



Canada

EMC & RF Test Report

As per

RSS-247 Issue 2:2017 & FCC Part 15 Subpart 15.247:2016

Unlicensed Intentional Radiators

on the

VTGP Transceiver Card (with SER8150RB1194 host)

Issued by: **TÜV SÜD Canada Inc.**
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Testing produced
for



See Appendix A for
full client &
EUT details.

Scott
Drysdale,
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Registration #
6844B-1



Testing Laboratory
Certificate #2955.02




Registration #
382292

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

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Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
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Report Scope

This report addresses the EMC verification testing and test results of the VTGP Transceiver Card (Alternate Host) and is herein referred to as EUT (Equipment Under Test). The EUT was tested for compliance against the following standards:

RSS-247 Issue 2:2017

FCC Part 15 Subpart C 15.247:2016

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

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc. accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc., unless otherwise stated.


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Summary

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

EUT:	VTGP Transceiver Card (with SER8150RB1194 host)
FCC Certification #, FCC ID:	V95-VTGP
Industry Canada Certification #, IC:	7591A-VTGP
EUT passed all tests performed	Yes (see test results summary)
Tests conducted by	Scott Drysdale

For testing dates, see "Testing Environmental Conditions and Dates".

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Test Results Summary

Standard/Method	Description	Class/Limit	Result
FCC 15.203	Antenna Requirement	Unique	Pass See Justification
FCC 15.205 RSS-GEN (Table 6)	Restricted Bands for Intentional Operation	QuasiPeak Average	Pass See Justification
FCC 15.207 RSS-GEN (Table 3)	Power Line Conducted Emissions	QuasiPeak Average	Pass
FCC 15.209 RSS-GEN (Table 4)	Spurious Radiated Emissions	QuasiPeak Average	Pass
FCC 15.247(a)2 RSS-247 5.2(a)	6 dB Bandwidth	> 500 kHz	Pass See Justifications
FCC 15.247(b)2 RSS-247 5.4(d)	Max Output Power	< 1 Watt	Pass See Justifications
FCC 15.247(b)4 RSS-247 5.4(d)	Antenna Gain	< 6 dBi	Pass See Justifications
FCC 15.247(d) RSS-247 5.5	Antenna Conducted Spurious	< 20 dBc	Pass See Justifications
FCC 15.247(e) RSS-247 5.2(b)	Spectral Density	< 8 dBm (3 kHz BW)	Pass See Justifications
Overall Result			Pass

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 '*'.

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Notes, Justifications, or Deviations

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

Only spurious radiated emissions and power line conducted emissions testing was performed as this device was scanned for spurious emissions in an alternate host.

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

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 was mounted in three orthogonal axis. Worst case results were obtained with the EUT in the X-axis. Worst case results are presented. See Appendix B for axis details.

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Sample Calculation(s)

Radiated Emission Test

Margin = Limit – (Received Signal + Antenna Factor + Cable Loss – Pre-Amp Gain)

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

Margin = 8.0 dB (pass)

Power Line Conducted Emission Test

Margin = Limit – (Received Signal + Attenuation Factor + Cable Loss + LISN Factor)

Margin = 73.0dB μ V – (50dB μ V + 10dB + 2.5dB + 0.5dB)

Margin = 10.0 dB (pass)

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Applicable Standards, Specifications and Methods

ANSI C63.4:2014	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10:2013	American National Standard For Testing Unlicensed Wireless Devices
CFR 47 FCC 15 Subpart C:2016	Code of Federal Regulations – Radio Frequency Devices, Intentional Radiators
CISPR 22:2008	Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement
FCC KDB 558074: 2016	FCC KDB 558074 Digital Transmission Systems, measurements and procedures
ICES-003 Issue 6 2016	Digital Apparatus - Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard
RSS-GEN Issue 4 2014	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 Issue 2:2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories

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Document Revision Status

Revision 000 - June 5, 2017
Initial release

Revision 001 – June 29, 2017
Added host as per TCB request.

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Definitions and Acronyms

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

AE – Auxiliary Equipment. A digital accessory that feeds data into or receives data from another device (host) that in turn, controls its operation.

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

EMC – Electro-Magnetic Compatibility. The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

EMI – Electro-Magnetic Immunity. The ability to maintain a specified performance when the equipment is subjected to disturbance (unwanted) signals of specified levels.


EUT – Equipment Under Test. A device or system being evaluated for compliance that is representative of a product to be marketed.

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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Testing Facility

Testing for EMC on the EUT was carried out at TÜV SÜD Canada testing lab in Montréal, Québec, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on a EUT that has a maximum width or length of up to 2m and a height of up to 3m. The chamber is equipped with a turntable that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120Vac and 240Vac single phase, or devices that are rated for a 208Vac 3 phase input. DC capability is also available for testing. The chamber is equipped with a mast that controls the polarization and height of the antenna. Control of the mast occurs in the control room adjoining the shielded chamber. Radiated emission measurements are performed using a BiLog antenna and a Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN and using the Vertical Ground plane if applicable.

Calibrations and Accreditations

The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC, 382292) and Industry Canada (IC, 6844B-1). This chamber was 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 TÜV SÜD Canada. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at TÜV SÜD Canada. TÜV SÜD Canada Inc. is accredited to ISO 17025 by A2LA with Testing Certificate #2955.02. The laboratory's 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.

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Testing Environmental Conditions and Dates

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

Date	Test	Initials	Temperature (°C)	Humidity (%)	Pressure (kPa)
Mar 22-23, 2017	Radiated Emissions	SD	20 – 24	40 – 51	98.0 – 102.0
May 29, 2017	Power Line Conducted Emissions	SD	20 – 24	40 – 51	98.0 – 102.0

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Detailed Test Results Section

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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.

Limits and Method

The method is as defined in Section 12.2 of FCC KDB 558074 and ANSI C63.10.

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 ‘Antenna Spurious Conducted Emissions (-20dBc)’ for further details.

Frequency	Limit
0.009 MHz – 0.490 MHz	2400/F(kHz) uV/m at 300m ¹
0.490 MHz – 1.705 MHz	24000/F(kHz) uV/m at 30m ¹
1.705 MHz – 30 MHz	30 uV/m at 30m ¹
30 MHz – 88 MHz	100 uV/m (40.0 dBuV/m ¹) at 3m
88 MHz – 216 MHz	150 uV/m (43.5 dBuV/m ¹) at 3m
216 MHz – 960 MHz	200 uV/m (46.0 dBuV/m ¹) at 3m
Above 960 MHz	500 uV/m (54.0 dBuV/m ¹) at 3m
Above 1000 MHz	500 uV/m (54 dBuV/m ²) at 3m
Above 1000 MHz	500 uV/m (74 dBuV/m ³) at 3m

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

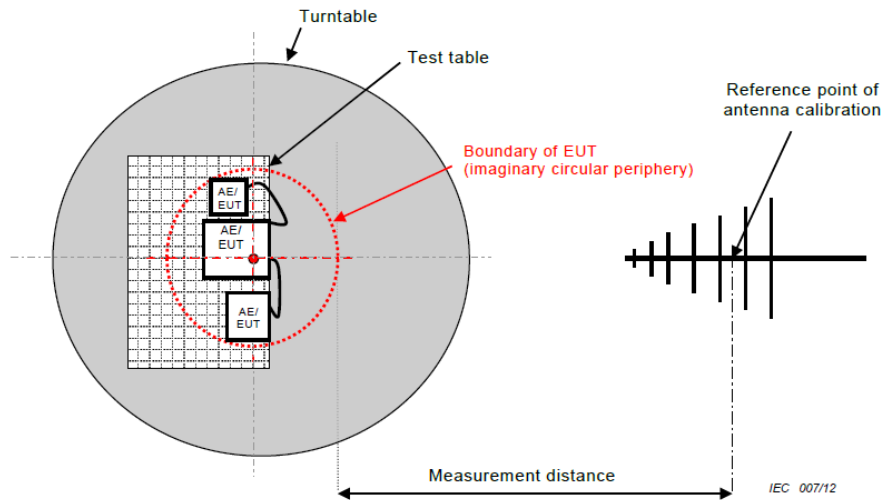
²Limit is with 1 MHz measurement bandwidth and using an Average detector

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

Based on ANSI C63.4 Section 4.2, if the Peak detector measurements do not exceed the Quasi-Peak limits, where defined, then the EUT is deemed to have passed the requirements.

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Typical Radiated Emissions Setup



Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is $\pm 4.25\text{dB}$ for 30MHz – 1GHz and $\pm 4.93\text{dB}$ for 1GHz – 18GHz with a 'k=2' coverage factor and a 95% confidence level.

Preliminary Graphs


The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector over a full 0-360°. This peaking process is done as a worst case measurement and enables the detection of frequencies of concern for final measurement. For final measurements with the appropriate detector, where applicable, please refer to the tables under Final Measurements.

