

RAPPORTO DI PROVA / TEST REPORT

Rif./Ref.No. FCCTR_140655A-2

Data / Date: 01/10/2014

Pagine / Pages : 63

Scopo delle prove / Test object :

Prove di tipo in accordo a / Type test according to: **FCC Cfr 47
Parts 2.815, 2.1033, 2.1046, 2.1053
Parts 97.305, 97.307 (d) (e), 97.313, 97.315, 97.317**

Richiedente / Applicant :

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Persona di riferimento /
Applicant's referee :

Mr. Andrea Molinari

Marchio commerciale /
Trade mark :



Fabbricante / Manufacturer :

RM COSTRUZIONI ELETTRONICHE S.r.l.

Prodotto / Product :

250W HF Linear Power Amplifier

Modello / Model :

HLA 305V

Modello derivato/Derived Model

HLA 305

Data ricevimento campioni /
Date of test sample receipt:

27/05/2014

Campioni verificati /
No. of tested samples

1

Data verifiche / Testing date :

27-28/05/2014

Sito di prova / Testing site :

Prima Ricerca & Sviluppo Via Campagna - 92 I-22020 FALOPPIO (CO)

Esito delle valutazioni /
Assessment results :

CONFORME / COMPLIANT

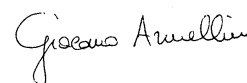
Verifiche effettuate da /
Verifications carried out by :

Enrico BANFI
Tecnico di laboratorio EMC e RADIO /
EMC and RADIO Test Engineer



Approvato / Approved by :

Giacomo ARMELLINI
Responsabile Laboratorio EMC e RADIO/
EMC and RADIO Laboratory Manager



I risultati delle prove riportati nel presente rapporto di prova si riferiscono solo ai campioni esaminati. / The test results reported in this test report shall refer only to the samples tested

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1 RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_140655A_0	Original release	03/06/2014
FCCTR_140655A_1	Added EUT Dimension; Corrected absorbing current	23/06/2014
FCCTR_140655A_2	Added spurious Radiated Emission	01/10/2014

2 TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

2.1 EUT Identification EUT Identification

DESCRIPTION :	250W HF Linear Power Amplifier
TRADEMARK:	
MODEL:	HLA 305V
S/N:	Prototype
DERIVED MODEL	HLA 305
MANUFACTURER:	RM COSTRUZIONI ELETTRONICHE S.r.l.
COUNTRY OF MANUFACTURER:	ITALY
COMPOSED BY:	SINGLE
EUT DIMENSIONS :	H:90 X W:240 x L:440 (mm)
EUT DIMENSIONS DERIVED MODEL :	H:70 X W:240 x L:440 (mm)
EUT STANDING:	Vehicle

2.2 EUT Technical Data

POWER SOURCE :	EXTERNAL
POWER SUPPLY NOMINAL VOLTAGE:	12-14V DC
NOMINAL POWER OR ABSORBING CURRENT :	Max 45A
TYPICAL USAGE :	Amateur Radio

2.3 EUT ports identification

This section contains descriptions of all ports, the length and the type of the cable provided by manufacturer needed for the tests. Moreover it is specified if the ports are ever or optionally connected.

Port		Description	Connector	Max cable length
1	Enclosure	Metallic	---	---
2	AC mains input/output ports	Port NOT present	---	---
3	DC mains input/output ports	12V	---	---
4	RF power Output		Type N	---
Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.				

2.4 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test:

- None

2.5 Auxiliary equipment

- None

2.6 Difference of derived model

The **HLA 305** is a derived model of the 250W HF Linear Power Amplifier **HLA 305V**. (basic model)

The differences declared by the manufacturer are listed in the following table (see also next photographs)

Table1: Difference between basic and derived model as declared by manufacturer		
Basic model	Derived model	Difference between basic and derived model
HLA 305V	HLA 305	No cooling fan

3 OTHER INFORMATION

The amplifier operates only in the amateur radio bands below 30 MHz.

The amplifier is NOT capable of operation on any frequency outside of the amateur bands including 26-28 MHz.

The amplifier typically requires 10 Watts of drive to obtain full output power depending upon which transmit band it is on.

The gain of the amplifier is less than 15dB on all bands under all conditions.

In *off* or *standby* positions the amplifier does NOT amplify. The exciter energy is simply passed on to the antenna at the same level in which it entered the amplifier. The spurious emissions of the transceiver remain unaffected.

PART 2.815 (b) (1) (2)

The HLA 305 external RF amplifier is not capable of amplification in the frequency band 26-28 MHz and cannot be modified to operate in the 26-28 MHz frequency band. Any attempt to drive the amplifier in the 26-28 MHz frequency band will result in 0 dB gain from input to output of the amplifier.

PART 97.313

The output power will not exceed 250 Watts into 50 Ohm resistive load. Therefore, it is impossible for the output power to reach or exceed the 1500 Watts PEP legal limit.

PART 2.1033 (c) (8)

Input Power: DC Voltage (12 Volts) x DC Current (45 Amps) = 540 Watts

4 OPERATING TEST MODES AND CONDITIONS

OPERATING CONDITION	DESCRIPTION
#1	Input Power 10W, max GAIN

5 SUMMARY OF TEST RESULTS

Port		Phenomena	Reference Standard	Operating condition	Result
1	RF Power Output	Max Gain	Part 2.1046 (a), Part 97.317 (a) (2)	#1	Within the limit
2	RF Power Output	Spurious Conducted Emissions	Part 2.1053, Part 97.307 (d) (e)	#1	Within the limit
3	RF Power Output	Spurious Radiated Emissions	Part 2.1053, Part 97.307 (d) (e)	#1	Within the limit

6 TEST RESULTS

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**TEST
1.**

RF POWER OUTPUT

REFERENCE
DOCUMENT

FCC Cfr 47 **Part 2.1046 (a), Part 97.317 (a) (2)**
Part 2.1033 (b) (6)
Part 15.31 (a) (3) [see also] Note to paragraph (a) (3); Part 97

- TEST SETUP: Acc. to reference standard
- TEST LOCATION: Radio Test Area
- TEST EQUIPMENT USED FOR TEST: Power Meter Rohde & Schwarz NRVD,
Thermal Power Sensor NRV-Z53
RF Generator Agilent N9310A
- TESTED PORT: RF Output

TEST CONDITIONS:			MEASURED
Ambient temperature :	15 - 35 °C		24 ± 3 °C
Ambient humidity :	25 - 75 %rH		40 ± 5 %rH
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	950 ± 50 mbar
Voltage :			12V

OPERATING CONDITION (Rif. Section. 2.6) : **#1**

RESULT: WITHIN THE LIMITS

TEST RESULT

The setup to measure the RF power output was made by connecting the output of the the exciter to the input of the HLA 305 amplifier.

A watt-meter was placed in-line between the amplifier and a 50 ohm load. The exciter was tuned to a frequency in the center of each band shown. The amplifier was powered with the voltage and current previously indicated. The input and output power was recorded by a wattmeter, and the gain was calculated. The gain does not exceed 15dB and the output power is under 1.5kW PEP into a 50 ohm load.

Frequency (MHz)	Input level (W)	Output level (W)	GAIN
30,000	10	147,9	11,7
28,850	10	162,2	12,1
24,900	10	199,5	13
21,100	10	165,6	12,2
19,500	10	165,6	12,2
18,100	10	190,5	12,8
14,100	10	208,9	13,3
10,125	10	208,9	13,3
7,100	10	229,1	13,8
3,750	10	263,0	14,2
3,550	10	257,0	14,1
1,830	10	245,5	13,9

**TEST
2.**

STRENGTH OF SPURIOUS EMISSIONS (CONDUCTED)

REFERENCE
DOCUMENT

Part 2.1053, Part 97.307 (d) (e)

- TEST SETUP: In according to manufacturer specifications
- TEST LOCATION: Radio Test Area
- TEST EQUIPMENT USED FOR TEST: Spectrum Analyzer Rohde & Schwarz Mod. FSP 40
RF Generator Agilent N9310A
- TESTED PORT: RF Output Port

TEST CONDITIONS:			MEASURED
Ambient temperature :	15 - 35 °C		24 ± 3 °C
Ambient humidity :	25 - 75 %rH		40 ± 5 %rH
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	950 ± 50 mbar
Voltage :			12 Vdc

OPERATING CONDITION (Rif. Section. 2.6) : **#1**

RESULT: **WITHIN THE LIMIT**

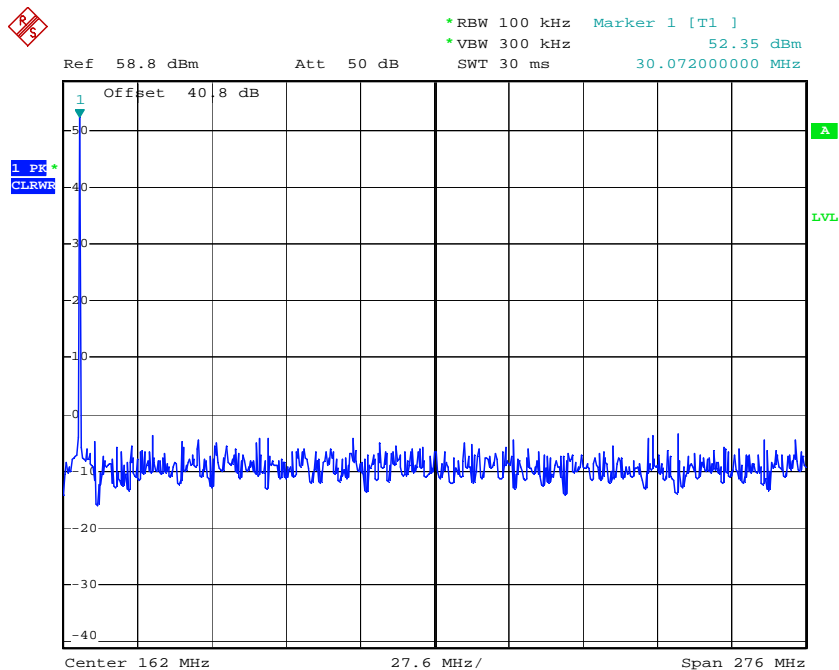
The setup to measure the strength of spurious emissions was made by connecting the output of the exciter to the input of the HLA 305 amplifier.
A 50 ohm load was connected to the amplifier, and a spectrum analyzer was connected to the 50 ohm load. The exciter was tuned to the frequency shown and each harmonic of that frequency up to the tenth was observed on the spectrum analyzer.

For the execution of the tests have been used two Resolution BW: 30kHz and 100kHz.

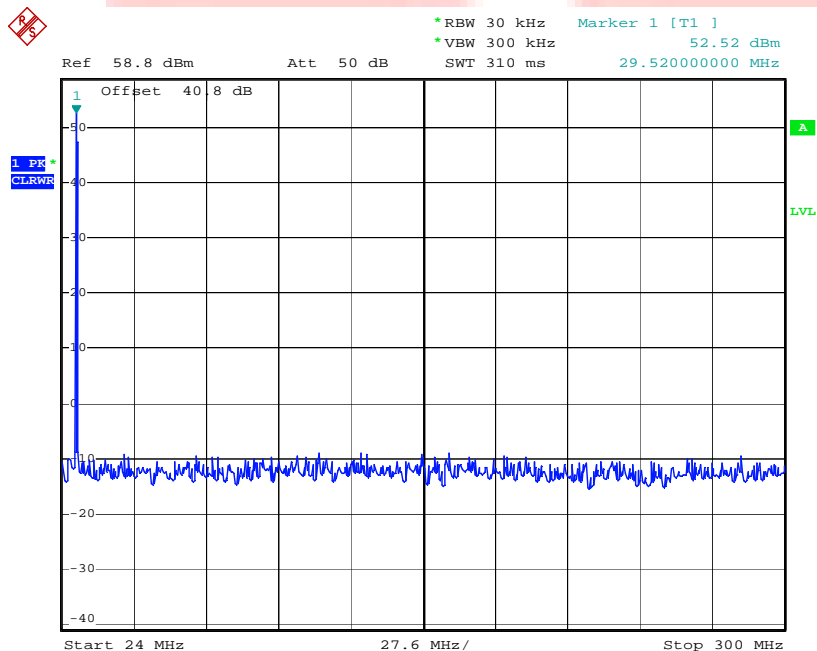


Frequency: 30MHz; Wavelength band:10m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
30,000	30		Yes
30,000	60	>60	Yes
30,000	90	>60	Yes
30,000	120	>60	Yes
30,000	150	>60	Yes
30,000	180	>60	Yes
30,000	210	>60	Yes
30,000	240	>60	Yes
30,000	270	>60	Yes
30,000	300	>60	Yes



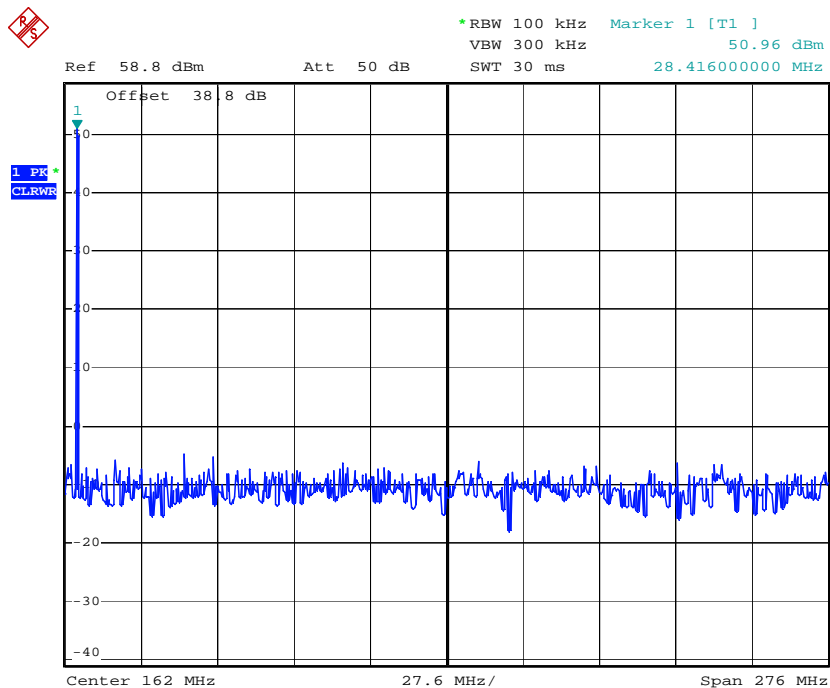
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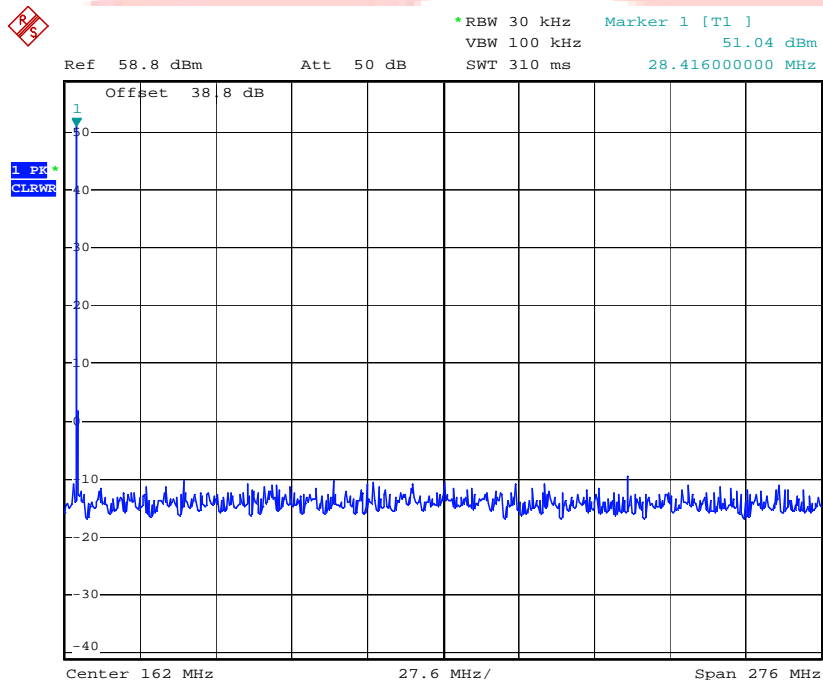
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Frequency: 28.850MHz; Wavelength band:10m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
28,85	28,85		Yes
28,85	57,70	>60	Yes
28,85	86,55	>60	Yes
28,85	115,40	>60	Yes
28,85	144,25	>60	Yes
28,85	173,10	>60	Yes
28,85	201,95	>60	Yes
28,85	230,80	>60	Yes
28,85	259,65	>60	Yes
28,85	288,50	>60	Yes



