BEC INCORPORATED

CERTIFICATION APPLICATION TEST REPORT

TEST STANDARDS:
FCC Part 15 Subpart C Intentional Radiator

ARRIS Model DCX905
Set Top Box

REPORT BEC-1751-02

TEST DATES: 10/07/2016 – 10/12/2016

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

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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	11/29/2016

1.0 Administrative Information

1.1 Project Details

Project Number	BEC-1751
Set Top Box Manufacturer	ARRIS Group Incorporated
Set Top Box Model Number	DCX905_ppr1
Set Top Box Serial Number	M11633TC5657
Set Top Box Sample Number	1751-02 (Modified With SMA Ports to the Antennas)
Set Top Box Serial Number	M11633TC5599
Set Top Box Sample Number	1751-03 (Unmodified Antennas)
FCC ID	ACQ-DCX905
Antenna Manufacturer	GreenPeak Technologies
Antenna Model Number	GP501
Frequency of Operation	2400 - 2483.5 MHz
Test Laboratory Location	BEC Incorporated 970 East High Street Pottstown, PA 19464
Test Performed For	ARRIS Group Incorporated 101 Tournament Drive Horsham, PA 19044
Test Personnel	Paul Banker / Steve Fanella
Technical Contact	Mark Hagaeli
Date Received	09/29/2016
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 DCX905 Set Top Box was tested and found to be compliant to the sections of the FCC Part 15 Subpart C standard listed below:

FCC Part 15, Subpart C Intentional Radiators	Test Description	Result
15.207(b)	Conducted Emissions, Power Leads, 150 kHz to 30 MHz	**PASS**
15.209(a)	Spurious Radiated Emissions, 30 MHz to 1 GHz	**PASS**
15.209, 15.205	Spurious Radiated Emissions, 1 GHz to 25 GHz	**PASS**
15.247(a)(2)	6 dB Occupied Bandwidth	**PASS**
15.247(b)(3)	Maximum Peak Power Output	**PASS**
15.247(d)	Antenna Port, Conducted Spurious Emissions	**PASS**
15.247(e)	Antenna Port, Power Spectral Density	**PASS**
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	3.58
Radiated Disturbance	3 m	30 MHz – 1 GHz	FCC Section 15.209	4.61

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 ARRIS DCX905 is an IP Video Gateway (next-gen, set-top technology). It is a high-definition set-top with multiple 1 GHz tuners that support both MPEG-2 and MPEG-4 AVC services. The all-digital DCX905 includes the latest audio and video output interfaces, including HDMI™, Award-winning Dolby® Digital Plus audio and Dolby Volume Leveling. With the included MoCA® home networking, the DCX905 provides the flexibility to serve as a multimedia client for accessing content from other compatible devices in the home. An embedded DOCSIS 2.0+ cable modem provides support for DSG and downstream channel bonding.

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

2.6 Test Configuration

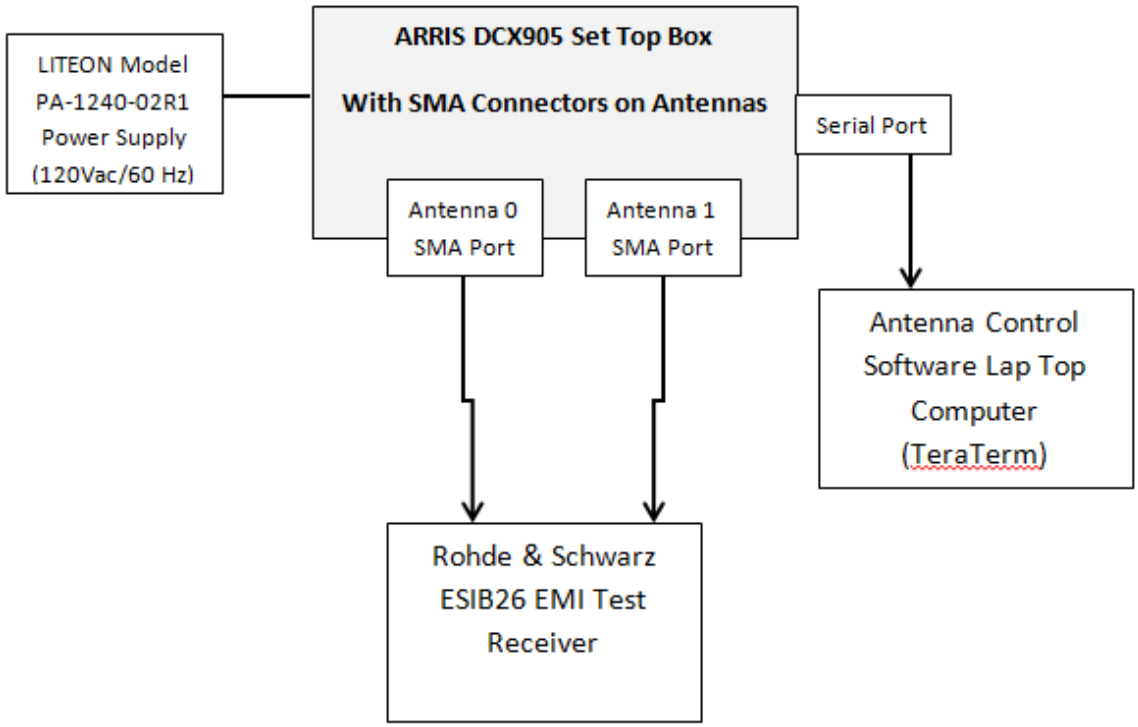
The antennas within the ARRIS DCX905 set top box were controlled by software which allowed the test technician to select the specific antenna within the EUT, designate the specific Channel Frequency, control the antenna power and control the antenna modulation (on/off).

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.

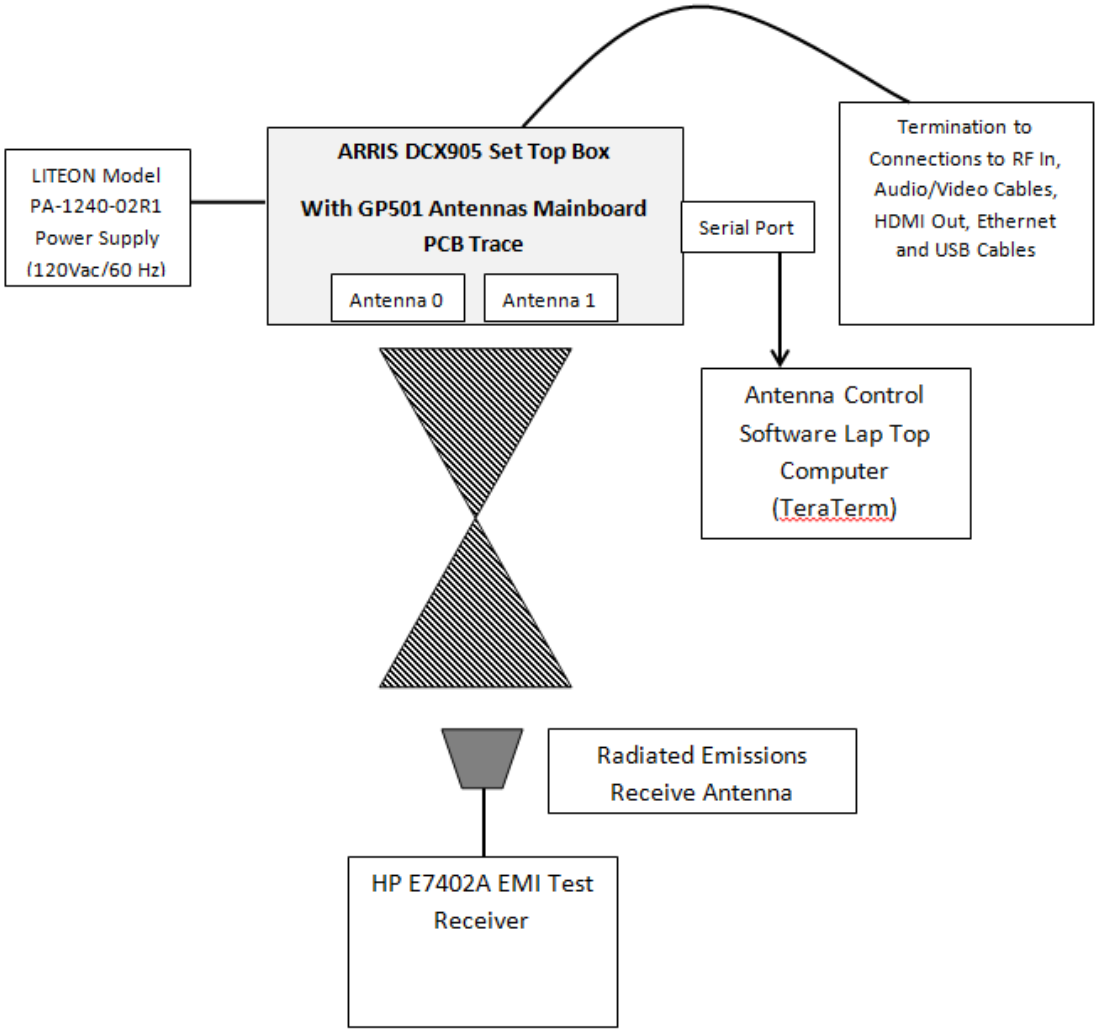
2.8 Test Configuration Diagram (Conducted Measurements)

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	DCX905_ppr1a (RF4CE)	M11633TC5657	1751-02
Set Top Box (Unmodified Antennas)	ARRIS	DCX905_ppr1a (RF4CE)	M11633TC5599	1751-03

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 Video	Acoustic Research/PR161	95% braid w/100% aluminum Mylar foil	6 Ft	Audio & Video Out Ports
HDMI	Rocketfish	Braid over foil	1.3 m	HDMI Port
75-Ohm Coax	Belden-T 9114 Duobond	Double Braid	1 m	RF In and RF Out
Ethernet CAT5	Siemon Co. / MC5-8-T-07-20	Mylar foil	7 Ft	Ethernet Port
USB	Hannstar/E52534-D	Braid over foil	2 m	USB Port

Support Equipment

Description	Manufacturer	Model	Serial Number
AC/DC Power Convertor for DCX905 Set Top Box	Liteon	PA-1240-02R1	524475080991629000207
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

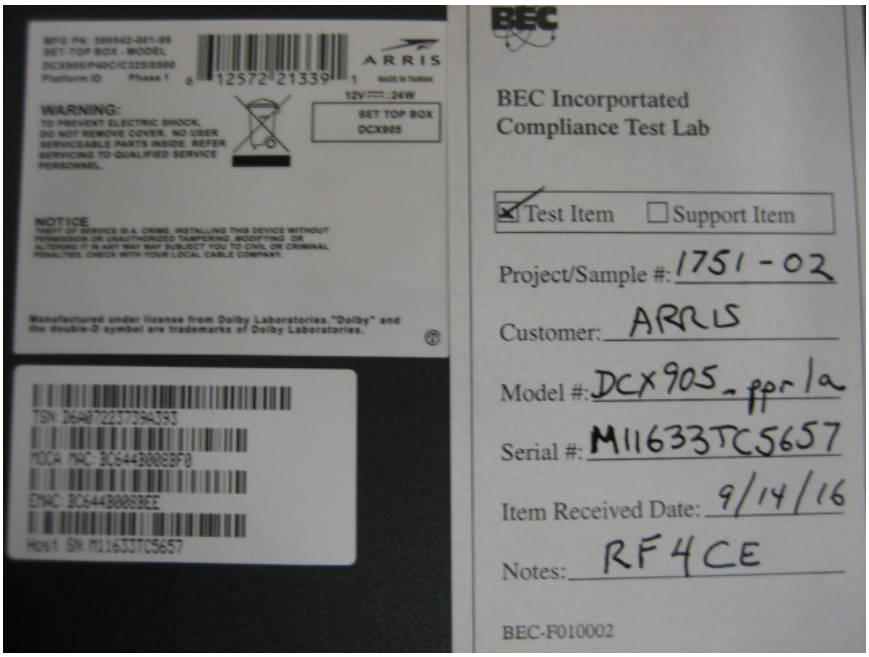
No modifications were made to the ARRIS DCX905 set top box.

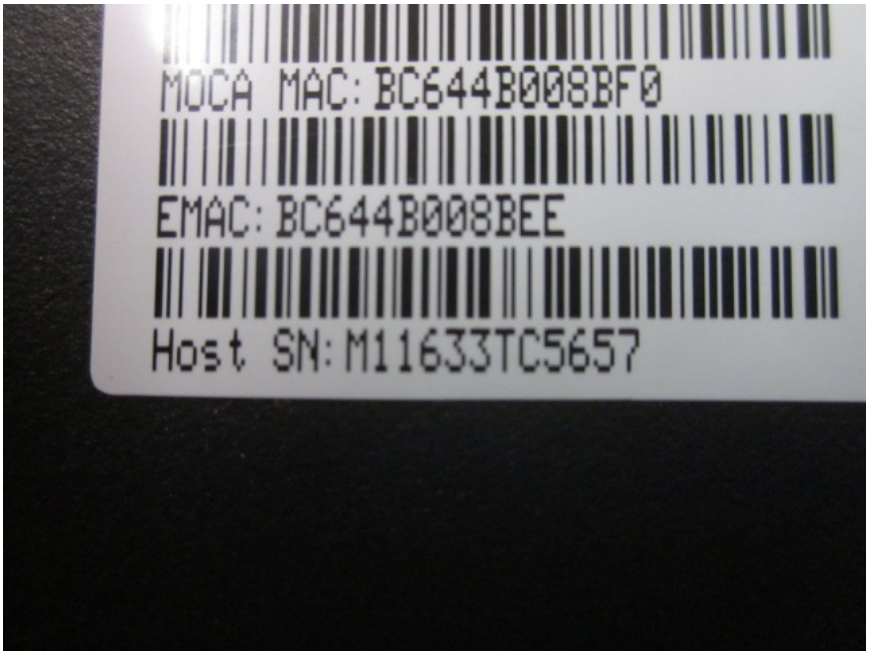
2.14 EUT Pictures

ARRIS MODEL DCX905 SET TOP BOX

ARRIS MODEL DCX905 SET TOP BOX SAMPLE 1751-02 MODIFIED ANTENNA UNIT

ARRIS MODEL DCX905 SET TOP BOX SAMPLE 1751-02 MODIFIED ANTENNA UNIT


ARRIS
WARNING:
SET TOP BOX
DCX905
NOTICE
BEC Incorporated
Compliance Test Lab
Test Item
Support Item
Project/Sample #: 1751-02
Customer: ARRIS
Model #: DCX905-ppr1a
Serial #: M11633TC5657
Item Received Date: 9/14/16
Notes: RF4CE
BEC-F010002


MOCA MAC: BC644B008BF0
EMAC: BC644B008BEE
Host SN: M11633TC5657

ARRIS MODEL DCX905 SET TOP BOX SAMPLE 1751-03 UN-MODIFIED ANTENNA UNIT

ARRIS MODEL DCX905 SET TOP BOX SAMPLE 1751-03 UN-MODIFIED ANTENNA UNIT

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:

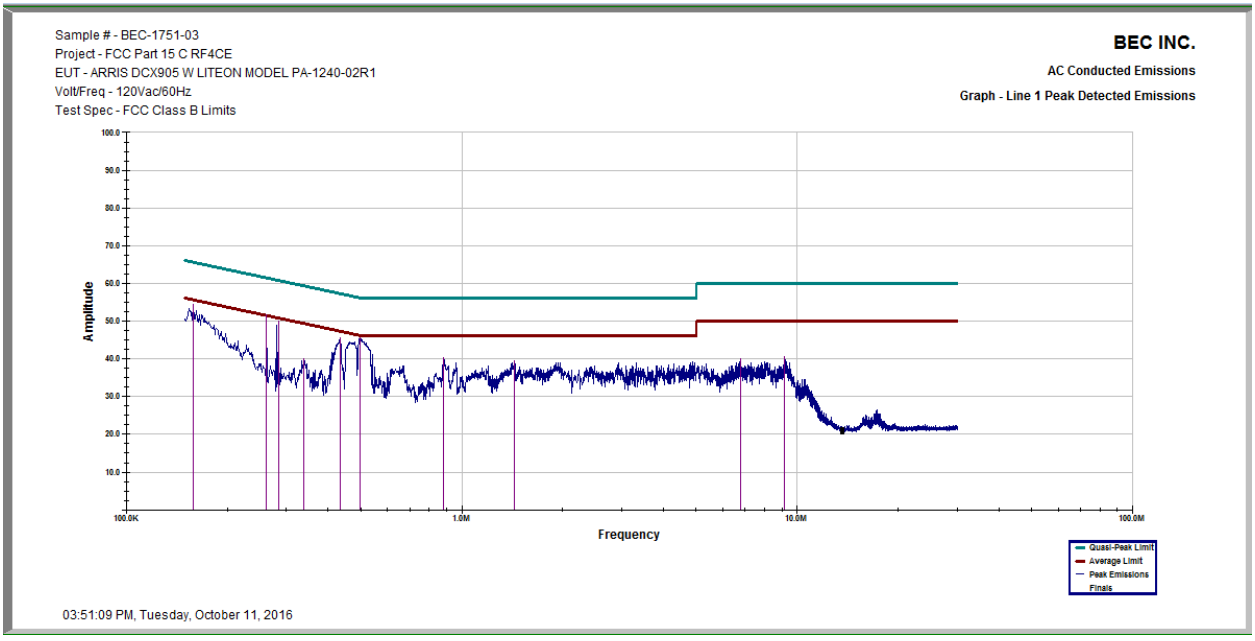
Emission (dBμV) = Meter Reading (dBμv) + Cable Loss (dB) + LISN Factor (dB) + Limiter Loss (dB)

4.1.2 Conducted Emissions Test Results DCX905 with LITEON Model PA-1240-02R1 Power Supply (10/11/2016)

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 LITEON Model PA-1240-02R1 supply was powered at 120Vac/60 Hz.

