Global EMC Inc. Labs

RF Test Report

As per

FCC Part 74 Subpart H, 74.870

(Wireless Video Assist Devices)

on the

CanaTrans White Space (CTWS)

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Testing produced for

LENTEQUIP

See Appendix A for full customer & EUT details.

Industry Canada

LAB REGISTRATION #6844A-2

FCC REGISTRATION #612361

Table of Contents

Report Scope

This report addresses the EMC verification testing and test results of the CanaTrans White Space (CTWS), herein referred to as EUT (Equipment Under Test) performed at Global EMC Labs.

The EUT was tested for compliance against the following standards:

FCC Part 74, Subpart H, 74.870

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	**Lentequip**
Product	CanaTrans White Space (CTWS)
Standard(s)	FCC Part 74 Subpart H, 74.870

Summary

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

EUT FCC Certification #, FCC ID:	YEO-CTWS
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Scott Drysdale

Client	**Lentequip**
Product	CanaTrans White Space (CTWS)
Standard(s)	FCC Part 74 Subpart H, 74.870

Test Results Summary

Standard/Method	Description	Requirement	Result
FCC 74.802 FCC 74.870(f)(1)	Frequency Assignment	Licensee / Applicant	Pass See justification
FCC 74.803 FCC 74.870(f)(1)	Frequency Selection	Licensee / Applicant	Pass See justification
FCC 74.831	Scope of service Permissible Transmissions	Licensee / Applicant	Pass See Justification
FCC 74.832	Licensing requirements	Licensee / Applicant	Pass See Justification
FCC 74.833	Temporary Authorization	Licensee / Applicant	Pass See Justification
FCC 74.851 FCC 15.216	Certifcation of equipment 700 MHz Band restriction	Licensee / Applicant	Pass See Justifications
FCC 74.870(b)	Scheduled production	Licensee / Applicant Restrictions Apply	Pass See Justifications
FCC 74.870(c)	6 MHz Bandwidth Channel, 8-12, 14-36 and 38-50	<= 6 MHz bandwidth	Pass
FCC 74.870(c)(1) FCC 74.870(c)(2)	Single Channel Channel 37 prohibited	Single Channel	Pass See Justifications
FCC 74.870(c)(3) FCC 74.870(c)(4)	Geographic considerations	Licensee / Applicant Restrictions Apply	Pass See Justifications
FCC 74.870(d)	Maximum ERP	250 mW	Pass
FCC 74.870(d) FCC 74.637	Conducted / Radiated Spurious Emissions	-43 + 10 Log(p) (82.2 dBuV/m)	Pass
FCC 74.870(e)	Antenna requirement	Unique	Pass See Justifications
FCC 74.870(f) FCC 74.870(g) FCC 74.870(h)	Licensee requirements	Notification and transfer requirements	Pass See Justifications
FCC 2.1091	Maximum Permissible Exposure	> 20 cm separation.	Pass See justifications and MPE Exhibit
Overall Result			**PASS**

All tests were performed by Scott Drysdale.

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 '*'.

Justifications, Descriptions, or Deviations

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

During emissions testing, the product was preliminary scanned in three orthogonal axis, and the worst case is presented in this report.

For the Licensee / Applicant requirements as defined in FCC 74.802, 74.803, 74.831, 74.832, 74.833, 74.851, 74.870(b), 74.870(c), 74.870(f), 74.870(g), and 74.870(h), this test report is for certification of device only and is not an application for license for its use. The end user is reminded of these requirements in the regulatory information documents provided with, or prior to sale of the product. See separate exhibit provided for regulatory provided documentation

For the Single channel requirement, this product may only operate on one channel.

For the antenna requirement, this product uses a Reverse polarity SMA connector.

For spurious emissions a worst case application of EiRP was applied instead of the ERP requirement.

For maximum permissible exposure, this device operates is designed to operate in mobile operation at greater than 20 cm from personnel during normal operation, as per instructions provided in end user documentation. A separate MPE exhibit is presented.

Applicable Standards, Specifications and Methods

ANSI C63.4:2003	- Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CFR 47 FCC 15	- Code of Federal Regulations – Radio Frequency Devices
CFR 47 FCC 74	- Experimental Radio, Auxiliary, Special Broadcast And Other Program Distributional Services
FCC KDB 412172	- D01 Determining ERP and EIRP v01
ISO 17025:2005	- General Requirements for the competence of testing and calibration laboratories

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 - Mar 7, 2013
1st revision.

Revision 2 - Mar 20, 2013
2nd revision
Title page error of 78 reference changed to 74.

Revision 3 - April 1, 2013
3rd revision
Added reference to ERP on pages 6, 18, and 19.

Definitions and Acronyms

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

AE – Auxiallary 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

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 measurement site used is registered with Federal Communications Commission (FCC) and Industry Canada (IC). This site is 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 semi-anechoic chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

Testing Environmental Conditions and Dates

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

Date	Test	Init.	Temperature (ºC)	Humidity (%)	Pressure (kPa)
January 1- Feb 27, 2013	RE	SD	20-25ºC	30-45%	98 -103kPa
January 1- Feb 27, 2013	Antenna conducted	SD	20-25ºC	30-45%	98 -103kPa

Detailed Test Results Section

Occupied Bandwidth (99 % or 20 dB) and Necessary Bandwidth

Purpose

The purpose of this test is to ensure that the bandwidth is reported. This helps ensure the correct frequency allocation.

Limits

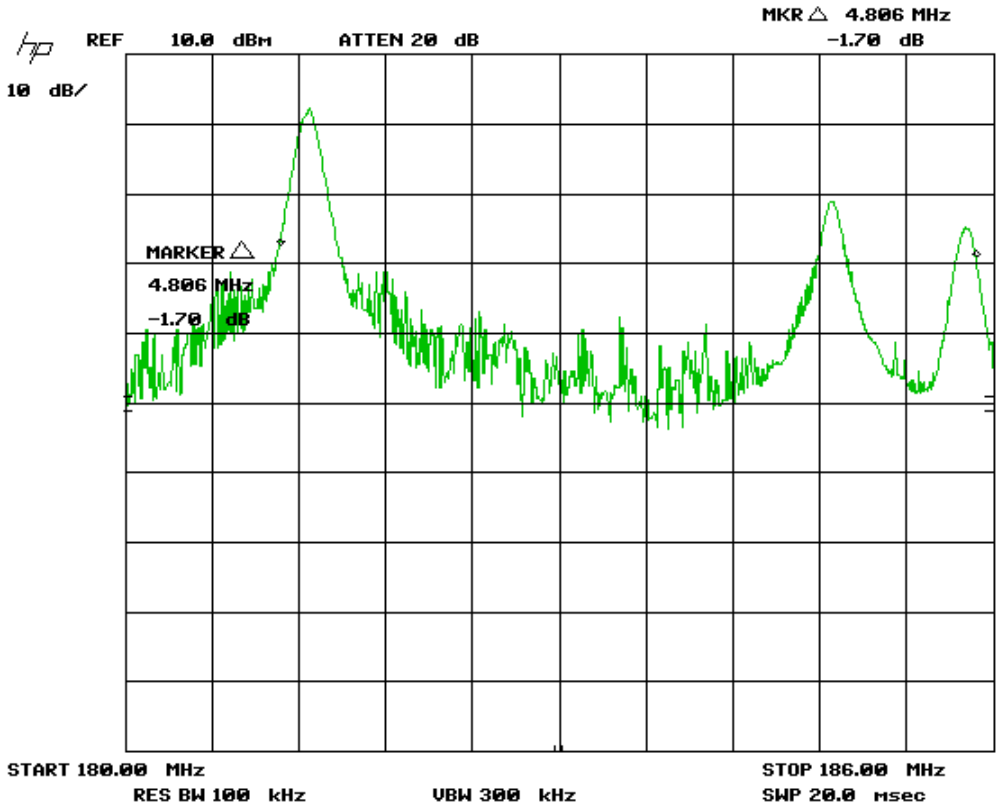
A 6 MHz Limit applies as per FCC 74.870(c) and FCC 2.202. Test procedure is as per 47 CFR, Section 2.1049.

Results

The maximum 20 dB BW measured was 4.806 MHz, however due to the properties of the NTSC signal utilized; a maximum necessary bandwidth of 6 MHz is reported as per FCC 2.202

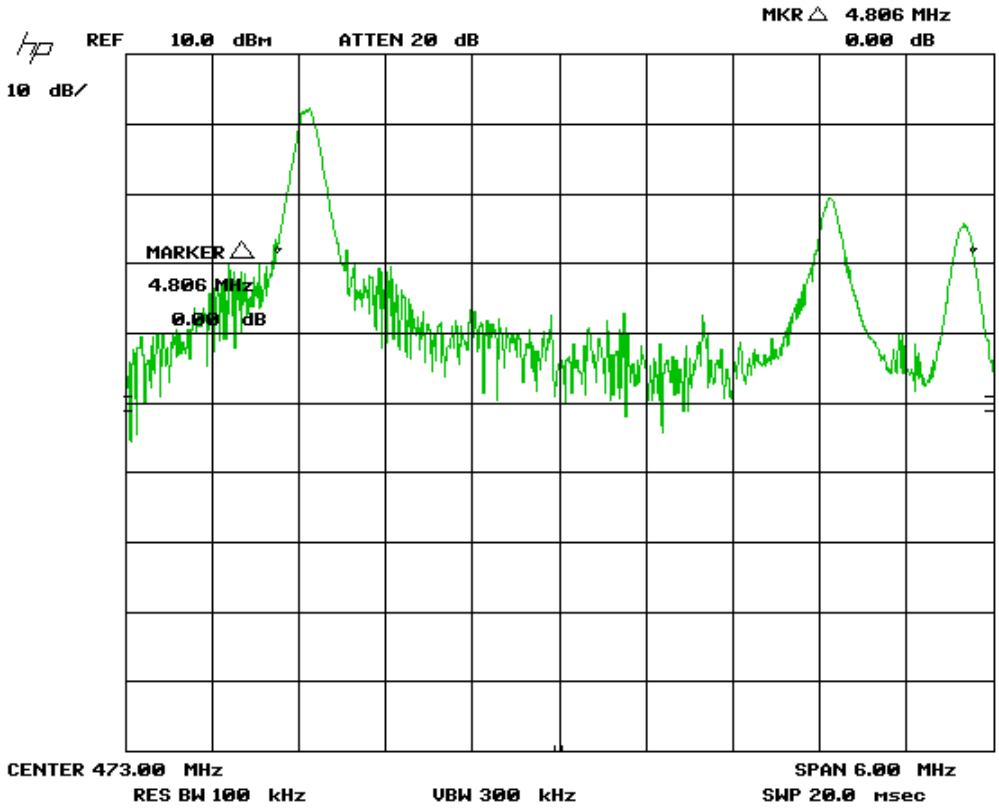
Graph(s)

Low channel

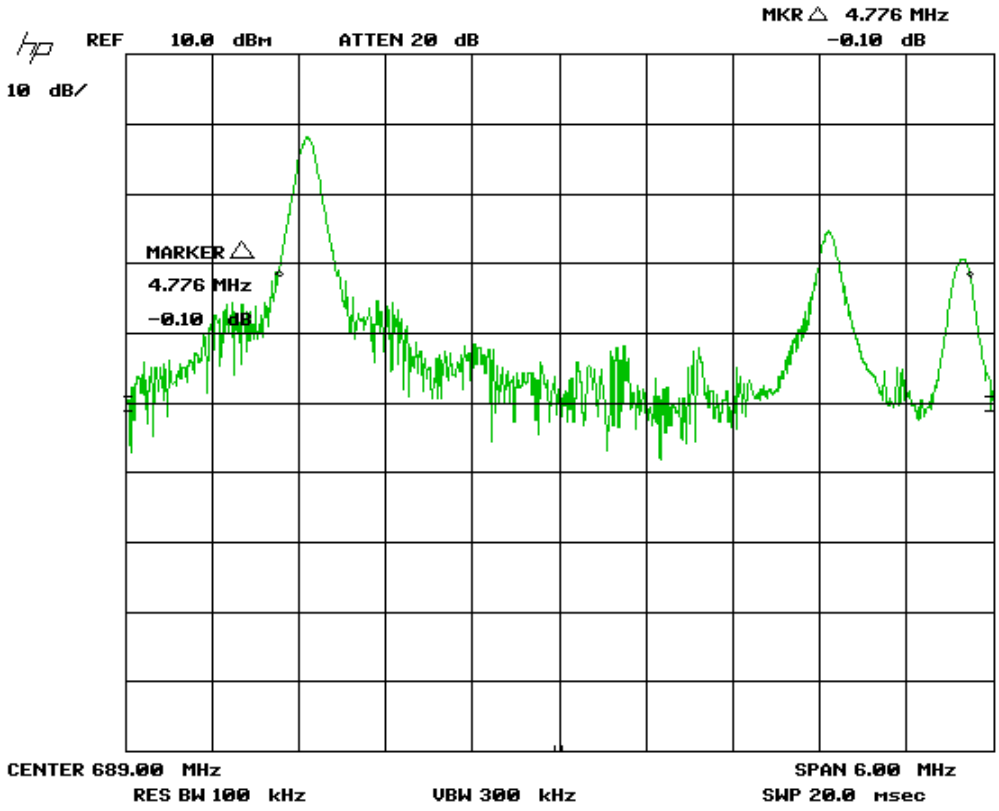


Maximum bandwidth graph shown above.

Middle Channel



High Channel



Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Attenuator 20 dB	FP-50-20	Trilithic	NCR	NCR	GEMC 43
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	NCR	NCR	GEMC 49

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

Maximum Effective Radiated Power

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element with antenna gain and radiated power does not exceed the limits specified.

Limits

The limits are defined in FCC Part 74 Section 74.870 (d)

Wireless video assist devices are limited to a maximum of 250 milliwatts ERP and must limit power to that necessary to reliably receive a signal at a distance of 300 meters. Wireless video assist devices must also comply with the emission limitations of § 74.637 (See emission mask for further details)

180–210 MHz (Channels 8-12) - 250 mW
470-608 MHz (Channels 14-36) – 250 mW
614-698 MHz (Channels 38-51) – 250 mW

Results

The EUT passed. The maximum radiated power measured was 229.1 mW (23.6 dBm), EiRP. This was at channel 30, 566-572 MHz, using the white antenna as a specified by the client. This measured at 3 meters and a factor of 95.2 was applied to the dBuV/m reading to calculate the EiRP. The antenna gain shown in the table below was calculated by comparing the conducted measurement to the EiRP.

Table(s)
For information purposes, the table shown below shows the peak power output of the device during the radiated emissions measurement during transmit operation of the EUT.

		Customer Antenna	Setting	Conducted dBm	Conducted mW	dBuV/m	Factor	EIRP (dBm)	ERP (dBm)[1]	ERP (mW)	Limit(dBm)	Margin (dB) (Note 1)	Pass / Fail	Calculated Antenna Gain (dBi)
Freq	Center MHz		Ch											
180	183	Long	8	23.7	234.4	113.3	95.2	18.1	15.95	39.4	24	8.05	Pass	-5.6
192	195	Long	10	23.6	229.1	112.9	95.2	17.7	15.55	35.9	24	8.45	Pass	-5.9
204	207	Long	12	23.6	229.1	113.4	95.2	18.2	16.05	40.3	24	7.95	Pass	-5.4
470	473	White	14	24.6	288.4	116.2	95.2	21	18.85	76.7	24	5.15	Pass	-3.6
518	521	White	22	24.9	309.0	117.2	95.2	22	19.85	96.6	24	4.15	Pass	-2.9
566	569	White	30	24.9	309.0	118.8	95.2	23.6	21.45	139.6	24	2.55	Pass	-1.3
572	575	Orange	31	21.4	138.0	116.9	95.2	21.7	19.55	90.2	24	4.45	Pass	0.3
626	629	Orange	40	20.5	112.2	117.3	95.2	22.1	19.95	98.9	24	4.05	Pass	1.6
686	689	Orange	50	18.1	64.6	117.5	95.2	22.3	20.15	103.5	24	3.85	Pass	4.2

Worst case highlighted in green above.

Note 1: A factor of 2.15 dB was applied in accordance with FCC KDB 412172 D01 Determining ERP and EIRP v01.

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

Test Equipment List

Note: Measurements using the power meter were performed while the power meter was in house, and it was shipped for calibration prior to the calibration due date. Measurements were additionally performed after the power arrived from calibration, and both calibration cycles are shown in the table below.

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Power Head	PH 2000	AR	2011-01-31	2013-01-31	GEMC 15
Power meter	PM 2002	AR	2011-01-31	2013-01-31	GEMC 16
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
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	NCR	NCR	GEMC 49

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

Spurious Conducted Emissions

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 47 CFR, FCC Part 74, Section 74.637(a)(1), however a worst case of -13 dBm was applied. The limits are as follows:

(i) On any frequency removed from the assigned (center) frequency by more than 50% up to and including 100% of the authorized bandwidth: At least 25 dB in any 100 kHz reference bandwidth (BREF);

(ii) On any frequency removed from the assigned (center) frequency by more than 100% up to and including 250% of the authorized bandwidth: At least 35 dB in any 100 kHz reference bandwidth;

(iii) On any frequency removed from the assigned (center) frequency by more than 250% of the authorized bandwidth: At least 43+10 log(P) dB, or 80 dB, whichever is the lesser attenuation, in any 100 kHz reference bandwidth.

Note: A 43 + 10 Log(P), or -13 dBm ERP was applied for any frequency from the assigned (center) frequency by more than 50% up to and including 100% of the authorized bandwidth. As the power is allowed up to 24 dBm, this was considered worst case as -13 dBm would require -37 dBc from the allowable maximum power.

Note: P is transmitter output power in Watts

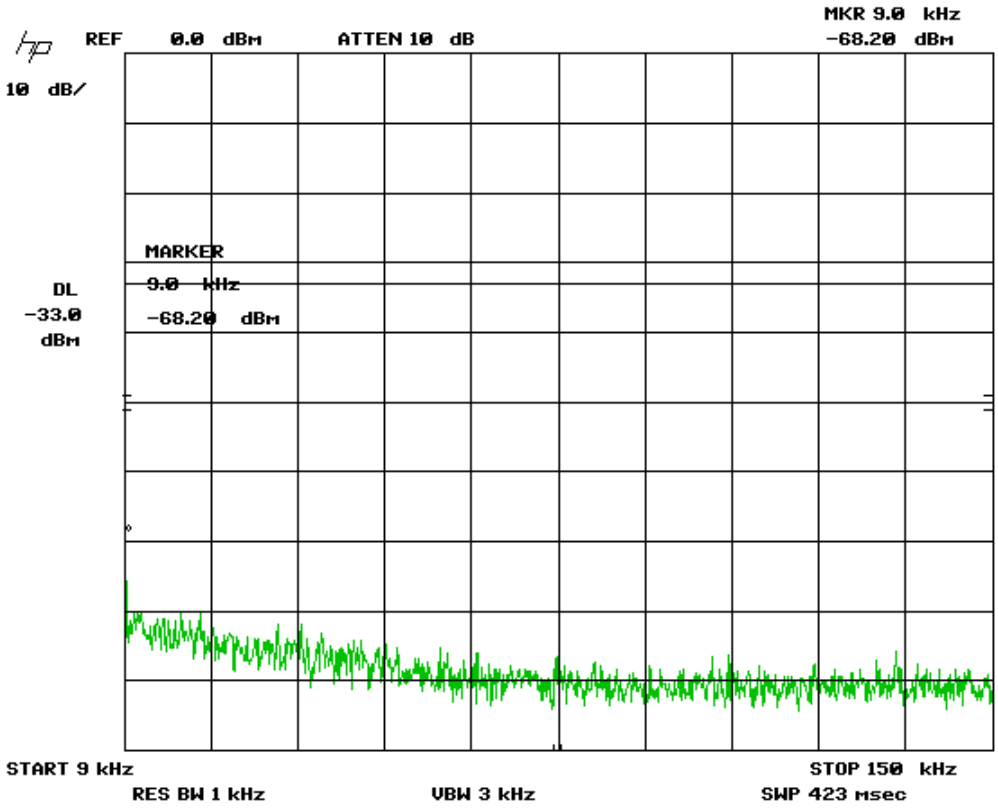
Results

The EUT passed. Low, middle and high band was measured for each mode, radiated and conducted were measured and the worst case results are presented.