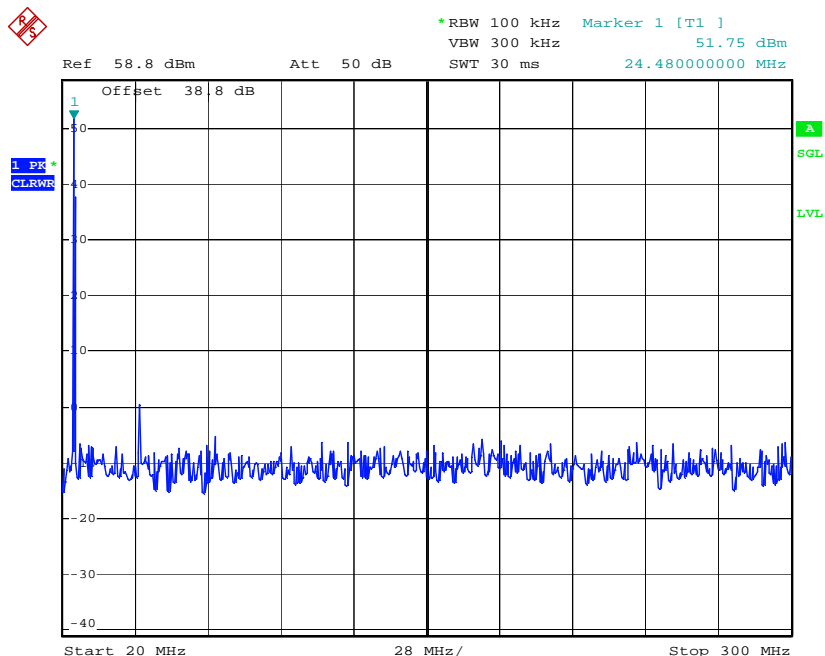
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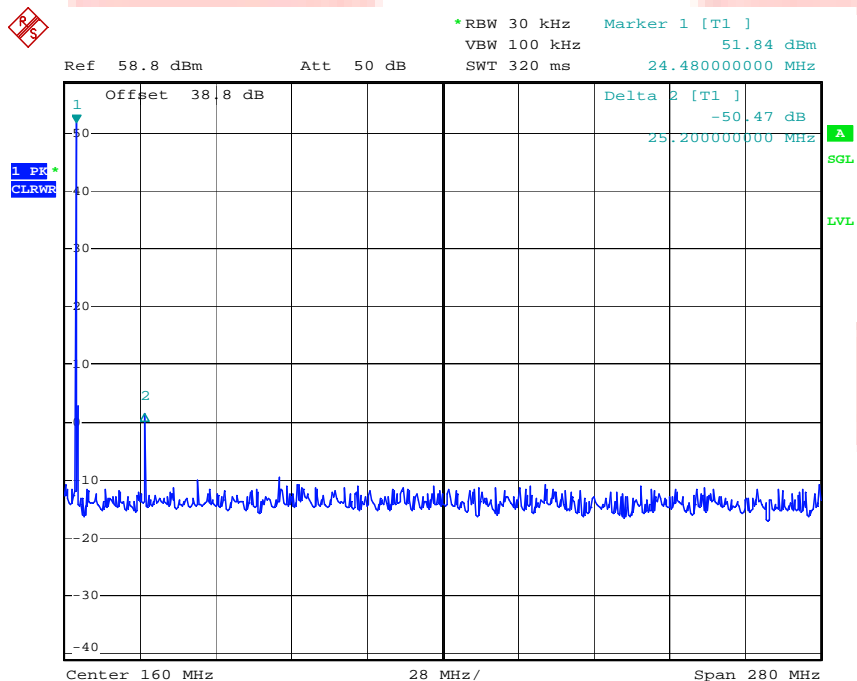
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Frequency: 24.9MHz; Wavelength band:12m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
24,90	24,90	-	Yes
24,90	49,80	50,47	Yes
24,90	74,70	>60	Yes
24,90	99,60	>60	Yes
24,90	124,50	>60	Yes
24,90	149,40	>60	Yes
24,90	174,30	>60	Yes
24,90	199,20	>60	Yes
24,90	224,10	>60	Yes
24,90	249,00	>60	Yes



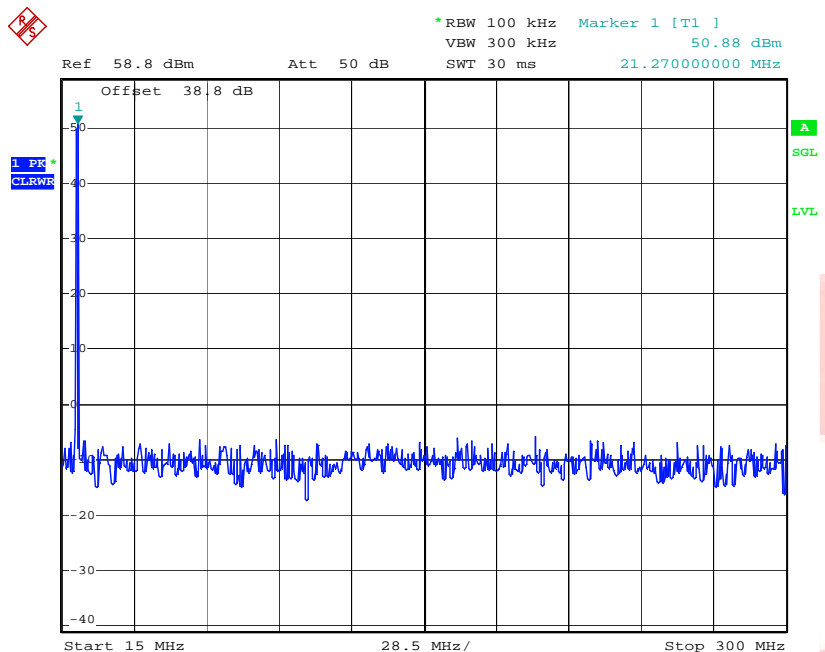
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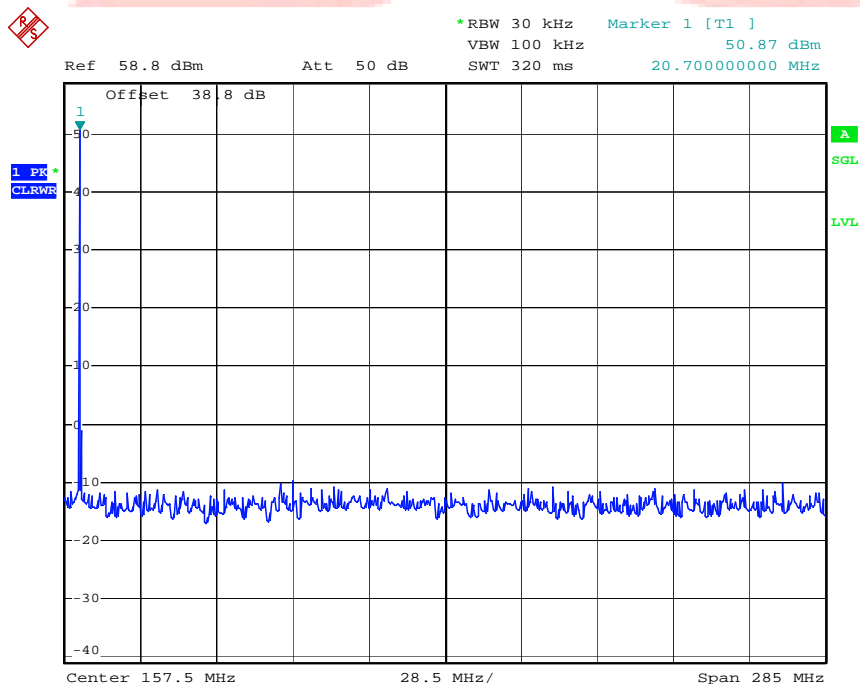
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Frequency: 21.1MHz; Wavelength band:15m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
21,10	21,10	-	Yes
21,10	42,20	>60	Yes
21,10	63,30	>60	Yes
21,10	84,40	>60	Yes
21,10	105,50	>60	Yes
21,10	126,60	>60	Yes
21,10	147,70	>60	Yes
21,10	168,80	>60	Yes
21,10	189,90	>60	Yes
21,10	211,00	>60	Yes



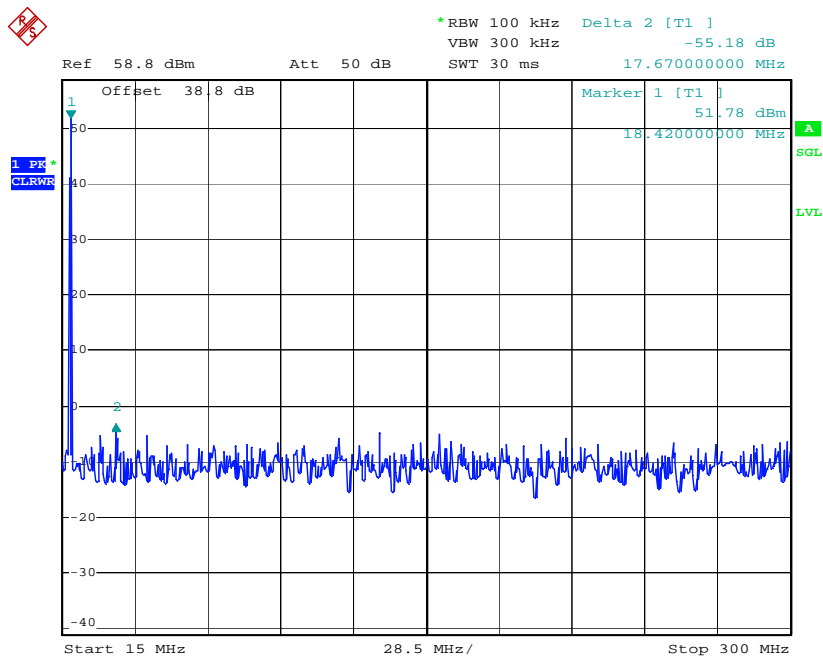
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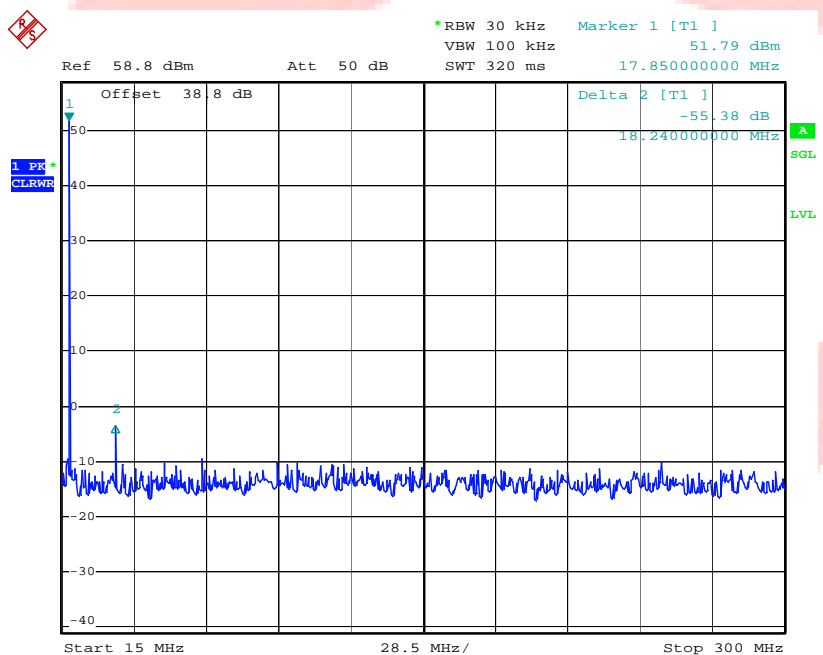
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Frequency 18.1MHz; Wavelength band:17m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
18,10	18,10	-	Yes
18,10	36,20	55,38	Yes
18,10	54,30	>60	Yes
18,10	72,40	>60	Yes
18,10	90,50	>60	Yes
18,10	108,60	>60	Yes
18,10	126,70	>60	Yes
18,10	144,80	>60	Yes
18,10	162,90	>60	Yes
18,10	181,00	>60	Yes



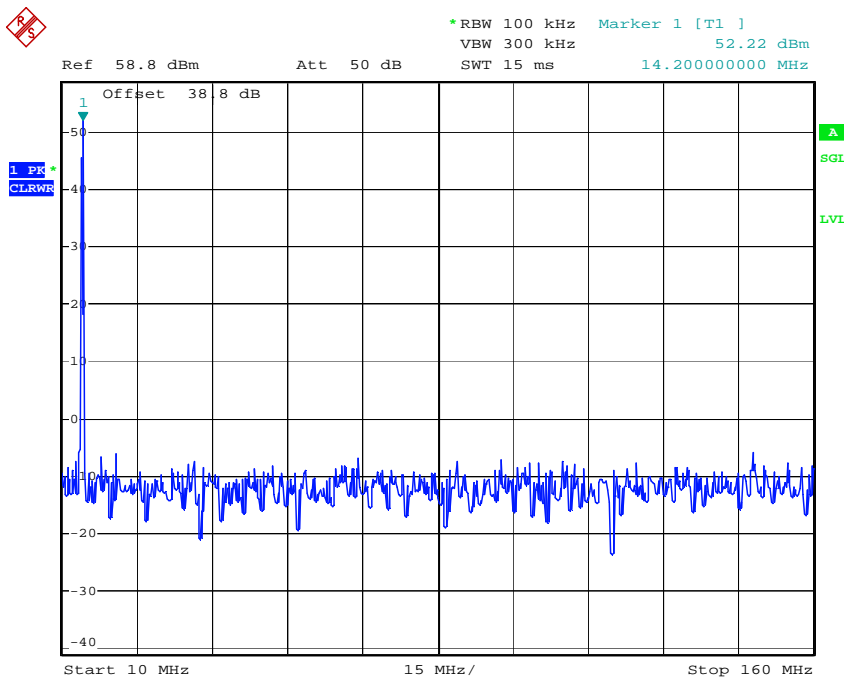
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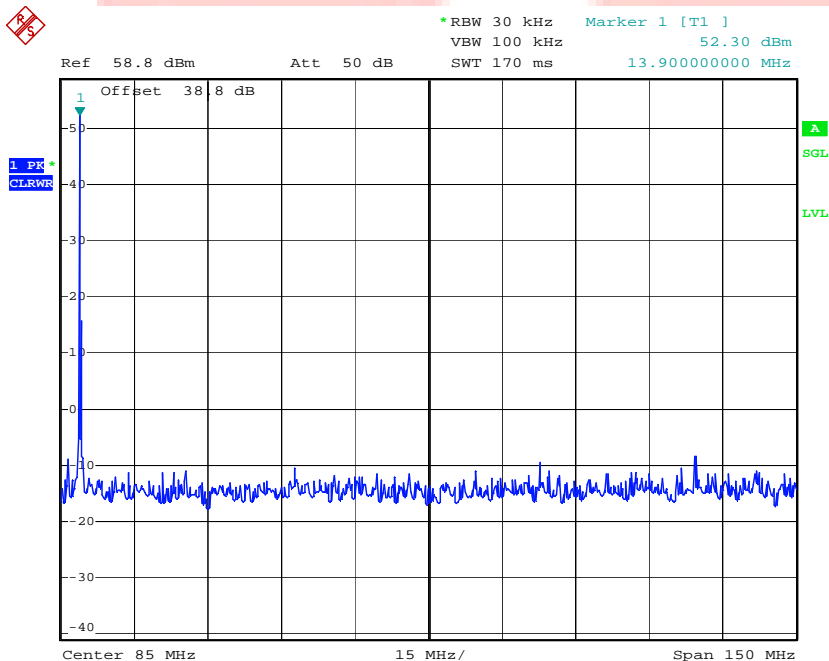
Date: 28.MAY.2014 10:49:01

