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DATE: 03 February 2015

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

Activocal LTD.

Equipment under test:

Voice or Smartphone Application Activated Bulb Adapter

Vocca Pro
2.4 GHz Bluetooth (BLE)

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

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Measurement/Technical Report for

Activocal LTD.

Voice or Smartphone Application Activated Bulb Adapter

Vocca Pro

FCC ID: 2ADI5-VPRO

03 February 2015

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	
Equipment type:	Digital Transmission System	
Limits used:	47CFR15 Section 15.247	

Measurement procedure used is KDB 558074 D01 v03r02 and ANSI C63.4-2003.

Application for Certification
prepared by:
R. Pinchuck
ITL (Product Testing) Ltd.
1 Bat Sheva Street
Lod
Israel
Tel: +972-8-918-6117
Fax: +972-8-915-3101
Email: Rpinchuck@itl.co.il

Applicant for this device:
(different from "prepared by")
Activocal LTD
PO Box 102
Rehovot, 7610002
Israel
Tel: +972-8-699-6910
Fax: +972-8--
Email: nir@activocal.com

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1. General Information

1.1 *Administrative Information*

Manufacturer:	Activocal LTD.
Manufacturer's Address:	PO Box 102 Rehovot, 761002 Israel
Manufacturer's Representative:	Nir Dvash
Equipment Under Test (E.U.T):	Voice or Smartphone Application Activated Bulb Adapter
Equipment Model No.:	Vocca Pro
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	20.01.15
Start of Test:	20.01.15
End of Test:	23.01.15
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15, Subpart C

1.2 *List of Accreditations*

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. US1004.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025A-1.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 *Product Description*

The voice/smartphone application activated bulb adaptor is a physical adaptor, fitted between any light bulb and a light bulb socket. The voice/smartphone application activated bulb adaptor contains an electronic board that enables the user to control the flow of electricity through it by using voice commands and by that effectively turning the bulb light on and off.

It reacts to a voice command (i.e. “lights please”) and turns the attached bulb on or off, according to its state. A dimming function will also be available and controlled via voice commands (i.e. “turn on 70%”)

The bulb attached to this adaptor continues to function normally using the light switch.

The user does not need to train the adaptor. It uses Speaker Independent voice recognition technology making it an ‘out-of-the-box’ product.

The user can control this adaptor from any smartphone by transmitting ultrasonic sound waves that are picked up by the adaptor. Functions include turning the attached bulb on or off, dimming it, selecting voice commands (from a list) other than the preset one and other commands.

No installation of any kind is needed. No Wi-Fi, Bluetooth or any other wireless networks are needed.

User only needs to fit this adaptor between the existing light bulb and the bulb socket and this voice activated adaptor is ready.

The mains high voltage AC power supply is first converted into a low DC voltage using an internal AC/DC converter which powers the microprocessor. A microphone is connected to the microprocessor enabling it to pick up the sound. When a voice command is given, the microprocessor compares it with a set of voice commands stored in its internal memory and if a comparing command is found the microprocessor will cause the Load Switch to be activated or deactivated thus causing the attached light bulb to be turned on or Off accordingly.

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 v03r02 and ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 *Test Facility*

Radiated emissions tests were performed at I.T.L.’s testing facility in Lod, Israel. I.T.L.’s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is US1004.

1.6 *Measurement Uncertainty*

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)
0.15 – 30 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.98 dB

Note: See ITL Procedure No. PM 198.

2. System Test Configuration

2.1 *Justification*

Unit was evaluated, transmitting continuously at the low channel (2402MHz) the middle channel (2440MHz) and the high channel (2480MHz), modulated with one type of modulation: BlueTooth LOW ENERGY.

Exploratory radiated emission screening was performed in 3 orthogonal orientations to determine the worst case which was the Y axis.

2.2 *EUT Exercise Software*

No special exercise software was used.

2.3 *Special Accessories*

No special accessories were needed to achieve compliance.

2.4 *Equipment Modifications*

No modifications were necessary in order to achieve compliance.

