

BEC INCORPORATED

CERTIFICATION APPLICATION TEST REPORT

TEST STANDARDS:

FCC Part 15 Subpart C, Section 15.247 Intentional Radiator

ARRIS Model VMS4100 Set Top Box

FCC ID: ACQ-VMS4100

REPORT BEC-1792-03

TEST DATES: 04/24/2017 – 05/08/2017

CUSTOMER:

ARRIS Group Incorporated

101 Tournament Drive

Horsham, PA 19044

PREPARED BY:

Paul Banker, Test Engineer

REVIEWED and APPROVED BY:

Steve Fanella, Quality Manager

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Notice To Customer

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Revision History

Revision #	Description of Changes	Date of Changes	Date Released
0	Test Report Initial Release	N/A	06/09/2017



1.0 Administrative Information

1.1 General Project Information

Project Number	BEC-1792	
Set Top Box Manufacturer	ARRIS Group Incorporated	
Set Top Box Model Number	VMS4100	
Set Top Box Serial Number	M11707TCP172	M11707TCP165
Set Top Box Sample Number	1792-02	1792-03 (Modified with SMA to transmitter output)
Power Supply Manufacturer Model and Serial Number	Delta Model ADP-36KR SN# IEAD66B002L	
Power Supply Sample Number	1792-04	
Power Supply Manufacturer Model and Serial Number	LITEON Model PB-1360-05R4 SN#524475079041603300238010005000	
Power Supply Sample Number	1792-05	
FCC ID	ACQ-VMS4100	
Antenna Manufacturer	Broadcom Corporation	
Antenna Model Number	BCM20705 Single Chip Blue Tooth Transceiver (BLE Only)	
Frequency of Operation	2402.0 - 2480.0 MHz	
Equipment Class	DTS	
EUT Description	Cable Set Top Box with wireless capability supporting BLE	
Applicable Test Standards	47 CFR Part 15.247: Operation within the band 2400-2483.5 MHz, FCC Public Bulletin KDB 558074 D01 DTS Measurement Guidance ANSI C63.10: 2013	
Test Laboratory Location	BEC Incorporated 970 East High Street Pottstown, PA 19464	
Test Personnel	Paul Banker / Steve Fanella	
Test Performed For	ARRIS Group Incorporated 101 Tournament Drive Horsham, PA 19044	
Customer Contact(s)	Robert Sicilia / Mark Haegali	
Date Received	03/10/2017	



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 VMS4100 Set Top Box with BLE was tested to the following standards:

FCC Part 15, Subpart C Intentional Radiators	Test Description	Result
15.207(b)	Conducted Emissions Power Leads 150 kHz to 30 MHz (FCC Part 15 Class B Limits)	PASS
15.247(d) 15.209(a)	Restricted Bands of Operation	PASS
15.247(d) 15.209(a)	Spurious Radiated Emissions, 30 MHz to 25 GHz (Non Restricted Bands) (>20 dB Peak)	PASS
15.247(a)(2)	6 dB Bandwidth (DTS Bandwidth of Minimum 500 kHz)	PASS
15.247(b)(3)	Maximum Peak Power Output (Maximum 1 Watt)	PASS
15.247(d)	Band Edge Measurement	PASS
15.247(e)	Antenna Port, Power Spectral Density (< 8 dBm)	PASS

1.4 Measurement Uncertainty

Measurement	Measurement Distance	Frequency Range	Measurement Limit	Expanded Uncertainty
AC Conducted Emissions	N/A	150 kHz – 30 MHz	FCC Section 15.207	3.58
Radiated Emissions	3 Meters	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 than 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.

FCC Registered Test Site Number: US1118



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: $22^{\circ} \pm 5^{\circ}$

Humidity: $50\% \pm 20\%$

Barometric Pressure: $1000\text{mb} \pm 20\%$

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 VMS4100 HD Video Media Server is an advanced whole home solution for viewing entertainment in the home. It is a media server that includes multiple QAM tuners up to 860MHz, a high-end processor, expanded memory, and enhanced graphics to support delivery of digital, on-demand, and interactive services, including 4K video, throughout the entire home. The ARRIS VMS4100 provides a full complement of interconnection options including Bluetooth for Remote control and audio streaming. This device not only allows for streaming media content, but also uses smaller, more energy-efficient IP client set-top boxes (STBs). The ARRIS VMS4100 communicates with the client set-top boxes (STBs) each connected to a TV.

2.2 Product Category

FCC Part 15, Subpart C (Section 15.247)

2.3 Product Classification

Intentional Radiator Testing Requirements DTS
Operation within the band of 2400 - 2483.5 MHz.

2.4 Test Configuration

The antenna within the ARRIS VMS4100 set top box was controlled by software which allowed selection of frequency with BLE modulation. When selecting specific transmission frequencies the software would allow the technician to select the Maximum Output Power. The EUT with BLE provides GFSK modulation with a 1 Mbps Rate. Frequencies of 2402 MHz, 2440 MHz and 2480 MHz were tested at the Maximum Power Output.

2.5 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.

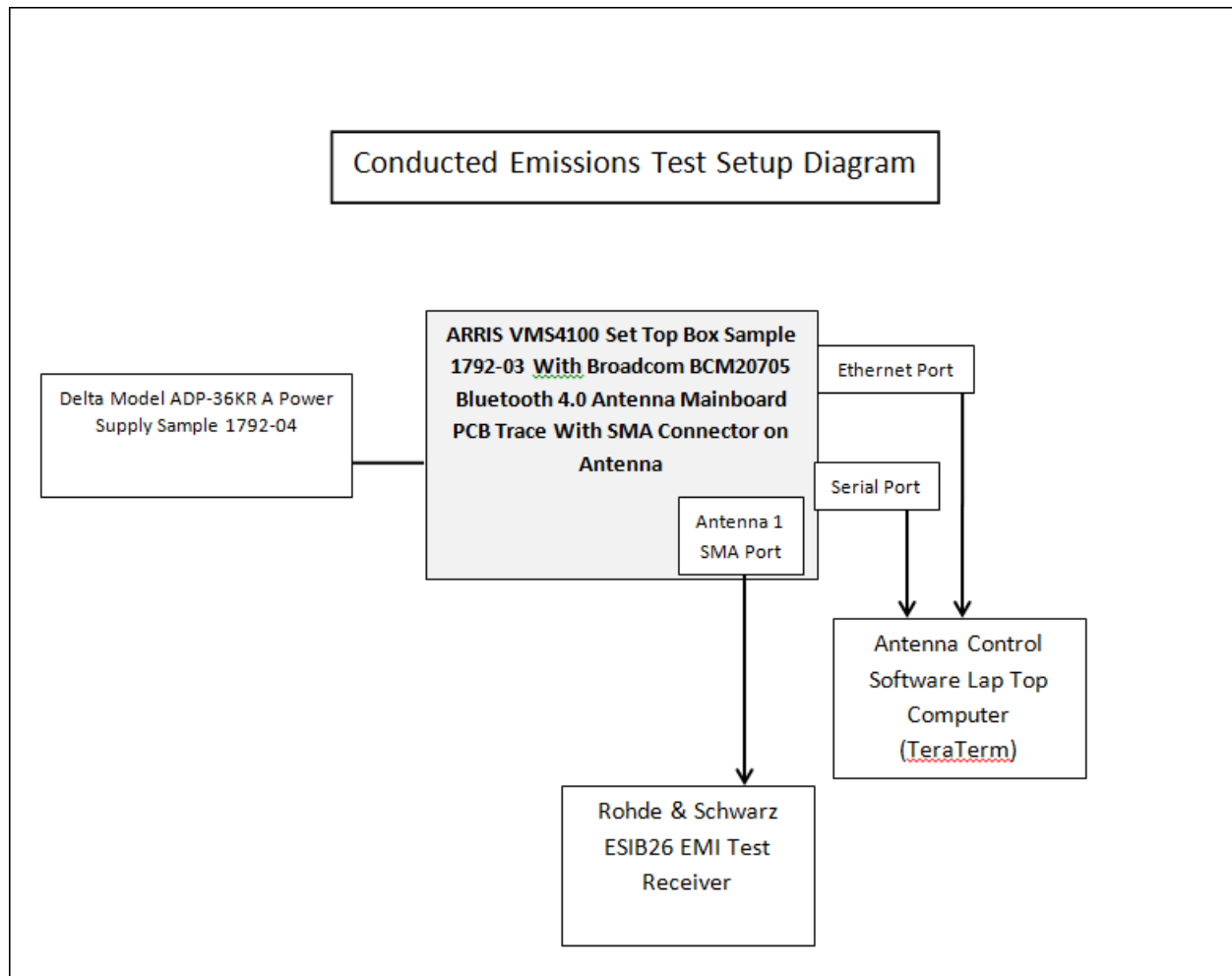
2.6 Test Software Version

The test software "simple_app Version 0107" was used to control the BLE antenna transmit frequency and output power. The software was supplied to BEC Incorporated by ARRIS Corporation.



2.7 Test Configuration Diagram (Transmitter Conducted Measurements)

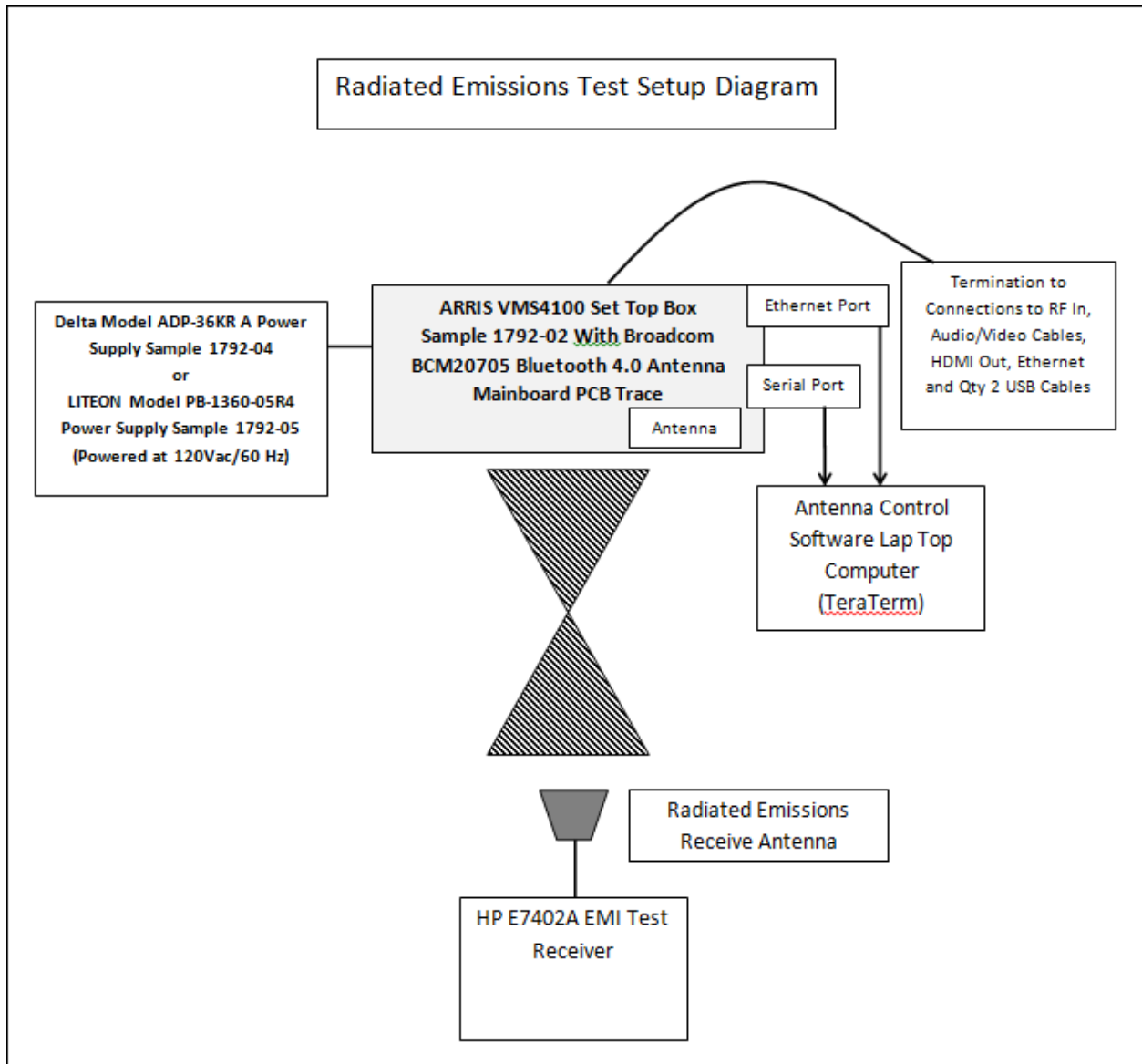
A block diagram of the EUT configuration showing interconnection cables is illustrated below. The drawing shows the physical hardware layout used for the tests along with I/O cables and AC power distribution.





2.8 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.





2.9 EUT Information, Interconnection Cabling and Support Equipment

EUT Hardware

Description	Manufacturer	Model	Serial Number	Sample Number
Set Top Box (Unmodified Antennas)	ARRIS	VMS4100	M11707TCP172	1792-02
Set Top Box (Modified Antennas with SMA Connectors)	ARRIS	VMS4100	M11707TCP165	1792-03
AC Adapter	Delta	ADP-36KR A	IEAD66B002L	1792-04
AC Adapter	LITEON	PB-1360-05R4	524475079041603 300238010005000	1792-05

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
Ethernet Broadband Router	D-Link	DI-604	B25I16B000726
Lap Top Computer	Dell	Latitude C640	HB00X21



2.10 BLE Test Signals and Test Modulation

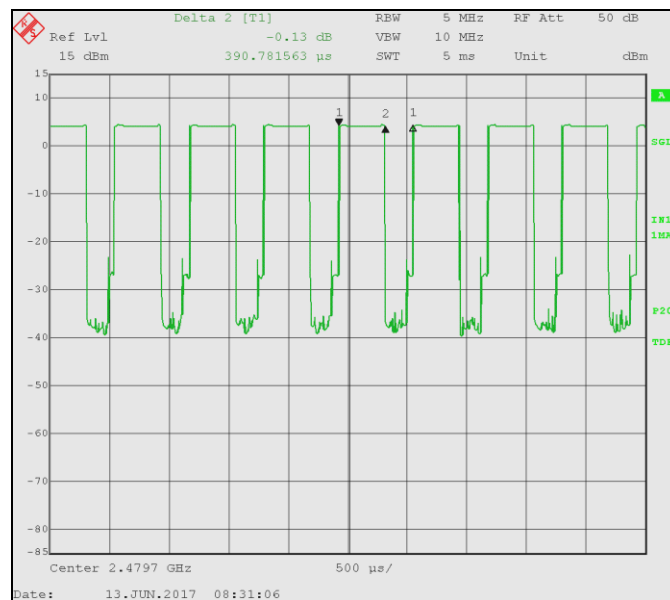
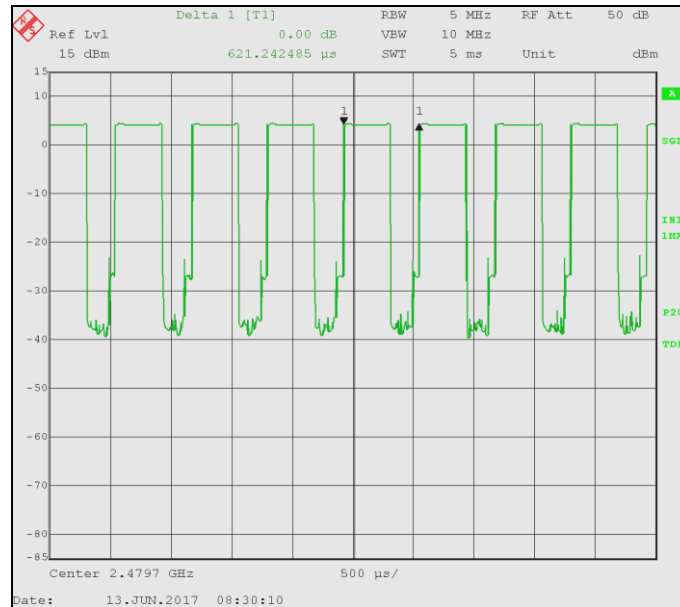
The following table lists the individual frequencies for the BLE transmitter. The EUT with BLE provides GFSK modulation with a 1 Mbps Rate. Frequencies of 2402 MHz, 2440 MHz and 2480 MHz were tested at the Maximum Power Output.

Frequency MHz	Channel	Type	Frequency MHz	Channel	Type
2402	37	Advertising	2442	18	Data
2404	0	Data	2444	19	Data
2406	1	Data	2446	20	Data
2408	2	Data	2448	21	Data
2410	3	Data	2450	22	Data
2412	4	Data	2452	23	Data
2414	5	Data	2454	24	Data
2416	6	Data	2456	25	Data
2418	7	Data	2458	26	Data
2420	8	Data	2460	27	Data
2422	9	Data	2462	28	Data
2424	10	Data	2464	29	Data
2426	38	Advertising	2466	30	Data
2428	11	Data	2468	31	Data
2430	12	Data	2470	32	Data
2432	13	Data	2472	33	Data
2434	14	Data	2474	34	Data
2436	15	Data	2476	35	Data
2438	16	Data	2478	36	Data
2440	17	Data	2480	39	Advertising



2.11 Duty Cycle

The duty cycle of the test transmission was measured using the procedure provided by ANSI C63.10. The screen captures below show the transmitter on-time and transmission cycle time.



Duty Cycle		
Cycle Time	621.24	μsec
Transmitter On time	390.78	μsec
(Transmit/Cycle)X100	62.90	%

The duty cycle of the ARRIS VMS4100 is used to determine the reference level and input attenuation according to FCC/KDB 550874 D01.



2.12 Grounding

Direct grounding of the test sample was accomplished through the coaxial cable connected to the RF input port of the EUT.

2.13 EUT Modifications

Except for the attachment of a SMA connector directly to the antenna output on the main board of the ARRIS VMS4100 Sample 1972-03 for conducted testing, no modifications were made to the units under test.

