



FCC 47 CFR PART 15 SUBPART E
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

WIFI+BT module
MODEL NUMBER: WCT0LR2201J

FCC ID: 2AC23-WCT0LR2201J
IC: 12290A-WCT0LR2201J

REPORT NUMBER: 4788196596.1-4

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Prepared for

Hui Zhou Gaoshengda Technology Co.,LTD

**HuaXing RD,NO 2,ZhongKai High Technology Development Area,Huizhou,Guangdong,
China**

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch
Room 101, Building 10, Innovation Technology Park,
Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Tel: +86 769 33817100
Fax: +86 769 33244054
Website: www.ul.com

Revision History

Rev.	Issue Date	Revisions	Revised By
--	9/30/2017	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6/26db Bandwidth	FCC 15.407 (a)&(e) RSS-247 Clause 6.2	PASS
2	99% Bandwidth	RSS-Gen Clause 6.6	PASS
3	Maximum Conducted Output Power	FCC 15.407 (a) RSS-247 Clause 6.2	PASS
4	Power Spectral Density	FCC 15.407 (a) RSS-247 Clause 6.2	PASS
5	Antenna Conducted Spurious Emission	FCC 15.407 (b) RSS-247 Clause 6.2	PASS
6	Radiated Bandedge and Spurious Emission	FCC 15.407 (a) FCC 15.209 FCC 15.205 RSS-247 Clause 6.2 RSS-GEN Clause 8.9	PASS
7	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	PASS
8	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	PASS
9	Frequency Stability	FCC 15.407 (g)	PASS

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Hui Zhou Gaoshengda Technology Co.,LTD
Address: HuaXing RD,NO 2,ZhongKai High Technology Development Area,Huizhou,Guangdong, China

Manufacturer Information

Company Name: Hui Zhou Gaoshengda Technology Co.,LTD
Address: HuaXing RD,NO 2,ZhongKai High Technology Development Area,Huizhou,Guangdong, China

EUT Description

Product Name	WIFI+BT module
Brand Name	GSD
Model Name	WCT0LR2201J
Sample ID	1220986
Sample Status	Good
Sample Received date	October 20, 2017
Date Tested	October 23~November 27, 2017

APPLICABLE STANDARDS

STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass
ISED RSS-247 Issue 2	Pass
ISED RSS-GEN Issue 4	Pass

Tested By:

Kebo Zhang
Engineer
Approved By:

Stephen Guo
Laboratory Manager

Checked By:

Shawn Wen
Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 789033 D02 v02r01, KDB 662911 D01 v02r01, RSS-GEN Issue 4, RSS-247 Issue 2 and KDB414788 D01 Radiated Test Site v01.

3. FACILITIES AND ACCREDITATION

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	<p>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01.</p> <p>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187.</p> <p>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.</p>

Note: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.2dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.04dB(1-6GHz) 5.30dB (6GHz-18Gz) 5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	WIFI+BT module
Model Name	WCT0LR2201J
Power Supply	AC120V/60Hz
Hardware Version	V1.0
Software Version	V1.2

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	IEE Std. 802.11	Frequency (MHz)	Max Power (dBm)	Max EIRP (dBm)
UNII-1	a	5150-5250	13.95	17.69
UNII-3	a	5725-5850	14.08	N/A
UNII-1	n(HT20)	5150-5250	15.92	19.66
UNII-3	n(HT20)	5725-5850	16.02	N/A
UNII-1	n(HT40)	5150-5250	15.87	19.61
UNII-3	n(HT40)	5725-5850	16.03	N/A
UNII-1	ac(HT20)	5150-5250	13.02	16.76
UNII-3	ac(HT20)	5725-5850	13.04	N/A
UNII-1	ac(HT40)	5150-5250	12.97	16.71
UNII-3	ac(HT40)	5725-5850	13.17	N/A
UNII-1	ac(HT80)	5150-5250	13.11	16.85
UNII-3	ac(HT80)	5725-5850	12.13	N/A

5.3. CHANNEL LIST

UNII-1		UNII-1		UNII-1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

UNII-3		UNII-3		UNII-3	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

5.4. TEST CHANNEL CONFIGURATION

Pretest Test Mode	Description
Mode 1	TX A Mode / CH36, CH40, CH48 (UNII-1)
Mode 2	TX N20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 3	TX N40 Mode / CH38, CH46 (UNII-1)
Mode 4	TX AC20 Mode / CH36, CH40, CH48 (UNII-1)
Mode 5	TX AC40 Mode / CH38, CH46 (UNII-1)
Mode 6	TX AC80 Mode / CH42 (UNII-1)
Mode 7	TX A Mode / CH149, CH157, CH165 (UNII-3)
Mode 8	TX N20 Mode / CH149, CH157, CH165 (UNII-3)
Mode 9	TX N40 Mode / CH151, CH159 (UNII-3)
Mode 10	TX AC20 Mode / CH149, CH157, CH165 (UNII-3)
Mode 11	TX AC40 Mode / CH151, CH159 (UNII-3)
Mode 12	TX AC80 Mode / CH155 (UNII-3)

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under UNII-1 and UNII-3 Band					
Test Software	REALTEK				

Band	Mode	Rate	Channel	Antenna1	Antenna2	
UNII-1	11a	6M	36	52	50	
			40	52	53	
			48	52	54	
	11a		149	42	44	
			157	42	47	
			165	43	48	

Band	Mode	Rate	Channel	Antenna1	Antenna2	
UNII-1	11n (20M)	MCS0	36	53	56	
			40	53	56	
			48	53	57	
	11n(40M)		38	42	45	
			46	53	56	
			149	37	37	
UNII-3	11n (20M)		157	36	40	
			165	36	42	
			151	36	37	
	11n(40M)		159	36	40	

Band	Mode	Rate	Channel	Soft set value	Soft set value	
UNII-1	11ac (20M)	MCS0	36	48	49	
			40	48	49	
			48	48	49	
	11ac (40M)		38	45	46	
			46	47	49	
			42	48	50	
UNII-3	11ac (20M)		149	37	38	
			157	36	41	
			165	36	42	
	11ac (40M)		151	35	37	
			159	35	40	
			155	36	39	

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna No.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
ANT 2	5150-5250	External Antenna	3.73
	5725-5850		4.97
Antenna 2	5150-5250		3.73
	5725-5850		4.97

IEE Std. 802.11	Transmit and Receive Mode	Description
a	<input checked="" type="checkbox"/> 2TX, 2RX	ANT 2 and ANTENNA 2 can be used as transmitting/receiving antenna.
n(MCS0-15)	<input checked="" type="checkbox"/> 2TX, 2RX	ANT 2 and ANTENNA 2 can be used as transmitting/receiving antenna.
ac(MCS0-9)	<input checked="" type="checkbox"/> 2TX, 2RX	ANT 2 and ANTENNA 2 can be used as transmitting/receiving antenna.

Note: 1. The EUT supports the diversity function for WLAN.
2. All the modes had been tested but only the worst data in the report.

5.7. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28°C
Voltage :	VL	N/A
	VN	AC 120V/60Hz
	VH	N/A

Note: VL= Lower Extreme Test Voltage

VN= Nominal Voltage

VH= Upper Extreme Test Voltage

TN= Normal Temperature

5.8. WORST-CASE CONFIGURATIONS

IEEE Std. 802.11	Modulation Technology	Modulation Type	Data Rate (Mbps)	Worst Case (Mbps)
a	OFDM	BPSK, QPSK, 16QAM, 64QAM	54/48/36/24/18/12/9/6	6

802.11n HT20/HT40							
Antenna	MCS	Modulation	HT20 Data Rate(Mbps)		HT40 Data Rate(Mbps)		Worst Case (Mbps)
			GI=800ns	GI=400ns	GI=800ns	GI=400ns	
2x2	8	BPSK	13	14.4	27	30	MCS8
	9	QPSK	26	28.9	54	60	MCS8
	10	QPSK	39	43.3	81	90	MCS8
	11	16-QAM	52	57.8	108	120	MCS8
	12	16-QAM	78	86.7	162	180	MCS8
	13	64-QAM	104	115.6	216	240	MCS8
	14	64-QAM	117	130	243	270	MCS8
	15	64-QAM	130	144.4	270	300	MCS8

