CETECOM ICT Services GmbH

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

TTI-P-G166/98

Accredited testing-laboratory

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

Accredited Bluetooth Test Facility (BQTF)

Test report no.: 5-4113-01-02-A/02
FCC Part15.247/CANADA RSS-210
SIEMENS BIRD
FCC ID: L82-BIRD

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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.

Test Laboratory Manager:

Date	Section	Name	Signature
2002-11-04	RSC8414	Ames H.	

Technical Responsibility for Area of Testing:

Date	Section	Name	Signature
2002-11-04	RSC8412	Hausknecht D.	

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-ict.de

(details of accreditation status, where relevant)
State of accreditation: The Test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025.
DAR registration number: TTI-P-G-166/98

1.3 Details of applicant

Name : SIEMENS AG
Street : Frankenstrasse 2
City : D-46395 Bocholt
Country : Germany
Telephone: +49 2871 91 0
Telefax : +49 2871 91 2495
Contact : Mr. Uwe Alt
Telephone: +49 2871 91 2948

1.3 Application details

Date of receipt of application : 2002-09-20
Date of receipt of test item : 2002-09-20
Date of test : 2002-09-20 - 2002-10-09

1.4 Test item

Type of equipment	:	**DECT-Phone in 2.4 GHz range**
Type designation	:	**Model : BIRD Basestation**
Manufacturer	:	- applicant -
Street	:	
City	:	
Country	:	
Serial number	:	
Additional information	**:**	
Frequency	:	2400 – 2483.5 MHz (2407 – 2469 MHz)
Type of modulation	:	1M00GXW (TDMA) Ch.Sep. : 7 MHz
Number of channels	:	10
Antenna	:	Build-in patch antenna
Power supply	:	9.5V AC via Adapter
Output power rad. max	:	24.44 dBm / 277.97 mW
Type of equipment	:	Class B
Temperature range	:	0°C - +35°C
FCC ID		L82-BIRD

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

2 Technical test

2.1 Summary of test results

The radiated measurements were performed vertical and horizontal over the whole frequency range. We start at 1 m high with vertical receiving antenna and rotate the dish continuously. During rotation we use the antenna lift system to vary the high from 1 to 4 m. So we find maximum radiation output. At this points we do manual re-measurements. After this we do the same measurements in horizontal position of the receiving antenna. This (horizontal and vertical) is made for all the three planes of the test sample. We use the maximum received results.
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 1 MHz, waveguide horn

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 and 15.247.
The product fulfills also the requirements for CANADA RSS-210

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

Final verdict : PASS

Remark:

The product is a variation of a DECT phone (TDMA) in the 2.4 GHz ISM band.
The protocol and timing behavior is equal to the 1800 MHz DECT system.
(Timing description later in the report)

low channel: 2407.104 MHz
mid channel: 2441.664 MHz
high channel: 2469.312 MHz

2.2 Test report

TEST REPORT

Test report no. : 5-4113-01-02-A/02

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

Paragraph	PARAMETER TO BE MEASURED	PAGE
	Transmitter parameters	
§ 15.247	Antenna gain	9
§ 15.247 (a)(2)	Spectrum bandwidth of a DSSS System	10
§ 15.247 (b)(1)	Maximum peak output power	14
§ 15.247 (b) (4)	RF Exposure calculation	23
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Antenna Gain **SUBCLAUSE § 15.247**

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

	low channel	mid channel	high channel
Conducted power	21.44 dBm	21.44 dBm	21.53 dBm
Radiated power	22.10 dBm	22.01 dBm	21.64 dBm
Gain	0.66 dBi	0.57 dBi	0.11 dBi

The calculated antenna gain is between +0.11 and +0.66 dBi.

Spectrum Bandwidth

§15.247(a)

6 dB bandwidth

TEST CONDITIONS		6 dB BANDWIDTH (kHz)		
Frequency (MHz)		low channel	mid channel	high channel
T_{nom}(23.4)°C	V_{nom}(115)V	861.723	901.803	941.883
Measurement uncertainty		±1kHz		

RBW / VBW 100 kHz

LIMIT **SUBCLAUSE §15.247(a) (2)**

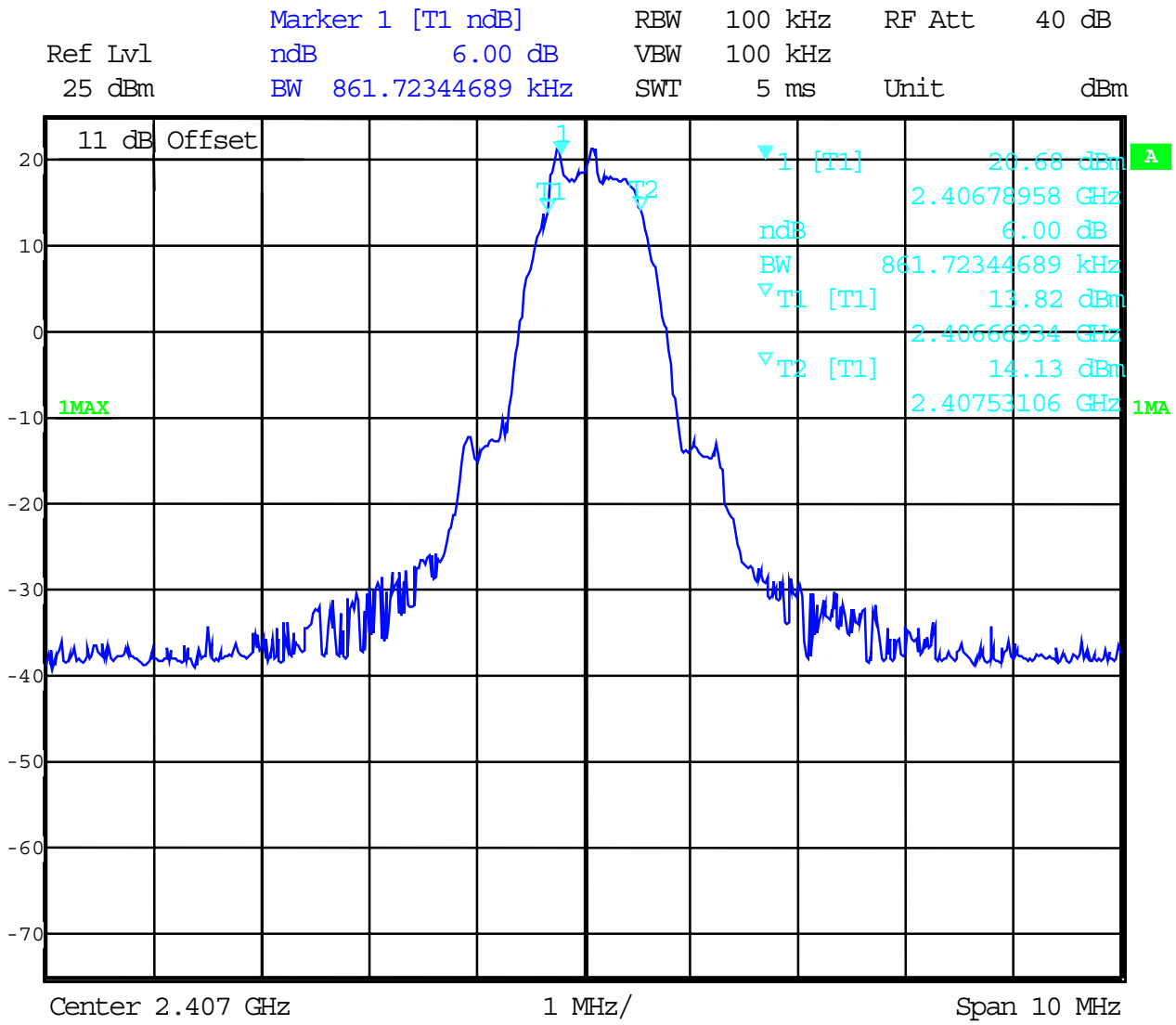
The minimum 6dB bandwith shall be at least 500 KHz

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

Spectrum Bandwidth **§15.247(a)**

6 dB bandwidth

low channel:

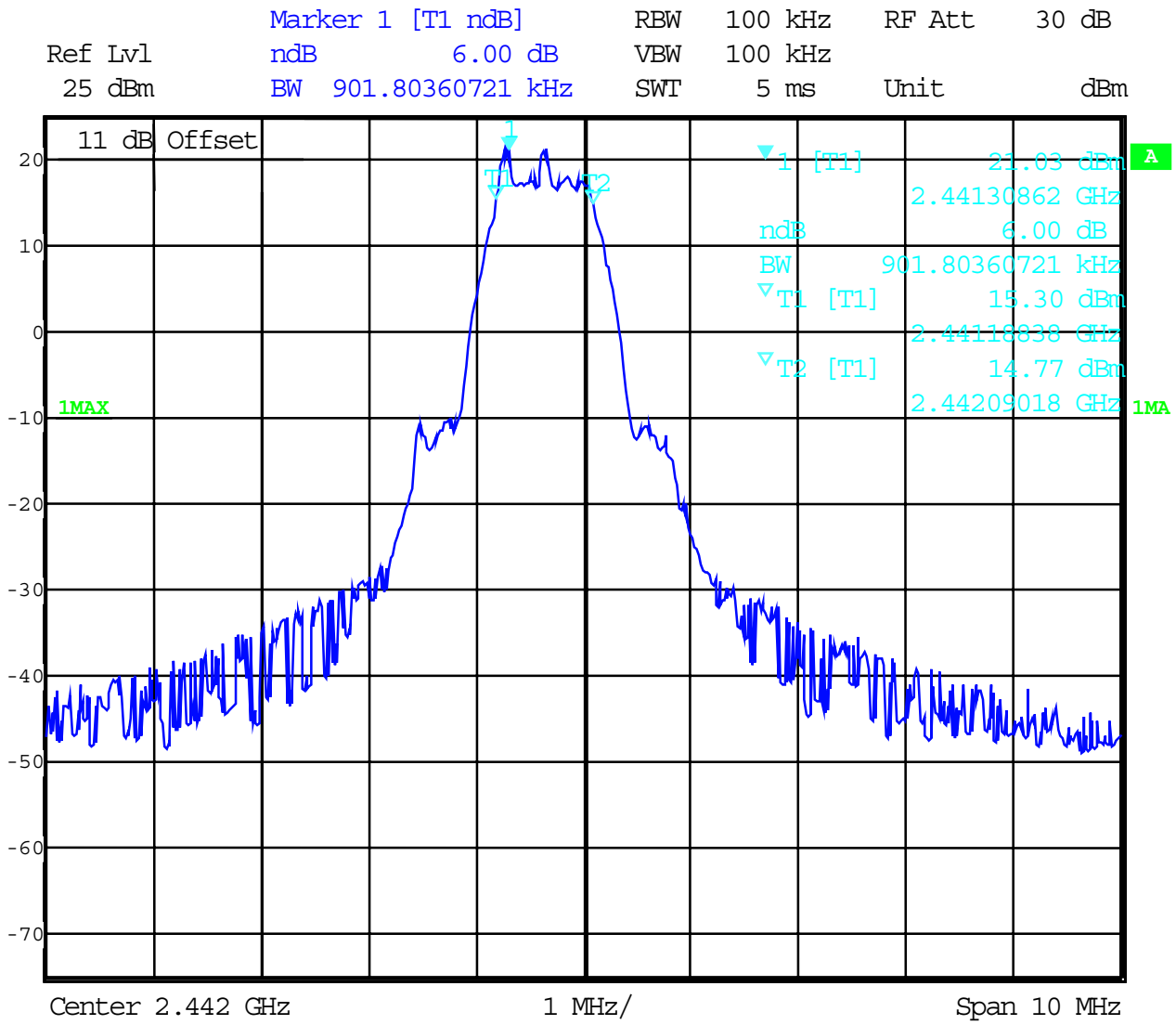


Spectrum Bandwidth

§15.247(a)

6 dB bandwidth

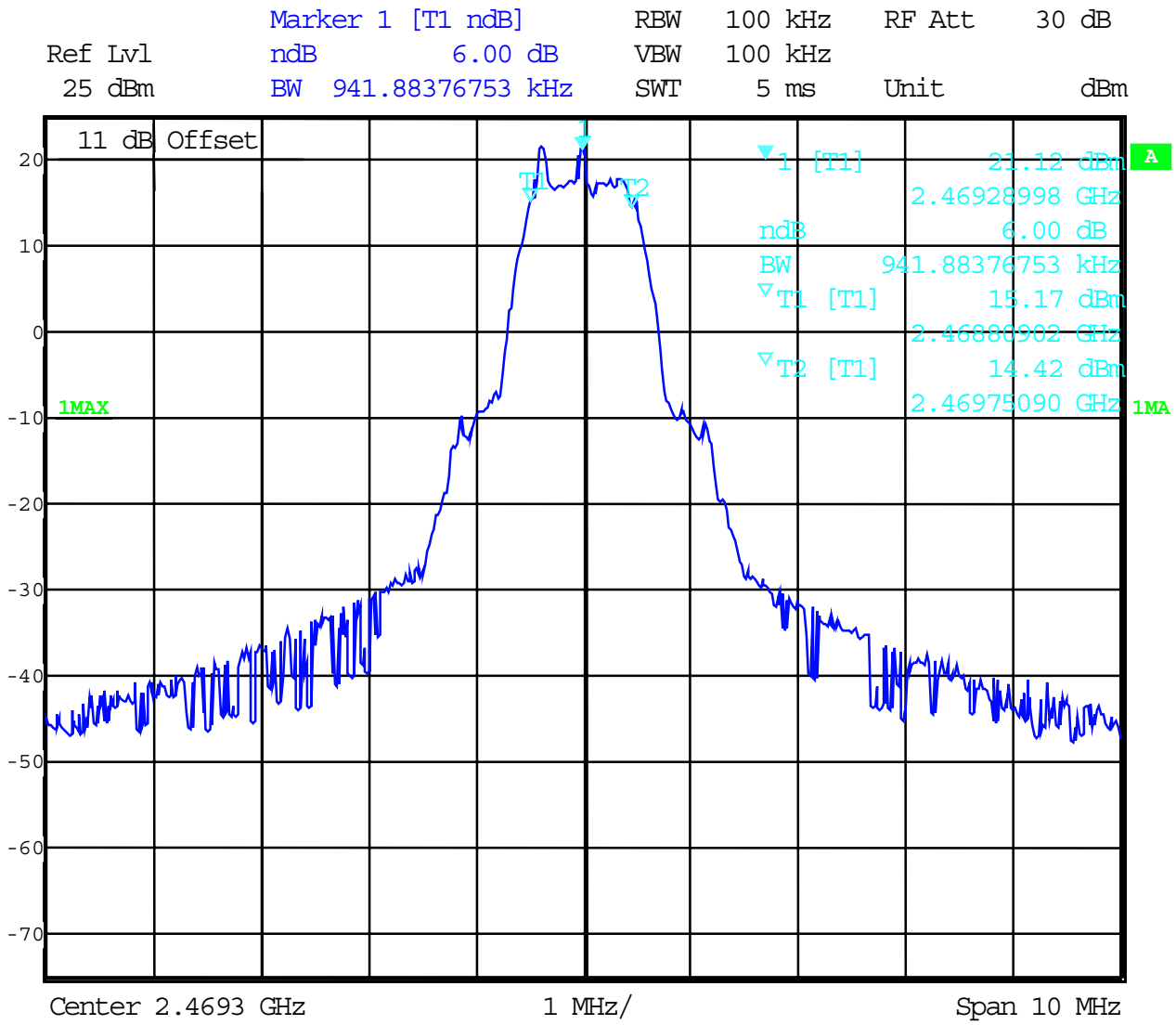
mid channel:



Spectrum Bandwidth **§15.247(a)**

6 dB bandwidth

high channel:



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

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		low channel	mid channel	high channel
T_{nom}(23.4)°C	V_{nom}(115)V	Peak : 21.44 AV: 7.24	Peak : 21.44 AV: 7.24	Peak : 21.53 AV: 7.33
Maximum deviation from output power under extreme test conditions (dBc)		0.5	0.5	0.5
Measurement uncertainty		±0.5dB		

RBW/VBW : 10 MHz

The timing used here is fixed (DECT). There is a duty cycle of 3.8%. That is a factor of –14.2dB for average value.

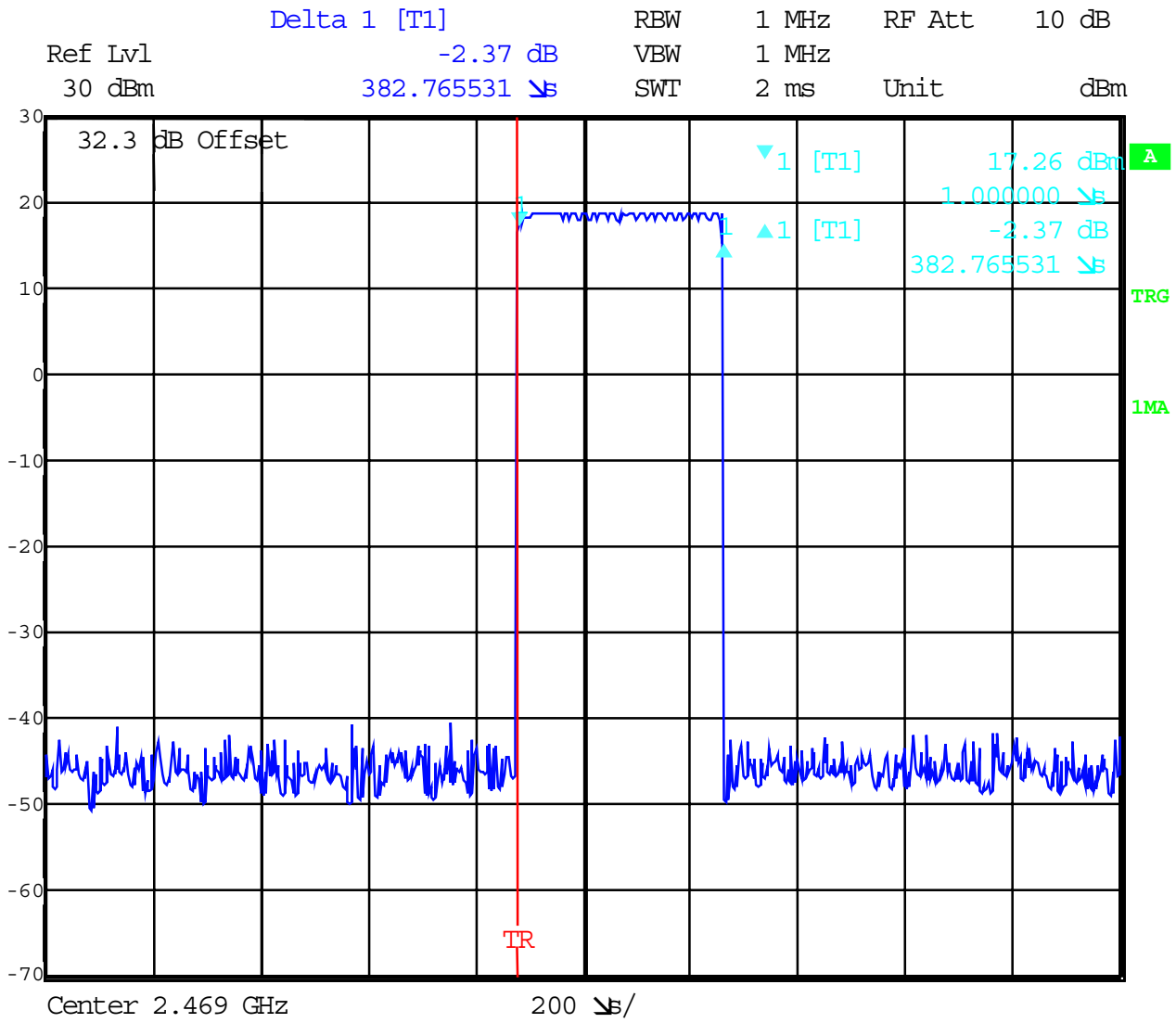
LIMIT **SUBCLAUSE § 15.247 (b) (1)**

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

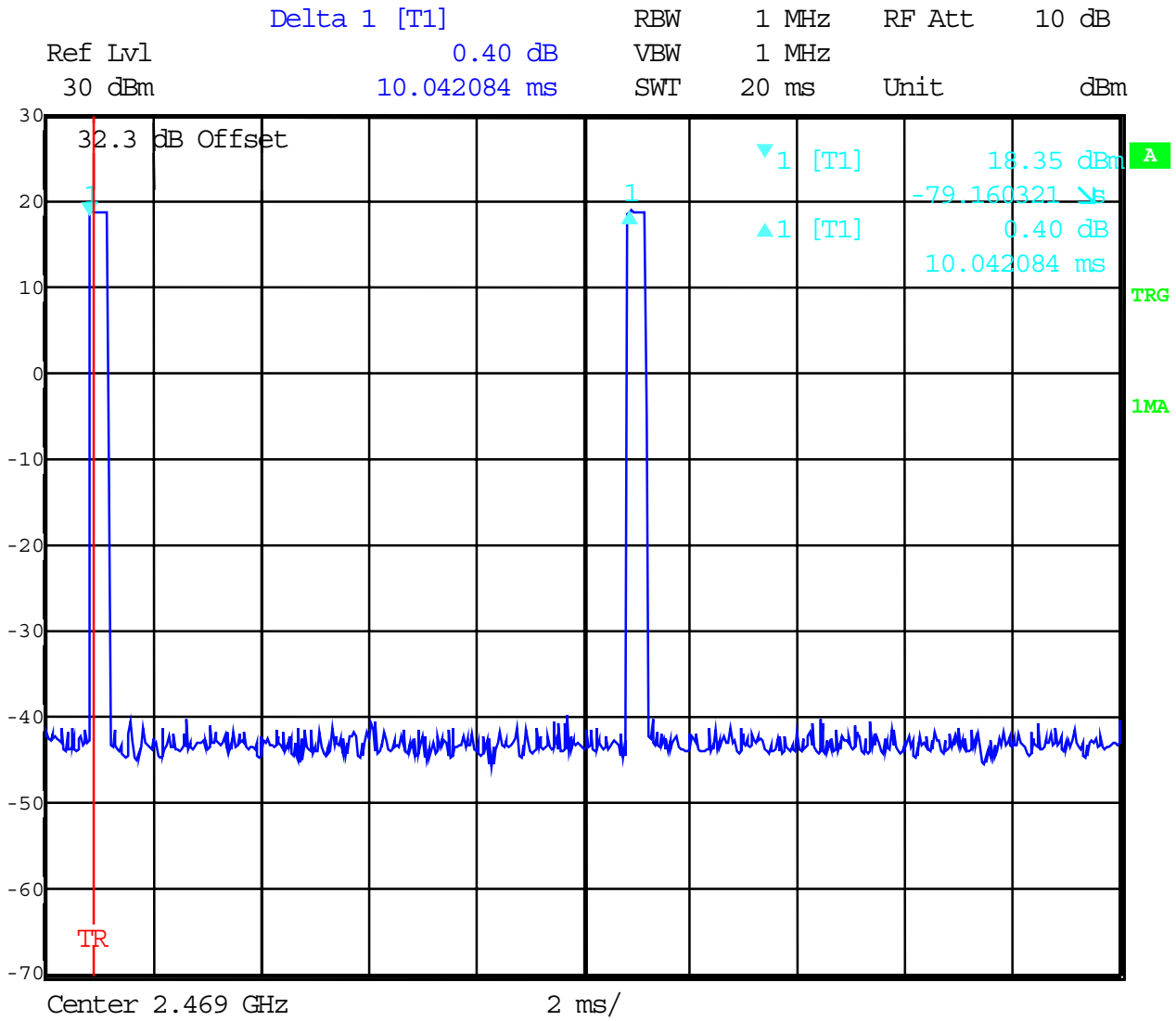
Timing of the system:

Puls train contains 24 time slots with each 417 µs, together 10 ms.
Real burst time is 380 µs on-time.
Maximum use is 6 timeslots for 6 connections (Base only)
Handset has only one timeslot TX during one pulse train.
So we have a duty cycle of 0.038 that is a relation of –14.2 dB.
So we have for the handset an average value that is –14.2 dB below peak value.

