

Accredited Testing Laboratory

**DAR-Registration number:
TTI-P-G 166/98-00**

**Test report no.: 5-2973-F/00
FCC Part15.247/CANADA RSS-210
AXIS 9010**

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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

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Accredited testing laboratory

DAR-registration number : TTI-P-G-166/98-00

1.3 Details of applicant

Name : AXIS Communications AB

Street : Scheelevägen 34

City : SE-22363 LUND

Country : Sweden

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Telefax : +46 46 13 6130

Contact : Mr. Nils Olsson

Telephone: +46 46 2721 899

1.4 Application details

Date of receipt of application : 28.03.01

Date of receipt of test item : 28.03.01

Date of test : 28.03. – 04.04.01

1.5 Test item

Type of equipment : RLAN Access Point for Bluetooth

Type designation : AXIS 9010/ALPS

Manufacturer : applicant

Street :

City :

Country :

Serial number :

Additional informations: :

Frequency : 2402,0 – 2480 MHz

Type of modulation : 1M00FXD (FHSS) Ch.Sep. : 1 MHz

Number of channels : 79

Antenna : integral antenna

Power supply : 12V AC

Type of equipment : Temperature range : -10°C - +55°C

1.6 Test standards

FCC 15.247

2 Technical test

2.1 Summary of test results

The radiated measurements were performed vertically, horizontal results are about 2 dB lower over the whole frequency range.

The antenna gain measurement was performed by the difference between conducted and radiated output measurement.

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

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

Technical responsibility for area of testing :

10.04.01 RSC 8414 Ames H.

Date

Section

Name



Signature

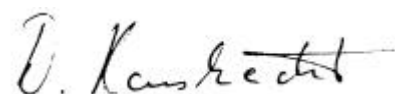
Technical responsibility for area of testing :

10.04.01 RSC8412 Hausknecht D.

Date

Section

Name



Signature

2.2 Testreport

TEST REPORT

Testreport no. : 5-2973-F/00

TEST REPORT REFERENCE**LIST OF MEASUREMENTS**

Paragraph	PARAMETER TO BE MEASURED	PAGE
	Transmitter parameters	
§ 15.204	Antenna gain	7
§ 15.247 (a)	Carrier frequency separation	8
§ 15.247 (a)	Number of hopping channels	9
§ 15.247 (a)	Time of occupancy (dwell time)	13
§ 15.247 (a)(1)	Spectrum bandwidth of a FHSS System	20
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	Receiver parameters	
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	Test equipment listing	73
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Antenna Gain**SUBCLAUSE § 15.204**

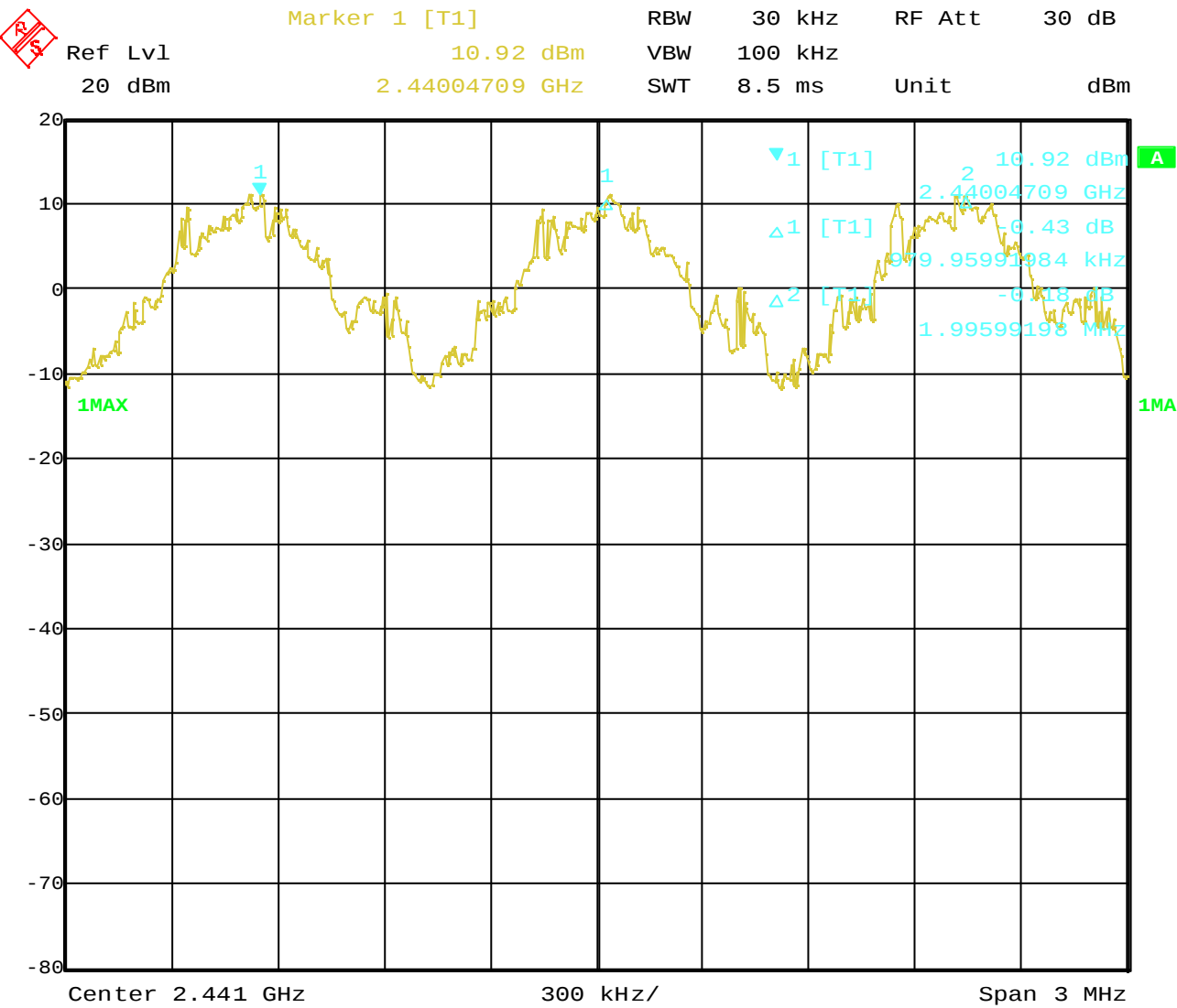
The antenna gain of the complete system is calculated by the difference of conducted gain of the module and the radiated power in EIRP.

	low channel	mid channel	high channel
Conducted power	12.7 dBm	13.7 dBm	14.7dBm
Radiated power	9.8 dBm	9.5 dBm	10.0 dBm
Gain	-2.9 dB	-4.2 dB	-4.7 dB

The calculated antenna gain is between –2.9 and –4.7 dB.

Carrier frequency separation

§15.247(a)



Date: 3.APR.2001 11:49:47

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

Number of hopping channels

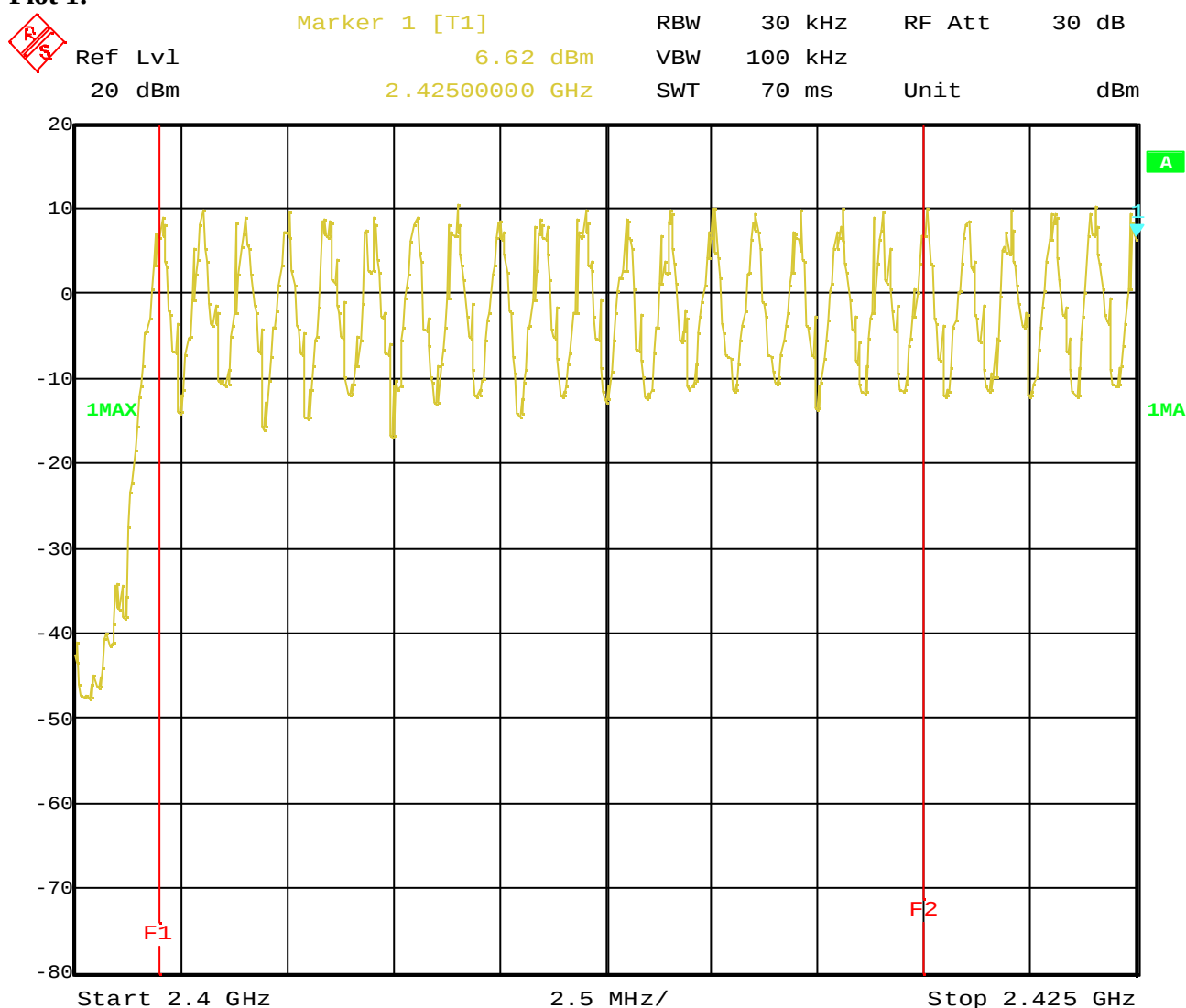
§15.247(a)

The number of hopping channels is 79.

The next 4 plots shows the number.

The right red line corresponds to the left red line from the next plot.

Plot 1:

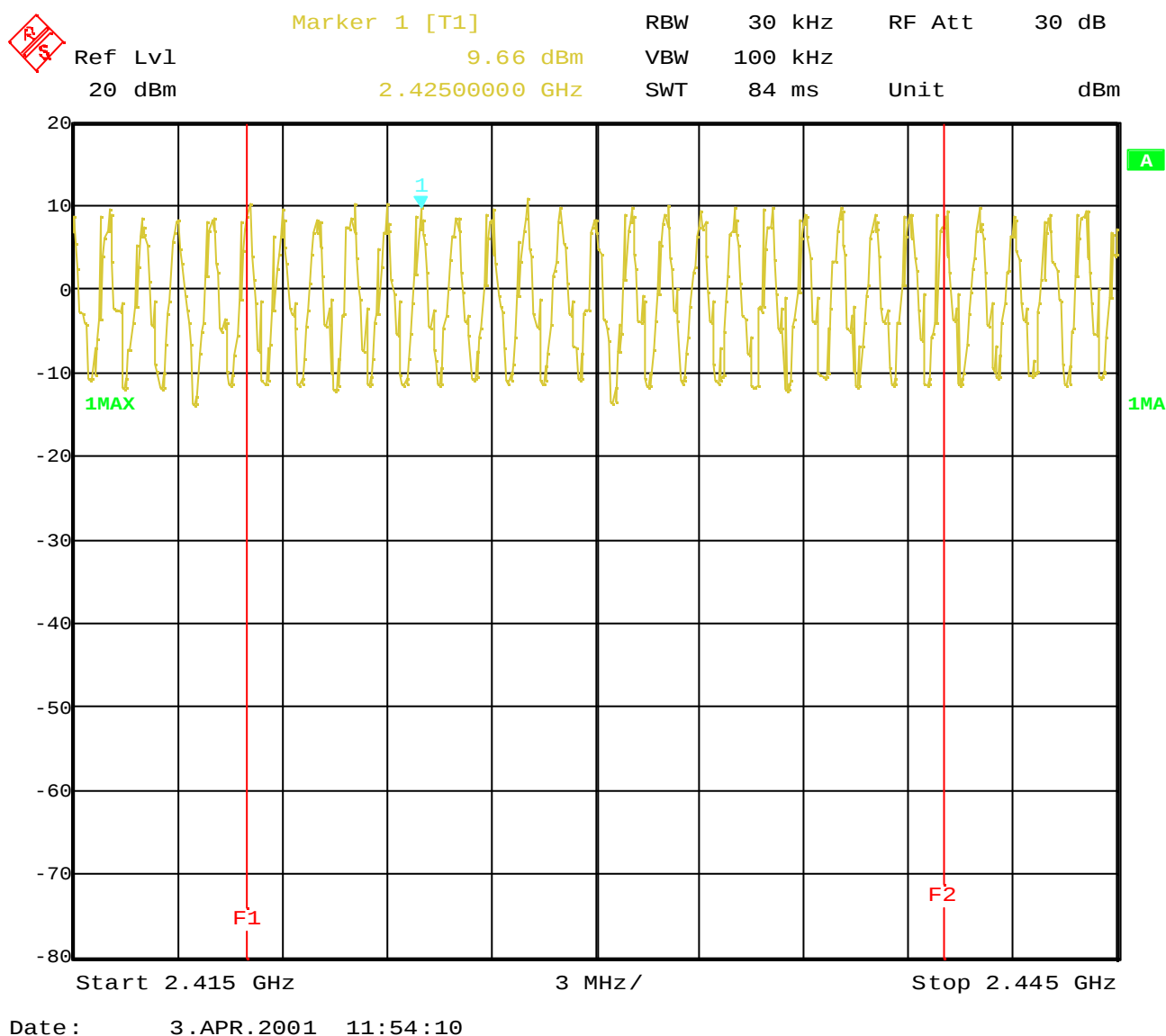


Date: 3.APR.2001 11:52:35

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

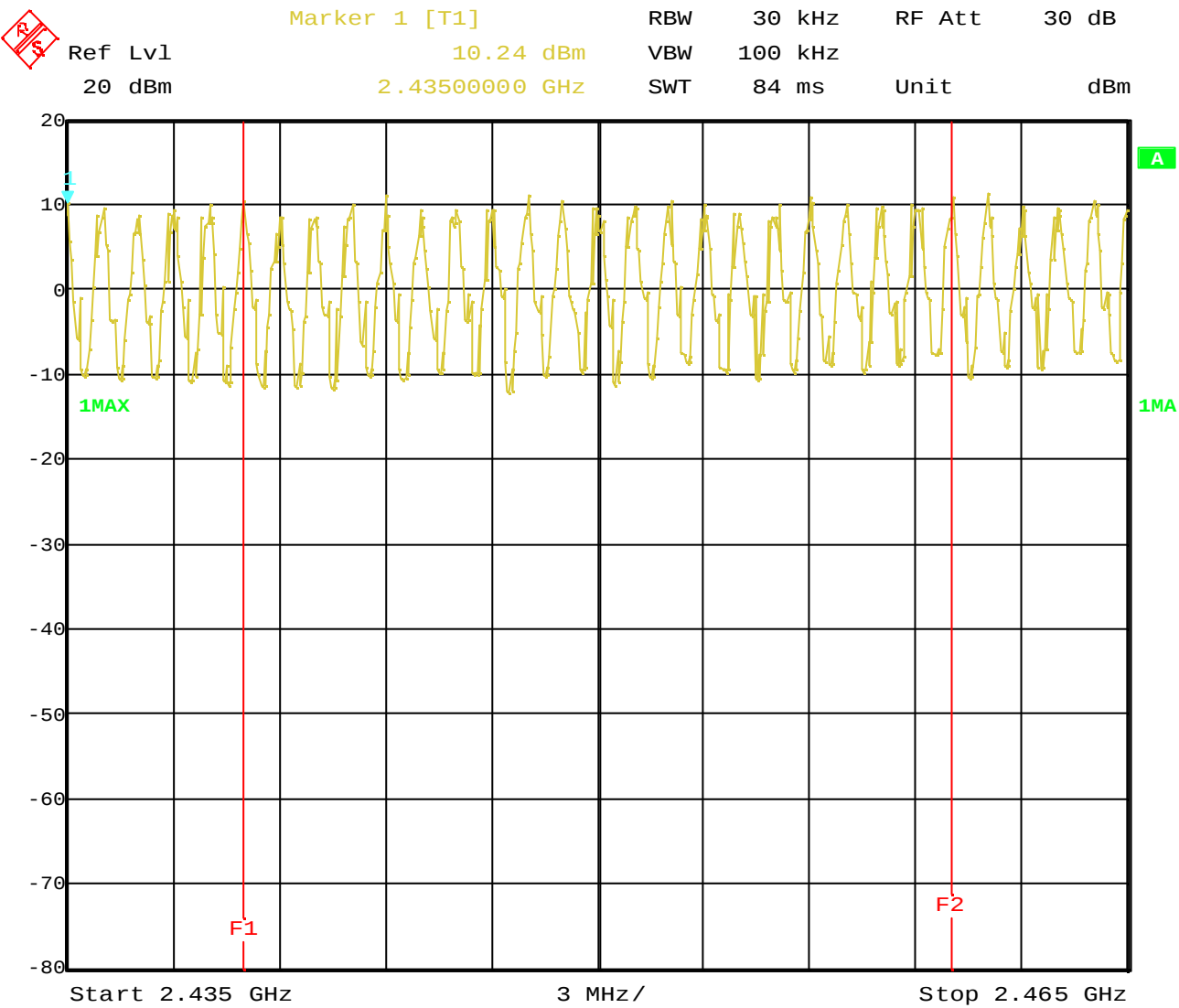
(for reference numbers see test equipment listing)

Plot 2:



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

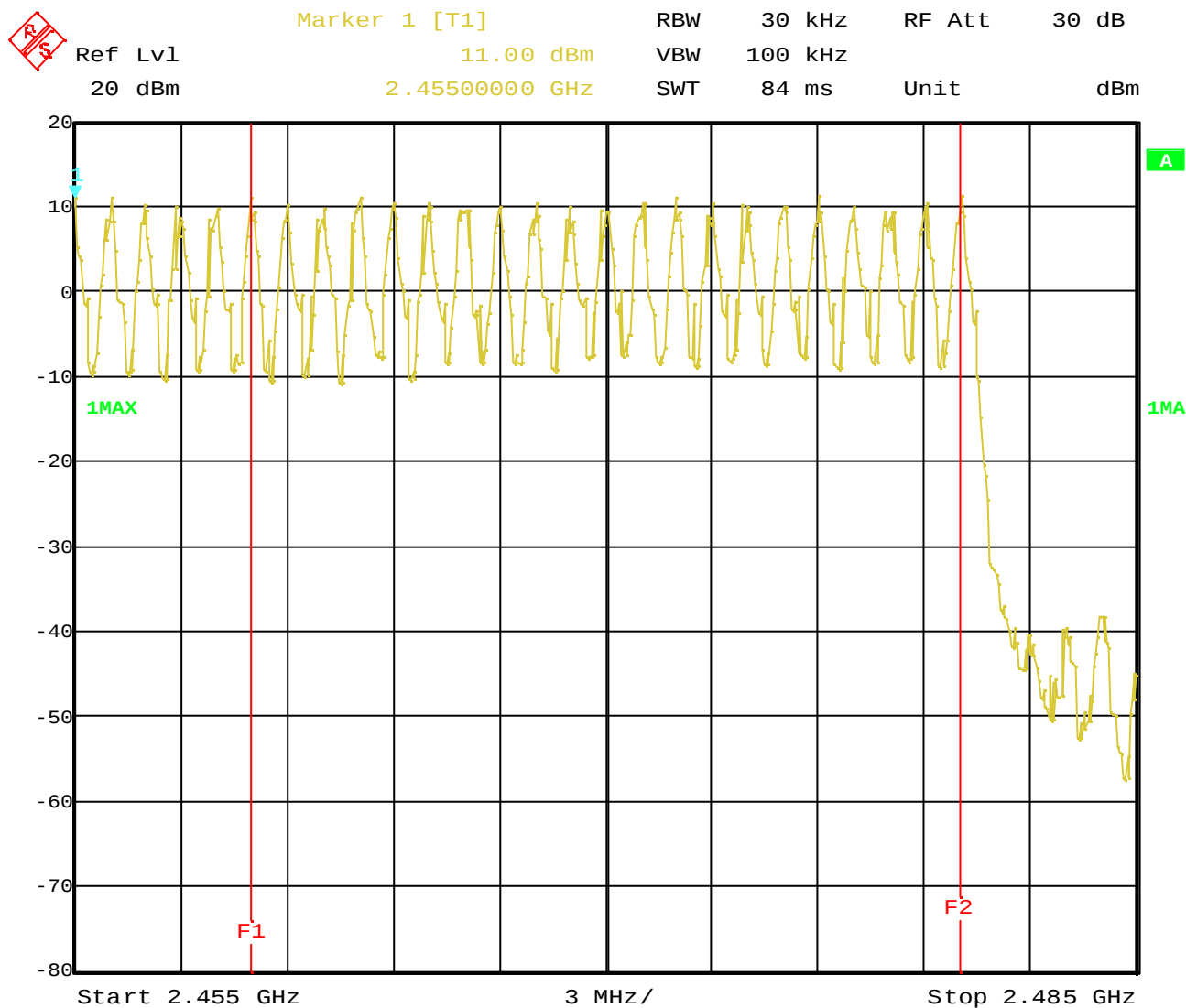
Plot 3:



Date: 3.APR.2001 11:55:51

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

Plot 4:



Date: 3.APR.2001 11:57:30

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

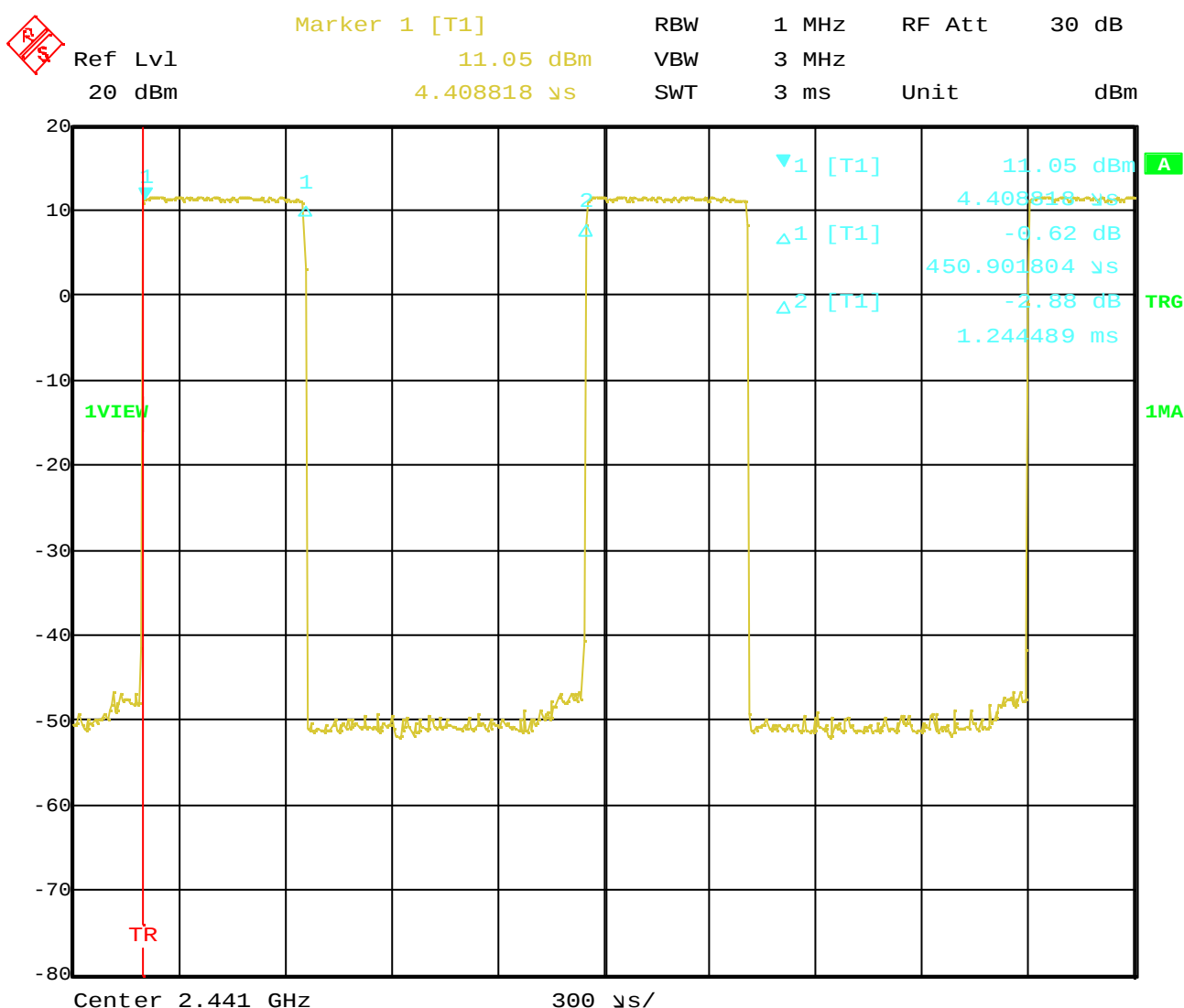
Time of occupancy (dwell time) for DH1

§15.247(a)

The system makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 times per second and so for 30 seconds you have 303.9 times of appearance .

Each tx-time per appearance is 475 µs.

So we have 303.9 * 475 µs = 144.4 ms per 30 seconds.