802.11ac HT20/HT40/HT80									
Antenna	MCS	Modulation	HT20 Data Rate (Mbps)		HT40 Data Rate (Mbps)		HT80 Data Rate (Mbps)		Worst Case (Mbps)
			GI=800ns	GI=400ns	GI=800ns	GI=400ns	GI=800ns	GI=400ns	
2x2	0	BPSK	13	14.4	27	30	58.5	65	MCS0
	1	QPSK	26	28.9	54	60	117	130	MCS0
	2	QPSK	39	43.3	81	90	175.5	195	MCS0
	3	16-QAM	52	57.8	108	120	234	260	MCS0
	4	16-QAM	78	86.7	162	180	351	390	MCS0
	5	64-QAM	104	115.6	216	240	468	520	MCS0
	6	64-QAM	117	130.3	243	270	526.5	585	MCS0
	7	64-QAM	130	144.4	270	300	585	650	MCS0
	8	256-QAM	156	173.3	324	360	702	780	MCS0
	9	256-QAM	N/A	N/A	360	400	780	866.7	MCS0

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	PC	Dell	Vostro 3902	8KNDB2
2	Debug	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	PCIEX	N/A	N/A	0.1	N/A

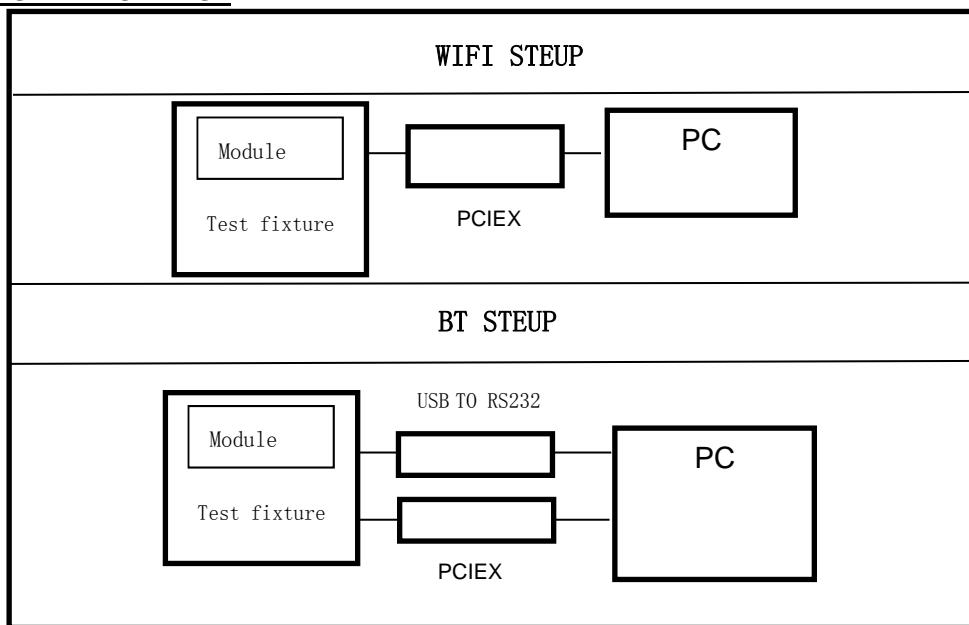
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

The EUT can work in engineering mode with a software through a PC.

SETUP DIAGRAM FOR TEST



5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	101961	Dec.20, 2016	Dec.19, 2017
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	101983	Dec.20, 2016	Dec.19, 2017
<input checked="" type="checkbox"/>	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Feb.10, 2017	Feb.10, 2018
Software						
Used	Description		Manufacturer	Name	Version	
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance		UL	Antenna port	Ver. 7.2	
Radiated Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400 036	Feb. 24, 2017	Feb. 24, 2018
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A090 99	Feb. 13, 2017	Feb. 13, 2018
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Dec. 20, 2016	Dec. 20, 2017
<input checked="" type="checkbox"/>	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019
<input checked="" type="checkbox"/>	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan. 14, 2017	Jan. 14, 2018
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec. 20, 2016	Dec. 20, 2017
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 26, 2019
Software						
Used	Description		Manufacturer	Name	Version	
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance		Farad	EZ-EMC	Ver. UL-3A1	
Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030A	MY55410 512	Dec. 20, 2016	Dec. 20, 2017
<input checked="" type="checkbox"/>	Power Meter	Keysight	N9031A	MY55416 024	Feb. 13, 2017	Feb. 13, 2018
<input checked="" type="checkbox"/>	Power Sensor	Keysight	N9323A	MY55440 013	Feb. 13, 2017	Feb. 13, 2018
<input checked="" type="checkbox"/>	Power Sensor	Keysight	U2021XA	MY57030 004	Feb. 13, 2017	Feb. 13, 2018

6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

RESULTS

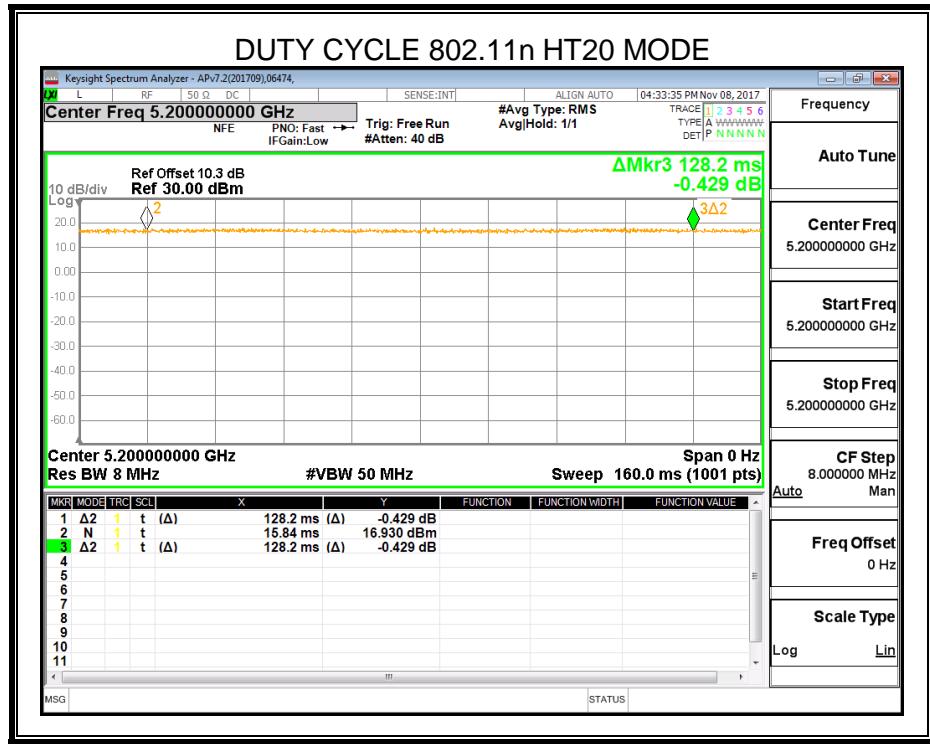
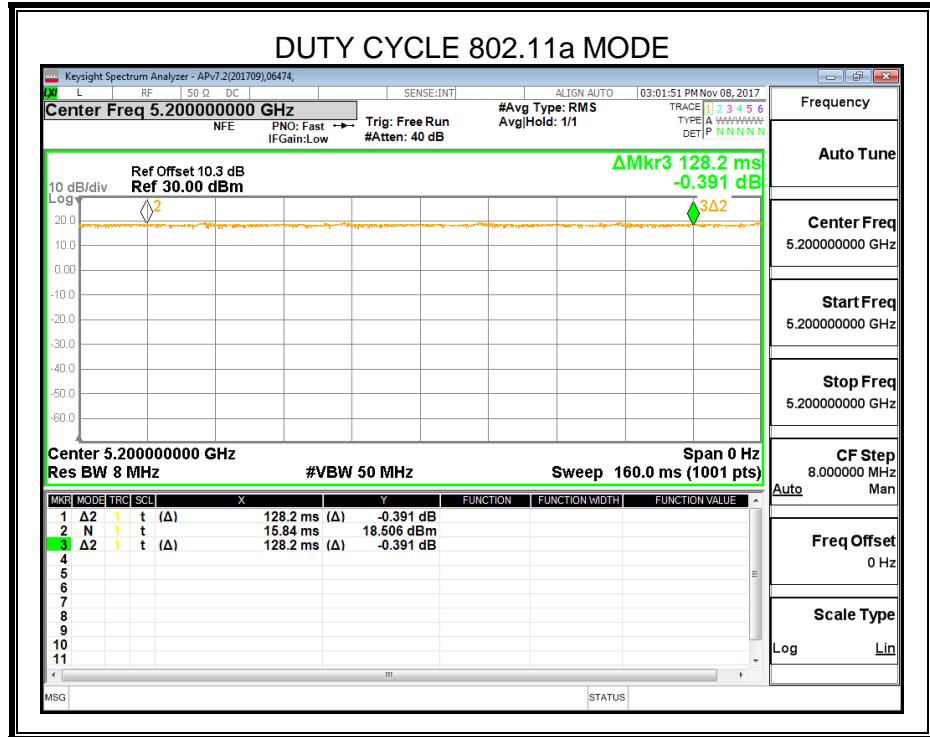
ANTENNA1