Graph(s)

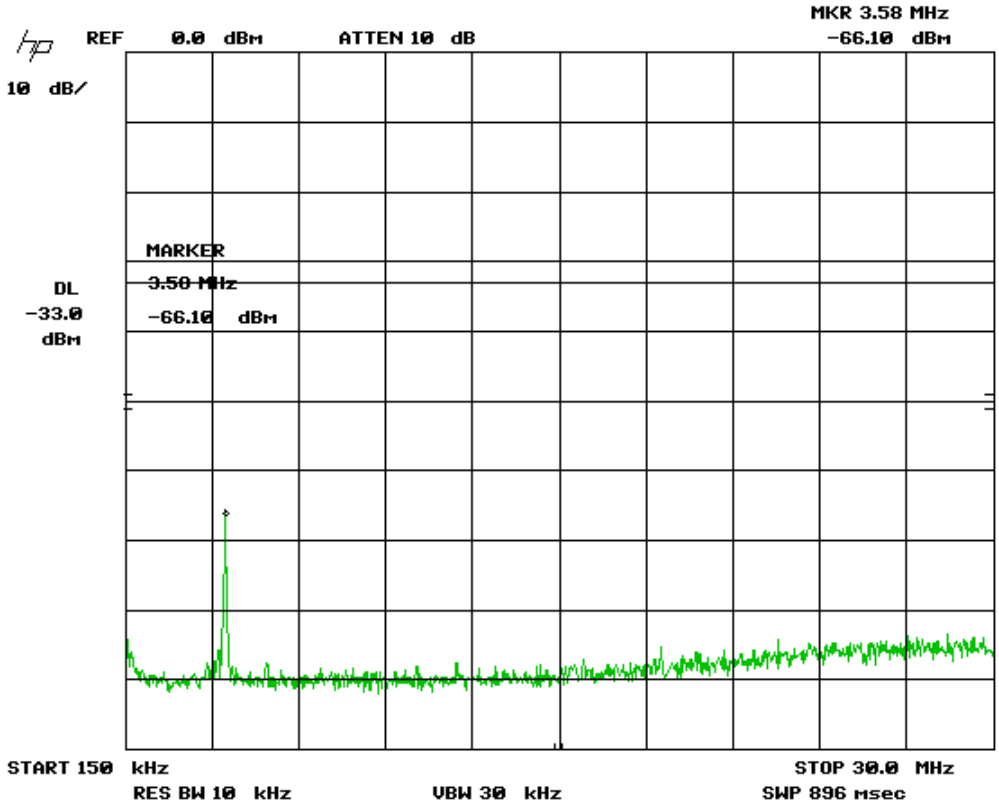
The graphs shown below shows the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT.

All channels - 9 kHz to 150 kHz



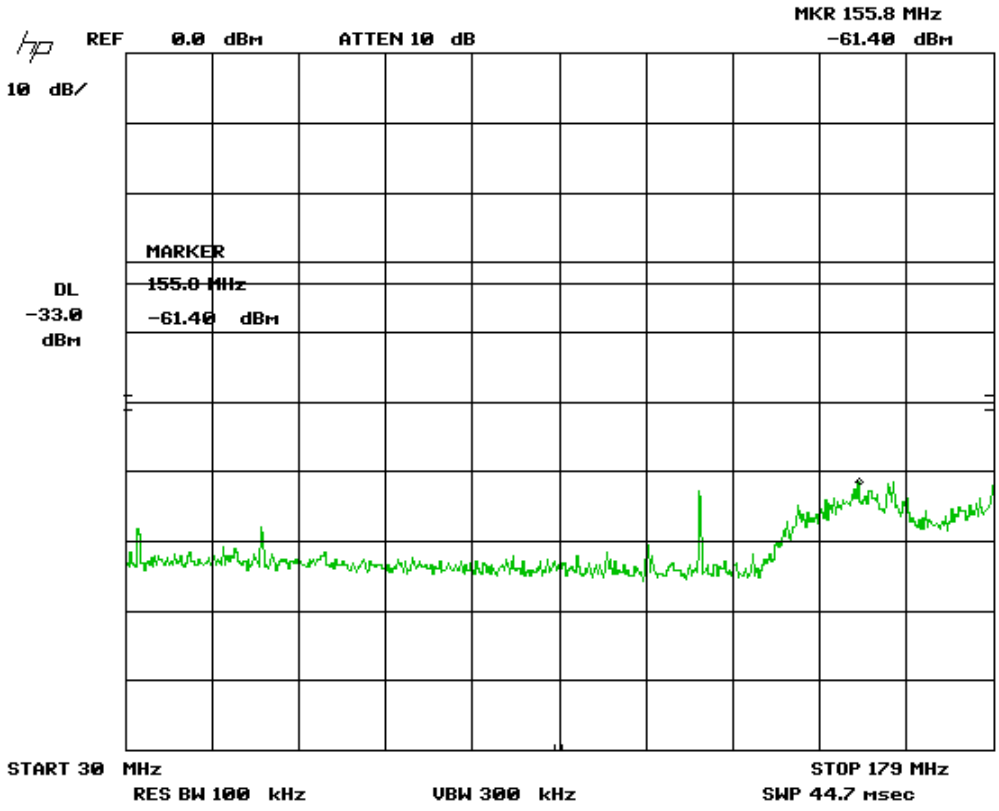
Note: Hi, middle and low were scanned, worst case antenna conducted is shown. There was 20 dB of external attenuation taken during this measurement.

All Channels - 150 kHz to 30 MHz



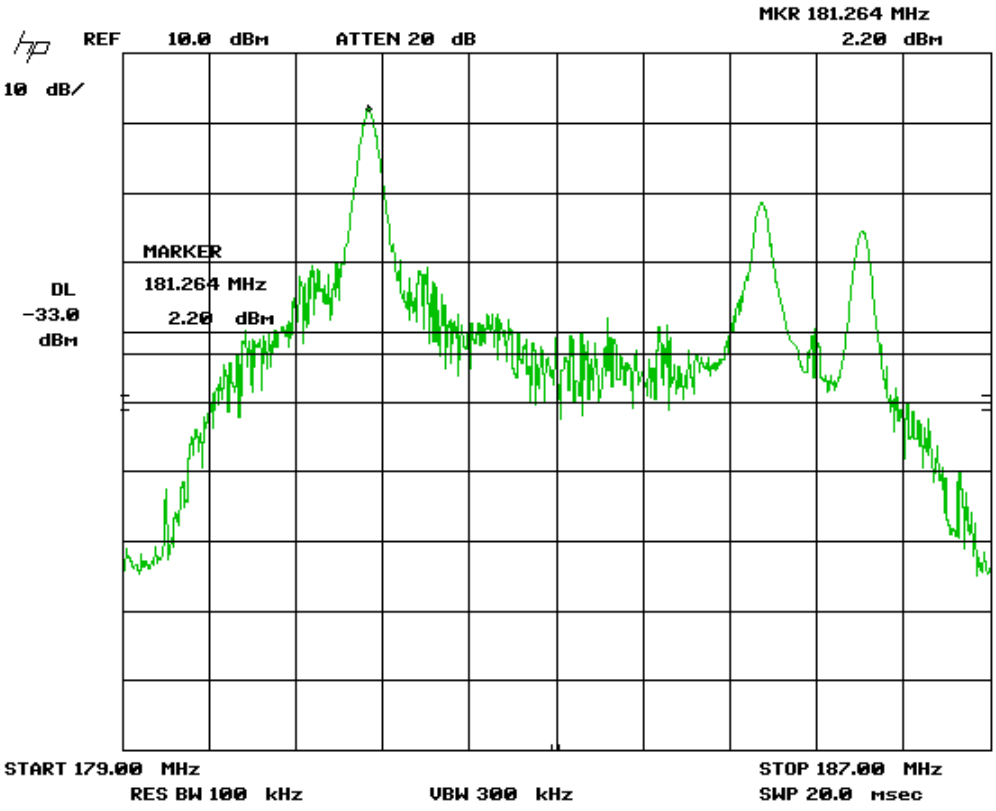
Note: Hi, middle and low were scanned, worst case antenna conducted is shown. There was 20 dB of external attenuation taken during this measurement.

Channel 8 - Antenna Conducted - 30 MHz to 179 MHz



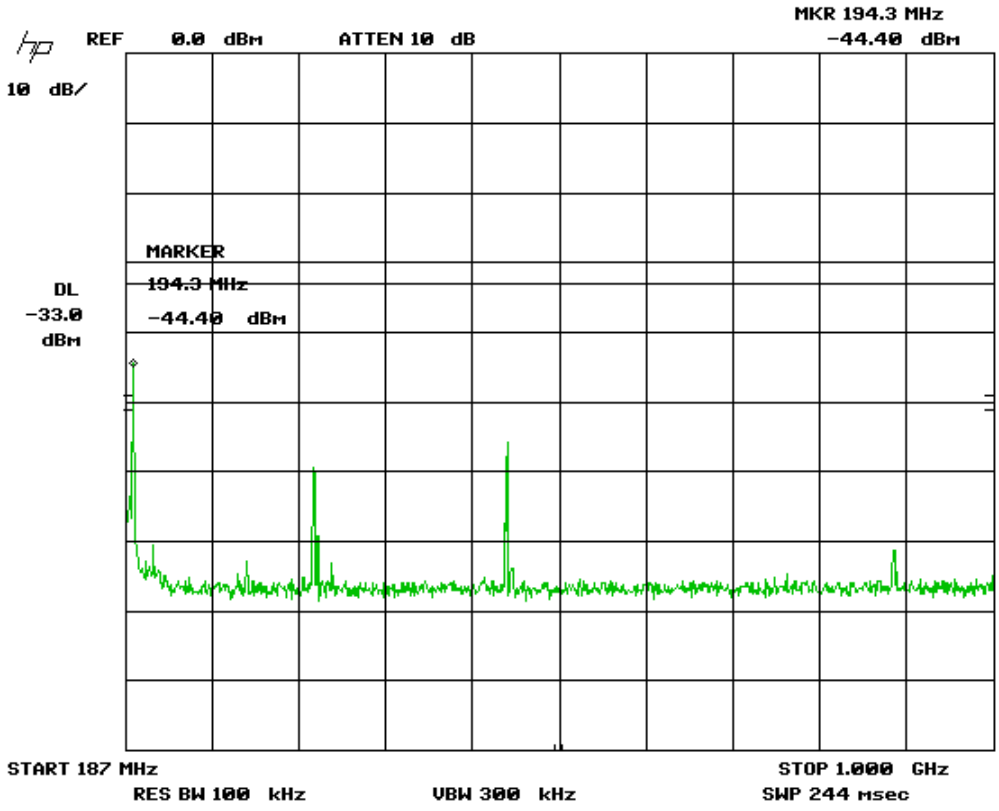
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 8 - Antenna Conducted - 179 MHz to 187 MHz



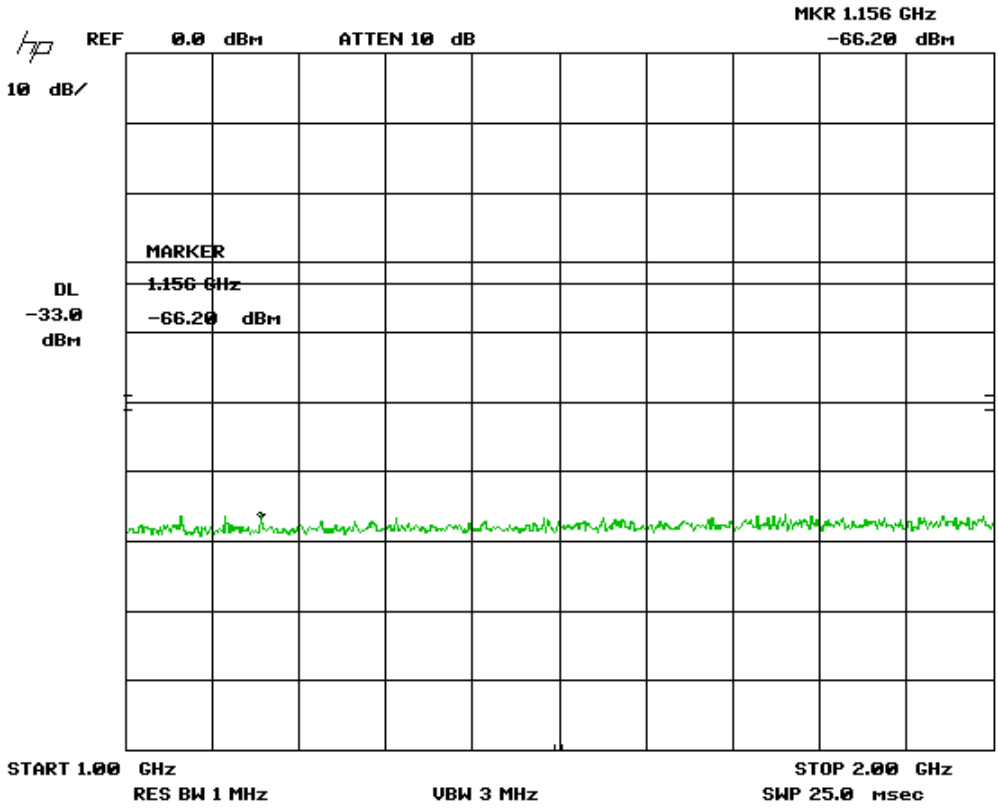
Note: For Band edge measurements, see spurious radiated emissions. There was 20 dB of external attenuation taken during this measurement.

Channel 8 - Antenna Conducted - 187 MHz to 1 GHz



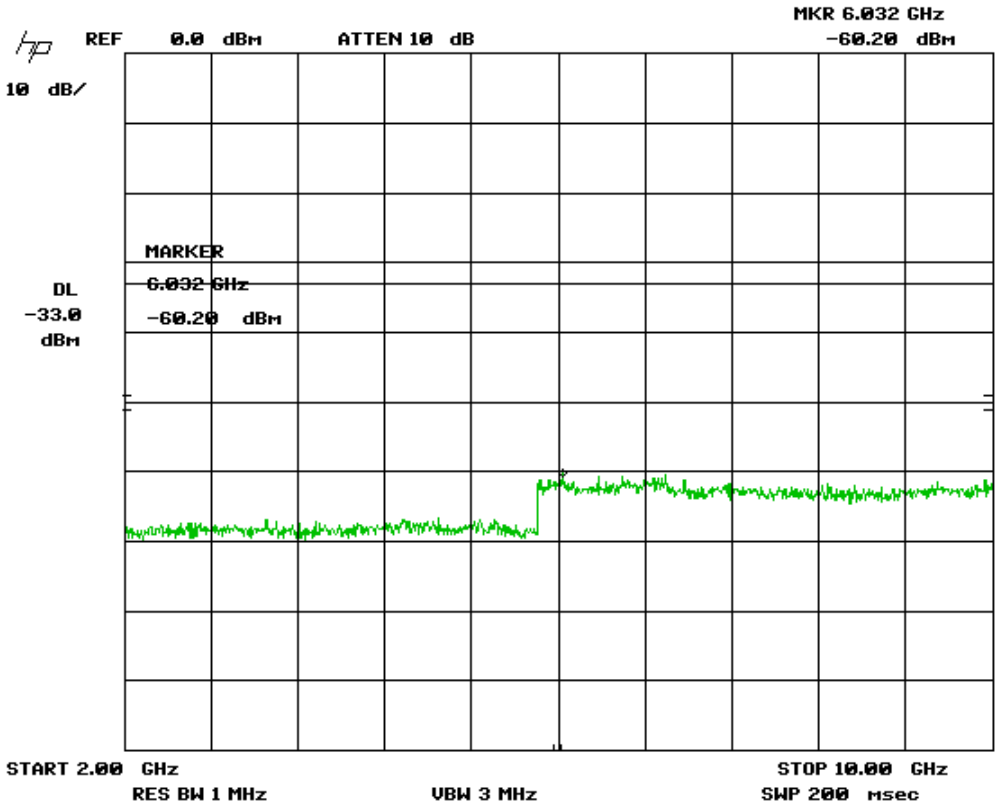
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 8 - 1 GHz to 2 GHz



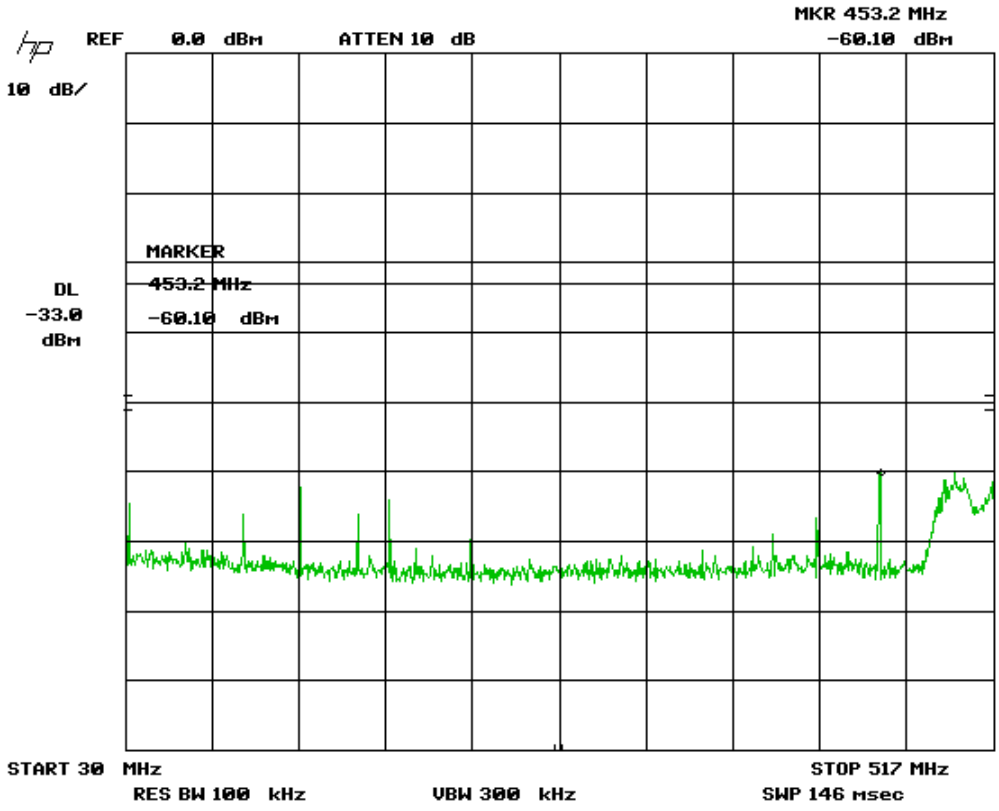
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 8 - 2GHz to 10 GHz



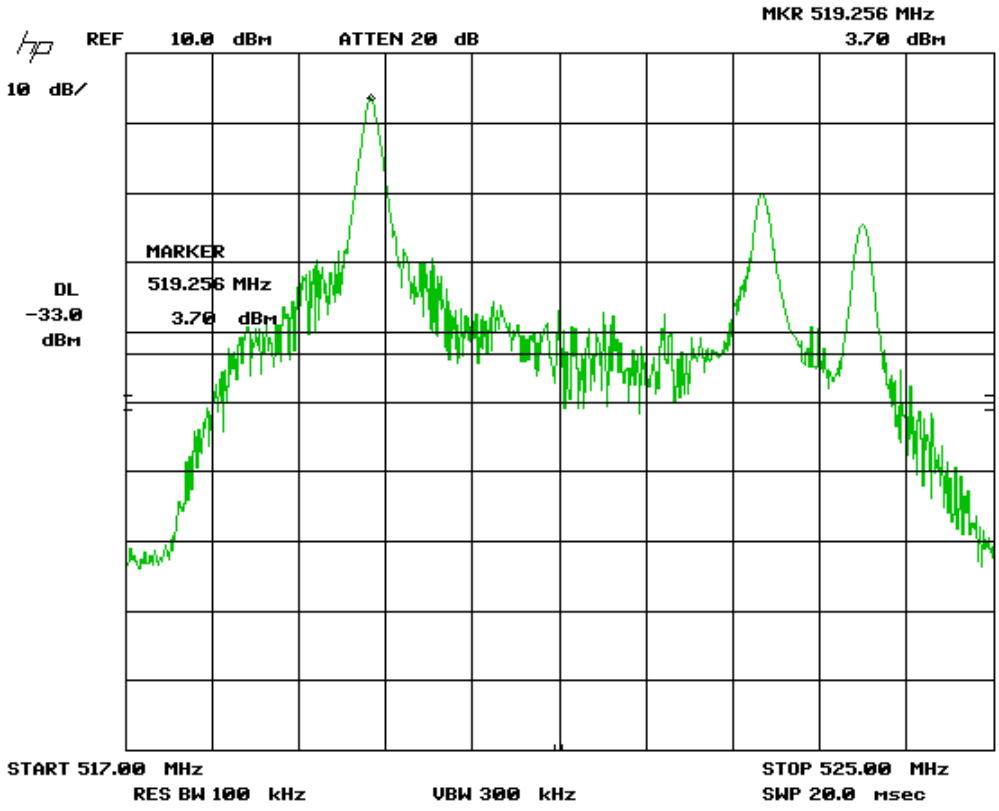
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 22 - 30 MHz to 517 MHz



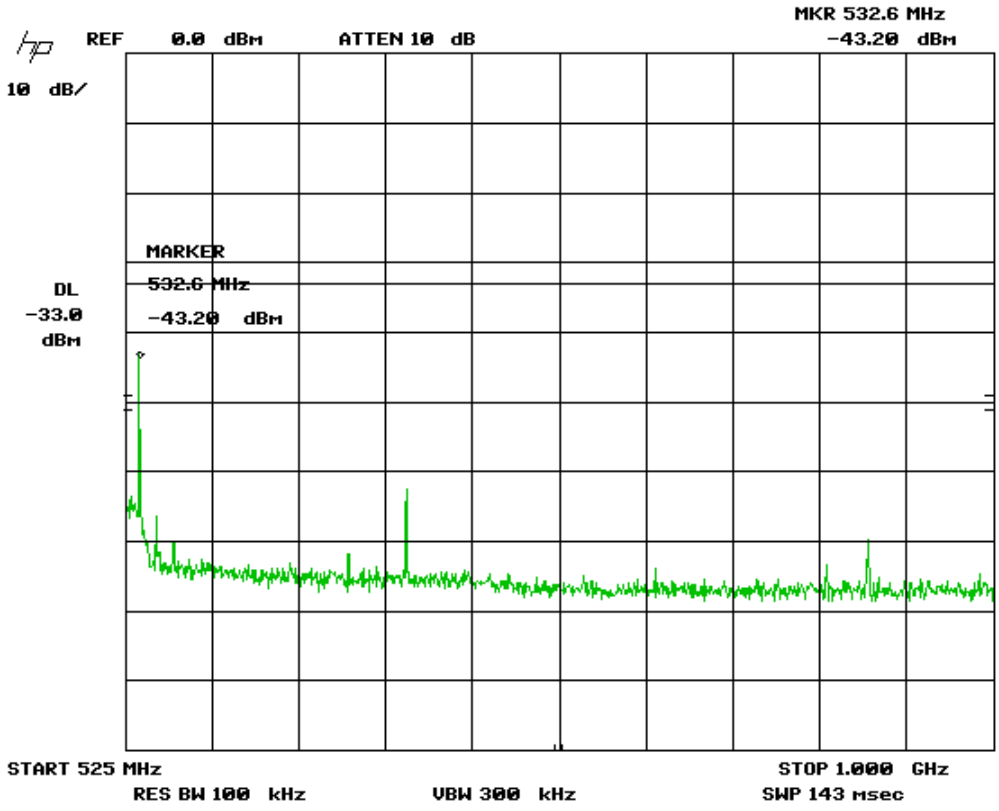
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 22 - 517 to 525 MHz



