

**TEST REPORT CONCERNING THE COMPLIANCE OF A
DECODER OPERATING ON 6.78 MHz,
BRAND MYLAPS,
MODEL X2 Decoder
WITH 47 CFR PART 15 (10-1-12 Edition).**

**13072505.fcc01_Rev01
December 11, 2013**

FCC listed : 90828
Industry Canada : 2932G-2
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

MYLAPS
Model : Decoder

FCC ID: NXYX2DECODER
IC: Not applicable

This report concerns: Original grant/certification ~~Class 2 change~~ Verification

Equipment type: DXX Low Power Communication Device Transmitter

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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-12 Edition) and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: December 11, 2013

Signature:



O. Hoekstra
Senior Engineer Telecom TÜV Rheinland EPS

Description of test item

Test item	:	Decoder, DXX Low Power Communication Device Transmitter
Manufacturer	:	MYLAPS BV
Brand	:	MYLAPS
Model	:	X2 Decoder
Serial number(s)	:	--
Revision	:	Not applicable

Applicant information

Applicant's representative	:	Mr. B. van Rens & Mr. R. Stokman
Company	:	MYLAPS BV
Address	:	Zuiderhoutlaan 4
Postal code	:	2012PJ
City	:	Haarlem
Country	:	The Netherlands
Telephone number	:	+31 23 5291893
Telefax number	:	+31 23 5290156
Email	:	brens@mylaps.com &
Internet	:	www.mylaps.com

Test(s) performed

Location	:	Leek
Test(s) started	:	September 27, 2013
Test(s) completed	:	December 11, 2013
Purpose of test(s)	:	Equipment Authorization (original certification)
Test specification(s)	:	47 CFR Part 15 (10-1-12 Edition)

Test engineer(s)	:	R. van der Meer
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Report written by	:	R. van der Meer
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Report date	:	December 11, 2013
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The test results relate only to the item(s) tested.

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The product tested is part of an inductive lap timing system used in radio controlled model cars.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report supports the original certification in equipment authorization files under FCC ID: NXYX2DECODER.