Frequency 14.1MHz; Wavelength band:20m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
14,10	14,10	-	Yes
14,10	28,20	>60	Yes
14,10	42,30	>60	Yes
14,10	56,40	>60	Yes
14,10	70,50	>60	Yes
14,10	84,60	>60	Yes
14,10	98,70	>60	Yes
14,10	112,80	>60	Yes
14,10	126,90	>60	Yes
14,10	141,00	>60	Yes



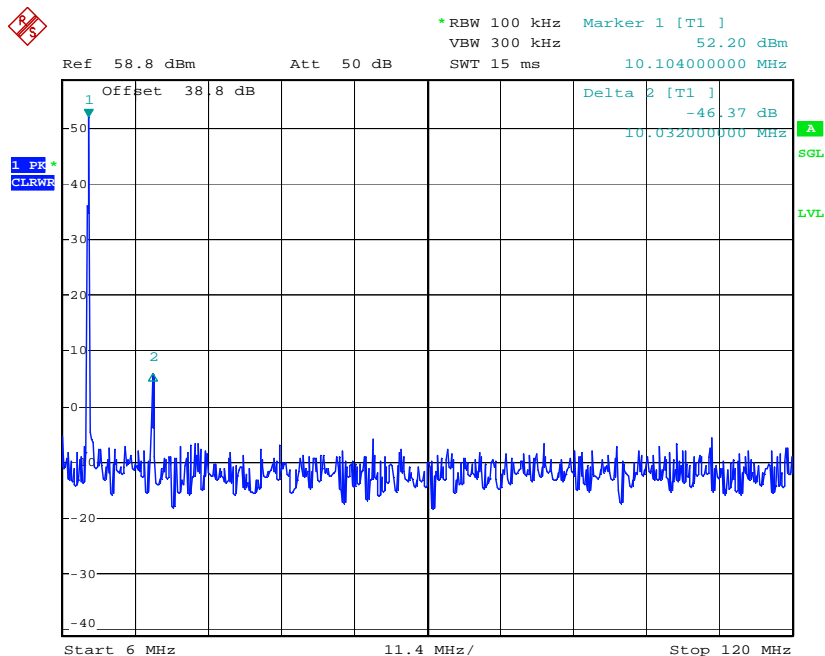
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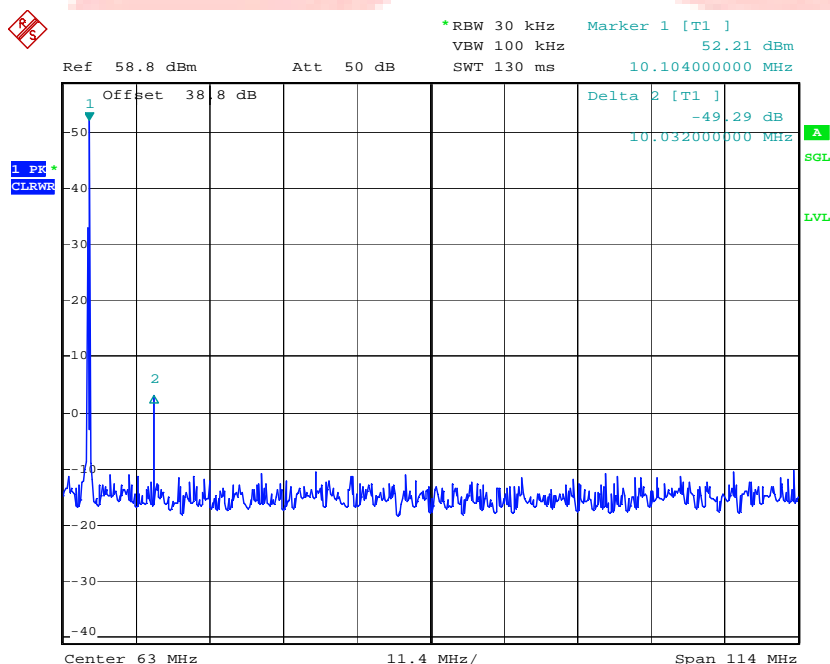
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Frequency: 10.125MHz; Wavelength band:30m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
10,125	10,125	-	Yes
10,125	20,250	49,29	Yes
10,125	30,375	>60	Yes
10,125	40,500	>60	Yes
10,125	50,625	>60	Yes
10,125	60,750	>60	Yes
10,125	70,875	>60	Yes
10,125	81,000	>60	Yes
10,125	91,125	>60	Yes
10,125	101,250	>60	Yes



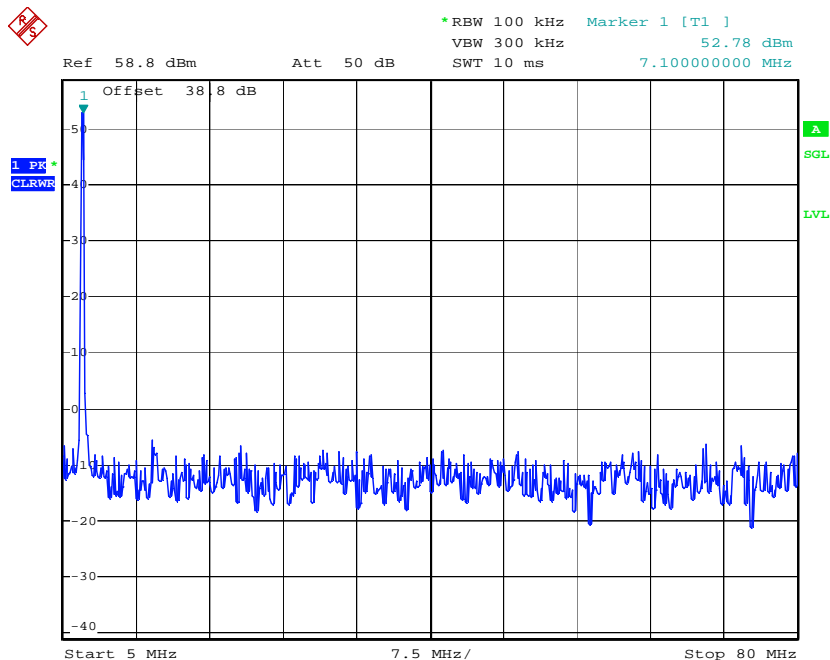
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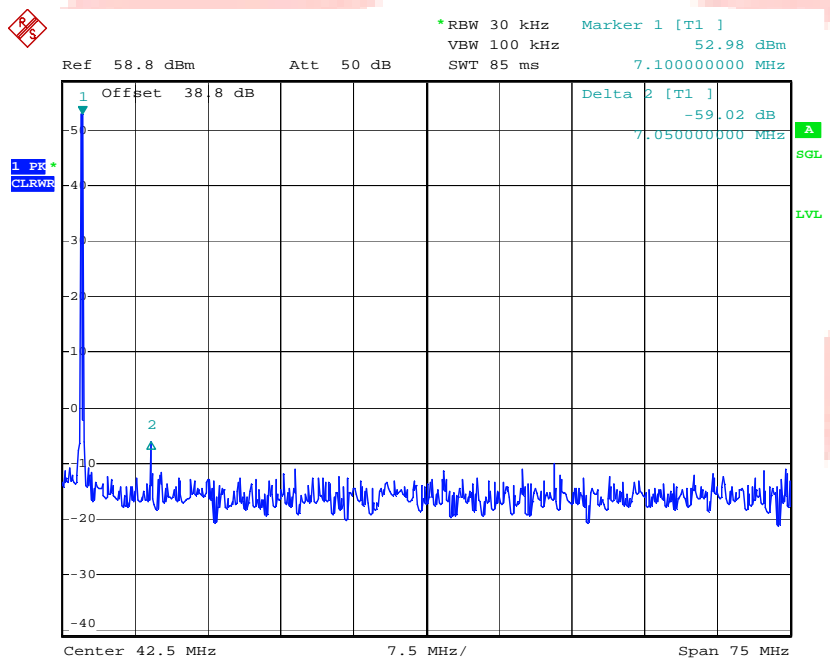
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Frequency: 7.1MHz; Wavelength band:40m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
7,10	7,10	-	Yes
7,10	14,20	59,02	Yes
7,10	21,30	>60	Yes
7,10	28,40	>60	Yes
7,10	35,50	>60	Yes
7,10	42,60	>60	Yes
7,10	49,70	>60	Yes
7,10	56,80	>60	Yes
7,10	63,90	>60	Yes
7,10	71,00	>60	Yes



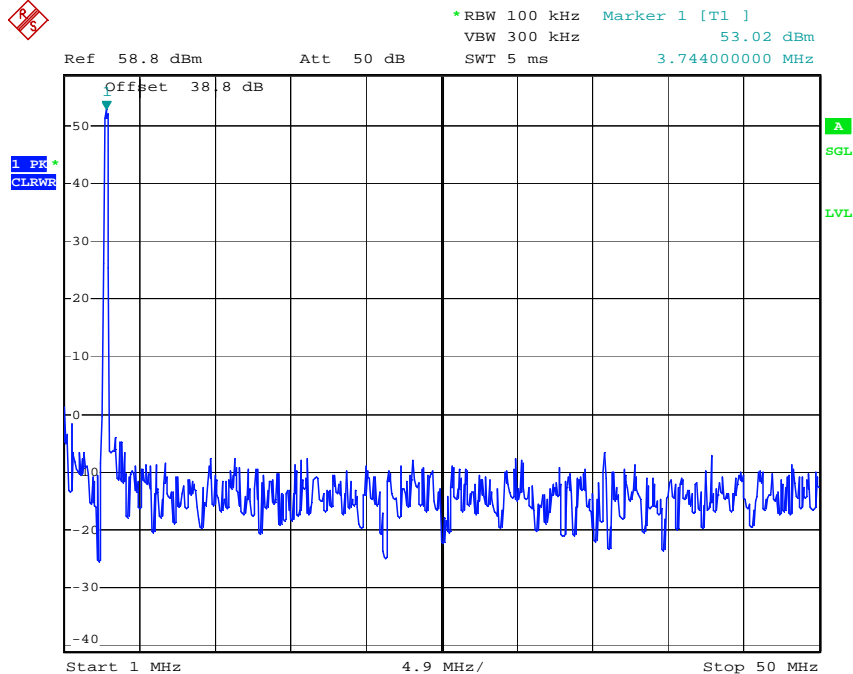
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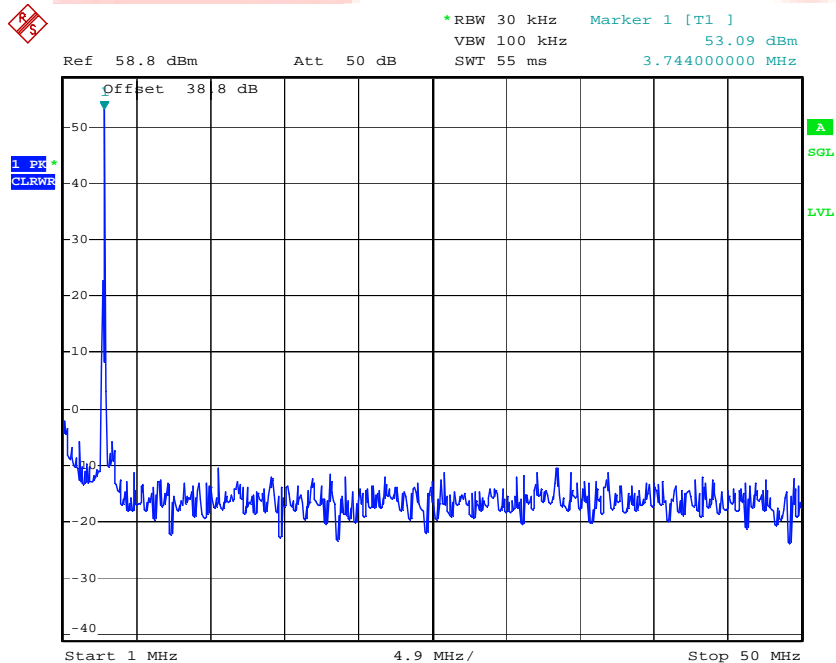
Date: 28.MAY.2014 11:03:38

Frequency: 3.75MHz; Wavelength band:75m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
3,75	3,75	-	Yes
3,75	7,5	>60	Yes
3,75	11,25	>60	Yes
3,75	15,00	>60	Yes
3,75	18,75	>60	Yes
3,75	22,50	>60	Yes
3,75	26,25	>60	Yes
3,75	30,00	>60	Yes
3,75	33,75	>60	Yes
3,75	37,50	>60	Yes



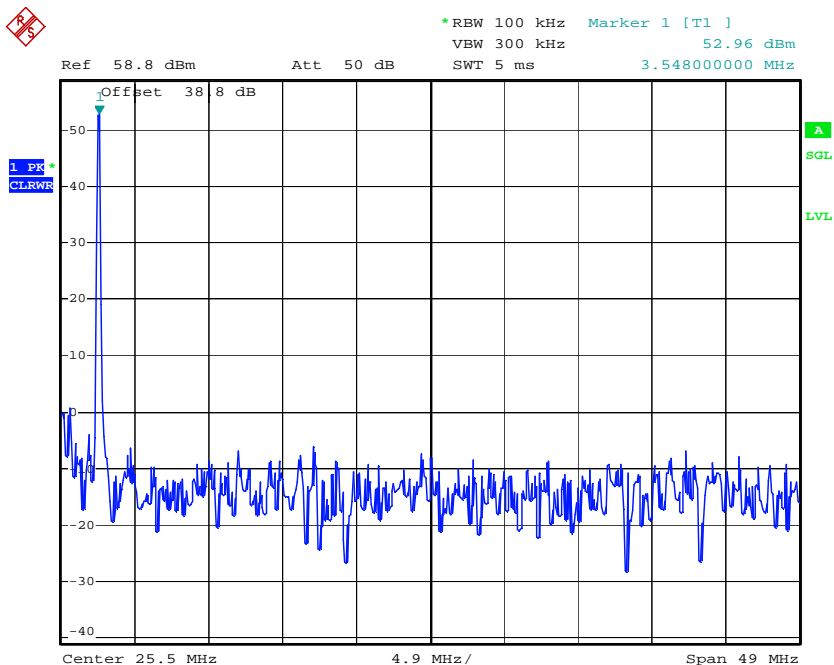
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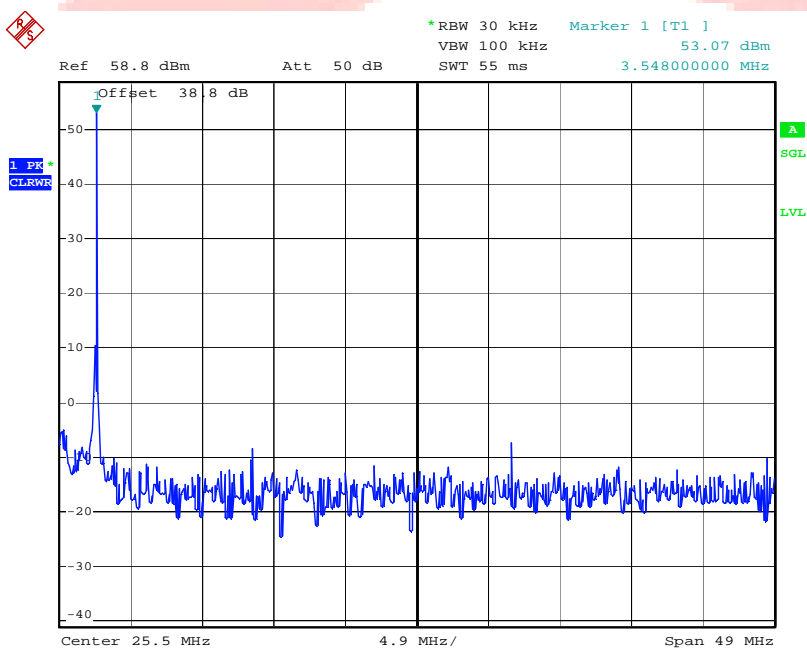
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Frequency: 3.55MHz; Wavelength band:80m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
3,55	3,55	-	Yes
3,55	7,10	>60	Yes
3,55	10,65	>60	Yes
3,55	14,20	>60	Yes
3,55	17,75	>60	Yes
3,55	21,30	>60	Yes
3,55	24,85	>60	Yes
3,55	28,40	>60	Yes
3,55	31,95	>60	Yes
3,55	35,50	>60	Yes



