CETECOM ICT Services GmbH

Radio Satellite Communication
Untertürkheimer Straße 6-10 . D-66117 Saarbrücken Telefon: +49 (0)681 598-0 Telefax: -9075

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.: 4-1137-01-03/03
FCC Part 15.247 / CANADA RSS-210
CTX 714 V.2
FCC ID: Q6DCTX714

CETECOM – ICT Services GmbH
Untertürkheimerstr. 6-10
66117 Saarbrücken, Germany

Telephone: + 49 (0) 681 / 598-0
Fax: + 49 (0) 681 / 598-9075

Table of Contents

1 General information

1.1 Notes

1.2 Testing laboratory

1.3 Details of applicant

1.4 Application details

1.5 Test item

1.6 Test standards

2 Technical test

2.1 Summary of test results

2.2 Test report

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
Telefone : + 49 681 598 - 9100
Telefax : + 49 681 598 - 9075
E-mail : Harro.Ames@ict.cetecom.de
Internet : www.cetecom.de

Accredited testing laboratory
DAR-registration number : TTI-P-G-166/98-30
Accredited Bluetooth™ Test Facility (BQTF)

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 MiniPCI card 802.11b/g**
Type designation	:	**CTX 714 V.2**
Manufacturer	:	**-applicant -**
Street	:	
City	:	
Country	:	
Serial number	:	
FCC ID	:	**Q6DCTX714**
Hardware	:	V.2
Software	:	V.2

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 Coax Adapter
Power supply	:	3.3 V via MiniPCI PC slot
Output power cond./rad.	:	DSSS System: 209.89 mW / 113.76 mW EIRP OFDM System: 381.94 mW / 209.41 mW EIRP
Type of equipment	:	Class B
Temperature range	:	0°C - +40°C
Field strength peak	:	103.1 dBµV/m
Occupied bandwidth	:	DSSS: 11632 kHz OFDM: 16432 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 a Laptop to show the reaction 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 are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2001 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 C63-4-2001 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 DTS 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 :

2003-12-03	**RSC 8414**	**Ames H.**	
Date	**Section**	**Name**	**Signature**

Technical responsibility for area of testing :

2003-12-03	**RSC8412**	**Hausknecht D.**	
Date	**Section**	**Name**	**Signature**

2.2 Test report

TEST REPORT

Test report no. : 4-1137-01-03/03

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

PARAMETER TO BE MEASURED **PAGE**

Antenna Gain SUBCLAUSE § 15.204 **8**

Spectrum Bandwith of a DSSS System §15.247(a) **9**

MAXIMUM PEAK OUTPUT POWER SUBCLAUSE § 15.247 (b) (1) **17**

MPE calculation **18**

Power spectral density §15.247 (d) **26**

Band-edge compliance of conducted emissions §15.247 (c) **33**

EMISSION LIMITATIONS- Conducted (Transmitter) § 15.247 (c) (1) **43**

SPURIOUS EMISSION (radiated) § 15.247 (c) (1) **47**

Conducted emissions § 15.107/207 **53**

EMISSION LIMITATIONS- Receiver radiated § 15.209 **57**

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS **61**

Test site **63**

Photographs of the equipment **65**

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	22.80 dBm	23.06 dBm	23.22 dBm
Radiated power (EIRP)	18.50 dBm	20.56 dBm	19.93 dBm
Gain	-4.30 dBi	-2.50 dBi	-3.30 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	11523	11632	11523
Measurement uncertainty		±1kHz		

RBW=100 kHz / VBW=1MHz

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	16432	16432	16382
Measurement uncertainty		±1kHz		

RBW=100 kHz / VBW=1MHz

LIMIT **SUBCLAUSE §15.247(a) (2)**

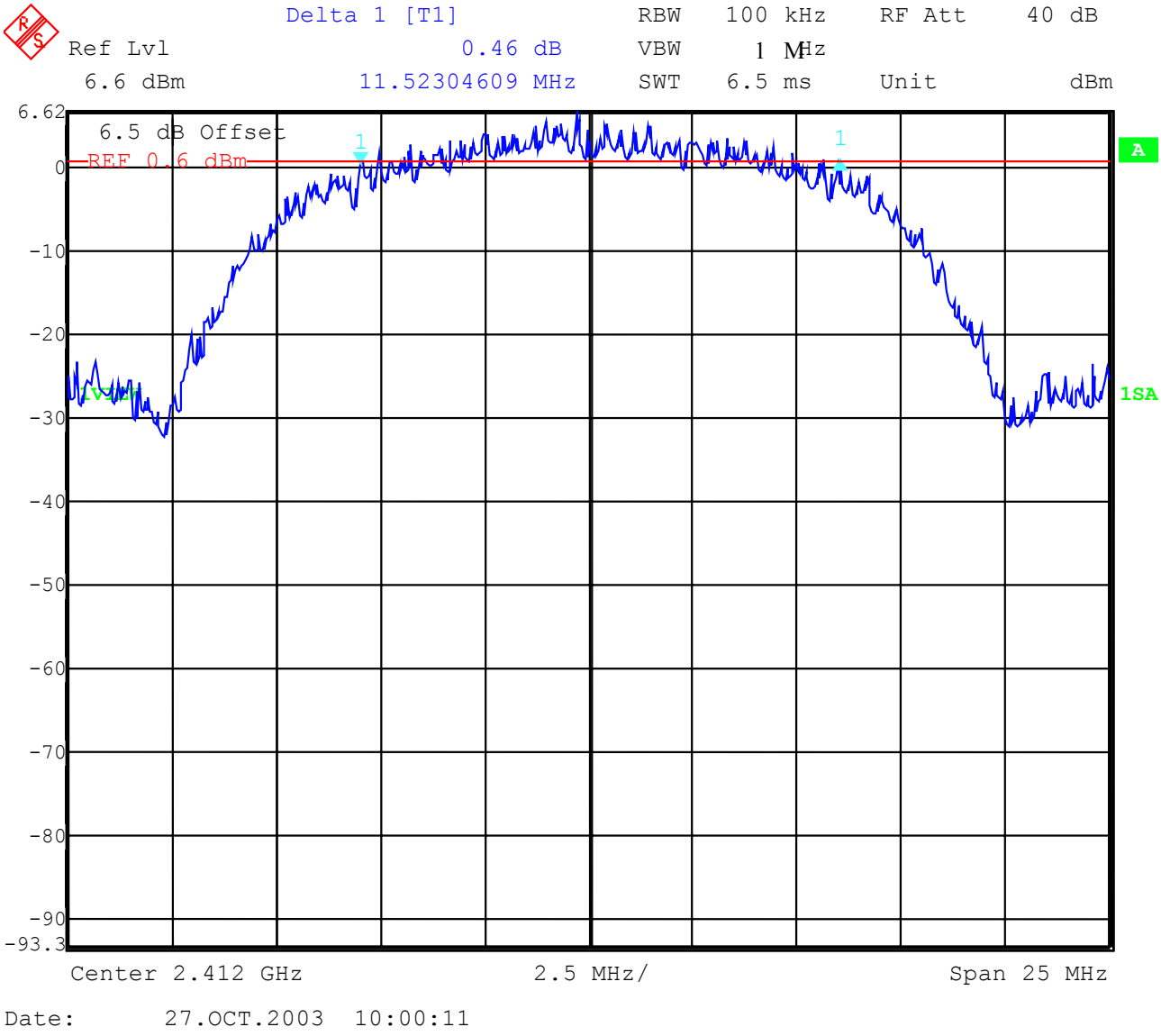
The minimum 6dB bandwidth shall be at least 500 kHz

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

Spectrum Bandwidth of a DSSS System **§15.247(a)**

6 dB bandwidth

Channel 1

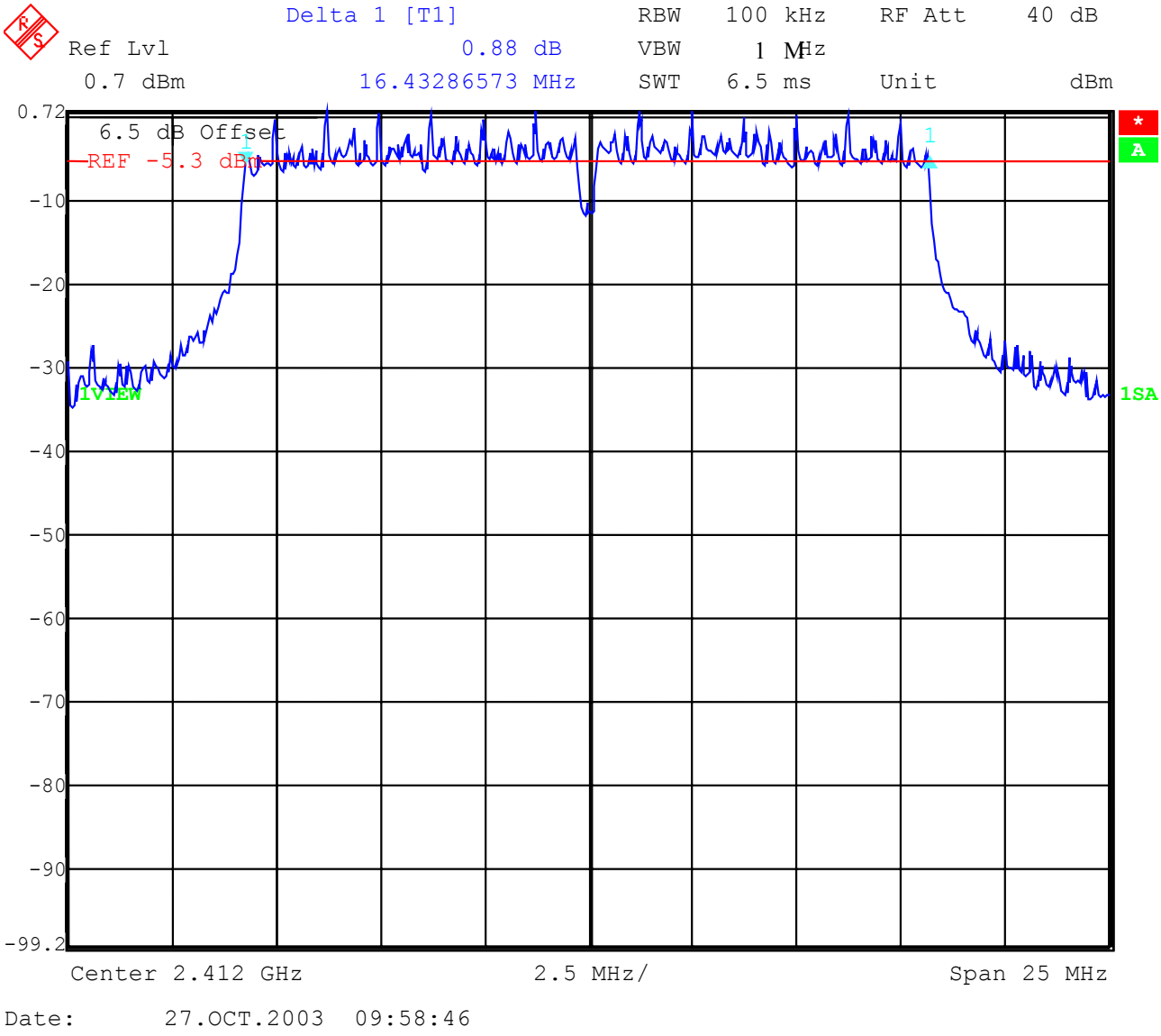


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Spectrum Bandwidth of an OFDM System **§15.247(a)**

6 dB bandwidth

Channel 1



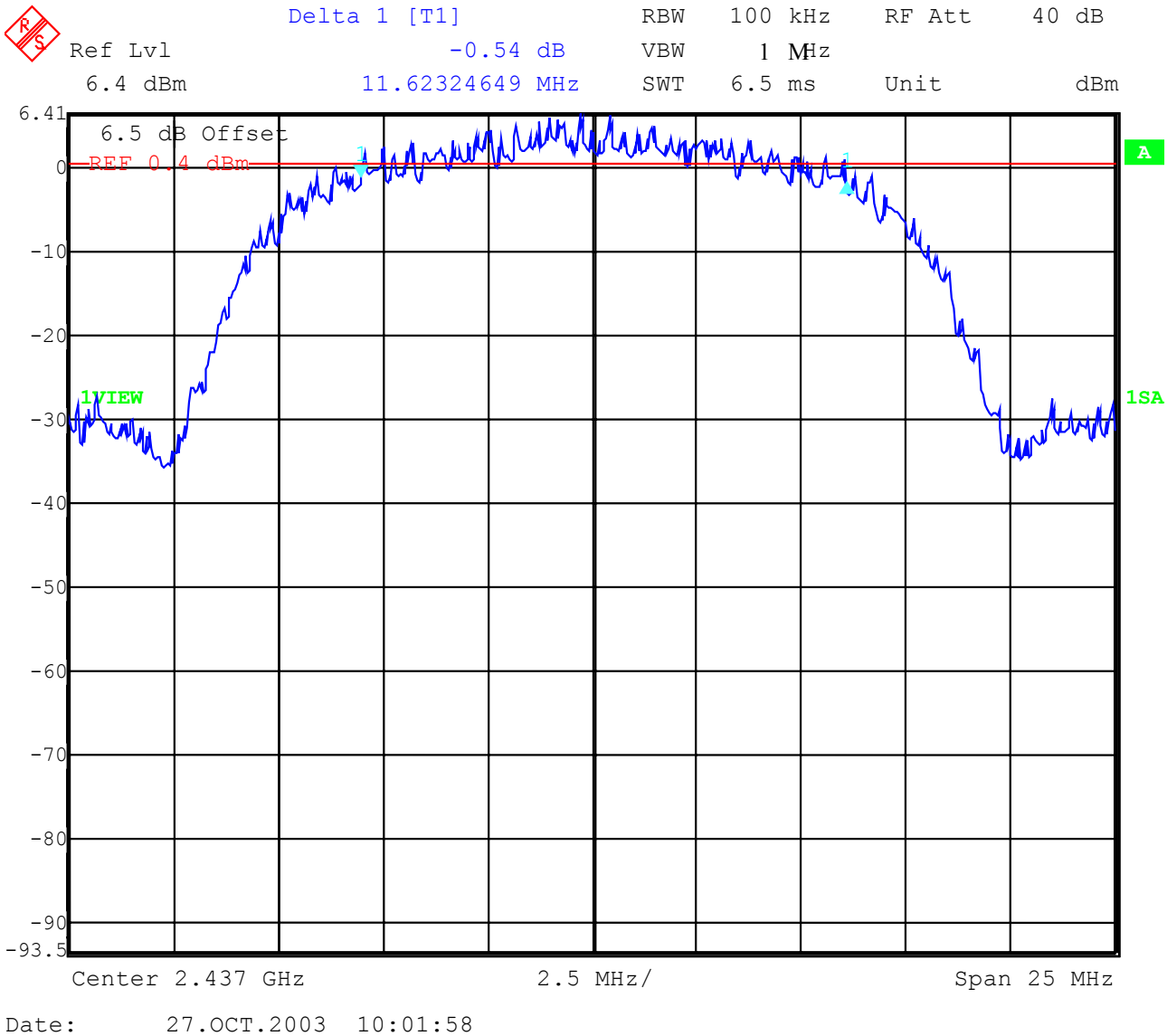
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Spectrum Bandwidth of a DSSS System

§15.247(a)

6 dB bandwidth

Channel 6



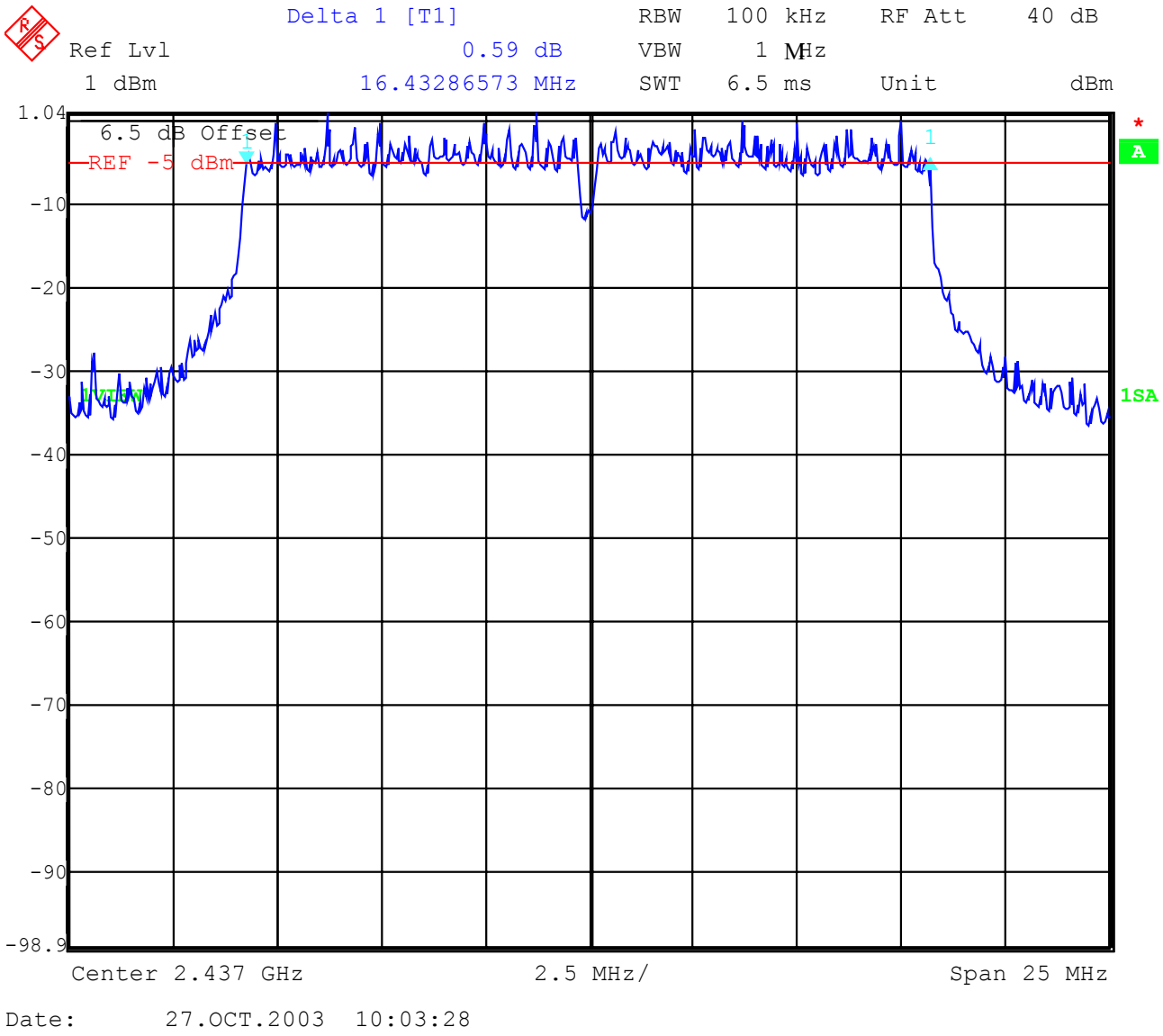
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Spectrum Bandwidth of an OFDM System

§15.247(a)