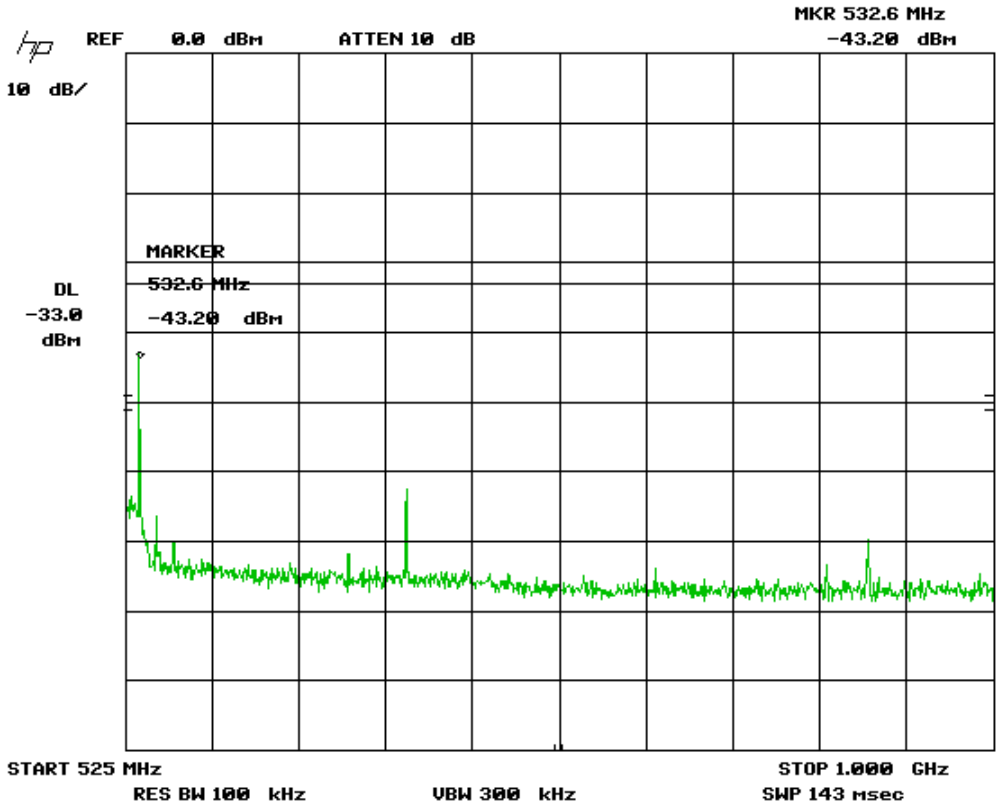
Note: For Band edge measurements, see spurious radiated emissions. There was 20 dB of external attenuation taken during this measurement.

Channel 22 - 525 MHz to 1 GHz



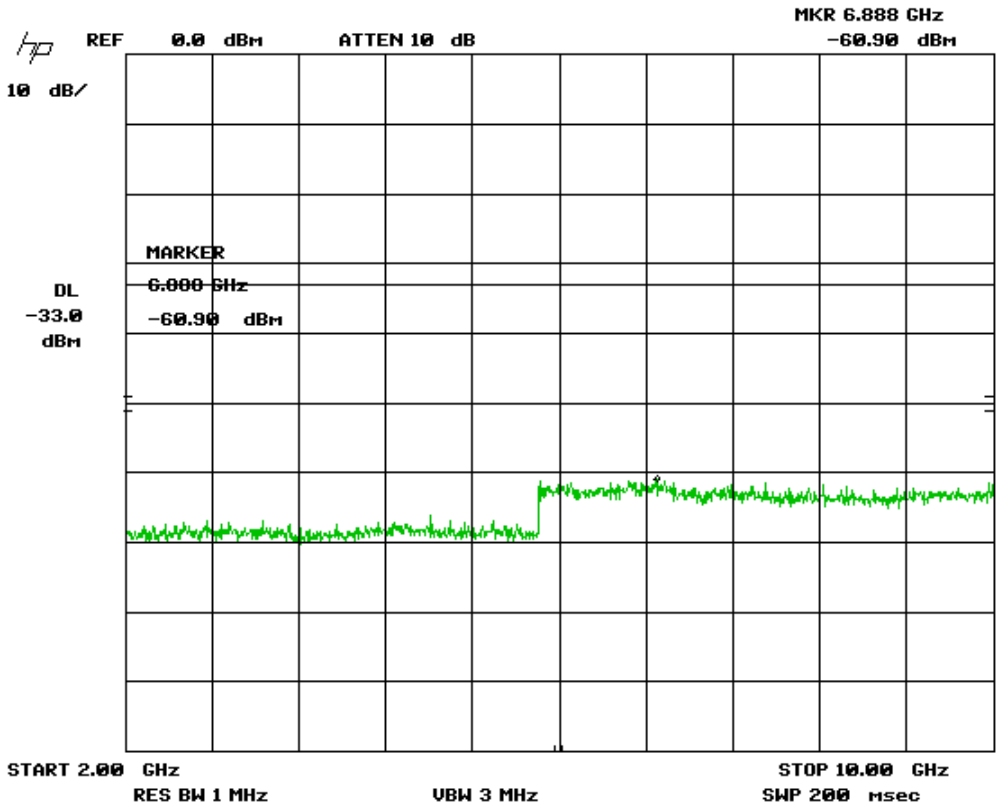
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 22 - 1 GHz to 2 GHz



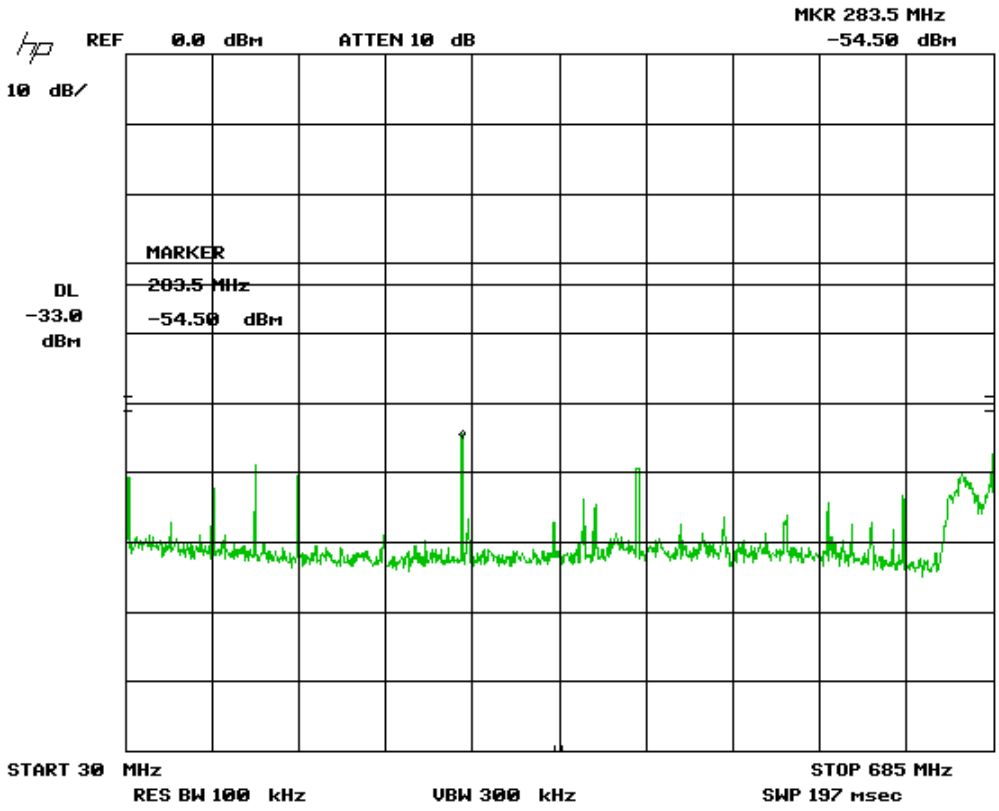
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 22 - 2 GHz to 10 GHz



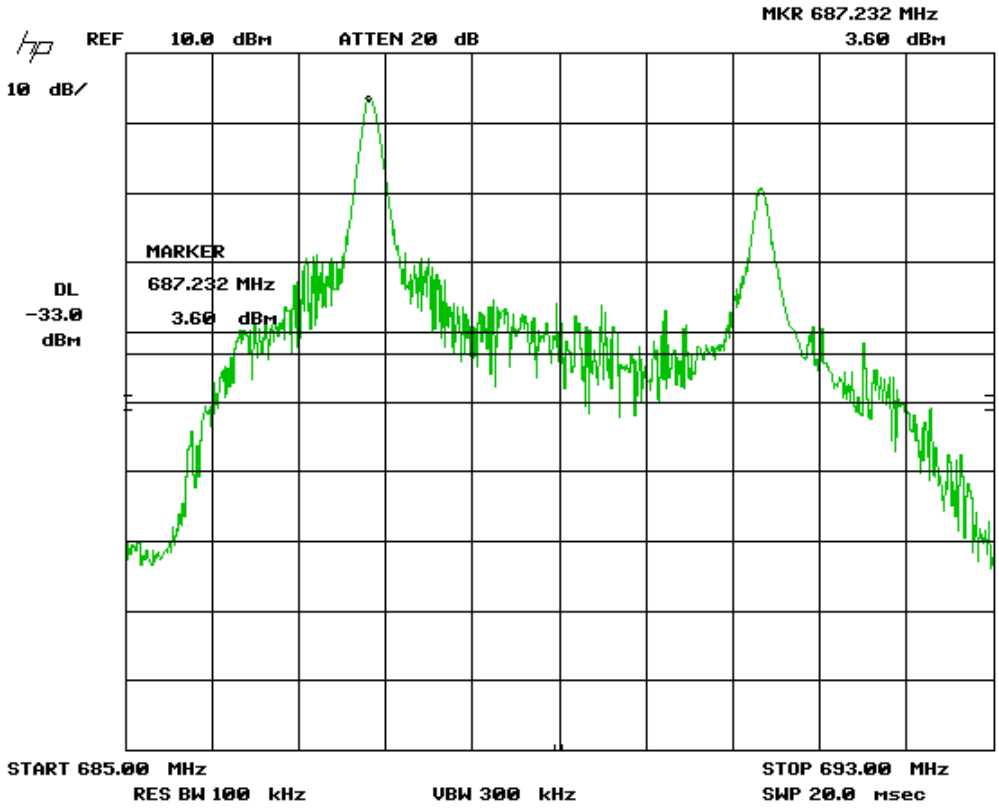
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 50 - 30 MHz to 685 MHz



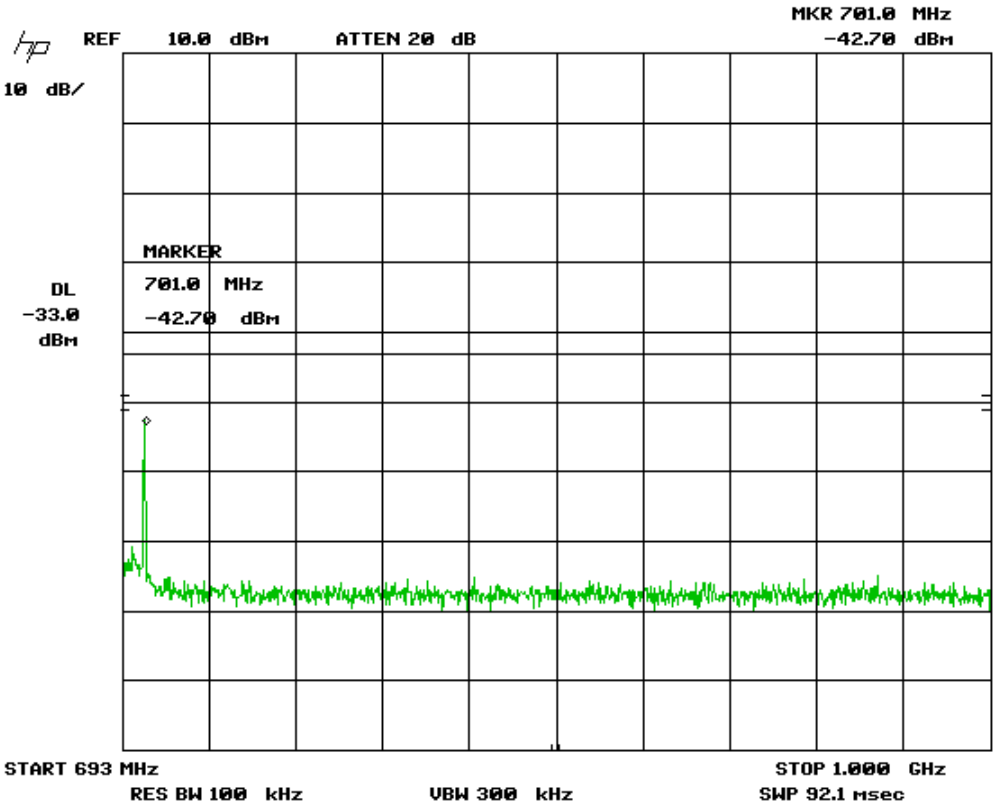
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 50 - 685 to 693 MHz



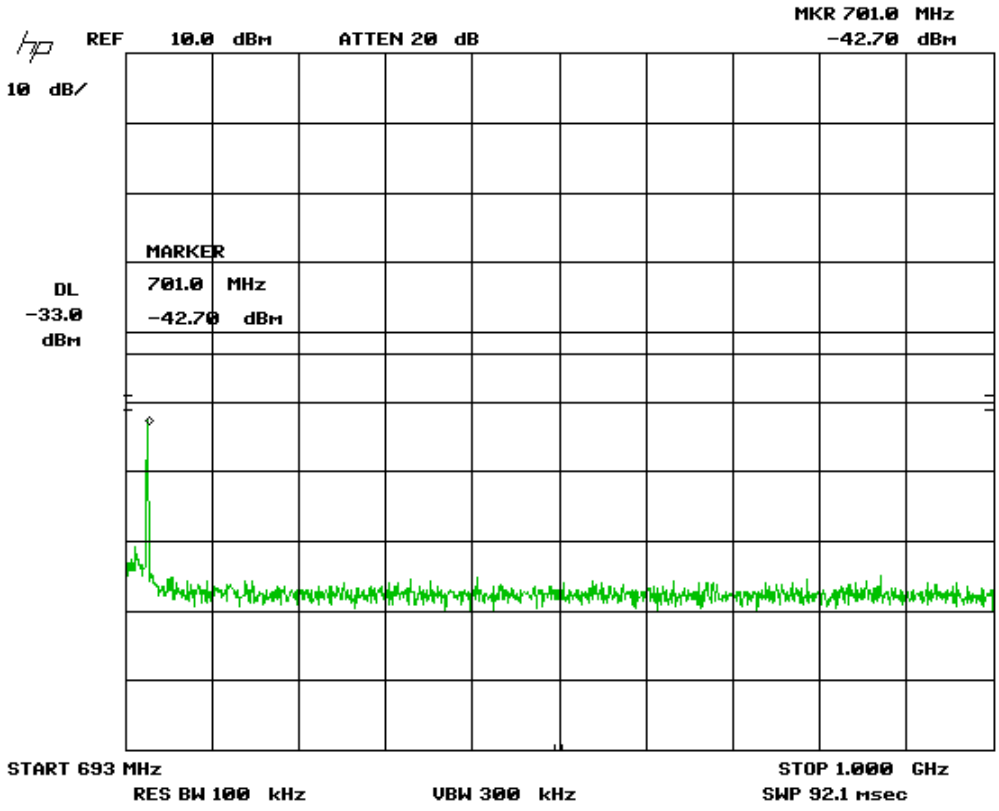
Note: For Band edge measurements, see spurious radiated emissions. There was 17 dB of external attenuation taken during this measurement.

Channel 50 - 693 MHz to 1 GHz



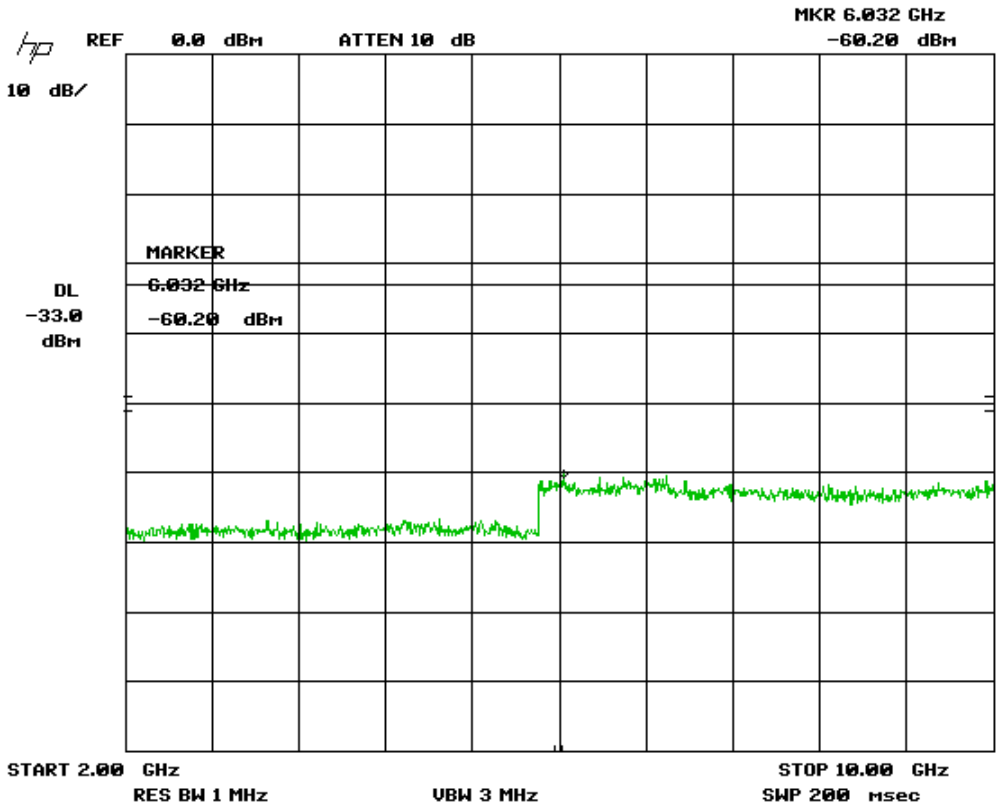
Note: There was 20 dB of external attenuation taken during this measurement.

Channel 50 - 1 GHz to 2 GHz



Note: There was 20 dB of external attenuation taken during this measurement.

Channel 50 - 2 GHz to 10 GHz



Note: There was 20 dB of external attenuation taken during this measurement.

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	12/21/ 2011	12/21/2013	GEMC 141
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Attenuator 3 dB	FP-50-3	Trilithic	NCR	NCR	GEMC 40
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 – Power Line Conducted Emissions Class B_Rev1"

Spurious Radiated Emissions

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 47 CFR, FCC Part 74, Section 74.637(a)(1), however a worst case of -13 dBm was applied. the limits are as follows:

(i) On any frequency removed from the assigned (center) frequency by more than 50% up to and including 100% of the authorized bandwidth: At least 25 dB in any 100 kHz reference bandwidth (BREF);

(ii) On any frequency removed from the assigned (center) frequency by more than 100% up to and including 250% of the authorized bandwidth: At least 35 dB in any 100 kHz reference bandwidth;

(iii) On any frequency removed from the assigned (center) frequency by more than 250% of the authorized bandwidth: At least 43+10 log(P) dB, or 80 dB, whichever is the lesser attenuation, in any 100 kHz reference bandwidth.

Note: A 43 + 10 Log(P), or -13 dBm ERP was applied for any frequency from the assigned (center) frequency by more than 50% up to and including 100% of the authorized bandwidth. As the power is allowed up to 24 dBm, this was considered worst case as -13 dBm would require -37 dBc from the allowable maximum power.

