



DATE: 09 June 2015

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

FCC Radio Test Report

for

Verifood Ltd.

Equipment under test:

**Spectrometer for SCiO Molecular
Sensor Kit**

**CP-SCM001
2.4 GHz Bluetooth
(BLE)**

Approved by: _____

M. Zohar

Approved by: _____

D. Shidlowsky

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This report relates only to items tested.



Measurement/Technical Report for Verifood Ltd.

Spectrometer for SCiO Molecular Sensor Kit

CP-SCM001

FCC ID: 2AEKW-CP-SCM001

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
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1. General Information

1.1 Administrative Information

Manufacturer:	Verifood Ltd.
Manufacturer's Address:	P.O.B. 12414 Herzliya, 46733 Israel
Manufacturer's Representative:	Ofer Rachman
Equipment Under Test (E.U.T):	Spectrometer for SCiO Molecular Sensor Kit
Equipment Model No.:	CP-SCM001
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	25.03.2015
Start of Test:	25.03.2015
End of Test:	12.05.2015
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

Low cost hand-held spectrometer, with cloud-based distribution spectrum analysis. It is powered by 3.7V LiPoly USB rechargeable battery. Communication is done via Bluetooth.

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

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

Radiated emission screening was performed in 3 orthogonal orientations. The worst case orientation was the vertical (Y axis) position.

The fundamental results are shown in the below table:

Frequency (GHz)	X axis (dBuV/m)	Y axis (dBuV/m)	Z axis (dBuV/m)
2.441	53.4	56.2	53.1

The E.U.T. was transmitting continuously at the low channel (2402MHz) the middle channel (2441MHz) and the high channel (2480MHz), modulated with one type of modulation: BlueTooth LOW ENERGY.

The E.U.T. was tested connected to a computer which was used as a power source since the battery was weak.

Per FCC Response to Inquiry (Tracking Number 292400) the E.U.T. is not a computer peripheral and operates on a battery.

See customer's Declaration on page 10.

2.2 EUT Exercise Software

No special exercise software was used.

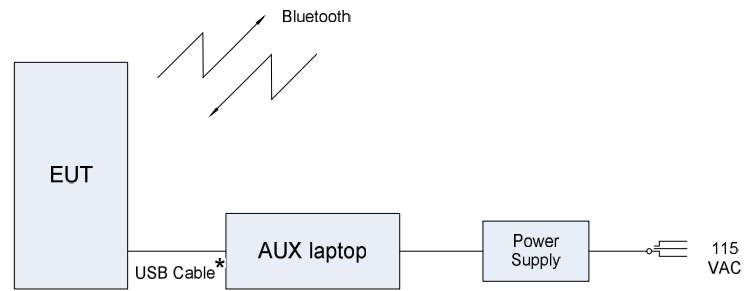
2.3 Special Accessories

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



*Note – USB cable was only used for charging the EUT.

Figure 1. Configuration of Tested System



Date: May 29, 2015

DECLARATION

**I HEREBY DECLARE THAT THERE IS NO COMMUNICATION BETWEEN THE
EUT, SCIO - SPECTROMETER FOR MOLECULAR ANALYSIS KIT AND THE COMPUTER
VIA THE USB CABLE.**

THE USB CABLE IS FOR CHARGING THE EUT ONLY.

**Thank you,
Signature:** _____

**Printed Name: DAMIAN GOLDRING
Title: CTO**

3. Radiated Measurement Test Set-up Photo



Figure 2. Conducted Emission From AC Mains Test



Figure 3. Radiated Emission Test



Figure 4. Radiated Emission Test



Figure 5. Radiated Emission Test

5. Conducted Emission From AC Mains

5.1 Test Specification

0.15 - 30 MHz, FCC Part 15, Subpart C, Section 15.207

5.2 Test Procedure

The E.U.T operation mode and test configuration are as described in Section 2. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room (see Section 3), with the E.U.T placed on a 0.4 meter high wooden table. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 μ Hn 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.'s 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 effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in the photograph, *Figure 2. Conducted Emission From AC Mains Test.*

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are pre-loaded to the receiver 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, using peak detection.

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

5.3 Test Results

The E.U.T met the requirements of the FCC Part 15, Subpart C, Section 15.207 specification.

The margin between the emission levels and the specification limit is, in the worst case, 11.31 dB for the phase line at 2.654 MHz and 15.68 dB at 2.694 MHz for the neutral line.

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



Conducted Emission

E.U.T Description Spectrometer for SCiO Molecular Sensor Kit
Type CP-SCM001
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.207
Lead: Phase
Detectors: Peak, Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)				
Trace1:		CE22BQP		
Trace2:		CE22BAP		
Trace3:		---		
	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	158 kHz	39.09	-26.47
1	Quasi Peak	210 kHz	40.00	-23.20
2	Average	210 kHz	29.67	-23.53
1	Quasi Peak	422 kHz	36.58	-20.82
2	Average	770 kHz	26.85	-19.14
2	Average	910 kHz	27.00	-18.99
2	Average	974 kHz	28.27	-17.72
1	Quasi Peak	986 kHz	35.58	-20.41
1	Quasi Peak	1.91 MHz	35.48	-20.51
2	Average	1.982 MHz	30.41	-15.58
2	Average	2.654 MHz	34.68	-11.31
1	Quasi Peak	2.79 MHz	39.73	-16.26
2	Average	5.63 MHz	31.33	-18.66
1	Quasi Peak	5.674 MHz	36.70	-23.29
1	Quasi Peak	8.674 MHz	36.65	-23.34
2	Average	8.746 MHz	31.37	-18.62
2	Average	11.562 MHz	28.25	-21.74
1	Quasi Peak	11.702 MHz	33.45	-26.54
2	Average	20.714 MHz	27.33	-22.66
1	Quasi Peak	20.754 MHz	32.71	-27.28

Date: 12.MAY.2015 16:25:20

Figure 6. Detectors: Peak, Quasi-peak, Average

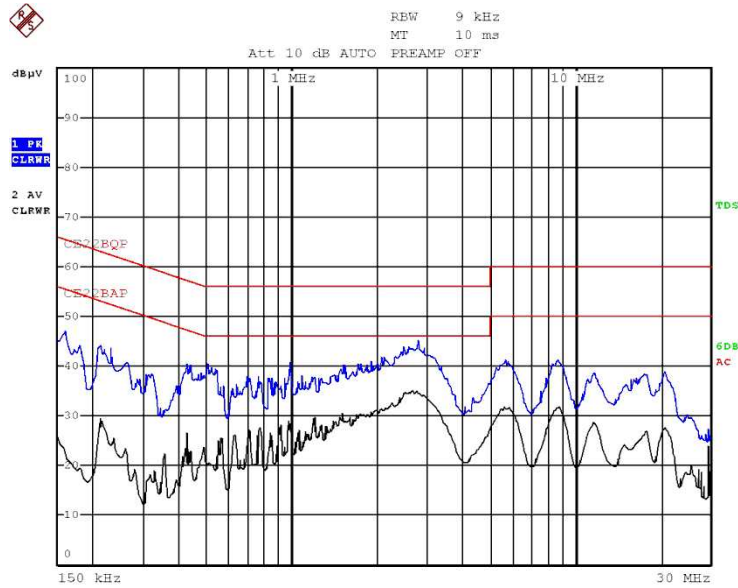
Note: DELTA LIMIT refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.