6 dB bandwidth

Channel 6

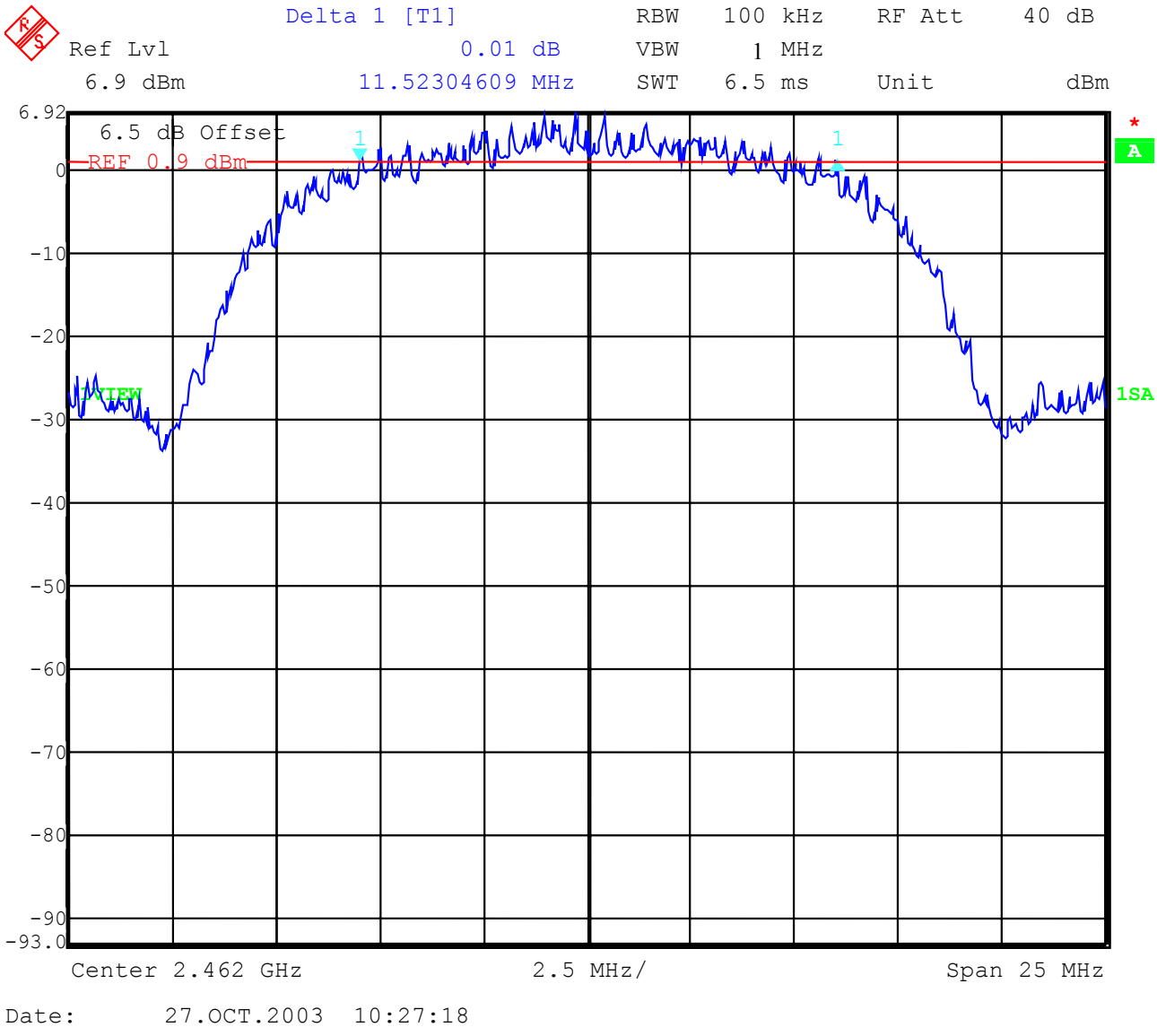


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Spectrum Bandwidth of a DSSS System **§15.247(a)**

6 dB bandwidth

Channel 11:

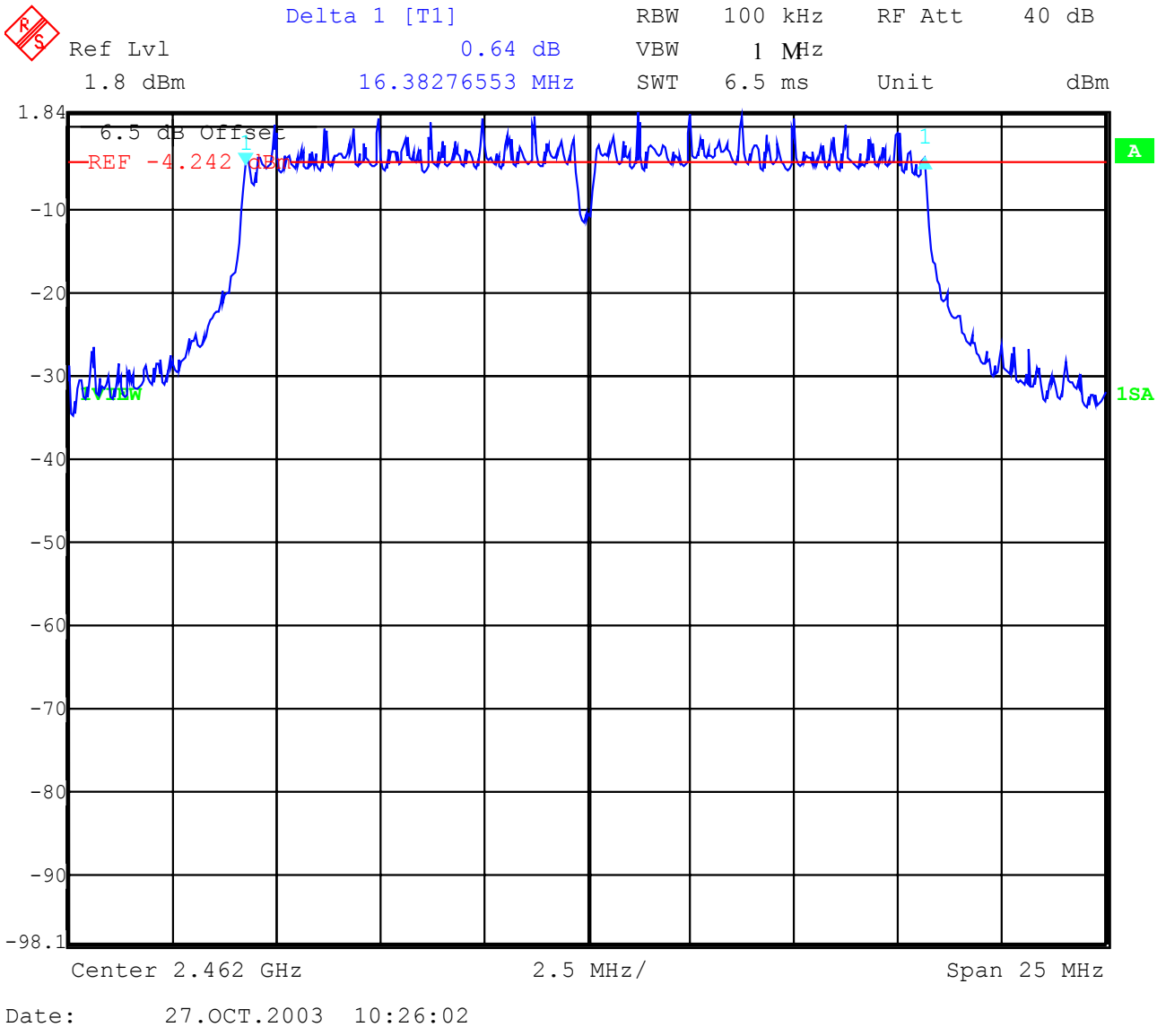


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Spectrum Bandwidth of an OFDM System **§15.247(a)**

6 dB bandwidth

Channel 11:



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

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 :22.18 AV : 14.99	Peak :22.40 AV : 15.65	Peak :22.60 AV : 15.36
Correction factor		+0.62 dB	+0.66 dB	+0.62 dB
Final corrected result		Peak :22.80 AV : 15.61	Peak :23.06 AV : 16.31	Peak :23.22 AV : 15.98
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 :23.30 AV : 12.41	Peak :23.55 AV : 11.82	Peak :23.68 AV : 12.03
Correction factor		+2.16 dB	+2.16 dB	+2.14 dB
Final corrected result		Peak :25.46 AV : 14.57	Peak :25.71 AV : 13.98	Peak :25.82 AV : 14.17
Measurement uncertainty		±0.5dB		

RBW/VBW : 10 MHz

The correction factor is calculated by 10*log (measured BW / used BW) (dB)

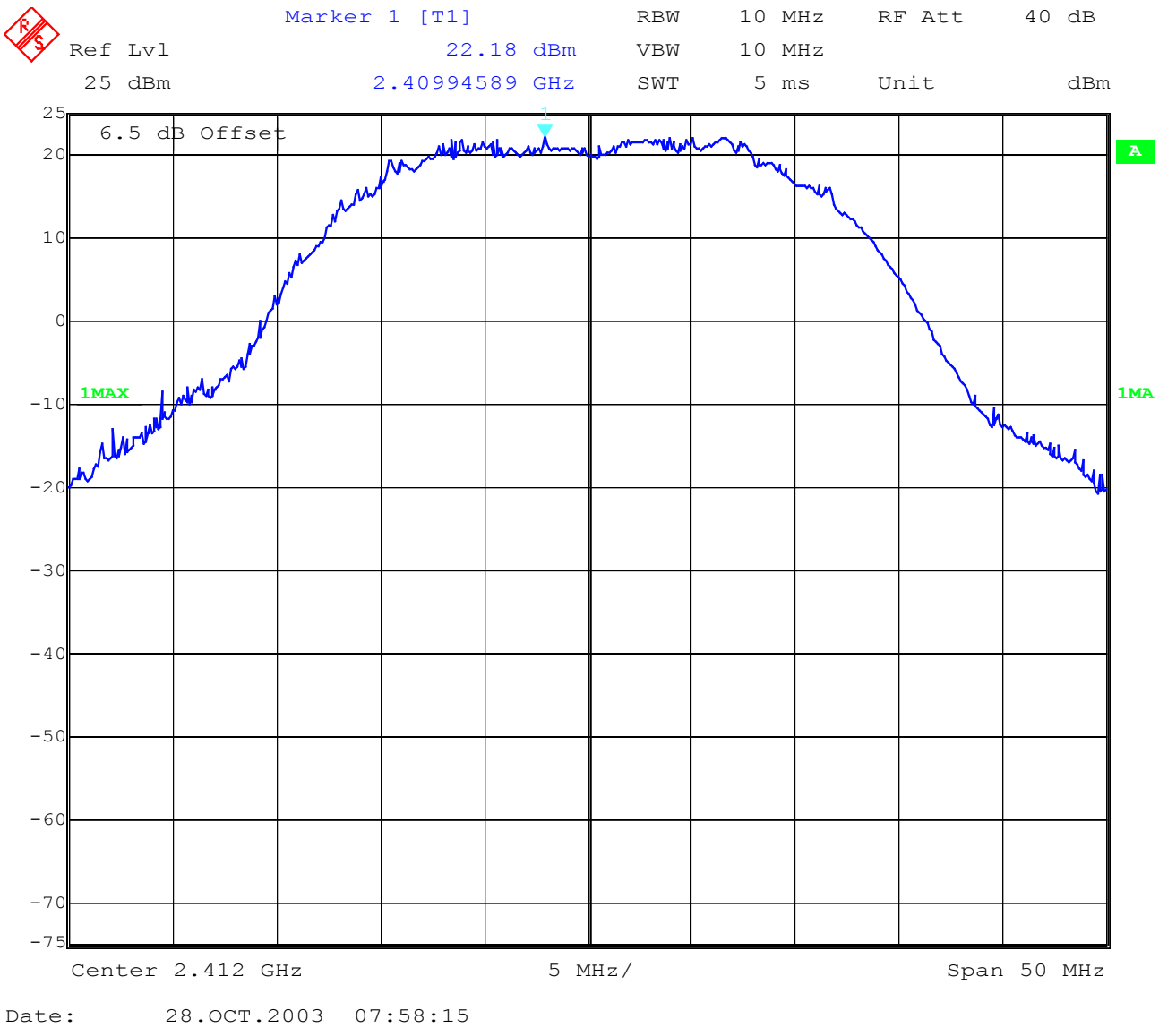
LIMIT **SUBCLAUSE § 15.247 (b) (1)**

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)
64

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

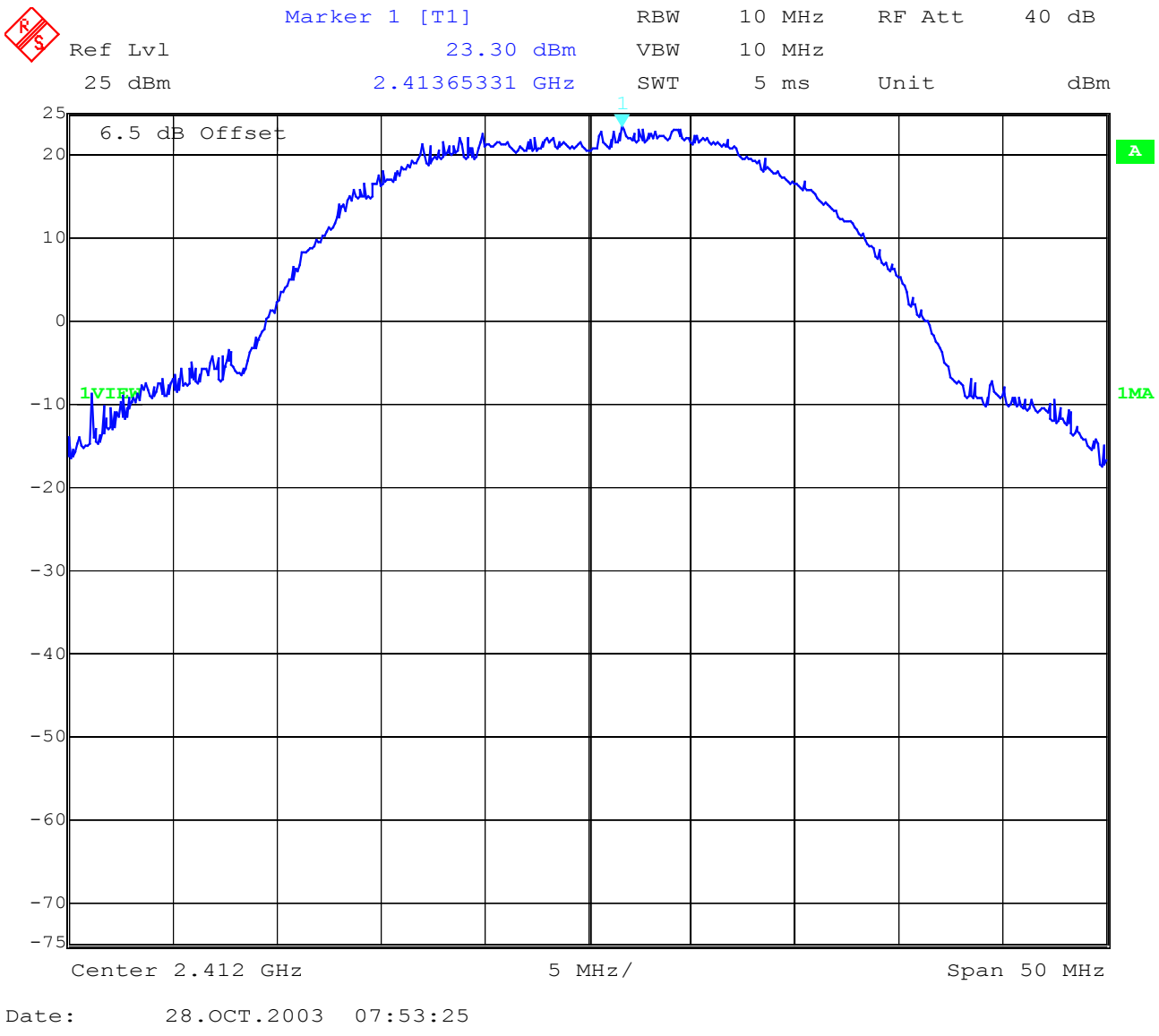
low channel peak



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

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

low channel peak

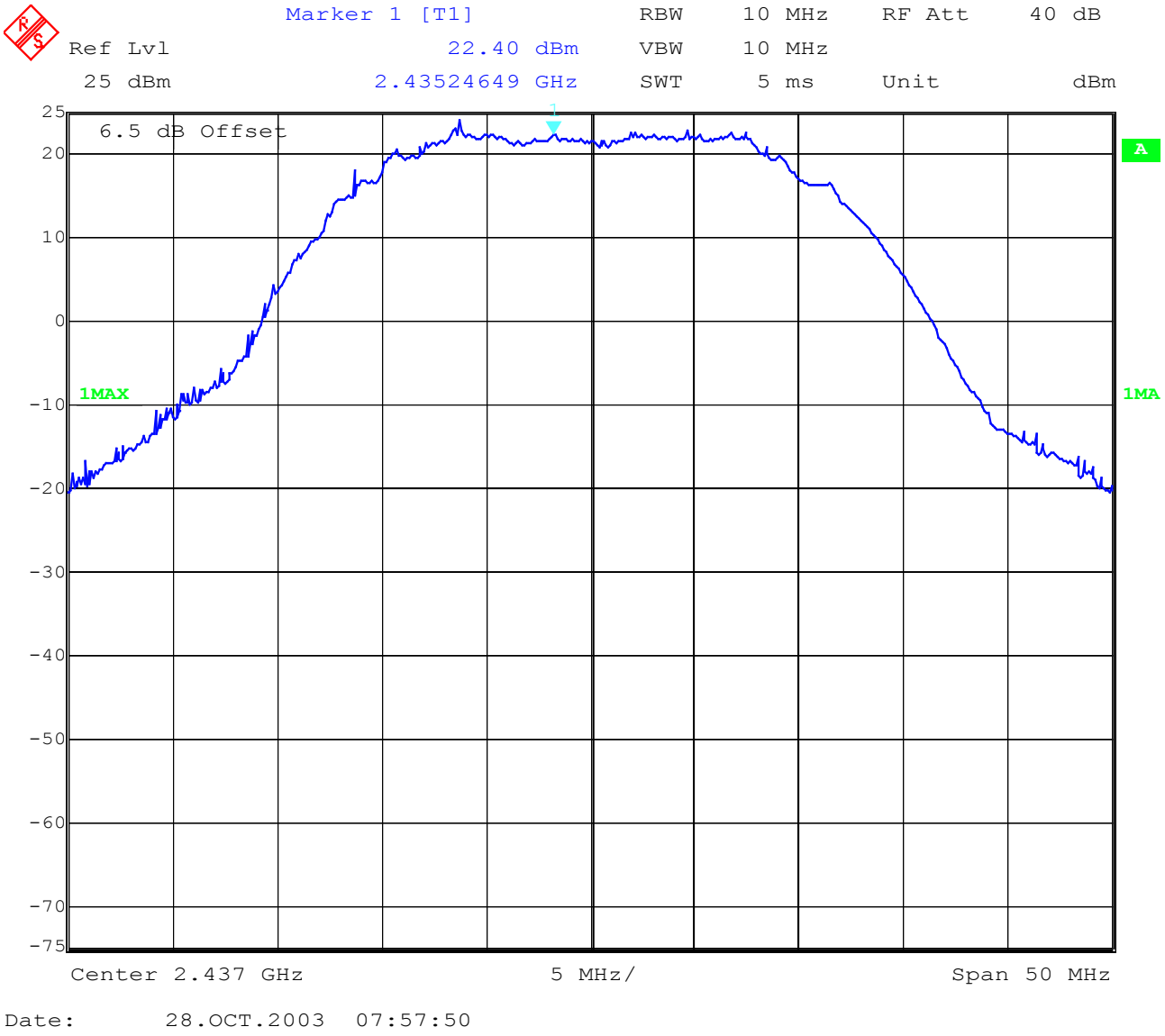


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

MAXIMUM PEAK OUTPUT POWER
DSSS System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

mid channel peak

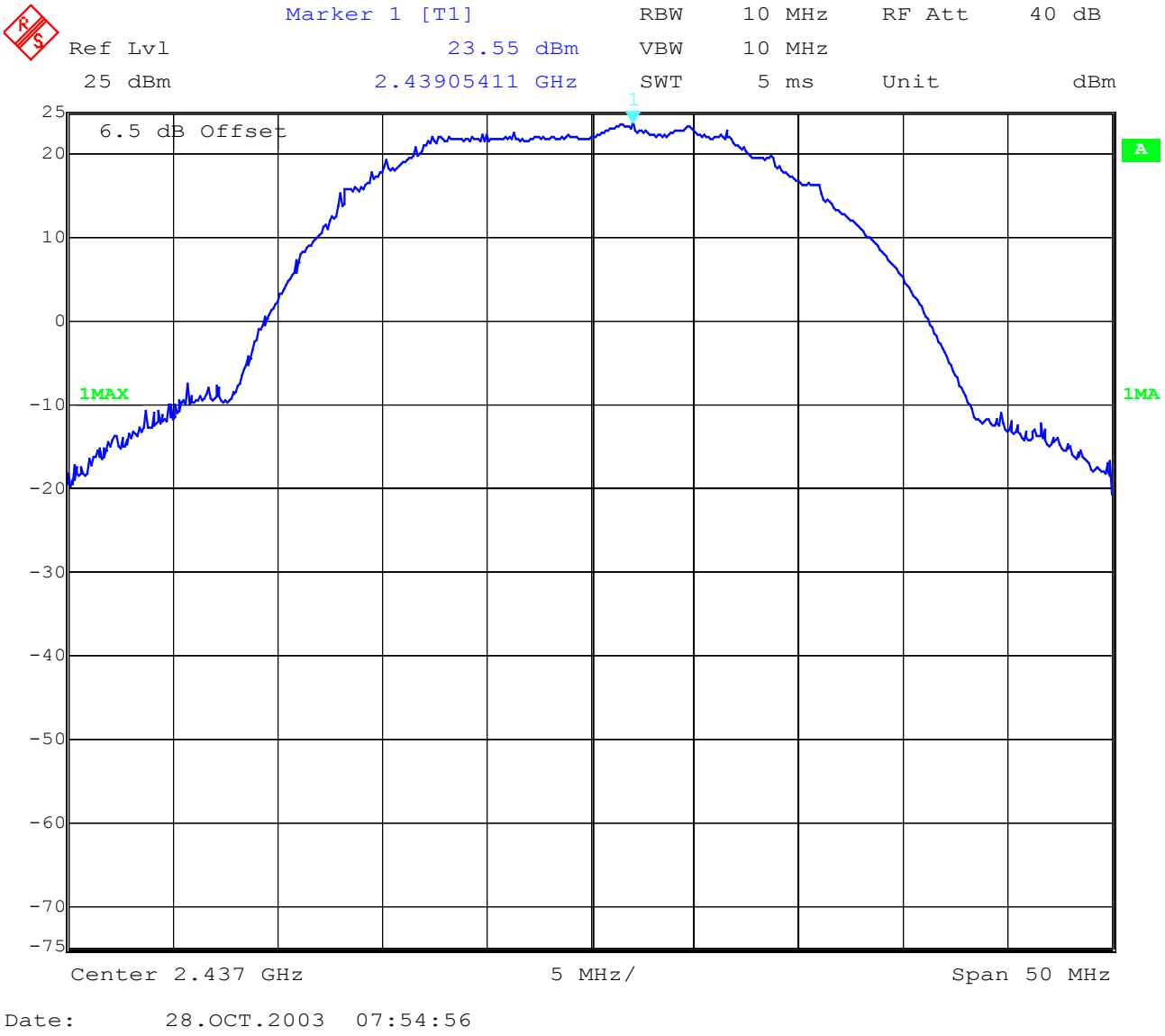


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

MAXIMUM PEAK OUTPUT POWER OFDM System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

