



CERTIFICATION TEST REPORT

Report Number. : 12607353-E3V2

Applicant : APPLE, INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A2215

FCC ID : BCG-E3307A

IC : 579C-E3307A

EUT Description : SMARTPHONE

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5

Date Of Issue:
August 09, 2019

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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	8/1/2019	Initial Issue	Chris Xiong
V2	8/9/2019	Addressed TCB Questions on Sections 2, 5.5, 6, 7, 8.3, 8.4, 9, 9.1.4	Tony Li

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

EUT DESCRIPTION: SMARTPHONE

MODEL: A2215

SERIAL NUMBER: Radiated & Conducted
C39YT00TN2RK, C39YT01JN2RK, C39YT053N2RK,
C39YT0CCN2R1

DATE TESTED: APRIL 10, 2019 – AUGUST 09, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

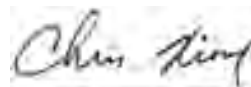
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Approved & Released For
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
☐ Chamber A	☒ Chamber D	☐ Chamber I
☒ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☒ Chamber F	☐ Chamber K
	☒ Chamber G	☐ Chamber L
	☒ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

EUT is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wide band, GPS and NFC. All models support at least one UICC based SIM. The second SIM, if present, is either UICC based pSIM (physical SIM) or e-SIM (electronic SIM). The device has a built-in inductive charging receiver. The rechargeable battery is also not user accessible

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

2.4GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
1Tx			
2412 - 2472	802.11b	21.22	132.43
2412 - 2472	802.11g	Covered by 802.11n HT20 1TX	
2412 - 2472	802.11n HT20	21.2	131.83
2412 - 2472	802.11ax HE20, 242-Tones	21.15	130.32
2412 - 2472	802.11ax HE20, 26-Tones	21.24	133.05

2Tx			
2412 - 2472	802.11n HT20 CDD	23.02	200.45
2412 - 2472	802.11g SDM/STBC	Covered by 802.11n HT20 2TX CDD	
2412 - 2472	802.11ax HE20, 242-Tones	23.01	199.99
2412 - 2472	802.11ax HE20, 26-Tones	22.14	163.68

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range	Antenna 4	Antenna ANT 3
2400-2480	-1.7	-1.9

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v1.29.99992

5.5. WORST-CASE CONFIGURATION AND MODE

EUT was investigated in three orthogonal orientations X, Y and Z on ANT 4 (Antenna 4) and ANT 3 (Antenna 3). It was determined that Y (Landscape) orientation was worst-case orientation for ANT 3. For ANT 4 and 2Tx, X (Flatbed) orientation was the worst case for 2TX.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, 1-18GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmitting at the channel with the highest output power as worst-case scenario. Output power test results were performed with respect to Client's target powers.

For radiated harmonics spurious below 1GHz, 1-18GHz L/M/H channels, 18-26GHz, and power line conducted emissions were performed with the EUT set at the 2TX CDD mode among the CDD/SDM modes and 2TX HE mode with power setting equal or higher than SISO modes as worst-case scenario. G mode covered by HT20 mode since it has the same power as HT20.

Below 1GHz tests were performed with EUT connected to AC power adapter as the worst case; and for above 1GHz tests, the worst-case configuration reported was with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop. There were no emissions found below 30MHz within 20dB of the limit.

The output power and psd for the 802.11 ax mode were investigated between all different tones, and we found that the highest tone had the highest output power and PSD readings, the lowest tone had the highest PSD readings. Therefore, full testing was performed on both the highest and lowest tones.

The peak PSD were performed as worst case mode.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
802.11n HT20mode: MCS0
802.11ax HE20mode: MCS0

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
laptop	Apple	A1502	HRP003436	QDS-BRCM1080
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	NA
EUT AC Adapter	Apple	A1385	D29325SM03XDHLHC9	NA

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	2	N/A

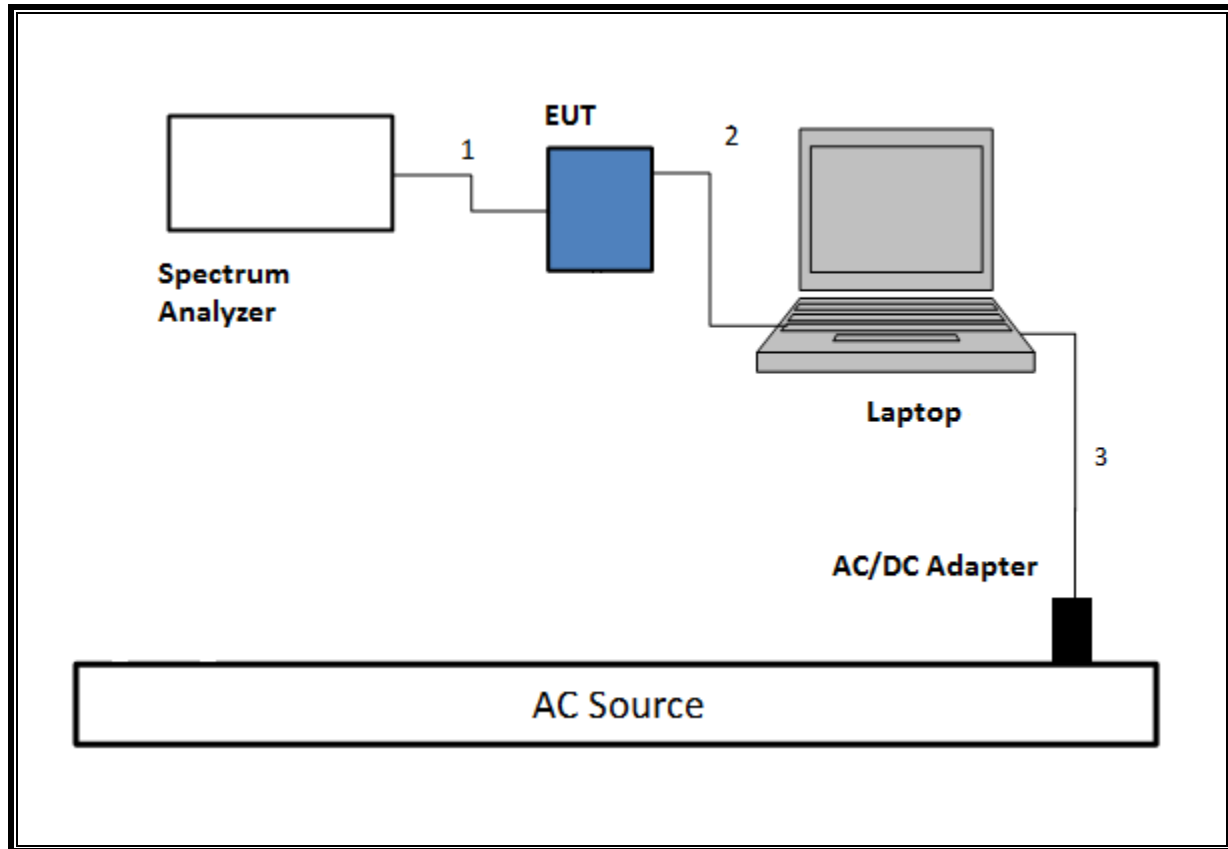
I/O CABLES (BELOW 1GHz AND AC POWER LINE TEST WITH ADAPTER AND LAPTOP)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Un-shielded	1	N/A

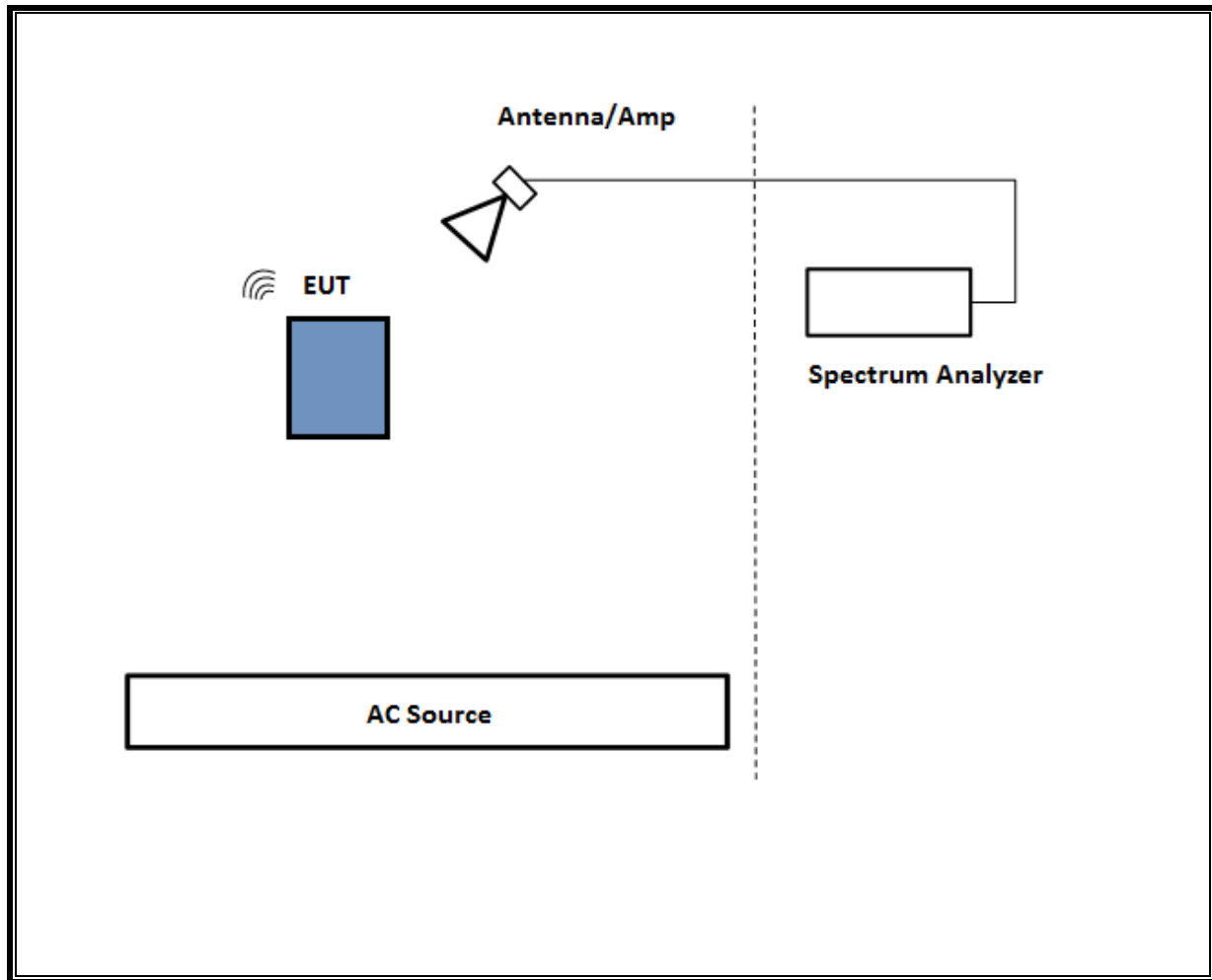
TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

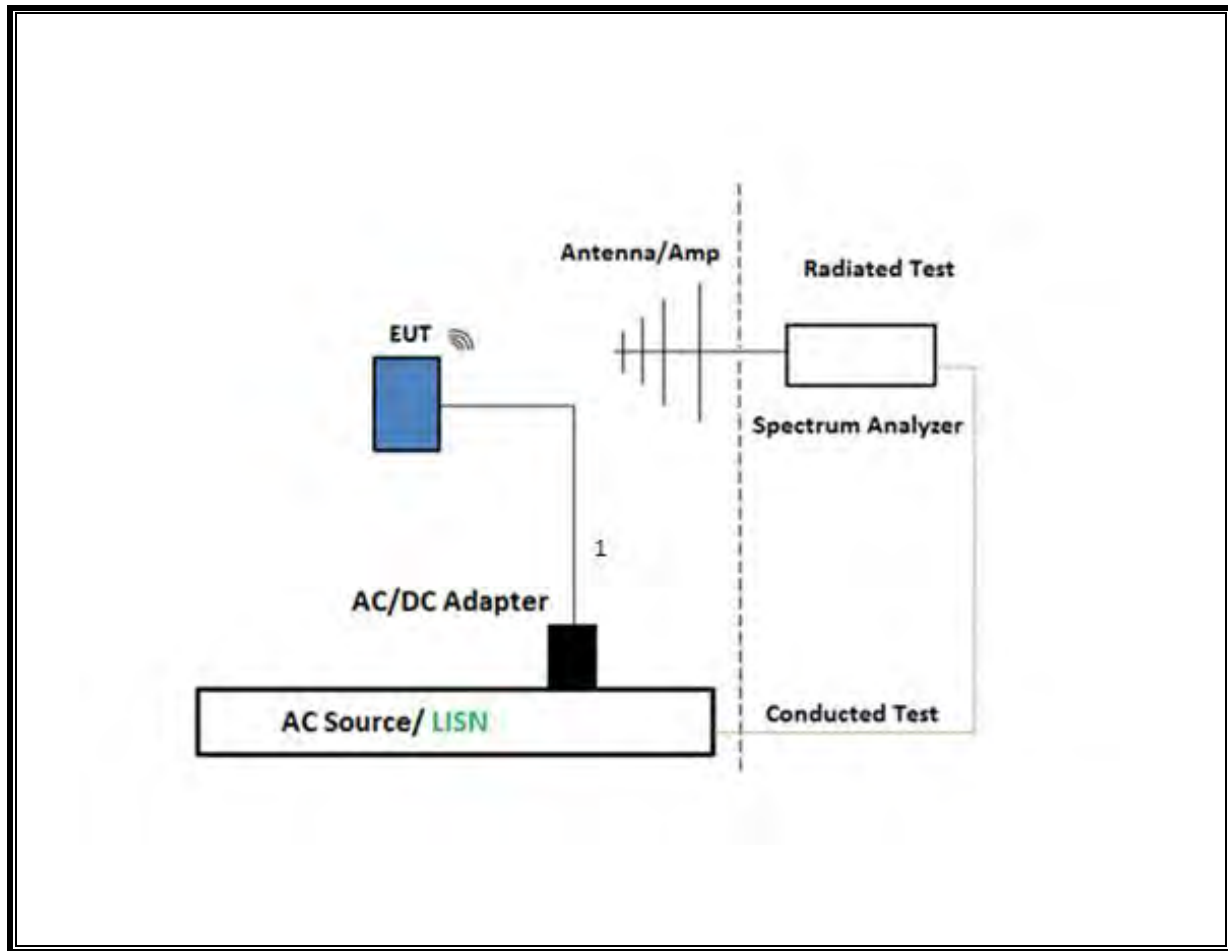
SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST



6. MEASUREMENT METHOD

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW $\geq$ DTS BW

99% BW: ANSI C63.10-2013, Section 6.9.3.

Output Power: ANSI C63.10 Subclause -11.9.2.3.1 Method AVGPM (Measurement using an RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Subclause -11.13.3.2 Integration method -Peak detection

Band-edge: ANSI C63.10 Subclause -11.13.3.3 Integration method -Trace averaging with continuous transmission at full power

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

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

7. 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	ID Num	Cal Due	Last Cal
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	05/30/2020	05/30/2019
Amplifier, 1 to 18GHz, 35dB	Amplical	AFS42-00101800-25-S-42	T1567	01/26/2020	01/26/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	05/07/2020	05/07/2019
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T931	05/11/2020	05/11/2019
*Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T120	07/02/2019	07/02/2018
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T491	05/30/2020	05/30/2019
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T119	03/22/2020	03/22/2019
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T740	10/06/2019	10/06/2018
*Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	07/02/2019	07/02/2018
Amplifier, 1 to 18GHz, 35dB	Amplical	AFS42-00101800-25-S-42	T1567	01/26/2020	01/26/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	04/20/2020	04/20/2019
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	138301	09/15/2019	09/15/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T712	02/26/2020	02/26/2019
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T740	05/31/2020	05/31/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T346	05/14/2020	05/14/2019
RF Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T1165	05/24/2020	05/24/2019
*Antenna, Broadband Hybrid, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0181574	08/01/2020	08/01/2019
Amplifier, 100KHz to 1GHz, 32dB	Agilent (Keysight) Technologies	8447D	T15	10/20/2019	10/20/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	04/20/2020	04/20/2019
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T742	12/15/2019	12/15/2018
Spectrum Analyzer, PXA 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T906	01/22/2020	01/22/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T340	01/22/2020	01/22/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T905	01/24/2020	01/24/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1454	01/23/2020	01/23/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T908	01/23/2020	01/23/2019
*Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T447	06/16/2019	06/16/2018
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	03/23/2020	03/23/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T227	10/29/2019	10/29/2018
*Power Sensor	Keysight	N1921A	T1228	07/10/2020	07/10/2019

*Note: All testing done before calibration due date

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	02/14/2020	02/14/2019
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2019	08/31/2018
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/19/2019	06/19/2018
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016		
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.11b 1Tx	2.000	2.000	1.000	100.00%	0.00	0.010
802.11n HT20 1Tx	11.610	11.650	0.997	99.66%	0.00	0.010
802.11n HT20 CDD	11.610	11.650	0.997	99.66%	0.00	0.010
802.11ax HE20 1Tx, 26-Tones	4.121	4.166	0.989	98.92%	0.00	0.010
802.11ax HE20 1Tx, 242-Tones	1.573	1.595	0.986	98.62%	0.00	0.010
802.11ax HE20 OFMDA, 26-Tones	4.128	4.166	0.991	99.09%	0.00	0.010
802.11ax HE20 OFMDA, 242-Tones	1.573	1.595	0.986	98.62%	0.00	0.010



DUTY CYCLE 802.11n HT20 1TX MODE



DUTY CYCLE 802.11n HT20 CDD MODE



DUTY CYCLE 802.11b 1Tx MODE



DUTY CYCLE 802.11ax HE20 1TX, 26-Tones



DUTY CYCLE 802.11ax HE20 OFDMA, 26-Tones



DUTY CYCLE 802.11ax HE20 1Tx, 242-Tones



DUTY CYCLE 802.11ax HE20 OFDMA, 242-Tones

8.2. 99% BANDWIDTH

LIMITS

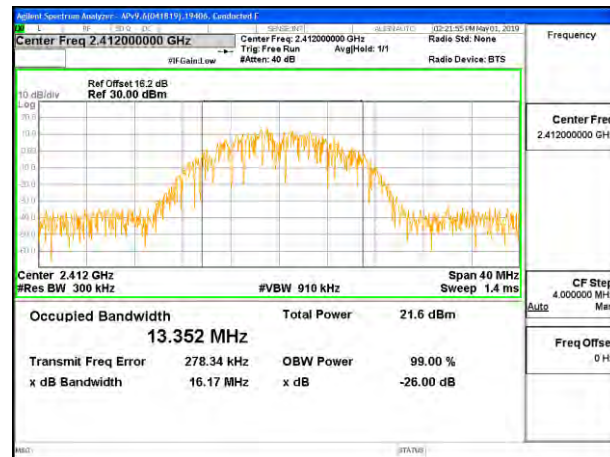
None; for reporting purposes only.

RESULTS

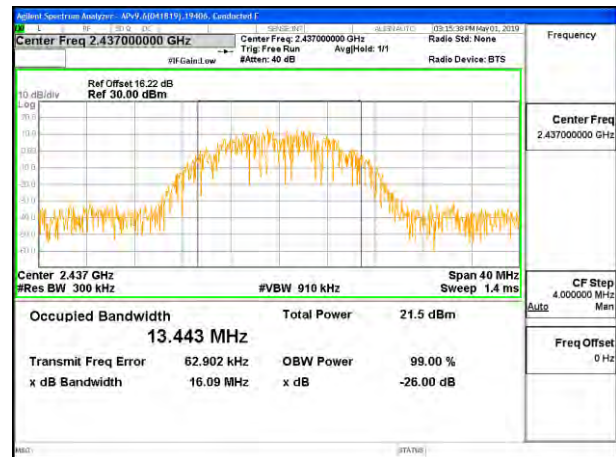
8.2.1. 802.11b MODE

1TX Antenna 4 MODE

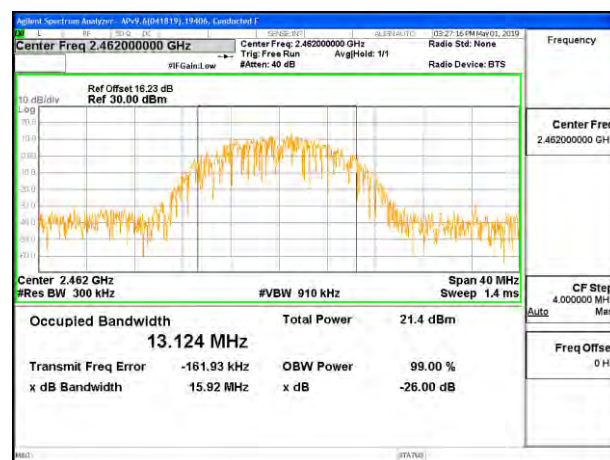
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	13.3520
Mid 6	2437	13.4430
High 11	2462	13.1240
High 12	2467	12.8920
High 13	2472	13.3590



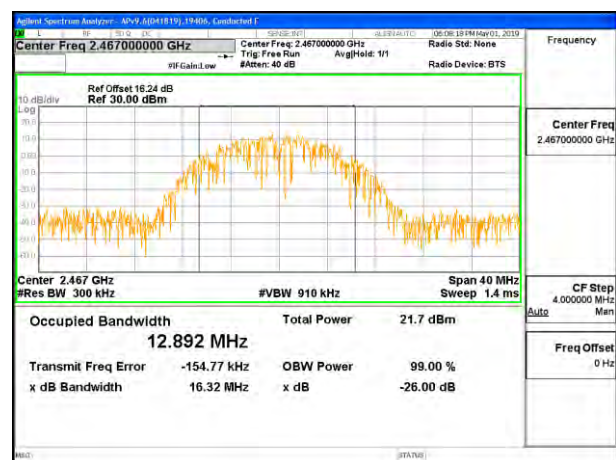
LOW CHANNEL 1



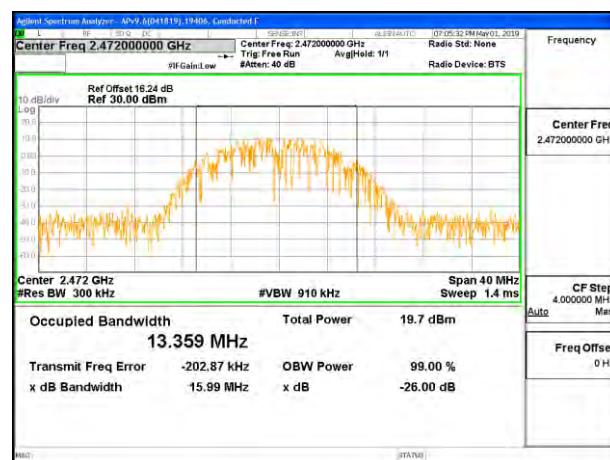
MID CHANNEL 6



HIGH CHANNEL 11



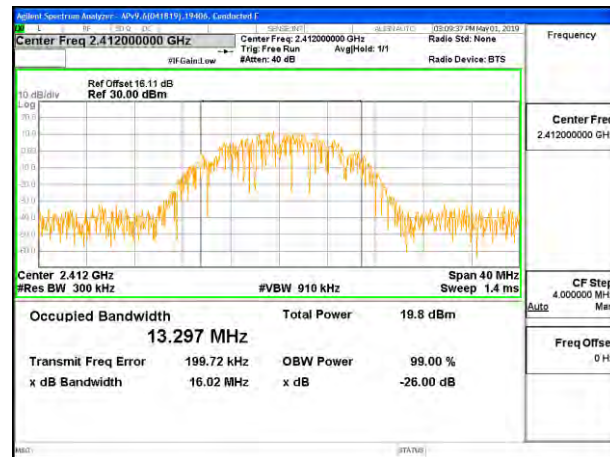
HIGH CHANNEL 12



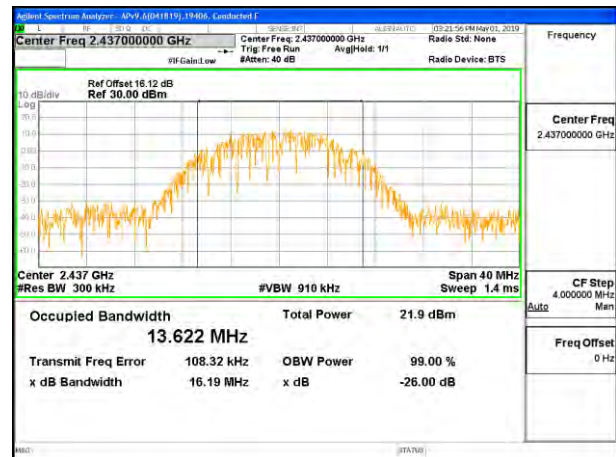
HIGH CHANNEL 13

1TX Antenna 3 MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	13.2970
Mid 6	2437	13.6220
High 11	2462	13.0890
High 12	2467	13.0760
High 13	2472	13.3080



