

CETECOM ICT Services GmbH

Radio Satellite Communication

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RSC14

issued test report consists of 63 Pages

Page 1 (63)

Recognized by the
Federal Communications Commission
Anechoic chamber registration no: 90462 (FCC)
Anechoic chamber registration no: 3436 (IC)
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
TTI-P-G 166/98



Independent ETSI
compliance test house



Accredited Bluetooth™ Test Facility (BQTF)

Test Report No.: 4-1164-01-03/03
FCC Part 15.247 / CANADA RSS-210
CTX 405 V.2
FCC ID: Q6DCTX405

CETECOM – ICT Services GmbH
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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 ICT Services GmbH 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 ICT Services GmbH.

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Telephone : + 49 681 598 - 9100

Telefax : + 49 681 598 - 9075

E-mail : info@ict.cetecom.de

Internet : www.cetecom.de

Accredited testing laboratory

DAR-registration number : TTI-P-G-166/98-30

Accredited BluetoothTM Test Facility (BQTF)

BLUETOOTHTM is a trademark owned by Bluetooth SIG, Inc. and licensed to CETECOM

1.3 Details of applicant

Name : Creatix Polymedia Gesellschaft für Kommunikationssysteme GmbH
Street : Heinrich-Barth-Str. 3
City : 66115 Saarbrücken
Country : Germany
Telephone: +49 (0) 681 98 11-3 00
Telefax : +49 (0) 681 98 11-3 90
Contact : Herr Frank von Ehren
Telephone: +49 (0) 681 98 11-4 13

1.4 Application details

Date of receipt of application : 2003-10-06
Date of receipt of test item : 2003-10-06
Date of test : 2003-10-21 to 2003-10-24

1.5 Test item

Type of equipment : 2.4 GHz WLAN PCI card 802.11b/g
Type designation : CTX 405 V.2
Manufacturer : -applicant -
Street :
City :
Country :
Serial number :
FCC ID : Q6DCTX405
Hardware : V.1
Software : V.1

Additional information :

Frequency : 2412 – 2462 MHz
Type of modulation : 22M0P7D (DSSS) / (OFDM) Ch. Sep. : 5 MHz
Number of channels : 11
Antenna : Dedicated antenna connected via reverse SMA coax adaptor
Power supply : 3.3 V via PCI PC slot
Output power cond./rad. : DSSS System: 19.74 dBm / 22.8 dBm EIRP
OFDM System: 20.60 dBm / 22.40 dBm EIRP
Type of equipment : Class B
Temperature range : 0°C - +40°C
Field strength peak : 104 dB μ V/m
Occupied bandwidth : DSSS: 12174 kHz
OFDM: 16583 kHz
Temperature range : 0°C - +40°C

1.6 Test standards: FCC Part 15 §15.247 / CANADA RSS-210

Test set-ups:

We measured at 11 Mbit/s (DSSS) and 54 Mbit/s (OFDM) where necessary.

The tests were performed with a special shielded PC with extender card to get free radiation of the test sample.

We also used special test software to set the samples in the required modes.

We also made a conducted measurement with the test pc to show the influence of the sample on the AC line.

2 Technical test

2.1 Summary of test results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.

The receiving antennas conform with specifications ANSI C63.2-1987 clause 15 and ANSI C63.4-1992 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-1992 clause 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

9 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave-guide horn

All measurement settings are according to FCC 15.35, 15.205, 15.209, 15.247 and the „Measurement guidelines for DSSS systems“.

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

The product fulfills also the requirements for CANADA RSS-210.

FINAL VERDICT : PASS

Technical responsibility for area of testing :

2003-12-04 RSC 8414 Ames H.

Date

Section

Name



Signature

Technical responsibility for area of testing :

2003-12-04 RSC8412 Hausknecht D.

Date

Section

Name



Signature

2.2 Test report

TEST REPORT

Test report no. : 4-1164-01-03/03

TEST REPORT REFERENCE**LIST OF MEASUREMENTS**

PARAMETER TO BE MEASURED	PAGE
Antenna Gain	§ 15.204
Spectrum Bandwith of a DSSS System	§15.247(a)
MAXIMUM PEAK OUTPUT POWER	§ 15.247 (b) (1)
MPE calculation	
Power spectral density	§15.247 (d)
Band-edge compliance of conducted emissions	§15.247 (c)
EMISSION LIMITATIONS- Conducted (Transmitter)	§ 15.247 (c) (1)
SPURIOUS EMISSION(radiated)	§ 15.247 (c) (1)
Conducted emissions	§ 15.107/207
EMISSION LIMITATIONS- Receiver radiated	§ 15.209
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	
Test site	
Photographs of the equipment	

Antenna Gain**SUBCLAUSE § 15.204**

The antenna gain of the complete system is calculated by the difference of conducted power of the module and the radiated power in EIRP with DSSS modulation.

	low channel	mid channel	high channel
Conducted power	19.74 dBm	19.25 dBm	19.02 dBm
Radiated power (EIRP)	22.80 dBm	22.50 dBm	22.00 dBm
Gain	+3.06 dBi	+3.25 dBi	+2.98 dBi

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24, 64

Spectrum Bandwidth of a DSSS System

§15.247(a)

6 dB bandwidth

TEST CONDITIONS		6 dB BANDWIDTH (kHz)		
Frequency (MHz)		2412	2437	2462
T _{nom} (23.0)°C	V _{nom} (3.3)V	12124	12174	12174
Measurement uncertainty		±1kHz		

RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)

LIMIT

SUBCLAUSE §15.247(a) (2)

The minimum 6dB bandwidth shall be at least 500 kHz

Spectrum Bandwidth of an OFDM System §15.247(a)

6 dB bandwidth

TEST CONDITIONS		6 dB BANDWIDTH (kHz)		
Frequency (MHz)		2412	2437	2462
T _{nom} (23.0)°C	V _{nom} (3.3)V	16482	16583	16533
Measurement uncertainty		±1kHz		

RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)

LIMIT

SUBCLAUSE §15.247(a) (2)

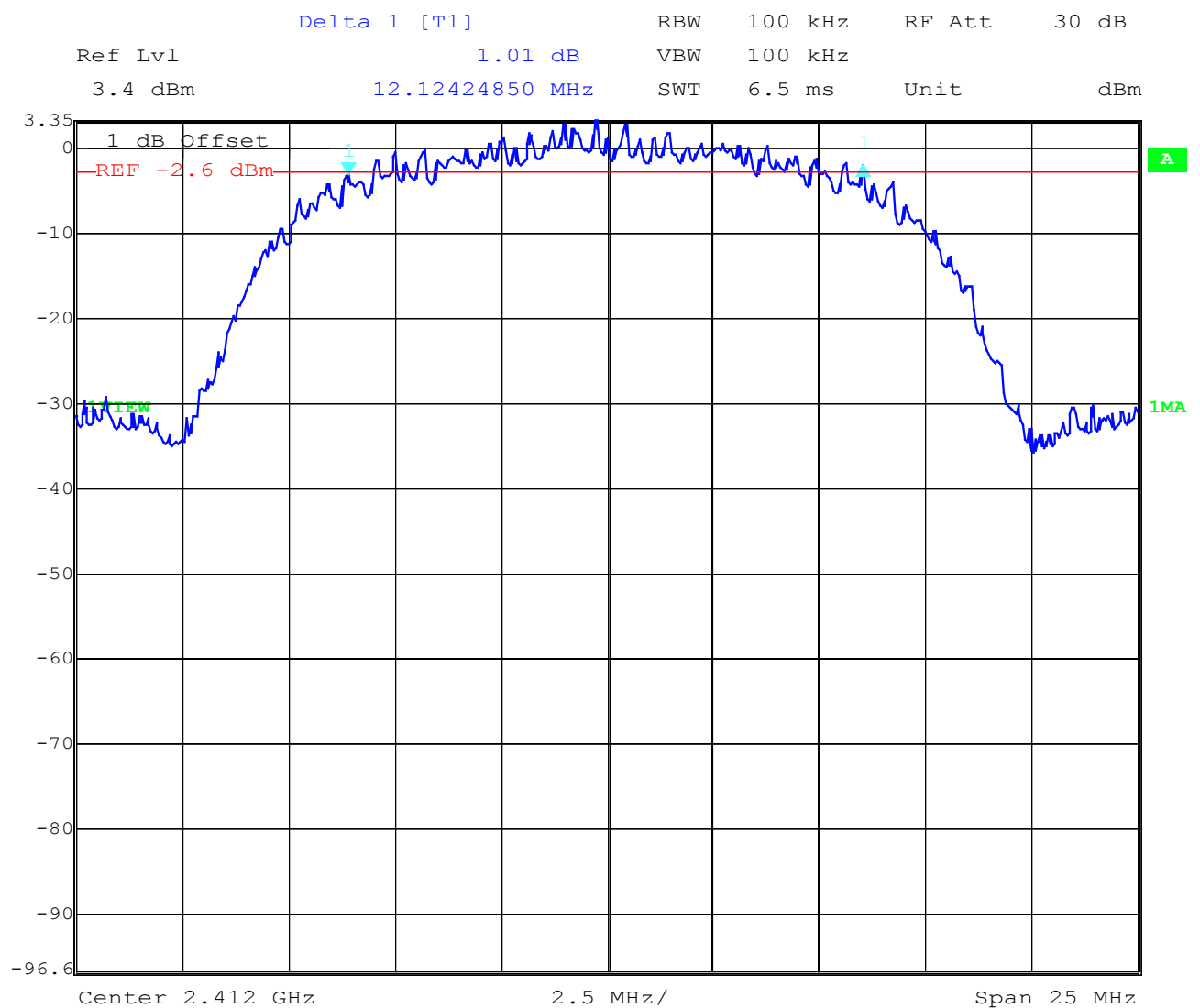
The minimum 6dB bandwidth shall be at least 500 kHz

Spectrum Bandwidth of a DSSS System

§15.247(a)

6 dB bandwidth

Channel 1



Date: 1.DEC.2003 17:52:46

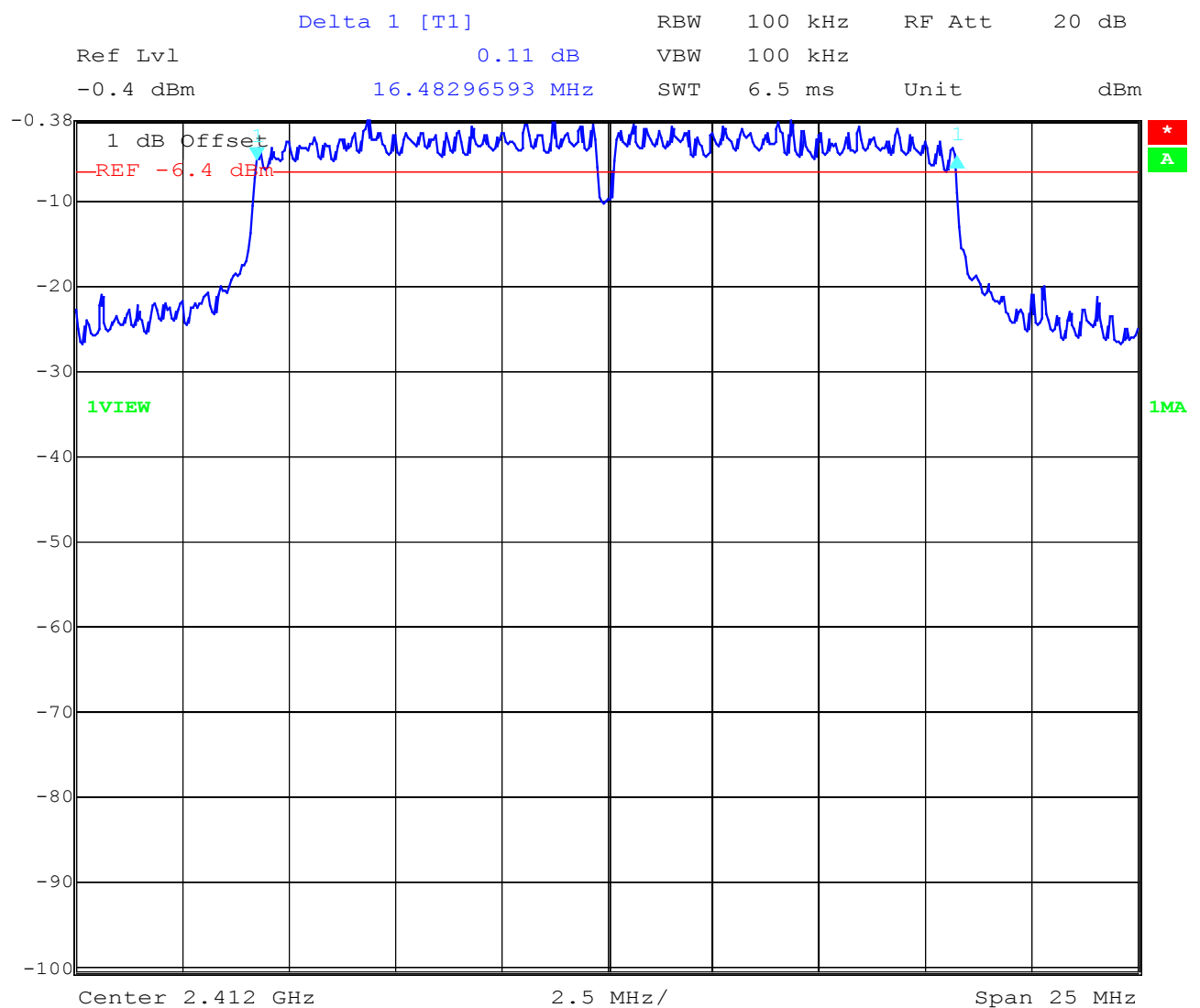
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Spectrum Bandwidth of an OFDM System

§15.247(a)

6 dB bandwidth

Channel 1



Date: 1.DEC.2003 18:00:41

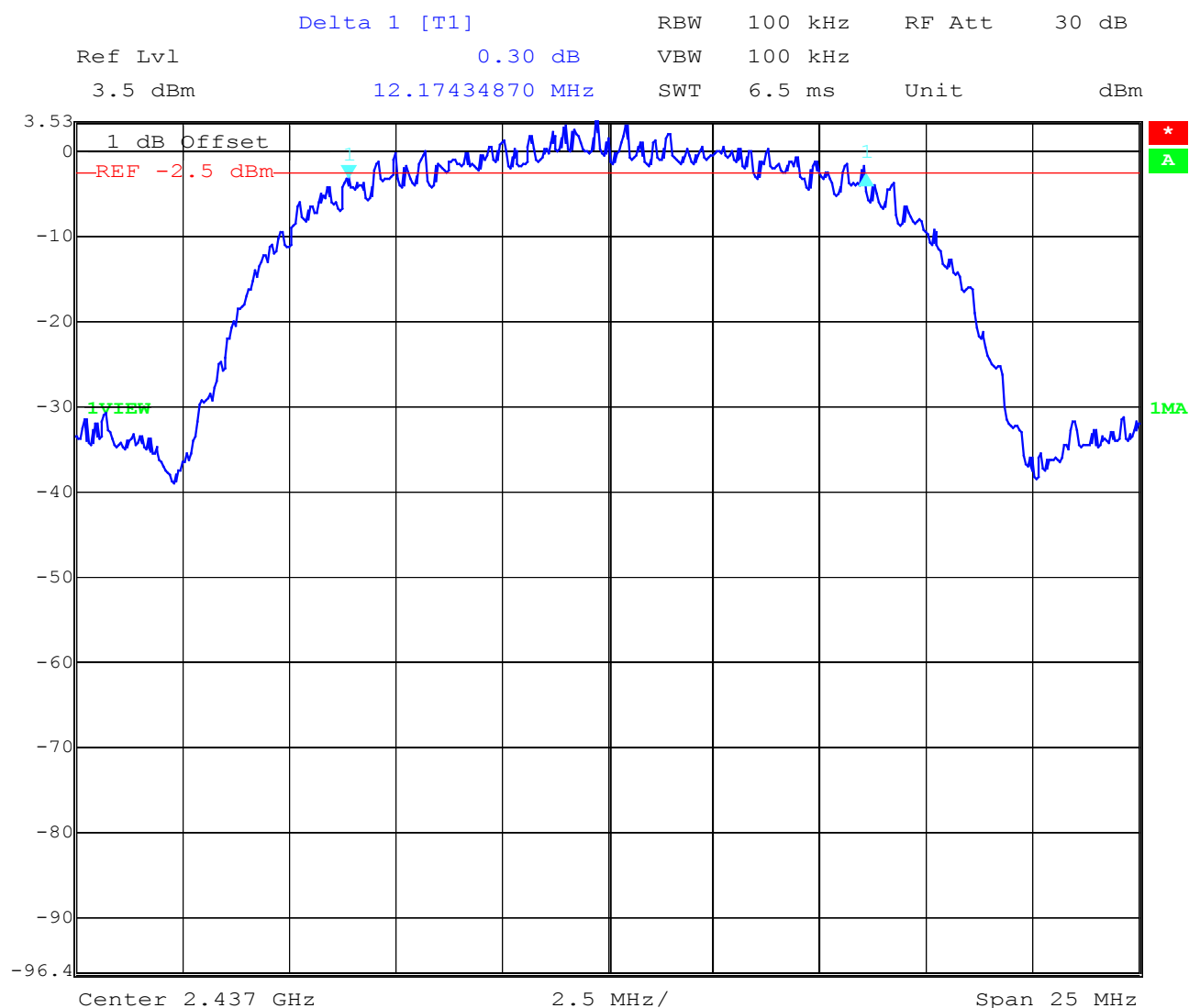
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Spectrum Bandwidth of a DSSS System

§15.247(a)

6 dB bandwidth

Channel 6



Date: 1.DEC.2003 17:54:12

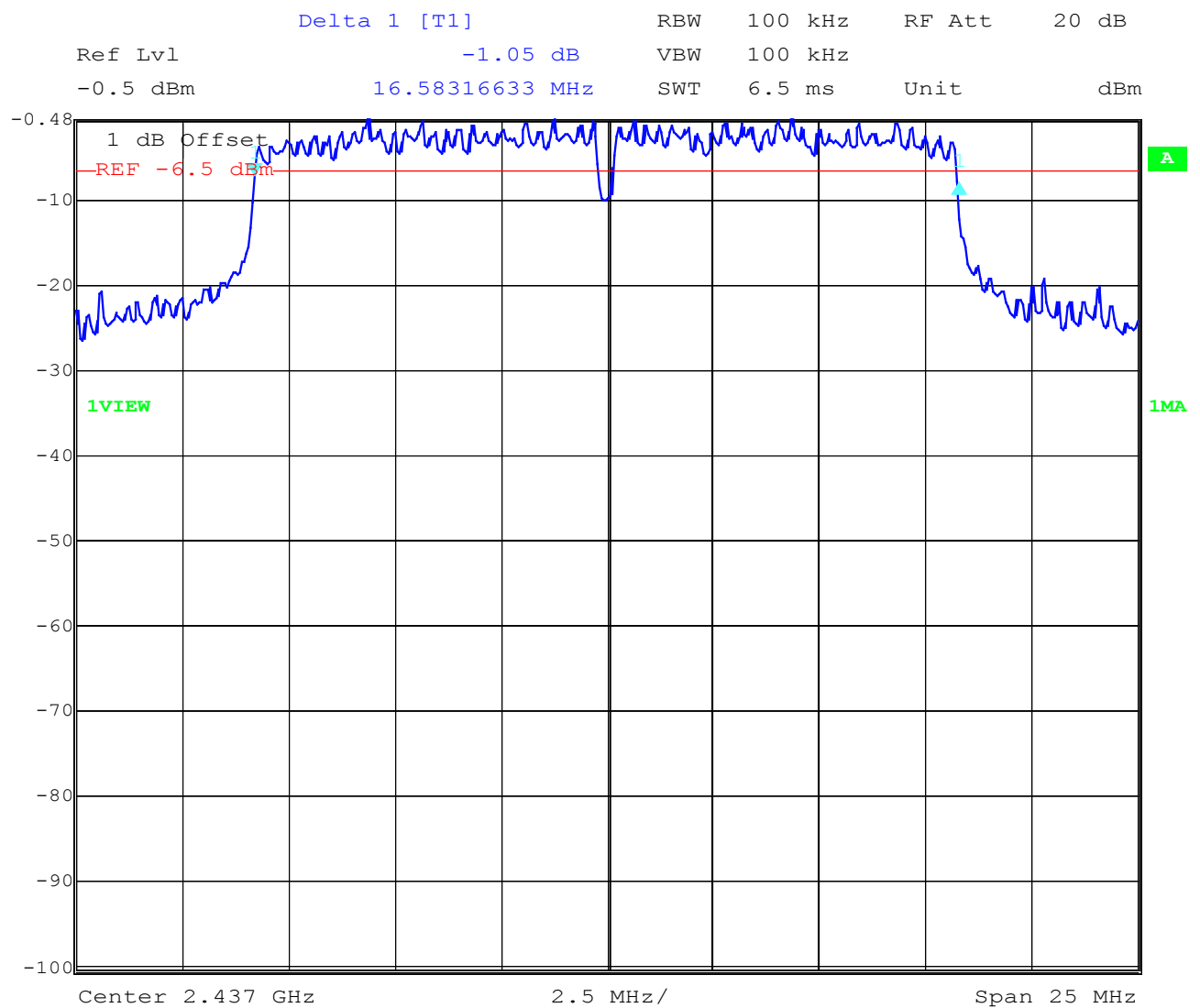
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