In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10th harmonic (a minimum of 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 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 axis were checked. However, the worst case graphs are presented. See final measurement section for all measurements.

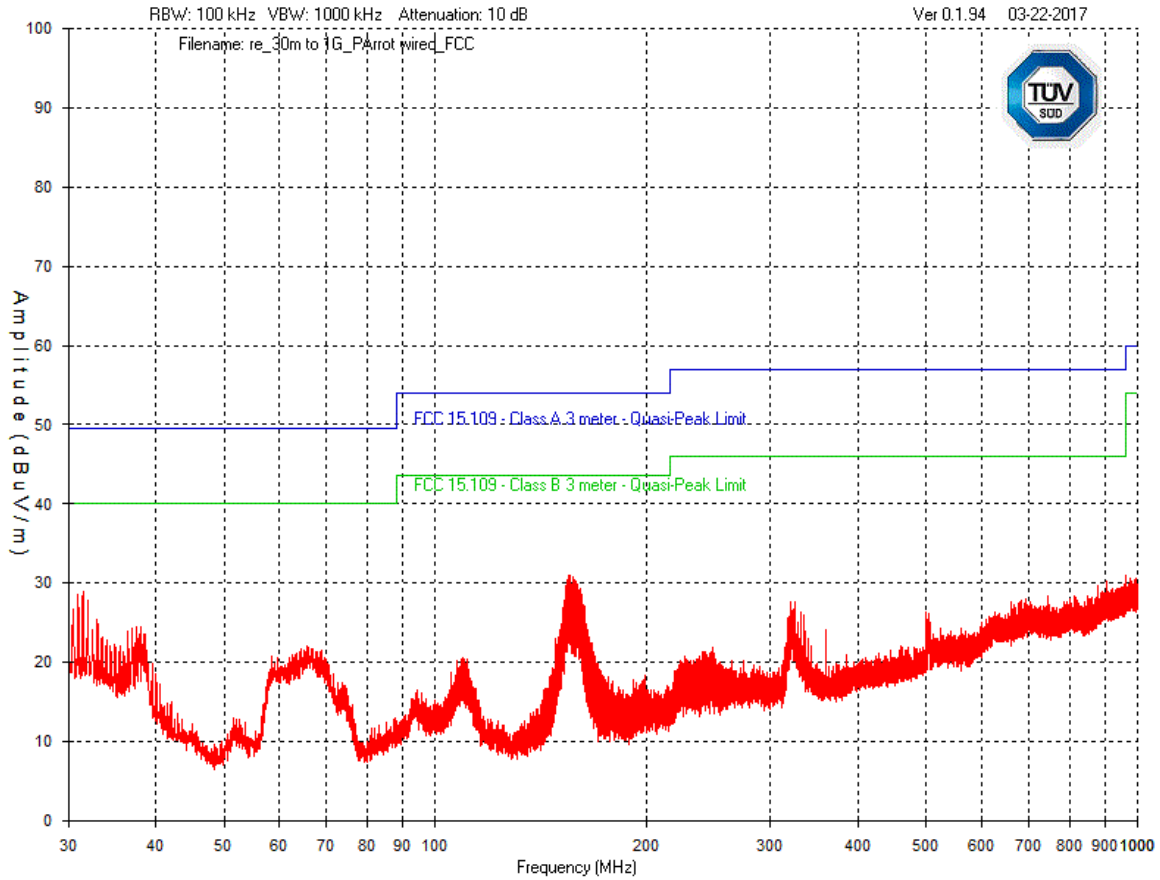
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Note: 9 kHz to 30 MHz was scanned and no emissions were detected.

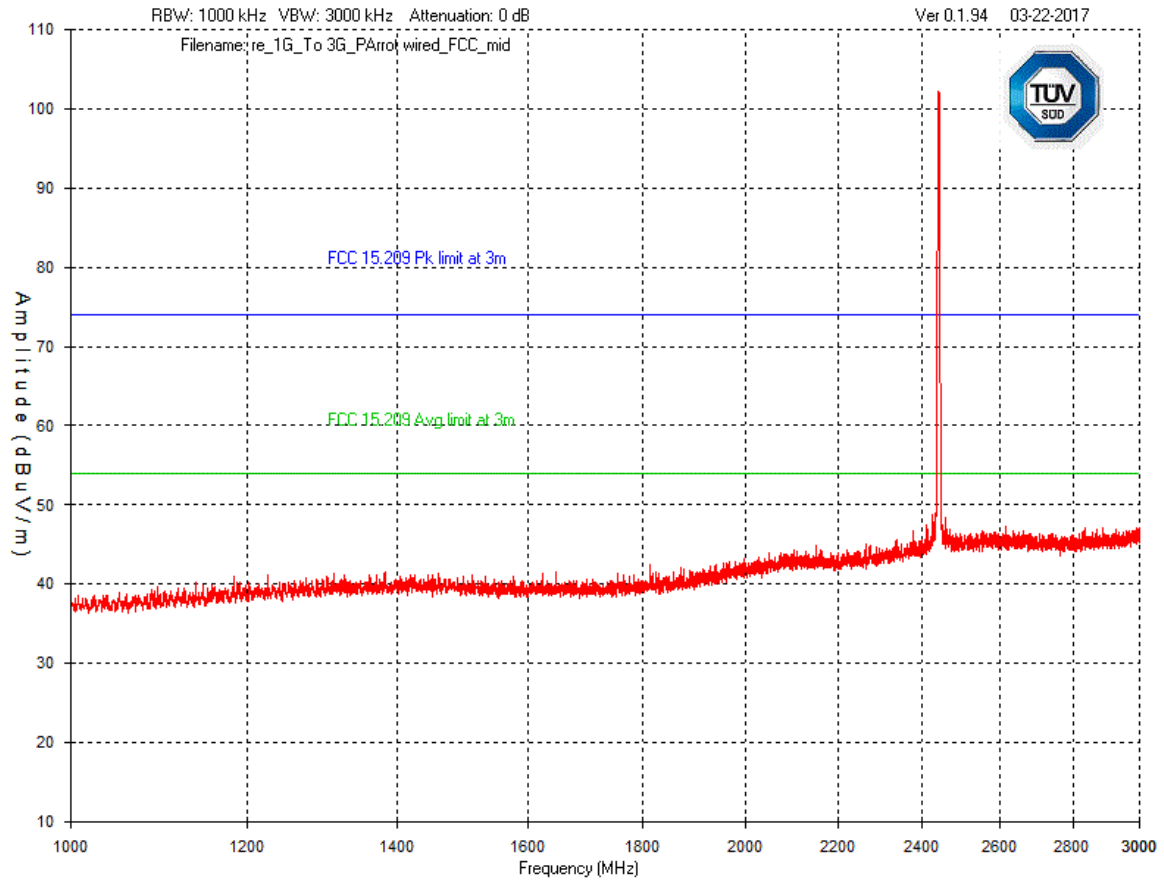
Mid Channel – 30 MHz – 1 GHz


Horizontal - Peak Emission Graph



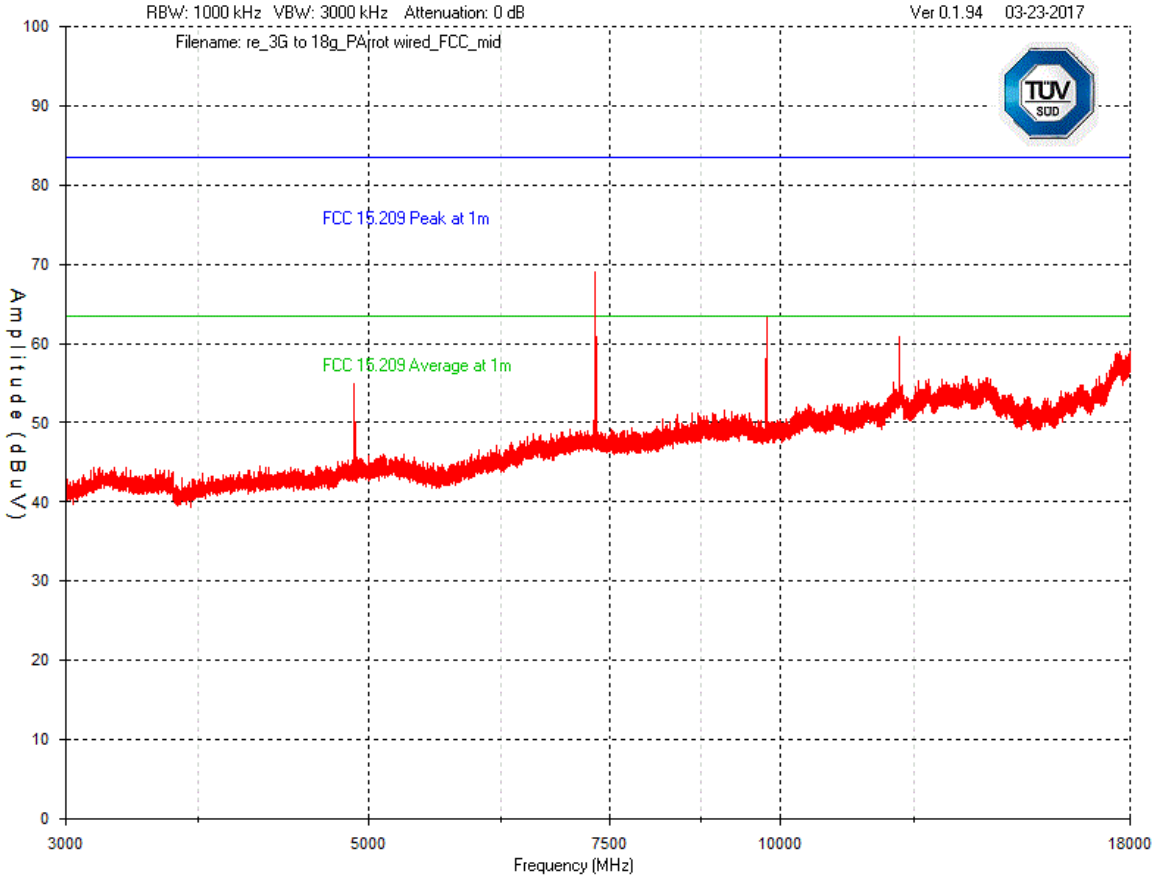
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Mid Channel – 1 GHz – 3 GHz
Horizontal - Peak Emission Graph