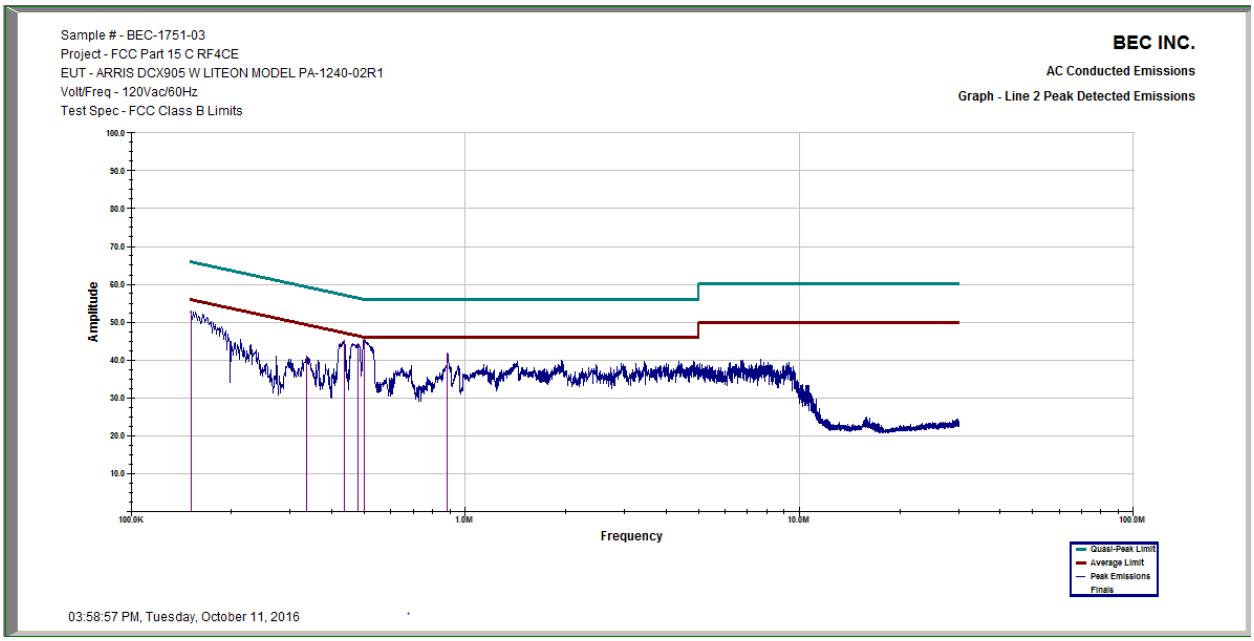
BEC INC.
Line 1 Conducted Emissions
03:51:05 PM, Tuesday, October 11, 2016

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
157.157 KHz	35.87	55.80	-19.92	49.74	65.80	-16.06	0.130
263.472 KHz	21.48	52.76	-31.28	34.27	62.76	-28.49	0.120
287.212 KHz	28.89	52.08	-23.19	35.55	62.08	-26.53	0.120
336.754 KHz	35.34	50.66	-15.32	36.74	60.66	-23.93	0.127
433.848 KHz	33.31	47.89	-14.58	42.87	57.89	-15.02	0.137
494.193 KHz	30.49	46.17	-15.67	44.14	56.17	-12.02	0.131
884.910 KHz	33.53	46.00	-12.47	38.59	56.00	-17.41	0.168
1.423 MHz	24.93	46.00	-21.07	36.07	56.00	-19.93	0.190
6.829 MHz	28.82	50.00	-21.18	34.63	60.00	-25.37	0.423
9.169 MHz	30.12	50.00	-19.88	35.64	60.00	-24.36	0.582
Sample # - BEC-1751-03							
Project - FCC Part 15 C RF4CE							
EUT - ARRIS DCX905 W LITEON MODEL PA-1240-02R1							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits							



BEC INC.
Line 2 Conducted Emissions
03:58:55 PM, Tuesday, October 11, 2016

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
150.041 KHz	38.310	55.999	-17.689	51.640	65.999	-14.359	0.130
335.085 KHz	34.597	50.712	-16.115	37.907	60.712	-22.805	0.137
432.007 KHz	34.529	47.943	-13.414	37.846	57.943	-20.096	0.146
474.223 KHz	35.235	46.736	-11.501	42.865	56.736	-13.871	0.145
495.133 KHz	31.428	46.139	-14.711	44.221	56.139	-11.918	0.141
885.540 KHz	34.099	46.000	-11.901	39.029	56.000	-16.971	0.169
Sample # - BEC-1751-03							
Project - FCC Part 15 C RF4CE							
EUT - ARRIS DCX905 W LITEON MODEL PA-1240-02R1							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits							



Results: All conducted emissions measured on the AC power line of the LITEON Model PA-1240-02R1 supply are below the limits specified in FCC Section 15.207 by a margin of at least 11.5 dB.

4.2 Spurious Radiated Emissions, 1 GHz 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 GP501 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 1GHz to 25 GHz Test Results (10/10/2016 through 10/12/2016)

The following table 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.

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	Average Limit	Average Margin	Comment
(GHz)	dBuV/m	dBuV/m	H/V	Degrees	cm	dBm^{-1}	dBuV/m	dB	PASS/FAIL
2.99177	47.20	31.64	V	082	100	-2.44	53.98	-22.34	PASS
2.99978	46.65	32.49	H	112	100	-2.40	53.98	-21.49	PASS
3.20017	47.54	45.62	V	043	112	-1.68	53.98	-8.36	PASS
4.80888	39.21	33.21	V	220	143	2.27	53.98	-20.77	PASS
4.81102	39.83	33.74	H	317	129	2.28	53.98	-20.24	PASS
5.40004	47.41	44.58	H	077	099	4.04	53.98	-9.40	PASS

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	Average Limit	Average Margin	Comment
(GHz)	dBuV/m	dBuV/m	H/V	Degrees	cm	dBm^{-1}	dBuV/m	dB	PASS/FAIL
3.59641	47.90	44.60	V	193	101	-0.29	53.98	-9.38	PASS
4.50006	48.67	45.77	V	087	100	1.10	53.98	-8.21	PASS
4.79526	51.45	49.63	V	275	102	2.22	53.98	-4.35	PASS
4.89083	36.35	28.13	H	314	204	2.59	53.98	-25.85	PASS
4.89104	40.48	34.44	V	263	102	2.59	53.98	-19.54	PASS
5.39999	52.23	48.87	V	325	117	4.04	53.98	-5.11	PASS
5.4003	48.16	45.38	H	075	101	4.04	53.98	-8.60	PASS

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	Average Limit	Average Margin	Comment
(GHz)	dBuV/m	dBuV/m	H/V	Degrees	cm	dBm^{-1}	dBuV/m	dB	PASS/FAIL
3.59644	47.33	44.35	V	198	101	-0.29	53.98	-9.63	PASS
4.7951	47.14	43.74	H	182	101	2.22	53.98	-10.24	PASS
4.79516	52.28	50.12	V	275	107	2.22	53.98	-3.86	PASS
4.95886	39.47	33.43	V	264	099	2.84	53.98	-20.55	PASS
5.40007	49.24	45.85	H	076	101	4.04	53.98	-8.13	PASS
5.40008	53.34	48.62	V	043	132	4.04	53.98	-5.36	PASS

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	Average Limit	Average Margin	Comment
(GHz)	dBuV/m	dBuV/m	H/V	Degrees	cm	dBm^{-1}	dBuV/m	dB	PASS/FAIL
4.50000	50.33	46.37	V	035	110	1.10	53.98	-7.61	PASS
4.79521	48.91	45.41	V	149	100	2.22	53.98	-8.57	PASS
4.80889	33.79	27.28	V	088	209	2.27	53.98	-26.70	PASS
4.81094	36.88	30.62	H	052	127	2.28	53.98	-23.36	PASS
5.39990	45.00	43.17	H	086	101	4.04	53.98	-10.81	PASS
5.40001	54.23	49.87	V	352	123	4.04	53.98	-4.12	PASS

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	Average Limit	Average Margin	Comment
(GHz)	dBuV/m	dBuV/m	H/V	Degrees	cm	dBm^{-1}	dBuV/m	dB	PASS/FAIL
3.59652	49.18	44.09	V	268	115	-0.29	53.98	-9.89	PASS
4.79532	51.12	47.75	V	277	110	2.22	53.98	-6.23	PASS
4.88891	36.43	30.47	H	050	119	2.58	53.98	-23.51	PASS
4.88896	37.85	31.50	V	154	110	2.58	53.98	-22.48	PASS
5.40003	50.30	49.05	V	351	122	4.04	53.98	-4.93	PASS
5.40013	47.57	44.17	H	295	102	4.04	53.98	-9.82	PASS

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

Frequency	Peak Level	Average Level	Antenna Polarity	Turntable Angle	Antenna Height	Correction Factor	Average Limit	Average Margin	Comment
(GHz)	dBuV/m	dBuV/m	H/V	Degrees	cm	dBm^{-1}	dBuV/m	dB	PASS/FAIL
3.59648	49.74	44.95	V	273	101	-0.29	53.98	-9.03	PASS
4.50000	48.85	46.18	V	036	113	1.10	53.98	-7.81	PASS
4.79522	47.39	44.36	V	146	145	2.22	53.98	-9.62	PASS
4.95890	36.50	30.52	V	151	112	2.84	53.98	-23.46	PASS
5.39998	53.83	51.68	V	351	120	4.04	53.98	-2.30	PASS
5.40023	49.74	46.20	H	147	101	4.04	53.98	-7.78	PASS

Results: All harmonic spurious radiated emissions as recorded at a distance of 3 meters from the ARRIS Model DCX905 Set Top Box are below the 3 meter limit specified by FCC Section 15.209 requirements by a margin of at least 2.30 dB.

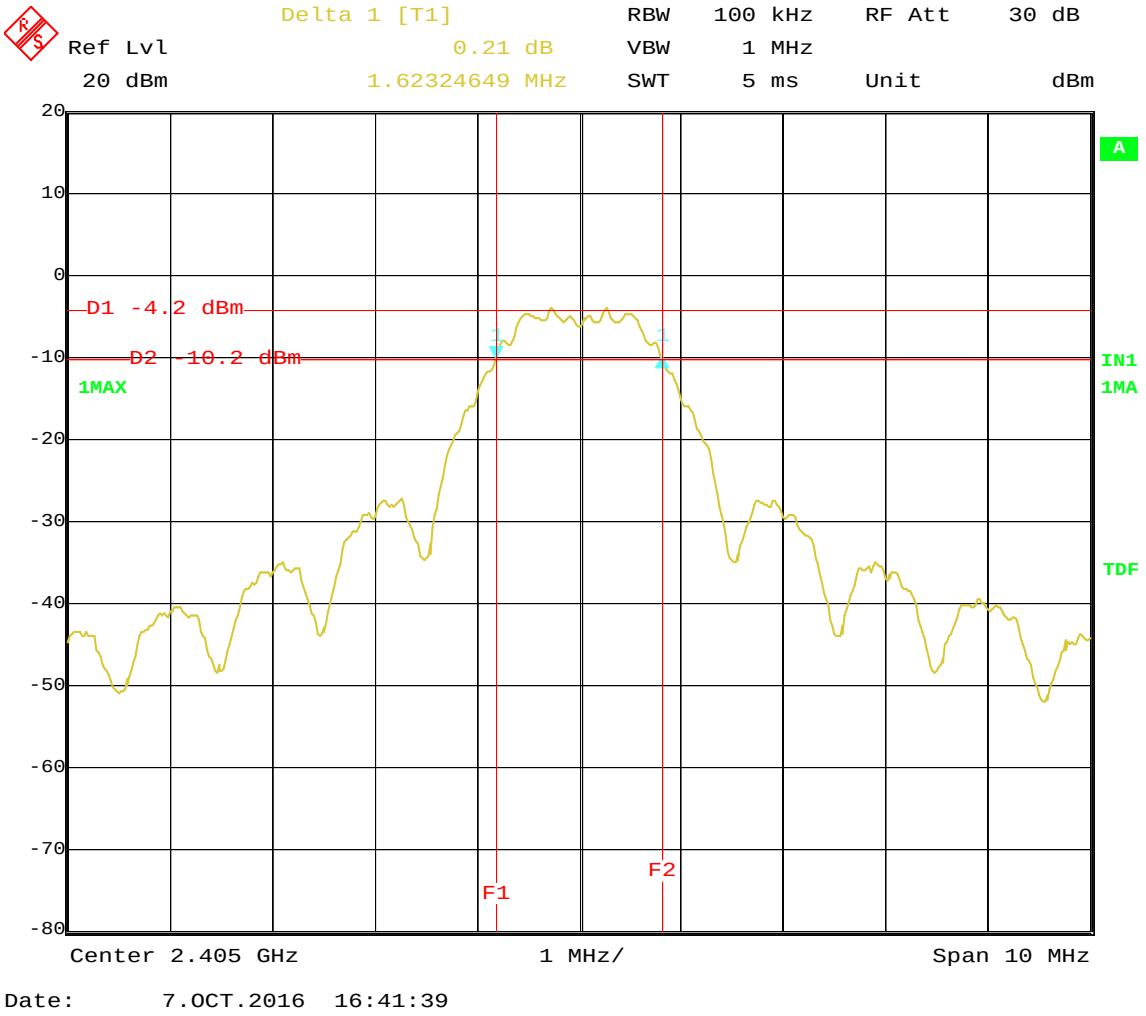
4.3 6 dB Occupied Bandwidth. FCC Section 15.247(a)(2)