2 Tested system details.

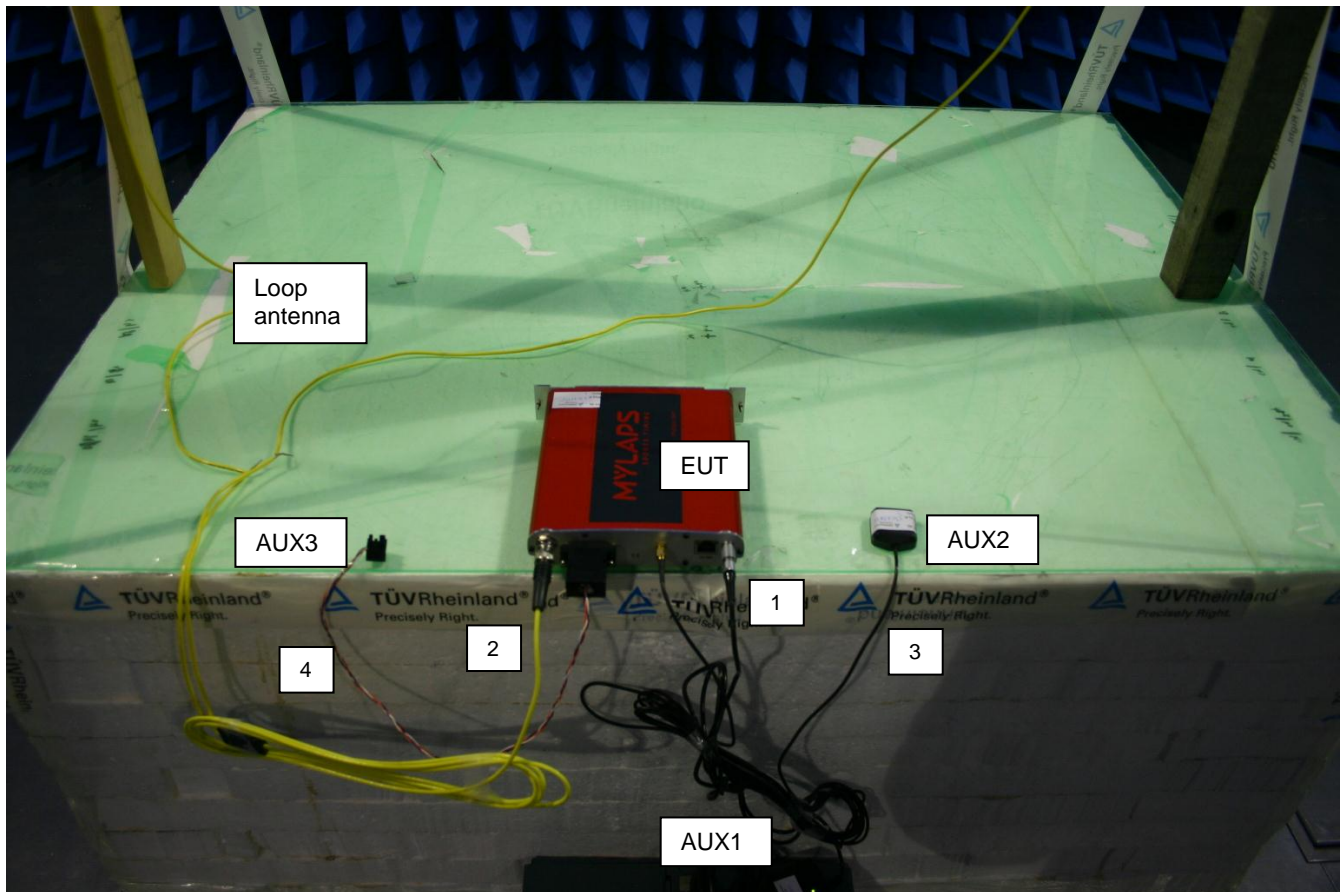
Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Decoder
Manufacturer	:	MYLAPS BV
Brand	:	MYLAPS
Model	:	X2 Decoder
Serial number	:	--
Operating frequency	:	6.78 MHz
Modulation	:	QPSK
Voltage input rating	:	12 Vdc
Voltage output rating	:	n.a.
Current input rating	:	--
Antenna	:	External Loop Antenna
Remarks	:	n.a.
Interface cable(s)	:	n.a.
Operating configuration	:	continuously transmitting

Auxiliary equipment (AUX1)	:	Power supply
Manufacturer	:	DVE
Brand	:	DVE
Model	:	DSA-0421S-12 1
Serial number	:	--
Voltage input rating	:	100-240Vac
Voltage output rating	:	+12Vdc 2.7A
Remark	:	power supply for EUT

Auxiliary equipment (AUX2)	:	GPS receive antenna
Manufacturer	:	Trimble
Brand	:	Trimble
Model	:	66800-52
Serial number	:	081120899
Voltage input rating	:	--
Voltage output rating	:	--.
Remark	:	--

Auxiliary equipment (AUX3) : Photocell
Brand : MYLAPS
Model : --
Serial number : --
Voltage input rating : --
Current input rating : --
Remark : connects to Auxiliary port



Photograph of the system

2.1.1 Description of input and output ports.

Number	Terminal	From	To	Remarks
1	Mains	AUX1	EUT	Cable, unshielded <0.5m
2	Antenna	EUT antenna port	External loop antenna (yellow cable)	Cable, shielded >3m
3	GPS	EUT GPS port	GPS antenna	Cable, shielded <3m
4	Auxiliary	EUT auxiliary port	Photocell	Cable, unshielded <0.5m

