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Nemko Italy S.p.A., Via del Carroccio 4, 20853, Biassono, Italy.

Report number:	272549TRFWL
Apparatus:	VS4000 806-870
Applicant:	Selex ES S.p.A. Piazza Monte Grappa 4 - 00195 Roma- Italy
FCC ID:	X5YVS4000-806-870

Test specification:

Title 47-Telecommunication
Chapter I - Federal Communications Commission
Subchapter D – Safety and special radio services
Part 90 – Private land mobile services
FCC 11-63 – Amendment of part 90 of the Commission Rule's to permit Terrestrial Trunked Radio Tecnology (TETRA)

- **Subpart I – General technical standards**

Reviewed by: 2014-11-05
Signature Date
G. Curioni, Wireless/EMC Specialist

Tested by:
Signature 2014-11-05
D. Guarnone, Wireless/EMC Specialist Date

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Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Italy SpA.

Test specification:
FCC Part 90 Private land mobile services
Subpart I – General technical standards

Compliance status:	Complies
Exclusions:	None
Non-compliances:	None
Report release history:	Original release
Test location:	Nemko Italy S.p.A. Via del Carroccio 4, 20853, Biassono, Italy.
Registration number:	481407 (10 m Semi anechoic chamber)

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted is accordance with ANSI C63.4-2003.

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Italy's ISO/IEC 17025 accreditation.

Section 2: Equipment under test

2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

Type of equipment:	Mobile Radio Unit
Product marketing name:	VS4000
Model :	VS4000 806-870
Code :	774-1052/01
Serial number:	A0001
FCC ID:	X5YVS4000-806-870
Date of receipt:	2014-11-03
Label	

2.2 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

Item # 1	
Type of equipment:	Digital Radio Test Set
Brand name:	AEROFLEX
Model name or number:	3901
Serial number:	297001035
Nemko sample number:	--
Connection port:	RF
Cable length and type:	--
Item # 2	
Type of equipment:	Tetra Signal Analyzer
Brand name:	IFR
Model name or number:	2310
Serial number:	231001/010
Nemko sample number:	--
Connection port:	RF
Cable length and type:	--

Section 2: Equipment under test, continued

2.3 EUT description

- Mobile Radio Unit: with the following accessories:
- FPG3 vehicular console 972-0562/03.01
- Vehicular Radio FPG3 Cable HPI-0127/01
- Vehicular multiple accessories cable HPI-0128/01
- FPG3 Vehicular Environmental Microphone HPI-0191/01
- FPG3 Gooseneck PTT Button HPI-0186/01
- Hand-held PTT microphone IP54 HPI-0103/01
- Vehicular Speaker 774-0139/02
- Vehicular Speaker cable HPI-1315/01
- ANTENNA: 68720-42/023

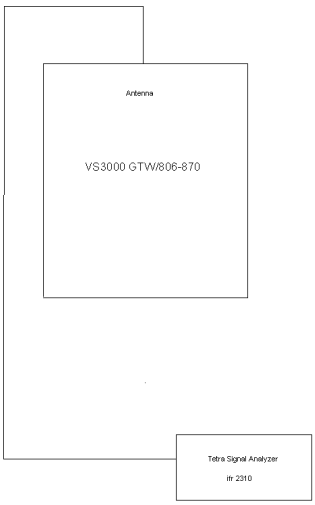
2.4 Technical specifications of the EUT

Operating frequency:	809-824/854-869 MHz
Modulation type:	Π/4 DQPSK
Occupied bandwidth:	25 kHz
Emission designator:	21K0D1E, 21K0D1W, 21K0D1D
Antenna type:	Equipment that has an external 50 Ω RF connector
Power source	Battery operated
Temperature range:	-25 to + 55°C

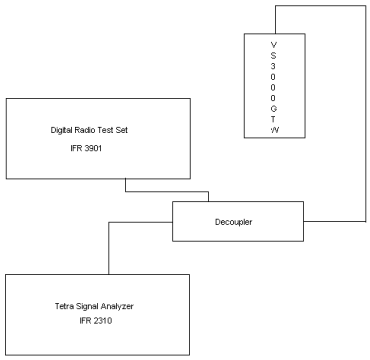
Section 2: Equipment under test, continued

2.5 EUT setup diagram

1)



2)



2.6 Operation of the EUT during testing

Transmitting at maximum power and normal modulation to:

1) 809.0125 MHz
2) 823.9875 MHz
3) 854.0125 MHz
4) 868.9875 MHz

2.7 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

Section 3: Test conditions

3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

3.2 Test conditions, power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 860–1060 hPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
Power supply range:	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 3: Test conditions, continued

3.3 Measurement uncertainty

Nemko S.p.A. measurement uncertainty has been calculated using the standard CISPR 16-4-2 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements“. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko S.p.A. document WML1002.

3.4 Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Trilog Broad Band Antenna	Schwarzbeck	VULB 9168	VULB 9168-242	2015/02
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	2015/02
EMI receiver 20 Hz ÷ 3 GHz	R&S	ESCI	100888	2015/08
Hydraulic revolving platform	Nemko	RTPL 01	4.233	NCR
Turning-table	R&S	HCT	835 803/03	NCR
Antenna mast	R&S	HCM	836 529/05	NCR
Controller	R&S	HCC	836 620/7	NCR
Spectrum Analyzer 9kHz ÷ 40GHz	R&S	FSEK	848255/005	2015/08
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2016/09
Shielded room	Siemens	10m control room	1947	NCR
Attenuator	Aeroflex/Weinschel	24-20-34	CA0248	2015/08
Attenuator	Aeroflex/Weinschel	24-10-34	0124BZ2456	2015/08
Notch Filter	Nemko	400-500	2.437	NCR
High Pass Filter	Wainwright	WHK0.8/13G-10EF	SN1	2015/08
Tetra Signal Analyzer (*)	IFR	2310	231001/055	2016/07
Climatic chamber	Espec	ARS 1100	4100000067	2015/02
Digital Radio Test Set (*)	Aeroflex	3901	298001223	2015/07
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	2015/10
Digital Radio Test Set (*)	Aeroflex	3901	297001035	2015/07
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	2015/09
Antenna 1 ÷ 18 GHz	Schwarzbeck	STLP 9148	STLP9148-123	2015/02
Dual Coaxial coupler	Amplifier Research	DC7144	301249	09/2015
Dual Coaxial coupler	Amplifier Research	DC7435	301045	09/2015

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer’s

Section 4: Result summary

4.1 FCC Part 90: Test results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Y	Yes : Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See report summary)

Part	Test method	Test description	Required	Result
§90.205	§2.1046	Output power	Y	Pass
§90.207	§2.1047	Modulation Characteristics	Y	N
§90.221	§2.1049	Bandwidth limitations (*)	Y	Pass
§90.210	§2.1051	Spurious Emissions at the antenna terminal	Y	Pass
§90.210	§2.1053	Field strength of spurious radiation	Y	Pass
§90.213	§2.1055	Frequency stability	Y	Pass
§90.214	---	Transient Behaviour	Y	N
§90.219	---	Use of boosters	N	---

Note:
(*) According to FCC 11-63

Appendix A: Test results

Clause 90.205 Output power

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized to applicants whose license applications for new stations are filed after August 18, 1995 is as follows in FCC Part 90.205 (a) through (r).

For measurements conducted pursuant to paragraphs (a) and (b) of § 2.1046, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

Test date: 2014-11-04

Test results: Pass

Test data

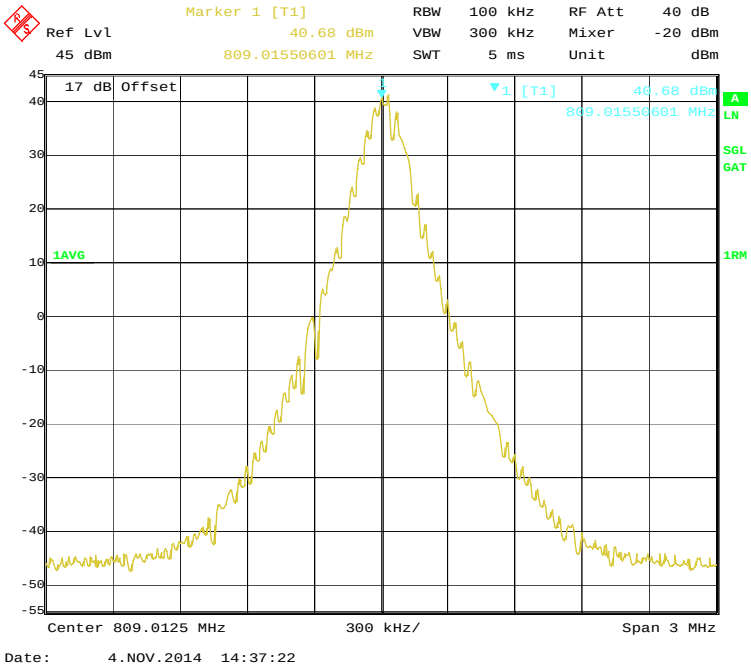
– Power supply used +12 Vdc

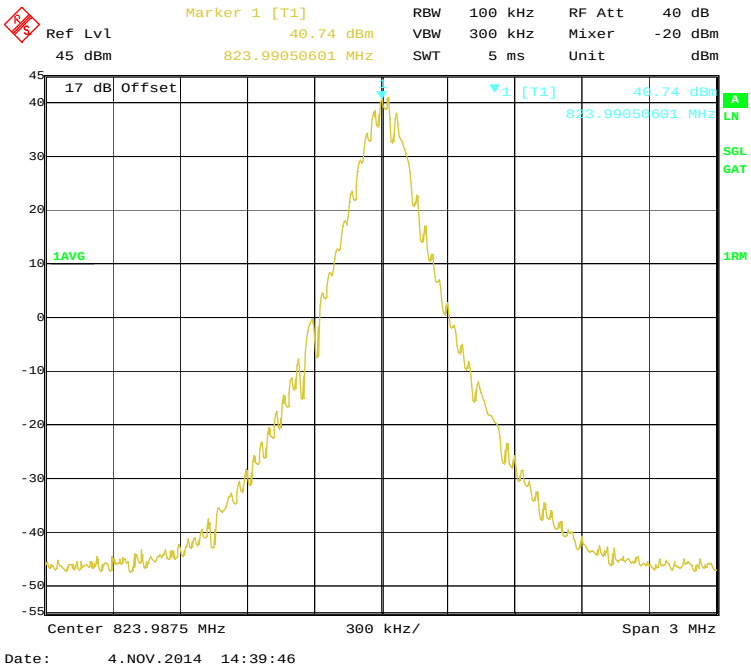
Frequency [MHz]	Measured Output power [W]	Manufacturer's Rated Power [W]	LIMIT [W] (Manufacturer's rated Power + 20%)
809.0125	11.7	10	12
823.9875	11.9	10	12
854.0125	11.7	10	12
868.9875	11.9	10	12

The RF Power maintains unchanged from 10,8 - 15,6 Vdc at 20° C.

Test data

Power supply used: 13.5 Vdc

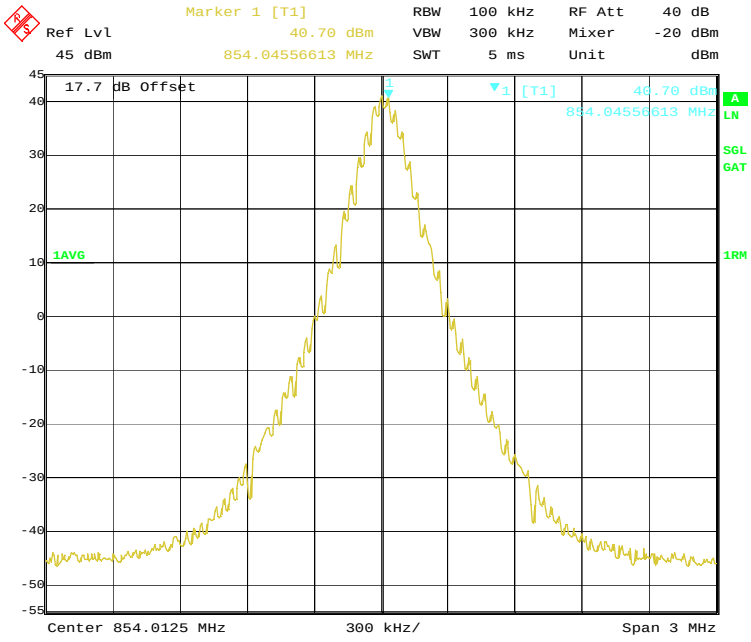


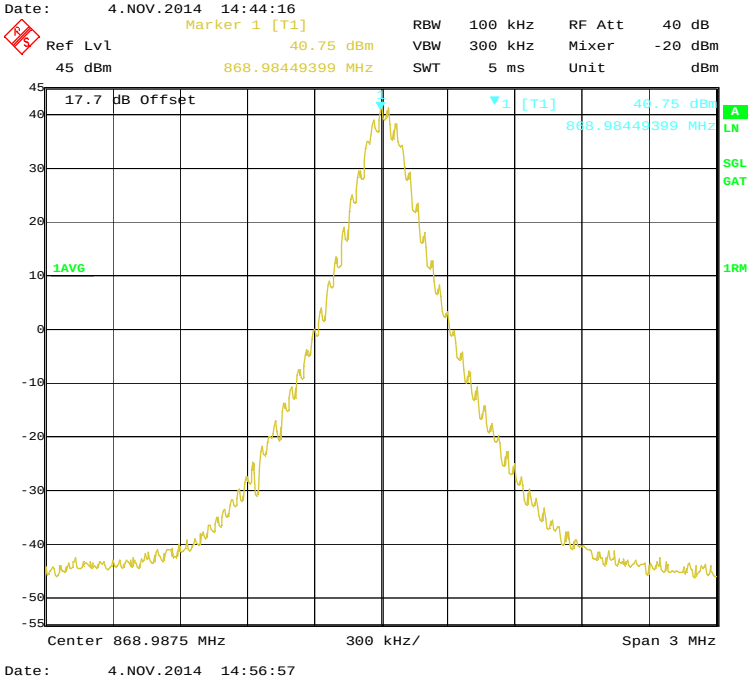


The RF Power maintains unchanged from 10,8 - 15,6 Vdc at 20° C.

