



FCC CFR47 PART 15 SUBPART C

DTS Wireless LAN

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-G973N

FCC ID: A3LSMG973KOR

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

Prepared by
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433



Testing
Laboratory

TL-637

Revision History

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
1.1. INTRODUCTION OF TEST DATA REUSE	6
1.2. DIFFERENCE	6
1.3. SPOT CHECK VERIFICATION DATA.....	6
1.4. REFERENCE DETAIL.....	7
2. TEST METHODOLOGY	8
3. FACILITIES AND ACCREDITATION	8
4. CALIBRATION AND UNCERTAINTY	8
4.1. MEASURING INSTRUMENT CALIBRATION.....	8
4.2. SAMPLE CALCULATION.....	8
4.3. MEASUREMENT UNCERTAINTY	9
5. EQUIPMENT UNDER TEST	10
5.1. DESCRIPTION OF EUT.....	10
5.2. MAXIMUM OUTPUT POWER.....	11
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	11
5.4. TESTED CHANNELS LIST	12
5.5. WORST-CASE CONFIGURATION AND MODE	12
5.6. DESCRIPTION OF TEST SETUP	13
6. TEST AND MEASUREMENT EQUIPMENT	15
7. REFERENCE MEASUREMENT RESULTS.....	16
7.1. ON TIME AND DUTY CYCLE RESULTS.....	16
8. MEASUREMENT METHODS	17
9. SUMMARY TABLE	18
10. ANTENNA PORT TEST RESULTS	19
10.1. 6 dB BANDWIDTH.....	19
10.1.1. 802.11b MODE IN THE 2.4 GHz BAND.....	20
10.1.2. 802.11g MODE IN THE 2.4 GHz BAND.....	20
10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND	21
10.1.4. 6 dB BANDWIDTH PLOTS	22
10.2. OUTPUT POWER.....	28
10.2.1. 1TX_TEST RESULTS	29
10.2.2. 2TX_TEST RESULTS	30

- 10.3. PSD31
 - 10.3.1. TEST RESULTS.....32
 - 10.3.2. PSD PLOTS33
- 10.4. OUT-OF-BAND EMISSIONS39
 - 10.4.1. 802.11b MODE IN THE 2.4 GHz BAND.....40
 - 10.4.2. 802.11g MODE IN THE 2.4 GHz BAND.....48
 - 10.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND58
- 11. RADIATED TEST RESULTS68**
 - 11.1. LIMITS AND PROCEDURE68
 - 11.2. TRANSMITTER ABOVE 1 GHz70
 - 11.2.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND ANTENNA170
 - 11.2.2. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND ANTENNA284
 - 11.2.3. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND ANTENNA198
 - 11.2.4. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND ANTENNA2114
 - 11.2.5. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND ANTENNA1 130
 - 11.2.6. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND ANTENNA2 146
 - 11.2.7. TX ABOVE 1 GHz 802.11g 2TX CDD MODE IN THE 2.4 GHz BAND162
 - 11.2.8. TX ABOVE 1 GHz 802.11n HT20 2TX CDD MODE IN THE 2.4 GHz BAND178
 - 11.3. WORST-CASE BELOW 1 GHz.....194
- 12. AC POWER LINE CONDUCTED EMISSIONS196**
- 13. SETUP PHOTOS201**

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, ANT+, NFC and WPT

MODEL NUMBER: SM-G973N

SERIAL NUMBER: R38KA0BE04H, R38KA0BE5CF (RADIATED, Original);
R38KA0BCW8E (CONDUCTED, Original);
R39KA0LF5PR, R39KA0LETVN (RADIATED, Spotcheck);

DATE TESTED: NOV 06, 2018 - NOV 29, 2018 (Original)
DEC 03, 2018 - DEC 14, 2018 (Spot check)

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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.

Approved & Released For
UL Korea, Ltd. By:

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Hoonpyo Lee
Suwon Lab Engineer
UL Korea, Ltd.

1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMG973F DTS WLAN(FCC CFR 47 Part 15C). And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMT973F, shares the same enclosure and circuit board as FCC ID: A3LSMG973F. The WLAN antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMG973F remains representative of FCC ID: A3LSMG973KOR. The test data of FCC ID: A3LSMG973F being submitted for this application to cover WLAN features.

1.3. SPOT CHECK VERIFICATION DATA (Worst case of the radiated spurious and band edge emissions)

Band	Test Item	Mode	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-G973F/DS Results	SM-G973N Results		
					FCC ID : A3LSMG973F	FCC ID : A3LSMG973N		
DTS WLAN (2.4 GHz)	Band Edge	802.11b_ANT1	2563 MHz	54 dBuV/m	43.26 dBuV/m	40.79 dBuV/m	-2.47 dB	
	RSE	802.11b_ANT2	2437 MHz	54 dBuV/m	38.77 dBuV/m	40.93 dBuV/m	2.16 dB	2nd Harmonic
	Band Edge	802.11g_ANT ALL	2484 MHz	54 dBuV/m	47.54 dBuV/m	47.71 dBuV/m	0.17 dB	
	RSE	802.11g_ANT1	2462 MHz	54 dBuV/m	40.85 dBuV/m	41.31 dBuV/m	0.46 dB	Noise floor level
	Band Edge	802.11n_ANT ALL	2484 MHz	74 dBuV/m	70.26 dBuV/m	68.55 dBuV/m	-1.71 dB	
	RSE	802.11n_ALL	2437 MHz	54 dBuV/m	36.36 dBuV/m	33.02 dBuV/m	-3.34 dB	2nd Harmonic

Comparison of two models, upper deviation is within 3dB range and all test results are under FCC Technical Limits.

1.4. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID	Type Grant/ Permissive Change	Reference Application	Folder Test/RF Exposure	Report Tittle / Section
DTS	A3LSMG973F	Grant	4788725460-E2	Test	FCC Report DTS(802.11b/g/n) WLAN / All sections
			4788725460-E3	Test	FCC Report DTS(802.11ax) WLAN / All sections
			4788725460-E6	Test	FCC Report BLE / All sections
NII	A3LSMG973F	Grant	4788725460-E4	Test	FCC Report UNII (802.11a/b/g/n/ac) WLAN / All sections
			4788725460-E5	Test	FCC Report UNII(802.11ax) WLAN / All sections
DSS	A3LSMG973F	Grant	4788725460-E7	Test	FCC Report BT / All sections
DXX	A3LSMG973F	Grant	4788725460-E8	Test	FCC Report ANT+ / All sections
			4788725460-E9	Test	FCC Report NFC / All sections
DCD	A3LSMG973F	Grant	4788725460-E10	Test	FCC Report WPT / All sections

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 558074 D01 15.247 Meas Guidance v05.
4. ANSI C63.10-2013.
5. KDB 662911 D01 v02r01
6. KDB 484596 D01 v01

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 type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.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	2.32 dB
Radiated Disturbance, Below 1GHz	3.86 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

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, ANT+, NFC and WPT. This test report addresses the DTS (WLAN) operational mode.

WiFi MIMO Condition

Frequency	Mode	Antenna 1	Antenna 2
2.4GHz	802.11g	TX / RX	TX / RX
	802.11g MIMO	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
	802.11ax	TX / RX	TX / RX
	802.11ax MIMO	TX / RX	TX / RX
5 GHz	802.11a	TX / RX	TX / RX
	802.11a MIMO	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
	802.11ac	TX / RX	TX / RX
	802.11ac MIMO	TX / RX	TX / RX
	802.11ax	TX / RX	TX / RX
	802.11ax MIMO	TX / RX	TX / RX

Simultaneous TX Condition (RSDB)

	# TX	5GHz WIFI [dBm]		2.4GHz WIFI [dBm]	
		Ant1	Ant2	Ant1	Ant2
2.4 GHz + 5 GHz RSDB Only	2	A	-	-	B
	2	-	A	B	-
	2	A	-	B	-
	2	-	A	-	B
2.4 GHz + 5 GHz RSDB & MIMO	3	A	A	B	-
	3	A	A	-	B
	3	A	-	B	B
	3	-	A	B	B
2.4 GHz + 5 GHz RSDB MIMO	4	A	A	B	B

Simultaneous TX Condition Bluetooth with 5GHz WIFI (Not RSDB)

	# TX	5GHz WIFI		2.4GHz BT
		ANT1	ANT2	ANT1
2.4GHz BT+5GHz WIFI (Not RSDB)	2	A	-	B
	2	-	A	B
	3	A	A	B

Spurious Emissions for Simultaneous Transmission were reported on the UNII test report(4788725709-E4) section 11.5.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]	
		Antenna1	Antenna2	Antenna1	Antenna2
2412 - 2472	802.11b SISO	18.24	18.80	66.68	75.86
	802.11g SISO	15.97	15.74	39.54	37.50
	802.11g MIMO	18.86		76.91	
	802.11n HT20 SISO	15.91	15.73	38.99	37.41
	802.11n HT20 MIMO	18.83		76.38	

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antennas, with antenna1's maximum gain of -5.0 dBi and antenna2's maximum gain of -5.7 dBi ..

5.4. TESTED CHANNELS LIST

802.11b mode	CHANNEL	Frequency (MHz)
LOW	1	2412
MID	6	2437
HIGH	11	2462
REDUCTION HIGH 1	12	2467
REDUCTION HIGH 2	13	2472

802.11g/n mode	CHANNEL	Frequency (MHz)
LOW	1	2412
MID	6	2437
HIGH	10	2457
REDUCTION HIGH 1	11	2462
REDUCTION HIGH 2	12	2467
REDUCTION HIGH 3	13	2472

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

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

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

- 802.11b mode: 1 Mbps
- 802.11g mode: 6 Mbps
- 802.11n HT20 mode: MCS0

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA200	R37KB5B03T1SE3	N/A
Data Cable	SAMSUNG	EP-DG970BBE	N/A	N/A
Earphone	SAMSUNG	EO-IG955	N/A	N/A

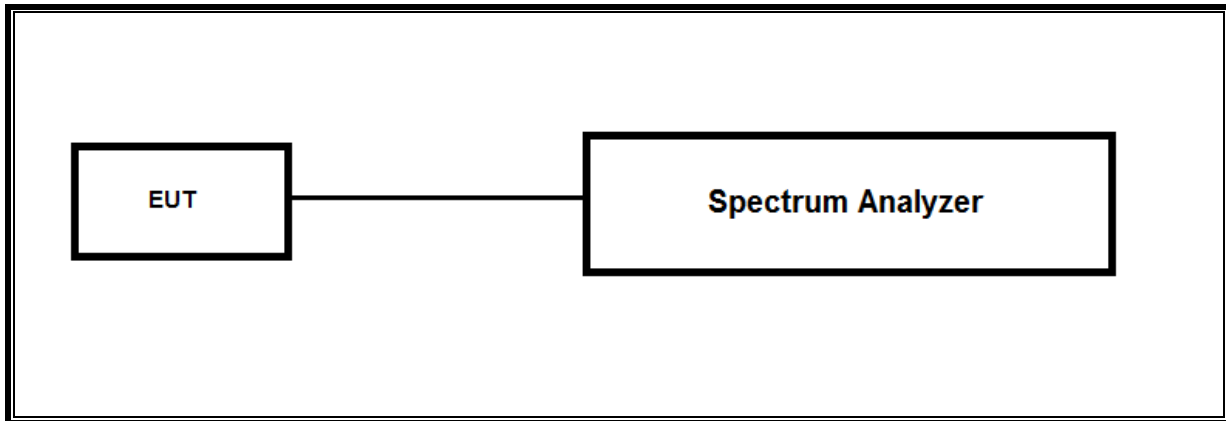
I/O CABLE

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	1.1m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

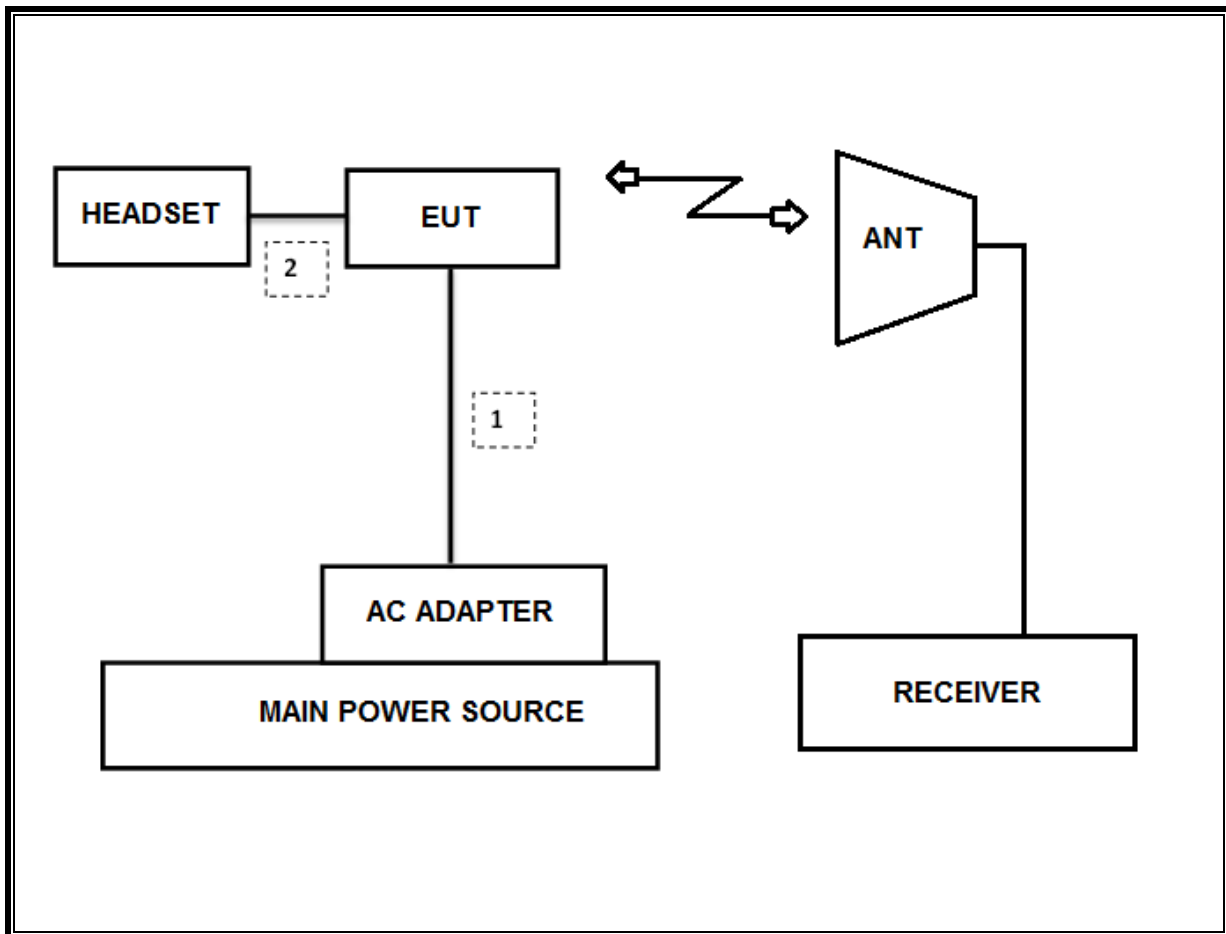
TEST SETUP

The EUT is a stand-alone unit during the tests.
 Test software in hidden menu exercised the EUT to enable DTS 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	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-07-19
Attenuator	PASTERNAK	PE7087-10	A001	08-08-19
Attenuator	PASTERNAK	PE7087-10	A008	08-08-19
Attenuator	PASTERNAK	PE7004-10	2	08-07-19
Attenuator	PASTERNAK	PE7087-10	A009	08-08-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-19
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
LISN	R&S	ENV-216	101837	08-09-19
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

