



# FCC PART 15 SUBPART C



## TEST AND MEASUREMENT REPORT

For

### Glooko, Inc.

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Palo Alto, CA 94301, USA

**FCC ID: 2ACSCGMB**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Bluetooth Low Energy Cable
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<b>Report Number:</b> R1407092-247	
<b>Report Date:</b> 2014-08-12	
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA\*, NIST, or any agency of the Federal Government.

\* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “\*”

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### DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1407092-247	Original Report	2014-08-12

## 1 General Description

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### 1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Glooko Inc.*, and their product model: *Glooko MeterSync Blue*, FCC ID: 2ACSCGMB, which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a Bluetooth Low Energy Cable.

### 1.2 Mechanical Description of EUT

The EUT measures approximately 3.7 cm (L) x 3.0 cm (W) x 1.4 cm (H) and weighs 14(g).

*The test data gathered are from typical production sample, serial number: #269addb BR9600 assigned by Client.*

### 1.3 Objective

This report is prepared on behalf of *Glooko Inc.* in accordance with Part 2, Subpart J, and Part 15C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15.247 for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

### 1.4 Related Submittal(s)/Grant(s)

N/A

### 1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz, ANSI C63.10-2009, American National Standard for Testing Unlicensed Wireless Devices and FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

### 1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The following calculation follows the procedures as set forth in clause 7.2.3, ETSI TR 100 028-1 V1.4.1 (2001-12), the expression of Uncertainty in Radiated RF Testing is in accordance to ISO/IEC 17025 and TR 100 028-1 V1.4.1 (2001-12).

The expanded Measurement Uncertainty value having a confidence factor of 95%, is within a range of 5.48 dB.

This means that the value of conducted RF carrier power test will be within +/- 2.74 dB of the measuring radiated emissions power versus the expected value.

The expected value is defined as the power at the antenna of the Transmitter under Test.

## 1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:

1- An independent Commercial Test Laboratory accredited to **ISO 17025: 2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminaires and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC (Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65: 1996** by **A2LA** to certify:

1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.

2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.

3. Radio Communication Equipment for Singapore.

4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.

5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).

6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s), Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

<http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b>

## 2 System Test Configuration

### 2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009 and FCC KDB 558074 D01 DTS Meas Guidance v03r02.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

### 2.2 EUT Exercise Software

The software is provided by customer. The EUT exercise program used during testing was designed to exercise the system components.

### 2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

### 2.4 Equipment Modifications

No modifications were made to the EUT.

### 2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Bayer Health Care LLC	Compatible blood glucose meter	Contour	3912112

### 2.6 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
Glooko	PCB board	Glooko MeterSync Blue	#269addb BR9600

### 2.7 Interface Ports and Cables

Cable Description	Length (m)	To	From
RF Cable	<1.0	PSA	EUT
Audio Cable	<1.0	EUT	Compatible blood glucose meter

### 3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Results
§15.247(i), §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	N/A <sup>Note 1</sup>
§15.247(d)	Spurious Emissions at Antenna Port	Compliant
§15.205	Restricted Bands	Compliant
§15.209, §15.247(d)	Radiated Spurious Emissions	Compliant
§15.247(a)(2)	6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	Maximum Peak Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

Note 1: This device is battery powered.



## 4 FCC §15.247 (i) & §2.1093 – RF Exposure

### 4.1 Applicable Standards

According to FCC §15.247(i), §2.1093

### 4.2 SAR Exemption Guidelines

According to FCC KDB 447498, § 4.3.1

- 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances*  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{(GHz)}}}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR,<sup>25</sup> where

- $f_{\text{(GHz)}}$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation<sup>26</sup>
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum *test separation distance* is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

### 4.3 Evaluation Result

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{(GHz)}}}] = (0.28/5) \cdot (\sqrt{2.402}) = 0.09 < 3$  for FCC.

So SAR evaluation is not required.

## 5 FCC §15.203 – Antenna Requirements

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### 5.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 5.2 Antenna List

Antenna Type/Pattern	Antenna Gain (dBi) @ 2.4 GHz
Internal	0

The EUT consists of internal antenna with less 6 dBi gain; therefore, it complies with the antenna requirement.

## 6 FCC §2.1051 & §15.247(d) – Spurious Emissions at Antenna Terminals

### 6.1 Applicable Standards

For FCC §15.247(d) in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Requirements: CFR 47, §2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1057.

### 6.2 Measurement Procedure

The measurements are base on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11: Emissions in non-restricted frequency bands and section 12: Emissions in restricted frequency bands.

### 6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-10-22	1 year

*Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

### 6.4 Test Environmental Conditions

Temperature:	23 ° C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

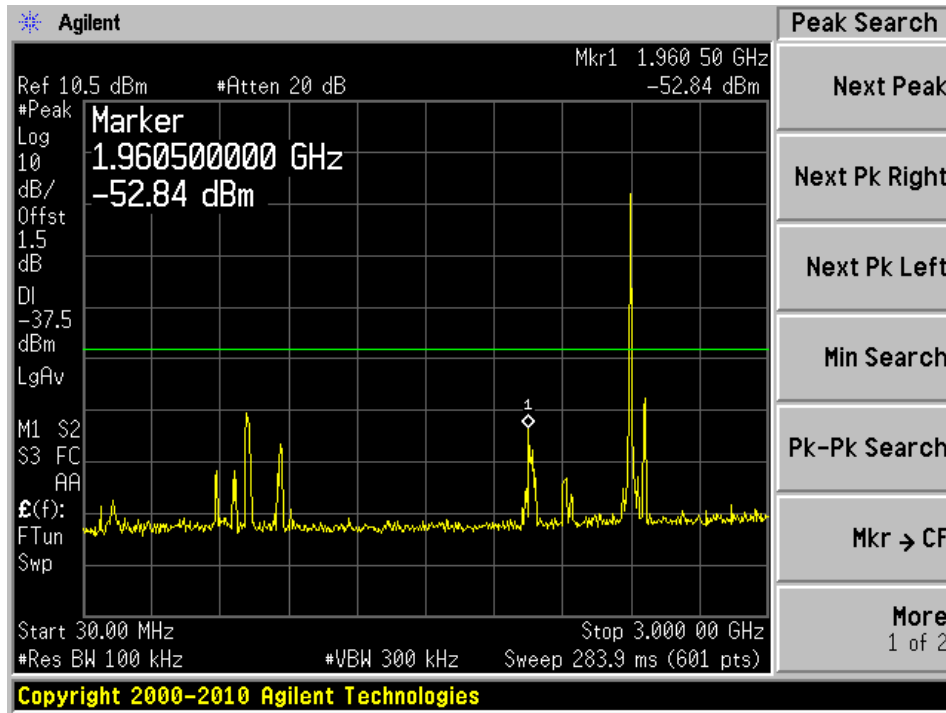
*The testing was performed by Cipher Chu on 2014-07-28 at RF site.*