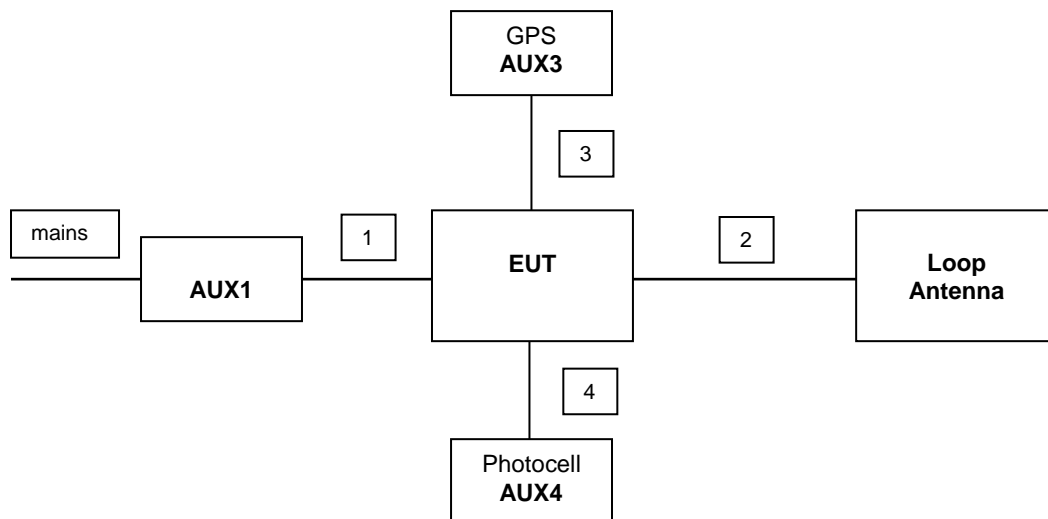


Figure 1. Basic set-up for testing

2.2 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-09 Edition), sections 15.31, 15.209 and 15.223.

The test methods, which have been used, are based on ANSI C63.4: 2009 and KDB 174176 additionally for conducted emissions.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the appropriate extrapolation factor is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

2.3 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS, located in Leek, 9351VT Eiberkamp 10, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

2.4 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120Vac/60Hz
Air pressure	: 950 – 1050 hPa

*When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

3 System test configuration.

3.1 Justification.

The system was configured for testing in a typical fashion (as a customer would normally use it). The Ethernet ports on the EUT were not connected, test with these connections can be found in the 15B report. The sample as supplied by the applicant was configured with a standard BNC connector as Antenna connector. The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

3.2 EUT mode of operation.

The EUT has been tested while continuously transmitting. The intentional radiator tests (47 CFR Part 15 sections, 15.209 and 15.223) have been performed with a complete functioning EUT .

3.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

3.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

3.5 Product Labeling

The product labeling information is available in the technical documentation package.

3.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

3.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

3.8 Part list of the EUT.

The part list is available in the technical documentation package.

4 Radiated emission data.

4.1 Radiated field strength measurements H-field, frequency range of 0.009-30 MHz.

Frequency (MHz)	(a) Measurement results (dBμV)	(b) Antenna factor	(c) Cable loss	(d) Distance extrapolation factor 3m to 30m	Detector	Measurement results (calculated = a+b+c-d)	Limits
	3 m	dB	dB	dB		dBμV/m	dBμV/m
1.000	14.1	19.7	1	40	Qp	-5.2	27.6
1.986	7.8	19.5	1	40	Qp	-11.7	29.5
6.78 fundamental	44.6	19.5	1	40	Pk	25.1	43.5
6.78 fundamental	32.5	19.5	1	40	Av	13.0	23.5
16.196	4.7	19.7	1	40	Qp	-14.6	29.5
21.938	4.0	20.0	1	40	Qp	-15.0	29.5
22.460	3.9	20.0	1	40	Qp	-15.1	29.5

Table 1 Radiated emissions of the EUT.

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 and 15.223 with the EUT operating in continuous transmit mode, are depicted in Table 1.