Conducted Emission

E.U.T Description Spectrometer for SCiO Molecular Sensor Kit
Type CP-SCM001
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.207
Lead: Phase
Detectors: Peak, Quasi-peak, Average



Date: 12.MAY.2015 16:23:53

Figure 7. Detectors: Peak, Quasi-peak, Average



Conducted Emission

E.U.T Description Spectrometer for SCiO Molecular Sensor Kit
Type CP-SCM001
Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.207
Lead: Neutral
Detectors: Peak, Quasi-peak, Average

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE22BQP			
Trace2:	CE22BAP			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBuV	DELTA LIMIT dB	
1 Quasi Peak	218 kHz	44.92	-17.97	
2 Average	218 kHz	30.06	-22.83	
1 Quasi Peak	262 kHz	41.80	-19.56	
2 Average	414 kHz	27.17	-20.39	
1 Quasi Peak	538 kHz	34.82	-21.17	
2 Average	550 kHz	26.62	-19.38	
2 Average	902 kHz	25.81	-20.18	
1 Quasi Peak	986 kHz	27.79	-28.20	
2 Average	2.098 MHz	26.83	-19.16	
1 Quasi Peak	2.11 MHz	32.28	-23.71	
2 Average	2.694 MHz	30.31	-15.68	
1 Quasi Peak	2.878 MHz	35.39	-20.60	
1 Quasi Peak	5.69 MHz	36.64	-23.36	
2 Average	5.742 MHz	31.59	-18.40	
1 Quasi Peak	8.682 MHz	36.63	-23.36	
2 Average	8.77 MHz	31.53	-18.46	
2 Average	11.654 MHz	28.69	-21.30	
1 Quasi Peak	11.762 MHz	34.05	-25.94	
1 Quasi Peak	20.646 MHz	33.71	-26.28	
2 Average	20.682 MHz	27.88	-22.11	

Date: 12.MAY.2015 16:30:21

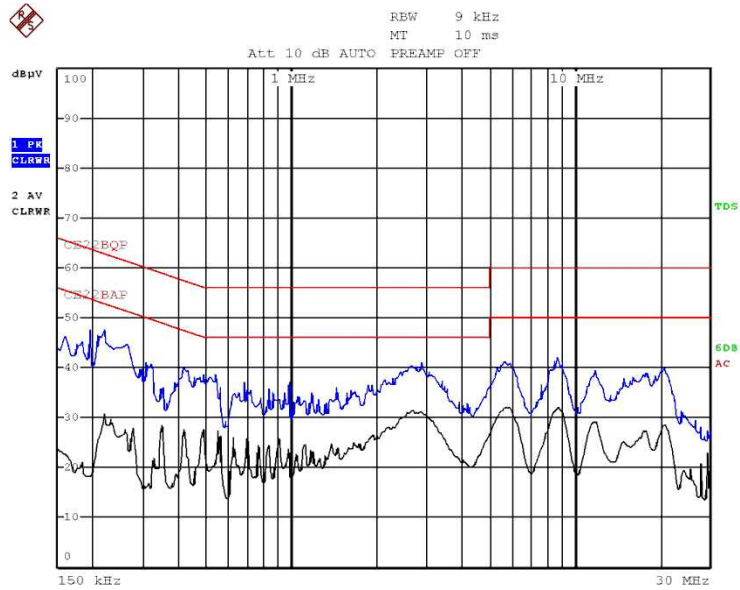
Figure 8. Detectors: Peak, Quasi-peak, Average

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 Spectrometer for SCiO Molecular Sensor Kit
 Type CP-SCM001
 Serial Number: Not designated

Specification: FCC Part 15, Subpart C, Section 15.207
 Lead: Neutral
 Detectors: Peak, Quasi-peak, Average



Date: 12.MAY.2015 16:29:06

Figure 9 Detectors: Peak, Quasi-peak, Average



5.1 Test Equipment Used; Conducted Emissions from AC Mains

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 16, 2015	1 year
Transient Limiter	HP	11947A	3107A03041	May 13, 2015	1 year
EMI Receiver	Rohde & Schwarz	ESCI7	100724	January 4, 2015	1 year

Figure 10 Test Equipment Used

6. 6 dB Minimum Bandwidth

6.1 Test Specification

F.C.C. Part 15, Subpart C, Section 247(a)(2)

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

6.3 Test Results

Operation Frequency (MHz)	Modulation	Reading (KHz)	Specification (KHz)
Low	BLE	701.4	>500
Mid	BLE	701.4	>500
High	BLE	729.5	>500

Figure 11 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 12 to Figure 14*.