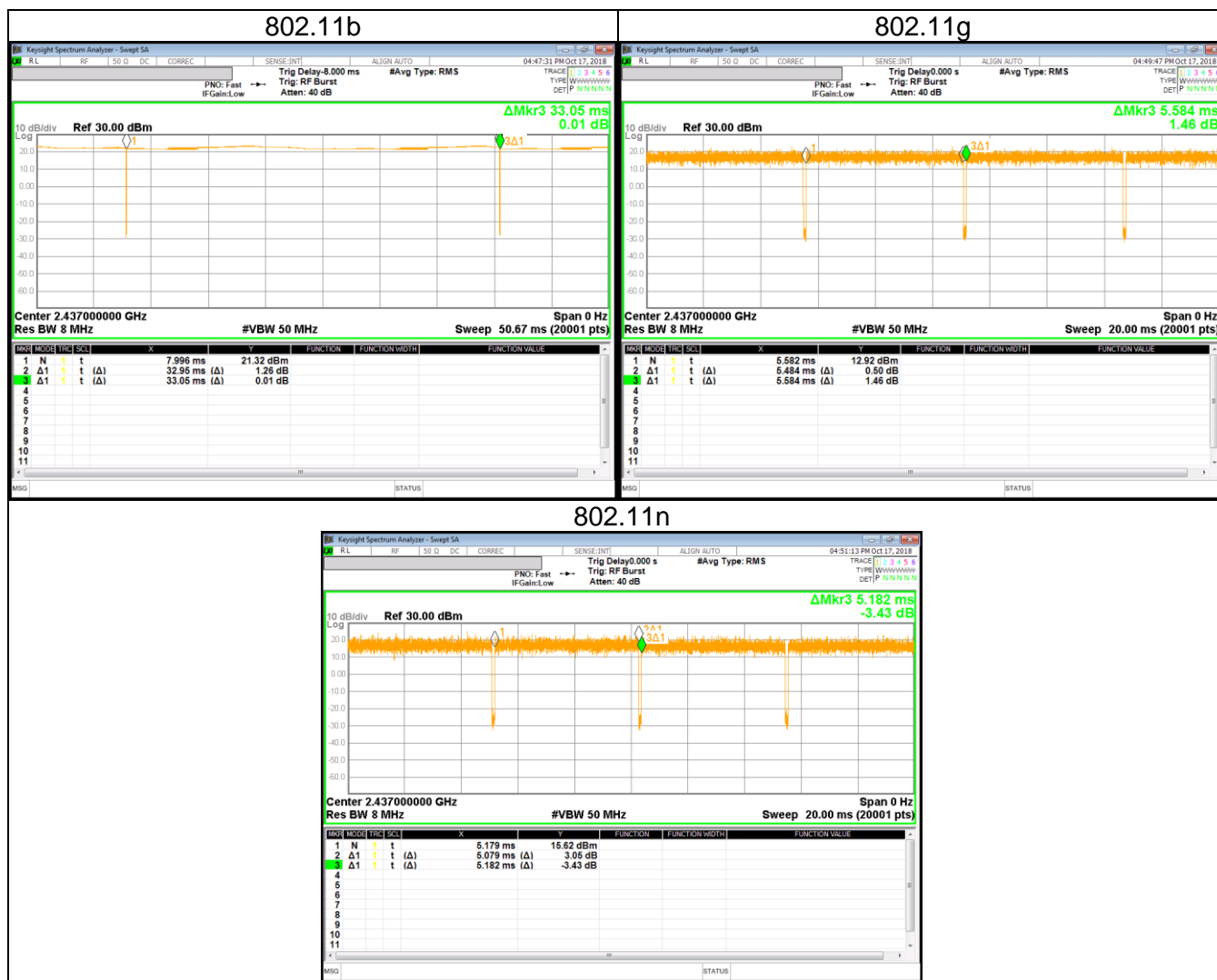
7. REFERENCE MEASUREMENT RESULTS

7.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

None; for reporting purposes only.

Mode	On Time [mS]	Period [mS]	Duty Cycle X [linear]	Duty Cycle X [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
802.11b	32.950	33.050	0.997	99.7	0.00	0.010
802.11g	5.484	5.584	0.982	98.2	0.00	0.010
802.11n HT20	5.079	5.182	0.980	98.0	0.00	0.010



8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05, Section 8.3.2.3.

POWER SPECTRAL DENSITY : KDB 558074 D01 v05, Section 8.4.

Out-of-band EMISSIONS (Conducted) : KDB 558074 D01 v05, Section 8.5, 8.7.

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: KDB 558074 D01 v05, Section 8.5.

Out-of-band EMISSIONS IN RESTRICTED BANDS : KDB 558074 D01 v05, Section 8.6.

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

9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-30dBc		Pass
15.247 (b)(3)	TX conducted output power	<30dBm		Pass
15.247 (e)	PSD	<8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to 100KHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS**10.1.1. 802.11b MODE IN THE 2.4 GHz BAND**

ANTENNA	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	Low	2412	7.544	0.5
	Mid	2437	7.556	0.5
	High	2462	7.061	0.5
	11	2467	8.019	0.5
	12	2472	7.556	0.5
	Worst			7.061
2	Low	2412	7.564	0.5
	Mid	2437	7.090	0.5
	High	2462	7.082	0.5
	11	2467	7.546	0.5
	12	2472	7.565	0.5
	Worst			7.082

10.1.2. 802.11g MODE IN THE 2.4 GHz BAND

ANTENNA	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	Low	2412	16.350	0.5
	Mid	2437	16.350	0.5
	High	2457	16.360	0.5
	11	2462	16.340	0.5
	12	2467	16.360	0.5
	13	2472	16.360	0.5
	Worst			16.340
2	Low	2412	16.360	0.5
	Mid	2437	16.350	0.5
	High	2457	16.350	0.5
	11	2462	16.330	0.5
	12	2467	16.340	0.5
	13	2472	16.090	0.5
	Worst			16.090

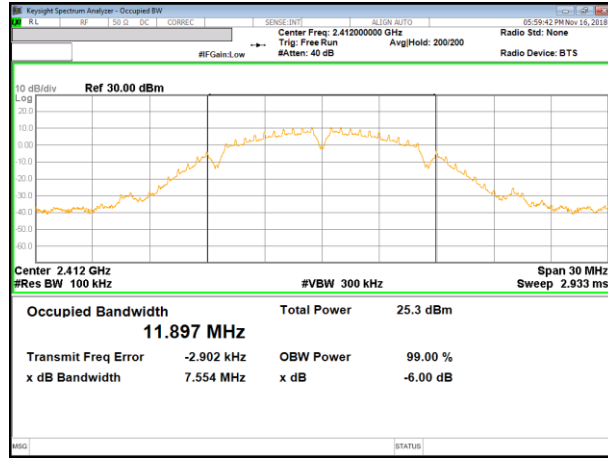
10.1.3. **802.11n HT20 MODE IN THE 2.4 GHz BAND**

ANTENNA	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	Low	2412	17.590	0.5
	Mid	2437	17.570	0.5
	High	2457	17.600	0.5
	11	2462	17.580	0.5
	12	2467	17.580	0.5
	13	2472	17.590	0.5
	Worst			17.570
2	Low	2412	17.590	0.5
	Mid	2437	17.580	0.5
	High	2457	17.580	0.5
	11	2462	17.580	0.5
	12	2467	17.330	0.5
	13	2472	16.940	0.5
	Worst			16.940