### 6.5 Test Results

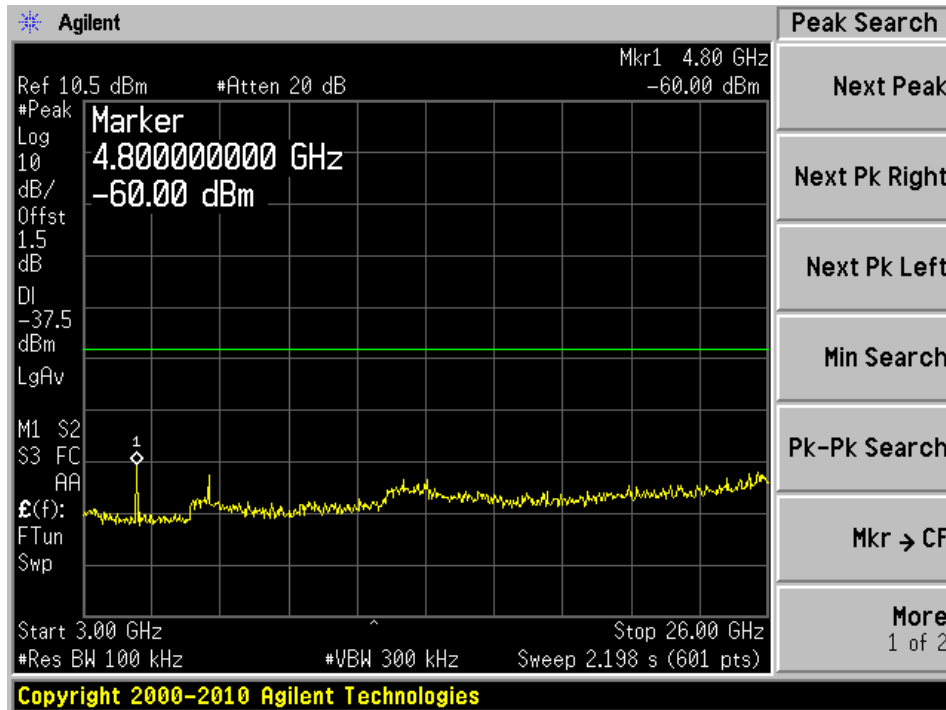
Please refer to following plots of spurious emissions.