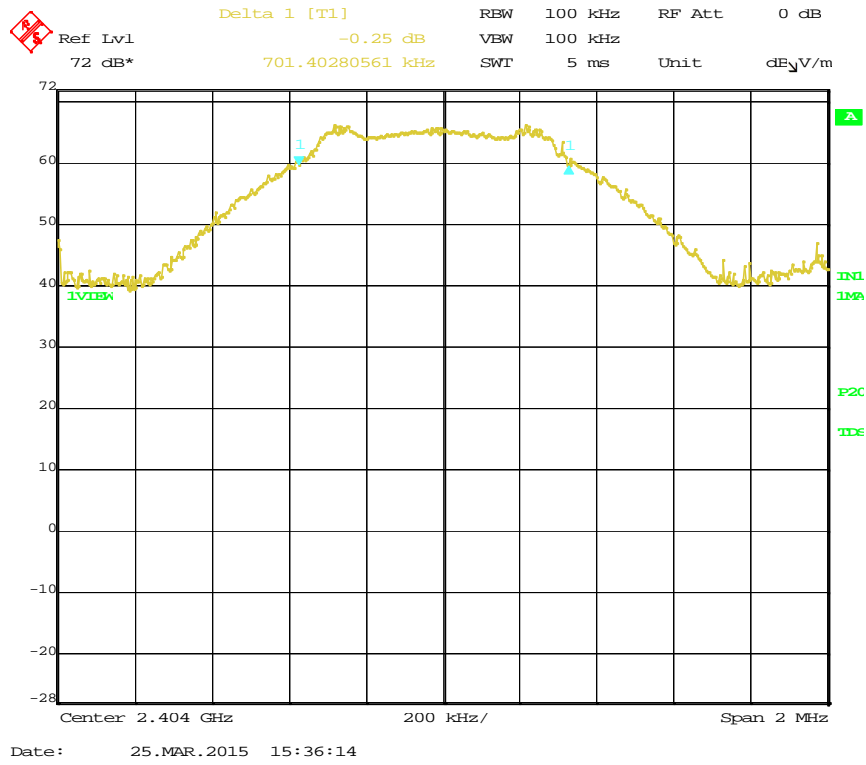


Figure 12. Low Channel, BLE Modulation

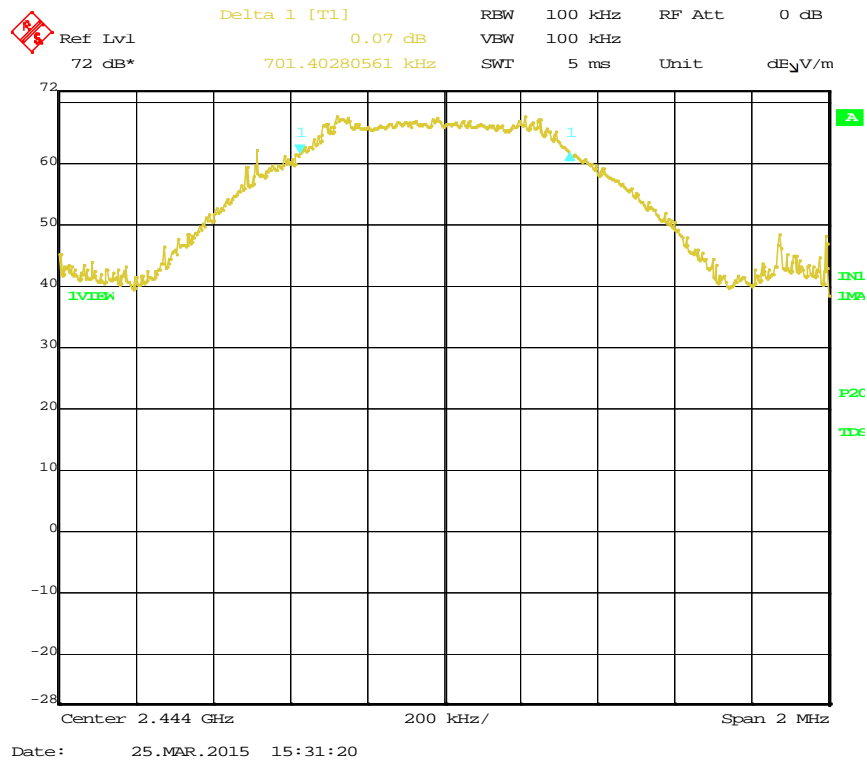


Figure 13. Mid Channel, BLE Modulation

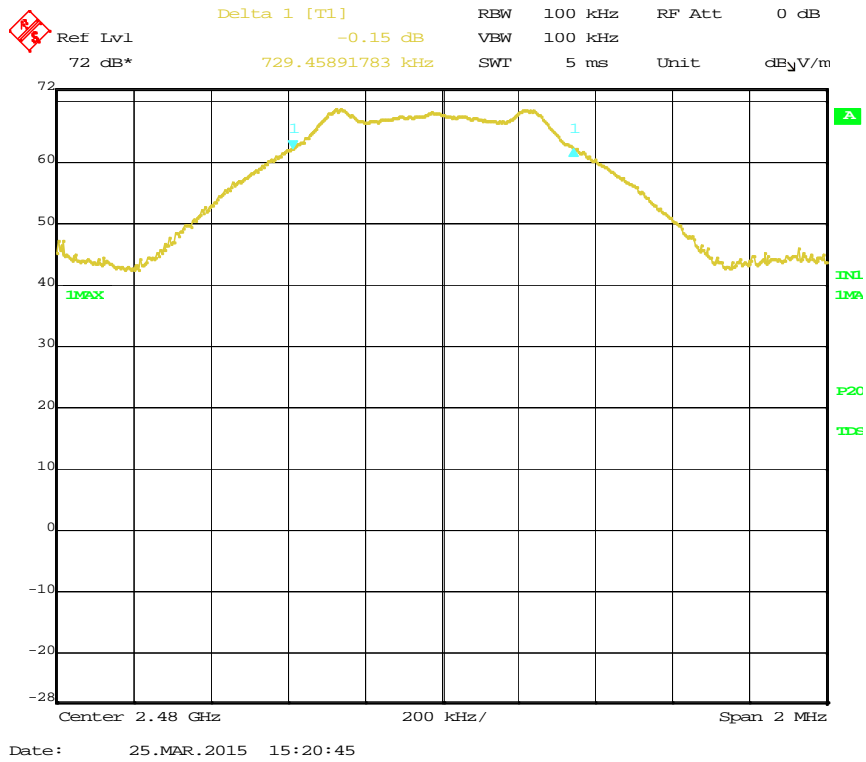


Figure 14. High Channel, BLE Modulation



6.4 Test Equipment Used; 6dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 15, 2014	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	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	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

*Note – Extended to May 19, 2015

Figure 15 Test Equipment Used

7. Maximum Transmitted Peak Power Output

7.1 Specification

F.C.C. Part 15, Subpart C Section 15.247(b)(3)

7.2 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:

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

E - Field Strength (V/m)

d – Distance from transmitter (m)

G – Antenna gain

P – Peak power (W)



7.1 Test Results

Operation Frequency (MHz)	Modulation	Pol	Field (dBuV/m)	Power (dBm)	Power (mW)	Specification (mW)	Margin (mW)
Low	BLE	V	69.8	-25.4	0.003	1000	-999.997
Low		H	72.1	-23.1	0.005	1000	-999.995
Mid		V	69.9	-25.3	0.003	1000	-999.997
Mid		H	71.0	-24.2	0.004	1000	-999.996
High		V	69.7	-25.5	0.003	1000	-999.997
High		H	71.5	-23.7	0.004	1000	-999.996

Figure 16 Maximum Peak Power Output

JUDGEMENT: Passed by 0.999995 W

For additional information see Figure 17 to Figure 22.