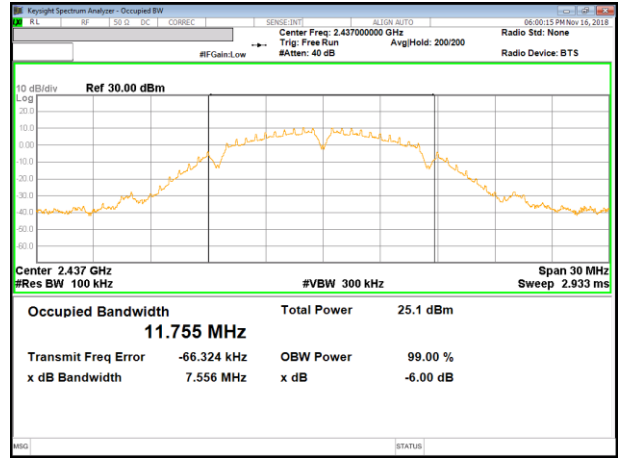
10.1.4. 6 dB BANDWIDTH PLOTS

1TX_ANTENNA 1

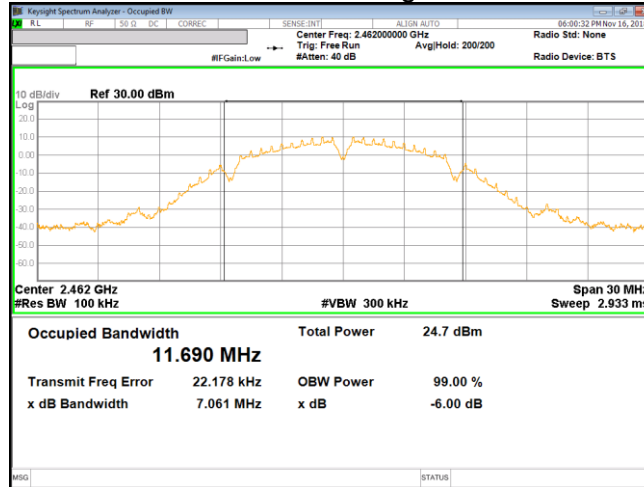
11b Mode Low



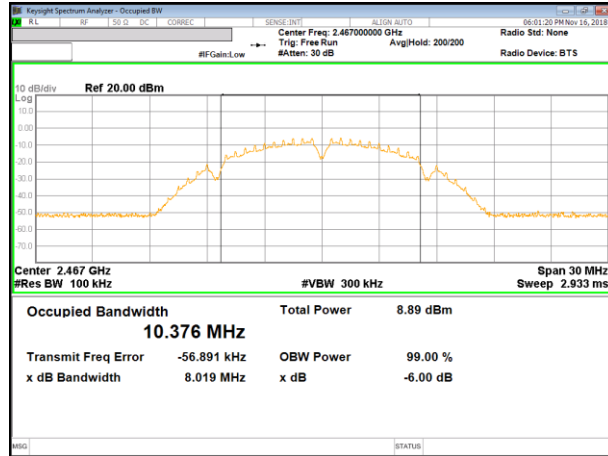
11b Mode Mid



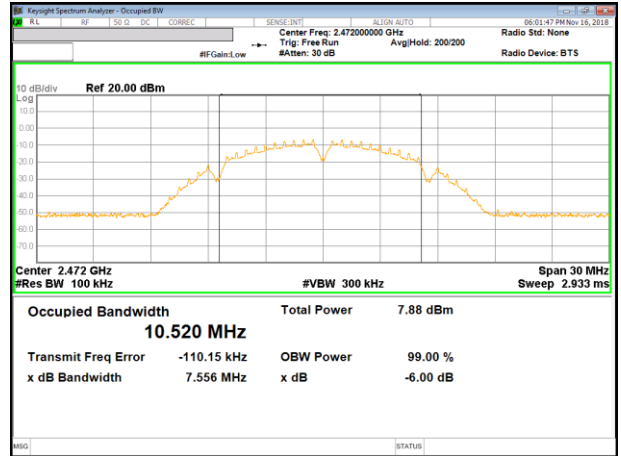
11b Mode High



11b Mode 12 CH

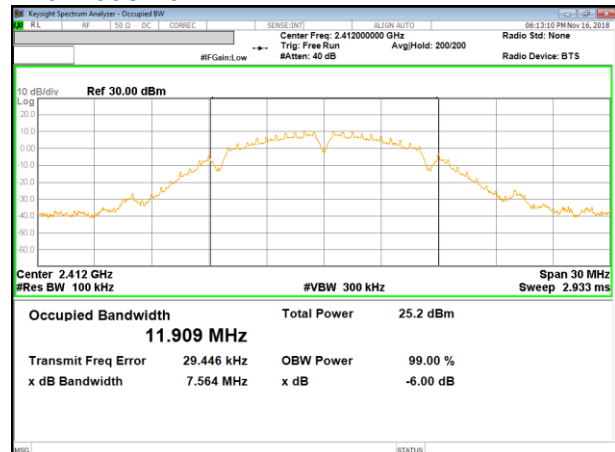


11b Mode 13 CH

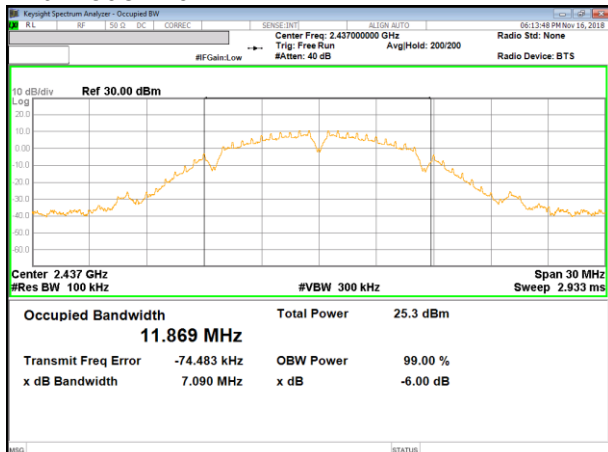


1TX_ANTENNA 2

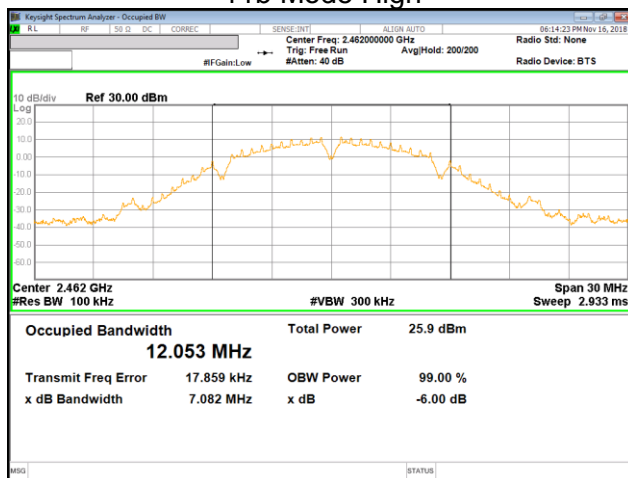
11b Mode Low



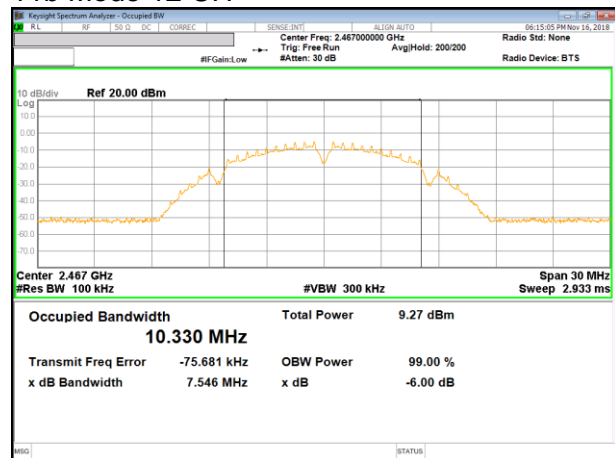
11b Mode Mid



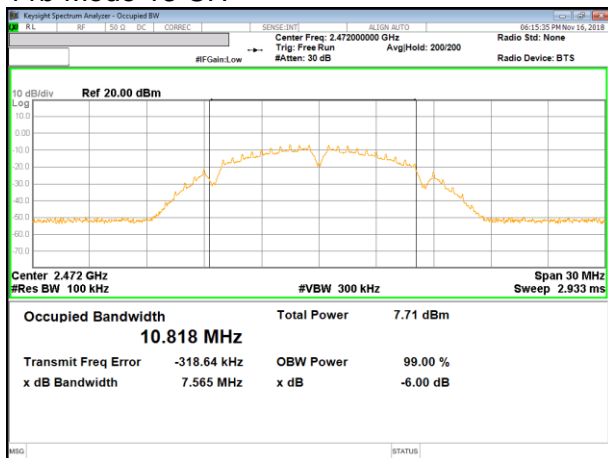
11b Mode High



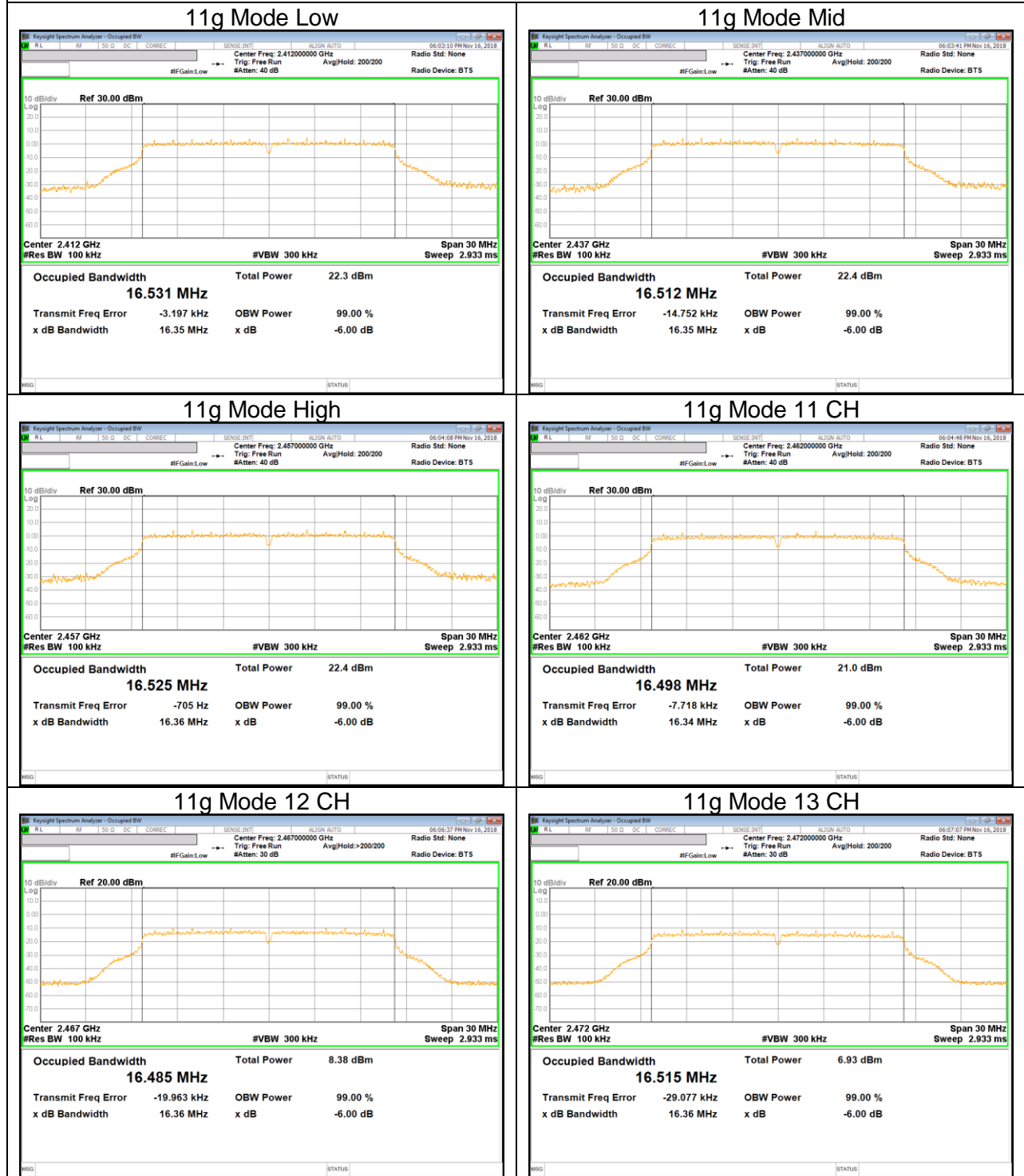
11b Mode 12 CH



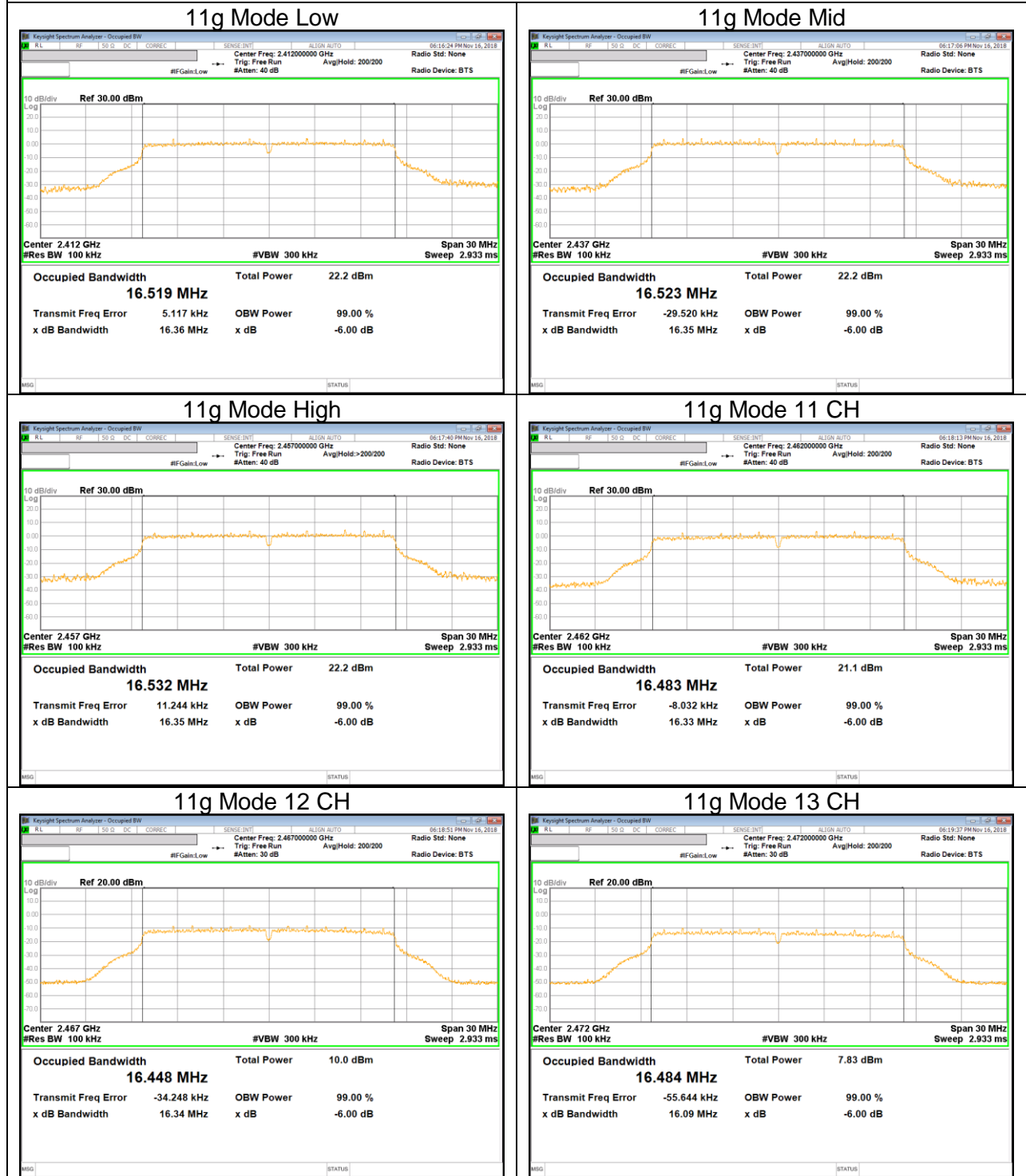
11b Mode 13 CH



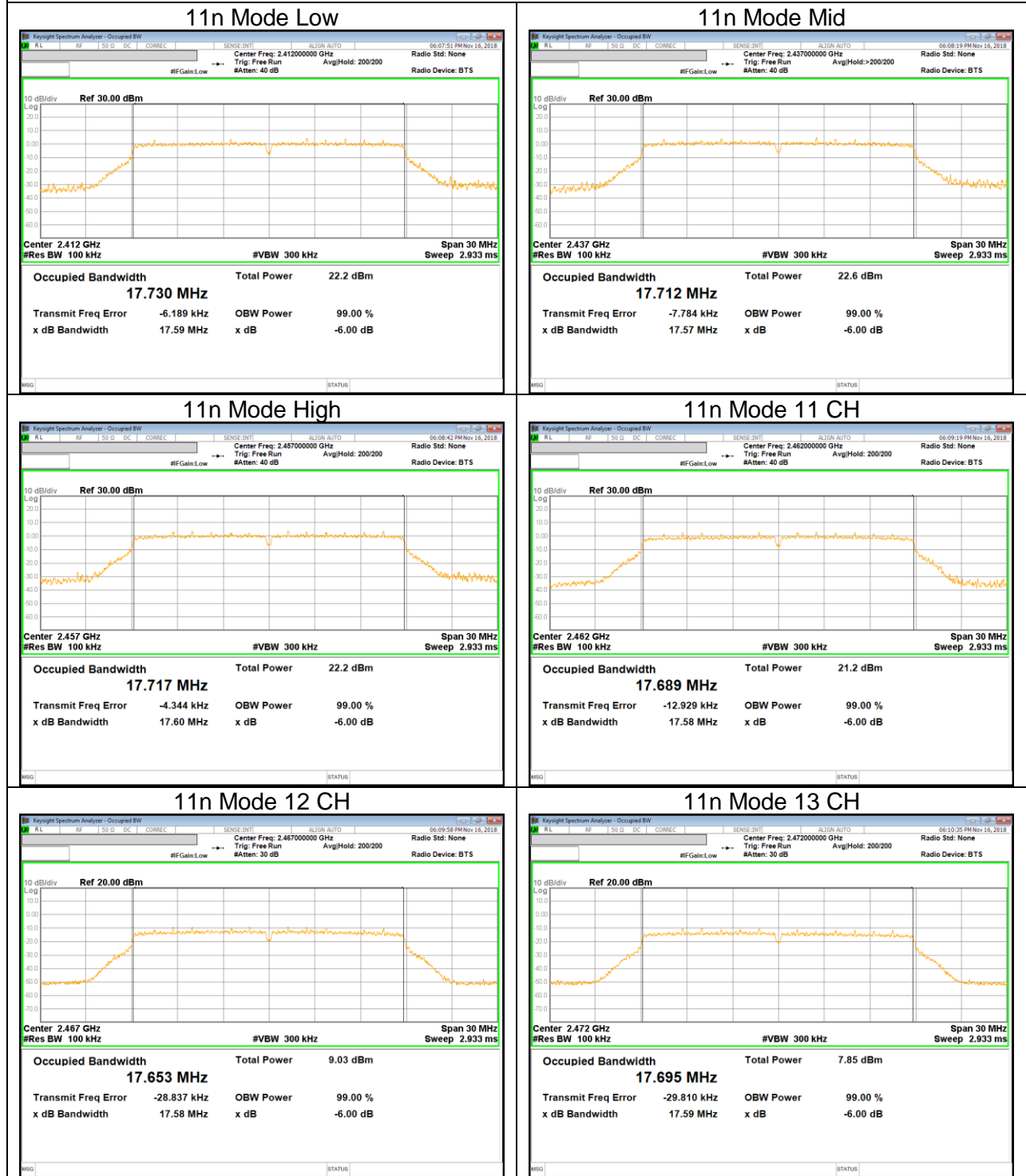
1TX_ANTENNA 1



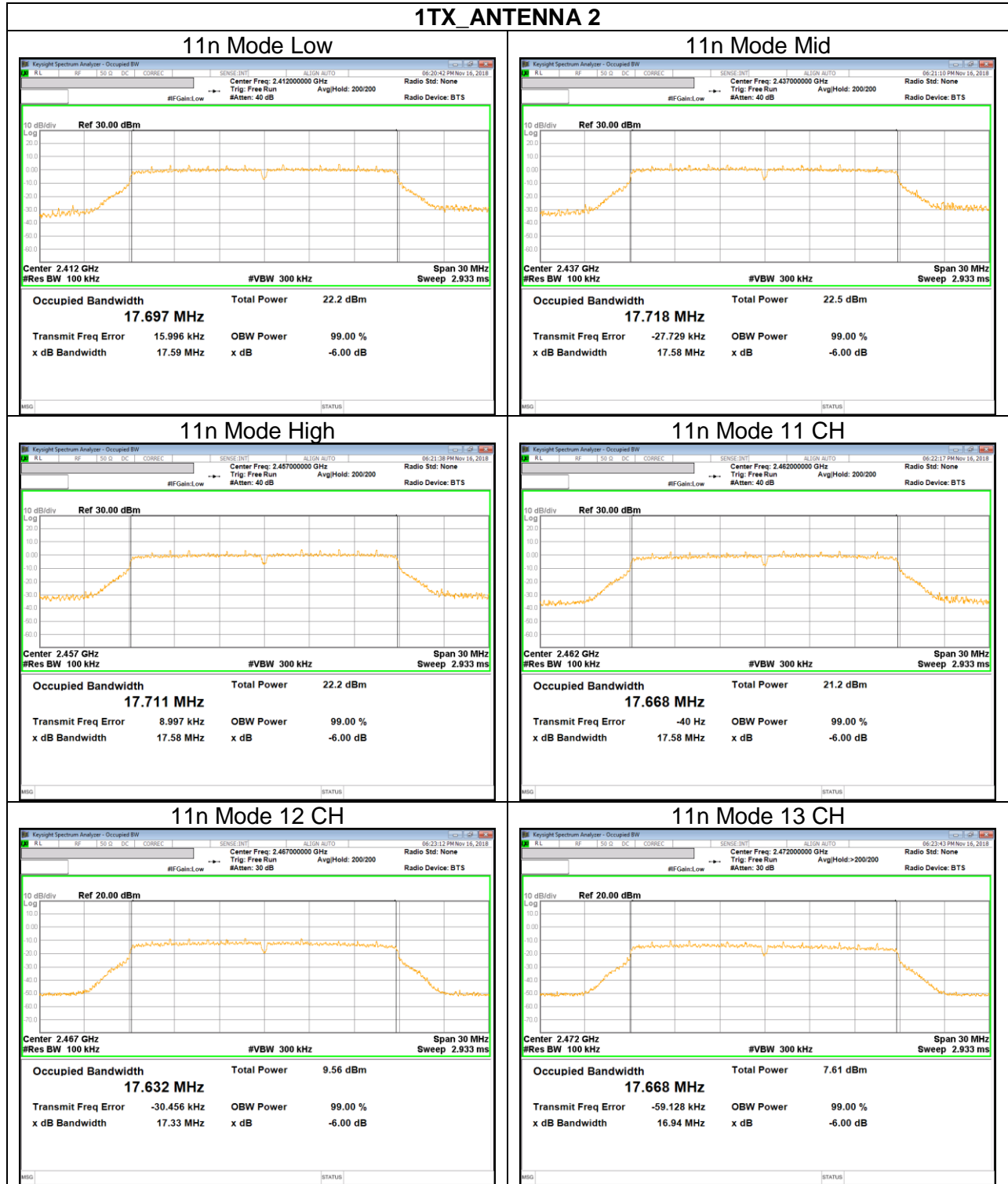
1TX_ANTENNA 2



1TX_ANTENNA 1



1TX_ANTENNA 2



10.2. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

Duty cycle correction factor is not added to the average output power results for duty cycle factor > 98%. (All mode)

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains.
The directional gain is:

Frequency Band [MHz]	Antenna1 Gain [dBi]	Antenna2 Gain [dBi]	Correlated Chains Directional Gain [dBi]
2400 ~ 2483.5	-5.00	-5.70	-2.33

- IEEE 802.11b Mode is not supported MIMO operation. So can't transmit on two antennas as the same time.

RESULTS

10.2.1. 1TX_TEST RESULTS

Limits

Frequency Range [MHz]	Directional Gain ANTENNA1 [dBi]	Directional Gain ANTENNA2 [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2472	-5.00	-5.70	30.00	30.00

Included in Calculations of Corr'd Power			
Duty Cycle CF [dB]	b	0.00	dB
	g	0.00	dB
	n	0.00	dB

Calculation of Output Power result

Corr'd Power [dBm] = Meas Power [dBm] + Duty CF [dB]

Output Power Results

Mode	Channel	Frequency [MHz]	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Antenna 1 Corr'd Power [dBm]	Antenna 2 Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
802.11b	Low	2412	18.24	18.32	18.24	18.32	30.00	-11.68
	Mid	2437	18.19	18.27	18.19	18.27	30.00	-11.73
	High	2462	17.62	18.80	17.62	18.80	30.00	-11.20
	12	2467	2.51	2.52	2.51	2.52	30.00	-27.48
	13	2472	0.65	0.84	0.65	0.84	30.00	-29.16
Worst Case					18.24	18.80	30.00	-11.20

Output Power Results

Mode	Channel	Frequency [MHz]	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Antenna 1 Corr'd Power [dBm]	Antenna 2 Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
802.11g	Low	2412	15.65	15.74	15.65	15.74	30.00	-14.26
	Mid	2437	15.97	15.70	15.97	15.70	30.00	-14.03
	High	2457	15.47	15.51	15.47	15.51	30.00	-14.49
	11	2462	14.34	14.49	14.34	14.49	30.00	-15.51
	12	2467	3.01	2.97	3.01	2.97	30.00	-26.99
	13	2472	0.92	1.43	0.92	1.43	30.00	-28.57
Worst Case					15.97	15.74	30.00	-14.03

Output Power Results

Mode	Channel	Frequency [MHz]	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Antenna 1 Corr'd Power [dBm]	Antenna 2 Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
802.11n	Low	2412	15.42	15.69	15.42	15.69	30.00	-14.31
	Mid	2437	15.91	15.73	15.91	15.73	30.00	-14.09
