

EMC Test Report

Project Number: 2744378**Report Number:** 2744378EMC03**Revision Level:** 1**Client:** Hollywog**Equipment Under Test:** Remote control unit for WiTouch Pro**Model Name:** Remote Control**Model Number:** 11.1520**FCC ID:** N8L-HWOGTENS12**IC ID:** 10346A-HWOGTENS12**Applicable Standards:** FCC Part 15 § 15.249 and RSS-210**ANSI C63.10: 2013****Report issued on:** 28 September 2015**Test Result:** Compliant

Tested by:



Jeremy O. Pickens, Senior EMC Engineer

Reviewed by:



David Schramm, EMC/RF/SAR/HAC Manager**Remarks:**

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or Testing done by SGS International Electrical Approvals in connection with distribution or use of the product described in this report must be approved by SGS international Electrical Approvals in writing.

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1 Summary of Test Results

Test Description	Test Specification	Test Result
Field strength of fundamental	15.249(a) RSS 210, A2.9 (1)	Compliant
Field strength of spurious radiation	15.249 (a) and 15.209 RSS 210 2.6, A2.9 (1)(2)	Compliant
Fixed, point-to-point	15.249(b)	Not applicable
20 dB bandwidth	15.215(c)	Report data only
99% Occupied bandwidth	RSS GEN 4.4.1	Report data only
Duty Cycle	--	Report data only

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: Mike Treas
Address: 2830 Amnicola Hwy
City, State, Zip, Country: Chattanooga, TN 37406 USA

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

2.3 General Information of EUT

Product Name: Remote Control
Model Name: 11.1520
Serial Number: Not provided
Firmware Version ID: 1.8.0.1
Rated Voltage: 3Vdc
Test Voltage: 3Vdc replaceable batteries

Sample Received Date: April 23, 2012
Dates of testing: May 9 to May 18, 2012

Ratings and declarations

Operation Frequency Range (OFR) TX Mode:	2.44 GHz
TX Channels:	1
Operation Frequency Range (OFR) RX Mode:	2.44 GHz
RX Channels:	1
Channel Bandwidth:	1.8 MHz
Antenna type and gain:	Internal, integrated PCB antenna

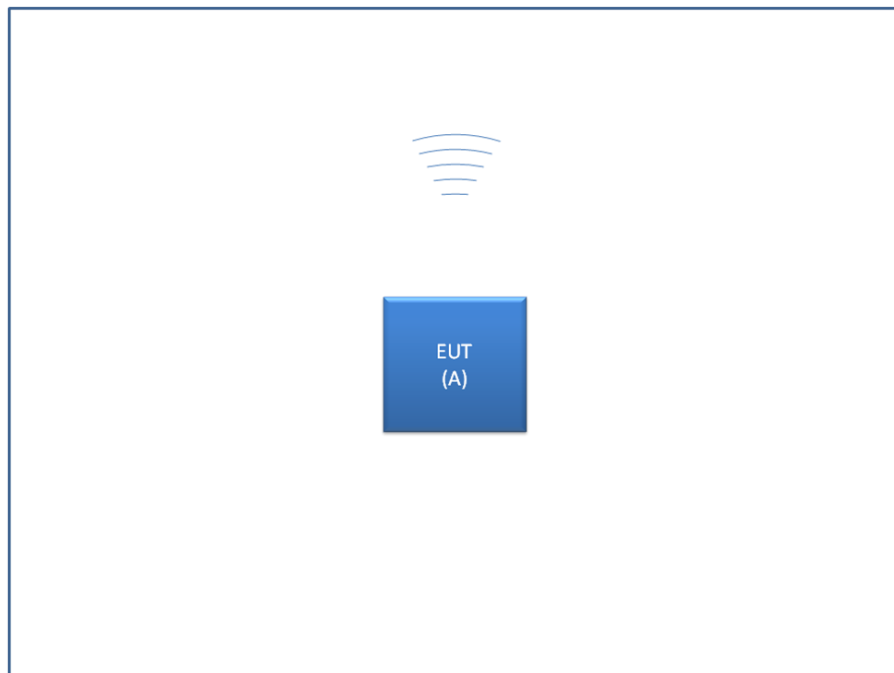
2.4 *Operating Modes and Conditions*

The EUT was programmed by the manufacturer to operate at maximum power transmitting continuously exercising all modes of operation.

