



CERTIFICATION TEST REPORT

Report Number. : 4789754174-E6V1

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SCG09, SC-51B

FCC ID : A3LSMG991JPN

EUT Description : GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax,
WPT and NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART E

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ACCREDITED

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, UWB, WPT and NFC
MODEL NUMBER: SCG09, SC-51B
SERIAL NUMBER: R3CNA0ASLED (CONDUCTED);
R3CNC038RQH (RADIATED);
DATE TESTED: DEC 04, 2020 – FEB 03, 2021;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v02r01
4. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
5. KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
6. KDB 662911 D01 v02r01
7. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input checked="" type="checkbox"/>	Chamber 2
<input checked="" type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

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 recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.01 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC. This test report addresses the NII (UNII 802.11a/n/ac/ax) operational mode. SCG09 and SC-51B have the same hardware. Supported band and protocol are different depending on software settings.

Note. This EUT does not support channel puncturing.

WiFi operating mode

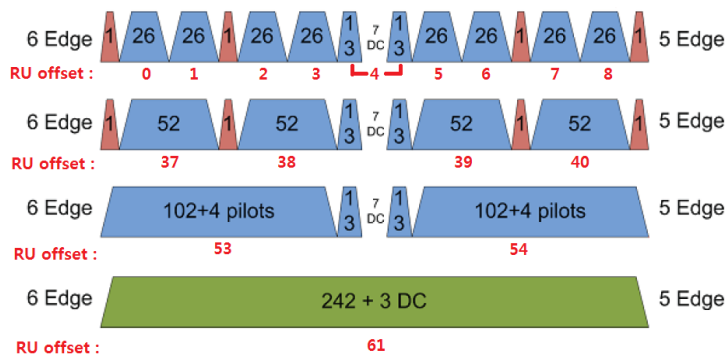
Frequency rage	Mode	ANT1	ANT2
5GHz (5180 MHz ~ 5825 MHz)	802.11a MIMO	TX/RX	TX/RX
	802.11n MIMO	TX/RX	TX/RX
	802.11ac MIMO	TX/RX	TX/RX
	802.11ax MIMO	TX/RX	TX/RX

Simultaneous TX Condition

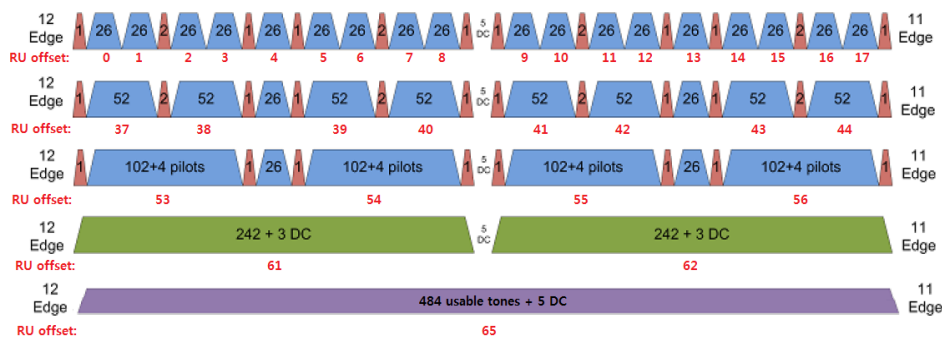
Simultaneous Tx Condition - RSDB

Mode	# of TX	5GHz WLAN		2.4GHz WLAN		Test Case
		ANT1	ANT2	ANT1	ANT2	
2.4GHz + 5GHz RSDB MIMO	4	o	o	o	o	o

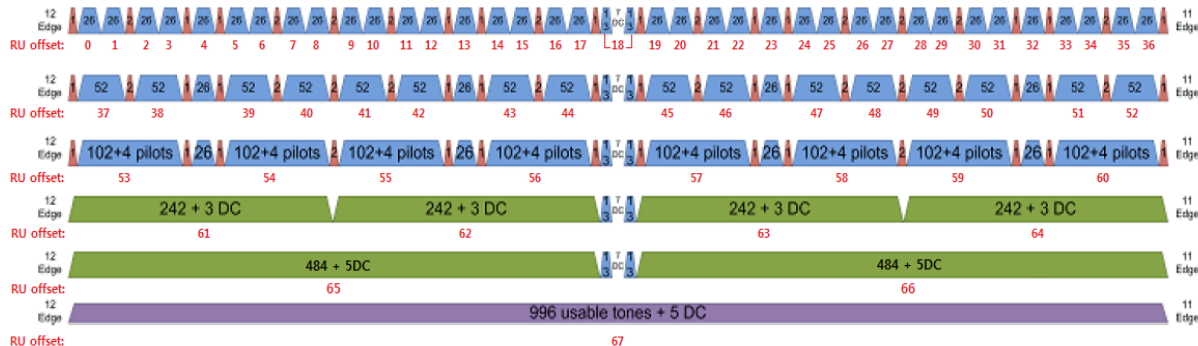
802.11ax RU allocations



- HE 20 Mode -



- HE 40 Mode -



- HE 80 Mode -

Test RU offset for tones in each modes

Mode	Tones	RU offset
HE20	26T	0
		4
		8
	52T	37
		38
40		
106T	53	
242T / SU ^{Note 1}	54	
HE40	26T	61 / -
		0
		9
	52T	17
		37
		41
	106T	44
		53
		54
	242T	56
61		
62		
484T / SU ^{Note 1}	63 / -	
HE80	26T	0
		18
		36
	52T	37
		45
		52
	106T	53
		57
		60
	242T	61
		62
		64
	484T	65
66		
996T / SU ^{Note 1}		67 / -

Note1. Full RU(Resource Unit) 242T mode and SU(Single Unit) mode have no difference in physical waveform. This report has been reported the SU mode with highest output power in MIMO.

Note2. This EUT does not support 26T in UNII 2A and 2C bands

Band portion of RU allocation about straddle channels

Mode	Channel	Tones	RU offset	Portion
HE20	Straddle 5720 MHz	52T	39	UNII 2C & UNII 3
		242T / SU	61 / -	
HE40	Straddle 5710 MHz	52T	43	UNII 2C & UNII 3
		484T / SU	65 / -	
HE80	Straddle 5690 MHz	52T	51	UNII 2C & UNII 3
		996T / SU	67 / -	

Note: In case of RU straddle channel, test was performed overlapping RU position.

MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

UNII-1

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
5180 - 5240	802.11a MIMO	19.48	88.72
	802.11n(HT20) MIMO	19.44	87.90
	802.11ax(HE20) MIMO	19.17	82.60
5190 - 5230	802.11n(HT40) MIMO	17.34	54.20
	802.11ax(HE40) MIMO	17.23	52.84
5210	802.11ac(VHT80) MIMO	16.39	43.55
	802.11ax(HE80) MIMO	16.02	39.99

UNII-2A

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
5260 - 5320	802.11a MIMO	19.53	89.74
	802.11n(HT20) MIMO	19.49	88.92
	802.11ax(HE20) MIMO	19.19	82.99
5270 - 5310	802.11n(HT40) MIMO	17.53	56.62
	802.11ax(HE40) MIMO	17.26	53.21
5290	802.11ac(VHT80) MIMO	16.30	42.66
	802.11ax(HE80) MIMO	16.02	39.99

UNII-2C

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
5500 - 5720	802.11a MIMO	18.82	76.21
	802.11n(HT20) MIMO	18.77	75.34
	802.11ax(HE20) MIMO	19.48	88.72
5510 - 5710	802.11n(HT40) MIMO	17.22	52.72
	802.11ax(HE40) MIMO	17.74	59.43
5530 - 5690	802.11ac(VHT80) MIMO	16.24	42.07
	802.11ax(HE80) MIMO	16.83	48.19

UNII-3

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
5745 - 5825	802.11a MIMO	18.84	76.56
	802.11n(HT20) MIMO	18.81	76.03
	802.11ax(HE20) MIMO	19.46	88.31
5755 - 5795	802.11n(HT40) MIMO	16.97	49.77
	802.11ax(HE40) MIMO	17.60	57.54
5775	802.11ac(VHT80) MIMO	16.19	41.59
	802.11ax(HE80) MIMO	15.49	35.40

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.
 Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes a internal antenna, with a maximum gain of:

Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]	Correlated Chains Directional Gain [dBi]
UNII 1 5150 - 5250	-7.11	-6.71	-3.90
UNII 2A 5250 - 5350	-6.59	-6.55	-3.56
UNII 2C 5470 - 5725	-6.30	-6.66	-3.47
UNII 3 5725 - 5850	-7.30	-6.69	-3.98

“Sub5” and “Sub3” as indicated in antenna specification are written as ANT 1 and ANT 2 in this report.

5.3. List of test reduction and modes covering other modes:

The output power on covered modes is equal to or less than one referenced.

Authorized Frequency Band			
Mode	Antenna Stream	Mode	Covered by
802.11a	MIMO	802.11a 2TX	
802.11n HT20		802.11n HT20 2TX	
802.11ac VHT20		802.11ac VHT20 2TX	802.11n HT20 2TX
802.11ax HE20(SU)		802.11ax HE20 RU(242T) 2TX	802.11ax HE20 SU 2TX
802.11n HT40		802.11n HT40 2TX	
802.11ac VHT40		802.11ac VHT40 2TX	802.11n HT40 2TX
802.11ax HE40(SU)		802.11ax HE40 RU(484T) 2TX	802.11ax HE40 SU 2TX
802.11ac VHT80		802.11ac VHT80 2TX	
802.11ax HE80(SU)		802.11ax HE80 RU(996T) 2TX	802.11ax HE80 SU 2TX

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

For MIMO, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps 2Tx

802.11n HT20 mode: MCS0 2Tx

802.11n HT40 mode: MCS0 2Tx

802.11ac VHT80 mode: MCS0 2Tx

802.11ax HE20 mode: MCS0 2Tx

802.11ax HE40 mode: MCS0 2Tx

802.11ax HE80 mode: MCS0 2Tx

802.11a & n HT20 & n HT40 & ax HE20 & ax HE40 & ax HE80 mode only supports MIMO mode.

