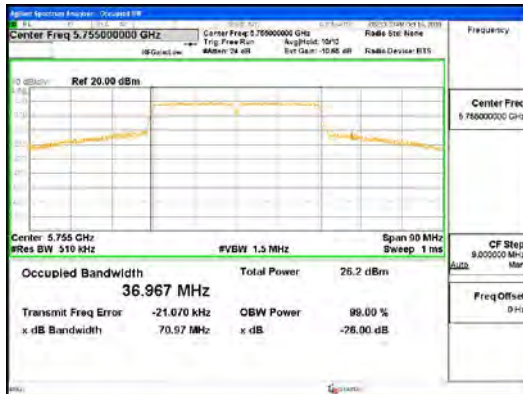


ANT2_802.11n_HT40_UNI I 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (57) / (248) Pages

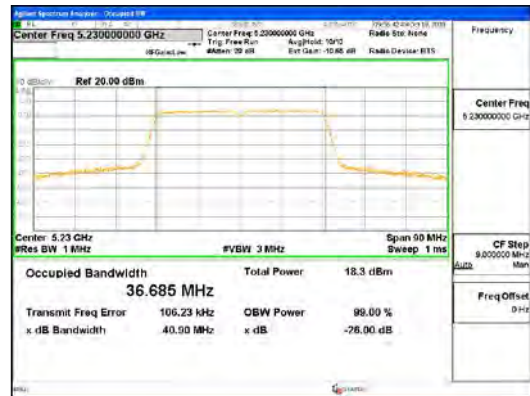
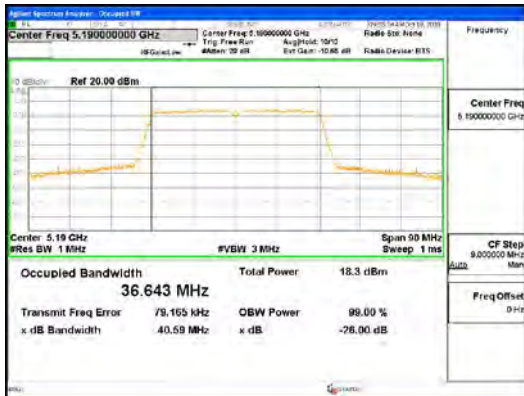


ANT2_802.11n_HT40_UNI1 3

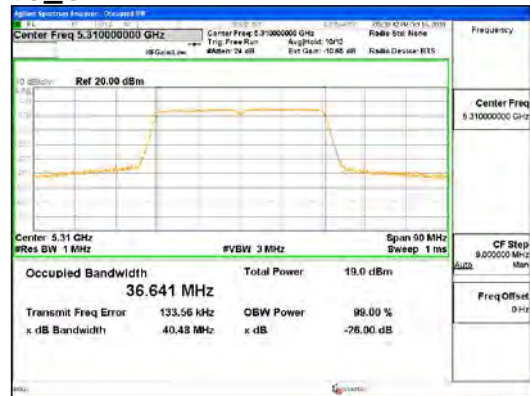
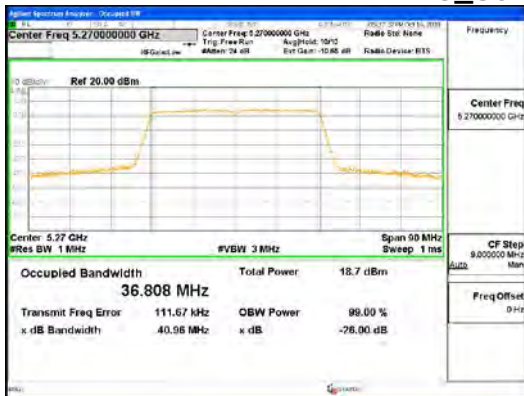


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

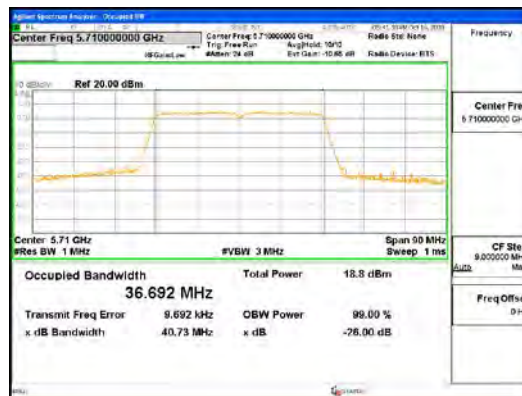
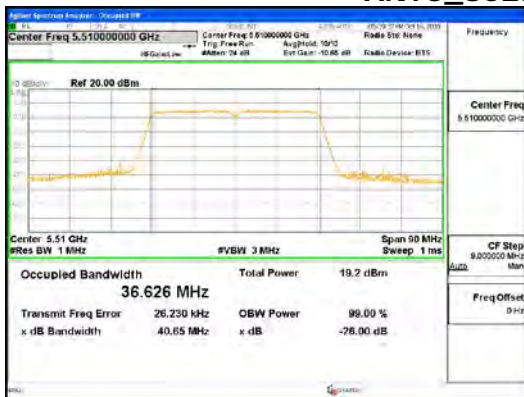
Report No.:
 CTK-2018-03453
 Page (58) / (248) Pages



ANT3_802.11n_HT40_UNI I 1



ANT3_802.11n_HT40_UNI I 2A

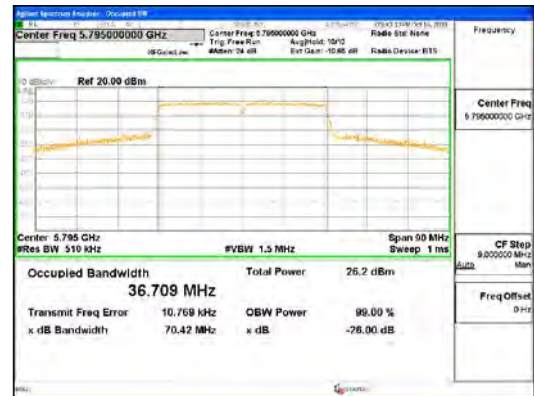
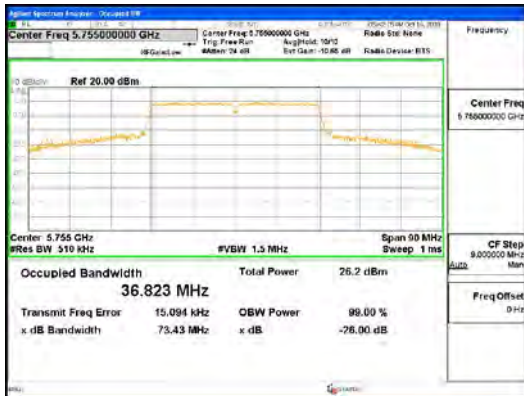


ANT3_802.11n_HT40_UNI I 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (59) / (248) Pages

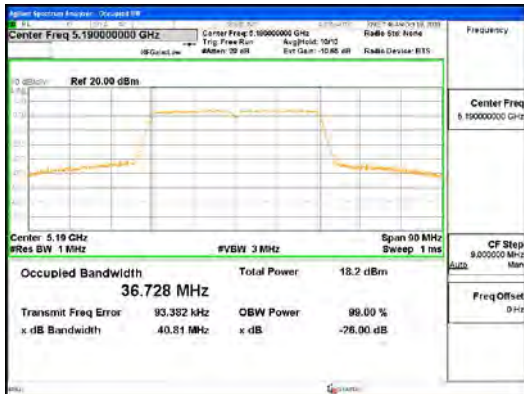


ANT3_802.11n_HT40_UNII 3

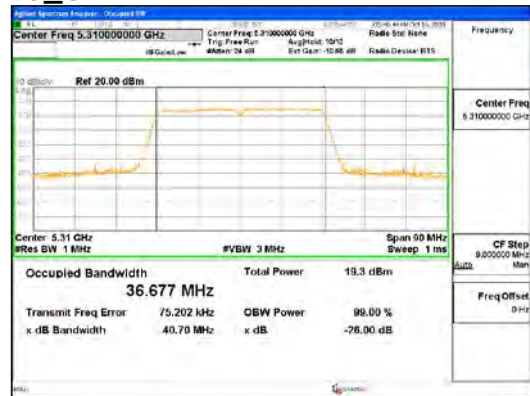
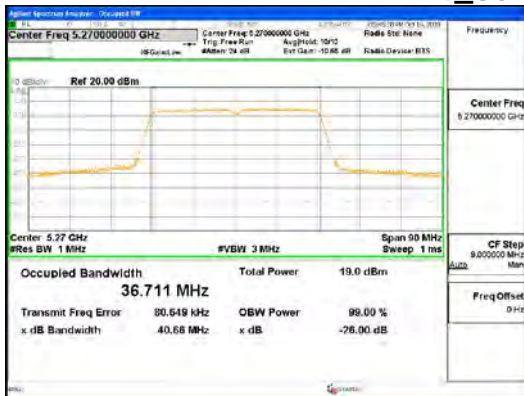


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

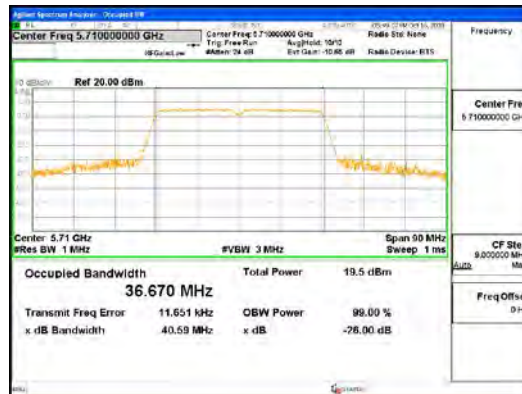
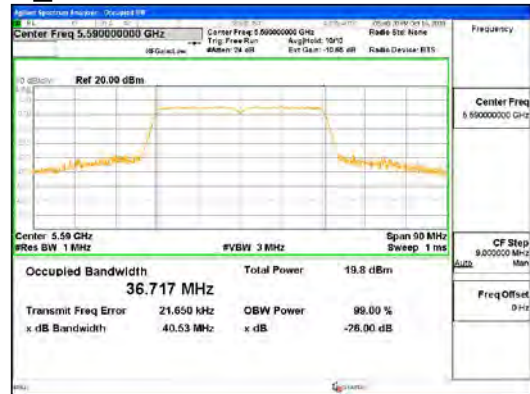
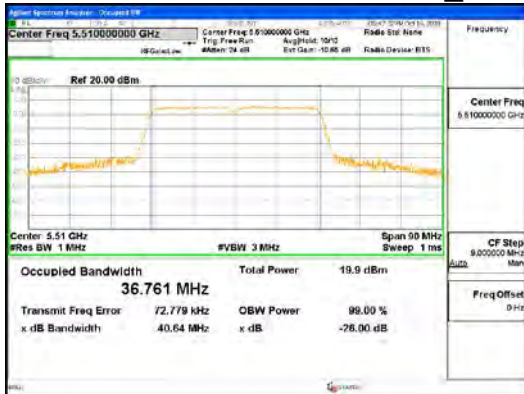
Report No.:
 CTK-2018-03453
 Page (60) / (248) Pages



ANT4_802.11n_HT40_UNI I 1



ANT4_802.11n_HT40_UNI I 2A

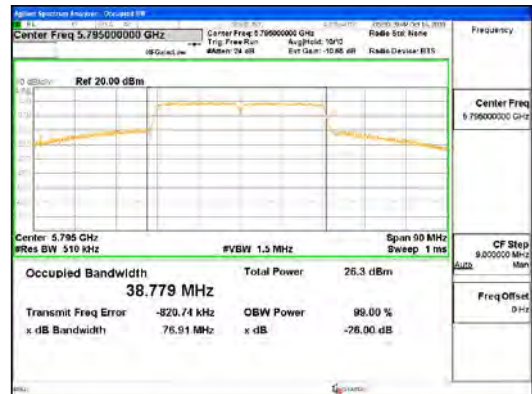
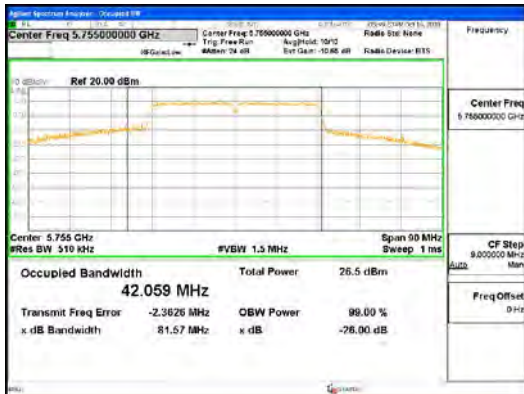


ANT4_802.11n_HT40_UNI I 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (61) / (248) Pages

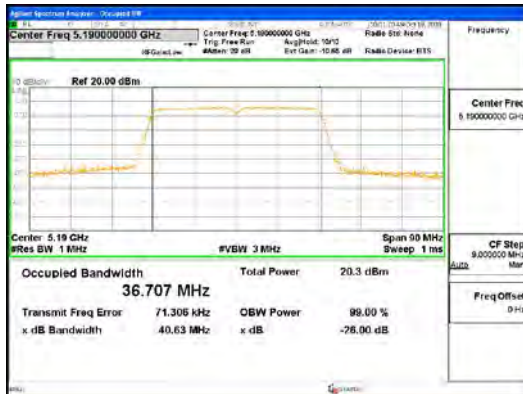


ANT4_802.11n_HT40_UNII 3

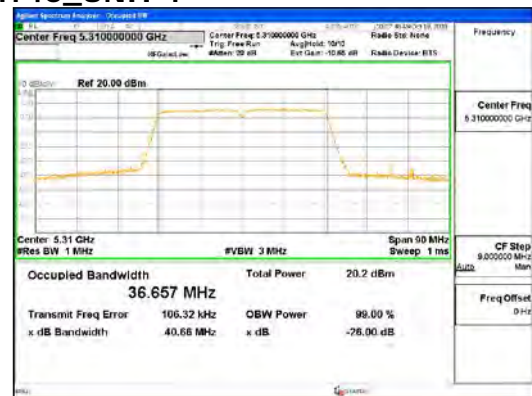
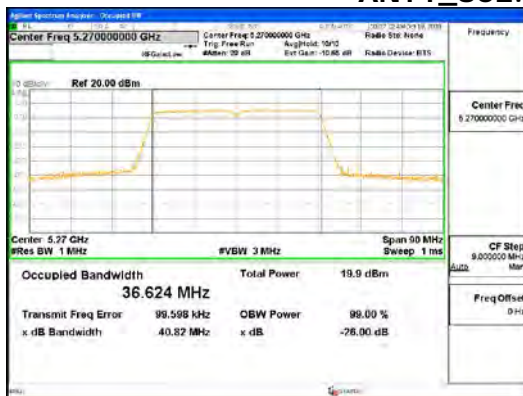