	High	2457	15.31	15.31	15.31	15.31	30.00	-14.69
	11	2462	14.29	14.45	14.29	14.45	30.00	-15.55
	12	2467	3.13	2.92	3.13	2.92	30.00	-26.87
	13	2472	1.27	1.15	1.27	1.15	30.00	-28.73
Worst Case					15.91	15.73	30.00	-14.09

10.2.2. 2TX_TEST RESULTS

Limits

Frequency Range [MHz]	Correlated Chains Directional Gain [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2472	-2.33	30.00	30

Included in Calculations of Corr'd Power			
Duty Cycle CF [dB]	g	0.00	dB
	n	0.00	dB

Calculation of Output Power result

Sum PW
 = ANTENNA1_Meas Power [mW] + ANTENNA2_Meas Power [mW]
 Total Corr'd Power [dBm]
 = Sum PW [dBm] + Duty CF [dB]

Output Power Results

Mode	Channel	Frequency [MHz]	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
802.11g	Low	2412	15.60	15.24	18.43	30.00	-11.57
	Mid	2437	15.99	15.70	18.86	30.00	-11.14
	High	2457	15.89	15.65	18.78	30.00	-11.22
	11	2462	14.93	14.48	17.72	30.00	-12.28
	12	2467	2.76	2.62	5.70	30.00	-24.30
	13	2472	1.21	1.12	4.18	30.00	-25.82
Worst Case					18.86	30.00	-11.14

Mode	Channel	Frequency [MHz]	Antenna 1 Meas Power [dBm]	Antenna 2 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
802.11n	Low	2412	15.50	15.21	18.37	30.00	-11.63
	Mid	2437	15.97	15.67	18.83	30.00	-11.17
	High	2457	15.90	15.53	18.73	30.00	-11.27
	11	2462	14.80	14.51	17.67	30.00	-12.33
	12	2467	2.85	3.15	6.01	30.00	-23.99
	13	2472	1.48	1.47	4.49	30.00	-25.51
Worst Case					18.83	30.00	-11.17

10.3. PSD

LIMITS

FCC §15.247

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the section 8.4 under KDB558074 D01 15.247 Meas Guidance.

RESULTS

10.3.1. TEST RESULTS

Included in Calculations of Corr'd Power			
Duty Cycle CF [dB]	b	0.00	dB
	g	0.00	dB
	n	0.00	dB

Calculation of Output Power result

- 1TX
 $\text{Corr'd PSD [dBm]} = \text{Meas PSD [dBm]} + \text{Duty CF [dB]}$
- 2TX
 $\text{Sum PSD} = \text{Ant1_Meas PSD [mW]} + \text{Ant1_Meas PSD [mW]}$
 $\text{Total Corr'd PSD [dBm]} = \text{Sum PW [dBm]} + \text{Duty CF [dB]}$

PSD Results

Mode	Channel	Frequency [MHz]	Antenna 1	Antenna 2	Antenna 1	Antenna 2	PSD Limit [dBm/3kHz]	PSD Margin [dB]
			Meas PSD [dBm/3kHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]		
802.11b	Low	2412	-12.09	-13.00	-12.09	-13.00	8.00	-20.09
	Mid	2437	-12.63	-12.72	-12.63	-12.72	8.00	-20.63
	High	2462	-13.53	-11.94	-13.53	-11.94	8.00	-19.94
	12	2467	-28.27	-27.24	-28.27	-27.24	8.00	-35.24
	13	2472	-30.12	-29.69	-30.12	-29.69	8.00	-37.69
Worst Case					-12.09	-11.94	8.00	-19.94

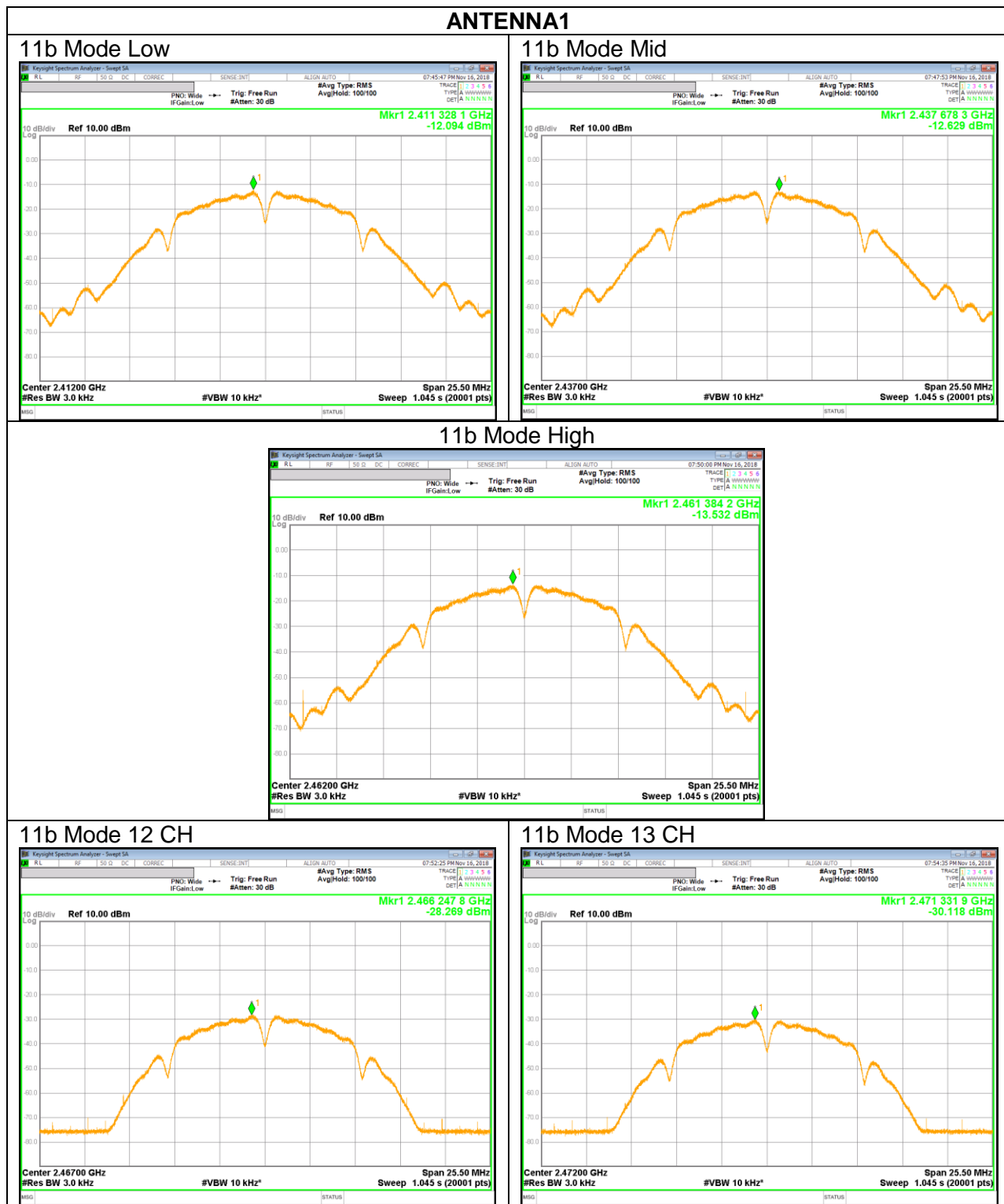
PSD Results

Mode	Channel	Frequency [MHz]	Antenna 1	Antenna 2	Total	PSD Limit [dBm/3kHz]	PSD Margin [dB]
			Meas PSD [dBm/3kHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]		
802.11g	Low	2412	-17.07	-16.27	-13.64	8.00	-21.64
	Mid	2437	-15.72	-16.85	-13.24	8.00	-21.24
	High	2457	-17.25	-16.24	-13.70	8.00	-21.70
	11	2462	-18.23	-17.50	-14.84	8.00	-22.84
	12	2467	-28.93	-29.02	-25.96	8.00	-33.96
	13	2472	-32.29	-30.46	-28.27	8.00	-36.27
Worst Case					-13.24	8.00	-21.24

