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

Report number: 242288-1TRFWL
Apparatus: IP TETRA BS Node
Applicant: SELEX ES S.p.A.
Via Piemonte, 60 - 00187 Roma- Italy
FCC ID: X5YBSNODE-470

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
Technology (TETRA)

– Subpart I – General technical standards

Reviewed by: 
Signature _____ 2013-09-17
G. Curioni, Wireless/EMC Specialist Date

Tested by: 
Signature _____ 2013-09-17
D. Guarnone, Wireless/EMC Specialist Date

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Table of contents

Section 1: Report summary.....	3
Section 2: Equipment under test	4
2.1 Identification of equipment under test (EUT)	4
2.2 Accessories and support equipment.....	5
2.3 EUT description	6
2.4 Technical specifications of the EUT	6
2.5 EUT setup diagram.....	7
2.6 Operation of the EUT during testing	7
2.7 Modifications incorporated in the EUT	7
Section 3: Test conditions	8
3.1 Deviations from laboratory tests procedures.....	8
3.2 Test conditions, power source and ambient temperatures.....	8
3.3 Measurement uncertainty	9
3.4 Test equipment.....	9
Section 4: Result summary	10
4.1 FCC Part 90: Test results	10
Appendix A: Test results	11
Clause 90.205 Output power.....	11
Clause 90.207 Modulation characteristics	15
Clause 90.209 Bandwidth limitations (*)	16
Clause 90.210 Spurious emissions at the antenna terminal	24
Clause 90.210 Field strength of spurious radiation.....	33
Clause 90.213 Frequency stability.....	50
Clause 90.219 Use of boosters	53
Appendix B: Block diagrams of test set-ups	54



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Section 1: Report summary

Report Number: 242288-1TRFWL

Specification: FCC 90

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

FCC 11-63 – Amendment of part 90 of the Commission Rule's to permit Terrestrial Trunked Radio Technology (TETRA)

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 in 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 contained in this report are within Nemko Italy's ISO/IEC 17025 accreditation.

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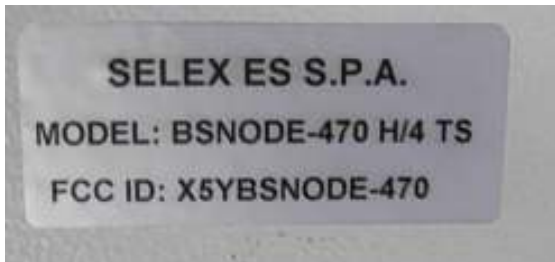
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	Report Number: 242288-1TRFWL
	Specification: FCC 90

Section 2: Equipment under test

2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

Type of equipment:	IP TETRA BS Node
Product marketing name:	BS Node-470 IP
Code number:	775-1197/01 (460-465 MHz); 775-1200/01 465-470 MHz)
Model number:	BS Node-470 L/4 TS; BS Node-470 H/4 TS)
Serial number:	A0001; A0001
FCC ID:	X5YBSNODE-470
Date of receipt:	2013-09-09
Label	

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	Report Number: 242288-1TRFWL
	Specification: FCC 90

2.2 Accessories and support equipment

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

Item # 1	
Type of equipment:	Power supply
Brand name:	Delta Elektronika
Model name or number:	SM 70-45D
Serial number:	917103900096
Nemko sample number:	--
Connection port:	DC
Cable length and type:	2 m two wires cable
Item # 2	
Type of equipment:	Tetra Signal Analyzer
Brand name:	IFR
Model name or number:	2310
Serial number:	169975/043
Nemko sample number:	--
Connection port:	RF port
Cable length and type:	--

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	Report Number: 242288-1TRFWL
	Specification: FCC 90

Section 2: Equipment under test, continued

2.3 EUT description

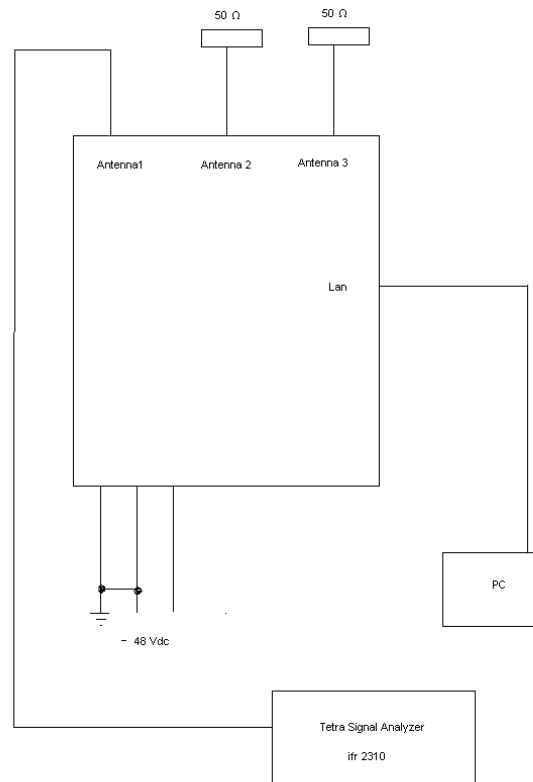
Licensed Non-Broadcast Station Transmitter

2.4 Technical specifications of the EUT

Operating frequency:	460.0000 MHz ÷ 470.0000 MHz
Modulation type:	Π/4DQPSK
Occupied bandwidth:	25 kHz
Emission designator:	21K0D1E, 21K0D1W, 21K0D1D
Synchronization:	OCXO synchronized by GPS
Antenna type:	Equipment that has an external 50 Ω RF connector
Power source	-48 VDC external
Temperature range:	-10 to 45°C

Section 2: Equipment under test, continued

2.5 EUT setup diagram



2.6 Operation of the EUT during testing

Transmitting at maximum power and normal modulation to:

- 1) 460.0125 MHz
- 2) 465.0000 MHz
- 3) 469.9875 MHz

2.7 Modifications incorporated in the EUT

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

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	Report Number: : 242288-1TRFWL
	Specification: FCC 90

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 $\pm 5\%$, for which the equipment was designed.

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Section 3: Test conditions

Report Number: : 242288-1TRFWL

Specification: FCC 90

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 Broadband Antenna	Schwarzbeck	VULB 9162	9162-025	2015/05
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	2014/08
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 9 kHz ÷ 40GHz	R&S	FSEK	848255/005	2014/08
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2014/08
Shielded room	Siemens	10m control room	1947	NCR
Attenuator	BIRD Electronic Corpo.	1500-WA-FFN-30	1032019	2014/08
Dummy load	Celwave	ALO30A	--	2014/08
Notch Filter	Nemko	400-500	2.437	NCR
Tetra Signal Analyzer (*)	IFR	2310	169975/043	2014/04
Climatic chamber	Angelantoni	CH 3900 H	7315	2014/11
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	2014/08
Bilog antenna 1 ÷ 18 GHz	Schwarzbeck	STLP 9148-123	123	2015/02

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use

(*) Equipment supplied by manufacturer's



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Section 4: Result summary

Report Number: : 242288-1TRFWL

Specification: FCC 90

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
§90.209	§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

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	Report Number: : 242288-1TRFWL
	Specification: FCC 90

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 data

– Power supply used -48 Vdc

Frequency [MHz]	Measured Output power [W] Average	Manufacturer's Rated Power [W] Average± 2dB	LIMIT [W] (Manufacturer's rated Power + 20%)
460.0125	28.1	25	30
465.0000	28.4	25	30
469.9875	29.3	25	30

Test date: 2013-09-09

Test results: Pass



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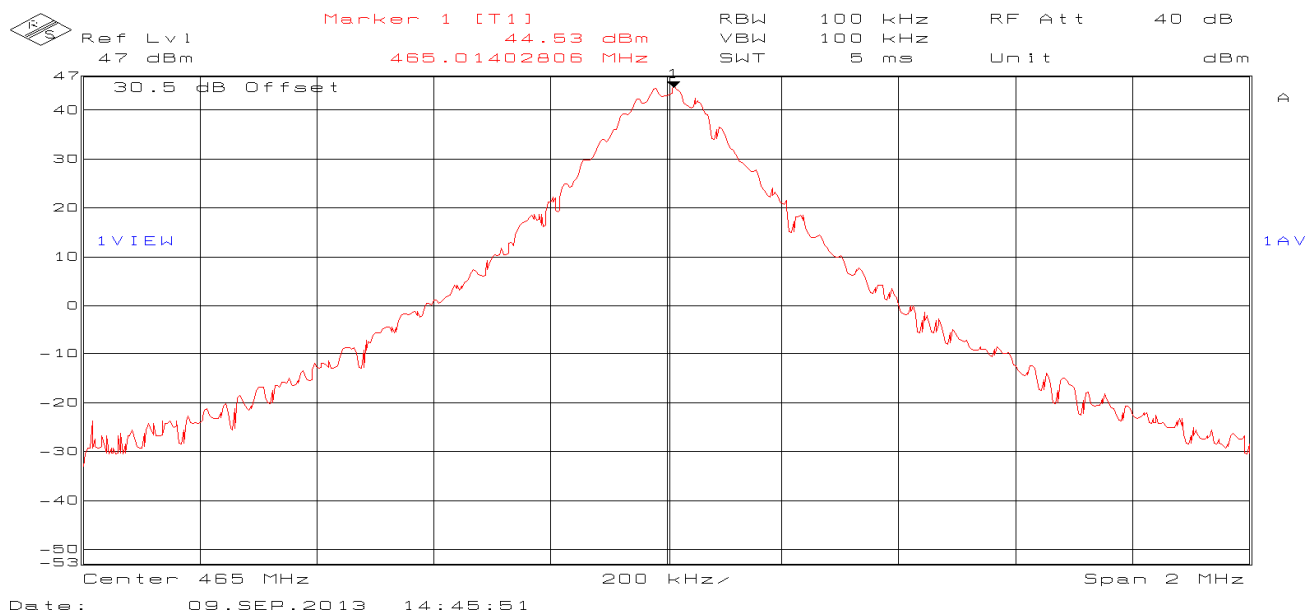
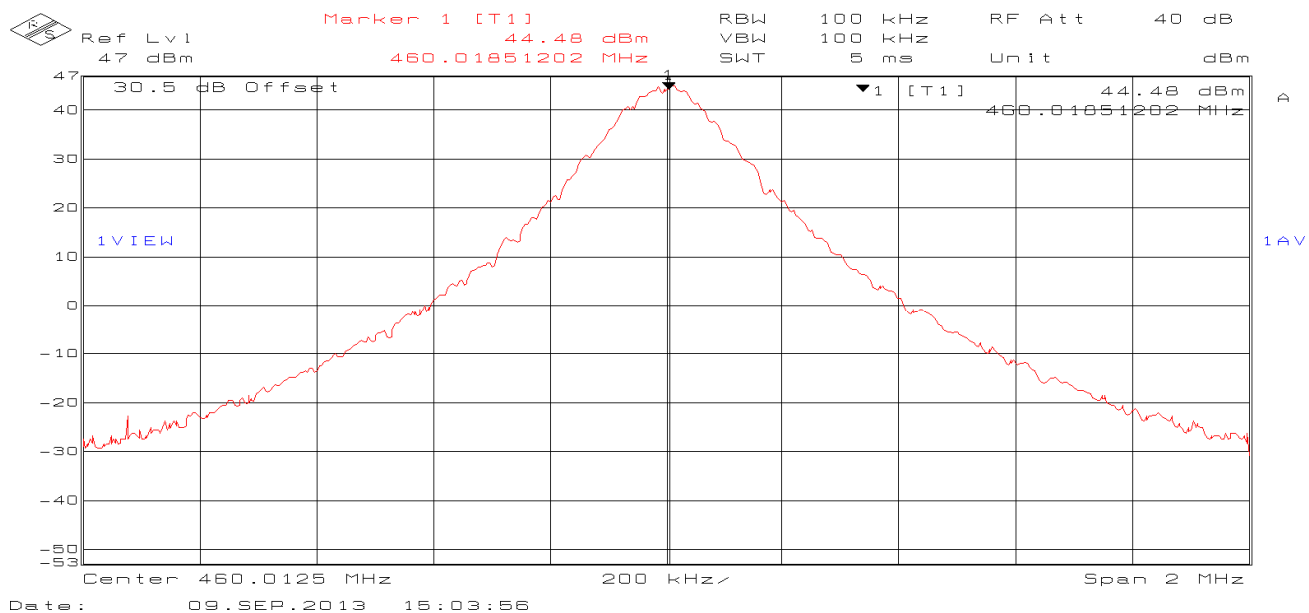
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