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

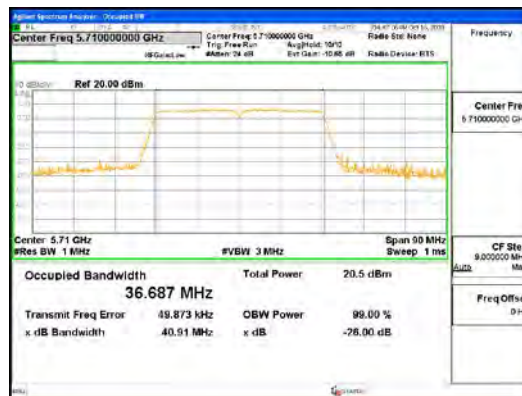
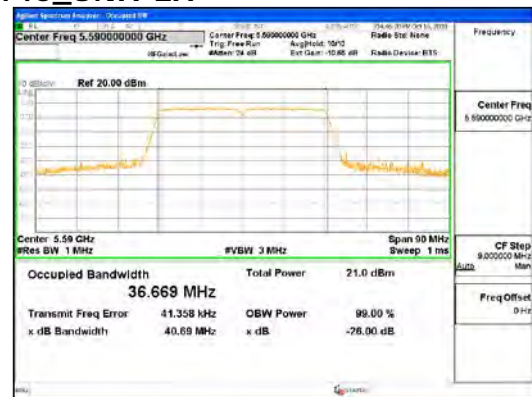
Report No.:
 CTK-2018-03453
 Page (62) / (248) Pages



ANT1_802.11ac_VHT40_UNII 1



ANT1_802.11ac_VHT40_UNII 2A

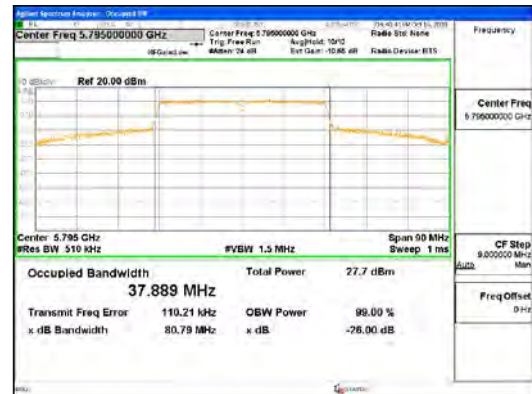


ANT1_802.11ac_VHT40_UNII 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (63) / (248) Pages

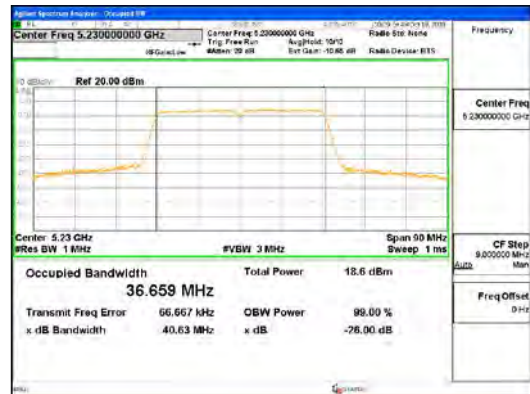
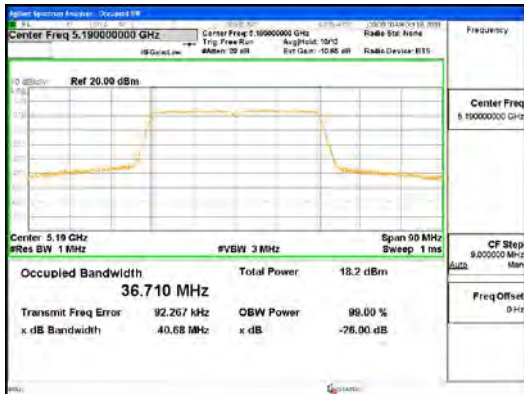


ANT1_802.11ac_VHT40_UNII 3

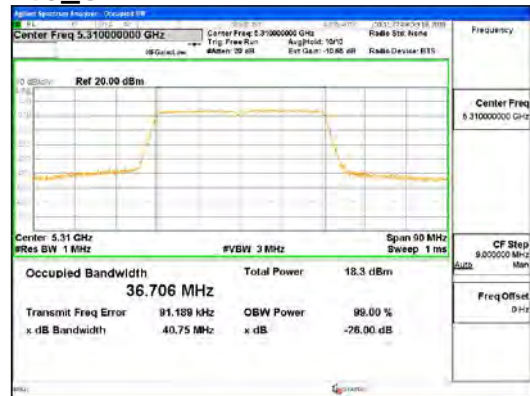


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

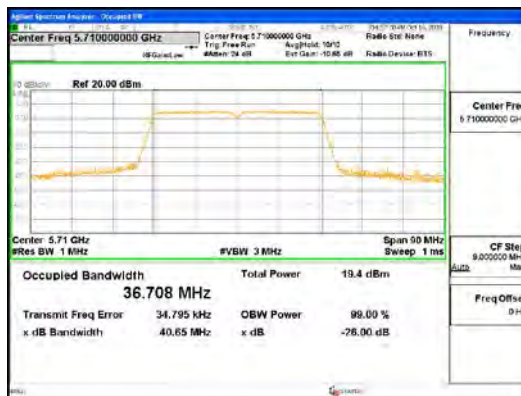
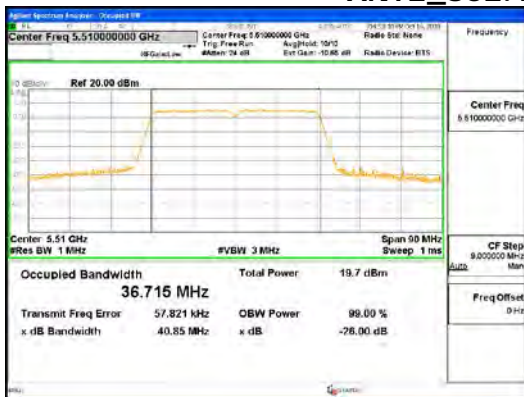
Report No.:
 CTK-2018-03453
 Page (64) / (248) Pages



ANT2_802.11ac_VHT40_UNII 1



ANT2_802.11ac_VHT40_UNII 2A

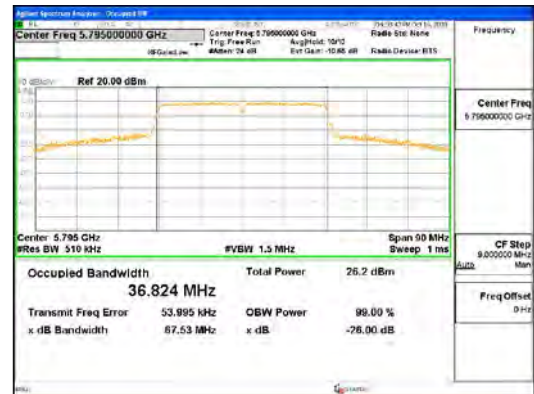
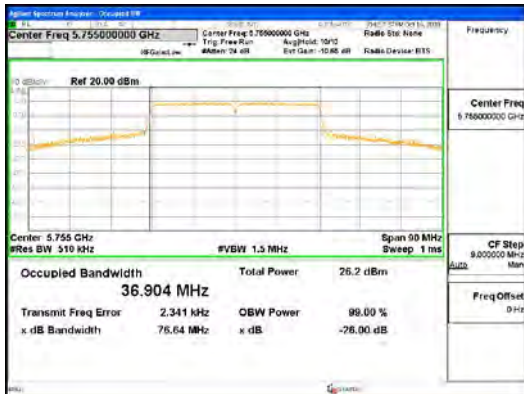


ANT2_802.11ac_VHT40_UNII 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (65) / (248) Pages

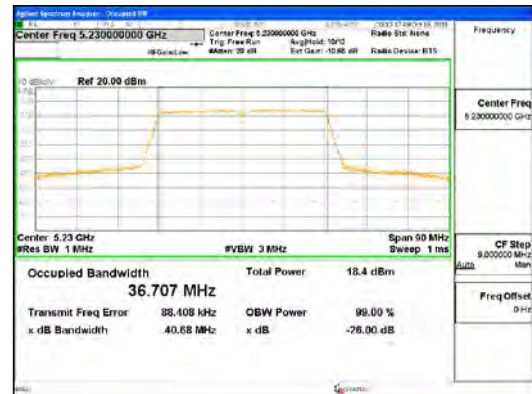


ANT2_802.11ac_VHT40_UNII 3

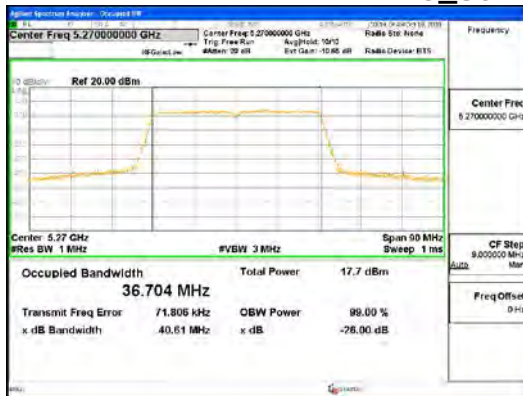


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

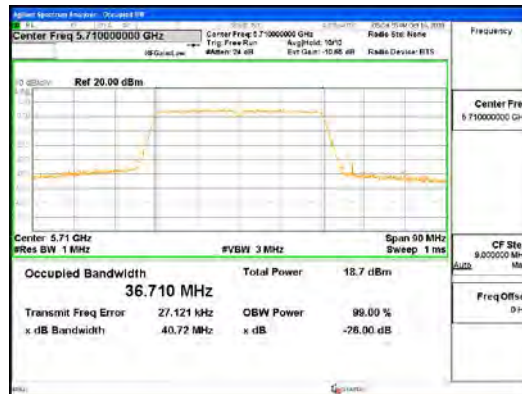
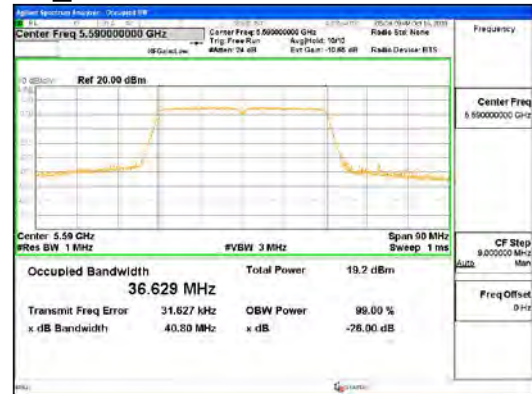
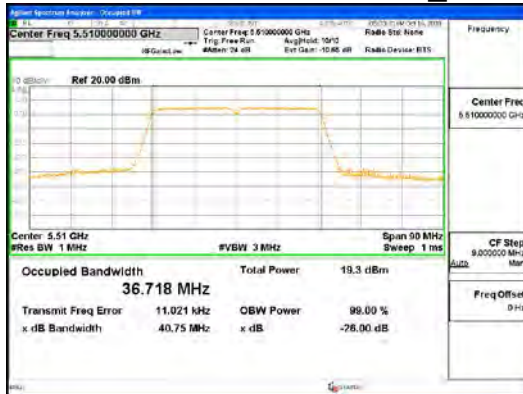
Report No.:
 CTK-2018-03453
 Page (66) / (248) Pages



ANT3_802.11ac_VHT40_UNII 1



ANT3_802.11ac_VHT40_UNII 2A

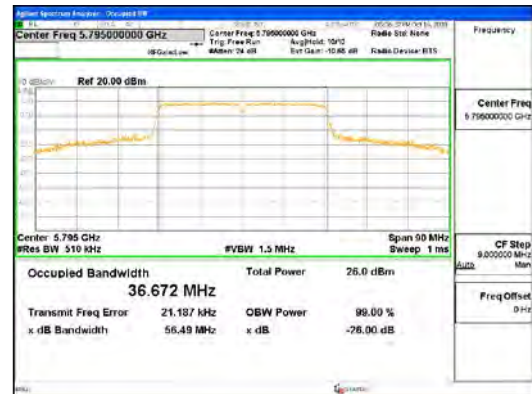
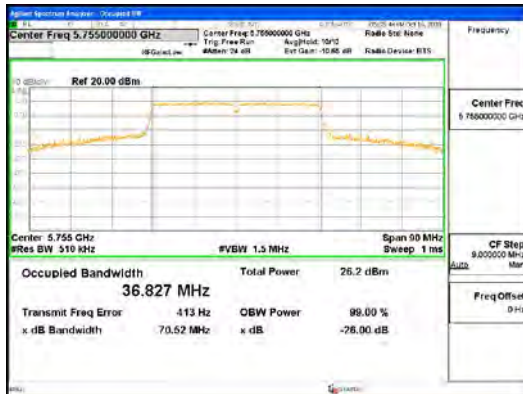


ANT3_802.11ac_VHT40_UNII 2C



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (67) / (248) Pages

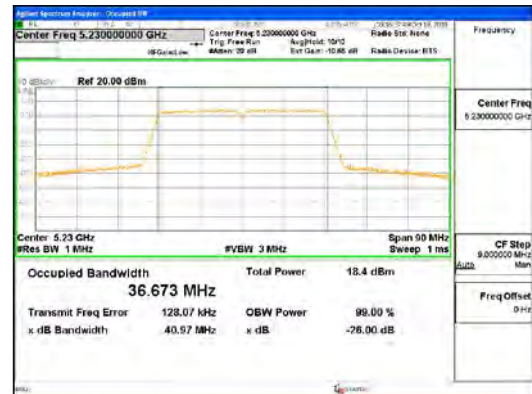
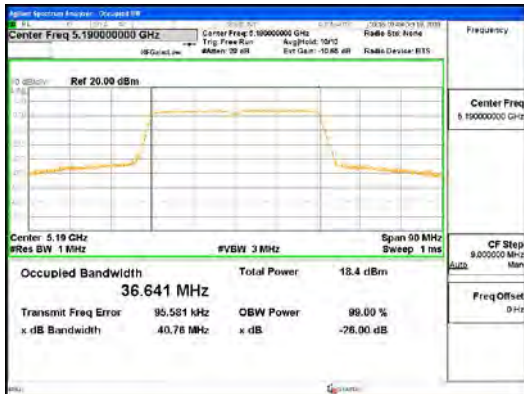