2.14 EUT Pictures

ARRIS Model VMS4100 Set Top Box Sample #1792-02 (Front View)

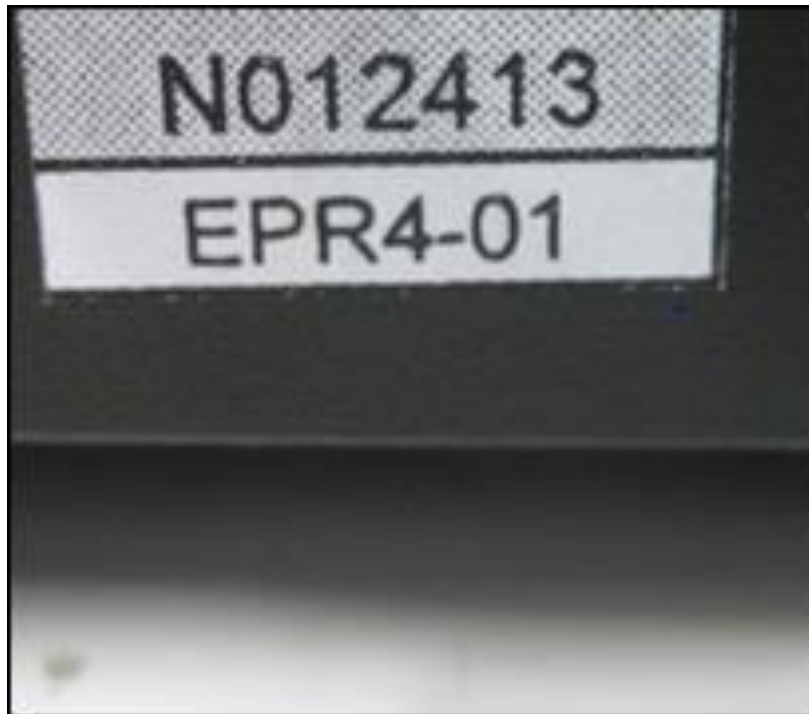




ARRIS Model VMS4100 Set Top Box Sample #1792-02 (Rear View)



ARRIS Model VMS4100 Set Top Box Sample #1792-02 (Build Tag)





ARRIS Model VMS4100 Set Top Box Sample #1792-02 (Bottom View)

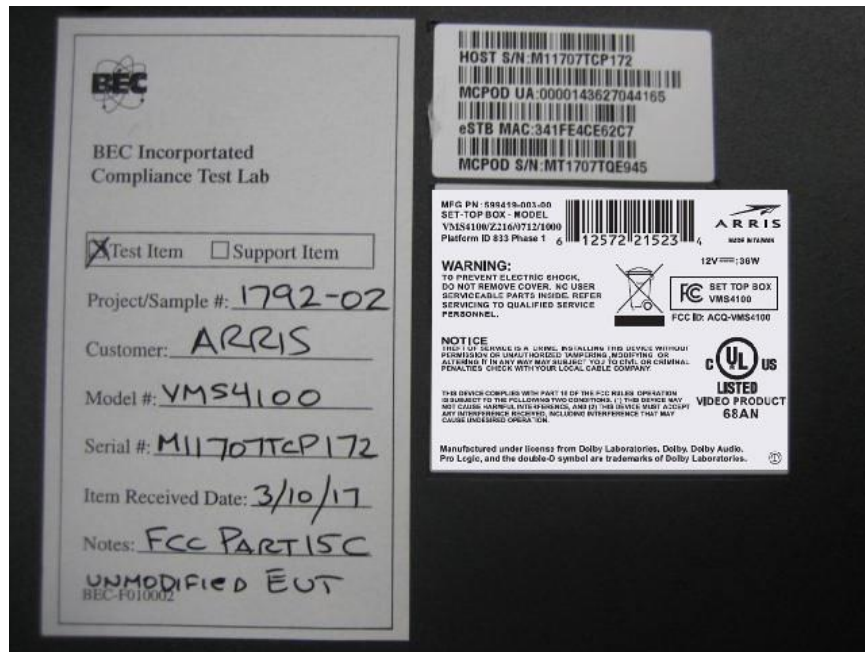


ARRIS Model VMS4100 Set Top Box Sample #1792-02 (Top View)





ARRIS Model VMS4100 Set Top Box Sample #1792-02 (Sample Tag, Serial Number View)



ARRIS Model VMS4100 Set Top Box Sample #1792-03 (Front View)

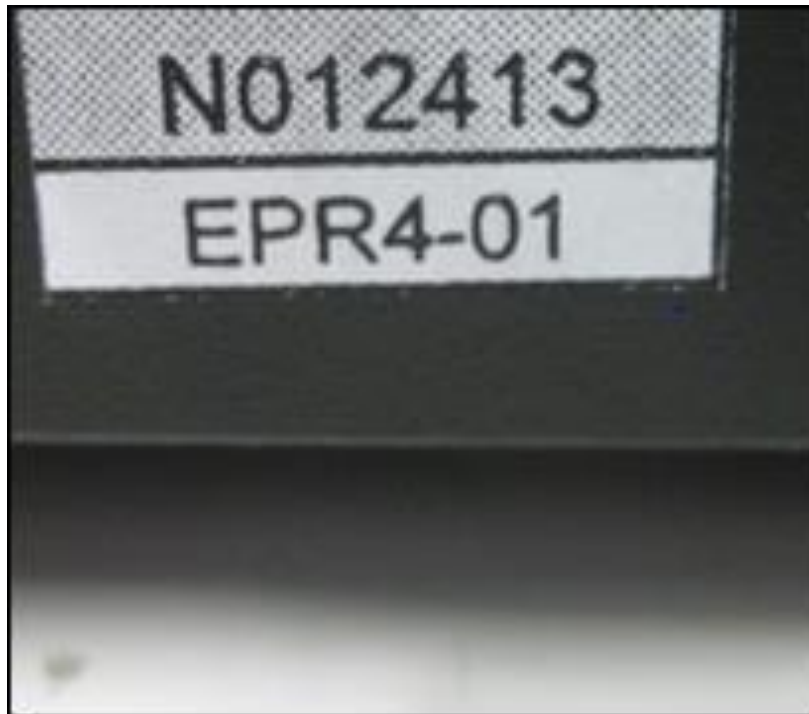




ARRIS Model VMS4100 Set Top Box Sample #1792-03 (Rear View)



ARRIS Model VMS4100 Set Top Box Sample #1792-03 (Build Tag)



ARRIS Model VMS4100 Set Top Box Sample #1792-03 (Bottom View)



ARRIS Model VMS4100 Set Top Box Sample #1792-03 (Top View)





ARRIS Model VMS4100 Set Top Box Sample #1792-03 (Sample Tag, Serial Number View)

 BEC Incorporated Compliance Test Lab <input checked="" type="checkbox"/> Test Item <input type="checkbox"/> Support Item Project/Sample #: <u>1792-03</u> Customer: <u>ARRIS</u> Model #: <u>VMS4100</u> Serial #: <u>M11707TCP165</u> Item Received Date: <u>3/10/17</u> Notes: <u>FCC PART 15C</u> <u>Antenna SMA EOT</u> BEC-F010002	 HOST S/N: M11707TCP165 MCPD UA: 0000143626994046 eSTB MAC: 341FE4CE66C9 MCPD S/N: MT1707TQE907 MFG PN: 599419-001-00 SET-TOP BOX - MODEL VMS4100/2160/121/300 Platform ID: 833 Phase 1 6 12572 21523 4 12VDC / 10W WARNING: TO PREVENT ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER SERVICABLE PARTS INSIDE. REPAIR SERVICING TO QUALIFIED SERVICE PERSONNEL. FCC ID: ACQ VMS4100 LISTED VIDEO PRODUCT 68AN NOTICE THEFT OF SERVICE IS A CRIME. REINSTALLING THIS DEVICE WITHOUT PERMISSION OR UNAUTHORIZED TAMPERING, REPAIRING OR ALTERING IT IN ANY WAY MAY SUBJECT YOU TO CIVIL OR CRIMINAL PENALTIES. CHECK WITH YOUR LOCAL CABLE COMPANY. THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND (2) IT MUST ACCEPT ANY INTERFERENCE THAT IT MAY RECEIVE, INCLUDING THAT WHICH MAY CAUSE UNDESIRABLE OPERATION. Manufactured under license from Dolby Laboratories, Dolby, Dolby Audio, Pro Logic, and the double-D symbol are trademarks of Dolby Laboratories.
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ARRIS Model VMS4100 Set Top Box Sample #1792-03 (SMA to Antenna View)





ARRIS Model VMS4100 Set Top Box Sample #1792-03 (SMA to Antenna View) Close-up





Delta AC Adapter Sample # 1792-04



LITEON AC Adapter Sample # 1792-05





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

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.

ANSI C63.10: 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

FCC Public Notice 558074 D01, “Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247”.

3.2 Deviations or Exclusions from the Requirements

No deviations or exclusions were made.



4.0 Test Results

4.1 Number of Operating Frequencies (47 CFR 15.31(m))

4.1.1 BLE Frequency List

The table below details the BLE frequencies contained in the 2.402 – 2.480 GHz band.

Frequency MHz	Channel	Type	Frequency MHz	Channel	Type
2402	37	Advertising	2442	18	Data
2404	0	Data	2444	19	Data
2406	1	Data	2446	20	Data
2408	2	Data	2448	21	Data
2410	3	Data	2450	22	Data
2412	4	Data	2452	23	Data
2414	5	Data	2454	24	Data
2416	6	Data	2456	25	Data
2418	7	Data	2458	26	Data
2420	8	Data	2460	27	Data
2422	9	Data	2462	28	Data
2424	10	Data	2464	29	Data
2426	38	Advertising	2466	30	Data
2428	11	Data	2468	31	Data
2430	12	Data	2470	32	Data
2432	13	Data	2472	33	Data
2434	14	Data	2474	34	Data
2436	15	Data	2476	35	Data
2438	16	Data	2478	36	Data
2440	17	Data	2480	39	Advertising

Demonstration of compliance of intentional radiators that operate in a frequency range greater than 10 MHz shall test three frequencies. A lower frequency of 2402 MHz, a middle frequency of 2440 MHz and a higher frequency of 2480 MHz were selected for testing of the ARRIS VMS4100.

4.2 Antenna Requirement (47 CFR 15.203)

The antenna used by the ARRIS VMS4100, is a short trace on the main PCB of the EUT. There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the requirements of this section.

4.3 External RF power amplifiers and antenna modifications (47 CFR 15.204)

There are no RF power amplifier kits available to be used with the ARRIS VMS4100. There are no detachable parts of the antenna. The antenna is not replaceable, nor changeable, and therefore complies with the requirements of this section.



4.4 Conducted Emissions AC power leads (47 CFR 15.207(b))

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 μ H 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 (dB μ V) = Meter Reading (dB μ v) + Cable Loss (dB) + LISN Factor (dB) + Limiter Loss (dB)

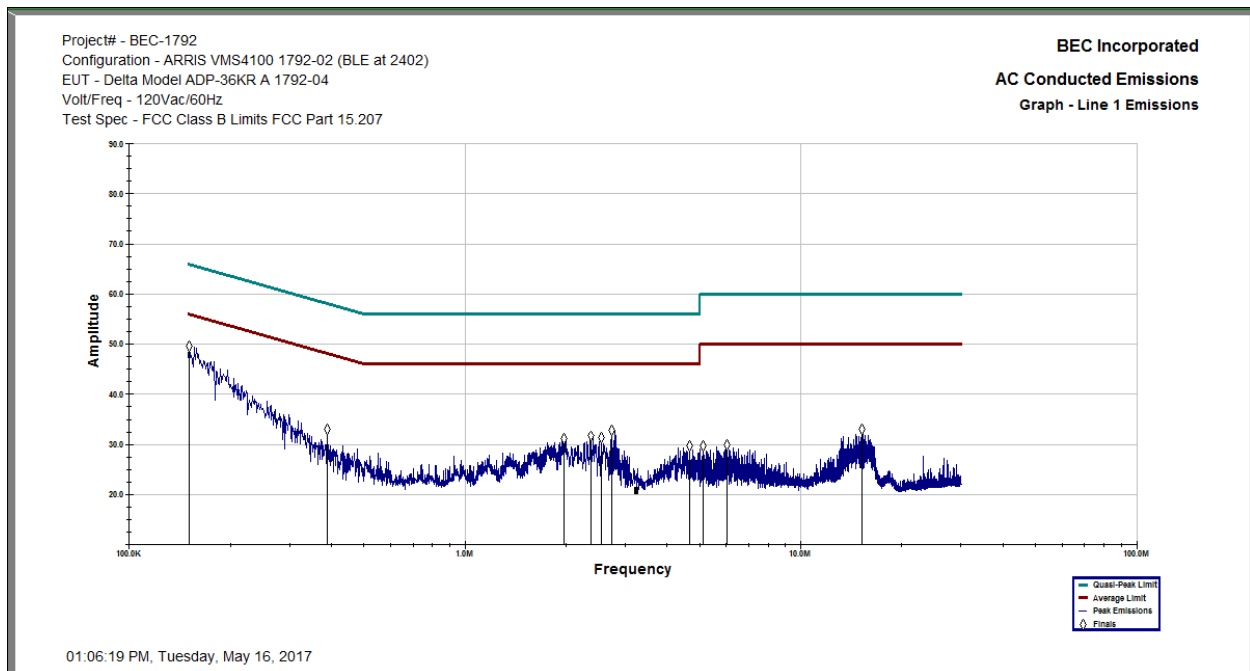
4.4.1 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Configuration Description

The ARRIS Model VMS4100 Set Top Box Sample 1792-03 was tested with both the Delta Model ADP-36KR A Power Supply Sample 1792-04 with the BLE Modulation Scheme tested at a Low (2402 MHz), Medium (2441 MHz) and High (2480 MHz) Frequency. The testing was then repeated using the LITEON Model PB-1360-05R4 Power Supply Sample 1792-05.



4.4.2 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Results Table and Graph For Delta Model ADP-36KR A Power Supply Sample 1792-04 With ARRIS VMS4100 BLE QPSK @ 2402 MHz (05/16/2017)

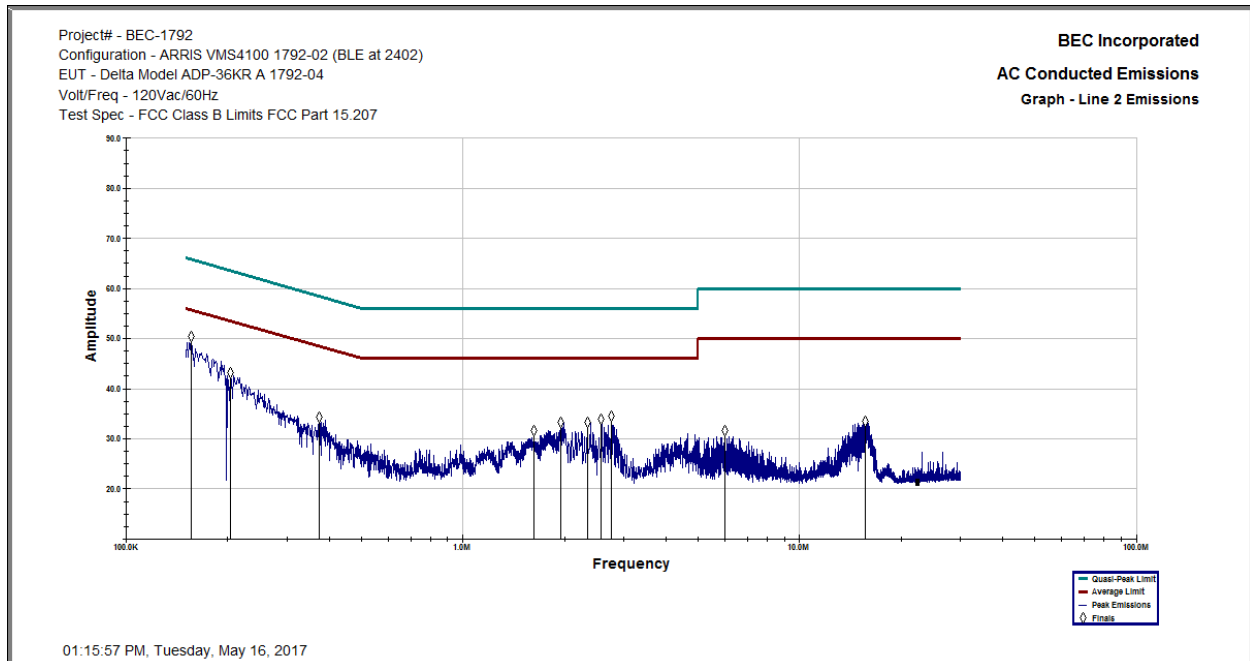
BEC INC. Line 1 Conducted Emissions 01:14:23 PM, Tuesday, May 16, 2017							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
150.113 KHz	27.71	56.00	-28.28	43.26	66.00	-22.74	0.130
385.572 KHz	14.93	49.27	-34.33	24.77	59.27	-34.50	0.130
1.952 MHz	20.76	46.00	-25.24	26.83	56.00	-29.17	0.218
2.360 MHz	21.07	46.00	-24.93	27.85	56.00	-28.15	0.234
2.546 MHz	20.15	46.00	-25.85	27.41	56.00	-28.59	0.243
2.744 MHz	19.43	46.00	-26.57	27.36	56.00	-28.64	0.255
4.628 MHz	18.67	46.00	-27.33	26.30	56.00	-29.70	0.333
5.158 MHz	16.14	50.00	-33.86	24.65	60.00	-35.35	0.356
6.055 MHz	18.81	50.00	-31.19	26.95	60.00	-33.05	0.392
15.184 MHz	20.26	50.00	-29.74	27.66	60.00	-32.34	0.755
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2402)							
EUT - Delta Model ADP-36KR A 1792-04							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							





BEC INC.
Line 2 Conducted Emissions
01:26:02 PM, Tuesday, May 16, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
157.600 KHz	28.81	55.78	-26.98	42.72	65.78	-23.063	0.150
202.110 KHz	18.22	54.51	-36.29	36.48	64.51	-28.031	0.150
371.603 KHz	12.82	49.67	-36.85	25.48	59.67	-34.188	0.250
1.618 MHz	20.52	46.00	-25.48	26.19	56.00	-29.810	0.360
1.951 MHz	22.12	46.00	-23.88	27.94	56.00	-28.060	0.360
2.340 MHz	22.43	46.00	-23.57	29.91	56.00	-26.089	0.401
2.575 MHz	21.57	46.00	-24.43	29.35	56.00	-26.651	0.429
2.741 MHz	20.59	46.00	-25.41	29.21	56.00	-26.791	0.449
5.990 MHz	18.72	50.00	-31.28	27.75	60.00	-32.250	0.530
15.693 MHz	24.06	50.00	-25.94	29.97	60.00	-30.031	0.849
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2402)							
EUT - Delta Model ADP-36KR A 1792-04							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							

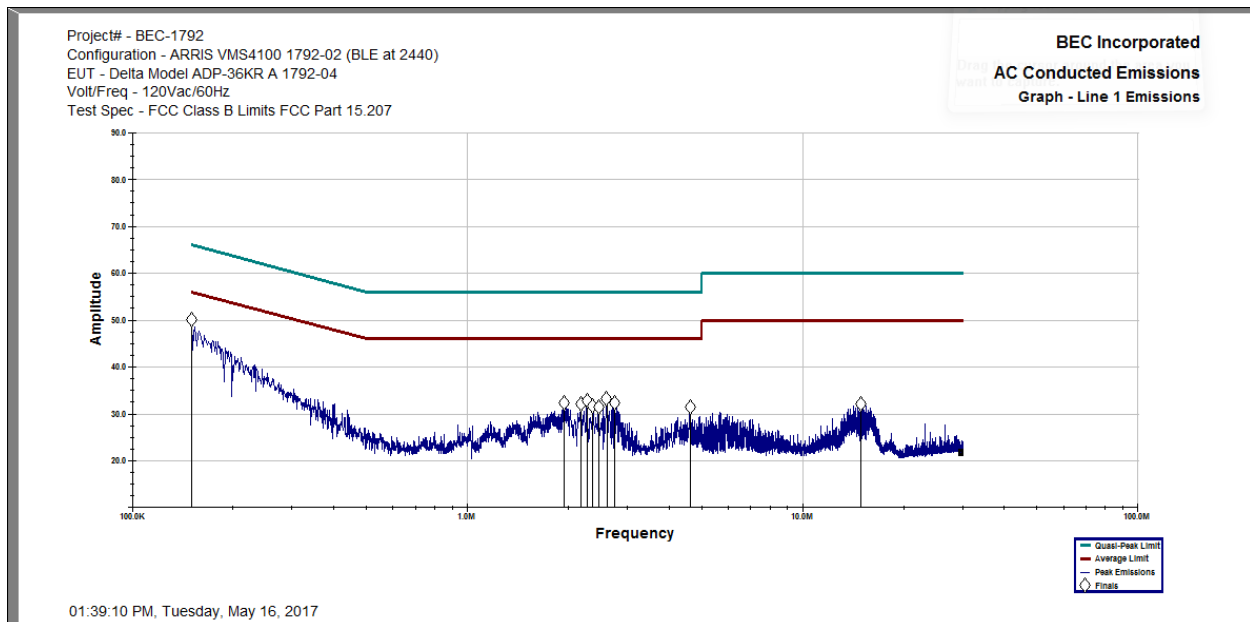


Results: All conducted emissions measured on the AC power line of the Delta Model ADP-36KR A Power Supply Sample 1792-04 With ARRIS VMS4100 BLE QPSK @ 2402 MHz are below the limit specified by 47 CFR Part 15B, Class B products by a margin of at least 22.74 dB.