### Low Channel, 2402 MHz

30 MHz – 3 GHz

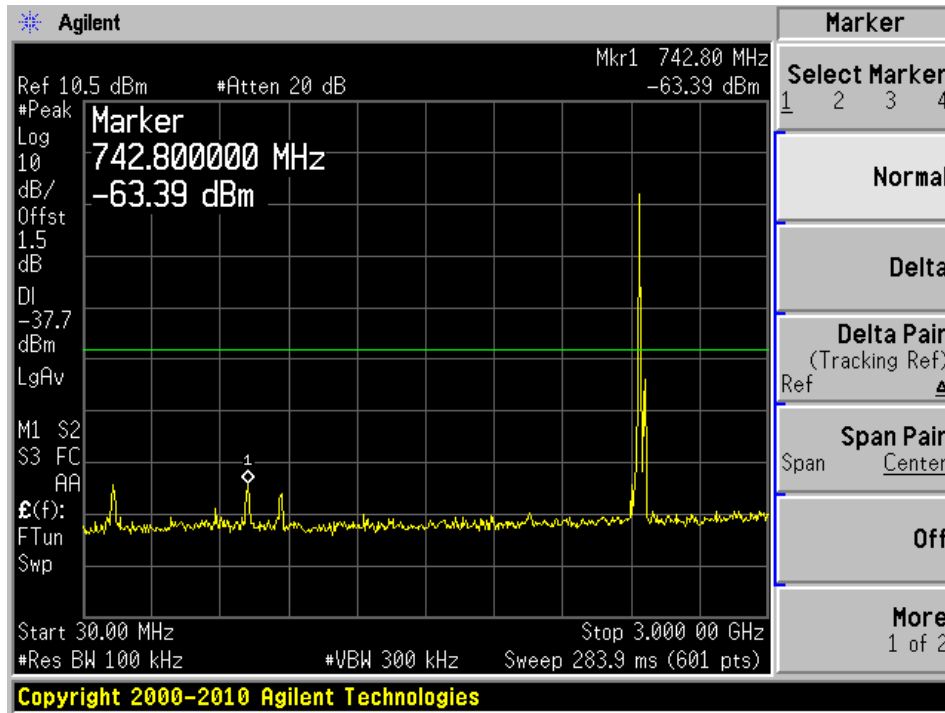


3 GHz – 26 GHz

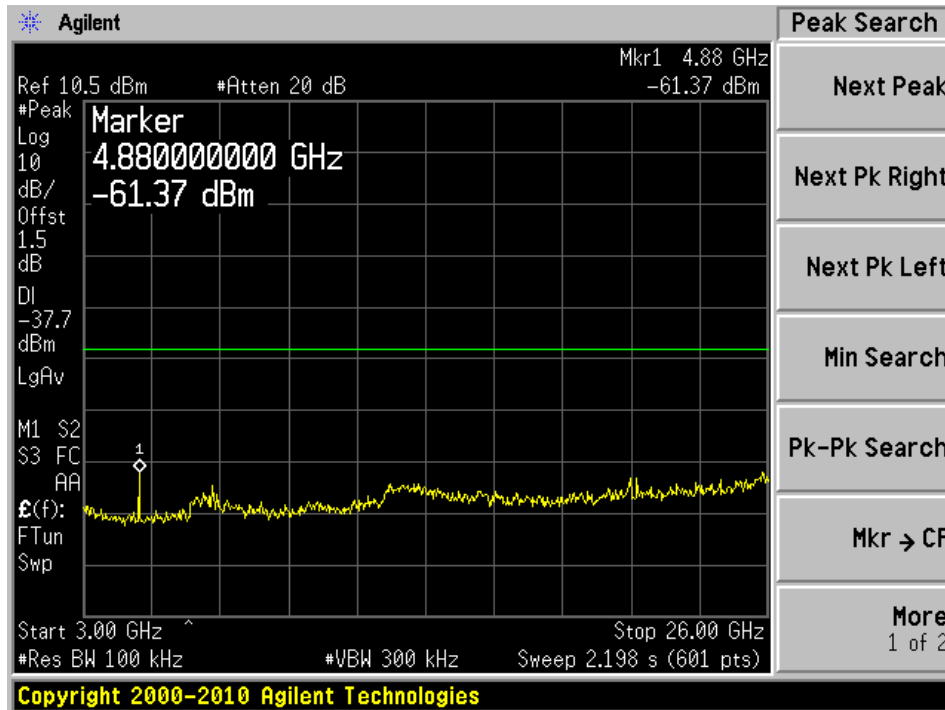


Middle Channel, 2440 MHz

30 MHz – 3 GHz

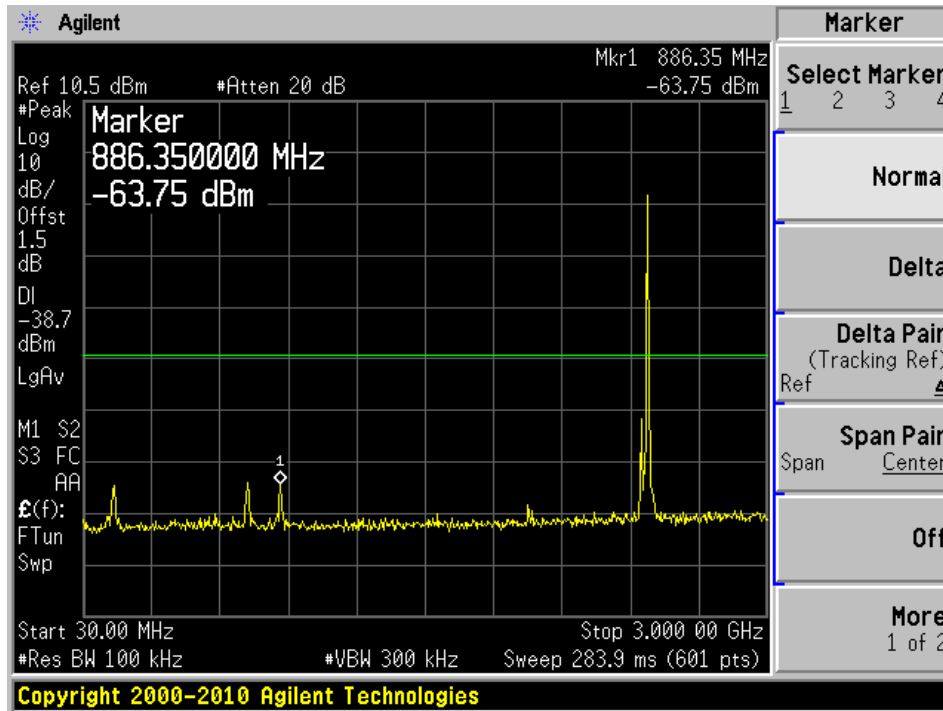


3 GHz – 26 GHz

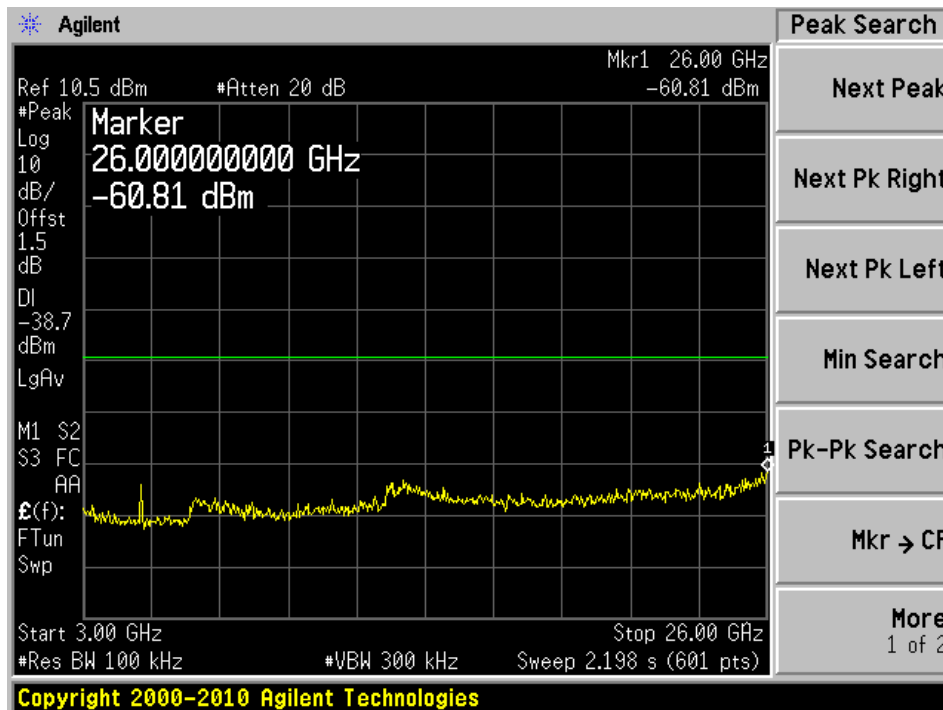


### High Channel, 2480 MHz

30 MHz – 3 GHz



3 GHz – 26 GHz



## 7 FCC §15.205, §15.209 & §15.247(d) – Spurious Radiated Emissions

### 7.1 Applicable Standards

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5.46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52480 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 – 167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3.3458 – 3.358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

## 7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15 Subpart C limits.

## 7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000 MHz:

- (1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
- (2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto



## 7.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + AF + CL + Atten - Ga$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

## 7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2014-06-09	1 year
Hewlett Packard	Pre-amplifier	8449B	3147A00400	2014-07-23	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-10-22	1 year
EMCO	Horn Antenna	3115	9511-4627	2014-01-06	1 year
Wisewave	Horn Antenna	ARH-4223-02	10555-02	2013-09-20	3 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2014-05-28	1 year
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2014-07-24	1 year

**Statement of Traceability:** *BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

## 7.6 Test Environmental Conditions

<b>Temperature:</b>	22-23 °C
<b>Relative Humidity:</b>	43 %
<b>ATM Pressure:</b>	102 kPa

*The testing was performed by Cipher Chu on 2014-07-31 at 5m chamber 3.*

## 7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C standard's radiated emissions limits, and had the worst margin of:

### 30-1000 MHz:

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel
-17.96	164.0048	Horizontal	Low Channel