So radiation test for 802.11a / n HT20 & HT40 / ac VHT80 / ax HE20 & HE40 & HE80 were evaluated at MIMO mode.



Worst-case selection criteria for 802.11ax test items :

- For the 6dB Bandwidth, it was tested at the RU allocation with lowest tones number for each bandwidth.

Note : All radiated and power line conducted tests were performed connected with charger for evaluation of worst case mode.

Test case configuration for 802.11a, 802.11n HT20 & 40, 802.11ac VHT20 & 40 & 80, 802.11ax HE20 & 40 & 80 (SU) modes :

Mode	Band	SISO Target[dBm]				MIMO Target[dBm]			
		802.11a	802.11n	802.11ac	802.11ax (SU)	802.11a	802.11n	802.11ac	802.11ax (SU)
5GHz (20 MHz)	UNII-1					19	19 36ch: 17	19 36ch: 17	19 36ch: 17
	UNII-2A					19 64ch: 17	19 64ch: 16	19 64ch: 16	19 64ch: 16
	UNII-2C					19 100,140ch: 14	19 100,140ch: 14	19 100,140ch: 14	19 100,140ch: 14
	UNII-3					19	19	19	19
5GHz (40 MHz)	UNII-1						17 38ch: 14	17 38ch: 14	17 38ch: 14
	UNII-2A						17 62ch: 14	17 62ch: 14	17 62ch: 14
	UNII-2C						17	17	15
	UNII-3						17	17	17
5GHz (80 MHz)	UNII-1							16	16
	UNII-2A							16	16
	UNII-2C							16 106ch: 14	16 106ch: 14
	UNII-3							16	16

 Band-Edge & Spurious Emission
 Band-Edge

Note1. This EUT support only MIMO mode.

Note2. 802.11ac VHT20 & 802.11ac VHT40 mode are covered by 802.11n HT20 & 802.11n HT40.

Test case configuration for 802.11ax HE20 & 40 & 80 (RU) modes :

802.11ax HE20 RU mode							802.11ax HE40 RU mode												
Band	Freq.	Tone	RU offset	Test Case			Band	Freq.	Tone	RU offset	Test Case								
				ANT1	ANT2	MIMO					ANT1	ANT2	MIMO						
UNII-1	5180	26T	0	-	-	-	UNII-1	5190	26T	0	-	-	-						
			4	-	-	O				9	-	-	-						
			8	-	-	-				17	-	-	O						
	0		-	-	-	0				-	-	-							
	4		-	-	O	9				-	-	O							
	8		-	-	-	17				-	-	-							
	0		-	-	-	5270		UNII-2A	5270	52T	37	-	-	-					
	4		-	-	O						41	-	-	O					
	8		-	-	-						44	-	-	-					
UNII-2A	5260	52T	37	-	-	-	5310	5270	52T	37	-	-	-						
			38	-	-	O				41	-	-	O						
			40	-	-	-				44	-	-	-						
	37		-	-	-	5510	UNII-2C	5510		52T	37	-	-	-					
	38		-	-	O						41	-	-	O					
	40		-	-	-						44	-	-	-					
	UNII-2C		5300	52T	37	-	-	-			5590	5510	52T	37	-	-	-		
					38	-	-	O						41	-	-	O		
					40	-	-	-						44	-	-	-		
UNII-2C		5320	52T		37	-	-	-	5670		5590	52T		37	-	-	-		
					38	-	-	O						41	-	-	O		
					40	-	-	-						44	-	-	-		
		UNII-2C			5500	52T	37	-	-	-	5755			5670	26T	0	-	-	-
							38	-	-	O						9	-	-	O
							40	-	-	-						17	-	-	-
	UNII-3			5580	26T		37	-	-	-	5795		5755	26T		0	-	-	-
							38	-	-	O						9	-	-	O
							40	-	-	-						17	-	-	-
UNII-3			5700	26T			37	-	-	-	5795	5795	26T			0	-	-	-
							38	-	-	O						9	-	-	O
							40	-	-	-						17	-	-	-
		UNII-3	5745			26T	0	-	-	-	UNII-3	5210			26 T	0	-	-	-
							4	-	-	O						18	-	-	O
							8	-	-	-						36	-	-	-
	0		-		-		-	5290	UNII-2A	52T				37		-	-	-	
	4		-		-		O							45		-	-	O	
	8		-		-		-							52		-	-	-	
UNII-3	5785		26T	0	-		-	-	5530			5290	52T	37	-	-	O		
				4	-		-	O						45	-	-	-		
				8	-		-	-						52	-	-	-		
	UNII-3	5825		26T	0	-	-	-	5610	5530	52T	37		-	-	O			
					4	-	-	O				45		-	-	-			
					8	-	-	-				52		-	-	-			
		UNII-3			5775	26T	0	-	-	-		5775		5775	26T	0	-	-	-
							18	-	-	O						18	-	-	O
							36	-	-	-						36	-	-	-

Note3. Radiated spurious test was performed on the lower tone with worst average power.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	N/A	N/A
Data Cable	SAMSUNG	EP-DN980BBE	N/A	N/A

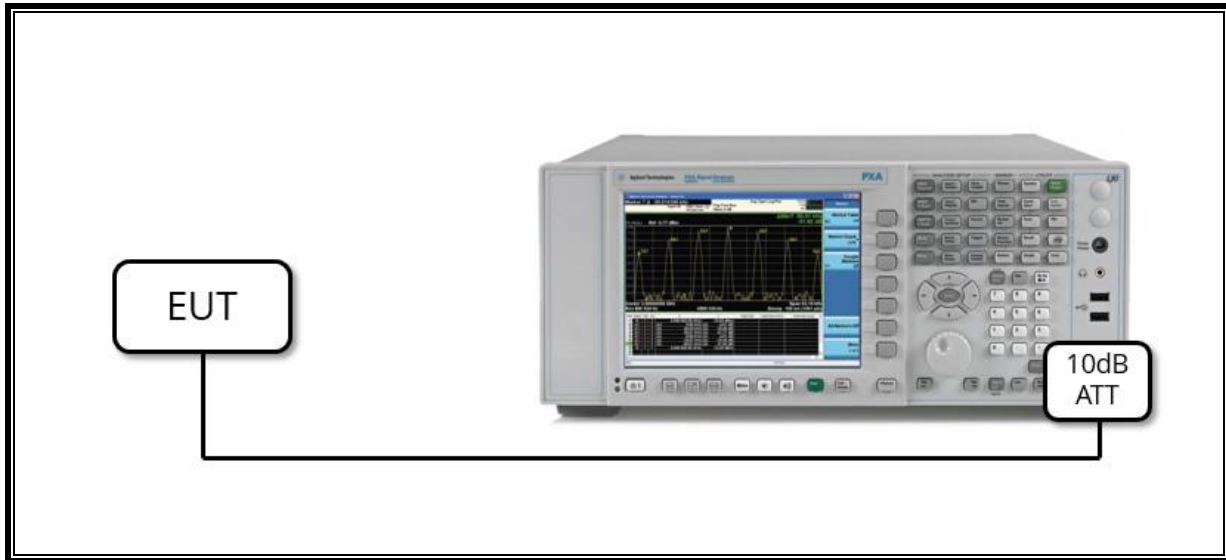
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