Notes:

1. Calculated measurement results are obtained by using the 40 dB/decade extrapolation factor and the antenna factor and cable loss is included. For instance the corrected value for 6.78 MHz is calculated as:
Measurement result + Antenna Factor + Cable loss – Extrapolation Factor =>
44.6 dBμV + 19.5 dB + 1 dB – 40 dB = 25.1 dBμV/m.
2. A resolution bandwidth of 9kHz was used during testing
3. Field strength values of radiated emissions at frequencies in the frequency range 0.009 – 30 MHz not listed in Table 1 are more than 20 dB below the applicable limit
4. The EUT was varied in three positions, the loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
5. Measurement uncertainty is ±5.0dB

Used test equipment and ancillaries:

15453	99699	99861	99847	99855		

Test engineer

Signature :



Name :

R. van der Meer

Date :

September 27, 2013

4.2 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

Freq. [MHz]	Antenna Orientation	Detector/ Bandwidth	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
43.58	Vertical	Qp / 120 kHz	19.7	40.0	Pass
99.84	Horizontal	Qp / 120 kHz	23.2	43.5	Pass
161.92	Vertical	Qp / 120 kHz	17.8	43.5	Pass
233.70	Vertical	Qp / 120 kHz	19.2	46.0	Pass
324.88	Vertical	Qp / 120 kHz	21.2	46.0	Pass
340.40	Horizontal	Qp / 120 kHz	21.5	46.0	Pass

Table 2 Radiated emissions of the EUT.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209 are depicted in Table 2.

Notes:

- Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
- Measurement uncertainty is ± 5.0 dB
- The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).

Used test equipment and ancillaries:

99608	99699	99847	99861	99858		

Test engineer

Signature :



Name : Richard van der Meer

Date : September 27, 2013

5 Conducted emission data.

5.1 Requirements

For an intentional radiator that is designed to be connected the public utility AC power line, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the following table. The tighter limit applies at the frequency range boundaries.

Frequency of Emission (MHz)	Conducted Limit (dBμV) Quasi-Peak	Conducted Limit (dBμV) Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	46	50

*Decreases with the logarithm of the frequency.

5.2 Testresults, Conducted emission data of the EUT

Frequency (MHz)	Measurement results (dBμV) Neutral/L2		Measurement results (dBμV) Line 1		Limits (dBμV)		Result
	QP	AV	QP	AV	QP	AV	
0.165	30.6	*6	33.2	*6	64.5	54.5	PASS
0.205	37.3	*6	33.5	*6	63.6	53.6	PASS
0.435	32.1	*6	32.8	*6	57.1	47.1	PASS
0.495	29.7	*6	29.8	*6	56.0	46.0	PASS
16.29	32.6	*6	32.0	*6	60.0	50.0	PASS
23.82	45.5	*6	29.0	*6	60.0	50.0	PASS

Table 2

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207(a) section 7.2.4, at the 120 Volts/ 60 Hz AC mains connection terminals of AUX1 that connects to the EUT, are depicted in Table 2 above. The system is tested as in whole, so with all equipment as shown in Figure 1 in place and functioning. Being the worst case situation. See note on the next page.

Notes:

1. Measurement uncertainty is ± 3.5 dB
2. The resolution bandwidth used was 9 kHz
3. The EUT was tested with a GPS receive antenna connected and a Photocell connected to AUX port. Worst case values noted.
4. The loop antenna was replaced by a 50 Ohm load (Inv Nr. 99082) as per KDB 174176.
5. Values of conducted emissions at frequencies not listed in Table 2 are more than 20 dB below the applicable limit.
6. Qp values were already within Av limits, therefor Av not tested.
7. See plots on page 14 and 15.

Used test equipment and ancillaries:

15667	99161	12512	99848	99852	99855	99082
13313						

Test engineer

Signature :



