CETECOM Inc.

CETECOM Inc.

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FCC LISTED, REG. NO.: 101450
&
RECOGNIZED BY INDUSTRY CANADA
IC – 3925

Test report no.: 221FCC/2001
FCC Part 15.247
WL-306
FCC ID: DF6-WL306

Table of Contents

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalisations 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 the CETECOM Inc. USA.

TEST REPORT PREPARED BY:
EMC & Radio Engineer: Harpreet Sidhu

1.2 Testing laboratory

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Phone: +1 408 586 6200 Fax: +1 408 586 6299
E-mail: lothar.schmidt@cetecomusa.com
Internet: www.cetecom.com

1.3 Details of applicant

Name : 3COM Corporation
Street : 5400 Bayfront Plaza
City : Santa Clara, CA 95052
Country : USA
Contact : Chris McGough
Telephone : +1 408 326 8474
Telefax : +1 408 326 5854
e-mail : chris_mcgough@3com.com

1.4 Application details

Date of receipt of application : 2001-12-10
Date of receipt of test item : 2001-12-13
Date of test : 2001-12-13/14

1.5 Test item

Manufacturer	:	applicant
Name of EUT	:	3COM Model WL-306
Description	:	Wireless LAN Access Point
Model No.	:	WL-306
Serial No.	:	N/A
FCC ID	:	DF6-WL306

Additional informations

Frequency	:	2400 – 2483.5 MHz
Type of modulation	:	DSSS
Number of channels	:	13
Antenna	:	External **4 dBi** The report shows also other antenna combinations which will not be used under this FCC application.
Power supply	:	powered by external power supply (100 – 250 V)
Output power	:	22.22 dBm (for the antenna with an maximum gain of 4 dBi)
Extreme Vol. Limits	:	±10%
Extreme Temp. Limits	:	-20°C - +55°C

1.6 Test standards : FCC Part 15 §15.247

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

Technical responsibility for area of testing :

Date	Section	Name	Signature
2002-01-08	EMC & Radio	Lothar Schmidt	

2.2 Testreport

TEST REPORT

Testreport no. : 221FCC/2001
WL-306

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

NOTE: This test report is based on the following test set up of EUT;
Antenna : 18dBi
Antenna Cable: 50ft
Power setting: 160
Additional testing was done to verify the out put power with different combinations of antenna, antenna cable and four power level settings. Refer to certificate showing power level configuration for all different combinations.

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

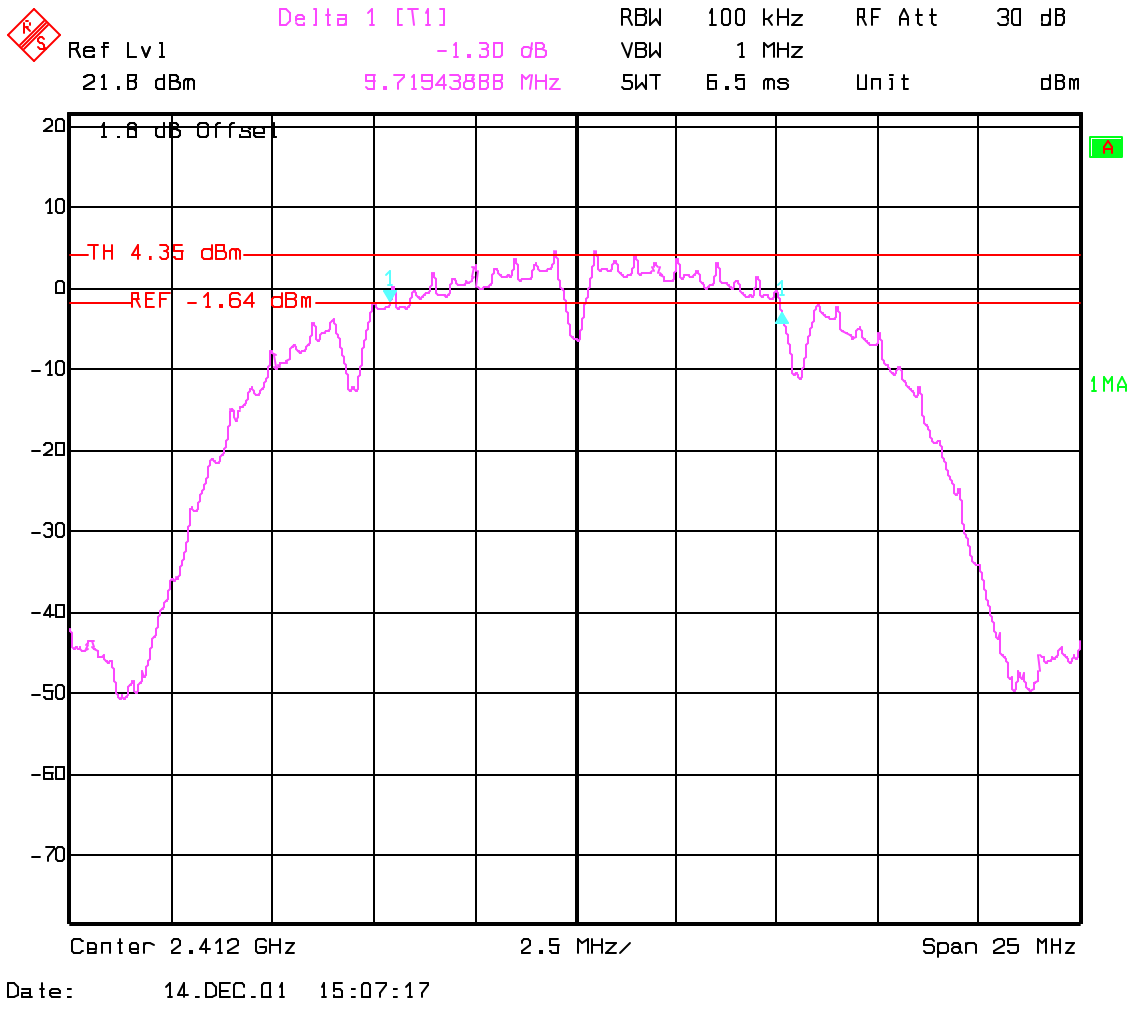
TEST CONDITIONS		6 dB BANDWIDTH (kHz)		
Frequency (MHz)		2412	2442	2472
T_{nom}(23)° C	V_{nom}(230)VAC	9719.43	9769.53	9969.93
Measurement uncertainty		±3dB		

LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

Low Channel: 2412 MHz



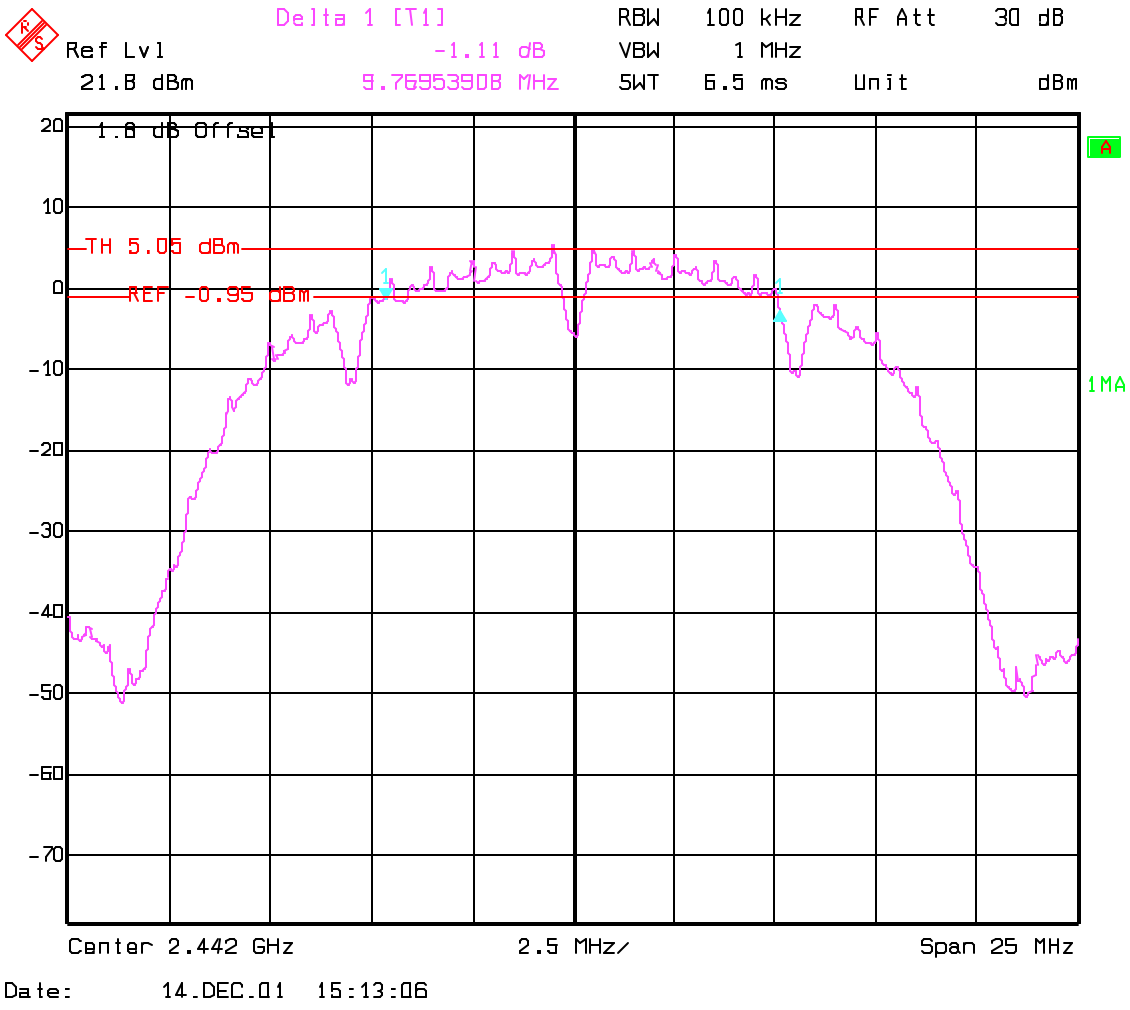
LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz

ANALYZER SETTINGS: RBW=100KHz , VBW=1MHz

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

Mid Channel: 2442 MHz



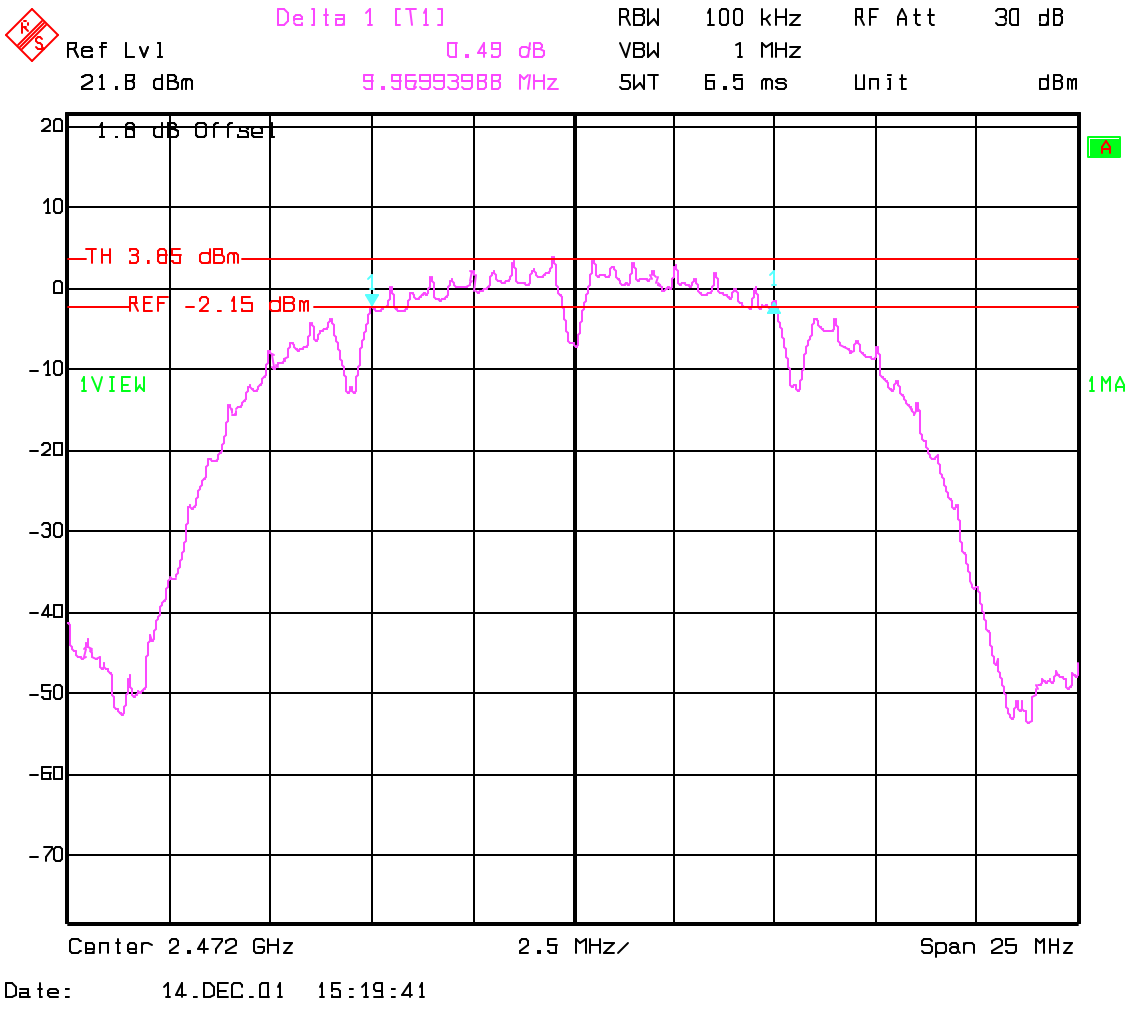
LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz

ANALYZER SETTINGS: RBW=100KHz , VBW=1MHz

SPECTRUM BANDWITH OF DSSS-SYSTEM **SUBCLAUSE § 15.247 (a)(2)**

High Channel: 2472 MHz



LIMIT **SUBCLAUSE §15.247(a) (2)**

The minimum 6dB bandwith shall shall be at least 500 KHz

ANALYZER SETTINGS: RBW=100KHz , VBW=1MHz

MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

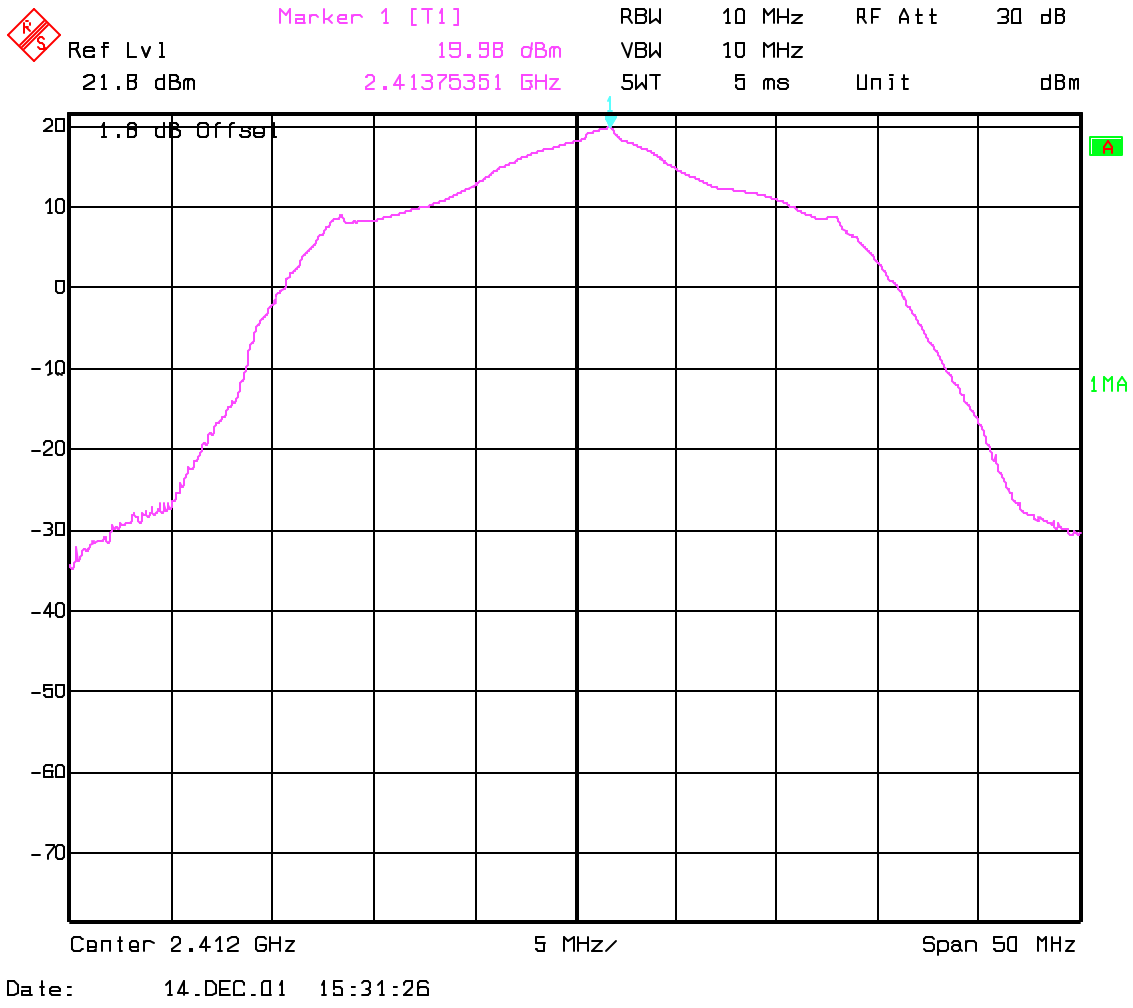
TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)					
Frequency (MHz)		2412		2442		2472	
T_{nom}(23)° C	V_{nom}(230)VAC	Pk	19.98	Pk	20.20	Pk	19.20
		Av	12.03	Av	12.60	Av	11.21
Measurement uncertainty		±3dB					

