TÜV SÜD Canada
EMC & RF Test Report

As per

RSS 210 Issue 9: 2016
&
FCC Part 15 Subpart C: 2016

For

Unlicensed Intentional Radiators

Operating in the 2.4 – 2.4835 GHz band

on the

SwingTracker

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Testing produced for

Diamond KINETICS

See *Appendix A* for full customer & EUT details.

Industry Canada
Registration # 6844A-3

Testing Laboratory Certificate #2955.02

Registration # CA6844

R-4023, G-506 T-1246, C-4498

Table of Contents

Report Scope

This report addresses the EMC certification testing and test results of the **SwingTracker** from **Diamond Kinetics**. This unit is herein referred to as EUT (Equipment Under Test). Testing is performed at TÜV SÜD Canada Labs.

The EUT was tested for compliance against the following standards:

RSS 210 Issue 9:2016
FCC Part 15 Subpart C 15.249:2016

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 TÜV SÜD Canada.

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

Client	Diamond Kinetics	
Product	SwingTracker	
Standard(s)	RSS 210 Issue 9 / FCC Part 15 Subpart C 15.249	

Summary

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

FCC Certification # (FCC ID):	2ABWR-DKST02
ISED Certification # (IC):	12312A-DKST02
EUT passed all tests performed.	Yes
Tests conducted by	Raymond Lee Au

Client	Diamond Kinetics
Product	SwingTracker
Standard(s)	RSS 210 Issue 9 / FCC Part 15 Subpart C 15.249

Results Summary

Standard/Method	Description	Limit/Requirement	Result
FCC 15.203	Antenna requirement	Unique	Pass [α]
FCC 15.205 RSS-Gen (Table 6)	Restricted bands of operation	QuasiPeak Average	Pass
FCC 15.249(a) RSS-210 B.10 a.	Max fundamental field strength	≤ 50 mV/m (93.9 dBuV/m) at 3m	Pass
FCC 15.249(a) RSS-210 B.10 a.	Max harmonic field strength	≤ 500 µV/m (53.9 dBuV/m) at 3m	Pass
FCC 15.249(d) RSS-210 B.10 b.	Spurious radiated emissions and band edges	FCC 15.209(a) RSS- Gen 8.9 Table 4	Pass
Overall Result			**PASS**

[α] See *Notes, Justifications, or Deviations* section.

All tests were performed by Raymond Lee Au.

If the product as tested or evaluated complies with the specification, the EUT is deemed to comply with the requirement, and is allotted a result of “Pass.” If not, a “Fail” will be issued. Note that a “Pass” or “Fail” status is independent of any measurement uncertainties.

Notes, Justifications, or Deviations

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

The EUT is used to provide inertial measurement data to analyze the technique of baseball players during the swinging of a baseball bat. It communicates using Bluetooth 4.0 with compatible mobile phones and computing devices using the 2.4 – 2.4835 GHz band. The unit is powered by a rechargeable lithium polymer battery, which is not user replicable. It is charged via induction. As per the applicant, the charger is pre-approved. Therefore, the RF properties of the charger is not addressed separately. However, the EUT is tested while it is charging to achieve worst case results with its charging circuitry activated. The EUT does not have a means to connect to mains power.

For the antenna requirement specified in FCC 15.203, the antenna used is a Johanson Technology 2450AT18A100 ceramic chip antenna soldered onto the PCB. Both are completely enclosed within the unit's enclosure, and is not accessible or replaceable by the end user.

The 2.4 GHz antenna has a peak gain of < 6 dBi (0.5 dBi rated maximum).

The EUT was tested positioned in the 3 orthogonal axis. Worst case results are presented. Worst case is with the EUT positioned flat, with its flat faces parallel to the ceiling of the test chamber. See test photos.

The EUT's 2.4 GHz output level is set to the maximum output setting used.

The EUT has no connectors or connection cables. For test purposes, wires were soldered onto the PCB to configure test settings.

For maximum permissible exposure, this device operates at less than 1 Watt. The device meets SAR test exemption requirements.

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 15:2016	Code of Federal Regulations – Radio Frequency Devices
ISO 17025:2005	General Requirements for the competence of testing and calibration laboratories
RSS-Gen Issue 4:2014	General Requirements and Information for the Certification of Radio Apparatus
RSS 102 Issue 5:2015	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
RSS-210 Issue 9:2016	Licence-Exempt Radio Apparatus: Category I Equipment

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

Release 1 - September 28, 2016
Initial release

Definitions and Acronyms

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

AE – Auxiallary Equipment.

BW – Bandwidth.

DTSs – Digital Transmission Systems.

E.I.R.P. – Equivalent Isotropically Radiated Power.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity

EUT – Equipment Under Test

FHSs – Frequency Hopping Systems

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

OBW – Occupied Bandwidth

RF – Radio Frequency

Testing Facility

Testing for EMC on the EUT was carried out at TÜV SÜD Canada near 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 a variety of input voltages, including 120 and 240 Vac single phase, and 208 Vac 3 phase. 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 Loop, Bilog, or Horn antennas as 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, CA6844), 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 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 is accredited to ISO 17025 by A2LA with Testing Certificate #2955.02. 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.

Testing Environmental Conditions and Dates

Following are the environmental conditions in the facility during time of testing.

Date	Test(s)	Init.	Temperature (ºC)	Humidity (%)	Pressure (kPa)
Aug. 5, 2016	99% occupied bandwidth	RA	20-24ºC	39 - 50%	96 -102kPa
Aug. 11, 2016	Restricted bands of operation.	RA	20-24ºC	39 - 50%	96 -102kPa
Aug. 10, 2016	Max fundamental field strength (Max peak E.I.R.P output.)	RA	20-24ºC	39 - 50%	96 -102kPa
Aug. 8, 2016	Max peak conducted output power.	RA	20-24ºC	39 - 50%	96 -102kPa
Aug. 11, 2016	Max harmonic field strength & Spurious radiated emissions	RA	20-24ºC	39 - 50%	96 -102kPa

Detailed Test Results Section

99% Occupied Bandwidth

Purpose

The purpose of this test is to find the 99% occupied bandwidth to provide information for filing purposes.

Limits & Method

There is no limit for the 99% OBW. This test is for informational purposes only.

The method is described in ANSI C63.10, 6.9.

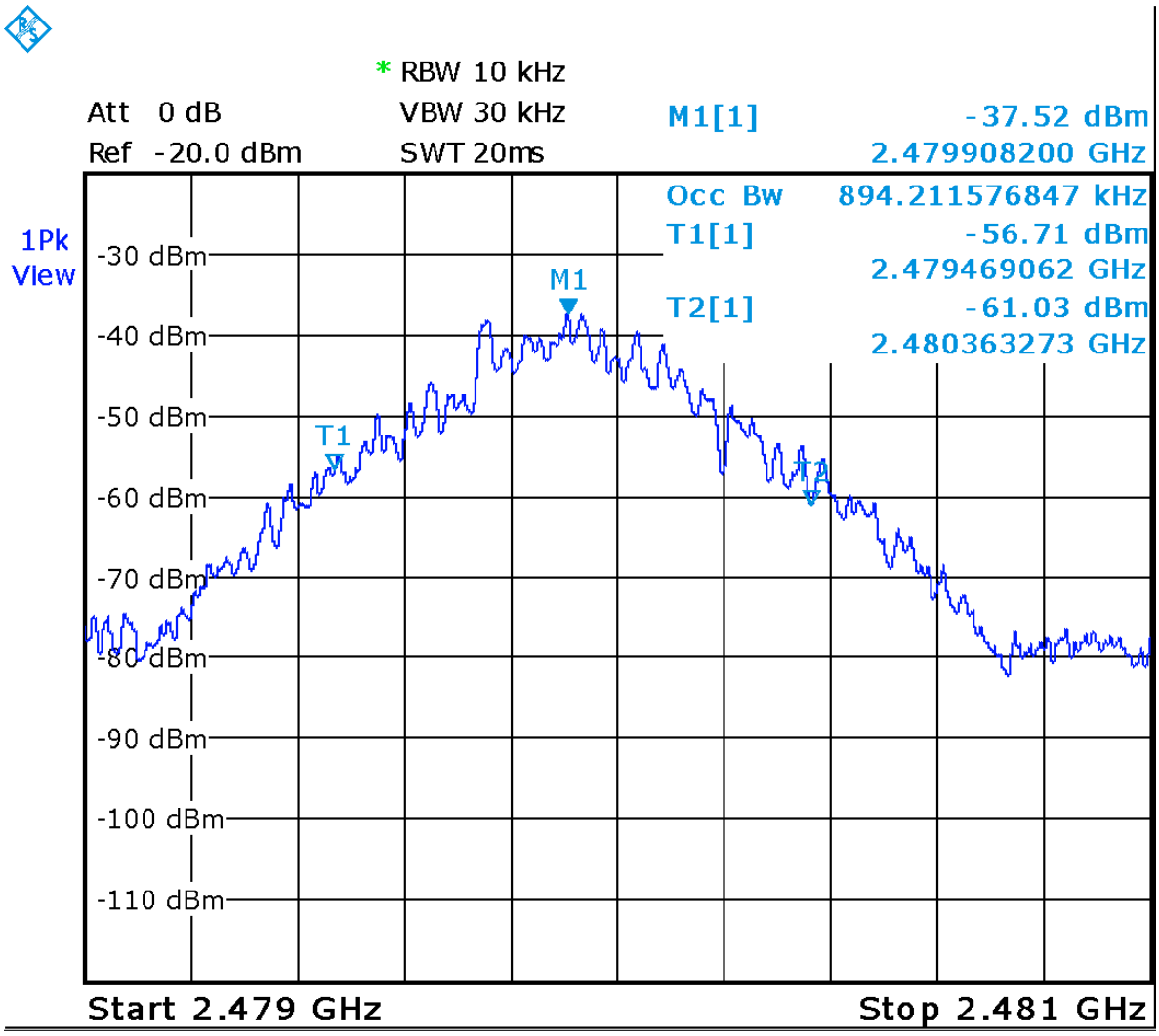
Results

The EUT passed. The 99% OBW measured was 902 kHz.

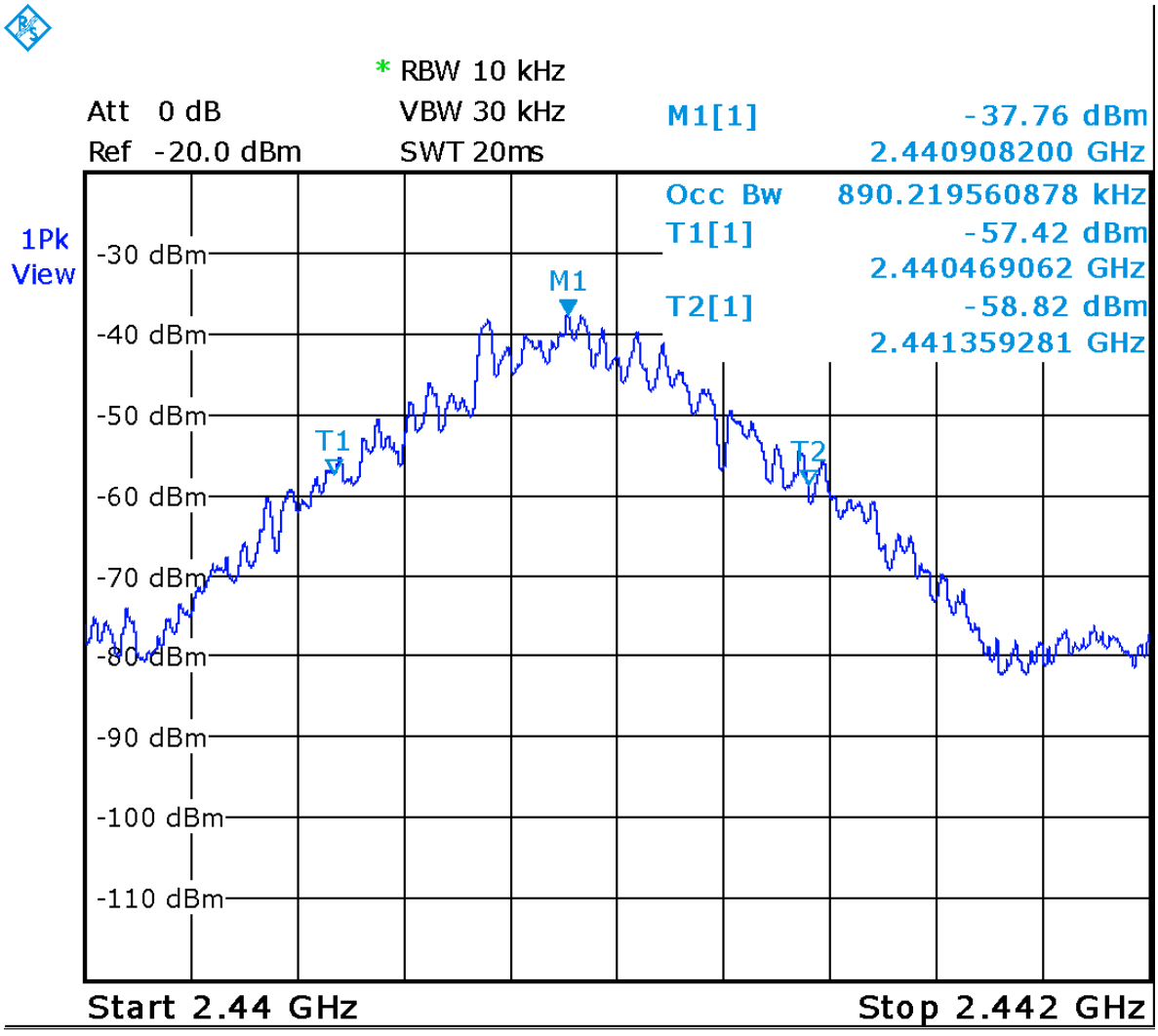
Graph(s)

The graphs below show the 99% OBW during the operation of the device. This is measured using max hold peak on the spectrum analyzer during operation of the EUT, and the 99% power bandwidth function of the measurement instrument.

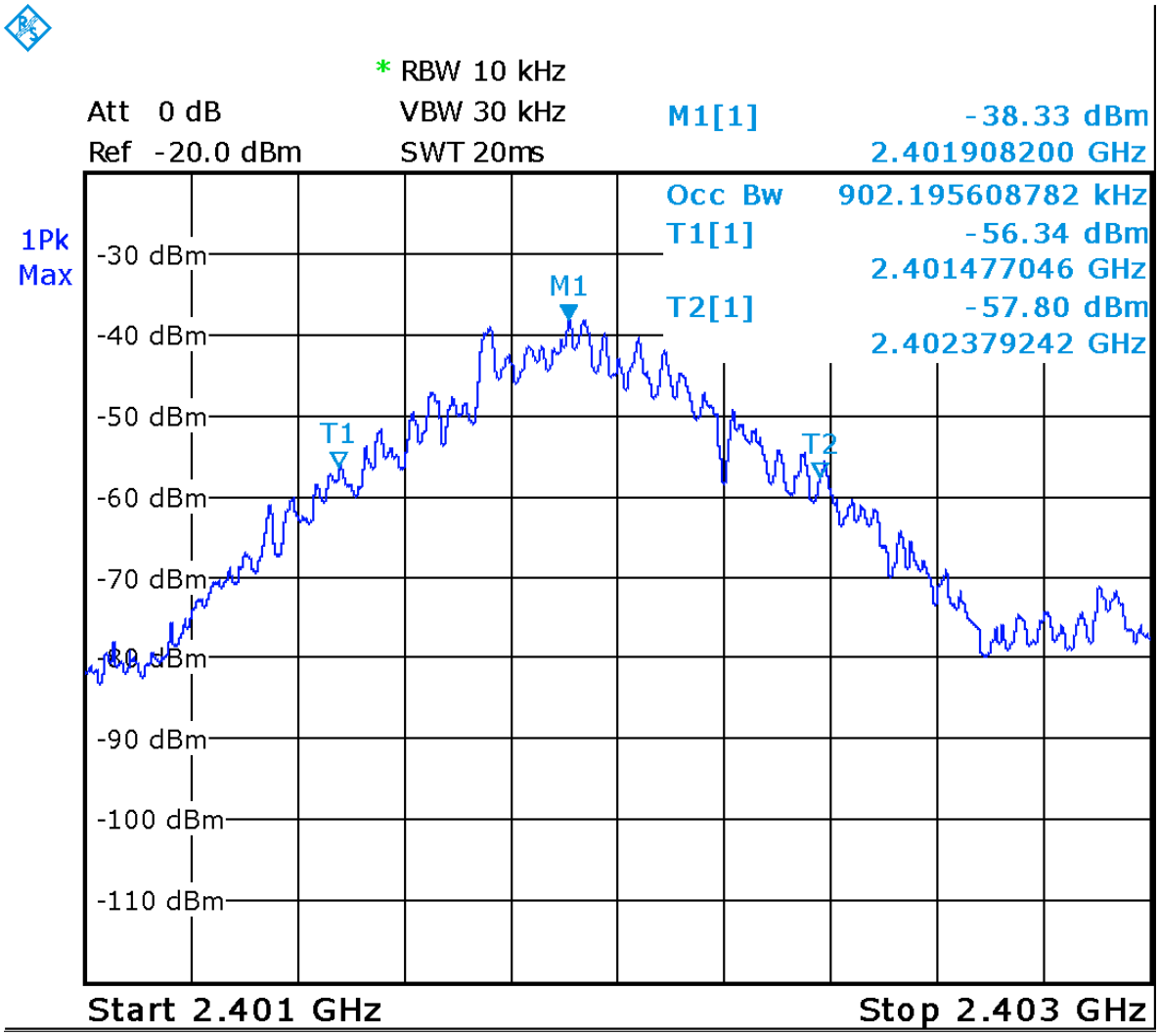
High Channel
99% OBW = 894 kHz



Middle Channel
99% OBW = 890 kHz



Low Channel
99% OBW = 902 kHz



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

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	ESL6	Rohde & Schwarz	Nov. 25, 2015	Nov. 25, 2017	GMEC 160

Max Fundamental Field Strength

Purpose

The purpose of this test is to ensure that the maximum power output does not exceed the limits specified when used with the antenna, which may provide gain. This ensures that the maximum power does not exceed an amount which may create an excessive power level.