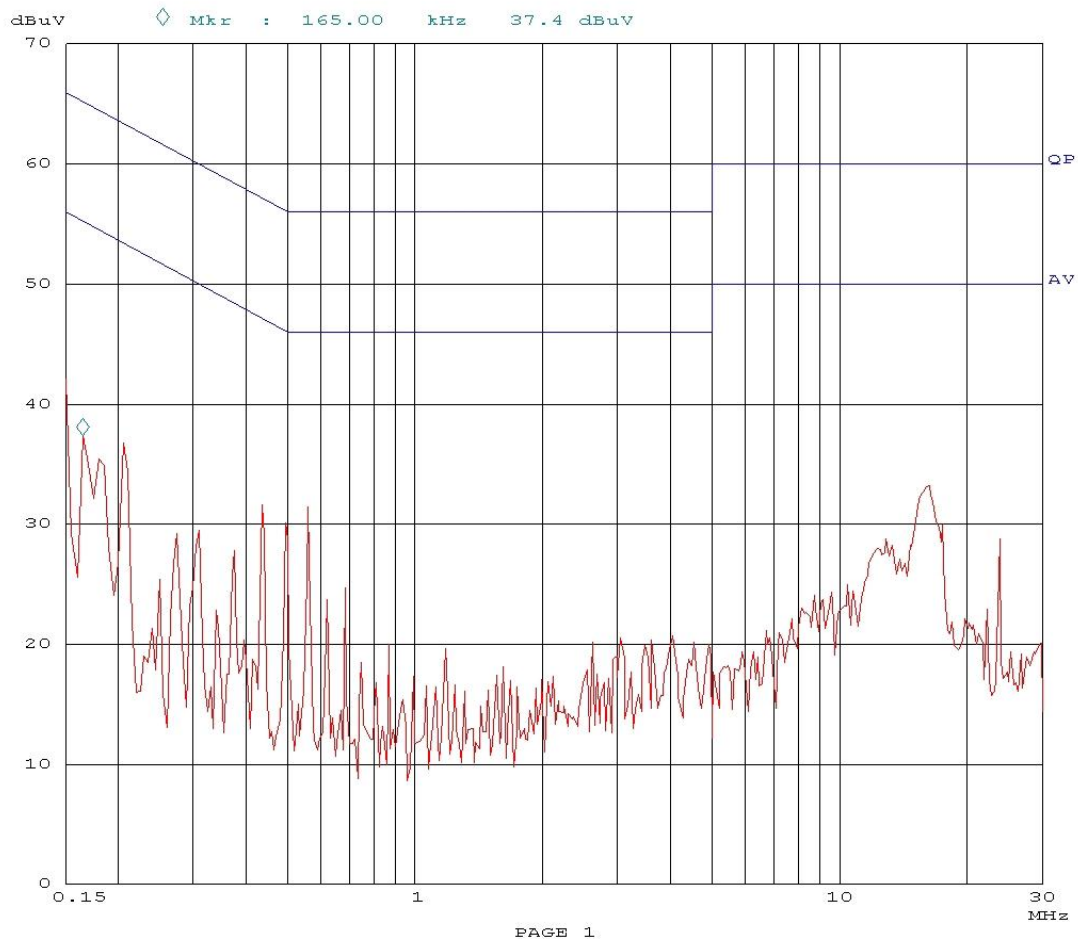
Name : R. van der Meer

Date : October 14, 2013



14. Oct 13 12:44

Scan Settings (1 Range)
|----- Frequencies -----| |----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp
150k 30M 5k 9k PK 1ms AUTO LN OFF
Final Measurement: x QP
Meas Time: 1 s