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz / 5725 – 5850 MHz	1.0 Watt

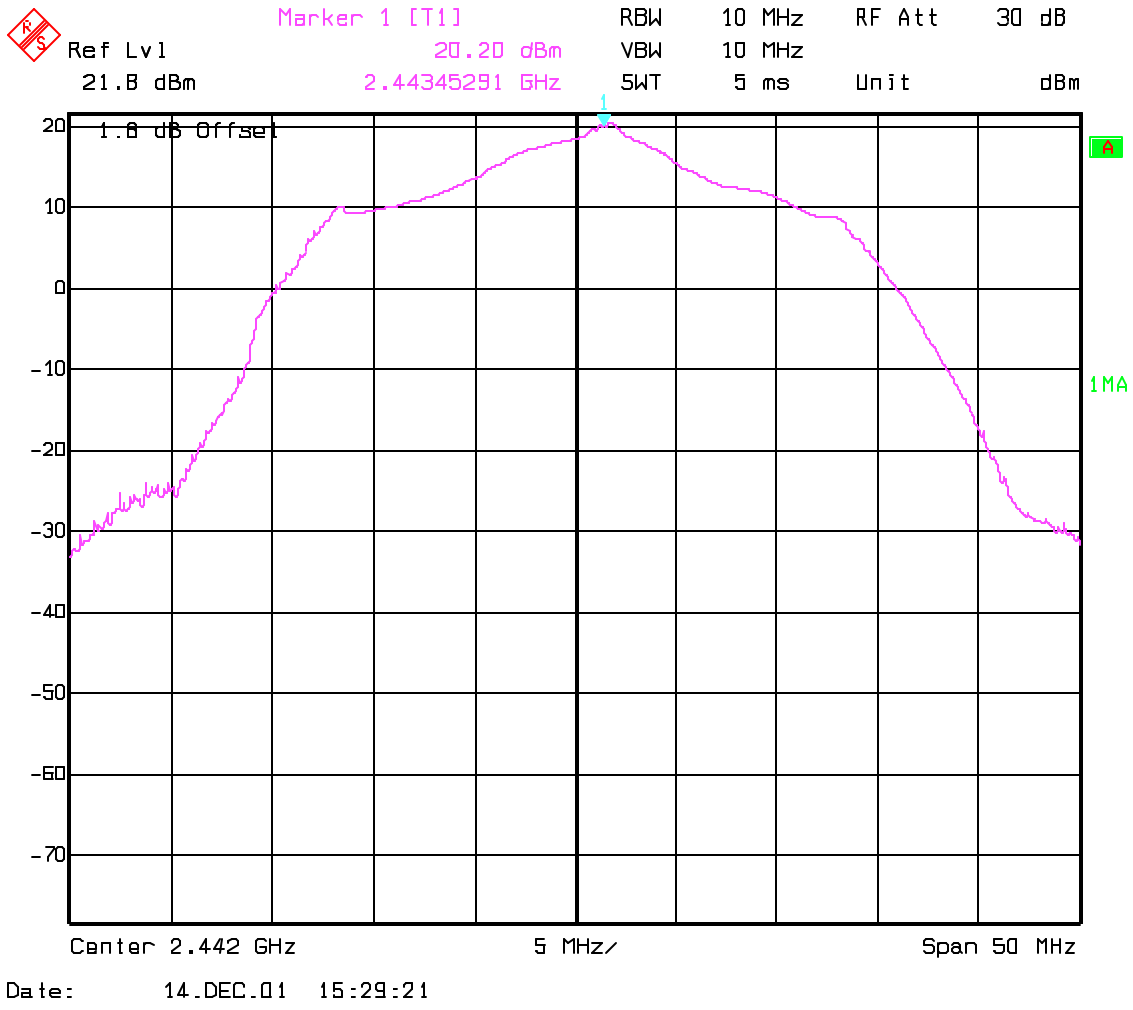
MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

Low Channel: 2412 MHz



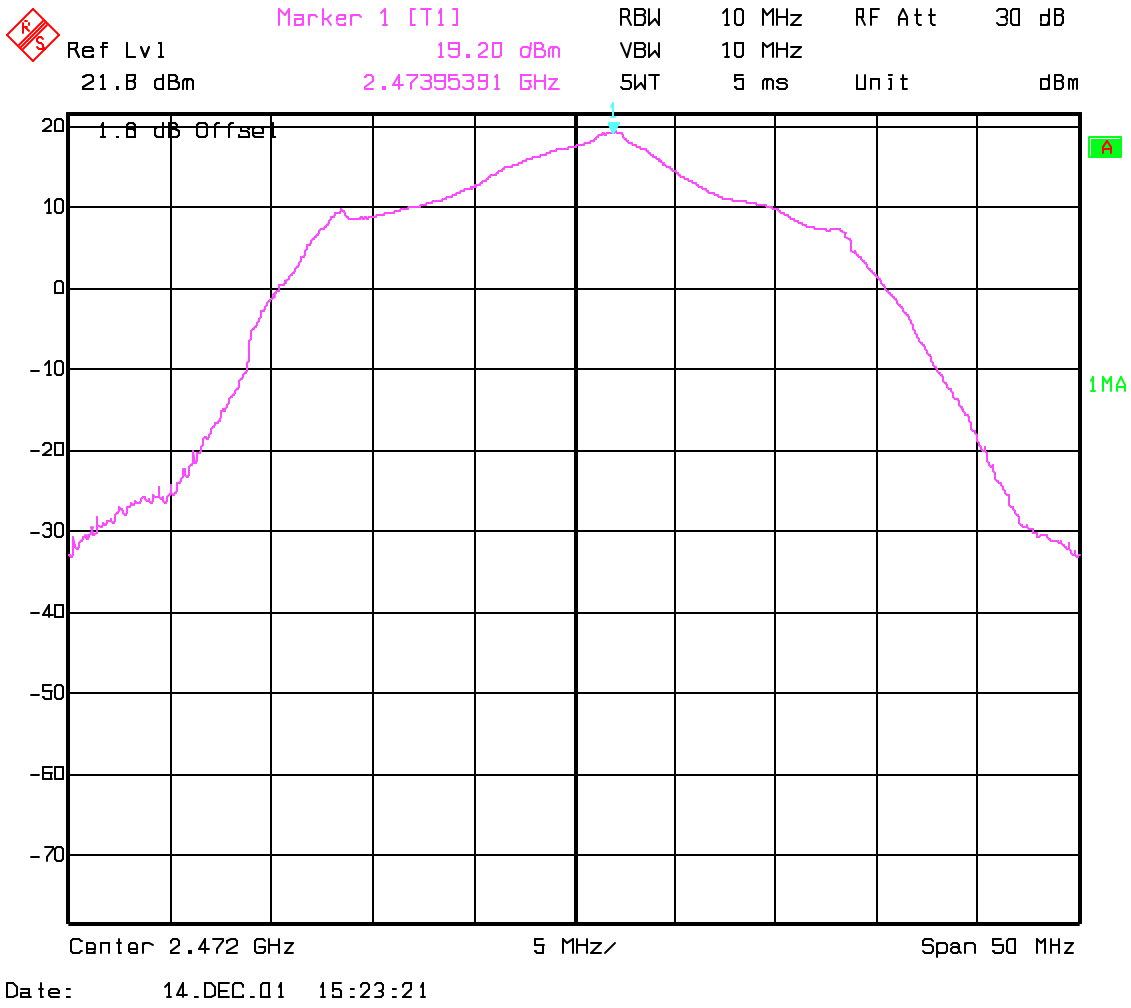
MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

Mid Channel: 2442 MHz



MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

High Channel: 2472 MHz



MAXIMUM PEAK OUTPUT POWER (EIRP) (RADIATED) **SUBCLAUSE § 15.247 (b) (1)**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm) 18 dBi antenna 50 ft cable		
Frequency (MHz)		2412	2442	2472
T_{nom}(23)° C	V_{nom}(230)VAC	24.70	24.78	23.18
Measurement uncertainty		±3dB		

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm) 18 dBi antenna 20 ft cable		
Frequency (MHz)		2412	2442	2472
T_{nom}(23)° C	V_{nom}(230)VAC	27.97	28.06	26.46
Measurement uncertainty		±3dB		

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm) 4 dBi antenna 6 ft cable		
Frequency (MHz)		2412	2442	2472
T_{nom}(23)° C	V_{nom}(230)VAC	22.02	22.22	21.32
Measurement uncertainty		±3dB		

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

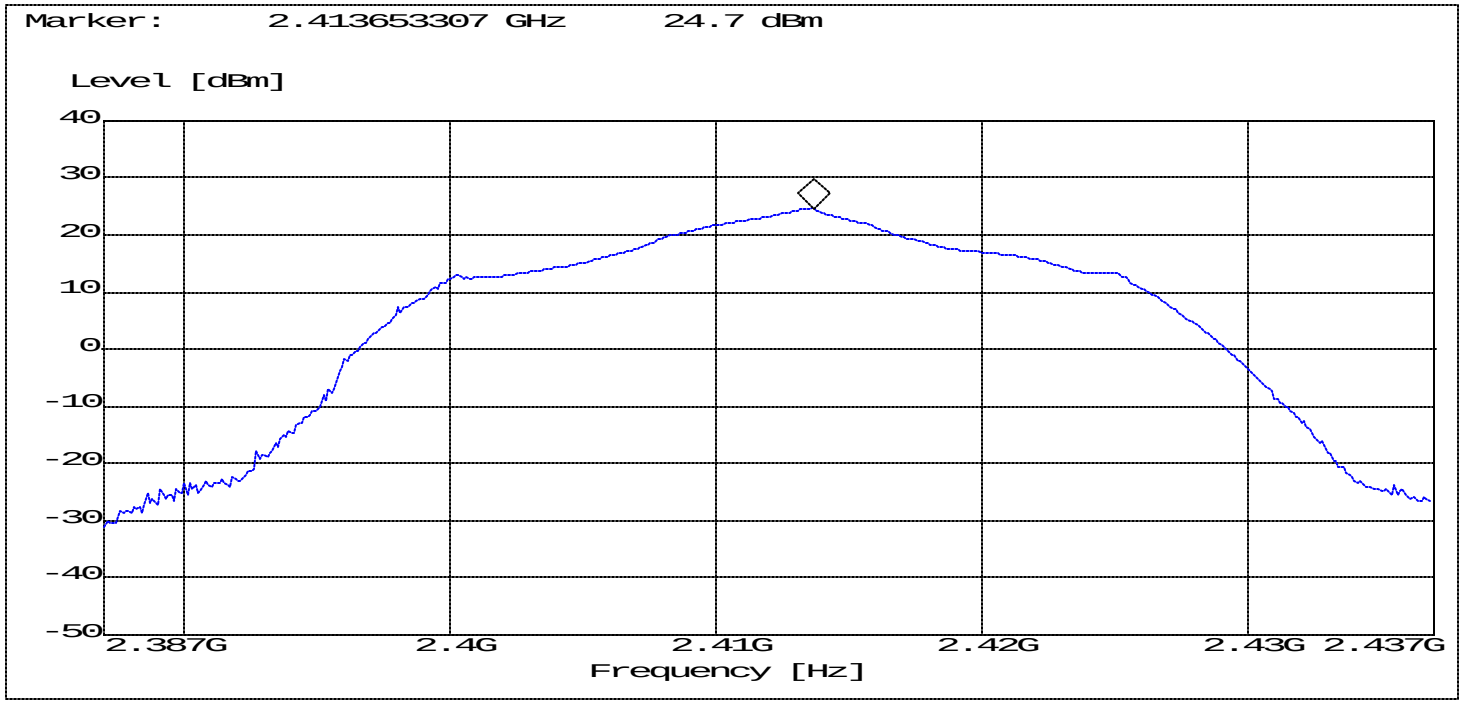
Frequency range	RF power output
2400-2483.5 MHz / 5725 – 5850 MHz	1.0 Watt