– Power supply used -48 Vdc





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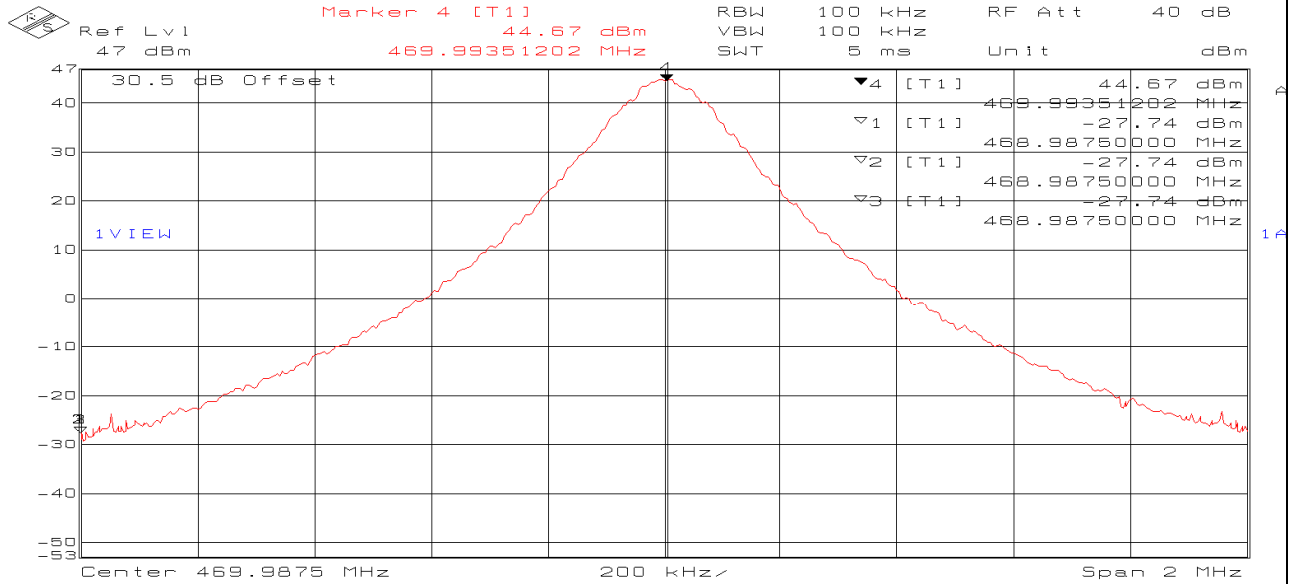
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

– Power supply used -48 Vdc



– Date: 10.SEP.2013 08:43:38



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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Set up photo



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	Report Number: : 242288-1TRFWL
	Specification: FCC 90

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



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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Clause 90.209 Bandwidth limitations (*)

Unless specified elsewhere, channel spacing 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	6.25	13.5, 20, 21, 25, 36
806-809, 851-854	12.5	20
809-824, 854-889	25	20

929-930	25	20

¹ For stations authorized on or after August 18, 1985.

² Bandwidths for radiolocation stations in the 428-438 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 8 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2015, unless the operations meet the efficiency standard of §90.202(g).

⁴ 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 § 90.211.

12

Frequency Offset	Maximum ACP (dBc) for devices 1 watt and less	Maximum ACP (dBc) for devices above 1 watt
25 kHz	-55 dBc	-60 dBc
50 kHz	-70 dBc	-70 dBc
75 kHz	-70 dBc	-70 dBc

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

(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.

(*) According to FCC 11-63

Test date: 2013-09-09

Test results: Pass



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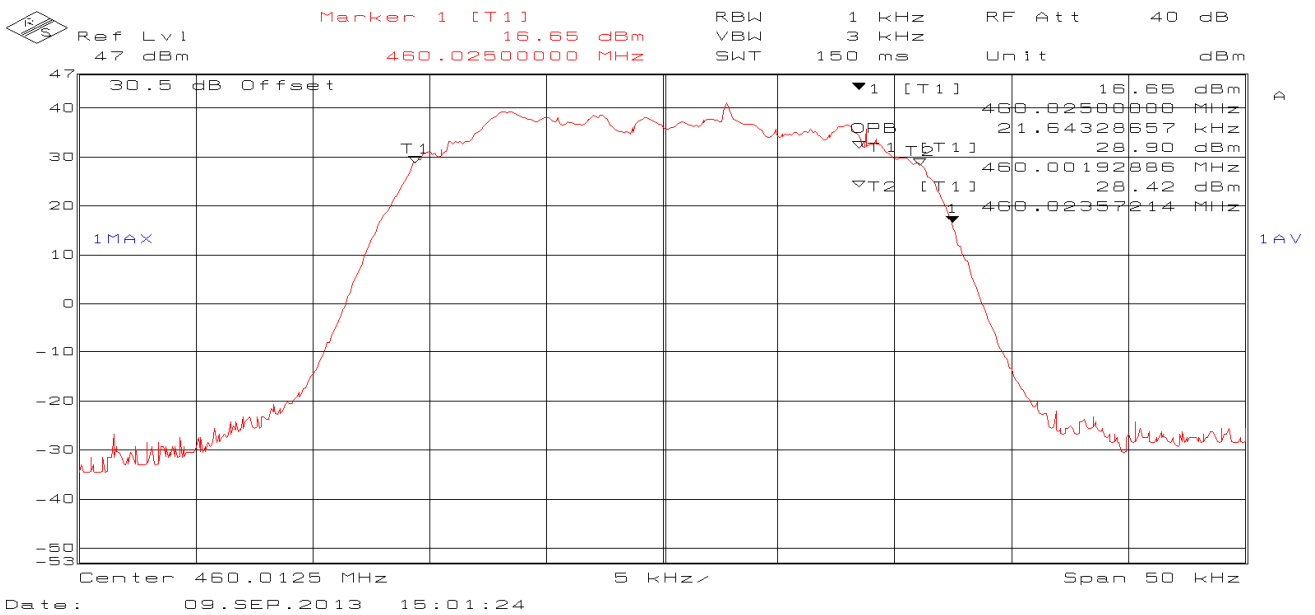
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Occupied bandwidth: 460.0125 MHz





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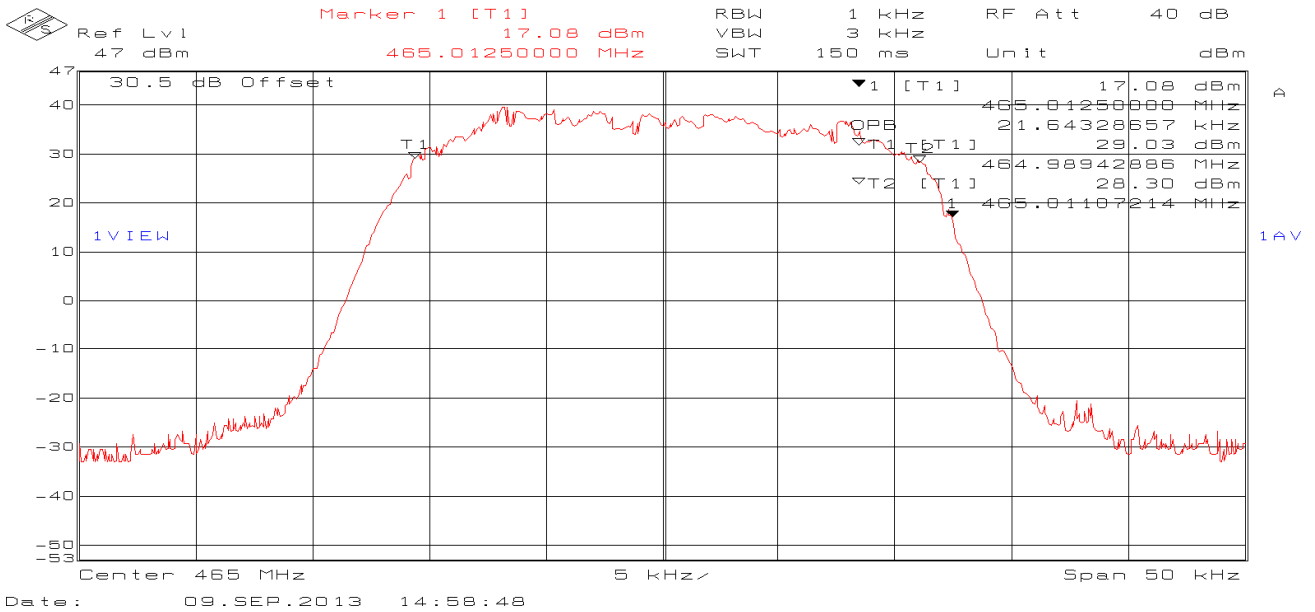
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Occupied bandwidth: 465 MHz





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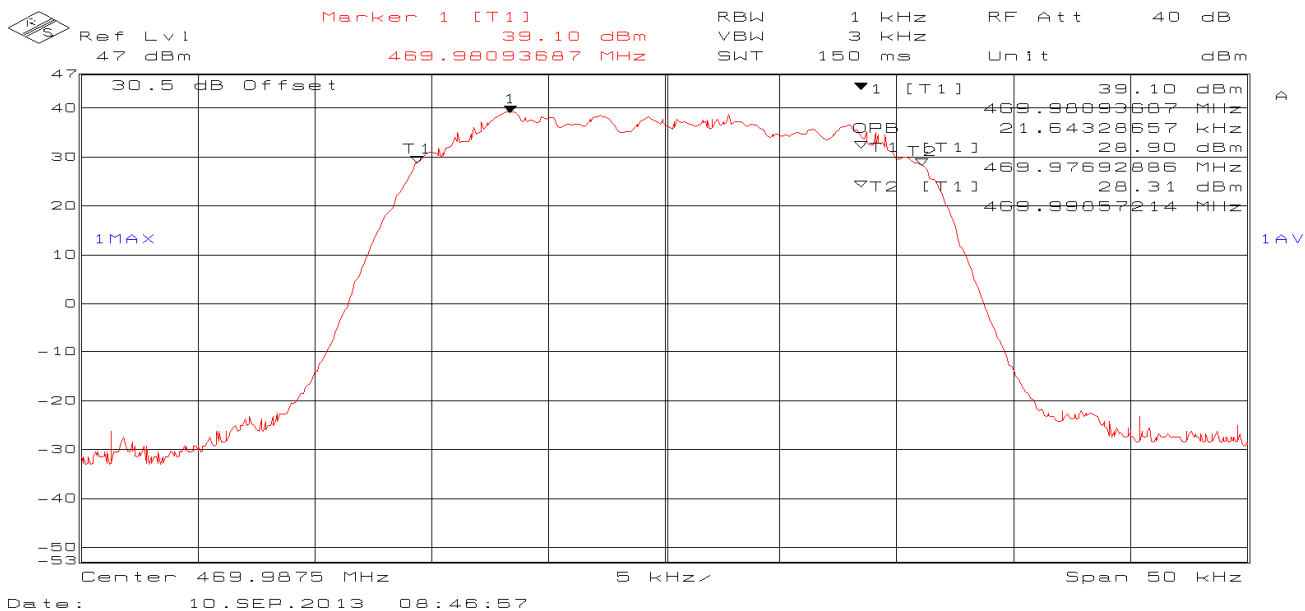
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Occupied bandwidth: 469.9875 MHz