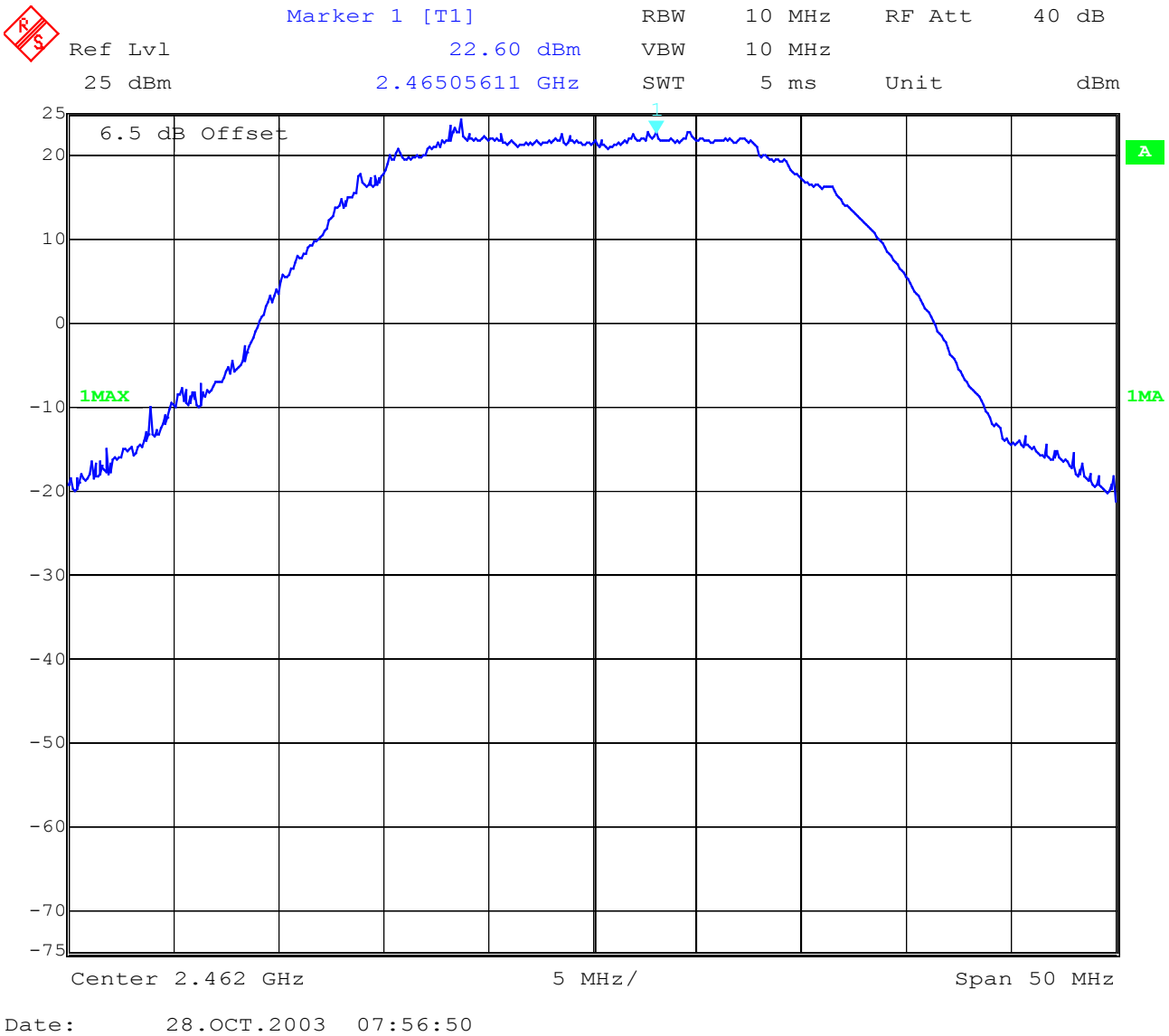
mid channel peak



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

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

high channel peak

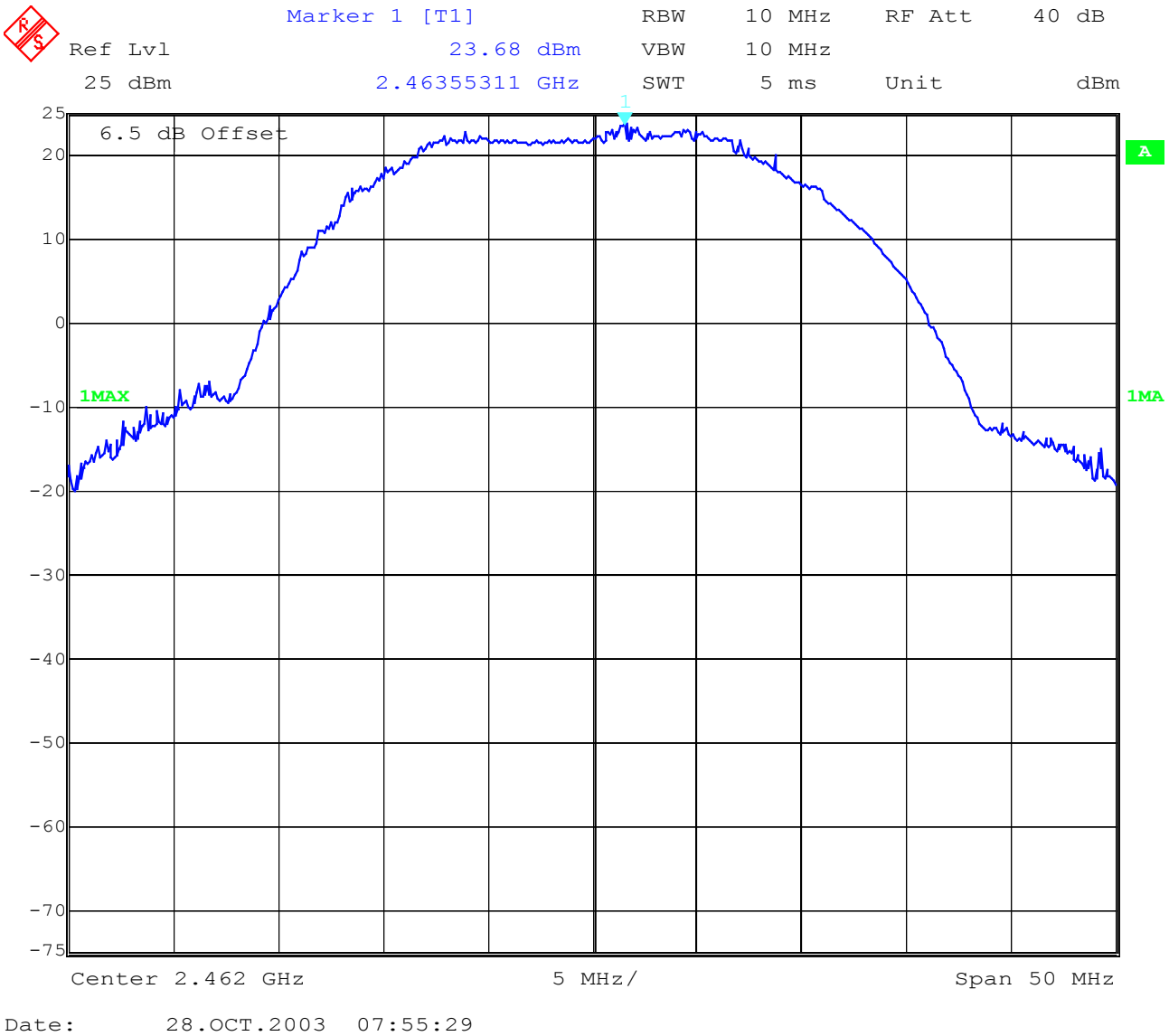


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

MAXIMUM PEAK OUTPUT POWER OFDM System (CONDUCTED)

SUBCLAUSE § 15.247 (b) (1)

high channel peak



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

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	61.38 mW 17.88 dBm	97.72 mW 19.90 dBm	85.31 mW 19.31 dBm
Correction factor		+0.62 dB	+0.66 dB	+0.62 dB
Final corrected result		70.79 mW 18.50 dBm	113.76 mW 20.56 dBm	98.40 mW 19.93 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	79.43 mW 19.00 dBm	127.35 mW 21.05 dBm	85.11 mW 19.30 dBm
Correction factor		+2.16 dB	+2.16 dB	+2.14 dB
Final corrected result		130.62 mW 21.16 dBm	209.41 mW 23.21 dBm	139.32 mW 21.44 dBm
Measurement uncertainty		±3dB		

RBW/VBW : 10 MHz

The correction factor is calculated by 10*log (measured BW / 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)
64

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/cm^2)
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: 23.21 dBm (209.41 mW)

calculated at distance of 20 cm

power density = $209.41/4\pi 20^2$

= 0.042 mW/ cm^2

Limit:

1mW/ cm^2 is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

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

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	-12.67 dBm	-10.71 dBm	-11.31 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	-16.13 dBm	-13.28 dBm	-15.65 dBm
Measurement uncertainty		±3dB		