### 1-25 GHz:

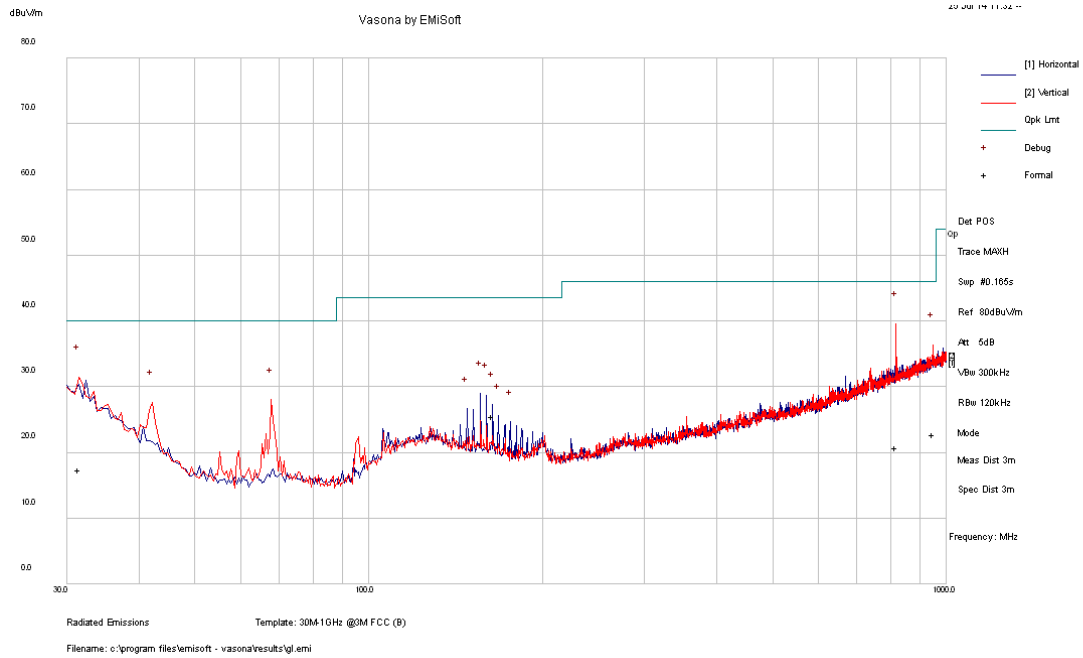
Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel
-1.268	4960	Horizontal	High Channel

Please refer to the following table for specific test result details

### 7.8 Radiated Emissions Test Data and Plots

#### 1) 30 – 1000 MHz Radiated Emission Test

Worst Case: Channel 2402 MHz



Frequency (MHz)	Corrected Amplitude (dBuV)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
164.0048	25.54	151	H	353	43.5	-17.96	QP
31.50675	17.44	191	V	278	40	-22.56	QP
947.2748	22.80	178	V	265	46	-23.20	QP
818.2455	20.71	281	V	133	46	-25.29	QP

## 2) 1– 25 GHz Radiated Emission Test

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2402 MHz, measured at 3 meters											
2402	56.67	66	100	V	28.707	2.94	0	88.317	-	-	Peak
2402	51.6	2	100	H	28.707	2.94	0	83.247	-	-	Peak
2402	55.52	66	100	V	28.707	2.94	0	87.167	-	-	Ave
2402	50.26	2	100	H	28.707	2.94	0	81.907	-	-	Ave
2354	27.76	66	100	V	28.707	2.87	0	59.337	74	-14.663	Peak
2354	27.54	2	100	H	28.707	2.87	0	59.117	74	-14.883	Peak
2354	14.21	66	100	V	28.707	2.87	0	45.787	54	-8.213	Ave
2354	14.14	2	100	H	28.707	2.87	0	45.717	54	-8.283	Ave
4804	55.17	64	100	V	32.752	4.06	36.5	55.482	74	-18.518	Peak
4804	52.03	2	100	H	32.752	4.06	36.5	52.342	74	-21.658	Peak
4804	50.58	64	100	V	32.752	4.06	36.5	50.892	54	-3.108	Ave
4804	44.16	2	100	H	32.752	4.06	36.5	44.472	54	-9.528	Ave
7206	48.44	0	100	V	36.463	4.93	36.7	53.133	68.317	-15.184	Peak
7206	48.29	0	100	H	36.463	4.93	36.7	52.983	63.247	-10.264	Peak
7206	34.29	0	100	V	36.463	4.93	36.7	38.983	67.167	-28.184	Ave
7206	34.67	0	100	H	36.463	4.93	36.7	39.363	61.907	-22.544	Ave
9608	48.82	0	100	V	37.248	5.82	36.9	54.988	68.317	-13.329	Peak
9608	48.23	0	100	H	37.248	5.82	36.9	54.398	63.247	-8.849	Peak
9608	35.15	0	100	V	37.248	5.82	36.9	41.318	67.167	-25.849	Ave
9608	35.13	0	100	H	37.248	5.82	36.9	41.298	61.907	-20.609	Ave
Middle Channel 2440 MHz, measured at 3 meters											
2440	55.03	53	100	V	28.707	2.94	0	86.677	-	-	Peak
2440	48.48	0	100	H	28.707	2.94	0	80.127	-	-	Peak
2440	53.71	53	100	V	28.707	2.94	0	85.357	-	-	Ave
2440	46.91	0	100	H	28.707	2.94	0	78.557	-	-	Ave
4880	58.39	46	100	V	32.752	4.06	36.5	58.702	74	-15.298	Peak
4880	52.16	23	100	H	32.752	4.06	36.5	52.472	74	-21.528	Peak
4880	47.98	46	100	V	32.752	4.06	36.5	48.292	54	-5.708	Ave
4880	46.9	23	100	H	32.752	4.06	36.5	47.212	54	-6.788	Ave
7320	48.11	0	100	V	36.463	4.93	36.7	52.803	74	-21.197	Peak
7320	48.07	0	100	H	36.463	4.93	36.7	52.763	74	-21.237	Peak
7320	34.09	0	100	V	36.463	4.93	36.7	38.783	54	-15.217	Ave
7320	34.06	0	100	H	36.463	4.93	36.7	38.753	54	-15.247	Ave
9760	48.81	0	100	V	37.248	5.82	36.9	54.978	66.677	-11.699	Peak
9760	48.74	0	100	H	37.248	5.82	36.9	54.908	60.127	-5.219	Peak
9760	35.2	0	100	V	37.248	5.82	36.9	41.368	65.357	-23.989	Ave
9760	35.12	0	100	H	37.248	5.82	36.9	41.288	58.557	-17.269	Ave