Limits

The limits are defined in FCC Part 15.249(a)3 and RSS-210 B.10 a.

For equipment with the fundamental frequency operating in the 2400-2483.5 MHz band, the limit of the fundamental is 50 mV/m (93.9 dBµV/m), when measured at a 3m distance

Results

The EUT passed. The max peak fundamental field strength is 92.2 dBµV/m at 3 m.

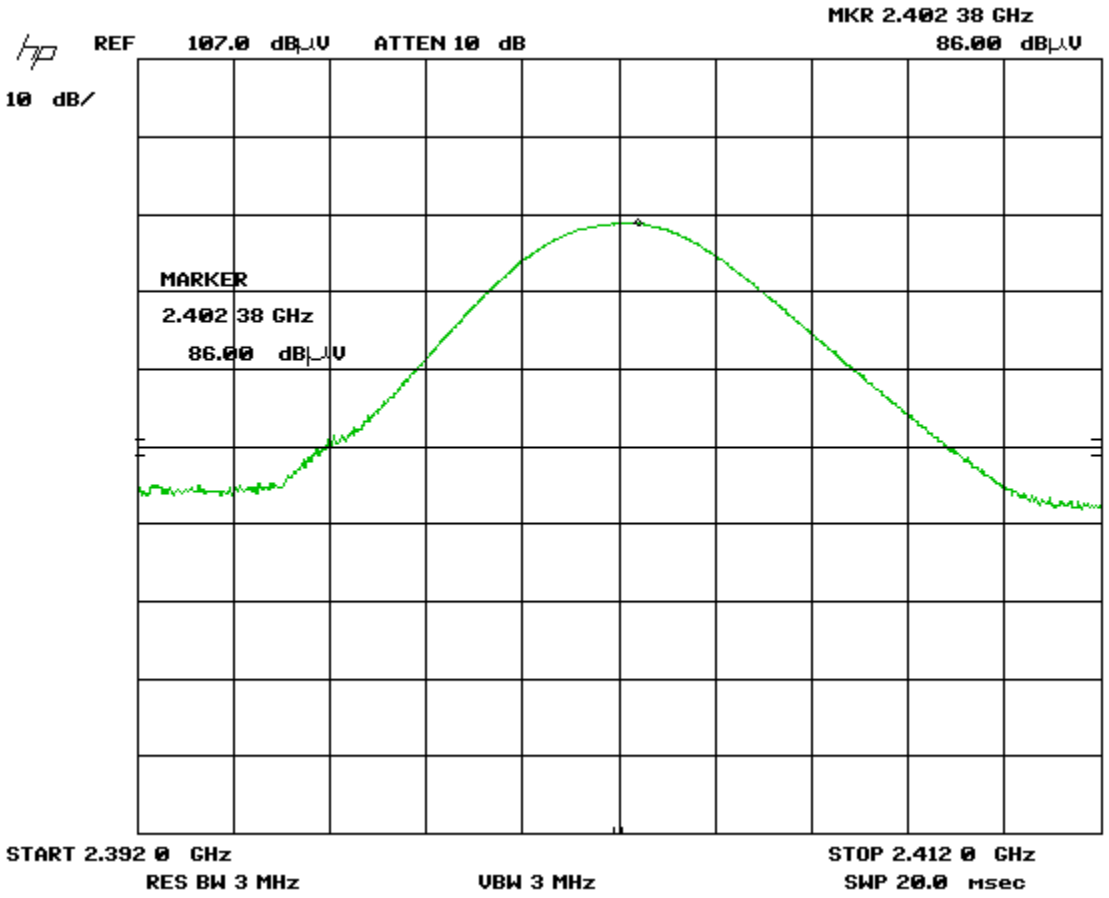
Table(s)

The table below shows the measured peak power output of the device. Peak measurements were made during transmit operation of the EUT with continuous modulated data at the maximum output power used by the manufacturer. Worst case plots are shown.

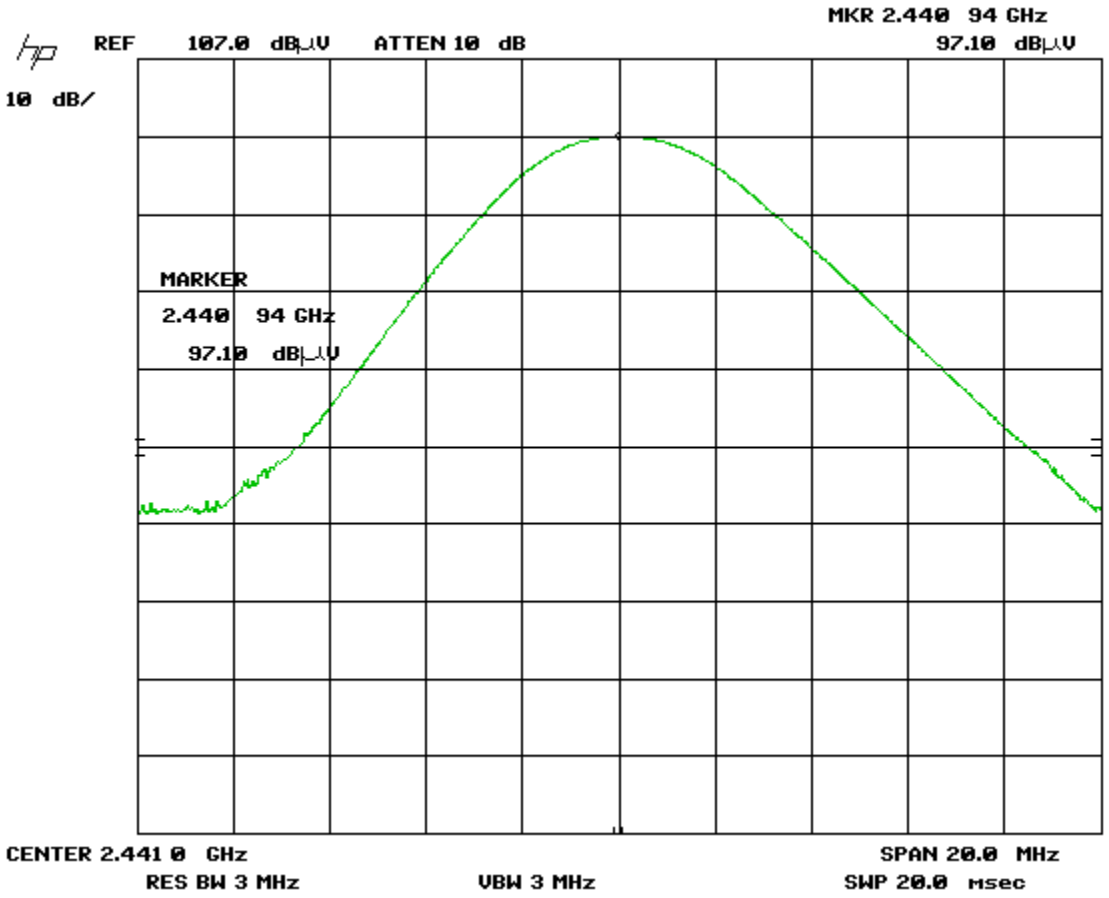
Table 2 – Max peak E.I.R.P. output

Test Frequency (MHz)	Channel	Antenna polarity	Received Reading dB(µV)	Antenna factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Received signal at 3m (dBµV)	EIRP (dBm)	Emission limit dB(µV)	Margin (dB)	Result
2402.4	Low	Vertical	86.0	26.4	3.6	35.8	80.2	-15.0	93.9	13.7	Pass
2402.1	Low	Horizontal	94.5	26.4	3.6	35.8	88.7	-6.5	93.9	5.2	Pass
2440.8	Middle	Vertical	88.1	26.3	3.6	35.8	82.2	-13.0	93.9	11.7	Pass
2440.9	Middle	Horizontal	97.1	26.3	3.6	35.8	91.2	-4.0	93.9	2.7	Pass
2479.9	High	Vertical	89.9	26.2	3.6	35.8	83.9	-11.3	93.9	10	Pass
2479.8	High	Horizontal	98.2	26.2	3.6	35.8	**92.2**	-3.0	93.9	1.7	Pass

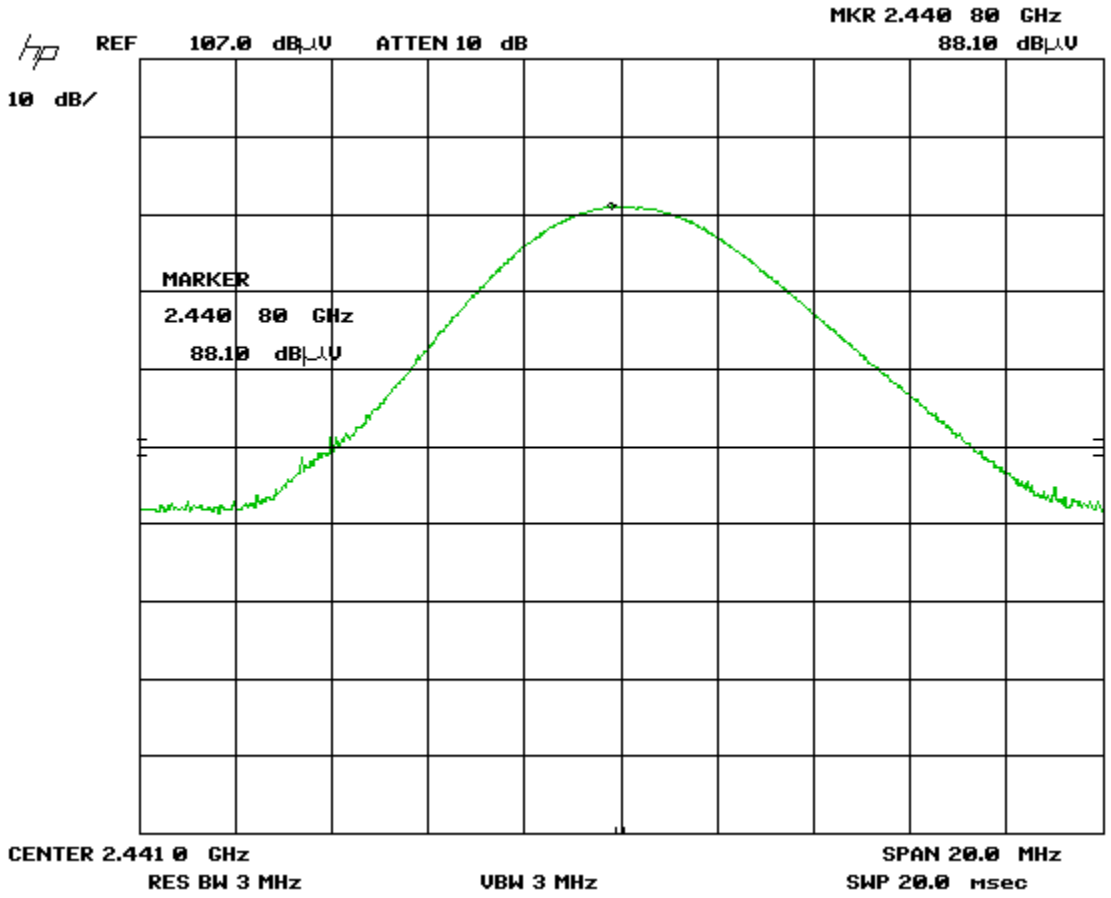
Low Channel
Vertical Antenna Polarity



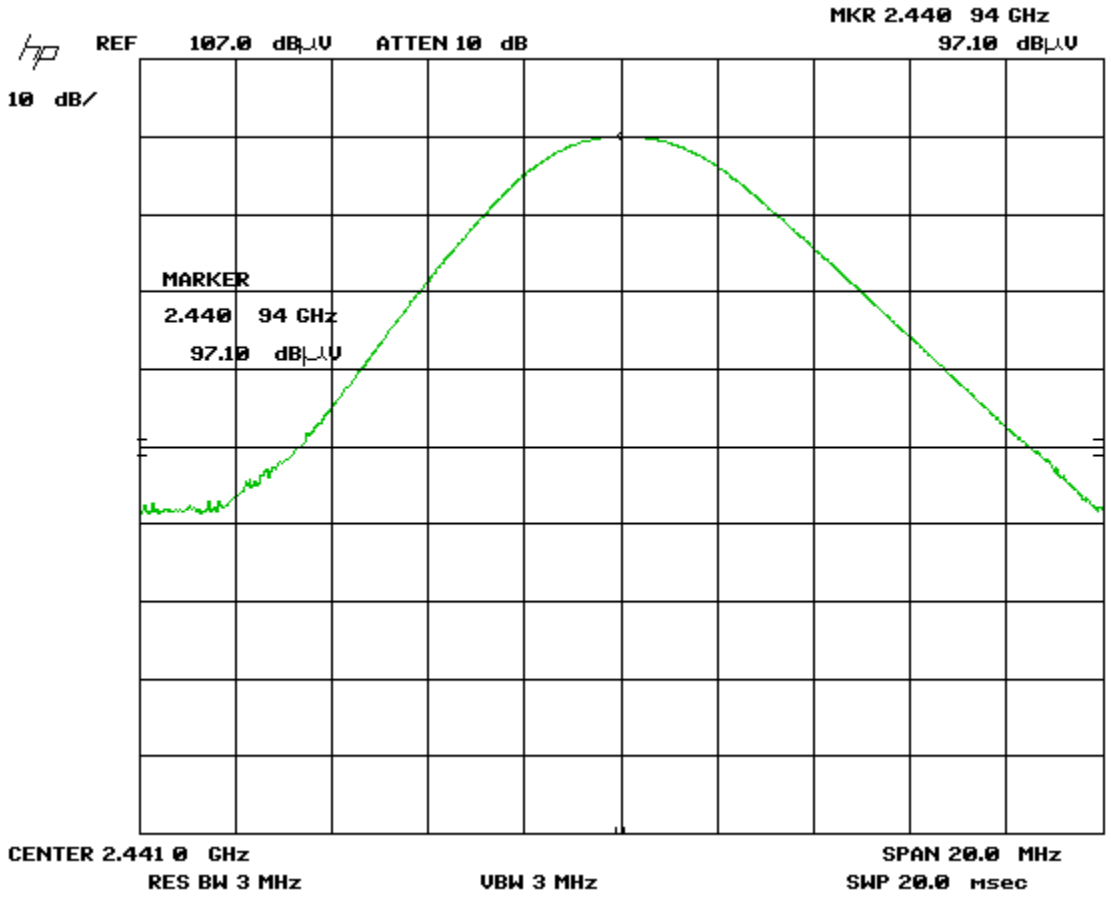
Low Channel
Horizontal Antenna Polarity



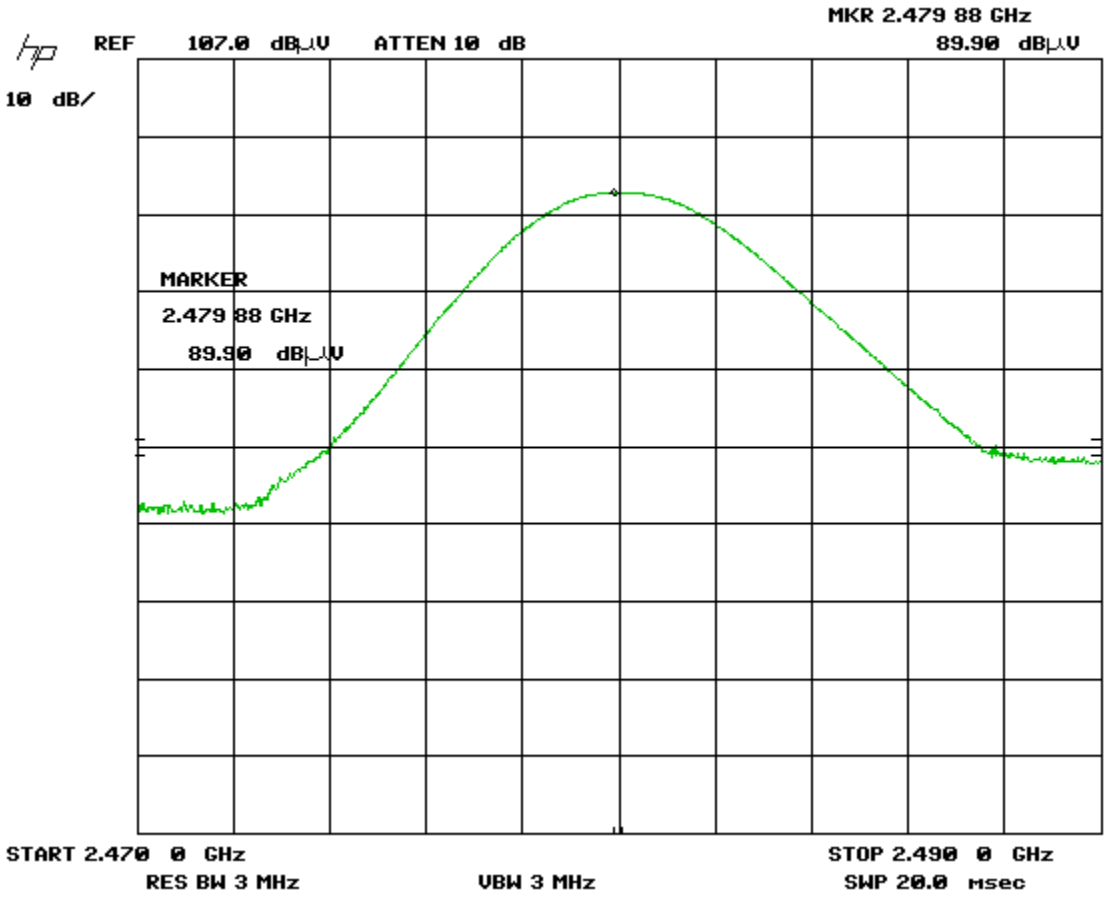
Middle Channel
Vertical Antenna Polarity