4.3.1 6 dB Occupied Bandwidth – Test Procedure

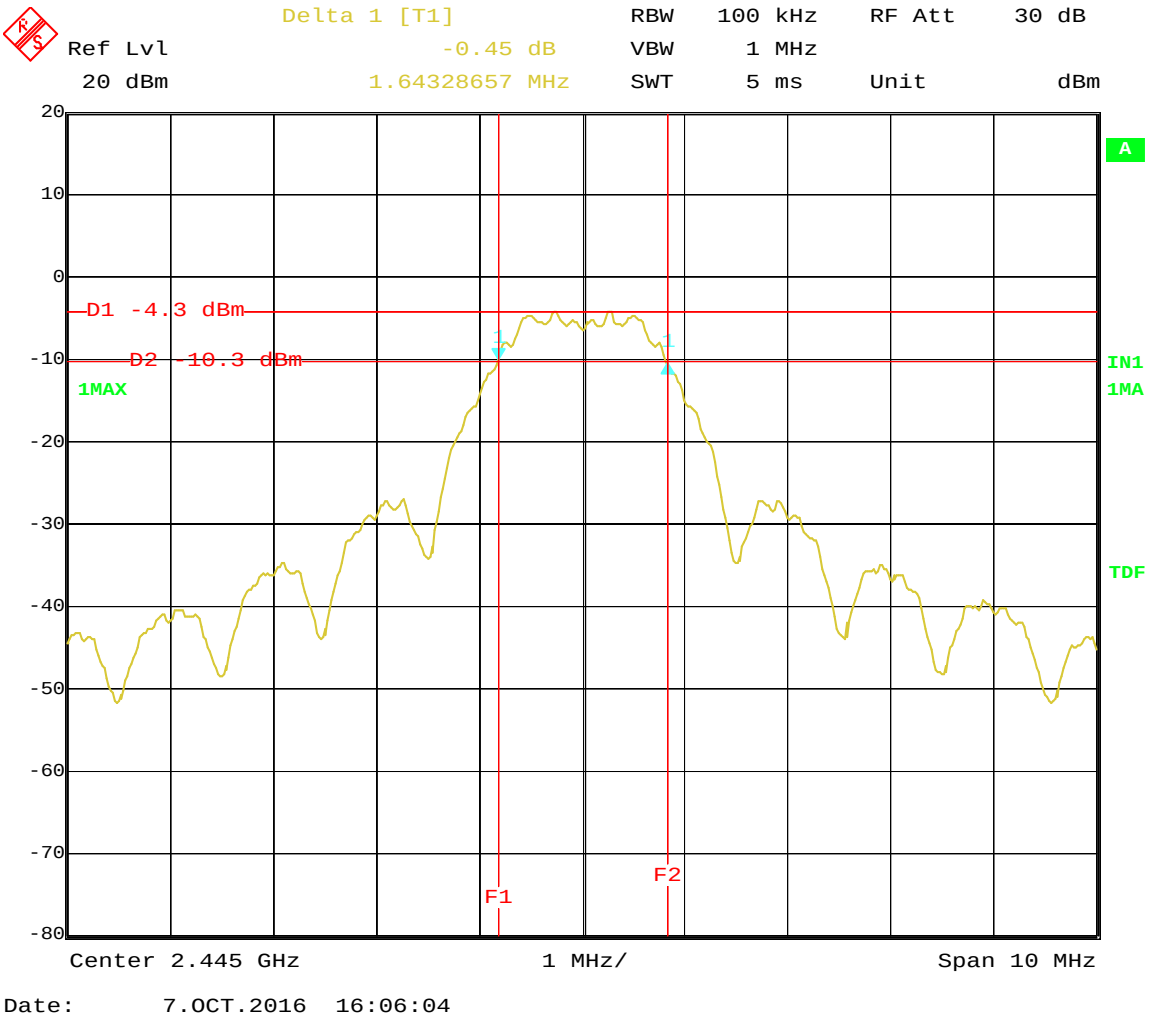
The minimum 6 dB bandwidths per FCC Section 15.247(a)(2) were measured using a 50 Ohm EMI Test Receiver with settings of 100 kHz resolution bandwidth and 300 kHz video bandwidth. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal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

4.3.2 6 dB Occupied Bandwidth Analyzer Display Captures Antenna 0

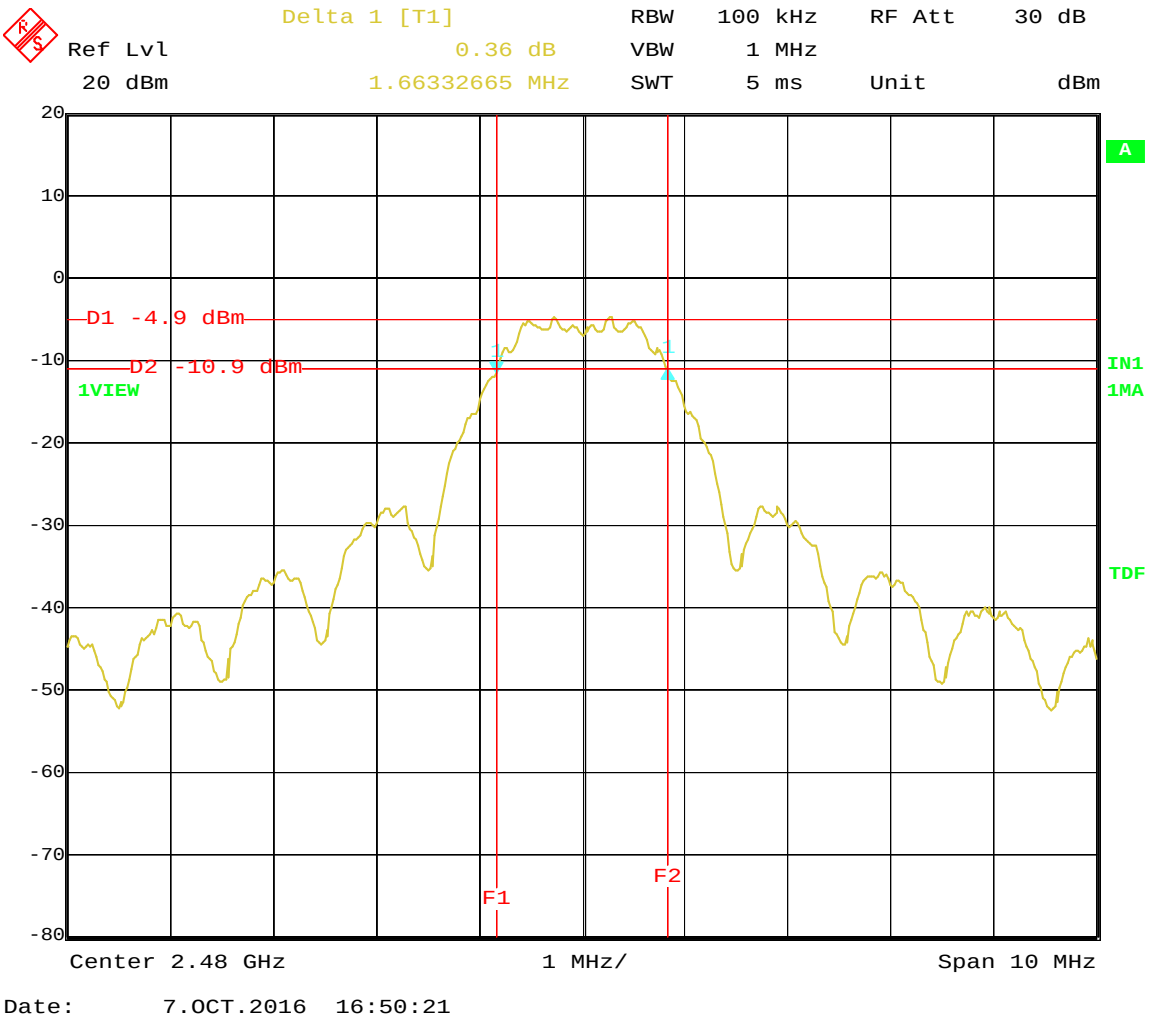
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

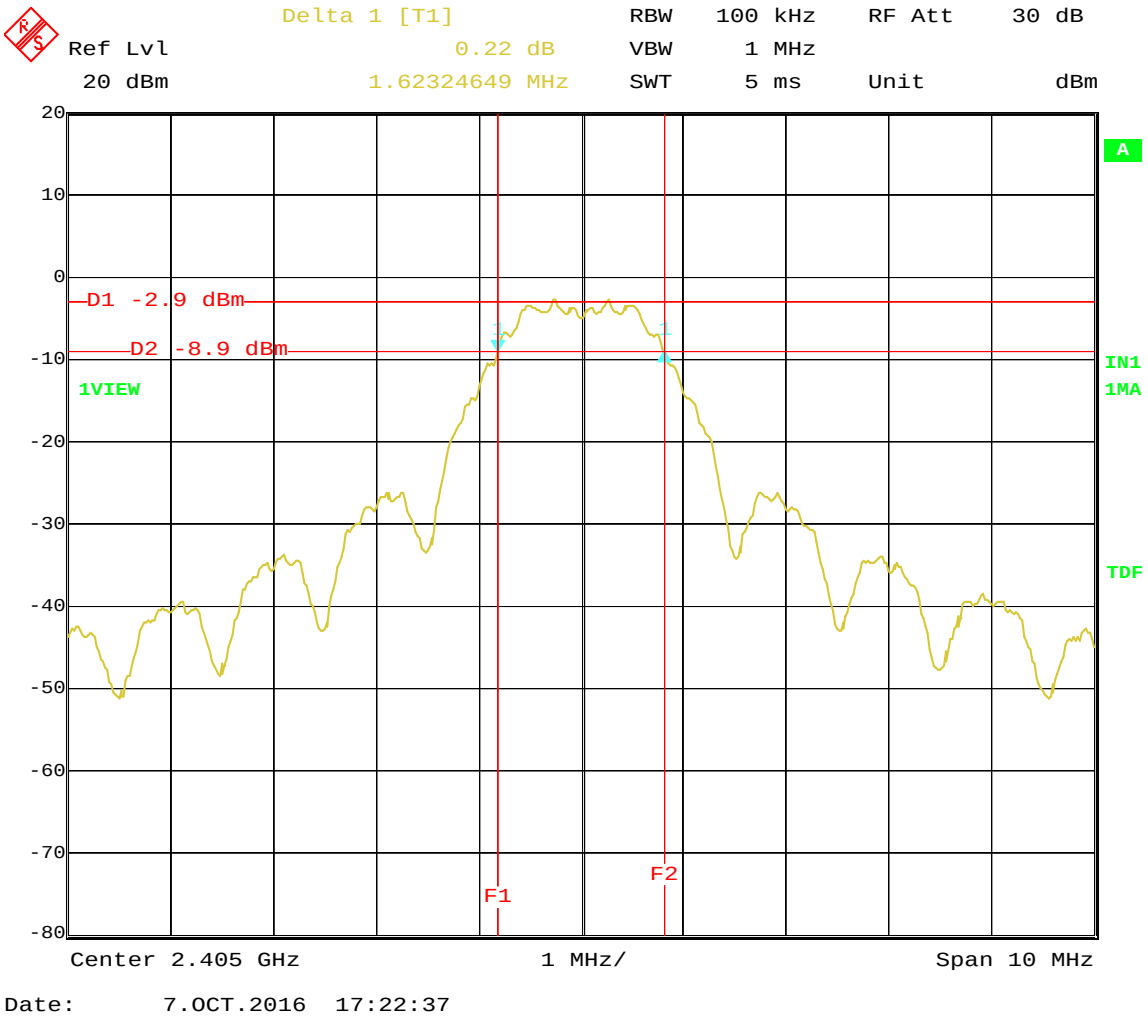


Antenna 0, Channel 26 (2.480 GHz)

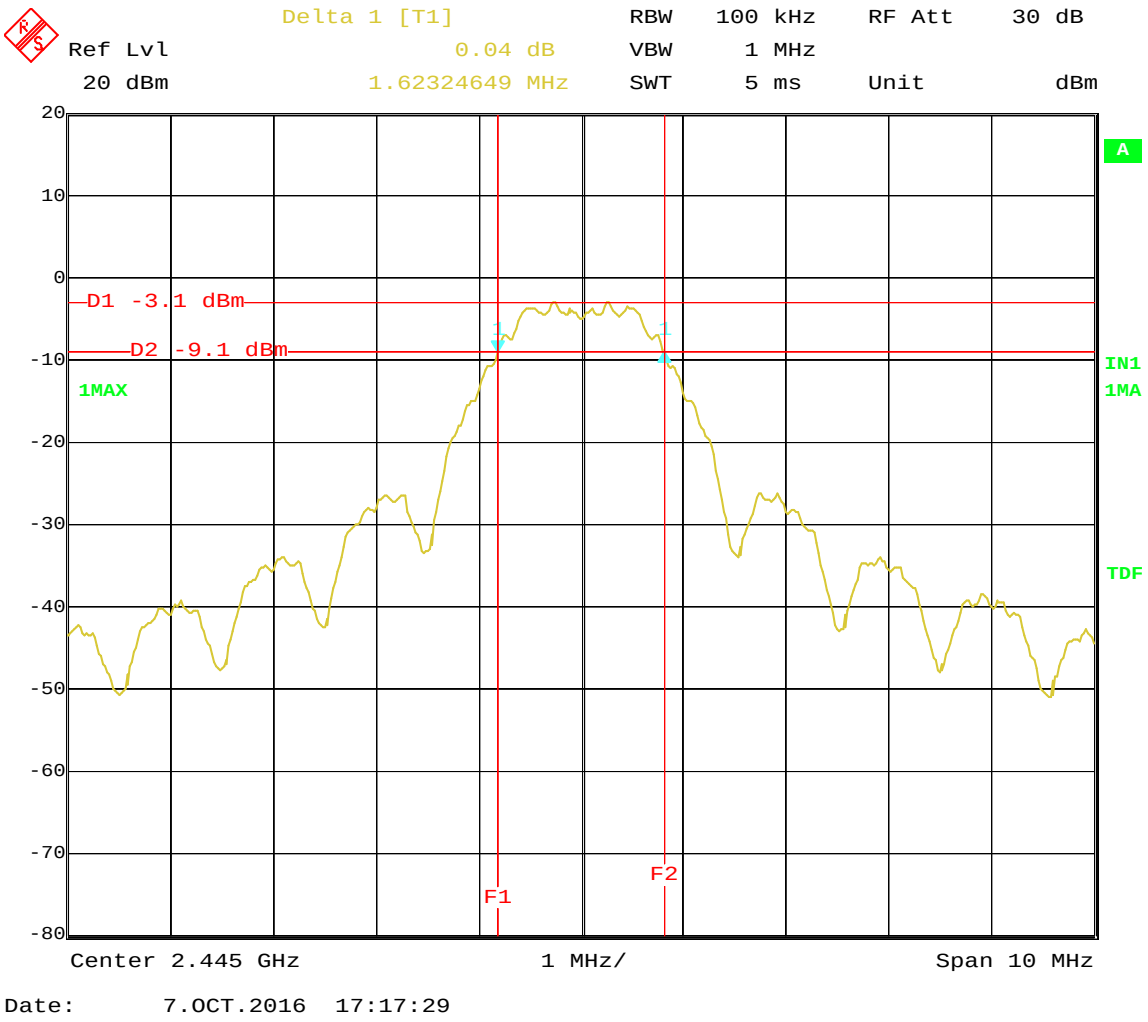


4.3.3 6 dB Occupied Bandwidth Analyzer Display Captures Antenna 1

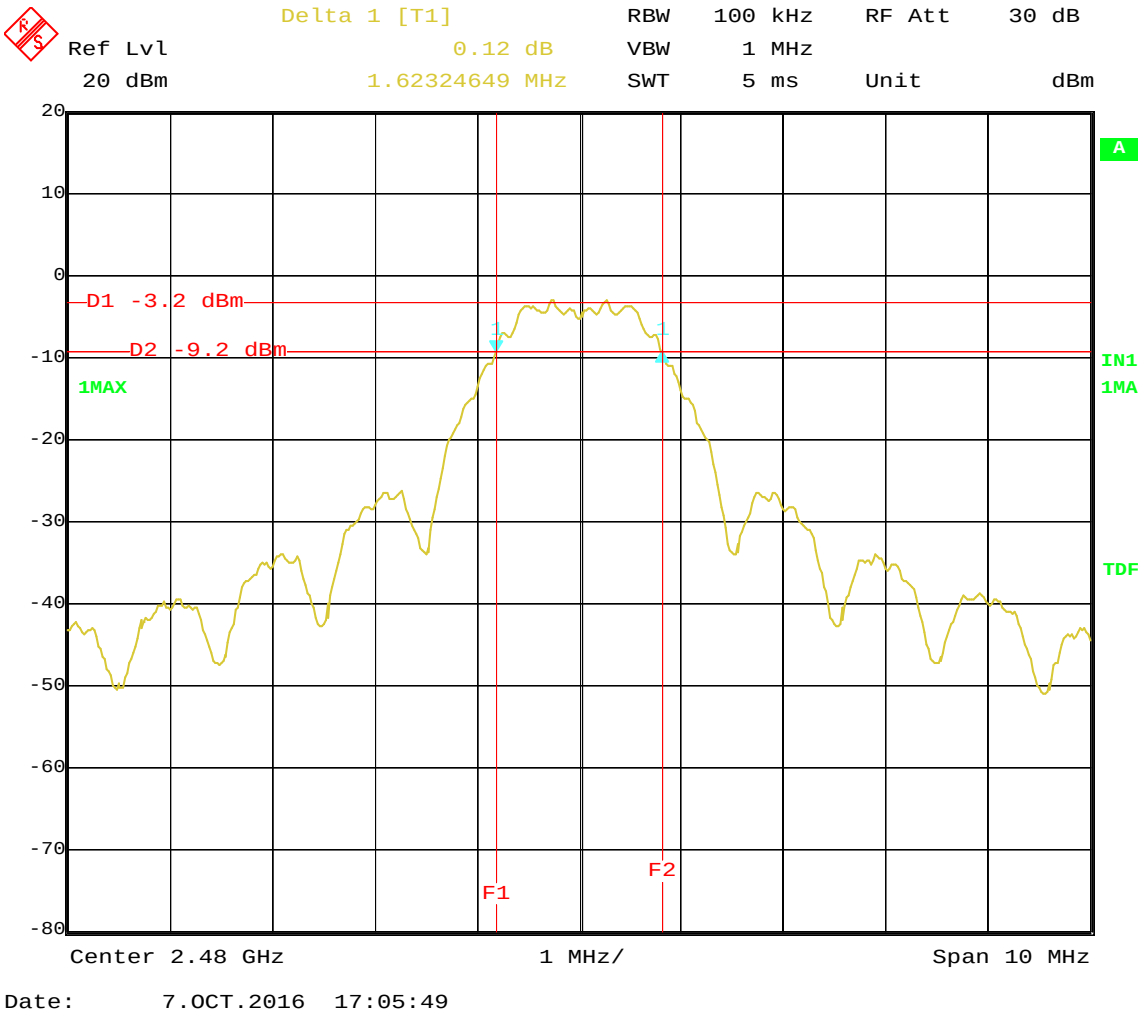
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.3.4 6 dB Occupied Bandwidth Test Results (10/07/2016)

Antenna 0

Antenna Number	Freq (GHz)	6 - dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
0	2.405	1.6232	0.5	PASS
0	2.445	1.6432	0.5	PASS
0	2.480	1.6633	0.5	PASS

Antenna 1

Antenna Number	Freq (GHz)	6 - dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/Fail
1	2.405	1.6232	0.5	PASS
1	2.445	1.6232	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 DCX905 Set Top Box are compliant with the limits specified in FCC Section 15.247(a)(2).

