

**CETECOM™****CETECOM ICT Services**
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-9103/14-01-03-A

Deutsche
Akkreditierungsstelle
D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH

Untertuerkheimer Strasse 6 – 10

66117 Saarbruecken / Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

Internet: <http://www.cetecom.com>e-mail: ict@cetecom.com**Accredited Testing Laboratory:**

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

Applicant

Wisycor SRL

Via Spin, 156

36060 Romano D'Ezzelino - Vicenza / ITALY

Phone: +39 04 24 38 26 05

Fax: +39 04 24 38 27 33

Contact: Nadia Sbrissa

e-mail: support@wisycor.com

Phone: +39 04 24 38 26 05

Manufacturer

Wisycor SRL

Via Spin, 156

36060 Romano D'Ezzelino - Vicenza / ITALY

Test standard/s

47 CFR Part 74

Title 47 of the Code of Federal Regulations; Chapter I

Part 74 - Experimental radio, auxiliary. special broadcast and other program distribution services

RSS – 210 Issue 8
Amendment 1

Licence-Exempt, Low-Power Radio Apparatus Operating in the Television Bands

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: Dual Transmitter**Model name:** MTK952N-2W0-US**FCC ID:** POUMTK952N-2W0**IC:** 11967A-MTK952N2W0

Frequency: 470 MHz to 608 MHz and 614 MHz to 698 MHz

Technology tested: Proprietary

Antenna: External antenna

Power supply: 120 V AC

Temperature range: -10°C to +55°C



This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:

p.o.

Stefan BöS
Radio Communications & EMC

Test performed:

David Lang
Radio Communications & EMC

1 Table of contents

1	Table of contents	2
2	General information	3
2.1	Notes and disclaimer	3
2.2	Application details	3
3	Test standard/s	3
4	Test environment	4
5	Test item	4
5.1	Additional information	4
6	Test laboratories sub-contracted	4
7	Description of the test setup	5
7.1	Radiated measurements	5
7.1	Conducted measurements	6
8	Summary of measurement results	7
8.1	Additional comments	8
9	Measurement results	9
9.1	Output power (conducted)	9
9.2	Frequency stability	11
9.2.1	Frequency error vs. temperature	11
9.2.2	Frequency error vs. voltage	19
9.3	Modulation characteristics	23
9.4	Occupied bandwidth	25
9.5	Unwanted radiation (spectrum mask)	39
9.6	Field strength of spurious radiation (radiated)	52
9.7	Field strength of spurious radiation (conducted)	56
10	Test equipment and ancillaries used for tests	68
11	Observations	68
Annex A	Document history	69
Annex B	Further information	69
Annex C	Accreditation Certificate	70

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

The testing service provided by CETECOM ICT Services GmbH has been rendered under the current "General Terms and Conditions for CETECOM ICT Services GmbH".

CETECOM ICT Services GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.

Under no circumstances does the CETECOM ICT Services GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.

Under no circumstances does the CETECOM ICT Services GmbH test report include or imply any product or service warranties from CETECOM ICT Services GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CETECOM ICT Services GmbH.

All rights and remedies regarding vendor's products and services for which CETECOM ICT Services GmbH has prepared this test report shall be provided by the party offering such products or services and not by CETECOM ICT Services GmbH.

In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

This test report replaces the test report with the number 1-9103/14-01-03 and dated 2015-03-13

2.2 Application details

Date of receipt of order:	2014-12-19
Date of receipt of test item:	2015-03-02
Start of test:	2015-03-02
End of test:	2015-03-11
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 74	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 74 - Experimental radio, auxiliary. special broadcast and other program distribution services
RSS – 210 Issue 8 Amendment 1	05.02.2015	Licence-Exempt, Low-Power Radio Apparatus Operating in the Television Bands

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	+55 °C during high temperature tests
	T_{min}	-10 °C during low temperature tests
Relative humidity content:		51 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	120 V AC
	V_{max}	138 V
	V_{min}	102 V

5 Test item

Kind of test item	:	Dual Transmitter
Type identification	:	MTK952N-2W0-US
S/N serial number	:	T4847680
HW hardware status	:	6
SW software status	:	Boot:0.8.d – App: 0.133.d- DSP: 0.85.r
Frequency band [MHz]	:	470 MHz to 608 MHz and 614 MHz to 698 MHz
Type of radio transmission	:	Modulated carrier
Use of frequency spectrum	:	
Type of modulation	:	FM
Antenna	:	External antenna
Power supply	:	120 V AC
Temperature range	:	-10°C to +55 °C

5.1 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

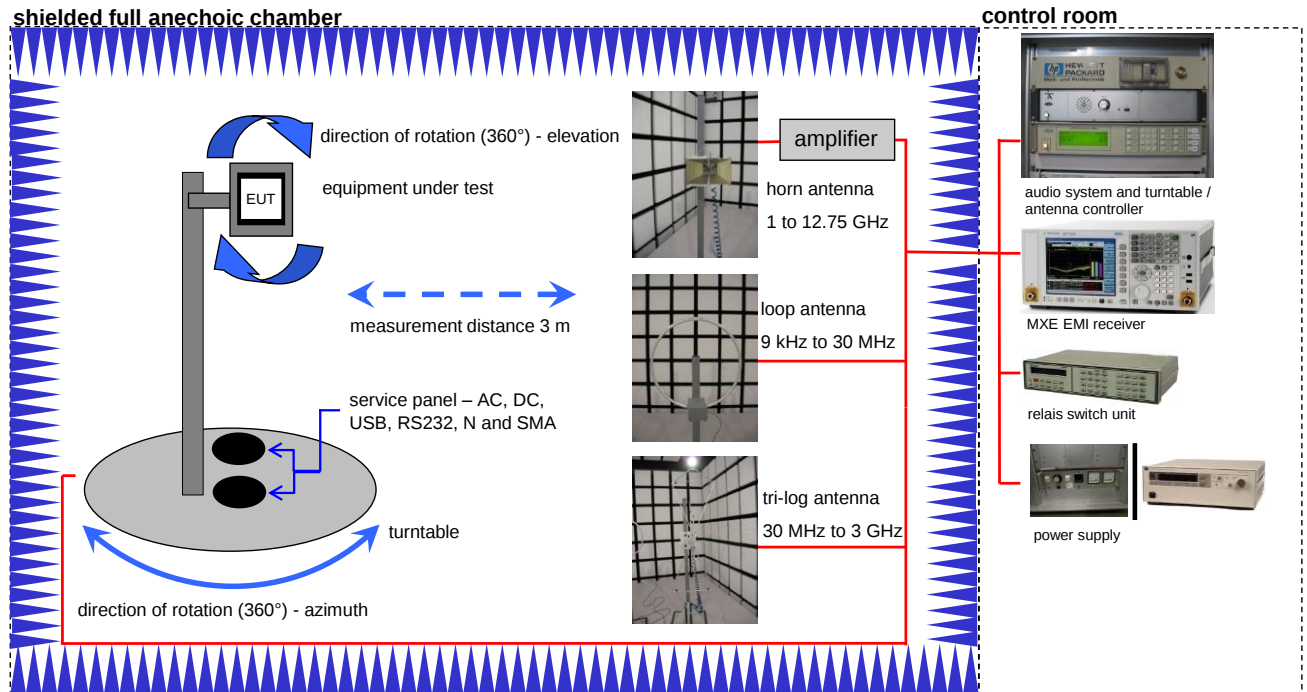
Test setup- and EUT-photos are included in test report: 1-9103/14-01-01_AnnexA
 1-9103/14-01-01_AnnexB
 1-9103/14-01-01_AnnexC

6 Test laboratories sub-contracted

None

7 Description of the test setup

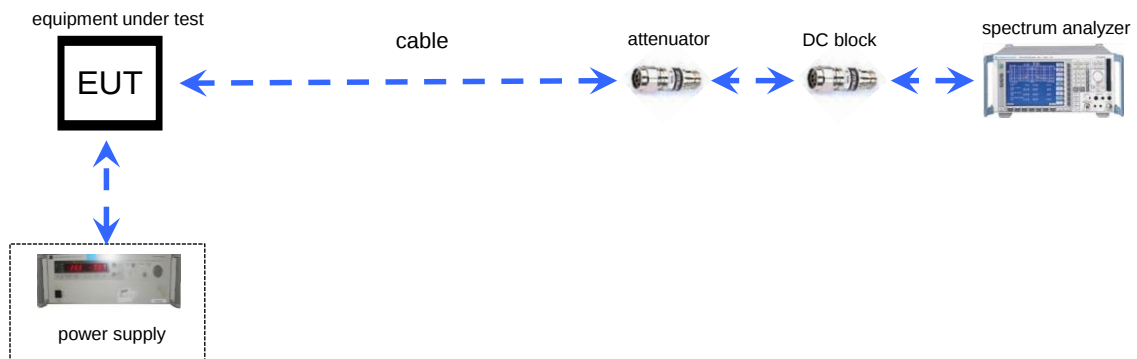
7.1 Radiated measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

7.1 Conducted measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Signal Analyzer 20Hz-26.5GHz-150 to + 30 DBM	FSiQ26	R&S	835111/0004	300002678
EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059
Spectrum Analyzer 9kHz to 30GHz -140..+30dBm	FSP30	R&S	100886	300003575

8 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained



This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	FCC 47 CFR § 74.861 RSS-123 Issue 2	See table	2015-04-10	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Remark
FCC 47 CFR § 74.861 (e)(1)(ii) RSS-123 §6.2 Issue 2	Output power	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 74.861 RSS-123 §7 Issue 2	Frequency stability	Nominal	Extreme	☒	☐	☐	☐	-/-
		Extreme	Nominal	☒	☐	☐	☐	
FCC 47 CFR § 2.1049 § 74.861	Modulation characteristics	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 2.1049 § 74.861 RSS-123 §6 Issue 2	Occupied bandwidth	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 74.861	Unwanted radiation (spectrum mask)	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 74 RSS-123 Issue 2	Field strength of spurious radiation Transmitter unwanted emissions	Nominal	Nominal	☒	☐	☐	☐	-/-
FCC 47 CFR § 15.209 RSS-123 Issue 2	Receiver spurious emissions (radiated)	Nominal	Nominal	☐	☐	☒	☐	-/-

Note: NA = Not Applicable; NP = Not Performed

8.1 Additional comments

Reference documents: None

Special test descriptions: set-up The EUT contains two identical transmitters which have been tested as of the table below.

Test setups:

Setup	Transmitter	Modulation	Remarks
A	2	ENR-Wisy, ENR-Wisy Stereo	-/-
B	1+2	ENR-Wisy, ENR-Wisy Stereo	Two transmitters simultaneously via combiner.

Configuration descriptions: Power Setting: 250mW
Modulation type: ENR-Wisy & ENR-Wisy Stereo

9 Measurement results

9.1 Output power (conducted)

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	5 MHz
Trace-Mode:	Max. hold

Limits:

FCC	IC
47 CFR § 74.861 (e)(1)(ii)	RSS-123 §6.2 Issue 2
Maximum transmitter power	
470-608 and 614-698MHz bands - 250mW (24 dBm)	

Result Setup A (Transmitter 2):

ENR-Wisy modulation:

Frequency	Conducted output power
470.1 MHz	23.3 dBm
539.0 MHz	23.4 dBm
607.9 MHz	23.8 dBm
614.1 MHz	23.3 dBm
626.6 MHz	23.7 dBm
697.9 MHz	23.1 dBm

ENR-Wisy Stereo modulation:

Frequency	Conducted output power
470.1 MHz	23.0 dBm
539.0 MHz	22.9 dBm
607.9 MHz	23.0 dBm
614.1 MHz	23.1 dBm
626.6 MHz	23.0 dBm
697.9 MHz	22.9 dBm

Result Setup B (Transmitter 1)

ENR-Wisy modulation:

Frequency	Conducted output power
470.1 MHz	23.1 dBm
539.0 MHz	22.7 dBm
607.9 MHz	22.9 dBm
614.1 MHz	22.9 dBm
626.6 MHz	22.7 dBm
697.9 MHz	22.5 dBm

ENR-Wisy Stereo modulation:

Frequency	Conducted output power
470.1 MHz	23.1 dBm
539.0 MHz	22.7 dBm
607.9 MHz	22.8 dBm
614.1 MHz	22.8 dBm
626.6 MHz	22.7 dBm
697.9 MHz	22.3 dBm

Result Setup B (Transmitter 2)

ENR-Wisy modulation:

Frequency	Conducted output power
470.1 MHz	23.1 dBm
539.0 MHz	22.9 dBm
607.9 MHz	23.4 dBm
614.1 MHz	22.9 dBm
626.6 MHz	23.2 dBm
697.9 MHz	22.6 dBm

ENR-Wisy Stereo modulation:

Frequency	Conducted output power
470.1 MHz	23.5 dBm
539.0 MHz	22.7 dBm
607.9 MHz	23.3 dBm
614.1 MHz	23.2 dBm
626.6 MHz	22.9 dBm
697.9 MHz	22.9 dBm

Verdict: **Passed**

9.2 Frequency stability

9.2.1 Frequency error vs. temperature

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 Hz
Video bandwidth:	100 Hz
Span:	1 kHz
Trace-Mode:	Max. hold
Voltage (nominal):	120 V

Limits:

FCC	IC
47 CFR § 74.861	RSS-123 §7 Issue 2
The frequency tolerance of the transmitter shall be 0.005 percent (50ppm)	

Results Setup B (Transmitter 1):

470.1 MHz

Temperature	Deviation (Hz)	Deviation (ppm)
-30 °C	-1	0.00
-20 °C	10	0.02
-10 °C	16	0.03
0 °C	127	0.27
10 °C	188	0.40
20 °C	86	0.18
30 °C	-84	-0.18
40 °C	-40	-0.09
50 °C	-39	-0.08

539.0 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	75	0.14
-20 °C	75	0.14
-10 °C	69	0.13
0 °C	178	0.33
10 °C	234	0.43
20 °C	113	0.21
30 °C	-49	-0.09
40 °C	-60	-0.11
50 °C	10	0.02

607.9 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	152	0.25
-20 °C	141	0.23
-10 °C	151	0.25
0 °C	229	0.38
10 °C	278	0.46
20 °C	143	0.24
30 °C	-15	-0.02
40 °C	-24	-0.04
50 °C	-47	-0.08

614.1 MHz

Temperature	Frequency (MHz)	Deviation (kHz / ppm)
-30 °C	156	0.25
-20 °C	146	0.24
-10 °C	124	0.20
0 °C	244	0.40
10 °C	281	0.46
20 °C	141	0.23
30 °C	-12	-0.02
40 °C	-22	-0.04
50 °C	-50	-0.08

626.6 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	181	0.29
-20 °C	157	0.25
-10 °C	127	0.20
0 °C	249	0.40
10 °C	293	0.47
20 °C	143	0.23
30 °C	-6	-0.01
40 °C	-13	-0.02
50 °C	-57	-0.09

697.9 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	176	0.25
-20 °C	228	0.33
-10 °C	178	0.26
0 °C	313	0.45
10 °C	339	0.49
20 °C	180	0.26
30 °C	31	0.04
40 °C	26	0.00
50 °C	100	0.14

Results Setup B (Transmitter 2):**470.1 MHz**

Temperature	Deviation (Hz)	Deviation (ppm)
-30 °C	58	0.12
-20 °C	68	0.14
-10 °C	78	0.17
0 °C	178	0.38
10 °C	239	0.51
20 °C	17	0.04
30 °C	-43	-0.09
40 °C	-95	-0.20
50 °C	-28	-0.06

539.0 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	141	0.26
-20 °C	143	0.27
-10 °C	138	0.26
0 °C	238	0.44
10 °C	294	0.55
20 °C	59	0.11
30 °C	11	0.02
40 °C	3	0.01
50 °C	1	0.00

607.9 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	225	0.37
-20 °C	217	0.36
-10 °C	230	0.38
0 °C	297	0.49
10 °C	346	0.57
20 °C	103	0.17
30 °C	54	0.09
40 °C	48	0.08
50 °C	122	0.20

614.1 MHz

Temperature	Frequency (MHz)	Deviation (kHz / ppm)
-30 °C	229	0.37
-20 °C	222	0.36
-10 °C	205	0.33
0 °C	316	0.51
10 °C	352	0.57
20 °C	110	0.18
30 °C	58	0.09
40 °C	49	0.08
50 °C	122	0.20

626.6 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	259	0.41
-20 °C	235	0.38
-10 °C	205	0.33
0 °C	316	0.50
10 °C	364	0.58
20 °C	126	0.20
30 °C	65	0.10
40 °C	59	0.09
50 °C	130	0.21

697.9 MHz

Temperature	Deviation (Hz)	Deviation (kHz / ppm)
-30 °C	330	0.47
-20 °C	317	0.45
-10 °C	265	0.38
0 °C	390	0.56
10 °C	417	0.60
20 °C	175	0.25
30 °C	110	0.16
40 °C	105	0.00
50 °C	177	0.25

Verdict: **Passed**

9.2.2 Frequency error vs. voltage

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 Hz
Video bandwidth:	100 Hz
Span:	1 kHz
Trace-Mode:	Max. hold
Temperature:	+20°C

Limits:

FCC	IC
47 CFR § 74.861	RSS-123 §7 Issue 2
The frequency tolerance of the transmitter shall be 0.005 percent (50ppm)	

Results Setup B (Transmitter 1):

470.1 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	94	0.20
120 V	86	0.18
138 V	82	0.17

539.0 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	111	0.21
120 V	113	0.21
138 V	115	0.21

607.9 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	149	0.25
120 V	143	0.24
138 V	141	0.23

614.1 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	139	0.23
120 V	141	0.23
138 V	143	0.23

626.6 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	143	0.23
120 V	143	0.23
138 V	142	0.23

697.9 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	180	0.26
120 V	180	0.26
138 V	183	0.26

Results Setup B (Transmitter 2):**470.1 MHz**

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	15	0.03
120 V	17	0.04
138 V	15	0.03

539.0 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	95	0.18
120 V	95	0.18
138 V	95	0.18

607.9 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	101	0.17
120 V	103	0.17
138 V	102	0.17

614.1 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	112	0.18
120 V	110	0.18
138 V	108	0.18

626.6 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	123	0.20
120 V	126	0.20
138 V	126	0.20

697.9 MHz

Voltage	Deviation (Hz)	Deviation (ppm)
102 V	176	0.25
120 V	175	0.25
138 V	173	0.25

Verdict: Passed

9.3 Modulation characteristics

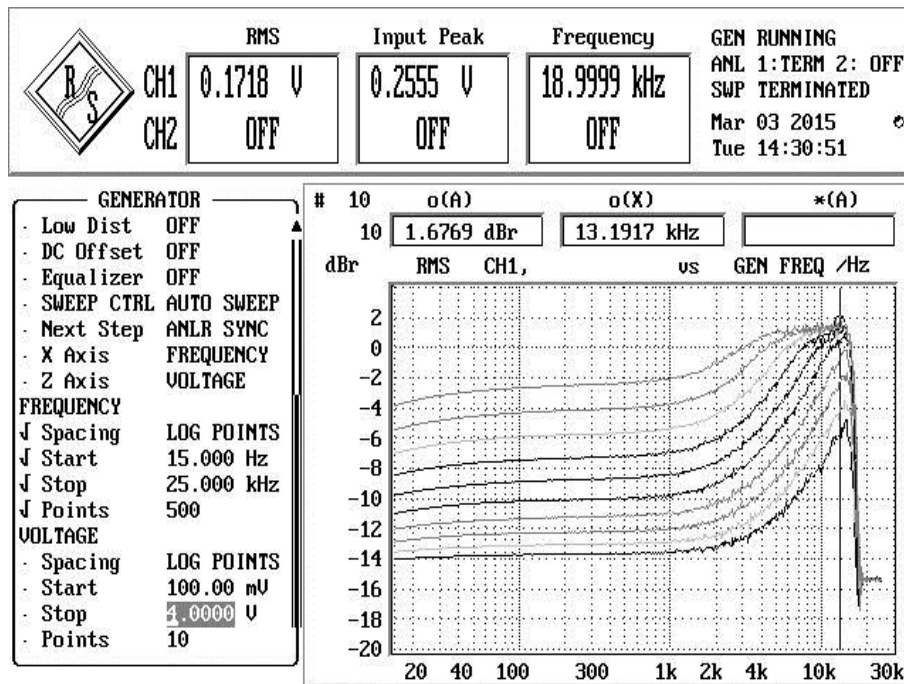
Measurement:

FCC	IC
47 CFR § 2.1047 47 CFR § 74.861	-/-

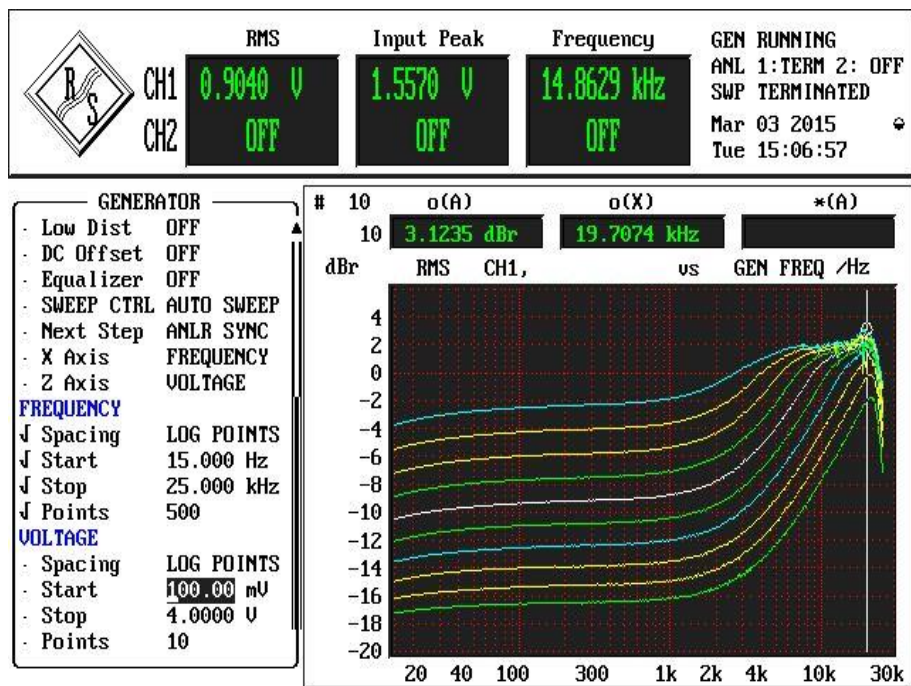
Method of measurement:

The audio frequency responds was measured in accordance with EIA/TIA 603. The plots shows 10 curves with different modulation levels, the frequency is varied from 15 Hz to 20 kHz.