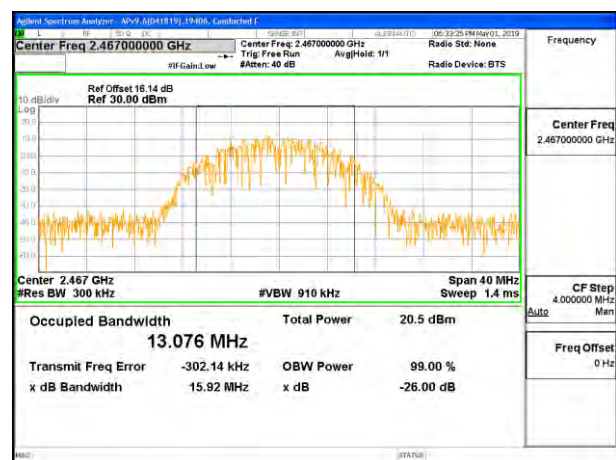
LOW CHANNEL 1



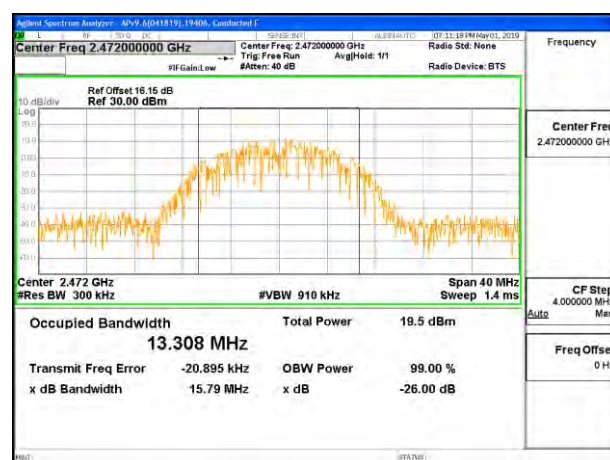
MID CHANNEL 6



HIGH CHANNEL 11



HIGH CHANNEL 12

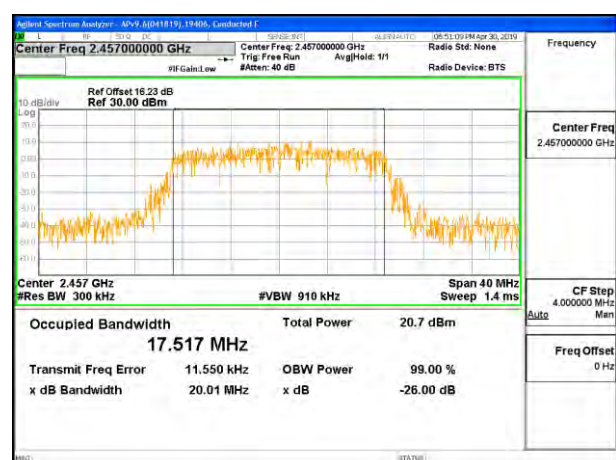
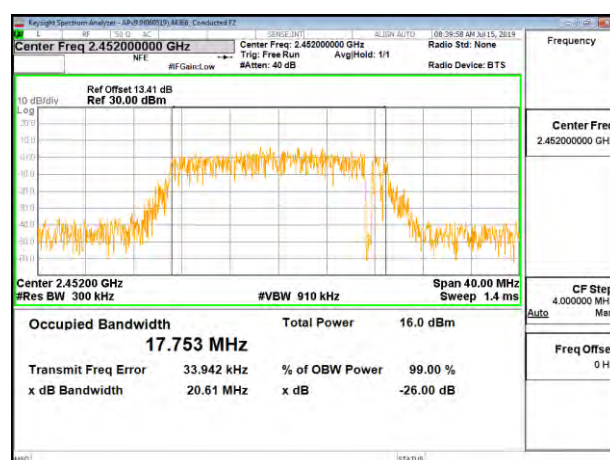
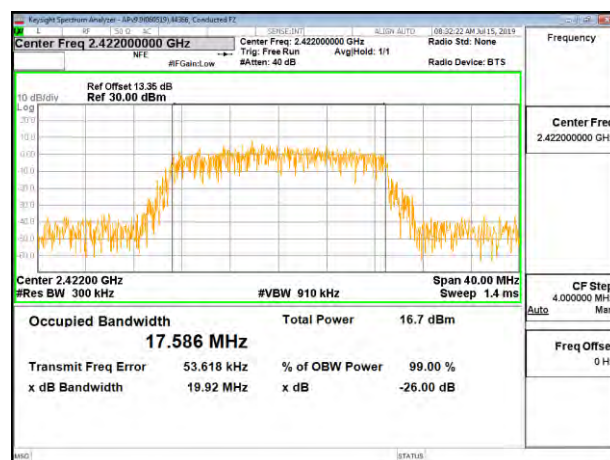
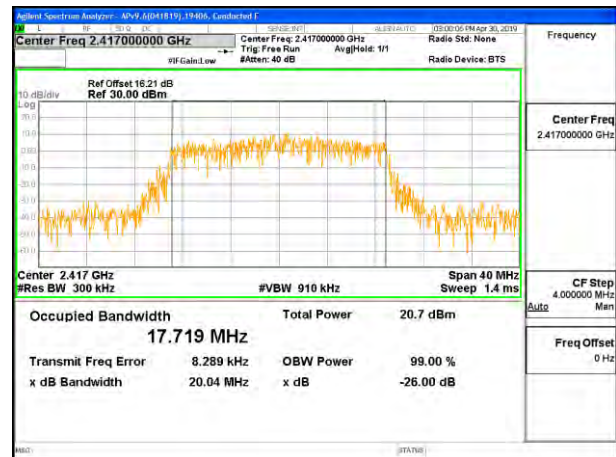


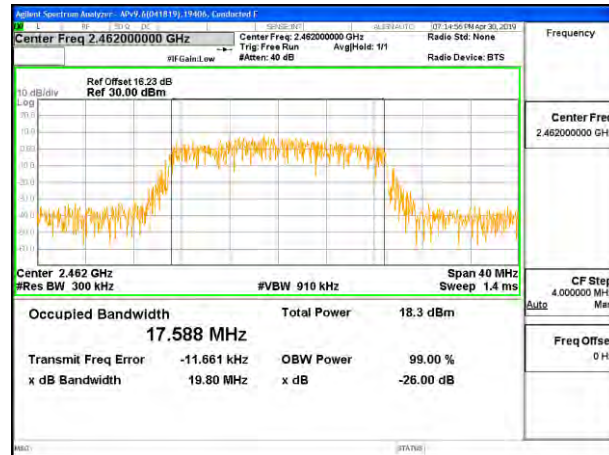
HIGH CHANNEL 13

8.2.2. 802.11n HT20 MODE

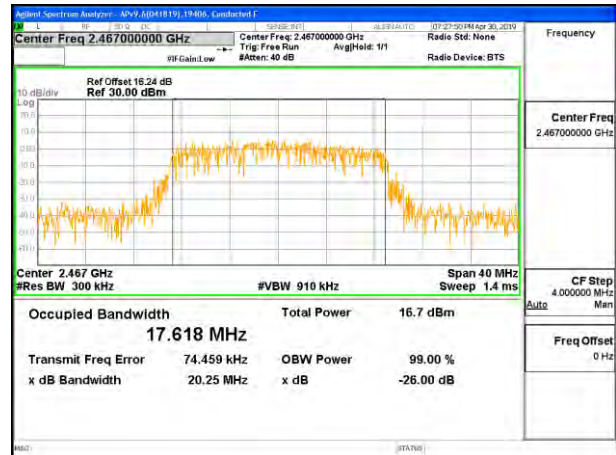
1TX Antenna 4 MODE

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.7940
Low 2	2417	17.7190
Low 3	2422	17.5860
Mid 6	2437	17.6370
High 9	2452	17.7530
High 10	2457	17.5170
High 11	2462	17.5880
High 12	2467	17.6180
High 13	2472	17.7370





HIGH CHANNEL 11



HIGH CHANNEL 12



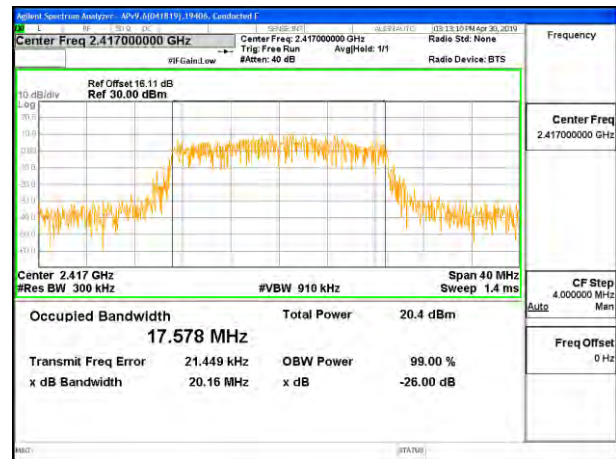
HIGH CHANNEL 13

1TX Antenna 3 MODE

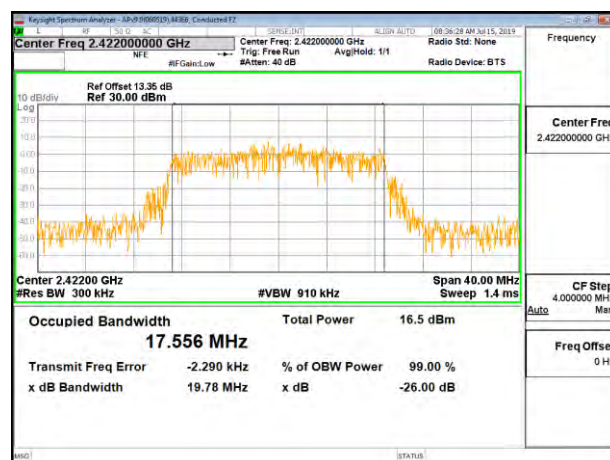
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.7010
Low 2	2417	17.5780
Low 3	2422	17.5560
Mid 6	2437	17.6610
High 9	2452	17.7090
High 10	2457	17.5960
High 11	2462	17.6550
High 12	2467	17.7180
High 13	2472	17.7500



LOW CHANNEL 1



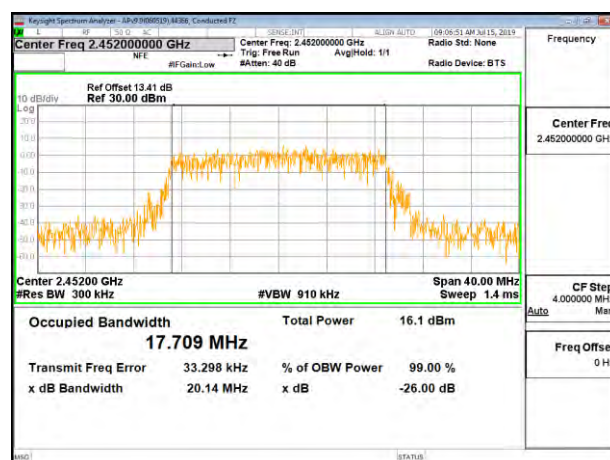
LOW CHANNEL 2



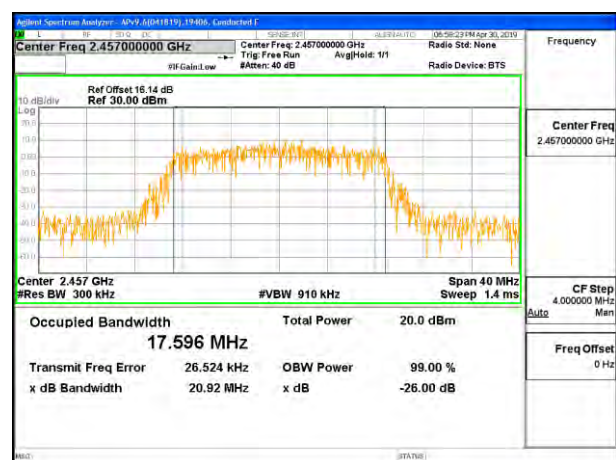
LOW CHANNEL 3



MID CHANNEL 6



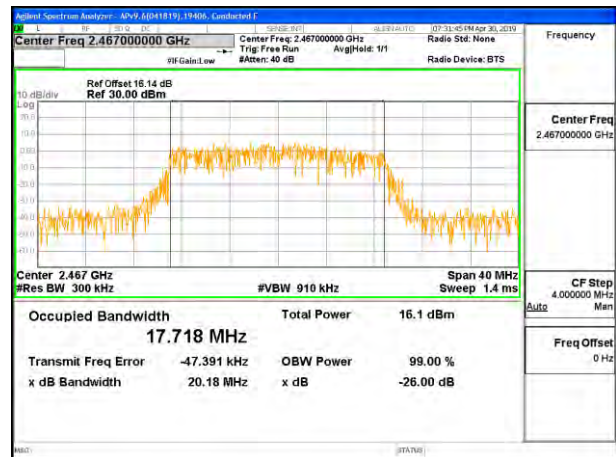
HIGH CHANNEL 9



HIGH CHANNEL 10



HIGH CHANNEL 11



HIGH CHANNEL 12

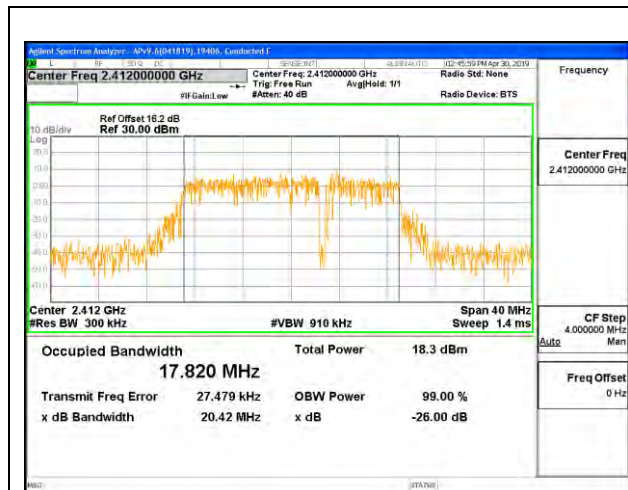


HIGH CHANNEL 13

2TX Antenna 4 + Antenna 3 CDD MODE

Channel	Frequency (MHz)	99% Bandwidth Ant 4 (MHz)	99% Bandwidth Ant 3 (MHz)
Low 1	2412	17.8200	17.6330
Low 2	2417	17.5490	17.6210
Low 3	2422	17.5360	17.6230
Mid 6	2437	17.6860	17.7280
High 9	2452	17.5870	17.6590
High 10	2457	17.5860	17.6140
High 11	2462	17.5890	17.6860
High 12	2467	17.5410	17.6600
High 13	2472	17.7990	17.7270

LOW CHANNEL 1

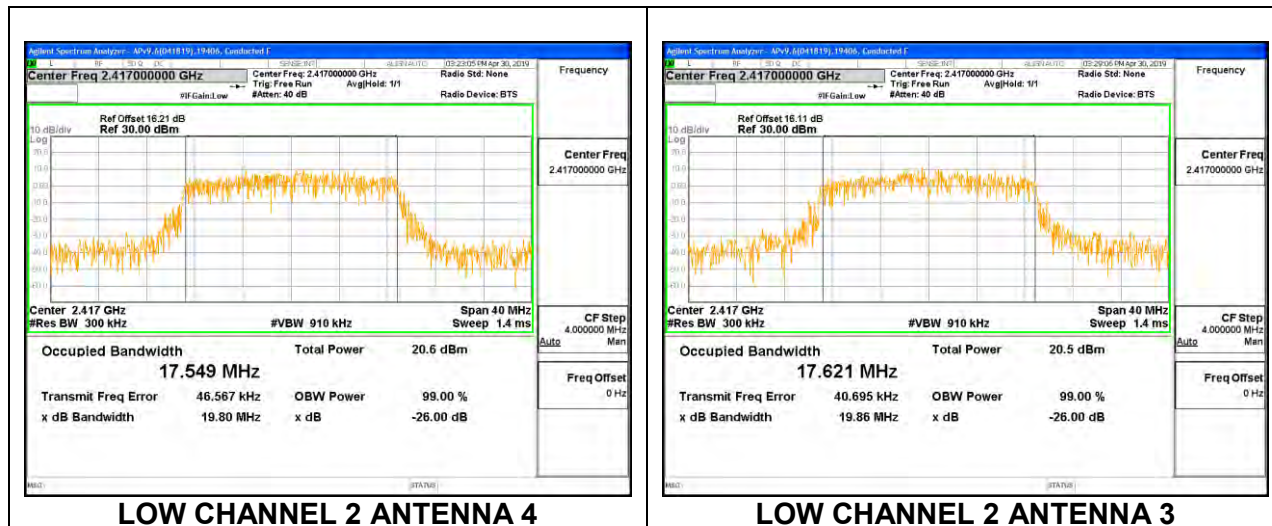


LOW CHANNEL 1 ANTENNA 4

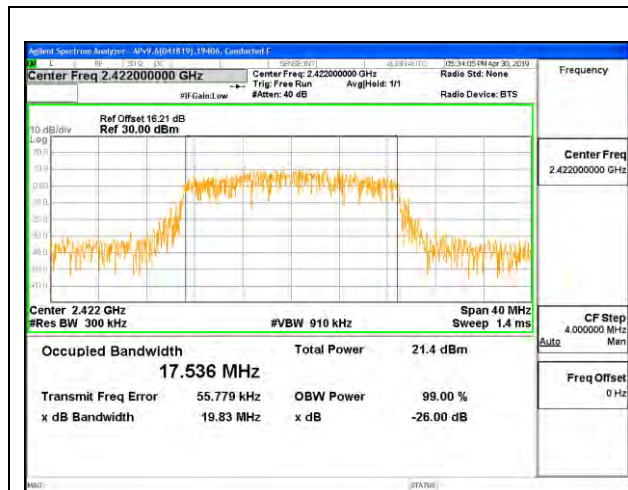


LOW CHANNEL 1 ANTENNA 3

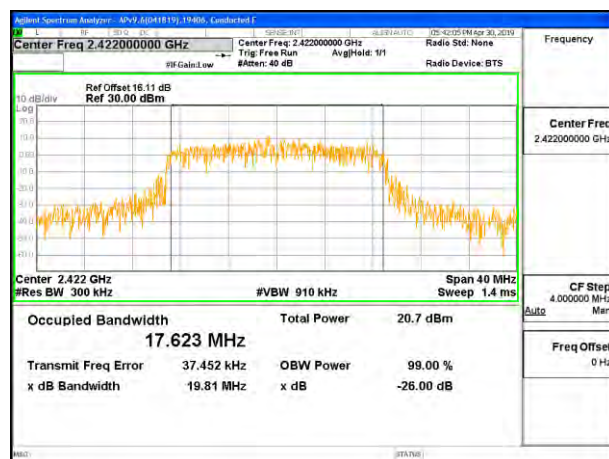
LOW CHANNEL 2



LOW CHANNEL 3

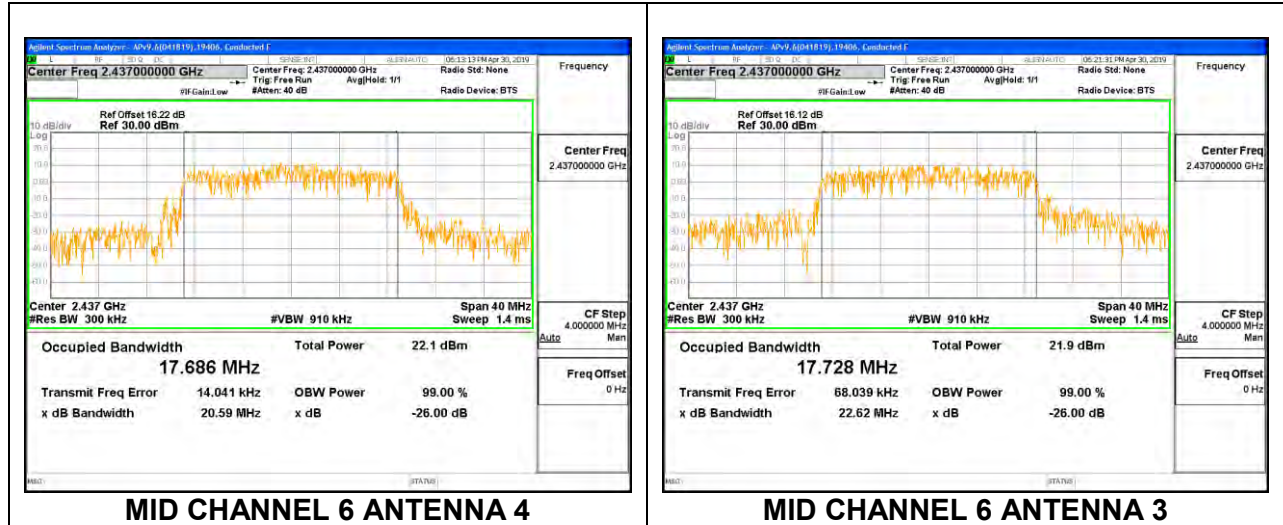


LOW CHANNEL 3 ANTENNA 4



LOW CHANNEL 3 ANTENNA 3

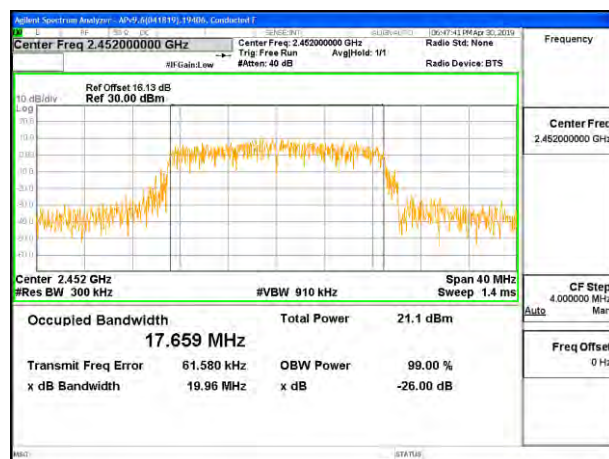
MID CHANNEL 6



HIGH CHANNEL 9

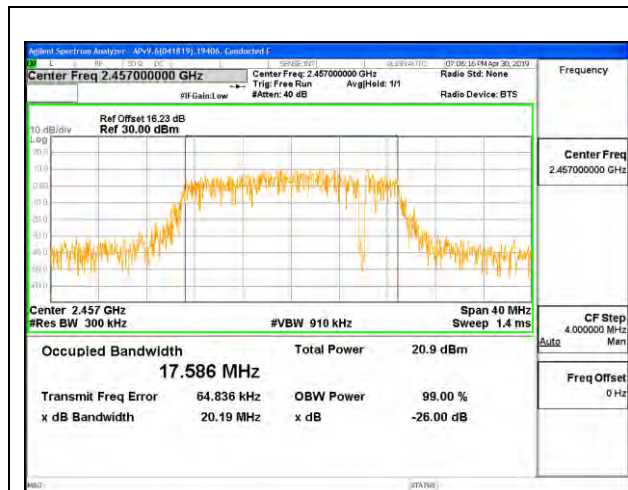


HIGH CHANNEL 9 ANTENNA 4



HIGH CHANNEL 9 ANTENNA 3

HIGH CHANNEL 10

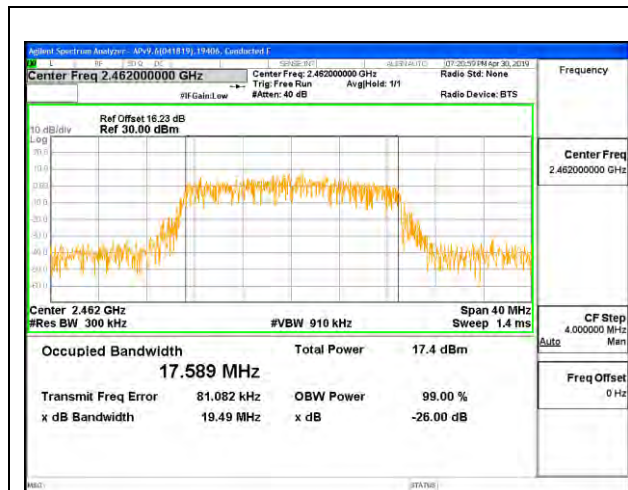


HIGH CHANNEL 10 ANTENNA 4



HIGH CHANNEL 10 ANTENNA 3

HIGH CHANNEL 11

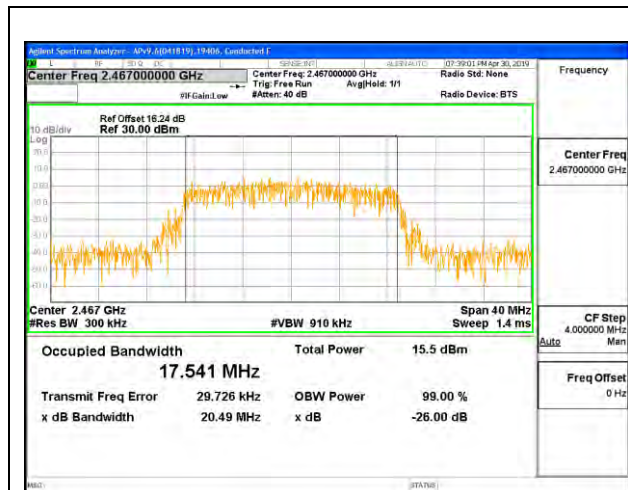


HIGH CHANNEL 11 ANTENNA 4



HIGH CHANNEL 11 ANTENNA 3

HIGH CHANNEL 12



HIGH CHANNEL 12 ANTENNA 4

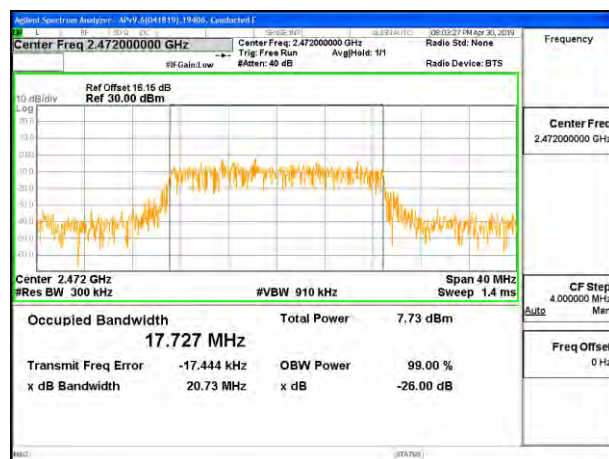


HIGH CHANNEL 12 ANTENNA 3

HIGH CHANNEL 13



HIGH CHANNEL 13 ANTENNA 4

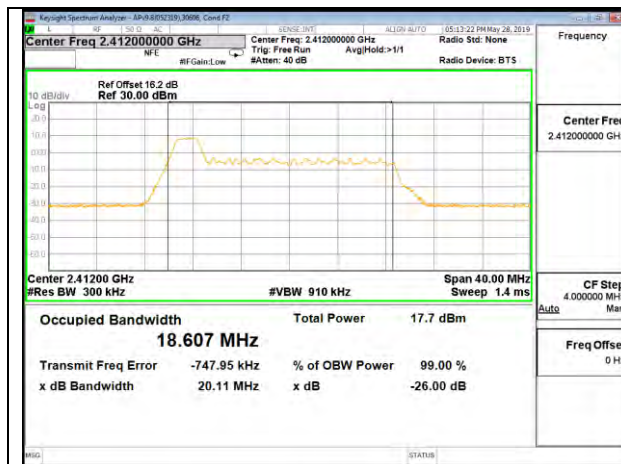


HIGH CHANNEL 13 ANTENNA 3

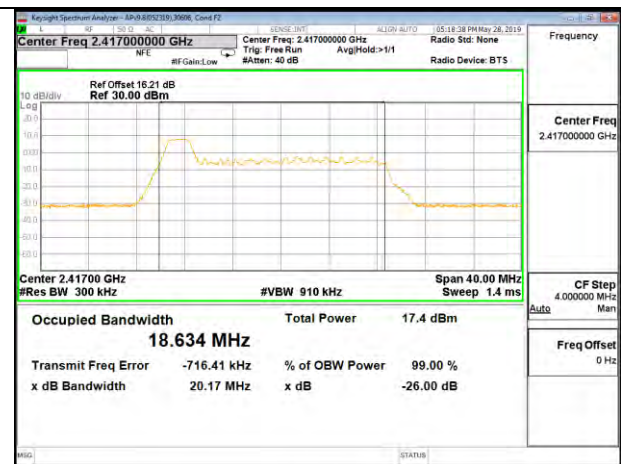
8.2.3. 802.11ax HE20 MODE

Antenna 4, LEGACY SISO MODE: 26-Tones, RU index 0

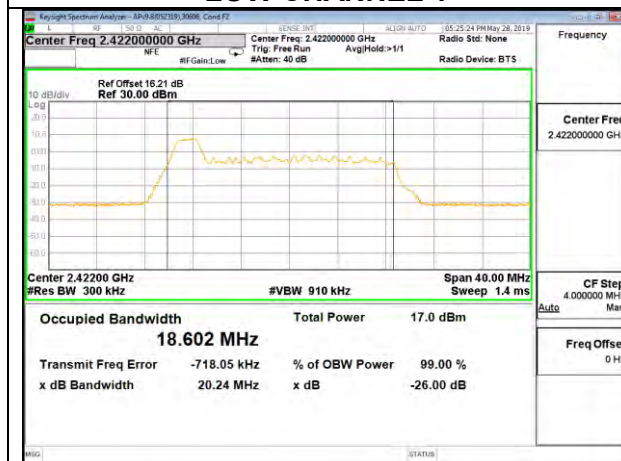
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.6070
Low 2	2417	18.6340
Low 3	2422	18.6020
Mid 6	2437	18.5000
High 9	2452	18.6750
High 10	2457	18.6330
High 11	2462	18.5970
High 12	2467	18.4660
High 13	2472	18.2770



