BEC INCORPORATED

CERTIFICATION APPLICATION TEST REPORT

TEST STANDARDS:
FCC Part 15 Subpart C Intentional Radiator

ARRIS Model Spectrum 210A
Set Top Box

REPORT BEC-1839-02

TEST DATES: 10/03/2017 – 11/02/2017

CUSTOMER:
ARRIS Group Incorporated
101 Tournament Drive
Horsham, PA 19044

PREPARED BY: _____
Steve Fanella**,** Test Engineer

REVIEWED and APPROVED BY: _____
Al Fanella**,** Test Director

ACCREDITED
Testing Cert #2957.01

TABLE OF CONTENTS

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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	11/02/2017
1	FCC ID was changed to reflect all Caps	11/08/2017	11/08/2017

1.0 Administrative Information

1.1 Project Details

Project Number	BEC-1893
Set Top Box Manufacturer	ARRIS Group Incorporated
Set Top Box Model Number	Spectrum 210A
Set Top Box Serial Number	CA1TBJLD723T
Set Top Box Sample Number	1839-04 (Modified With SMA Ports to the Antennas)
Set Top Box Serial Number	CA1TBJLD724T
Set Top Box Sample Number	1825-04 (Unmodified Antennas)
FCC ID	ACQ-SPECTRUM210
Antenna Manufacturer	GreenPeak Technologies
Antenna Model Number	GP712
Frequency of Operation	2400 - 2483.5 MHz
Test Laboratory Location	BEC Incorporated 970 East High Street Pottstown, PA 19464
Test Personnel	Paul Banker / Steve Fanella / JR Fanella
Test Performed For	ARRIS Group Incorporated 101 Tournament Drive Horsham, PA 19044
Customer Technical Contact	Tom Piacentino
Date Received	09/30/2017
Condition Received	Suitable for test
Sample Type	Production unit
EUT Classification	Cable Set Top Box with wireless capability supporting RF4CE
FCC Classification	DTS- Part 15 Digital Transmission System
Applicable FCC Rule Part	FCC Rules Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System

1.2 Preface

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures, and recorded data are generally described in this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

1.3 Test Result Summary Table

The ARRIS Model Spectrum 210A Set Top Box was tested and found to be compliant to the sections of the FCC Part 15 Subpart C standard listed below:

Report Section	FCC Part 15, Subpart C Intentional Radiators	Test Description	Result
4.1	15.207(b)	Conducted Emissions, Power Leads, 150 kHz to 30 MHz	**PASS**
4.2.3	15.209(a)	Spurious Radiated Emissions, 30 MHz to 1 GHz	**PASS**
4.2.4	15.209, 15.205	Spurious Radiated Emissions, 1 GHz to 25 GHz	**PASS**
4.3	15.247(a)(2)	6 dB Occupied Bandwidth	**PASS**
4.4	15.247(b)(3)	Maximum Peak Power Output	**PASS**
4.5	15.247(d)	Antenna Port, Conducted Spurious Emissions	**PASS**
4.6	15.247(e)	Antenna Port, Power Spectral Density	**PASS**
4.7	15.247(d)	Band Edge Measurement	**PASS**

1.4 Measurement Uncertainty

Measurement	Measurement Distance	Frequency Range	Measurement Limit	Expanded Uncertainty
Conducted Disturbance	N/A	150 kHz – 30 MHz	FCC Section 15.207	3.43
Radiated Disturbance	3 Meter	30 MHz – 1 GHz	FCC Section 15.209	4.41

No adjustments to measured data presented in this report are required because all values of uncertainty are less that the CISPR 16-4-2:2011 recommendations. These uncertainties have a coverage factor of $k = 2$, which yields approximately a 95% level of confidence for the near-normal distribution typical of most measurement results.

1.5 Condition of Received Sample

An evaluation of the EUT was conducted in order to verify test subject identity and condition and to ensure suitability for testing. No evidence of physical damage was noted. The test item condition was deemed acceptable for the performance of the requested test services.

1.6 Climatic Environment

Unless noted elsewhere in this report, the following were the ambient conditions in the laboratory during testing:

Temperature: 22 ° ± 5 °
Humidity: 50% ± 20%
Barometric Pressure: 1000mb ± 20%

1.7 Test Equipment

All test equipment is checked to manufacturer's specifications and, when applicable, have current N.I.S.T. traceable, ISO 9002 conforming certificates of calibration. Test equipment used for the tests described herein is listed in Appendix A.

2.0 Equipment Under Test

Unless otherwise noted in the individual test results sections, testing was performed on the EUT as follows.

2.1 EUT Description

The Spectrum product line includes the Spectrum 210A and Spectrum 210A. Both products are video home set tops with a wideband QAM tuner capable of up to 4 tunes. Video display capability is max 1080P60. Both products have fully compliant Docsis3.0 embedded cable modems. The Spectrum 210A is capable of pause/live TV with internal SD card. The Spectrum 210A is capable of up to 4 DVR recordings with included HDD. Both products have capsense menu keys with Bluetooth and RF4CE wireless technologies.

2.2 Receiver Classification

N/A

2.3 Product Category

FCC Part 15, Subpart C (Section 15.247)

2.4 Product Classification

RF4CE Intentional Radiator Testing Requirements for IR Signal Operation within the bands of 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz-Direct Sequence System

2.5 GreenPeak Technologies Model GP712 RF4CE Device Information

The GreenPeak Technologies GP712 System-on-Chip is an IEEE 802.15.4 communications controller for integration into a ZigBee node. It is compliant with the IEEE Standard 802.15.4, providing robust spread spectrum data communication with a secure encrypted data flow, and supports multiple ZigBee (RF4CE1,ZigBee PRO2, ZigBee IP3) and associated low power wireless (6LowPAN4, Thread5) protocol stacks in the host processor. The GP712 is able to listen simultaneously on three different channels with antenna diversity. The GP712‘s interference robustness and antenna diversity offer superior performance in a crowded wireless 2.4 GHz environment. In addition, the GP712 presents a Coexistence Interface to enable coexistence with other potentially interfering radios (Bluetooth, Wi-Fi) within the same host device. The GP712 provides a high-speed serial interface (SPI or UART) to the host processor. It supports stand-alone RF4CE Duty Cycling and packet filtering through Deep Packet Inspection when the host is asleep and has an extremely low standby power enabling total system power consumption of less than 1 mW while allowing reception of remote control commands. The GP712 is optimized for low cost while providing superior performance. Its radio characteristics reduce the product’s RF design complexity enabling low cost single layer applications using simple PCB antennas requiring no shielding and a minimum number of external components.

2.6 Test Configuration

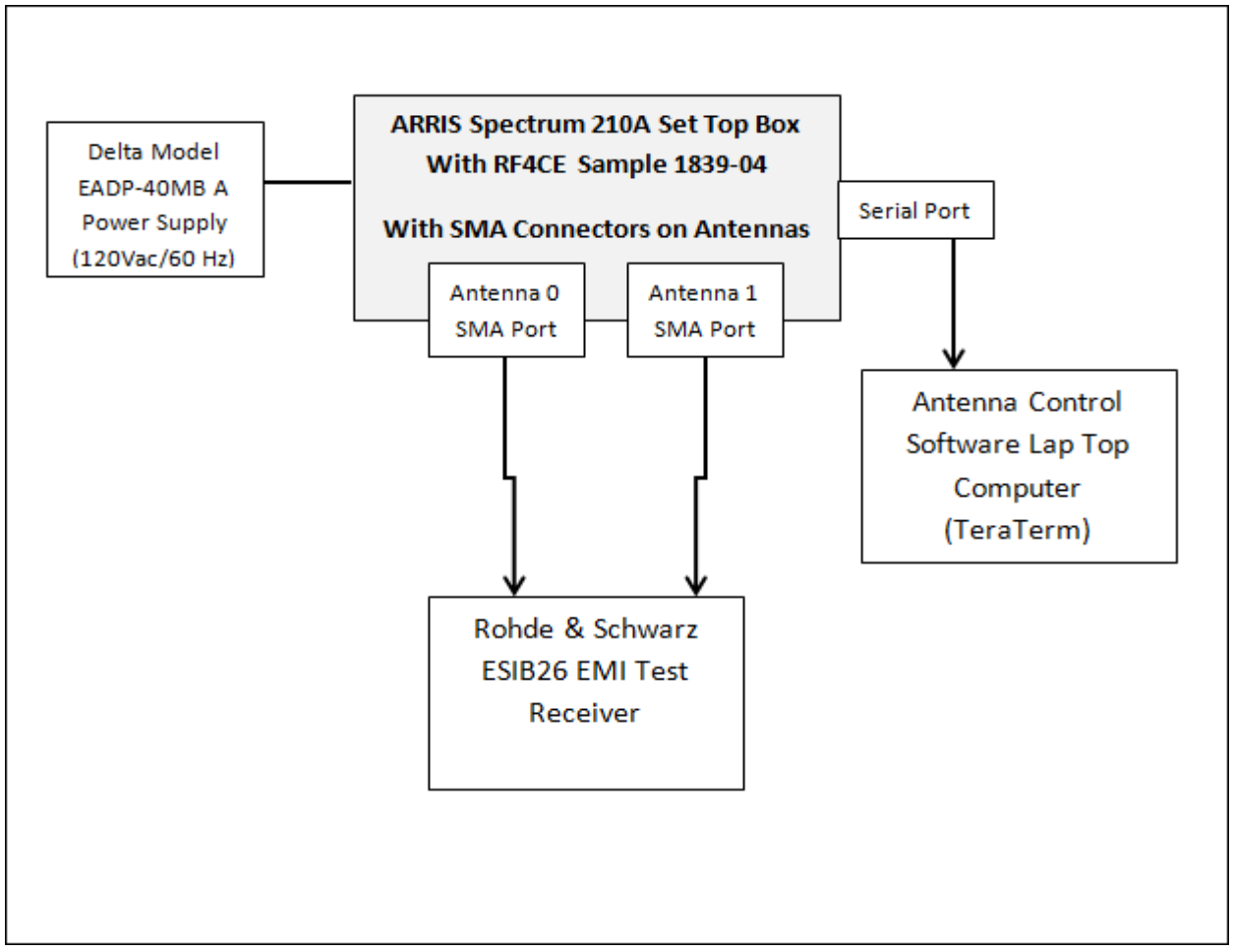
The antennas within the ARRIS Model Spectrum 210A Set Top Box were controlled by software which allowed the test technician to select the specific antenna within the EUT, designate the specific Channel Frequency, control the antenna power and control the antenna modulation (on/off).

2.7 Test Configuration Rationale

The tested configuration of the EUT was required so that the test technician could view the characteristics of the antenna at specific frequencies and allow the technician to record the required measurements.

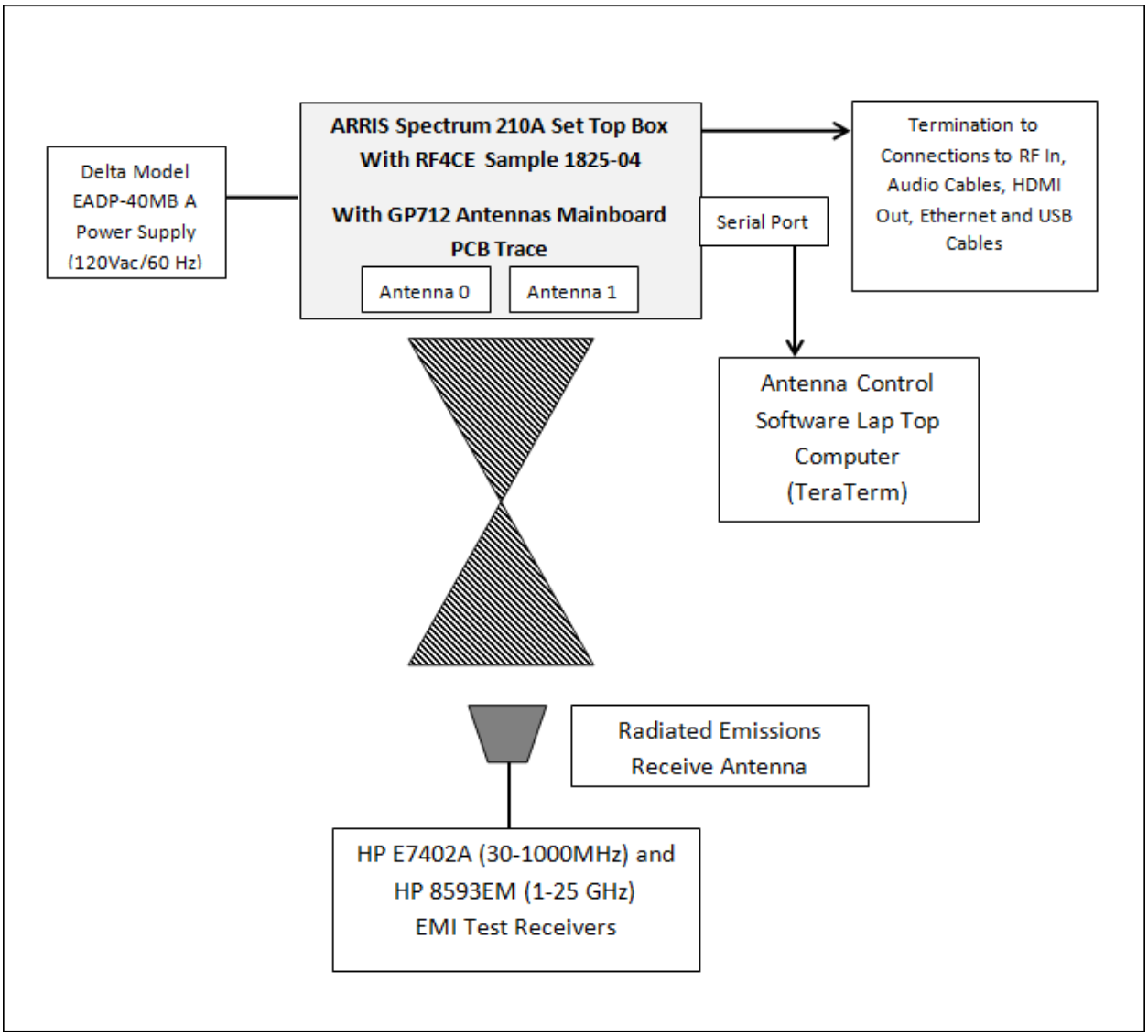
2.8 Test Configuration Diagram (Conducted Measurements)

A block diagram of the EUT configuration showing interconnection cables is illustrated below. The drawing shows the physical hardware layout used for the tests along with I/O cables and AC power distribution.



2.9 Test Configuration Diagram (Radiated Measurements)

A block diagram of the EUT configuration showing interconnection cables is illustrated below. The drawing shows the physical hardware layout used for the tests along with I/O cables and AC power distribution.



2.10 EUT Information, Interconnection Cabling and Support Equipment

EUT Hardware

Description	Manufacturer	Model	Serial Number	Sample Number
Set Top Box (Modified Antennas with SMA Connectors)	ARRIS	Spectrum 210A	CA1TBJLD723T	1839-04
Set Top Box (Unmodified Antennas)	ARRIS	Spectrum 210A	CA1TBJLD724T	1825-04

Interconnection Cable List (Conducted Test Setup)

Manufacturer	Model	Type	Shielding	Length	Description
Workhorse	WHU18-3636-036	High Frequency RF Cable 1 to 40 GHz	Double Braid	1 Meter	Measurement Cable from the Antenna SMA Connector to the Rohde and Schwarz ESIB26 Receiver. Asset # BEC-814

Interconnection Cable List (Radiated Test Setup)

Type	Mfr/Part#	Shielding	Length	Description
Audio	Acoustic Research/PR161	95% braid w/100% aluminum Mylar foil	6 Feet	Audio Out Ports
HDMI	Monoprice/HH-28F-04E	Double Copper Braid	4 Feet	HDMI Port (Emissions)
75-Ohm Coax	Belden-T 9114 Duobond	Double Braid	1 Meter	RF In and RF Out
Ethernet CAT5	Siemon Co. / MC5-8-T-07-20	Mylar foil	7 Feet	Ethernet Port
USB	Hannstar/E52534-D	Braid over foil	2 Meters	USB Port

Support Equipment

Description	Manufacturer	Model	Serial Number
AC/DC Power Convertor for Spectrum 210A Set Top Box	Delta	EADP-40MB A	DTDG0140300274151009036
Antenna Control Software Lap Top Computer	Dell	Latitude D830	CH-0HN338-48643-84F-0307

2.11 Test Signals and Test Modulation

By design this product does not have an external Modulation input connector, therefore, normal operating modulation was used for all testing reported herein. The only test where modulation was not active was during testing of the Maximum Peak Power Output FCC Section 15.247(b)(3) (Section 4.4 of this report) because the signal amplitude was higher without modulation applied when measuring.

The control unit in this product is a digital frequency transmitter. The EUT transmits to a discrete frequency on a specific channel. The RF4CE Device has 16 Channels available. The 16 Channels and frequencies that can be transmitted by the EUT are as follows:

Channel 11	2.405 GHz	Channel 19	2.445 GHz
Channel 12	2.410 GHz	Channel 20	2.450 GHz
Channel 13	2.415 GHz	Channel 21	2.455 GHz
Channel 14	2.420 GHz	Channel 22	2.460 GHz
Channel 15	2.425 GHz	Channel 23	2.465 GHz
Channel 16	2.430 GHz	Channel 24	2.470 GHz
Channel 17	2.435 GHz	Channel 25	2.475 GHz
Channel 18	2.440 GHz	Channel 26	2.480 GHz

For some of the required testing, the EUT was configured to transmit individually at low Channel 11 (2.405 GHz), middle Channel 19 (2.445 GHz) or high Channel 26 (2.480 GHz) during the measurement of the signal.

2.12 Grounding

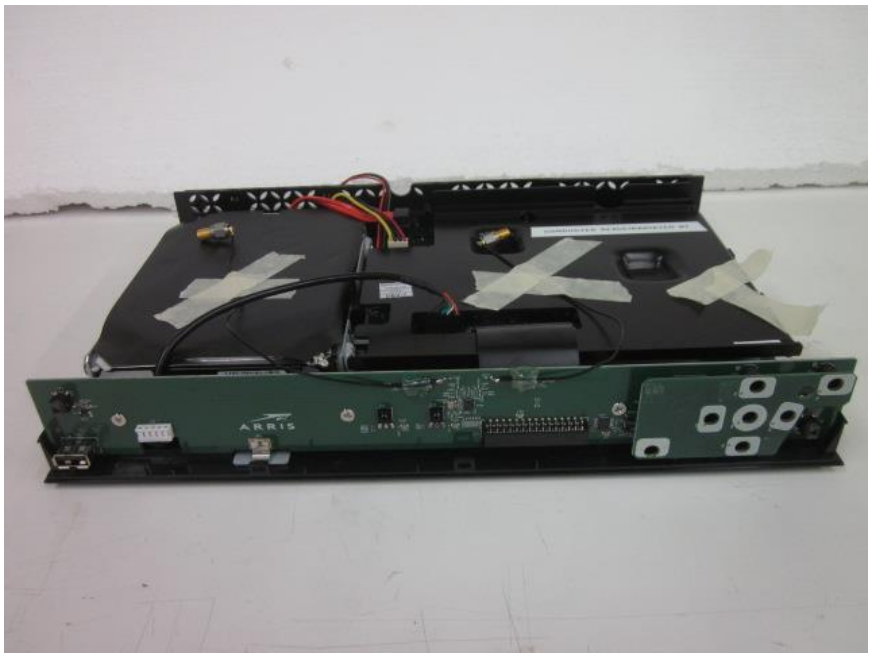
During all testing presented in this report, earth grounding of the test sample was accomplished through the AC mains input power cord to the EUT and through the return of the DC line to the Controller.

2.13 EUT Modifications

No modifications were made to the ARRIS Model Spectrum 210A Set Top Box.