Time 1

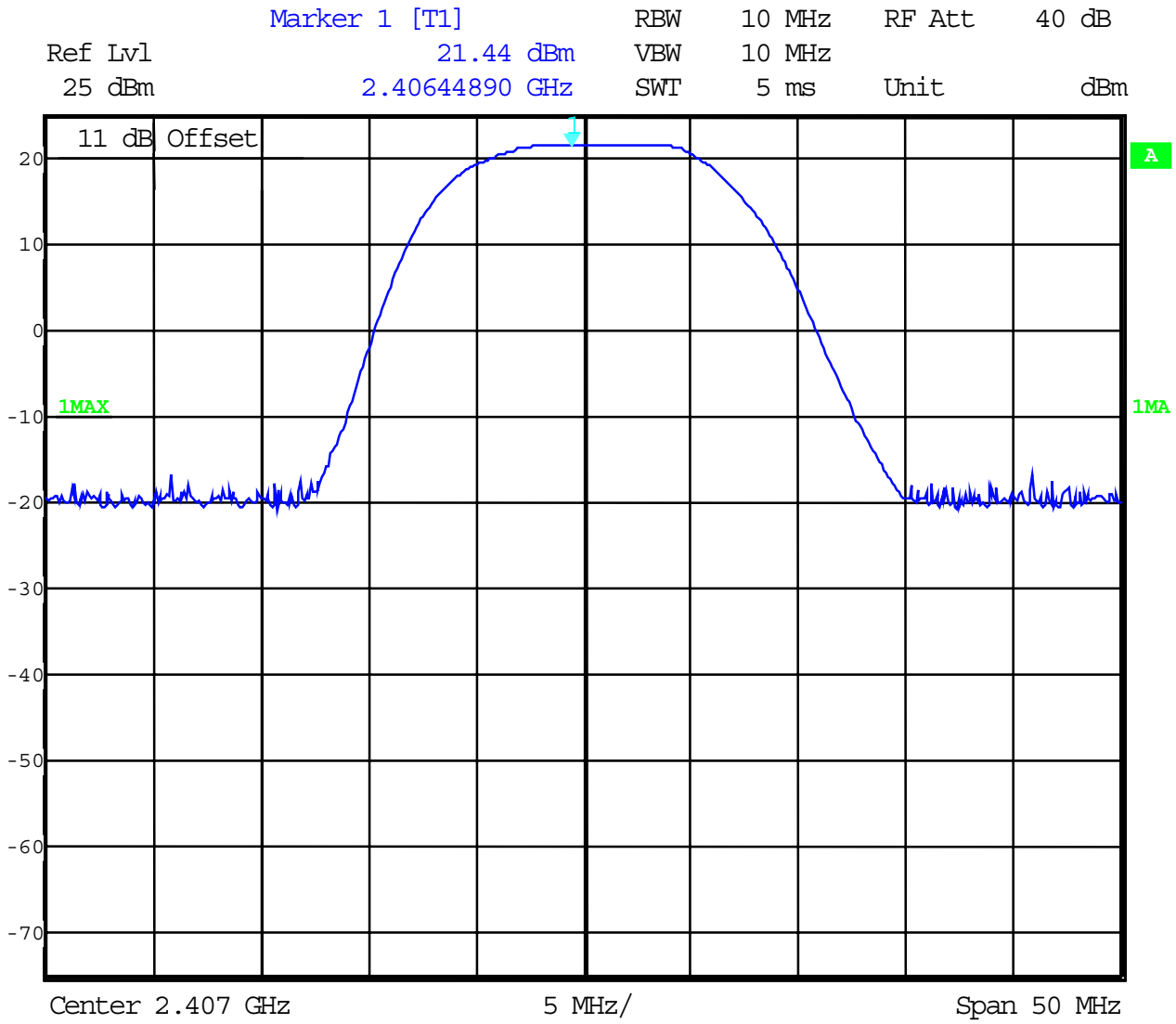


Time 2


Delta 1 [T1]
0.40 dB
10.042084 ms
RBW 1 MHz
VBW 1 MHz
SWT 20 ms
RF Att 10 dB
Unit dBm
Ref Lvl
30 dBm
32.3 dB Offset
1 [T1] 18.35 dBm
-79.160321 s
1 [T1] 0.40 dB
10.042084 ms
A
TRG
1MA
TR
Center 2.469 GHz
2 ms/

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

low channel peak



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

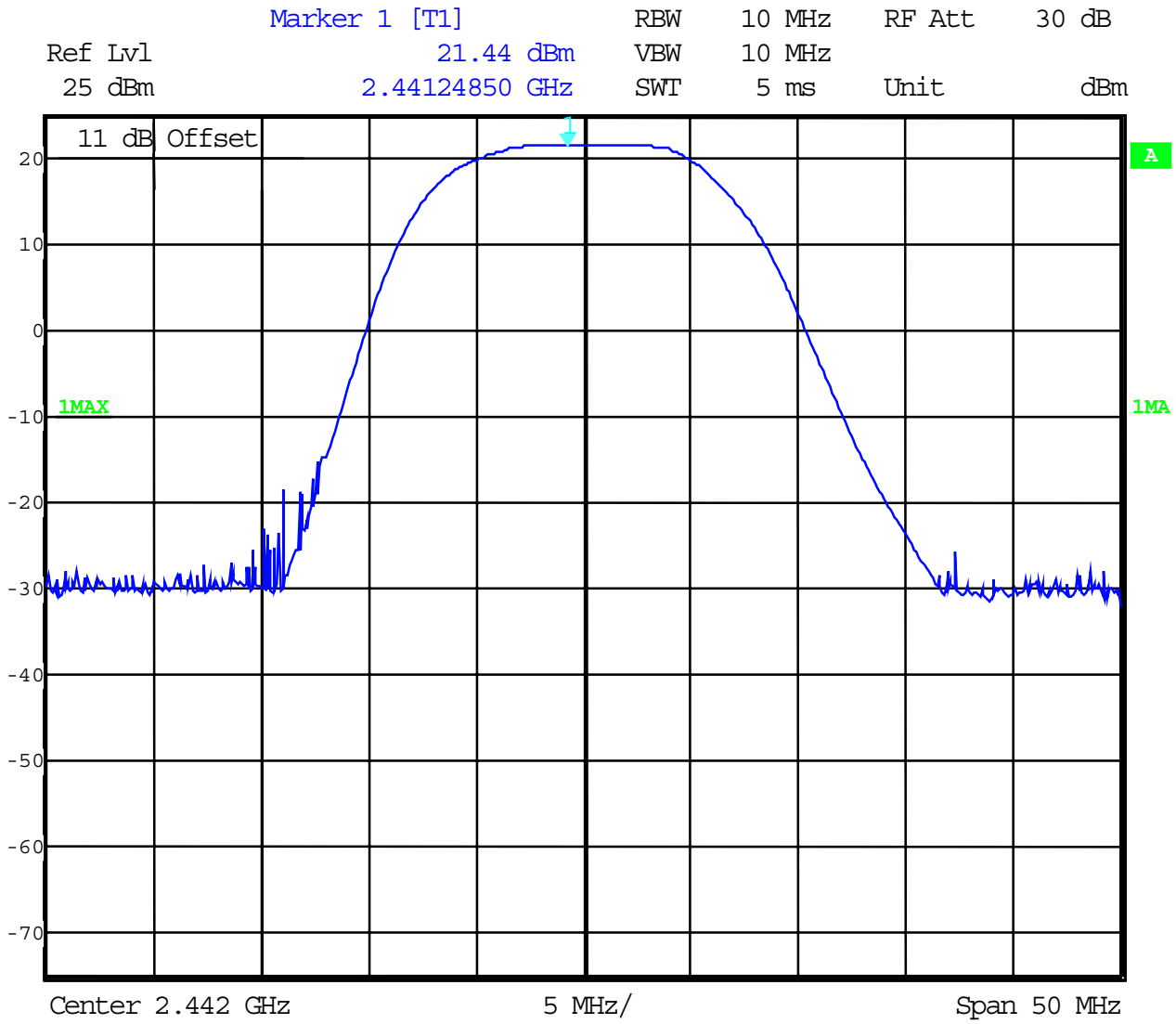
low channel average

calculated by the duty cycle of 3.8 % or –14.2 dB .

Peak value: 21.44 dBm
Average value: 21.44 dBm –14.2 dB = 7.24 dBm

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

mid channel peak



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

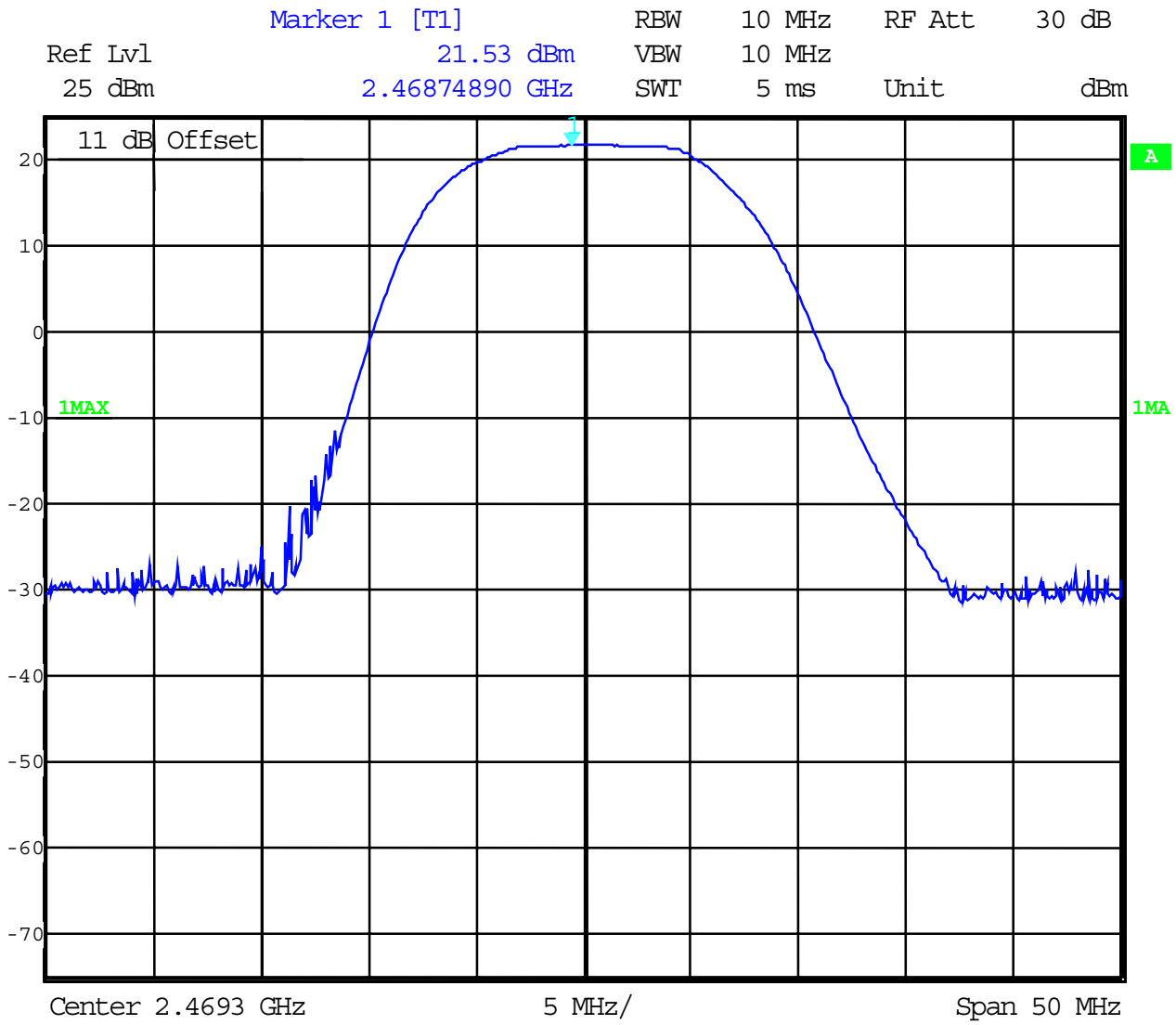
mid channel average

calculated by the duty cycle of 3.8 % or –14.2 dB .

Peak value: 21.44 dBm
Average value: 21.44 dBm –14.2 dB = 7.24 dBm

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

high channel peak



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

high channel average

calculated by the duty cycle of 3.8 % or –14.2 dB .

Peak value: 21.53 dBm
Average value: 21.53 dBm –14.2 dB = 7.33 dBm

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

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER EIRP (mW)		
Frequency (MHz)		low channel	mid channel	High channel
T_{nom}(23.4)°C	V_{nom}(115)V	22.10 dBm 162.18 mW	22.01 dBm 158.85 mW	21.64 dBm 145.88 mW
Maximum deviation from output power under extreme test conditions (dBc)		-	-	-
Measurement uncertainty		±3dB		

RBW/VBW : 10 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

RF EXPOSURE CALCULATION **SUBCLAUSE § 15.247 (B) (4)**

The maximal power density at 20cm distance is calculated as: $Pd = (P_{out} * G)/(4\pi * r^2)$

$162.18\ mW / 4\pi 400cm^2 = 0.03226\ mW/cm^2$

Limit

The Limit for general population/uncontrolled exposures according §1.1307(b) is $1mW/cm^2$

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

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

TEST CONDITIONS		RF POWER LEVEL IN 3 kHz BW		
Frequency (MHz)		low channel	mid channel	high channel
T_{nom}(23.4)°C	V_{nom}(115)V	+5.7 dBm	+4.61 dBm	+5.65 dBm
Measurement uncertainty		±3dB		

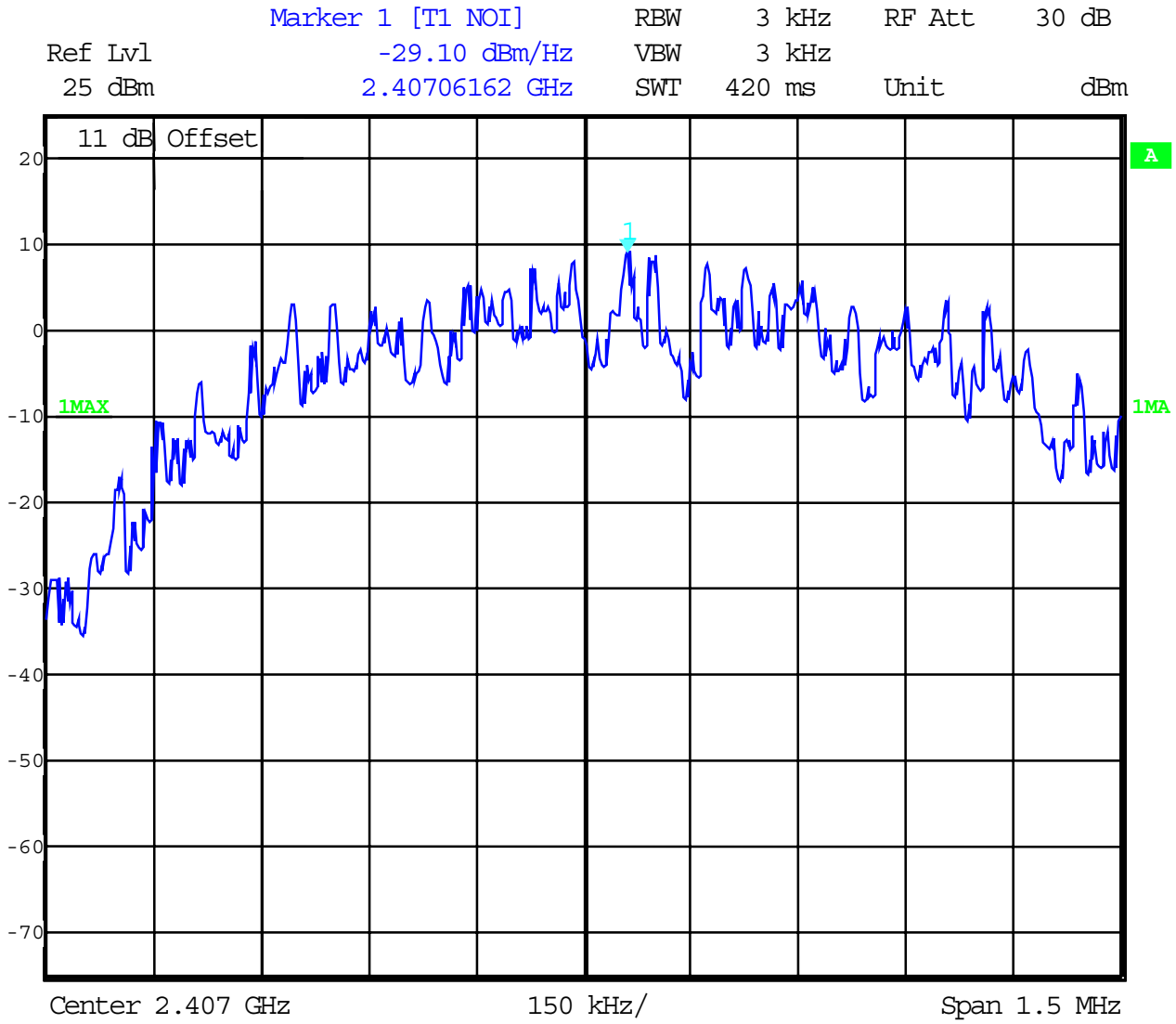
The measurement was performed with the power density funktion of the analyzer.
The readout is related to 1 Hz BW. For 3 kHz BW we have to add 34.8 dB.

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)**

low channel:

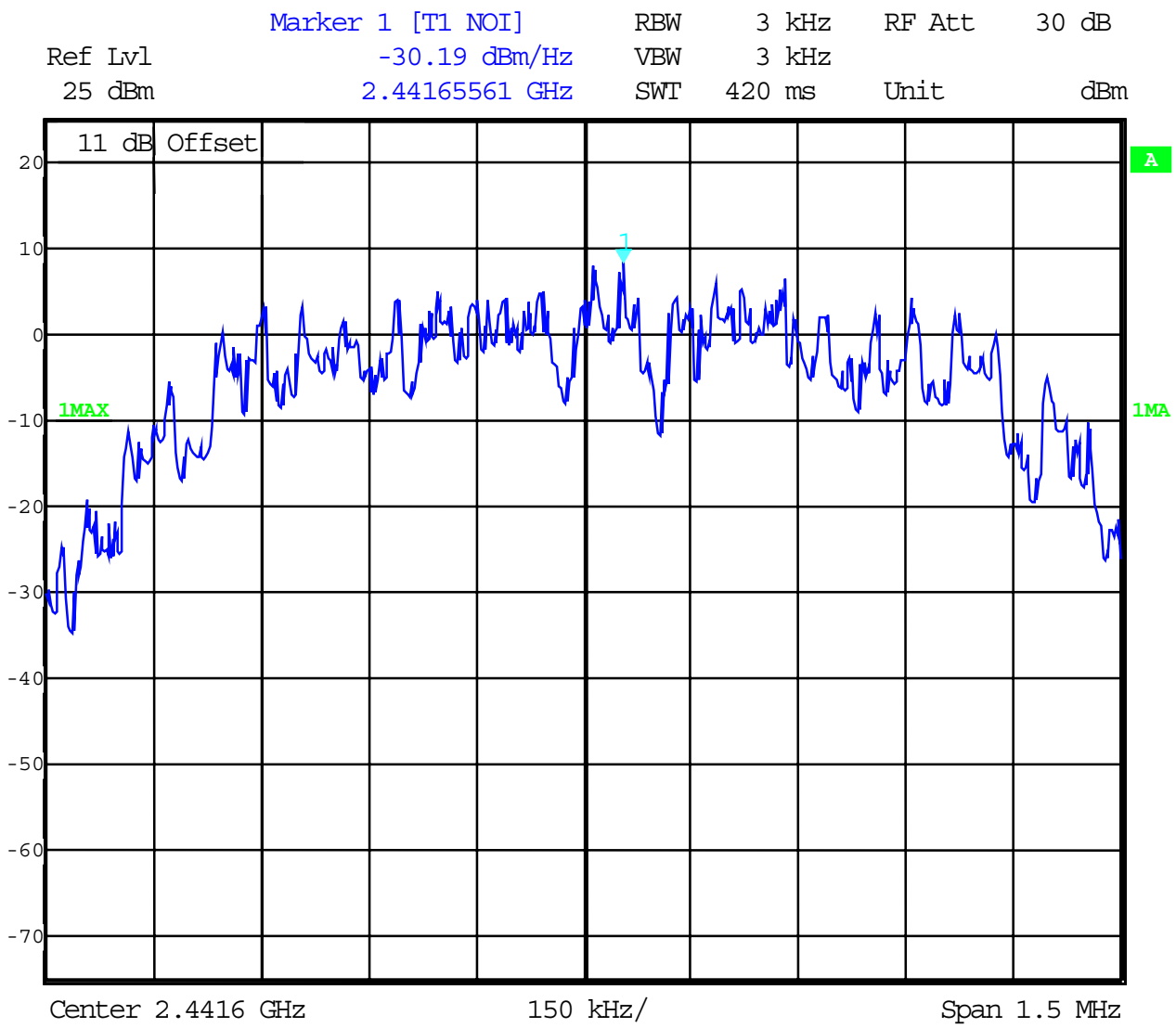


LIMIT **SUBCLAUSE §15.247(d)**

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

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

mid channel:

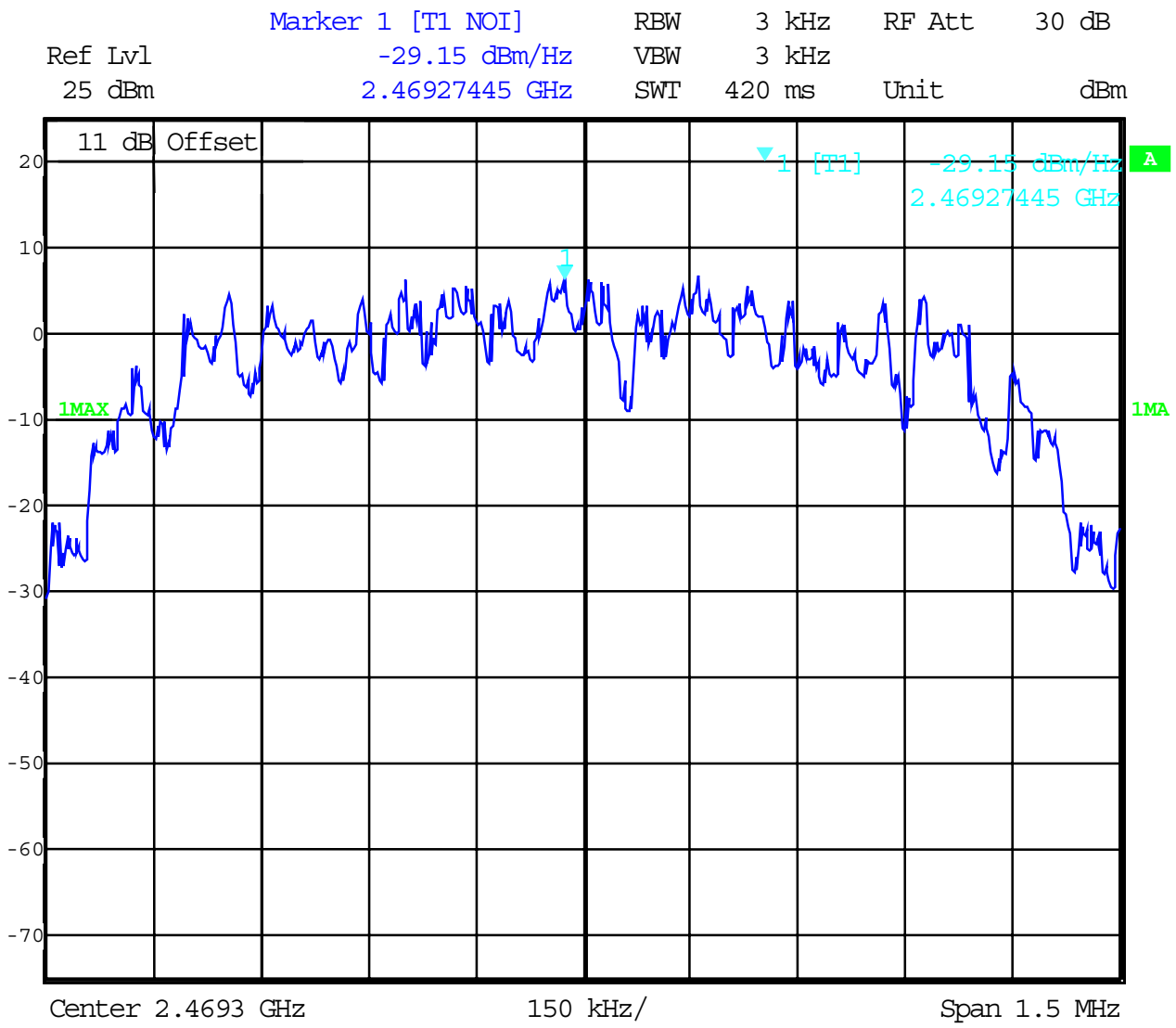


LIMIT **SUBCLAUSE §15.247(d)**

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

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

high channel:

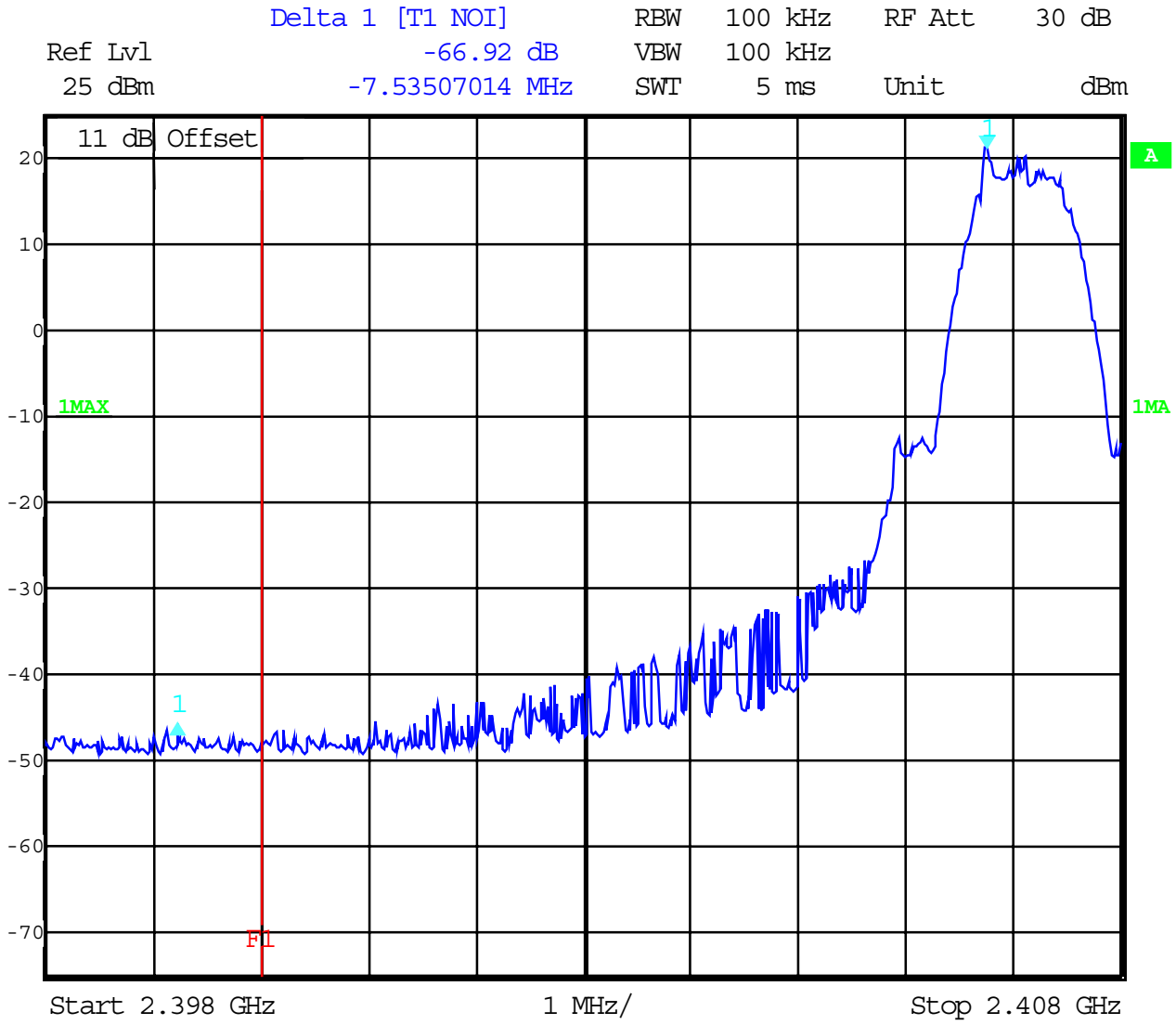


LIMIT **SUBCLAUSE §15.247(d)**

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

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

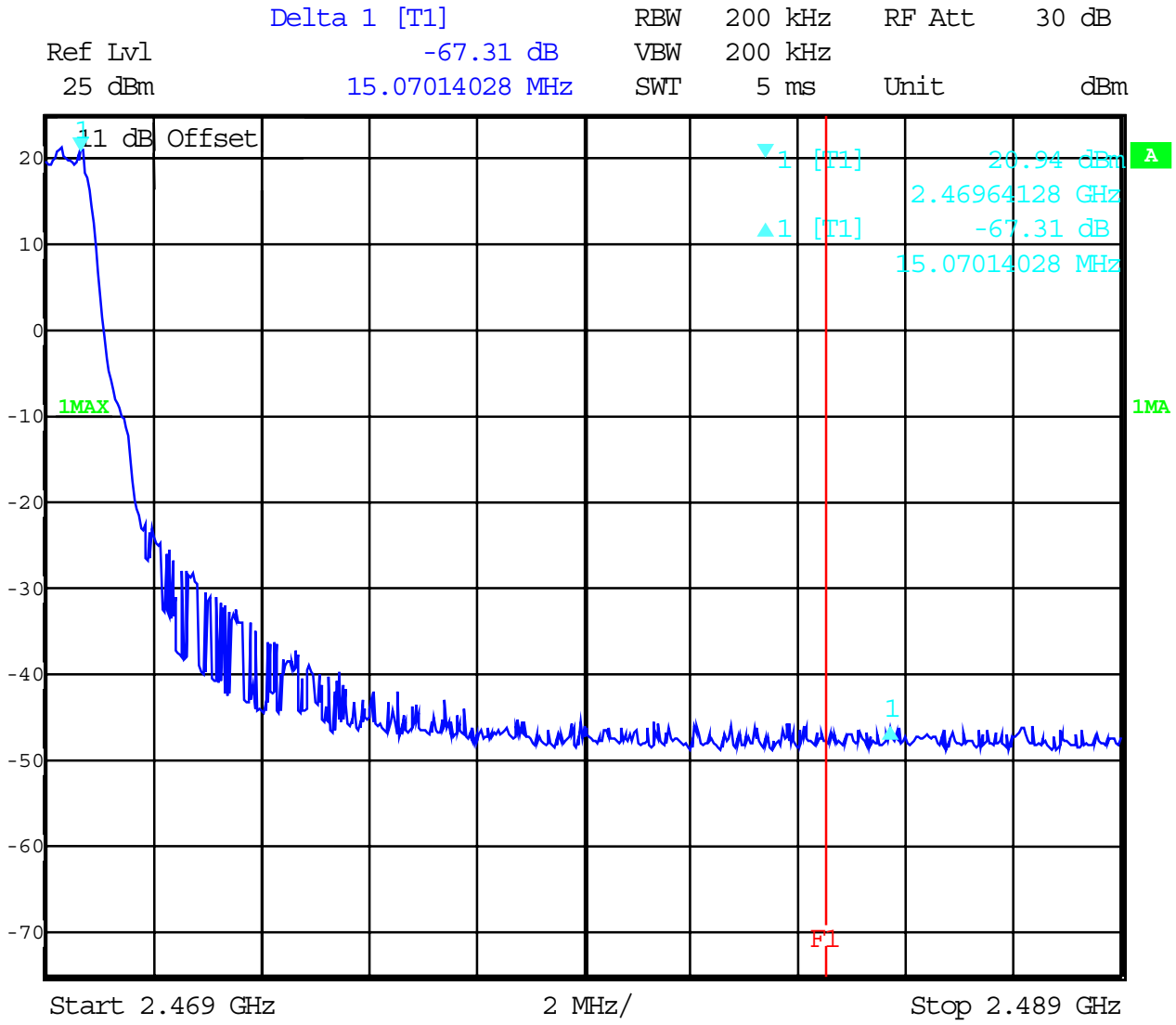
Low channel



We have a reduction > 20 dB.

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

high channel



We have a reduction > 20 dB in the restricted band.

Band-edge compliance of radiated emissions **§15.205**

Radiated field strength

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.

The correction factor is the summation of path loss, cable loss, antenna gain and amplifier gain.
The value at 2470 MHz is +15.2 dB.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Peak value	1 MHz RBW 1 MHz VBW	105.81 dBµV/m	15.2 dB	121.01 dBµV/m
Average value	1 MHz RBW 10 Hz VBW	91.61 dBµV/m	15.2 dB	106.81 dBµV/m
Delta value	Peak 100 kHz RBW/VBW 300 kHz	68.2 dB 68.9 dB	-	-
Value at band edge 100 kHz RBW 300 kHz RBW	limit 54 dBµV/m			38.61 dBµV/m 37.91 dBµV/m
Statement:				Complies

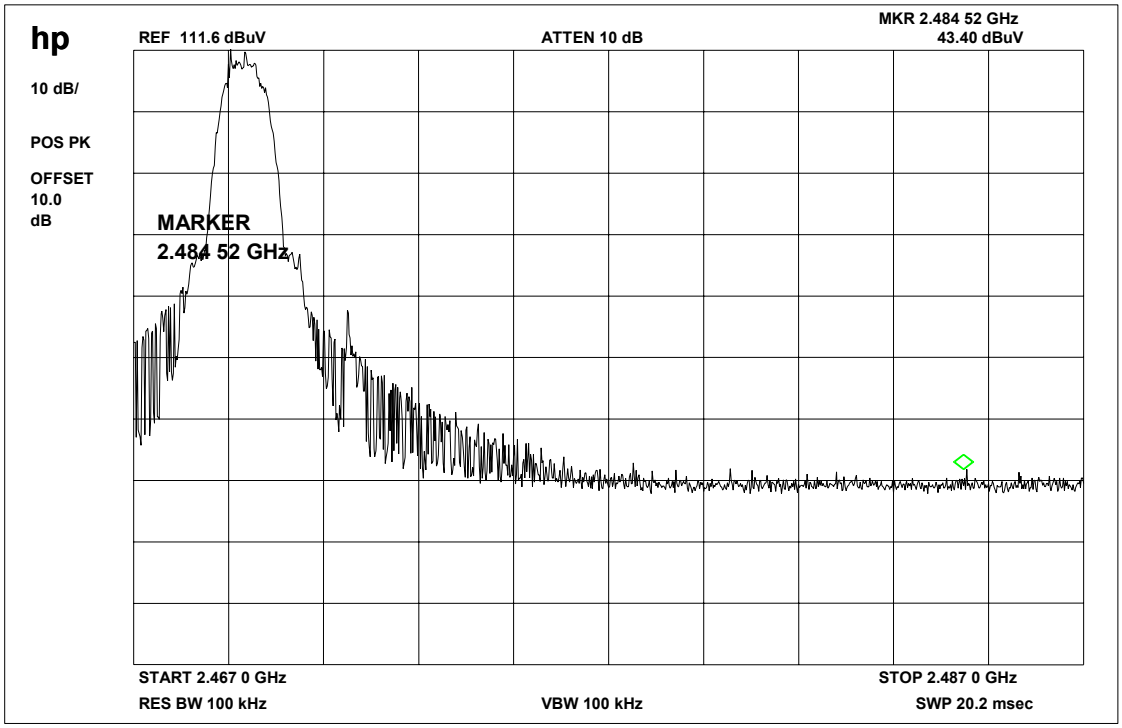
<u>The product complies with the limit of the restricted bands.</u>

Delta marker plots see next page

Radiated field strength **SUBCLAUSE § 15.205**

Plot of radiated band edge behavior. (Peak, max hold)

<u>100 kHz RBW, delta bB is 68.2 dB</u>

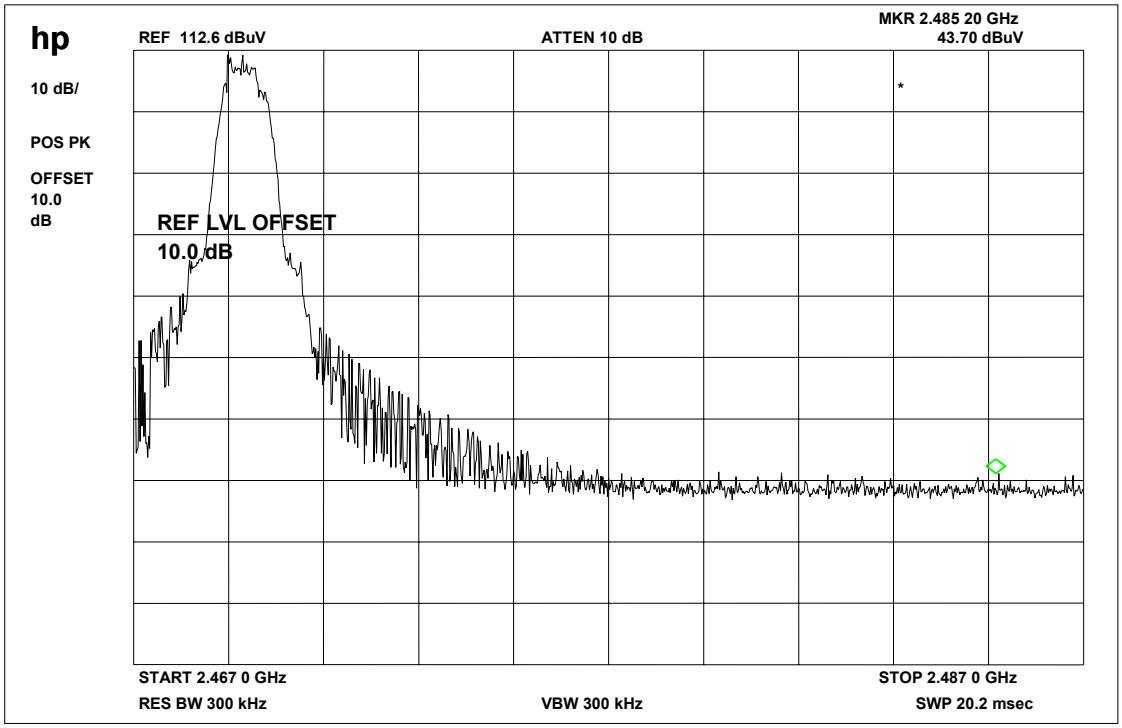


Span is 20 MHz, so we choose a RBW of ~1% span, here 100 kHz as the analyzer is not able to be set to 200 kHz RBW/VBW.
We made a second plot with 300 kHz RBW. We got nearly the same result.

Radiated field strength **SUBCLAUSE § 15.205**

Plot of radiated band edge behavior. (Peak, max hold)

<u>300 kHz RBW, delta bB is 68.9 dB</u>



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

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBm)	limit max. allowed emmision power	actual attenuation below frequency of operation (dB)	results
low channel		21.44	30 dBm	-	Operating frequency
all peaks <<limit			-20 dBc		complies
mid channel		21.44	30 dBm	-	Operating frequency
all peaks <<limit			-20 dBc		complies
high channel		21.53	30 dBm		Operating frequency
all peaks <<limit §			-20 dBc		complies
Measurement uncertainty		± 3dB			

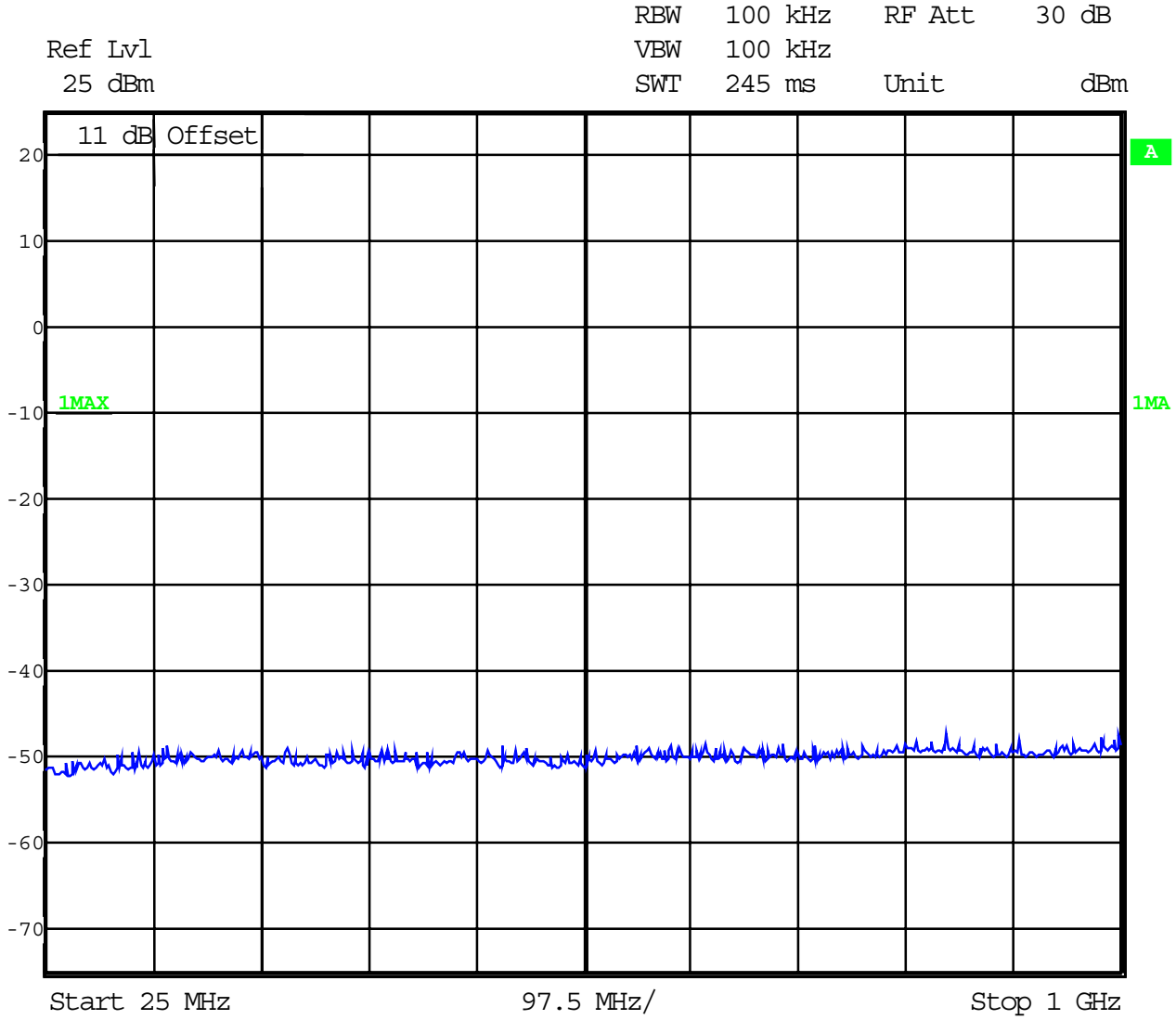
LIMITS **SUBCLAUSE § 15.247 (c)**

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)).

