

Global EMC Inc. Labs

EMC & RF Test Report

As per
RSS 210 Issue 8:2010
&
FCC Part 15 Subpart C:2013
Unlicensed Intentional Radiators
on the

Wireless Door and Window Switch

Min Xie
Project Engineer
11 Gordon Collins Dr,
Gormley, ON, L0H 1G0 Canada
Ph: (905) 883-8189

Testing produced for



See Appendix A for full customer & EUT details.



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Table of Contents

Table of Contents	2
Report Scope	3
Summary	4
Test Results Summary	5
Justifications, Descriptions, or Deviations	6
Applicable Standards, Specifications and Methods	7
Sample calculation(s)	8
Document Revision Status	8
Definitions and Acronyms	9
Testing Facility	10
Calibrations and Accreditations	10
Testing Environmental Conditions and Dates	11
Detailed Test Results Section	12
6dB Bandwidth of Digitally Modulated Systems	13
Antenna Spurious Conducted Emissions (-20 dBc Requirement)	21
Transmitter Spurious Radiated Emissions	30
Power Spectral Density - DM	57
Maximum Permissible Exposure	62
Appendix A – EUT Summary	64
Appendix B – EUT and Test Setup Photographs	65

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Report Scope

This report addresses the EMC verification testing and test results of Viconics Technologies Inc's Wireless Door and Window Switch, herein referred to as EUT (Equipment Under Test) performed at Global EMC Labs.

The EUT was tested for compliance against the following standards:

RSS 210 Issue 8:2010
 FCC Part 15 Subpart C 15:2013

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

The results contained in this report relate only to the item(s) tested.

This report does not imply product endorsement by A2LA or any other accreditation agency, any government, or Global EMC Inc.

Opinions/interpretations expressed in this report, if any, are outside the scope of Global EMC Inc accreditation. Any opinions expressed do not necessarily reflect the opinions of Global EMC Inc, unless otherwise stated.

Client	Viconics Technologies Inc
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Summary

The results contained in this report relate only to the item(s) tested.

EUT FCC Certification #, FCC ID:	V95-VWAP
EUT Industry Canada Certification #, IC:	7591A-VWAP
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Min Xie

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Test Results Summary

Standard/Method	Description	Class/Limit	Result
FCC 15.203	Antenna Requirement	Unique	Pass See Justification
FCC 15.205 RSS 210 (Table 1)	Restricted Bands for intentional operation	QuasiPeak Average	Pass
FCC 15.207	Power line conducted emissions	QuasiPeak Average	N/A See Justifications
FCC 15.209 RSS-210 (Table 2)	Spurious Radiated emissions	QuasiPeak Average	Pass
FCC 15.247(a)2 RSS-210 A8.2(a)	6 dB Bandwidth	> 500 kHz	Pass
FCC 15.247(b)2 RSS-210 A8.4(4)	Max output power	< 1 Watt	Pass
FCC 15.247(b)(4) RSS-210 A8.4(5)	Antenna Gain	< 6 dBi	Pass See Justifications
FCC 15.247(d) RSS-210 A8.5	Antenna conducted spurious	< 20 dBc	Pass
FCC 15.247(e) RSS-210 A8.2(b)	Spectral Density	< 8 dBm (3 kHz BW)	Pass
FCC 15.247(i) IC Safety code 6	Maximum Permissible Exposure	> 20 cm separation.	Pass See justification and calculations
Overall Result			PASS

All tests were performed by Min Xie.

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '*'.

Client	Viconics Technologies Inc	
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Justifications, Descriptions, or Deviations

The following justifications for tests not performed or deviations from the above listed specifications apply:

525-0023_JOHANSON-TECH_2450AT42B100.pdf

For the Antenna requirement specified in FCC 15.203 (RSS 210 section 5.5), the unit uses a permanently connected ceramic chip antenna (0 dbi gain - Johanson 2450AT42B100) with less than 6 dBi gain.

For the Restricted Bands of operation, the EUT is designed to only operate between 2400 – 2483.5 MHz.

For maximum permissible exposure, this device operates at less than 1 Watt at 2400 – 2483.5 MHz and is designed to operate greater than 20 cm from any personnel during normal operation. No testing is required, however worst case calculated exposure compliance follows later in this report.

The EUT is not a hybrid system and FCC 15.247 (f) does not apply to it. However the 15.247 (d) requirement of power density were met and are detailed later in this test report.

The EUT is a AAA battery powered device and does not have any provision to connect to AC mains outlet, therefore, FCC 15.207 does not apply.

All tests were performed with new batteries.

For the scope of this test report the EUT was mounted in three orthogonal axes to maximize emissions. Worst case results are presented.

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Applicable Standards, Specifications and Methods

ANSI C63.4:2009 - 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

CFR 47 FCC 15 - Code of Federal Regulations – Radio Frequency Devices

CISPR 22:2008 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

FCC KDB 558074 - FCC KDB 558074 Digital Transmission Systems, measurements and procedures

ICES-003:2012 - Digital Apparatus - Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard

ISO 17025:2005 - General Requirements for the competence of testing and calibration laboratories

RSS-GEN General Requirements and Information for the Certification of Radio Apparatus

RSS 210:2010 - Issue 8: Spectrum Management and Telecommunications Policy. Radio Standards Specification Low Power License-Exempt Radiocommunication Devices

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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Sample calculation(s)

Margin = limit – (received signal + antenna factor + cable loss – pre-amp gain)

Margin = 50.5dBuV/m – (50dBuV + 10dB + 2.5dB – 20dB)

Margin = 8.5 dB

Document Revision Status

Revision 1 - December 6, 2013

Initial release

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxillary Equipment.

BW – Bandwidth. Unless otherwise stated, this is refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity

EUT – Equipment Under Test

ITE – Information Technology Equipment with a primary function(s) of entry, storage, display, retrieval, transmission, processing, switching, or control, of data.

LISN – Line impedance stabilization network

NCR – No Calibration Required

RF – Radio Frequency

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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Testing Facility

Testing for EMC on the EUT was carried out at Global EMC labs in Toronto, Ontario, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN.

Calibrations and Accreditations

The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC, 377448), Industry Canada (IC, 6844A-3) and VCCI (R-4023, G-506, T-1246, and C-4498). This semi-anechoic chamber complies with the requirements of EN55016-2-3:2006, section 7.5 and the site attenuation requirements of EN55016-1-4. This chamber was additionally calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. The NSA data is kept on file at Global EMC. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at Global EMC. Global EMC Inc is accredited to ISO 17025 by A2LA with Testing Certificate #2555.01. The laboratories current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

Client	Viconics Technologies Inc	
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Testing Environmental Conditions and Dates

Following were the environmental conditions in the facility during time of testing –

Date	Test	Init.	Temperature (°C)	Humidity (%)	Pressure (kPa)
8/29 to 9/5, 2013	All	MX	23-26°C	35 - 41%	98 -103kPa

Client	Viconics Technologies Inc
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



The logo for Global EMC Inc. It features the word "GLOBAL" in blue capital letters at the top, with a small red star above the letter "O". Below "GLOBAL" is a stylized red globe with white lines. The word "EMC" is in large, bold, blue capital letters, and "INC" is in smaller blue capital letters to the right of "EMC".

Detailed Test Results Section

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



6dB Bandwidth of Digitally Modulated Systems

Purpose

The purpose of this test is to ensure that the bandwidth occupied exceeds a stated minimum. This helps ensure the utilization of the frequency allocation is sufficiently wide. This also helps prevent corruption of data by ensuring adequate data separation to distinguish the reception of the intended information.

Limits

The Limit is as specified in FCC Part 15 and RSS 210.

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. This should be measured with a 100 kHz RBW and a 300 kHz VBW.

Results

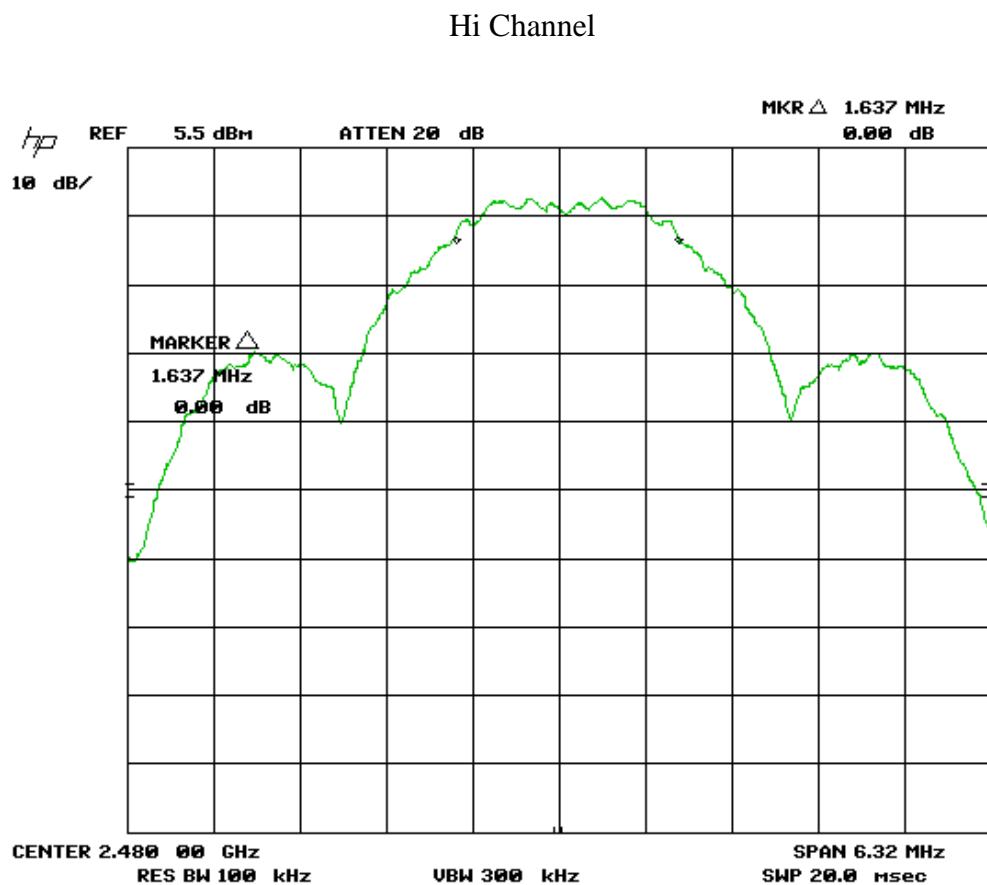
The EUT passed. The minimum 6 dB BW measured was 1.66 MHz and the 20 dB BW is 2.89 MHz.

Client	Viconics Technologies Inc
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Graph(s)

The graphs showed below shows the OBW during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is sufficiently low to exhibit the 6 dB bandwidth of a channel during operation of the EUT. This measurement is a peak measurement. Max hold is performed for a duration of not less then 1 minute.



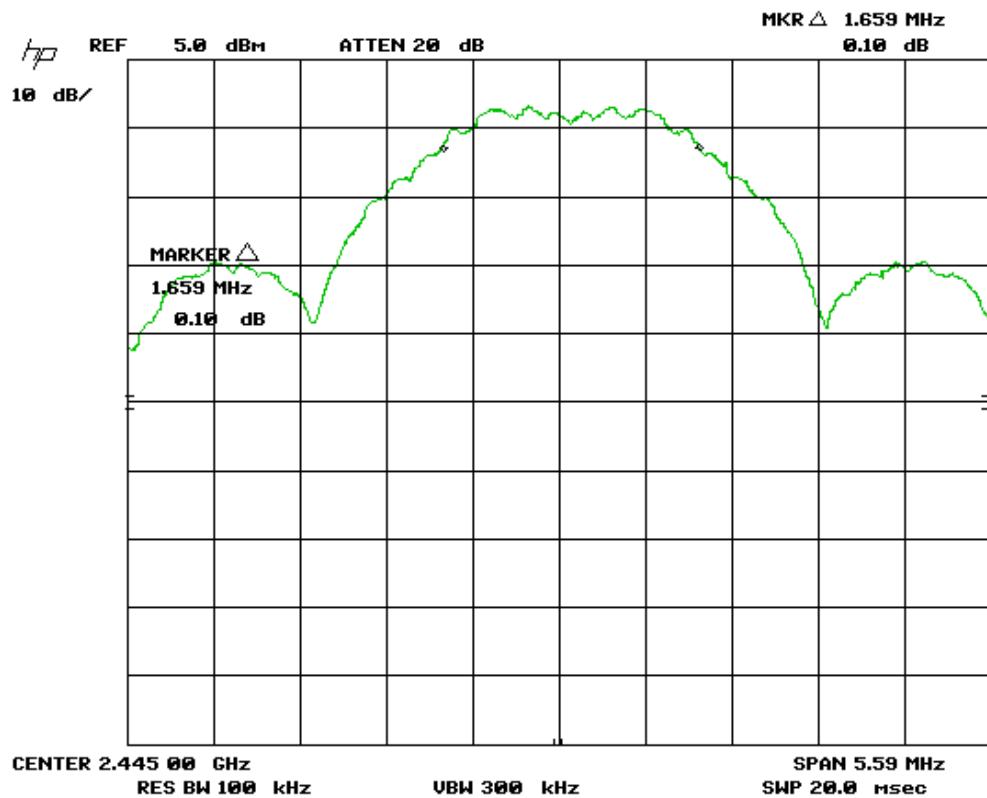
6 dB BW = 1.64 MHz

20 dB BW = 2.80 MHz

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Mid Channel



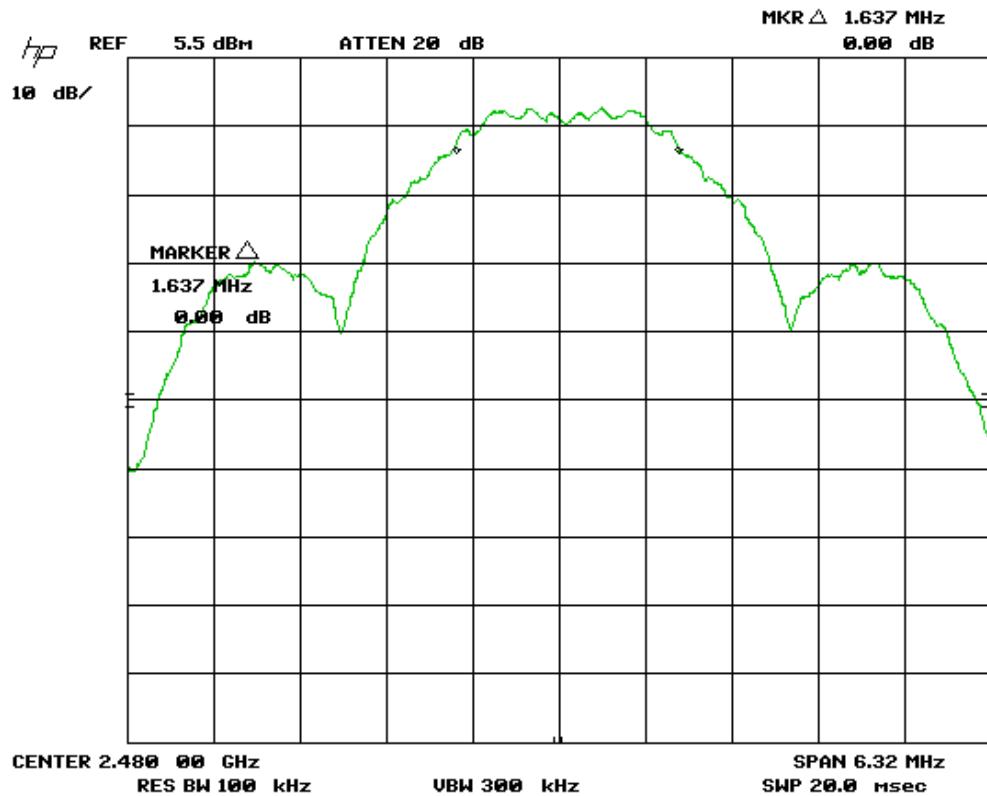
6 dB BW = 1.66 MHz

20 dB BW = 2.80 MHz

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Low Channel



$$6 \text{ dB BW} = 1.64 \text{ MHz}$$

$$20 \text{ dB BW} = 2.80 \text{ MHz}$$

Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Quasi Peak Adapter	85650A	HP	12/21/ 2011	12/21/2013	GEMC 7
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC 133
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B_Rev1"

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Maximum Peak Envelope Conducted Power - DM

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element does not exceed the limits specified. This ensures that if the end-user replaces the antenna, that the maximum power does not exceed an amount which may create an excessive power level.

Limits

The limits are defined in FCC Part 15.247(b) and RSS 210.

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, the peak limit is 1 watt.

Results

The EUT passed. Three Channels 11, 19, and 26 were measured in the channel range. The following table show the peak powers measured

Internal Antenna			
Channel	Frequency (MHz)	Power (dBm)	Power (mW)
Lo Channel (11)	2405	3.22	2.09
Mid Channel (19)	2445	3.30	2.14
Hi Channel (26)	2480	3.21	2.09

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Table(s)

The photos shown below shows the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT.

Tests were conducted using a power meter.



Figure 1: Maximum power of Lo, Mid, and High channels

Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test setup.

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Power Head	PH 2000	AR	2013-02-07	2015-02-07	GEMC 15
Power meter	PM 2002	AR	2013-02-07	2015-02-07	GEMC 16
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B_Rev1"

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Antenna Spurious Conducted Emissions (-20 dBc Requirement)

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element at frequencies outside of the authorized spectrum does not exceed the limits specified. This ensures that the only the intended signal is delivered to the radiating element.

Limits

The limits are defined in 15.247(d). In any 100 kHz band, the peak spurious harmonics emissions must be at least 20 dB below the fundamental. Spurious Conducted emissions are to be evaluated up to the 10th harmonic. This -20 dBc requirement also applies at the 'band edge' or 2.4 GHz and 2.4835 GHz.

Results

The EUT passed the limits. Low, middle and high band was measured. The worst case is presented as a graph for the spectrum. The -20 dBc requirement is shown for the lower band edge at 2.4 GHz in the low band. The -20 dBc requirement is also shown for the higher band edge at 2.4835 GHz in the high band.