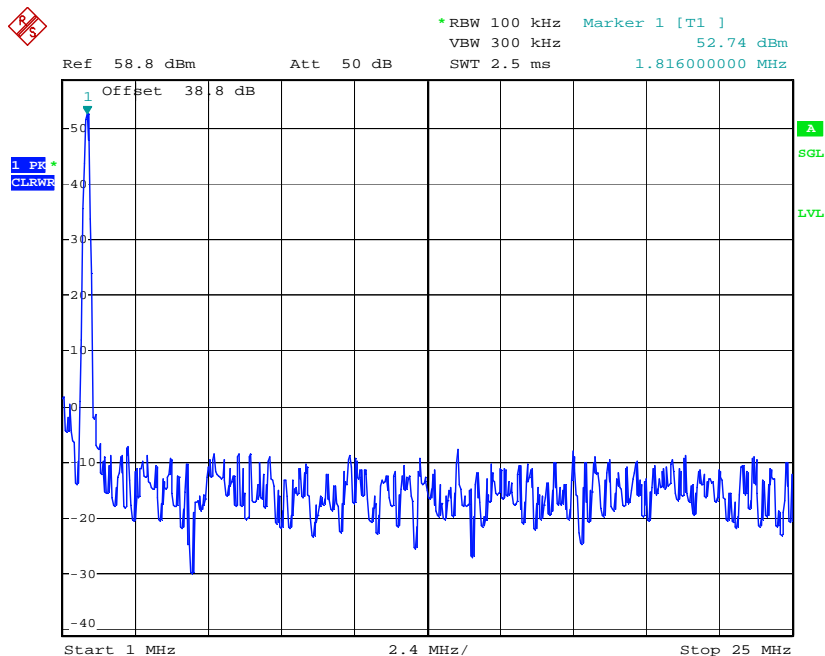
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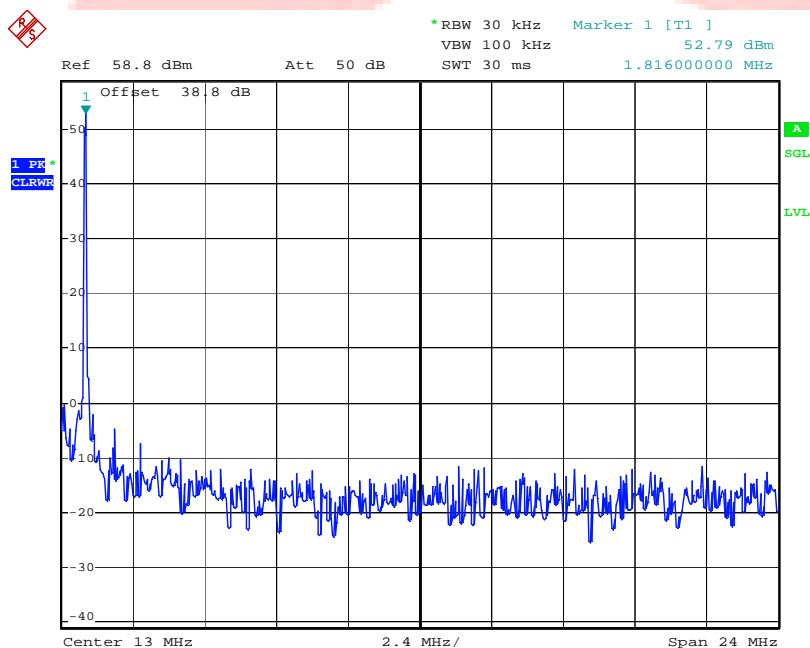
Date: 28.MAY.2014 11:14:29

Frequency 1,83MHz; Wavelength band:160m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
1,83	1,83	-	Yes
1,83	3,66	>60	Yes
1,83	5,49	>60	Yes
1,83	7,32	>60	Yes
1,83	9,15	>60	Yes
1,83	10,98	>60	Yes
1,83	12,81	>60	Yes
1,83	14,64	>60	Yes
1,83	16,47	>60	Yes
1,83	18,30	>60	Yes



Date: 28.MAY.2014 11:20:26



Date: 28.MAY.2014 11:21:09

**TEST
3.**

STRENGTH OF SPURIOUS EMISSIONS (RADIATED)

REFERENCE
DOCUMENT

Part 2.1053, Part 97.307 (d) (e)

- TEST SETUP: In according to manufacturer specifications
- TEST LOCATION: Semi-anechoic chamber (CISPR 16-1 :1993)
Siemens+Matsushita type B84117-D6019-T232
Measure distance 3 meters
- TEST EQUIPMENT USED FOR TEST: EMI receiver Rohde & Schwarz Mod. ESU40
Chase Antenna Mod. CBL 6111

TEST CONDITIONS:			MEASURED
Ambient temperature :	15 - 35 °C		24 ± 3 °C
Ambient humidity :	25 - 75 %rH		40 ± 5 %rH
Pressure :	85 - 106 kPa	(860 mbar - 1060 mbar)	950 ± 50 mbar
Voltage :			12 Vdc

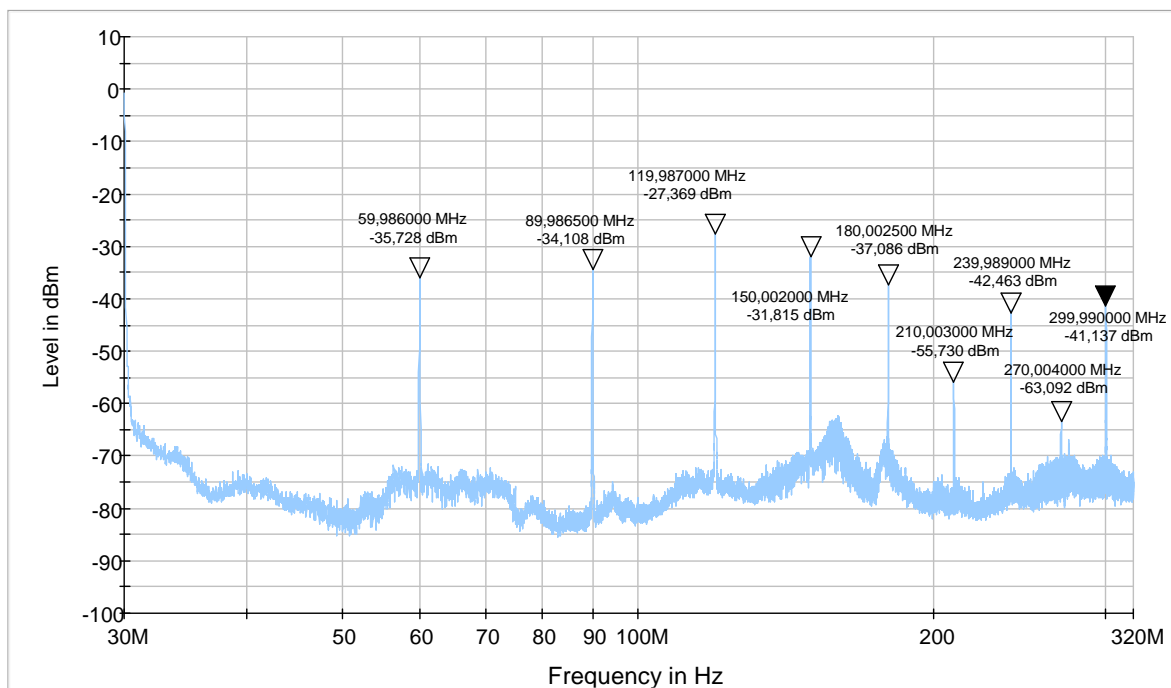
OPERATING CONDITION (Rif. Section. 2.6) : **#1**

RESULT: **WITHIN THE LIMIT**

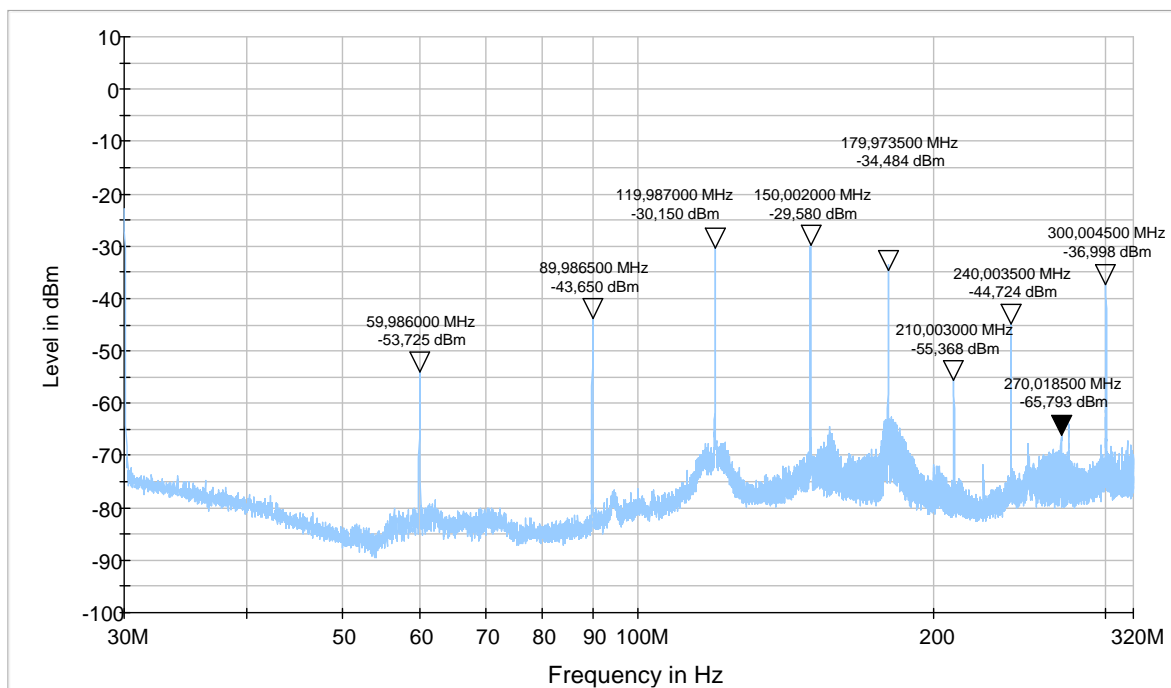
Frequency: 30MHz; Wavelength band:10m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
30,000	---	---	Yes
	59.986	87.428	Yes
	89.986	85.808	Yes
	119.987	79.070	Yes
	150.002	81.280	Yes
	180.002	86.184	Yes
	210.003	107.086	Yes
	239.989	94.160	Yes
	270.004	114.790	Yes
	300.004	88.690	Yes

Vertical polarization



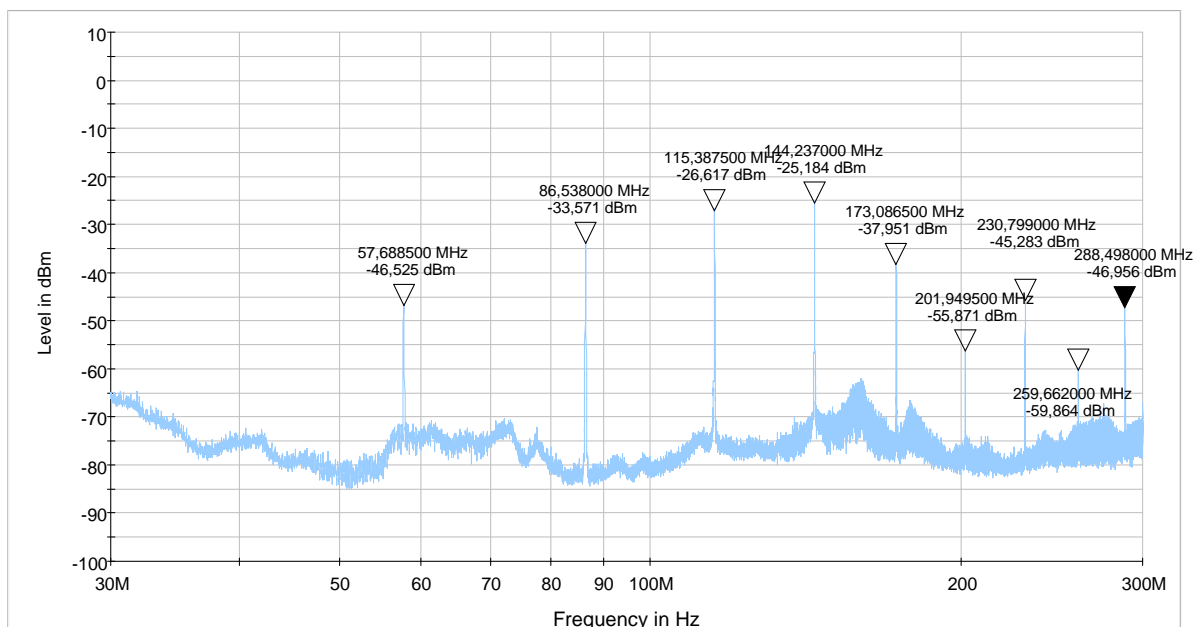
Horizontal polarization



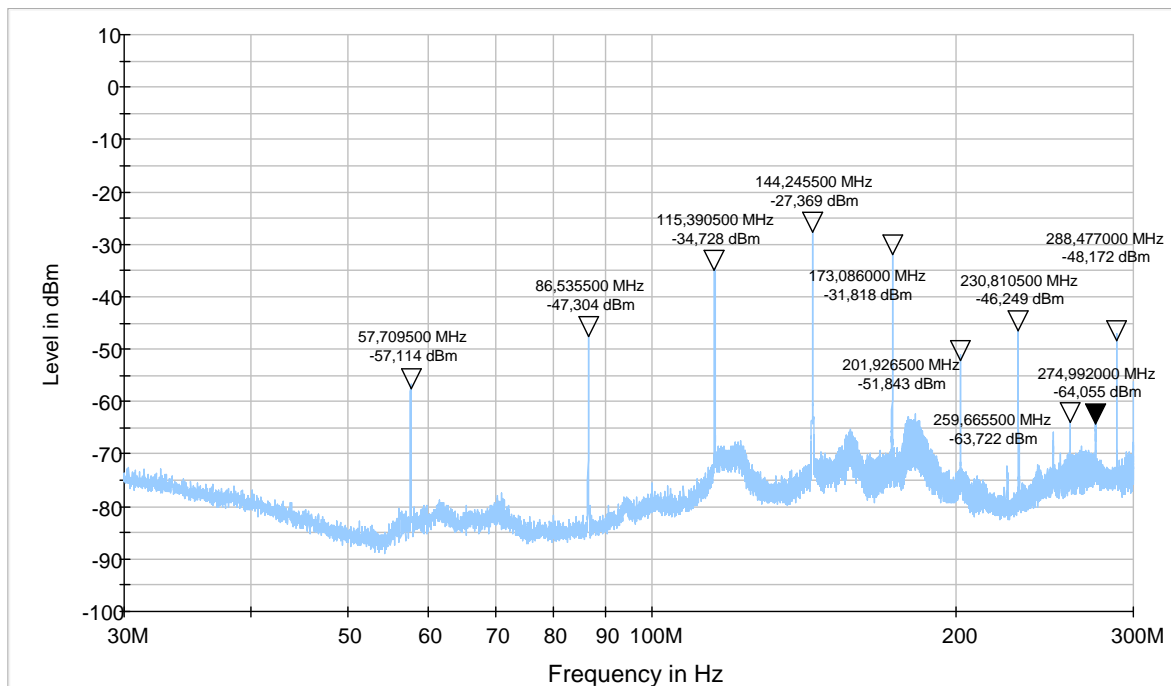
Frequency: 28.850MHz; Wavelength band:10m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
28,850	---	---	Yes
	57,688	98.625	Yes
	86,538	85.610	Yes
	115,387	78.710	Yes
	144,237	77.280	Yes
	173,086	83.910	Yes
	201,949	103.943	Yes
	230,799	97.380	Yes
	259,650	111.960	Yes
	288,498	99.050	Yes