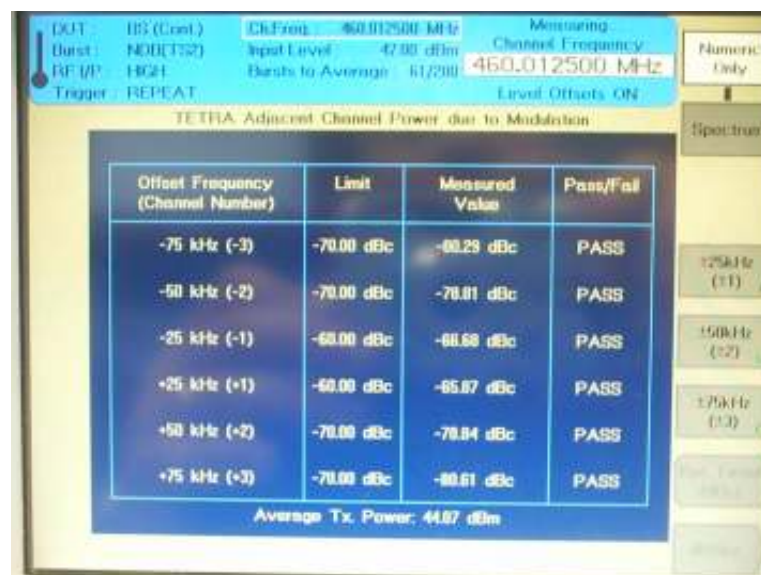
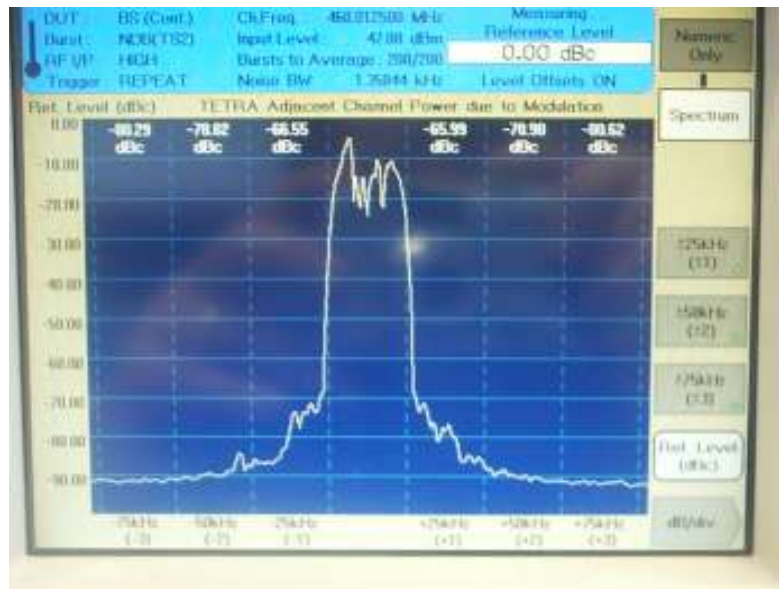


Test data, continued

Frequency, MHz	99% bandwidth, kHz
460.0125	21.6
465.0000	21.6
469.9875	21.6

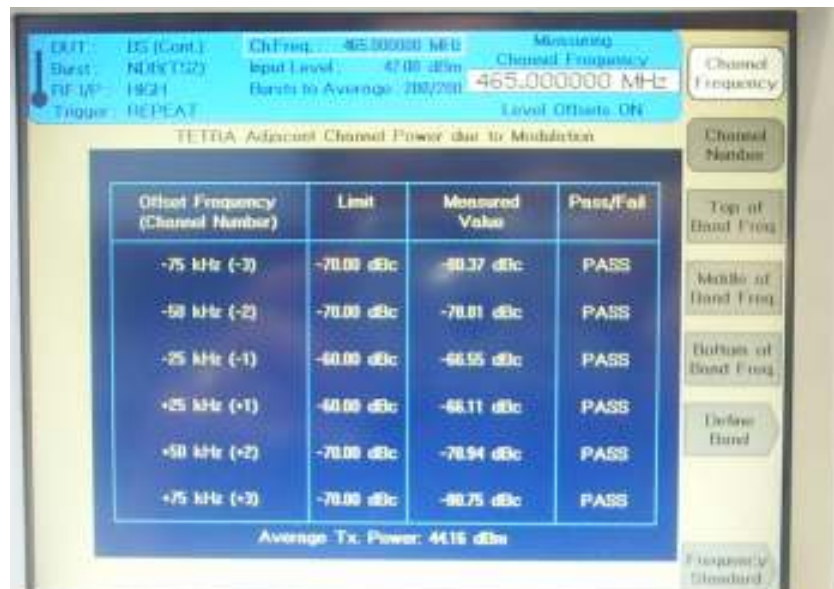
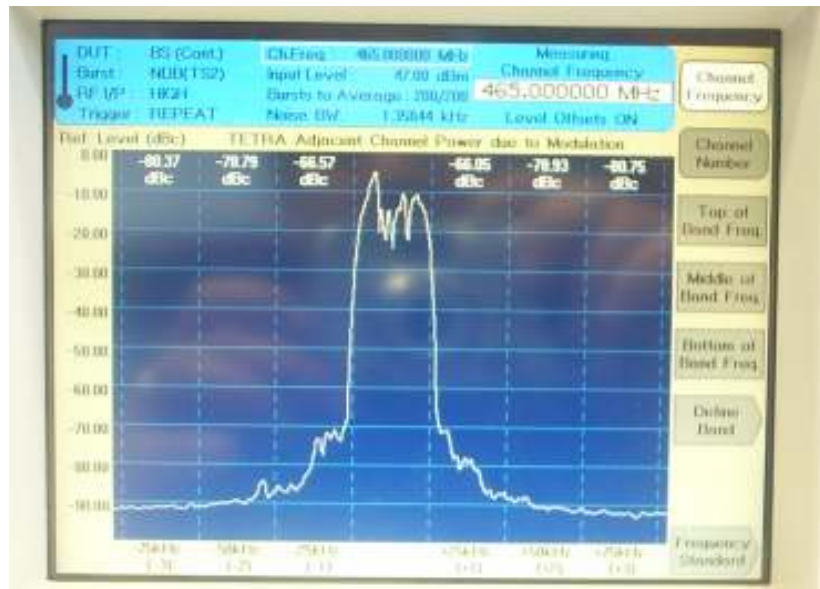
Test data

Adjacent channel Power 460.0125 MHz



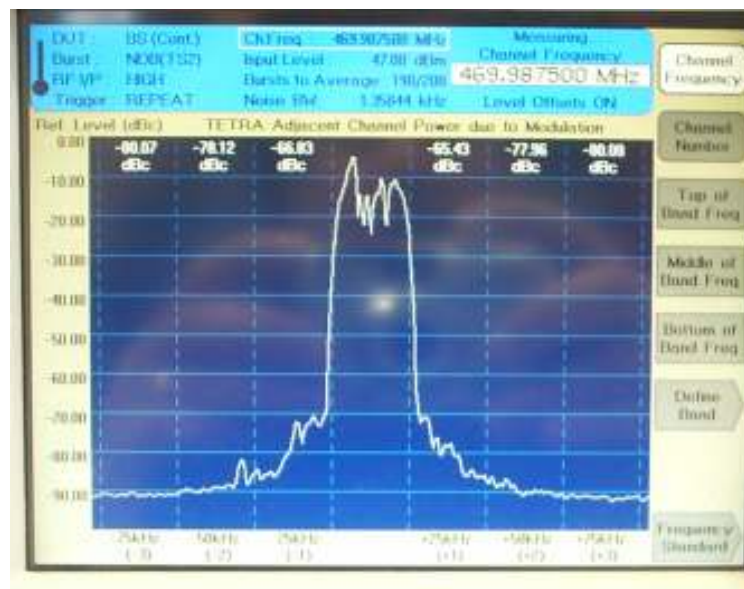
Test data

Adjacent channel Power 465 MHz



Test data

Adjacent channel Power 469.9875 MHz



Set up photo



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	Report Number: : 242288-1TRFWL
	Specification: FCC 90

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: 2013-09-09

Test results: Pass

Special notes

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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Set up photo





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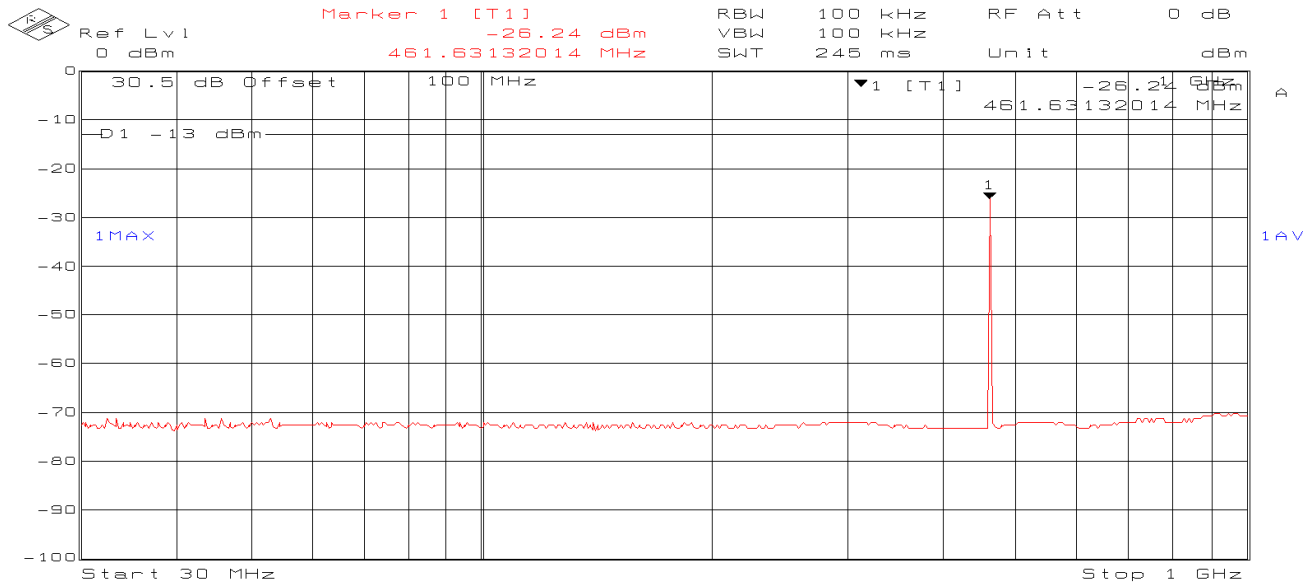
Appendix A: Test results

