FCC/IC Test Report

FOR:

Manufacturer: SmartSynch Inc.
Model Name: SSI I210 1x
FCC ID: QHC-SSI2101X
IC ID: 4393B-SSI2101X

47 CFR Part 15.247 for DSSS Systems

IC RSS-210 Issue 7

TEST REPORT #: EMC_SMAR1_023_10001 _15.247
DATE: 2010-06-17

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 2135.01

Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Test Lab
LAB CODE 20020328-00

FCC listed
A2LA Accredited

IC recognized # 3462B

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

TABLE OF CONTENTS

1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS 210 Issue 7.

Company	Description	Model #
SmartSynch Inc.	**Wireless Utility Meter with CDMA & ZiGBEE radios.**	**SSI I210 1x**

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2010-06-17	Compliance	Marc Douat (Test Lab Manager)	

Responsible for the Report:

Date	Section	Name	Signature
2010-06-17	Compliance	Josie Sabado (Project Engineer)	Josie Sabado I am the author of this document

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Heiko Strehlow
Responsible Project Leader:	Josie Sabado

2.2 Identification of the Client

Applicant's Name:	SmartSynch Inc.
Street Address:	4400 Old Canton Road, Suite 300
City/Zip Code	Jackson, MS 39211
Country	USA
Contact Person:	Mike Mathis
Phone No.	601-362-1780 ext 1018
Fax:	601-362-1787
e-mail:	mmathis@smartsynch.com

2.3 Identification of the Manufacturer

Same as above client.

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	SSI I210 1x
Model No:	SSI I210 1x
Product Type:	Fixed
Hardware Revision :	55M-000600006
Software Revision :	660-040100-P01
FCC-ID:	QHC-SSI2101X
IC-ID :	4393B-SSI2101X
Frequency:	802.15.4: 2400-2483.5 MHz
Type(s) of Modulation:	OQPSK
Number of channels:	15
Antenna Type:	Integral, 0.75 dBi gain
Equipment Classification:	■Fixed ☐Vehicular ☐Portable ☐Module
Power Supply:	240VAC

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Comment
1	N/A	55M-000600006	660-040100-P01	Radiated Unit
2	N/A	55M-000600006	660-040100-P01	Conducted Unit

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Serial Number	Comment
1	Power Transformer	Acme	N/A	N/A	Converts 120VAC to 240VAC

4 Subject Of Investigation

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS-210 Issue 7.

This test report is to support a request for new equipment authorization under the FCC ID **QHC-SSI2101X** and IC ID **4393B-SSI2101X.**
All testing was performed on the product referred to in Section 3 as EUT. This test report contains full radiated and conducted testing results as per FCC15.247.

During the testing process the EUT was tested on low, mid and high channels for all the supported modes of operation. For radiated measurements, all data in this report shows the worst case between horizontal and vertical polarization measurements.

5 Measurements

5.1 Radiated Measurement Procedure

ANSI C63.4 Section 8.3.1.1: Exploratory radiated emission measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a closer distance than that specified for compliance to determine the emission characteristics of the EUT. At near distances, for EUTs of comparably small size, it is relatively easy to determine the spectrum signature of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. A shielded room may be used for exploratory testing, but may have anomalies that can lead to significant errors in amplitude measurements.

Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of testing. It is recommended that either a headset or loudspeaker be connected as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT when the exploratory and final testing is performed in an OATS with strong ambient signals. Caution should be taken if either antenna height between 1 and 4 meters or EUT azimuth is not fully explored. Not fully exploring these parameters during exploratory testing may require complete testing at the OATS or semi-anechoic chamber when the final full spectrum testing is conducted.

The EUT should be set up in its typical configuration and arrangement, and operated in its various modes. For tabletop systems, cables or wires should be manipulated within the range of likely arrangements. For floor-standing equipment, the cables or wires should be located in the same manner as the user would install them and no further manipulation is made. For combination EUTs, the tabletop and floor-standing portions of the EUT shall follow the procedures for their respective setups and cable manipulation. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions.

For each mode of operation required to be tested, the frequency spectrum shall be monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit. A step-by-step technique for determining this emission can be found in Annex C.

When measuring emissions above 1 GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1 GHz. If the EUT is a device with dimensions approximately equal to that of the measurement antenna beamwidth, the measurement antenna shall be aligned with the EUT.

ANSI C63.4 Section 8.3.1.2: Final radiated emission measurements

Based on the measurement results in 8.3.1.1, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement. The final measurement is then performed on a site meeting the requirements of 5.3, 5.4, or 5.5 as appropriate without variation of the EUT arrangement or EUT mode of operation. If the EUT is relocated from an exploratory test site to a final test site, the highest emission shall be remaximized at the final test location before final radiated emissions measurements are performed. However, antenna height and polarity and EUT azimuth are to be varied. In addition, the full frequency spectrum (for the range to be checked for meeting compliance) shall be investigated.

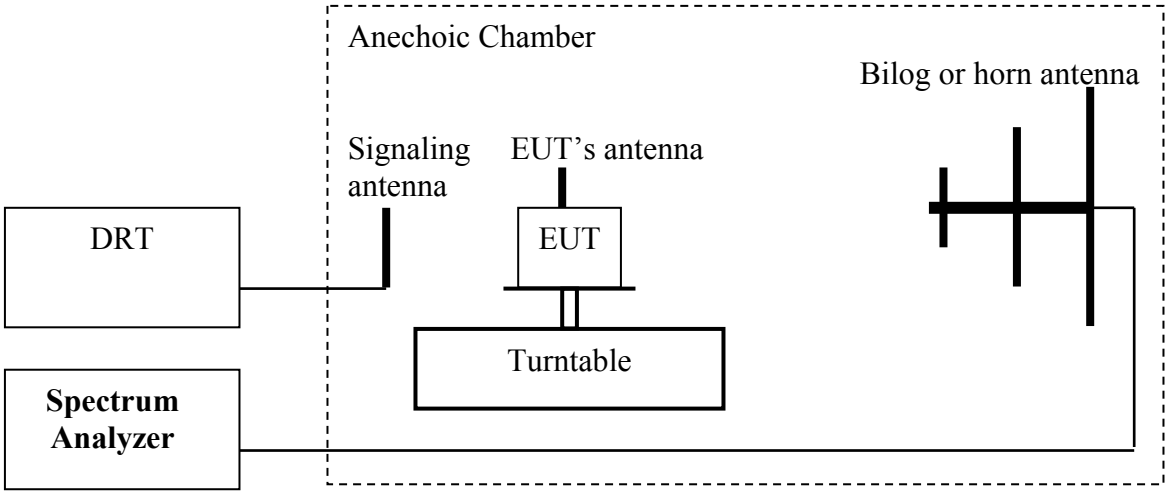
This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. During the full frequency spectrum investigation, particular focus should be made on those frequencies found in exploratory testing that were used to find the final test configuration, mode of operation, and arrangement (associated with achieving the least margin with respect to the limit). This full spectrum test constitutes the compliance measurement.

For measurements above 1 GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response. The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of measurements. Data collected shall satisfy the report requirements of Clause 10.

NOTES

1— Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
2—Use of waveguide and flexible waveguide may be necessary at frequencies above 10 GHz to achieve usable signal-to noise ratios at required measurement distances. If so, it may be necessary to restrict the height search of the antenna, and special care should be taken to ensure that maximum emissions are correctly measured.
3—All presently known devices causing emissions above 10 GHz are physically small compared with the beam-widths of typical horn antennas used for EMC measurements. For such EUTs and frequencies, it may be preferable to vary the height and polarization of the EUT instead of the receiving antenna to maximize the measured emissions.

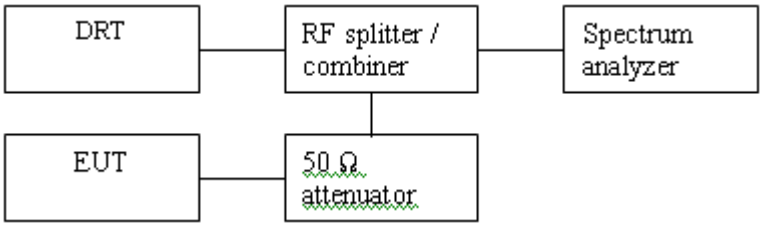
Ref: TIA-603C 2004 -2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a vertical orientation.
2. Adjust the settings of the Digital RadioCommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the ERP using the following equation:
   ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channels.

Spectrum analyzer settings: RBW=VBW=3MHz

5.2 Conducted Measurement Procedure



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital RadioCommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Measurements are to be performed with the EUT set to the low, middle and high channels.

5.3 Maximum Peak Output Power §15.247 (b)(3)

5.3.1 Limits: §15.247 (b)(1)

Nominal Peak Output Power < 30 dBm (1W)
EIRP < 36dBm

5.3.2 Test Conditions:

Tnom: 21.6°C; Vnom: 120 VAC

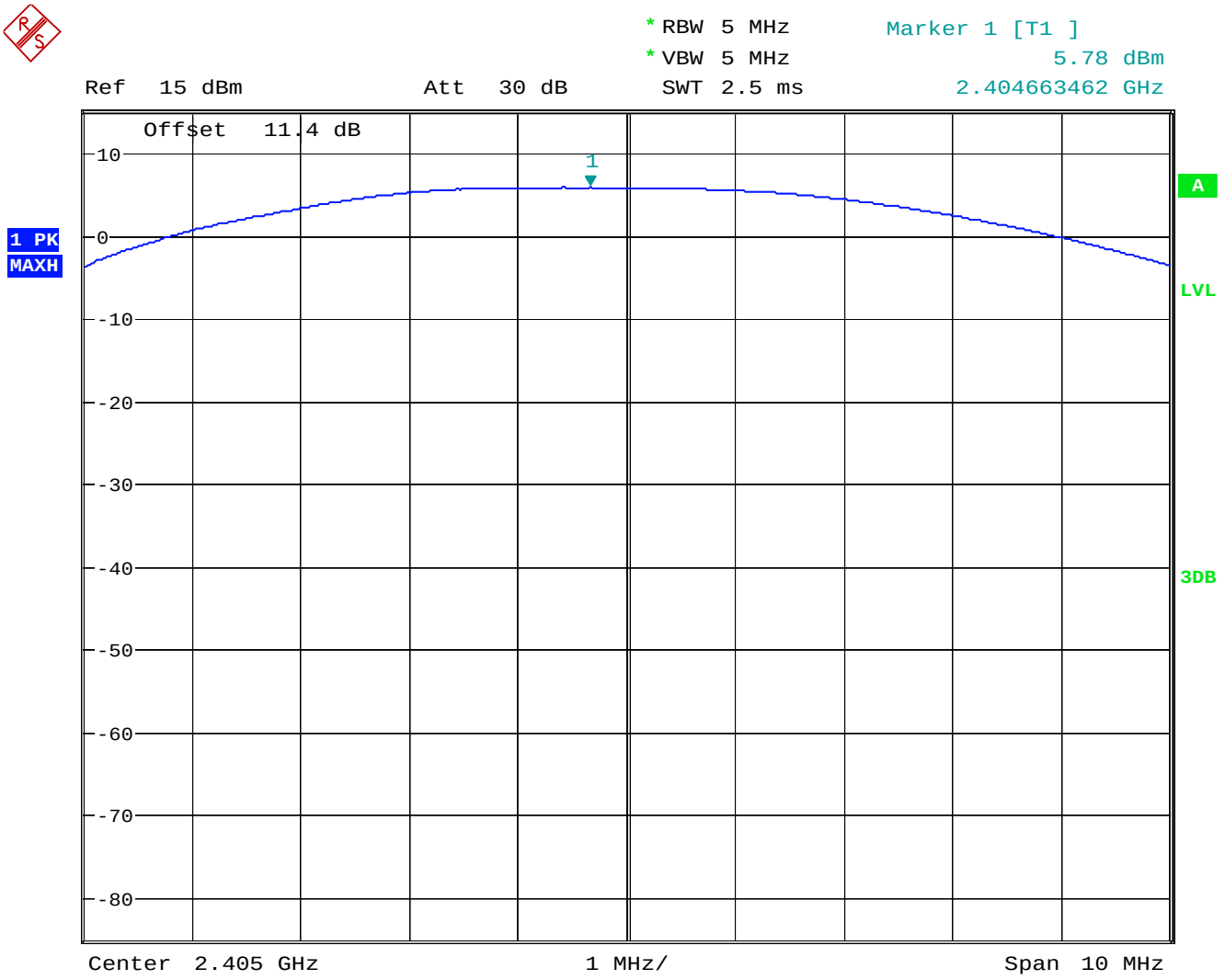
5.3.3 Test Result:

Max Peak Output Power- Radiated (dBm)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4	6.603	11.686	4.404
Measurement Uncertainty: ±3dB			

Max Peak Output Power- Conducted (dBm)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4	5.78	11.90	2.75
Measurement Uncertainty: ±0.5dB			

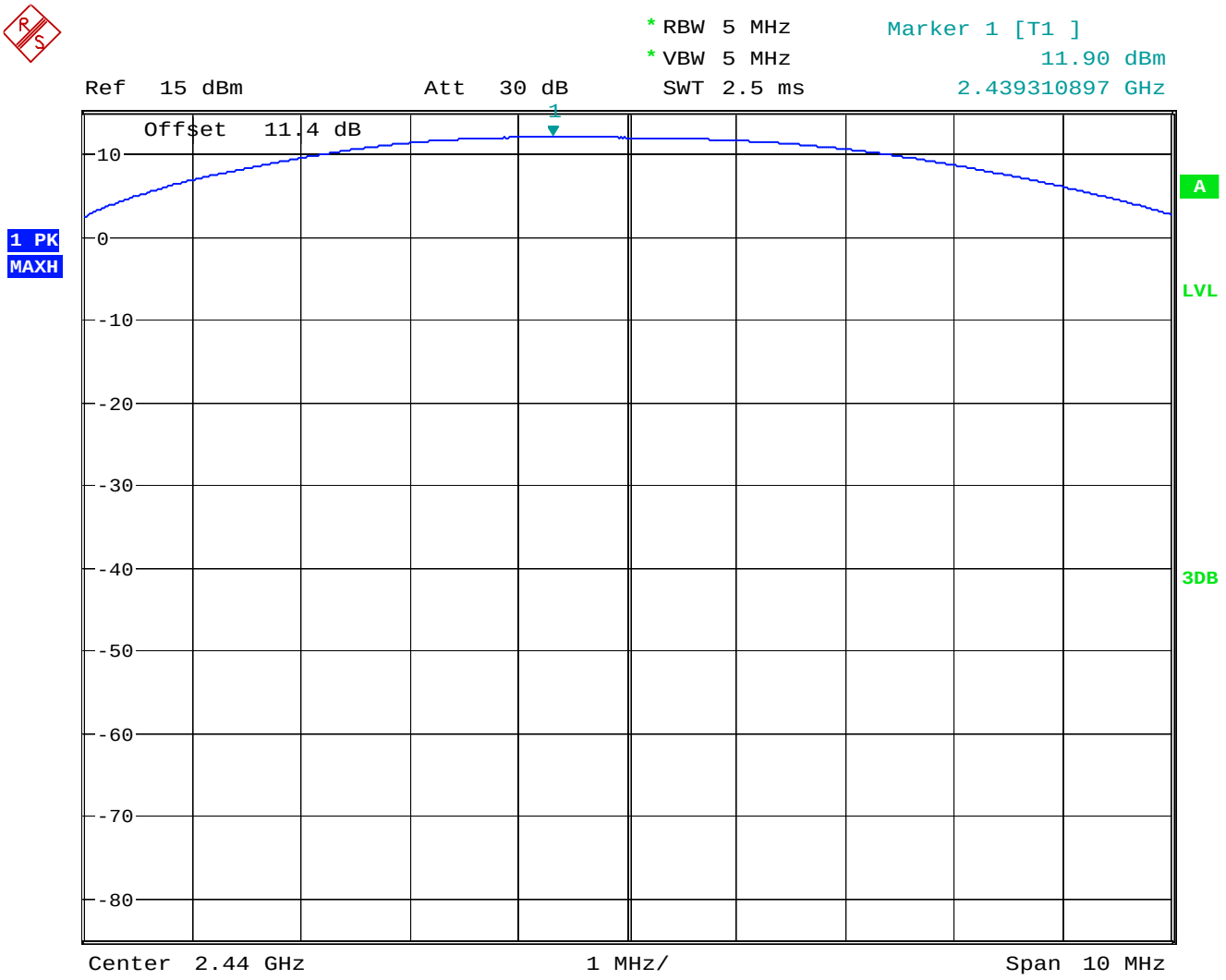
5.3.4 Test Data/plots:

Conducted Peak Power 2405MHz



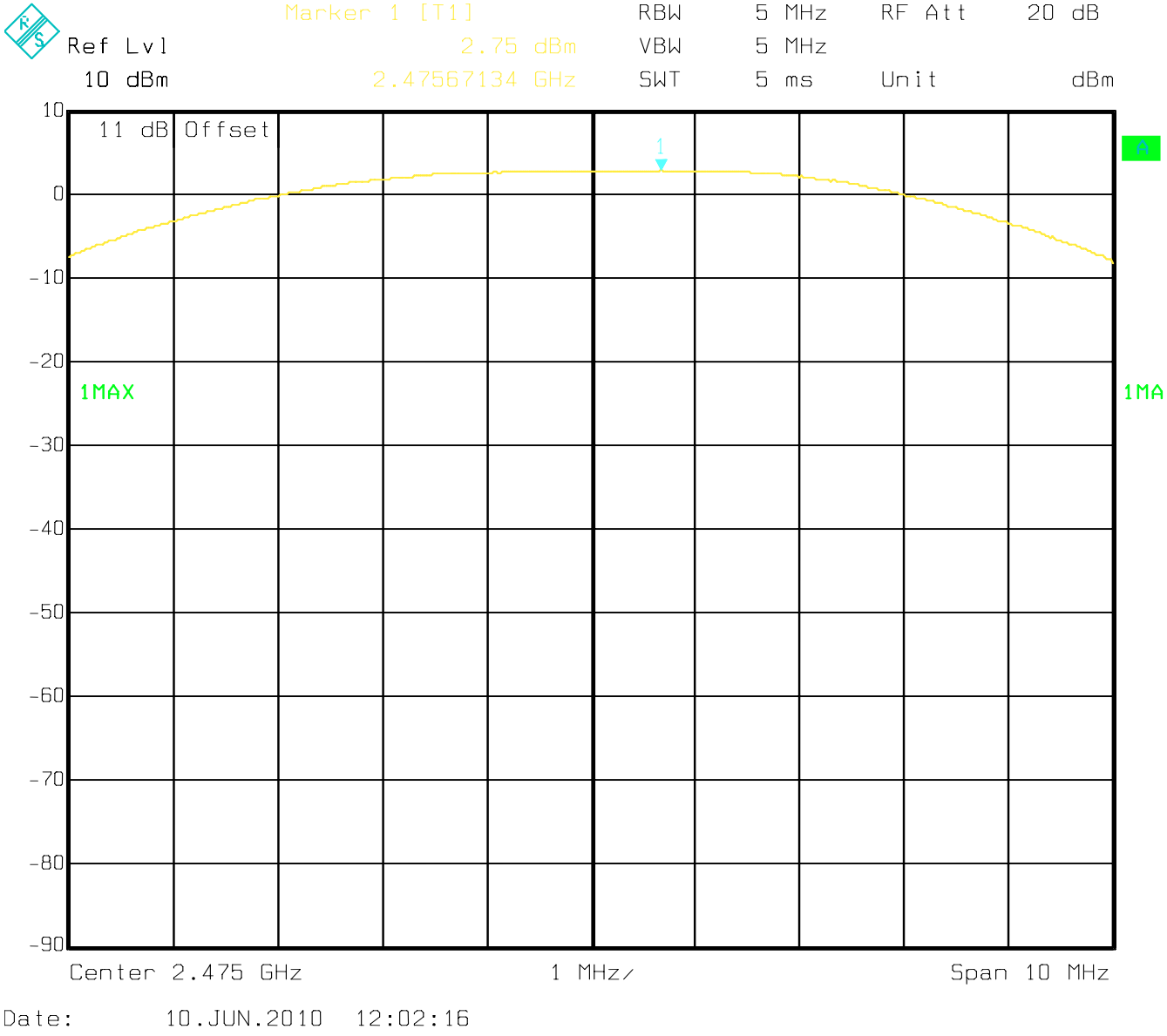
Date: 1.JUN.2010 13:27:20

Conducted Peak Power 2440MHz



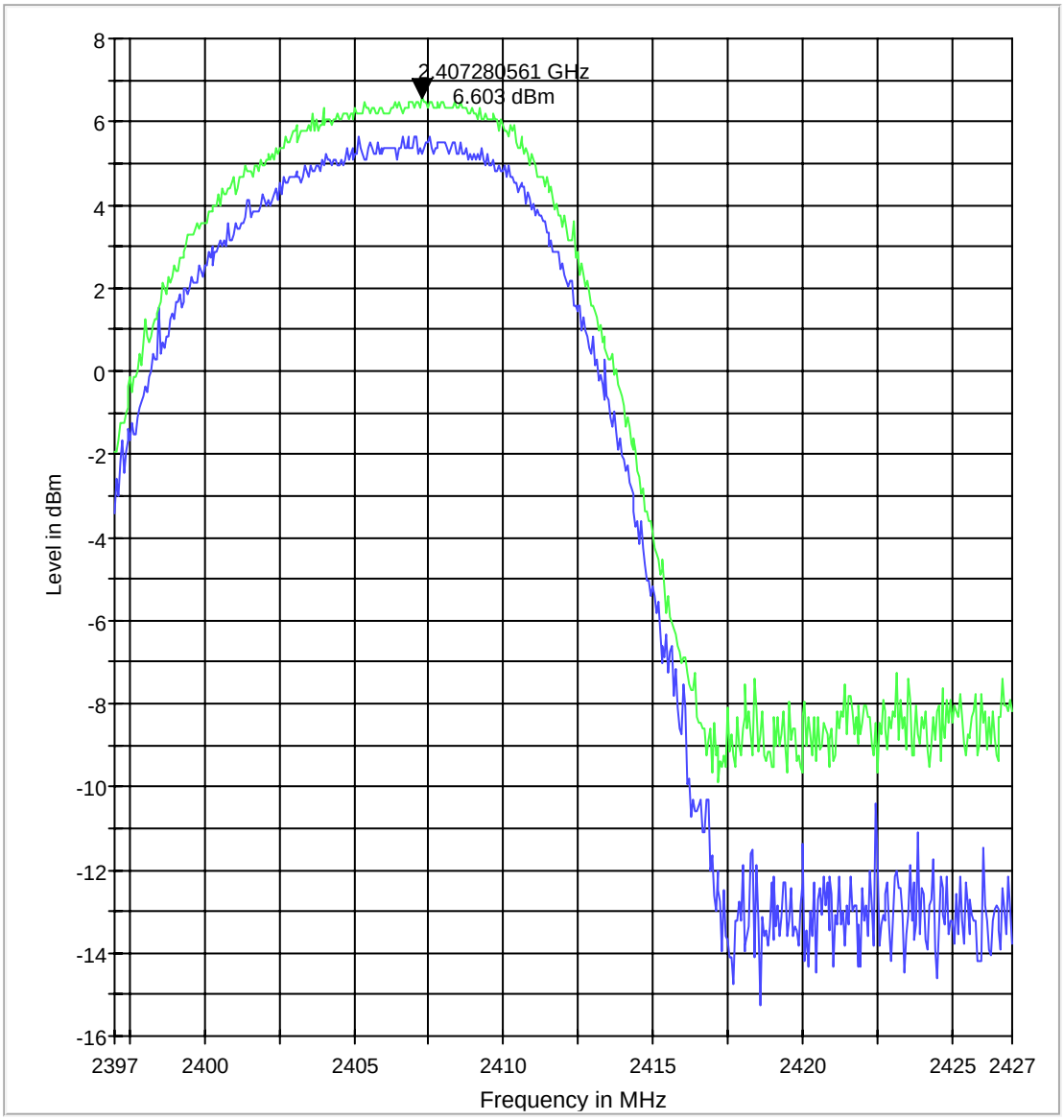
Date: 1.JUN.2010 11:45:56

Conducted Peak Power 2475MHz



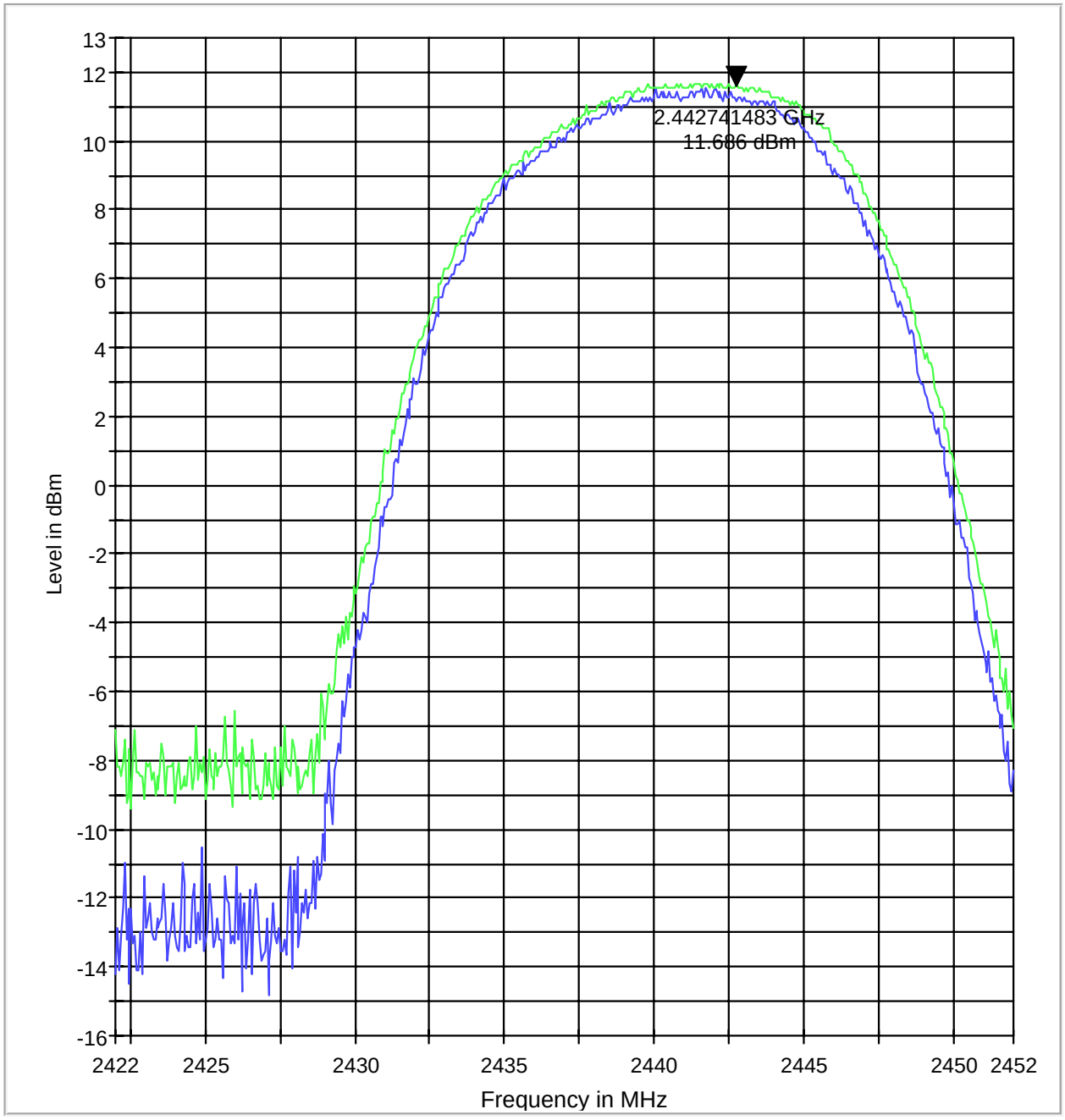
Radiated Peak Power 2405MHz

EIRP 2412 20MHz



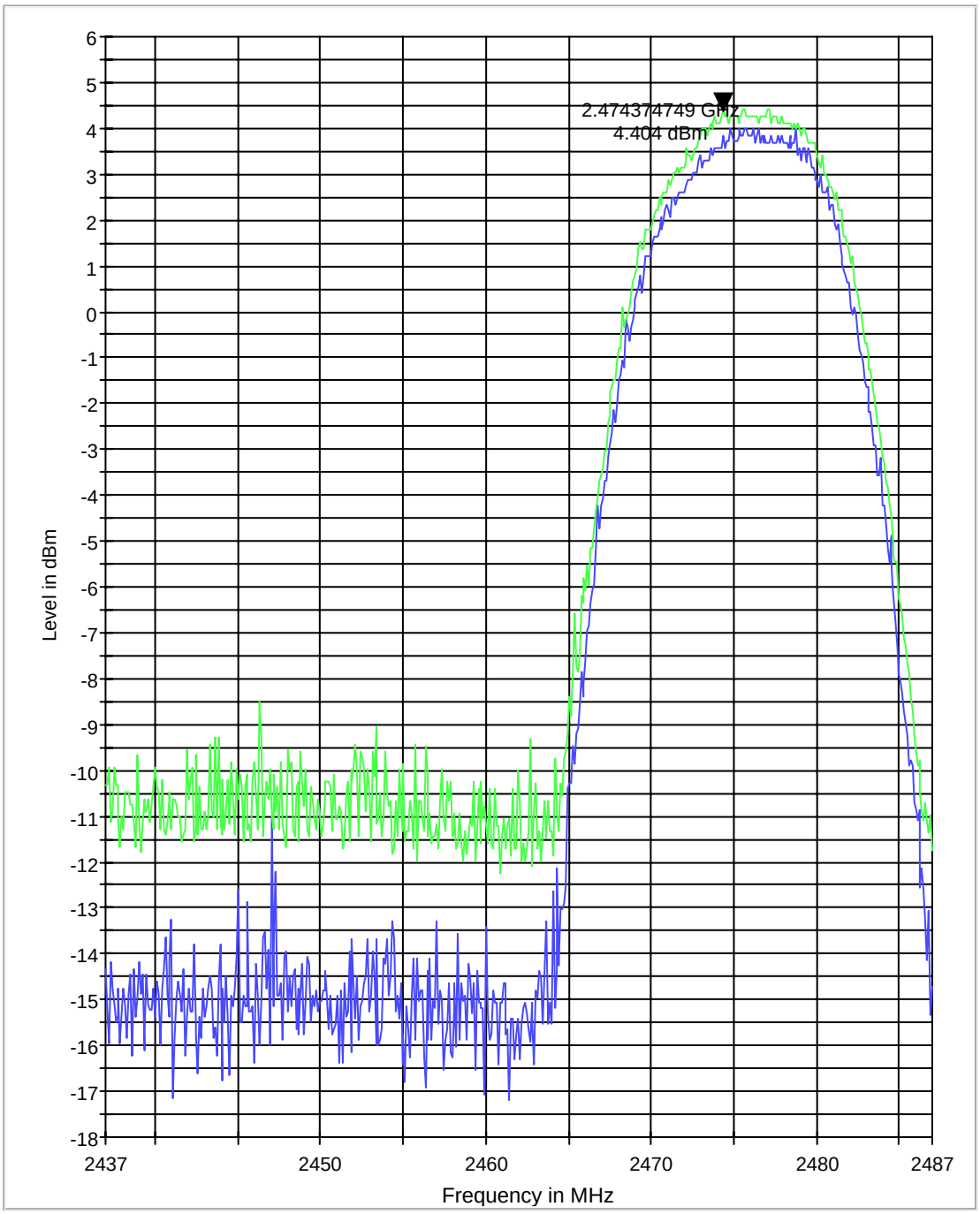
Radiated Peak Power 2440MHz

EIRP 2437 20MHz



Radiated Peak Power 2475MHz

EIRP 2462 40MHz



5.4 Restricted Band Edge Compliance

5.4.1 Limits: §15.247/15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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)).

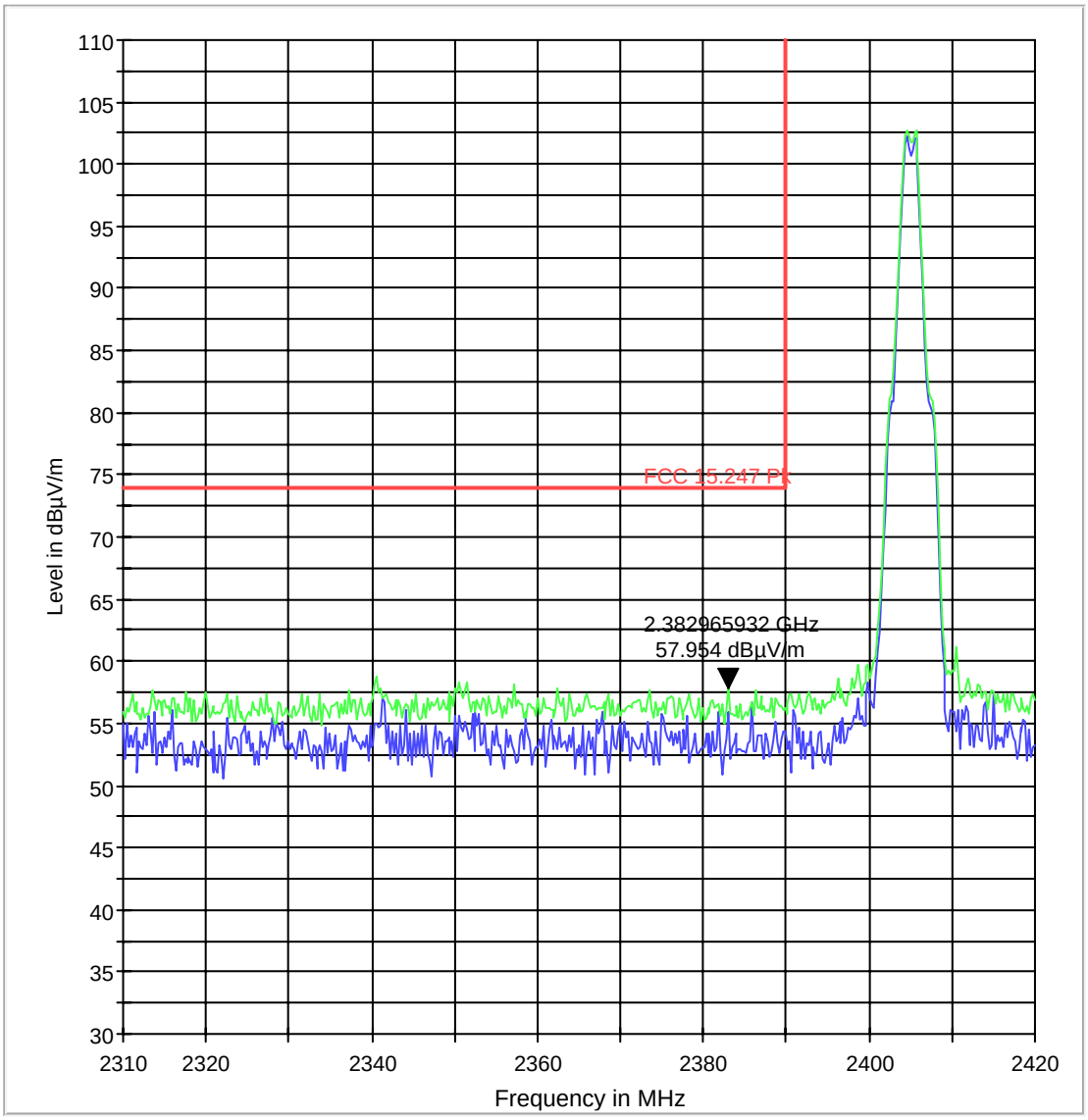
*PEAK LIMIT= 74dBµV/m
*AVG. LIMIT= 54dBµV/m

5.4.2 Test Conditions:

Average measurements: RBW=1MHz, VBW=10Hz
Peak measurements: RBW=VBW=1MHz

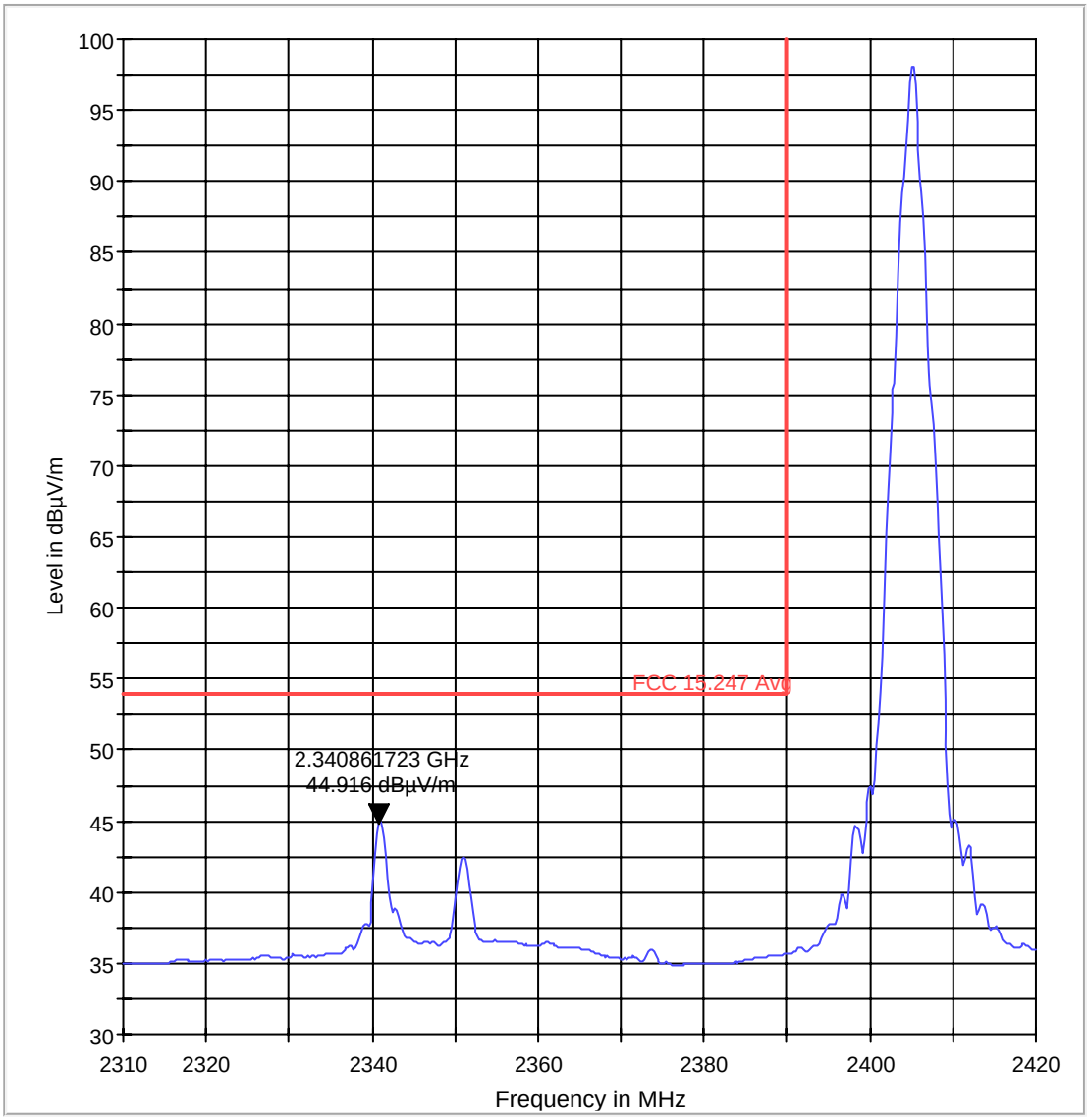
5.4.3 Test Data/plots:

Lower band edge peak



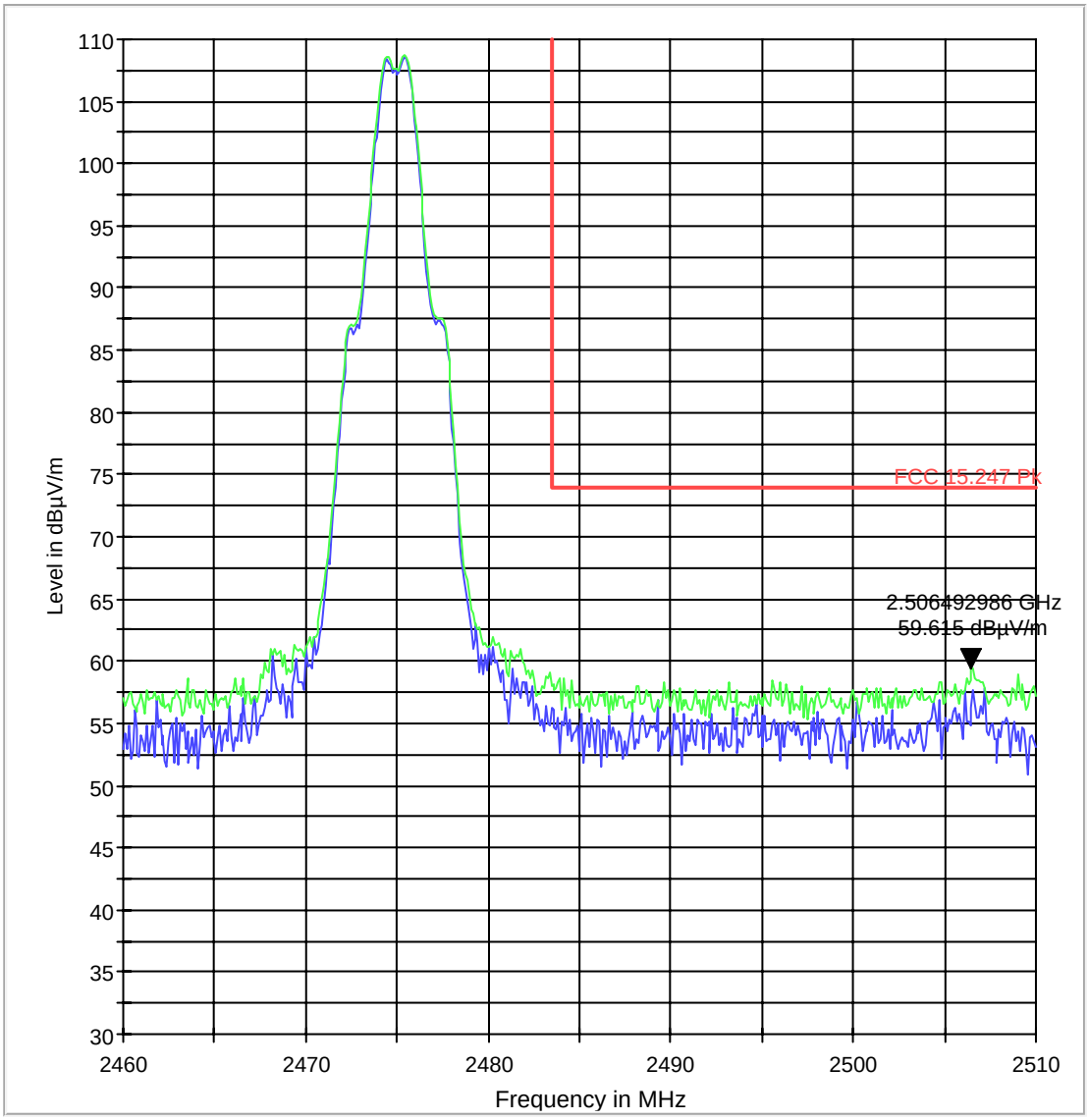
Lower band edge average

FCC 15.247 LBE Avg 3m



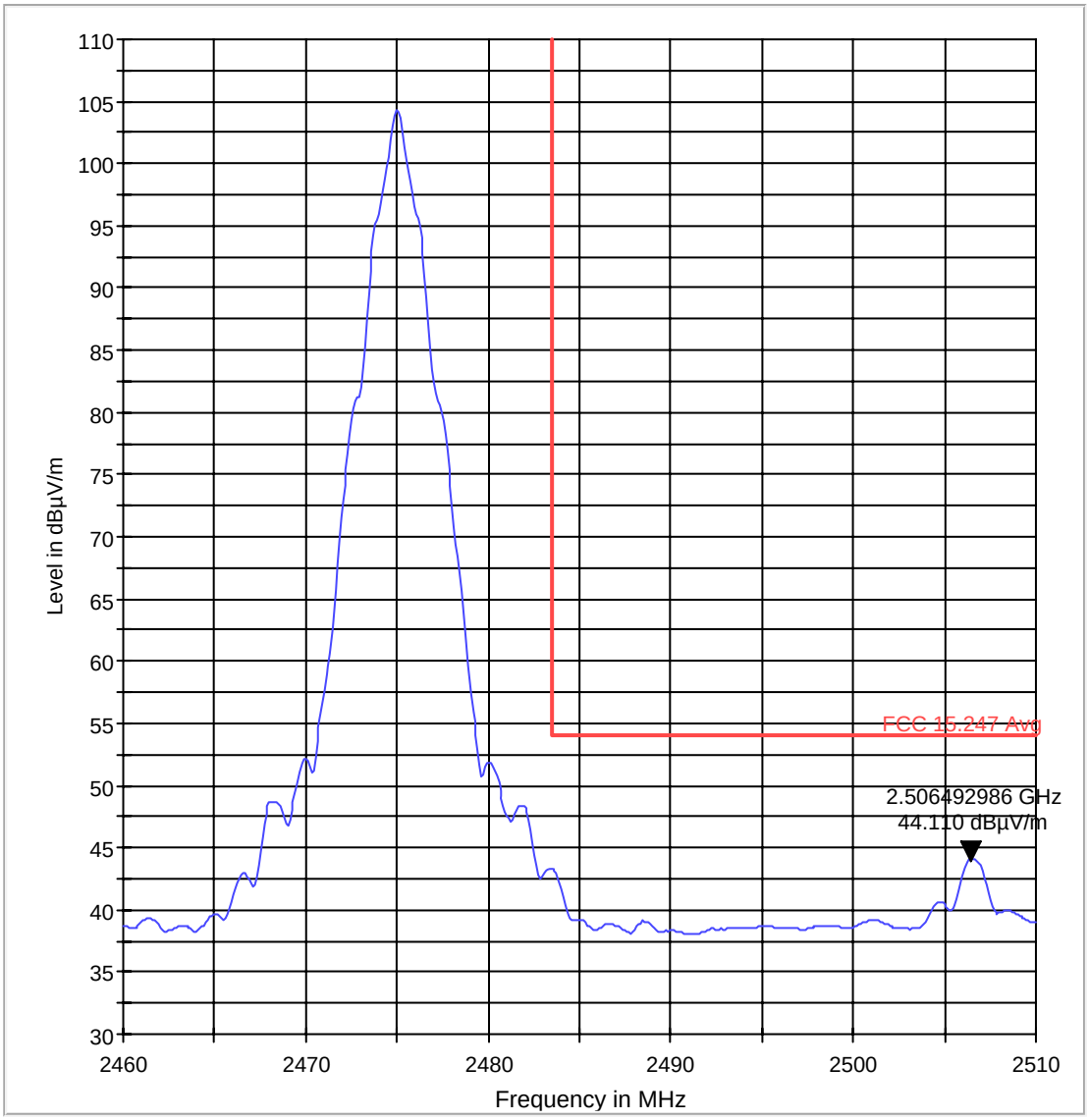
Higher band edge peak

FCC 15.247 HBE Pk 3m



Higher band edge average

FCC 15.247 HBE Avg 3m



5.5 Spectrum Bandwidth/ 20dB Bandwidth § 15.247 (a)(2)

5.5.1 Limits: § 15.247 (a)(1)

Spectrum Bandwidth > 500 kHz

5.5.2 Test Result:

Occupied Bandwidth (MHz)						
Mode	**Frequency (MHz)**					
	2405 Channel 11		**2440 Channel 18**		**2475 Channel 25**	
	6dB	**20dB/ 99%**	**6dB**	**20dB/ 99%**	**6dB**	**20dB/ 99%**
802.15.4	1.619	2.788	1.651	2.772	1.643	2.786
Measurement Uncertainty: ±100 kHz						

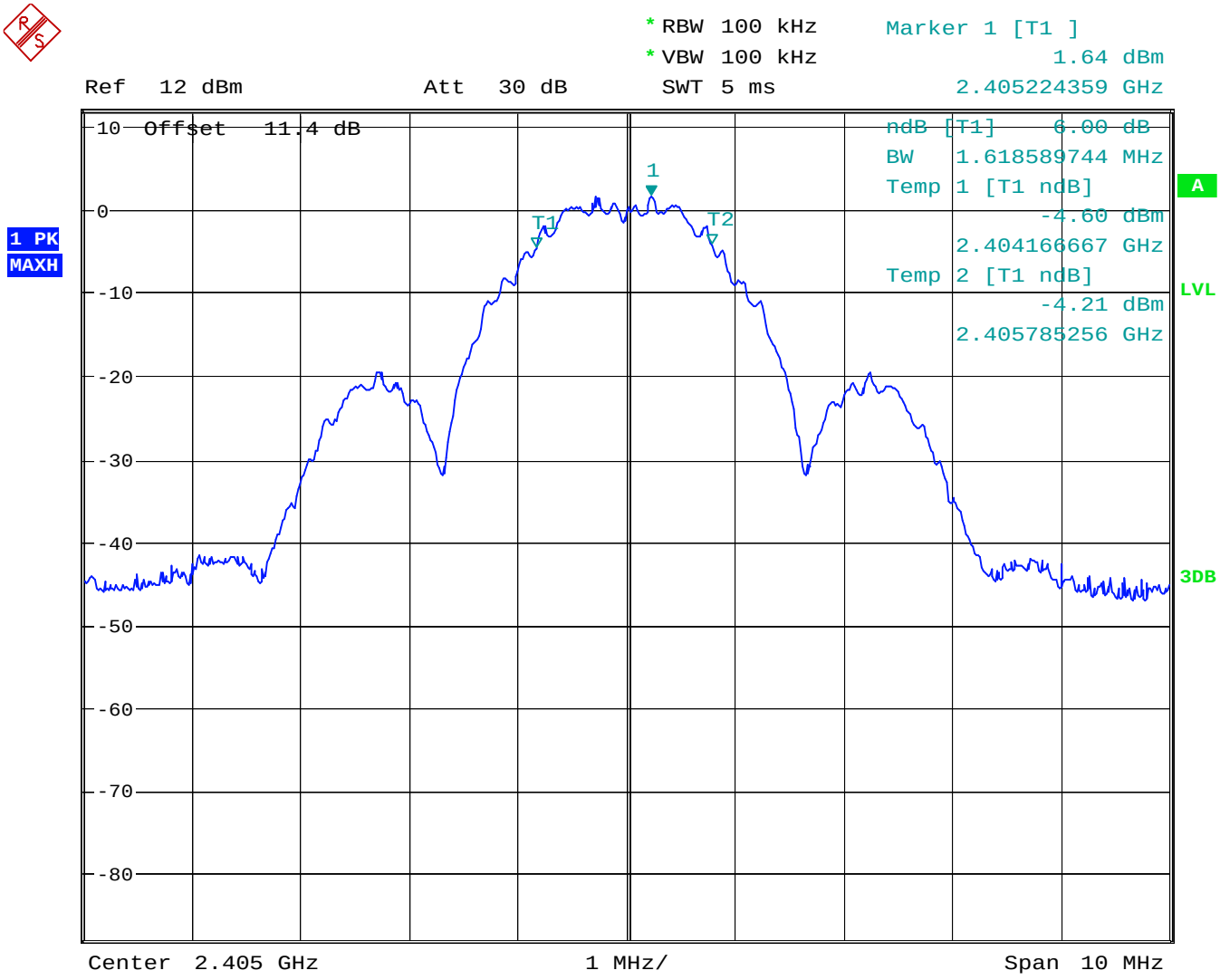
Spectrum Analyzer Settings:

6dB Bandwidth: RBW=VBW=100 kHz

99% Bandwidth: RBW=50kHz, VBW=200kHz

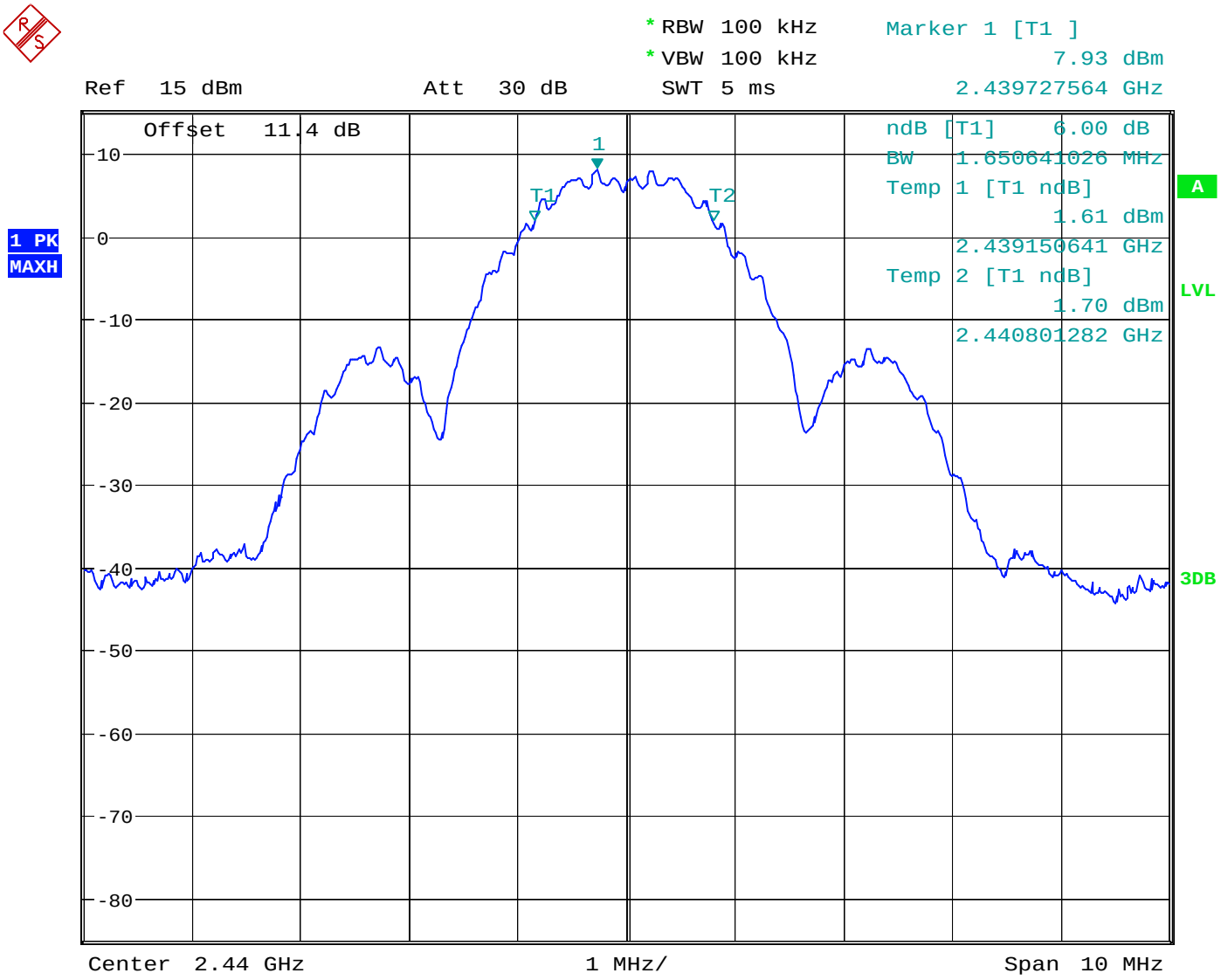
5.5.3 Test Data/plots:

6dB Bandwidth 2405MHz



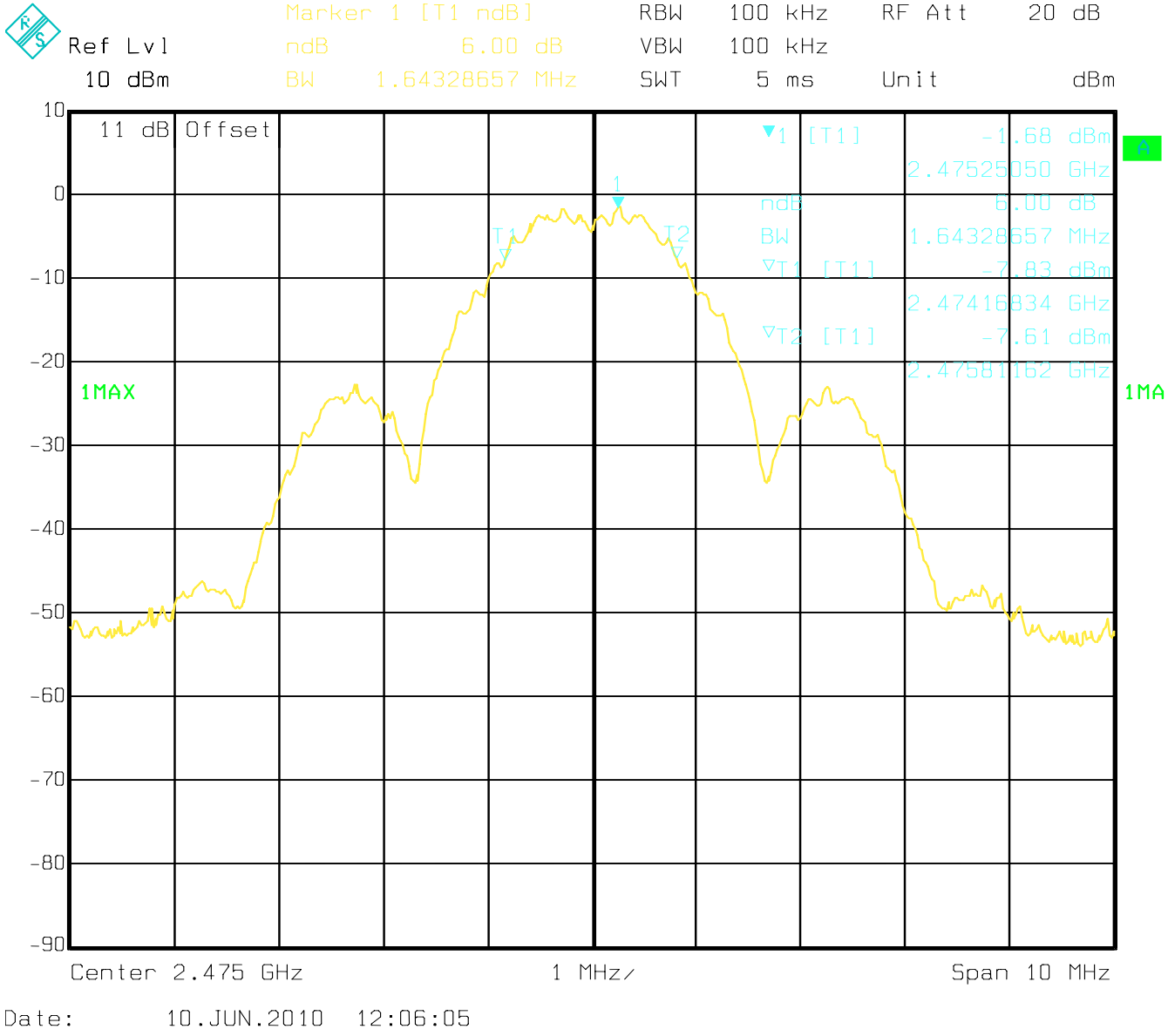
Date: 28.MAY.2010 13:02:40

6dB Bandwidth 2440 MHz

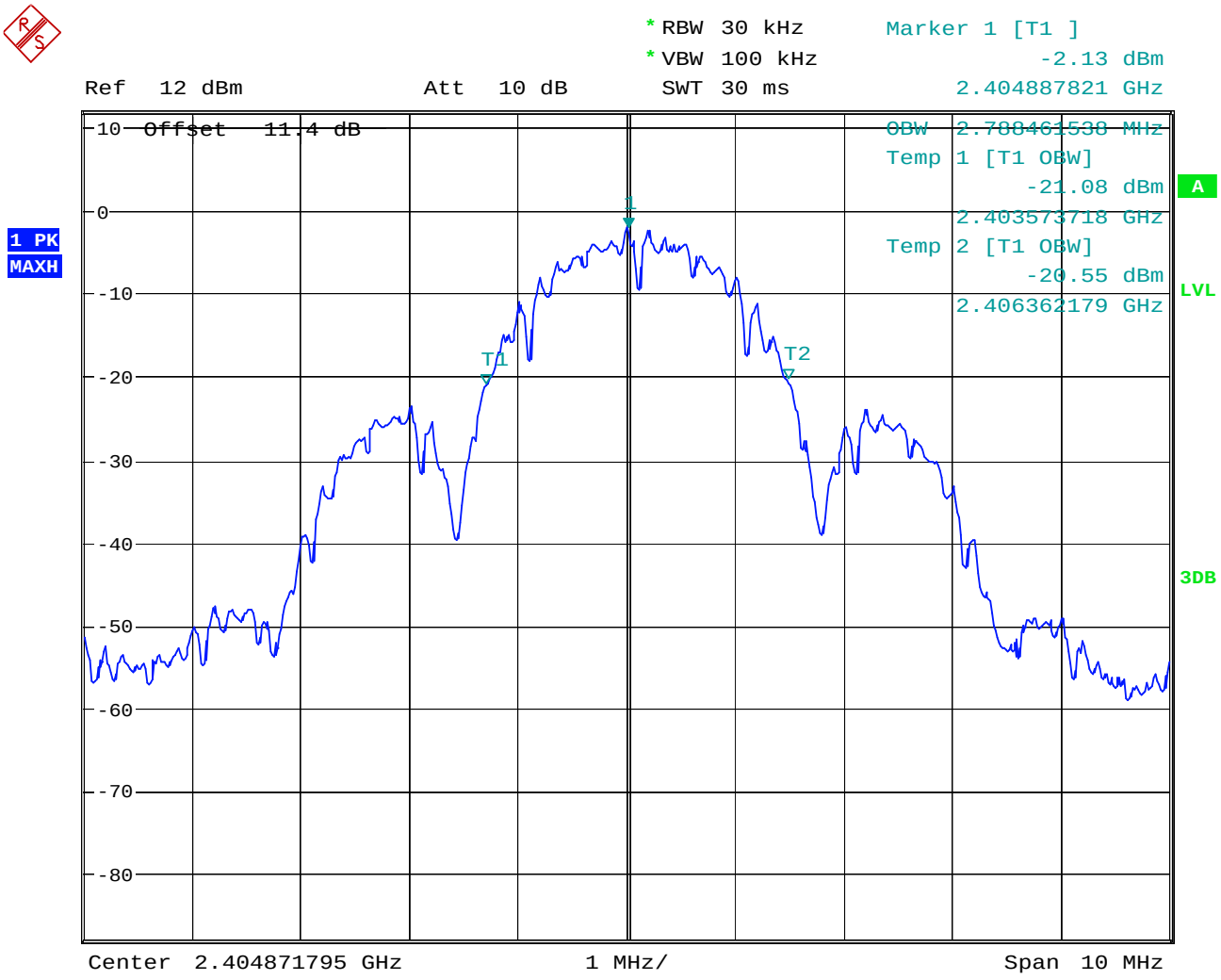


Date: 1.JUN.2010 11:41:49

6dB Bandwidth 2475 MHz

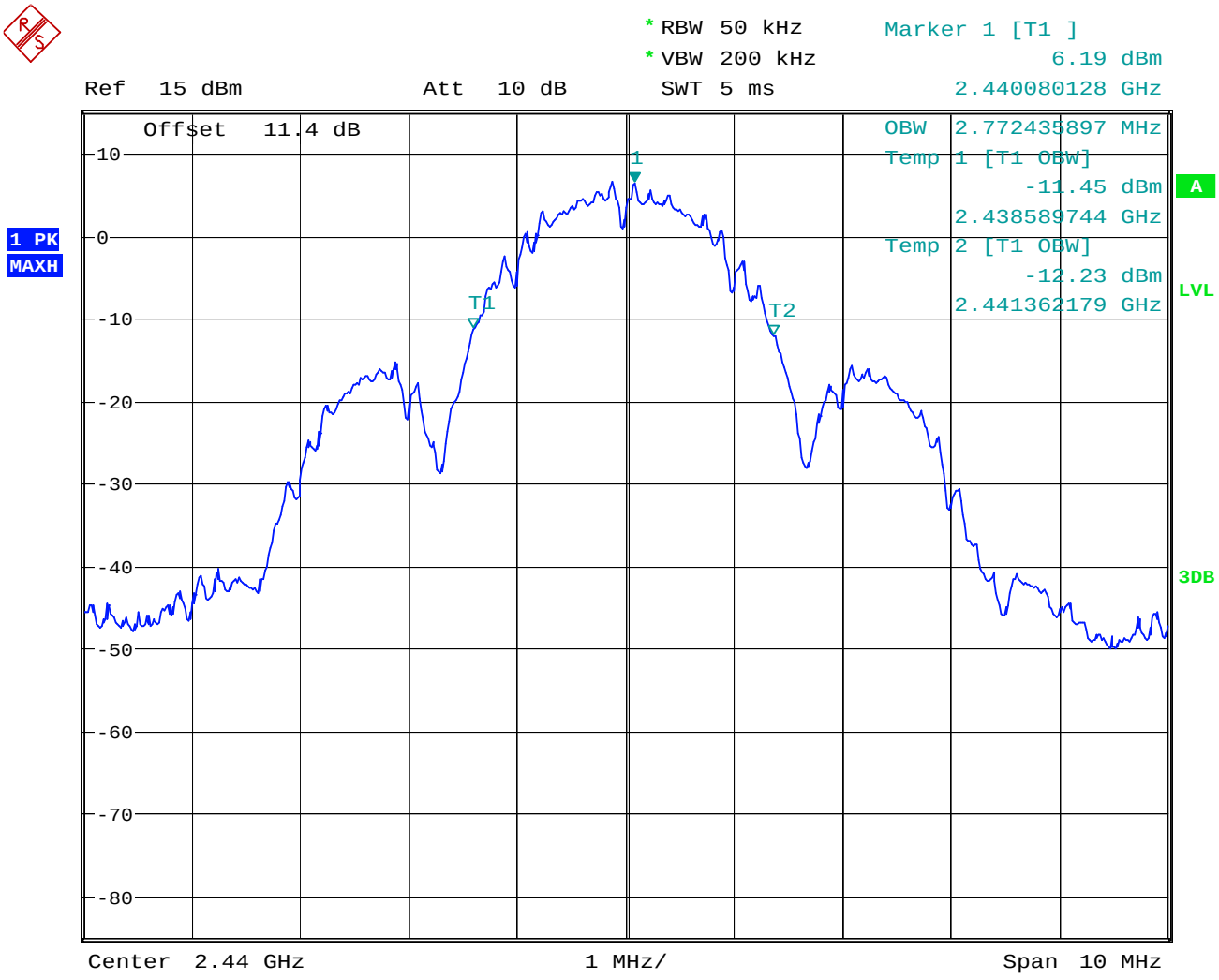


20dB Bandwidth 2405 MHz



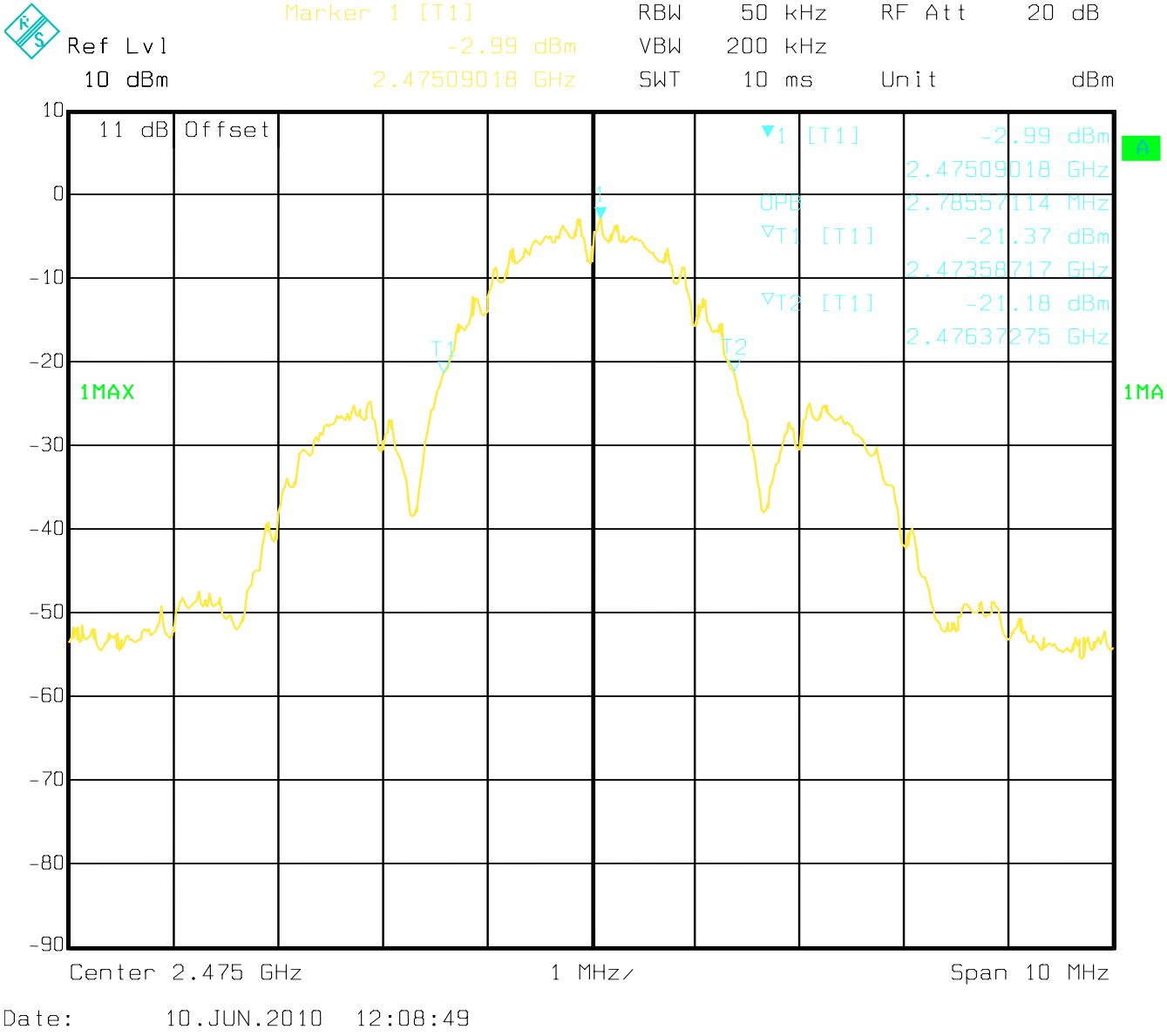
Date: 28.MAY.2010 13:08:37

20dB Bandwidth 2440 MHz



Date: 1.JUN.2010 11:44:17

20dB Bandwidth 2475 MHz



5.6 Power Spectral Density

5.6.1 Limits: § 15.247 (e)

For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

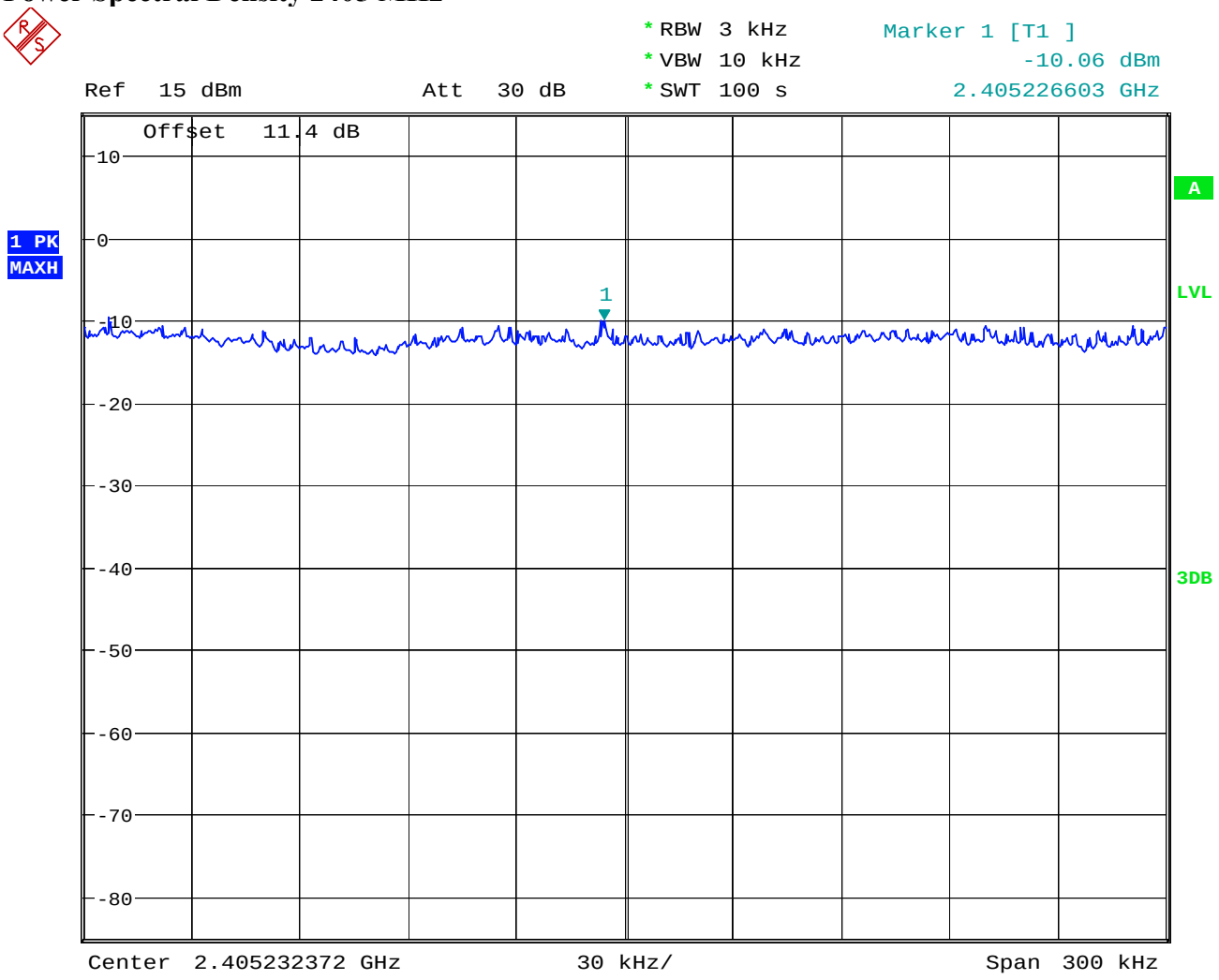
5.6.2 Test results:

Power Spectral Density (dBm)			
Mode	**Frequency (MHz)**		
	2405 Channel 11	**2440 Channel 18**	**2475 Channel 25**
802.15.4	-10.06	-3.10	-12.66
Measurement Uncertainty: ±0.5dB			

RBW = 3kHz, VBW=10kHz

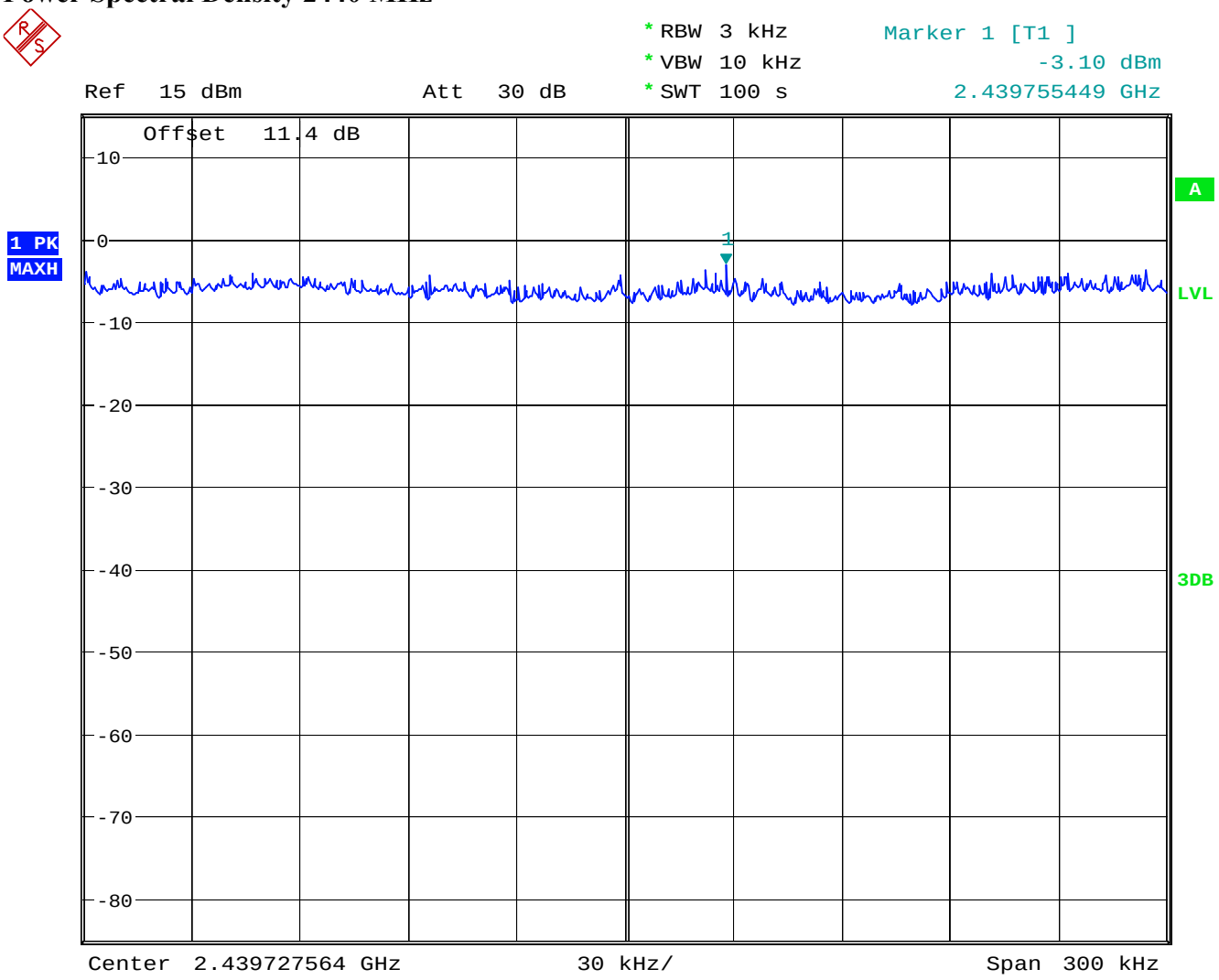
Test Data/plots:

Power Spectral Density 2405 MHz



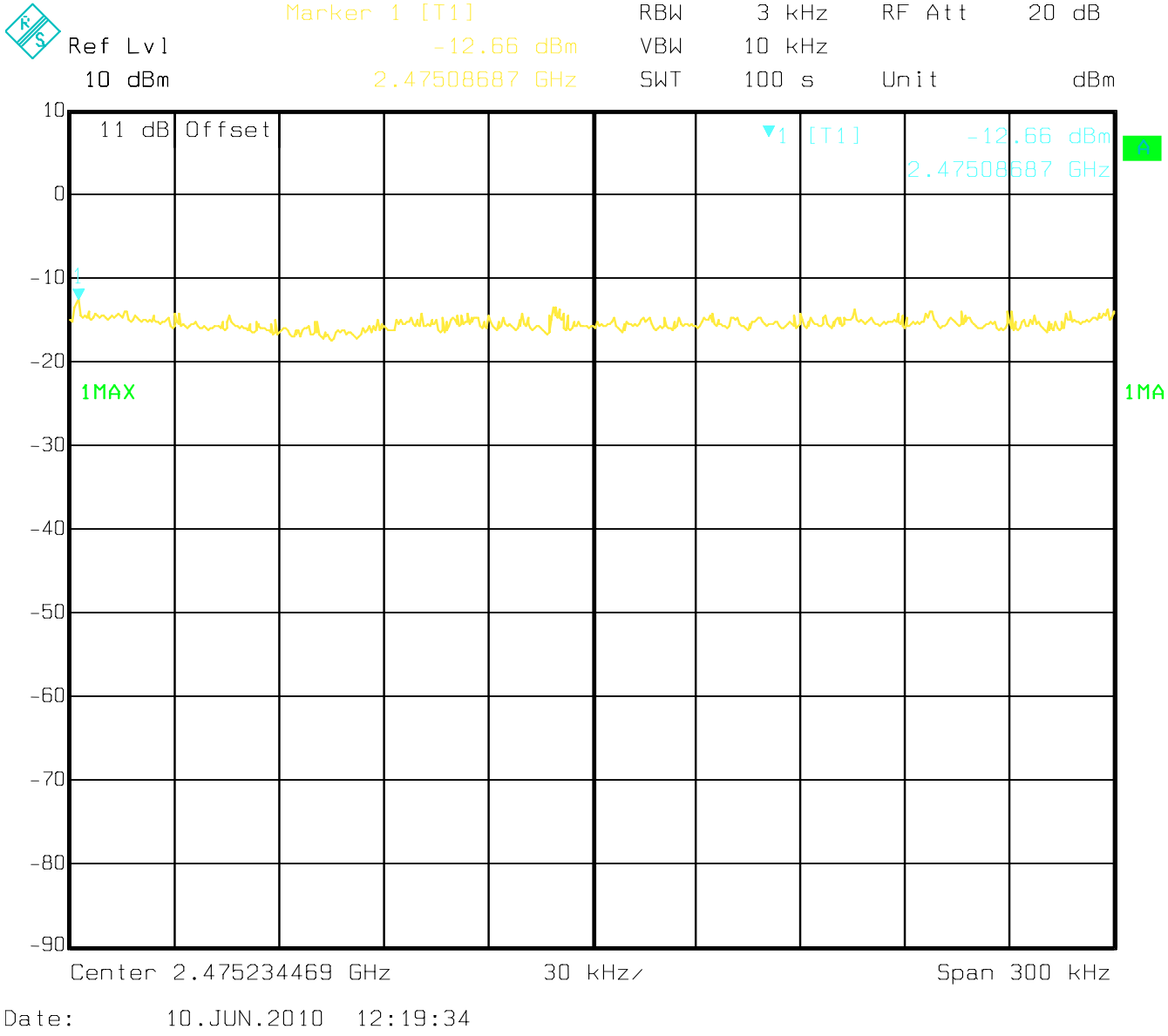
Date: 1.JUN.2010 13:36:29

Power Spectral Density 2440 MHz



Date: 1.JUN.2010 11:56:39

Power Spectral Density 2475 MHz



Transmitter Spurious Emissions- Conducted § 15.247 (c)

5.6.3 Limits: § 15.247 (d)

30dBm for the transmitter.
-30dBc in the frequency range 30MHz- 25GHz.

5.6.4 Test Conditions:

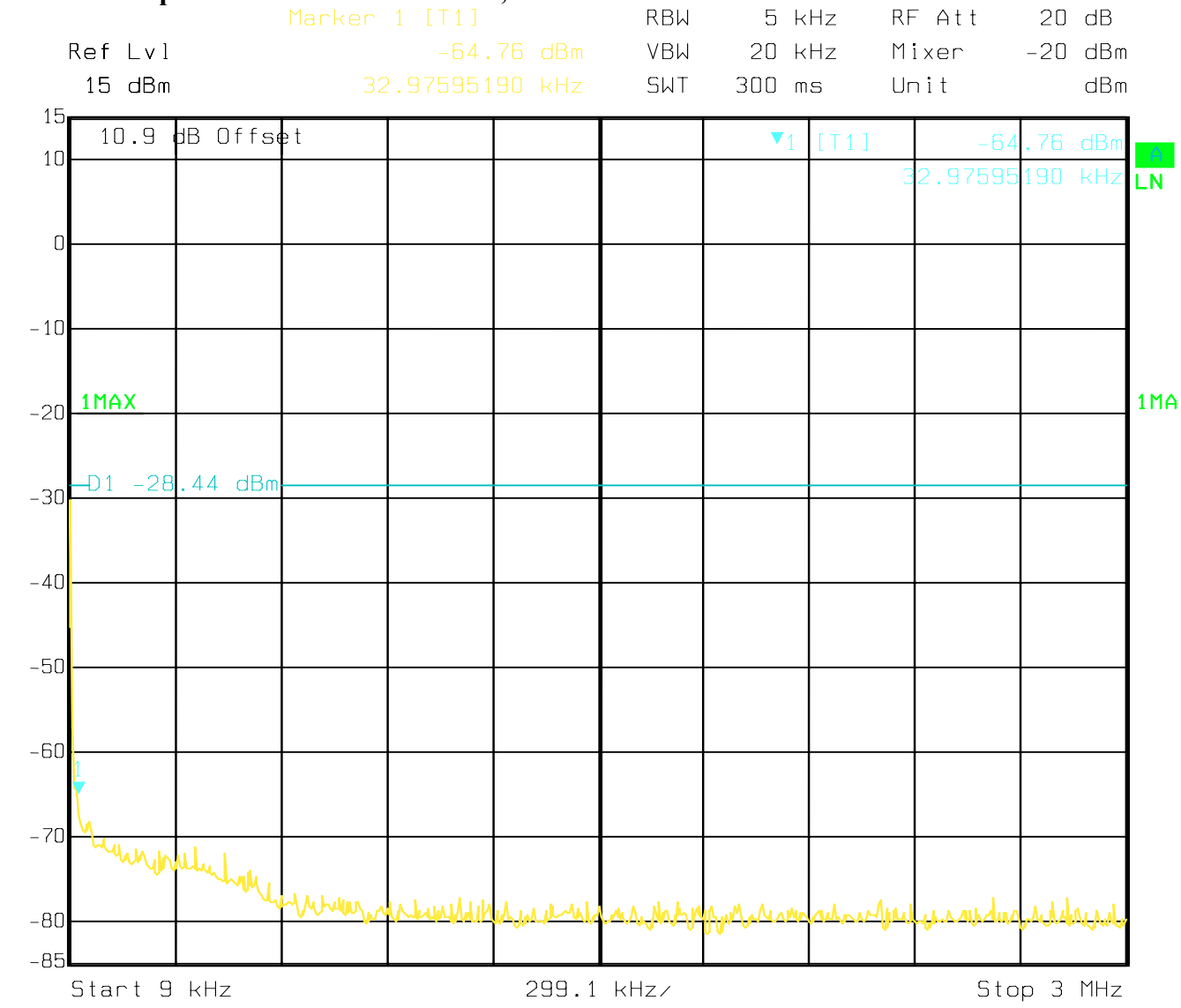
Analyzer settings:
9kHz-3MHz: RBW=5kHz, VBW=20kHz
3MHz-25GHz: RBW=VBW=100kHz

5.6.5 Test data/ plots:

Conducted Spurious Emissions			
Channel	**Frequency (MHz)**	**Amplitude (dBm)**	**Limits**
Low	**2405**	-1.56	30dBm
	4813	-47.40	-30dBc
	1606	-49.94	
	6615	-53.60	
Mid	**2440**	6.16	30 dBm
	No critical peaks		-20dBc
High	**2475**	4.56	30 dBm
	1606	-50.75	-20dBc
	6565	-52.04	
Measurement Uncertainty: ±1 dB			

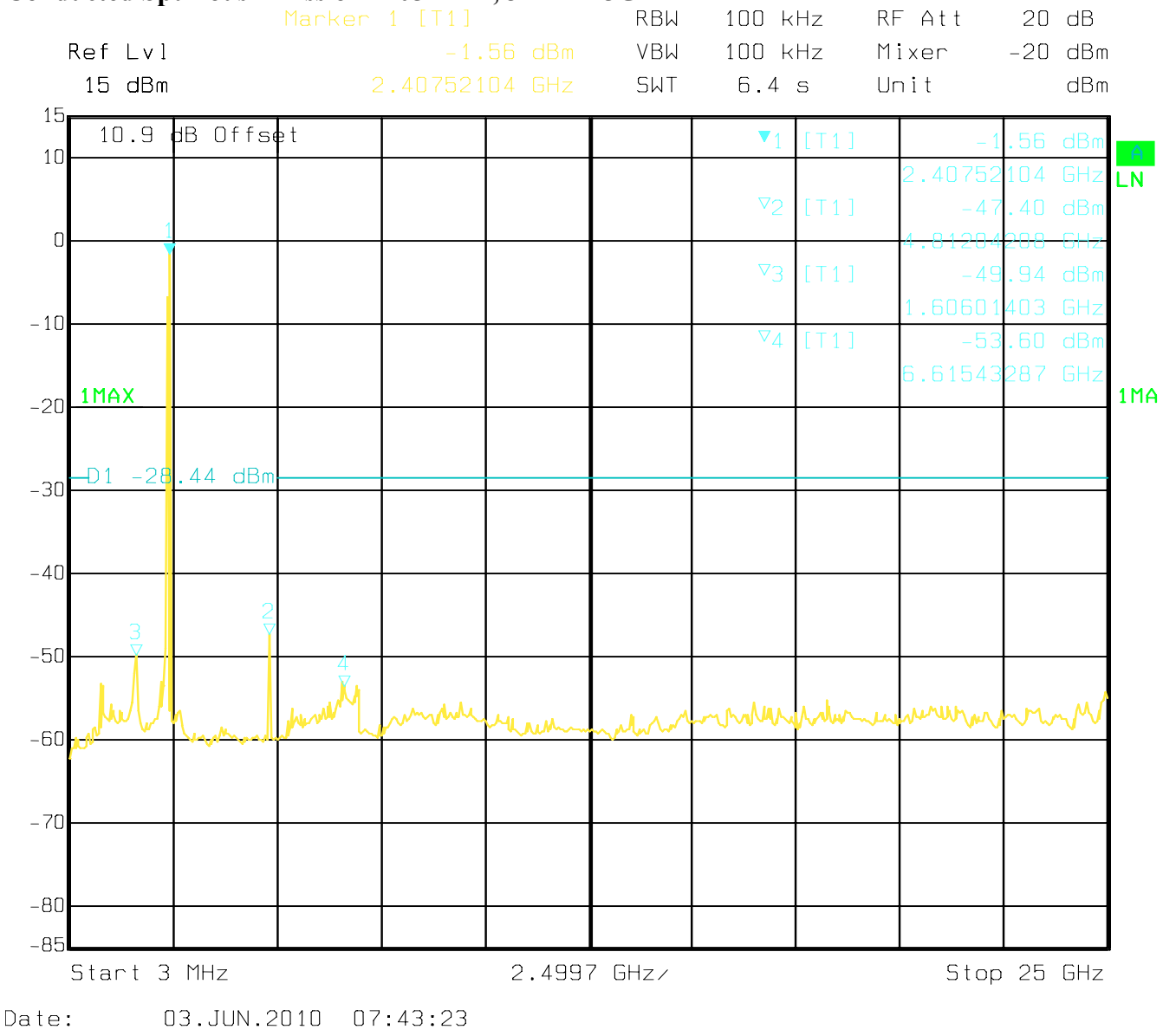
5.6.6 Test data/ plots:

Conducted Spurious Emission 2405 MHz, 9kHz-3MHz



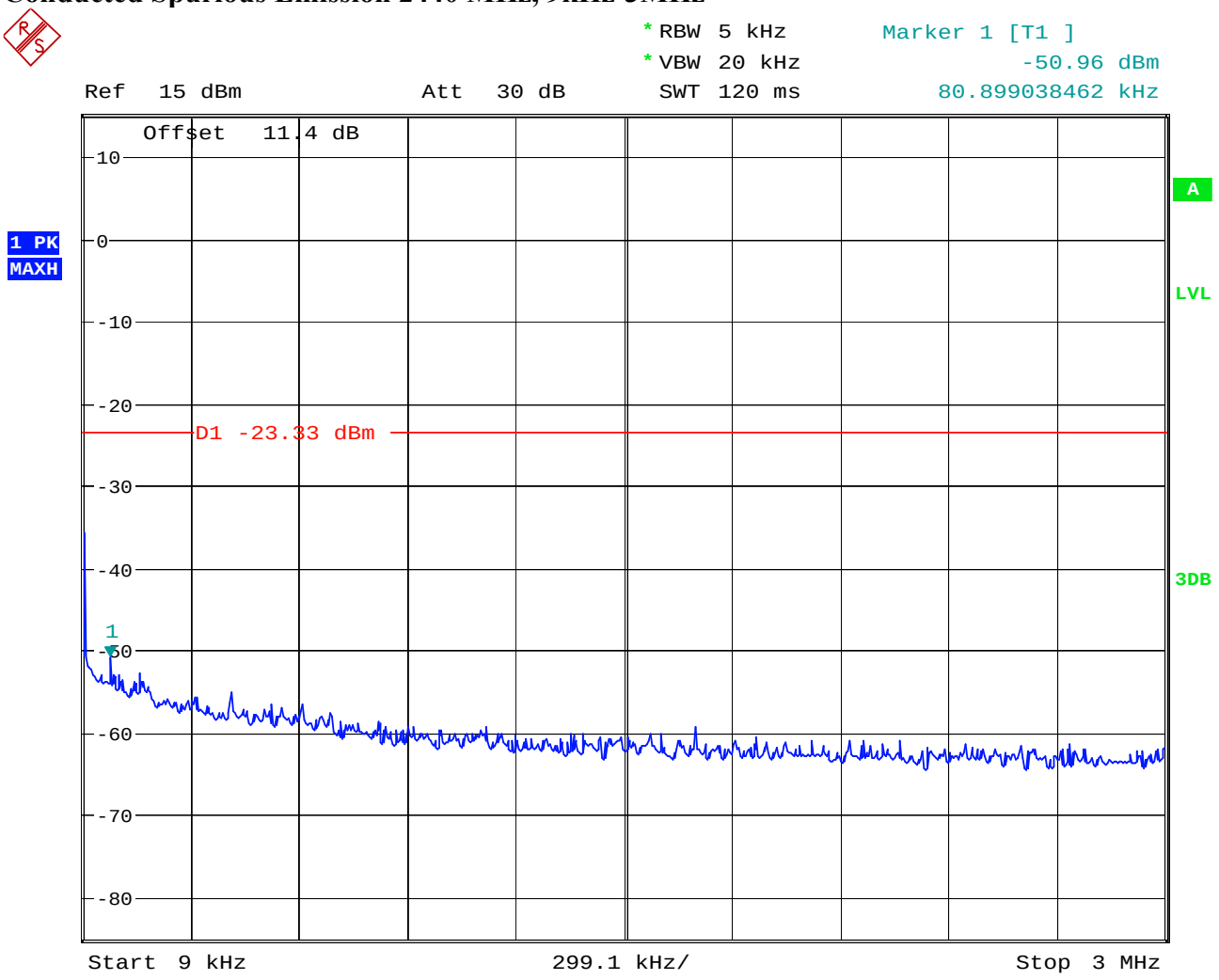
Date: 03.JUN.2010 07:44:48

Conducted Spurious Emission 2405 MHz, 3MHz-25GHz



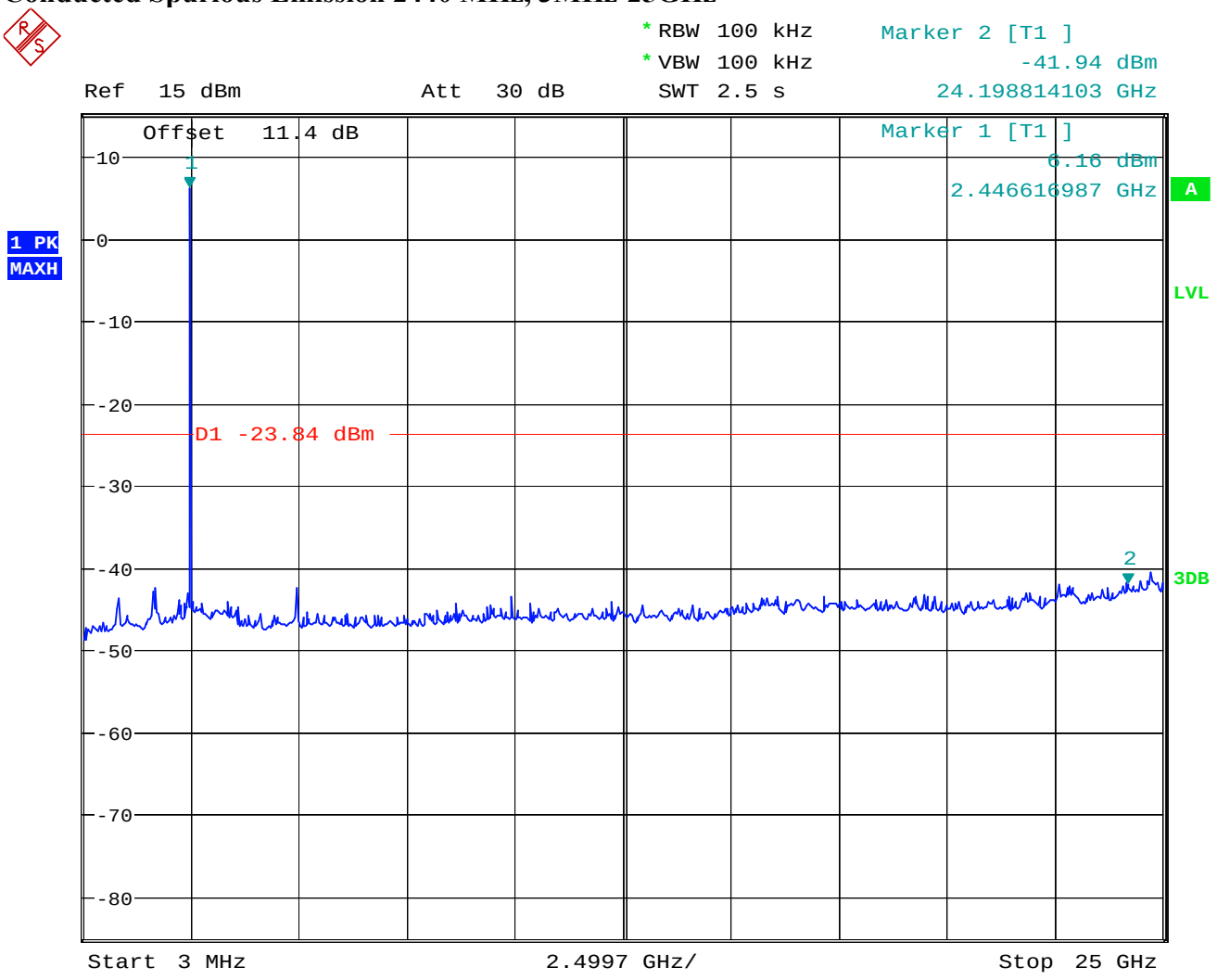
Date: 03.JUN.2010 07:43:23

Conducted Spurious Emission 2440 MHz, 9kHz-3MHz



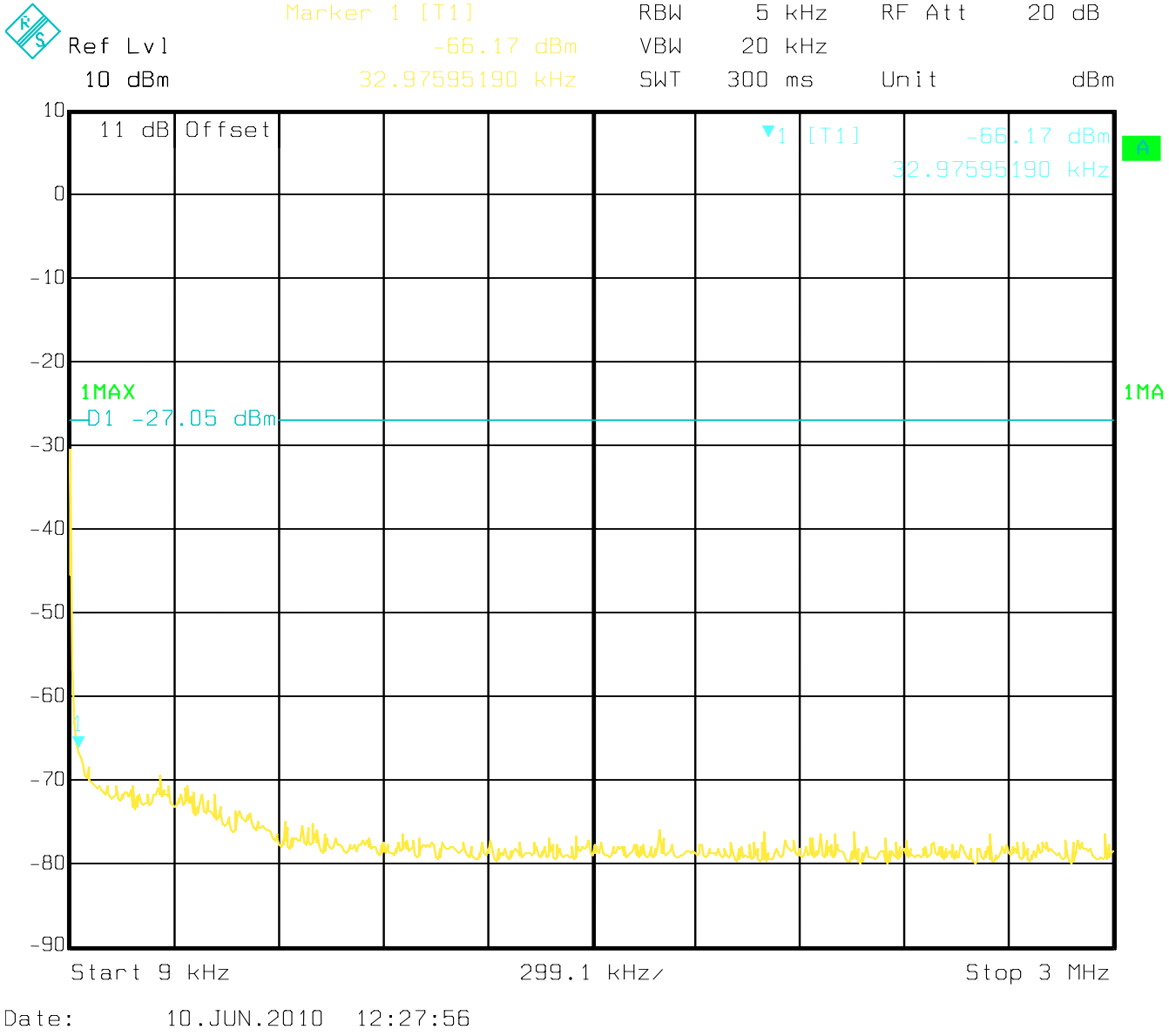
Date: 1.JUN.2010 12:03:23

Conducted Spurious Emission 2440 MHz, 3MHz-25GHz

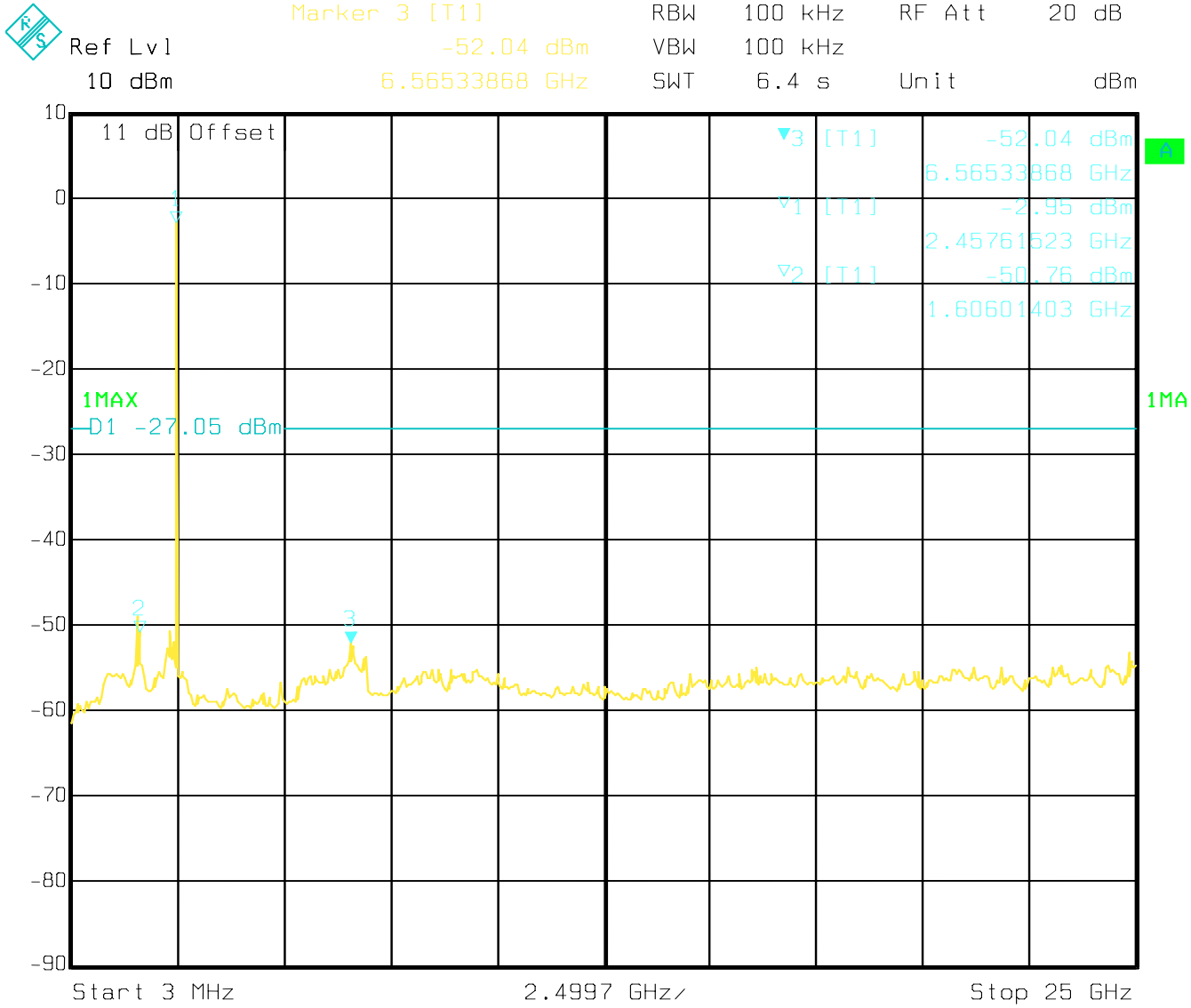


Date: 1.JUN.2010 11:30:43

Conducted Spurious Emission 2475 MHz, 9kHz-3MHz



Conducted Spurious Emission 2475 MHz, 3MHz-25GHz



5.7 Transmitter Spurious Emissions- Radiated

5.7.1 Limits: §15.247/15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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)).
*PEAK LIMIT= 74dBµV/m
*AVG. LIMIT= 54dBµV/m

5.7.2 Limits: §15.209

(For measurement distance of 3m)

Frequency of emission (MHz)	Field strength (µV/m)
30–88	100 (40dBµV/m)
88–216	150 (43.5 dBµV/m)
216–960	200 (46 dBµV/m)
Above 960	500 (54 dBµV/m)

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 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in Peak mode using an Average limit, unless specified within the plots.

5.7.3 Limits: §15.209

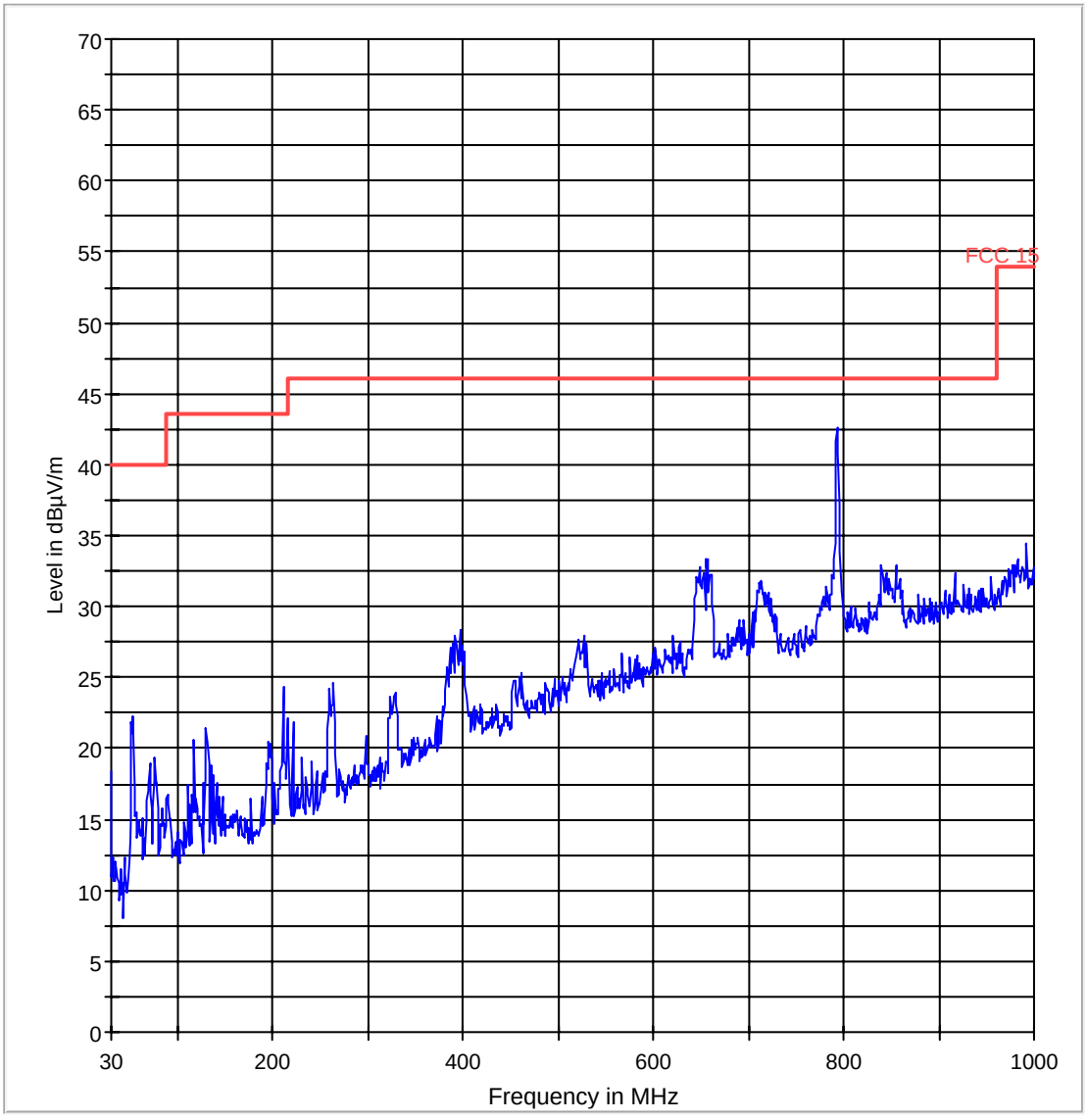
Frequency of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30

5.7.4 Test Conditions:
RBW=120kHz, VBW=1Mhz

5.7.5 Test Result:
No significant emissions measurable. Plots reported here represent the worse case emissions.

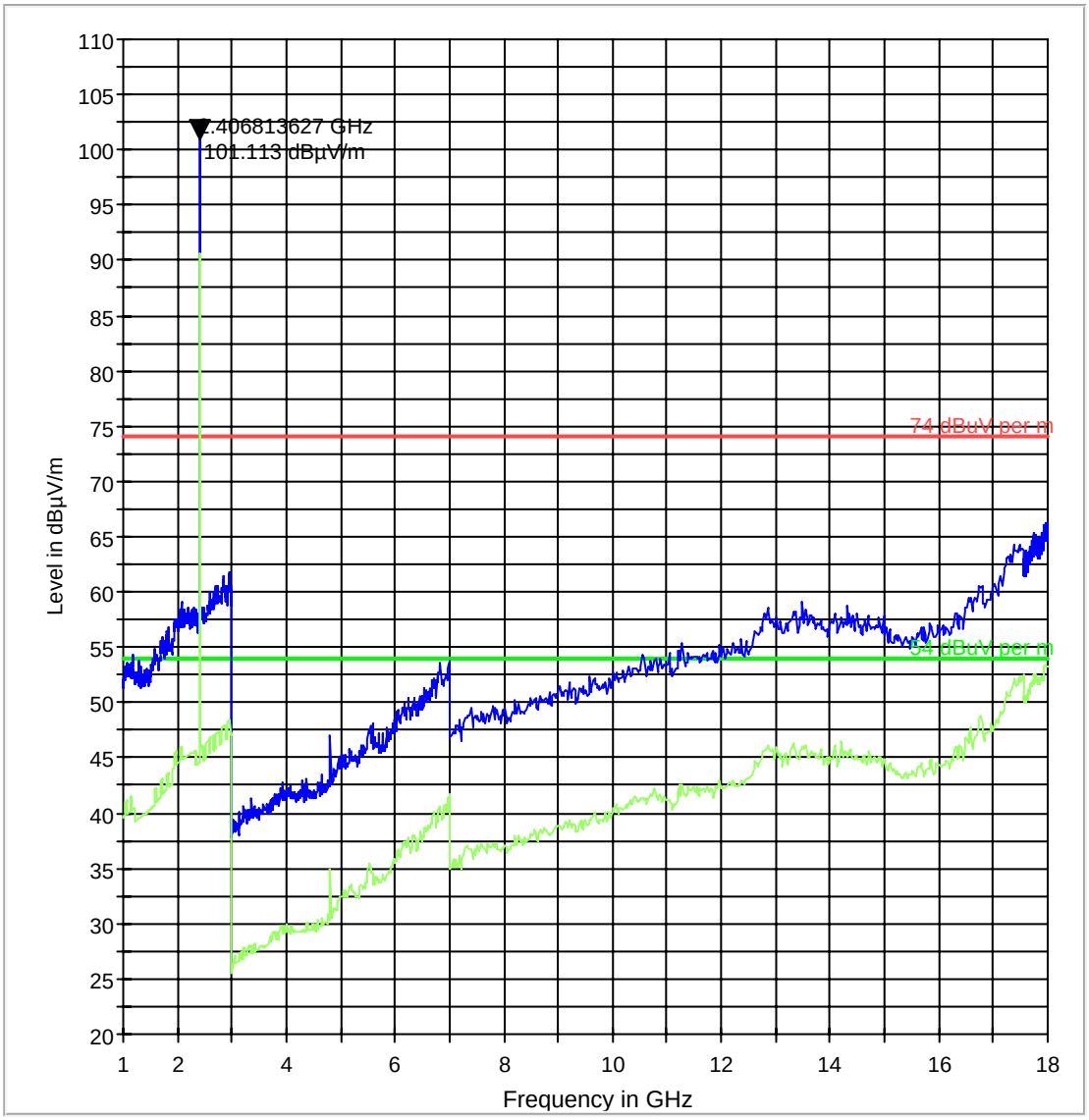
5.7.6 Test data/ plots:

Transmitter Radiated Spurious Emission- 30M-1GHz
NOTE: Plot represents worst case emissions