Vertical polarization



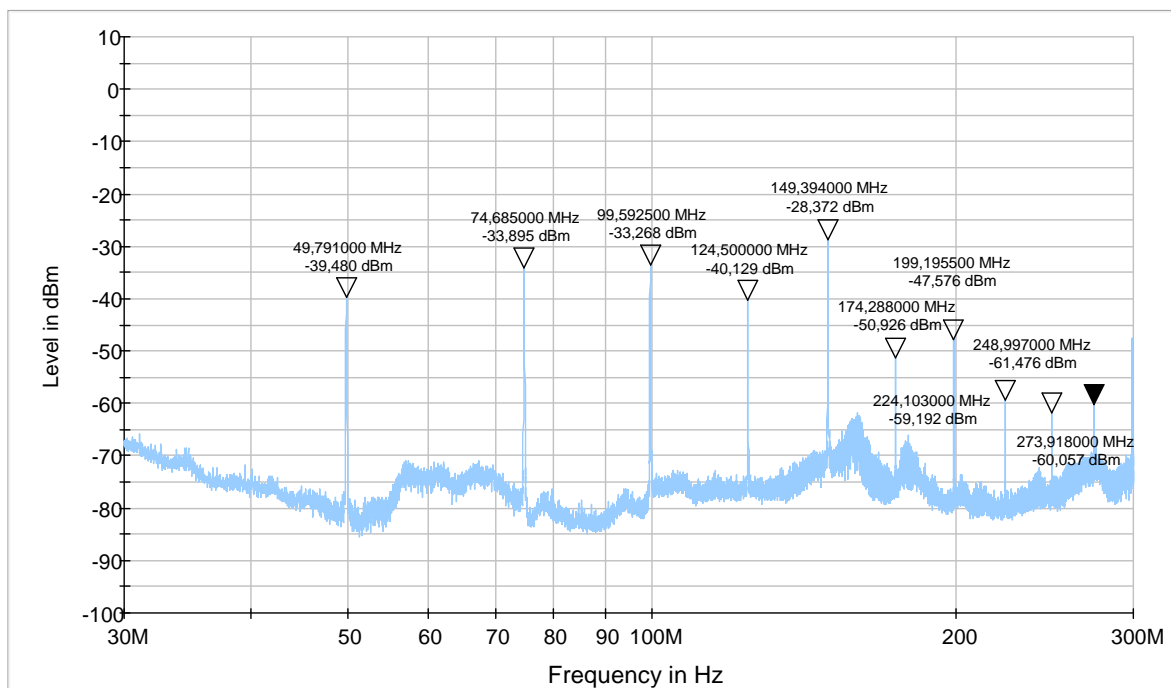
Horizontal polarization



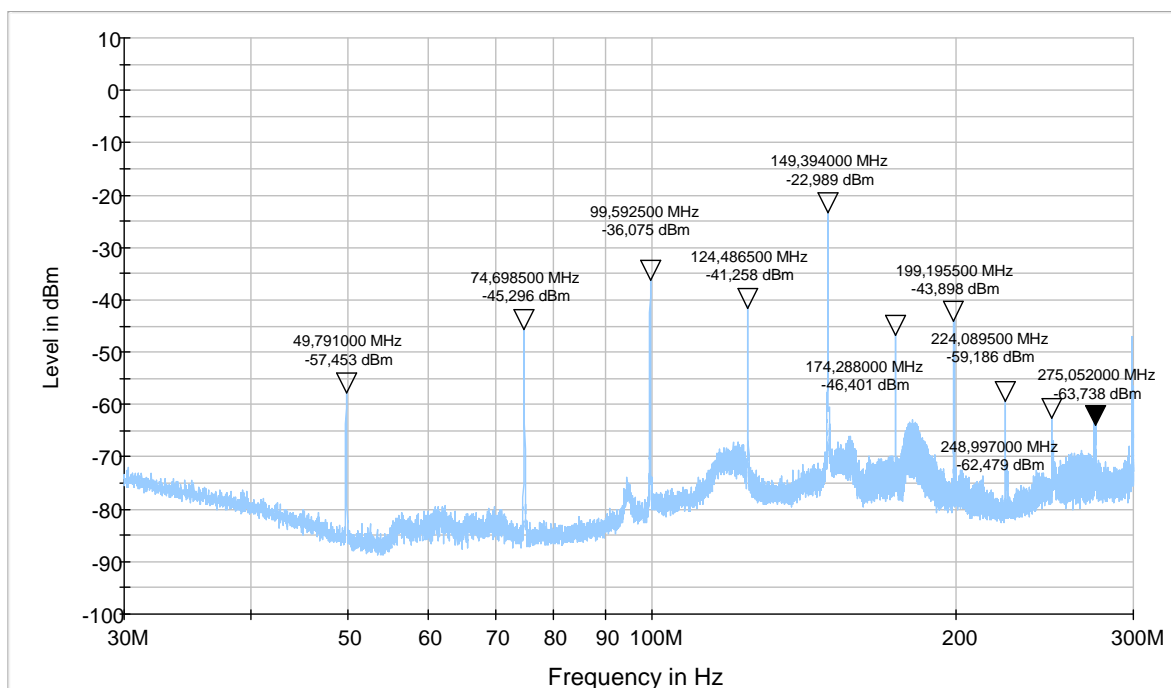
Frequency: 24.9MHz; Wavelength band:12m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
24,90	---	---	Yes
	49,791	92.470	Yes
	74,685	86.790	Yes
	99,592	86.250	Yes
	124,50	93.110	Yes
	149,394	75.979	Yes
	174,288	99.390	Yes
	199,200	96.888	Yes
	224,195	112.182	Yes
	248.997	114.466	Yes

Vertical polarization



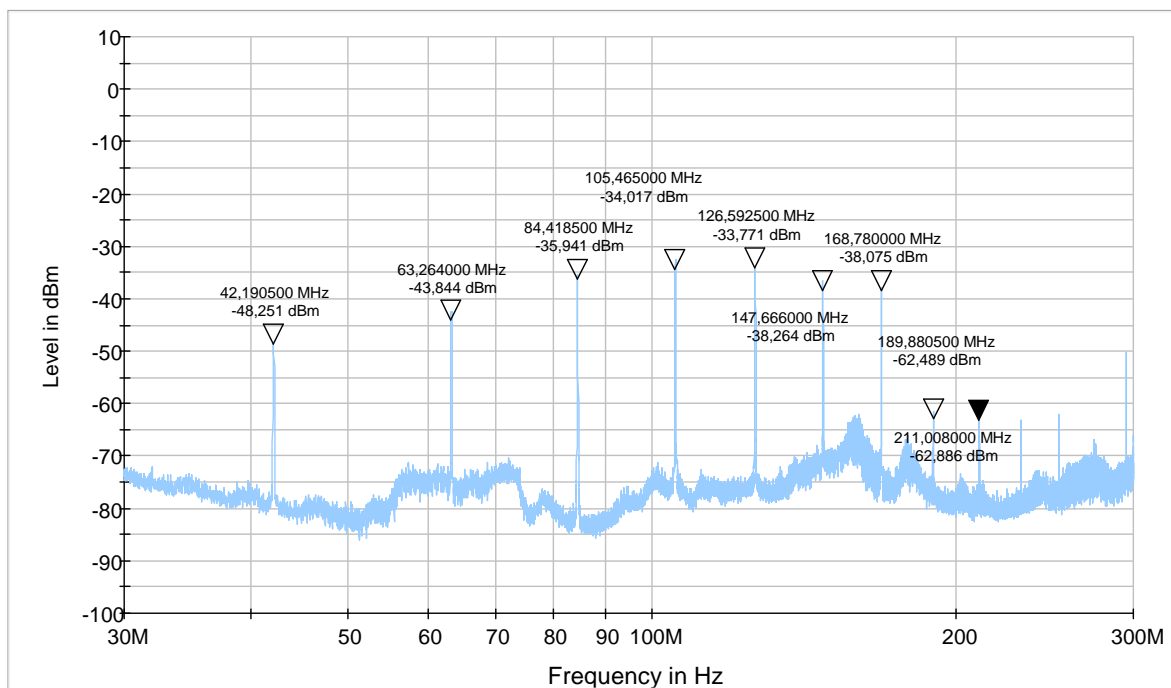
Horizontal polarization



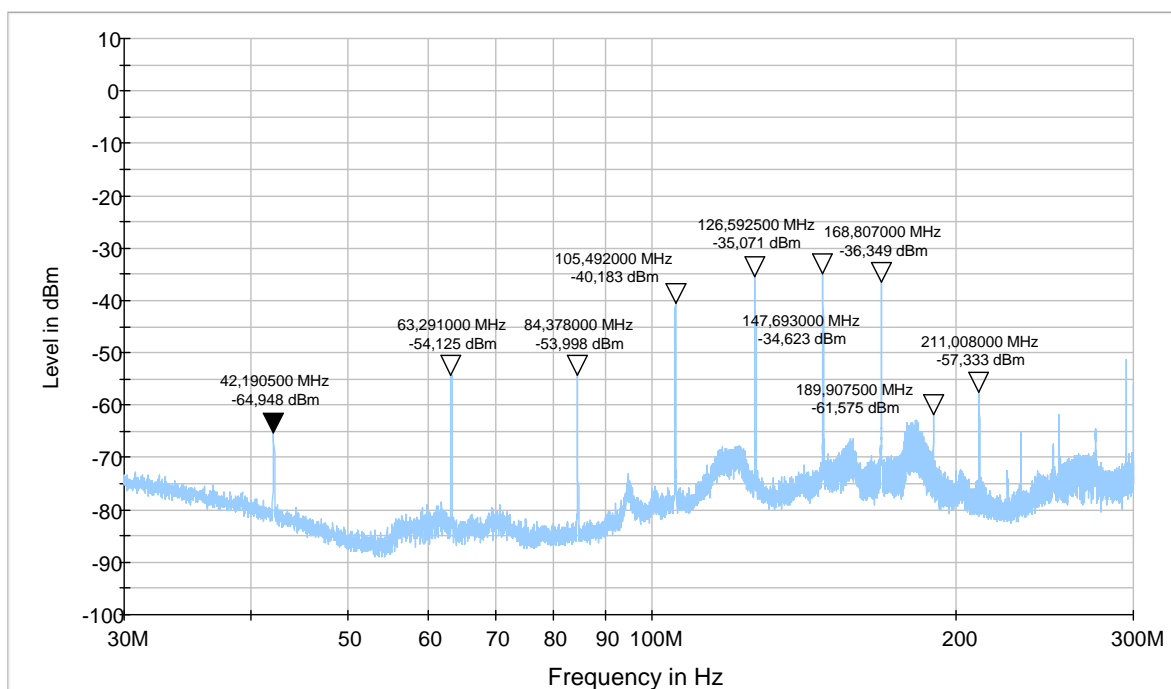
Frequency: 21.1MHz; Wavelength band:15m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
21,10	---	---	Yes
	42,190	100.44	Yes
	63,264	96.070	Yes
	84,418	88.131	Yes
	105,465	86.200	Yes
	126,592	85.960	Yes
	147,660	86.810	Yes
	168,780	88.539	Yes
	189,90	113.765	Yes
	211,00	109.523	Yes

Vertical polarization



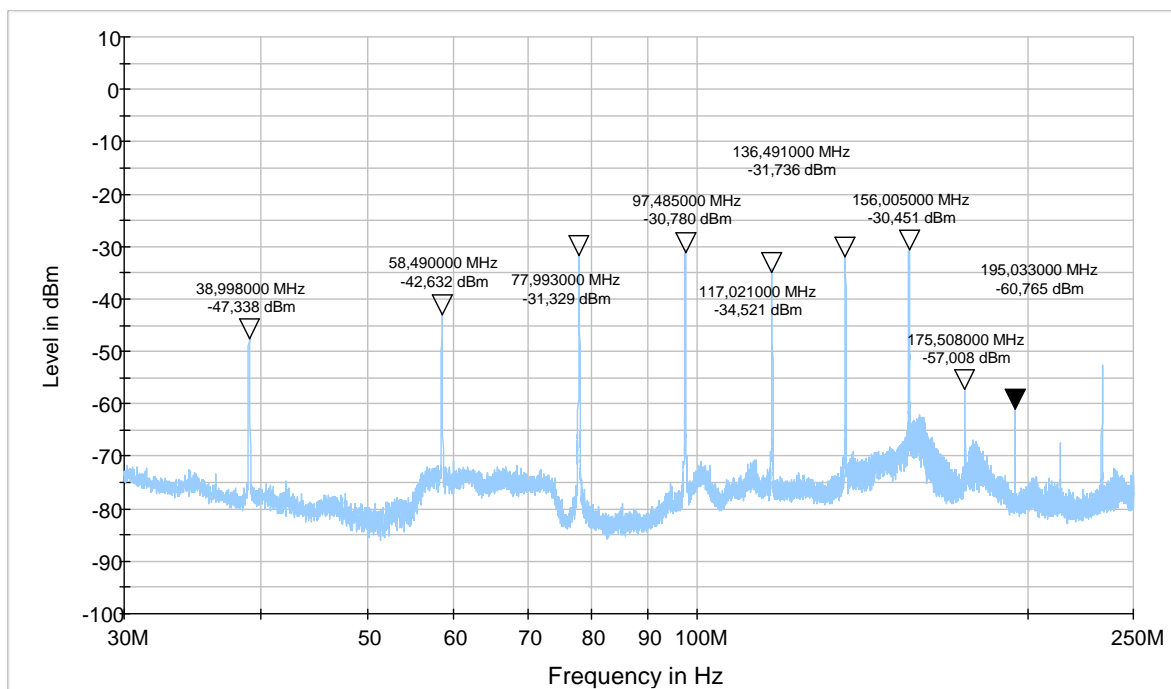
Horizontal polarization



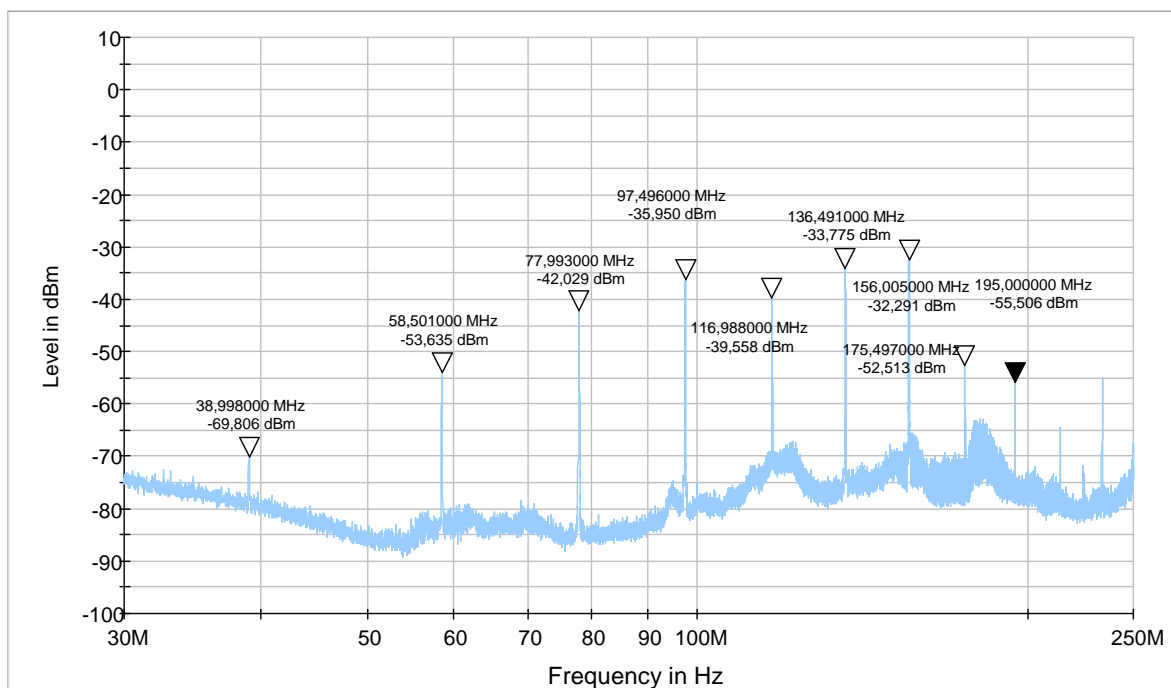
Frequency 19.50MHz; Wavelength band:18m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
19.50	---	---	Yes
	38.998	99.528	Yes
	58.501	94.822	Yes
	77.993	83.519	Yes
	97.496	82.970	Yes
	116.988	86.711	Yes
	136.491	83.926	Yes
	156.005	82.641	Yes
	175.497	104.703	Yes
	195.000	107.690	Yes

