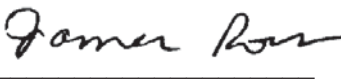


**FCC PART 15 SUBPART B and C
TEST REPORT***for***ROKU REMOTE****MODEL: GR-14**

Prepared for

ROKU, INC.
12980 SARATOGA AVENUE, SUITE #D
SARATOGA, CALIFORNIA 95070Prepared by: 

KYLE FUJIMOTO

Approved by: 

JAMES ROSS

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: MAY 27, 2011

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	
PAGES	17	2	2	2	13	32	68

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TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	4
1. PURPOSE	5
2. ADMINISTRATIVE DATA	6
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
3. APPLICABLE DOCUMENTS	7
4. DESCRIPTION OF TEST CONFIGURATION	8
4.1 Description of Test Configuration – EMI	8
4.1.1 Cable Construction and Termination	9
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
5.2 EMI Test Equipment	11
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
6.3 Facility Environmental Characteristics	12
7. TEST PROCEDURES	13
7.1 RF Emissions	13
7.1.1 Conducted Emissions Test	13
7.1.2 Radiated Emissions (Spurious and Harmonics) Test	14
7.1.3 RF Emissions Test Results	16
8. CONCLUSIONS	17

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations and Recognitions
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagram, Charts, and Photos <ul style="list-style-type: none">• Test Setup Diagram• Antenna and Amplifier Factors• Radiated Emissions Photos
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Plot Map And Layout of Radiated Test Site – 3 Meters

GENERAL REPORT SUMMARY

Compatible Electronics Inc. generates this electromagnetic emission test report, 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 endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Device Tested: Roku Remote
Model: GR-14
S/N: N/A

Product Description: See Expository Statement

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

Manufacturer: Jetta Company Limited
19 On Kui Street
On Lok Tsuen, Fanling,
Hong Kong

Customer: Roku, Inc.
12980 Saratoga Avenue, Suite #D
Saratoga, California 95070

Test Date(s): May 5 and 25, 2011

Test Specifications: EMI requirements
CFR Title 47, Part 15, Subpart B

Test Procedure: ANSI C63.4

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions 150 kHz to 30 MHz	This test was not performed because the EUT operates on battery power only.
2	Radiated RF Emissions 10 kHz – 25000 MHz (Transmitter, Receive, and Digital Portion)	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. Highest reading in relation to spec limit: 45.79 dBuV @ 2483.50 MHz (*U = 5.27 dB)

*U = Expanded Uncertainty with a coverage factor of k=2

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Roku Remote, Model: GR-14. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4. 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 for the digital and receiver portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.249 for the transmitter portion.



2. ADMINISTRATIVE DATA

2.1 Location of Testing

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

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

Roku, Inc.

Greg Garner Director of Hardware Engineering

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer

James Ross Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the date of testing.

2.5 Disposition of the Test Sample

The test sample has not yet been returned as of the date of this report.

2.6 Abbreviations and Acronyms

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

FCC	Federal Communications Commission
RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
ITE	Information Technology Equipment
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
N/A	Not Applicable
Ltd.	Limited
Inc.	Incorporated
IR	Infrared

3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4: 2009	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

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – EMI

The Roku Remote, Model: GR-14 (EUT) was tested as a stand alone unit in three orthogonal axis. The EUT was continuously transmitting and receiving.

The antenna is a PCB trace.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The final emissions data was taken in this mode of operation and any cables were maximized. All initial investigations were performed with the measurement receiver in manual mode scanning the frequency range continuously. Photographs of the test setup are in Appendix D of this report.

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
ROKU REMOTE (EUT)	JETTA COMPANY LIMITED	GR-14	N/A	TC2GR-14

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS					
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100194	November 19, 2010	November 19, 2012
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
RF RADIATED EMISSIONS TEST EQUIPMENT					
Biconical Antenna	Com-Power	AB-900	15250	June 18, 2010	June 18, 2011
Log Antenna	Com-Power	AL-100	16252	June 9, 2010	June 9, 2011
Preamplifier	Com-Power	PA-102	1017	January 11, 2011	January 11, 2012
Horn Antenna	Com-Power	AH-118	071175	March 18, 2010	March 18, 2012
Loop Antenna	Com-Power	AL-130	17089	January 21, 2011	January 21, 2012
Microwave Preamplifier	Com-Power	PA-840	711013	March 11, 2010	March 11, 2012
Horn Antenna	Com-Power	AH826	71957	NCR	N/A
Microwave Preamplifier	Com-Power	PA-118	181656	December 22, 2010	December 22, 2011
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A

6. TEST SITE DESCRIPTION**6.1 Test Facility Description**

Please refer to section 2.1 and 7.1.2 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

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 measurement receiver was used as a measuring meter. The data was collected with the measurement receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A transient limiter was used for the protection of the measurement receiver's input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the measurement 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 C63.4. 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 the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

Test Results:

This test was not performed because the EUT operates on battery power only.

7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer and EMI Receiver were used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com-Power Preamplifier, Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, the Com-Power Microwave Preamplifier, Model: PA-122 was used for frequencies from 1 GHz to 18 GHz, and the Com-Power Microwave Preamplifier, Model: PA-840 was used for frequencies above 18 GHz. The spectrum analyzer and EMI Receiver were used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps.

The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets.

The readings were averaged by a "duty cycle correction factor," derived from $20 \log$ (dwell time / one pulse train with blanking interval).

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

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 25 GHz	1 MHz	Horn Antenna

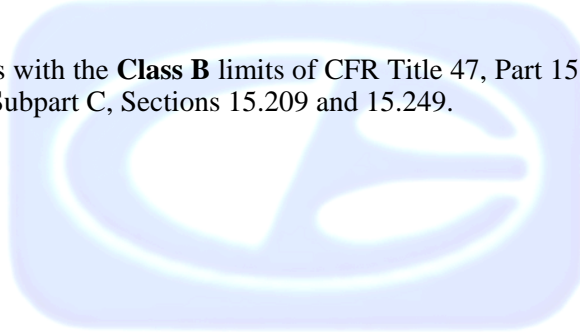
The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. 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 by the Radiated Emission Manual Test software. 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 loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.

Radiated Emissions (Spurious and Harmonics) Test (continued)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3-meter test distance to obtain the final test data.

Test Results:

The EUT 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, Sections 15.209 and 15.249.