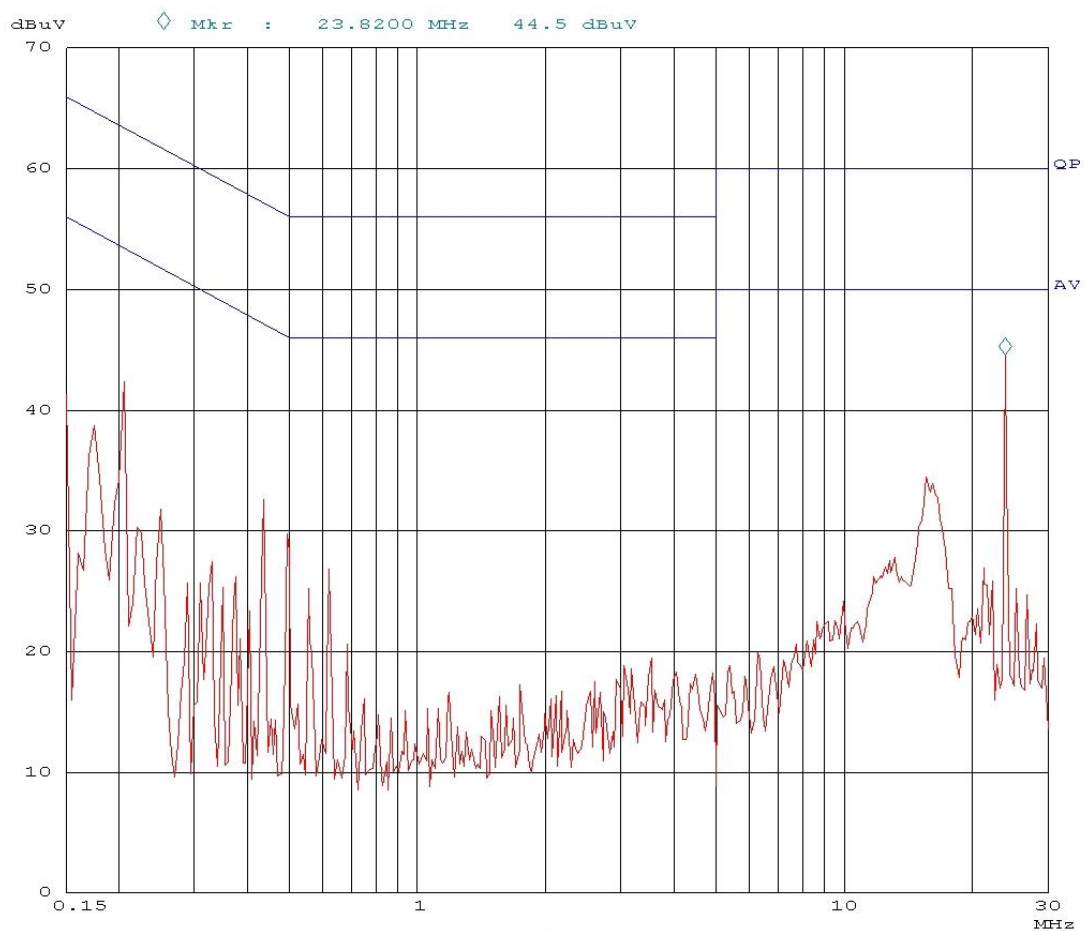


Plot of the conducted emissions on L1



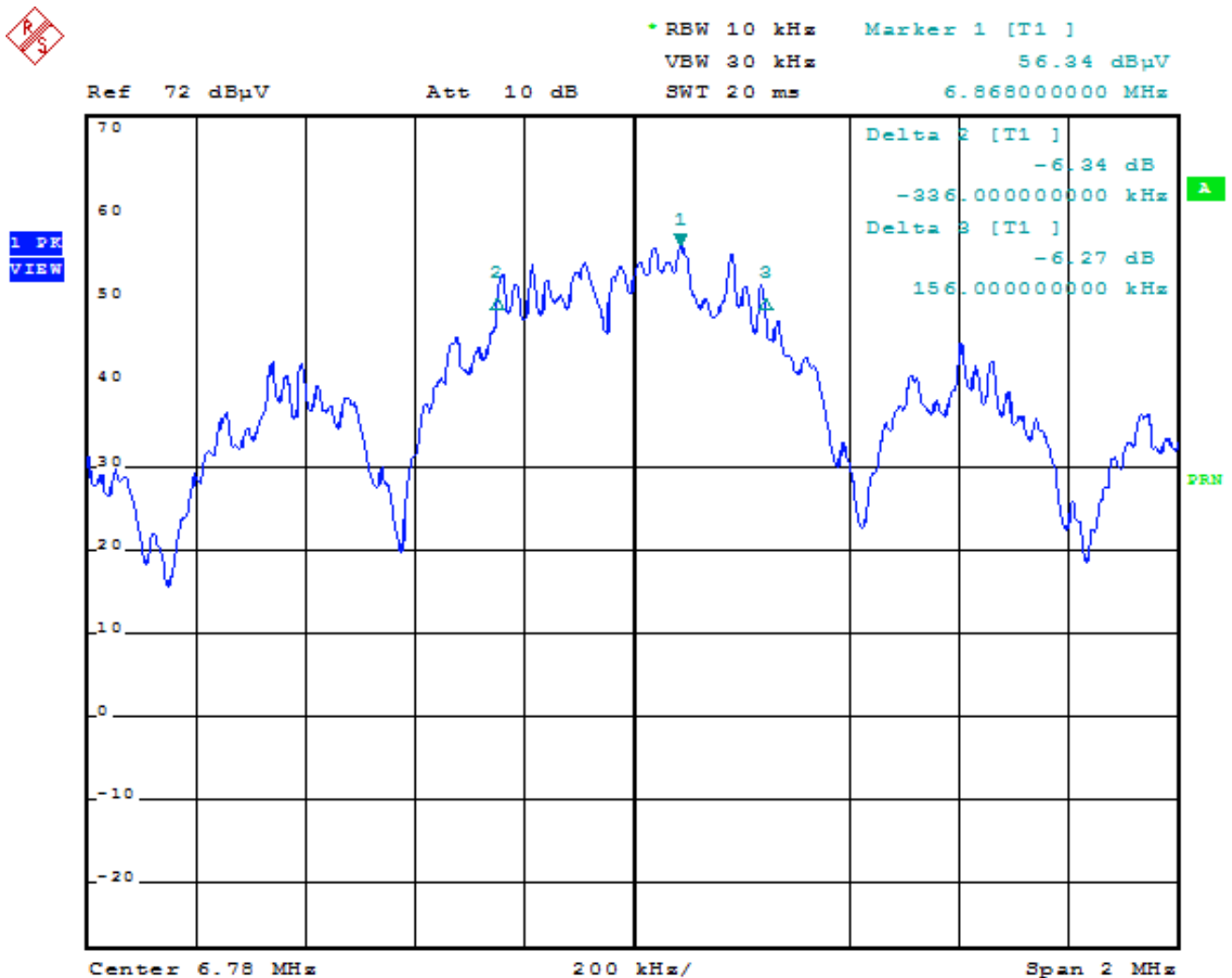
14. Oct 13 12:13

Scan Settings (1 Range)
|----- Frequencies -----| |----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp
150k 30M 5k 9k PK 1ms AUTO LN OFF
Final Measurement: x QP
Meas Time: 1 s