ENR-Wisy modulation:



ENR-Wisy Stereo modulation:

Verdict: **Passed**

9.4 Occupied bandwidth**Measurement:**

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 kHz
Video bandwidth:	1 kHz
Span:	400 kHz
Trace-Mode:	Max. hold

Limits:

FCC	IC
47 CFR § 74.861	RSS-123 §6 Issue 2
Occupied bandwidth 99%. Other than single sideband or independent sideband transmitters - when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.	
The operating bandwidth shall not exceed 200 kHz	

Result Setup B (Transmitter 1):

ENR-Wispy modulation:

Frequency	20dB Bandwidth
407.1 MHz	118.6 kHz
539.0 MHz	118.6 kHz
607.9 MHz	119.4 kHz
614.1 MHz	119.4 kHz
626.6 MHz	119.4 kHz
697.9 MHz	119.4 kHz

ENR-Wisy Stereo modulation:

Frequency	20dB Bandwidth
407.1 MHz	97.8 kHz
539.0 MHz	99.4 kHz
607.9 MHz	109.0 kHz
614.1 MHz	107.4 kHz
626.6 MHz	109.0 kHz
697.9 MHz	109.0 kHz

Result Setup B (Transmitter 2):

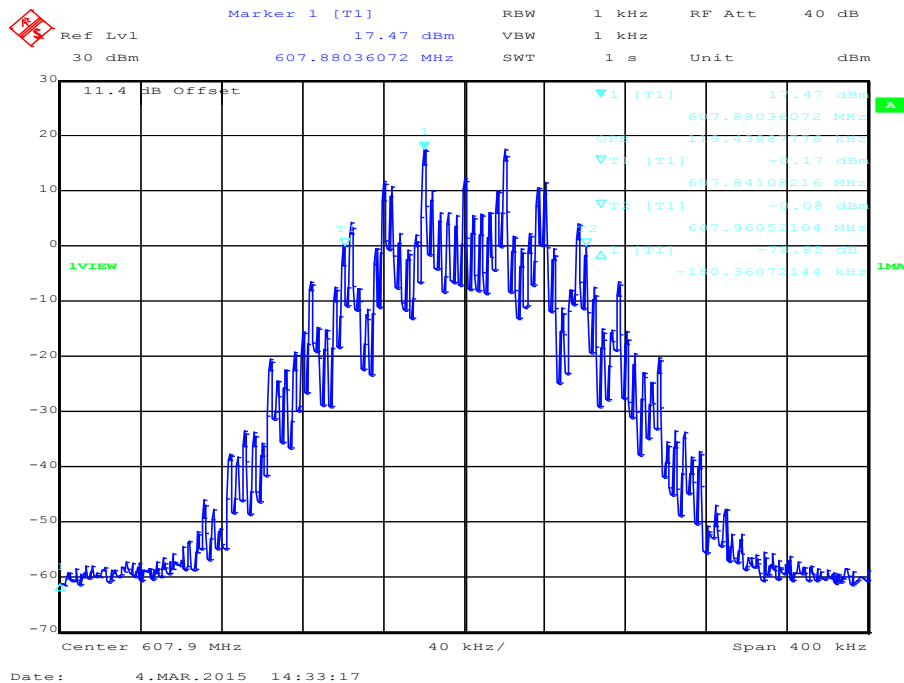
ENR-Wisy modulation:

Frequency	20dB Bandwidth
407.1 MHz	118.6 kHz
539.0 MHz	118.6 kHz
607.9 MHz	119.4 kHz
614.1 MHz	119.4 kHz
626.6 MHz	119.4 kHz
697.9 MHz	119.4 kHz

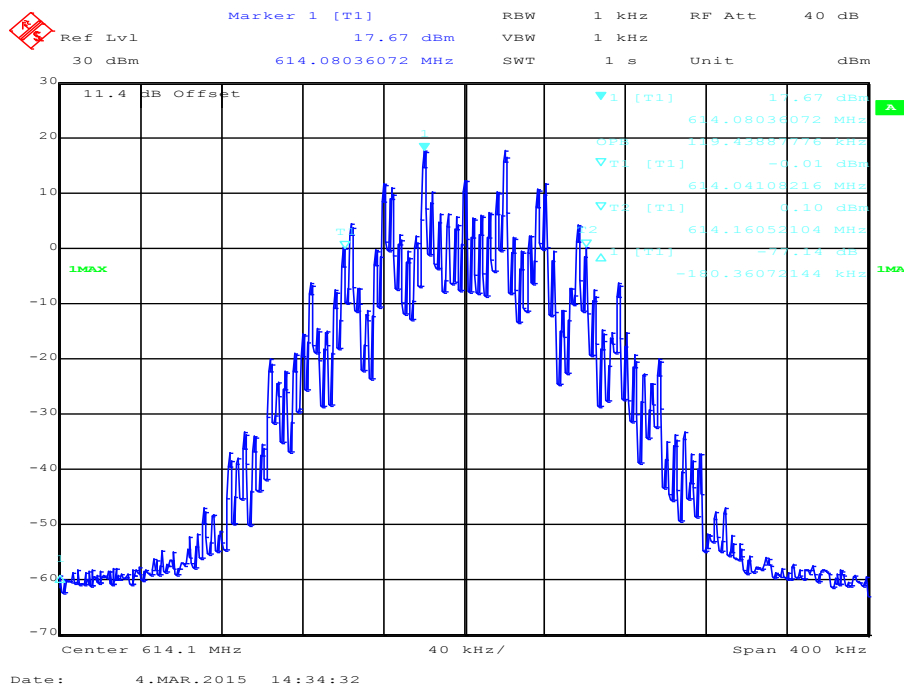
ENR-Wisy Stereo modulation:

Frequency	20dB Bandwidth
407.1 MHz	99.4 kHz
539.0 MHz	99.4 kHz
607.9 MHz	99.4 kHz
614.1 MHz	99.4 kHz
626.6 MHz	99.4 kHz
697.9 MHz	99.4 kHz

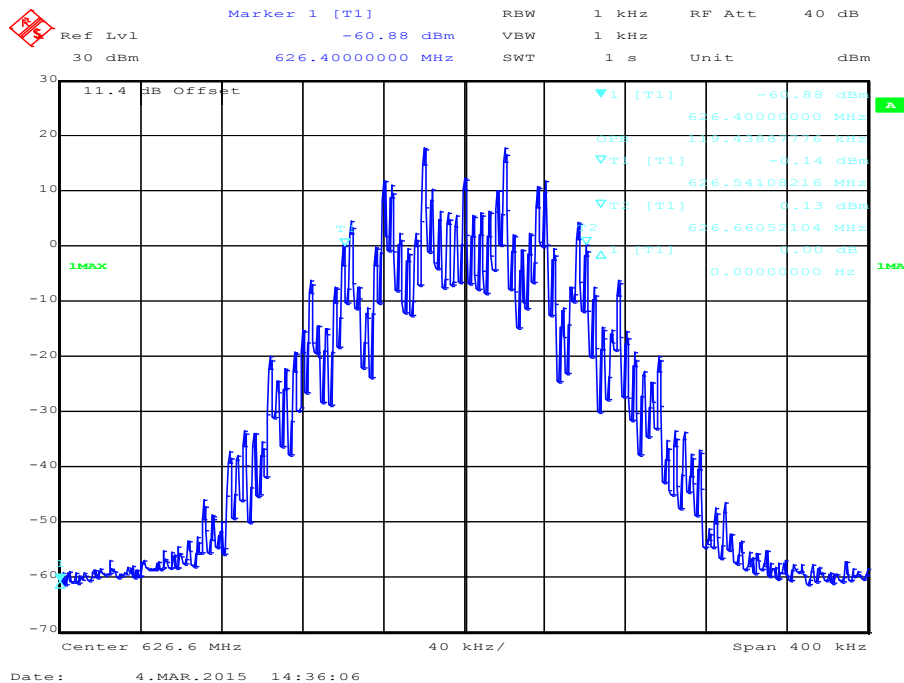
Plot 3: 607.9 MHz, ENR-Wispy modulation



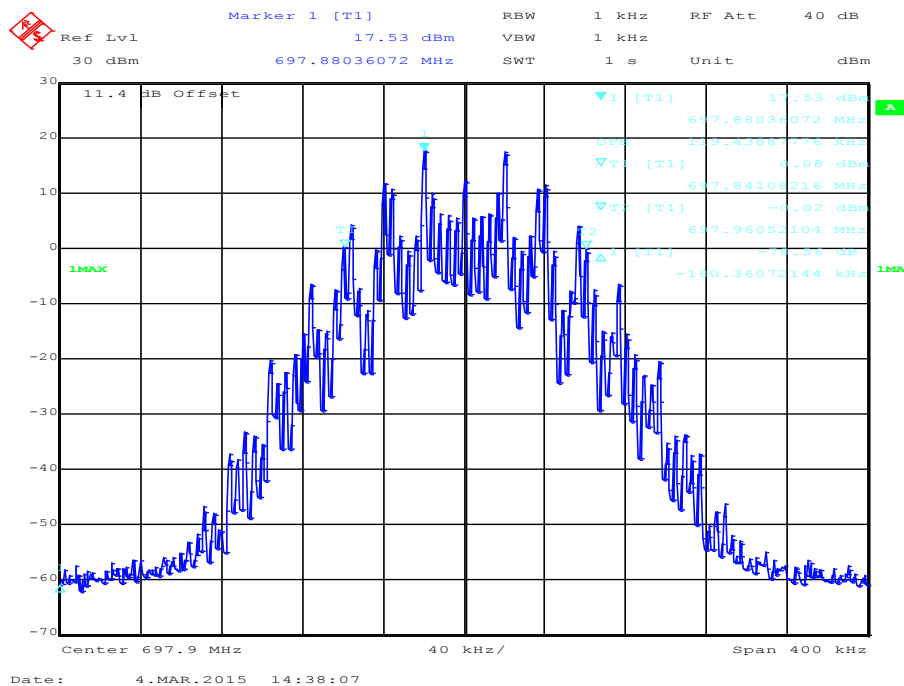
Plot 4: 614.1 MHz, ENR-Wispy modulation



Plot 5: 626.6 MHz, ENR-Wispy modulation

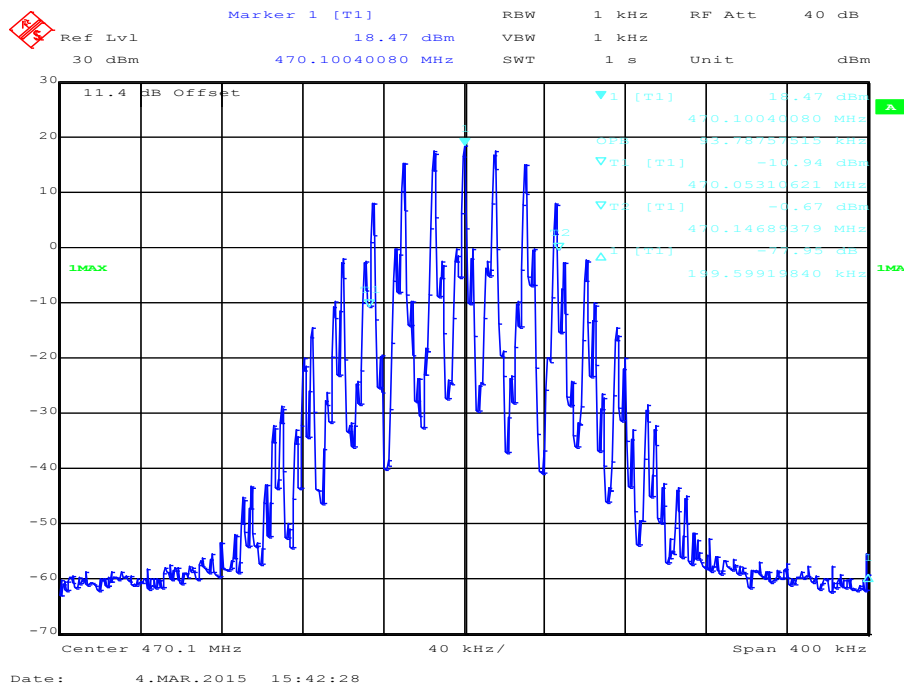


Plot 6: 697.9 MHz, ENR-Wispy modulation

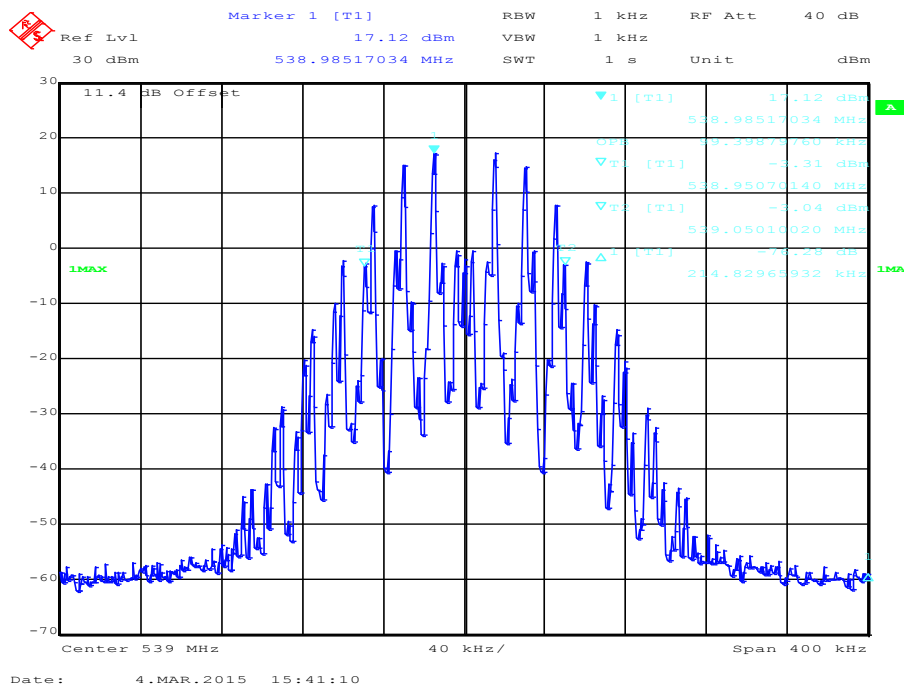


Plots of the measurements, Setup B (Transmitter 1):

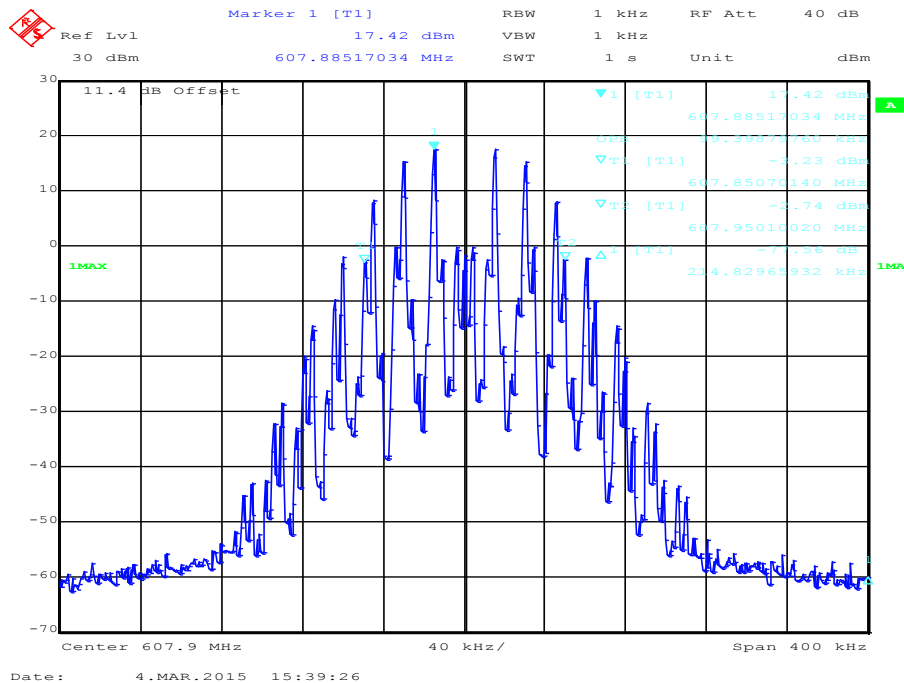
Plot 1: 470.1 MHz, ENR-Wispy Stereo modulation



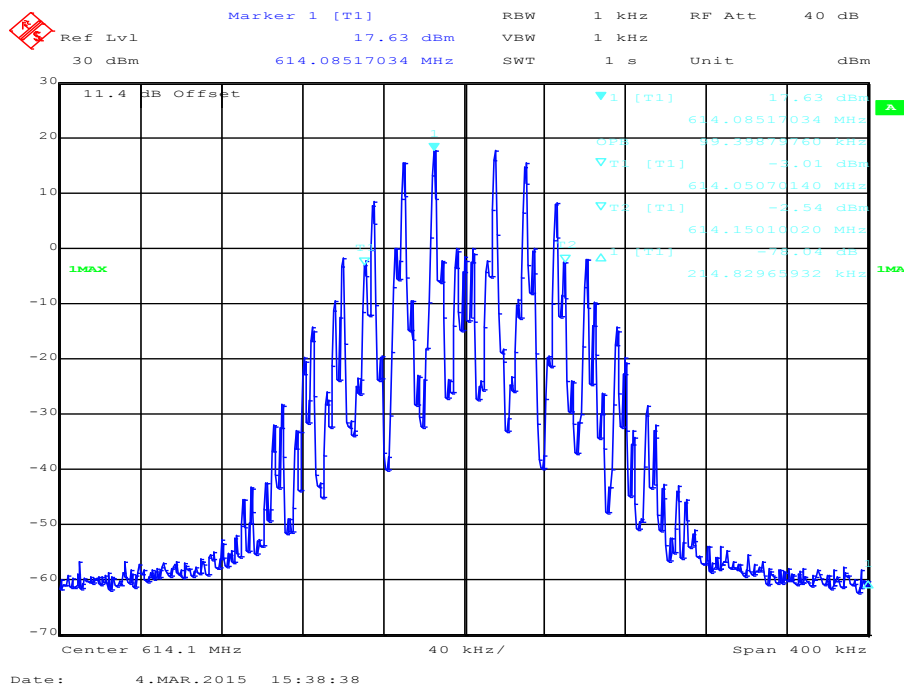
Plot 2: 539.0 MHz, ENR-Wispy Stereo modulation



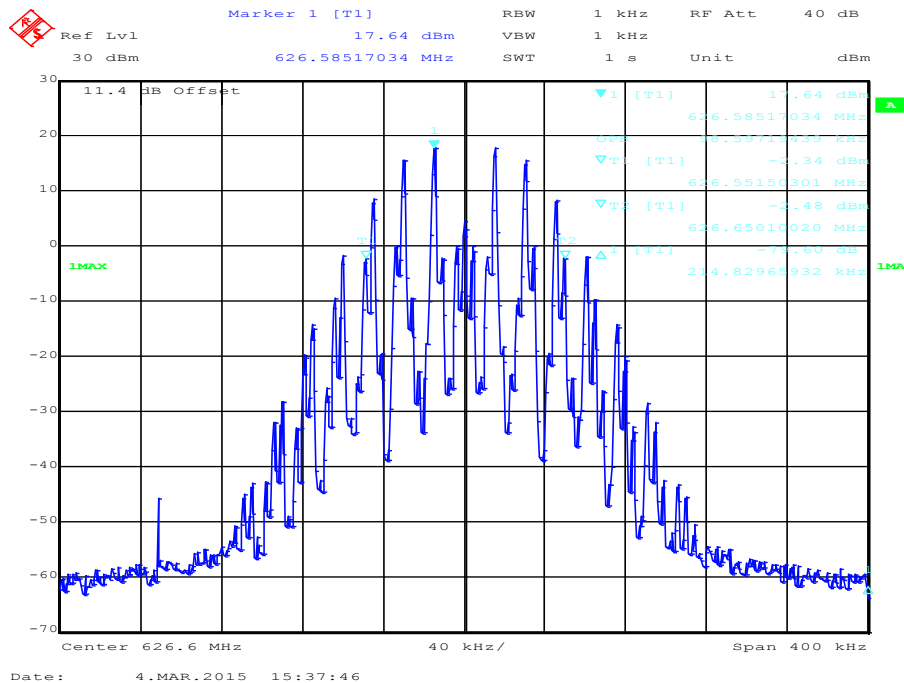
Plot 3: 507.9 MHz, ENR-Wispy Stereo modulation