2.5 *Configuration of Tested System*

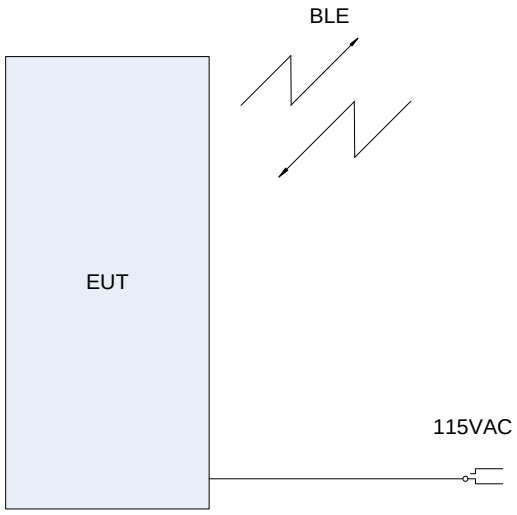

Figure 1. Configuration of Tested System

3. Conducted and Radiated Measurement Test Set-up Photos

Figure 2. Conducted Emission Test

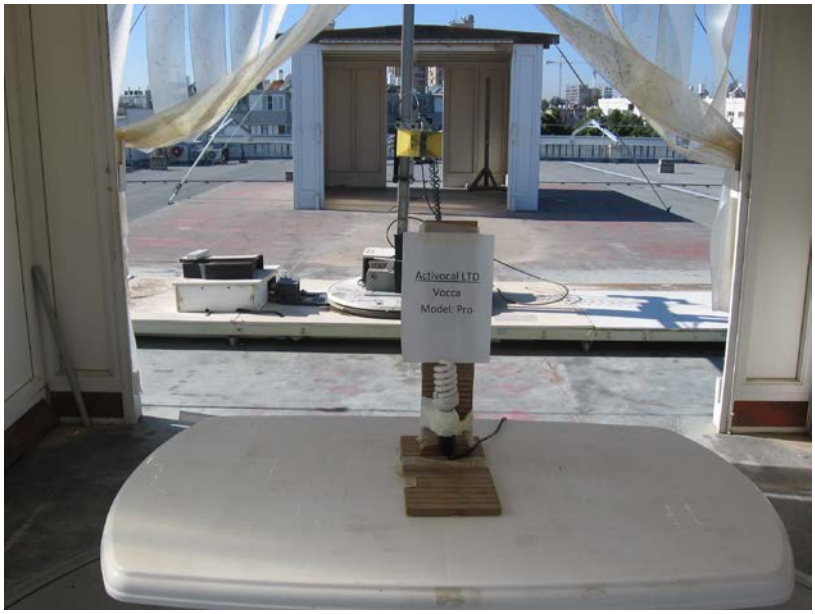

Figure 3. Radiated Emission Test

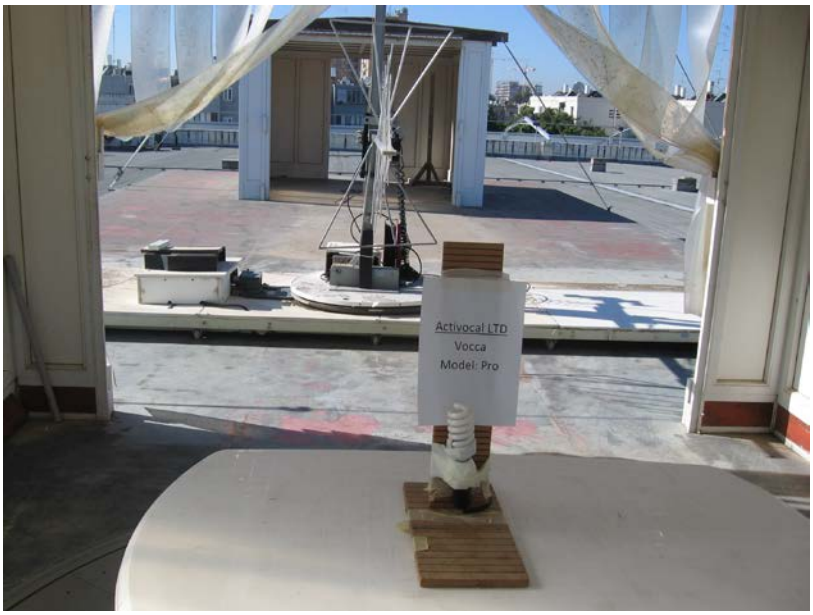

Figure 4. Radiated Emission Test

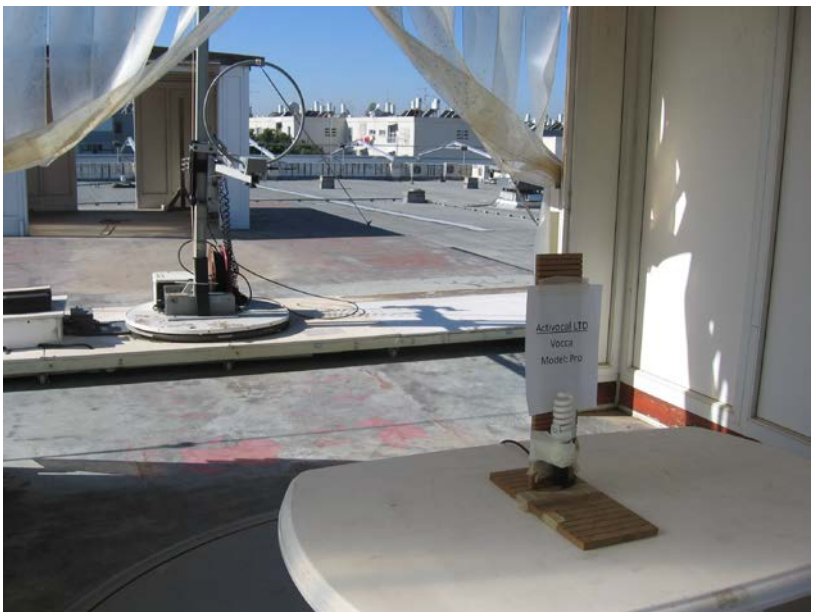

Figure 5. Radiated Emission Test

4. Conducted Emission

4.1 *Test Specification*

F.C.C., Part 15, Subpart C, Section 15.209

4.2 *Test Procedure*

The E.U.T operation mode and test set-up are as described in Section 2. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via a 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 *Measured Data*

JUDGEMENT: Passed by 17.40 dB

The margin between the emission levels and the specification limit is, in the worst case, 17.40 dB for the phase line at 0.234 MHz and 17.76 dB at 0.234 MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 6* to *Figure 9.*

TEST PERSONNEL:

Tester Signature: ___ ___ Date: 08.02.15

Typed/Printed Name: M. Zohar

Conducted Emission

E.U.T Description	Voice or Smartphone Application Activated Bulb Adapter
Type	Vocca Pro
Serial Number:	Not designated

Specification:	F.C.C., Part 15, Subpart C, Class B
Lead:	Phase
Detectors:	Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	230 kHz	37.76	-24.68
2	Average	230 kHz	34.48	-17.96
2	Average	234 kHz	34.90	-17.40
1	Quasi Peak	238 kHz	37.06	-25.10
1	Quasi Peak	426 kHz	17.54	-39.78
2	Average	426 kHz	15.01	-32.31
1	Quasi Peak	770 kHz	19.82	-36.17
2	Average	770 kHz	14.02	-31.98
1	Quasi Peak	962 kHz	18.73	-37.26
2	Average	966 kHz	14.22	-31.77
2	Average	1.426 MHz	9.27	-36.72
1	Quasi Peak	1.738 MHz	10.72	-45.28
1	Quasi Peak	2.174 MHz	10.96	-45.04
2	Average	2.182 MHz	6.42	-39.57
2	Average	3.39 MHz	6.11	-39.88
1	Quasi Peak	3.746 MHz	10.11	-45.88
2	Average	7.446 MHz	6.00	-43.99
1	Quasi Peak	7.954 MHz	11.17	-48.82
1	Quasi Peak	9.574 MHz	11.74	-48.25
2	Average	10.066 MHz	7.23	-42.76

Date: 25.JAN.2015 09:34:01

Figure 6. Detectors: Quasi-peak, Average

Note: DELTA LIMIT refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	Voice or Smartphone Application Activated Bulb Adapter
Type	Vocca Pro
Serial Number:	Not designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Phase
Detectors:	Quasi-peak, Average