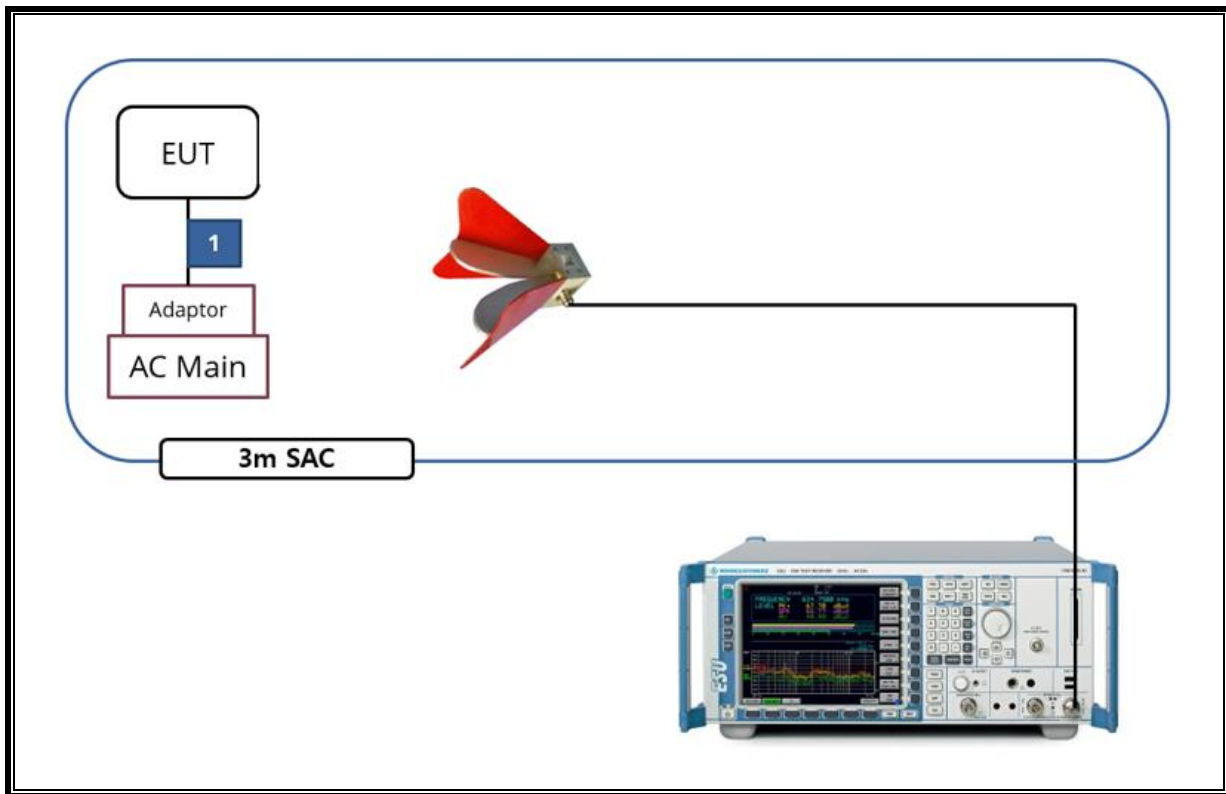
TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software exercised the EUT to enable NII mode.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-19-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-13-22
Antenna, Horn, 18 GHz	ETS	3115	00167211	07-27-22
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-15-22
Antenna, Horn, 18 GHz	ETS	3117	00168724	07-27-22
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-15-22
Antenna, Horn, 18 GHz	ETS	3117	00218957	01-15-23
Antenna, Horn, 40 GHz	ETS	3116C	00166155	01-15-23
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Preamplifier	ETS	3116C-PA	00168841	08-06-21
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-04-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-05-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-05-21
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-21
EMI Test Receiver, 44 GHz	R&S	ESW44	101590	08-04-21
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-05-21
Attenuator	PASTERNAK	PE7087-10	A001	08-03-21
Attenuator	PASTERNAK	PE7087-10	A008	08-03-21
Attenuator	PASTERNAK	PE7004-10	2	08-04-21
Attenuator	PASTERNAK	PE7087-10	A009	08-05-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-03-21
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-04-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-03-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-03-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-04-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-03-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-03-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-04-21
LISN	R&S	ENV-216	101837	08-06-21
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
Termination	WEINSCHL	M1406A	T01	08-05-21
Attenuator	WEINSCHL	WA76-30-21	A015	08-05-21
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.407(e)	6dB Band width (5.8GHz)	500kHz	Condcuted	PASS
15.407 (a)(2)	TX Cond. Power 5.15-2.25, 5.25-5.35 & 5.47-5.725	< 24dBm or 11+10Log(26dB BW)		PASS
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm		PASS
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		PASS
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		PASS
15.207 (a)	AC Power Line conducted emissions	Section 13	Radiated	PASS
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m		PASS
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Condcuted	PASS

8. MEASUREMENT METHODS

On-Time and Duty Cycle : KDB 789033 D02 v02r01, Section II.B.

6dB Emission BW : KDB 789033 D02 v02r01, Section II.C.2.

26dB Emission BW : KDB 789033 D02 v02r01, Section II.C.1.

99% Occupied BW : KDB 789033 D02 v02r01, Section II.D.

Conducted Output Power : KDB 789033 D02 v02r01, Section II.E.3.b(Method PM-G)

Conducted Output Power for Straddle Channel (ch144/142/138 for 20/40/80MHz BW):

KDB 789033 D02 v02r01, Section II.E.2.b(Method SA-1)

Power Spectral Density : KDB 789033 D02 v02r01, Section II.F.

Unwanted emissions in restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

Unwanted emissions in non-restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

9. REFERENCE MEASUREMENTS RESULTS

9.1. ON TIME AND DUTY CYCLE RESULTS

Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]
802.11a MIMO	4.064	4.162	0.976	97.645	0.10
802.11n(HT20) MIMO	3.768	3.867	0.974	97.440	0.11
802.11n(HT40) MIMO	3.610	3.710	0.973	97.305	0.12
802.11ac(VHT80) MIMO	2.103	2.204	0.954	95.417	0.20

Mode	ANT.	Tone	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]
802.11ax HE20	MIMO	26T	5.223	5.323	0.981	98.121	-
		52T	5.104	5.204	0.981	98.078	-
		106T	4.754	4.854	0.979	97.940	0.09
		SU	4.268	4.368	0.977	97.711	0.10
802.11ax HE40	MIMO	26T	5.222	5.322	0.981	98.121	-
		52T	5.102	5.204	0.980	98.040	-
		106T	4.754	4.854	0.979	97.940	0.09
		242T	4.528	4.629	0.978	97.818	0.10
		SU	4.474	4.574	0.978	97.814	0.10
802.11ax HE80	MIMO	26T	5.221	5.323	0.981	98.084	-
		52T	5.103	5.204	0.981	98.059	-
		106T	4.754	4.855	0.979	97.920	0.09
		242T	4.527	4.628	0.978	97.818	0.10
		484T	4.519	4.621	0.978	97.793	0.10
		SU	4.278	4.379	0.977	97.694	0.10

Note. If the duty cycle is over 98%, compensation is not included in average measurement.