Vertical polarization



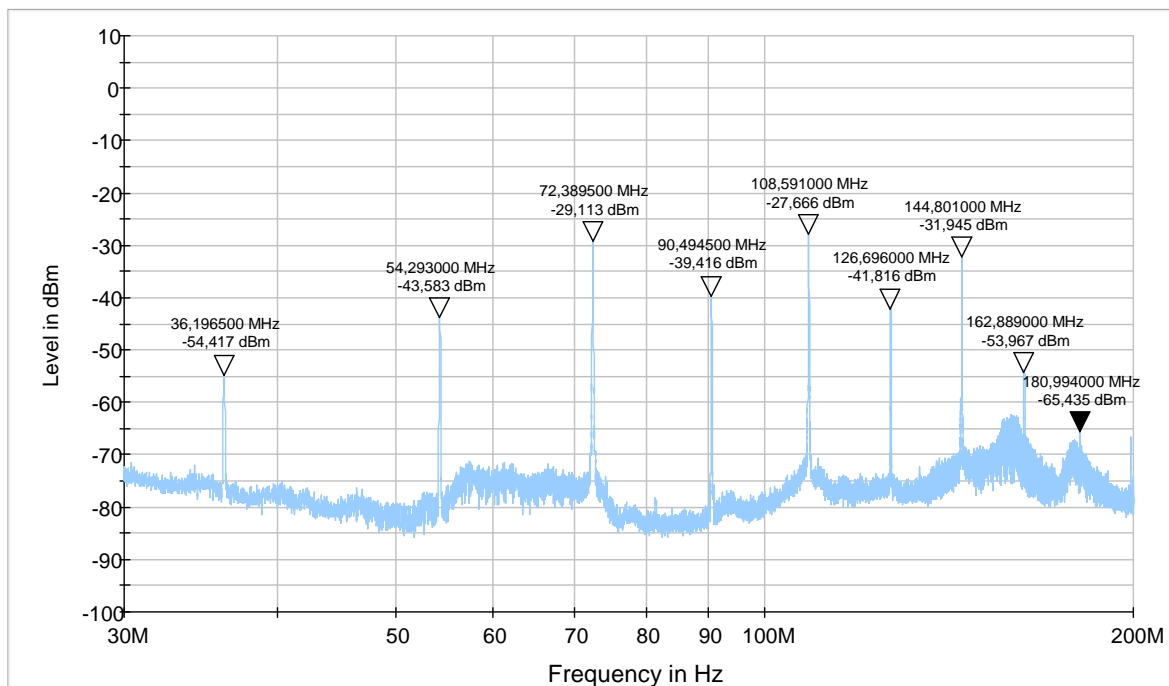
Horizontal polarization



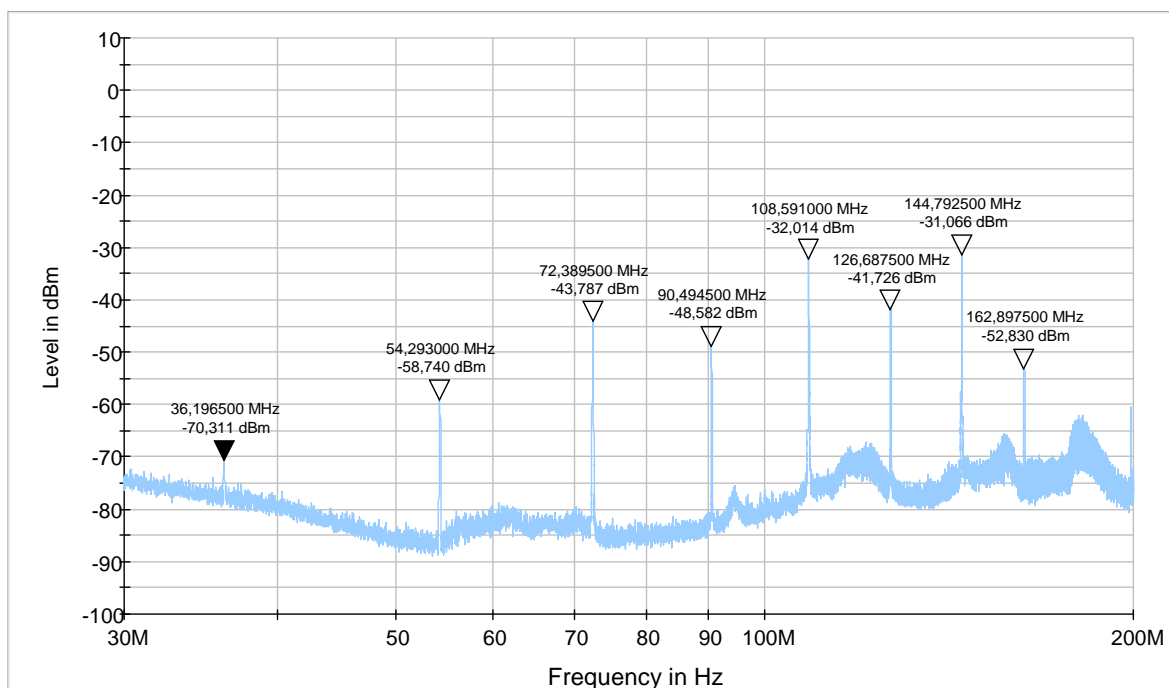
Frequency 18.10MHz; Wavelength band:17m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
18,10	---	---	---
	36,196	107.217	Yes
	54,293	96.383	Yes
	72,389	81.913	Yes
	90,494	92.216	Yes
	108,591	80.466	Yes
	126,696	94.616	Yes
	144,801	83.866	Yes
	162,889	105.63	Yes
	180,994	118.230	Yes

Vertical polarization



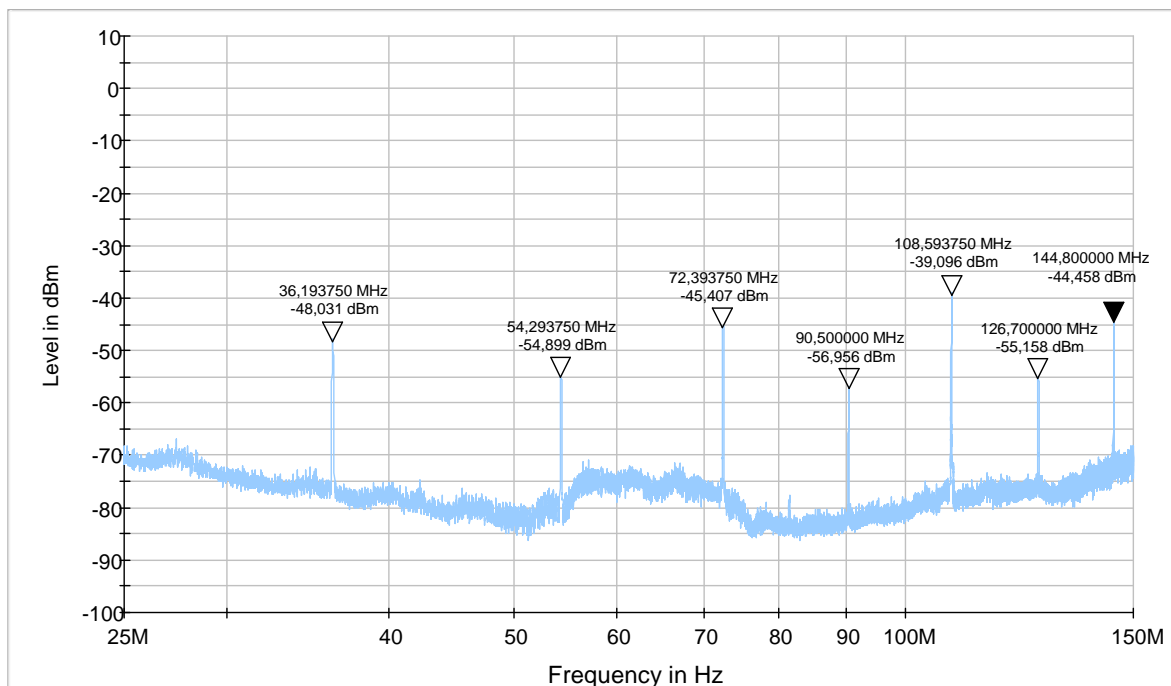
Horizontal polarization



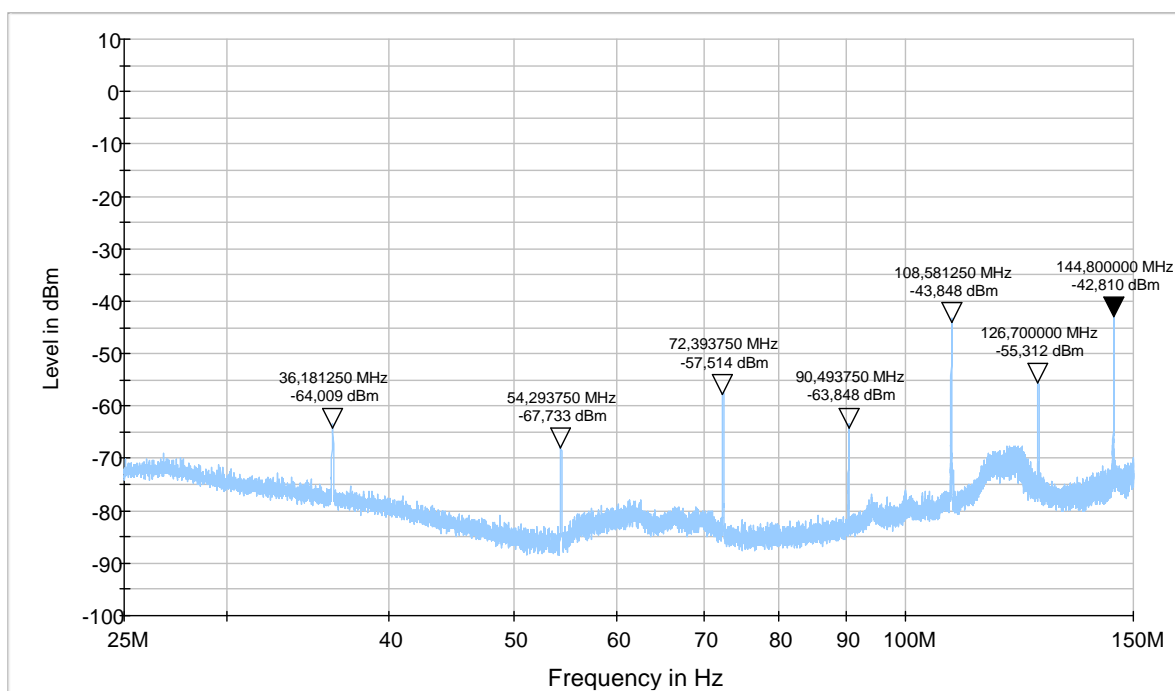
Frequency 14.10MHz; Wavelength band:20m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
14,10	---	---	---
	28,20	>120	Yes
	42,30	>120	Yes
	56,40	>120	Yes
	70,50	>120	Yes
	84,60	>120	Yes
	98,70	>120	Yes
	112,80	92.290	Yes
	126,90	108.300	Yes
	141,00	96.010	Yes

Vertical polarization



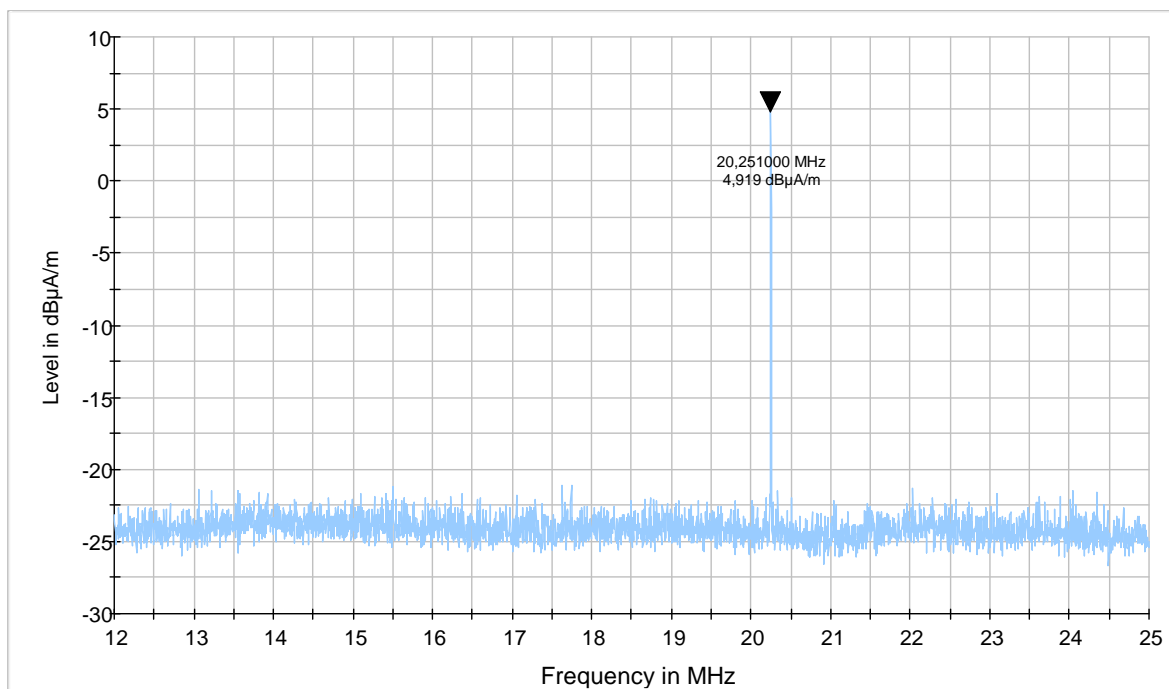
Horizontal polarization



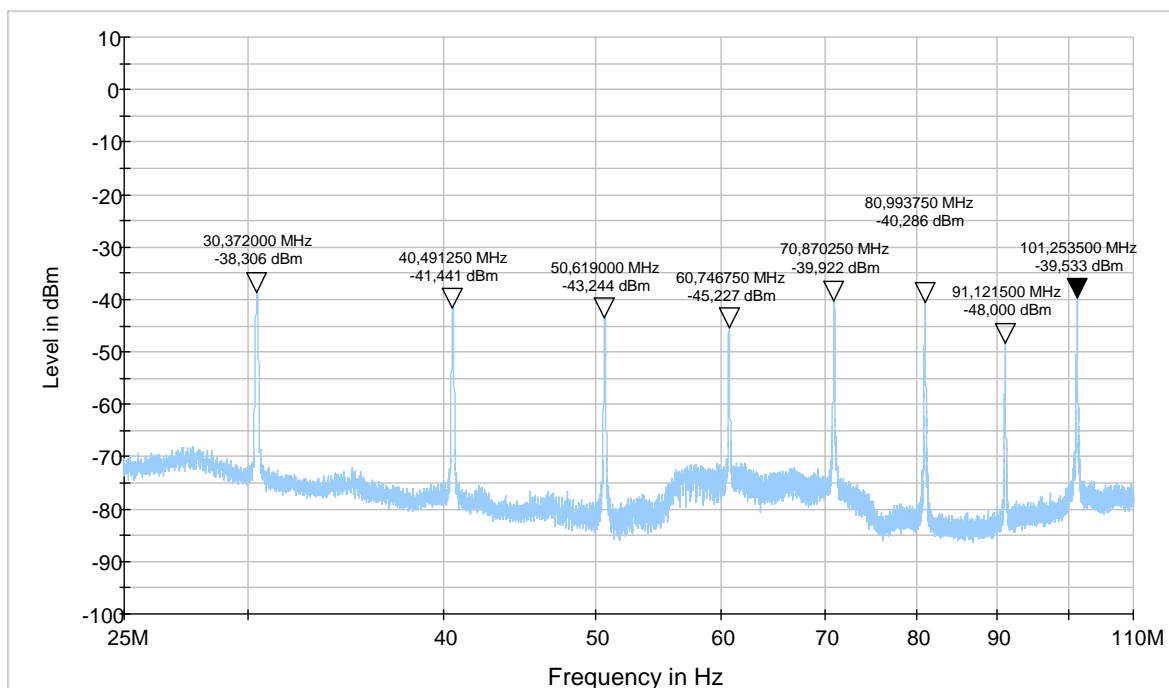
Frequency: 10.125MHz; Wavelength band:30m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
10,125	---	---	--
	20,250	92.010	Yes
	30,372	91.500	Yes
	40,492	94.640	Yes
	50,619	96.444	Yes
	60,746	98.477	Yes
	70,870	92.532	Yes
	80,993	93.486	Yes
	91,121	101.200	Yes
	101,253	92.733	Yes