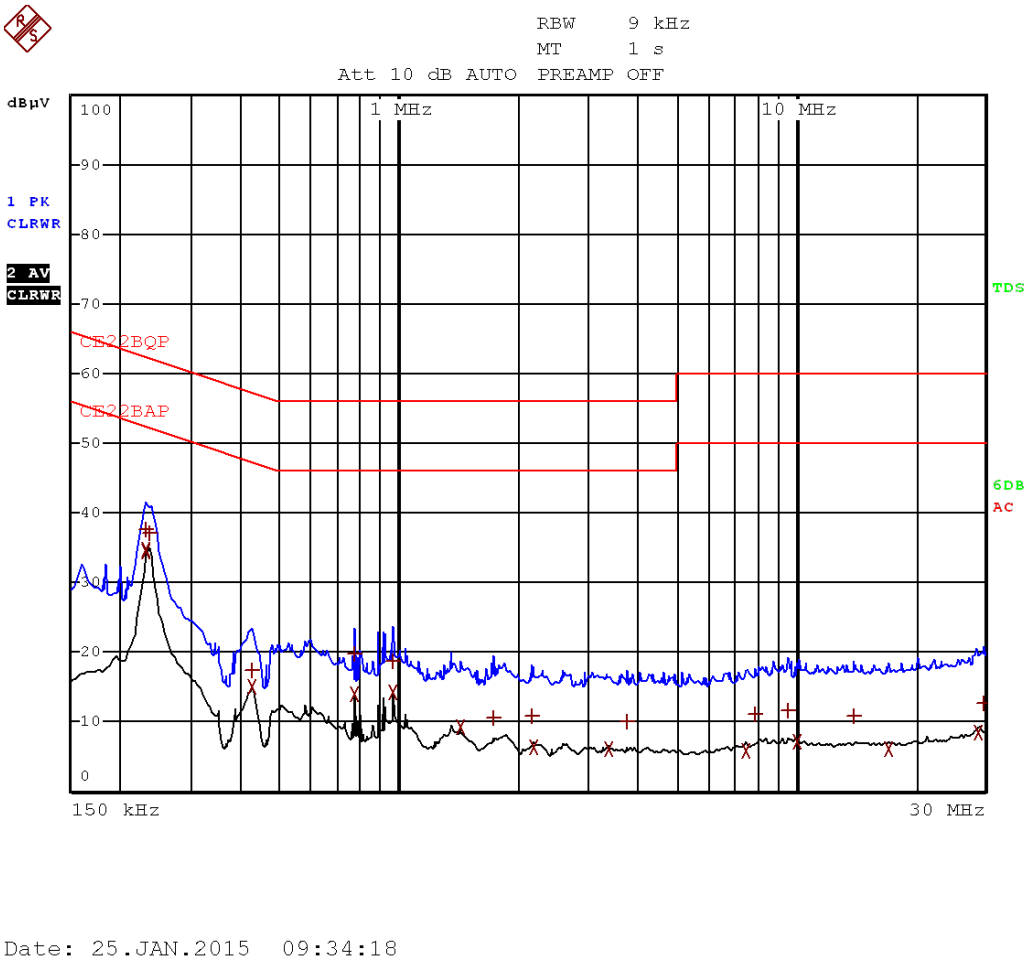

Figure 7 Detectors: Quasi-peak, Average

Conducted Emission

E.U.T Description	Voice or Smartphone Application Activated Bulb Adapter
Type	Vocca Pro
Serial Number:	Not designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Neutral
Detectors:	Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	230 kHz	37.44	-25.00
2	Average	230 kHz	34.27	-18.17
2	Average	234 kHz	34.53	-17.76
1	Quasi Peak	238 kHz	36.69	-25.47
1	Quasi Peak	426 kHz	16.95	-40.37
2	Average	426 kHz	14.38	-32.95
1	Quasi Peak	770 kHz	19.53	-36.46
2	Average	770 kHz	13.91	-32.08
1	Quasi Peak	962 kHz	18.79	-37.20
2	Average	966 kHz	14.22	-31.77
2	Average	1.426 MHz	9.74	-36.25
1	Quasi Peak	1.738 MHz	11.13	-44.87
1	Quasi Peak	2.174 MHz	11.87	-44.12
2	Average	2.182 MHz	7.56	-38.43
2	Average	3.39 MHz	7.64	-38.35
1	Quasi Peak	3.746 MHz	11.14	-44.86
2	Average	7.446 MHz	7.00	-42.99
1	Quasi Peak	7.954 MHz	11.89	-48.10
1	Quasi Peak	9.574 MHz	11.78	-48.21
2	Average	10.066 MHz	7.03	-42.96

Date: 25.JAN.2015 09:40:13

Figure 8. Detectors: Quasi-peak, Average

Note: DELTA LIMIT refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	Voice or Smartphone Application Activated Bulb Adapter
Type	Vocca Pro
Serial Number:	Not designated

Specification:	FCC Part 15, Subpart C, Class B
Lead:	Neutral
Detectors:	Quasi-peak, Average

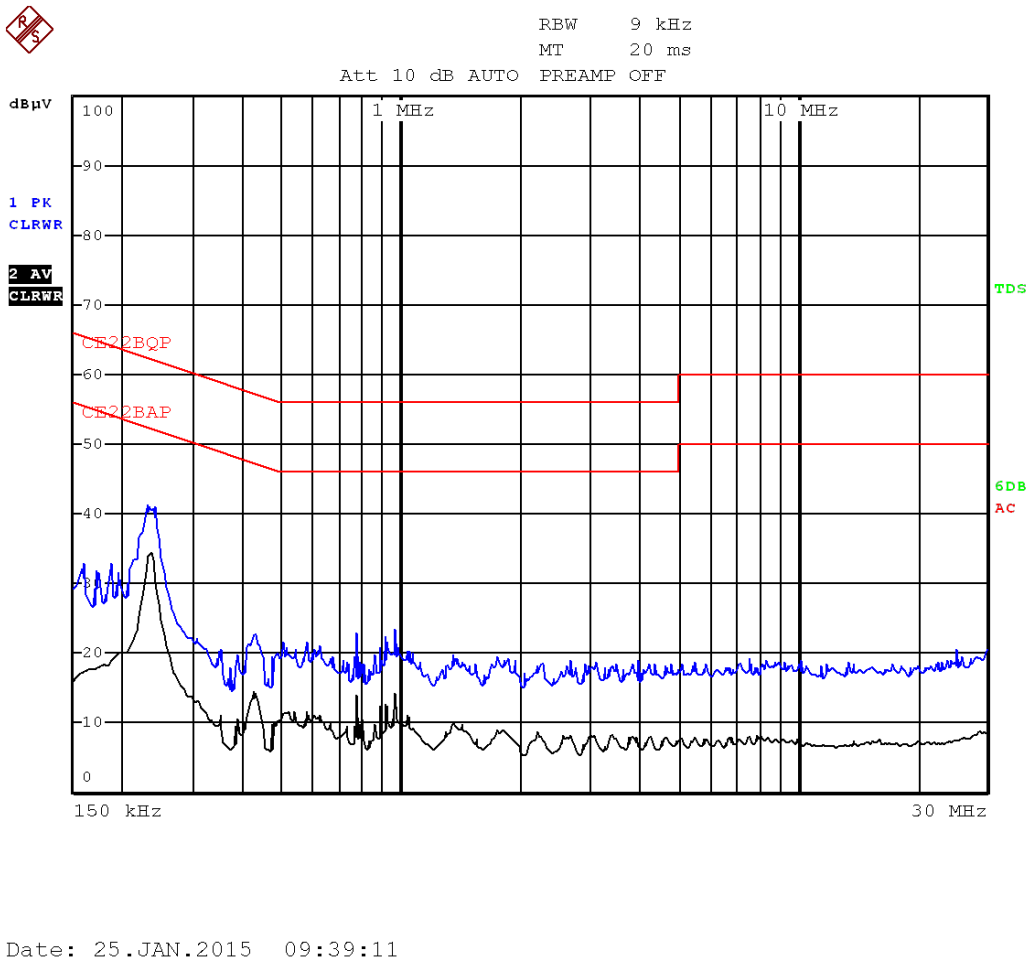

Figure 9 Detectors: Quasi-peak, Average

4.1 *Test Equipment Used; Conducted Emission*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	June 23, 2014	1 Year
Transient Limiter	HP	11947A	3107A03041	May 13, 2014	1 Year
EMI Receiver	Rohde & Schwarz	ESCI7	100724	January 4, 2015	1 Year

Figure 10 Test Equipment Used

5. Avg. Factor Calculation

1. Pulse period = 1 (worst scenario)
2. Pulse duration = 1 (worst scenario)
3. Burst duration = 0.143msec
4. Time between bursts =0.5 msec
5. $$\text{Average Factor} = 20\log\left[\frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100\text{msec}} \times \text{Num of burst within } 100\text{msec}\right]$$

$$\text{Average Factor} = 20\log\left[1 * \frac{0.143}{100} * 160\right] = -12.8dB$$