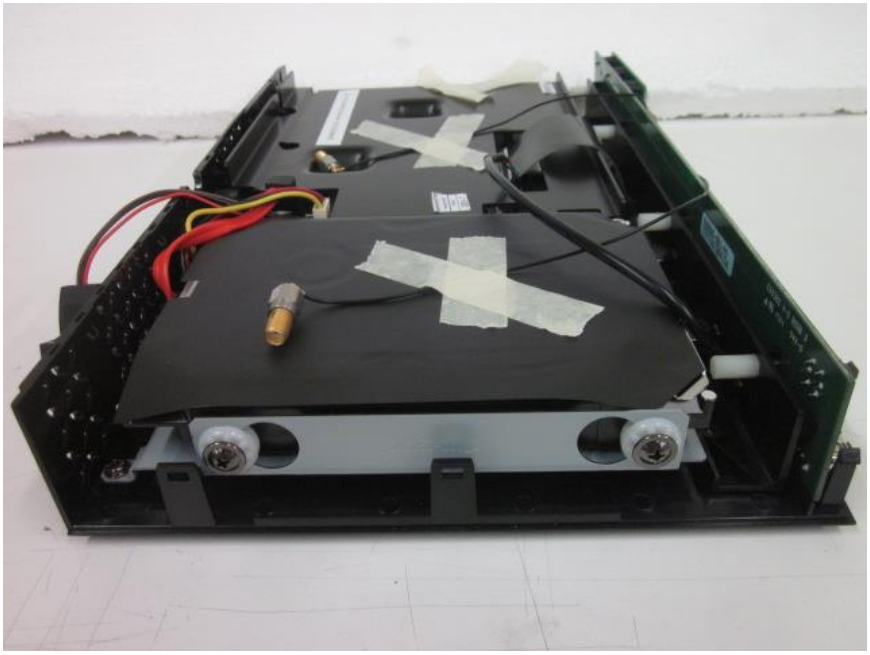
2.14 EUT Pictures ARRIS Model Spectrum 210A With RF4CE Antenna Connections Conducted Testing Sample 1839-04

ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 FRONT SIDE

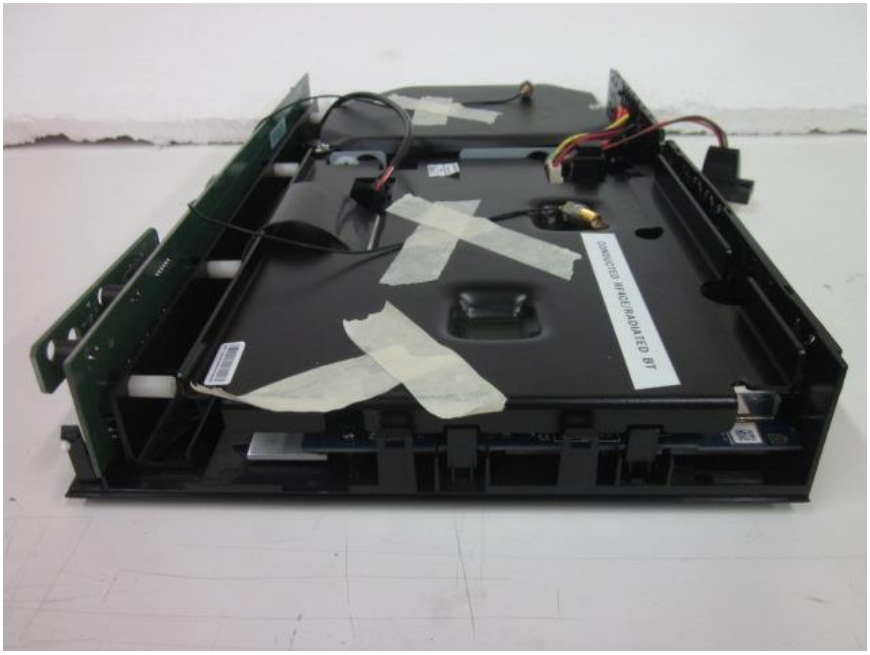


ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 REAR SIDE

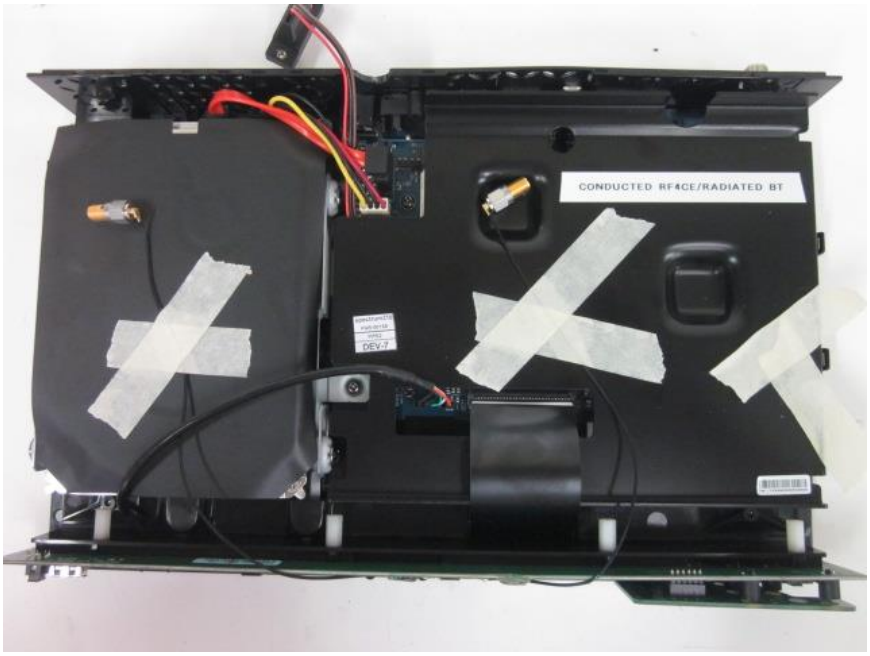
ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 LEFT SIDE



ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 RIGHT SIDE

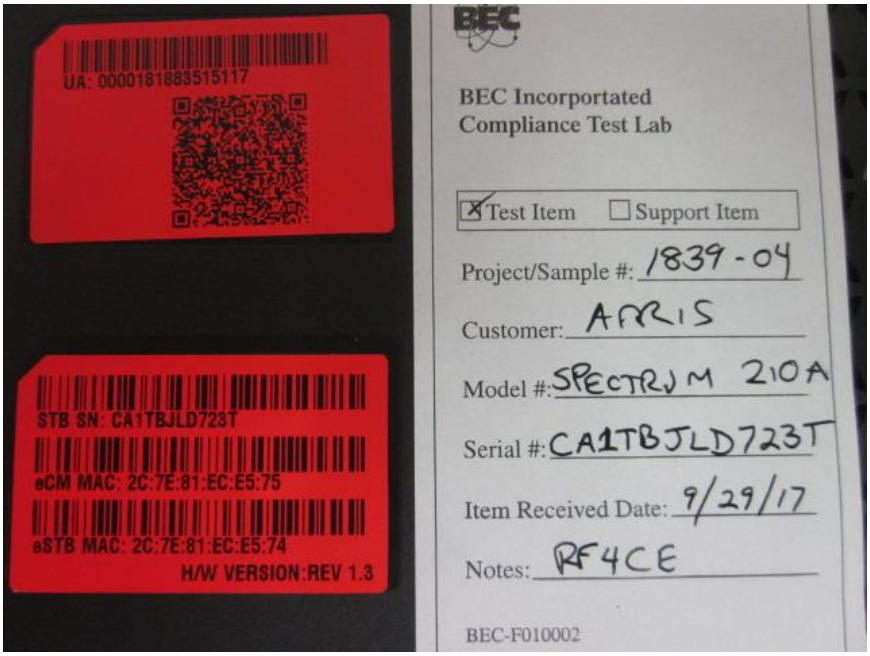


ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 TOP SIDE



ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 BOTTOM SIDE

ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1839-04 SAMPLE TAG



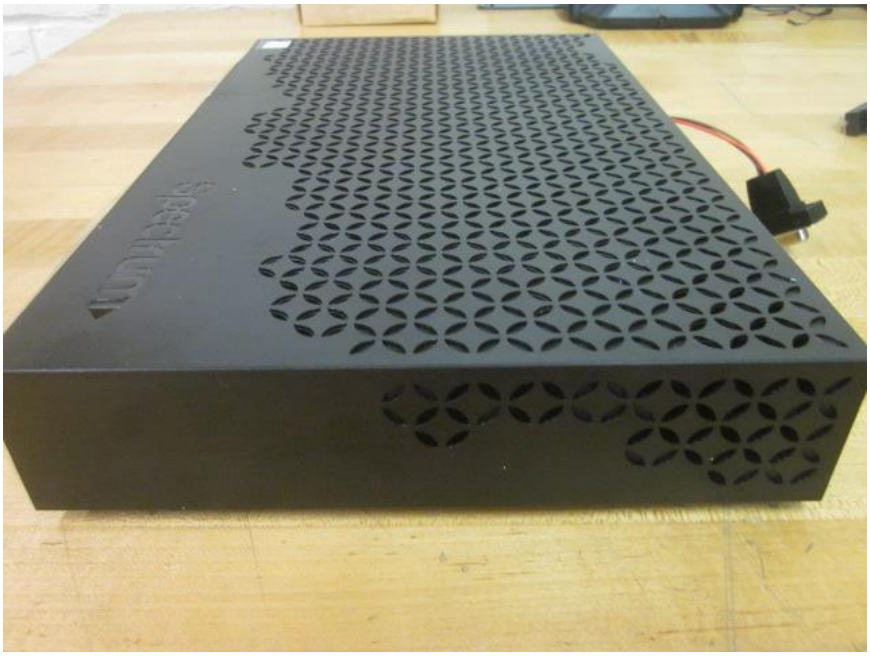
2.15 EUT Pictures ARRIS Model Spectrum 210A No Antenna Modifications Radiated Testing Sample 1825-04

ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1825-04 FRONT SIDE

ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1825-04 REAR SIDE

ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1825-04 LEFT SIDE

ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1825-04 RIGHT SIDE



ARRIS MODEL SPECTRUM 210A SET TOP BOX SAMPLE 1825-04 BOTTOM SIDE

3.0 Applicable Requirements, Methods, and Procedures

3.1 Applicable Requirements

The results of the measurement of the radio disturbance characteristics of the EUT described herein may be applied and where appropriate, provide a presumption of compliance to one or more of the following requirements or to other requirements at the discretion of the customer, regulatory agencies, or other entities.

3.1.1 FCC Requirements

USA

Code of Federal Regulations:

Title 47 – Telecommunication

Chapter I - Federal Communications Commission

Sub-chapter A – General

Part 15 – Radio Frequency Devices

Subpart C - Intentional Radiators

Subpart D - Unlicensed Personal Communications Service Devices

Subpart E - Unlicensed National Information Infrastructure Devices

3.1.2 Basic Test Methods and Test Procedures

ANSI C63.4: 2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

3.2 Deviations or Exclusions from the Requirements

No deviations or exclusions were made.

4.0 Test Results

4.1 Conducted Emissions Power Leads, 150 kHz to 30 MHz. FCC Section 15.207(b)

4.1.1 Conducted Emissions Test Procedure

AC Power Line

Conducted emissions at the power line input of the EUT were measured with an EMI receiver set to the appropriate detector and CISPR bandwidth, which was connected to the RF output of a 50 Ω, 50 µH Line Impedance Stabilization Network (LISN) installed in each power line. Measurements were made over the frequency range of 150 kHz to 30 MHz while the EUT was operating as described in the EUT section of this report. The significant amplitudes of emissions measured on the AC power lines of the EUT were recorded as follows:

Emission (dBµV) = Meter Reading (dBµv) + Cable Loss (dB) + LISN Factor (dB) + Limiter Loss (dB)

The EUT was tested with individual conducted emissions test runs with Antenna 0 set to Channel 11, Channel 19 and Channel 26. The EUT was then tested at the same three frequencies with Antenna 1 active. The Summary Results are listed in Section 4.1.2 with the worst case of Antenna 1 set to Channel 19 (2445 MHz) shown in Section 4.1.3.

4.1.2 Conducted Emissions Summary

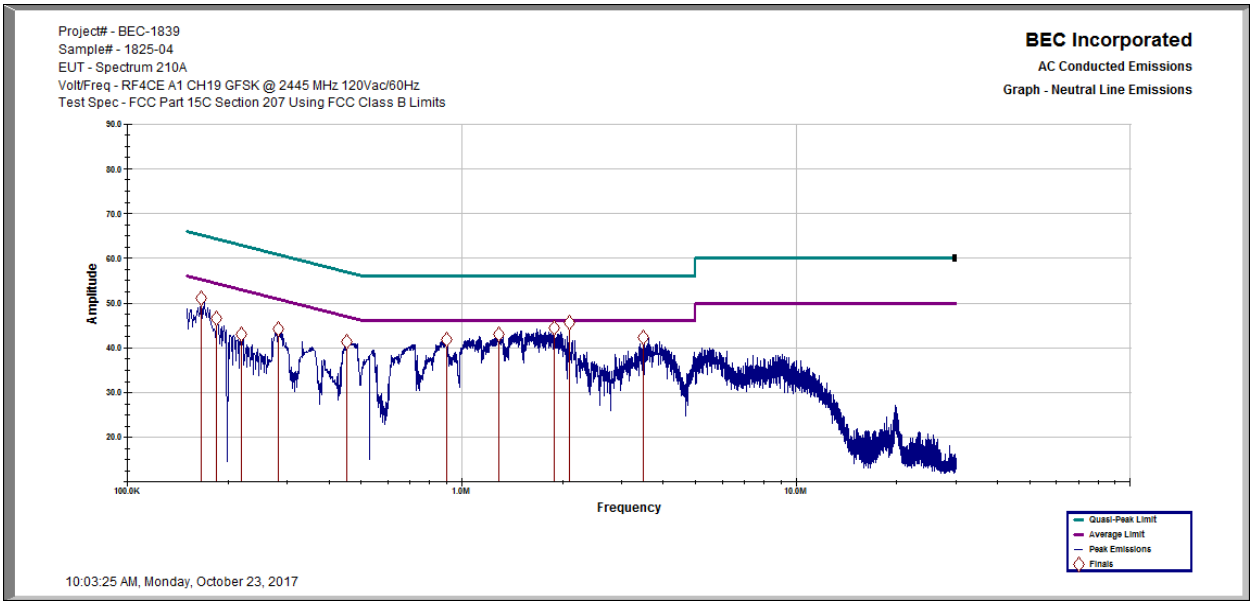
	Closest Average Margin	Closest QP Margin
Antenna 0 Channel 11 (2405 MHz)	-14.64	-15.71
Antenna 0 Channel 19 (2445 MHz)	-16.06	-15.61
Antenna 0 Channel 26 (2480 MHz)	-15.25	-15.56
Antenna 1 Channel 11 (2405 MHz)	-14.34	-15.63
Antenna 1 Channel 19 (2445 MHz)	-13.54	-15.58
Antenna 1 Channel 26 (2480 MHz)	-13.79	-15.61

4.1.3 Conducted Emissions Test Results ARRIS Spectrum 210A with Delta Model EADP-40MB A Power Supply (10/23/2017)

The following graphs and tables show the conducted emissions recorded on the AC power line of the EUT displayed against the FCC limits as outlined in Section 15.207(b). The Delta Model EADP-40MB A supply was powered at 120Vac/60 Hz.

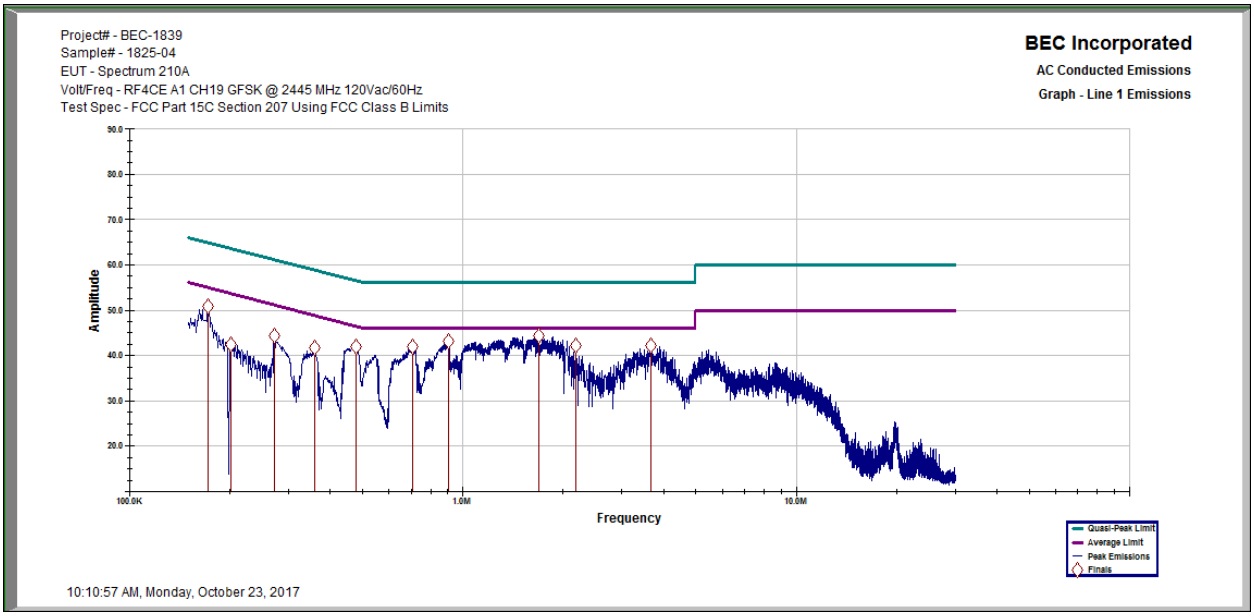
BEC Incorporated
Neutral Line Conducted Emissions
10:03:22 AM, Monday, October 23, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
165.954 KHz	40.75	55.54	-14.79	47.19	65.54	-18.35	10.030
183.980 KHz	27.23	55.03	-27.80	40.39	65.03	-24.64	10.030
219.215 KHz	20.87	54.02	-33.15	34.69	64.02	-29.33	10.030
282.803 KHz	34.28	52.21	-17.92	40.88	62.21	-21.33	10.030
450.859 KHz	30.76	47.40	-16.65	39.60	57.40	-17.80	10.130
898.590 KHz	27.79	46.00	-18.21	39.64	56.00	-16.36	10.240
1.289 MHz	26.15	46.00	-19.85	38.90	56.00	-17.10	10.240
1.904 MHz	28.11	46.00	-17.89	38.61	56.00	-17.39	10.250
2.079 MHz	27.67	46.00	-18.33	38.62	56.00	-17.38	10.258
3.493 MHz	29.65	46.00	-16.35	37.33	56.00	-18.67	10.360
Project# - BEC-1839							
Sample# - 1825-04							
EUT - Spectrum 210A							
Volt/Freq - RF4CE A1 CH19 GFSK @ 2445 MHz 120Vac/60Hz							
Test Spec - FCC Part 15C Section 207 Using FCC Class B Limits							



BEC Incorporated
Line 1 Conducted Emissions
10:10:54 AM, Monday, October 23, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
170.686 KHz	41.872	55.409	-13.537	46.849	65.409	-18.560	10.049
203.016 KHz	9.340	54.485	-45.145	35.350	64.485	-29.135	10.040
270.032 KHz	23.450	52.571	-29.121	38.680	62.571	-23.891	10.040
359.262 KHz	24.760	50.021	-25.261	39.130	60.021	-20.891	10.140
469.976 KHz	27.132	46.858	-19.725	40.270	56.858	-16.588	10.150
710.160 KHz	25.705	46.000	-20.295	39.190	56.000	-16.810	10.160
896.640 KHz	29.055	46.000	-16.945	40.420	56.000	-15.580	10.250
1.680 MHz	28.130	46.000	-17.870	39.640	56.000	-16.360	10.260
2.201 MHz	25.785	46.000	-20.215	37.170	56.000	-18.830	10.290
3.677 MHz	30.778	46.000	-15.222	38.240	56.000	-17.760	10.380
Project# - BEC-1839							
Sample# - 1825-04							
EUT - Spectrum 210A							
Volt/Freq - RF4CE A1 CH19 GFSK @ 2445 MHz 120Vac/60Hz							
Test Spec - FCC Part 15C Section 207 Using FCC Class B Limits							



Results: All conducted emissions measured on the ARRIS Model Spectrum 210A Set Top Box AC power port with the Delta Model EADP-40MB A supply are below the limits specified in FCC Section 15.207 by a margin of at least 13.54 dB.

4.2 Spurious Radiated Emissions, 30 MHz to 25 GHz. FCC Section 15.209

4.2.1 Test Facility

OATS

The Open Area Test Site (OATS) is an all-weather facility with a wooden enclosure that contains a ground level 4-foot diameter turntable capable of rotating equipment 360 degrees. The enclosure is free of reflective metallic objects and extraneous electromagnetic signals. This non-metallic enclosure and the 3 and 10 meter test range existing outside the enclosure rest upon a protective insulating material, which in turn covers a flat, metal, continuous ground plane.

Instrumentation for remote control of the antenna mast, turntable, and other equipment are controlled by personnel indoors. The EUT and support peripherals required for EUT operation were placed on a table 80 cm high for tabletop equipment or directly on the turntable surface for floor standing equipment.

The test site complies with the attenuation measurements specified in ANSI C63.4 and CISPR 22.

SR#1

The Semi-Anechoic Shielded Room (SR#1) is an ferrite and absorber lined chamber which houses a 5-foot diameter turntable capable of rotating equipment 360 degrees and antenna mast for Horizontal and Vertical polarity measurements. The enclosure is free of reflective metallic objects and extraneous electromagnetic signals. This 3 meter shielded enclosure has a raised computer floor with metal tile bottoms providing a continuous ground plane.

Instrumentation for remote control of the antenna mast, turntable, and other equipment are controlled by personnel outside the chamber. The EUT and support peripherals required for EUT operation were placed on a table 80 cm high for tabletop equipment or directly on the turntable surface for floor standing equipment.

The test site complies with the attenuation measurements specified in ANSI C63.4 and CISPR 22.

4.2.2 Spurious Radiated Emissions Test Procedure

Radiated Emissions 30 MHz – 40 GHz
The EMI receiver was set to quasi-peak mode for frequencies from 30MHz to 1GHz and the appropriate CISPR bandwidths were employed. The receiver was set to average mode for frequencies above 1GHz with the appropriate CISPR bandwidths were employed. Significant emissions found during the preliminary scans were maximized by rotating the turntable and varying the antenna height. Both horizontal and vertical antenna polarities were also investigated for suspect emissions. The signals are maximized and measured using the in house generated RADE or off the shelf TILE software. The support equipment and test item(s) were powered off in turn to determine the source of the emissions where appropriate.