Note: P is transmitter output power in Watts

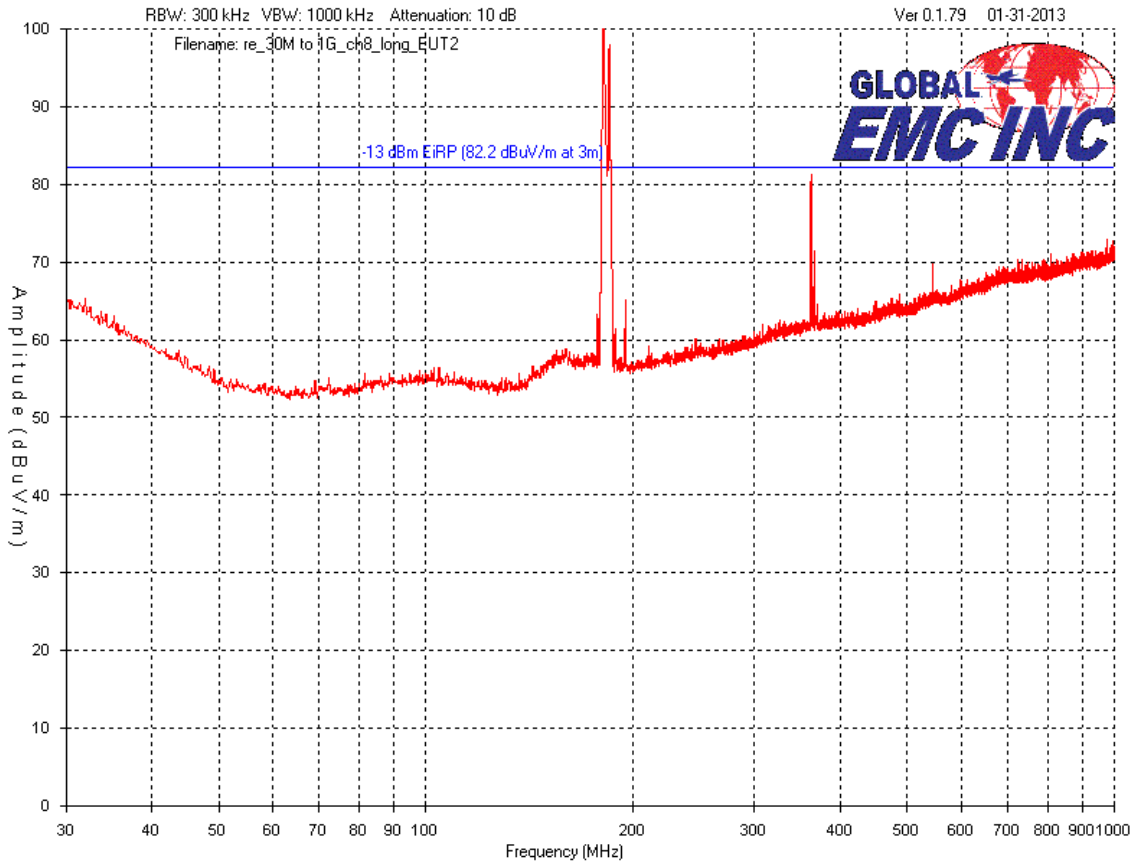
Results

The EUT passed. Low, middle and high band was measured for each mode, radiated and conducted were measured and the worst case results are presented.

Graph(s) / Table(s)

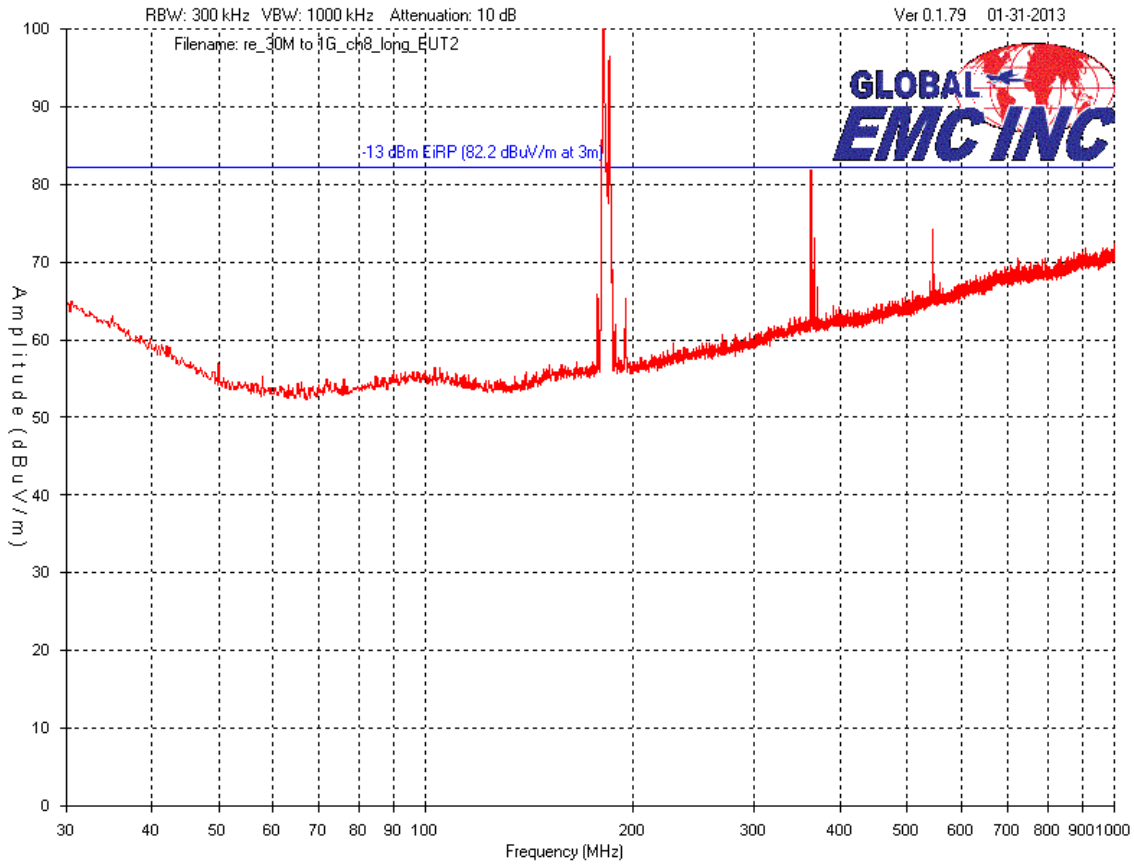
The emissions were scanned on channels 8,10,12, 14,22,30,31,40 and 50 as these were hi, middle and low band for each antenna utilized. The frequency range scanned was 9 kHz to 10 GHz. No significant emissions were detected between 9 kHz and 30 MHz. The graphs shown below shows the peak power output of the device during the radiated emissions measurement during transmit operation of the EUT. See following table for final measurements in table form.