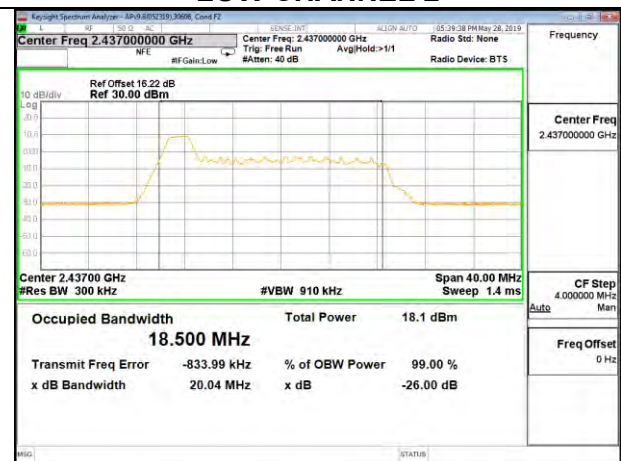
LOW CHANNEL 1



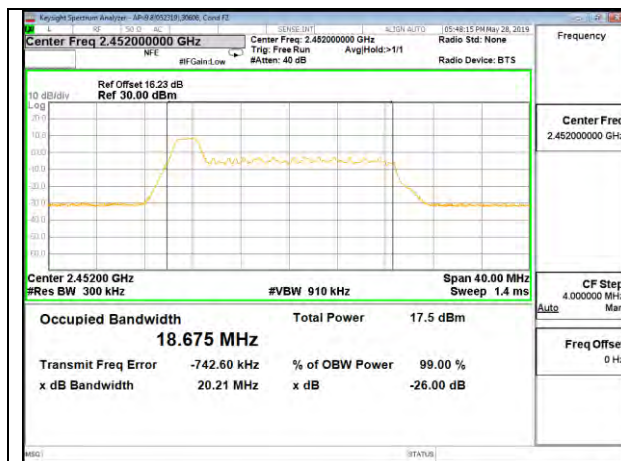
LOW CHANNEL 2



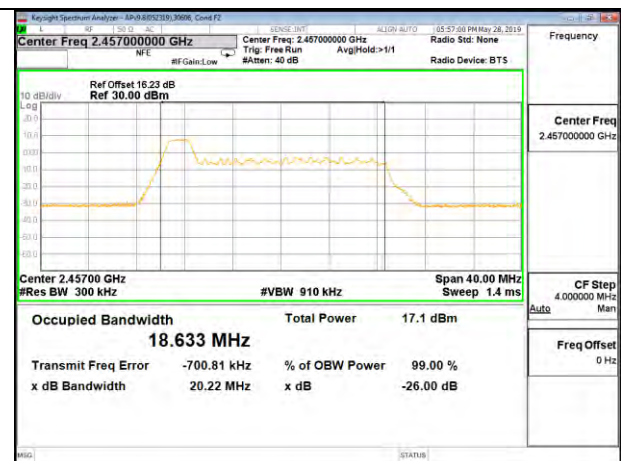
LOW CHANNEL 3



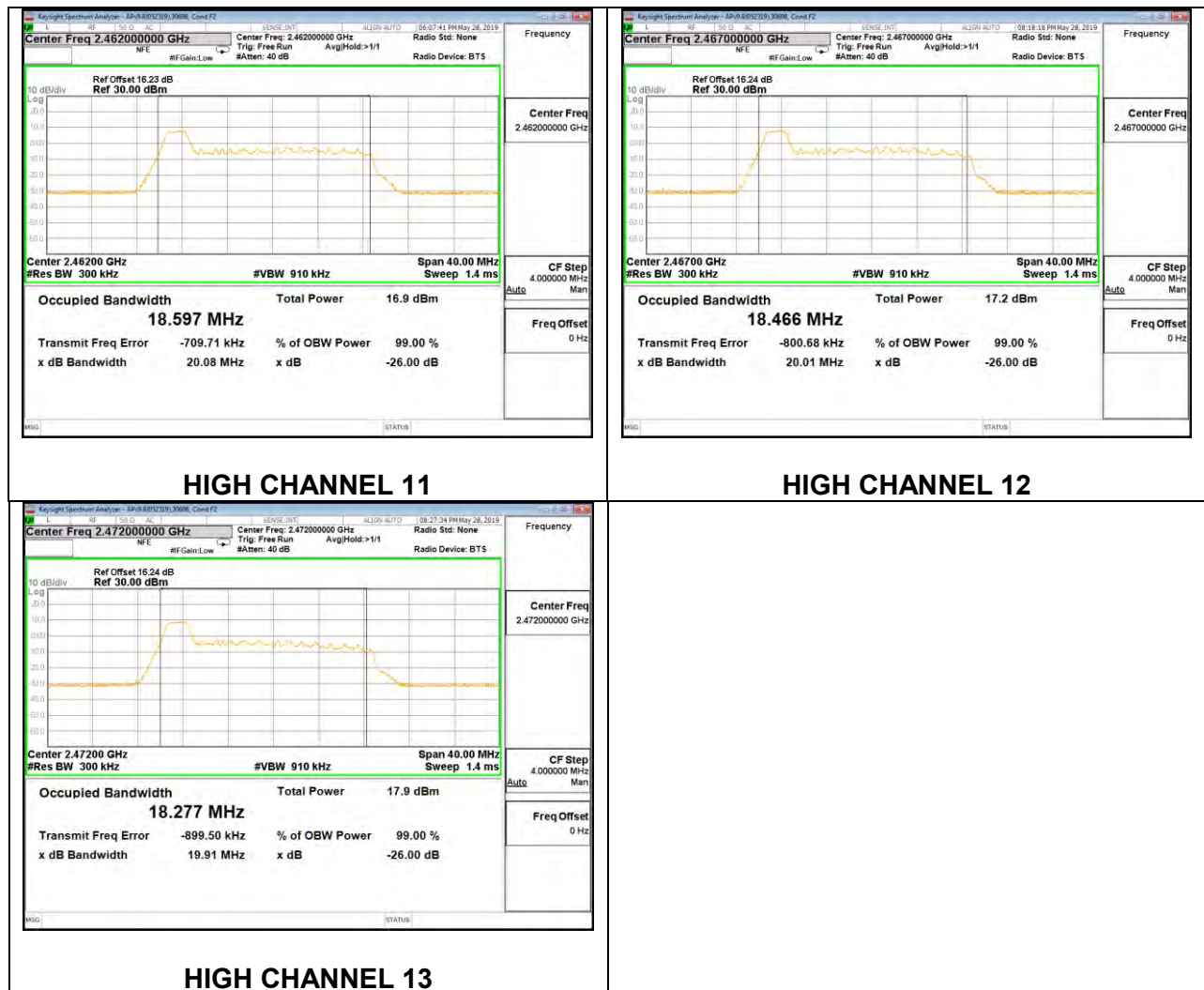
MID CHANNEL 6



HIGH CHANNEL 9

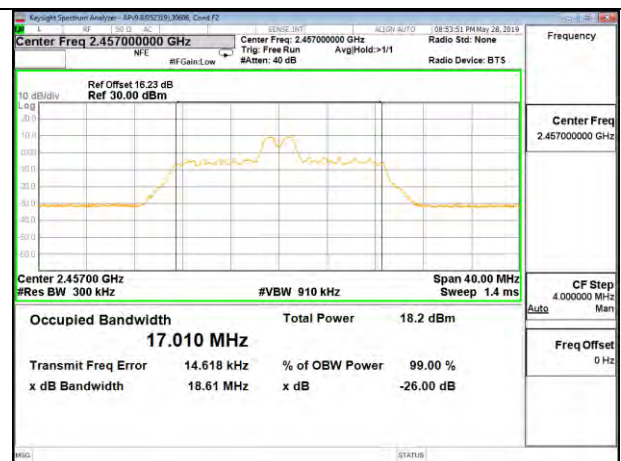
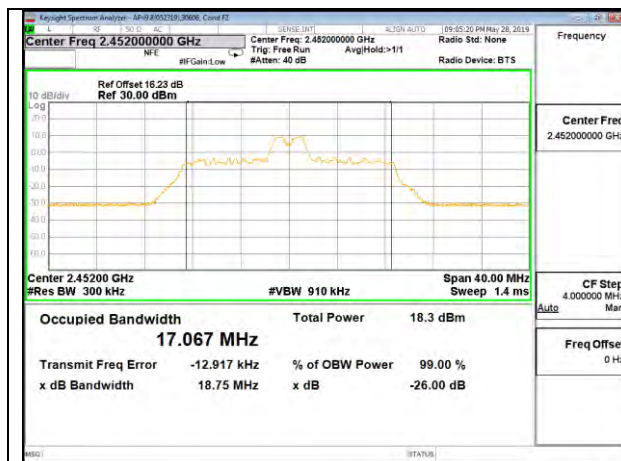
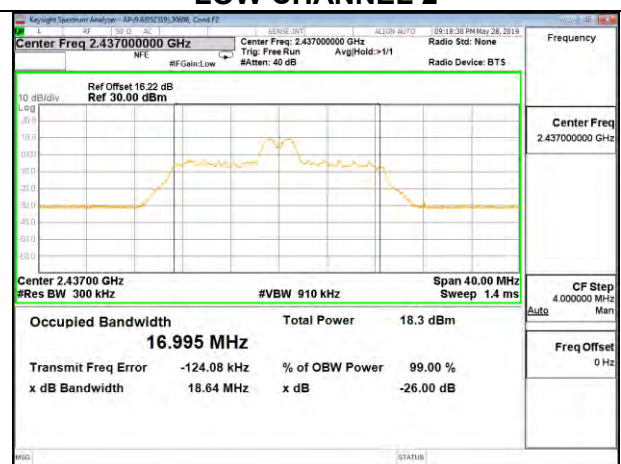
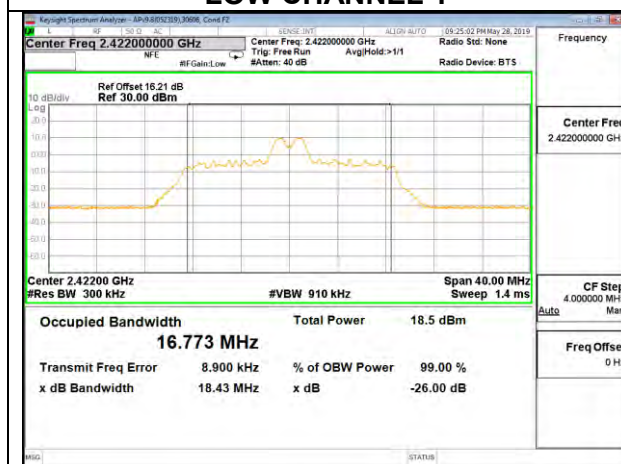
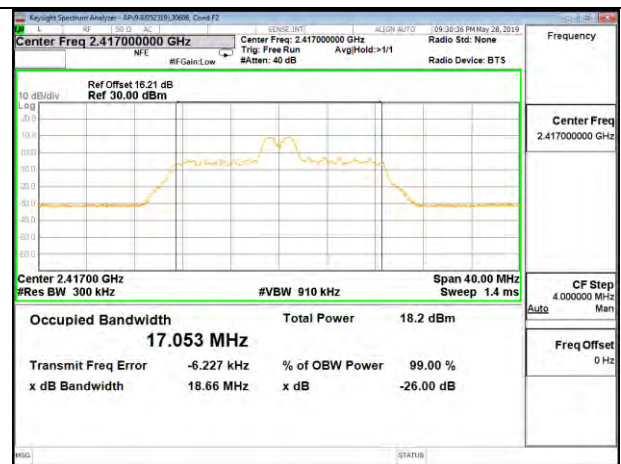
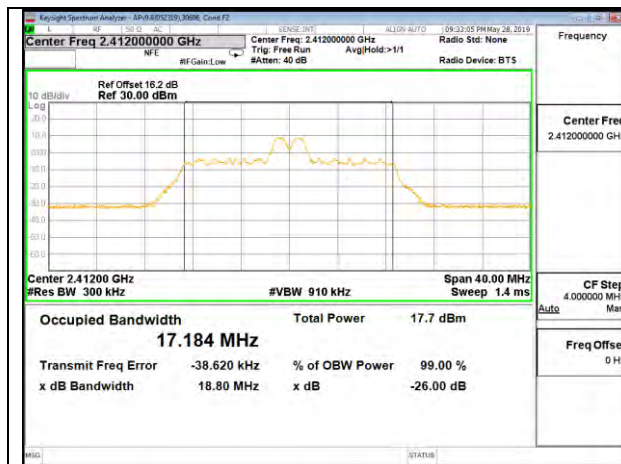


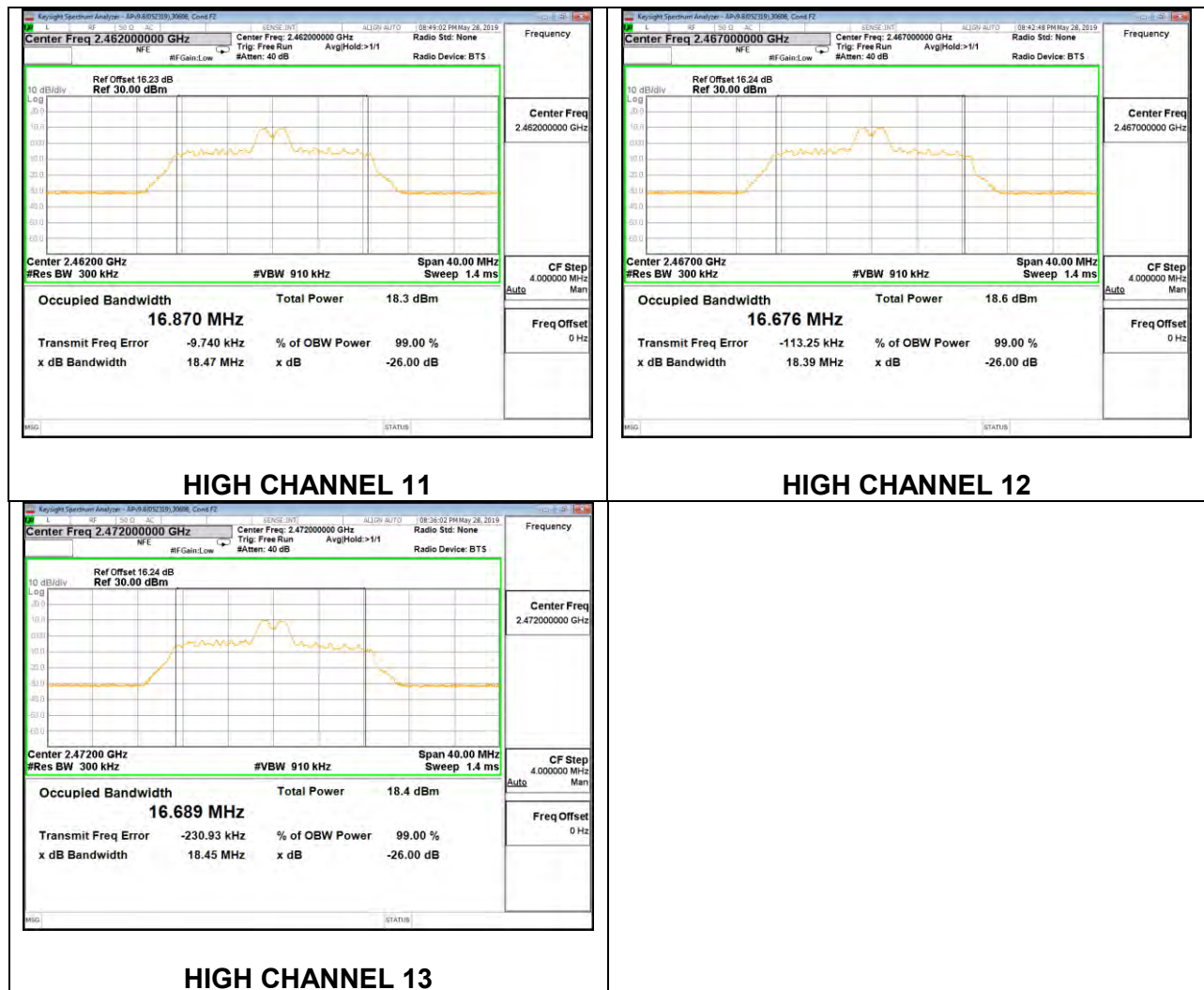
HIGH CHANNEL 10



Antenna 4, LEGACY SISO MODE: 26-Tones, RU index 4

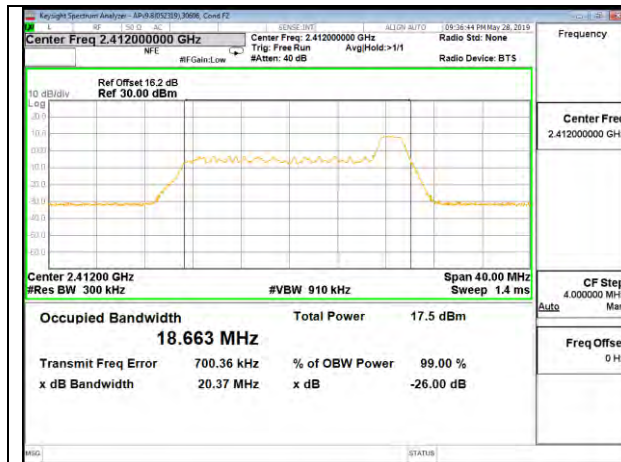
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.1840
Low 2	2417	17.0530
Low 3	2422	16.7730
Mid 6	2437	16.9950
High 9	2452	17.0670
High 10	2457	17.0100
High 11	2462	16.8700
High 12	2467	16.6760
High 13	2472	16.6890



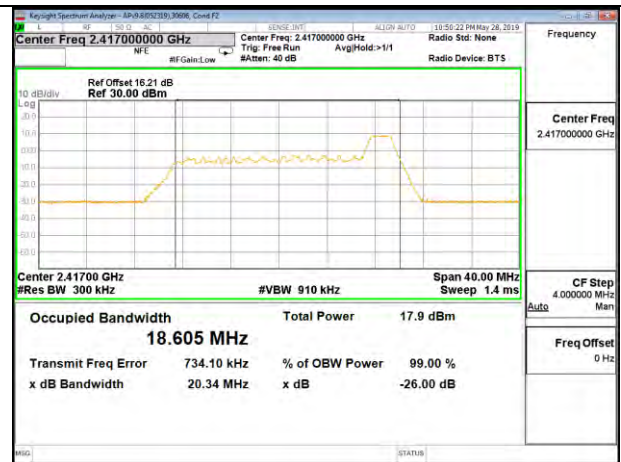


Antenna 4, LEGACY SISO MODE: 26-Tones, RU index 8

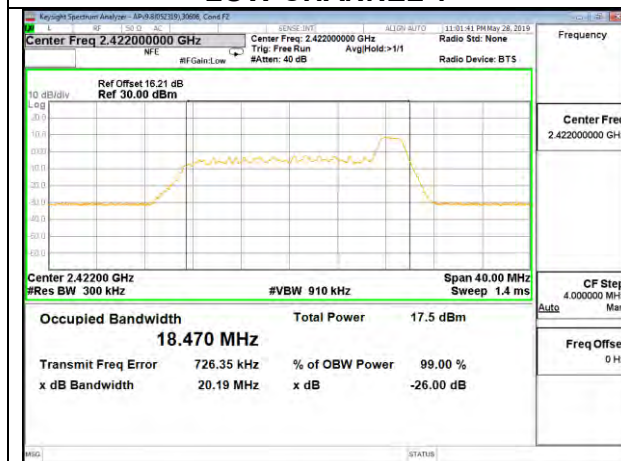
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.6630
Low 2	2417	18.6050
Low 3	2422	18.4700
Mid 6	2437	18.7350
High 9	2452	18.6290
High 10	2457	18.5210
High 11	2462	18.5390
High 12	2467	18.6610
High 13	2472	18.7460