ANT3_802.11ac_VHT40_UNII 3

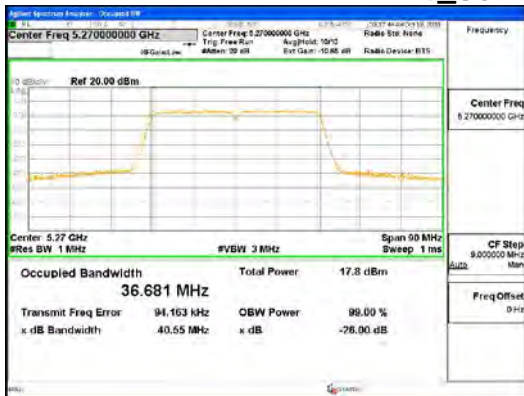


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

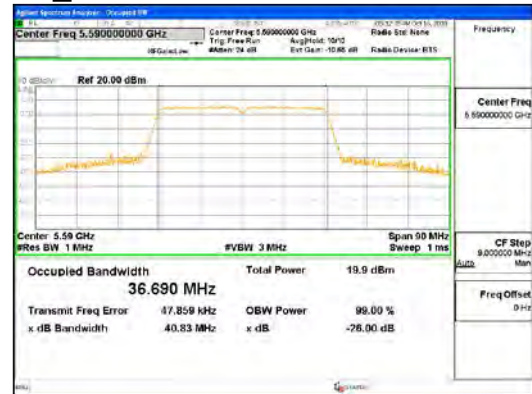
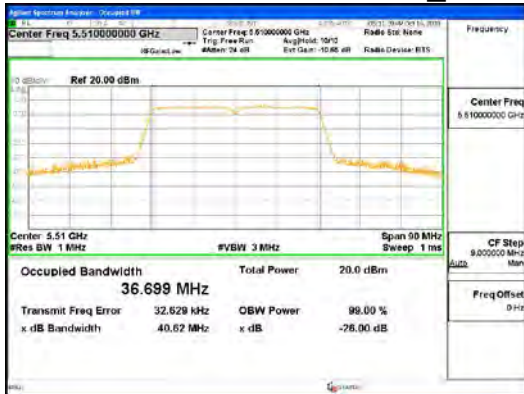
Report No.:
 CTK-2018-03453
 Page (68) / (248) Pages



ANT4_802.11ac_VHT40_UNII 1



ANT4_802.11ac_VHT40_UNII 2A

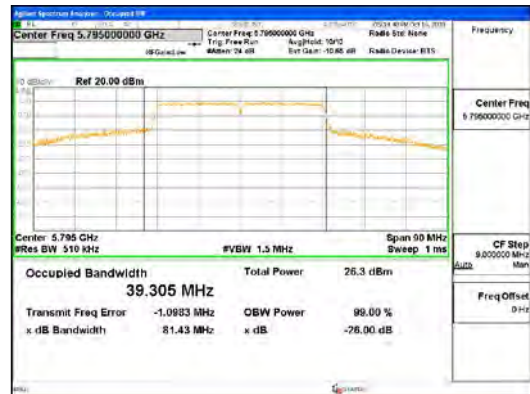
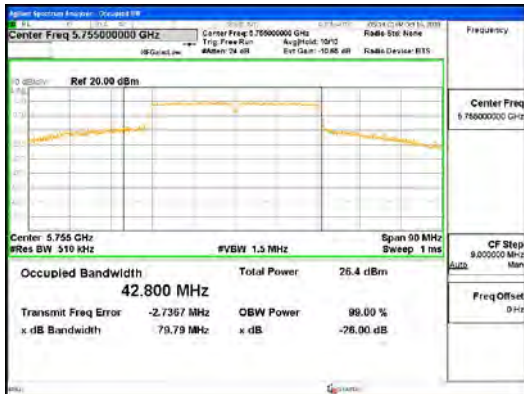


ANT4_802.11ac_VHT40_UNII 2C

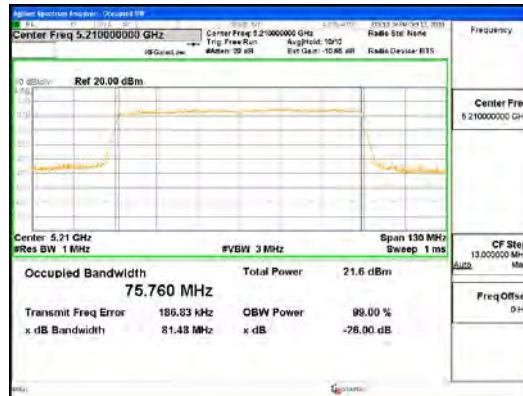


CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (69) / (248) Pages



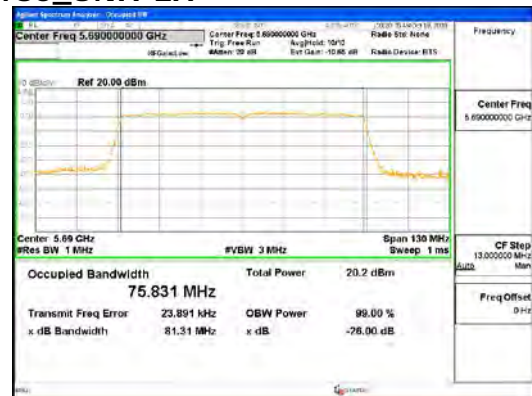
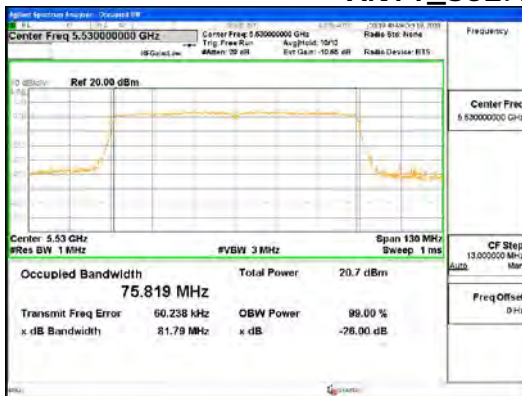
ANT4_802.11ac_VHT40_UNII 3



ANT1_802.11ac_VHT80_UNII 1



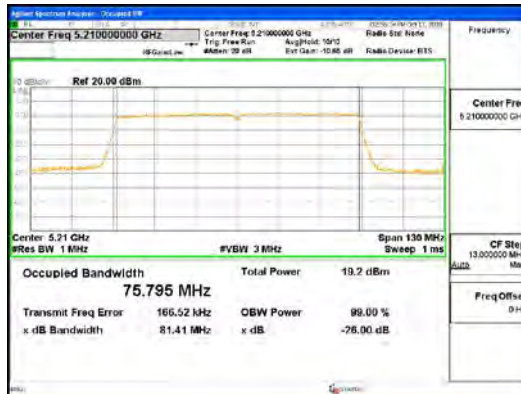
ANT1_802.11ac_VHT80_UNII 2A



ANT1_802.11ac_VHT80_UNII 2C



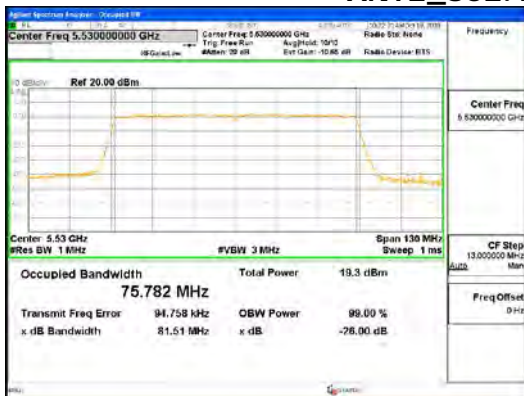
ANT1_802.11ac_VHT80_UNII 3



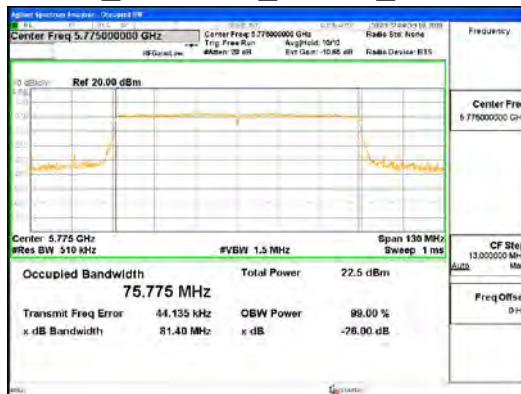
ANT2_802.11ac_VHT80_UNII 1



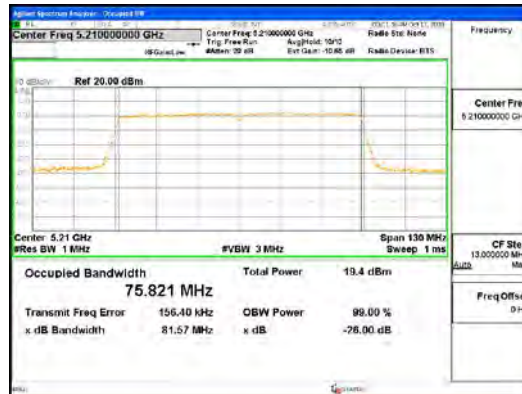
ANT2_802.11ac_VHT80_UNII 2A



ANT2_802.11ac_VHT80_UNII 2C



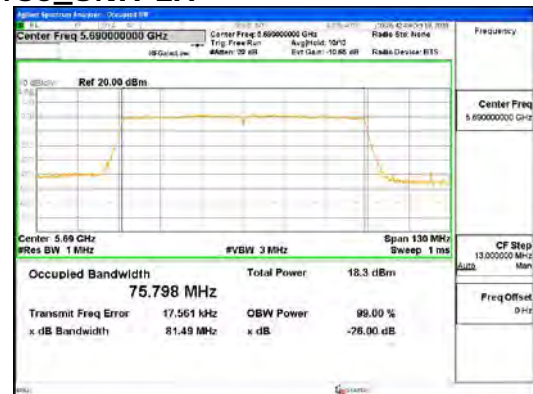
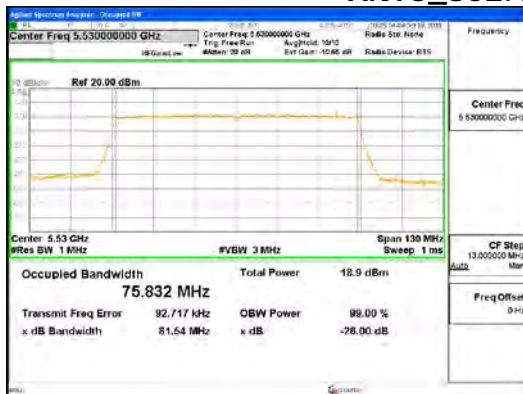
ANT2_802.11ac_VHT80_UNII 3



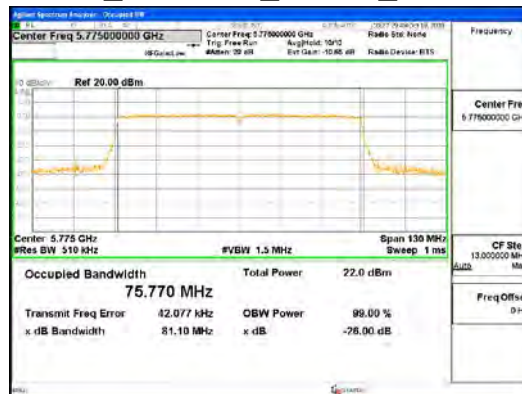
ANT3_802.11ac_VHT80_UNII 1



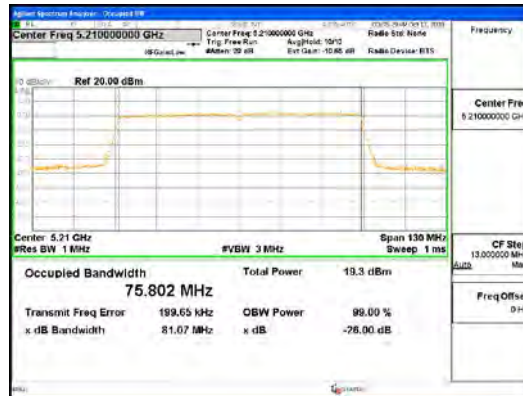
ANT3_802.11ac_VHT80_UNII 2A



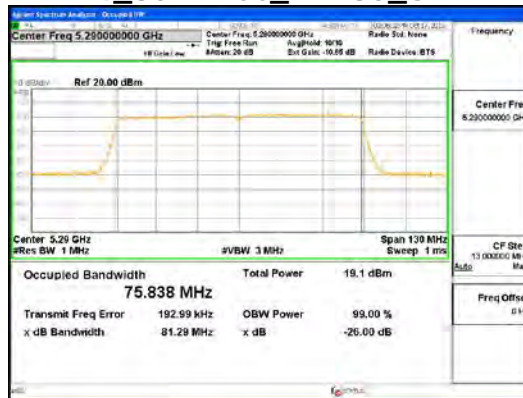
ANT3_802.11ac_VHT80_UNII 2C



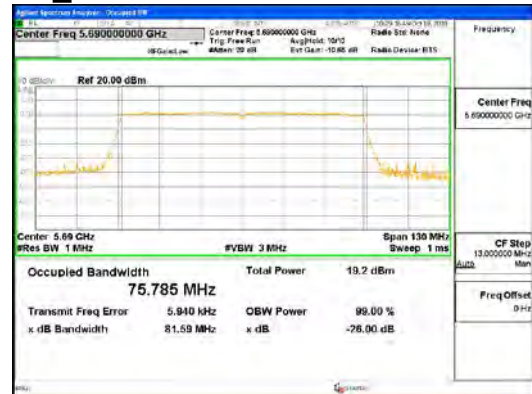
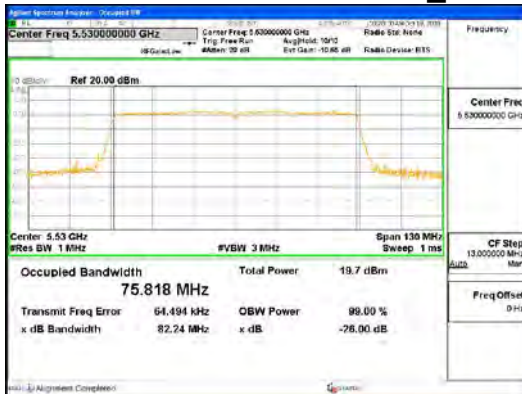
ANT3_802.11ac_VHT80_UNII 3