As specified in Section 5.11 of ANSI C63.2013:

- Special software allowed the EUT to operate at the worst-case duty cycle and maximum power.

2.5 EUT Connection Block Diagram



2.6 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Hollywog	Remote control	11.1520	Not labeled

2.7 Cable List

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
	NONE					

3 Field Strength of Fundamental

3.1 Test Result

Test Description	Test Specification	Test Result
Field strength of fundamental	15.249(a) RSS 210, A2.9 (1)	Compliant

3.2 Test Method

The test data was measured using a Quasi-Peak detector below 1GHz and a Peak detector above 1GHz. Average measurements were made by correcting the peak value with the duty cycle correction factor. The receivers resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Fundamental Frequency	Average Limits			Peak Limits dBuV/m
	Millivolts/meter	Microvolts/m	dBuV/m	
902 - 928 MHz	50	50000	94	114
2400 - 2483.5 MHz	50	50000	94	114
5725 - 5875 MHz	50	50000	94	114
24 - 24.25 GHz	250	250000	108	128

Example calculations

$$FS \text{ Value} = \text{Level} + AF + CL - \text{Amp} + DCCF$$

$$\text{Margin} = FS \text{ Value} - \text{Limit}$$

$$FS = \text{Field Strength}$$

$$DCCF = \text{Duty Cycle Correction Factor}$$

3.3 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 23.2 °C

Relative Humidity: 55.6 %

3.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Bilog Antenna	JB6	Sunol	B079689	24 Aug 2012
Receiver	ESU40	R & S	B079629	25 AUG 2012
Pre-Amplifier	NSP1800-25-HG	Miteq	B085930	14 Oct 2012
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079712	12 Aug 2012
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079711	12 Aug 2012
Coaxial Cable	Sucoflex 106	Huber+Suhner	B085888	26 Sep 2012

Note: The calibration period equipment is 1 year.

3.5 Test Setup Photographs

Test setup photographs are located in a separate exhibit.

3.6 Test Data

Orientation X,Y,Z	Polarity V,H	Type Pk,Avg	Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Z	H	Avg	2439.85	296	108	107.6	32.3	1.9	44.1	-41.7	55.9	94.0	-38.0
Z	H	Pk	2439.85	296	108	107.6	32.3	1.9	44.1	0.0	97.7	114.0	-16.3
Z	V	Avg	2439.85	20	400	102.3	32.3	1.9	44.1	-41.7	50.6	94.0	-43.3
Z	V	Pk	2439.85	20	400	102.3	32.3	1.9	44.1	0.0	92.4	114.0	-21.6
Y	H	Avg	2439.85	0	400	79.9	32.3	1.9	44.1	-41.7	28.2	94.0	-65.7
Y	H	Pk	2439.85	0	400	79.9	32.3	1.9	44.1	0.0	70.0	114.0	-44.0
Y	V	Avg	2439.85	82	400	83.7	32.3	1.9	44.1	-41.7	32.0	94.0	-61.9
Y	V	Pk	2439.85	82	400	83.7	32.3	1.9	44.1	0.0	73.8	114.0	-40.2
X	H	Avg	2439.85	-42	-42	83.7	32.3	1.9	44.1	-41.7	32.0	94.0	-61.9
X	H	Pk	2439.85	-42	-42	83.7	32.3	1.9	44.1	0.0	73.8	114.0	-40.2
X	V	Avg	2439.85	238	336	71.9	32.3	1.9	44.1	-41.7	20.2	94.0	-73.7
X	V	Pk	2439.85	238	336	71.9	32.3	1.9	44.1	0.0	62.0	114.0	-52.0