7.1.3 RF Emissions Test ResultsTable 1.0 RADIATED EMISSION RESULTS
Roku Remote, Model: GR-14

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
2483.50	45.79	54.00	-8.21
2400.00 (A)	42.25	54.00	-11.75
2390.00 (A)	41.32	54.00	-12.68
2441.00 (A)	79.53	94.00	-14.47
2480.00 (A)	79.38	94.00	-14.62
2402.00 (A)	77.63	94.00	-16.37

Notes:

- * The complete emissions data is given in Appendix E of this report.
- A Average Reading

8. CONCLUSIONS

The Roku Remote, Model: GR-14, as tested, meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B for the digital and receiver portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.249 for the transmitter portion.




APPENDIX A***LABORATORY ACCREDITATIONS AND RECOGNITIONS***

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP LAB CODES 200063-0,
200528-0, 200527-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025. Please follow the link to the NIST/NVLAP site for each of our facilities' NVLAP certificate and scope of accreditation

NVLAP listing links[Agoura Division](#) / [Brea Division](#) / [Silverado/Lake Forest Division](#)

.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."

ANSI listing [CETCB](#)

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).

US/EU MRA list [NIST MRA site](#)

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).

APEC MRA list [NIST MRA site](#)

We are also listed for IT products by the following country/agency:

VCCI Support member: Please visit http://www.vcci.jp/vcci_e/

FCC Listing, from FCC OET site

[FCC test lab search](#) <https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm>

Compatible Electronics IC listing can be found at:

<http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home>

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.249 and/or FCC **Class B** 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 modification were made to the EUT during the testing.





APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Roku Remote
Model: GR-14
S/N: N/A

ALSO APPROVED UNDER THIS REPORT:

There were no additional models covered under this report.



APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

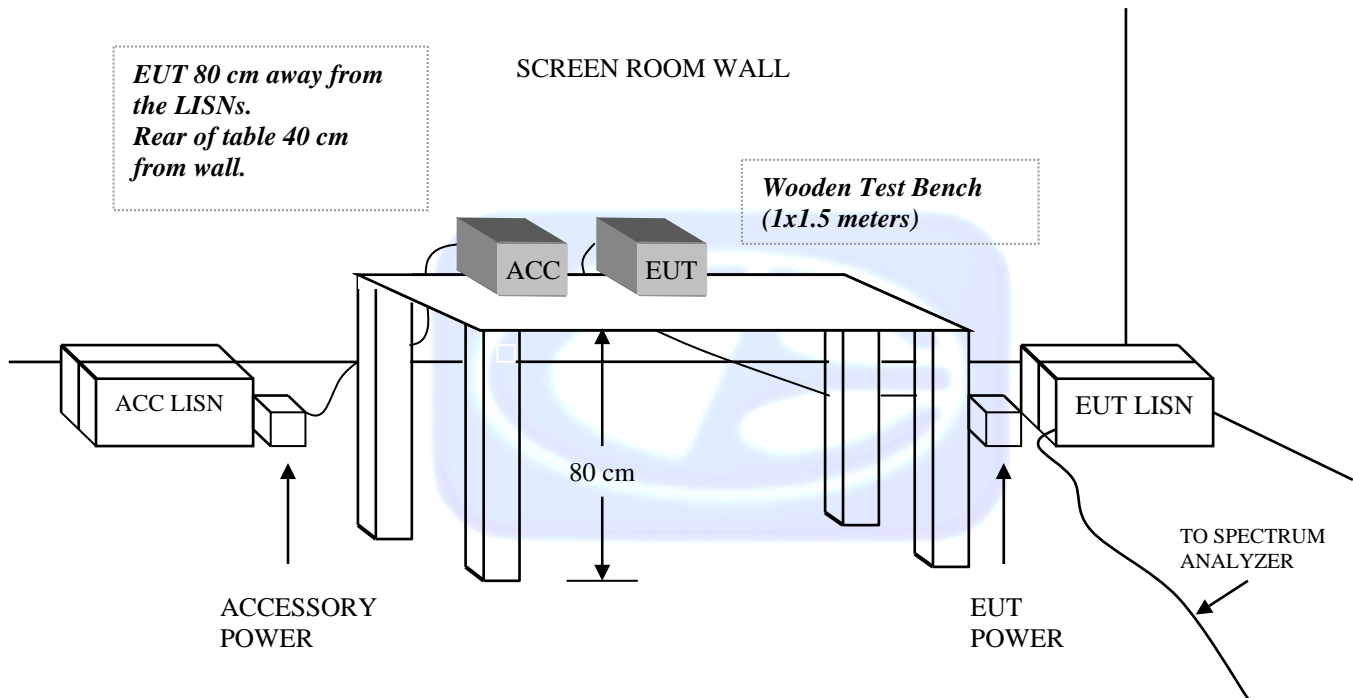
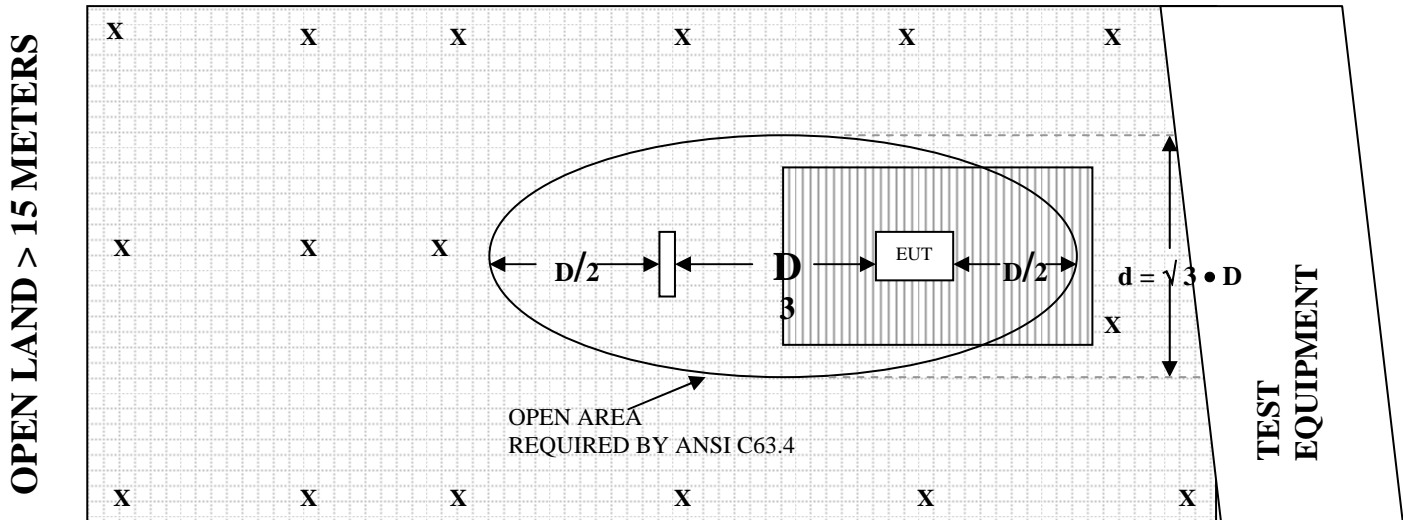