Channel 8 - Radiated Emissions - 30 MHz to 1 GHz - Vertical



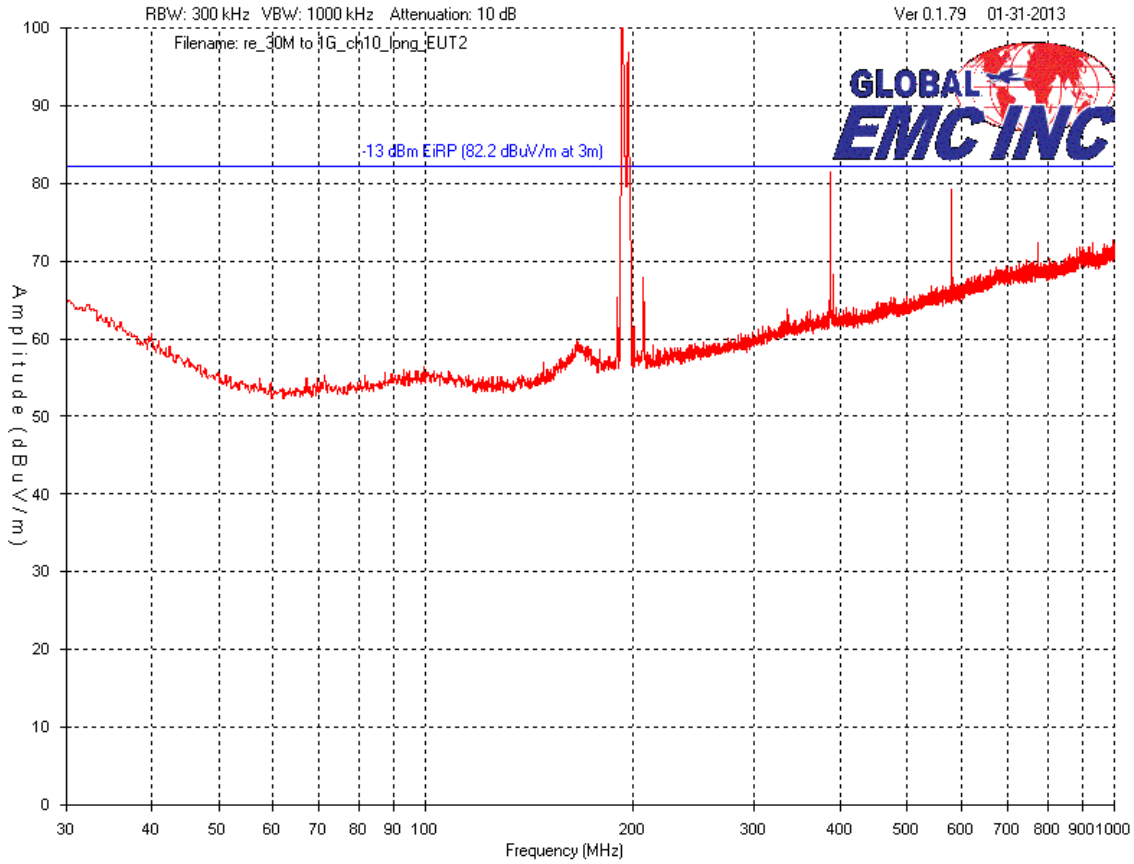
Note: See table for final measurements

Channel 8 - Radiated Emissions - 30 MHz to 1 GHz - Horizontal



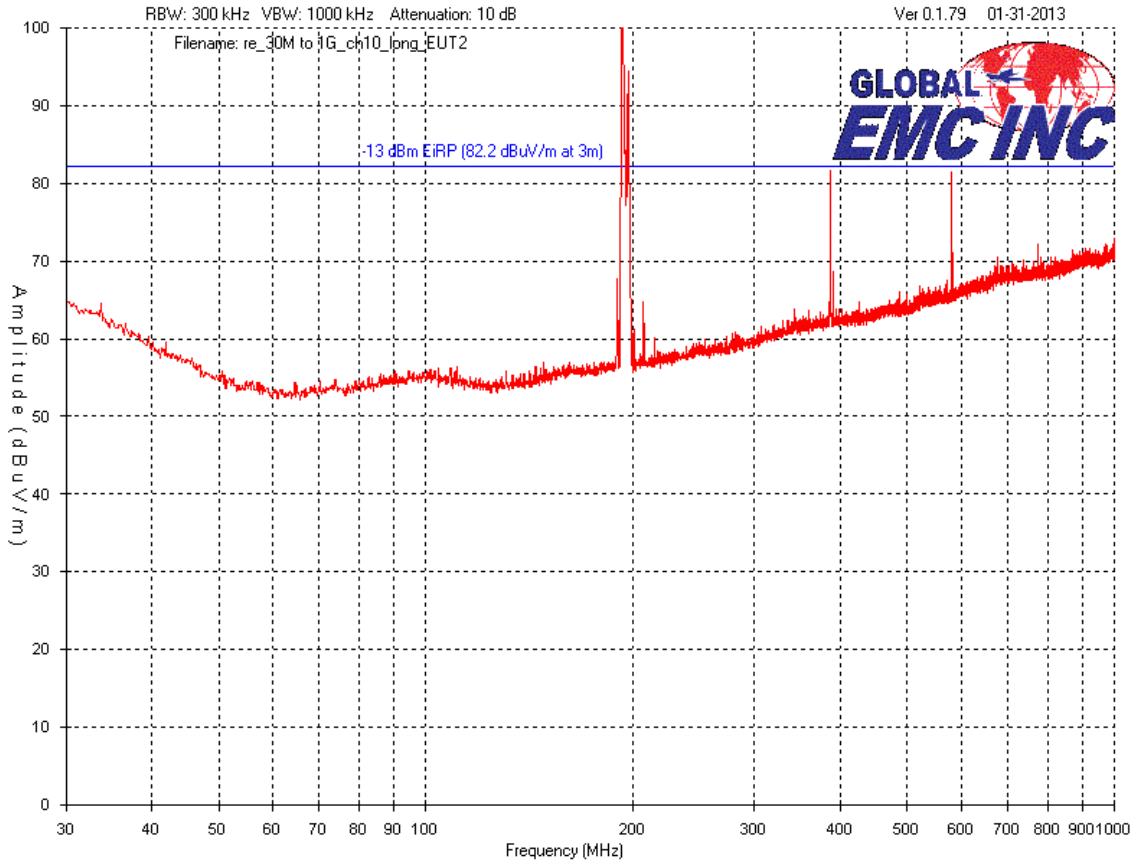
Note: See table for final measurements

Channel 10 - 30 MHz to 1 GHz - Vertical



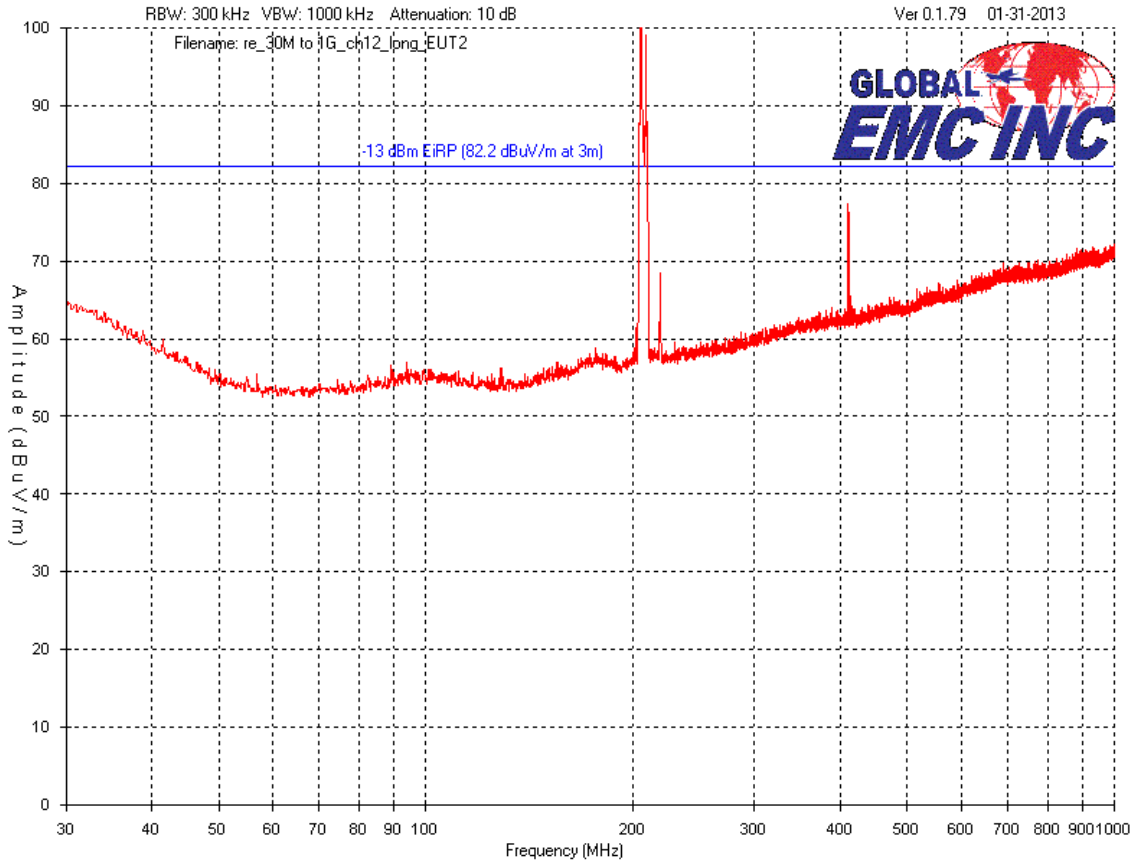
Note: See table for final measurements

Channel 10 - 30 MHz to 1 GHz - Horizontal



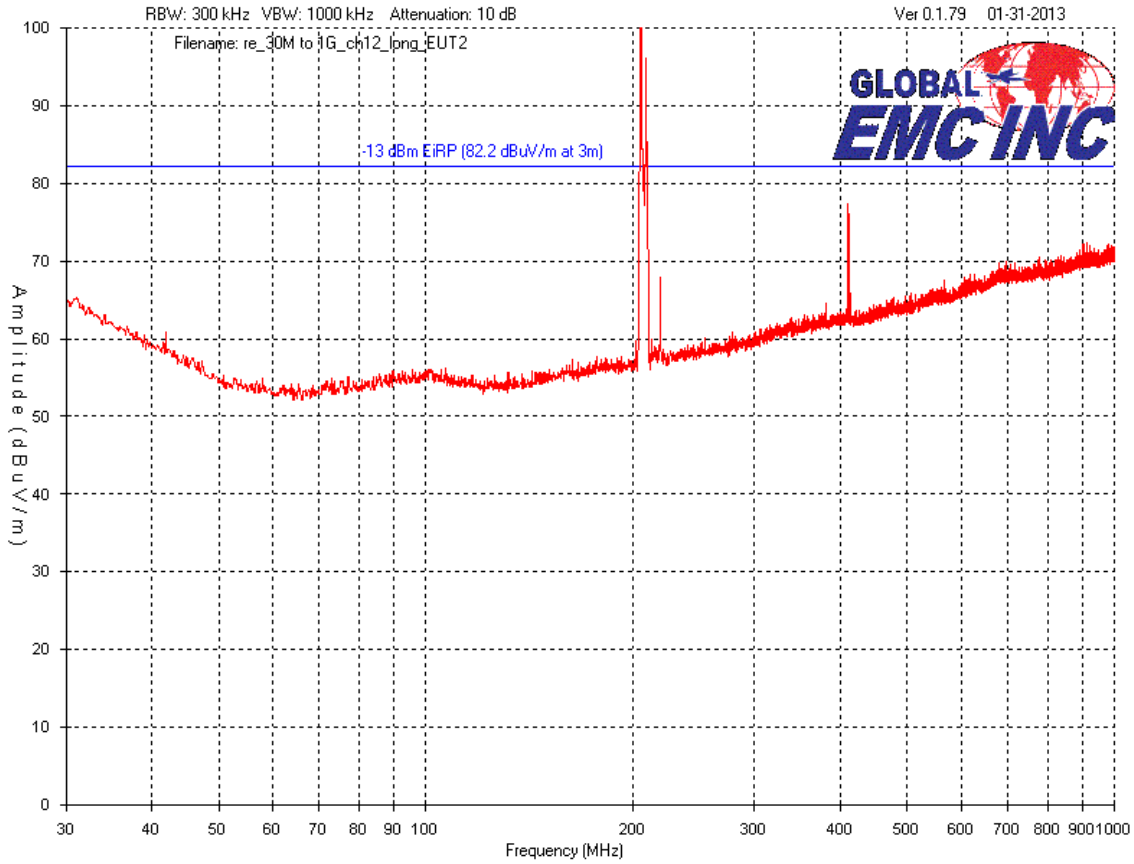
Note: See table for final measurements

Channel 12 - 30 MHz to 1 GHz - Vertical



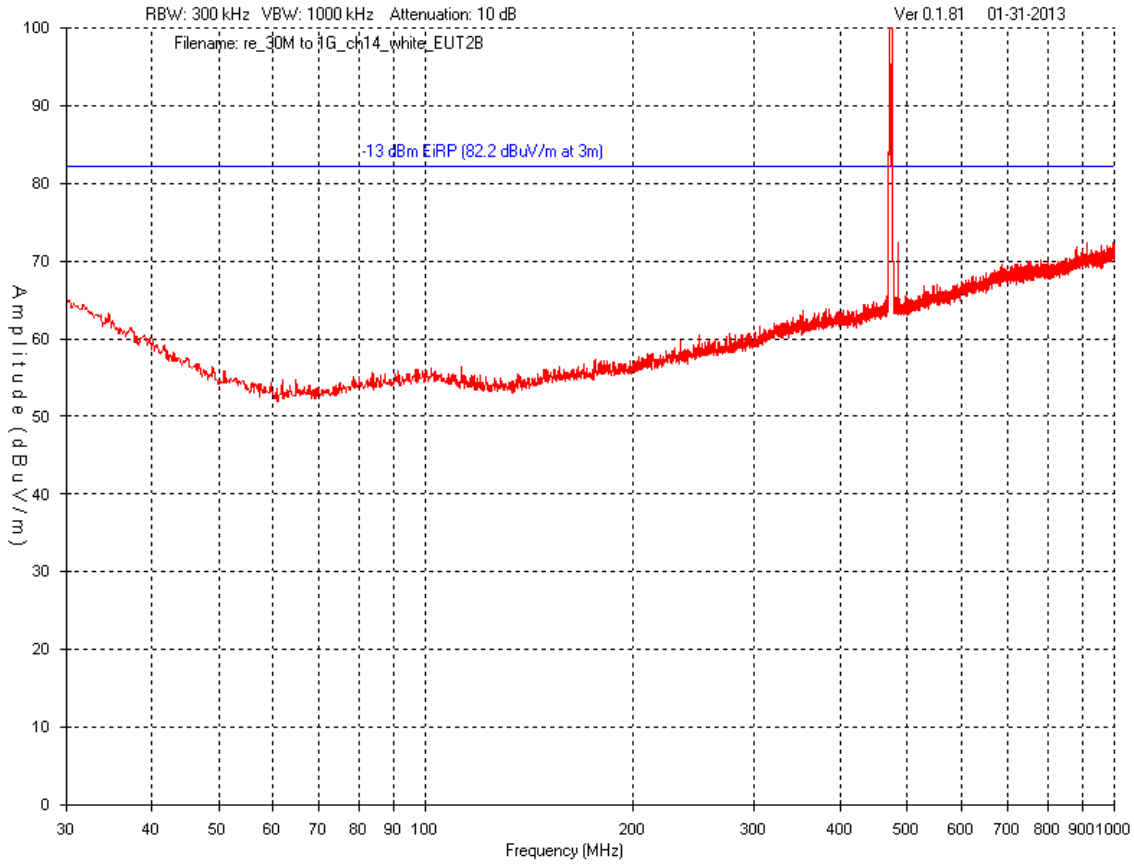
Note: See table for final measurements

Channel 12 - 30 MHz to 1 GHz - Horizontal



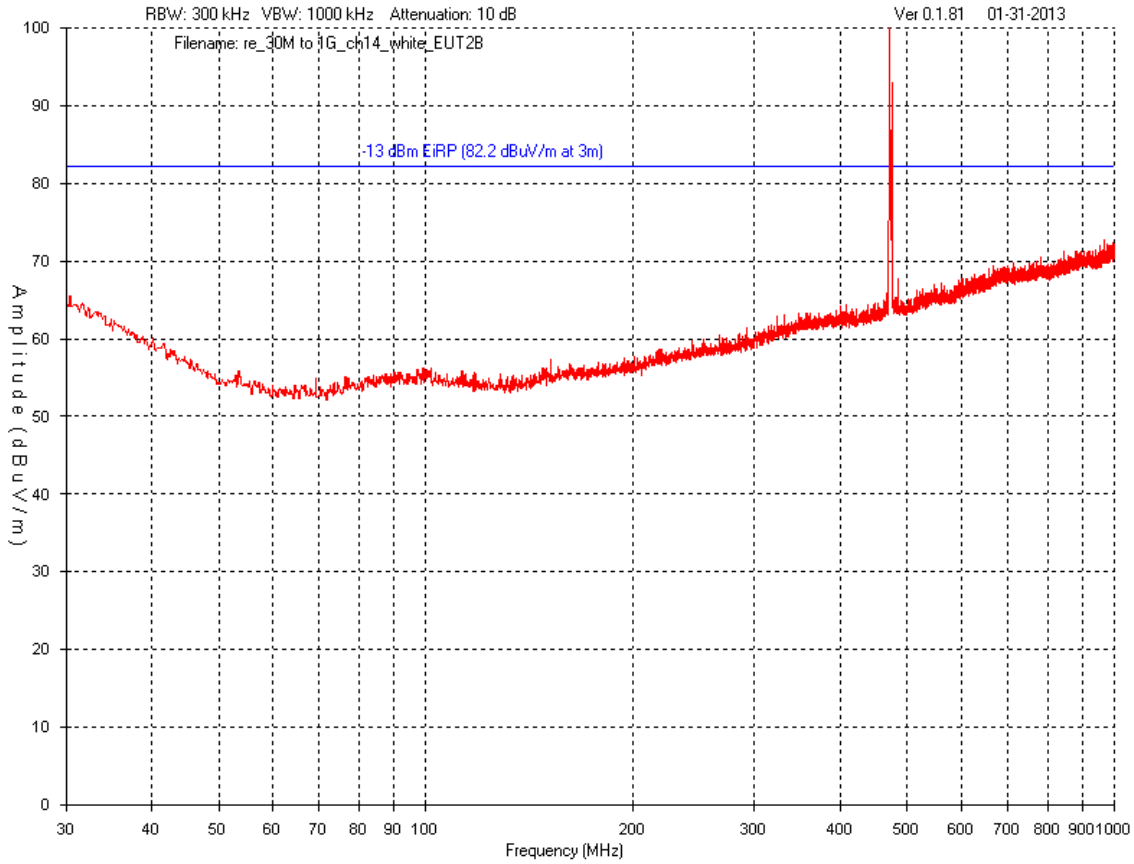
Note: See table for final measurements

Channel 14 - 30 MHz to 1 GHz - Vertical



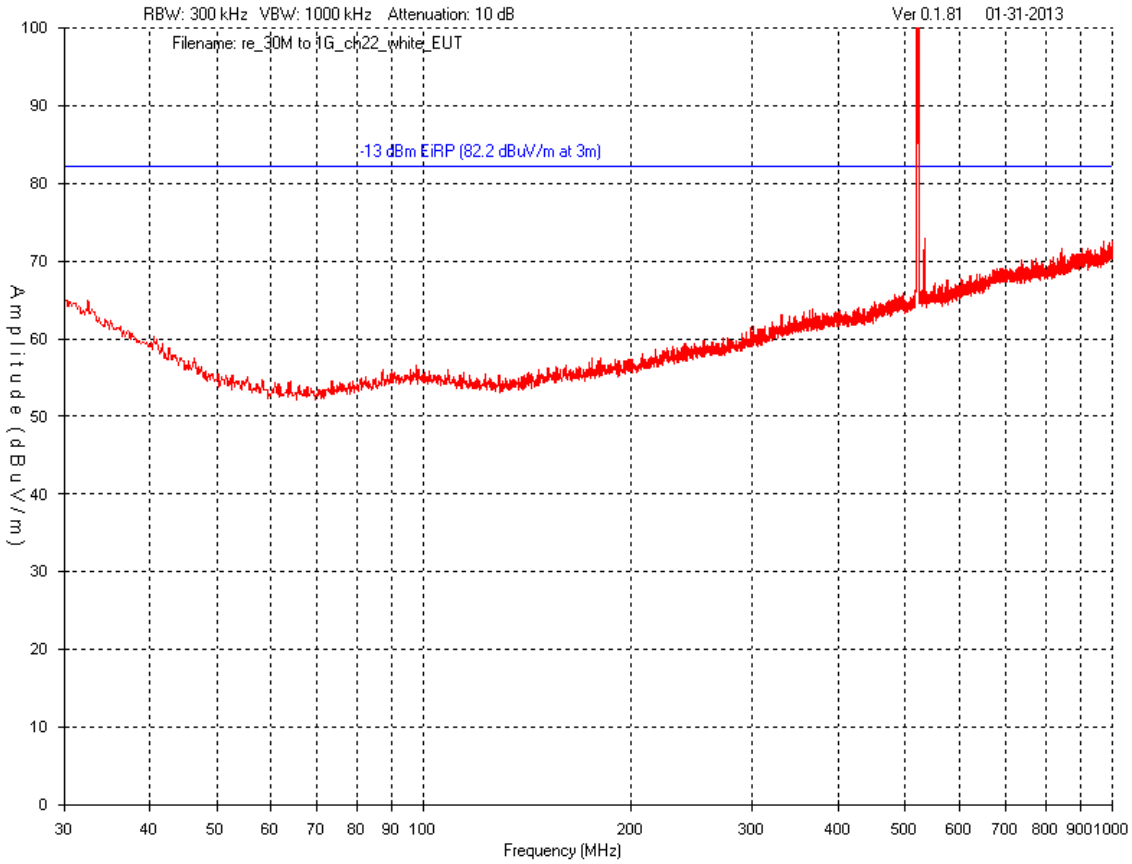
Note: See table for final measurements

Channel 14 - 30 MHz to 1 GHz - Horizontal



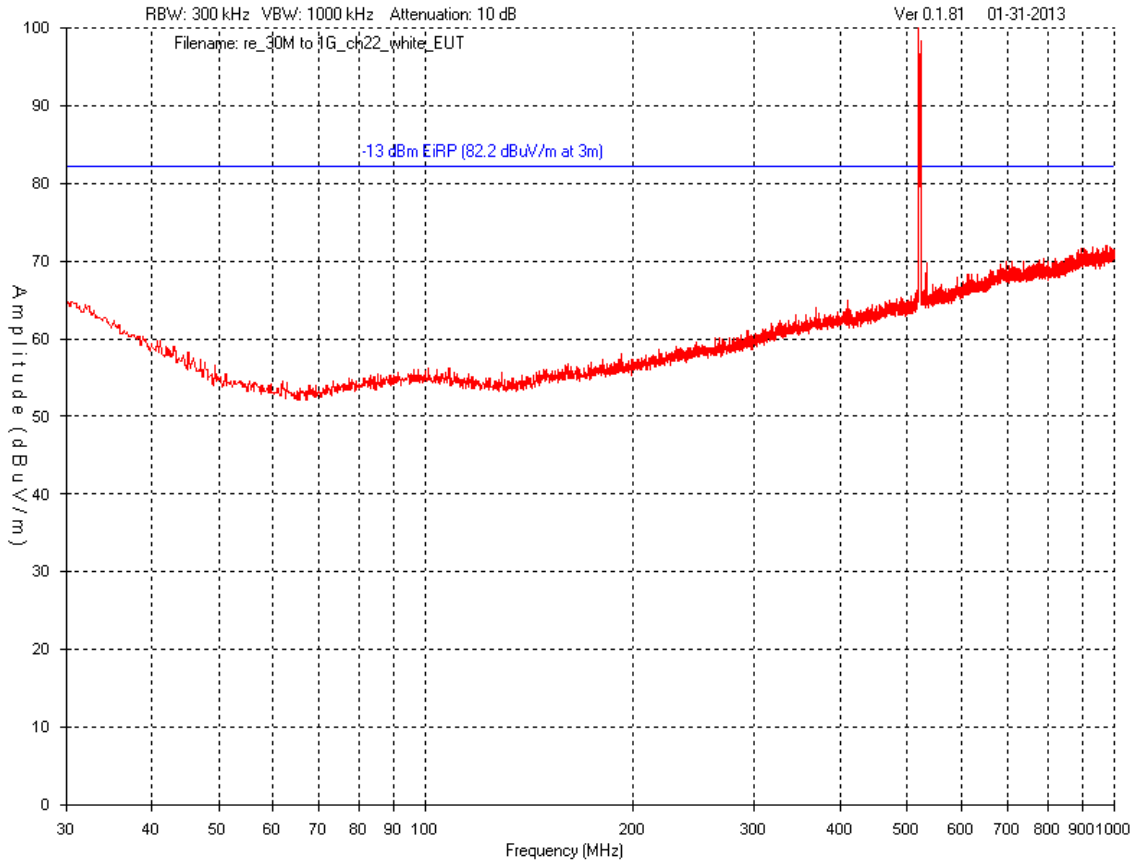
Note: See table for final measurements