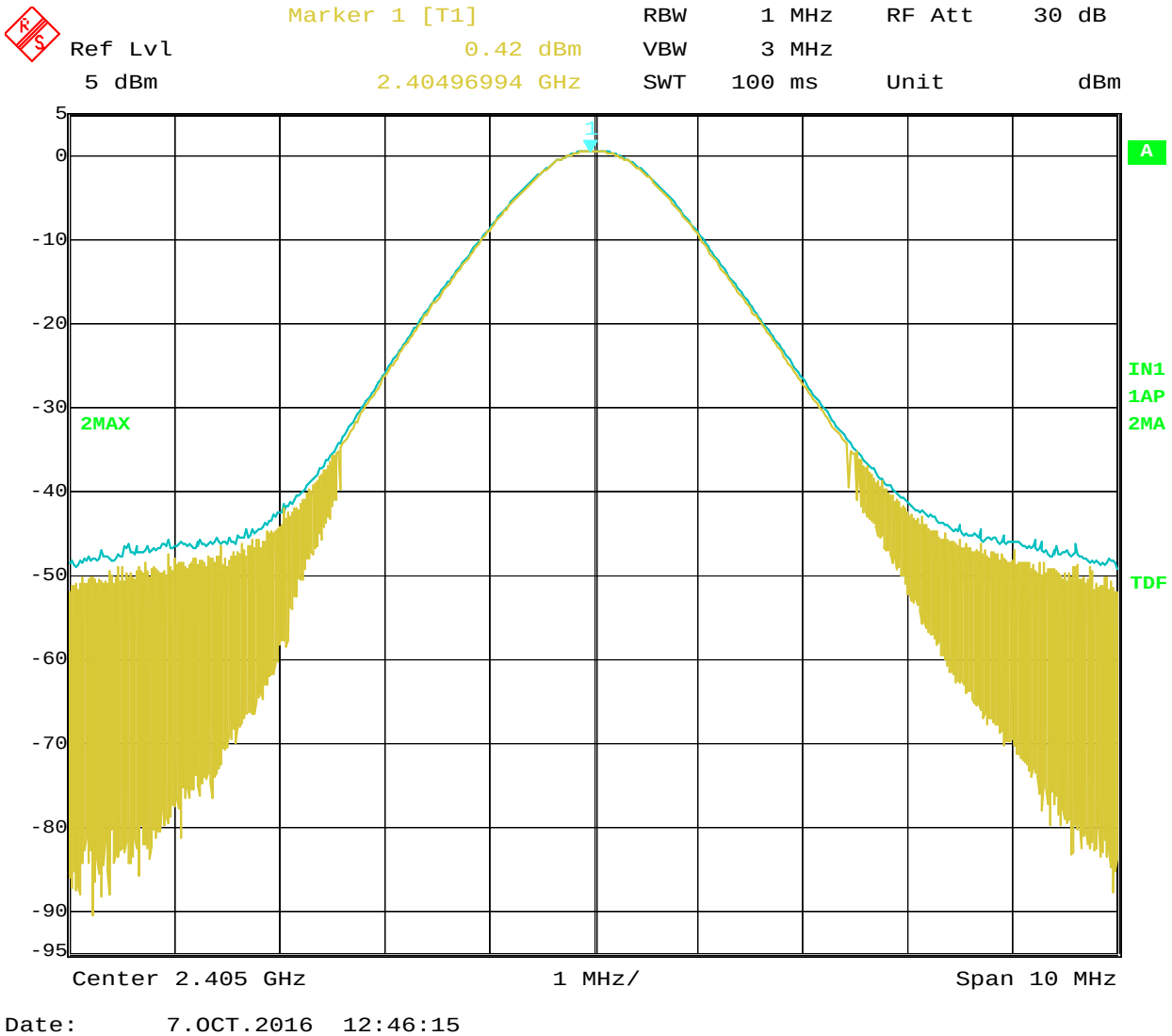
4.4 Maximum Peak Power Output FCC Section 15.247(b)(3)

4.4.1 Maximum Peak Power Output Test Procedure

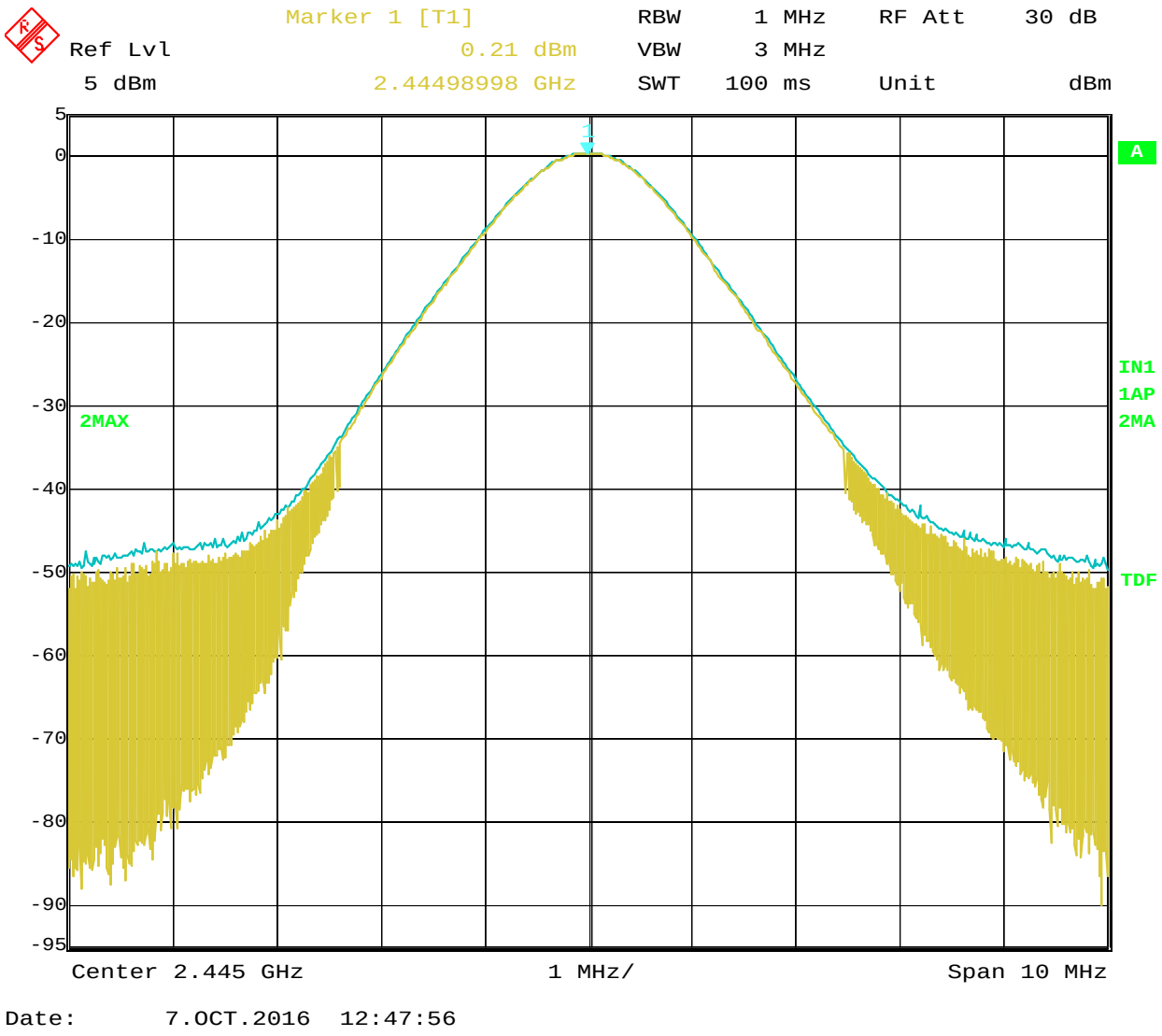
A conducted power measurement of the output frequency was measured for both Antenna 0 and Antenna 1. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized without modulation. Signal was measured with no modulation since the peak of the signal was higher when modulation was turned off.

4.4.2 Maximum Peak Power Output Analyzer Display Captures Antenna 0

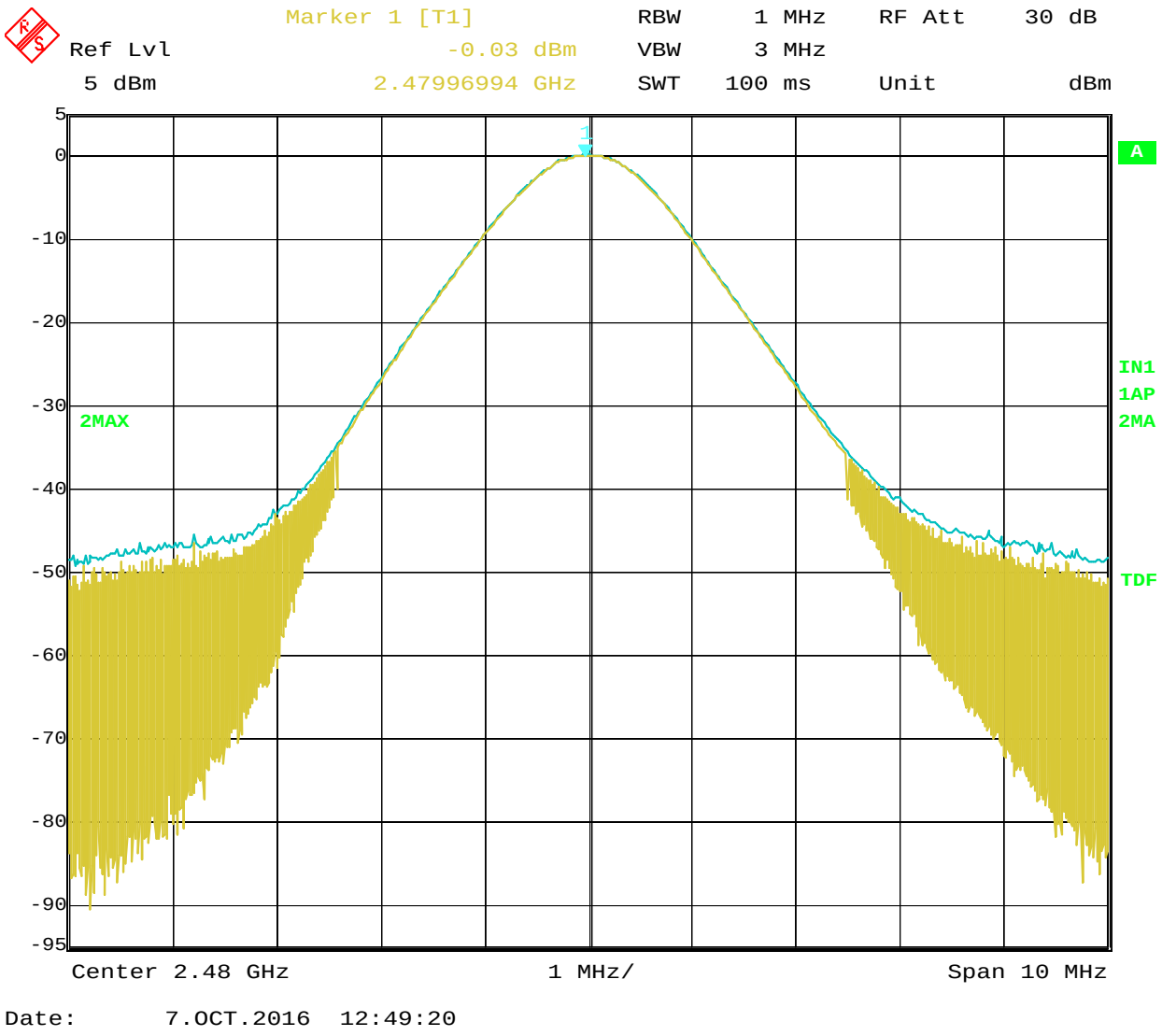
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

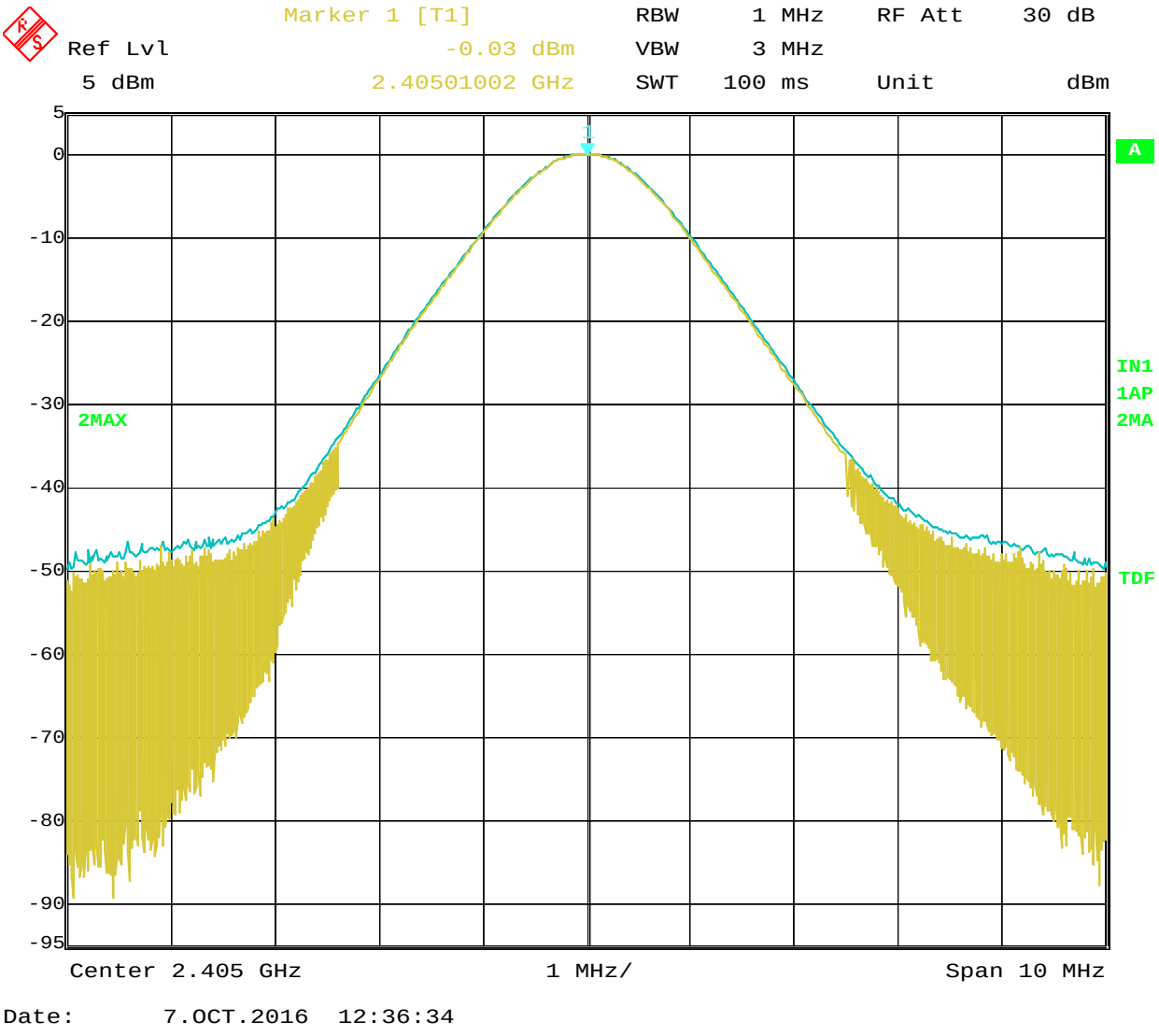


Antenna 0, Channel 26 (2.480 GHz)