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE – 3 METERS

OPEN LAND > 15 METERS



OPEN LAND > 15 METERS

- | | | | |
|----------|--------------------------|--|-----------------|
| X | = GROUND RODS | | = GROUND SCREEN |
| D | = TEST DISTANCE (meters) | | = WOOD COVER |

COM-POWER AB-900**BICONICAL ANTENNA**

S/N: 15250

CALIBRATION DATE: JUNE 18, 2010

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	12.8	100	11.5
35	11.3	120	13.6
40	10.8	140	12.5
45	10.1	160	13.2
50	11.0	180	15.5
60	11.1	200	16.9
70	7.3	250	16.4
80	7.5	275	18.7
90	8.3	300	19.5

COM-POWER AL-100**LOG PERIODIC ANTENNA**

S/N: 16252

CALIBRATION DATE: JUNE 9, 2010

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	12.7	700	19.5
400	16.1	800	20.9
500	16.9	900	20.8
600	20.1	1000	21.5

COM-POWER PA-102**PREAMPLIFIER**

S/N: 1017

CALIBRATION DATE: JANUARY 11, 2011

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
20	38.2	300	38.1
30	38.1	350	38.0
40	38.2	400	37.9
50	38.2	450	37.7
60	38.2	500	37.6
70	38.2	550	37.9
80	38.2	600	37.9
90	38.2	650	37.7
100	38.1	700	37.9
125	38.2	750	37.5
150	38.2	800	37.6
175	38.2	850	37.6
200	38.2	900	37.0
225	38.2	950	37.2
250	38.2	1000	36.8
275	38.2		

COM POWER AH-118**HORN ANTENNA**

S/N: 071175

CALIBRATION DATE: MARCH 18, 2010

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	22.2	10.0	39.8
1.5	24.2	10.5	40.2
2.0	27.2	11.0	39.7
2.5	27.8	11.5	39.9
3.0	30.5	12.0	41.7
3.5	30.9	12.5	42.7
4.0	31.9	13.0	42.3
4.5	33.2	13.5	40.3
5.0	33.6	14.0	42.6
5.5	36.2	14.5	43.4
6.0	35.8	15.0	41.9
6.5	36.1	15.5	40.8
7.0	37.9	16.0	41.0
7.5	37.4	16.5	41.5
8.0	38.0	17.0	44.5
8.5	38.8	17.5	47.6
9.0	38.0	18.0	50.8
9.5	39.2		

COM-POWER PA-118**PREAMPLIFIER**

S/N: 181656

CALIBRATION DATE: DECEMBER 22, 2010

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.90	10.0	26.07
1.5	26.50	10.5	24.97
2.0	26.79	11.0	24.79
2.5	26.90	11.5	24.33
3.0	27.03	12.0	24.24
3.5	26.94	12.5	24.92
4.0	27.18	13.0	24.52
4.5	26.79	13.5	24.33
5.0	26.25	14.0	24.56
5.5	26.16	14.5	24.99
6.0	25.52	15.0	26.06
6.5	25.29	15.5	26.87
7.0	24.45	16.0	25.95
7.5	24.18	16.5	24.69
8.0	24.02	17.0	24.20
8.5	24.54	17.5	25.12
9.0	24.91	18.0	26.03
9.5	25.42		

COM-POWER AL-130**LOOP ANTENNA**

S/N: 17089

CALIBRATION DATE: JANUARY 21, 2011

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-41.9	9.6
0.01	-41.79	9.71
0.02	-41.43	10.07
0.05	-41.53	9.97
0.07	-41.47	10.03
0.1	-41.44	10.06
0.2	-41.61	9.89
0.3	-41.62	9.88
0.5	-41.66	9.84
0.7	-41.48	10.02
1	-41.13	10.37
2	-40.89	10.61
3	-41.00	10.50
4	-41.14	10.36
5	-41.02	10.48
10	-40.69	10.82
15	-40.41	11.09
20	-41.07	10.43
25	-42.10	9.40
30	-41.15	10.35

COM-POWER AH826**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: MARCH 11, 2010

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	24.36	29.5	23.52
18.5	24.54	30.0	21.73
19.0	24.06	30.5	22.34
19.5	23.71	31.0	20.06
20.0	23.42	31.5	20.02
20.5	22.87	32.0	18.11
21.0	22.60	32.5	19.35
21.5	21.08	33.0	17.50
22.0	22.13	33.5	17.49
22.5	22.42	34.0	17.48
23.0	22.85	34.5	18.57
23.5	22.85	35.0	18.64
24.0	23.82	35.5	18.82
24.5	22.33	36.0	19.14
25.0	24.09	36.5	18.58
25.5	23.20	37.0	15.07
26.0	23.18	37.5	17.29
26.5	23.50	38.0	20.82
27.0	24.25	38.5	19.96
27.5	23.58	39.0	20.66
28.0	23.81	39.5	21.41
28.5	23.76	40.0	18.89
29.0	24.83		



FRONT VIEW

ROKU, INC.
ROKU REMOTE
MODEL: GR-14
FCC SUBPART B AND C – RADIATED EMISSIONS

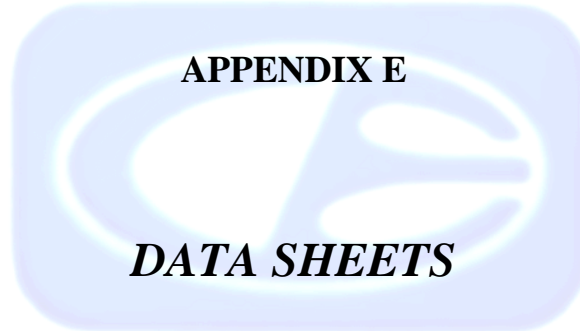
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