Spectrum Bandwidth of an OFDM System

§15.247(a)

6 dB bandwidth

Channel 6



Date: 1.DEC.2003 17:59:26

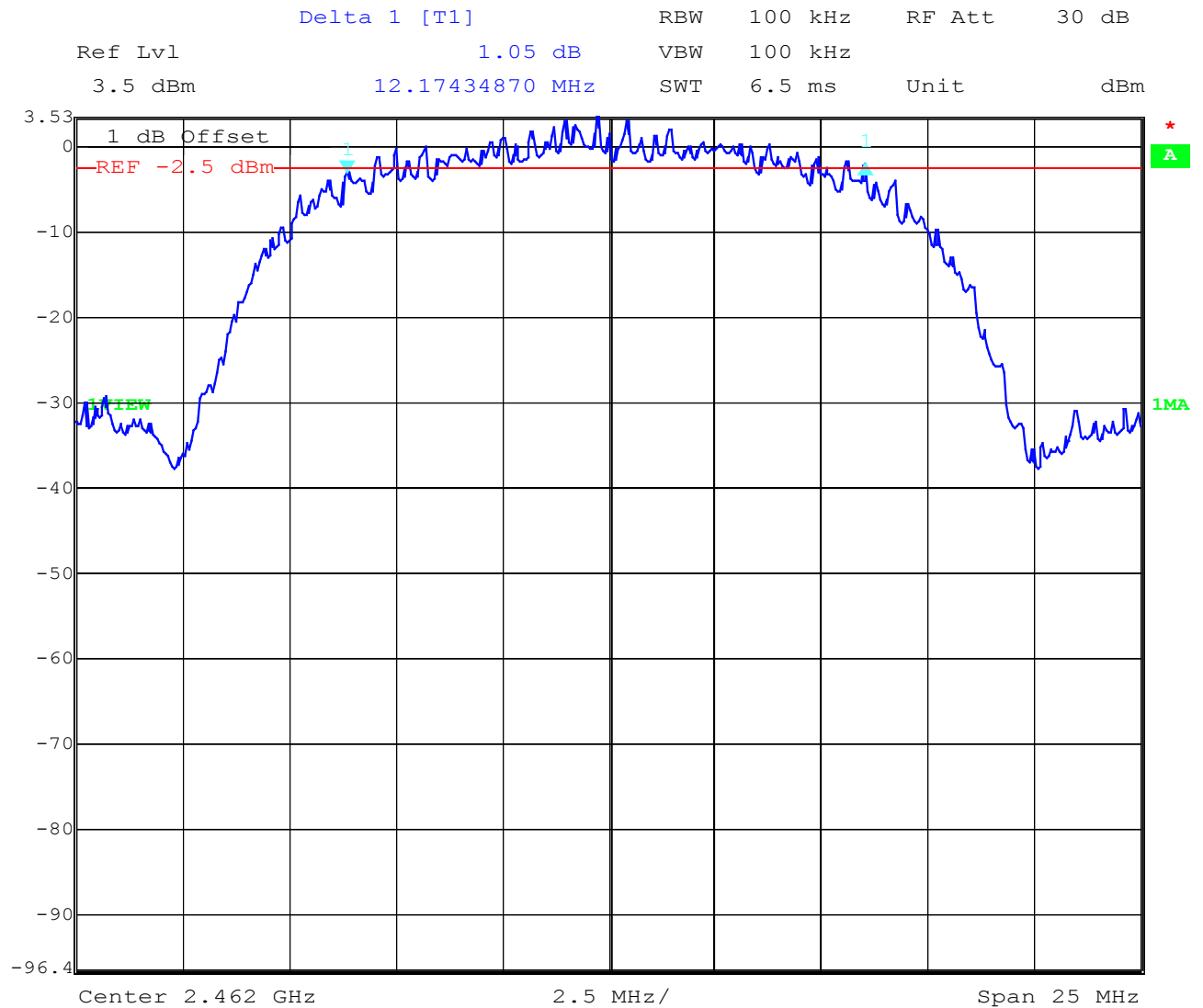
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

Spectrum Bandwidth of a DSSS System

§15.247(a)

6 dB bandwidth

Channel 11:



Date: 1.DEC.2003 17:55:10

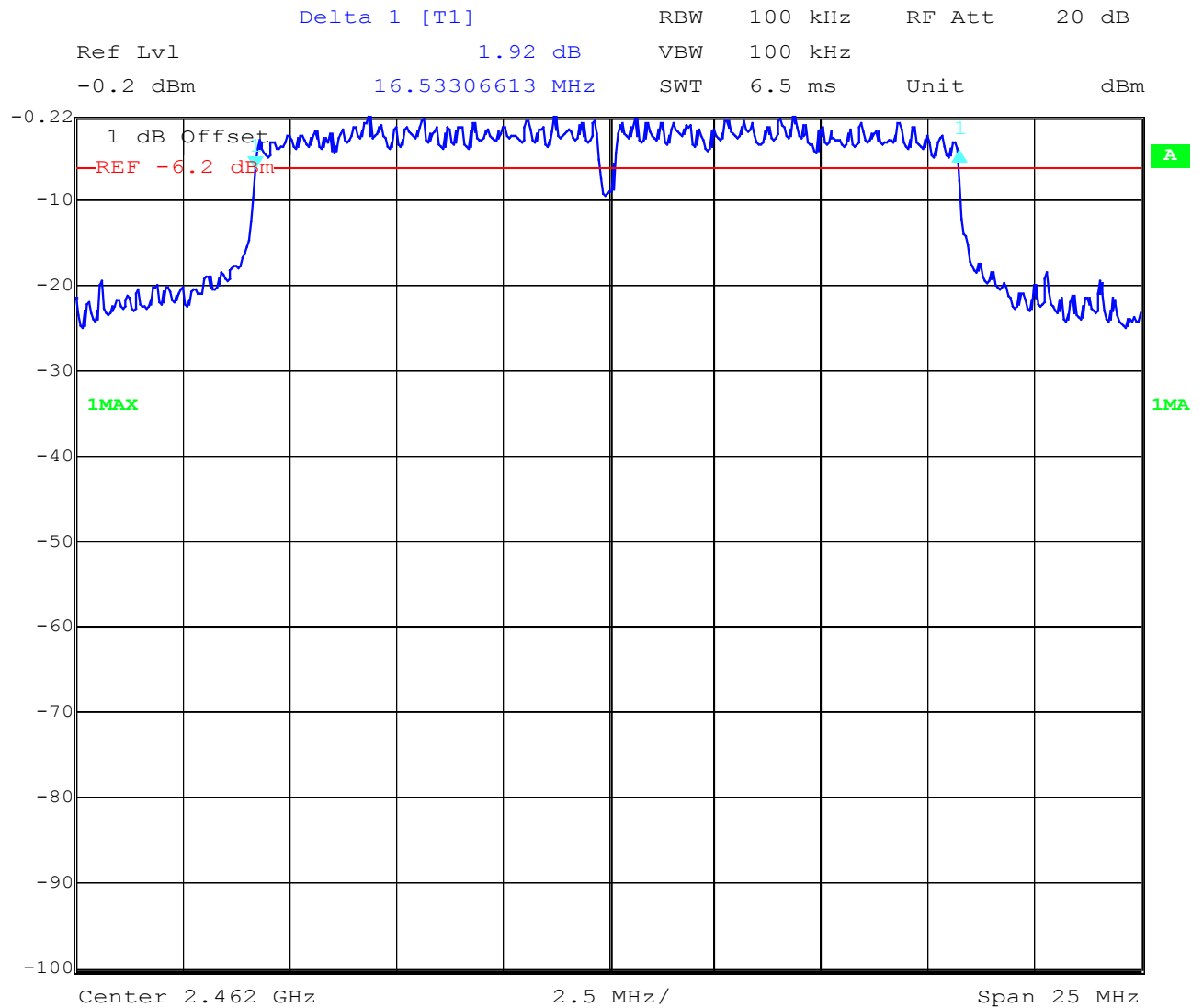
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Spectrum Bandwidth of an OFDM System

§15.247(a)

6 dB bandwidth

Channel 11:



Date: 1.DEC.2003 17:58:14

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

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

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23.0)°C	V_{nom}(3.3)V	Peak :18.90 AV : 10.82	Peak :18.40 AV : 11.32	Peak :18.17 AV : 11.62
Correction factor		+0.84 dB	+0.85 dB	+0.85 dB
Final corrected result		Peak :19.74 AV : 11.66	Peak :19.25 AV : 12.17	Peak :19.02 AV : 12.47
Measurement uncertainty		±0.5dB		

OFDM System

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T_{nom}(23.0)°C	V_{nom}(3.3)V	Peak :18.54 AV : 13.88	Peak :18.40 AV : 13.72	Peak :18.17 AV : 13.54
Correction factor		+2.2 dB	+2.2 dB	+2.2 dB
Final corrected result		Peak :20.47 AV : 16.08	Peak :20.60 AV : 15.92	Peak :20.37 AV : 15.74
Measurement uncertainty		±0.5dB		

RBW/VBW : 10 MHz
The correction factor is calculated by 10*log (measured BW / used BW) (dB)
LIMIT
SUBCLAUSE § 15.247 (b) (1)

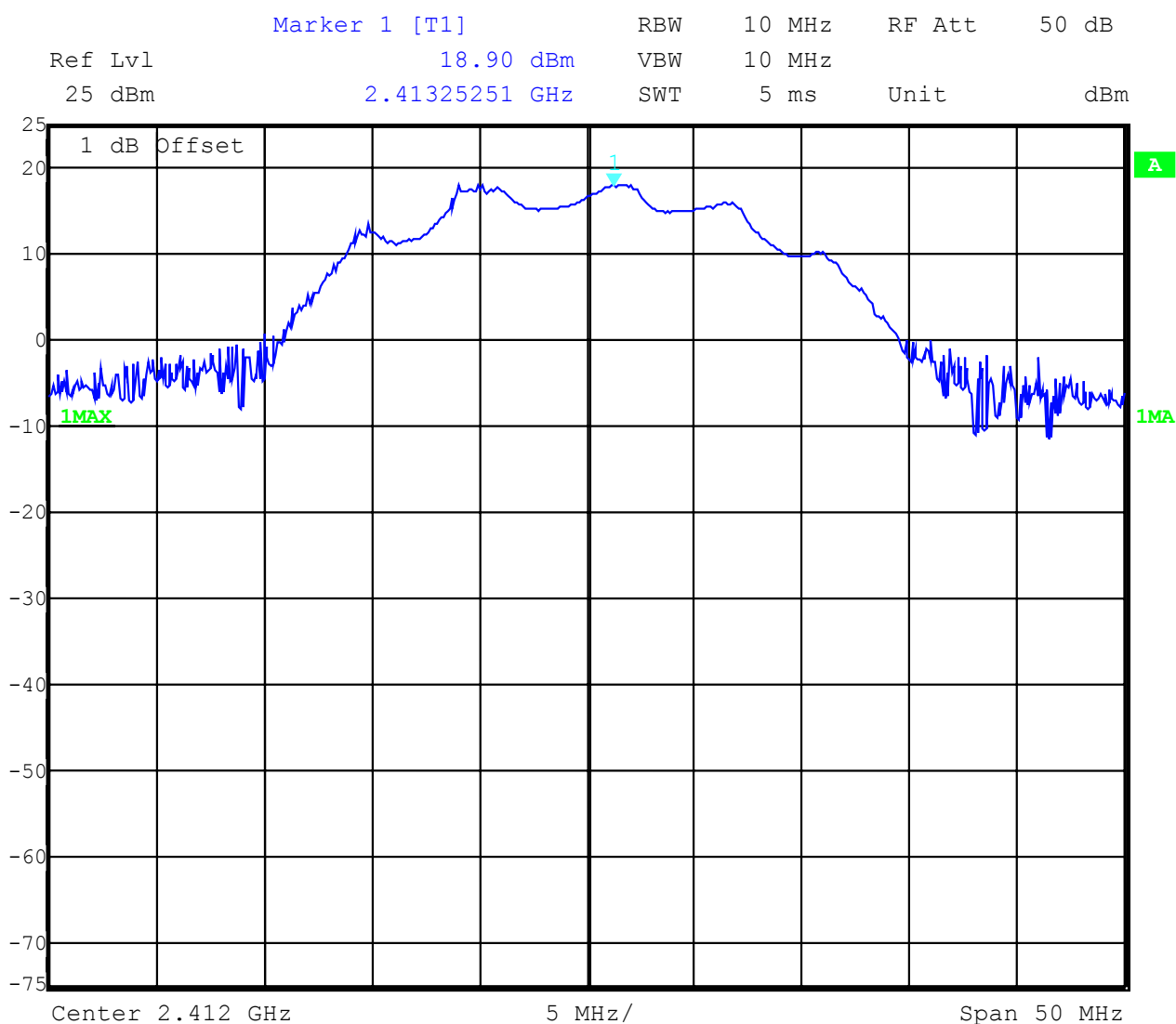
Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt/ 30dBm

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

MAXIMUM PEAK OUTPUT POWER DSSS System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

low channel peak



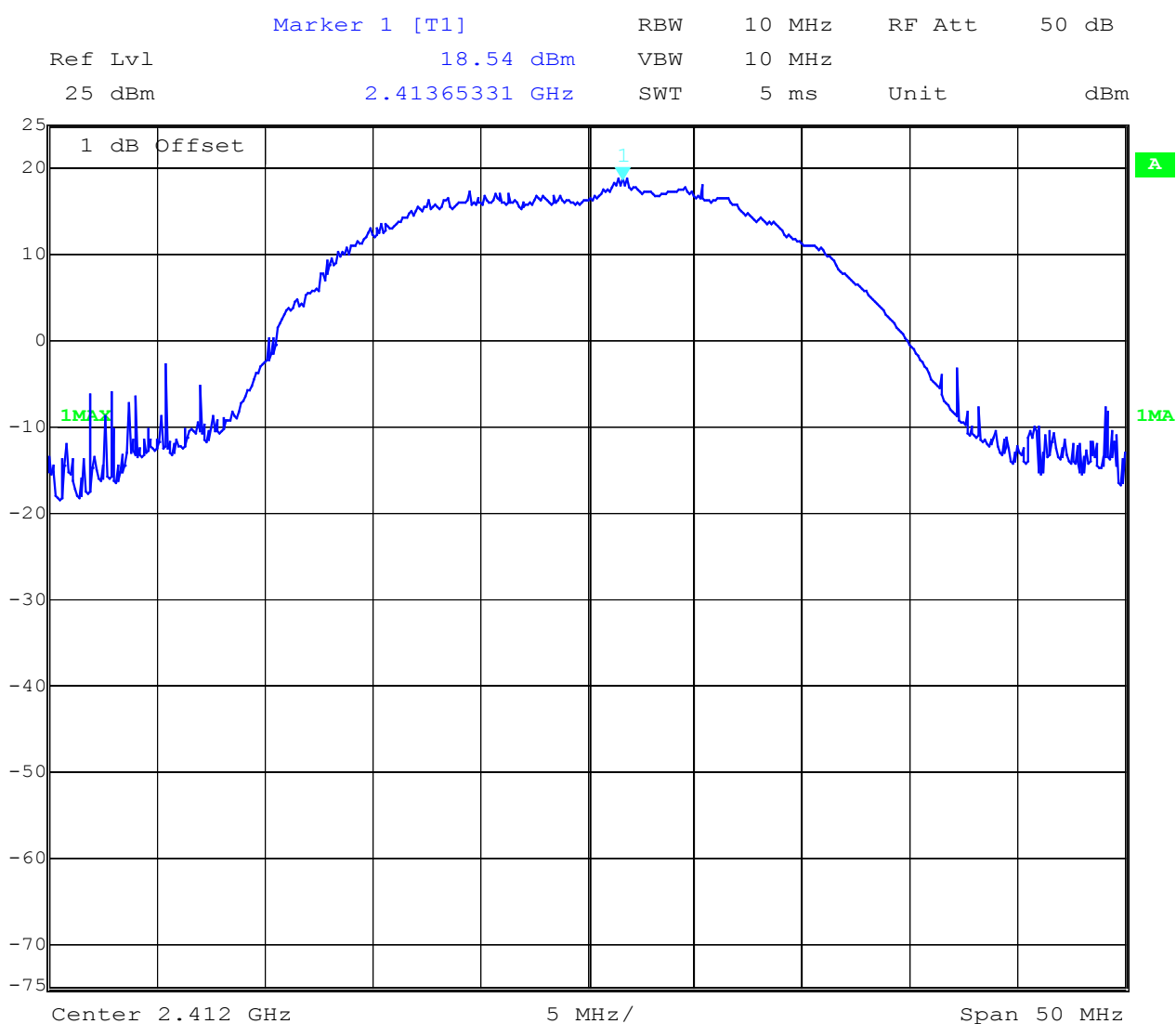
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

MAXIMUM PEAK OUTPUT POWER OFDM System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

low channel peak



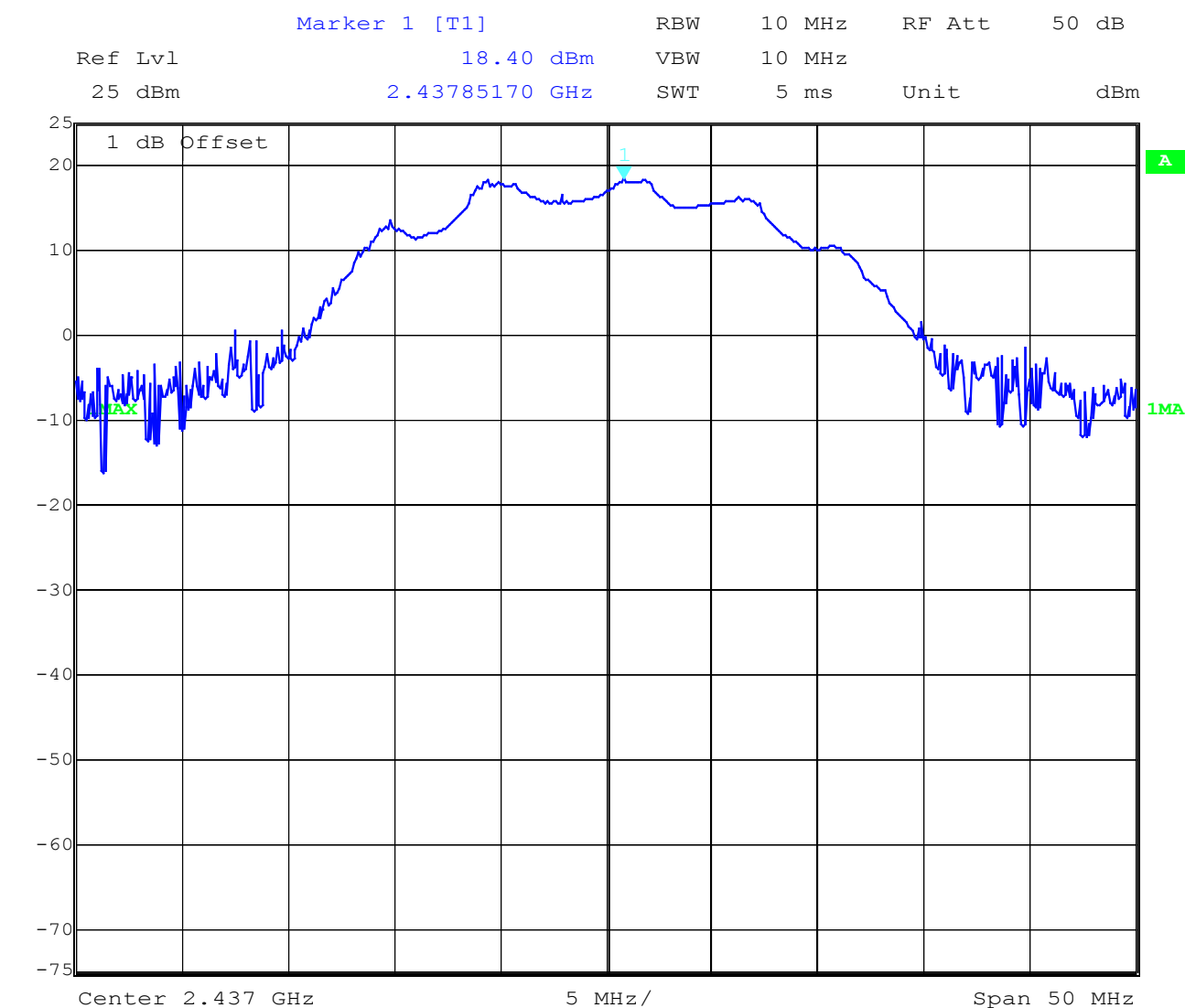
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