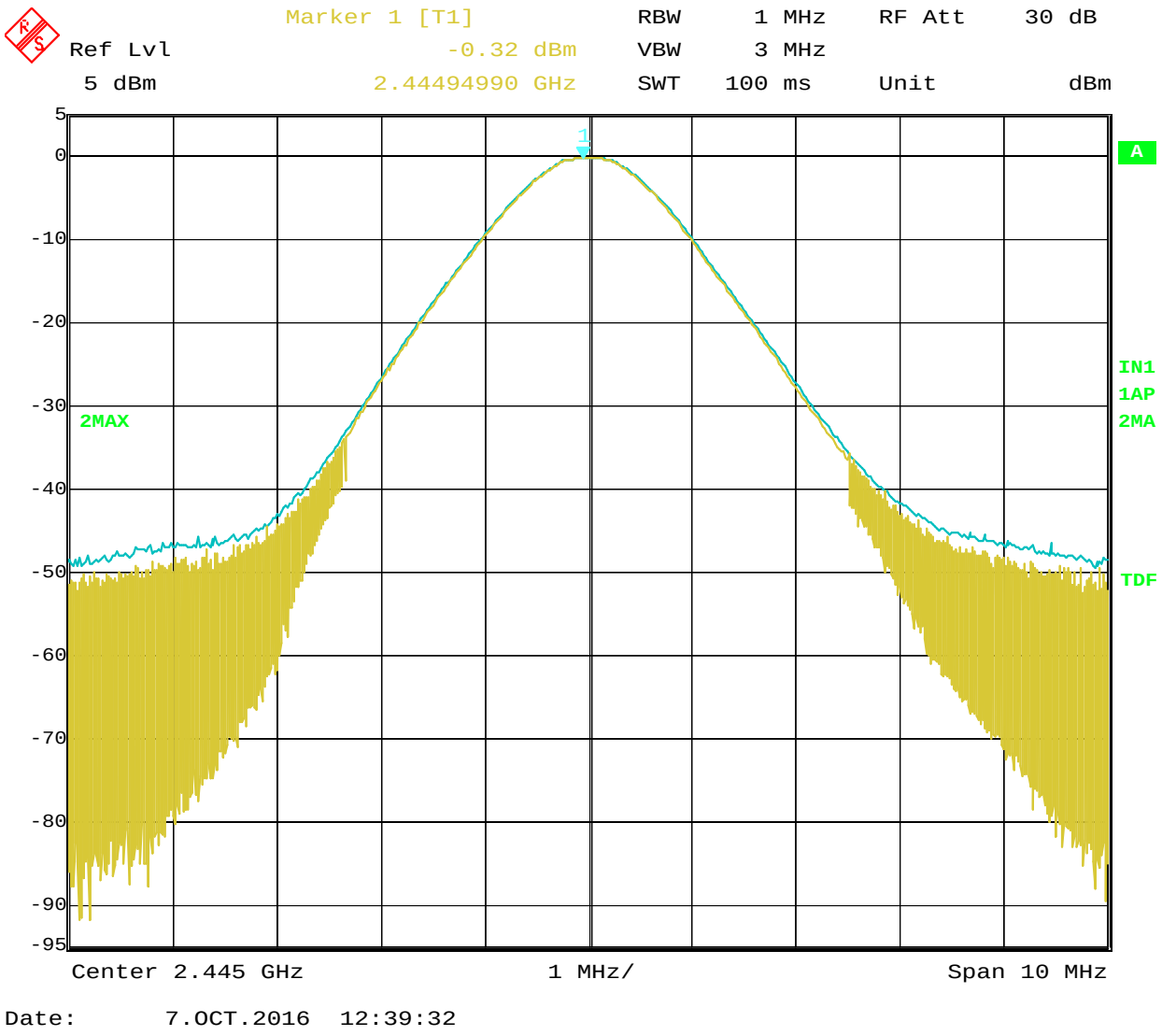


4.4.3 Maximum Peak Power Output Analyzer Display Captures Antenna 1

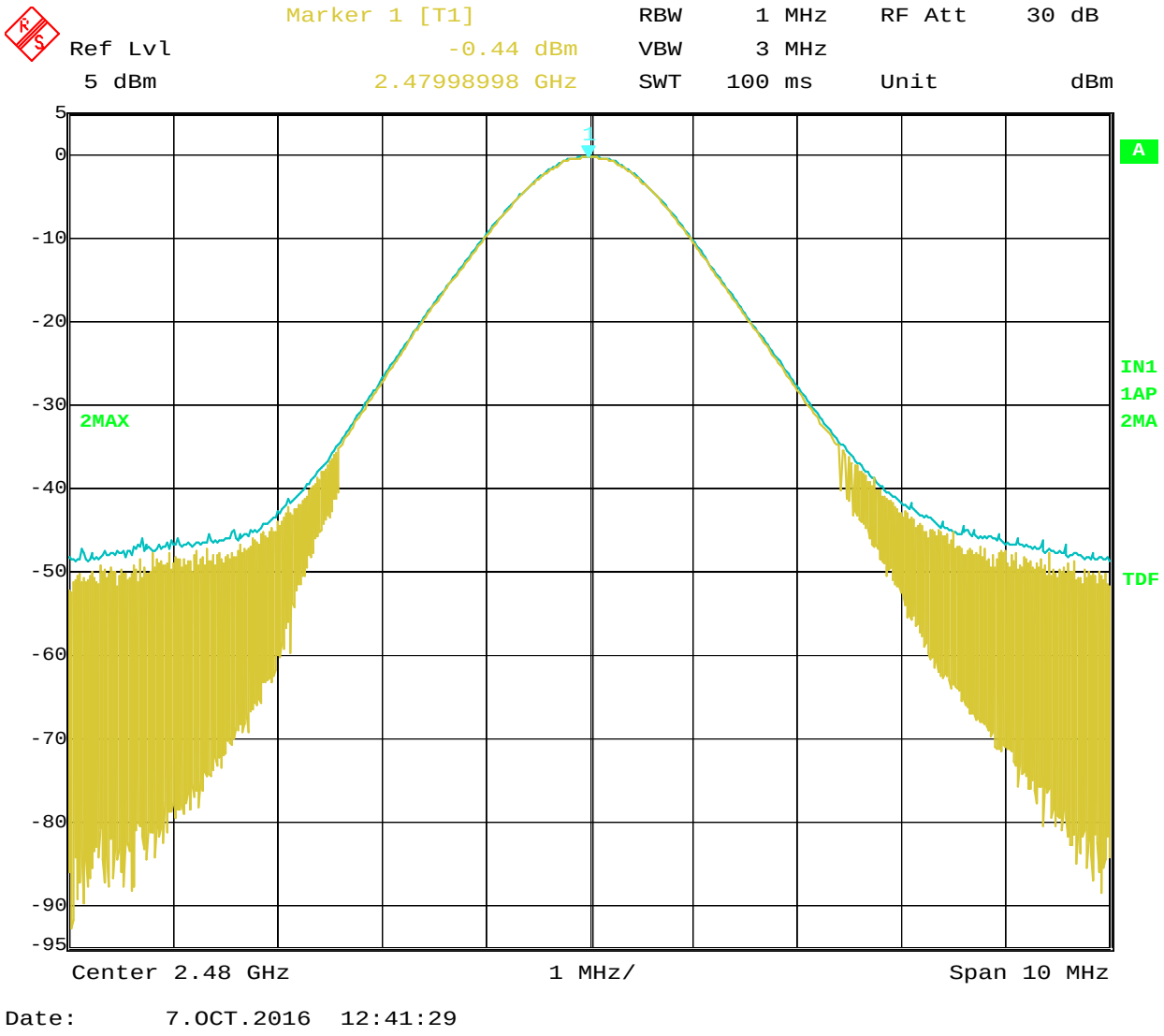
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.4.4 Maximum Peak Power Output Test Results (10/07/2016)

Antenna 0

Frequency GHz	Measured Level dBm	Cable Loss dB	Total		Limit		Margin	
			dBm	Watts	dBm	Watts	dBm	Watts
2.405	0.42	0.6	1.02	0.00126	30	1	-28.98	-0.99874
2.445	0.21	0.6	0.81	0.00121	30	1	-29.19	-0.99879
2.480	-0.03	0.6	0.57	0.00114	30	1	-29.43	-0.99886

Antenna 1

Frequency GHz	Measured Level dBm	Cable Loss dB	Total		Limit		Margin	
			dBm	Watts	dBm	Watts	dBm	Watts
2.405	-0.03	0.6	0.57	0.00114	30	1	-29.43	-0.99886
2.445	-0.32	0.6	0.28	0.00107	30	1	-29.72	-0.99893
2.480	-0.44	0.6	0.16	0.00104	30	1	-29.84	-0.99896

Results: The Peak Power Output measurements for antenna 0 and antenna 1 of the ARRIS Model DCX905 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.

4.5.2 Antenna Conducted Spurious Emissions Test Results (10/10/2016)

Antenna 0

Channel	Fundamental Channel Freq (GHz)	Freq (GHz)	Measured Level (dBm)	#814 Cable Loss (dB)	Total Corrected Level (dBm)	Output Spurious Limit (dBm)	Pass/Fail
11	2.405	4.7795	-63.24	0.9	-62.34	-21.84	PASS
11	2.405	12.0140	-60.45	1.4	-59.05	-21.84	PASS
11	2.405	No other harmonics to 24 GHz					
19	2.445	4.8957	-65.8	0.9	-64.9	-21.99	PASS
19	2.445	12.2064	-60.13	1.4	-58.73	-21.99	PASS
19	2.445	No other harmonics to 24 GHz					
26	2.480	4.9438	-67.71	0.9	-66.81	-23.23	PASS
26	2.480	12.3988	-62.43	1.4	-61.03	-23.23	PASS
26	2.480	21.0080	-64.34	2.1	-62.24	-23.23	PASS
26	2.480	No other harmonics to 24 GHz					

Antenna 1

Channel	Fundamental Channel Freq (GHz)	Freq (GHz)	Measured Level (dBm)	Cable Loss (dB)	Total Corrected Level (dBm)	Output Spurious Limit (dBm)	Pass/Fail
11	2.400	4.7995	-63.01	0.9	-62.11	-21.7	PASS
11	2.400	No other harmonics to 24 GHz					
19	2.445	4.8957	-65.97	0.9	-65.07	-22.07	PASS
19	2.400	14.1302	-65.26	1.5	-63.76	-21.7	PASS
19	2.445	No other harmonics to 24 GHz					
26	2.480	4.9438	-66.16	0.9	-65.26	-23.59	PASS
26	2.480	No other harmonics to 24 GHz					

Results: The Antenna Conducted Spurious Emissions measurements for antenna 0 and antenna 1 of the ARRIS Model DCX905 Set Top Box are compliant with the limits specified in FCC Section 15.247(d).

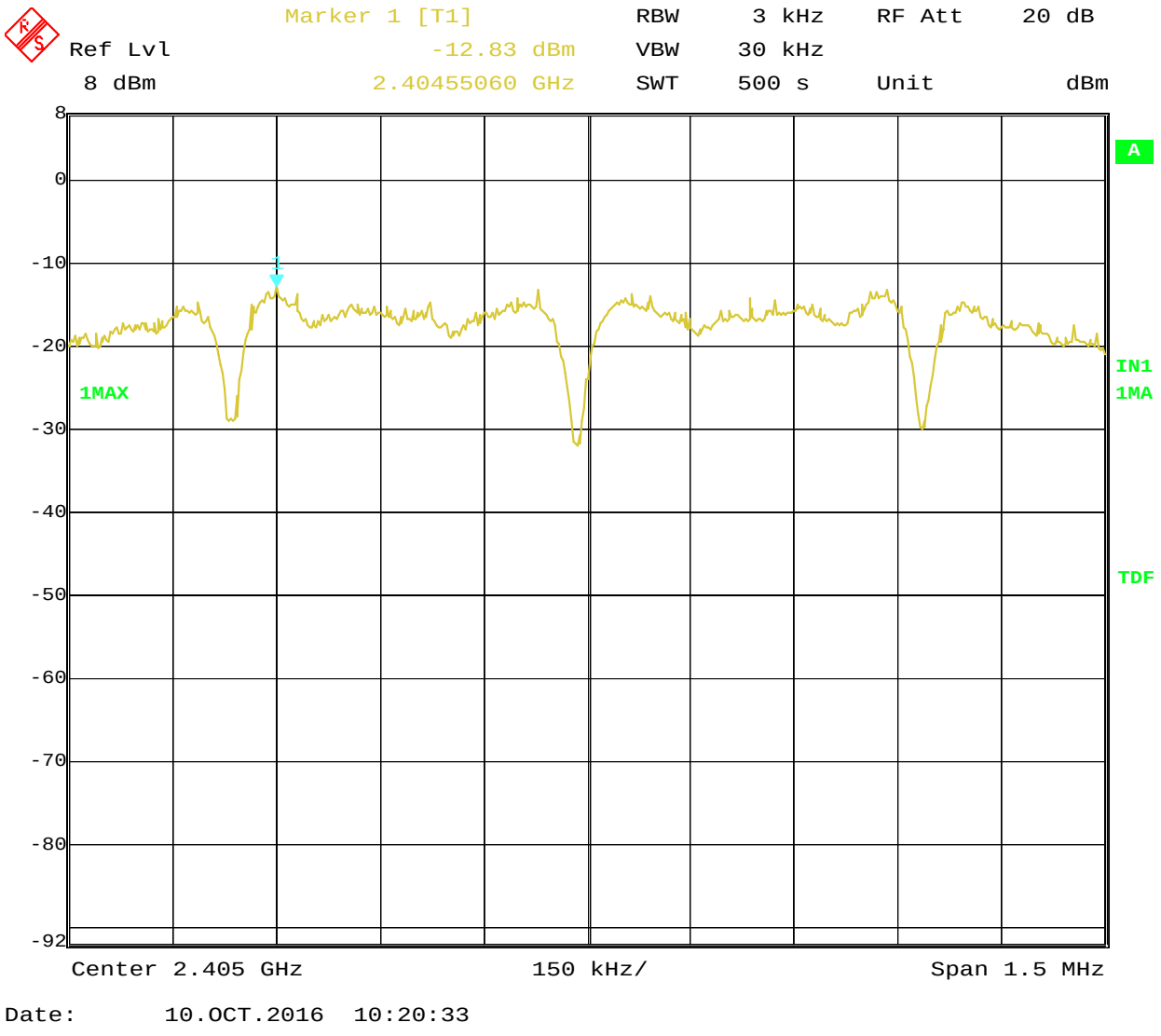
4.6 Power Spectral Density FCC Section 15.247(e)

