

*FCC PART 15, SUBPART B and C
TEST REPORT**for***ECHOSTAR 54.0 BRISBANE VOICE REMOTE 2017****MODEL: URC-2027BC0-R**

Prepared for

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DATE: JUNE 7, 2017

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	17	2	2	2	13	37	73

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TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	5
1. PURPOSE	6
2. ADMINISTRATIVE DATA	7
2.1 Location of Testing	7
2.2 Traceability Statement	7
2.3 Cognizant Personnel	7
2.4 Date Test Sample was Received	7
2.5 Disposition of the Test Sample	7
2.6 Abbreviations and Acronyms	7
3. APPLICABLE DOCUMENTS	8
4. DESCRIPTION OF TEST CONFIGURATION	9
4.1 Description of Test Configuration – Emissions	9
4.1.1 Cable Construction and Termination	9
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
7. TEST PROCEDURES	13
7.1 RF Emissions	13
7.1.1 Conducted Emissions Test	13
7.1.2 Radiated Emissions Test	14
7.1.3 RF Emissions Test Results	15
7.1.4 Duty Cycle Calculation	16
8. CONCLUSIONS	17

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations and Recognitions
B	Modifications to the EUT
C	Additional Model Covered Under This Report
D	Diagrams and Charts • Test Setup Diagrams • Antenna and Effective Gain Factors
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Layout of the Semi-Anechoic Test Chamber

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

Device Tested: EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R
S/N: N/A

Product Description: The EUT is a remote control used with dish systems.

Modifications: The EUT was not modified in order to meet the specifications.

Customer: Universal Electronics, Inc.
201 E. Sandpointe Ave, 8th Floor
Santa Ana, California 92707

Test Dates: May 10, 11 and 12, 2017

Test Specifications covered by accreditation:

CFR Title 47, Part 15, Subpart B; and Subpart C sections 15.205, 15.209, and 15.249



Test Procedures: ANSI C63.4: 2014 and ANSI C63.10: 2013

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Spurious Radiated RF Emissions, 9 kHz – 25000 MHz (Transmitter and Digital portion)	Complies with the Class B limits of CFR Title 47, Part 15 Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.249 Highest reading in relation to spec limit: 86.35 dBuV/m @ 2450 MHz (*U = 3.70 dB)
2	Conducted RF Emissions, 150 kHz to 30 MHz	This test was not performed because the EUT does not connect to the AC mains

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the EchoStar 54.0 Brisbane Voice Remote 2017, Model: URC-2027BC0-R. The emissions measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.249.**



2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Universal Electronics, Inc.

Jesse Mendez

Senior Core Electrical Engineer

Compatible Electronics Inc.

James Ross

Test Engineer

Kyle Fujimoto

Test Engineer

2.4 Date Test Sample was Received

The test sample was received on May 10, 2017.

2.5 Disposition of the Test Sample

The test sample has not been returned to Universal Electronics, Inc. as of the date of this test report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
ASK	Amplitude Shift Key
ITE	Information Technology Equipment
LISN	Line Impedance Stabilization Network
N/A	Not Applicable
Tx	Transmit
Rx	Receive

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this emissions Test Report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
FCC Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
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 procedure for compliance testing of unlicensed wireless devices

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The EchoStar 54.0 Brisbane Voice Remote 2017, Model: URC-2027BC0-R (EUT) was setup in a stand-alone configuration. The EUT was investigated in all three orthogonal axis with X-axis being the worst case. The EUT was continuously transmitting a data stream during the testing. A fresh set of batteries were used to operate.

The X orientation is when the EUT is parallel to the ground. The Y orientation is when the EUT is perpendicular to the ground mounted vertically. The Z orientation is when the EUT is perpendicular to the ground mounted horizontally.

The EUT was programmed to be able to transmit at the low, middle, or high channels via the Texas Instruments Test Software on the laptop.

The final radiated data for the EUT as was taken in the mode described above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

The EUT had no external cables.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
ECHOSTAR 54.0 BRISBANE VOICE REMOTE 2017 (EUT)	UNIVERSAL ELECTRONICS, INC.	URC-2027BC0-R	N/A	MG3-2027
LAPTOP*	HEWLETT PACKARD	HP PROBOOK 450 G2	CND50454JC	PD93160H
AC ADAPTER FOR LAPTOP*	HEWLETT PACKARD	HSTNN-DA40	WDWRT0AAR 8Q66A	N/A
TEST SOFTWARE*	TEXAS INSTRUMENTS	SMARTRF STUDIO 7	2.2.1	N/A

*Used to program the EUT only and was removed prior to the testing.

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CAL. CYCLE
GENERAL TEST EQUIPMENT USED IN LAB D					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
EMI Receiver, 20 Hz – 26.5 GHz	Keysight	N9038A	MY51210150	December 29, 2015	2 Year
RF RADIATED EMISSIONS TEST EQUIPMENT					
CombiLog Antenna	Com-Power	AC-220	61060	September 3, 2015	2 Year
Preamplifier	Com-Power	PAM-118A	551024	May 12, 2016	2 Year
Loop Antenna	Com-Power	AL-130R	121090	February 9, 2017	2 Year
Horn Antenna	Com-Power	AH-118	071175	February 26, 2016	2 Year
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
System Controller	Sunol Sciences Corporation	SC110V	112213-1	N/A	N/A
Turntable	Sunol Sciences Corporation	2011VS	N/A	N/A	N/A
Antenna-Mast	Sunol Sciences Corporation	TWR95-4	112213-3	N/A	N/A
Preamplifier	Com-Power	PA-840	711013	May 13, 2016	1 Year
Horn Antenna	Com-Power	AH-826	71957	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for emissions test location.

6.2 EUT Mounting, Bonding and Grounding

For frequencies 1 GHz and below: The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz: The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 1.5 meters above the ground plane.

The EUT was not grounded.

7. Test Procedures

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The EMI Receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. A transient limiter was used for the protection of the EMI Receiver input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the EMI Receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI 63:4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by computer software. The final qualification data is located in Appendix E.

Test Results:

This device is battery powered and does not connect to the AC public mains, thus this test was not performed.

7.1.2 Radiated Emissions Test

The EMI Receiver was used as the measuring meter. A built-in, internal preamplifier was used to increase the sensitivity of the instrument. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. A quasi-peak reading was taken only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz for 9 kHz to 150 kHz, 9 kHz for 150 kHz to 30 MHz, 120 kHz for 30 MHz to 1 GHz and 1 MHz for 1 GHz to 25 GHz).

The frequencies above 1 GHz were averaged using a duty cycle correction factor as explained in section 7.1.4 of this test report.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 1.0.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	CombiLog Antenna
1 GHz to 25 GHz	1 MHz	Horn Antenna

Test Results:

The EUT complies with the **Class B** limits of **CFR** Title 47, Part 15, Subpart B; and Subpart C sections 15.205, 15.209 and 15.249 for radiated emissions.

7.1.3 RF Emissions Test Results

Table 1.0 RADIATED EMISSION RESULTS
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Frequency MHz	EMI Reading (dBuV/m)	Specification Limit (dBuV/m)	Delta (Cor. Reading – Spec. Limit) dB
2450.00 (H) (Y-Axis)	86.35 (A)	93.97	-7.62
4950.00 (V) (Z-Axis)	46.23 (A)	53.97	-7.74
7350.00(H) (X-Axis)	45.89 (A)	53.97	-8.08
7275.00 (V) (Z-Axis)	45.88 (A)	53.97	-8.09
7425.00 (H) (X-Axis)	45.77 (A)	53.97	-8.20
2425.00 (H) (X-Axis)	85.59 (A)	93.97	-8.38

Notes:

- * The complete emissions data is given in Appendix E of this report.
- (BL) Black Lead
- (WL) White Lead
- (V) Vertical
- (H) Horizontal
- (A) Average
- (QP) Quasi-Peak

7.1.4 Duty Cycle Calculation

The fundamental and harmonics were measured at a 3-meter test distance. The EMI Receiver was used to obtain the final test data. The final qualification data sheets are located in Appendix E.

Where

$$\delta(\text{dB}) = 20 \log \left[\frac{\sum (nt_1 + mt_2 + \dots + \xi t_x)}{T} \right]$$

n is the number of pulses of duration t_1

m is the number of pulses of duration t_2

ξ is the number of pulses of duration t_x

T is the period of the pulse train or 100 ms if the pulse train length is greater than 100 ms

The worst case was advertising mode and is calculated as shown below:

Duty Cycle Correction Factor = -20.00dB

Pulse = 14 * 1.8 ms

Total On Time = 25.2 ms

Worst Case Between Pulses was 251 ms, so the maximum 100 ms interval can be used.

25.2 ms / 100 ms = 0.252

20 log (0.252) = -11.97 dB correction factor

8. CONCLUSIONS

The EchoStar 54.0 Brisbane Voice Remote 2017, Model: URC-2027BC0-R, as tested, meets all of the **Class B** specification limits defined in FCC Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209 and 15.249.



APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS



NVLAP LAB CODE 200528-0



For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025. **For the most up-to-date version of our scopes and certificates please visit <http://celectronics.com/quality/scope/>**

Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."



APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and FCC 15.249 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.



APPENDIX C

***ADDITIONAL MODEL COVERED
UNDER THIS REPORT***

ADDITIONAL MODEL COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R
S/N: N/A

There are no additional Model covered under this report.



APPENDIX D

DIAGRAMS AND CHARTS

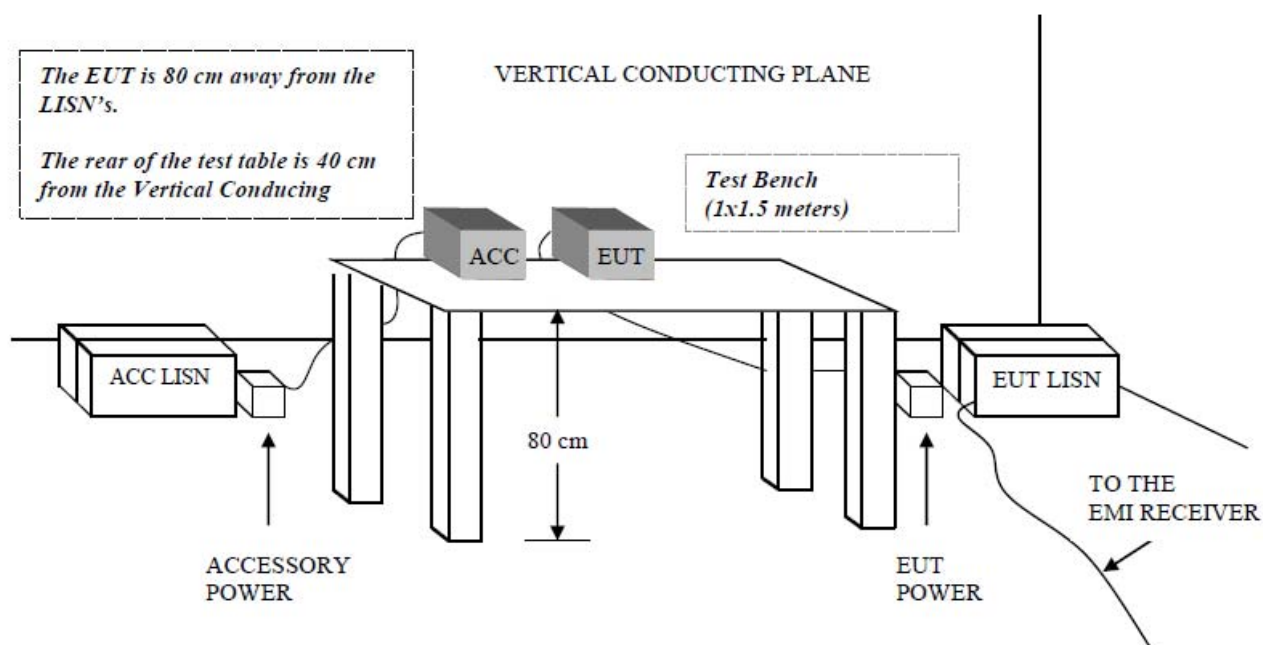
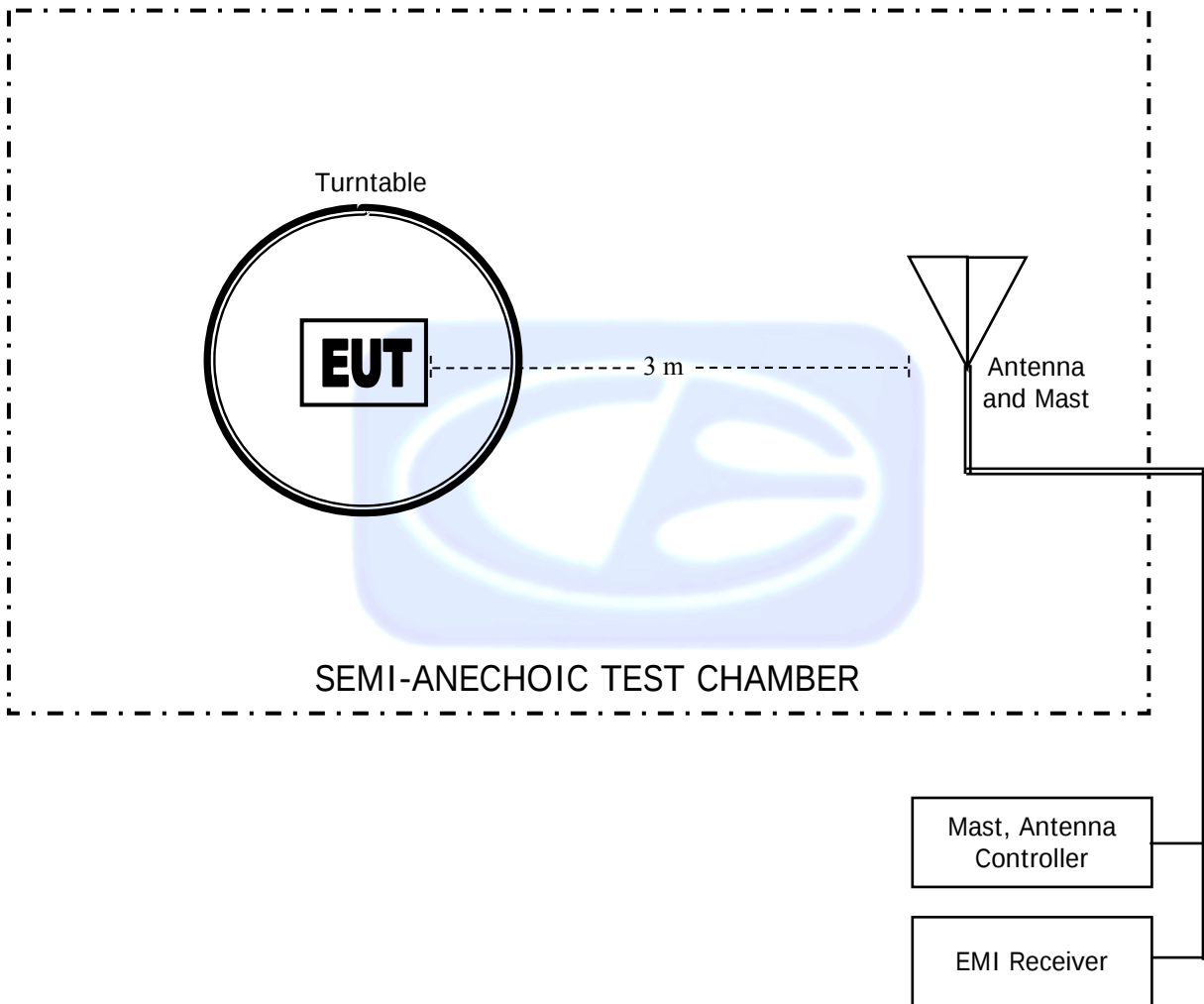
FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

FIGURE 2: LAYOUT OF THE SEMI -ANECHOIC TEST CHAMBER



COM-POWER AL-130**LOOP ANTENNA****S/N: 121090****CALIBRATION DATE: FEBRUARY 9, 2017**

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-36.17	15.33
0.01	-35.86	15.64
0.02	-37.30	14.20
0.03	-36.58	14.92
0.04	-36.99	14.51
0.05	-37.66	13.84
0.06	-37.53	13.97
0.07	-37.64	13.86
0.08	-37.52	13.98
0.09	-37.62	13.88
0.1	-37.59	13.91
0.2	-37.79	13.71
0.3	-37.80	13.70
0.4	-37.70	13.80
0.5	-37.79	13.71
0.6	-37.79	13.71
0.7	-37.69	13.81
0.8	-37.49	14.01
0.9	-37.39	14.11
1	-37.39	14.11
2	-37.09	14.41
3	-37.09	14.41
4	-37.19	14.31
5	-36.98	14.52
6	-37.17	14.33
7	-37.05	14.45
8	-36.85	14.65
9	-36.84	14.66
10	-36.75	14.75
15	-37.16	14.34
20	-36.44	15.06
25	-37.88	13.62
30	-39.14	12.36

COM-POWER AC-220**COMBILOG ANTENNA****S/N: 61060****CALIBRATION DATE: SEPTEMBER 3, 2015**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	24.00	200	13.00
35	24.30	250	15.30
40	25.40	300	18.20
45	21.50	350	17.90
50	22.50	400	18.60
60	15.40	450	19.80
70	12.70	500	21.60
80	11.10	550	22.40
90	13.40	600	23.70
100	13.80	650	24.30
120	15.40	700	24.00
125	15.40	750	24.50
140	13.10	800	24.30
150	17.20	850	26.30
160	13.20	900	26.90
175	14.20	950	26.00
180	14.30	1000	25.60