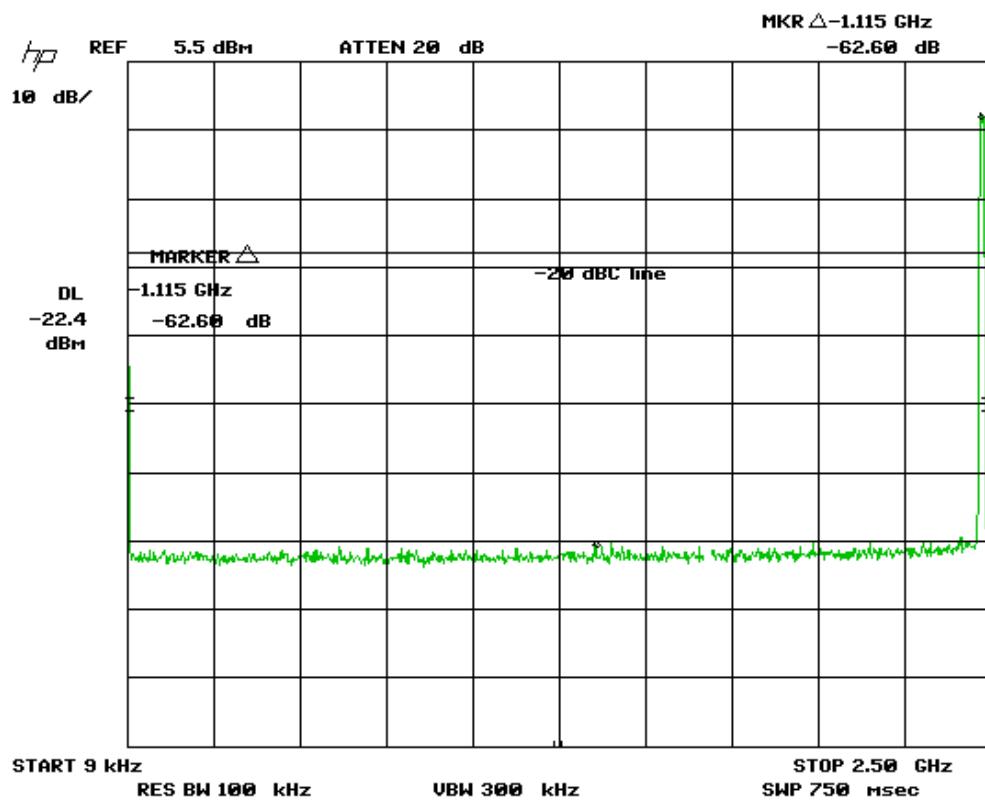
Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Graph(s)

The graphs shown below shows the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT.

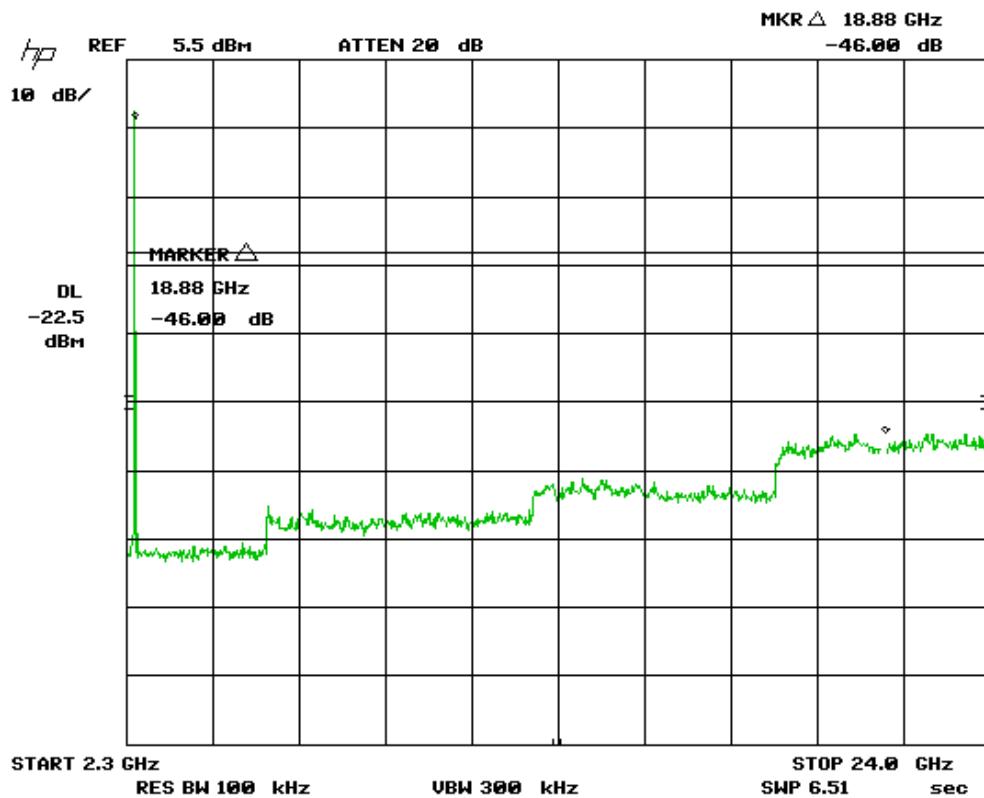
Hi Channel 9 kHz – 2.5 GHz



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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



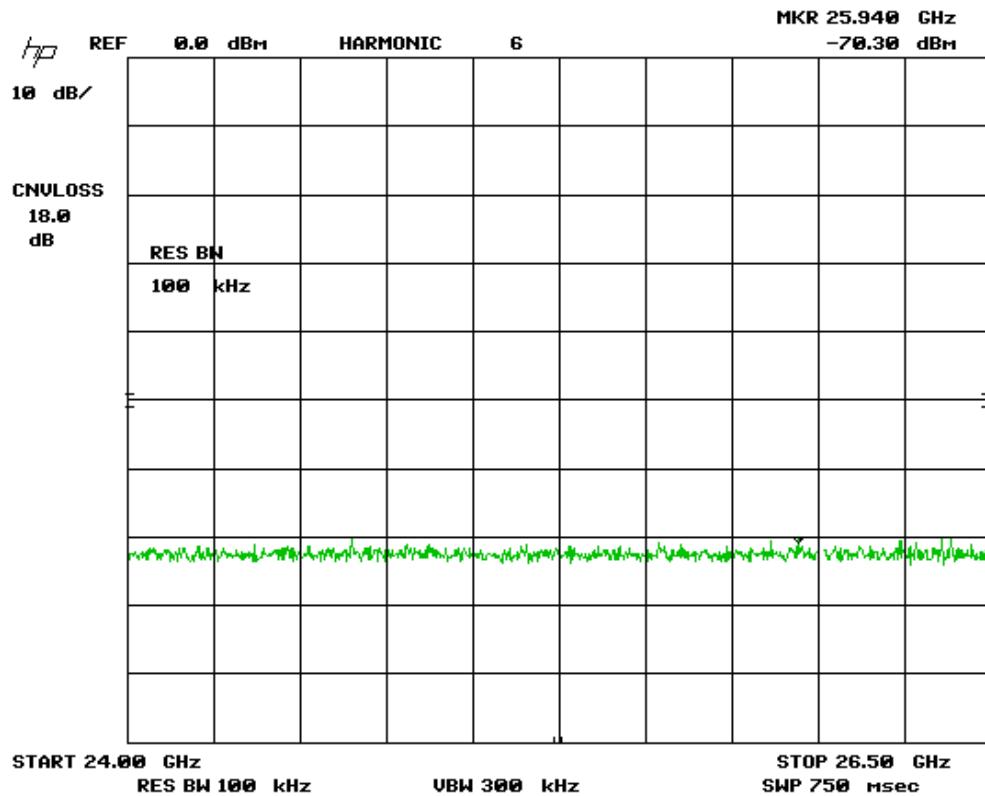
Hi Channel 2.3 GHz – 24 GHz



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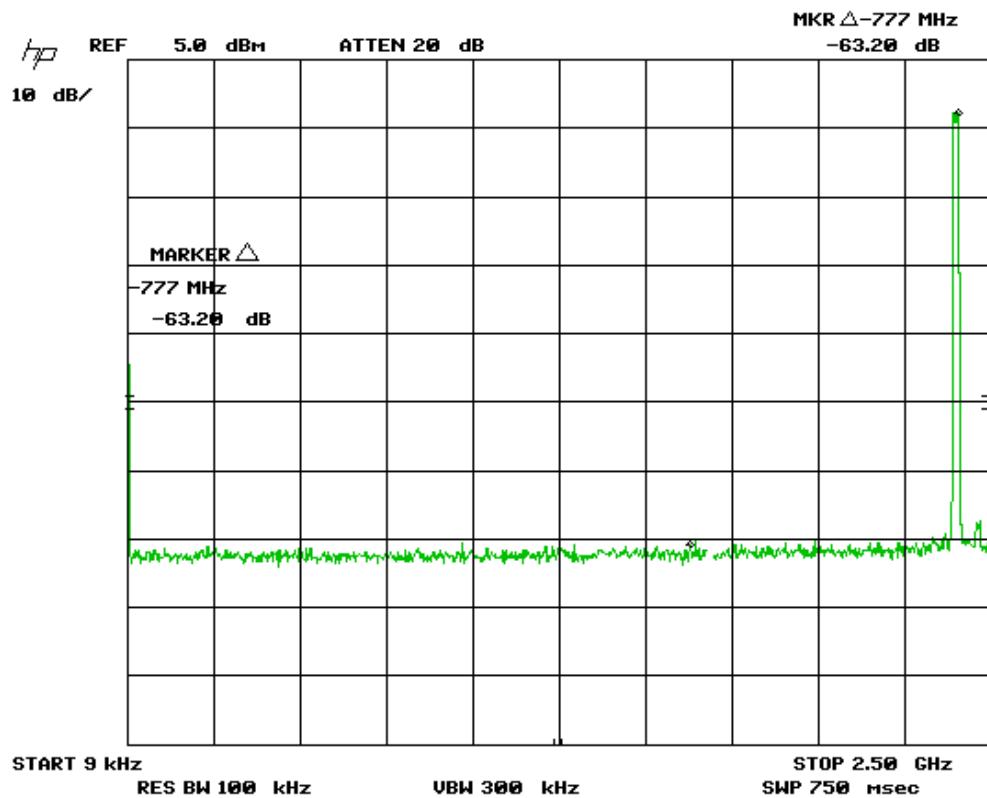
Hi Channel 24 GHz – 26 GHz



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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



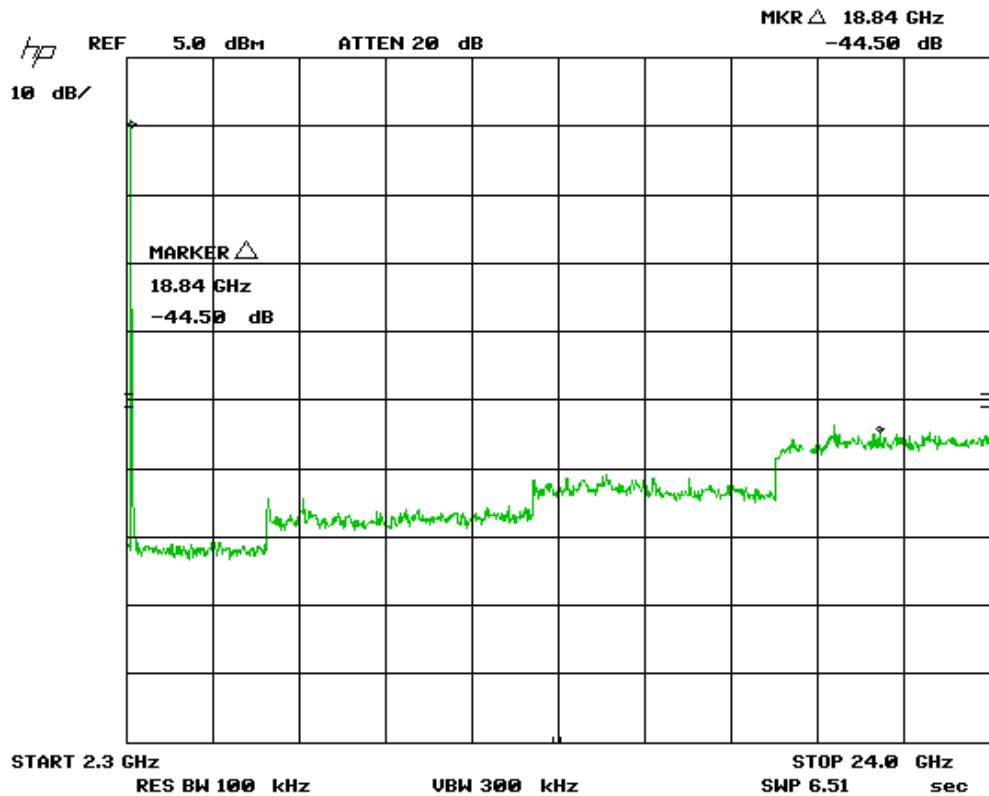
Low Channel 9 kHz – 2.5 GHz



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



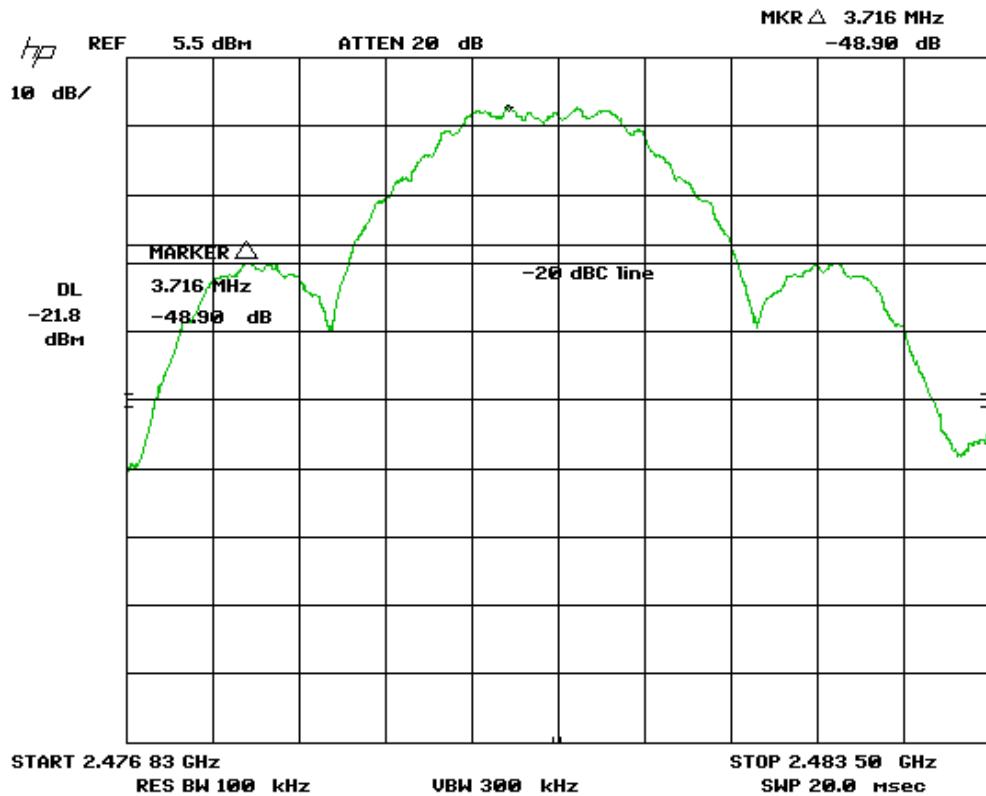
Low Channel 2.3 GHz – 24 GHz



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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



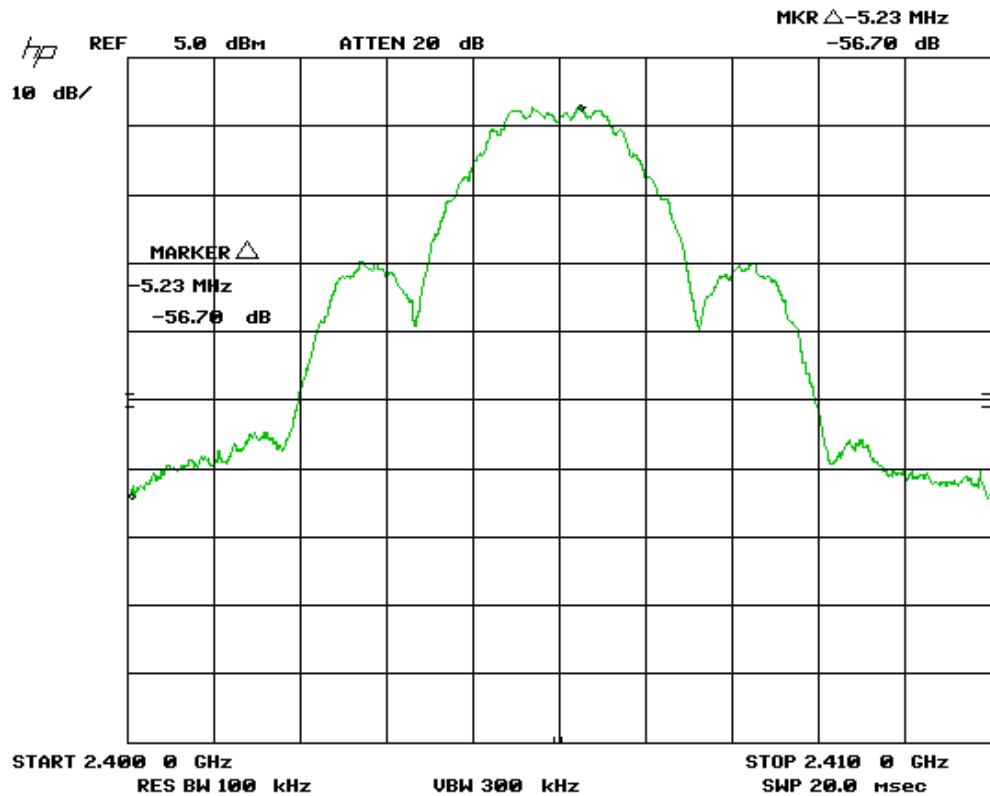
Hi Channel – 2483.5 Band Edge



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Low Channel – 2400 MHz



Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

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Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
Quasi Peak Adapter	85650A	HP	12/21/ 2011	12/21/2013	GEMC 7
18.0-26.5 GHz Harmonic Mixer	11970K	HP	21-Dec-11	21-Dec-13	GEMC 158
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B_Rev1"

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Transmitter Spurious Radiated Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

Limit(s) and Method

The method is as defined in ANSI C63.4:2003.

The limits are as defined in FCC Part 15, Section 15.209:

The limits, as defined in 15.247(d) for unintentional radiated emissions apply for those emissions that fall in the restricted bands, as defined in Section 15.205(a). These emissions must comply with the radiated emission limits specified in Section 15.209(a).

All unintentional emissions must also meet the ‘Spurious Conducted Emissions’ requirements of -20 dBc or greater. See also ‘Spurious Conducted Emissions’ for further details.