4 Field Strength of Spurious Radiation

4.1 Test Result

Test Description	Test Specification	Test Result
Field strength of spurious radiation	15.249 (a) and 15.209 RSS 210 2.6, A2.9 (1)(2)	Compliant

4.2 Test Method

The initial preliminary exploratory scans were performed over the frequency range as indicated in the tables below using the max hold function and incorporating a Peak detector and using TILE! software. The final test data was measured using a Quasi-Peak detector below 1GHz and a Peak detector above 1GHz. For harmonics of the fundamental, Average measurements were made by correcting the peak value with the duty cycle correction factor. For emissions other than harmonics of the fundamental, the Average measurements were made using the Average detector. The receivers resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Frequency	Limits		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 (1)	--
88 - 216 MHz	150	43.5 (1)	--
216 - 960 MHz	200	46 (1)	--
960 - 1000 MHz	500	54 (1)	--
1 - 40 GHz	500	54 (2)	74

(1) Quasi-peak limit

(2) Average limit

4.3 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 23.2 °C

Relative Humidity: 55.6 %

4.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Bilog Antenna	JB6	Sunol	B079689	24 Aug 2012
Receiver	ESU40	R & S	B079629	25 AUG 2012
Pre-Amplifier	NSP1800-25-HG	Miteq	B085930	14 Oct 2012
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079712	12 Aug 2012
Coaxial Cable	Sucoflex 106	Huber+Suhner	B079711	12 Aug 2012
Coaxial Cable	Sucoflex 106	Huber+Suhner	B085888	26 Sep 2012

Note: The calibration period equipment is 1 year.

4.5 Test Setup Photographs

Test setup photographs are located in a separate exhibit.

4.6 Test Data

Z axis - Horizontal

Average Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2789.00	170	370	52.2	33.3	2.0	44.3	-41.7	1.6	54.0	-52.4
7319.60	273	233	63.5	36.0	3.6	42.2	-41.7	19.2	54.0	-34.8

Peak Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2789.00	170	370	52.2	33.3	2.0	44.3	0.0	43.2	74.0	-30.8
7319.60	273	233	63.5	36.0	3.6	42.2	0.0	60.9	74.0	-13.1

Z axis – Vertical

Average Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2789.00	220	310	52.4	33.3	2.0	44.3	-41.7	1.8	54.0	-52.2
9759.25	185	316	57.5	37.3	4.2	40.3	-41.7	17.0	54.0	-37.0

Peak Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2789.00	220	310	52.4	33.3	2.0	44.3	0.0	43.4	74.0	-30.6
9759.25	185	316	57.5	37.3	4.2	40.3	0.0	58.7	74.0	-15.3

Y axis - Horizontal

Average Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	0	212	52.7	33.3	2.0	44.3	-41.7	2.1	54.0	-51.9
4880.53	0	338	61.7	34.9	2.8	44.6	-41.7	13.1	54.0	-40.9

Peak Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	0	212	52.7	33.3	2.0	44.3	0.0	43.7	74.0	-30.3
4880.53	0	338	61.7	34.9	2.8	44.6	0.0	54.8	74.0	-19.2

Y axis – Vertical

Average Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	266	400	50.5	33.3	2.0	44.3	-41.7	-0.1	54.0	-54.1
9759.25	1	400	49.3	37.3	4.2	40.3	-41.7	8.8	54.0	-45.2

Peak Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	266	400	50.5	33.3	2.0	44.3	0.0	41.5	74.0	-32.5
9759.25	1	400	49.3	37.3	4.2	40.3	0.0	50.5	74.0	-23.5

X axis - Horizontal

Average Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	-42	-42	50.5	33.3	2.0	44.3	-41.7	-0.1	54.0	-54.1
9759.25	-42	-42	49.3	37.3	4.2	40.3	-41.7	8.8	54.0	-45.2

Peak Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	-42	-42	50.5	33.3	2.0	44.3	0.0	41.5	74.0	-32.5
9759.25	-42	-42	49.3	37.3	4.2	40.3	0.0	50.5	74.0	-23.5