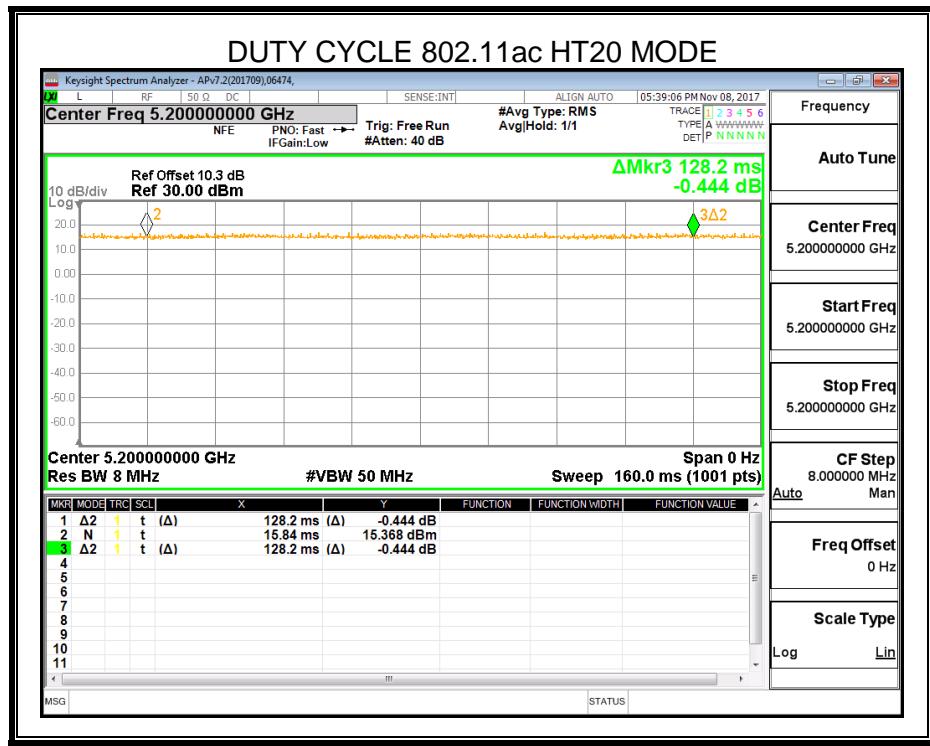
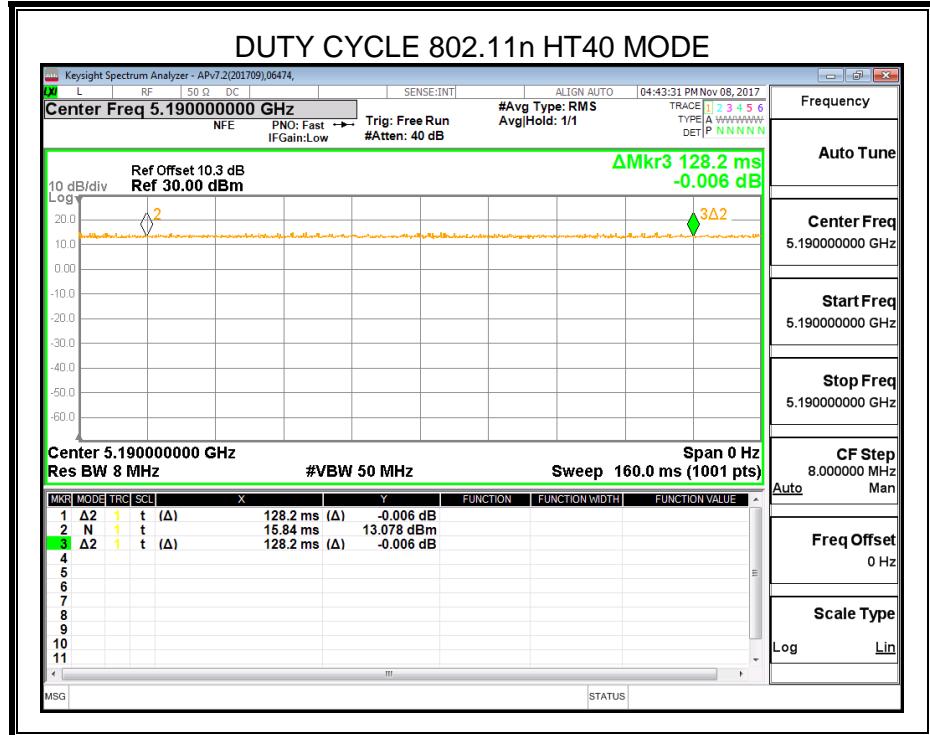
Mode	ON Time (ms)	Period (ms)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (KHz)
11a 1TX	100	100	1	100%	0	0.01
11n HT20 CDD	100	100	1	100%	0	0.01
11n HT40 CDD	100	100	1	100%	0	0.01
11ac HT20 CDD	100	100	1	100%	0	0.01
11ac HT40 CDD	100	100	1	100%	0	0.01
11ac HT80 CDD	100	100	1	100%	0	0.01

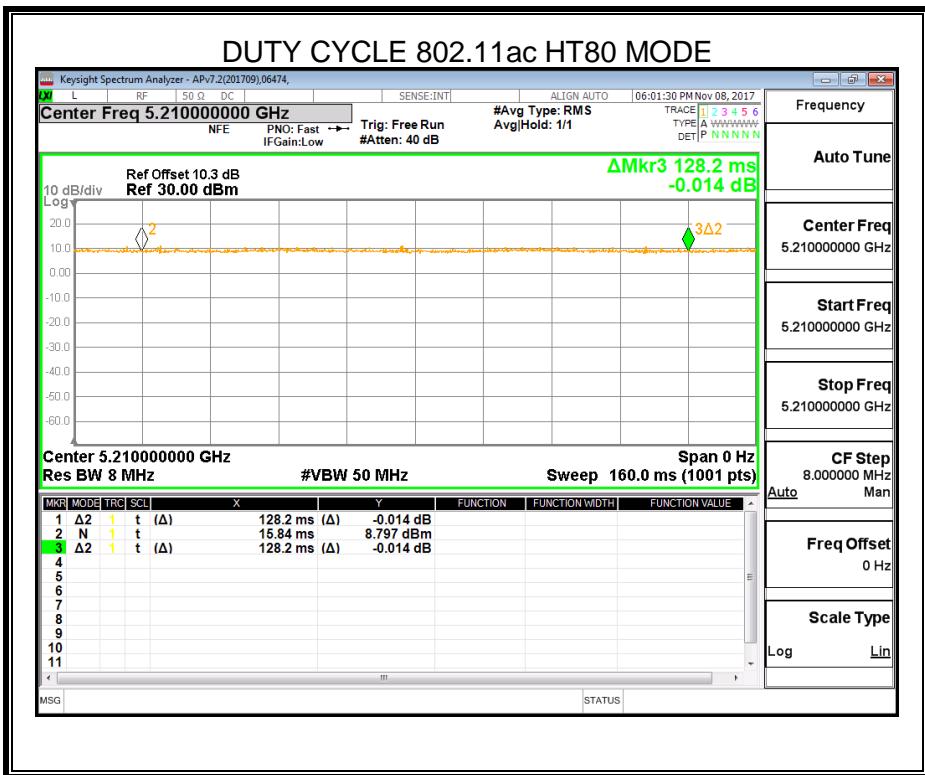
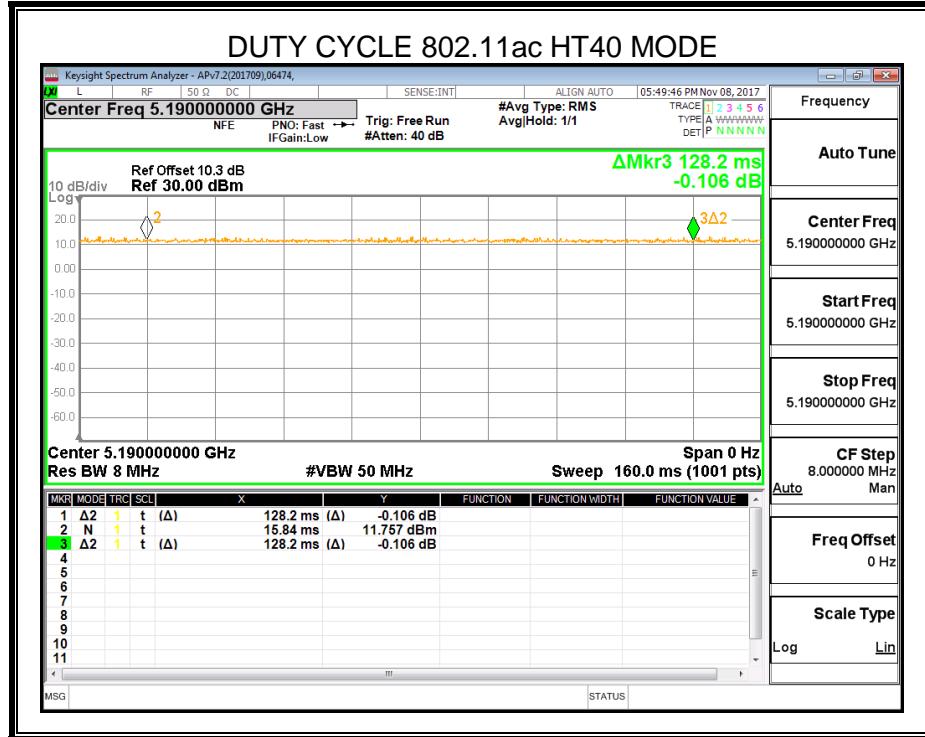
Note: Duty Cycle Correction Factor=10log(1/x).