ANALYZER SETTINGS: RBW=10MHz , VBW=10MHz

MAXIMUM PEAK OUTPUT POWER (EIRP) (RADIATED) **SUBCLAUSE § 15.247 (b) (1)**

Low Channel: 2412 MHz

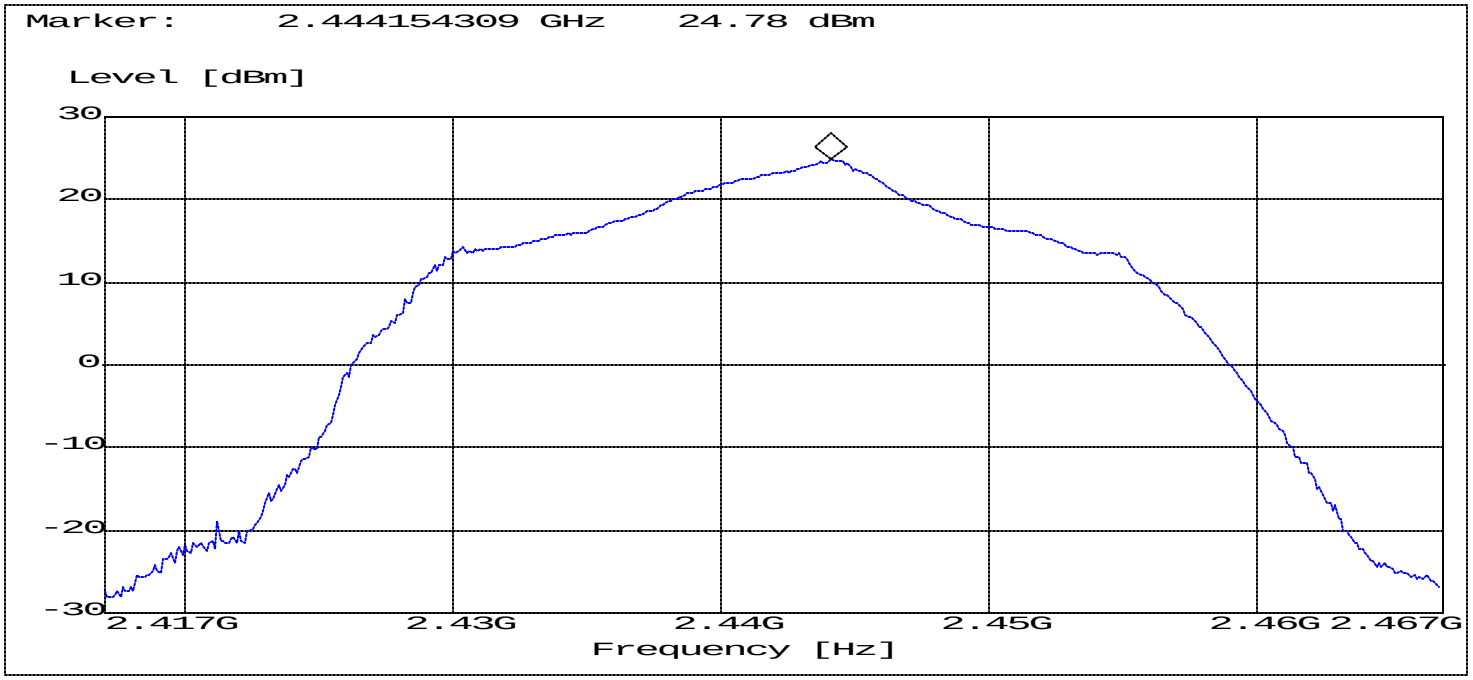
ANALYZER SETTINGS: RBW=10MHz, VBW=10MHz



MAXIMUM PEAK OUTPUT POWER (EIRP) (RADIATED) **SUBCLAUSE § 15.247 (b) (1)**

Mid Channel: 2442 MHz

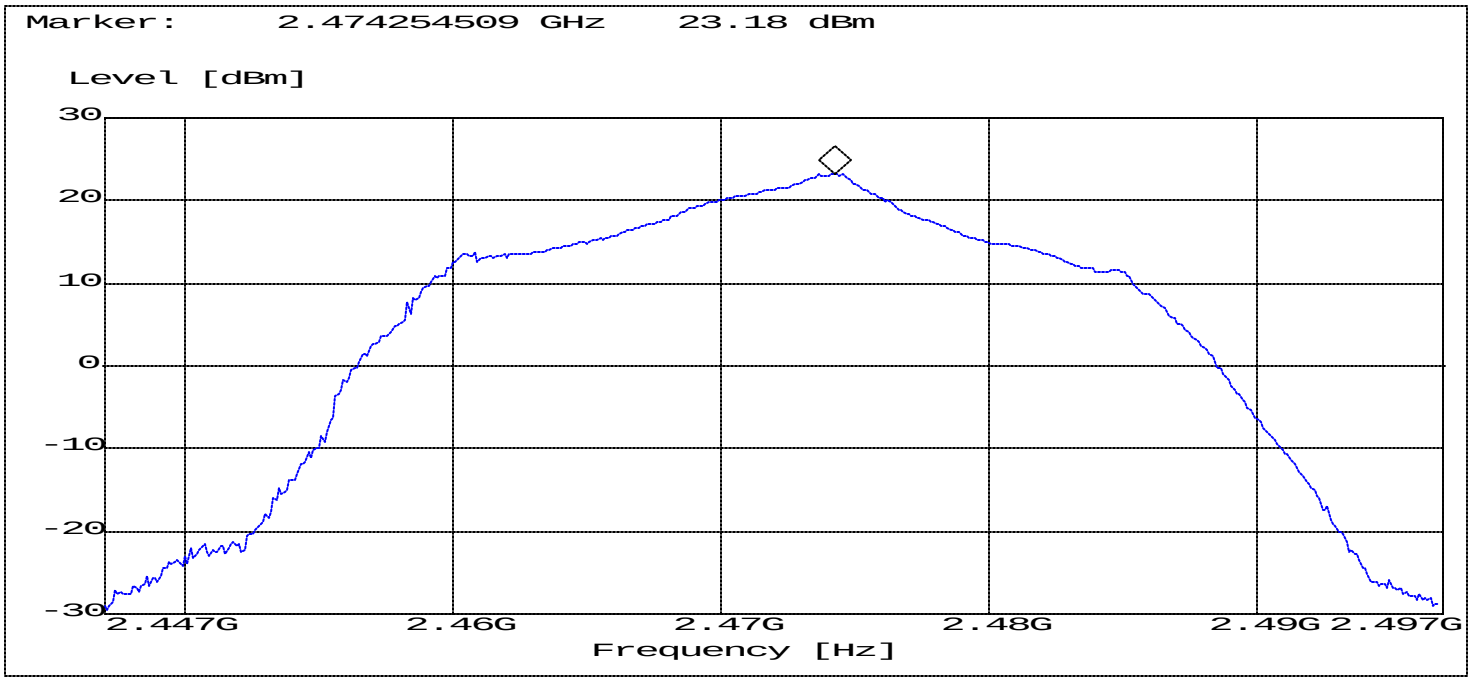
ANALYZER SETTINGS: RBW=10MHz , VBW=10MHz



MAXIMUM PEAK OUTPUT POWER (EIRP) (RADIATED) **SUBCLAUSE § 15.247 (b) (1)**

High Channel: 2472 MHz

ANALYZER SETTINGS: RBW=10MHz, VBW=10MHz



EMISSION LIMITATIONS - Conducted (Transmitter) § 15.247 (c) (1)

LIMITS

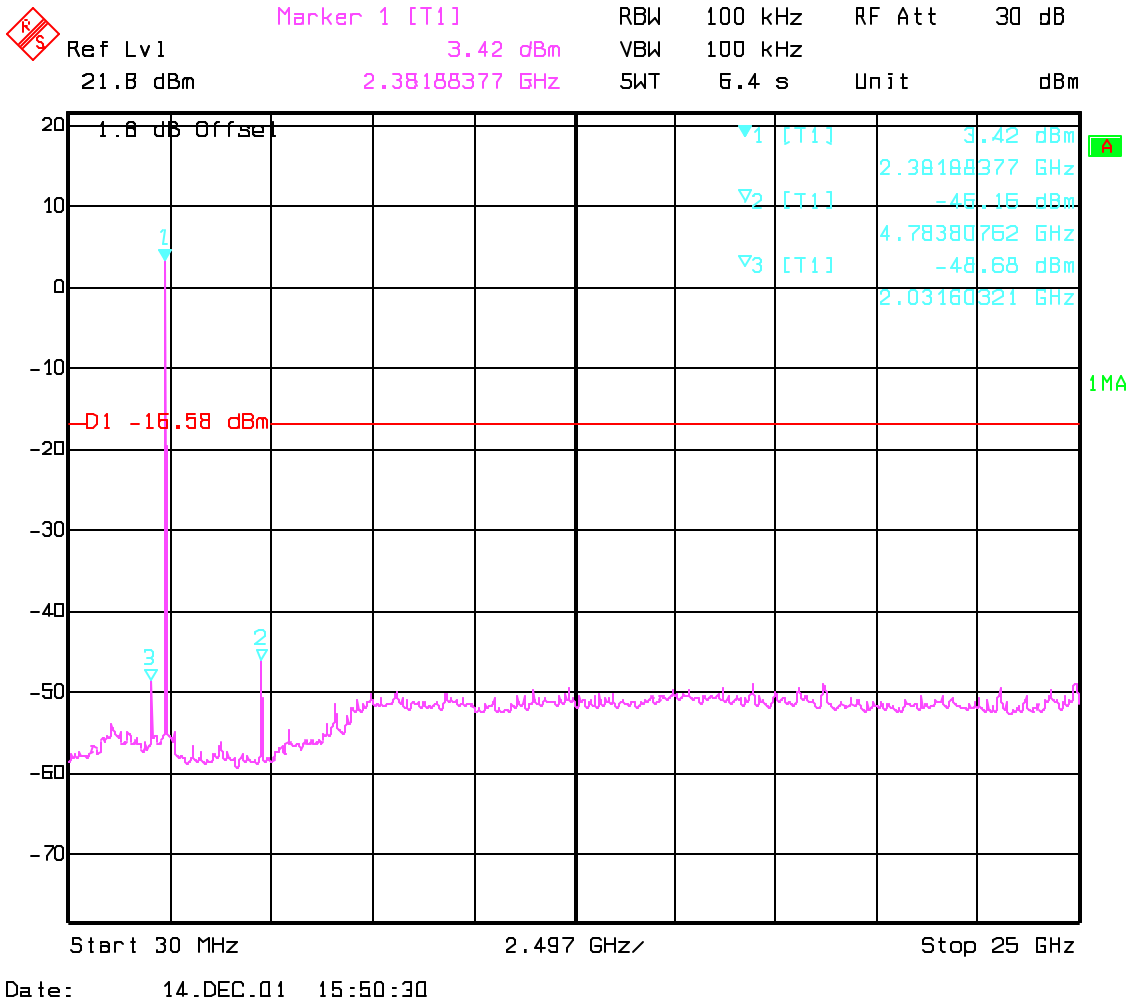
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

NOTE: Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Conducted

Low Channel (2412 MHz): 30MHz – 25GHz

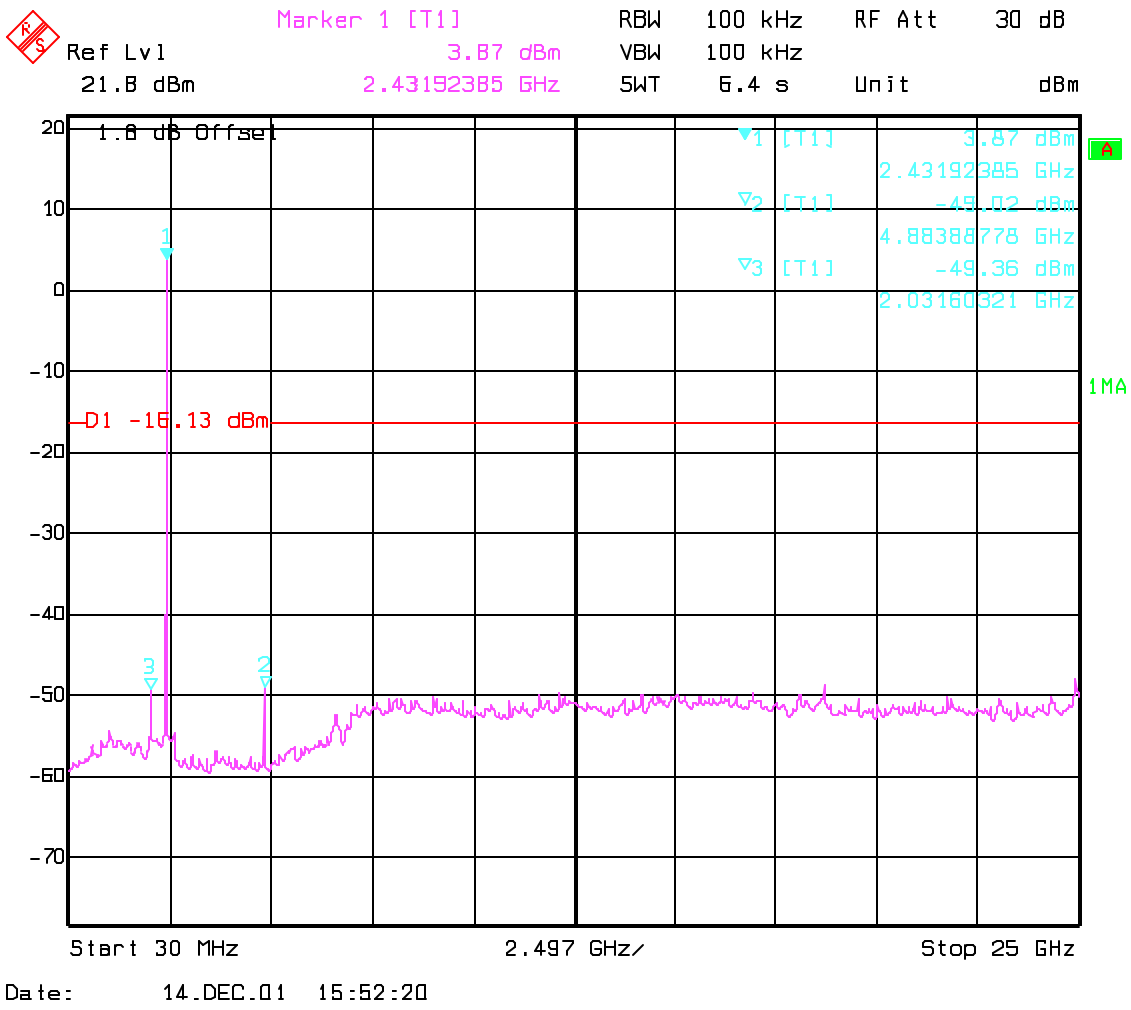


NOTE: The peak above the limit line is the carrier frequency.

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

conducted

Mid Channel (2442 MHz): 30MHz – 25GHz

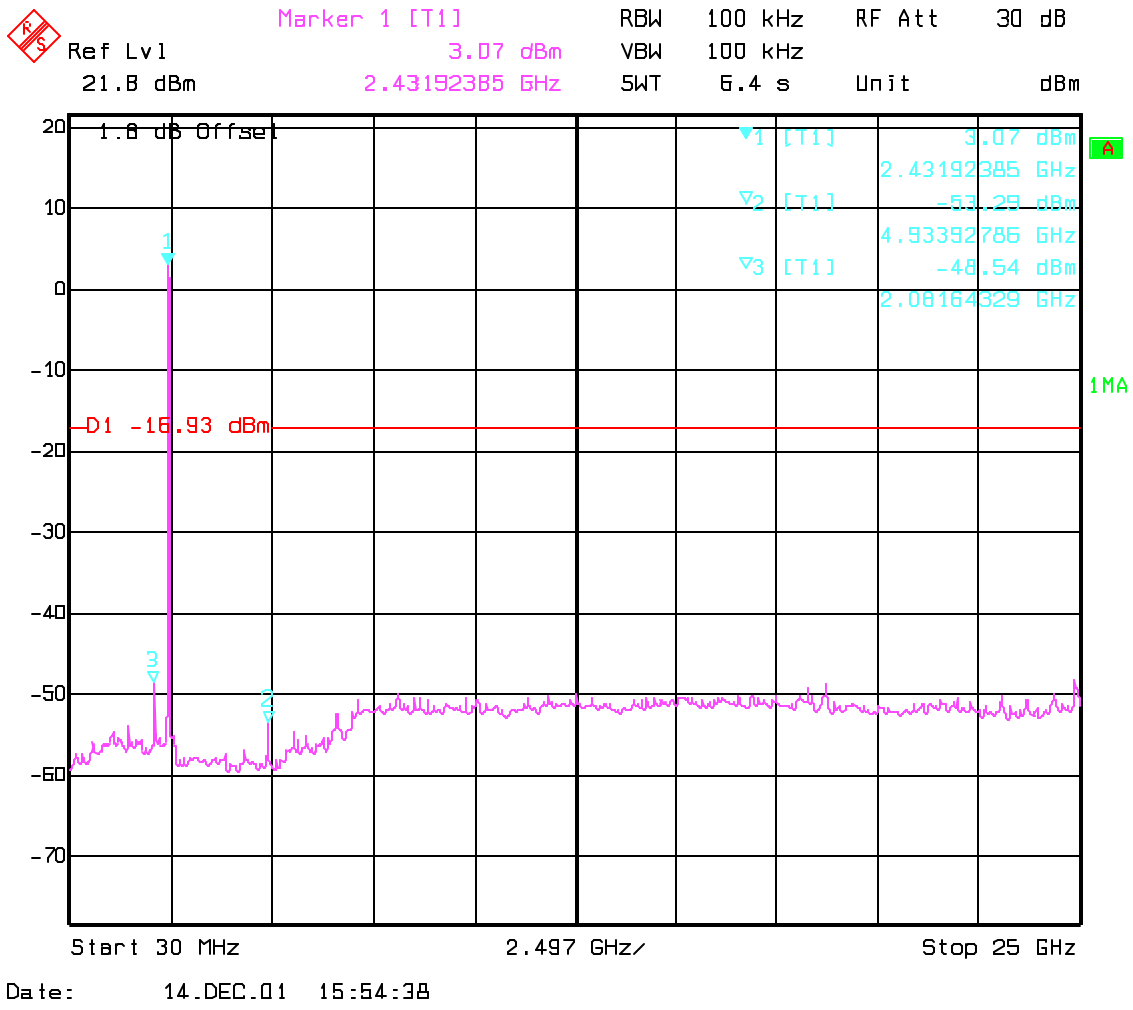


NOTE: The peak above the limit line is the carrier frequency.