4.6.1 Power Spectral Density Test Procedure

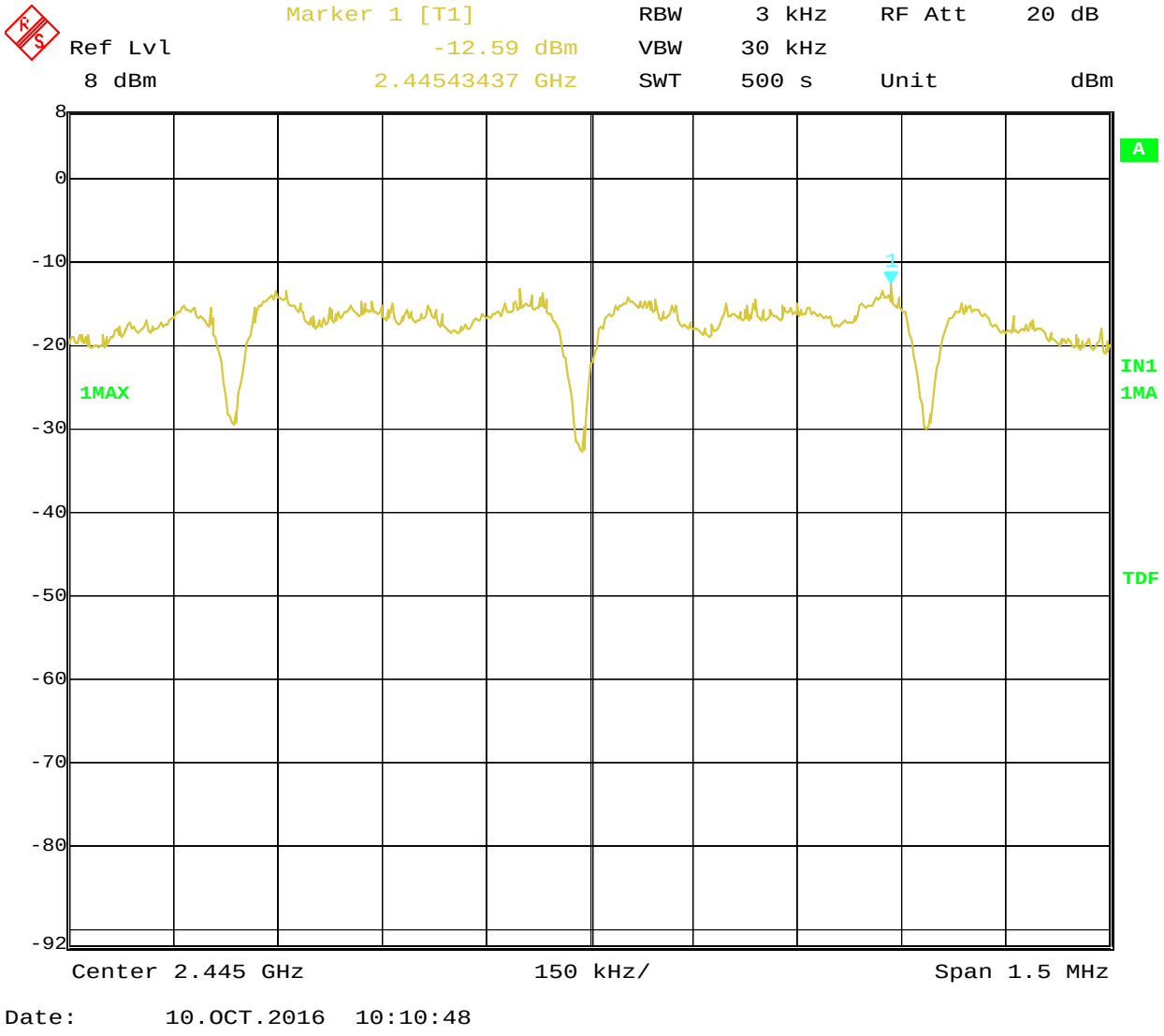
A conducted power measurement of the output frequency was measured for both Antenna 0 and Antenna 1. The Antenna 0 and Antenna 1 were set individually to low (Channel 11), middle (Channel 19) and high (Channel 26). The signal output was maximized with modulation.

4.6.2 Power Spectral Density Analyzer Display Captures Antenna 0

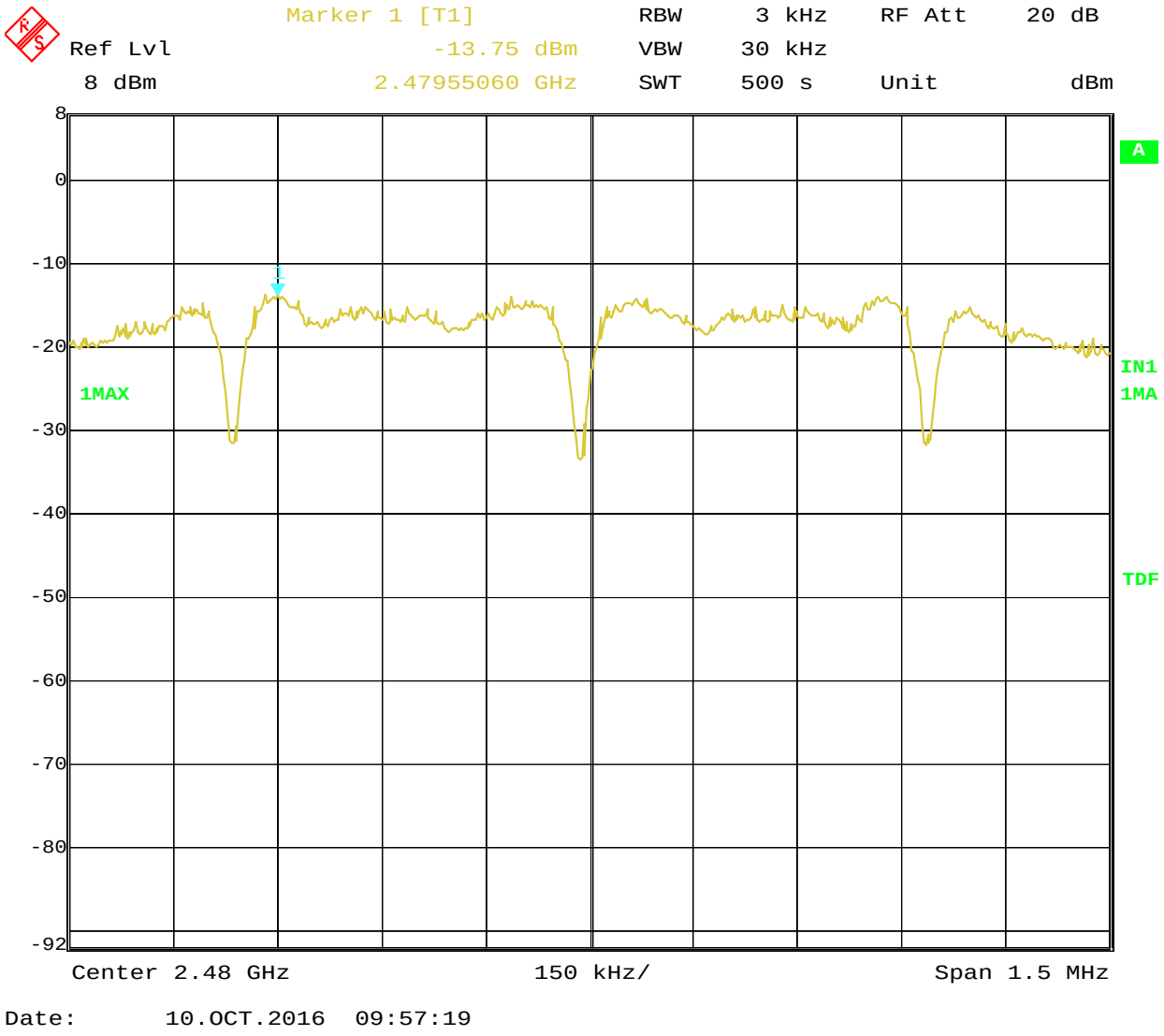
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

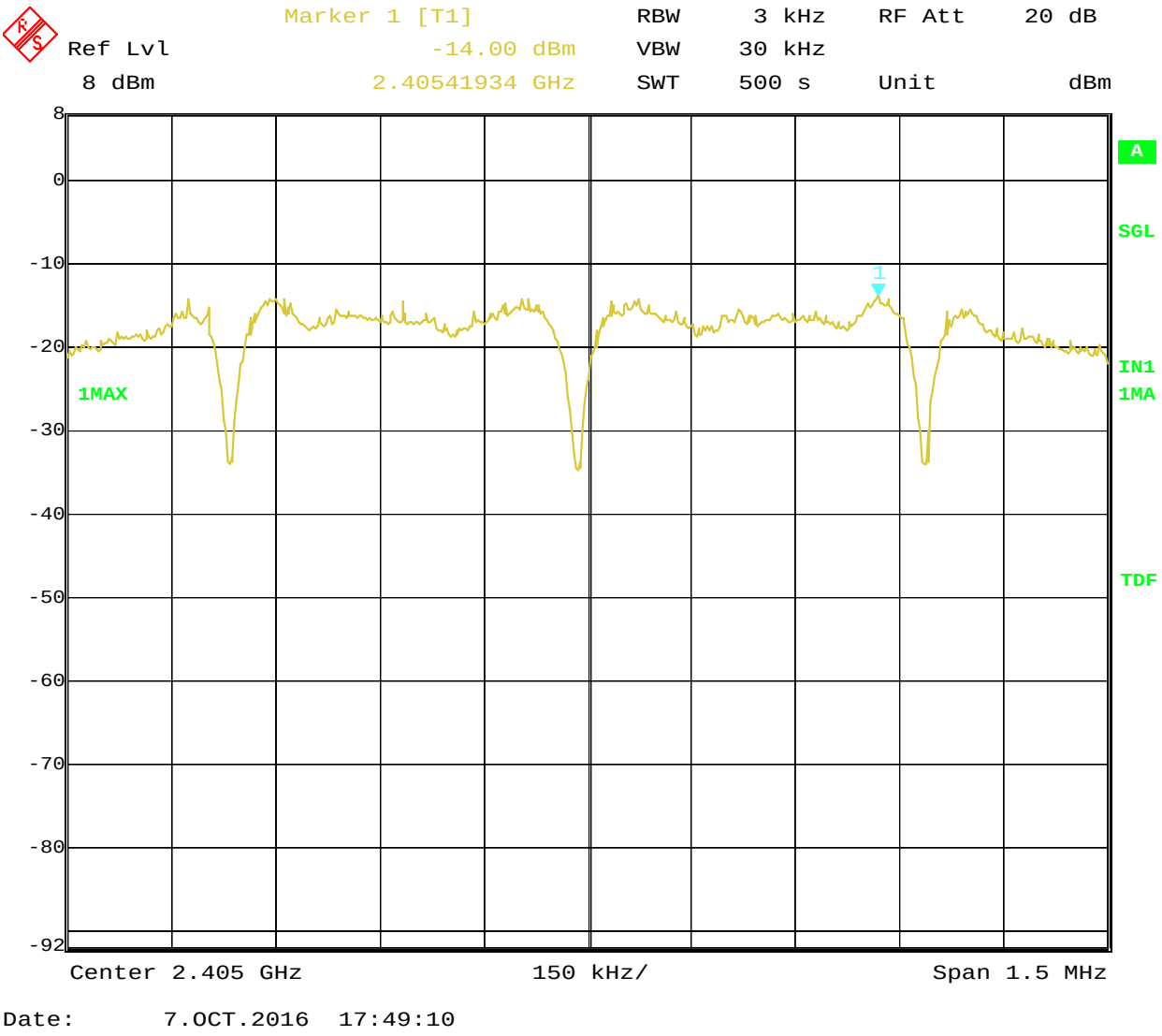


Antenna 0, Channel 26 (2.480 GHz)

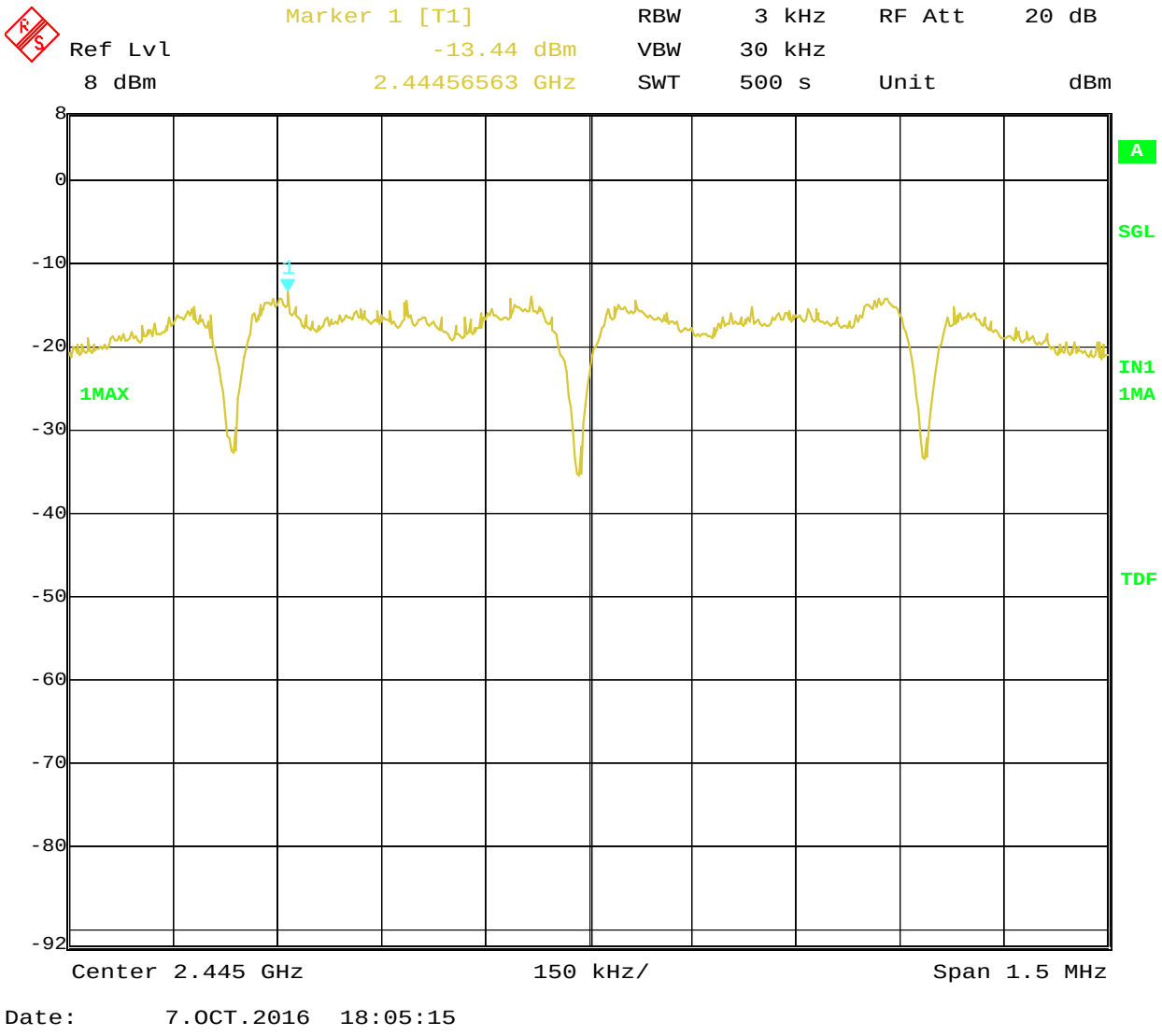


4.6.3 Power Spectral Density Analyzer Display Captures Antenna 1

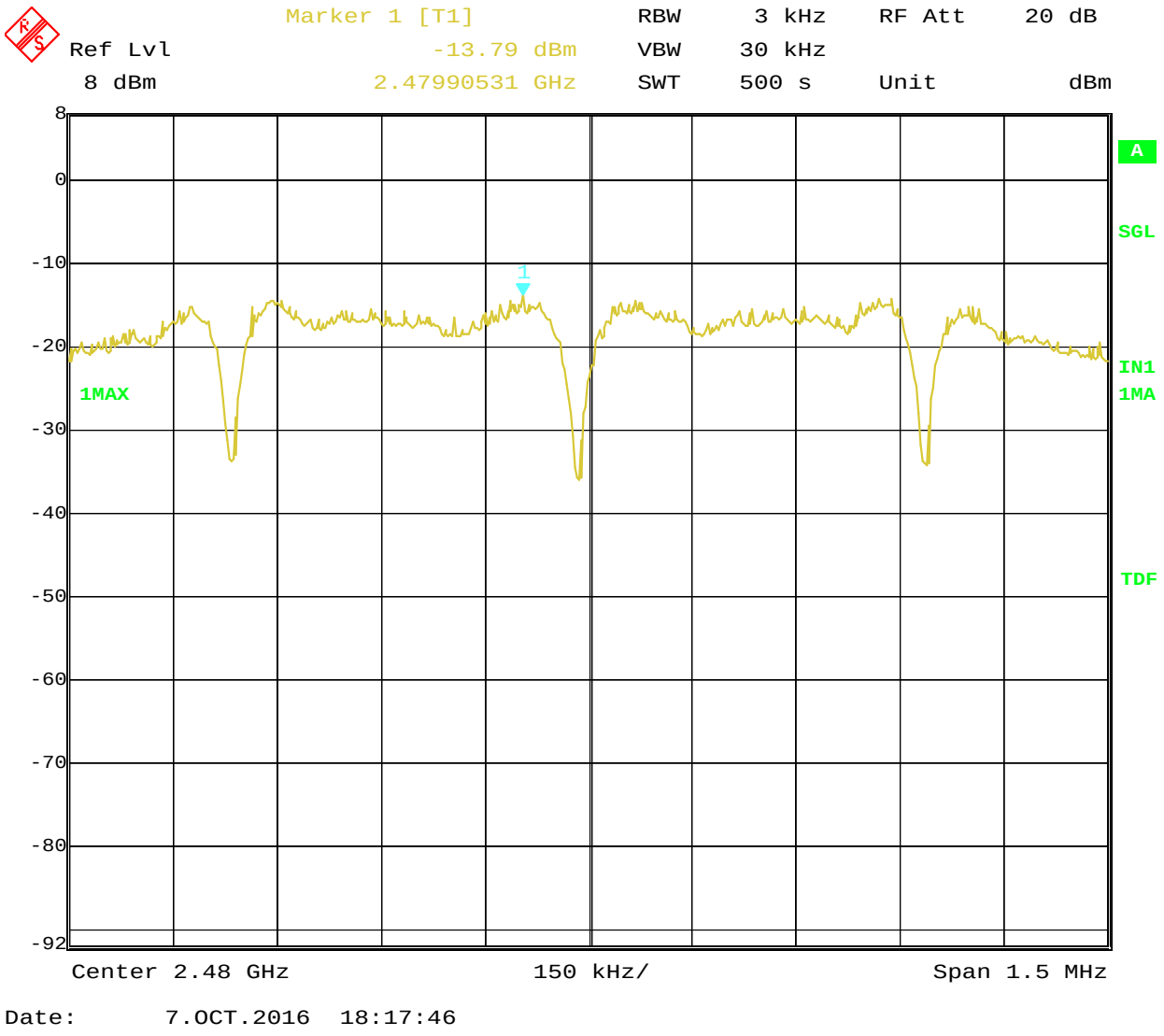
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 1, Channel 26 (2.480 GHz)