Report Number: : 242288-1TRFWL

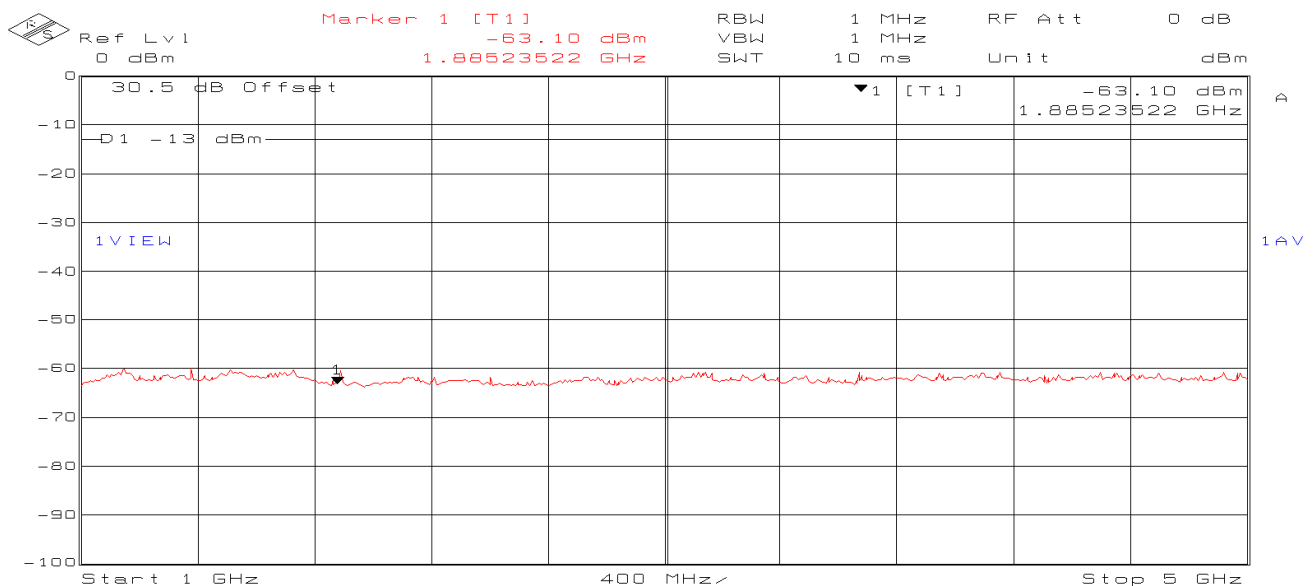
Specification: FCC 90

Test data

460.0125 MHz



Date: 09.SEP.2013 15:52:28

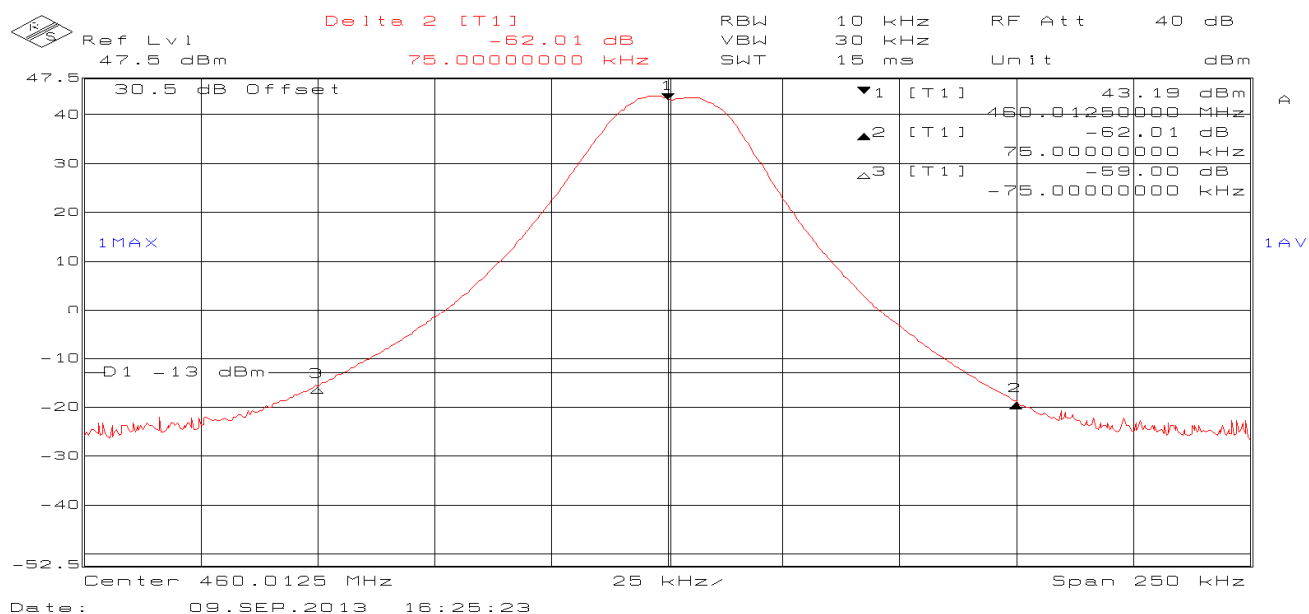


Date: 09.SEP.2013 16:01:42

Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
460.0125 MHz	--	--	--	Peak	carrier attenuated by notch filter

Test data

460.0125 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
459.9375	-15.8	30.5	-13	peak	
460.0875	-18.8	30.5	-13	peak	



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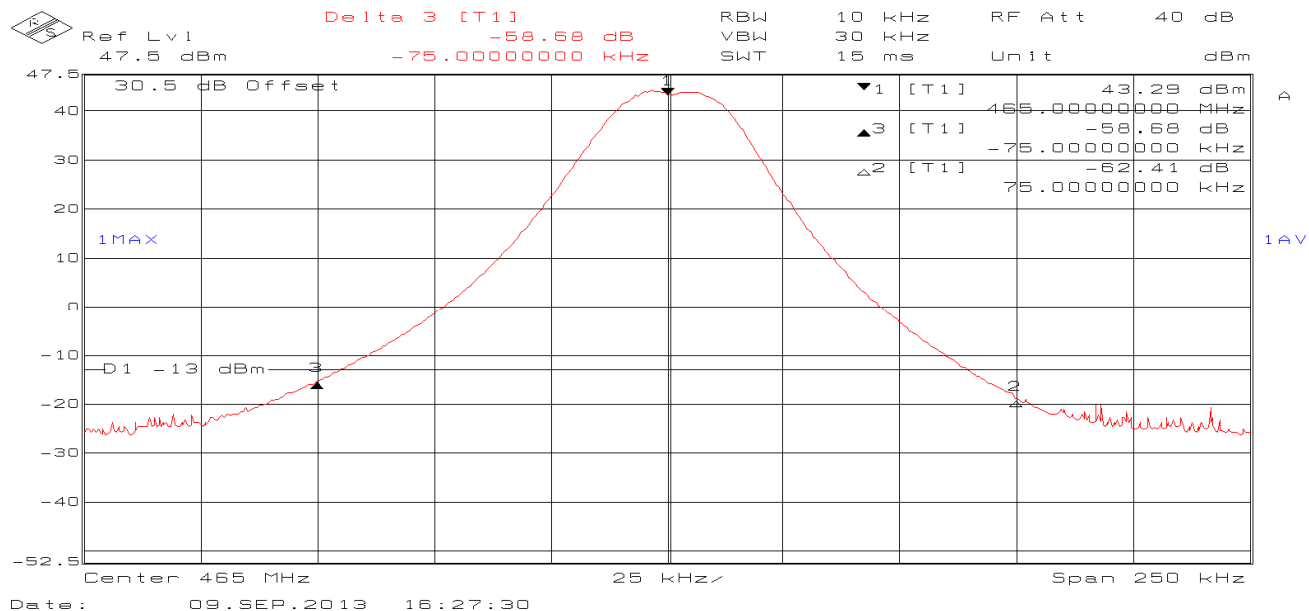
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

465 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
464.925	-15.4	30.5	-13	peak	
465.075	-19.1	30.5	-13	peak	



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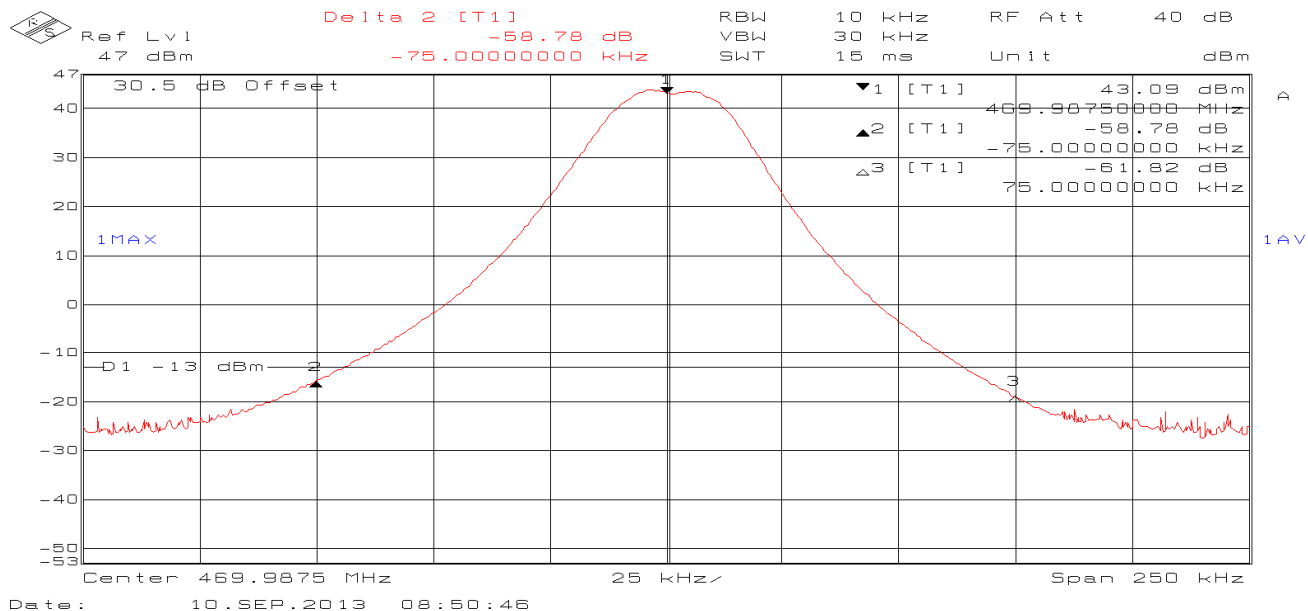
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

469.9875 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
469.9125	-18.8	30.5	-13	peak	
470.0625	-21.5	30.5	-13	peak	



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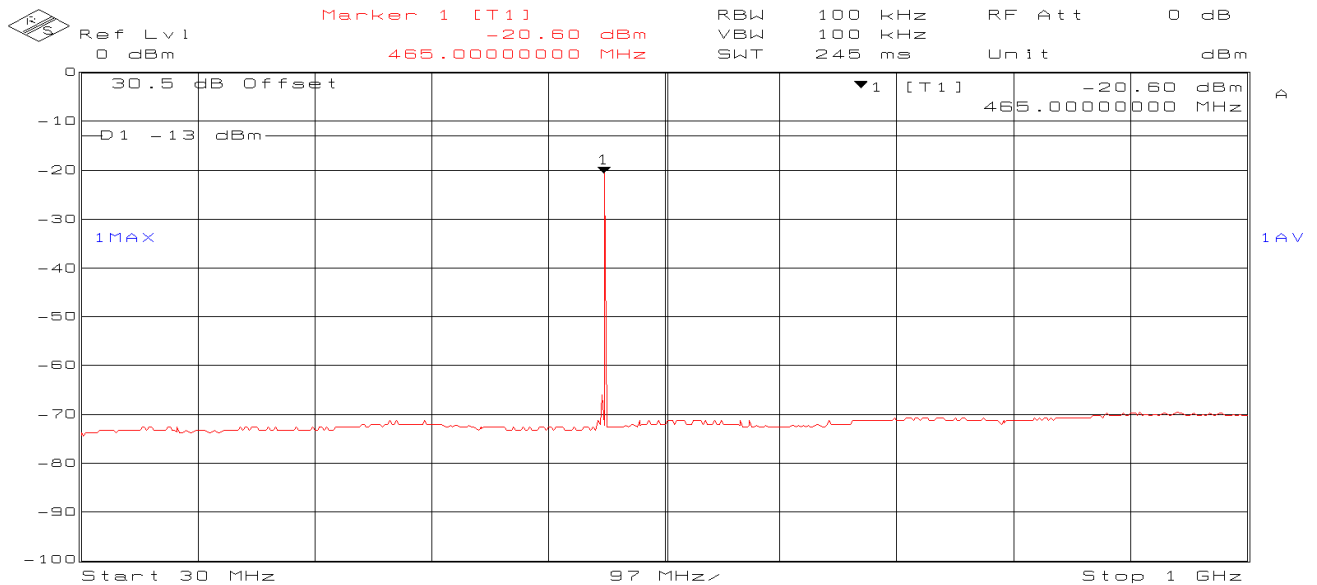
Appendix A: Test results

Report Number: : 242288-1TRFWL

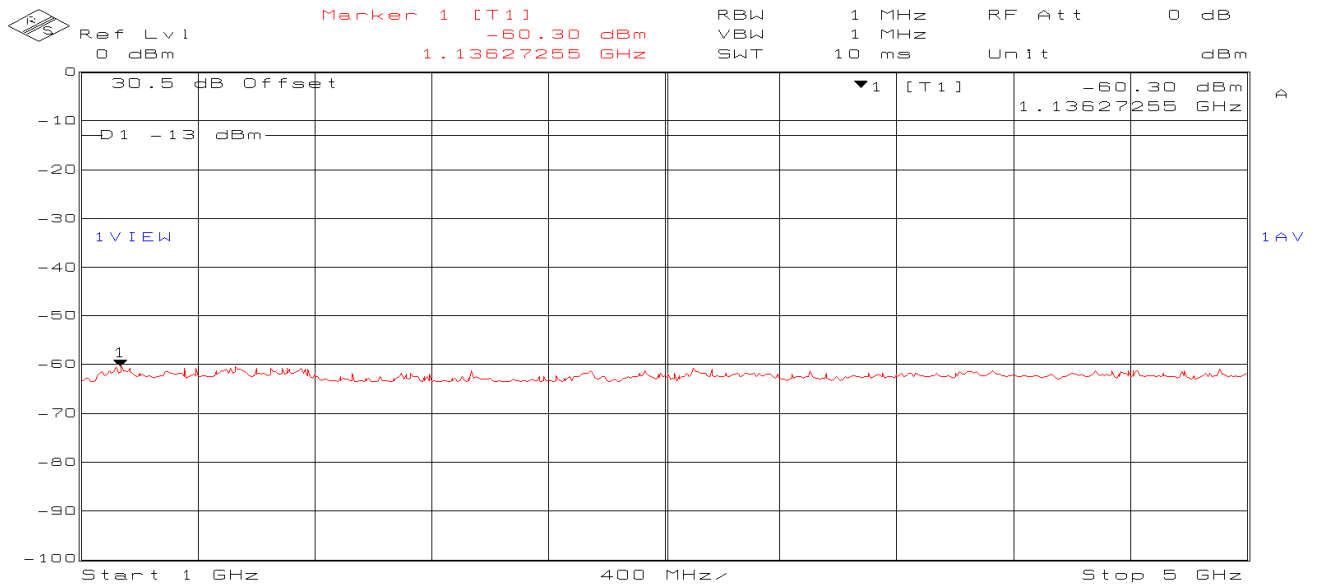
Specification: FCC 90

Test data

465 MHz



Date: 09.SEP.2013 16:39:27



Date: 09.SEP.2013 16:43:59

Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
465	--	30.5	--	peak	carrier attenuated by notch filter