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

conducted

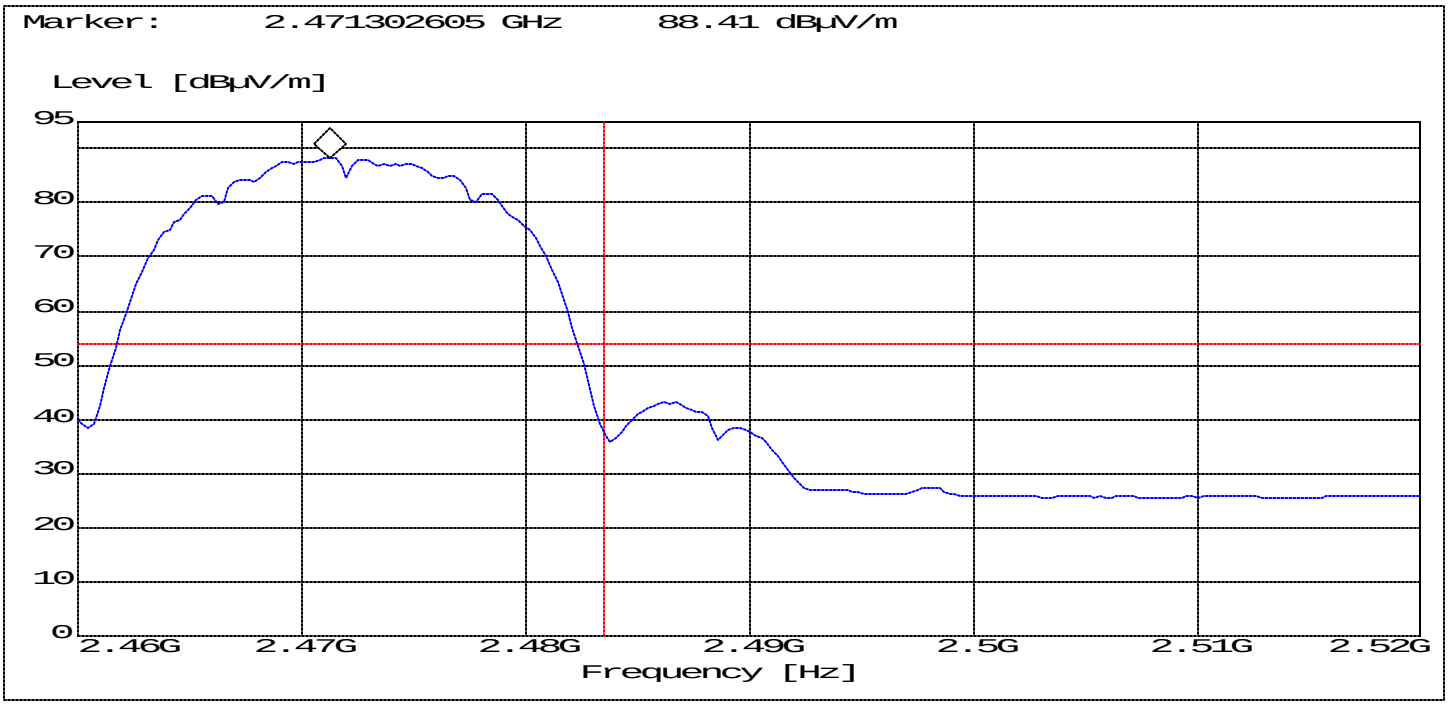
High Channel (2472 MHz): 30MHz – 25GHz



NOTE: The peak above the limit line is the carrier frequency.

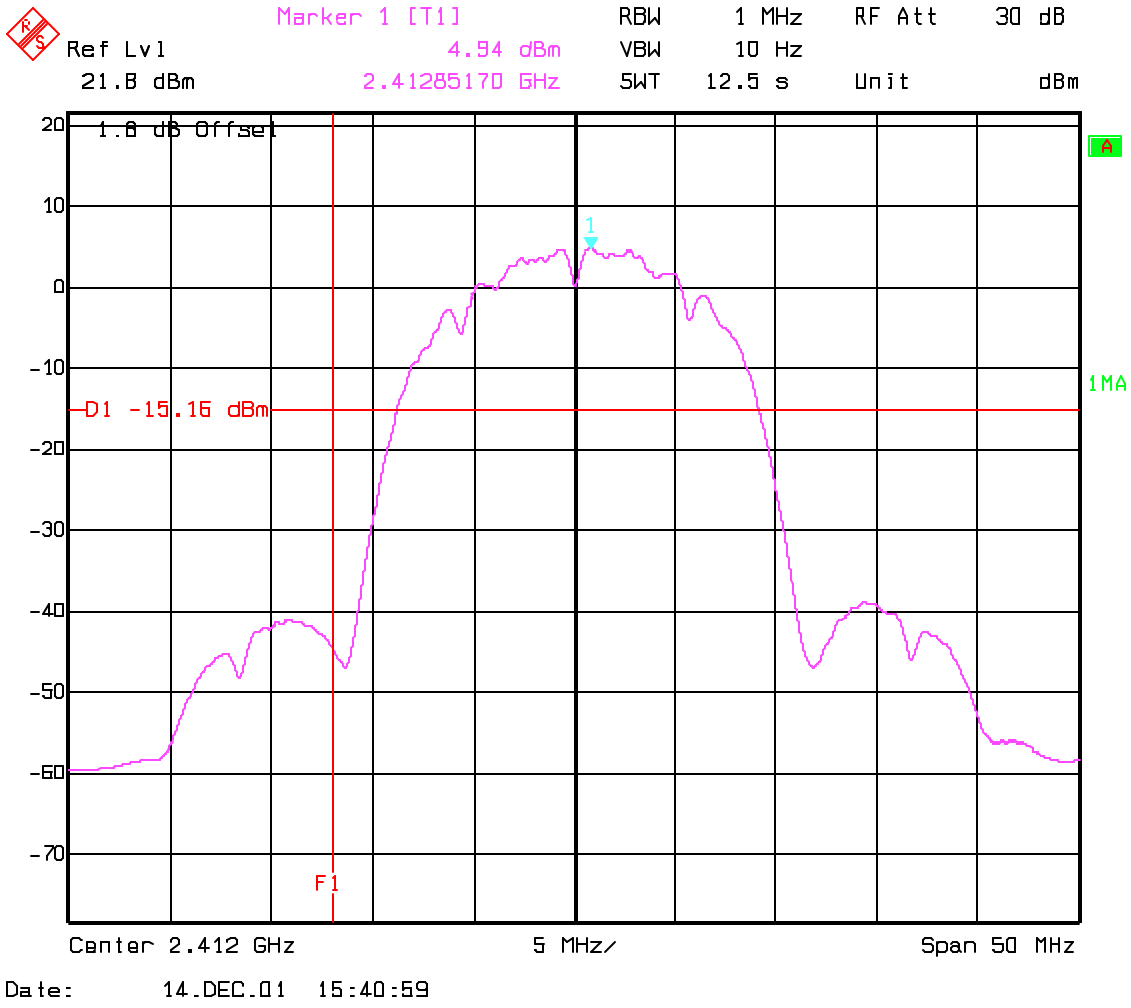
EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (2)**

spurious in the restricted band 2483.5 – 2500 MHz
(Higher Band Edge)



ANALYZER SETTINGS: RBW=1MHz VBW=10Hz

Lower Band Edge: (2400MHz)



EMISSION LIMITATIONS - Radiated (Transmitter) SUBCLAUSE § 15.247 (c) (1)

LIMITS

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

3. All emission measurements were done in Peak mode. In case limits are exceeded the measurements will be repeated and documented in the test report either with Quasi Peak or average detector depending on the frequency range specified in FCC 15 and/or DA00-705. Bandwidth, sweeptime etc. were set according DA00-705 and recorded

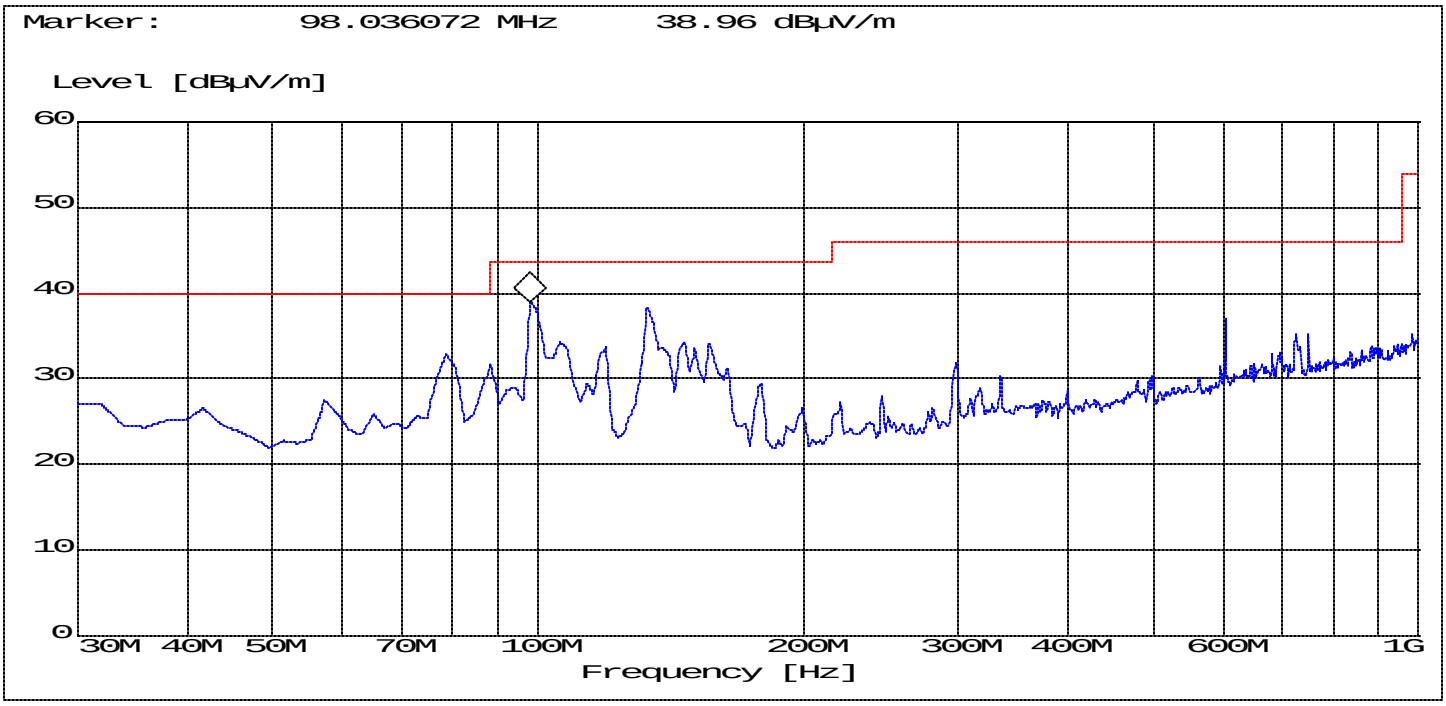
Results for the radiated measurements below 30MHz according § 15.33

Frequency	Measured values	Remarks
10KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Low Channel(2412MHz): 30MHz-1GHz

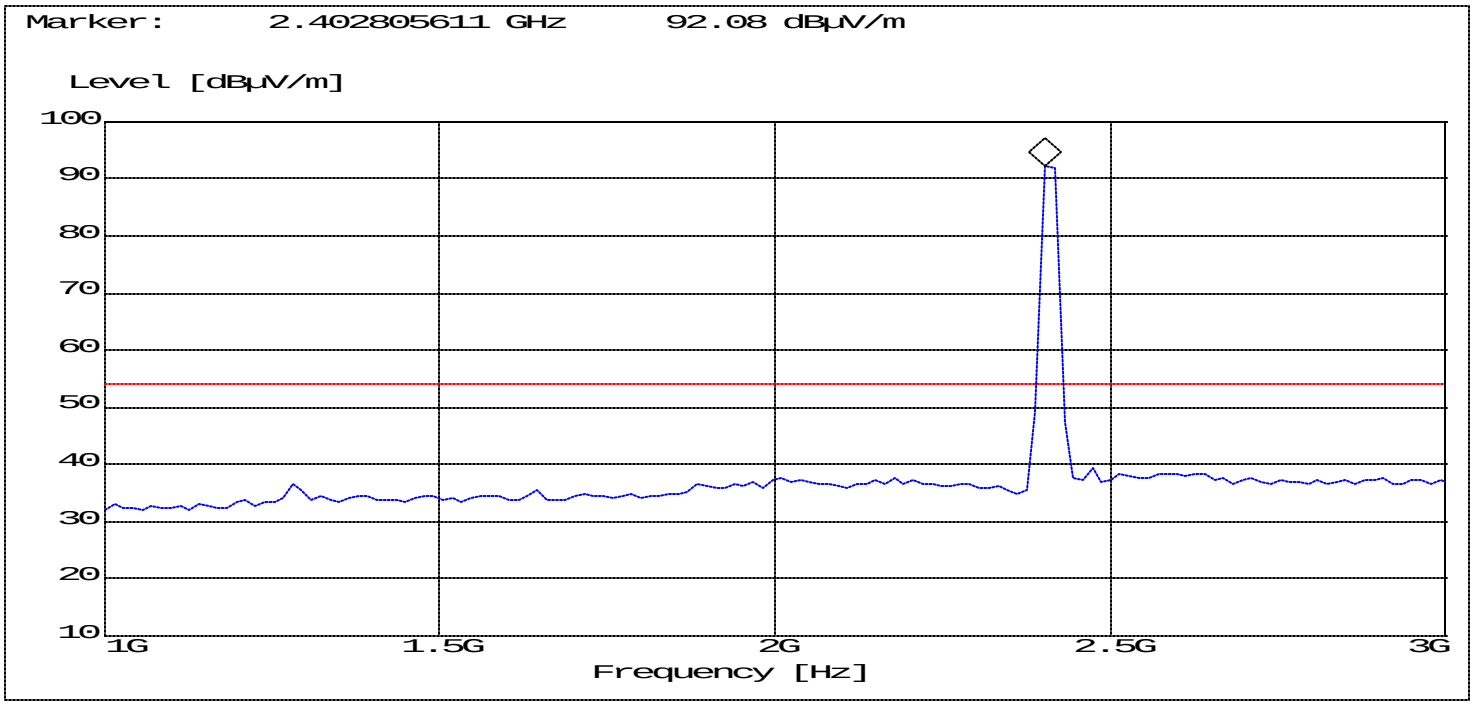


ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Low Channel(2412MHz): 1GHz-3GHz