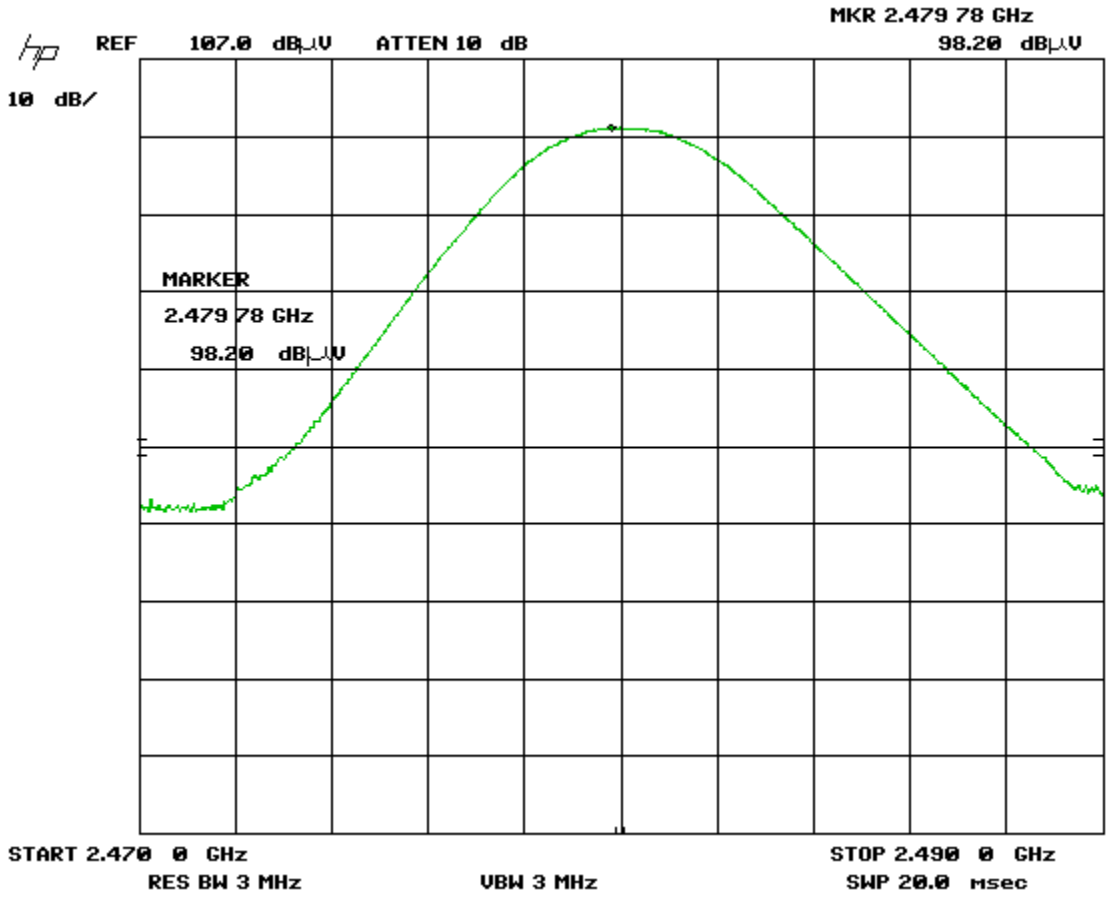
Middle Channel
Horizontal Antenna Polarity



High Channel
Vertical Antenna Polarity



High Channel
Horizontal Antenna Polarity



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

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	Nov. 27, 2015	Nov. 27, 2017	GEMC 190
Quasi-Peak Adapter	85650A	HP	Nov. 27, 2015	Nov. 27, 2017	GEMC 191
Horn Antenna	WBH218HN	Q-par	Feb. 12, 2016	Feb. 12, 2018	GEMC 6375
Pre-amp	HP 8449B	HP	Nov. 27, 2015	Nov. 27, 2017	GEMC 189
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

Spurious Radiated Emissions, Restricted Bands, & Harmonics

Purpose

The purpose of this test is to ensure that the RF energy and harmonics 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 requirement is stated in 47 CFR FCC Part 15 Section 249(d), and RSS-210 B.10 b.
The method is as defined in ANSI C63.4.
The restricted bands are defined in 47 CFR FCC Part 15.205 and RSS-Gen (Table 6).

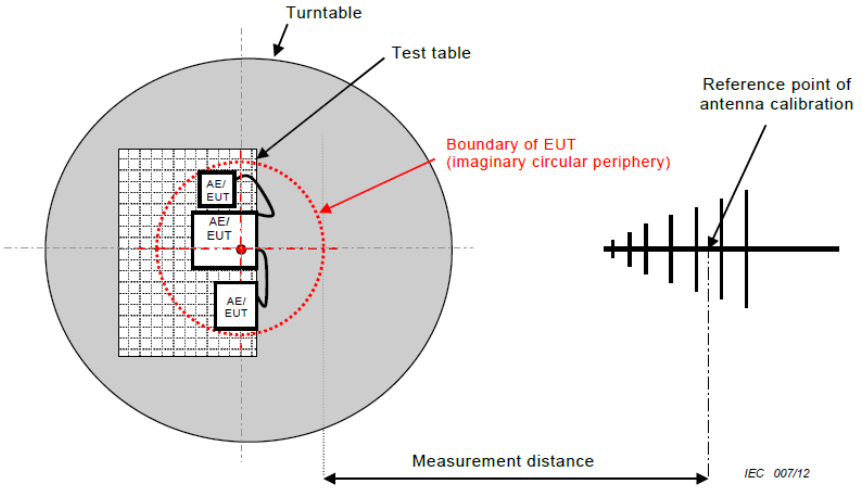
The harmonic limits are defined in 47 CFR FCC Part 15.249(a) and RSS-210 B.10 a.
For equipment with the fundamental frequency operating in the 2400-2483.5 MHz band, the limit of the harmonics is 500 µV/m (53.9 dBµV/m), when measured at a 3m distance, using average detector.

The general radiated emissions limits are defined in 47 CFR FCC Part 15.209 and RSS-Gen (Table 4). Except for the harmonics, radiated emissions outside of the allocated frequency band shall either be attenuated by at least 50 dB below the fundamental transmission, or meet the general radiated emissions limits. These limits are as follows:

0.009 MHz – 0.490 MHz, 2400/F(kHz) uV/m at 300 m [1]
0.490 MHz – 1.705 MHz, 24000/F(kHz) uV/m at 30 m [1]
1.705 MHz – 30 MHz, 30 uV/m at 30 m [1]
30 MHz – 88 MHz, 100 uV/m (40.0 dBuV/m [1]) at 3 m
88 MHz – 216 MHz, 150 uV/m (43.5 dBuV/m [1]) at 3 m
216 MHz – 960 MHz, 200 uV/m (46.0 dBuV/m[1]) at 3 m
Above 960 MHz, 500 uV/m (54.0 dBuV/m [1]) at 3 m
Above 1000 MHz, 500 uV/m (54 dBuV/m [2]) at 3m
Above 1000 MHz, 5011.9 uV/m (74 dBuV/m [3]) at 3m

[1]Limit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1.
[2]Limit is with 1 MHz measurement bandwidth and using an Average detector.
[3]Limit is with 1 MHz measurement bandwidth and using a Peak detector.

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 graphs shown below are maximized peak measurement graphs, measured with a resolution bandwidth greater than or equal to, 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 10^{th} harmonic.

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.

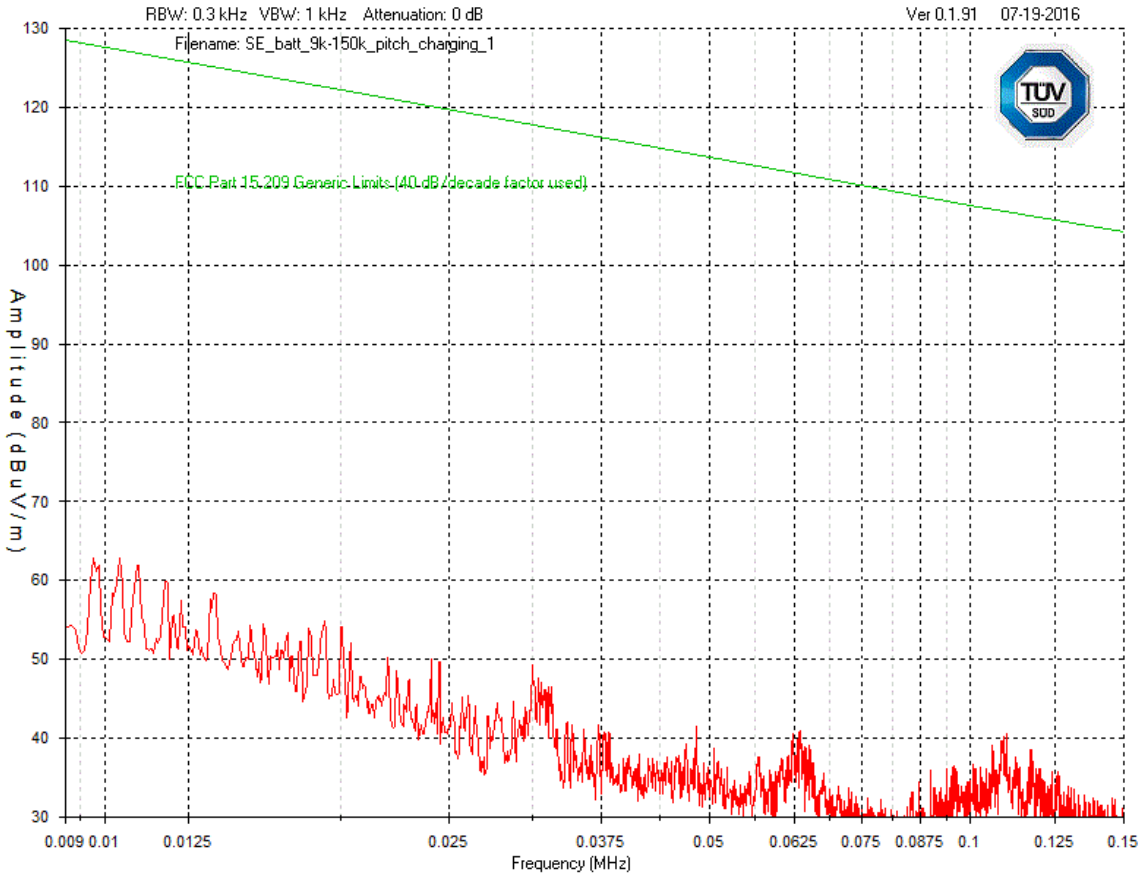
See *Final Measurements* section for measurement data.

EUT was scanned at low, middle, and high channels. Worst case data is presented.

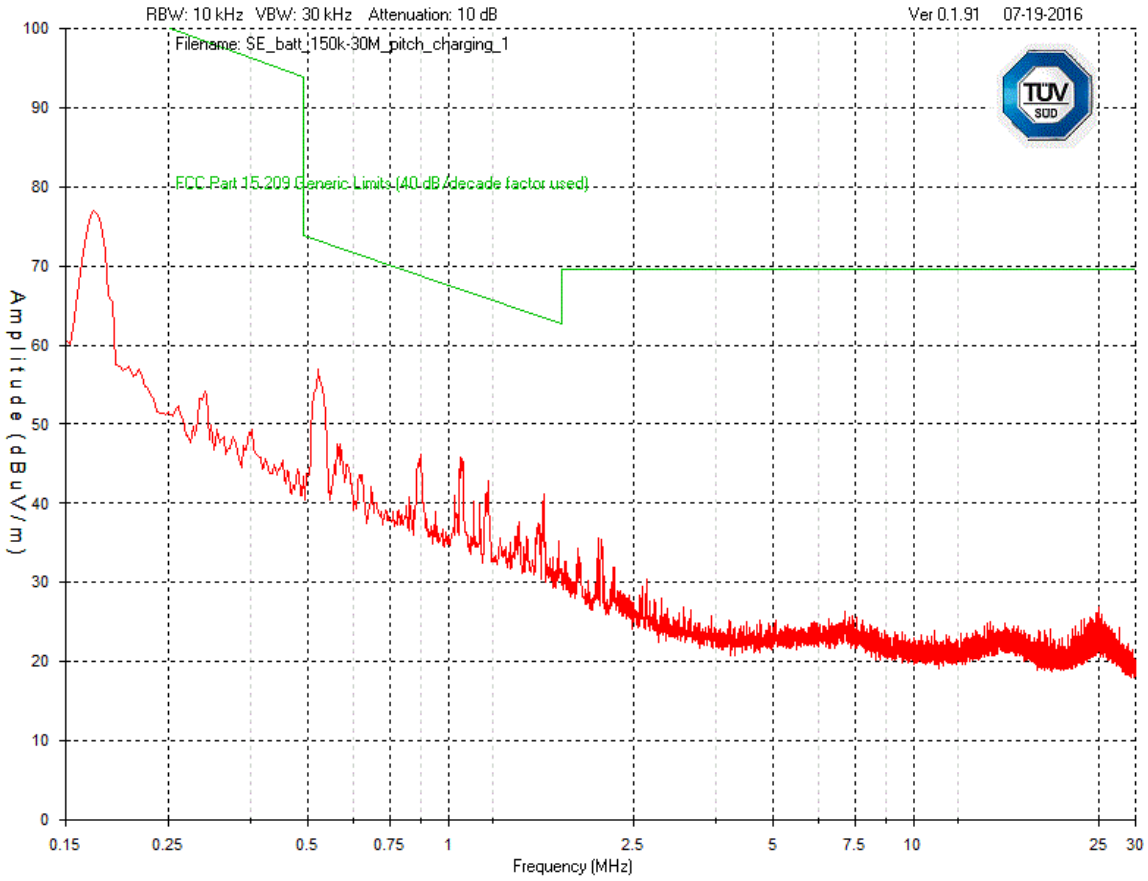
To exercise all functions of the EUT and obtain the worst case spurious emissions, the EUT was tested while it is transmitting and charging.

All transmitters in the EUT are on and transmitting continuous modulated data at the maximum power setting used by the manufacturer.