MAXIMUM PEAK OUTPUT POWER DSSS System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

mid channel peak



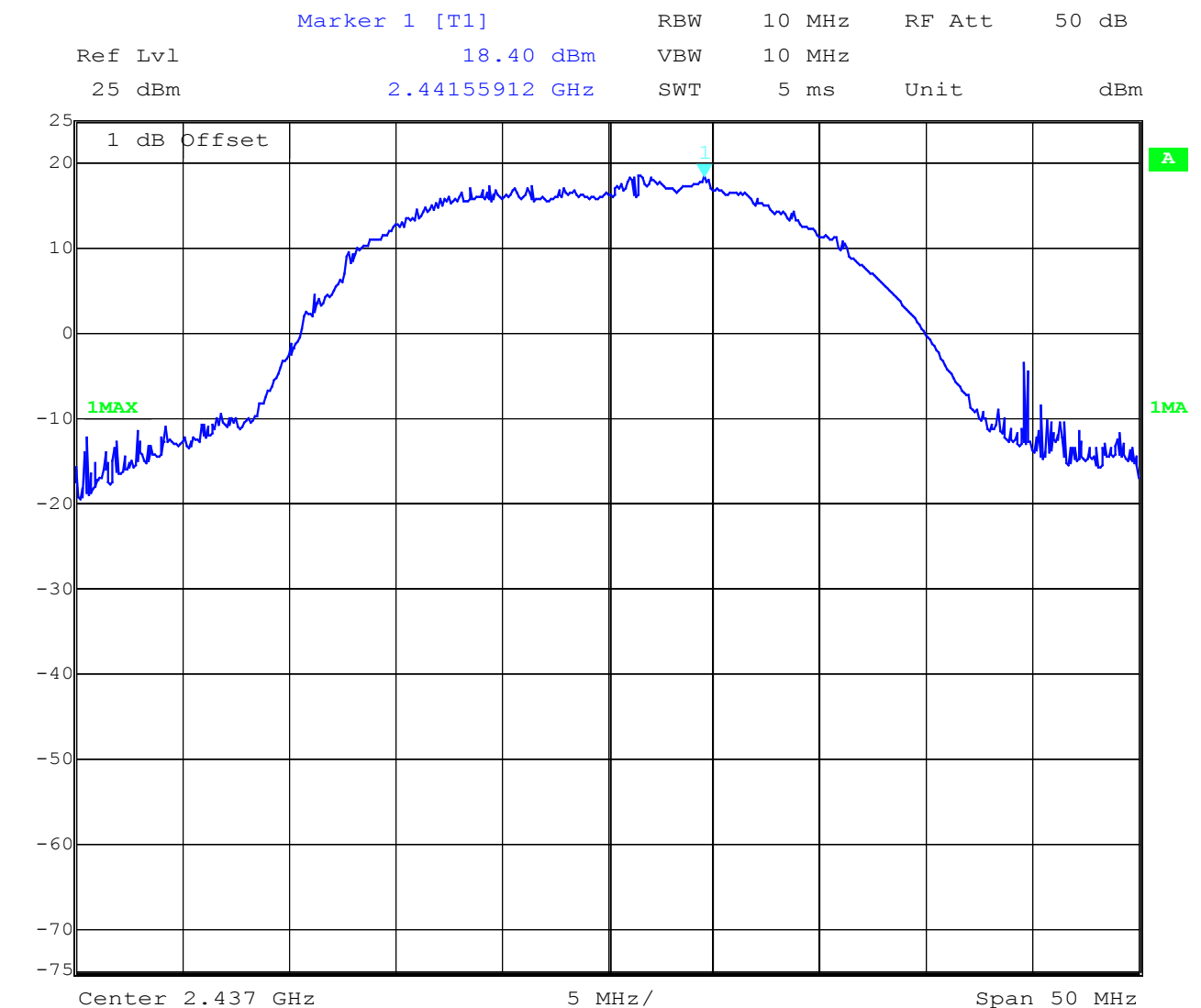
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

MAXIMUM PEAK OUTPUT POWER OFDM System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

mid channel peak



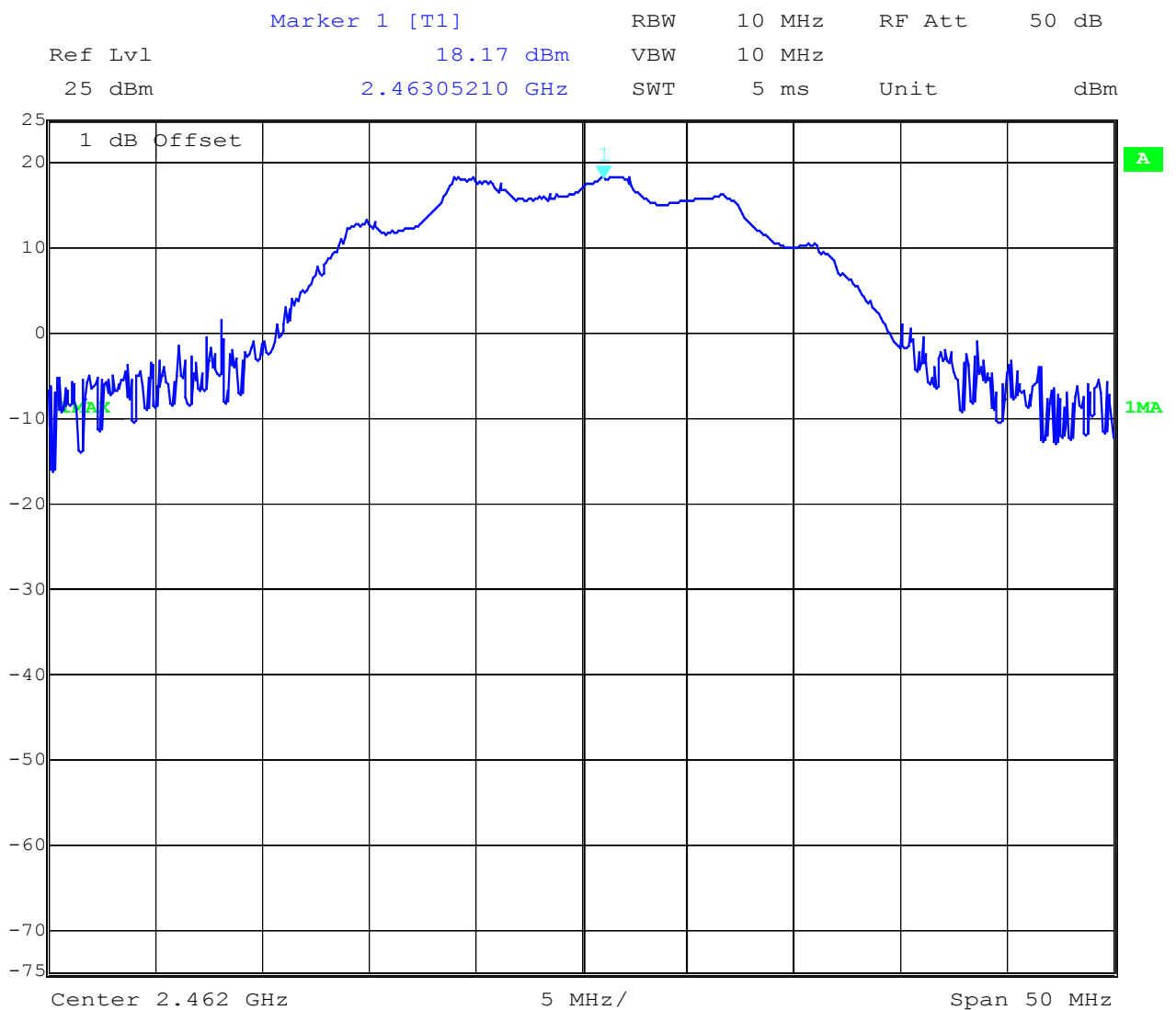
Date: 1.DEC.2003 18:08:30

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

MAXIMUM PEAK OUTPUT POWER DSSS System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

high channel peak



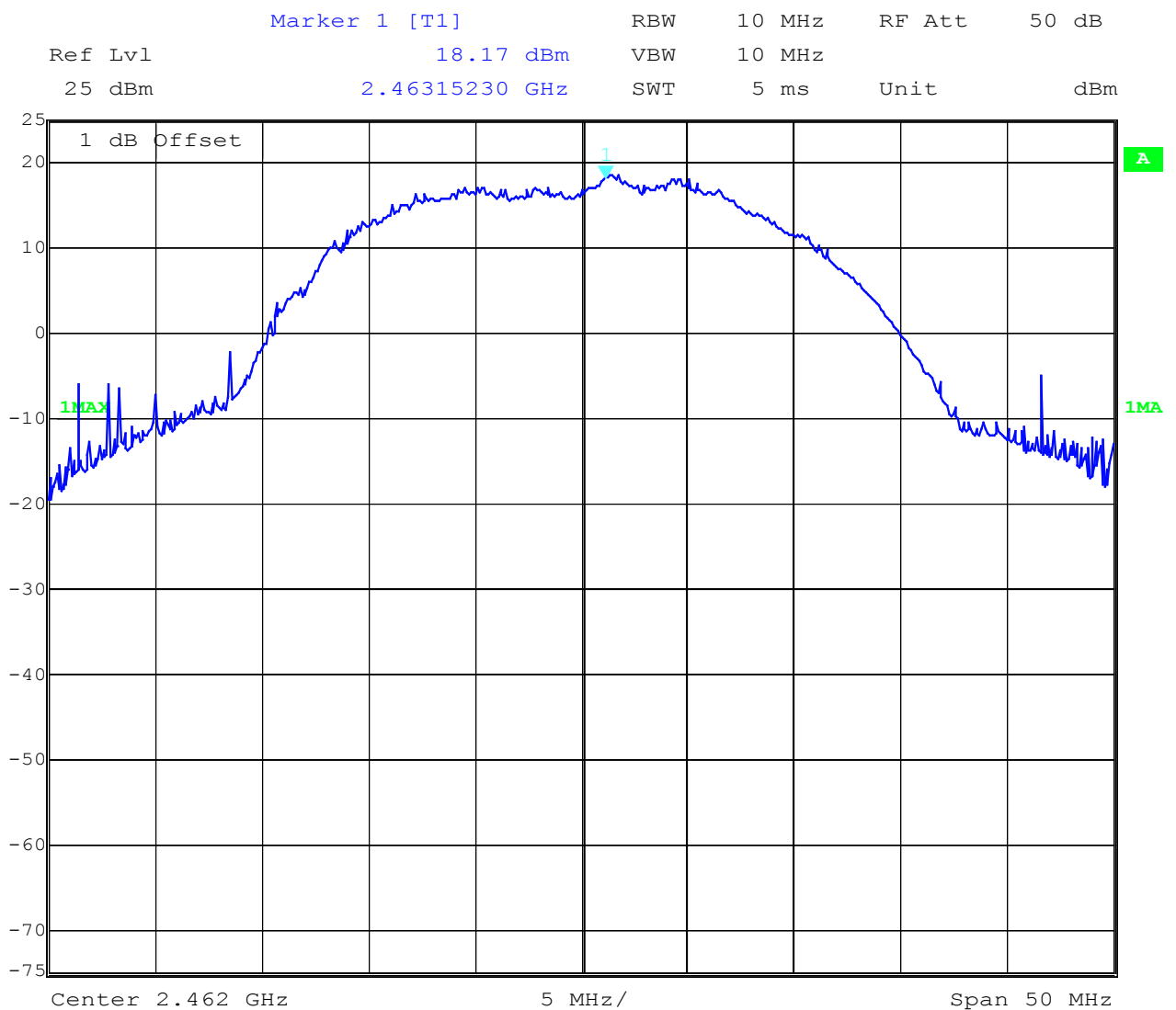
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

MAXIMUM PEAK OUTPUT POWER OFDM System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

high channel peak



Date: 1.DEC.2003 18:09:10

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

**MAXIMUM PEAK OUTPUT POWER
(RADIATED)**

SUBCLAUSE § 15.247 (b) (1)

DSSS System

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW)		
Frequency (MHz)		2412	2437	2462
T_{nom} (23.0)°C	V_{nom} (3.3)V	157 mW 21.96 dBm	146 mW 21.65 dBm	130 mW 21.15 dBm
Correction factor		+0.84 dB	+0.85 dB	+0.85 dB
Final corrected result		191 mW 22.80 dBm	178 mW 22.50 dBm	159 mW 22.00 dBm
Measurement uncertainty		±3dB		

OFDM System

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW)		
Frequency (MHz)		2412	2437	2462
T_{nom} (23.0)°C	V_{nom} (3.3)V	93 mW 19.70 dBm	105 mW 20.20 dBm	91 mW 19.60 dBm
Correction factor		+2.2 dB	+2.2 dB	+2.2 dB
Final corrected result		155 mW 21.90 dBm	174 mW 22.40 dBm	151 mW 21.80 dBm
Measurement uncertainty		±3dB		

RBW/VBW : 10 MHz

 The correction factor is calculated by $10 \cdot \log(\text{measured BW} / \text{used BW})$ (dB)

Measured at a distance of 3m

LIMIT

SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30 dBm

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

MPE calculation

These equations are generally accurate in the far field of an antenna but will over predict power density in the near field, where they could be used for making a “worst case” prediction.

$$S = PG/4\pi R^2$$

where S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units e.g. mW)

G = power gain of the antenna in the direction of interest relative to the isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units e.g. cm)

or,

$$S = EIRP/4\pi R^2$$

where EIRP = equivalent isotropically radiated power

Calculation:

(Calculated for max. EIRP)

EIRP: 22.8 dBm (190.5 mW)

calculated at distance of 20 cm

$$\begin{aligned}\text{power density} &= 190.5/4\pi 20^2 \\ &= 0.038 \text{ mW/ cm}^2\end{aligned}$$

Limit:

1mW/ cm² is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

Power spectral density

§15.247 (d)

DSSS System

TEST CONDITIONS		RF POWER LEVEL IN 3 kHz BW		
Frequency (MHz)		2412	2437	2462
T _{nom} (22.4)°C	V _{nom} (3.3)V	-10.66 dBm	-10.35 dBm	-10.37 dBm
Measurement uncertainty		±3dB		

OFDM System

TEST CONDITIONS		RF POWER LEVEL IN 3 kHz BW		
Frequency (MHz)		2412	2437	2462
T _{nom} (22.4)°C	V _{nom} (3.3)V	-14.44 dBm	-14.17 dBm	-13.99 dBm
Measurement uncertainty		±3dB		

The measurement was performed with the power density funktion of the analyzer.

LIMIT

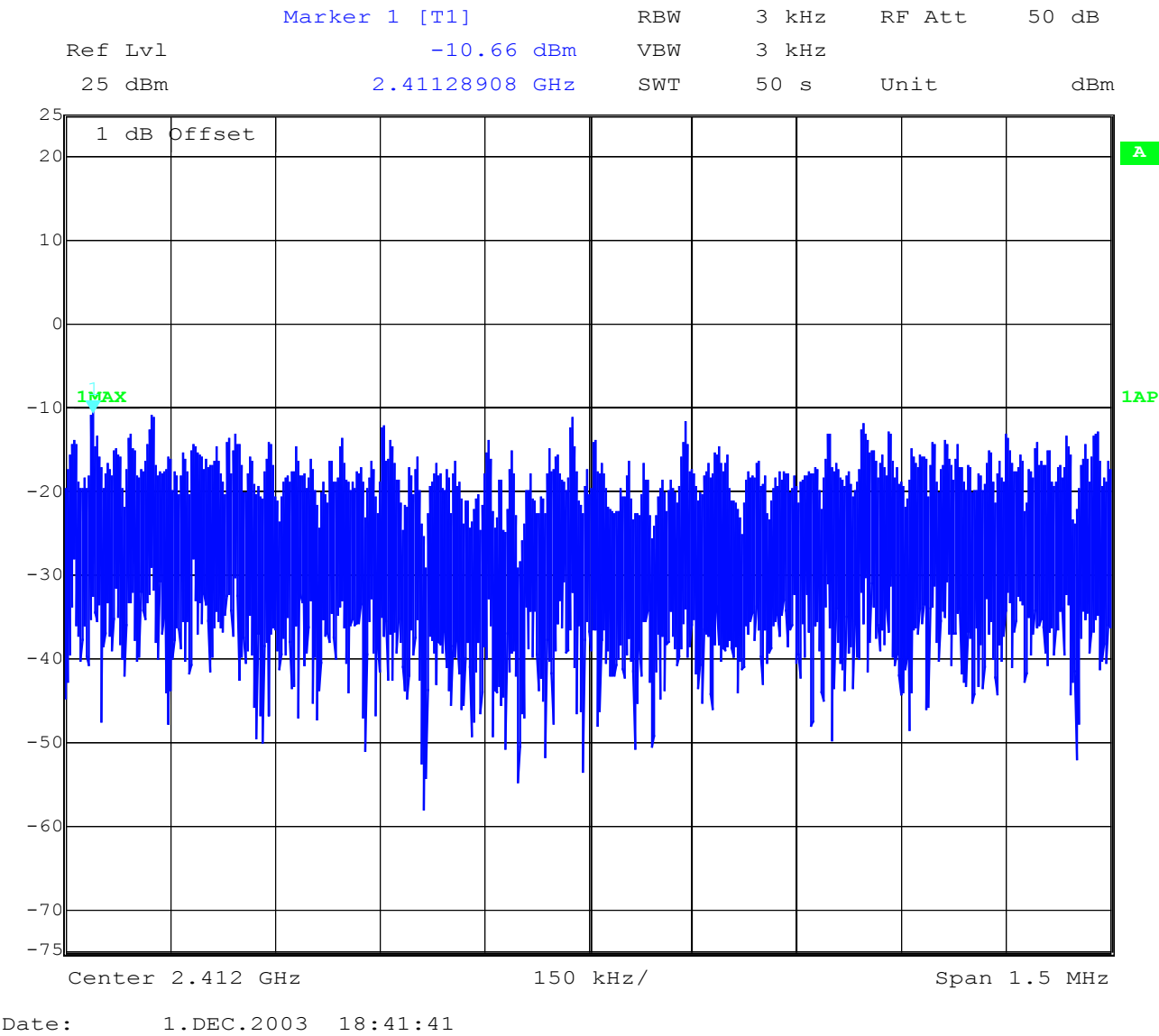
SUBCLAUSE §15.247(d)

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

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

POWER SPECTRAL DENSITY SUBCLAUSE § 15.247 (d)
2412 MHz

DSSS System

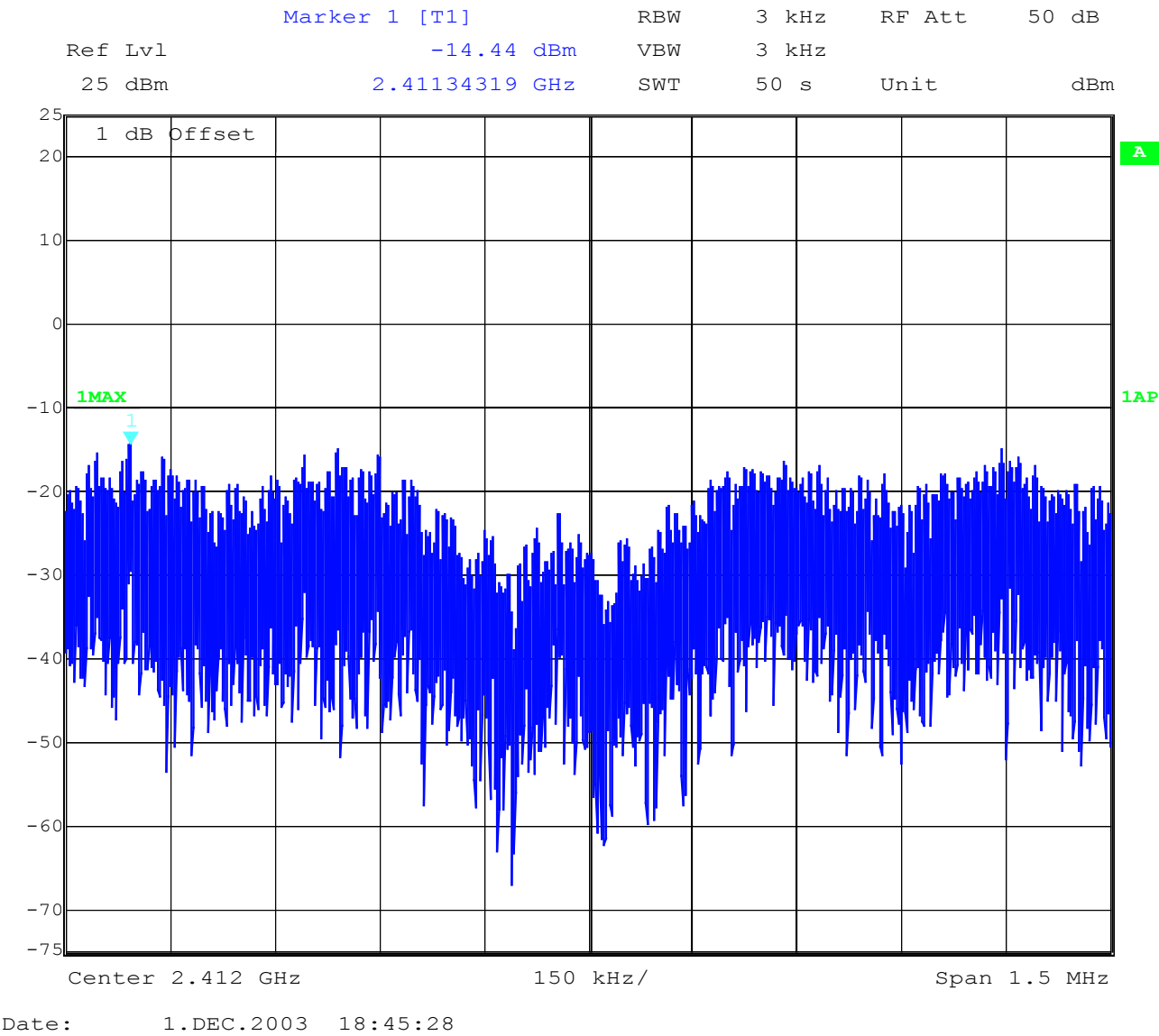


LIMIT SUBCLAUSE §15.247(d)