PSD Results

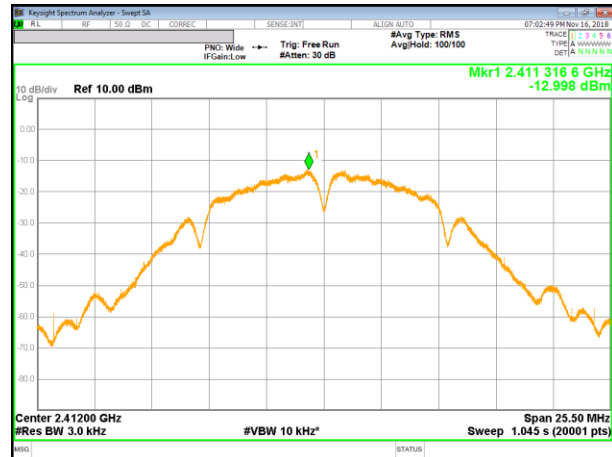
Mode	Channel	Frequency [MHz]	Antenna 1	Antenna 2	Total	PSD Limit [dBm/3kHz]	PSD Margin [dB]
			Meas PSD [dBm/3kHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]		
802.11n	Low	2412	-19.01	-18.73	-15.86	8.00	-23.86
	Mid	2437	-18.23	-18.34	-15.28	8.00	-23.28
	High	2457	-18.98	-18.96	-15.96	8.00	-23.96
	11	2462	-19.95	-19.73	-16.83	8.00	-24.83
	12	2467	-31.52	-31.05	-28.26	8.00	-36.26
	13	2472	-32.97	-33.16	-30.05	8.00	-38.05
Worst Case					-15.28	8.00	-23.28