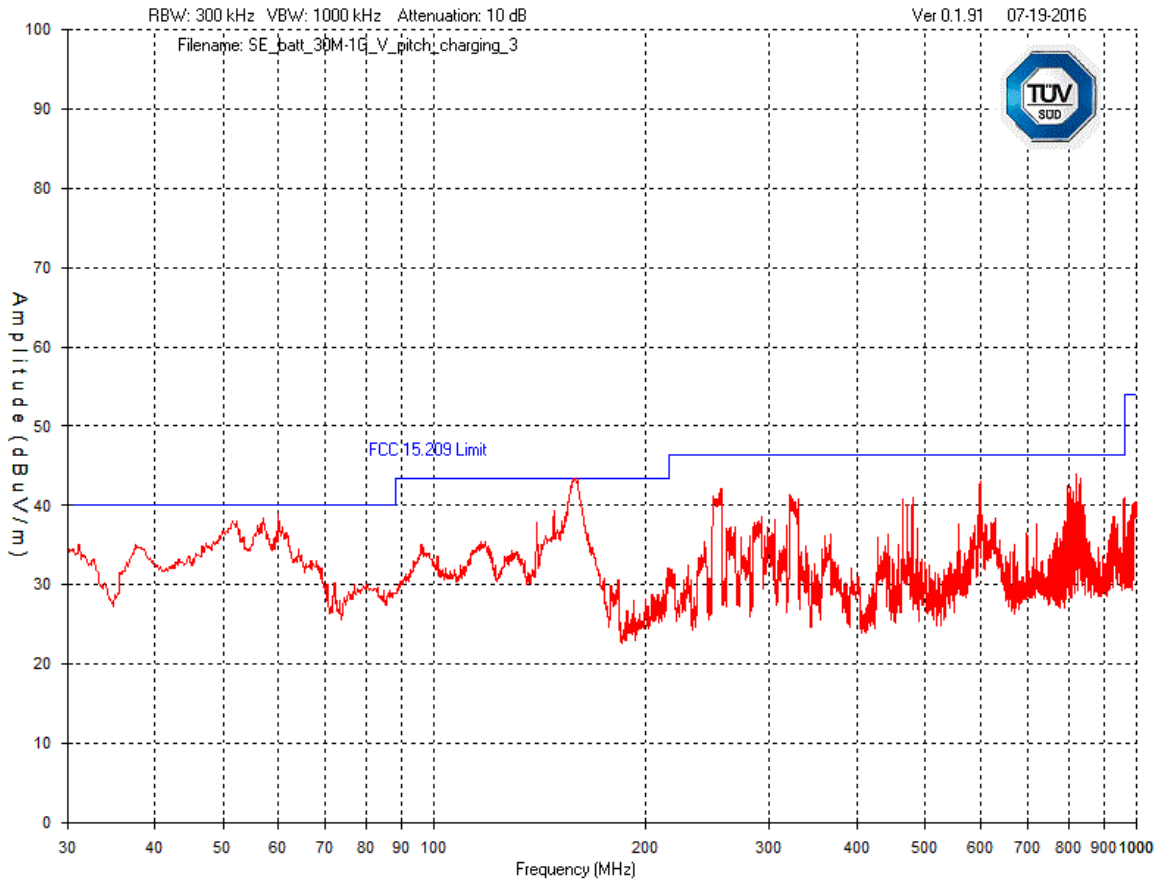
Peak Emissions Graph
9 kHz to 150 kHz



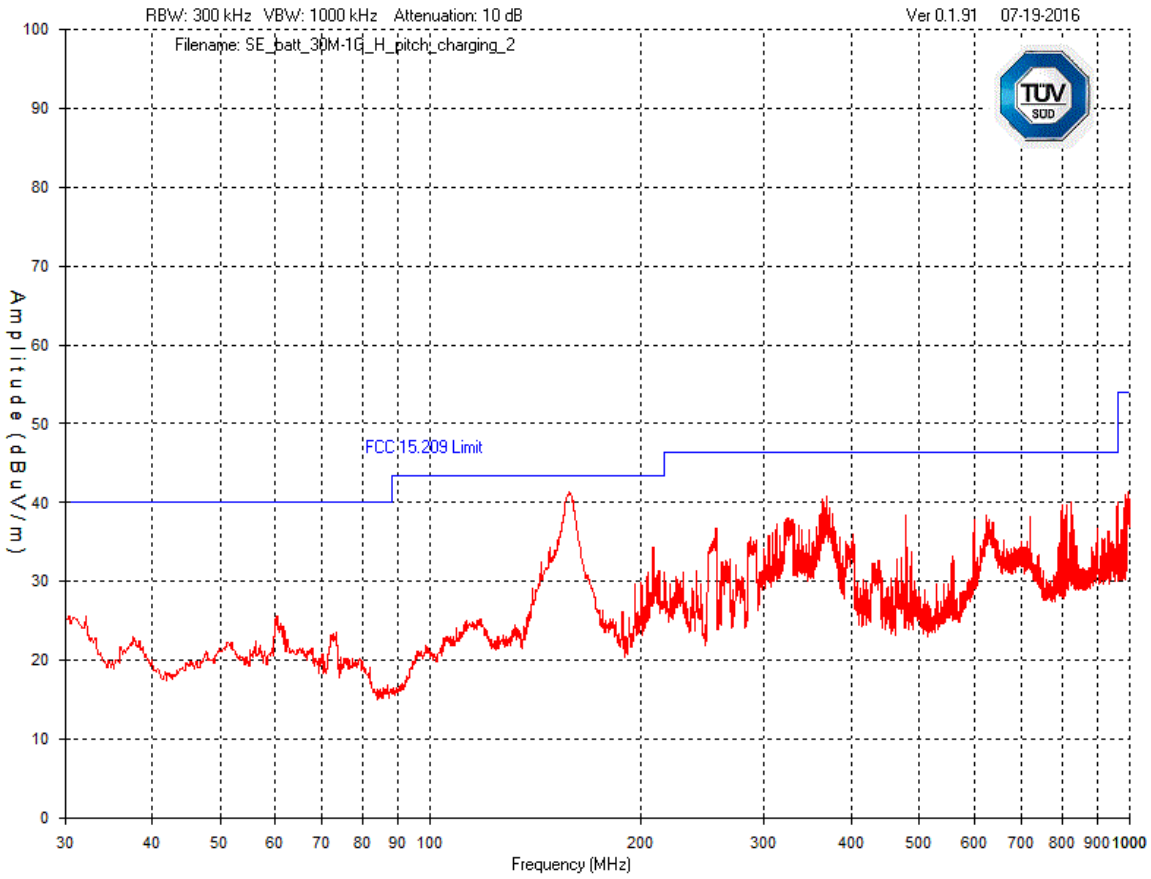
Peak Emissions Graph
150 kHz to 30 MHz



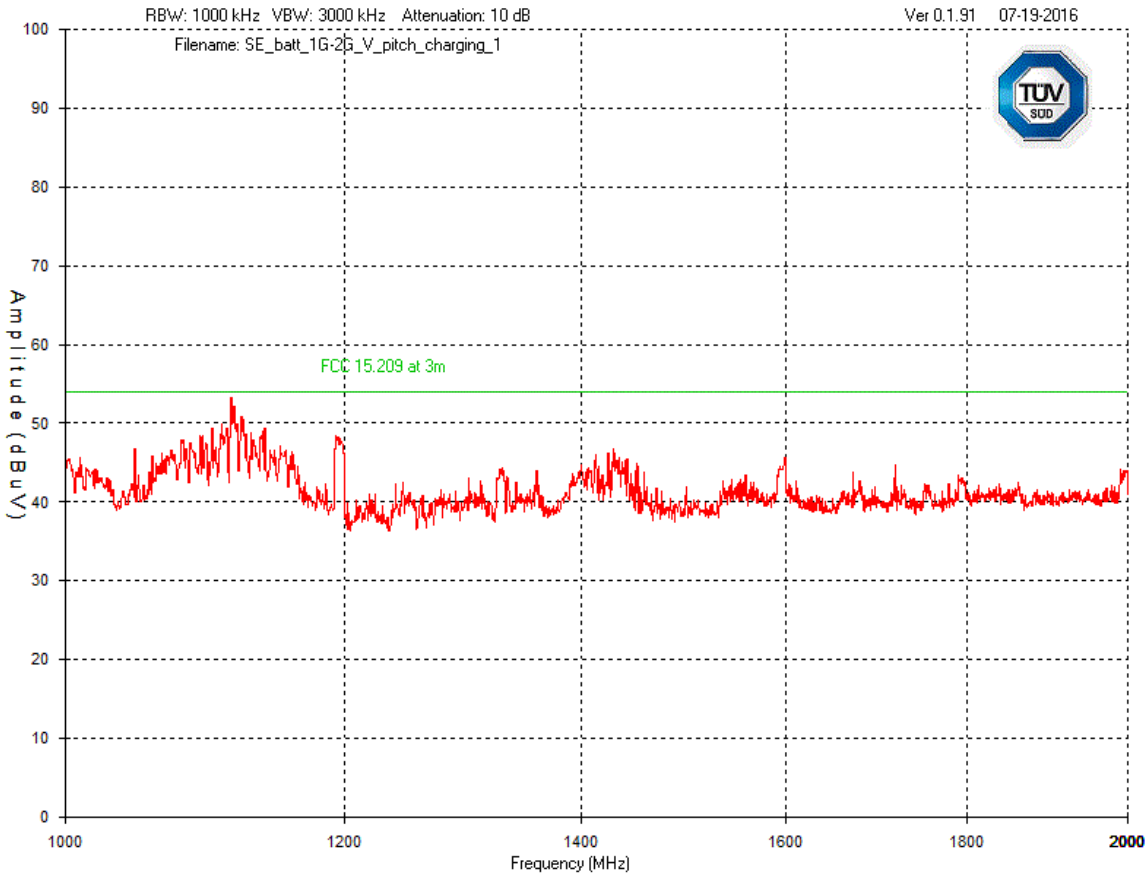
Peak Emissions Graph
Vertical Antenna Polarity
30 MHz to 1 GHz



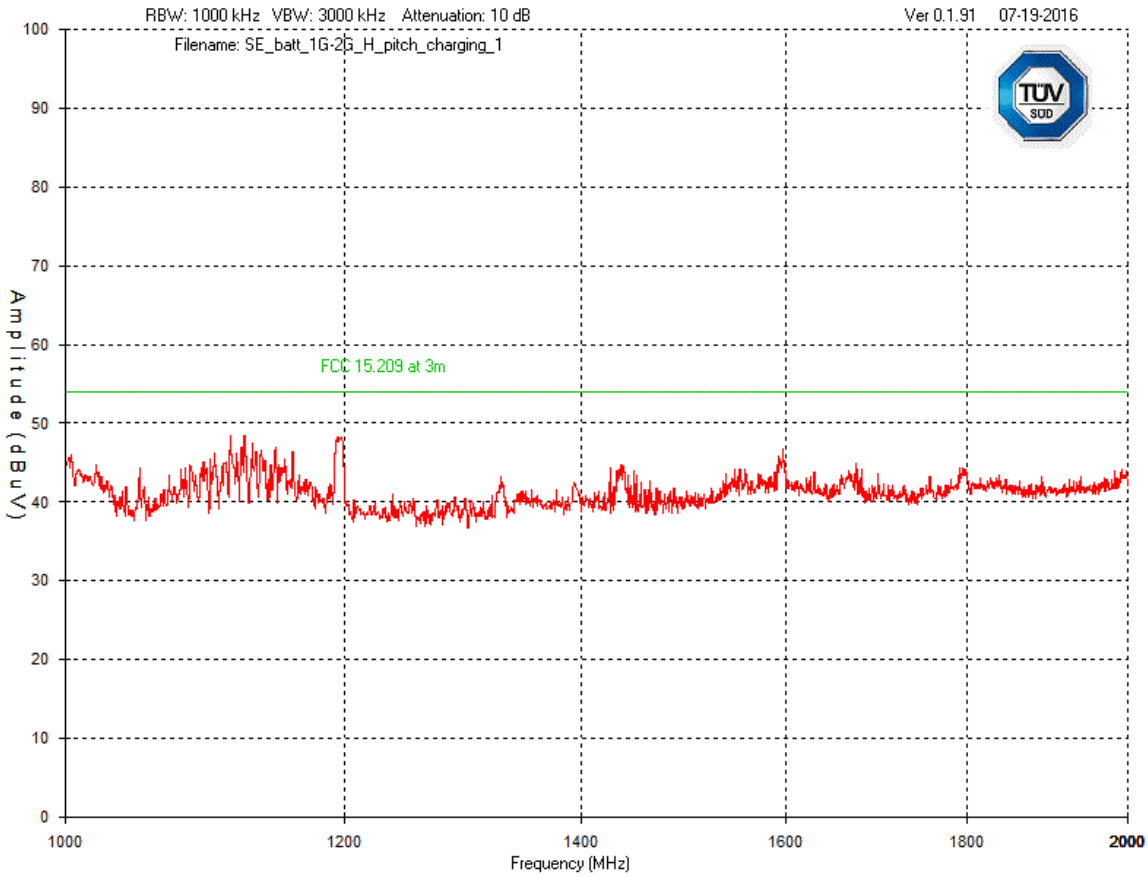
Peak Emissions Graph
Horizontal Antenna Polarity
30 MHz to 1 GHz



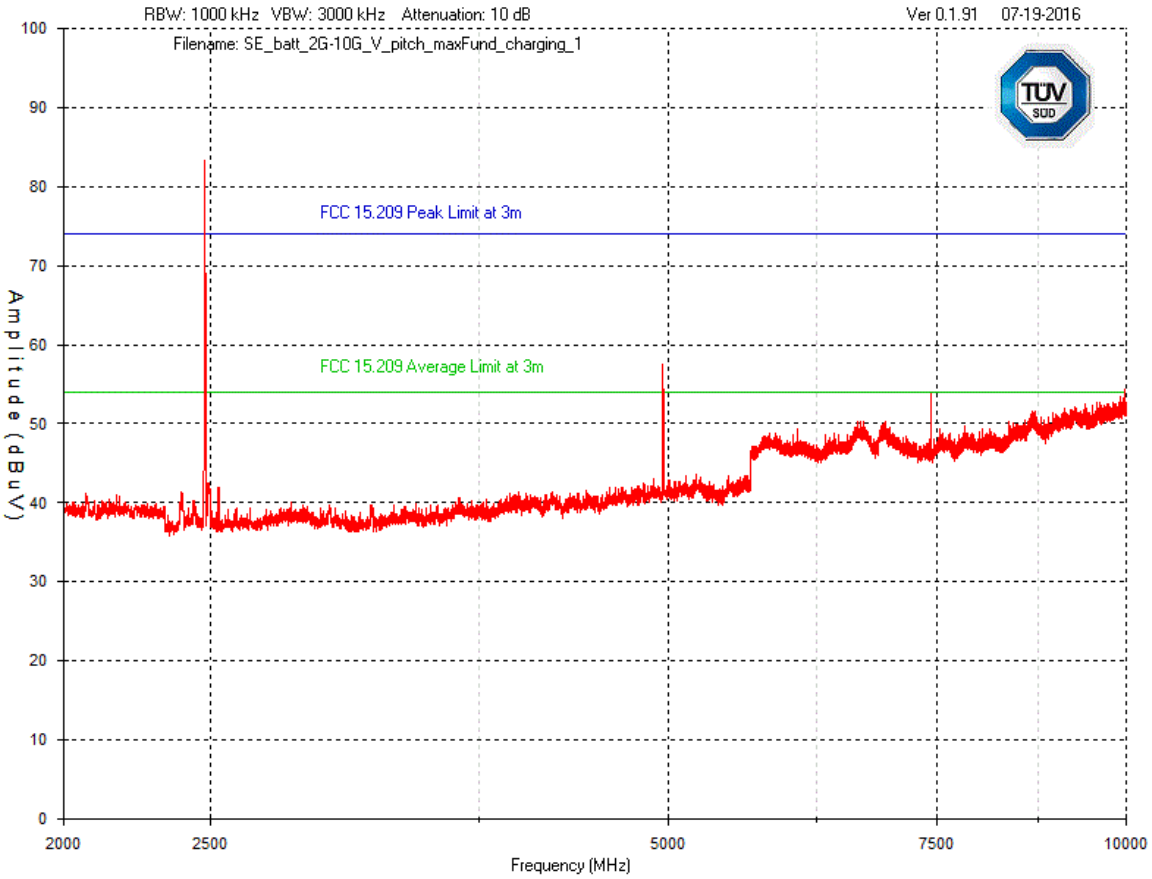
Peak Emissions Graph
Vertical Antenna Polarity
1 GHz to 2 GHz



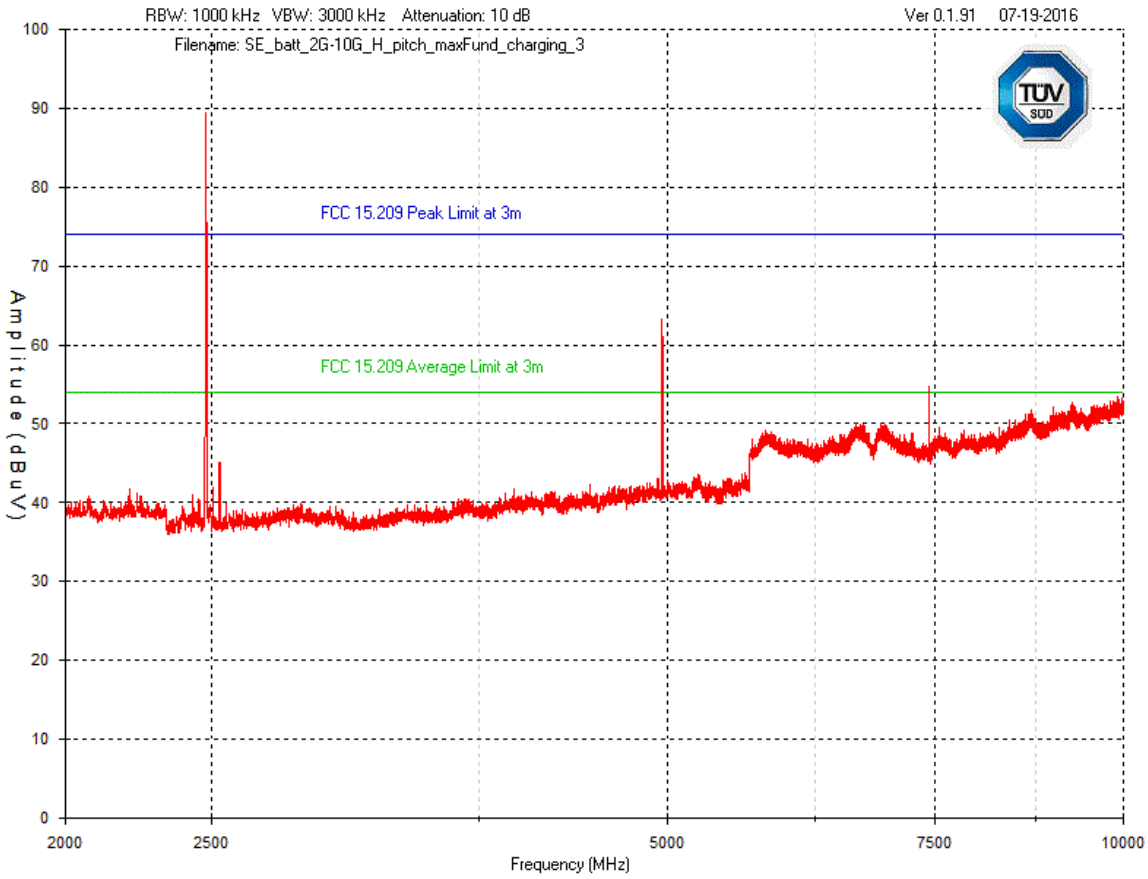
Peak Emissions Graph
Horizontal Antenna Polarity
1 GHz to 2 GHz



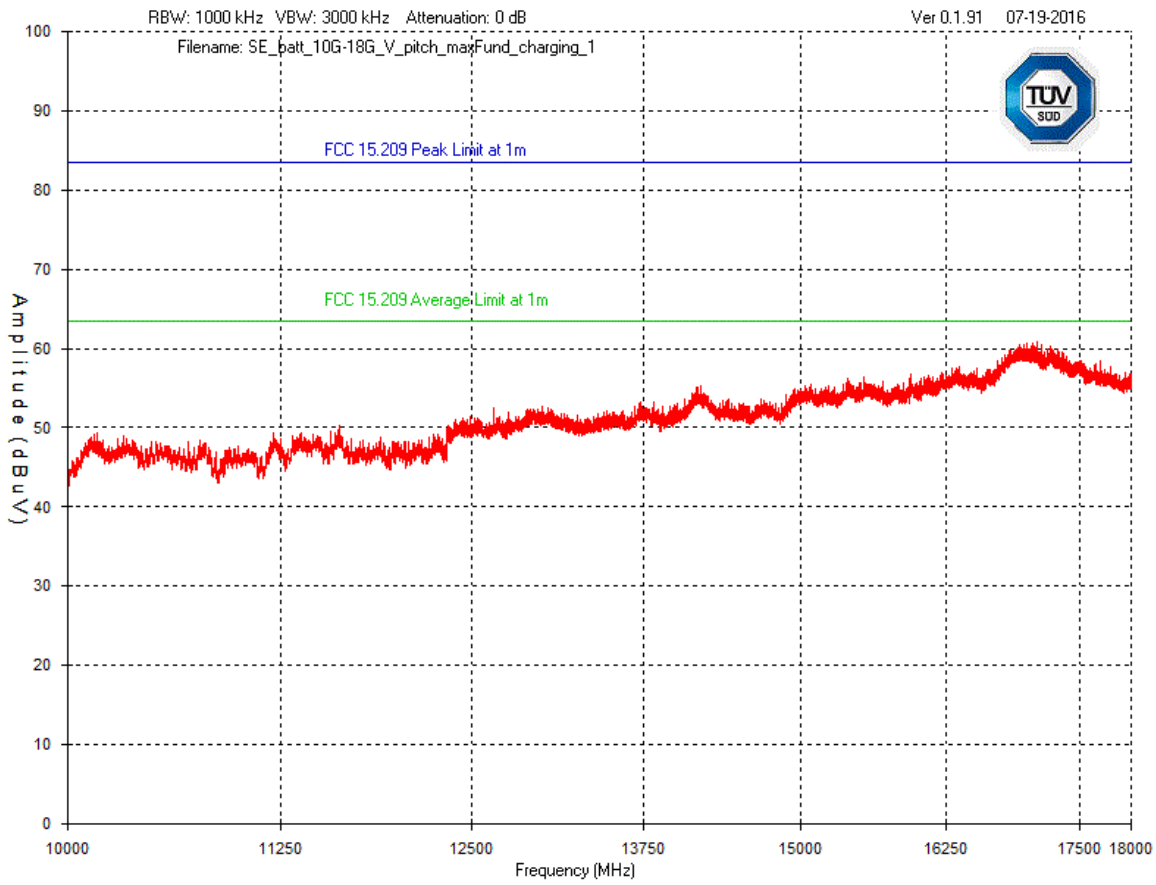
Peak Emissions Graph
Vertical Antenna Polarity
2 GHz to 10 GHz