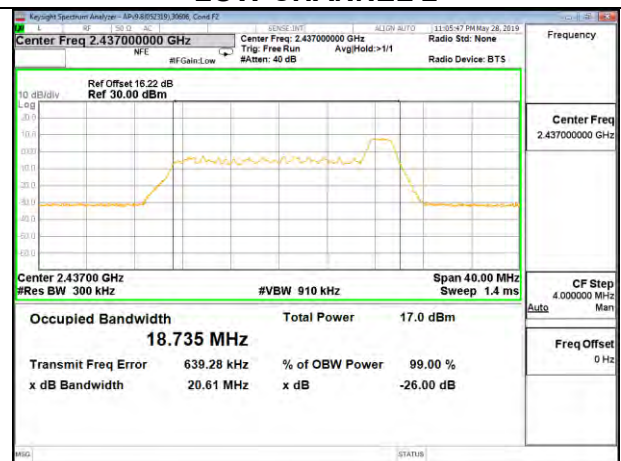
LOW CHANNEL 1



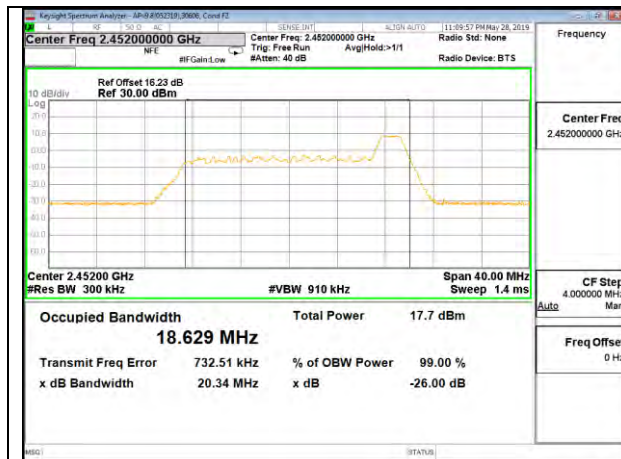
LOW CHANNEL 2



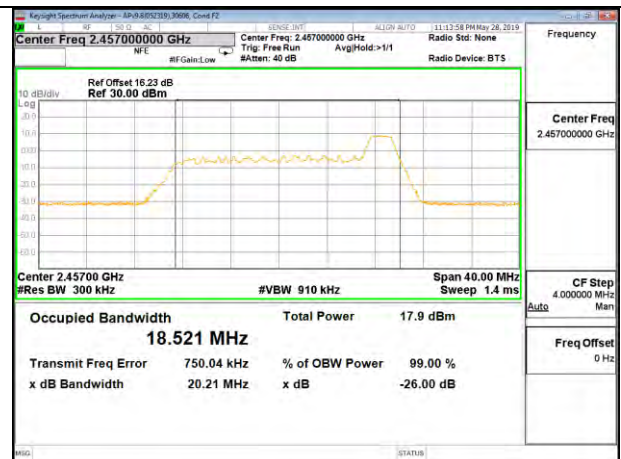
LOW CHANNEL 3



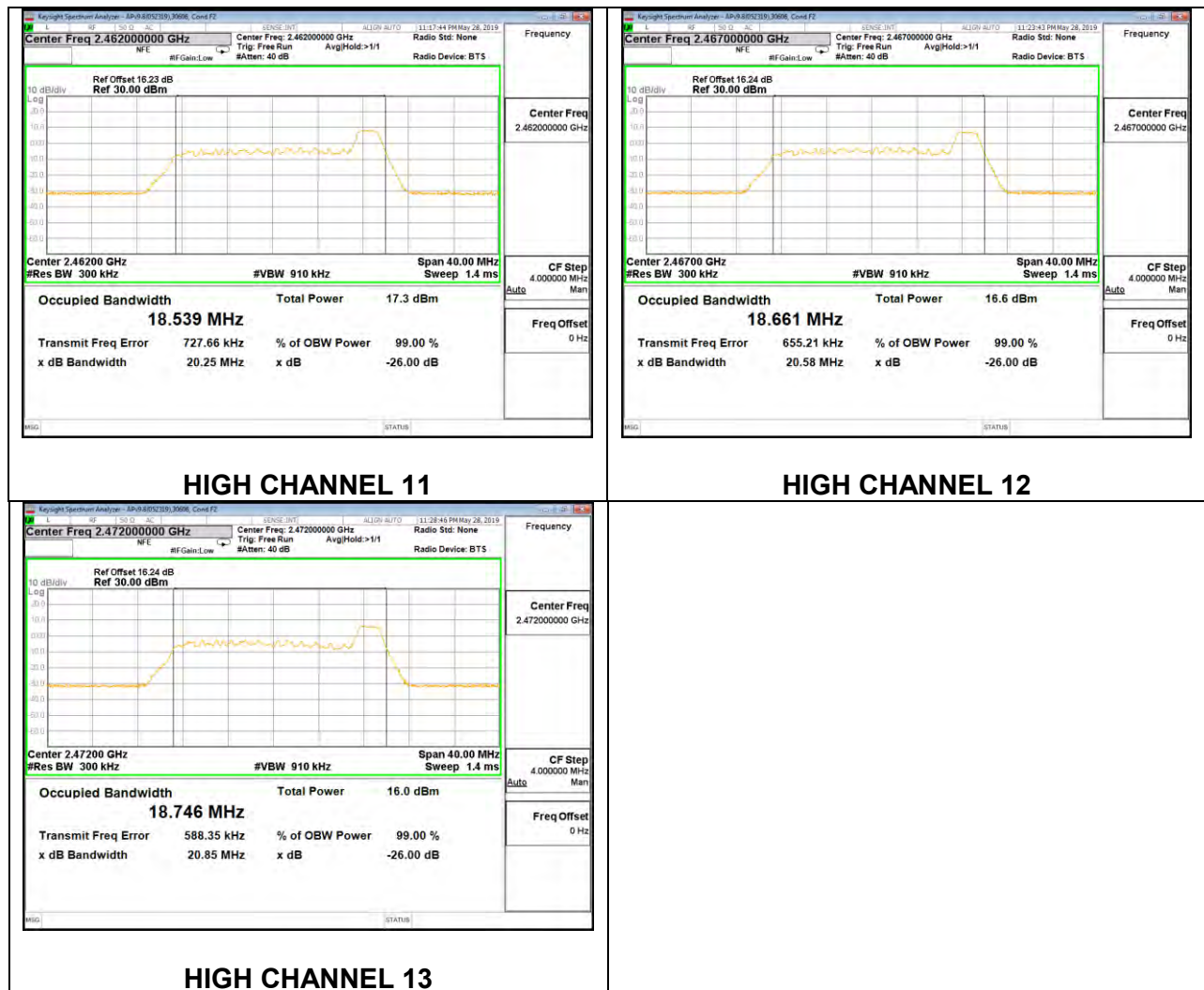
MID CHANNEL 6



HIGH CHANNEL 9

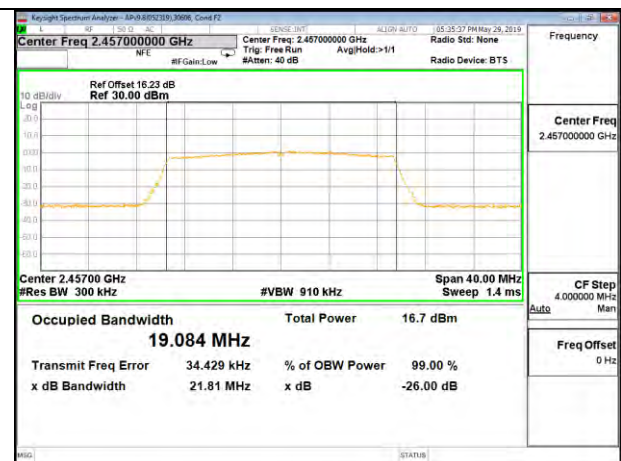
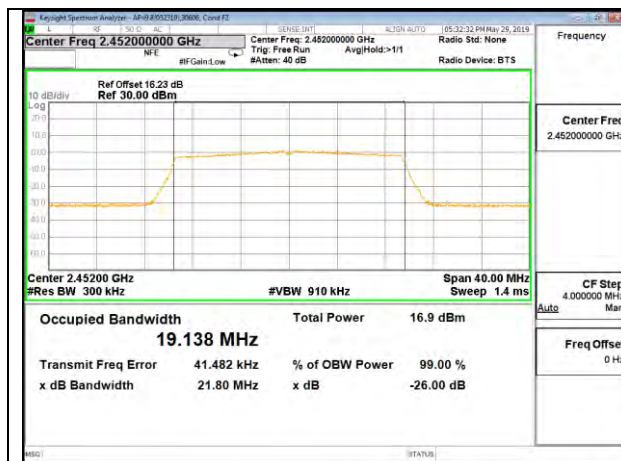
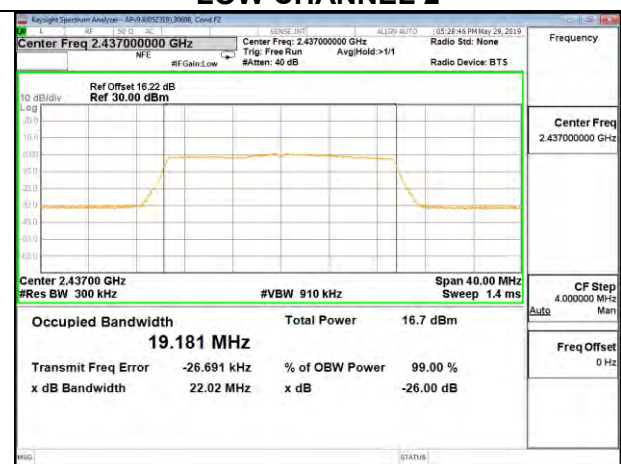
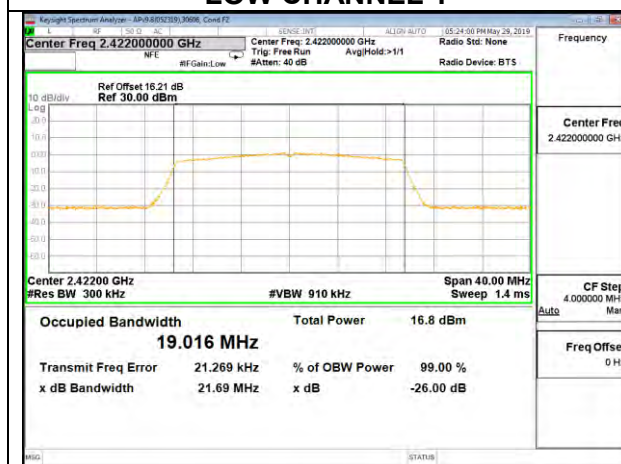
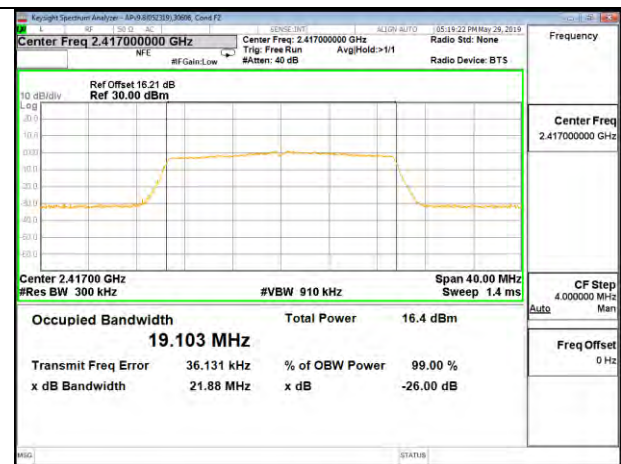
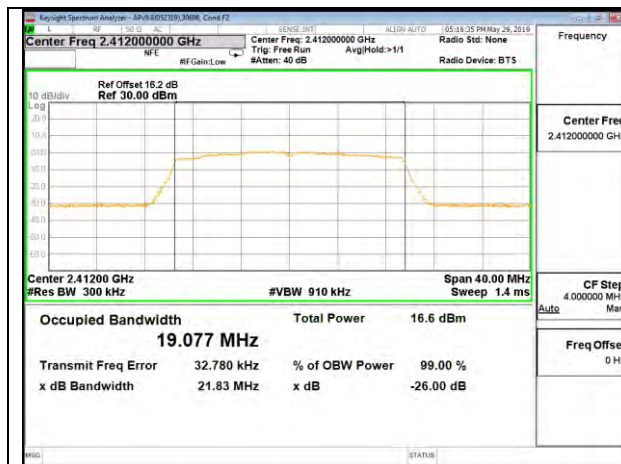


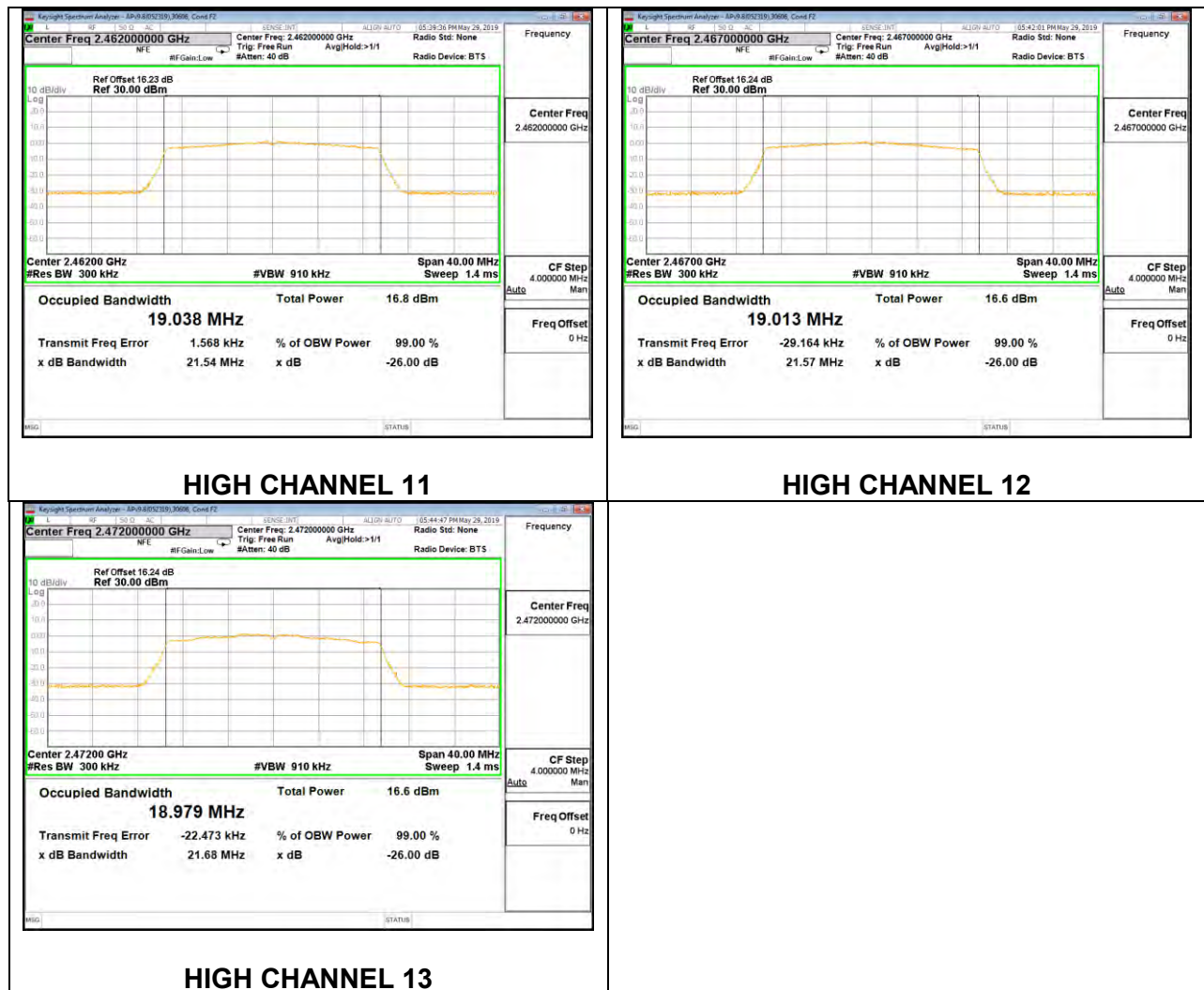
HIGH CHANNEL 10



Antenna 4, LEGACY SISO MODE: 242-Tones, RU index 61

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	19.0770
Low 2	2417	19.1030
Low 3	2422	19.0160
Mid 6	2437	19.1810
High 9	2452	19.1380
High 10	2457	19.0840
High 11	2462	19.0380
High 12	2467	19.0130
High 13	2472	18.9790

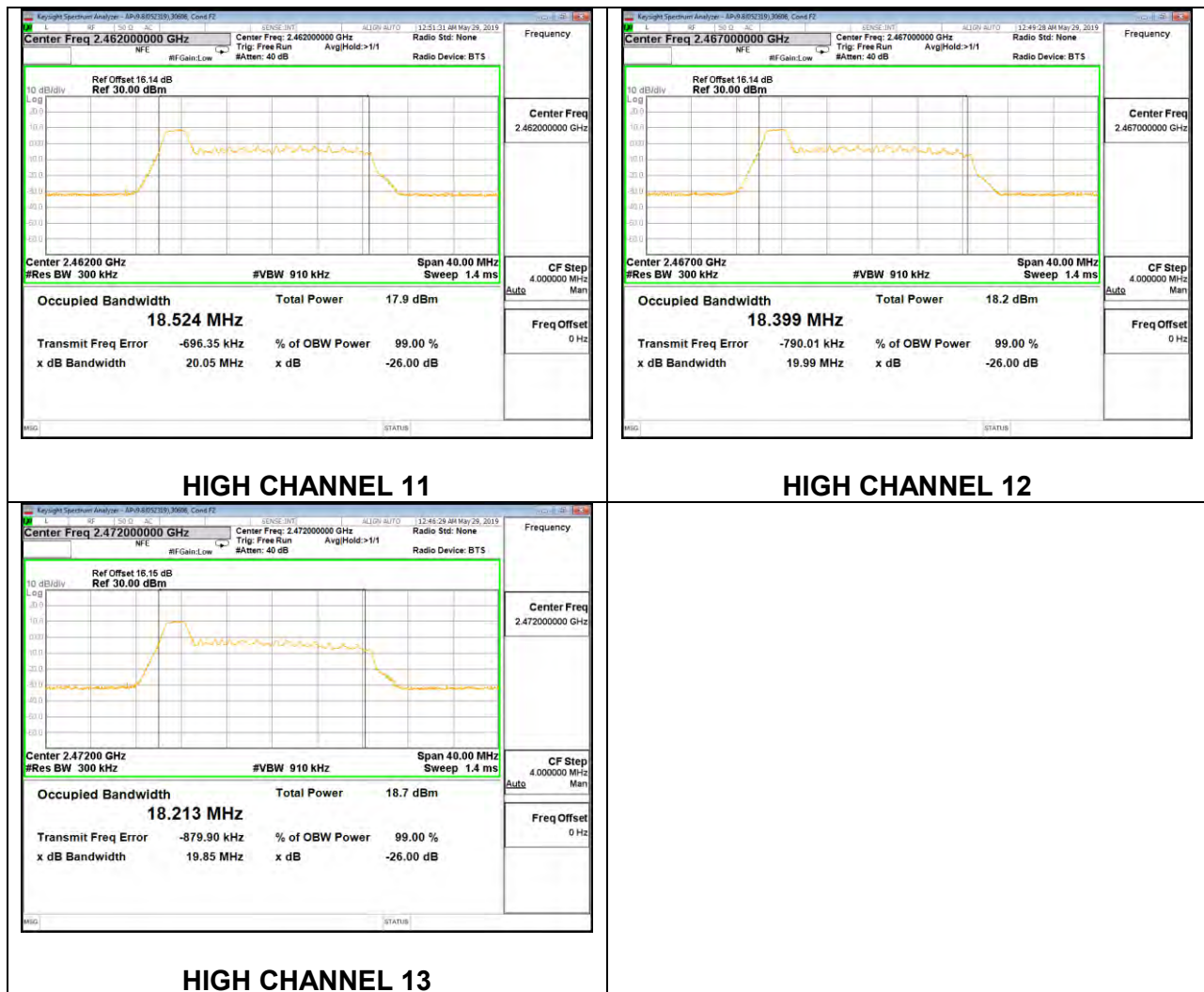




Antenna 3, LEGACY SISO MODE: 26-Tones, RU index 0

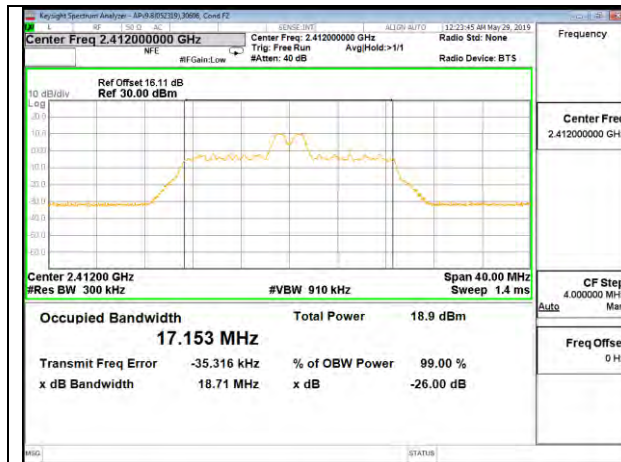
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.5240
Low 2	2417	18.5770
Low 3	2422	18.5140
Mid 6	2437	18.3910
High 9	2452	18.5560
High 10	2457	18.5600
High 11	2462	18.5240
High 12	2467	18.3990
High 13	2472	18.2130



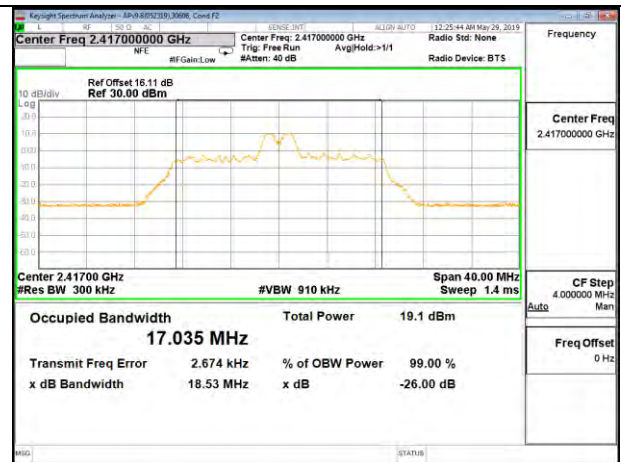


Antenna 3, LEGACY SISO MODE: 26-Tones, RU index 4

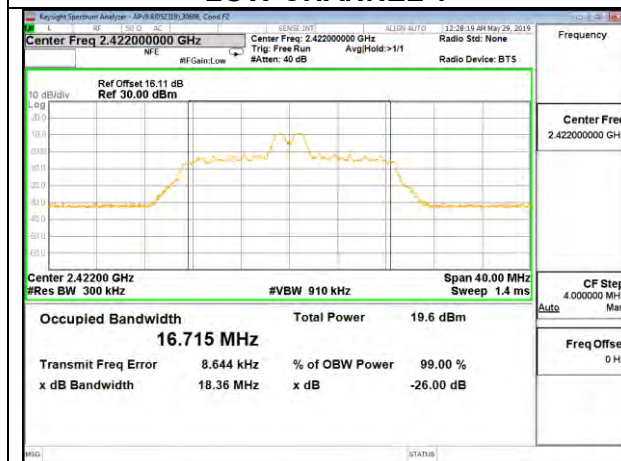
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.1530
Low 2	2417	17.0350
Low 3	2422	16.7150
Mid 6	2437	16.9850
High 9	2452	17.0530
High 10	2457	16.9990
High 11	2462	16.8280
High 12	2467	16.6720
High 13	2472	16.7000



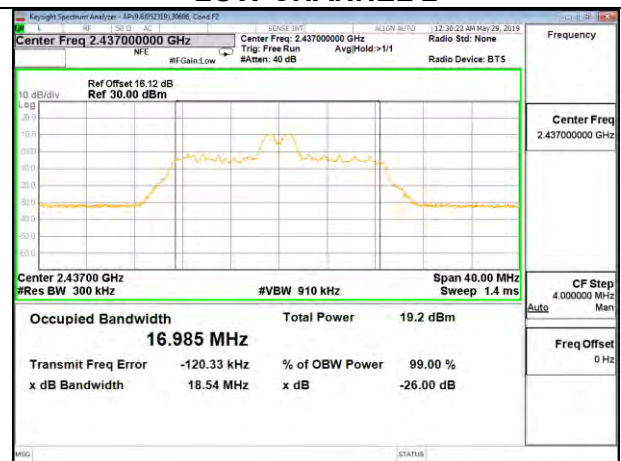
LOW CHANNEL 1



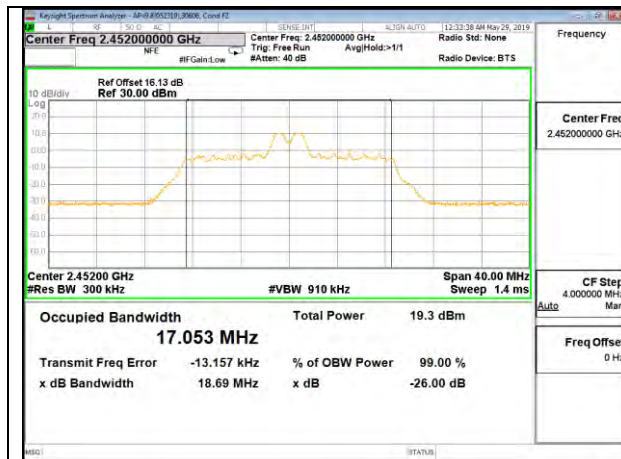
LOW CHANNEL 2



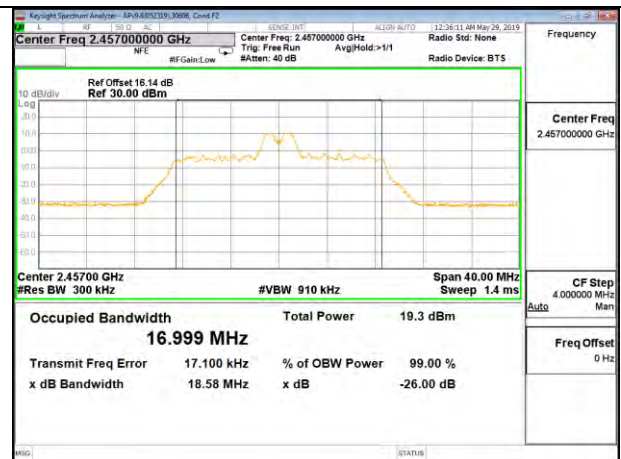
LOW CHANNEL 3



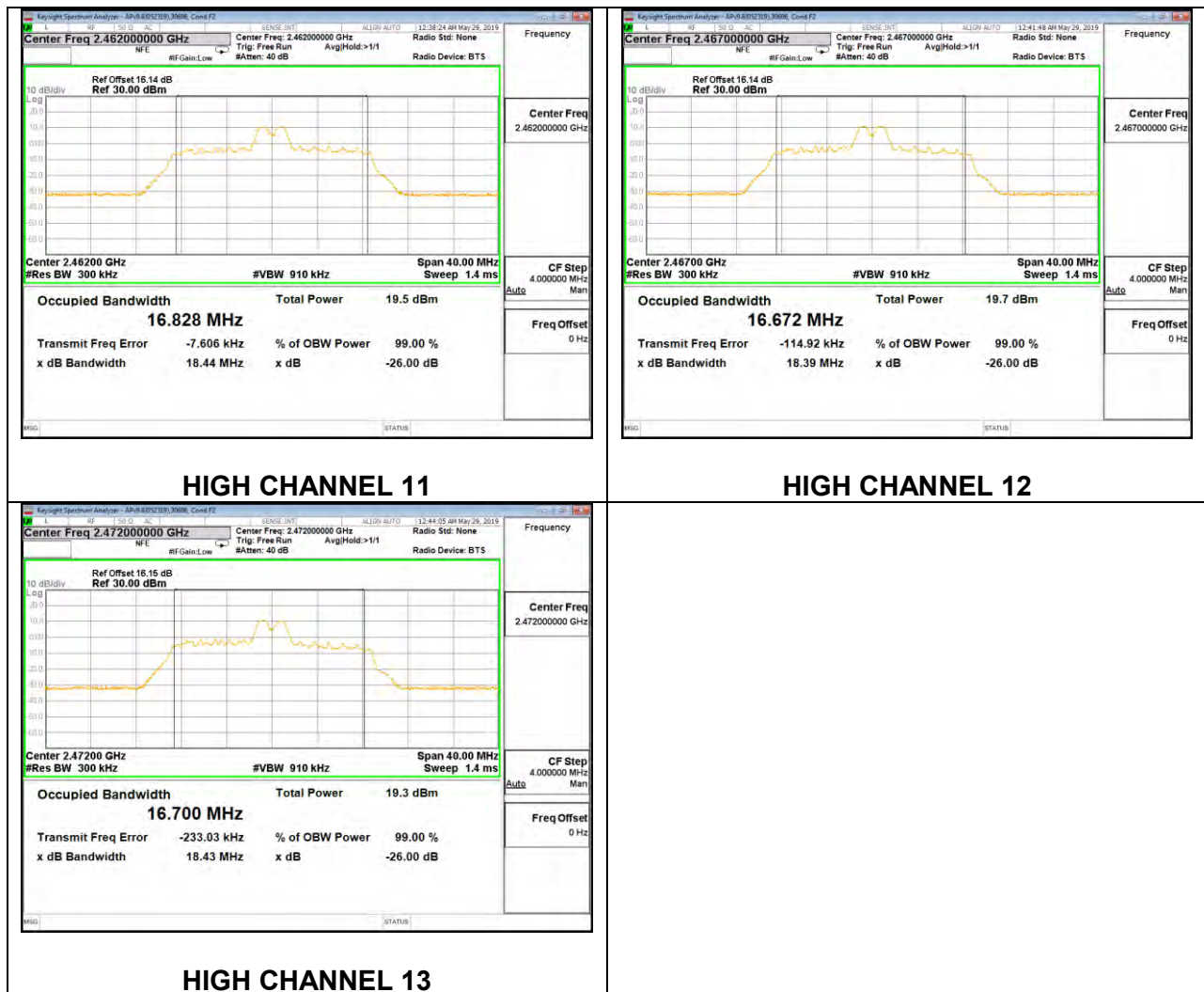
MID CHANNEL 6



HIGH CHANNEL 9

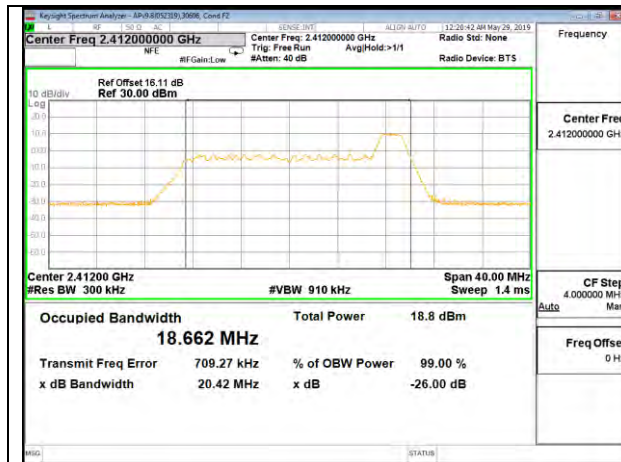


HIGH CHANNEL 10

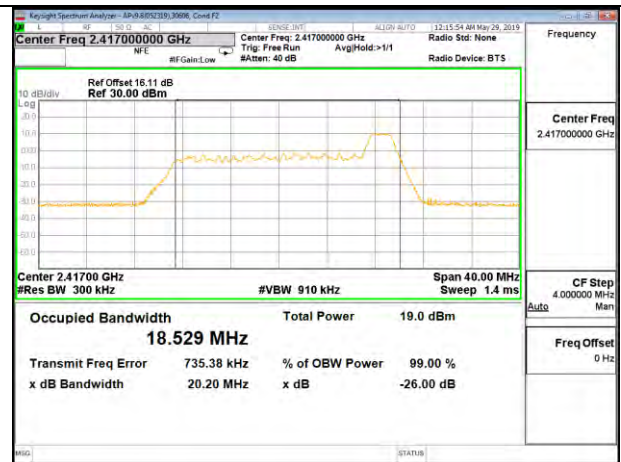


Antenna 3, LEGACY SISO MODE: 26-Tones, RU index 8

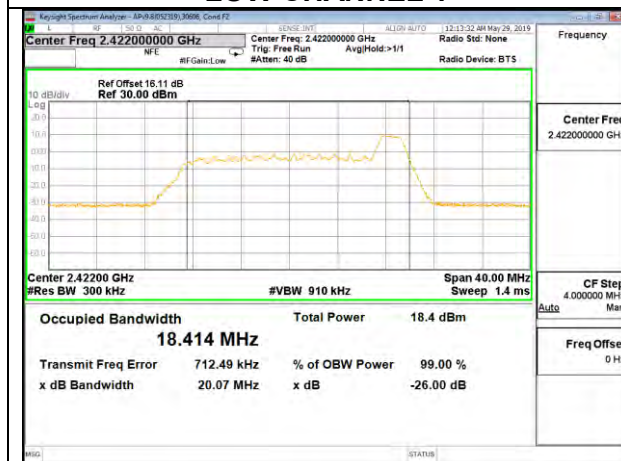
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.6620
Low 2	2417	18.5290
Low 3	2422	18.4140
Mid 6	2437	18.7140
High 9	2452	18.5930
High 10	2457	18.5200
High 11	2462	18.5130
High 12	2467	18.6430
High 13	2472	18.7170