4.4.3 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Results Table and Graph For Delta Model ADP-36KR A Power Supply Sample 1792-04 With ARRIS VMS4100 BLE QPSK @ 2440 MHz (05/16/2017)

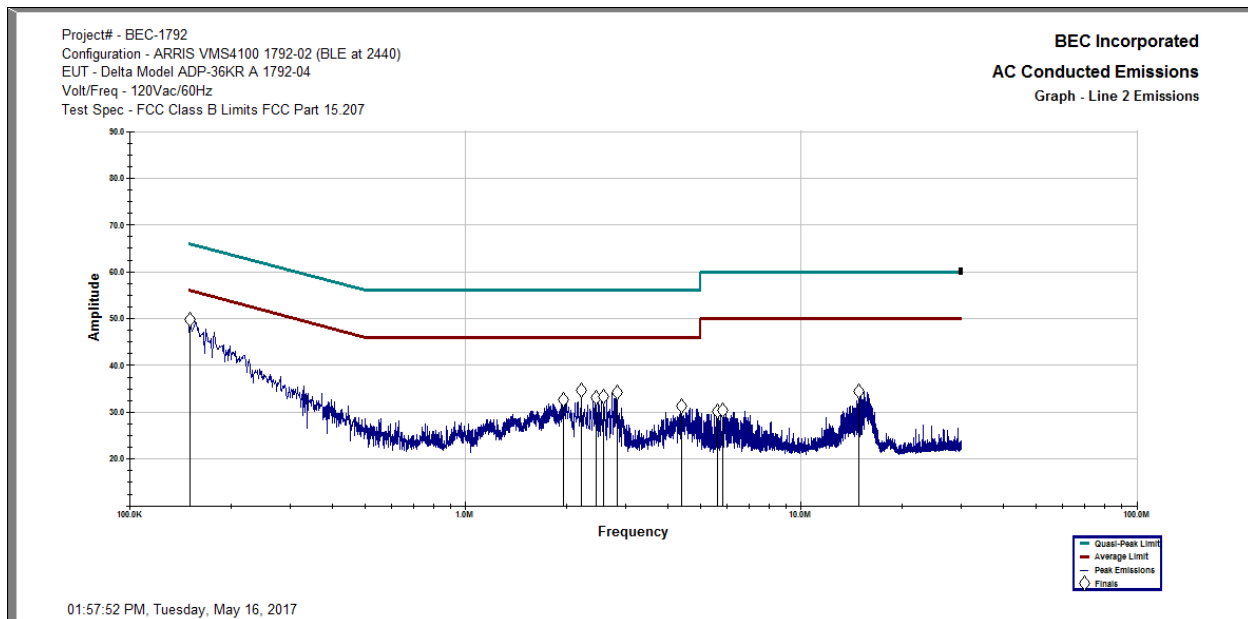
BEC INC. Line 1 Conducted Emissions 01:49:56 PM, Tuesday, May 16, 2017							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
150.082 KHz	27.53	56.00	-28.47	42.63	66.00	-23.37	0.150
1.940 MHz	20.38	46.00	-25.62	26.70	56.00	-29.30	0.369
2.187 MHz	21.30	46.00	-24.70	27.78	56.00	-28.22	0.389
2.270 MHz	20.08	46.00	-25.92	27.10	56.00	-28.90	0.397
2.365 MHz	21.14	46.00	-24.86	27.89	56.00	-28.11	0.407
2.462 MHz	20.14	46.00	-25.86	27.26	56.00	-28.74	0.416
2.587 MHz	20.64	46.00	-25.36	28.17	56.00	-27.83	0.430
2.728 MHz	19.19	46.00	-26.81	28.20	56.00	-27.80	0.447
4.611 MHz	19.88	46.00	-26.12	26.85	56.00	-29.15	0.502
14.872 MHz	20.49	50.00	-29.51	27.09	60.00	-32.91	0.749
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2440)							
EUT - Delta Model ADP-36KR A 1792-04							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							





BEC INC.
Line 2 Conducted Emissions
02:03:45 PM, Tuesday, May 16, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
151.848 KHz	22.50	55.95	-33.45	42.68	65.95	-23.27	0.150
1.947 MHz	21.68	46.00	-24.32	27.67	56.00	-28.33	0.360
2.187 MHz	22.34	46.00	-23.66	28.83	56.00	-27.17	0.382
2.435 MHz	21.61	46.00	-24.39	29.23	56.00	-26.77	0.412
2.566 MHz	21.51	46.00	-24.49	29.35	56.00	-26.65	0.428
2.806 MHz	20.25	46.00	-25.75	29.23	56.00	-26.77	0.457
4.374 MHz	20.62	46.00	-25.38	27.40	56.00	-28.60	0.497
5.633 MHz	18.07	50.00	-31.93	25.99	60.00	-34.01	0.523
5.861 MHz	16.82	50.00	-33.18	26.29	60.00	-33.71	0.527
14.946 MHz	21.32	50.00	-28.68	27.97	60.00	-32.03	0.759
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2440)							
EUT - Delta Model ADP-36KR A 1792-04							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							

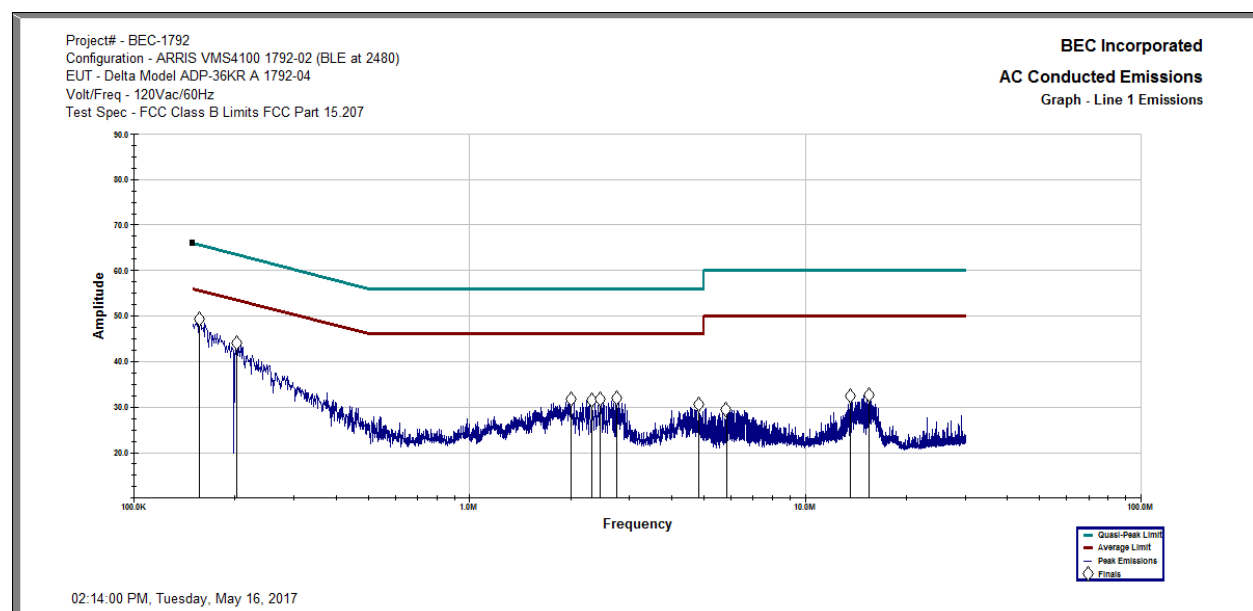


Results: All conducted emissions measured on the AC power line of the Delta Model ADP-36KR A Power Supply Sample 1792-04 With ARRIS VMS4100 BLE QPSK @ 2440 MHz are below the limit specified by 47 CFR Part 15B, Class B products by a margin of at least 23.27 dB.



4.4.4 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Results Table and Graph For Delta Model ADP-36KR A Power Supply Sample 1792-04 With ARRIS VMS4100 BLE QPSK @ 2480 MHz (05/16/2017)

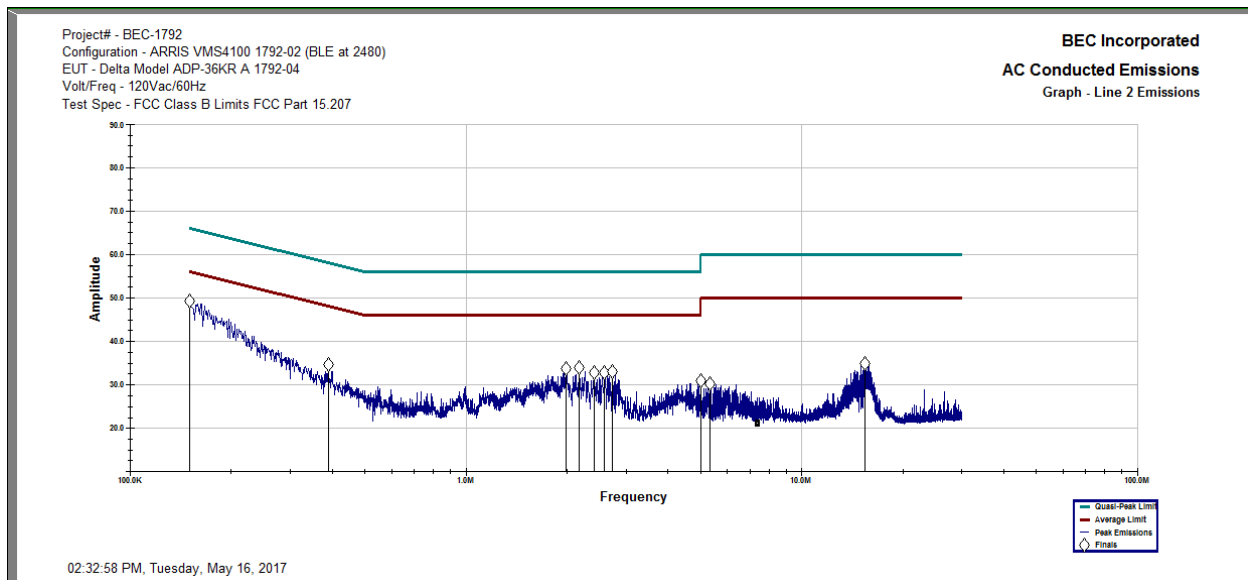
BEC INC.							
Line 1 Conducted Emissions							
02:24:17 PM, Tuesday, May 16, 2017							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
155.944 KHz	26.88	55.83	-28.95	41.89	65.83	-23.94	0.150
202.016 KHz	17.63	54.51	-36.89	36.52	64.51	-27.99	0.140
2.014 MHz	21.25	46.00	-24.75	27.05	56.00	-28.95	0.371
2.331 MHz	20.42	46.00	-25.58	27.34	56.00	-28.66	0.403
2.443 MHz	20.43	46.00	-25.57	27.92	56.00	-28.08	0.414
2.729 MHz	19.18	46.00	-26.82	27.44	56.00	-28.56	0.448
4.838 MHz	18.18	46.00	-27.82	25.92	56.00	-30.08	0.507
5.870 MHz	17.03	50.00	-32.97	26.42	60.00	-33.58	0.527
13.521 MHz	20.08	50.00	-29.92	26.26	60.00	-33.74	0.735
15.428 MHz	21.04	50.00	-28.96	27.30	60.00	-32.70	0.764
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2480)							
EUT - Delta Model ADP-36KR A 1792-04							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							





BEC INC.
Line 2 Conducted Emissions
02:37:58 PM, Tuesday, May 16, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
150.489 KHz	26.93	55.99	-29.06	43.54	65.99	-22.446	0.150
383.775 KHz	16.63	49.32	-32.69	25.96	59.32	-33.361	0.250
1.983 MHz	22.15	46.00	-23.85	27.85	56.00	-28.150	0.360
2.178 MHz	22.39	46.00	-23.61	28.63	56.00	-27.369	0.381
2.393 MHz	21.90	46.00	-24.10	29.37	56.00	-26.633	0.407
2.589 MHz	21.62	46.00	-24.38	30.07	56.00	-25.929	0.431
2.734 MHz	20.41	46.00	-25.59	29.27	56.00	-26.732	0.448
5.003 MHz	18.94	50.00	-31.06	27.07	60.00	-32.930	0.510
5.343 MHz	16.79	50.00	-33.21	27.75	60.00	-32.253	0.517
15.327 MHz	22.61	50.00	-27.39	28.88	60.00	-31.118	0.802
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2480)							
EUT - Delta Model ADP-36KR A 1792-04							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							

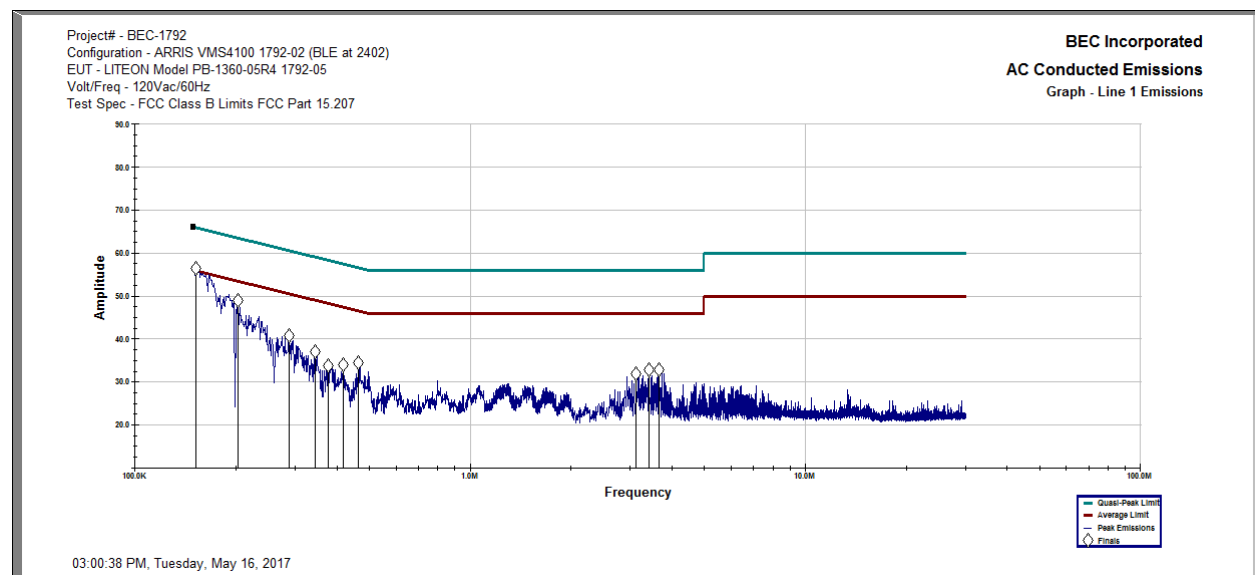


Results: All conducted emissions measured on the AC power line of the Delta Model ADP-36KR A Power Supply Sample 1792-04 With ARRIS VMS4100 BLE QPSK @ 2480 MHz are below the limit specified by 47 CFR Part 15B, Class B products by a margin of at least 22.45 dB.



4.4.5 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Results Table and Graph For LITEON Model PB-1360-05R4 Power Supply Sample 1792-05 With ARRIS VMS4100 BLE QPSK @ 2402 MHz (05/16/2017)

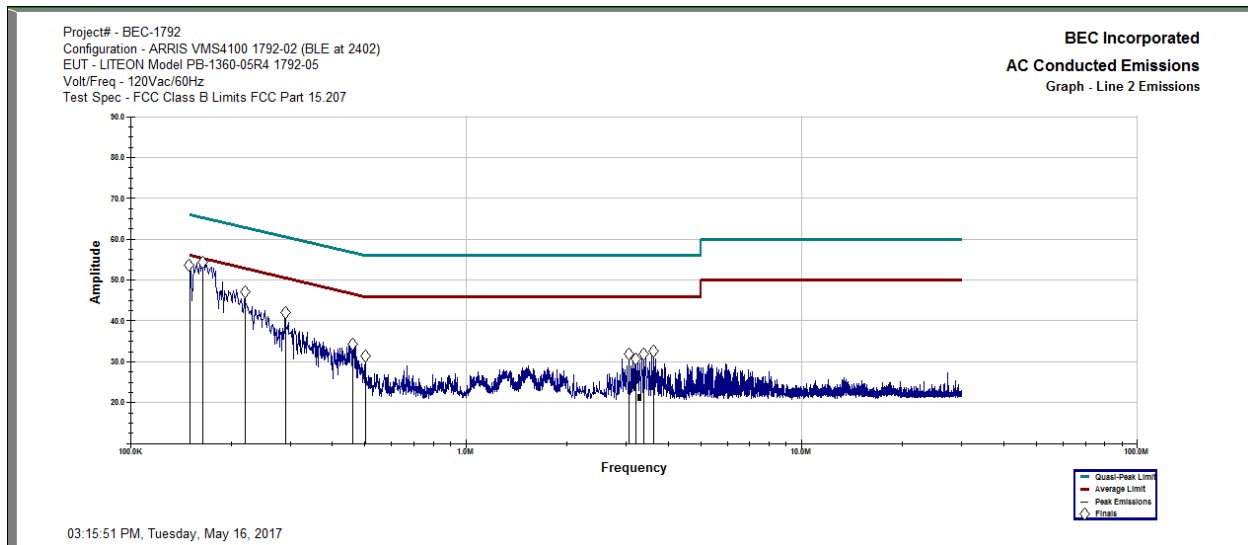
BEC INC.							
Line 1 Conducted Emissions							
03:00:30 PM, Tuesday, May 16, 2017							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
153.232 KHz	40.08	55.91	-15.83	54.44	65.91	-11.47	0.150
203.618 KHz	28.97	54.47	-25.50	44.83	64.47	-19.64	0.140
285.963 KHz	19.41	52.12	-32.70	33.22	62.12	-28.90	0.140
343.673 KHz	17.54	50.47	-32.93	29.89	60.47	-30.58	0.227
374.537 KHz	18.83	49.58	-30.75	31.11	59.58	-28.47	0.240
418.687 KHz	21.78	48.32	-26.54	28.23	58.32	-30.09	0.240
462.919 KHz	23.58	47.06	-23.48	31.15	57.06	-25.91	0.240
3.101 MHz	18.99	46.00	-27.01	26.86	56.00	-29.14	0.481
3.419 MHz	18.64	46.00	-27.36	27.17	56.00	-28.83	0.484
3.667 MHz	18.03	46.00	-27.97	26.91	56.00	-29.09	0.487
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2402)							
EUT - LITEON Model PB-1360-05R4 1792-05							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							





BEC INC.
Line 2 Conducted Emissions
03:15:42 PM, Tuesday, May 16, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
150.692 KHz	37.30	55.98	-18.68	50.54	65.98	-15.44	0.150
164.057 KHz	36.26	55.60	-19.33	50.93	65.60	-14.67	0.150
217.469 KHz	22.41	54.07	-31.66	38.40	64.07	-25.67	0.150
287.636 KHz	19.57	52.07	-32.50	32.69	62.07	-29.38	0.150
462.478 KHz	22.37	47.07	-24.71	30.83	57.07	-26.24	0.250
501.589 KHz	17.52	46.00	-28.48	23.53	56.00	-32.47	0.250
3.089 MHz	17.48	46.00	-28.52	26.72	56.00	-29.28	0.481
3.160 MHz	18.61	46.00	-27.39	26.97	56.00	-29.03	0.482
3.356 MHz	18.56	46.00	-27.44	27.21	56.00	-28.79	0.484
3.603 MHz	18.23	46.00	-27.77	27.24	56.00	-28.76	0.486
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2402)							
EUT - LITEON Model PB-1360-05R4 1792-05							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							

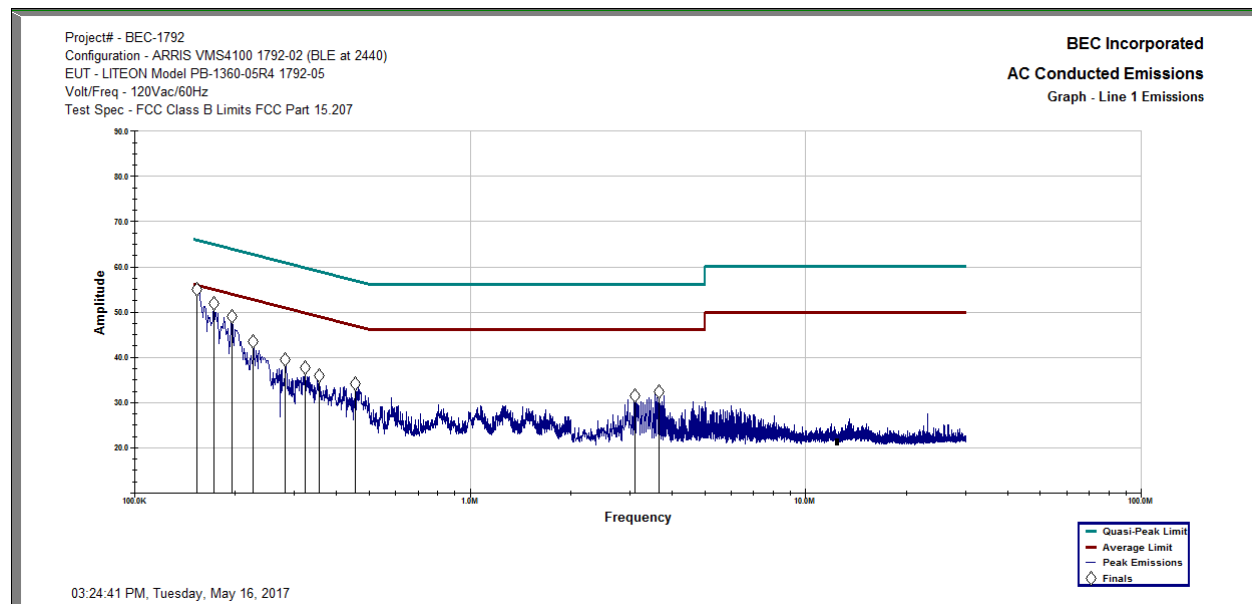


Results: All conducted emissions measured on the AC power line of the LITEON Model PB-1360-05R4 Power Supply Sample 1792-05 With ARRIS VMS4100 BLE QPSK @ 2402 MHz are below the limit specified by 47 CFR Part 15B, Class B products by a margin of at least 11.47 dB.