X axis – Vertical

Average Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	360	100	52.9	33.3	2.0	44.3	-41.7	2.3	54.0	-51.7
7319.47	193	176	61.4	36.0	3.6	42.2	-41.7	17.1	54.0	-36.9
9759.25	28	100	54.6	37.3	4.2	40.3	-41.7	14.1	54.0	-39.9

Peak Test Data

Frequency MHz	Azimuth (degrees)	Elevation (cm)	Level (dBuV)	AF (dB/m)	CL (dB)	Amp (dB)	DCCF (dB)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2790.95	360	100	52.9	33.3	2.0	44.3	0.0	43.9	74.0	-30.1
7319.47	193	176	61.4	36.0	3.6	42.2	0.0	58.8	74.0	-15.2
9759.25	28	100	54.6	37.3	4.2	40.3	0.0	55.8	74.0	-18.2

5 20 dB Bandwidth

5.1 Test Result

Test Description	Basic Standards	Test Result
20 dB bandwidth	15.215(c)	Data only

5.2 Test Method

The procedures from ANSI C63.10 (2009) clause 6.9 were used to determine the 20 dB bandwidth.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.2 °C

Relative Humidity: 55.6 %

5.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R & S	B079629	25 AUG 2012
Preamplifier		Miteq		

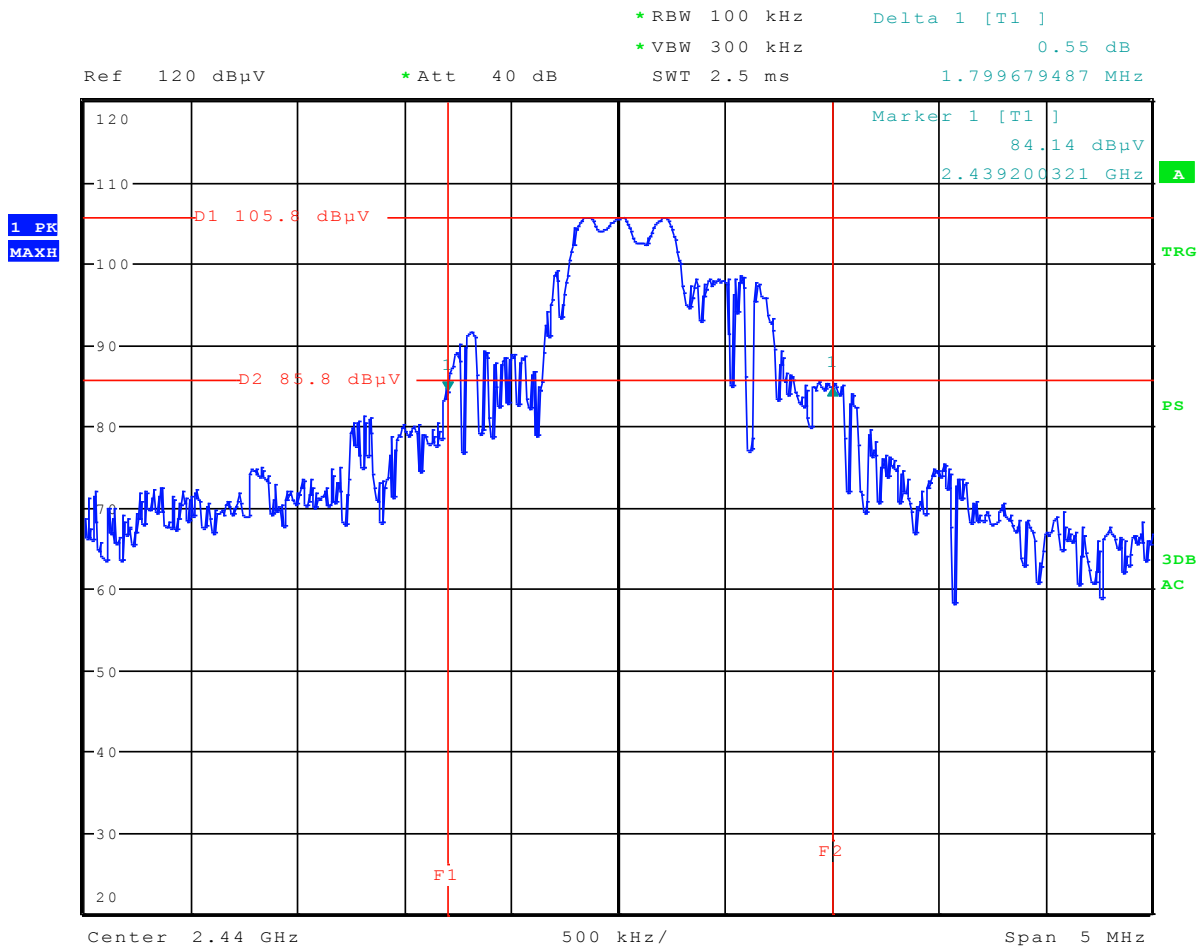
Note: The calibration period equipment is 1 year.