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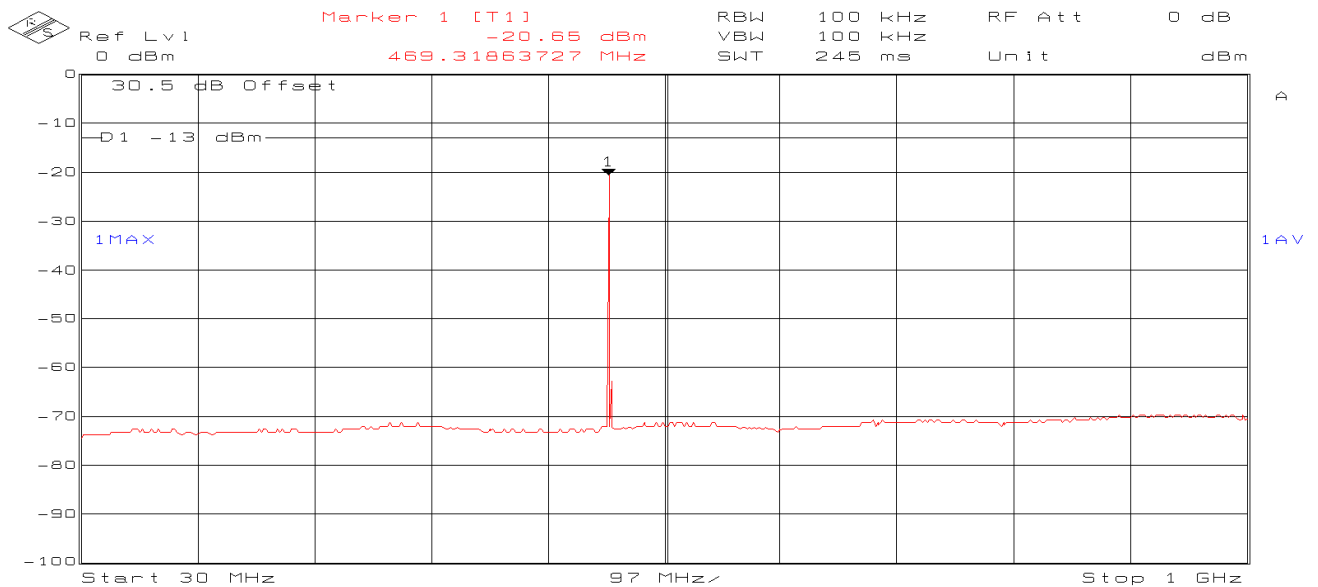
Appendix A: Test results

Report Number: : 242288-1TRFWL

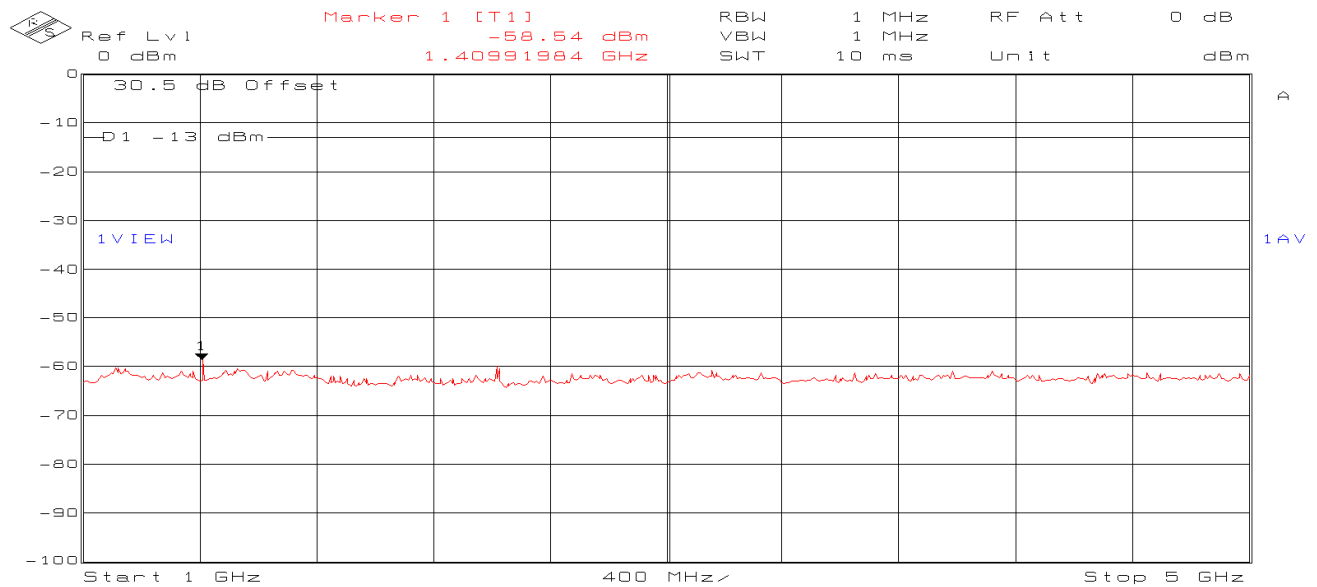
Specification: FCC 90

Test data

469.9875 MHz



Date: 10.SEP.2013 09:08:09



Date: 10.SEP.2013 09:13:28

Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
469.9875	--	30.5	--	peak	carrier attenuated by notch filter



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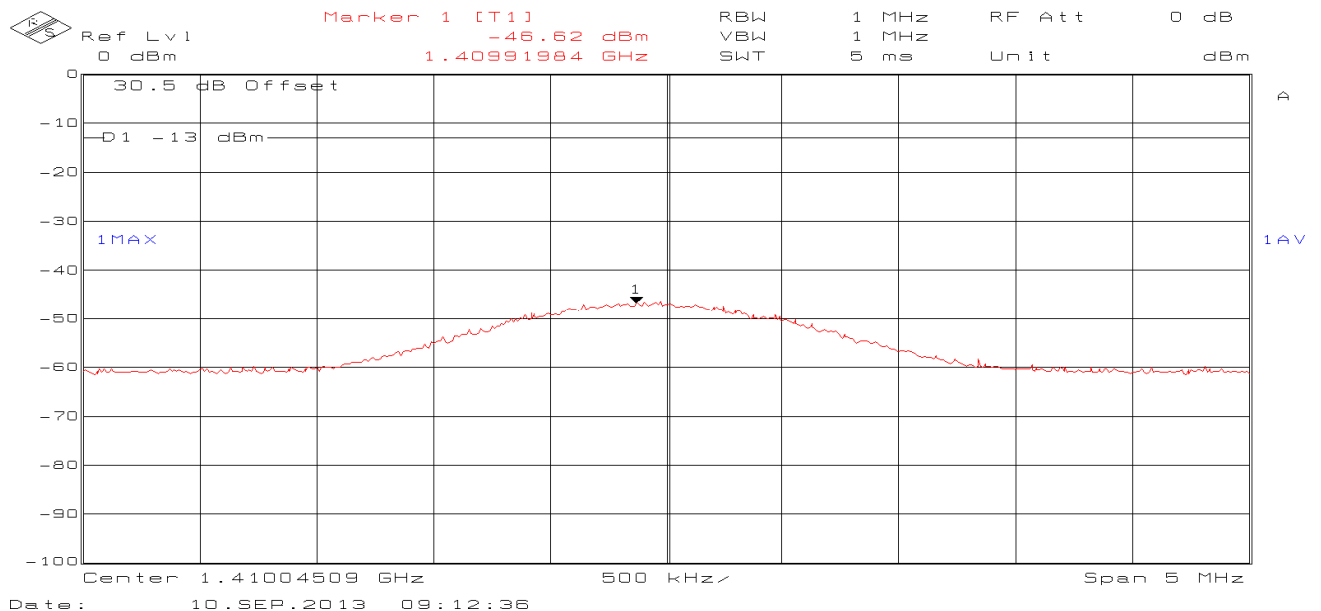
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

469.9875 MHz, continuee....



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
1409.91984	-46.6	30.5	-13	Peak	



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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

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: 2013-09-10

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.
- The substitution method was used



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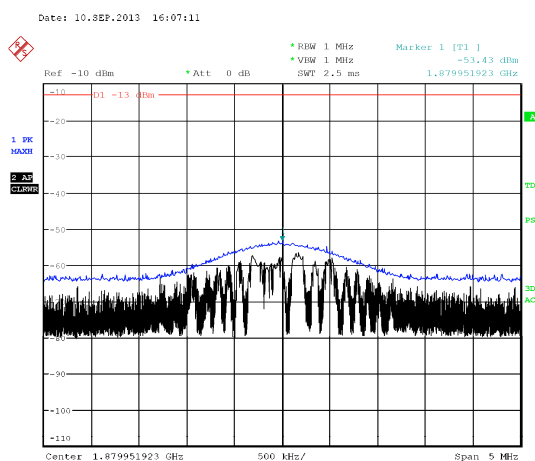
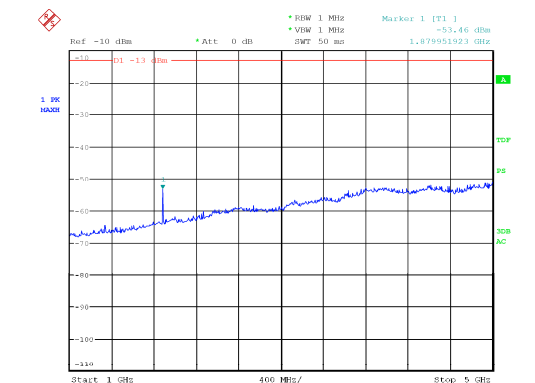
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Vertical polarization, 469.9875 MHz, 25 W



Date: 10.SEP.2013 16:04:52

Frequency MHz	Level measured dBm erp	Correction factor dB	Limit dBm erp	Detector	Remarks
1736.6	-47	17.0	-13	PK	--



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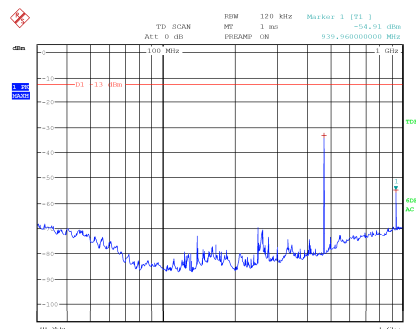
Appendix A: Test results

Report Number: : 242288-1TRFWL

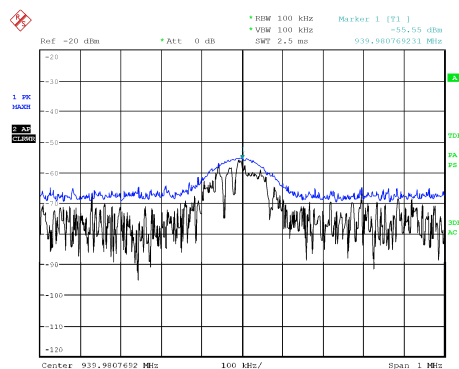
Specification: FCC 90

Test data

Horizontal polarization 469.9875 MHz, 25 W



Date: 10.SEP.2013 15:55:52



Date: 10.SEP.2013 15:10:42

Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
939.9807	-33.2	33.7	-13	PK	--



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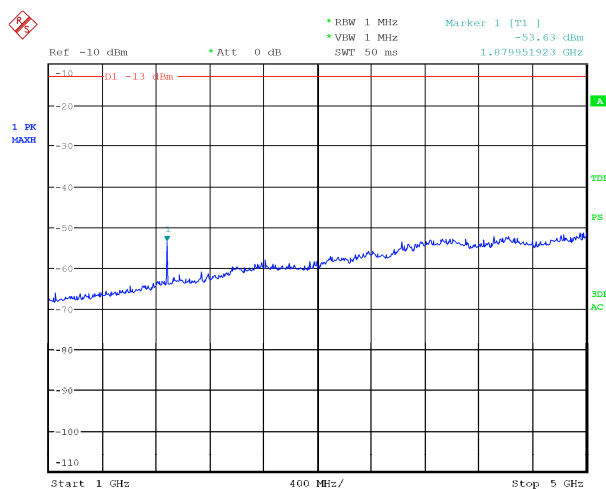
Appendix A: Test results