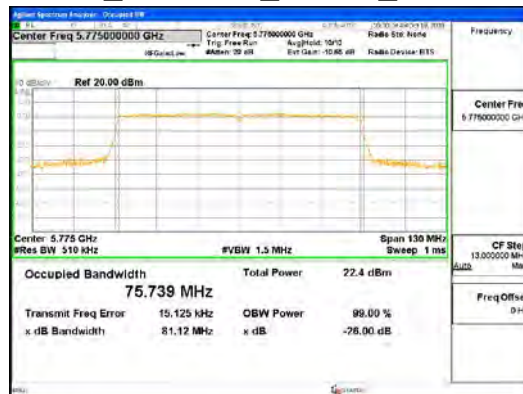
ANT4_802.11ac_VHT80_UNII 1



ANT4_802.11ac_VHT80_UNII 2A



ANT4_802.11ac_VHT80_UNII 2C



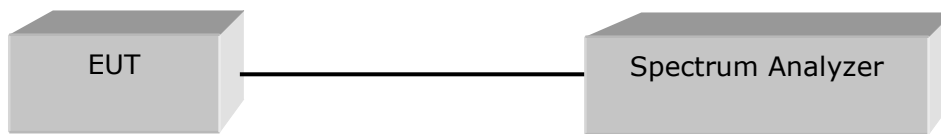
ANT4_802.11ac_VHT80_UNII 3

4.3 OUTPUT POWER

Test Procedures

KDB 789033 – Section E.2.d (Method SA-2, Maximum Conducted Output Power)
KDB 662911 D01, D02 (Multiple Transmitter Output)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 1 MHz
- b) VBW $\geq 3 \times$ RBW
- c) Sweep time = auto
- d) Detector = power averaging (rms)
- e) Trace mode = Average at least 100
- f) Duty cycle factor = $10\log(1/x)$

Test mode	Duty Cycle Factor (dB)
802.11a	0.20
802.11n_HT20	0.21
802.11n_HT40	0.43
802.11ac_VHT20	0.21
802.11ac_VHT40	0.42
802.11ac_VHT80	0.84

Limit

Operating Mode	ANT Configuration	ANT Gain (dBi)	Mode	Band	Limit (dBm)
SISO	ANT1, ANT2, ANT3, ANT4	2.00	802.11a/n/ac	UNII 1	24.00
				UNII 2A	24.00
				UNII 2C	24.00
				UNII 3	30.00
MIMO (2Tx)	ANT1 + ANT2	5.01	802.11a/n/ac	UNII 1	24.00
				UNII 2A	24.00
				UNII 2C	24.00
				UNII 3	30.00
MIMO (3Tx)	ANT1 + ANT2 + ANT3	6.77	802.11a/n/ac	UNII 1	23.23
				UNII 2A	23.23
				UNII 2C	23.23
				UNII 3	29.23
MIMO (4Tx)	ANT1 + ANT2 + ANT3 + ANT4	8.02	802.11a/n/ac	UNII 1	21.98
				UNII 2A	21.98
				UNII 2C	21.98
				UNII 3	27.98

Test Data

ANT1

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	14.64	0.20	14.84	24.00	9.16
	5 200	14.71	0.20	14.91	24.00	9.09
	5 240	15.04	0.20	15.24	24.00	8.76
	5 260	14.85	0.20	15.05	24.00	8.95
	5 300	15.05	0.20	15.25	24.00	8.75
	5 320	15.27	0.20	15.47	24.00	8.53
	5 500	14.65	0.20	14.85	24.00	9.15
	5 600	14.49	0.20	14.69	24.00	9.31
	5 720	14.00	0.20	14.20	24.00	9.80
	5 745	21.24	0.20	21.44	30.00	8.56
	5 785	21.21	0.20	21.41	30.00	8.59
	5 825	21.01	0.20	21.21	30.00	8.79
802.11n _HT20	5 180	14.71	0.21	14.92	24.00	9.08
	5 200	14.83	0.21	15.04	24.00	8.96
	5 240	14.93	0.21	15.14	24.00	8.86
	5 260	14.80	0.21	15.01	24.00	8.99
	5 300	15.10	0.21	15.31	24.00	8.69
	5 320	15.29	0.21	15.50	24.00	8.50
	5 500	14.95	0.21	15.16	24.00	8.84
	5 600	14.83	0.21	15.04	24.00	8.96
	5 720	14.35	0.21	14.56	24.00	9.44
	5 745	21.26	0.21	21.47	30.00	8.53
	5 785	21.21	0.21	21.42	30.00	8.58
	5 825	21.11	0.21	21.32	30.00	8.68
802.11ac _VHT20	5 180	14.86	0.21	15.07	24.00	8.93
	5 200	14.69	0.21	14.90	24.00	9.10
	5 240	15.11	0.21	15.32	24.00	8.68
	5 260	14.70	0.21	14.91	24.00	9.09
	5 300	15.08	0.21	15.29	24.00	8.71
	5 320	15.12	0.21	15.33	24.00	8.67
	5 500	15.21	0.21	15.42	24.00	8.58
	5 600	14.61	0.21	14.82	24.00	9.18
	5 720	14.27	0.21	14.48	24.00	9.52
	5 745	21.16	0.21	21.37	30.00	8.63



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (77) / (248) Pages

	5 785	21.40	0.21	21.61	30.00	8.39
	5 825	21.03	0.21	21.24	30.00	8.76
802.11n _HT40	5 190	14.66	0.43	15.09	24.00	8.91
	5 230	14.87	0.43	15.30	24.00	8.70
	5 270	15.55	0.43	15.98	24.00	8.02
	5 310	15.76	0.43	16.19	24.00	7.81
	5 510	15.46	0.43	15.89	24.00	8.11
	5 590	15.30	0.43	15.73	24.00	8.27
	5 710	14.84	0.43	15.27	24.00	8.73
	5 755	21.48	0.43	21.91	30.00	8.09
	5 795	21.48	0.43	21.91	30.00	8.09
802.11ac _VHT40	5 190	14.67	0.42	15.09	24.00	8.91
	5 230	14.72	0.42	15.14	24.00	8.86
	5 270	14.26	0.42	14.68	24.00	9.32
	5 310	14.49	0.42	14.91	24.00	9.09
	5 510	15.53	0.42	15.95	24.00	8.05
	5 590	15.41	0.42	15.83	24.00	8.17
	5 710	14.93	0.42	15.35	24.00	8.65
	5 755	21.43	0.42	21.85	30.00	8.15
5 795	21.48	0.42	21.90	30.00	8.10	
802.11ac _VHT80	5 210	15.41	0.84	16.25	24.00	7.75
	5 290	15.38	0.84	16.22	24.00	7.78
	5 530	14.56	0.84	15.40	24.00	8.60
	5 690	14.19	0.84	15.03	24.00	8.97
	5 775	17.14	0.84	17.98	30.00	12.02
Measurement uncertainty		± 1.5 dB				

ANT2

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	12.53	0.20	12.73	24.00	11.27
	5 200	12.61	0.20	12.81	24.00	11.19
	5 240	12.81	0.20	13.01	24.00	10.99
	5 260	12.53	0.20	12.73	24.00	11.27
	5 300	12.85	0.20	13.05	24.00	10.95
	5 320	13.02	0.20	13.22	24.00	10.78
	5 500	12.80	0.20	13.00	24.00	11.00
	5 600	12.61	0.20	12.81	24.00	11.19
	5 720	12.77	0.20	12.97	24.00	11.03
	5 745	20.04	0.20	20.24	30.00	9.76
	5 785	20.09	0.20	20.29	30.00	9.71
	5 825	20.06	0.20	20.26	30.00	9.74
802.11n _HT20	5 180	12.69	0.21	12.90	24.00	11.10
	5 200	12.51	0.21	12.72	24.00	11.28
	5 240	12.62	0.21	12.83	24.00	11.17
	5 260	12.67	0.21	12.88	24.00	11.12
	5 300	12.79	0.21	13.00	24.00	11.00
	5 320	13.32	0.21	13.53	24.00	10.47
	5 500	13.24	0.21	13.45	24.00	10.55
	5 600	13.00	0.21	13.21	24.00	10.79
	5 720	13.32	0.21	13.53	24.00	10.47
	5 745	19.86	0.21	20.07	30.00	9.93
	5 785	20.09	0.21	20.30	30.00	9.70
	5 825	20.09	0.21	20.30	30.00	9.70
802.11ac _VHT20	5 180	12.60	0.21	12.81	24.00	11.19
	5 200	12.67	0.21	12.88	24.00	11.12
	5 240	12.93	0.21	13.14	24.00	10.86
	5 260	12.50	0.21	12.71	24.00	11.29
	5 300	12.79	0.21	13.00	24.00	11.00
	5 320	13.09	0.21	13.30	24.00	10.70
	5 500	13.29	0.21	13.50	24.00	10.50
	5 600	13.02	0.21	13.23	24.00	10.77
	5 720	13.25	0.21	13.46	24.00	10.54
	5 745	19.78	0.21	19.99	30.00	10.01
	5 785	20.02	0.21	20.23	30.00	9.77



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (79) / (248) Pages

	5 825	19.97	0.21	20.18	30.00	9.82
802.11n _HT40	5 190	13.00	0.43	13.43	24.00	10.57
	5 230	12.86	0.43	13.29	24.00	10.71
	5 270	13.50	0.43	13.93	24.00	10.07
	5 310	13.92	0.43	14.35	24.00	9.65
	5 510	14.02	0.43	14.45	24.00	9.55
	5 590	14.25	0.43	14.68	24.00	9.32
	5 710	13.80	0.43	14.23	24.00	9.77
	5 755	20.06	0.43	20.49	30.00	9.51
	5 795	20.31	0.43	20.74	30.00	9.26
802.11ac _VHT40	5 190	12.81	0.42	13.23	24.00	10.77
	5 230	12.93	0.42	13.35	24.00	10.65
	5 270	12.40	0.42	12.82	24.00	11.18
	5 310	12.61	0.42	13.03	24.00	10.97
	5 510	14.12	0.42	14.54	24.00	9.46
	5 590	14.29	0.42	14.71	24.00	9.29
	5 710	13.76	0.42	14.18	24.00	9.82
	5 755	20.06	0.42	20.48	30.00	9.52
	5 795	20.08	0.42	20.50	30.00	9.50
802.11ac _VHT80	5 210	13.26	0.84	14.10	24.00	9.90
	5 290	13.01	0.84	13.85	24.00	10.15
	5 530	13.27	0.84	14.11	24.00	9.89
	5 690	12.85	0.84	13.69	24.00	10.31
	5 775	15.95	0.84	16.79	30.00	13.21
Measurement uncertainty		± 1.5 dB				



ANT3

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	12.61	0.20	12.81	24.00	11.19
	5 200	12.41	0.20	12.61	24.00	11.39
	5 240	12.85	0.20	13.05	24.00	10.95
	5 260	12.65	0.20	12.85	24.00	11.15
	5 300	12.81	0.20	13.01	24.00	10.99
	5 320	12.96	0.20	13.16	24.00	10.84
	5 500	12.90	0.20	13.10	24.00	10.90
	5 600	12.35	0.20	12.55	24.00	11.45
	5 720	12.24	0.20	12.44	24.00	11.56
	5 745	19.89	0.20	20.09	30.00	9.91
	5 785	20.11	0.20	20.31	30.00	9.69
	5 825	19.72	0.20	19.92	30.00	10.08
802.11n _HT20	5 180	12.43	0.21	12.64	24.00	11.36
	5 200	12.44	0.21	12.65	24.00	11.35
	5 240	12.79	0.21	13.00	24.00	11.00
	5 260	12.33	0.21	12.54	24.00	11.46
	5 300	12.74	0.21	12.95	24.00	11.05
	5 320	13.05	0.21	13.26	24.00	10.74
	5 500	13.23	0.21	13.44	24.00	10.56
	5 600	12.80	0.21	13.01	24.00	10.99
	5 720	12.59	0.21	12.80	24.00	11.20
	5 745	20.01	0.21	20.22	30.00	9.78
	5 785	20.04	0.21	20.25	30.00	9.75
	5 825	20.00	0.21	20.21	30.00	9.79
802.11ac _VHT20	5 180	12.50	0.21	12.71	24.00	11.29
	5 200	12.34	0.21	12.55	24.00	11.45
	5 240	12.77	0.21	12.98	24.00	11.02
	5 260	12.67	0.21	12.88	24.00	11.12
	5 300	12.76	0.21	12.97	24.00	11.03
	5 320	12.97	0.21	13.18	24.00	10.82
	5 500	13.13	0.21	13.34	24.00	10.66
	5 600	12.91	0.21	13.12	24.00	10.88
	5 720	12.77	0.21	12.98	24.00	11.02
	5 745	19.79	0.21	20.00	30.00	10.00



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (81) / (248) Pages

	5 785	19.81	0.21	20.02	30.00	9.98
	5 825	19.64	0.21	19.85	30.00	10.15
802.11n _HT40	5 190	12.74	0.43	13.17	24.00	10.83
	5 230	12.64	0.43	13.07	24.00	10.93
	5 270	13.10	0.43	13.53	24.00	10.47
	5 310	13.40	0.43	13.83	24.00	10.17
	5 510	13.69	0.43	14.12	24.00	9.88
	5 590	13.54	0.43	13.97	24.00	10.03
	5 710	13.14	0.43	13.57	24.00	10.43
	5 755	19.98	0.43	20.41	30.00	9.59
	5 795	19.99	0.43	20.42	30.00	9.58
802.11ac _VHT40	5 190	12.69	0.42	13.11	24.00	10.89
	5 230	12.77	0.42	13.19	24.00	10.81
	5 270	12.07	0.42	12.49	24.00	11.51
	5 310	12.49	0.42	12.91	24.00	11.09
	5 510	13.74	0.42	14.16	24.00	9.84
	5 590	13.65	0.42	14.07	24.00	9.93
	5 710	13.19	0.42	13.61	24.00	10.39
	5 755	19.86	0.42	20.28	30.00	9.72
5 795	19.82	0.42	20.24	30.00	9.76	
802.11ac _VHT80	5 210	13.30	0.84	14.14	24.00	9.86
	5 290	12.79	0.84	13.63	24.00	10.37
	5 530	12.87	0.84	13.71	24.00	10.29
	5 690	12.34	0.84	13.18	24.00	10.82
	5 775	15.43	0.84	16.27	30.00	13.73
Measurement uncertainty		± 1.5 dB				