Date: 3.APR.2001 13:02:34

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

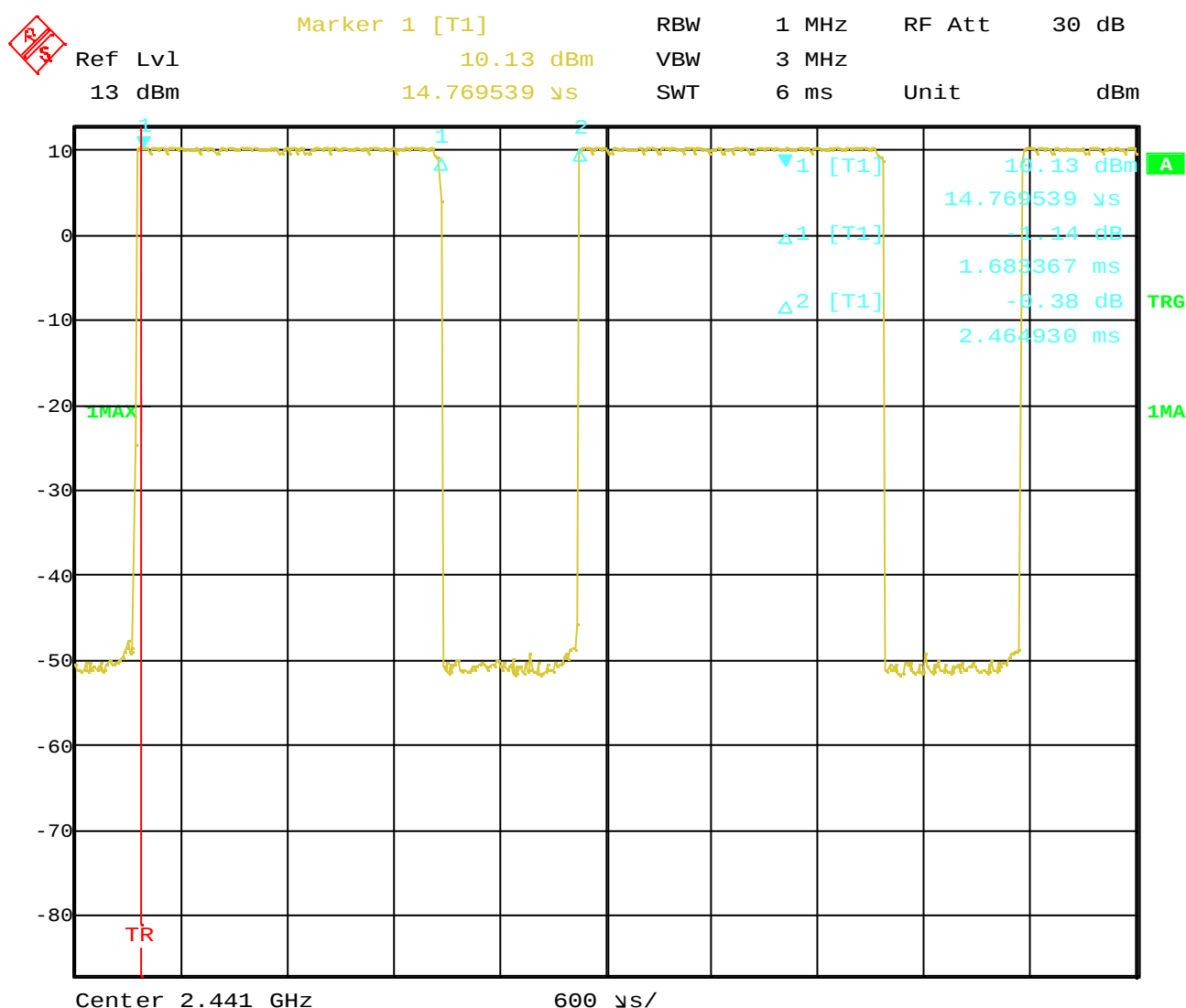
Time of occupancy (dwell time) for DH3

§15.247(a)

A DH3 Packets need 3 time slots for transmit and 1 for receicing, then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 times per second and so for 30 seconds you have 153 times of appearance .

Each tx-time per appearance is 1.73 ms.

So we have 153 * 1.73 ms = 264.7 ms per 30 seconds.



Date: 3.APR.2001 13:40:29

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

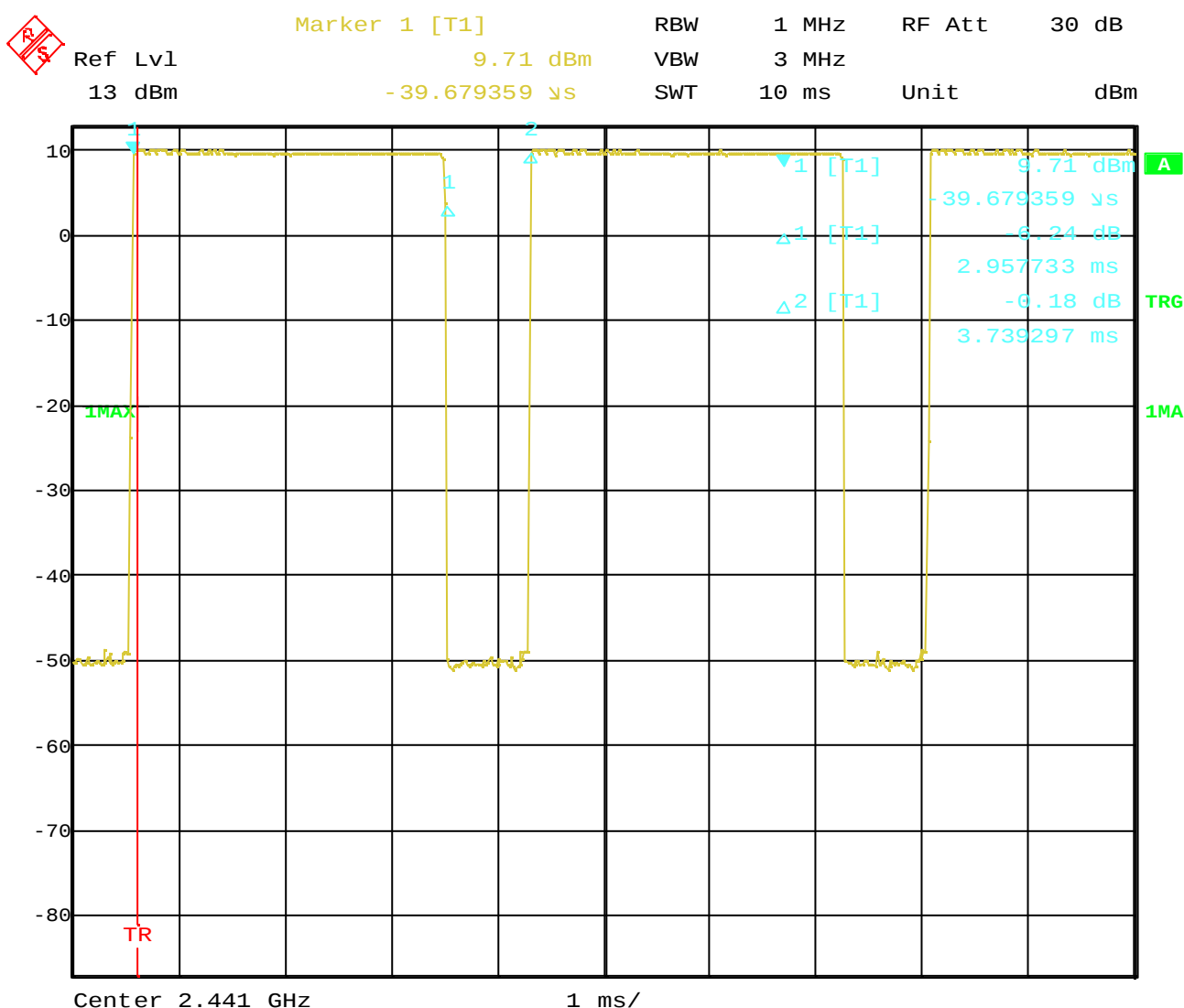
Time of occupancy (dwell time) for DH5

§15.247(a)

At DH5 Packets you need 5 time slots for transmit and 1 for receicing,then the system makes worst case 266,7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 100,8 times of appearance .

Each tx-time per appearance is 3.7 ms.

So we have $100,8 * 3.7\text{ms} = 372.96\text{ ms}$ per 30 seconds.



Date: 3.APR.2001 13:36:59

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

Time of occupancy (dwell time) for page mode

§15.247(a)

At paging mode the system makes first hopping with 16 channels. One sequence(called train A) lasts 10 ms. Every 1.28s frequencies change and a second train A starts with different frequencies. After max $7 \cdot 1.28$ s 16 new more distance frequencies (Train B) are used.

So we have in the worst case (same frequency is in every train) the following time scedule.

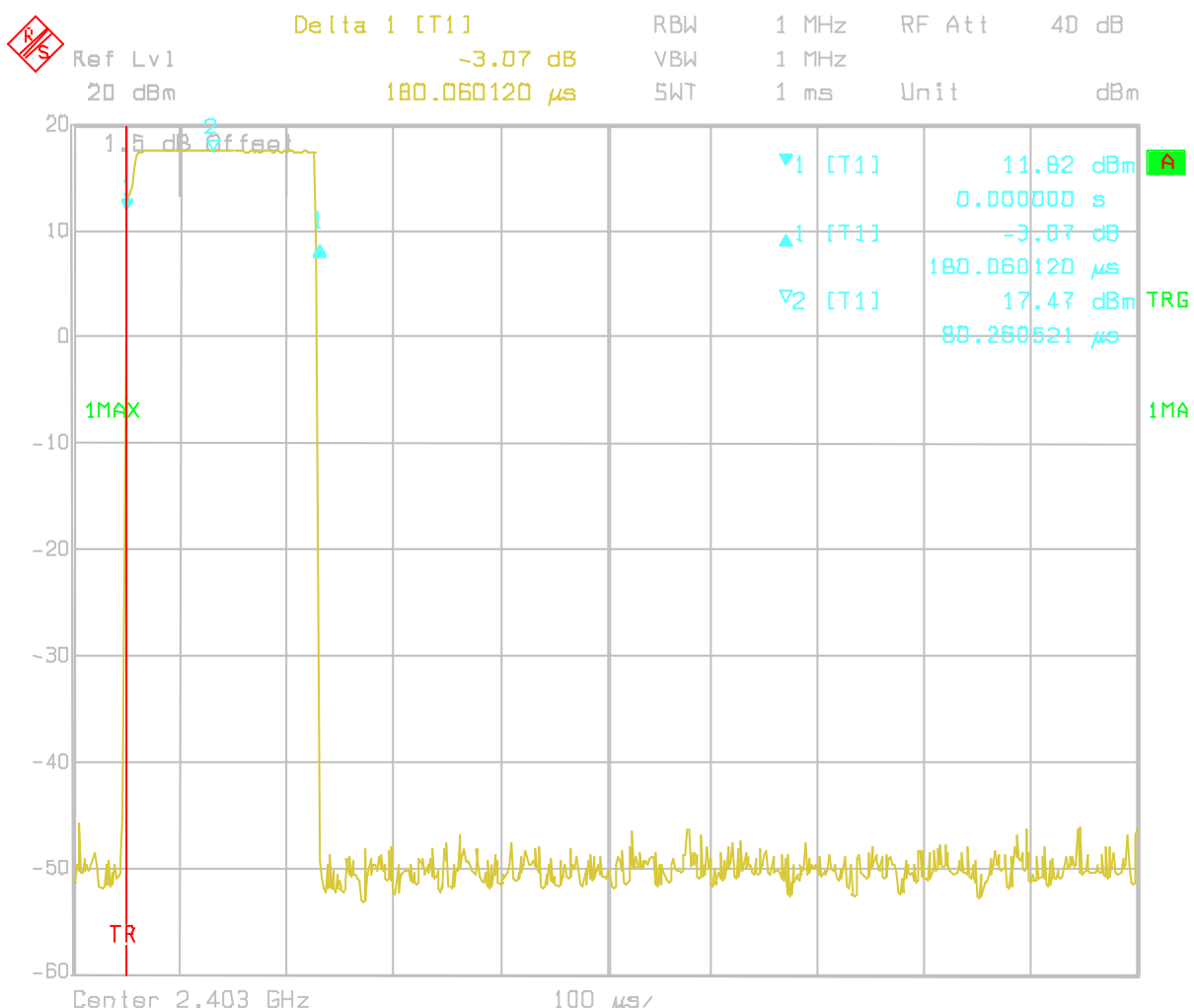
First: $7 \cdot 128 \cdot 10$ ms. For the next 7 seconds train B with other frequencies.

Then train A and B changes frequently.

⇒ so we have $7 \cdot 128 \cdot 180 \mu$ s, then 8.96 s other frequencies, then again $7 \cdot 128 \cdot 180 \mu$ s

⇒ together in 30 s maximal 2 sequences =>maximal 0,322 s per 30 second period.

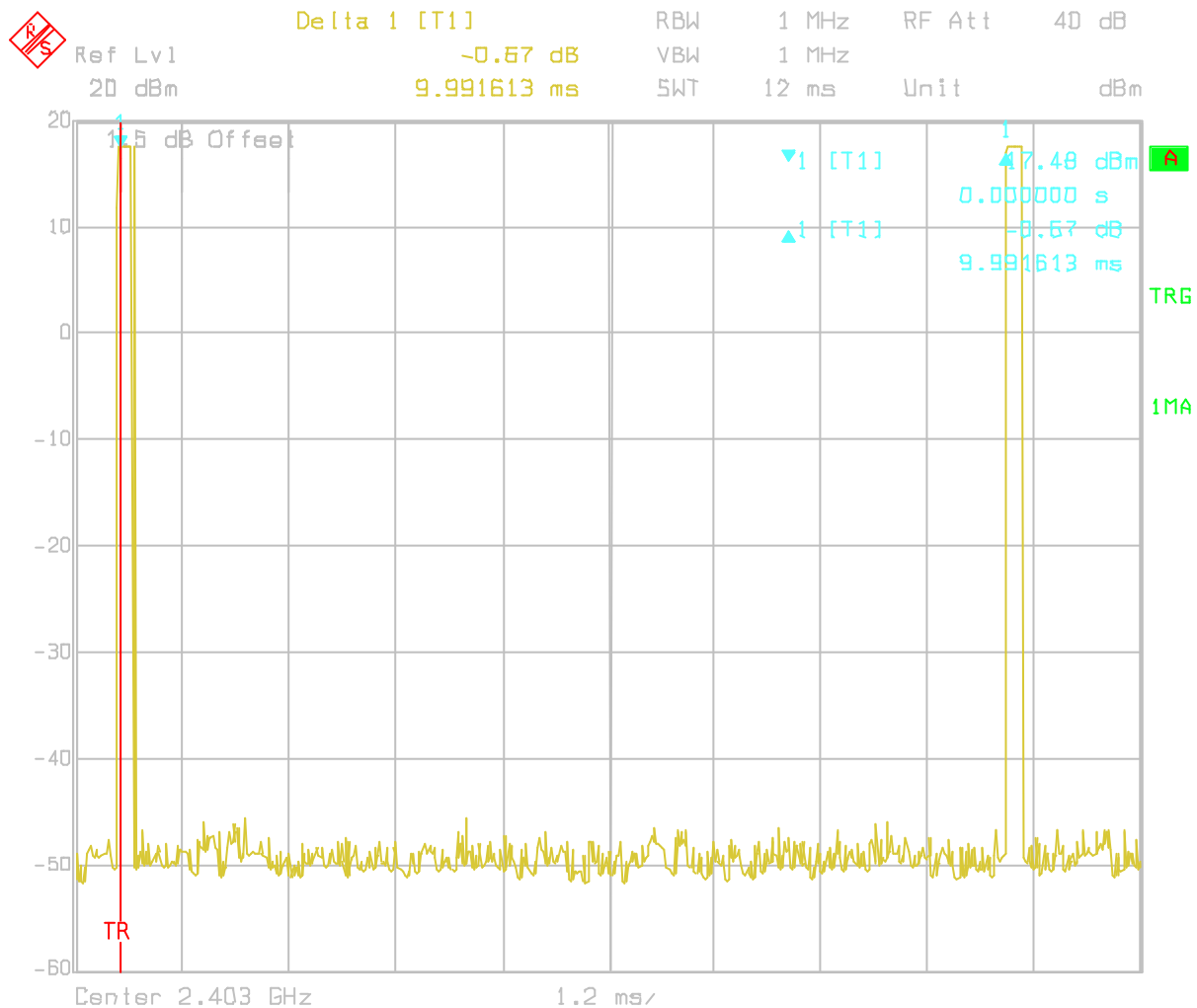
Page mode (TX-on time)



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Page mode (complete sequence)



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

Time of occupancy (dwell time) for inquiry mode

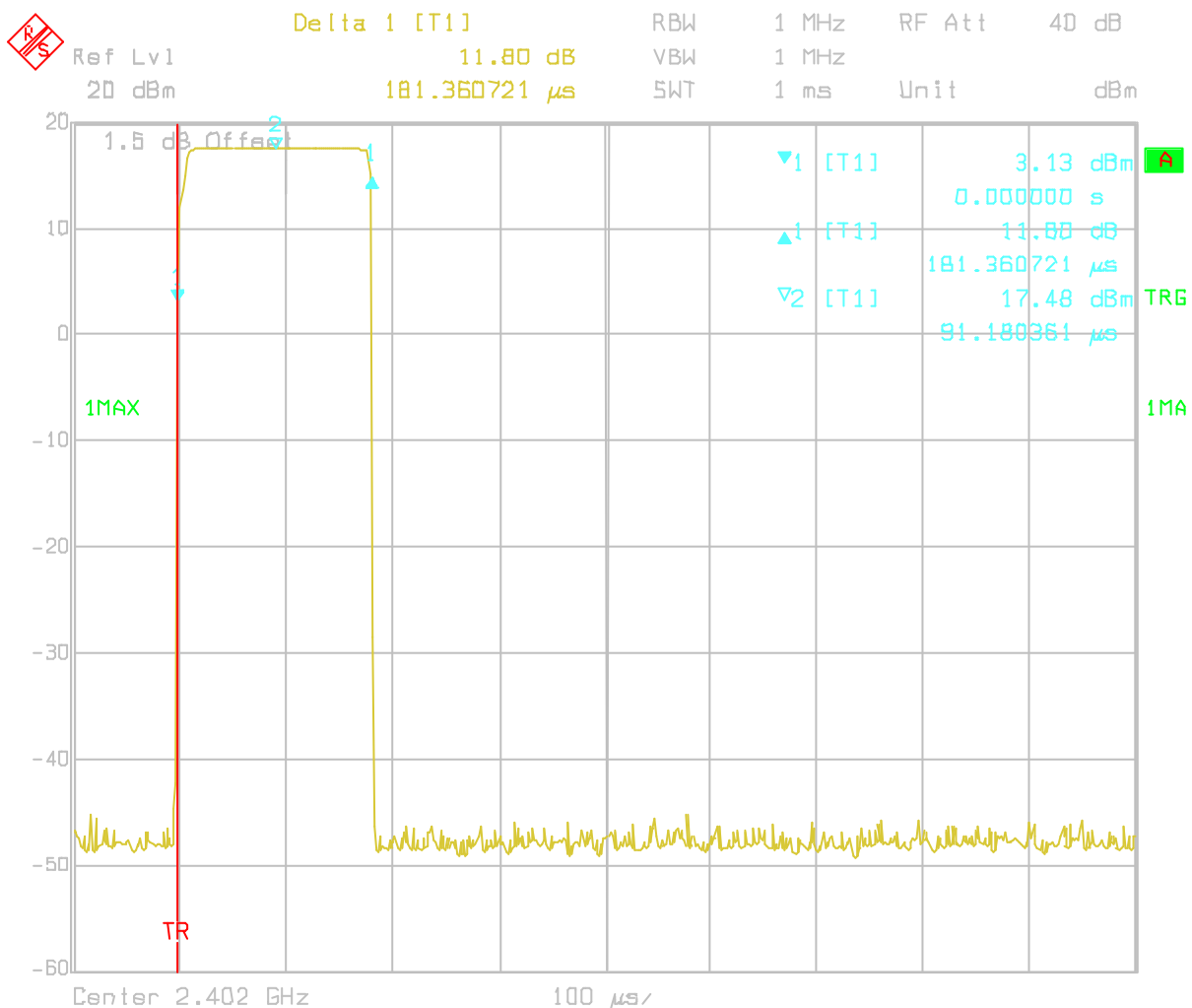
§15.247(a)

At inquiry mode the system uses the same timing as in page mode

⇒ so we have $7 \cdot 128 \cdot 180 \mu s$, then 8.96 s other frequencies, then again $7 \cdot 128 \cdot 180 \mu s$

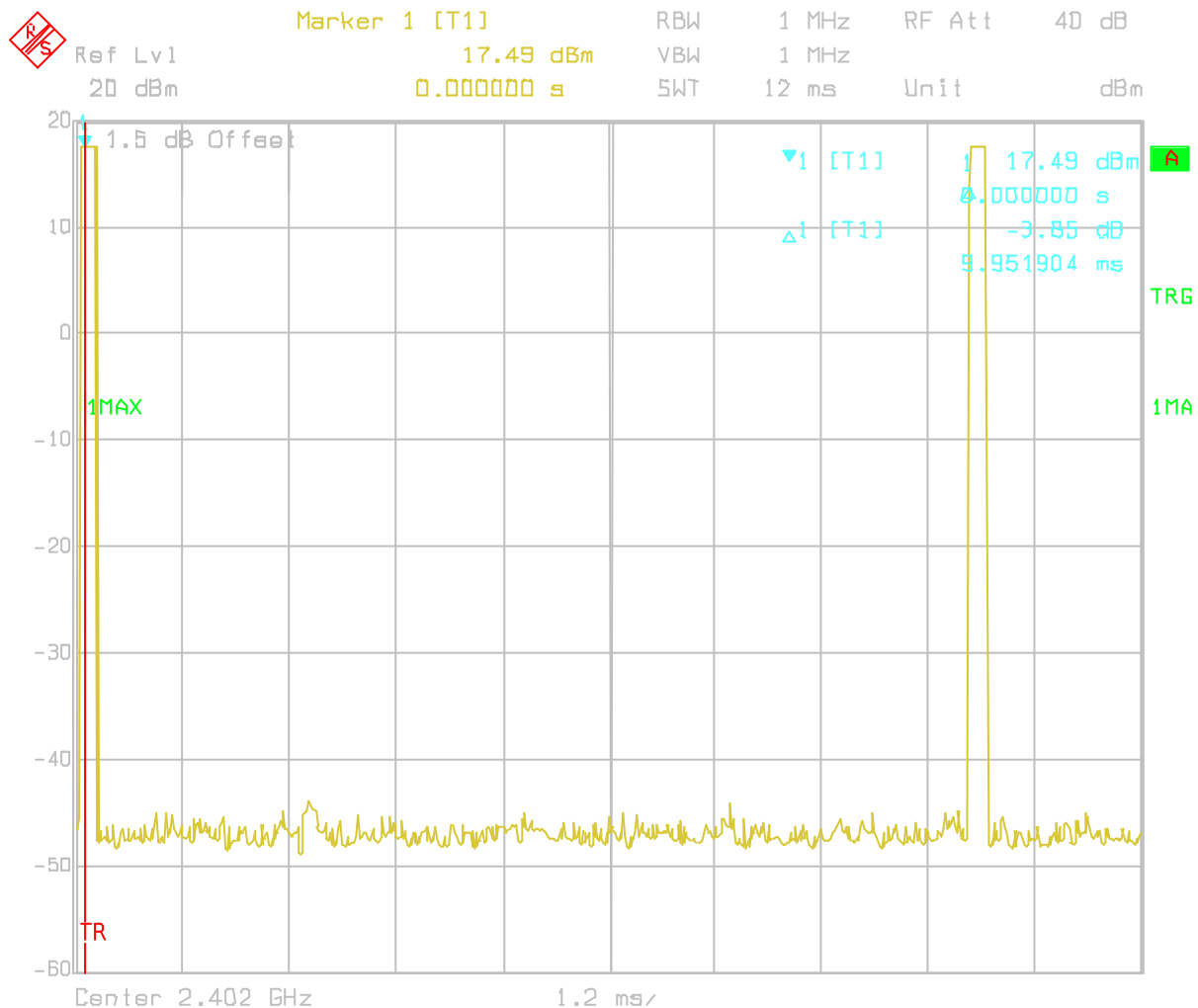
⇒ together in 30 s maximal 2 sequences => maximal 0,322 s per 30 second period.

Inquiry mode (TX-on time)



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

Inquiry mode (complete sequence)



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

Spectrum Bandwith of a FHSS System §15.247(a)
10 dB + 20 dB bandwidth (DH5 packet)

TEST CONDITIONS		20 dB BANDWIDTH (kHz)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)° C	V _{nom} (12.0)V	961.924	973.947	985.971
Measurement uncertainty		±3dB		

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

LIMIT

SUBCLAUSE §15.247(a) (1)

The maximum 20dB bandwith shall be at maximum 1000 KHz

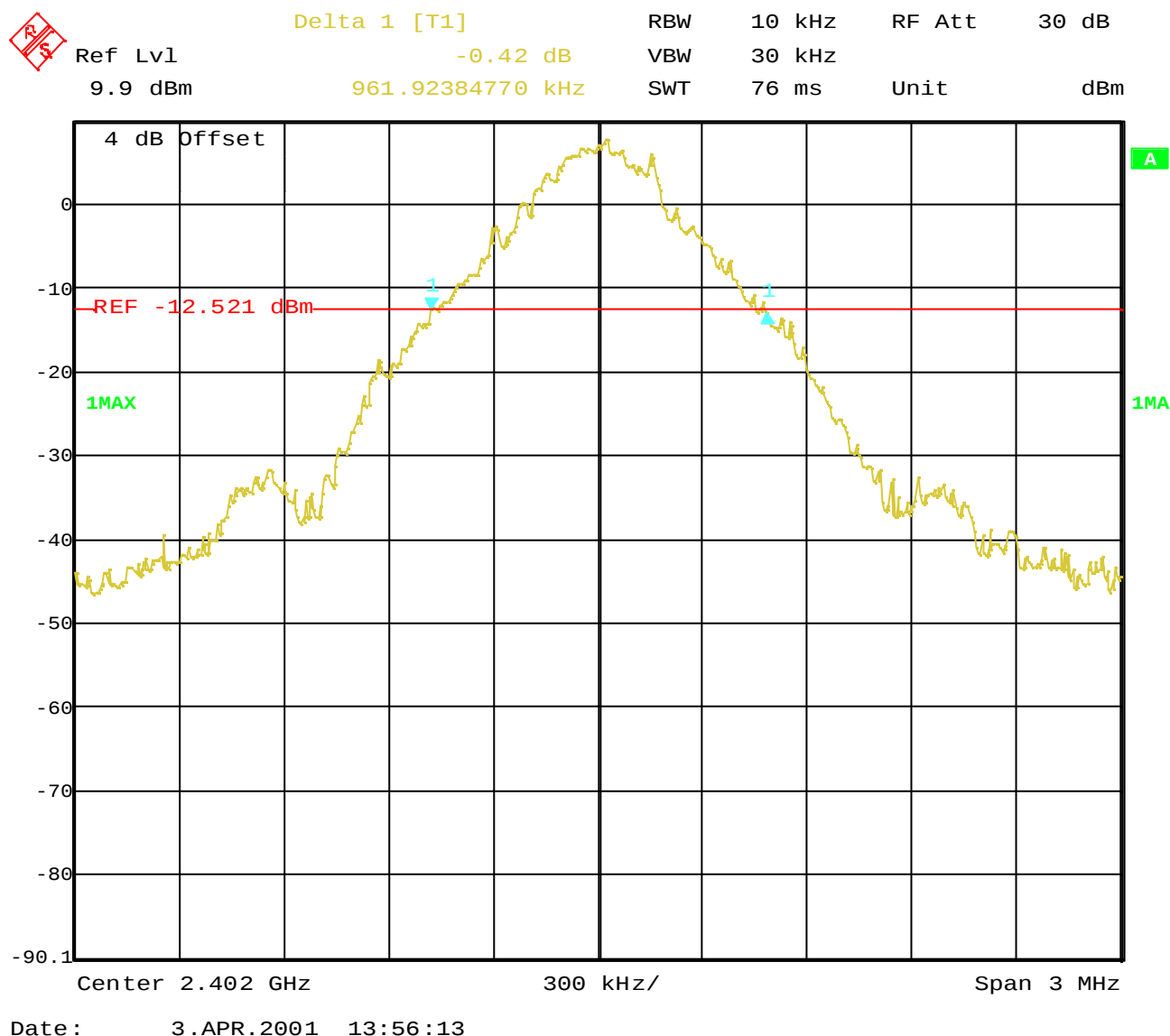
TEST CONDITIONS		10 dB BANDWIDTH (kHz)		
Frequency (MHz)		2402	2441	2480
T _{nom} (23)° C	V _{nom} (12.0)V	577.154	595.190	541.082
Measurement uncertainty		±3dB		