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

<u>No peak found < 20 dB below limit (20dBc)</u>

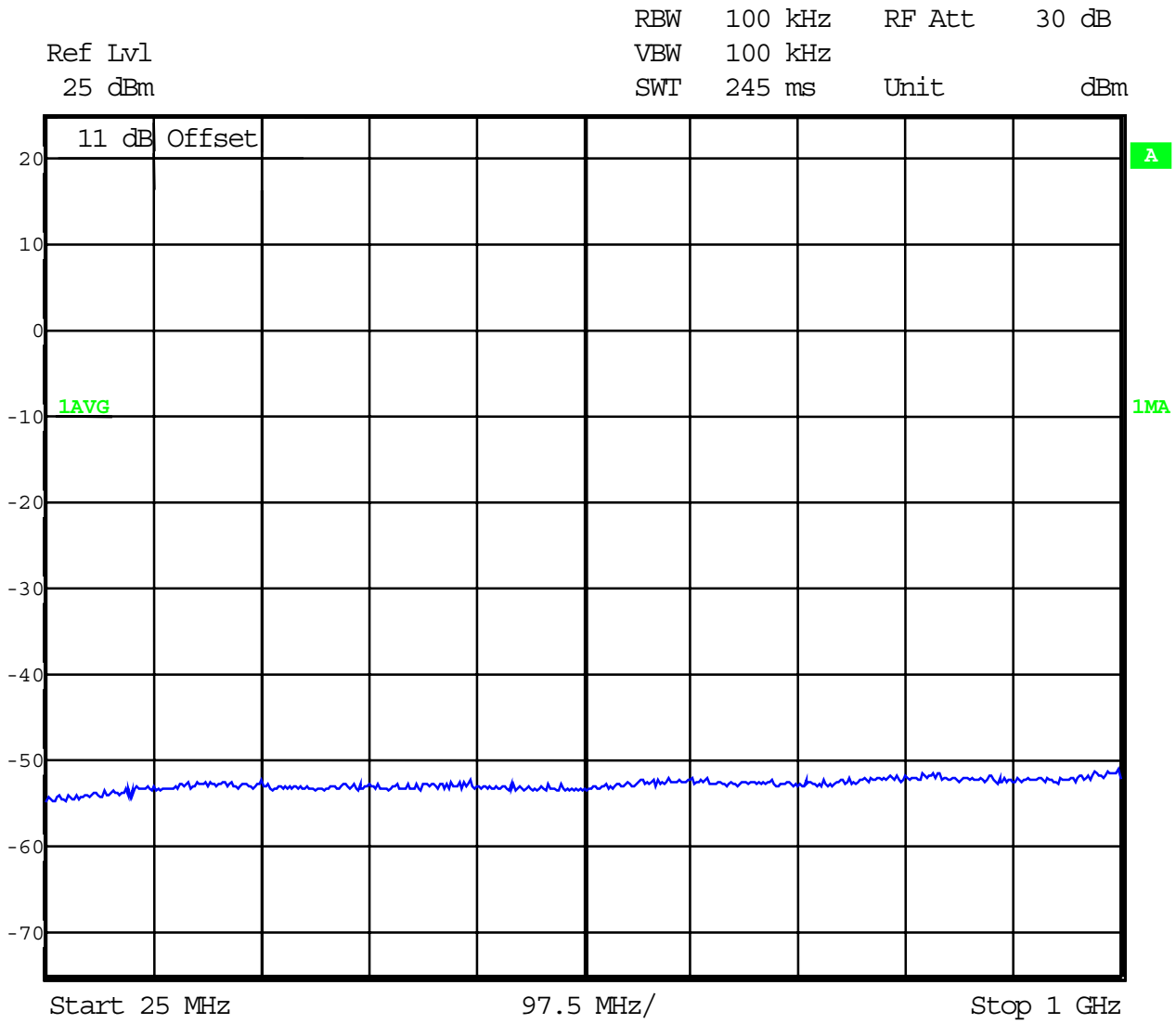
Low channel peak (25 – 1000 MHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

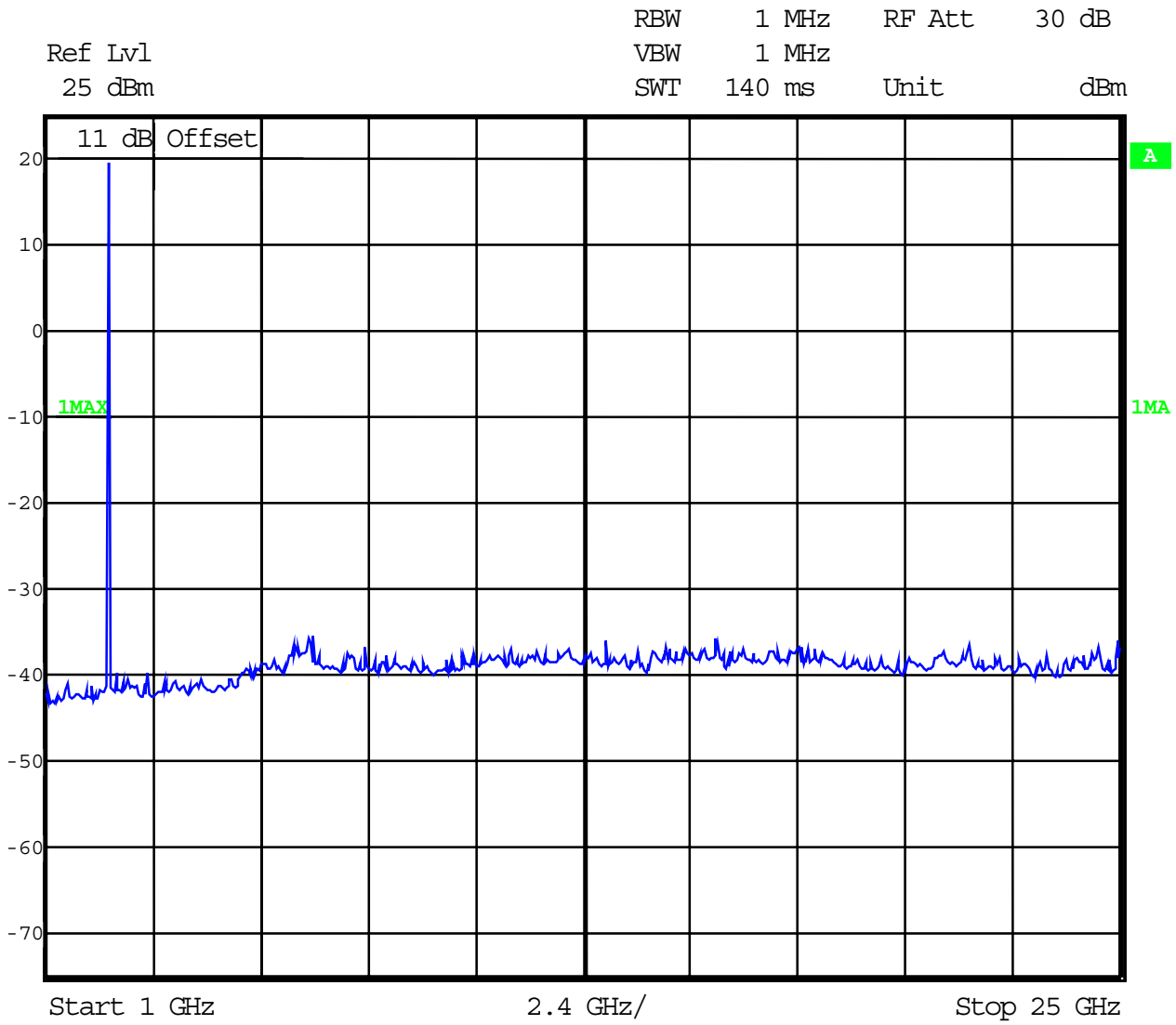
Low channel average (with average detector) (25 – 1000 MHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

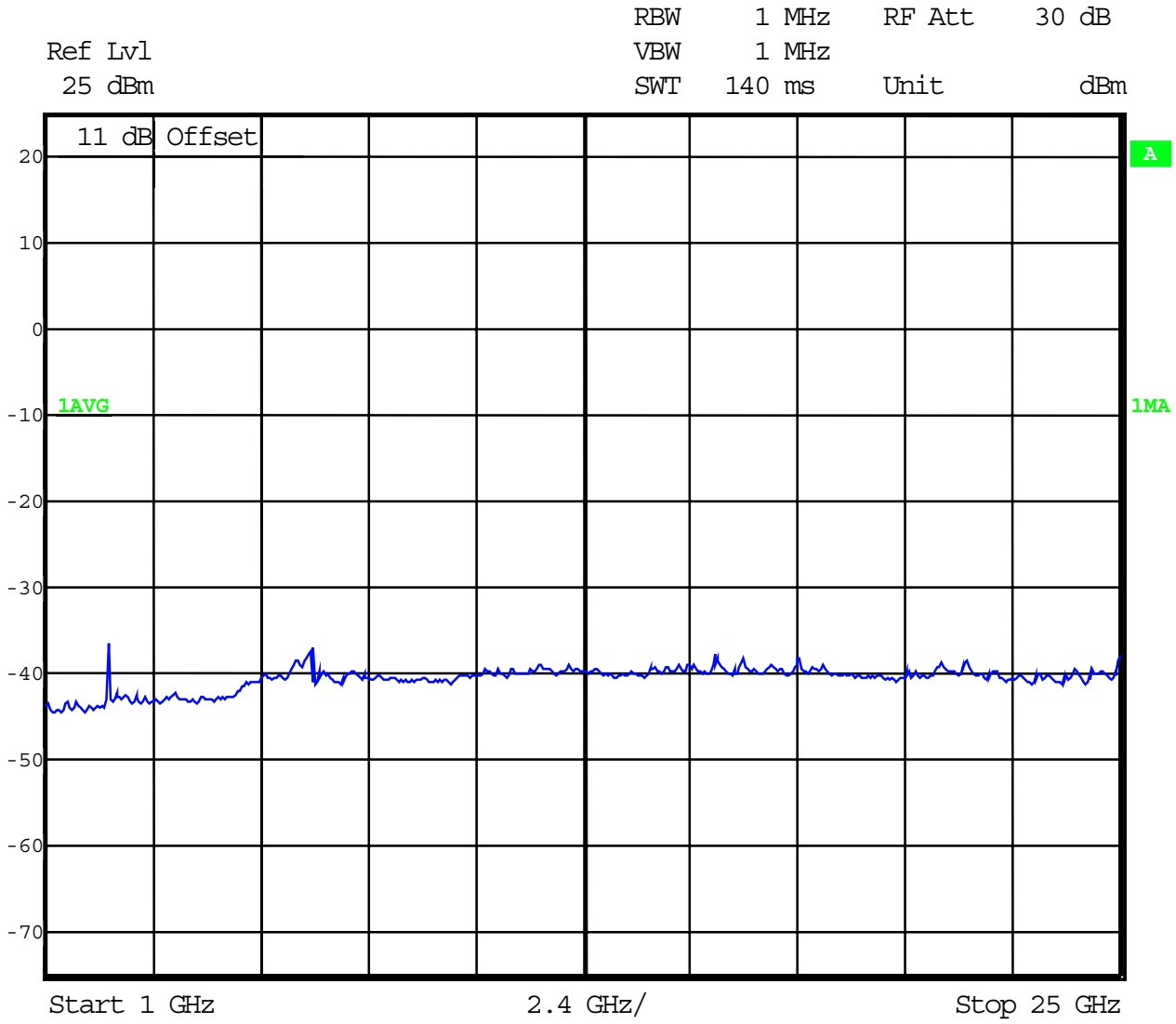
Low channel peak (1 – 25 GHz)



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

<u>No peak found < 20 dB below imit (20dBc)</u>

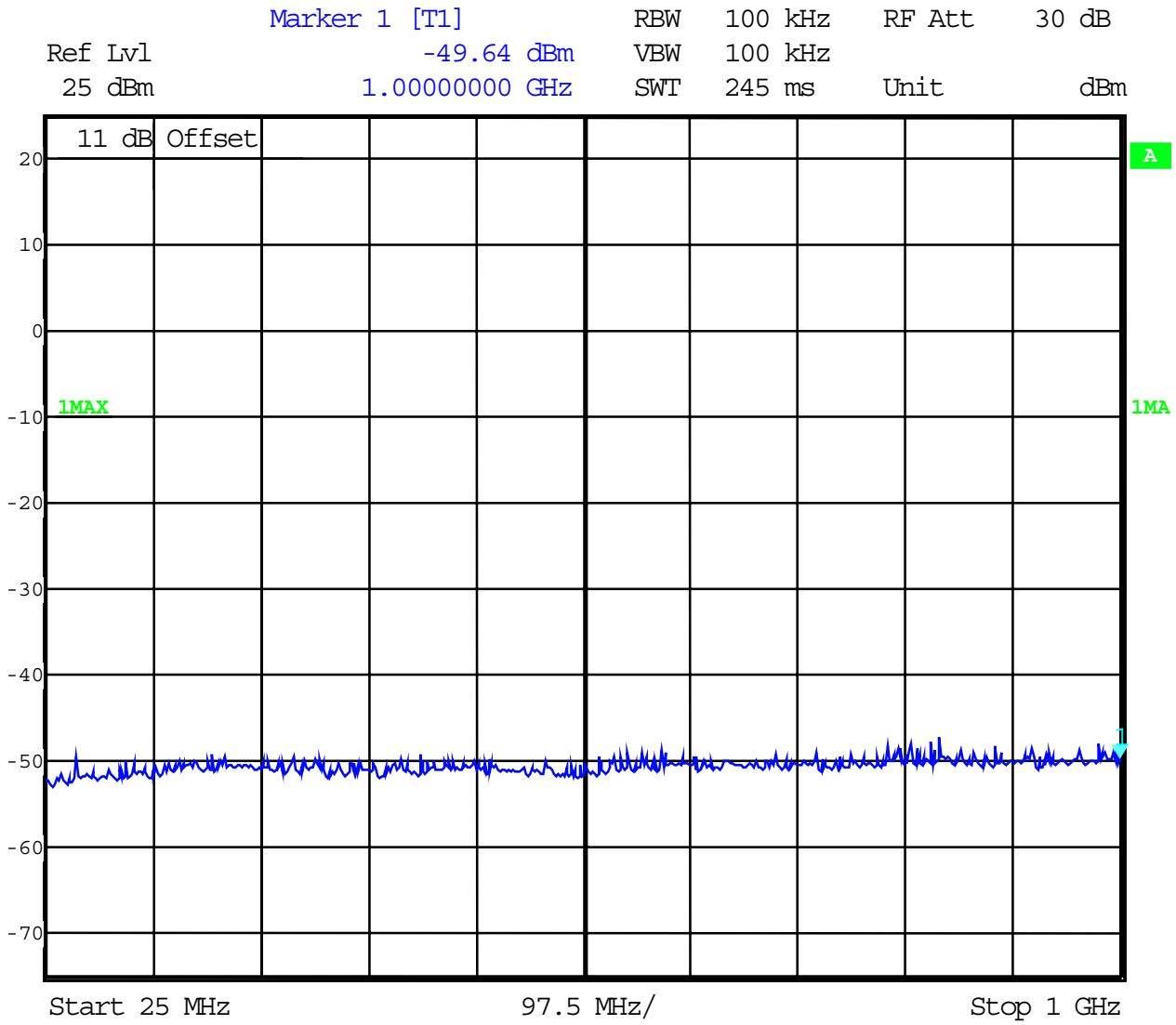
Low channel average (1 – 25 GHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

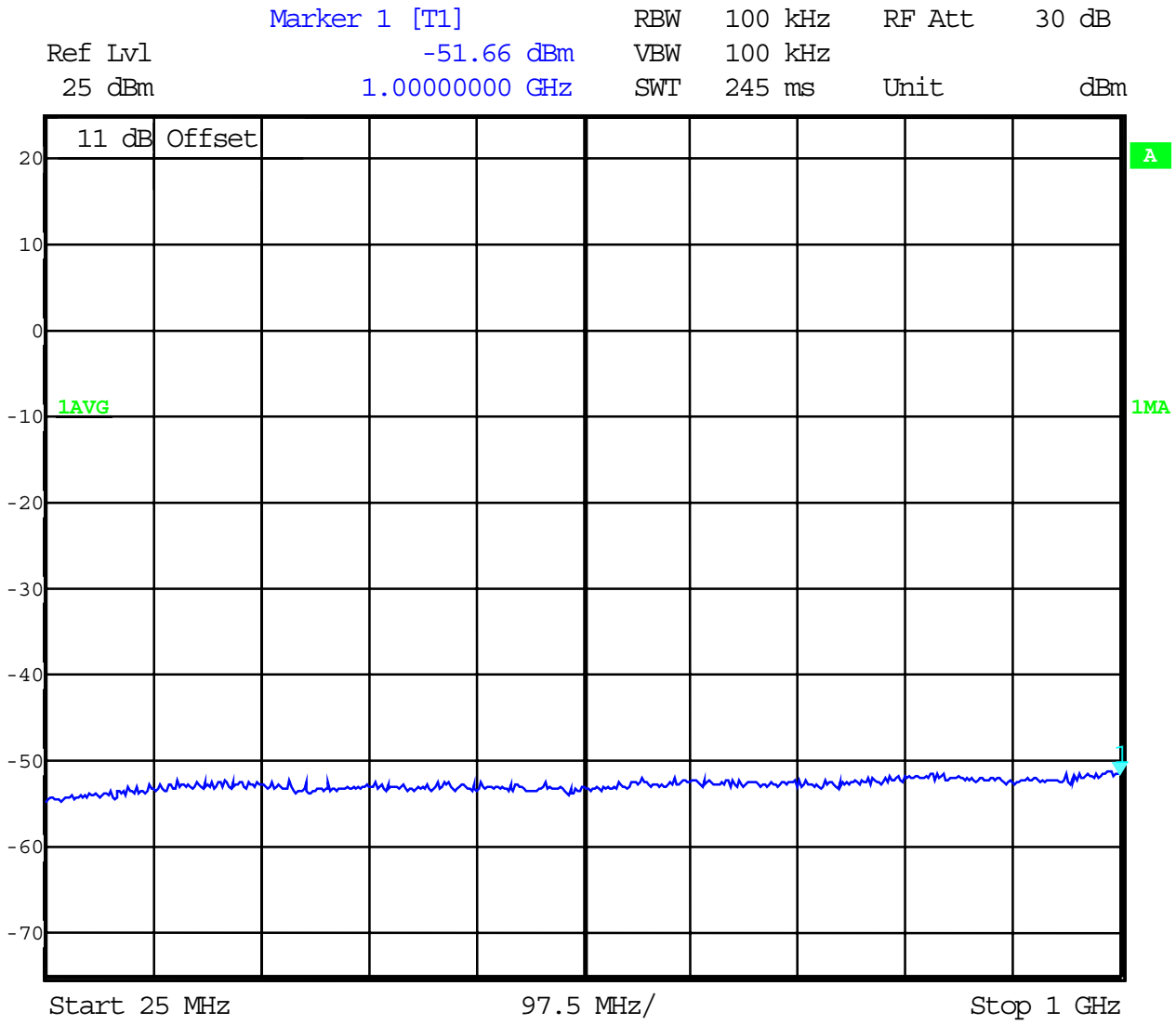
Mid channel (peak) (25 – 1000 MHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

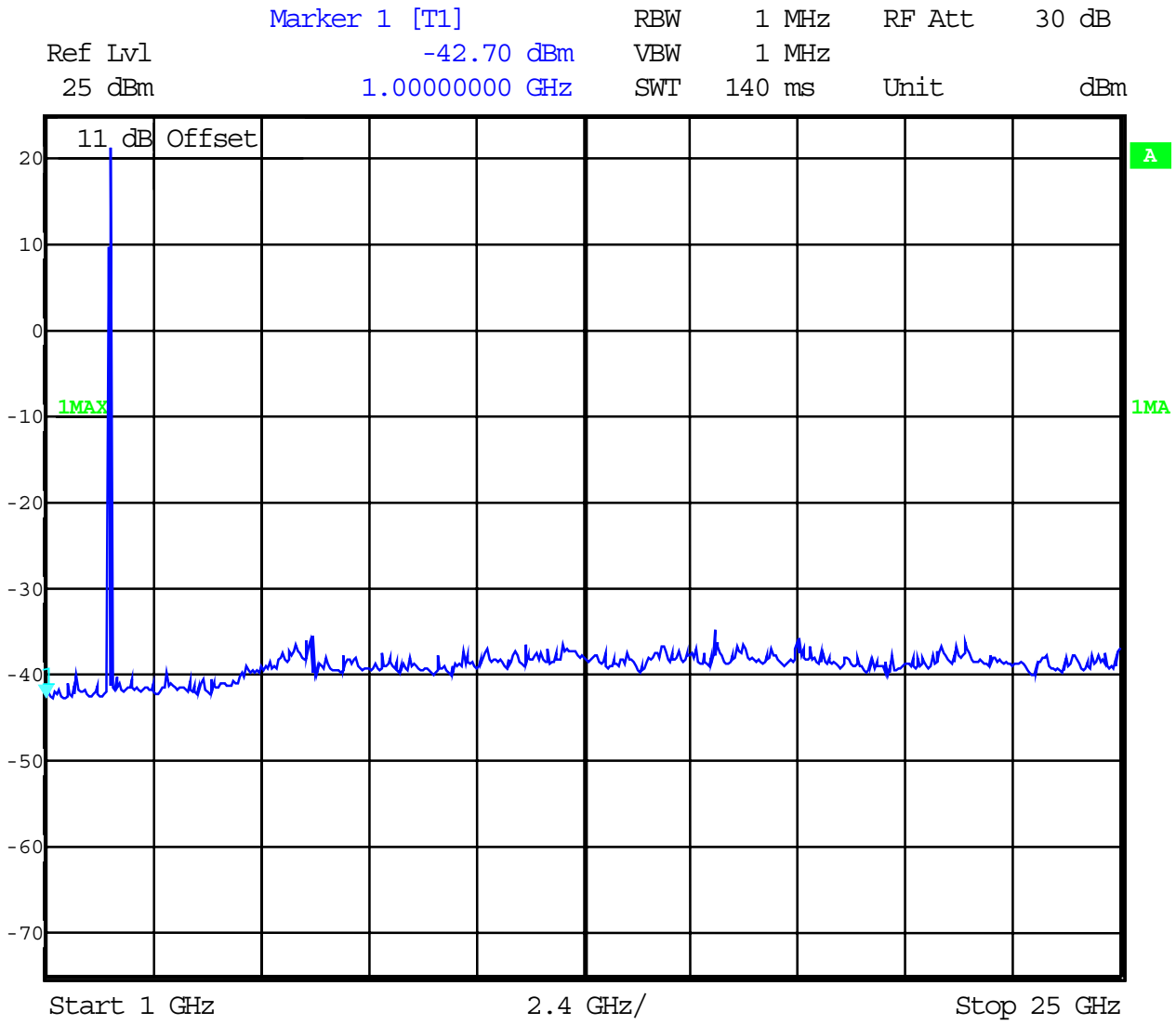
mid channel average (with average detector) (25 – 1000 MHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

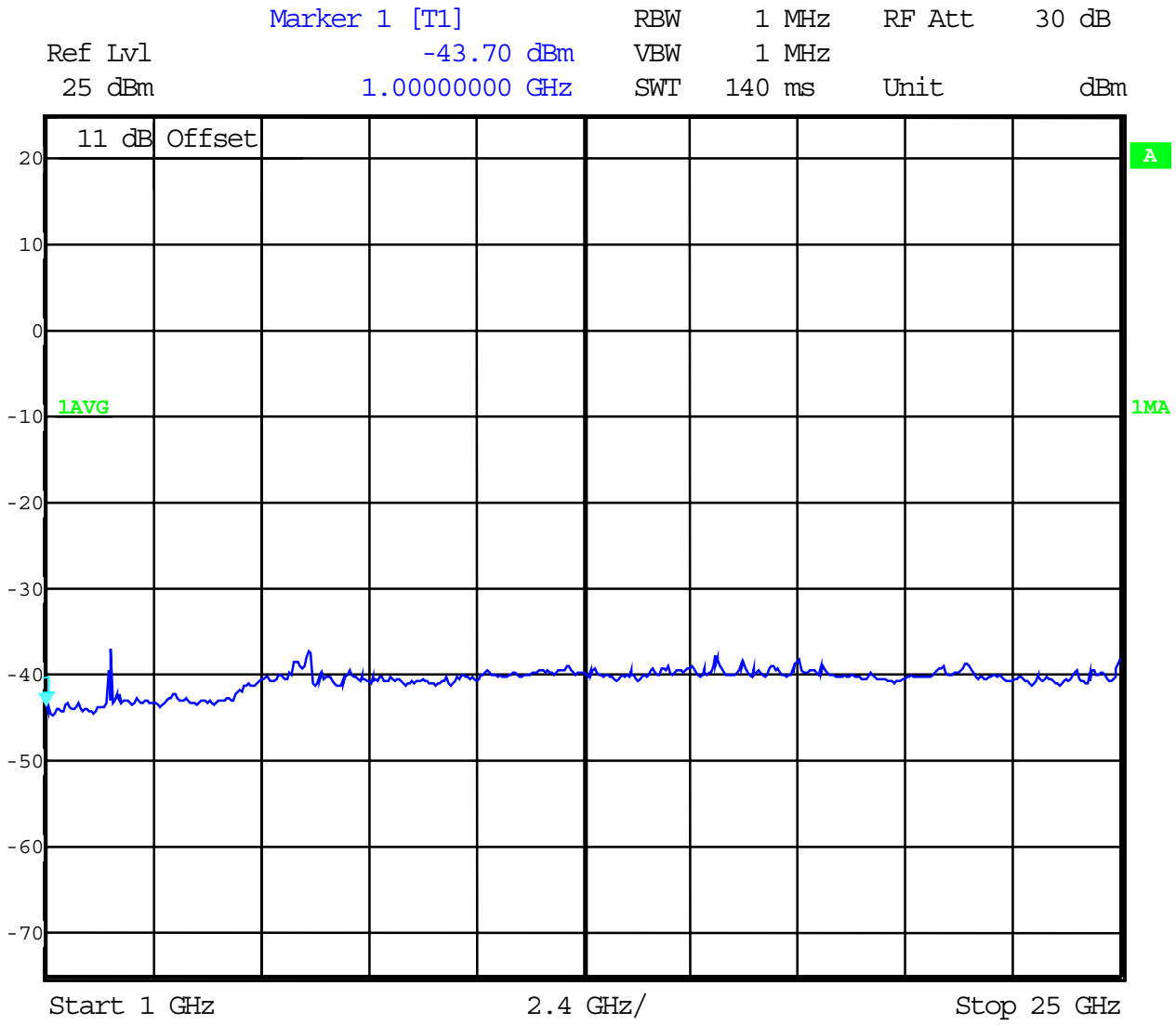
mid channel peak (1 – 25 GHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