Field strengths were calculated as follows:

Field Strength (dBµV/m) = Meter Reading (dBµV) + Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier Gain (dB)

Because the intentional radiator has a pulse modulated amplitude signal, a "duty cycle correction factor" must be taken against the Peak Measurement of the harmonic spurious emissions when calculating the final field strengths against the required limits. The duty cycle correction factor for the GreenPeak GP712 is 20 dB (maximum allowed by the FCC).

Section 15.35 (c) mentions: "Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds."

The maximum duty cycle of the RF4CE set top box is gated by the remote control. The maximum repeat rate of a RF4CE remote control, while continuously pressing a key, is 1 packet per 100 ms, so the set top box can confirm every 100 ms a packet with an ACK. The duration of an ACK is ~0.5 ms.

The duration of a ACK is 0.5 ms, the interval time is 100 ms. This means that the correction factor for the average spurious emission field strength is:
$20 * \log_{10}(0.5 / 100) = -46$ dB. FCC limits the max duty cycle correction factor to 20 dB.

4.2.3 Spurious Radiated Emissions 30 MHz to 1000 MHz Test Results (10/20/2017, 10/23/2017 and 10/24/2017)

The following tables shows the highest amplitude average detected field strengths as recorded from the EUT. These measurements were performed over the frequency range of 30 MHz to 1000 MHz at a distance of 3 meters to satisfy FCC Section 15.209 requirements. Spurious emissions from the Antenna 0 and Antenna 1 were measured when individually set to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with modulation. Graphs for all individual runs are available upon request.

Settings: Antenna 0, Channel 11 (2.405 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
250.009	43.98	43.96	H	3	143	-13.3	46.02	-2.06	PASS
375.001	45.75	45.05	H	7	110	-10	46.02	-0.97	PASS
728.979	42.39	42.98	H	172	114	-4.57	46.02	-3.04	PASS
762.67	39.51	38.84	H	142	109	-3.93	46.02	-7.18	PASS
780.026	41.03	38.01	H	144	108	-3.96	46.02	-8.01	PASS
970.391	47.97	38.37	H	39	112	-1.09	53.98	-15.61	PASS

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
80.995	30.88	32.73	V	286	185	-18.86	40	-7.27	PASS
161.998	39.29	40.66	V	215	122	-13.69	43.52	-2.86	PASS
189.002	31.94	33.97	V	192	126	-14.25	43.52	-9.55	PASS
899.777	40.31	39.27	V	201	105	-1.95	46.02	-6.75	PASS
970.406	49.43	47.98	V	157	106	-1.09	53.98	-6	PASS
974.73	48.16	46.93	V	169	106	-0.98	53.98	-7.05	PASS

Settings: Antenna 0, Channel 19 (2.445 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
249.981	43.51	43.12	H	207	159	-13.3	46.02	-2.9	PASS
374.989	40.85	40.72	H	351	106	-9.99	46.02	-5.3	PASS
728.986	41.97	40.81	H	163	111	-4.57	46.02	-5.21	PASS
748.928	36.56	36.21	H	212	188	-4.38	46.02	-9.81	PASS
792.58	34.97	33.51	H	216	107	-3.53	46.02	-12.51	PASS
970.731	42.01	37.68	H	303	108	-1.08	53.98	-16.3	PASS

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
161.98	36.74	35.06	V	196	108	-13.68	43.52	-8.46	PASS
188.987	28.51	29.57	V	210	108	-14.25	43.52	-13.95	PASS
522.56	38.22	36.16	V	219	108	-7.36	46.02	-9.86	PASS
757.647	30.89	30.18	V	195	109	-3.95	46.02	-15.84	PASS
899.744	36.88	34.55	V	175	110	-1.95	46.02	-11.47	PASS
970.388	42.3	40.46	V	171	104	-1.09	53.98	-13.52	PASS

Settings: Antenna 0, Channel 26 (2.480 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
374.979	38.56	39.05	H	350	115	-9.99	46.02	-6.97	PASS
728.989	39.99	39.43	H	152	107	-4.57	46.02	-6.59	PASS
748.176	36.17	33.64	H	253	107	-4.39	46.02	-12.38	PASS
760.801	35.1	34	H	216	118	-3.94	46.02	-12.02	PASS
786.751	34.32	31.64	H	217	196	-3.74	46.02	-14.38	PASS
974.38	41.42	37.13	H	34	109	-0.99	53.98	-16.85	PASS

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
134.991	30.02	31.94	V	49	143	-12.8	43.52	-11.58	PASS
149.995	27.88	27.47	V	238	122	-13.38	43.52	-16.05	PASS
161.978	35.11	34.43	V	193	106	-13.68	43.52	-9.09	PASS
522.552	37.92	35.76	V	218	107	-7.36	46.02	-10.26	PASS
746.475	34.36	32.56	V	32	108	-4.4	46.02	-13.46	PASS
974.727	42.05	40.09	V	171	170	-0.98	53.98	-13.89	PASS

Settings: Antenna 1, Channel 11 (2.405 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
249.994	41.54	40.96	H	163	115	-13.3	46.02	-5.06	PASS
374.981	37.76	41	H	356	110	-9.99	46.02	-5.02	PASS
728.984	40.07	39.8	H	150	104	-4.57	46.02	-6.22	PASS
746.768	37.67	36.84	H	229	106	-4.4	46.02	-9.18	PASS
837.23	35.26	33.89	H	228	179	-2.58	46.02	-12.13	PASS
970.401	41.12	39.45	H	303	105	-1.09	53.98	-14.53	PASS

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
80.97	30.04	29.62	V	274	105	-18.86	40	-10.38	PASS
161.965	35.94	36.3	V	198	110	-13.68	43.52	-7.22	PASS
188.98	33.21	34.24	V	181	104	-14.25	43.52	-9.28	PASS
249.976	37.61	36.85	V	163	108	-13.3	46.02	-9.17	PASS
899.692	40.95	38.86	V	178	112	-1.95	46.02	-7.16	PASS
974.677	43.55	41.33	V	305	114	-0.98	53.98	-12.65	PASS

Settings: Antenna 1, Channel 19 (2.445 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
148.488	31.9	30.98	H	52	116	-13.3	43.52	-12.54	PASS
374.969	37.33	40.85	H	355	109	-9.99	46.02	-5.17	PASS
728.981	40.85	39.33	H	147	110	-4.57	46.02	-6.69	PASS
763.085	33.9	32.68	H	145	107	-3.92	46.02	-13.34	PASS
780.061	36.18	34.29	H	133	112	-3.96	46.02	-11.73	PASS
970.359	44.31	40.52	H	42	114	-1.09	53.98	-13.46	PASS

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
135.004	36.79	35.95	V	17	194	-12.8	43.52	-7.57	PASS
148.473	33.21	32.45	V	124	111	-13.3	43.52	-11.07	PASS
161.99	35.72	35.25	V	221	114	-13.69	43.52	-8.27	PASS
899.749	36.52	34.68	V	166	105	-1.95	46.02	-11.34	PASS
960.03	26.91	24.72	V	215	109	-1.31	53.98	-29.26	PASS
970.416	44.07	42	V	167	104	-1.09	53.98	-11.98	PASS

Settings: Antenna 1, Channel 26 (2.480 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
134.981	40.05	38.69	H	137	115	-12.8	43.52	-4.83	PASS
374.964	43.46	41.07	H	355	106	-9.99	46.02	-4.95	PASS
710.954	27.98	26.41	H	237	128	-4.77	46.02	-19.61	PASS
728.964	41.14	39.49	H	149	105	-4.57	46.02	-6.53	PASS
822.739	35.01	33.31	H	203	179	-2.79	46.02	-12.71	PASS
970.388	40.85	38.8	H	32	107	-1.09	53.98	-15.18	PASS

Frequency	Peak	QP	Polarity	Turntable	Antenna Height	Correction Factors	FCCB Limit	Margin	Results
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	PASS/FAIL
134.986	42.94	42.09	V	17	219	-12.8	43.52	-1.43	PASS
161.99	36.23	35.86	V	202	109	-13.69	43.52	-7.66	PASS
899.722	37.46	35.15	V	175	104	-1.95	46.02	-10.87	PASS
959.992	30.05	25.57	V	332	141	-1.31	46.02	-20.45	PASS
970.396	43.3	41.06	V	157	107	-1.09	53.98	-12.92	PASS
974.707	42.13	40.21	V	175	107	-0.98	53.98	-13.77	PASS

Results: All harmonic spurious radiated emissions as recorded at a distance of 3 meters from the ARRIS Model Spectrum 210A Set Top Box are below the 3 meter limit specified by FCC Section 15.209 requirements by a margin of at least 0.97 dB.

4.2.4 Spurious Radiated Emissions 1GHz to 25 GHz Test Results (10/30/2017)

The following tables shows the highest amplitude average detected field strengths as recorded from the EUT. These measurements were performed over the frequency range of 1.0 GHz to 25 GHz at a distance of 3 meters to satisfy FCC Section 15.209 requirements. Spurious emissions from the Antenna 0 and Antenna 1 were measured when individually set to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with modulation. Graphs for all individual runs are available upon request.

Settings: Antenna 0, Channel 11 (2.405 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak Limit	Peak Margin	
4421290000	43.25	29.76	H	178	149.1	1.08	53.98	-24.216	73.98	-30.726	PASS
4499620000	53.61	32.7	H	179	142.6	1.1	53.98	-21.28	73.98	-20.37	PASS
4810810000	55.32	29.4	H	43	208.3	2.28	53.98	-24.579	73.98	-18.659	PASS

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak Limit	Peak Margin	
4498100000	49.35	32.34	V	280	118	1.1	53.98	-21.635	73.98	-24.63	PASS
4808950000	55.13	29.37	V	339	99	2.27	53.98	-24.614	73.98	-18.846	PASS

Settings: Antenna 0, Channel 19 (2.445 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak Limit	Peak Margin	
2444710000	30.98	25.26	H	322	205.3	-5.32	53.98	-28.724	73.98	-43.001	PASS
3968690000	44.16	30.58	H	209	145.6	0.9	53.98	-23.4	73.98	-29.82	PASS
4119440000	41.5	29.21	H	206	155.8	1.02	53.98	-24.769	73.98	-32.476	PASS
4272920000	43.14	29.36	H	175	102.7	1.05	53.98	-24.623	73.98	-30.835	PASS
4499440000	51	31.8	H	181	143.9	1.1	53.98	-22.178	73.98	-22.98	PASS
4888920000	59.42	31.5	H	316	109.6	2.58	53.98	-22.482	73.98	-14.562	PASS
7336540000	59.39	32.01	H	15	175.2	5.38	53.98	-21.966	73.98	-14.593	PASS

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak Limit	Peak Margin	
2445480000	31.64	25.07	V	314	104	-5.32	53.98	-28.906	73.98	-42.338	PASS
3560810000	41.49	28.34	V	206	99	-0.41	53.98	-25.643	73.98	-32.485	PASS
4497980000	49.26	32.27	V	213	100	1.1	53.98	-21.713	73.98	-24.72	PASS
4888940000	54.92	28.43	V	350	144	2.58	53.98	-25.547	73.98	-19.062	PASS
7333400000	56.18	28.58	V	301	139	5.37	53.98	-25.398	73.98	-17.803	PASS

Settings: Antenna 0, Channel 26 (2.480 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak Limit	Peak Margin	
2480400000	37.51	31.07	H	317	101.4	-5.18	53.98	-22.908	73.98	-36.468	PASS
4274480000	44.34	29.59	H	216	112.7	1.05	53.98	-24.385	73.98	-29.635	PASS
4499610000	51.49	31.77	H	176	111.4	1.1	53.98	-22.205	73.98	-22.49	PASS
4958940000	53.05	24.63	H	49	212	2.84	53.98	-29.349	73.98	-20.926	PASS
7438270000	60.75	33.4	H	18	149	5.7	53.98	-20.575	73.98	-13.228	PASS

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak Limit	Peak Margin	
2479460000	37.35	32	V	295	101	-5.18	53.98	-21.985	73.98	-36.632	PASS
3591070000	38.15	28.75	V	173	209	-0.31	53.98	-25.229	73.98	-35.829	PASS
4494380000	50.13	32.43	V	214	115	1.1	53.98	-21.551	73.98	-23.851	PASS
4960960000	54.07	27.84	V	332	100	2.85	53.98	-26.143	73.98	-19.908	PASS
7438430000	54.59	26.39	V	228	100	5.7	53.98	-27.59	73.98	-19.387	PASS

Settings: Antenna 1, Channel 11 (2.405 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak	Peak	
3948320000	37.48	28.79	H	211	100.2	0.83	53.98	-25.188	73.98	-36.495	PASS
4274560000	44.35	29.78	H	212	140.2	1.05	53.98	-24.2	73.98	-29.625	PASS
4499570000	50.49	31.82	H	193	99.8	1.1	53.98	-22.158	73.98	-23.49	PASS
4808870000	55.09	27.23	H	316	210.2	2.27	53.98	-26.749	73.98	-18.886	PASS

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak	Peak	
3965200000	43.82	29.98	V	12	132	0.89	53.98	-23.996	73.98	-30.161	PASS
4478100000	50.44	31.94	V	280	99	1.1	53.98	-22.042	73.98	-23.544	PASS
4808920000	52.18	25.59	V	226	100	2.27	53.98	-28.394	73.98	-21.796	PASS

Settings: Antenna 1, Channel 19 (2.445 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Limit	Margin	
3967310000	44.69	30.55	H	209	101.5	0.9	53.98	-23.432	73.98	-29.295	PASS
4274530000	44.7	29.41	H	213	141.7	1.05	53.98	-24.568	73.98	-29.275	PASS
4494380000	50.36	32.88	H	177	158.4	1.1	53.98	-21.096	73.98	-23.621	PASS
4888990000	55.8	29.9	H	315	202.1	2.58	53.98	-24.082	73.98	-18.182	PASS

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Peak	Peak	
3957480000	42.99	29.66	V	12	124	0.86	53.98	-24.321	73.98	-30.986	PASS
4492840000	49.74	32.37	V	281	118	1.1	53.98	-21.606	73.98	-24.241	PASS
4888970000	55.22	29.36	V	308	135	2.58	53.98	-24.617	73.98	-18.762	PASS

Settings: Antenna 1, Channel 26 (2.480 GHz Fundamental) Maximum Output with Modulation

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Limit	Margin	
2480420000	33.12	25.79	H	44	100.9	-5.18	53.98	-28.193	73.98	-40.858	PASS
3982340000	38.78	29.03	H	203	153.4	0.94	53.98	-24.947	73.98	-35.197	PASS
4265430000	42.22	29.26	H	180	120.2	1.05	53.98	-24.722	73.98	-31.757	PASS
4499580000	51.9	32.16	H	192	101.4	1.1	53.98	-21.82	73.98	-22.08	PASS
4960920000	58.19	31.64	H	316	205.4	2.85	53.98	-22.336	73.98	-15.788	PASS
7438380000	55.76	27.58	H	155	144	5.7	53.98	-26.397	73.98	-18.217	PASS

Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	FCC Part 15C	FCC Part 15C	FCC Part 15C	FCC Part 15C	Results
Hz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	Avg Limit	Avg Margin	Limit	Margin	
2480510000	34.31	30.19	V	63	168	-5.18	53.98	-23.788	73.98	-39.668	PASS
3972790000	45.19	31.11	V	15	136	0.91	53.98	-22.872	73.98	-28.787	PASS
4479750000	48.8	32	V	215	114	1.1	53.98	-21.982	73.98	-25.184	PASS
4960760000	55.89	30.59	V	293	167	2.85	53.98	-23.394	73.98	-18.089	PASS

Results: All harmonic spurious radiated emissions as recorded at a distance of 3 meters from the ARRIS Model Spectrum 210A Set Top Box are below the 3 meter limit specified by FCC Section 15.209 requirements by a margin of at least 14.5 dB.

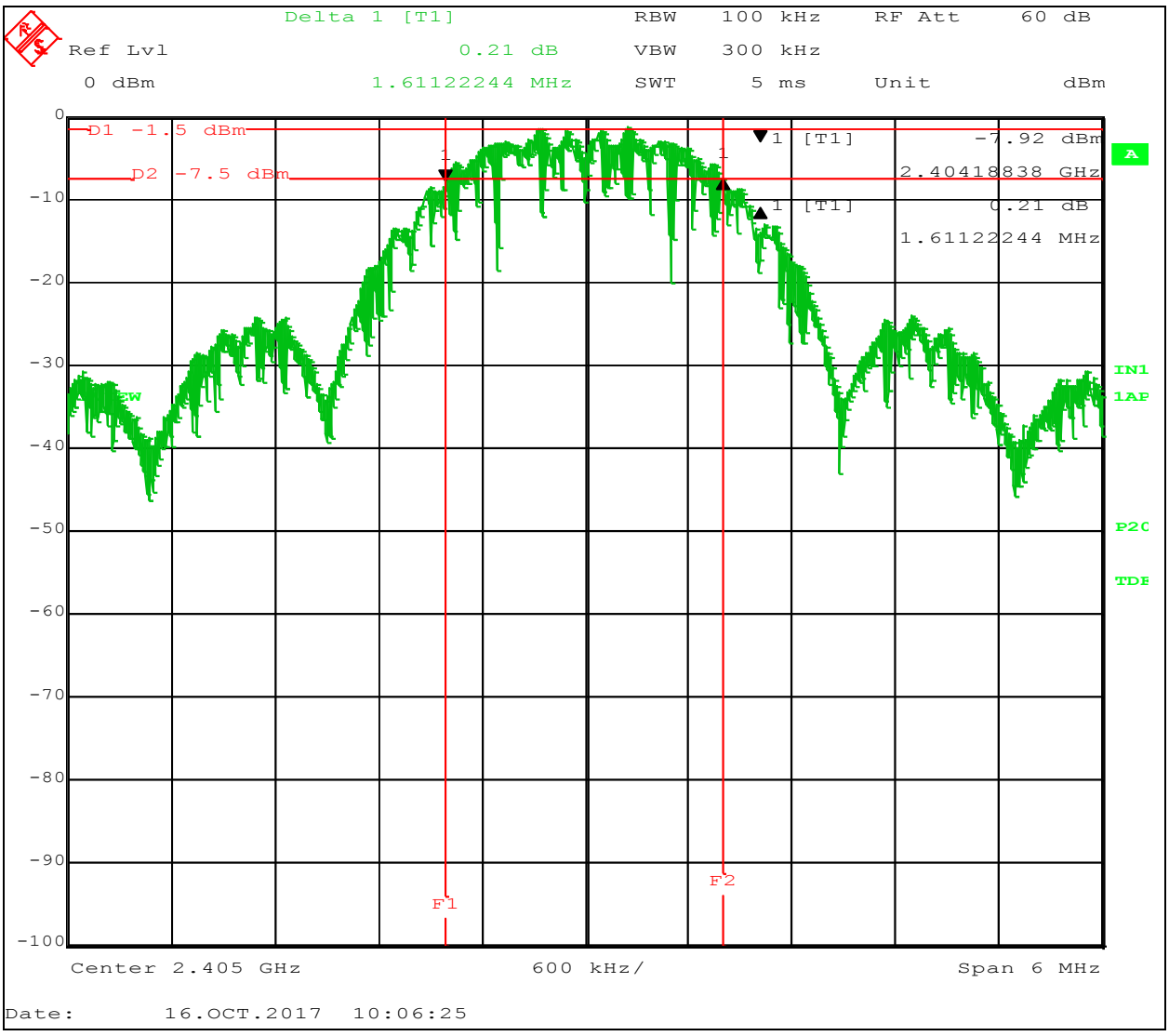
4.3 6 dB Occupied Bandwidth. FCC Section 15.247(a)(2)

4.3.1 6 dB Occupied Bandwidth – Test Procedure

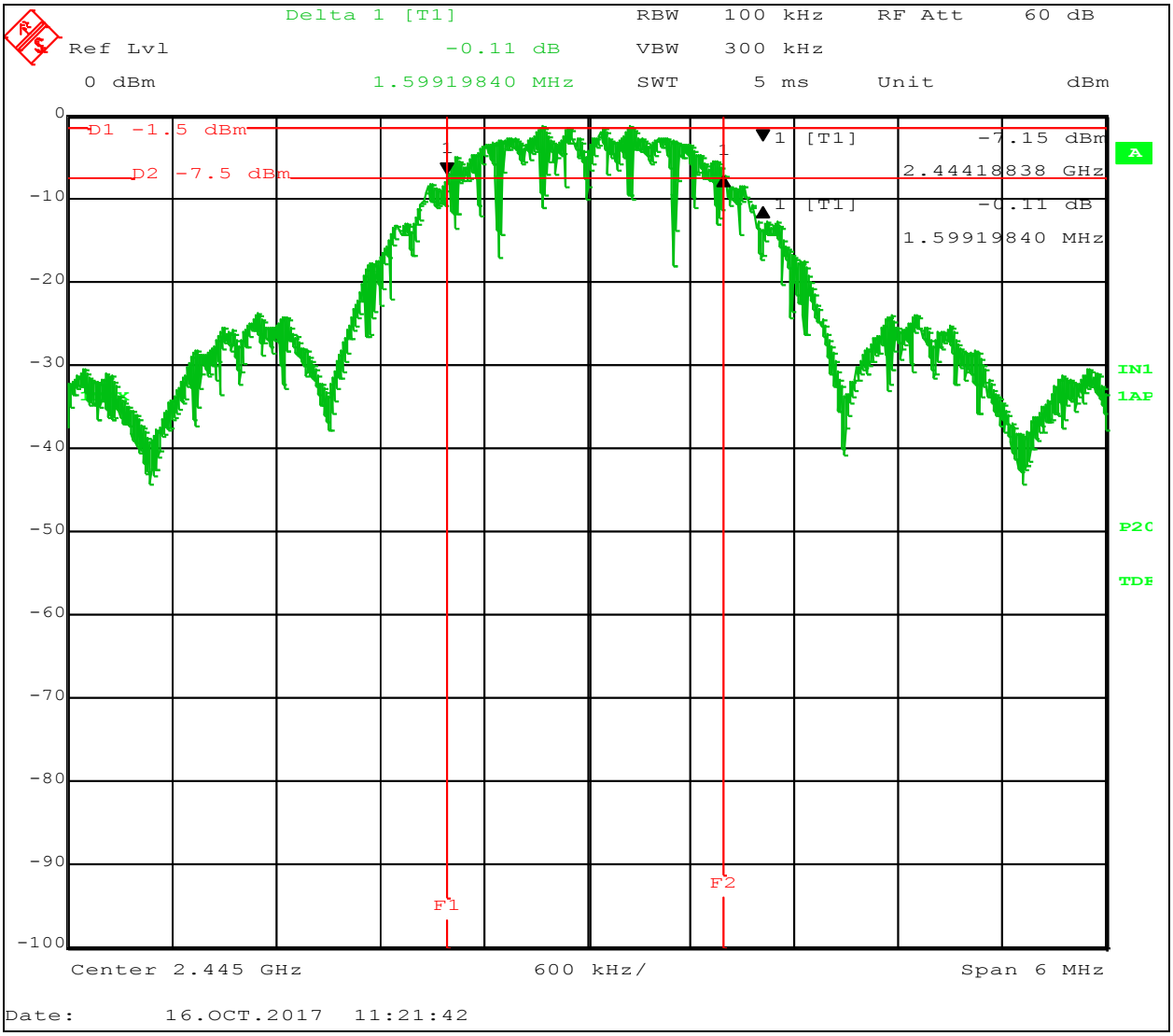
The minimum 6 dB bandwidths per FCC Section 15.247(a)(2) were measured using a 50 Ohm EMI Test Receiver with settings of 100 kHz resolution bandwidth and 300 kHz video bandwidth. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with modulation.