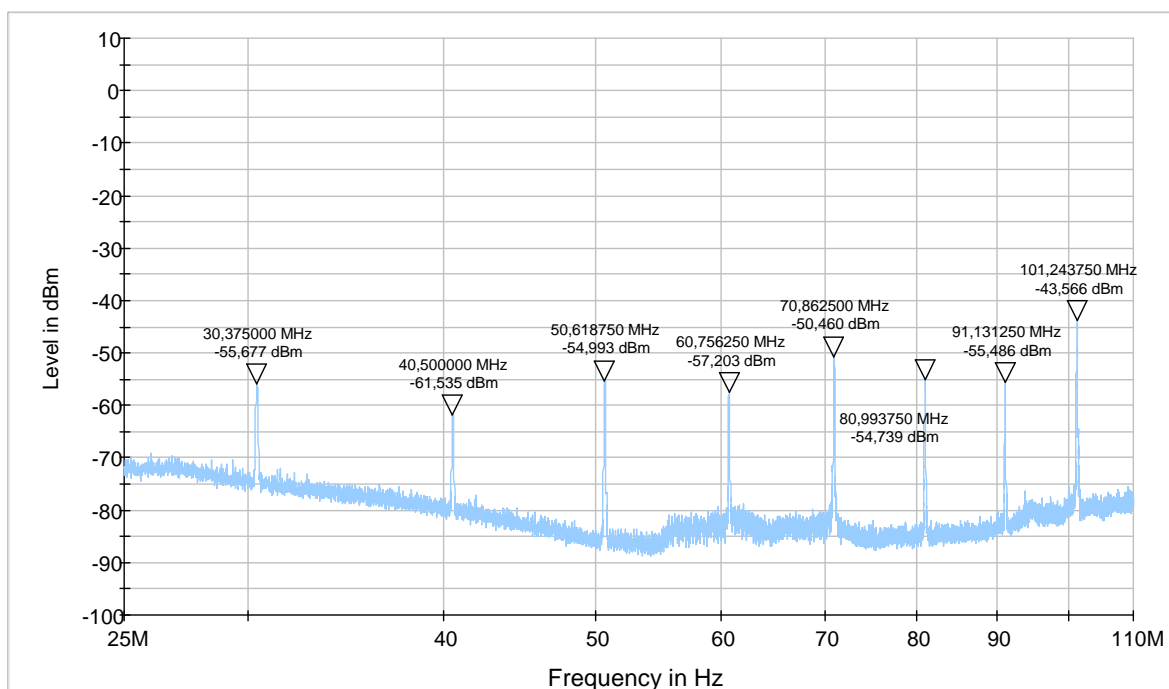
Magnetic field



Vertical polarization



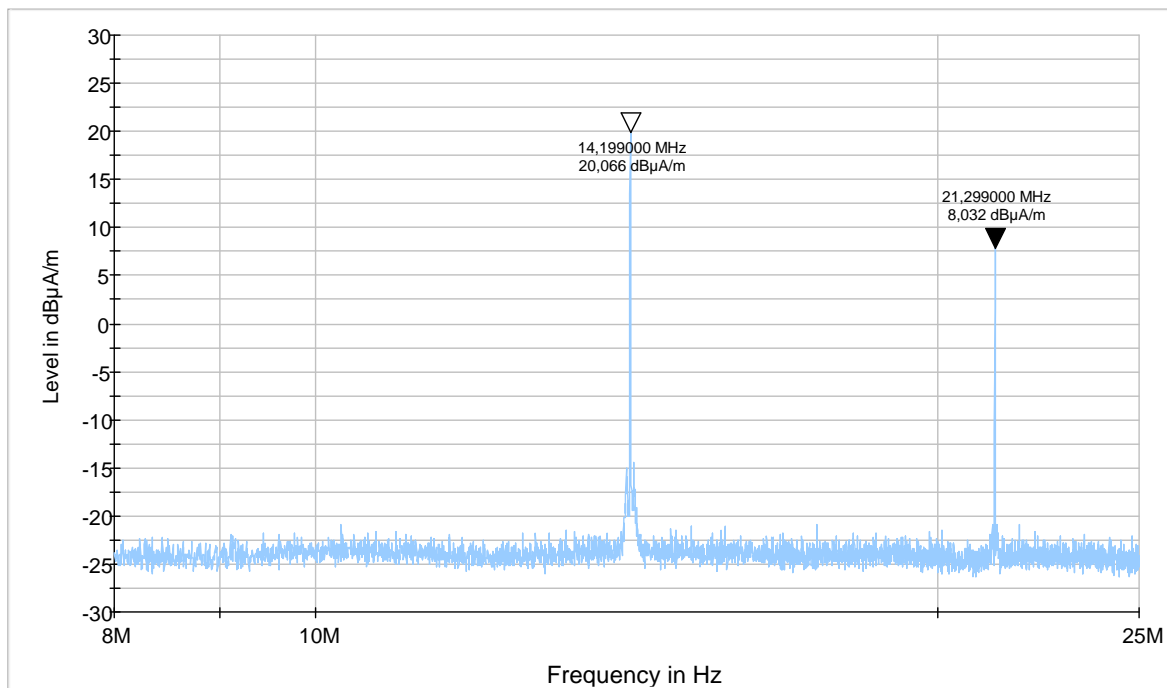
Horizontal polarization



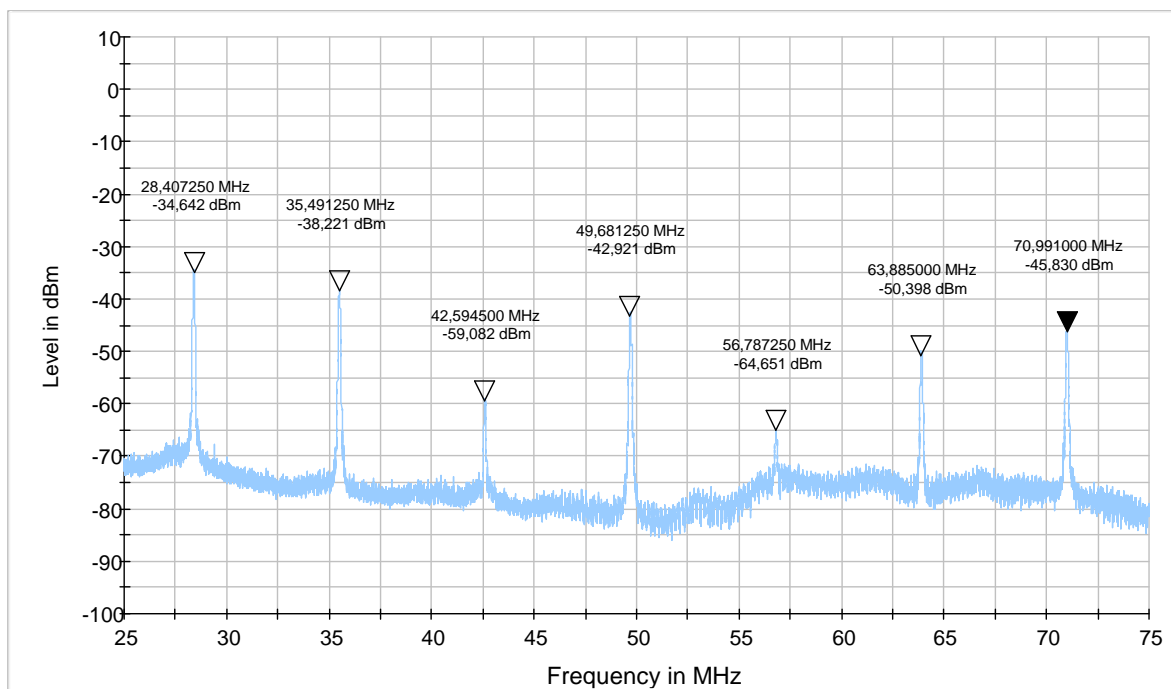
Frequency: 7.1MHz; Wavelength band:40m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
7,10	---	---	---
	14,20	73.260	Yes
	21,30	89.300	Yes
	28,40	88.242	Yes
	35,50	91.811	Yes
	42,60	112.682	Yes
	49,70	96.521	Yes
	56,80	>120	Yes
	63,90	103.998	Yes
	71,00	99.430	Yes

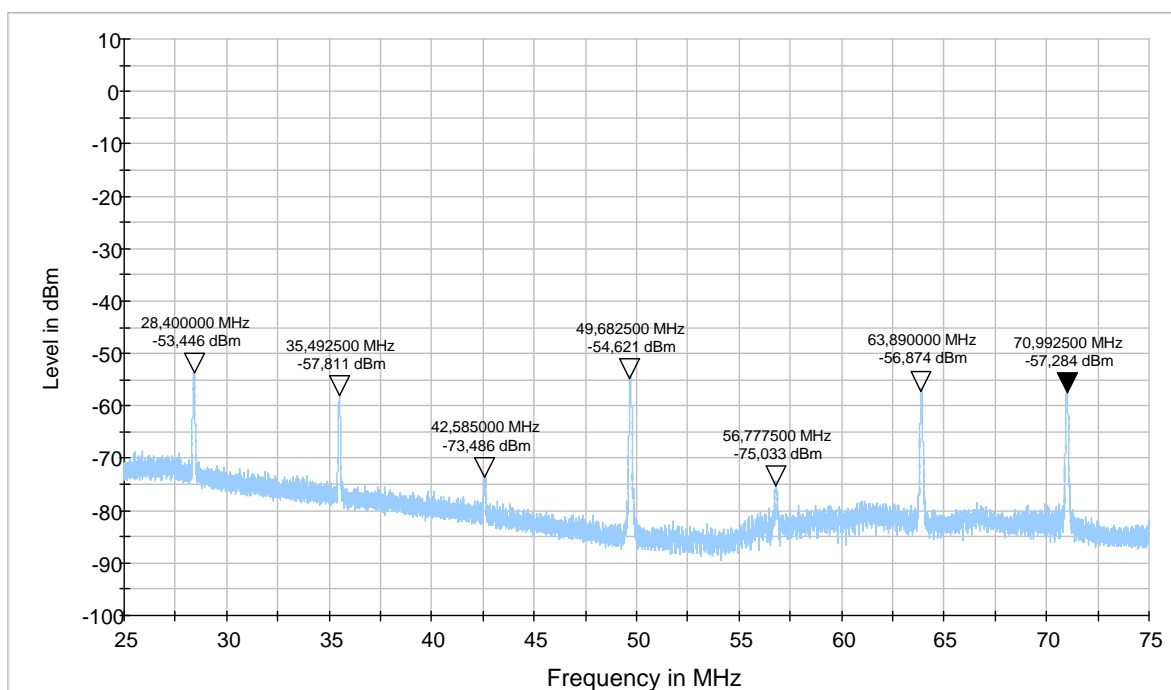
Magnetic field



Vertical polarization



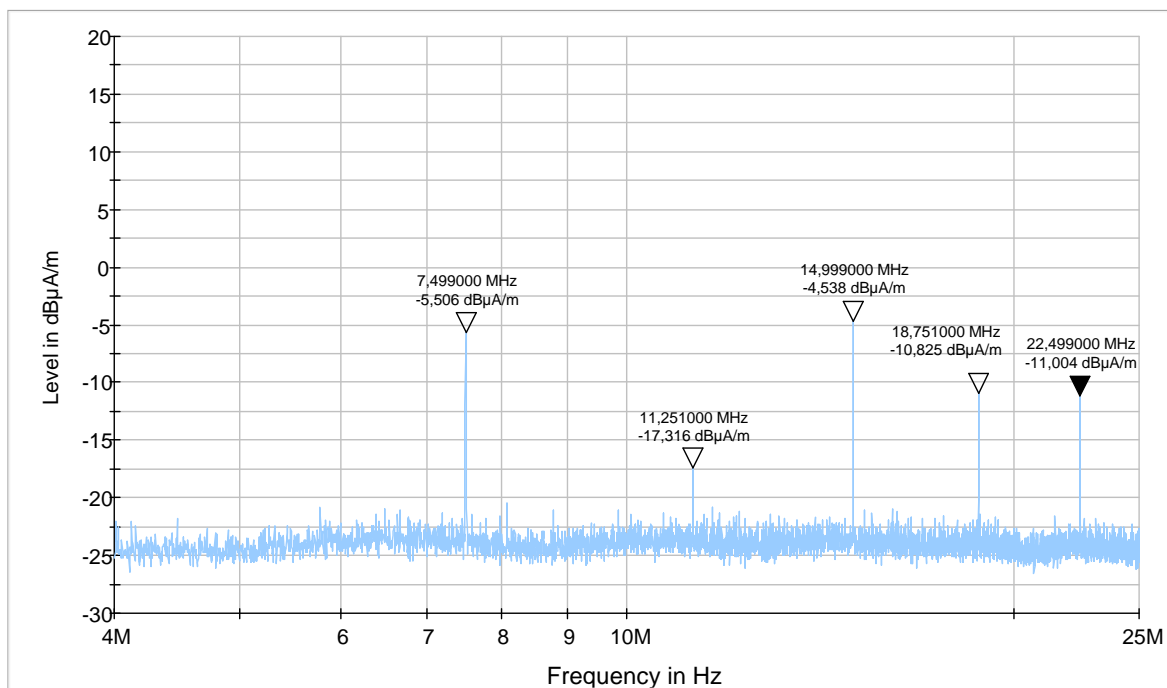
Horizontal polarization



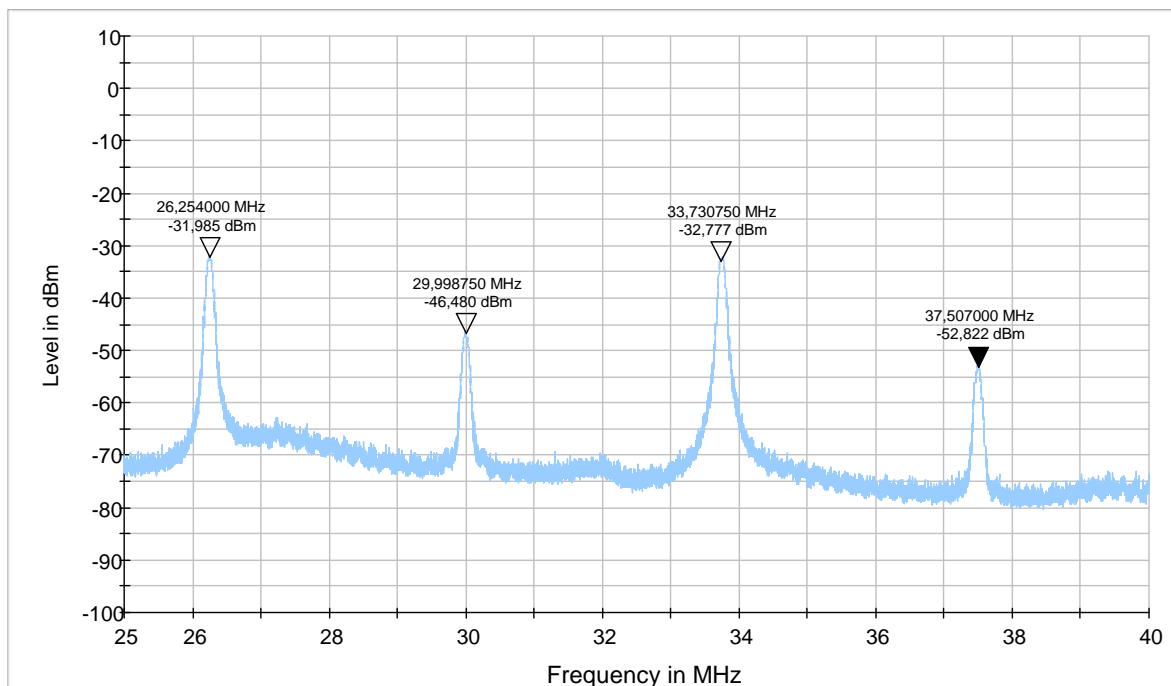
Frequency: 3.75MHz; Wavelength band:75m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
3,75	---	---	---
	7,5	103.44	Yes
	11,25	115.25	Yes
	15,00	102.47	Yes
	18,75	108.76	Yes
	22,50	108.93	Yes
	26,25	86.185	Yes
	30,00	100.68	Yes
	33,75	86.977	Yes
	37,50	106.722	Yes