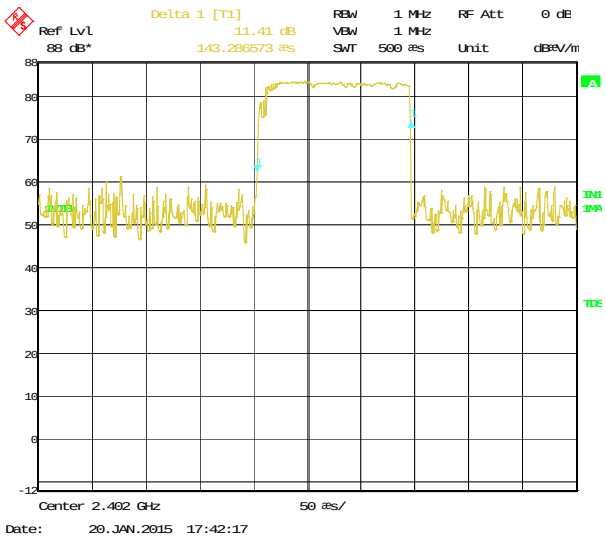

Figure 11. Burst Duration

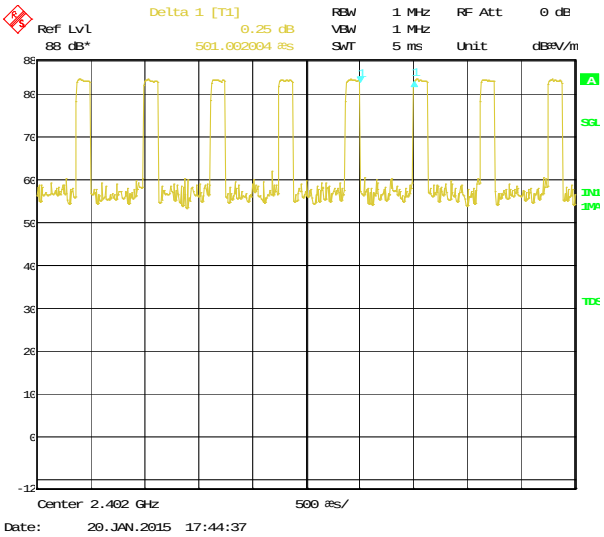

Figure 12. Number of bursts in 5msec=8
Number of bursts in 100msec=160

5.1 *Test Equipment Used; Average Factor Calculation*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	Rohde & Schwarz	ESCI7	100724	January 4, 2015	1 Year

Figure 13 Test Equipment Used

6. 6 dB Minimum Bandwidth

6.1 *Test procedure*

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in *Figure 1*.

The RBW of the receiver was set to 100 kHz.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded.

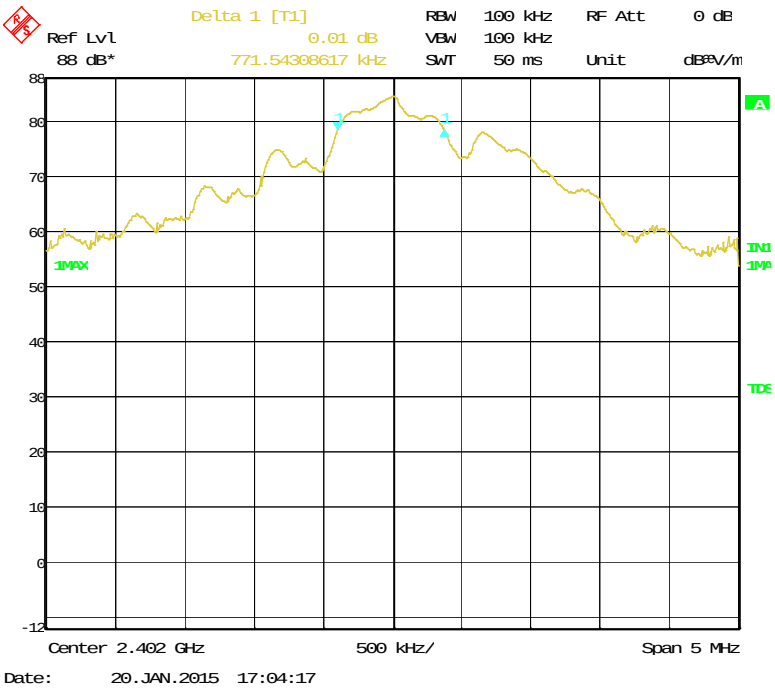

Figure 14. Low Channel, BLE Modulation

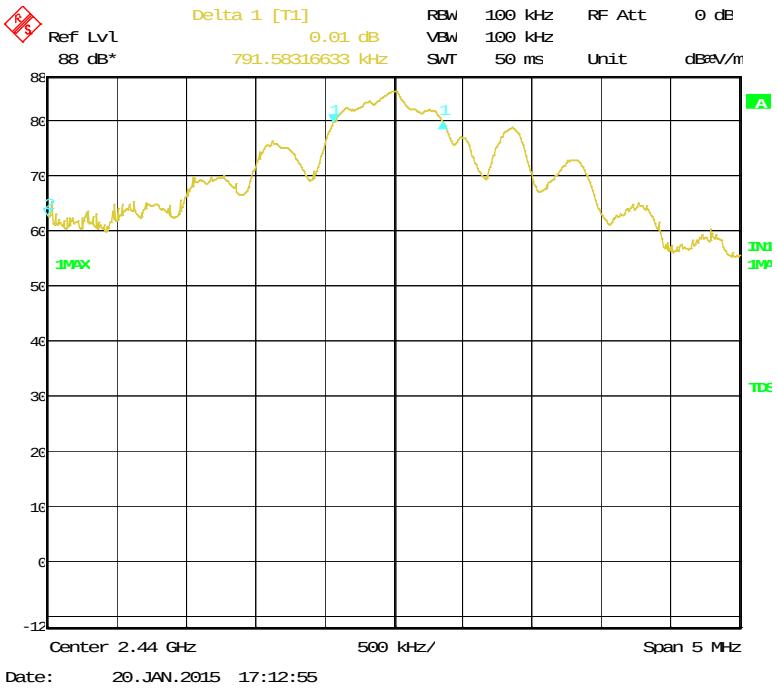

Figure 15. Mid Channel, BLE Modulation

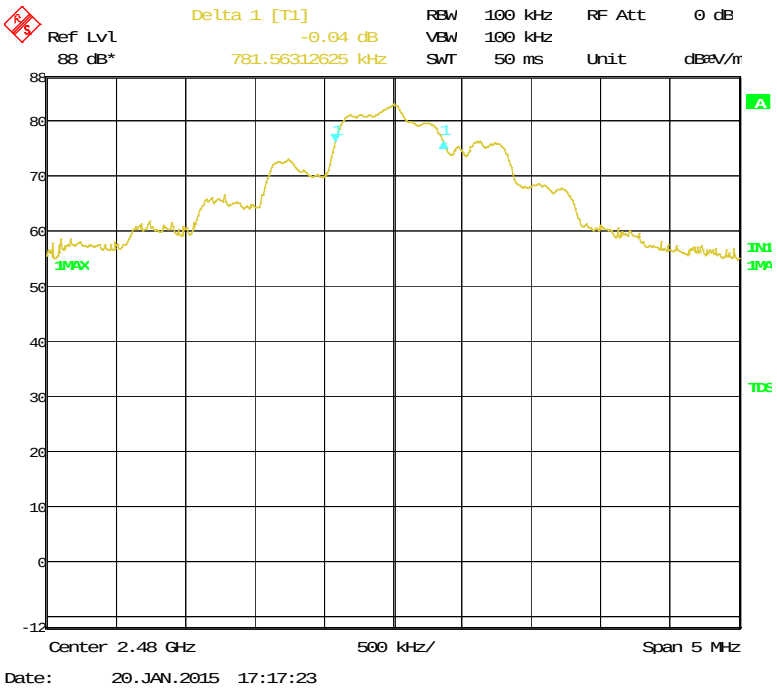

Figure 16. High Channel, BLE Modulation

6.2 *Results table*

E.U.T Description: Voice or Smartphone Application Activated Bulb Adapter
Model No.: Vocca Pro
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C: (15.247-a2)

Operation Frequency (MHz)	Modulation	Reading (KHz)	Specification (KHz)
Low	BLE	771.5	>500
Mid	BLE	791.5	>500
High	BLE	781.5	>500

Figure 17 6 dB Minimum Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 08.02.15

Typed/Printed Name: M. Zohar

6.3 *Test Equipment Used; 6dB Bandwidth*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 18 Test Equipment Used

8. Maximum Transmitted Peak Power Output

8.1 *Test procedure*

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The E.U.T was evaluated in 3 channels: Low, Mid and High.