ROKU, INC.
ROKU REMOTE
MODEL: GR-14
FCC SUBPART B AND C – RADIATED EMISSIONS

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



RADIATED EMISSIONS

DATA SHEETS

FCC 15.249

Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

**Fundamental of Low Channel
 Transmit Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402	95.89	V	114	-18.11	Peak	1	180	X-Axis
2402	75.89	V	94	-18.11	Avg	1	180	Vertical Polarization
2402	88.77	H	114	-25.23	Peak	1	225	X-Axis
2402	68.77	H	94	-25.23	Avg	1	225	Horizontal Polarization
2402	97.25	V	114	-16.75	Peak	1.25	90	Y-Axis
2402	77.25	V	94	-16.75	Avg	1.25	90	Vertical Polarization
2402	91.8	H	114	-22.2	Peak	1.25	135	Y-Axis
2402	71.8	H	94	-22.2	Avg	1.25	135	Horizontal Polarization
2402	97.63	V	114	-16.37	Peak	2	45	Z-Axis
2402	77.63	V	94	-16.37	Avg	2	45	Vertical Polarization
2402	93.27	H	114	-20.73	Peak	1	135	Z-Axis
2402	73.27	H	94	-20.73	Avg	1	135	Horizontal Polarization

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Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

**Fundamental of Middle Channel
 Transmit Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2441	96.22	V	114	-17.78	Peak	1.25	155	X-Axis
2441	76.22	V	94	-17.78	Avg	1.25	155	Vertical Polarization
2441	87.64	H	114	-26.36	Peak	1.25	155	X-Axis
2441	67.64	H	94	-26.36	Avg	1.25	155	Horizontal Polarization
2441	99.19	V	114	-14.81	Peak	2.25	90	Y-Axis
2441	79.19	V	94	-14.81	Avg	2.25	90	Vertical Polarization
2441	92.16	H	114	-21.84	Peak	1.25	155	Y-Axis
2441	72.16	H	94	-21.84	Avg	1.25	155	Horizontal Polarization
2441	99.53	V	114	-14.47	Peak	2.25	90	Z-Axis
2441	79.53	V	94	-14.47	Avg	2.25	90	Vertical Polarization
2441	91.52	H	114	-22.48	Peak	1.25	155	Z-Axis
2441	71.52	H	94	-22.48	Avg	1.25	155	Horizontal Polarization

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Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

**Fundamental of High Channel
 Transmit Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2480	98.7	V	114	-15.3	Peak	2.5	180	X-Axis
2480	78.7	V	94	-15.3	Avg	2.5	180	Vertical Polarization
2480	95.64	H	114	-18.36	Peak	1.25	135	X-Axis
2480	75.64	H	94	-18.36	Avg	1.25	135	Horizontal Polarization
2480	93.94	V	114	-20.06	Peak	1.25	135	Y-Axis
2480	73.94	V	94	-20.06	Avg	1.25	135	Vertical Polarization
2480	92.98	H	114	-21.02	Peak	1.25	45	Y-Axis
2480	72.98	H	94	-21.02	Avg	1.25	45	Horizontal Polarization
2480	99.38	V	114	-14.62	Peak	1	225	Z-Axis
2480	79.38	V	94	-14.62	Avg	1	225	Vertical Polarization
2480	93.37	H	114	-20.63	Peak	2.25	135	Z-Axis
2480	73.37	H	94	-20.63	Avg	2.25	135	Horizontal Polarization

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804	47.03	V	74	-26.97	Peak	2.25	135	
4804	27.03	V	54	-26.97	Avg	2.25	135	
7206	50.37	V	74	-23.63	Peak	1.25	135	
7206	30.37	V	54	-23.63	Avg	1.25	135	
9608								No Emission Detected
9608								
12010								No Emission Detected
12010								
14412								No Emission Detected
14412								
16814								No Emission Detected
16814								
19216								No Emission Detected
19216								
21618								No Emission Detected
21618								
24020								No Emission Detected
24020								

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Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804	47.66	V	74	-26.34	Peak	1.25	225	
4804	27.66	V	54	-26.34	Avg	1.25	225	
7206	50.01	V	74	-23.99	Peak	1.35	155	
7206	30.01	V	54	-23.99	Avg	1.35	155	
9608								No Emission Detected
9608								
12010								No Emission Detected
12010								
14412								No Emission Detected
14412								
16814								No Emission Detected
16814								
19216								No Emission Detected
19216								
21618								No Emission Detected
21618								
24020								No Emission Detected
24020								

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Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804	49.11	V	74	-24.89	Peak	1.25	225	
4804	29.11	V	54	-24.89	Avg	1.25	225	
7206	49.43	V	74	-24.57	Peak	1.25	225	
7206	29.43	V	54	-24.57	Avg	1.25	225	
9608								No Emission Detected
9608								
12010								No Emission Detected
12010								
14412								No Emission Detected
14412								
16814								No Emission Detected
16814								
19216								No Emission Detected
19216								
21618								No Emission Detected
21618								
24020								No Emission Detected
24020								

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804	44.46	H	74	-29.54	Peak	1.25	135	
4804	24.46	H	54	-29.54	Avg	1.25	135	
7206	49.34	H	74	-24.66	Peak	1.25	90	
7206	29.34	H	54	-24.66	Avg	1.25	90	
9608								No Emission
9608								Detected
12010								No Emission
12010								Detected
14412								No Emission
14412								Detected
16814								No Emission
16814								Detected
19216								No Emission
19216								Detected
21618								No Emission
21618								Detected
24020								No Emission
24020								Detected

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804	48.11	H	74	-25.89	Peak	1.25	155	
4804	28.11	H	54	-25.89	Avg	1.25	155	
7206	50.18	H	74	-23.82	Peak	1.35	145	
7206	30.18	H	54	-23.82	Avg	1.35	145	
9608								No Emission
9608								Detected
12010								No Emission
12010								Detected
14412								No Emission
14412								Detected
16814								No Emission
16814								Detected
19216								No Emission
19216								Detected
21618								No Emission
21618								Detected
24020								No Emission
24020								Detected

FCC 15.249

 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804	47.53	H	74	-26.47	Peak	2.25	135	
4804	27.53	H	54	-26.47	Avg	2.25	135	
7206	49.21	H	74	-24.79	Peak	1.25	135	
7206	29.21	H	54	-24.79	Avg	1.25	135	
9608								No Emission
9608								Detected
12010								No Emission
12010								Detected
14412								No Emission
14412								Detected
16814								No Emission
16814								Detected
19216								No Emission
19216								Detected
21618								No Emission
21618								Detected
24020								No Emission
24020								Detected