COM POWER AH-118**HORN ANTENNA****S/N: 071175****CALIBRATION DATE: FEBRUARY 26, 2016**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.93	10.0	39.33
1.5	25.54	10.5	39.64
2.0	28.09	11.0	41.04
2.5	30.21	11.5	44.29
3.0	30.15	12.0	41.22
3.5	30.17	12.5	41.50
4.0	31.90	13.0	41.62
4.5	33.51	13.5	40.63
5.0	33.87	14.0	39.94
5.5	35.08	14.5	41.84
6.0	34.81	15.0	42.69
6.5	34.26	15.5	39.03
7.0	36.33	16.0	39.07
7.5	37.03	16.5	41.40
8.0	37.56	17.0	43.18
8.5	40.07	17.5	47.01
9.0	38.92	18.0	46.48
9.5	38.21		

COM-POWER PAM-118A**PREAMPLIFIER**

S/N: 551024

CALIBRATION DATE: MAY 12, 2016

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	39.84	6.0	39.05
1.1	39.40	6.5	38.94
1.2	39.58	7.0	39.25
1.3	39.68	7.5	39.09
1.4	39.91	8.0	39.01
1.5	39.78	8.5	38.60
1.6	39.50	9.0	38.64
1.7	39.81	9.5	39.67
1.8	39.89	10.0	39.30
1.9	39.94	11.0	39.15
2.0	39.57	12.0	39.24
2.5	40.39	13.0	39.49
3.0	40.63	14.0	39.44
3.5	40.80	15.0	39.94
4.0	40.86	16.0	40.09
4.5	39.94	17.0	40.06
5.0	34.47	18.0	39.76
5.5	39.32		

COM-POWER AH-826**HORN ANTENNA**

S/N: 71957

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	33.5	22.5	35.5
18.5	33.5	23.0	35.9
19.0	34.0	23.5	35.7
19.5	34.0	24.0	35.6
20.0	34.3	24.5	36.0
20.5	34.9	25.0	36.2
21.0	34.7	25.5	36.1
21.5	35.0	26.0	36.2
22.0	35.0	26.5	35.7

COM-POWER PA-840**MICROWAVE PREAMPLIFIER**

S/N: 711013

CALIBRATION DATE: MAY 13, 2016

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	25.19	31.0	25.69
19.0	24.48	31.5	25.74
20.0	24.39	32.0	26.35
21.0	24.73	32.5	26.64
22.0	23.49	33.0	25.98
23.0	24.23	33.5	24.68
24.0	24.59	34.0	24.61
25.0	25.32	34.5	23.78
26.0	25.66	35.0	24.74
26.5	25.99	35.5	24.39
27.0	26.26	36.0	23.46
27.5	25.33	36.5	23.71
28.0	24.49	37.0	26.35
28.5	24.74	37.5	23.49
29.0	25.93	38.0	25.42
29.5	26.28	38.5	24.87
30.0	26.17	39.0	22.60
30.5	26.11	39.5	20.57
		40.0	19.15



FRONT VIEW

UNIVERSAL ELECTRONICS, INC.
ECHOSTAR 54.0 BRISBANE VOICE REMOTE 2017
MODEL: URC-2027BC0-R
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

UNIVERSAL ELECTRONICS, INC.
ECHOSTAR 54.0 BRISBANE VOICE REMOTE 2017
MODEL: URC-2027BC0-R
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



FRONT VIEW

UNIVERSAL ELECTRONICS, INC.
ECHOSTAR 54.0 BRISBANE VOICE REMOTE 2017
MODEL: URC-2027BC0-R
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

UNIVERSAL ELECTRONICS, INC.
ECHOSTAR 54.0 BRISBANE VOICE REMOTE 2017
MODEL: URC-2027BC0-R
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONs**

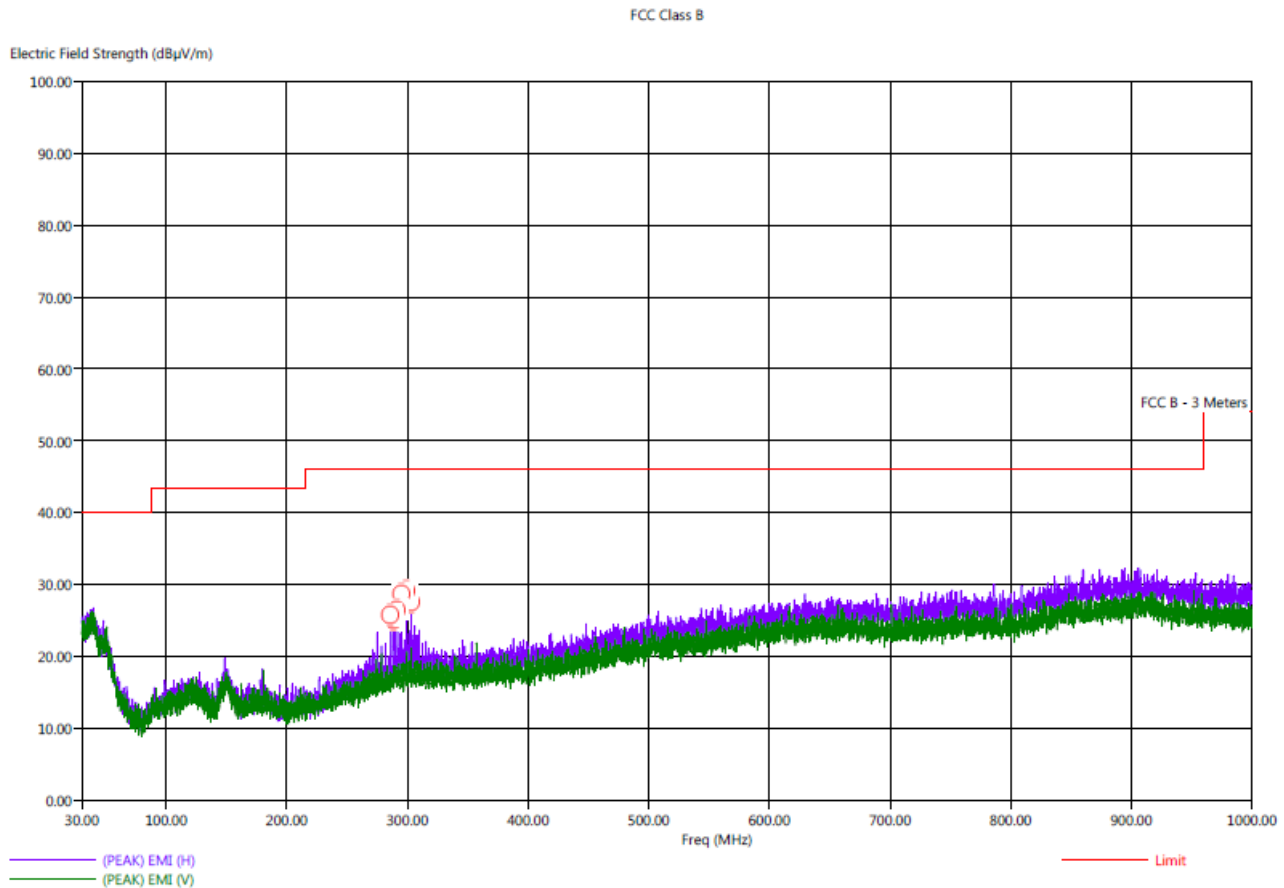
APPENDIX E

DATA SHEETS

***RADIATED EMISSIONS
DATA SHEETS***

Title: Pre-Scan - FCC Class B
File: 1 - RE - Pre-Scan - FCC Class B - X-Axis Worst Case - 05-12-2017.set
Operator: Kyle Fujimoto
EUT Type: EchoStar 54.0 Brisbane Voice Remote 2017
EUT Condition: The EUT is continuously transmitting at the low channel
Comments: Customer: Universal Electronics, Inc.
Model: URC-2027BC0-R
X-Axis

5/12/2017 9:09:25 AM
Sequence: Preliminary Scan



Title: Radiated Final - FCC Class B
File: 1 - RE - Final Scan - FCC Class B - X-Axis Worst Case - 05-12-2017.set
Operator: Kyle Fujimoto
EUT Type: EchoStar 54.0 Brisbane Voice Remote 2017
EUT Condition: The EUT is continuously transmitting at the low channel
Comments: Company: Universal Electronics, Inc.
Model: URC-2027BC0-R
X-Axis

5/12/2017 9:39:11 AM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBμV/m)	(QP) EMI (dBμV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBμV/m)	Transducer (dB)	Cable (dB)	Ttbl Aql (deg)	Twr Ht (cm)
286.10	H	29.32	26.08	-16.68	-19.92	46.00	17.45	1.44	98.00	111.65
288.00	H	29.29	25.34	-16.71	-20.66	46.00	17.55	1.46	112.50	111.17
291.80	H	29.37	23.49	-16.63	-22.51	46.00	17.75	1.50	84.25	159.59
295.50	H	30.33	27.85	-15.67	-18.15	46.00	17.96	1.55	111.75	111.53
299.30	H	31.59	28.52	-14.41	-17.48	46.00	18.16	1.59	96.75	143.47
303.10	H	32.05	28.92	-13.95	-17.08	46.00	18.18	1.60	69.00	111.65



FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Low Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4850.00	52.76	V	73.97	-21.22	Peak	16.00	184.90	
4850.00	40.79	V	53.97	-13.19	Avg	16.00	184.90	
7275.00	55.23	V	73.97	-18.74	Peak	236.50	226.80	
7275.00	43.26	V	53.97	-10.71	Avg	236.50	226.80	
9700.00								No Emission
9700.00								Detected
12125.00								No Emission
12125.00								Detected
14550.00								No Emission
14550.00								Detected
16975.00								No Emission
16975.00								Detected
19400.00								No Emission
19400.00								Detected
21825.00								No Emission
21825.00								Detected
24250.00								No Emission
24250.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

**Harmonics - Low Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4850.00	54.91	V	73.97	-19.06	Peak	352.00	192.59	
4850.00	42.94	V	53.97	-11.03	Avg	352.00	192.59	
7275.00	55.53	V	73.97	-18.45	Peak	198.75	130.62	
7275.00	43.56	V	53.97	-10.42	Avg	198.75	130.62	
9700.00								No Emission
9700.00								Detected
12125.00								No Emission
12125.00								Detected
14550.00								No Emission
14550.00								Detected
16975.00								No Emission
16975.00								Detected
19400.00								No Emission
19400.00								Detected
21825.00								No Emission
21825.00								Detected
24250.00								No Emission
24250.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

**Harmonics - Low Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4850.00	54.72	V	73.97	-19.25	Peak	178.50	200.23	
4850.00	42.75	V	53.97	-11.22	Avg	178.50	200.23	
7275.00	57.85	V	73.97	-16.12	Peak	352.50	129.01	
7275.00	45.88	V	53.97	-8.09	Avg	352.50	129.01	
9700.00								No Emission
9700.00								Detected
12125.00								No Emission
12125.00								Detected
14550.00								No Emission
14550.00								Detected
16975.00								No Emission
16975.00								Detected
19400.00								No Emission
19400.00								Detected
21825.00								No Emission
21825.00								Detected
24250.00								No Emission
24250.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

**Harmonics - Low Channel
Transmit Mode - X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4850.00	54.84	H	73.97	-19.13	Peak	217.50	179.40	
4850.00	42.87	H	53.97	-11.10	Avg	217.50	179.40	
7275.00	56.19	H	73.97	-17.78	Peak	317.00	130.98	
7275.00	44.22	H	53.97	-9.75	Avg	317.00	130.98	
9700.00								No Emission
9700.00								Detected
12125.00								No Emission
12125.00								Detected
14550.00								No Emission
14550.00								Detected
16975.00								No Emission
16975.00								Detected
19400.00								No Emission
19400.00								Detected
21825.00								No Emission
21825.00								Detected
24250.00								No Emission
24250.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

**Harmonics - Low Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4850.00	52.20	H	73.97	-21.77	Peak	350.00	128.71	
4850.00	40.23	H	53.97	-13.74	Avg	350.00	128.71	
7275.00	55.76	H	73.97	-18.21	Peak	157.75	204.77	
7275.00	43.79	H	53.97	-10.18	Avg	157.75	204.77	
9700.00								No Emission
9700.00								Detected
12125.00								No Emission
12125.00								Detected
14550.00								No Emission
14550.00								Detected
16975.00								No Emission
16975.00								Detected
19400.00								No Emission
19400.00								Detected
21825.00								No Emission
21825.00								Detected
24250.00								No Emission
24250.00								Detected

FCC 15.249

Universal Electronics, Inc.

EchoStar 54.0 Brisbane Voice Remote 2017

Model: URC-2027BC0-R

Date: 05/10/2017

Lab:

D

Tested By: Kyle Fujimoto

Harmonics - Low Channel**Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4850.00	54.76	H	73.97	-19.21	Peak	190.00	101.10	
4850.00	42.79	H	53.97	-11.18	Avg	190.00	101.10	
7275.00	56.51	H	73.97	-17.46	Peak	200.25	116.35	
7275.00	44.54	H	53.97	-9.43	Avg	200.25	116.35	
9700.00								No Emission
9700.00								Detected
12125.00								No Emission
12125.00								Detected
14550.00								No Emission
14550.00								Detected
16975.00								No Emission
16975.00								Detected
19400.00								No Emission
19400.00								Detected
21825.00								No Emission
21825.00								Detected
24250.00								No Emission
24250.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4900.00	52.69	V	73.97	-21.28	Peak	266.50	144.74	
4900.00	40.72	V	53.97	-13.25	Avg	266.50	144.74	
7350.00	55.68	V	73.97	-18.30	Peak	80.75	170.47	
7350.00	43.71	V	53.97	-10.27	Avg	80.75	170.47	
9800.00								No Emission
9800.00								Detected
12250.00								No Emission
12250.00								Detected
14700.00								No Emission
14700.00								Detected
17150.00								No Emission
17150.00								Detected
19600.00								No Emission
19600.00								Detected
22050.00								No Emission
22050.00								Detected
24500.00								No Emission
24500.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4900.00	54.66	V	73.97	-19.31	Peak	349.50	168.55	
4900.00	42.69	V	53.97	-11.28	Avg	349.50	168.55	
7350.00	55.68	V	73.97	-18.29	Peak	266.75	201.43	
7350.00	43.71	V	53.97	-10.26	Avg	266.38	201.43	
9800.00								No Emission
9800.00								Detected
12250.00								No Emission
12250.00								Detected
14700.00								No Emission
14700.00								Detected
17150.00								No Emission
17150.00								Detected
19600.00								No Emission
19600.00								Detected
22050.00								No Emission
22050.00								Detected
24500.00								No Emission
24500.00								Detected

FCC 15.249Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-RDate: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel****Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4900.00	57.51	V	73.97	-16.46	Peak	145.25	168.35	
4900.00	45.54	V	53.97	-8.43	Avg	145.25	168.35	
7350.00	55.96	V	73.97	-18.01	Peak	93.75	202.32	
7350.00	43.99	V	53.97	-9.98	Avg	93.75	202.32	
9800.00								No Emission
9800.00								Detected
12250.00								No Emission
12250.00								Detected
14700.00								No Emission
14700.00								Detected
17150.00								No Emission
17150.00								Detected
19600.00								No Emission
19600.00								Detected
22050.00								No Emission
22050.00								Detected
24500.00								No Emission
24500.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4900.00	55.86	H	73.97	-18.11	Peak	157.00	170.35	
4900.00	43.89	H	53.97	-10.08	Avg	157.00	170.35	
7350.00	57.86	H	73.97	-16.11	Peak	210.25	124.62	
7350.00	45.89	H	53.97	-8.08	Avg	210.25	124.62	
9800.00								No Emission
9800.00								Detected
12250.00								No Emission
12250.00								Detected
14700.00								No Emission
14700.00								Detected
17150.00								No Emission
17150.00								Detected
19600.00								No Emission
19600.00								Detected
22050.00								No Emission
22050.00								Detected
24500.00								No Emission
24500.00								Detected

FCC 15.249Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-RDate: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4900.00	53.85	H	73.97	-20.12	Peak	165.75	103.61	
4900.00	41.88	H	53.97	-12.09	Avg	165.75	103.61	
7350.00	55.64	H	73.97	-18.33	Peak	262.25	103.61	
7350.00	43.67	H	53.97	-10.30	Avg	262.25	103.61	
9800.00								No Emission
9800.00								Detected
12250.00								No Emission
12250.00								Detected
14700.00								No Emission
14700.00								Detected
17150.00								No Emission
17150.00								Detected
19600.00								No Emission
19600.00								Detected
22050.00								No Emission
22050.00								Detected
24500.00								No Emission
24500.00								Detected

FCC 15.249Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-RDate: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4900.00	54.68	H	73.97	-19.29	Peak	217.50	194.44	
4900.00	42.71	H	53.97	-11.26	Avg	217.50	194.44	
7350.00	55.32	H	73.97	-18.65	Peak	144.38	150.74	
7350.00	43.35	H	53.97	-10.62	Avg	144.75	150.74	
9800.00								No Emission
9800.00								Detected
12250.00								No Emission
12250.00								Detected
14700.00								No Emission
14700.00								Detected
17150.00								No Emission
17150.00								Detected
19600.00								No Emission
19600.00								Detected
22050.00								No Emission
22050.00								Detected
24500.00								No Emission
24500.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4950.00	53.42	V	73.97	-20.55	Peak	348.00	201.04	
4950.00	41.45	V	53.97	-12.52	Avg	348.00	201.04	
7425.00	54.86	V	73.97	-19.11	Peak	68.00	225.52	
7425.00	42.89	V	53.97	-11.08	Avg	68.00	225.52	
9900.00								No Emission
9900.00								Detected
12375.00								No Emission
12375.00								Detected
14850.00								No Emission
14850.00								Detected
17325.00								No Emission
17325.00								Detected
19800.00								No Emission
19800.00								Detected
22275.00								No Emission
22275.00								Detected
24750.00								No Emission
24750.00								Detected