4.4.6 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Results Table and Graph For LITEON Model PB-1360-05R4 Power Supply Sample 1792-05 With ARRIS VMS4100 BLE QPSK @ 2440 MHz (05/16/2017)

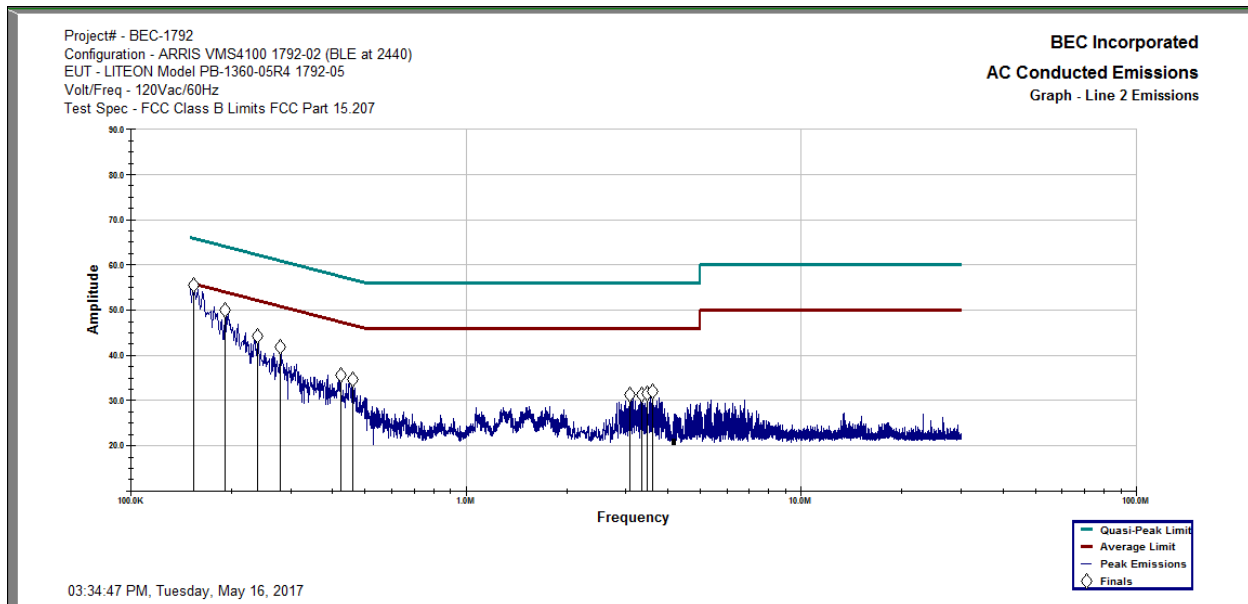
BEC INC.							
Line 1 Conducted Emissions							
03:24:38 PM, Tuesday, May 16, 2017							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
154.304 KHz	38.98	55.88	-16.90	52.38	65.88	-13.50	0.150
172.470 KHz	34.54	55.36	-20.82	46.05	65.36	-19.31	0.149
194.265 KHz	31.11	54.74	-23.63	45.21	64.74	-19.52	0.142
226.726 KHz	22.28	53.81	-31.53	37.22	63.81	-26.59	0.140
279.500 KHz	19.42	52.30	-32.88	32.52	62.30	-29.78	0.140
319.071 KHz	18.10	51.17	-33.07	29.82	61.17	-31.35	0.178
352.852 KHz	15.51	50.20	-34.69	27.82	60.20	-32.38	0.240
451.949 KHz	17.84	47.37	-29.53	27.59	57.37	-29.78	0.240
3.119 MHz	18.90	46.00	-27.10	26.95	56.00	-29.05	0.481
3.634 MHz	18.64	46.00	-27.36	27.75	56.00	-28.25	0.486
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2440)							
EUT - LITEON Model PB-1360-05R4 1792-05							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							





BEC INC.
Line 2 Conducted Emissions
03:34:44 PM, Tuesday, May 16, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
153.163 KHz	37.66	55.91	-18.25	51.22	65.91	-14.69	0.150
189.170 KHz	29.73	54.88	-25.16	43.59	64.88	-21.29	0.150
238.622 KHz	21.55	53.47	-31.91	36.58	63.47	-26.89	0.150
277.948 KHz	18.81	52.34	-33.54	33.59	62.34	-28.75	0.150
422.155 KHz	20.94	48.22	-27.28	29.45	58.22	-28.77	0.250
455.736 KHz	21.10	47.26	-26.17	29.73	57.26	-27.53	0.250
3.093 MHz	17.35	46.00	-28.65	25.78	56.00	-30.22	0.481
3.345 MHz	18.50	46.00	-27.50	27.85	56.00	-28.15	0.483
3.480 MHz	18.87	46.00	-27.13	26.81	56.00	-29.19	0.485
3.610 MHz	18.02	46.00	-27.98	27.44	56.00	-28.56	0.486
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2440)							
EUT - LITEON Model PB-1360-05R4 1792-05							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							

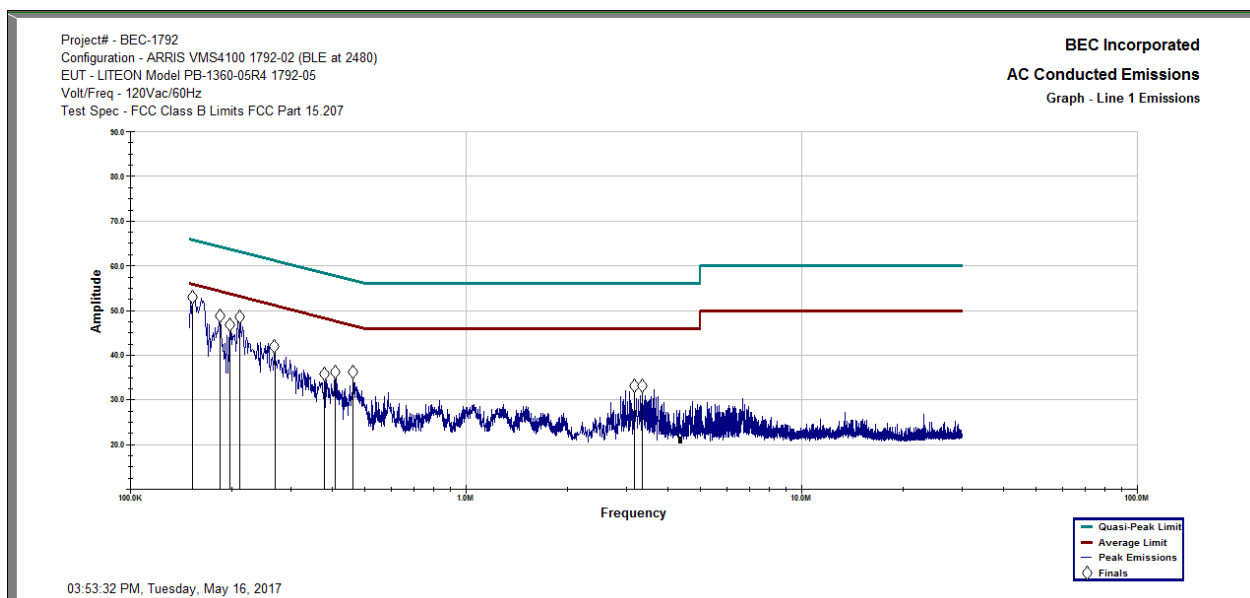


Results: All conducted emissions measured on the AC power line of the LITEON Model PB-1360-05R4 Power Supply Sample 1792-05 With ARRIS VMS4100 BLE QPSK @ 2440 MHz are below the limit specified by 47 CFR Part 15B, Class B products by a margin of at least 13.50 dB.



4.4.7 Conducted Emissions AC power leads (47 CFR 15.207(b)) EUT Test Results Table and Graph For LITEON Model PB-1360-05R4 Power Supply Sample 1792-05 With ARRIS VMS4100 BLE QPSK @ 2480 MHz (05/16/2017)

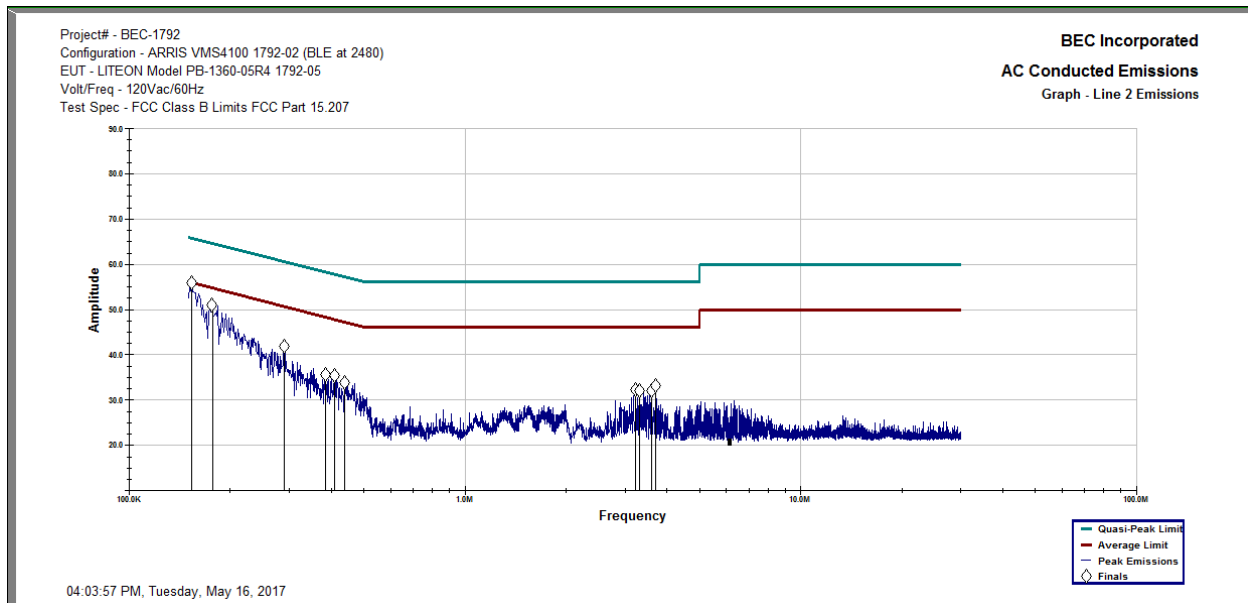
BEC INC.							
Line 1 Conducted Emissions							
03:53:29 PM, Tuesday, May 16, 2017							
	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
153.068 KHz	38.21	55.91	-17.70	51.40	65.91	-14.51	0.150
183.485 KHz	26.35	55.04	-28.69	45.62	65.04	-19.43	0.146
198.473 KHz	29.29	54.62	-25.33	43.06	64.62	-21.55	0.141
211.698 KHz	25.59	54.24	-28.65	40.45	64.24	-23.79	0.140
267.841 KHz	21.45	52.63	-31.18	31.73	62.63	-30.90	0.140
381.650 KHz	20.33	49.38	-29.05	28.32	59.38	-31.06	0.240
410.215 KHz	20.38	48.57	-28.19	28.95	58.57	-29.62	0.240
461.960 KHz	23.12	47.09	-23.97	30.05	57.09	-27.04	0.240
3.162 MHz	19.32	46.00	-26.68	27.32	56.00	-28.68	0.482
3.391 MHz	19.04	46.00	-26.96	27.28	56.00	-28.72	0.484
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2480)							
EUT - LITEON Model PB-1360-05R4 1792-05							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							





BEC INC.
Line 2 Conducted Emissions
04:03:54 PM, Tuesday, May 16, 2017

	1	2	3	4	5	6	7
Frequency	AVG	AVG	AVG	QP	QP	QP	Corr
MHz	dBuV	Limit	Margin	dBuV	Limit	Margin	Factor
155.337 KHz	38.19	55.85	-17.66	51.01	65.85	-14.84	0.150
174.520 KHz	30.78	55.30	-24.52	44.55	65.30	-20.75	0.150
287.093 KHz	20.16	52.08	-31.93	33.09	62.08	-28.99	0.150
384.380 KHz	16.72	49.30	-32.58	27.69	59.30	-31.61	0.250
407.715 KHz	17.07	48.64	-31.56	28.39	58.64	-30.25	0.250
437.058 KHz	20.76	47.80	-27.04	29.01	57.80	-28.79	0.250
3.205 MHz	18.83	46.00	-27.17	26.71	56.00	-29.29	0.482
3.308 MHz	18.64	46.00	-27.36	26.12	56.00	-29.88	0.483
3.601 MHz	18.14	46.00	-27.86	27.21	56.00	-28.79	0.486
3.659 MHz	17.22	46.00	-28.78	27.20	56.00	-28.80	0.487
Project# - BEC-1792							
Configuration - ARRIS VMS4100 1792-02 (BLE at 2480)							
EUT - LITEON Model PB-1360-05R4 1792-05							
Volt/Freq - 120Vac/60Hz							
Test Spec - FCC Class B Limits FCC Part 15.207							



Results: All conducted emissions measured on the AC power line of the LITEON Model PB-1360-05R4 Power Supply Sample 1792-05 With ARRIS VMS4100 BLE QPSK @ 2480 MHz are below the limit specified by 47 CFR Part 15B, Class B products by a margin of at least 14.51 dB.



4.5 Restricted Bands of Operation Per 47 CFR 15.209 30 MHz - 25 GHz

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 C63.4:2014 and is a registered site with the FCC (US1118).

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 C63.4:2014

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 (dB μ V/m) = Meter Reading (dB μ V) + Antenna Factor (dB/m) + Cable Loss (dB)
– Amplifier Gain (dB)



4.5.1 Restricted Bands of Operation Per 47 CFR 15.247(d) and 15.209(a) 30 MHz – 1000 MHz Test Results (04/24/2017)

The emissions, from the ARRIS VMS4100, which fall in the restricted bands of operation, detailed in this section, comply with the limits of 15.209. The EUT was tested at a combination of frequencies with maximum RF output at Low Frequency (LF) 2.402 GHz, Middle Frequency (MF) 2.441 GHz and High Frequency (HF) 2.480 GHz. The EUT was configured to set the output of the BLE modulation to GFSK modulation with a 1 Mbps Rate.

Measurement of the signals was performed with the EUT on a turntable and a variable height antenna mast at 3 meters distance. The signals residing in restricted bands of operation were the second harmonic of the carrier. The table below shows the highest emission measured among the nine combinations of frequency and modulation. No signals related to the intentional radiator antenna frequencies were detected in the scanned frequency range of 30 MHz to 1000 MHz.



CHANNEL 0: 2402 MHZ: 30-1000 MHZ SCAN FCC PART 15 CLASS B

FCC Section 15.205 & 15.209 Class B 3M BLE Testing Requirements Per Guidance Document KDB 558075 Sections 11.0 Emissions in Non-restricted frequency bands & 12.2.7 Radiated spurious emission test for Restricted Band Measurement								
ARRIS VMS4100 Sample BEC 1792-02 w Delta Sample BEC 1792-04 @ 2402 MHz Modulated BLE								
Frequency	Peak	QP	Polarity	Turntable	Ant Height	Correction Factors	FCC Class B 3 Meter Limit	Margin FCC B
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB
132.545	27.32	26.84	H	226	251	-12.71	43.52	-16.68
188.997	27.94	27.51	H	267	166	-14.25	43.52	-16.01
350.998	40.66	39.77	H	022	121	-10.28	46.02	-6.25
377.990	35.81	37.30	H	021	114	-10.03	46.02	-8.72
404.987	37.3	36.4	H	346	104	-9.3	46.02	-9.62
432.011	38.77	38.49	H	352	105	-8.88	46.02	-7.53
445.506	34.9	34.06	H	352	106	-8.34	46.02	-11.96
459.015	35.68	35.47	H	339	107	-8.56	46.02	-10.55
895.795	32.38	30.59	H	310	110	-2.04	46.02	-15.43
959.163	24.72	21.87	H	276	115	-1.31	46.02	-24.15
Frequency	Peak	QP	Polarity	Turntable	Ant Height	Correction Factors	FCC Class B 3 Meter Limit	Margin FCC B
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB
33.555	21.14	22.83	V	283	143	-8.22	40	-17.17
66.7863	19.08	22.83	V	278	184	-18.65	40	-17.17
107.994	25.87	25.66	V	46	110	-14.13	43.52	-17.86
128.553	21.65	20.93	V	284	105	-12.68	43.52	-22.59
132.178	29.59	28.86	V	18	201	-12.71	43.52	-14.66
143.831	20.6	19.91	V	313	109	-13.12	43.52	-23.61
189.002	25.75	26.06	V	214	113	-14.25	43.52	-17.46
405.012	31.26	30.5	V	179	114	-9.3	46.02	-15.52
432.004	33.63	33.48	V	182	119	-8.88	46.02	-12.54
458.985	34.49	34.9	V	199	116	-8.56	46.02	-11.12



CHANNEL 19: 2440 MHZ: 30-1000 MHZ SCAN FCC PART 15 CLASS B

FCC Section 15.205 & 15.209 Class B 3M BLE Testing Requirements Per Guidance Document KDB 558075 Sections 11.0 Emissions in Non-restricted frequency bands & 12.2.7 Radiated spurious emission test for Restricted Band Measurement								
ARRIS VMS4100 Sample BEC 1792-02 w Delta Sample BEC 1792-04 @ 2440 MHz Modulated BLE								
Frequency	Peak	QP	Polarity	Turntable	Ant Height	Correction Factors	FCC Class B 3 Meter Limit	Margin FCC B
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB
131.882	26.93	25.63	H	214	126	-12.71	43.52	-17.89
350.998	39.89	39.97	H	017	108	-10.28	46.02	-6.05
377.997	36.19	35.56	H	010	119	-10.03	46.02	-10.46
405.012	38.79	37.84	H	322	110	-9.30	46.02	-8.18
431.991	38.16	36.49	H	351	114	-8.88	46.02	-9.53
445.493	34.94	33.69	H	351	106	-8.34	46.02	-12.33
458.988	34.66	33.83	H	351	223	-8.56	46.02	-12.19
704.002	16.49	16.98	H	195	190	-4.83	46.02	-29.04
709.362	18.87	17.2	H	199	127	-4.78	46.02	-28.82
711.178	18.94	16.97	H	154	167	-4.77	46.02	-29.05
Frequency	Peak	QP	Polarity	Turntable	Ant Height	Correction Factors	FCC Class B 3 Meter Limit	Margin FCC B
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB
33.573	24.87	23.66	V	218	119	-8.23	40.00	-16.34
67.101	26.71	25.95	V	210	106	-18.65	40.00	-14.05
108.012	27.34	26.17	V	028	111	-14.12	43.52	-17.35
131.632	30.43	28.35	V	033	190	-12.71	43.52	-15.17
162.008	23.28	24.32	V	209	133	-13.69	43.52	-19.2
188.99	28.1	27.22	V	212	116	-14.25	43.52	-16.3
404.992	31.75	30.6	V	177	115	-9.3	46.02	-15.42
432.011	30.56	29.99	V	194	127	-8.88	46.02	-16.03
459.005	33.01	32.06	V	192	107	-8.56	46.02	-13.96
958.913	22.97	21.78	V	324	129	-1.31	46.02	-24.24