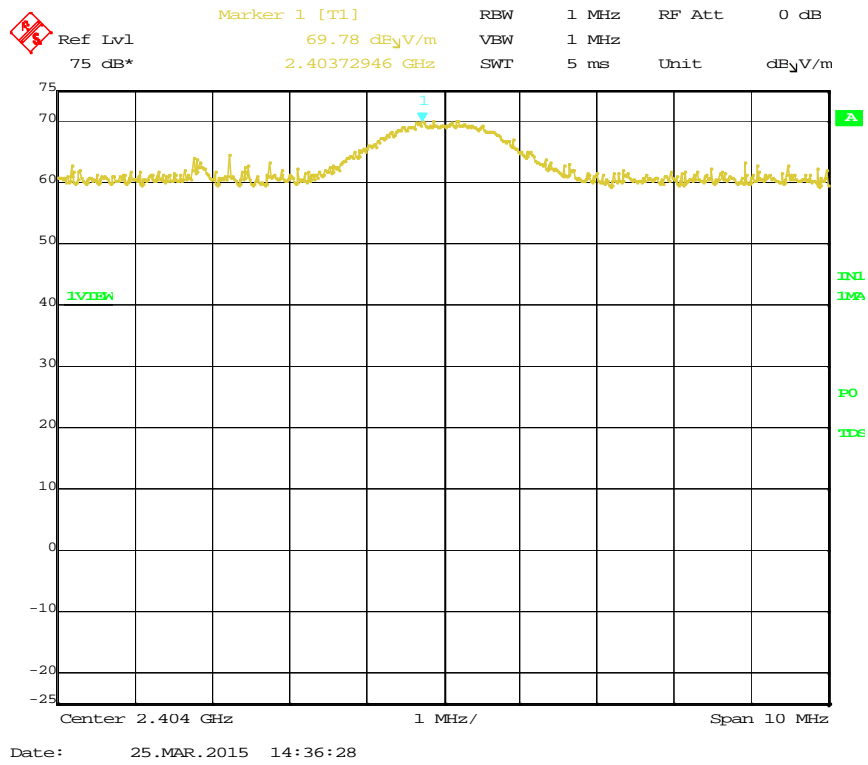


Figure 17 2404.00 MHz – Vertical, BLE Modulation

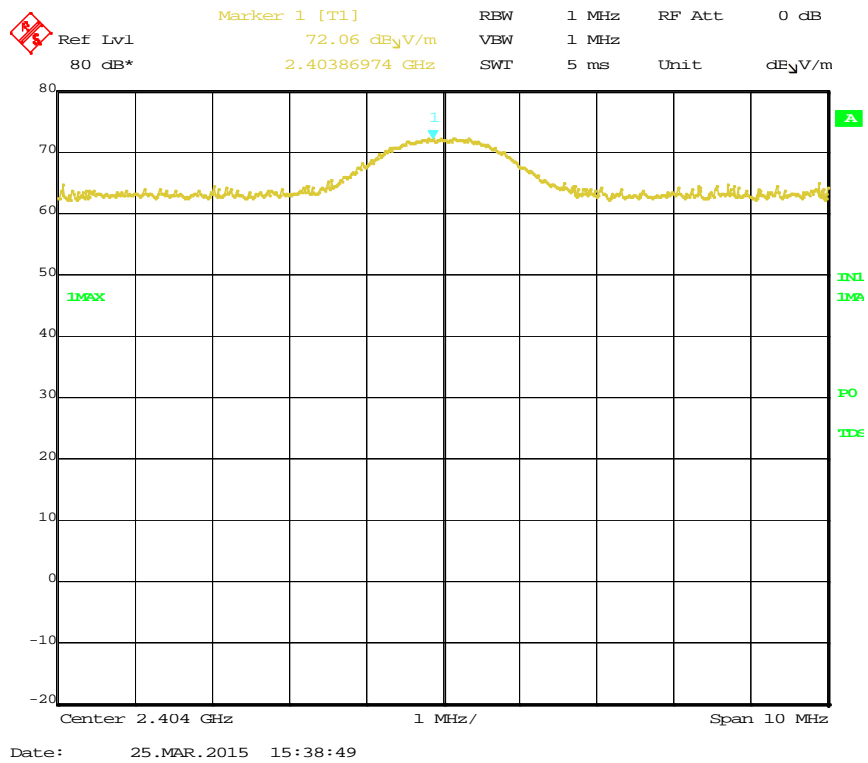


Figure 18 2404.00 MHz – Horizontal, BLE Modulation

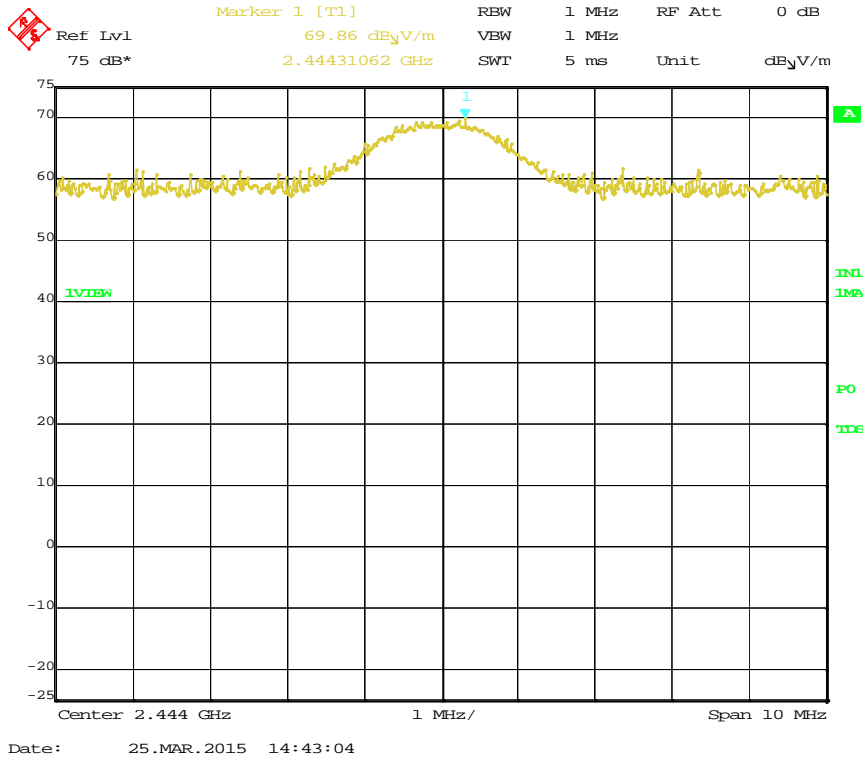


Figure 19 2444.00 MHz – Vertical, BLE Modulation

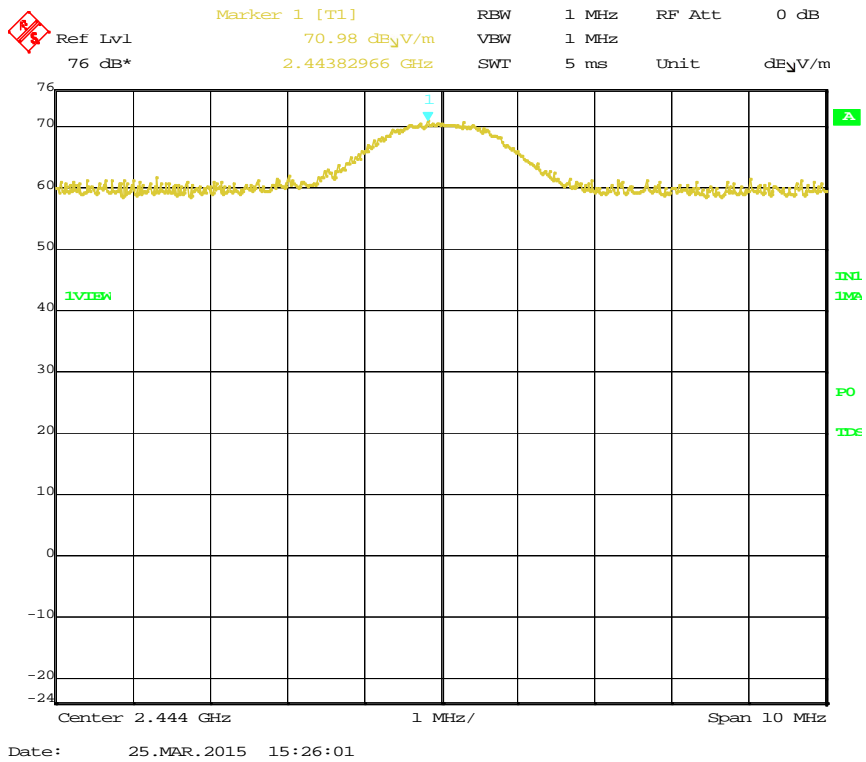


Figure 20 2444.00 MHz – Horizontal, BLE Modulation

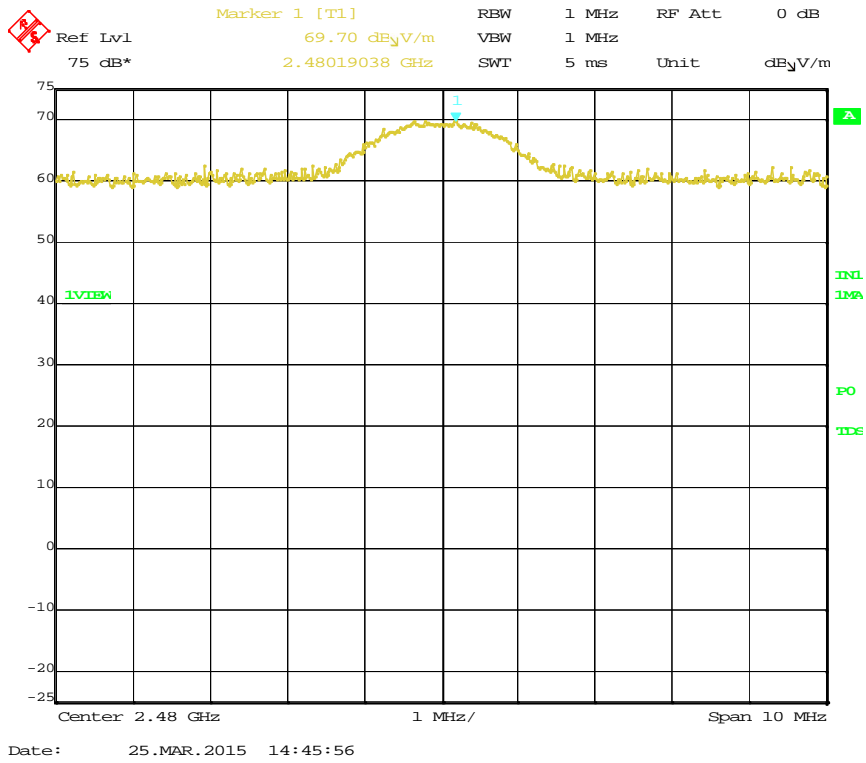


Figure 21 2480.00 MHz – Vertical, BLE Modulation

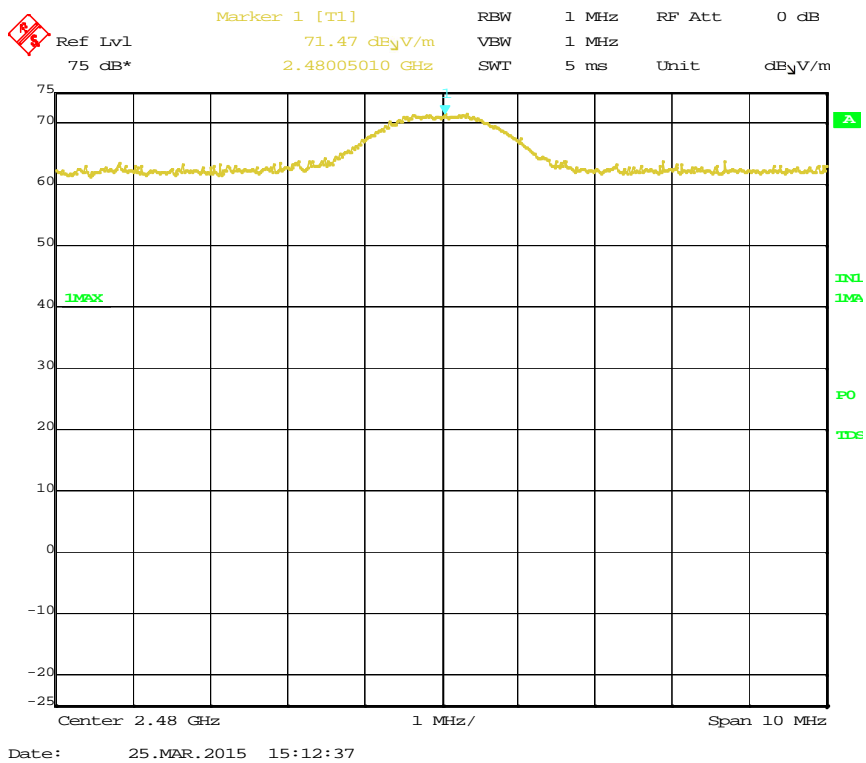


Figure 22 2480.00 MHz – Horizontal, BLE Modulation



7.2 Test Equipment Used; Maximum Peak Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 15, 2014	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	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	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

*Note – Extended to May 19, 2015

Figure 23 Test Equipment Used

8. Band Edge Spectrum

8.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

8.2 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 horizontal test antenna polarization as worst case for emission.