0.009 MHz – 0.490 MHz, 2400/F(kHz) uV/m at 300 m¹

0.490 MHz – 1.705 MHz, 24000/F(kHz) uV/m at 30 m¹

1.705 MHz – 30 MHz, 30 uV/m at 30 m¹

30 MHz – 88 MHz, 100 uV/m (40.0 dBuV/m¹) at 3 m

88 MHz – 216 MHz, 150 uV/m (43.5 dBuV/m¹) at 3 m

216 MHz – 960 MHz, 200 uV/m (46.0 dBuV/m¹) at 3 m

Above 960 MHz, 500 uV/m (54.0 dBuV/m¹) at 3 m

Above 1000 MHz, 500 uV/m (54 dBuV/m²) at 3m

Above 1000 MHz, 500 uV/m (74 dBuV/m³) at 3m

¹Limit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1

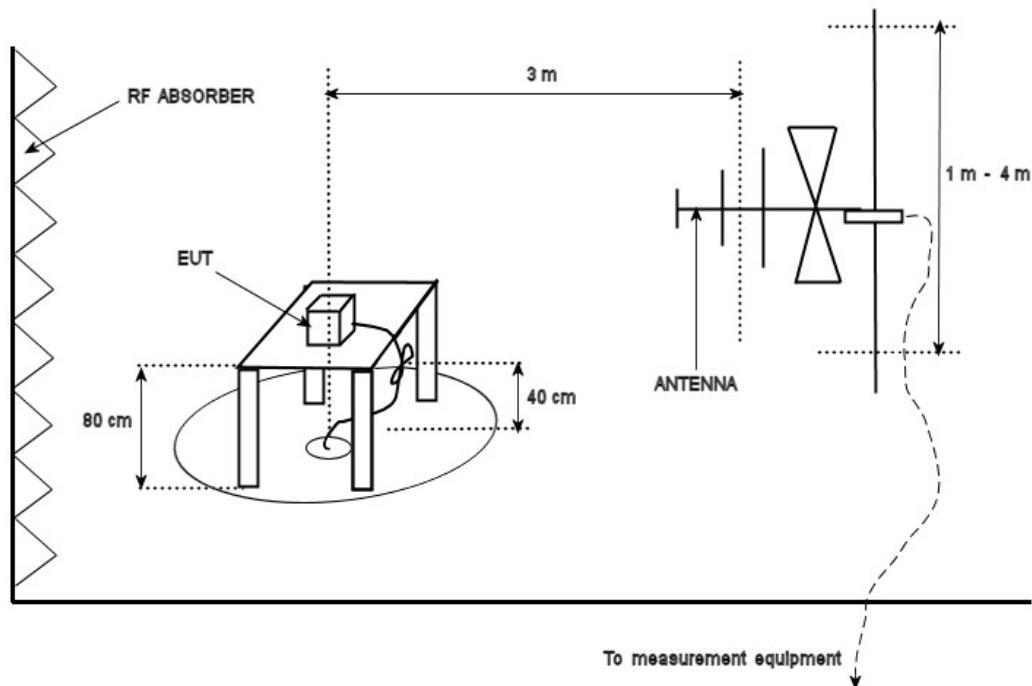
²Limit is with 1 MHz measurement bandwidth and using an Average detector

³Limit is with 1 MHz measurement bandwidth and using a Peak detector

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Typical Radiated Emissions Setup



Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a 'k=2' coverage factor and a 95% confidence level.

Preliminary Graphs

Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final required detector and over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings.

In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10th harmonic (a minimum of a 24.835 GHz).

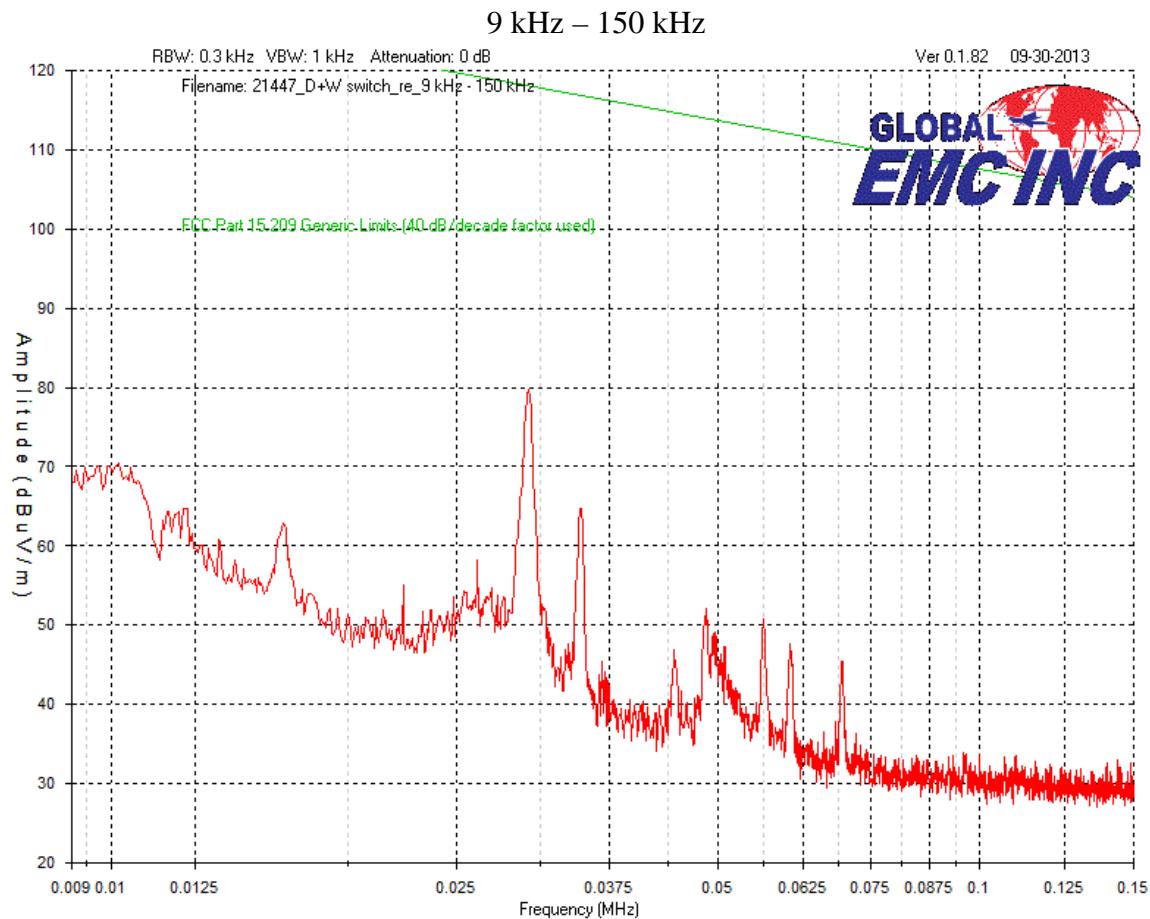
Devices scanned may be scanned at alternate test distances, and in accordance with FCC Part 15, Subpart A, Section 15.31, an extrapolation factor of 20 dB/decade was used above

Client	Viconics Technologies Inc	
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

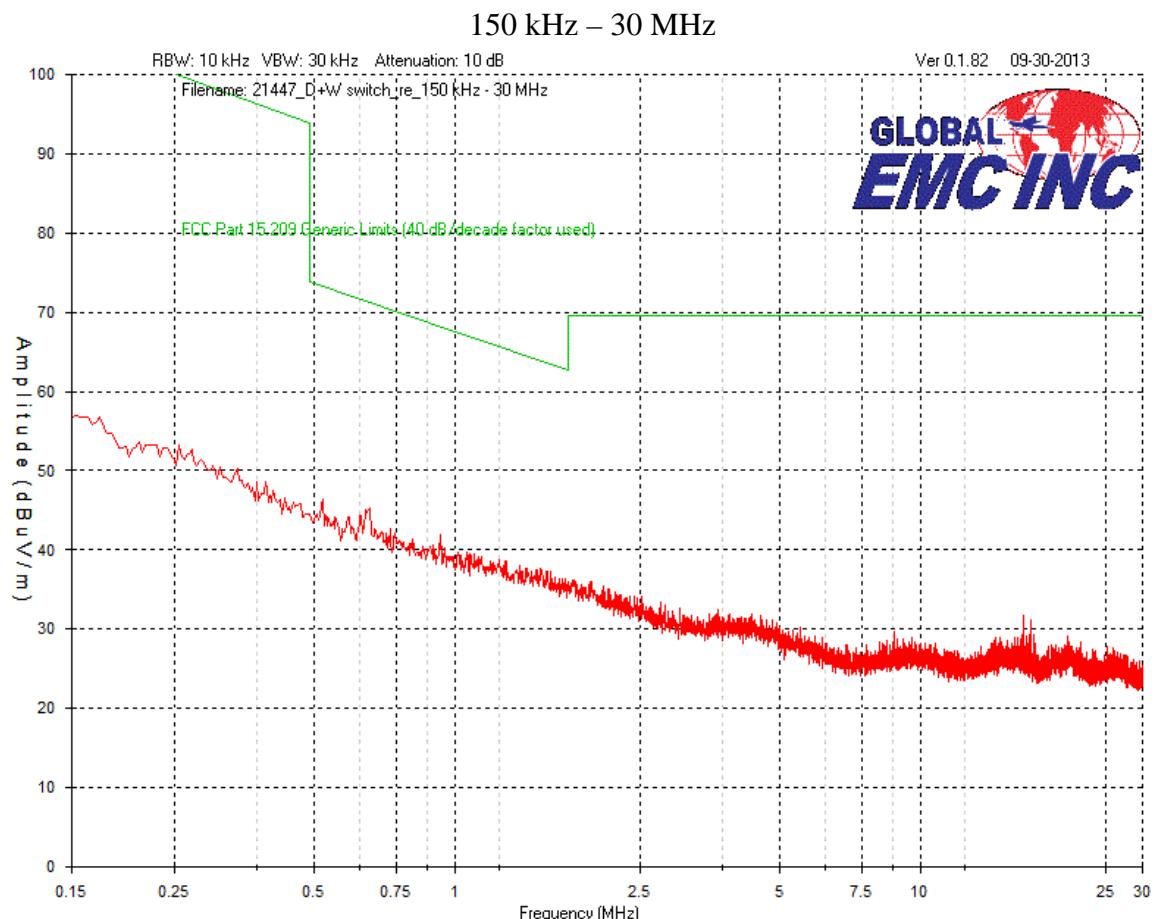
30 MHz and 40 dB/decade below 30 MHz. For example for 1 meter measurements, an extrapolation factor 9.5 dB from 20 Log (1m / 3m) is applied.

Low, middle and high channels, each in three orthogonal axes were checked; however the worst case graphs are presented.

Band edge measure graphs were shown for illustrations purpose. See final measurement section for all measurements.



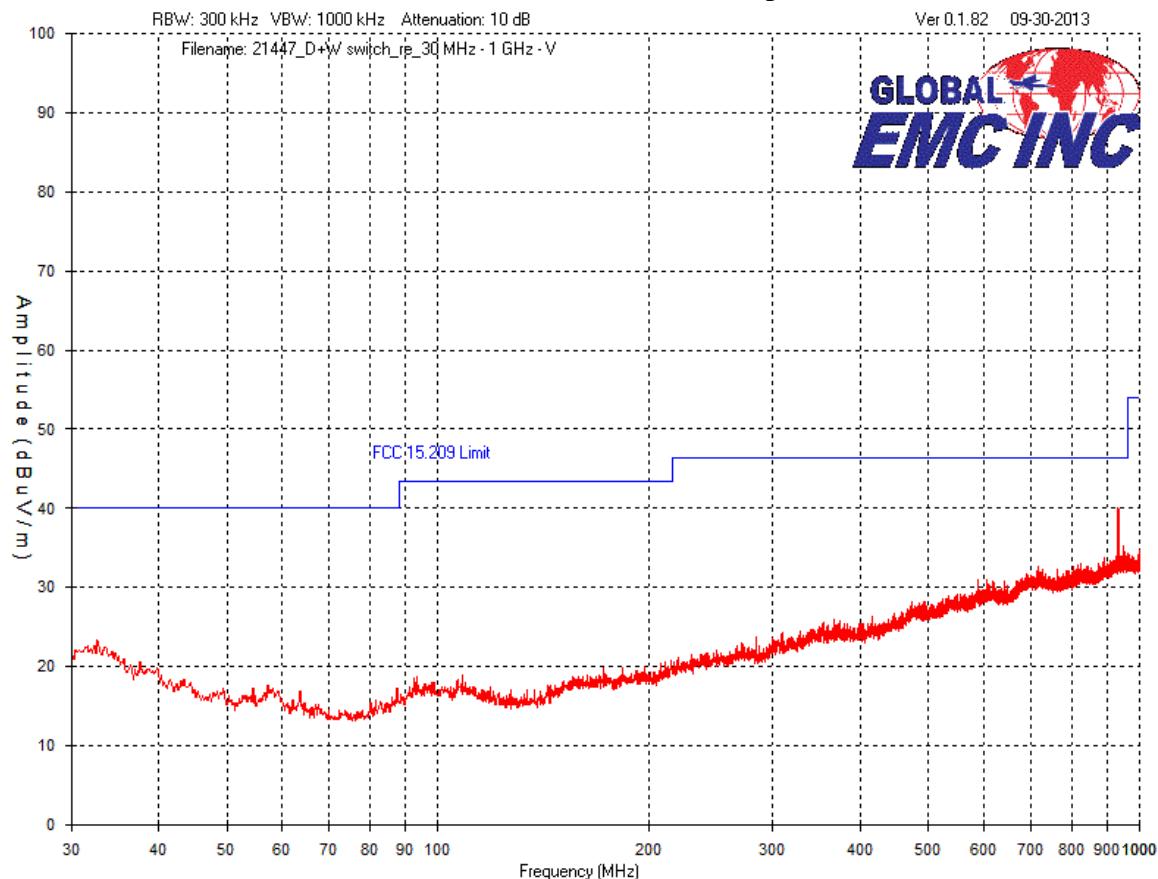
Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



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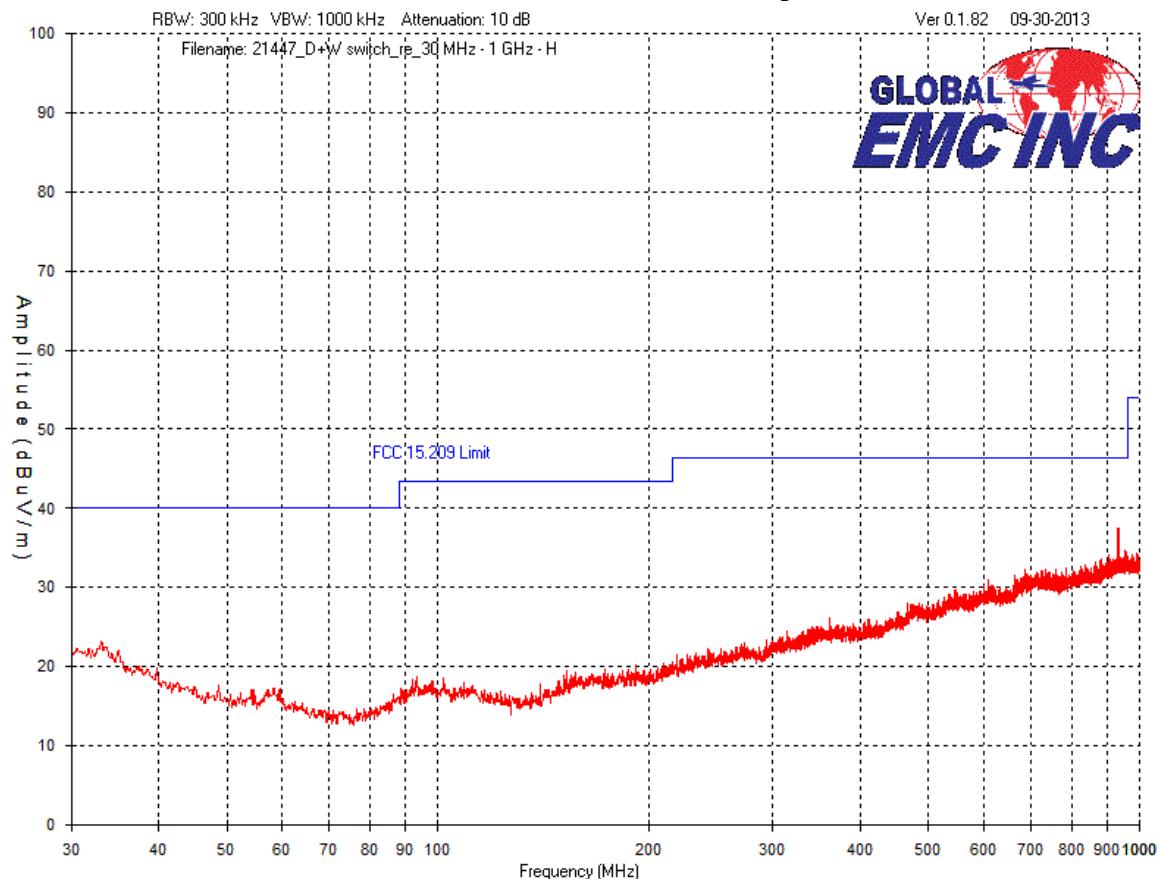
Hi Channel - 30 MHz – 1 GHz
Vertical – Peak Emission Graph



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Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



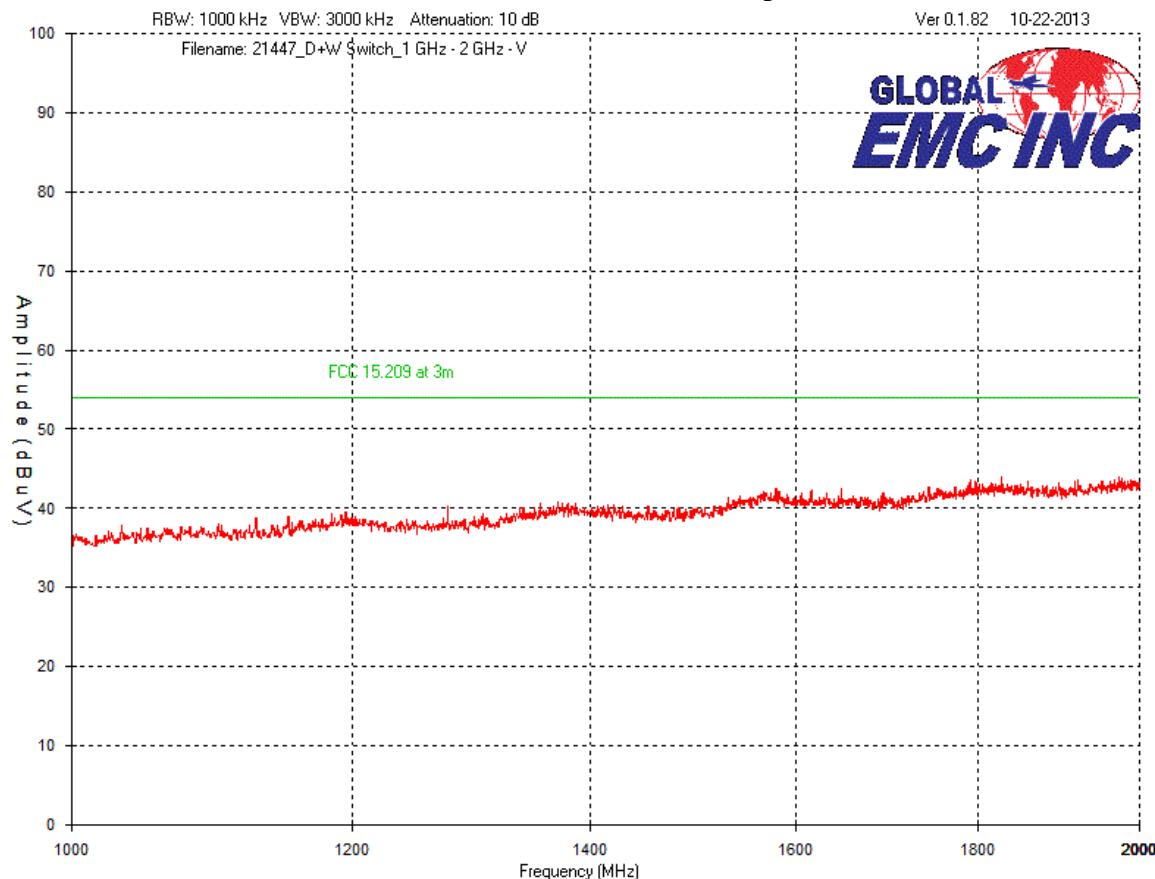
Hi Channel – 30 MHz – 1 GHz
Horizontal - Peak Emission Graph