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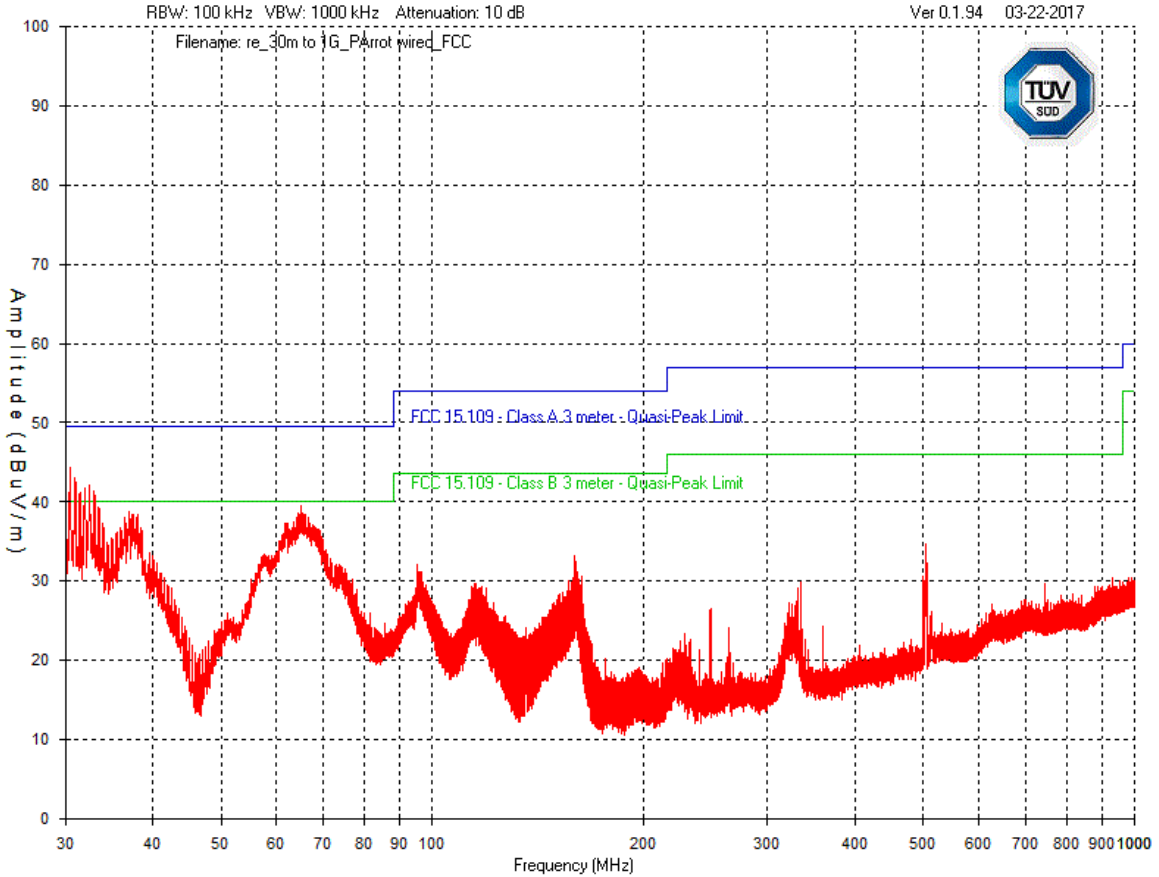
Mid Channel – 3 GHz – 18 GHz
Horizontal - Peak Emission Graph



Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. Emissions were scanned to 25 GHz. No emissions were found above 18 GHz and the noise floor of the measurement was below the applicable limit.


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**Mid Channel – 30 MHz – 1 GHz
Vertical - Peak Emission Graph**

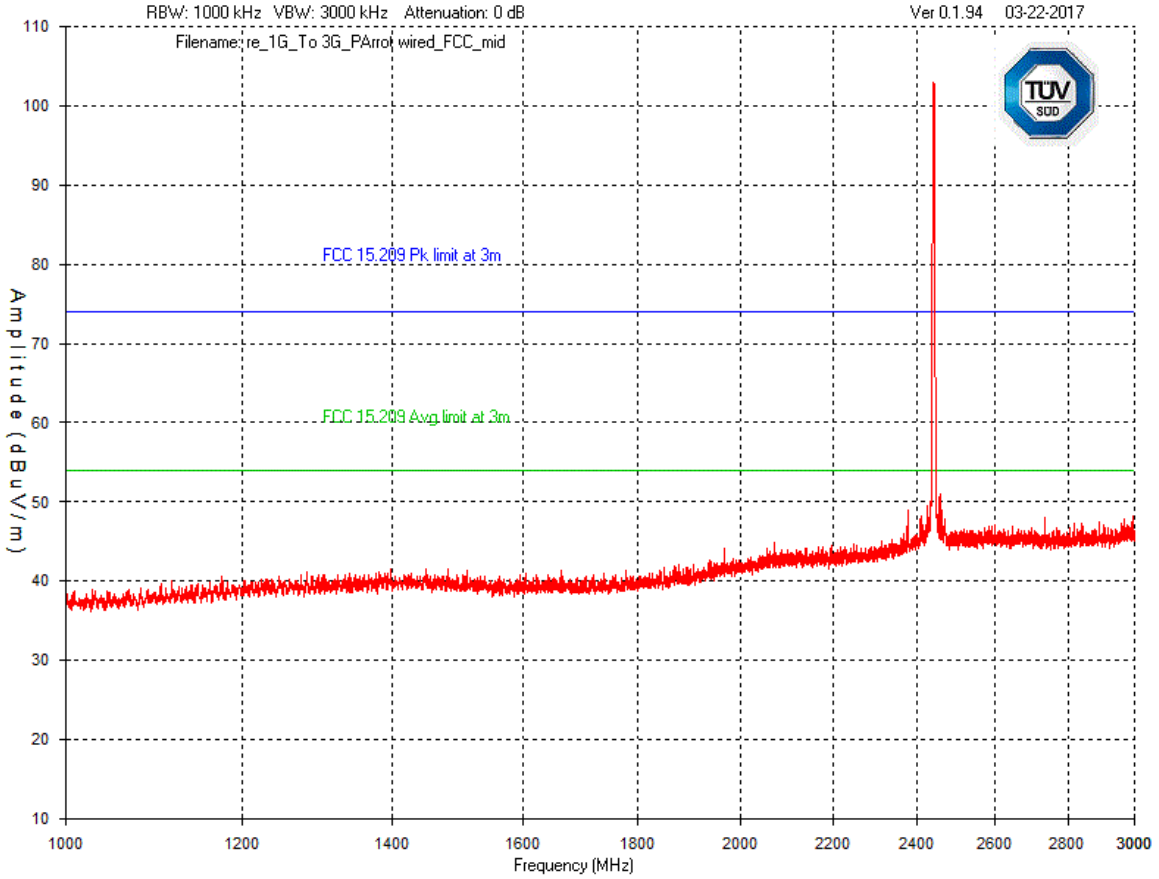



Note: Frequency range between 30 and 37.5 MHz is not within a restricted band.