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

Spectrum Bandwidth of a FHSS System 20 dB bandwidth

§15.247(a)

Channel 1

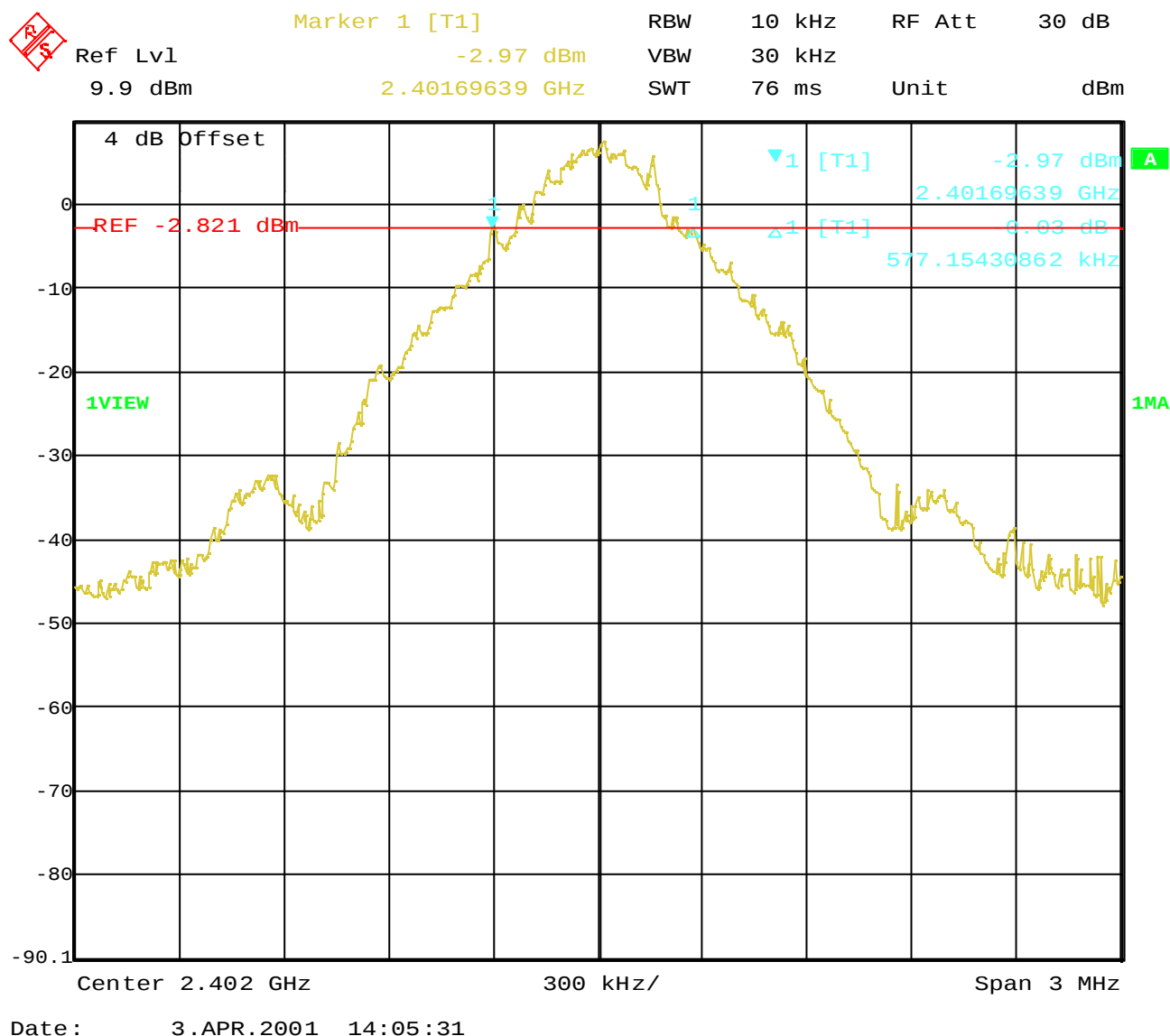


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Spectrum Bandwidth of a FHSS System 10 dB bandwidth

§15.247(a)

Channel 1

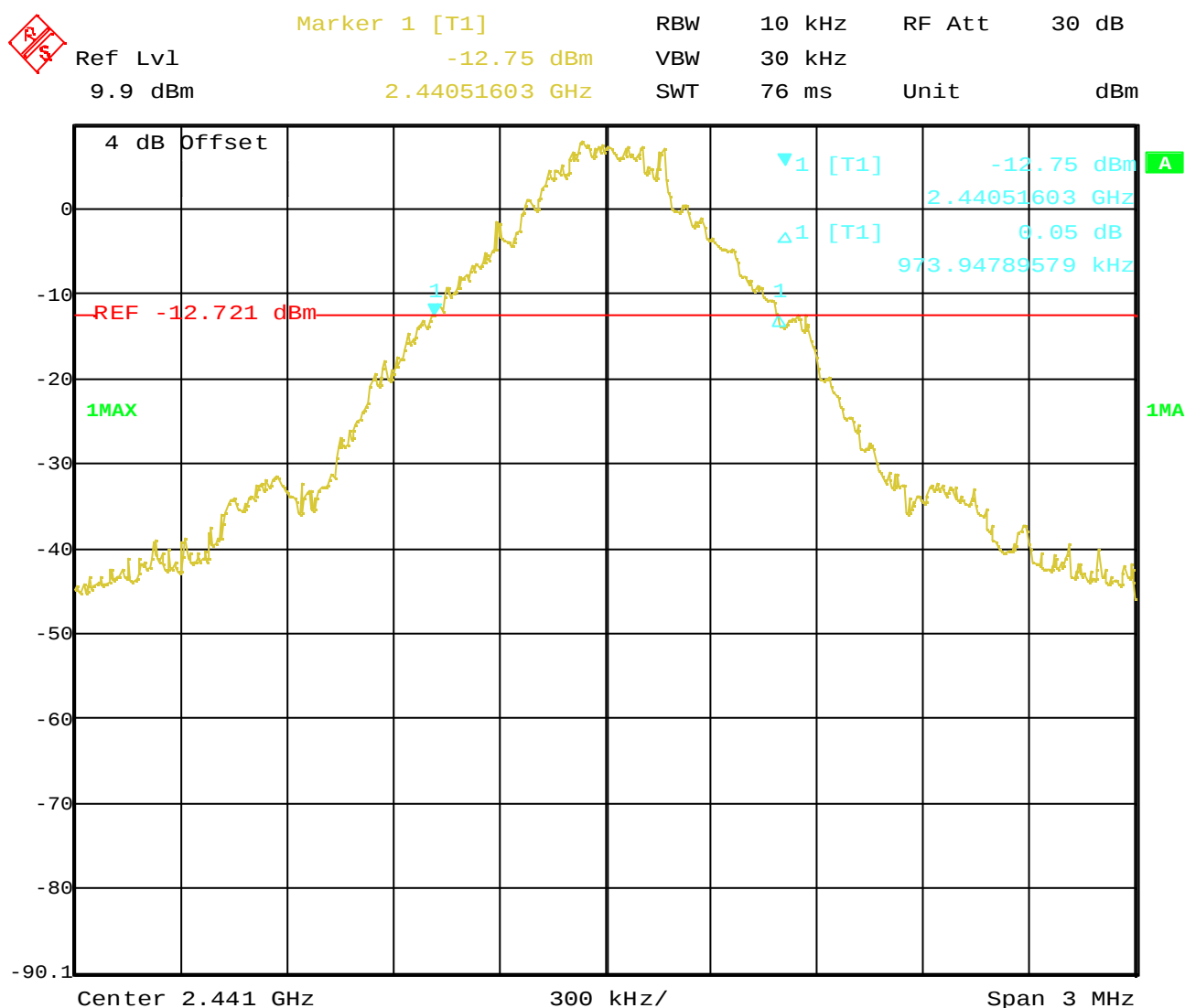


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Spectrum Bandwidth of a FHSS System 20 dB bandwidth

§15.247(a)

Channel 2



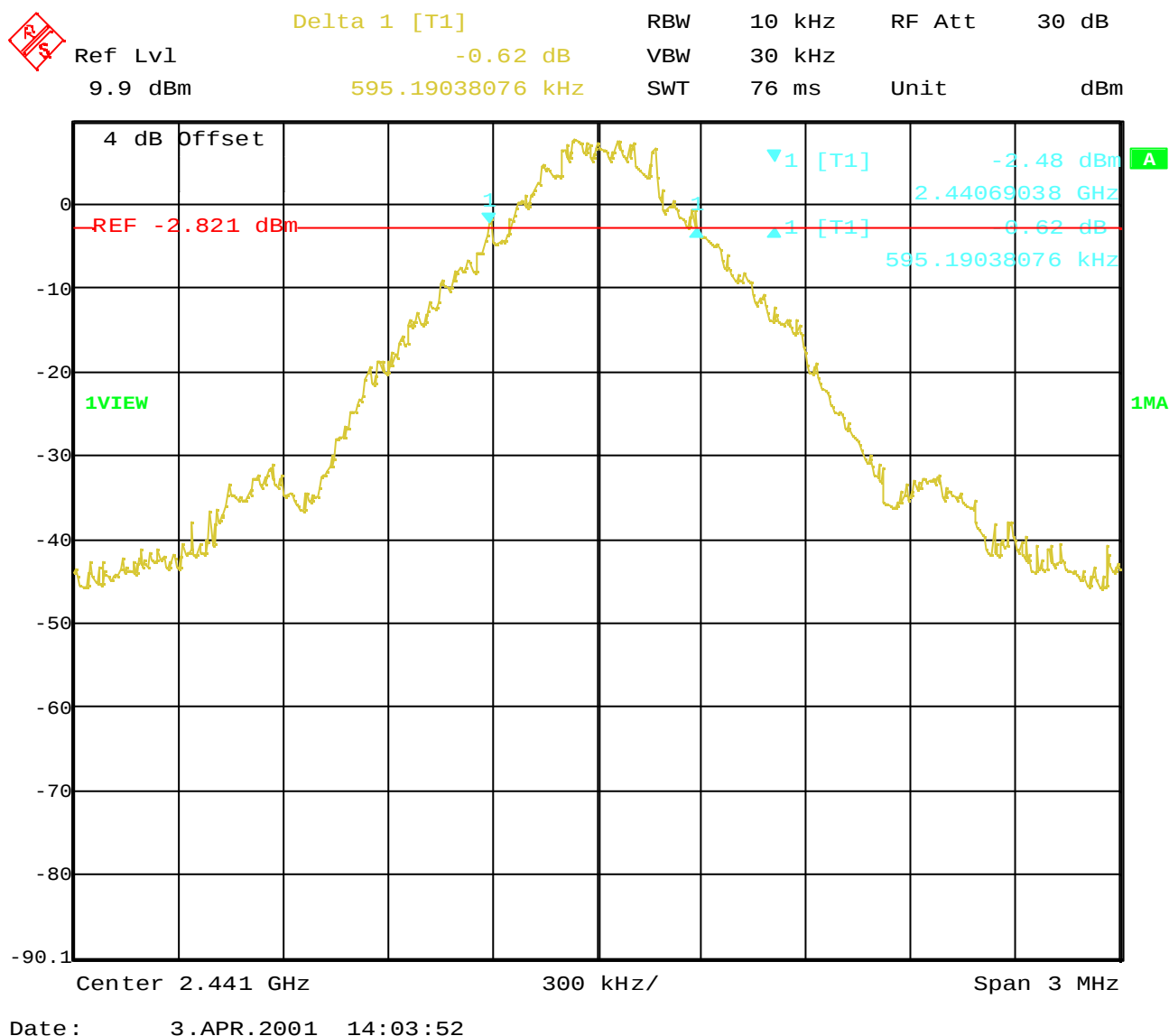
Date: 3.APR.2001 13:58:36

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

Spectrum Bandwidth of a FHSS System 10 dB bandwidth

§15.247(a)

Channel 2

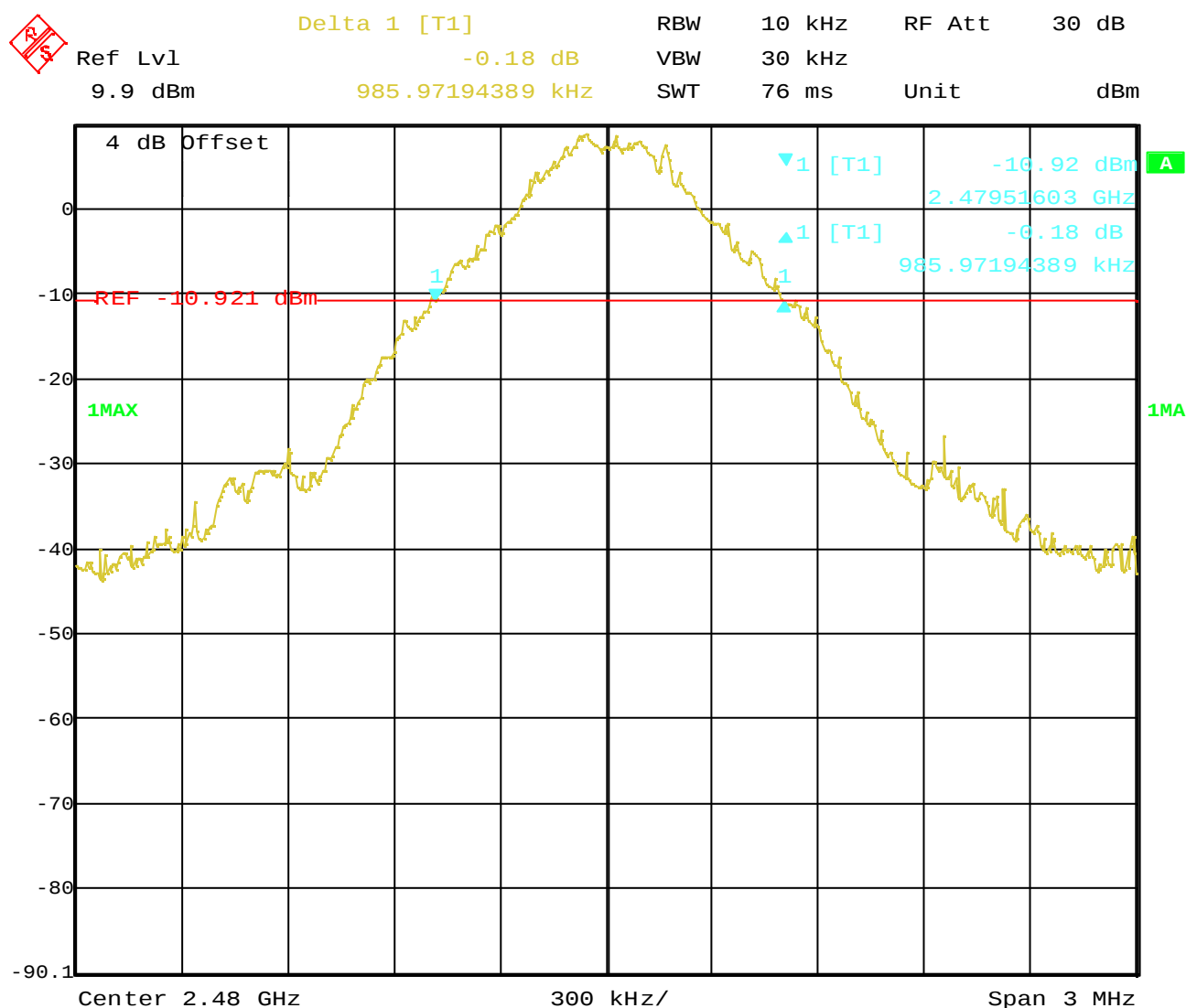


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Spectrum Bandwidth of a FHSS System 20 dB bandwidth

§15.247(a)

Channel 3:



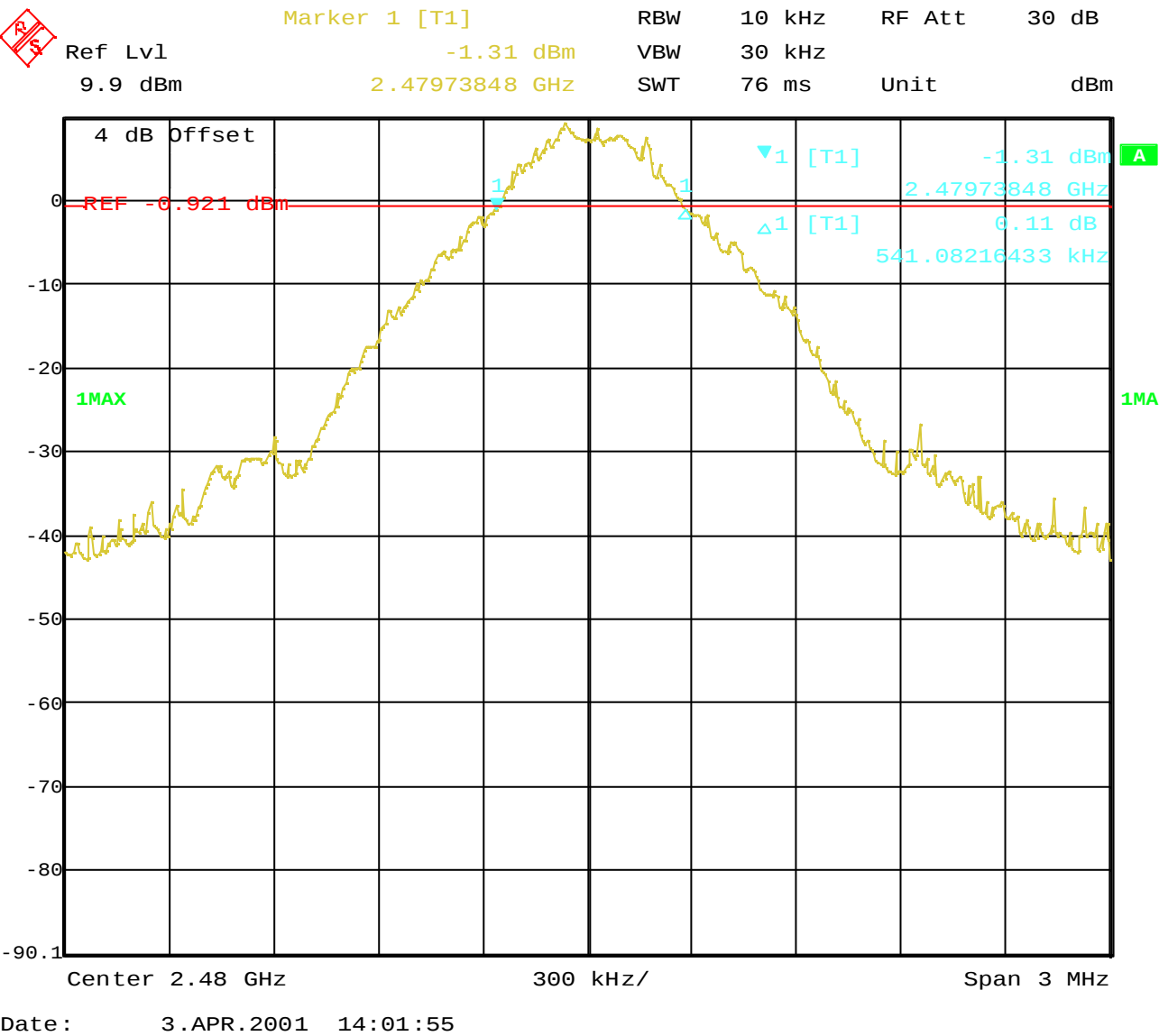
Date: 3.APR.2001 14:00:53

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

Spectrum Bandwidth of a FHSS System
10 dB bandwidth

§15.247(a)

Channel 3



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

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW)			
Frequency (MHz)		2402		2441	2480
T _{nom} (20)° C	V _{nom} (12.0)V	PK	18.72	23.28	30.13
		AV	14.86	18.45	23.88
Maximum deviation from output power under extreme test conditions (dBc)		+0.21 / -0.58		+0.29 / -0.59	+0.22 / -0.61
Measurement uncertainty		±3dB			

RBW / VBW : 3 MHz

LIMIT
SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt

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

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

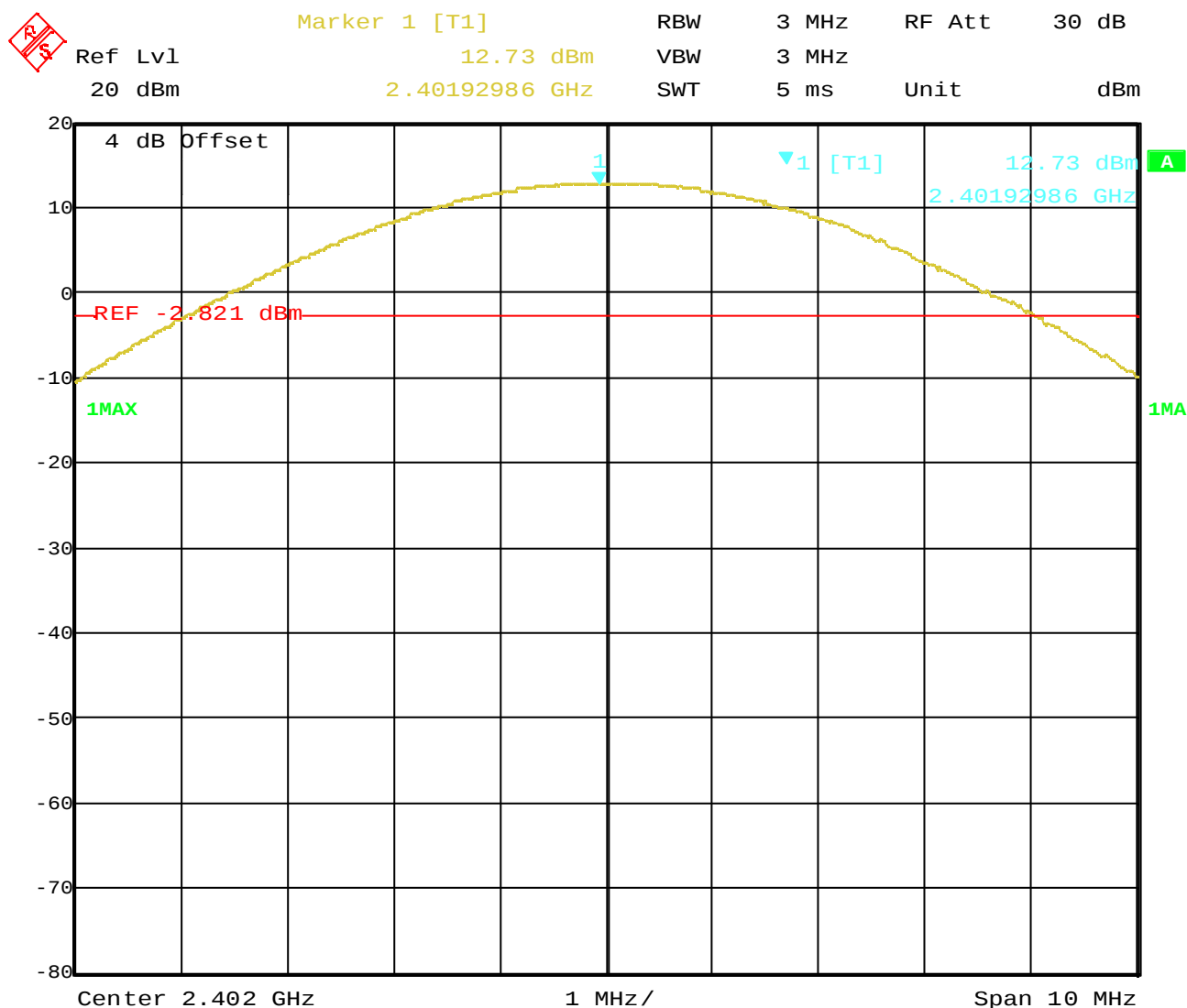
Relative humidity : 31%

Peak output power

§15.247 (b)

Channel 1: +12.72dBm at 2402 MHz

De facto EIRP with -2.9 dbI max. antenna gain is +9.8 dBm



Date: 3.APR.2001 14:08:11

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

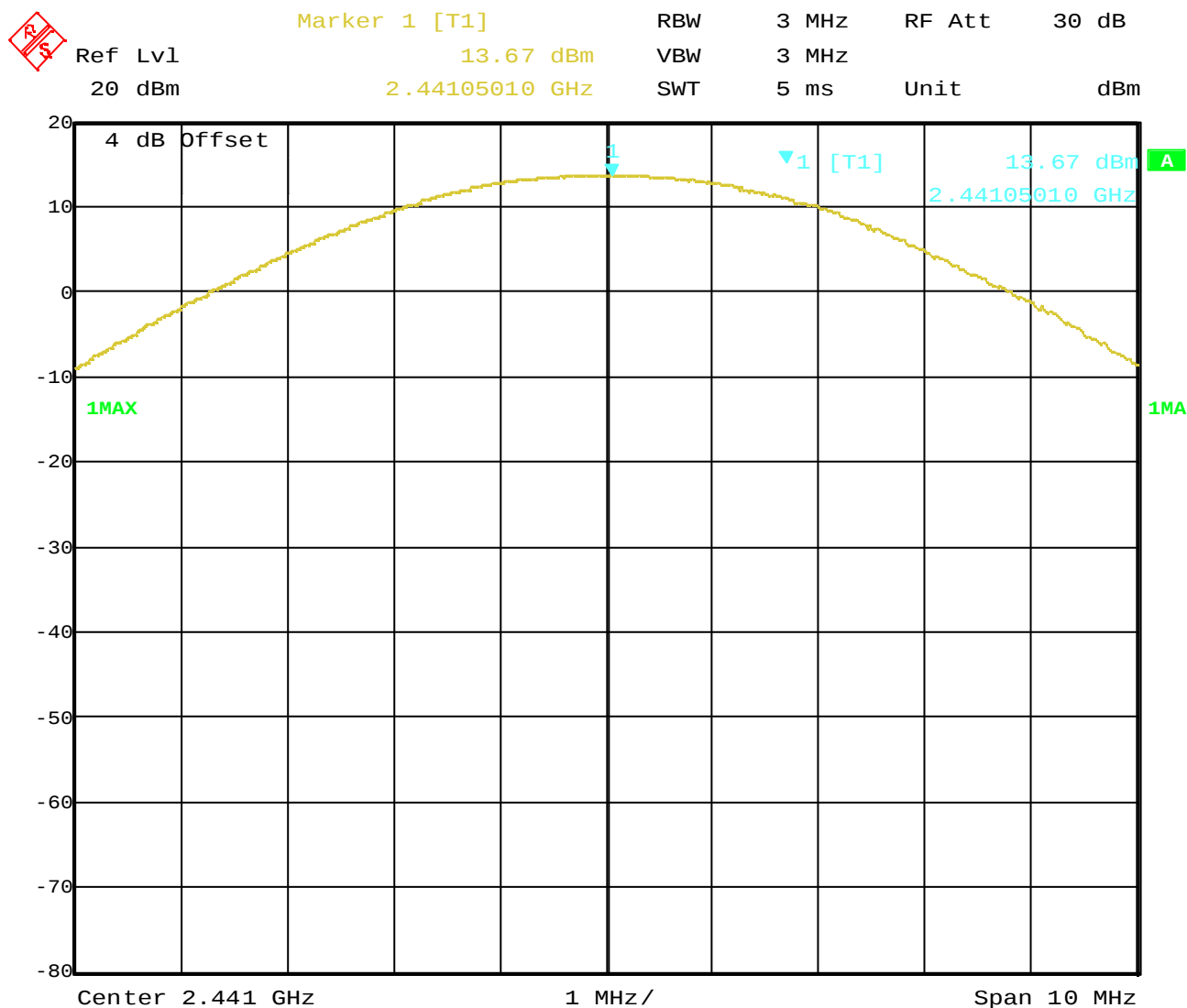
Relative humidity : 31%

Peak output power

§15.247 (b)