Frequency (MHz)	S.A. Reading (dB $\mu$ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB $\mu$ V/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB $\mu$ V/m)	Margin (dB)	
High Channel 2480 MHz, measured at 3 meters											
2480	51.47	52	100	V	28.707	2.94	0	83.117	-	-	Peak
2480	45.77	3	100	H	28.707	2.94	0	77.417	-	-	Peak
2480	50.19	52	100	V	28.707	2.94	0	81.837	-	-	Ave
2480	43.99	3	100	H	28.707	2.94	0	75.637	-	-	Ave
2483.5	27.77	52	100	V	28.944	2.94	0	59.654	74	-14.346	Peak
2483.5	28.25	3	100	H	28.944	2.94	0	60.134	74	-13.866	Peak
2483.5	14.08	52	100	V	28.944	2.94	0	45.964	54	-8.036	Ave
2483.5	14.11	3	100	H	28.944	2.94	0	45.994	54	-8.006	Ave
4960	52.09	45	100	V	32.752	4.06	34.51	54.392	74	-19.608	Peak
4960	54.61	29	100	H	32.752	4.06	36.5	54.922	74	-19.078	Peak
4960	45.85	45	100	V	32.752	4.06	36.5	46.162	54	-7.838	Ave
4960	52.42	29	100	H	32.752	4.06	36.5	52.732	54	-1.268	Ave
7440	48.32	0	100	V	36.463	4.93	36.7	53.013	74	-20.987	Peak
7440	48.17	0	100	H	36.463	4.93	36.7	52.863	74	-21.137	Peak
7440	34.17	0	100	V	36.463	4.93	36.7	38.863	54	-15.137	Ave
7440	34.55	0	100	H	36.463	4.93	36.7	39.243	54	-14.757	Ave
9920	48.7	0	100	V	37.248	5.82	36.9	54.868	63.117	-8.249	Peak
9920	48.11	0	100	H	37.248	5.82	36.9	54.278	57.417	-3.139	Peak
9920	35.03	0	100	V	37.248	5.82	36.9	41.198	61.837	-20.639	Ave
9920	35.01	0	100	H	37.248	5.82	36.9	41.178	55.637	-14.459	Ave

## 8 FCC §15.247(a)(2) – 6 dB & 99% Emission Bandwidth

### 8.1 Applicable Standard

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

### 8.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8: DTS bandwidth

### 8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-10-22	1 year

*Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

### 8.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

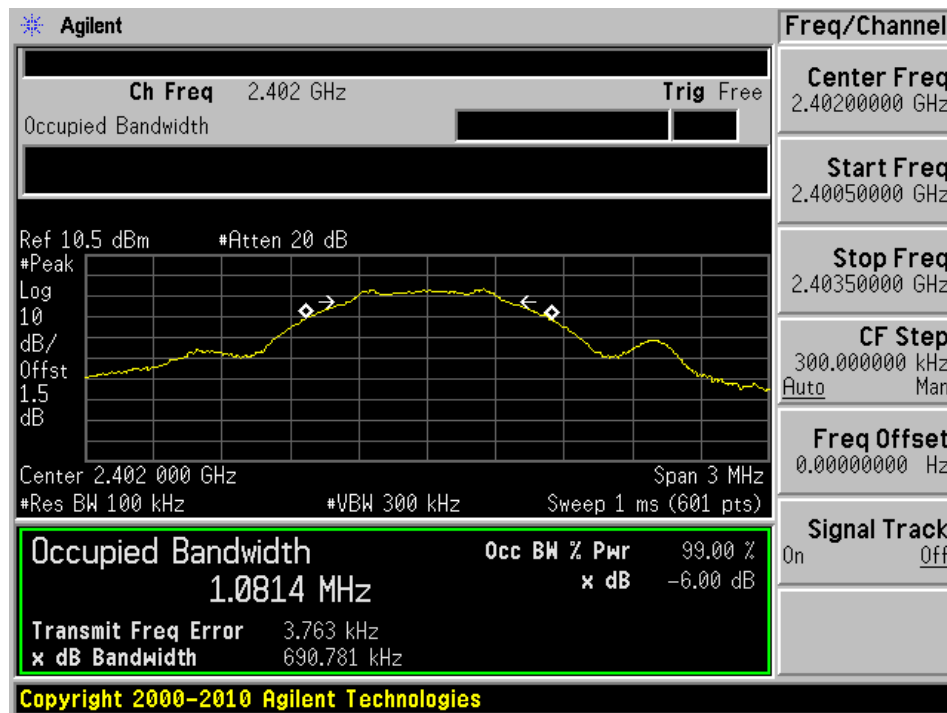
*The testing was performed by Cipher Chu on 2014-07-28 at RF site.*

### 8.5 Test Results

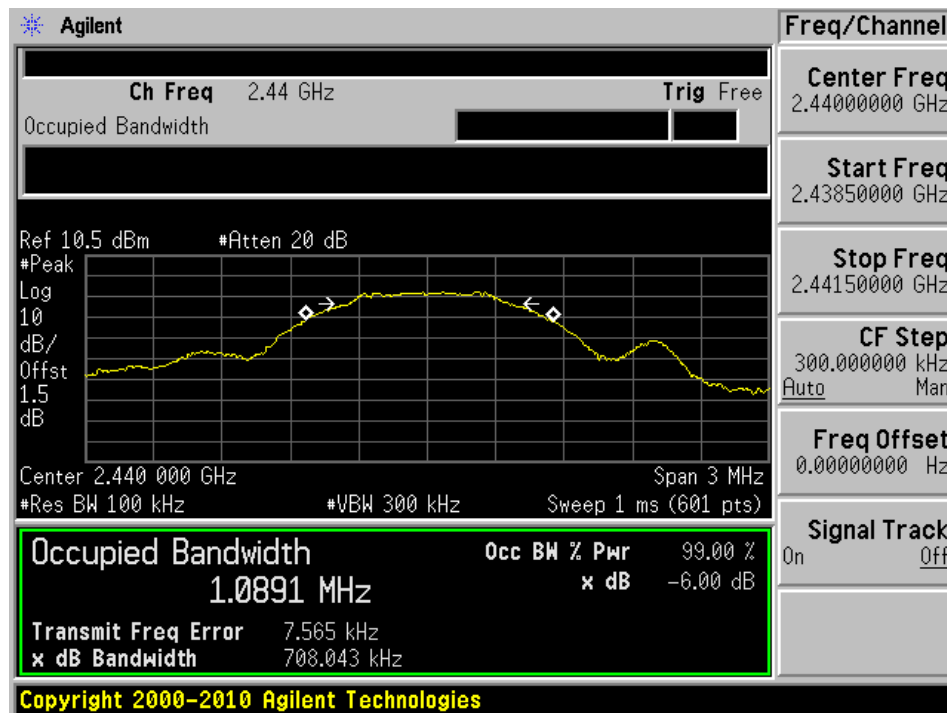
Channel	Frequency (MHz)	6 dB Emission Bandwidth (kHz)	99% Emission Bandwidth (kHz)	Limit (kHz)	Results
Low	2402	690.781	1081.4	> 500	Compliant
Middle	2440	708.043	1089.1	> 500	Compliant
High	2480	713.803	1089.9	> 500	Compliant