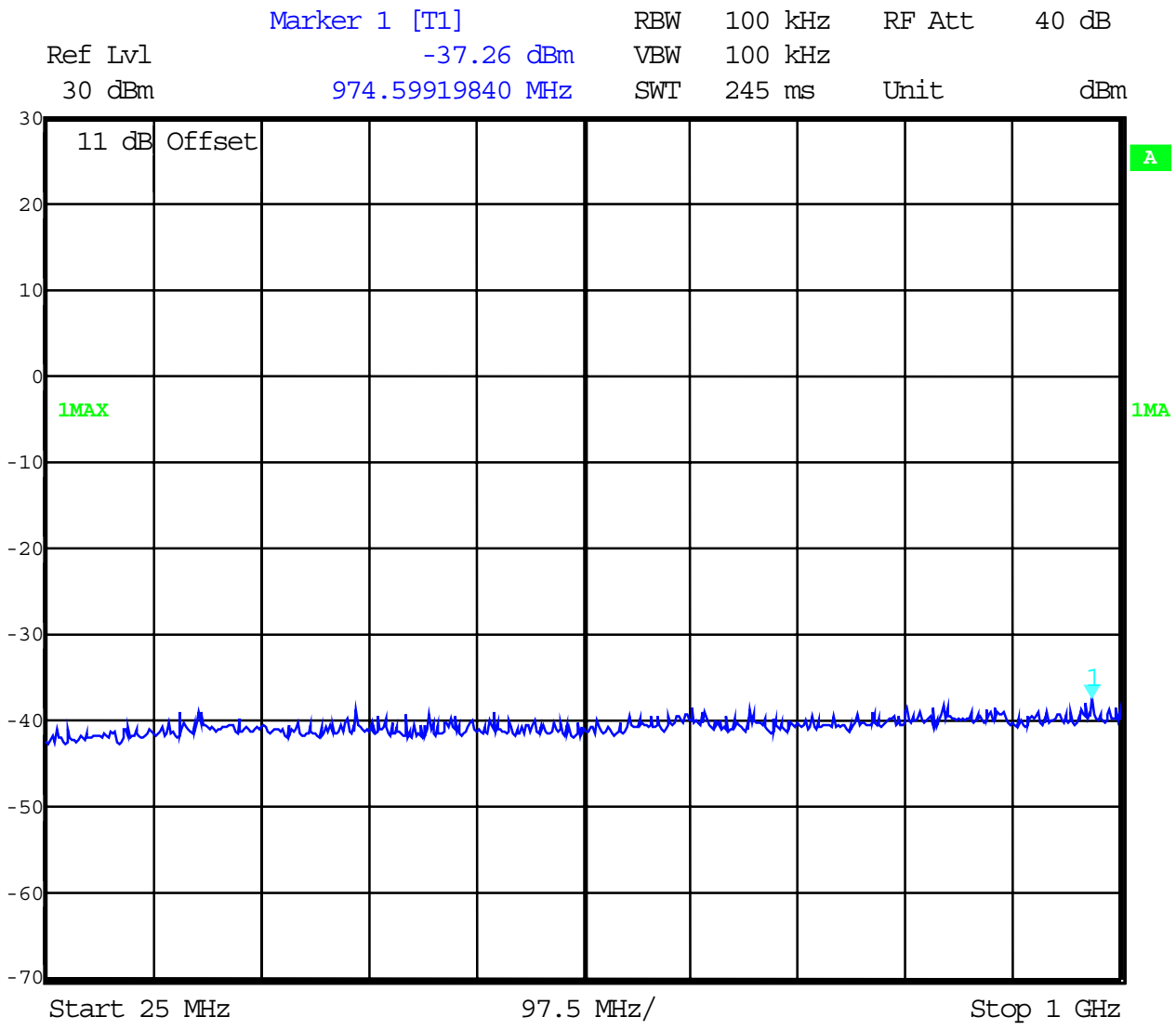
mid channel average (1 – 25 GHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

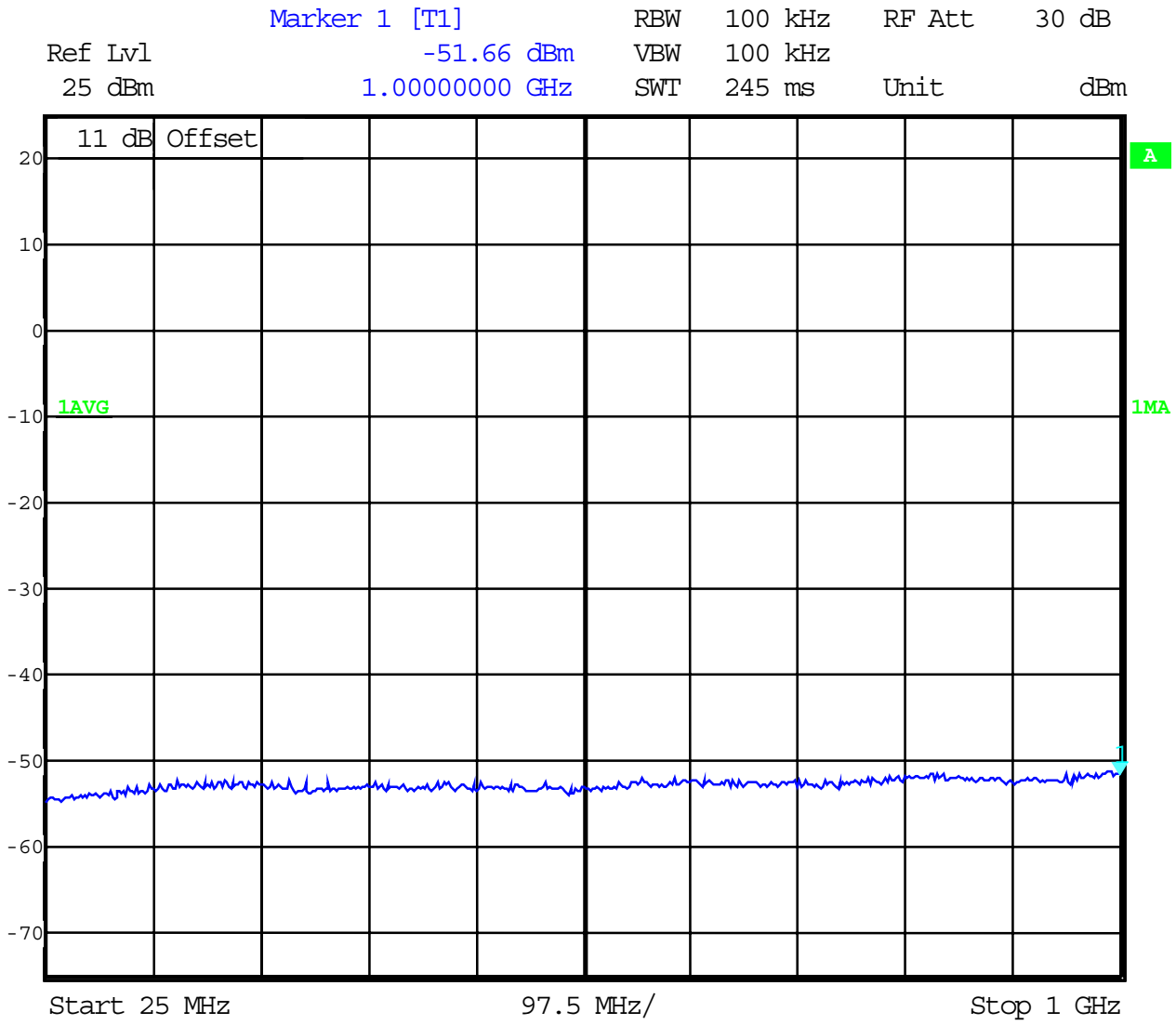
high channel (peak) (25 – 1000 MHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

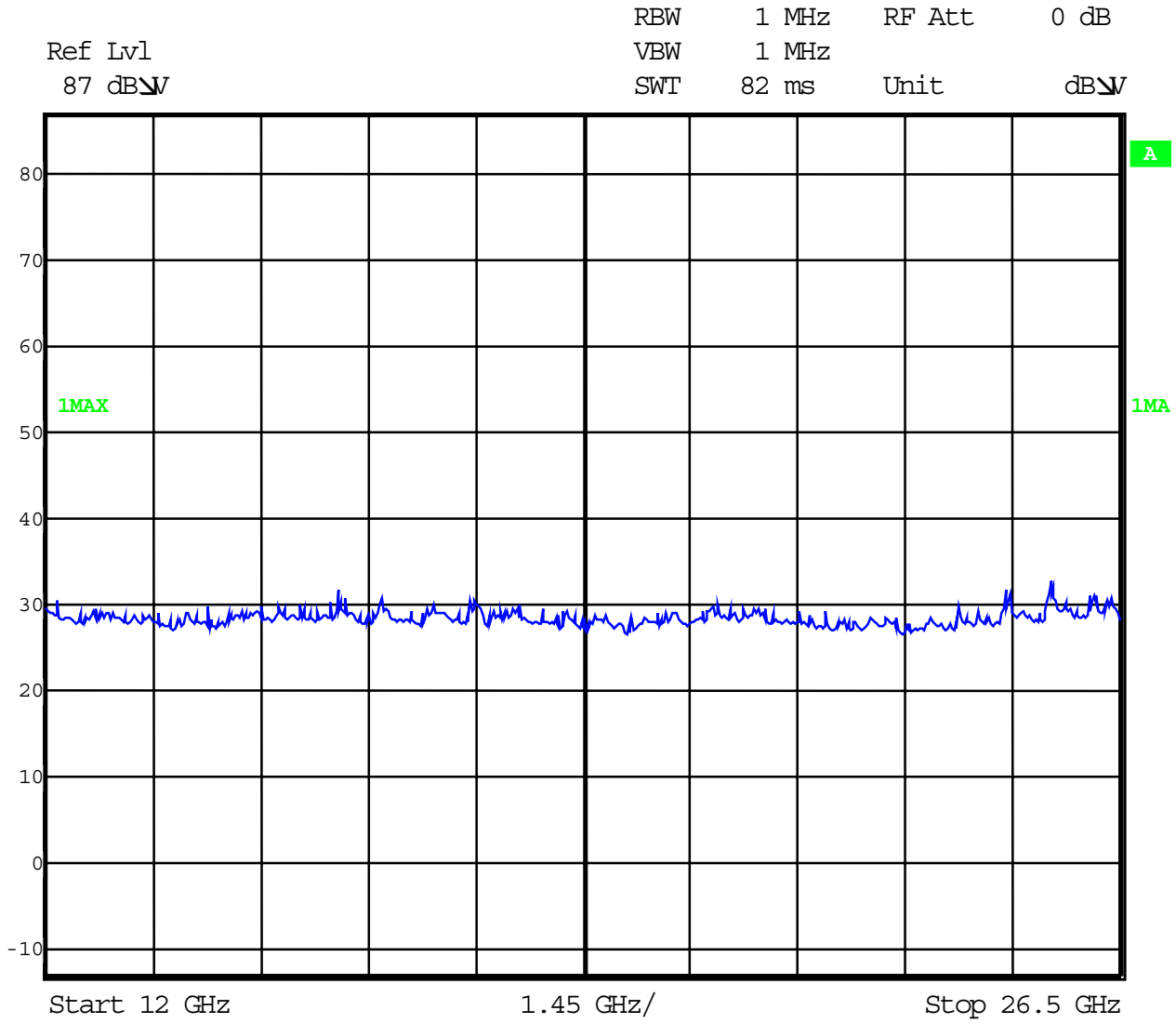
high channel average (with average detector) (25 – 1000 MHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

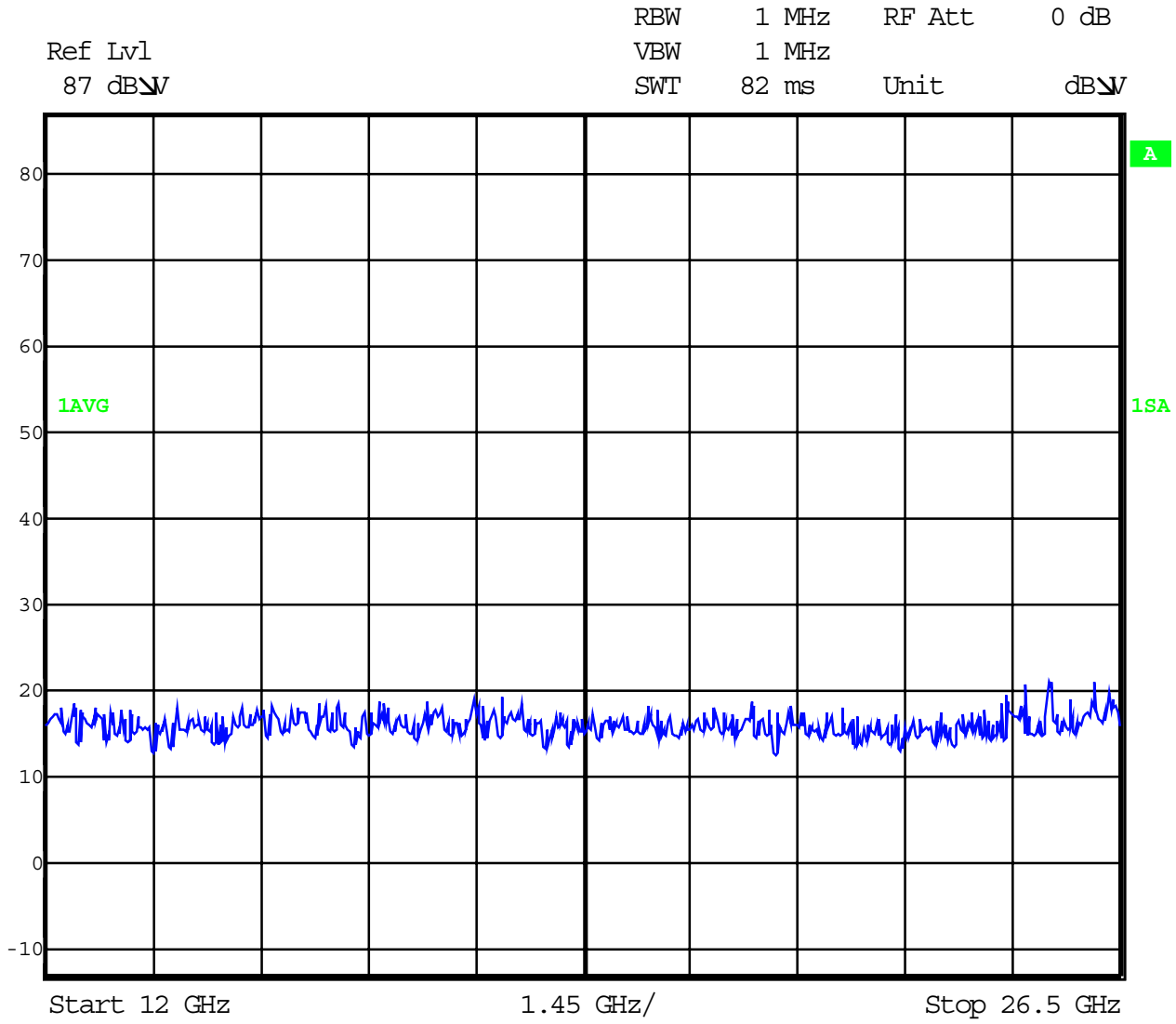
High channel peak (1 – 25 GHz)



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

<u>No peak found < 20 dB below limit (20dBc)</u>

High channel average (with average detector) (1 – 25 GHz)



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

All peaks in the plot near the limit are peak values.

The peaks below 1 GHz are caused by the measuring PC, not by the test sample.

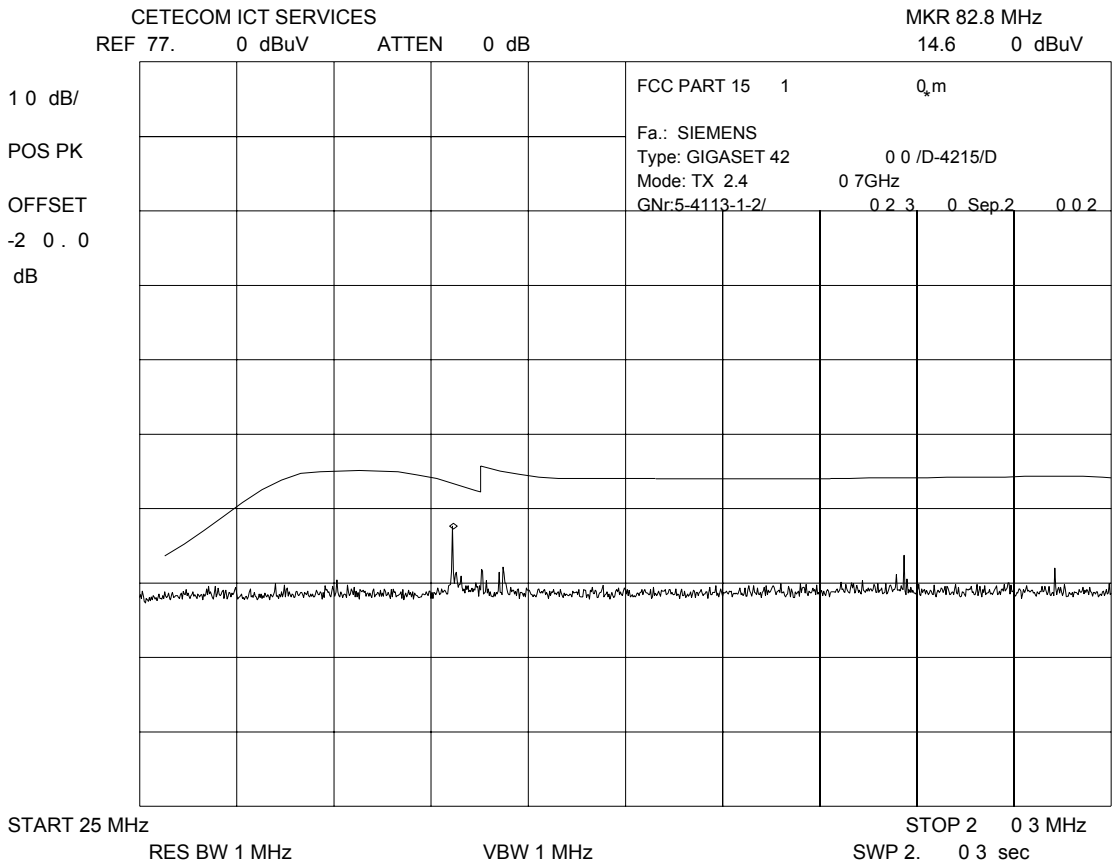
EMISSION LIMITATIONS					
f (MHz)	polari-zation	amplitude of emission (dBµV/m) QUASIPEAK	amplitude of emission (dBµV/m) average	limit max. allowed emmision power (dBµV/m)	results
Low channel					
524.0	vert	36.1		46.0	complies
659.5	hor	38.4		46.0	complies
749.4	vert	33.9		46.0	complies
4815.8	vert		18.5	54.0	complies
mid channel					
725.6	vert	39.6		46.0	complies
958.8	hor	36.5		46.0	complies
4885.1	vert		18.5	54.0	complies
High channel					
82.9	vert	32.5		40.0	complies
Measurement uncertainty		± 3dB			

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)
17 - 24

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
low channel 30 – 200 MHz (vertical)

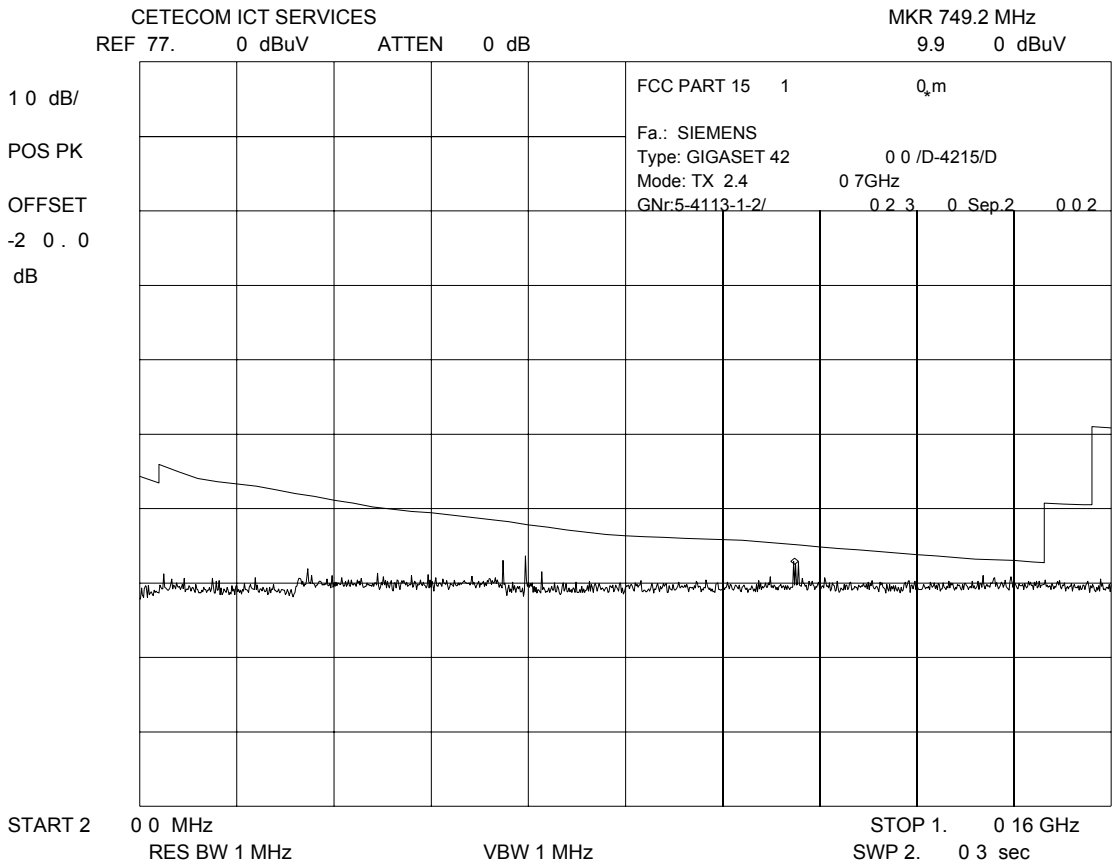


LIMITS **SUBCLAUSE § 15.247 (c)**

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)
17 – 24, 64

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
low channel 200 - 1000 MHz (vertical)

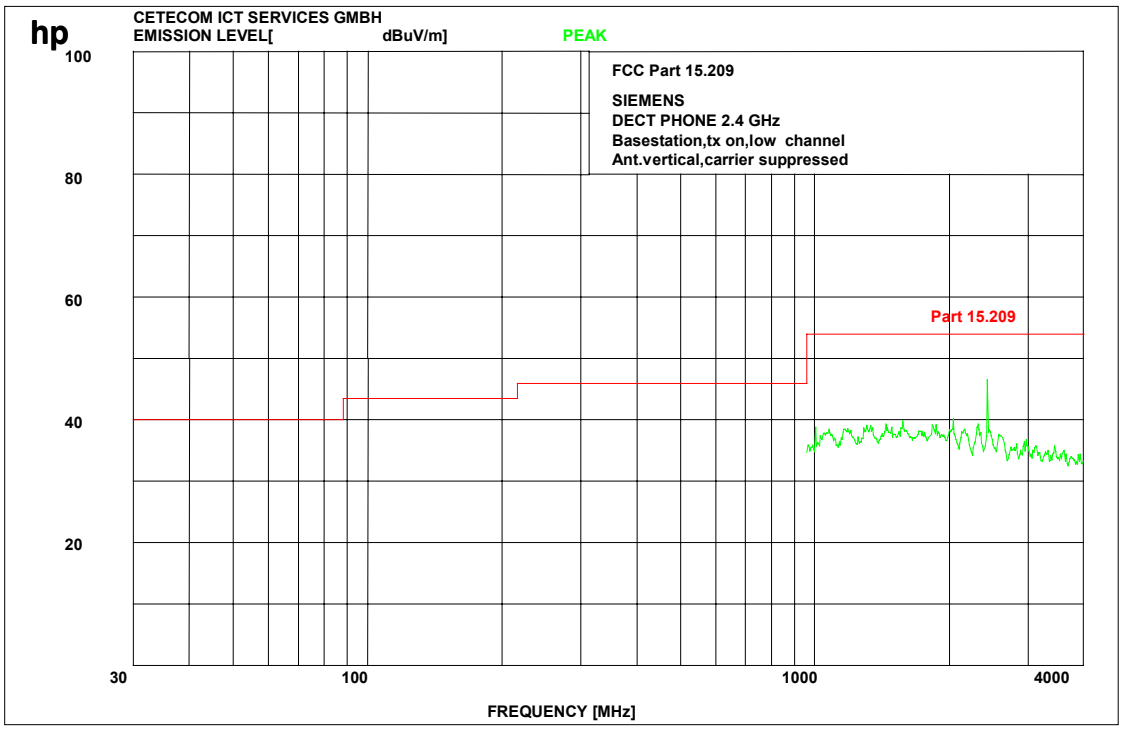


LIMITS **SUBCLAUSE § 15.247 (c)**

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)).