ANT3

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	12.83	0.20	13.03	24.00	10.97
	5 200	12.75	0.20	12.95	24.00	11.05
	5 240	12.90	0.20	13.10	24.00	10.90
	5 260	12.46	0.20	12.66	24.00	11.34
	5 300	13.01	0.20	13.21	24.00	10.79
	5 320	13.14	0.20	13.34	24.00	10.66
	5 500	13.16	0.20	13.36	24.00	10.64
	5 600	13.21	0.20	13.41	24.00	10.59
	5 720	12.75	0.20	12.95	24.00	11.05
	5 745	20.28	0.20	20.48	30.00	9.52
	5 785	20.39	0.20	20.59	30.00	9.41
5 825	20.15	0.20	20.35	30.00	9.65	
802.11n _HT20	5 180	12.53	0.21	12.74	24.00	11.26
	5 200	12.56	0.21	12.77	24.00	11.23
	5 240	12.87	0.21	13.08	24.00	10.92
	5 260	12.58	0.21	12.79	24.00	11.21
	5 300	13.05	0.21	13.26	24.00	10.74
	5 320	13.10	0.21	13.31	24.00	10.69
	5 500	13.73	0.21	13.94	24.00	10.06
	5 600	13.47	0.21	13.68	24.00	10.32
	5 720	13.28	0.21	13.49	24.00	10.51
	5 745	20.23	0.21	20.44	30.00	9.56
	5 785	20.15	0.21	20.36	30.00	9.64
5 825	19.88	0.21	20.09	30.00	9.91	
802.11ac _VHT20	5 180	12.81	0.21	13.02	24.00	10.98
	5 200	12.61	0.21	12.82	24.00	11.18
	5 240	12.75	0.21	12.96	24.00	11.04
	5 260	12.60	0.21	12.81	24.00	11.19
	5 300	12.90	0.21	13.11	24.00	10.89
	5 320	13.22	0.21	13.43	24.00	10.57
	5 500	13.72	0.21	13.93	24.00	10.07
	5 600	13.85	0.21	14.06	24.00	9.94
	5 720	13.29	0.21	13.50	24.00	10.50
	5 745	20.23	0.21	20.44	30.00	9.56
5 785	20.05	0.21	20.26	30.00	9.74	



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (83) / (248) Pages

	5 825	19.91	0.21	20.12	30.00	9.88
802.11n _HT40	5 190	12.57	0.43	13.00	24.00	11.00
	5 230	12.49	0.43	12.92	24.00	11.08
	5 270	13.38	0.43	13.81	24.00	10.19
	5 310	13.69	0.43	14.12	24.00	9.88
	5 510	14.28	0.43	14.71	24.00	9.29
	5 590	14.16	0.43	14.59	24.00	9.41
	5 710	13.82	0.43	14.25	24.00	9.75
	5 755	20.23	0.43	20.66	30.00	9.34
	5 795	20.13	0.43	20.56	30.00	9.44
802.11ac _VHT40	5 190	12.79	0.42	13.21	24.00	10.79
	5 230	12.74	0.42	13.16	24.00	10.84
	5 270	12.20	0.42	12.62	24.00	11.38
	5 310	12.45	0.42	12.87	24.00	11.13
	5 510	14.34	0.42	14.76	24.00	9.24
	5 590	14.19	0.42	14.61	24.00	9.39
	5 710	13.95	0.42	14.37	24.00	9.63
	5 755	20.17	0.42	20.59	30.00	9.41
	5 795	20.09	0.42	20.51	30.00	9.49
802.11ac _VHT80	5 210	13.23	0.84	14.07	24.00	9.93
	5 290	13.03	0.84	13.87	24.00	10.13
	5 530	13.82	0.84	14.66	24.00	9.34
	5 690	13.14	0.84	13.98	24.00	10.02
	5 775	15.85	0.84	16.69	30.00	13.31
Measurement uncertainty		± 1.5 dB				



ANT1 + ANT2

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	16.72	0.20	16.92	24.00	7.08
	5 200	16.80	0.20	17.00	24.00	7.00
	5 240	17.08	0.20	17.28	24.00	6.72
	5 260	16.85	0.20	17.05	24.00	6.95
	5 300	17.10	0.20	17.30	24.00	6.70
	5 320	17.30	0.20	17.50	24.00	6.50
	5 500	16.83	0.20	17.03	24.00	6.97
	5 600	16.66	0.20	16.86	24.00	7.14
	5 720	16.44	0.20	16.64	24.00	7.36
	5 745	23.69	0.20	23.89	30.00	6.11
	5 785	23.70	0.20	23.90	30.00	6.10
	5 825	23.57	0.20	23.77	30.00	6.23
802.11n _HT20	5 180	16.83	0.21	17.04	24.00	6.96
	5 200	16.83	0.21	17.04	24.00	6.96
	5 240	16.94	0.21	17.15	24.00	6.85
	5 260	16.87	0.21	17.08	24.00	6.92
	5 300	17.11	0.21	17.32	24.00	6.68
	5 320	17.43	0.21	17.64	24.00	6.36
	5 500	17.19	0.21	17.40	24.00	6.60
	5 600	17.02	0.21	17.23	24.00	6.77
	5 720	16.88	0.21	17.09	24.00	6.91
	5 745	23.63	0.21	23.84	30.00	6.16
	5 785	23.70	0.21	23.91	30.00	6.09
	5 825	23.64	0.21	23.85	30.00	6.15
802.11ac _VHT20	5 180	16.89	0.21	17.10	24.00	6.90
	5 200	16.81	0.21	17.02	24.00	6.98
	5 240	17.17	0.21	17.38	24.00	6.62
	5 260	16.75	0.21	16.96	24.00	7.04
	5 300	17.09	0.21	17.30	24.00	6.70
	5 320	17.23	0.21	17.44	24.00	6.56
	5 500	17.37	0.21	17.58	24.00	6.42
	5 600	16.90	0.21	17.11	24.00	6.89
	5 720	16.80	0.21	17.01	24.00	6.99
	5 745	23.53	0.21	23.74	30.00	6.26



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (85) / (248) Pages

	5 785	23.77	0.21	23.98	30.00	6.02
	5 825	23.54	0.21	23.75	30.00	6.25
802.11n _HT40	5 190	16.92	0.43	17.35	24.00	6.65
	5 230	16.99	0.43	17.42	24.00	6.58
	5 270	17.66	0.43	18.09	24.00	5.91
	5 310	17.95	0.43	18.38	24.00	5.62
	5 510	17.81	0.43	18.24	24.00	5.76
	5 590	17.82	0.43	18.25	24.00	5.75
	5 710	17.36	0.43	17.79	24.00	6.21
	5 755	23.84	0.43	24.27	30.00	5.73
	5 795	23.94	0.43	24.37	30.00	5.63
802.11ac _VHT40	5 190	16.85	0.42	17.27	24.00	6.73
	5 230	16.93	0.42	17.35	24.00	6.65
	5 270	16.44	0.42	16.86	24.00	7.14
	5 310	16.66	0.42	17.08	24.00	6.92
	5 510	17.89	0.42	18.31	24.00	5.69
	5 590	17.90	0.42	18.32	24.00	5.68
	5 710	17.39	0.42	17.81	24.00	6.19
	5 755	23.81	0.42	24.23	30.00	5.77
5 795	23.85	0.42	24.27	30.00	5.73	
802.11ac _VHT80	5 210	17.48	0.84	18.32	24.00	5.68
	5 290	17.37	0.84	18.21	24.00	5.79
	5 530	16.97	0.84	17.81	24.00	6.19
	5 690	16.58	0.84	17.42	24.00	6.58
	5 775	19.60	0.84	20.44	30.00	9.56
Measurement uncertainty		± 1.5 dB				

See next pages for actual measured spectrum plots.



ANT1 + ANT2 + ANT3

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	18.15	0.20	18.35	23.23	4.88
	5 200	18.14	0.20	18.34	23.23	4.89
	5 240	18.47	0.20	18.67	23.23	4.56
	5 260	18.25	0.20	18.45	23.23	4.78
	5 300	18.47	0.20	18.67	23.23	4.56
	5 320	18.66	0.20	18.86	23.23	4.37
	5 500	18.31	0.20	18.51	23.23	4.72
	5 600	18.03	0.20	18.23	23.23	5.00
	5 720	17.84	0.20	18.04	23.23	5.19
	5 745	25.20	0.20	25.40	29.23	3.83
	5 785	25.27	0.20	25.47	29.23	3.76
	5 825	25.07	0.20	25.27	29.23	3.96
802.11n _HT20	5 180	18.17	0.21	18.38	23.23	4.85
	5 200	18.18	0.21	18.39	23.23	4.84
	5 240	18.35	0.21	18.56	23.23	4.67
	5 260	18.18	0.21	18.39	23.23	4.84
	5 300	18.46	0.21	18.67	23.23	4.56
	5 320	18.78	0.21	18.99	23.23	4.24
	5 500	18.66	0.21	18.87	23.23	4.36
	5 600	18.41	0.21	18.62	23.23	4.61
	5 720	18.25	0.21	18.46	23.23	4.77
	5 745	25.19	0.21	25.40	29.23	3.83
	5 785	25.25	0.21	25.46	29.23	3.77
	5 825	25.20	0.21	25.41	29.23	3.82
802.11ac _VHT20	5 180	18.23	0.21	18.44	23.23	4.79
	5 200	18.13	0.21	18.34	23.23	4.89
	5 240	18.51	0.21	18.72	23.23	4.51
	5 260	18.18	0.21	18.39	23.23	4.84
	5 300	18.46	0.21	18.67	23.23	4.56
	5 320	18.62	0.21	18.83	23.23	4.40
	5 500	18.76	0.21	18.97	23.23	4.26
	5 600	18.36	0.21	18.57	23.23	4.66
	5 720	18.25	0.21	18.46	23.23	4.77
	5 745	25.06	0.21	25.27	29.23	3.96



CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (87) / (248) Pages

	5 785	25.24	0.21	25.45	29.23	3.78
	5 825	25.03	0.21	25.24	29.23	3.99
802.11n _HT40	5 190	18.32	0.43	18.75	23.23	4.48
	5 230	18.35	0.43	18.78	23.23	4.45
	5 270	18.96	0.43	19.39	23.23	3.84
	5 310	19.25	0.43	19.68	23.23	3.55
	5 510	19.23	0.43	19.66	23.23	3.57
	5 590	19.20	0.43	19.63	23.23	3.60
	5 710	18.75	0.43	19.18	23.23	4.05
	5 755	25.33	0.43	25.76	29.23	3.47
	5 795	25.41	0.43	25.84	29.23	3.39
802.11ac _VHT40	5 190	18.26	0.42	18.68	23.23	4.55
	5 230	18.34	0.42	18.76	23.23	4.47
	5 270	17.79	0.42	18.21	23.23	5.02
	5 310	18.07	0.42	18.49	23.23	4.74
	5 510	19.30	0.42	19.72	23.23	3.51
	5 590	19.28	0.42	19.70	23.23	3.53
	5 710	18.79	0.42	19.21	23.23	4.02
	5 755	25.28	0.42	25.70	29.23	3.53
5 795	25.29	0.42	25.71	29.23	3.52	
802.11ac _VHT80	5 210	18.88	0.84	19.72	23.23	3.51
	5 290	18.66	0.84	19.50	23.23	3.73
	5 530	18.40	0.84	19.24	23.23	3.99
	5 690	17.97	0.84	18.81	23.23	4.42
	5 775	21.00	0.84	21.84	29.23	7.39
Measurement uncertainty		± 1.5 dB				

ANT1 + ANT2 + ANT3 + ANT4

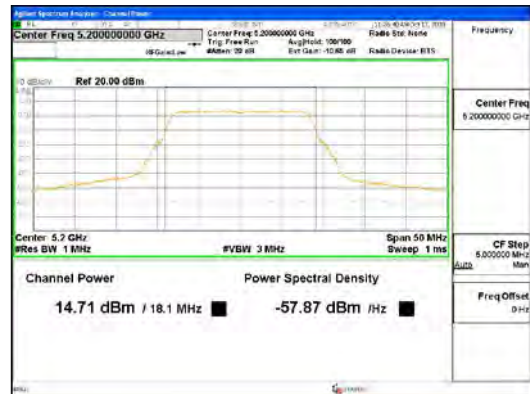
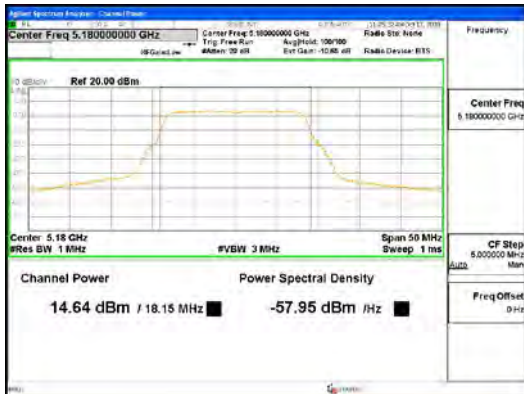
Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	19.27	0.20	19.47	21.98	2.51
	5 200	19.25	0.20	19.45	21.98	2.53
	5 240	19.53	0.20	19.73	21.98	2.25
	5 260	19.27	0.20	19.47	21.98	2.51
	5 300	19.56	0.20	19.76	21.98	2.22
	5 320	19.73	0.20	19.93	21.98	2.05
	5 500	19.47	0.20	19.67	21.98	2.31
	5 600	19.27	0.20	19.47	21.98	2.51
	5 720	19.01	0.20	19.21	21.98	2.77
	5 745	26.42	0.20	26.62	27.98	1.36
	5 785	26.50	0.20	26.70	27.98	1.28
	5 825	26.28	0.20	26.48	27.98	1.50
802.11n _HT20	5 180	19.22	0.21	19.43	21.98	2.55
	5 200	19.23	0.21	19.44	21.98	2.54
	5 240	19.43	0.21	19.64	21.98	2.34
	5 260	19.24	0.21	19.45	21.98	2.53
	5 300	19.56	0.21	19.77	21.98	2.21
	5 320	19.82	0.21	20.03	21.98	1.95
	5 500	19.87	0.21	20.08	21.98	1.90
	5 600	19.62	0.21	19.83	21.98	2.15
	5 720	19.45	0.21	19.66	21.98	2.32
	5 745	26.40	0.21	26.61	27.98	1.37
	5 785	26.42	0.21	26.63	27.98	1.35
	5 825	26.32	0.21	26.53	27.98	1.45
802.11ac _VHT20	5 180	19.33	0.21	19.54	21.98	2.44
	5 200	19.21	0.21	19.42	21.98	2.56
	5 240	19.53	0.21	19.74	21.98	2.24
	5 260	19.24	0.21	19.45	21.98	2.53
	5 300	19.52	0.21	19.73	21.98	2.25
	5 320	19.72	0.21	19.93	21.98	2.05
	5 500	19.94	0.21	20.15	21.98	1.83
	5 600	19.67	0.21	19.88	21.98	2.10
	5 720	19.45	0.21	19.66	21.98	2.32
	5 745	26.30	0.21	26.51	27.98	1.47