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

E - Field Strength (V/m)

d – Distance from transmitter (m)

G – Antenna gain

P – Peak power (W)

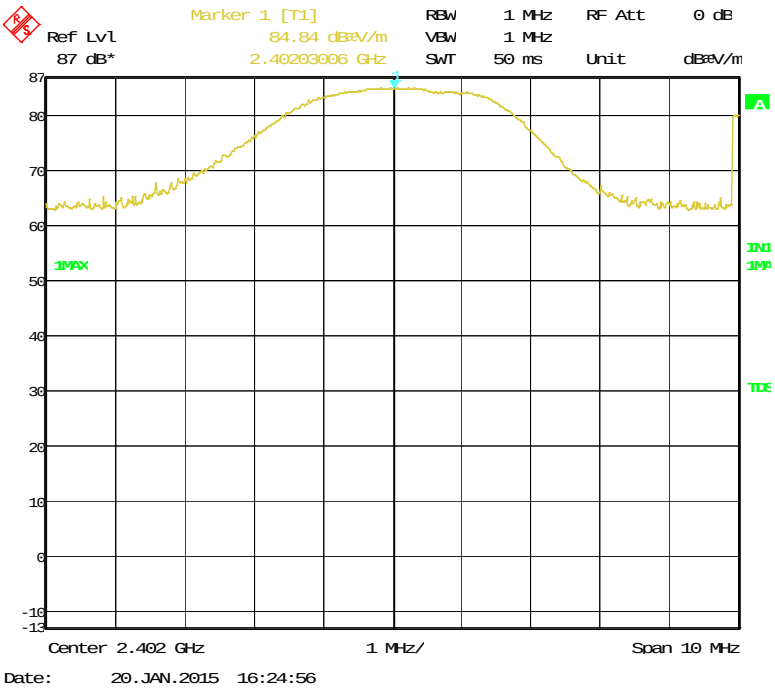

Figure 19 2402.00 MHz – Vertical, BLE Modulation

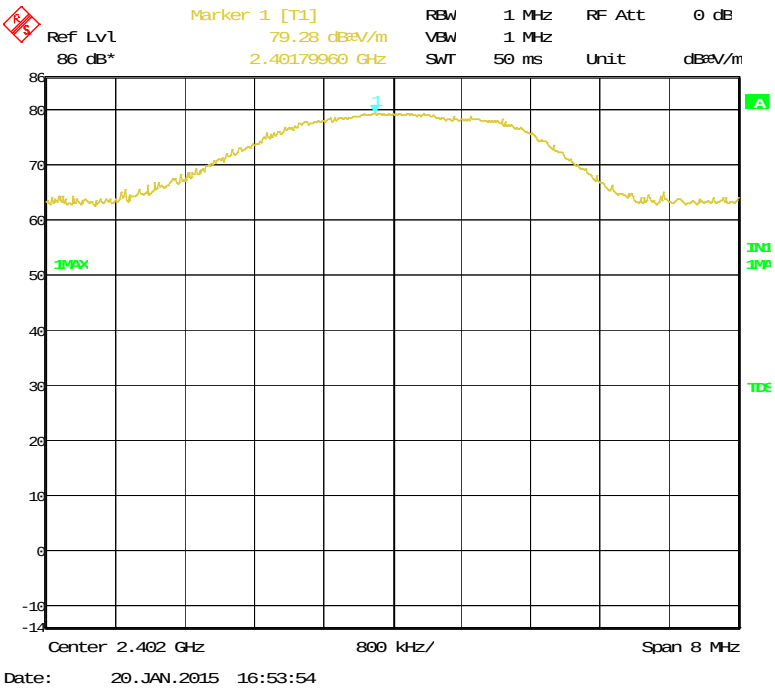

Figure 20 2402.00 MHz – Horizontal, BLE Modulation

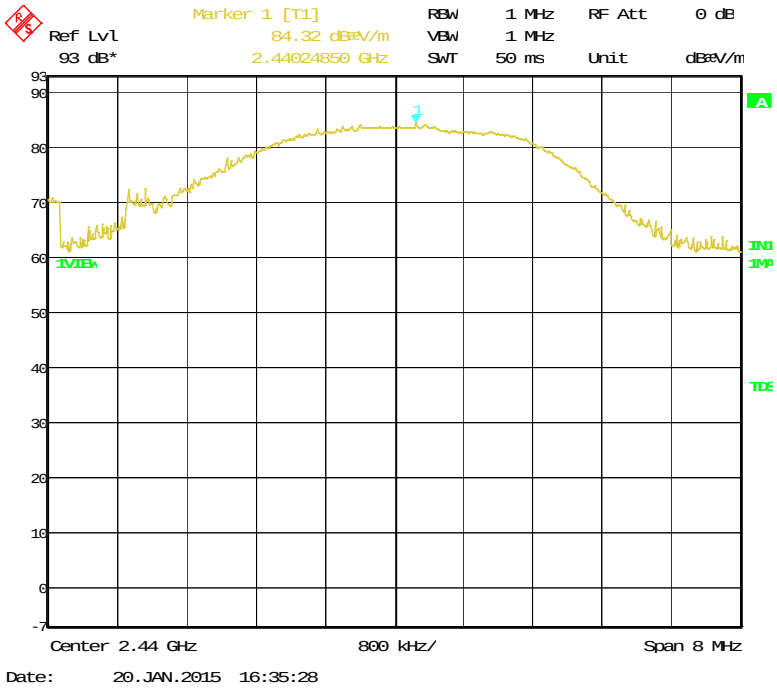

Figure 21 2440.00 MHz – Vertical, BLE Modulation

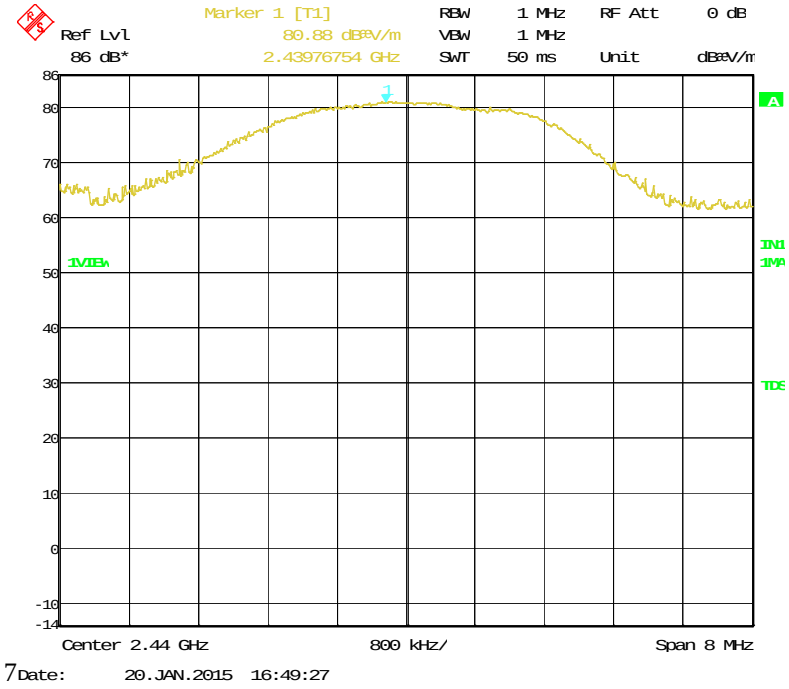

Figure 22 2440.00 MHz – Horizontal, BLE Modulation

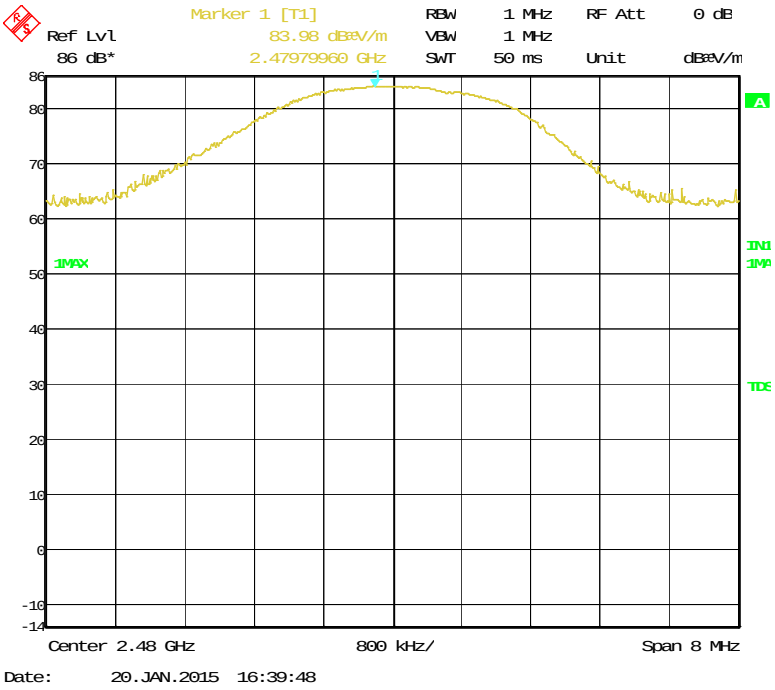

Figure 23 2480.00 MHz – Vertical, BLE Modulation

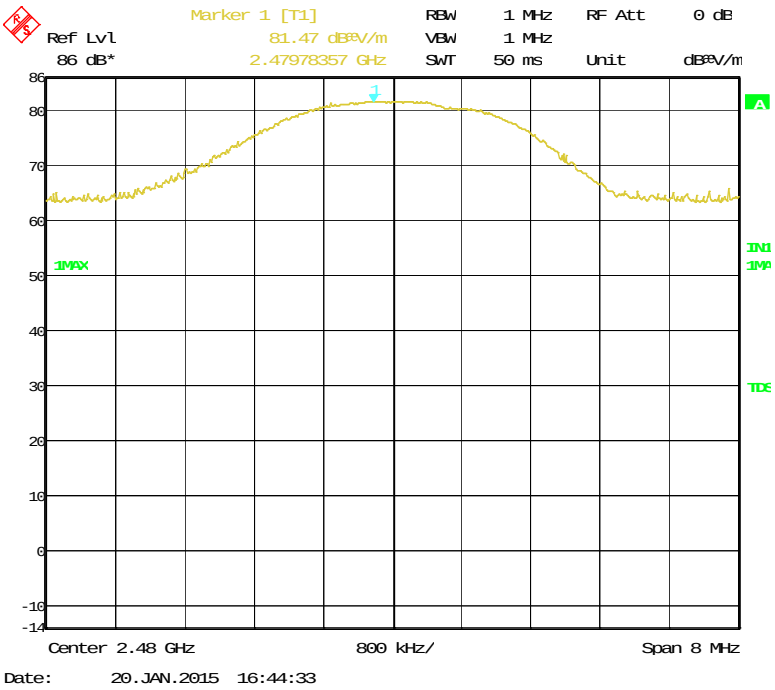

Figure 24 2480.00 MHz – Horizontal, BLE Modulation

8.2 *Results table*

E.U.T. Description: Voice or Smartphone Application Activated Bulb Adapter
Model No.: Vocca Pro
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C Section 15.247(b)

Operation Frequency (MHz)	Modulation	Polarization	Power (dBuV/m)	Power (dBm)	Power (mW)	Specification (mW)	Margin (mW)
Low	BLE	V	84.8	-10.4	0.09	1000	-999.91
Low		H	79.3	-15.9	0.03	1000	-999.97
Mid		V	84.3	-10.9	0.08	1000	-999.92