4.3.2 6 dB Occupied Bandwidth Analyzer Display Captures Antenna 0

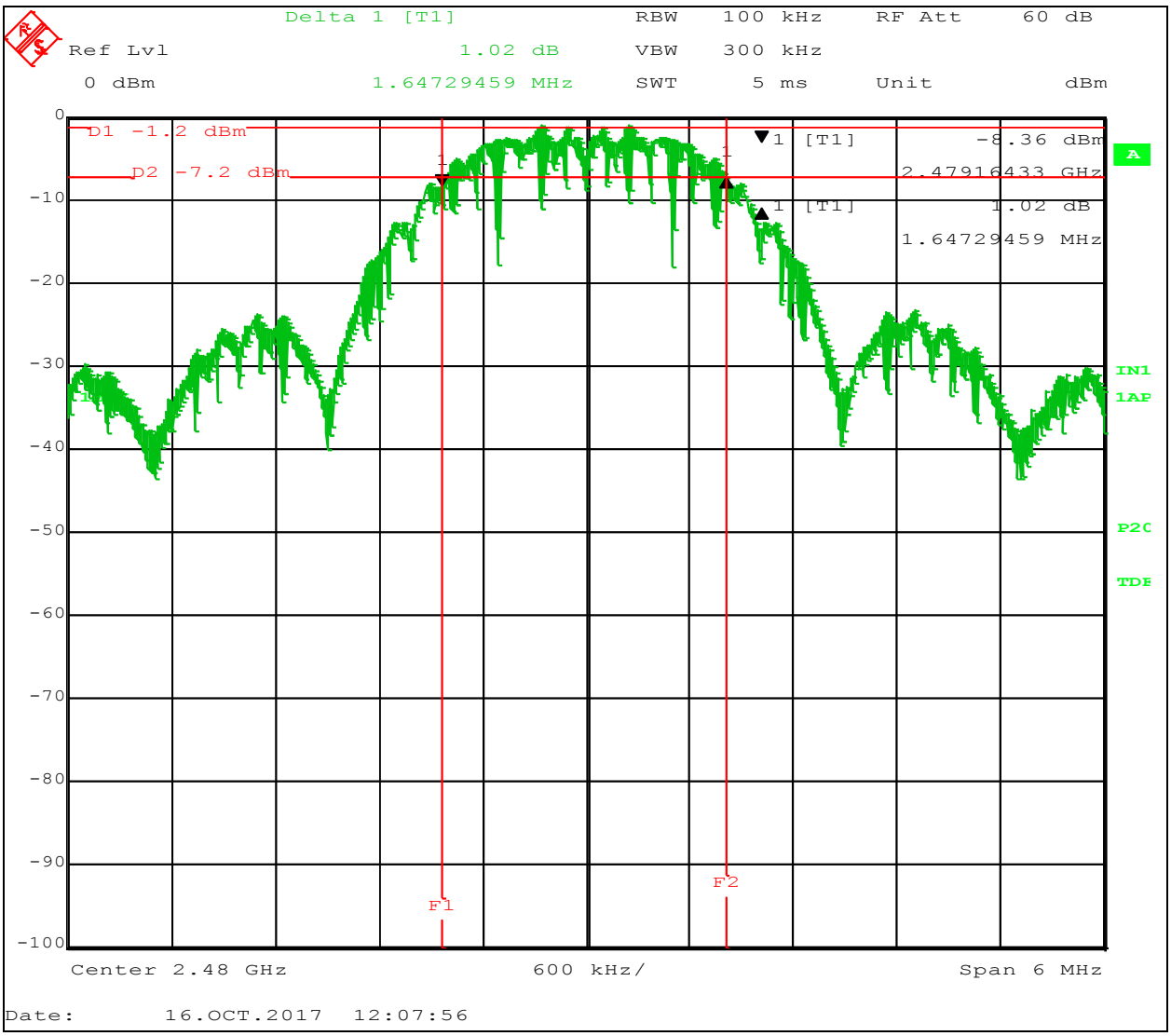
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

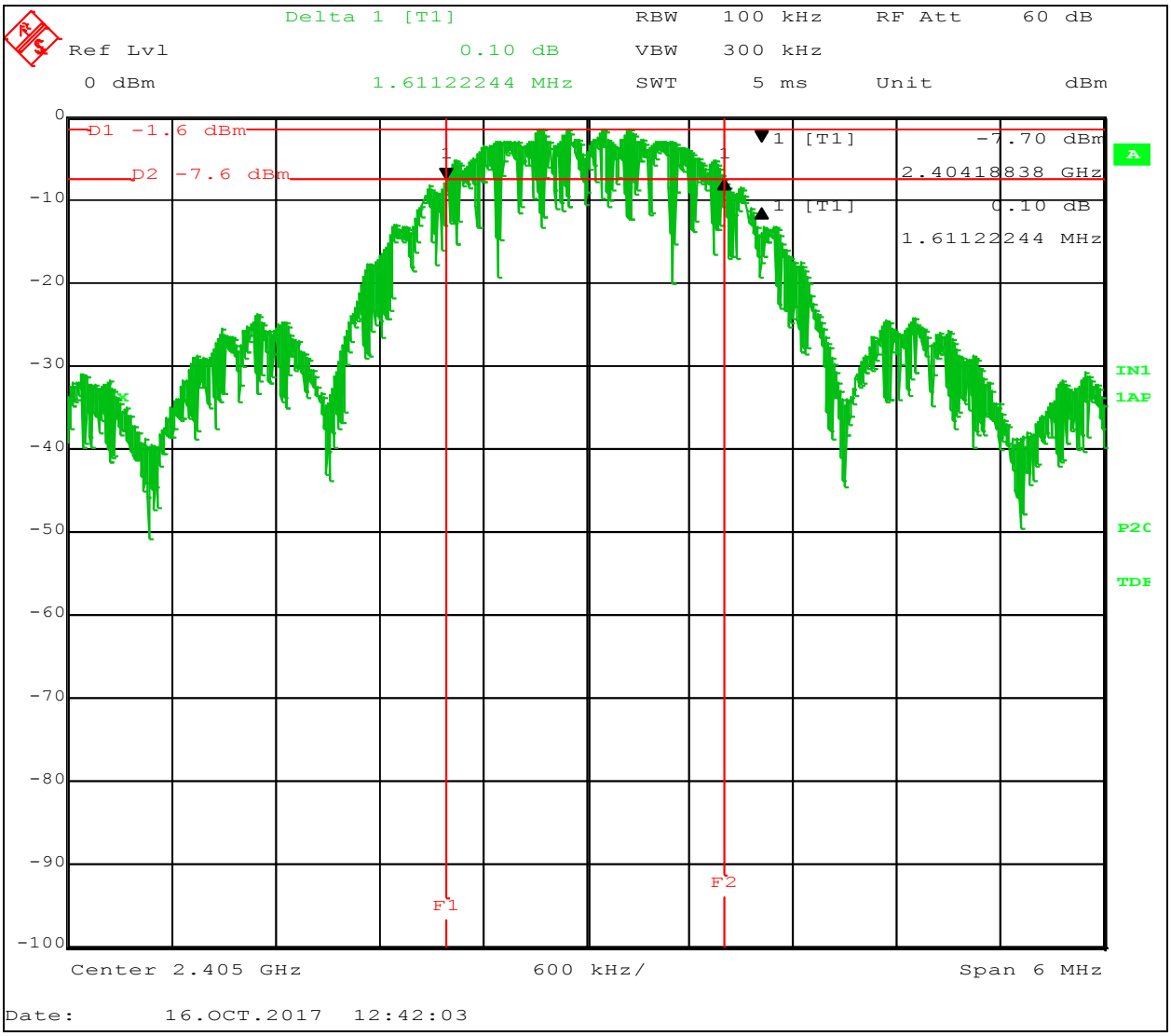


Antenna 0, Channel 26 (2.480 GHz)

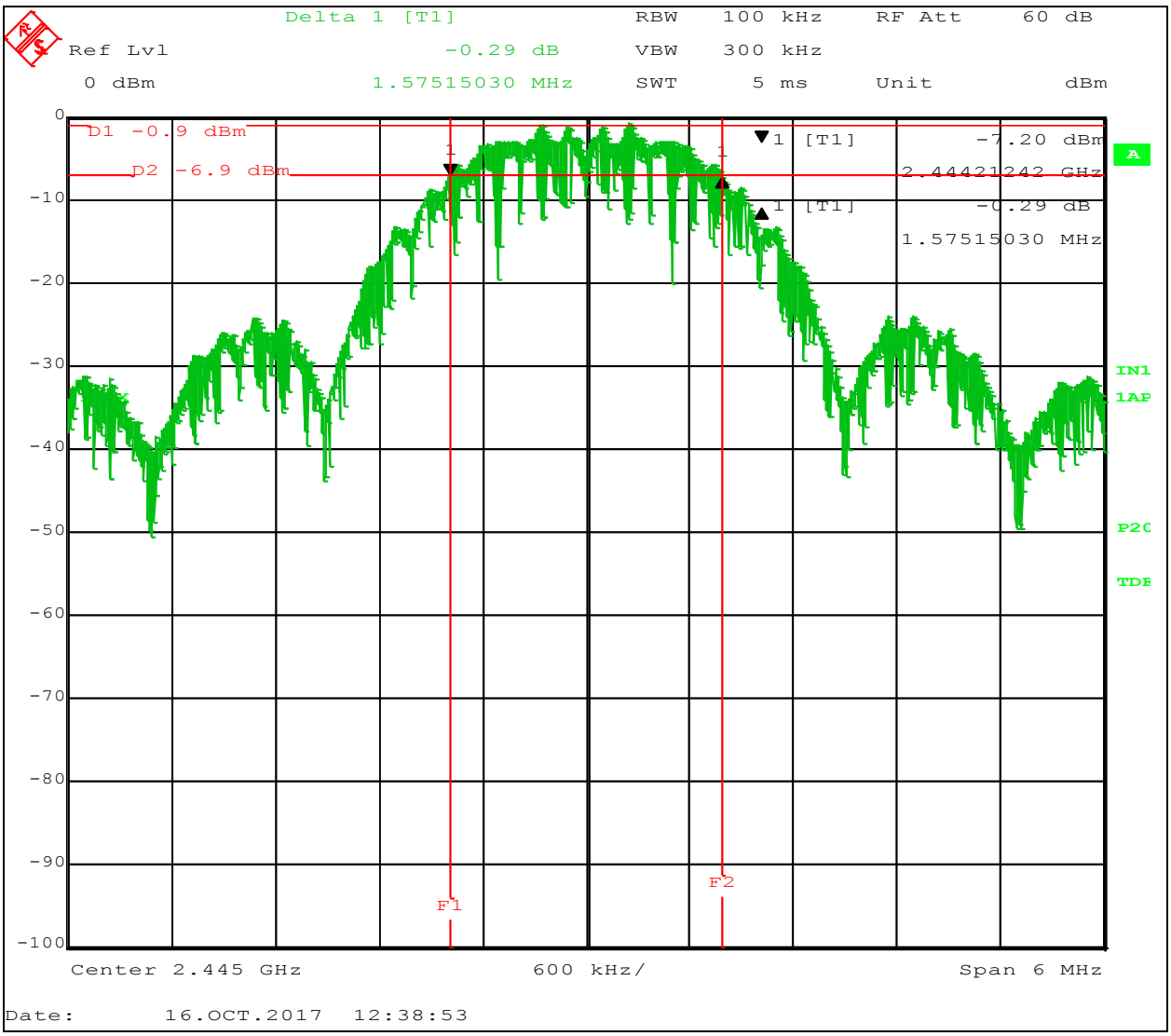


4.3.3 6 dB Occupied Bandwidth Analyzer Display Captures Antenna 1

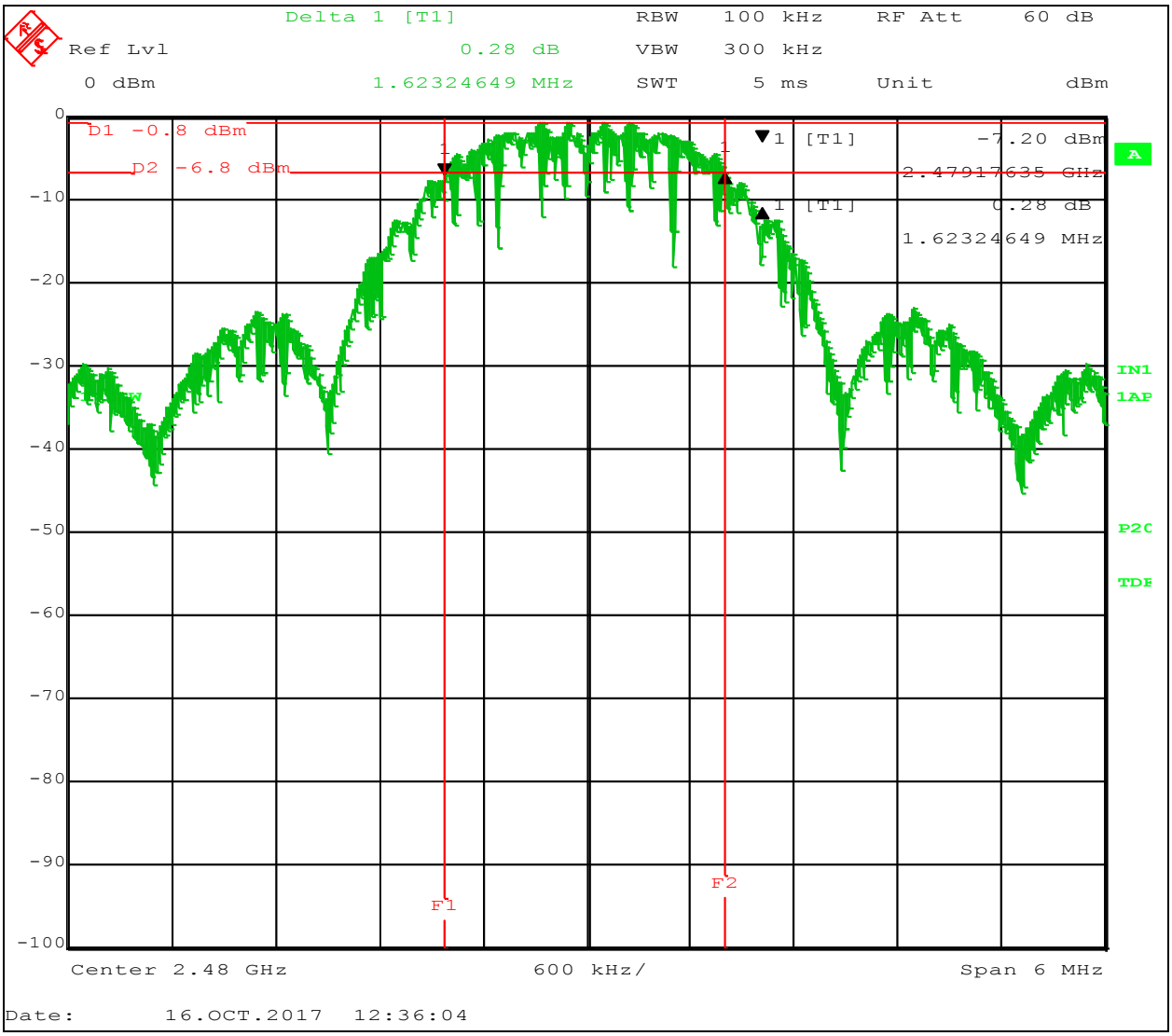
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.3.4 6 dB Occupied Bandwidth Test Results (10/16/2017)

Antenna 0

Antenna Number	Freq (GHz)	6 - dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
0	2.405	1.6112	0.5	PASS
0	2.445	1.5991	0.5	PASS
0	2.480	1.6472	0.5	PASS

Antenna 1

Antenna Number	Freq (GHz)	6 - dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
1	2.405	1.6112	0.5	PASS
1	2.445	1.5751	0.5	PASS
1	2.480	1.6232	0.5	PASS

Results: The 6 dB Occupied Bandwidth measurements for antenna 0 and antenna 1 of the ARRIS Model Spectrum 210A Set Top Box are compliant with the limits specified in FCC Section 15.247(a)(2).