Channel 2: +13.67 dBm at 2441 MHz

De facto EIRP with -4.2 dbI max. antenna gain is +9.5 dBm



Date: 3.APR.2001 14:14:24

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

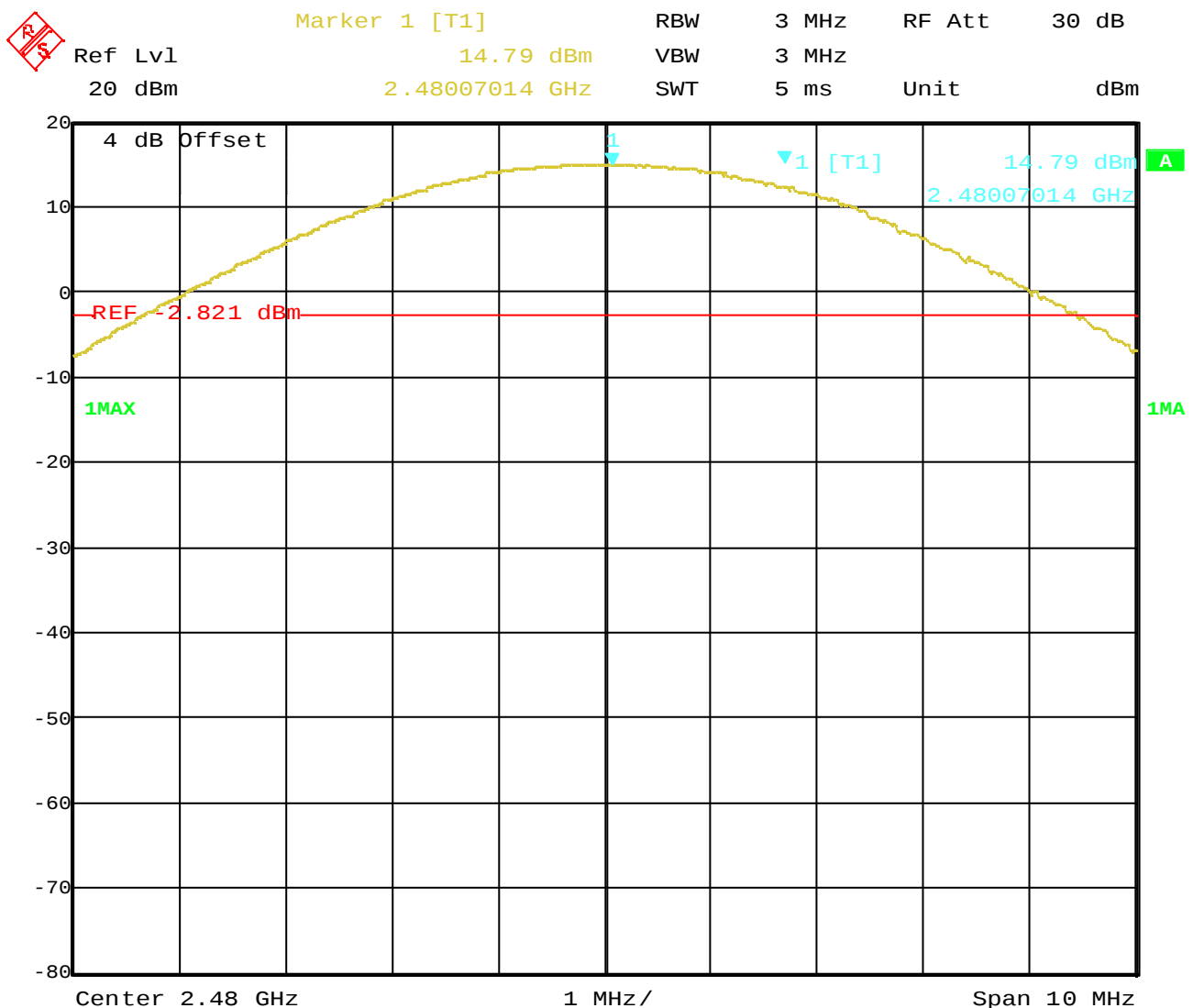
Relative humidity : 31%

Peak output power

§15.247 (b)

Channel 3: +14.79 dBm at 2481 MHz

De facto EIRP with -4.7 dbI max. antenna gain is +10.0 dBm



Date: 3.APR.2001 14:13:34

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

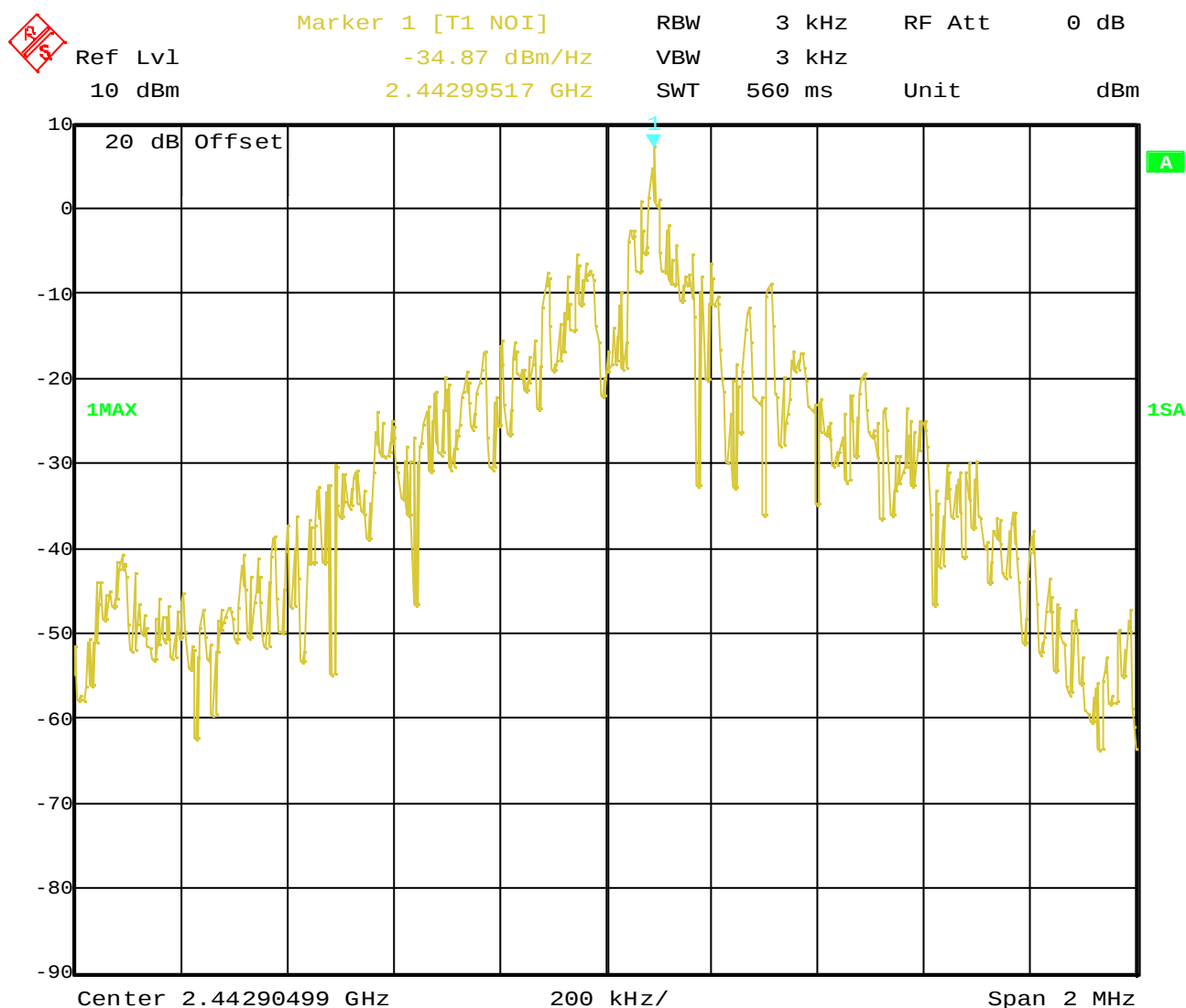
Power density

SUBCLAUSE § 15.247

Inquiry mode

The measured value is related to 1 Hz. So we have to add 34.8 dB for 3 kHz BW.

The result is -0.07 dBm related to 3kHz.



Date: 3.APR.2001 07:34:35

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

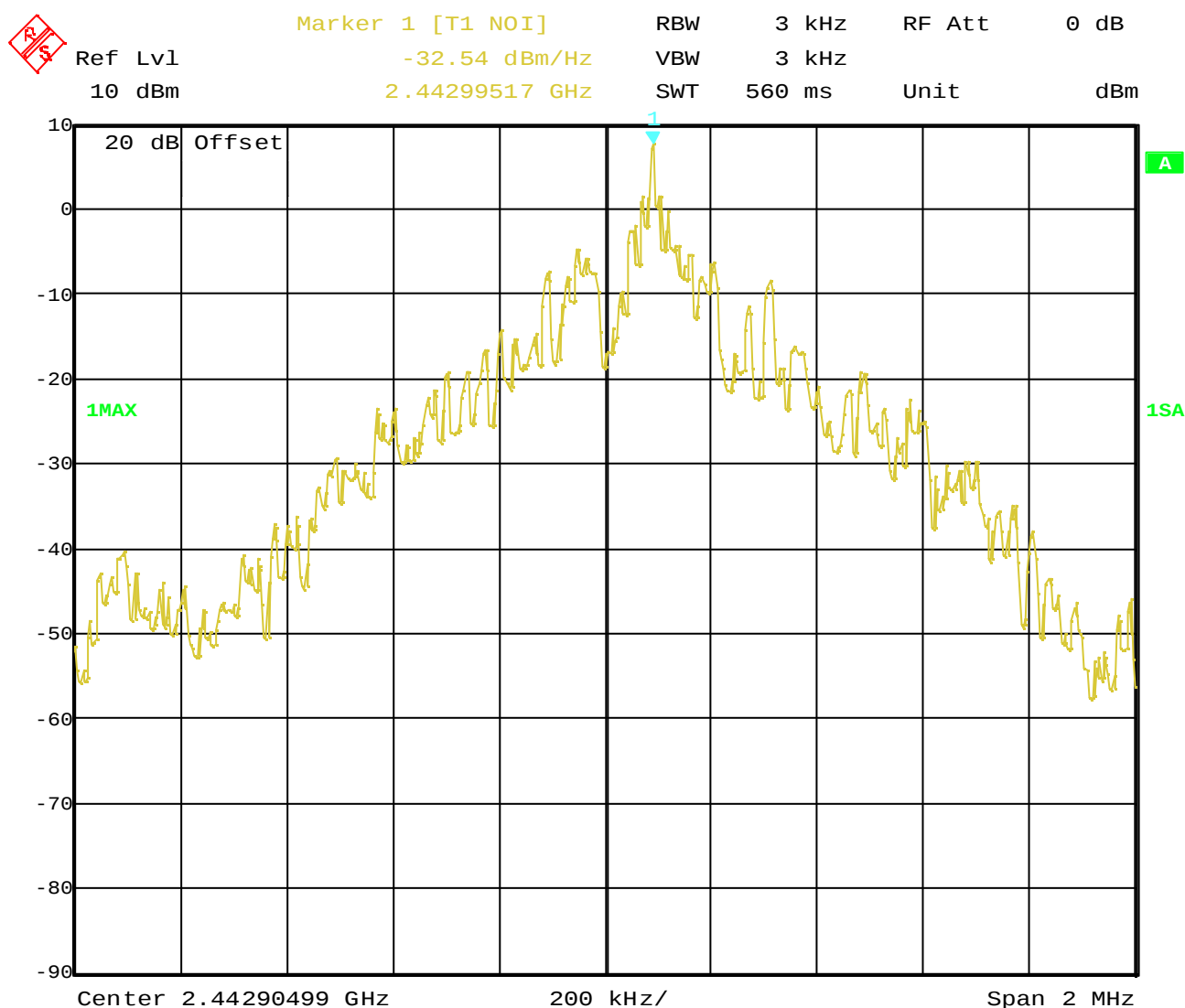
Power density

SUBCLAUSE § 15.247

Page mode

The measured value is related to 1 Hz. So we have to add 34.8 dB for 3 kHz BW.

The result is +2.26 dBm related to 3kHz.



Date: 3.APR.2001 07:57:16

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 23° C
Relative humidity : 47%
**MAXIMUM PEAK OUTPUT POWER
(RADIATED)**
SUBCLAUSE § 15.247 (b) (1)

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW)		
Frequency (MHz)		2402	2441	2481
T _{nom} (23)° C	V _{nom} (12.0)V	9.5	8.9	10.0
Maximum deviation from output power under extreme test conditions (dBc)		0.5	0.5	0.5
Measurement uncertainty		±3dB		

RBW/VBW : 3 MHz
Measured at a distance of 3m
LIMIT
SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt

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

Equipment under test : AXIS 9010/ALPS

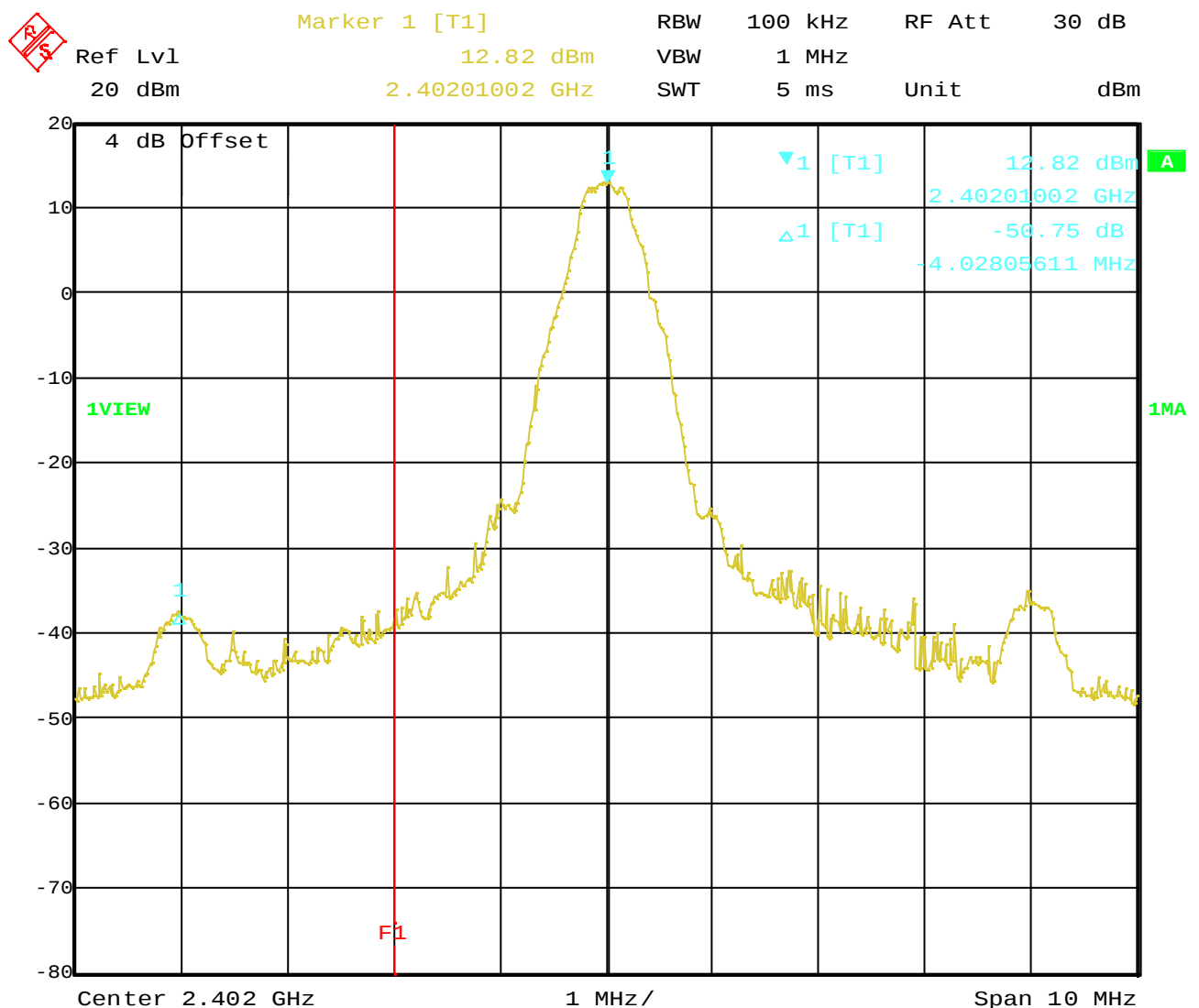
Ambient temperature : 23° C

Relative humidity : 47%

Band-edge compliance of conducted emissions

§15.247 (c)

Low frequency section (hopping off)



Date: 3.APR.2001 14:16:52

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

17 - 24

Equipment under test : AXIS 9010/ALPS

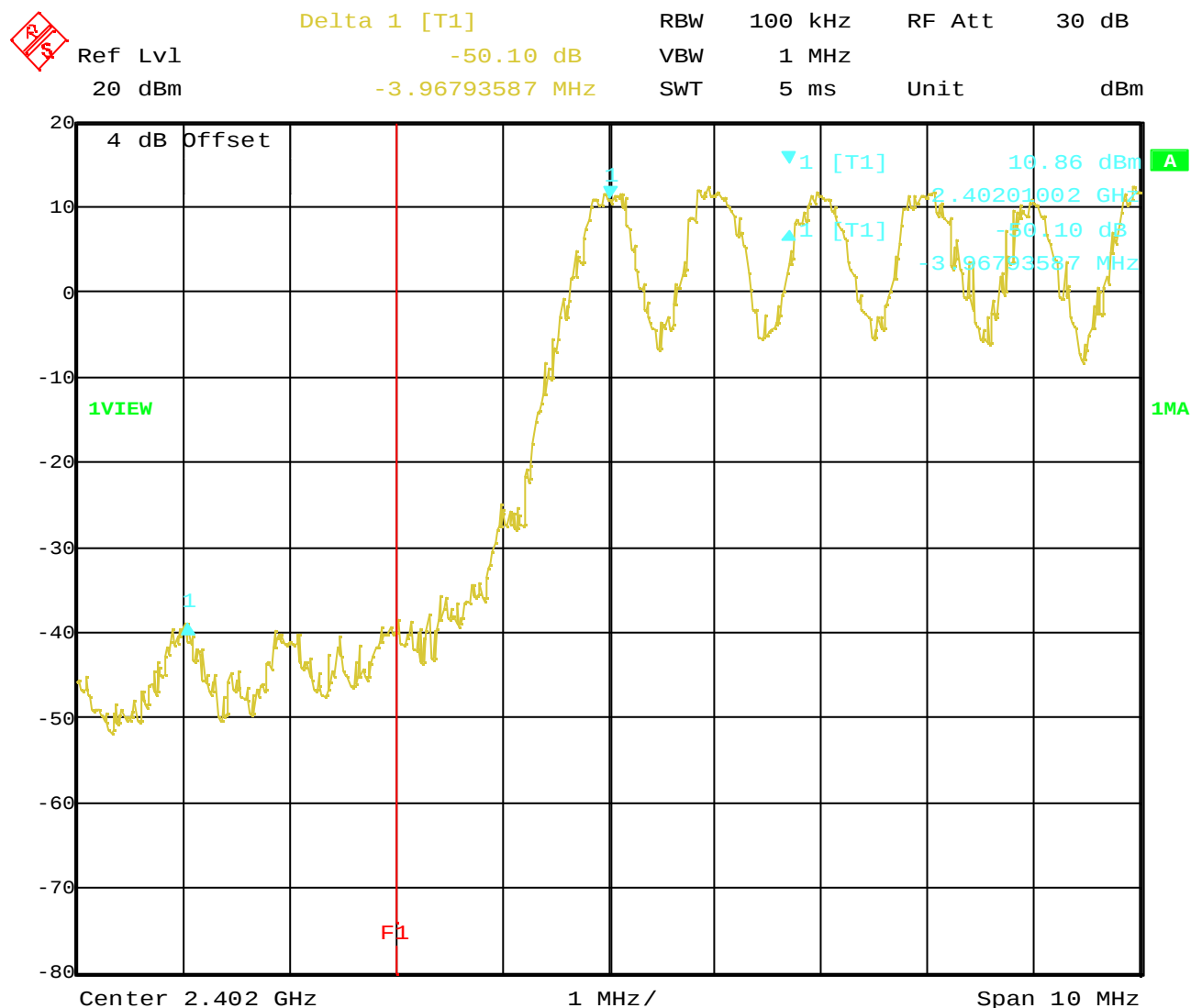
Ambient temperature : 20° C

Relative humidity : 31%

Band-edge compliance of conducted emissions

§15.247 (c)

Low frequency section (hopping on)



Date: 3.APR.2001 14:18:10

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

Equipment under test : AXIS 9010/ALPS

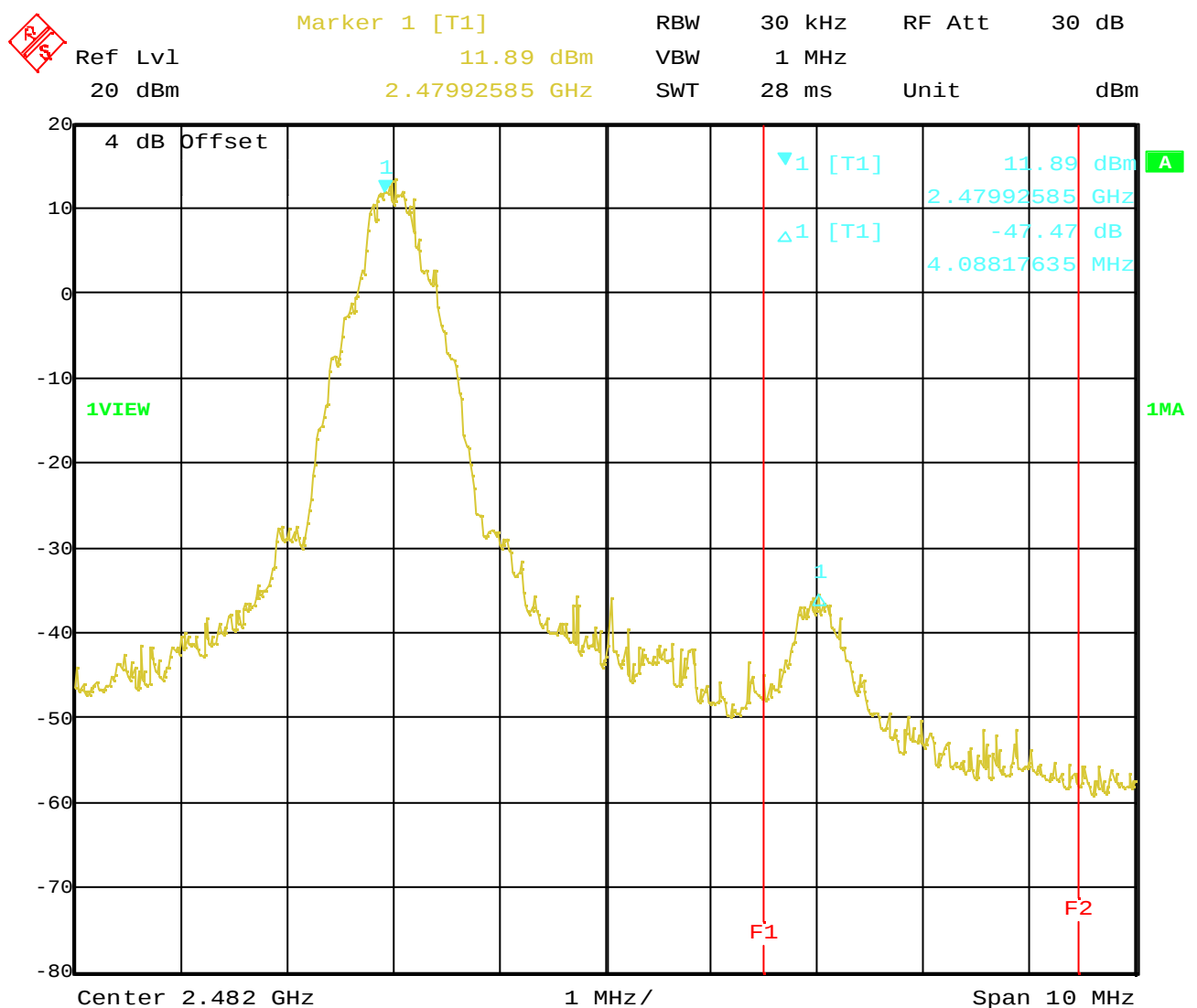
Ambient temperature : 20° C

Relative humidity : 31%

Band-edge compliance of conducted emissions

§15.247 (c)

high frequency section (hopping off)



Date: 3.APR.2001 14:23:04

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

Equipment under test : AXIS 9010/ALPS

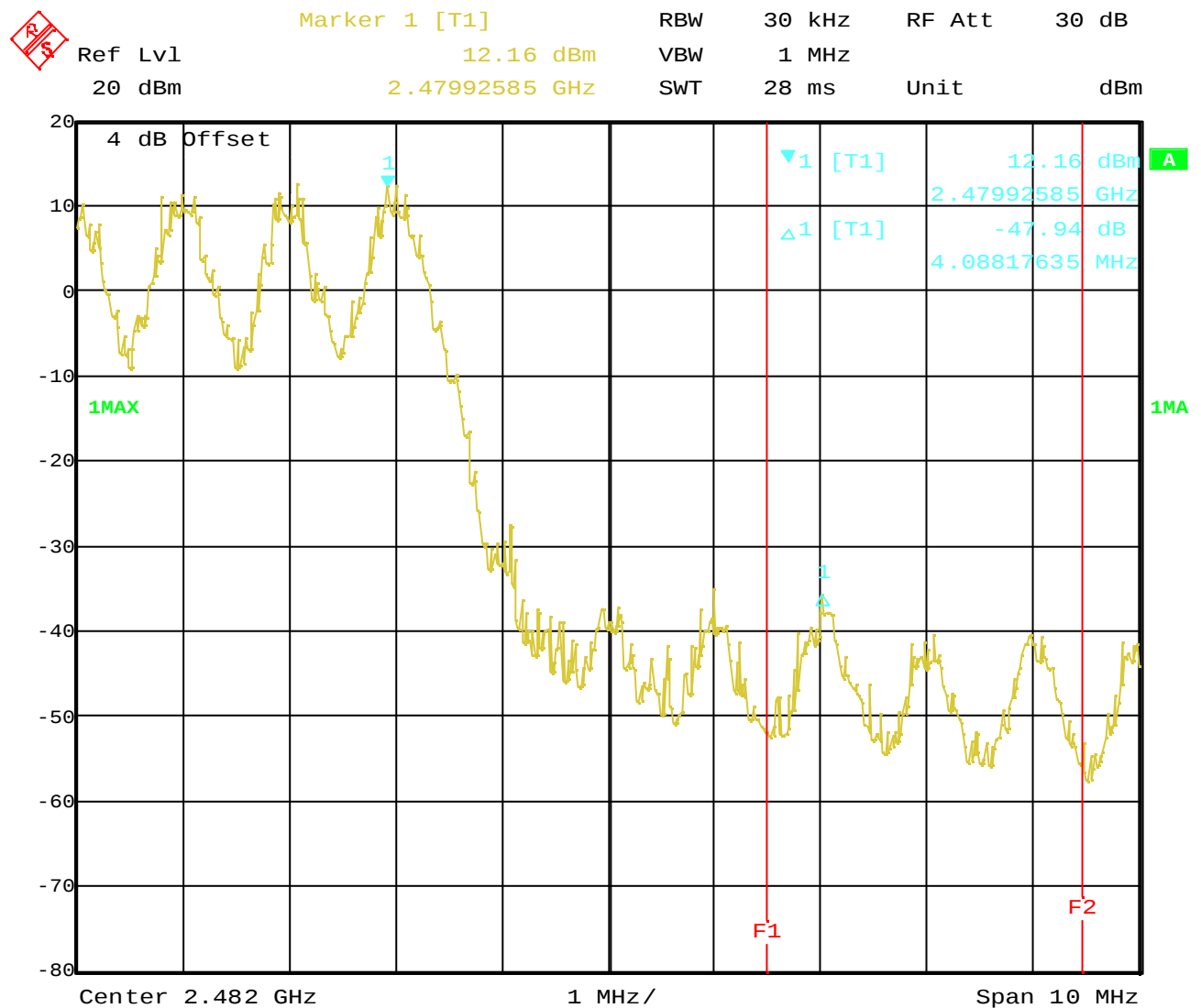
Ambient temperature : 20° C

Relative humidity : 31%

Band-edge compliance of conducted emissions

§15.247 (c)

high frequency section (hopping on)