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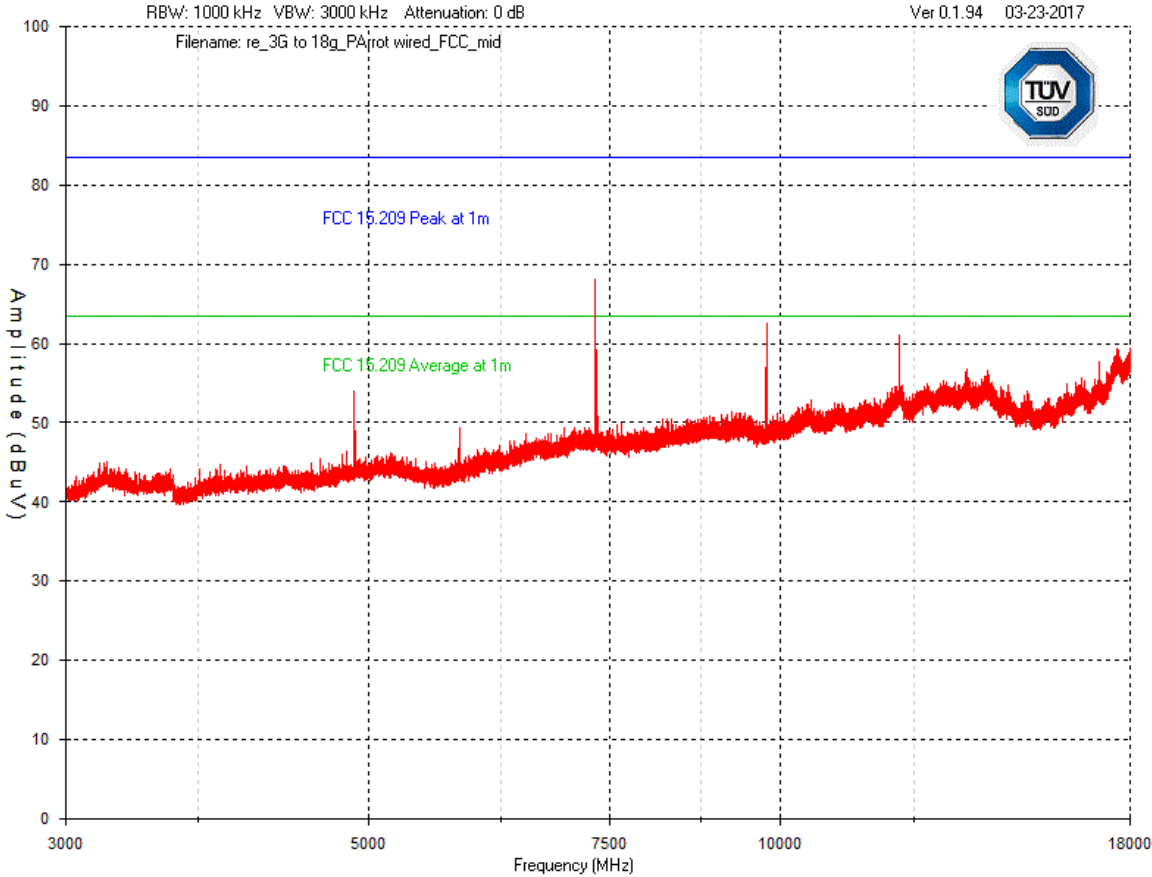
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Mid Channel – 1 GHz – 3 GHz
Vertical - Peak Emission Graph



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**Mid Channel – 3 GHz – 18 GHz
Vertical - Peak Emission Graph**



Plot was taken at a 1 meter distance. All emissions were noise floor of measurement instrument. Emissions were scanned to 25 GHz. No emissions were found above 18 GHz and the noise floor of the measurement was below the applicable limit.

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Note: Restricted band Band Edge plot was taken at a 3m measurement distance. The marker shows the raw value. See the Final Measurements and Results section below for correct values.

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Final Measurements and Results

The EUT passed. Low, middle, and high bands were measured.

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. Emissions inside the restricted bands were measured for informational purposes.

The measurements were maximized by rotating the turn table over a full 0-360 rotation and the antenna height was varied from 1 m to 4 m.

Vertical 30 MHz to 1 GHz

Frequency	Raw Reading	Antenna - Factor	Atten Factor	Cable Factor	Preamp- Factor	Level	Limit	Margin
30.5179	50.1	17.2	3	0.5	-32.4	38.4	40	1.6
31.0033	49	16.9	3	0.6	-32.4	37.1	40	2.9
32.4922	49	16	3	0.6	-32.5	36.1	40	3.9
32.0067	48.3	16.3	3	0.6	-32.4	35.8	40	4.2
32.9776	48.7	15.7	3	0.6	-32.5	35.5	40	4.5
31.4888	47.5	16.6	3	0.6	-32.4	35.3	40	4.7

No peak emissions in horizontal over the 30 MHz to 1GHz range exceeded the quasi-peak limits.


Test Frequency (MHz)	Detection mode (Q-Peak)	Antenna polarity (Horz/Vert)	Raw signal dB(µV)	Antenna factor dB	Cable loss dB + Preselector	Attenuator dB	Pre-Amp Gain dB	Received signal dB(µV/m)	Emission limit dB(µV/m)	Margin dB	Result
Low Channel											
2405	Peak	Horz	106.5	30.6	5.4	0.0	36.2	106.3			PASS
2405	Avg	Horz	104.1	30.6	5.4	0.0	36.2	103.9			PASS
2405	Peak	Vert	106.1	30.6	5.4	0.0	36.2	105.9			PASS
2405	Avg	Vert	104.5	30.6	5.4	0.0	36.2	104.3			PASS
2390	Peak	Horz	47.7	30.6	5.4	0.0	36.2	47.5	74.0	26.5	PASS
2390	Avg	Horz	35.5	30.6	5.4	0.0	36.2	35.3	54.0	18.7	PASS
2390	Peak	Vert	47.9	30.6	5.4	0.0	36.2	47.7	74.0	26.3	PASS
2390	Avg	Vert	36.1	30.6	5.4	0.0	36.2	35.9	54.0	18.1	PASS
4810	Peak	Horz	42.0	33.7	7.7	0.0	35.7	47.7	54.0	6.3	PASS
4810											PASS
4810	Peak	Vert	41.2	33.7	7.7	0.0	35.7	46.9	54.0	7.1	PASS
4810											PASS
7215	Peak	Horz	50.3	37.9	9.6	0.0	35.7	62.1	74.0	11.9	PASS

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7215	Avg	Horz	22.3	37.9	9.6	0.0	35.7	34.1	54.0	19.9	PASS
7215	Peak	Vert	51.2	37.9	9.6	0.0	35.7	63.0	74.0	11.0	PASS
7215	Avg	Vert	23.2	37.9	9.6	0.0	35.7	35.0	54.0	19.0	PASS
9620	Peak	Horz	42.0	39.0	7.4	0.0	36.2	52.2	54.0	1.8	PASS
9620											PASS
9620	Peak	Vert	43.1	39.0	7.4	0.0	36.2	53.3	54.0	0.7	PASS
9620	Avg										PASS
12025	Peak	Horz	36.0	38.8	8.4	0.0	35.4	47.8	54.0	6.2	PASS
12025	Avg										PASS
12025	Peak	Vert	38.0	38.8	8.4	0.0	35.4	49.8	54.0	4.2	PASS
12025	Avg										PASS
Mid Channel											
2445	Peak	Horz	106.9	30.6	5.4	0.0	36.2	106.7			PASS
2445	Avg	Horz	104.9	30.6	5.4	0.0	36.2	104.7			PASS
2445	Peak	Vert	105.1	30.6	5.4	0.0	36.2	104.9			PASS
2445	Avg	Vert	102.6	30.6	5.4	0.0	36.2	102.4			PASS
4890	Peak	Horz	40.0	33.4	7.7	0.0	35.7	45.4	54.0	8.6	PASS
4890											PASS
4890	Peak	Vert	39.1	33.4	7.7	0.0	35.7	44.5	54.0	9.5	PASS
4890											PASS
7335	Peak	Vert	47.0	37.9	9.6	0.0	35.9	58.6	74.0	15.4	PASS
7335	Avg	Vert	19.0	37.9	9.6	0.0	35.9	30.6	54.0	23.4	PASS
7335	Peak	Horz	47.9	37.9	9.6	0.0	35.9	59.5	74.0	14.5	PASS
7335	Avg	Horz	19.9	37.9	9.6	0.0	35.9	31.5	54.0	22.5	PASS
9780	Peak	Horz	43.6	39.0	7.4	0.0	36.2	53.8	54.0	0.2	PASS
9780											PASS
9780	Peak	Vert	42.8	39.0	7.4	0.0	36.2	53.0	54.0	1.0	PASS
9780											PASS
12225	Peak	Horz	39.5	38.8	8.4	0.0	35.4	51.3	54.0	2.7	PASS
12225											PASS
12225	Peak	Vert	39.6	38.8	8.4	0.0	35.4	51.4	54.0	2.6	PASS
12225											PASS
High Channel											
2475	Peak	Horz	101.9	30.6	5.4	0.0	36.2	101.7			PASS
2475	Avg	Horz	99.4	30.6	5.4	0.0	36.2	99.2			PASS
2475	Peak	Vert	103.9	30.6	5.4	0.0	36.2	103.7			PASS
2475	Avg	Vert	101.7	30.6	5.4	0.0	36.2	101.5			PASS
2483.5	Peak	Horz	53.2	30.6	5.4	0.0	36.2	53.0	74.0	21.0	PASS
2483.5	Avg	Horz	50.7	30.6	5.4	0.0	36.2	50.5	54.0	3.5	PASS
2483.5	Peak	Vert	54.2	30.6	5.4	0.0	36.2	54.0	74.0	20.0	PASS
2483.5	Avg	Vert	52.0	30.6	5.4	0.0	36.2	51.8	54.0	2.2	PASS