5.5 Test Setup Photographs

Test setup photographs are located in a separate exhibit.

5.6 Test Data

20 dB Bandwidth Plot



Date: 18.MAY.2012 19:02:21

6 99% Bandwidth

6.1 Test Result

Test Description	Basic Standards	Test Result
99% Occupied bandwidth	RSS GEN 4.4.1	Report data only

6.2 Test Method

The 99% bandwidth function of the receiver was used.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.2 °C

Relative Humidity: 55.6 %

6.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R & S	B079629	25 AUG 2012

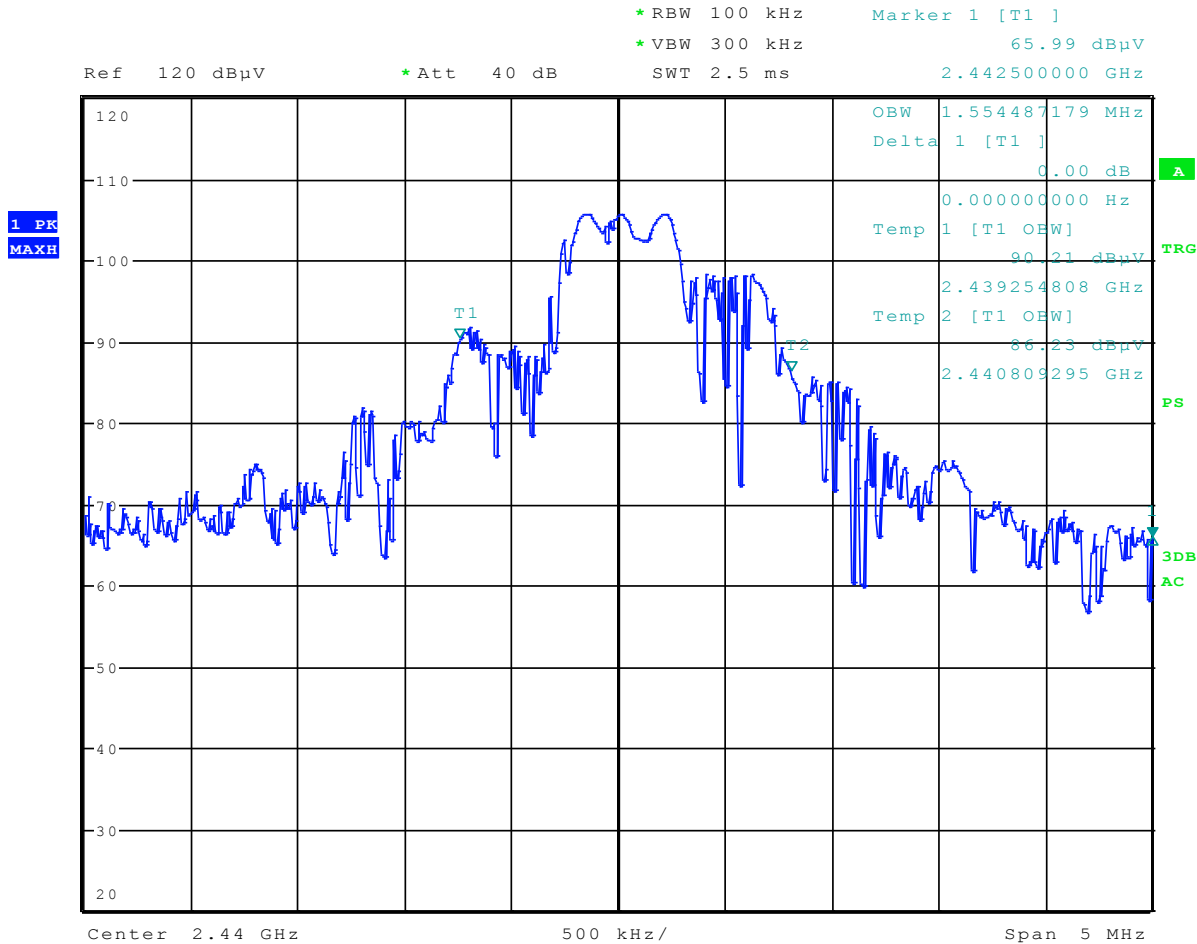
Note: The calibration period equipment is 1 year.