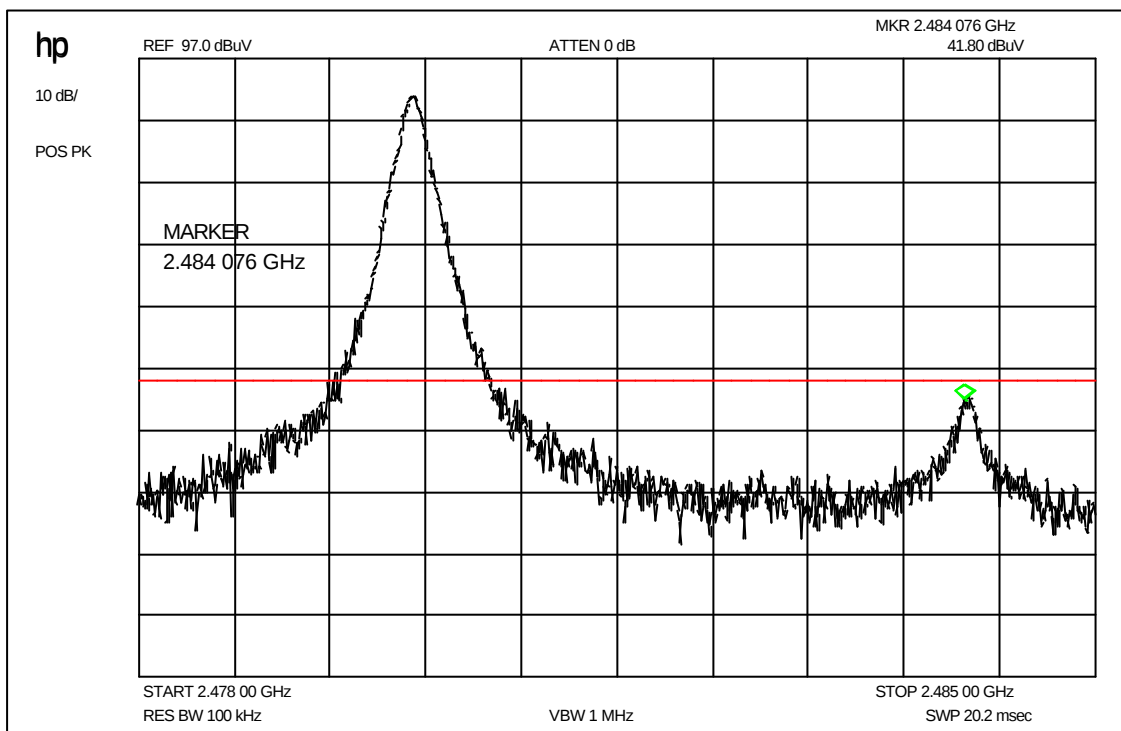


Date: 3 .APR. 2001 14:22:08

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

Equipment under test : AXIS 9010/ALPS
 Ambient temperature : 20° C
 Relative humidity : 31%

Band-edge compliance radiated



This measurement was made to show the conformity to FCC 15.205 (restricted bands)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emmission power	actual attenuation below frequency of operation (dB)	results
2402		+12.7	30 dBm	-	Operating frequency
all peaks <limit			-20 dBc	see plot	complies
2441		+13.7	30 dBm	-	Operating frequency
all peaks <limit			-20 dBc	see plot	complies
2480		+14.7	30 dBm		Operating frequency
all peaks <limit			-20 dBc	see plot	complies
Measurement uncertainty		± 3dB			

RBW : 100 kHz VBW: 1 MHz

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)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

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Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

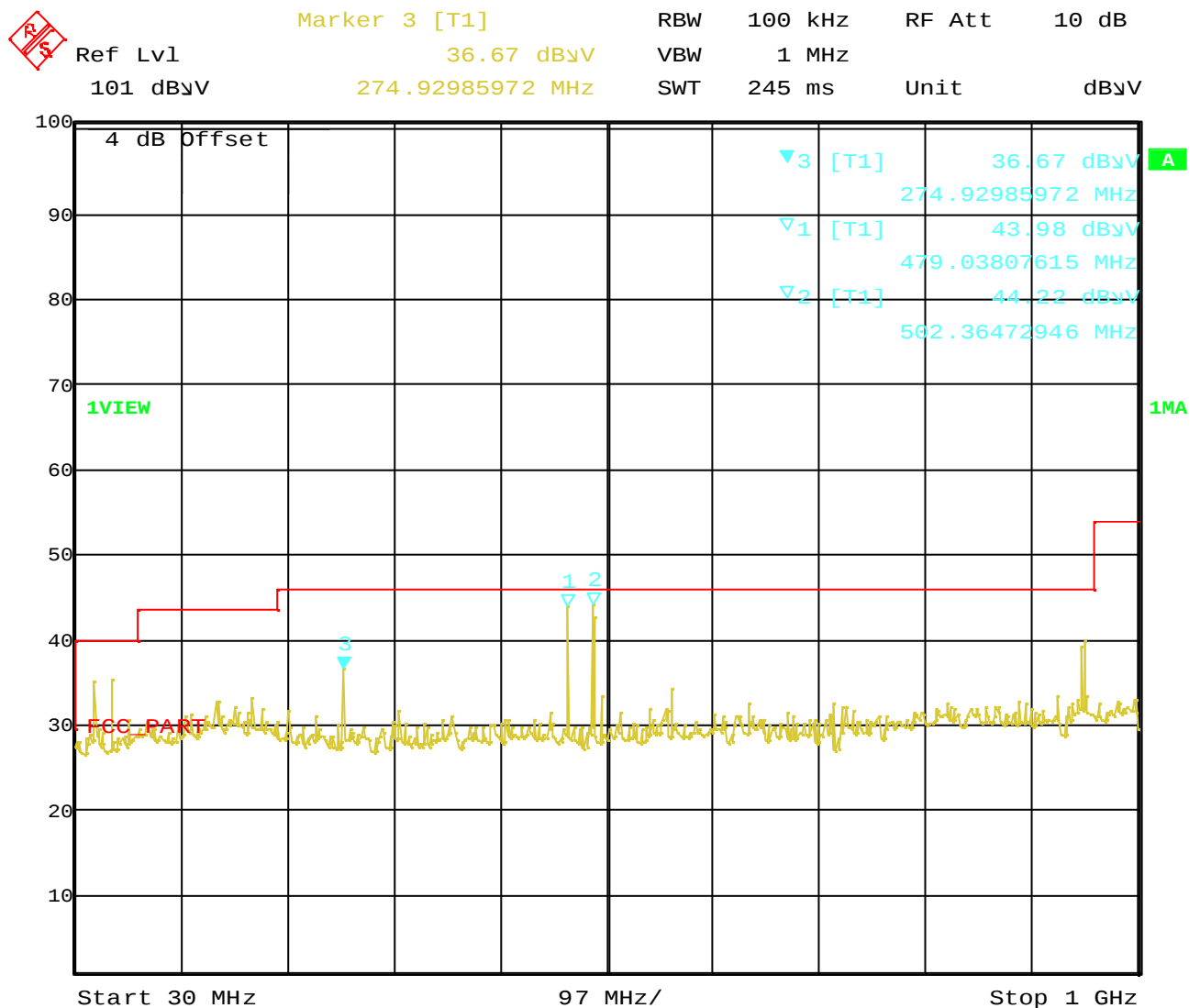
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1: 30 MHz - 1 GHz



Date: 3.APR.2001 14:36:16

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

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Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

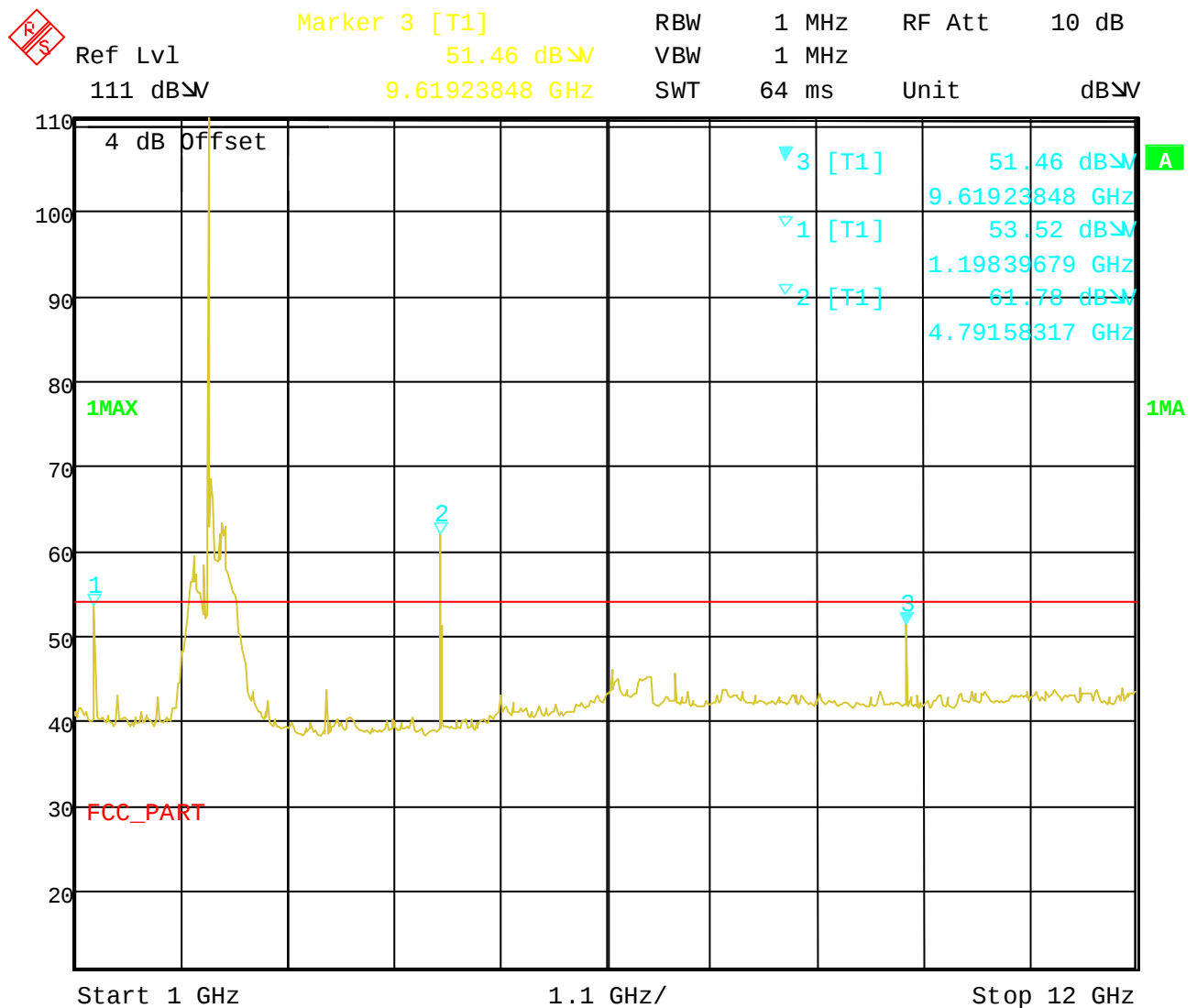
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1: 1 – 12 GHz peak



Date: 3. APR. 2001 14:41:17

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

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Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

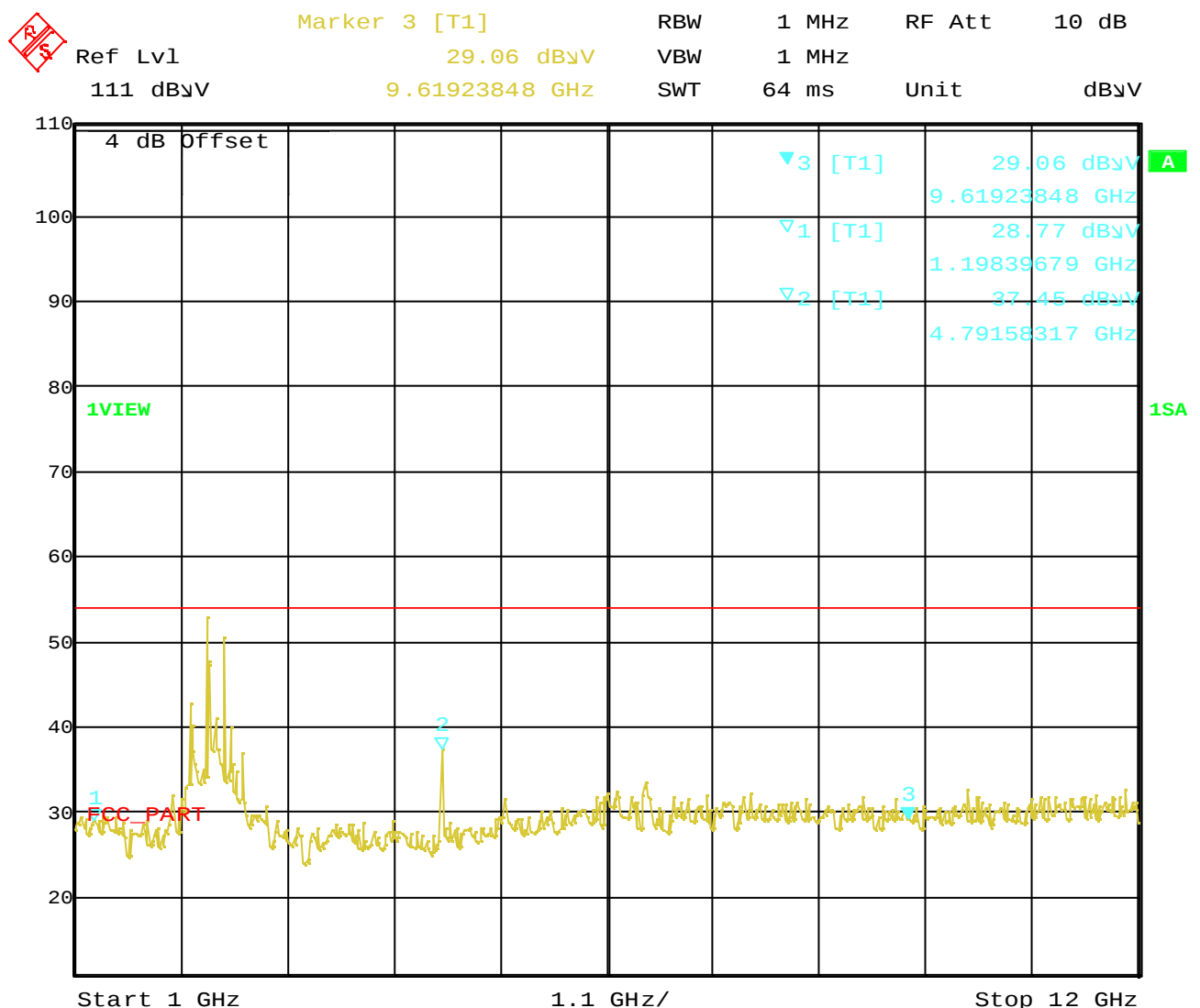
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1: 1 – 12 GHz average



Date: 3.APR.2001 14:42:02

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

Equipment under test : AXIS 9010/ALPS

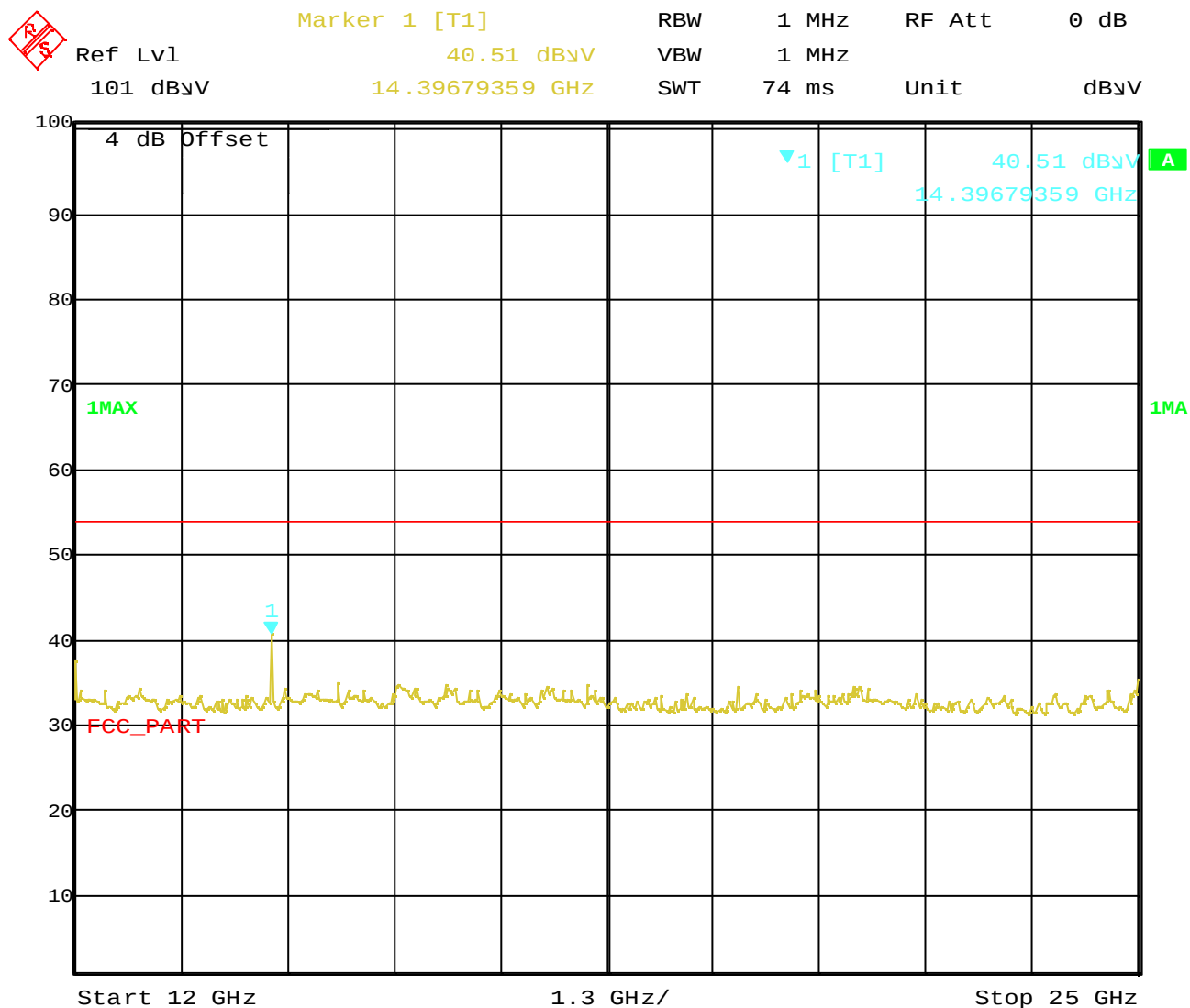
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 1: 12 - 25 GHz peak



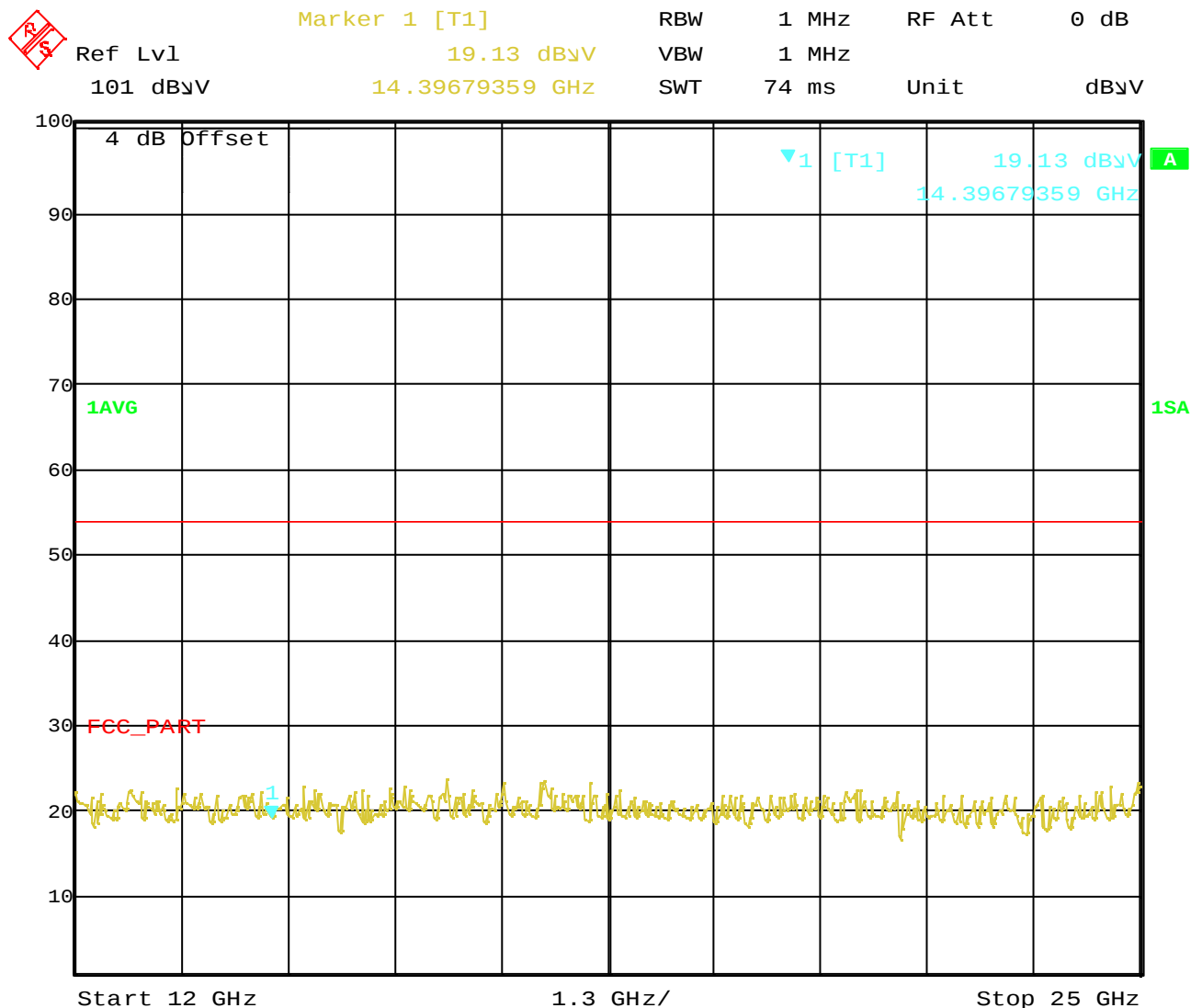
Date: 3.APR.2001 14:43:26

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

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter) Channel 1: 12 - 25 GHz average

§ 15.247 (c) (1)