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

POWER SPECTRAL DENSITY SUBCLAUSE § 15.247 (d)
2412 MHz

OFDM System



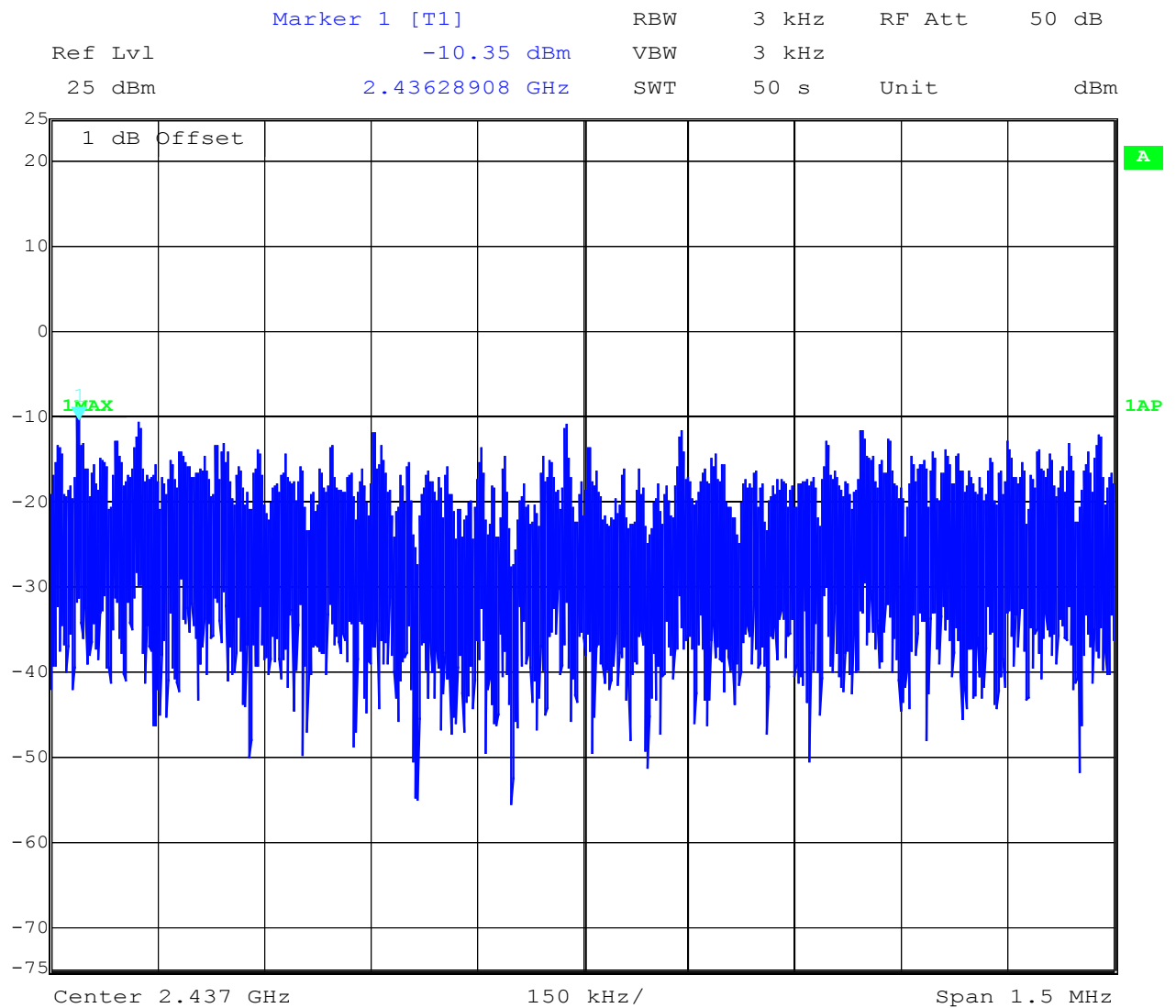
LIMIT SUBCLAUSE §15.247(d)

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

POWER SPECTRAL DENSITY 2437 MHz

SUBCLAUSE § 15.247 (d)

DSSS System



Date: 1.DEC.2003 18:43:01

LIMIT

SUBCLAUSE §15.247(d)

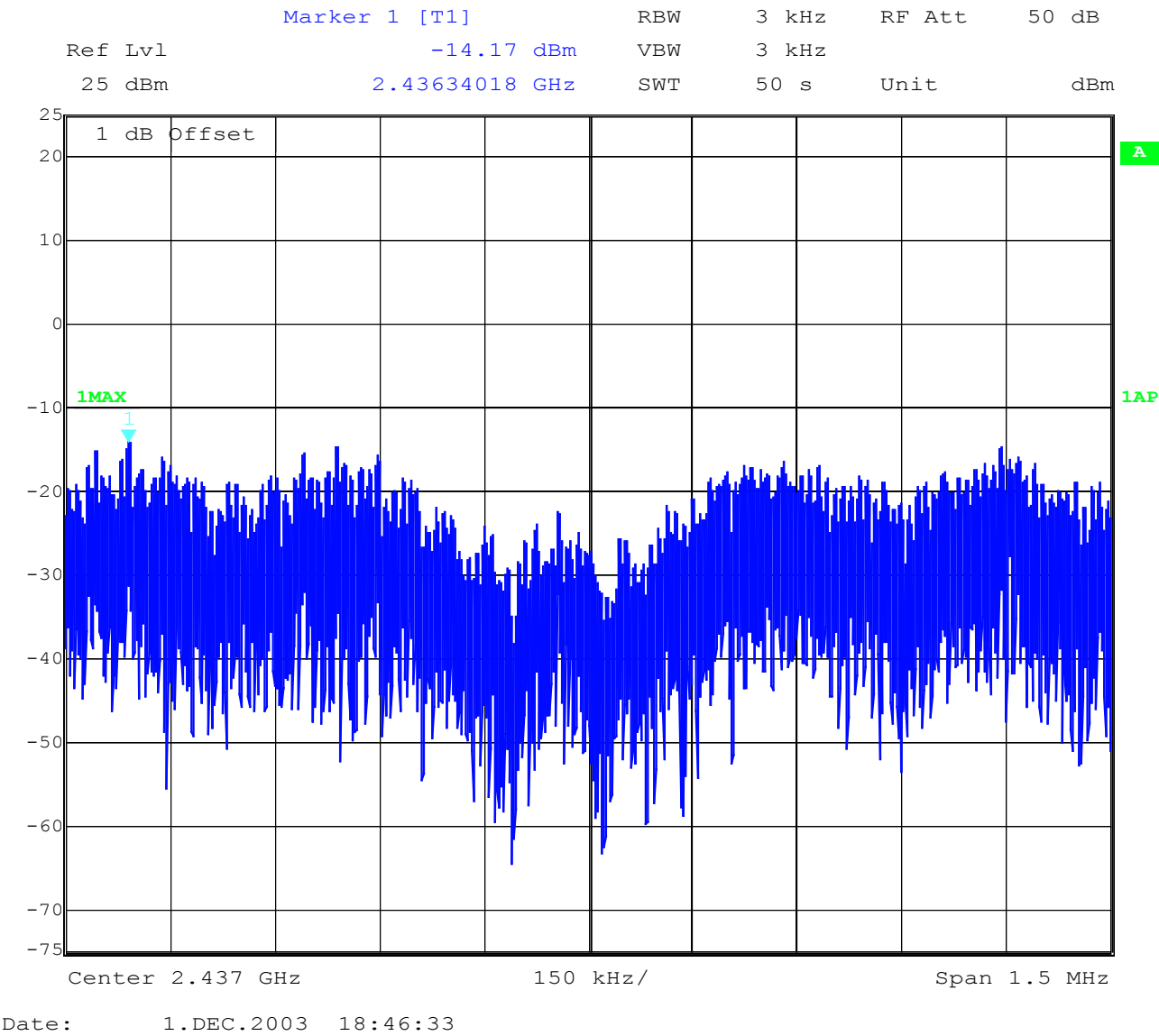
The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

POWER SPECTRAL DENSITY
2437 MHz

SUBCLAUSE § 15.247 (d)

OFDM System



LIMIT

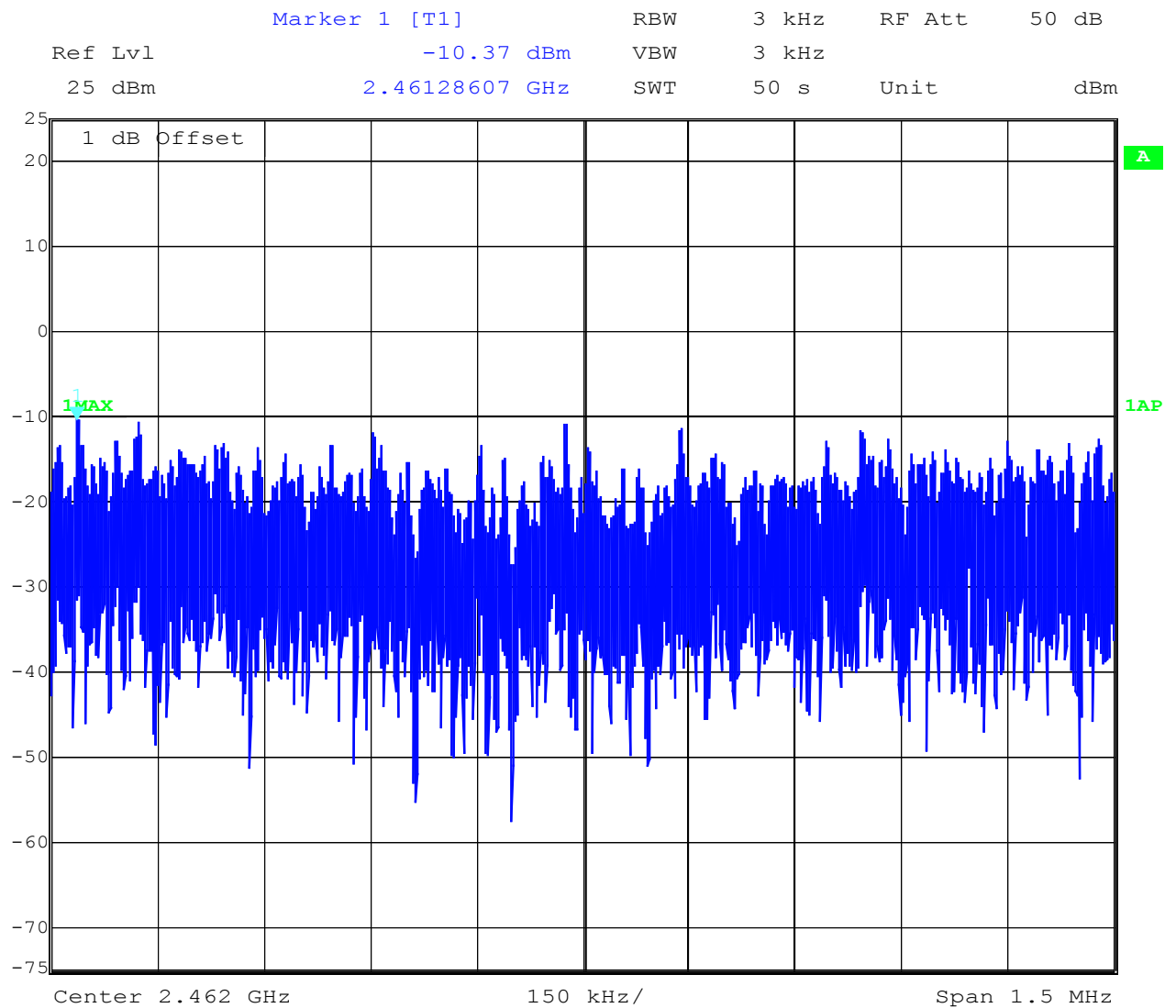
SUBCLAUSE §15.247(d)

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

POWER SPECTRAL DENSITY 2462 MHz

SUBCLAUSE § 15.247 (d)

DSSS System



Date: 1.DEC.2003 18:44:05

LIMIT

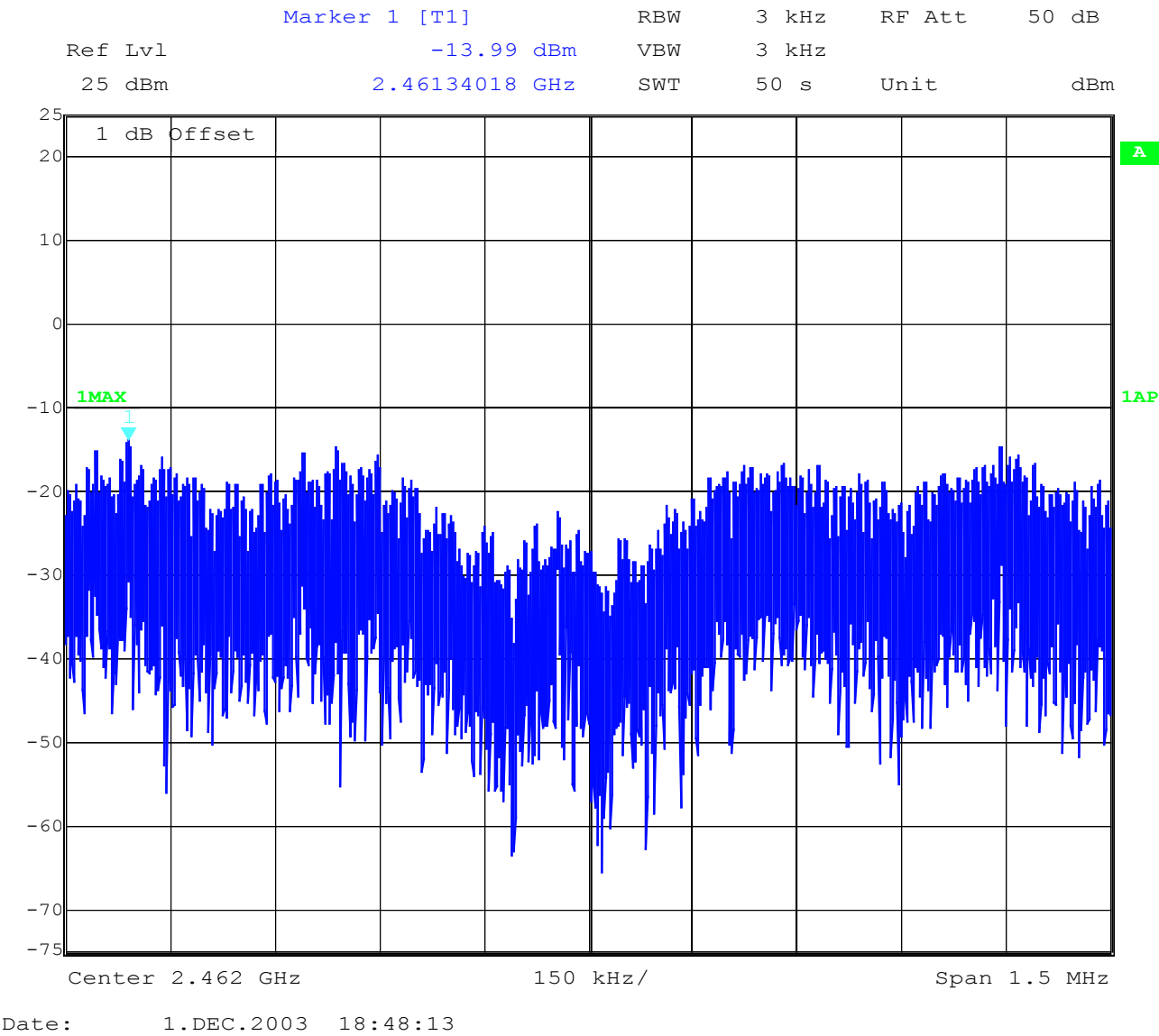
SUBCLAUSE §15.247(d)

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

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

POWER SPECTRAL DENSITY SUBCLAUSE § 15.247 (d)
2462 MHz

OFDM System



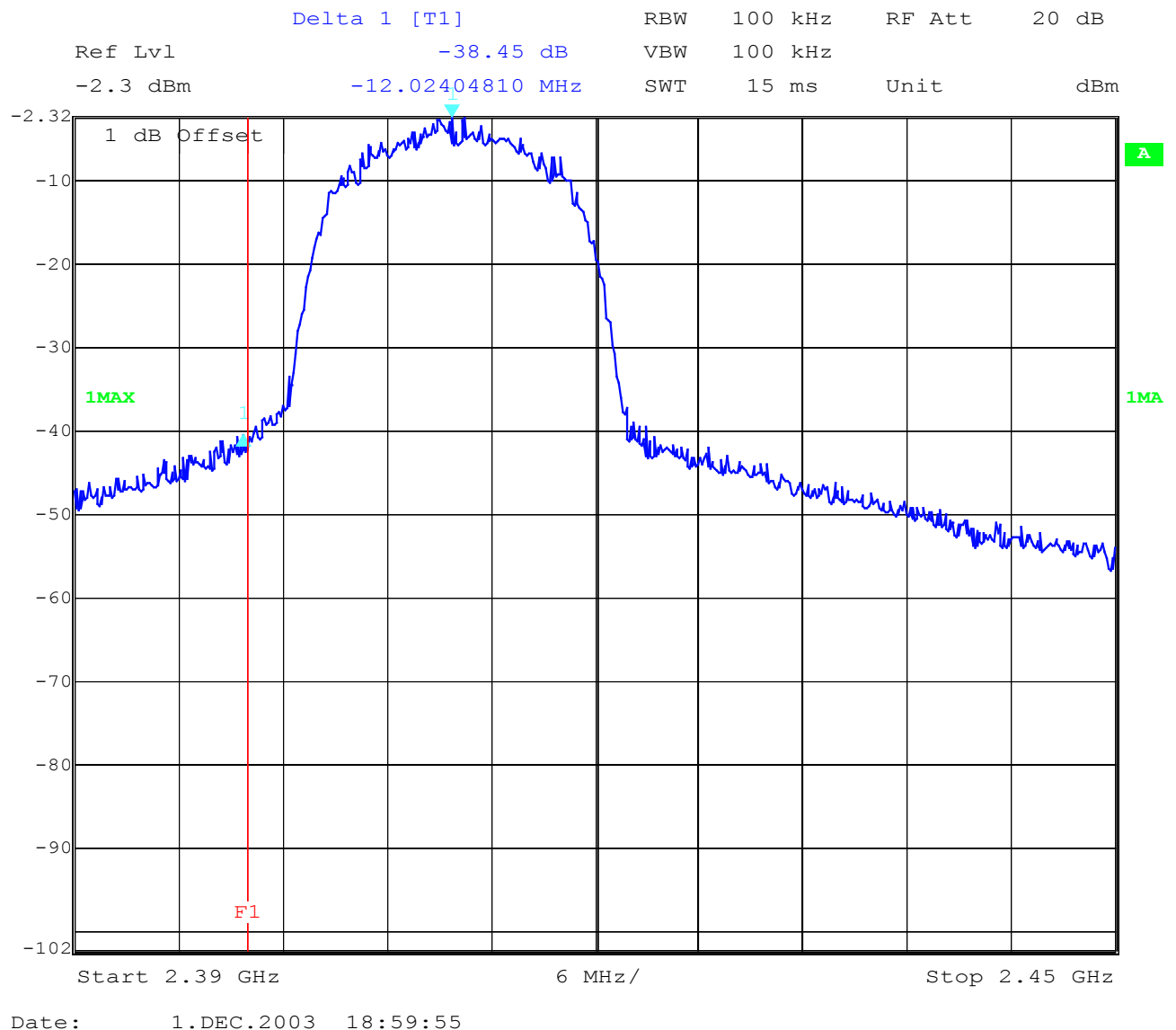
LIMIT SUBCLAUSE §15.247(d)

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

Band-edge compliance of conducted emissions Low channel

§15.247 (c)