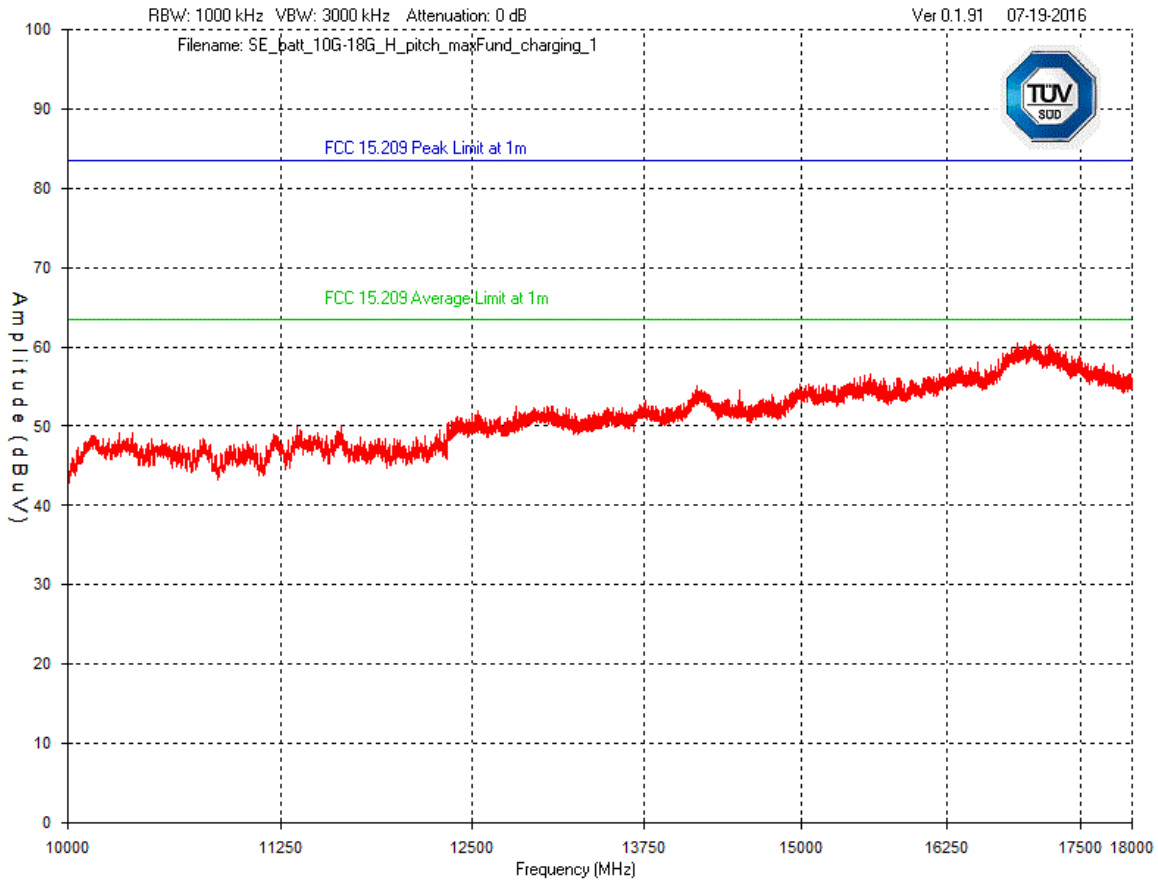
Peak Emissions Graph
Horizontal Antenna Polarity
2 GHz to 10 GHz



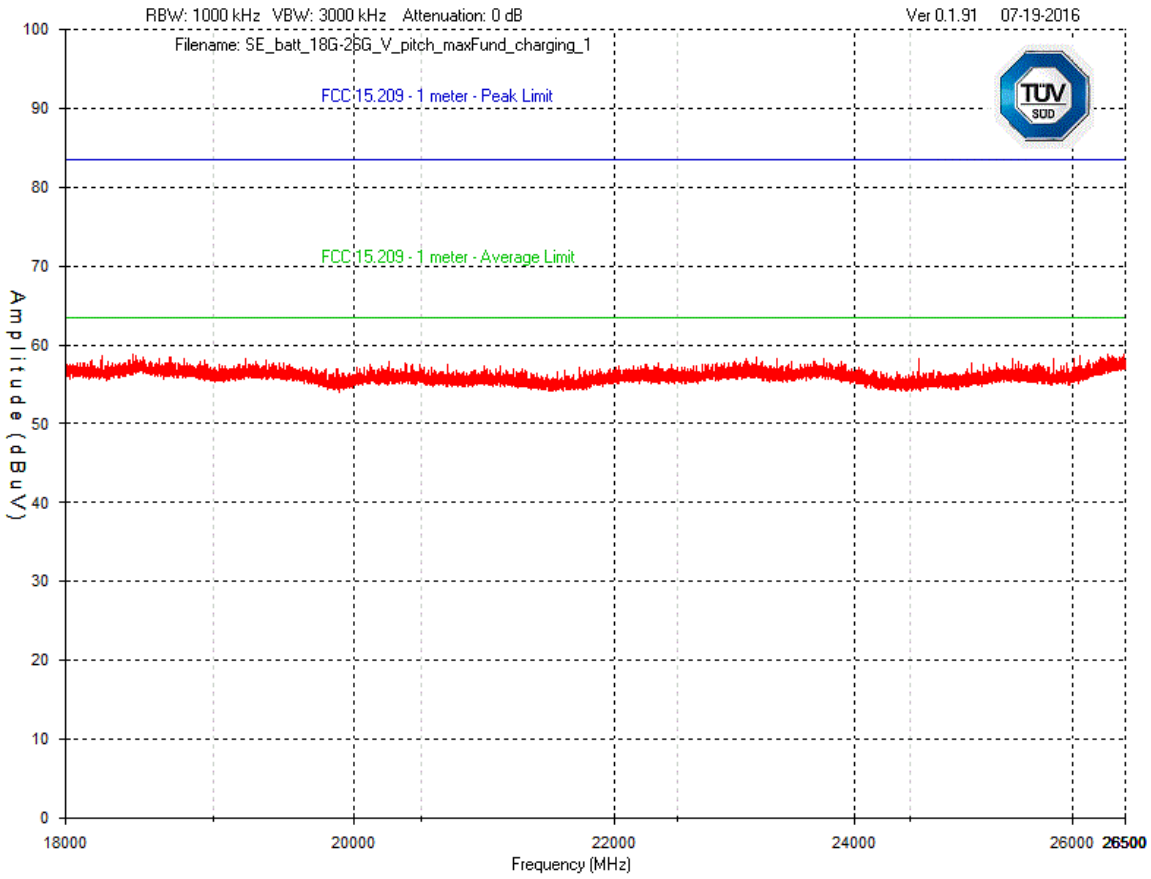
Peak Emissions Graph
Vertical Antenna Polarity
10 GHz to 18 GHz



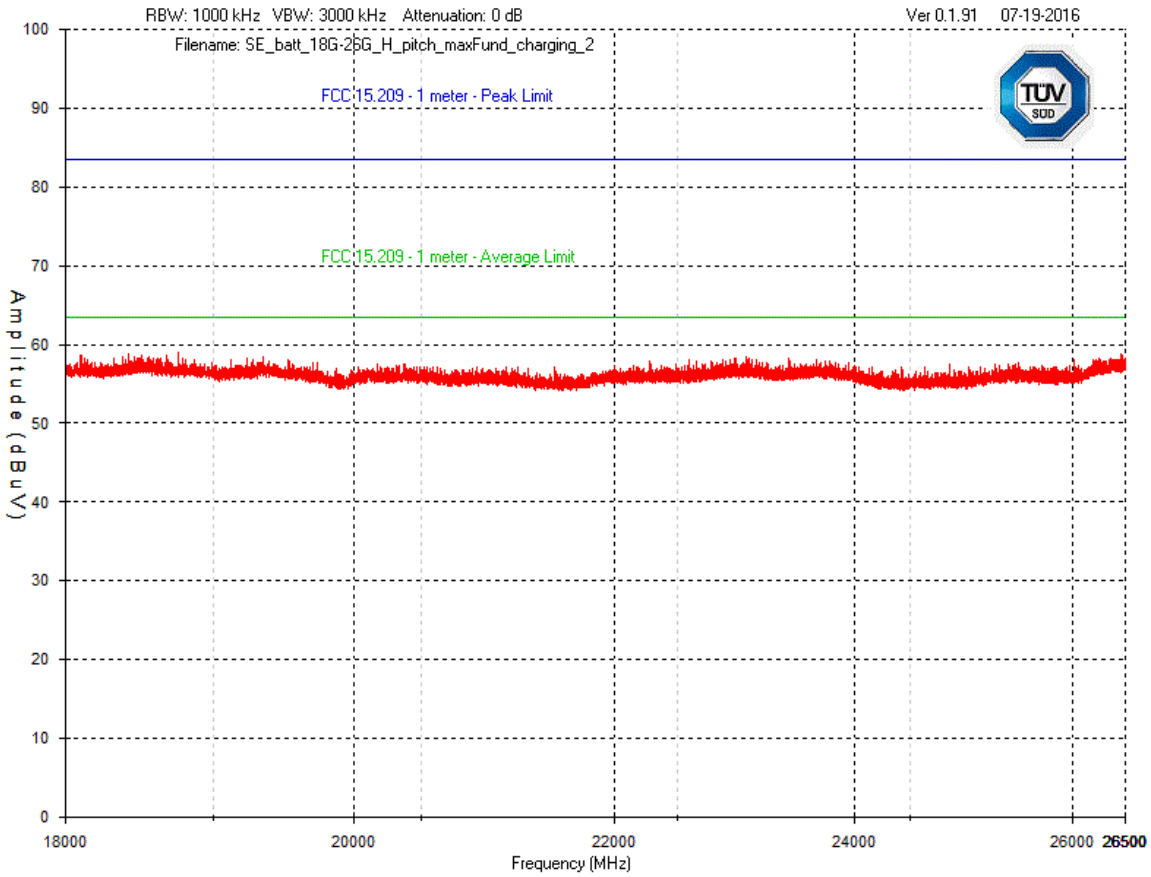
Peak Emissions Graph
Horizontal Antenna Polarity
10 GHz to 18 GHz



Peak Emissions Graph
Vertical Antenna Polarity
18 GHz to 26.5 GHz

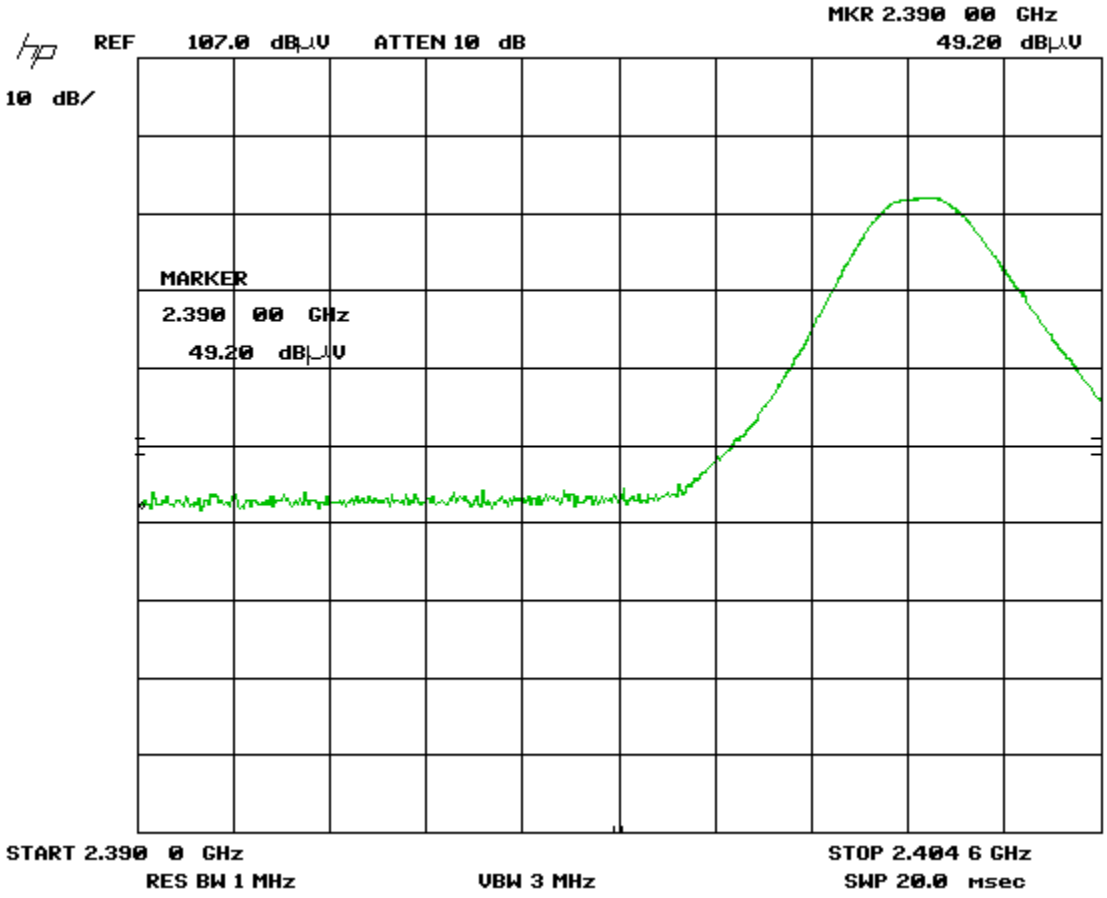


Peak Emissions Graph
Horizontal Antenna Polarity
18 GHz to 26.5 GHz



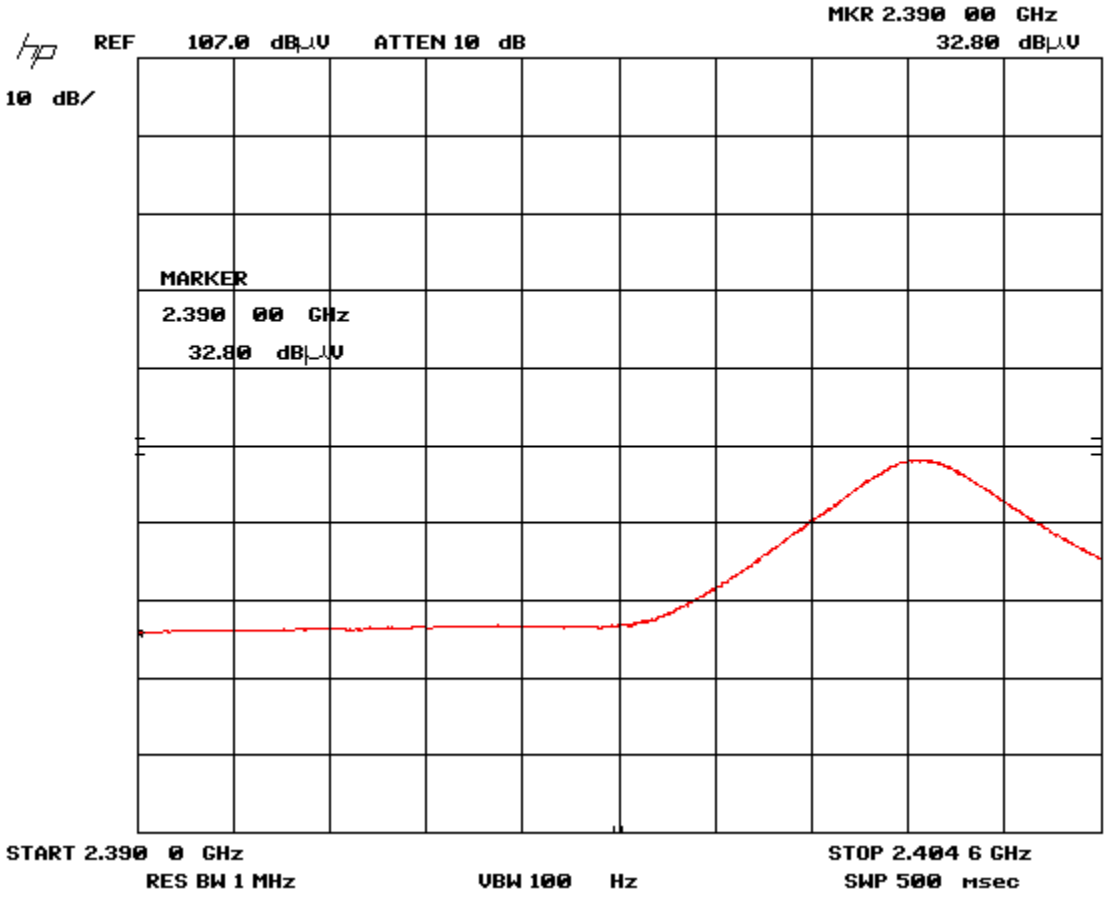
Restricted Band Edges Emissions Graph (Peak)
At 2.390 GHz, Vertical Antenna Polarity
Low Channe1

Note: Factors not incorporated. See table in *Final Measurements* for final factored values.