Where: x is Duty Cycle(Linear)

ANT 2 and Antenna 2 has the same duty cycle, only ANT 2 data show here.







6.2. 6/26/99% dB BANDWIDTH

LIMITS

FCC Part15, Subpart E/ RSS-247		
Test Item	Limit	Frequency Range (MHz)
Bandwidth	26 dB Bandwidth	5150-5250
	26 dB Bandwidth	5250-5350
	26 dB Bandwidth	For FCC:5470-5725 For IC:5470-5600 5650-5725
	Minimum 500kHz 6dB Bandwidth	5725-5850

RSS-247 ISSUE 2			
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	2400-2483.5

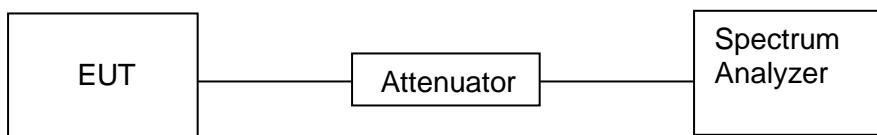
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6dB Bandwidth: RBW=100kHz For 26dB Bandwidth: approximately 1% of the emission bandwidth. For 99dB Bandwidth: approximately 1%~5% of the emission bandwidth.
VBW	For 6dB Bandwidth : VBW=300kHz For 26dB Bandwidth : >3RBW For 99%dB Bandwidth : >3RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and 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 6/26/99% dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



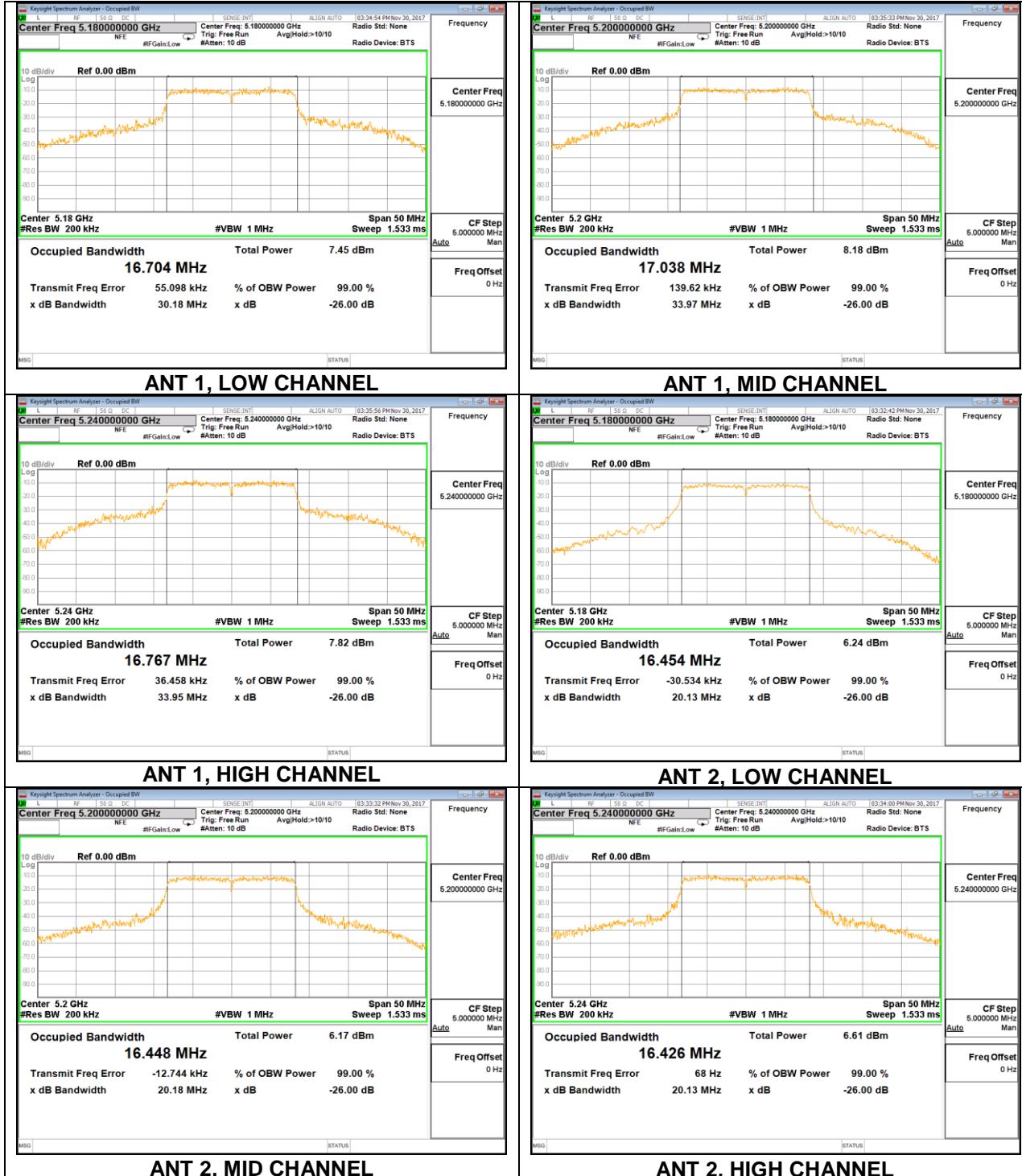
RESULTS

6.2.1. 802.11a SISO MODE

6.2.1.1. UNII-1 BAND

Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)
Low	5180	30.18	20.13
Mid	5200	33.97	20.18
High	5240	33.95	20.13