Date: 3.APR.2001 14:44:09

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

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2: 30 MHz - 1 GHz

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

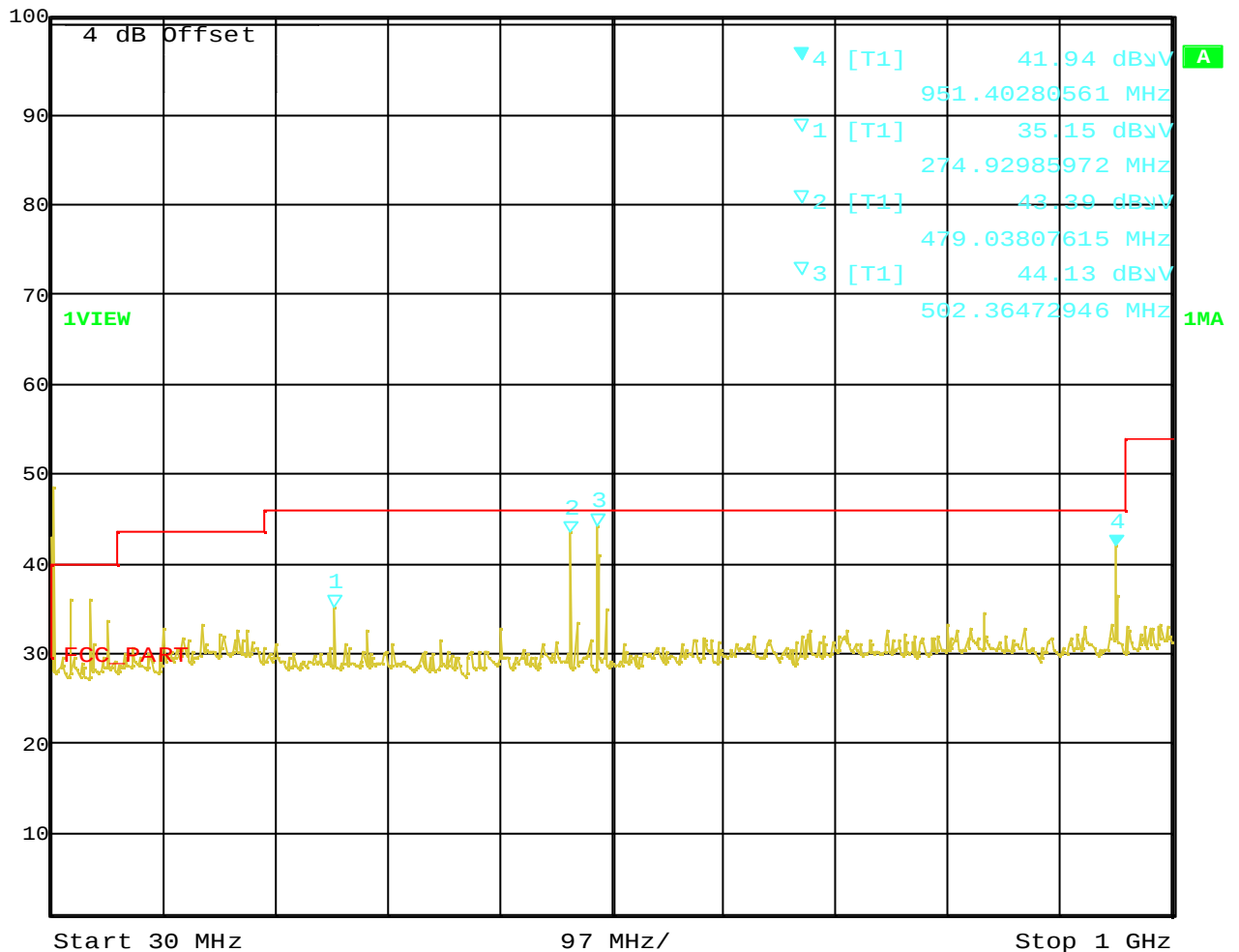
Ambient temperature : 20° C

Relative humidity : 31%



Ref Lvl 101 dBμV
Marker 4 [T1] 41.94 dBμV
951.40280561 MHz

RBW 100 kHz RF Att 10 dB
VBW 1 MHz
SWT 245 ms Unit dBμV



Date: 3.APR.2001 14:47:13

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2: 1 –12 GHz peak

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

Relative humidity : 31%

dBV



-64

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

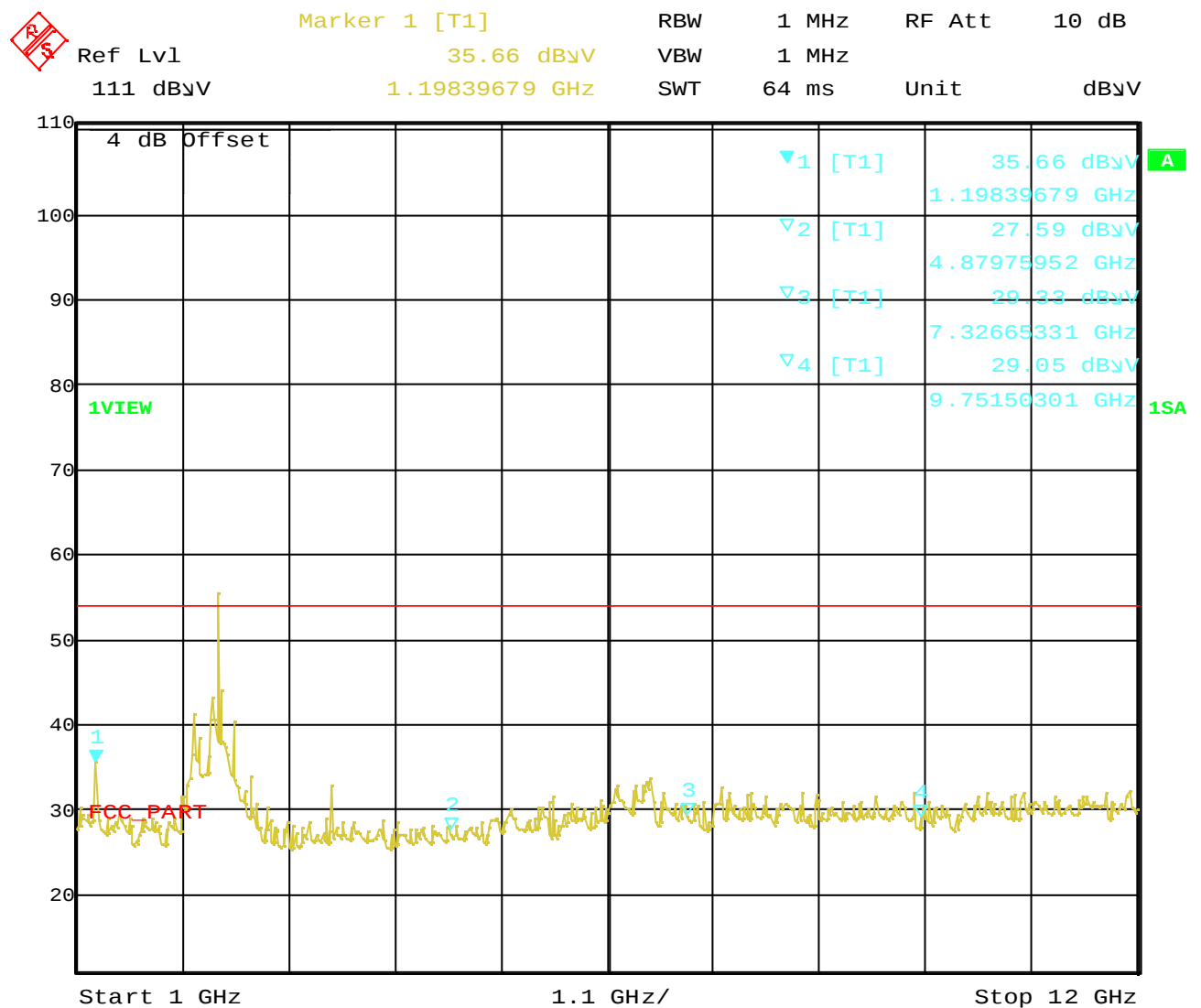
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2: 1 –12 GHz average



Date: 3.APR.2001 14:50:19

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

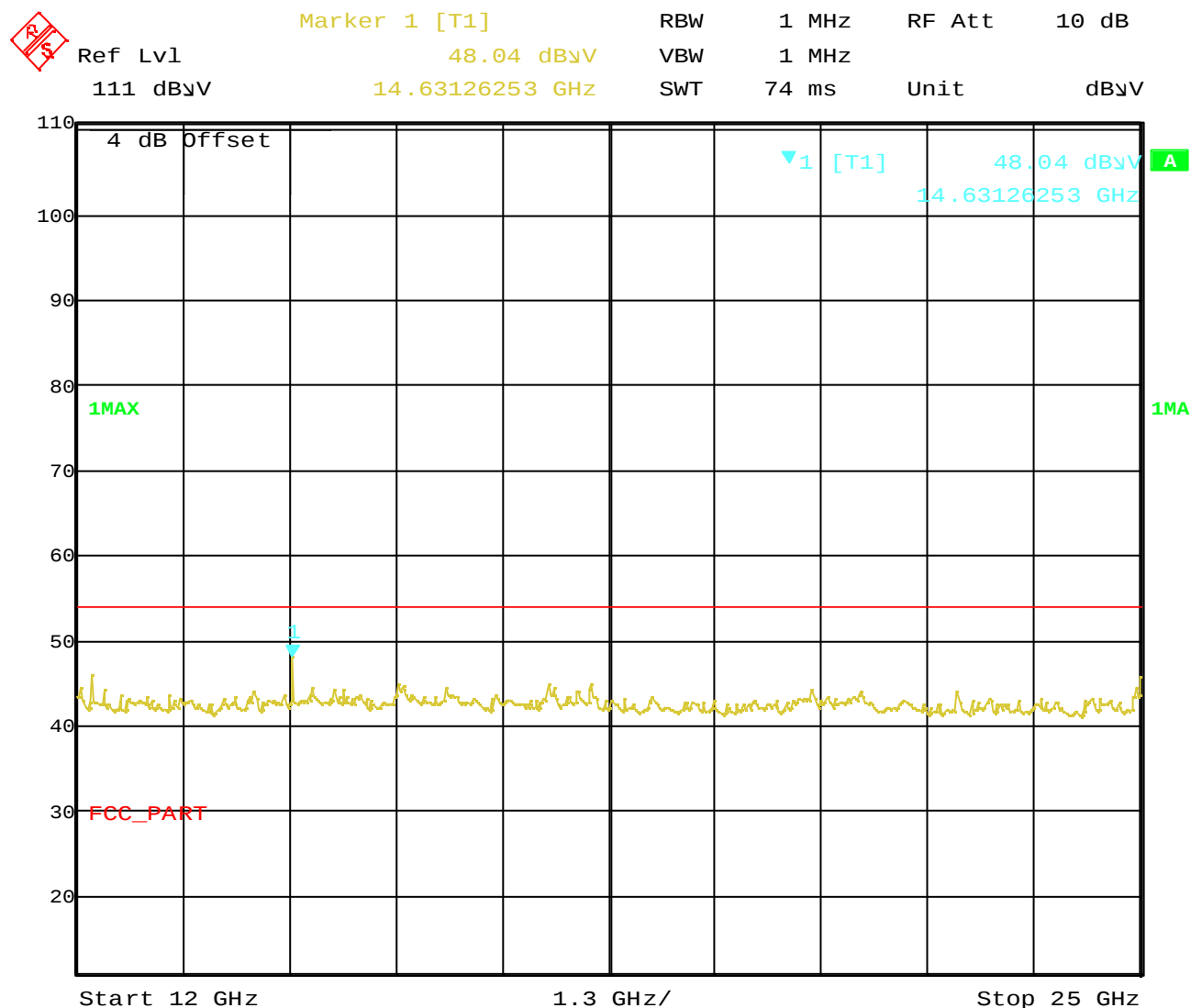
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2: 12 – 25 GHz peak



Date: 3.APR.2001 14:51:05

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

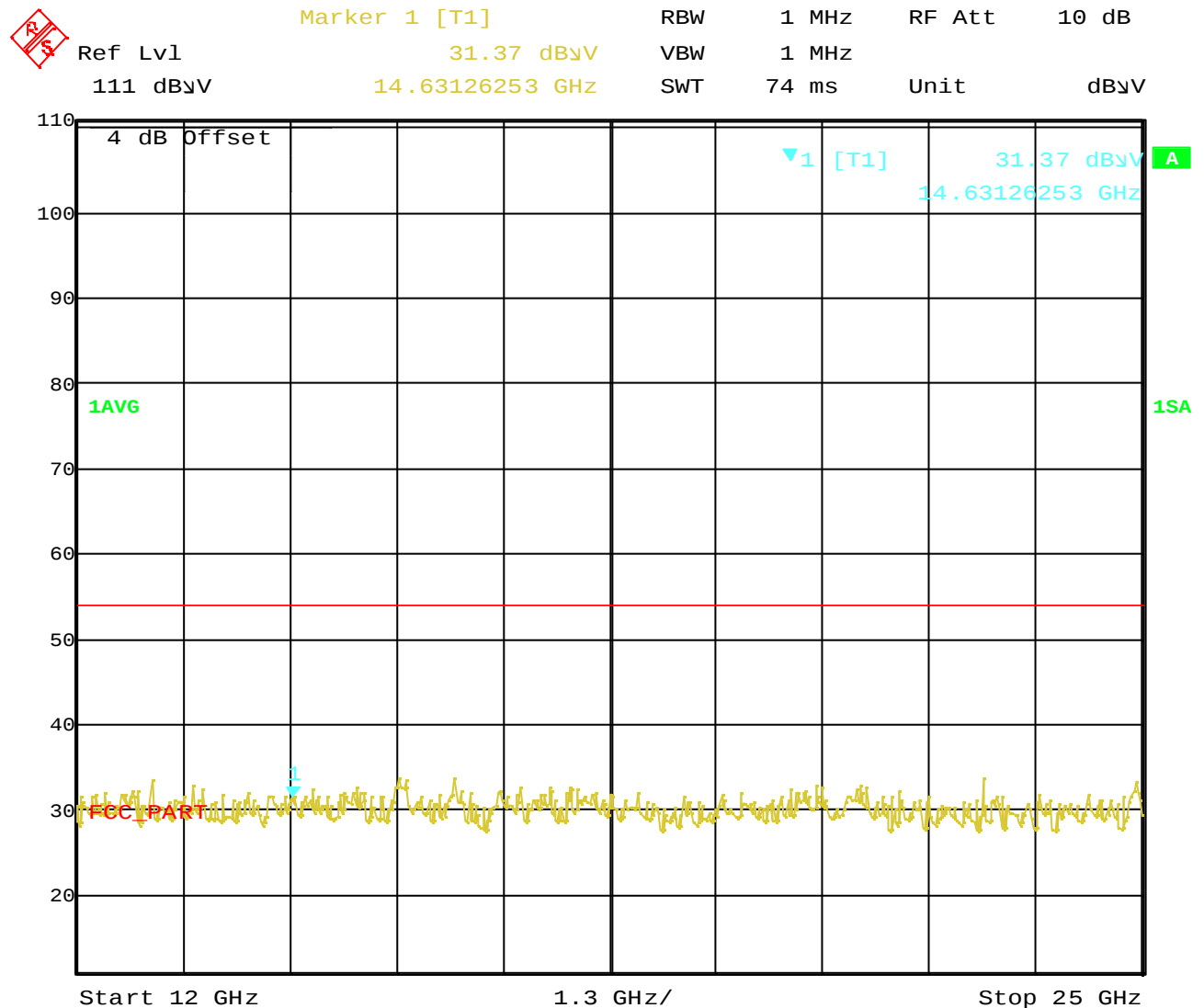
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 2: 12 – 25 GHz average



Date: 3.APR.2001 14:51:25

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

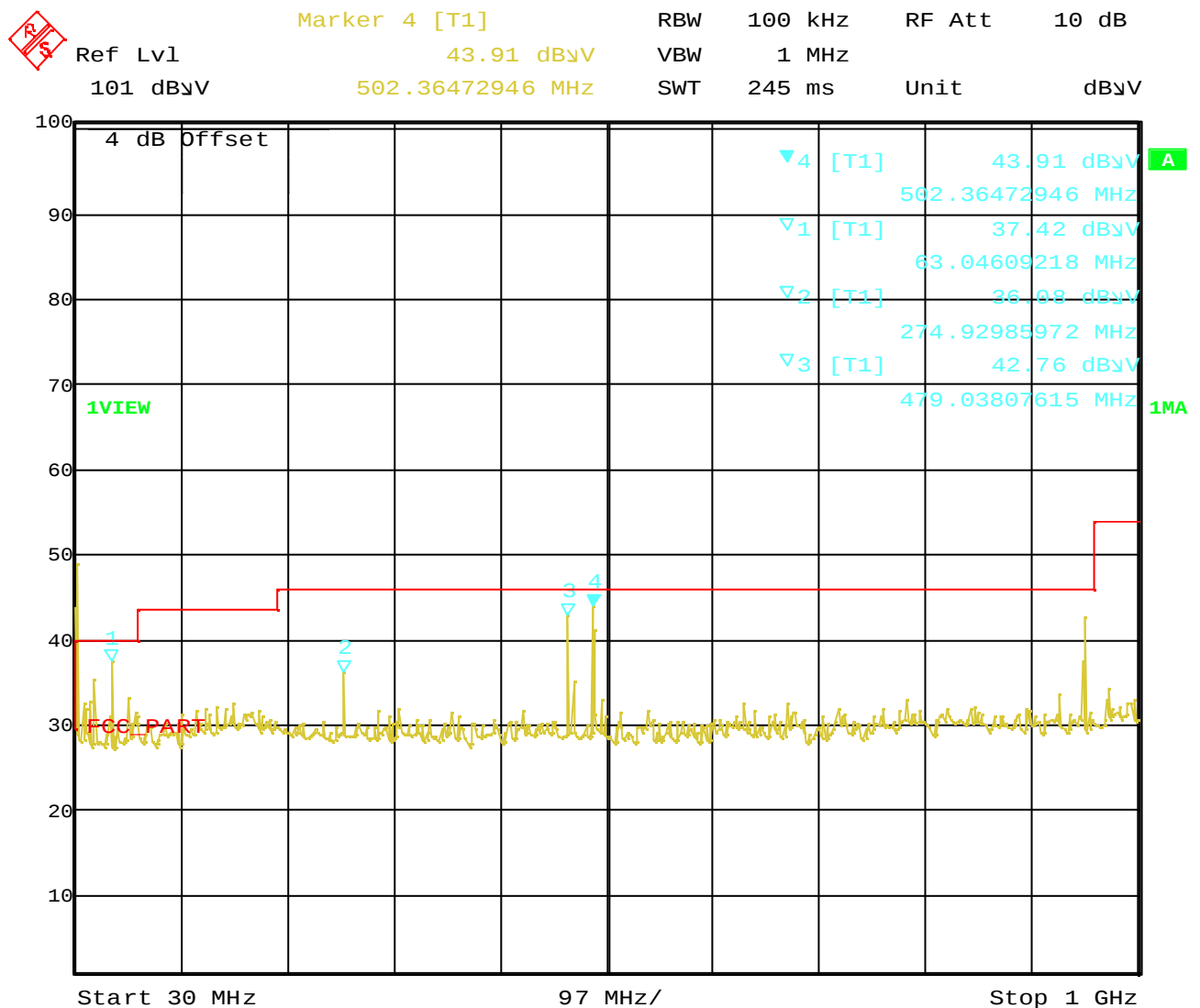
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 3: 30 MHz - 1 GHz



Date: 3.APR.2001 14:53:35

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

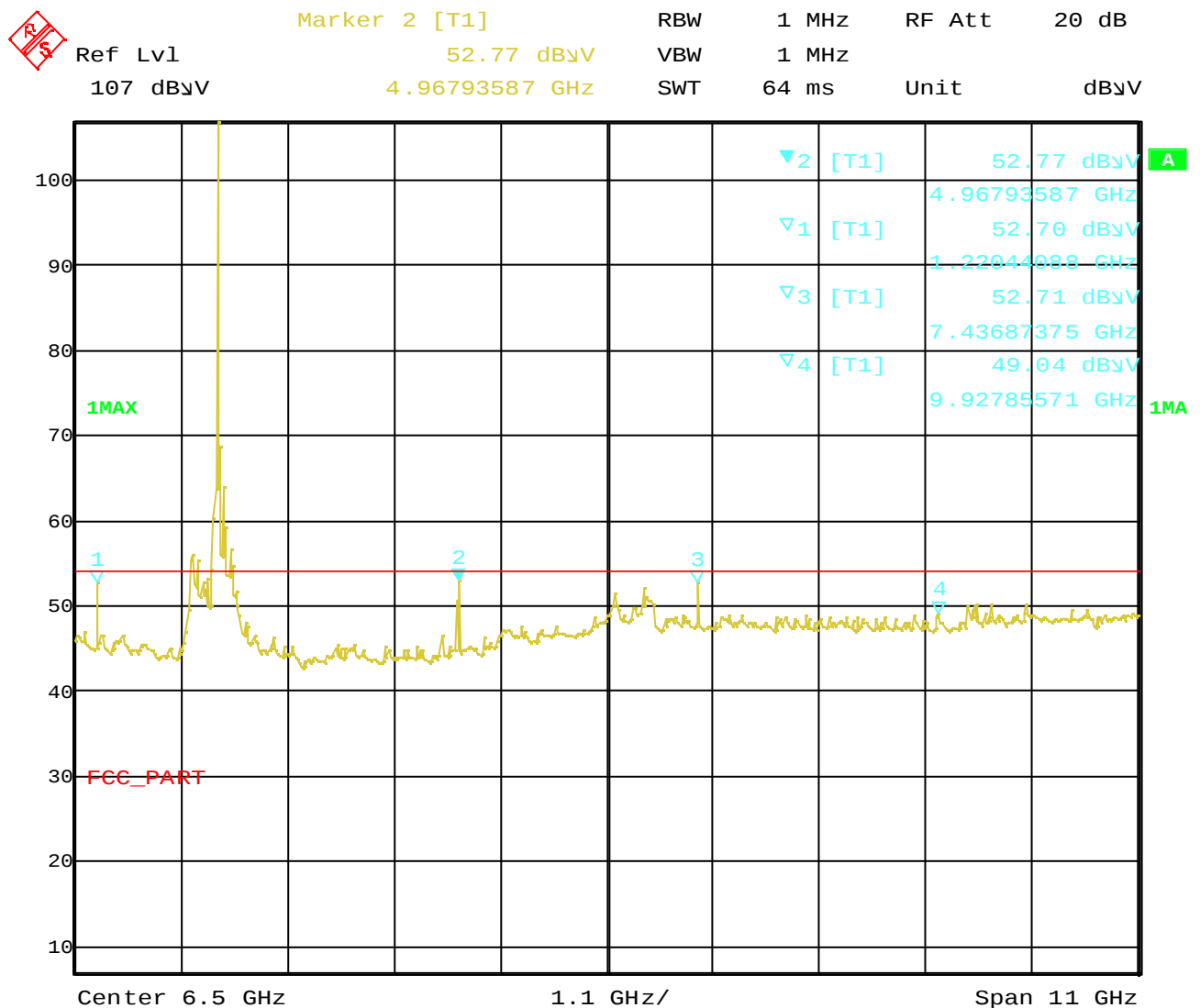
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 3: 1 - 12 GHz peak



Date: 3.APR.2001 15:03:18

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

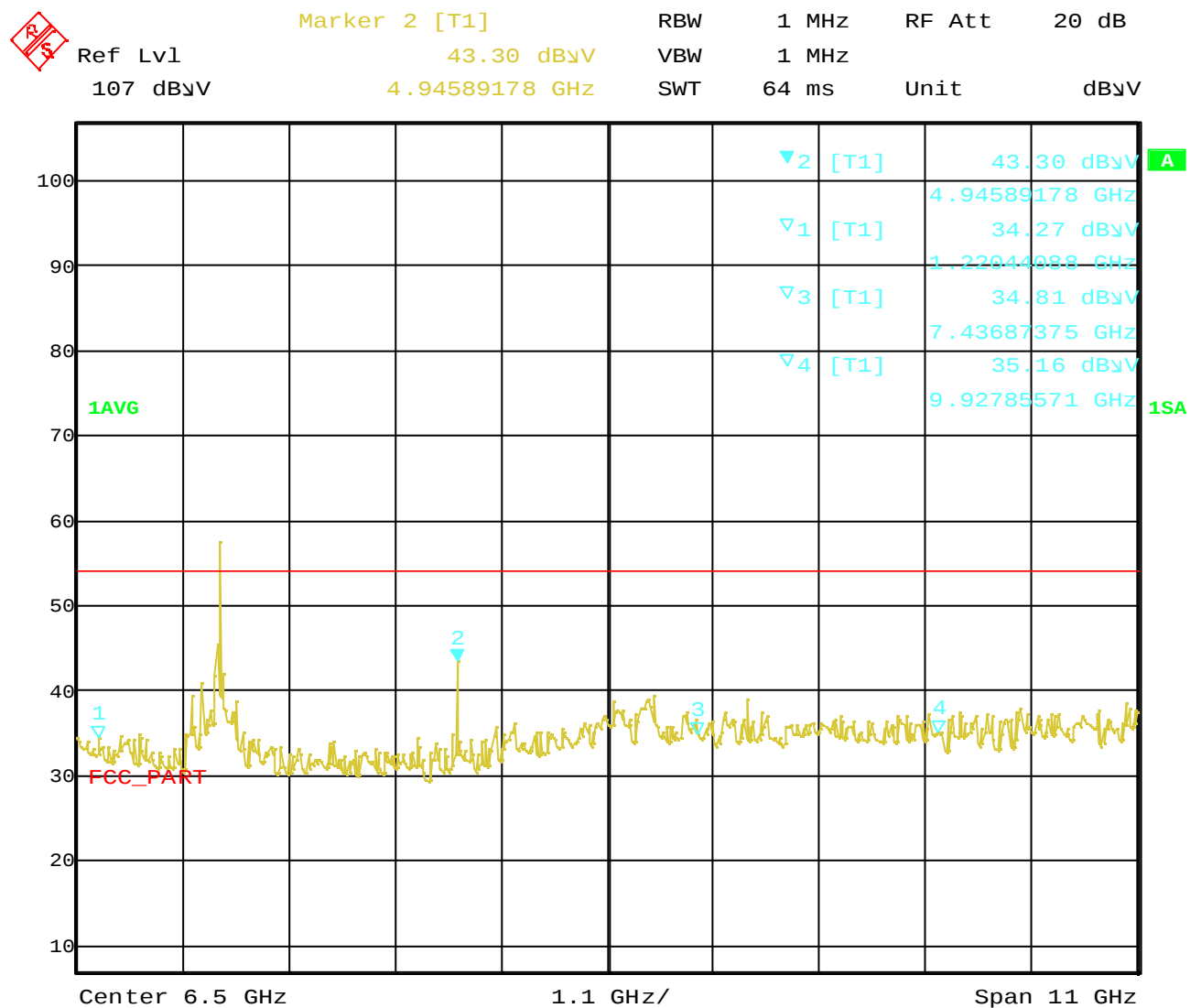
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 3: 1 - 12 GHz average



Date: 3.APR.2001 15:02:16

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

Page 57 (91)

Equipment under test : AXIS 9010/ALPS

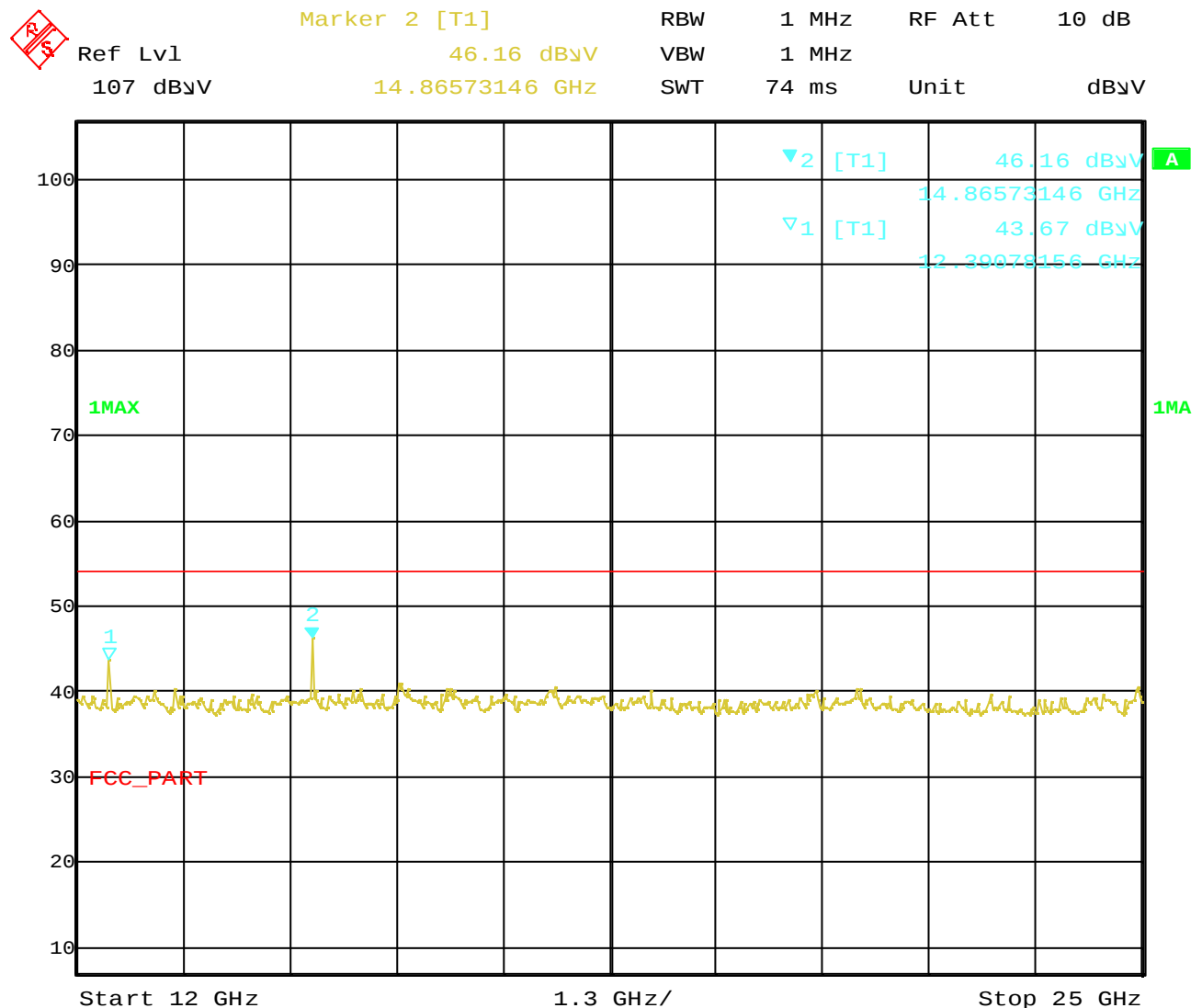
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 3: 12 - 25 GHz peak