CHANNEL 39: 2480 MHZ: 30-1000 MHZ SCAN FCC PART 15 CLASS B

FCC Section 15.205 & 15.209 Class B 3M BLE Testing Requirements Per Guidance Document KDB 558075 Sections 11.0 Emissions in Non-restricted frequency bands & 12.2.7 Radiated spurious emission test for Restricted Band Measurement								
ARRIS VMS4100 Sample BEC 1792-02 w Delta Sample BEC 1792-04 @ 2480 MHz Modulated BLE								
Frequency	Peak	QP	Polarity	Turntable	Ant Height	Correction Factors	FCC Class B 3 Meter Limit	Margin FCC B
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB
132.133	26.15	24.72	H	098	119	-12.71	43.52	-18.80
351.003	40.70	39.87	H	044	109	-10.28	46.02	-6.15
377.997	36.02	35.55	H	009	113	-10.03	46.02	-10.47
405.007	38.52	37.77	H	013	106	-9.30	46.02	-8.25
431.996	37.49	38.66	H	355	106	-8.88	46.02	-7.36
527.394	35.73	33.6	H	161	110	-7.1	46.02	-12.42
704.797	19.12	17.13	H	48	149	-4.82	46.02	-28.89
708.112	20.16	17.17	H	335	110	-4.79	46.02	-28.85
833.116	19.93	18.14	H	70	229	-2.81	46.02	-27.88
899.735	33.17	31.36	H	327	106	-1.95	46.02	-14.66
Frequency	Peak	QP	Polarity	Turntable	Ant Height	Correction Factors	FCC Class B 3 Meter Limit	Margin FCC B
MHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB
107.999	27.00	27.23	V	025	115	-14.13	43.52	-16.29
131.902	30.49	29.01	V	027	179	-12.71	43.52	-14.51
189.007	27.56	12.76	V	206	110	-14.25	43.52	-30.76
704.703	21.64	17.12	V	297	247	-4.82	46.02	-28.90
705.732	18.79	17.43	V	169	130	-4.81	46.02	-28.59
705.787	18.03	16.93	V	253	110	-4.81	46.02	-29.09
707.746	17.72	17	V	85	178	-4.79	46.02	-29.02
710.185	17.75	16.78	V	153	194	-4.77	46.02	-29.24
710.964	17.76	16.55	V	80	248	-4.77	46.02	-29.47
713.213	17.14	16.51	V	12	173	-4.78	46.02	-29.51

Test Results: The ARRIS VMS4100 With BLE complied with the requirements of 47 CFR Part 15.209(a). Signals that were detected in the restricted bands of operation were below the limits of 47 CFR Part 15.209(a) and are therefore compliant.



4.5.2 Restricted Bands of Operation Per 47 CFR 15.247(d) and 15.209(a) 1 – 25 GHz (03/28/2017)

The spurious signal measurements made above 1 GHz are compared against the limits of 47 CFR Part 15.209(a). The signals were the second and third harmonics of the radio transmitter. The test result tables are reprinted here for reader's convenience. The ARRIS VMS4100 was tested at the Lower 2.402 GHz, Middle 2.440 GHz and Higher 2.480 GHz frequency set using BLE GFSK modulation with a 1 Mbps Rate.

GFSK (2.402 GHz)										
Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	Peak Limit	Peak Margin	Avg Limit	Avg Margin
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB
measured peak and average with 1MHz RBW, 3 MHz VBW (47 CFR Part 15.205, 15.209)										
3.2026	45.04	43.59	V	215	121	-1.67	73.98	-28.94	53.98	-10.39
3.5190	42.43	28.89	V	340	101	-0.54	73.98	-31.55	53.98	-25.09
4.4946	47.73	31.90	V	323	100	1.10	73.98	-26.25	53.98	-22.08
4.4997	49.72	33.87	H	277	101.9	1.10	73.98	-24.26	53.98	-20.11
4.8037	56.18	51.47	V	233	124	2.25	73.98	-17.80	53.98	-2.51
4.8042	63.80	61.34	H	143	201.5	2.26	73.98	-10.18	53.98	7.36
Re-measured peak with 1MHz RBW, 10 Hz VBW										
4.8037	43.7		V	215.6	142.3	2.25			53.98	-8.03
4.8040	34.9		H	145	197.2	2.26			53.98	-16.82
GFSK (2.440 GHz)										
Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	Peak Limit	Peak Margin	Avg Limit	Avg Margin
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB
measured peak and average with 1MHz RBW, 3 MHz VBW (47 CFR Part 15.205, 15.209)										
3.2547	46.35	43.90	H	192	122	-1.48	73.98	-70.73	53.98	-10.08
3.2547	48.04	44.84	V	185	103	-1.48	73.98	-25.94	53.98	-9.14
4.4916	50.71	33.27	V	051	102	1.10	73.98	-23.27	53.98	-20.71
4.4963	47.78	31.60	H	059	101	1.10	73.98	-69.48	53.98	-22.38
4.8820	64.10	60.60	V	215	136	2.56	73.98	-9.88	53.98	9.18
4.8823	50.67	46.66	H	118	100	2.55	73.98	-69.10	53.98	-7.32
Re-measured peak with 1MHz RBW, 10 Hz VBW										
4.8820	39.20		V	215	136	2.56			53.98	-12.22
GFSK (2.480 GHz)										
Frequency	Peak Level	Avg Level	Ant Pol	Azimuth	Ant Hght	C/F	Peak Limit	Peak Margin	Avg Limit	Avg Margin
GHz	dBuV/m	dBuV/m	H/V	degrees	cm	dB	dBuV/m	dB	dBuV/m	dB
measured peak and average with 1MHz RBW, 3 MHz VBW (47 CFR Part 15.205, 15.209)										
3.3067	47.79	44.37	H	166	124	-1.30	73.98	-26.19	53.98	-9.61
3.5960	41.46	30.56	V	315	100	-0.29	73.98	-32.52	53.98	-23.42
4.4980	49.06	32.18	H	060	101	1.10	73.98	-24.92	53.98	-21.80
4.4997	53.07	33.71	V	060	102	1.10	73.98	-20.91	53.98	-20.27
4.9603	63.30	60.50	V	193	103	2.85	73.98	-10.68	53.98	9.37
4.9603	62.90	60.00	H	146	182	2.85	73.98	-11.08	53.98	8.87
Re-measured peak with 1MHz RBW, 10 Hz VBW										
4.9603	34.30		V	149	100	2.85			53.98	-16.83
4.9603	34.40		H	146	182	2.85			53.98	-16.73

Test Results: The ARRIS VMS4100 EPR4 complies with the requirements of 47 CFR Part 15.209(a). Emissions in the restricted frequency bands, namely the second and third harmonics of the transmitter frequency, were measured. Those average detected signals levels that exceeded the limits of 15.209(a), were re-measured with reduced bandwidth of 10 Hz.



4.6 Spurious Radiated Emissions-Non Restricted Bands Per 47 CFR 15.247(d) and 15.209(a)

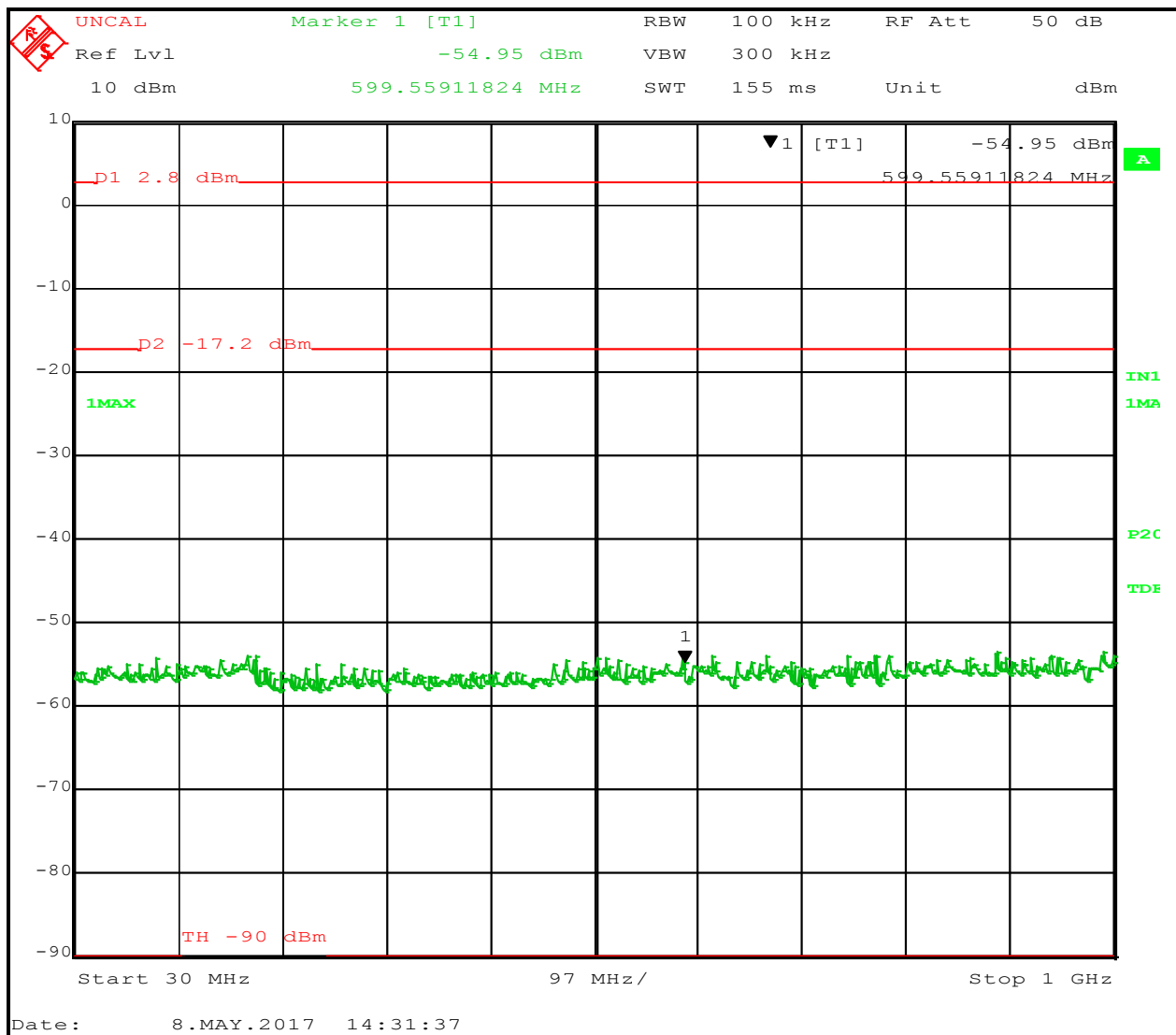
The EUT was scanned in the frequency ranges of 30 MHz to 1000 MHz and then 1 to 25 GHz. Connection to the EUT was made by direct conducted connection to the BLE antenna. The harmonics of the fundamental were checked to ensure that they were 20 dB below the peak of the fundamental amplitude. The test receiver screen captures have D1 which shows the fundamental peak amplitude of the intentional radiator at 2402 MHz, 2440 MHz and 2480 MHz and D2 showing 20 dB below each of the fundamental frequencies.



4.6.1 Spurious Radiated Emissions-Non Restricted Bands 30 – 1000 MHz Per 47 CFR 15.209 Test Results (05/08/2017)

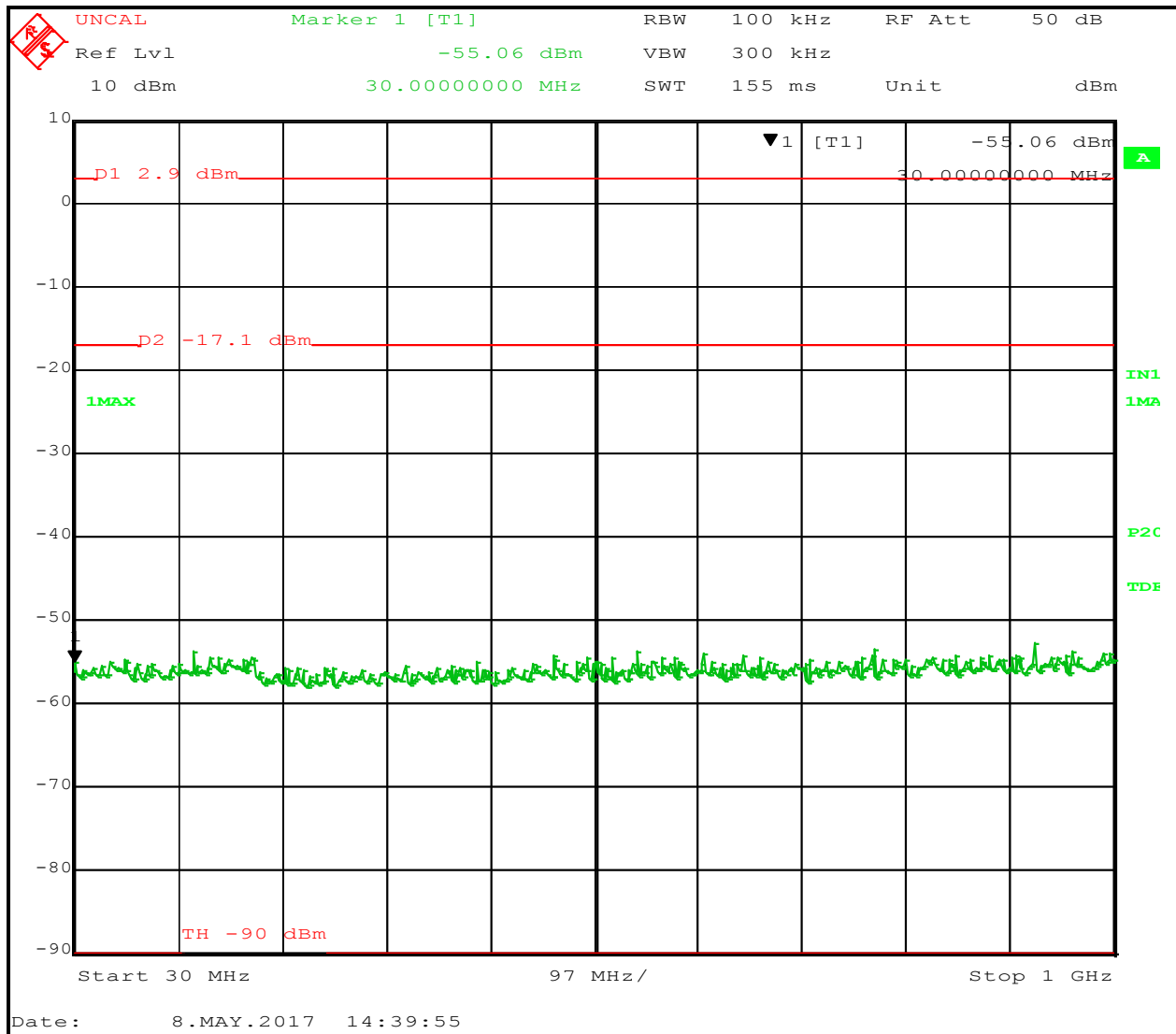
The EUT was scanned in the frequency range of 30 MHz to 1000 MHz. Connection to the EUT was made by direct conducted connection to the BLE antenna. The harmonics of the fundamental were checked to ensure that they were 20 dB below the peak of the fundamental amplitude. D1 shows the fundamental peak amplitude of the intentional radiator at 2402 MHz, 2440 MHz and 2480 MHz with D2 showing 20 dB below each of the fundamental frequencies.