FCC 15.249Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-RDate: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto**Harmonics - High Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4950.00	56.15	V	73.97	-17.82	Peak	202.00	138.77	
4950.00	44.18	V	53.97	-9.79	Avg	202.00	138.77	
7425.00	53.05	V	73.97	-20.92	Peak	74.75	154.00	
7425.00	41.08	V	53.97	-12.89	Avg	74.75	154.00	
9900.00								No Emission
9900.00								Detected
12375.00								No Emission
12375.00								Detected
14850.00								No Emission
14850.00								Detected
17325.00								No Emission
17325.00								Detected
19800.00								No Emission
19800.00								Detected
22275.00								No Emission
22275.00								Detected
24750.00								No Emission
24750.00								Detected

FCC 15.249Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-RDate: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto**Harmonics - High Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4950.00	58.20	V	73.97	-15.77	Peak	159.50	175.37	
4950.00	46.23	V	53.97	-7.74	Avg	159.50	175.37	
7425.00	55.84	V	73.97	-18.13	Peak	26.00	137.52	
7425.00	43.87	V	53.97	-10.10	Avg	26.00	137.52	
9900.00								No Emission
9900.00								Detected
12375.00								No Emission
12375.00								Detected
14850.00								No Emission
14850.00								Detected
17325.00								No Emission
17325.00								Detected
19800.00								No Emission
19800.00								Detected
22275.00								No Emission
22275.00								Detected
24750.00								No Emission
24750.00								Detected

FCC 15.249Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-RDate: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto**Harmonics - High Channel
Transmit Mode - X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4950.00	57.14	H	73.97	-16.83	Peak	16.50	182.05	
4950.00	45.17	H	53.97	-8.80	Avg	16.50	182.05	
7425.00	57.74	H	73.97	-16.23	Peak	162.75	148.80	
7425.00	45.77	H	53.97	-8.20	Avg	162.75	148.80	
9900.00								No Emission
9900.00								Detected
12375.00								No Emission
12375.00								Detected
14850.00								No Emission
14850.00								Detected
17325.00								No Emission
17325.00								Detected
19800.00								No Emission
19800.00								Detected
22275.00								No Emission
22275.00								Detected
24750.00								No Emission
24750.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4950.00	54.82	H	73.97	-19.15	Peak	206.50	152.20	
4950.00	42.85	H	53.97	-11.12	Avg	206.50	152.20	
7425.00	54.18	H	73.97	-19.79	Peak	105.25	149.50	
7425.00	42.21	H	53.97	-11.76	Avg	105.25	149.50	
9900.00								No Emission
9900.00								Detected
12375.00								No Emission
12375.00								Detected
14850.00								No Emission
14850.00								Detected
17325.00								No Emission
17325.00								Detected
19800.00								No Emission
19800.00								Detected
22275.00								No Emission
22275.00								Detected
24750.00								No Emission
24750.00								Detected

FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

Date: 05/10/2017
Lab: D
Tested By: Kyle Fujimoto

**Harmonics - High Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4950.00	54.32	H	73.97	-19.65	Peak	341.75	127.01	
4950.00	42.35	H	53.97	-11.62	Avg	341.75	127.01	
7425.00	56.45	H	73.97	-17.52	Peak	137.50	112.92	
7425.00	44.48	H	53.97	-9.49	Avg	137.50	112.92	
9900.00								No Emission
9900.00								Detected
12375.00								No Emission
12375.00								Detected
14850.00								No Emission
14850.00								Detected
17325.00								No Emission
17325.00								Detected
19800.00								No Emission
19800.00								Detected
22275.00								No Emission
22275.00								Detected
24750.00								No Emission
24750.00								Detected

FCC Class B and FCC 15.249Universal Electronics,
Inc.

EchoStar 54.0 Brisbane Voice Remote 2017

Model: URC-2027BC0-R

Date: 05/10/2017

Lab: D

Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx and Digital Portion - 9 kHz to 30 MHz**Non Harmonic Emissions from the Tx and Digital Portion - 1 GHz to 25 GHz**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
								No Emissions Detected from 9 kHz to 30 MHz for the digital portion of the EUT
								No Emissions Detected from 9 kHz to 30 MHz for the Non-Harmonic Emissions of the Transmitter for the EUT
								No Emissions Detected from 1 GHz to 25 GHz for the digital portion of the EUT
								No Emissions Detected from 1 GHz to 25 GHz for the Non-Harmonic Emissions of the Transmitter for the EUT
								Investigated in the X-Axis, Y-Axis, and Z-Axis

***BAND EDGES
DATA SHEETS***

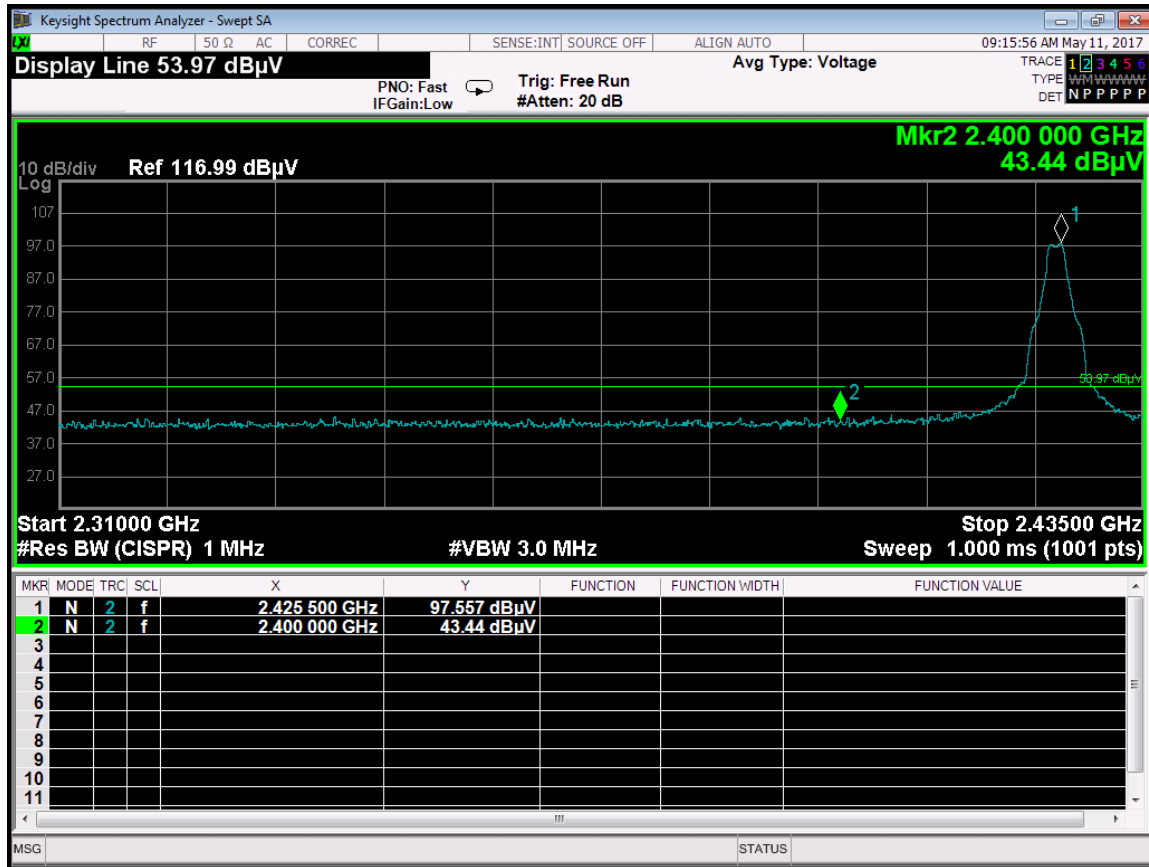
FCC 15.249

Universal Electronics, Inc.
EchoStar 54.0 Brisbane Voice Remote 2017
Model: URC-2027BC0-R