Mid		H	80.9	-14.3	0.04	1000	-999.96
High		V	84.0	-11.2	0.08	1000	-999.92
High		H	81.5	-13.7	0.04	1000	-999.96

Figure 25 Maximum Peak Power Output

JUDGEMENT: Passed by 999.91 mW

TEST PERSONNEL:

Tester Signature: _____ _ Date: 08.02.15

Typed/Printed Name: M. Zohar

8.3 *Test Equipment Used; Maximum Peak Power Output*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 26 Test Equipment Used

9. Band Edge Spectrum

[In Accordance with section 15.247(c)]

9.1 *Test procedure*

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The E.U.T was evaluated in 2 channels: Low and High and with vertical antenna test polarization as worst case.

The RBW=VBW was set to 100 kHz.

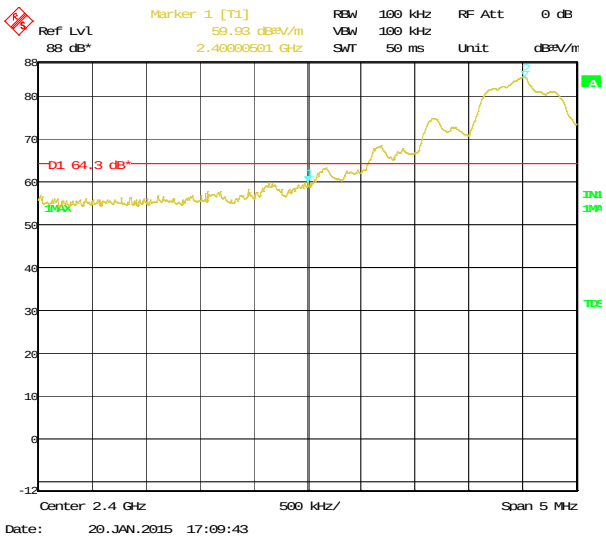

Figure 27 —Lower Band Edge, BLE Modulation

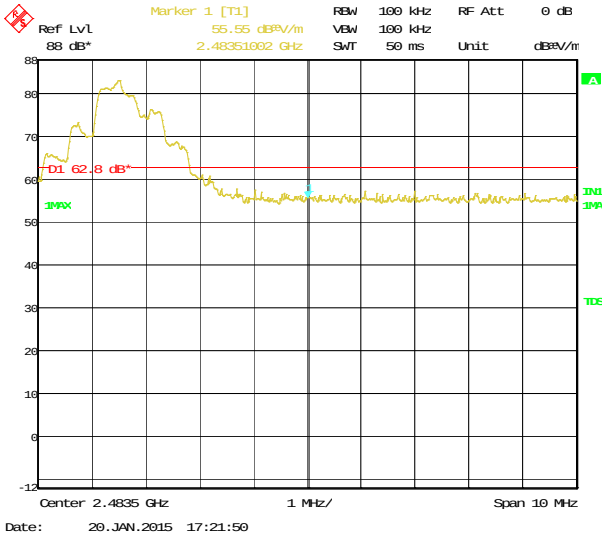

Figure 28 —Upper Band Edge, BLE Modulation

9.2 *Results table*

E.U.T. Description: Voice or Smartphone Application Activated Bulb Adapter
Model No.: Vocca Pro
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Specification (dBm)	Margin (dB)
Low	BLE	2400.0	59.9	64.3	-4.4
High	BLE	2483.5	55.5	62.8	-7.3