10.3.2. PSD PLOTS

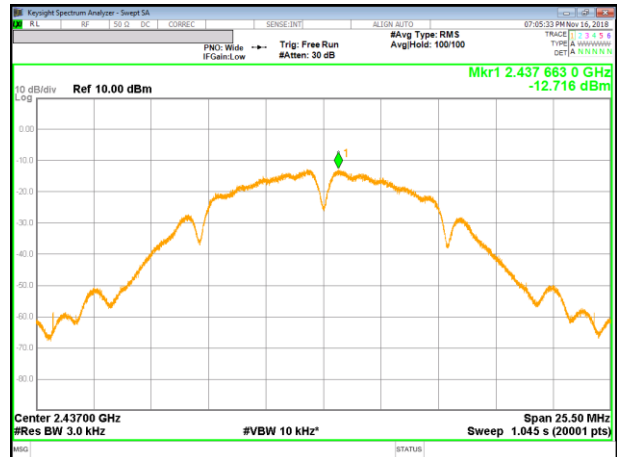


ANTENNA 2

11b Mode Low



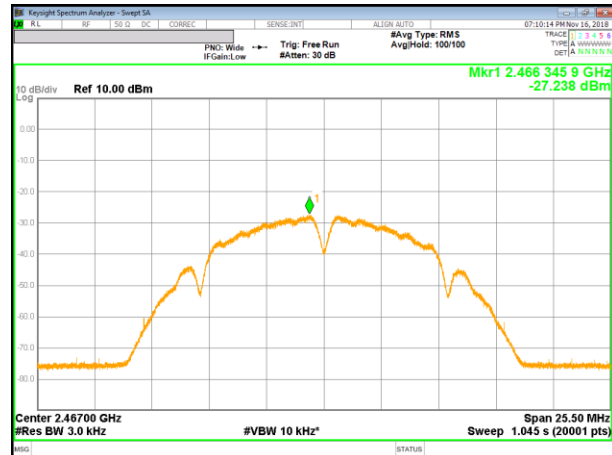
11b Mode Mid



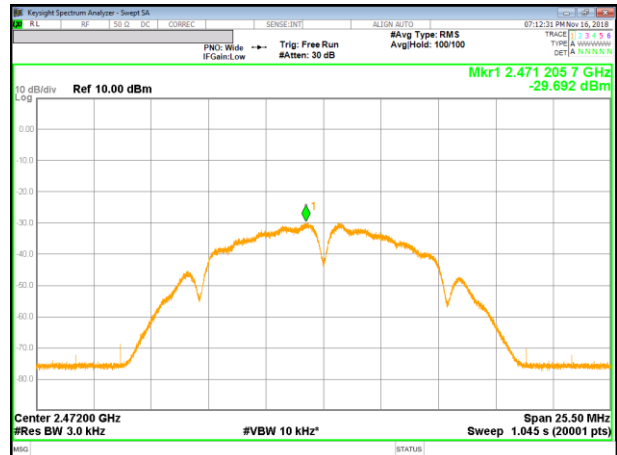
11b Mode High



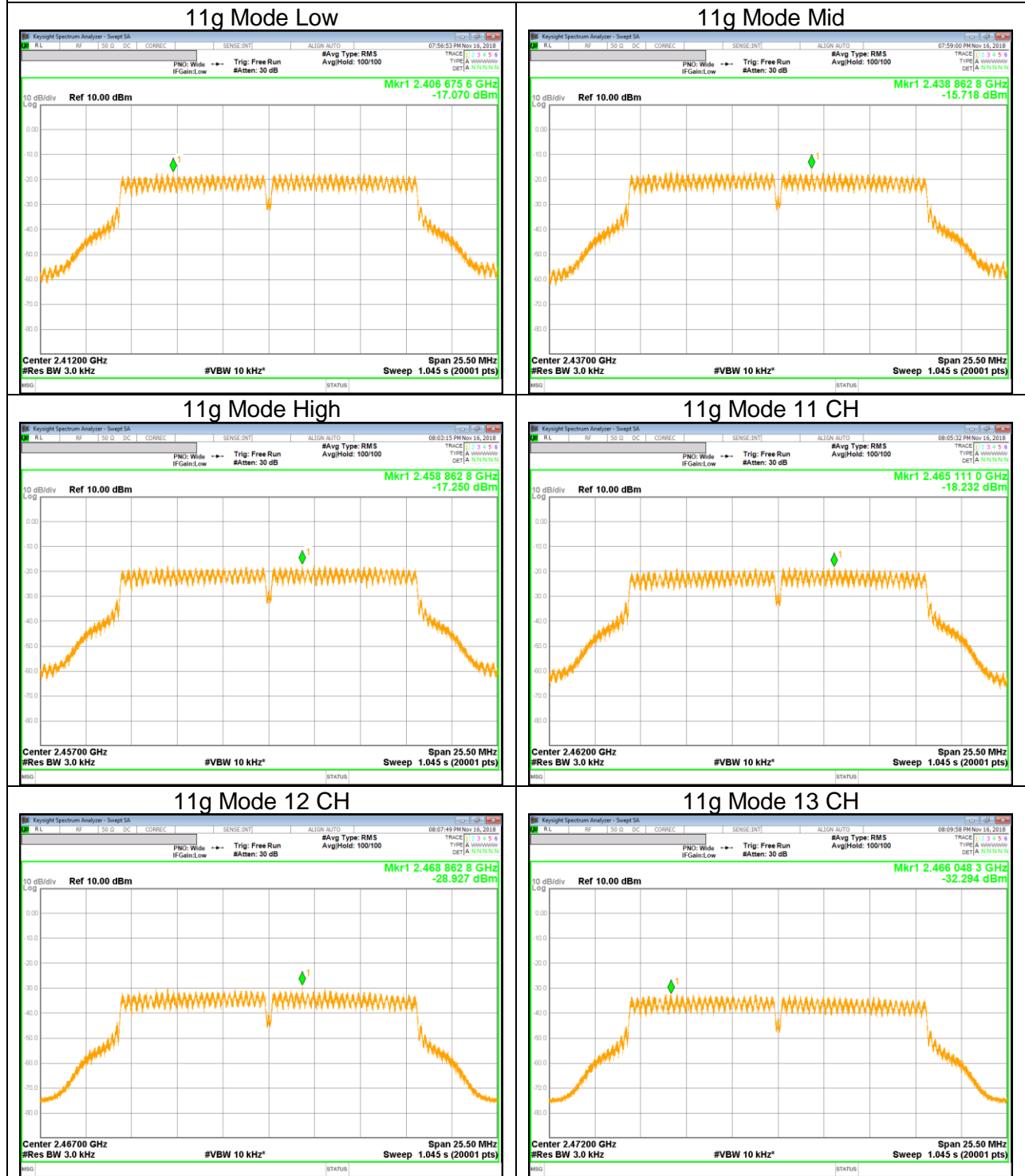
11b Mode 12 CH



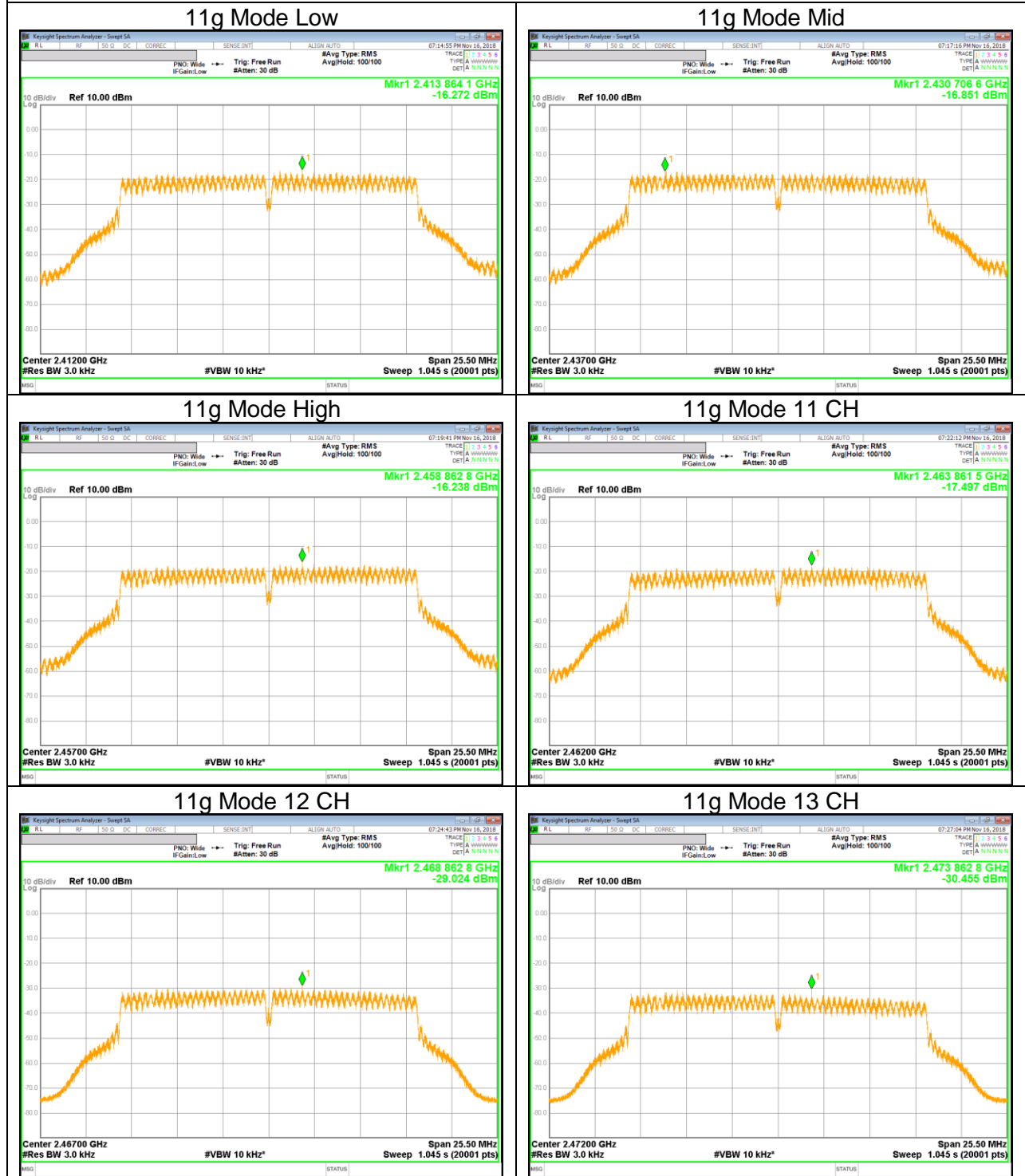
11b Mode 13 CH



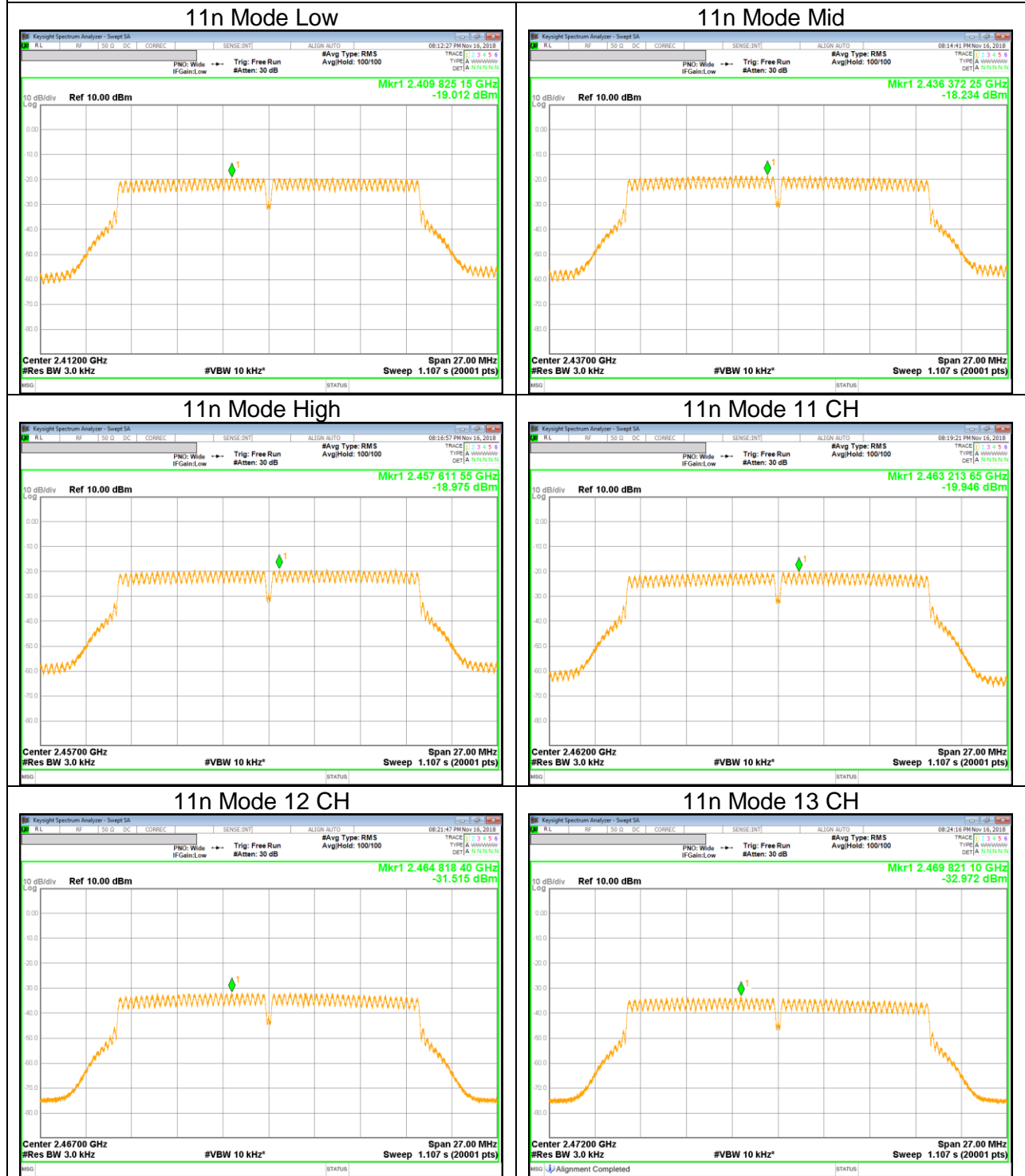
ANTENNA 1



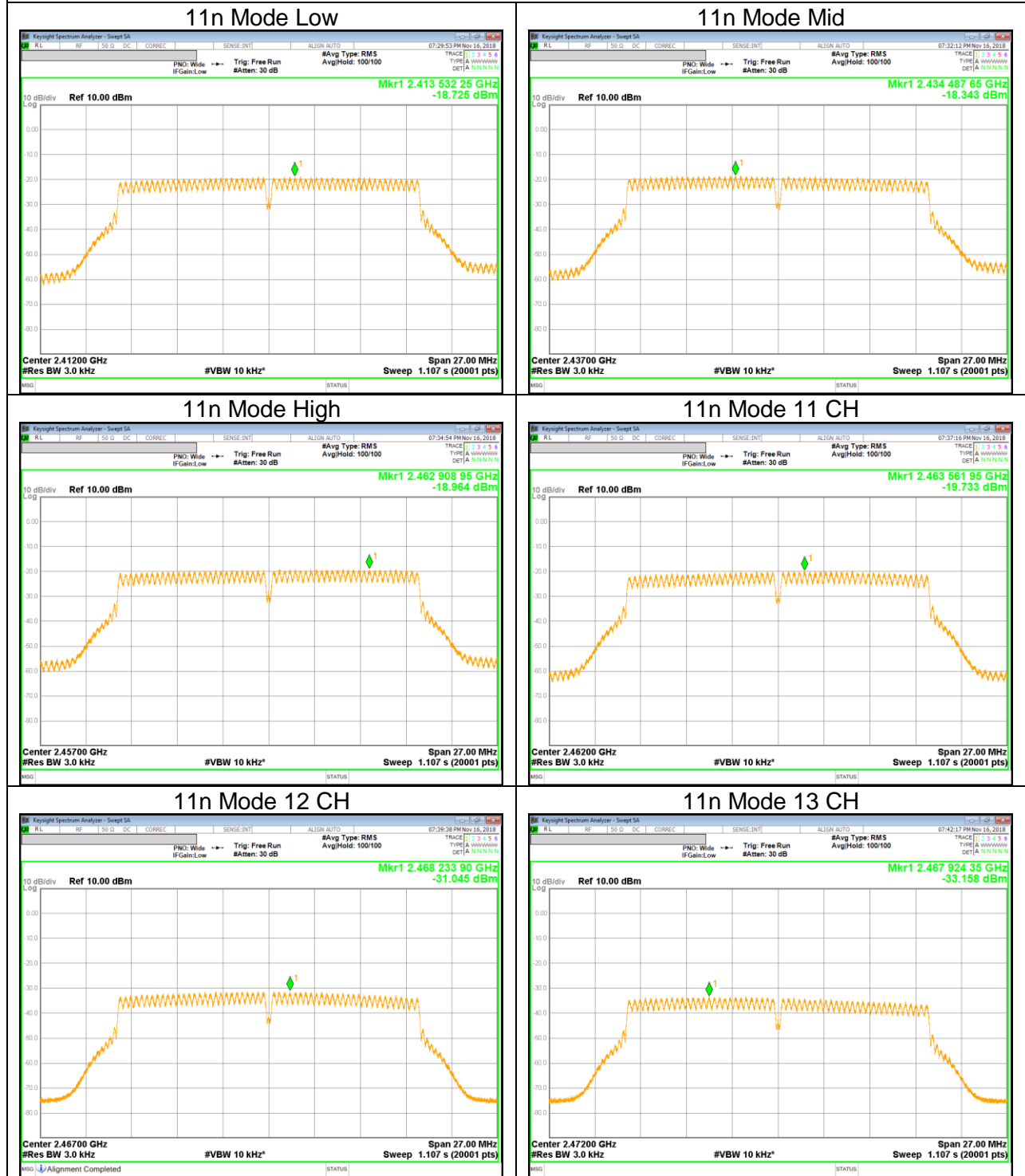
ANTENNA 2



ANTENNA 1



ANTENNA 2



10.4. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

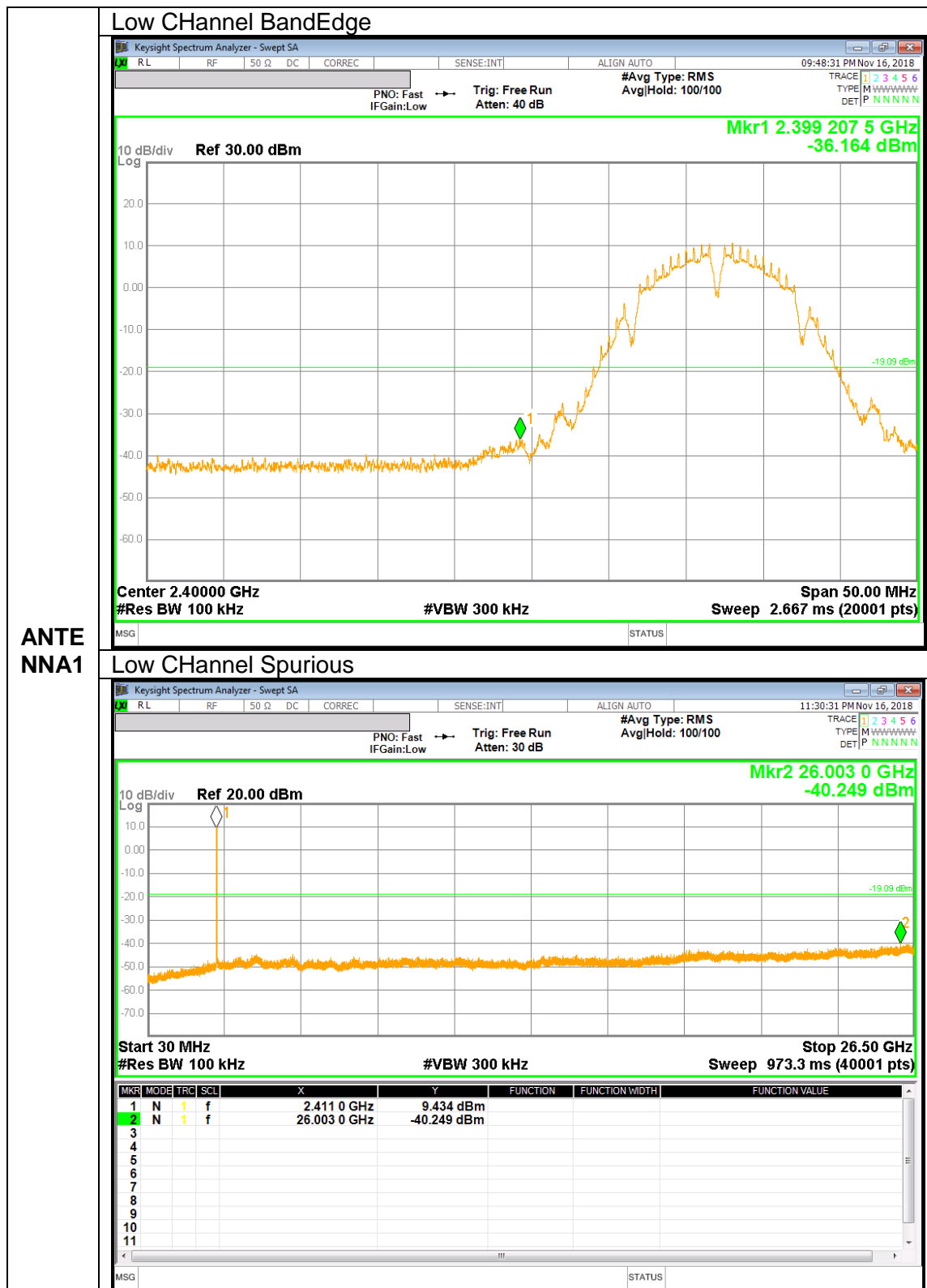
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

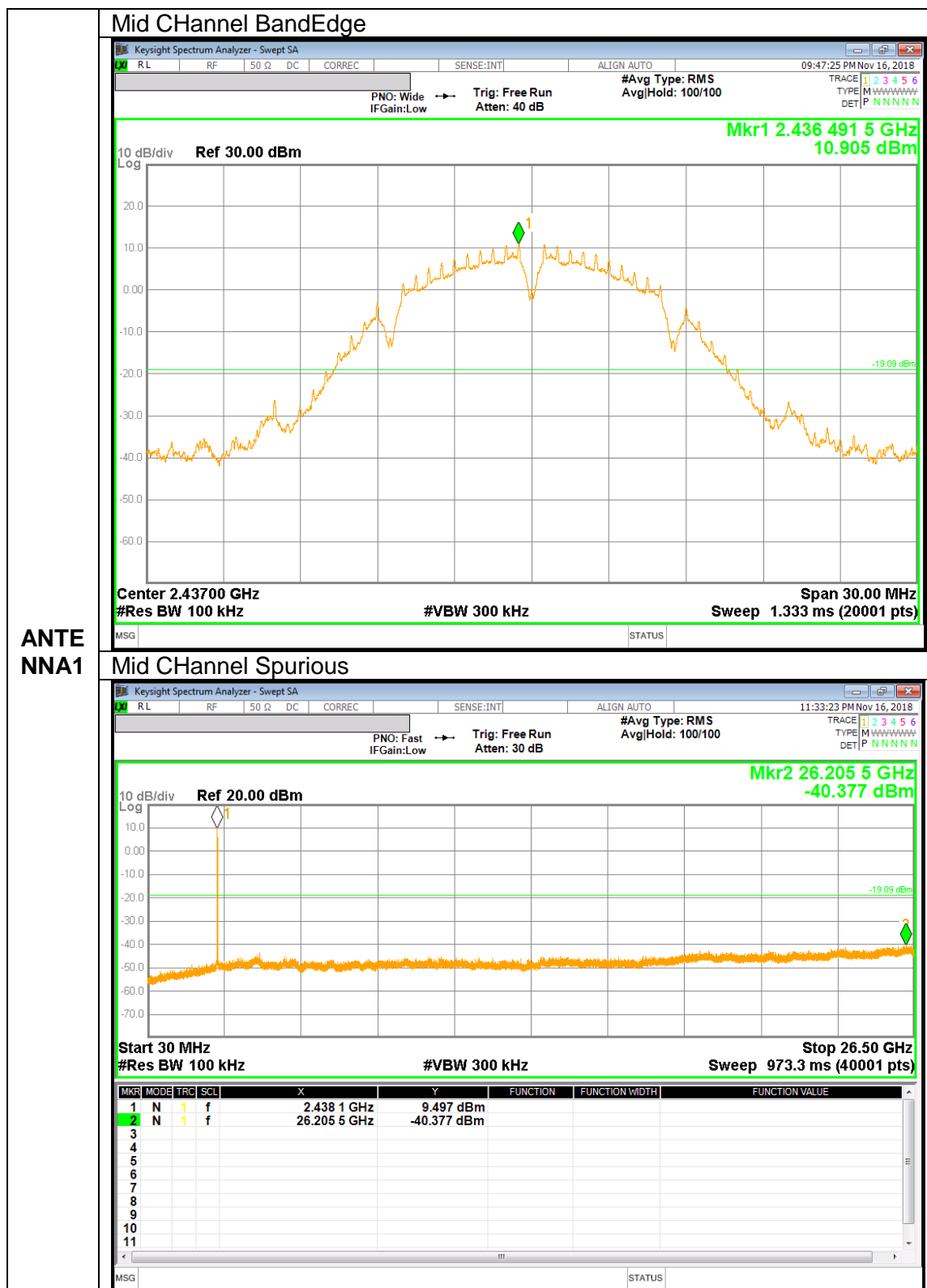
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge, out-of-band emissions (where measurements to the general radiated limits will not be made)