CHANNEL 0: 2402 MHZ: 30-1000 MHZ SCAN FCC PART 15 CLASS B



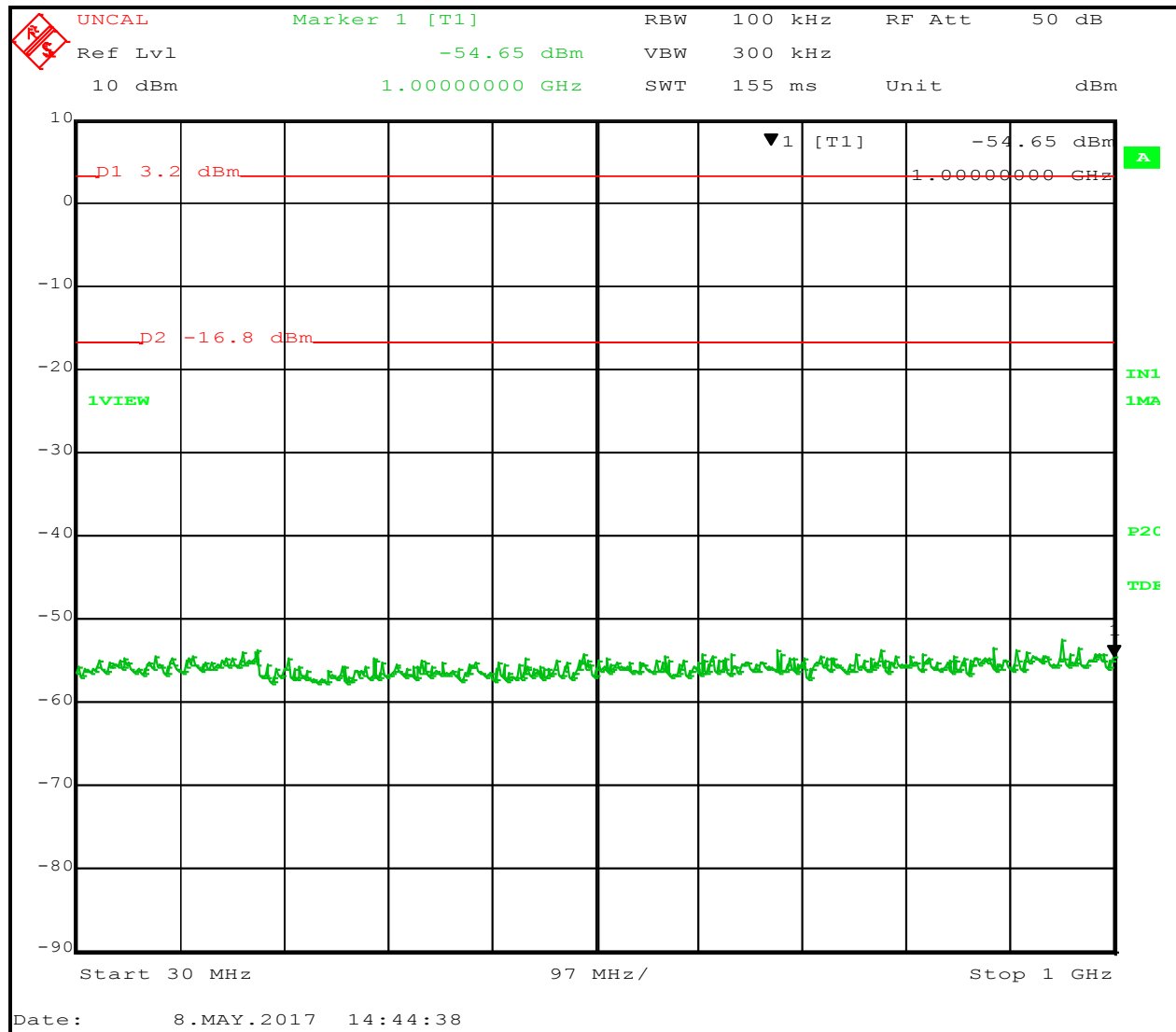


CHANNEL 19: 2440 MHZ: 30-1000 MHZ SCAN FCC PART 15 CLASS B





CHANNEL 39: 2480 MHZ: 30-1000 MHZ SCAN FCC PART 15 CLASS B



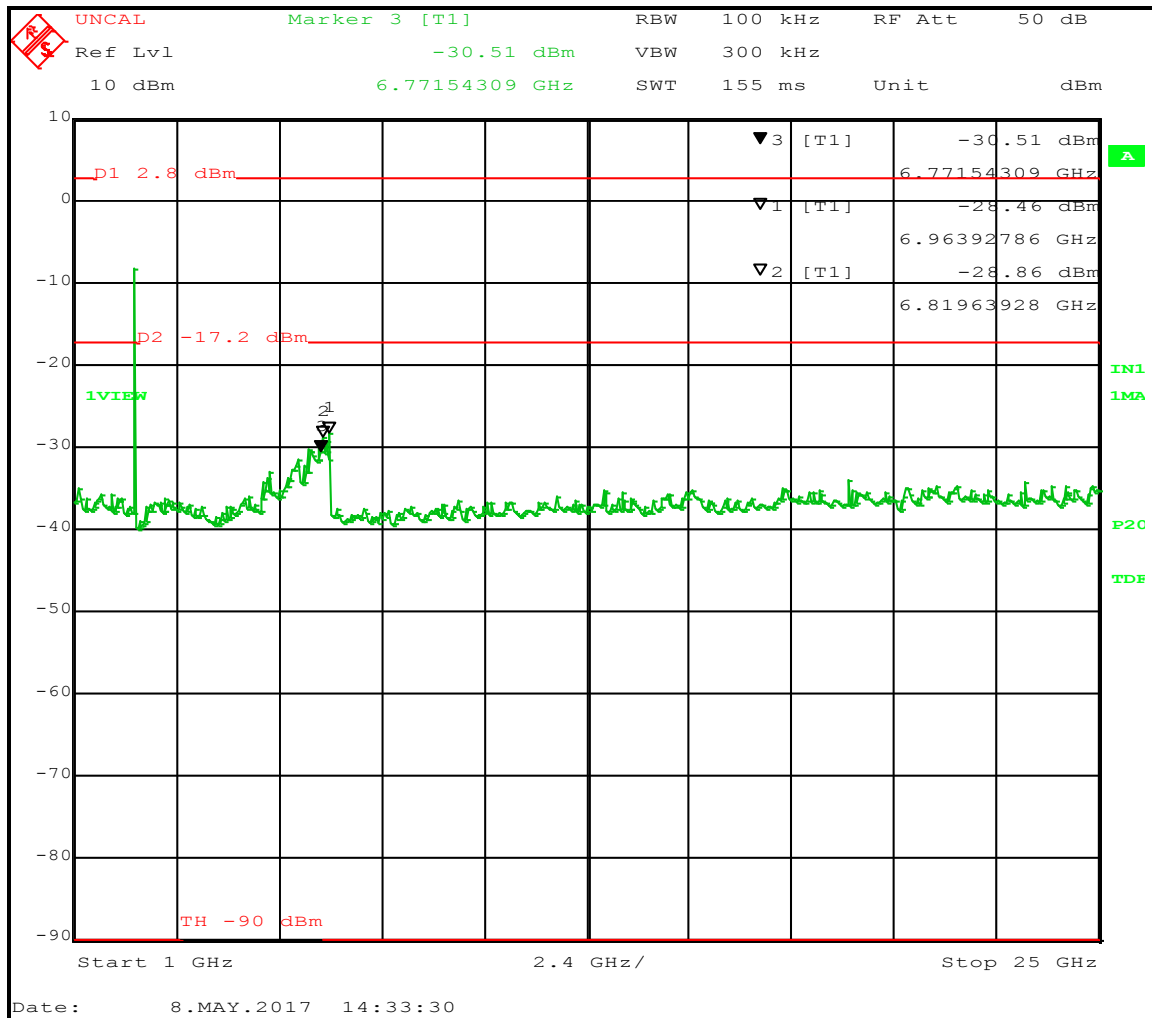
Test Results: The ARRIS VMS4100 With BLE complied with the requirements of 47 CFR Part 15.209. Signals that were detected in the non-restricted bands of operation were below the 20 dB peak margin and are therefore compliant to the limits of 47 CFR Part 15.209.



4.6.2 Spurious Radiated Emissions-Non Restricted 1 – 25 GHz Per 47 CFR 15.209 Test Results (05/08/2017)

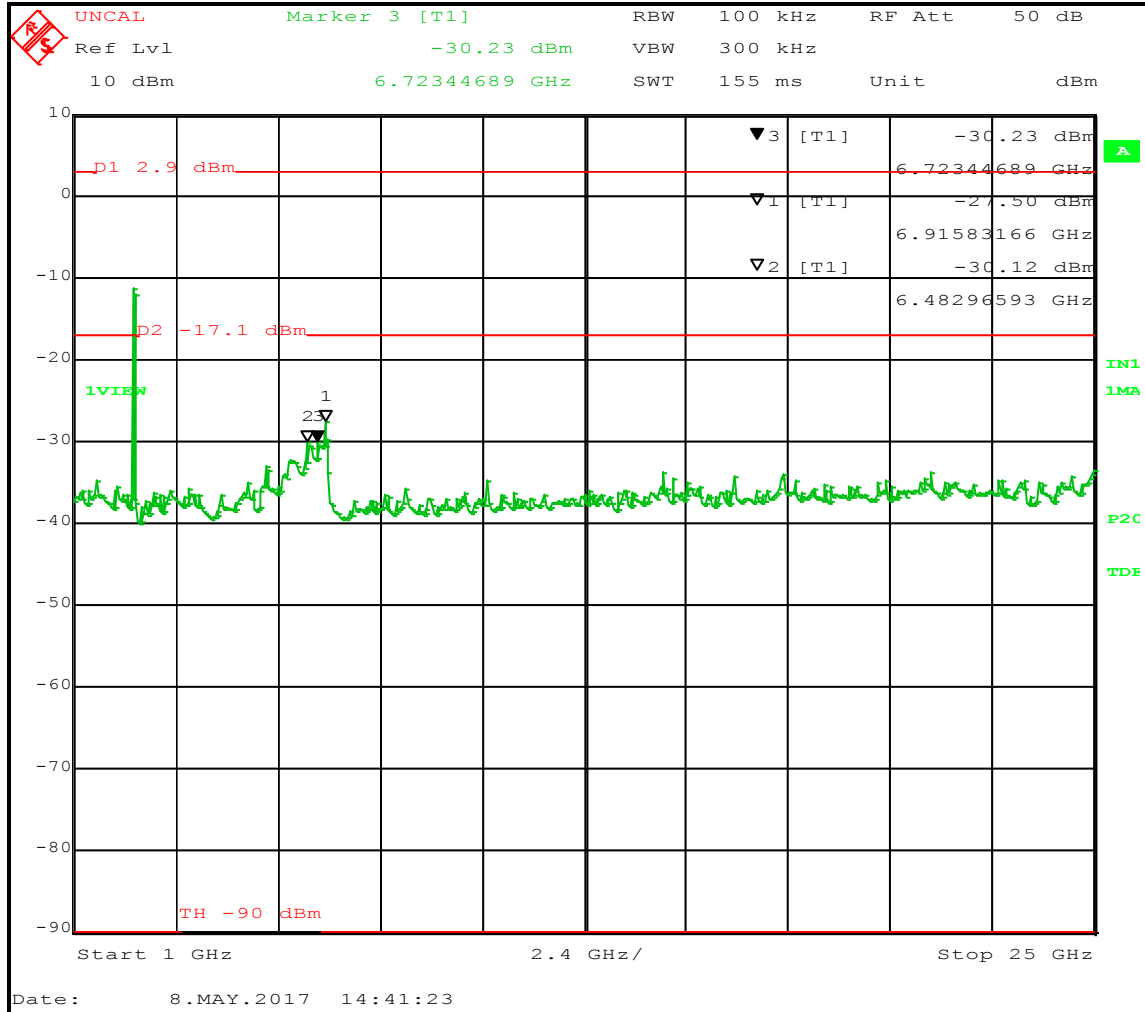
The EUT was scanned in the frequency range of 30 MHz to 1000 MHz. Connection to the EUT was made by direct conducted connection to the BLE antenna. The harmonics of the fundamental were checked to ensure that they were 20 dB below the peak of the fundamental amplitude. D1 shows the fundamental peak amplitude of the intentional radiator at 2402 MHz, 2440 MHz and 2480 MHz with D2 showing 20 dB below each of the fundamental frequencies.

CHANNEL 0: 2402 MHZ: 1-25 GHZ SCAN FCC PART 15 CLASS B



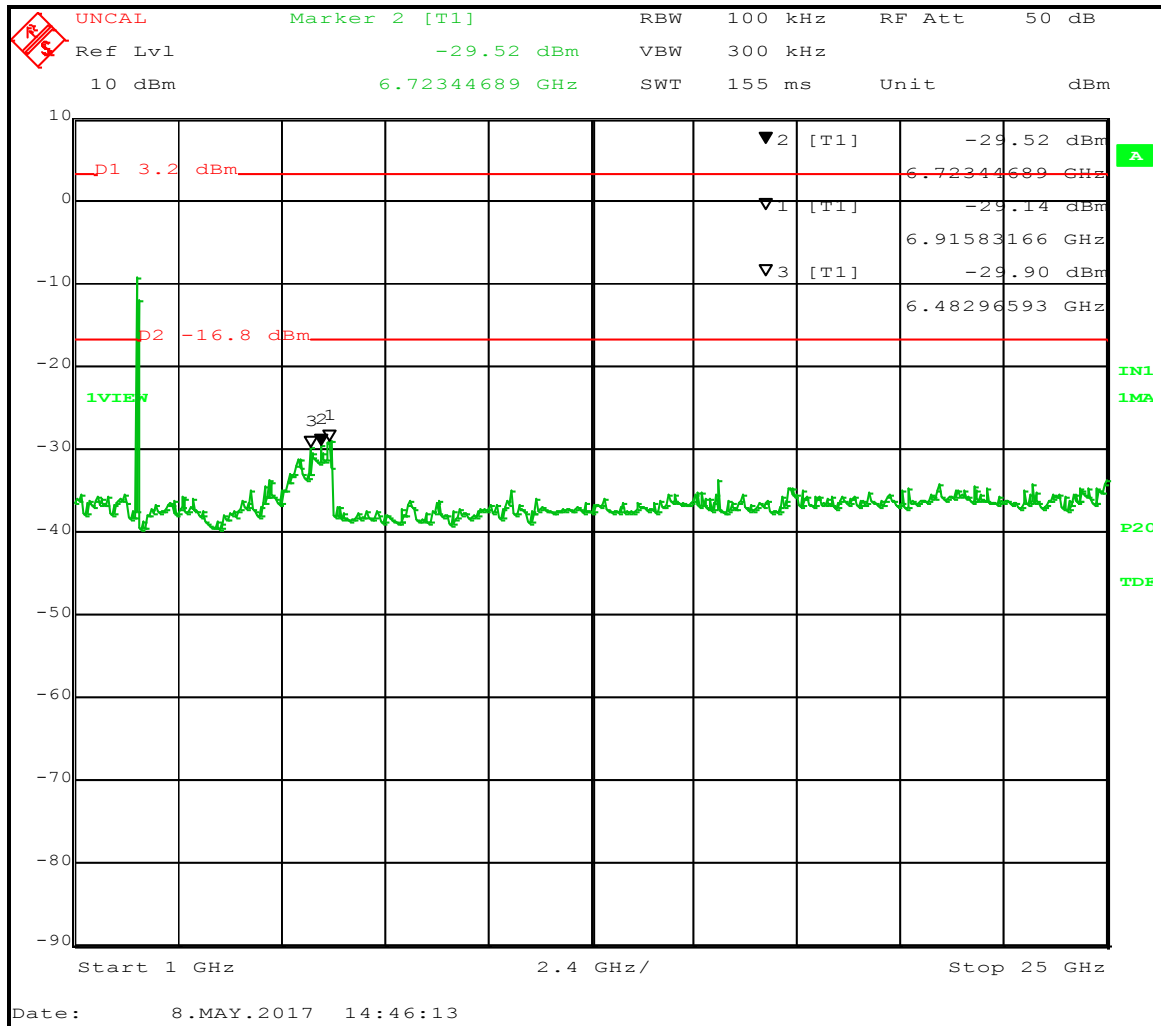


CHANNEL 19: 2440 MHZ: 1-25 GHZ SCAN FCC PART 15 CLASS B





CHANNEL 39: 2480 MHZ: 1-25 GHZ SCAN FCC PART 15 CLASS B



Test Results: The ARRIS VMS4100 With BLE complied with the requirements of 47 CFR Part 15.209(a). Signals that were detected in the non-restricted bands of operation were below the 20 dB peak margin and are therefore compliant to the limits of 47 CFR Part 15.209(a).



4.7 6 dB Bandwidth 47 CFR 15.247 (a)(2) Test Results (05/05/2017)

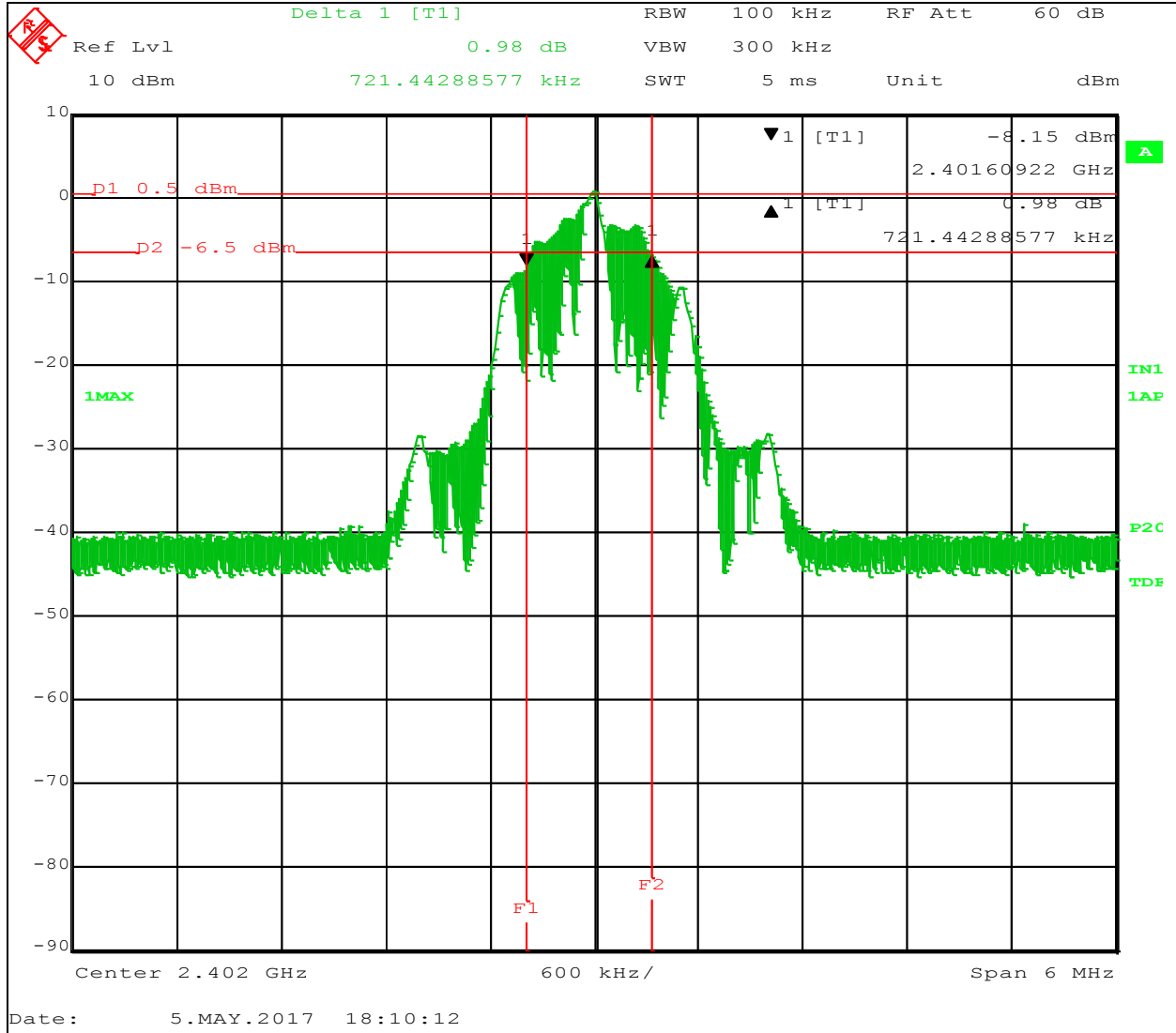
Measurement of the 6 dB bandwidth at BLE frequencies from the VMS4100 were made with the spectrum analyzer connected directly to the transmitter output in place of the antenna. The table contains the frequency measurement of the BLE modulation GFSK modulation with a 1 Mbps Rate at low, middle and high frequency channels in constant transmit mode, non-hopping. The DTS bandwidth must be a minimum of 500 kHz per FCC Part 15 Subpart C Section 15.247 (a)(2).

BLE GFSK Modulation Channel	Frequency GHz	Measurement kHz
0	2.402	721.44
19	2.440	685.37
39	2.480	661.32

Test Results: The VMS4100 meets the minimum 500 kHz requirements for the 6 dB bandwidth measurement as detailed in FCC Part 15 Subpart C Section 15.247 (a)(2).