Channel 22 - 30 MHz to 1 GHz - Vertical



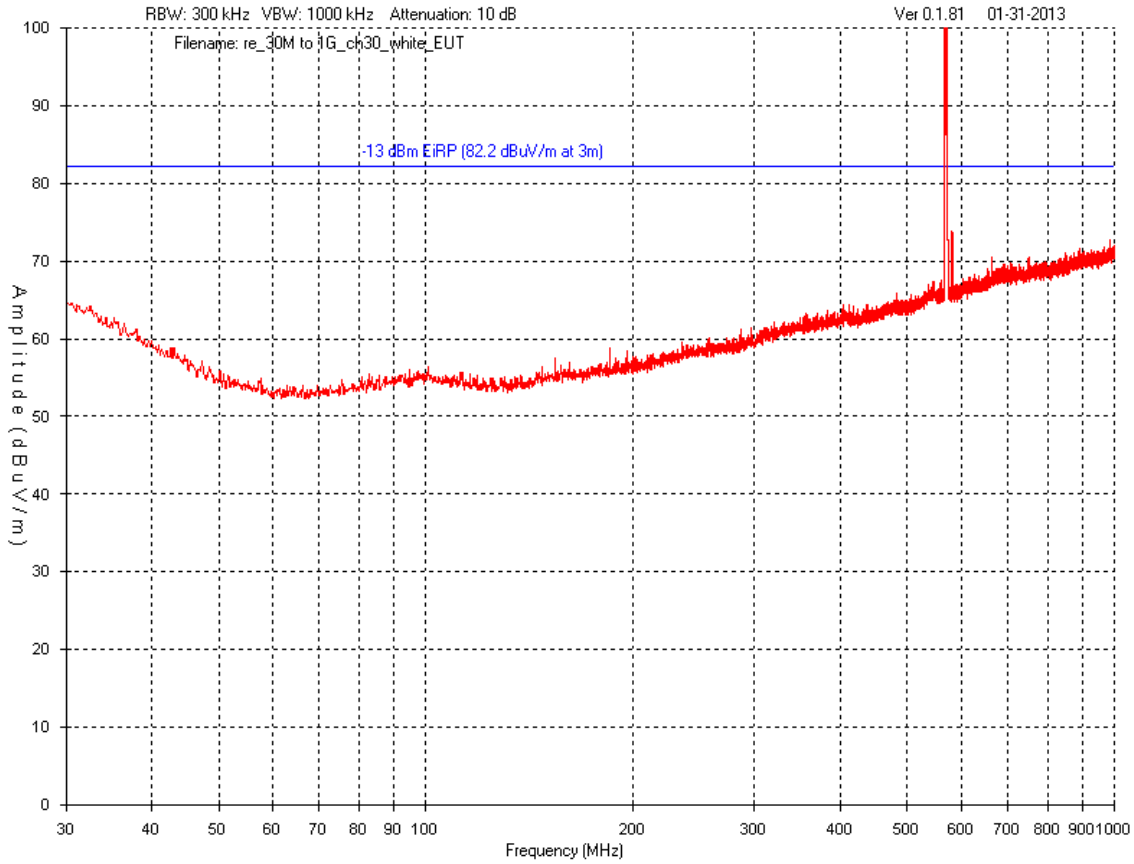
Note: See table for final measurements

Channel 22 - 30 MHz to 1 GHz - Horizontal



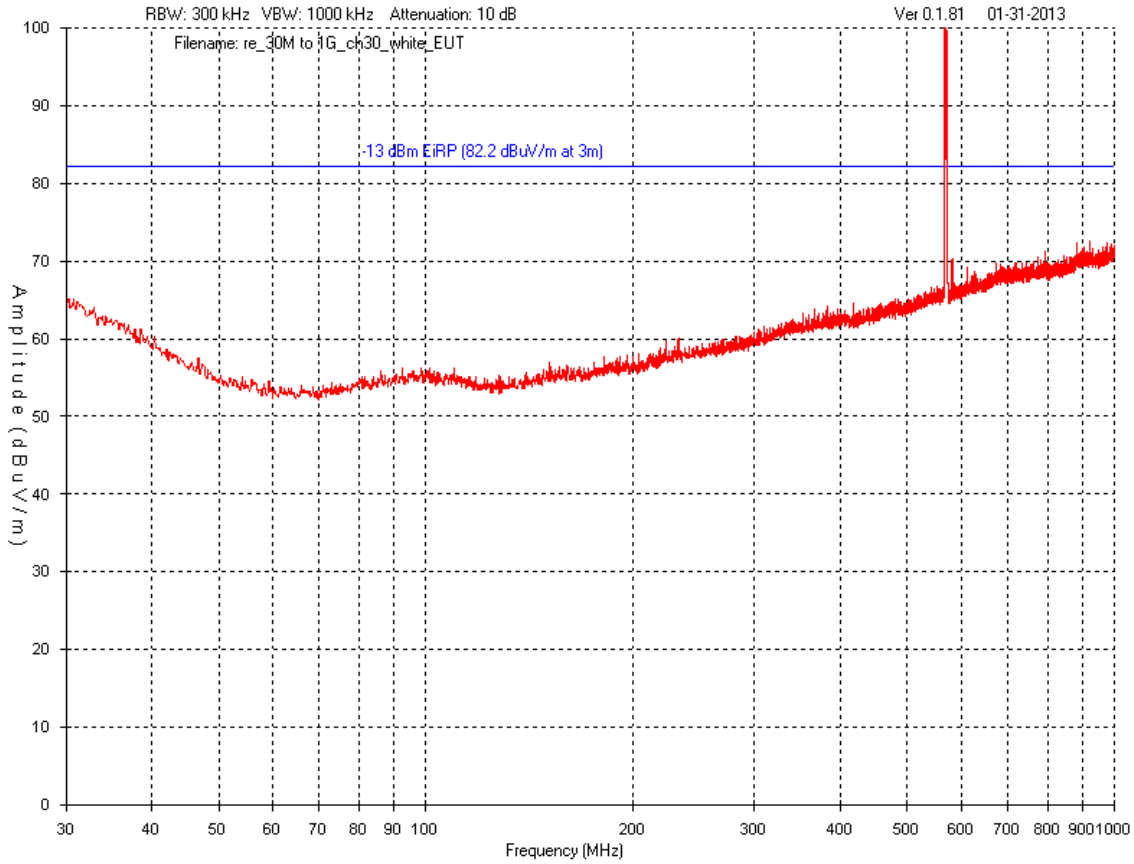
Note: See table for final measurements

Channel 30 - 30 MHz to 1 GHz - Vertical



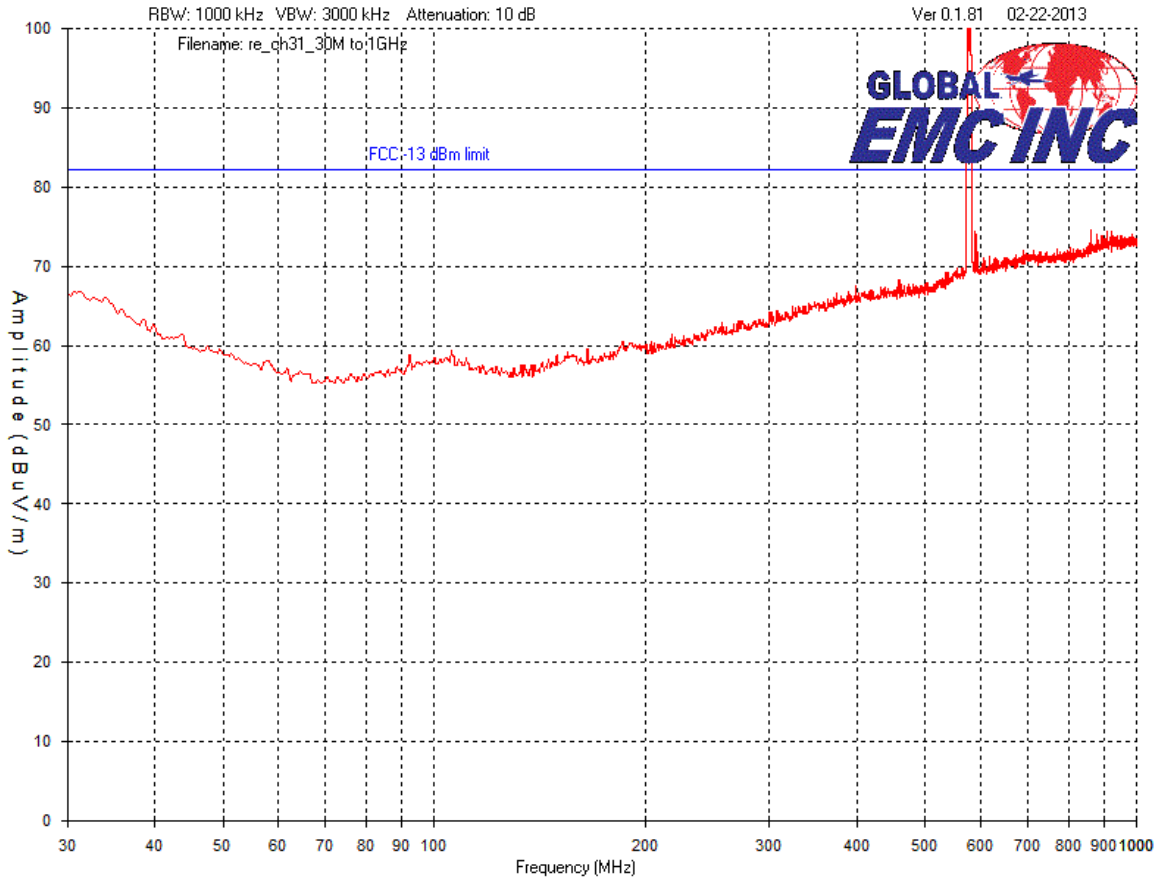
Note: See table for final measurements

Channel 30 - 30 MHz to 1 GHz - Horizontal



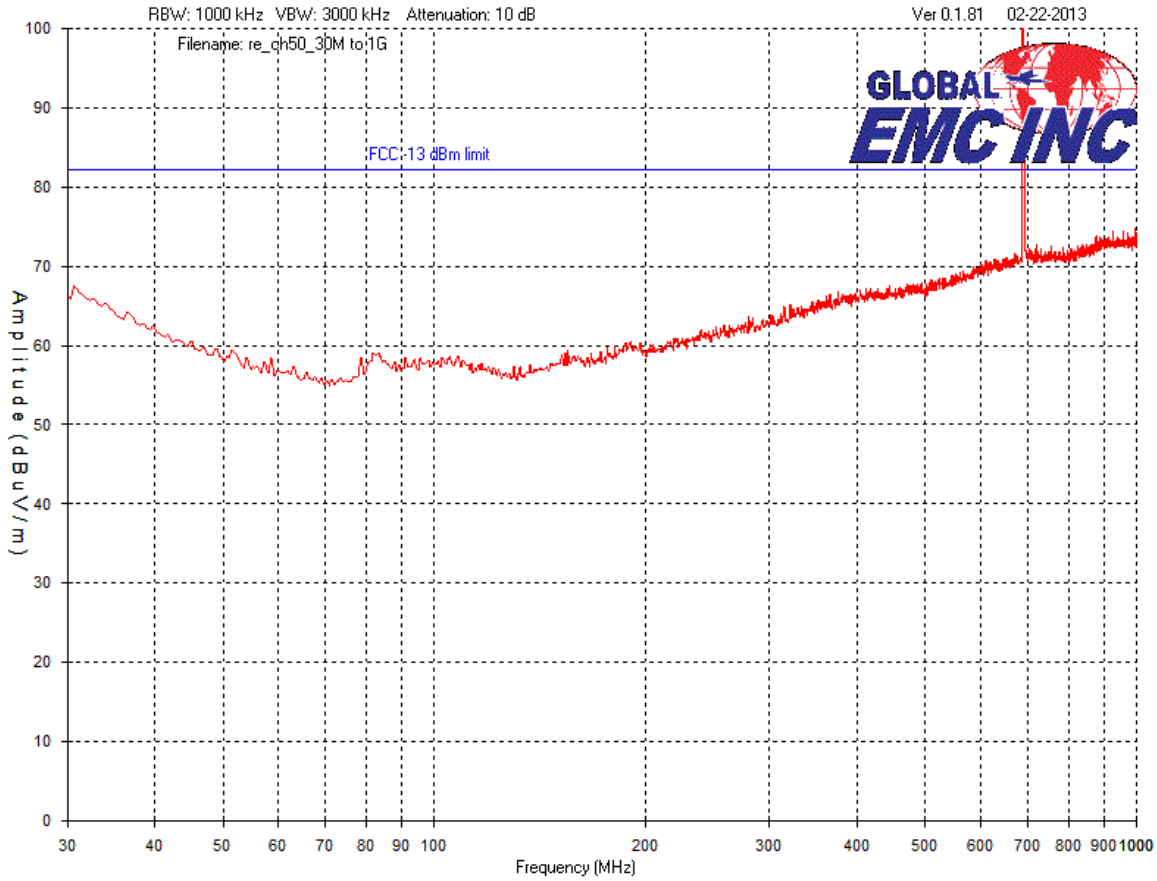
Note: See table for final measurements

Channel 31 - 30 MHz to 1 GHz - Vertical



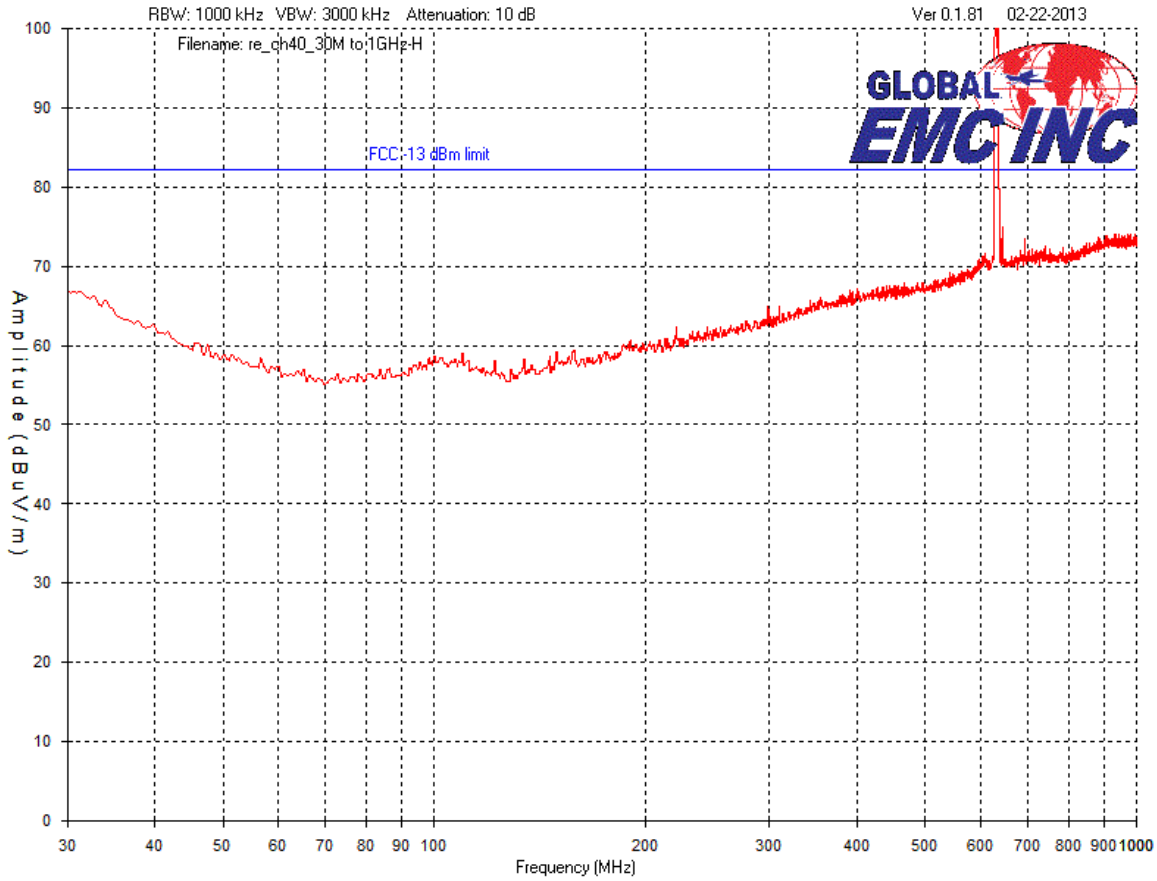
Note: See table for final measurements

Channel 31 - 30 MHz to 1 GHz - Horizontal



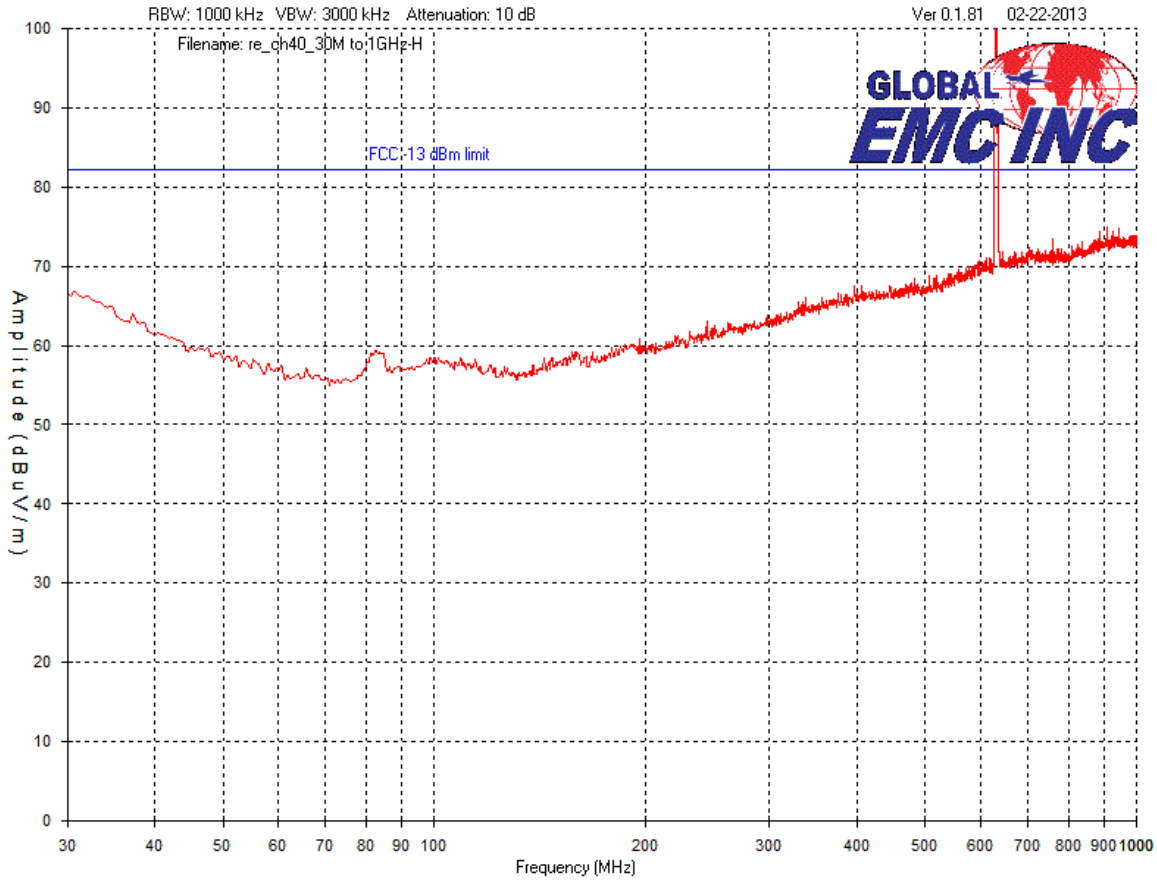
Note: See table for final measurements

Channel 40 - 30 MHz to 1 GHz - Vertical



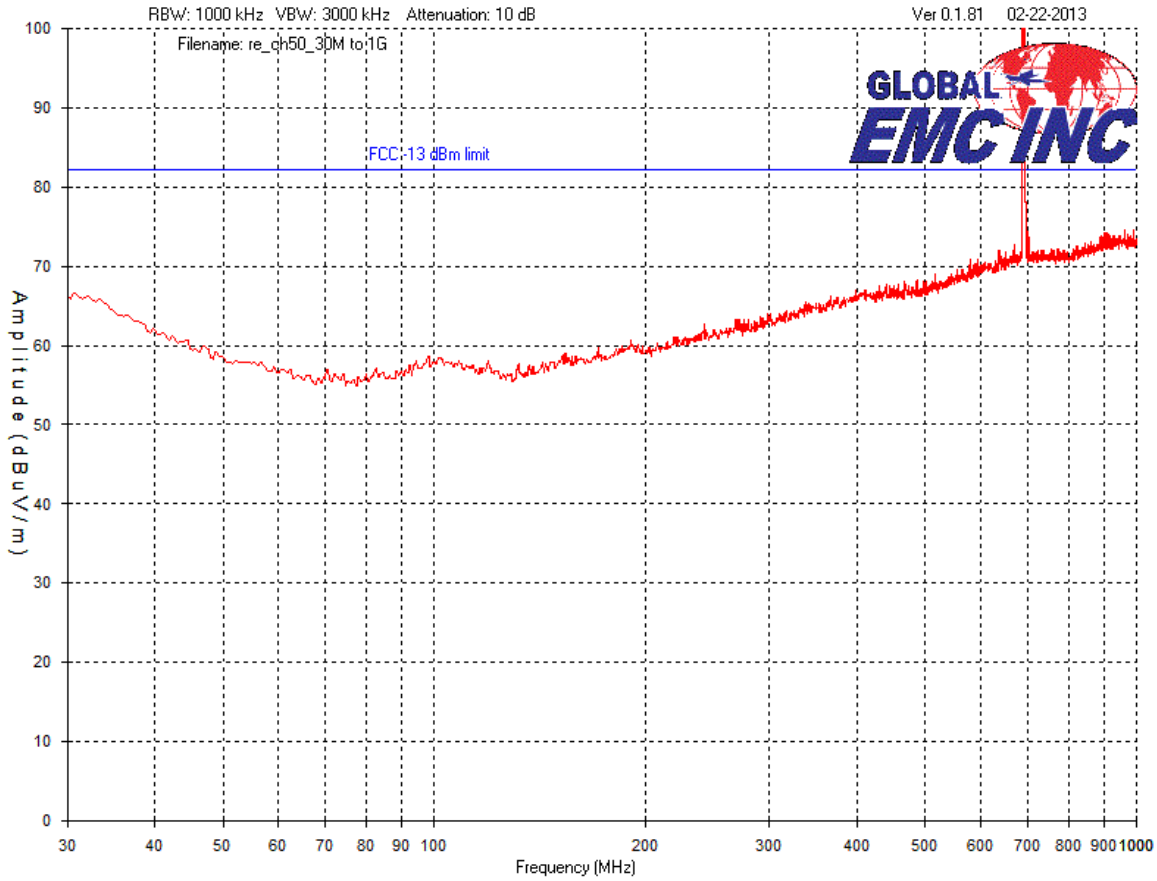
Note: See table for final measurements

Channel 40 - 30 MHz to 1 GHz - Horizontal



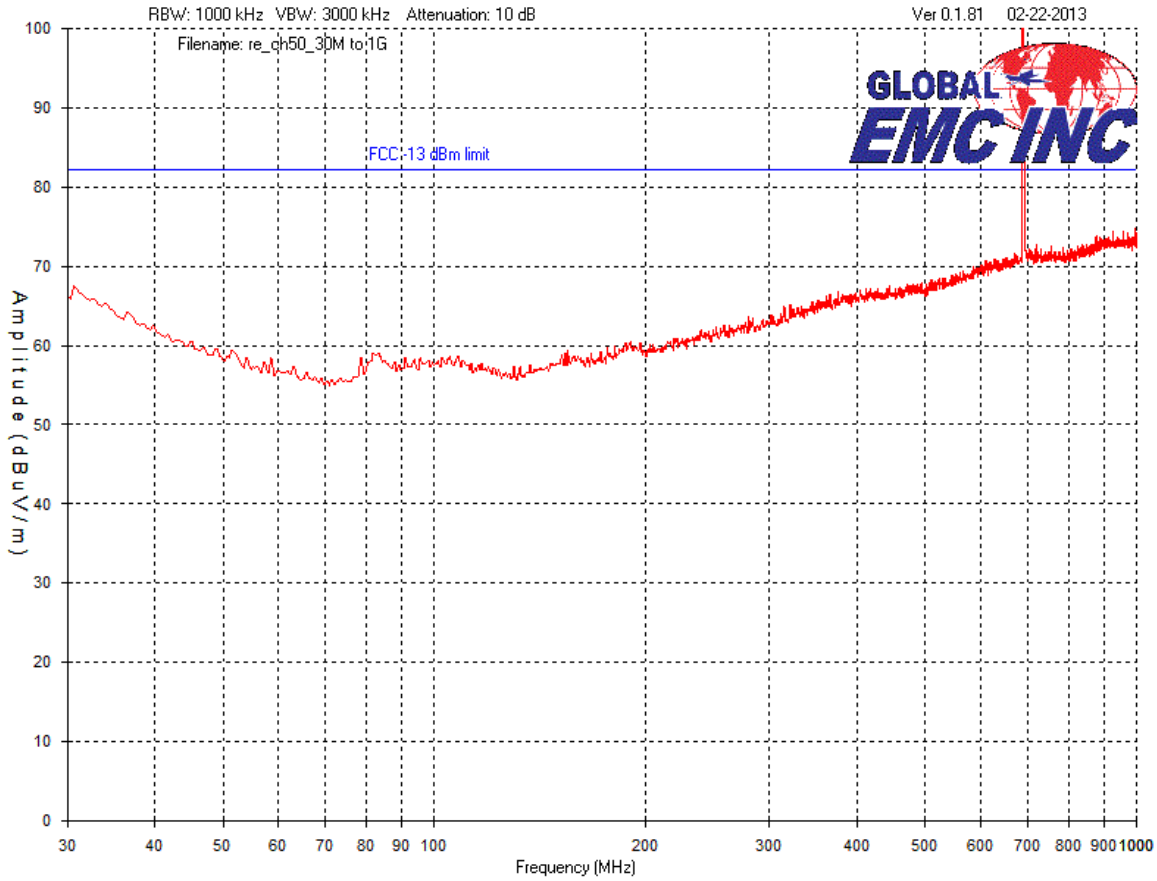
Note: See table for final measurements

Channel 50 - 30 MHz to 1 GHz - Vertical



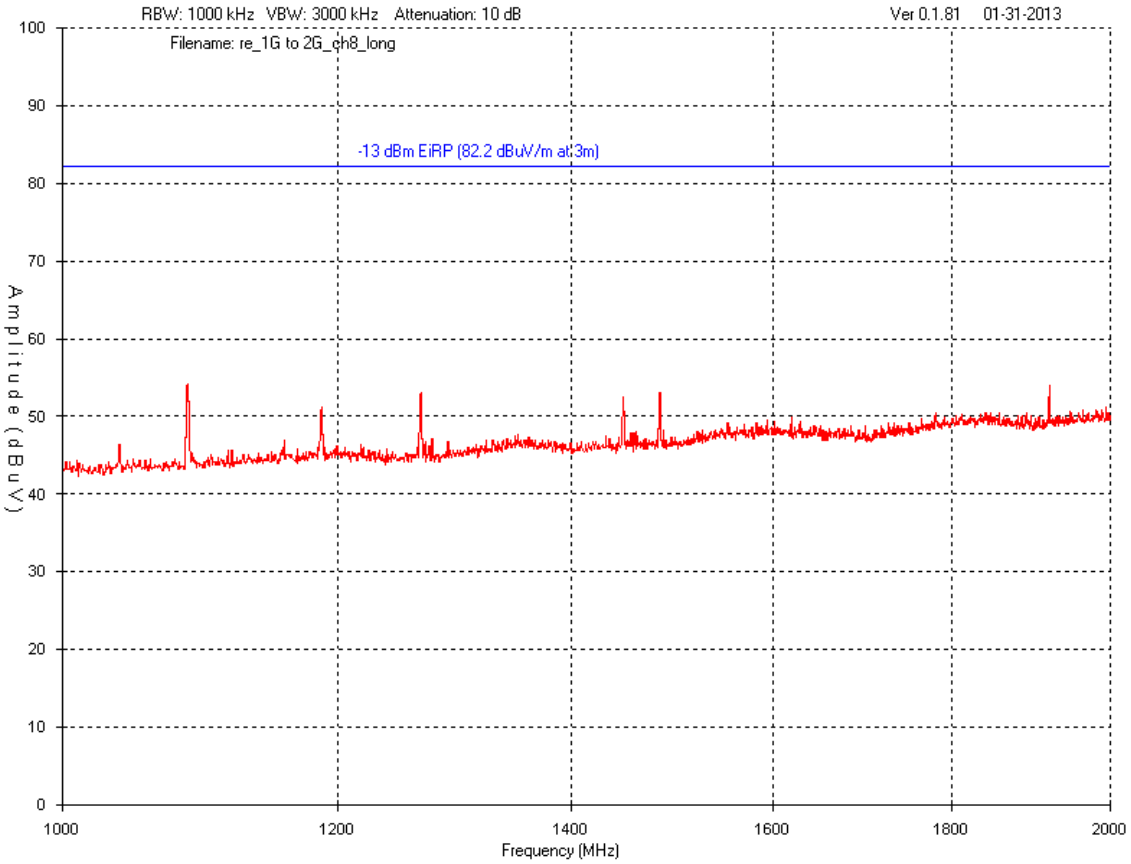