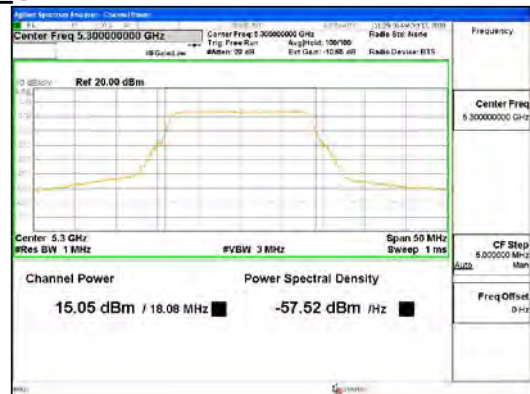
CTK Co., Ltd.
 (Ho-dong), 113, Yejik-ro, Cheoin-gu,
 Yongin-si, Gyeonggi-do, Korea
 Tel: +82-31-339-9970
 Fax: +82-31-624-9501

Report No.:
 CTK-2018-03453
 Page (89) / (248) Pages

	5 785	26.39	0.21	26.60	27.98	1.38
	5 825	26.19	0.21	26.40	27.98	1.58
802.11n _HT40	5 190	19.35	0.43	19.78	21.98	2.20
	5 230	19.35	0.43	19.78	21.98	2.20
	5 270	20.02	0.43	20.45	21.98	1.53
	5 310	20.32	0.43	20.75	21.98	1.23
	5 510	20.44	0.43	20.87	21.98	1.11
	5 590	20.38	0.43	20.81	21.98	1.17
	5 710	19.96	0.43	20.39	21.98	1.59
	5 755	26.50	0.43	26.93	27.98	1.05
	5 795	26.54	0.43	26.97	27.98	1.01
802.11ac _VHT40	5 190	19.34	0.42	19.76	21.98	2.22
	5 230	19.40	0.42	19.82	21.98	2.16
	5 270	18.85	0.42	19.27	21.98	2.71
	5 310	19.12	0.42	19.54	21.98	2.44
	5 510	20.51	0.42	20.93	21.98	1.05
	5 590	20.45	0.42	20.87	21.98	1.11
	5 710	20.02	0.42	20.44	21.98	1.54
	5 755	26.45	0.42	26.87	27.98	1.11
5 795	26.44	0.42	26.86	27.98	1.12	
802.11ac _VHT80	5 210	19.93	0.84	20.77	21.98	1.21
	5 290	19.71	0.84	20.55	21.98	1.43
	5 530	19.70	0.84	20.54	21.98	1.44
	5 690	19.20	0.84	20.04	21.98	1.94
	5 775	22.16	0.84	23.00	27.98	4.98
Measurement uncertainty	± 1.5 dB					



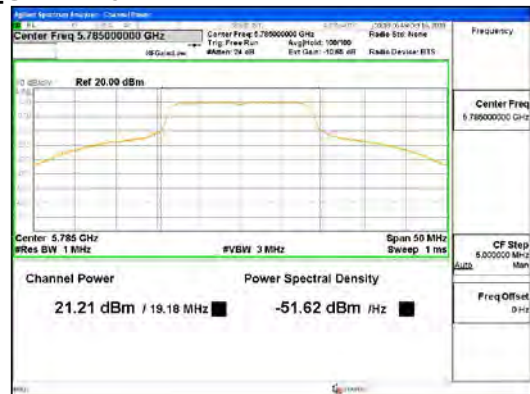
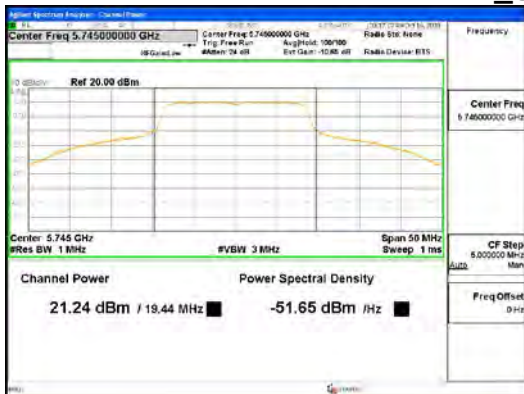
ANT1_802.11a_UNII 1



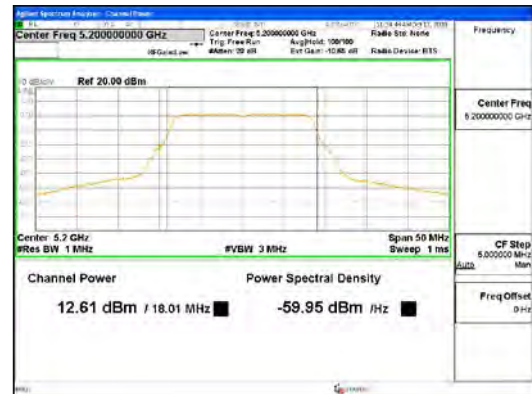
ANT1_802.11a_UNII 2A



ANT1_802.11a_UNII 2C



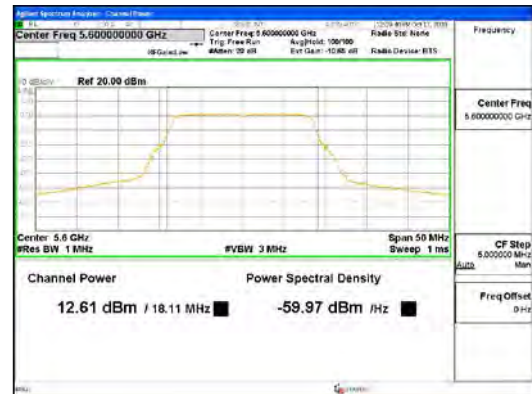
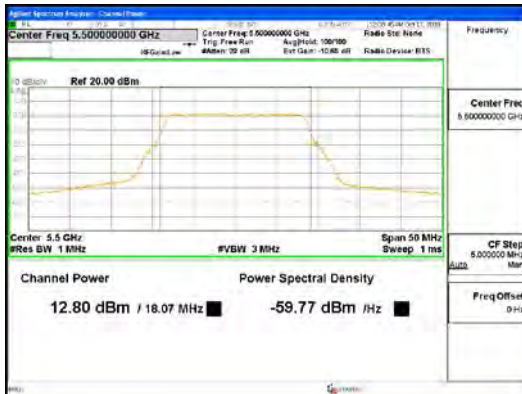
ANT1_802.11a_UNII 3



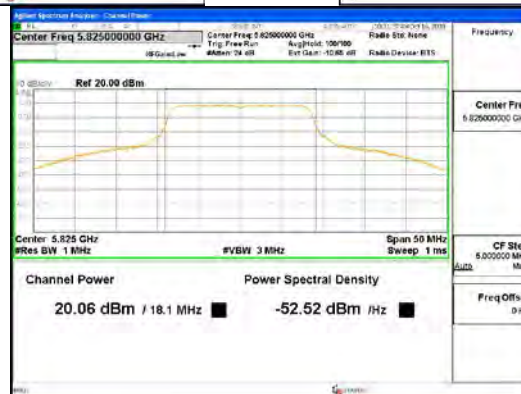
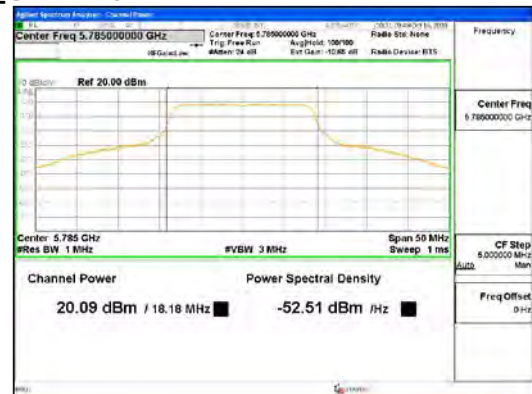
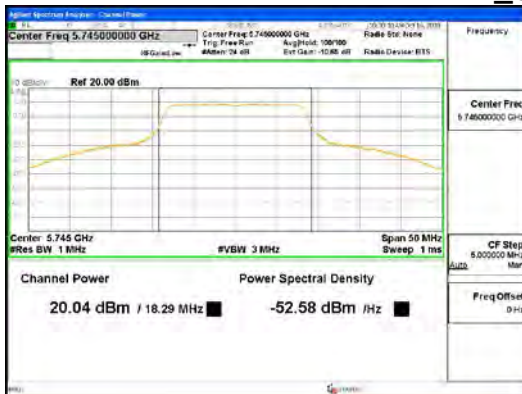
ANT2_802.11a_UNII 1



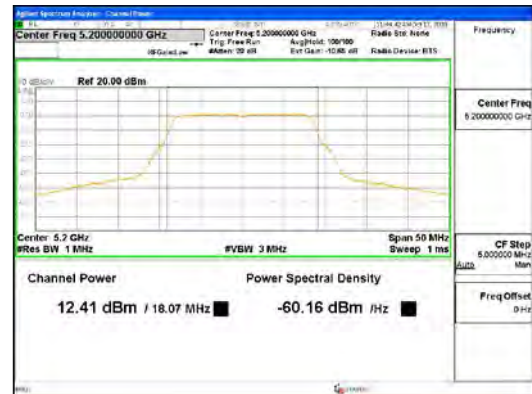
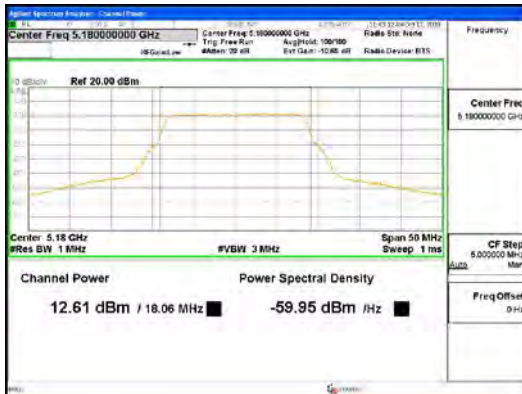
ANT2_802.11a_UNII 2A



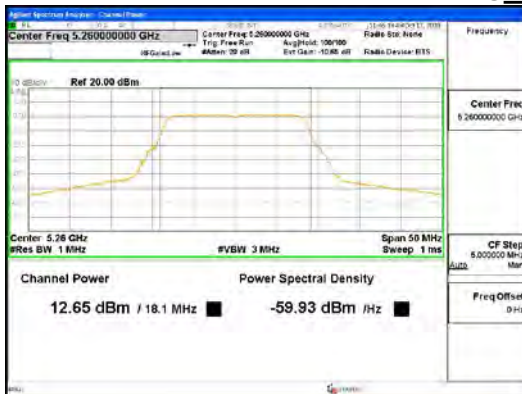
ANT2_802.11a_UNII 2C



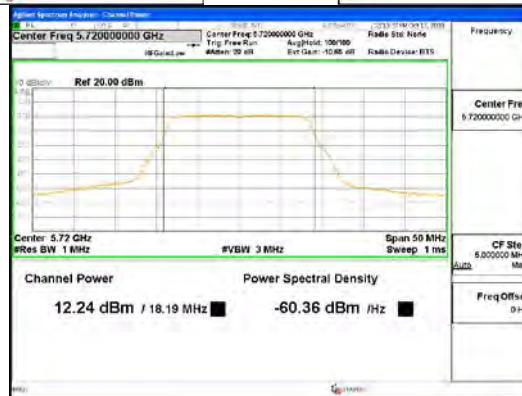
ANT2_802.11a_UNII 3



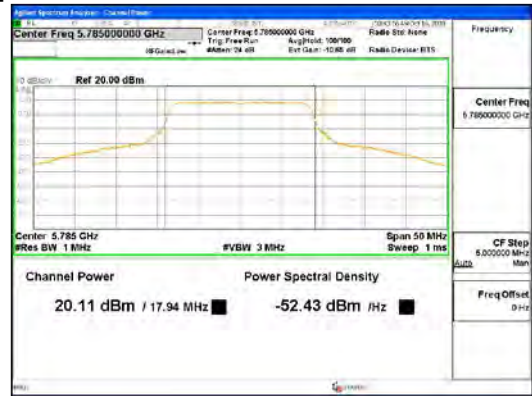
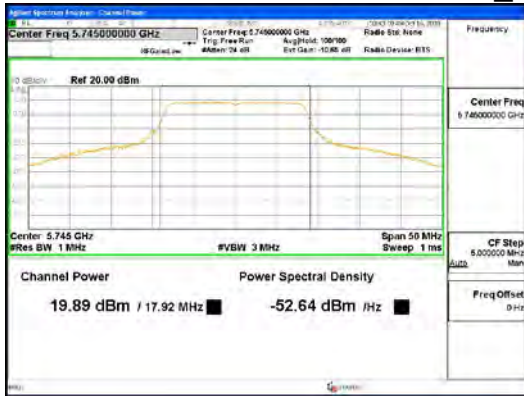
ANT3_802.11a_UNII 1