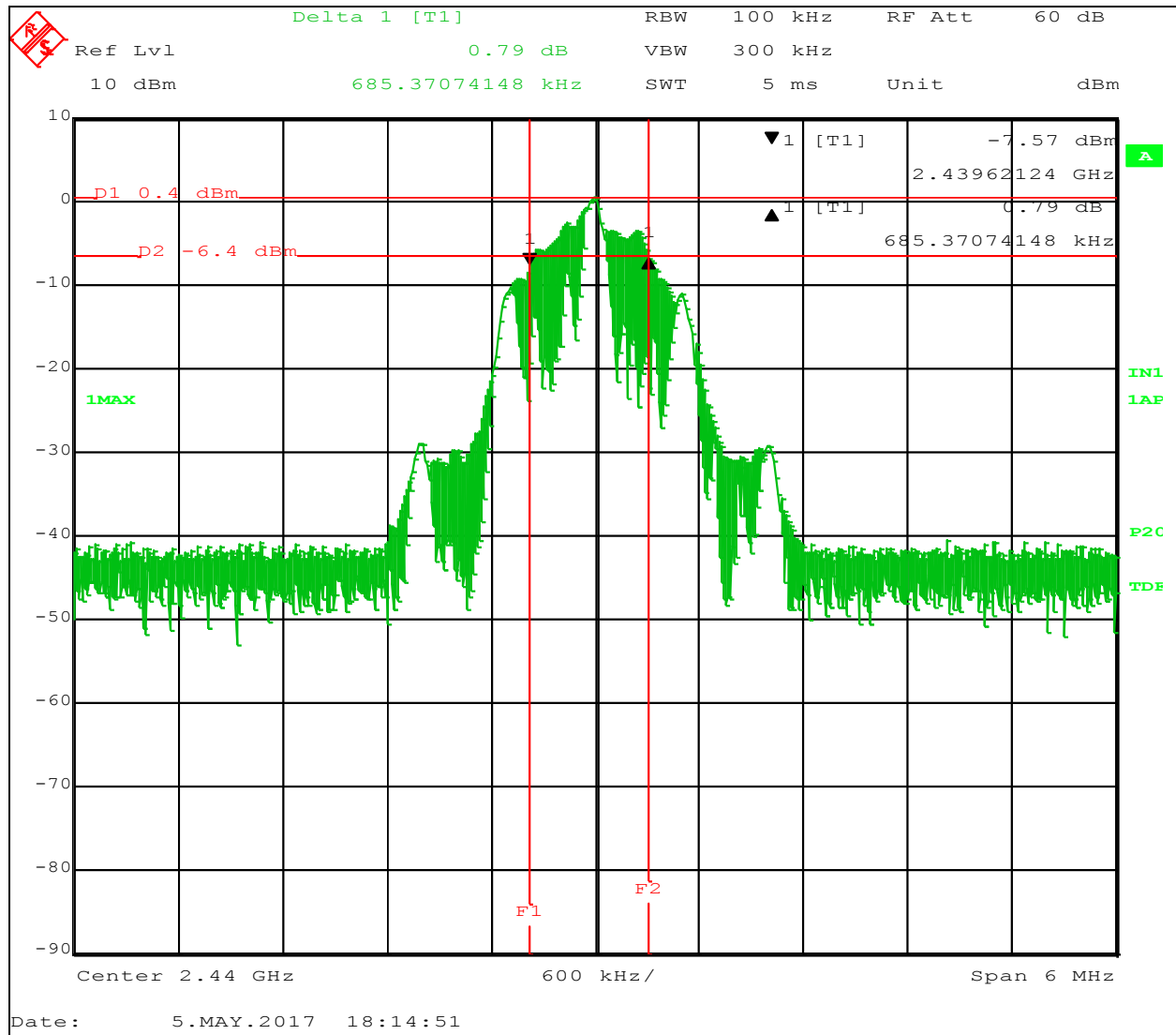


CHANNEL 0: 2402 MHZ 6 dB BANDWIDTH



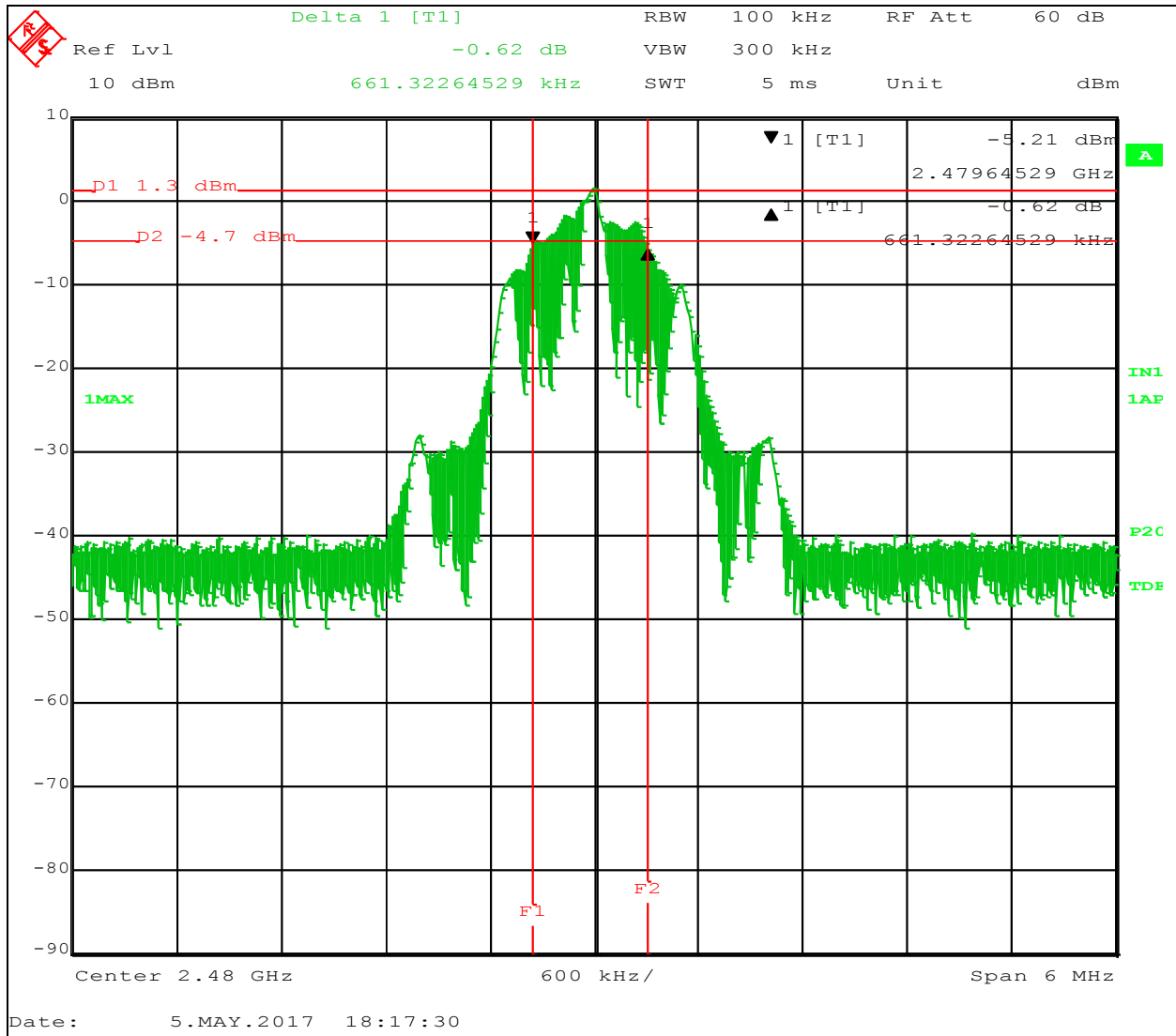


CHANNEL 19: 2440 MHZ 6 dB BANDWIDTH





CHANNEL 39: 2480 MHZ 6 dB BANDWIDTH

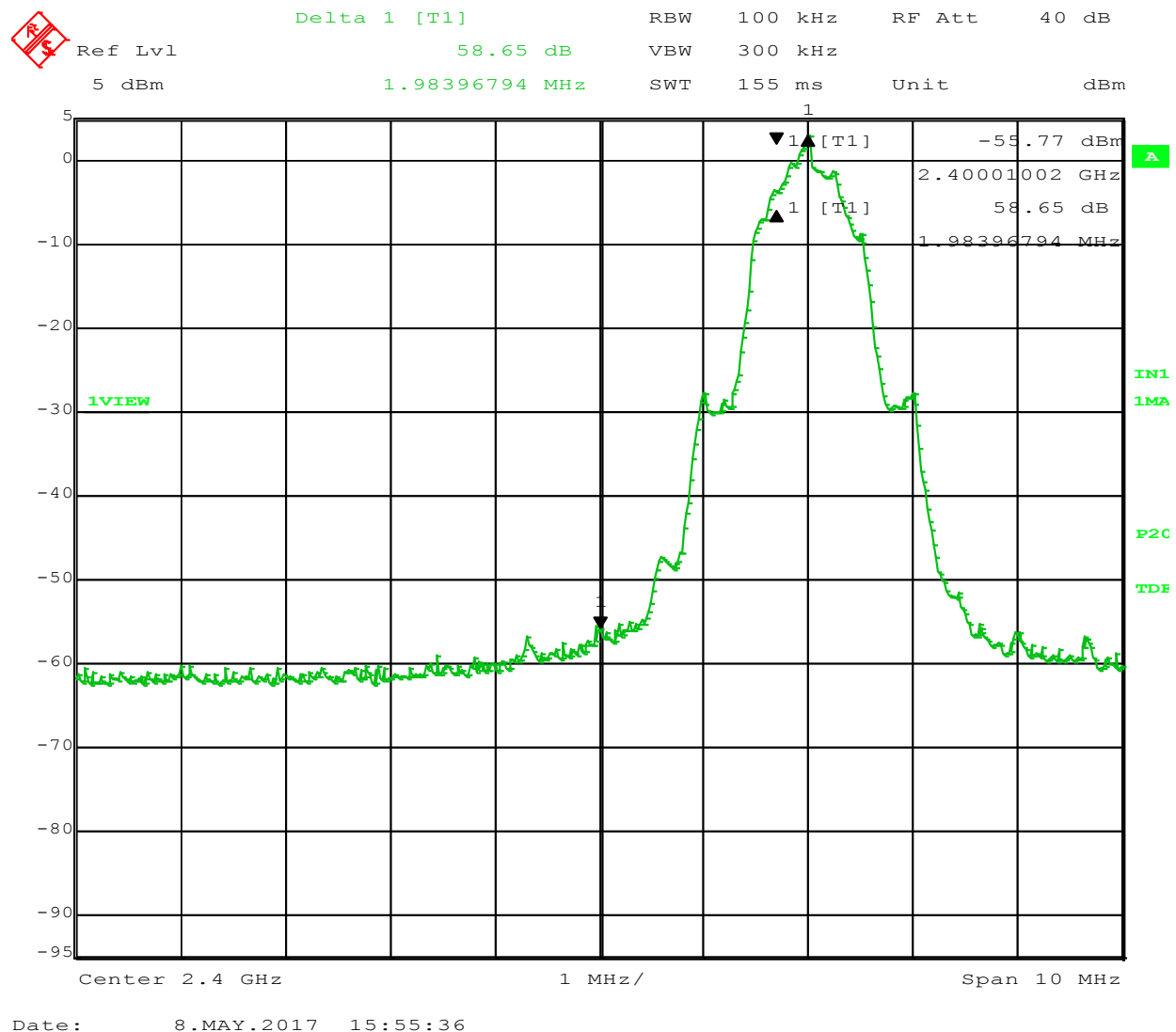




4.8 Band Edge Measurement Per 47 CFR 15.247(d) Test Results (05/08/2017)

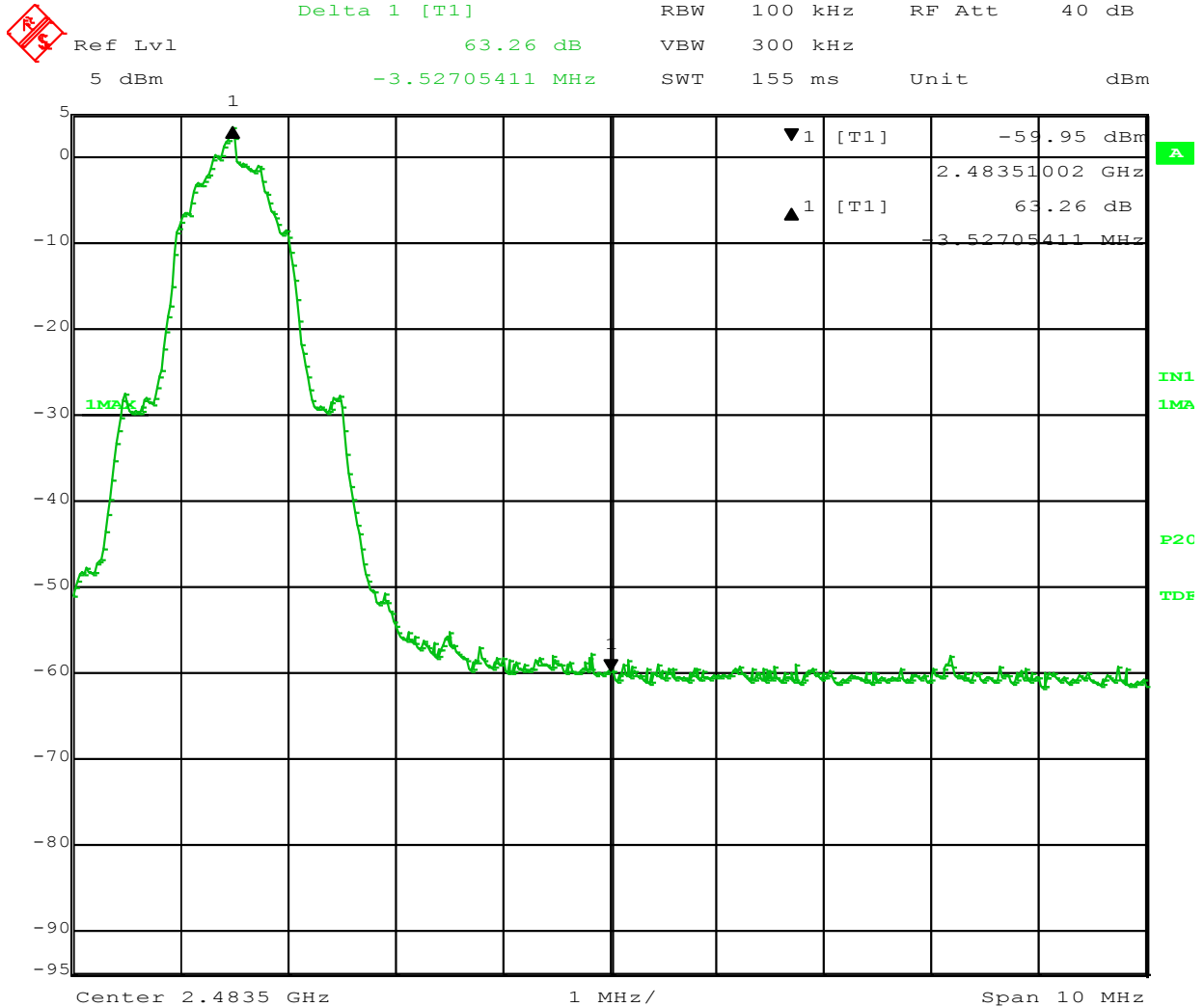
The demonstration of band-edge compliance is shown by two spectrum analyzer screen grabs showing the lowest channel (0), frequency of 2.402 GHz and the highest channel (37) frequency of 2.480 GHz. The two screen grabs demonstrate that the separation between the two channels and the restricted band edges at 2.390 GHz and 2.4385 GHz is greater than 2 MHz.

CHANNEL 0: 2402 MHZ BAND EDGE MEASUREMENT





CHANNEL 37: 2480 MHZ BAND EDGE MEASUREMENT



Date: 8.MAY.2017 15:34:30

Test Results: The 99% Occupied Bandwidth of the ARRIS VMS4100 does not encroach upon the 2 MHz band-edge of the restricted bands, 2310 – 2390 MHz and 2483.5 – 2500 MHz. Therefore the EUT is compliant to the requirements of FCC/KDB 550974 D01 and ANSI C63.10.



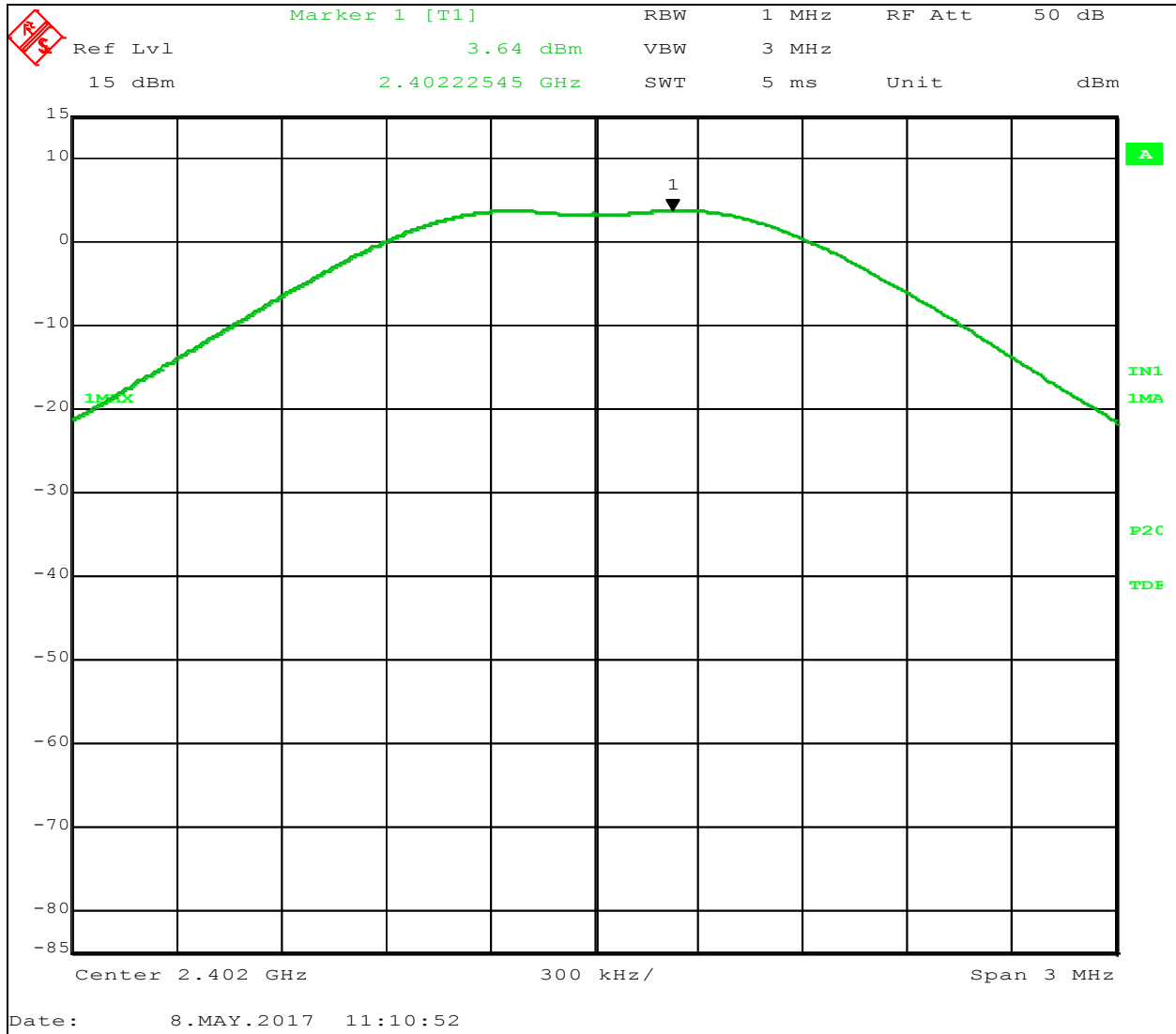
4.9 Maximum Peak Power Output (47 CFR 15.247(b)(3) Test Results (05/08/2017)

Measurement of the Maximum Peak Power Output of the VMS4100 was made with the spectrum analyzer connected directly to the transmitter output in place of the antenna. The table contains the power levels of the BLE modulation GFSK modulation with a 1 Mbps Rate at low, middle and high frequency channels in constant transmit mode, non-hopping.