FCC 15.249

Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Poi (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4882	41.99	V	74	-32.01	Peak	1.25	155	
4882	21.99	V	54	-32.01	Avg	1.25	155	
7323	50.57	V	74	-23.43	Peak	1.35	165	
7323	30.57	V	54	-23.43	Avg	1.35	165	
9764								No Emission
9764								Detected
12205								No Emission
12205								Detected
14646								No Emission
14646								Detected
17087								No Emission
17087								Detected
19528								No Emission
19528								Detected
21969								No Emission
21969								Detected
24410								No Emission
24410								Detected

FCC 15.249

Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4882	45.92	V	74	-28.08	Peak	1.25	165	
4882	25.92	V	54	-28.08	Avg	1.25	165	
7323	50.41	V	74	-23.59	Peak	1.35	175	
7323	30.41	V	54	-23.59	Avg	1.35	175	
9764								No Emission Detected
9764								
12205								No Emission Detected
12205								
14646								No Emission Detected
14646								
17087								No Emission Detected
17087								
19528								No Emission Detected
19528								
21969								No Emission Detected
21969								
24410								No Emission Detected
24410								

FCC 15.249

 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4882	46.65	V	74	-27.35	Peak	1.25	135	
4882	26.65	V	54	-27.35	Avg	1.25	135	
7323	50.44	V	74	-23.56	Peak	1.35	165	
7323	30.44	V	54	-23.56	Avg	1.35	165	
9764								No Emission
9764								Detected
12205								No Emission
12205								Detected
14646								No Emission
14646								Detected
17087								No Emission
17087								Detected
19528								No Emission
19528								Detected
21969								No Emission
21969								Detected
24410								No Emission
24410								Detected

FCC 15.249

 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4882	45.89	H	74	-28.11	Peak	1.25	135	
4882	25.89	H	54	-28.11	Avg	1.25	135	
7323	50.33	H	74	-23.67	Peak	1.35	145	
7323	30.33	H	54	-23.67	Avg	1.35	145	
9764								No Emission
9764								Detected
12205								No Emission
12205								Detected
14646								No Emission
14646								Detected
17087								No Emission
17087								Detected
19528								No Emission
19528								Detected
21969								No Emission
21969								Detected
24410								No Emission
24410								Detected

FCC 15.249

Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4882	46.33	H	74	-27.67	Peak	1.25	155	
4882	26.33	H	54	-27.67	Avg	1.25	155	
7323	49.61	H	74	-24.39	Peak	1.35	165	
7323	29.61	H	54	-24.39	Avg	1.35	165	
9764								No Emission
9764								Detected
12205								No Emission
12205								Detected
14646								No Emission
14646								Detected
17087								No Emission
17087								Detected
19528								No Emission
19528								Detected
21969								No Emission
21969								Detected
24410								No Emission
24410								Detected

FCC 15.249

 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4882	45.68	H	74	-28.32	Peak	2.25	135	
4882	25.68	H	54	-28.32	Avg	2.25	135	
7323	49.56	H	74	-24.44	Peak	1.25	155	
7323	29.56	H	54	-24.44	Avg	1.25	155	
9764								No Emission
9764								Detected
12205								No Emission
12205								Detected
14646								No Emission
14646								Detected
17087								No Emission
17087								Detected
19528								No Emission
19528								Detected
21969								No Emission
21969								Detected
24410								No Emission
24410								Detected

FCC 15.249

 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBUV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960	49.51	V	74	-24.49	Peak	1.25	155	
4960	29.51	V	54	-24.49	Avg	1.25	155	
7440	51.68	V	74	-22.32	Peak	1.35	155	
7440	31.68	V	54	-22.32	Avg	1.35	155	
9920								No Emission
9920								Detected
12400								No Emission
12400								Detected
14880								No Emission
14880								Detected
17360								No Emission
17360								Detected
19840								No Emission
19840								Detected
22320								No Emission
22320								Detected
24800								No Emission
24800								Detected

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Poi (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960	48.02	V	74	-25.98	Peak	1.25	135	
4960	28.02	V	54	-25.98	Avg	1.25	135	
7440	51.22	V	74	-22.78	Peak	1.35	155	
7440	31.22	V	54	-22.78	Avg	1.35	155	
9920								No Emission
9920								Detected
12400								No Emission
12400								Detected
14880								No Emission
14880								Detected
17360								No Emission
17360								Detected
19840								No Emission
19840								Detected
22320								No Emission
22320								Detected
24800								No Emission
24800								Detected

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBUV)	Poi (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960	45.55	V	74	-28.45	Peak	1.25	135	
4960	25.55	V	54	-28.45	Avg	1.25	135	
7440	53.25	V	74	-20.75	Peak	1.25	155	
7440	33.25	V	54	-20.75	Avg	1.25	155	
9920								No Emission
9920								Detected
12400								No Emission
12400								Detected
14880								No Emission
14880								Detected
17360								No Emission
17360								Detected
19840								No Emission
19840								Detected
22320								No Emission
22320								Detected
24800								No Emission
24800								Detected

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Poi (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960	45.61	H	74	-28.39	Peak	1.25	135	
4960	25.61	H	54	-28.39	Avg	1.25	135	
7440	50.51	H	74	-23.49	Peak	1.35	155	
7440	30.51	H	54	-23.49	Avg	1.35	155	
9920								No Emission
9920								Detected
12400								No Emission
12400								Detected
14880								No Emission
14880								Detected
17360								No Emission
17360								Detected
19840								No Emission
19840								Detected
22320								No Emission
22320								Detected
24800								No Emission
24800								Detected

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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960	47.81	H	74	-26.19	Peak	1.25	135	
4960	27.81	H	54	-26.19	Avg	1.25	135	
7440	50.41	H	74	-23.59	Peak	1.25	225	
7440	30.41	H	54	-23.59	Avg	1.25	225	
9920								No Emission
9920								Detected
12400								No Emission
12400								Detected
14880								No Emission
14880								Detected
17360								No Emission
17360								Detected
19840								No Emission
19840								Detected
22320								No Emission
22320								Detected
24800								No Emission
24800								Detected