The RBW=VBW was set to 100 kHz.

8.3 Test Results

Operation Frequency (MHz)	Modulation	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Specification (dBm)	Margin (dB)
Low	BLE	2400.0	39.1	48.3	-9.2
High	BLE	2483.5	43.2	48.0	-4.8

Figure 24 Band Edge Spectrum

JUDGEMENT: Passed by 4.8 dB

For additional information see *Figure 25* to *Figure 26*.

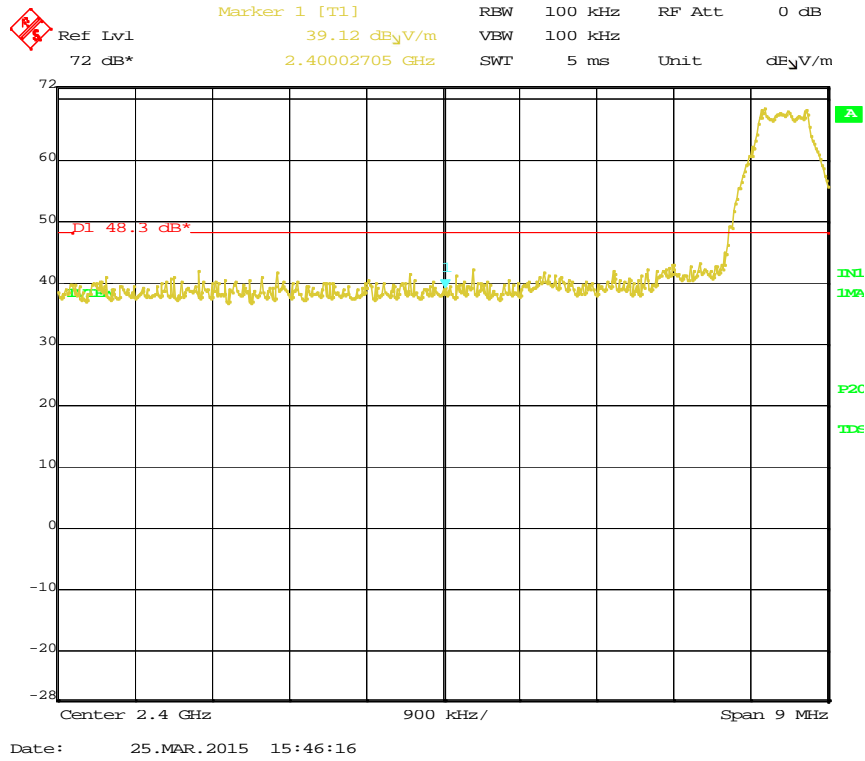


Figure 25 —Lower Band Edge, BLE Modulation

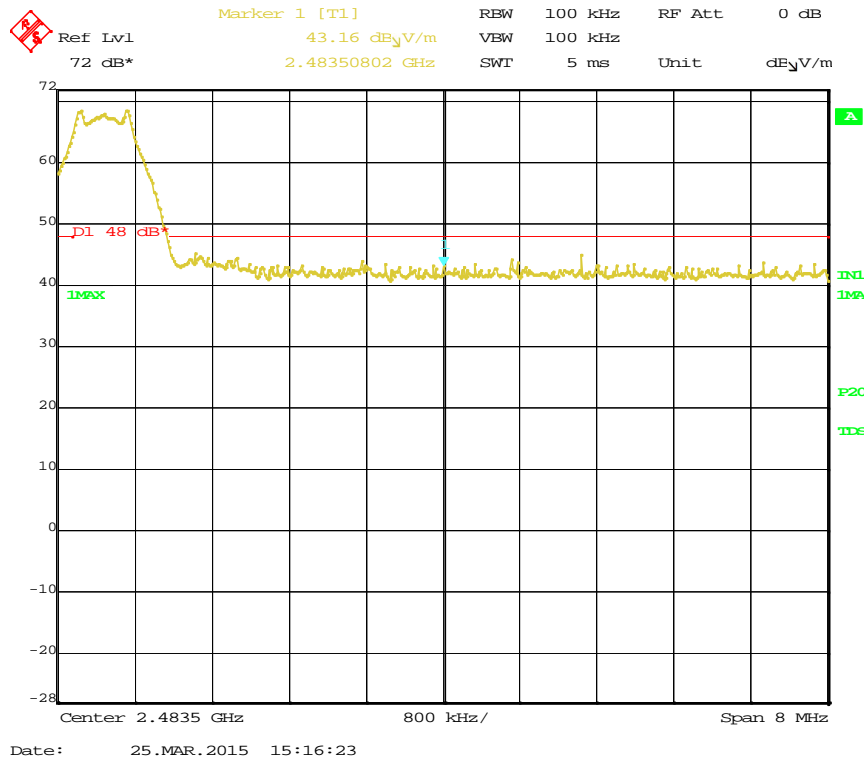


Figure 26 —Upper Band Edge, BLE Modulation



8.4 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 15, 2014	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	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	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

*Note – Extended to May 19, 2015

Figure 27 Test Equipment Used

9. Radiated Emission, 9 kHz – 30 MHz

9.1 Test Specification

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

9.2 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 2.1.

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.

9.3 Test Results

No signals were detected in the frequency range.

JUDGEMENT: Passed

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

9.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 15, 2014	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	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	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

*Note – Extended to May 19, 2015

Figure 28 Test Equipment Used



9.5 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 [dB μ v/m]
- RA: Receiver Amplitude [dB μ v]
- AF: Receiving Antenna Correction Factor [dB/m]
- CF: Cable Attenuation Factor [dB]

Example: $FS = 30.7 \text{ dB}\mu\text{V (RA)} + 14.0 \text{ dB (AF)} + 0.9 \text{ dB (CF)} = 45.6 \text{ dB}\mu\text{V}$

No external pre-amplifiers are used.