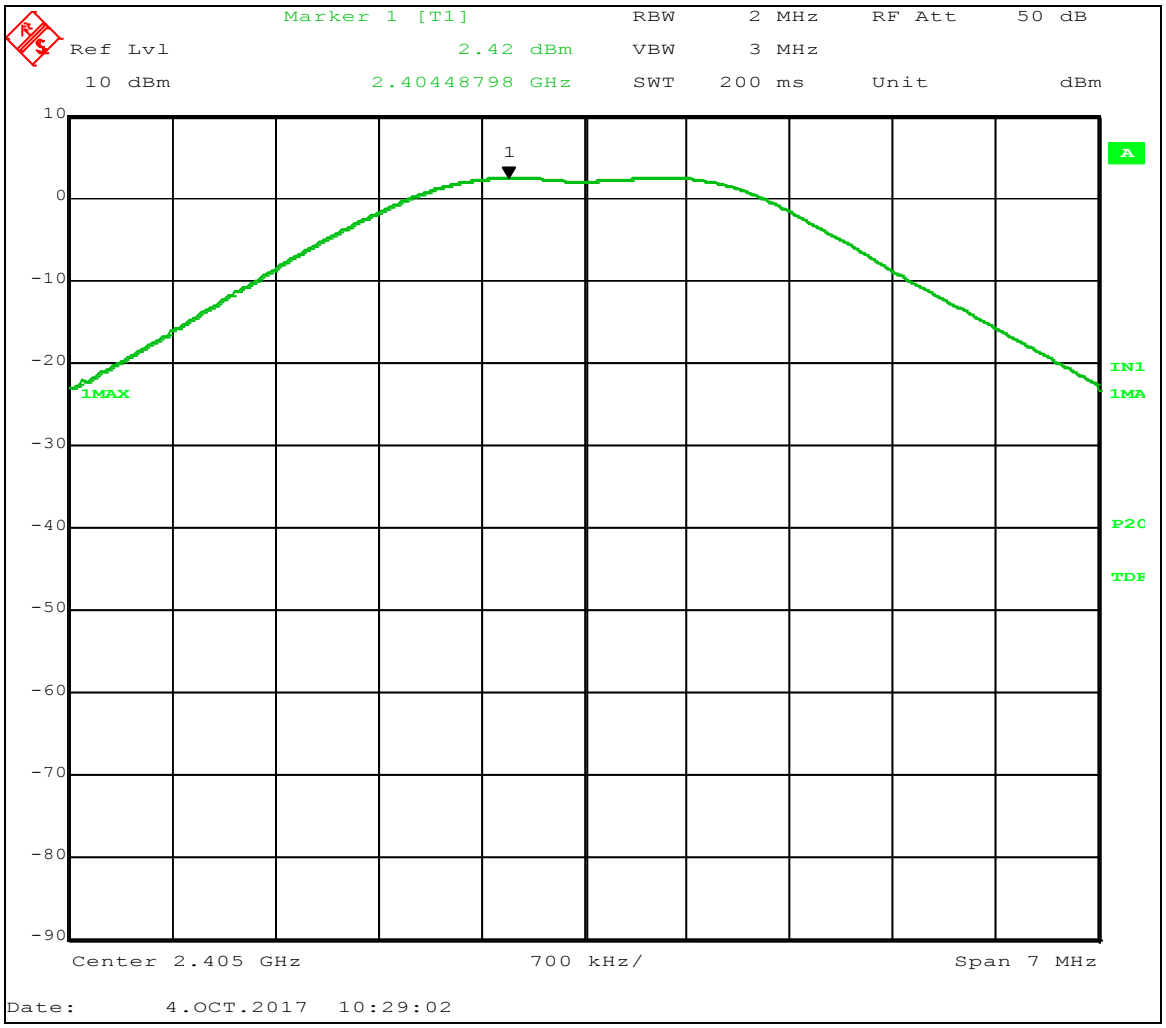
4.4 Maximum Peak Power Output FCC Section 15.247(b)(3)

4.4.1 Maximum Peak Power Output Test Procedure

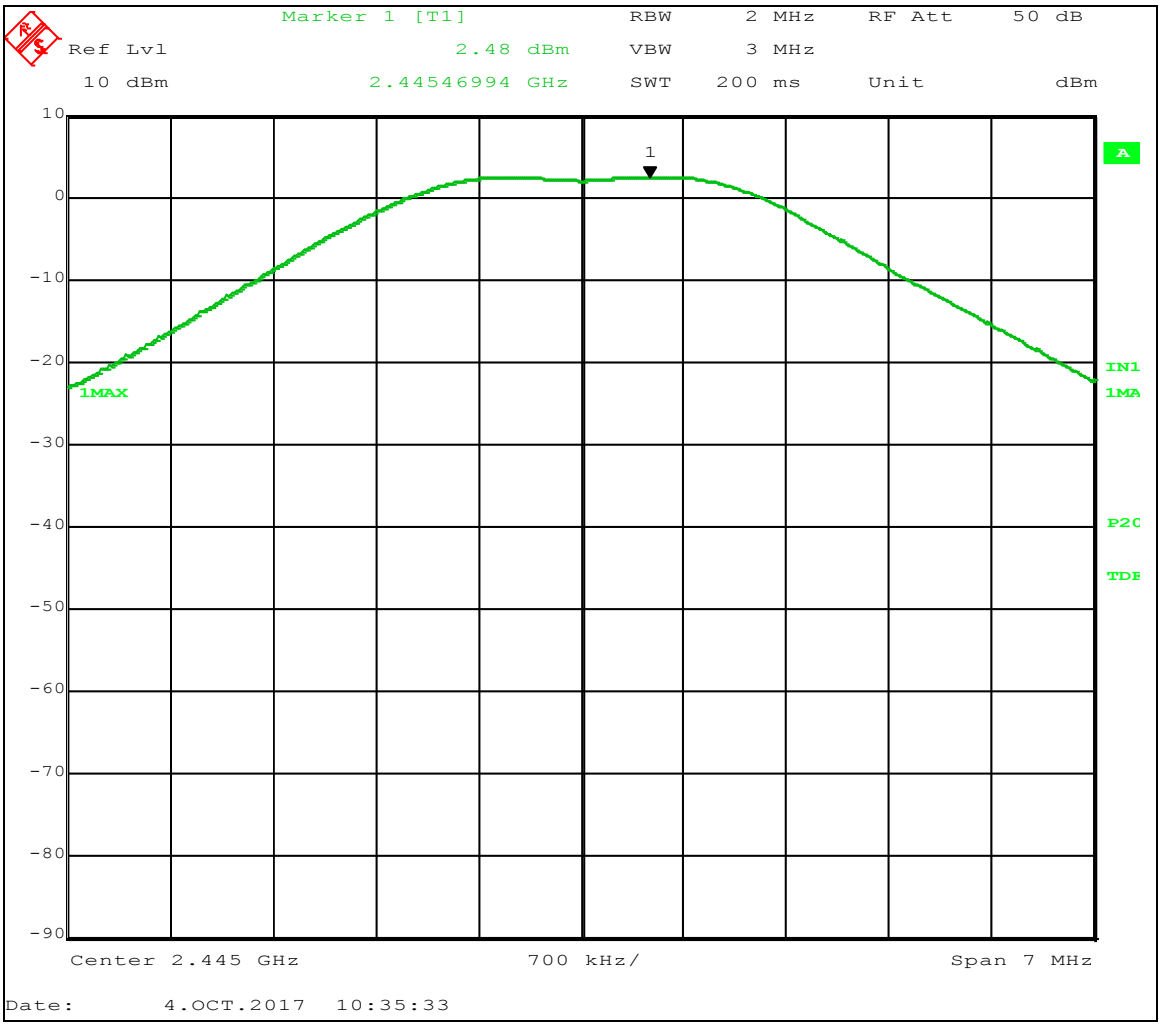
A conducted power measurement of the output frequency was measured for both Antenna 0 and Antenna 1. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with and without modulation. The results shown in this section are the ones measured with modulation since there was a slight difference in the amplitude with vs without modulation. BEC has data for both modulated and unmodulated signals on file if requested.

4.4.2 Maximum Peak Power Output Analyzer Display Captures Antenna 0

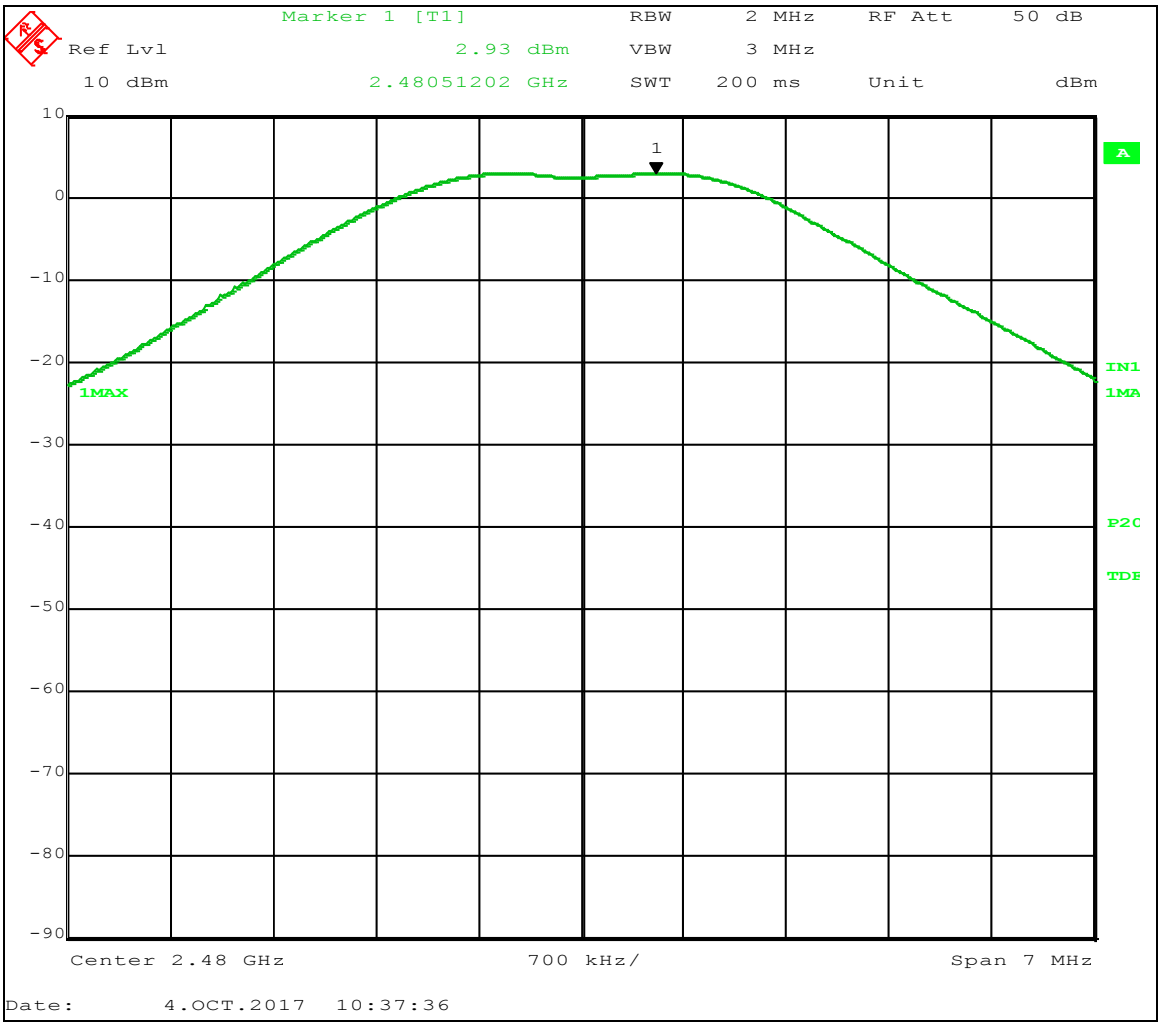
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

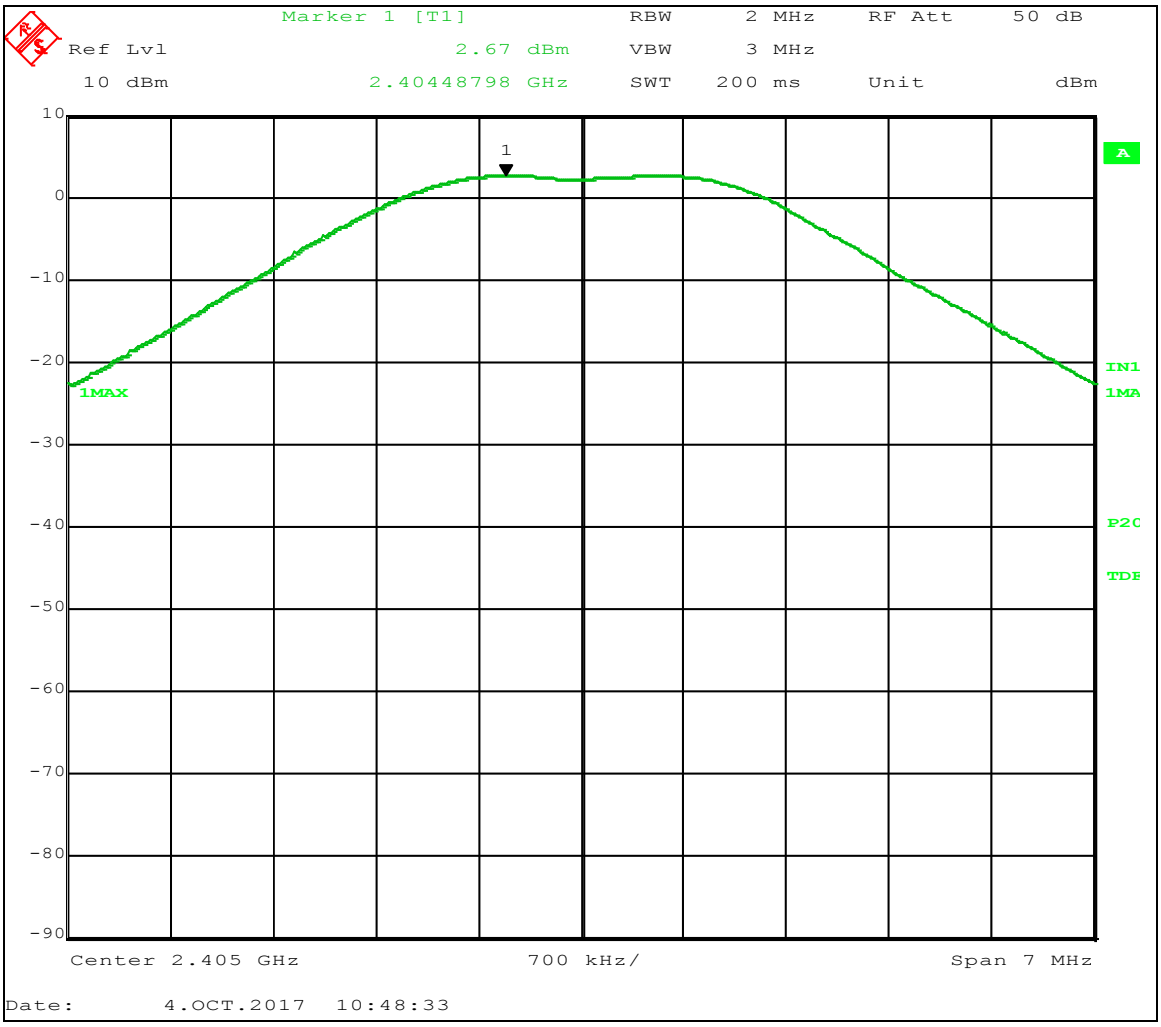


Antenna 0, Channel 26 (2.480 GHz)

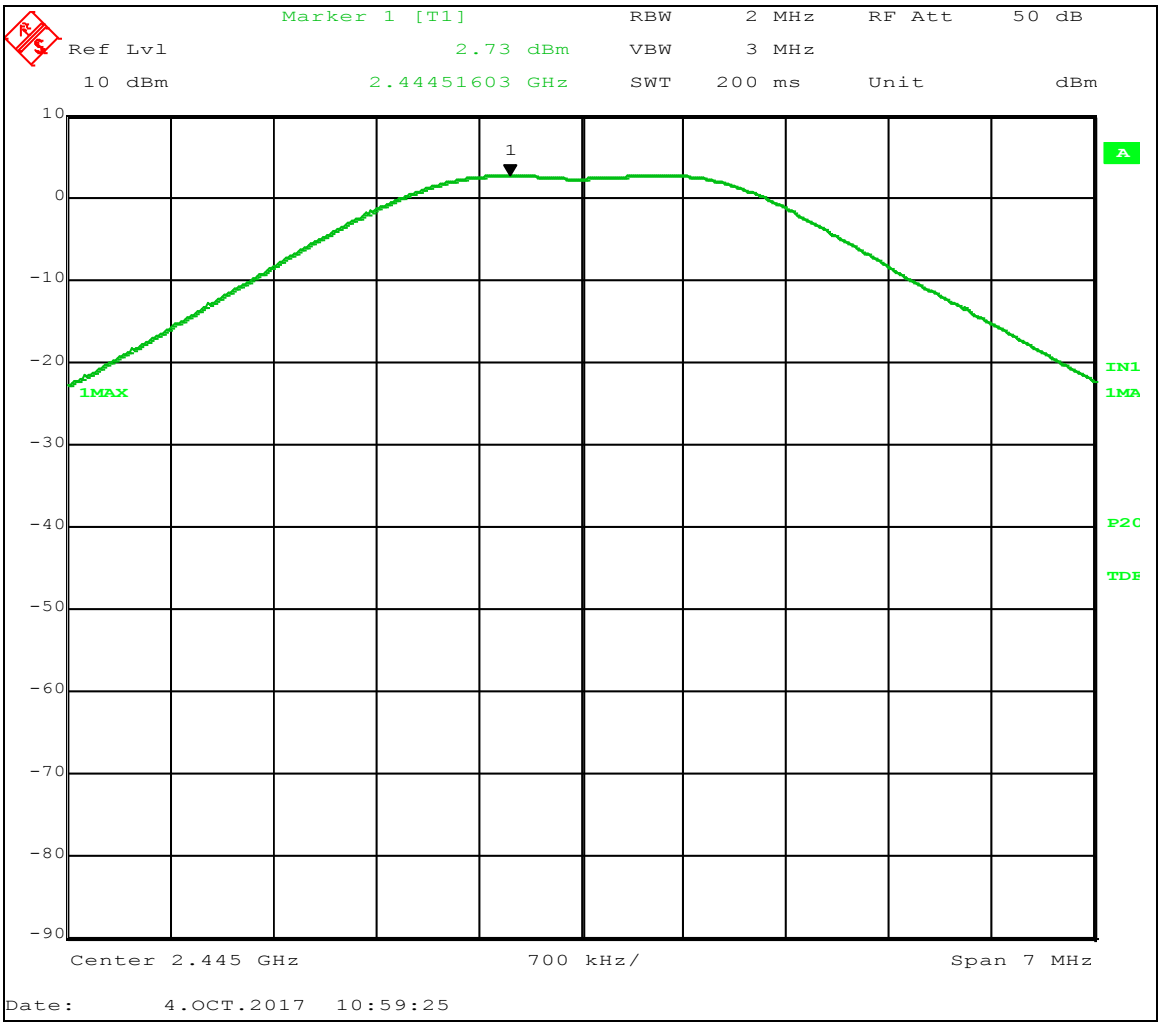


4.4.3 Maximum Peak Power Output Analyzer Display Captures Antenna 1

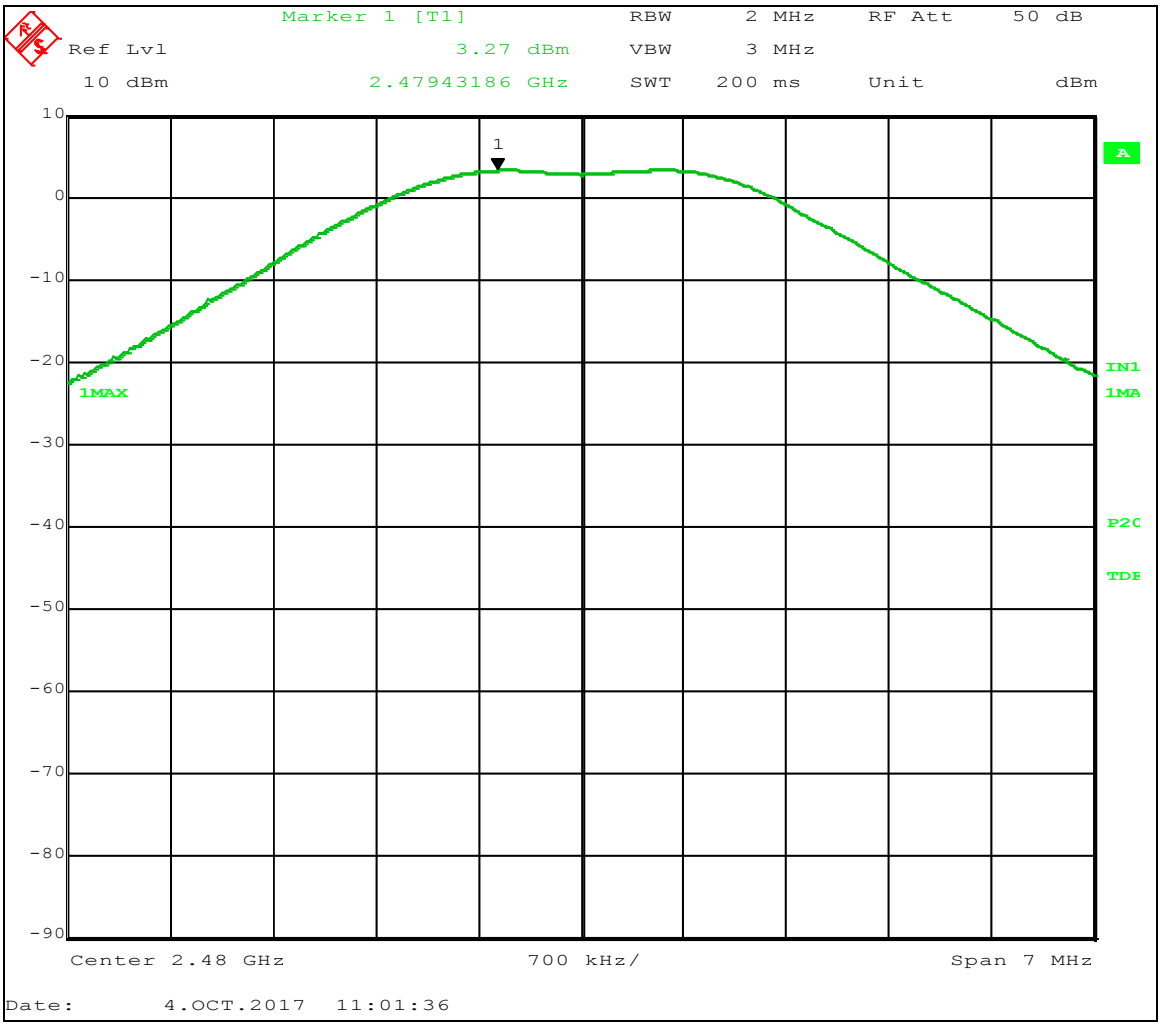
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.4.4 Maximum Peak Power Output Test Results (10/04/2017)

Channel	Antenna #		Frequency (GHz)	Measured Level (dBm)	Cable # 814 Loss (dB)	Total		Limit		Margin	
						dBm	Watts	dBm	Watts	dBm	Watts
11	0	GFSK-Modulated	2.405	2.42	0.62	3.04	0.002	30.00	1.000	-26.96	-0.998
19	0		2.445	2.48	0.63	3.11	0.002	30.00	1.000	-26.89	-0.998
26	0		2.480	2.93	0.63	3.56	0.002	30.00	1.000	-26.44	-0.998
11	0	GFSK-Unmodulated	2.405	2.37	0.62	2.99	0.002	30.00	1.000	-27.01	-0.998
19	0		2.445	2.48	0.63	3.11	0.002	30.00	1.000	-26.89	-0.998
26	0		2.480	2.88	0.63	3.51	0.002	30.00	1.000	-26.49	-0.998

Channel	Antenna #		Frequency (GHz)	Measured Level (dBm)	Cable # 814 Loss (dB)	Total		Limit		Margin	
						dBm	Watts	dBm	Watts	dBm	Watts
11	1	GFSK-Modulated	2.405	2.67	0.62	3.29	0.002	30.00	1.000	-26.71	-0.998
19	1		2.445	2.73	0.63	3.36	0.002	30.00	1.000	-26.64	-0.998
26	1		2.480	3.27	0.63	3.90	0.002	30.00	1.000	-26.10	-0.998
11	1	GFSK-Unmodulated	2.405	2.61	0.62	3.23	0.002	30.00	1.000	-26.77	-0.998
19	1		2.445	2.73	0.63	3.36	0.002	30.00	1.000	-26.64	-0.998
26	1		2.480	3.27	0.63	3.90	0.002	30.00	1.000	-26.10	-0.998

Results: The Peak Power Output measurements for antenna 0 and antenna 1 of the ARRIS Model Spectrum 210A Set Top Box are compliant with the limits specified in FCC Section 15.247(b)(3).