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Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



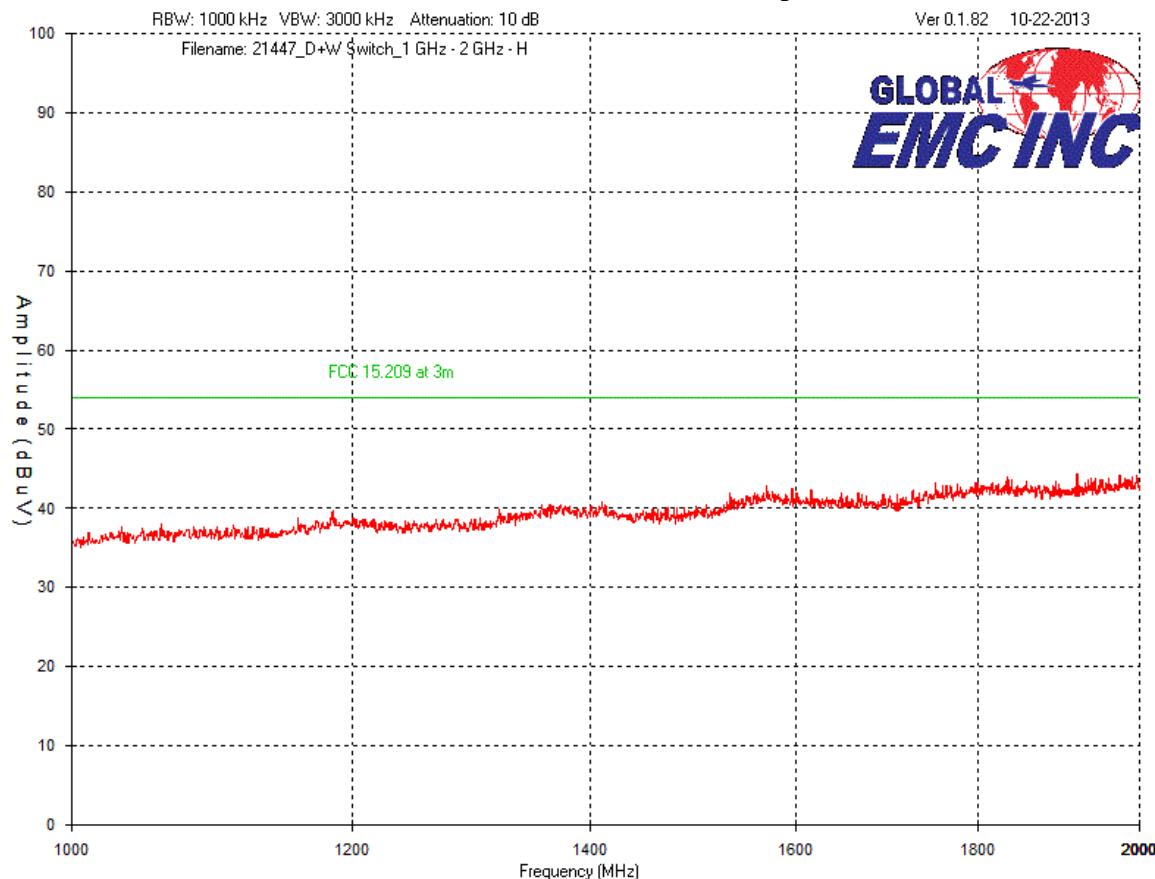
Hi Channel – 1 GHz – 2 GHz
Vertical - Peak Emission Graph



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



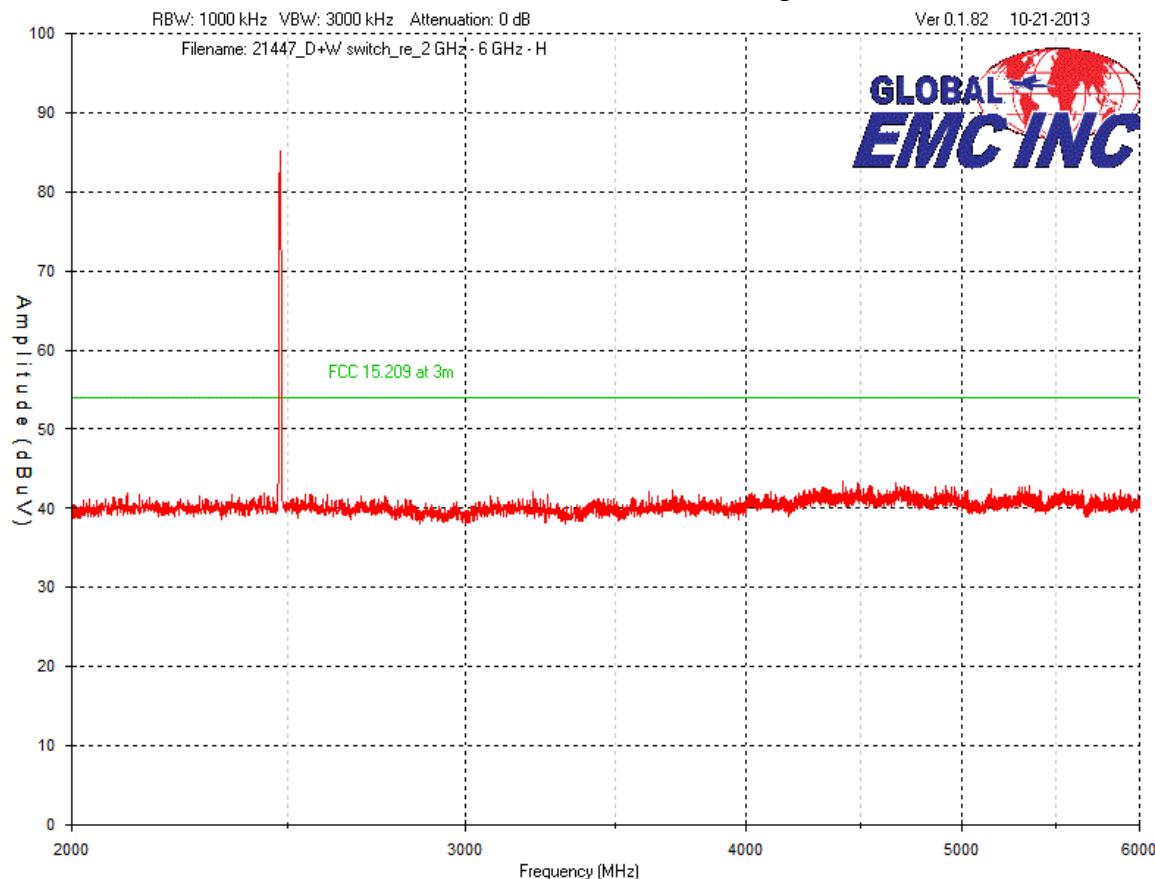
Hi Channel – 1 GHz – 2 GHz
Horizontal - Peak Emission Graph



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



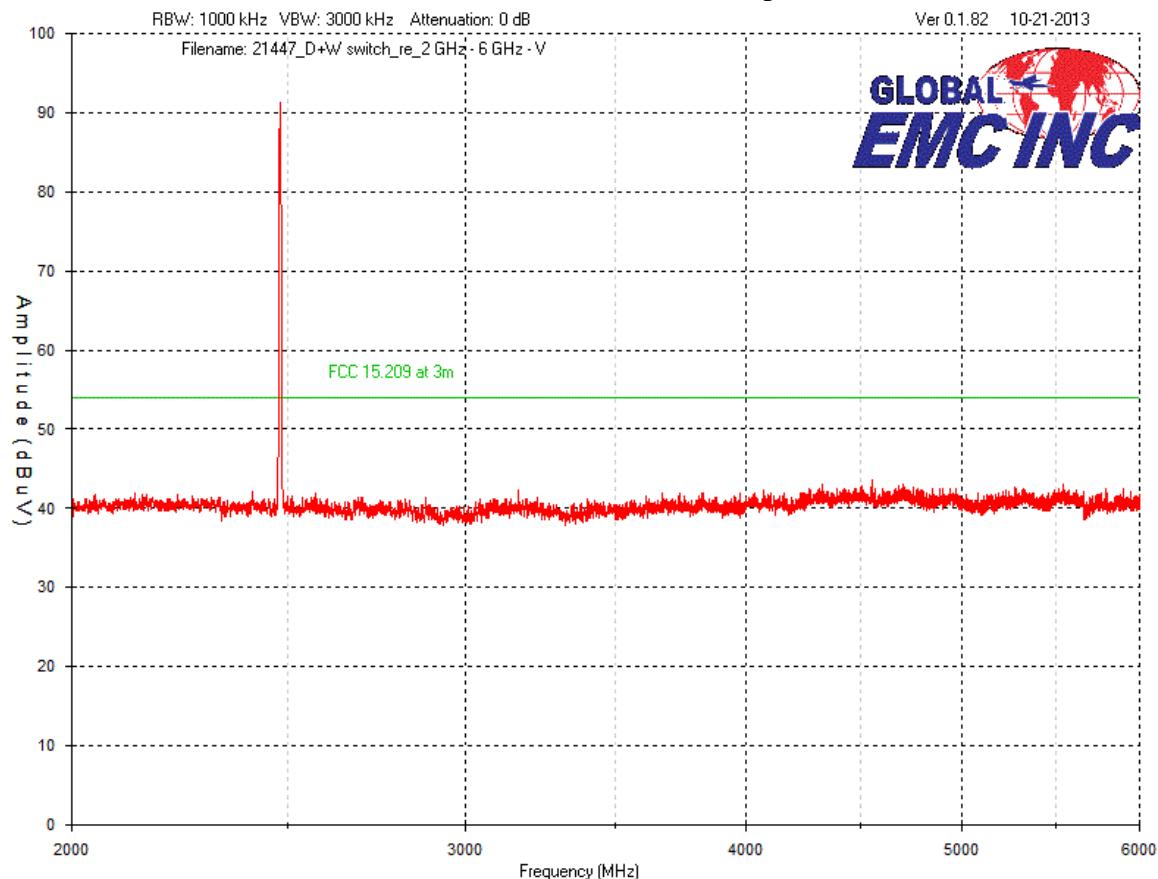
**Hi Channel – 2 GHz – 6 GHz
Horizontal - Peak Emission Graph**



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



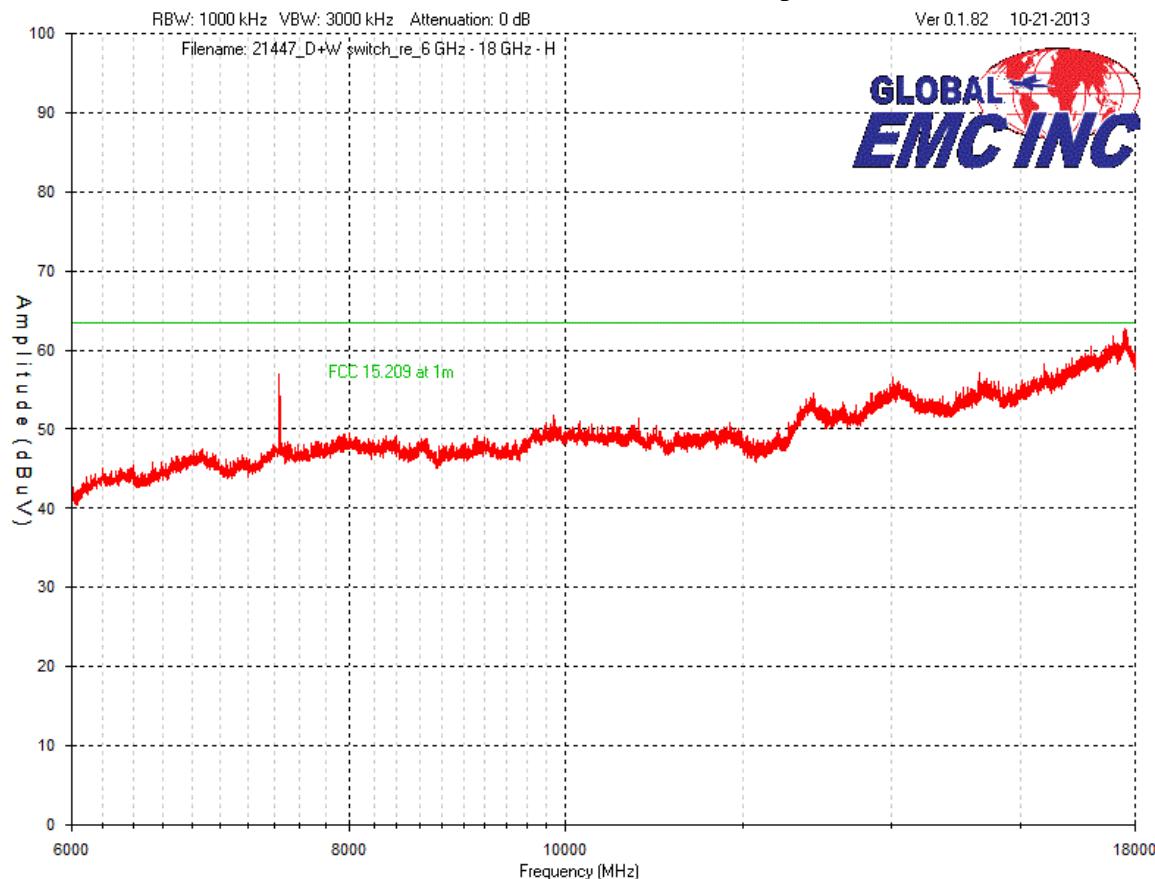
**Hi Channel – 2 GHz – 6 GHz
Vertical - Peak Emission Graph**



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



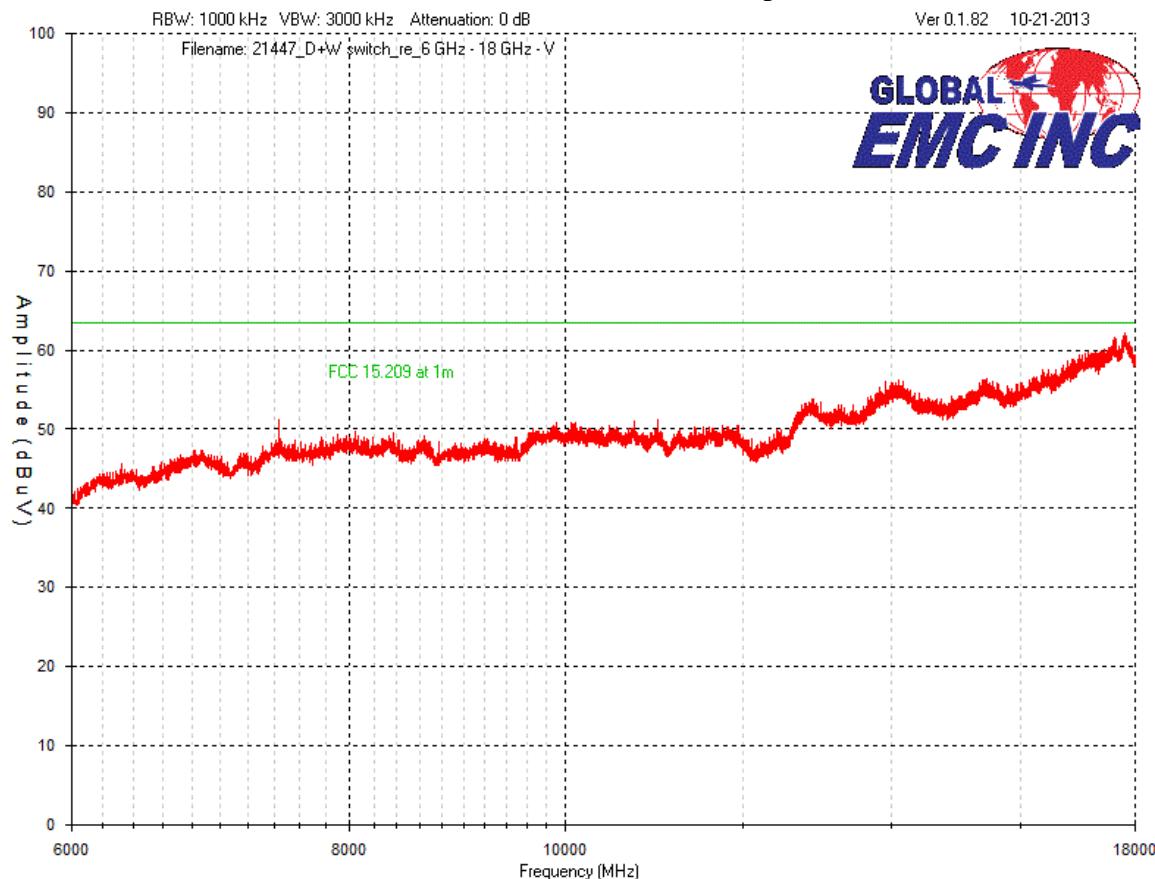
Hi Channel – 6 GHz – 18 GHz
Horizontal - Peak Emission Graph