Figure 29 Band Edge Spectrum

JUDGEMENT: Passed by 4.4 dB

TEST PERSONNEL:

Tester Signature: _____ Date: 08.02.15

Typed/Printed Name: M. Zohar

9.3 *Test Equipment Used; Band Edge Spectrum*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 30 Test Equipment Used

10. Radiated Emission, 9 kHz – 30 MHz

10.1 *Test Specification*

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

10.2 *Test Procedure*

The E.U.T. operation mode and test set-up are as described in Section 2.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying with CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was operated at the low, mid and high channels using a peak detector.

10.3 *Measured Data*

JUDGEMENT: Passed

No signals were detected in the frequency range of 9 kHz to 30 MHz.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

TEST PERSONNEL:

Tester Signature: _____ Date: 08.02.15

Typed/Printed Name: M. Zohar

10.4 *Test Instrumentation Used, Radiated Measurements*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 31 Test Equipment Used

10.5 *Field Strength Calculation*

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS:	Field Strength [dBμv/m]
RA:	Receiver Amplitude [dBμv]
AF:	Receiving Antenna Correction Factor [dB/m]
CF:	Cable Attenuation Factor [dB]

Example: FS = 30.7 dBμV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBμV

No external pre-amplifiers are used.

11. Spurious Radiated Emission, 30 – 25000 MHz

11.1 *Radiated Emission 30-25000 MHz*

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in *Figure 1*.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.
In the frequency range 1-6.0 GHz, a computerized EMI receiver complying with CISPR 16 requirements was used.
In the frequency range 6.0-25.0 GHz, a spectrum analyzer including a low noise amplifier was used. During average measurements, the IF bandwidth was 1 MHz and the video bandwidth was 100Hz. During peak measurements, the IF bandwidth was 1 MHz and the video bandwidth was 3 MHz.
The test distance was 3 meters.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
Verification of the E.U.T emissions was based on the following methods: turning the E.U.T on and off; using a frequency span less than 10 MHz; observation of the signal level during turntable rotation. (Background noise is not affected by the rotation of the E.U.T.)

The E.U.T. was operated at the low, mid and high channels using a peak detector.

11.2 *Test Data*

JUDGEMENT: Passed by 3.5 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C specification.
No signals were detected in the frequency range of 30 – 1000 MHz.
The details of the highest emissions are given in Figure 32 to Figure 33.

TEST PERSONNEL:
Tester Signature: _____ _ Date: 08.02.15
Typed/Printed Name: A. Sharabi

Radiated Emission

E.U.T Description	Voice or Smartphone Application Activated Bulb Adapter
Type	Vocca Pro
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Peak

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarity (H/V)	Peak Reading (dBµV/m)	Peak. Specification (dB µV/m)	Peak. Margin (dB)
2402.0	BLE	2390.0	H	50.1	74.0	-23.9
2402.0	BLE	2390.0	V	50.8	74.0	-23.2
2402.0	BLE	4804.0	H	59.2	74.0	-14.8
2402.0	BLE	4804.0	V	59.1	74.0	-14.9
2440.0	BLE	4880.0	H	59.2	74.0	-14.8
2440.0	BLE	4880.0	V	59.9	74.0	-14.1
2480.0	BLE	4960.0	H	60.5	74.0	-13.5
2480.0	BLE	4960.0	V	61.3	74.0	-12.7
2480.0	BLE	2483.5	H	50.1	74.0	-23.9
2480.0	BLE	2483.5	V	51.3	74.0	-22.7

Figure 32. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Peak

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Peak Amp" includes correction factor.

* "Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

Radiated Emission

E.U.T Description	Voice or Smartphone Application Activated Bulb Adapter
Type	Vocca Pro
Serial Number:	Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Frequency range: 1.0 GHz to 25.0 GHz
Test Distance: 3 meters
Detector: Average

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarity (H/V)	Average Reading (dBµV/m)	Average Specification (dB µV/m)	Average Margin (dB)
2402.0	BLE	2390.0	H	49.6	54.0	-4.4
2402.0	BLE	2390.0	V	50.1	54.0	-3.9
2402.0	BLE	4804.0	H	48.3	54.0	-5.7
2402.0	BLE	4804.0	V	50.5	54.0	-3.5
2440.0	BLE	4884.0	H	49.2	54.0	-4.8
2440.0	BLE	4884.0	V	49.6	54.0	-4.4
2480.0	BLE	4960.0	H	48.9	54.0	-5.1
2480.0	BLE	4960.0	V	50.2	54.0	-3.8
2480.0	BLE	2483.5	H	43.1	54.0	-10.9
2480.0	BLE	2483.5	V	43.9	54.0	-10.1

Figure 33. Radiated Emission. Antenna Polarization: HORIZONTAL / VERTICAL. Detector: Average

Notes:

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

"Average Amp" includes correction factor.

* Correction Factor = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

11.3 *Test Instrumentation Used, Radiated Measurements Above 1 GHz*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 34 Test Equipment Used

12. Transmitted Power Density

[In accordance with section 15.247(d)]

12.1 *Test procedure*

The E.U.T operation mode and test set-up are as described in Section 2.

See Section 2.1 Justification of the System Test Configuration concerning the E.U.T. orientation for this test.

The E.U.T was tested at the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in *Figure 1*.

The E.U.T was tested in vertical antenna polarity for worst case.

The spectrum analyzer was set to 3 kHz resolution BW and sweep time of 1 second for each 3 kHz "window". The spectrum peaks were located at each of the 3 operating frequencies.