Please refer to the following plots for detailed test results

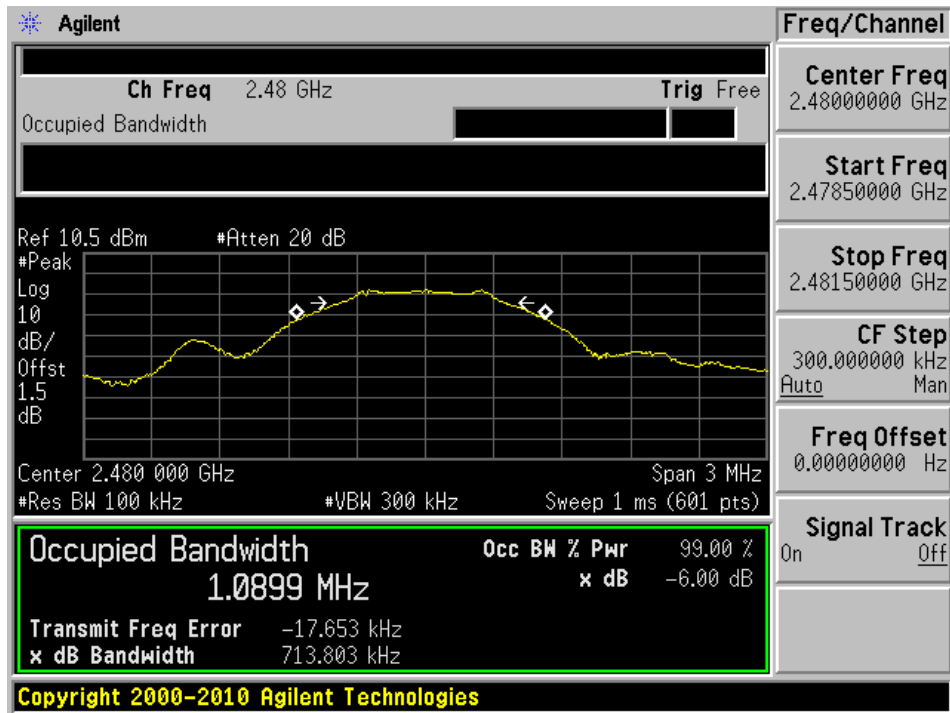
Low channel: 2402 MHz



Middle channel: 2440 MHz



High channel: 2480 MHz





## 9 FCC §15.247(b) – Peak Output Power Measurement

### 9.1 Applicable Standard

FCC §15.247(b) the maximum peak output power of the intentional radiator shall not exceed the following:

FCC §15.247(b) (3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

### 9.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power

### 9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-10-22	1 year

*Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

### 9.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

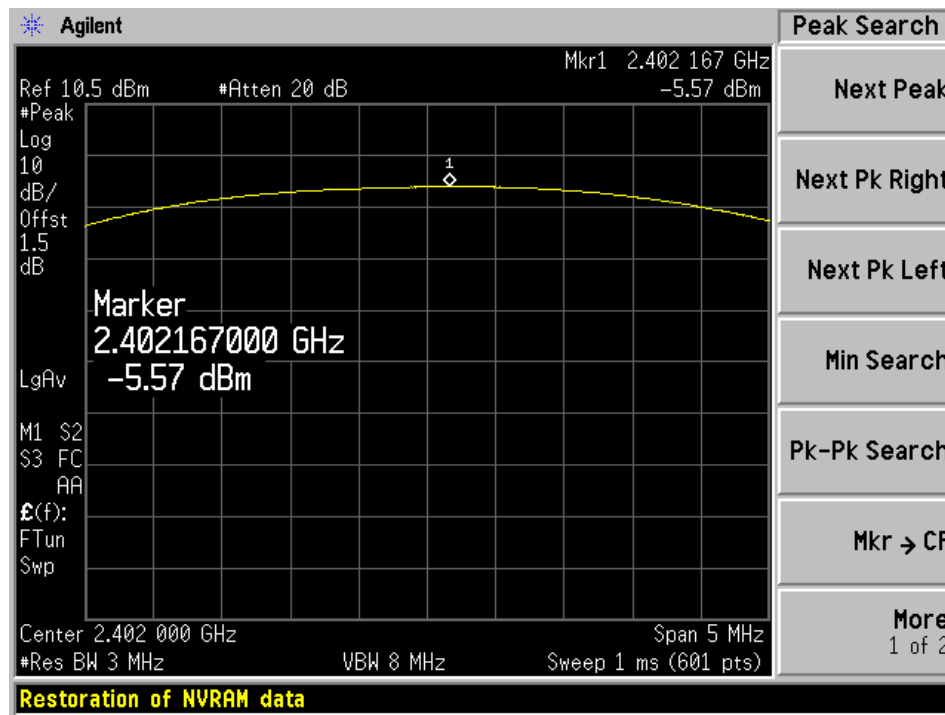
*The testing was performed by Cipher Chu on 2014-07-28 at RF site.*

### 9.5 Test Results

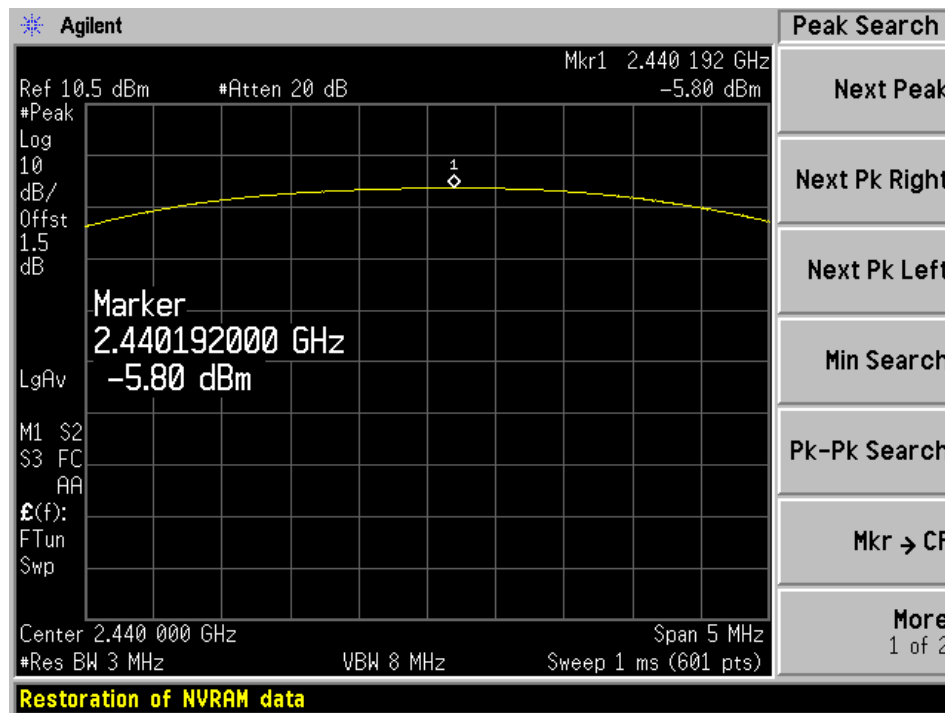
Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)	FCC Limit (dBm)
Low	2402	-5.57	30
Middle	2440	-5.80	30
High	2480	-6.32	30