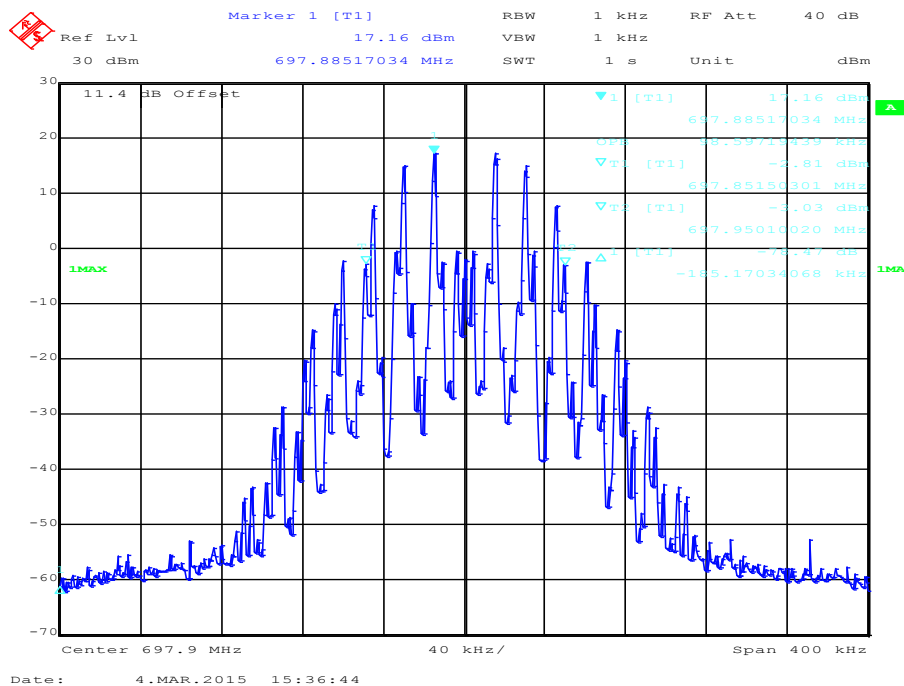
Plot 4: 614.1 MHz, ENR-Wispy Stereo modulation



Plot 5: 626.6 MHz, ENR-Wispy Stereo modulation

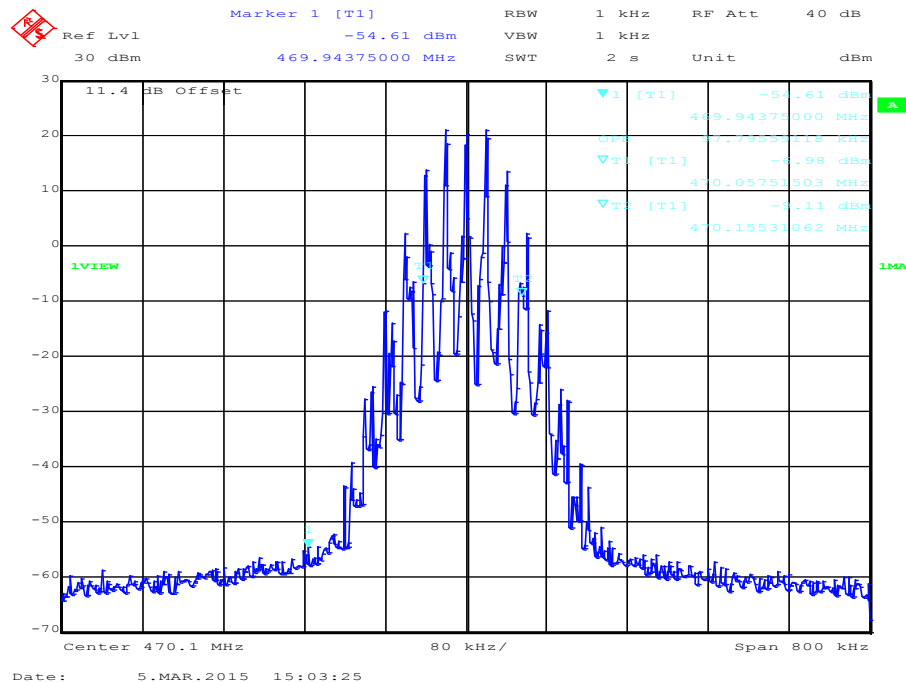


Plot 6: 697.9 MHz, ENR-Wispy Stereo modulation

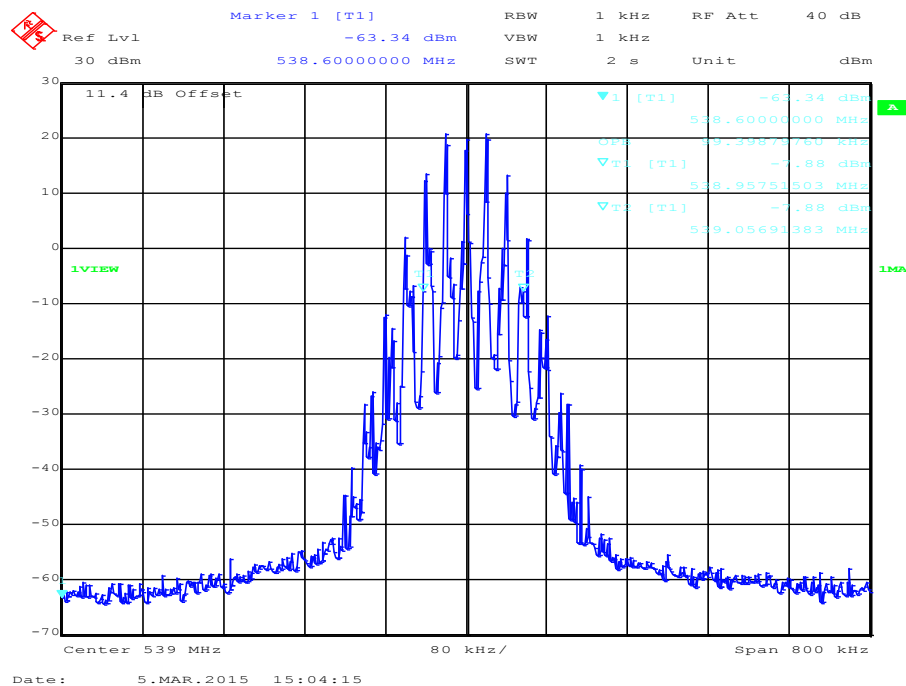


Plots of the measurements, Setup B (Transmitter 2):

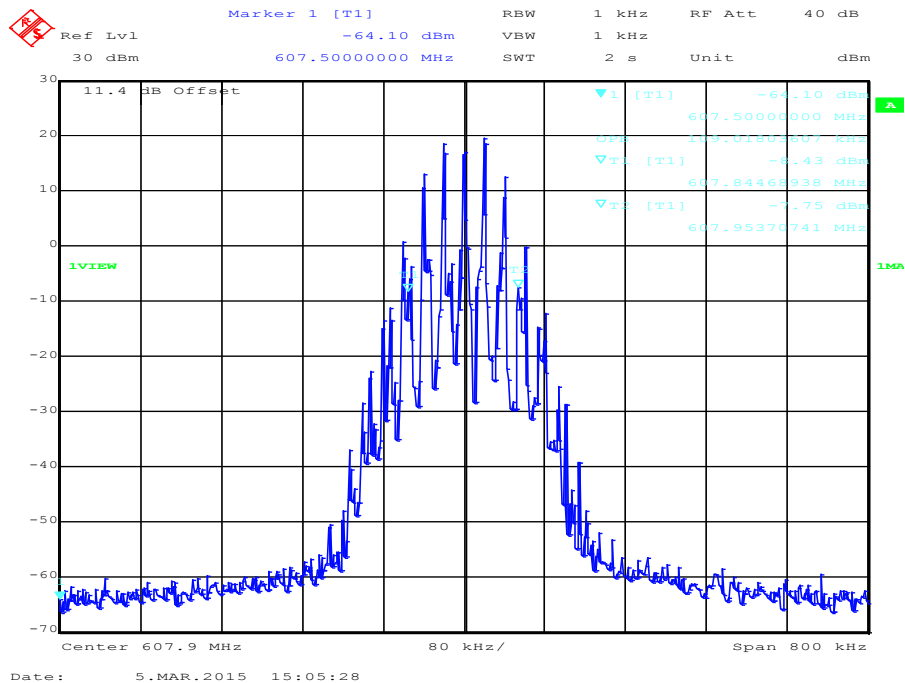
Plot 1: 470.1 MHz, ENR-Wispy modulation



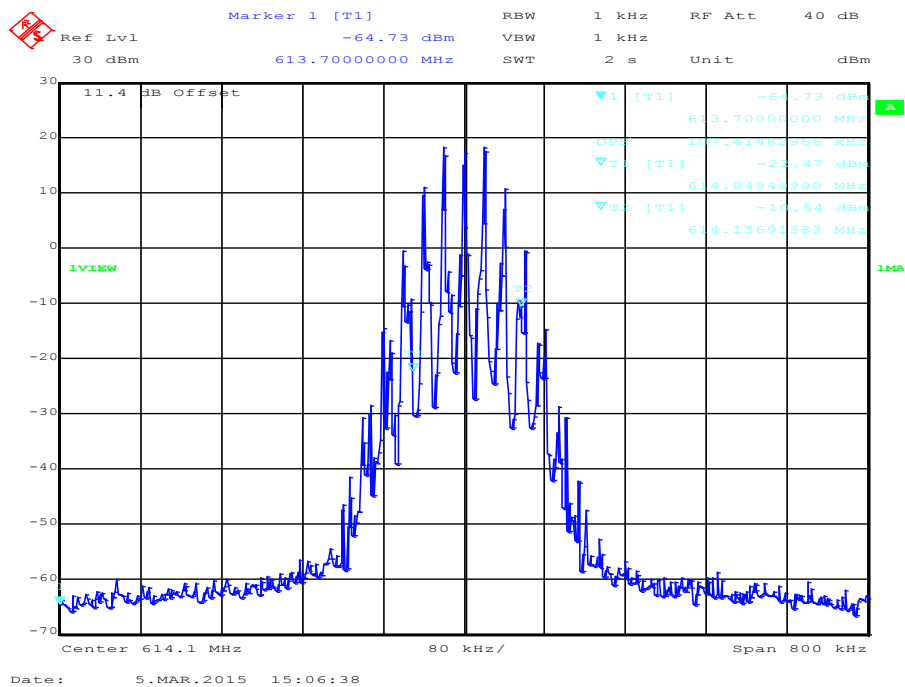
Plot 2: 539.0 MHz, ENR-Wispy modulation



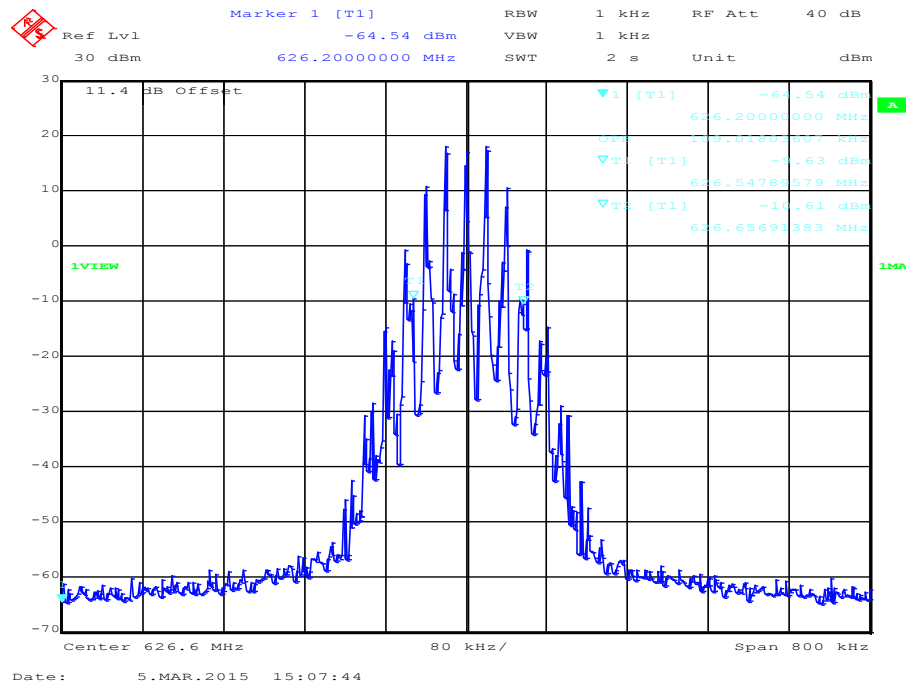
Plot 3: 607.9 MHz, ENR-Wispy modulation



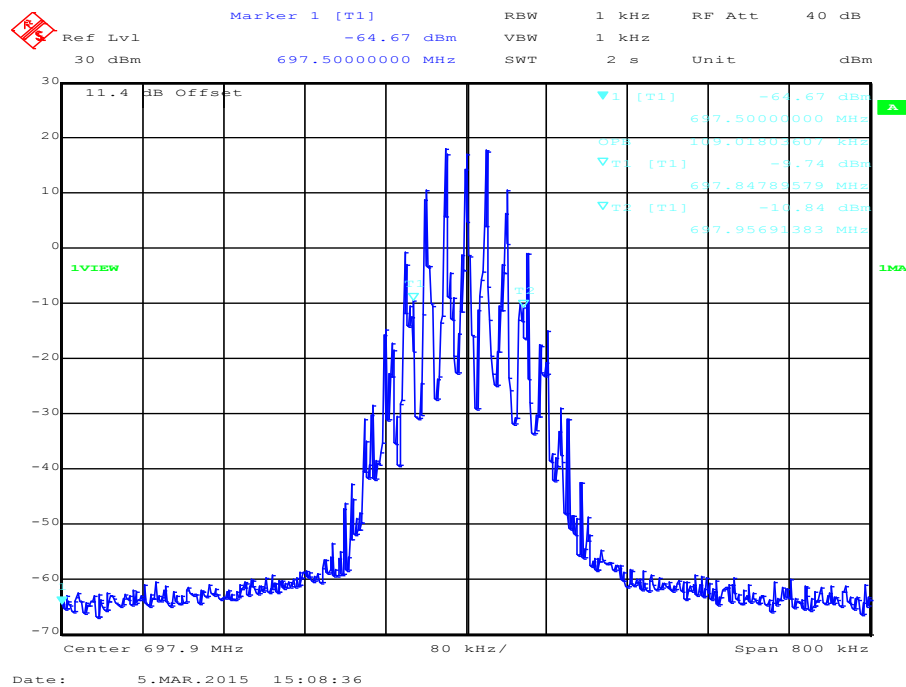
Plot 4: 614.1 MHz, ENR-Wispy modulation



Plot 5: 626.6 MHz, ENR-Wispy modulation

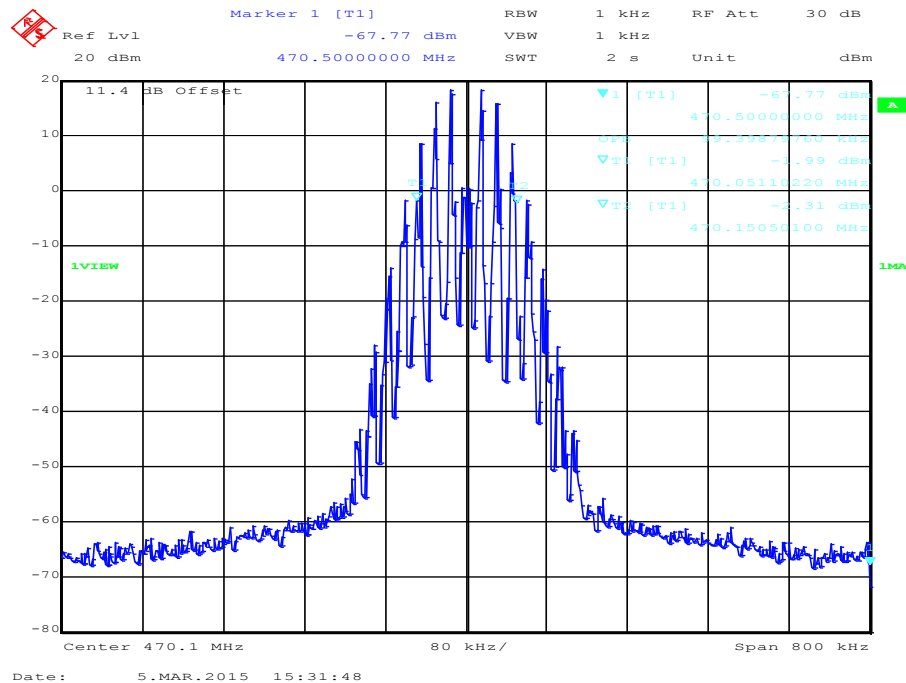


Plot 6: 697.9 MHz, ENR-Wispy modulation

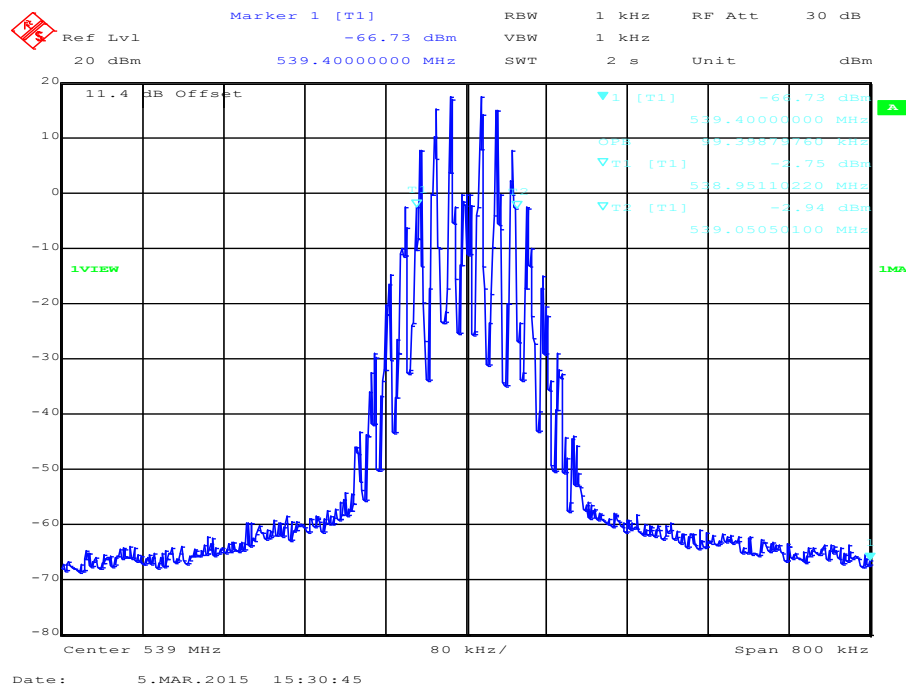


Plots of the measurements, Setup B (Transmitter 2):

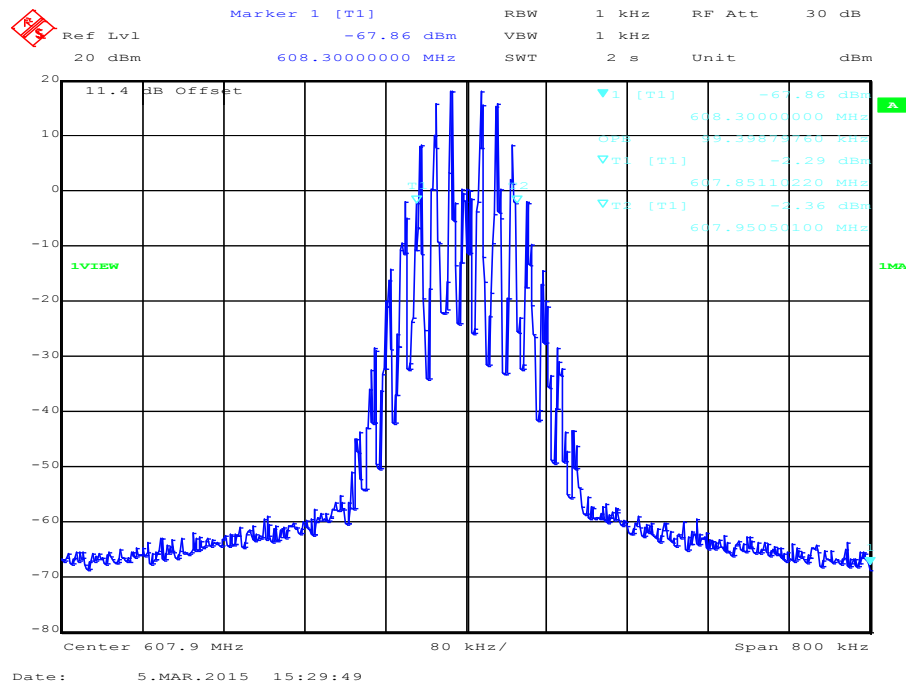
Plot 1: 470.1 MHz, ENR-Wispy Stereo modulation