Report Number: : 242288-1TRFWL

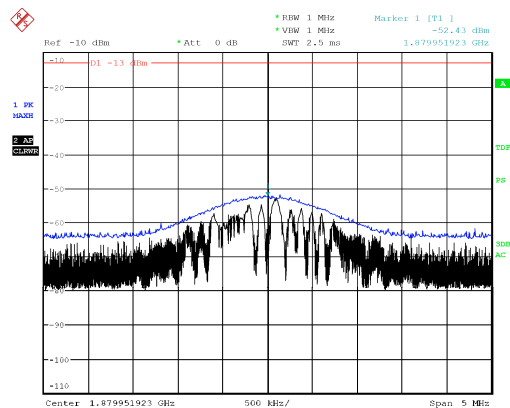
Specification: FCC 90

Test data

Horizontal polarization 469.9875 MHz, 25 W



Date: 10.SEP.2013 16:18:25



Date: 10.SEP.2013 16:17:07

Frequency MHz	Level measured dBm erp	Correction factor dB	Limit dBm erp	Detector	Remarks
1879.951	-52.4	18.0	-13	PK	--



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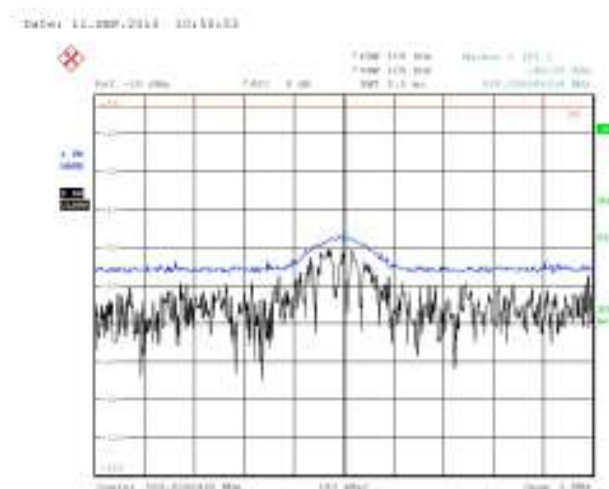
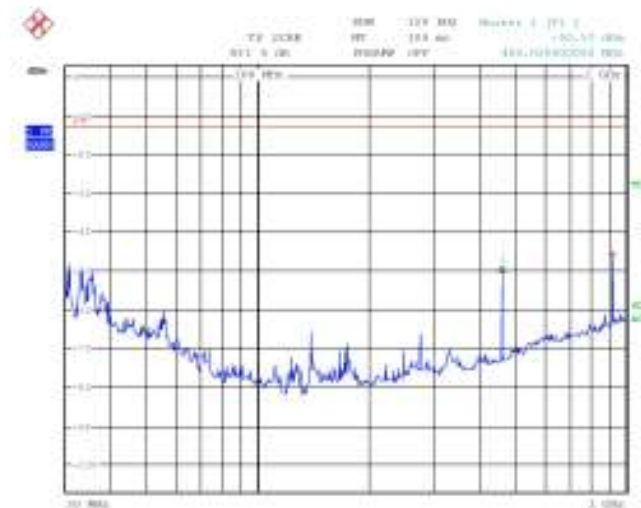
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Horizontal polarization, 460.0125 MHz



DATE: 11.09.2018 10:10:18

Frequency MHz	Level measured dBm erp	Correction factor dB	Limit dBm erp	Detector	Remarks
920.0288	-48.1	33.3	-13	Peak	--



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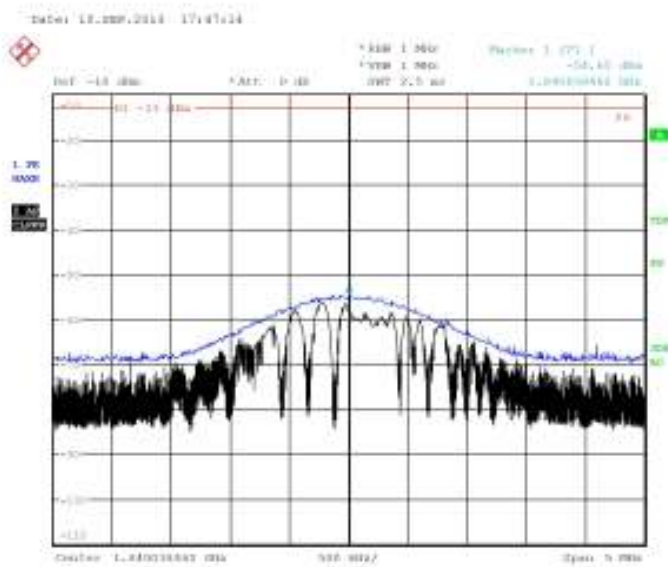
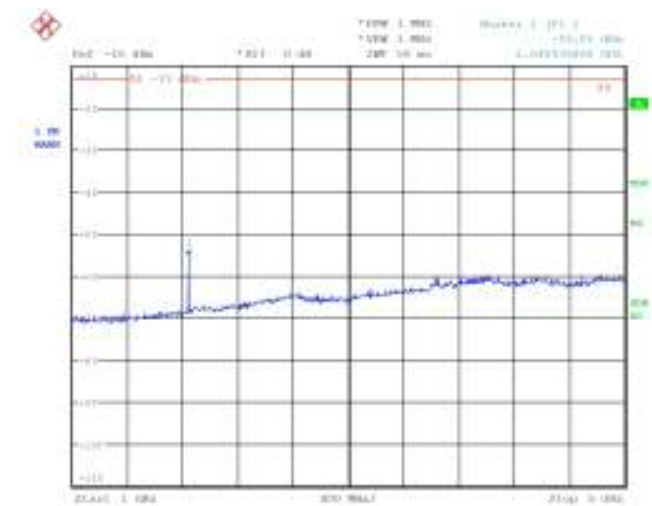
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Horizontal polarization, 460.0125 MHz



Date: 10 SEP 2013 17:43:16

Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
1840.03846	-54.6	18.0	-13	Peak	--



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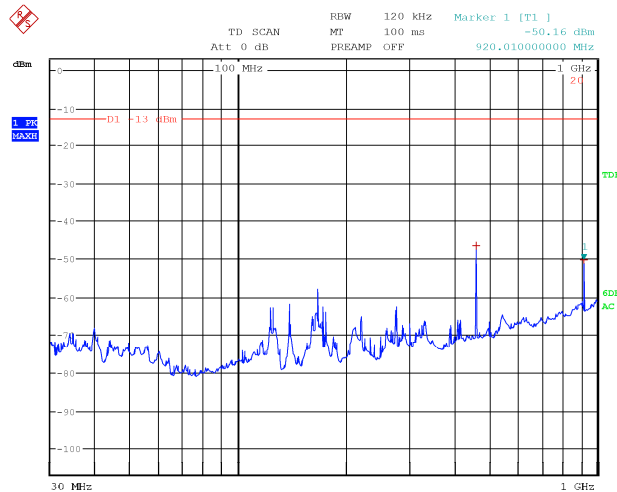
Appendix A: Test results

Report Number: : 242288-1TRFWL

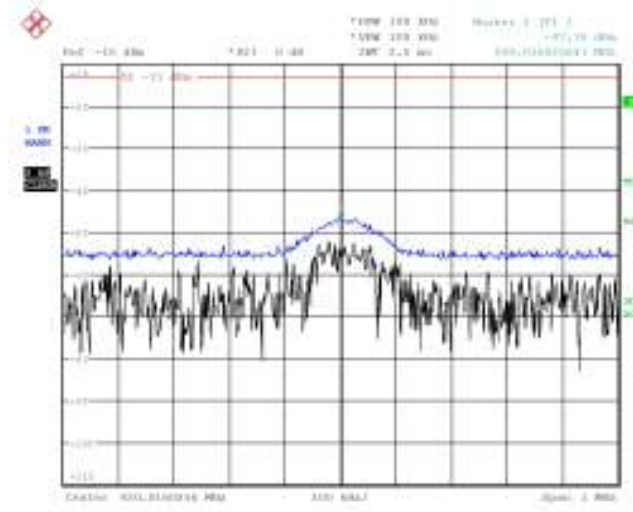
Specification: FCC 90

Test data

Vertical polarization, 460.0125 MHz



Date: 11.SEP.2013 10:37:34



Date: 11.SEP.2013 10:38:12

Frequency MHz	Level measured dBm erp	Correction factor dB	Limit dBm erp	Detector	Remarks
920.016	-47.4	33.8	-13	PK	



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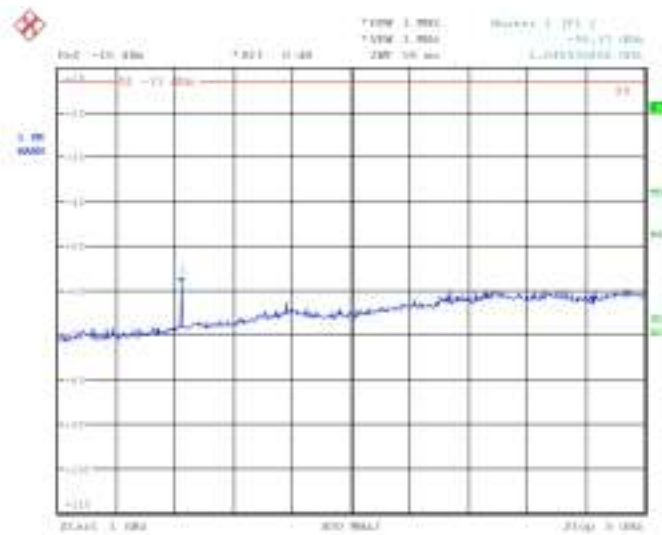
Appendix A: Test results

Report Number: : 242288-1TRFWL

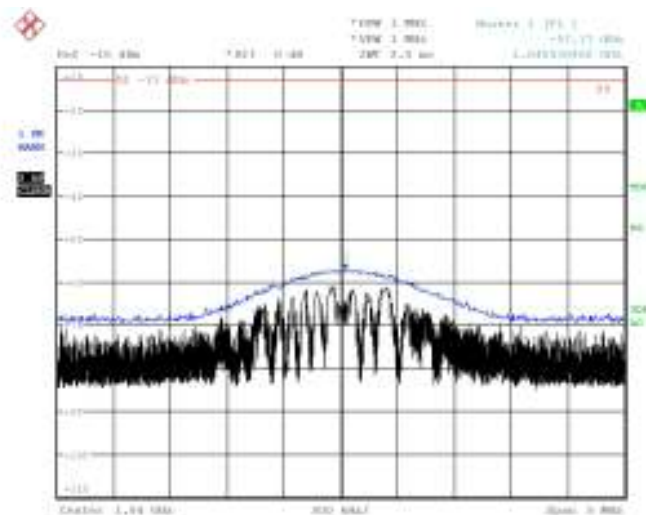
Specification: FCC 90

Test data

Vertical polarization, 460.0125 MHz



Data: 18.NOV.2018 17:12:14



Data: 18.NOV.2018 17:12:14

Frequency MHz	Level measured dBm erp	Correction factor dB	Limit dBm erp	Detector	Remarks
1840	-57	18	-13	PK	



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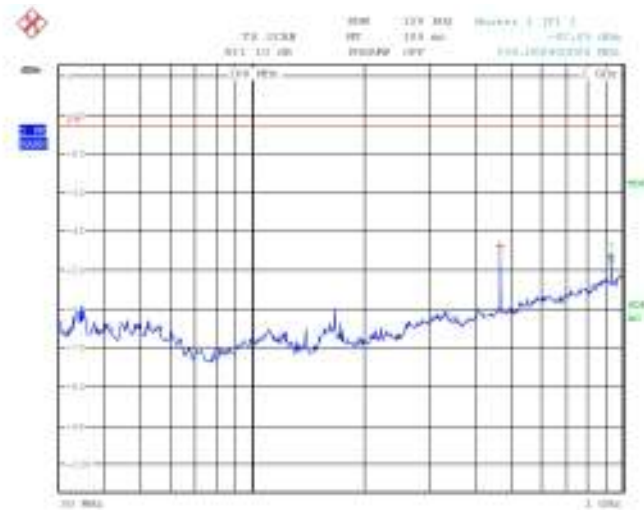
Appendix A: Test results