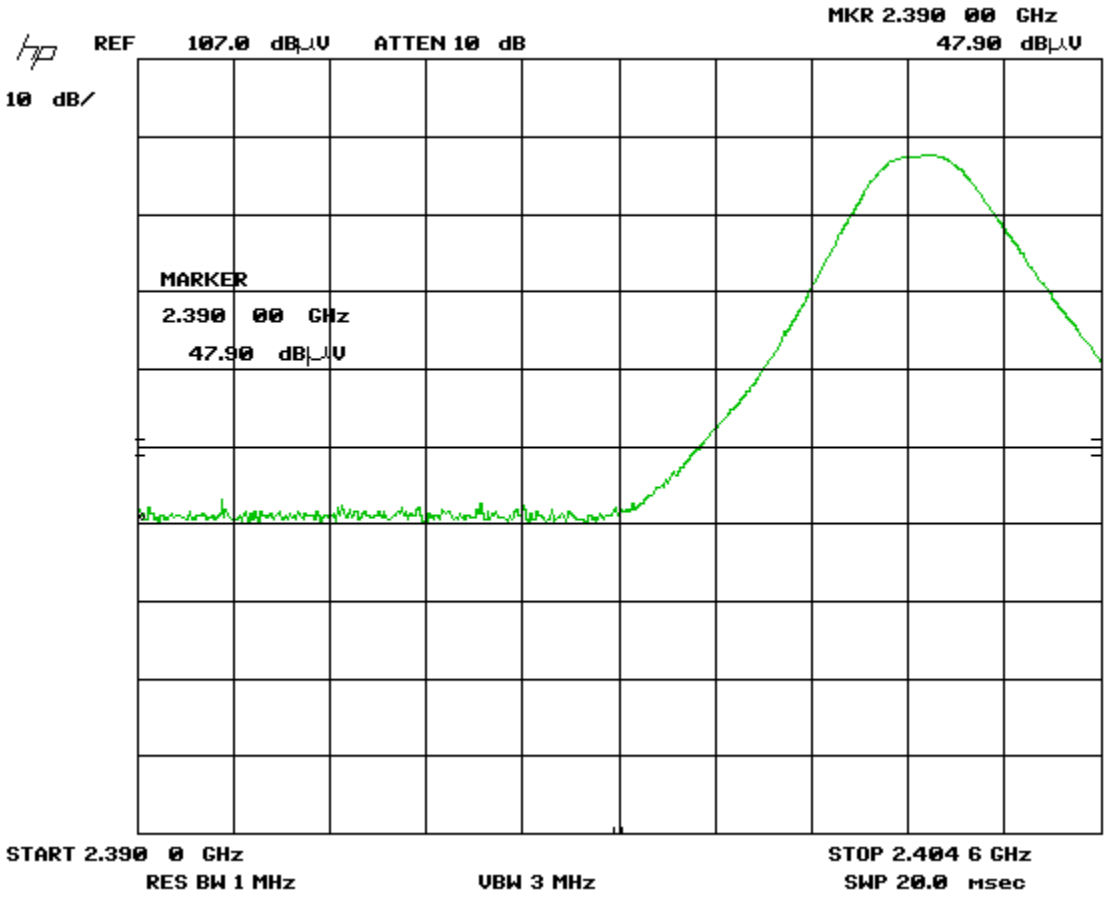
Restricted Band Edges Emissions Graph (Average)
At 2.390 GHz, Vertical Antenna Polarity
Low Channe1

Note: Factors not incorporated. See table in *Final Measurements* for final factored values.



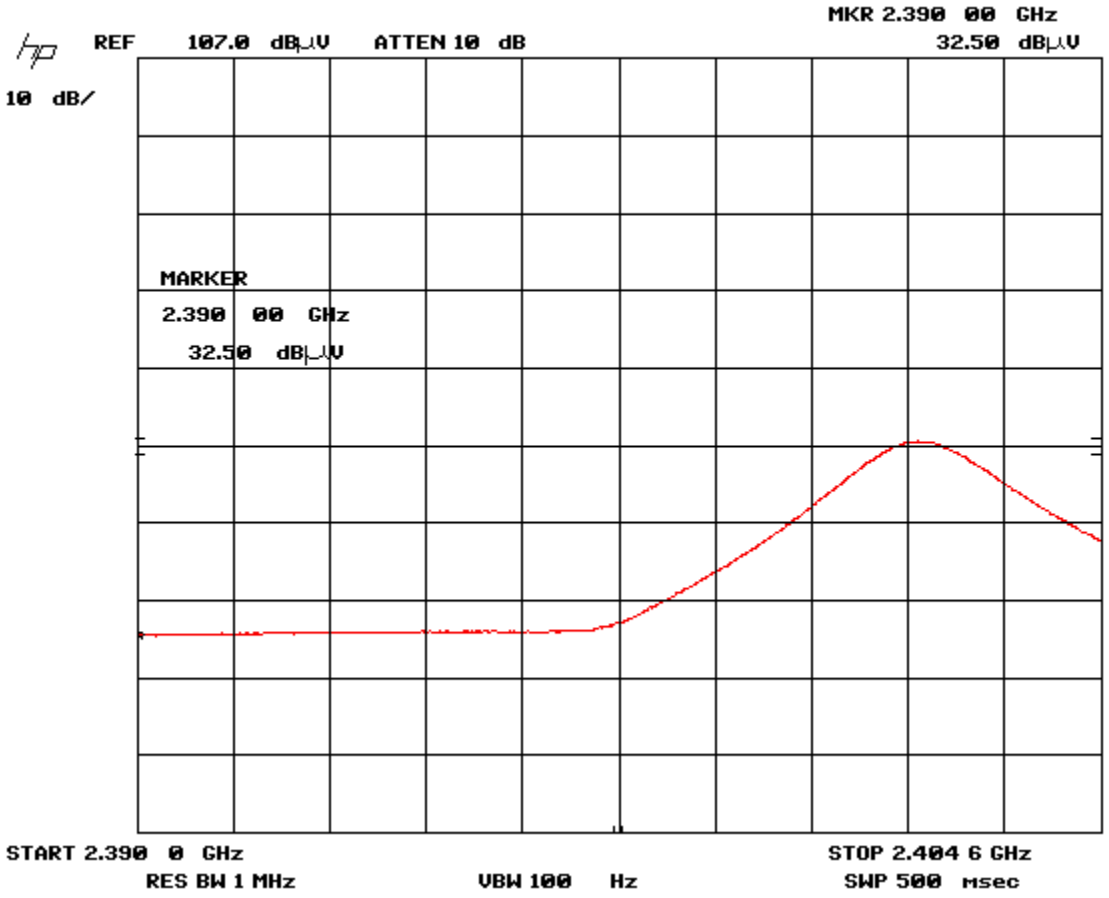
Restricted Band Edges Emissions Graph (Peak)
At 2.390 GHz, Horizontal Antenna Polarity
Low Channe1

Note: Factors not incorporated. See table in *Final Measurements* for final factored values.



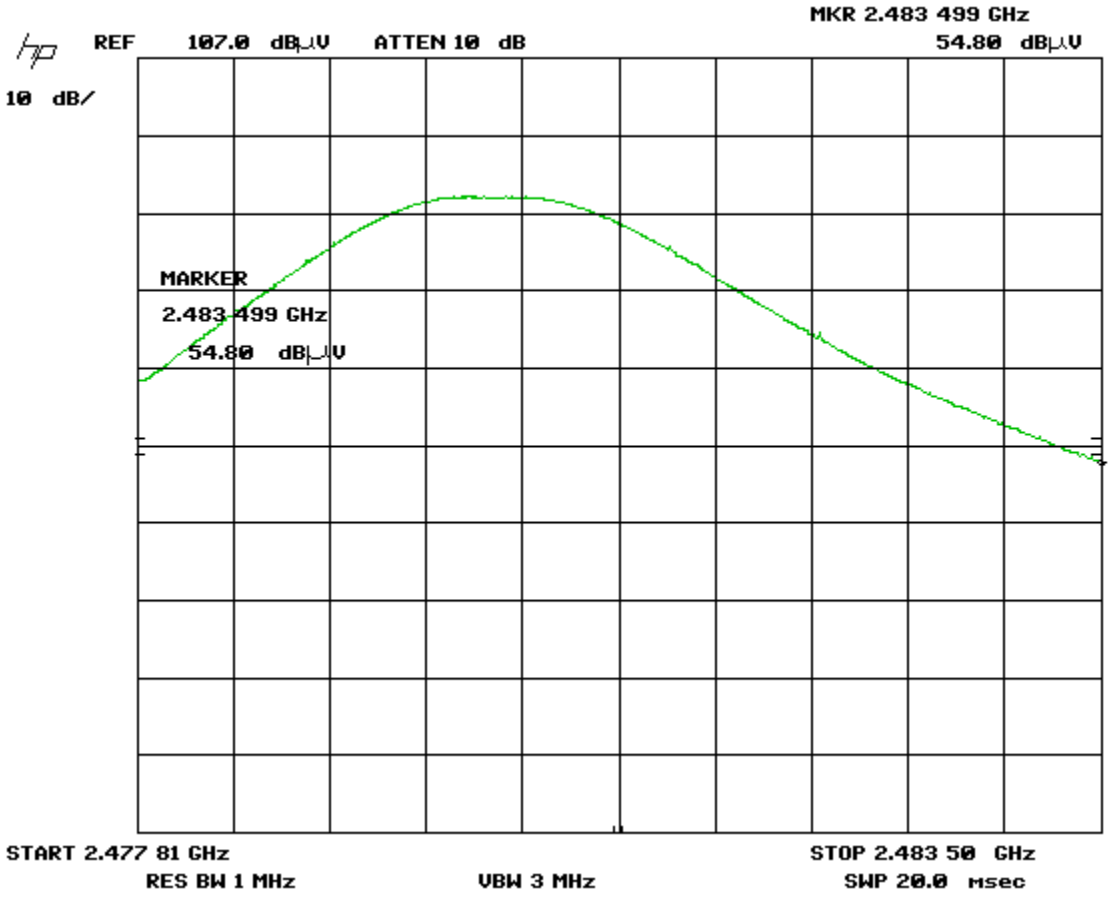
Restricted Band Edges Emissions Graph (Average)
At 2.390 GHz, Horizontal Antenna Polarity
Low Channe1

Note: Factors not incorporated. See table in *Final Measurements* for final factored values.



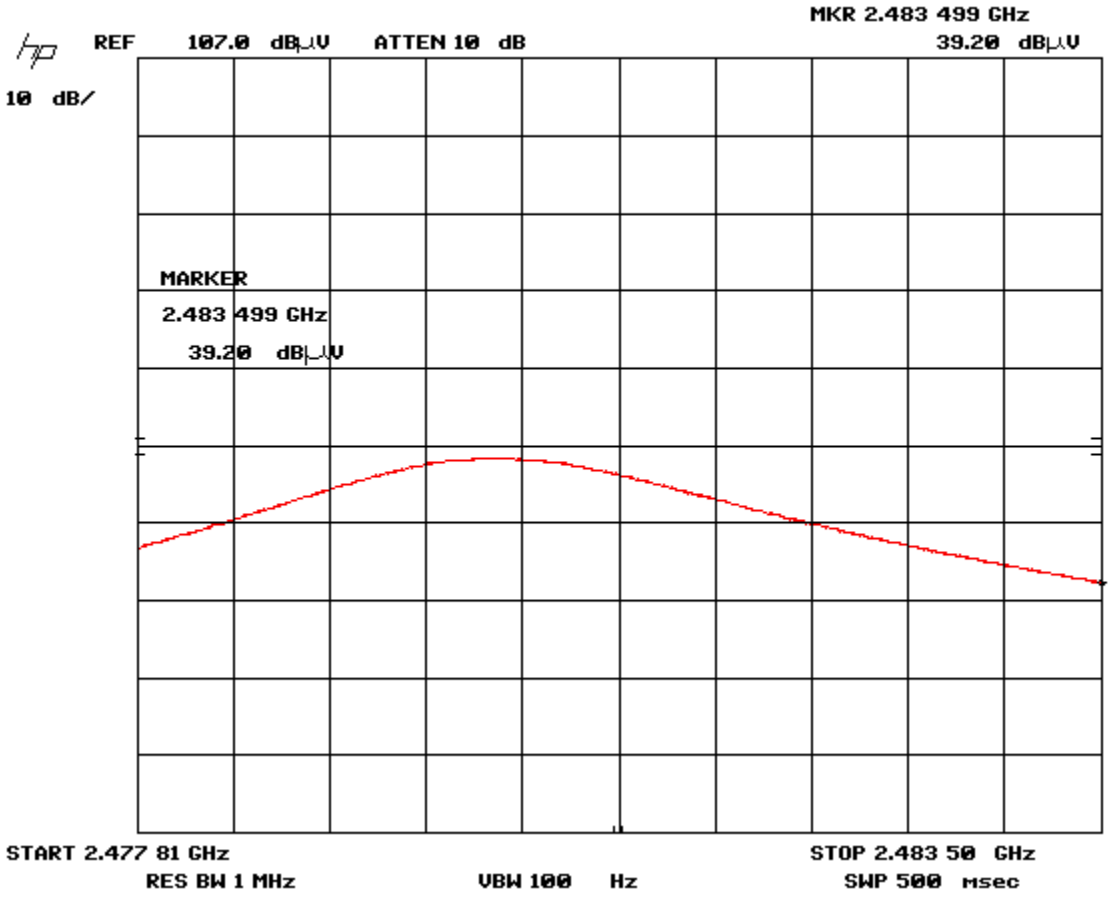
Restricted Band Edges Emissions Graph (Peak)
At 2.4835 GHz, Vertical Antenna Polarity
High Channe1 (2480 MHz)

Note: Factors not incorporated. See table in *Final Measurements* for final factored values



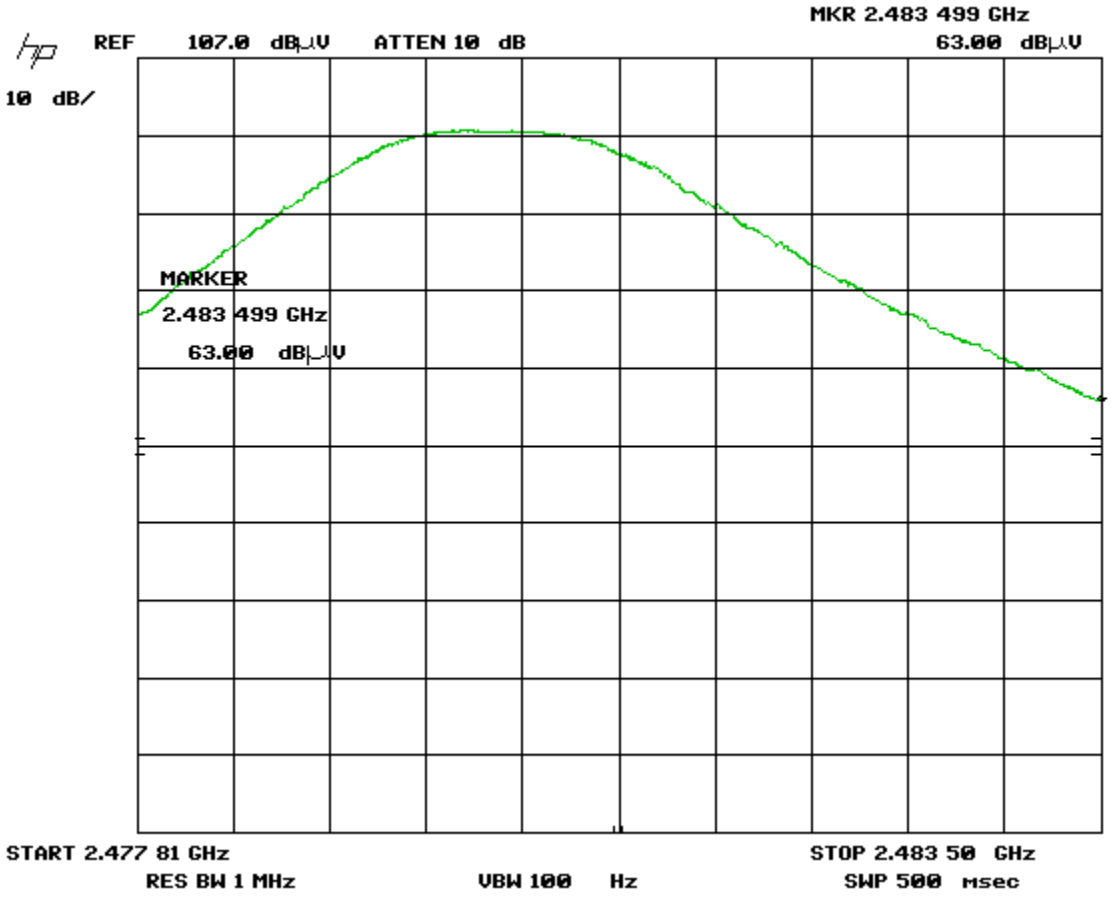
Restricted Band Edges Emissions Graph (Average)
At 2.4835 GHz, Vertical Antenna Polarity
High Channe1 (2480 MHz)

Note: Factors not incorporated. See table in *Final Measurements* for final factored values



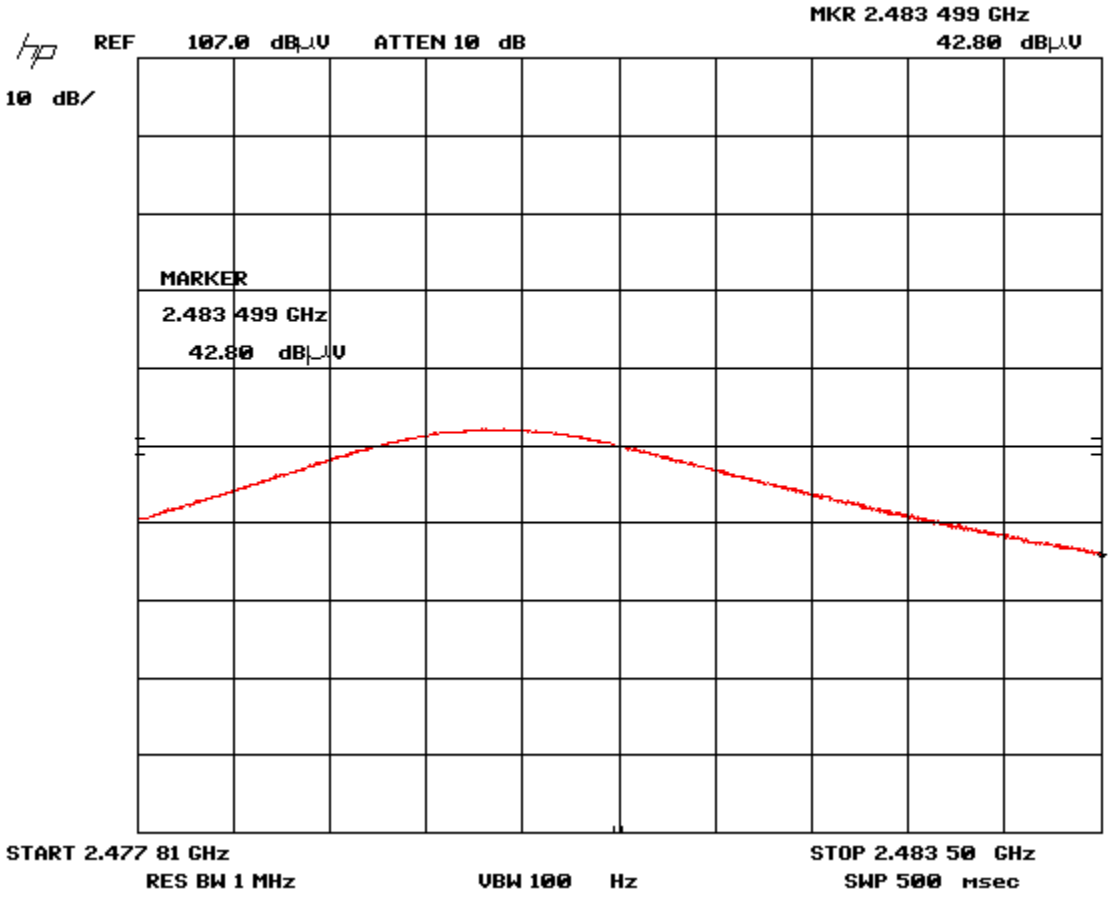
Restricted Band Edges Emissions Graph (Peak)
At 2.4835 GHz, Horizontal Antenna Polarity
High Channe1 (2480 MHz)

Note: Factors not incorporated. See table in *Final Measurements* for final factored values.