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

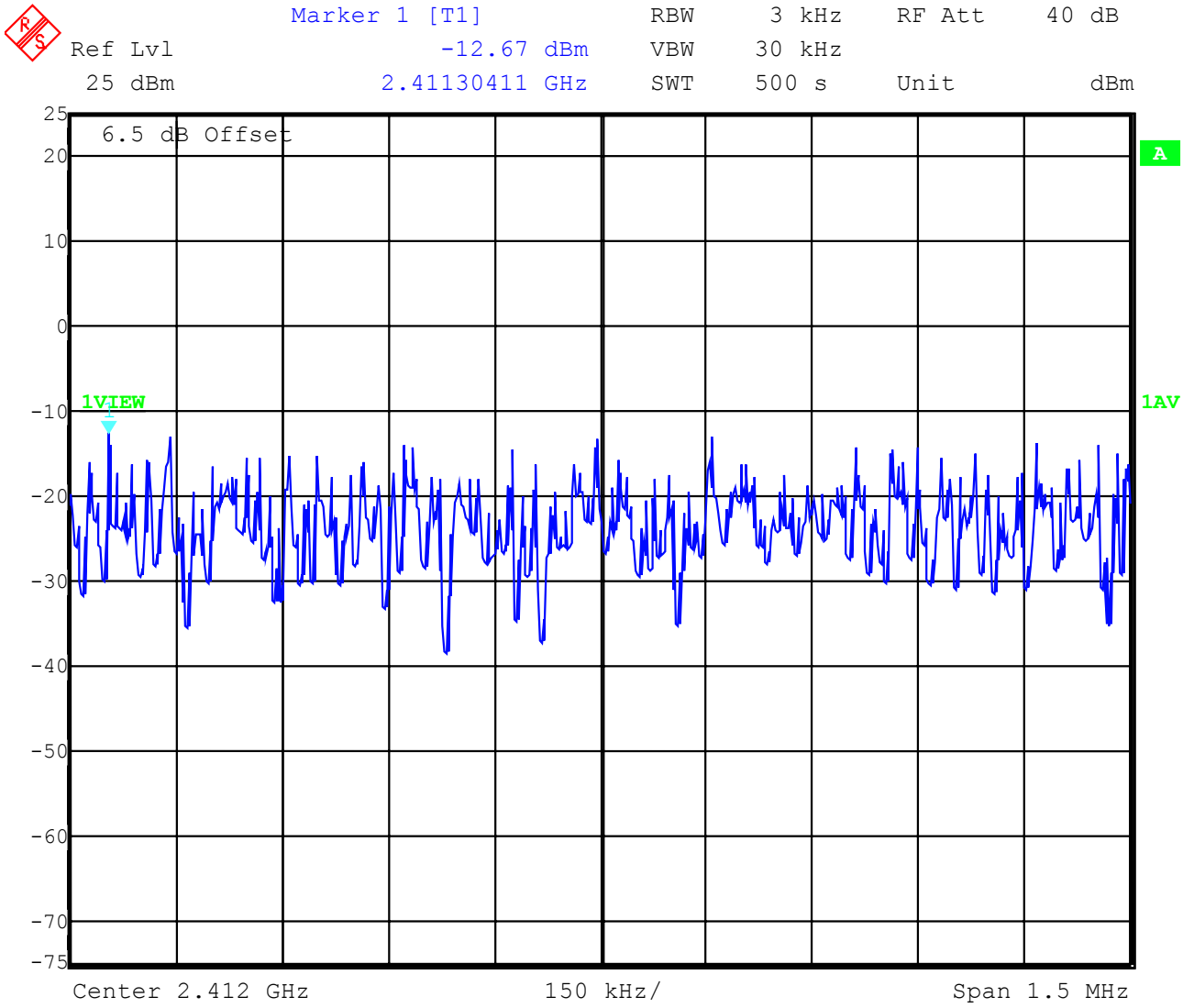
LIMIT **SUBCLAUSE §15.247(d)**

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)
64

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**
2412 MHz

DSSS System



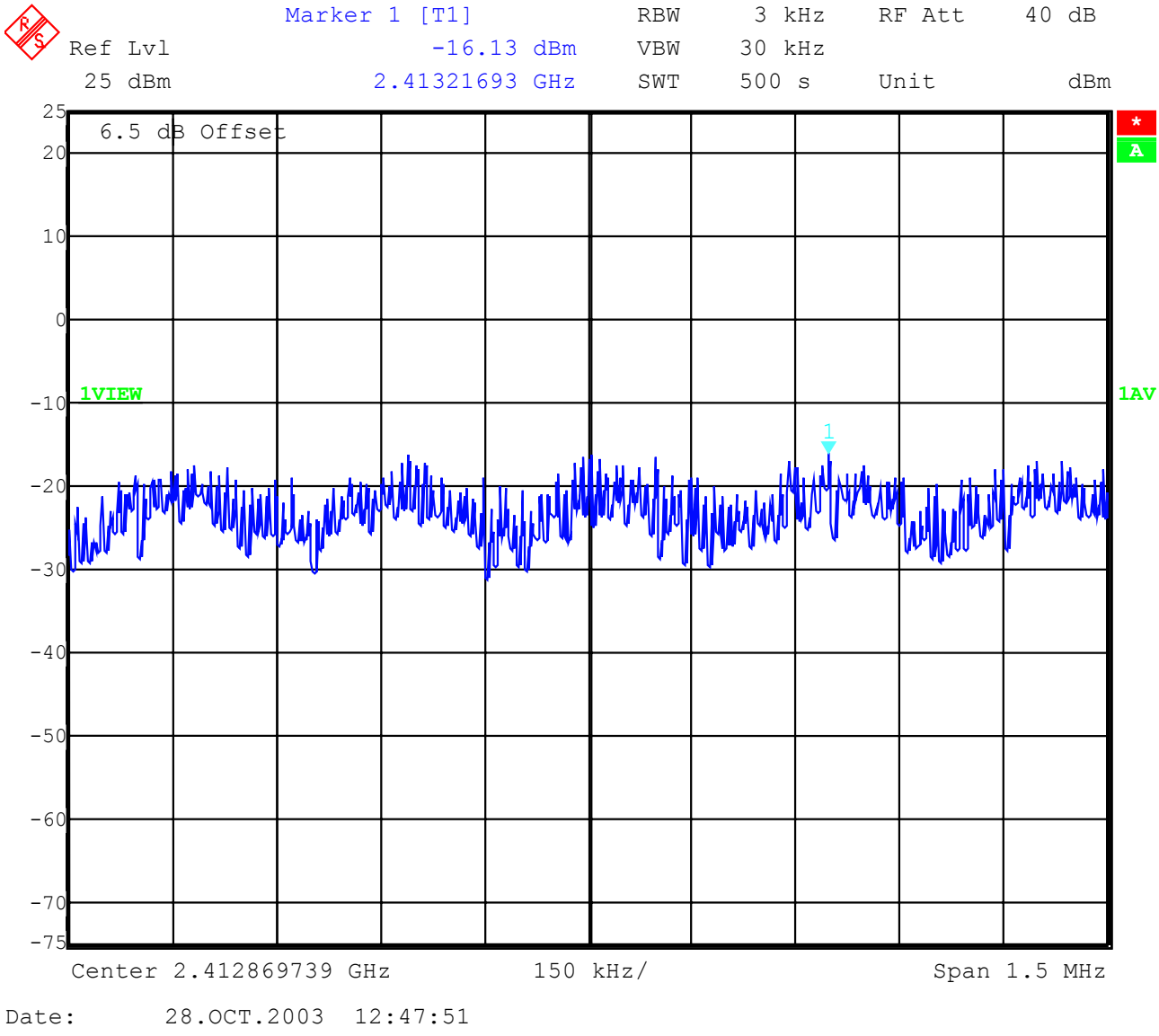
LIMIT **SUBCLAUSE §15.247(d)**

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

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

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**
2412 MHz

OFDM System



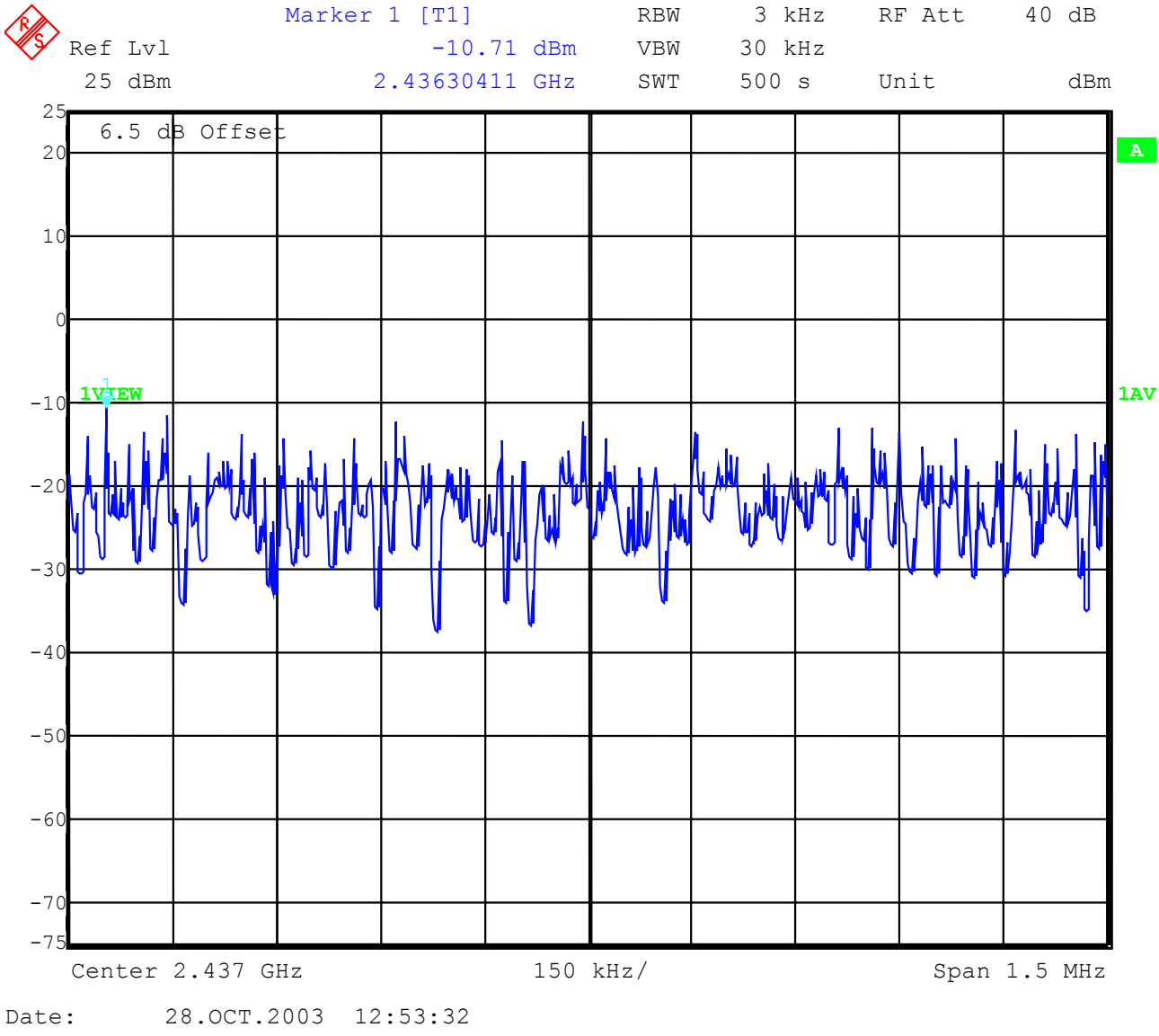
LIMIT **SUBCLAUSE §15.247(d)**

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

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

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**
2437 MHz

DSSS System



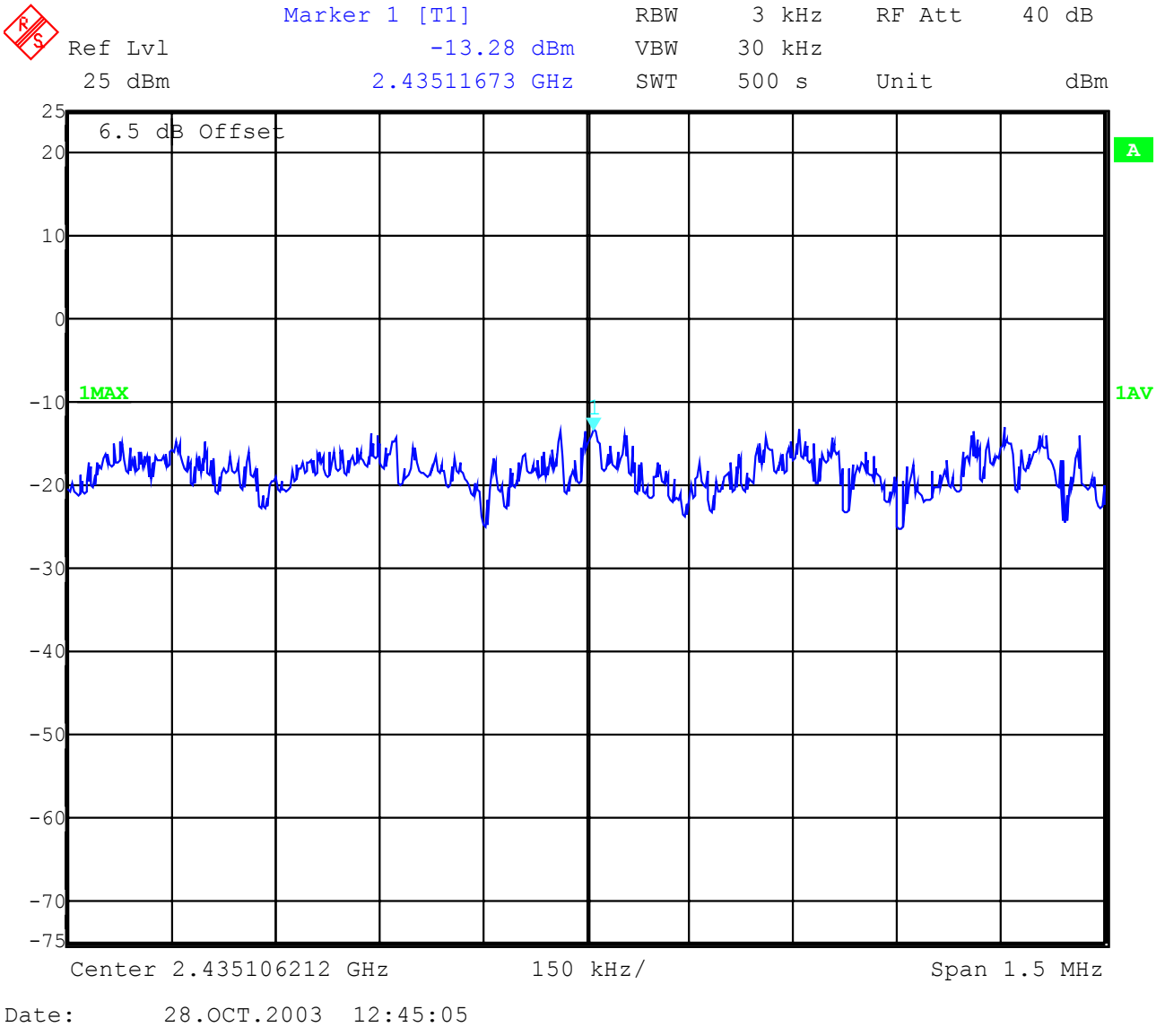
LIMIT **SUBCLAUSE §15.247(d)**

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

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

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**
2437 MHz

OFDM System



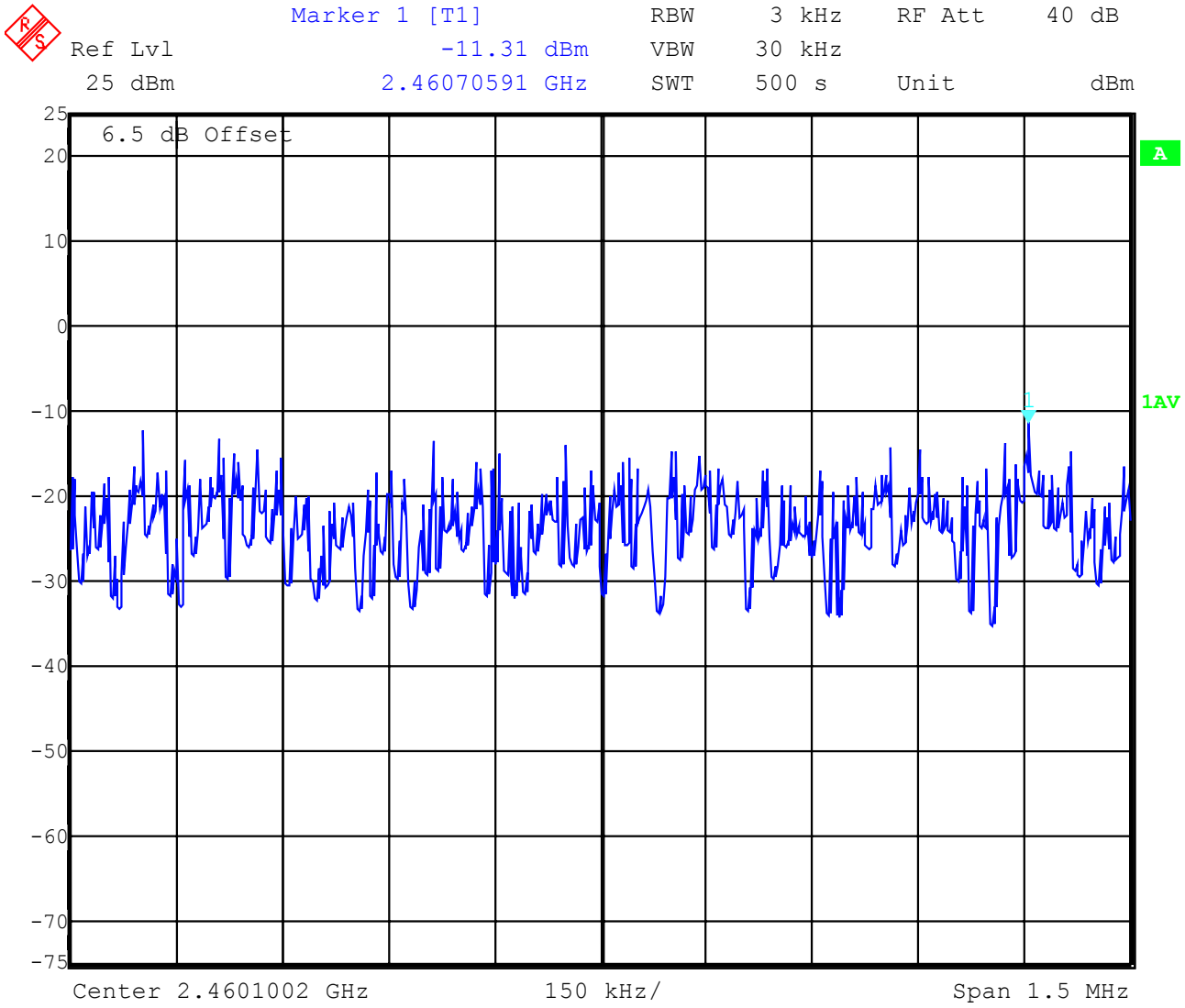
LIMIT **SUBCLAUSE §15.247(d)**

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

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

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**
2462 MHz

DSSS System



Date: 28.OCT.2003 12:52:11

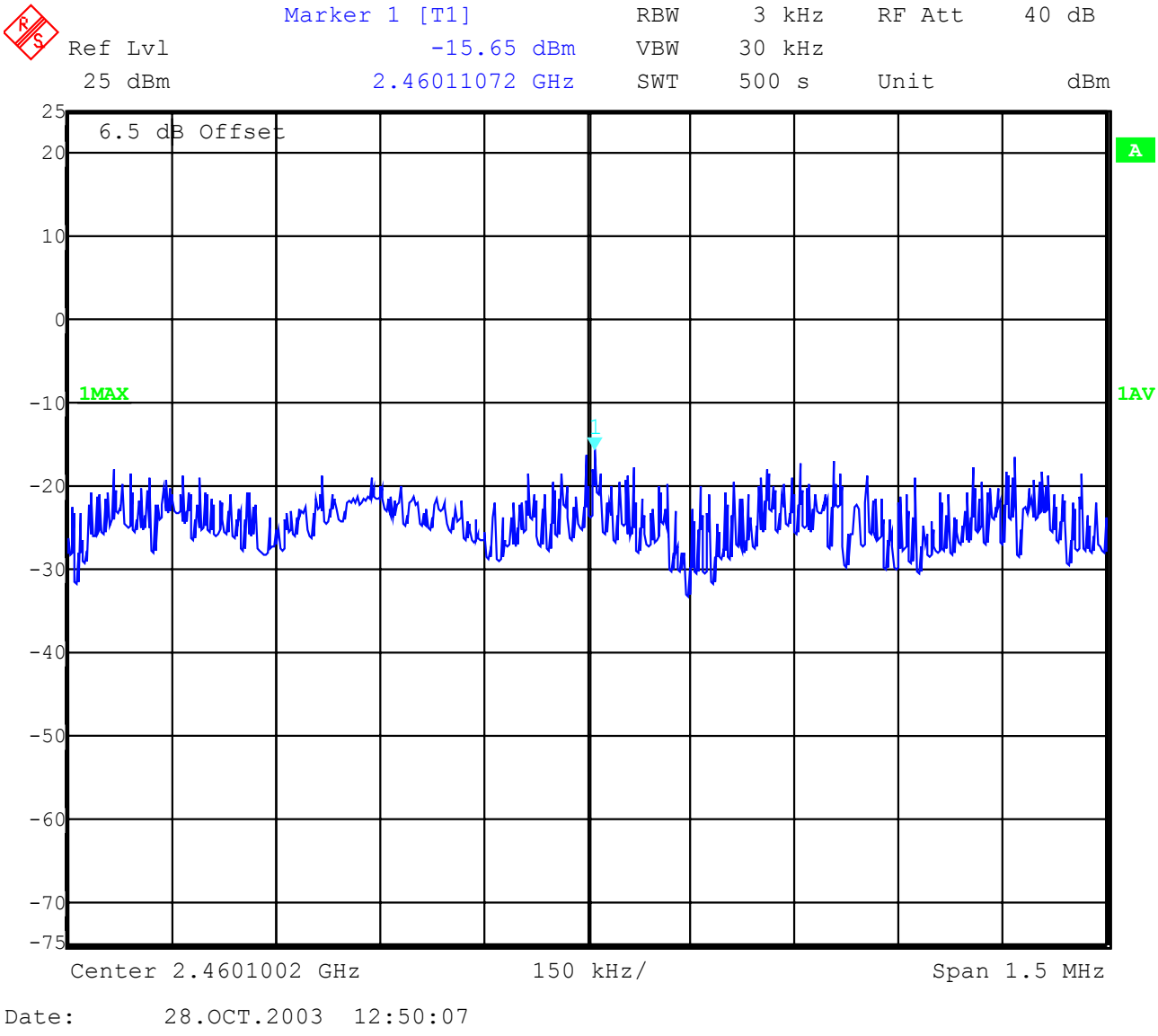
LIMIT **SUBCLAUSE §15.247(d)**

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)
64

POWER SPECTRAL DENSITY **SUBCLAUSE § 15.247 (d)**
2462 MHz

OFDM System



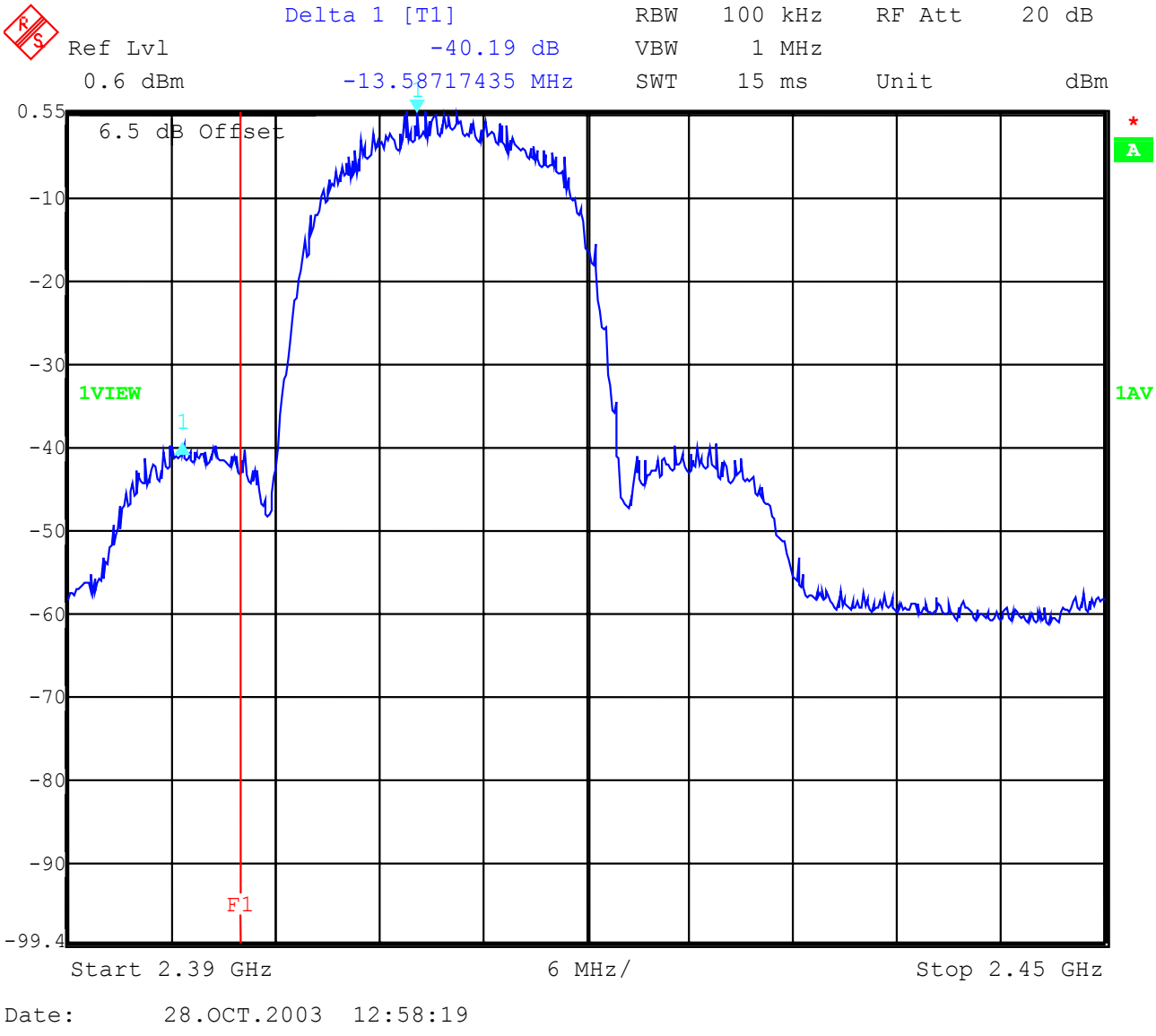
LIMIT **SUBCLAUSE §15.247(d)**

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

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

Band-edge compliance of conducted emissions §15.247 (c)
Low channel

DSSS System

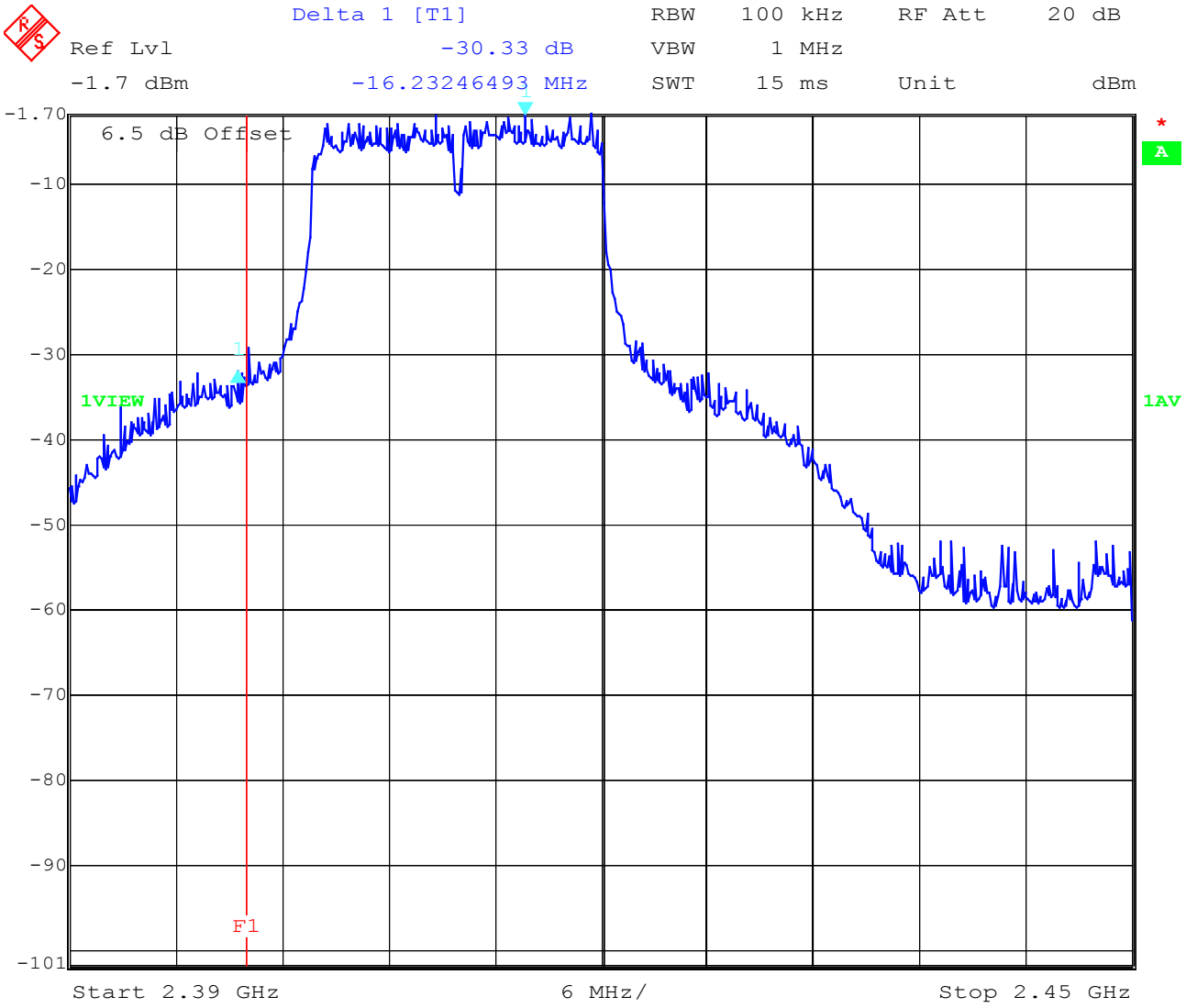


Delta dB = 40.19 dB