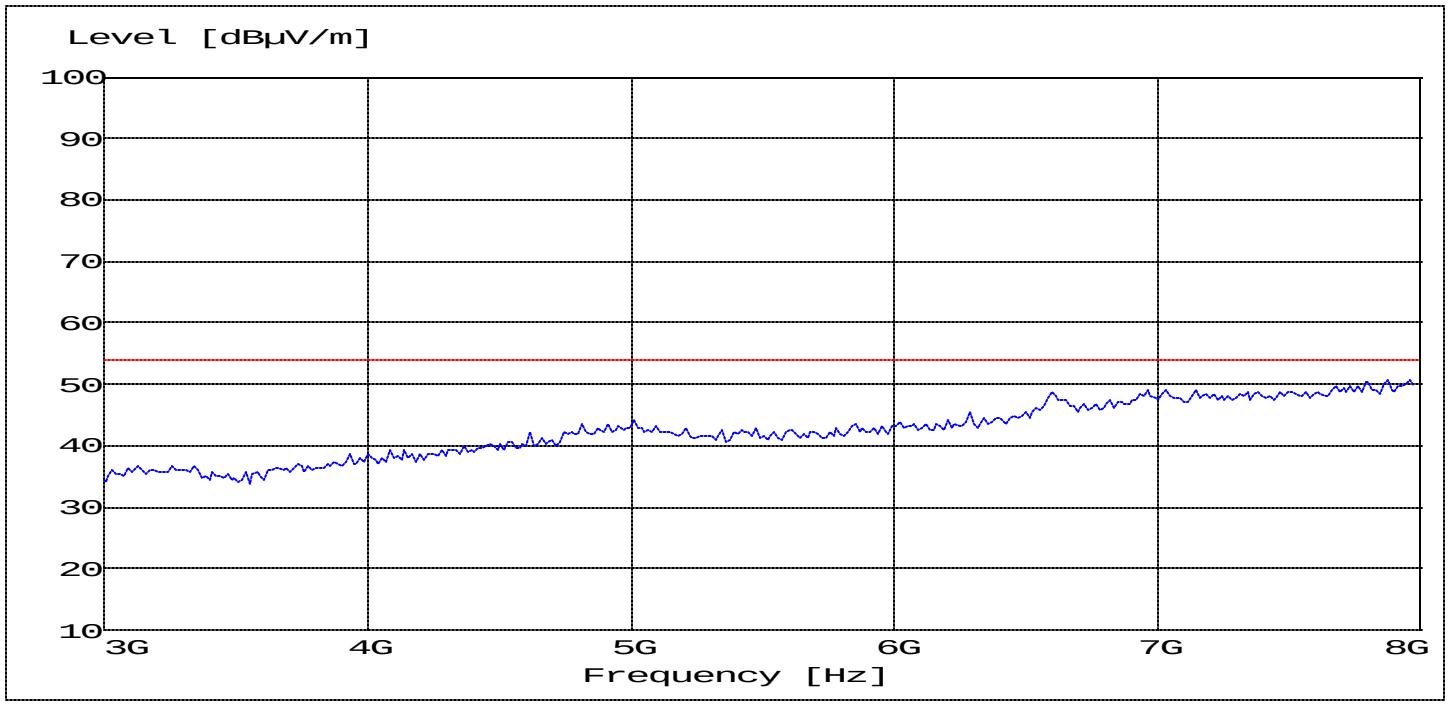


NOTE: The peak above the limit line is the carrier frequency.
ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Low Channel(2412MHz): 3GHz-8GHz

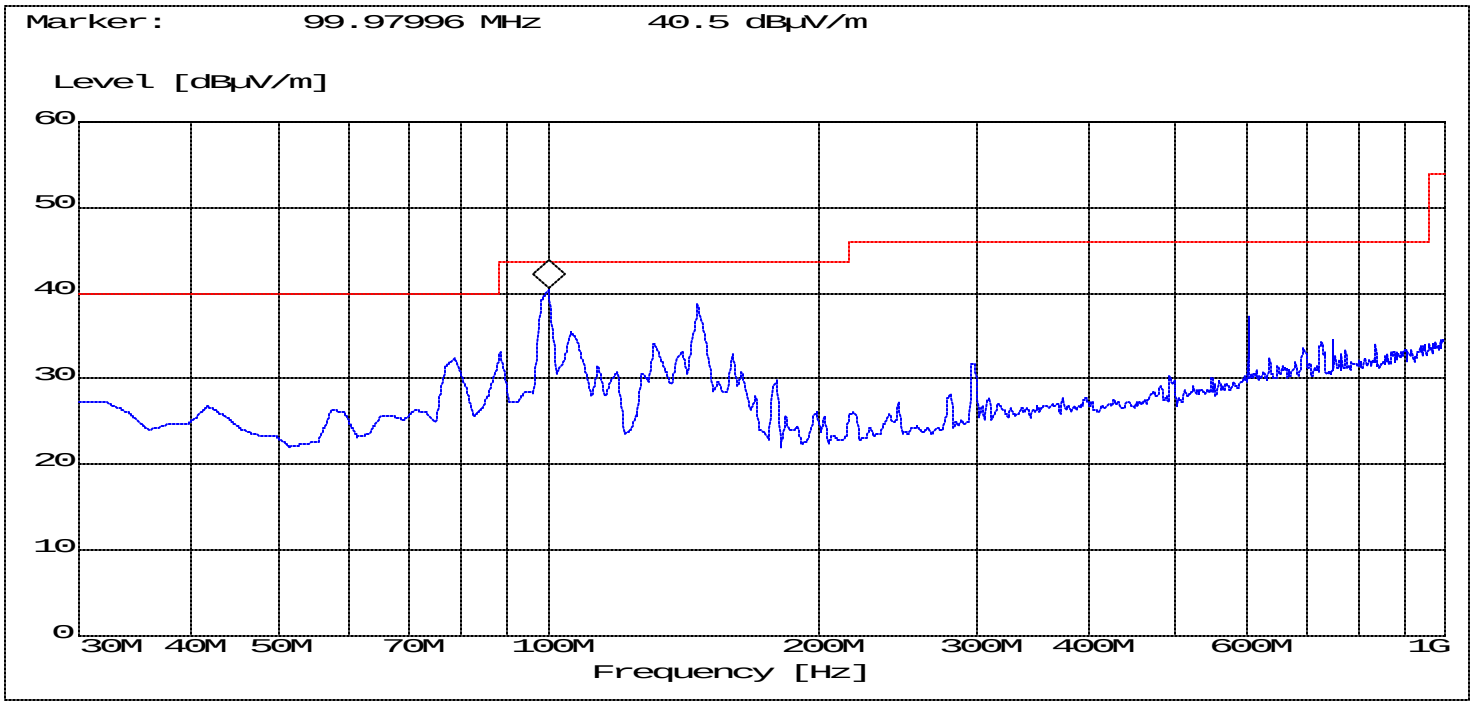


ANALYZER SETTINGS: **f < 1 GHz : RBW/VBW: 100 kHz** **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Mid Channel(2442MHz): 30MHz-1GHz

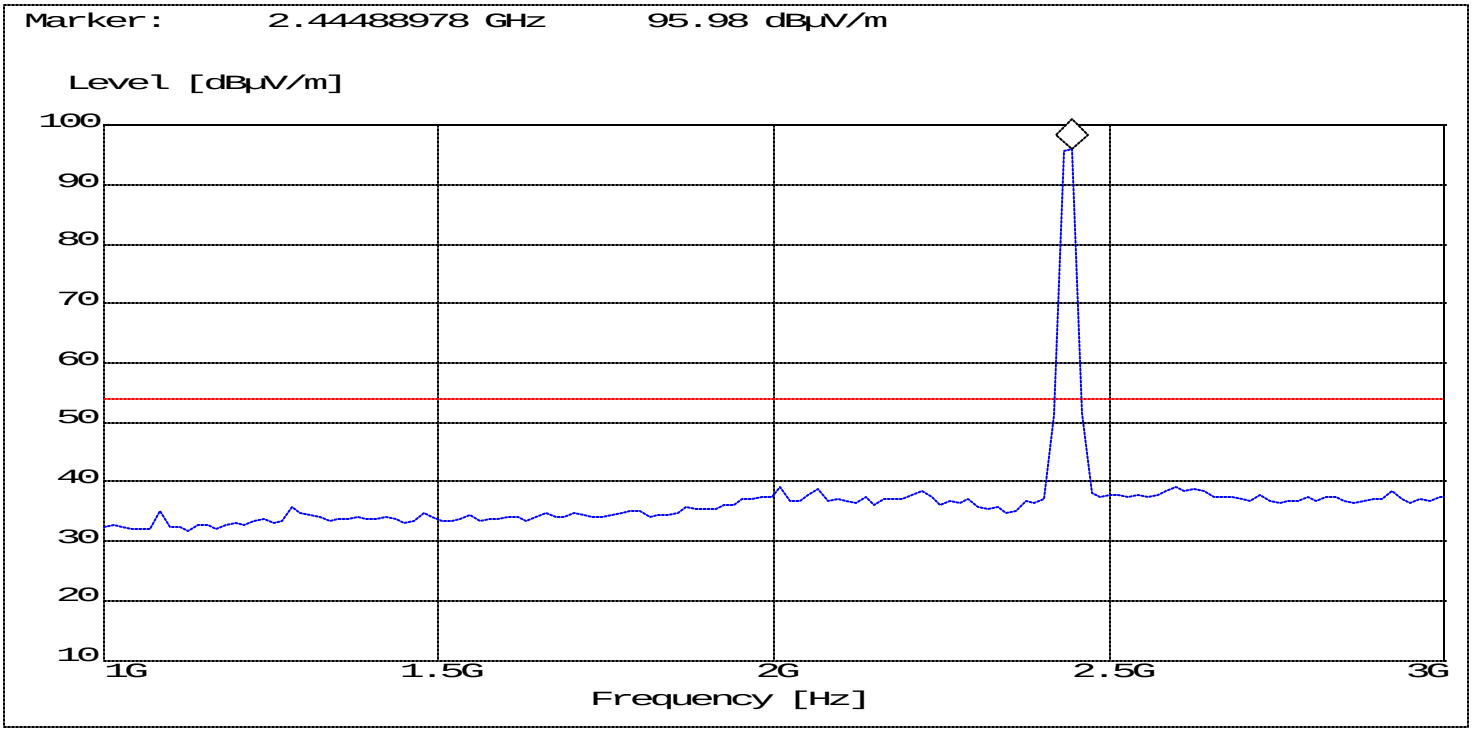


ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Mid Channel(2442MHz): 1GHz-3GHz

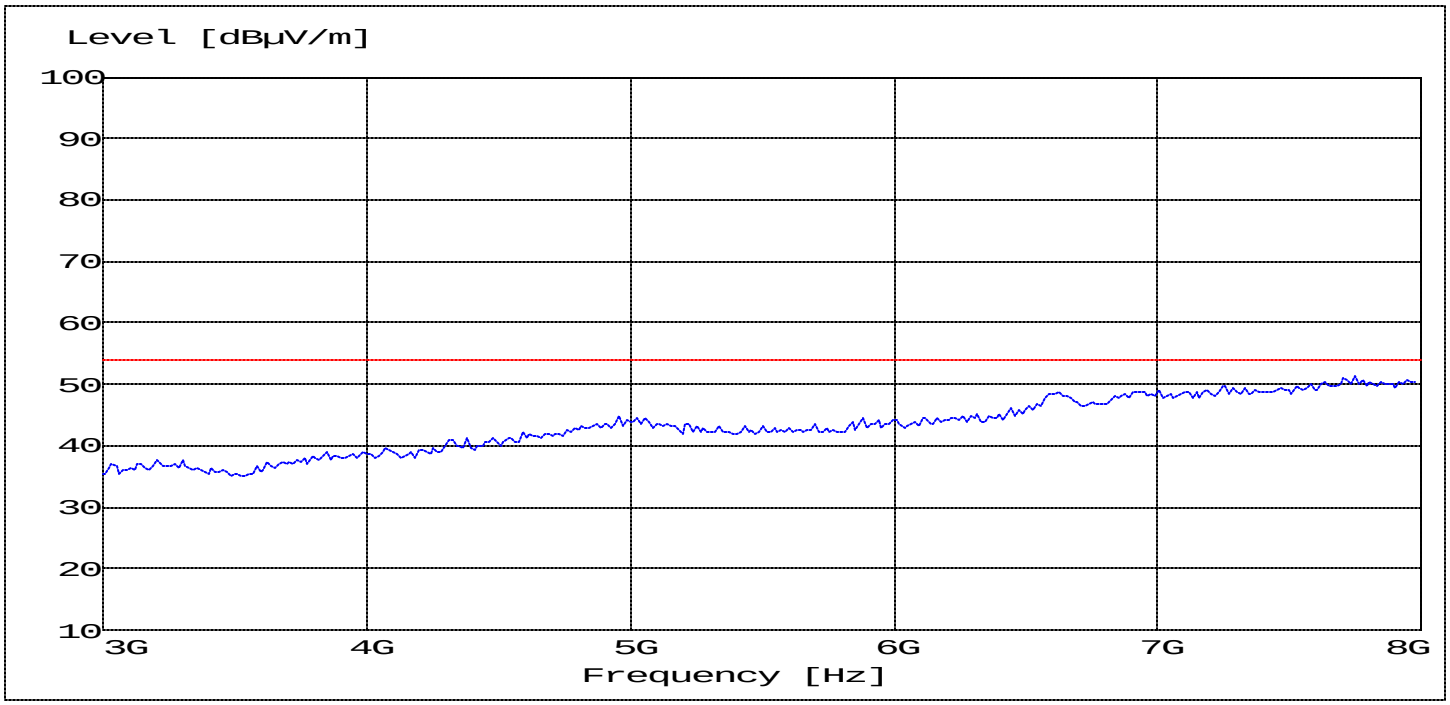


NOTE: The peak above the limit line is the carrier frequency.
ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Mid Channel(2442MHz): 3GHz-8GHz

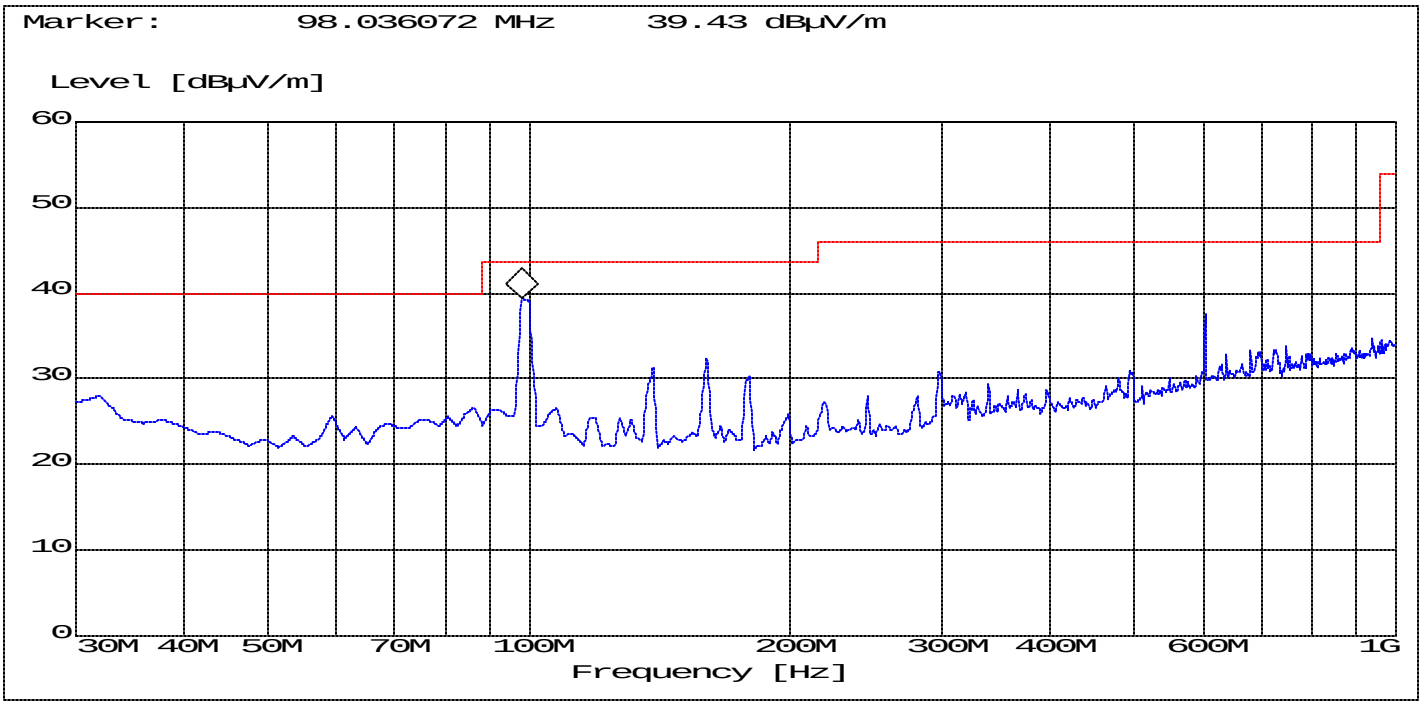


ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Hihg Channel(2472MHz): 30MHz-1GHz