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

low channel 1000 - 4000 MHz (vertical)



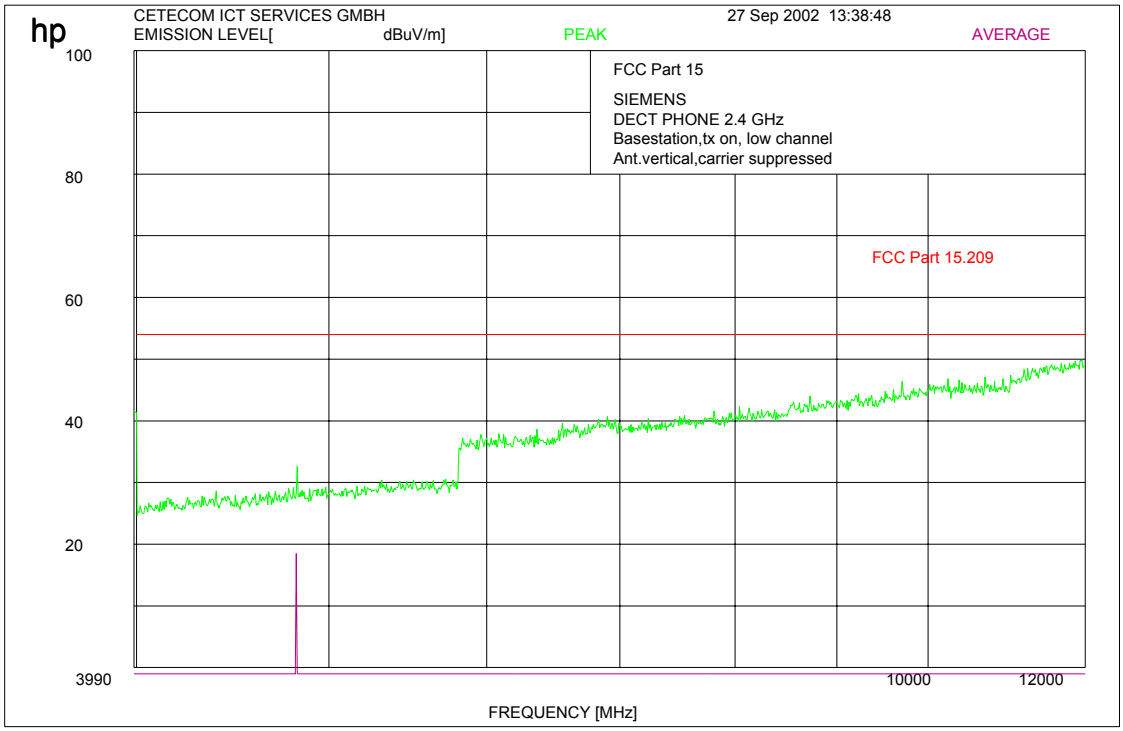
RBW/VBW 1 MHz

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)).

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

low channel up to 12 GHz



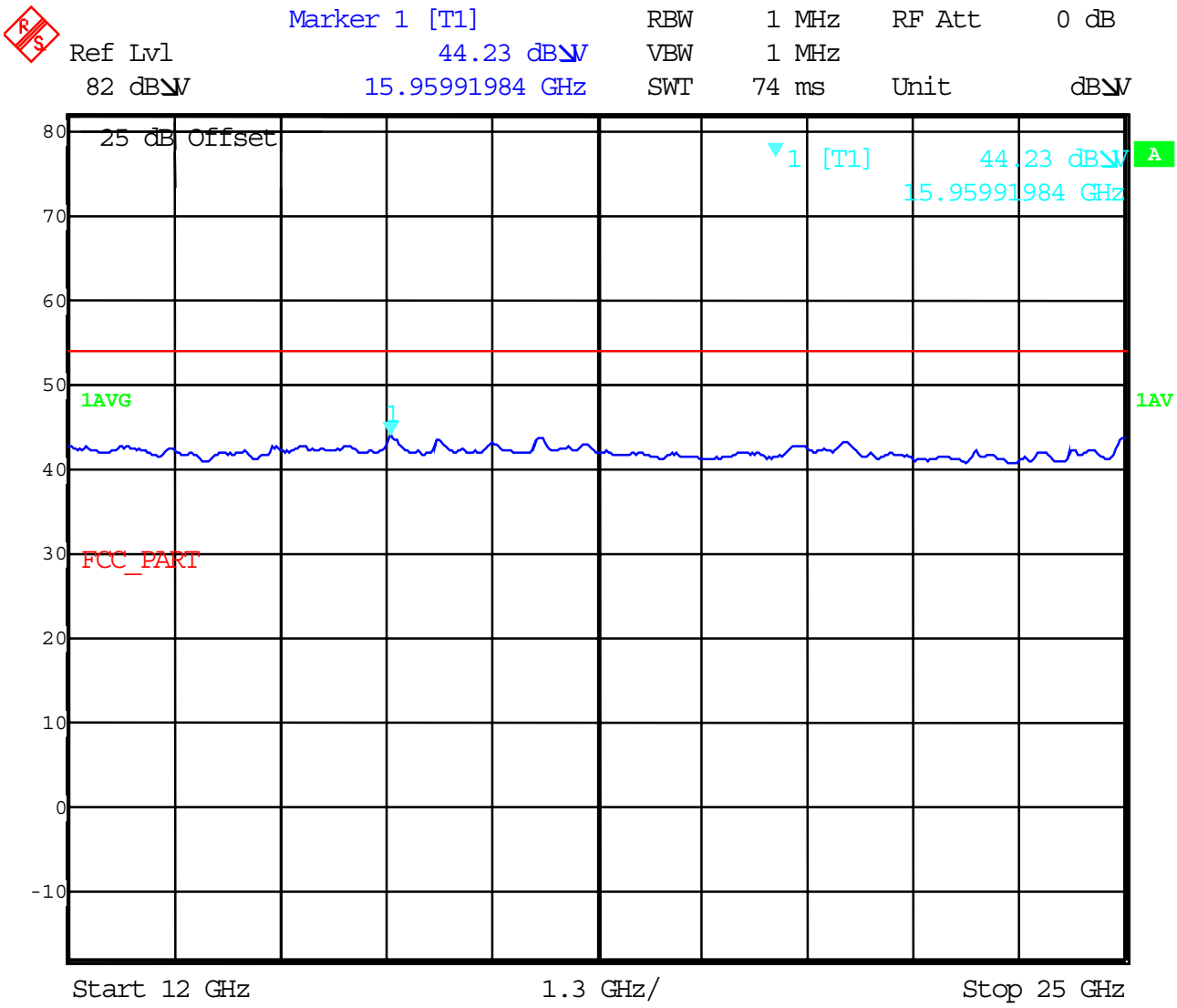
RBW/VBW 1 MHz

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)).

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

low channel up to 25 GHz

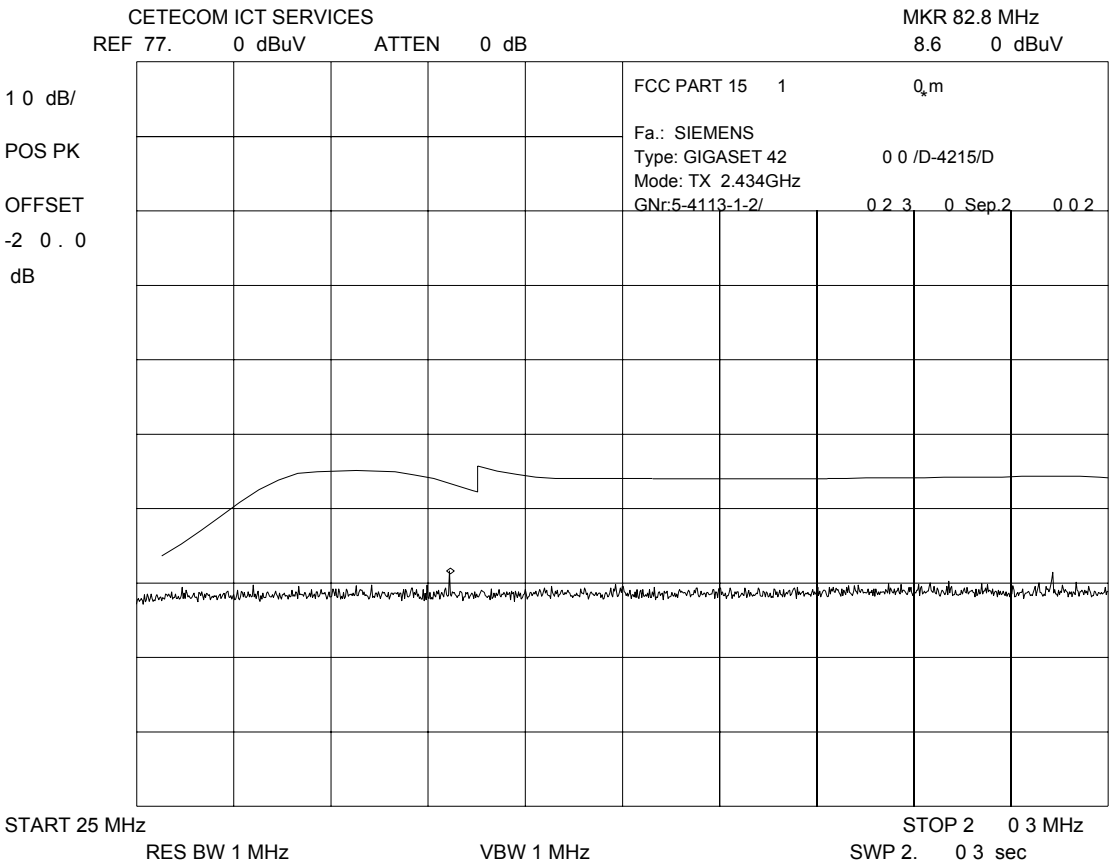


This plot was made with a wideband horn antenna and a special low noise preamp.
We measured base station and handset together. There were no peaks found.

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)).

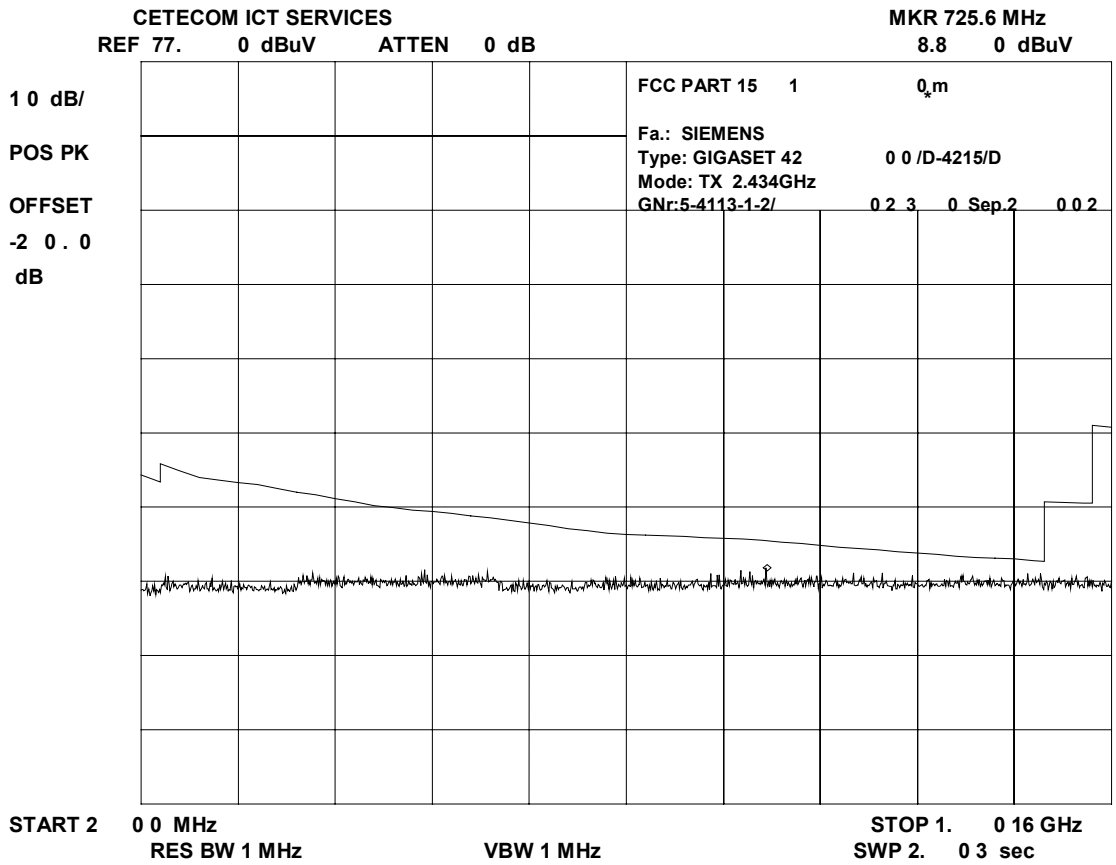
EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
mid channel 30 – 200 MHz (vertical)



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)).

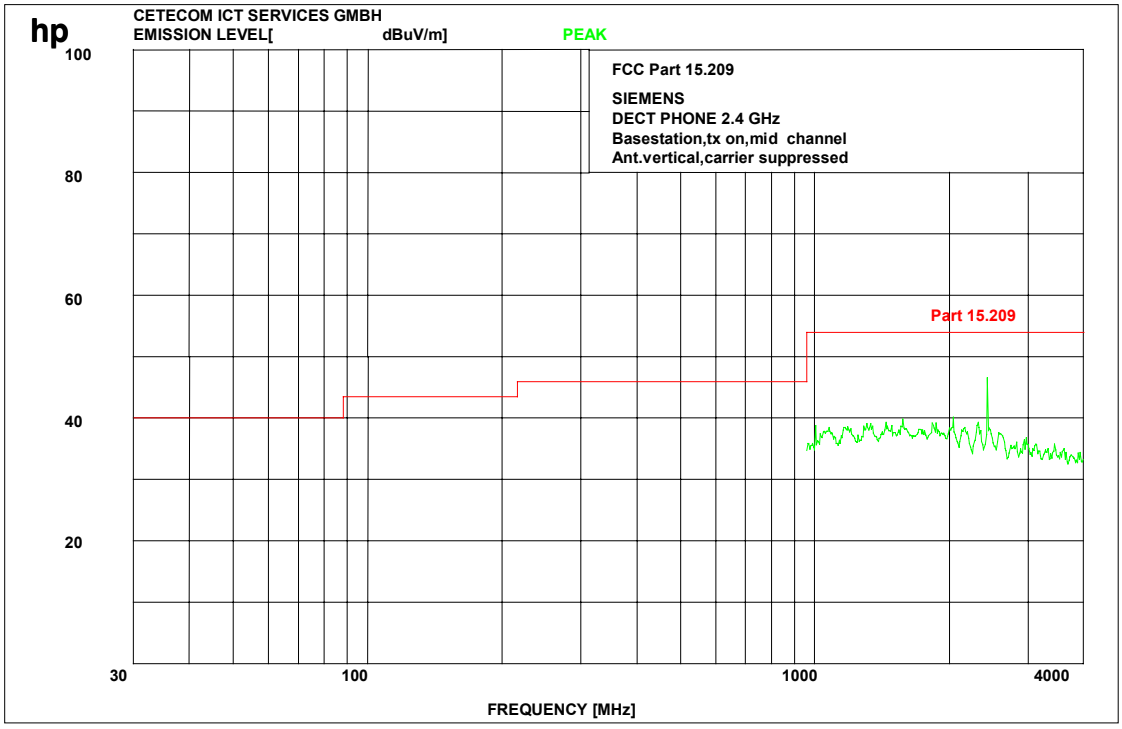
EMISSION LIMITATIONS- Radiated **§ 15.247 (c)**
mid channel 200 - 1000 MHz (vertical)



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)).

EMISSION LIMITATIONS- Radiated **§ 15.247 (c)**
mid channel 1000 - 4000 MHz (vertical)



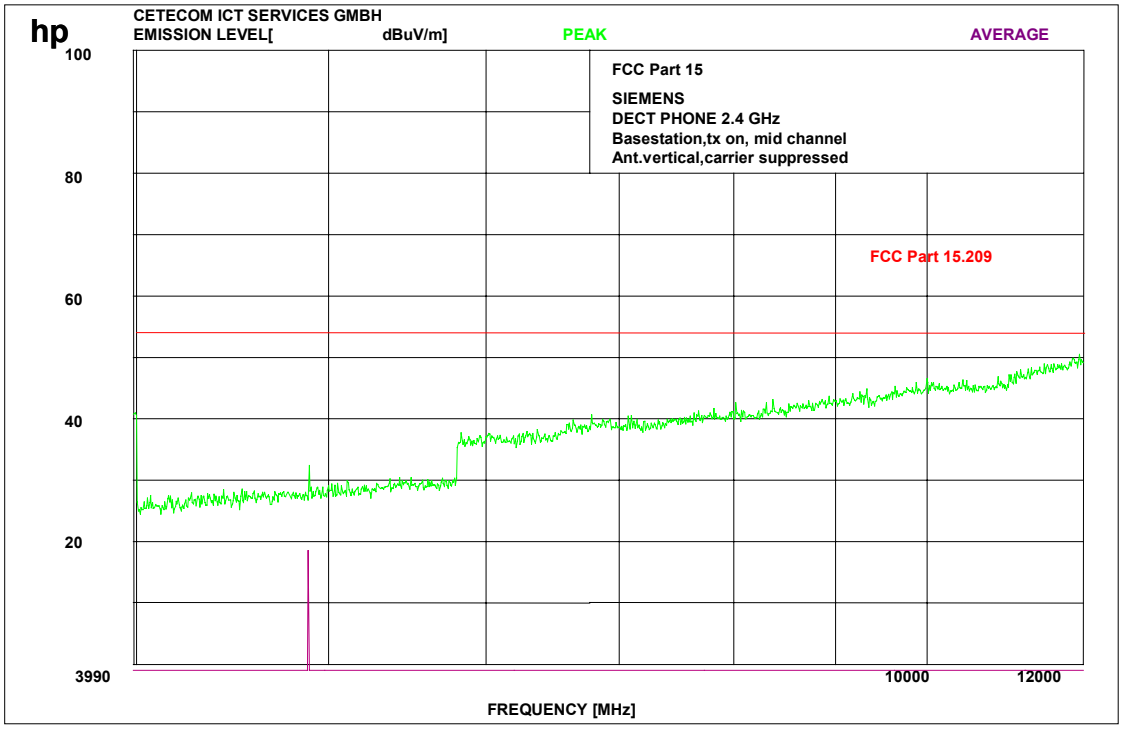
RBW/VBW 1 MHz

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)).

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

mid channel up to 12 GHz



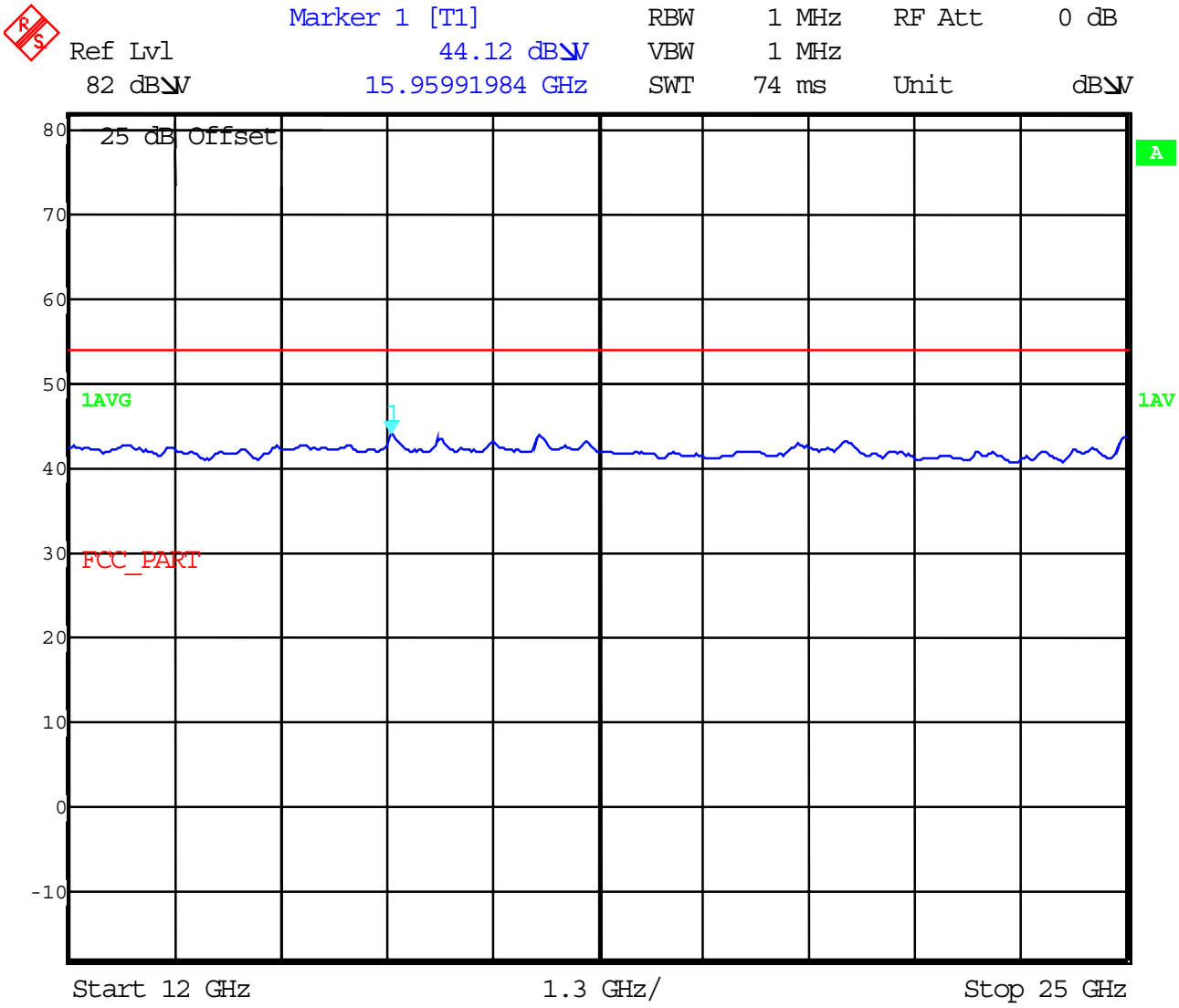
RBW/VBW 1 MHz

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)).