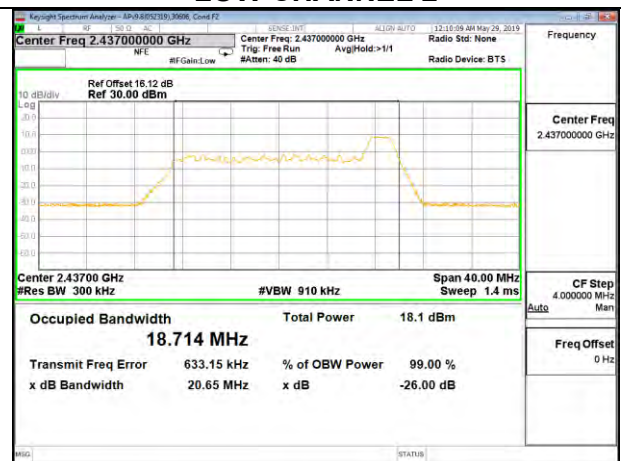
LOW CHANNEL 1



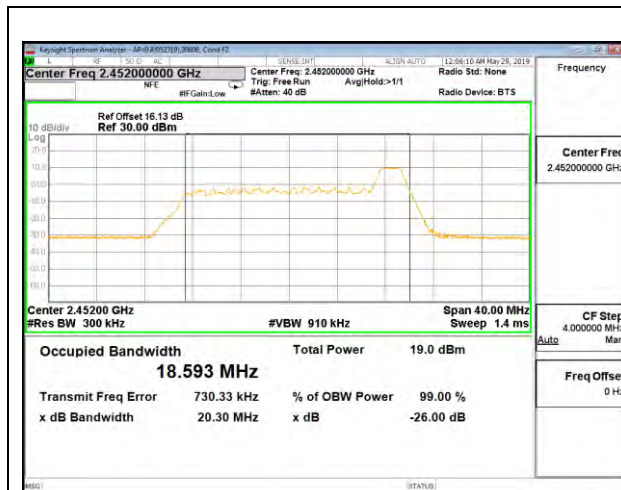
LOW CHANNEL 2



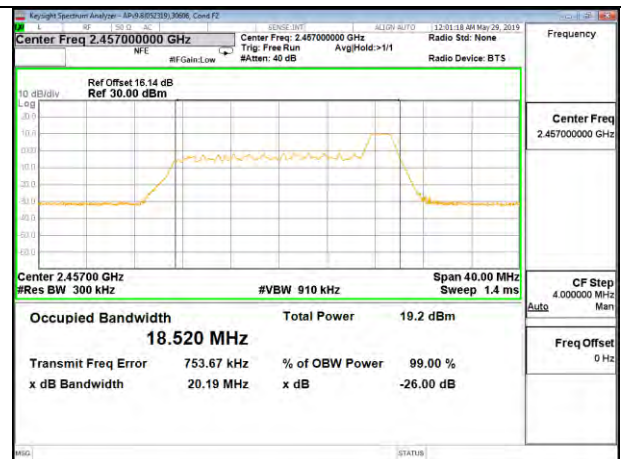
LOW CHANNEL 3



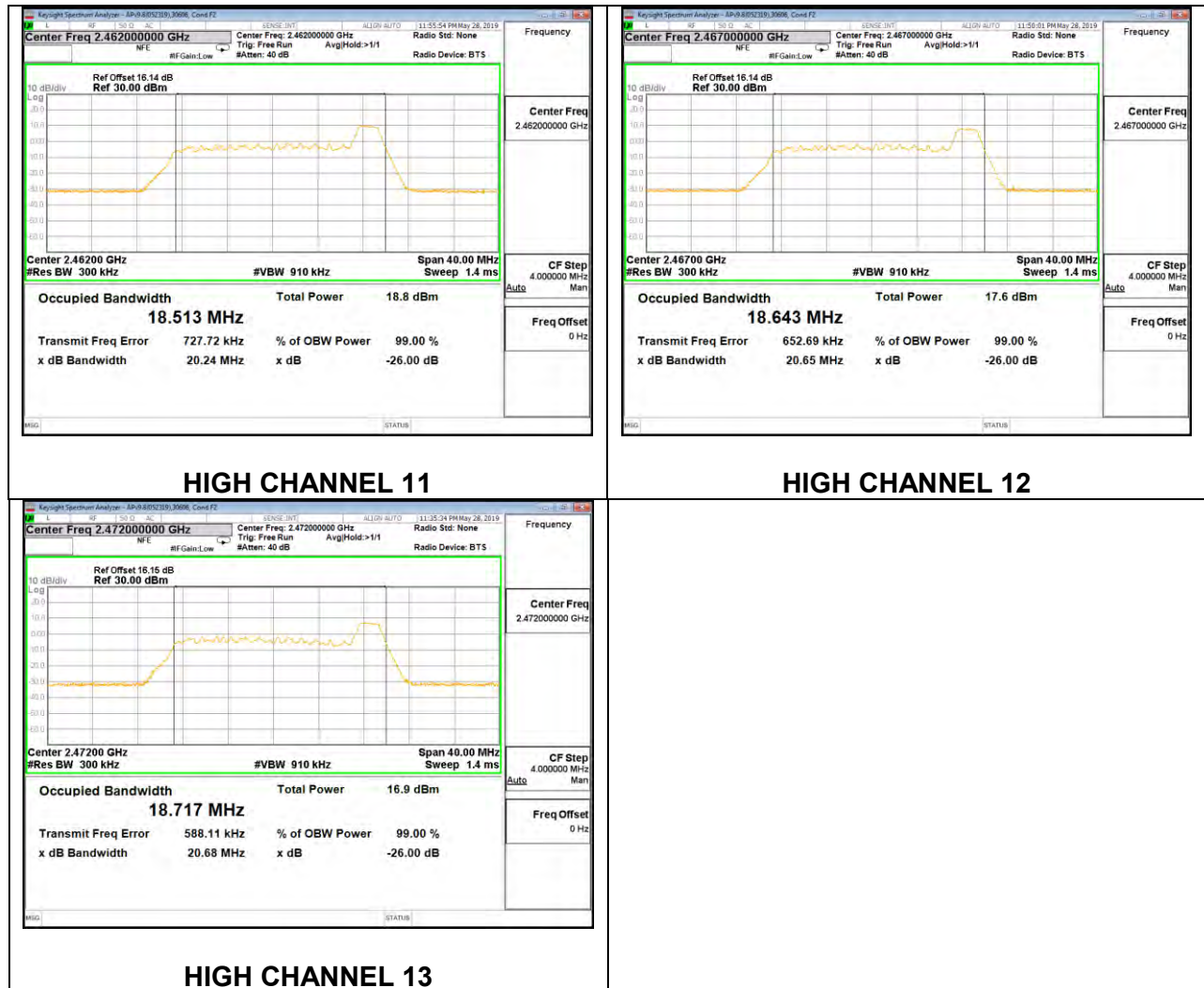
MID CHANNEL 6



HIGH CHANNEL 9

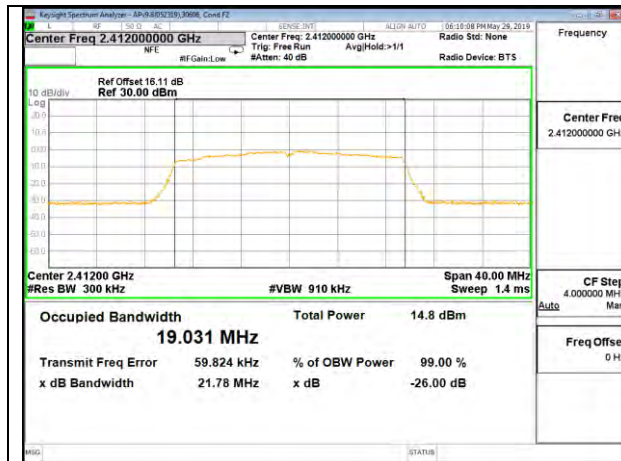


HIGH CHANNEL 10

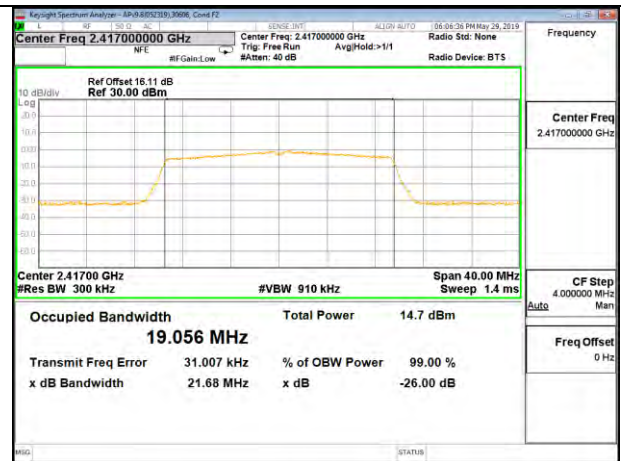


Antenna 3, LEGACY SISO MODE: 242-Tones, RU index 61

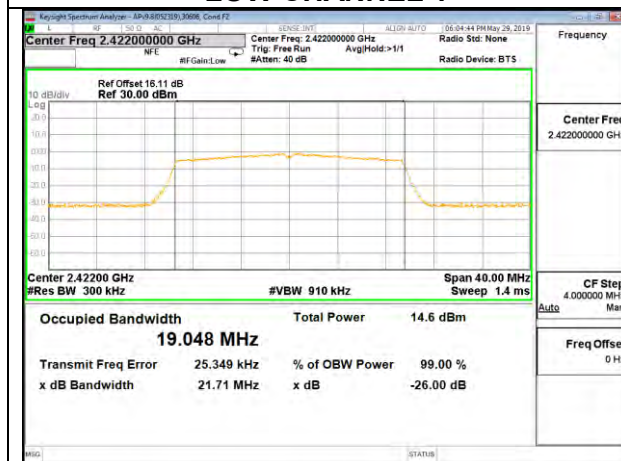
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	19.0310
Low 2	2417	19.0560
Low 3	2422	19.0480
Mid 6	2437	19.1810
High 9	2452	19.0780
High 10	2457	19.0560
High 11	2462	19.0510
High 12	2467	19.1180
High 13	2472	19.0140



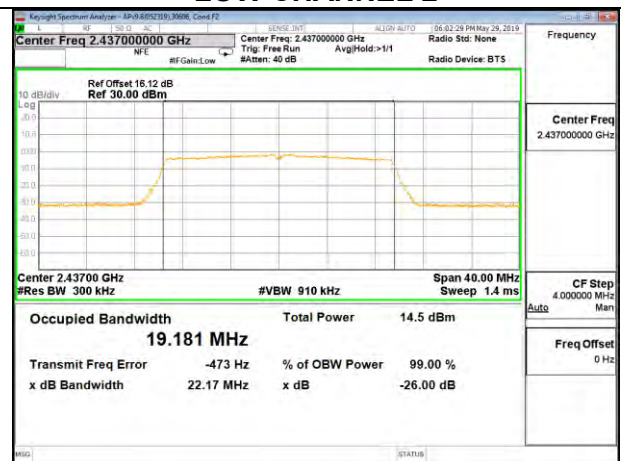
LOW CHANNEL 1



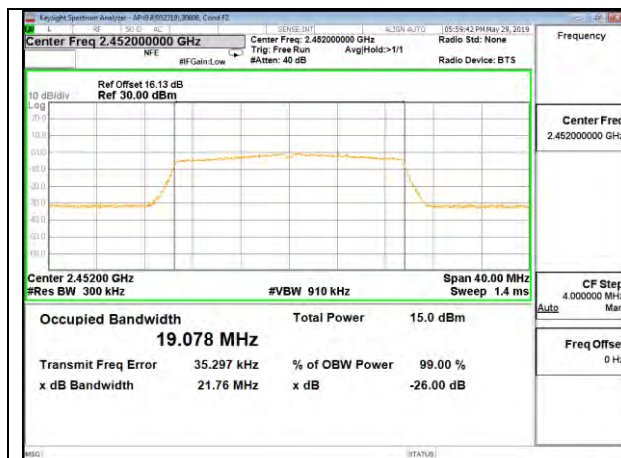
LOW CHANNEL 2



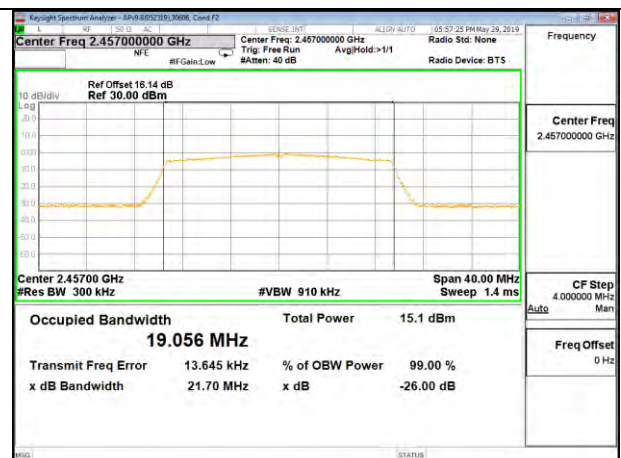
LOW CHANNEL 3



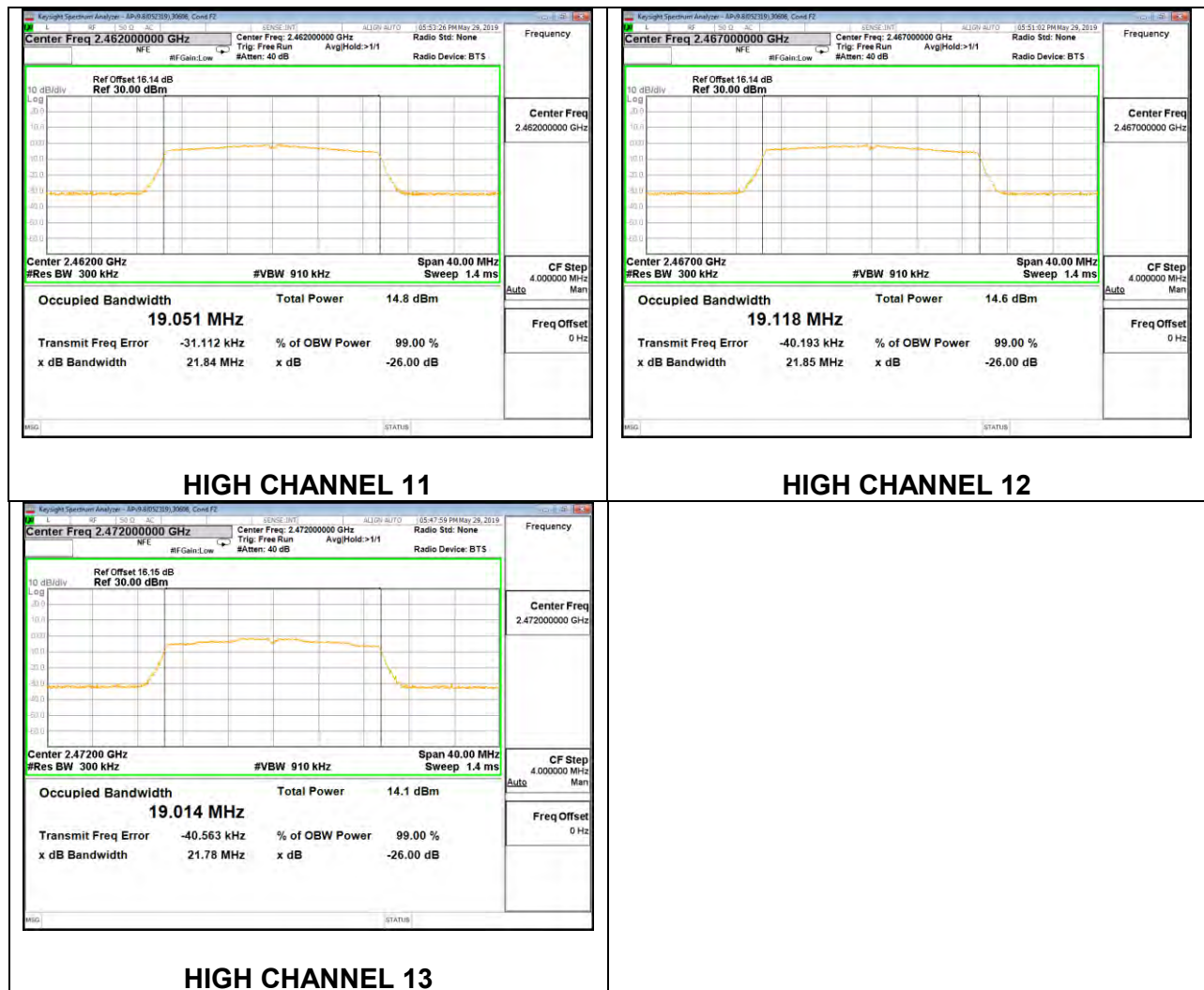
MID CHANNEL 6



HIGH CHANNEL 9



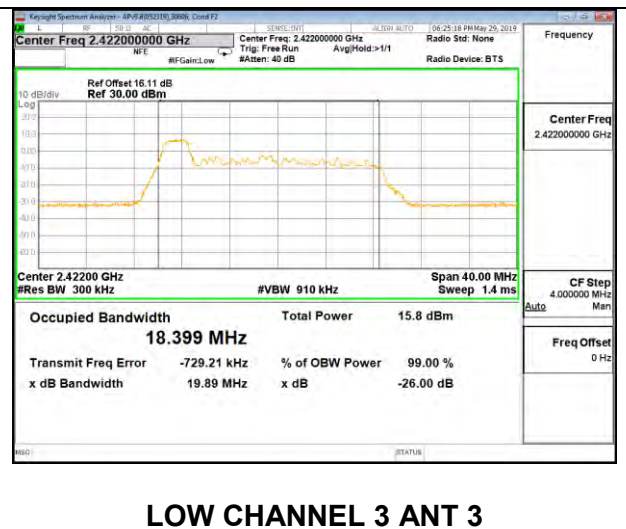
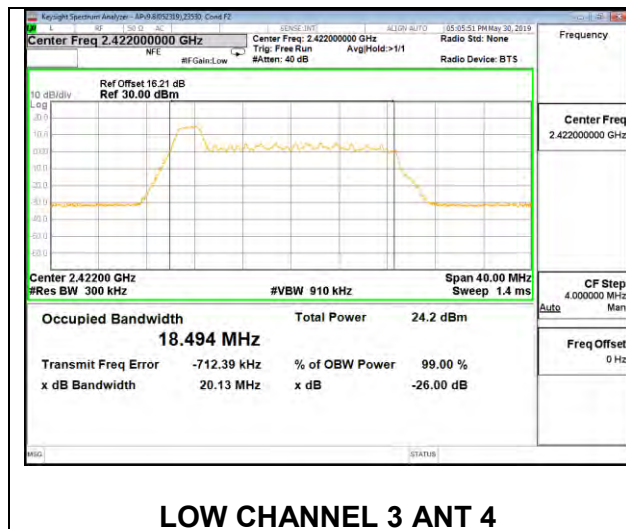
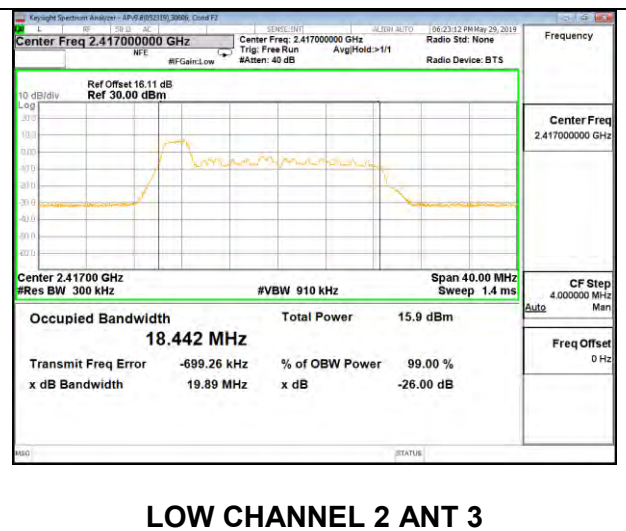
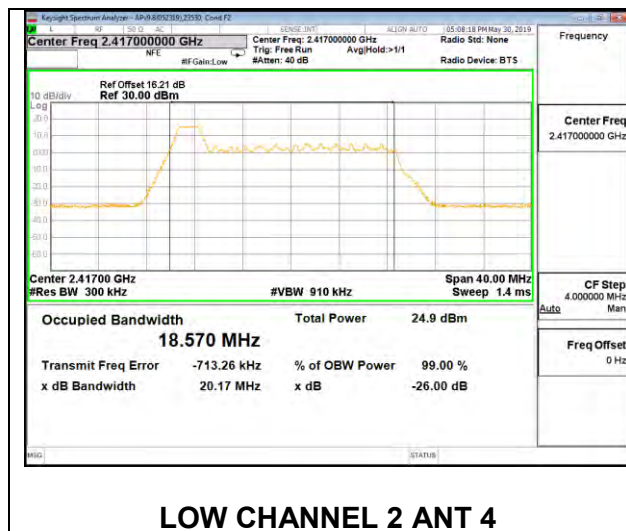
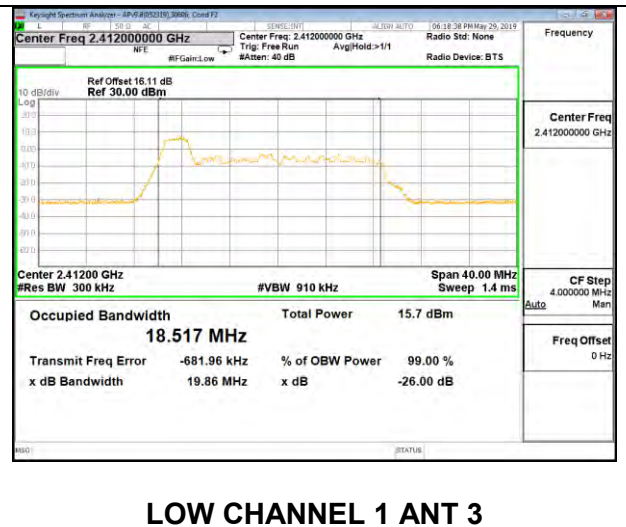
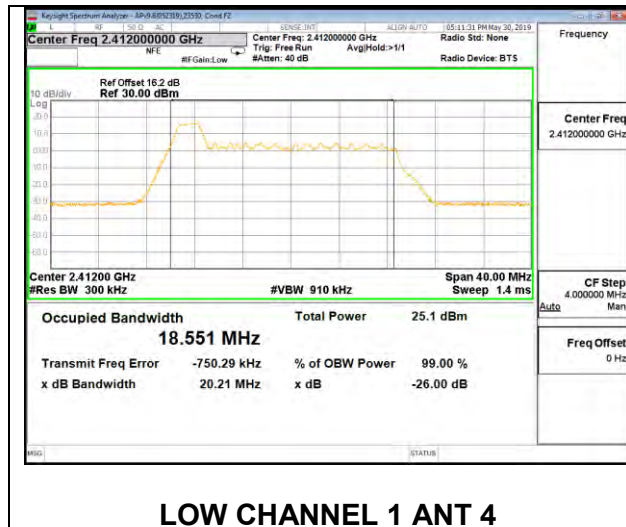
HIGH CHANNEL 10

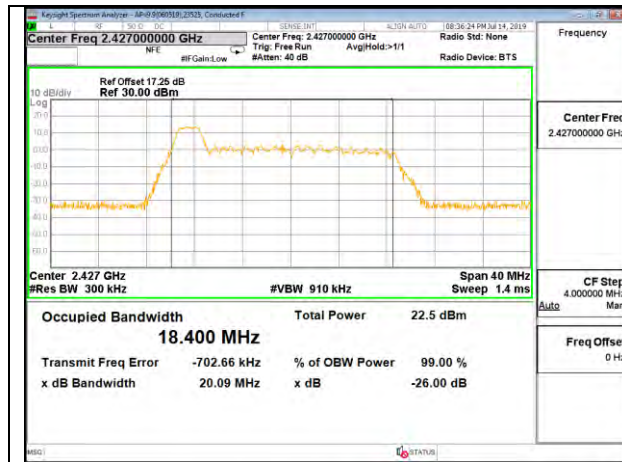


8.2.4. 802.11ax HE20 OFDMA MODE 2TX

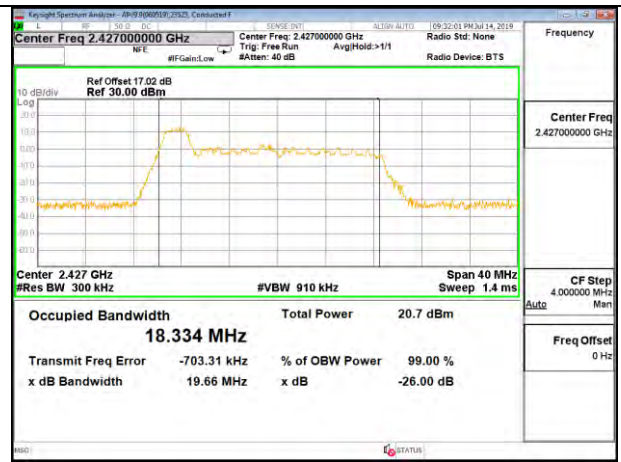
Antenna 4 + Antenna 3 2TX MODE: 26-Tones, RU Index 0