Test data

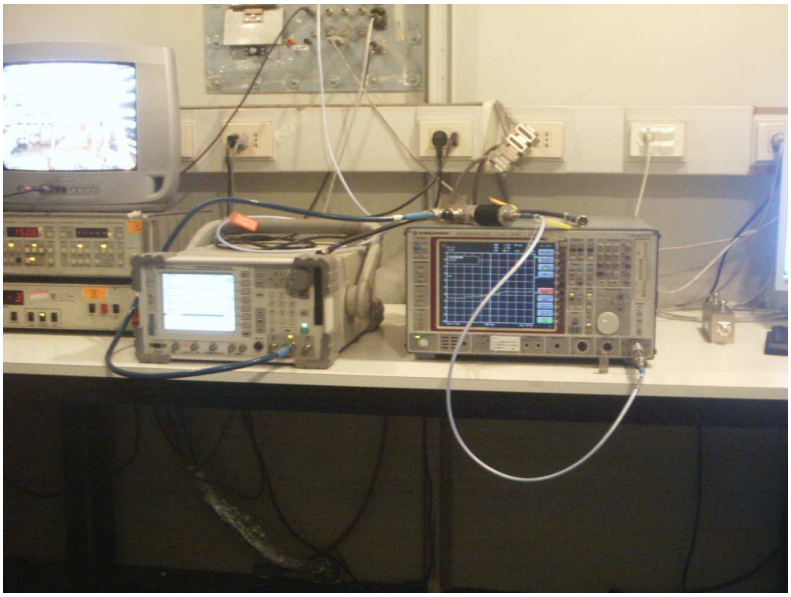
Power supply used: 13.5 Vdc

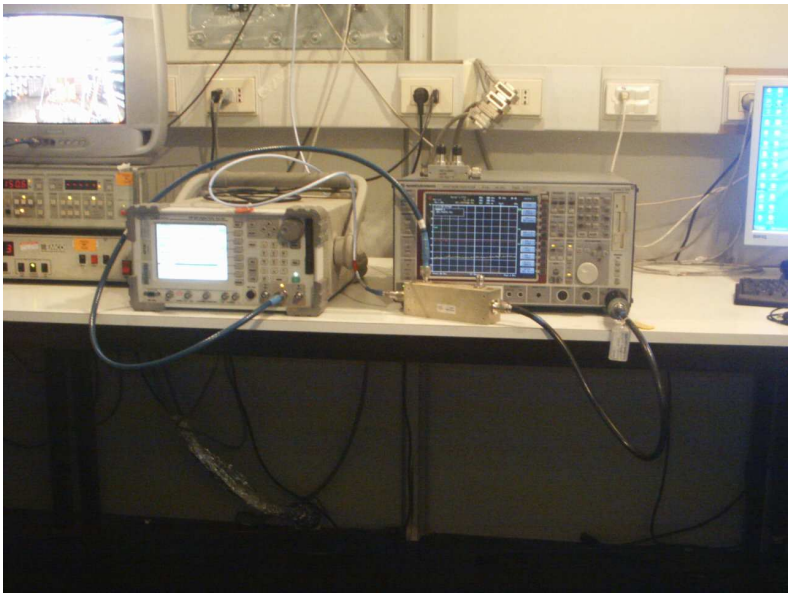




The RF Power maintains unchanged from 10,8 - 15,6 Vdc at 20° C.

Set up photo





Clause 90.207 Modulation characteristics

Unless specified elsewhere in this part, stations will be authorized emissions as provided for in paragraphs (b) through (n) of this section.

§ 2.1047 Measurements required: Modulation characteristics.

(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.

(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Test date: --

Test results: NA

Clause 90.221 Adiacent Channel Power

Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following table:

.

STANDARD CHANNEL SPACING/BANDWIDTH

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
* * *		
406–512[2]	[1]6.25	[1,3,6]20/11.25/6
806–809/851–854	12.5	[6]20
809–824/854–869	25	[6]20
* * *		
929–930	25	[6]20
* * *		

[1] For stations authorized on or after August 18, 1995.

[2] Bandwidths for radiolocation stations in the 420–450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.

[3] Operations using equipment designed to operate with a 25 kHz channel bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Operations using equipment designed to operate with a 6.25 kHz channel bandwidth will be authorized a 6 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2013, unless the operations meet the efficiency standard of §90.203(j)(3).

* * *

[6] Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of § 90.221.

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(c) Maximum adjacent power levels for frequencies above 700MHz:

Frequency Offset	Maximum ACP (dBc) for devices less than 15 watts	Maximum ACP (dBc) for devices 15 watts and above
25 kHz	**-55 dBc**	**-55 dBc**
50 kHz	**-65 dBc**	**-65 dBc**
75 kHz	**-65 dBc**	**-70 dBc**

In any case, no requirement in excess of -36 dBm shall apply.

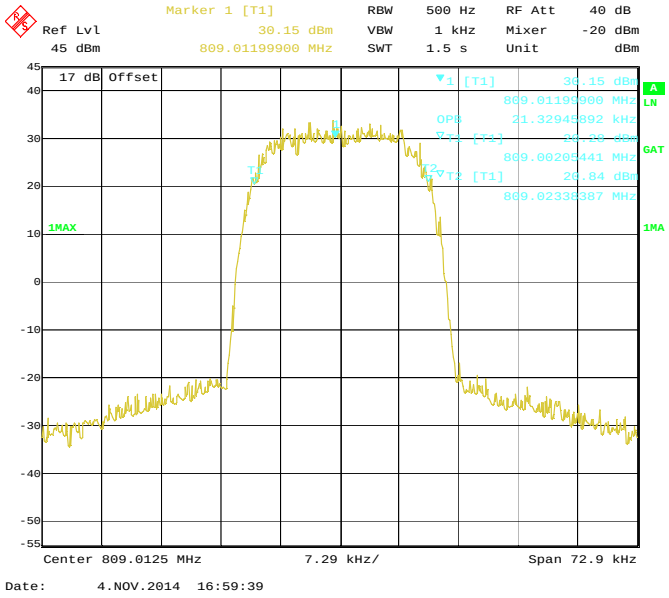
(d) On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least 43 + 10 log (P) dB.

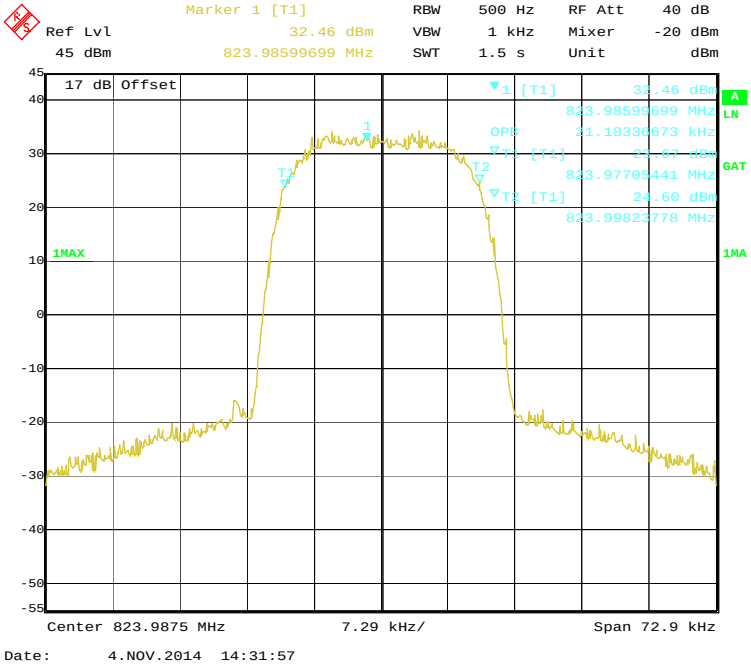
Test date: 2014-11-04

Test results: Pass

Test data

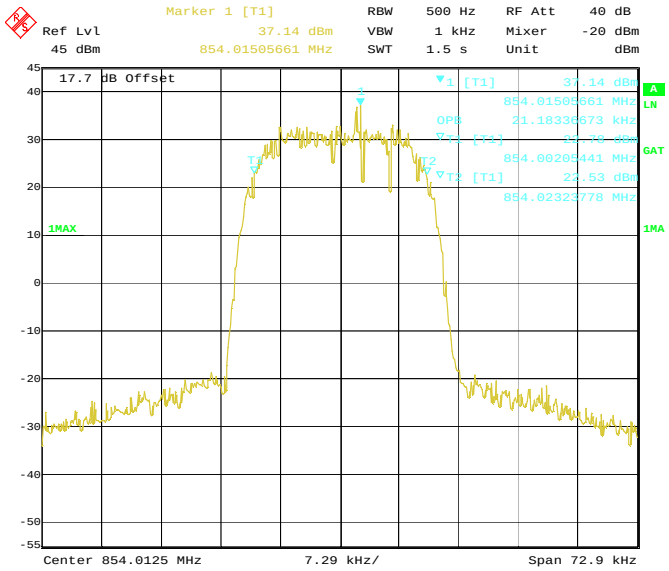
Occupied Bandwidth:

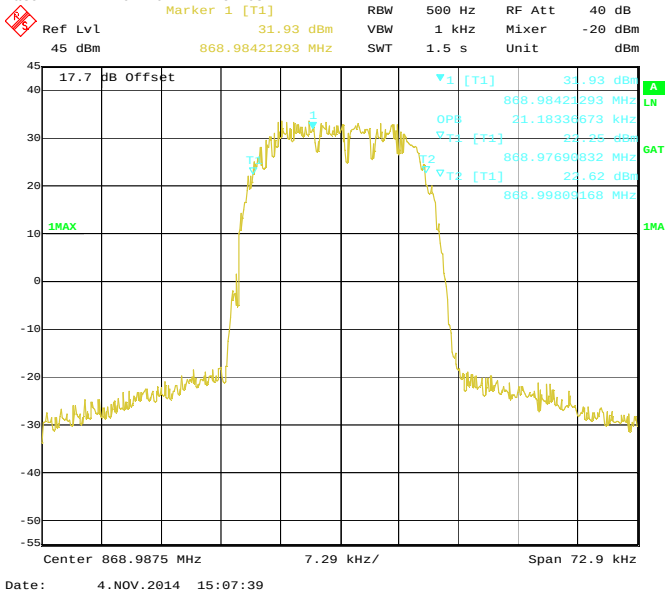




Test data

Occupied Bandwidth

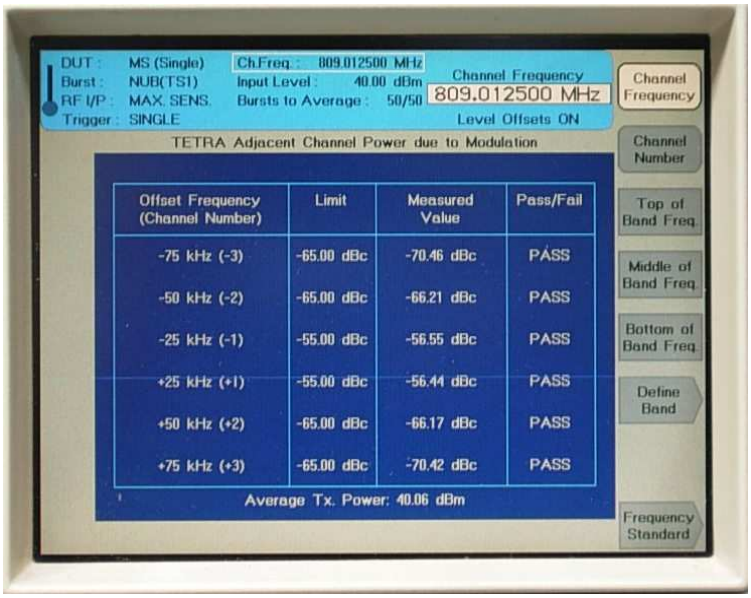


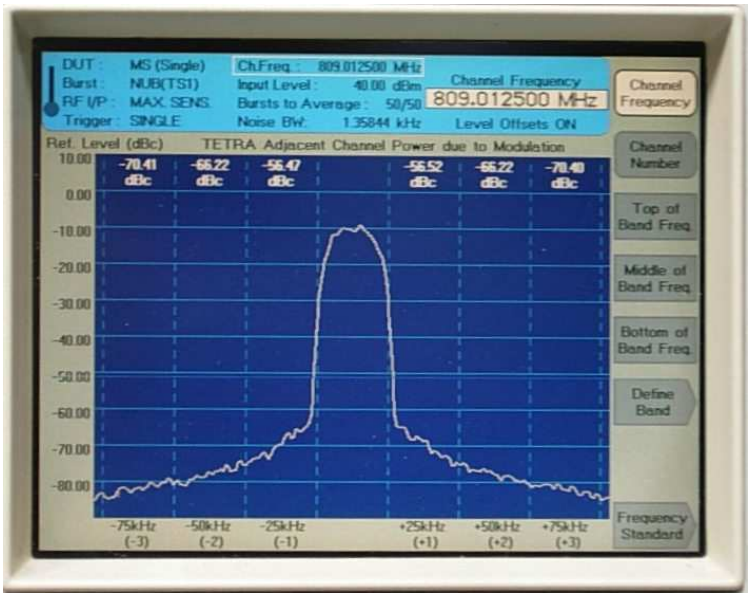


Frequency, MHz	26 dB bandwidth, kHz
809..0125	21.33
823.9875	21.18
854.0125	21.18
868.9875	21.18