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2485.5	Peak	Horz	56.0	30.6	5.4	0.0	36.2	55.8	74.0	18.2	PASS
2485.5	Avg	Horz	45.7	30.6	5.4	0.0	36.2	45.5	54.0	8.5	PASS
2485.5	Peak	Vert	57.6	30.6	5.4	0.0	36.2	57.4	74.0	16.6	PASS
2485.5	Avg	Vert	49.5	30.6	5.4	0.0	36.2	49.3	54.0	4.7	PASS
4950	Peak	Horz	40.1	33.7	7.7	0.0	35.7	45.8	74.0	28.2	PASS
4950											PASS
4950	Peak	Vert	39	33.7	7.7	0.0	35.7	44.7	74.0	29.3	PASS
4950											PASS
7425	Peak	Vert	46.7	38.5	9.6	0.0	35.9	58.9	74.0	15.1	PASS
7425	Avg	Vert	18.7	38.5	9.6	0.0	35.9	30.9	54.0	23.1	PASS
7425	Peak	Horz	46.8	38.5	9.6	0.0	35.9	59.0	74.0	15.0	PASS
7425	Avg	Horz	18.8	38.5	9.6	0.0	35.9	31.0	54.0	23.0	PASS
9900	Peak	Horz	43.5	39.0	7.4	0.0	36.2	53.7	74.0	20.3	PASS
9900											PASS
9900	Peak	Vert	42.9	39.0	7.4	0.0	36.2	53.1	74.0	20.9	PASS
9900											PASS
12375	Peak	Horz	39.7	38.8	8.6	0.0	35.3	51.8	74.0	22.2	PASS
12375											PASS
12375	Peak	Vert	40.1	38.8	8.6	0.0	35.3	52.2	74.0	21.8	PASS
12375											PASS

Note: Where the peak limit met the average limit, this was deemed to meet the requirements. The Average emission at the 3rd harmonic was obtained by applying duty cycle factor of 27.95 dB (a maximum duty cycle of 4%.was declared by the client).

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
Spectrum Analyzer	ESU-40	Rohde & Schwarz	1/28/16	1/28/2018	4092
Horn Antenna 2 – 18 GHz	WBH218HN	Q-par	Feb 12, 2016	Feb 12, 2018	GEMC 6375
Pre-Amp 1 – 26.5 GHz	HP 8449B	HP	Oct 12, 2016	Oct 12, 2018	GEMC 6351
Horn Antenna 18 – 26.5 GHz	SAS-572	A.H. Systems	Oct 11, 2016	Oct 11, 2018	GEMC 6371
Loop Antenna	EM 6871	Electro-Metrics	Feb 13, 2017	Feb 13, 2019	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Feb 13, 2017	Feb 13, 2019	GEMC 71
BiLog Antenna	3142-C	ETS	Oct 5, 2016	Oct 5, 2018	GEMC 8
2.4GHz-2.5GHz Notch Filter	BRM50702	Micro-Tronics	July 11, 2016	July 11, 2017	GEMC 230
RF Cable 7m	LMR-400-7M- 50Ω-MN-MN	LexTec	Feb 1, 2017	Feb 1, 2018	GEMC 4025
RF Cable 10m	LMR-400- 10M-50Ω-MN- MN	LexTec	Feb 1, 2017	Feb 1, 2018	GEMC 4026
RF Cable 0.5m	LMR-400- 0.5M-50Ω-MN- MN	LexTec	Feb 1, 2017	Feb 1, 2018	GEMC 4029
Emissions Software	0.1.94	Global EMC	NCR	NCR	GEMC 58

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Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Power Line Conducted Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT's power line does not exceed the limits listed below as defined in the applicable test standard, as measured from a LISN. This helps protect lower frequency radio services such as AM radio, shortwave radio, amateur radio operators, maritime radio, CB radio, and so on, from unwanted interference.

Limits and Method

The limits are as defined in 47 CFR FCC Part 15 Section 15.207

Method is as defined in ANSI C63.4

Average Limits		Quasi-Peak Limits	
150 kHz – 500 kHz	56 to 46* dB μ V	150 kHz – 500 kHz	66 to 56* dB μ V
500 kHz – 5 MHz	46 dB μ V	500 kHz – 5 MHz	56 dB μ V
5 MHz – 30 MHz	50 dB μ V	5 MHz – 30 MHz	60 dB μ V

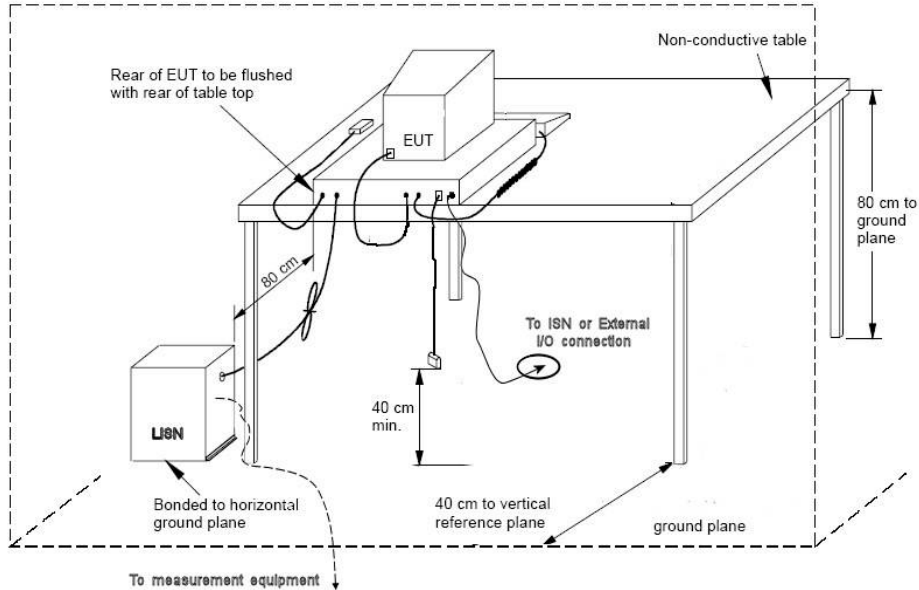
* Decreases linearly with the logarithm of the frequency

Both Quasi-Peak and Average limits are applicable and each is specified as being measured with a resolution bandwidth of 9 kHz. For Quasi-Peak, a video bandwidth at least three times greater than the resolution bandwidth is used.

Based on ANSI C63.4 Section 4.2, if the Peak or Quasi-Peak detector measurements do not exceed the Average limits, then the EUT is deemed to have passed the requirements.