Channel	Frequency (MHz)	99% Bandwidth Ant 4 (MHz)	99% Bandwidth Ant 3 (MHz)
Low 1	2412	18.5510	18.5170
Low 2	2417	18.5700	18.4420
Low 3	2422	18.4940	18.3990
Low 4	2427	18.4000	18.3340
Mid 6	2437	18.3730	18.4360
High 9	2452	18.5220	18.4810
High 10	2457	18.5330	18.3890
High 11	2462	18.4660	18.2720
High 12	2467	18.4310	18.2460
High 13	2472	18.1010	18.3300

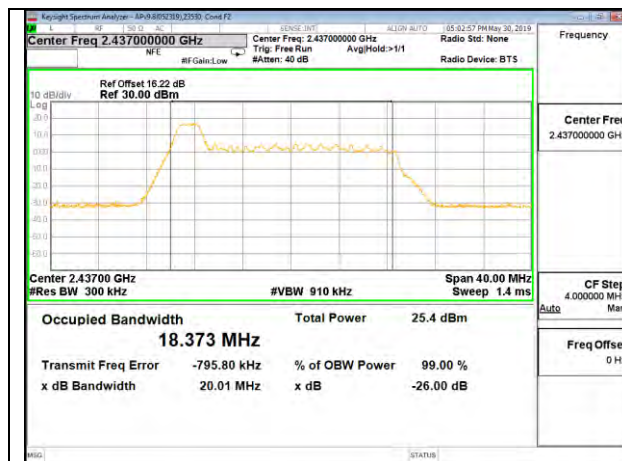




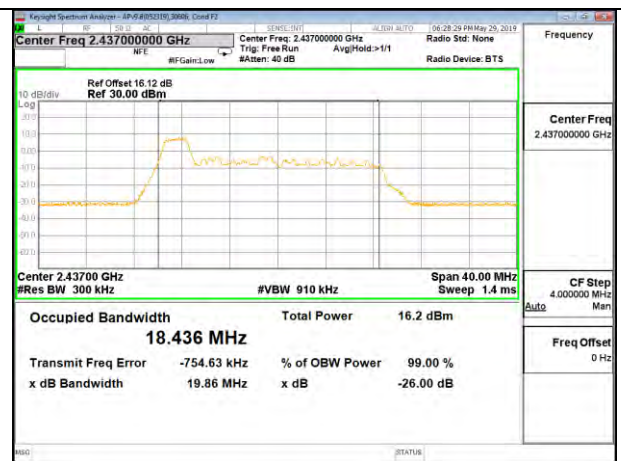
LOW CHANNEL 4 ANT 4



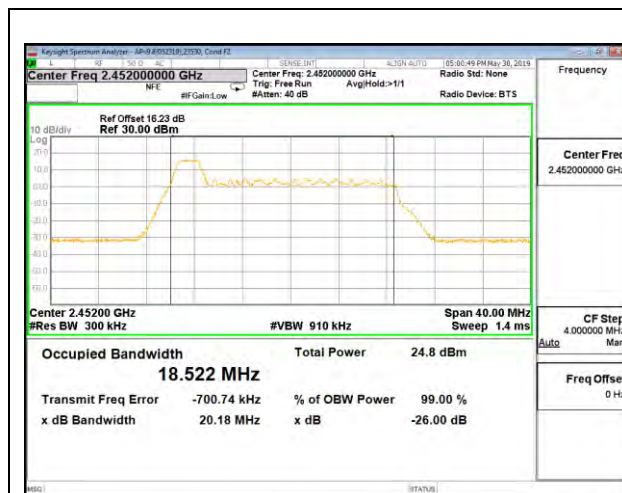
LOW CHANNEL 4 ANT 3



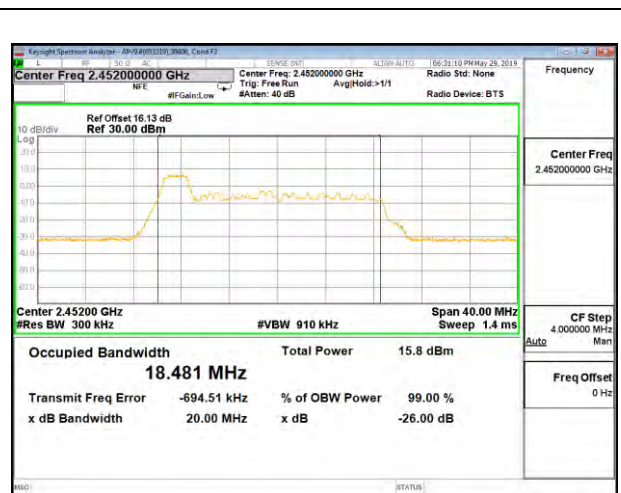
MID CHANNEL 6 ANT 4



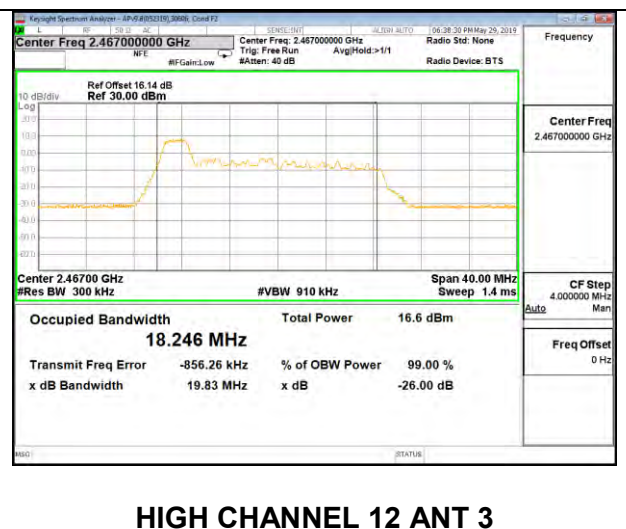
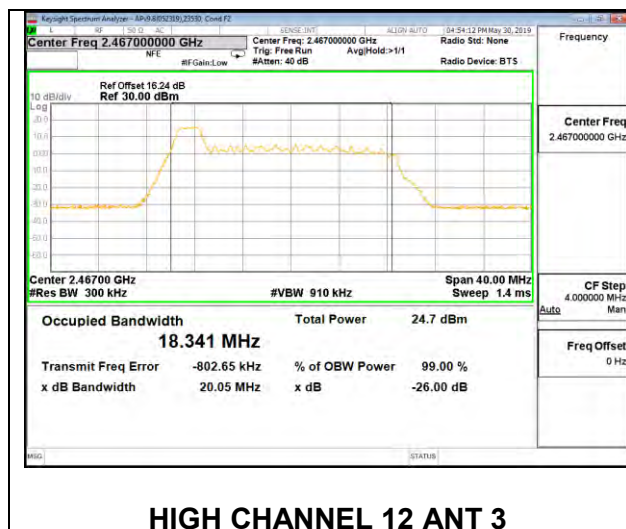
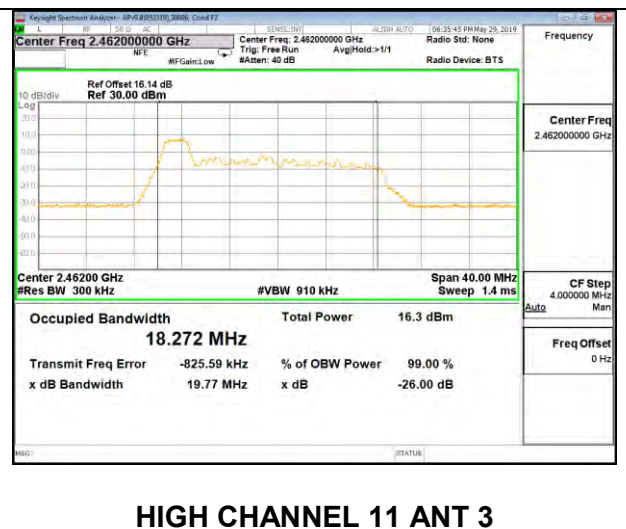
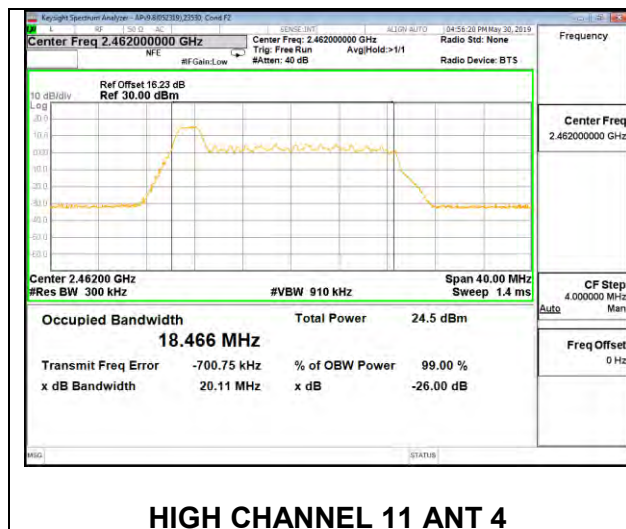
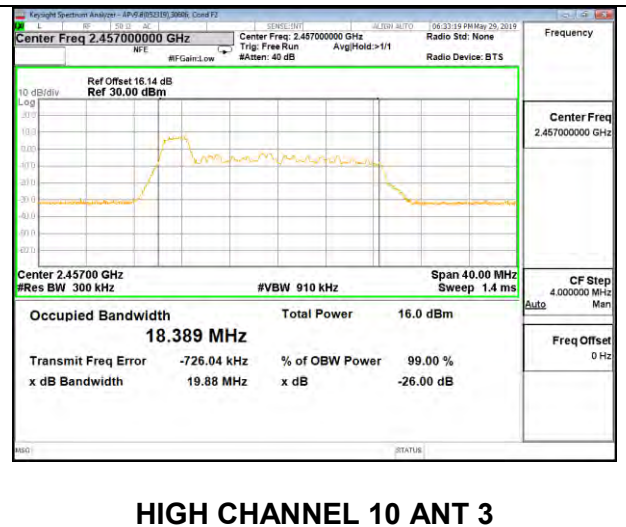
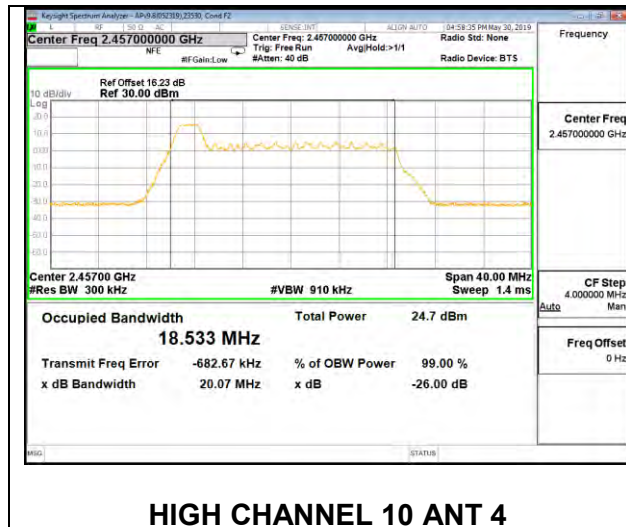
MID CHANNEL 6 ANT 3

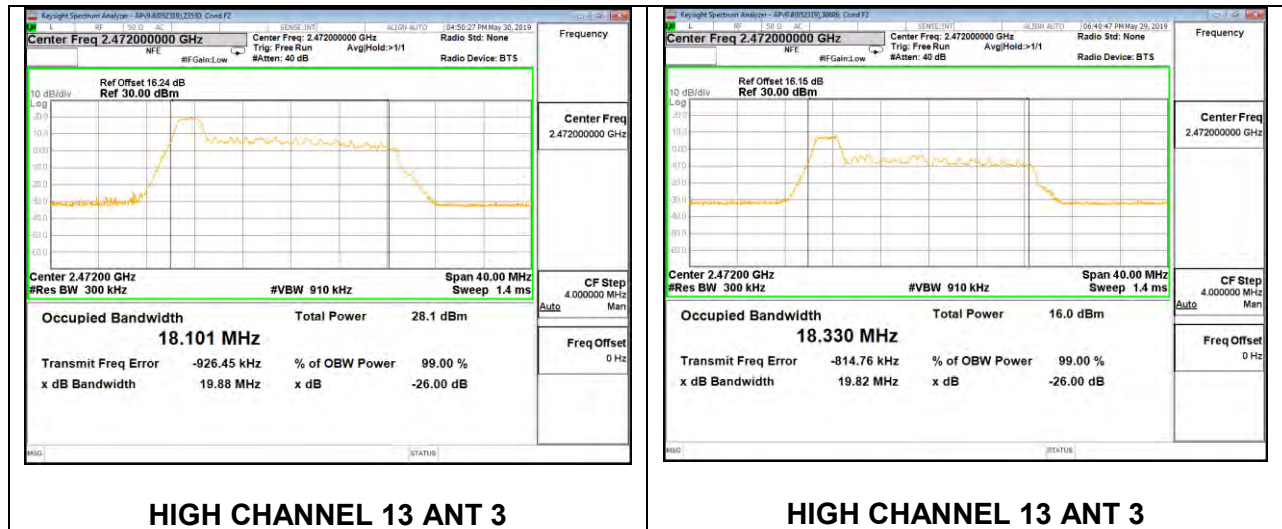


HIGH CHANNEL 9 ANT 4



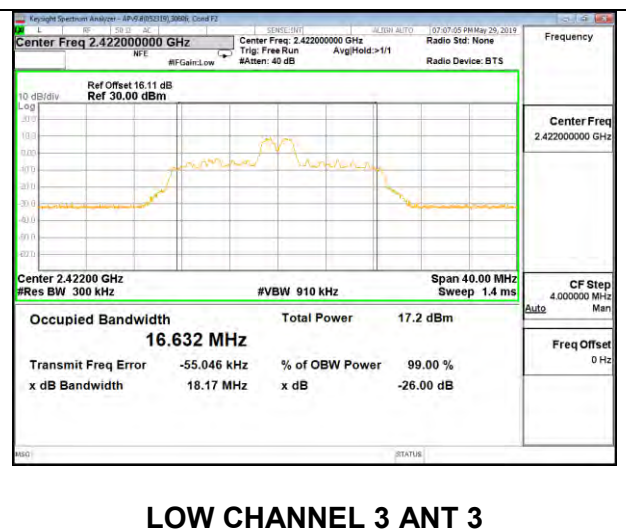
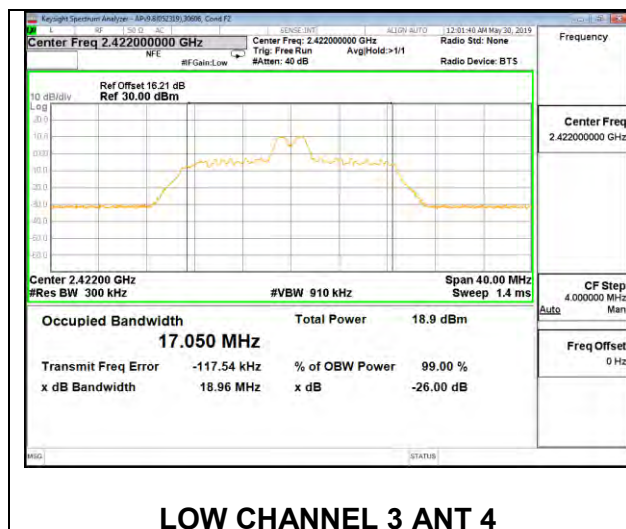
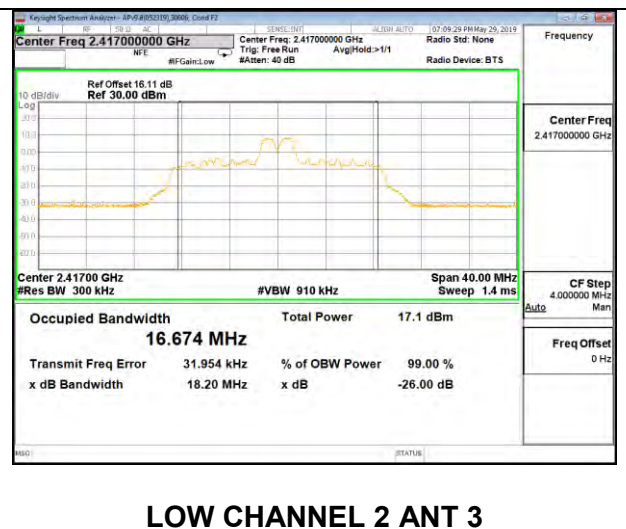
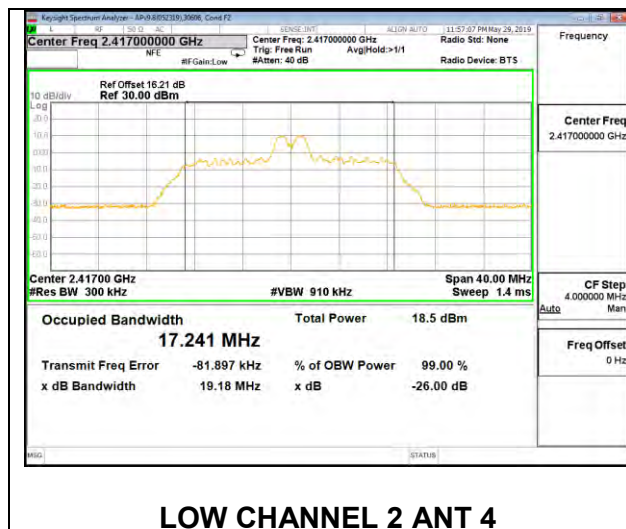
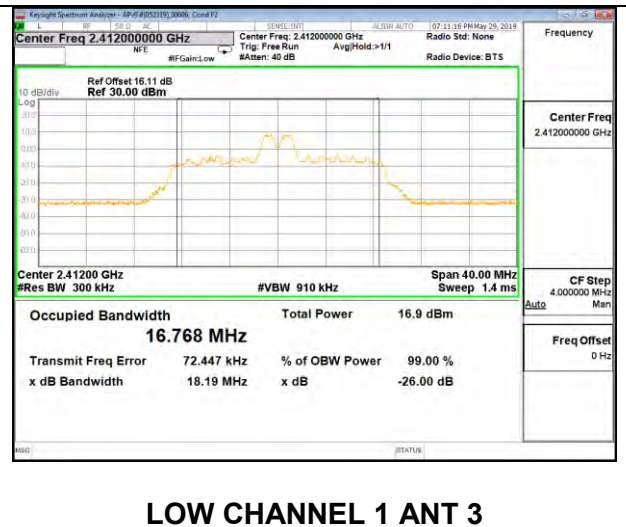
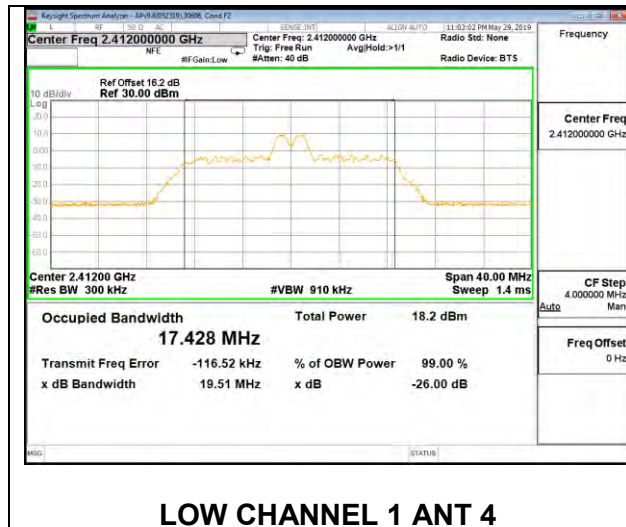
HIGH CHANNEL 9 ANT 3

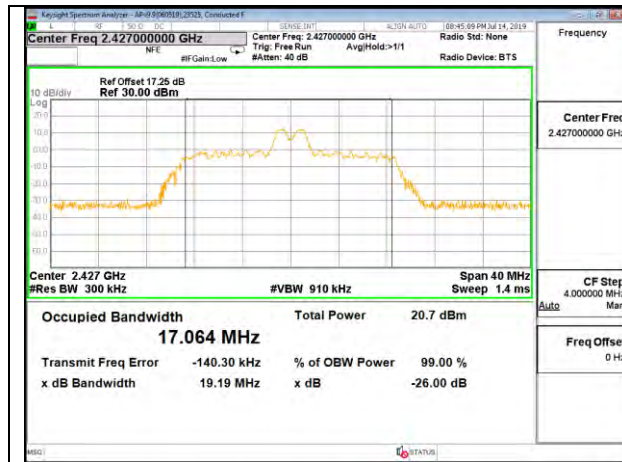




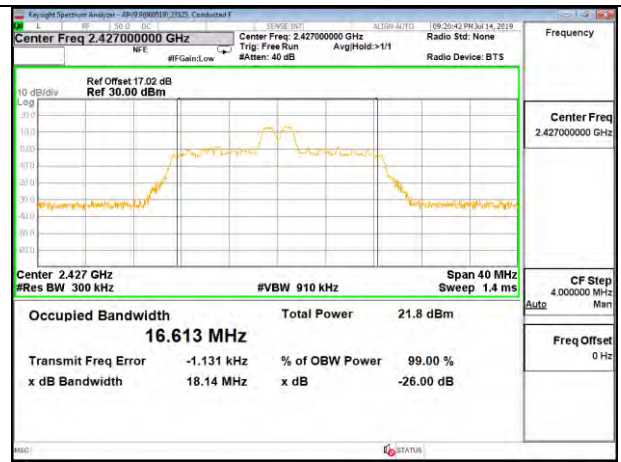
Antenna 4 + Antenna 3 2TX MODE: 26-Tones, RU Index 4

Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low 1	2412	17.4280	16.7680
Low 2	2417	17.4210	16.6740
Low 3	2422	17.0500	16.6320
Low 4	2427	17.0640	16.6130
Mid 6	2437	17.4190	16.9800
High 9	2452	17.3150	16.7500
High 10	2457	17.2360	16.5800
High 11	2462	17.1390	16.6400
High 12	2467	17.1440	16.8200
High 13	2472	17.3480	16.8980