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



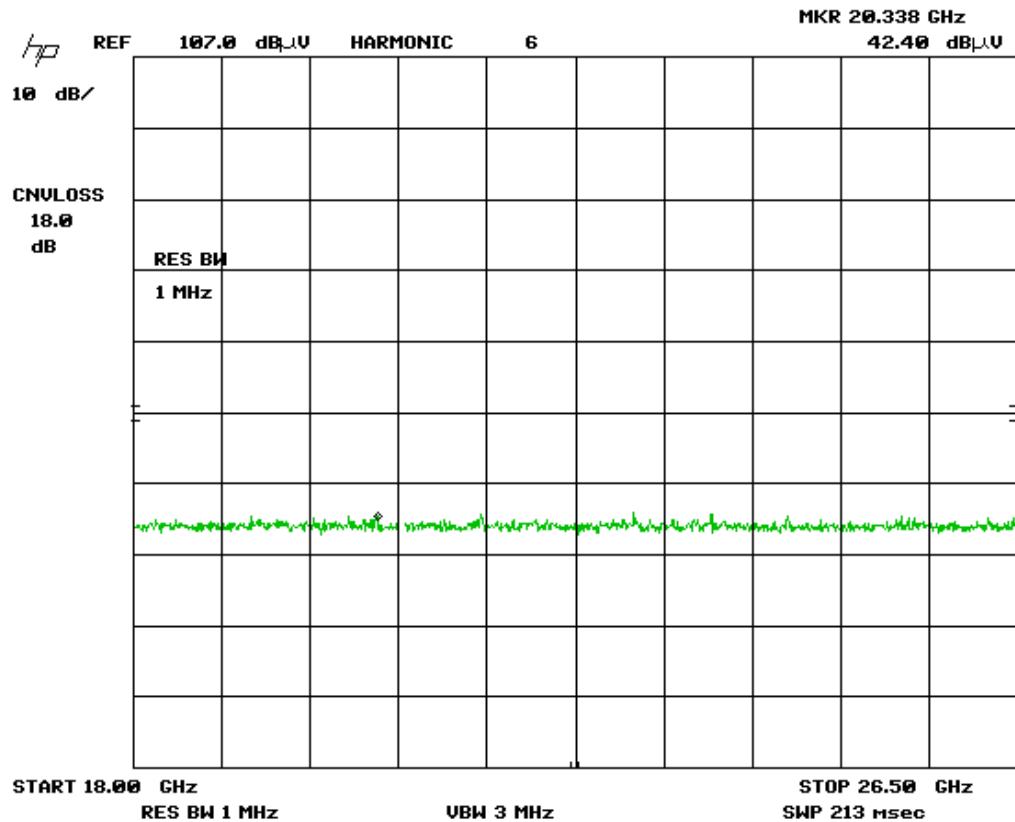
Hi Channel – 6 GHz – 18 GHz
Vertical - Peak Emission Graph



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



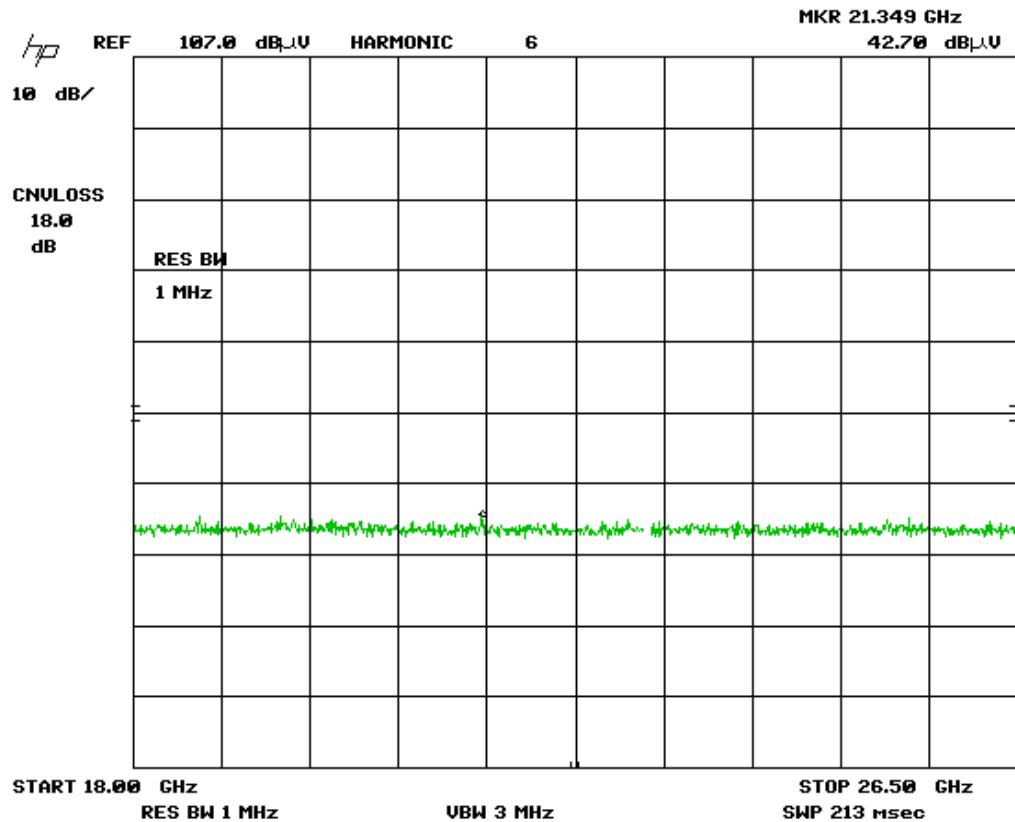
Mid Channel – 18 GHz – 26 GHz
Horizontal - Peak Emission Graph



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



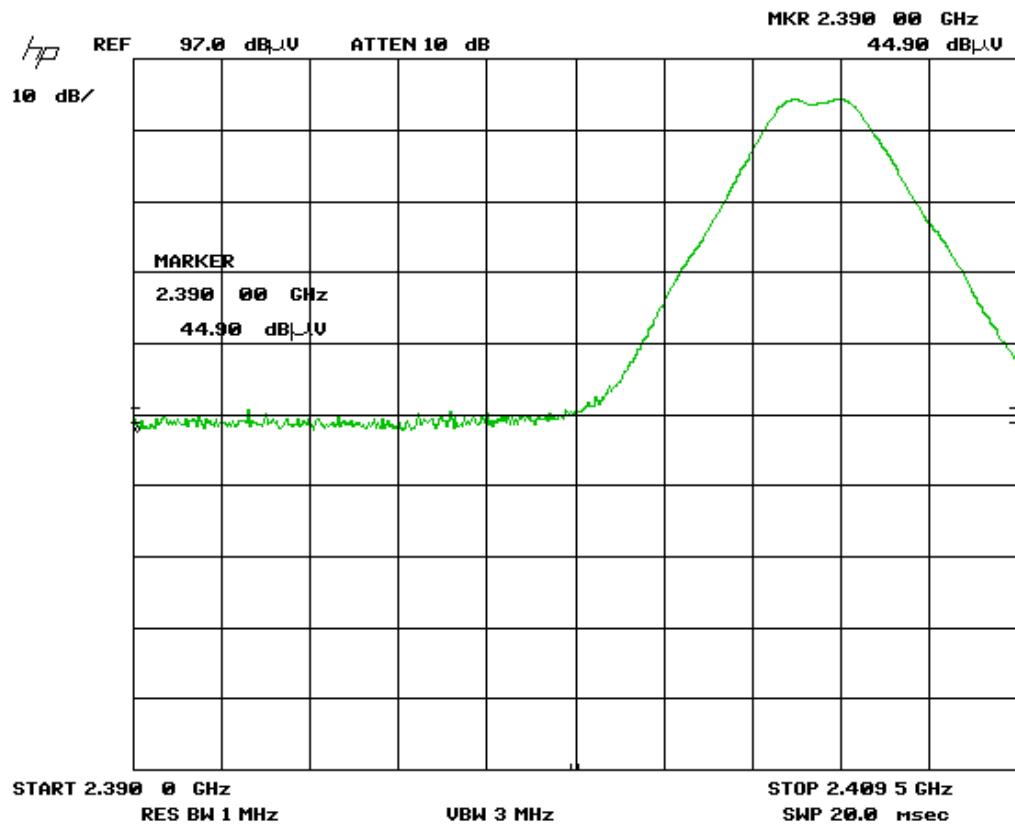
Mid Channel – 18 GHz – 26 GHz
Vertical - Peak Emission Graph



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



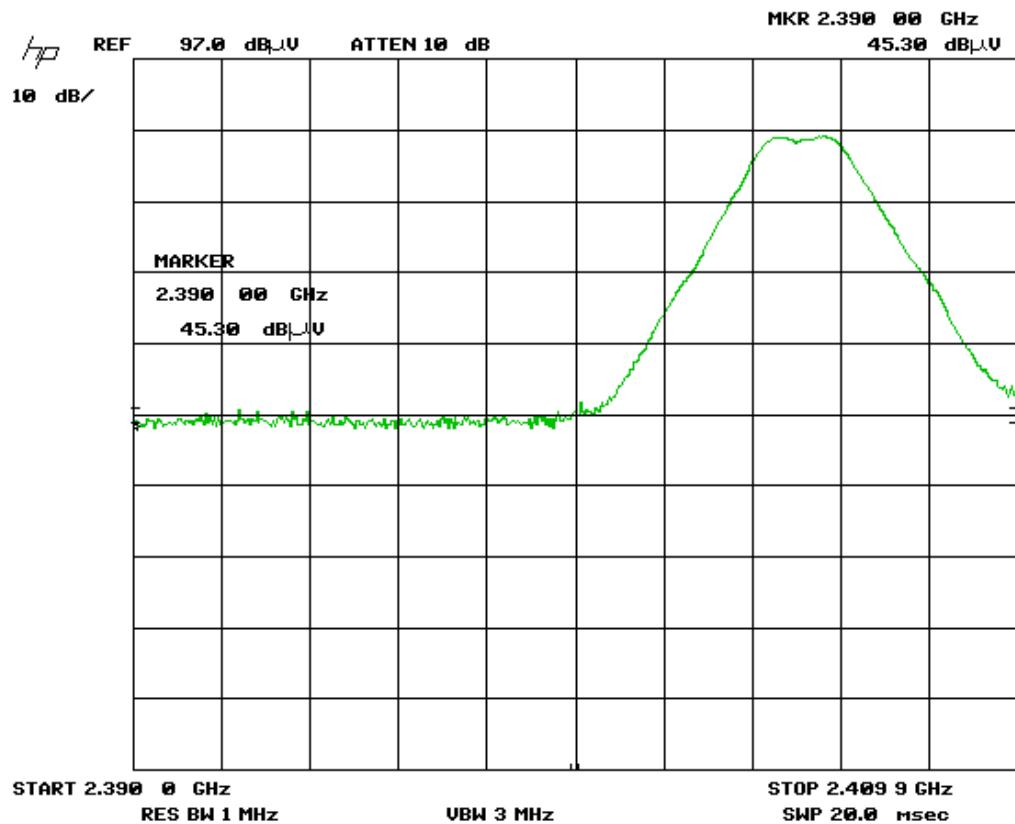
Band Edge – Low Channel
Vertical - Peak Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



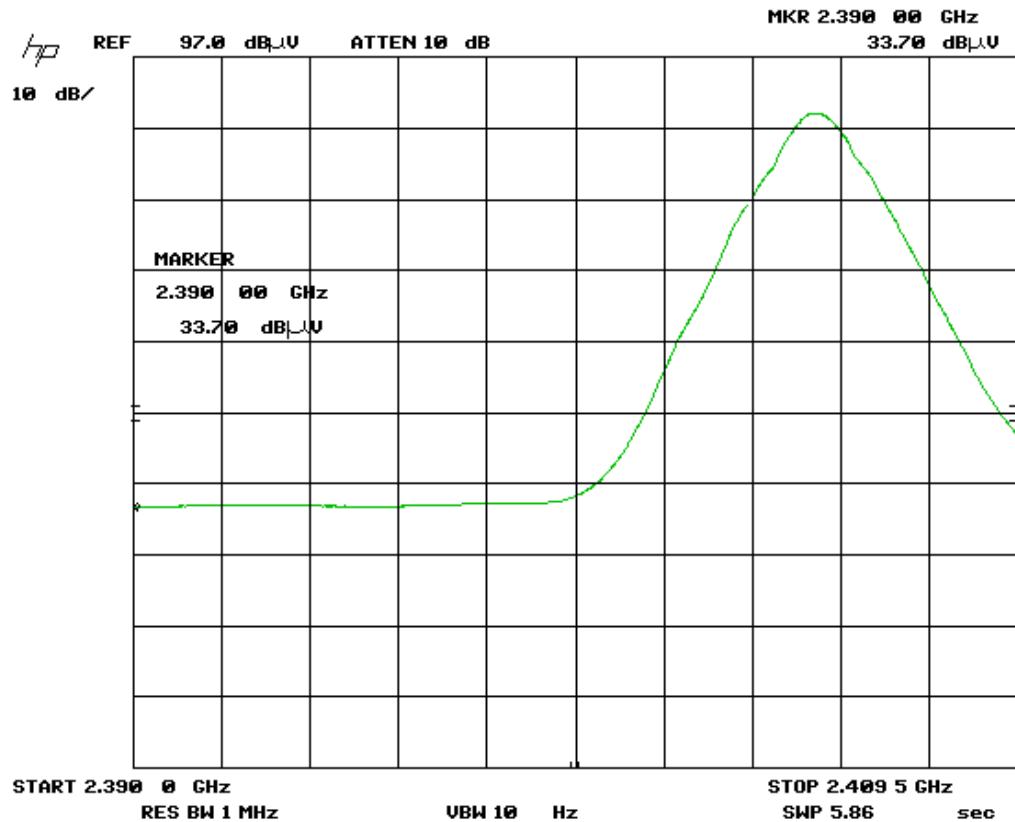
Band Edge – Low Channel
Horizontal - Peak Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



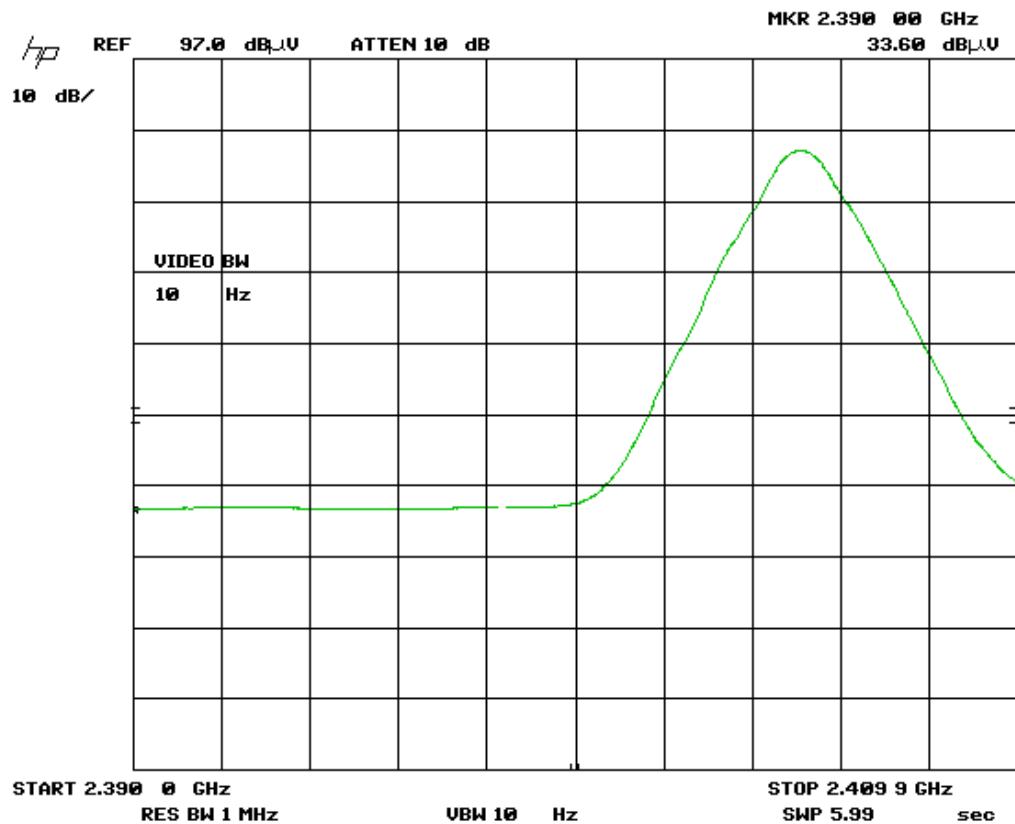
Band Edge – Low Channel
Vertical – Average Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



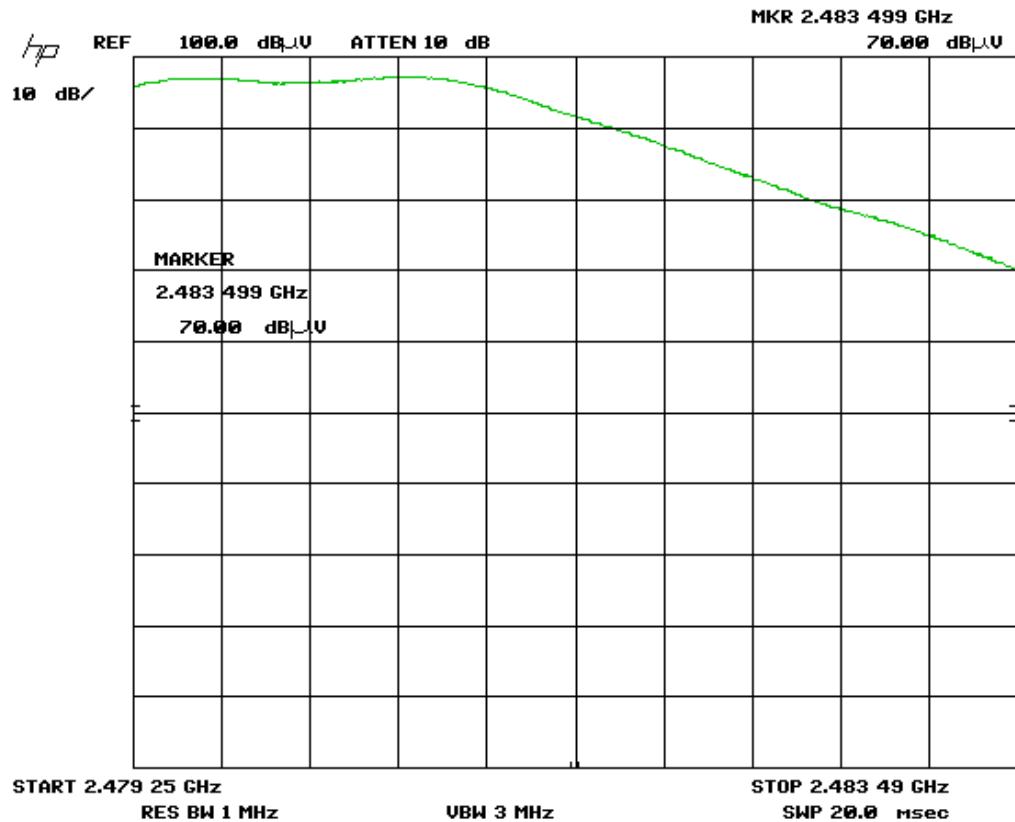
Band Edge – Low Channel
Horizontal - Average Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