Test data

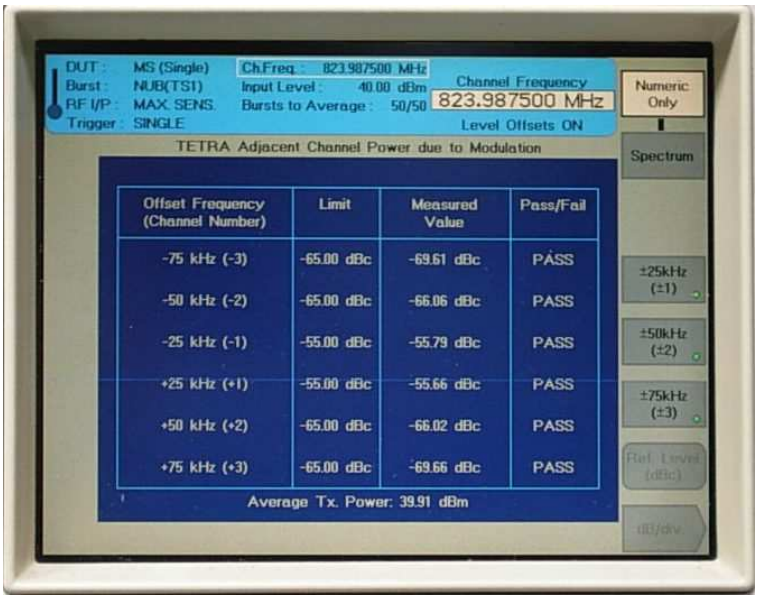
Adiacent channel Power 809.0125 MHz

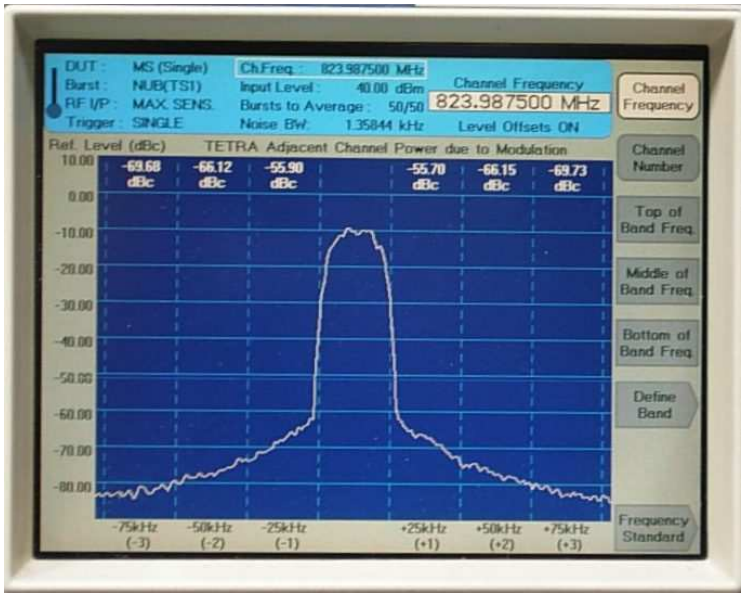




Test data

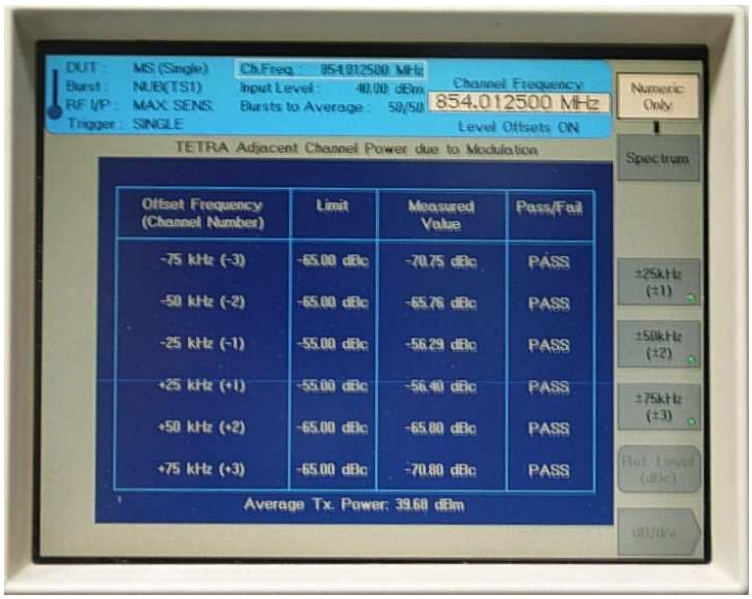
ACP 823.9875 MHz

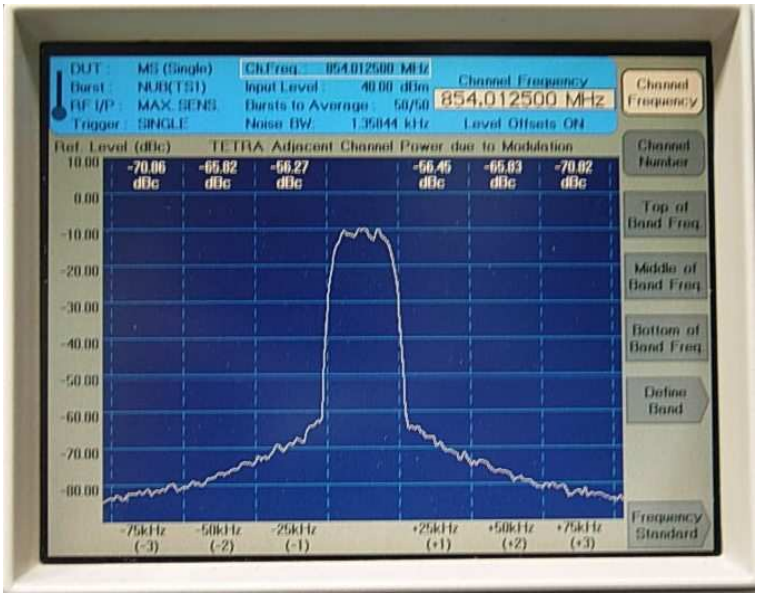




Test data

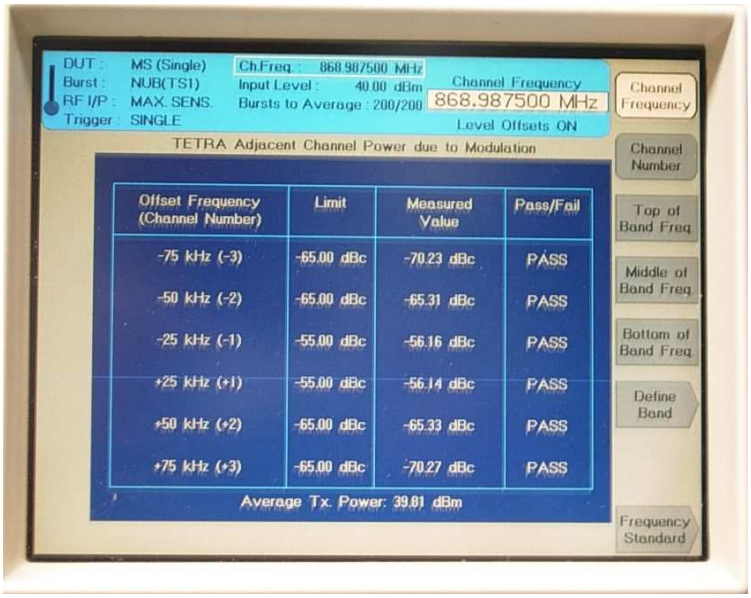
ACP 854.0125 MHz

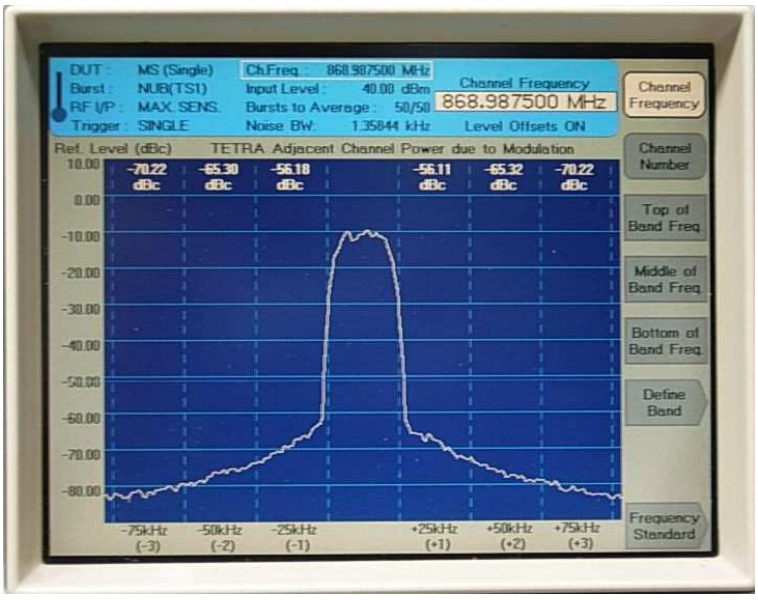




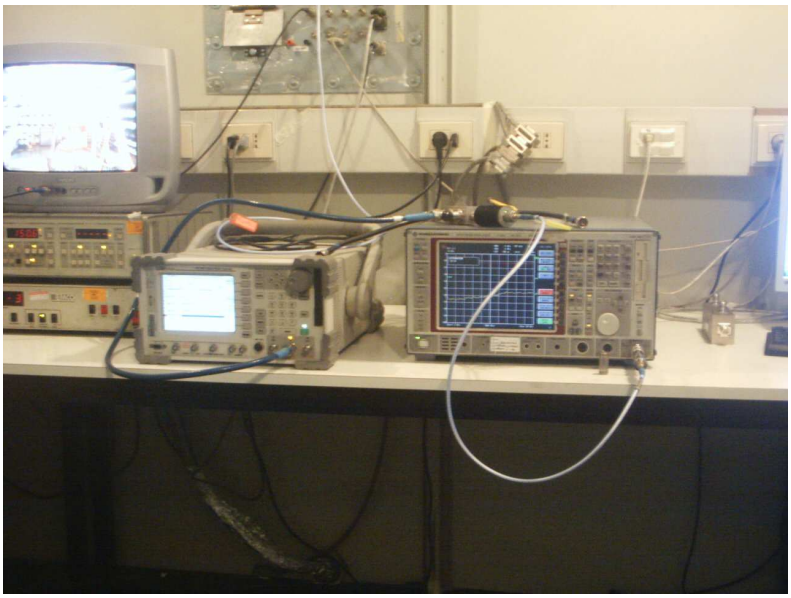
Test data

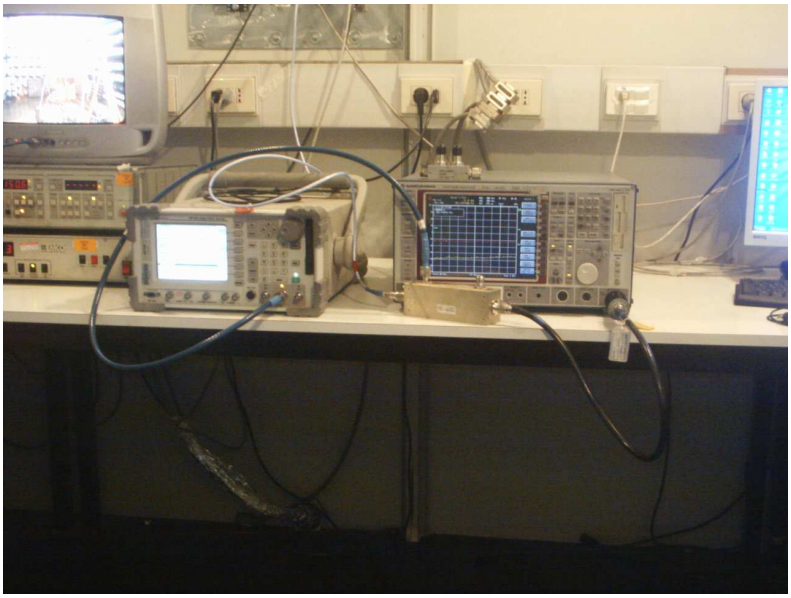
ACP 868.9875 MHz





Set up photo





Clause 90.210 Spurious emissions at the antenna terminal

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

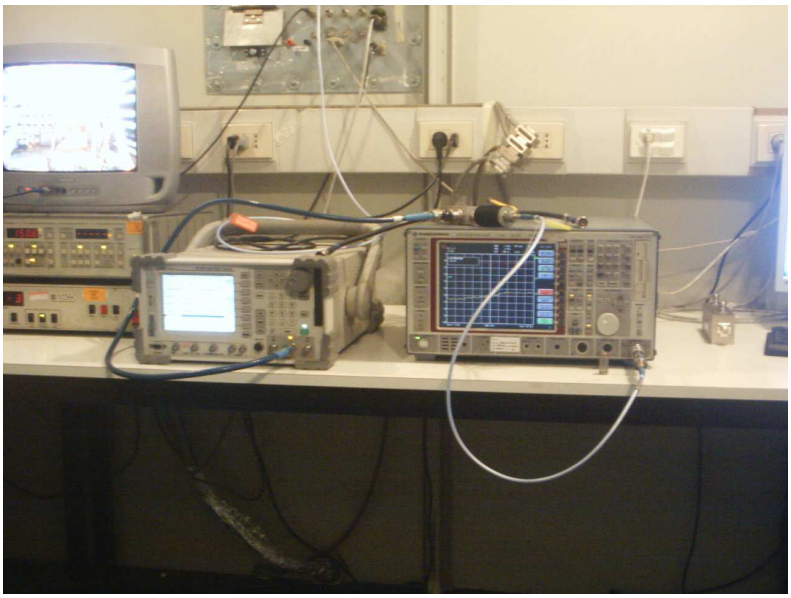
§ 2.1051 Measurements required: Spurious emissions at antenna terminals.
The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