Report Number: : 242288-1TRFWL

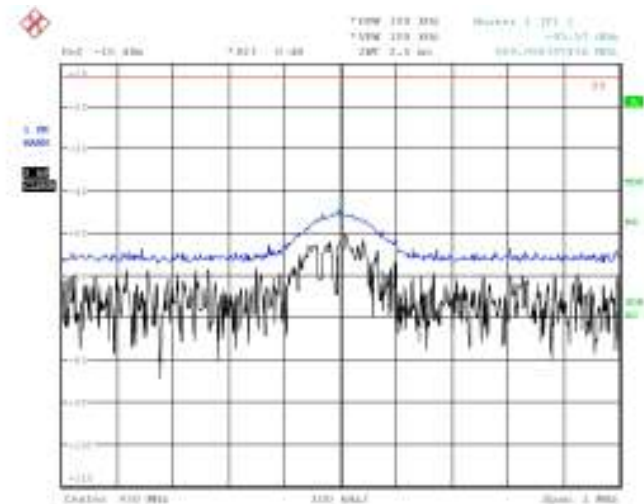
Specification: FCC 90

Test data

Vertical polarization, 465 MHz



Date: 11.09.2018 11:13:27



Date: 11.09.2018 11:16:42

Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
929.998	-45.6	33.5	-13	PK	



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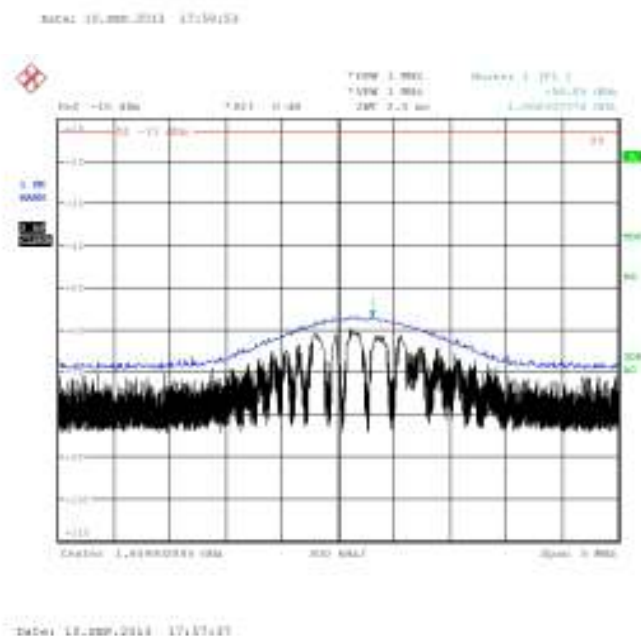
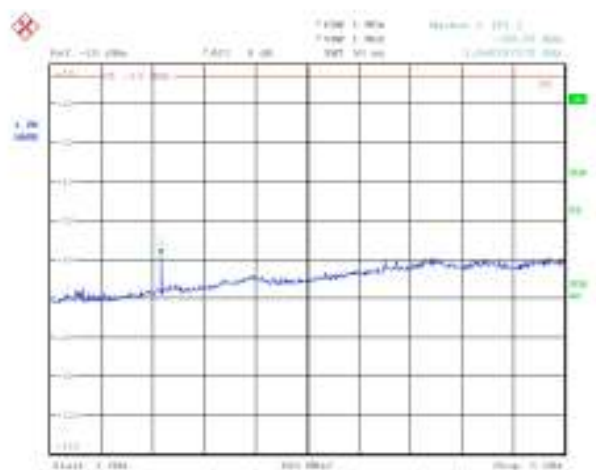
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Vertical polarization, 465 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
1859.80	-56.8	17.9	-13	PK	



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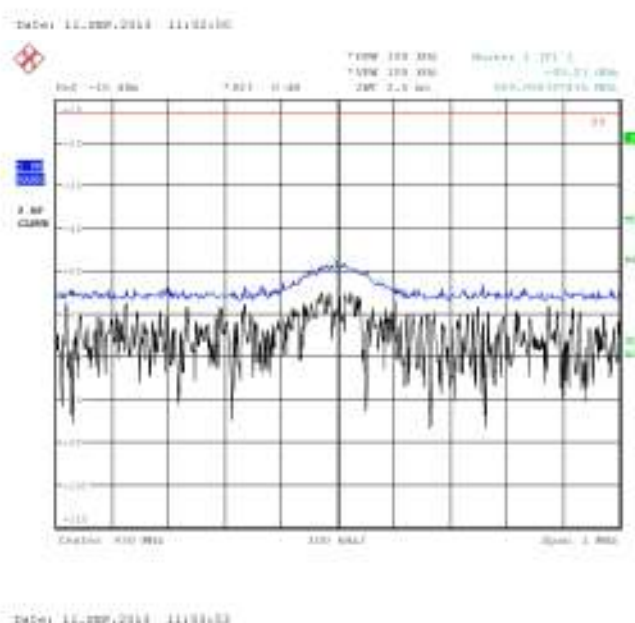
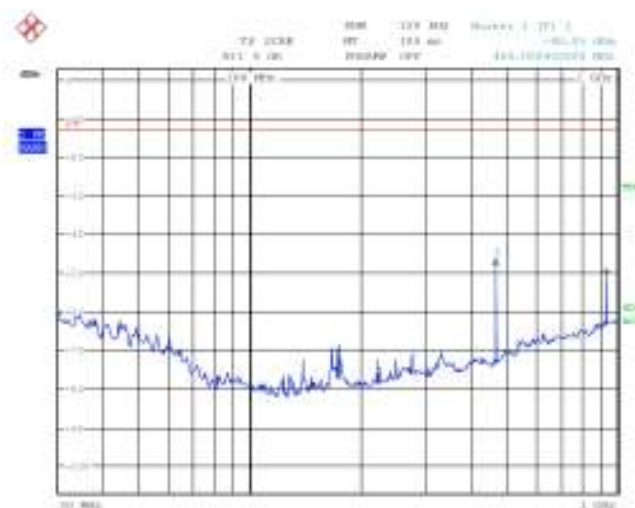
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Horizontal polarization, 465 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
929.998	-49.2	33.8	-13	PK	



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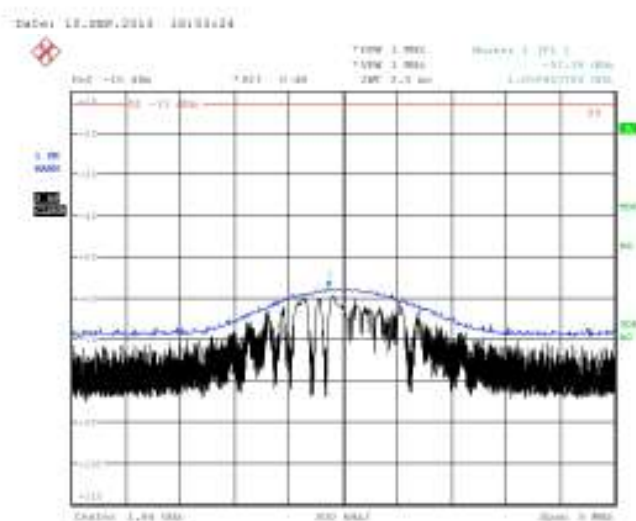
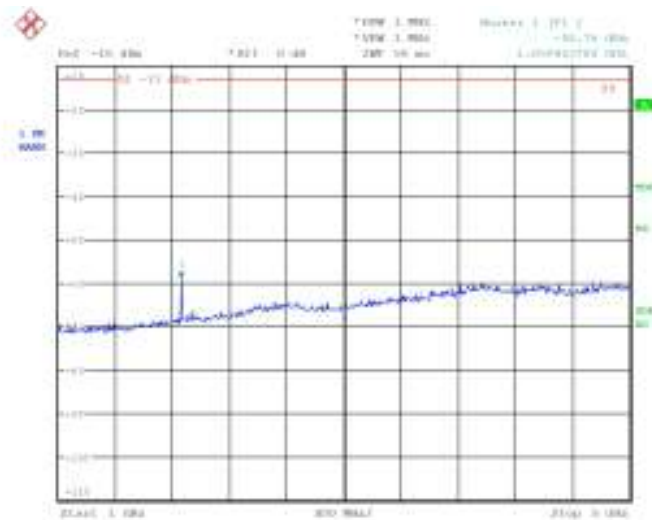
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

Horizontal polarization, 465 MHz



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm erp	dB	dBm erp		
1860.00	-57.3	18.7	-13	PK	



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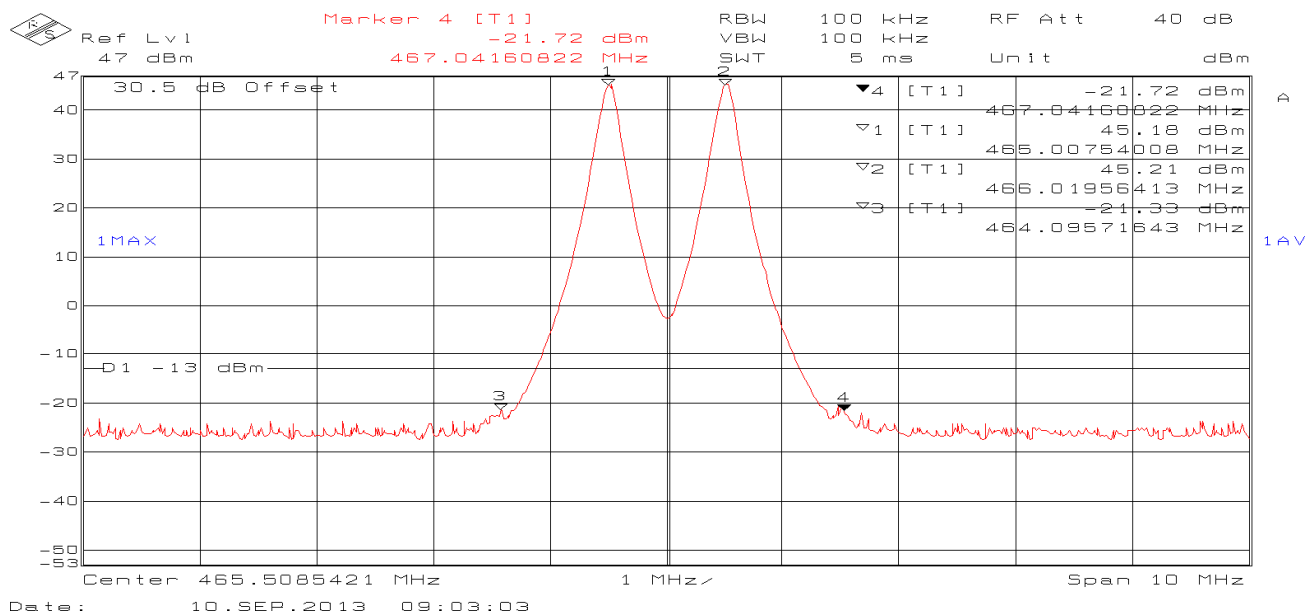
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

3rd order intermodulation products due to two carriers transmitting at the same time



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
464.0957	-21.3	30.5	-13	PK	
467.0416	-21.7	30.5	-13	PK	



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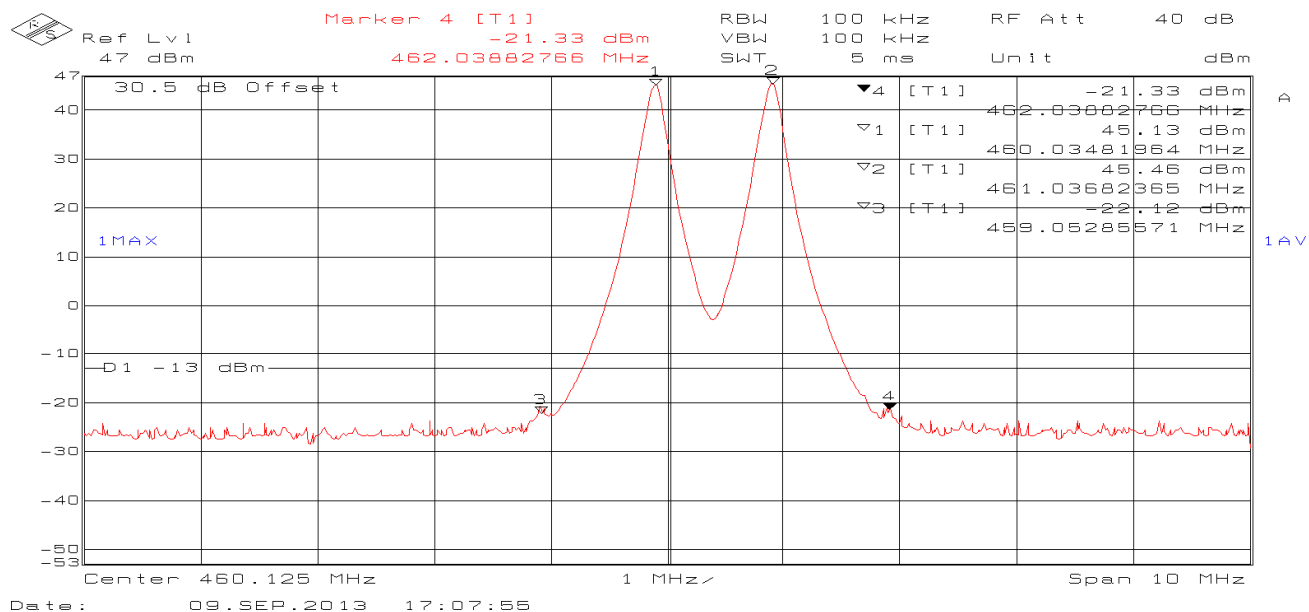
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