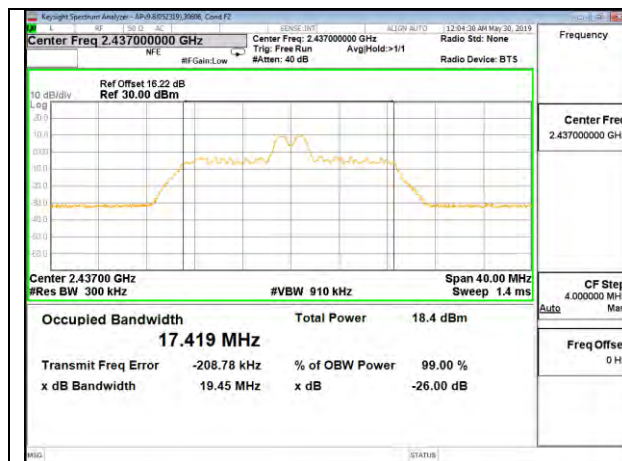




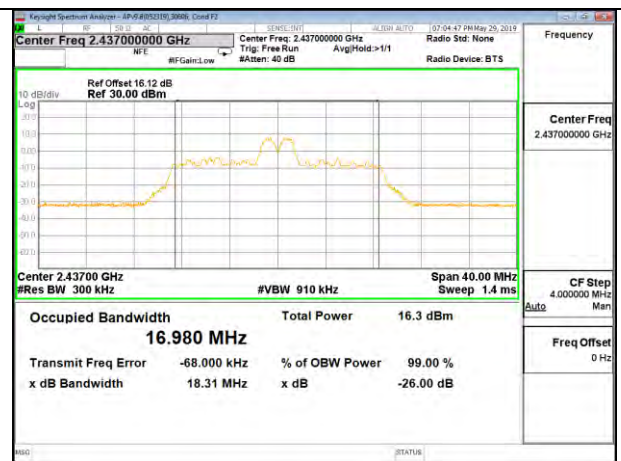
LOW CHANNEL 4 ANT 4



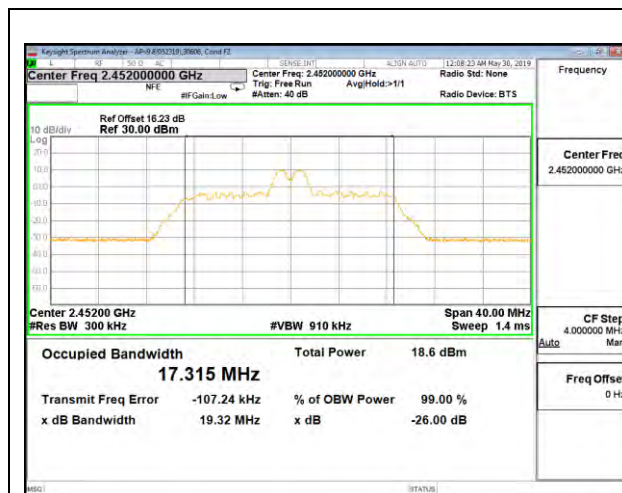
LOW CHANNEL 4 ANT 3



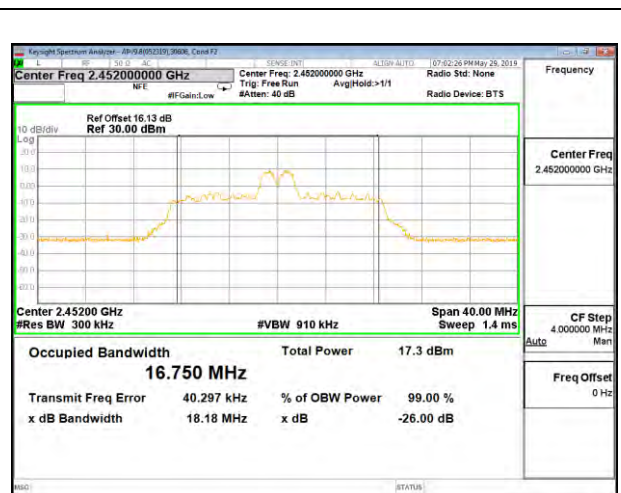
MID CHANNEL 6 ANT 4



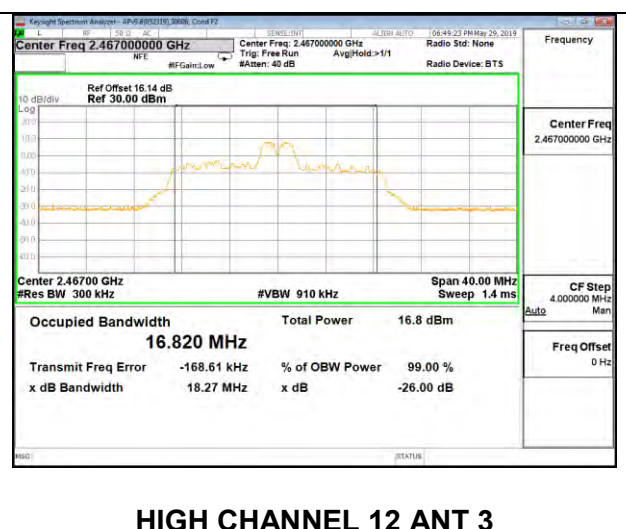
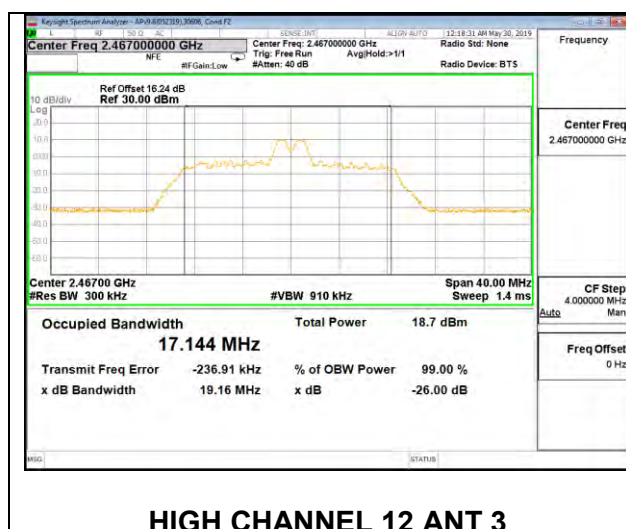
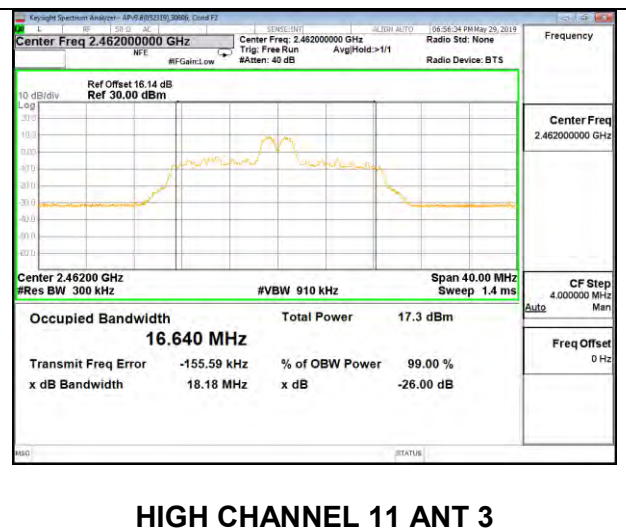
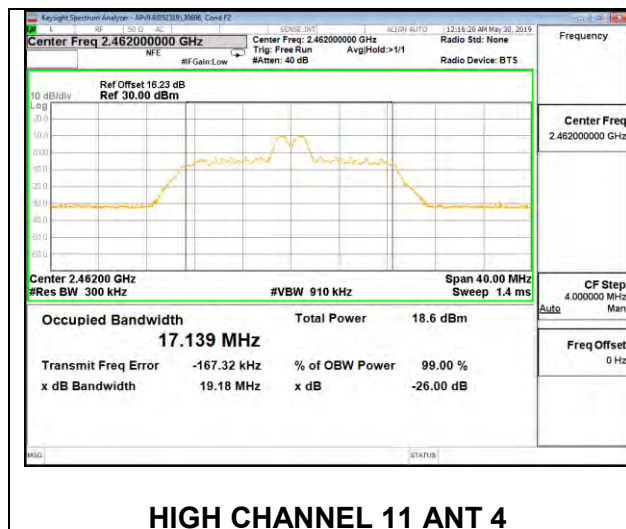
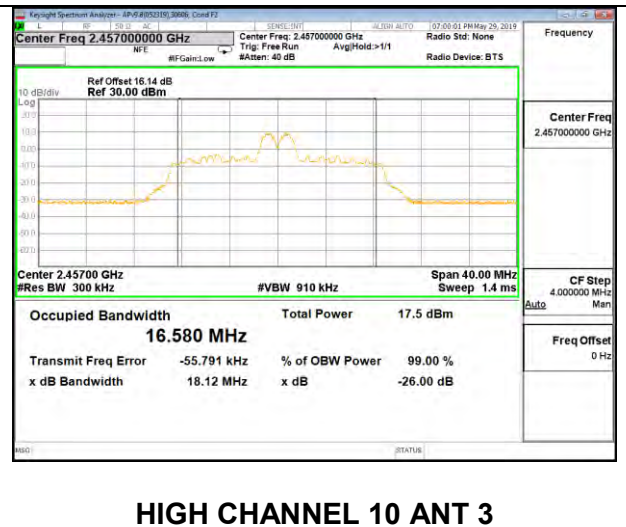
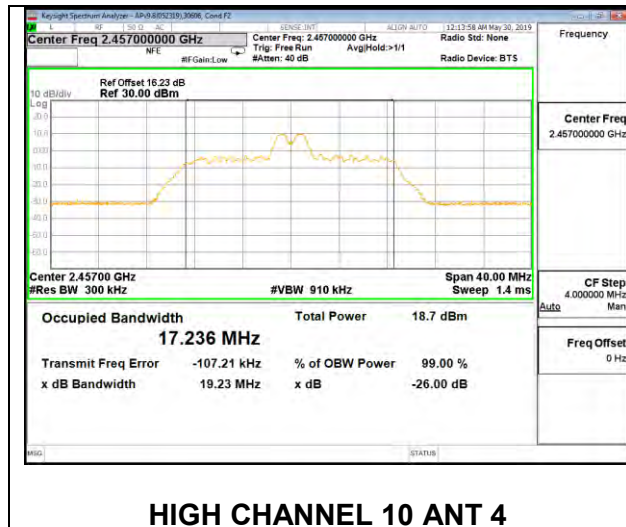
MID CHANNEL 6 ANT 3

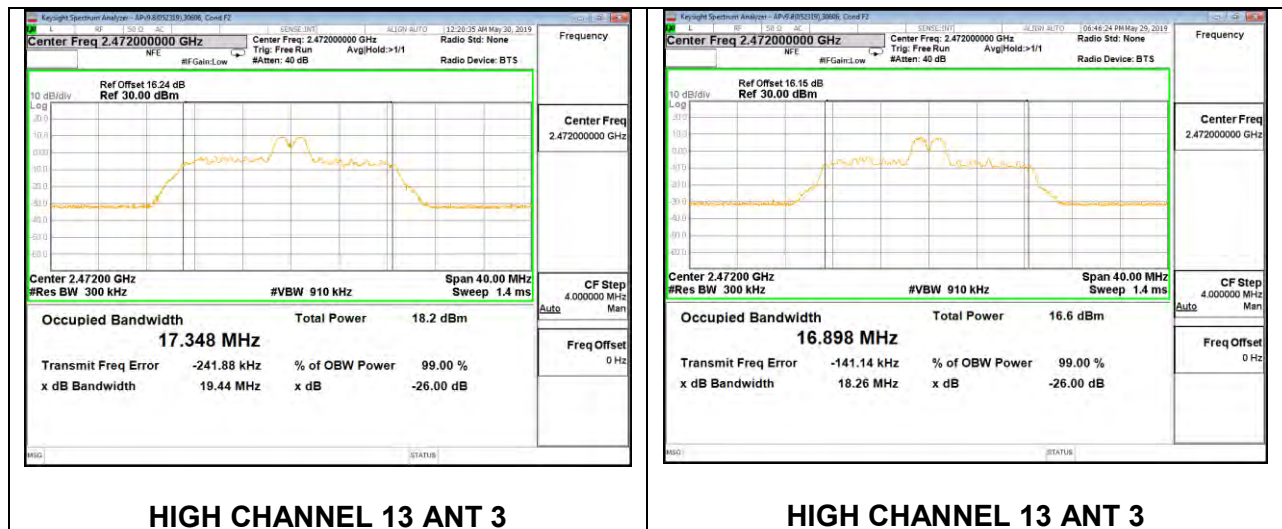


HIGH CHANNEL 9 ANT 4



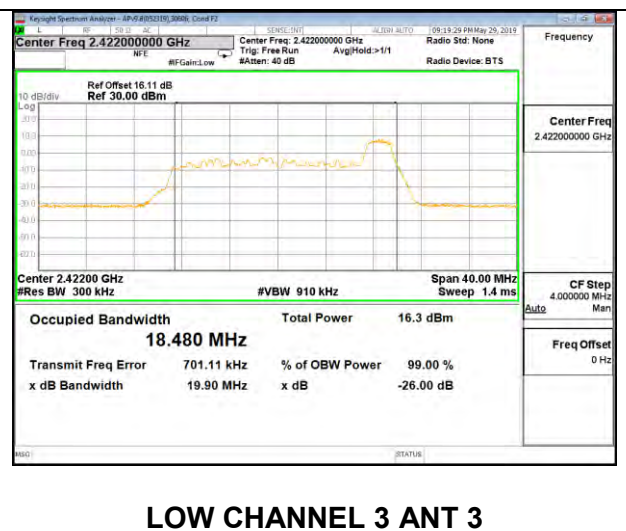
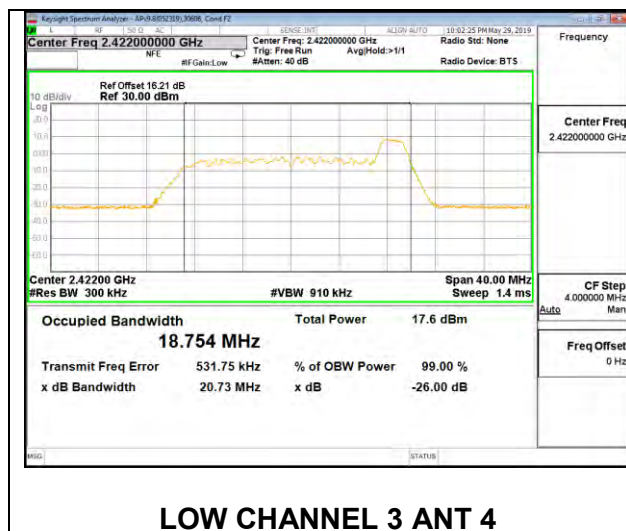
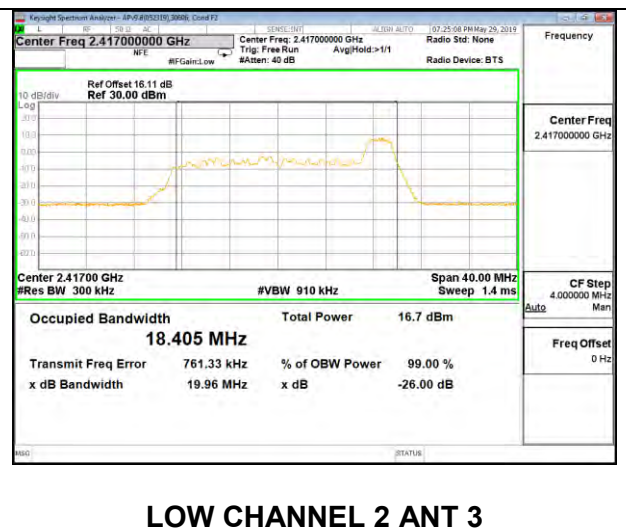
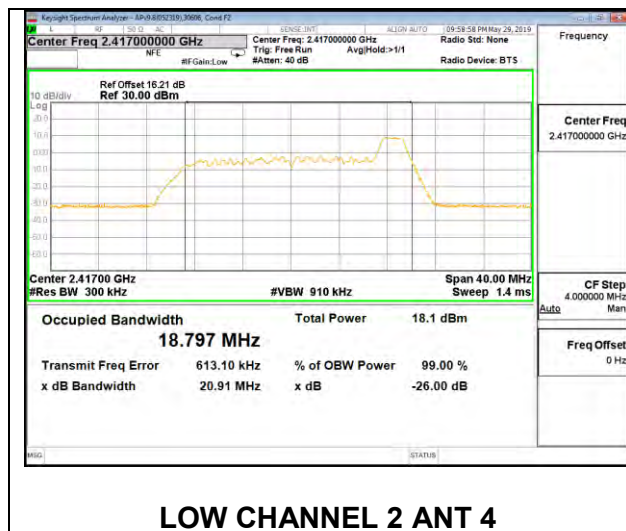
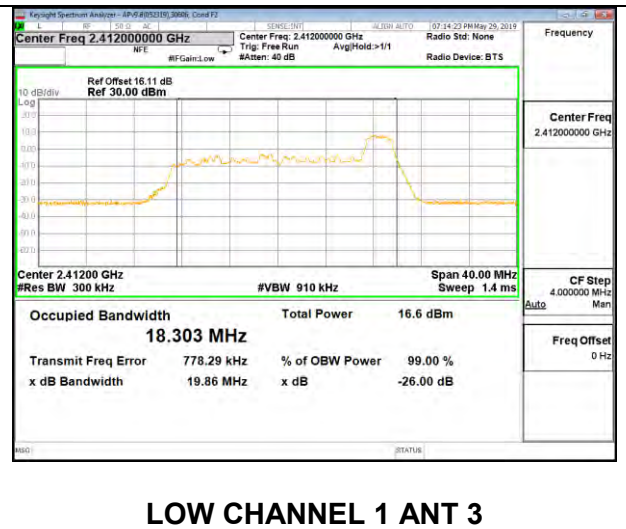
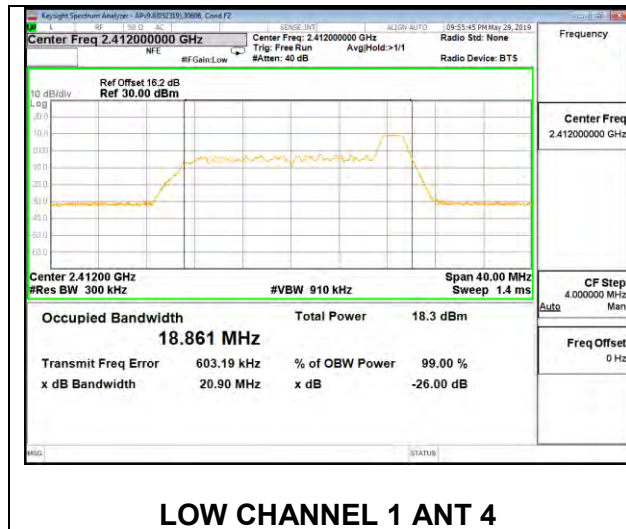
HIGH CHANNEL 9 ANT 3

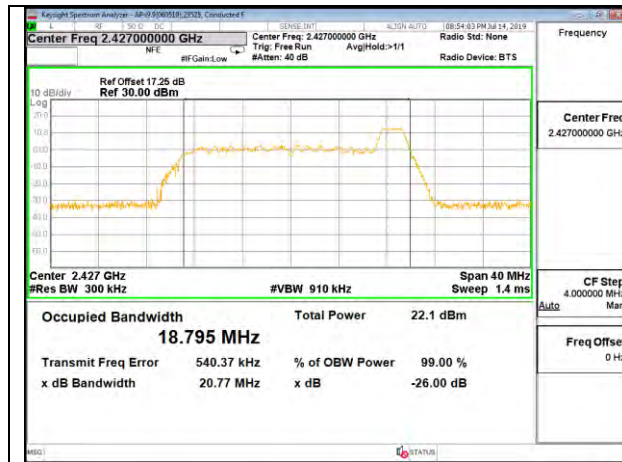




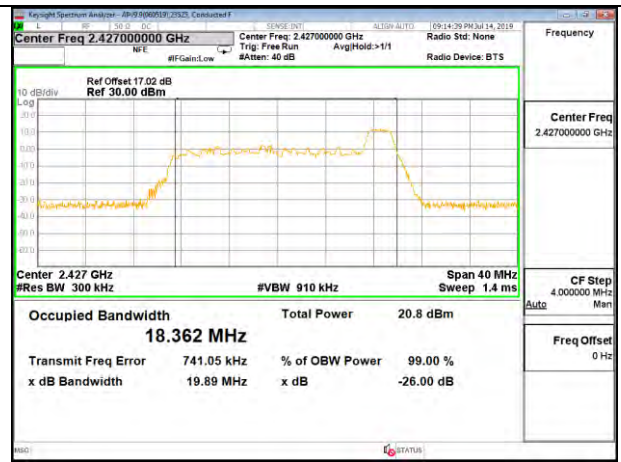
Antenna 4 + Antenna 3 2TX MODE: 26-Tones, RU Index 8

Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low 1	2412	18.8610	18.3030
Low 2	2417	18.7970	18.4050
Low 3	2422	18.7540	18.4800
Low 4	2427	18.7950	18.3620
Mid 6	2437	19.0160	18.5670
High 9	2452	18.7690	18.4130
High 10	2457	18.7900	18.4790
High 11	2462	18.8940	18.5770
High 12	2467	18.9530	18.6050
High 13	2472	19.0290	18.5920

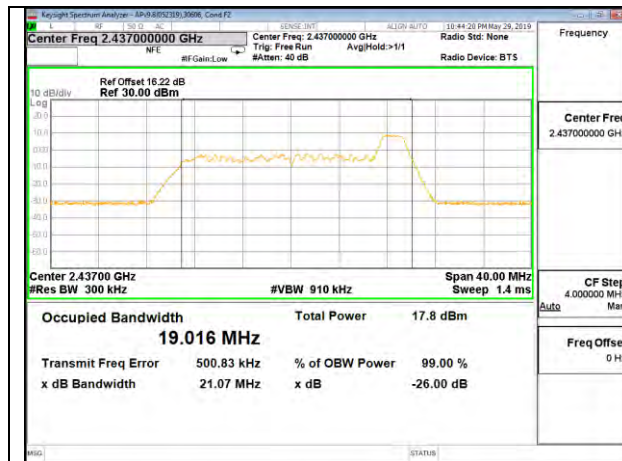




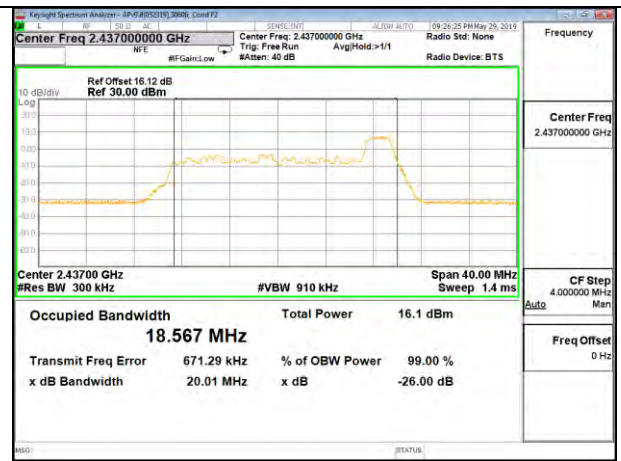
LOW CHANNEL 4 ANT 4



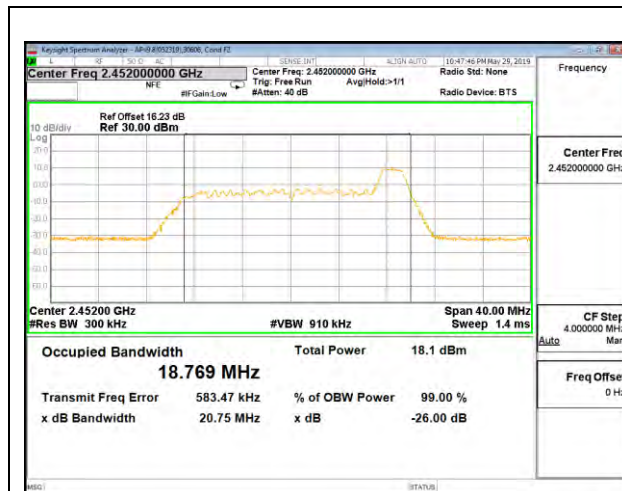
LOW CHANNEL 4 ANT 3



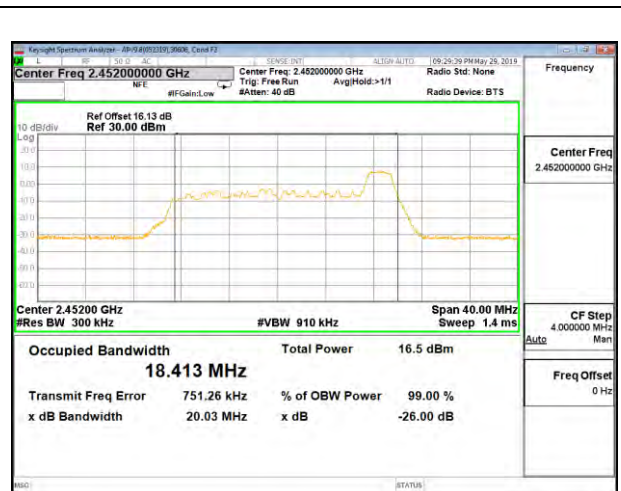
MID CHANNEL 6 ANT 4



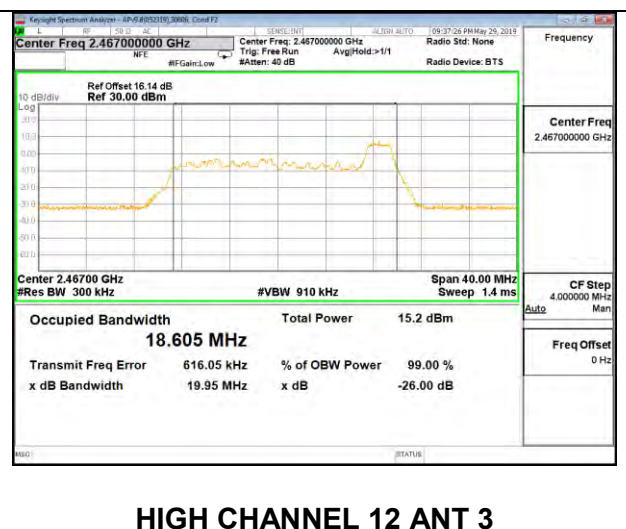
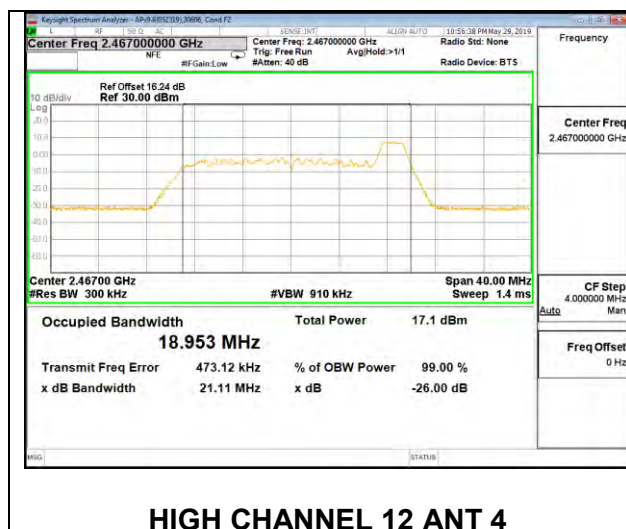
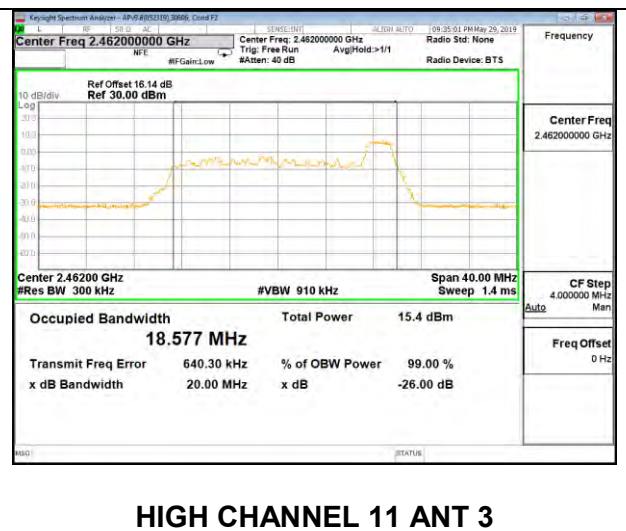
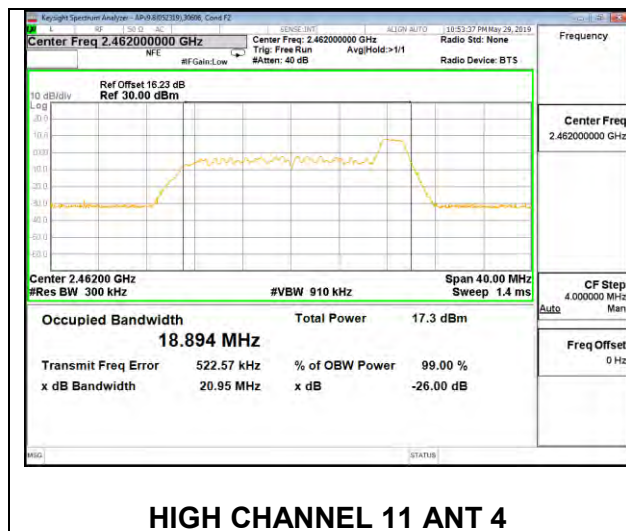
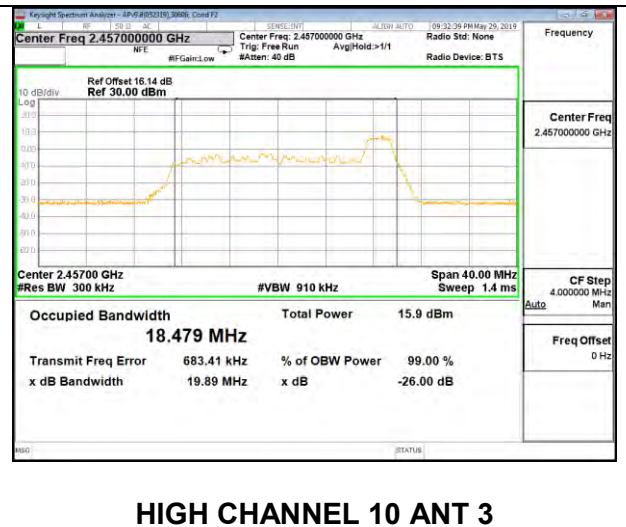
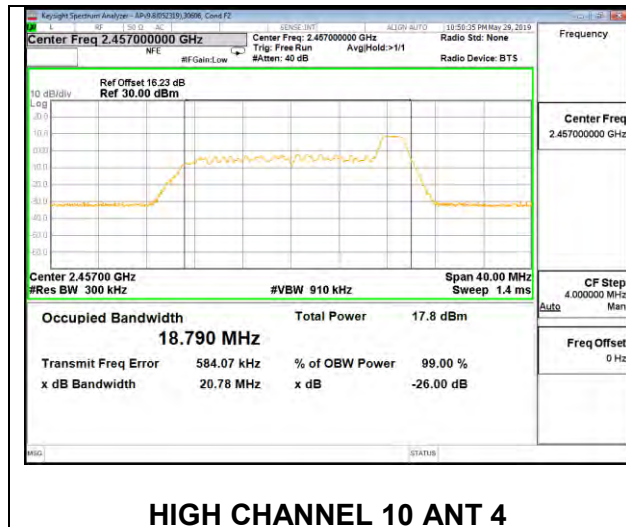
MID CHANNEL 6 ANT 3