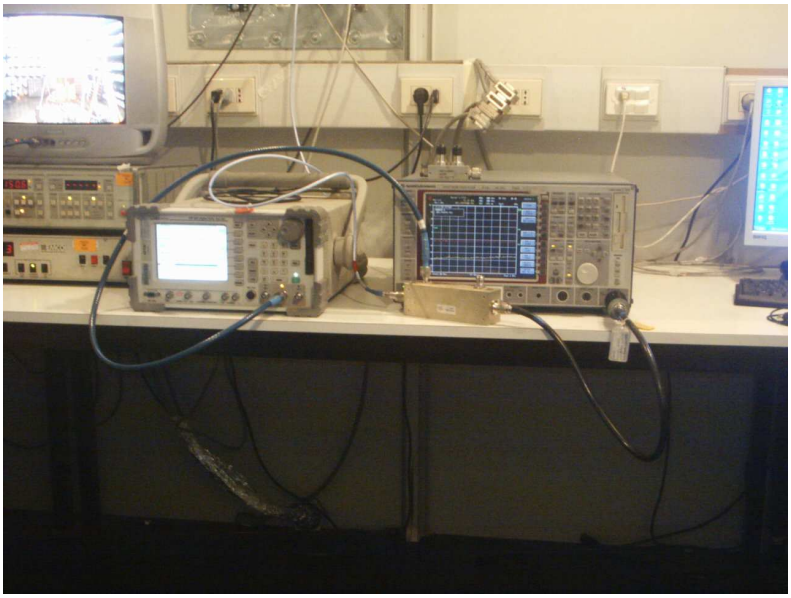
Test date: 2014-11-05

Test results: Pass

Special notes

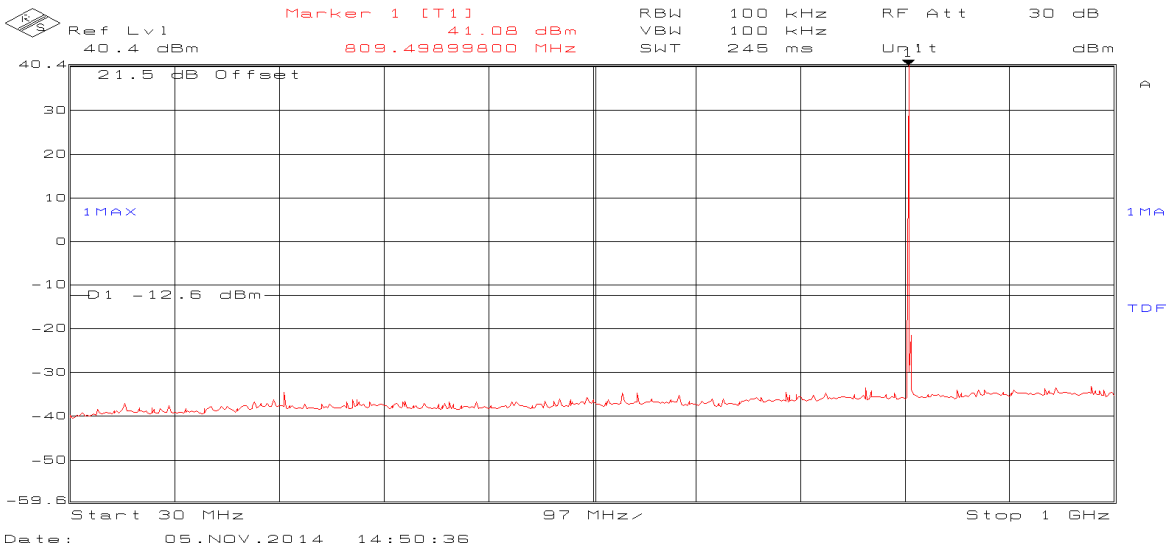
Set up photo

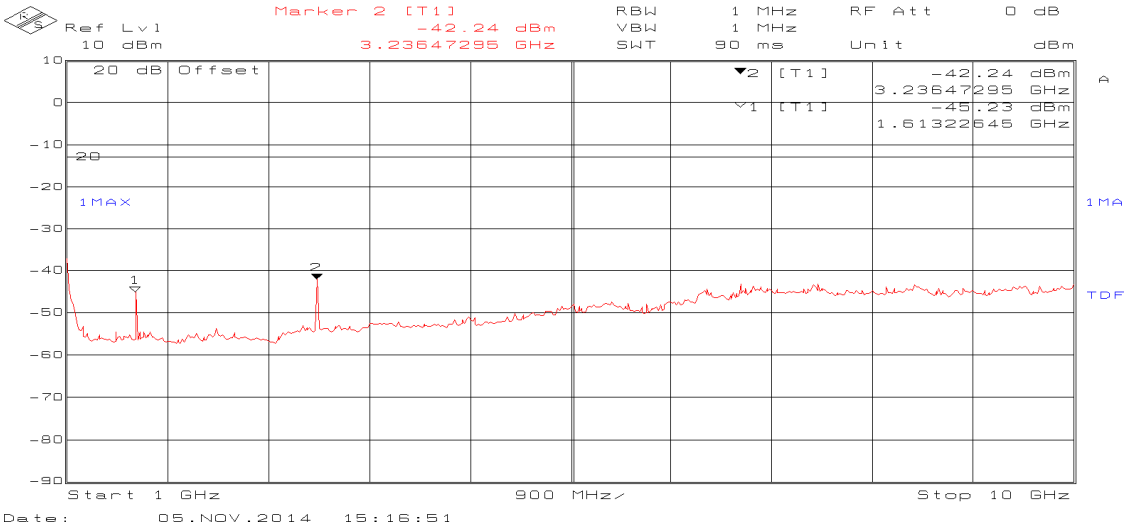




Test data

809.0125 MHz

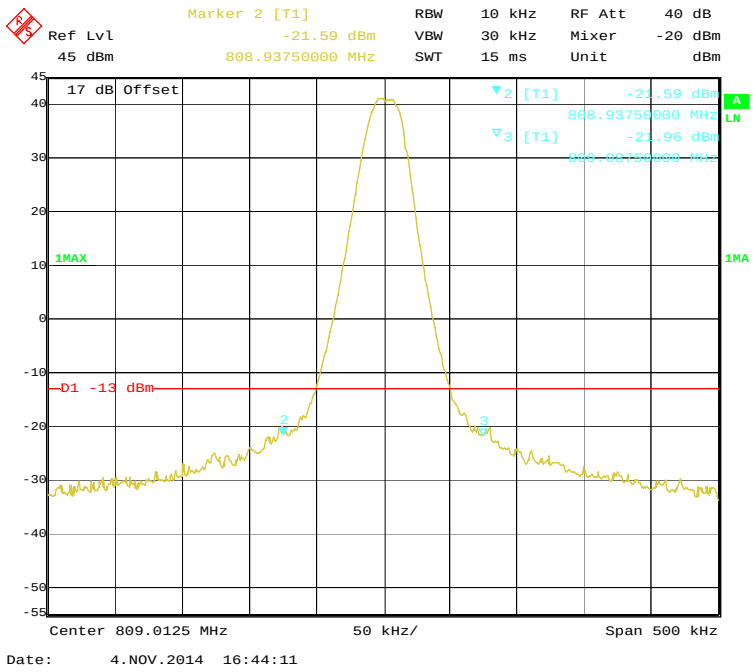




Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
809.0125	--	--	--	--	carrier
1613.226	-45.2	25.7	-13	peak	
3236.472	-42.4	28.4	-13	peak	

Test data

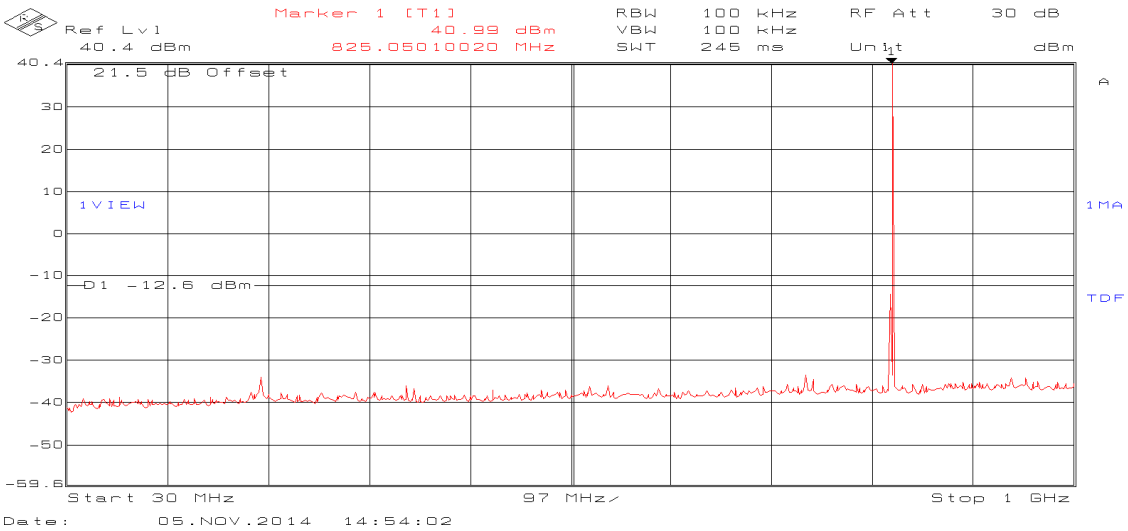
809.0125 MHz

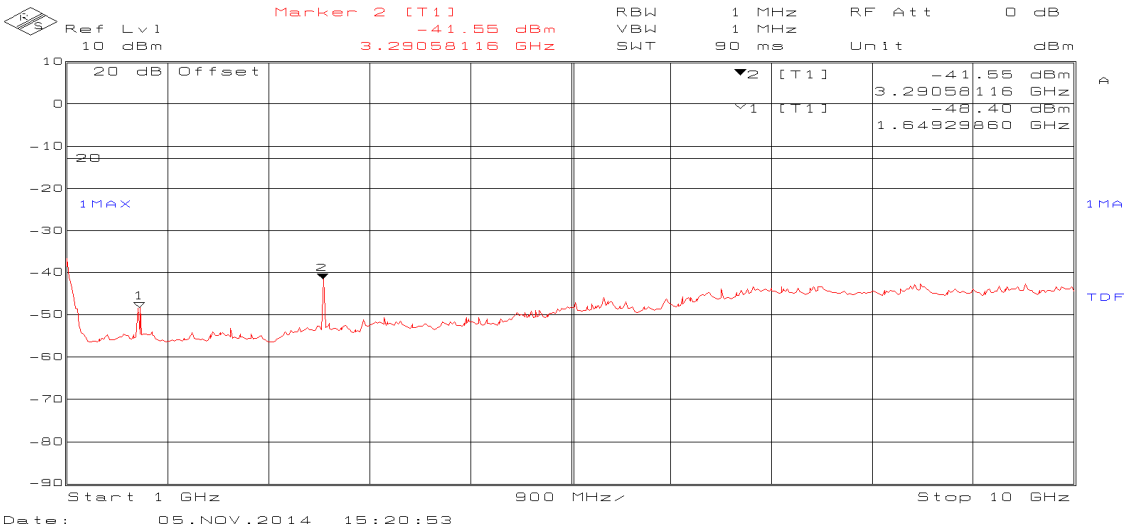


Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
808.9375	-21.6	17	-13	--	
809.0875	-21.9	17	-13	--	

Test data

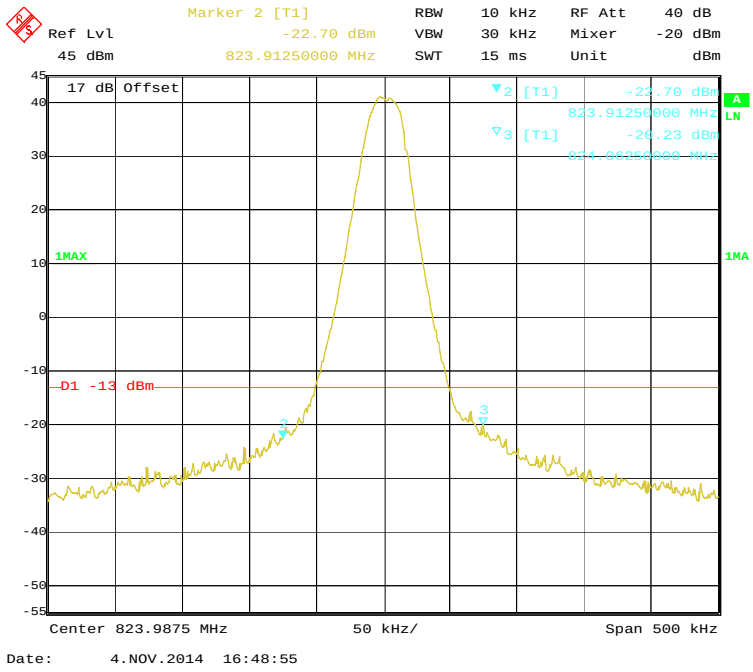
823.9875 MHz





Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
823.9875	--	--	--	PK	carrier
1649.298	-48.4	25.7	-13	PK	
3290.5811	-41.5	28.6	-13	PK	