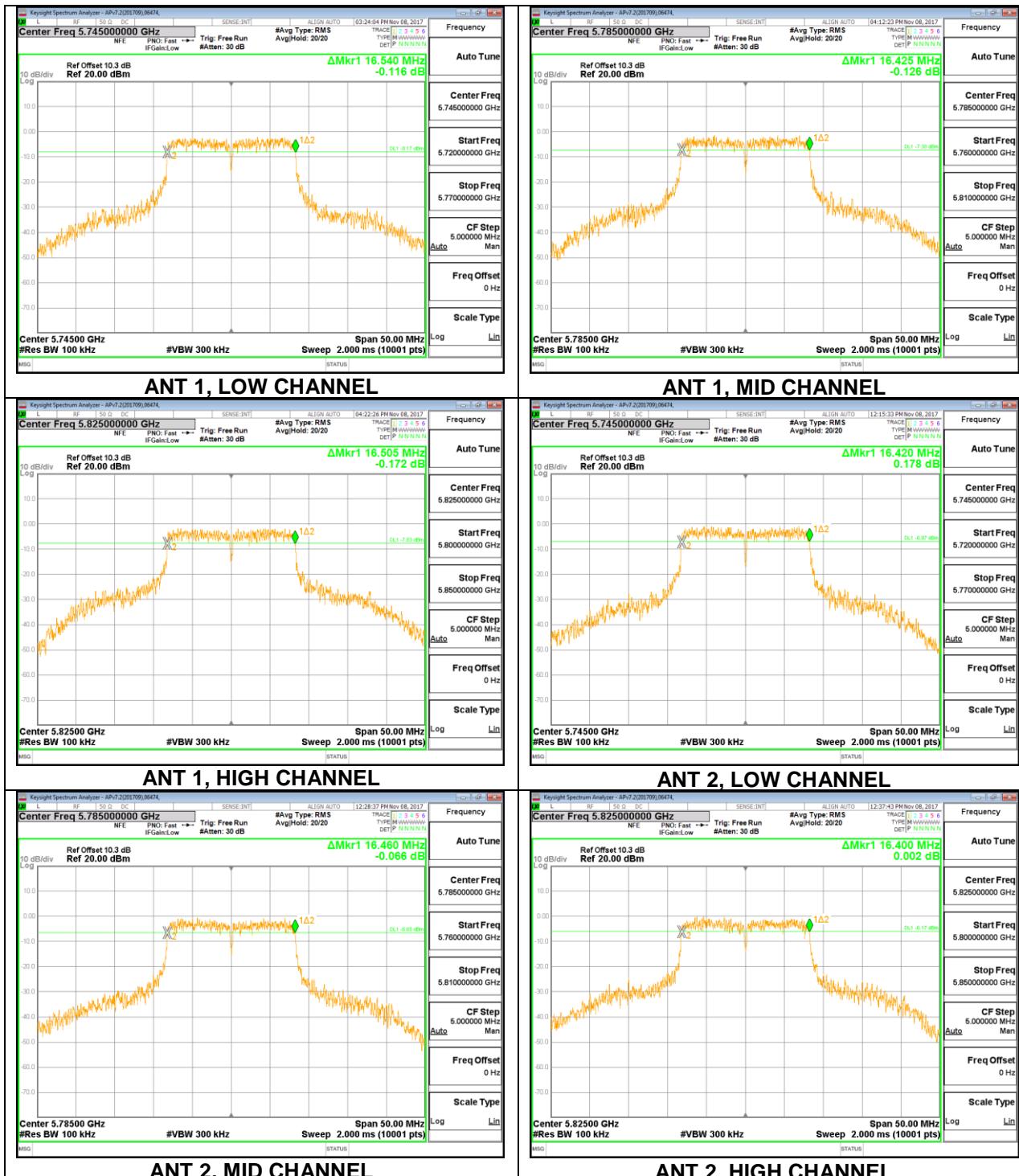
Channel	Frequency (MHz)	99% BW ANT1 (MHz)	99% BW ANT2 (MHz)
Low	5180	16.704	16.454
Mid	5200	17.038	16.448
High	5240	16.767	16.426



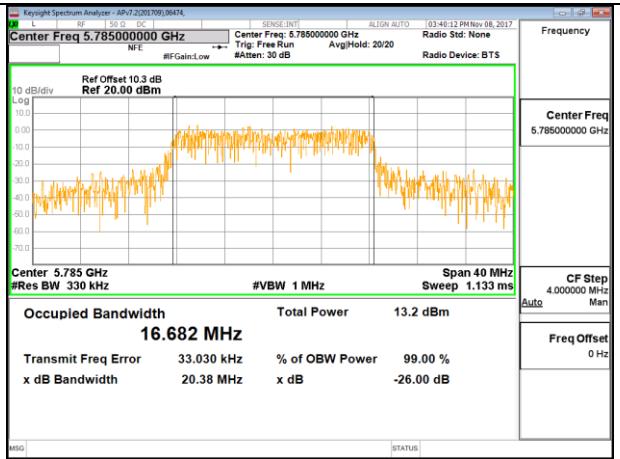
6.2.1.2. UNII-3 BAND

Channel	Frequency (MHz)	6 dB BW ANT1 (MHz)	6 dB BW ANT2 (MHz)	Limit (KHz)	Result
Low	5745	16.540	16.420	500	PASS
Mid	5785	16.425	16.460	500	PASS
High	5825	16.505	16.400	500	PASS

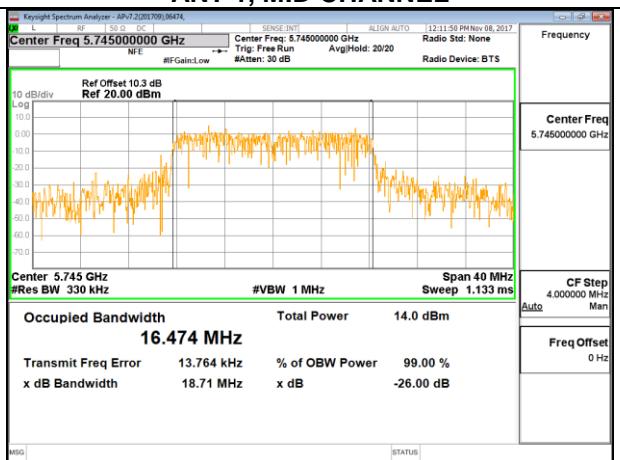
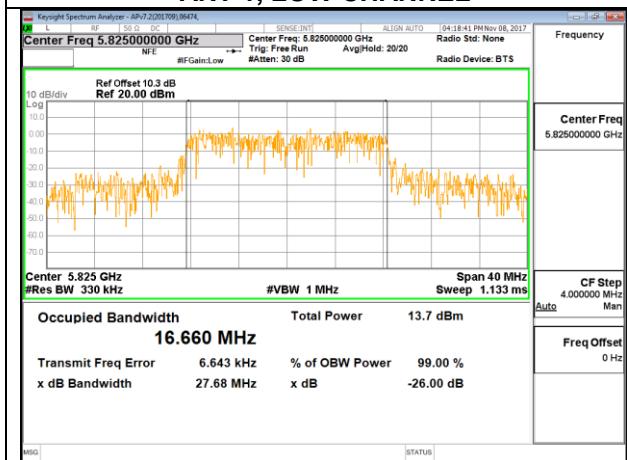
Channel	Frequency (MHz)	99% BW ANT1 (MHz)	99% BW ANT2 (MHz)
Low	5745	16.587	16.474
Mid	5785	16.682	16.521
High	5825	16.660	16.570



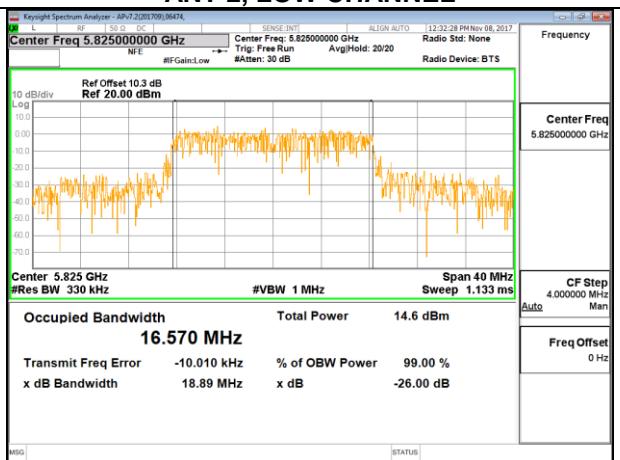
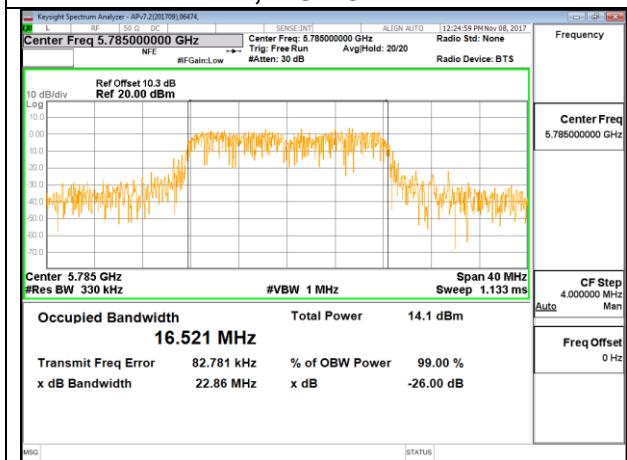
Channel	Frequency (MHz)	99% BW ANT1 (MHz)	99% BW ANT2 (MHz)
Low	5745	16.587	16.474
Mid	5785	16.682	16.521
High	5825	16.660	16.570



ANT 1, LOW CHANNEL



ANT 1, HIGH CHANNEL



ANT 2, MID CHANNEL

ANT 2, HIGH CHANNEL

6.2.2. 802.11n HT20 CDD MODE

6.2.2.1. UNII-1 BAND

Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)
Low	5180	23.45	20.83
Mid	5200	25.91	21.25
High	5240	20.67	20.29