Note: See table for final measurements

Channel 50 - 30 MHz to 1 GHz - Horizontal

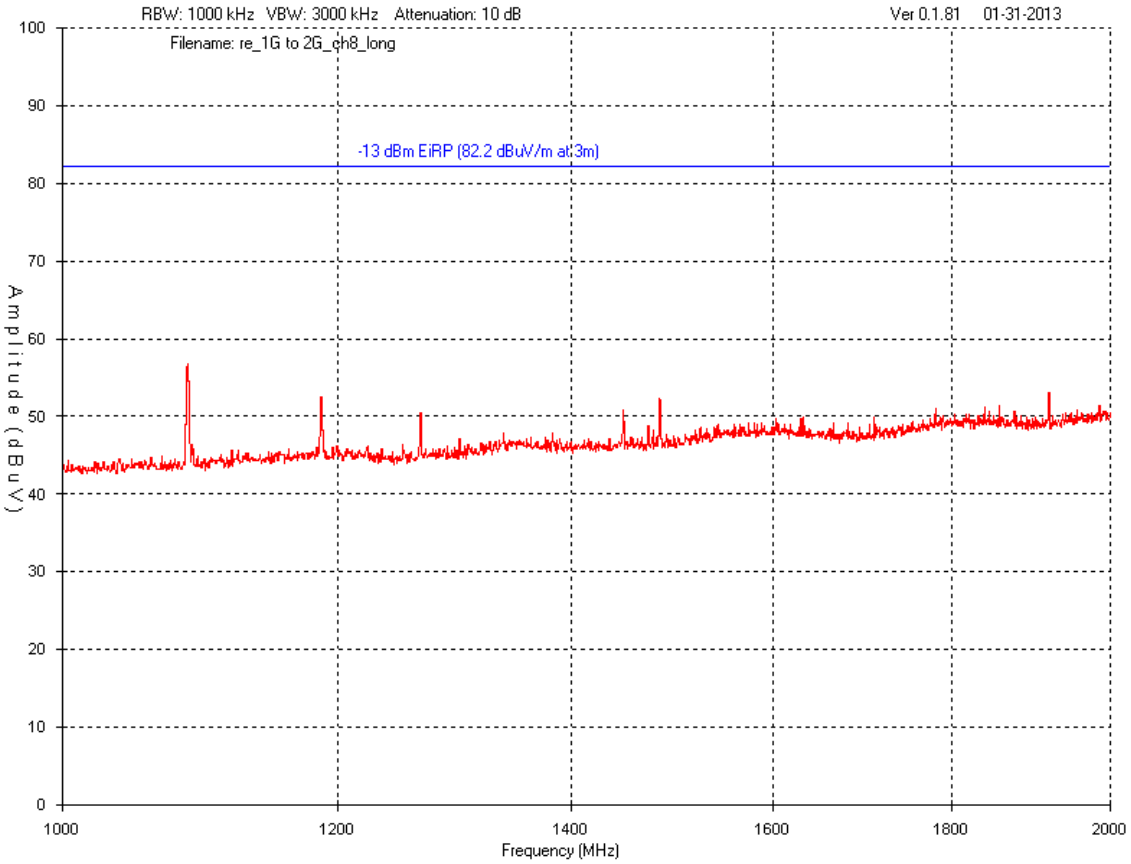


Note: See table for final measurements

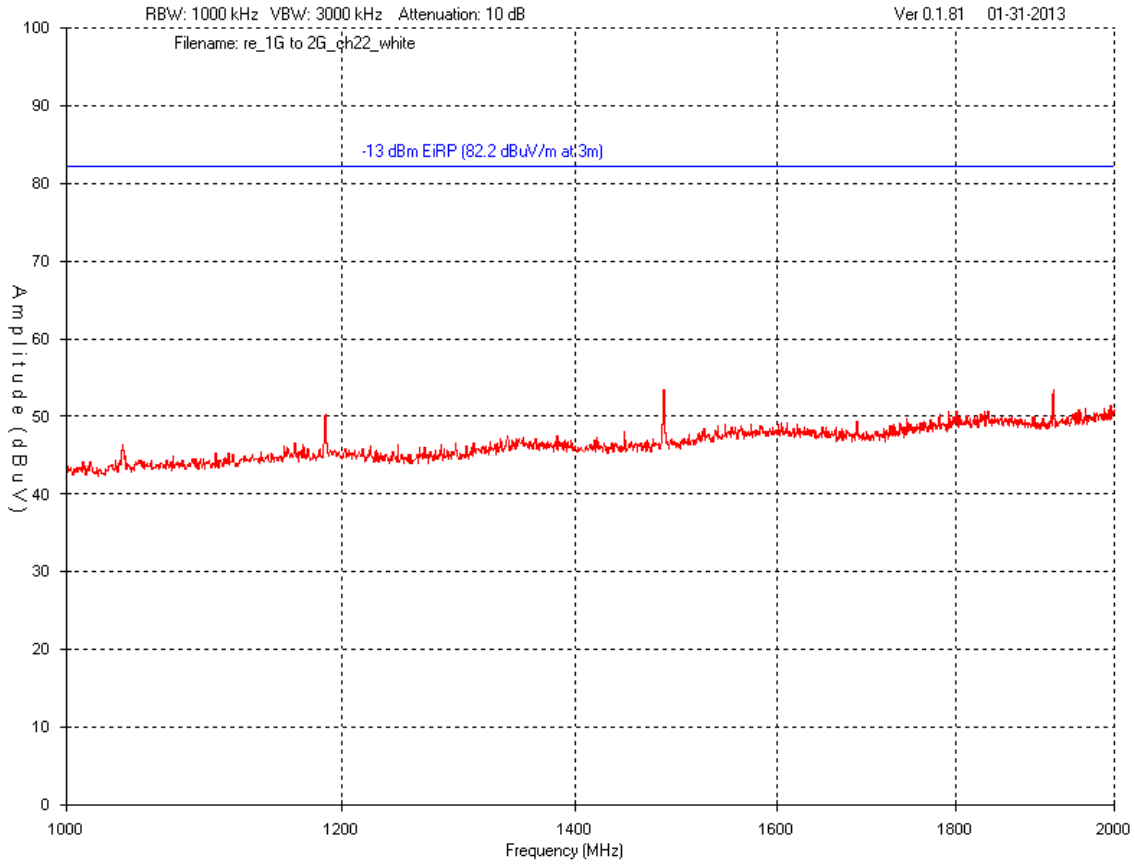
Channel 8 (Representative of channel 8, 10 and 12) - 1 GHz to 2 GHz - Vertical



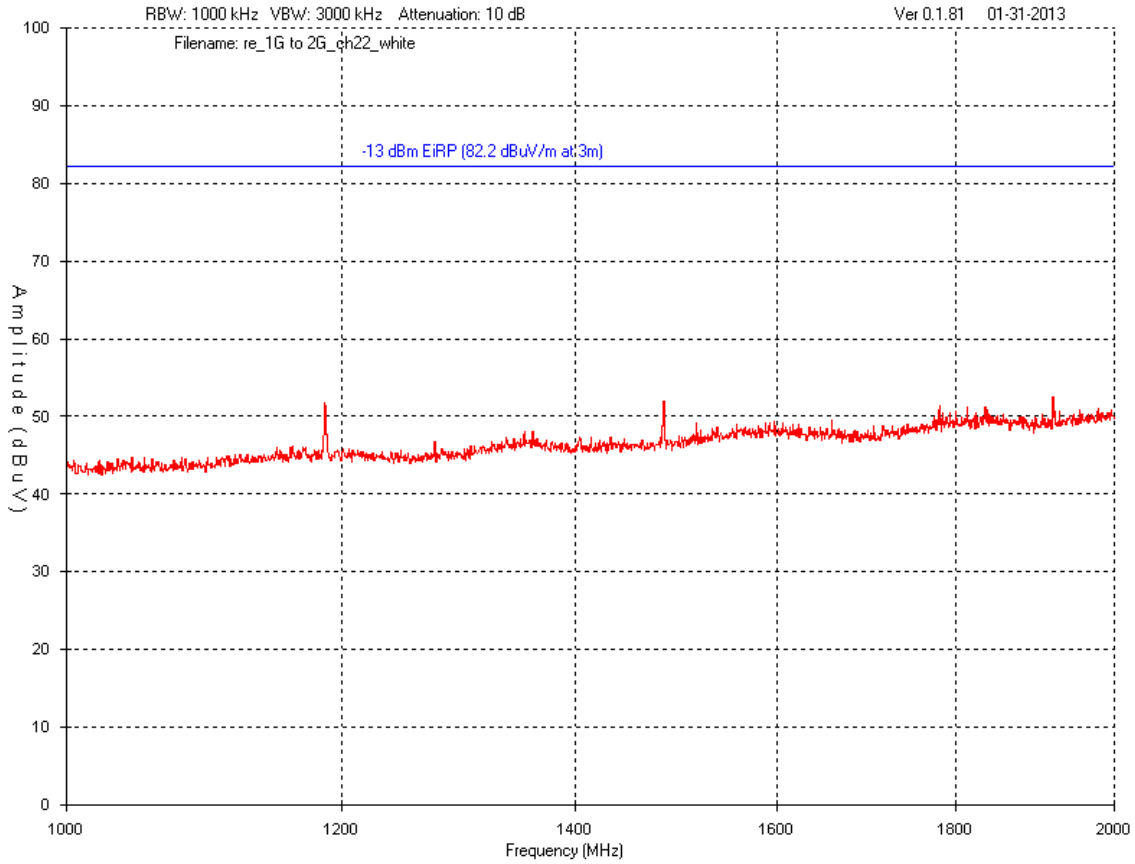
Channel 8 (Representative of channel 8, 10 and 12) - 1 GHz to 2 GHz - Horizontal



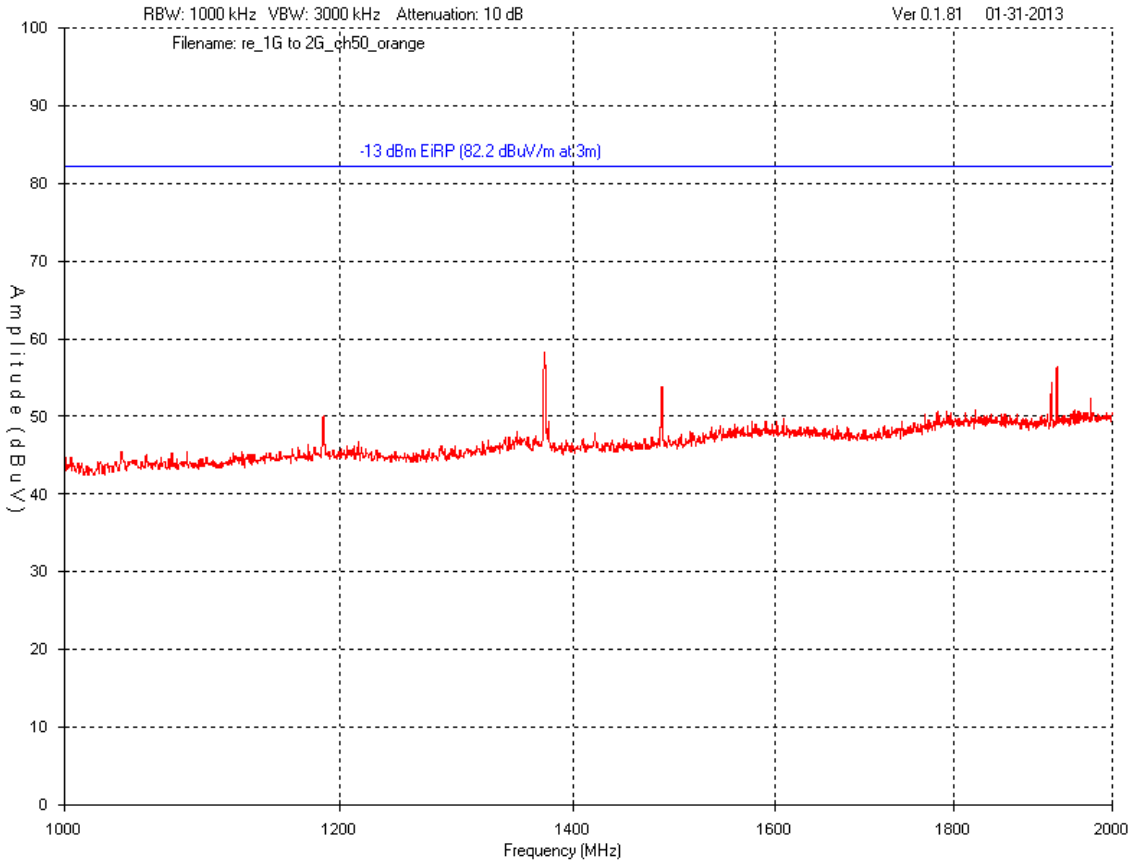
Channel 22 (Representative of channel 14, 22 and 30) - 1 GHz to 2 GHz - Vertical



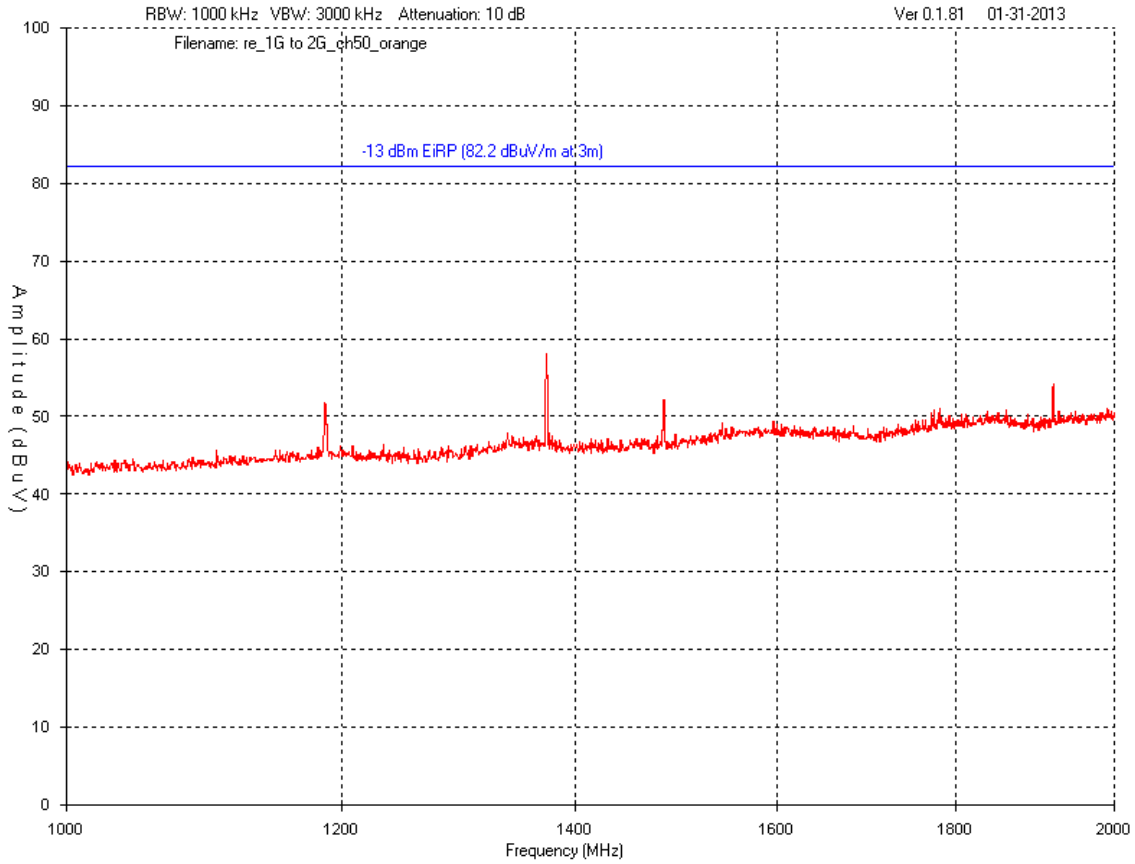
Channel 22 (Representative of channel 14, 22 and 30) - 1 GHz to 2 GHz - Horizontal



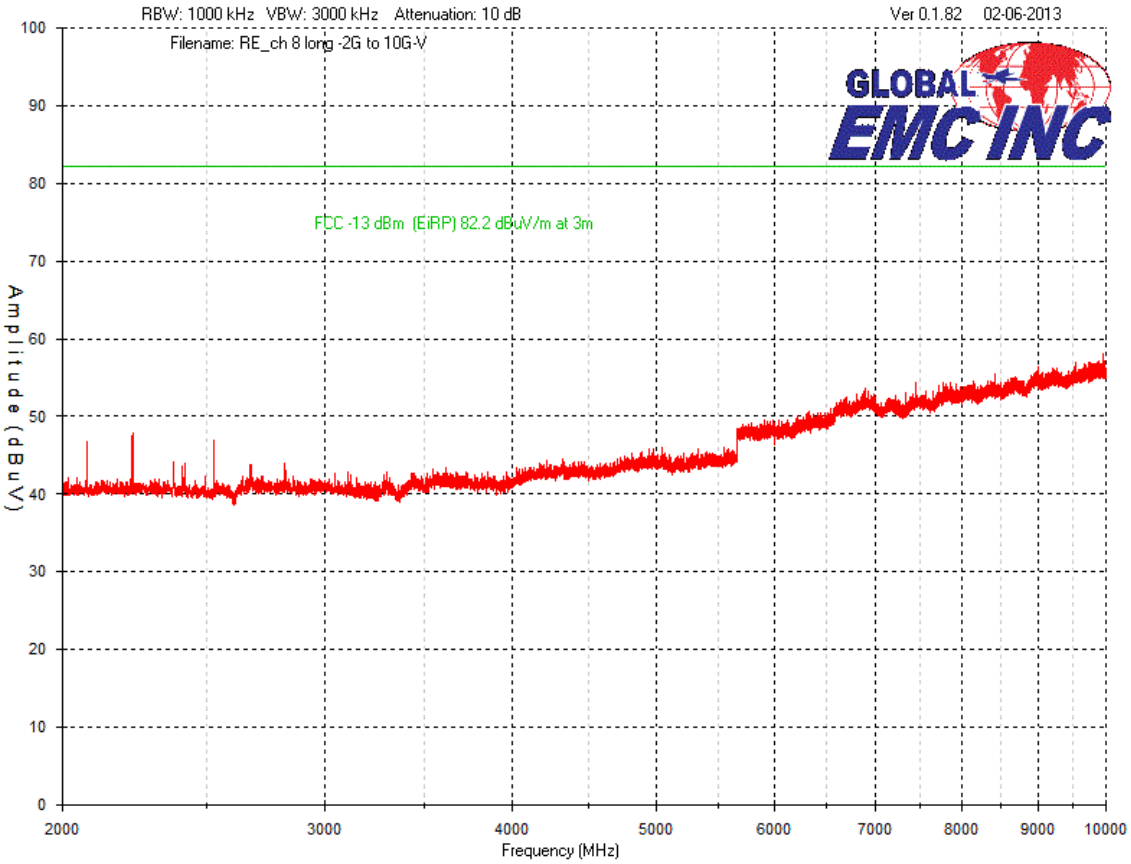
Channel 50 (Representative of channel 31, 40 and 50) - 1 GHz to 2 GHz - Vertical



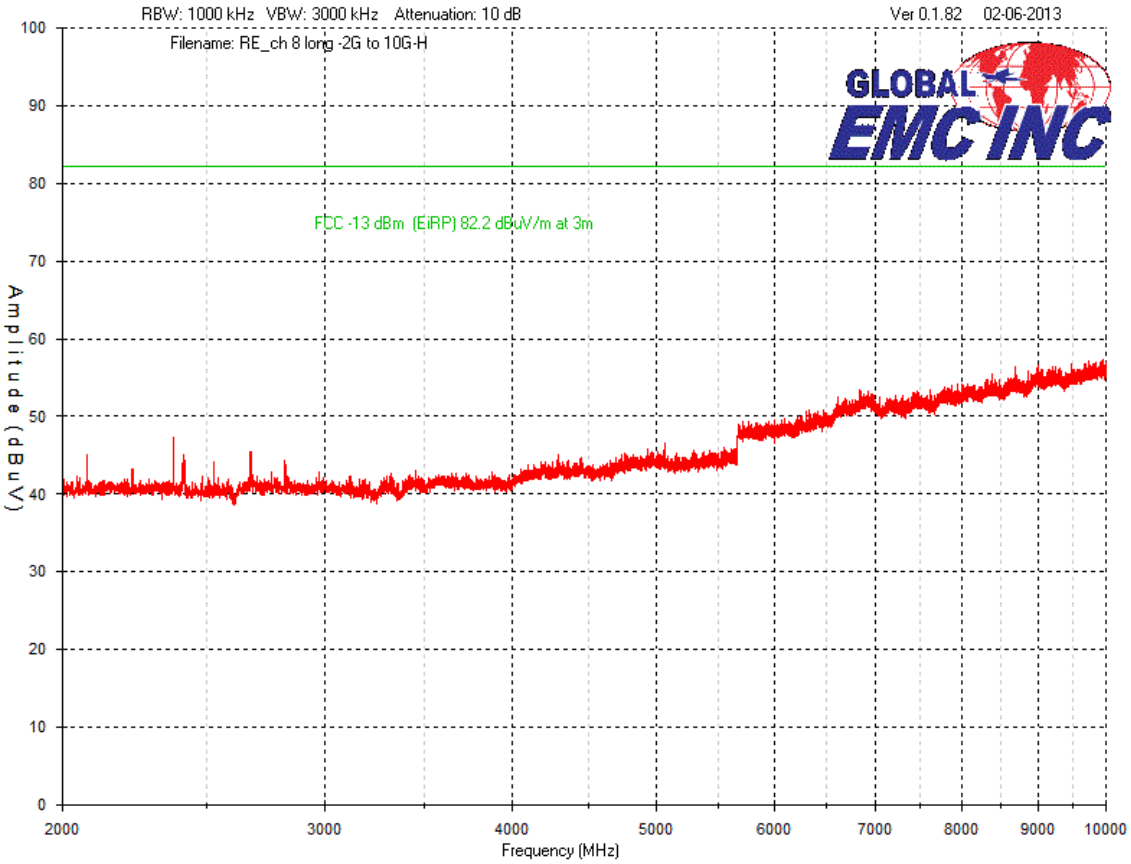
Channel 50 (Representative of channel 31, 40 and 50) - 1 GHz to 2 GHz - Horizontal



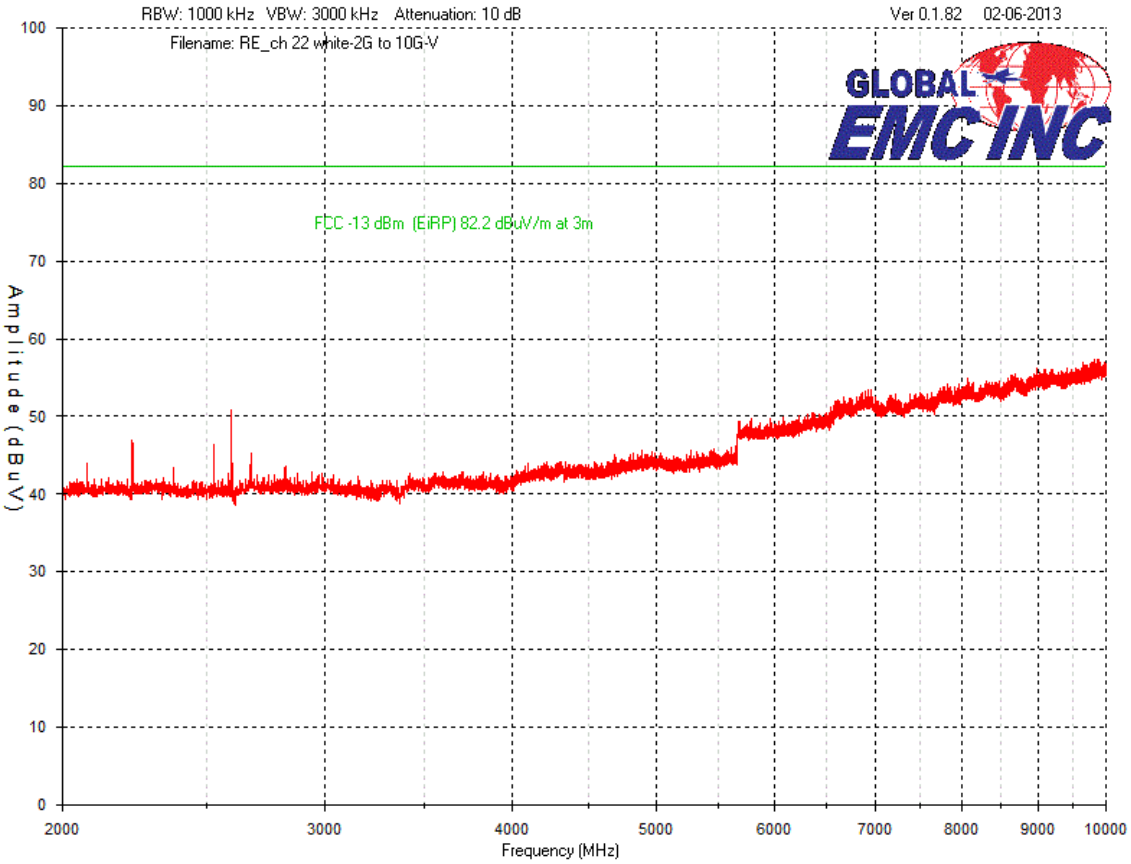
Channel 8 (Representative of channel 8, 10 and 12) - 2 GHz to 10 GHz - Vertical