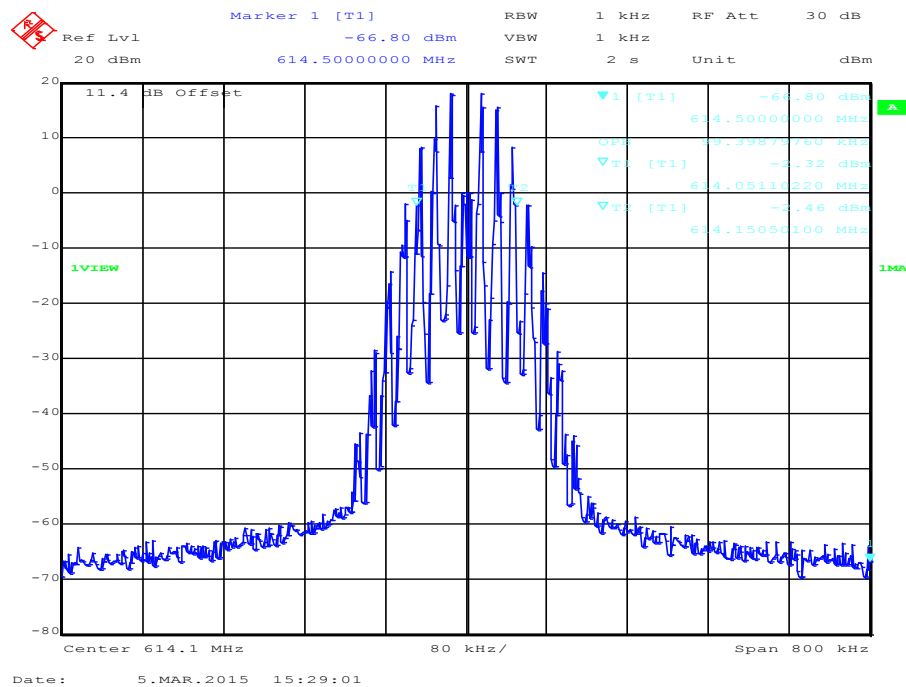
Plot 2: 539.0 MHz, ENR-Wispy Stereo modulation



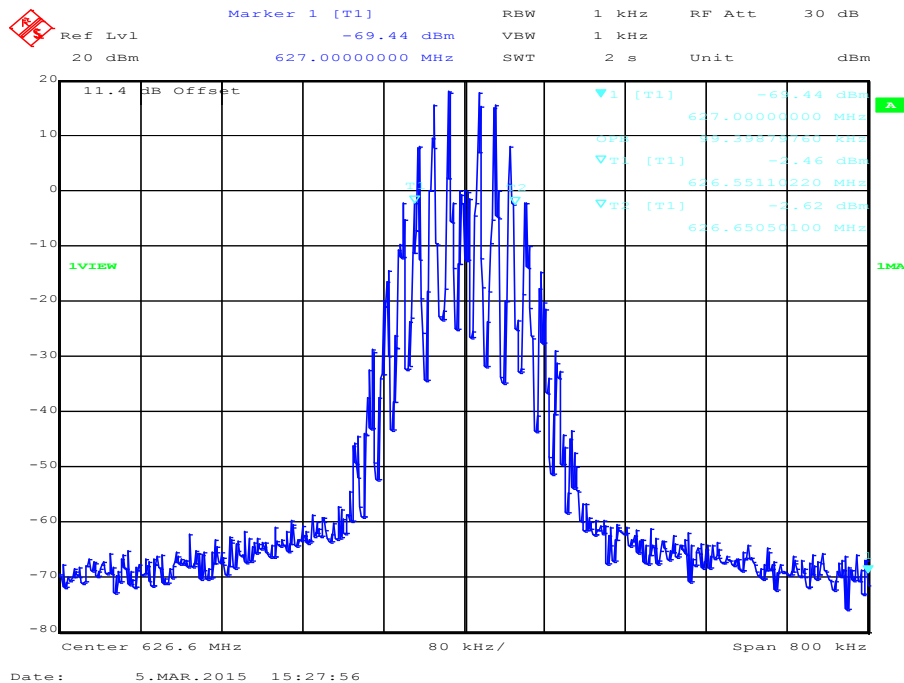
Plot 3: 507.9 MHz, ENR-Wisy Stereo modulation



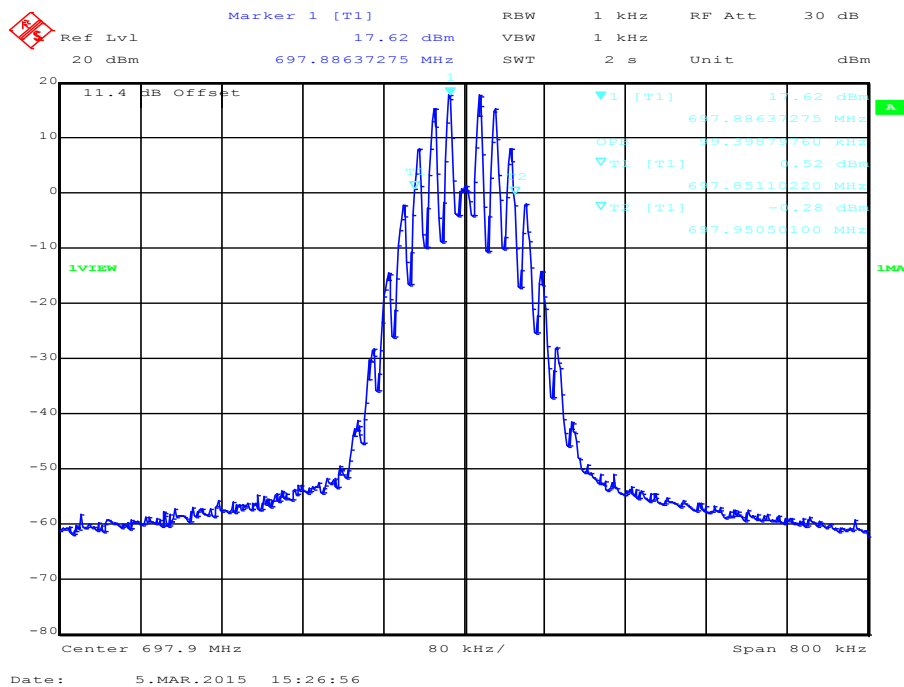
Plot 4: 614.1 MHz, ENR-Wisy Stereo modulation



Plot 5: 626.6 MHz, ENR-Wispy Stereo modulation



Plot 6: 697.9 MHz, ENR-Wispy Stereo modulation



9.5 Unwanted radiation (spectrum mask)**Measurement:**

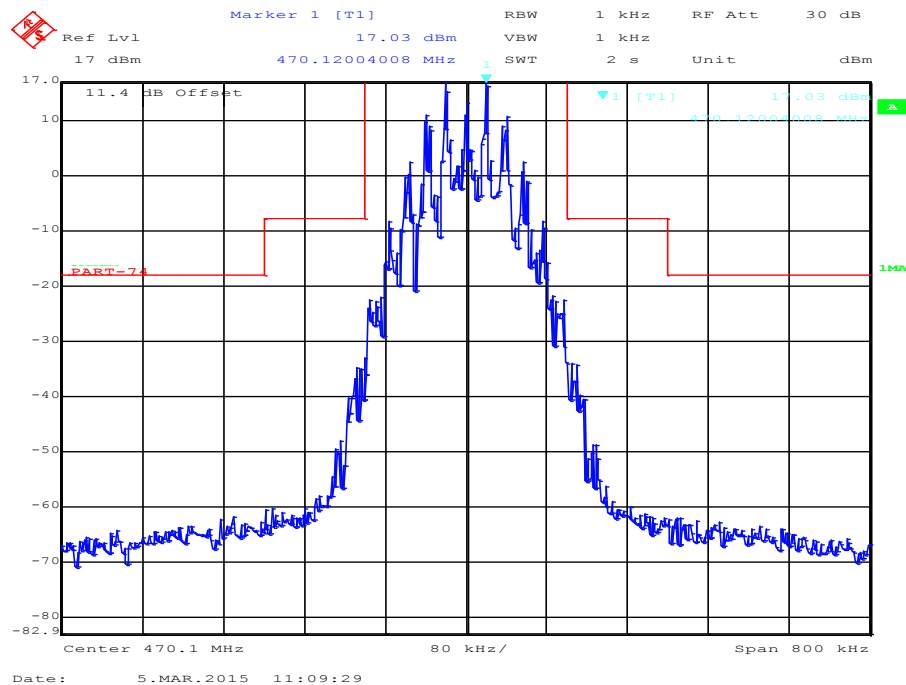
Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1-3 kHz
Video bandwidth:	1-3 kHz
Span:	800 kHz
Trace-Mode:	Max. hold

Limits:

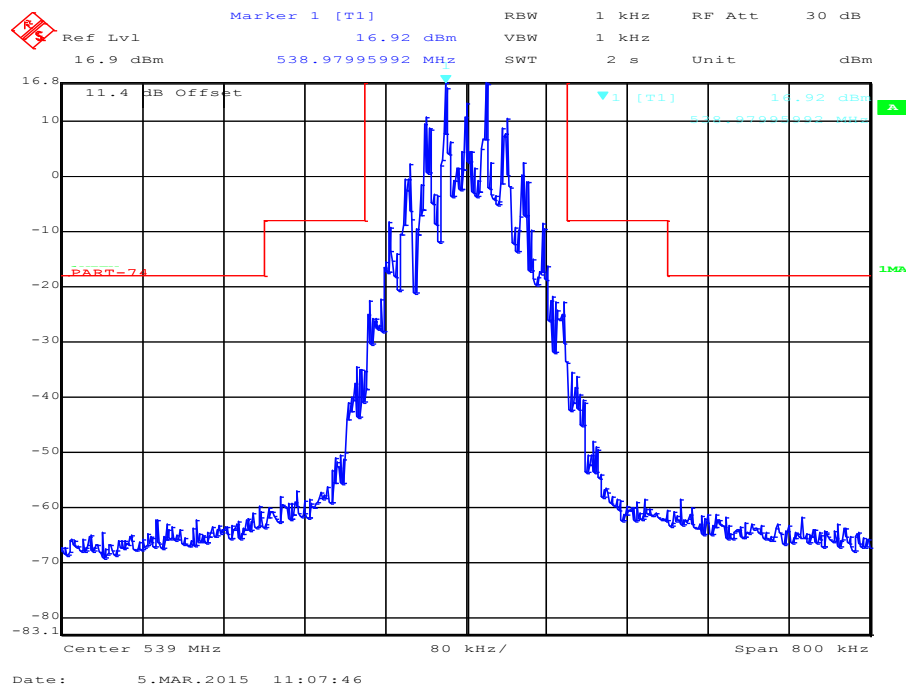
FCC	IC
47 CFR § 74.861	RSS-123 §5.5 Issue 2
The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule: (i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB; (ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB; (iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}$ (mean output power in watts) dB.	

Plots of the measurements, Setup B (Transmitter 1):

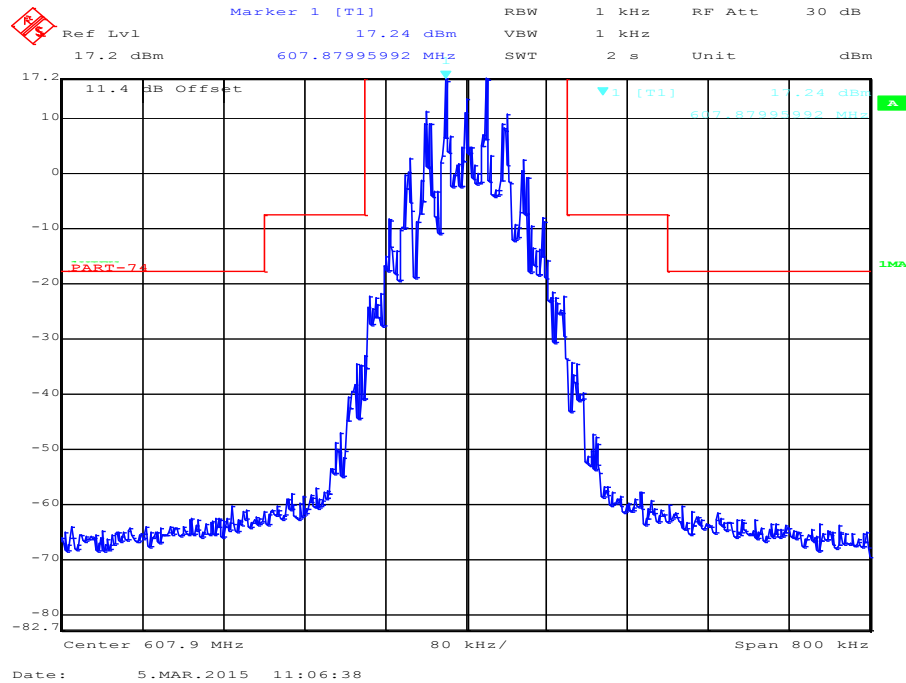
Plot 1: 470.1 MHz, ENR-Wispy modulation



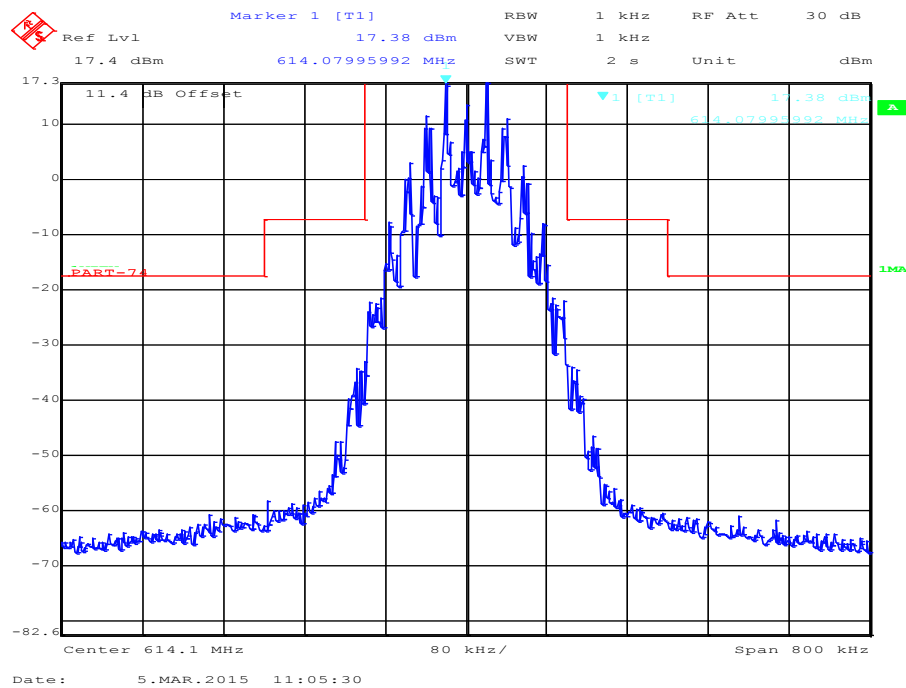
Plot 2: 539.0 MHz, ENR-Wispy modulation



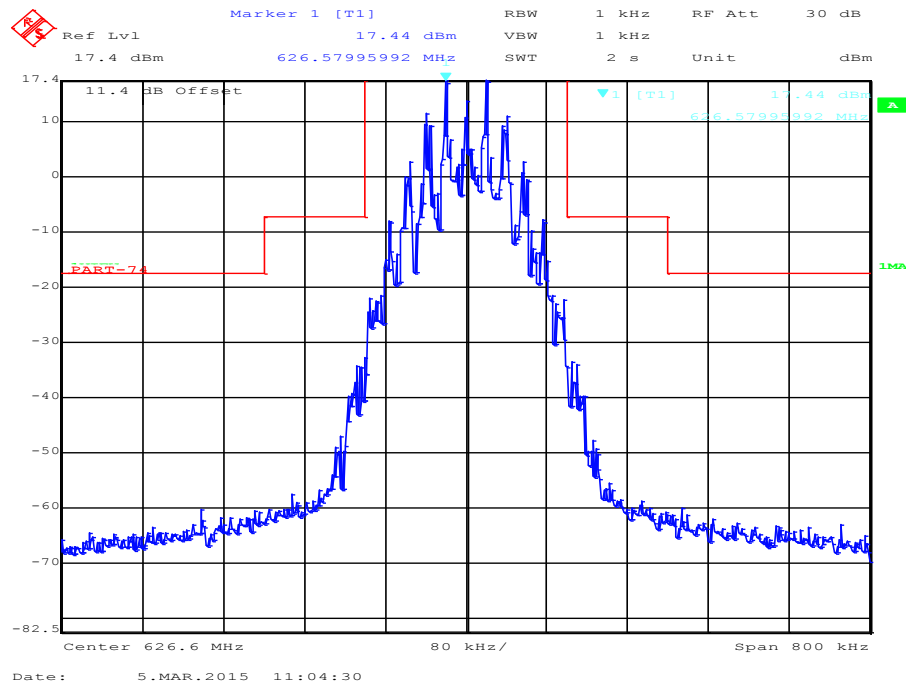
Plot 3: 607.9 MHz, ENR-Wispy modulation



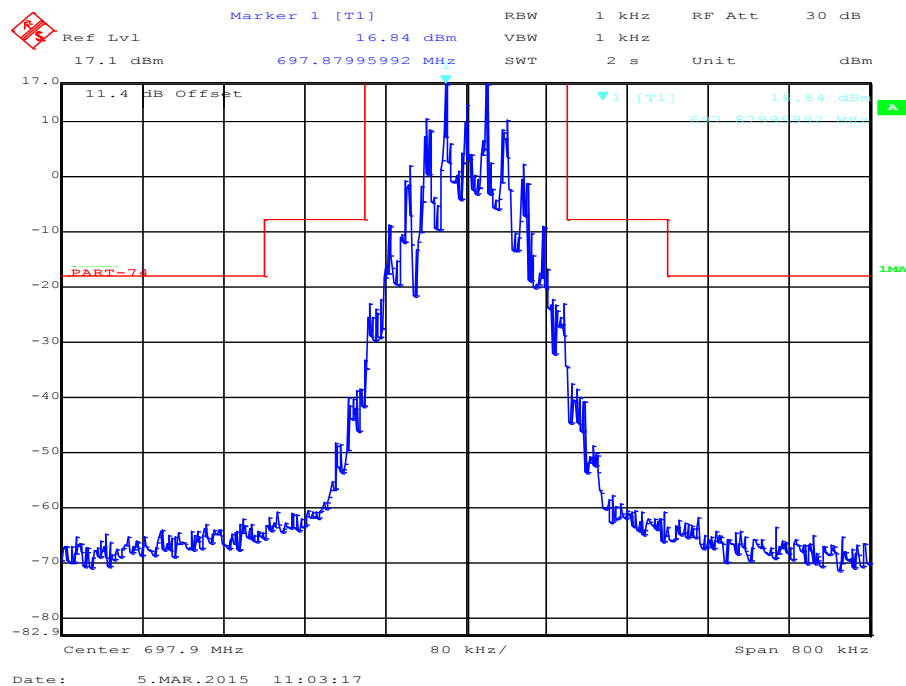
Plot 4: 614.1 MHz, ENR-Wispy modulation



Plot 5: 626.6 MHz, ENR-Wispy modulation

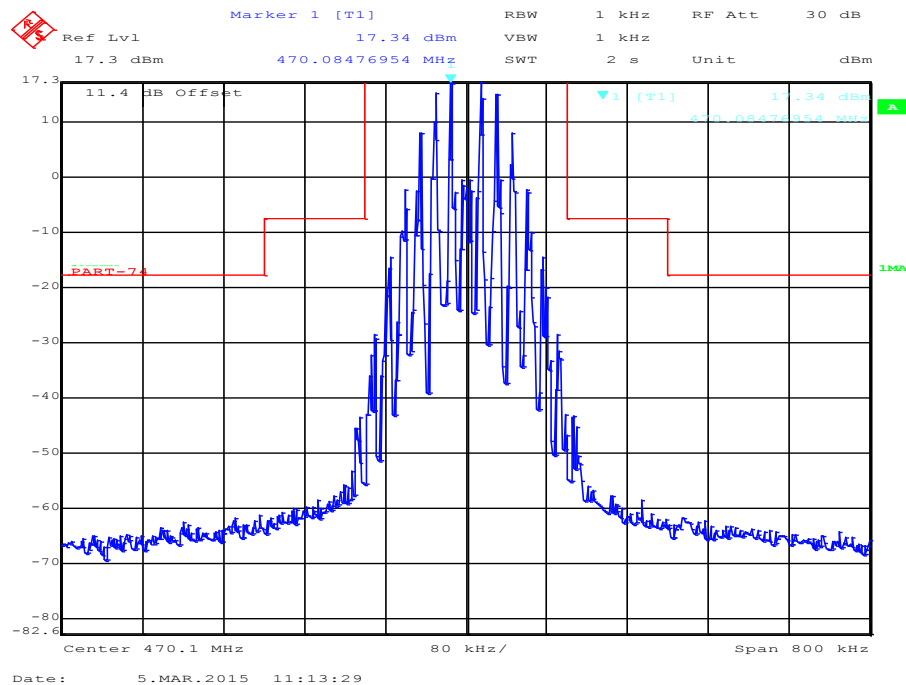


Plot 6: 697.9 MHz, ENR-Wispy modulation

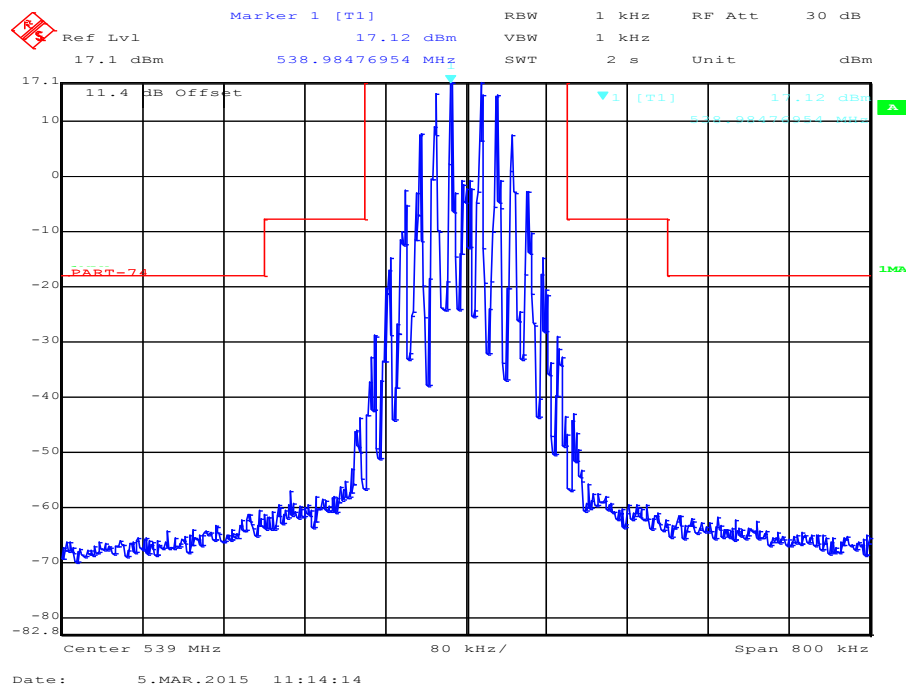


Plots of the measurements, Setup B (Transmitter 1):