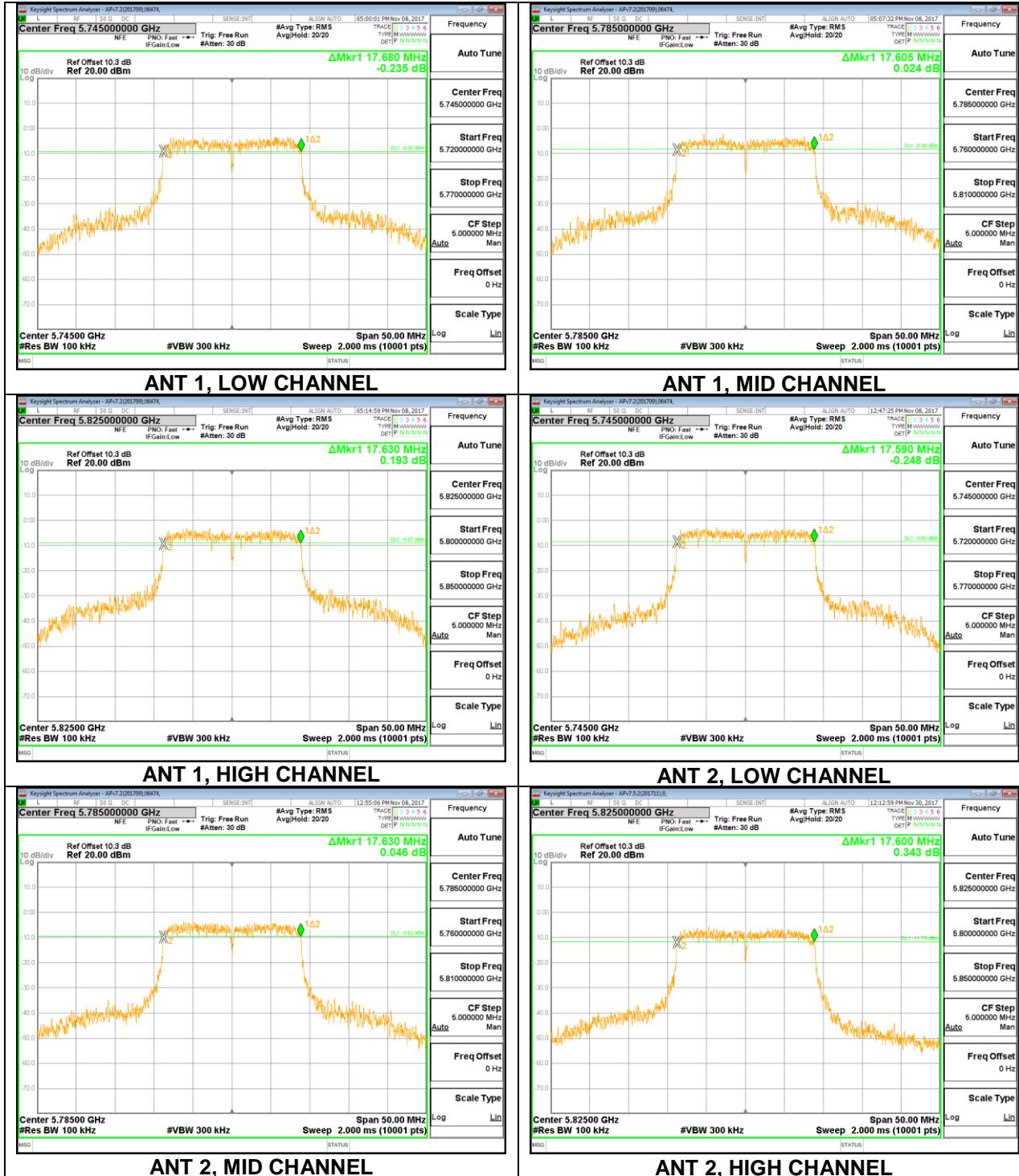
Channel	Frequency (MHz)	99% dB BW ANT1 (MHz)	99% dB BW ANT2 (MHz)
Low	5180	17.649	17.556
Mid	5200	17.677	17.552
High	5240	17.648	17.563



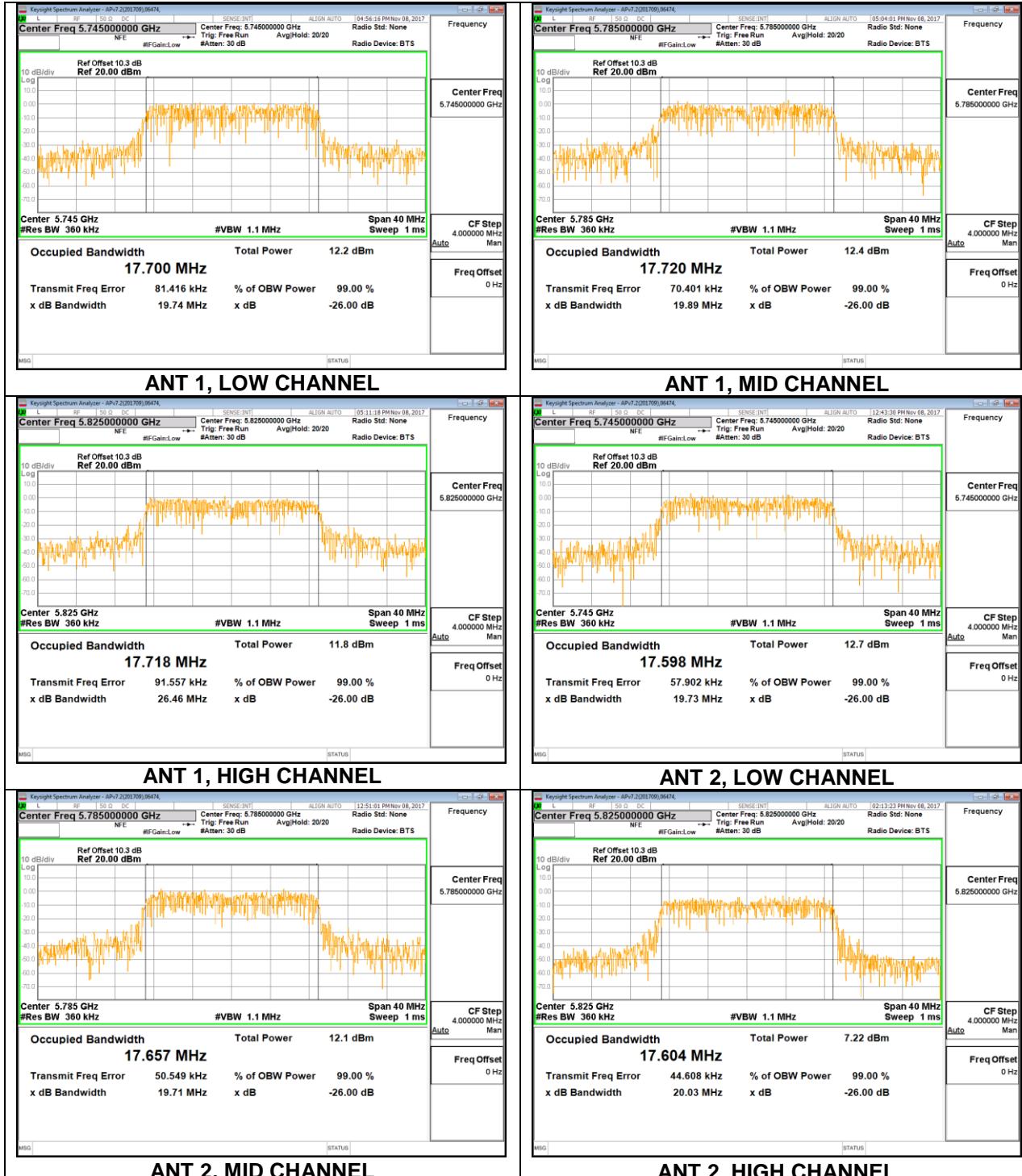
6.2.2.2. UNII-3 BAND

Channel	Frequency (MHz)	6 dB BW ANT1 (MHz)	6 dB BW ANT2 (MHz)	Limit (KHz)	Result
Low	5745	17.680	17.590	500	PASS
Mid	5785	17.605	17.630	500	PASS
High	5825	17.630	17.600	500	PASS

Channel	Frequency (MHz)	99% dB BW ANT1 (MHz)	99% dB BW ANT2 (MHz)
Low	5745	17.700	17.598
Mid	5785	17.720	17.657
High	5825	17.718	17.604



Channel	Frequency (MHz)	99% dB BW ANT1 (MHz)	99% dB BW ANT2 (MHz)
Low	5745	17.700	17.598
Mid	5785	17.720	17.657
High	5825	17.718	17.604