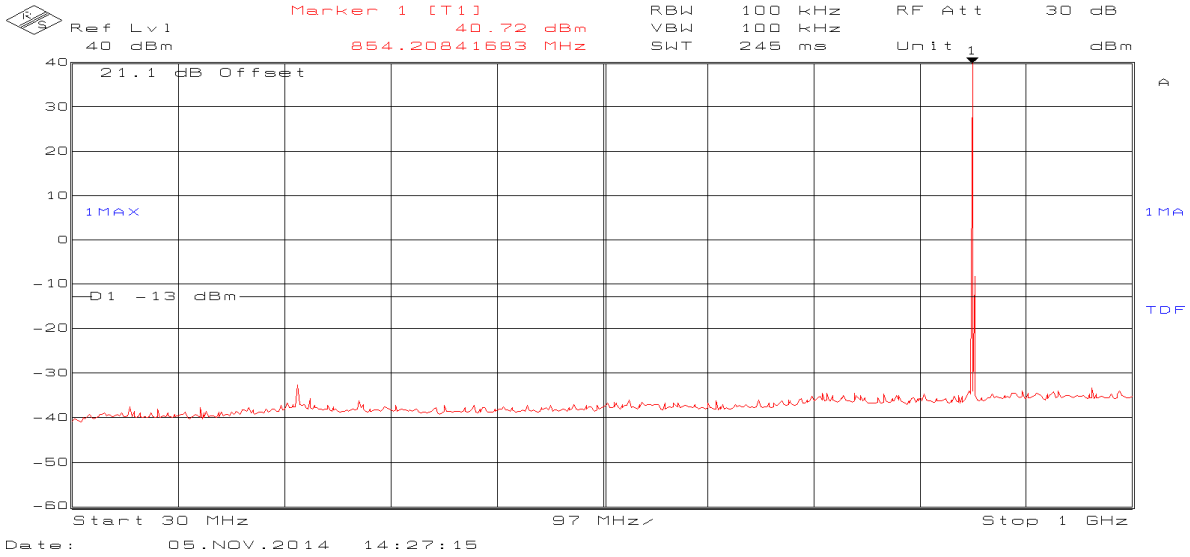
Test data

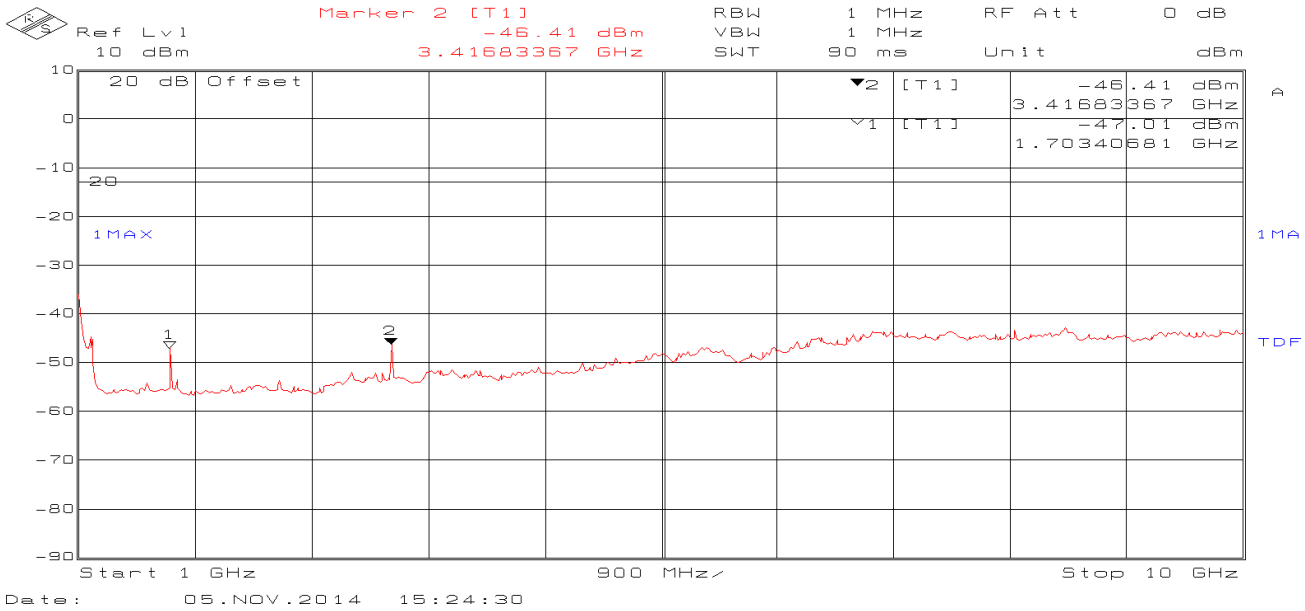


Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
823.9125	-22.7	17	-13	--	
824.0625	-20.3	17	-13	--	

Test data

854.0125 MHz

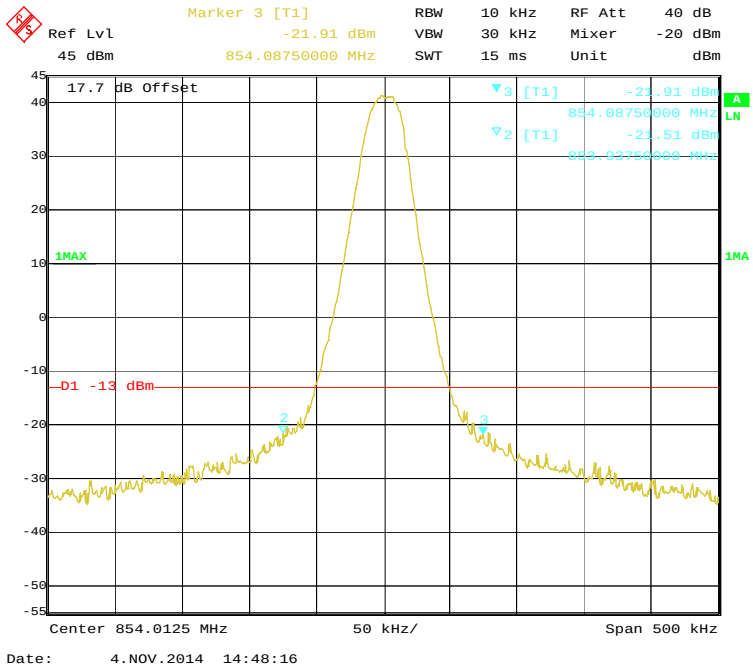




Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
854.01250	--	--	--	PK	carrier
1703.406	-47.0	25.7	-13	PK	
3416.8337	-46.4	28.3	-13	PK	

Test data

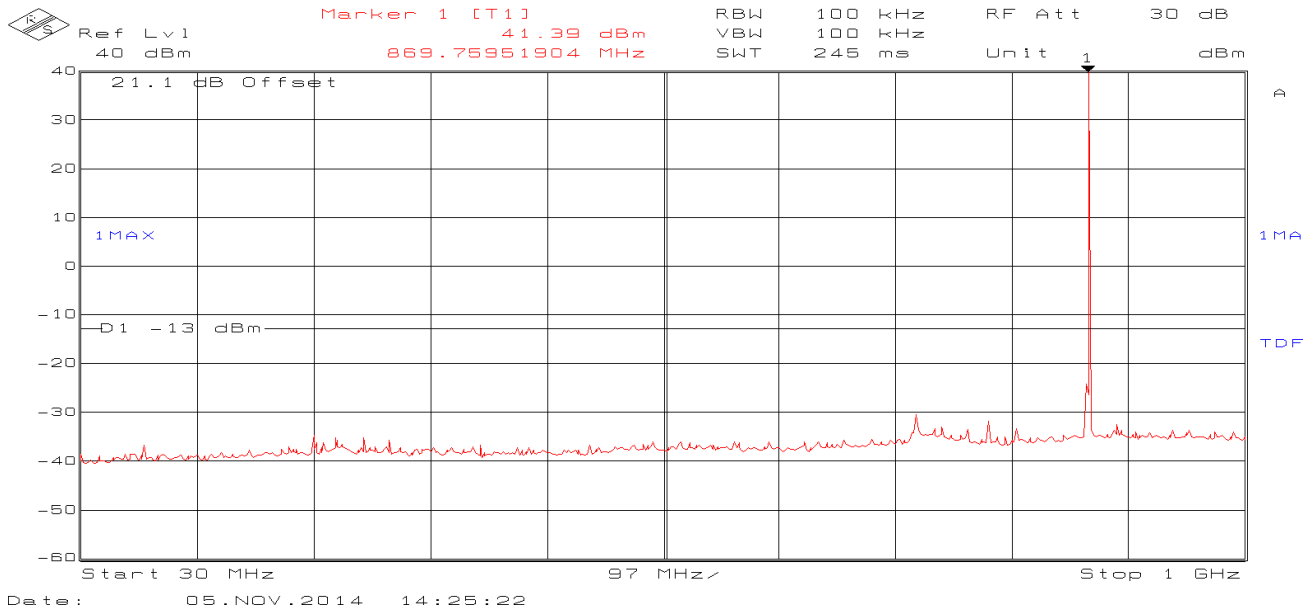
854.0125 MHz

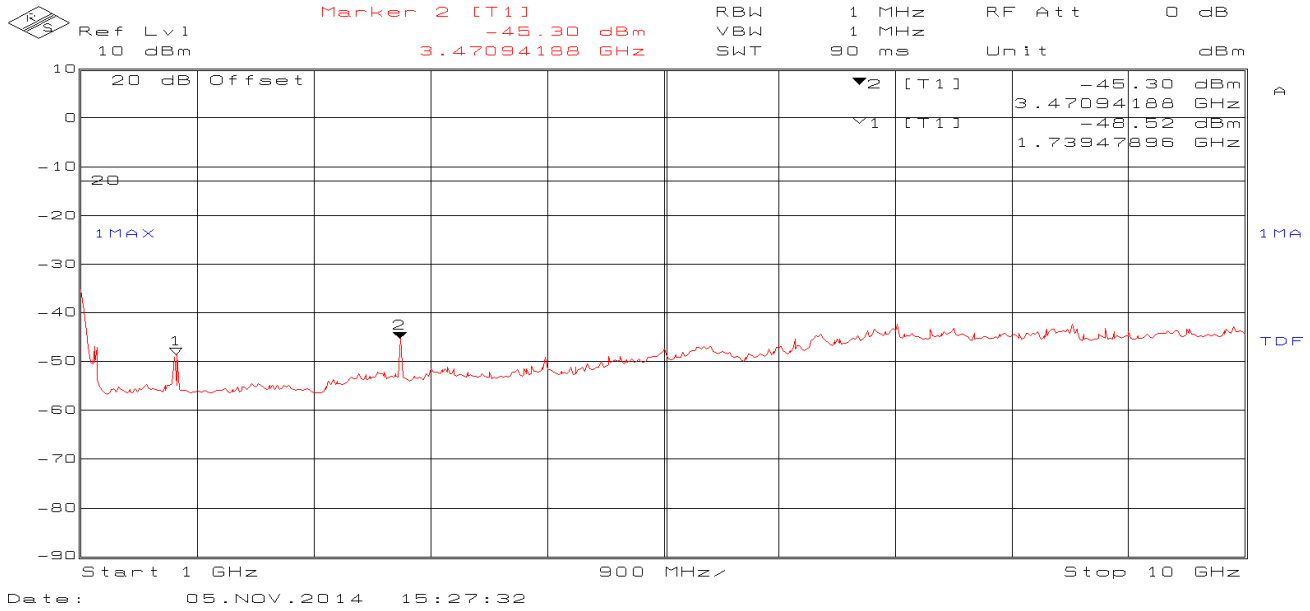


Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
853.9375	-21.5	17.7	-13	--	
854.0875	-21.9	17.7	-13	--	

Test data

868.9875 MHz

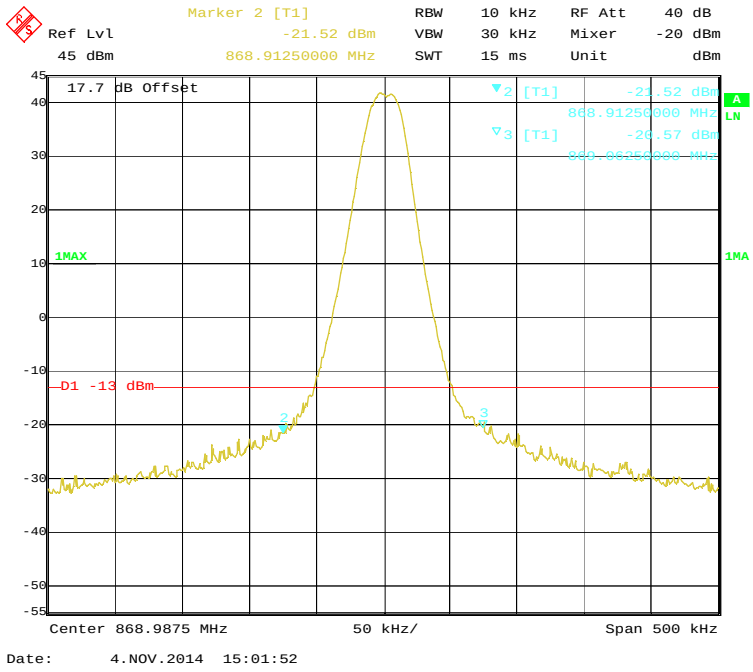




Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
868.9875	--	--	--	PK	carrier
1739.47896	-48.5	25.9	--	PK	
3470.94188	-45.3	28.2	--	PK	

Test data

868.9875 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
868.9125	-21.5	17.7	-13	--	
869.0625	-20.6	17.7	-13	--	

Clause 90.210 Field strength of spurious radiation

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

§ 2.1053 Measurements required: Field strength of spurious radiation.
(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.
(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:
(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz.
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