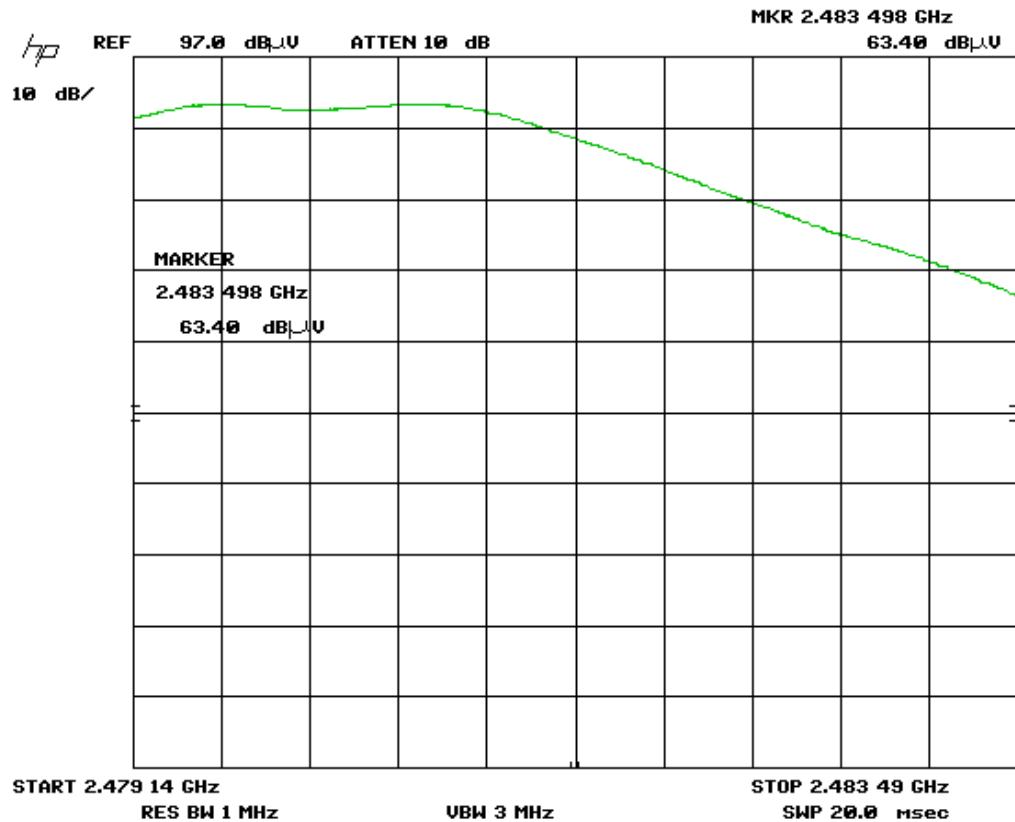
Band Edge – Hi Channel
Vertical - Peak Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



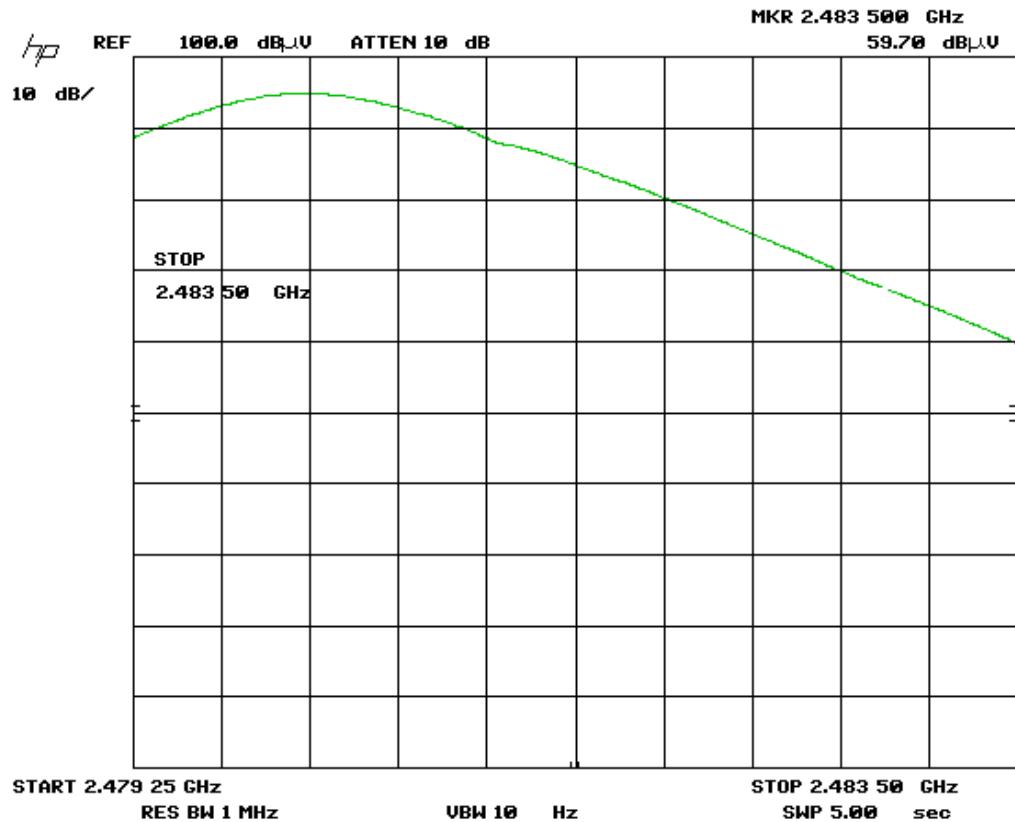
Band Edge – Hi Channel
Horizontal - Peak Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



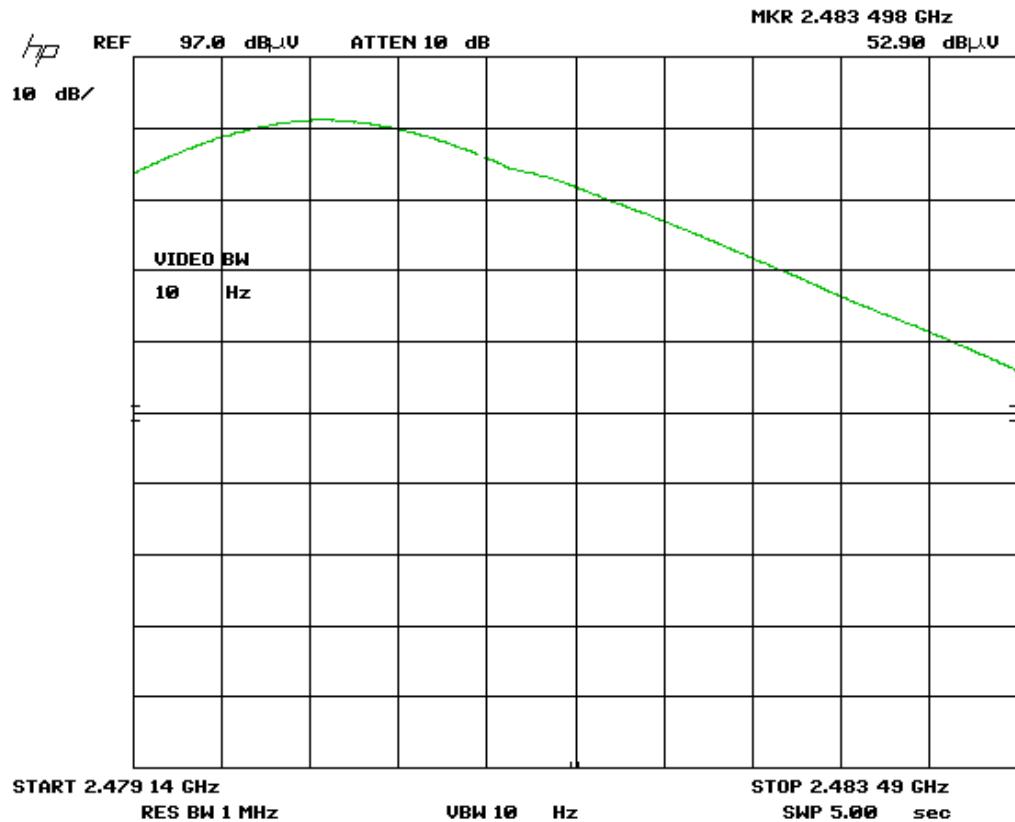
Band Edge – Hi Channel
Vertical - Average Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



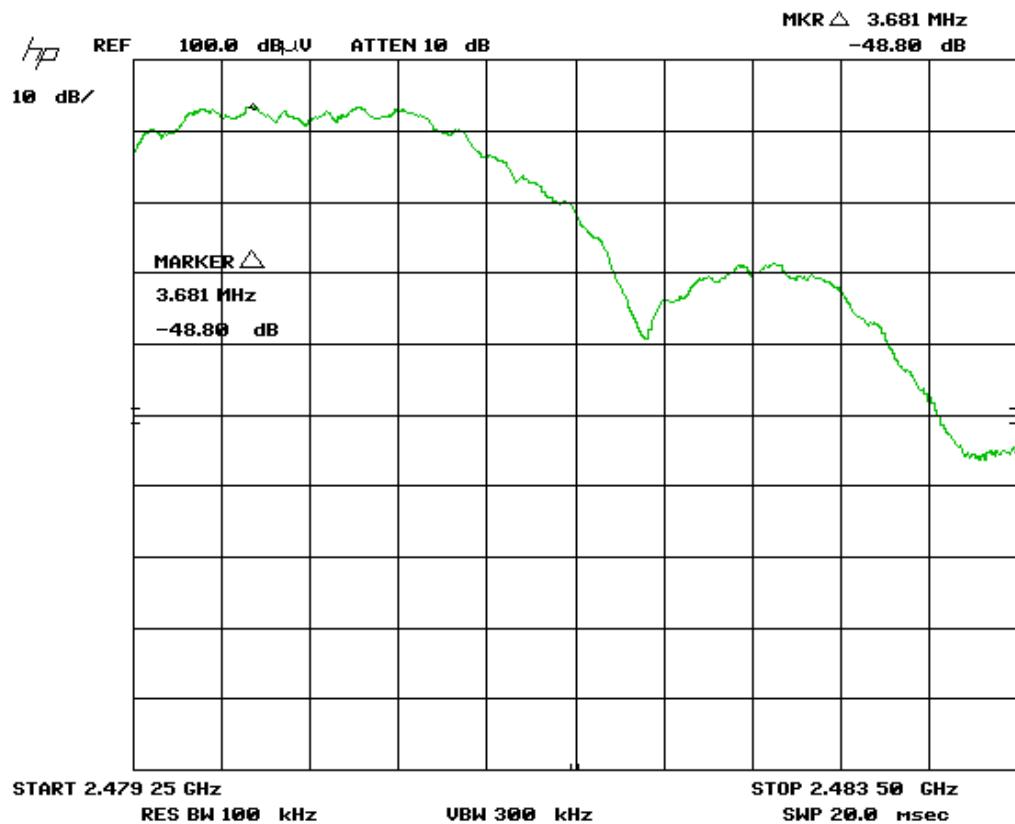
Band Edge – Hi Channel
Horizontal - Average Emission



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Band Edge – High channel
 Vertical – Marker-Delta measurement



Client	Viconics Technologies Inc							
Product	Wireless Door and Window Switch							
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013							



Final Measurements

Note: In accordance with 15.247(d), only frequencies exceeding the 15.209 limit that occur within the bands listed in 15.205, need to be verified with a final detector.

For frequency shown on the peak graphs and not listed in 15.205, measurements were taken for reference.

Low Channel (11) - Y axis (Horizontal)									
2405	Peak	Horz	84.2	30.6	5.4	0.0	36.2	84.0	
2405	Avg	Horz	82.2	30.6	5.4	0.0	36.2	82.0	
2405	Peak	Vert	89.4	30.6	5.4	0.0	36.2	89.2	
2405	Avg	Vert	87.2	30.6	5.4	0.0	36.2	87.0	
2390	Peak	Horz	45.8	30.6	5.4	0.0	36.2	45.6	74.0
2390	Avg	Horz	33.6	30.6	5.4	0.0	36.2	33.4	54.0
2390	Peak	Vert	46.3	30.6	5.4	0.0	36.2	46.1	74.0
2390	Avg	Vert	33.7	30.6	5.4	0.0	36.2	33.5	54.0
Low Channel (11) - X axis (Flat)									
2405	Peak	Horz	86.2	30.6	5.4	0.0	36.2	86.0	
2405	Avg	Horz	84.2	30.6	5.4	0.0	36.2	84.0	
2405	Peak	Vert	91.5	30.6	5.4	0.0	36.2	91.3	
2405	Avg	Vert	89.3	30.6	5.4	0.0	36.2	89.1	
2390	Peak	Horz	45.3	30.6	5.4	0.0	36.2	45.1	74.0
2390	Avg	Horz	33.6	30.6	5.4	0.0	36.2	33.4	54.0
2390	Peak	Vert	44.9	30.6	5.4	0.0	36.2	44.7	74.0
2390	Avg	Vert	33.7	30.6	5.4	0.0	36.2	33.5	54.0
4810	Peak	Horz	45.4	33.7	7.7	0.0	35.7	51.1	74.0
4810	Avg	Horz	30.9	33.7	7.7	0.0	35.7	36.6	54.0
4810	Peak	Vert	45.6	33.7	7.7	0.0	35.7	51.3	74.0
4810	Avg	Vert	32.1	33.7	7.7	0.0	35.7	37.8	54.0
7215	Peak	Vert	48.8	37.9	9.6	0.0	35.9	60.4	74.0
7215	Avg	Vert	34.7	37.9	9.6	0.0	35.9	46.3	54.0
7215	Peak	Horz	48.9	37.9	9.6	0.0	35.9	60.5	74.0
7215	Avg	Horz	34.7	37.9	9.6	0.0	35.9	46.3	54.0
Low Channel (11) - Z axis (Vertical)									
2405	Peak	Horz	84.3	30.6	5.4	0.0	36.2	84.1	
2405	Avg	Horz	82.0	30.6	5.4	0.0	36.2	81.8	
2405	Peak	Vert	88.3	30.6	5.4	0.0	36.2	88.1	
2405	Avg	Vert	86.2	30.6	5.4	0.0	36.2	86.0	
2390	Peak	Horz	44.9	30.6	5.4	0.0	36.2	44.7	74.0
2390	Avg	Horz	33.6	30.6	5.4	0.0	36.2	33.4	54.0
2390	Peak	Vert	45.6	30.6	5.4	0.0	36.2	45.4	74.0
2390	Avg	Vert	33.7	30.6	5.4	0.0	36.2	33.5	54.0

Client	Viconics Technologies Inc							
Product	Wireless Door and Window Switch							
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013							



Mid Channel (19) - X axis (Flat)									
2445	Peak	Horz	92.7	30.6	5.4	0.0	36.2	92.5	
2445	Avg	Horz	90.4	30.6	5.4	0.0	36.2	90.2	
2445	Peak	Vert	90.6	30.6	5.4	0.0	36.2	90.4	
2445	Avg	Vert	88.5	30.6	5.4	0.0	36.2	88.3	
Mid Channel (19) - Y axis (Horizontal)									
2445	Peak	Horz	87.8	30.6	5.4	0.0	36.2	87.6	
2445	Avg	Horz	85.6	30.6	5.4	0.0	36.2	85.4	
2445	Peak	Vert	93.6	30.6	5.4	0.0	36.2	93.4	
2445	Avg	Vert	91.4	30.6	5.4	0.0	36.2	91.2	
4890	Peak	Horz	46.5	33.4	7.7	0.0	35.7	51.9	74.0 22.1
4890	Avg	Horz	33.5	33.4	7.7	0.0	35.7	38.9	54.0 15.1
4890	Peak	Vert	46.7	33.4	7.7	0.0	35.7	52.1	74.0 21.9
4890	Avg	Vert	33.3	33.4	7.7	0.0	35.7	38.7	54.0 15.3
7335	Peak	Vert	49.1	37.9	9.6	0.0	35.9	60.7	74.0 13.3
7335	Avg	Vert	35.1	37.9	9.6	0.0	35.9	46.7	54.0 7.3
7335	Peak	Horz	52.6	37.9	9.6	0.0	35.9	64.2	74.0 9.8
7335	Avg	Horz	40.9	37.9	9.6	0.0	35.9	52.5	54.0 1.5
9780	Peak	Horz	50.5	39.0	7.4	0.0	36.2	60.7	74.0 13.3
9780	Avg	Horz	35.9	39.0	7.4	0.0	36.2	46.1	54.0 7.9
9780	Peak	Vert	49.8	39.0	7.4	0.0	36.2	60.0	74.0 14.0
9780	Avg	Vert	35.9	39.0	7.4	0.0	36.2	46.1	54.0 7.9
12225	Peak	Horz	49.1	38.8	8.4	0.0	35.4	60.9	74.0 13.1
12225	Avg	Horz	35.3	38.8	8.4	0.0	35.4	47.1	54.0 7.0
12225	Peak	Vert	49.7	38.8	8.4	0.0	35.4	61.5	74.0 12.6
12225	Avg	Vert	35.2	38.8	8.4	0.0	35.4	47.0	54.0 7.0
Mid Channel (19) - Z axis (Vertical)									
2445	Peak	Horz	85.7	30.6	5.4	0.0	36.2	85.5	
2445	Avg	Horz	82.7	30.6	5.4	0.0	36.2	82.5	
2445	Peak	Vert	92.9	30.6	5.4	0.0	36.2	92.7	
2445	Avg	Vert	90.7	30.6	5.4	0.0	36.2	90.5	

Client	Viconics Technologies Inc								
Product	Wireless Door and Window Switch								
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013								