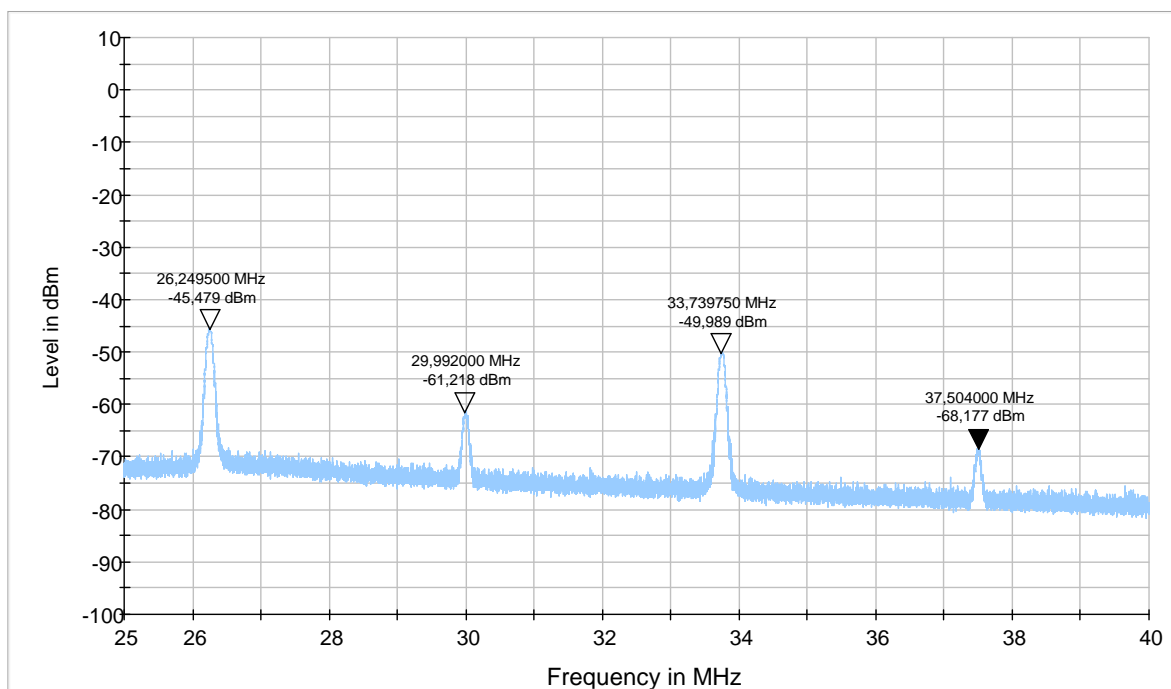
Magnetic field



Vertical polarization



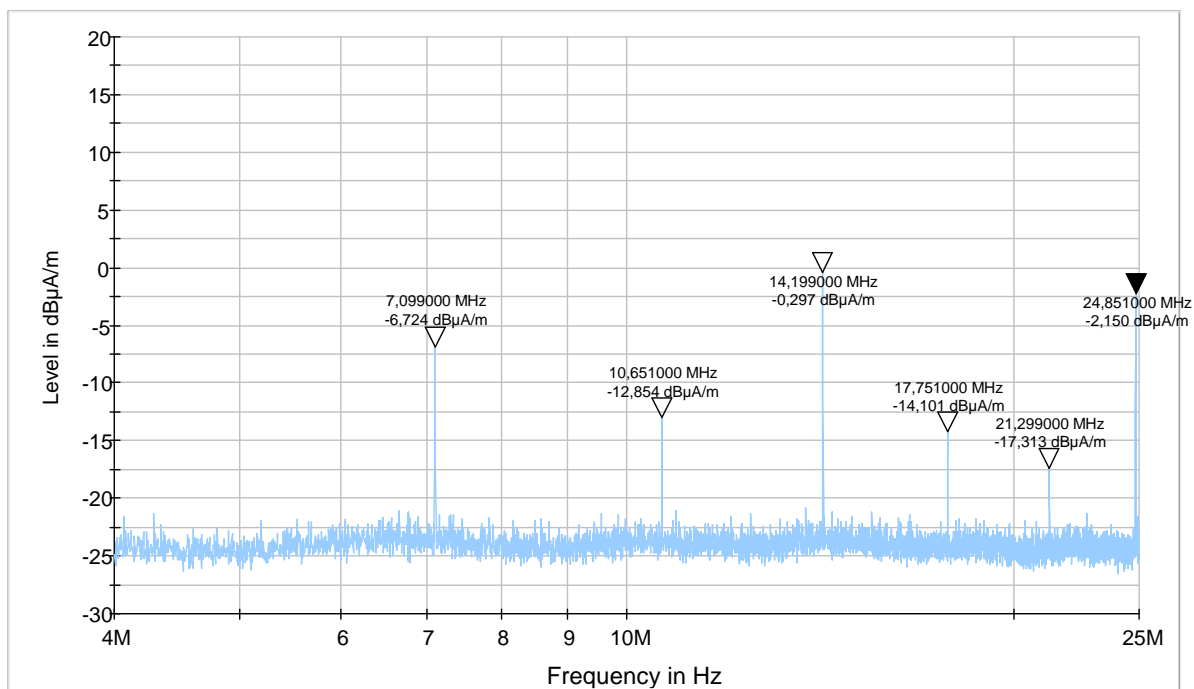
Horizontal polarization



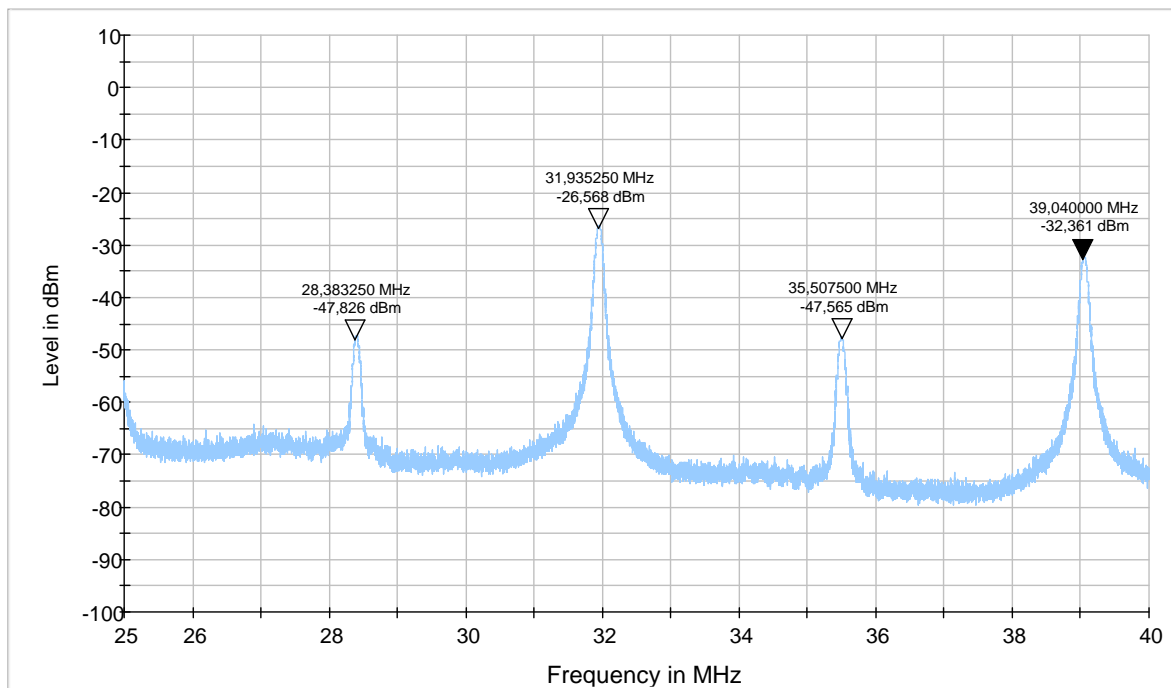
Frequency: 3.55MHz; Wavelength band:80m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
3,55	---	---	---
	7,10	104.550	Yes
	10,65	110.680	Yes
	14,20	98.130	Yes
	17,75	111.930	Yes
	21,30	115.14	Yes
	24,85	99.980	Yes
	28,40	101.926	Yes
	31,95	80.686	Yes
	35,50	101.665	Yes

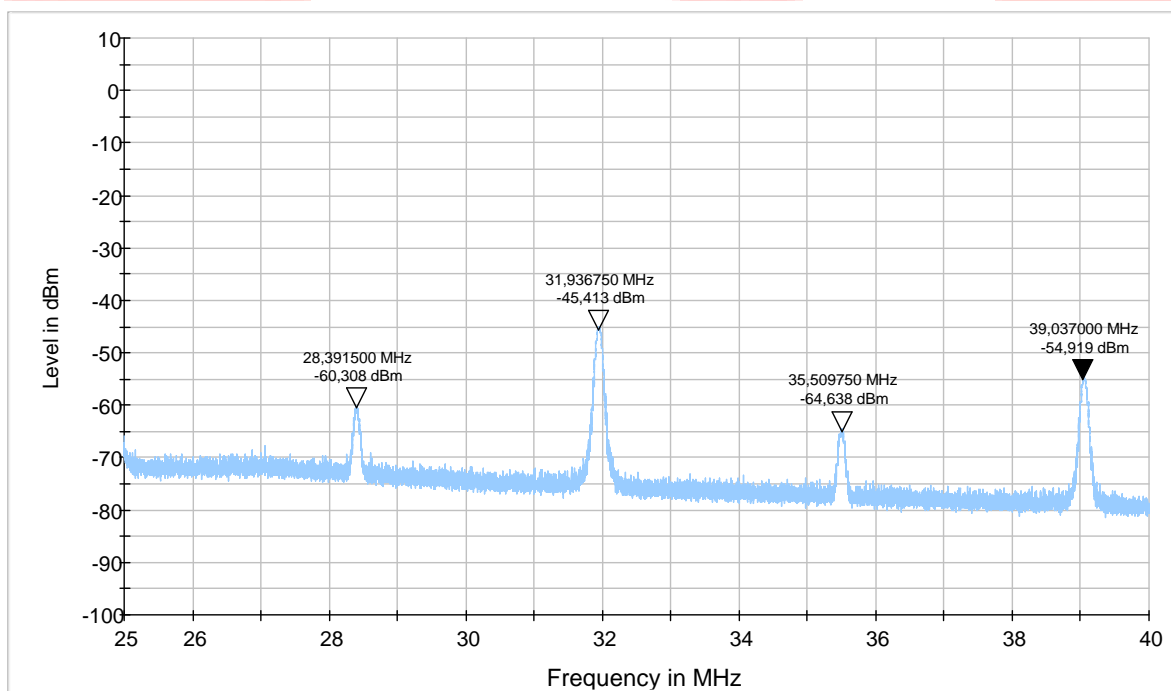
Magnetic field



Vertical polarization



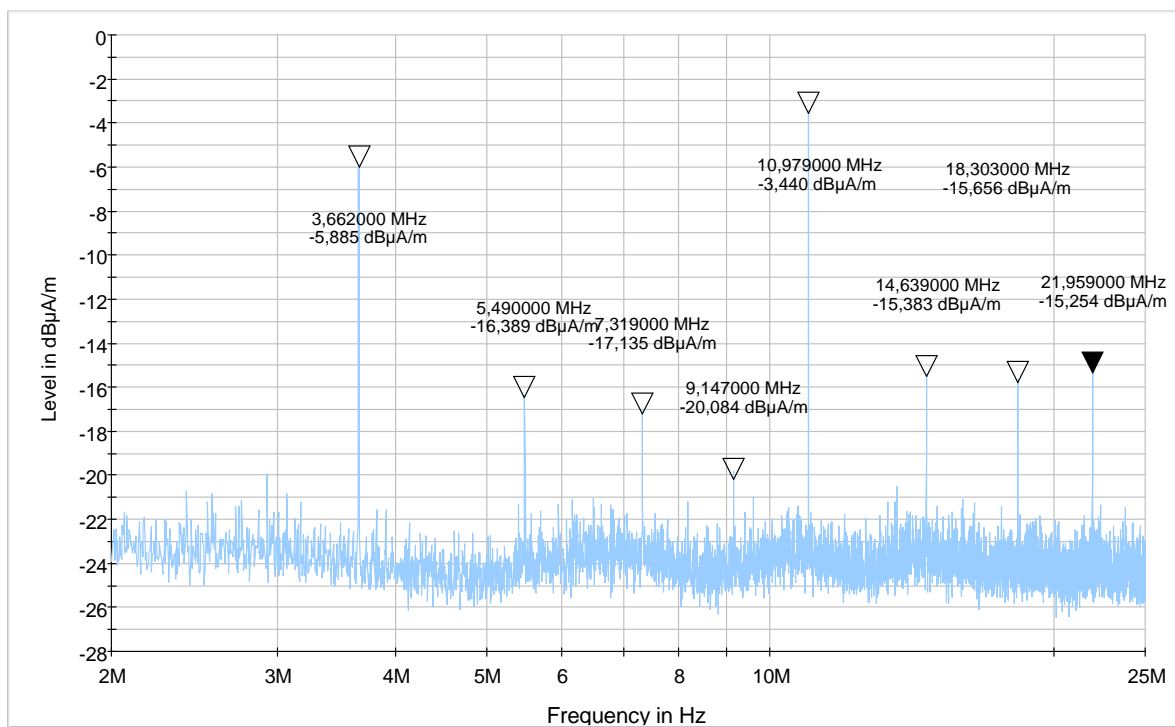
Horizontal polarization



Frequency 1,83MHz; Wavelength band:160m

Frequency (MHz)	Harmonics (MHz)	dB Below Main	>43dB Below
1,83	---	---	---
	3,66	103.510	Yes
	5,49	114.020	Yes
	7,32	114.770	Yes
	9,15	117.71	Yes
	10,98	101.070	Yes
	12,81	>120	Yes
	14,64	113.01	Yes
	16,47	>120	Yes
	18,30	113.290	Yes

Magnetic field



7 LIST OF EQUIPMENT USED

EQUIPMENT	IDENTIFICATION NUMBER	CAL. DUE
POWER METER	EMC.359	JEN.2015
VOLTAGE GENERATOR	EMC.397	MAR.2015
SPECTRUM ANALYZER	EMC.332	APR.2015
RF GENERATOR	--	--
SEMI ANECHOIC CHAMBER	EMC.191	MAR.2015
EMI RECEIVER	EMC.359	SEPT.2015
ANTENNA	EMC.022	MAY.2015