BLE GFSK Modulation Channel	Frequency (GHz)	Measured Level (dBm)	Cable # 814 Loss (dB)	Total		Limit		Margin	
				dBm	Watts	dBm	Watts	dBm	Watts
0	2.402	3.64	0.50	4.14	0.00259	30.00	1.000	-25.86	-0.9974
19	2.440	3.70	0.51	4.21	0.00264	30.00	1.000	-25.79	-0.9974
39	2.480	4.10	0.57	4.67	0.00293	30.00	1.000	-25.33	-0.9971

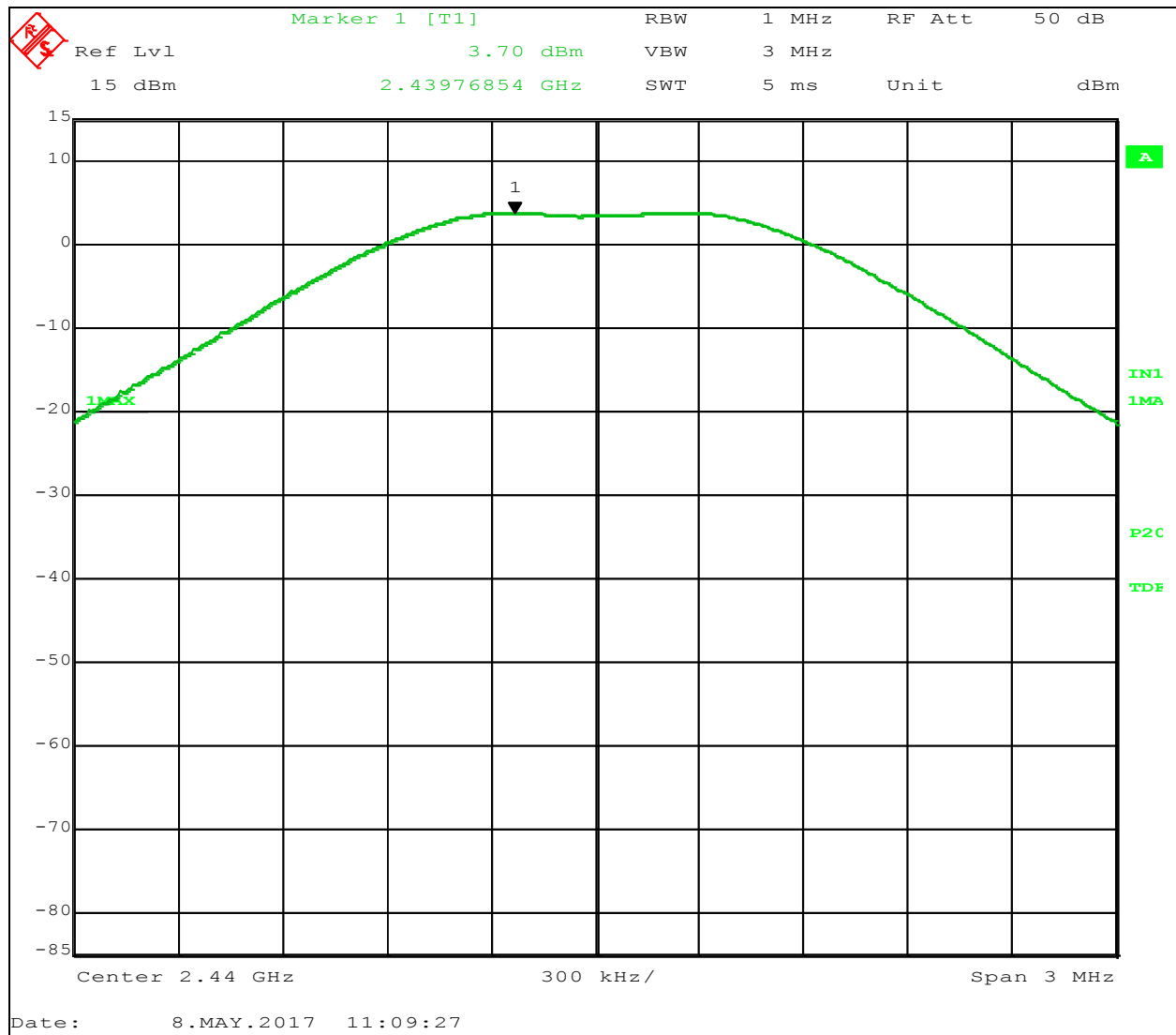


CHANNEL 0: 2402 MHZ OUTPUT POWER





CHANNEL 19: 2440 MHZ OUTPUT POWER





4.10 Antenna Port, Power Spectral Density Per 47 CFR 15.247(e) Test Results 06/12/2017

The VMS4100 employs a combination of both frequency hopping and digital modulation techniques. Therefore, the power spectral density, conducted from the transmitter to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off shall not be greater than 8 dBm in any 3 kHz band during continuous transmission.

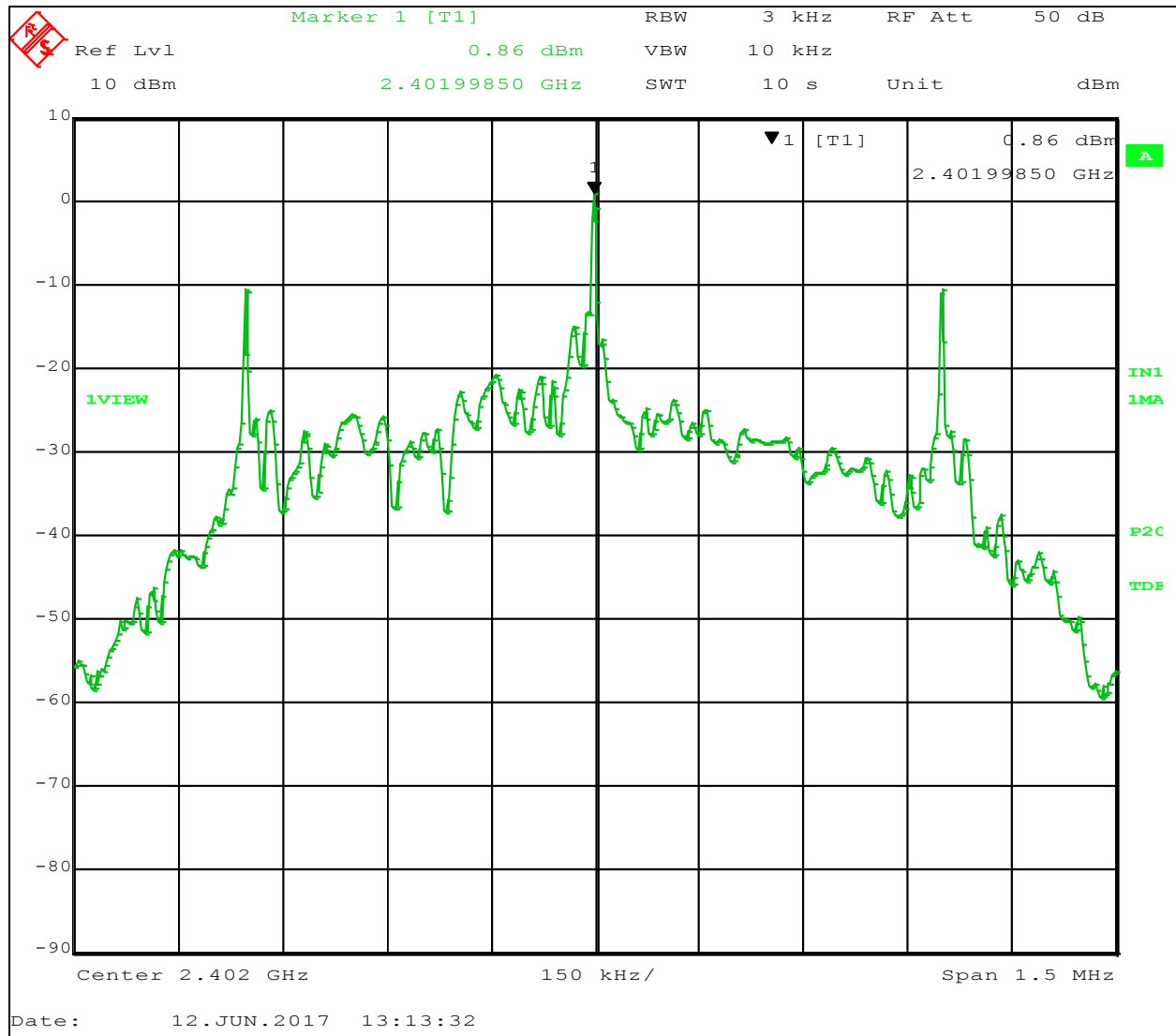
Measurement of the Power Spectral Density of the VMS4100 was made with the spectrum analyzer connected directly to the transmitter output in place of the antenna. The table contains the power levels of the BLE modulation GFSK modulation with a 1 Mbps Rate at low, middle and high frequency channels in constant transmit mode, non-hopping.

Modulation	Channel	Frequency (GHz)	Measured Power Spectral Density (dBm)	Cable Loss (dB)	Total Power Spectral Density (dBm)	Power Spectral Density Limit (dBm)	Pass/Fail
BLE W Modulation	CH.0	2.402	0.86	0.50	1.36	8.00	PASS
	CH.19	2.440	1.09	0.51	1.6	8.00	PASS
	CH.39	2.480	1.36	0.57	1.93	8.00	PASS

Test Results: The VMS4100 complies with the power spectral density requirements of 47 CFR Part 15.247(f) by a margin of 6.07 dB.

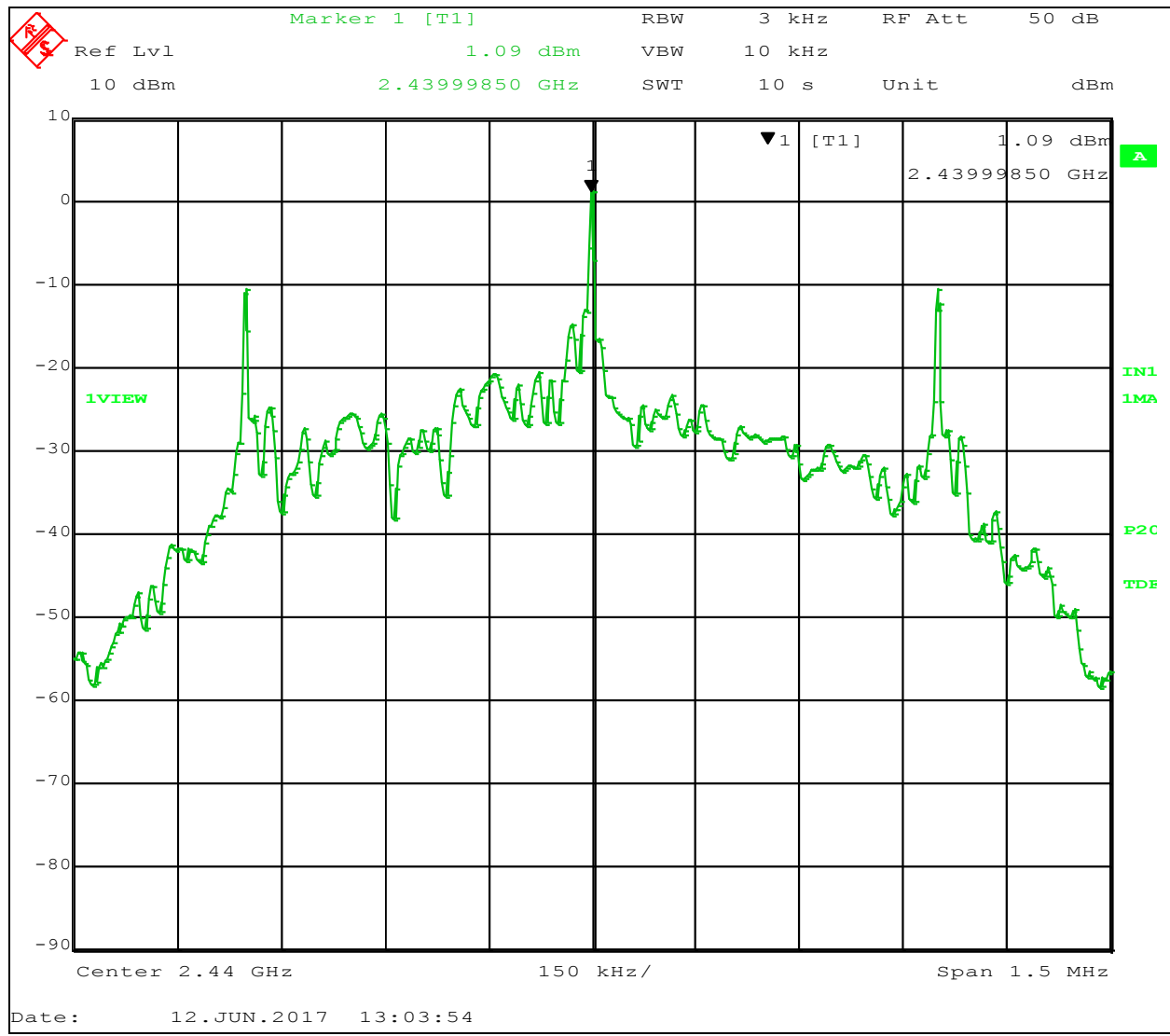


CHANNEL 0: 2402 MHZ POWER SPECTRAL DENSITY



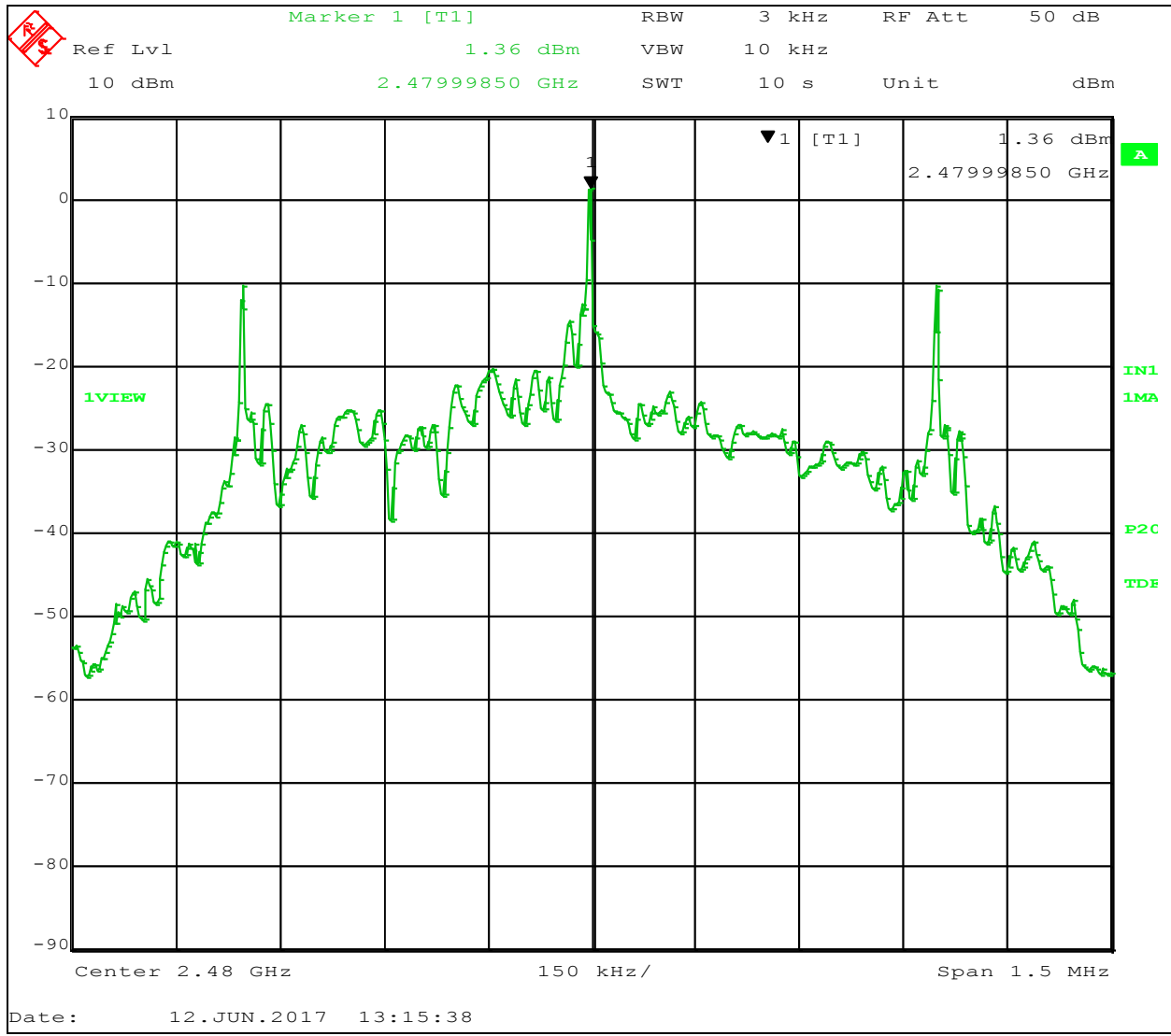


CHANNEL 19: 2440 MHZ POWER SPECTRAL DENSITY





CHANNEL 39: 2480 MHZ POWER SPECTRAL DENSITY

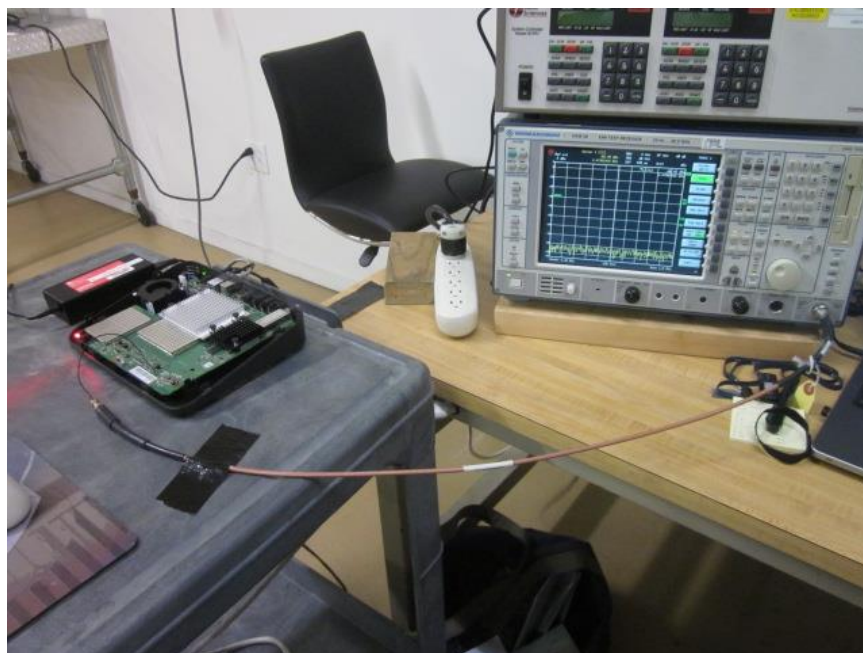




5.1 Conducted Emissions Power Line Test Setup Picture



5.2 Conducted Emissions Antenna Test Setup Picture

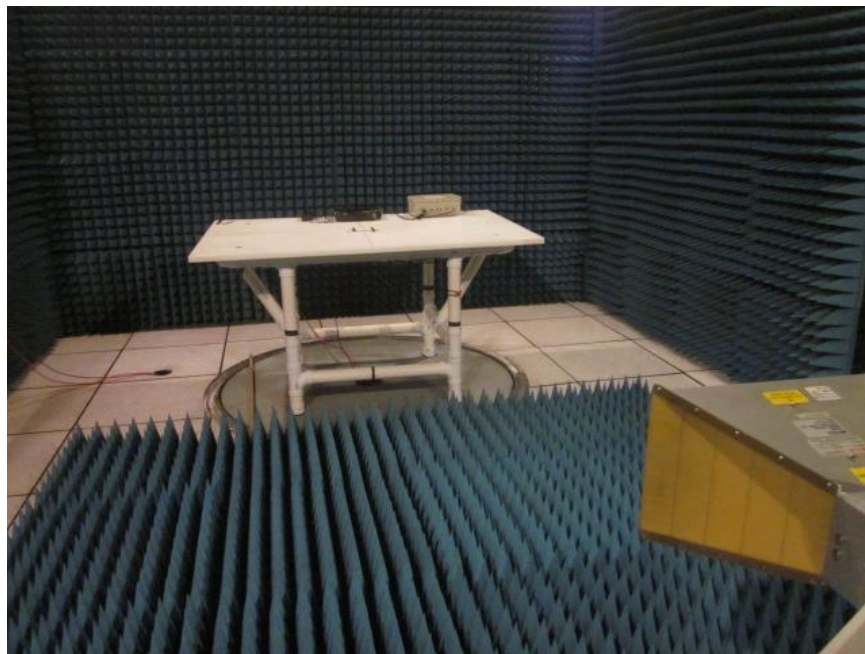




5.3 Radiated Emissions 30 – 1000 MHz Test Setup Picture



5.4 Radiated Emissions 1 – 25 GHz Test Setup Picture





Appendix A – Test Equipment

Equipment	Manufacturer	Model #	Serial #	BEC #	Calibration Date	Calibration Cycle	Calibration Due Date
Antenna (30 MHz - 6 GHz)	Sunol Sciences	JB6	A022108	712	05/10/16	2 Years	05/10/18
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
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 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	12/13/16	3 Years	12/13/19
LISN 10kHz-100MHz	EMCO	3825/2	1349	875	09/02/16	3 Years	09/02/19
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	12/04/16	2 Years	12/04/18
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