Date: 3.APR.2001 15:03:58

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

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

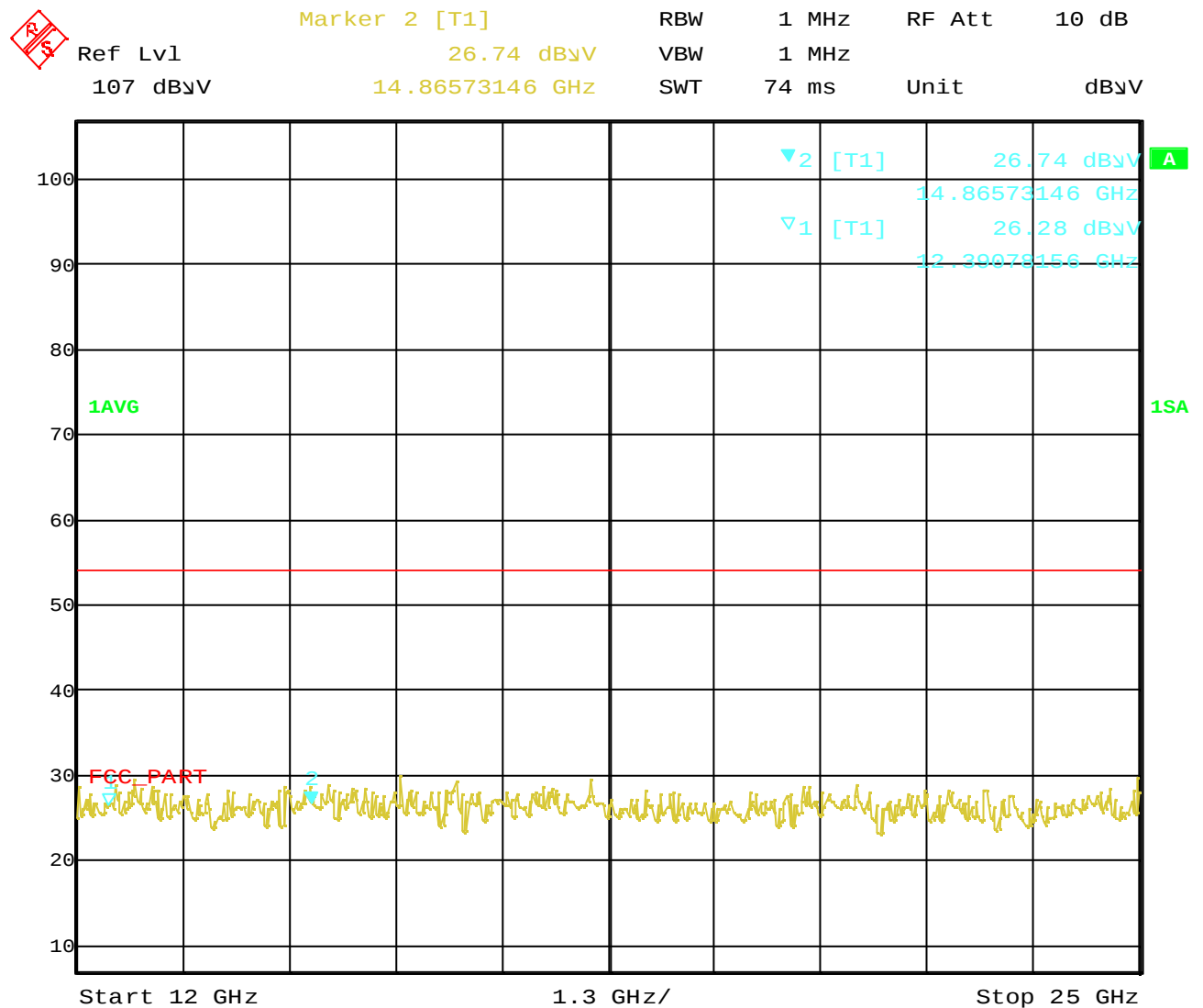
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Conducted (Transmitter)

§ 15.247 (c) (1)

Channel 3: 12 - 25 GHz average



Date: 3.APR.2001 15:04:16

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

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%
SPURIOUS RADIATED EMISSION
§ 15.247 (c) (1)

EMISSION LIMITATIONS					
f (MHz)	polarization	amplitude of emission (dBµV/m) PEAK	amplitude of emission (dBµV/m) QUASI PEAK	limit max. allowed emmission power (dBµV/m)	results
low channel					
47.03	vertical		32.3	40.0	complies
57.47	vertical		31.3	40.0	complies
99.85	vertical		29.8	43.5	complies
125.02	vertical		31.5	43.5	complies
197.94	vertical		29.1	43.5	complies
400.14	vertical		35.9	46.0	complies
501.03	vertical		25.8	46.0	complies
mid channel					
47.03	vertical		32.3	40.0	complies
57.47	vertical		31.3	40.0	complies
99.85	vertical		29.8	43.5	complies
125.02	vertical		31.5	43.5	complies
197.94	vertical		29.1	43.5	complies
400.14	vertical		35.9	46.0	complies
501.03	vertical		25.8	46.0	complies
high channel					
47.03	vertical		32.3	40.0	complies
57.47	vertical		31.3	40.0	complies
99.85	vertical		29.8	43.5	complies
125.02	vertical		31.5	43.5	complies
197.94	vertical		29.1	43.5	complies
400.14	vertical		35.9	46.0	complies
501.03	vertical		25.8	46.0	complies
Measurement uncertainty		± 3dB			

Horizontal measurments were about 2 dB lower
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)).

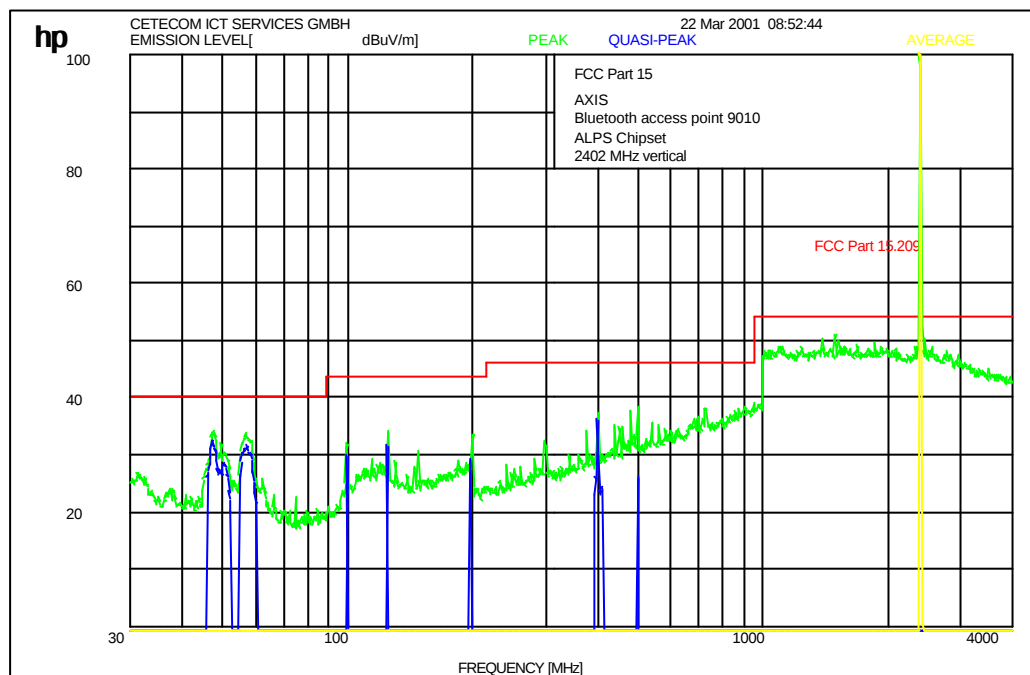
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

low channel up to 4 GHz

The peaks below 1 GHz were caused by the Sony Vaio Laptop that was used to operate the Access point.



This is only a scan.

Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : AXIS 9010/ALPS

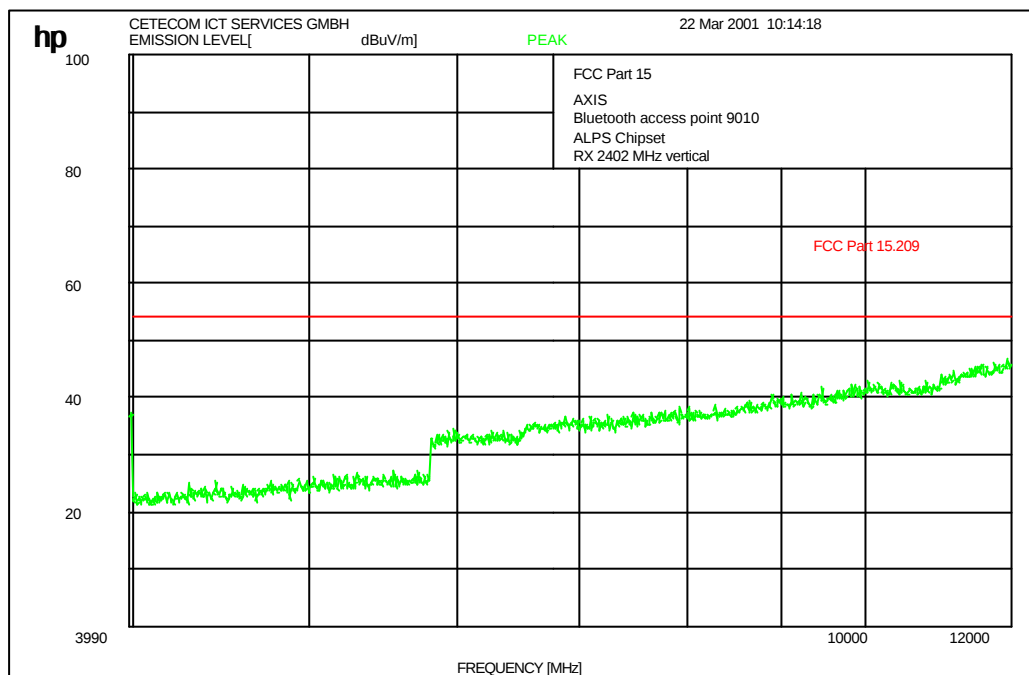
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

low channel up to 12 GHz



This is only a scan.

Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

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

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

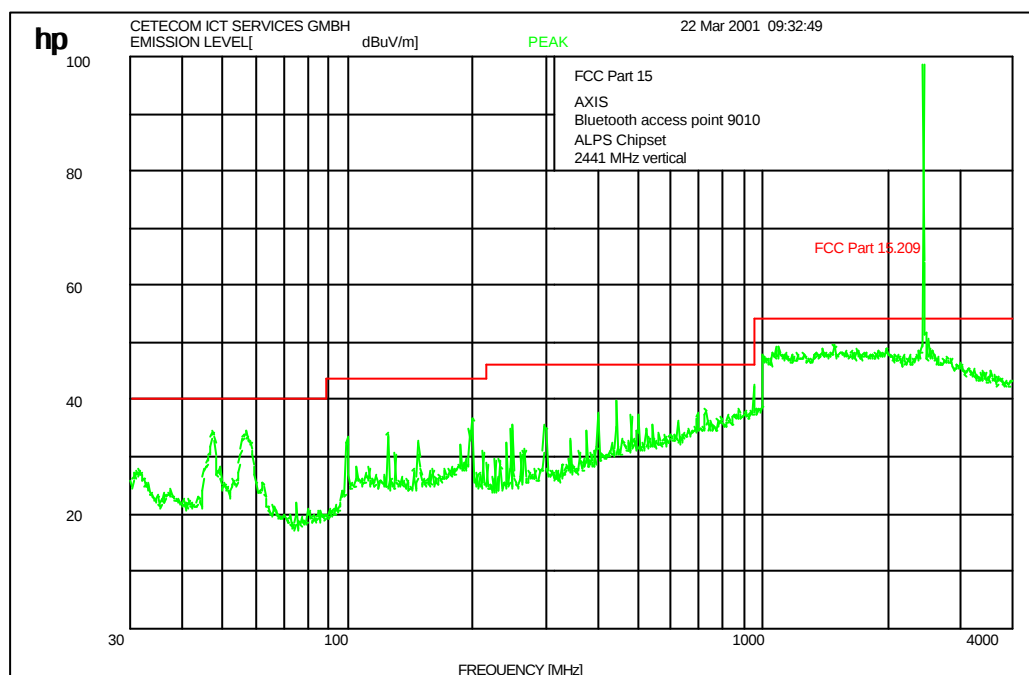
Relative humidity : 31%

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

mid channel up to 4 GHz

The peaks below 1 GHz were caused by the Sony Vaio Laptop that was used to operate the Access point.



This is only a scan.

Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : AXIS 9010/ALPS

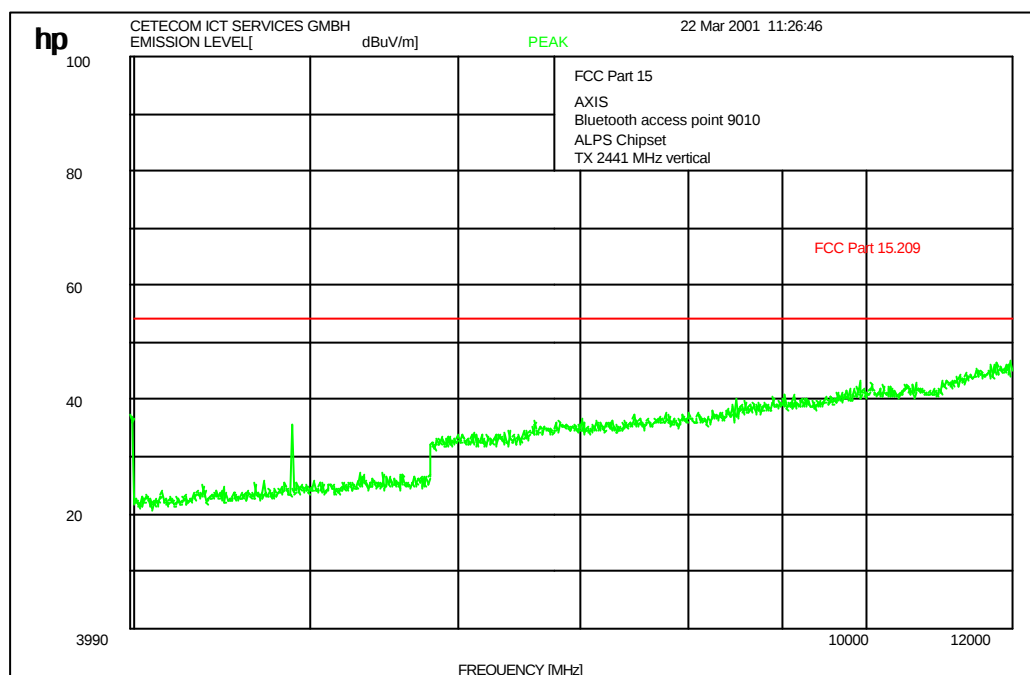
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

mid channel up to 12 GHz



Peak at 4882 MHz is 36.3 dBuV/m at 3m distance

This is only a scan.

Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

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

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

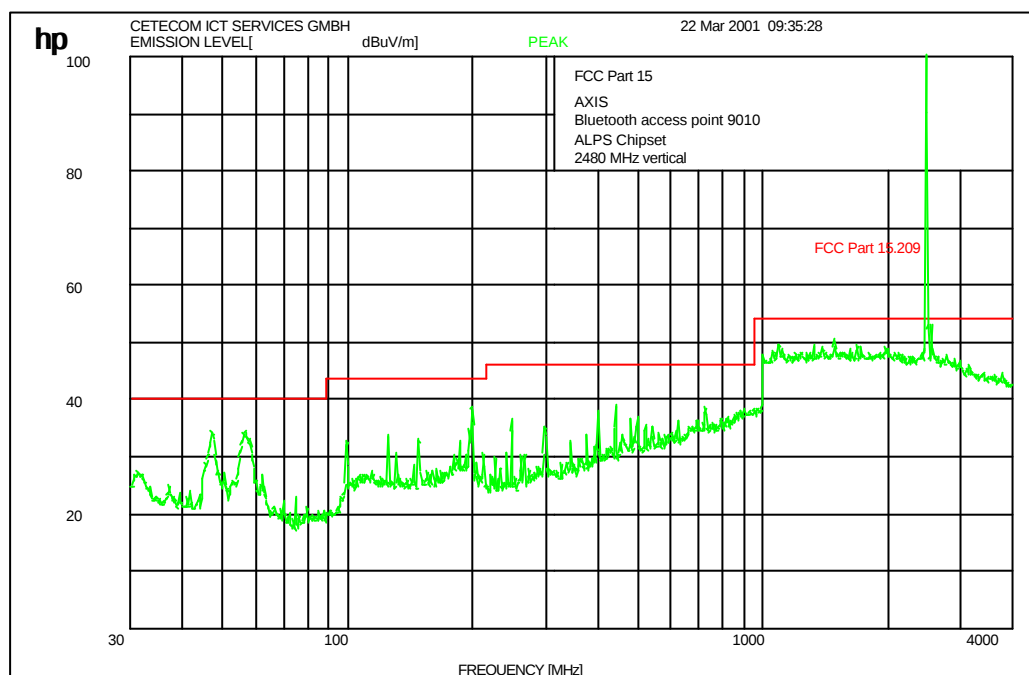
Relative humidity : 31%

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

high channel up to 4 GHz

The peaks below 1 GHz were caused by the Sony Vaio Laptop that was used to operate the Access point.



This is only a scan.

Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

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

Equipment under test : AXIS 9010/ALPS

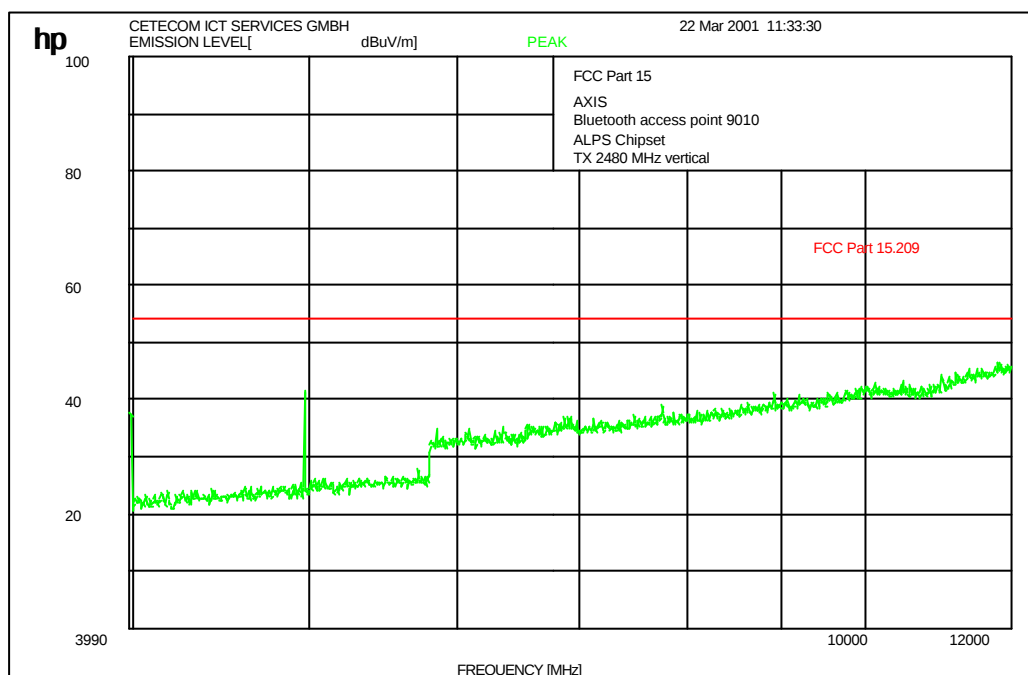
Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS- Radiated

§ 15.247 (c) (1)

high channel up to 12 GHz



Peak at 4960 MHz is 41.4 dBuV/m at 3m distance

This is only a scan.

Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS

(Transmitter)

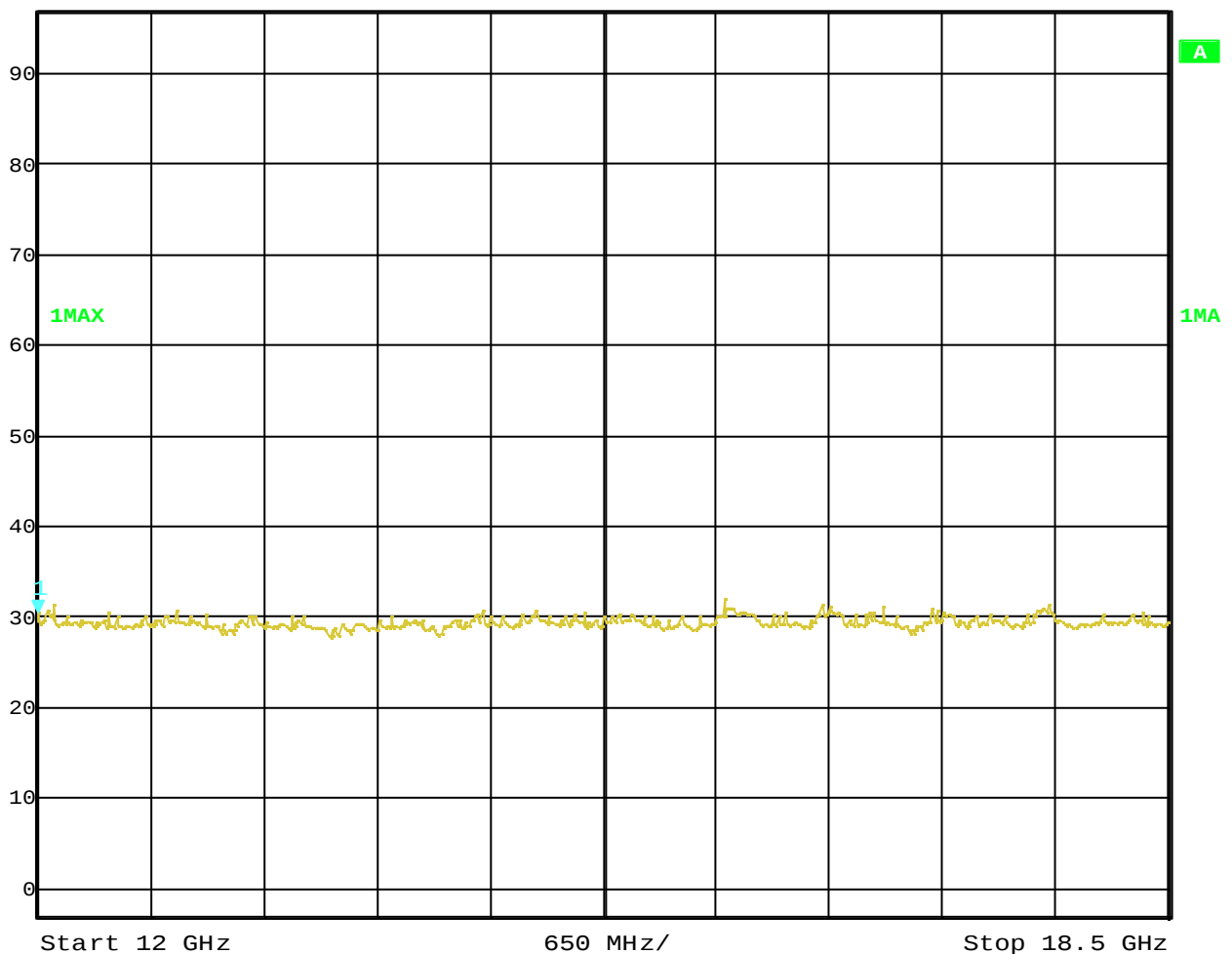
CLAUSE § 15.247 (c) (1)

Channel 1-3 (this is valid for all 3 channels) up to 18 GHz

Peak



Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	0 dB
97 dBμV	30.33 dBμV	VBW	1 MHz		
	12.00000000 GHz	SWT	37 ms	Unit	dBμV



Date: 3.APR.2001 09:29:11

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)

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

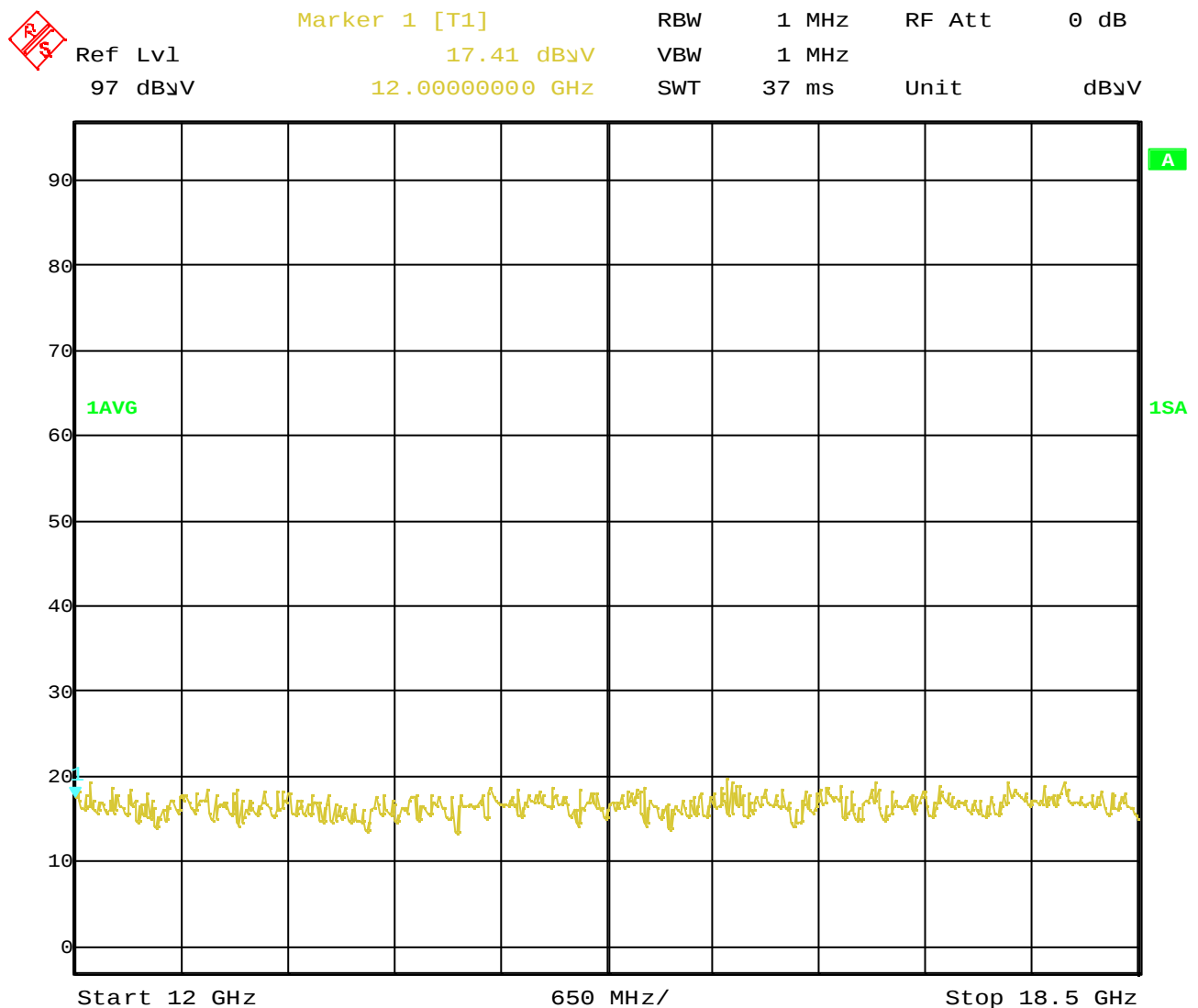
Relative humidity : 31%

EMISSION LIMITATIONS (Transmitter)