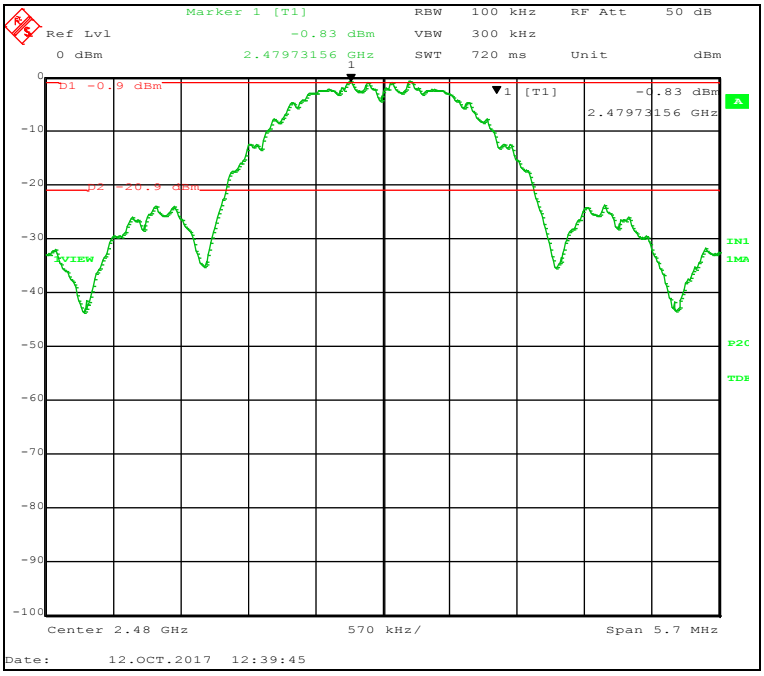
4.5 Antenna Conducted Spurious Emissions FCC Section 15.247(d)

4.5.1 Antenna Conducted Spurious Emissions Test Procedure

A conducted power measurement of the output frequency was measured for both Antenna 0 and Antenna 1. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with modulation. Three Frequency Sections were examined in the range of 30 to 1000 MHz, 1 to 10 GHz and 10 to 25 GHz. In Section 4.5.3 we have the screen captures for Antenna 1, Channel 26 @ 2480 MHz since this was the highest output measured in all of the configurations.

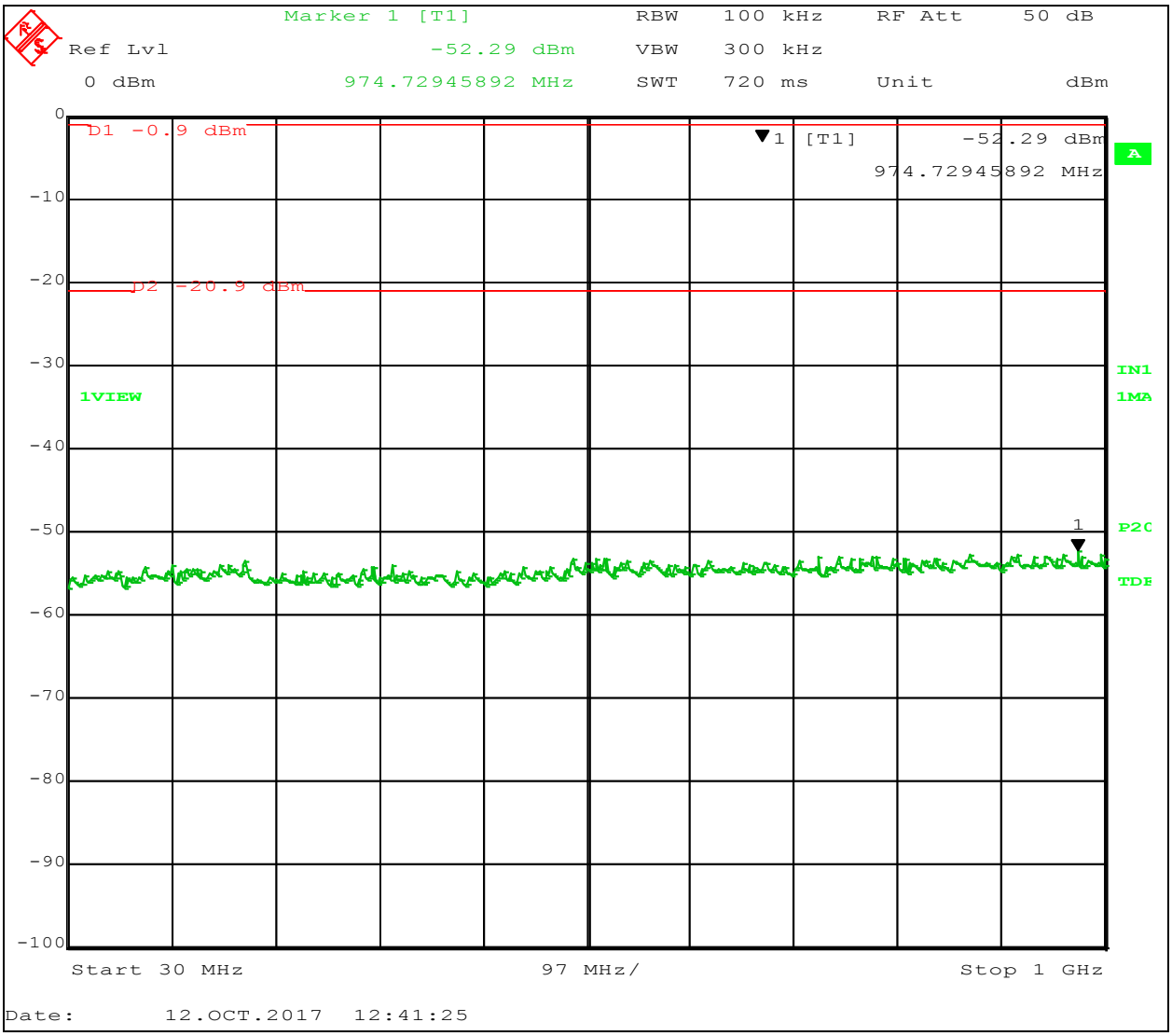
4.5.2 Antenna Conducted Spurious Emissions Fundamental Frequency Maximum Output for 20 dB Reference.

Modulation	Antenna	Channel	Freq (GHz)	Max Output (dBm) to Ref for the 20 dB Levels Limits
GFSK	0	CH.11	2.405	-1.43
	0	CH.19	2.445	-1.29
	0	CH.26	2.480	-1.44
GFSK	1	CH.11	2.405	-1.51
	1	CH.19	2.445	-1.12
	1	CH.26	2.480	-0.83

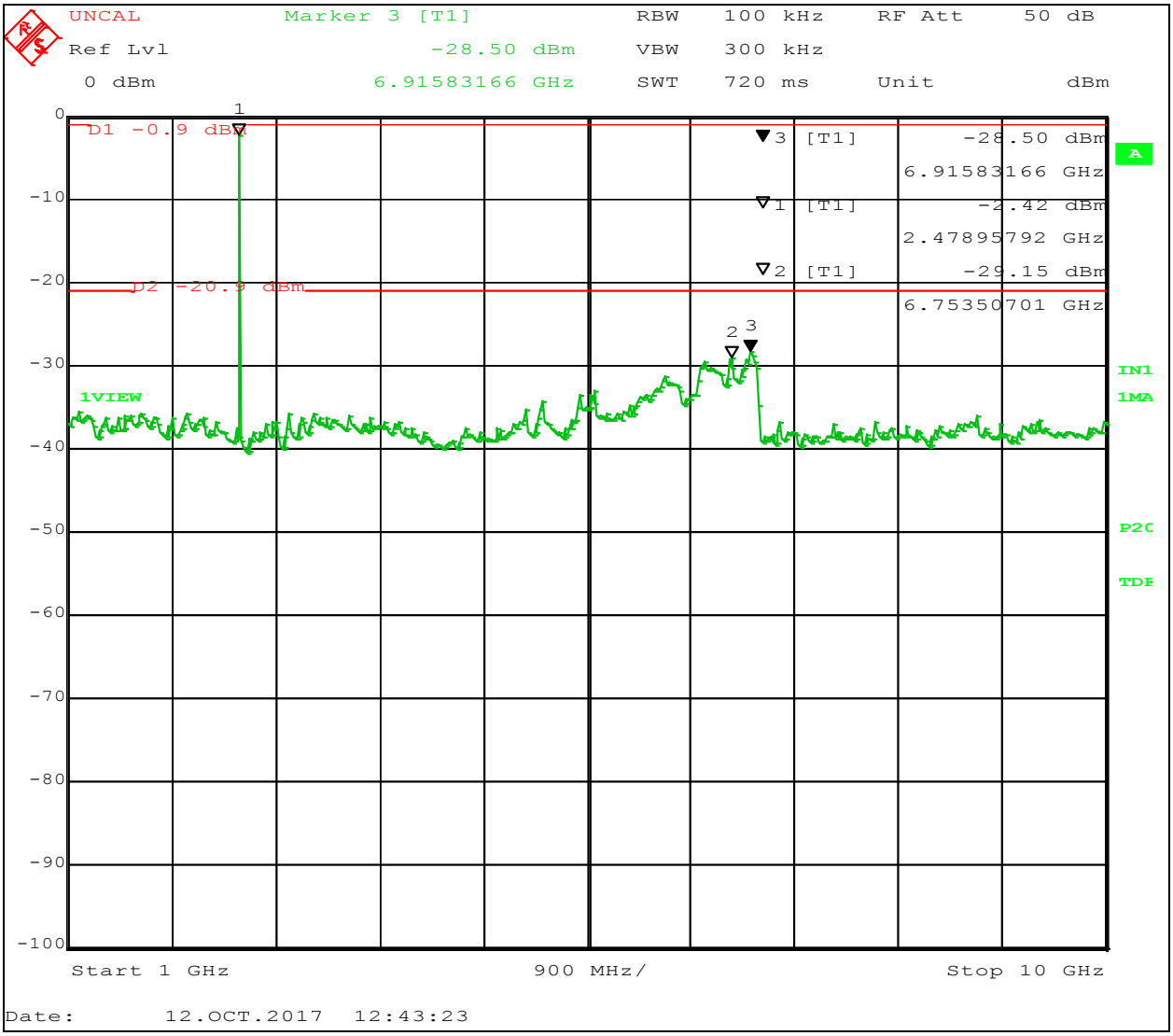


4.5.3 Antenna Conducted Spurious Emissions Test Results (10/12/2017)

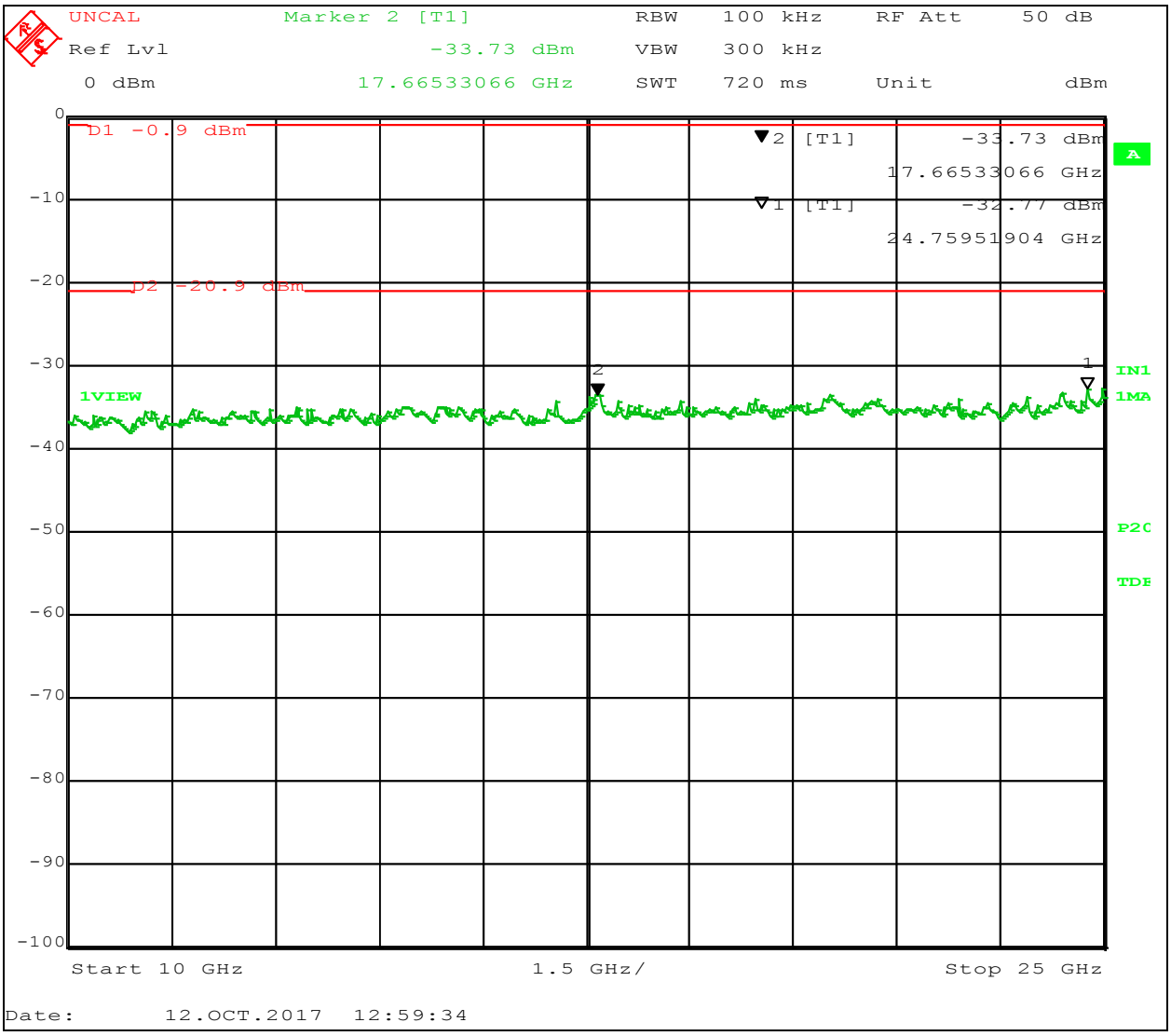
Frequency Range: 30 MHz to 1000 MHz



Frequency Range: 1 to 10 GHz



Frequency Range: 10 to 25 GHz



Results: The Antenna Conducted Spurious Emissions measurements for antenna 0 and antenna 1 of the ARRIS Model Spectrum 210A Set Top Box are compliant with the limits specified in FCC Section 15.247(d).

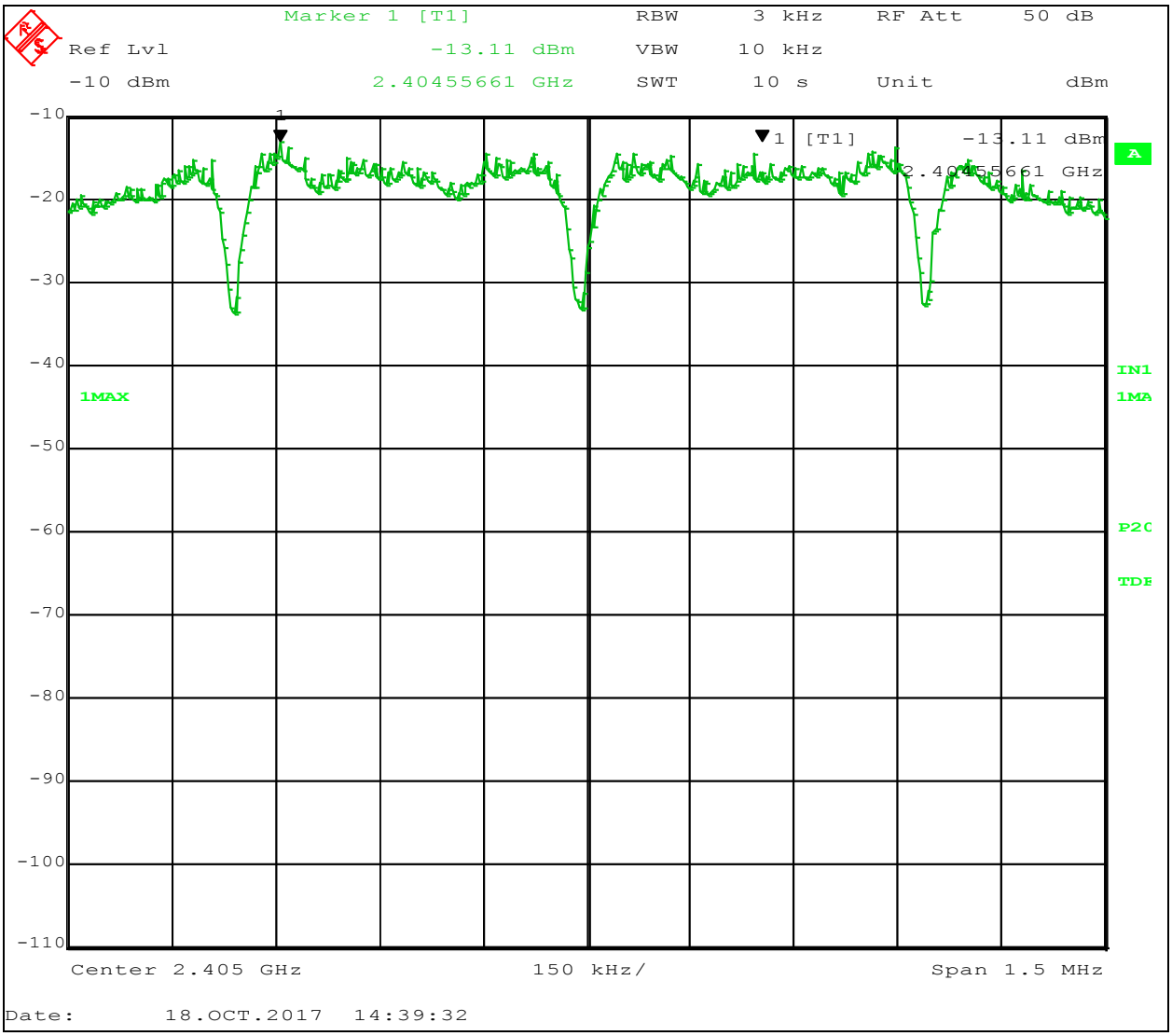
4.6 Power Spectral Density FCC Section 15.247(e)

4.6.1 Power Spectral Density Test Procedure

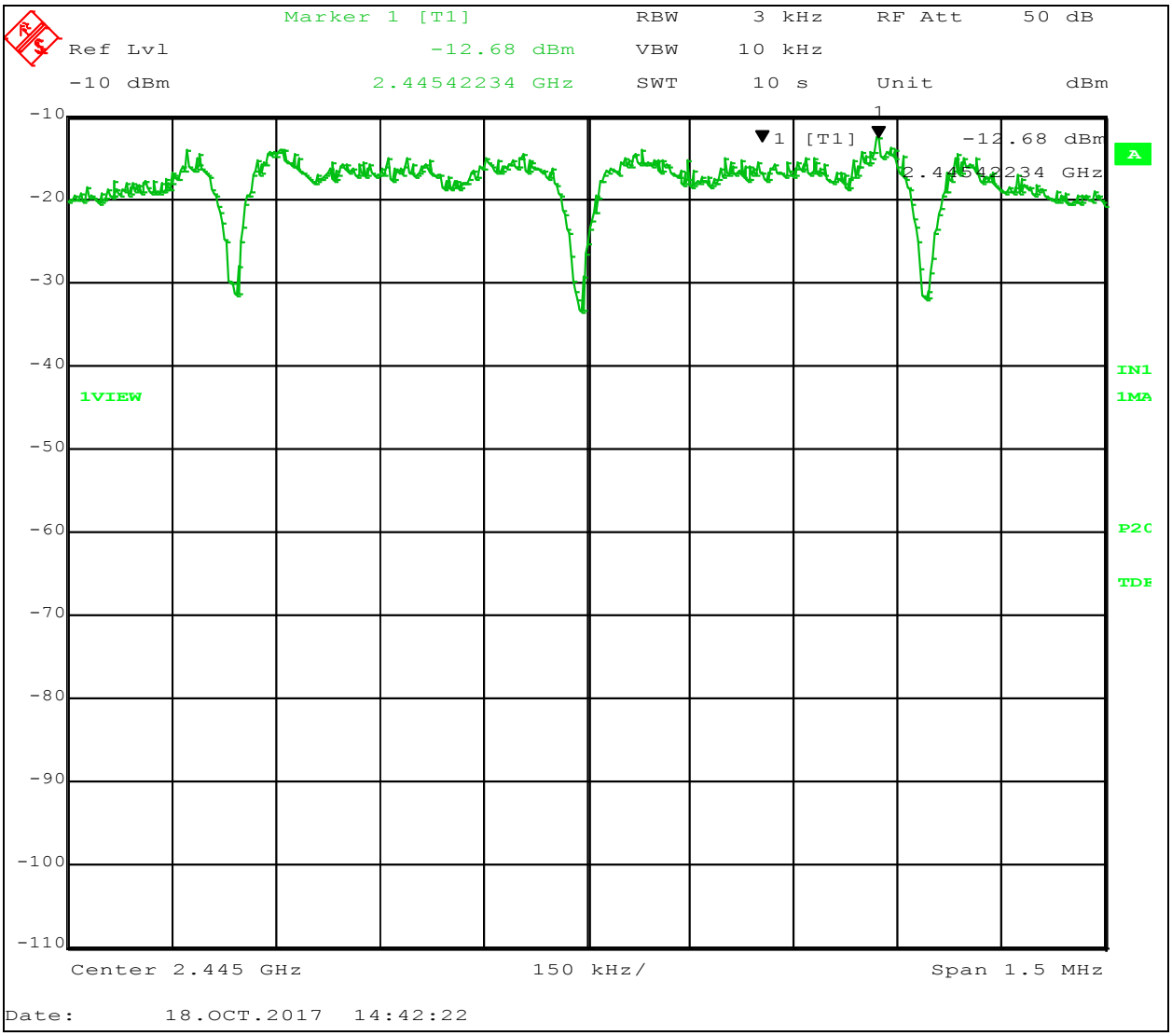
A conducted power measurement of the output frequency was measured for both Antenna 0 and Antenna 1. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with modulation.