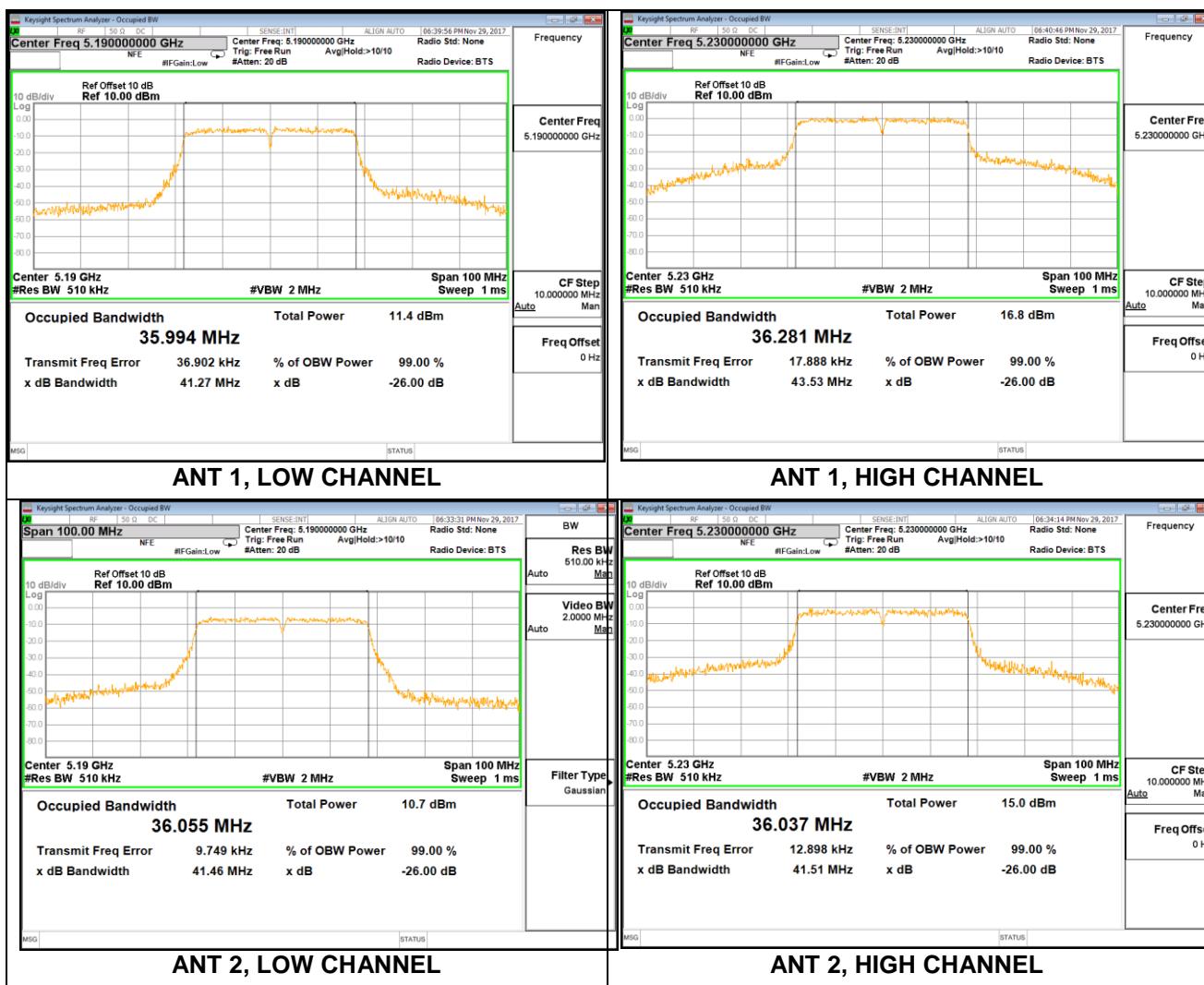


6.2.3. 802.11n HT40 CDD MODE

6.2.3.1. UNII-1 BAND

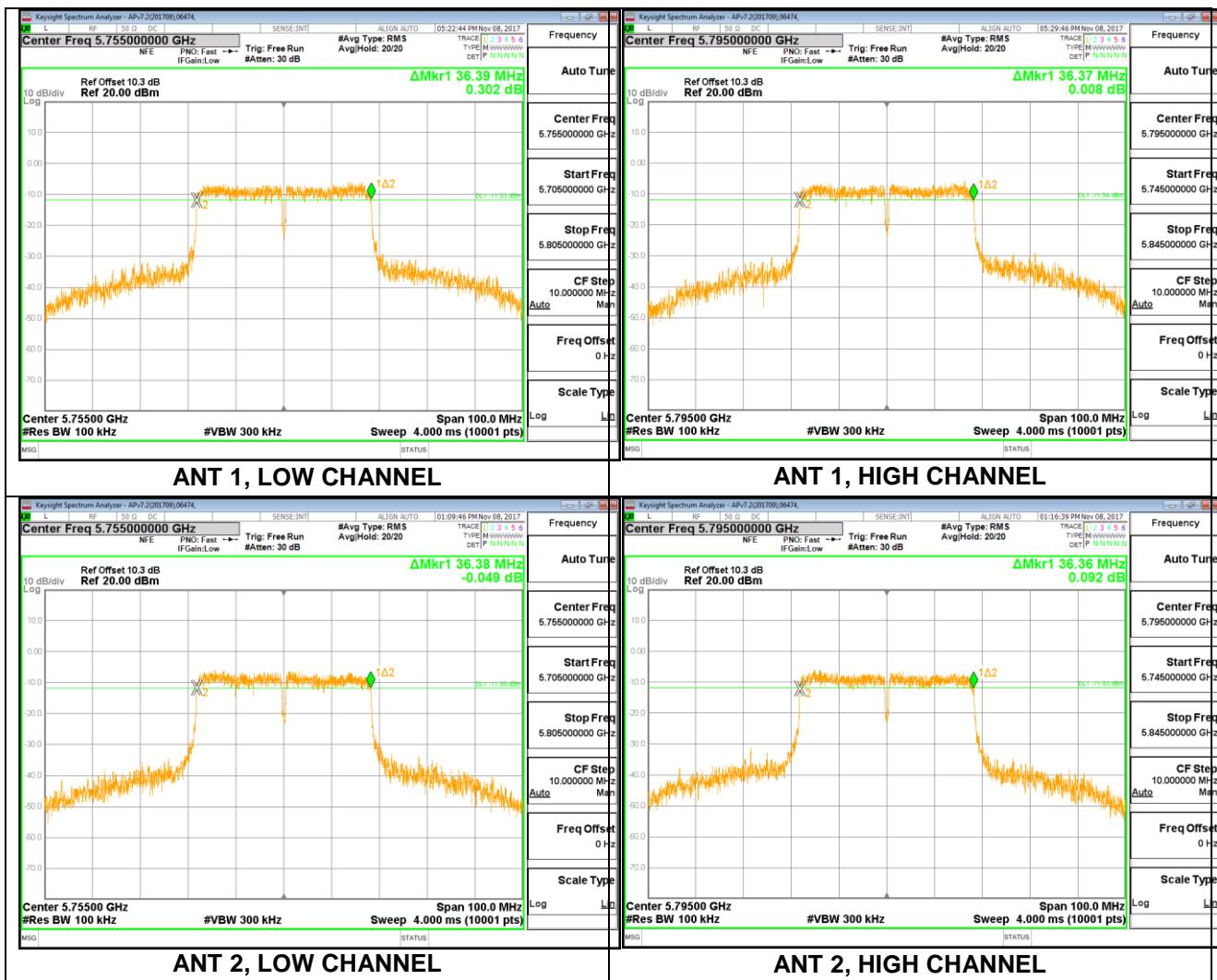
Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)
Low	5190	41.27	41.46
High	5230	43.53	41.51

Channel	Frequency (MHz)	99% dB BW ANT1 (MHz)	99% dB BW ANT2 (MHz)
Low	5190	35.994	36.055
High	5230	36.281	36.037