4.6.4 Power Spectral Density Test Results (10/07/2016 and 10/10/2016)

Antenna 0

Antenna	Channel	Freq (GHz)	Measured Power Spectral Density (dBm)	Cable Loss (dB)	Total Power Spectral Density (dBm)	Power Spectral Density Limit (dBm)	Pass/Fail
0	CH.11	2.405	-12.83	0.6	-12.23	8	PASS
0	CH.19	2.445	-12.59	0.6	-11.99	8	PASS
0	CH.26	2.480	-13.75	0.6	-13.15	8	PASS

Antenna 1

Antenna	Channel	Freq (GHz)	Measured Power Spectral Density (dBm)	Cable Loss (dB)	Total Power Spectral Density (dBm)	Power Spectral Density Limit (dBm)	Pass/Fail
1	CH.11	2.405	-14	0.6	-13.4	8	PASS
1	CH.19	2.445	-13.44	0.6	-12.84	8	PASS
1	CH.26	2.480	-13.79	0.6	-13.19	8	PASS

Results: The Power Spectral Density measurements for antenna 0 and antenna 1 of the ARRIS Model DCX905 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 2.48 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:

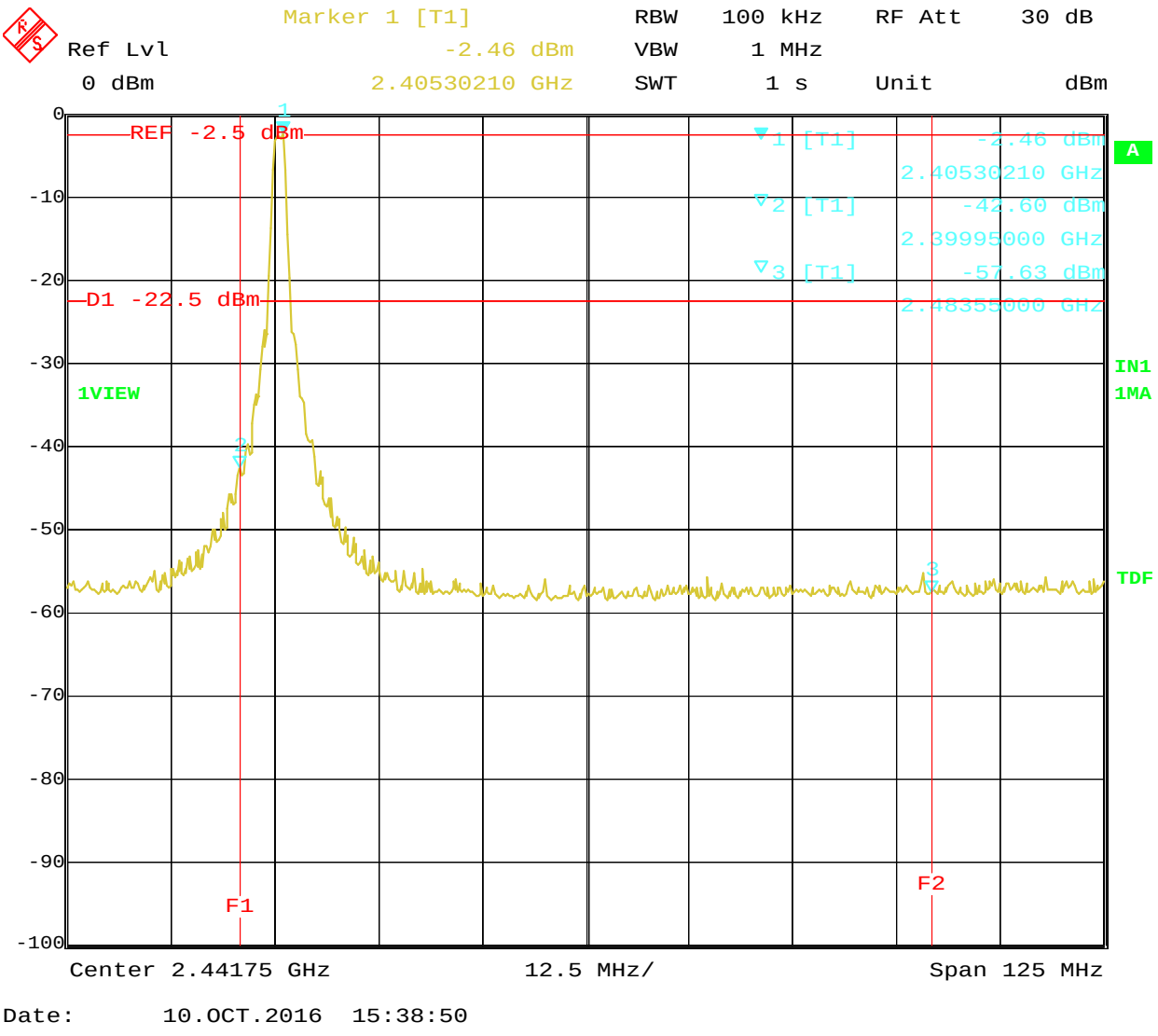
Channel	Frequency (GHz)
11	2.400
19	2.445
26	2.480

The data was recorded in three screen captures from the Spectrum Analyzer. Parameters particular to each measurement are as follows:

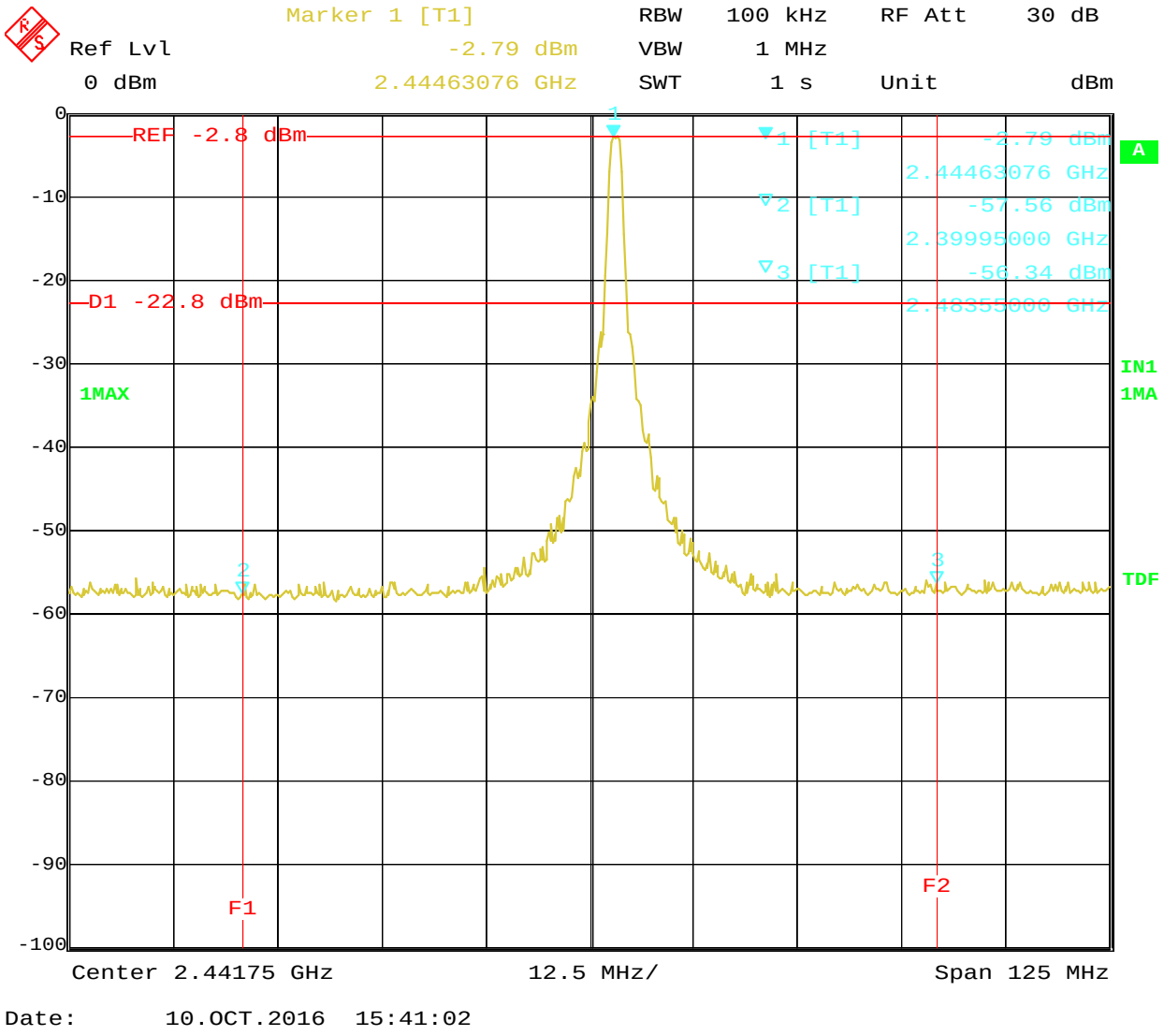
Center Frequency	
Resolution Bandwidth	100 kHz
Video Bandwidth	1 MHz
Span	125 MHz
Scale:	dBm
Reference Level:	0 dBm

4.7.2 Band Edge Measurement Analyzer Display Captures Antenna 0

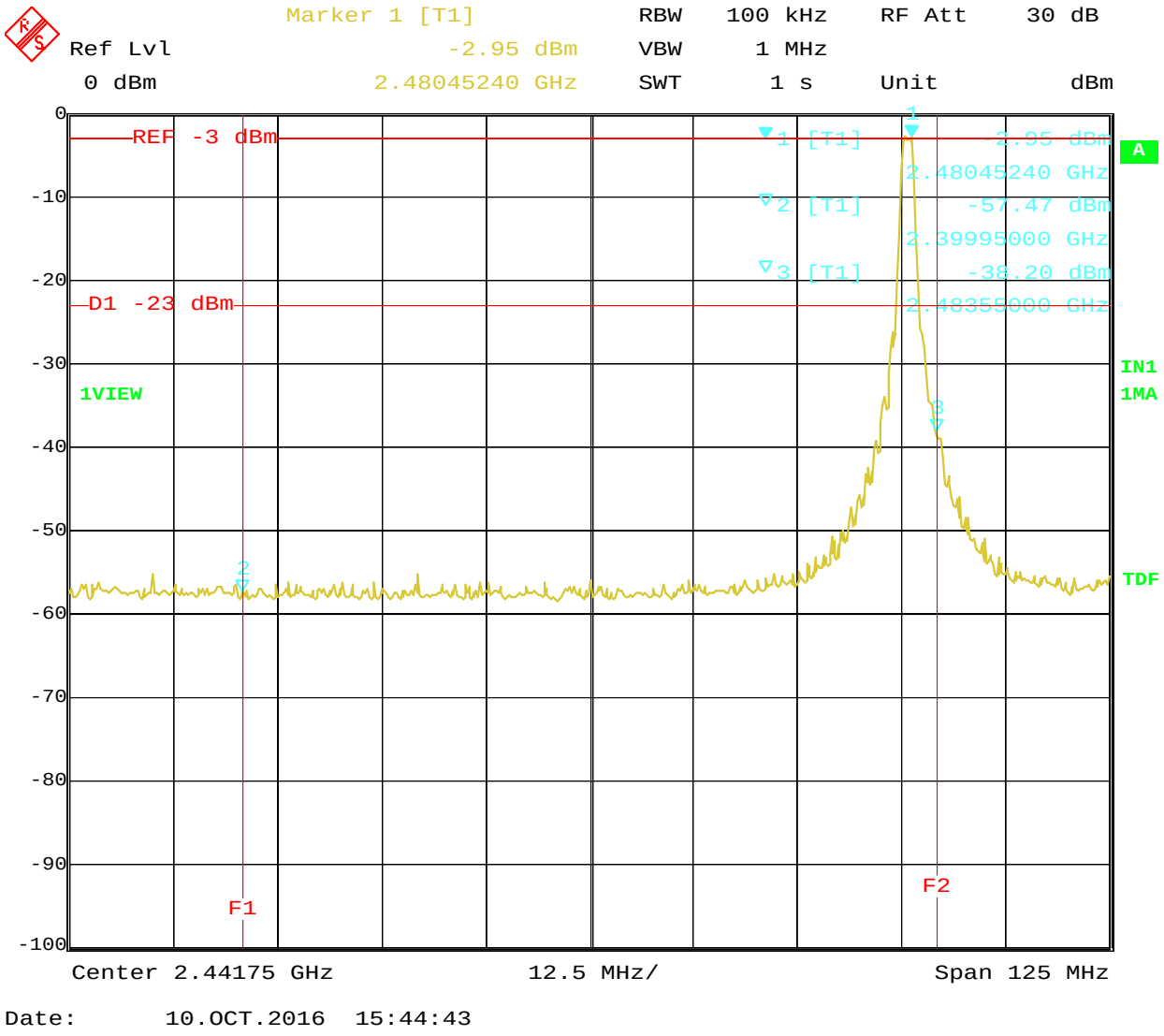
Antenna 0, Channel 11 (2.405 GHz)



Antenna 0, Channel 19 (2.445 GHz)