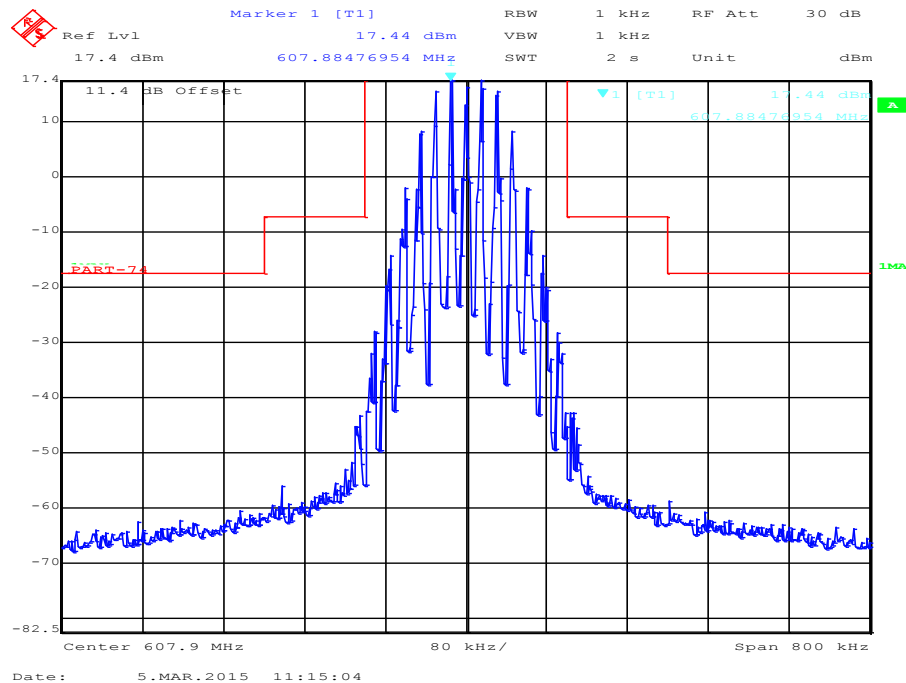
Plot 1: 470.1 MHz, ENR-Wispy Stereo modulation



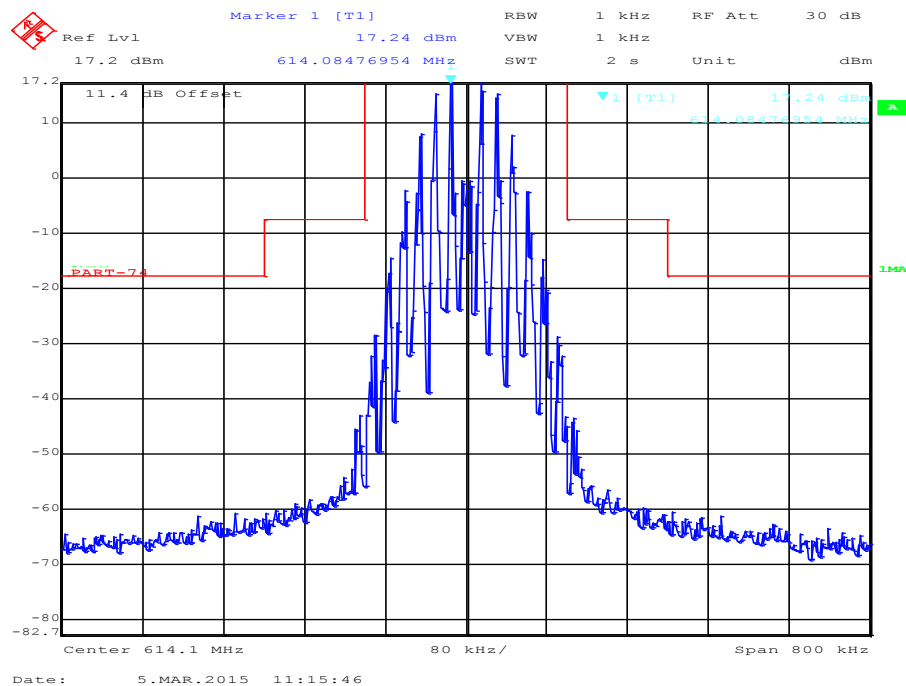
Plot 2: 539.0 MHz, ENR-Wispy Stereo modulation



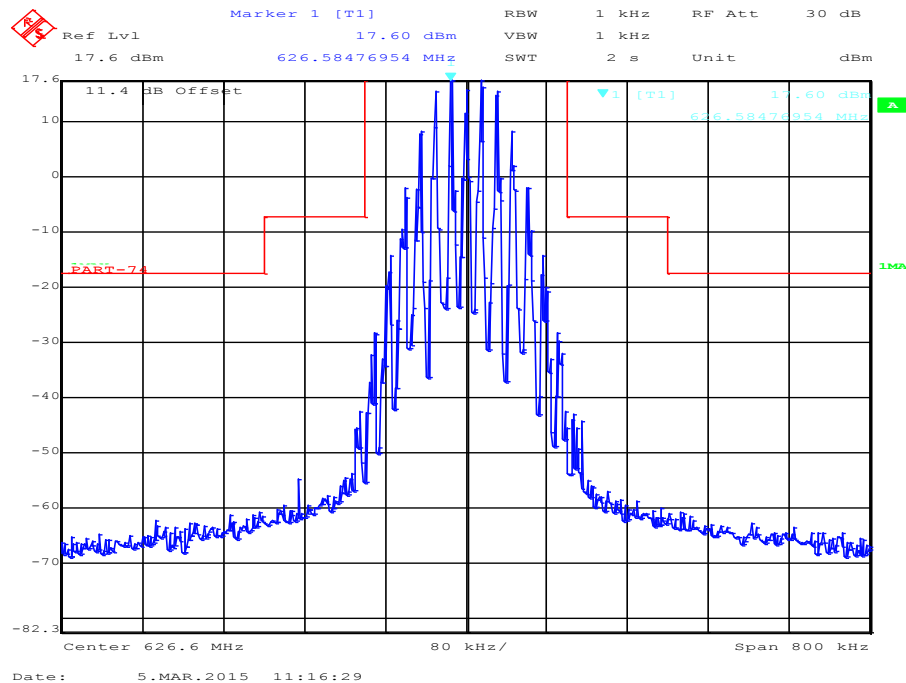
Plot 3: 507.9 MHz, ENR-Wispy Stereo modulation



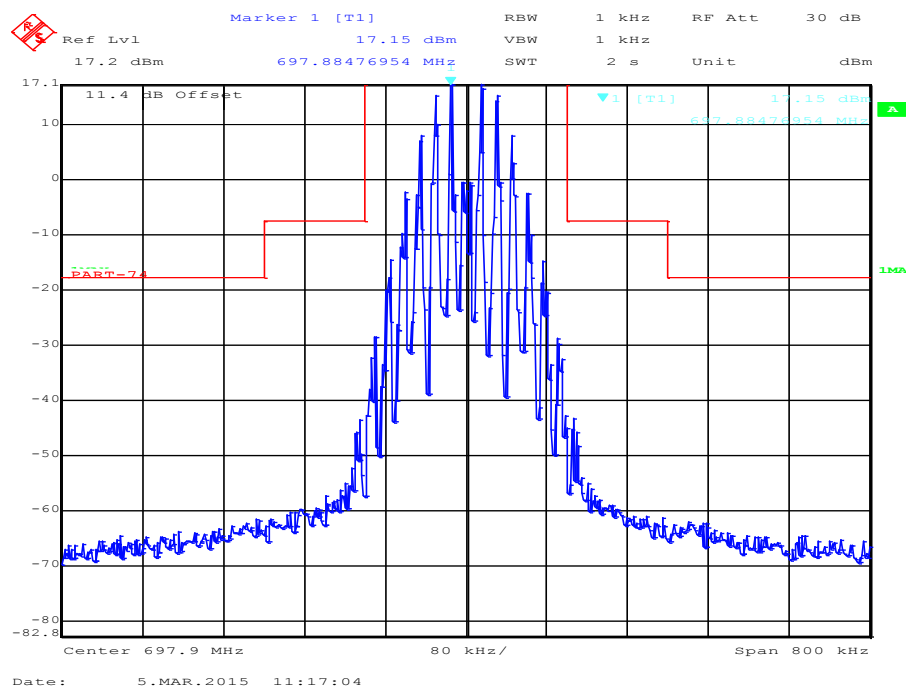
Plot 4: 614.1 MHz, ENR-Wispy Stereo modulation



Plot 5: 626.6 MHz, ENR-Wispy Stereo modulation

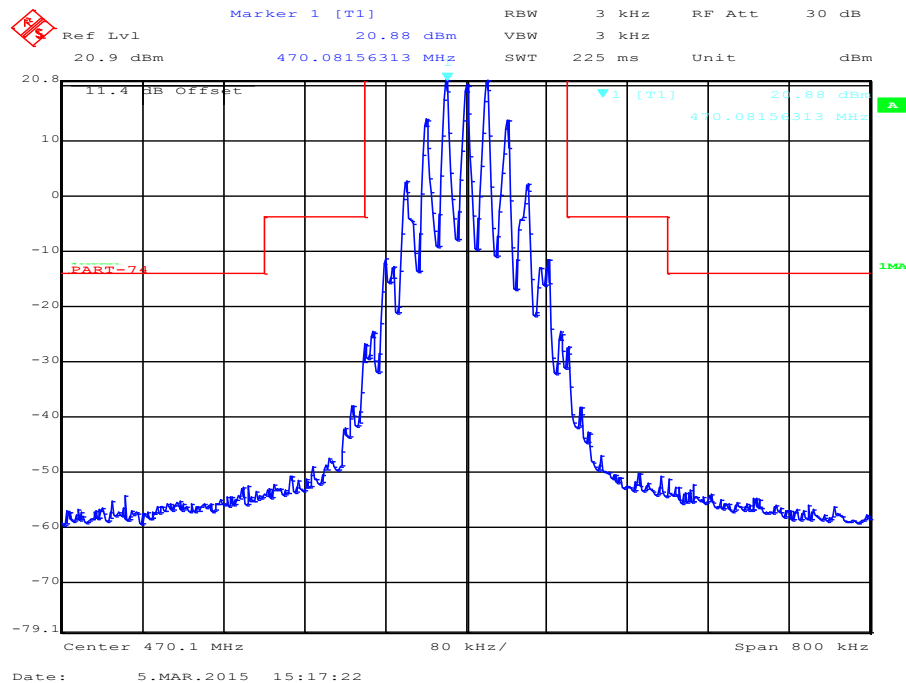


Plot 6: 697.9 MHz, ENR-Wispy Stereo modulation

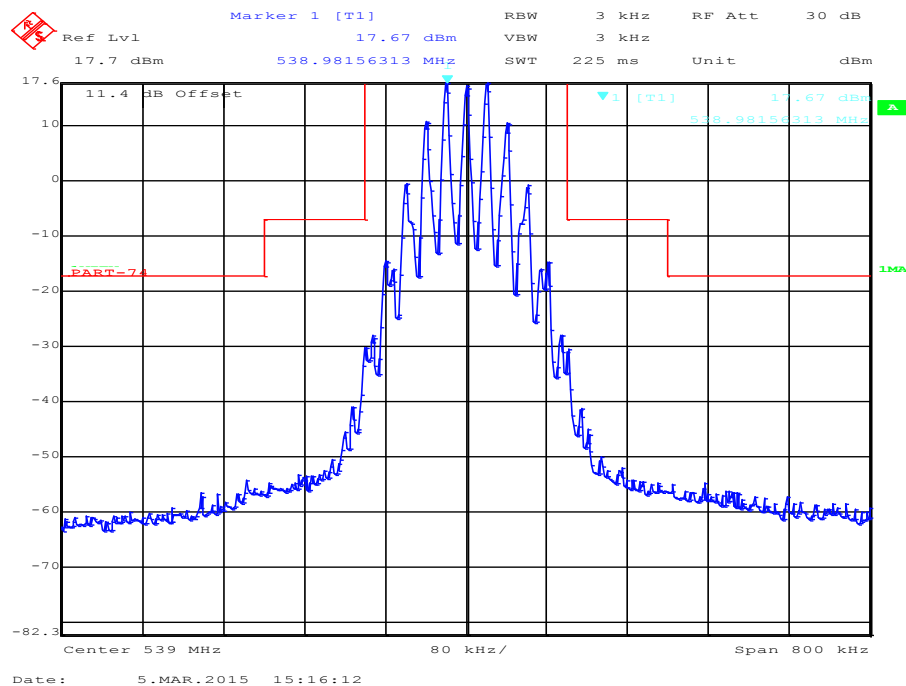


Plots of the measurements, Setup B (Transmitter 2):