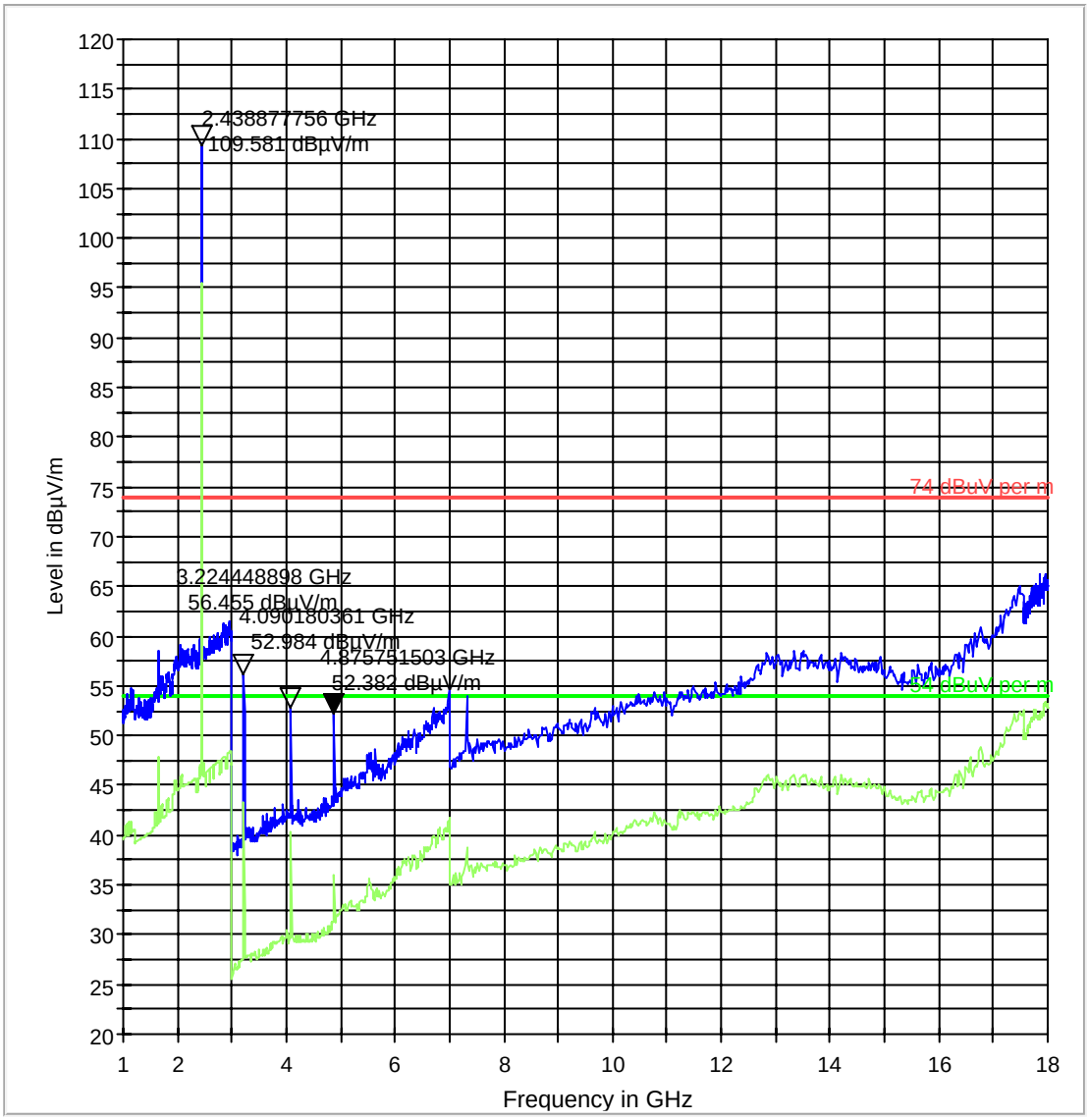
Transmitter Radiated Spurious Emission- Ch11 (2405 MHz)- 1G-18GHz

FCC 15 1-18GHz



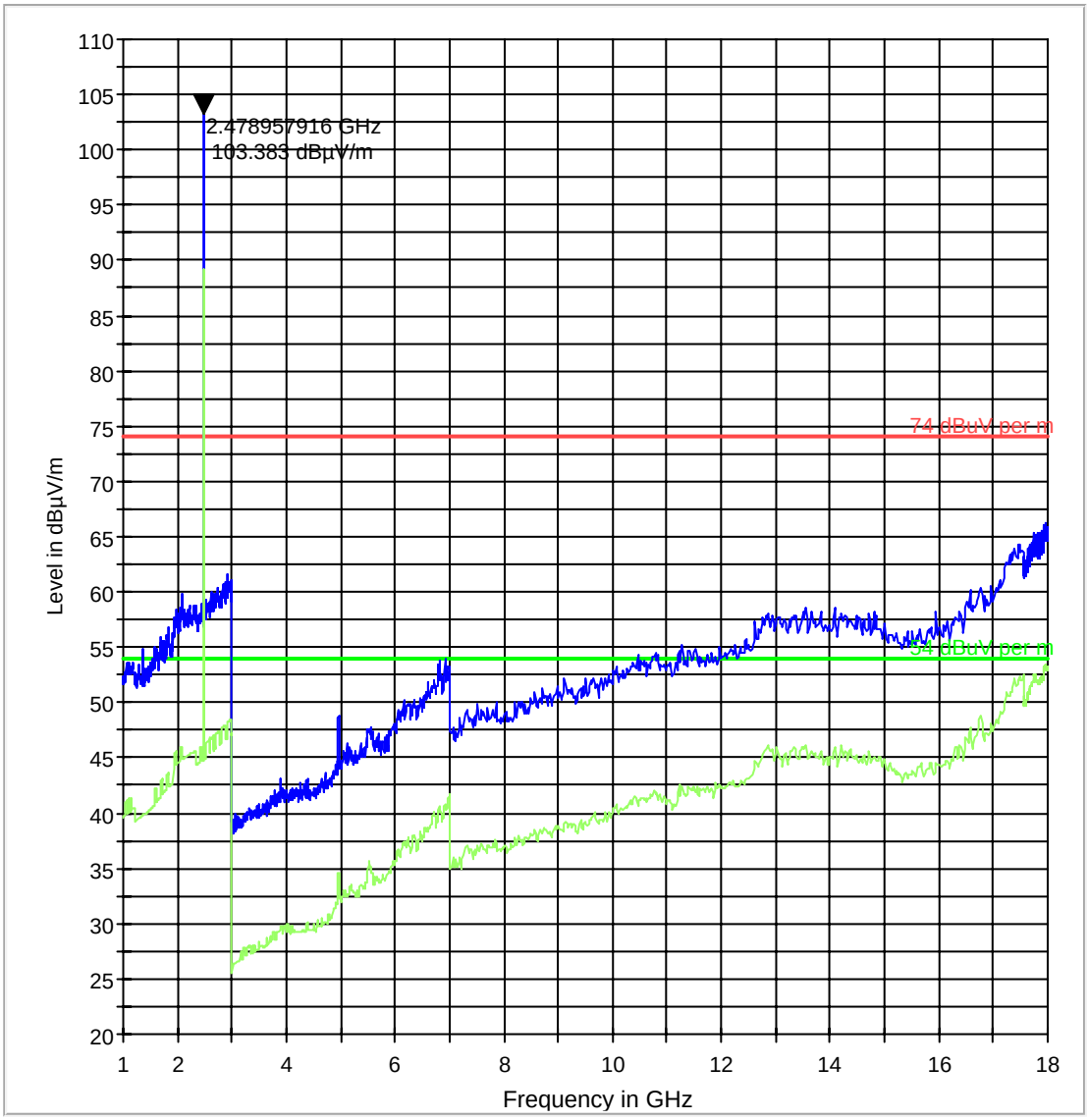
Transmitter Radiated Spurious Emission- Ch18 (2440 MHz)- 1G-18GHz

FCC 15 1-18GHz



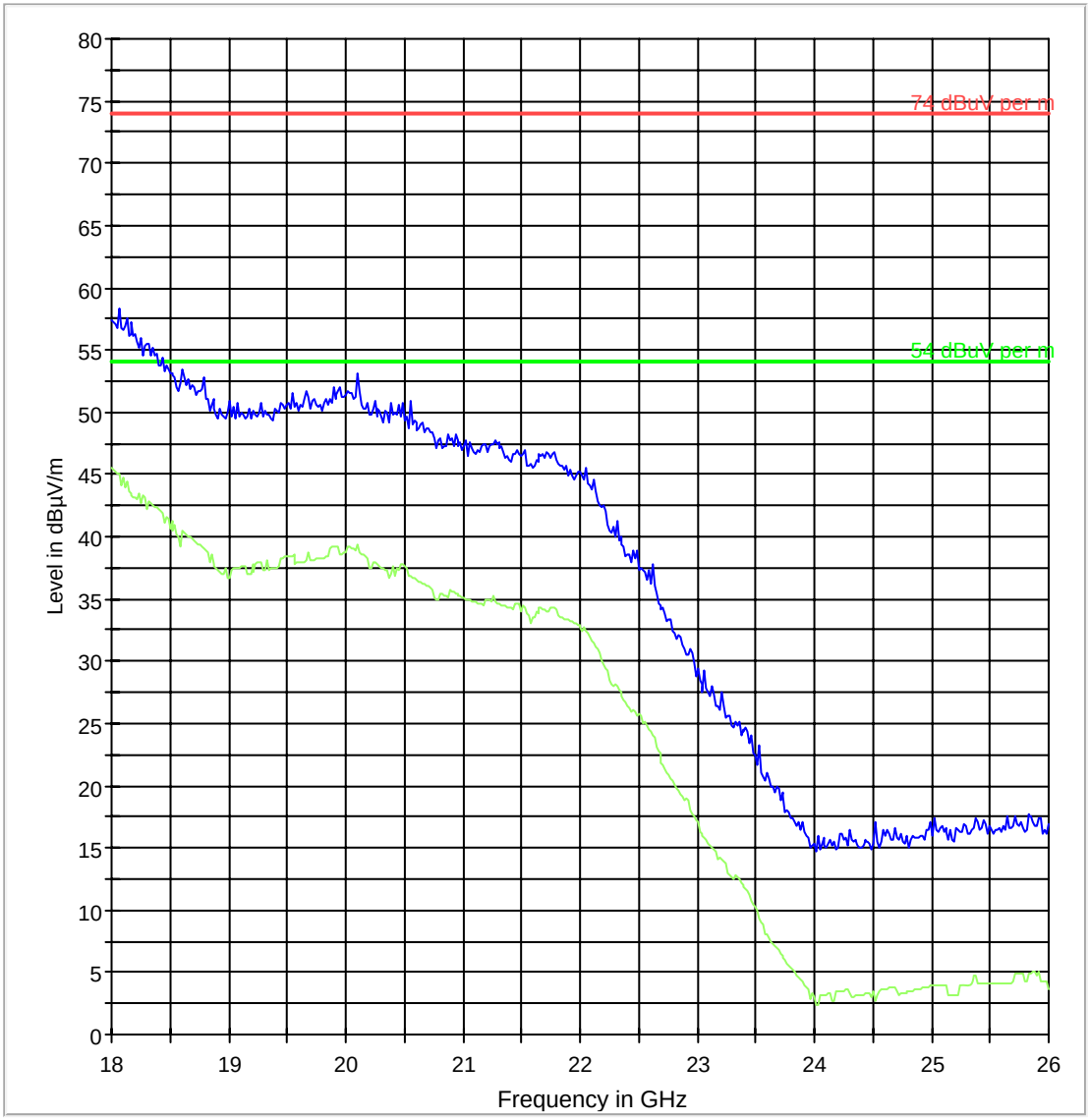
Transmitter Radiated Spurious Emission- Ch25 (2475 MHz)- 1G-18GHz

FCC 15 1-18GHz



Transmitter Radiated Spurious Emission- 18G-26GHz
Note: Plot represents worst case emissions.

FCC 15 18-26GHz



5.8 Receiver Spurious Emissions- Radiated

5.8.1 Limits: §15.109

Frequency of emission (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 (40dBµV/m)	3
88–216	150 (43.5 dBµV/m)	3
216–960	200 (46 dBµV/m)	3
Above 960	500 (54 dBµV/m)	3

5.8.2 Test Conditions:

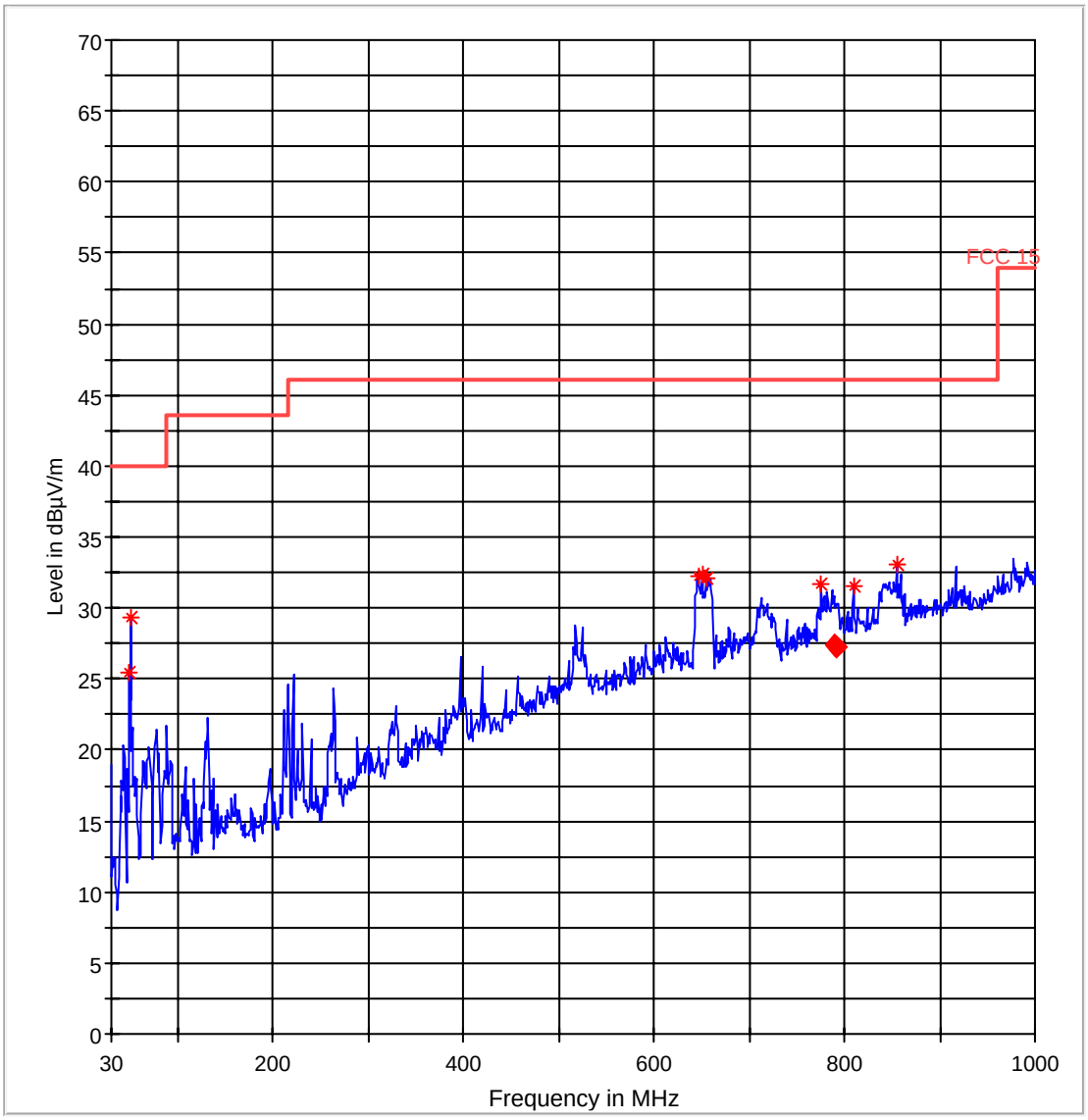
Mode: Receive mode
RBW=120kHz, VBW=1Mhz

5.8.3 Test Result:

No significant emissions measurable. Plots reported here represent the worse case emissions.

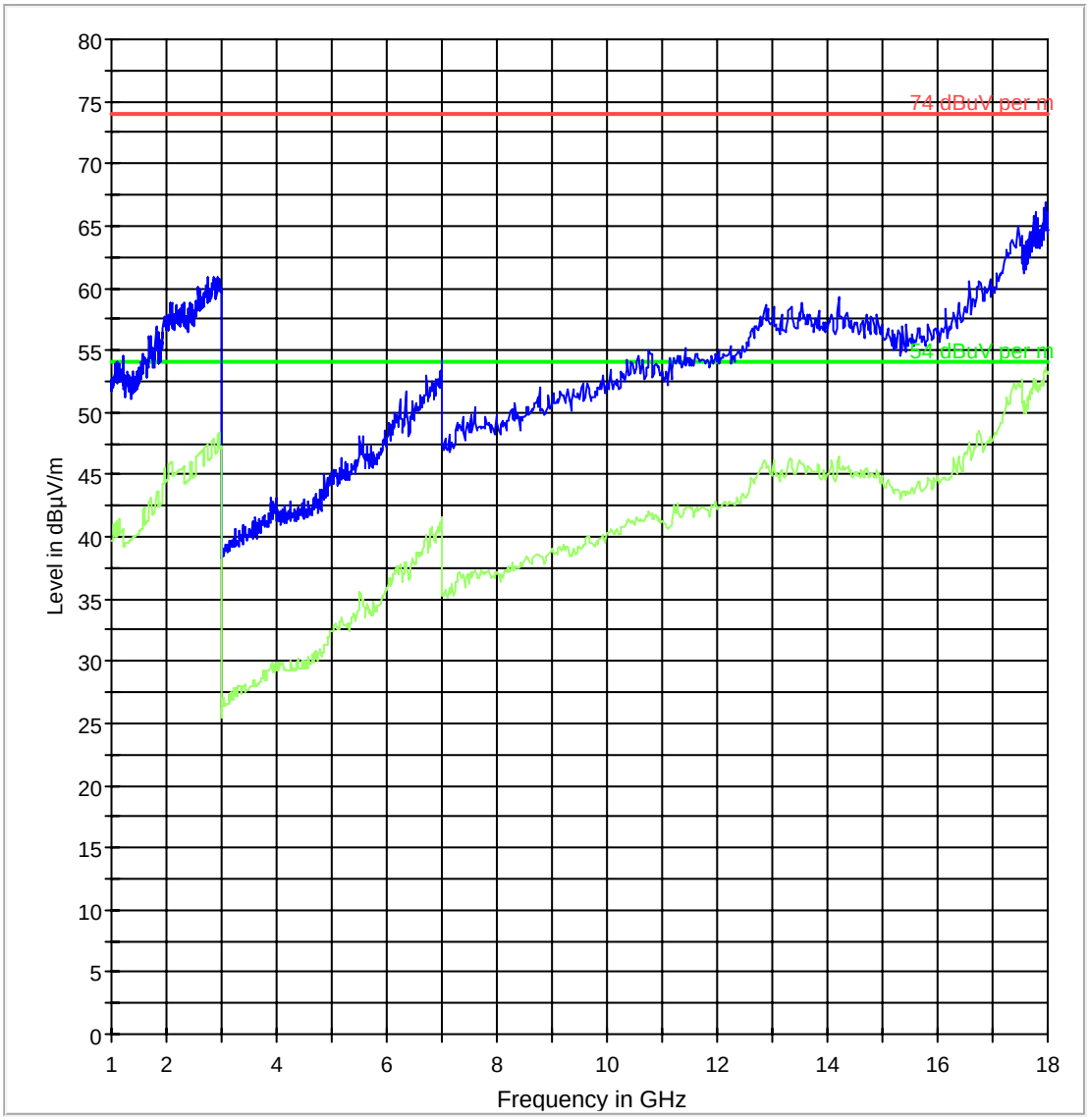
5.8.4 Test data/ plots:

Receive Mode: 30MHz-1GHz



Receive Mode: 1GHz-18GHz

FCC 15 1-18GHz



5.9 AC Power Line Conducted Emissions

5.9.1 Limits: §15.107/15.207

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Analyzer Settings: RBW = 10KHz; VBW = 10KHz

5.9.2 Test Conditions:

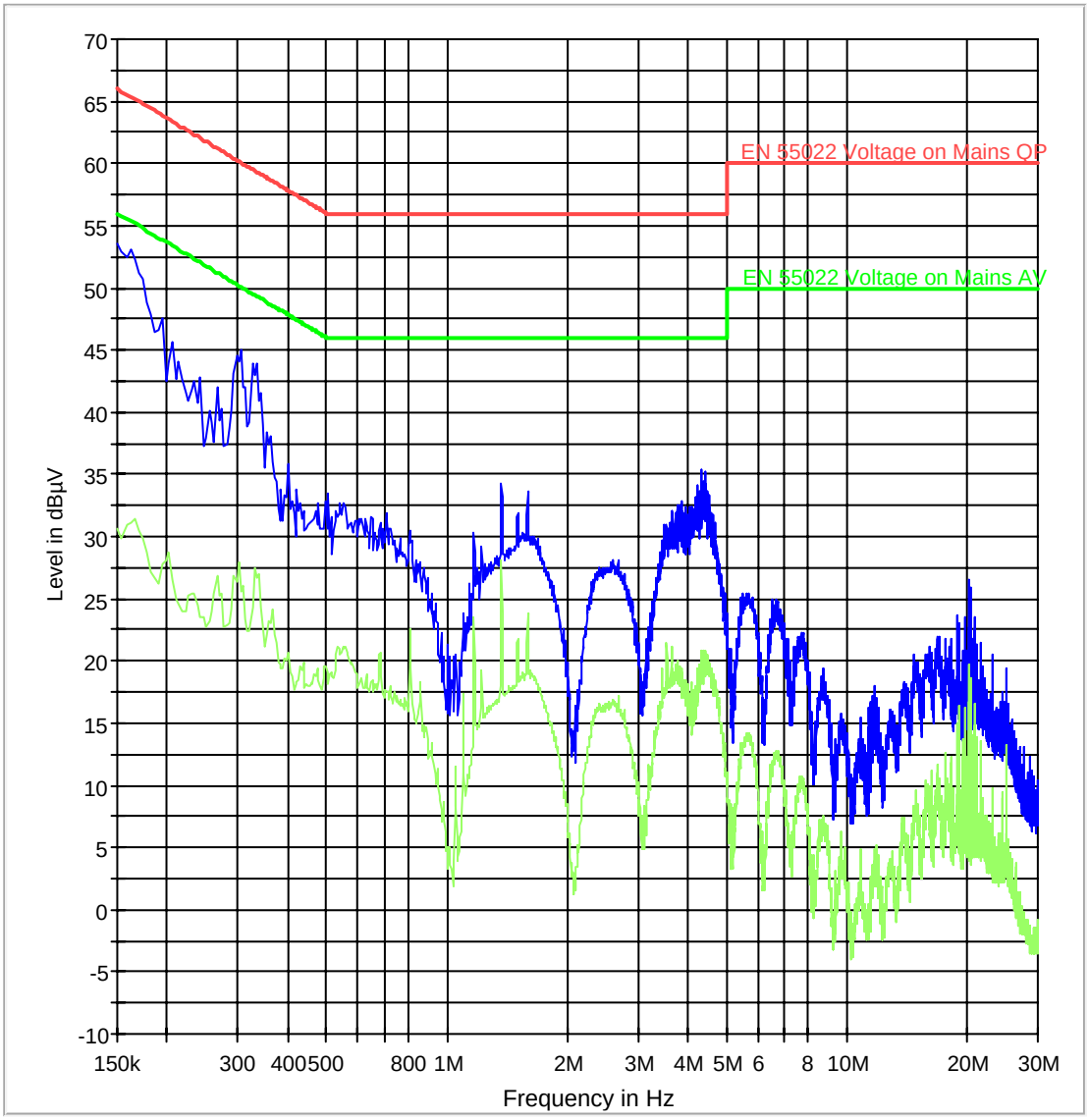
5.9.3 Test Result:

Plots reported here represent the worse case emissions.

5.9.4 Test data/ plots:

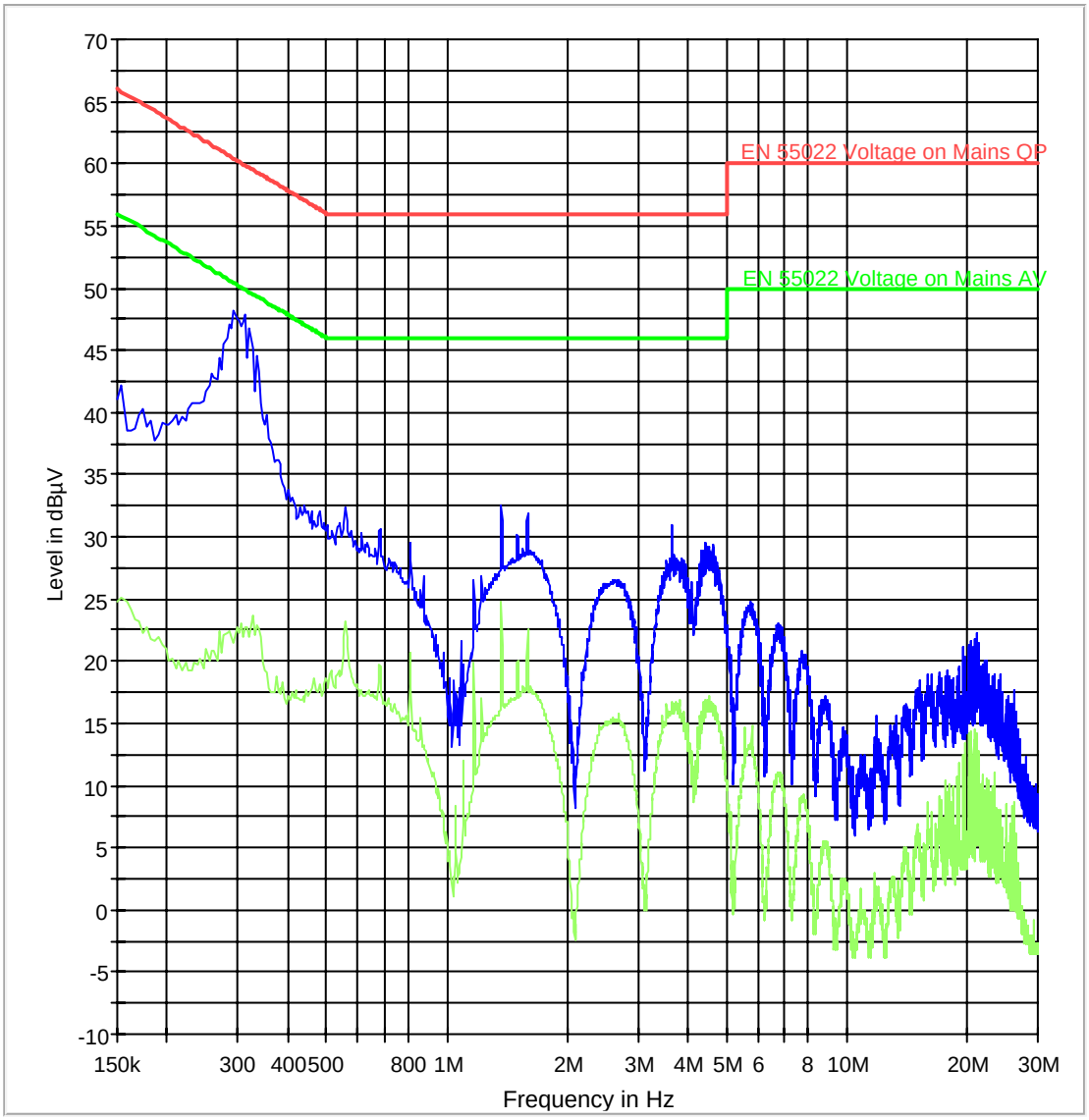
TX Mode: Line and Neutral

CISPR 22 Mains Conducted ESH3-Z5



RX Mode: Line and Neutral

CISPR 22 Mains Conducted ESH3-Z5

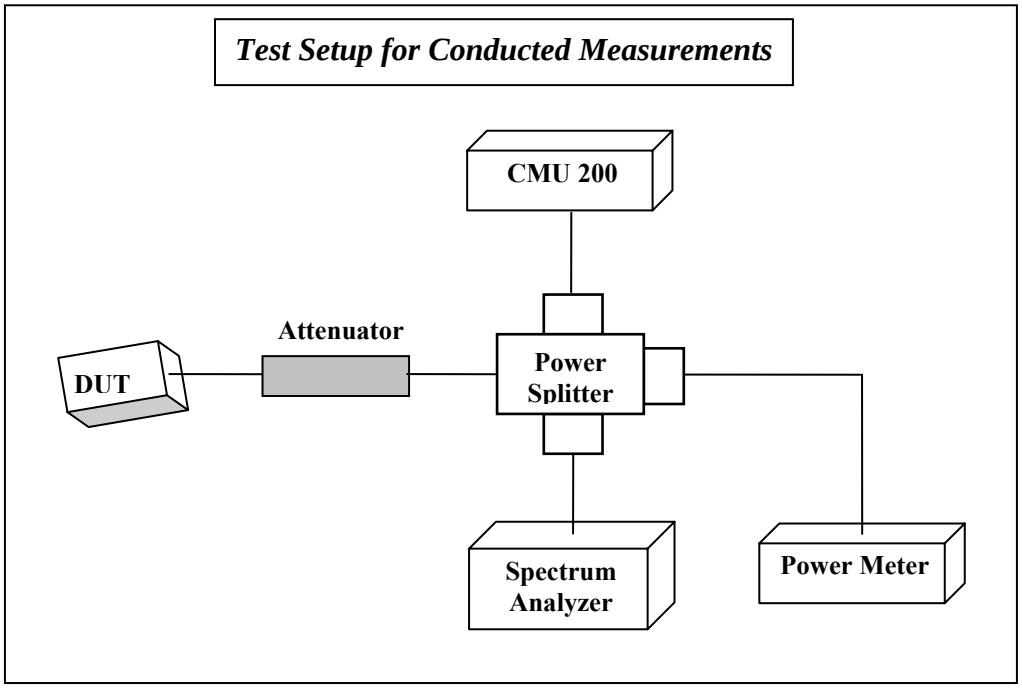


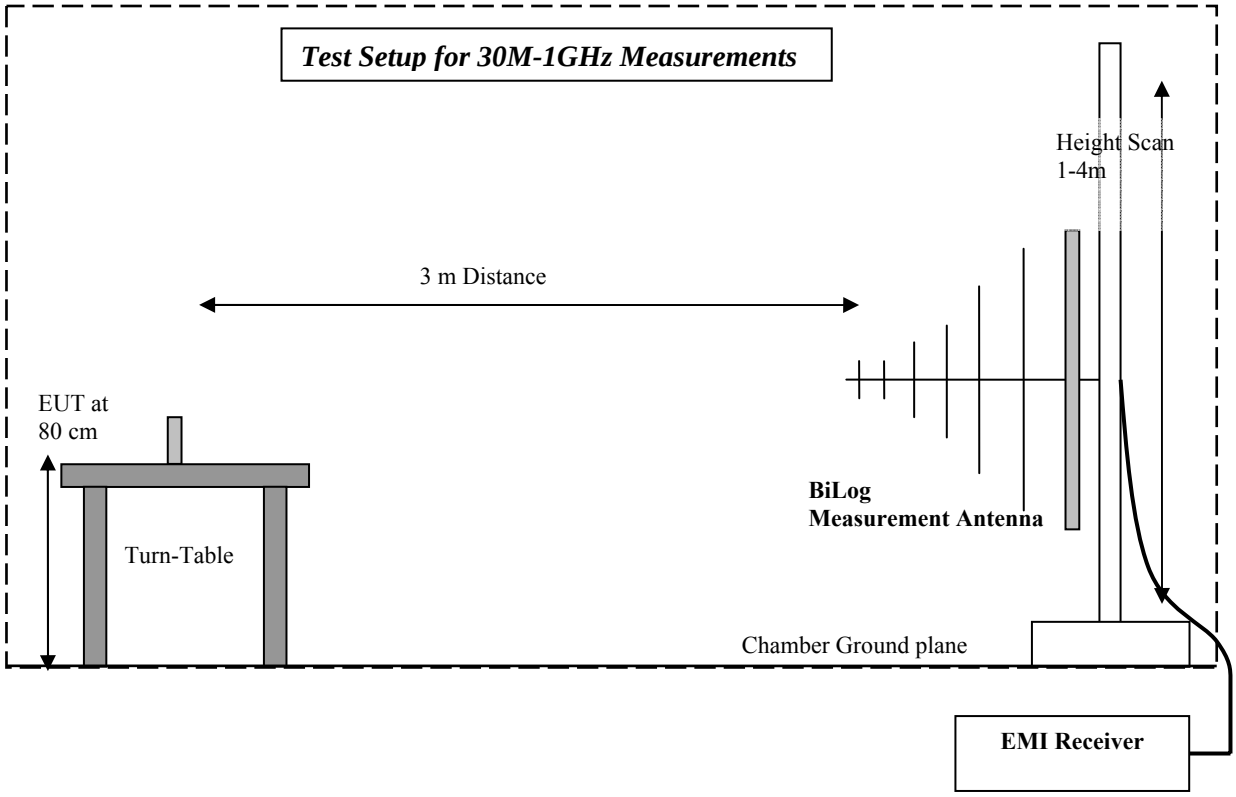
6 Test Equipment and Ancillaries used for tests

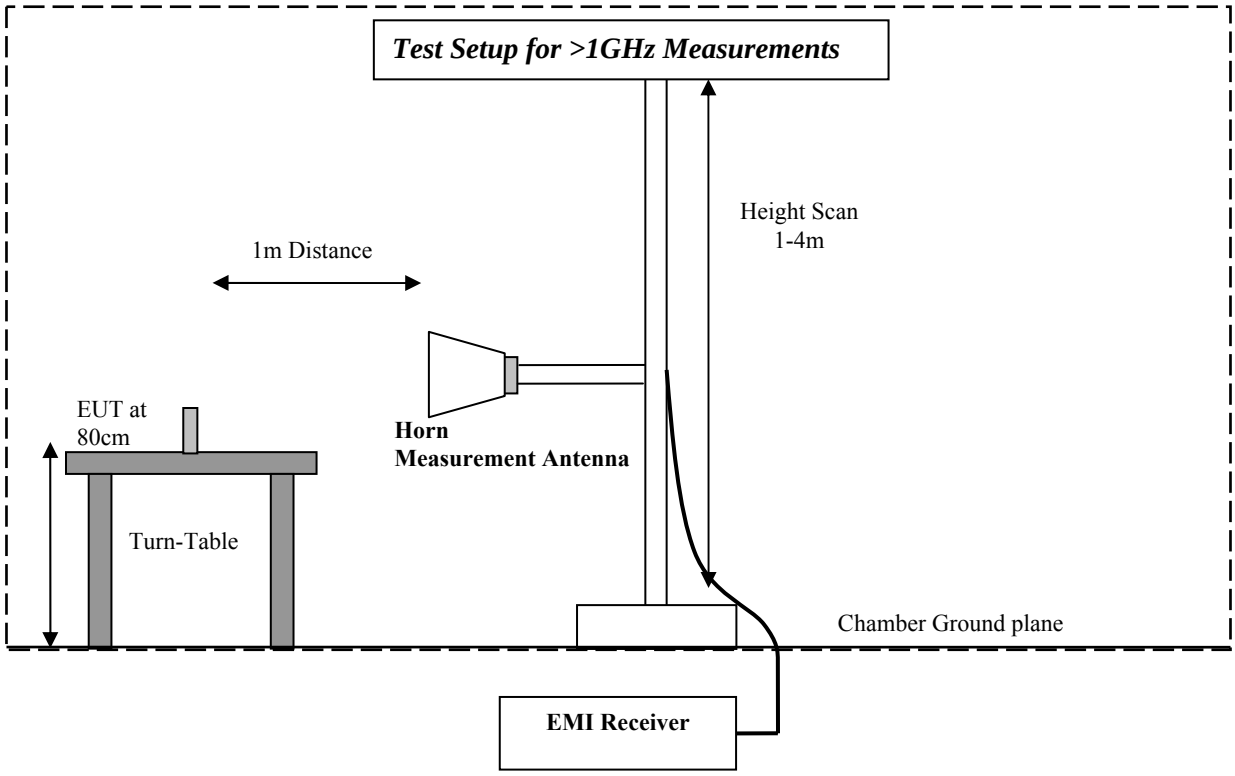
Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2009	1 year
Radio Communication Tester	CMU 200	Rohde & Schwarz	109879	May 2009	1 year
Radio Communication Tester	CMU 200	Rohde & Schwarz	110759	May 2009	1 year
Bluetooth Tester	CBT	Rohde & Schwarz	100212	May 2009	1 year
EMI Receiver/Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2009	1 year
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	Dec 2009	1 year
Loop Antenna	6512	EMCO	00049838	July 2008	2 years
Biconilog Antenna	3141	EMCO	0005-1186	June 2009	2 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Jan 2009	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Jan 2009	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
6GHz High Pass Filter	HPM50106	Microtronics	001	n/a	n/a
Pre-Amplifier	JS4-00102600	Miteq	00616	May 2009	1 year
LISN	50-25-2-08	FCC	08014	Apr 2009	1 year
Power Smart Sensor	R&S	NRP-Z81	100161	May 2009	1 Year
Power Smart Sensor	R&S	NRP-Z22	100223	May 2009	1 Year
Upconverter	PXI-5610	NI	E93740	Aug 2008	2 years
Waveform Generator	PXI-5421	NI	E965F1	Aug 2008	2 years
10dB attenuator	ATT-0298-10	MidwestMicrowav	n/a	n/a	n/a
Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
DC Power Supply	E3610A	Hewlett Packard	KR83021224	n/a	n/a
DC Power Supply	E3610A	Hewlett Packard	KR83023316	n/a	n/a
DC Power Supply	6632A	Hewlett Packard	3524A-12822	n/a	n/a
DC Power Supply	6655A	Hewlett Packard	3403A-00487	n/a	n/a
Multimeter	179	Fluke	N/A	Feb 2010	1 Year
Temp Hum Logger	TM320	Dickson	03280063	Feb 2010	1 Year
Temp Hum Logger	TM325	Dickson	5285354	Feb 2010	1 Year
Climatic Chamber	VT4004	Votsch	G1115	May 2009	1 year

Note:
Equipment calibration is performed by an accredited calibration lab according to ISO 17025 requirements.
Calibration intervals are determined from manufacturer recommendation and/or lab discretion.
Cetecom Inc takes all measures to calibrate equipment before the due date; for instances when the equipment has to be used beyond the calibration due date, necessary steps are taken for calibration verification and documented until accredited calibration can be performed- to meet the Quality System requirements.

7 BLOCK DIAGRAMS






Test Setup for >1GHz Measurements
Height Scan
1-4m
1m Distance
EUT at
80cm
Horn
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver

8 Revision History

Date	Report Name	Changes to report	Report prepared by
2010-06-17	**EMC_ SMAR1_023_10001_15.247**	**Original Report**	**Josie Sabado**