Please refer to the following plots for detailed test results

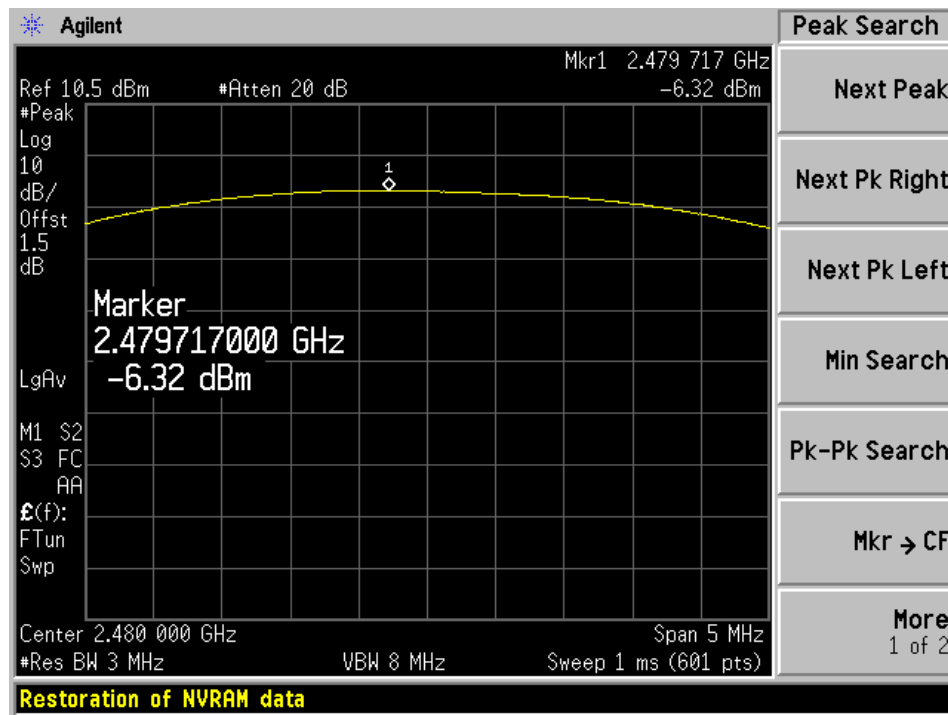
Low channel: 2402 MHz



Middle channel: 2440 MHz



High channel: 2480 MHz



## 10 FCC §15.247(d) – 100 kHz Bandwidth of Band Edges

### 10.1 Applicable Standard

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

### 10.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements

### 10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-10-22	1 year

*Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

### 10.4 Test Environmental Conditions

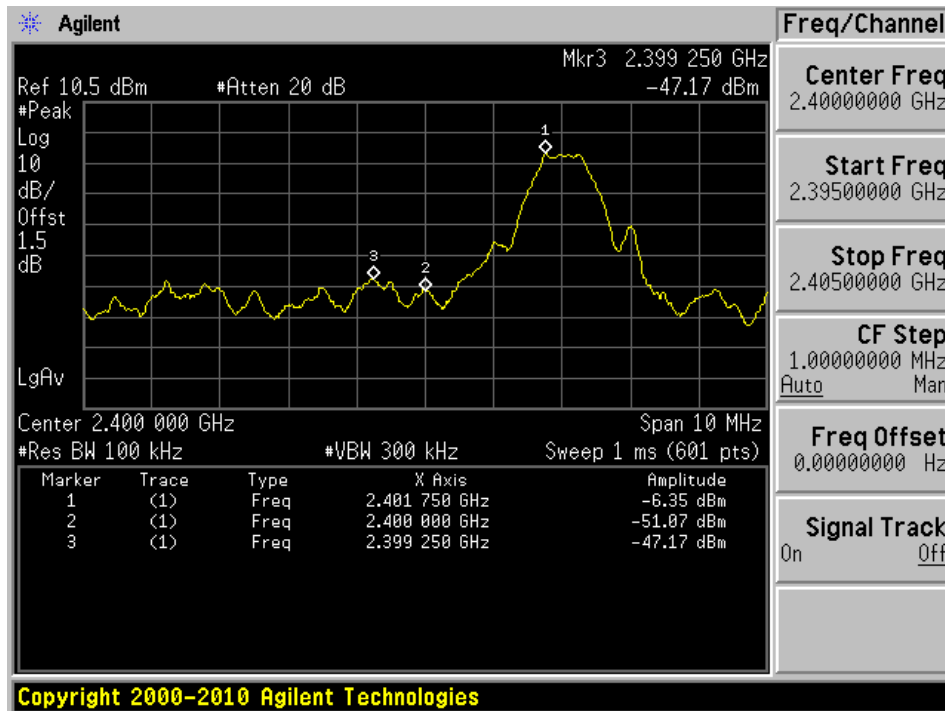
Temperature:	23 °C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