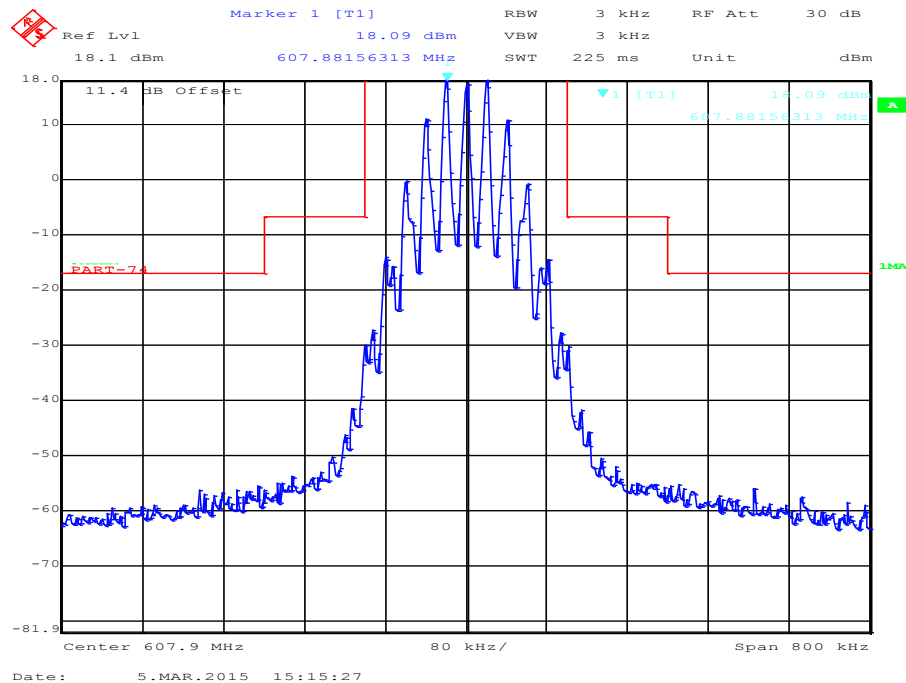
Plot 1: 470.1 MHz, ENR-Wispy modulation



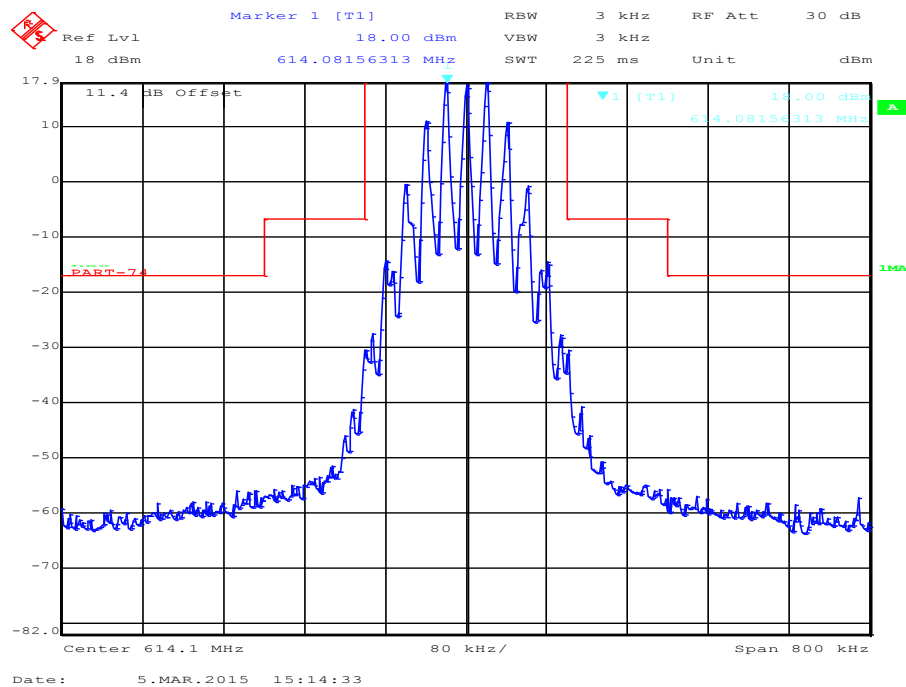
Plot 2: 539.0 MHz, ENR-Wispy modulation



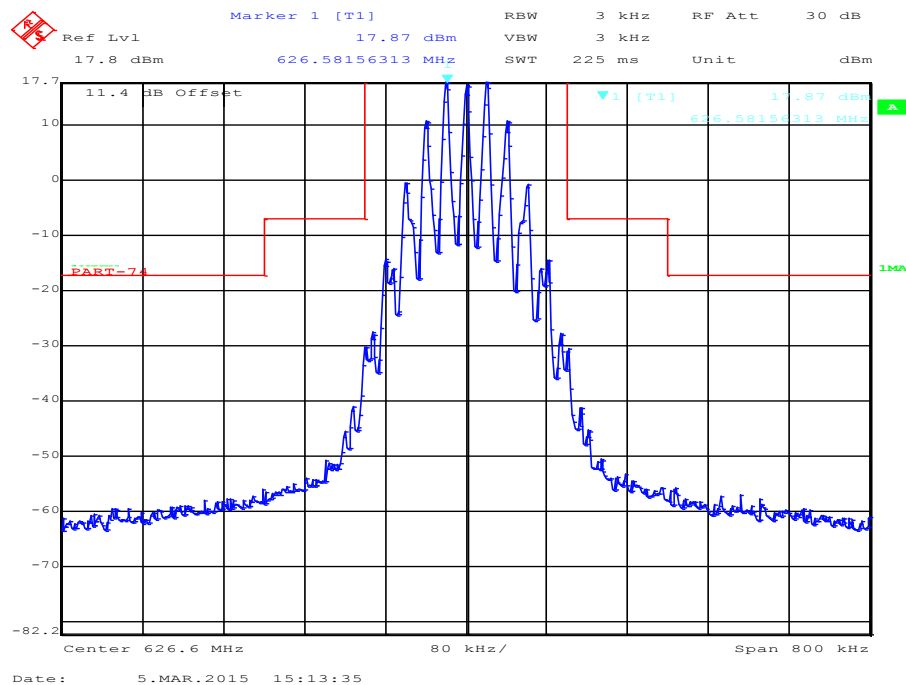
Plot 3: 607.9 MHz, ENR-Wispy modulation



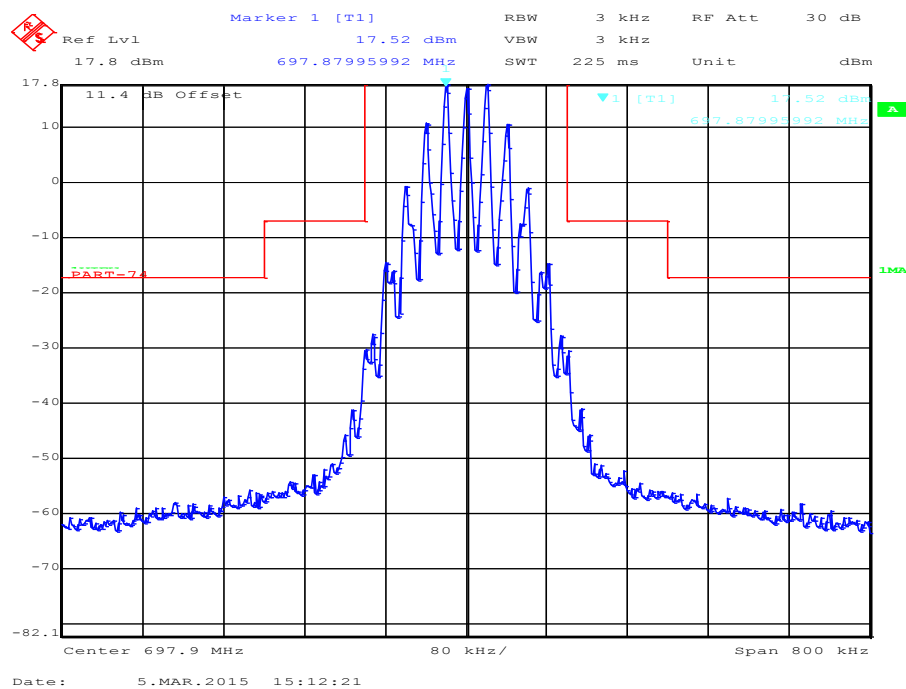
Plot 4: 614.1 MHz, ENR-Wispy modulation



Plot 5: 626.6 MHz, ENR-Wispy modulation

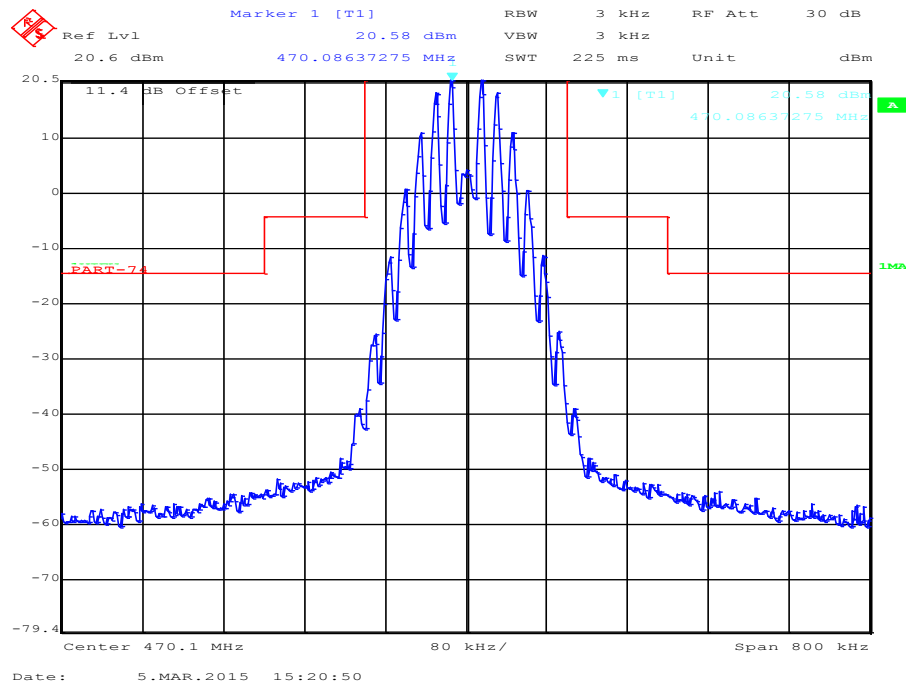


Plot 6: 697.9 MHz, ENR-Wispy modulation

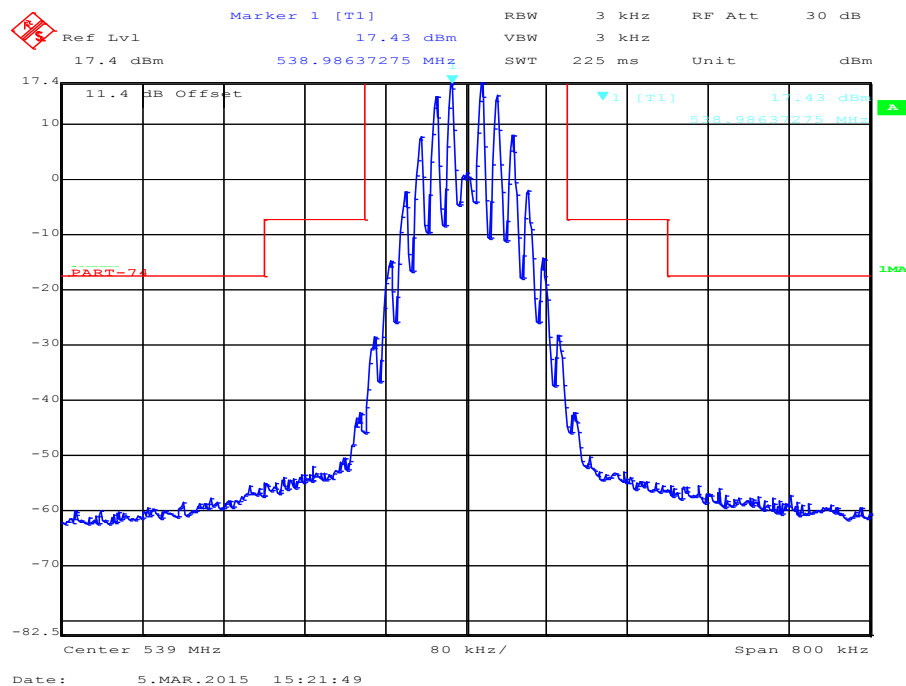


Plots of the measurements, Setup B (Transmitter 2):

Plot 1: 470.1 MHz, ENR-Wispy Stereo modulation



Plot 2: 539.0 MHz, ENR-Wispy Stereo modulation



Ref Lvl 17.7 dBm RBW 3 kHz RF Att 30 dB
 17.7 dBm 607.88637275 MHz SWT 225 ms Unit dBm

11.4 dB Offset
 PART-74
 [T1] 17.77 dBm
 607.88637275 MHz

Center 607.9 MHz 80 kHz/
 Span 800 kHz

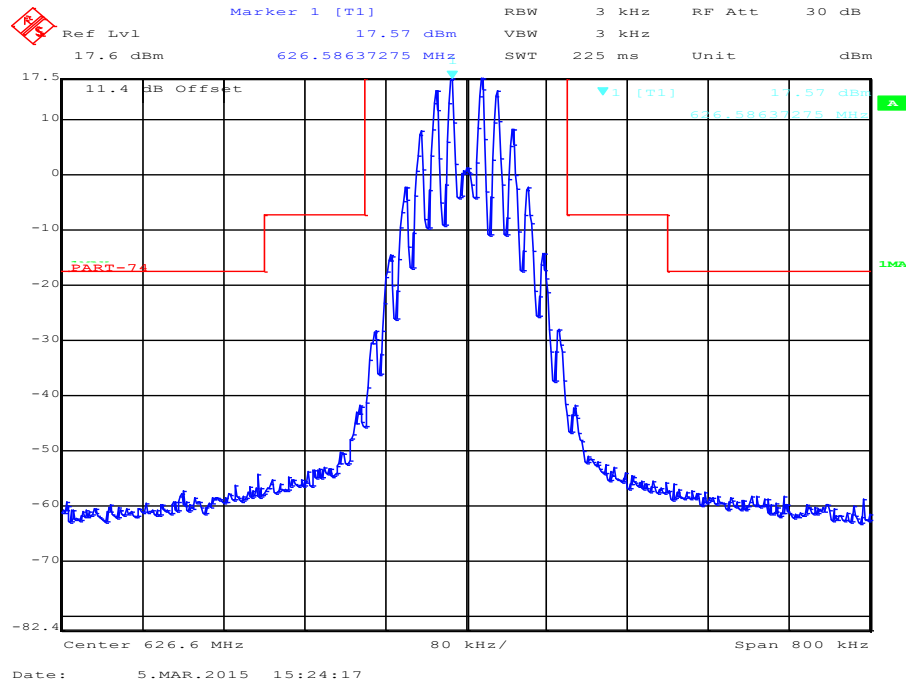
Date: 5.MAR.2015 15:22:37

Marker 1 [T1] RBW 3 kHz RF Att 30 dB
 Ref Lvl 17.73 dBm VBW 3 kHz
 17.7 dBm 614.08637275 MHz SWT 225 ms Unit dBm

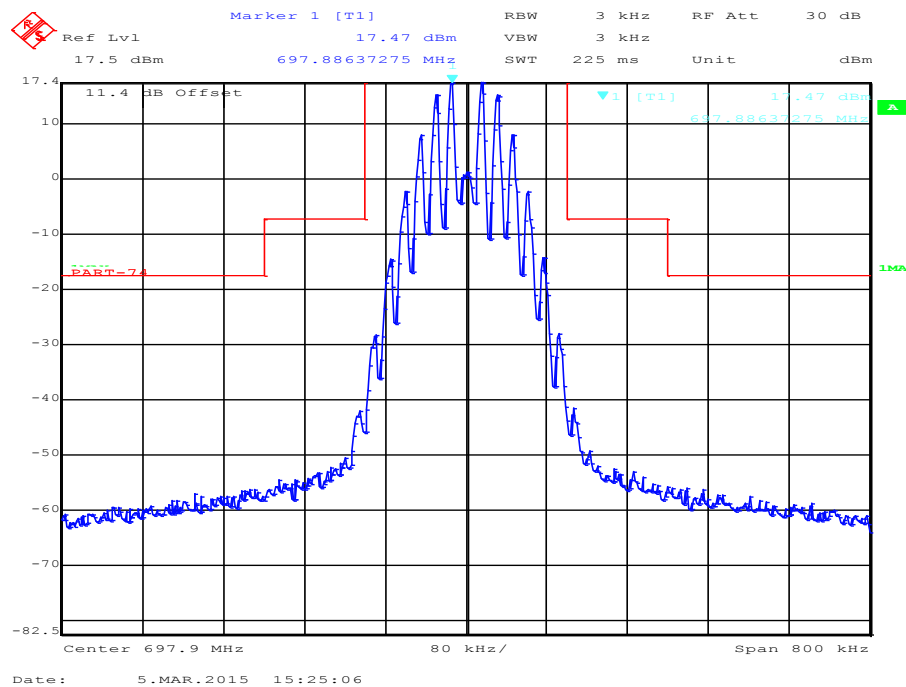
11.4 dB Offset
 PART-74
 17.73 dBm
 614.08637275 MHz
 80 kHz/
 Span 800 kHz

Date: 5.MAR.2015 15:23:36

Plot 5: 626.6 MHz, ENR-Wispy Stereo modulation



Plot 6: 697.9 MHz, ENR-Wispy Stereo modulation

**Verdict: Passed**

9.6 Field strength of spurious radiation (radiated)

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	f < 1 GHz : 100 kHz f ≥ 1GHz : 1 MHz
Video bandwidth:	f < 1 GHz : 100 kHz f ≥ 1GHz : 1 MHz
Span:	-/-
Trace-Mode:	Max. hold

Limits:

FCC	IC
Emissions for LPRS transmitters operating on standard band channels (25 kHz) shall be attenuated below the unmodulated carrier in accordance with the following: Emissions 12.5 kHz to 22.5 kHz away from the channel center frequency: at least 30 dB; and emissions more than 22.5 kHz away from the channel center frequency: FCC: at least 43 + 10log(carrier power in watts) dB IC: at least 55 + 10log(carrier power in watts) dB.	

Result Setup A (Transmitter 2):

SPURIOUS EMISSIONS LEVEL (dBm)								
-/-			539.0 MHz			-/-		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
-/-			No peaks detected.			-/-		
-/-			626.6 MHz			-/-		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
-/-			No peaks detected.			-/-		
Measurement uncertainty ± 3 dB								

Note: The cabinet radiation was measured at one channel per sub-band. The modulation with the highest conducted output power was used. For further spurious measurements please refer to section 9.7 in this test report.

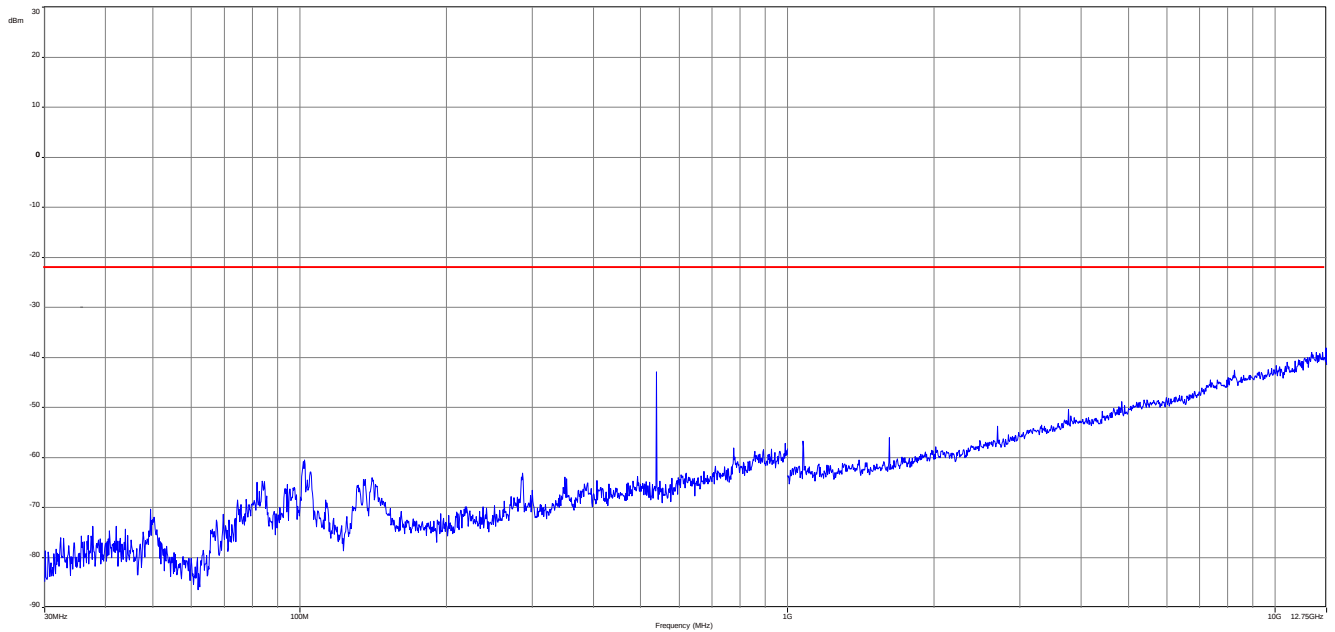
Result Setup B (Transmitter 1 & 2 active):

SPURIOUS EMISSIONS LEVEL (dBm)								
-/-			539.0 MHz & 626.6 MHz			-/-		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
-/-	-/-	-/-	1077.5	Peak	-47.1	-/-	-/-	-/-
			1252.6	Peak	-50.7			
Measurement uncertainty ± 3 dB								

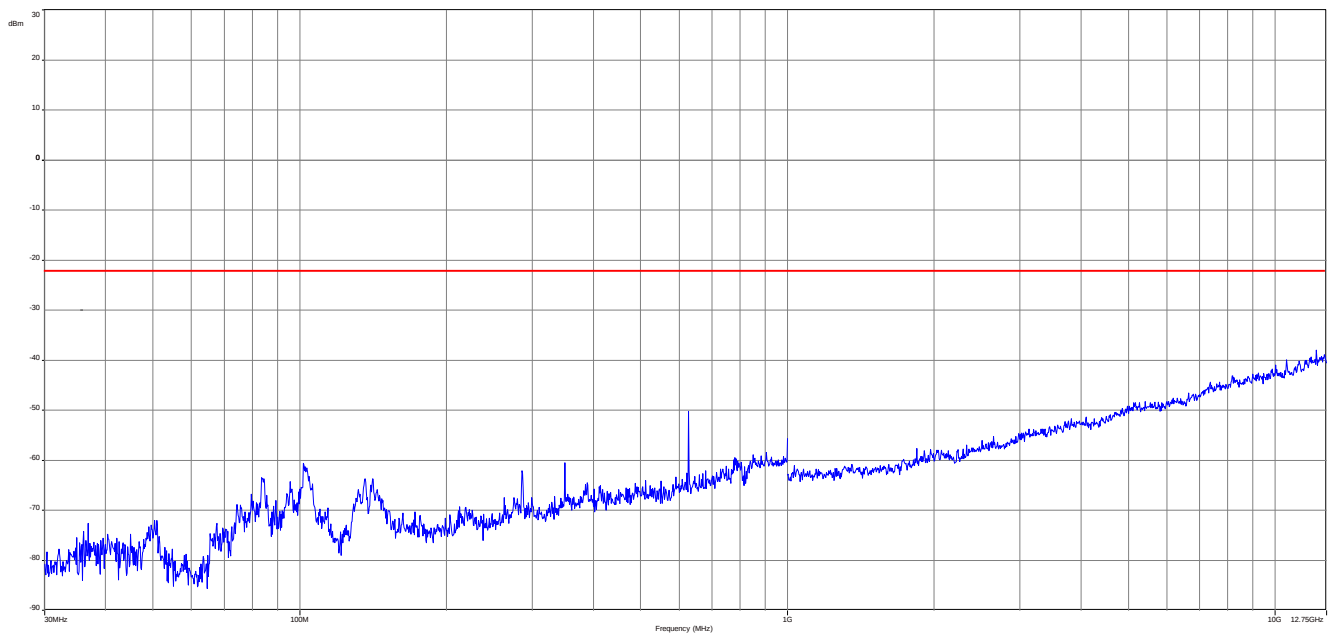
Note: The cabinet radiation was measured with Transmitter 1 allocated at the mid-channel in the lower sub-band and Transmitter 2 allocated at the mid-channel in the higher sub-band. The modulation with the highest conducted output power was used. For further spurious measurements please refer to section 9.7 in this test report.

Plots of the measurements, Setup A (Transmitter 2):

Plot 1: 30 MHz – 12.75 GHz, 539.0 MHz

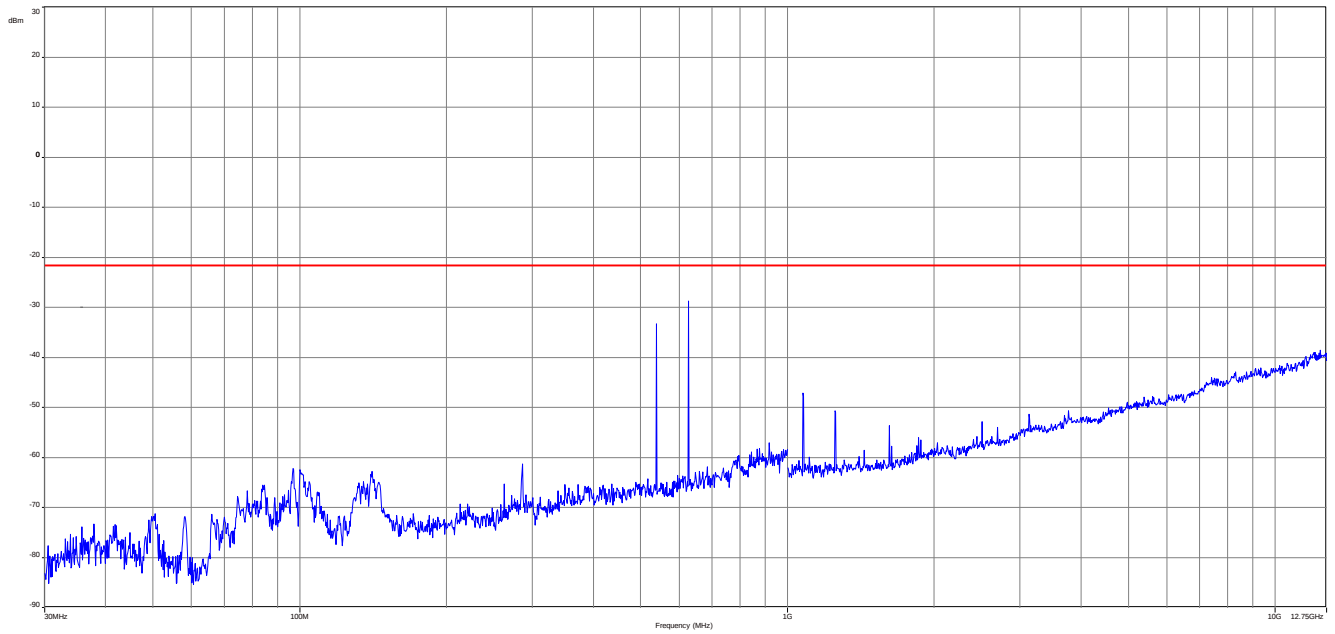


Plot 2: 30 MHz – 12.75 GHz, 626.6 MHz

**Verdict: Passed**

Plots of the measurements, Setup B (Transmitter 1 & 2 active):

Plot 1: 30 MHz – 12.75 GHz, 539.0 MHz & 626.6 MHz



Verdict: Passed

9.7 Field strength of spurious radiation (conducted)

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	f < 1 GHz : 100 kHz f ≥ 1GHz : 1 MHz
Video bandwidth:	f < 1 GHz : 100 kHz f ≥ 1GHz : 1 MHz
Span:	-/-
Trace-Mode:	Max. hold

Limits:

FCC	IC
Emissions for LPRS transmitters operating on standard band channels (25 kHz) shall be attenuated below the unmodulated carrier in accordance with the following: Emissions 12.5 kHz to 22.5 kHz away from the channel center frequency: at least 30 dB; and emissions more than 22.5 kHz away from the channel center frequency: FCC: at least 43 + 10log(carrier power in watts) dB IC: at least 55 + 10log(carrier power in watts) dB.	