Test date: 2014-11-03, 2014-11-04

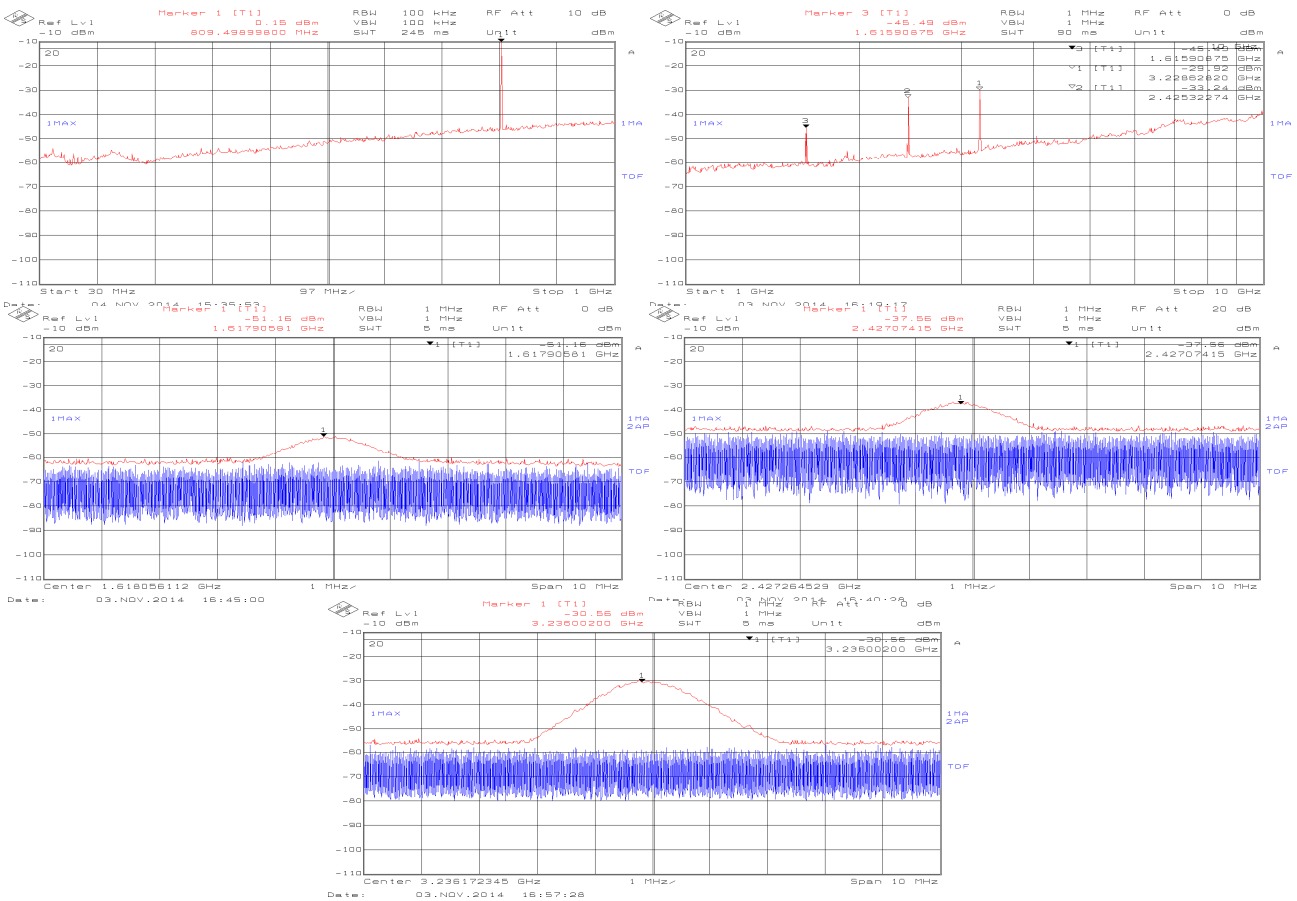
Test results: Pass

Special notes

- The spectrum was searched from 30 MHz to the 10th harmonic.
- All measurements were performed at a distance of 3 m.
- Only the worst data presented in the test report.
- Substitution method was used

Test data

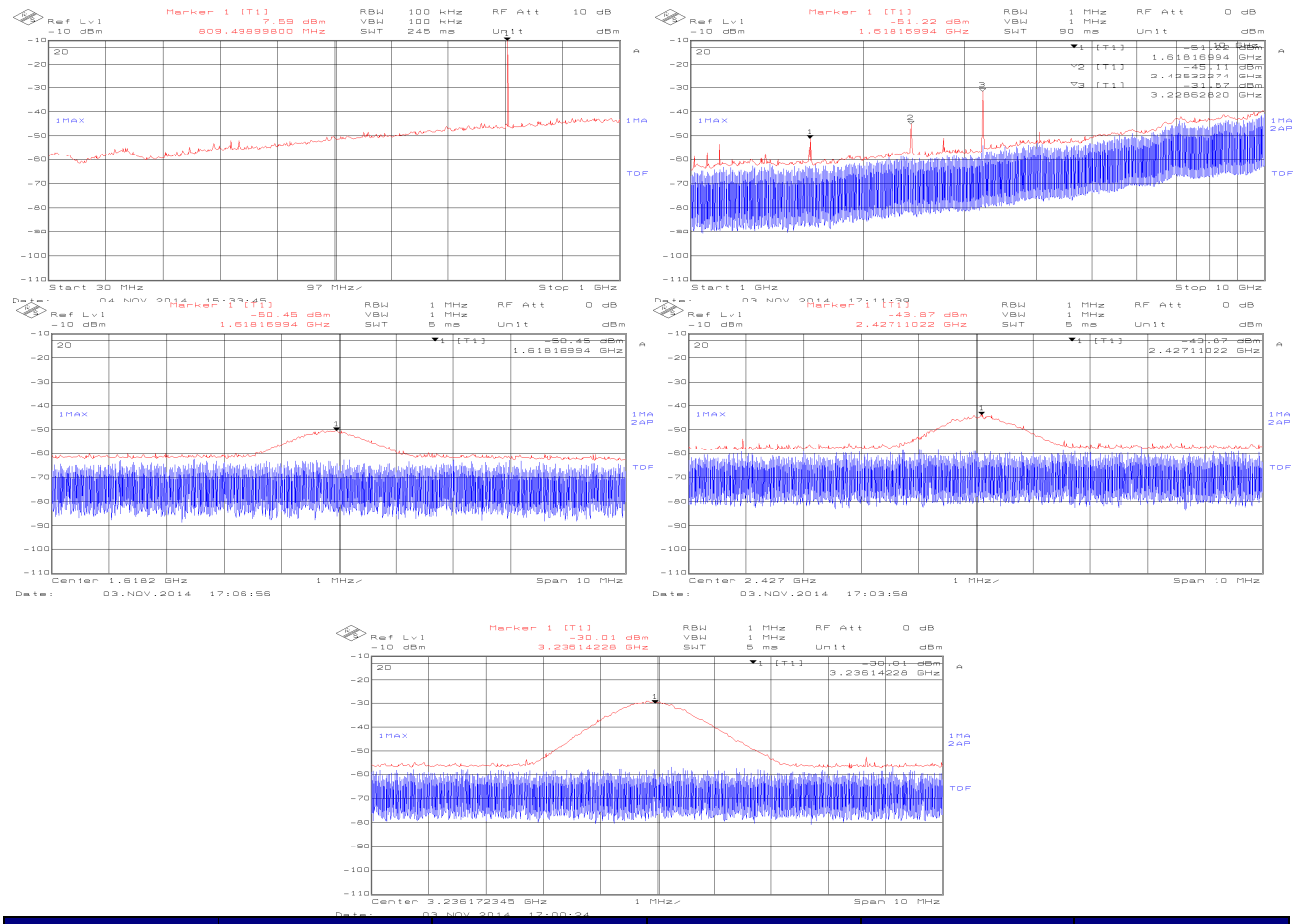
Vertical polarization, 30 ÷ 10000 MHz, 809.0125 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
809.0125	--	--	--	--	carrier
1618.056	-51.6	10.4	-13	--	
2427.645	-37.6	16.2	-13		
3236.076	-30.5	19.0	-13	--	

Test data

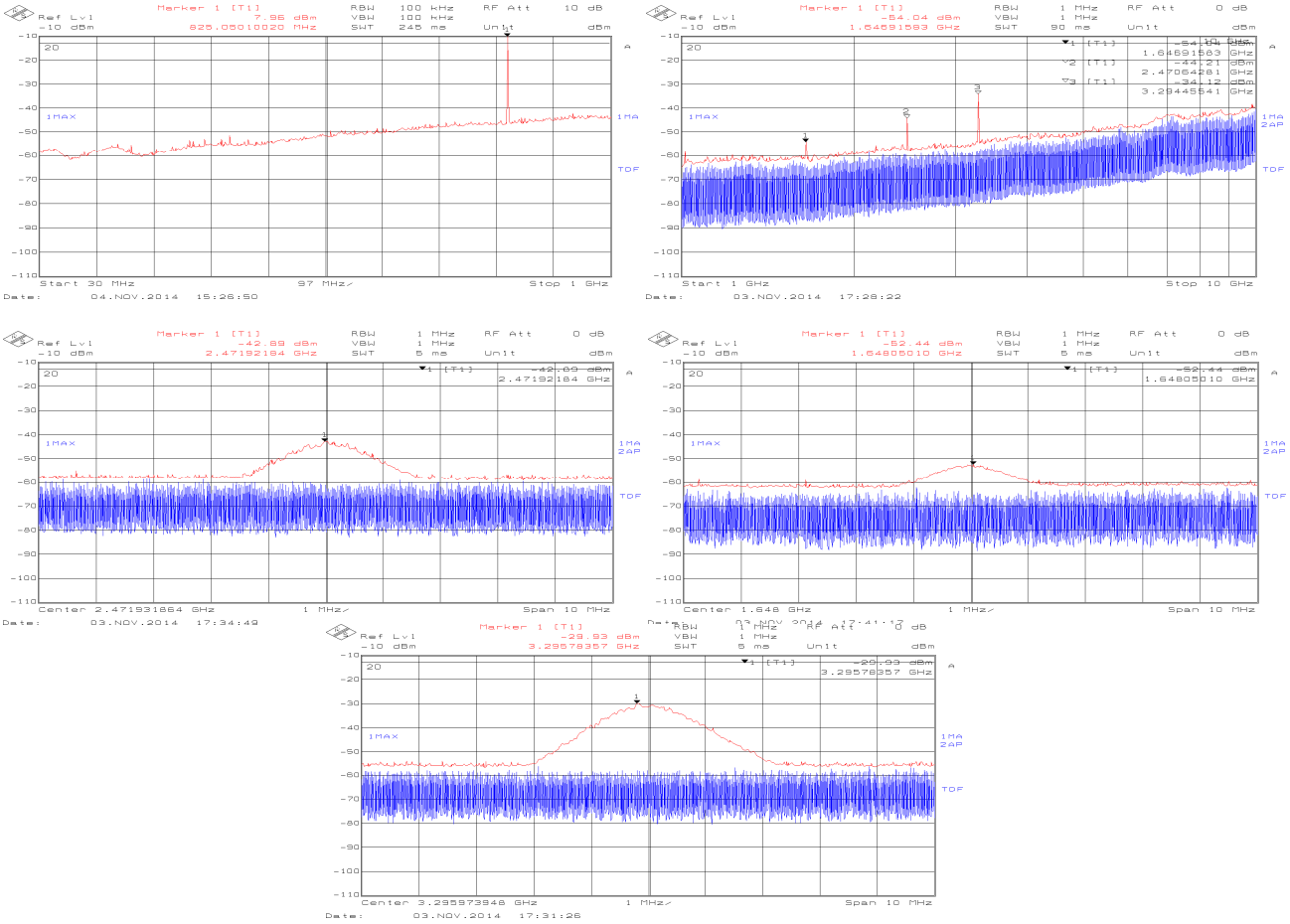
Horizontal polarization, 30 ÷ 10000 MHz, 809.0125 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
809.0125	--	--	--	--	carrier
1618.169	-50.5	10.4	-13	--	
2427.110	-43.9	16.2	-13		
3236.142	-29.7	19.0	-13		

Test data

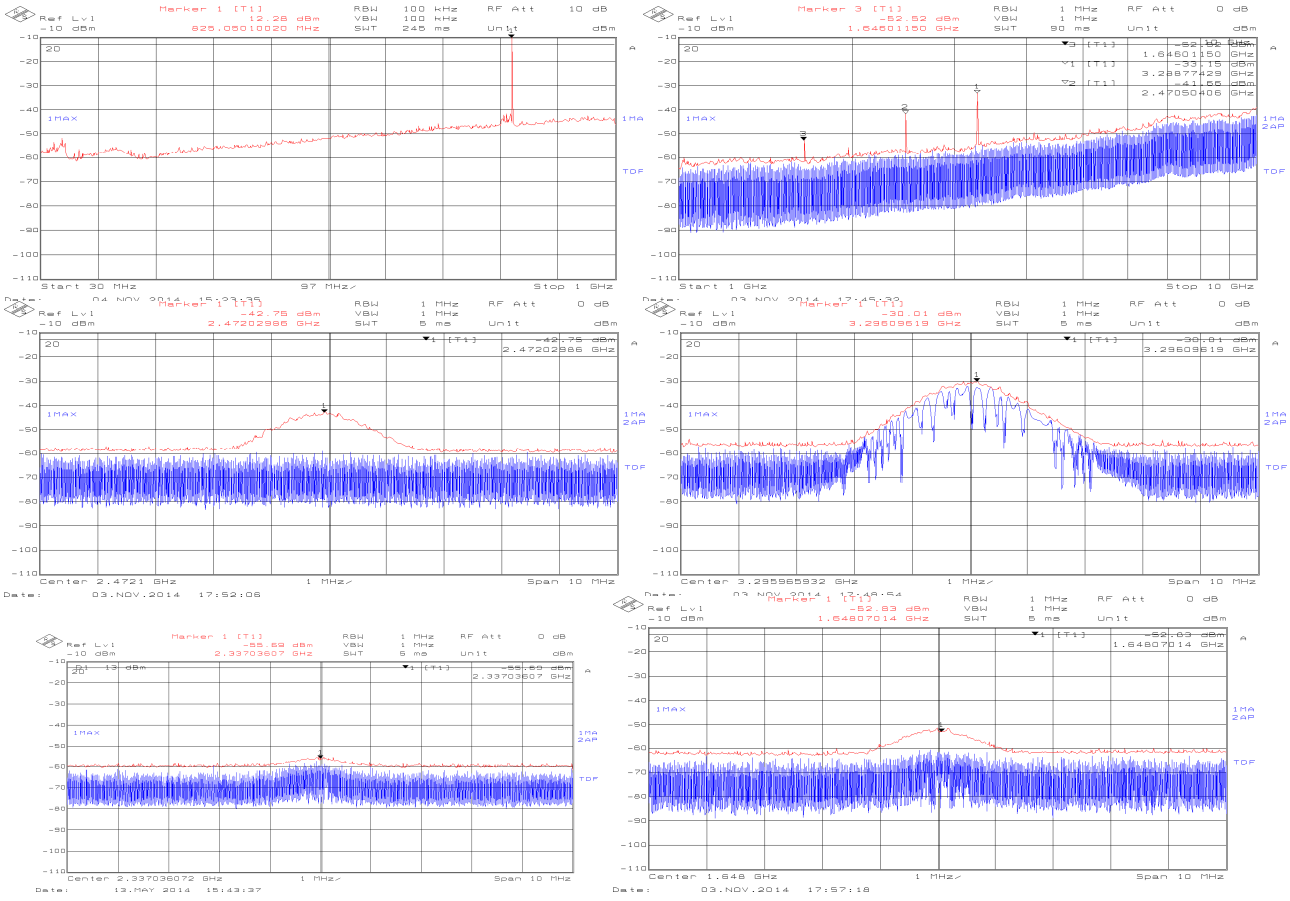
Horizontal polarization, 30 ÷ 10000 MHz, 823.9875 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
823.9875	--	--	--	--	carrier
1648.0501	-52.4	10.6	-13		
2471.9318	-42.9	16.3	-13		
3295.7835	-29.9	19.2	-13		