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

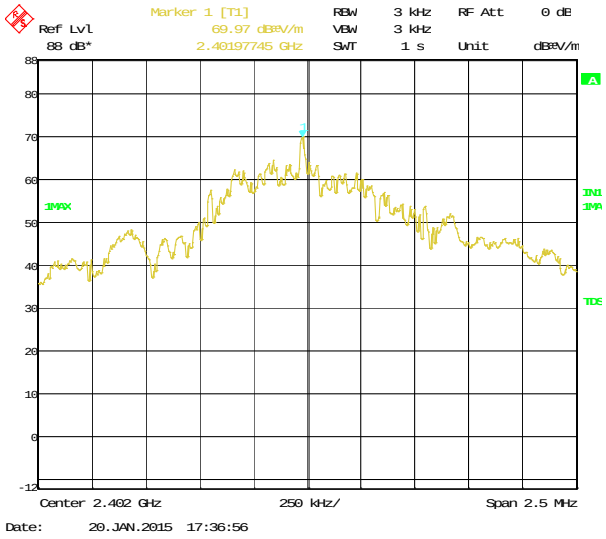

Figure 35 — Low Channel

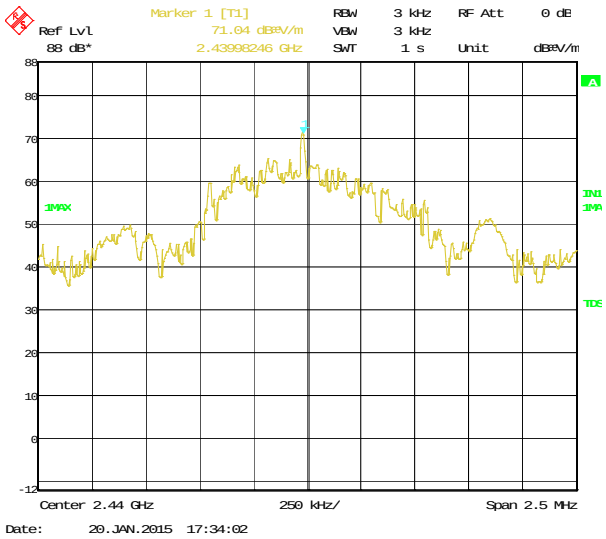

Figure 36 — Mid Channel

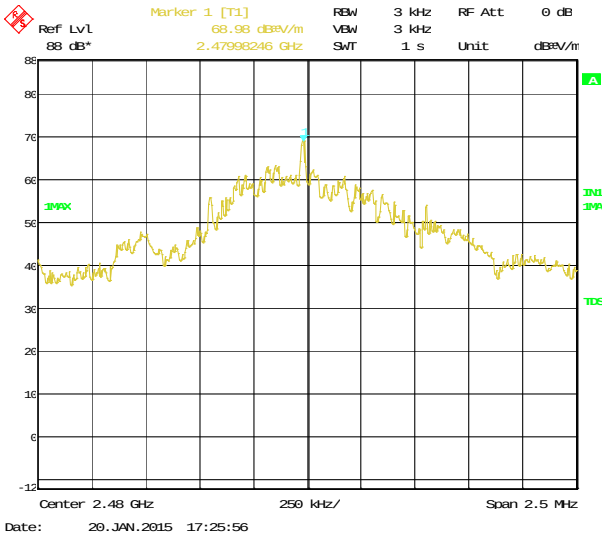

Figure 37 — High Channel

12.2 *Results table*

E.U.T. Description: Voice or Smartphone Application Activated Bulb Adapter
Model No.: Vocca Pro
Serial Number: Not designated
Specification: F.C.C. Part 15, Subpart C (15.247)

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBµV/m)	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
Low	BLE	67.0	-28.2	8.0	-36.2
Mid	BLE	71.0	-24.2	8.0	-32.2
High	BLE	69.0	-26.2	8.0	-34.2

Figure 38 Test Results

JUDGEMENT: Passed by 32.2 dB

TEST PERSONNEL:

Tester Signature: _____  Date: 08.02.15

Typed/Printed Name: M. Zohar

12.3 *Test Equipment Used; Transmitted Power Density*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESBI7	100120	January 1, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Active Loop Antenna	EMCO	6502	9506-2950	November 4, 2014	1 year
Biconilog Antenna	EMCO	3142B	1250	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years
Horn Antenna	ARA	SWH-28	1007	March 30, 2014	3 years
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Antenna Mast	ETS	2070-2	9608-1497	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

Figure 39 Test Equipment Used

13. Antenna Gain/Information

The antenna gain is 2.5 dBi, integral

14. R.F Exposure/Safety

Typical use of the E.U.T. is as a Voice or Smartphone application activated bulb adapter.

The typical placement of the E.U.T. is on a lighting fixture. The typical distance between the E.U.T. and the user in the worst case application, is 5 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310 Requirements

(a) FCC limits at 2402 MHz is:

$$1\frac{mW}{cm^2}$$

Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Transmitted Power 84.8 dBuV/m (Peak) = 0.09mW

G_T- Antenna Gain, 2.5 dBi = testing performed radiated; power results include antenna gain

R- Distance from Transmitter using 5 cm worst case

(c) The peak power density is:

$$S = \frac{(0.09)}{4\pi(5)^2} = 2.86\times10^{-4}\frac{mW}{cm^2}$$

(d) This is below the FCC limit.

15. APPENDIX A - CORRECTION FACTORS

15.1 *Correction factors for CABLE*

from EMI receiver to test antenna at 3 meter range.

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
0.010	0.4	50.00	1.2
0.015	0.2	100.00	0.7
0.020	0.2	150.00	20.1
0.030	0.3	200.00	2.3
0.050	0.3	300.00	2.9
0.075	0.3	500.00	3.8
0.100	0.2	750.00	4.8
0.150	0.2	1000.00	5.4
0.200	0.3	1500.00	6.7
0.500	0.4	2000.00	9.0
1.00	0.4	2500.00	9.4
1.50	0.5	3000.00	9.9
2.00	0.5	3500.00	10.2
5.00	0.6	4000.00	11.2
10.00	0.8	4500.00	12.1
15.00	0.9	5000.00	13.1
20.00	0.8	5500.00	13.5
		6000.00	14.5

NOTES:

1. The cable type is SPUMA400 RF-11N(X2) and 39m long

2. The cable is manufactured by Huber + Suhner

15.2 *Correction factors for CABLE* from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

15.3 *Correction factors for CABLE*

from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

15.4 *Correction factors for* *Bilog ANTENNA*

Model: 3142
Antenna serial number: 1250
3 meter range

FREQUENCY (MHz)	AFE (dB/m)	FREQUENCY (MHz)	AFE (dB/m)
30	18.4	1100	25
40	13.7	1200	24.9
50	9.9	1300	26
60	8.1	1400	26.1
70	7.4	1500	27.1
80	7.2	1600	27.2
90	7.5	1700	28.3
100	8.5	1800	28.1
120	7.8	1900	28.5
140	8.5	2000	28.9
160	10.8		
180	10.4		
200	10.5		
250	12.7		
300	14.3		
400	17		
600	19.6		
700	21.1		
800	21.4		
900	23.5		
1000	24.3		

15.5 *Correction factors for Horn ANTENNA.*

Model: 3115

Antenna serial number: 6142

3 meter range

FREQUENCY (MHz)	Antenna Factor (dB/m)	FREQUENCY (MHz)	Antenna Factor (dB/m)
1000	23.9	10500	38.4
1500	25.4	11000	38.5
2000	27.3	11500	39.4
2500	28.5	12000	39.2
3000	30.4	12500	39.4
3500	31.6	13000	40.7
4000	33	14000	42.1
4500	32.7	15000	40.1
5000	34.1	16000	38.2
5500	34.5	17000	41.7
6000	34.9	17500	45.7
6500	35.1	18000	47.7
7000	35.9		
7500	37.5		
8000	37.6		
8500	38.3		
9000	38.5		
9500	38.1		
10000	38.6		

15.6 *Correction factors for Double-Ridged Waveguide Horn*

Model: 3115, S/N 29845 at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			

15.7 *Correction factors for Horn Antenna*

Model: SWH-28
at 1 meter range.

FREQUENCY (GHz)	AFE (dB /m)	Gain (dB1)
18.0	40.3	16.1
19.0	40.3	16.3
20.0	40.3	16.1
21.0	40.3	16.3
22.0	40.4	16.8
23.0	40.5	16.4
24.0	40.5	16.6
25.0	40.5	16.7
26.0	40.6	16.4

15.8 *Correction factors for ACTIVE LOOP ANTENNA*

Model 6502
S/N 9506-2950

FREQUENCY	Magnetic Antenna Factor	Electric Antenna Factor
(MHz)	(dB)	(dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2