Results Setup B (Transmitter 2 only)

ENR-Wisy modulation:

SPURIOUS EMISSIONS LEVEL (dBm)								
Band 1								
470.1 MHz			539.0 MHz			607.9 MHz		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Band 2								
614.1 MHz			626.6 MHz			697.9 MHz		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Measurement uncertainty ± 3 dB								

ENR-Wisy Stereo modulation:

SPURIOUS EMISSIONS LEVEL (dBm)								
470.1 MHz			539.0 MHz			607.9 MHz		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
614.1 MHz			626.6 MHz			697.9 MHz		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Measurement uncertainty ± 3 dB								

Results Setup B (Transmitter 1 & 2 active)

ENR-Wisy modulation:

SPURIOUS EMISSIONS LEVEL (dBm)								
470.1 & 697.9 MHz			539.0 & 614.1 MHz			607.9 & 626.6 MHz		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Measurement uncertainty ± 3 dB								

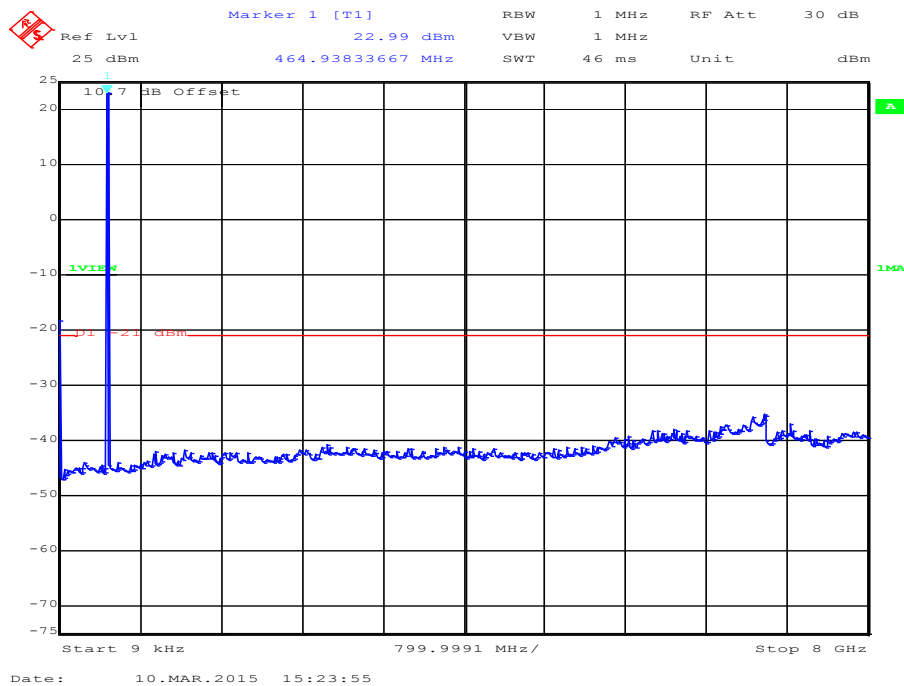
ENR-Wisy Stereo modulation:

SPURIOUS EMISSIONS LEVEL (dBm)								
470.1 & 614.1 MHz			539.0 & 626.6 MHz			607.9 & 697.9 MHz		
Frequency	Detector	Level	Frequency	Detector	Level	Frequency	Detector	Level
No peaks detected.			No peaks detected.			No peaks detected.		
Measurement uncertainty ± 3 dB								

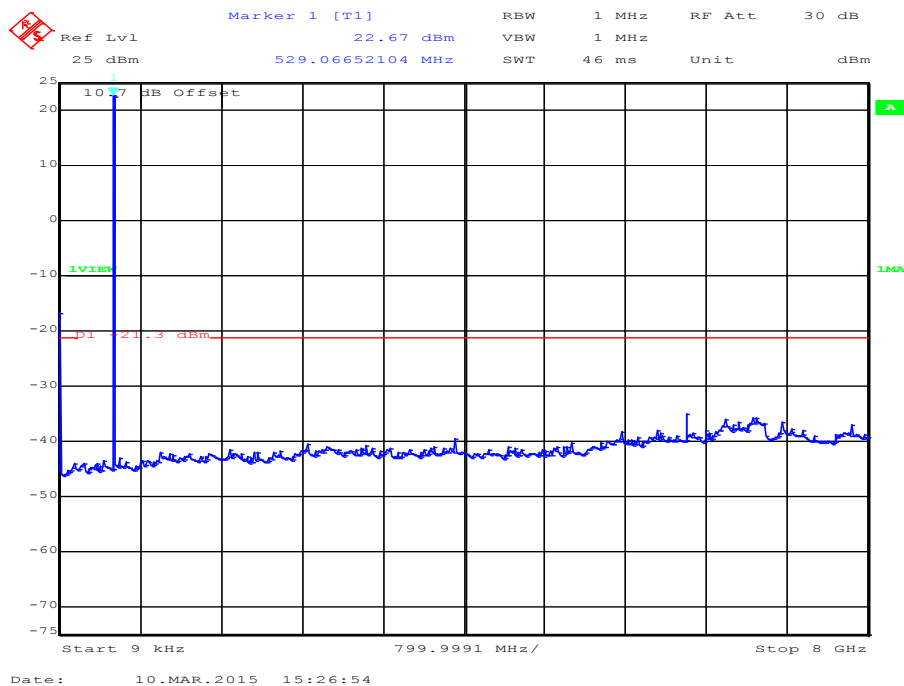
Plots of the measurements, Setup B (Transmitter 2 only)

ENR-Wispy modulation:

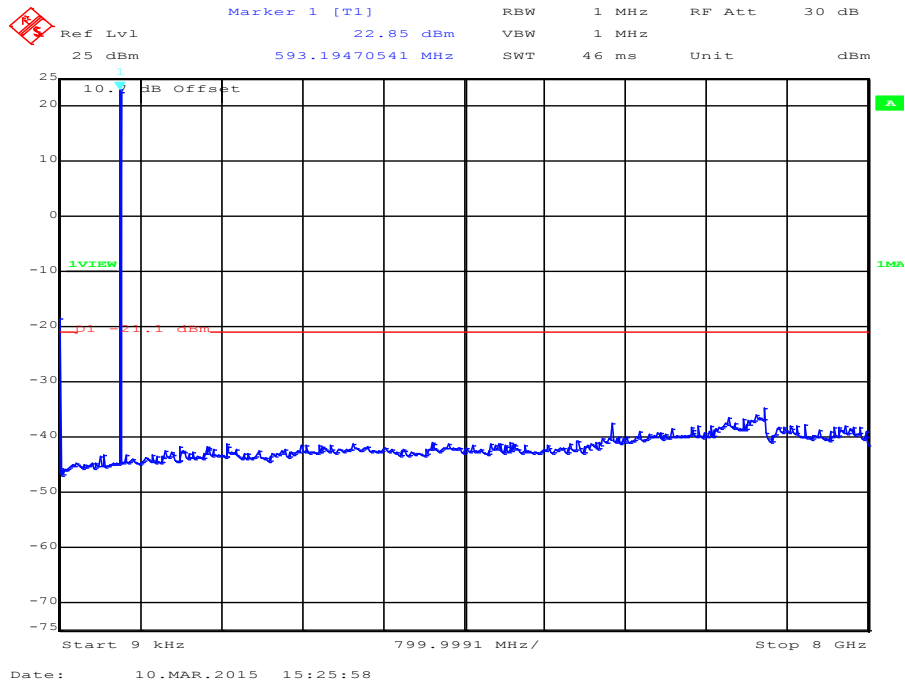
Plot 1: 30 MHz – 8 GHz, 470.1 MHz



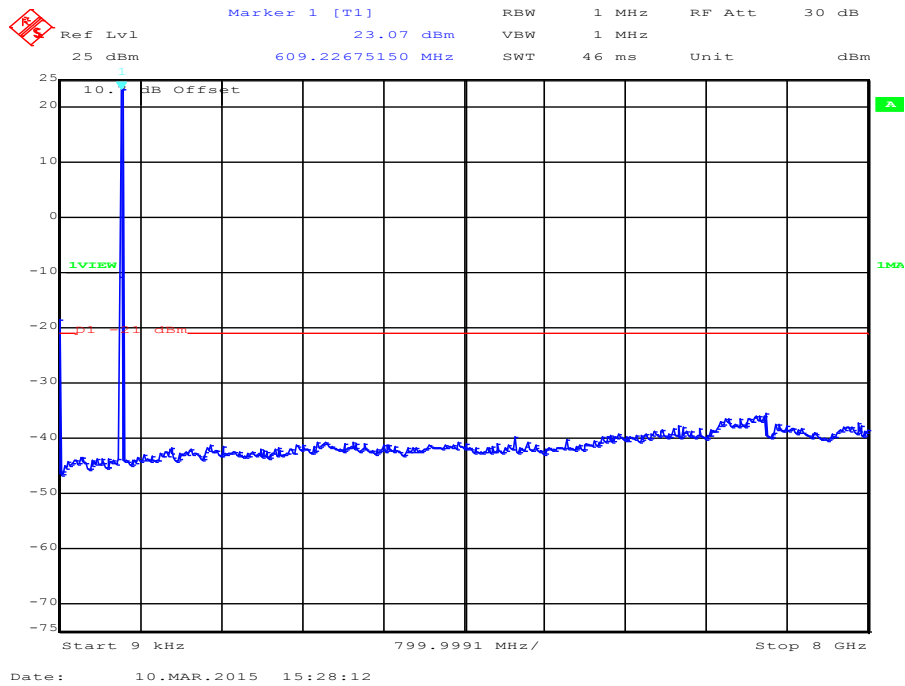
Plot 2: 30 MHz – 8 GHz, 539.0 MHz



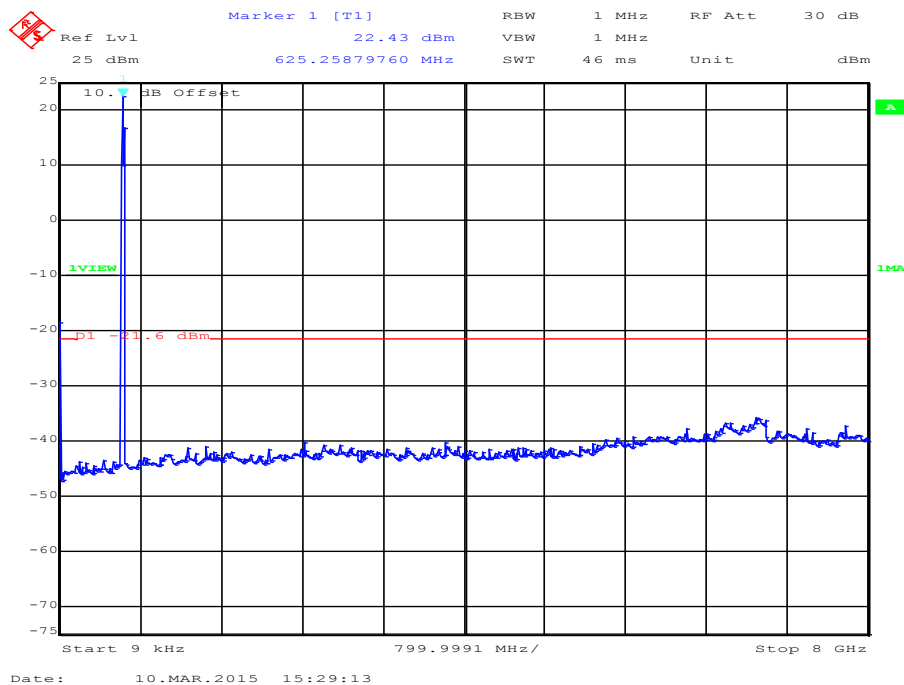
Plot 3: 30 MHz – 8 GHz, 607.9 MHz



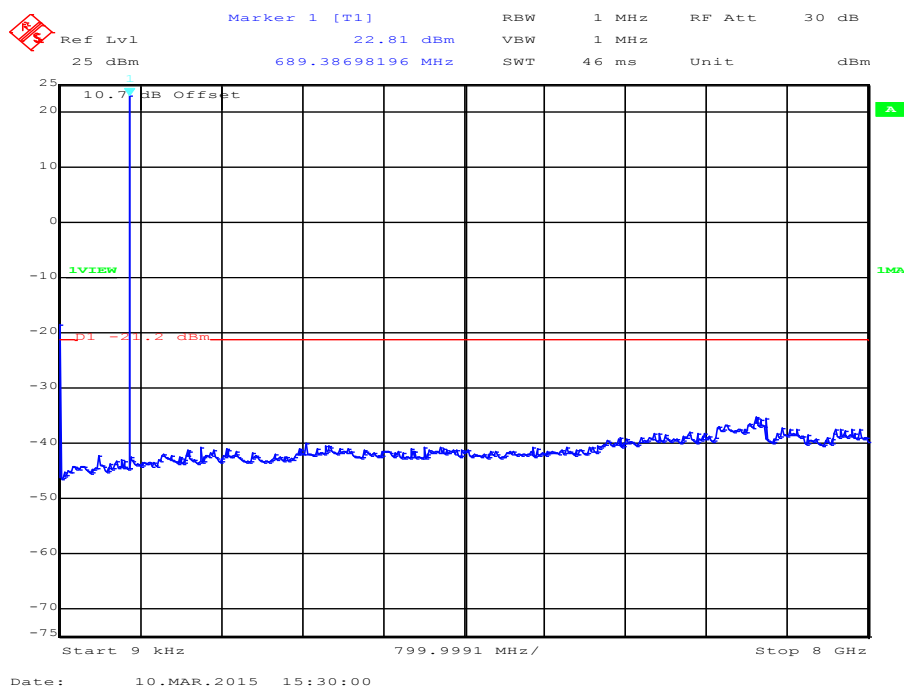
Plot 4: 30 MHz – 8 GHz, 614.1 MHz



Plot 5: 30 MHz – 8 GHz, 626.6 MHz

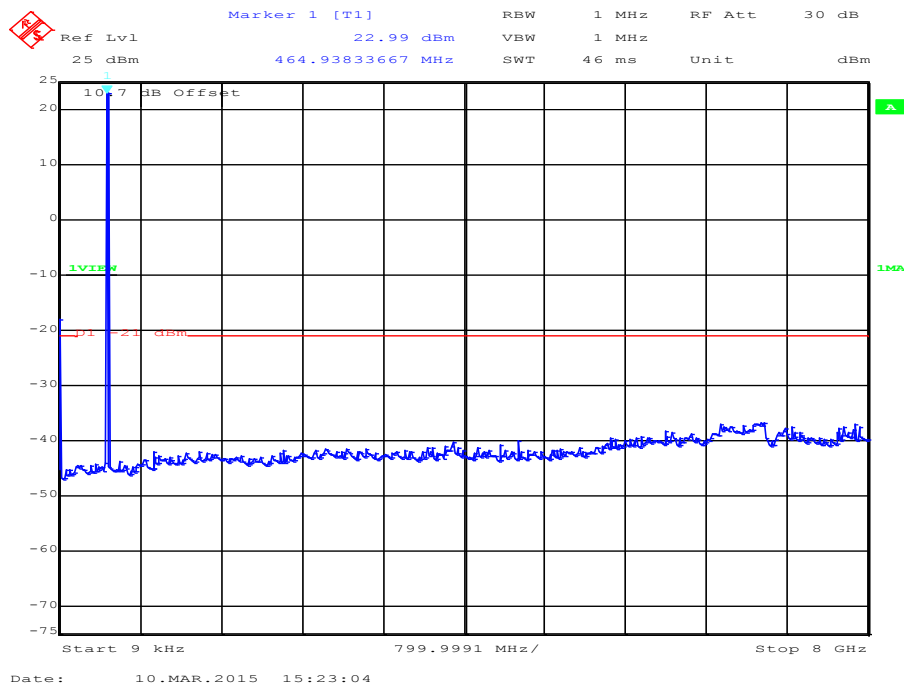


Plot 6: 30 MHz – 8 GHz, 697.9 MHz

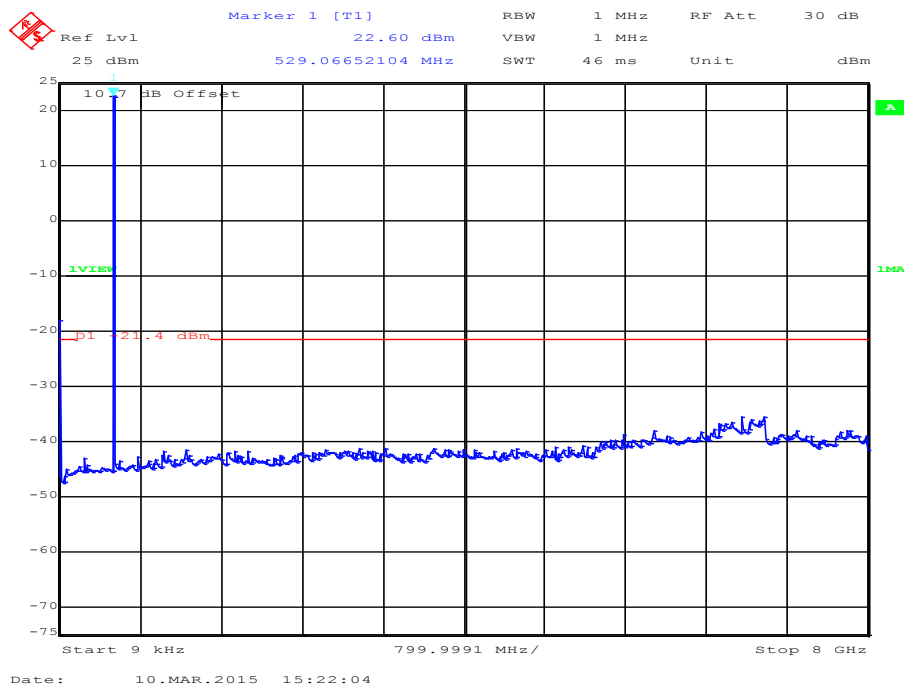


ENR-Wisy Stereo modulation:

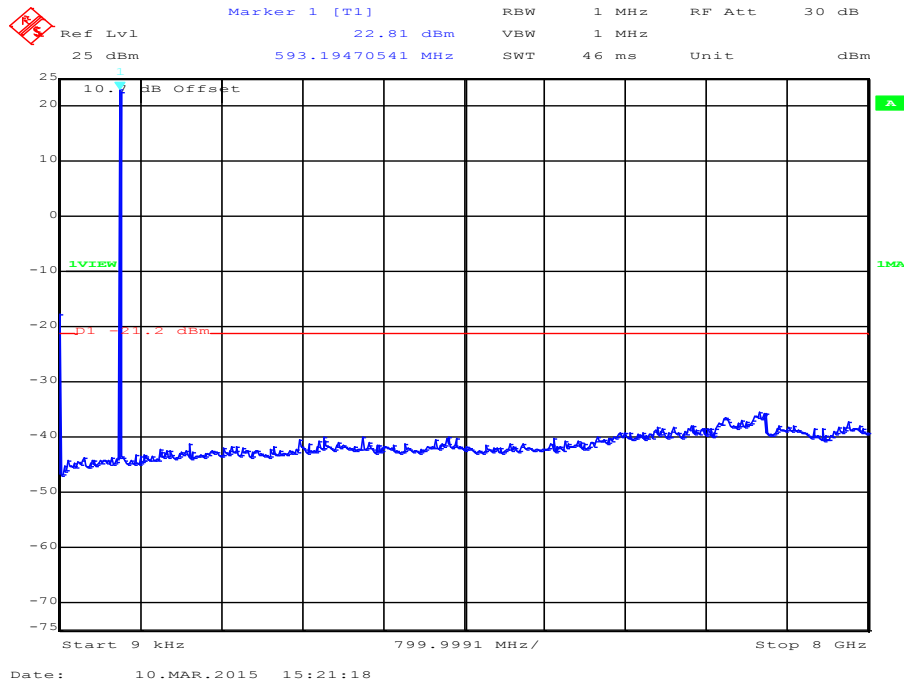
Plot 1: 30 MHz – 8 GHz, 470.1 MHz



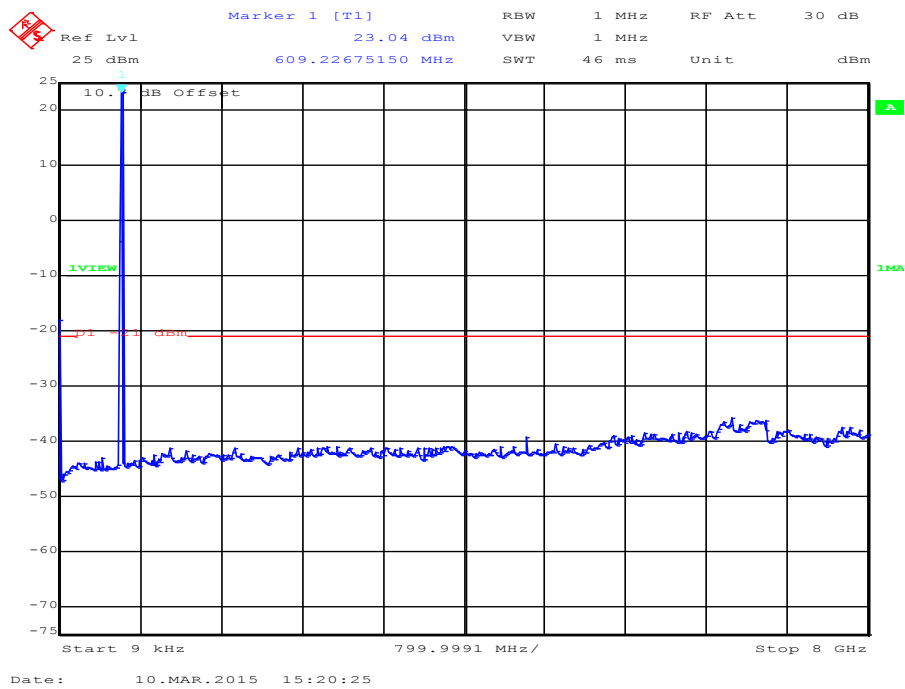
Plot 2: 30 MHz – 8 GHz, 539.0 MHz



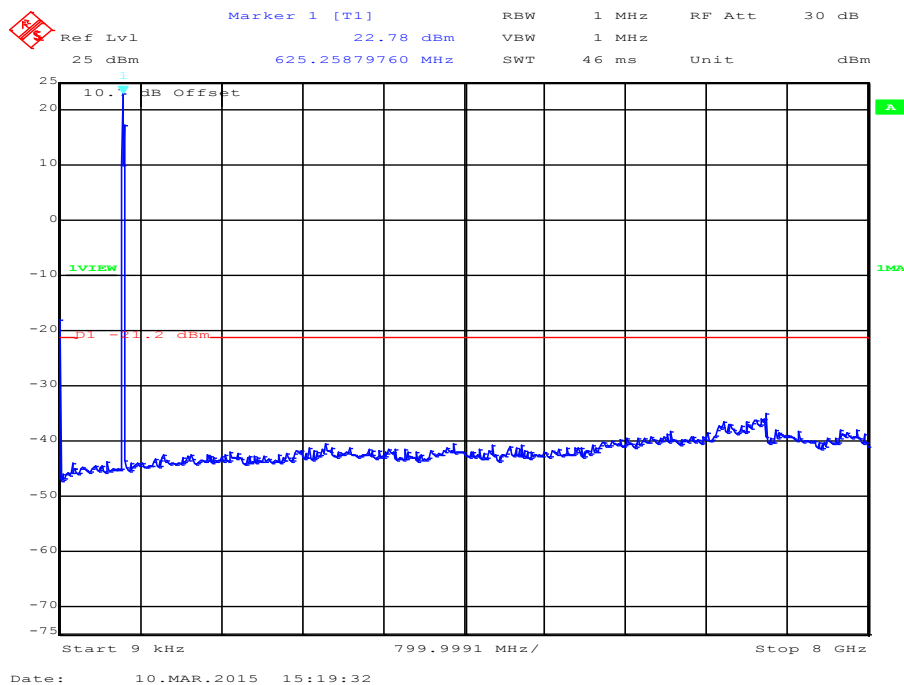
Plot 3: 30 MHz – 8 GHz, 607.9 MHz



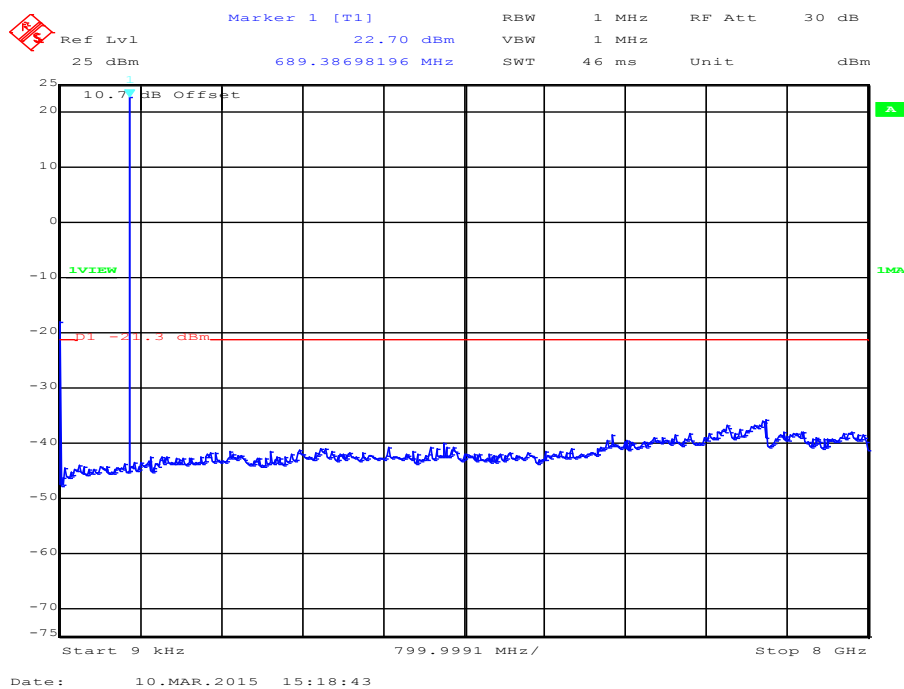
Plot 4: 30 MHz – 8 GHz, 614.1 MHz



Plot 5: 30 MHz – 8 GHz, 626.6 MHz



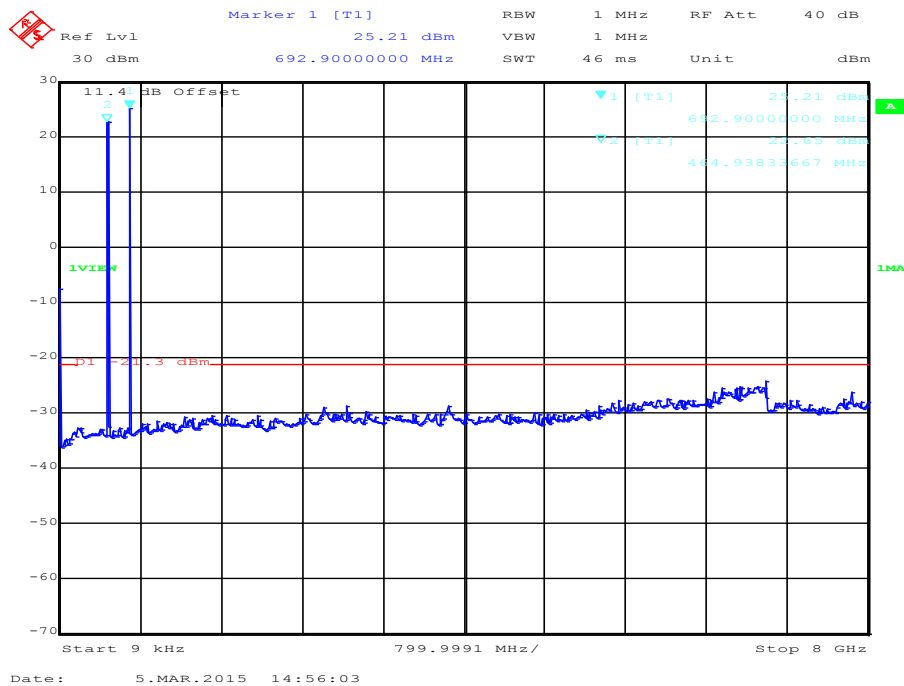
Plot 6: 30 MHz – 8 GHz, 697.9 MHz



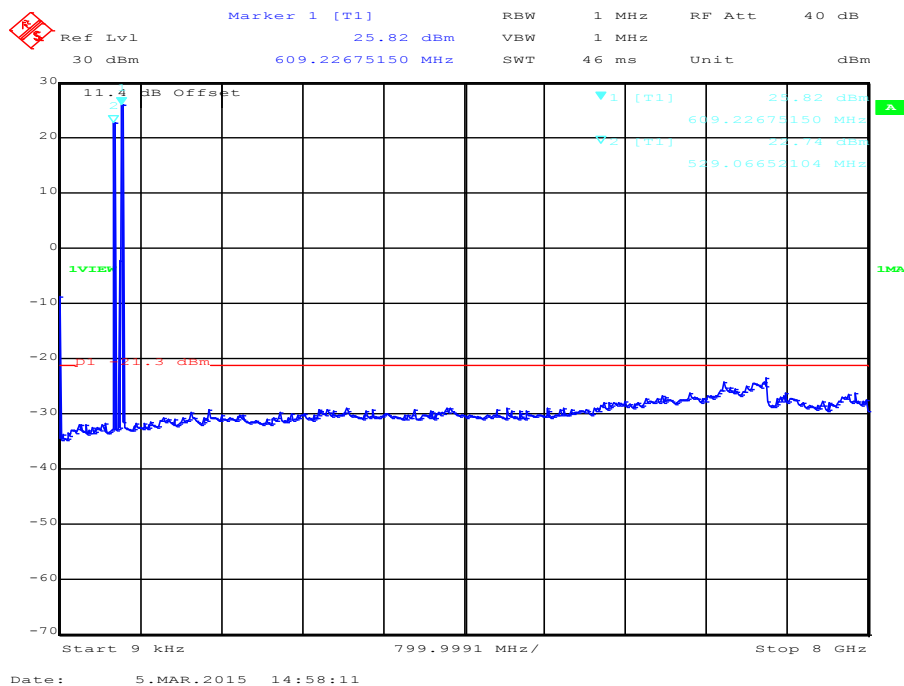
Plots of the measurements, Setup B (Transmitter 1 & 2 active)

ENR-Wisy modulation:

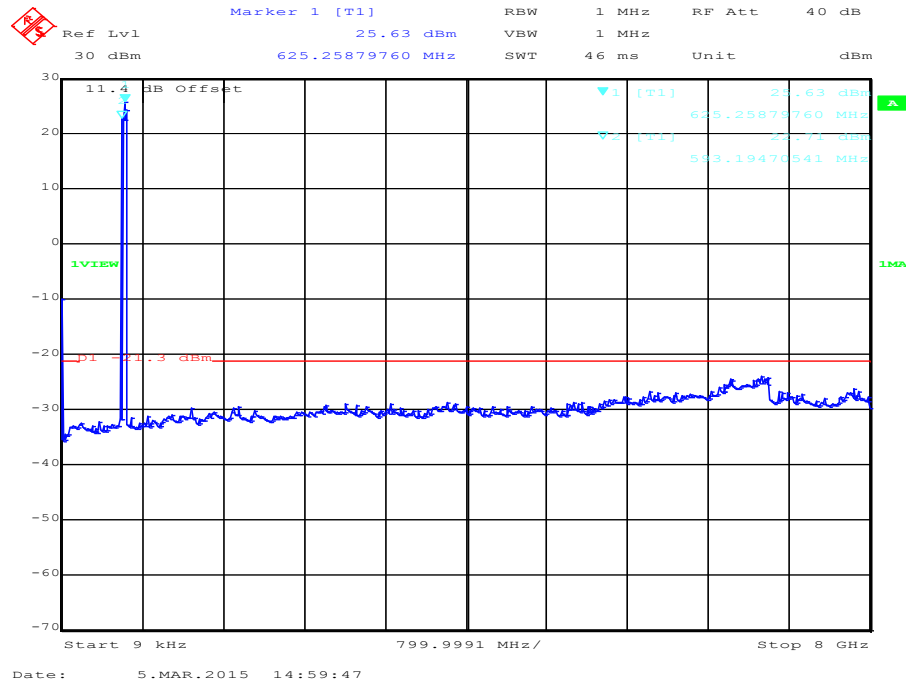
Plot 1: 30 MHz – 8 GHz, 470.1 & 697.9 MHz



Plot 2: 30 MHz – 8 GHz, 539.0 & 614.1 MHz

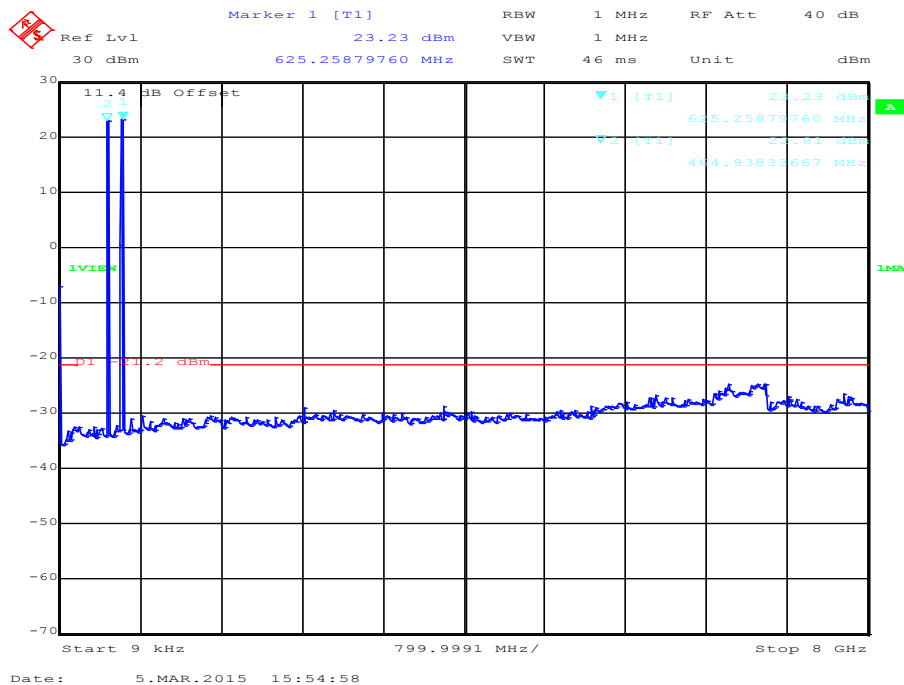


Plot 3: 30 MHz – 8 GHz, 607.9 & 626.6 MHz

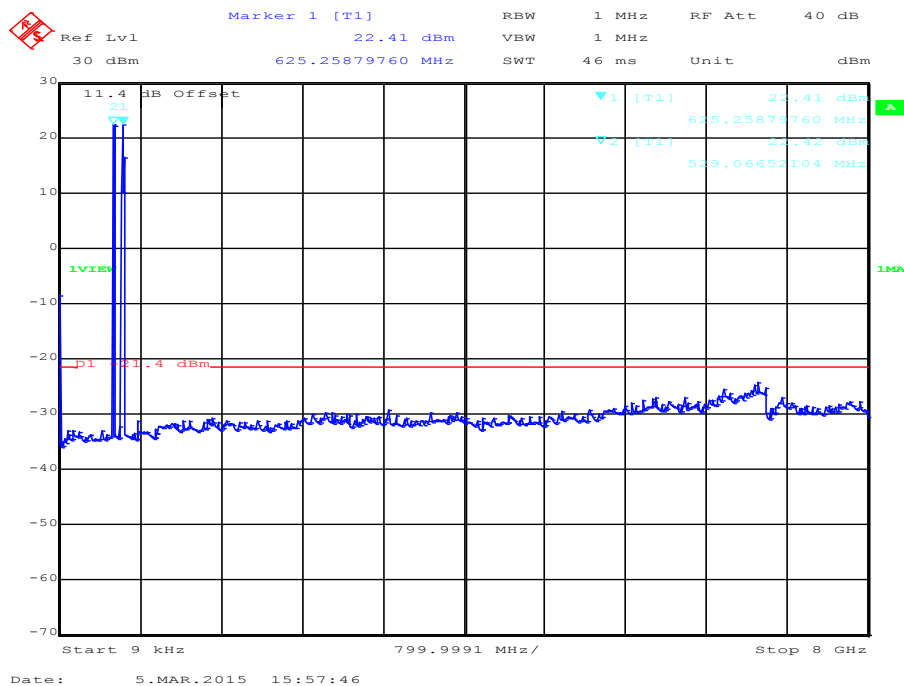


ENR-Wisy Stereo modulation:

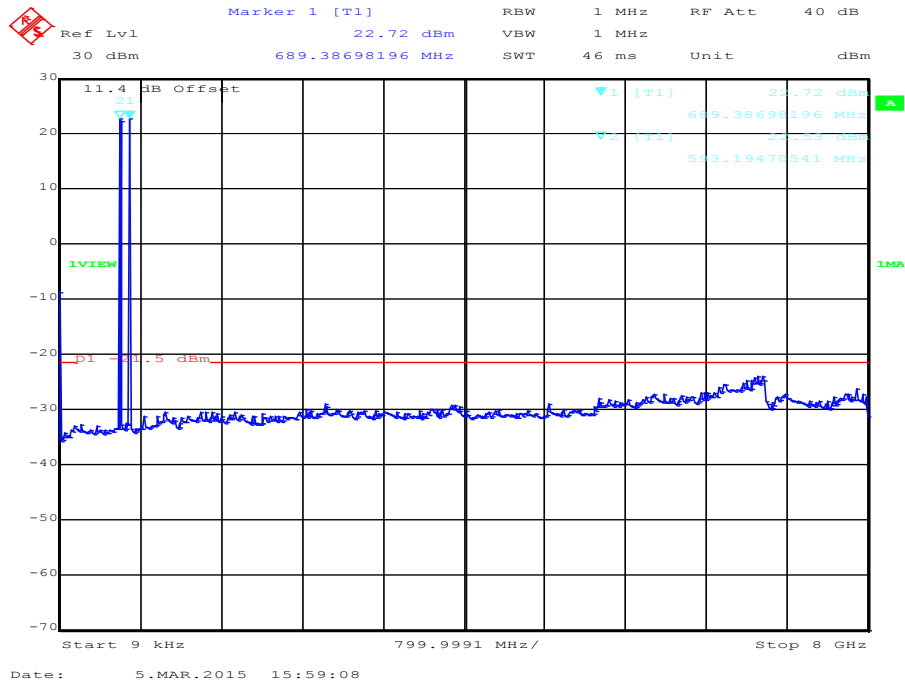
Plot 1: 30 MHz – 8 GHz, 470.1 & 614.1 MHz



Plot 2: 30 MHz – 8 GHz, 539.0 & 626.6 MHz



Plot 3: 30 MHz – 8 GHz, 607.9 & 697.9 MHz



Verdict: **Passed**

10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Isolating Transformer	913501	Erfi		300001205	ne		
2	4	Radiocom. Analyzer	CMTA 54	R&S	894043/010	300001175	NK!	06.06.2007	
3	4	Audio Analyzer 2Hz - 300 kHz	UPD	R&S	841074/009	300001236	k	28.01.2014	28.01.2016
4	4	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835111/0004	300002678	Ve	22.01.2015	22.01.2017
5	4	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	23.01.2015	23.01.2016
6	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140...+30dBm	FSP30	R&S	100886	300003575	k	26.08.2014	26.08.2016
7	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/84193	300003889	Ve	26.09.2013	26.09.2015
8	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
9	n. a.	Switch / Control Unit	3488A	HP	*	300000199	ne		
10	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
11	90	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
12	90	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
13	90	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vKl!	29.10.2014	29.10.2017
14	90	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne		
15	n. a.	MXE EMI Receiver 20 Hz to 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	13.03.2014	13.03.2015

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vKl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

11 Observations

No observations except those reported with the single test cases have been made.

Annex A Document history

Version	Applied changes	Date of release
	Initial release	2015-03-13
-A	Editorial changes: Product description, Model name, FCC ID and IC ID, Referenced Standard updated	2015-04-10

Annex B Further information**Glossary**

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex C Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Befehlerte gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
 Unterzeichnerin der Multilateralen Abkommen
 von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
 Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
 VoIP und DECT
 Akustik
 Funk einschließlich WLAN
 Short Range Devices (SRD)
 RFID
 WiMax und Richtfunk
 Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
 Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
 Produktsicherheit
 SAR und Hearing Aid Compatibility (HAC)
 Umweltsimulation
 Smart Card Terminals
 Bluetooth
 Wi-Fi Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der
 Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der
 Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-00

Frankfurt am Main, 07.03.2014

Datei: D-PL-12076-01-00

19.03.2014
 19.03.2014
 19.03.2014

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
 Spittelmarkt 10
 10117 Berlin

Standort Frankfurt am Main
 Gartenstraße 6
 60594 Frankfurt am Main

Standort Braunschweig
 Bundesallee 100
 38115 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen
 Zustimmung der Deutschen Akkreditierungsstelle GmbH (DAKKS). Ausgenommen davon ist die separate
 Weiterverbreitung des Deckblattes durch die uneingeschränkt genehmigte Konkursliquidationsgesellschaft in
 unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt,
 die über den durch die DAKKS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom
 31. Juli 2009 (RGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments
 und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung
 im Zusammenhang mit der Vermarktung von Produkten (Abt. L 218 vom 9. Juli 2008, S. 30).
 Die DAKKS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der
 Europäischen Organisation für Akkreditierung (EA), des Internationalen Akkreditationsforums (IAF) und
 der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen
 erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:

EA: www.europecan-accreditation.org
 IAF: www.iaf.or.jp
 ILAC: www.ilac.or.jp

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>