10. Spurious Radiated Emission, 30 – 25000 MHz

10.1 Test Specification

FCC, Part 15, Subpart C, Sections 15.247, 15.209

10.2 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.

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 30-6000 MHz, a computerized EMI receiver complying with CISPR 16 requirements was used with resolutions bandwidth 100kHz/1MHz respectively.

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.



10.3 Test Results

JUDGEMENT: Passed by 2.4 dB

No signals were detected in the frequency range of 30-1000MHz.

For the operation frequency of 2404 MHz, the margin between the emission level and the specification limit is in the worst case 3.3 dB at the frequency of 4808.0 MHz, vertical polarization.

For the operation frequency of 2442 MHz, the margin between the emission level and the specification limit is in the worst case 2.9 dB at the frequency of 4884.0 MHz, horizontal polarization.

For the operation frequency of 2480 MHz, the margin between the emission level and the specification limit is in the worst case 2.4 dB at the frequency of 4960.0 MHz, horizontal polarization.

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

The details of the highest emissions are given in *Figure 29* to *Figure 30*.



Radiated Emission

E.U.T Description Spectrometer for SCiO
Molecular Sensor Kit
Type CP-SCM001
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 (dB μ V/m)	Peak Specification (dB μ V/m)	Peak Margin (dB)
2404.0	BLE	2390.0	H	49.9	74.0	-24.1
2404.0	BLE	2390.0	V	50.6	74.0	-23.4
2404.0	BLE	4808.0	H	60.1	74.0	-13.9
2404.0	BLE	4808.0	V	59.9	74.0	-14.1
2442.0	BLE	4884.0	H	58.7	74.0	-15.3
2442.0	BLE	4884.0	V	58.2	74.0	-15.8
2480.0	BLE	4960.0	H	60.6	74.0	-13.4
2480.0	BLE	4960.0	V	60.9	74.0	-13.1
2480.0	BLE	2483.5	H	52.6	74.0	-21.4
2480.0	BLE	2483.5	V	51.9	74.0	-22.1

**Figure 29. 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 Spectrometer for SCiO
Molecular Sensor Kit
Type CP-SCM001
Serial Number: Not designated

Specification: FCC, Part 15, Subpart C

Antenna Polarization: Horizontal/Vertical
Test Distance: 3 meters

Frequency range: 1.0 GHz to 25.0 GHz
Detector: Average

Operation Frequency (MHz)	Modulation	Freq. (MHz)	Polarit (H/V)	Average Reading (dBμV/m)	Average Specification (dB μV/m)	Average Margin (dB)
2404.0	BLE	2390.0	H	41.9	54.0	-12.1
2404.0	BLE	2390.0	V	42.1	54.0	-11.9
2404.0	BLE	4808.0	H	50.3	54.0	-3.7
2404.0	BLE	4808.0	V	50.7	54.0	-3.3
2442.0	BLE	4884.0	H	51.1	54.0	-2.9
2442.0	BLE	4884.0	V	50.7	54.0	-3.3
2480.0	BLE	4960.0	H	51.6	54.0	-2.4
2480.0	BLE	4960.0	V	51.1	54.0	-2.9
2480.0	BLE	2483.5	H	44.6	54.0	-9.4
2480.0	BLE	2483.5	V	44.3	54.0	-9.7

**Figure 30. 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



10.4 Test Instrumentation Used, Radiated Measurements Above 1 GHz

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 15, 2014	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	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	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

*Note – Extended to May 19, 2015

Figure 31 Test Equipment Used

11. Transmitted Power Density

11.1 Test Specification

FCC, Part 15, Subpart C, Section 247(e)

11.2 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 horizontal test antenna polarity for worst case.

The spectrum analyzer was set to 3 kHz resolution BW. The spectrum peaks were located at each of the 3 operating frequencies.

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

11.3 Test Results

Operation Frequency (MHz)	Modulation	Reading Spectrum Analyzer (dBµV/m)	Reading Spectrum Analyzer (dBm)	Specification (dBm)	Margin (dB)
Low	BLE	57.3	-37.9	8.0	-29.9
Mid	BLE	56.8	-38.4	8.0	-30.4
High	BLE	56.2	-39.8	8.0	-31.8

Figure 32 Test Results

JUDGEMENT: Passed by 29.9 dB

For additional information see *Figure 33* to *Figure 35*.