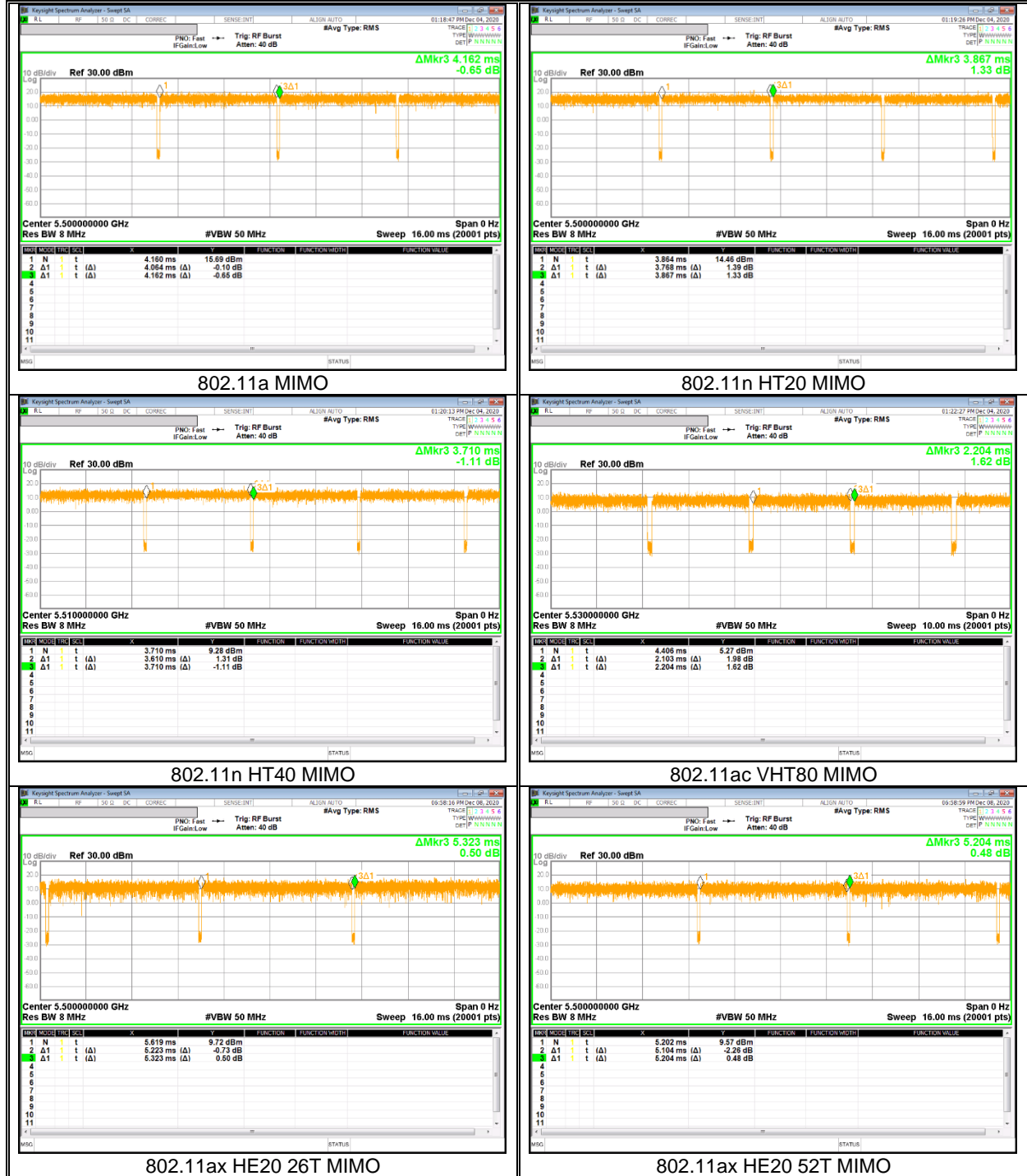
LIMITS

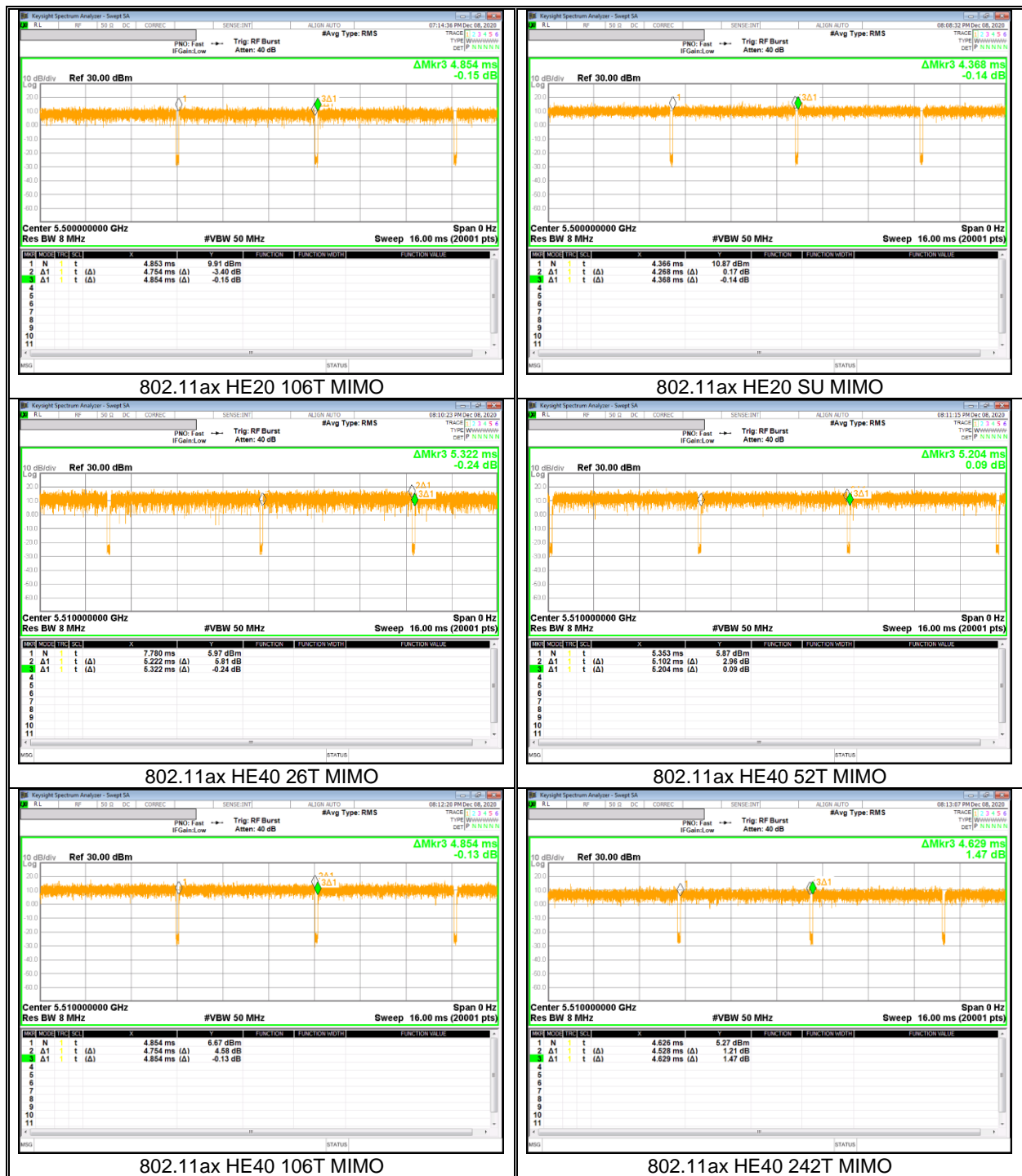
None; for reporting purposes only.

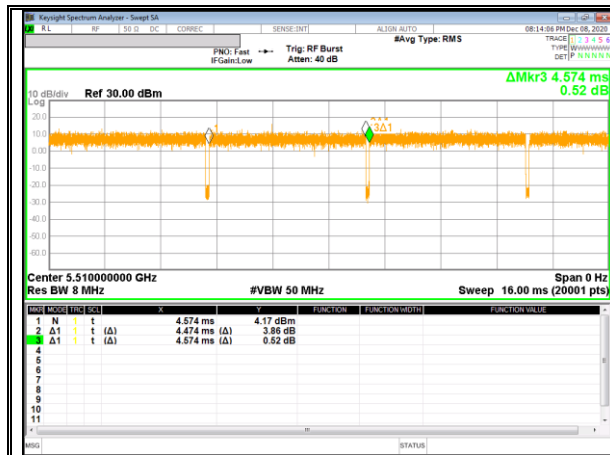
PROCEDURE

KDB 789033 D02 v02r01 Zero-Span Spectrum Analyzer Method.