RESULTS

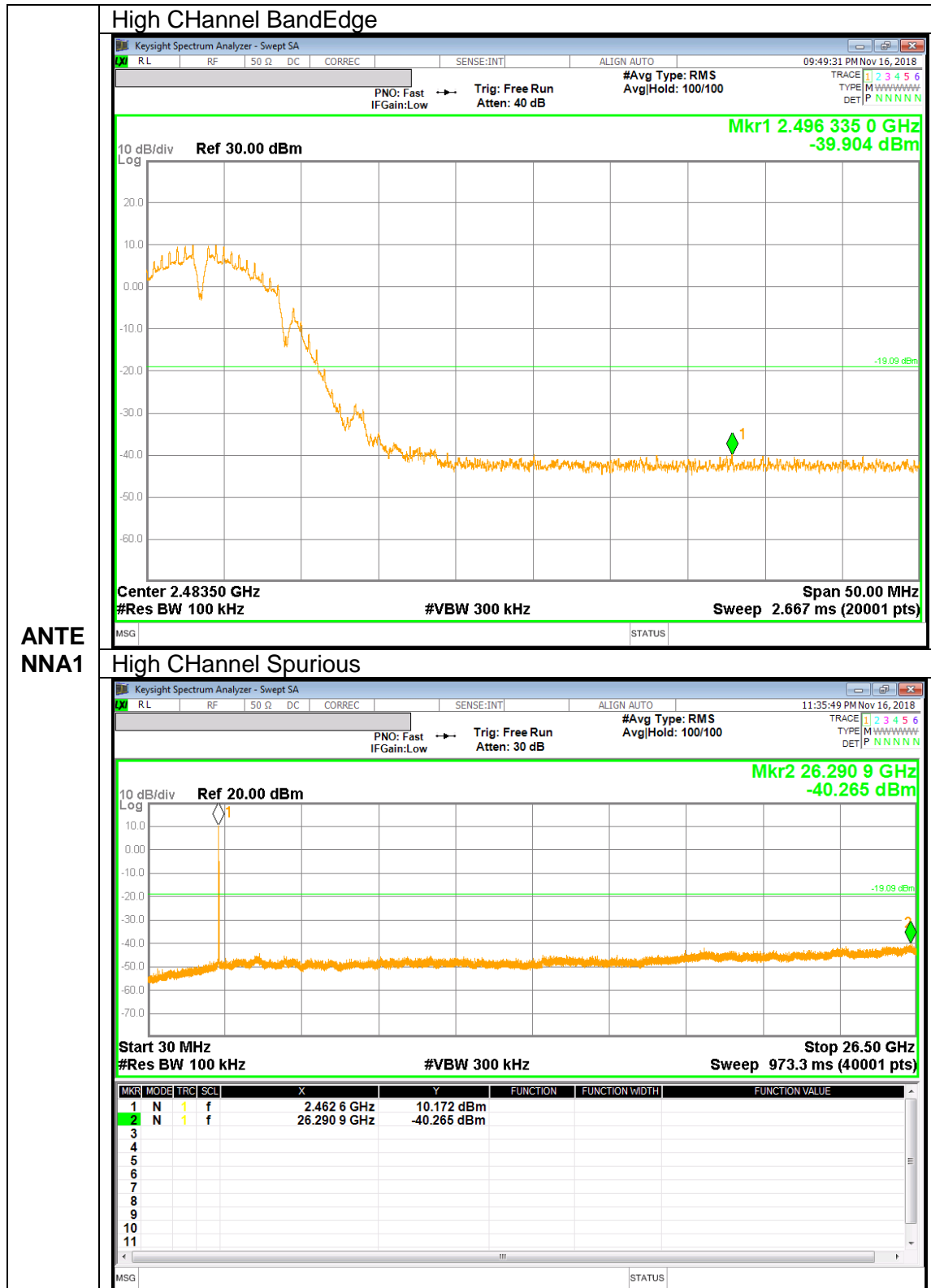
10.4.1. 802.11b MODE IN THE 2.4 GHz BAND