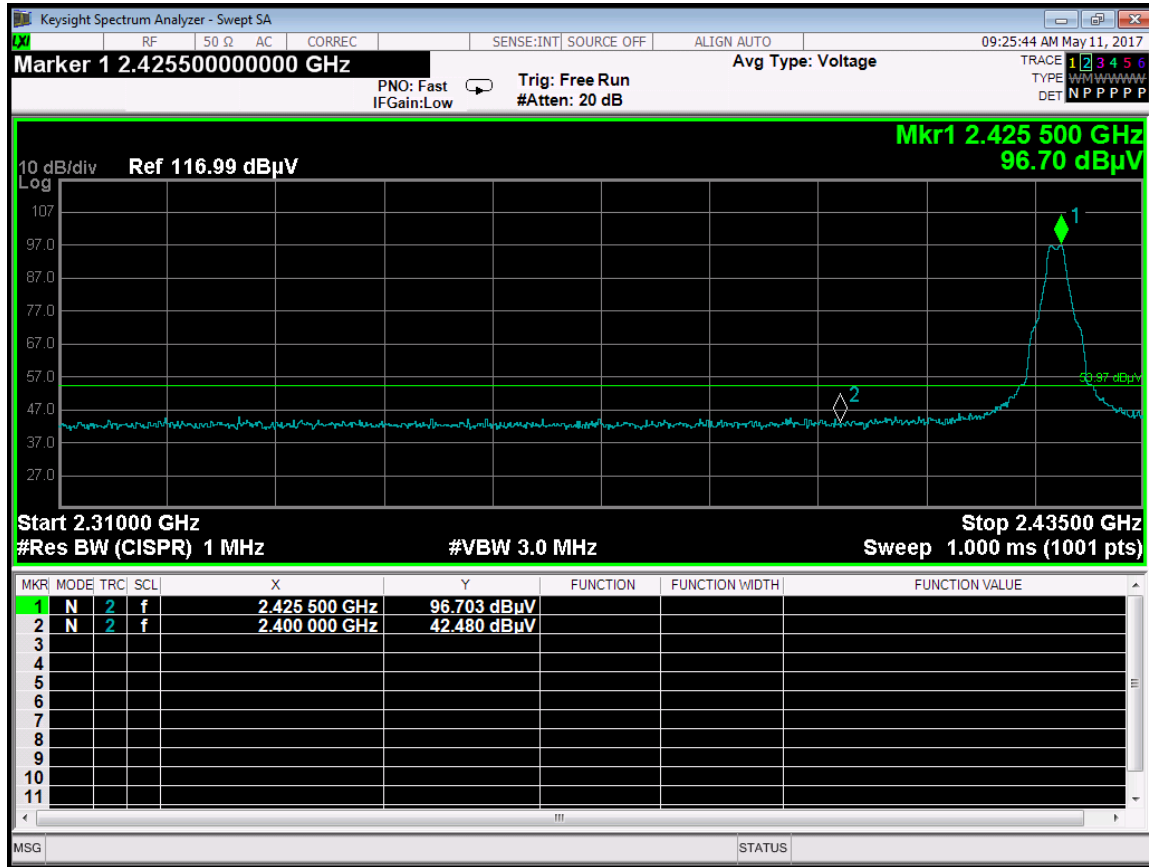
Date: 05/11/2017
Lab: D
Tested By: Kyle Fujimoto

Band Edges

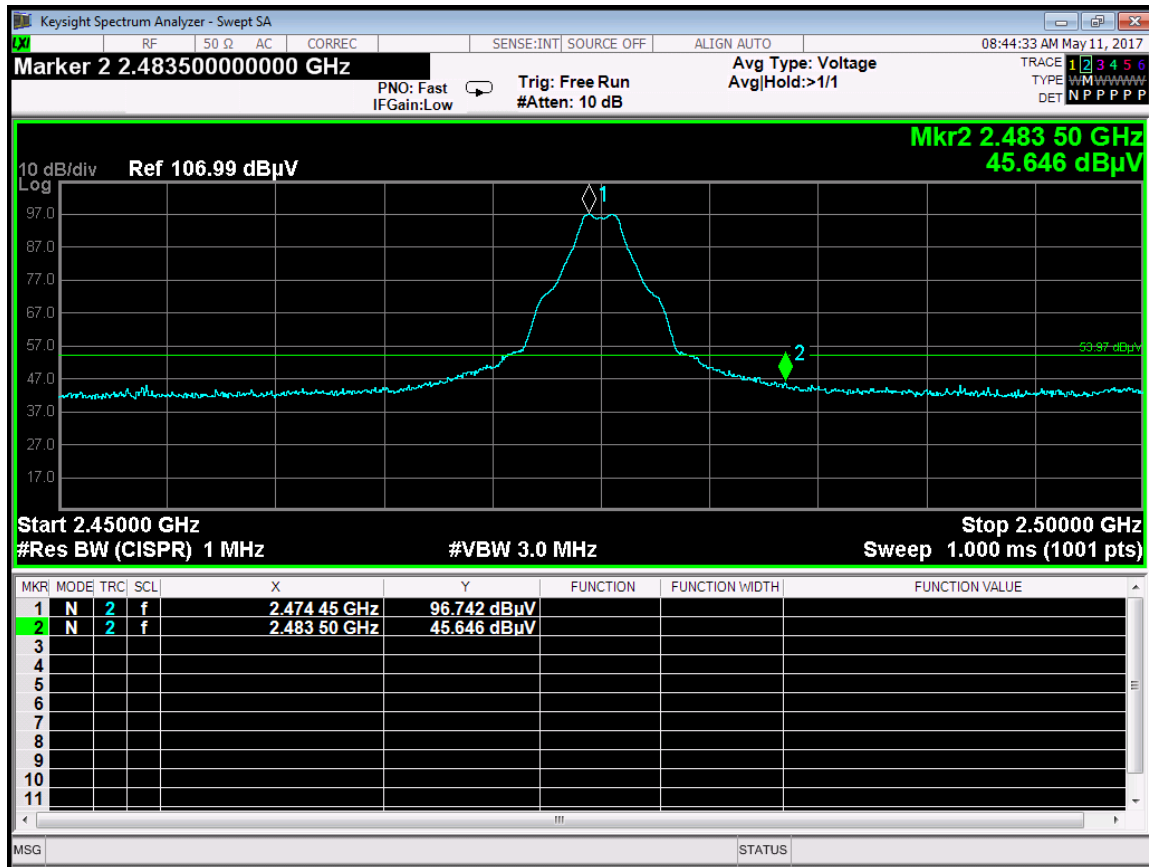
Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height c(m)	Comments
2425.00	97.56	H	113.97	-16.41	Peak	46.00	182.95	Fundamental - Low Ch.
2425.00	85.59	H	93.97	-8.38	Avg	46.00	182.95	X-Axis - Worst Case
2400.00	43.44	H	73.97	-30.53	Peak	46.00	182.95	Band Edge
2400.00	31.47	H	53.97	-22.50	Avg	46.00	182.95	X-Axis - Worst Case
2425.00	96.70	V	113.97	-17.27	Peak	24.75	122.83	Fundamental - Low Ch.
2425.00	84.73	V	93.97	-9.24	Avg	24.75	122.83	Z-Axis - Worst Case
2400.00	42.48	V	73.97	-31.49	Peak	24.75	122.83	Band Edge
2400.00	30.51	V	53.97	-23.46	Avg	24.75	122.83	Z-Axis - Worst Case
2475.00	96.74	H	113.97	-17.23	Peak	354.50	120.20	Fundamental - High Ch.
2475.00	84.77	H	93.97	-9.20	Avg	354.50	120.20	X-Axis - Worst Case
2483.50	45.65	H	73.97	-28.32	Peak	354.50	120.20	Band Edge
2483.50	33.68	H	53.97	-20.29	Avg	354.50	120.20	X-Axis - Worst Case
2475.00	91.51	V	113.97	-22.46	Peak	126.50	124.20	Fundamental - High Ch.
2475.00	79.54	V	93.97	-14.43	Avg	126.50	124.20	Z-Axis - Worst Case
2483.50	41.91	V	73.97	-32.06	Peak	126.50	124.20	Band Edge
2483.50	29.94	V	53.97	-24.03	Avg	126.50	124.20	Z-Axis - Worst Case



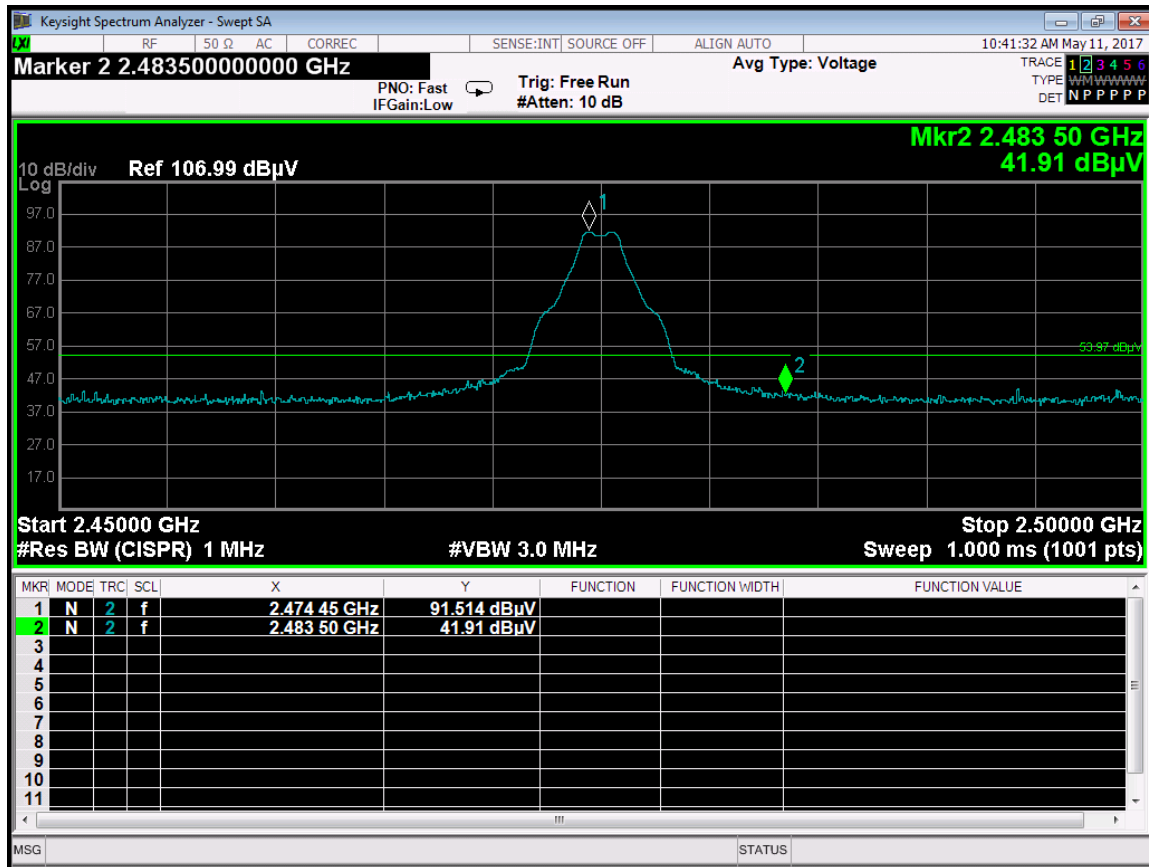
Band Edge – Horizontal Polarization – Low Channel – X-Axis Worst Case