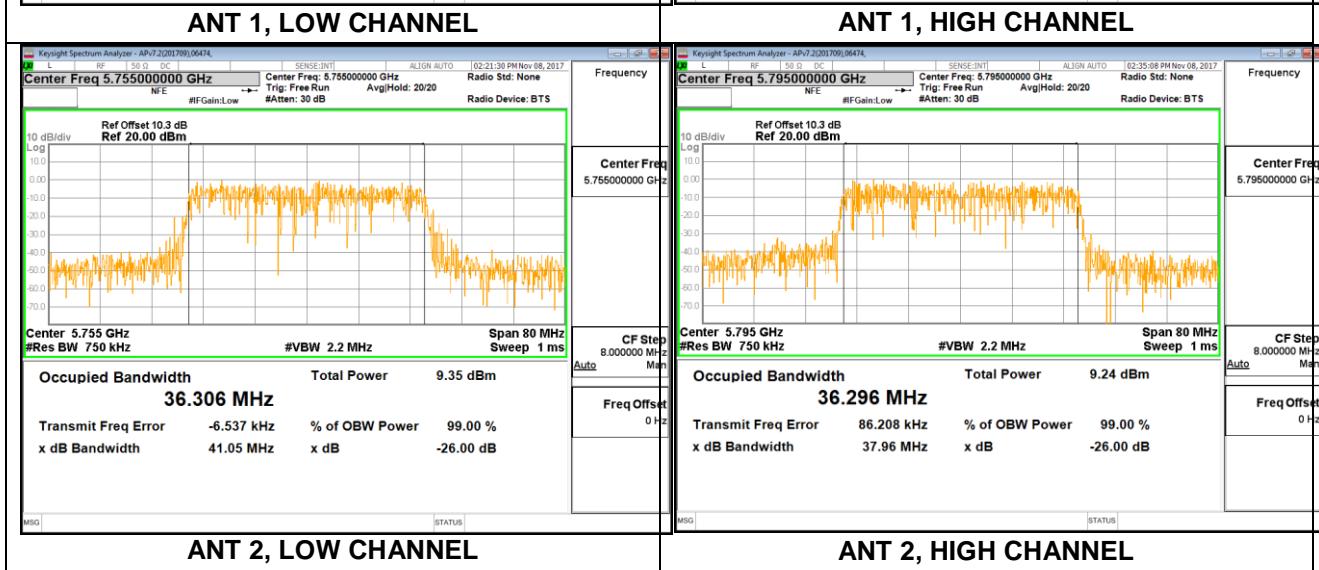
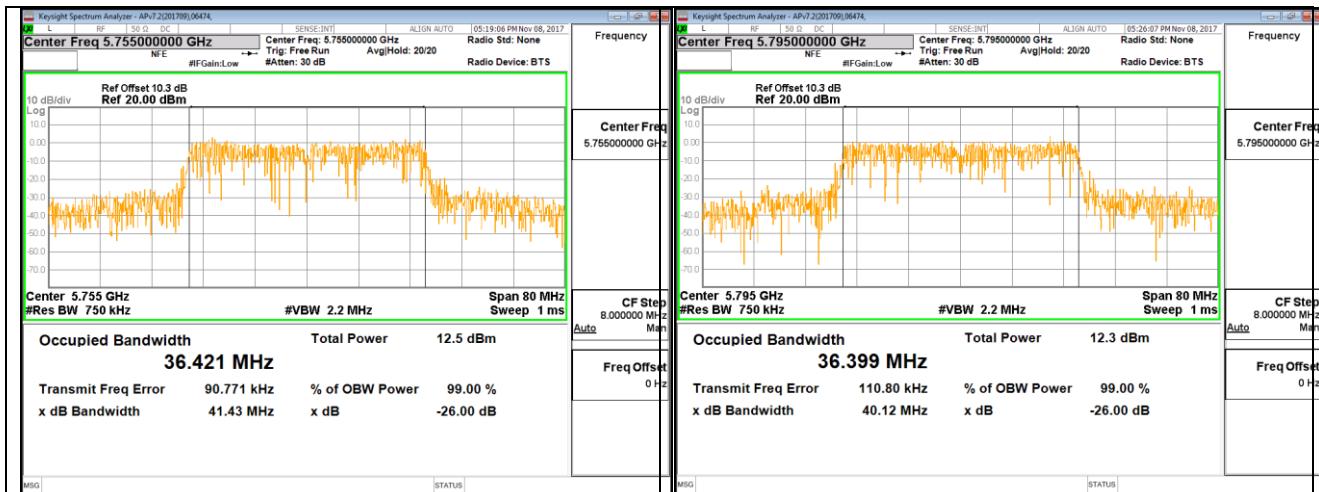


6.2.3.2. UNII-3 BAND

Channel	Frequency (MHz)	6 dB BW ANT1 (MHz)	6 dB BW ANT2 (MHz)	Limit (KHz)	Result
Low	5755	36.39	36.38	500	PASS
High	5795	36.37	36.36	500	PASS



Channel	Frequency (MHz)	99% dB BW ANT1 (MHz)	99% dB BW ANT2 (MHz)
Low	5755	36.421	36.306
High	5795	36.399	36.296

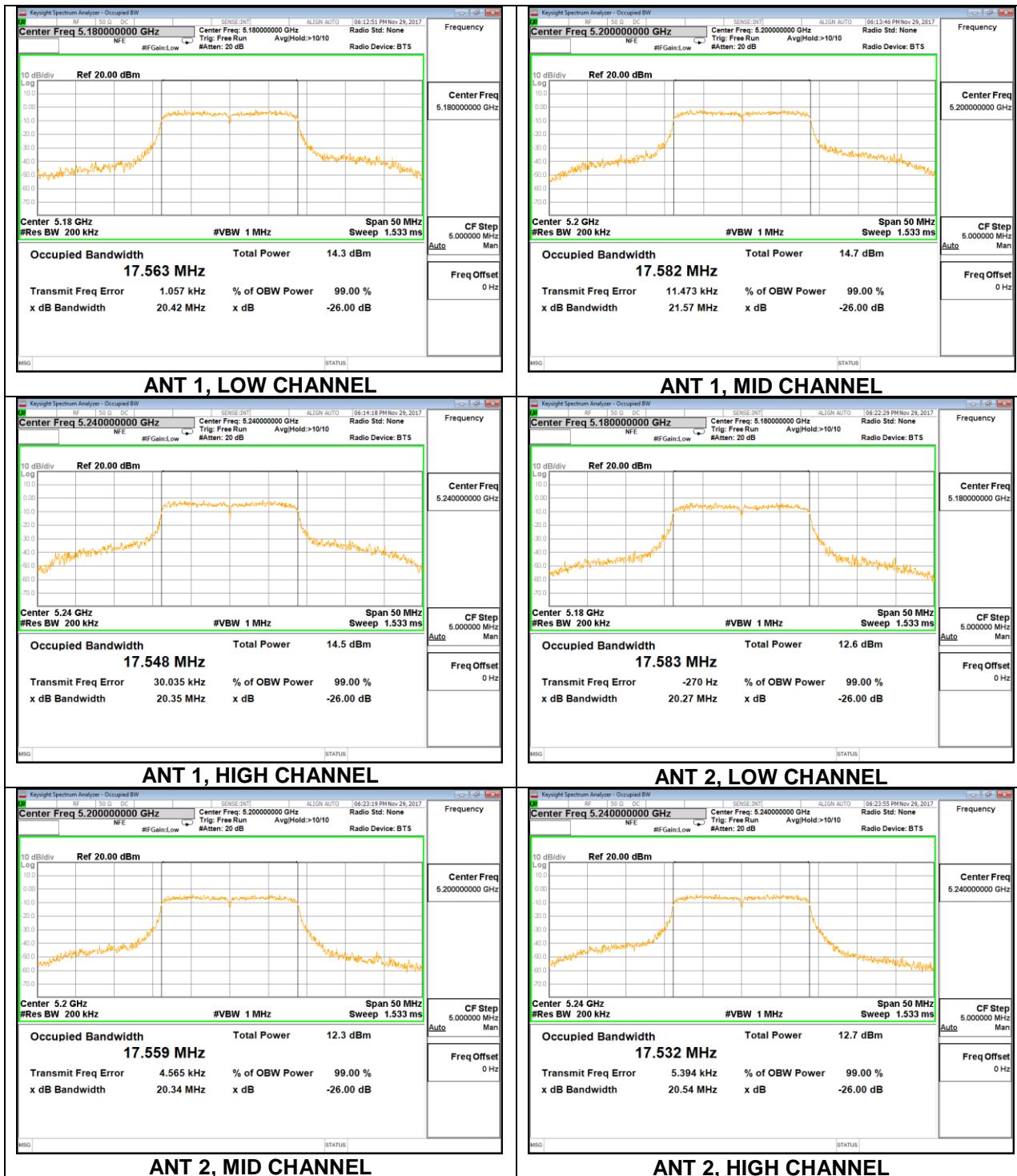


6.2.4. 802.11ac HT20 CDD MODE

6.2.4.1. UNII-1 BAND

Channel	Frequency (MHz)	26 dB BW ANT1 (MHz)	26 dB BW ANT2 (MHz)
Low	5180	20.42	20.27
Mid	5200	21.57	20.34
High	5240	20.35	20.54

Channel	Frequency (MHz)	99% dB BW ANT1 (MHz)	99% dB BW ANT2 (MHz)
Low	5180	17.563	17.583
Mid	5200	17.582	17.559
High	5240	17.548	17.532



6.2.4.2. UNII-3 BAND

Channel	Frequency (MHz)	6 dB BW ANT1 (MHz)	6 dB BW ANT2 (MHz)	Limit (KHz)	Result
Low	5745	17.580	17.610	500	PASS
Mid	5785	17.730	17.580	500	PASS
High	5825	17.610	17.590	500	PASS