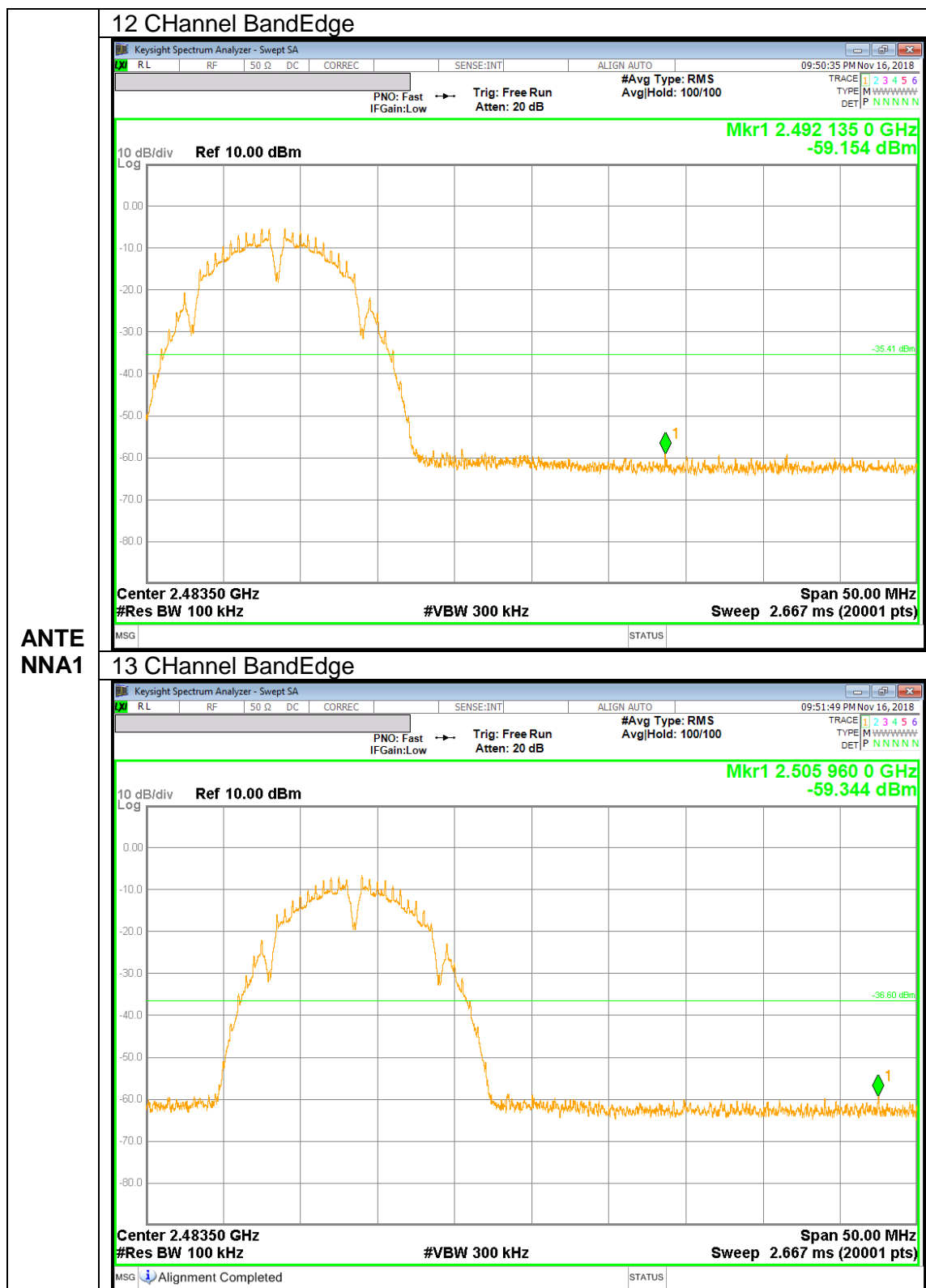
ANTE
 NNA1



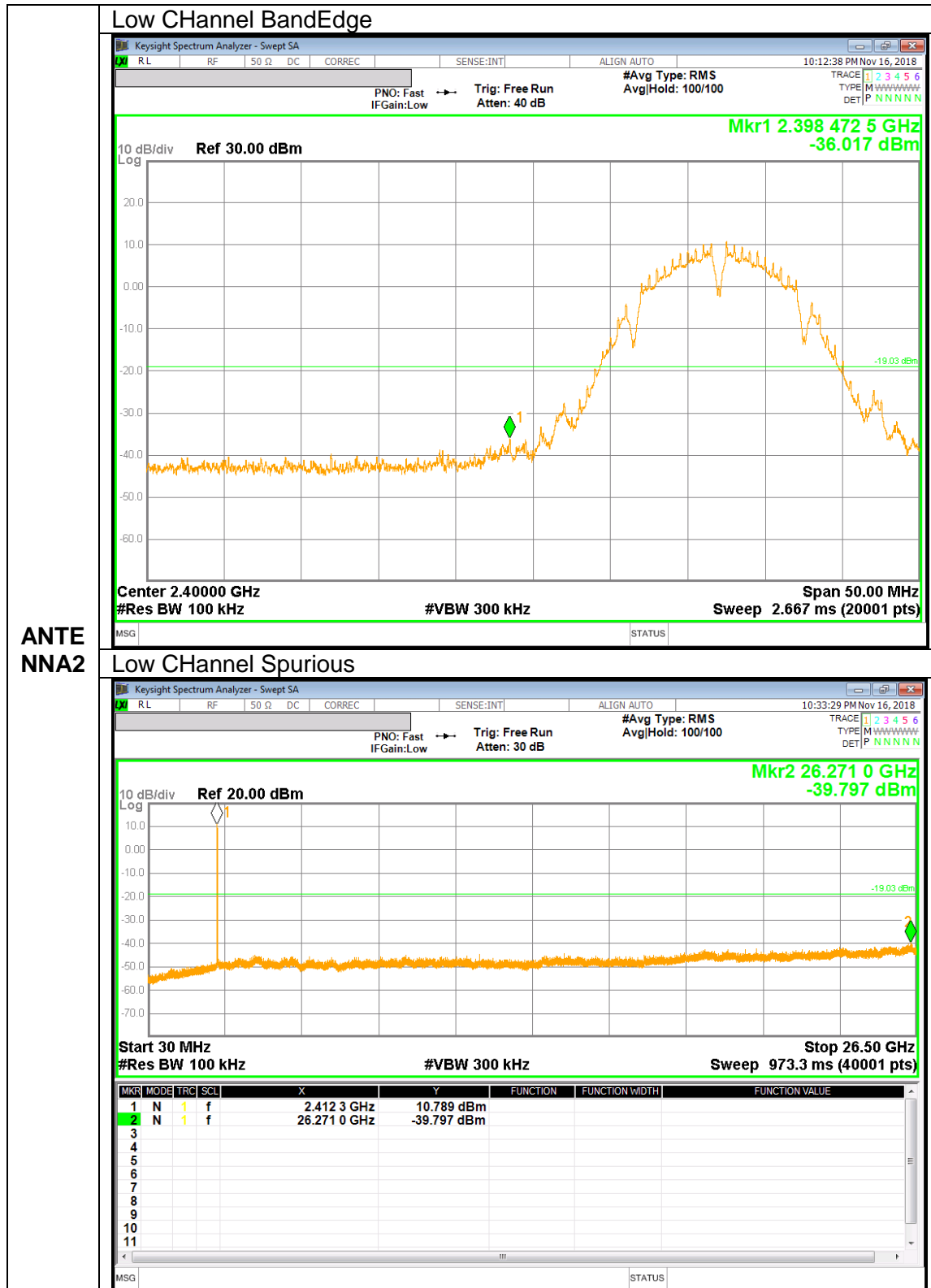
ANTE
 NNA1



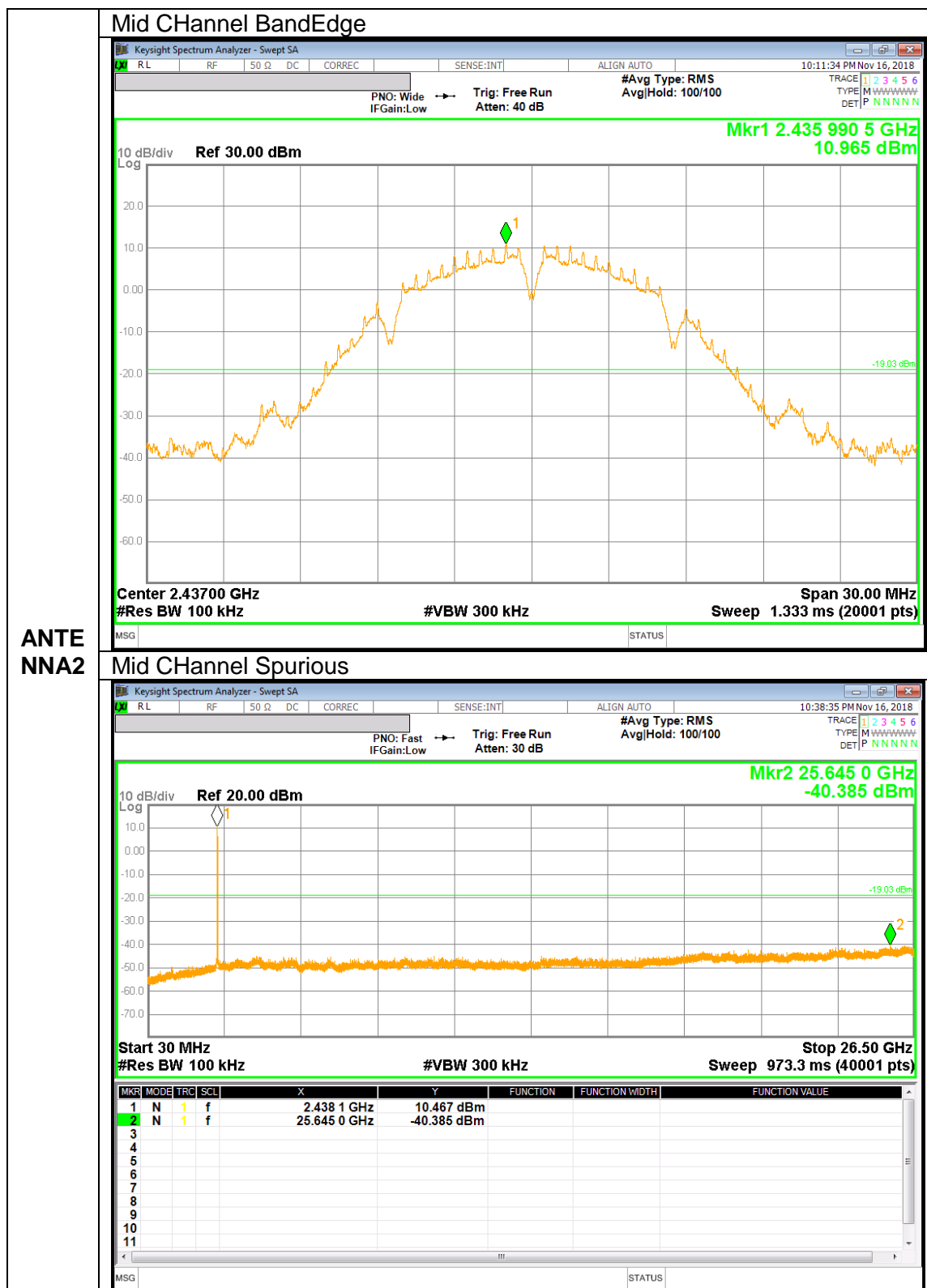
ANTE
 NNA1



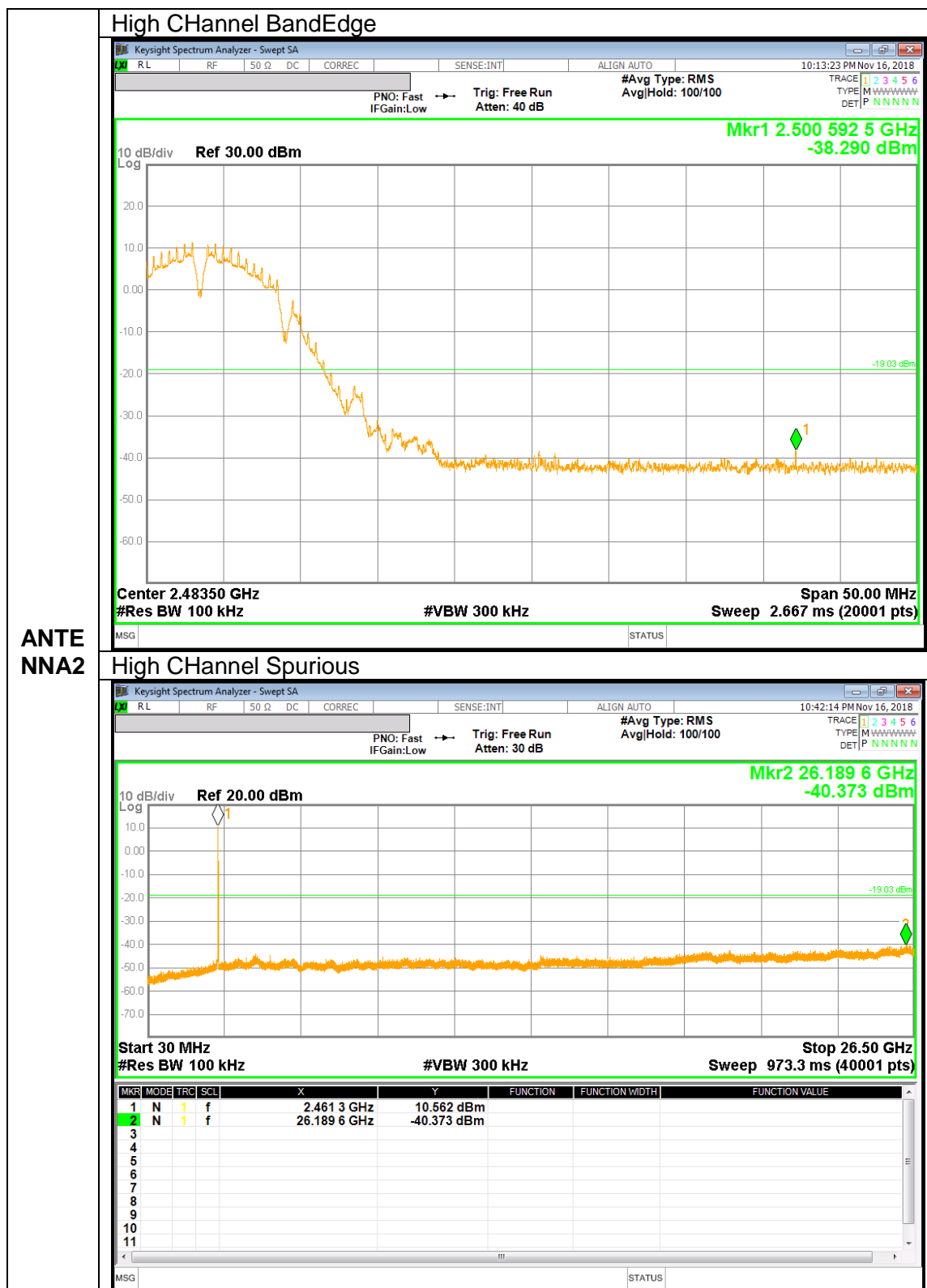
ANTE
 NNA1



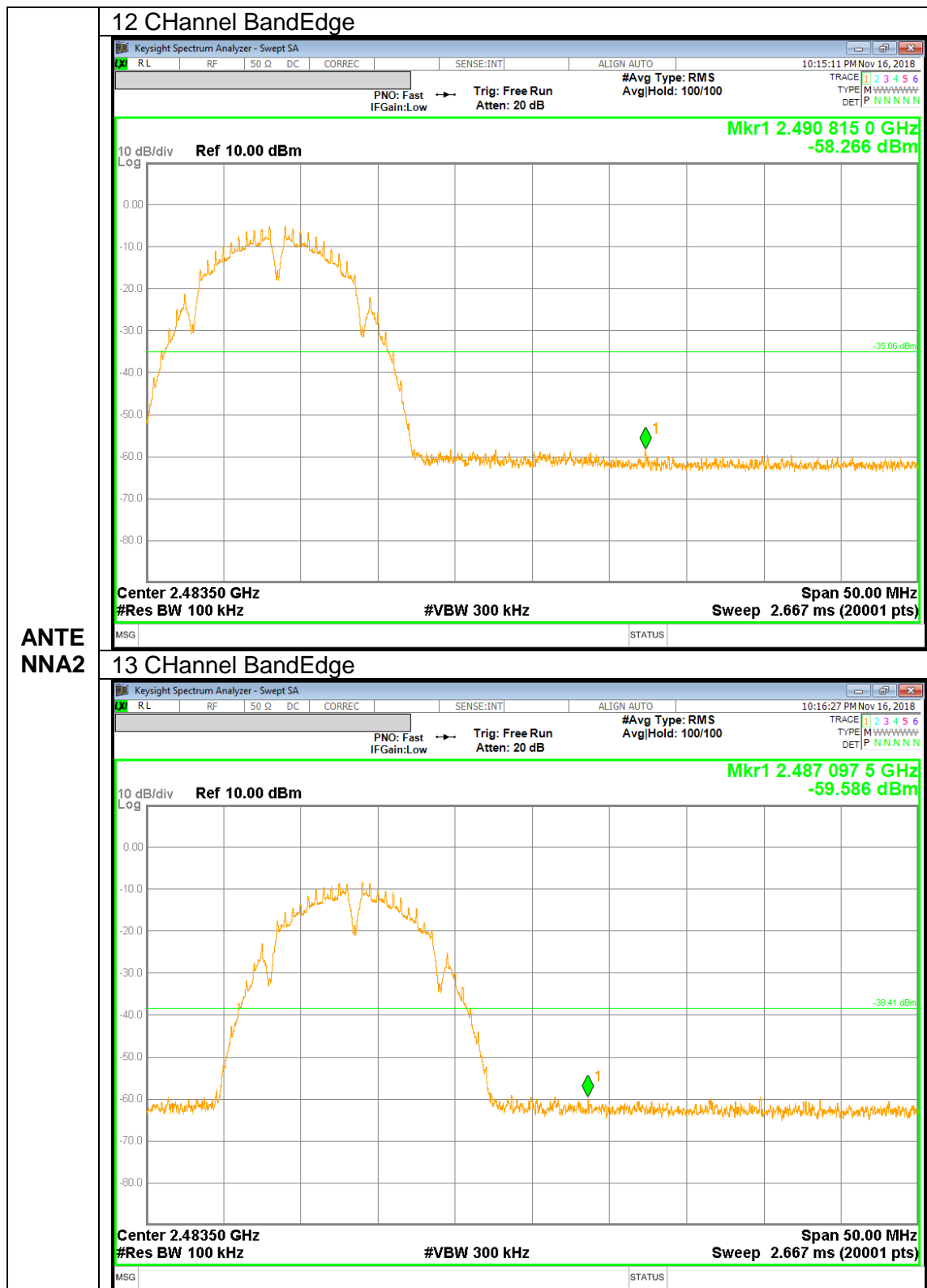
ANTE
 NNA2



ANTE
 NNA2

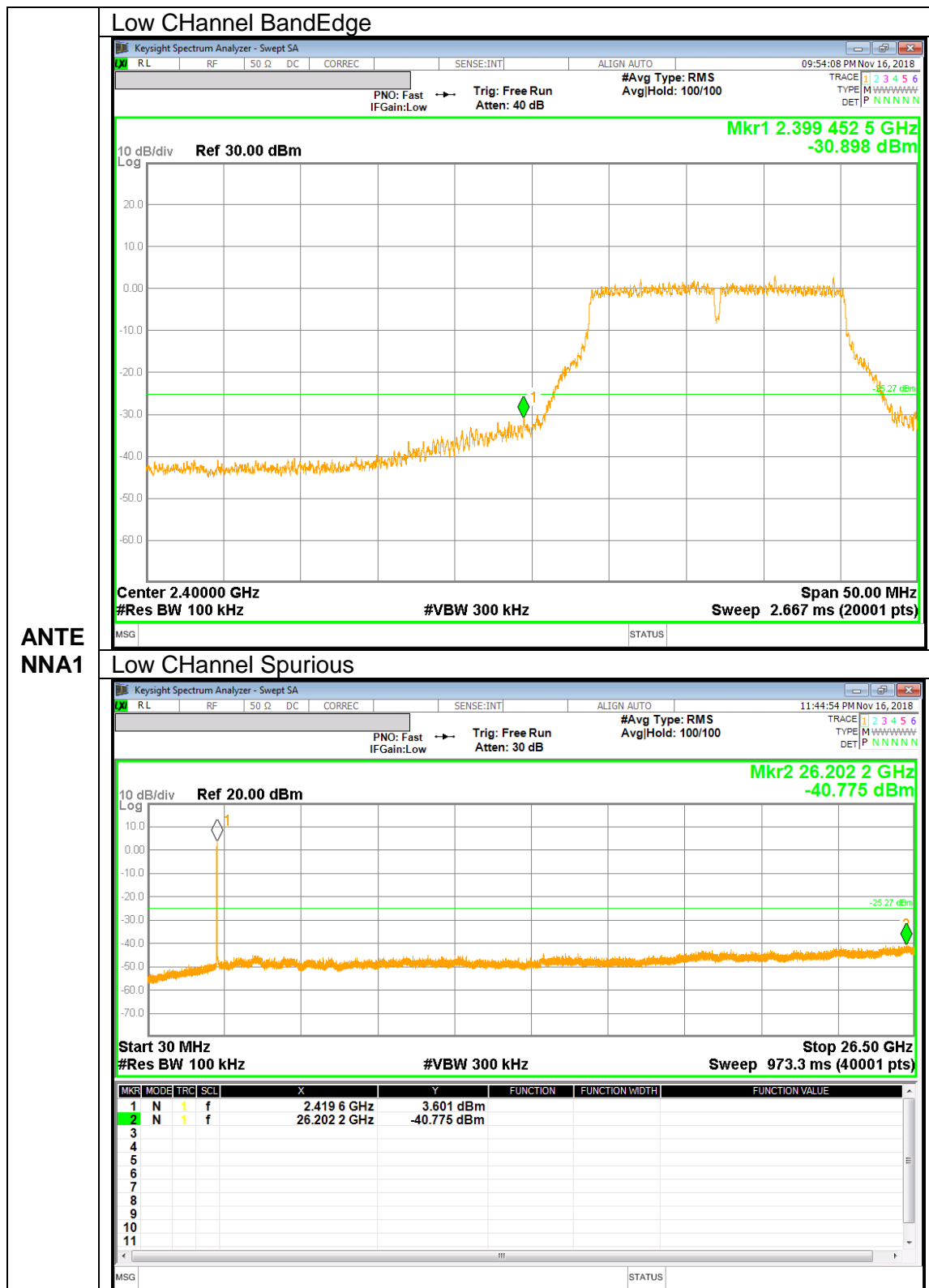


ANTE
 NNA2



ANTE
 NNA2

10.4.2. 802.11g MODE IN THE 2.4 GHz BAND



ANTE
 NNA1