High Channel (26) - X axis (Flat)									
2480	Peak	Horz	88.3	30.6	5.4	0.0	36.2	88.1	
2480	Avg	Horz	85.7	30.6	5.4	0.0	36.2	85.5	
2480	Peak	Vert	94.1	30.6	5.4	0.0	36.2	93.9	
2480	Avg	Vert	91.6	30.6	5.4	0.0	36.2	91.4	
2483.5	Peak	Horz	42.3	30.6	5.4	0.0	36.2	42.1	74.0 31.9
2483.5	Avg	Horz	39.7	30.6	5.4	0.0	36.2	39.5	54.0 14.5
2483.5	Peak	Vert	46.1	30.6	5.4	0.0	36.2	45.9	74.0 28.1
2483.5	Avg	Vert	43.6	30.6	5.4	0.0	36.2	43.4	54.0 10.6
2485.5	Peak	Horz	47.3	30.6	5.4	0.0	36.2	47.1	74.0 26.9
2485.5	Avg	Horz	35.5	30.6	5.4	0.0	36.2	35.3	54.0 18.7
2485.5	Peak	Vert	50.4	30.6	5.4	0.0	36.2	50.2	74.0 23.8
2485.5	Avg	Vert	39.2	30.6	5.4	0.0	36.2	39.0	54.0 15.0
High Channel (26) - Y axis (Horizontal)									
2480	Peak	Horz	90.7	30.6	5.4	0.0	36.2	90.5	
2480	Avg	Horz	88.2	30.6	5.4	0.0	36.2	88.0	
2480	Peak	Vert	97.3	30.6	5.4	0.0	36.2	97.1	
2480	Avg	Vert	95.0	30.6	5.4	0.0	36.2	94.8	
2483.5	Peak	Horz	44.3	30.6	5.4	0.0	36.2	44.1	74.0 29.9
2483.5	Avg	Horz	41.8	30.6	5.4	0.0	36.2	41.6	54.0 12.4
2483.5	Peak	Vert	48.5	30.6	5.4	0.0	36.2	48.3	74.0 25.7
2483.5	Avg	Vert	46.2	30.6	5.4	0.0	36.2	46.0	54.0 8.0
2485.5	Peak	Horz	48.3	30.6	5.4	0.0	36.2	48.1	74.0 25.9
2485.5	Avg	Horz	36.8	30.6	5.4	0.0	36.2	36.6	54.0 17.4
2485.5	Peak	Vert	52.5	30.6	5.4	0.0	36.2	52.3	74.0 21.7
2485.5	Avg	Vert	42.1	30.6	5.4	0.0	36.2	41.9	54.0 12.1
4960	Peak	Horz	46.1	33.7	7.7	0.0	35.7	51.8	74.0 22.2
4960	Avg	Horz	32.4	33.7	7.7	0.0	35.7	38.1	54.0 15.9
4960	Peak	Vert	45.6	33.7	7.7	0.0	35.7	51.3	74.0 22.7
4960	Avg	Vert	33.2	33.7	7.7	0.0	35.7	38.9	54.0 15.1
7440	Peak	Vert	49.8	38.5	9.6	0.0	35.9	62.0	74.0 12.0
7440	Avg	Vert	36.1	38.5	9.6	0.0	35.9	48.3	54.0 5.7
7440	Peak	Horz	51.7	38.5	9.6	0.0	35.9	63.9	74.0 10.1
7440	Avg	Horz	38.9	38.5	9.6	0.0	35.9	51.1	54.0 2.9
9920	Peak	Horz	49.9	39.0	7.4	0.0	36.2	60.1	74.0 13.9
9920	Avg	Horz	35.8	39.0	7.4	0.0	36.2	46.0	54.0 8.0
9920	Peak	Vert	49.9	39.0	7.4	0.0	36.2	60.1	74.0 13.9
9920	Avg	Vert	35.8	39.0	7.4	0.0	36.2	46.0	54.0 8.0
12400	Peak	Horz	49.9	38.8	8.6	0.0	35.3	62.0	74.0 12.0
12400	Avg	Horz	35.9	38.8	8.6	0.0	35.3	48.0	54.0 6.0
12400	Peak	Vert	49.9	38.8	8.6	0.0	35.3	62.0	74.0 12.0
12400	Avg	Vert	35.7	38.8	8.6	0.0	35.3	47.8	54.0 6.2
High Channel (26) - Z axis (Vertical)(20 dBm)									
2480	Peak	Horz	88.8	30.6	5.4	0.0	36.2	88.6	
2480	Avg	Horz	86.7	30.6	5.4	0.0	36.2	86.5	
2480	Peak	Vert	97.2	30.6	5.4	0.0	36.2	97.0	
2480	Avg	Vert	94.7	30.6	5.4	0.0	36.2	94.5	
2483.5	Peak	Horz	41.9	30.6	5.4	0.0	36.2	41.7	74.0 32.3
2483.5	Avg	Horz	39.8	30.6	5.4	0.0	36.2	39.6	54.0 14.4
2483.5	Peak	Vert	47.8	30.6	5.4	0.0	36.2	47.6	74.0 26.4
2483.5	Avg	Vert	45.3	30.6	5.4	0.0	36.2	45.1	54.0 8.9
2485.5	Peak	Horz	48.1	30.6	5.4	0.0	36.2	47.9	74.0 26.1
2485.5	Avg	Horz	36.1	30.6	5.4	0.0	36.2	35.9	54.0 18.1
2485.5	Peak	Vert	52.3	30.6	5.4	0.0	36.2	52.1	74.0 21.9
2485.5	Avg	Vert	41.8	30.6	5.4	0.0	36.2	41.6	54.0 12.4

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Note:

1. The marker-delta method was used at 2483.5 MHz band edge measurement. The RBW = 100 kHz is used to obtain the marker-delta value.

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Quasi Peak Adapter	85650A	HP	12/21/ 2011	12/21/2013	GEMC 7
Loop Antenna	EM 6871	Electro-Metrics	Feb 5, 2013	Feb 5, 2015	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Feb 5, 2013	Feb 5, 2015	GEMC 71
BiLog Antenna	3142-C	ETS	Feb 4, 2013	Feb 4, 2015	GEMC 137
Attenuator 10 dB	8493B	Agilent	NCR	NCR	GEMC 133
4GHZ-12GHz High Pass filter	11SH10-4000/T12000-0/0	K & L Microwave	NCR	NCR	GEMC 119
Chase Preamp 9kHz - 2 GHz	CPA9231A	Chase	8/29/2012	8/29/2014	GEMC 6403
Q-Par 1.5-18 GHz Horn	6878/24	Q-par	8/23/2012	8/23/2014	GEMC 6365
Horn Antenna 18 GHz - 26.5 GHz	SAS-572	A.H. Systems	8/27/2012	8/27/2014	GEMC 6371
18.0-26.5 GHz Harmonic Mixer	11970K	HP	21-Dec-11	21-Dec-13	GEMC 158
1-26G pre-amp	HP 8449B	HP	8/22/2012	8/22/2014	GEMC 6351
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 0.5M	LMR-400-0.5M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 31

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions_Rev1.doc"

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Power Spectral Density - DM

Purpose

The purpose of this test is to ensure that the maximum power spectral density to the radiating element does not exceed the limits specified. This ensures that the modulation is significantly wide enough, or low enough in power that it will allow for co-operation of other wireless devices operating within this frequency allocation.

Limits

The limits are defined in 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.

Results

The EUT passed. Low, medium, and high band was tested. The worst case value is -12.3 dBm as measured with a 3 kHz resolution bandwidth (peak power).

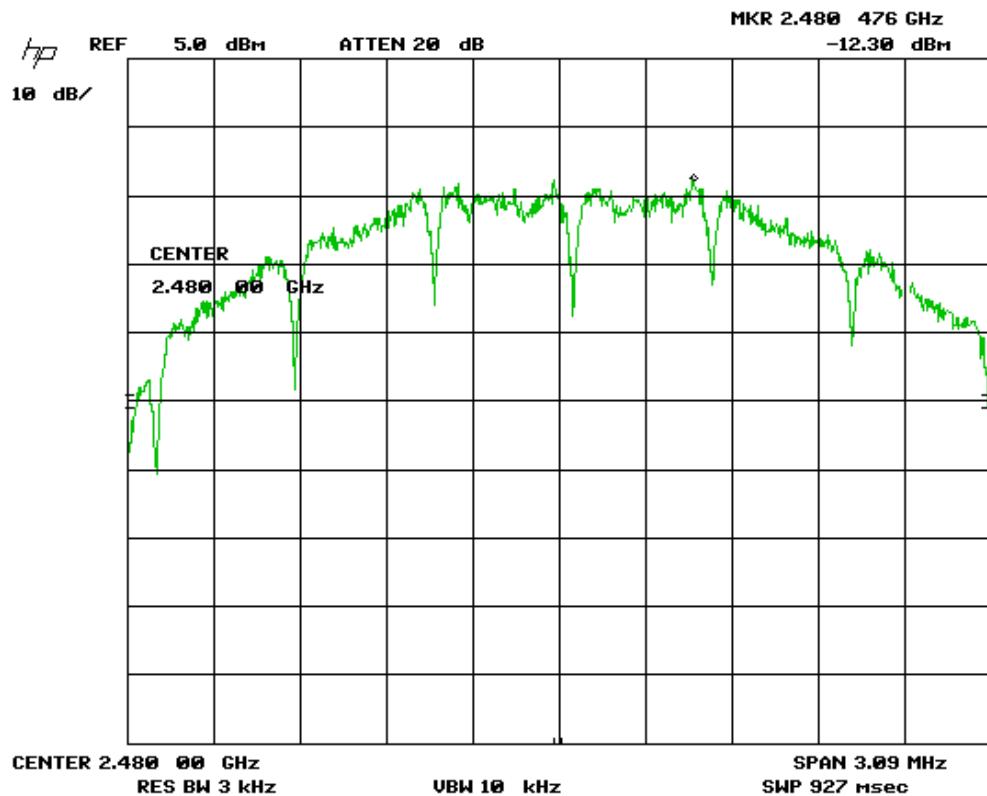
Graph(s)

The graphs shown below show the power spectral density of the device during the conducted measurement operation of the EUT. Low, middle, and high channel was investigated in each mode, with the worst case being presented.

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



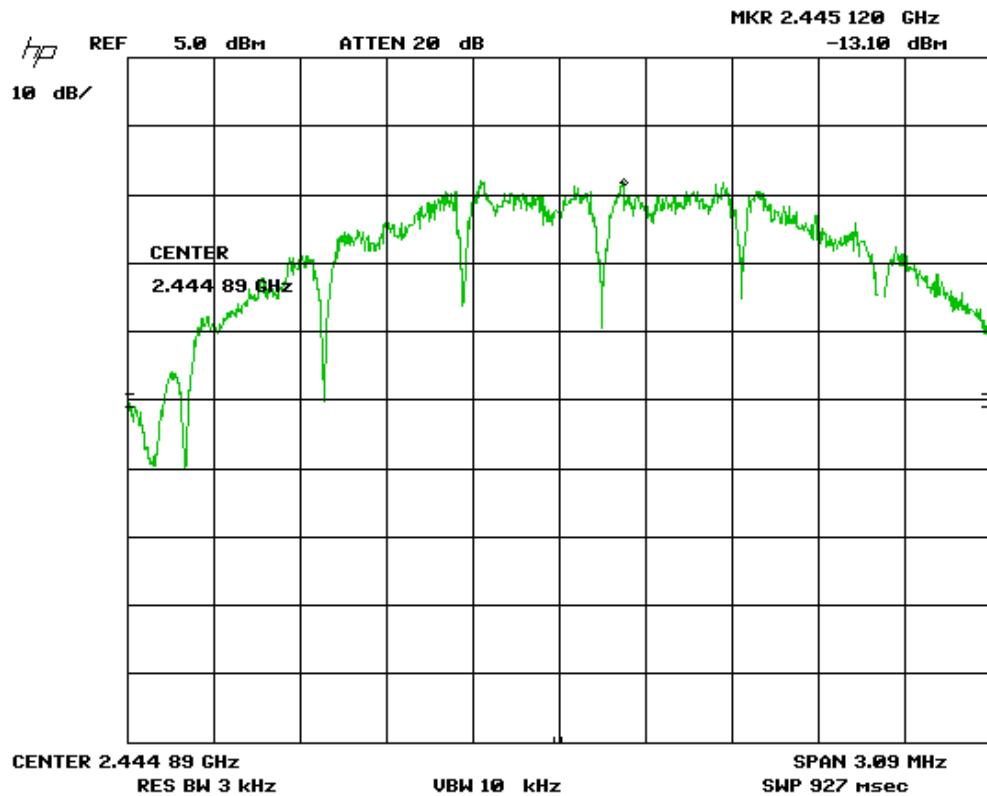
High Channel



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



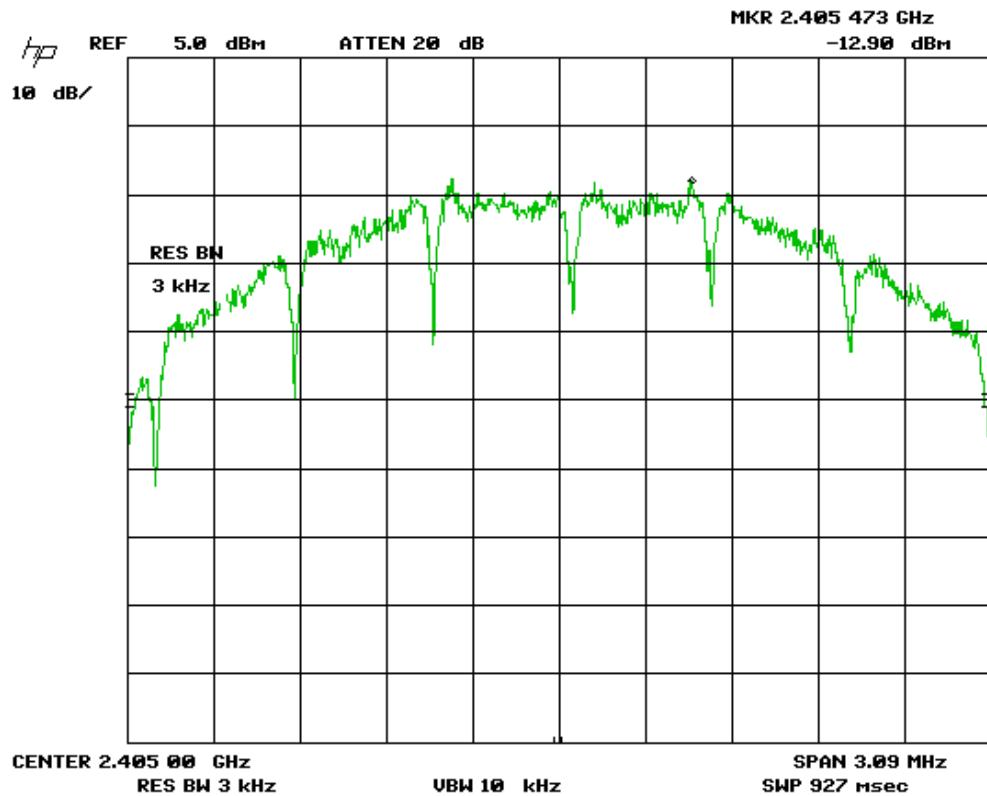
Mid Channel



Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Low Channel



Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
Quasi Peak Adapter	85650A	HP	12/21/ 2011	12/21/2013	GEMC 7
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B_Rev1"

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Maximum Permissible Exposure

Purpose

The purpose of this test is to ensure that the RF energy intentionally transmitted, in terms of power density emitted from the EUT at a stated operating distance does not exceed the limits listed below as defined in the applicable test standard, as calculated based upon readings obtained during testing. This helps protect human exposure to excessive RF fields.

Limit(s) and Method

The limits, as defined in FCC 15.247(i) and FCC 1.1310 Table 1 (B) limits for general public exposure was applied. The limit for the frequency range of 1.5 GHz to 100 GHz was applied. This is a limit of 1.0 mW/ cm². The distance used for calculations was 20cm, as this is the minimum distance an operator will be from the EUT during normal operation, as stated by the manufacturer.

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Results

The EUT passed the requirements. The worst case calculated power density was 0.0004 mW/cm², this is significantly under the 1.0 mW/cm² requirement.

Calculations

Method 1 (conducted power)

Internal antenna

$$P_d = (P_t * G) / (4 * \pi * R^2)$$

Where Pt = 3.30 dBm or 2.14 mW as per Peak power conducted output

Where G = 0 dBi, or numerically 1.0

Where R = 20 cm

$$P_d = (2.14 \text{ mW} * 1.0) / (4 * \pi * 20\text{cm}^2)$$

$$P_d = 2.14 \text{ mW} / 5026 \text{ cm}^2$$

$$P_d = 0.0004 \text{ mW/cm}^2$$

Client	Viconics Technologies Inc	
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Appendix A – EUT Summary

For further details for filing purposes, refer to filing package.

General EUT Description

Client	
Organization	Viconics Electronics Inc. 9245 Langelier Blvd. Montreal, Quebec, Canada, H1P 3K9
Contact	Paolo Primiani
Phone	514-321-5660
Email	Paolo.Primiani@schneider-electric.com
EUT Details	
EUT Name (for report title)	Wireless Door and Window Switch
EUT Model / SN (if known)	VWAP
FCC ID	V95-VWAP
Industry Canada #	7591A-VWAP
Equipment category	Wireless module
EUT is powered using	DC
Input voltage range(s) (V)	Two triple A battery
Frequency range(s) (Hz)	DC
Transmits RF energy? (describe)	Yes
Basic EUT functionality description	EUT is a wireless door or window contact.

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see ‘Appendix B – EUT & Test Setup Photographs’.

Client	Viconics Technologies Inc	 The logo for Global EMC Inc. It features the word "GLOBAL" in blue capital letters at the top, with a small blue star above the letter "O". Below "GLOBAL" is a stylized red globe with white latitude and longitude lines. Underneath the globe, the words "EMC INC" are written in large, bold, blue capital letters.
Product	Wireless Door and Window Switch	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013	

Appendix B – EUT and Test Setup Photographs

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.