4.6.2 Power Spectral Density Analyzer Display Captures Antenna 0

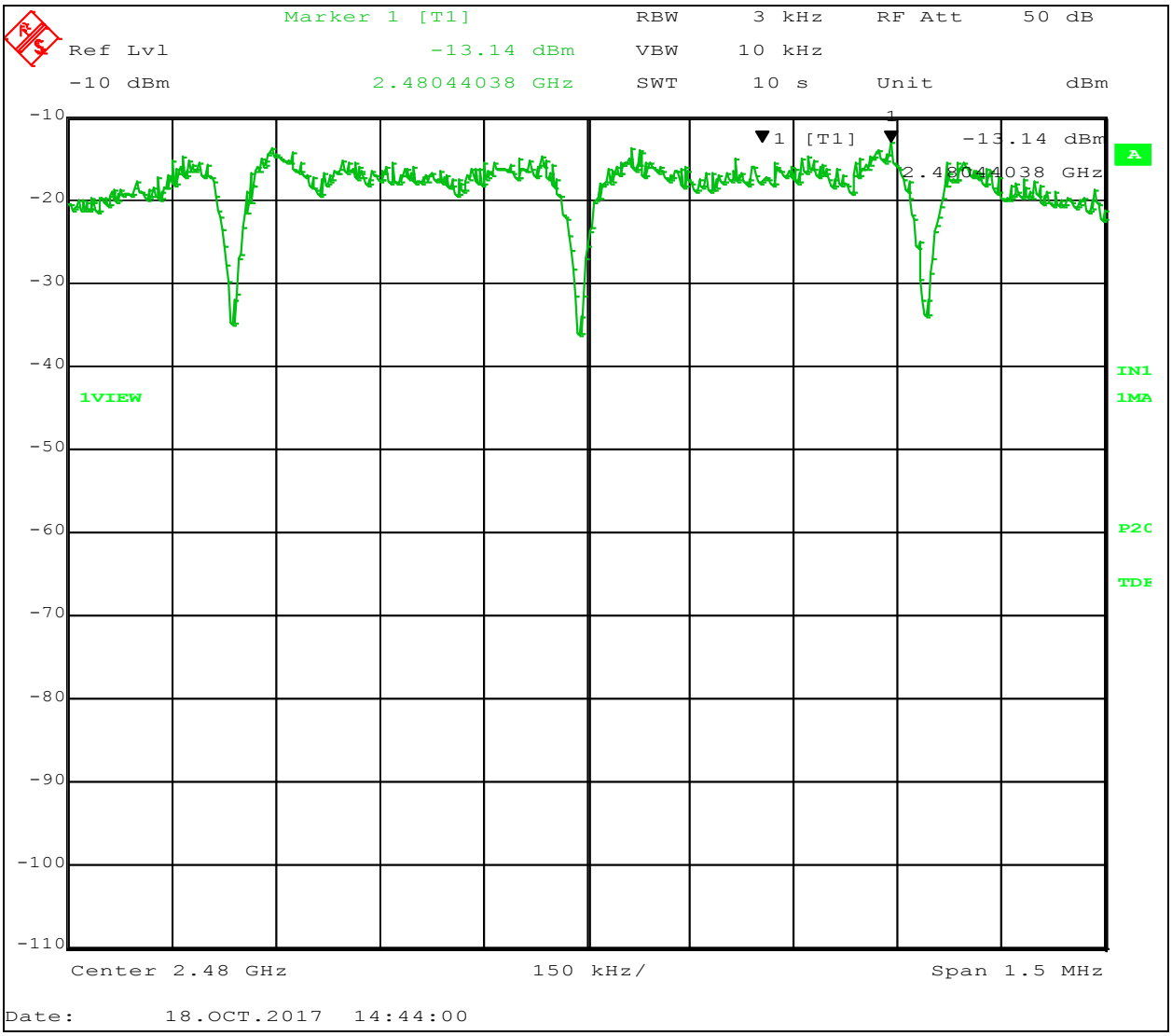
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

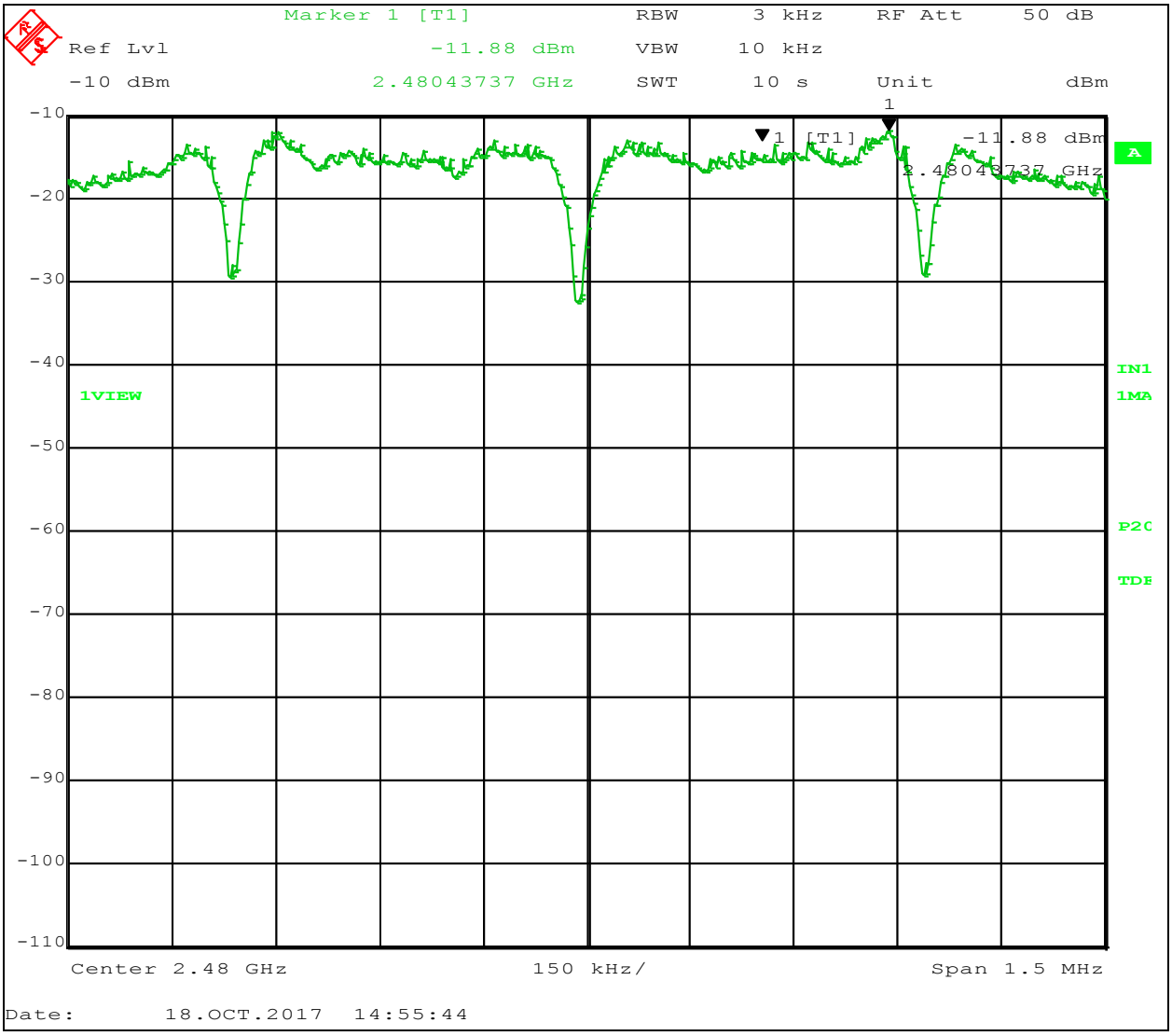


Antenna 0, Channel 26 (2.480 GHz)

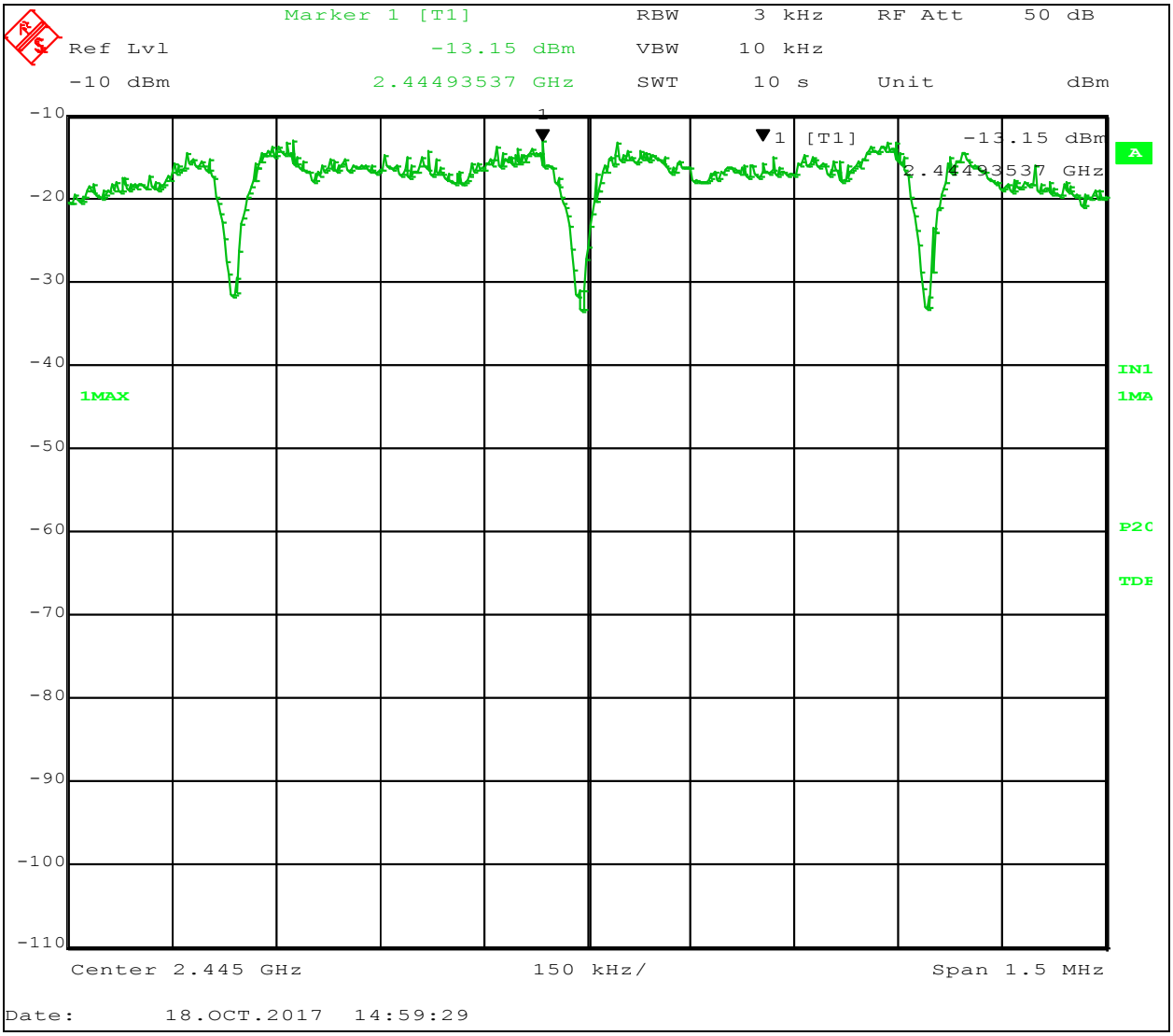

Marker 1 [T1]
RBW 3 kHz
RF Att 50 dB
Ref Lvl
-13.14 dBm
VBW 10 kHz
-10 dBm
2.48044038 GHz
SWT 10 s
Unit dBm
1
1 [T1]
-13.14 dBm
2.48044038 GHz
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
1VIEW
A
IN1
1MA
P2C
TDE
Center 2.48 GHz
150 kHz/
Span 1.5 MHz
Date: 18.OCT.2017 14:44:00

4.6.3 Power Spectral Density Analyzer Display Captures Antenna 1

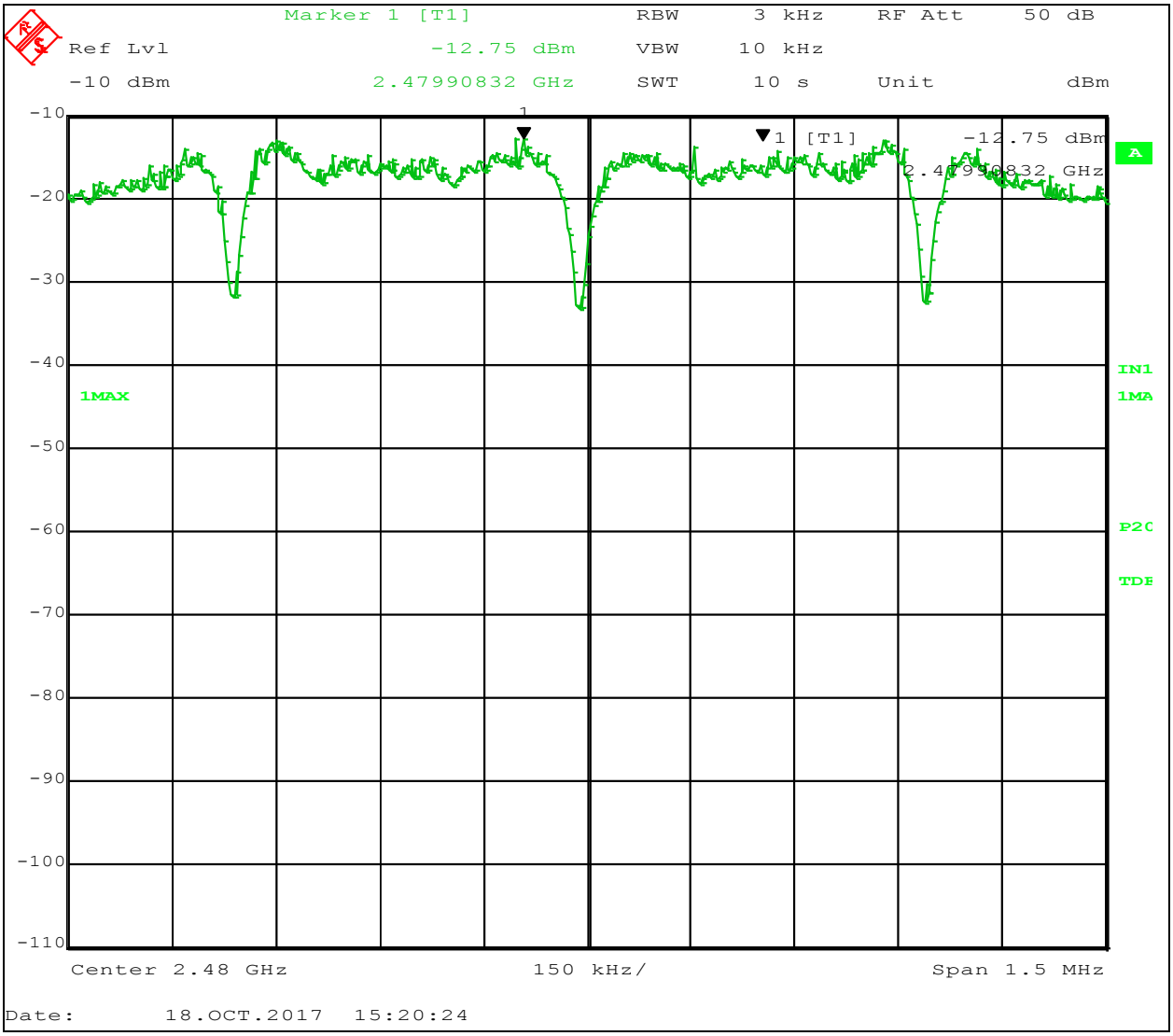
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.6.4 Power Spectral Density Test Results (10/18/2017)

Modulation	Channel	Antenna	Freq (GHz)	Measured Power Spectral Density (dBm)	Cable Loss (dB)	Total Power Spectral Density (dBm)	Power Spectral Density Limit (dBm)	Pass/Fail
GFSK	CH.11	0	2.405	-13.11	0.62	-12.49	8.00	PASS
	CH.19	0	2.445	-12.68	0.63	-12.05	8.00	PASS
	CH.26	0	2.480	-13.14	0.63	-12.51	8.00	PASS
GFSK	CH.11	1	2.405	-11.88	0.62	-11.26	8.00	PASS
	CH.19	1	2.445	-13.15	0.63	-12.52	8.00	PASS
	CH.26	1	2.480	-12.75	0.63	-12.12	8.00	PASS

Results: The Power Spectral Density measurements for antenna 0 and antenna 1 of the ARRIS Model Spectrum 210A Set Top Box are compliant with the limits specified in FCC Section 15.247(e).

4.7 Band Edge Measurement FCC Section 15.247(d)

4.7.1 Band Edge Measurement Test Procedure

Band edge measurements were recorded on the EUT while operating with a modulated carrier at three frequencies (low middle and high) in the operating band of 2.4 GHz to 2.4835 GHz. The measurement procedure used was the conducted output power method, where the antenna output port of the EUT was connected to the receiver input port for direct measurement.