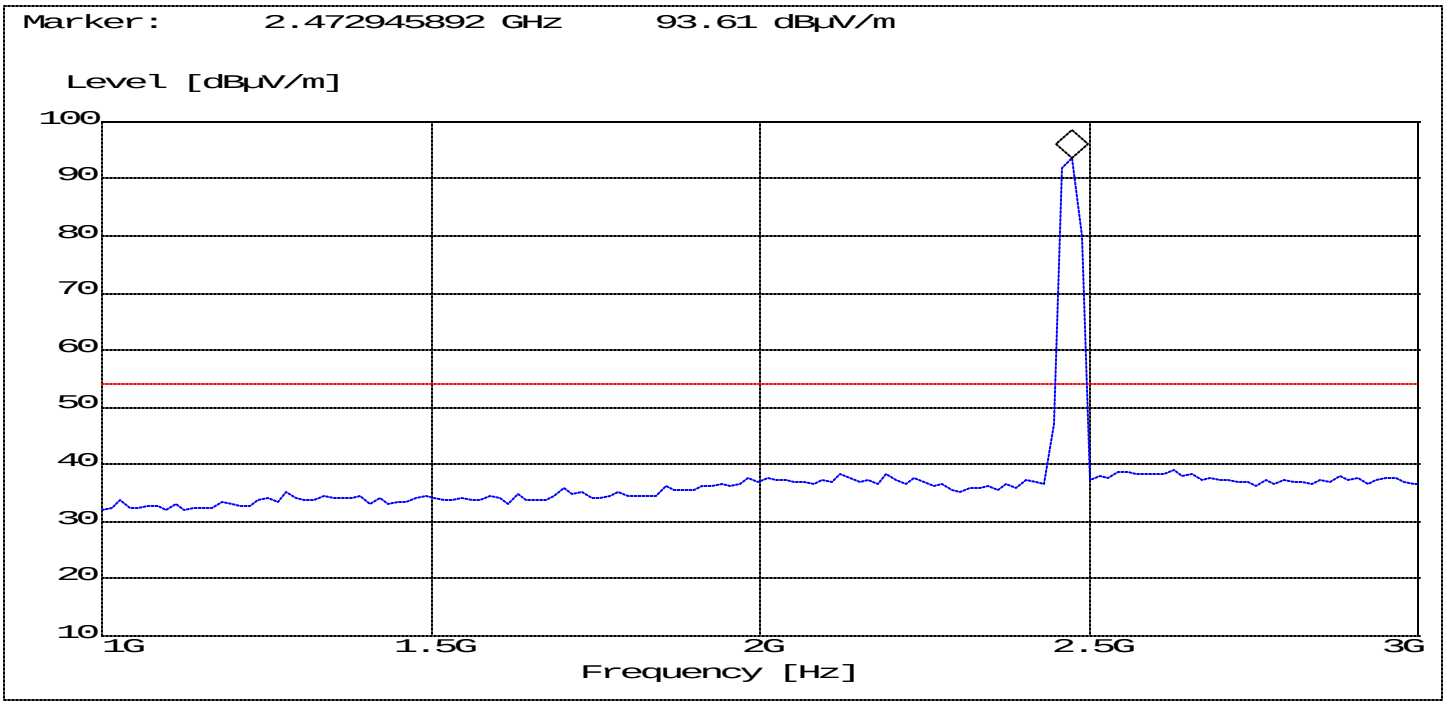


ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Hihg Channel(2472MHz): 1GHz-3GHz



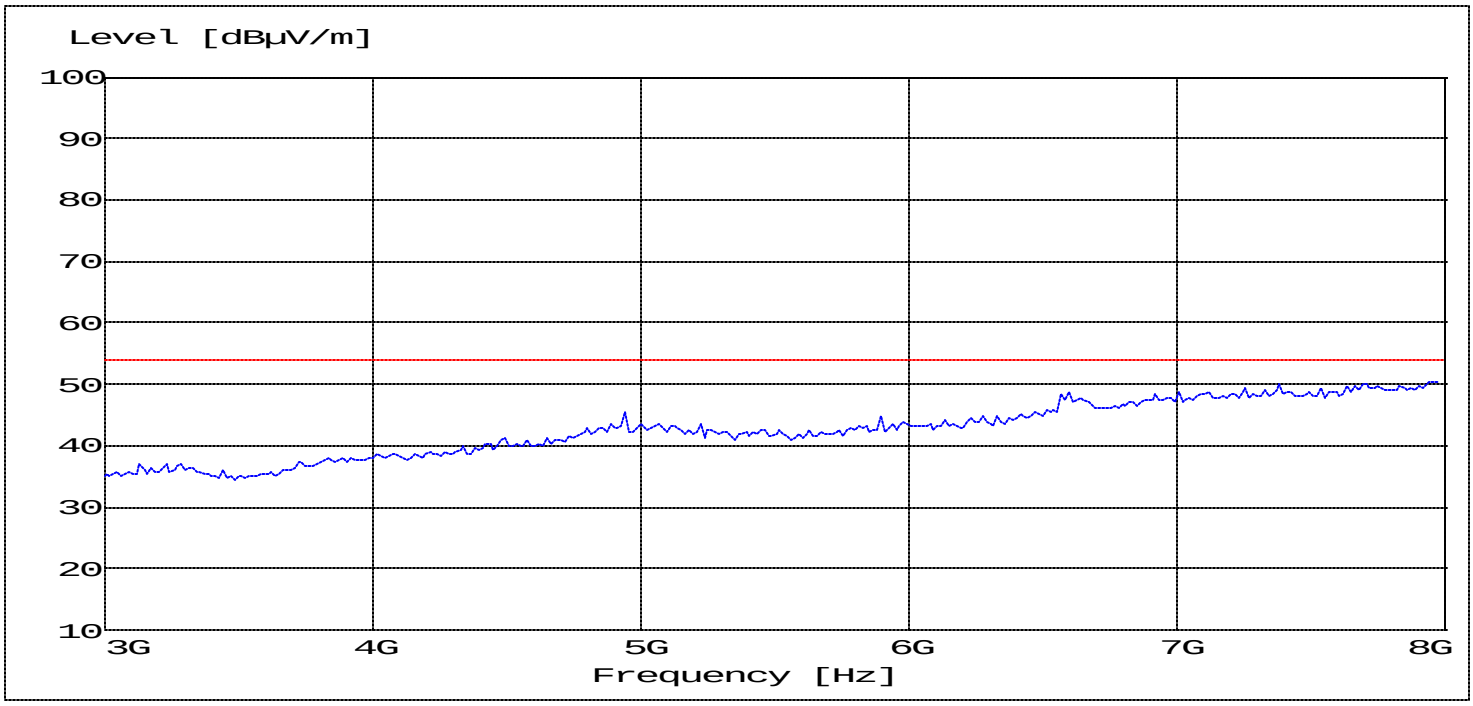
NOTE: The peak above the limit line is the carrier frequency.

ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

Hihg Channel(2472MHz): 3GHz-8GHz

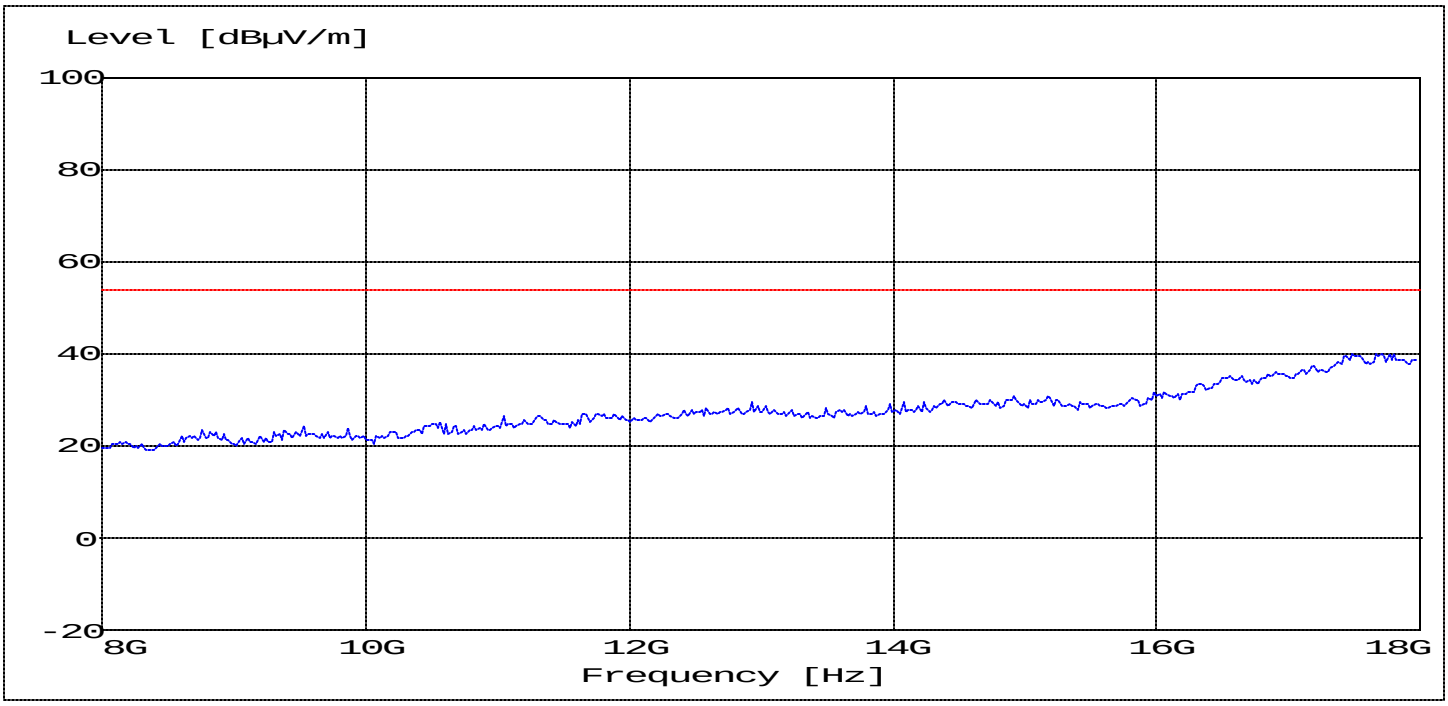


ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

8GHz – 18GHz (This plot is applicable for all three channels)

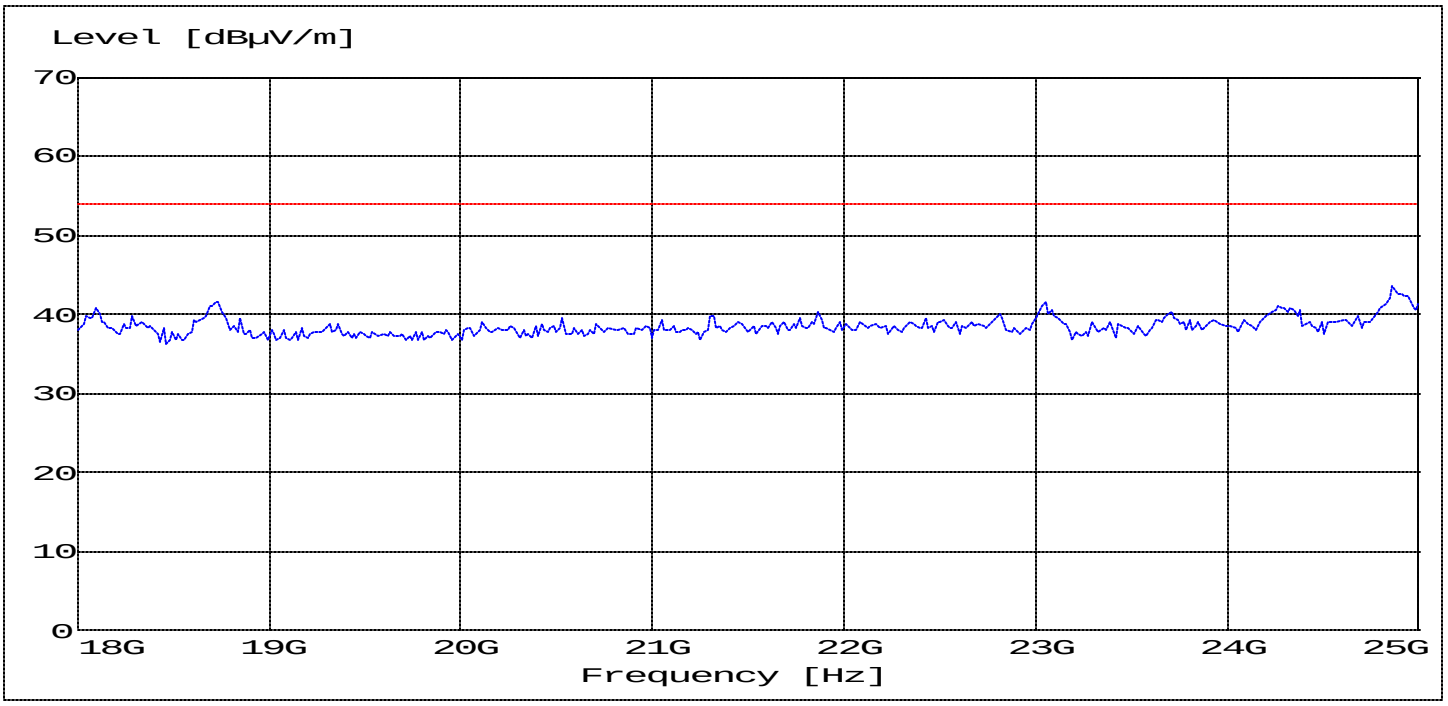


ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

EMISSION LIMITATIONS (Transmitter) **SUBCLAUSE § 15.247 (c) (1)**

Radiated

18GHz – 25GHz (This plot is applicable for all three channels)



ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

TEST CONDITIONS		RF POWER LEVEL IN 3 kHz BW		
Frequency (MHz)		2412	2442	2472
T_{nom}(23)° C	V_{nom}(230)VAC	-14.65 dBm	-13.97dBm	-14.91 dBm
Measurement uncertainty		±3dB		