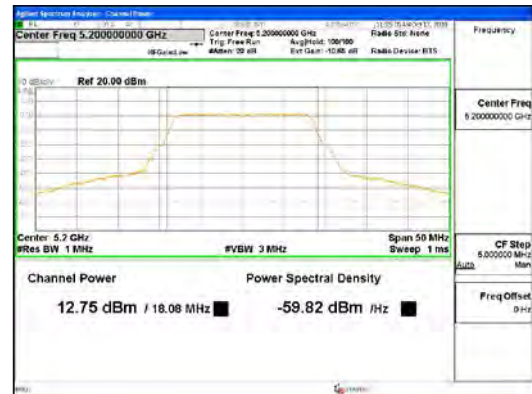
ANT3_802.11a_UNII 2A



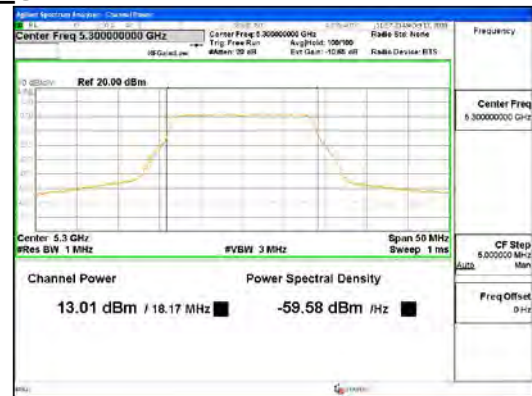
ANT3_802.11a_UNII 2C



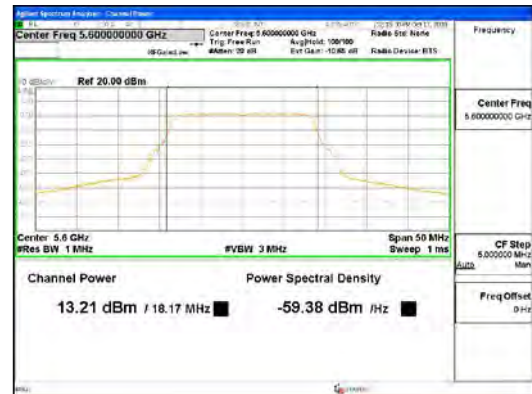
ANT3_802.11a_UNII 3



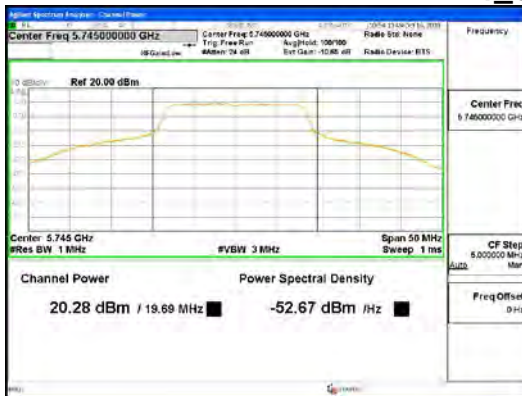
ANT4_802.11a_UNII 1



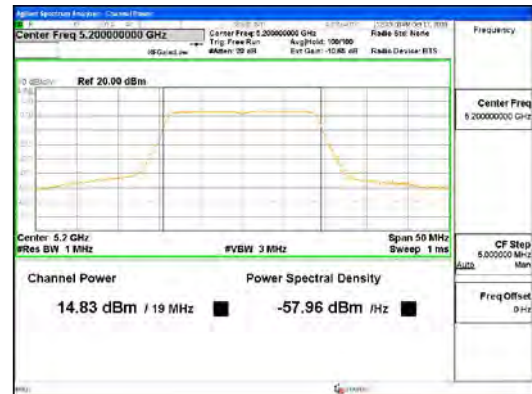
ANT4_802.11a_UNII 2A



ANT4_802.11a_UNII 2C



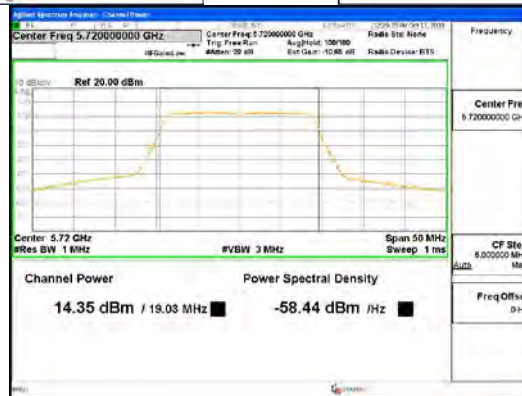
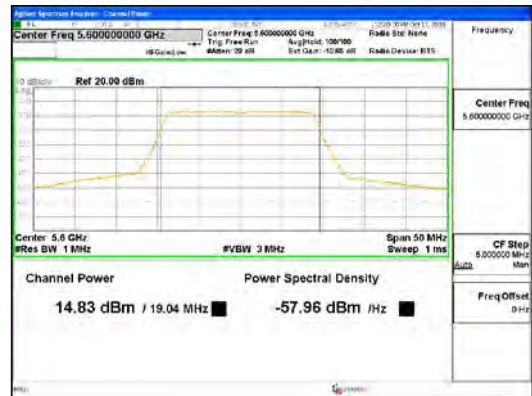
ANT4_802.11a_UNII 3



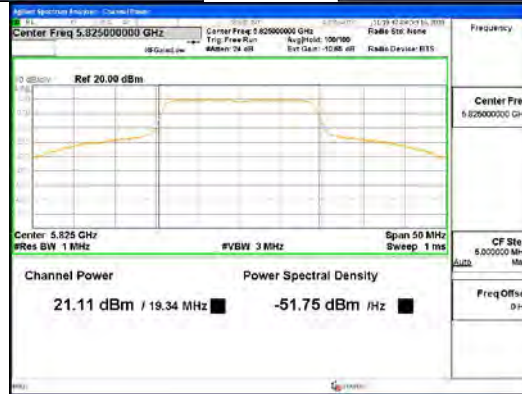
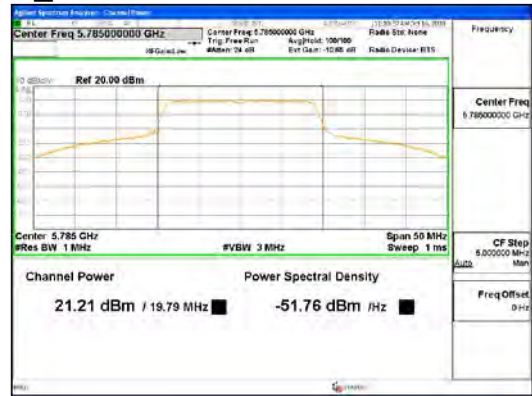
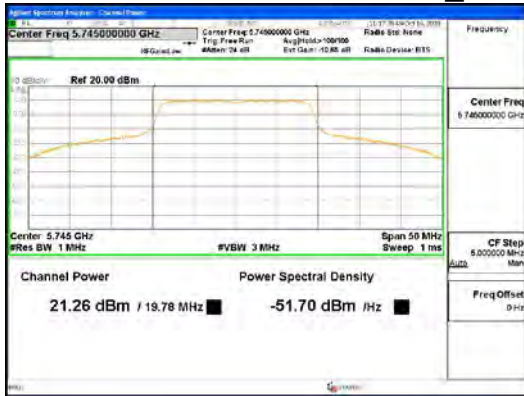
ANT1_802.11n_HT20_UNII 1



ANT1_802.11n_HT20_UNII 2A



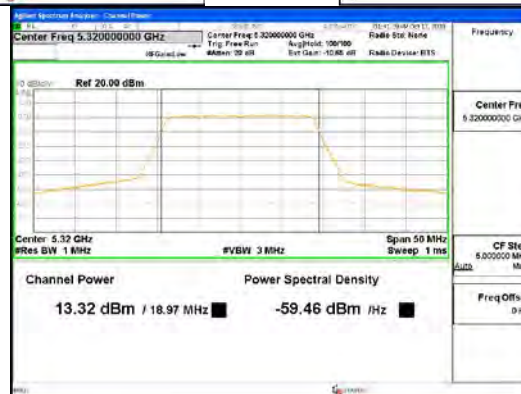
ANT1_802.11n_HT20_UNII 2C



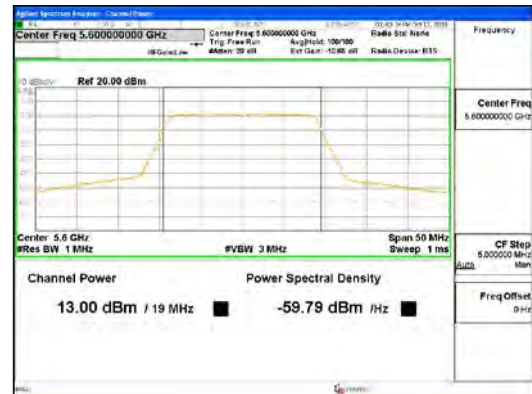
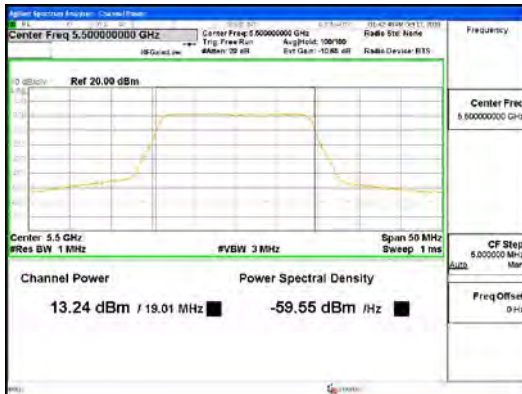
ANT1_802.11n_HT20_UNII 3



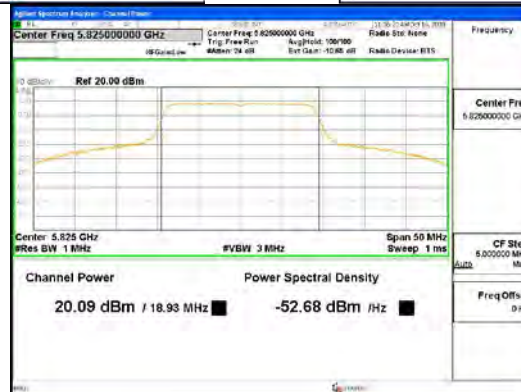
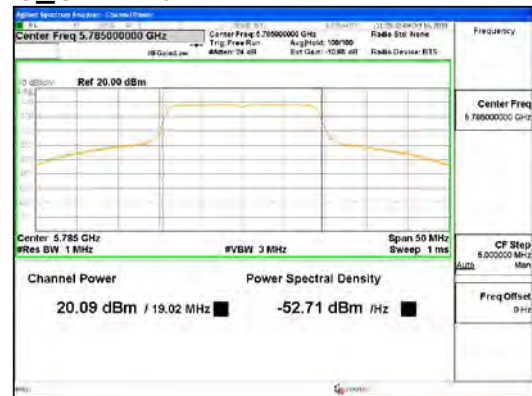
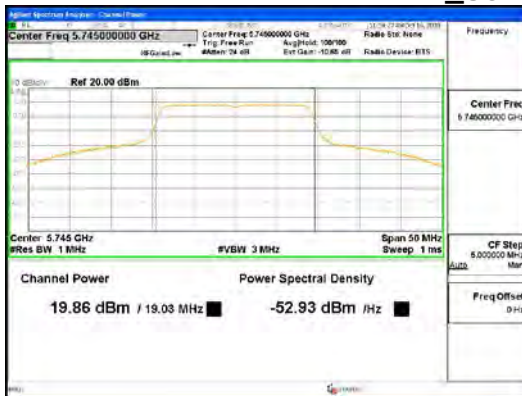
ANT2_802.11n_HT20_UNII 1



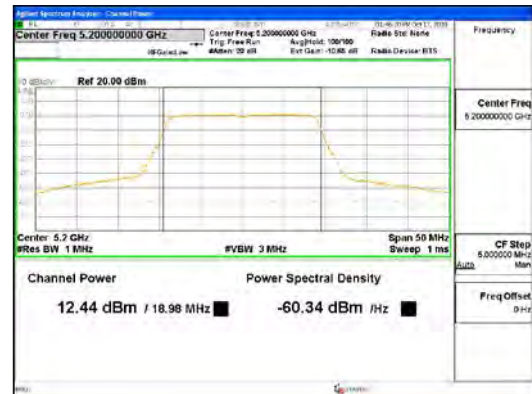
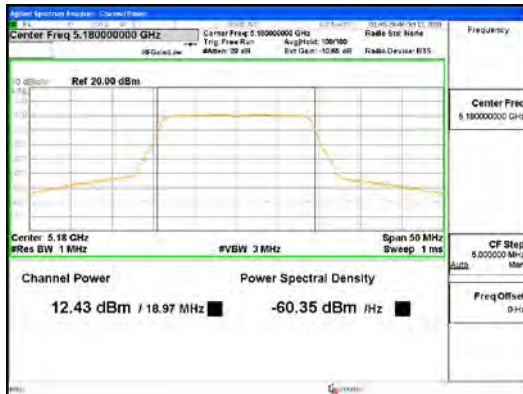
ANT2_802.11n_HT20_UNII 2A



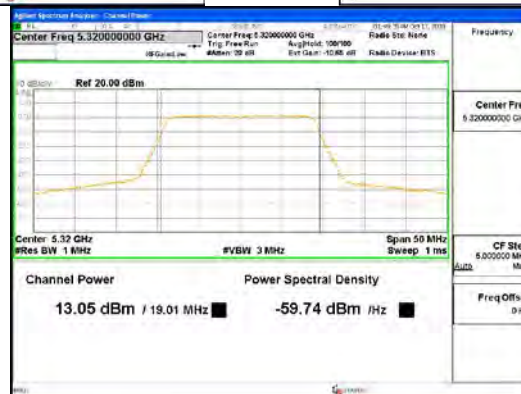
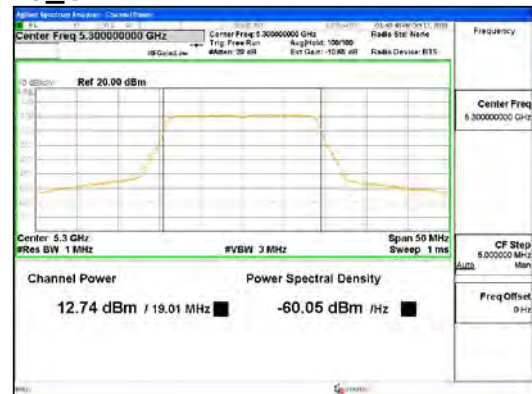
ANT2_802.11n_HT20_UNII 2C



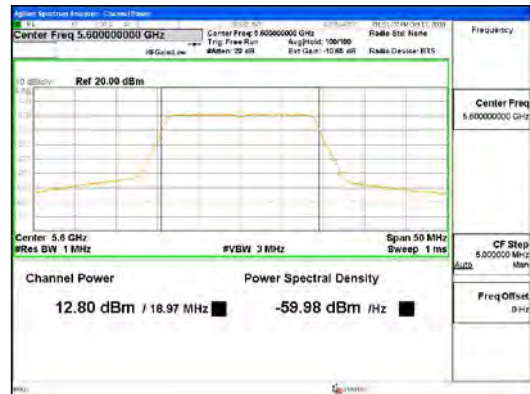
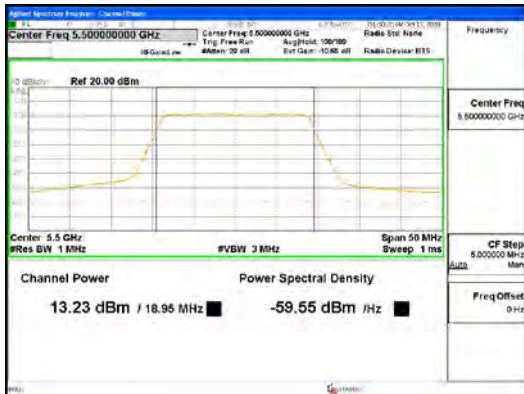
ANT2_802.11n_HT20_UNII 3