Band Edge – Vertical Polarization – Low Channel – Z-Axis Worst Case

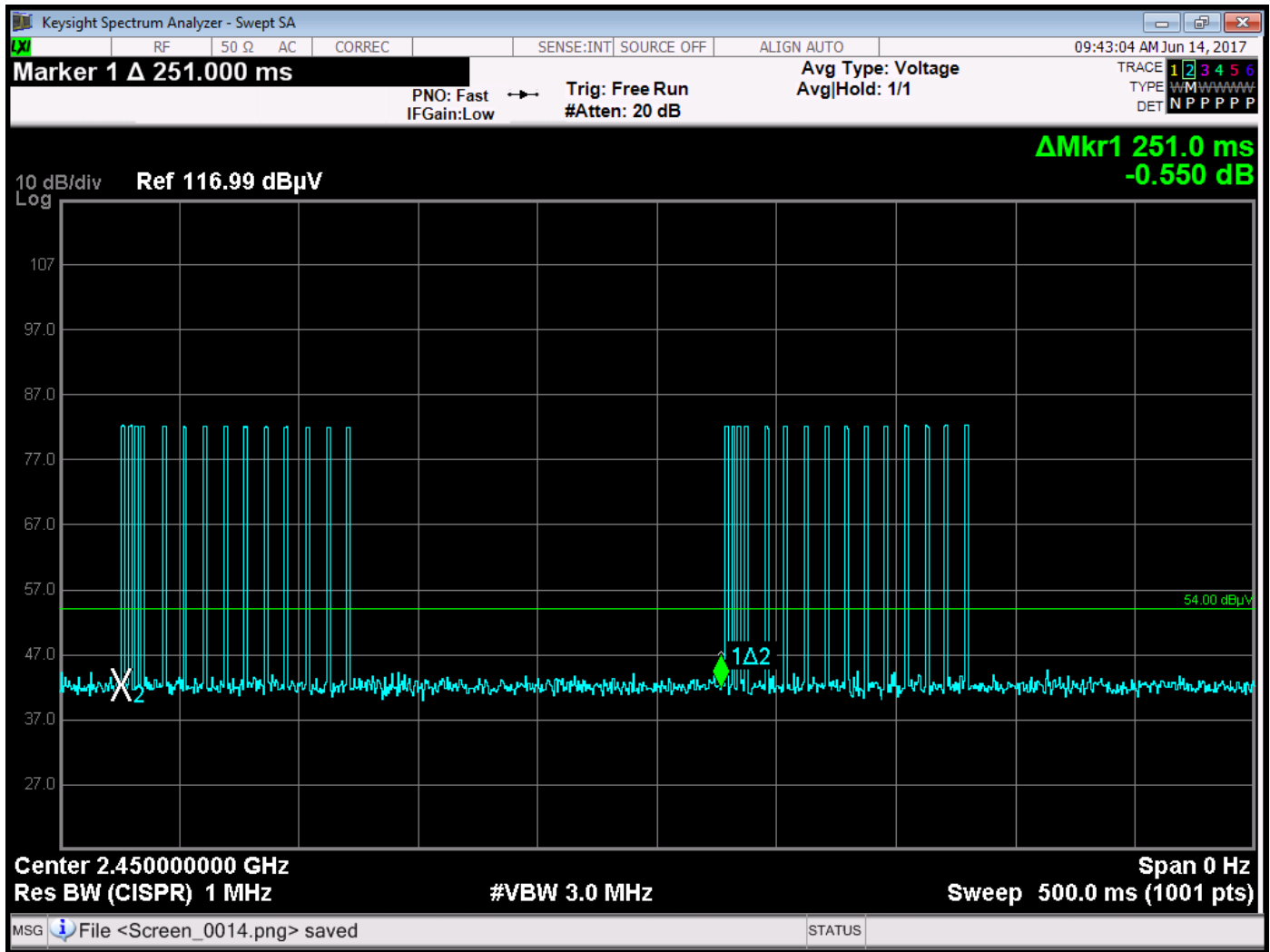


Band Edge – Horizontal Polarization – High Channel – X-Axis Worst Case

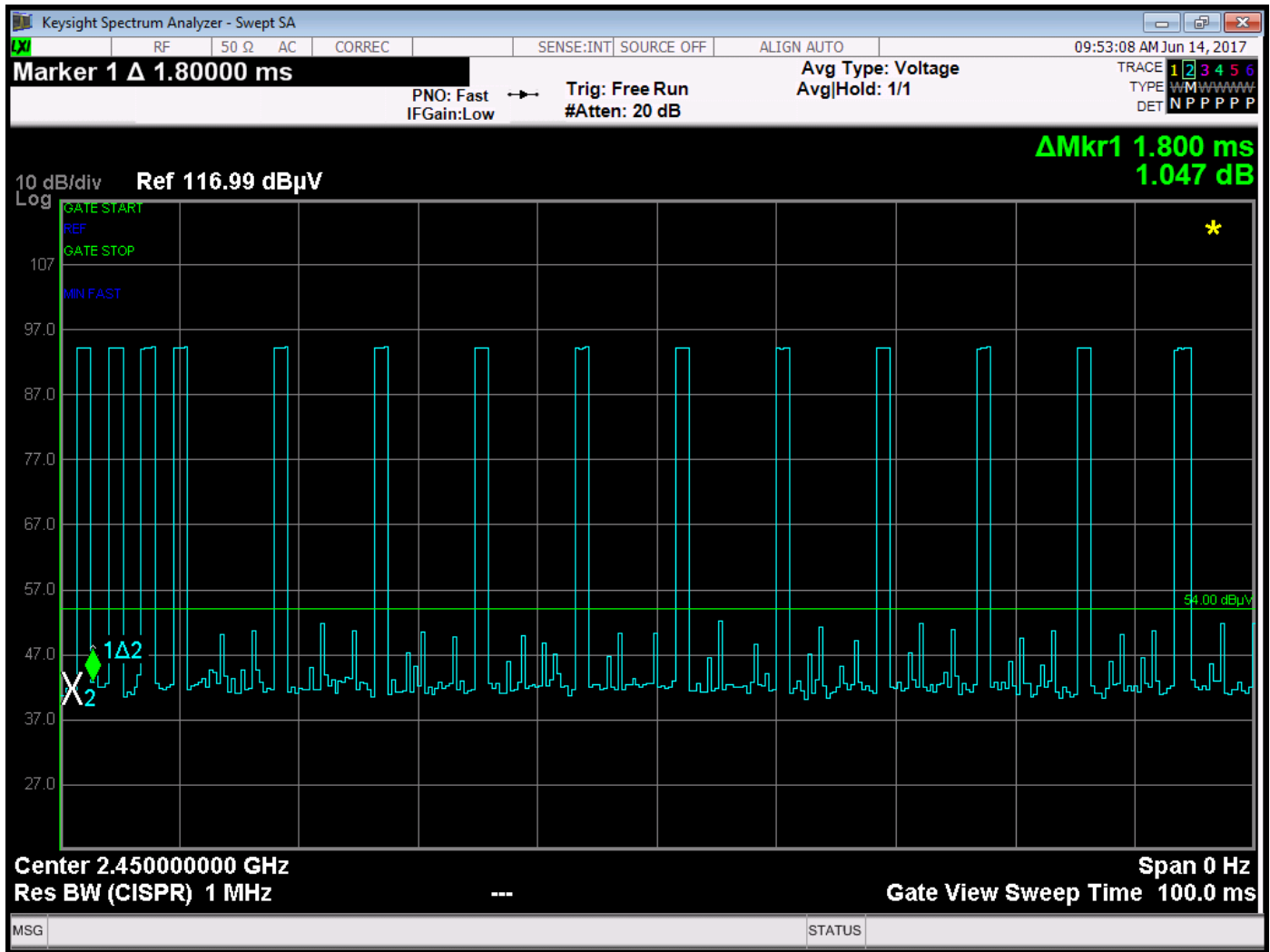


Band Edge – Vertical Polarization — High Channel – Z-Axis Worst Case

***DUTY CYCLE
DATA SHEETS***



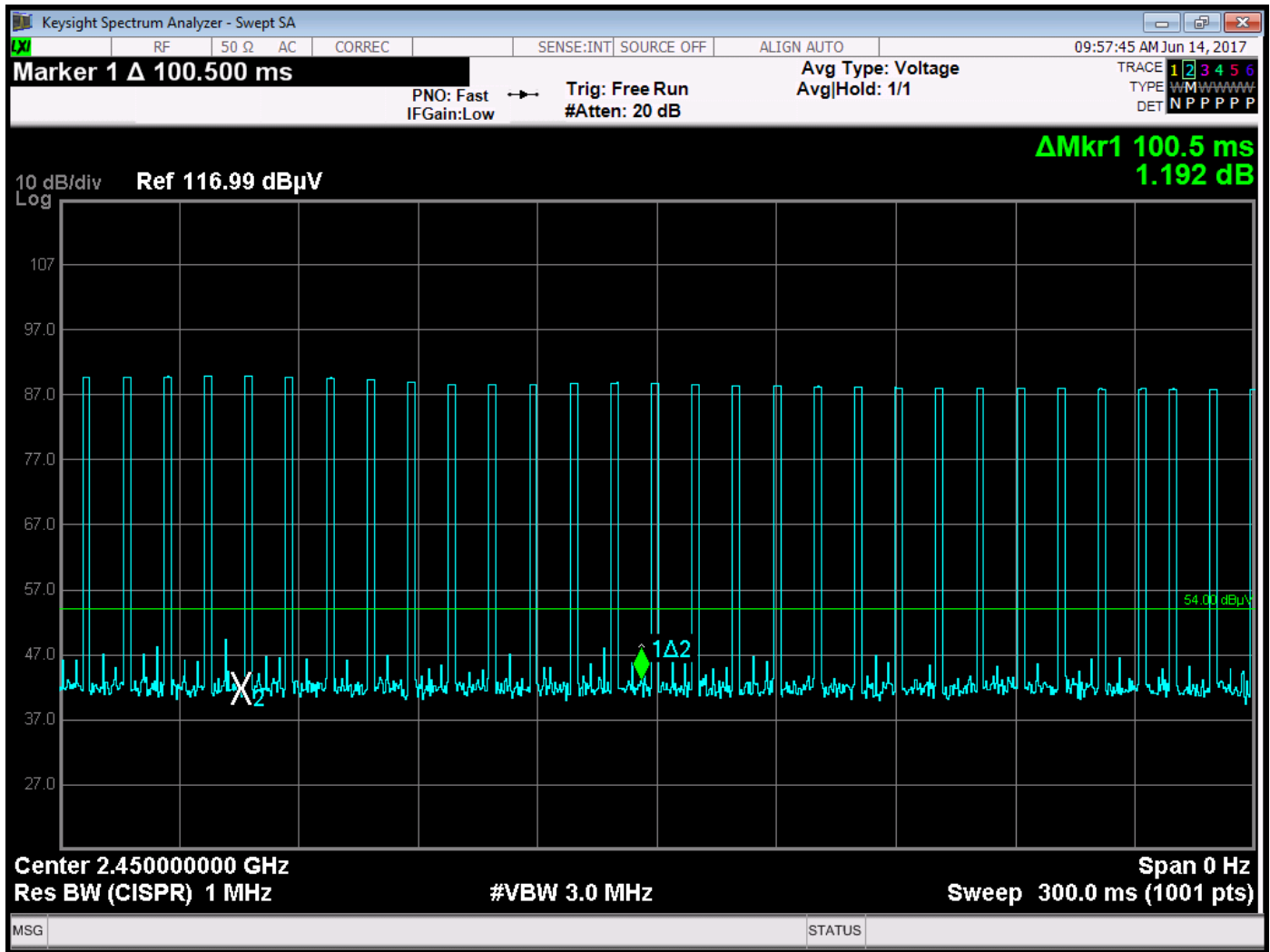
Time Between Pulses is greater than 100 ms – Advertising Mode