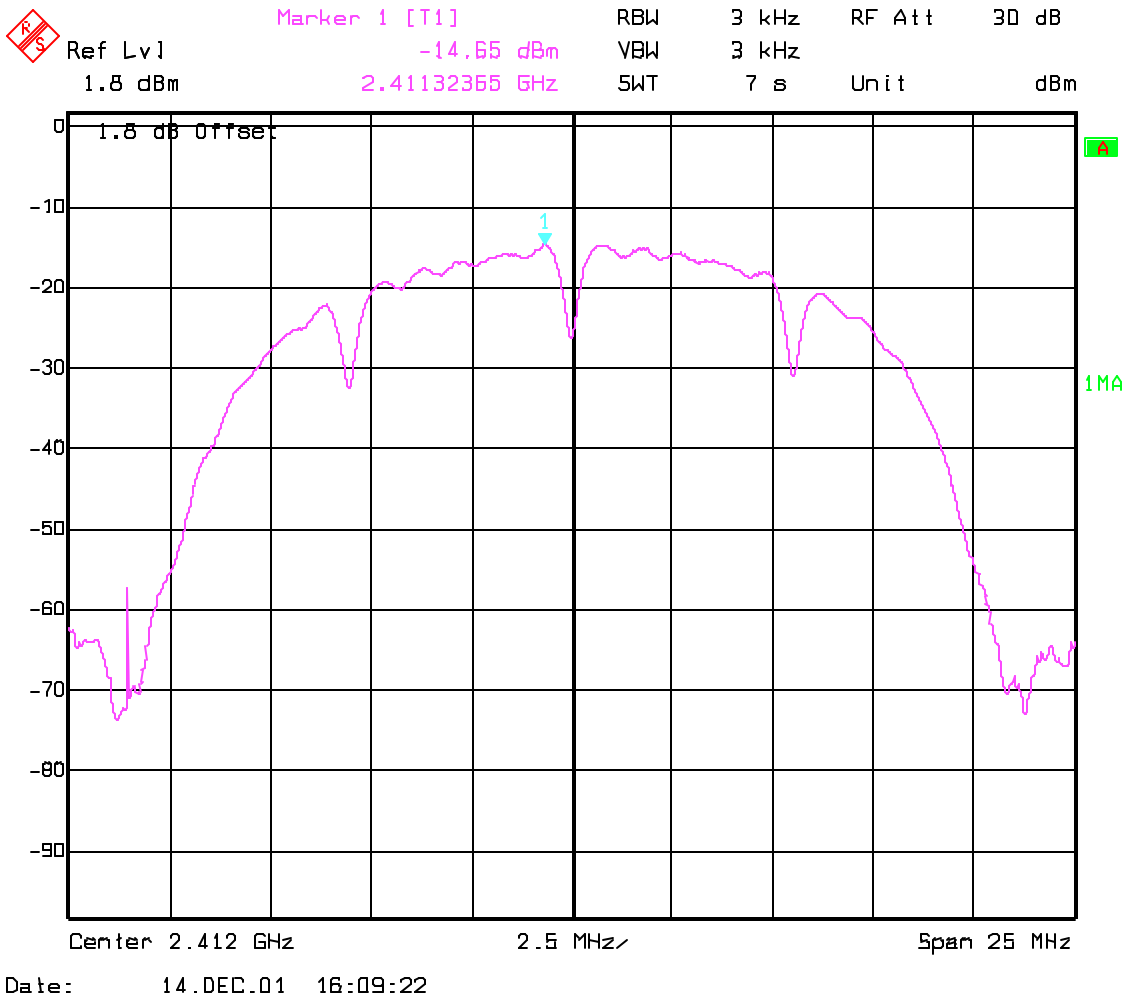
LIMIT **SUBCLAUSE §15.247(d)**

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

ANALYZER SETTINGS: RBW=3KHz , VBW=3KHz

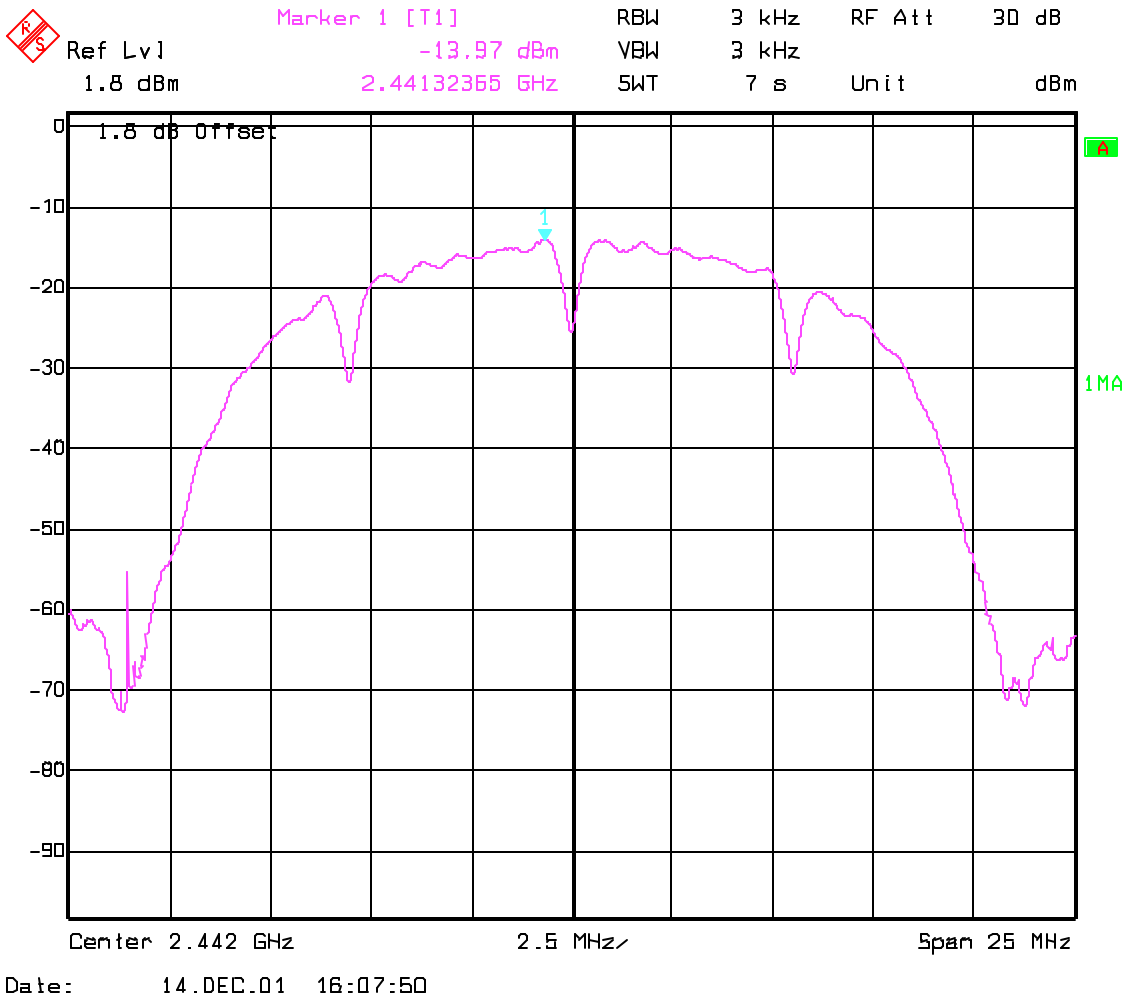
POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

Low Channel: 2412 MHz



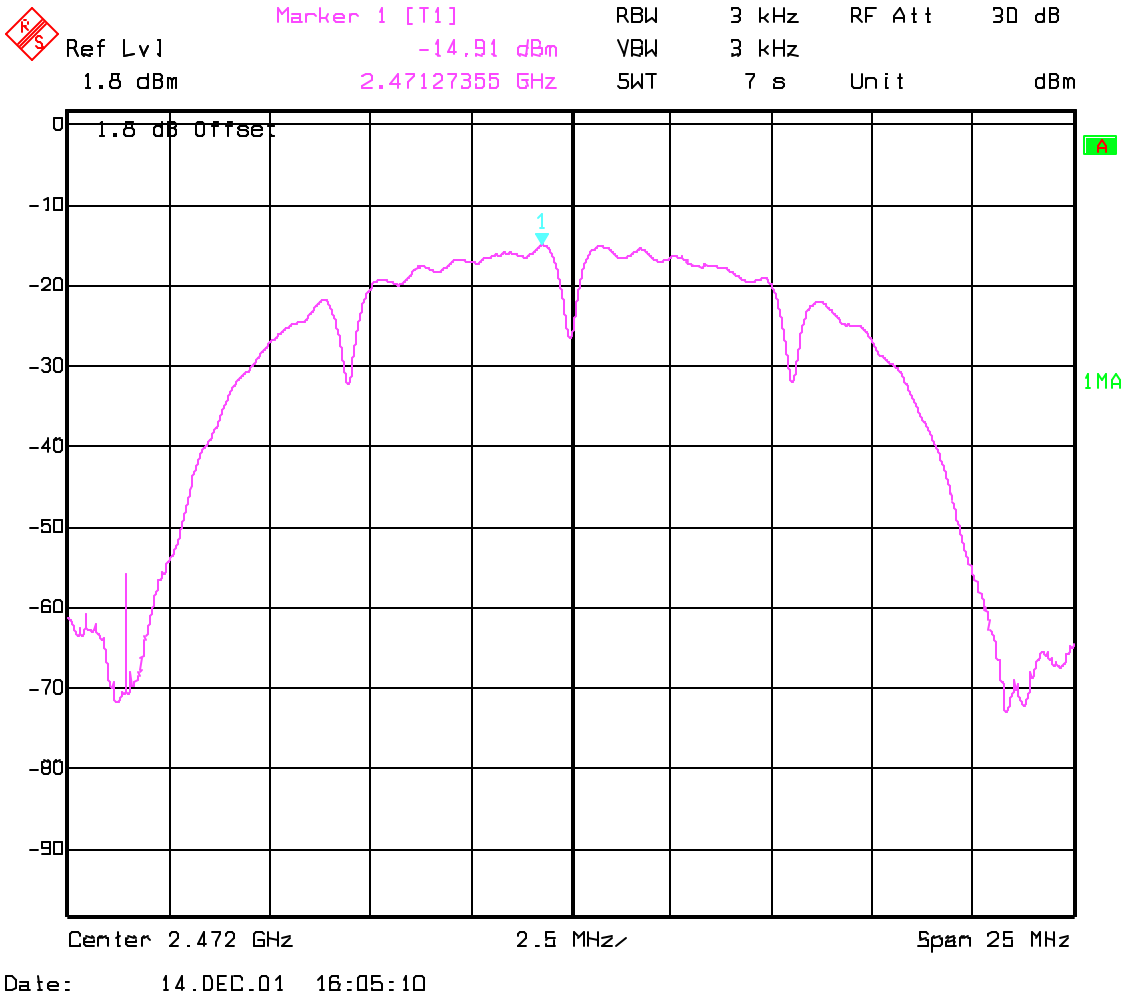
POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

Mid Channel: 2442 MHz



POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**

High Channel: 2472 MHz



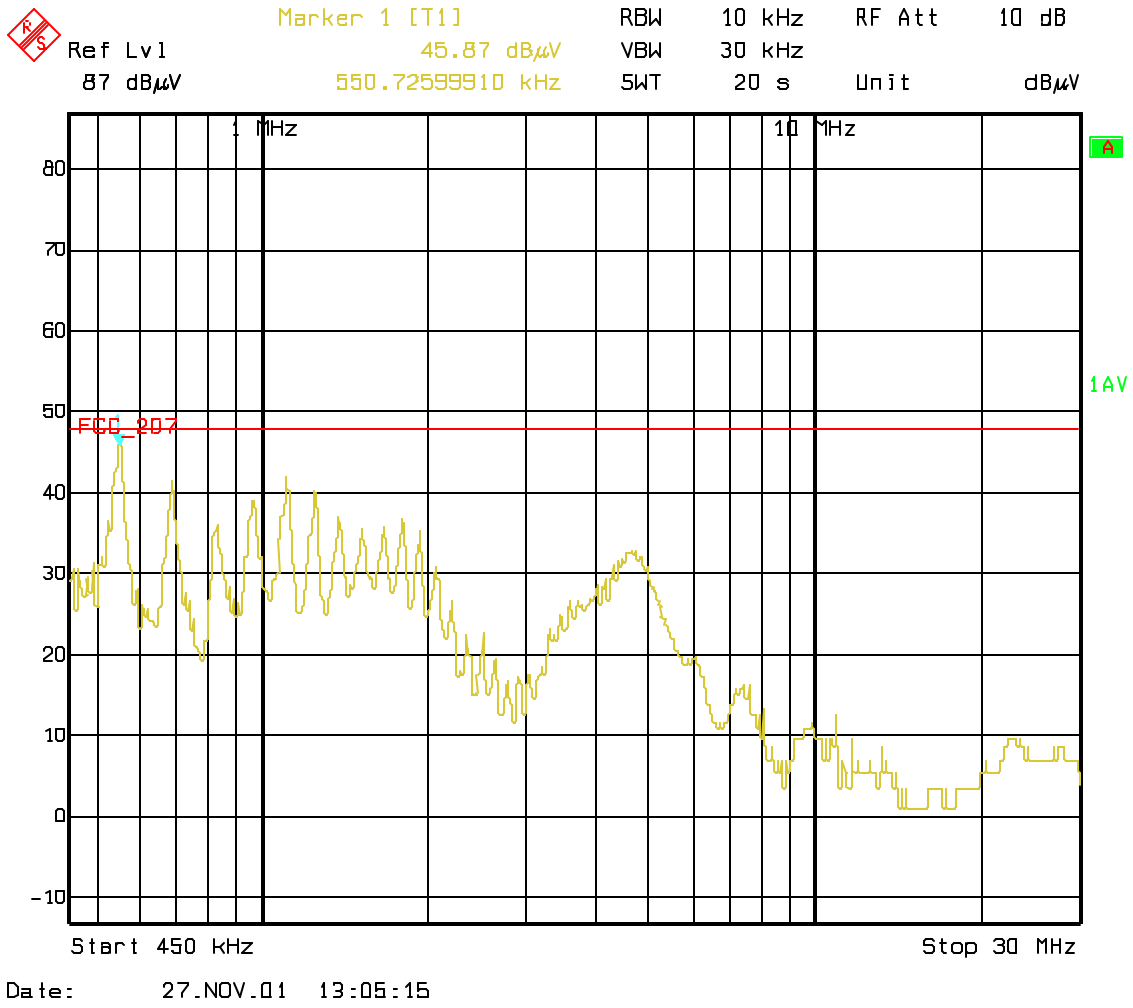
PROCESSING GAIN OF DSSS SYSTEMS SUBCLAUSE §15.247 (e)

(NOTE: The processing gain data is provided by Chip Set Manufacturer – see separate test report)

CONDUCTED EMISSIONS § 15.107/207

Measured with AC/DC power adapter plugged in LISN

Phase: Line

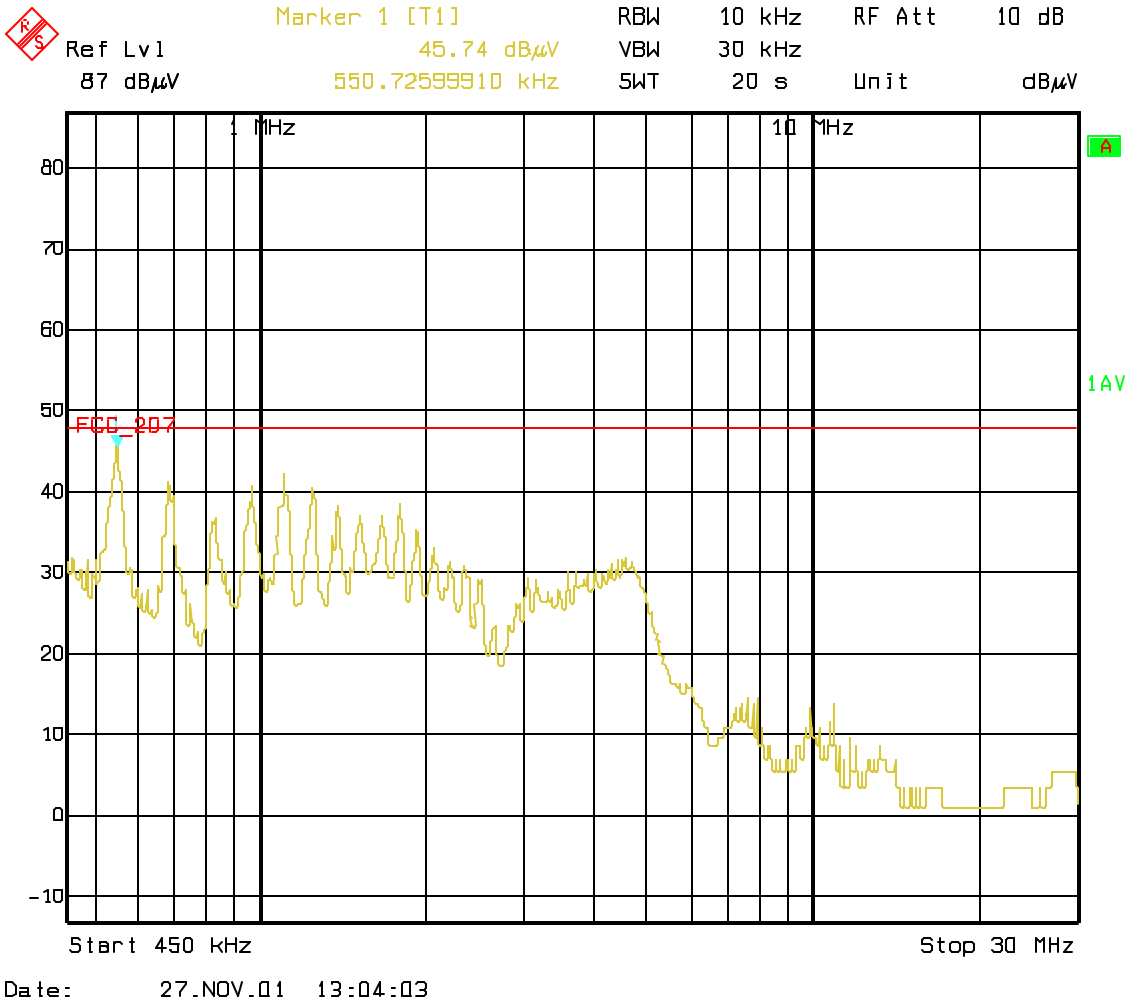


Technical specification : 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 µV / 47.96 dBµV