6.5 Test Setup Photographs

Test setup photographs are located in a separate exhibit.

6.6 Test Data

99% Bandwidth Plot, High Channel



Date: 18.MAY.2012 18:54:12

7 Duty Cycle

7.1 Test Result

Test Description	Basic Standards	Test Result
Duty Cycle	ANSI C63.10	Report data only

7.2 Test Method

Clause 7.5 of ANSI C63.10 (2009) was used.

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.5 °C

Relative Humidity: 56.5 %

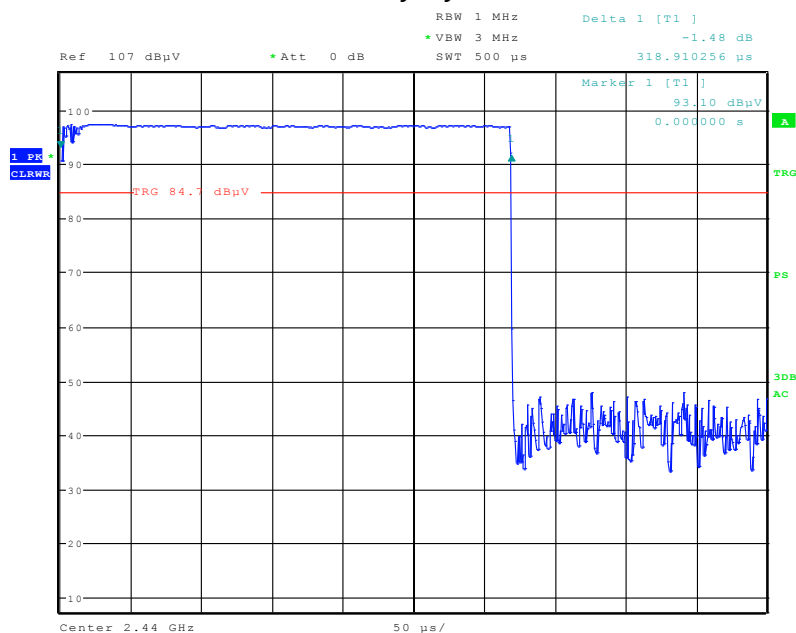
7.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Receiver	ESU40	R & S	B079629	25 AUG 2012