CLAUSE § 15.247 (c) (1)

Channel 1-3 (this is valid for all 3 channels) up to 18 GHz

Average



Date: 3.APR.2001 09:29:37

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)

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

EMISSION LIMITATIONS

(Transmitter)

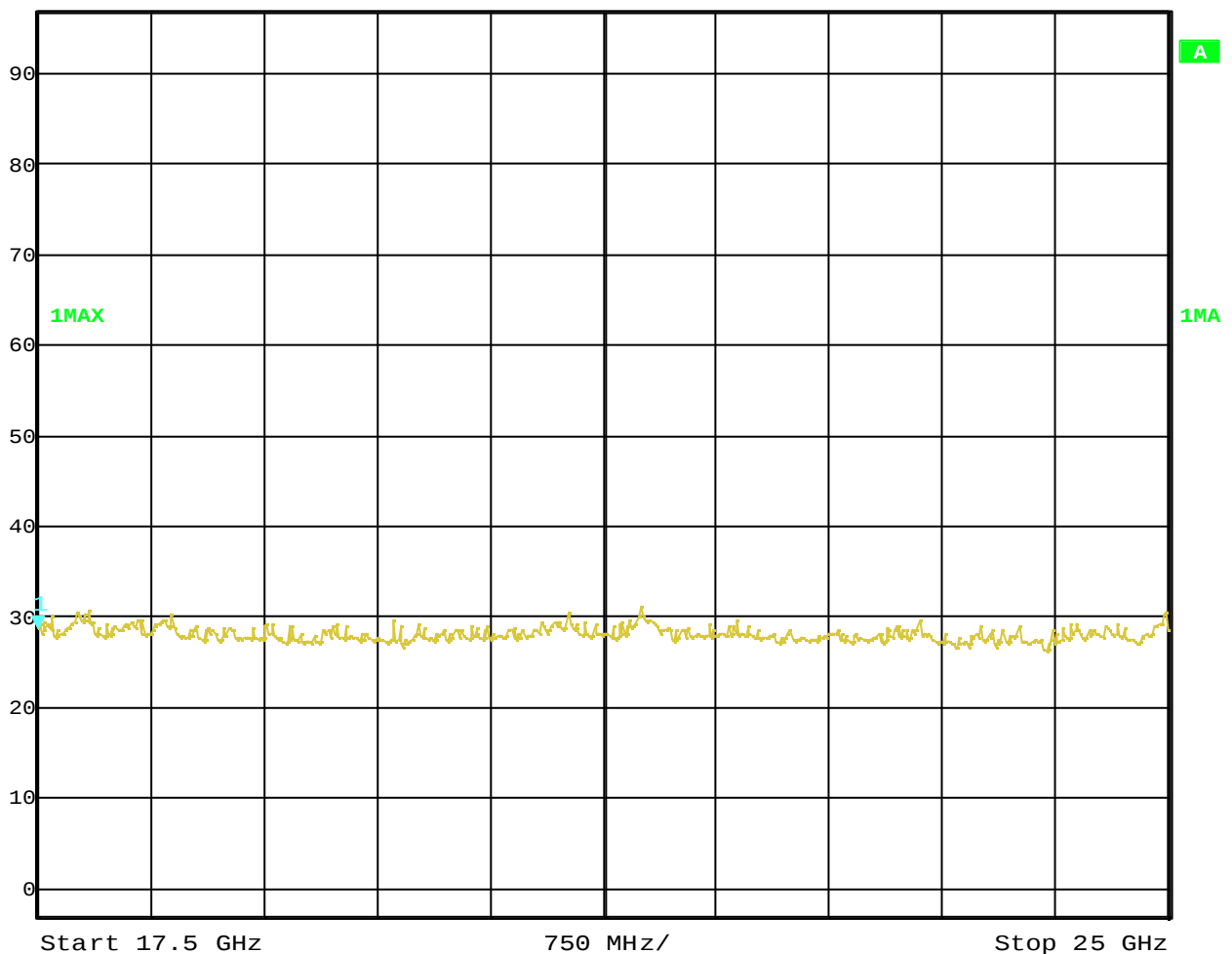
CLAUSE § 15.247 (c) (1)

Channel 1-3 (this is valid for all 3 channels) up to 25 GHz

Peak



Ref Lvl	Marker 1 [T1]	RBW	1 MHz	RF Att	0 dB
97 dBμV	28.53 dBμV	VBW	1 MHz		
	17.50000000 GHz	SWT	43 ms	Unit	dBμV



Date: 3.APR.2001 09:31:27

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)

Test report nr.: 5-2973-F/00

Issue Date: 29.01.2001

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Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

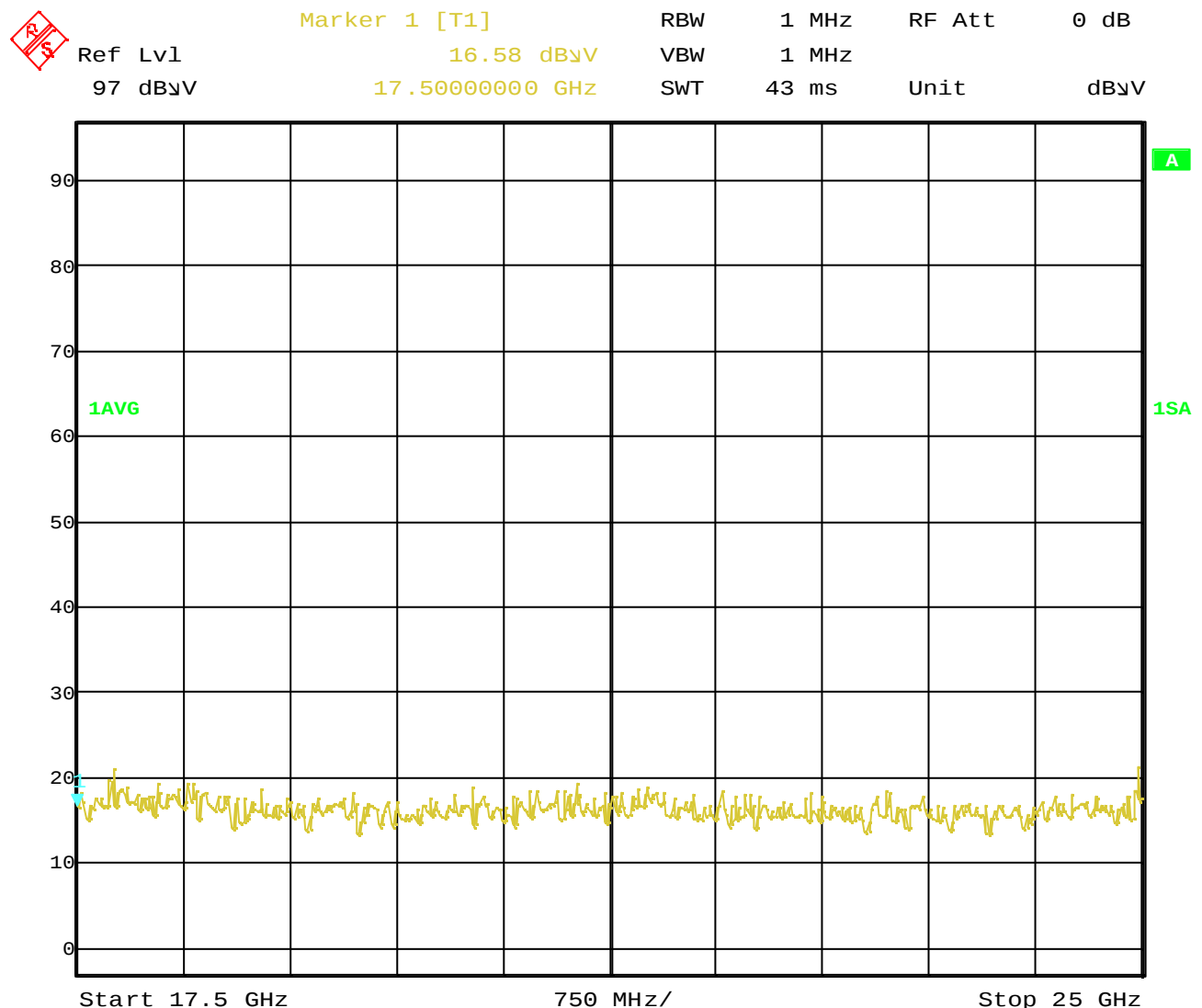
Relative humidity : 31%

EMISSION LIMITATIONS (Transmitter)

CLAUSE § 15.247 (c) (1)

Channel 1-3 (this is valid for all 3 channels) up to 18 GHz

Average



Date: 3.APR.2001 09:30:21

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)

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

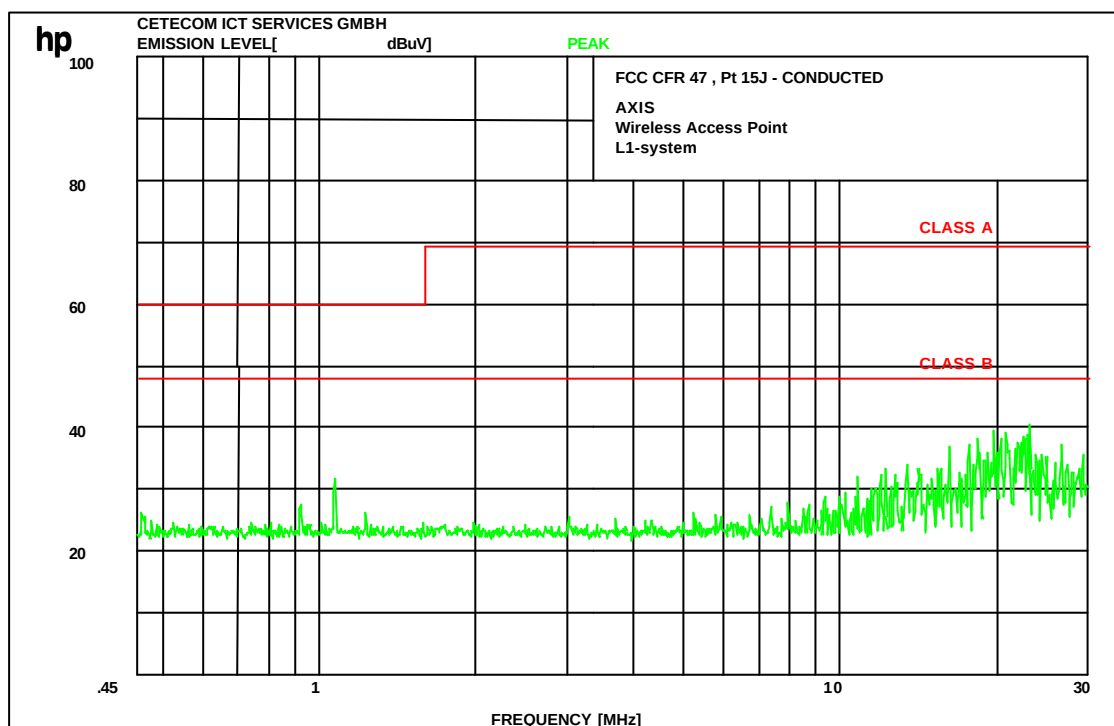
Relative humidity : 31%

Conducted emissions

§ 15.107/207

Measured with AC power adapter

L1-system



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

Limit

0.45 to 30 MHz	250 μ V / 47.96 dB μ V
----------------	--------------------------------

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

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

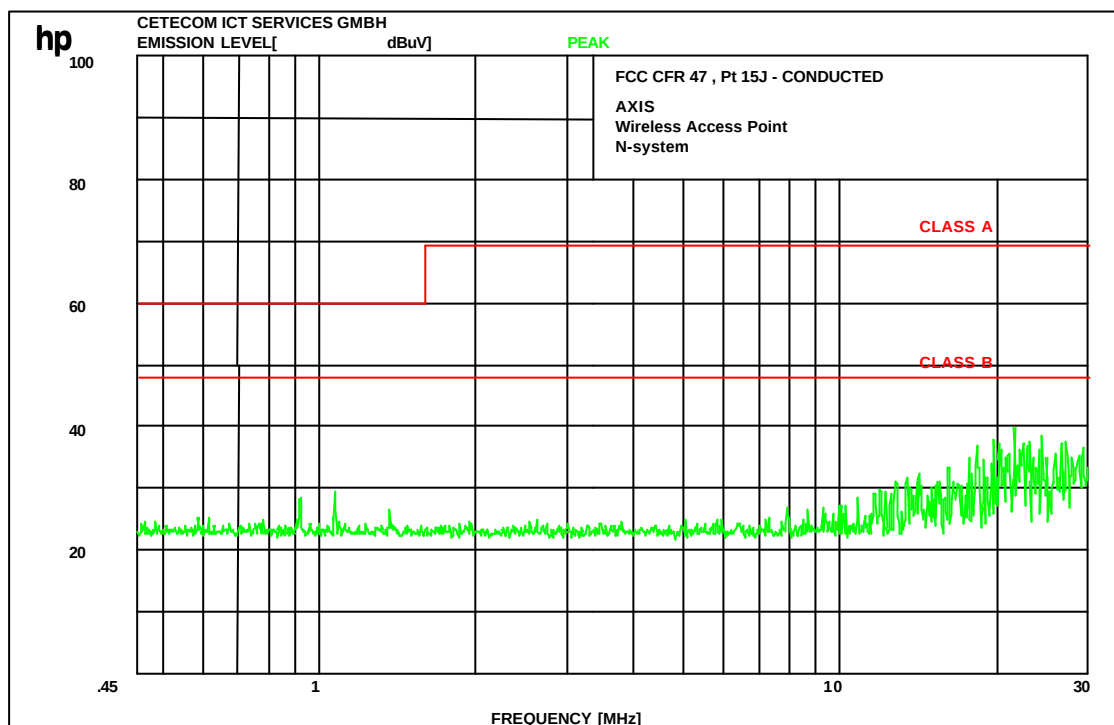
Relative humidity : 31%

Conducted emissions

§ 15.107/207

Measured with AC power adapter

N-system



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

Limit

0.45 to 30 MHz	250 μ V / 47.96 dB μ V
----------------	--------------------------------

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

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%
RECEIVER SPURIOUS RADIATION
§ 15.209
Radiated

SPURIOUS EMISSIONS LEVEL (µV/m)								
2402 MHz			2442 MHz			2481 MHz		
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
1595	Peak	177.8	1595	Peak	177.8	1595	Peak	177.8
1595	Average	32.4	1595	Average	32.4	1595	Average	32.4
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz
f ≥ 1GHz : RBW/VBW: 1 MHz
Measurement distance see table
Limits
SUBCLAUSE § 15.209

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

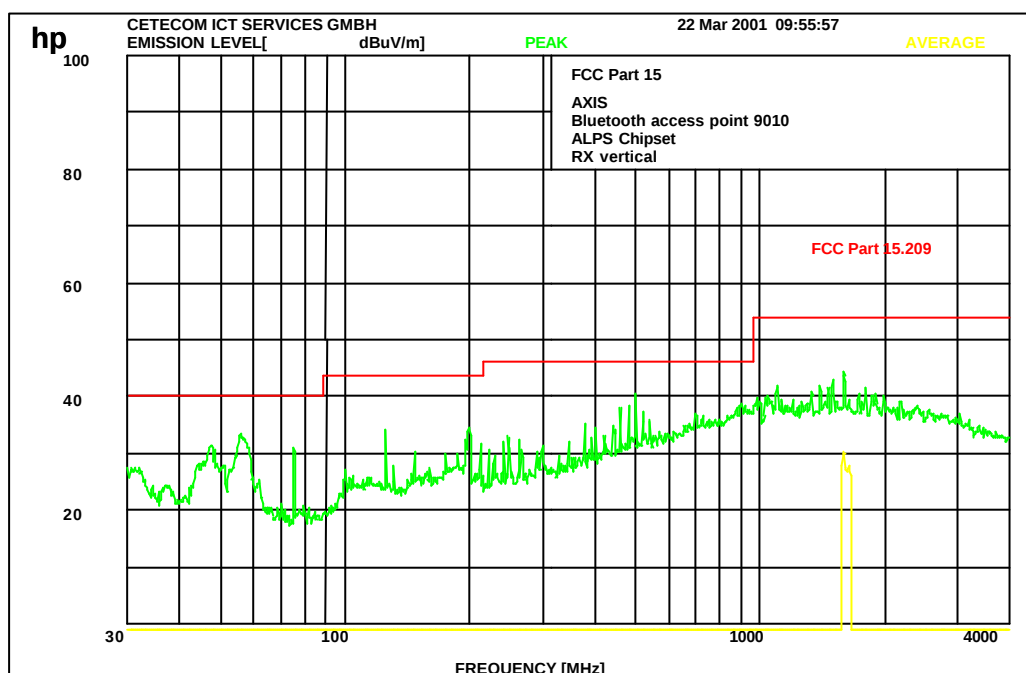
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%

RECEIVER SPURIOUS RADIATION

§ 15.209

All peaks below 1 GHz were caused by a Sony Vaio Laptop that was used to operate the access point.



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW: 1 MHz

Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

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

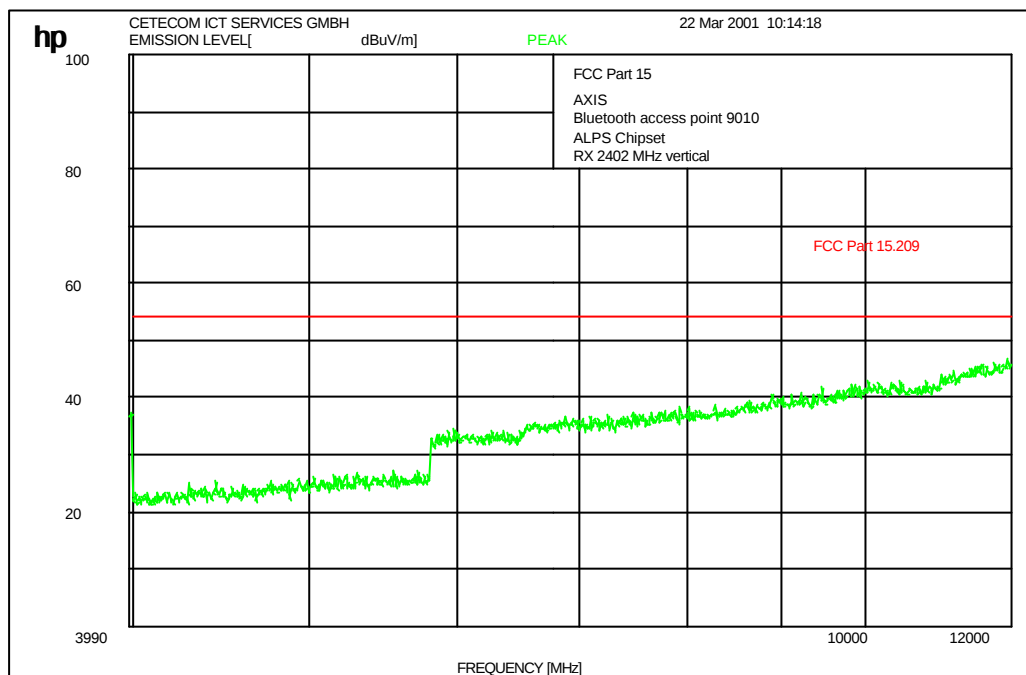
Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

RECEIVER SPURIOUS RADIATION

§ 15.209



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW: 1 MHz

Limits

SUBCLAUSE § 15.209

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

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

Equipment under test : AXIS 9010/ALPS

Ambient temperature : 20° C

Relative humidity : 31%

RECEIVER SPURIOUS RADIATION

§ 15.209

peak



Marker 1 [T1]

RBW 100 kHz RF Att 10 dB

Ref Lvl 31.09 dBμV

VBW 1 MHz

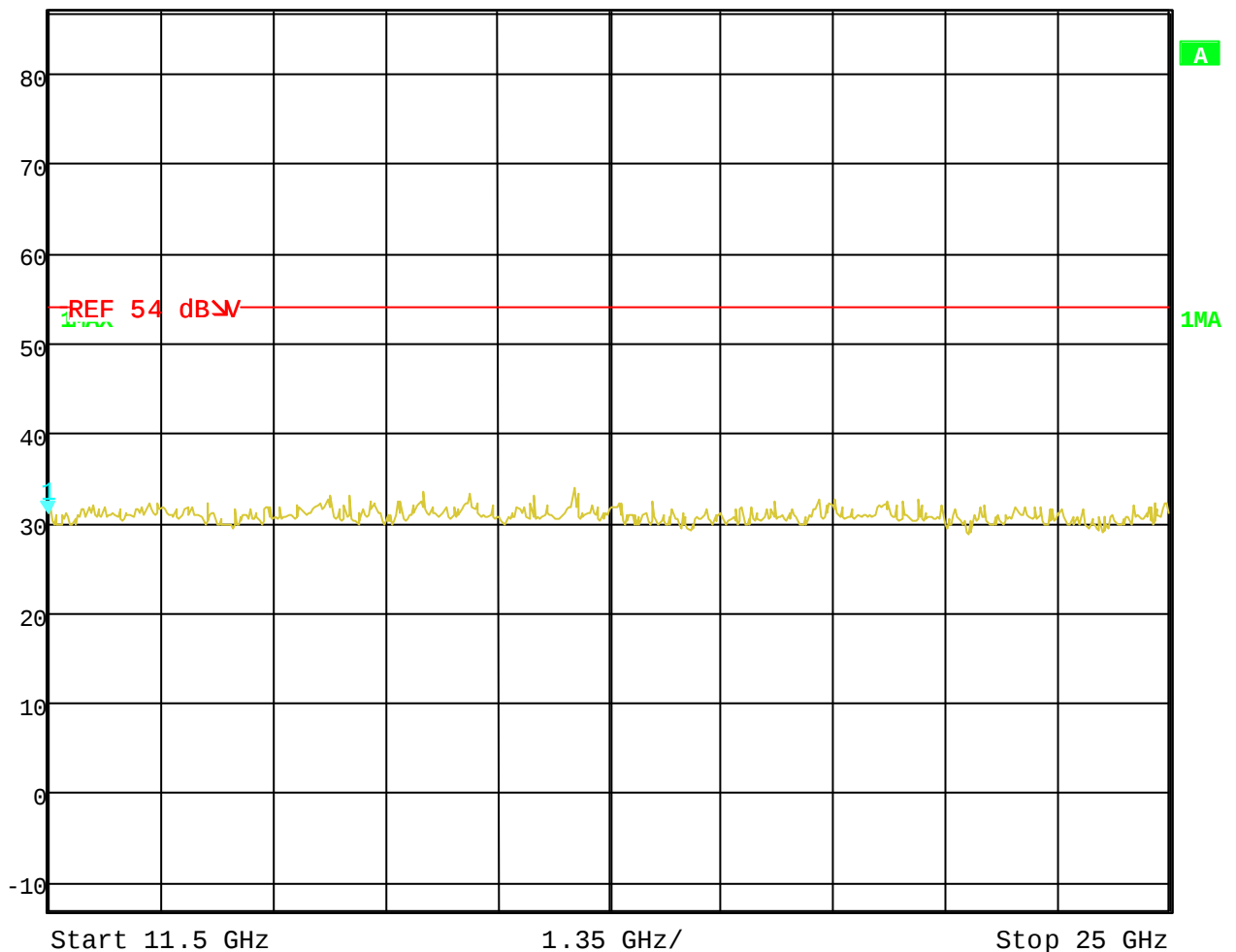
87 dBμV

11.50000000 GHz

SWT 3.4 s

Unit

dBμV



f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits

SUBCLAUSE § 15.209

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

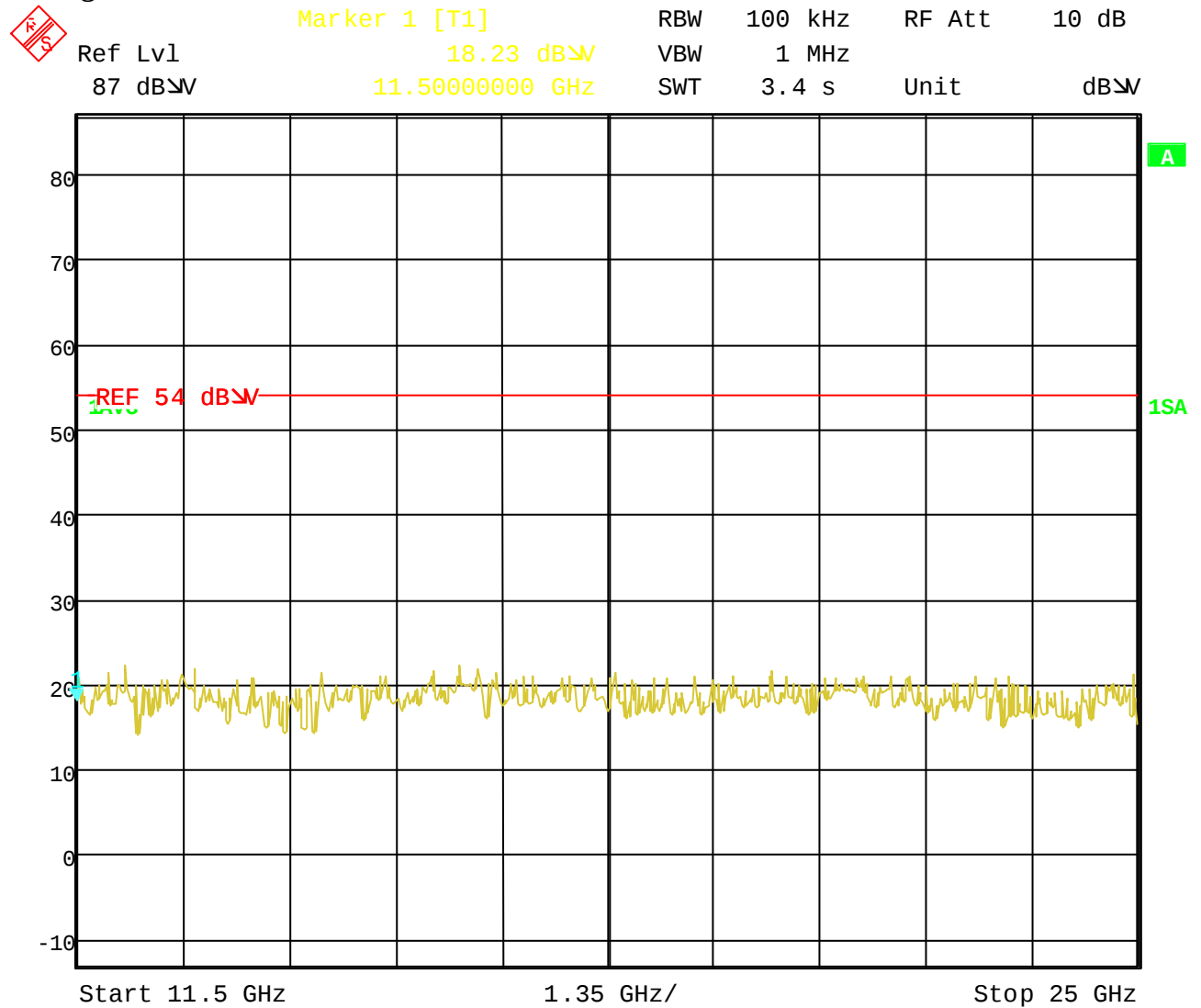
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%

RECEIVER SPURIOUS RADIATION

§ 15.209

average



f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3

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

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%

216 - 960	200	3
above 960	500	3

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

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

Equipment under test : AXIS 9010/ALPS
Ambient temperature : 20° C
Relative humidity : 31%

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

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.
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	Spectrum Analyzer	8562A	Hewlett Packard	2809AO2682
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)