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Typical Setup Diagram




Measurement Uncertainty

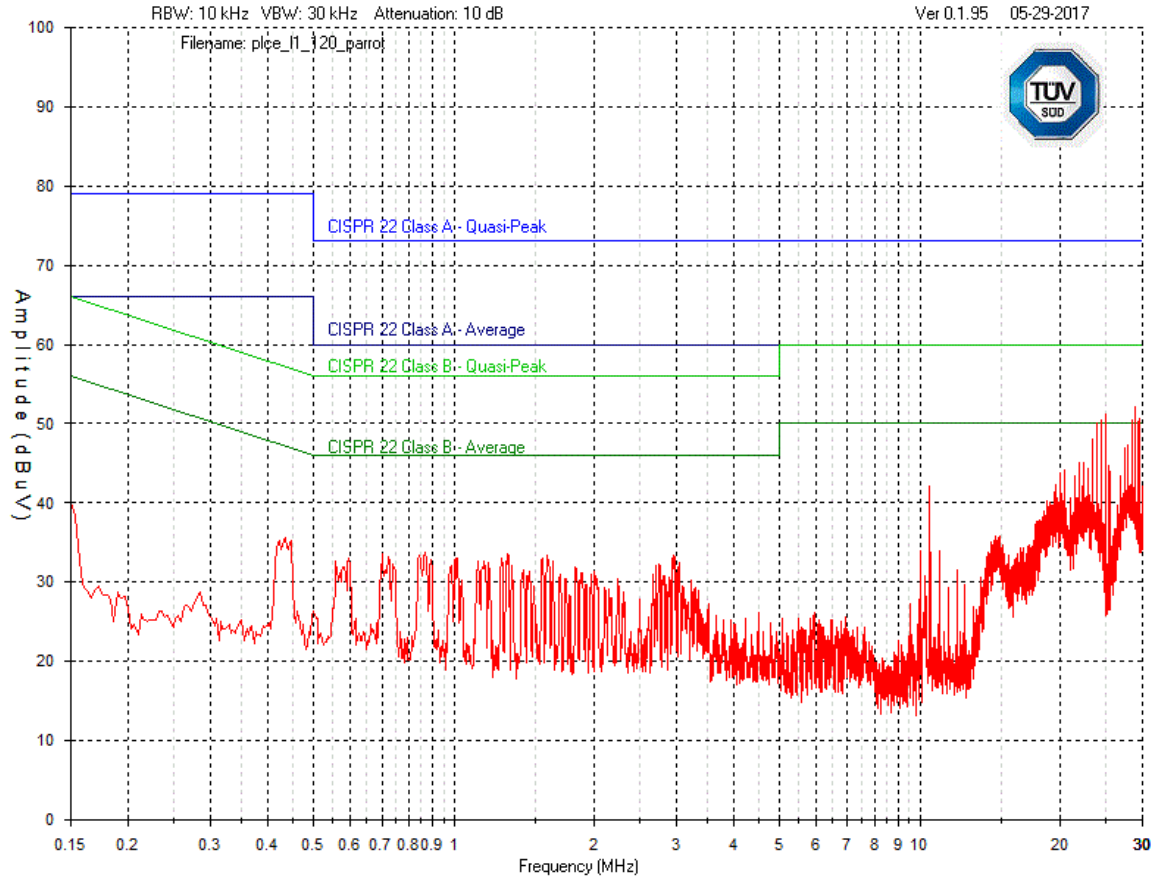
The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is $\pm 2.91\text{dB}$ with a 'k=2' coverage factor and a 95% confidence level.


Preliminary Graphs

The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector. This peaking process is done as a worst case measurement and enables the detection of frequencies of concern for final measurement. For final measurements with the appropriate detector, where applicable, please refer to the tables under Final Measurements.

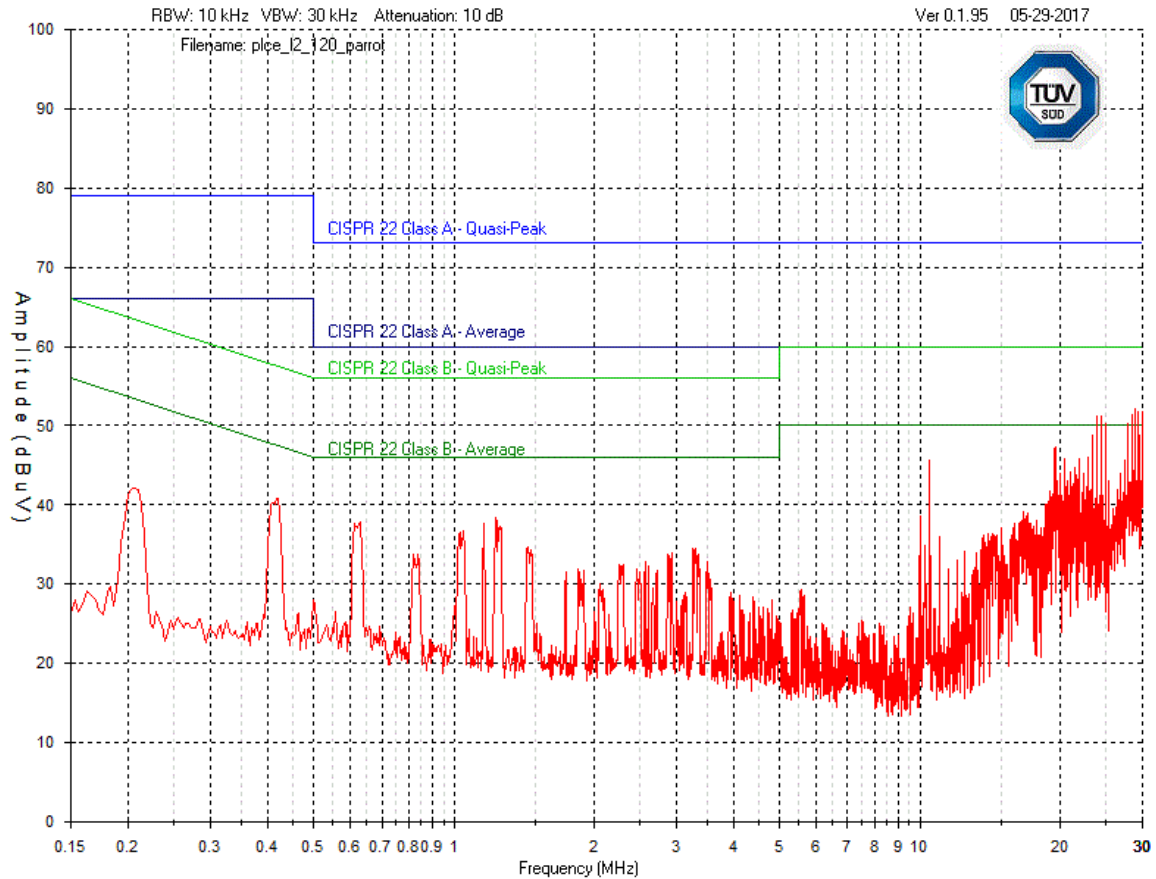
Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Line 1 (L1) – 120Vac 60Hz



Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Line 2 (L2) – 120Vac 60Hz



See 'Appendix B – EUT, Peripherals and Test Setup Photos' for photos showing the test set-up for the highest line conducted emission

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Final readings

Line 1

Frequency	Detector	Raw Reading	Atten 10dB Factor	Cable Factor	LISN - Factor	Level	Average Limit	Margin
29.014	AV	35.3	10	0.3	0.5	46.1	50	3.9
25.0233	AV	32.9	10	0.2	0.5	43.6	50	6.4
29.5186	AV	36	10	0.3	0.5	46.8	50	3.2
24.522	AV	25	10	0.2	0.5	35.7	50	14.3
28.5193	AV	35.6	10	0.3	0.5	46.4	50	3.6
24.0174	AV	36.2	10	0.2	0.5	46.9	50	3.1

Line 2

Frequency	Detector	Raw Reading	Atten Factor	Cable Factor	LISN - Factor	Level	Average Limit	Margin
29.014	AV	34.3	10	0.3	0.5	45.1	50	4.9
25.0233	AV	33.9	10	0.2	0.5	44.6	50	5.4
29.5186	AV	35	10	0.3	0.5	45.8	50	4.2
24.522	AV	26	10	0.2	0.5	36.7	50	13.3
28.5193	AV	34.6	10	0.3	0.5	45.4	50	4.6
24.0174	AV	35.7	10	0.2	0.5	46.4	50	3.6


Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date	Next Calibration Date	Asset #
Spectrum Analyzer	ESU-40	Rohde & Schwarz	1/28/16	1/28/2018	4092
LISN	FCC-LISN-50/250-16-2-01	FCC	Feb. 1, 2017	Feb. 1, 2019	GEMC 65
RF Cable 7m	LMR-400-7M-50Ω-MN-MN	LexTec	Feb 1, 2017	Feb 1, 2018	GEMC 4025
RF Cable 10m	LMR-400-10M-50Ω-MN-MN	LexTec	Feb 1, 2017	Feb 1, 2018	GEMC 4026
Emissions Software	0.1.94	Global EMC	NCR	NCR	GEMC 58

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Client	Viconics Technologies Inc	 TUV SUD Canada
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	


Appendix A – EUT Summary

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	


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

Client	
Organization	Viconics Electronics Inc. 9245 Langelier Blvd. Montreal, Quebec, Canada, H1P 3K9
Contact	Emmanuel Stathopoulos
Phone	514-906-8594
Email	emmanuel.stathopoulos@schneider-electric.com
EUT Details	
EUT Name (for report title)	VTGP Transceiver card
EUT Model / SN (if known)	VTGP
FCC ID	V95-VTGP
Industry Canada #	7591A-VTGP
Equipment category	Wireless module
EUT is powered using	DC
Input voltage range(s) (V)	6.5Vdc – 9Vdc
Frequency range(s) (Hz)	DC
Rated input current (A)	0.08A
Nominal power consumption (W)	0.3W
Number of power supplies in EUT	1
Transmits RF energy? (describe)	Yes
Basic EUT functionality description	EUT is a wireless module for sending data related to temperature and humidity.