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

Band-edge compliance of conducted emissions §15.247 (c)
Low channel

OFDM System

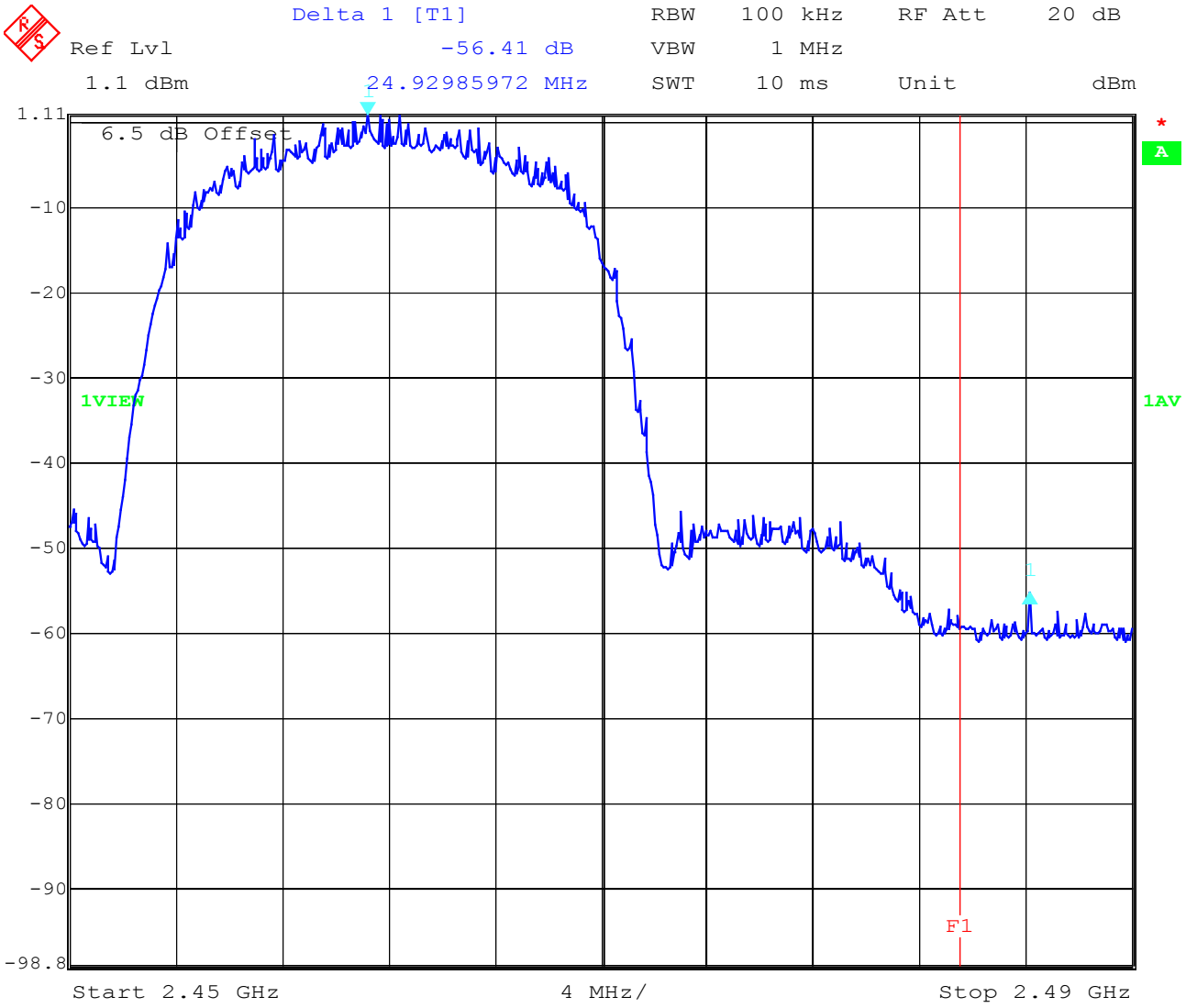


Delta dB = 30.33 dB

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

Band-edge compliance of conducted emissions **§15.247 (c)**
high channel

DSSS System

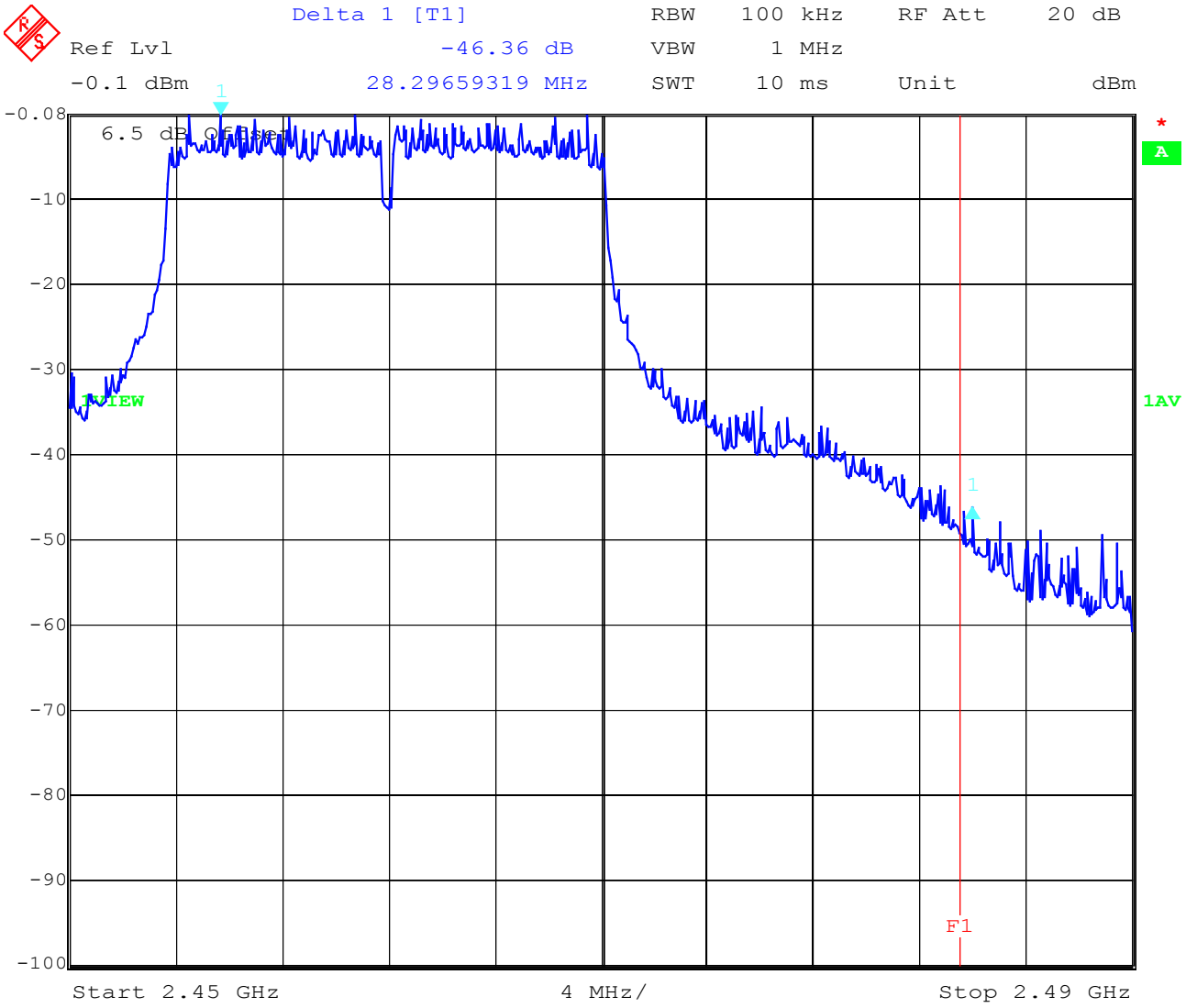


Delta dB = 56.41 dB

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

Band-edge compliance of conducted emissions **§15.247 (c)**
high channel

OFDM System

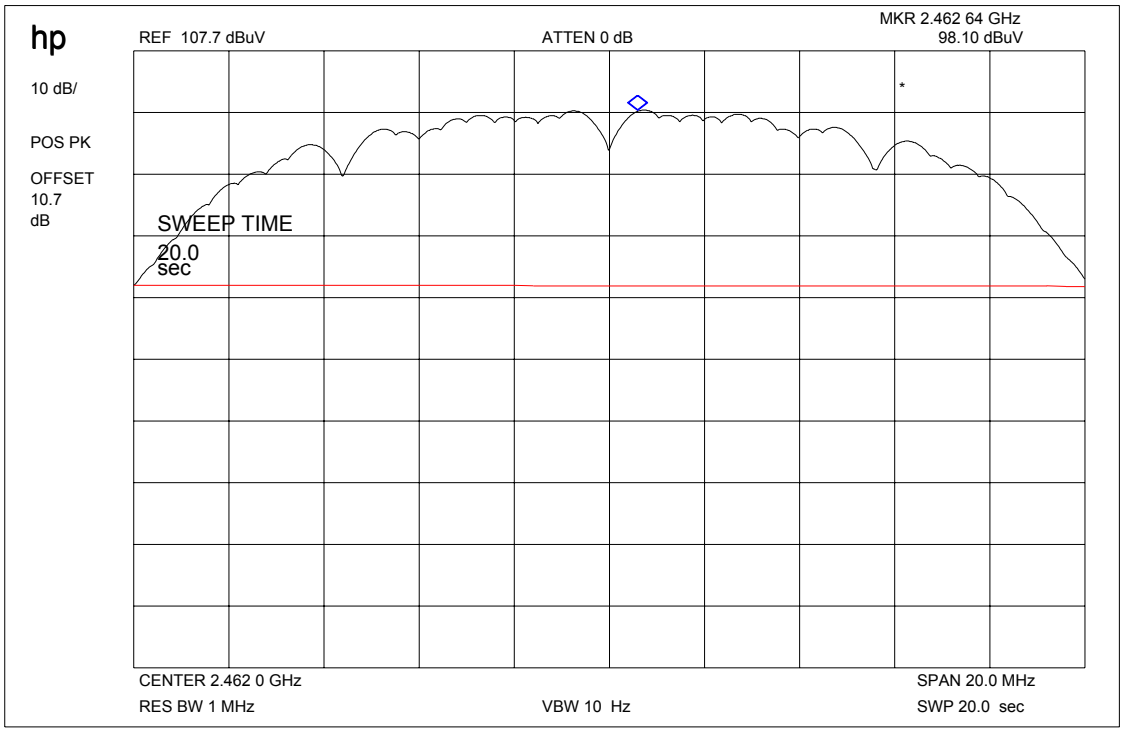


Delta dB = 46.36 dB

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

Band-edge compliance radiated **§15.247 (c)**

Max. field strength in 3m distance average
DSSS System

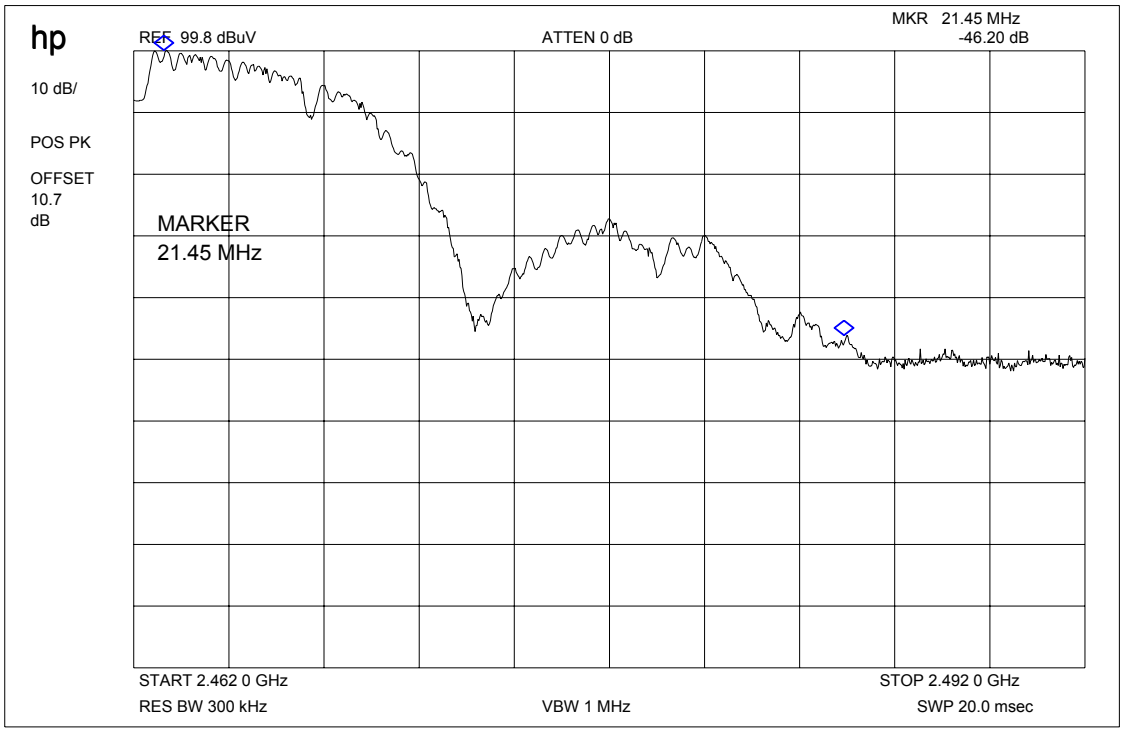


Frequency	Meter reading	Cable loss	Antenna factor	Results
2462 MHz	98.10 dBµV	7.8 dB	-7.2	98.70 dBµV/m

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

Band-edge compliance radiated **§15.247 (c)**

DSSS System

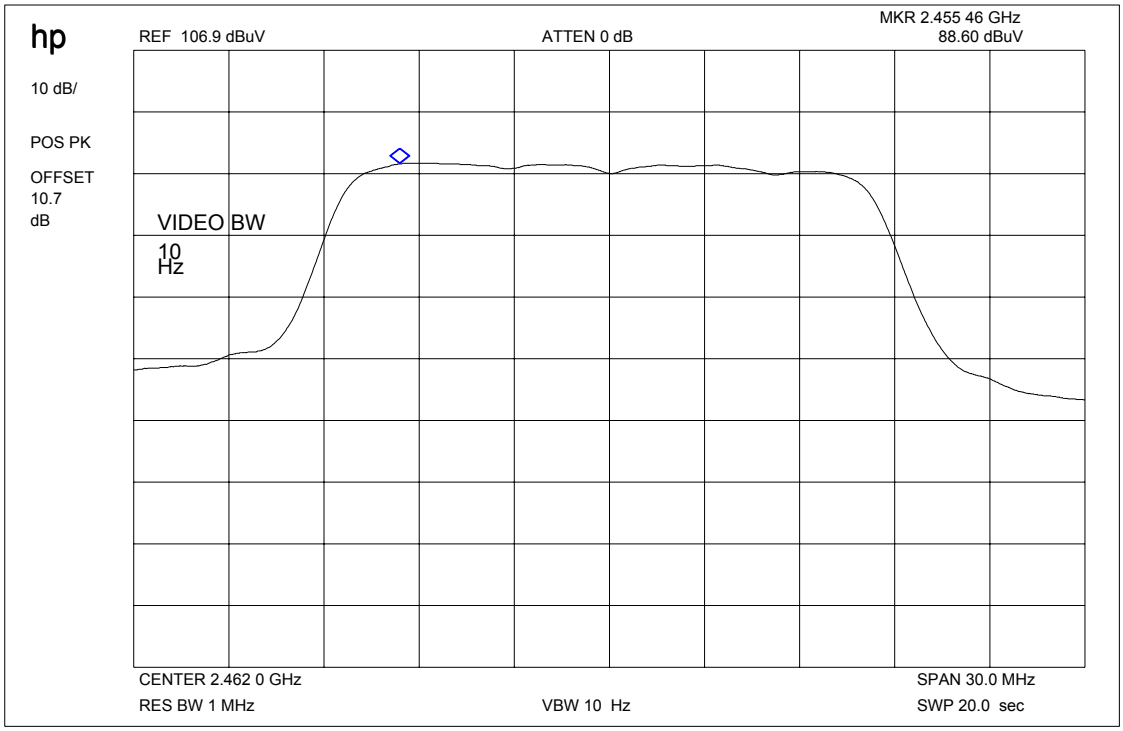


Delta dB = 46.2 dB

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

Band-edge compliance radiated **§15.247 (c)**

Max. field strength in 3m distance average
OFDM System

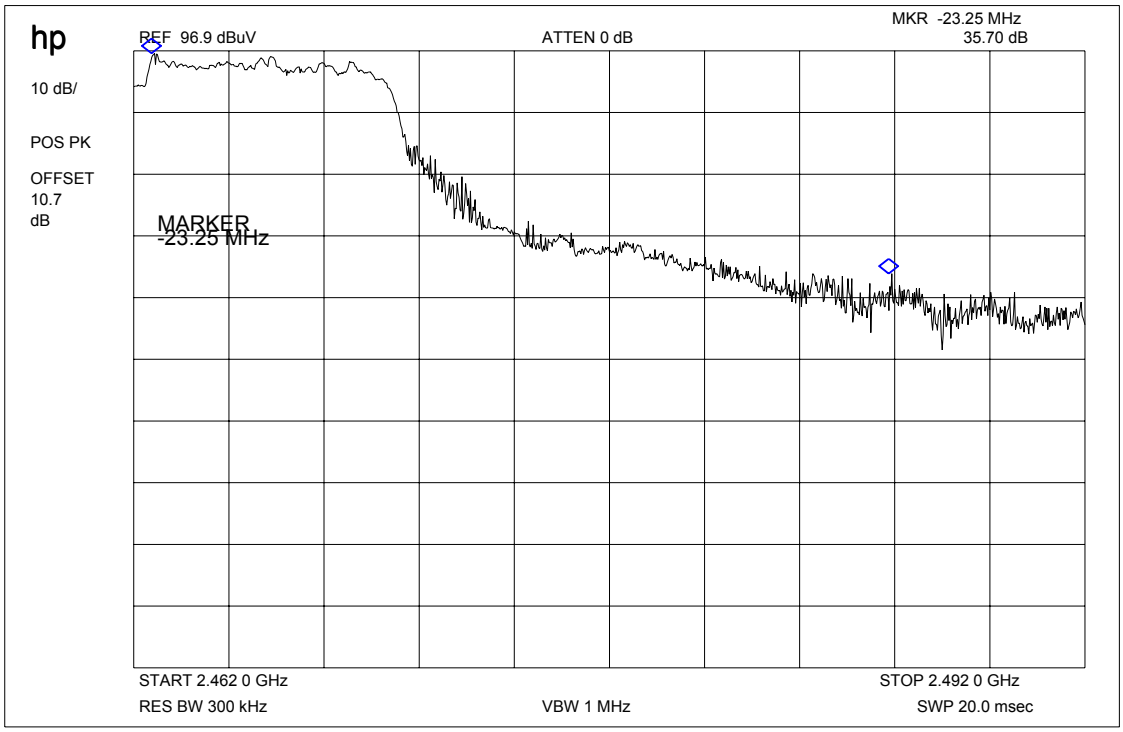


Frequency	Meter reading	Cable loss	Antenna factor	Results
2462 MHz	88.60 dBµV	7.8 dB	-7.2	89.20 dBµV/m

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

Band-edge compliance radiated **§15.247 (c)**

OFDM System



Delta dB = 35.7 dB

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

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	101.70 dBµV/m	+0,6 dB	102.30 dBµV/m
Max. average value	1 MHz RBW 10 Hz VBW	98.10	+0,6 dB	98.70 dBµV/m
Delta value	Peak 300 kHz RBW/VBW	46.2 dB	-	-
Value at band edge	limit 54 dBµV/m			52.50 dBµV/m
Statement:				Complies

The product complies with the limit of the restricted bands.