Restricted Band Edges Emissions Graph (Average)
At 2.4835 GHz, Horizontal Antenna Polarity
High Channe1 (2480 MHz)

Note: Factors not incorporated. See table in *Final Measurements* for final factored values.



Final Measurements

Table 4: Spurious Radiated Emissions

Test Frequency MHz	Detection mode	Measured signal dB(µV)	Antenna factor dB	Cable loss + Pre-selector dB	Pre-Amp Gain dB	Received signal dB(µV/m)	Emission limit dB(µV/m)	Margin dB(µV)	Result
Vertical Antenna Polarity									
158.3	QP	58.77	9.9	0.9	-33.3	36.27	43.5	7.23	Pass
59.9	QP	53.27	7.3	0.6	-33.1	28.07	40	11.93	Pass
52.1	QP	56.78	7.8	0.5	-33.2	31.88	40	8.12	Pass
56.8	QP	52.73	8.2	0.5	-33.1	28.33	40	11.67	Pass
819.1	QP	38.52	21.6	2.5	-32.4	30.22	46.4	16.18	Pass
599.8	QP	45.65	19.1	2	-33.7	33.05	46.4	13.35	Pass
1115.0	Peak	63.7	23.5	2.7	-36.7	53.2	74	20.8	Pass
1115.0	Avg.	46	23.5	2.7	-36.7	35.5	54	18.5	Pass
4959.6	Peak	60.7	27.9	6.2	-35.2	59.6	74	14.4	Pass
4959.8	Avg.	41.7	27.9	6.2	-35.2	40.6	54	13.4	Pass
9984.3	Peak	48.2	31.5	10.7	-36	54.4	74	19.6	Pass
9984.3	Avg.	38.6	31.5	10.7	-36	44.8	54	9.2	Pass
7439.5	Peak	55.4	29.2	7.6	-35.6	56.6	74	17.4	Pass
7439.5	Avg.	39.8	29.2	7.6	-35.6	41	54	13	Pass
Horizontal Antenna Polarity									
157.7	QP	57.84	9.2	0.9	-33.3	34.64	43.5	8.86	Pass
368.2	Peak	57.2	15.9	1.5	-33.8	40.8	46.4	5.6	Pass
825.6	Peak	47.2	22.8	2.5	-32.4	40.1	46.4	6.3	Pass
959.6	Peak	45.1	23.7	2.7	-31.5	40	46.4	6.4	Pass
812.3	Peak	47.4	22.3	2.5	-32.5	39.7	46.4	6.7	Pass
798.8	Peak	47.7	22	2.5	-32.6	39.6	46.4	6.8	Pass
4959.4	Peak	66.2	27.9	6.2	-35.2	65.1	74	8.9	Pass
4959.8	Avg.	44.2	27.9	6.2	-35.2	43.1	54	10.9	Pass
7439.3	Peak	57.9	29.2	7.6	-35.6	59.1	74	14.9	Pass
7439.7	Avg.	41.2	29.2	7.6	-35.6	42.4	54	11.6	Pass
9918.3	Peak	47.6	31.5	10.5	-36.1	53.5	74	20.5	Pass
9918.3	Avg.	36.6	31.5	10.5	-36.1	42.5	54	11.5	Pass

Table 5: Restricted Band Edges Emissions

Test Frequency MHz	Detection mode	Measured signal dB(µV)	Antenna factor dB	Cable loss + Pre-selector dB	Pre-Amp Gain dB	Received signal dB(µV/m)	Emission limit dB(µV/m)	Margin dB(µV)	Result
Vertical Antenna Polarity									
2390	Peak	49.2	26.4	3.6	-35.8	43.4	74	30.6	Pass
2390	Avg.	32.8	26.4	3.6	-35.8	27	54	27	Pass
2483.5	Peak	54.8	26.2	3.6	-35.8	48.8	74	25.2	Pass
2483.5	Avg.	39.2	26.2	3.6	-35.8	33.2	54	20.8	Pass
Horizontal Antenna Polarity									
2390	Peak	47.9	26.4	3.6	-35.8	42.1	74	31.9	Pass
2390	Avg.	32.5	26.4	3.6	-35.8	26.7	54	27.3	Pass
2483.5	Peak	63	26.2	3.6	-35.8	57	74	17	Pass
2483.5	Avg.	42.8	26.2	3.6	-35.8	36.8	54	17.2	Pass

Notes.

All harmonics are under the limits defined in FCC 15.209.

Peak = Peak measurement
QP = Quasi-Peak measurement
Avg. = Average measurement

Where peak values are under the quasi-peak and/or average limit, the emission passes the corresponding limit, and no measurement with the respective detector is required.

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	Nov 27, 2015	Nov 27, 2017	GEMC 190
Quasi-Peak Adapter	85650A	HP	Nov 27, 2015	Nov 27, 2017	GEMC 191
Loop Antenna 9 – 150 kHz	EM 6871	Electro-Metrics	Feb. 3, 2015	Feb. 3, 2017	GEMC 70
Loop Antenna 150 kHz – 30 MHz	EM 6872	Electro-Metrics	Feb. 3, 2015	Feb. 3, 2017	GEMC 71
BiLog Antenna 30 MHz – 2 GHz	3142-C	ETS	Feb. 10, 2015	Feb. 10, 2017	GEMC 137
Horn Antenna 2 – 18 GHz	WBH218HN	Q-par	Feb. 12, 2016	Feb. 12, 2018	GEMC 6375
Horn Antenna 18 GHz – 26.5 GHz	SAS-572	A.H. Systems	Sept. 9, 2014	Sept. 9, 2016	GEMC 6371
Preamp 9 kHz - 1 GHz	CPA9231A	Chase	Sept. 9, 2014	Sept. 9, 2016	GEMC 6403
Pre-amp 1 – 26.5 GHz	HP 8449B	HP	Sept. 9, 2014	Sept. 9, 2016	GEMC 6351
Leveled Amplifier 18 GHz – 26.5 GHz	11975A	HP	Feb. 8, 2016	Feb. 8, 2018	GEMC 157
Harmonic Mixer 18 GHz – 26.5 GHz	11970K	HP	Feb. 8, 2016	Feb. 8, 2018	GEMC 158
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

Appendix A – EUT Summary

Client	Diamond Kinetics	
Product	SwingTracker	
Standard(s)	RSS 210 Issue 9 / FCC Part 15 Subpart C 15.249	

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

General EUT Description

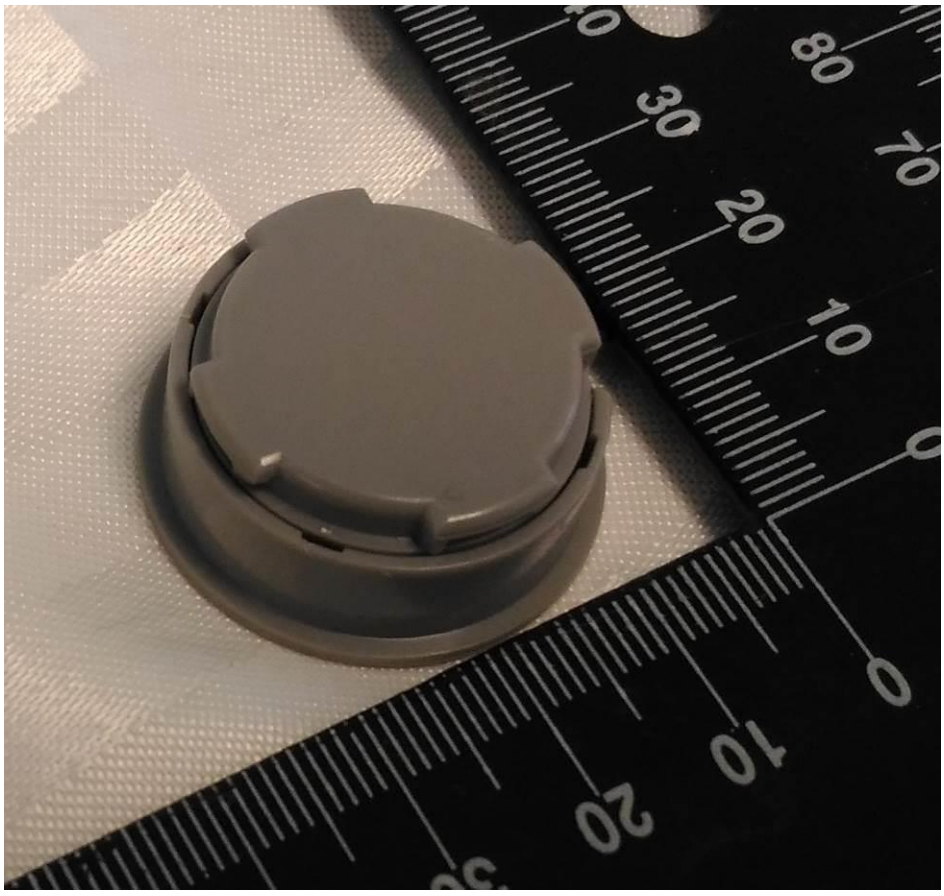
Client Details	
Organization / Address	Diamond Kinetics 700 River Ave Suite 540 Pittbsurgh, PA 15212
Contact	Jeremy Rittenhouse
Phone	412.223.5341 x712
Email	jrittenhouse@diamondkinetics.com
EUT (Equipment Under Test) Details	
EUT Name / Model	SwingTracker
Software version	1.0
EUT is powered using	Internal battery
Input voltage range(s)	3-4.2 VDC
Rated input current	40 mA
Nominal power consumption	80 mW
Transmit Frequencies	2.402 – 2.480 GHz
Basic EUT functionality description	IMU Sensor for Sports Applications. Uses Bluetooth Radio
I/O cables and connectors	None
Peripherals required to exercise EUT (auxiliary equipment not covered in the scope of this report).	CSR DEV-PC-1309C SPI and UART Computer Interface Board. CSR USB-SPI converter Induction Charger Laptop PC with CSR BlueSuite software installed.
Dimensions of product (approx.)	L: 32mm, W: 32mm, H: 12mm

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated.

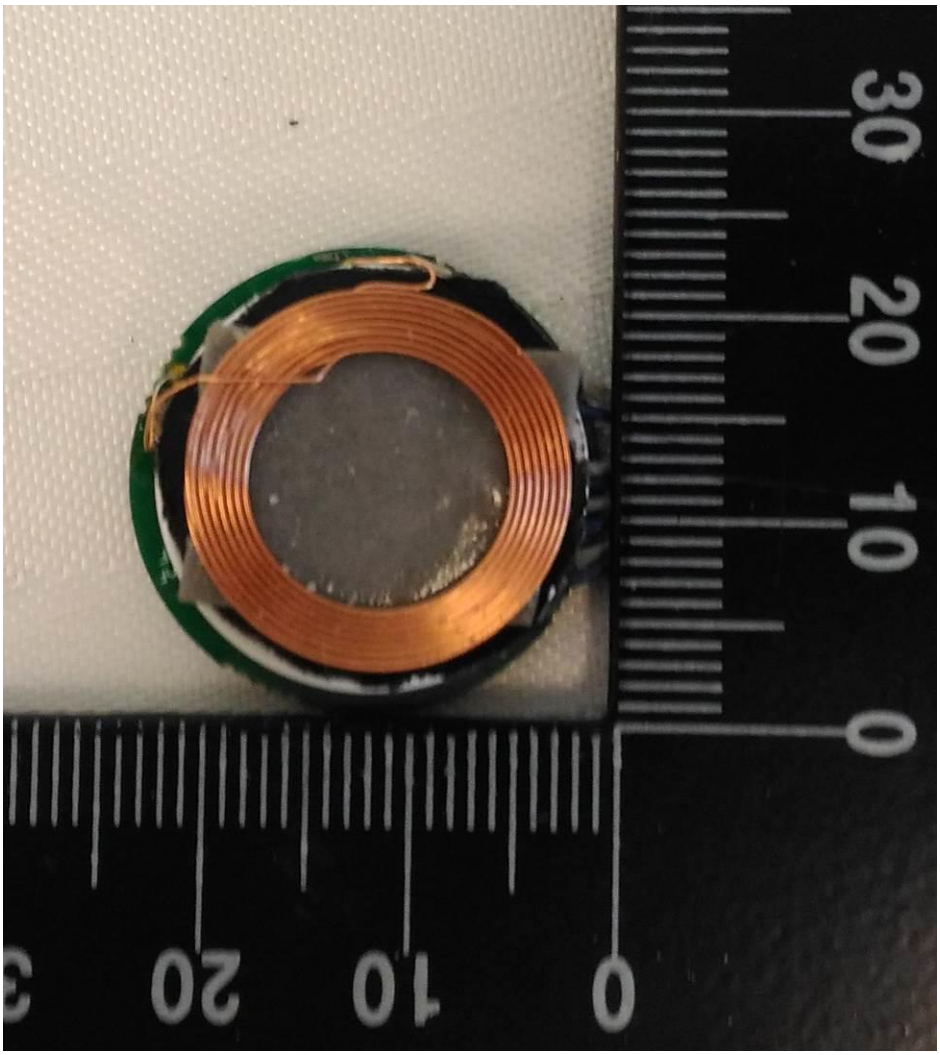
Appendix B – EUT and Test Setup Photographs

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

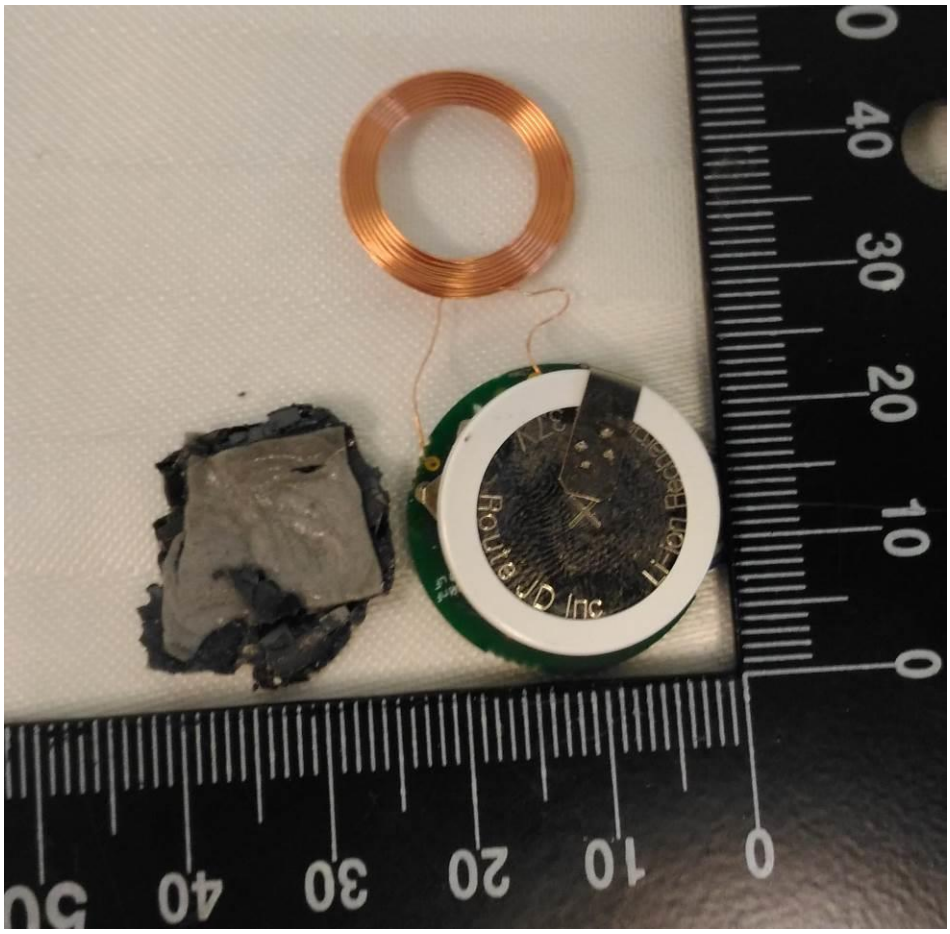
EUT – External view 1
As seen on tested unit.