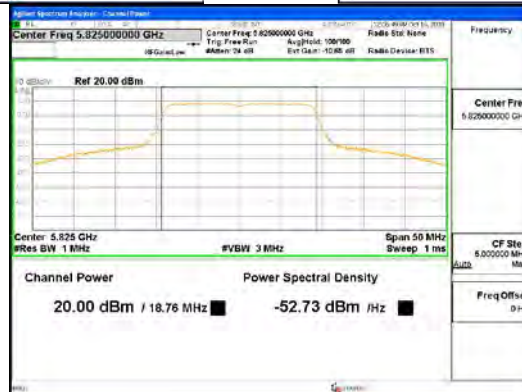
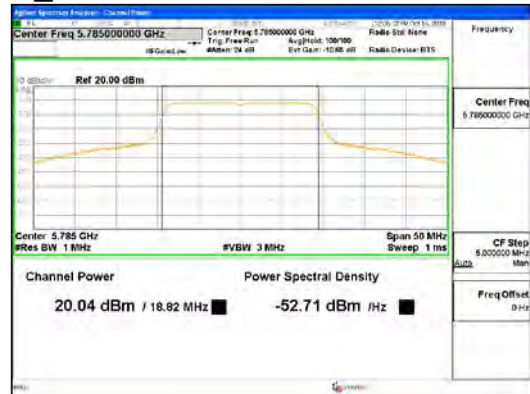
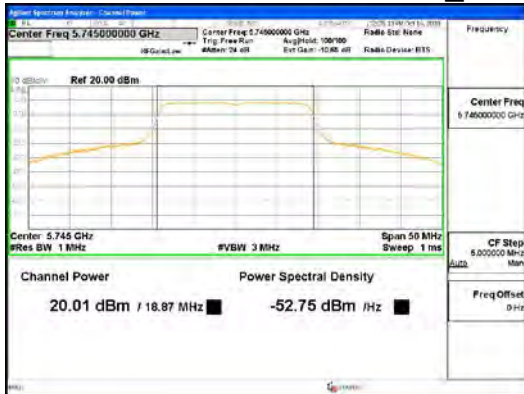
ANT3_802.11n_HT20_UNII 1



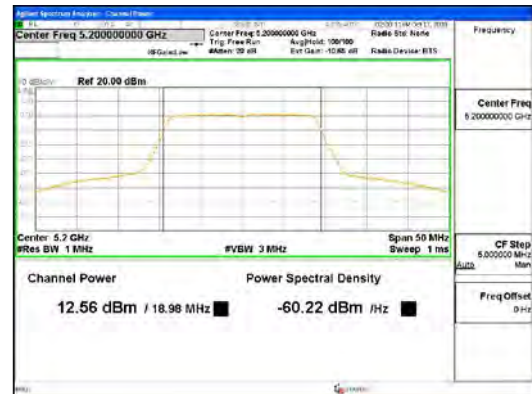
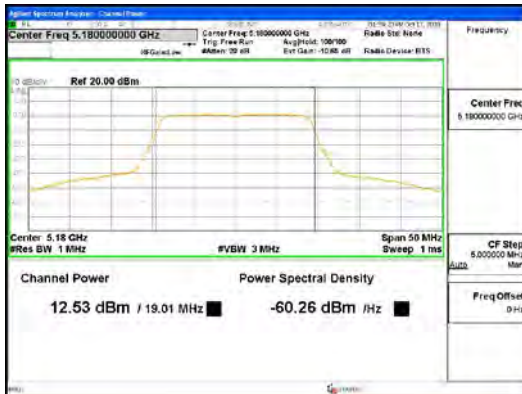
ANT3_802.11n_HT20_UNII 2A



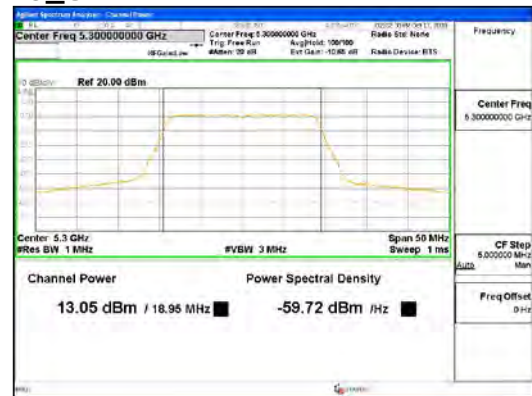
ANT3_802.11n_HT20_UNII 2C



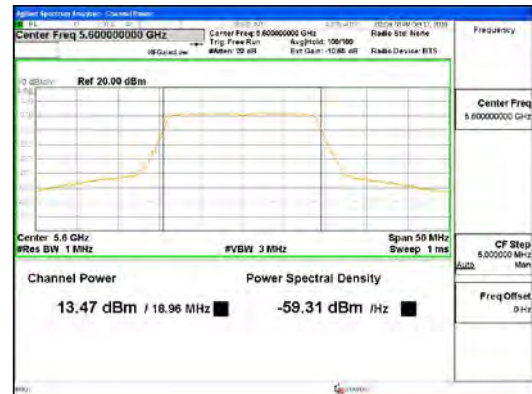
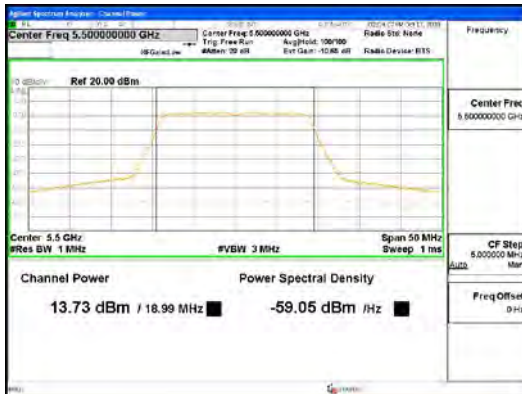
ANT3_802.11n_HT20_UNII 3



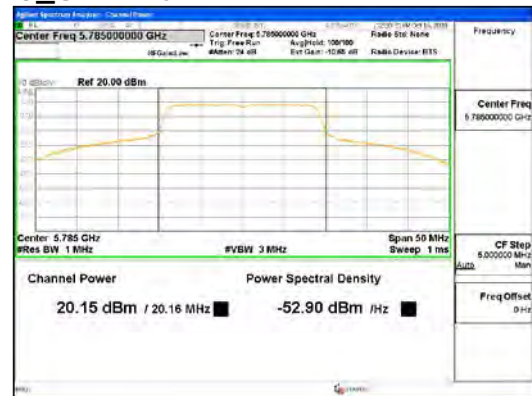
ANT4_802.11n_HT20_UNII 1



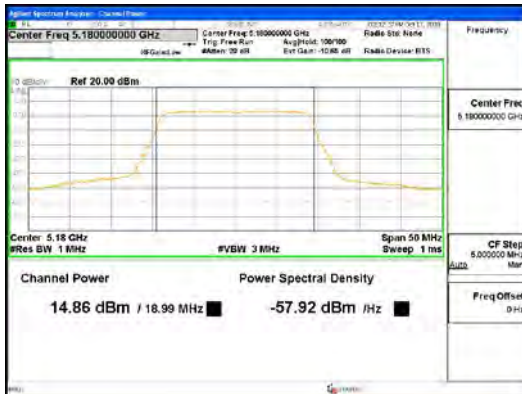
ANT4_802.11n_HT20_UNII 2A



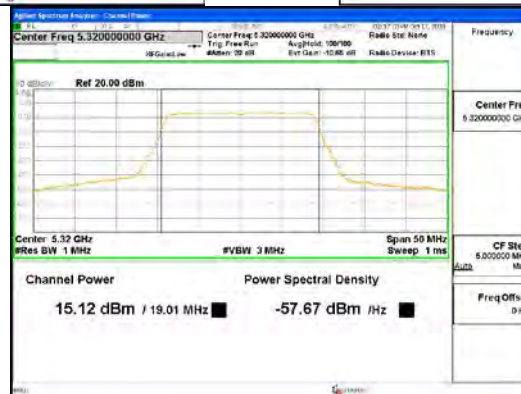
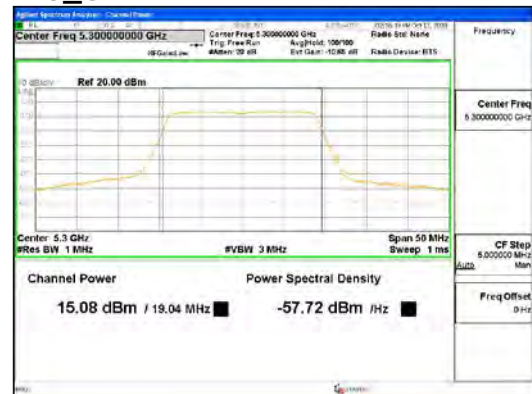
ANT4_802.11n_HT20_UNII_2C



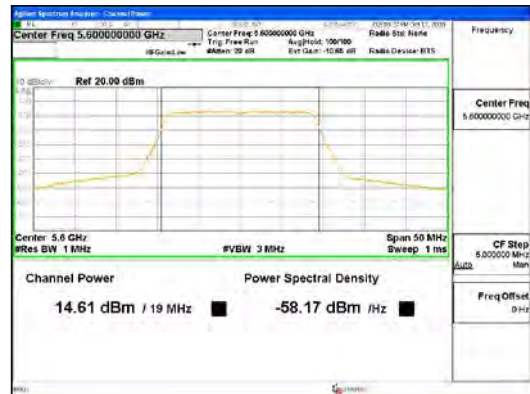
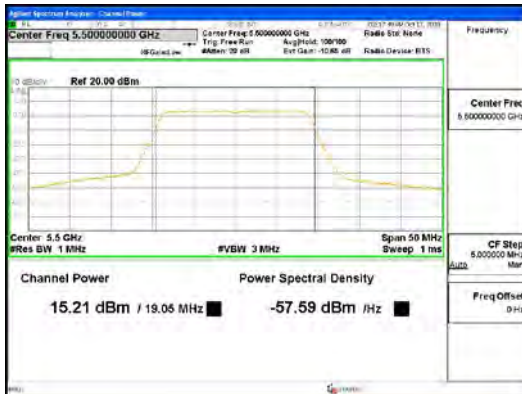
ANT4_802.11n_HT20_UNII_3



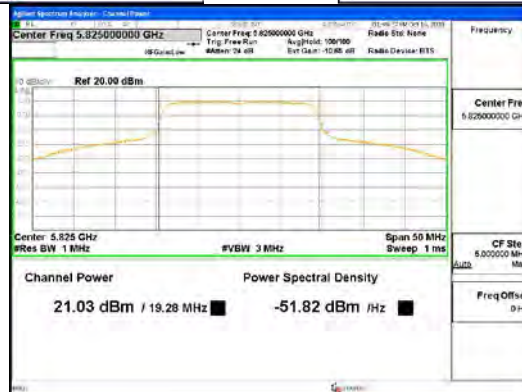
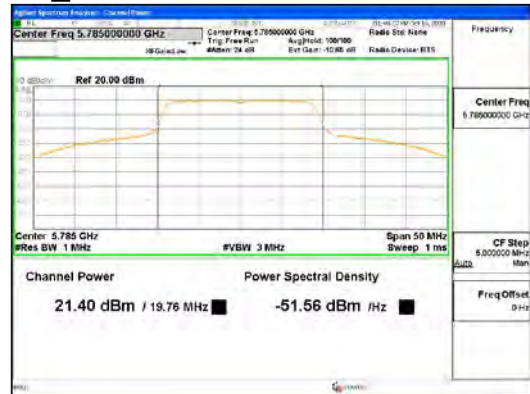
ANT1_802.11ac_VHT20_UNII 1



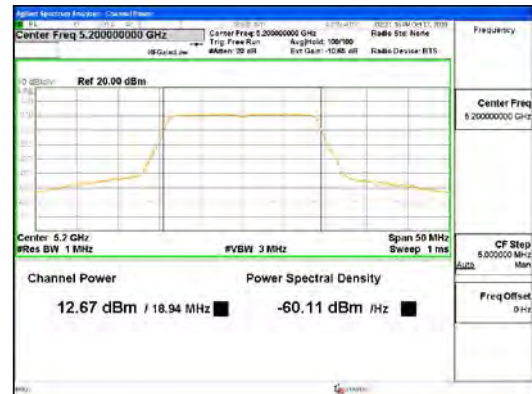
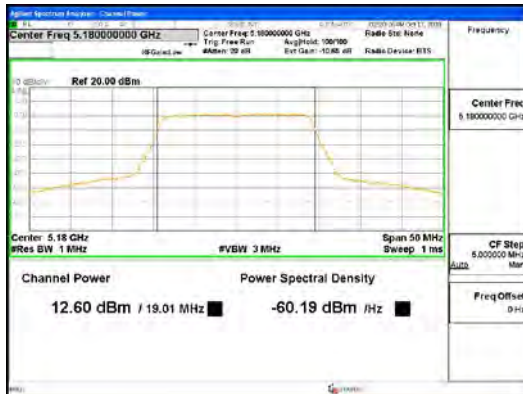
ANT1_802.11ac_VHT20_UNII 2A



ANT1_802.11ac_VHT20_UNII 2C



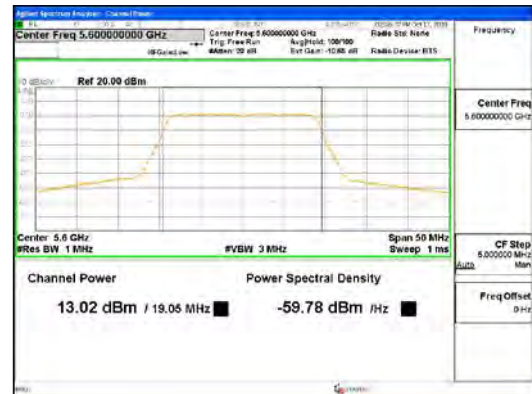
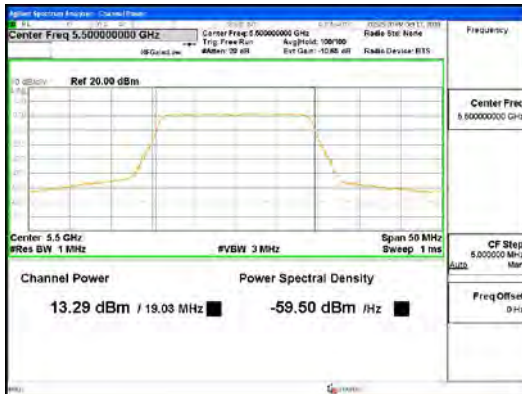
ANT1_802.11ac_VHT20_UNII 3



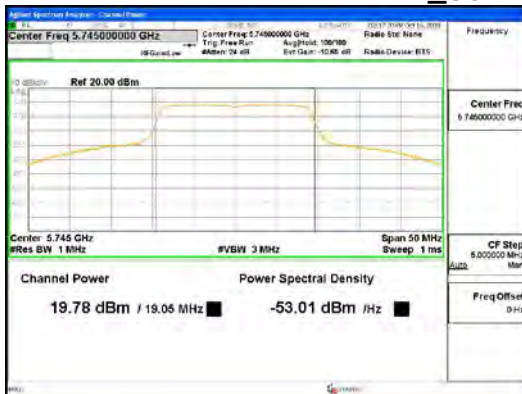
ANT2_802.11ac_VHT20_UNI1 1



ANT2_802.11ac_VHT20_UNI1 2A



ANT2_802.11ac_VHT20_UNII 2C



ANT2_802.11ac_VHT20_UNII 3