Delta marker plots see above pages

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

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	102.50 dBµV/m	+0,6 dB	103.10 dBµV/m
Max. average value	1 MHz RBW 10 Hz VBW	88.60	+0,6 dB	89.20 dBµV/m
Delta value	Peak 300 kHz RBW/VBW	35.7 dB	-	-
Value at band edge	limit 54 dBµV/m			53.50 dBµV/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 OFDM (54 Mbit/s) System

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emmision power	actual attenuation below frequency of operation (dB)	results
2412		23.30	30 dBm	-	Operating frequency
300.6		-55.02	-20 dBc (+3.30 dBm)	78.32	complies
7236		-53.21		76.51	complies
2437		23.55	30 dBm	-	Operating frequency
300.6		-54.80	-20 dBc (+3.55 dBm)	78.35	complies
2462		23.68	30 dBm		Operating frequency
100.2		-55.30	-20 dBc (+3.68 dBm)	78.98	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)

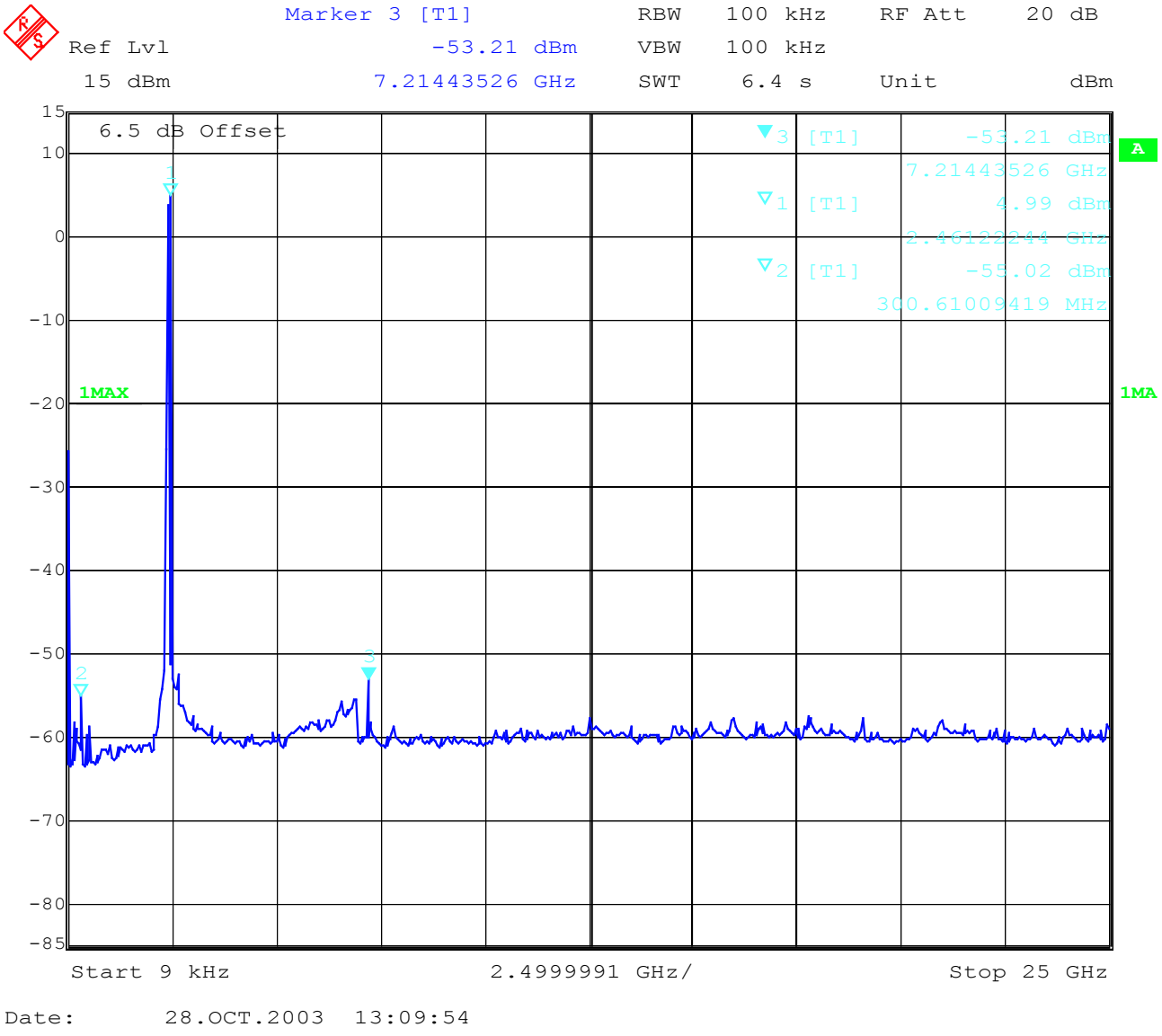
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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

SPURIOUS EMISSION LIMITATION CONDUCTED **§ 15.247 (c) (1)**

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

Low channel

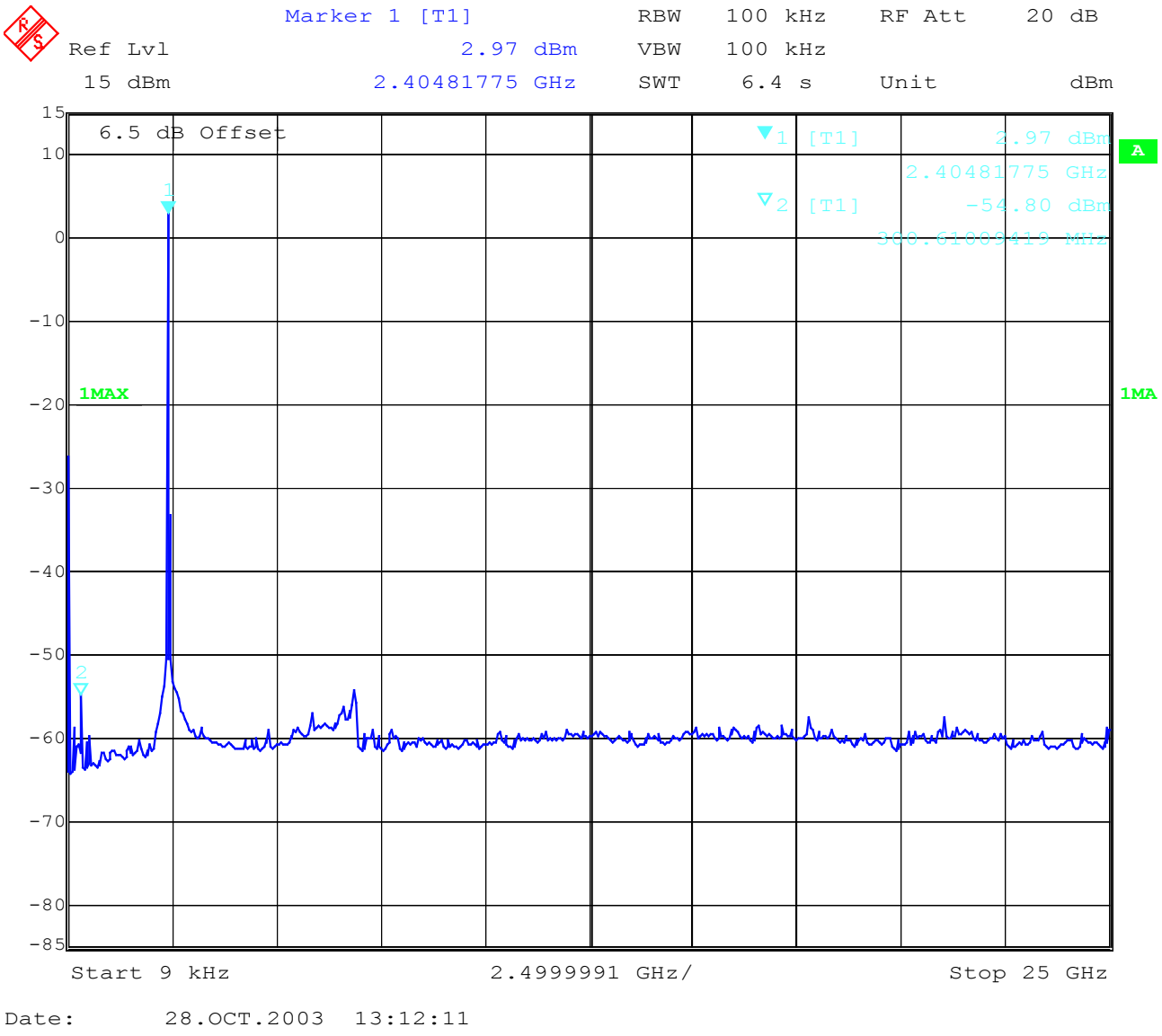


No spurious found in the restricted bands (2310 – 2390 MHz and 2483,5 – 2500 MHz)

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

SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Mid channel (peak)

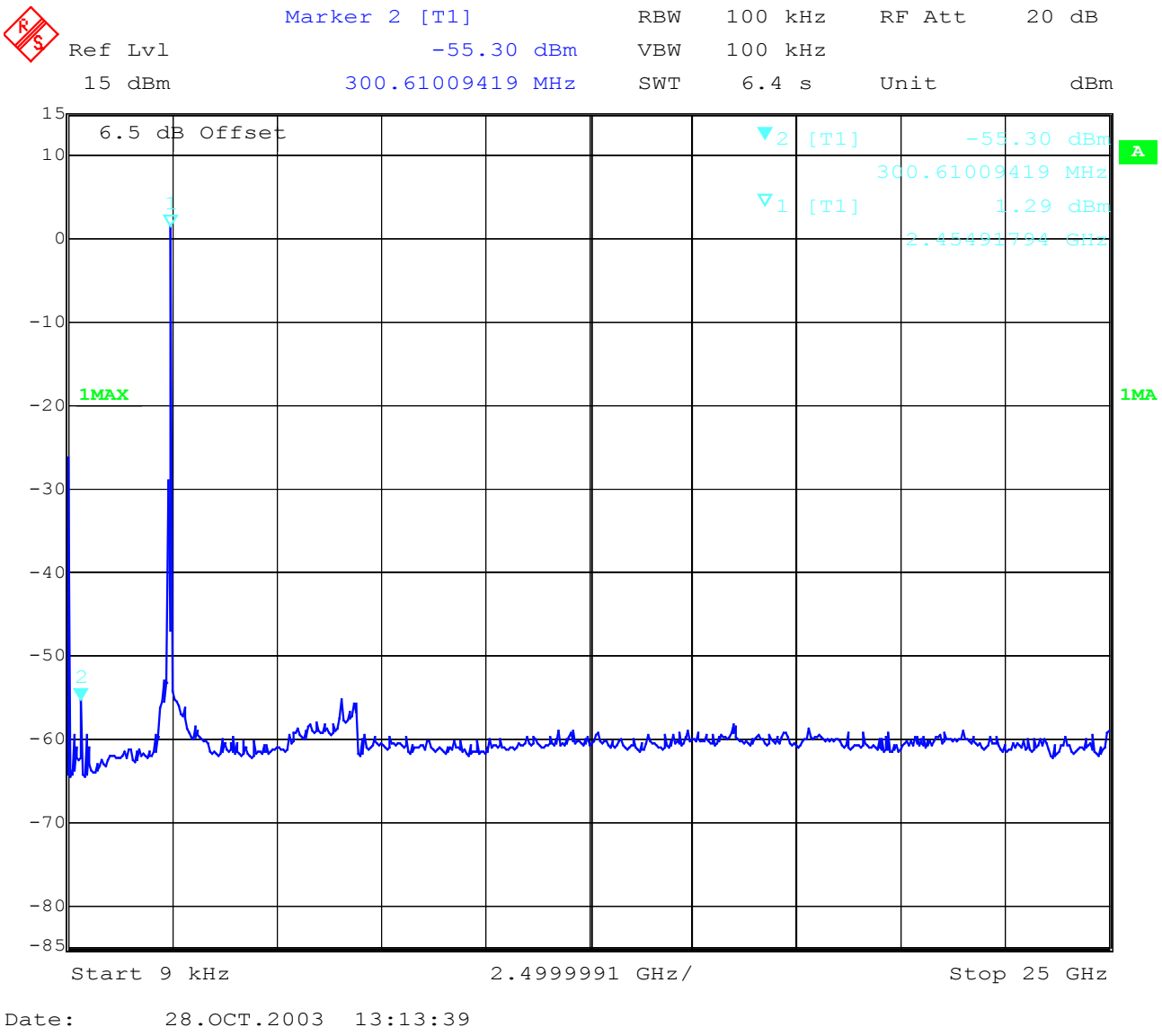


No spurious found in the restricted bands (2310 – 2390 MHz and 2483,5 – 2500 MHz)

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

SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

High 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)
64

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 (µV/m)								
2412 MHz			2437 MHz			2462 MHz		
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
150.5	QP	27.7	150.5	QP	27.4	149.8	QP	27.7
432.7	QP	39.0	432.7	QP	39.7	428.5	QP	39.7
571.7	QP	31.6	539.1	QP	35.3	560.4	QP	30.1
2160.7	AV	26.6	2171.2	AV	27.2	2171.2	AV	26.0
4824	AV	52.4	4874	AV	53.2	4924	AV	56.6
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz **f ≥ 1GHz : 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**

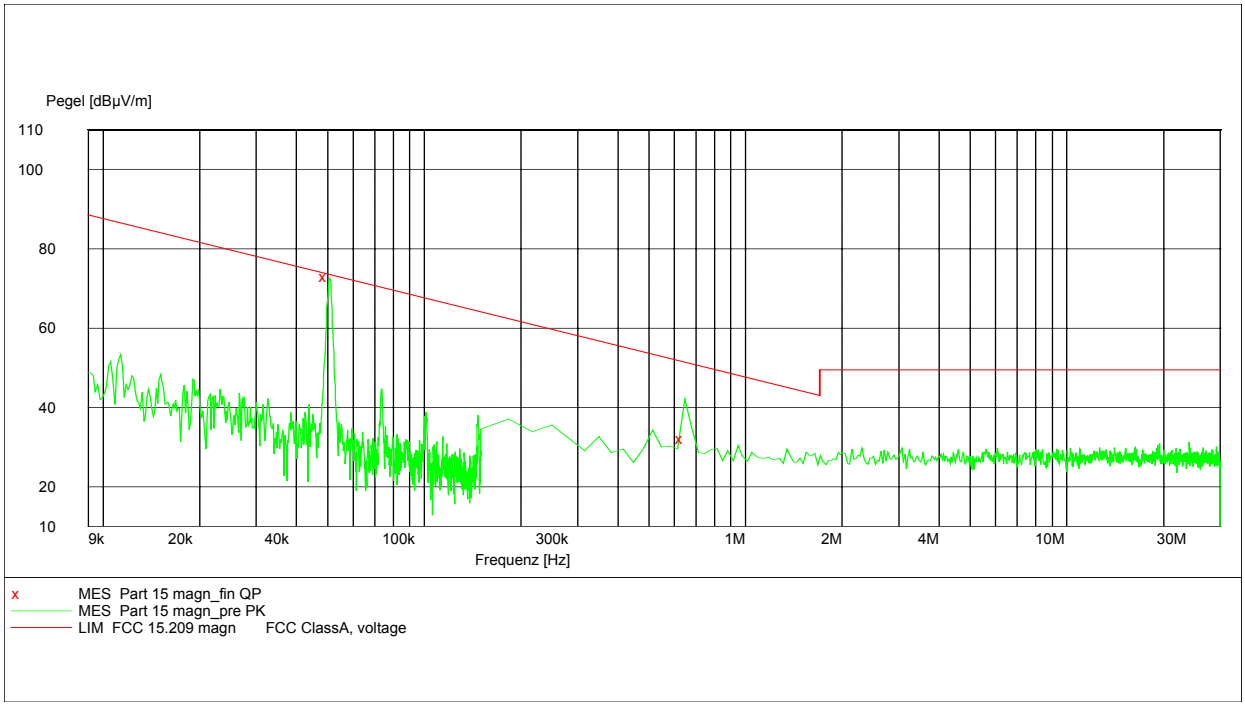
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100 (40 dBµV/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3
above 960	500 (54 dBµV/m)	3

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

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

Transmitter up to 30 MHz
this plot is valid for all channels

```
EUT:                  CTX 714 V.2
Manufacturer:         Creatix
Operating Condition:  Tx mode
Test Site:            Cetecom, Room 6
Operator:             Ames
Test Specification:
Comment:              pass
Start of Test:
```



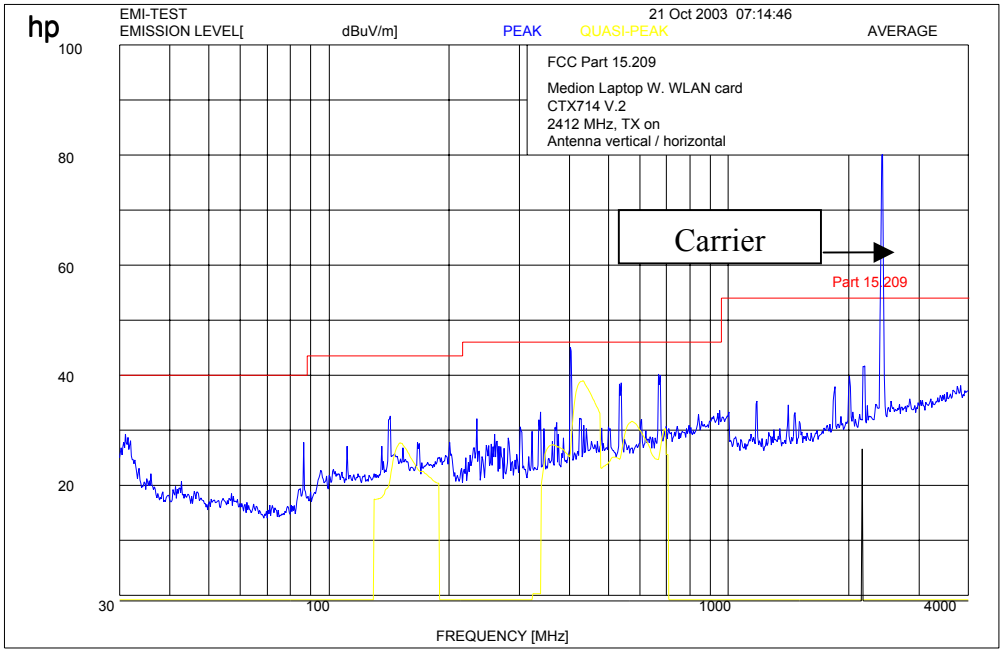
MEASUREMENT RESULT: "Part 15 magn_fin QP"

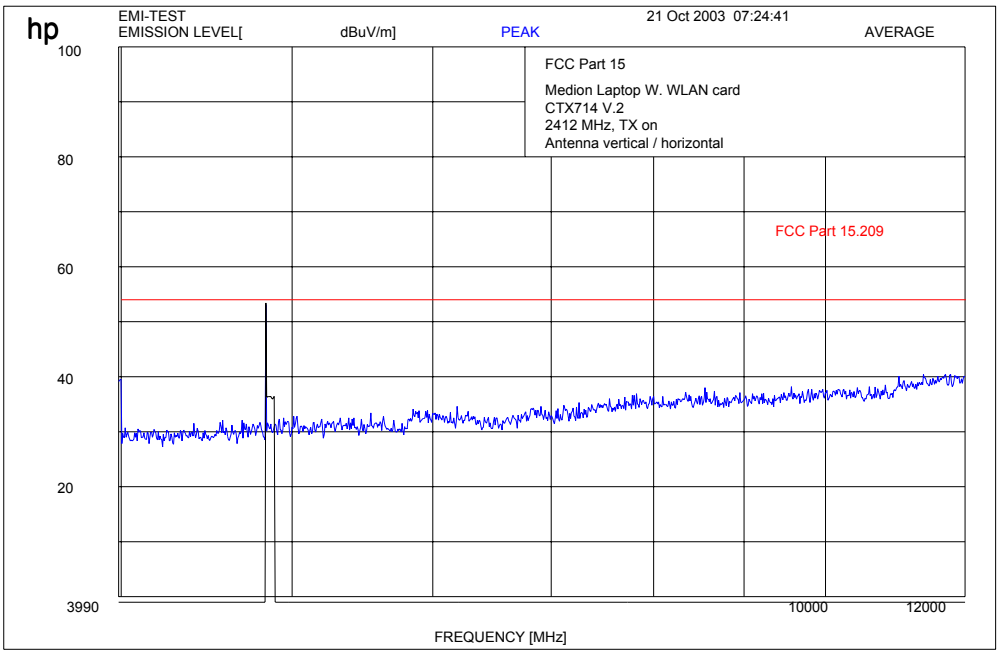
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Loop	Azimuth deg
0.050500	72.90	20.0	73.5	0.6	---	0.00
0.650000	32.20	20.1	51.4	19.2	---	0.00