Plot of the conducted emissions on L2

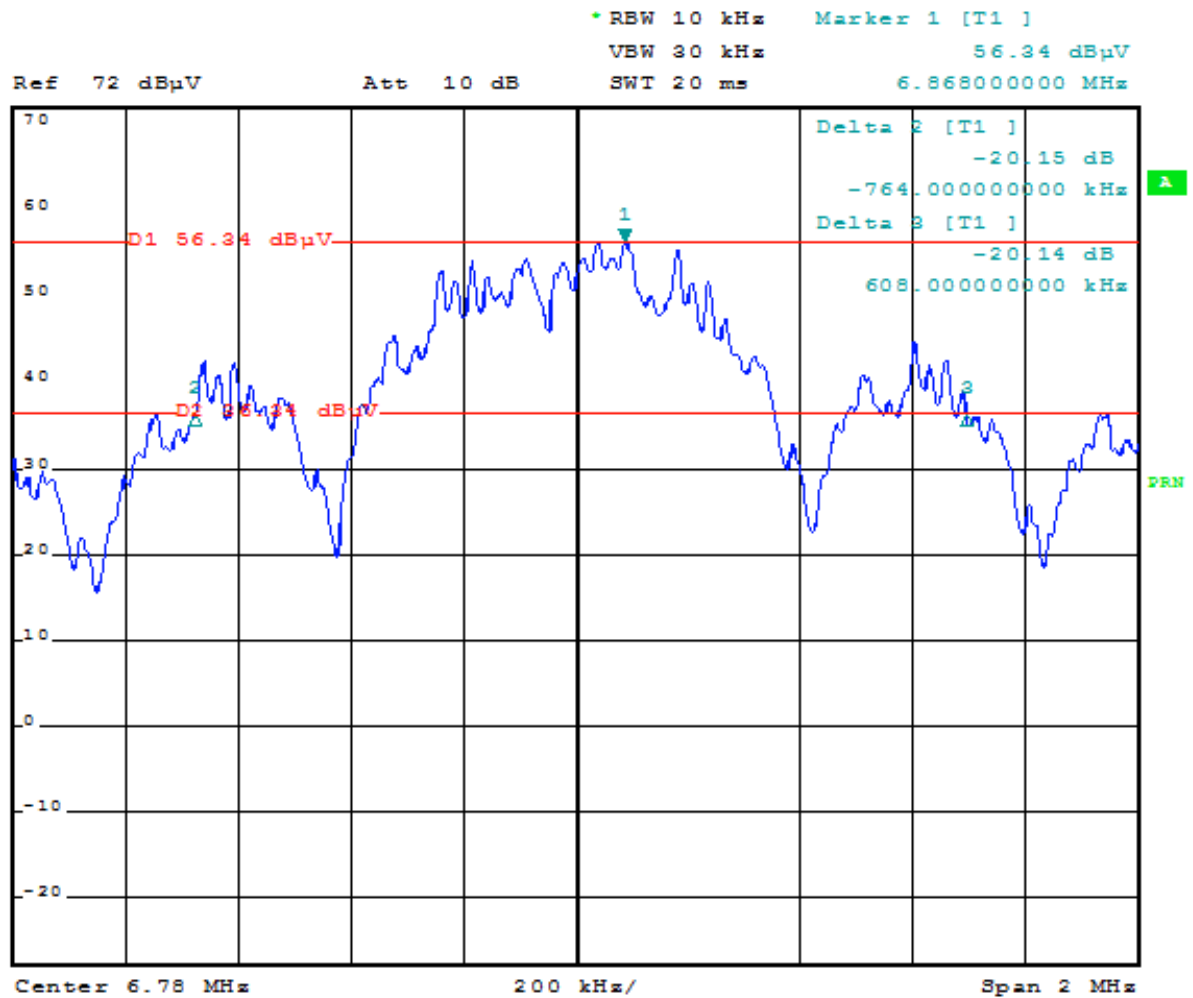
6 Plot of the carrier bandwidth



Plot 1: 6 dB bandwidth of the carrier, actual bandwidth is 492 kHz, which is less than 10% of the center frequency therefore the 23.5 dBμV/m limit for radiated emissions is applicable according to 47 CFR Part 15.223.



1 PK
VIEW



Plot 2: 20 dB bandwidth of the carrier, actual bandwidth is 1369 kHz.

7 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN	EMCO	3625/2	01/2012	01/2014
13313	Pulse limiter	R&S	ESH3-Z2	01/2013	01/2014
15453	Loop antenna	Chase	HLA6120	05/2013	05/2014
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99877	Biconilog Testantenna	Teseq	CBL 6111B	06-2013	06-2014
15667	Measuring receiver	R&S	ESCS30	09/2013	09/2014
99082	50 Ohm load resistor	R&S	R404051000 50 9141	10-15/2012	10-15/2013
99107	Controller	Heinrich Deisel	4630-100	NA	NA
99538	Spectrum analyzer	R&S	FSP40	05/2013	05/2014
99699	Measuring receiver	R&S	ESCI	03/2013	03/2014
99852/ 99855/	Temperature-Humiditymeter	Extech	SD500	02/2013	02/2014
99850/ 99847	Test site	Comtest	FCC listed: 90828	02/2012	02/2015
99848	Shielded room for Conducted emissions	Euroshield	RFD-100 359	NA	NA
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99858	Cable S-AR	Gigalink	APG0500	01/2013	01/2014
99861	Controller S-AR	Maturo	SCU/088/8090811	NA	NA
99683	Loop antenna, 6cm	NA	7405-901	10/2013	10/2014

NA= Not Applicable