DSSS System



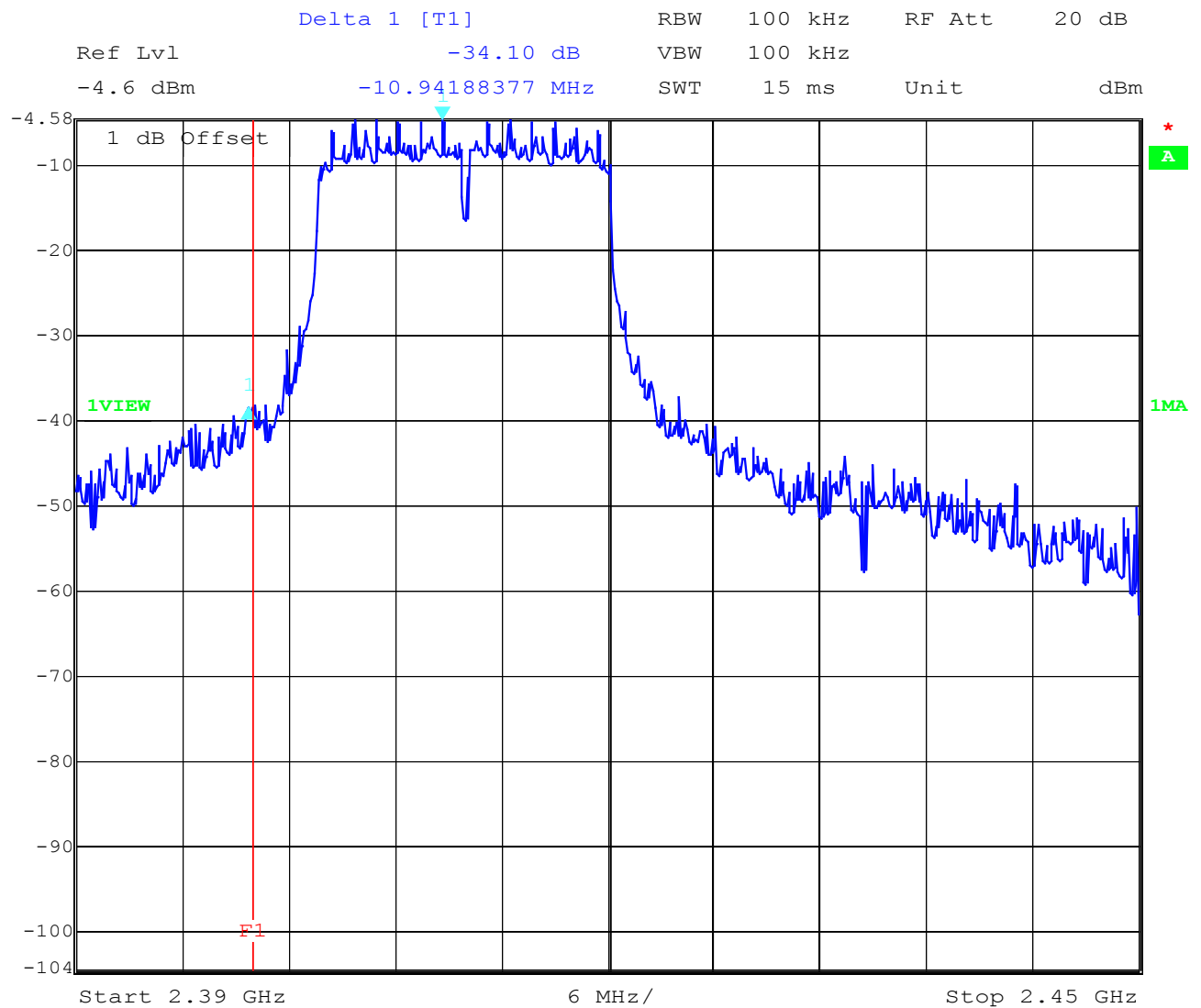
Delta dB = 38.45 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance of conducted emissions Low channel

§15.247 (c)

OFDM System



Date: 1.DEC.2003 19:00:45

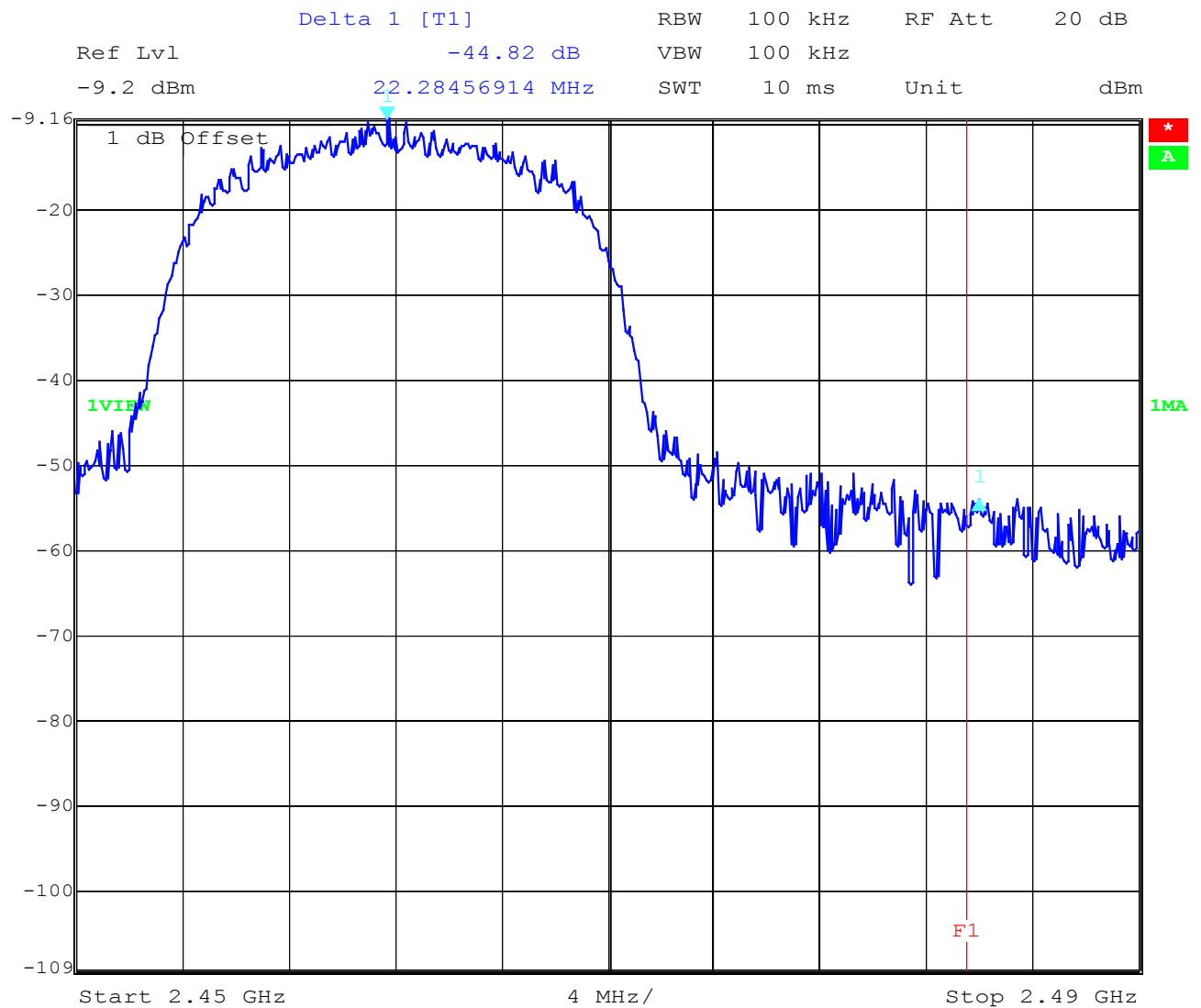
Delta dB = 34.1 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance of conducted emissions high channel

§15.247 (c)

DSSS System



Date: 1.DEC.2003 19:04:08

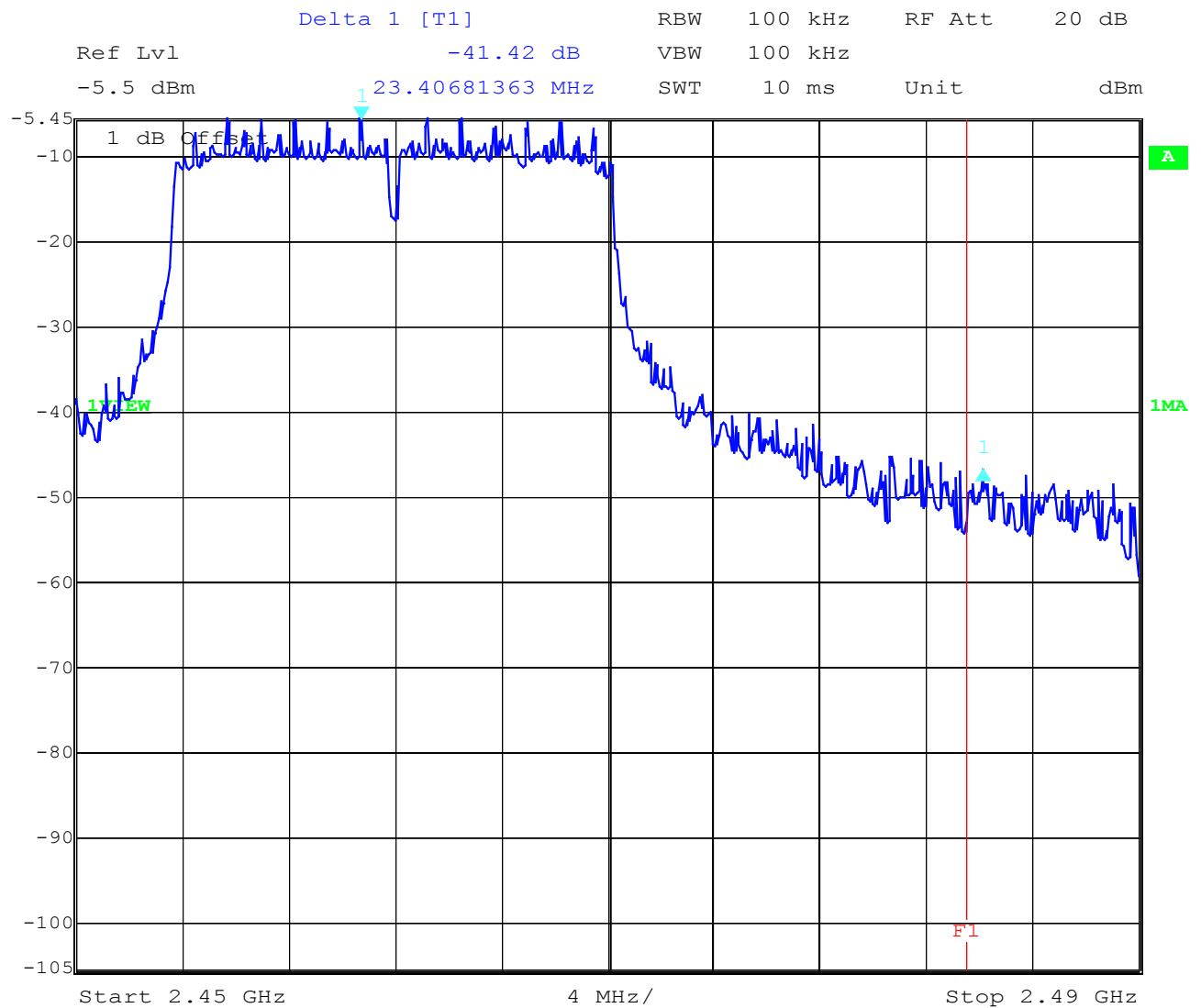
Delta dB = 44.82 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance of conducted emissions high channel

§15.247 (c)

OFDM System



Date: 1.DEC.2003 19:03:01

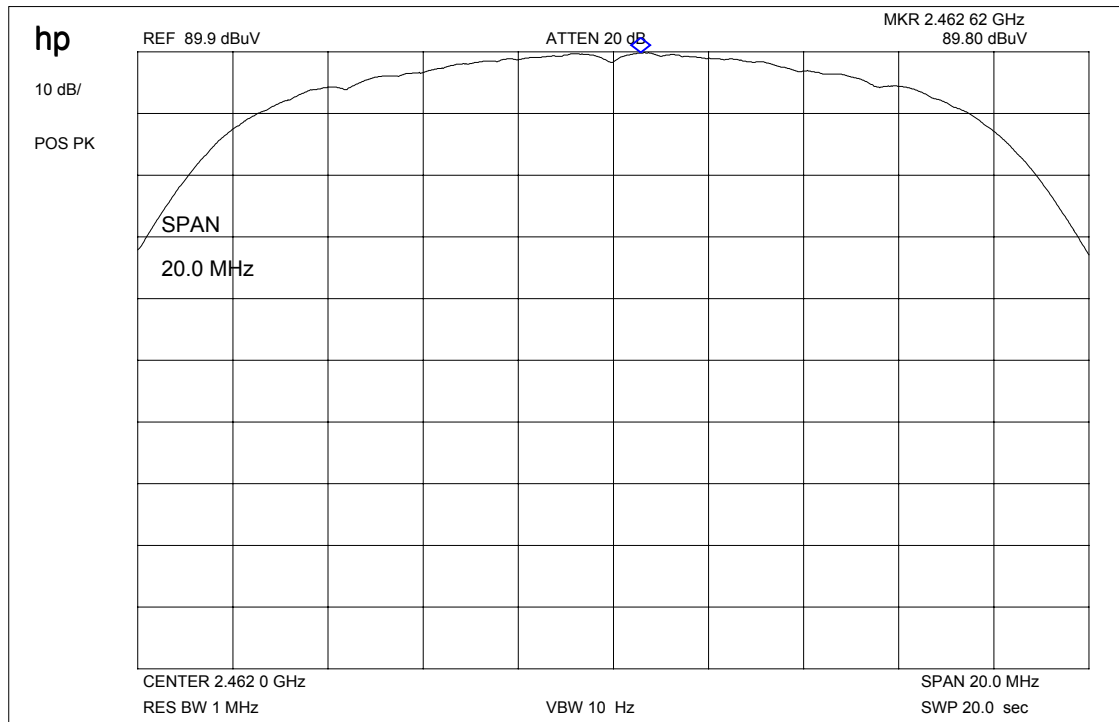
Delta dB = 41.42 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance radiated

§15.247 (c)

Max. field strength in 3m distance average
DSSS System



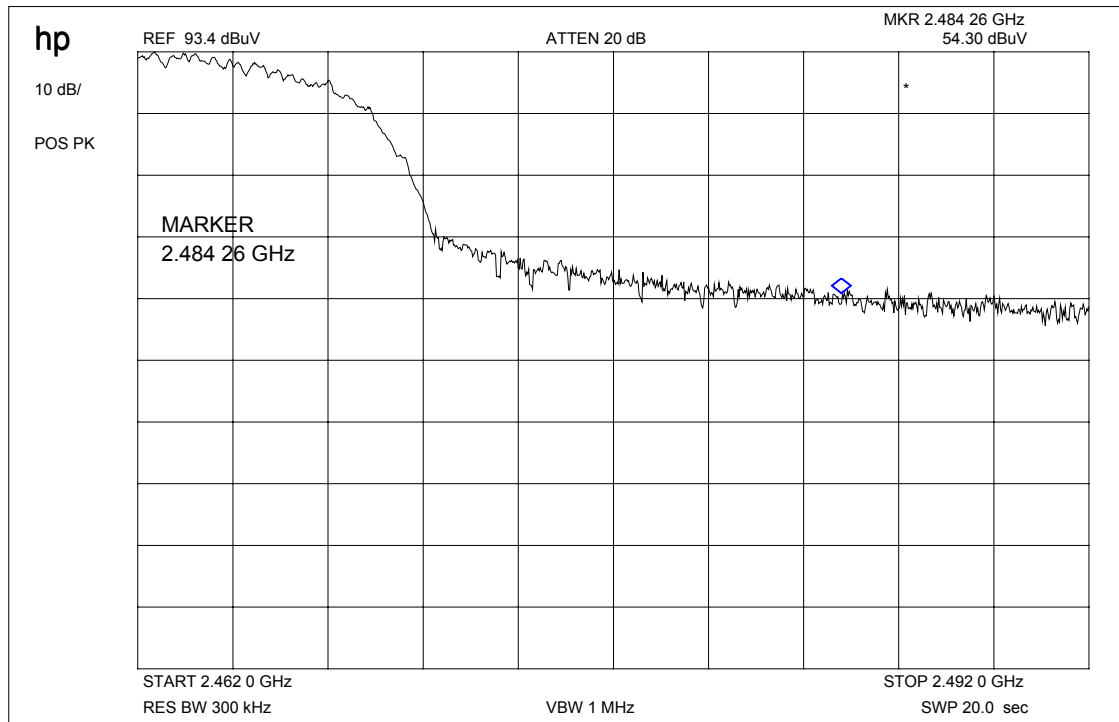
Frequency	Meter reading	Cable loss	Antenna factor	Results
2462 MHz	89.2 dB μ V	7.8 dB	-7.2	89.8 dB μ V/m

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance radiated

§15.247 (c)

DSSS System

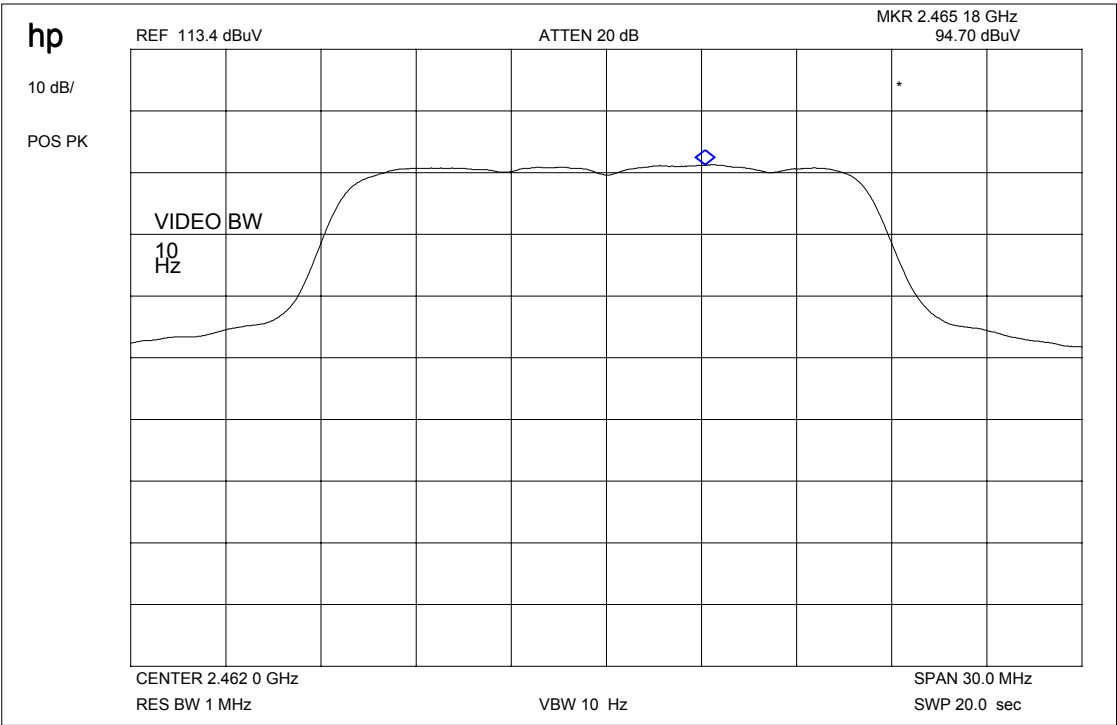


Delta dB = 39.1 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance radiated §15.247 (c)

Max. field strength in 3m distance average
OFDM System



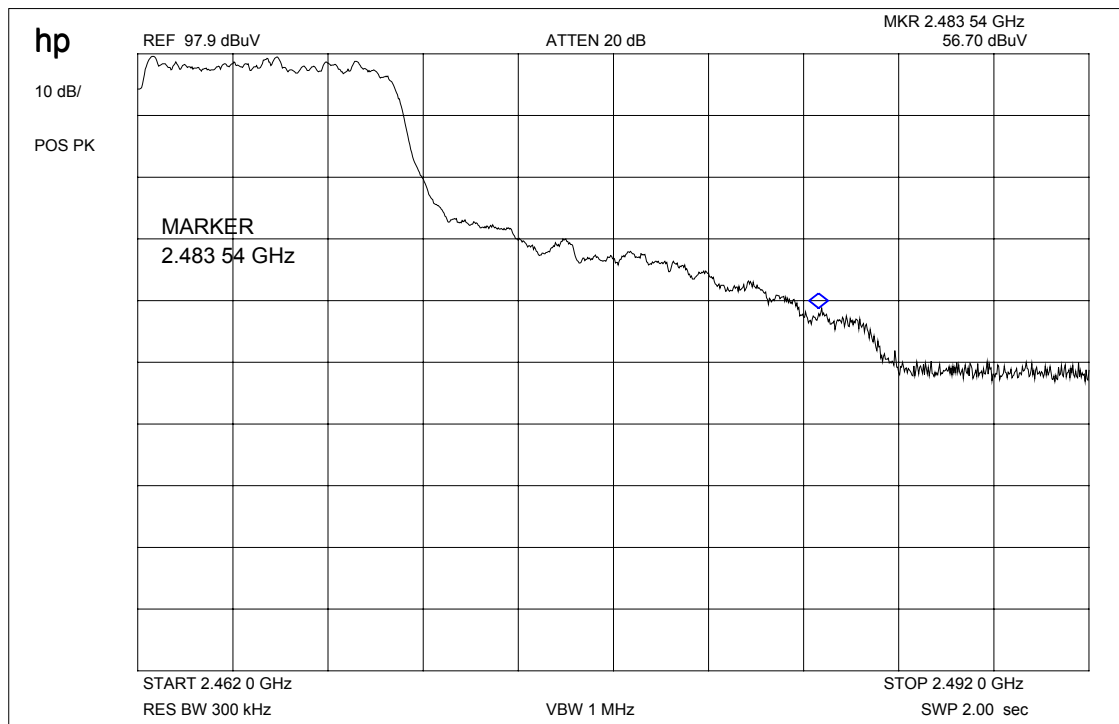
Frequency	Meter reading	Cable loss	Antenna factor	Results
2462 MHz	94.1 dB μ V	7.8 dB	-7.2	94.7 dB μ V/m

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance radiated

§15.247 (c)

OFDM System



Delta dB = 41.2 dB

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Band-edge compliance of radiated emissions**§15.205****Radiated field strength****DSSS System**

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	96.4 dB μ V/m	+0,6 dB	97.0 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	89.2	+0,6 dB	89.8 dB μ V/m
Delta value	Peak 300 kHz RBW/VBW	39.1 dB	-	-
Value at band edge	limit 54 dB μ V/m			50.7 dB μ V/m
Statement:				Complies

The product complies with the limit of the restricted bands.