3rd order intermodulation products due to two carriers transmitting at the same time



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
459.05286	-22.1	30.5	-13	PK	
462.03882	-21.3	30.5	-13	PK	



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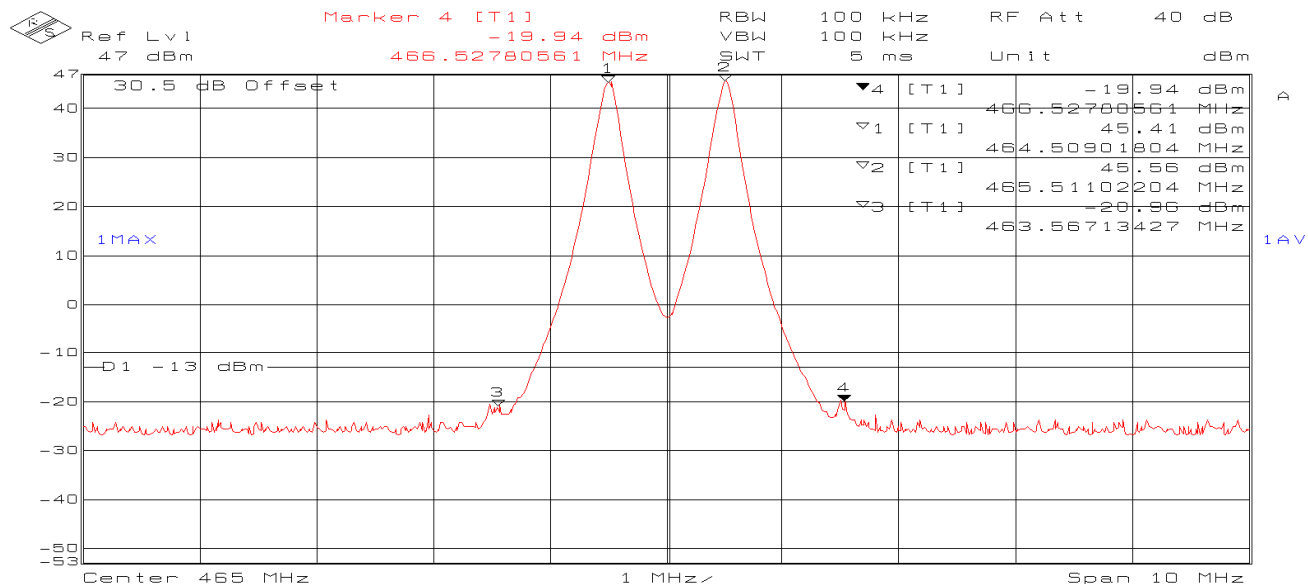
Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Test data

3rd order intermodulation products due to two carriers transmitting at the same time



Frequency	Level measured	Correction factor	Limit	Detector	Remarks
MHz	dBm	dB	dBm		
463.56713	-20.9	30.5	-13	PK	
466.52788	-19.9	30.5	-13	PK	

Clause 15. 209 Field Strength, continued

Set up photo



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



Log periodic antenna (1000 MHz ÷ 5000 MHz)
measurement distance: 3 m

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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

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: 2013-09-17

Test results: Pass**Special notes**

None



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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Clause 90.213 Frequency stability, continued

Test data, continued

Conditions	Frequency (MHz)	Offset (ppm)
+60 °C nom.power	(*)	
+50 °C nom.power	464,999984	-0,034430
+40 °C nom.power	464,999993	-0,015251
+30 °C nom.power	465,000005	0,011207
+20 °C +15% power	465,000005	0,010745
+20 °C nom.power	465,000009	0,018371
+20 °C -15% power	464,999996	-0,009359
+10 °C nom.power	465,000009	0,018833
0 °C nom.power	465,000016	0,034893
-10 °C nom.power	465,000013	0,028885
-20 °C nom.power	465,000012	0,026112
-30 °C nom.power	465,000008	0,017908

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

(*) The software inhibits the RF output power see below:

“VxWorks System Boot

Copyright 1984-2002 Wind River Systems, Inc.

CPU: MPC8280 PowerQUICC II (SC-BB)

Version: VxWorks5.5.1

BSP version: 1.2/2.0.5.4

Creation date: Nov 17 2010, 15:36:03

Setting board standby for cold boot or uncontrolled reboot

Temperature range is -20:55 (offset 0)

Board temperature is out of range! Press 'x' key to proceed anyway...

Current board temperature is 61C”



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Appendix A: Test results

Report Number: : 242288-1TRFWL

Specification: FCC 90

Set up photo



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	Report Number: : 242288-1TRFWL
	Specification: FCC 90

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: ---

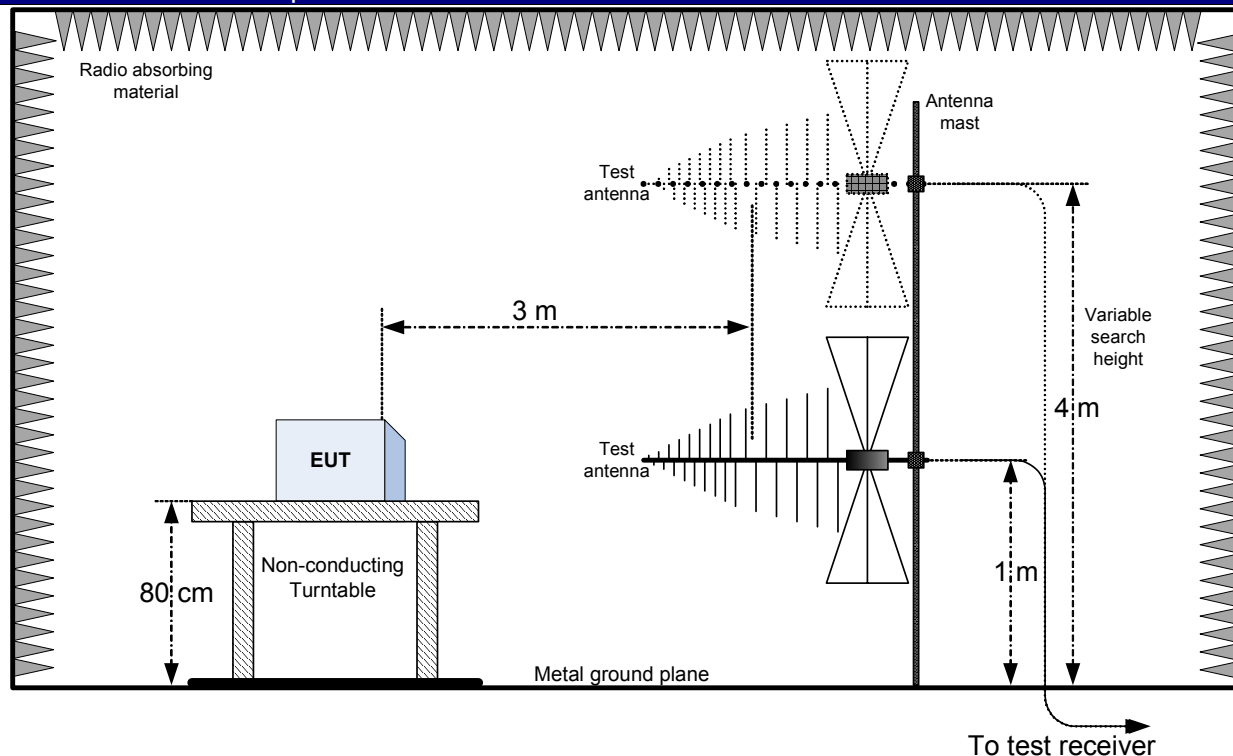
Test results: N

Special notes

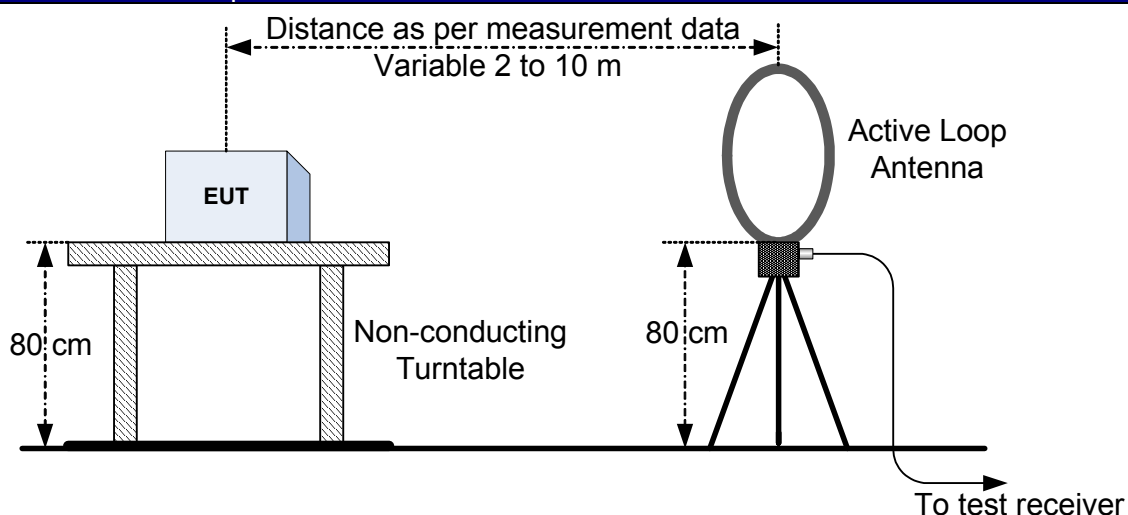
None

Appendix B: Block diagrams of test set-ups

Radiated emissions set-up above 30 MHz

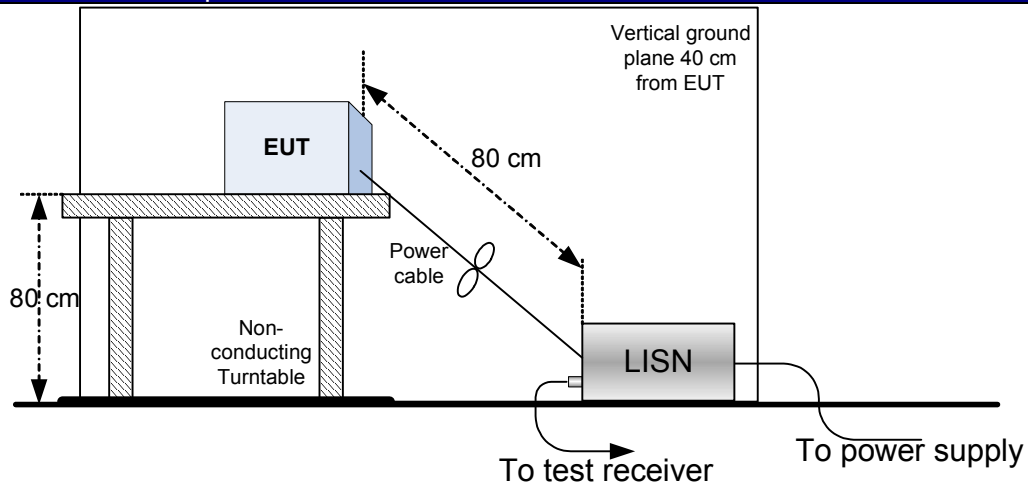


Radiated emissions set-up below 30 MHz



Block diagram, continued

Conducted emissions set-up



Frequency stability set-up