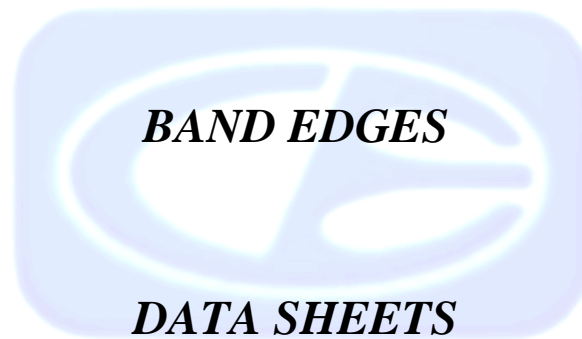
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 Roku, Inc.
 Roku Remote
 Model: GR-14

 Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBUV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960	43.98	H	74	-30.02	Peak	1.25	135	
4960	23.98	H	54	-30.02	Avg	1.25	135	
7440	50.01	H	74	-23.99	Peak	1.25	155	
7440	30.01	H	54	-23.99	Avg	1.25	155	
9920								No Emission Detected
12400								No Emission Detected
14880								No Emission Detected
17360								No Emission Detected
19840								No Emission Detected
22320								No Emission Detected
24800								No Emission Detected



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Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

Band Edges

Low Channel - 2402 MHz

Middle Channel - 2441 MHz

High Channel - 2480 MHz

Z-Axis (Worst Case) - Low Channel

Z-Axis (Worst Case) - Middle Channel

Z-Axis (Worst Case) - High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402	97.63	V	114	-16.37	Peak	2	45	Fundamental of Low Channel
2402	77.63	V	94	-16.37	Avg	2	45	@ 3 meters
2400	62.25	V	74	-11.75	Peak	2	45	No Marker Delta Method
2400	42.25	V	54	-11.75	Peak	2	45	Method Used
2390	41.32	V	54	-12.68	Peak	2	45	No Marker Delta Method
								Method Used
2441	99.53	V	114	-14.47	Peak	2.25	90	Fundamental of Middle Channel
2441	79.53	V	94	-14.47	Avg	2.25	90	@ 3 meters
2480	99.38	V	114	-14.62	Peak	1	225	Fundamental of High Channel
2480	79.38	V	94	-14.62	Avg	1	225	@ 3 meters
2483.5	45.79	V	54	-8.21	Peak	1	225	No Marker Delta Method
								Method Used

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Roku, Inc.
 Roku Remote
 Model: GR-14