Delta marker plots see above pages

Band-edge compliance of radiated emissions**§15.205****Radiated field strength****OFDM System**

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	103.4 dB μ V/m	+0,6 dB	104.0 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	94.1	+0,6 dB	94.7 dB μ V/m
Delta value	Peak 300 kHz RBW/VBW	41.2 dB	-	-
Value at band edge	limit 54 dB μ V/m			53.50 dB μ V/m
Statement:				Complies

The product complies with the limit of the restricted bands.

Delta marker plots see above pages

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Maximal Values at DSSS (11 Mbit/s) System

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emmission power	actual attenuation below frequency of operation (dB)	results
2412		19.74	30 dBm	-	Operating frequency
4824		-56.93	-20 dBc (-0.26 dBm)	76.67	complies
2437		19.25	30 dBm	-	Operating frequency
4874		-57.00	-20 dBc (-0.75 dBm)	76.25	complies
2462		19.02	30 dBm		Operating frequency
4924		-54.81	-20 dBc (- 0.98 dBm)	73.83	complies
Measurement uncertainty		± 3dB			

RBW : 100 kHz

VBW: 100 kHz

For emissions that fall into restricted bands you find the radiated emissions later in the report.

LIMITS

SUBCLAUSE § 15.247 (c)

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)).

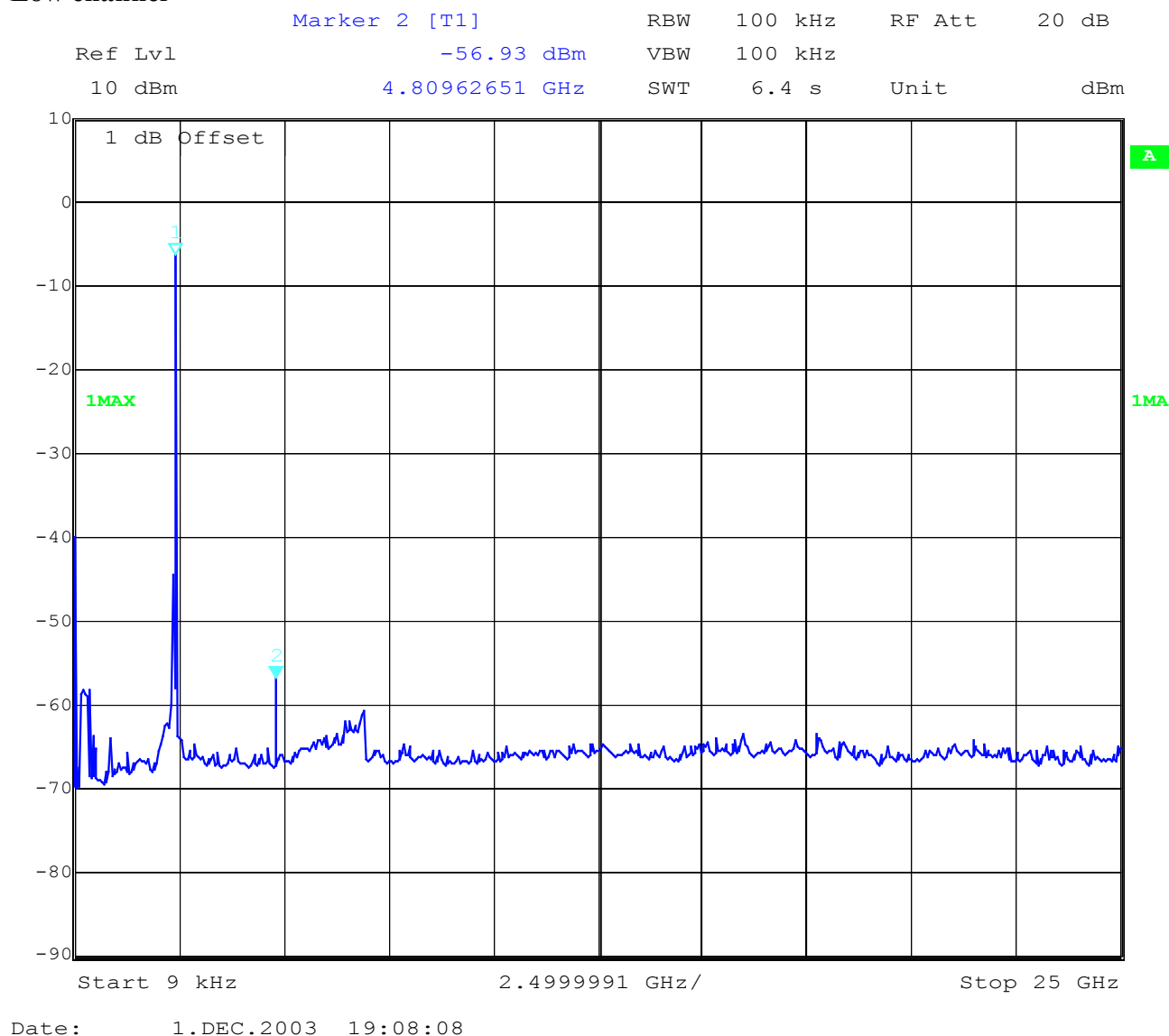
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

SPURIOUS EMISSION LIMITATION CONDUCTED

§ 15.247 (c) (1)

No peak found < 20 dB below limit (20dBc)

Low channel



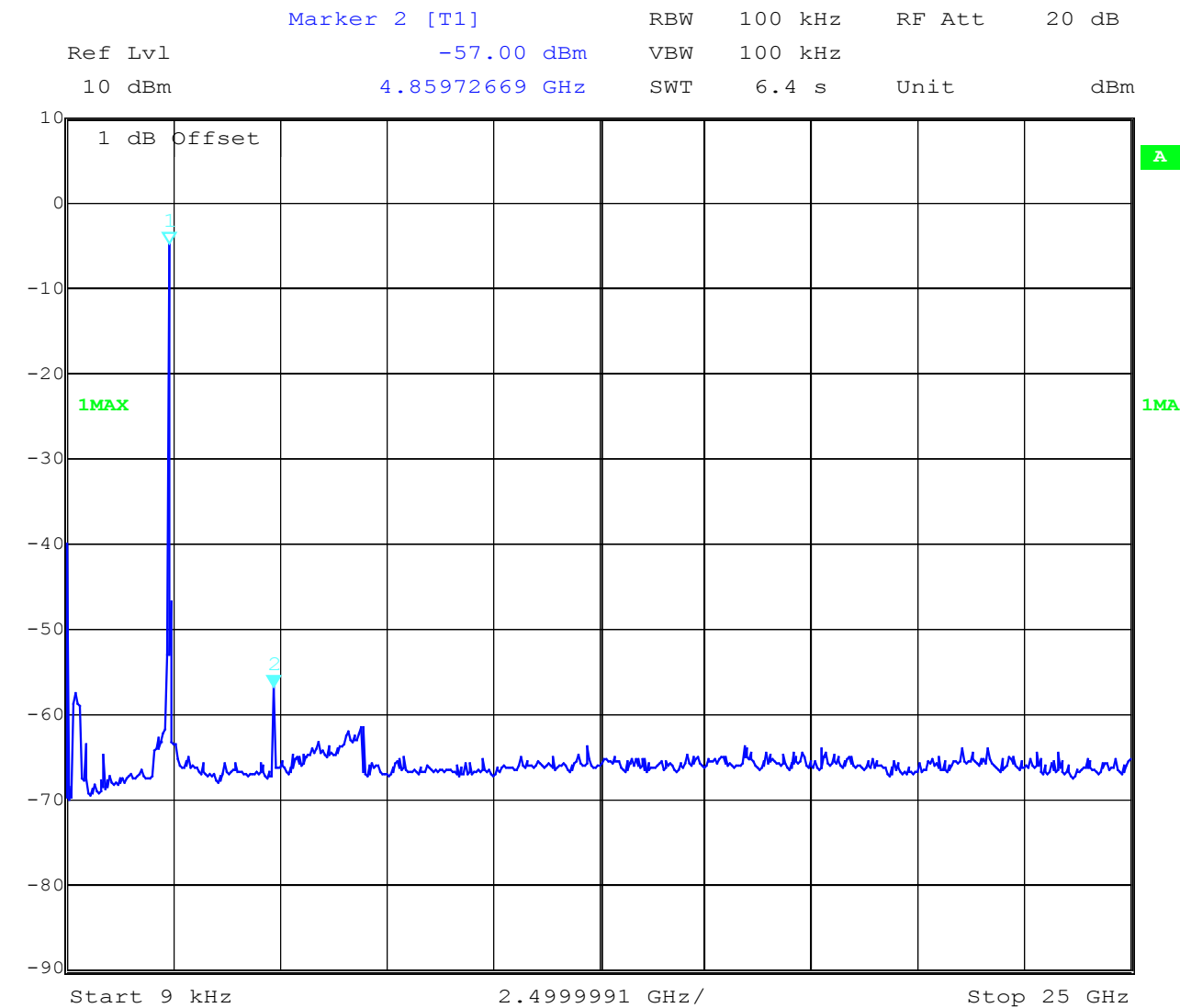
No spurious found in the restricted bands (2310 – 2390 MHz and 2483,5 – 2500 MHz)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

SPURIOUS EMISSION
CONDUCTED

§ 15.247 (c) (1)

Mid channel (peak)



Date: 1.DEC.2003 19:09:05

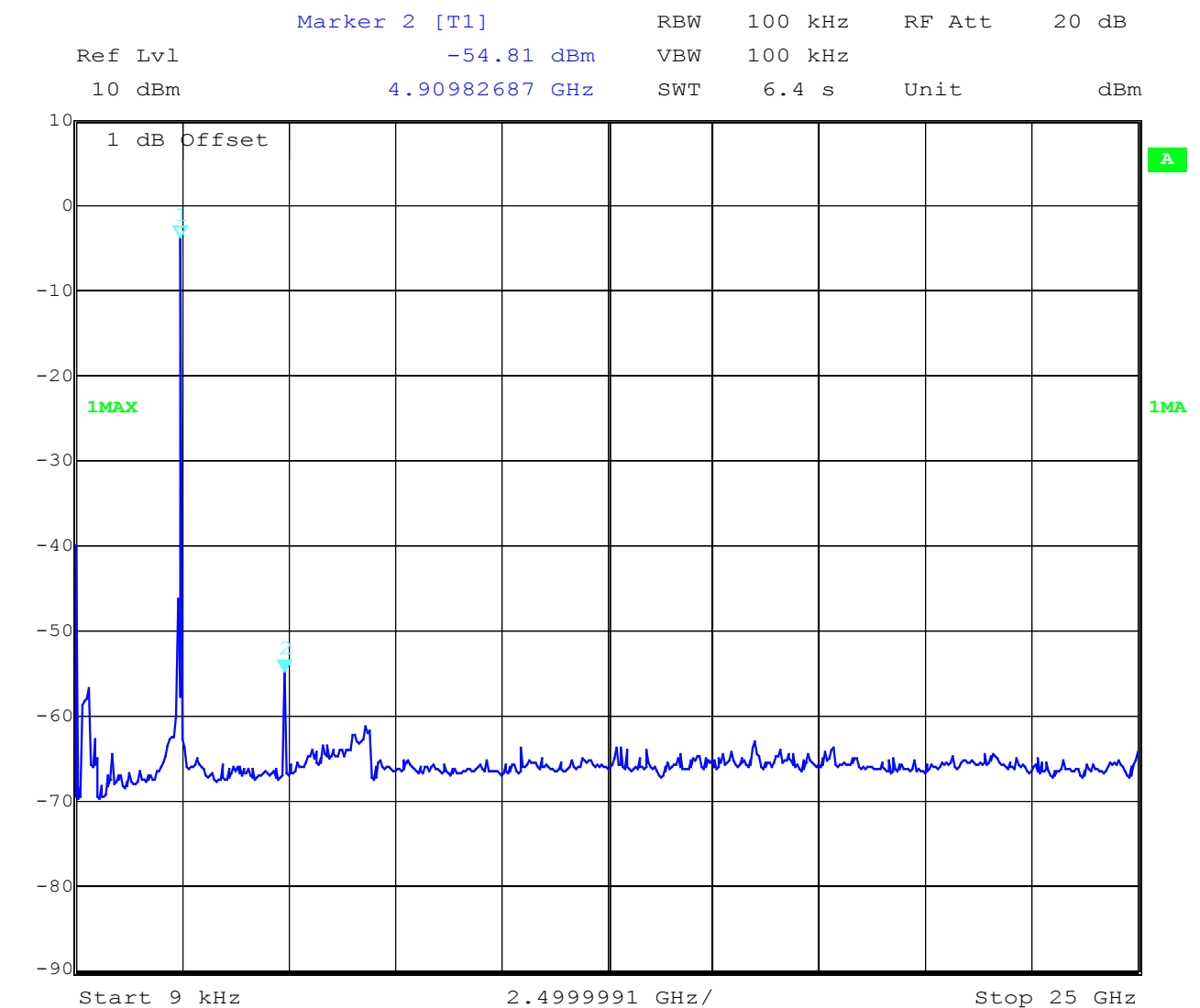
No spurious found in the restricted bands (2310 – 2390 MHz and 2483,5 – 2500 MHz)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

SPURIOUS EMISSION CONDUCTED

§ 15.247 (c) (1)

High channel



Date: 1.DEC.2003 19:10:32

No spurious found in the restricted bands (2310 – 2390 MHz and 2483,5 – 2500 MHz)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

SPURIOUS EMISSION(radiated)

§ 15.247 (c) (1)

All peaks in the plots below 1 GHz were caused by the test pc, not by the sample.

SPURIOUS EMISSIONS LEVEL (dB μ V/m)								
2412 MHz			2437 MHz			2462 MHz		
f (MHz)	Detector	Level dB μ V/m	f (MHz)	Detector	Level dB μ V/m	f (MHz)	Detector	Level dB μ V/m
38.5	QP	28.2	38.5	QP	28.2	38.5	QP	28.2
43.0	QP	33.2	43.0	QP	33.2	43.0	QP	33.2
4824	peak	41.2	4874	peak	39.3			
Measurement uncertainty			± 3 dB					

 $f < 1$ GHz : RBW/VBW: 100 kHz

 $f \geq 1$ GHz : RBW/VBW: 1 MHz

LIMITS

SUBCLAUSE § 15.247 (c)

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)).

Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (μ V/m)	Measurement distance (m)
30 - 88	100 (40 dB μ V/m)	3
88 - 216	150 (43.5 dB μ V/m)	3
216 - 960	200 (46 dB μ V/m)	3
above 960	500 (54 dB μ V/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

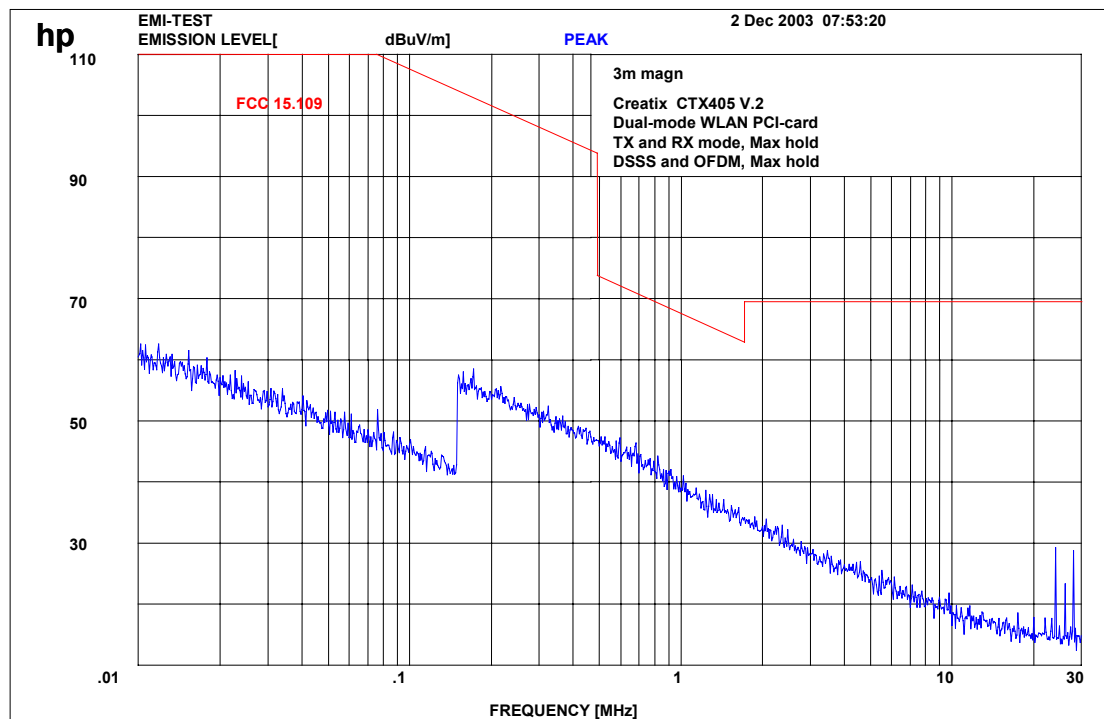
(for reference numbers see test equipment listing)

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

Transmitter up to 30 MHz

this plot is valid for all channels



The test was made with a special PC and test software.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

17 – 24; 64

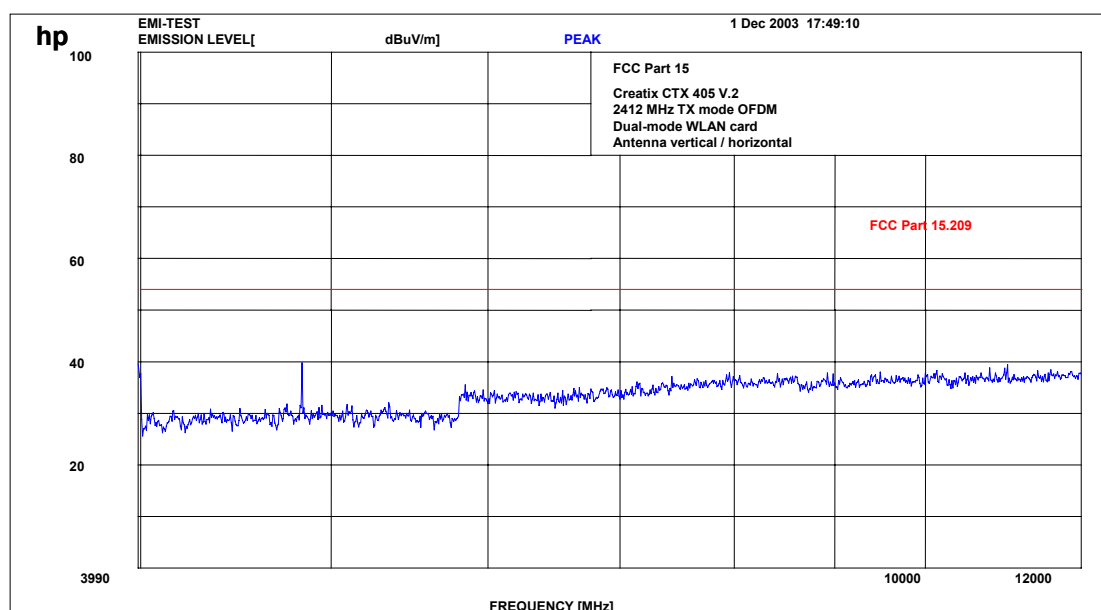
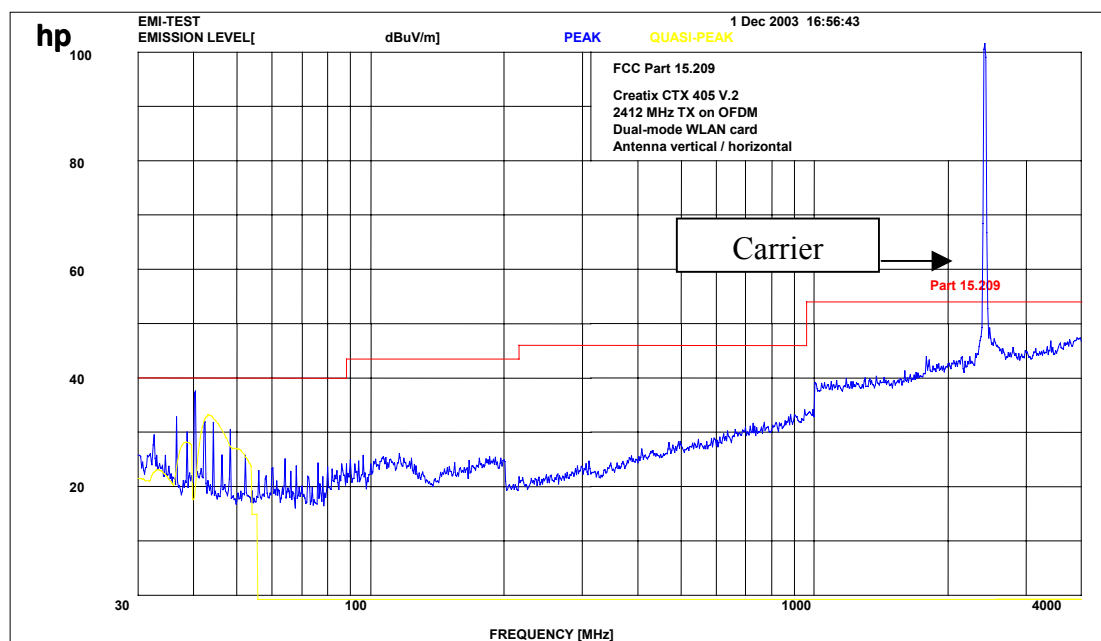
EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

low channel up to 12 GHz

Plots are valid for DSSS and OFDM mode

All peaks in the plots below 1 GHz were caused by the test pc, not by the sample.