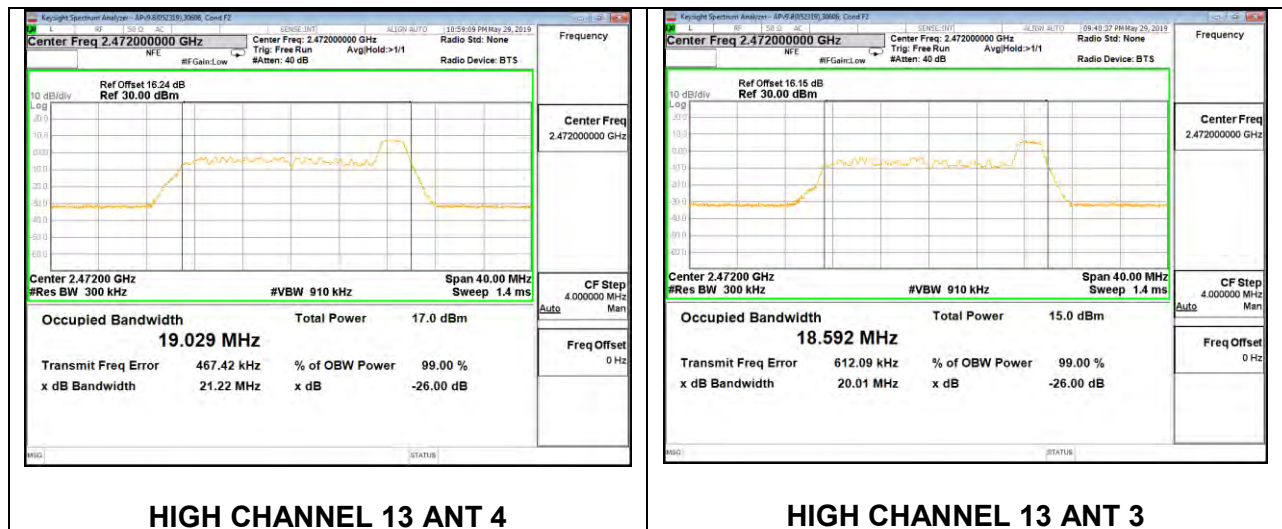


HIGH CHANNEL 9 ANT 4



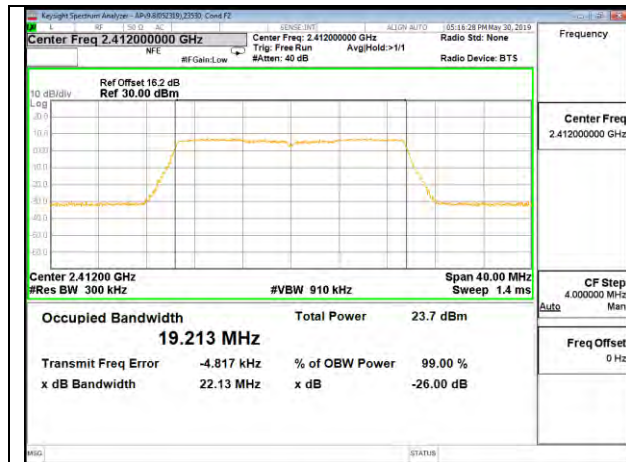
HIGH CHANNEL 9 ANT 3



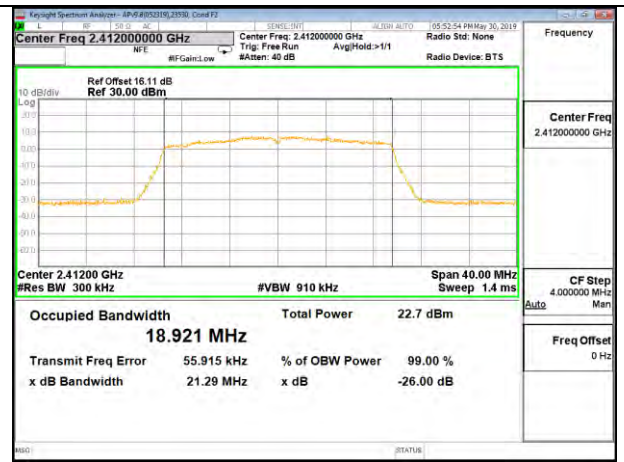


Antenna 4 + Antenna 3 2TX MODE: 242T-Tones, RU Index 61

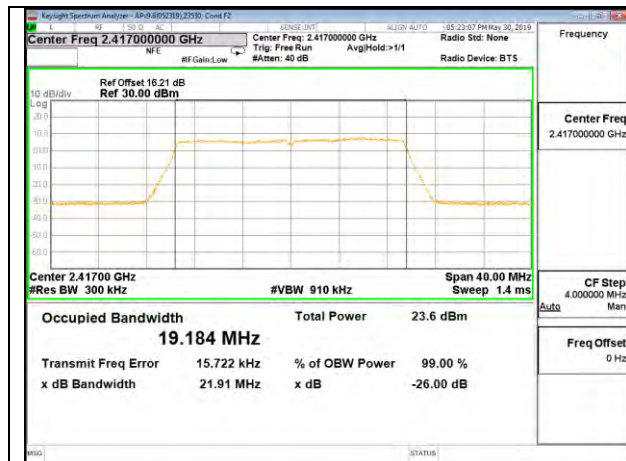
Channel	Frequency (MHz)	99% Bandwidth ANT 4 (MHz)	99% Bandwidth ANT 3 (MHz)
Low 1	2412	19.2130	18.9210
Low 2	2417	19.1840	18.9640
Low 3	2422	19.0050	18.9550
Low 4	2427	18.9300	18.9380
Mid 6	2437	19.2380	19.0690
High 9	2452	19.1970	19.0230
High 10	2457	19.1870	18.9650
High 11	2462	19.1030	18.9370
High 12	2467	19.0480	19.0040
High 13	2472	19.1090	18.9290



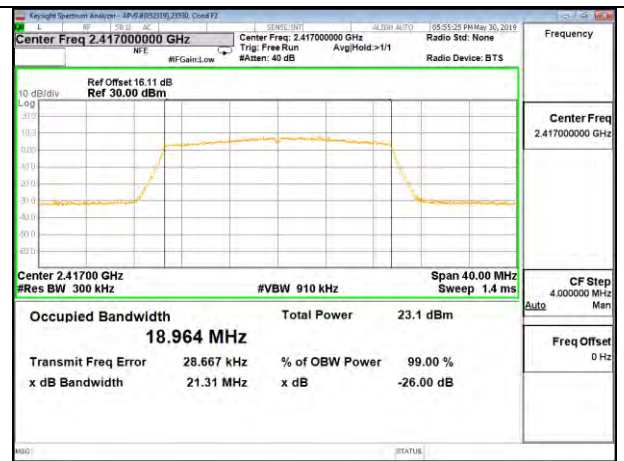
LOW CHANNEL 1 ANT 4



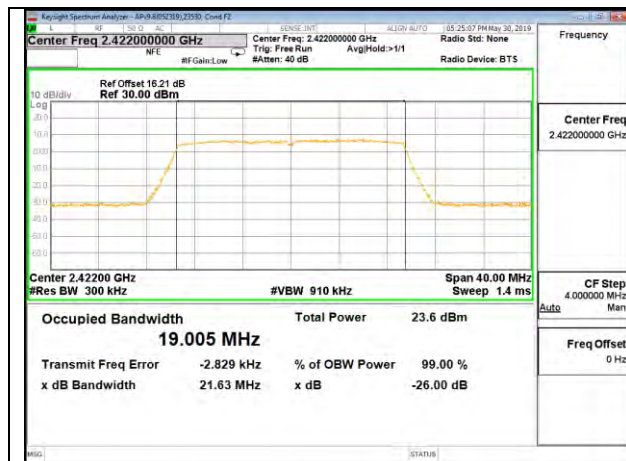
LOW CHANNEL 1 ANT 3



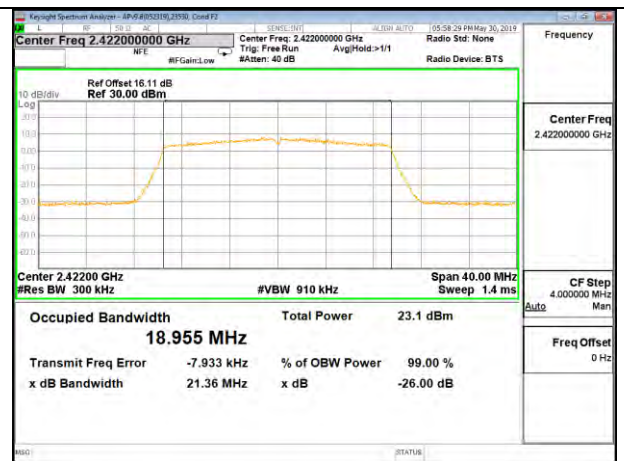
LOW CHANNEL 2 ANT 4



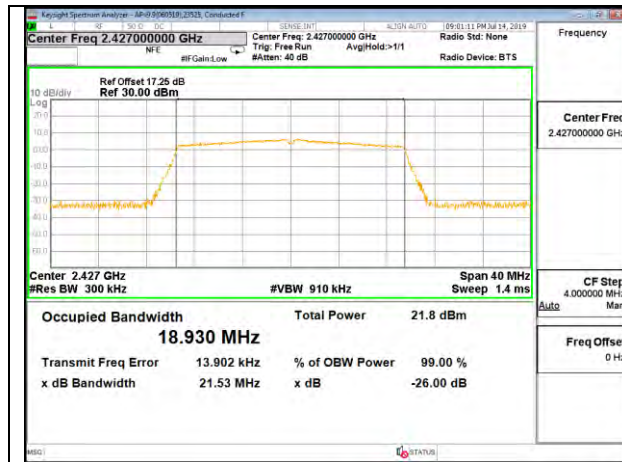
LOW CHANNEL 2 ANT 3



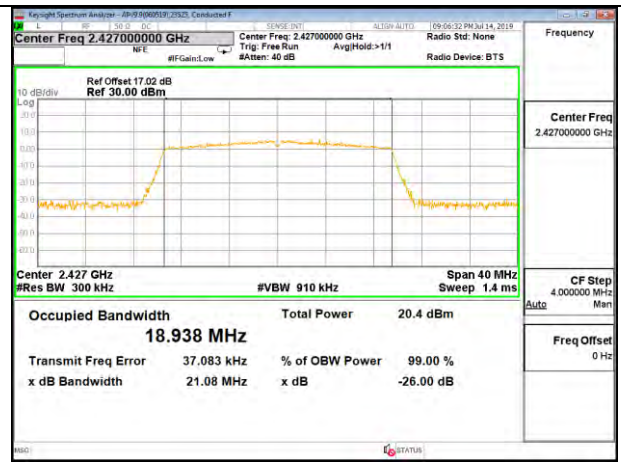
LOW CHANNEL 3 ANT 4



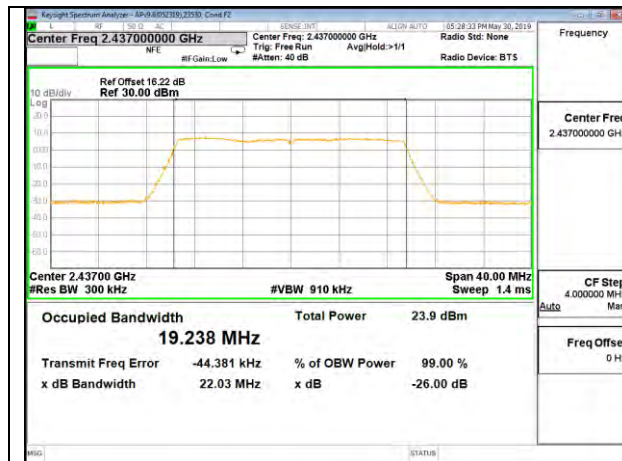
LOW CHANNEL 3 ANT 3



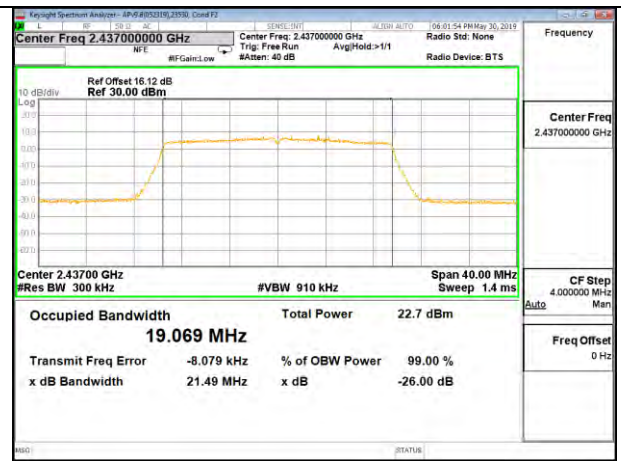
LOW CHANNEL 4 ANT 4



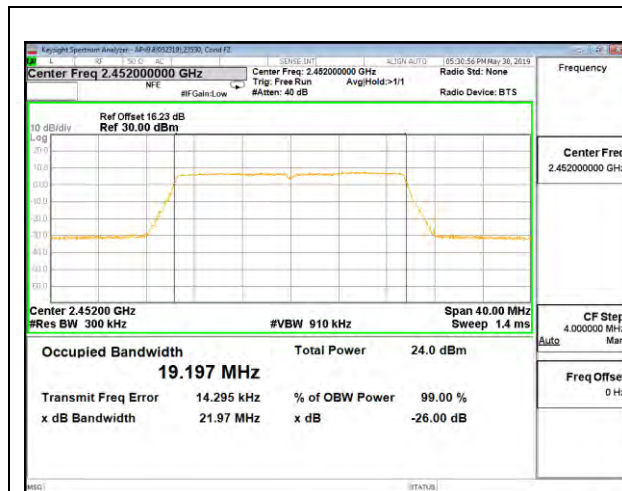
LOW CHANNEL 4 ANT 3



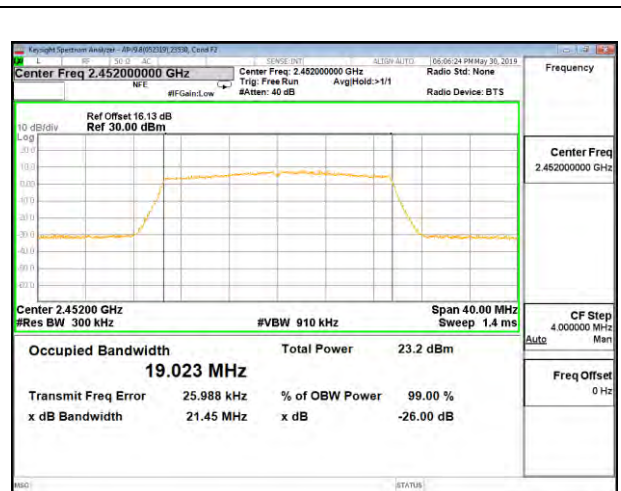
MID CHANNEL 6 ANT 4



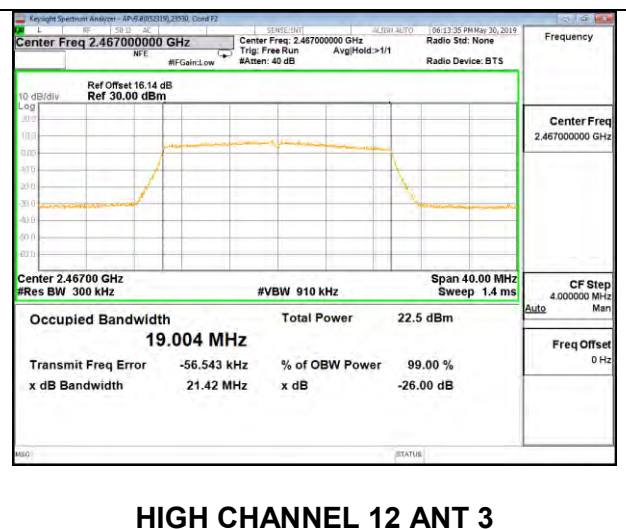
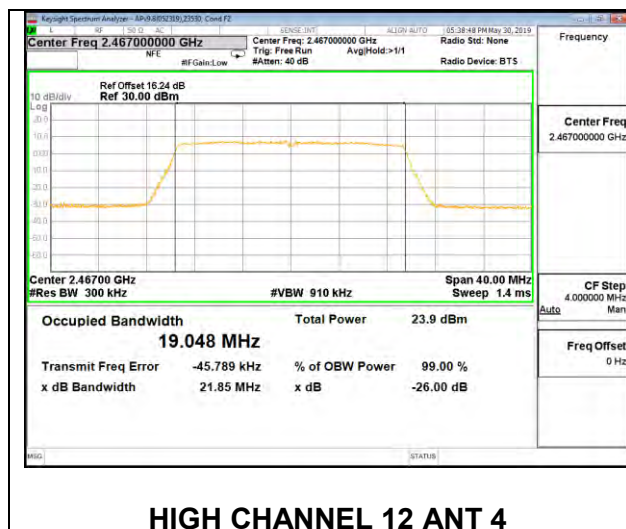
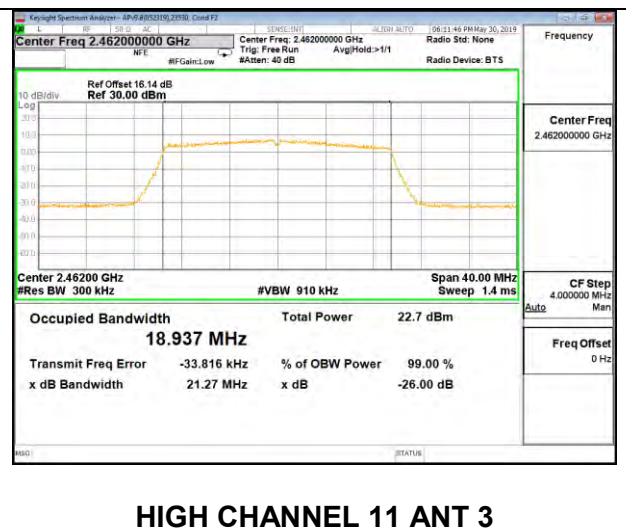
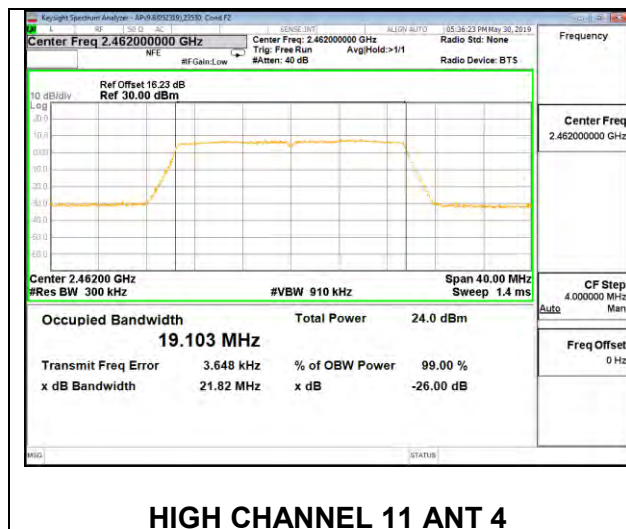
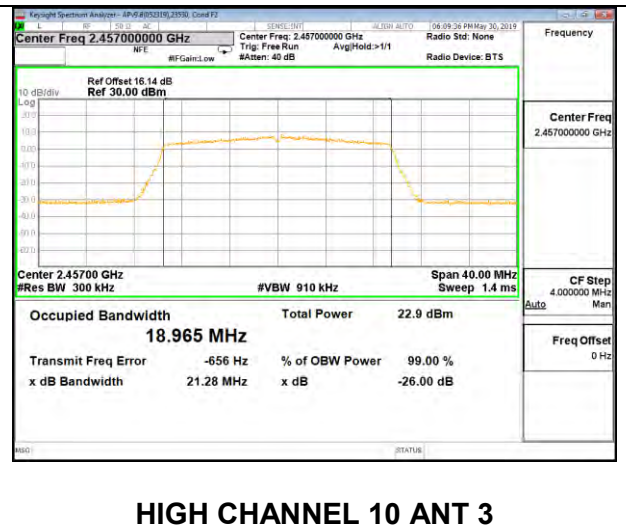
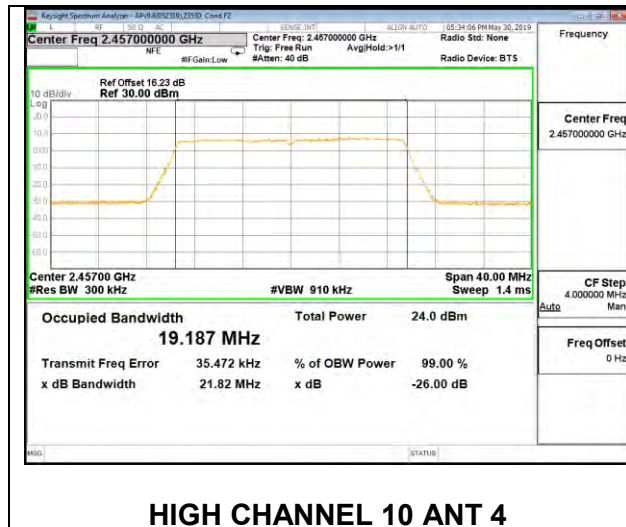
MID CHANNEL 6 ANT 3

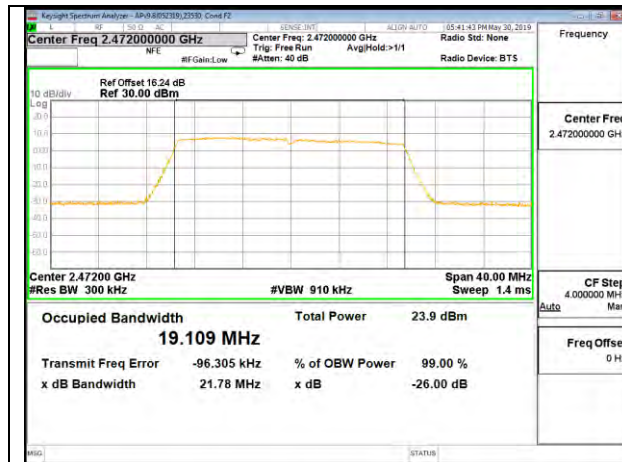


HIGH CHANNEL 9 ANT 4

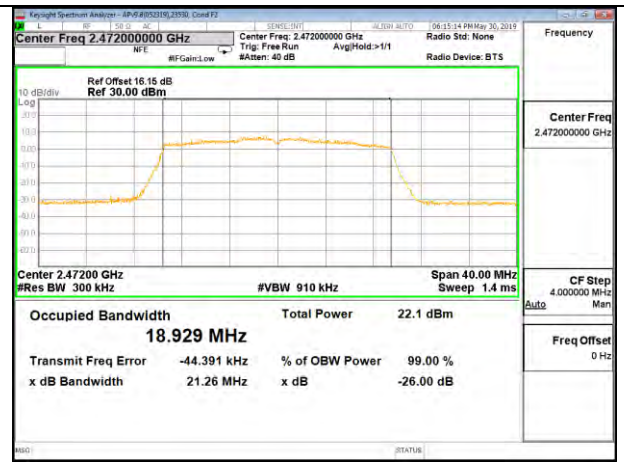


HIGH CHANNEL 9 ANT 3





HIGH CHANNEL 13 ANT 4



HIGH CHANNEL 13 ANT 3

8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

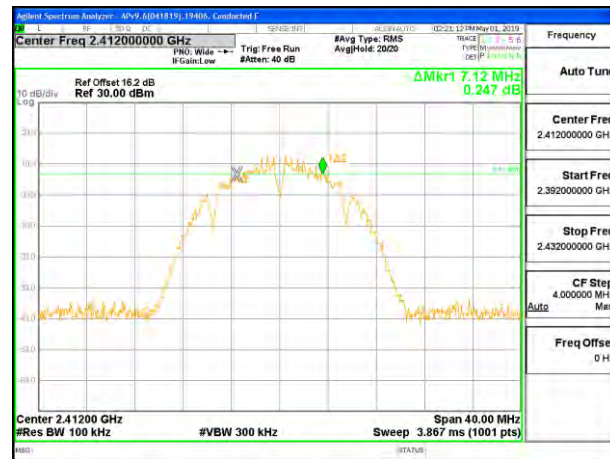
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

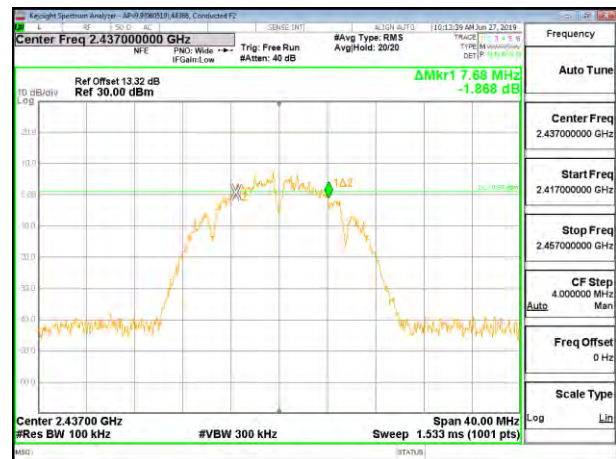
8.3.1. 802.11b MODE

1TX Antenna 4 MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	7.1200	0.5
Mid 6	2437	7.6800	0.5
High 11	2462	8.1200	0.5
High 12	2467	7.6000	0.5
High 13	2472	8.6000	0.5



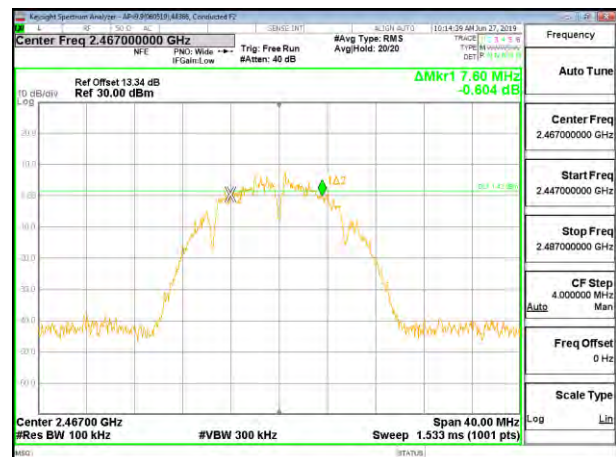
LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11



HIGH CHANNEL 12



HIGH CHANNEL 13

1TX Antenna 3 MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	8.6400	0.5
Mid 6	2437	7.6800	0.5
High 11	2462	8.6400	0.5
High 12	2467	7.7200	0.5
High 13	2472	7.6800	0.5