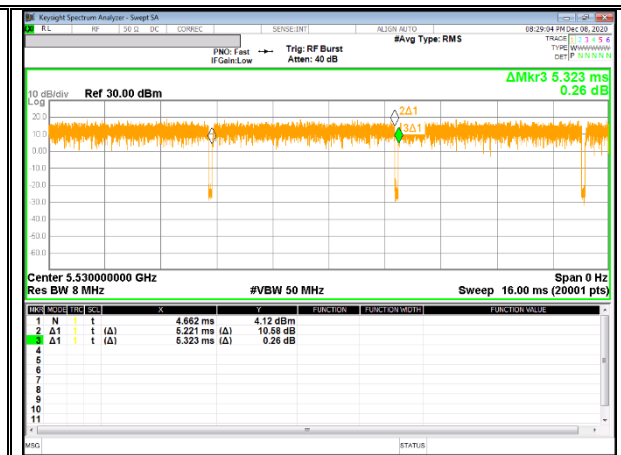
9.2. DUTY CYCLE PLOTS



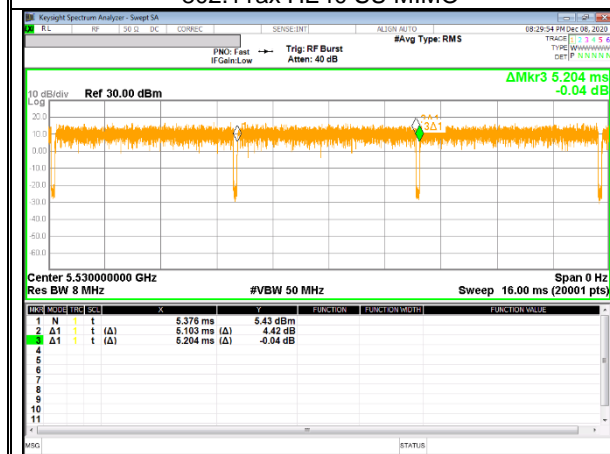




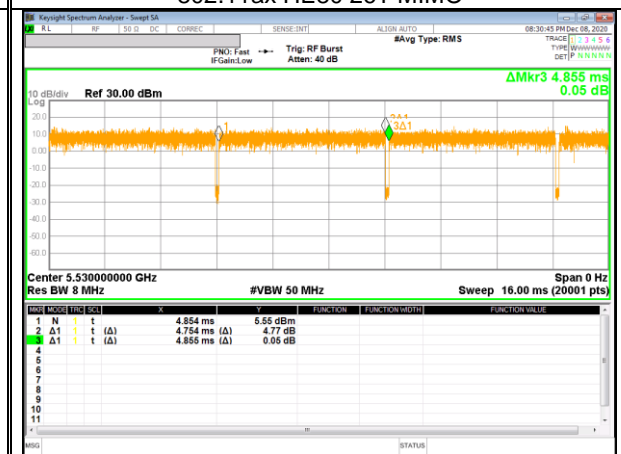
802.11ax HE40 SU MIMO



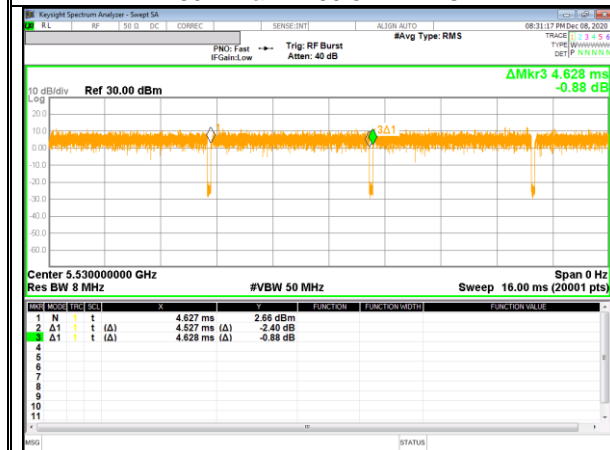
802.11ax HE80 26T MIMO



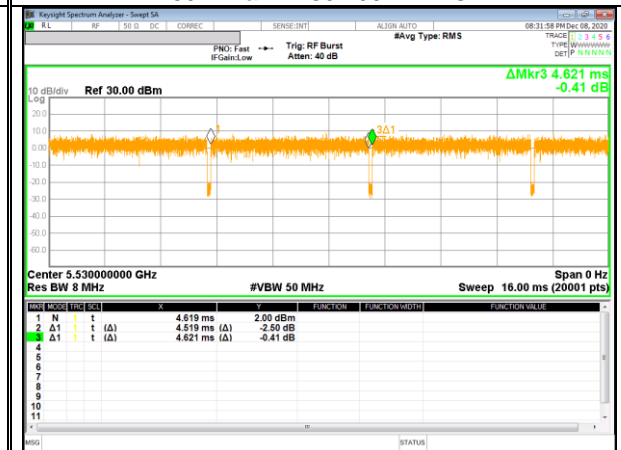
802.11ax HE80 52T MIMO



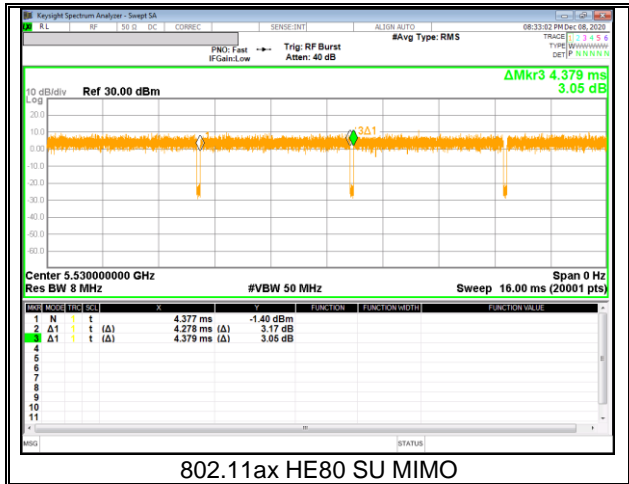
802.11ax HE80 106T MIMO



802.11ax HE80 242T MIMO



802.11ax HE80 484T MIMO



9.3. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

RESULTS

9.3.1. 5.2 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]		Worst	99% BW [MHz](Note1)	
				ANT1	ANT2		ANT1	ANT2
UNII-1	802.11a	Low	5180	21.57	21.46	21.21	16.80	16.76
		Mid	5200	21.92	21.21		16.79	16.77
		High	5240	21.43	21.56		16.83	16.76
	802.11n HT20	Low	5180	21.33	21.30	21.30	17.87	17.82
		Mid	5200	21.58	25.07		17.92	17.96
		High	5240	23.99	24.69		17.94	17.96
	802.11n HT40	Low	5190	39.72	39.37	39.19	36.22	36.22
		High	5230	39.56	39.19		36.29	36.21
	802.11ac VHT80	Mid	5210	82.30	81.42	81.42	75.75	75.69
	802.11ax HE20(SU)	Low	5180	21.51	21.28	21.07	19.07	19.02
		Mid	5200	21.46	21.07		19.05	19.04
		High	5240	21.38	22.38		19.03	19.07
	802.11ax HE40(SU)	Low	5190	39.75	39.51	39.51	37.59	37.55
		High	5230	39.65	39.65		37.58	37.54
802.11ax HE80(SU)	Mid	5210	81.20	80.43	80.43	76.95	76.96	

Note1. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

9.3.2. 5.3 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]		Worst	99% BW [MHz](Note2)	
				ANT1	ANT2		ANT1	ANT2
UNII-2A	802.11a	Low	5260	23.77	24.47	21.10	16.79	16.80
		Mid	5300	22.81	22.82		16.79	16.82
		High	5320	21.33	21.10		16.73	16.69
	802.11n HT20	Low	5260	23.48	25.07	21.37	17.92	17.96
		Mid	5300	25.34	25.29		17.97	17.95
		High	5320	21.45	21.37		17.84	17.82
	802.11n HT40	Low	5270	39.83	39.59	39.37	36.25	36.26
		High	5310	39.80	39.37		36.29	36.24
	802.11ac VHT80	Mid	5290	81.56	81.56	81.56	75.75	75.70
	802.11ax HE20(SU)	Low	5260	21.38	21.15	21.15	19.07	19.10
		Mid	5300	21.95	22.35		19.07	19.06
		High	5320	21.63	21.44		19.00	19.04
	802.11ax HE40(SU)	Low	5270	39.49	39.39	39.39	37.55	37.52
		High	5310	39.88	39.61		37.53	37.64
802.11ax HE80(SU)	Mid	5290	81.25	81.48	81.25	76.89	77.07	

Note2. As a result of 99% bandwidth test, the bandwidth of UNII-2A does not interfere with UNII-1.

9.3.3. 5.5 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]		Worst
				ANT1	ANT2	
UNII-2C	802.11a	Low	5500	21.06	21.49	21.06
		Mid	5580	21.73	25.04	
		High	5700	21.22	21.42	
	802.11n HT20	Low	5500	21.43	21.51	21.43
		Mid	5580	25.41	24.19	
		High	5700	21.61	21.52	
	802.11n HT40	Low	5510	39.83	39.27	39.27
		Mid	5590	39.95	39.33	
		High	5670	39.92	39.60	
	802.11ac VHT80	Low	5530	81.86	82.44	81.07
		High	5610	81.78	81.07	
	802.11ax HE20(SU)	Low	5500	21.73	21.31	21.24
		Mid	5580	21.53	27.13	
		High	5700	21.24	21.29	
	802.11ax HE40(SU)	Low	5510	39.41	39.55	39.39
		Mid	5590	39.61	39.59	
		High	5670	39.78	39.39	
	802.11ax HE80(SU)	Low	5530	81.06	81.30	80.87
High		5610	80.87	81.14		

9.3.4. STRADDLE CHANNEL

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]			
				ANT1		ANT2	
				UNII-2C	UNII-3	UNII-2C	UNII-3
Straddle Channel	802.11a	Straddle	5720	15.774	5.720	16.270	5.640
	802.11n HT20	Straddle	5720	15.700	5.786	15.880	5.690
	802.11n HT40	Straddle	5710	35.068	4.738	34.602	4.412
	802.11ac VHT80	Straddle	5690	75.612	6.130	76.084	5.602
	802.11ax HE20(SU)	Straddle	5720	15.962	5.450	17.318	7.134
	802.11ax HE40(SU)	Straddle	5710	34.898	4.958	34.778	4.770
	802.11ax HE80(SU)	Straddle	5690	75.194	5.966	75.242	5.166

9.3.5. 802.11ax 5.2 GHz BAND(RU)

Band	Mode	Center Freq. [MHz]	Tones	RU offset	26 dB BW [MHz]		99% BW [MHz](Note1)	
					ANT1	ANT2	ANT1	ANT2
UNII-1	HE20	5180	26T	0	19.36	18.22	18.31	16.99
				4	15.98	14.97	15.08	14.44
				8	19.09	18.18	17.91	17.37
		5200		0	18.68	15.31	17.66	14.08
				4	15.98	17.61	15.22	16.44
				8	19.61	19.52	18.50	18.15
	5240	0		17.09	16.73	15.85	15.39	
		4		18.87	17.67	17.17	15.99	
		8		18.96	18.98	17.51	17.92	
	HE40	5190		0	16.99	9.39	16.42	8.67
				9	21.92	17.44	17.89	15.42
				17	18.91	18.30	18.03	17.35
		5230		0	16.25	17.34	15.46	16.67
				9	10.29	22.83	7.26	19.77
				17	20.56	19.11	18.05	18.09
	HE80	5210		0	20.15	9.47	18.56	10.69
				18	41.33	29.36	26.70	28.06
				36	24.23	9.74	16.82	10.48

Note1. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

9.3.6. 802.11ax 5.3 GHz BAND(RU)

Band	Mode	Center Freq. [MHz]	Tones	RU offset	26 dB BW [MHz]		99% BW [MHz](Note2)	
					ANT1	ANT2	ANT1	ANT2
UNII-2A	HE20	5260	52T	37	18.13	19.41	16.87	18.04
				38	17.51	15.10	15.75	13.18
				40	18.49	19.84	16.94	16.70
		5300		37	19.04	15.96	17.45	14.48
				38	18.73	15.61	15.84	13.52
				40	19.34	19.67	16.00	17.85
		5320		37	18.56	18.86	17.32	17.54
				38	18.48	17.83	16.71	16.65
				40	20.48	18.96	18.13	17.73
	HE40	5270		37	20.89	15.24	17.78	14.00
				41	20.80	24.28	17.06	18.64
				44	22.32	19.45	18.01	17.94
		5310		37	21.11	18.64	17.84	17.55
				41	22.01	23.58	19.37	19.36
				44	22.13	18.30	17.91	17.13
	HE80	5290		37	20.47	11.55	18.48	9.96
				45	30.51	25.50	20.97	21.00
				52	28.31	13.86	13.62	11.58

Note2. As a result of 99% bandwidth test, the bandwidth of UNII-2A does not interfere with UNII-1.

9.3.7. 802.11ax 5.5 GHz BAND(RU)

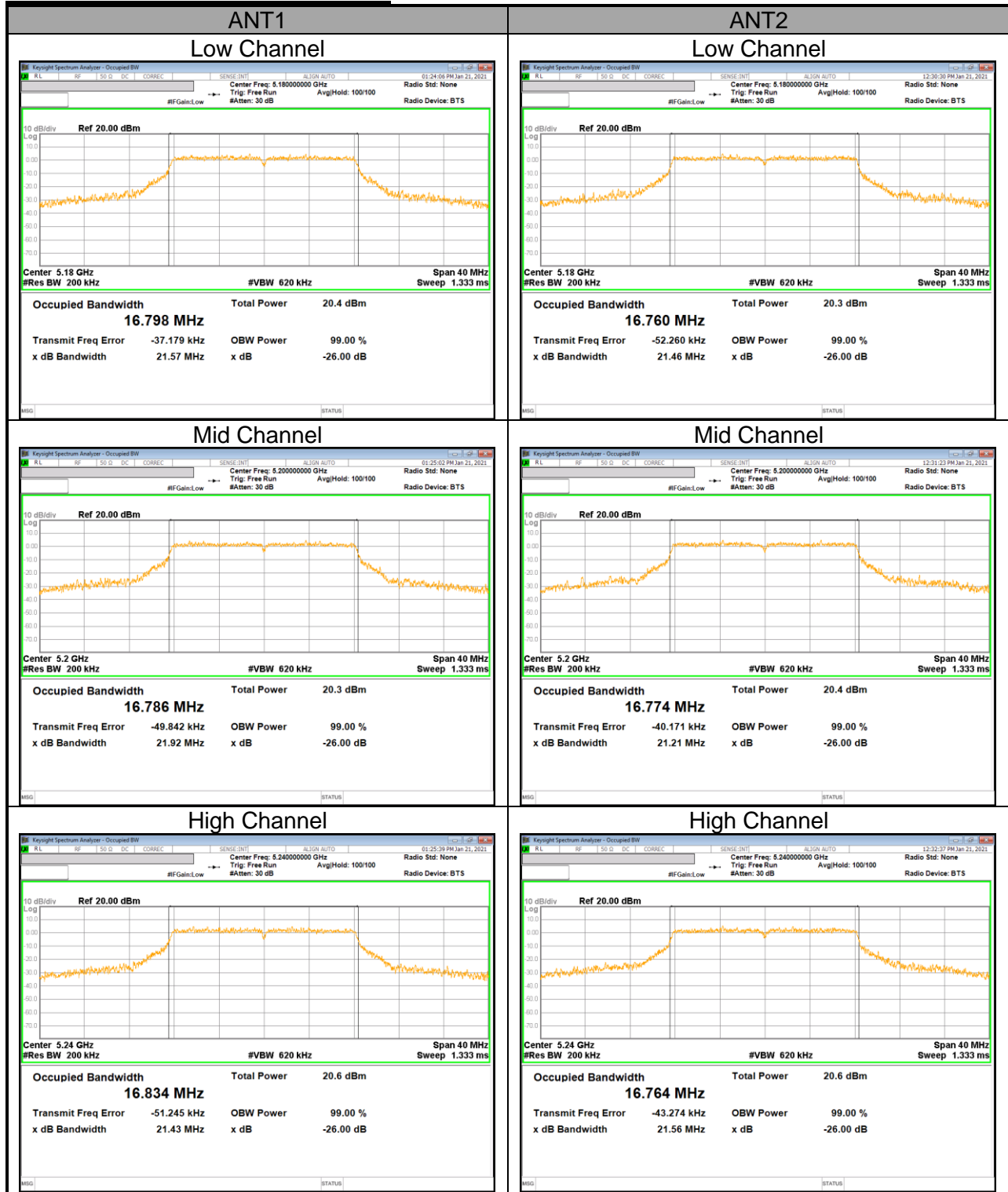
Band	Mode	Center Freq. [MHz]	Tones	RU offset	26 dB BW [MHz]	
					ANT1	ANT2
UNII-2C	HE20	5500	52T	37	19.80	17.76
				38	15.80	17.94
				40	21.04	18.99
		5580		37	17.78	17.71
				38	16.69	17.65
				40	20.21	18.79
		5700		37	16.39	16.01
				38	18.63	16.78
				40	20.94	18.99
	HE40	5510		37	20.75	13.44
				41	14.50	22.34
				44	20.98	19.05
		5590		37	19.77	16.29
				41	14.78	22.45
				44	19.41	15.95
		5670		37	20.38	19.72
				41	21.16	20.18
				44	19.78	19.98
	HE80	5530		37	22.17	14.25
				45	26.49	26.89
		5610		52	25.34	18.53
				37	14.81	14.19
		45		19.74	18.26	
		52		11.60	19.61	