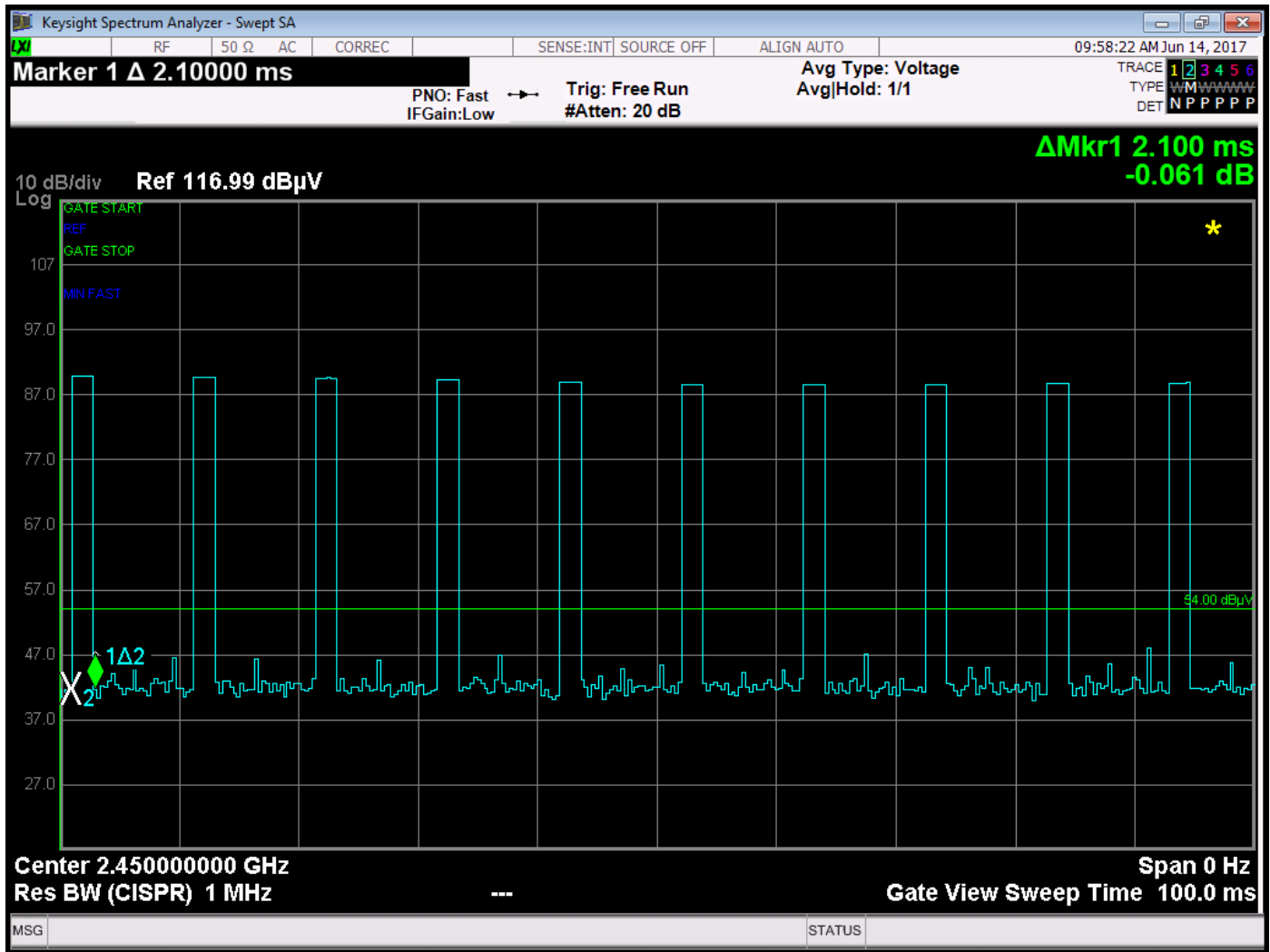
Time of One Pulse = 1.8 ms – Advertising Mode

Total Duty Cycle = 25.2 ms / 100 ms = 25.2%

The Peak to Average Ratio is -11.97 dB



Number of Pulses in worst case 100 ms – Pairing Mode



Time of One Pulse = 2.1 ms – Pairing Mode

Total Duty Cycle = 2.1 ms / 100 ms = 2.1%

The advertising mode is worst case and thus the duty cycle for the advertising mode was used.