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

Mid channel up to 25 GHz

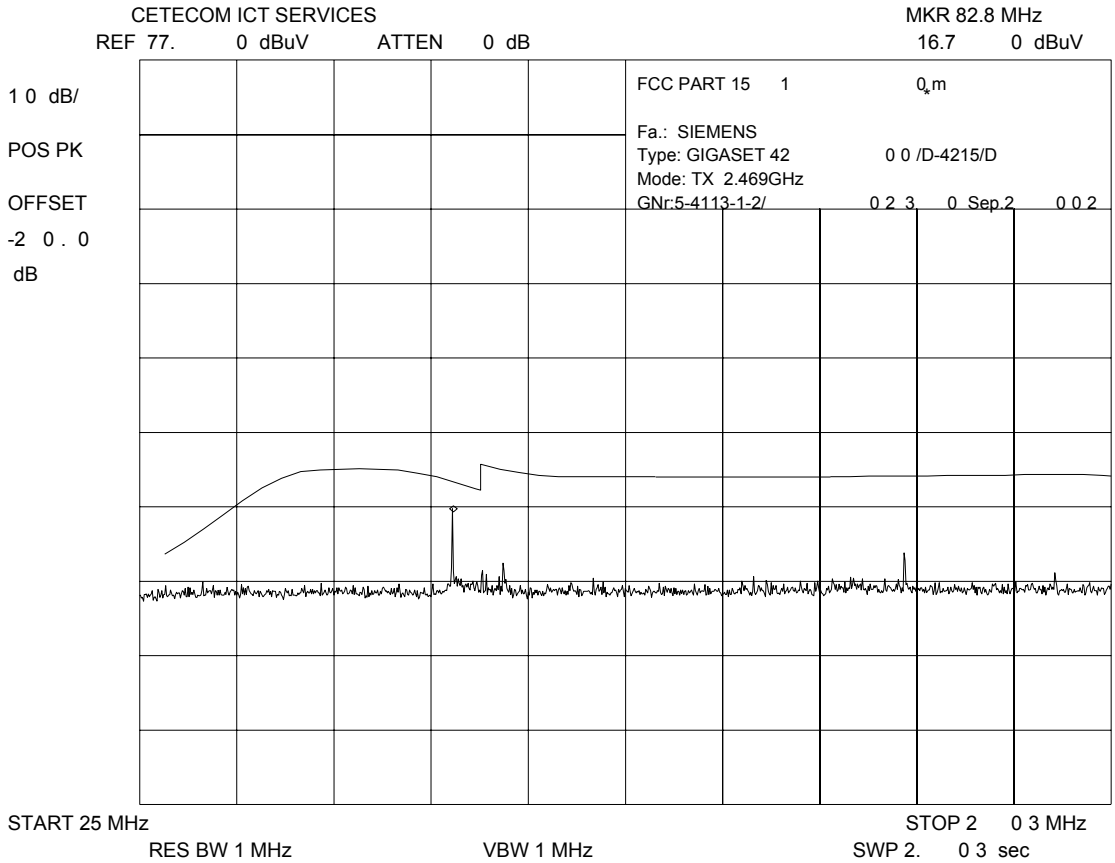


This plot was made with a wideband horn antenna and a special low noise preamp. We measured base station and handset together. There were no peaks found.

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)).

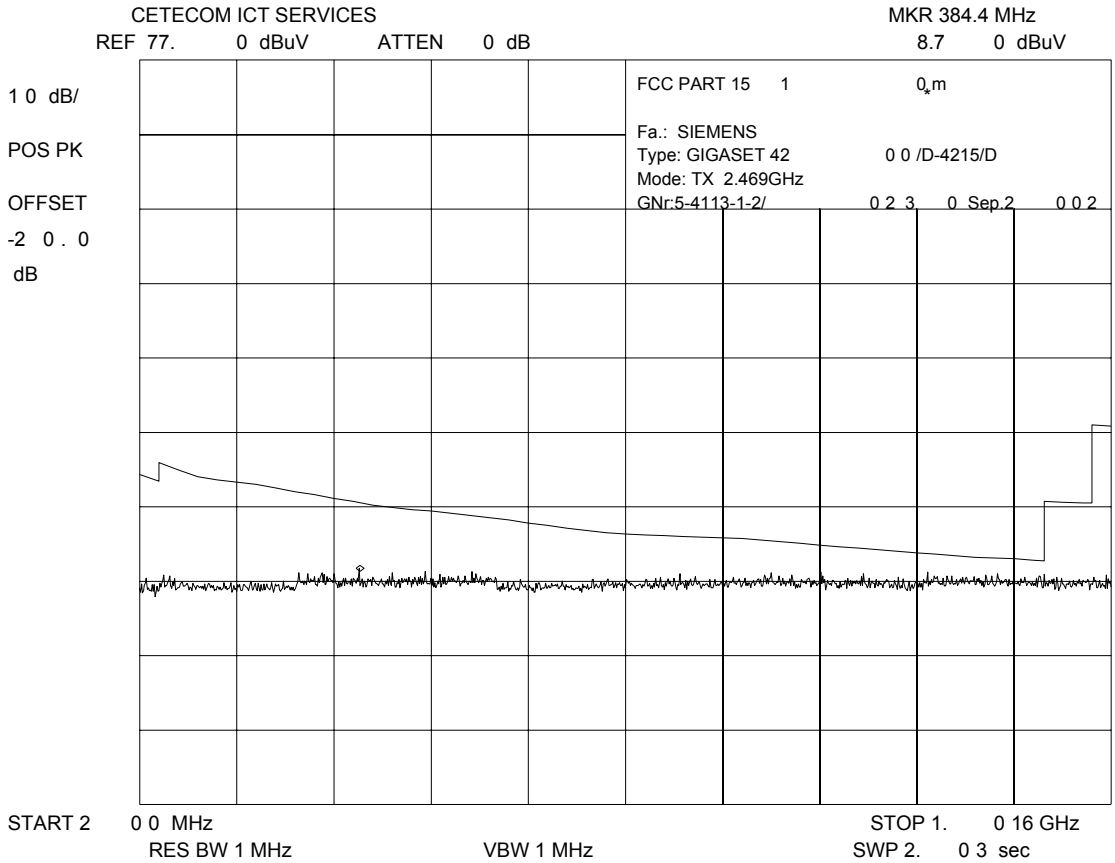
EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
high channel 30 – 200 MHz (vertical)



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)).

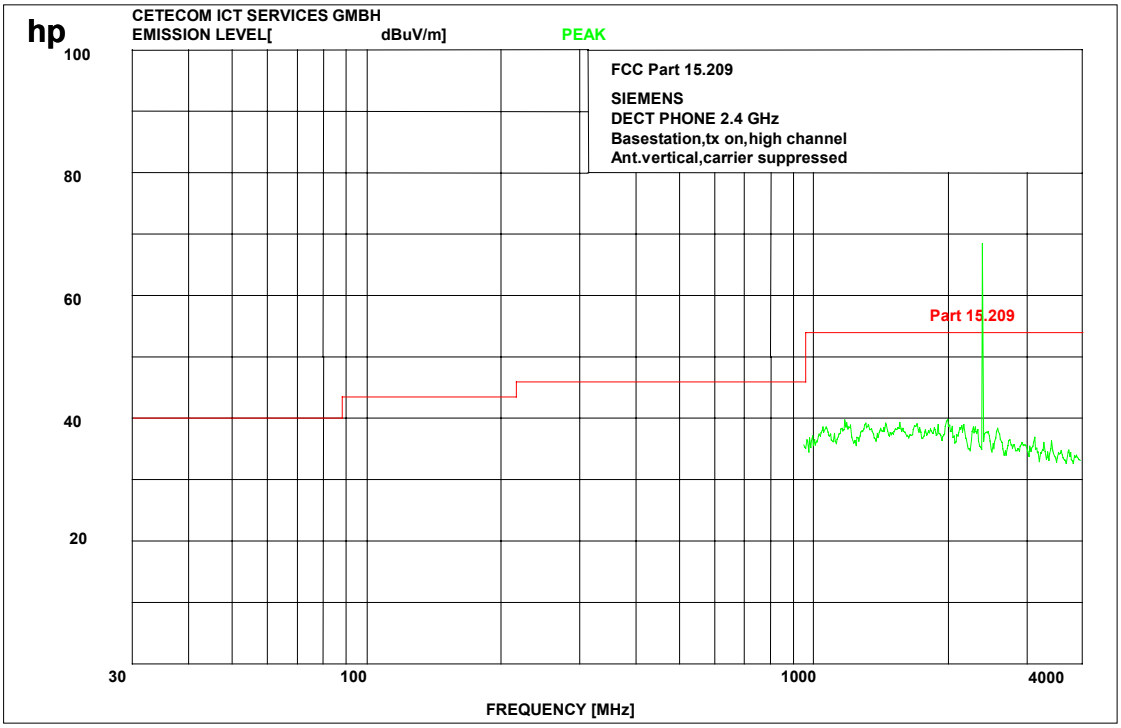
EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
high channel 200 - 1000 MHz (vertical)



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)).

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
high channel 1000 - 4000 MHz (vertical)



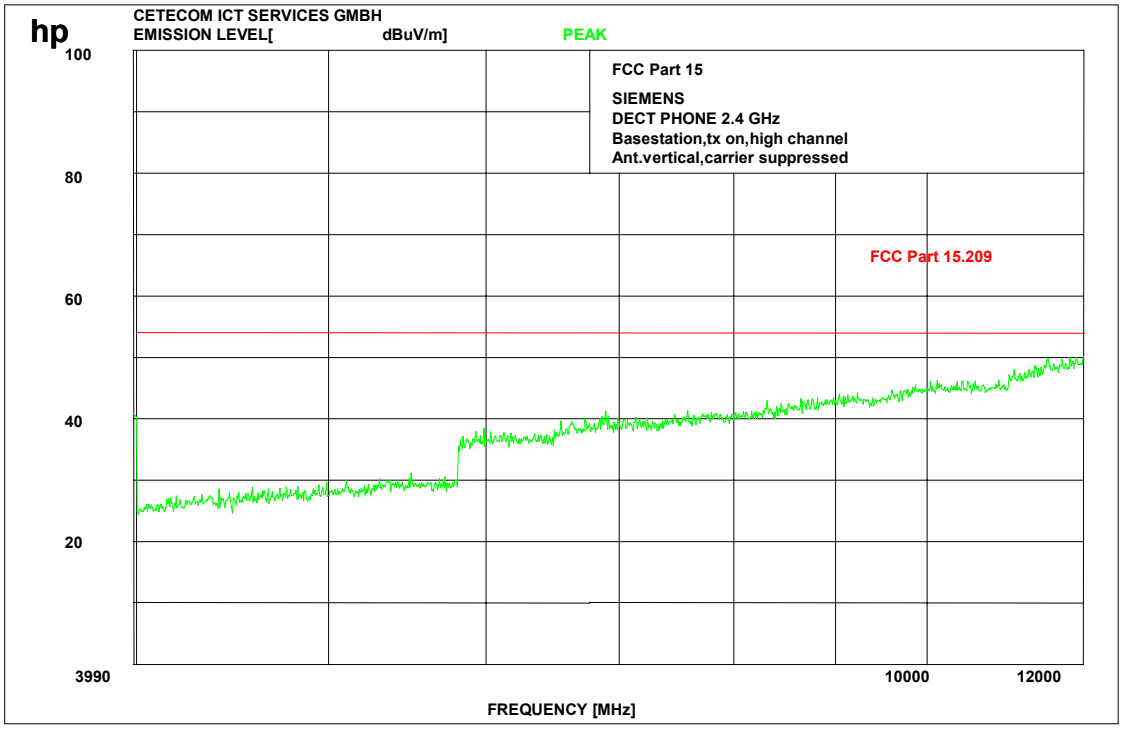
RBW/VBW 1 MHz

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)).

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

high channel up to 12 GHz



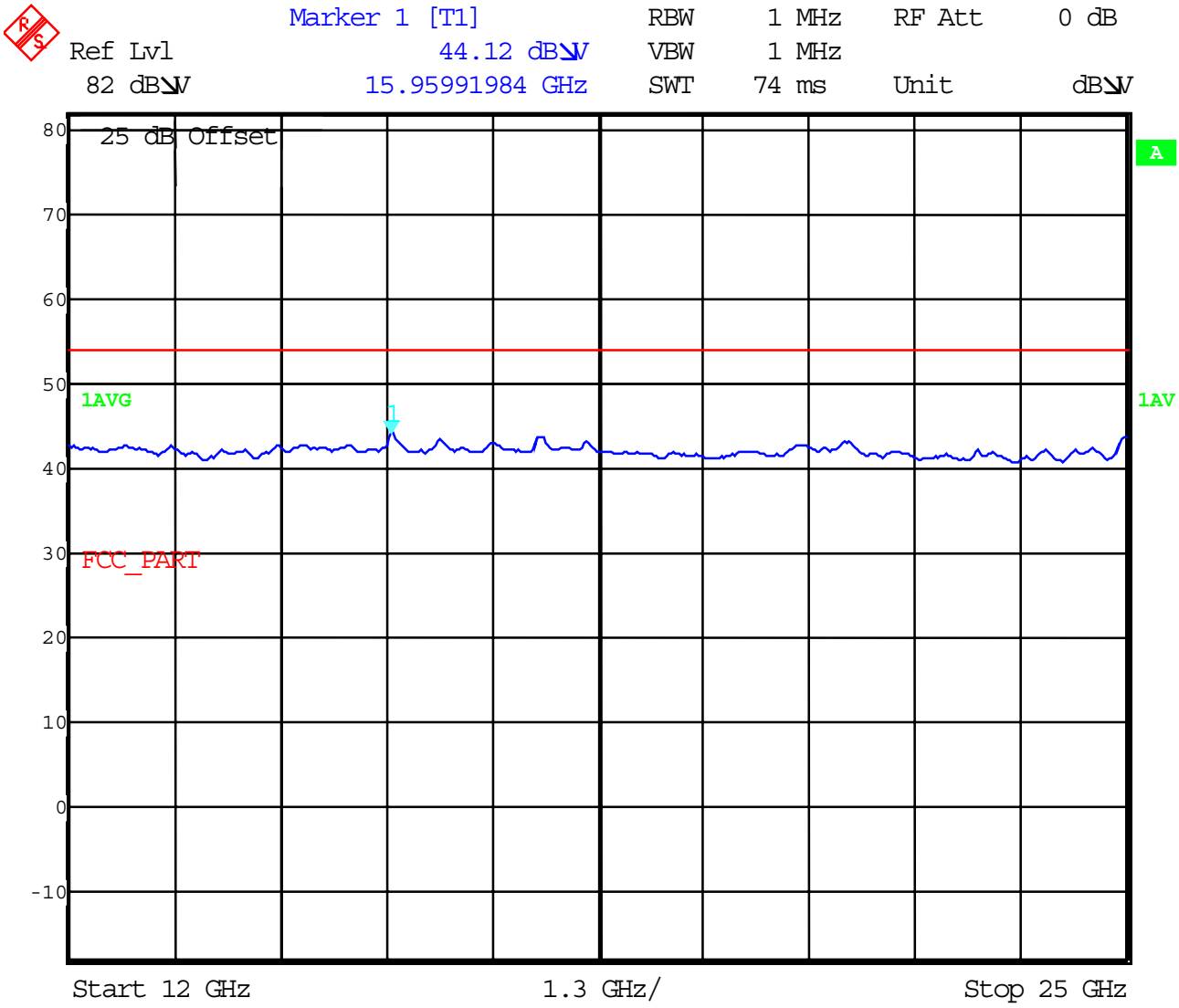
RBW/VBW 1 MHz

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)).

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

High channel up to 25 GHz



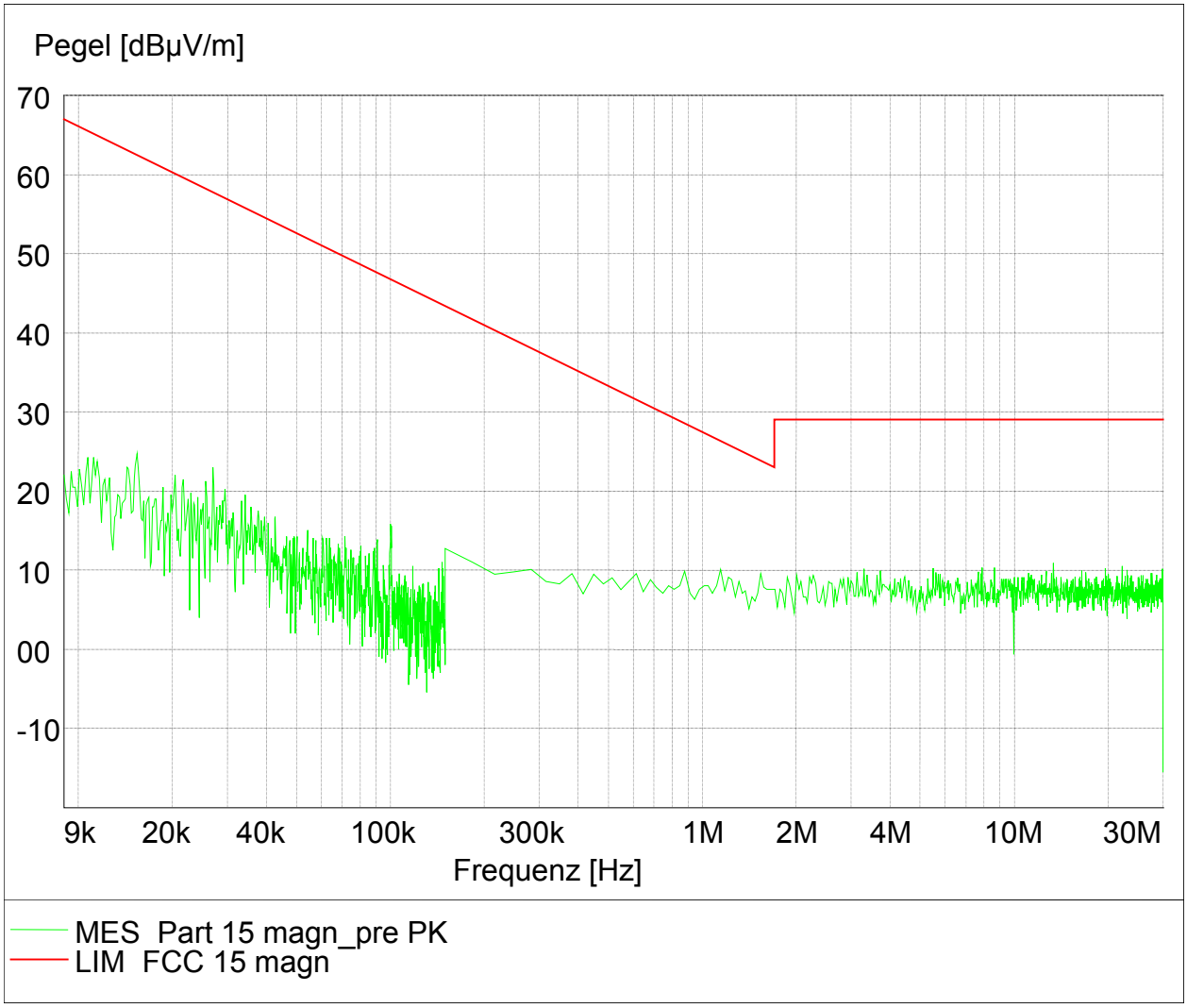
This plot was made with a wideband horn antenna and a special low noise preamp. We measured base station and handset together. There were no peaks found.

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)).

EMISSION LIMITATIONS- Radiated **§ 15.209 (a)**

The lowest produced frequency in the product is 10.38 MHz, so we made a radiated test from 9 kHz to 30 MHz to show compliance with the FCC rules.



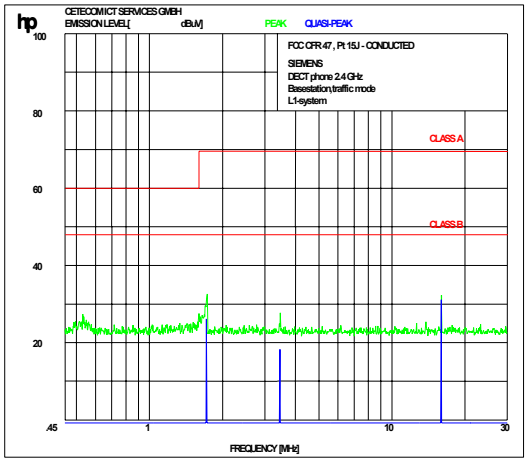
We made this measurement at a distance of 30 m and recalculated the result in the range from 9 kHz to 490 kHz with a factor of 40 dB/decade according to the FCC rules.

All peaks were far below the limits, als some remeasurements with a CISPR QP adapter and 9 kHz BW.