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	 TUV SUD Canada
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Appendix B – EUT and Test Setup Photographs

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

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

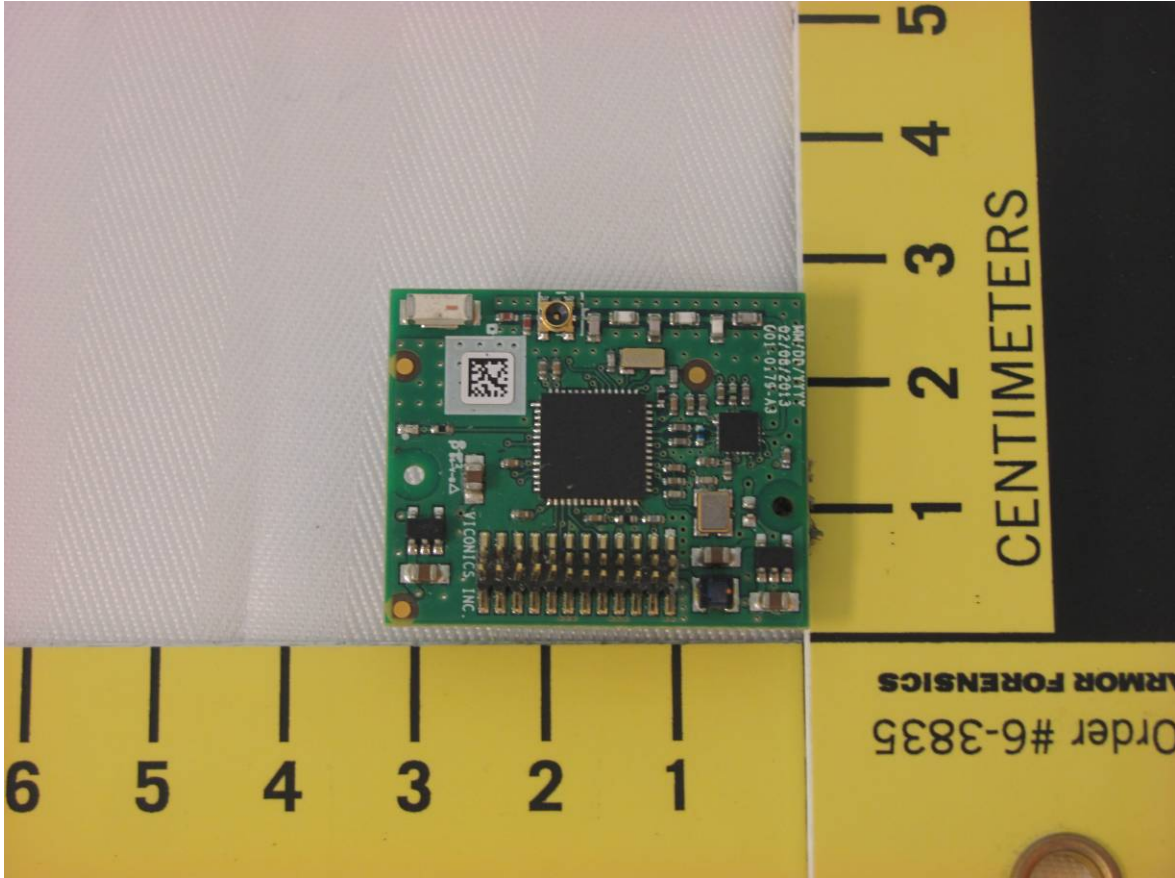



Illustration 1: EUT front view

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

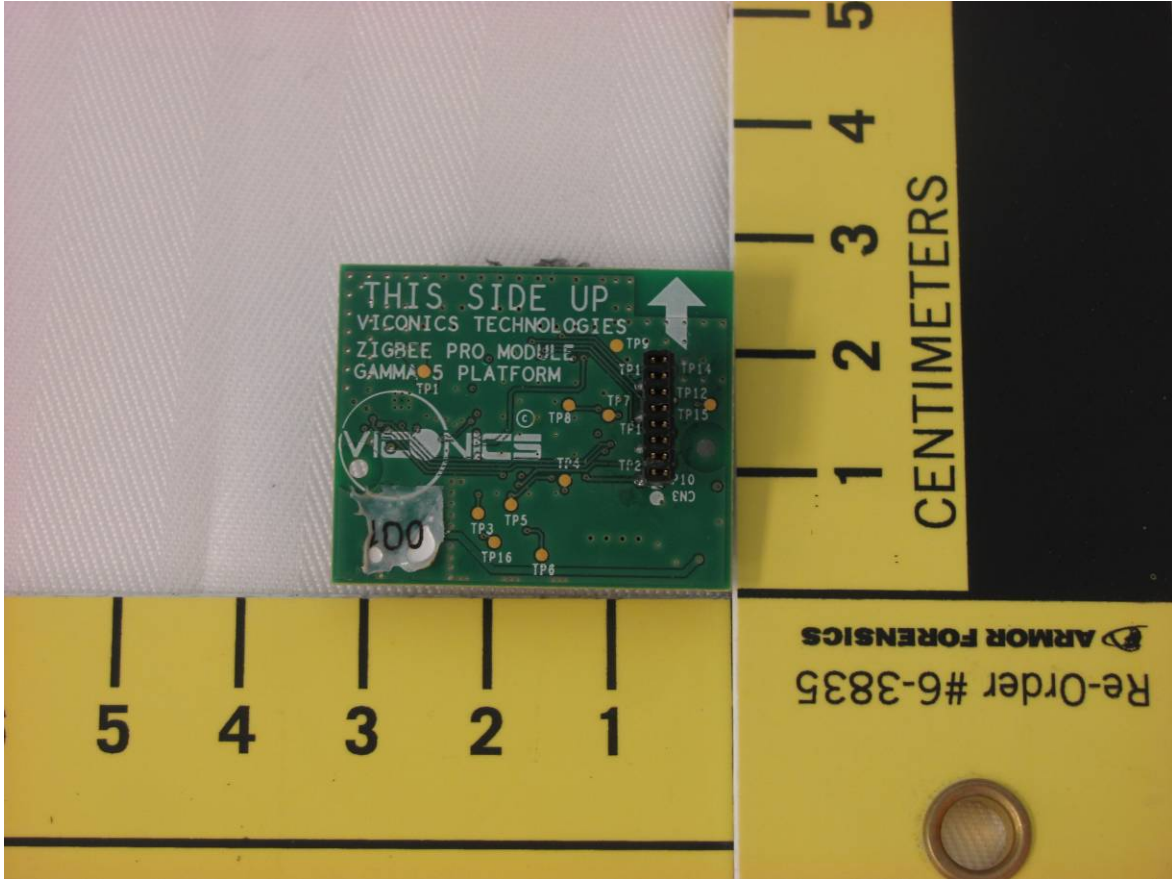


Illustration 2: EUT rear view

Note: These photos are for informational purposes. Also refer to the PDF files which are separate from this test report.


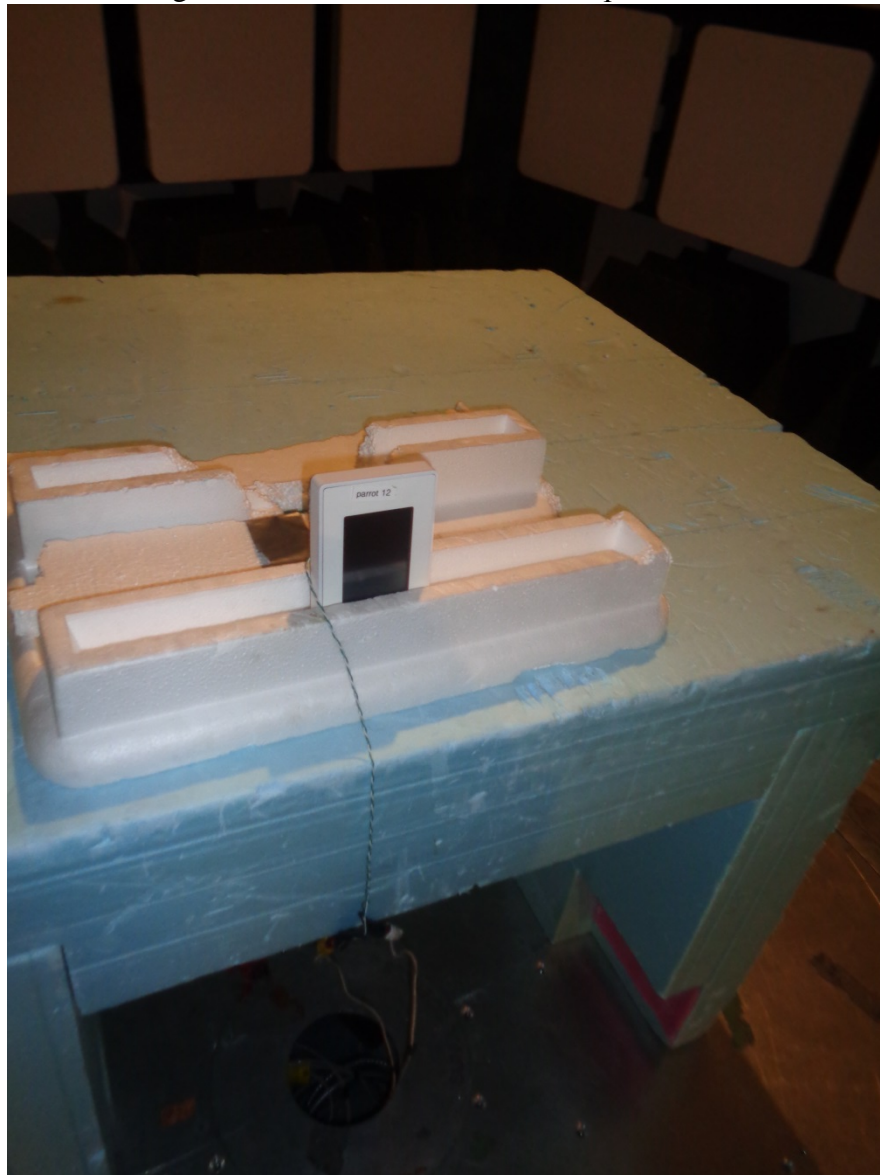
Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Figure 1 – Radiated Emissions Setup – Photo 1



Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

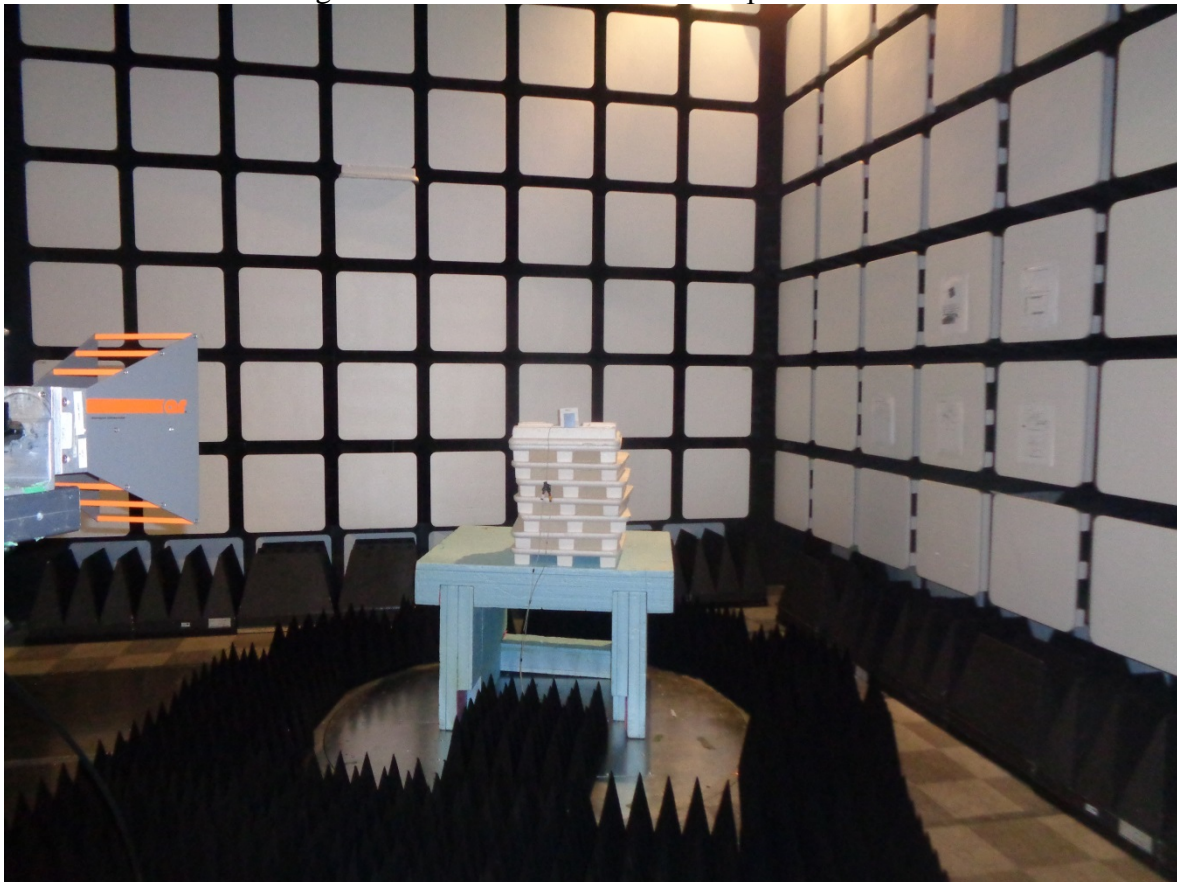
Figure 2 – Radiated Emissions Setup – Photo 2



Note: As per ANSI C63.10 Clause 6.3.1, below 1GHz, the height of the EUT was set to 80cm. Above 1GHz, the height was raised to 1.5m.

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

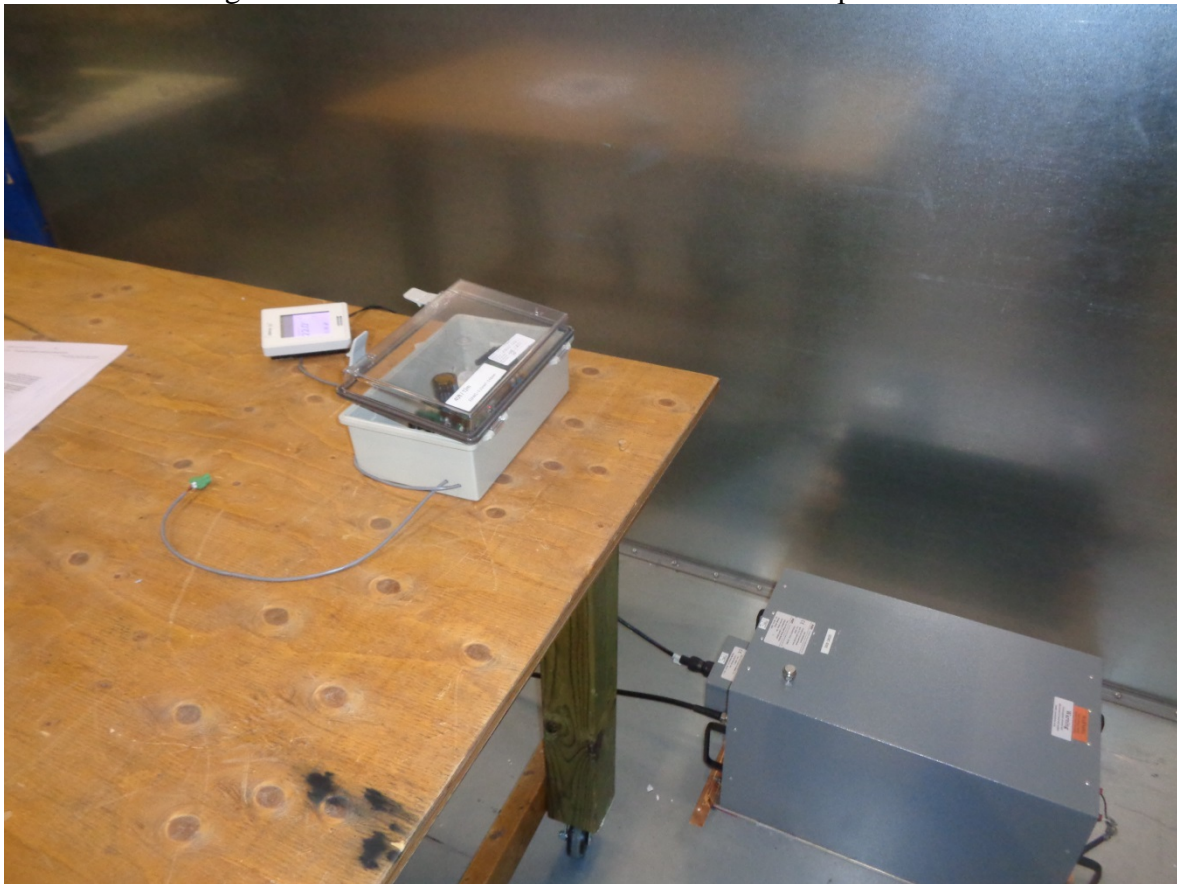
Figure 3 – Radiated Emissions Setup – Photo 3



Note: As per ANSI C63.10 Clause 6.3.1, above 1GHz, the height of the EUT was set to 1.5m.

Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Figure 4 – Power Line Conducted Emissions Setup – Photo 1



Client	Viconics Technologies Inc	
Product	VTGP Transceiver Card (with SER8150RB1194 host)	
Standard(s)	RSS 247 Issue 2:2017 FCC Part 15 Subpart 15.247:2016	

Figure 5 – Power Line Conducted Emissions Setup – Photo 2