9.3.8. 802.11ax STRADDLE CHANNEL(RU)

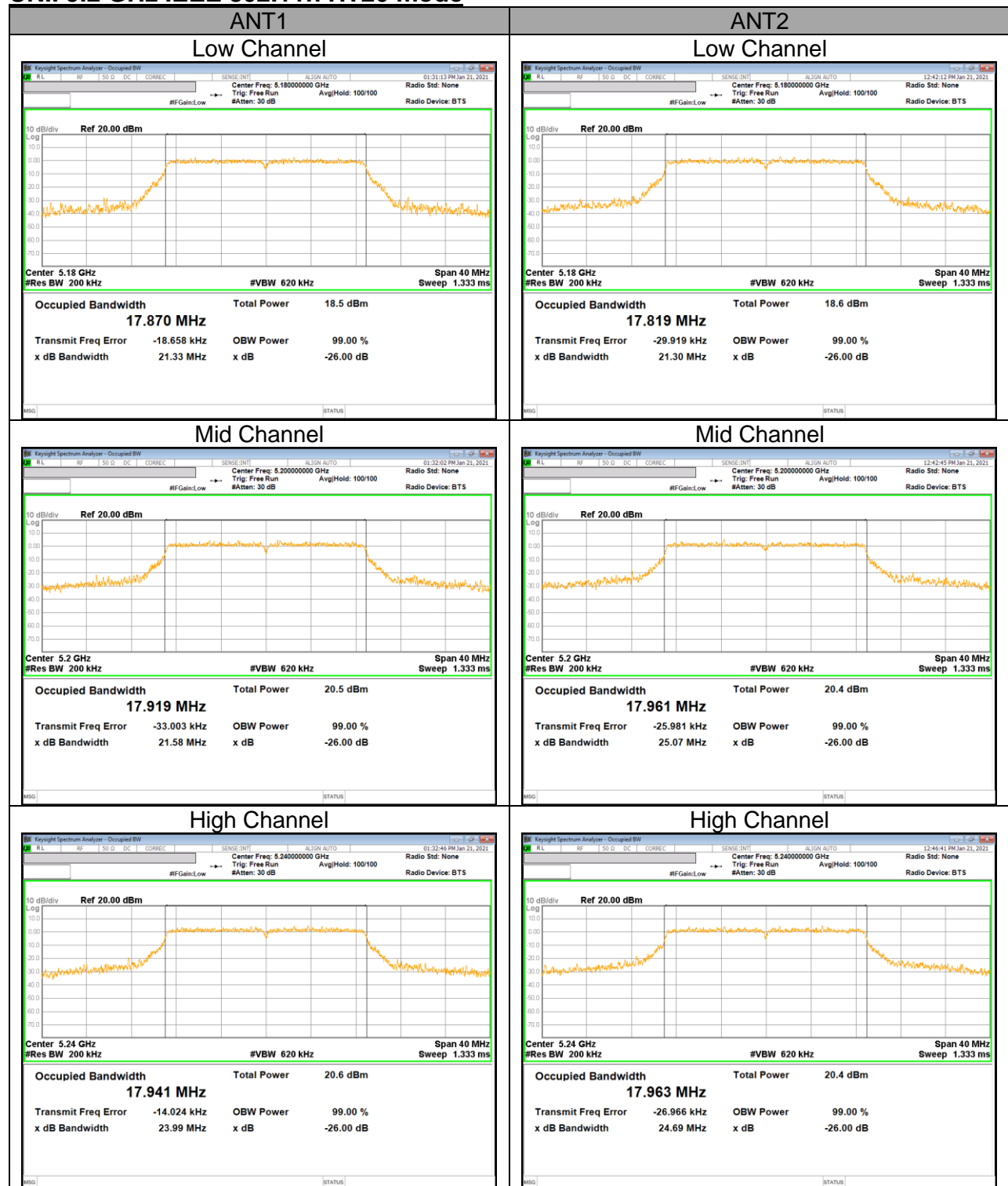
Band	Mode	Center Freq. [MHz]	Tones	RU offset	26 dB BW [MHz]			
					ANT1		ANT2	
					UNII-2C	UNII-3	UNII-2C	UNII-3
Straddle Channel	HE20	5720	52T	39	14.466	3.770	14.292	3.894
	HE40	5710		43	11.342	4.434	13.042	4.110
	HE80	5690		51	14.906	3.590	13.594	3.070