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

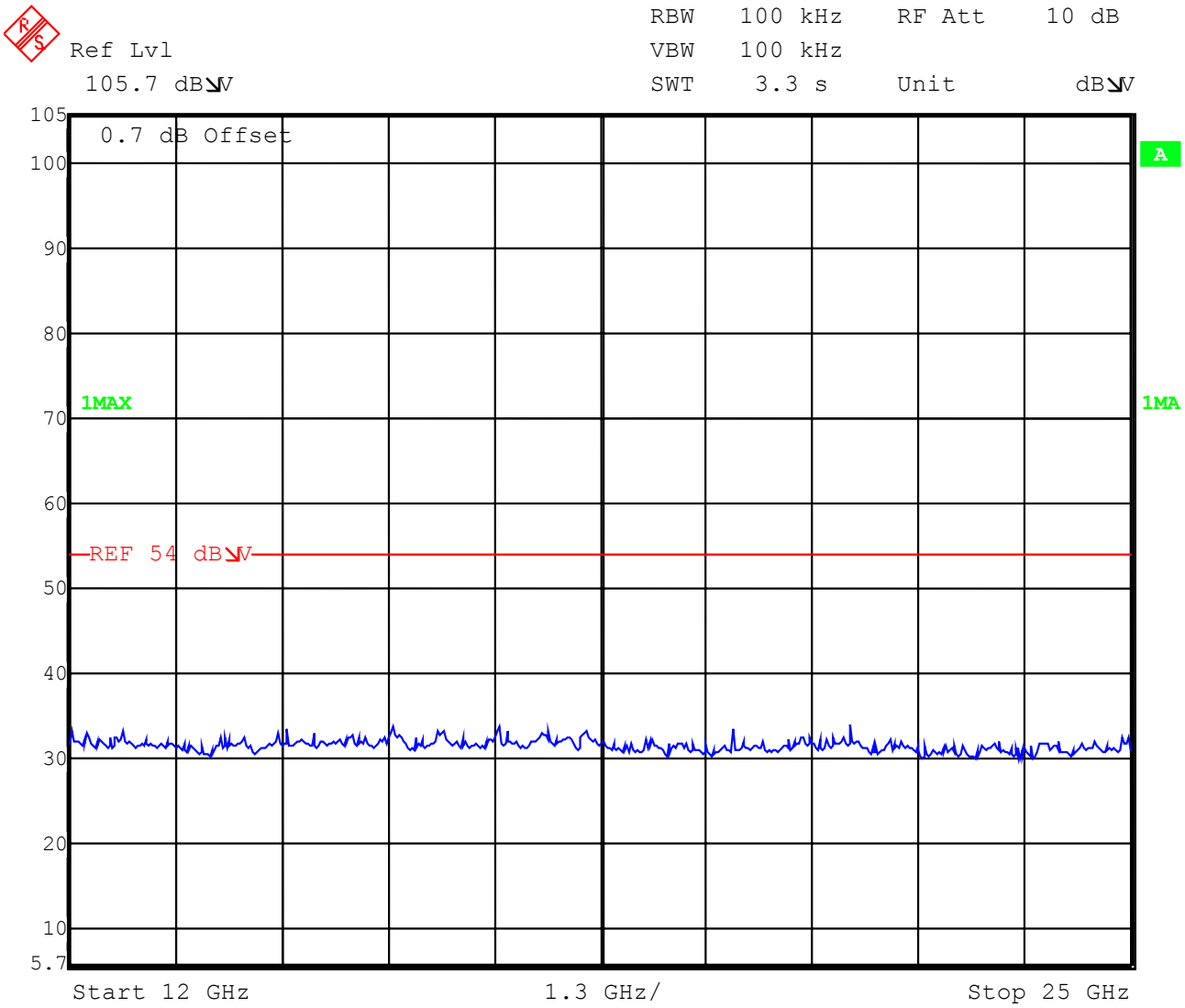




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24; 64

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

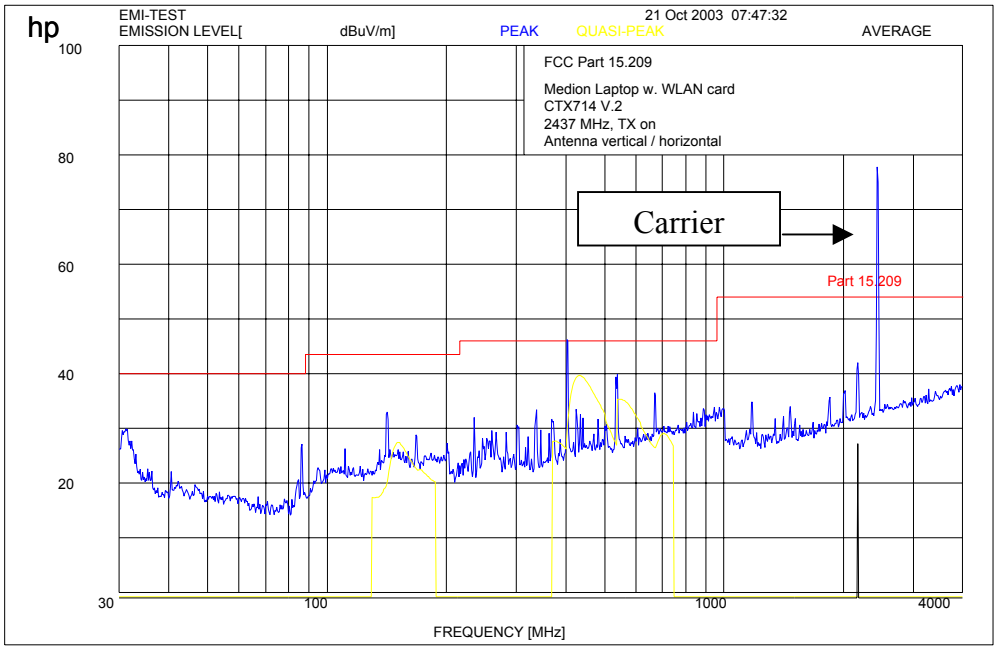
up to 25 GHz
this plot is valid for all 3channels

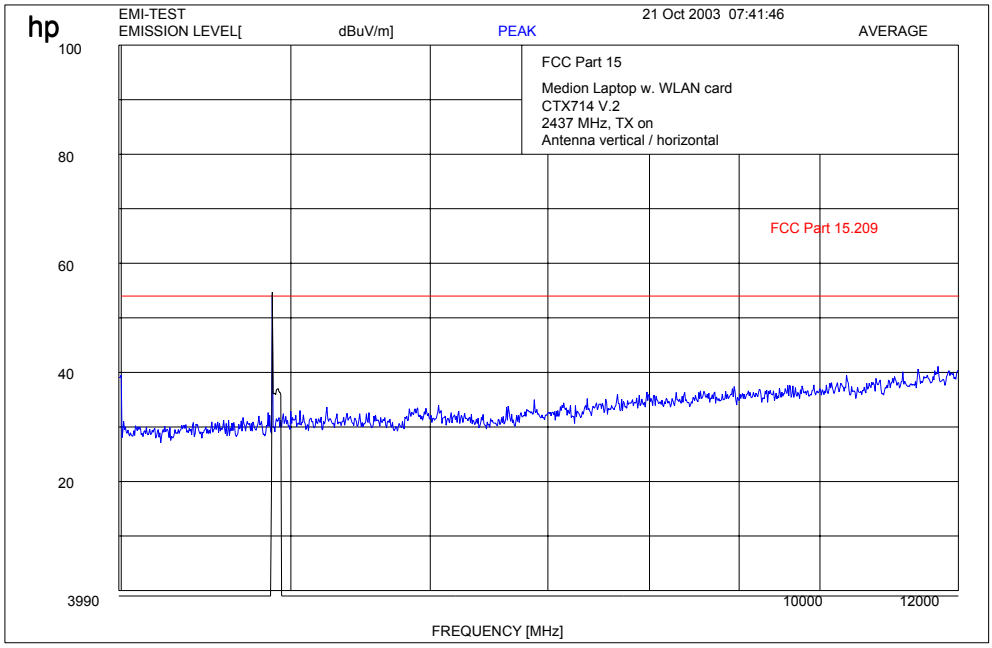


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24; 64

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
Mid channel up to 12 GHz

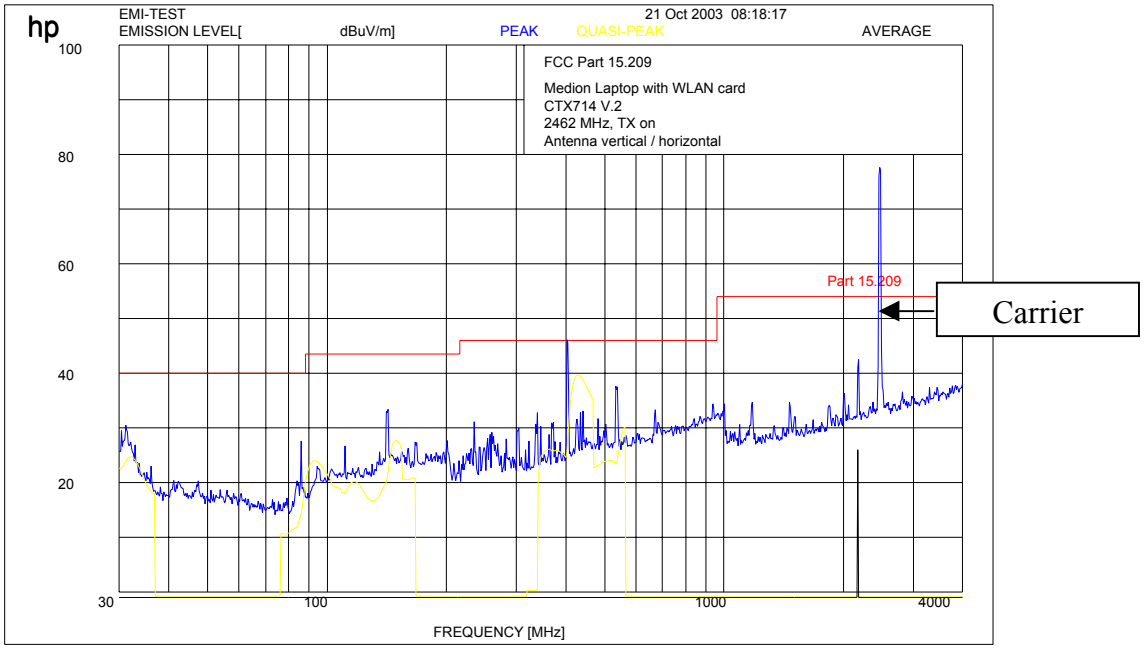
All peaks in the plots below 1 GHz were caused by the test pc, not by the sample.

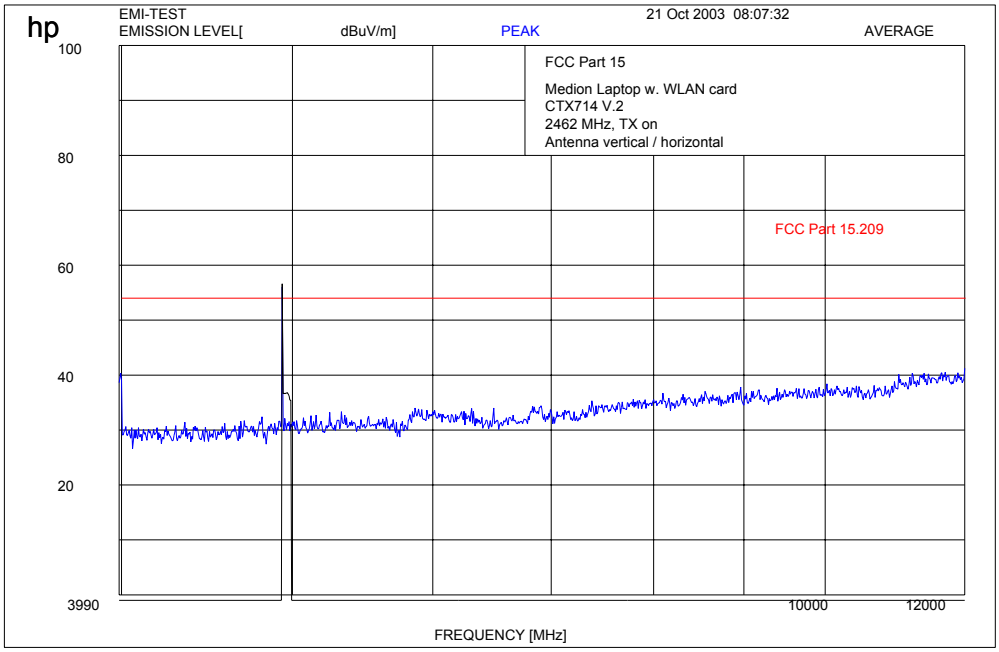




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24; 64

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
high channel up to 12 GHz
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

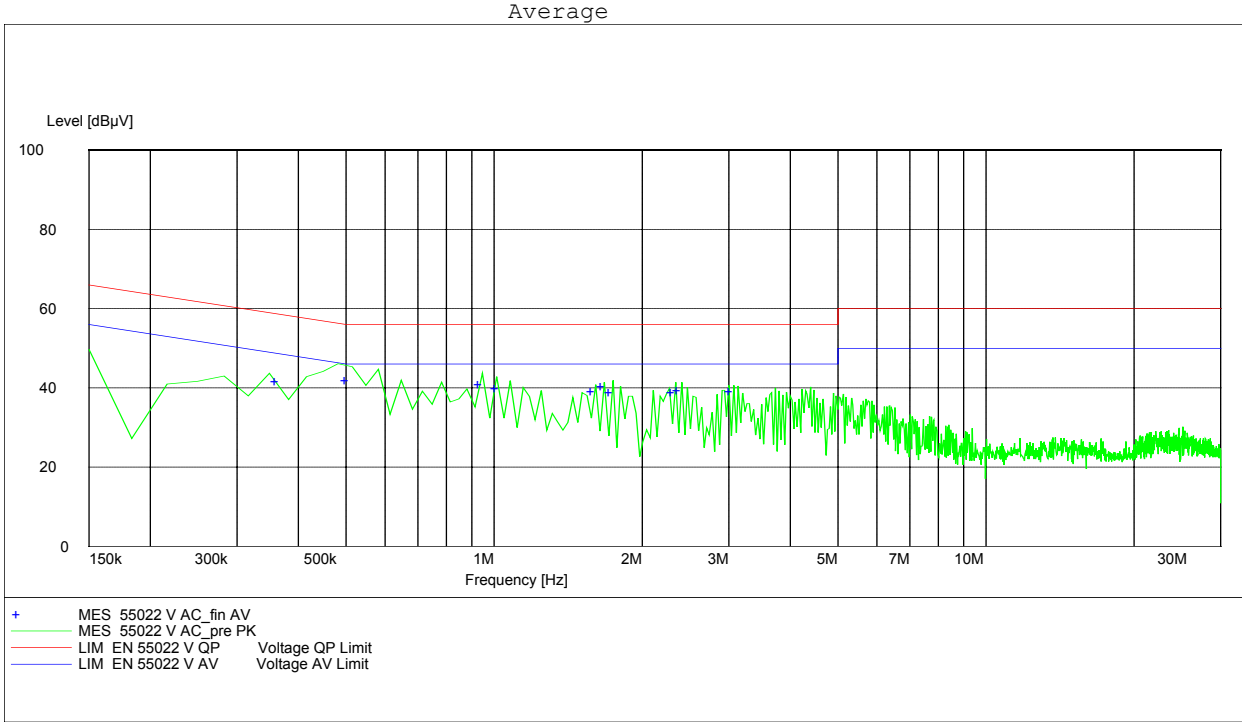
Conducted emissions § 15.107/207

EN 55022 / CISPR 22

```
EUT:                    CTX 714 V.2
Manufacturer:           Creatix
Operating Condition:    Tx-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
```



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

MEASUREMENT RESULT: "55022 V AC_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.367500	41.50	10.6	49	7.0	L1	FLO
0.510000	41.90	10.4	46	4.1	L1	FLO
0.952500	40.70	10.4	46	5.3	N	FLO
1.027500	39.90	10.3	46	6.1	L1	FLO
1.612500	39.10	10.3	46	6.9	L1	GND
1.687500	40.20	10.4	46	5.8	N	GND
1.755000	38.80	10.4	46	7.2	N	GND
2.347500	38.70	10.4	46	7.3	N	FLO
2.415000	39.20	10.4	46	6.8	N	FLO
3.075000	39.10	10.4	46	6.9	N	FLO

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

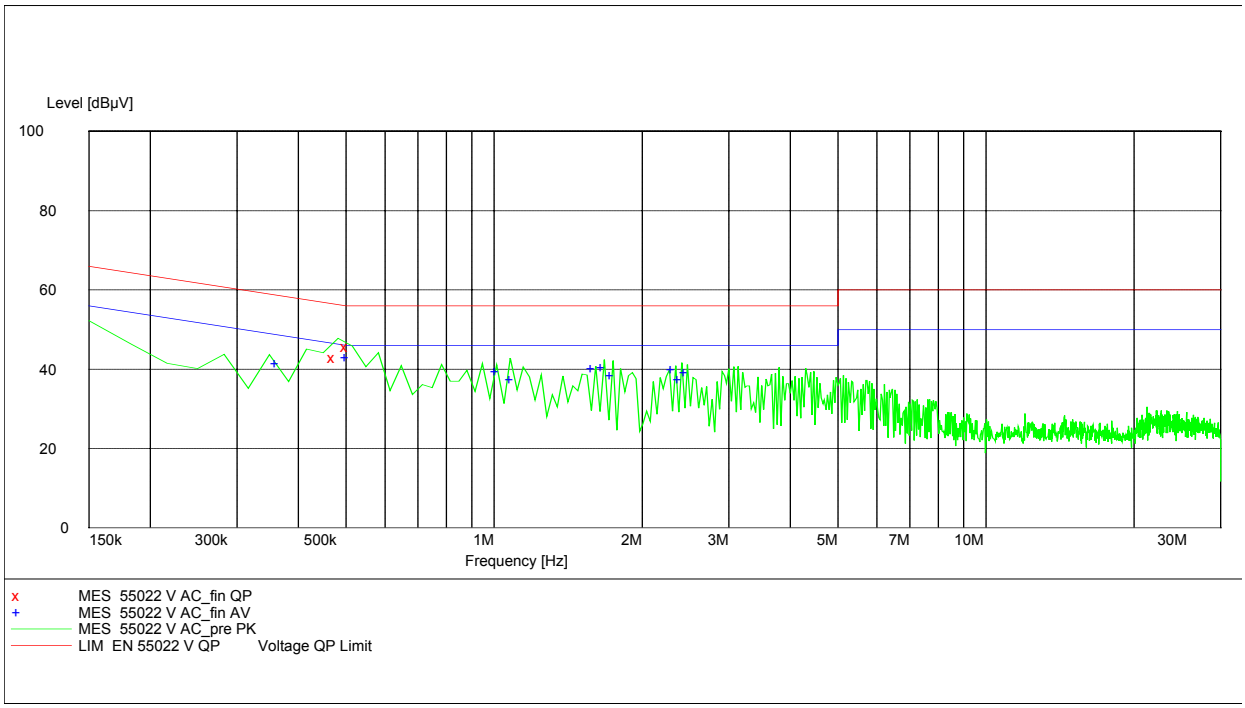
EN 55022 / CISPR 22

EUT: CTX 714 V.2
Manufacturer: Creatix
Operating Condition: 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"

Short Description: Voltage Mains 1.60

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



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

MEASUREMENT RESULT: "55022 V AC_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.480000	43.00	10.3	56	13.3	L1	GND
0.510000	45.60	10.4	56	10.4	L1	GND

MEASUREMENT RESULT: "55022 V AC_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.367500	41.20	10.6	49	7.3	L1	FLO
0.510000	43.00	10.4	46	3.0	L1	GND
1.027500	39.50	10.3	46	6.5	L1	FLO
1.102500	37.50	10.3	46	8.5	L1	FLO
1.612500	40.10	10.3	46	5.9	N	GND
1.687500	40.50	10.4	46	5.5	N	GND
1.762500	38.20	10.4	46	7.8	N	GND
2.347500	39.80	10.4	46	6.2	N	GND
2.422500	37.40	10.4	46	8.6	N	FLO
2.490000	39.00	10.4	46	7.0	N	GND

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)
all	peaks	<<limit						
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz
see above plots

Measurement distance see table

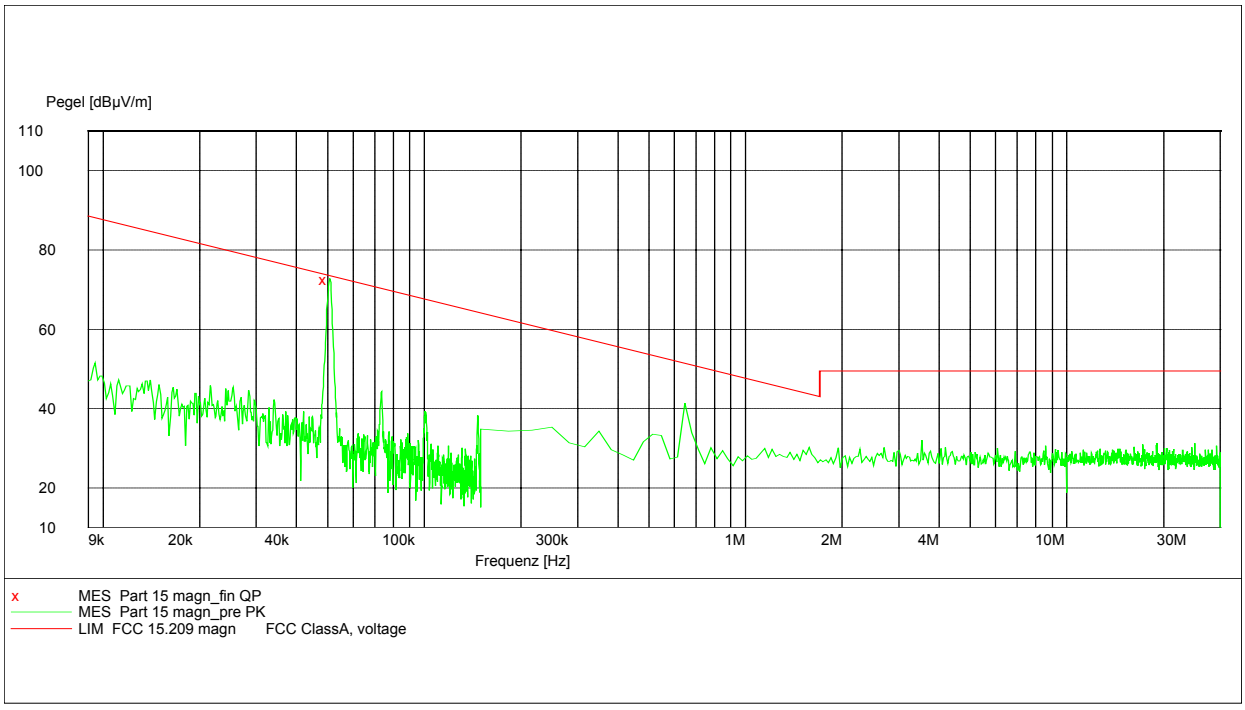
Limits SUBCLAUSE § 15.109

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 **§ 15.209**
Receiver up to 30 MHz

```
EUT:                  CTX 714 V.2
Manufacturer:         Creatix
Operating Condition:  Rx mode
Test Site:            Cetecom, Room 6
Operator:             Ames
Test Specification:   FCC 15 magn.
Comment:              pass
Start of Test:
```