The frequencies and associated channel numbers chosen for measurement were as follows:

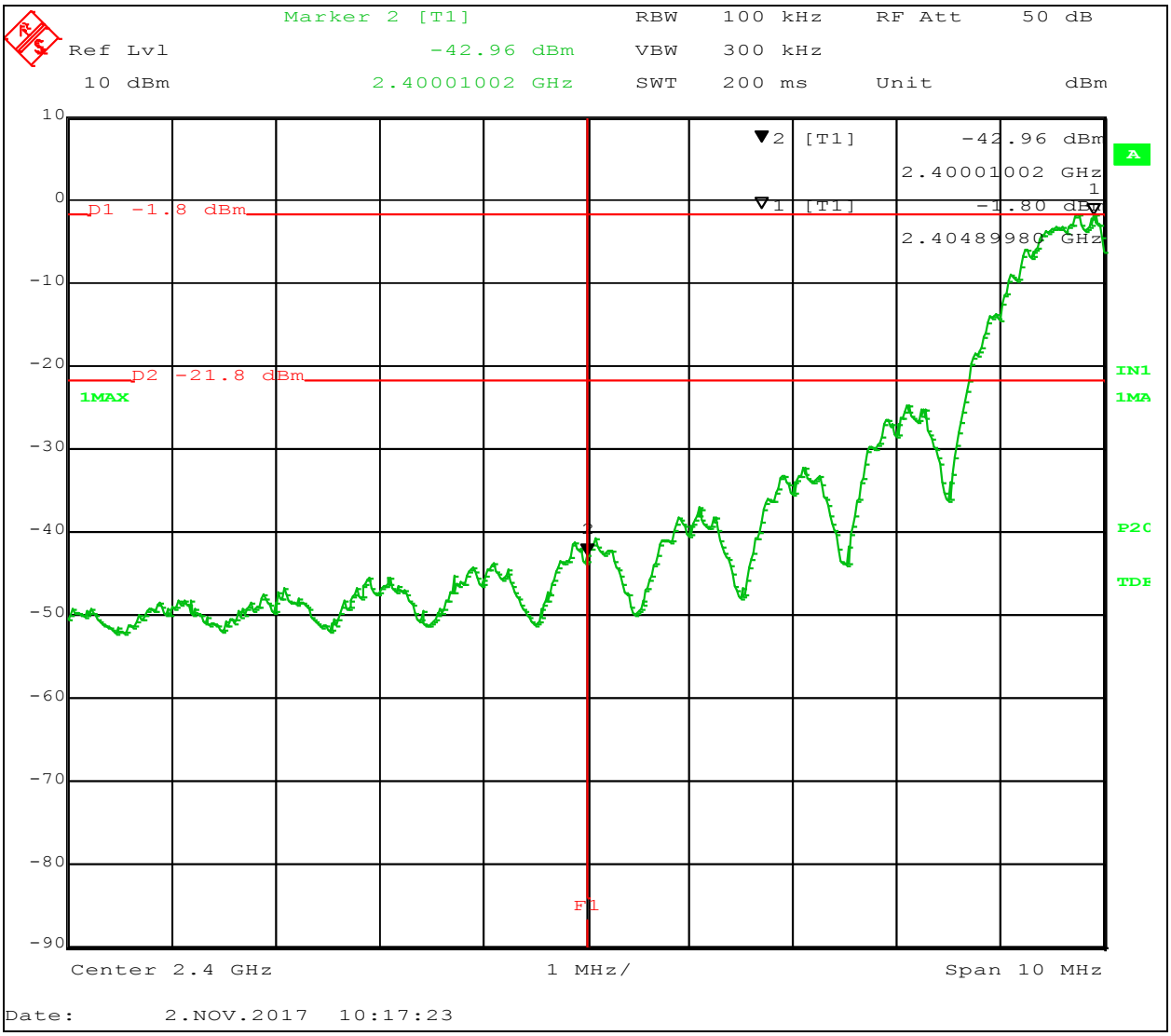
Channel	Frequency (GHz)
11	2.405
26	2.480

The data was recorded in two screen captures for each of the antennas (0 and 1) at the lower and higher transmit frequencies from the Spectrum Analyzer. Parameters particular to each measurement are as follows:

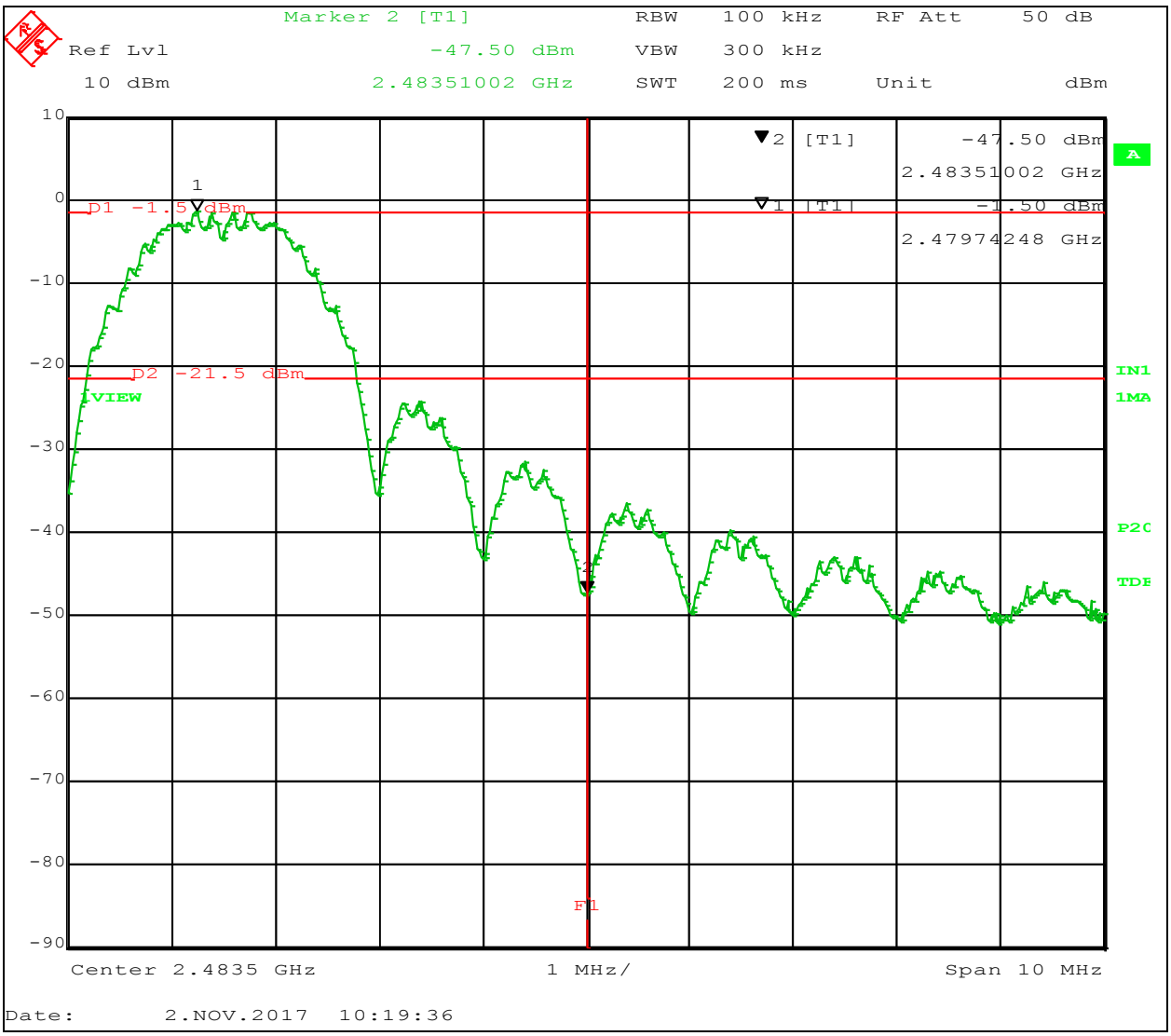
Center Frequency:	Lower Band Limit 2.4 GHz and Higher Band Limit 2.4835 GHz
Resolution Bandwidth:	100 kHz
Video Bandwidth:	300 kHz
Span:	10 MHz
Scale:	dBm
Reference Level:	10 dBm

4.7.2 Band Edge Measurement Analyzer Display Captures Antenna 0

Antenna 0, Channel 11 (2.405 GHz)

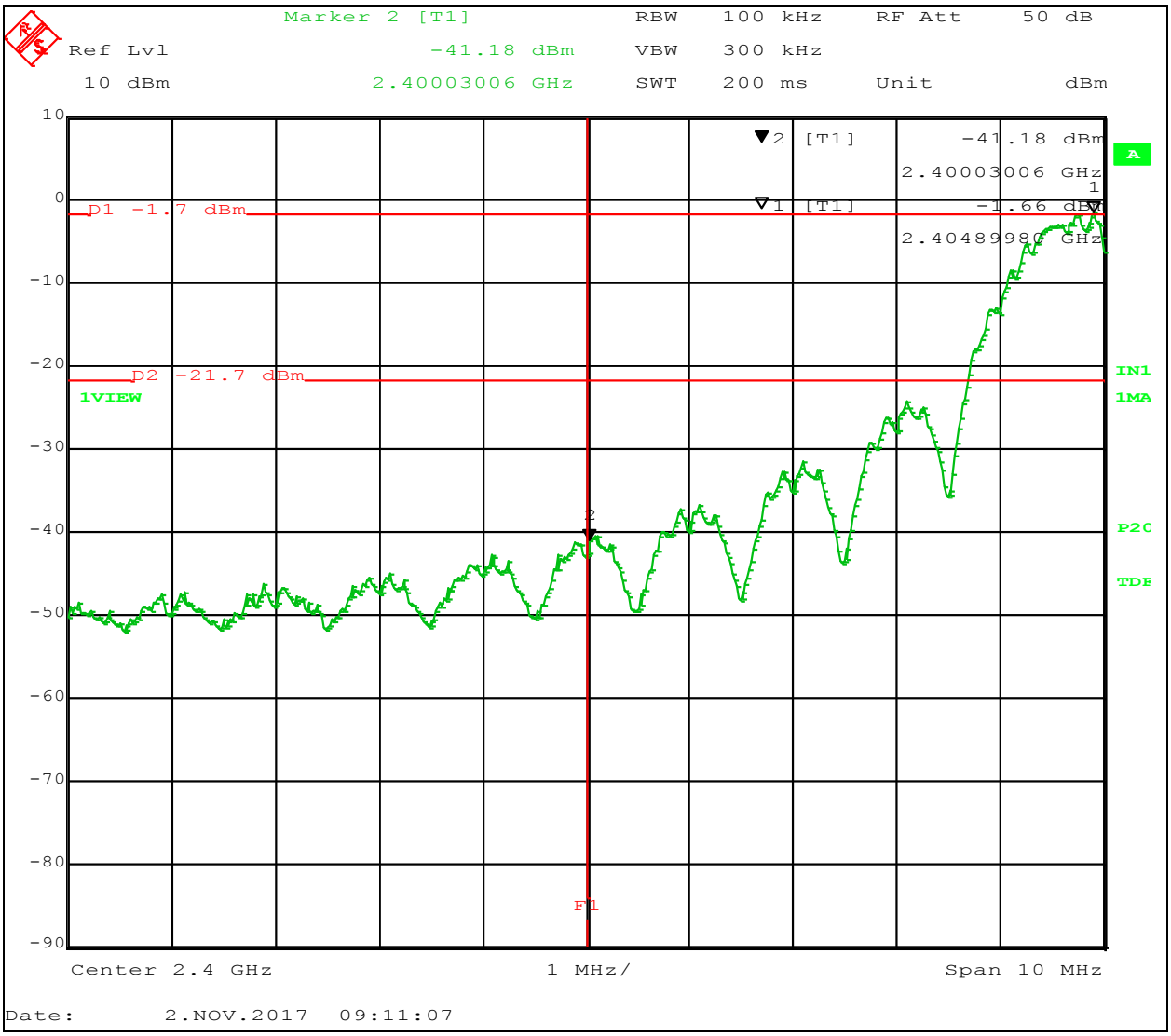


Antenna 0, Channel 26 (2.480 GHz)

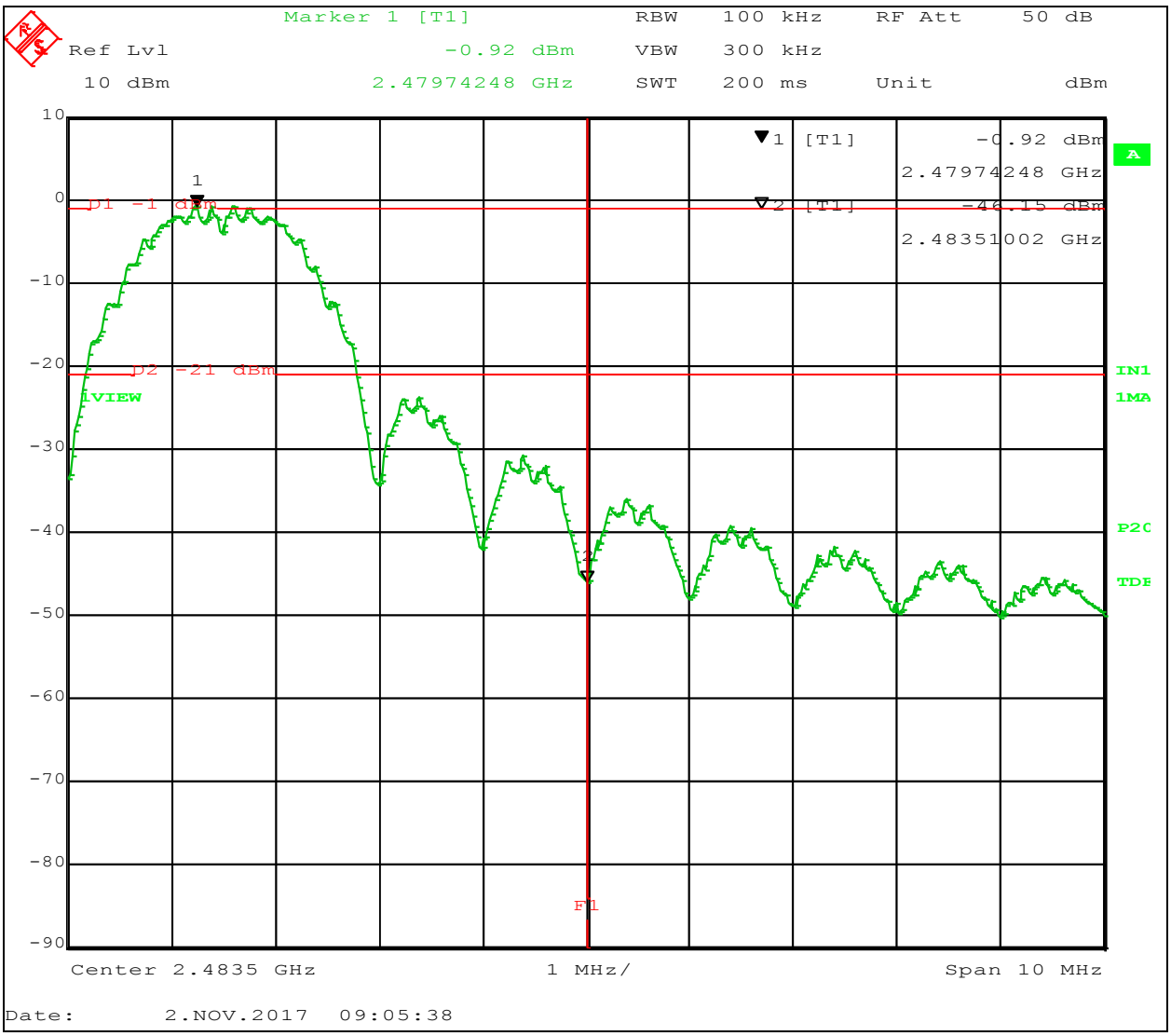


4.7.3 Band Edge Measurement Analyzer Display Captures Antenna 1

Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.7.4 Band Edge Measurement Test Data Results (11/02/2017)

Antenna 0

Channel	Measurement Frequency (GHz)	Peak Amplitude (dBm)	20 dB Limit	Lower Edge of Frequency Band (GHz)	Upper Edge of Frequency Band (GHz)	Lower Measured Frequency (GHz)	Lower Measured Amplitude (dBm)	Upper Measured Frequency (GHz)	Upper Measured Amplitude (dBm)	Results
11	2.405	-1.8	-21.8	2.4	2.4835	2.40001	-42.96			PASS
26	2.48	-1.5	-21.5	2.4	2.4835			2.4835	-47.5	PASS

Antenna 1

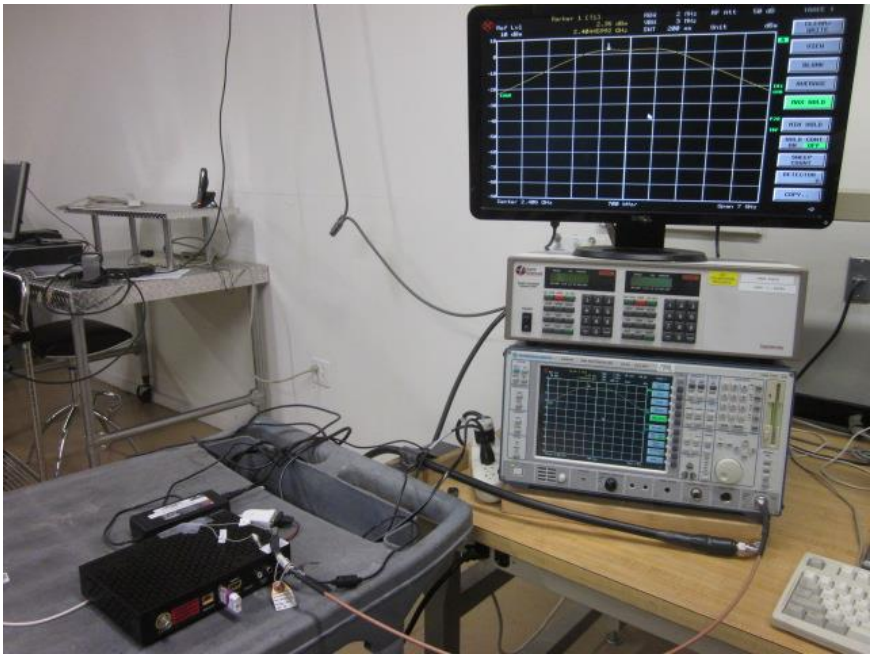
Channel	Measurement Frequency (GHz)	Peak Amplitude (dBm)	20 dB Limit	Lower Edge of Frequency Band (GHz)	Upper Edge of Frequency Band (GHz)	Lower Measured Frequency (GHz)	Lower Measured Amplitude (dBm)	Upper Measured Frequency (GHz)	Upper Measured Amplitude (dBm)	Results
11	2.405	-1.66	-21.66	2.4	2.4835	2.40003	-41.18			PASS
26	2.48	-0.92	-20.92	2.4	2.4835			2.48351	-46.16	PASS

Results: The Band Edge measurements for antenna 0 and antenna 1 of the ARRIS Model Spectrum 210A Set Top Box are compliant with the limits specified in FCC Section 15.247(d).

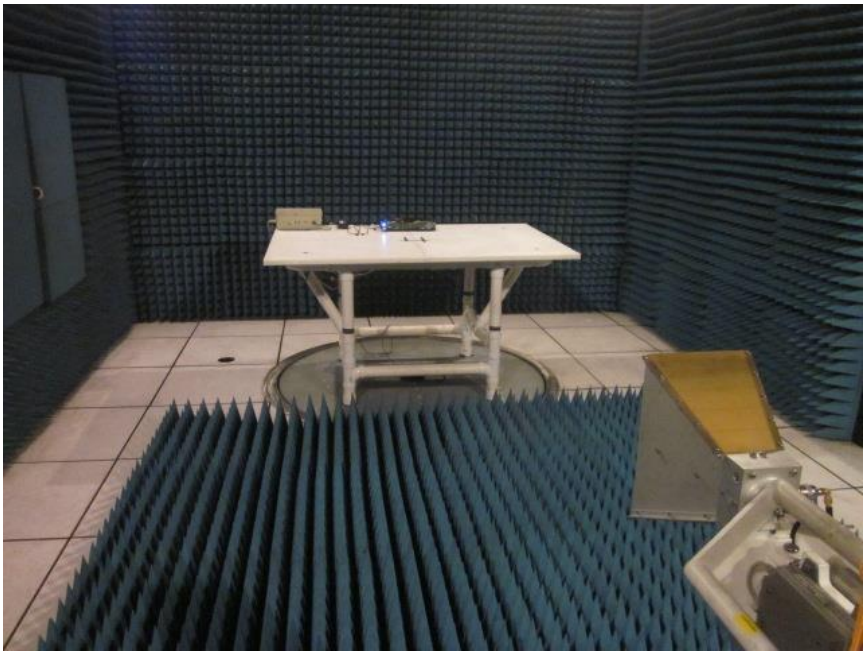
5.0 Test Setup Pictures

5.1 Conducted Emissions Power Line Test Setup Picture

5.2 Conducted Emissions Antenna Test Setup Picture



5.3 Harmonic Radiated Emissions Test Setup Pictures



Appendix A – Test Equipment

Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
EMI Receiver (20 Hz – 26.5 GHz)	Rohde & Schwarz	ESIB 26	836119/006	1010	07/01/16	2 Years	07/01/18
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A020714	882	04/01/16	2 Years	04/01/18
9kHz-3GHz EMC Analyzer	Agilent	E7402A	US39440162	883	02/16/16	2 Years	02/16/18
Amplifier (.09 – 1300 MHz)	Hewlett Packard	8447F	3313A06658	807	01/18/17	2 Years	01/18/19
EMC Analyzer (9 kHz - 1.8 GHz)	Hewlett Packard	8591EM	3536A00746	821	10/14/14	3 Years	10/14/17
GTEM (30 MHz – 1 GHz)	ETS Lindgren	5317	1014	1001	No Cal. Required	No Cal. Required	No Cal. Required
EMC Analyzer (9 kHz - 26.5 GHz)	Hewlett Packard	8593EM	3710A00214	1026	03/02/17	2 Years	03/02/19
Amplifier System (0.5 – 50 GHz)	Hewlett Packard	83015A 83017A	3123A00360 & 3332A00219	1027	10/03/16	2 Years	10/03/18
Double Ridged Horn Antenna (1 - 18 GHz)	EMCO	3115	9705-5225	1028	10/19/16	2 Years	10/19/18
Antenna (18 - 26.5 GHz)	Hewlett Packard	84125-80008	N/A	1056	10/19/16	2 Years	10/19/18

EMI Receiver (9 kHz - 6.5 GHz)	Hewlett Packard	8546A	3325A00158	761	11/05/13	3 Years	11/05/16
Four Line V-LISN	Teseq	NNB 52	253551	950	06/15/17	1 Year	06/15/18
Shielded Room #1	ETS Lindgren	12-2/2-0	4078	859	12/16/15	2 Years	12/16/17
Intentional Radiator Testing High Frequency RF Test Cable	Workhorse	WHU18-3636-036	N/A	814	12/04/14	2 Years	12/04/16
OATS Site (30 MHz – 1 GHz)	BEC	N/A	N/A	705	05/16/17	1 Year	05/16/18
Temp/Humidity Meter	Control Company	4096	151872672	780	11/19/15	2 Years	11/19/17
Software (Tile Instrument Control System)	Quantum Change/EMC Systems	Version 3	N/A	N/A	No Cal. Required	No Cal. Required	No Cal. Required
Radiated Emissions Test Software	BEC	RADE	2.2	N/A	No Cal. Required	No Cal. Required	No Cal. Required