9.3.9. 26 dB BANDWIDTH PLOTS

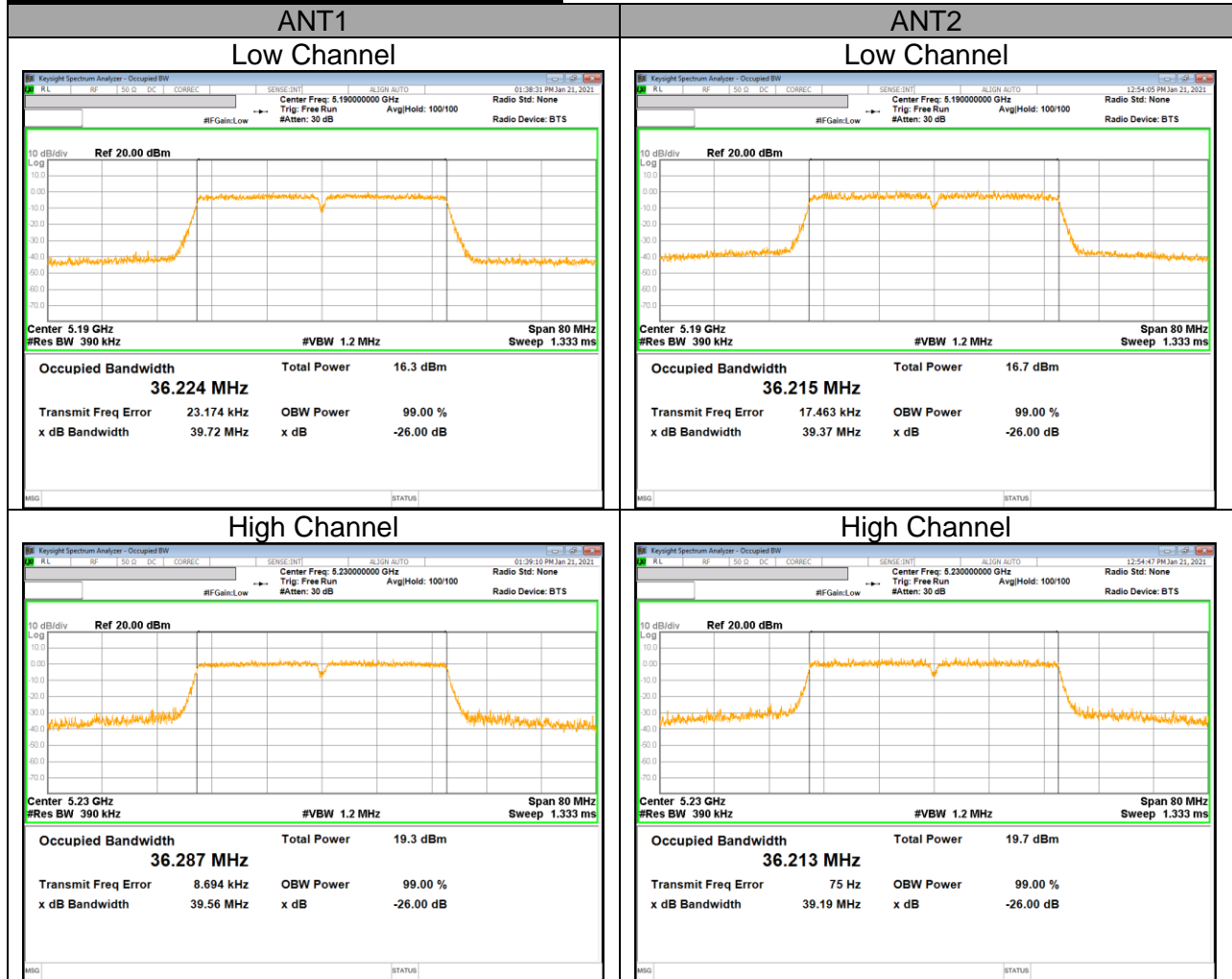
UNII 5.2 GHz IEEE 802.11a mode



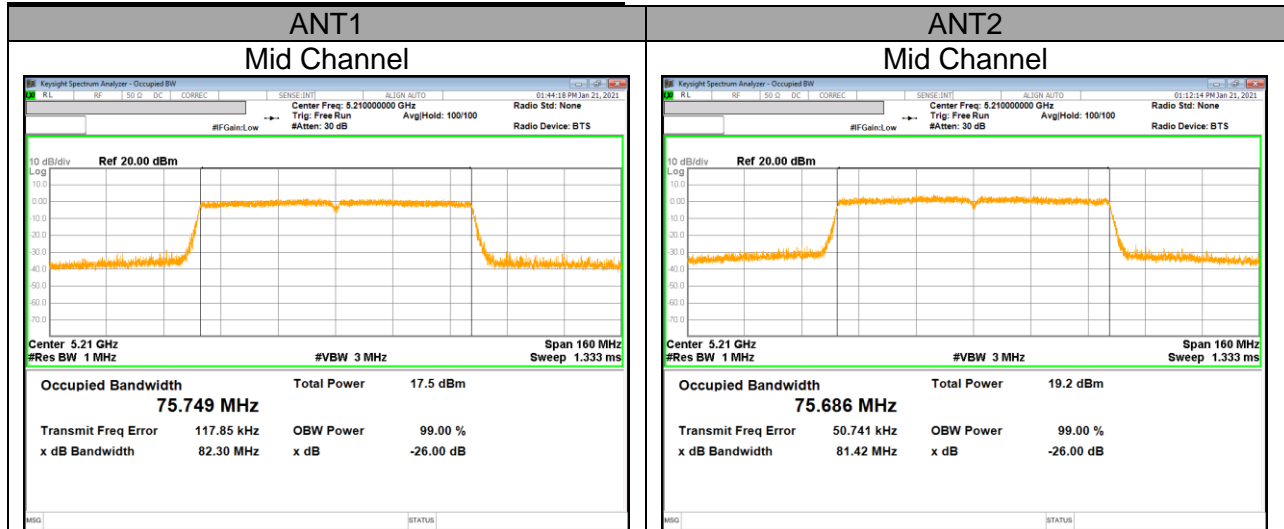
UNII 5.2 GHz IEEE 802.11n HT20 mode



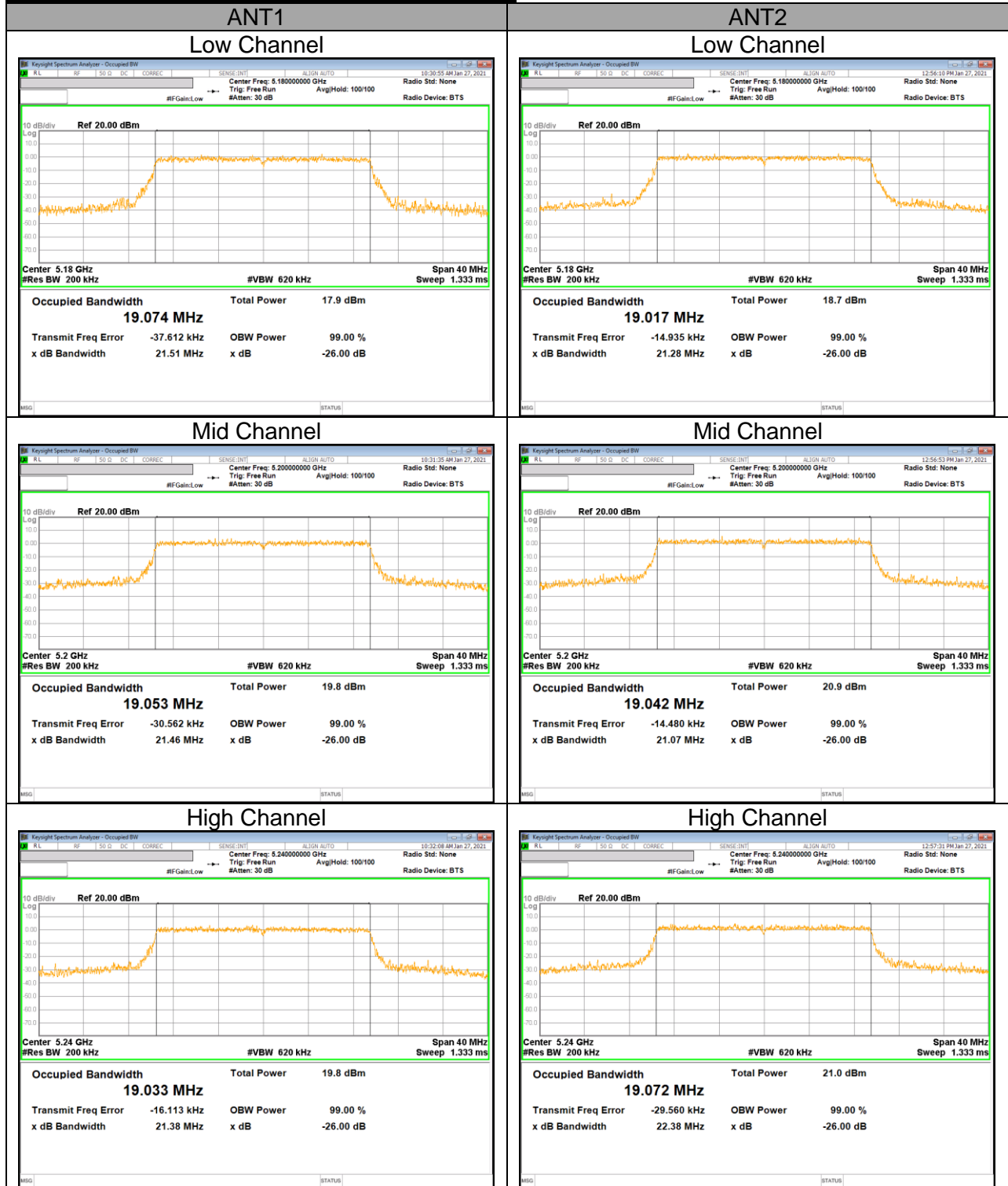
UNII 5.2 GHz IEEE 802.11n HT40 mode



UNII 5.2 GHz IEEE 802.11ac VHT80 mode



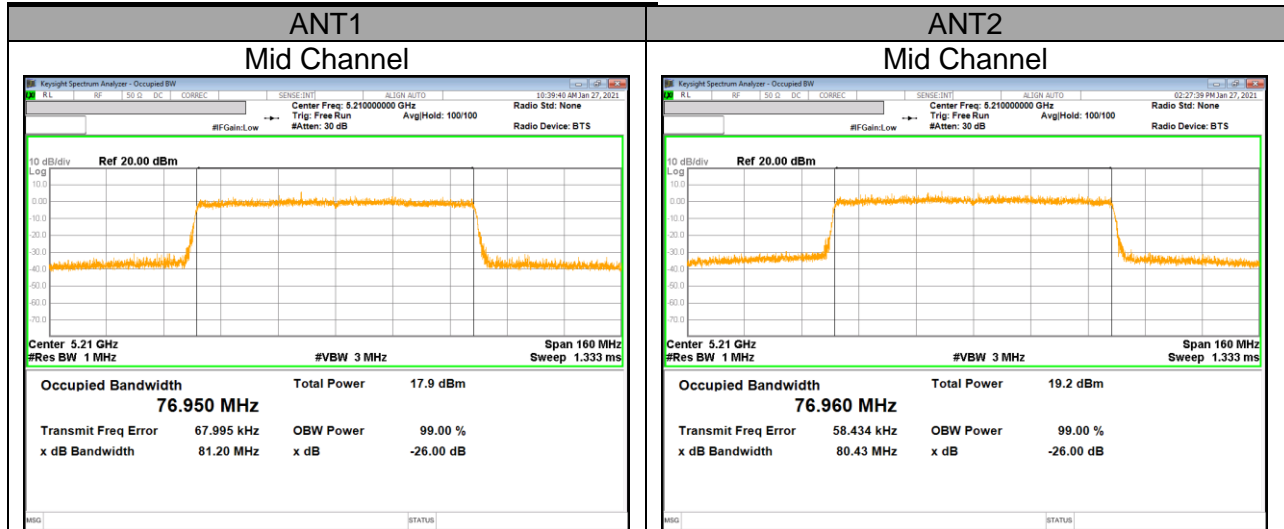
UNII 5.2 GHz IEEE 802.11ax HE20 SU mode