Test data

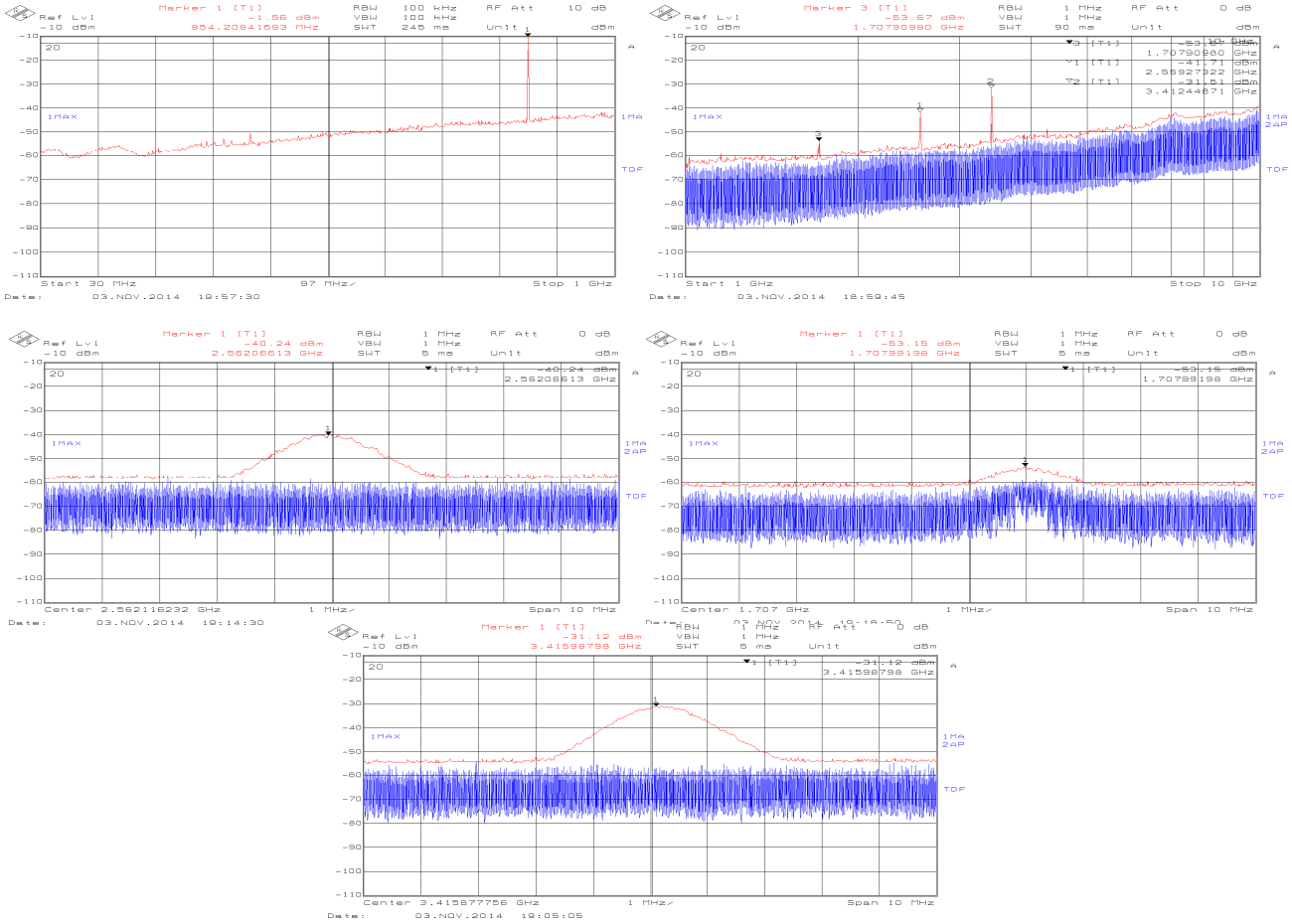
Vertical polarization, 30 ÷ 10000 MHz, 823.9875 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
823.9875	--	--	--	--	carrier
1648.0701	-52.8	10.6	-13	--	
2337.0360	-55.7	15.4	-13	--	
2472.0298	-42.7	16.3	-13		
3296.0961	-30.0	19.2	-13		

Test data

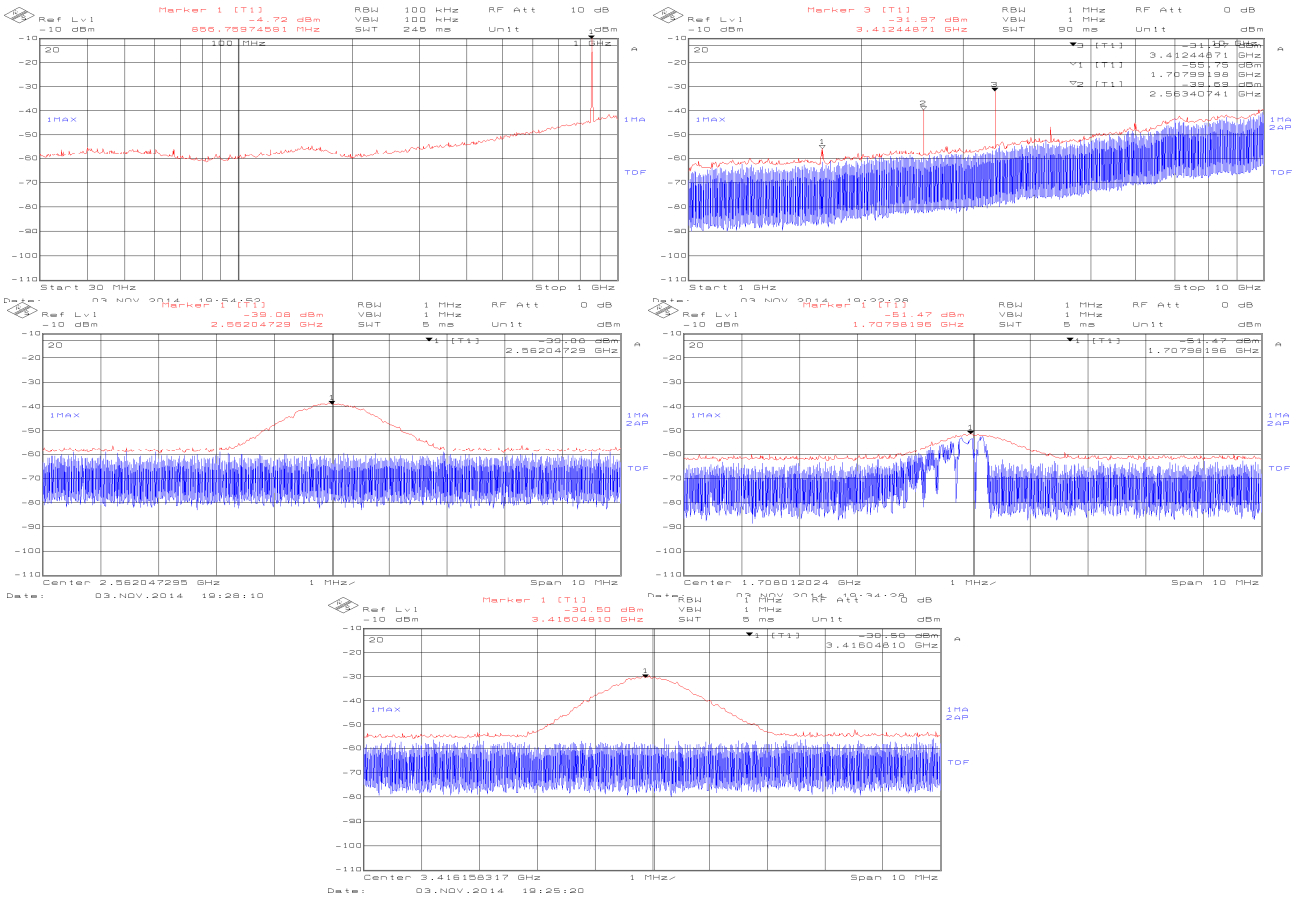
Horizontal polarization, 30 ÷ 10000 MHz, 854.0125 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
854.0125	--	--	--	--	carrier
1707.9919	-53.0	11.0	-13		
2562.0661	-40.2	16.6	-13		
3415.8777	-31.2	19.8	-13		

Test data

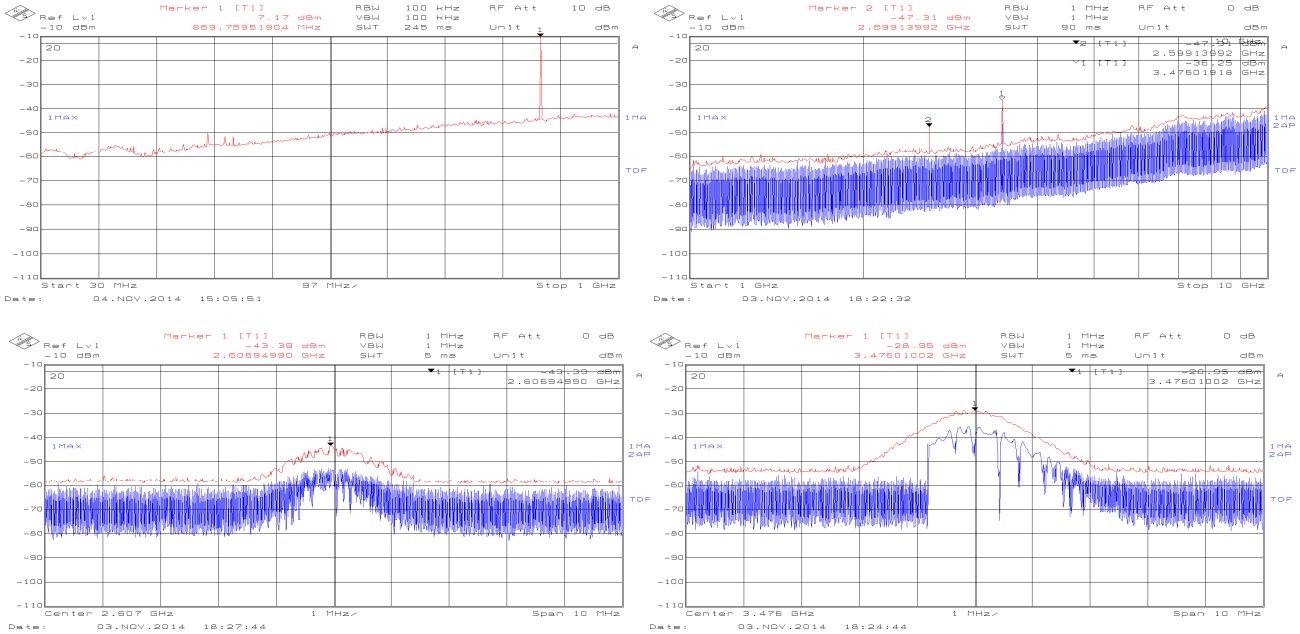
Vertical polarization, 30 ÷ 10000 MHz, 854.0125 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
854.0125	--	--	--	--	carrier
1707.9819	-51.5	11.0	-13		
2562.0472	-39.1	16.6	-13		
3416.0481	-30.5	19.8	-13		

Test data

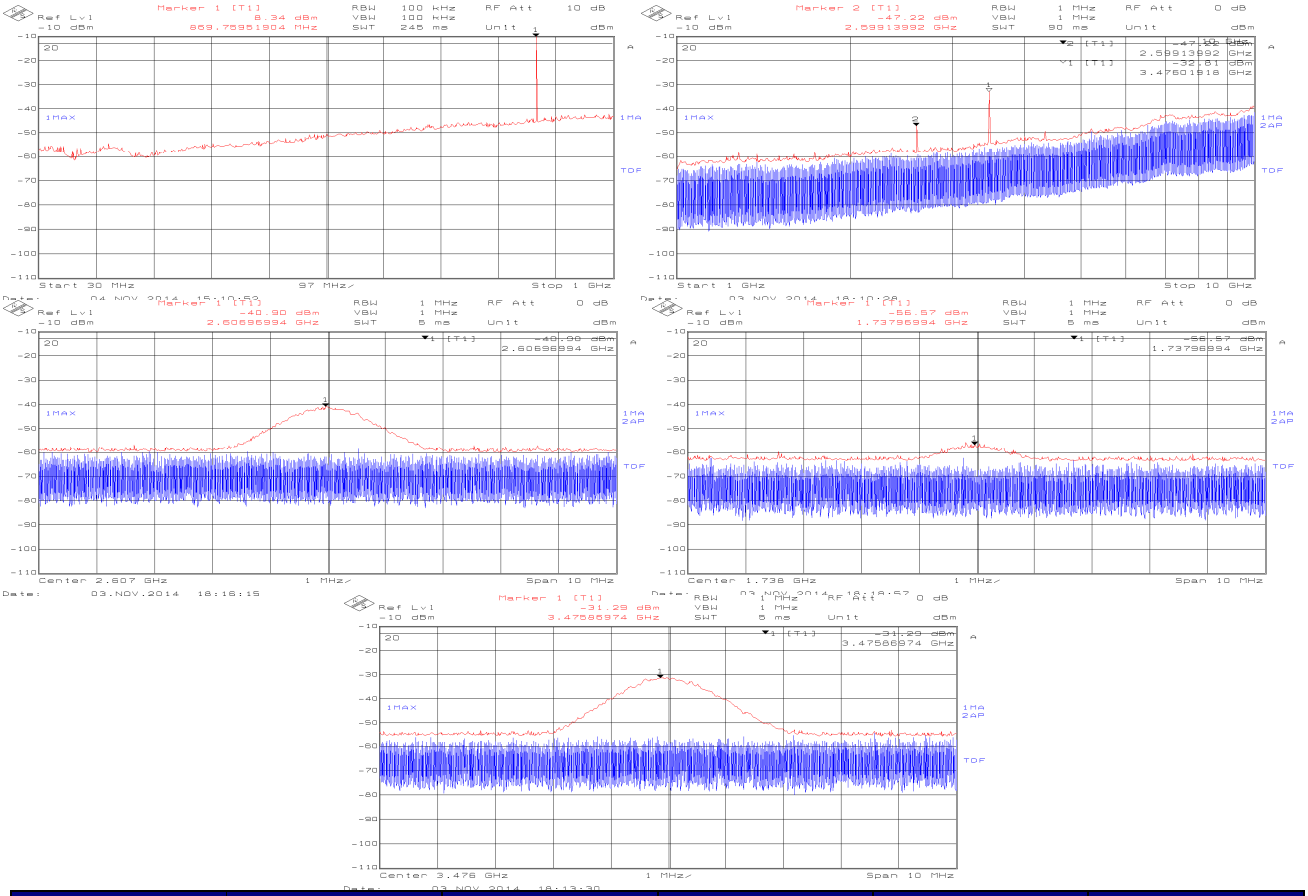
Horizontal polarization, 30 ÷ 10000 MHz, 868.9875 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
868.9875	--	--	--	--	carrier
2606.9499	-43.4	16.7	-13		
3476.0100	-28.9	19.7	-13		