Illustration 1: EUT front external view

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Illustration 2: EUT rear external view

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013

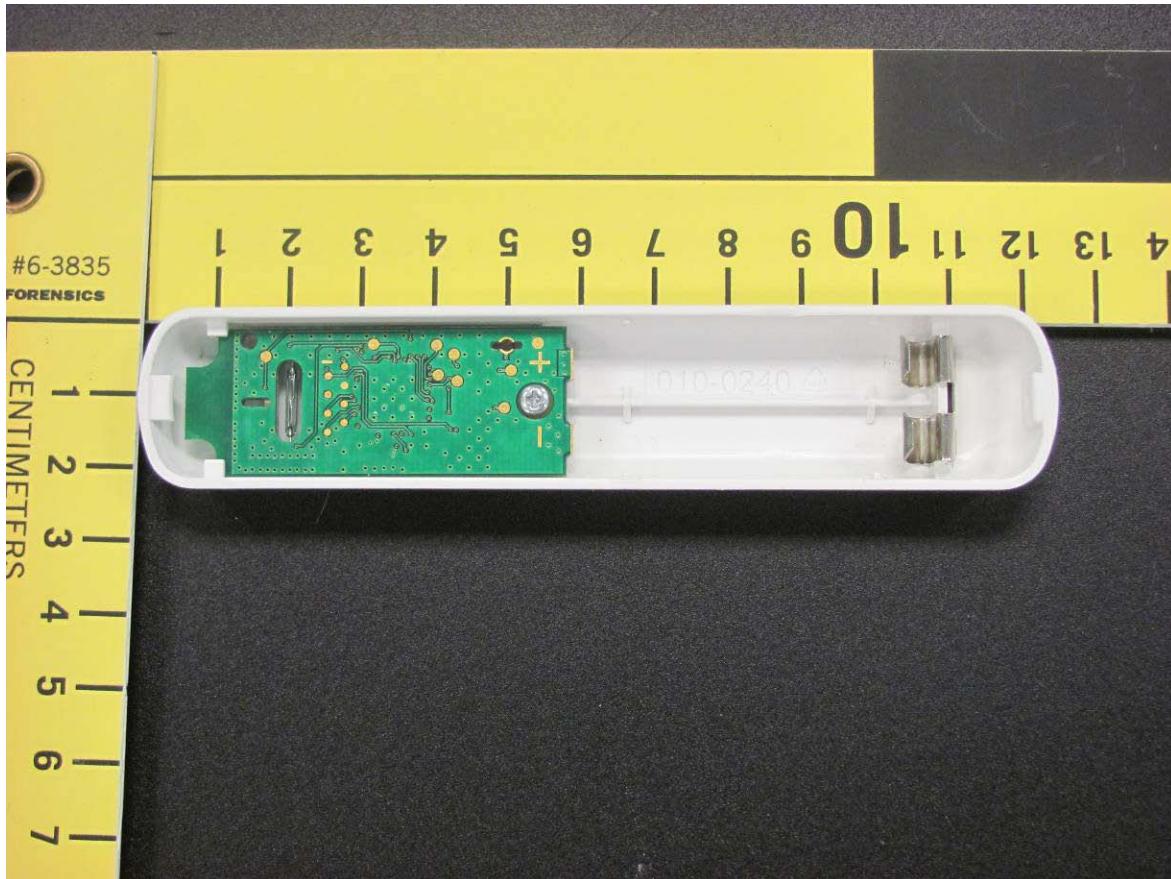


Illustration 3: EUT internal view

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013

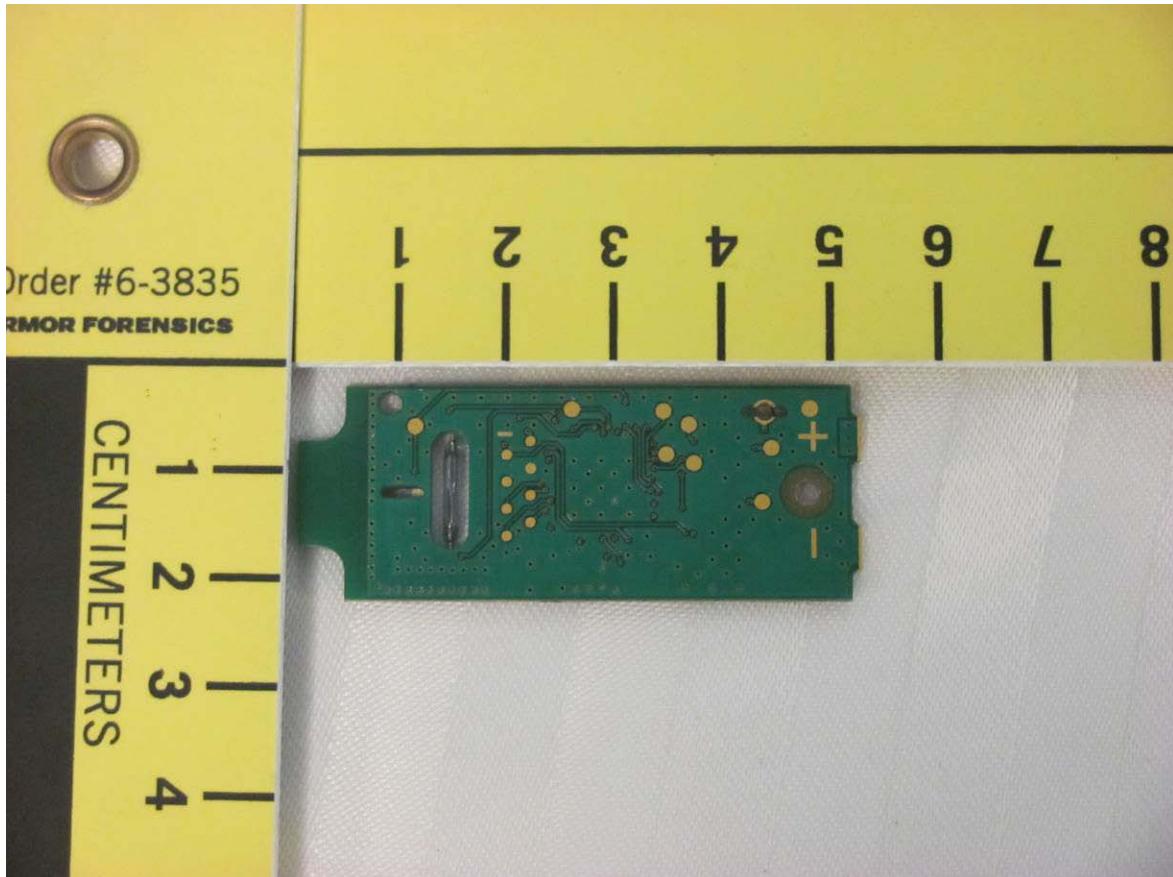


Illustration 4: EUT PCB rear view

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013

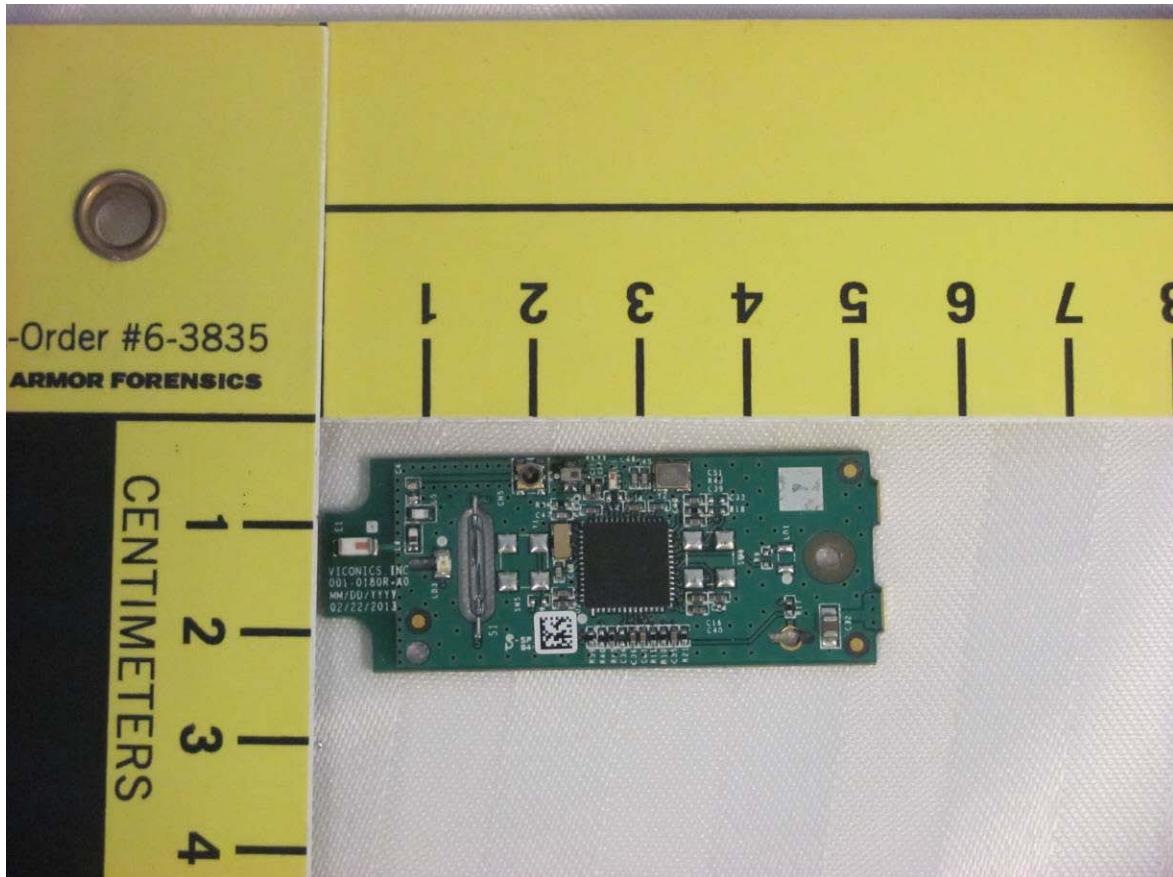


Illustration 5: EUT PCB front view

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013

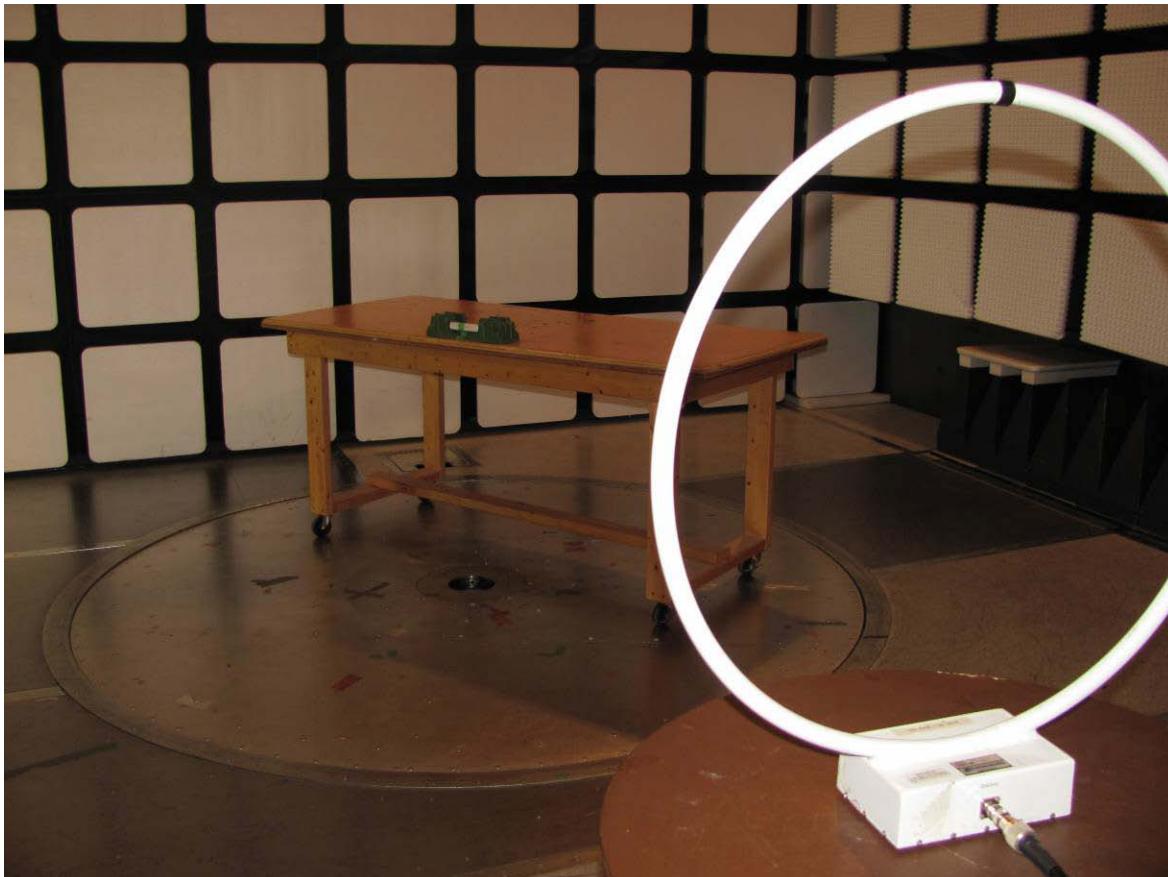


Illustration 6: Radiated emission setup – photo 1

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013



Illustration 7: Radiated emission setup - photo 2

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013

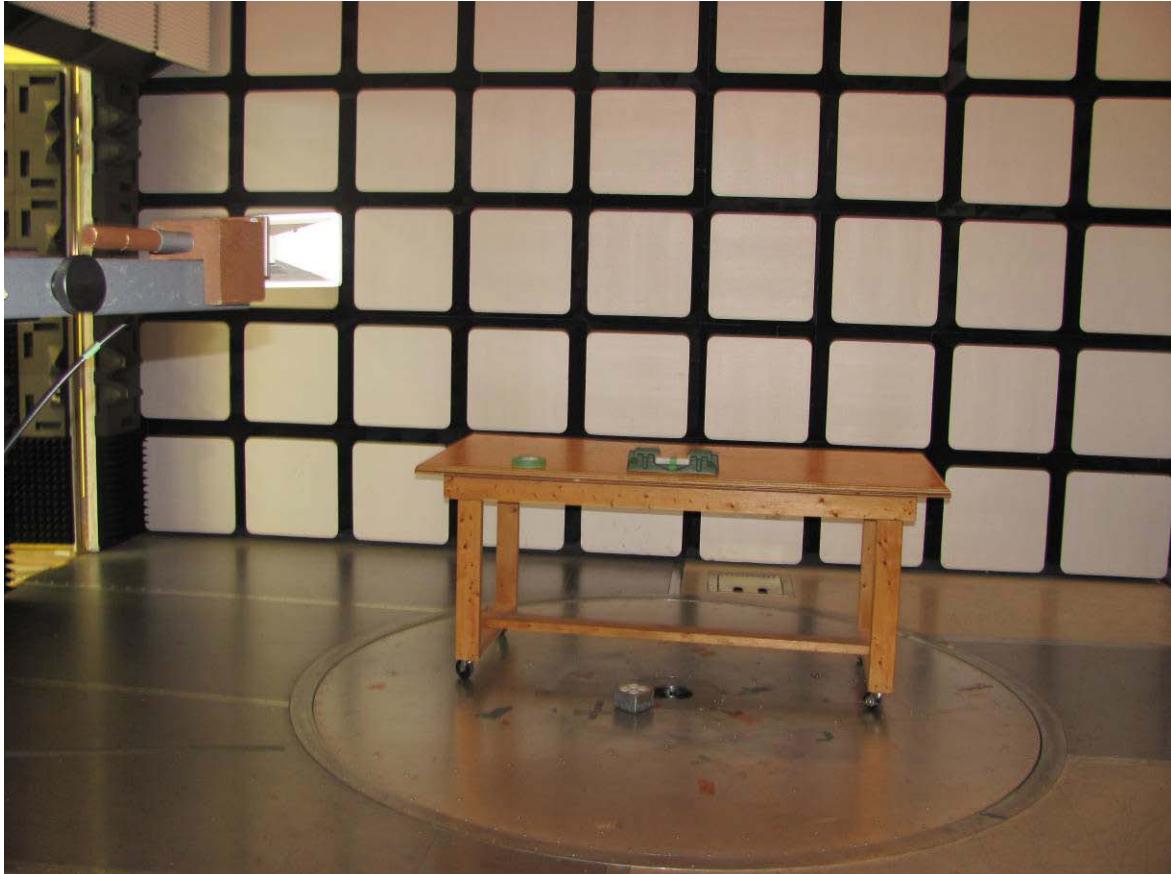


Illustration 8: Radiated setup - photo 3

Client	Viconics Technologies Inc
Product	Wireless Door and Window Switch
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2013

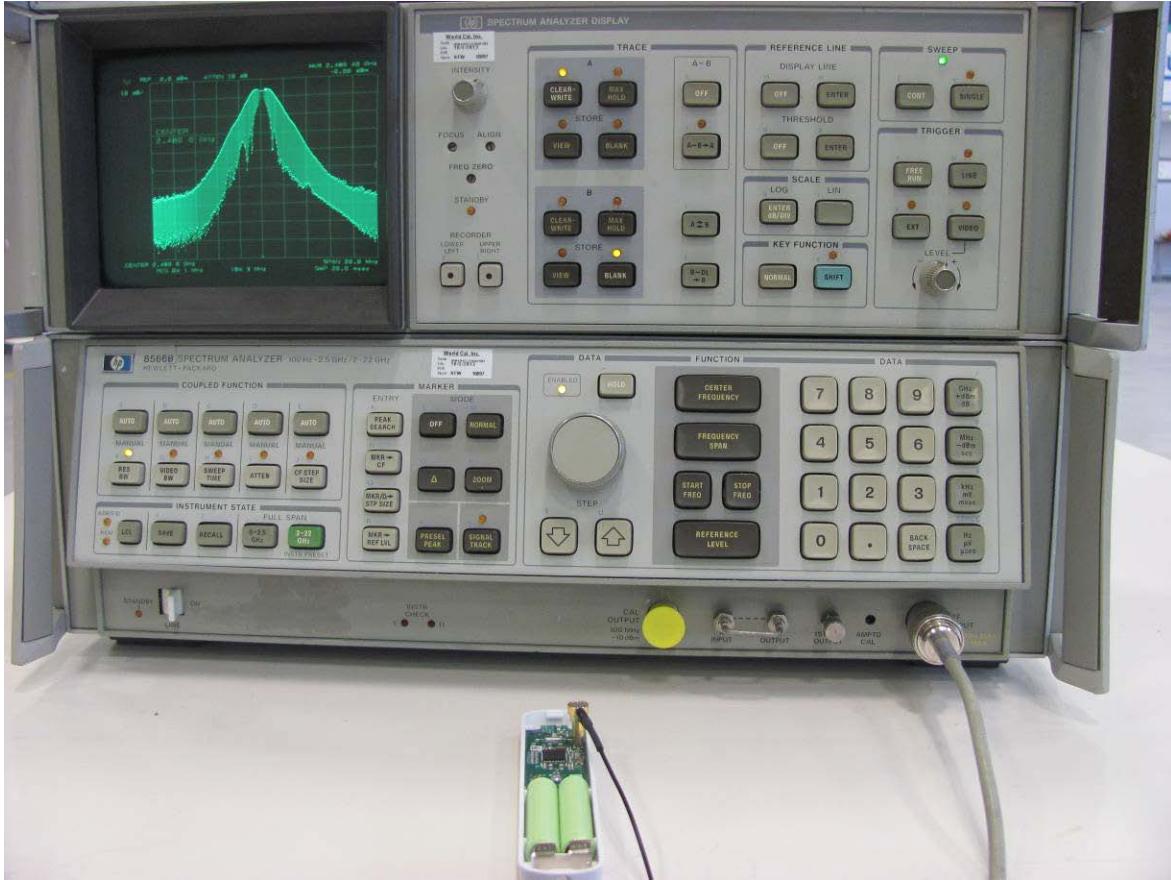


Illustration 9: Antenna conducted emission setup