Phase: Neutral



Technical specification : 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 µV / 47.96 dBµV

RECEIVER SPURIOUS RADIATION **§ 15.209**

Limits

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

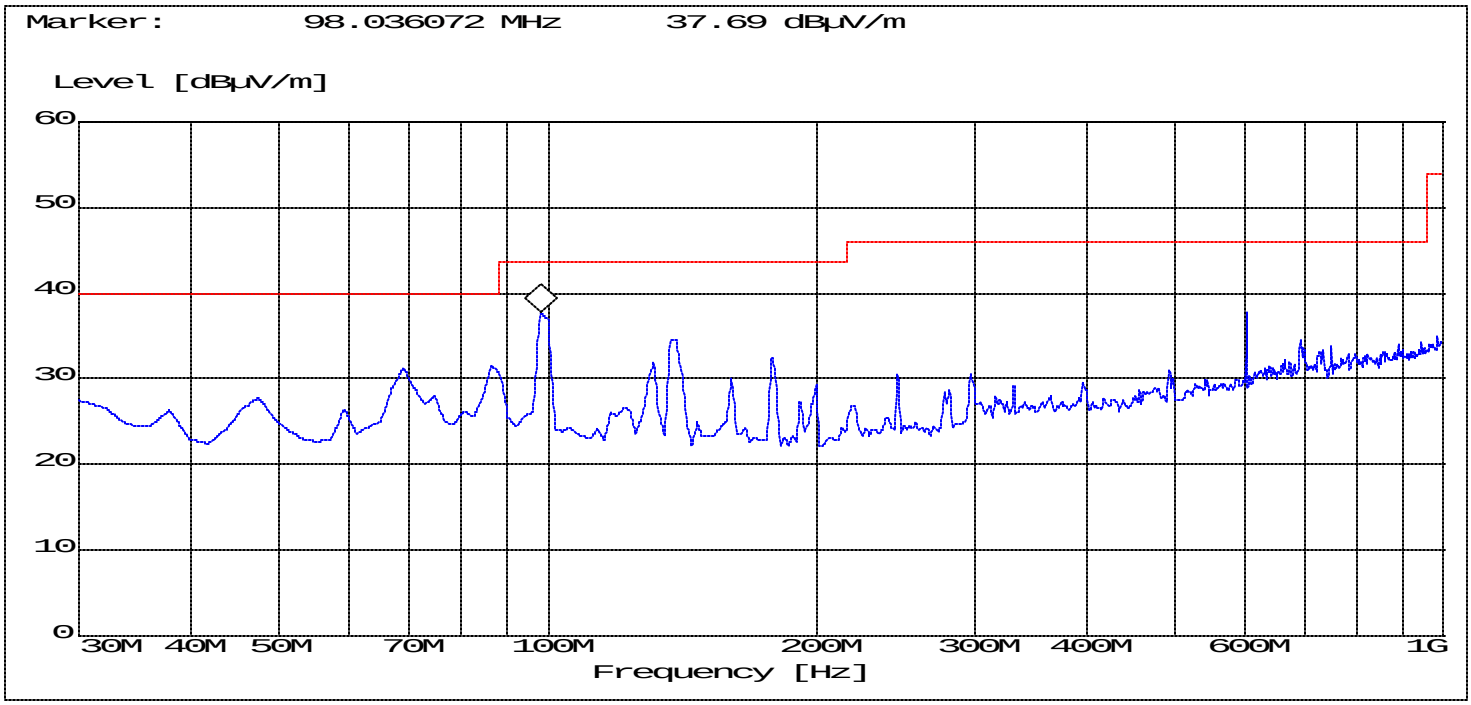
2. Measurements were done on low, mid & high channels, but plots depicting the worst case are submitted in the test report.

3. All emission measurements were done in Peak mode. In case limits are exceeded the measurements will be repeated and documented in the test report either with Quasi Peak or average detector depending on the frequency range specified in FCC 15 and/or DA00-705. Bandwidth, sweep time etc. were set according DA00-705 and recorded

4. Measurements were done on low , mid & high channels, but plots depicting the worst case are submitted in the test report.

RECEIVER SPURIOUS RADIATION **§ 15.209**

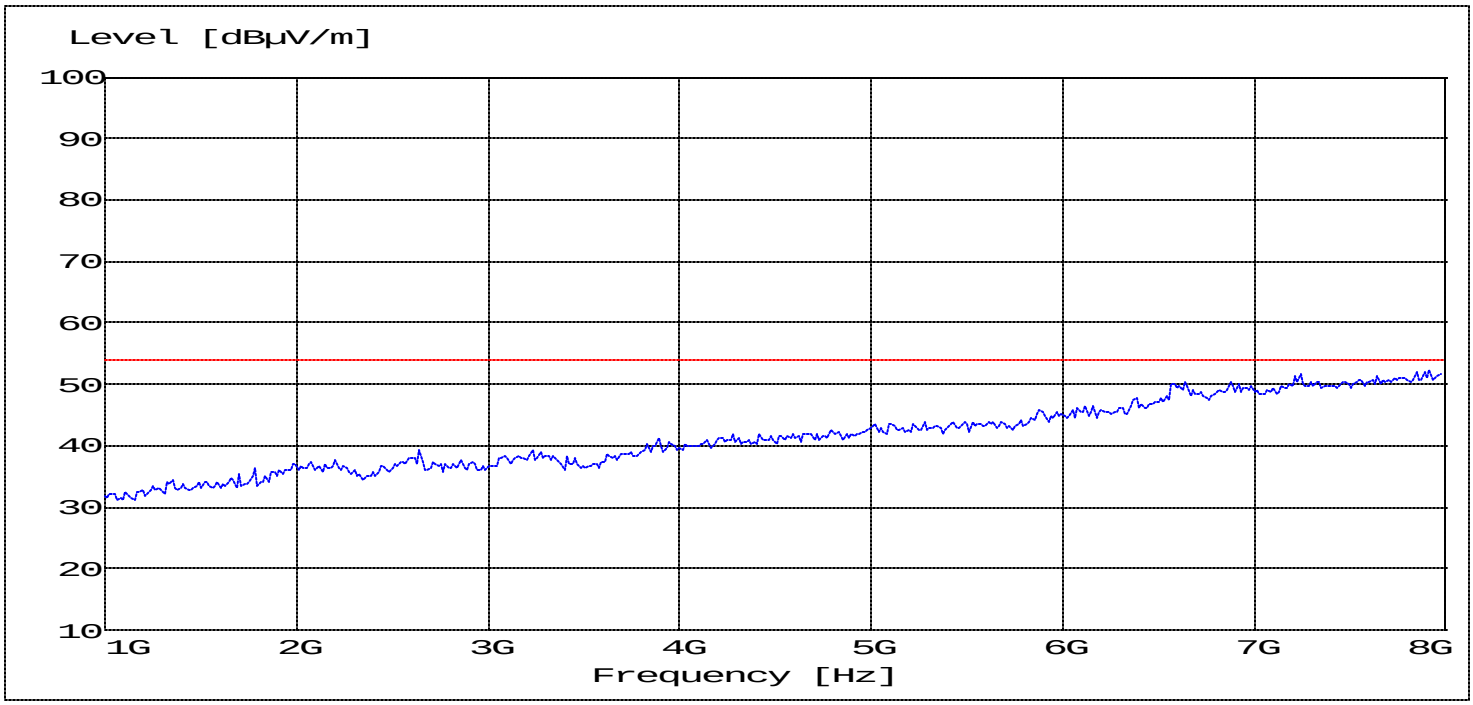
30MHz – 1GHz (This plot is valid for all three channels)



ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

RECEIVER SPURIOUS RADIATION **§ 15.209**

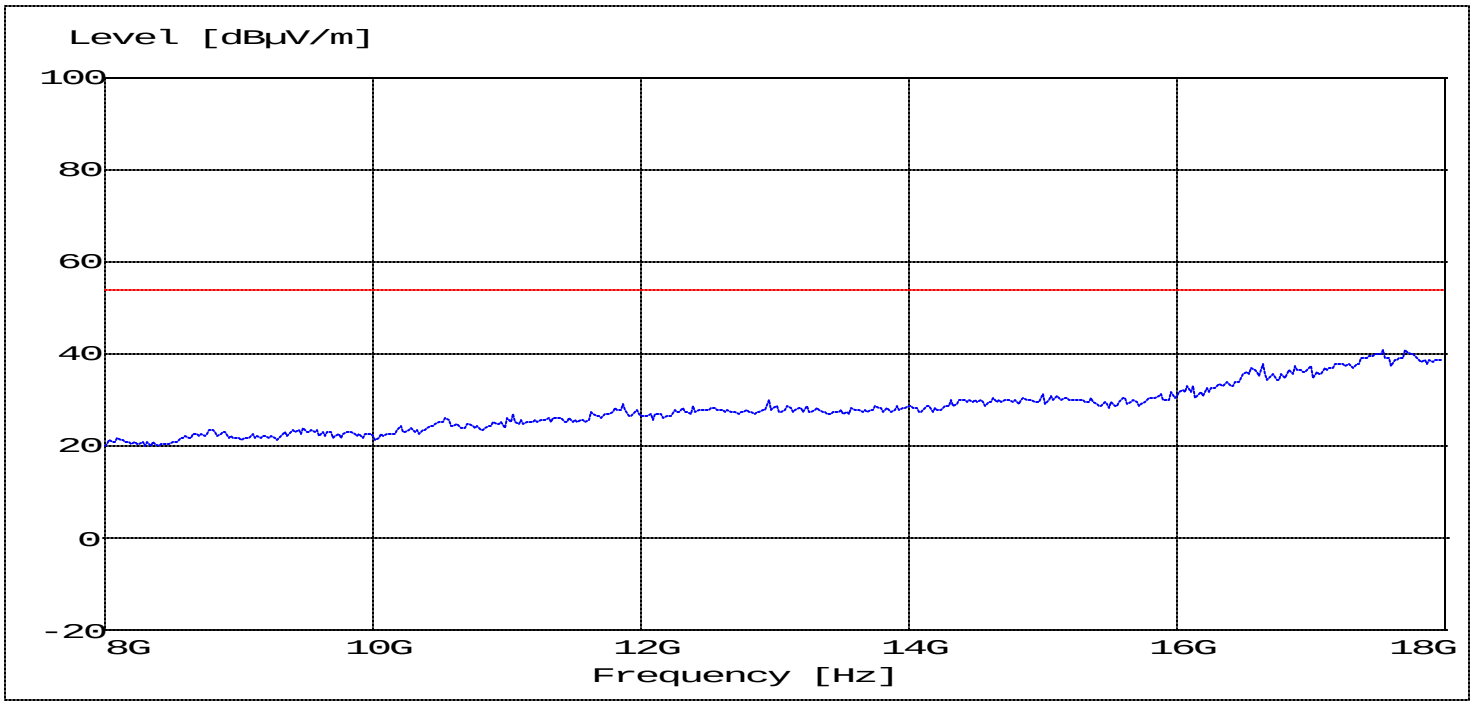
1GHz – 8GHz (This plot is valid for all three channels)



ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz **f ³ 1GHz : RBW/VBW: 1 MHz**

RECEIVER SPURIOUS RADIATION **§ 15.209**

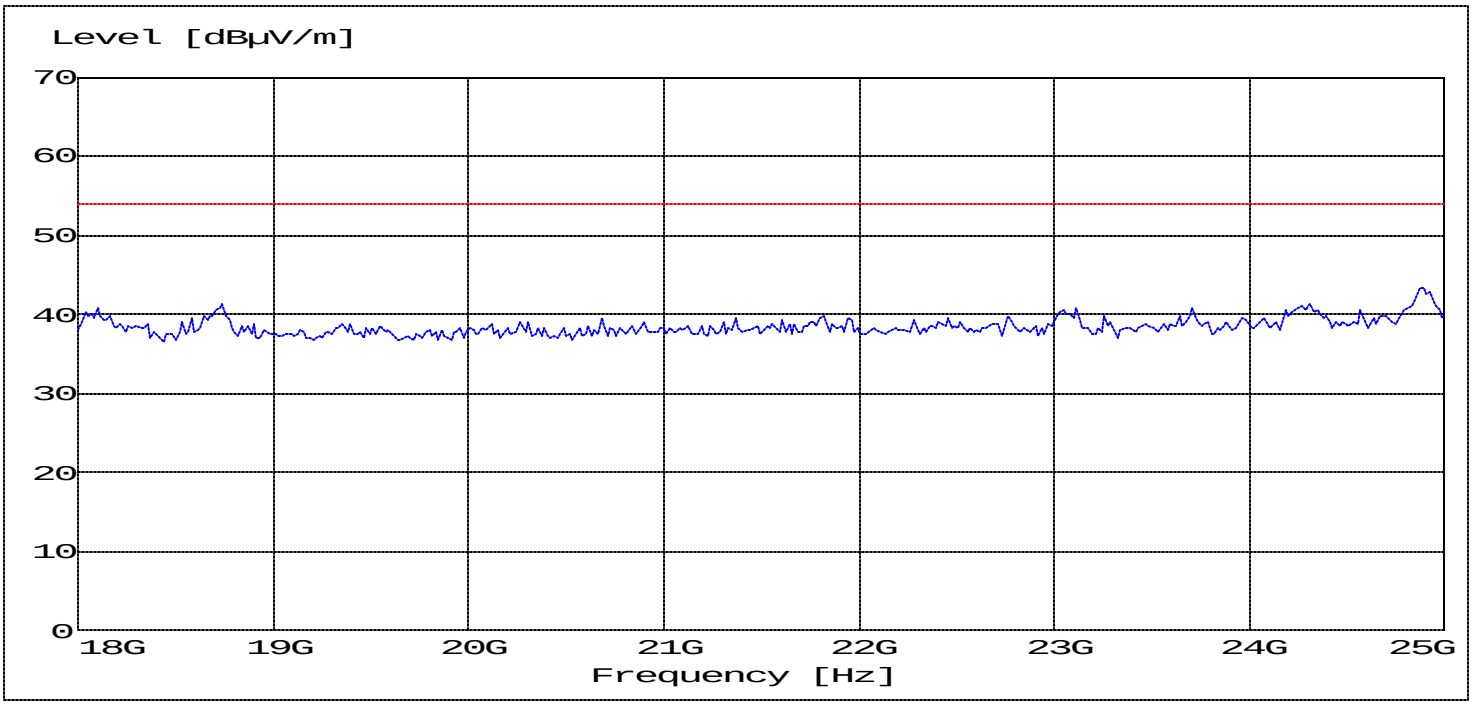
8GHz – 18GHz (This plot is valid for all three channels)



ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

RECEIVER SPURIOUS RADIATION **§ 15.209**

18GHz – 25GHz (This plot is valid for all three channels)



ANALYZER SETTINGS: f < 1 GHz : RBW/VBW: 100 kHz f ³ 1GHz : RBW/VBW: 1 MHz

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
02	Signal Generator	SMY0	Rohde & Schwarz	836878/011
03	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
04	Power Amlifier	250W1000	Amplifier Research	300031
05	Biconilog Antenna	3141	EMCO	0005-1186
06	Horn Antenna	SAS-200/571	AH Systems	325
07	Power Splitter	11667B	Hewlett Packard	645348
08	Climatic Chamber	VT4004	Votch	G1115
09	Pre-Amplifier	JS4-00102600	Miteq	00616
10	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
11	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30808