Test data

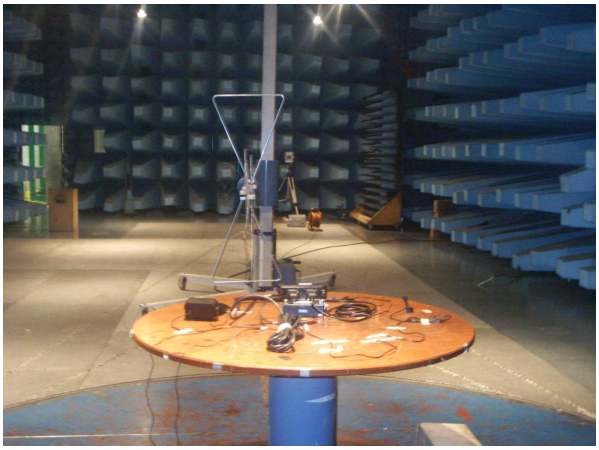
Vertical polarization, 30 ÷ 10000 MHz, 868.9875 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
868.9875	--	--	--	--	carrier
1737.9699	-56.6	11.2	-13	--	
2606.9699	-40.9	16.7	-13		
3475.8697	-31.3	19.7	-13		

Clause 15. 209 Field Strength, continued

Set up photo



Log periodic antenna (30MHz ÷ 1000 MHz)
measurement distance: 3 m

Log periodic antenna 1000 MHz ÷ 10000 MHz)
measurement distance: 3 m

Clause 90.213 Frequency stability

Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 W output power	2 W or less output power
Below 25	100	100	200
25–50	20	20	50
72–76	(5) 2.5	–	50
150–174	50	5	50
216–220	1.0	–	1.0
220–222	0.1	1.5	1.5
421–512	2.5	5	5
806–809	1.0	1.5	1.5
809–824	1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	0.1	1.5	1.5
902–928	2.5	2.5	2.5
929–930	1.5	–	–
935–940	0.1	1.5	1.5
1427–1435	300	300	300
Above 2450	–	–	–

The units are in ppm

Test date: 2014-11-05

Test results: Pass

Special notes

None

Clause 90.213 Frequency stability, continued

Test data, continued

Conditions	Frequency (MHz)	Offset (ppm)
+60°C	809.012513	0.0164
+50°C	809.012482	-0.0225
+40°C	809.012516	0.0195
+30°C	809.012479	-0.0256
+20°C (85% voltage)	809.012520	0.0245
+20°C (115% voltage)	809.012524	0.029
+20°C	809.012520	0.0252
+10°C	809.012517	0.0214
0°C	809.012514	0.0175
-10°C	809.012488	-0.0149
-20°C	809.012485	-0.0187
-30°C	809.012480	-0.0248

Offset calculation: $\frac{F_{Measured} - F_{reference}}{F_{reference}} \times 1 \cdot 10^{6}$

Test data, continued

Conditions	Frequency (MHz)	Offset (ppm)
+60 °C, Nominal power	823.987515	0.0177
+50 °C, Nominal power	823.987517	0.0200
+40 °C, Nominal power	823.987518	0.0216
+30 °C, Nominal power	823.987521	0.026
+20 °C, Nominal power	823.987519	0.0229
+20 °C, 115 % power	823.987481	-0.0237
+20 °C, 85 % power	823.987482	-0.0221
+10 °C, Nominal power	823.987519	0.0232
0 °C, Nominal power	823.987517	0.0203
−10 °C, Nominal power	823.987487	-0.0163
−20 °C, Nominal power	823.987482	-0.0224
−30 °C, Nominal power	823.987476	-0.0292

Offset calculation: $\frac{F_{Measured} - F_{reference}}{F_{reference}} \times 1 \cdot 10^{6}$

Clause 90.213 Frequency stability, continued

Test data, continued

Conditions	Frequency (MHz)	Offset (ppm)
+60 °C, Nominal power	854.013002	0.5879
+50 °C, Nominal power	854.012912	0.4823
+40 °C, Nominal power	854.012820	0.3748
+30 °C, Nominal power	854.012702	0.2359
+20 °C, Nominal power	854.012597	0.1137
+20 °C, 115 % power	854.012404	-0.1129
+20 °C, 85 % power	854.012406	-0.1104
+10 °C, Nominal power	854.012422	-0.0916
0 °C, Nominal power	854.012390	-0.1294
−10 °C, Nominal power	854.012341	-0.1866
−20 °C, Nominal power	854.012301	-0.2331
−30 °C, Nominal power	854.012252	-0.2907

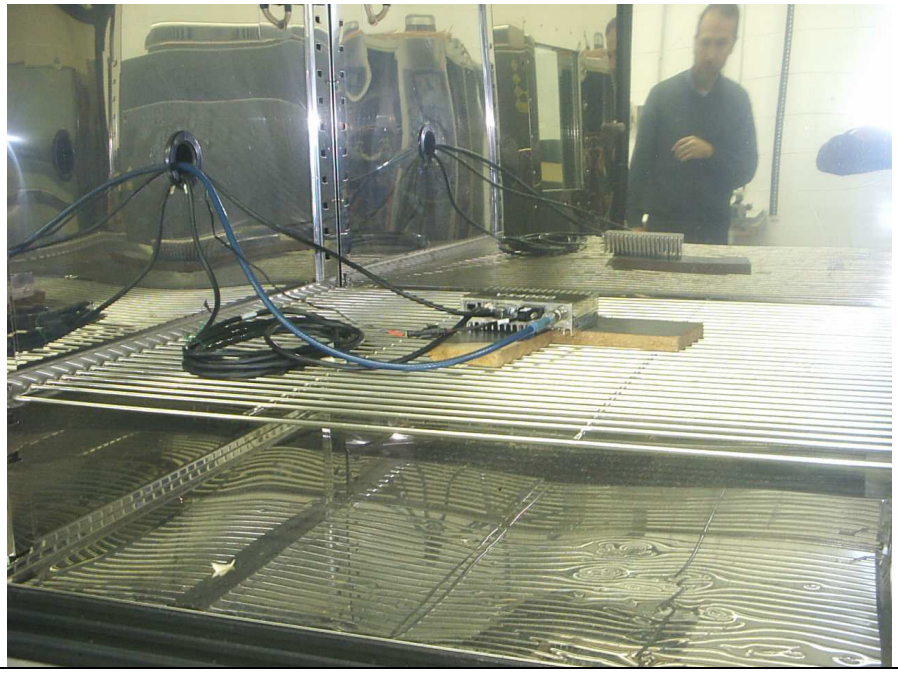
Offset calculation: $\frac{F_{Measured} - F_{reference}}{F_{reference}} \times 1 \cdot 10^{6}$

Test data, continued

Conditions	Frequency (MHz)	Offset (ppm)
+60 °C, Nominal power	868.988042	0.6235
+50 °C, Nominal power	868.987926	0.49
+40 °C, Nominal power	868.987809	0.3553
+30 °C, Nominal power	868.987714	0.2466
+20 °C, Nominal power	868.987403	-0.1118
+20 °C, 115 % power	868.987404	-0.1102
+20 °C, 85 % power	868.987406	-0.1083
+10 °C, Nominal power	868.987419	-0.0937
0 °C, Nominal power	868.987375	-0.1436
−10 °C, Nominal power	868.987328	-0.1976
−20 °C, Nominal power	868.987299	-0.2313
−30 °C, Nominal power	868.987244	-0.2946

Offset calculation: $\frac{F_{Measured} - F_{reference}}{F_{reference}} \times 1 \cdot 10^{6}$

Set up photo



Clause 90.219 Use of boosters

Licensees authorized to operate radio systems in the frequency bands above 150 MHz may employ signal boosters at fixed locations in accordance with the following criteria:
(a) The amplified signal is retransmitted only on the exact frequency(ies) of the originating base, fixed, mobile, or portable station(s). The booster will fill in only weak signal areas and cannot extend the system's normal signal coverage area.
(b) Class A narrowband signal boosters must be equipped with automatic gain control circuitry which will limit the total effective radiated power (ERP) of the unit to a maximum of 5 W under all conditions. Class B broadband signal boosters are limited to 5 W ERP for each authorized frequency that the booster is designed to amplify.
(c) Class A narrowband boosters must meet the out-of-band emission limits of §90.210 for each narrowband channel that the booster is designed to amplify. Class B broadband signal boosters must meet the emission limits of §90.210 for frequencies outside of the booster's designed passband.
(d) Class B broadband signal boosters are permitted to be used only in confined or indoor areas such as buildings, tunnels, underground areas, etc., or in remote areas, i.e., areas where there is little or no risk of interference to other users.
(e) The licensee is given authority to operate signal boosters without separate authorization from the Commission. Certificated equipment must be employed and the licensee must ensure that all applicable rule requirements are met.
(f) Licensees employing either Class A narrowband or Class B broadband signal boosters as defined in §90.7 are responsible for correcting any harmful interference that the equipment may cause to other systems. Normal co-channel transmissions will not be considered as harmful interference. Licensees will be required to resolve interference problems pursuant to §90.173(b).

Test date: ---

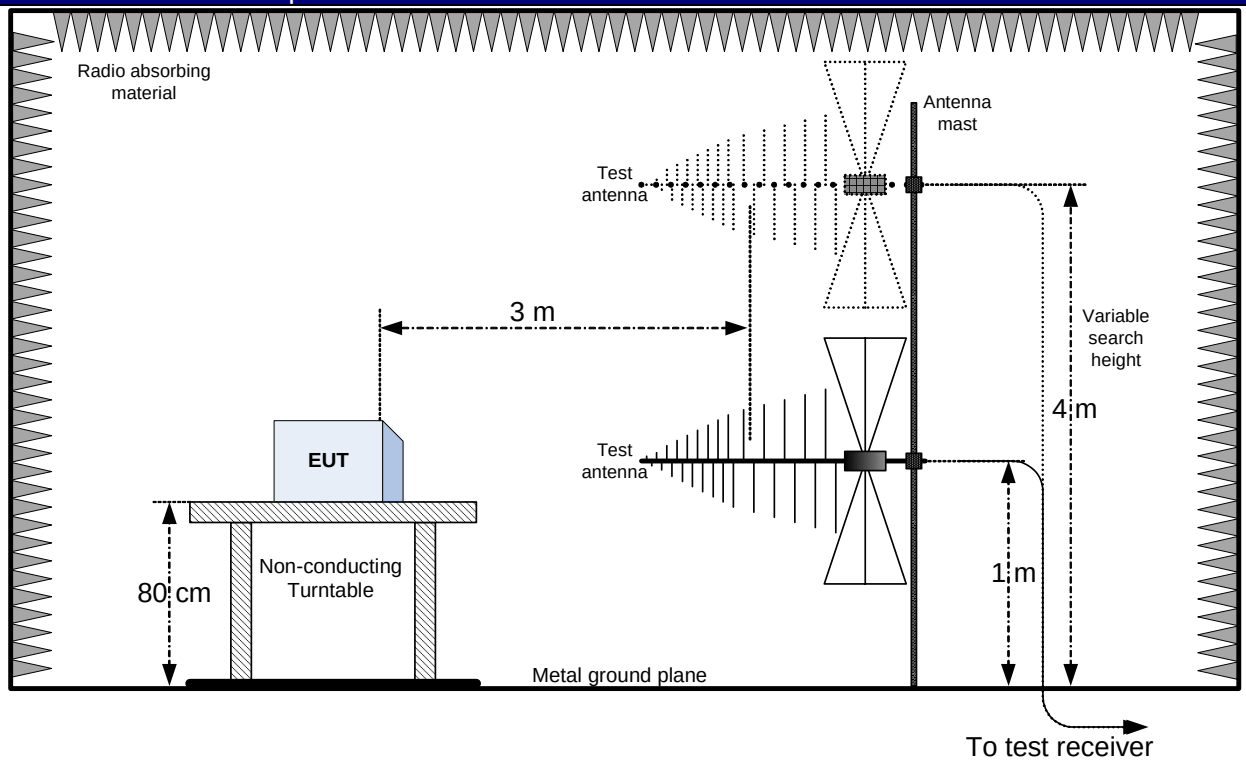
Test results: N

Special notes

None

Appendix B: Block diagrams of test set-ups

Radiated emissions set-up



Frequency stability set-up