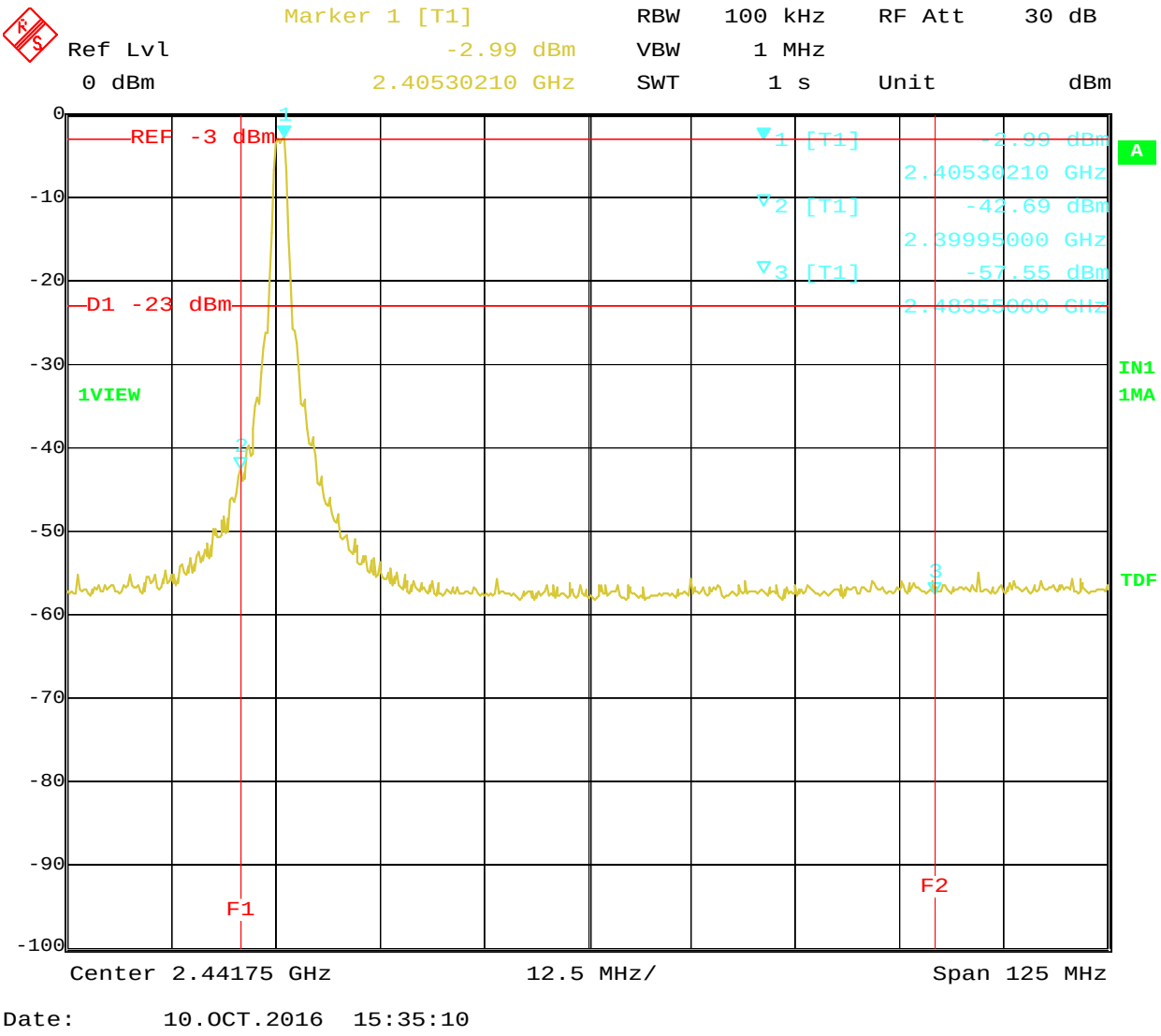


Antenna 0, Channel 26 (2.480 GHz)

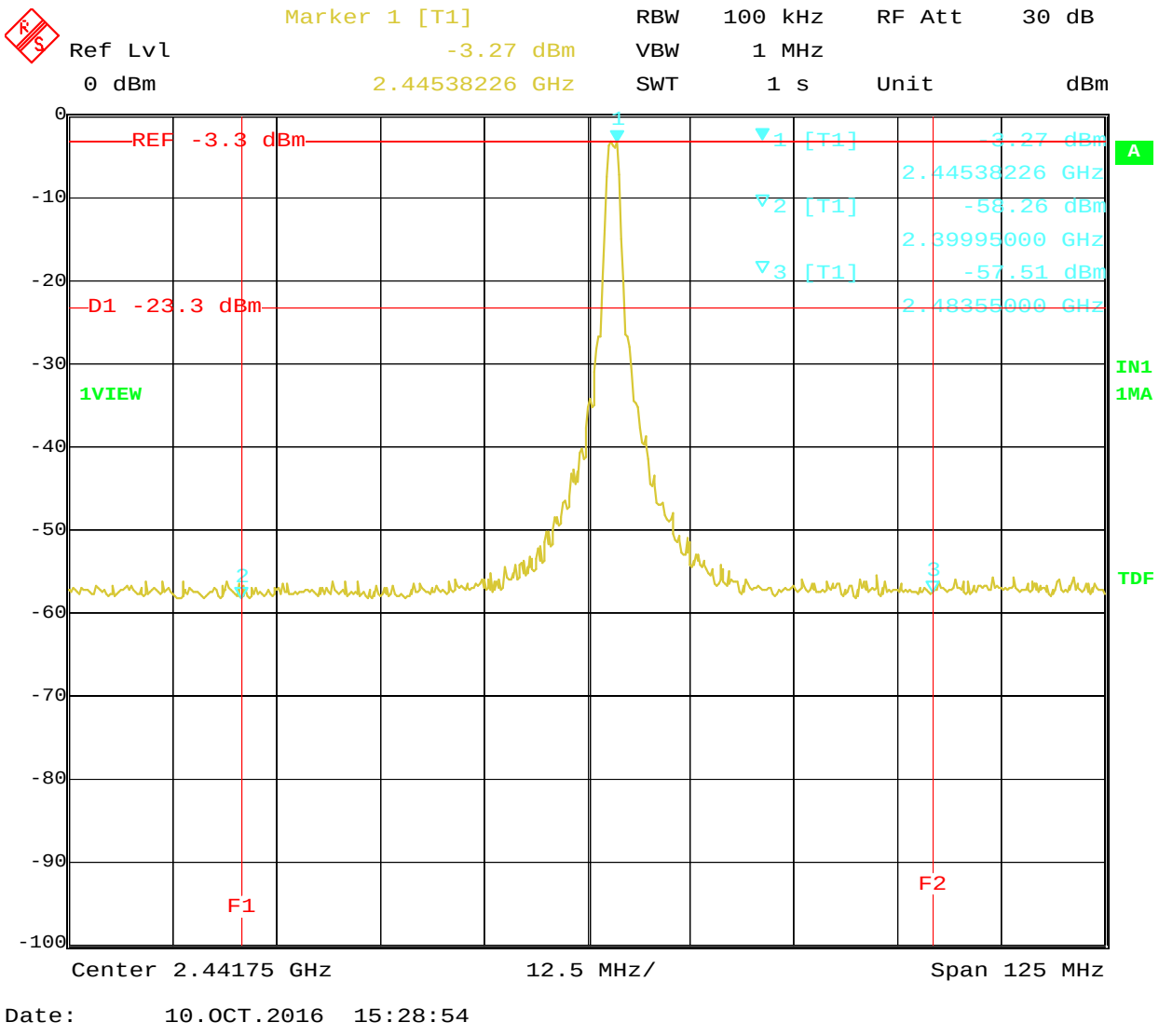


4.7.3 Band Edge Measurement Analyzer Display Captures Antenna 1

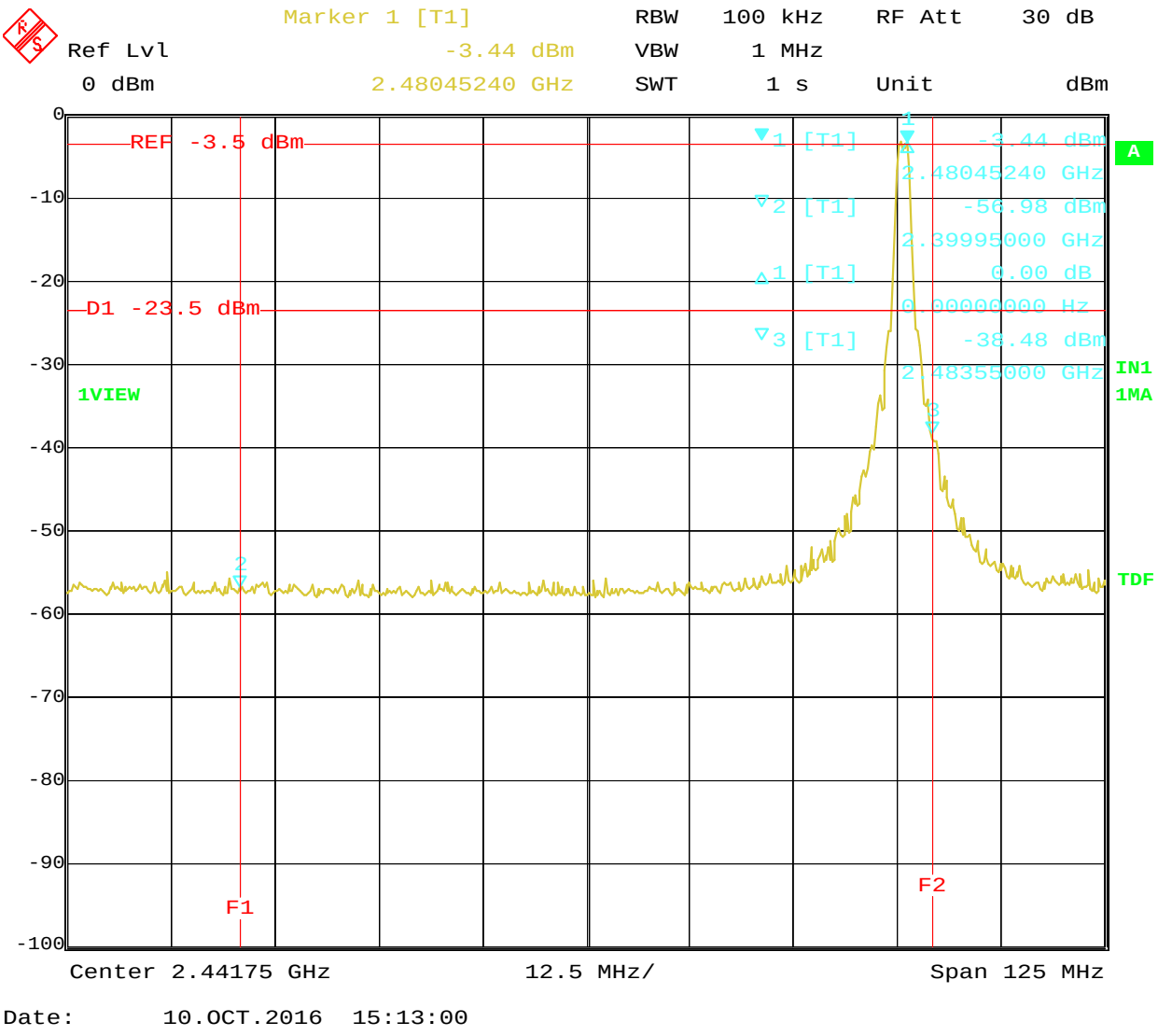
Antenna 1, Channel 11 (2.405 GHz)



Antenna 1, Channel 19 (2.445 GHz)



Antenna 0, Channel 26 (2.480 GHz)



4.7.4 Band Edge Measurement Test Data Results (10/10/2016)

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	2.4053	-2.46	-22.46	2.4	2.4835	2.39995	-42.6	2.48355	-57.63	PASS
19	2.4446	-2.8	-22.8	2.4	2.4835	2.39995	-57.56	2.48355	-56.34	PASS
26	2.48045	-2.95	-22.95	2.4	2.4835	2.39995	-57.47	2.48355	-38.2	PASS

Antenna 1

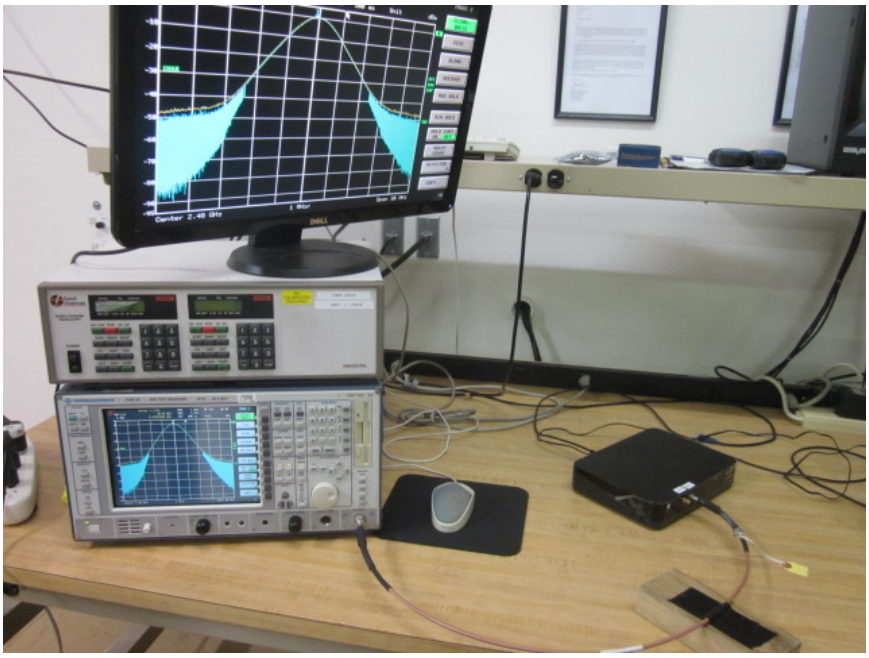
Channel	Measurement Frequency (GHz)	Peak Amplitude (dBm)	20 dB Limit	Lower Edge of Frequency Band (GHz)	Upper Edge of Frequency Band (GHz)	Lower Measured Frequency (GHz)	Lower Measured Amplitude (dBm)	Upper Measured Frequency (GHz)	Upper Measured Amplitude (dBm)	Results
11	2.4053	-2.99	-22.99	2.4	2.4835	2.39995	-42.69	2.48355	-57.55	PASS
19	2.4446	-3.27	-23.27	2.4	2.4835	2.39995	-58.26	2.48355	-57.51	PASS
26	2.48045	-3.44	-23.5	2.4	2.4835	2.39995	-56.98	2.48355	-38.48	PASS

Results: The Band Edge measurements for antenna 0 and antenna 1 of the ARRIS Model DCX905 Set Top Box are compliant with the limits specified in FCC Section 15.247(d).

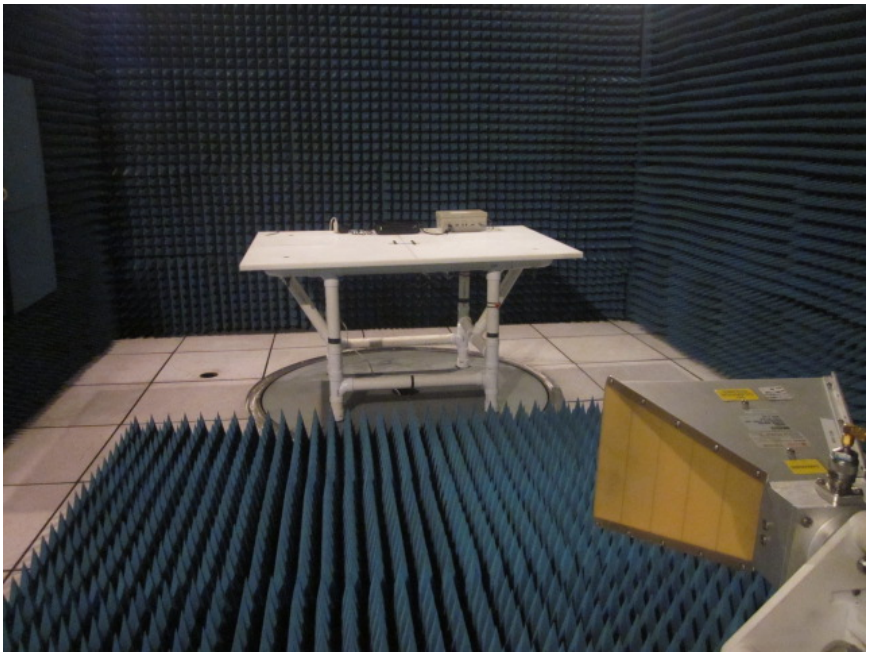
5.0 Test Setup Pictures

5.1 Conducted Emissions Power Line Test Setup Picture

5.2 Conducted Emissions Antenna Test Setup Picture



5.3 Harmonic Radiated Emissions Test Setup Picture



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 (.1 – 1300 MHz)	Hewlett Packard	8447F	2805A02896	1003	No Cal. Required	No Cal. Required	No Cal. Required
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
Spectrum Analyzer (9 kHz - 40 GHz)	Hewlett Packard	8564E	3410A00129	769	12/29/15	3 Years	12/29/18
EMC Analyzer (9 kHz - 26.5 GHz)	Hewlett Packard	8593EM	3710A00214	1026	02/11/15	2 Years	02/11/17
Amplifier System (0.5 – 50 GHz)	Hewlett Packard	83015A 83017A	3123A00360 & 3332A00219	1027	10/03/16	2 Year	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
LISN (9 kHz – 30 MHz)	EMCO	4825/2	9803-1047	750	04/21/15	2 Years	04/21/17
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	05/09/16	1 Year	05/09/17
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