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

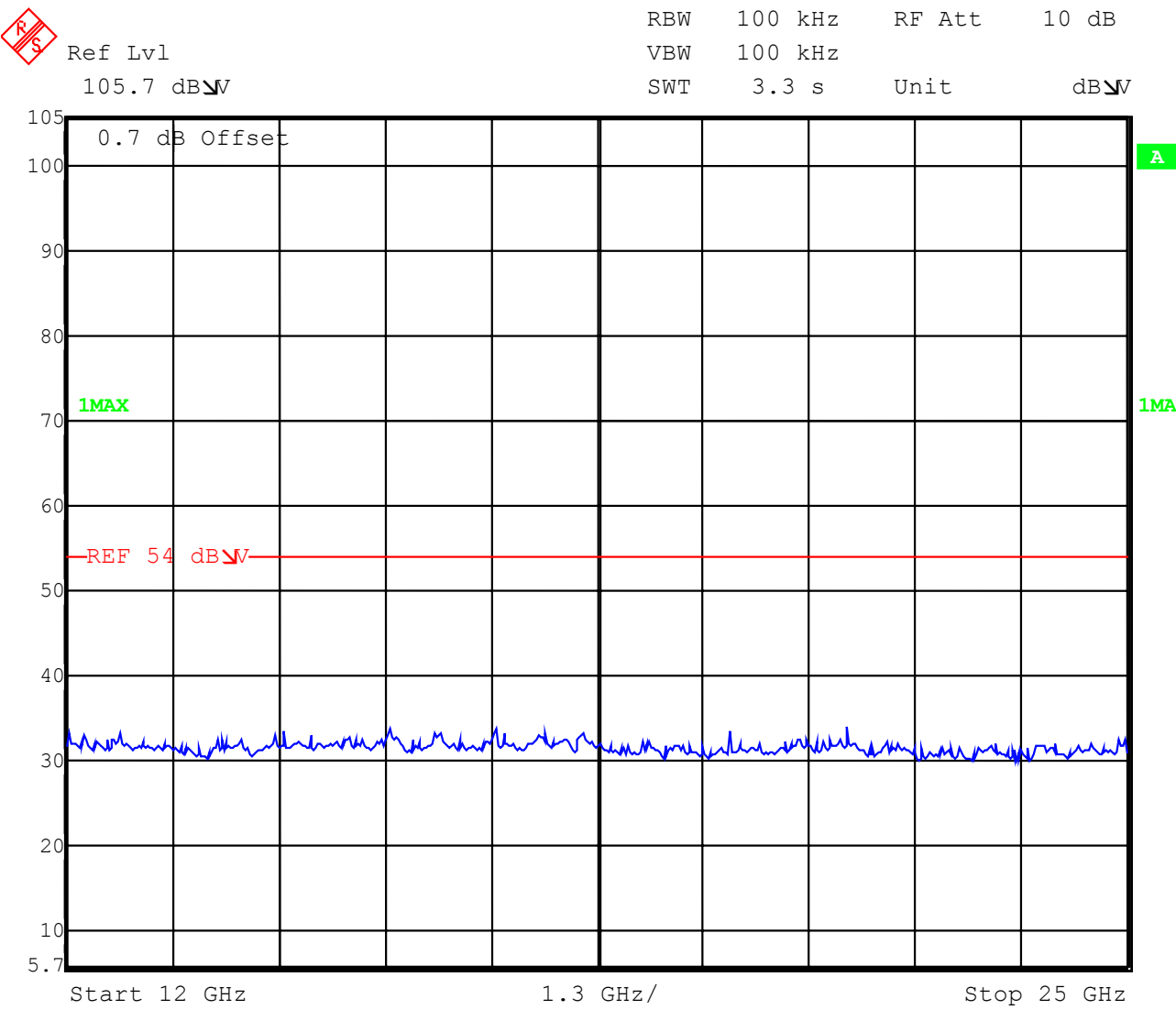
(for reference numbers see test equipment listing)

17 – 24; 64

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

up to 25 GHz (DSSS and OFDM)
this plot is valid for all 3channels



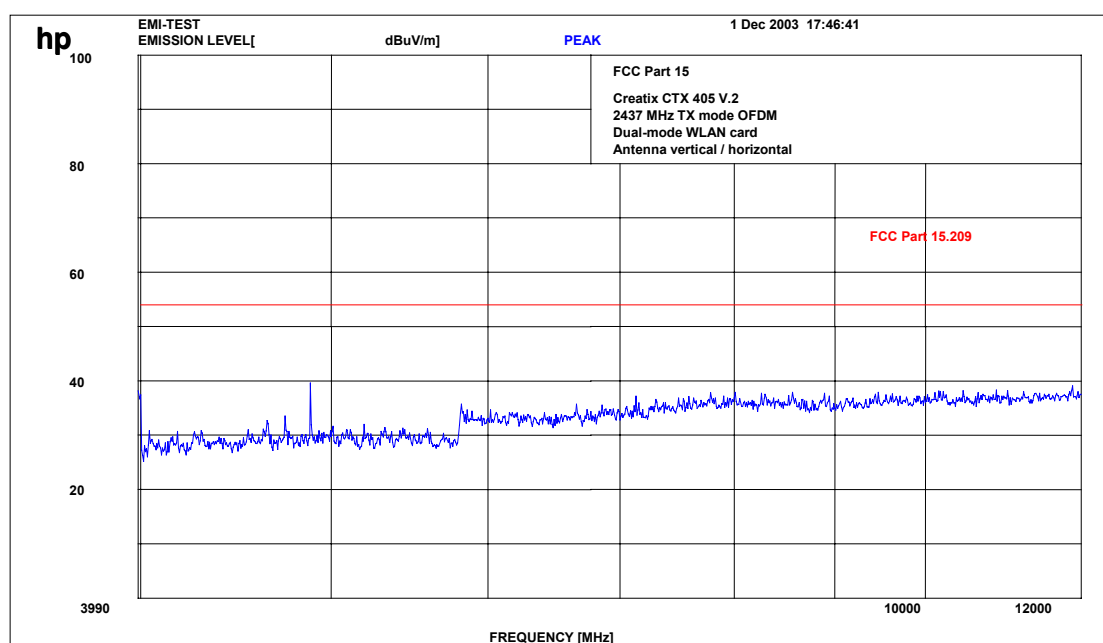
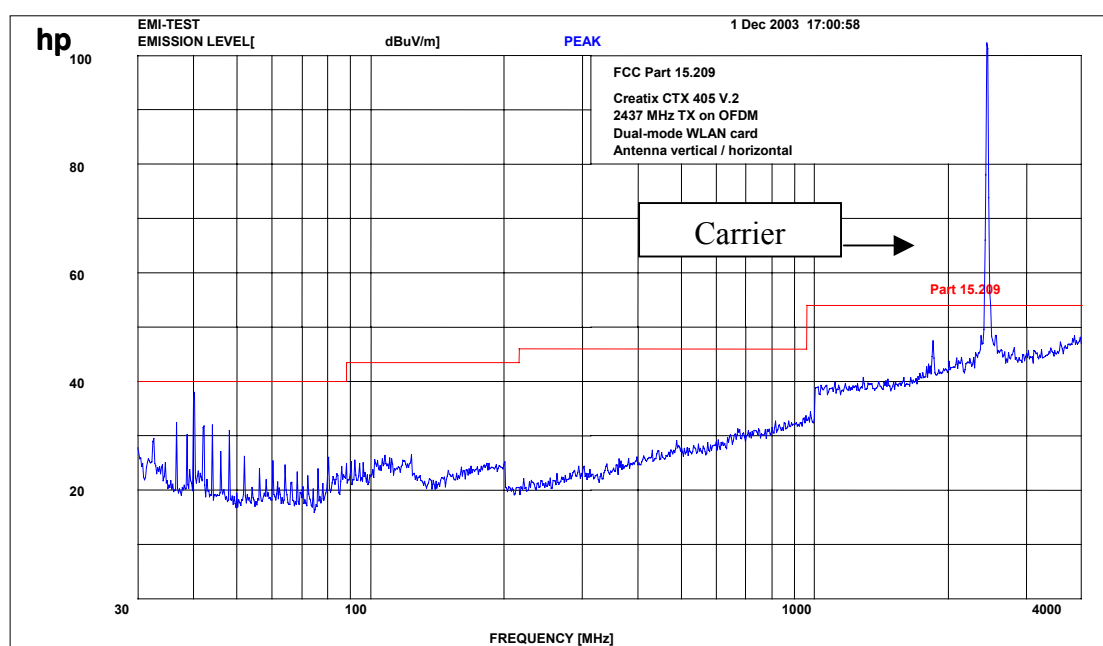
EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

Mid channel up to 12 GHz

Plots are valid for DSSS and OFDM mode

All peaks in the plots below 1 GHz were caused by the test pc, not by the sample.



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24; 64

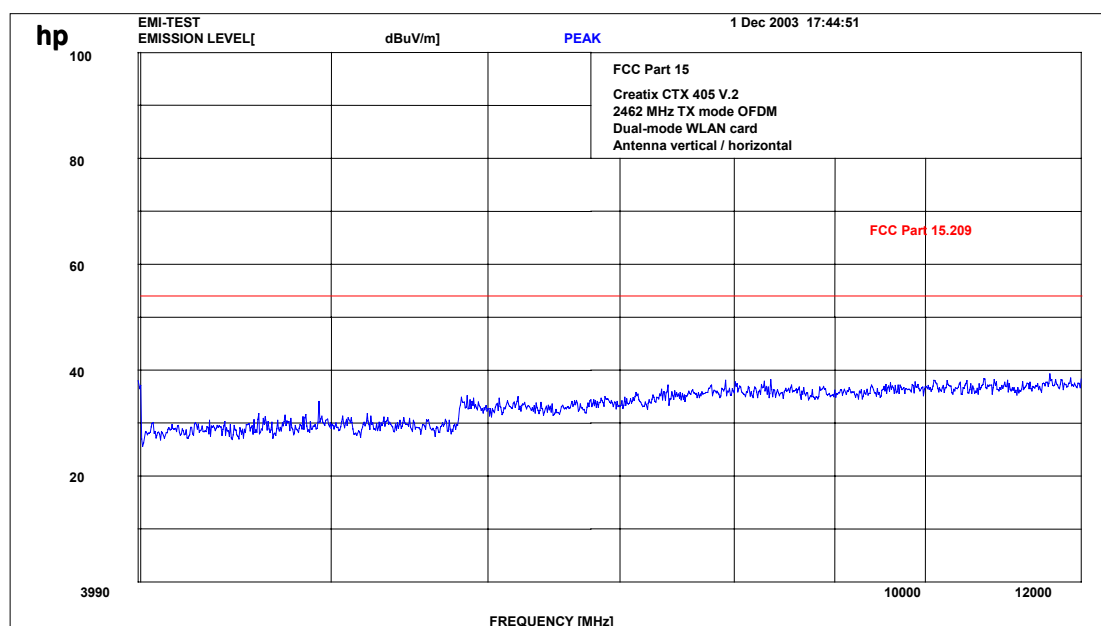
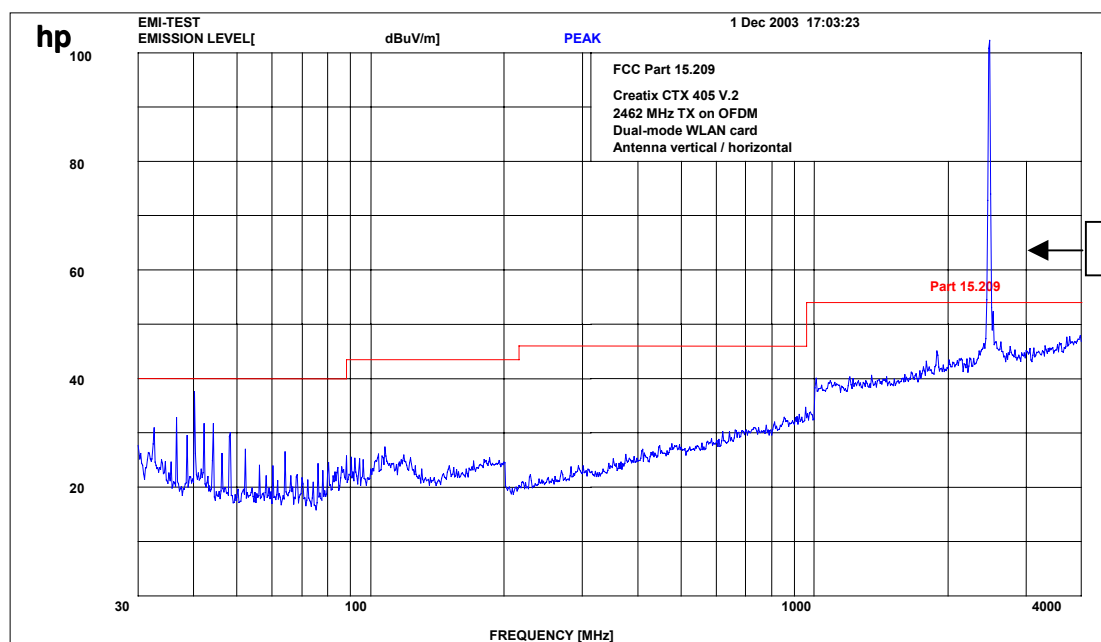
EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

high channel up to 12 GHz

Plots are valid for DSSS and OFDM mode

All peaks in the plots below 1 GHz were caused by the test pc, not by the sample.



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24; 64

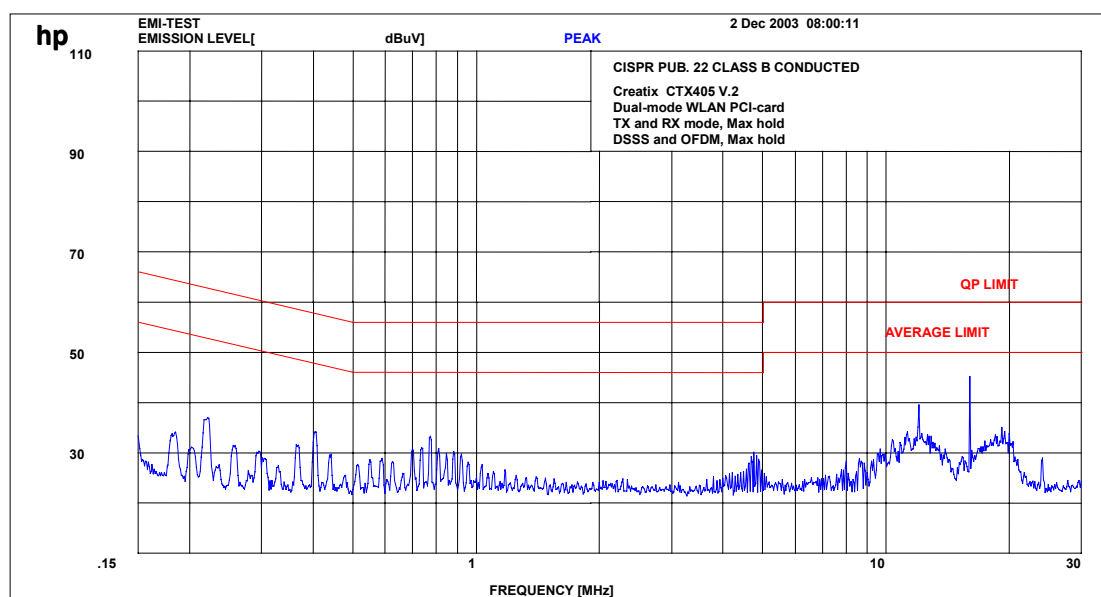
Conducted emissions § 15.107/207

EN 55022 / CISPR 22

EUT: CTX 405 V.2
 Manufacturer: Creatix
 Operating Condition: Tx-mode and RX-mode
 Test Site: Room 006
 Operator: Ames
 Test Specification: 115 V AC, measured at L1 and N floating and grounded, max hold function
 Comment: pass

SCAN TABLE: "CISPR 22 V"

Short Description: Voltage Mains 1.60
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 7.5 kHz MaxPeak 100.0 ms 10 kHz ESH3-Z5 L1 1458
 Average



Limit 15.207

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24; 64

EMISSION LIMITATIONS- Receiver radiated
§ 15.209

SPURIOUS EMISSIONS LEVEL (µV/m)								
CH 1 / 2 / 3								
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
1782	AV	30.2						
2227	AV	33.6						
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz
f ≥ 1GHz : RBW/VBW: 1 MHz
see above plots
Measurement distance see table
Limits
SUBCLAUSE § 15.109

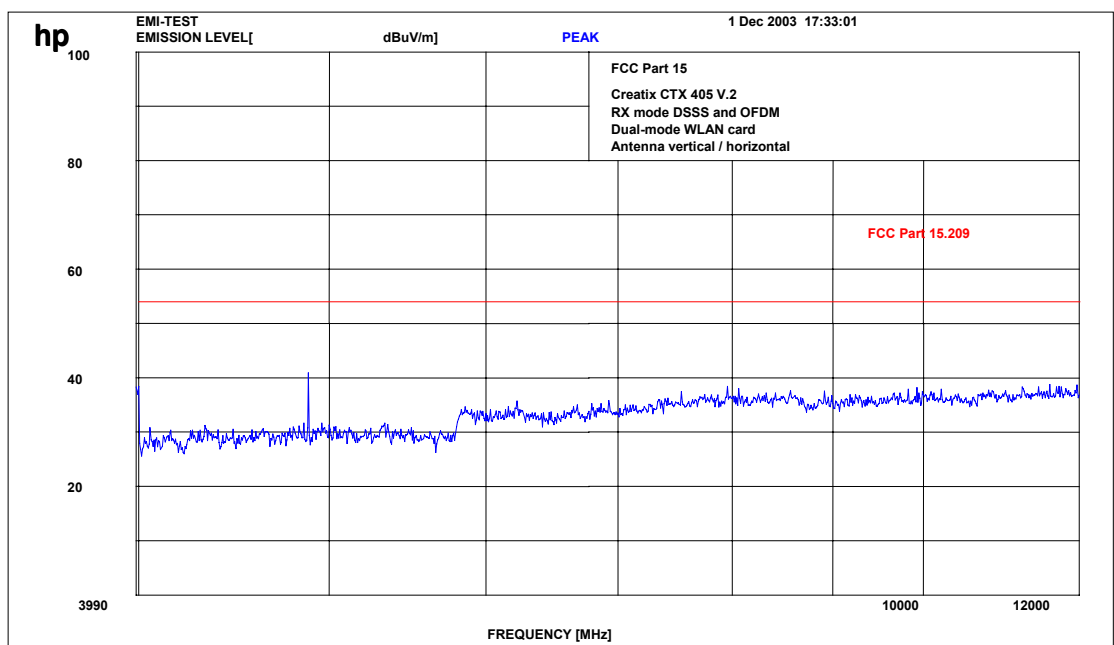
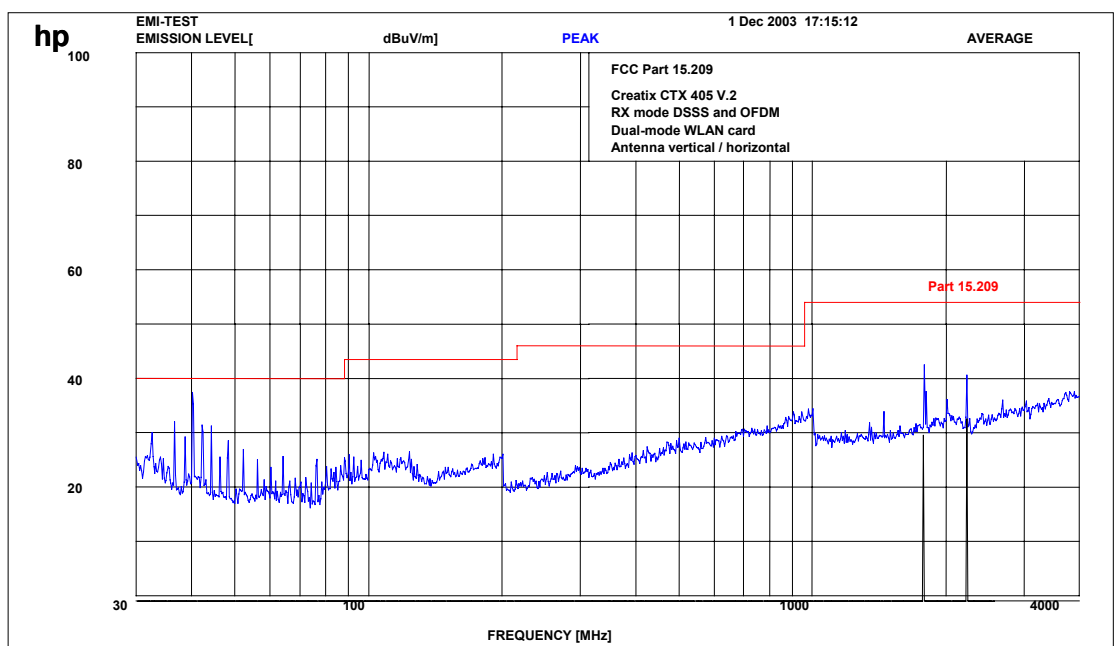
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30
30 - 88	100 / 40 dBµV/m	3
88 - 216	150 / 43.5 dBµV/m	3
216 - 960	200 / 46 dBµV/m	3
above 960	500 / 54 dBµV/m	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24; 64