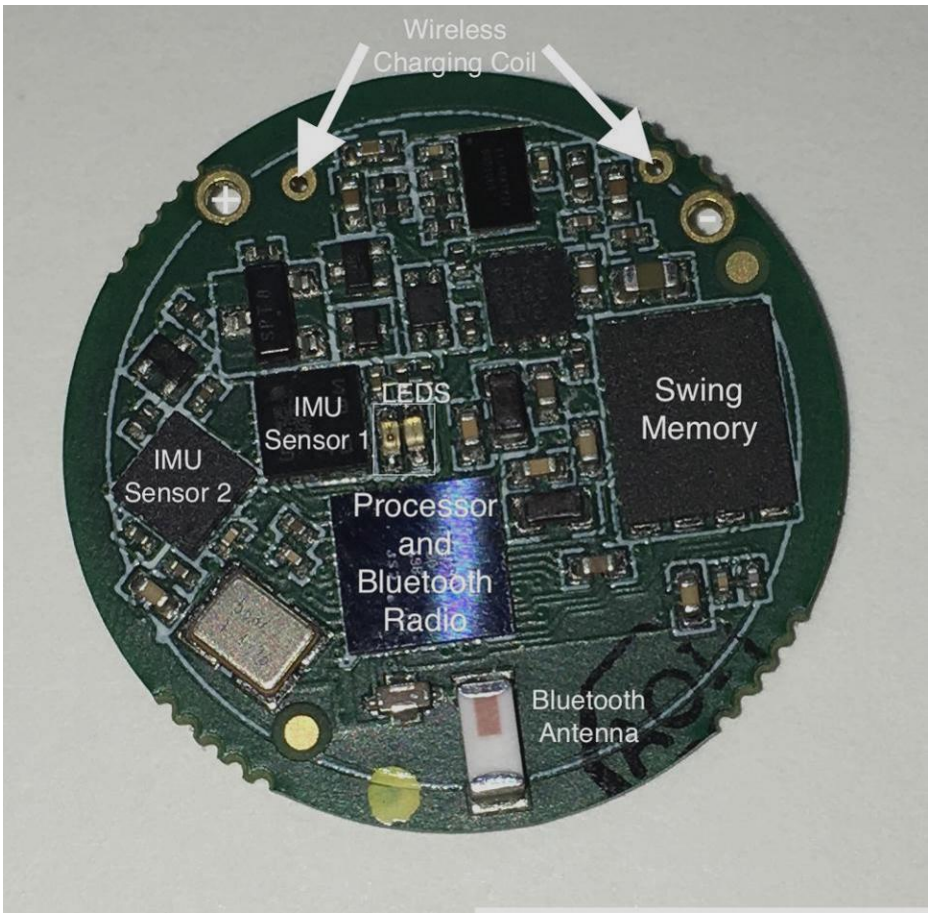
EUT – External view 2
As seen on tested unit.



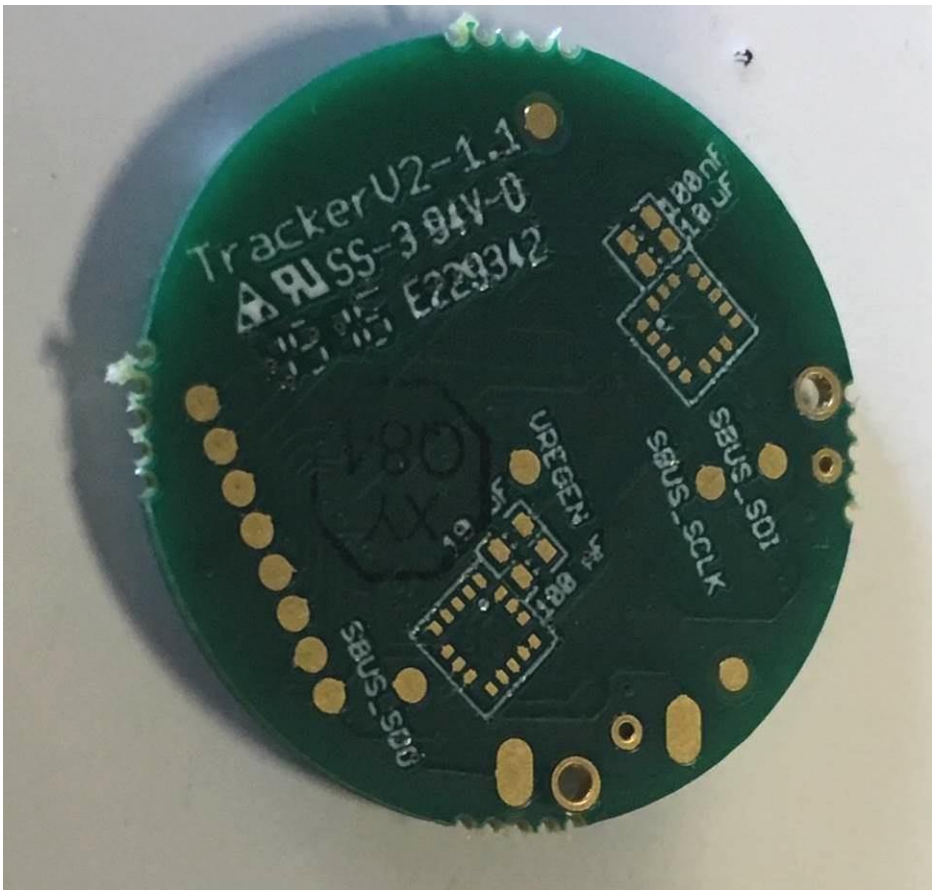
EUT – Internal view 1



EUT – Internal view 2



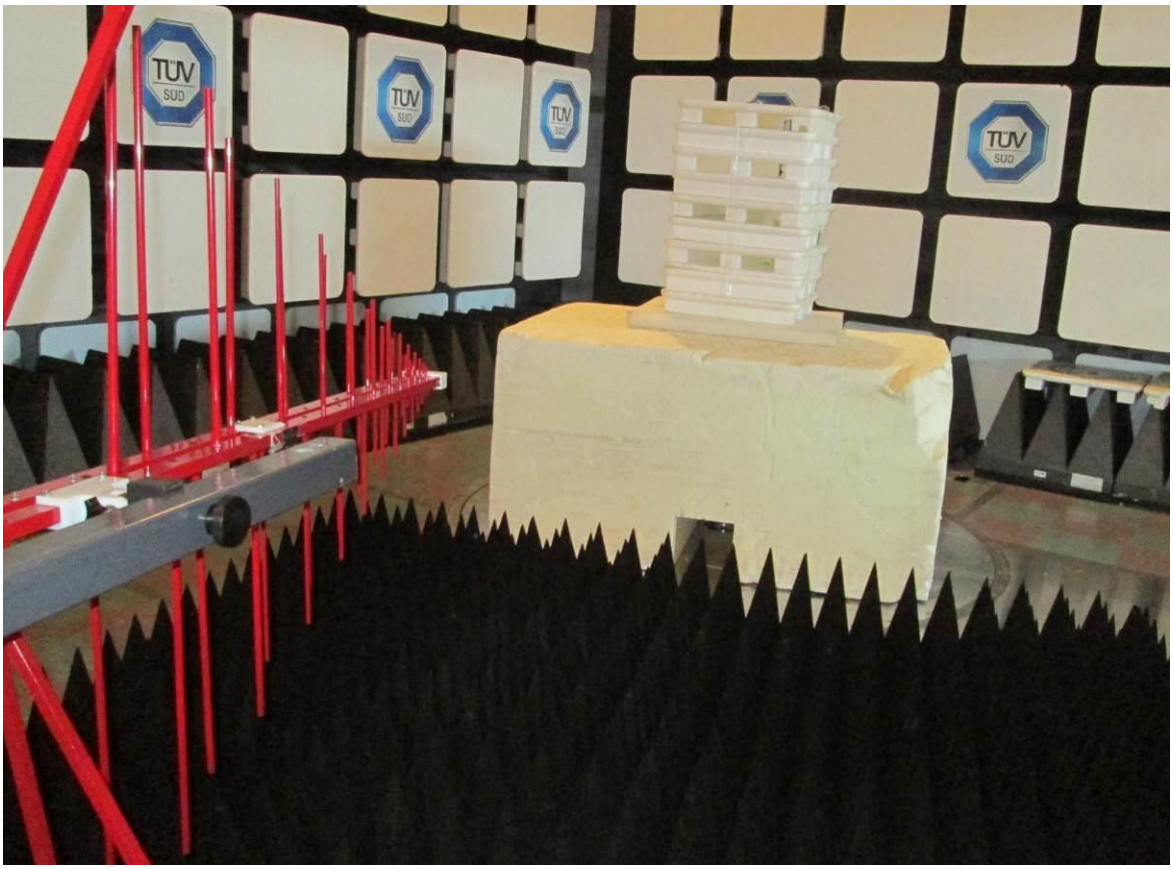
EUT – Internal view 3, PCB view 1
Selected parts labeled



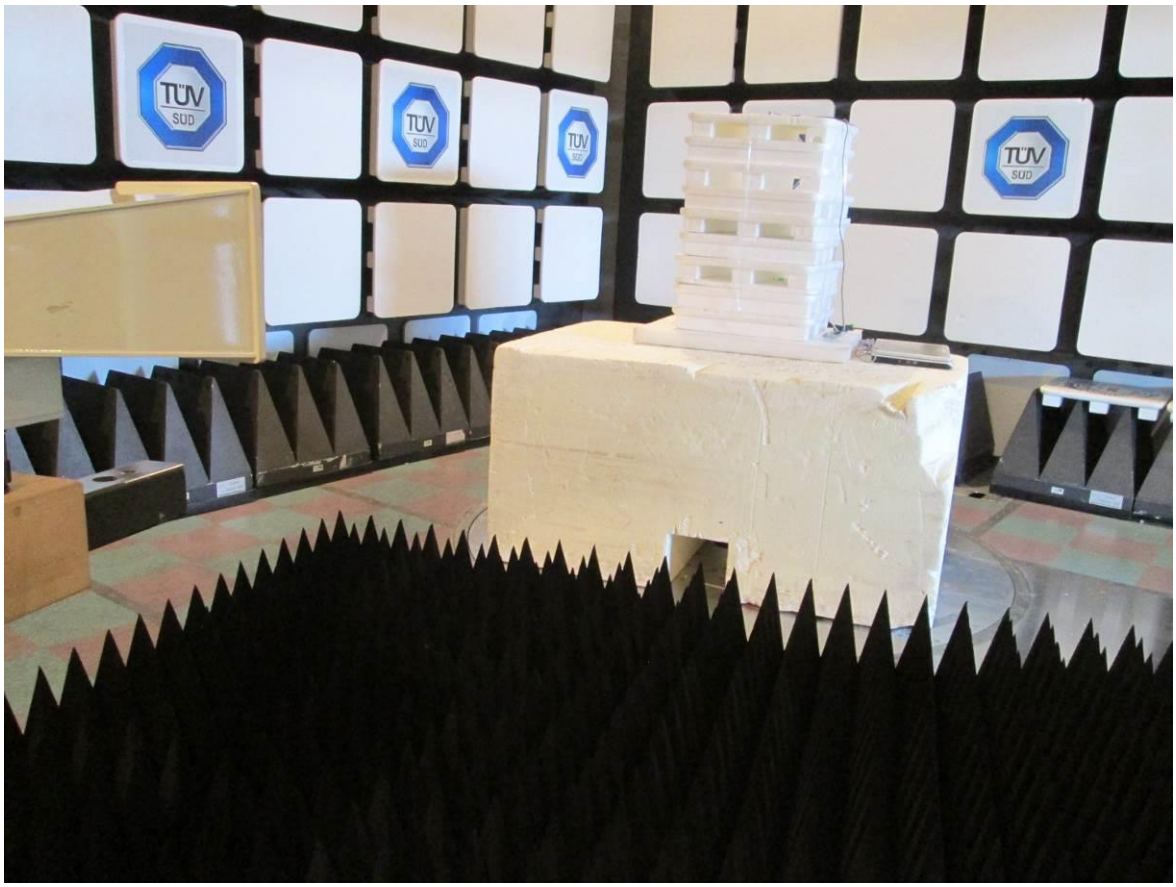
EUT – Internal view 4, PCB view 2

Test setup photo 1
Radiated measurements, 9 kHz – 30 MHz

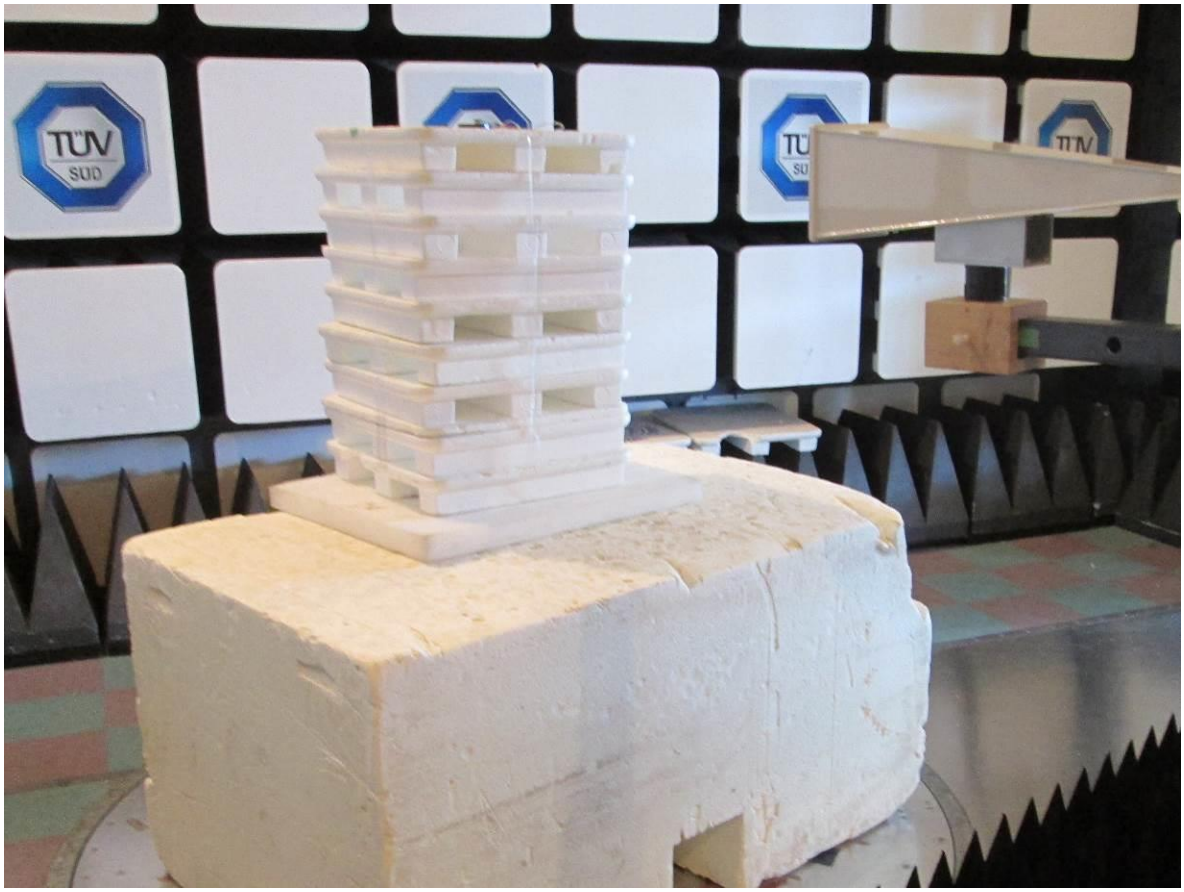
Test setup photo 2
Radiated measurements, 30 MHz – 1 GHz



Test setup photo 3
Radiated measurements, 1 GHz – 2 GHz

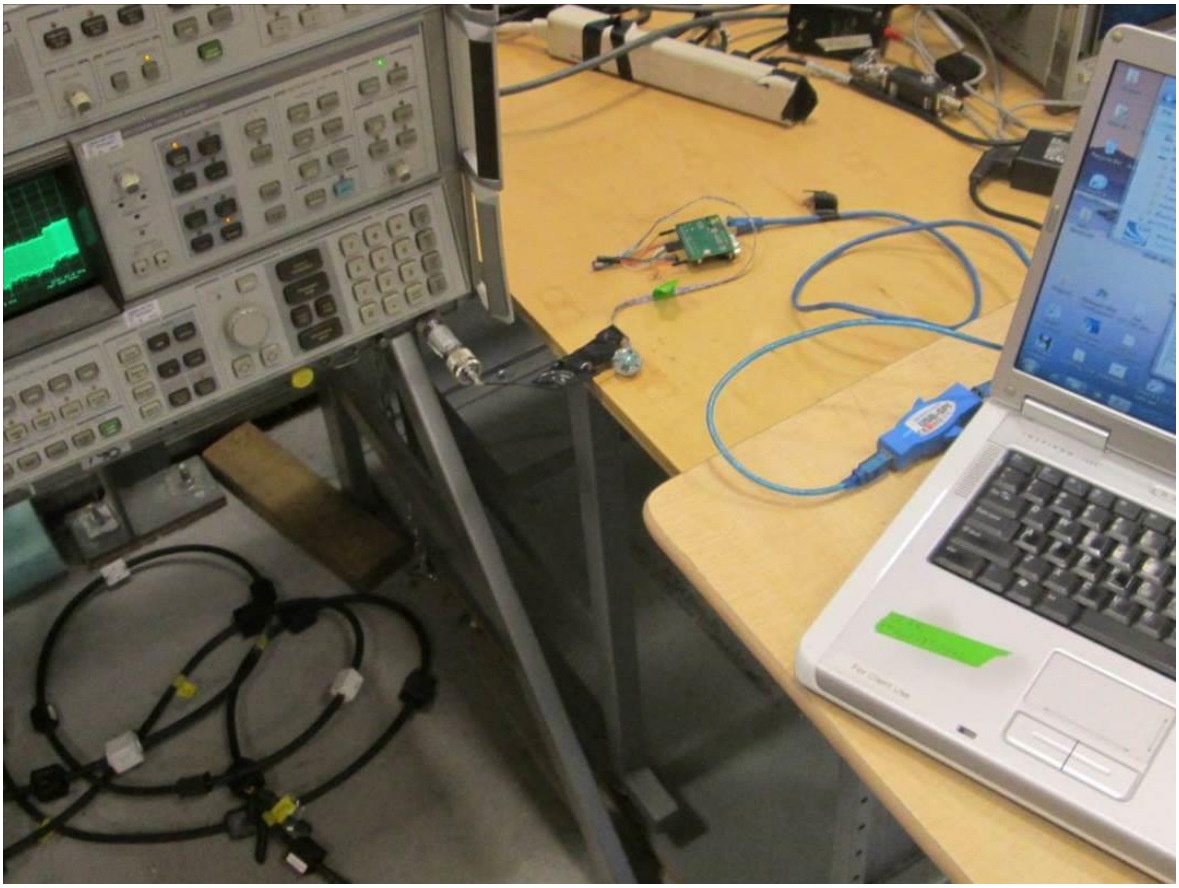


Test setup photo 4
Radiated measurements, 2 GHz – 10 GHz



Test setup photo 5
Radiated measurements, 10 GHz – 18 GHz

Test setup photo 6
Radiated measurements, 18 GHz – 26 GHz



Test setup photo 7
Conducted measurements