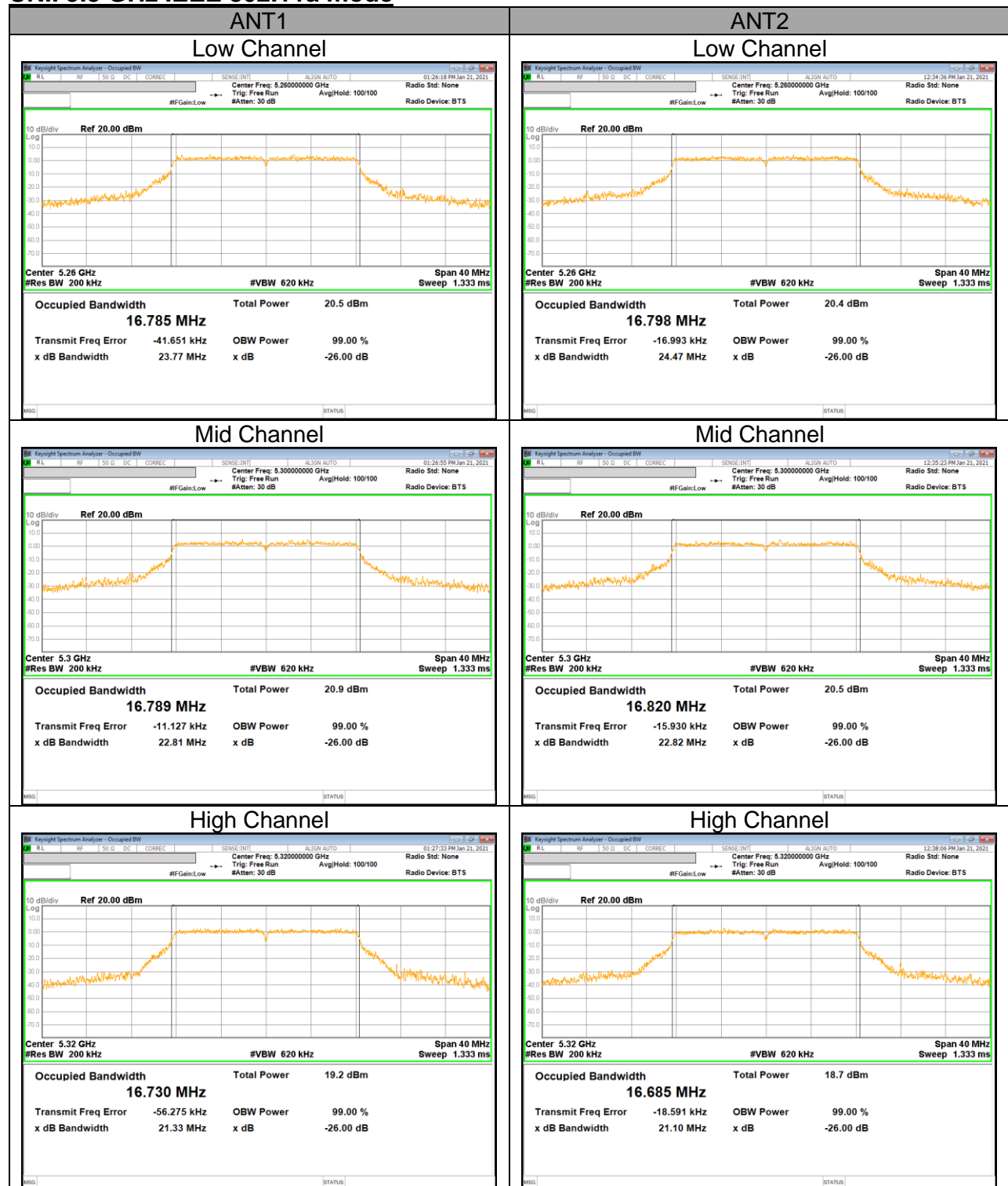
UNII 5.2 GHz IEEE 802.11ax HE40 SU mode



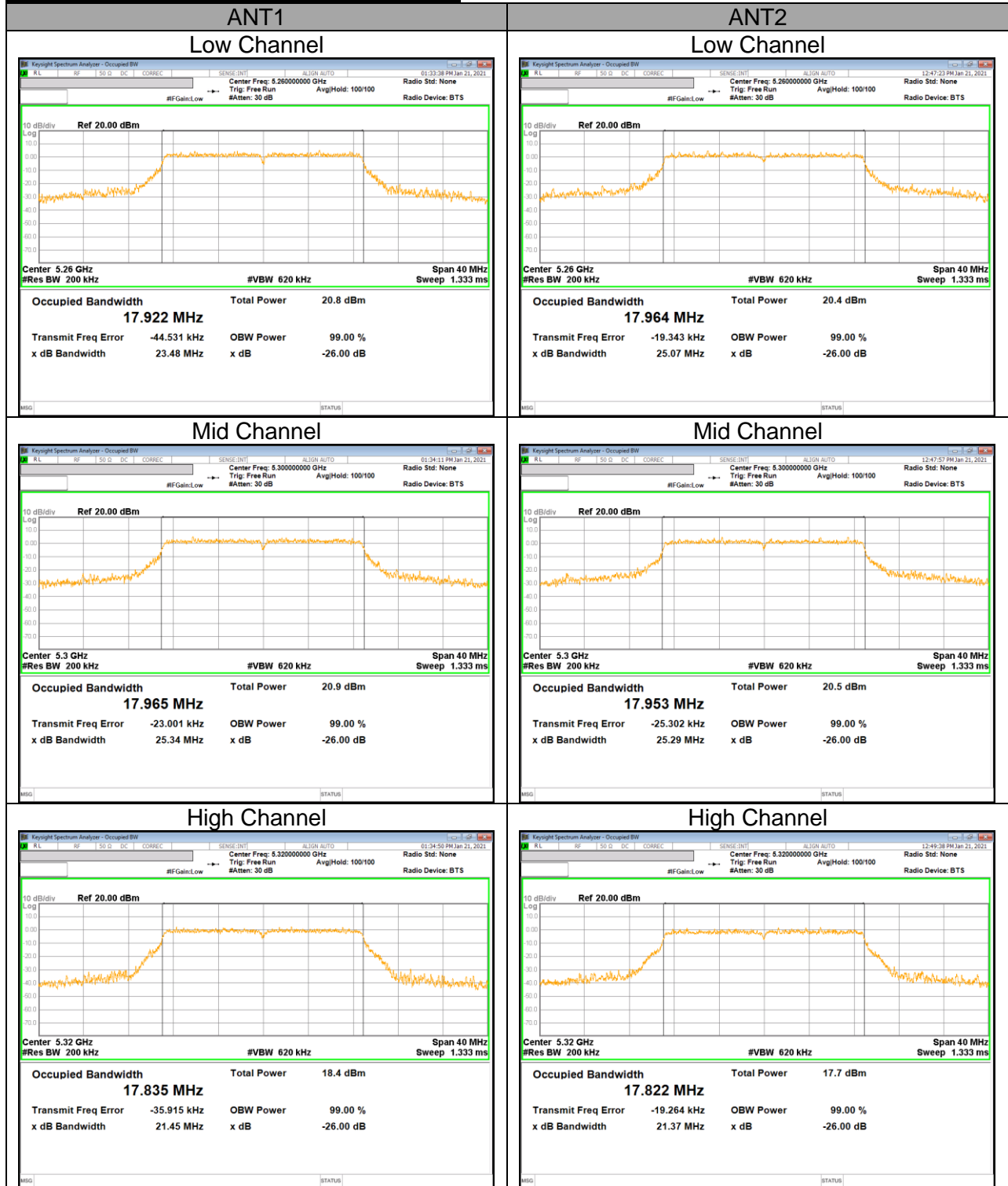
UNII 5.2 GHz IEEE 802.11ax HE80 SU mode



UNII 5.3 GHz IEEE 802.11a mode



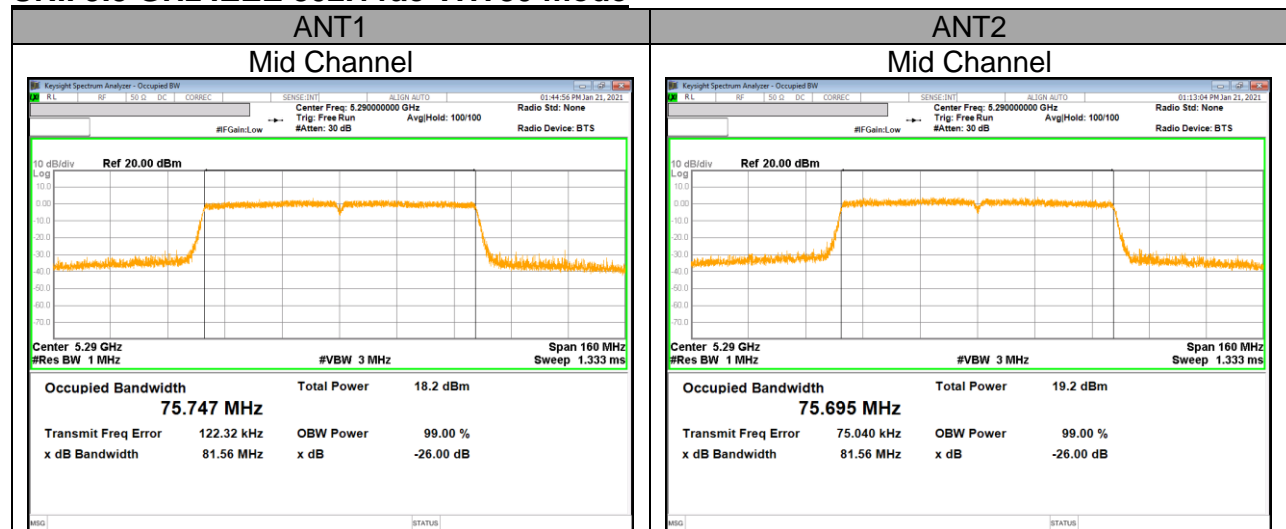
UNII 5.3 GHz IEEE 802.11n HT20 mode



UNII 5.3 GHz IEEE 802.11n HT40 mode



UNII 5.3 GHz IEEE 802.11ac VHT80 mode



UNII 5.3 GHz IEEE 802.11ax HE20(SU) mode