Date: 05/05/2011
 Lab: B
 Tested By: Kyle Fujimoto

Band Edges

Low Channel - 2402 MHz

Middle Channel - 2441 MHz

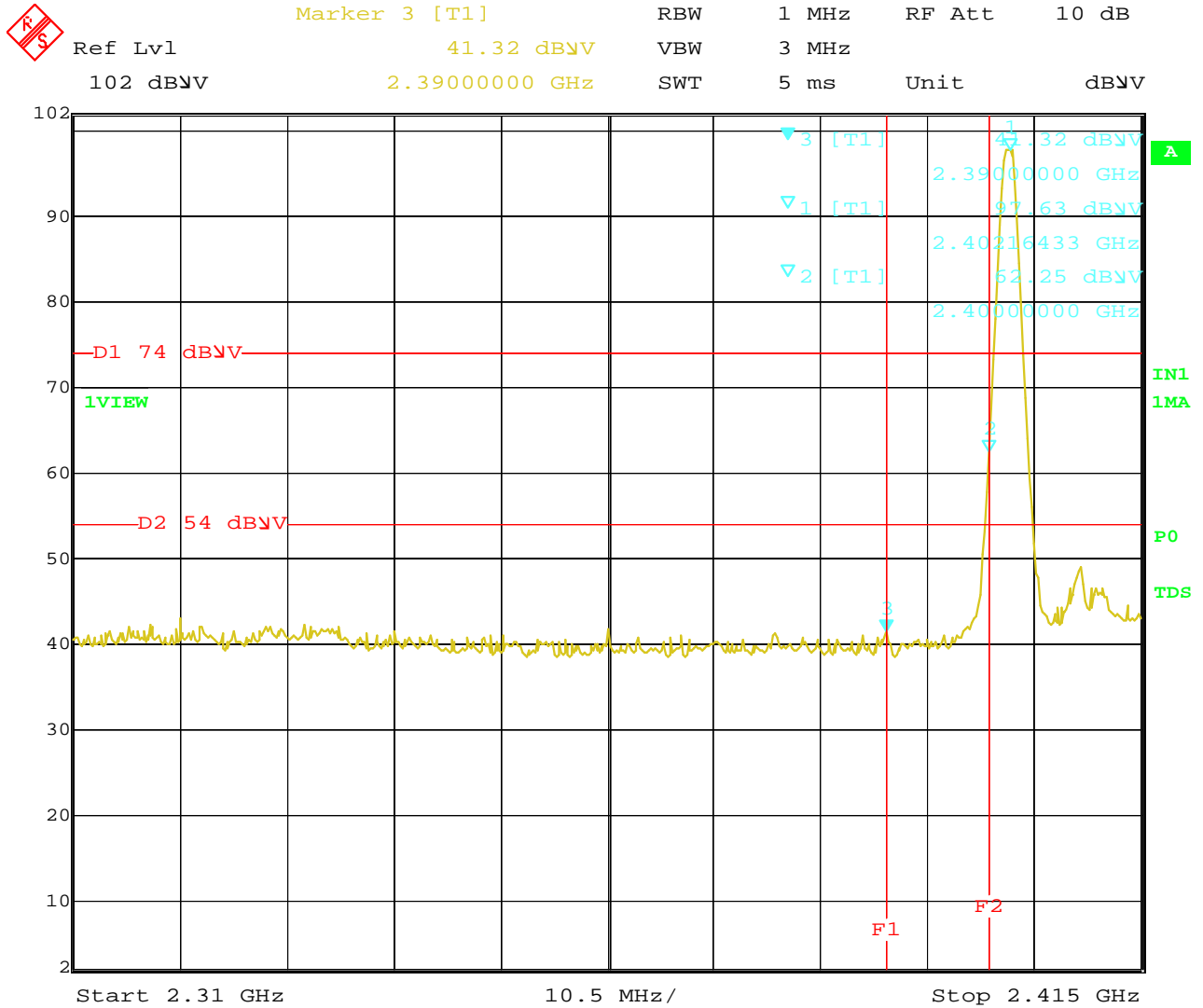
High Channel - 2480 MHz

Z-Axis (Worst Case) - Low Channel

Y-Axis (Worst Case) - Middle Channel

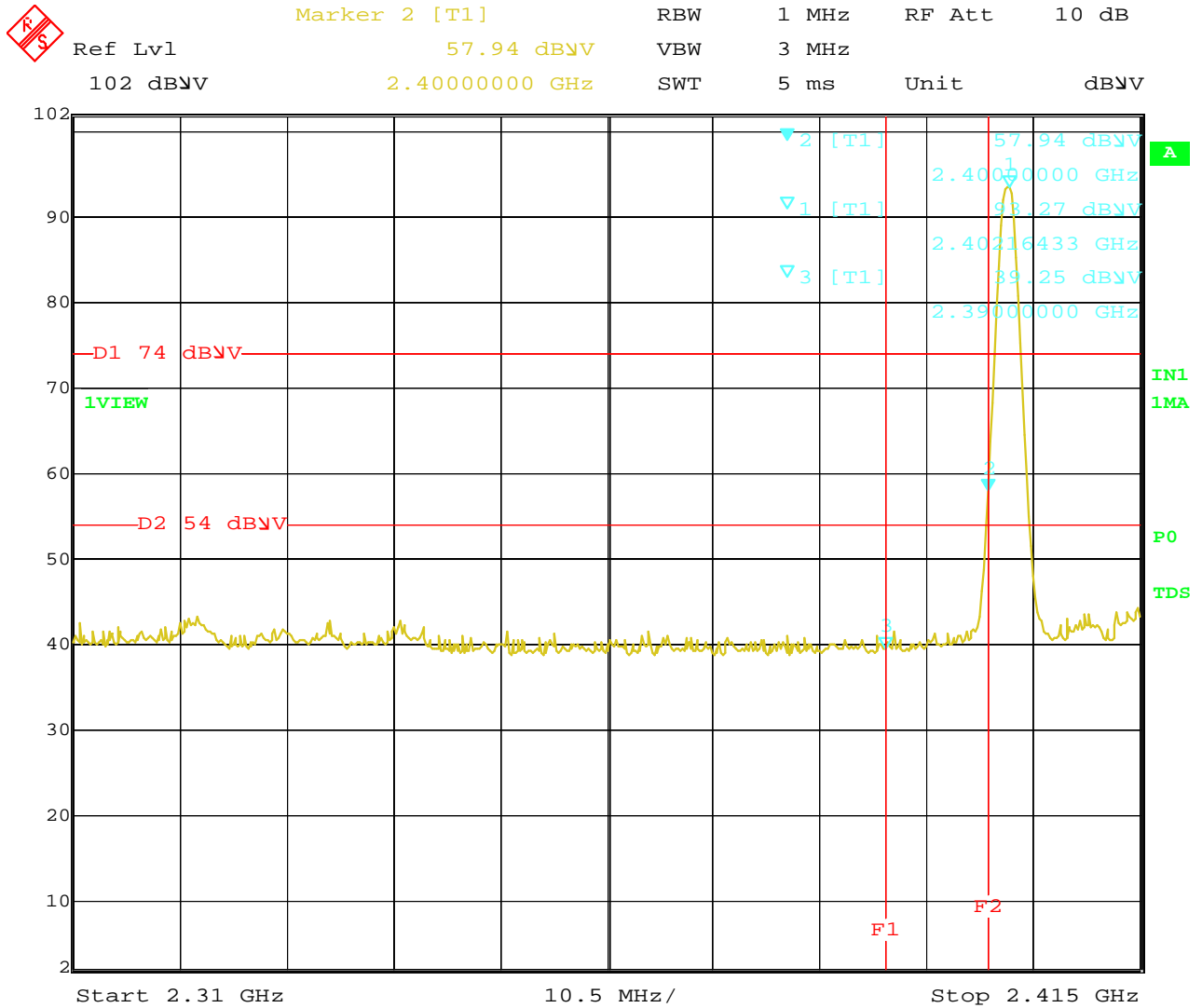
X-Axis (Worst Case) - High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402	93.27	H	114	-20.73	Peak	1	135	Fundamental of Low Channel
2402	73.27	H	94	-20.73	Avg	1	135	@ 3 meters
2400	57.94	H	74	-16.06	Peak	1	135	No Marker Delta Method
2400	37.94	H	54	-16.06	Peak	1	135	Method Used
2390	39.25	H	54	-14.75	Peak	1	135	No Marker Delta Method
								Method Used
2441	92.16	H	114	-21.84	Peak	1.25	155	Fundamental of Middle Channel
2441	72.16	H	94	-21.84	Avg	1.25	155	@ 3 meters
2480	95.64	H	114	-18.36	Peak	1.25	135	Fundamental of High Channel
2480	75.64	H	94	-18.36	Avg	1.25	135	@ 3 meters
2483.5	41.71	H	54	-12.29	Peak	1.25	135	No Marker Delta Method
								Method Used