*The testing was performed by Cipher Chu on 2014-07-28 at RF site.*

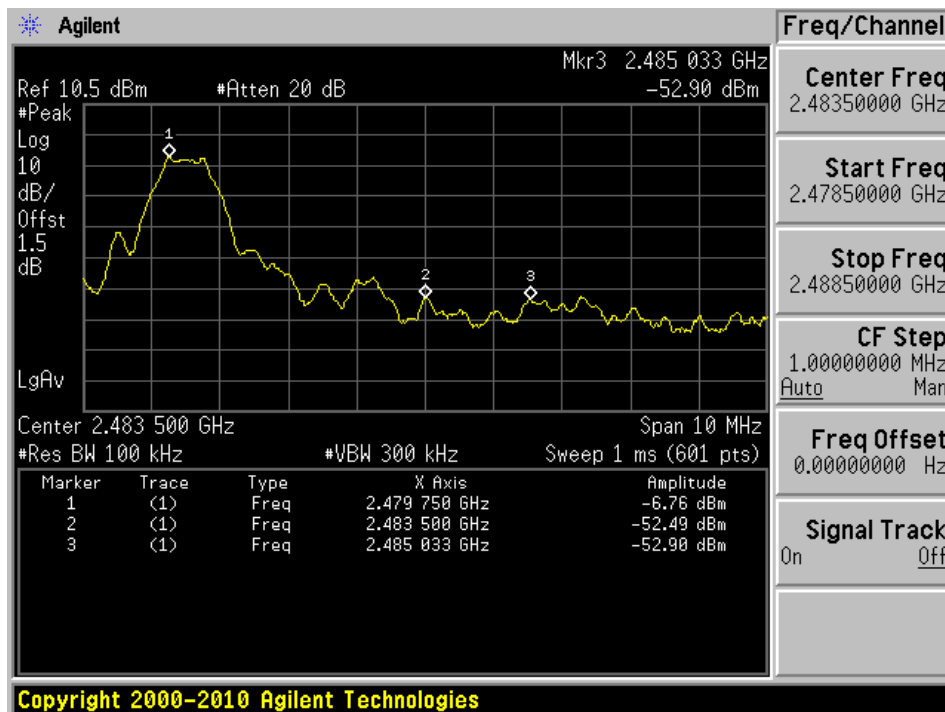
### 10.5 Test Results

Please refer to following pages for plots of band edge.

Low Band Edge



High Band Edge



## 11 FCC §15.247(e) – Power Spectral Density

### 11.1 Applicable Standard

According to FCC §15.247 (e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 11.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v03r02: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10: Maximum power spectral density level in the fundamental emission

### 11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-10-22	1 year

*Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

### 11.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	42 %
ATM Pressure:	102 kPa

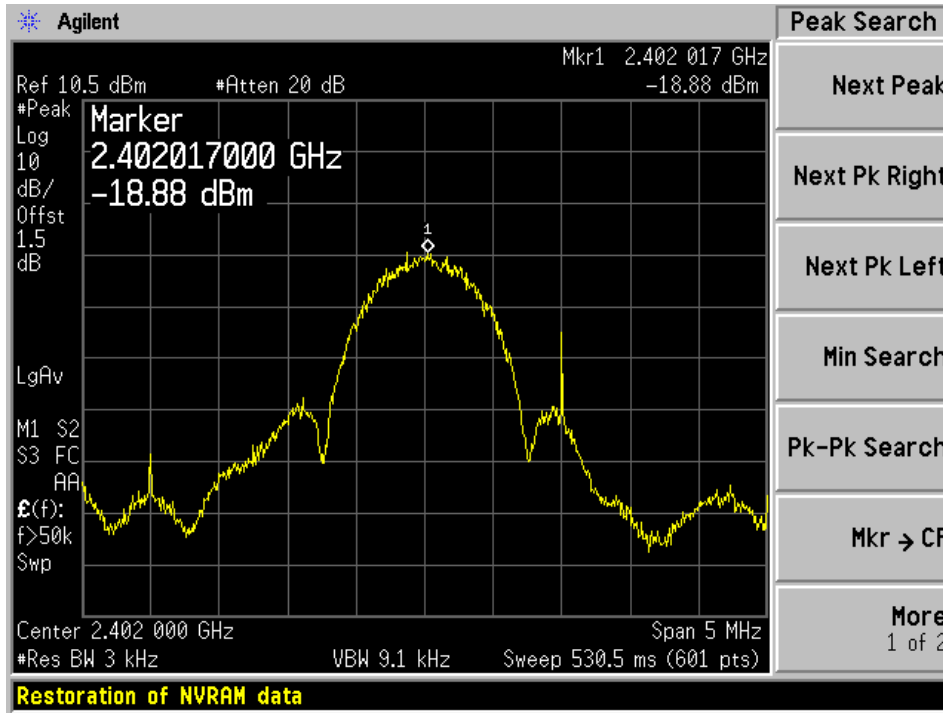
*The testing was performed by Cipher Chu on 2014-07-28 at RF site.*

### 11.5 Test Results

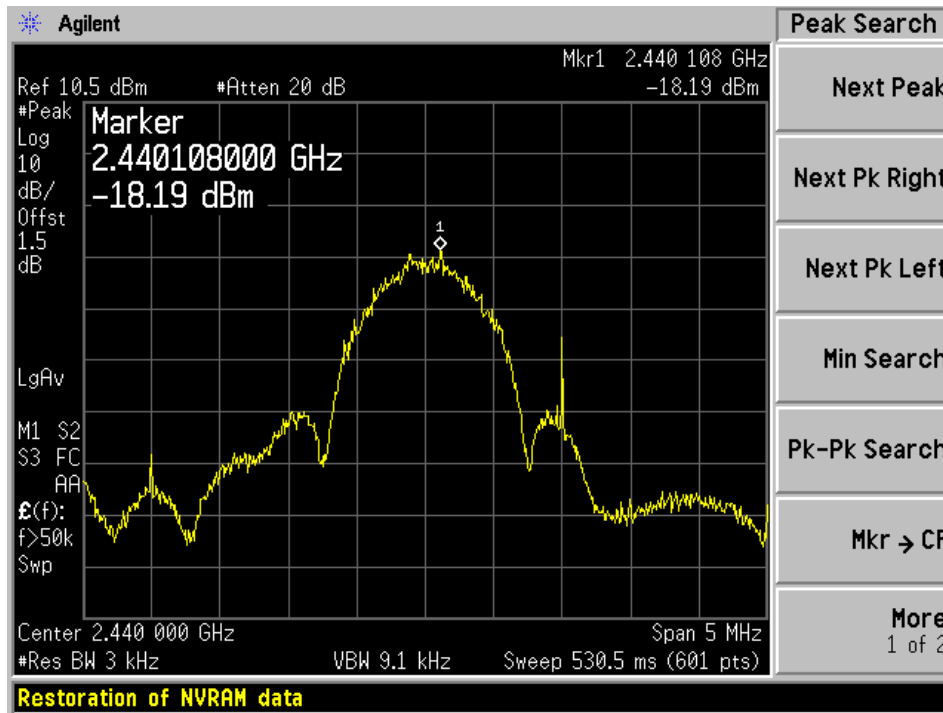
Channel	Frequency (MHz)	Power Spectrum Density (dBm)	FCC Limit (dBm)
Low	2402	-18.88	8
Middle	2440	-18.19	8
High	2480	-19.81	8

Please refer to the following plots for detailed test results:

Low channel: 2402 MHz



Middle channel: 2440 MHz



High channel: 2480 MHz