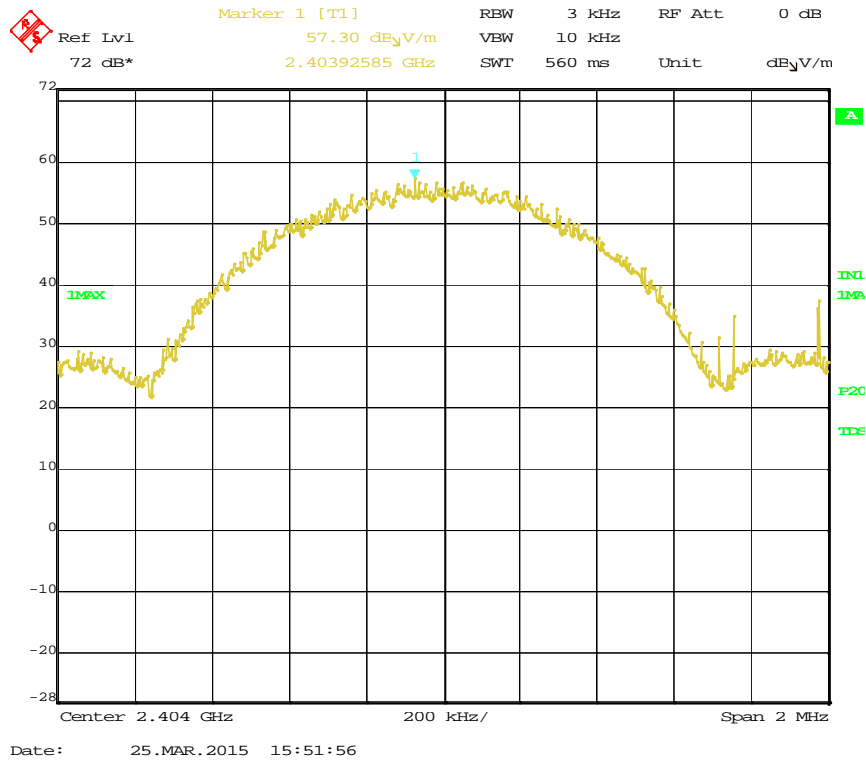


Figure 33 — Low Channel, Horizontal

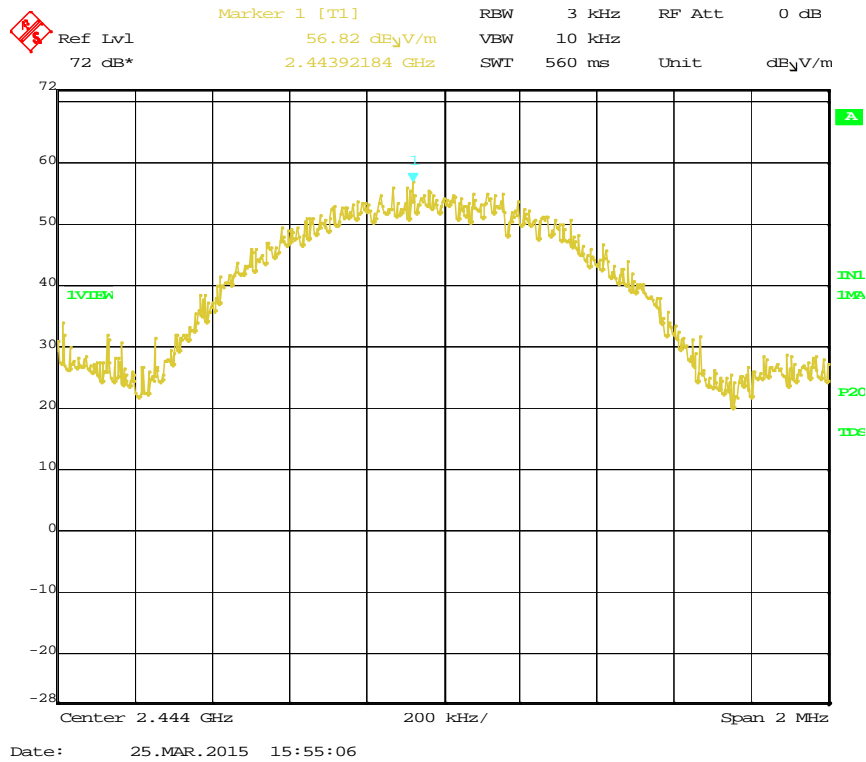


Figure 34 — Mid Channel, Horizontal

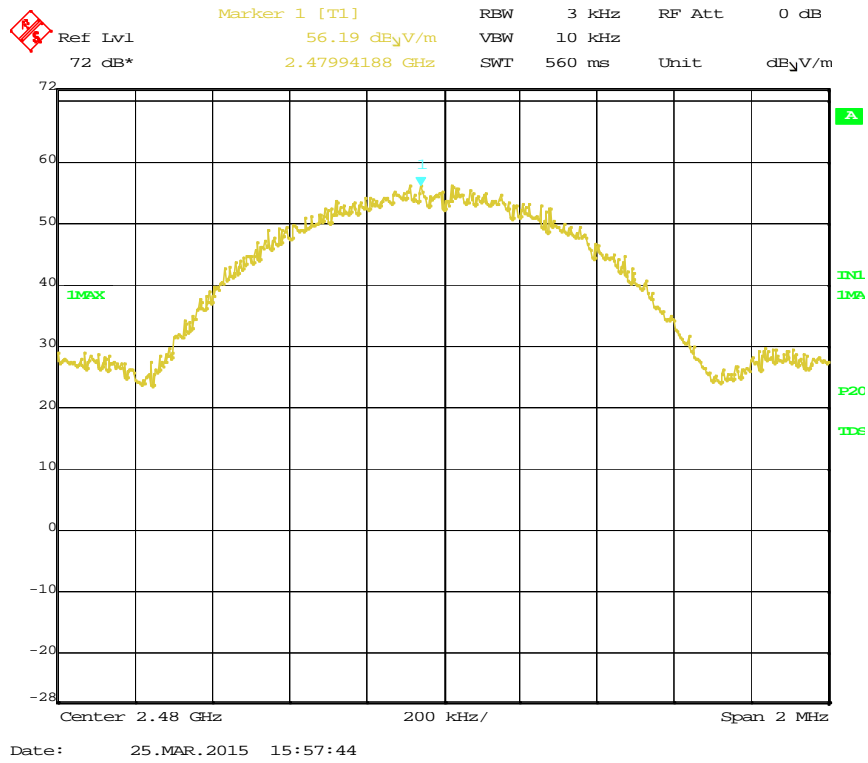


Figure 35 — High Channel, Horizontal



11.4 Test Equipment Used; Transmitted Power Density

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	R&S	ESIB7	100120	December 15, 2014	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	March 4, 2015	1 year
Spectrum Analyzer	HP	8564E	3442A00275	March 11, 2015	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 36 Test Equipment Used



12. Antenna Gain/Information

The antenna gain is -5 dBi, integral.

13. R.F Exposure/Safety

Typical use of the E.U.T. is as a hand held spectrometer.

The typical distance between the E.U.T. and the user in the worst case application, is 3 mm = 0.3 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on Section 1.1310 Requirements

(a) FCC limits at 2404 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

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

P_t - Transmitted Power 72.1 dBuV/m (Peak) = 0.005 mW

G_t - Antenna Gain, -5.0 dBi = testing performed radiated; power results include antenna gain

R - Distance from Transmitter using 0.3cm worst case

(c) The peak power density is:

$$S = \frac{(0.005)}{4f(0.3)^2} = 0.0044 \frac{mW}{cm^2}$$

(d) This is below the FCC limit.

14. APPENDIX A - CORRECTION FACTORS

14.1 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



14.2 Correction factors for CABLE
from spectrum analyzer
to test antenna above 6 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. Manufactured by Huber Zoner.*
- 2. The cable is used for measurements above 6 GHz.*
- 3. The overall length of the cable is 10 meters.*



14.4 Correction factors for

Bilog ANTENNA

Model: 3142

Antenna serial number: 1250

3 meter range

FREQUENCY	APE	FREQUENCY	APE
(MHz)	(dB/m)	(MHz)	(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		



14.5 Correction factors for Horn ANTENNA.

Model: 3115

Antenna serial number: 6142

3 meter range

FREQUENCY	Antenna Factor	FREQUENCY	Antenna Factor
(MHz)	(dB/m)	(MHz)	(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		



14.6 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



14.7 Correction factors for ACTIVE LOOP ANTENNA
Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (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