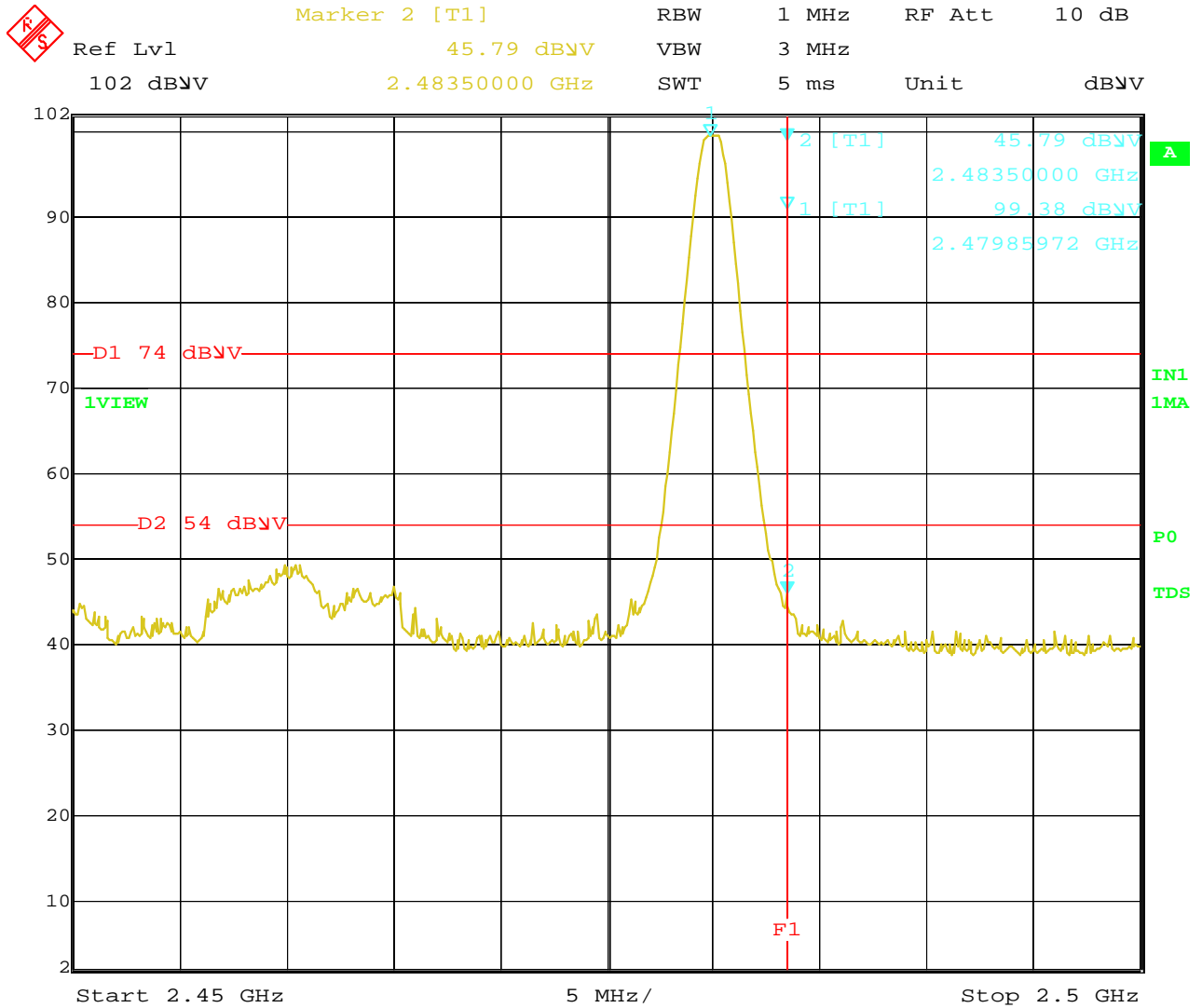
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Band Edge – Low Channel – Z-Axis – Vertical Polarization – Worst Case



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

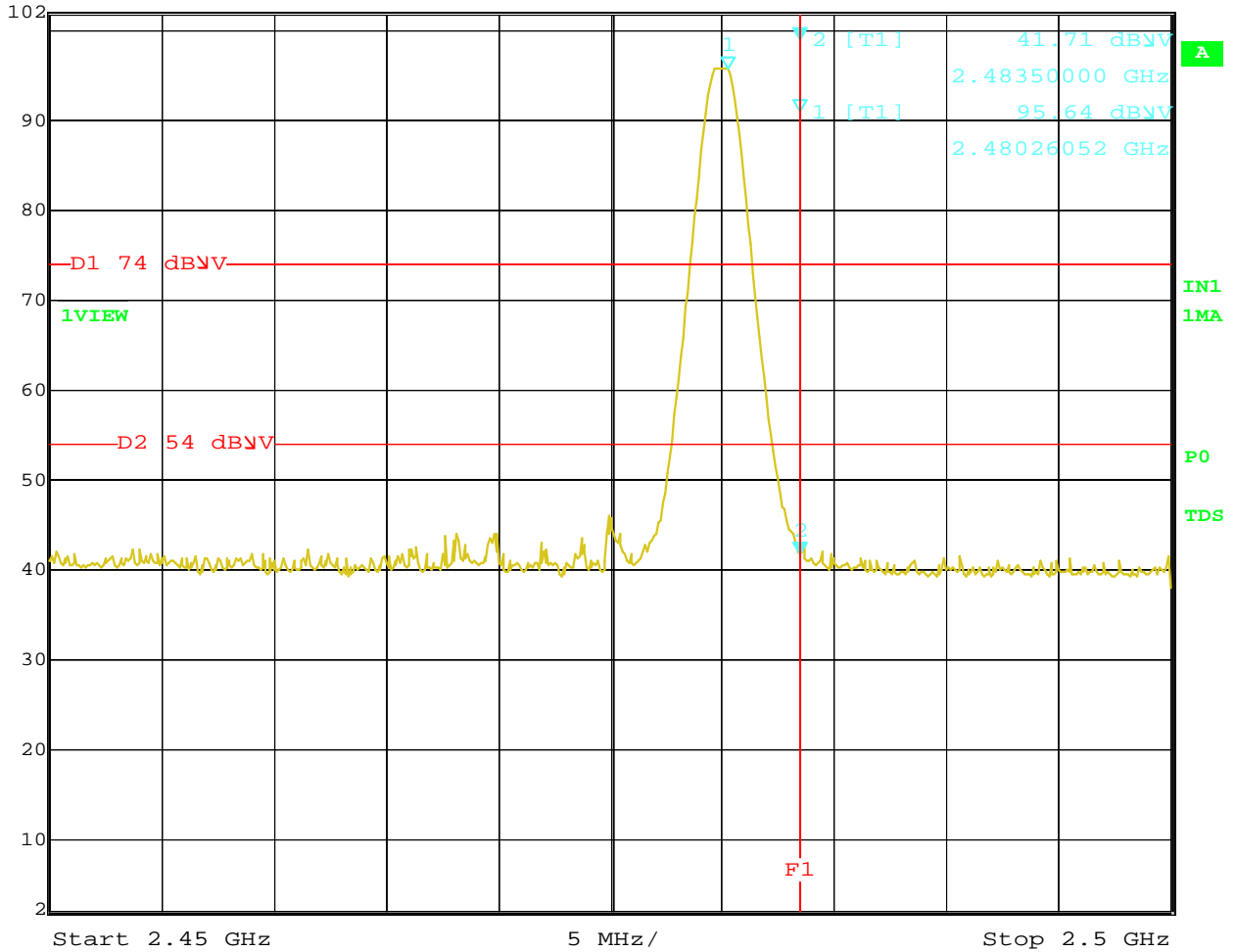


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Band Edge – Low Channel – Z-Axis – Vertical Polarization – Worst Case



Marker 2 [T1] RBW 1 MHz RF Att 10 dB
 Ref Lvl 41.71 dBμV VBW 3 MHz
 102 dBμV 2.48350000 GHz SWT 5 ms Unit dBμV



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