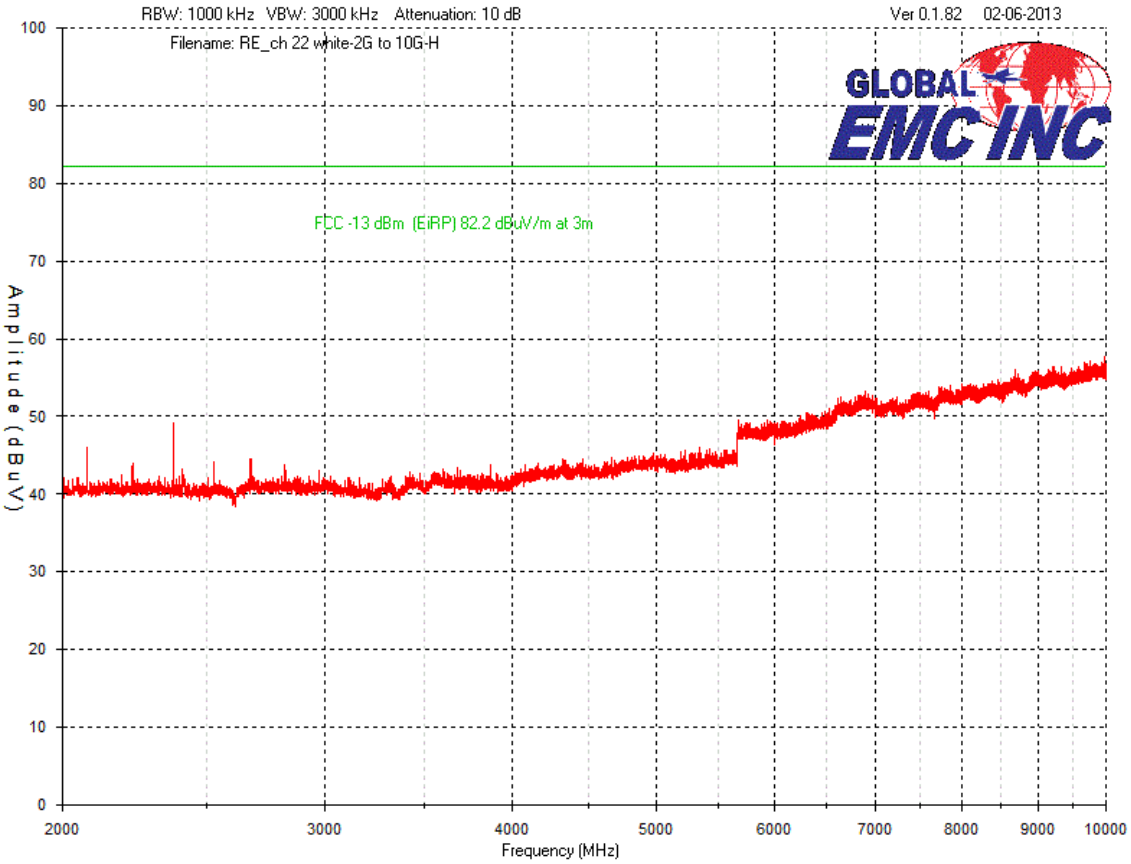
Channel 8 (Representative of channel 8, 10 and 12) - 2 GHz to 10 GHz - Horizontal



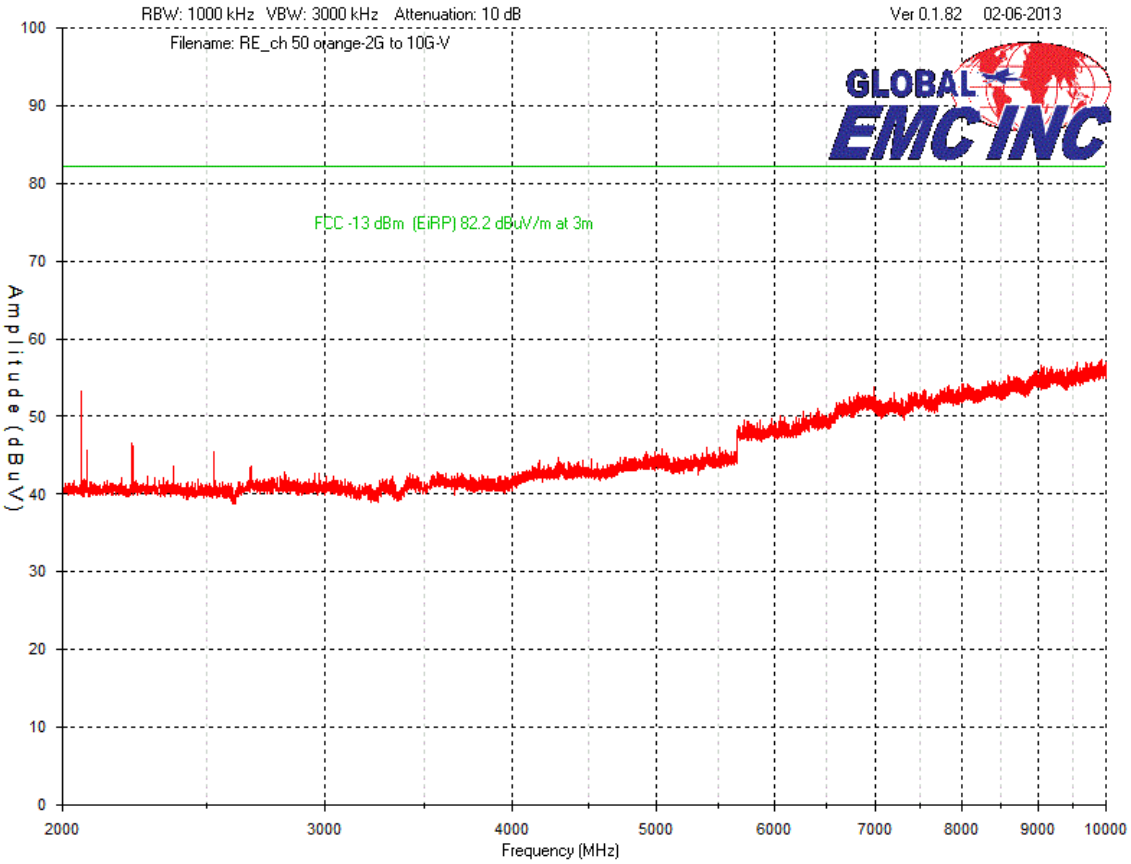
Channel 22 (Representative of channel 14, 22 and 30) - 2 GHz to 10 GHz - Vertical



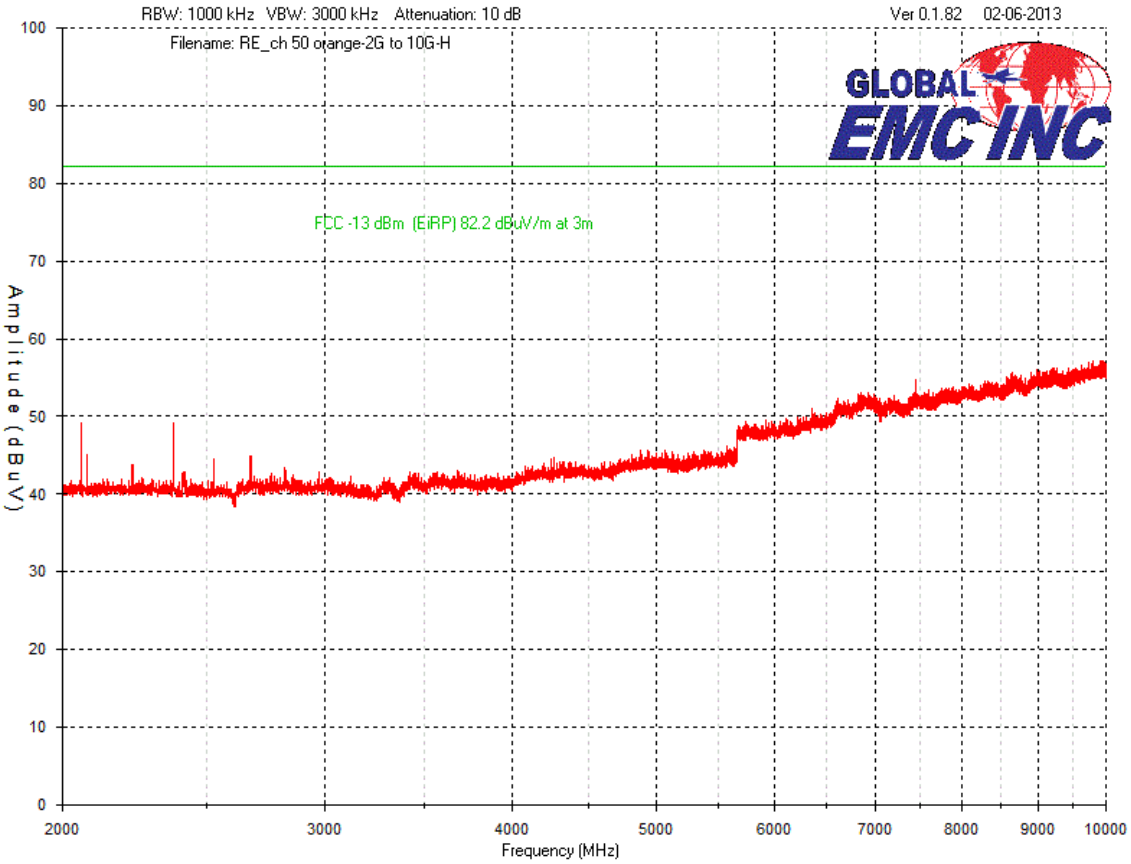
Channel 22 (Representative of channel 14, 22 and 30) - 2 GHz to 10 GHz - Horizontal



Channel 50 (Representative of channel 31, 40 and 50) - 2 GHz to 10 GHz - Vertical



Channel 50 (Representative of channel 31, 40 and 50) - 2 GHz to 10 GHz - Horizontal



Tables

Channel 8 – Low with Long Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
180	V	Long	56.5	9.8	10	0.5	76.8	82.2	5.4	Pass
181.029	V	Long	93	9.8	10	0.5	113.3	119.2	5.9	Pass
186	V	Long	49.7	9.8	10	0.5	70	82.2	12.2	Pass
180	H	Long	54.5	9.8	10	0.5	74.8	82.2	7.4	Pass
181.029	H	Long	89.5	9.8	10	0.5	109.8	119.2	9.4	Pass
186	H	Long	47.1	9.8	10	0.5	67.4	82.2	14.8	Pass
362.5	V	Long	55.1	15.5	10	0.6	81.2	82.2	1	Pass
362.5	H	Long	55.5	15.5	10	0.6	81.6	82.2	0.6	Pass

Channel 10- Middle with Long Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
192	V	Long	55.5	10.1	10	0.5	76.1	82.2	6.1	Pass
193.057	V	Long	92.3	10.1	10	0.5	112.9	119.2	6.3	Pass
198	V	Long	48.9	10.1	10	0.5	69.5	82.2	12.7	Pass
192	H	Long	51.4	10.1	10	0.5	72	82.2	10.2	Pass
193.057	H	Long	89.6	10.1	10	0.5	110.2	119.2	9	Pass
198	H	Long	45	10.1	10	0.5	65.6	82.2	16.6	Pass
386.5	V	Long	55.1	16	10	0.6	81.7	82.2	0.5	Pass
386.5	H	Long	54.2	16	10	0.6	80.8	82.2	1.4	Pass
579.9	V	Long	50.9	19.1	10	0.8	80.8	82.2	1.4	Pass
579.9	H	Long	49.8	19.1	10	0.8	79.7	82.2	2.5	Pass

Channel 12- High with Long Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
204	V	Long	55.1	10.4	10	0.6	76.1	82.2	6.1	Pass
205.085	V	Long	92.4	10.4	10	0.6	113.4	119.2	5.8	Pass
210	V	Long	49.2	10.4	10	0.6	70.2	82.2	12	Pass
204	H	Long	50.9	10.4	10	0.6	71.9	82.2	10.3	Pass
205.085	H	Long	89.1	10.4	10	0.6	110.1	119.2	9.1	Pass
210	H	Long	45	10.4	10	0.6	66	82.2	16.2	Pass

Channel 14 - Low withWhite Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
470	V	white	50.1	17.5	10	0.7	78.3	82.2	3.9	Pass
471.156	V	white	88	17.5	10	0.7	116.2	119.2	3	Pass
476	V	white	44.9	17.5	10	0.7	73.1	82.2	9.1	Pass
470	H	white	40	17.5	10	0.7	68.2	82.2	14	Pass
471.156	H	white	78.1	17.5	10	0.7	106.3	119.2	12.9	Pass
476	H	white	40	17.5	10	0.7	68.2	82.2	14	Pass

Channel 22 - Middle withWhite Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
518	V	white	51.5	18.2	10	0.7	80.4	82.2	1.8	Pass
519.2	V	white	88.3	18.2	10	0.7	117.2	119.2	2	Pass
524	V	white	45.4	18.2	10	0.7	74.3	82.2	7.9	Pass
518	H	white	42.6	18.2	10	0.7	71.5	82.2	10.7	Pass
519.2	H	white	79.5	18.2	10	0.7	108.4	119.2	10.8	Pass
524	H	white	41	18.2	10	0.7	69.9	82.2	12.3	Pass

Channel 30 - High withWhite Antenna (WORST CASE MEASUREMENT)

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
566	V	white	52.3	18.9	10	0.8	82	82.2	0.2	Pass
567.18	V	white	89.1	18.9	10	0.8	118.8	119.2	0.4	Pass
572	V	white	46.3	18.9	10	0.8	76	82.2	6.2	Pass
566	H	white	45.3	18.9	10	0.8	75	82.2	7.2	Pass
567.18	H	white	80.1	18.9	10	0.8	109.8	119.2	9.4	Pass
572	H	white	40.3	18.9	10	0.8	70	82.2	12.2	Pass

Channel 31 – Low with Orange Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
572	V	Orange	50.1	18.9	10	0.8	79.8	82.2	2.4	Pass
573.2	V	Orange	87.2	18.9	10	0.8	116.9	119.2	2.3	Pass
578	V	Orange	44.2	18.9	10	0.8	73.9	82.2	8.3	Pass
572	H	Orange	45.9	18.9	10	0.8	75.6	82.2	6.6	Pass
573.2	H	Orange	82.8	18.9	10	0.8	112.5	119.2	6.7	Pass
578	H	Orange	40	18.9	10	0.8	69.7	82.2	12.5	Pass

Channel 40 – Mid with Orange Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
626	V	Orange	49.4	20.2	10	0.9	80.5	82.2	1.7	Pass
627.2	V	Orange	86.2	20.2	10	0.9	117.3	119.2	1.9	Pass
632	V	Orange	43.5	20.2	10	0.9	74.6	82.2	7.6	Pass
626	H	Orange	46.4	20.2	10	0.9	77.5	82.2	4.7	Pass
627.2	H	Orange	83.5	20.2	10	0.9	114.6	119.2	4.6	Pass
632	H	Orange	40.5	20.2	10	0.9	71.6	82.2	10.6	Pass

Channel 50 –High with Orange Antenna

Frequency	Pol	Ant.	Raw	Antenna	Atten Factor	Cable	Level	Limit	Margin	Pass / Fail
MHz			dBuV	Factor	(dB)	dB	dBuV/m			
686	V	Orange	47.6	21.8	10	1	80.4	82.2	1.8	Pass
687.2	V	Orange	84.7	21.8	10	1	117.5	119.2	1.7	Pass
692	V	Orange	41.5	21.8	10	1	74.3	82.2	7.9	Pass
686	H	Orange	47.6	21.8	10	1	80.4	82.2	1.8	Pass
687.2	H	Orange	84.7	21.8	10	1	117.5	119.2	1.7	Pass
692	H	Orange	41.5	21.8	10	1	74.3	82.2	7.9	Pass

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
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Loop Antenna	EM 6871	Electro-Metrics	Jan 31, 2011	Jan 31, 2013	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Jan 31, 2011	Jan 31, 2013	GEMC 71
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	Aug 28, 2012	Aug 28, 2014	GEMC 8
Attenuator 3 dB	FP-50-3	Trilithic	NCR	NCR	GEMC 40
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
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 – Power Line Conducted Emissions Class B_Rev1"

Appendix A – EUT Summary

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

General EUT Description

Manufacturer	Lentequip
EUT Name	CanaTrans White Space
FCCID	YEO-CTWS
Approximate Size (LxWxH)	6 cm x 11cm x 15 cm
Equipment Category (Commercial / Residential / Medical)	Commercial
Input Voltage and Frequency	N/A – DC operated
Intentional RF (If yes describe)	NTSC 250 mW transmitter
Table Top / Wall mount / Floor standing (choose table top if unsure)	Camera mounted
I/O Connectors available on EUT	Antenna
Peripherals required for test	N/A – Internal Signal source
Minimum Separation distance from operator	20 cm from transmit antenna
Types and lengths of all I/O cables	N/A

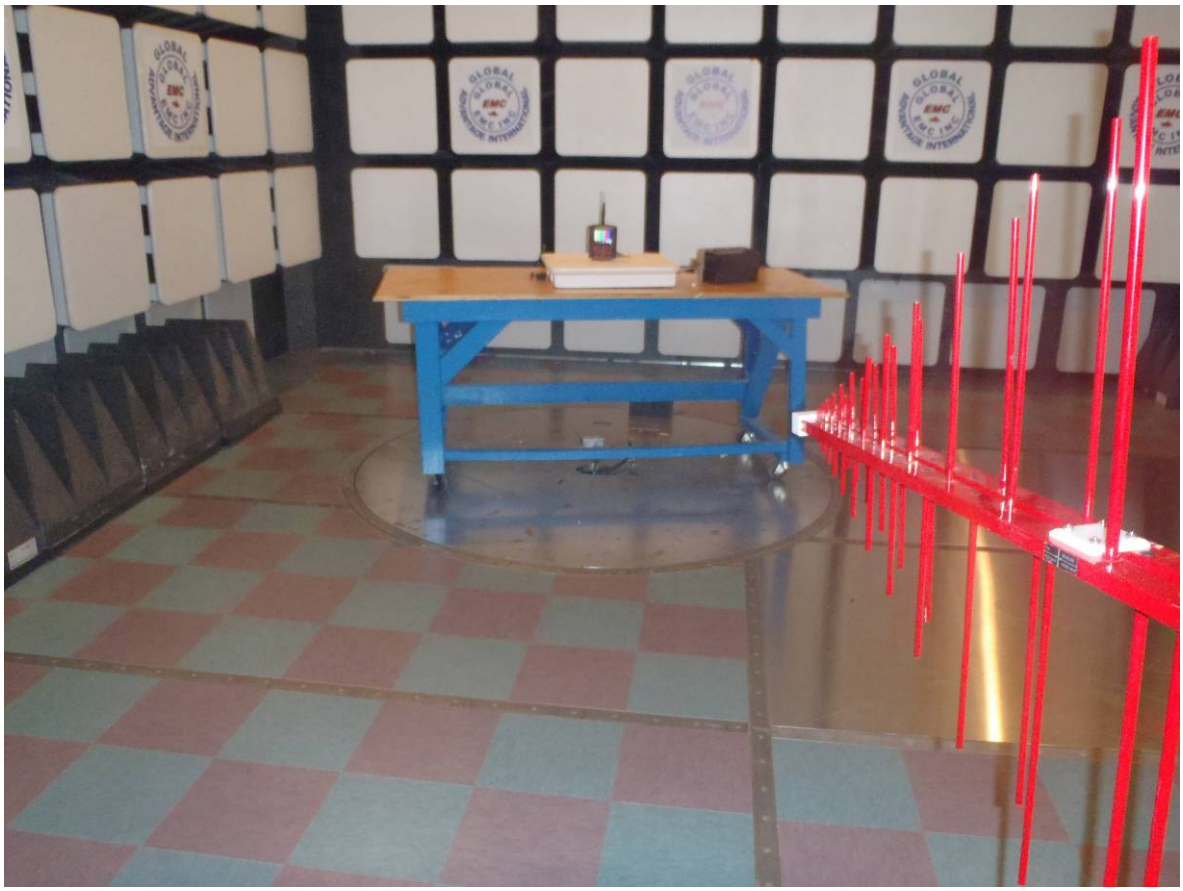
Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see 'Appendix B – EUT & Test Setup Photographs'.

Appendix B – EUT and Test Setup Photographs

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

EUT

Radiated Emissions



Radiated Emissions

Antenna Conducted Emissions