EMISSION LIMITATIONS- Radiated
Receiver up to 12 GHz

§ 15.209

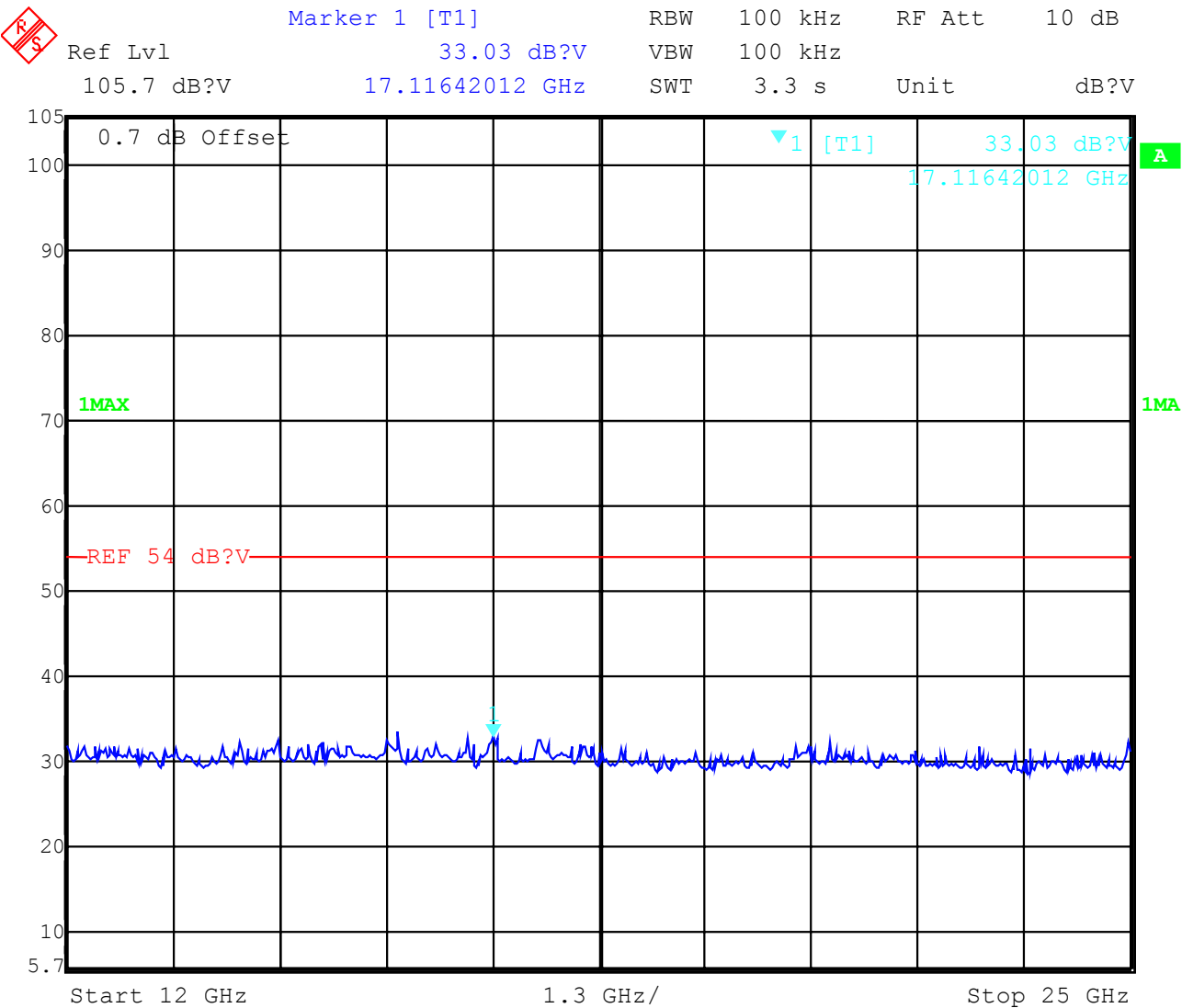
All peaks in the plot <1 GHz were caused by the test pc, not by the sample.



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24; 64

EMISSION LIMITATIONS- Radiated
Receiver up to 25 GHz

§ 15.209



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24; 64

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860
03	Oscilloscope	7633	Tektronix	230054
04	Radio Analyzer	CMTA 54	Rohde & Schwarz	894 043/010
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027
06	Signal Generator	8111 A	Hewlett-Packard	2215G00867
07	Signal Generator	8662 A	Hewlett-Packard	2224A01012
08	Funktionsgenerator	AFGU	Rohde & Schwarz	862 480/032
09	Regeltrenntrafo	MPL	Erfi	91350
10	Netznachbildung	NNLA 8120	Schwarzbeck	8120331
11	Relais-Matrix	PSU	Rohde & Schwarz	893 285/020
12	Power-Meter	436 A	Hewlett-Packard	2101A12378
13	Power-Sensor	8484 A	Hewlett-Packard	2237A10156
14	Power-Sensor	8482 A	Hewlett-Packard	2237A00616
15	Modulationsmeter	9008	Racal-Dana	2647
16	Frequenzzähler	5340 A	Hewlett-Packard	1532A03899
17	Absorber Schirmkabine	---	MWB	87400/002
18	Spectrum Analyzer	85660 B	Hewlett-Packard	2747A05306
19	Analyzer Display	85662 A	Hewlett-Packard	2816A16541
20	Quasi Peak Adapter	85650 A	Hewlett-Packard	2811A01131
21	RF-Preselector	85685 A	Hewlett-Packard	2833A00768
22	Biconical Antenne	3104	Emco	3758
23	Log. Per. Antenne	3146	Emco	2130
24	Double Ridge Horn	3115	Emco	3088
25	EMI-Testreceiver	ESAI	Rohde & Schwarz	863 180/013
26	EMI-Analyzer-Display	ESAI-D	Rohde & Schwarz	862 771/008
27	Biconical Antenne	HK 116	Rohde & Schwarz	888 945/013
28	Log. Per. Antenne	HL 223	Rohde & Schwarz	825 584/002
29	Relais-Switch-Unit	RSU	Rohde & Schwarz	375 339/002
30	Highpass	HM985955	FSY Microwave	001
31	Amplifier	P42-GA29	Tron-Tech	B 23602
32	Absorber Schirmkabine		Frankonia	
33	Steuerrechner	PSM 7	Rohde & Schwarz	834 621/004
34	EMI Test Reciever	ESMI	Rohde & Schwarz	827 063/010
35	EMI Test Receiver	Display	Rohde & Schwarz	829 808/010

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
36	Controler	HD 100	Deisel	100/322/93
37	Relais Matrix	PSN	Rohde & Schwarz	829 065/003
38	Control Unit	GB 016 A2	Rohde & Schwarz	344 122/008
39	Relais Switch Unit	RSU	Rohde & Schwarz	316 790/001
40	Power Supply	6032A	Hewlett Packard	2846A04063
41	Spektrum Monitor	EZM	Rohde & Schwarz	883 720/006
42	Meßempfänger	ESH 3	Rohde & Schwarz	890 174/002
43	Meßempfänger	ESVP	Rohde & Schwarz	891 752/005
44	Biconi Ant. 20-300MHz	HK 116	Rohde & Schwarz	833 162/011
45	Logper Ant. 0.3-1 GHz	HL 223	Rohde & Schwarz	832 914/010
46	Amplifier 0.1-4 GHz	AFS4	Miteq Inc.	206461
47	Logper Ant. 1-18 GHz	HL 024 A2	Rohde & Schwarz	342 662/002
48	Polarisationsnetzwerk	HL 024 Z1	Rohde & Schwarz	341 570/002
49	Double Ridge G Horn Antenne 1-26.5 GHz	3115	EMCO	9107-3696
50	Microw. Sys. Amplifier 0.5- 26.5 GHz	8317A	Hewlett Packard	3123A00105
51	Audio Analyzer	UPD	Rohde & Schwarz	1030.7500.04
52	Steuerrechner	PSM 7	Rohde & Schwarz	883 086/026
53	DC V-Netzwerk	ESH3-Z6	Rohde & Schwarz	861 406/005
54	DC V-Netzwerk	ESH3-Z6	Rohde & Schwarz	893 689/012
55	AC 2 Phasen V-Netzwerk	ESH3-Z5	Rohde & Schwarz	861 189/014
56	AC 2 Phasen V-Netzwerk	ESH3-Z5	Rohde & Schwarz	894 981/019
57	AC-3 Phasen V-Netzwerk	ESH2-Z5	Rohde & Schwarz	882 394/007
58	Stromversorgung	6032A	Rohde & Schwarz	2933A05441
59	HF-Test Empfänger	ESVP.52	Rohde & Schwarz	881 487/021
60	Spectrum Monitor	EZM	Rohde & Schwarz	883 086/026
61	HF-Test Empfänger	ESH3	Rohde & Schwarz	881 515/002
62	Relais Matrix	PSU	Rohde & Schwarz	882 943/029
63	Relais Matrix	PSU	Rohde & Schwarz	828 628/007
64	Spectrum Analyzer	FSIQ 26	Rohde & Schwarz	119.6001.27
65	Spectrum Analyzer	HP 8565E	Hewlett Packard	3473A00773
66				

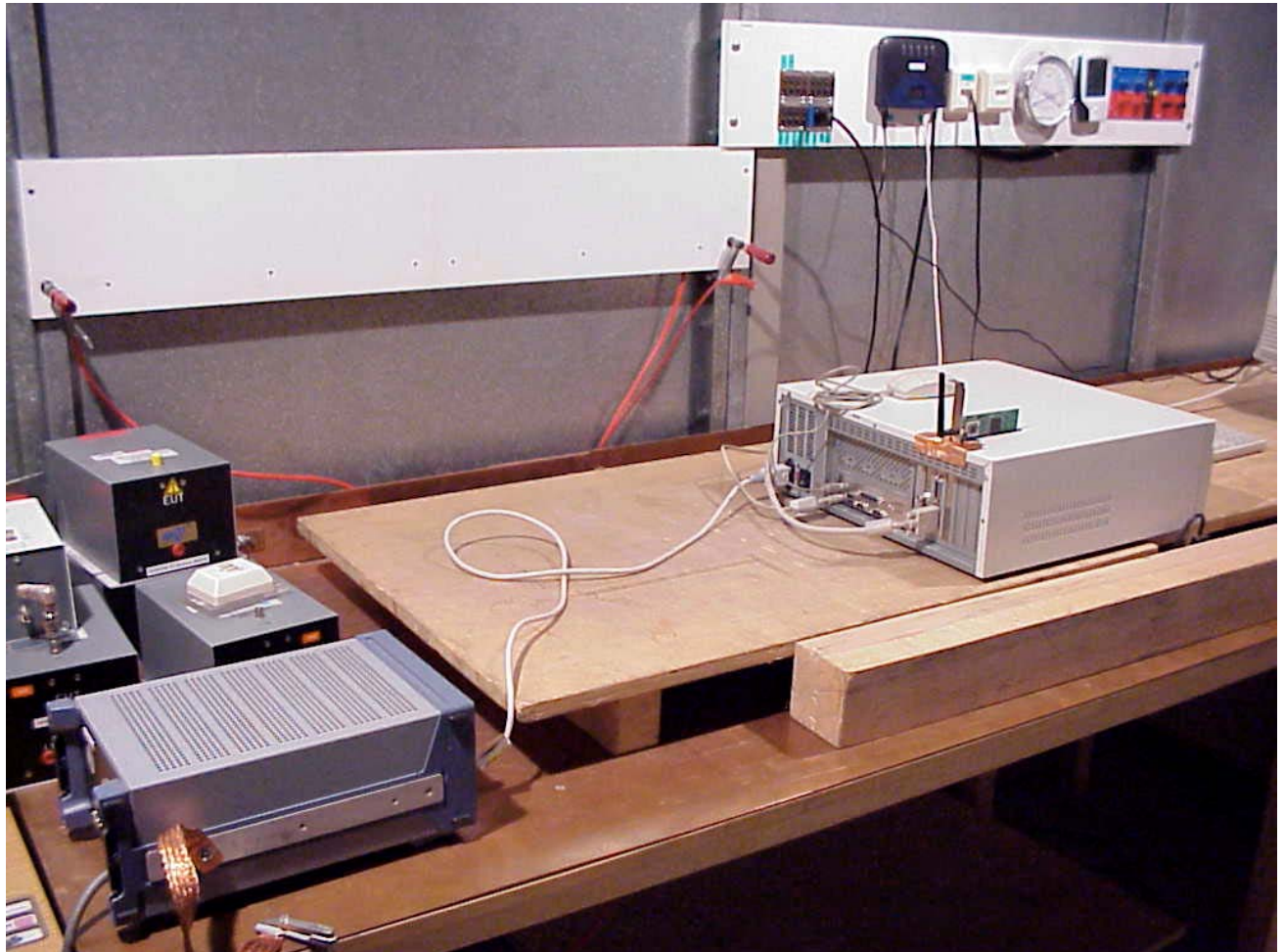
Test site

RADIATED EMISSIONS

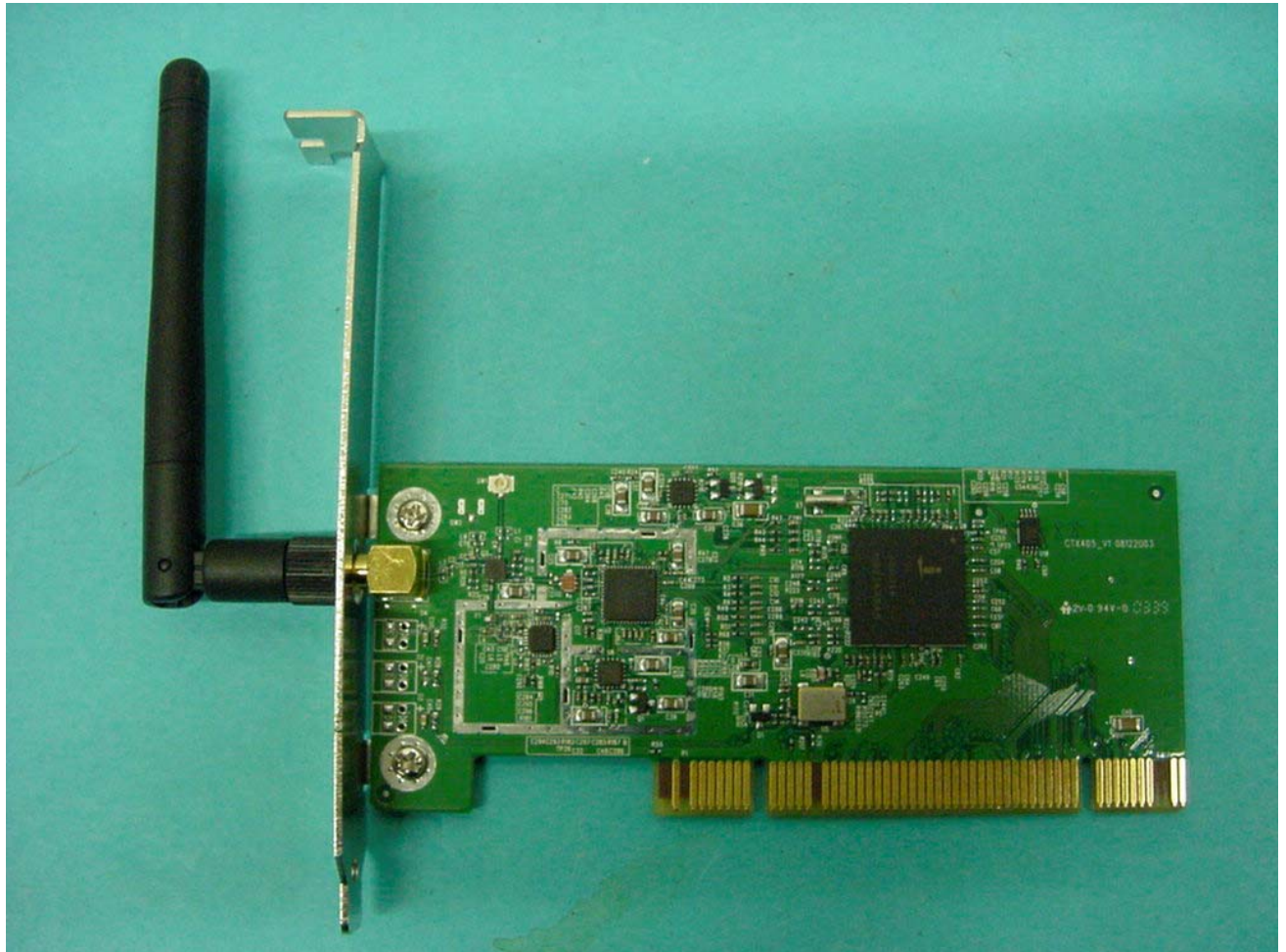


Test site

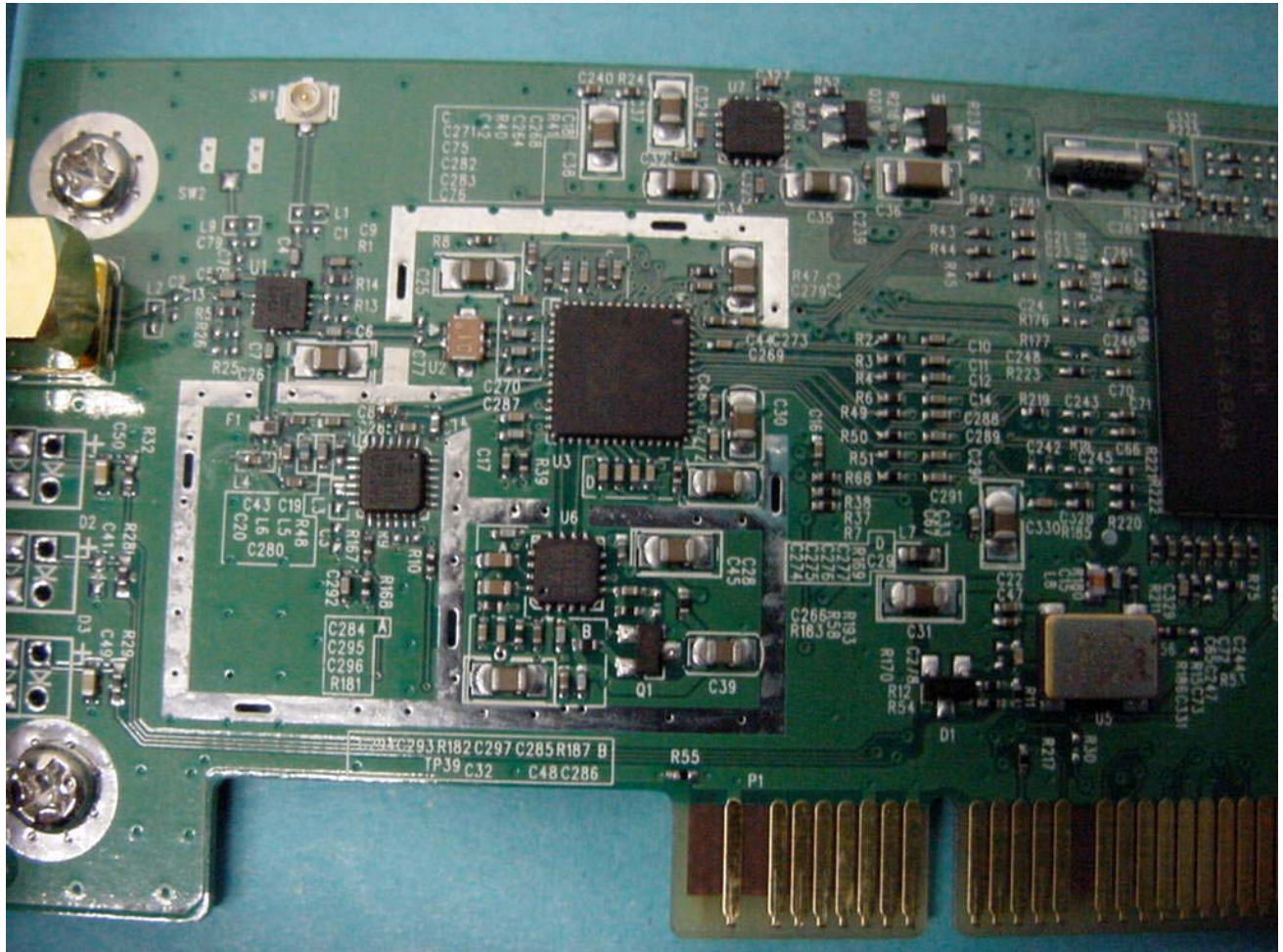
CONDUCTED EMISSIONS



Photographs of the equipment



Photographs



Photographs