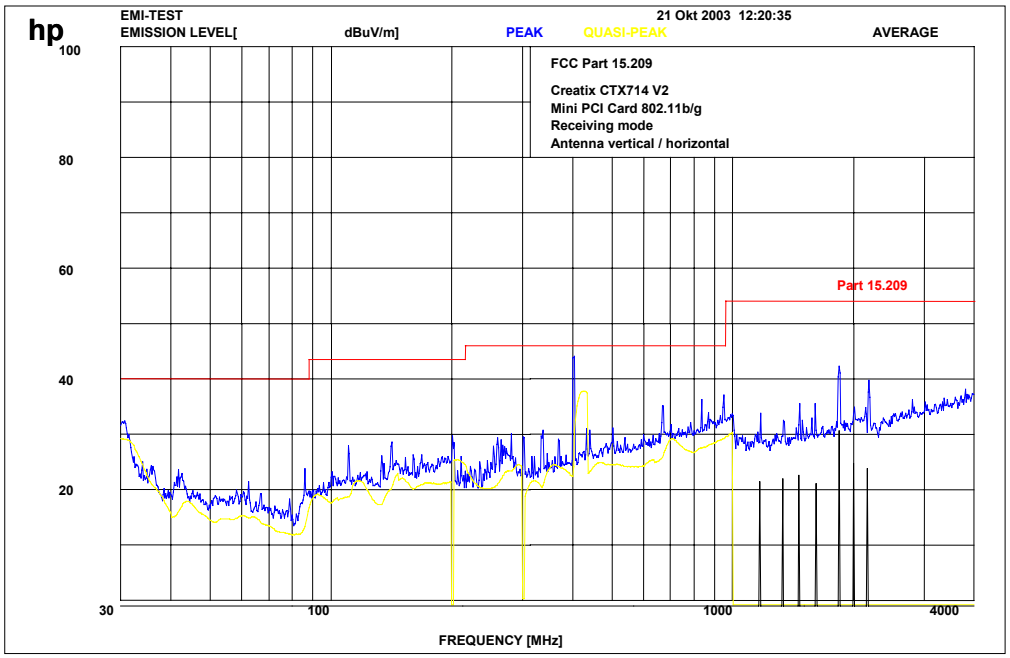
MEASUREMENT RESULT: "Part 15 magn_fin QP"

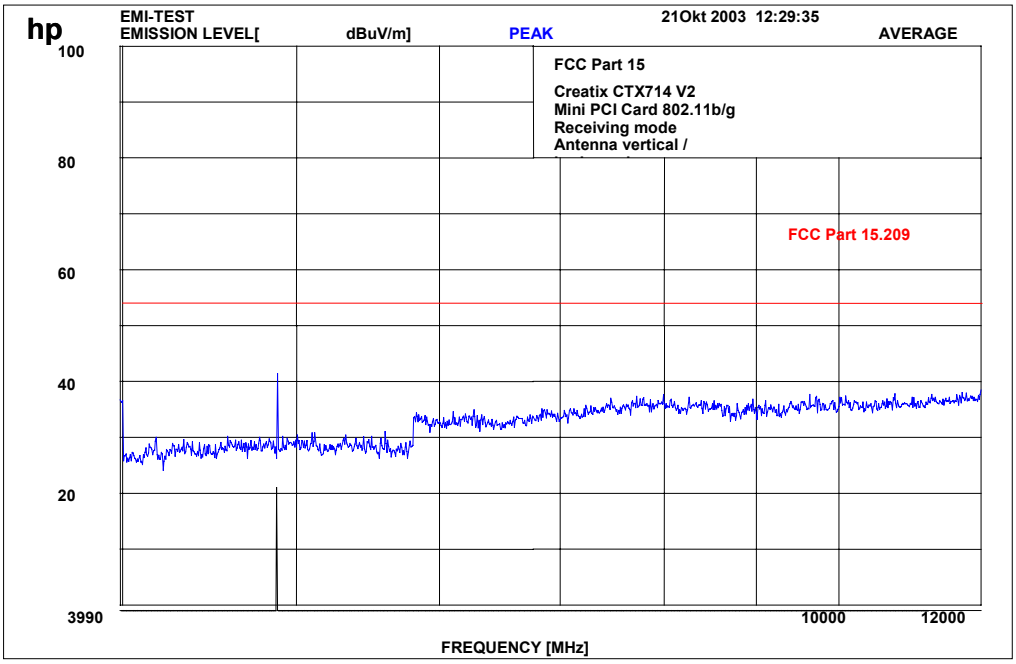
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Loop	Azimuth deg
0.050500	72.50	20.0	73.5	1.0	---	0.00

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

EMISSION LIMITATIONS- Radiated **§ 15.209**
Receiver up to 12 GHz

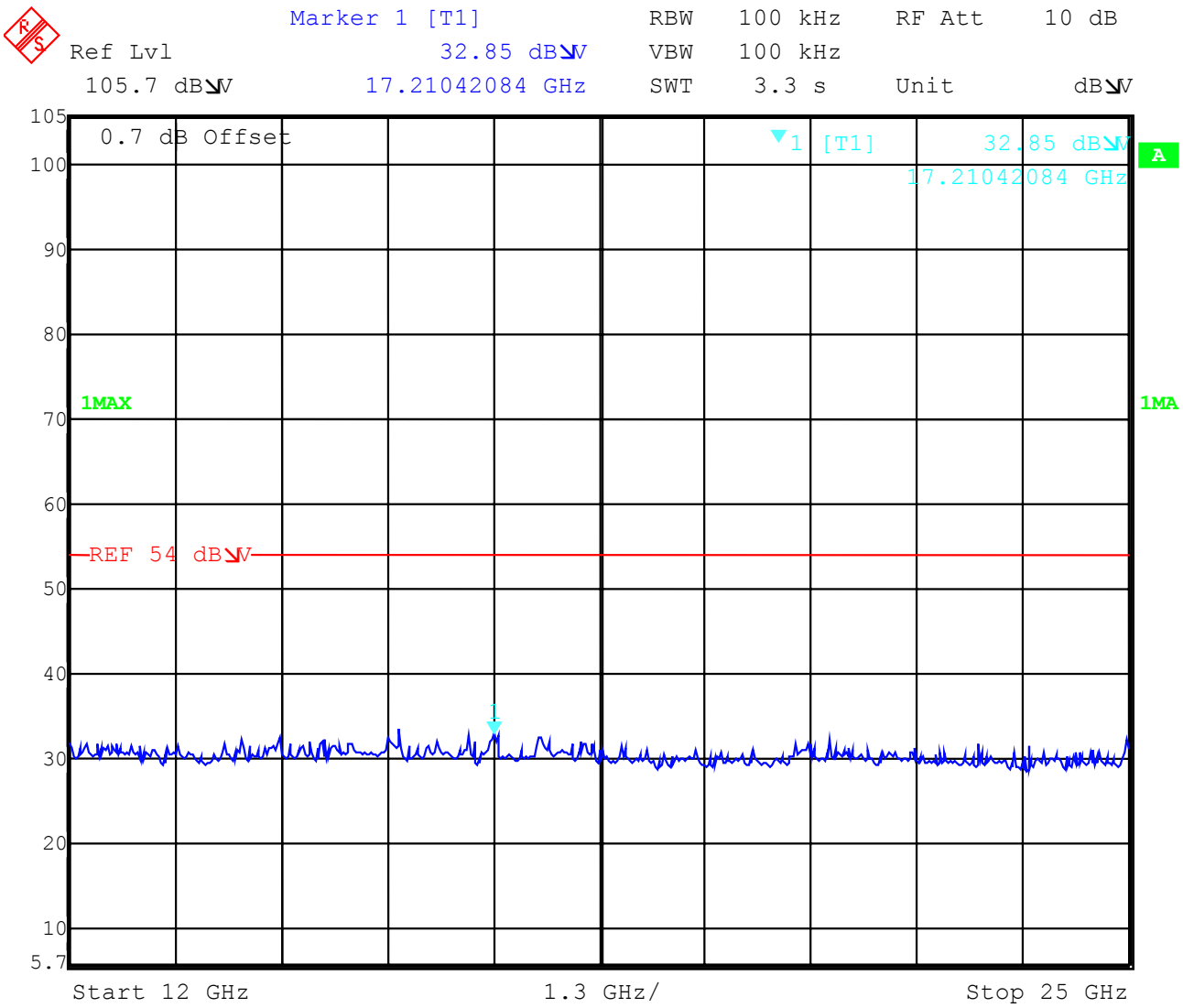
All peaks in the plot <1 GHz were caused by the test pc, not by the sample.





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

EMISSION LIMITATIONS- Radiated **§ 15.209**
Receiver up to 25 GHz



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

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

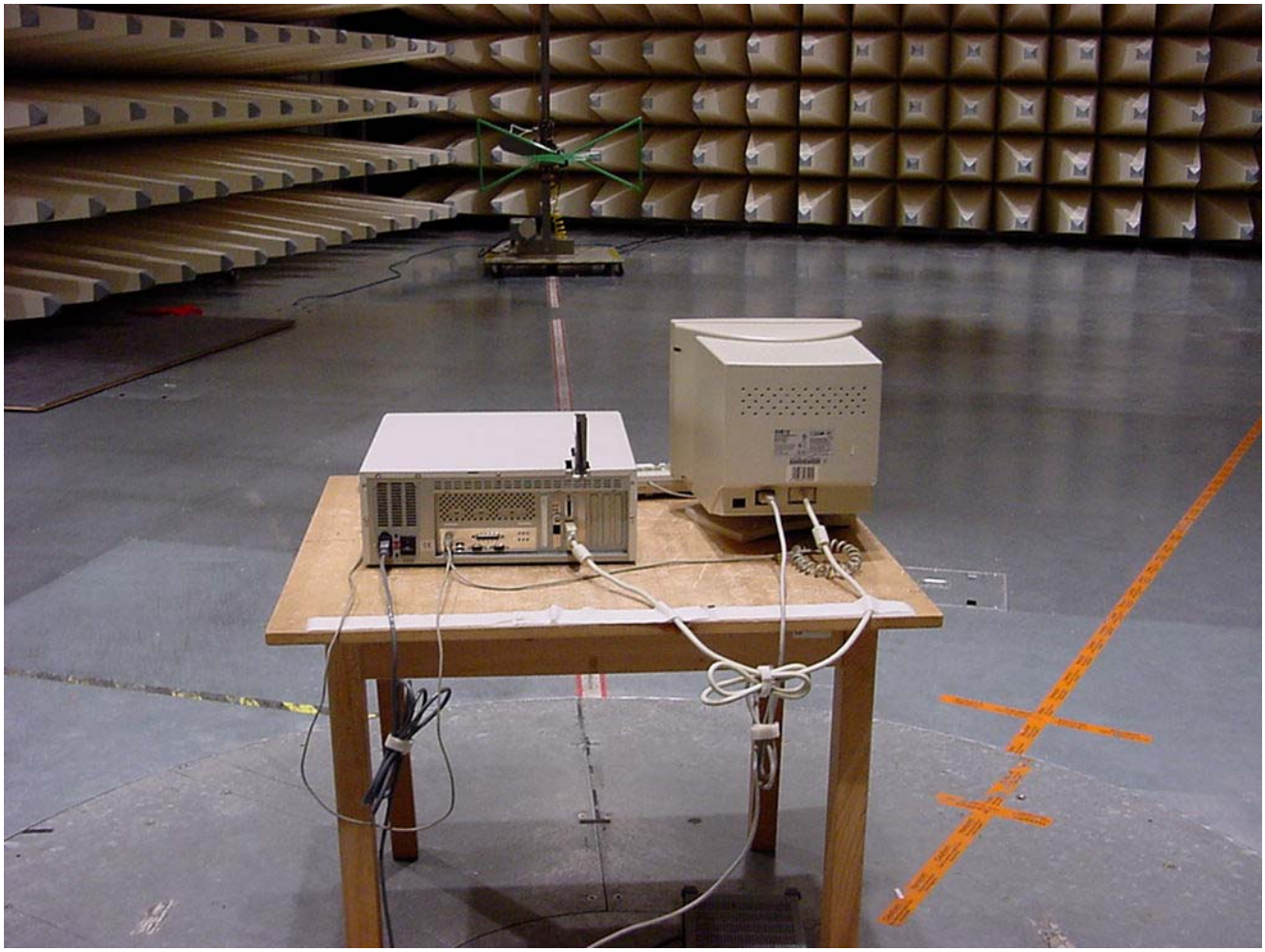
To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

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

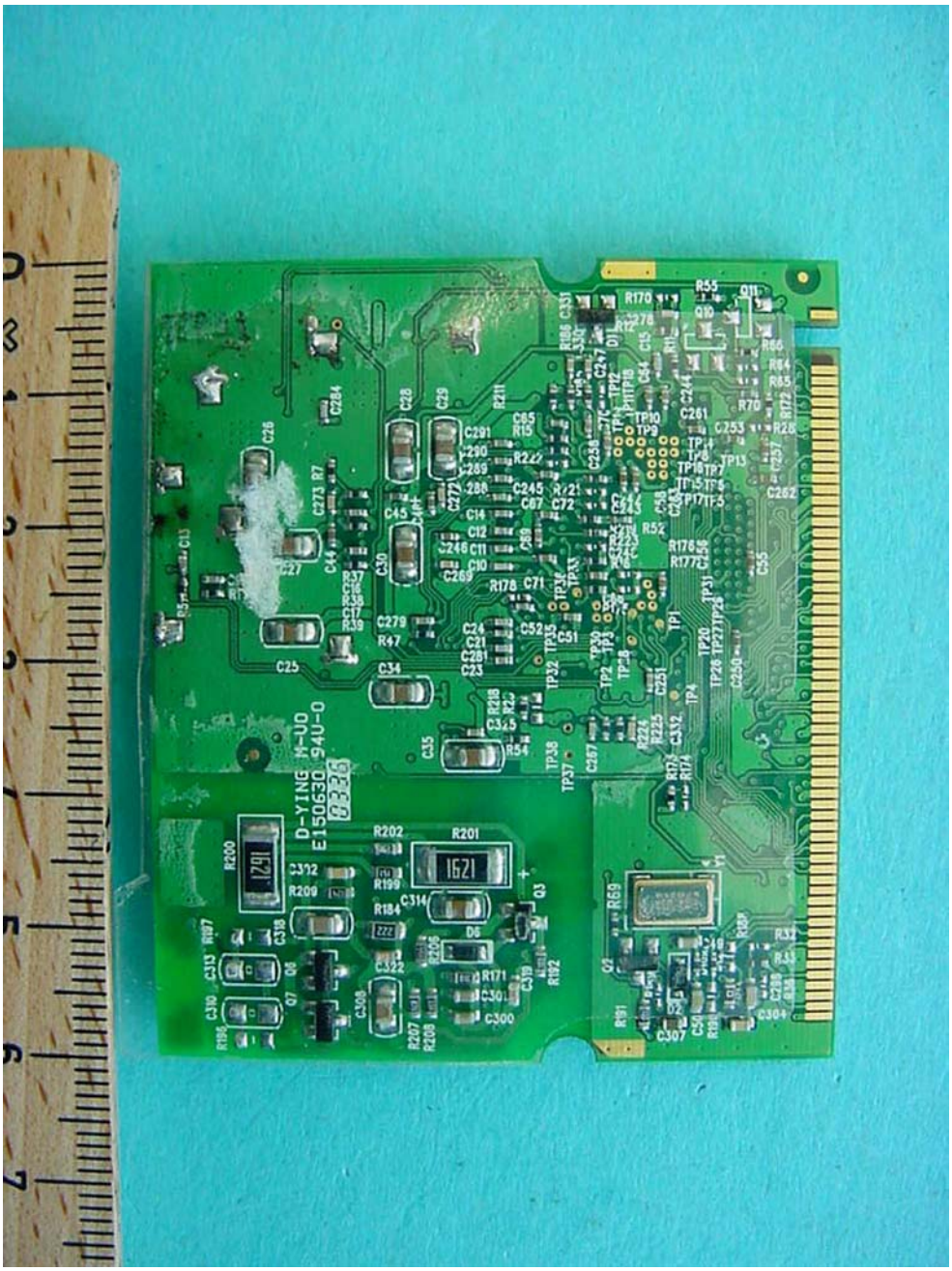


Test site

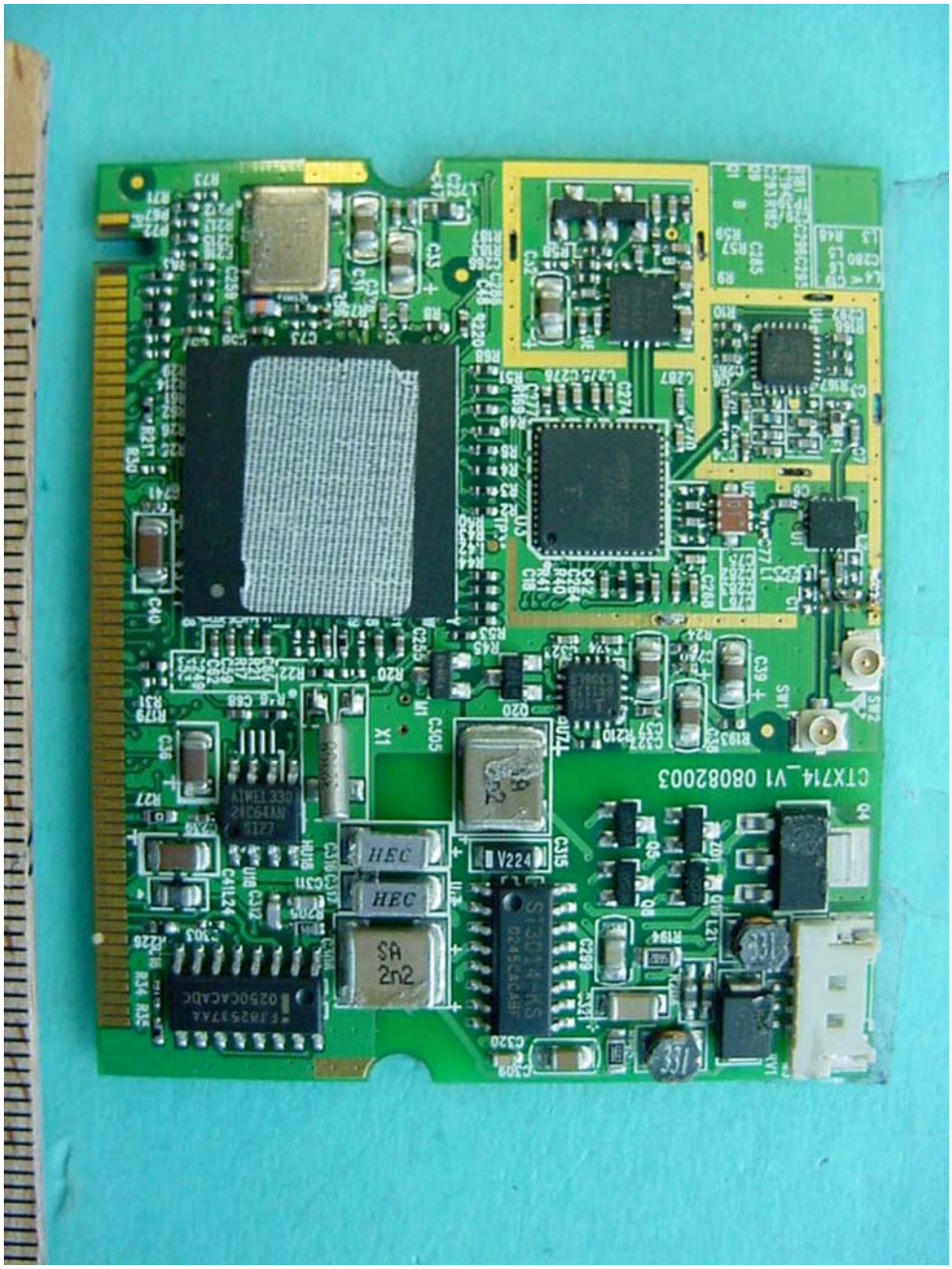
CONDUCTED EMISSIONS

Photographs of the equipment

Photographs



Photographs



Photographs