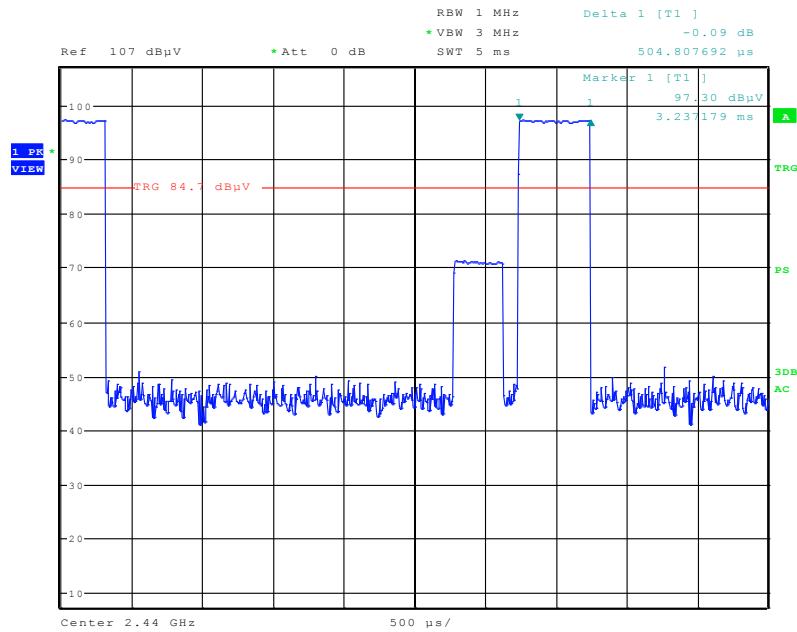
Note: The calibration period equipment is 1 year.

7.5 Test Data

Duty Cycle Data

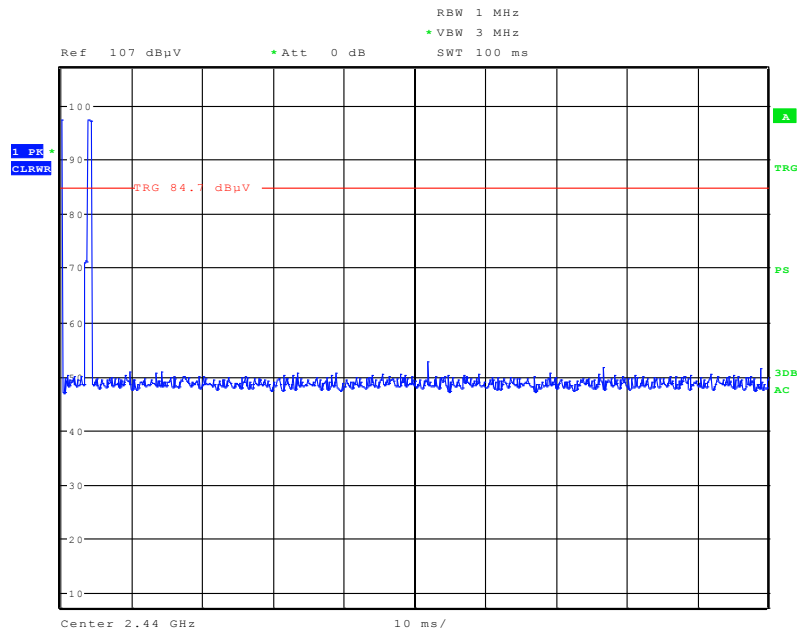


Date: 18.MAY.2012 09:01:00



Date: 18.MAY.2012 09:05:48

Note: The lower amplitude pulse emanates from the remote control unit. The large amplitude that is shown in this plot emanates from the EUT, which is the TENS unit.



Date: 18.MAY.2012 09:10:47

Duty cycle calculation

On time = 0.319 ms + 0.505 ms = 0824 ms

Duty cycle (DC) = 0.824 ms / 100 ms = 0.00824

Duty cycle correction factor (DCCF) = $20 * \text{LOG}_{10} (\text{DC})$

DCCF = $20 * \text{LOG}_{10} (0.00824) = -41.7 \text{ dB}$

8 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	18 May 2012
1	Updated to cover requirements on ANSI C63.10-2013. Added Firmware version information.	28 September 2015