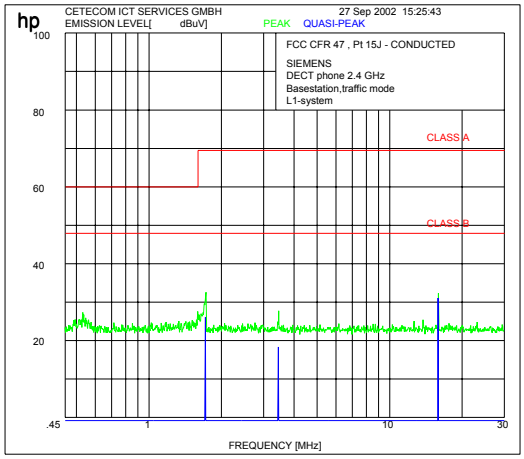
<u>The product complies with the rules.</u>

CONDUCTED EMISSIONS § 15.207

L1-system



N-system



CONDUCTED EMISSIONS				
f (MHz)	amplitude of emission (dBµV) QUASIPEAK	amplitude of emission (dBµV) PEAK	limit max. allowed emmision (QP) power (dBµV)	results
1.723	26.1		56.0	complies
3.46	18.3		56.0	complies
15.92	31.5		60.0	complies
Measurement uncertainty		± 3dB		

Limits:

	limit QP (dBµV)	limit AV (dBµV)
0.15 – 0.5 MHz	66 - 56	56 - 46
0.5 - 5.0 MHz	56	46
5.0 – 30.0 MHz	60	50

Receiver

EMISSION LIMITATIONS- Radiated **§ 15.209**

All peaks found were QP or Average >6 dB below limit of FCC15.209

EMISSION LIMITATIONS					
f (MHz)	polari-zation	amplitude of emission (dBµV/m) QUASIPEAK	amplitude of emission (dBµV/m) average	limit max. allowed emmision power (dBµV/m)	results
62.15	vert	18.3		40.0	complies
88.36	vert	15.9		43.5	complies
110.64	vert	16.9		43.5	complies
Measurement uncertainty		± 3dB			

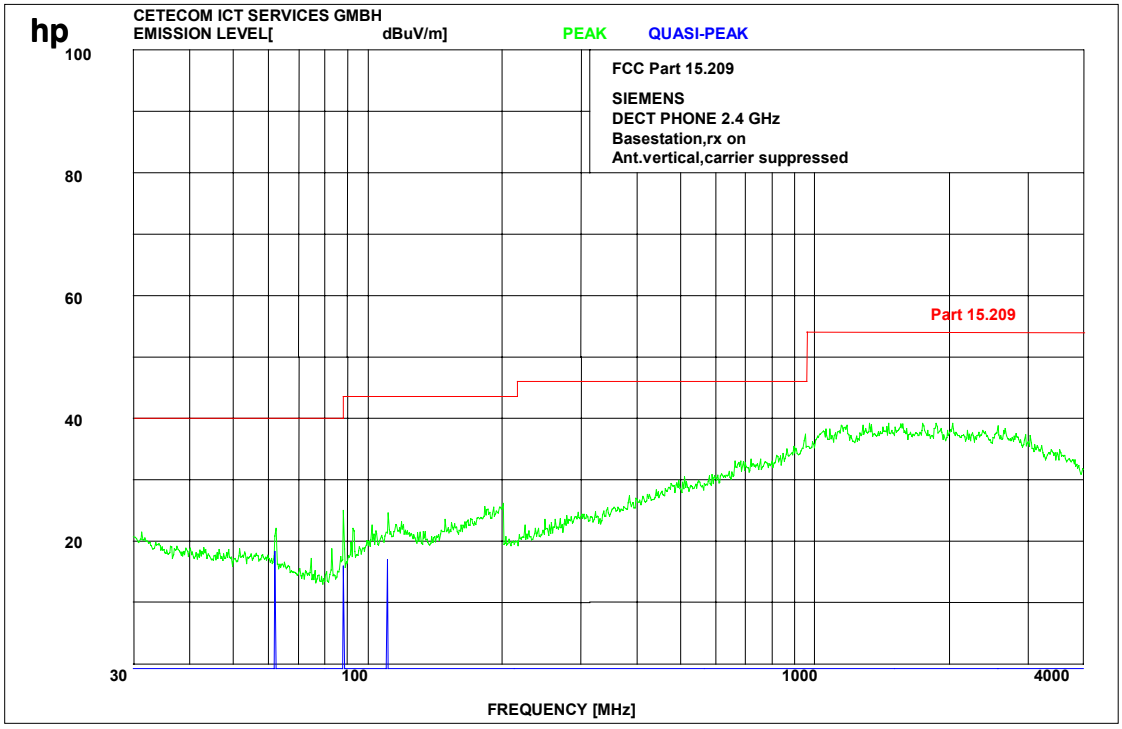
<u>All peaks found in Receiving mode are < limit.</u>

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

EMISSION LIMITATIONS- Radiated **§ 15.209**
Receiver 30 - 4000 MHz (vertical)

RBW/VBW < 1 GHz 100 kHz, RBW/VBW > 1GHz 1 MHz

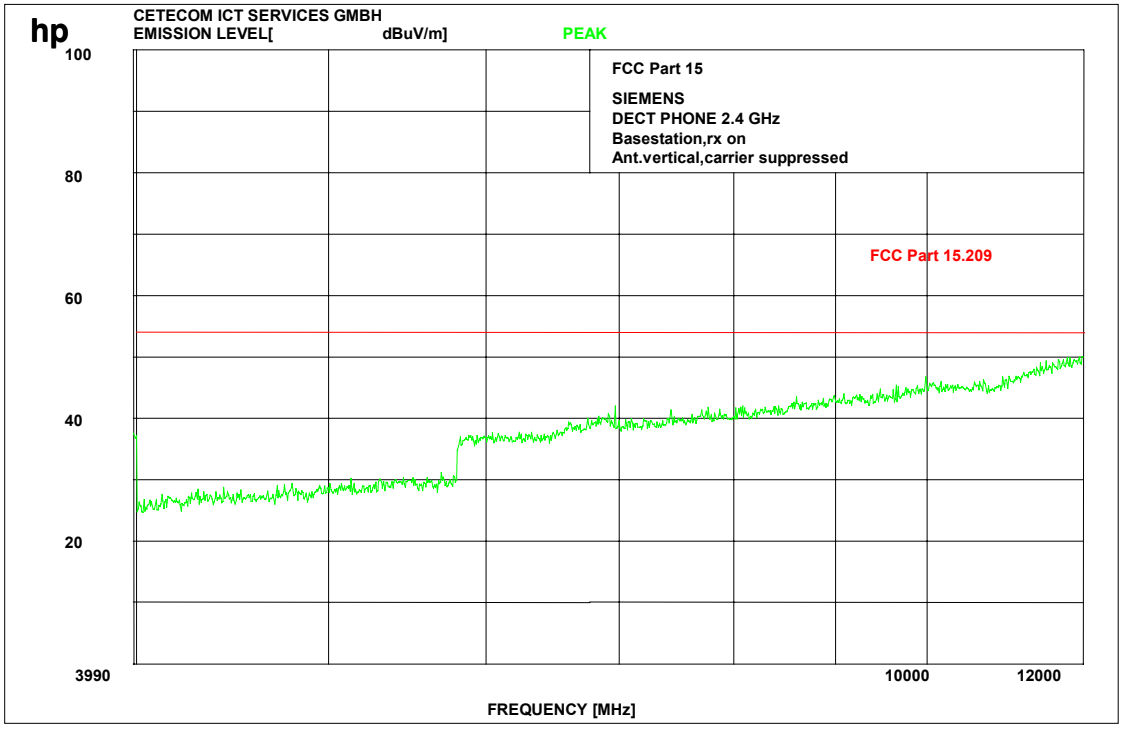


Limits **SUBCLAUSE § 15.209**

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

EMISSION LIMITATIONS- Radiated **§ 15.209**
Receiver 4000– 12000 MHz (vertical)

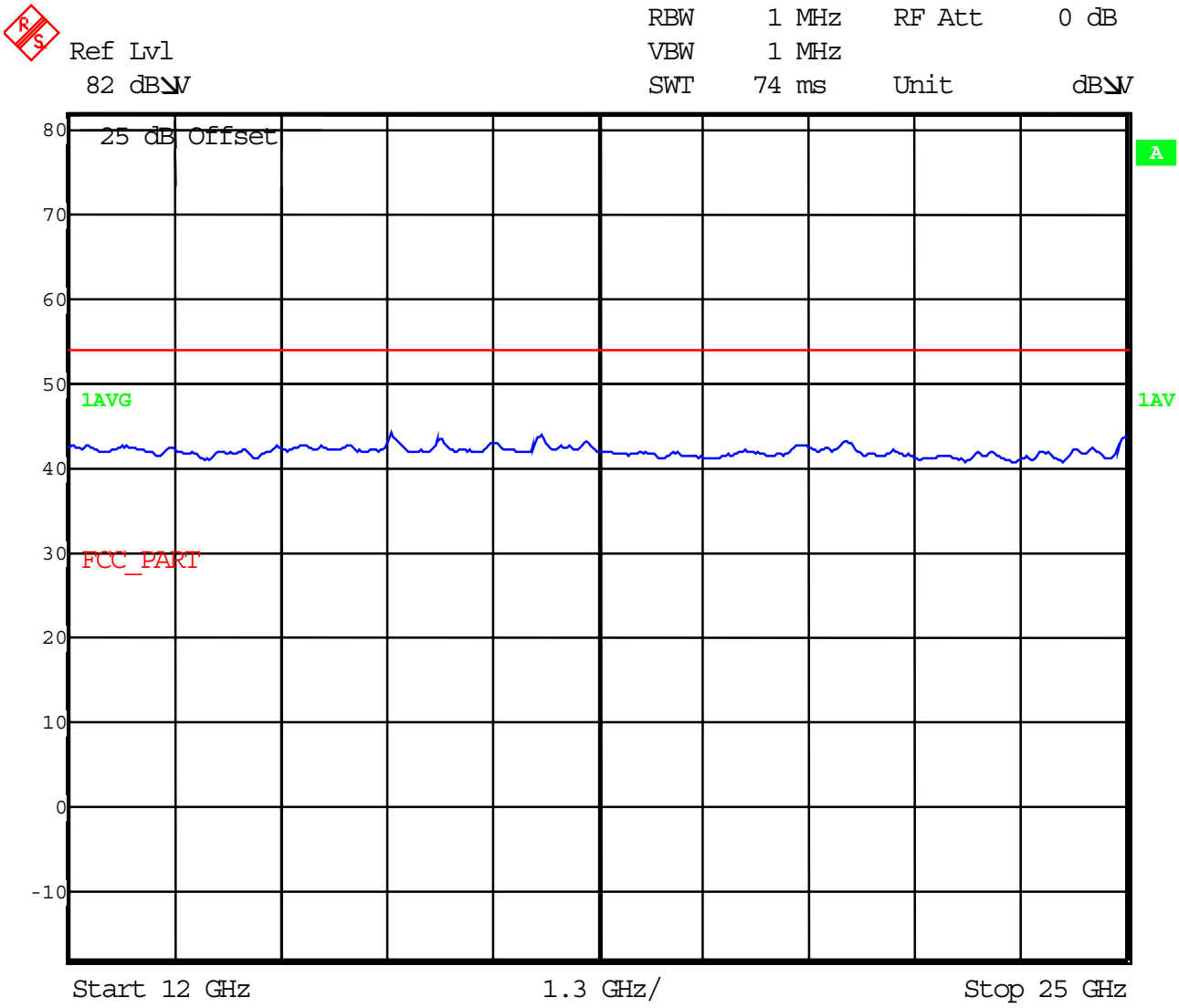
RBW/VBW 1 MHz



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

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



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

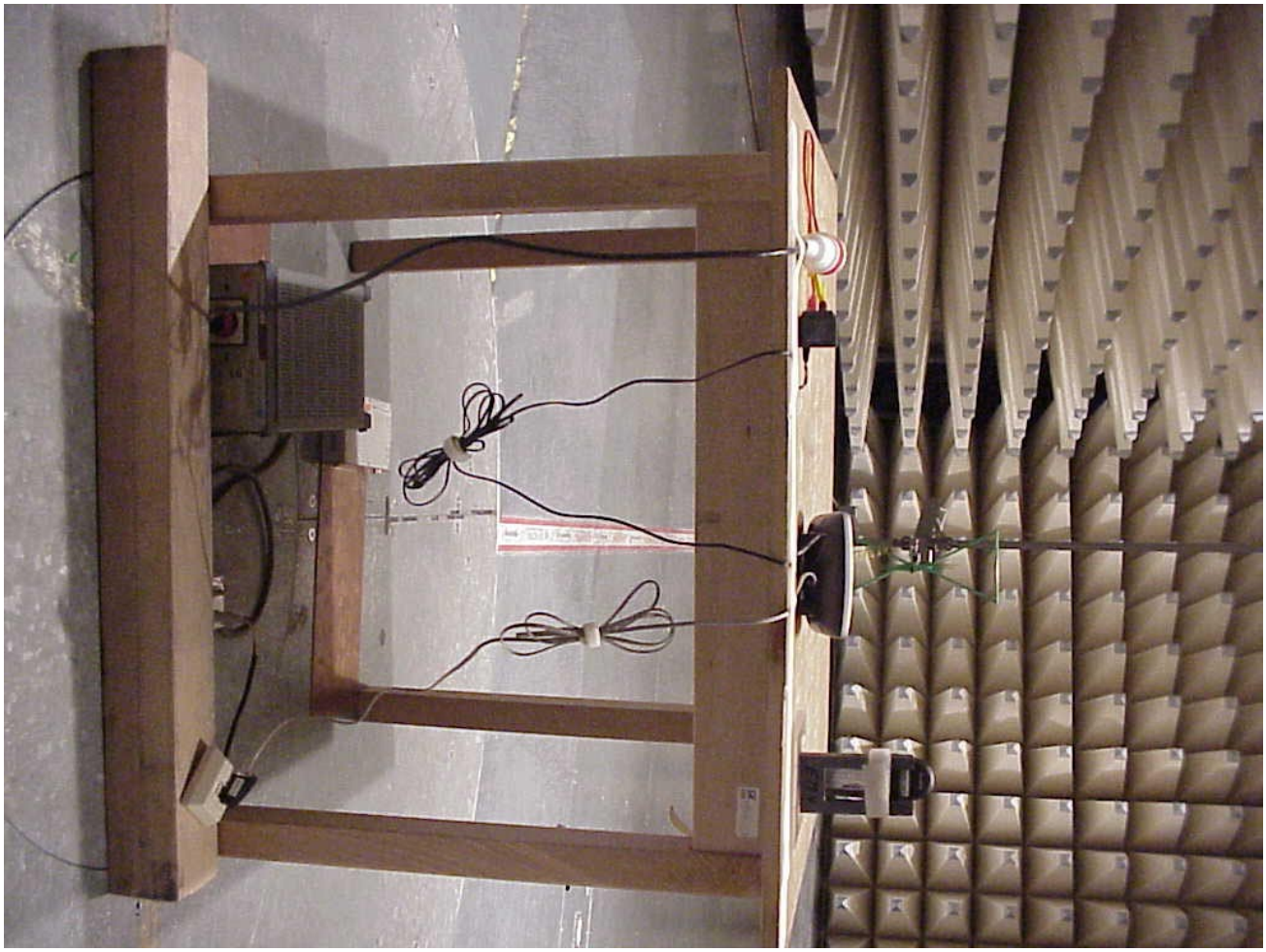
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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.

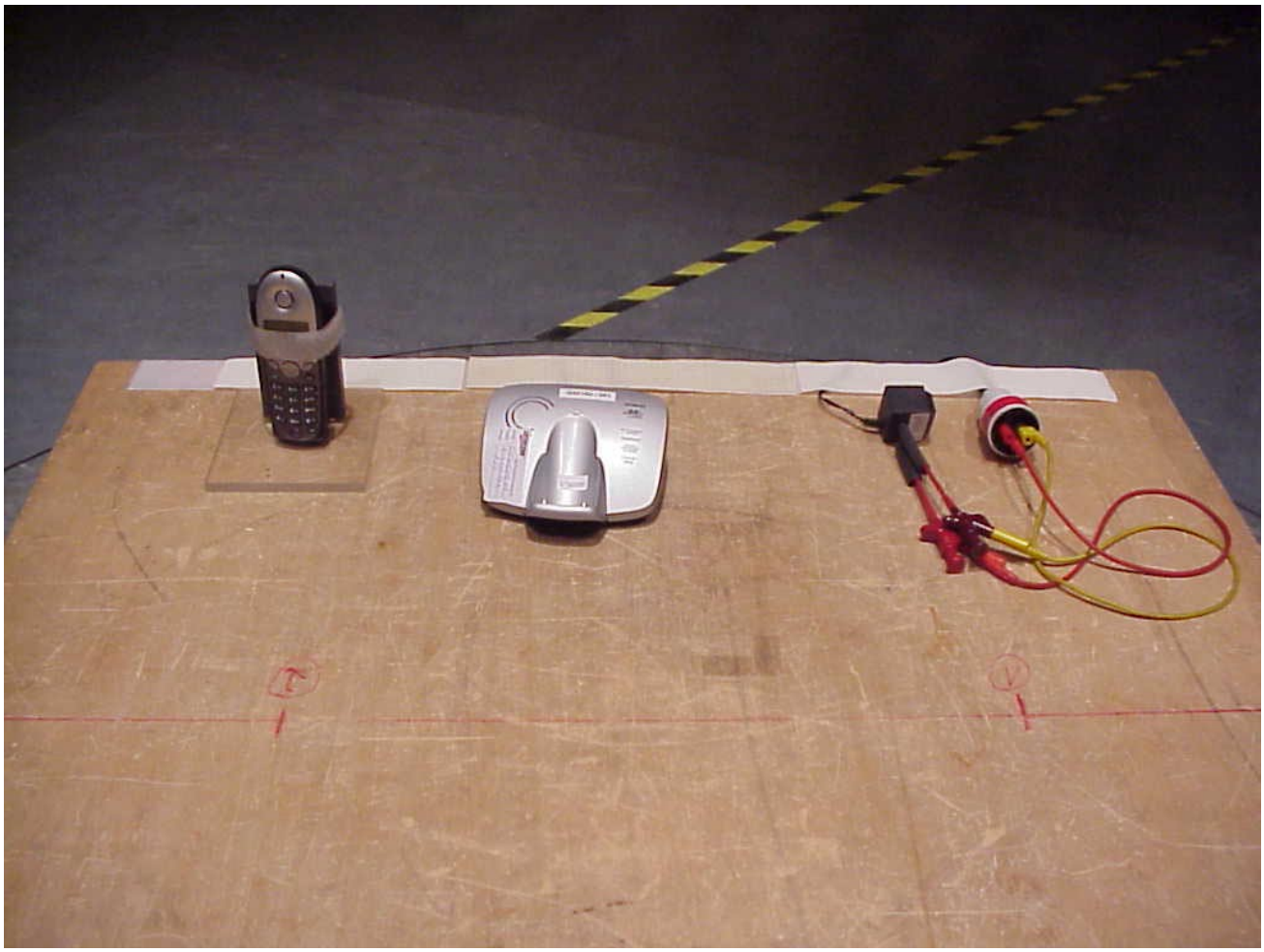
No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860
03	Oscilloscope	7633	Tektronix	230054
04	Radio Analyzer	CMTA 54	Rohde & Schwarz	894 043/010
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027
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
67				

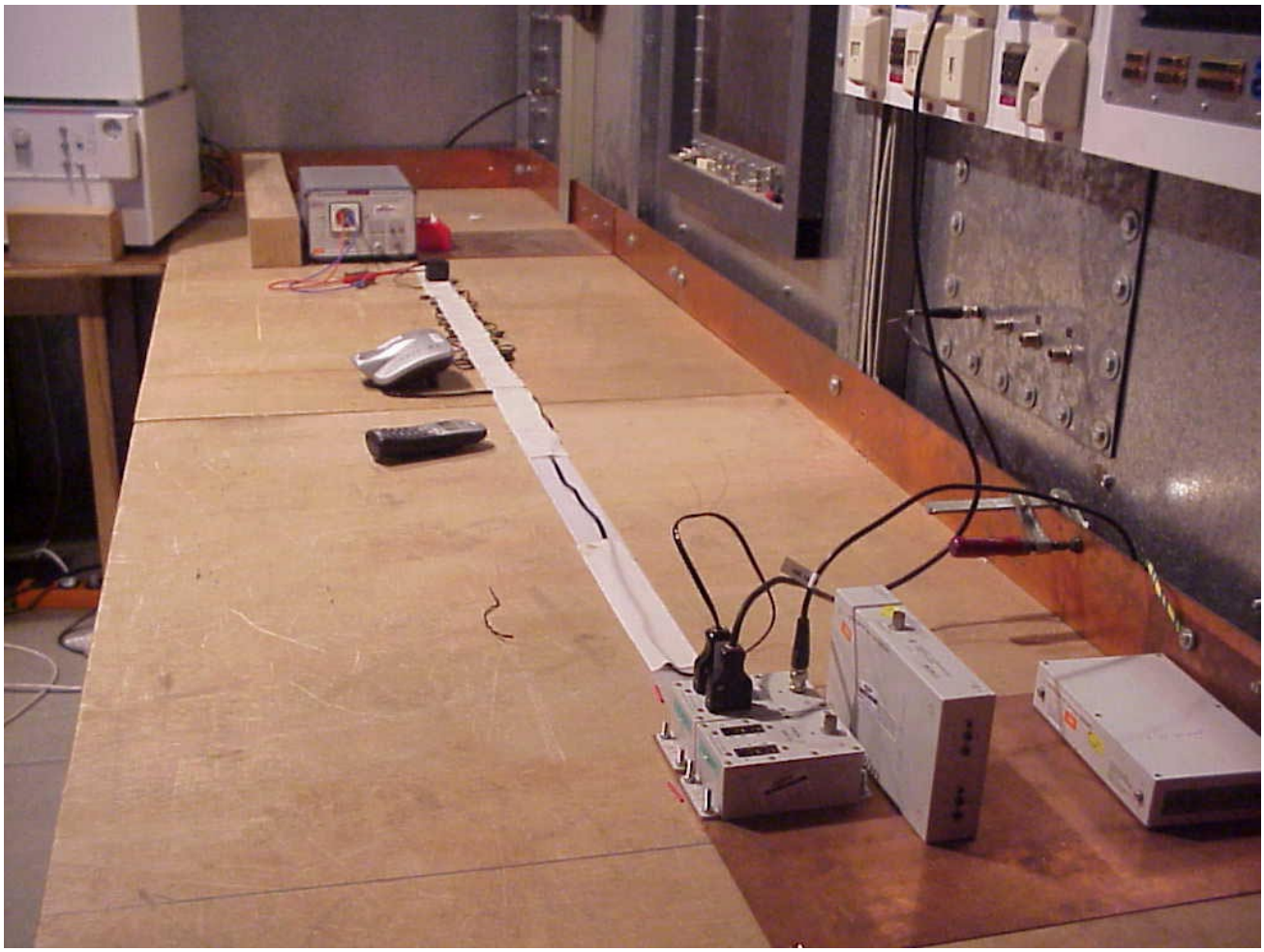
Test site
RADIATED EMISSIONS



Test site
RADIATED EMISSIONS



Test site
Conducted EMISSIONS

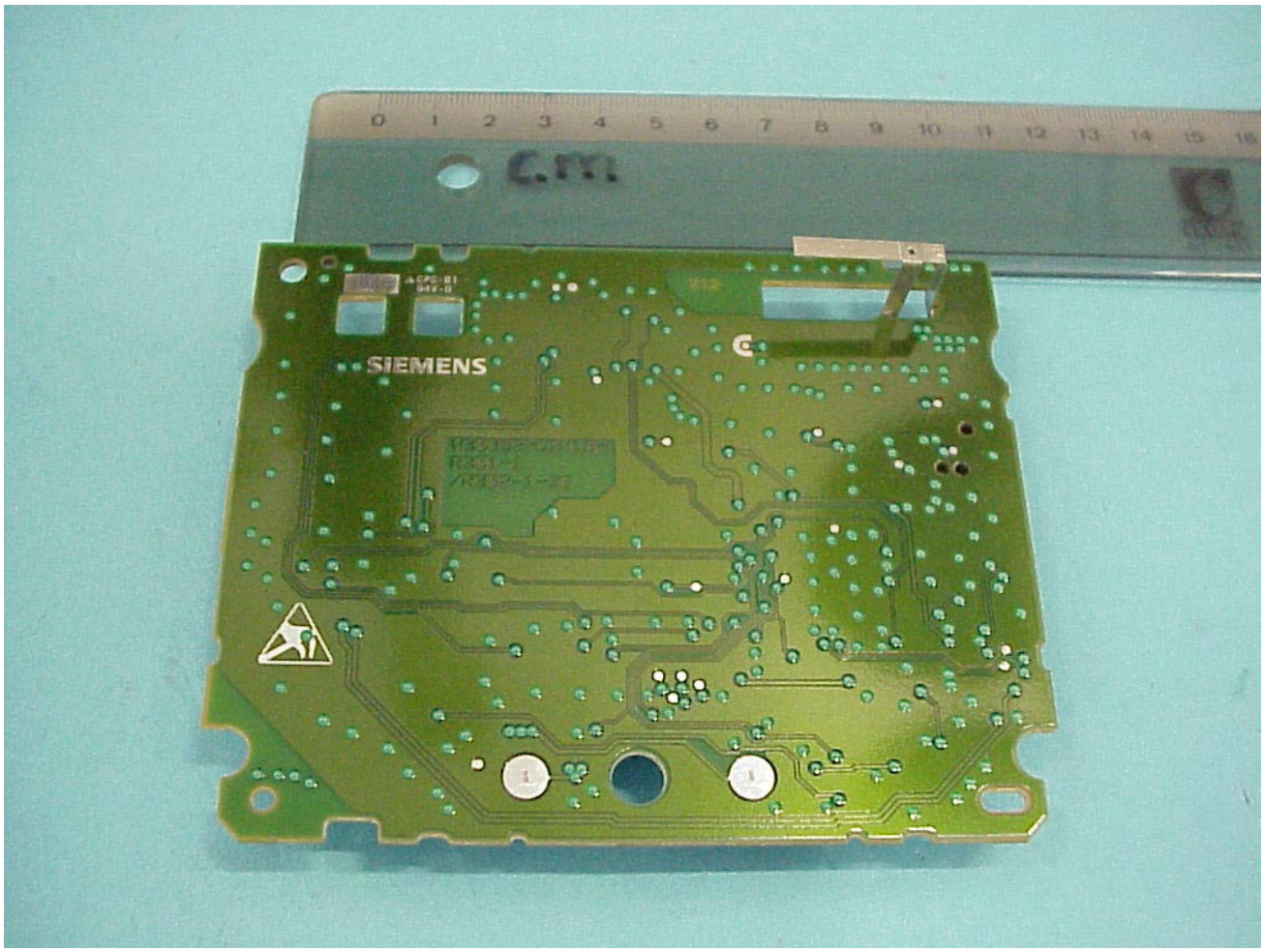


Base station

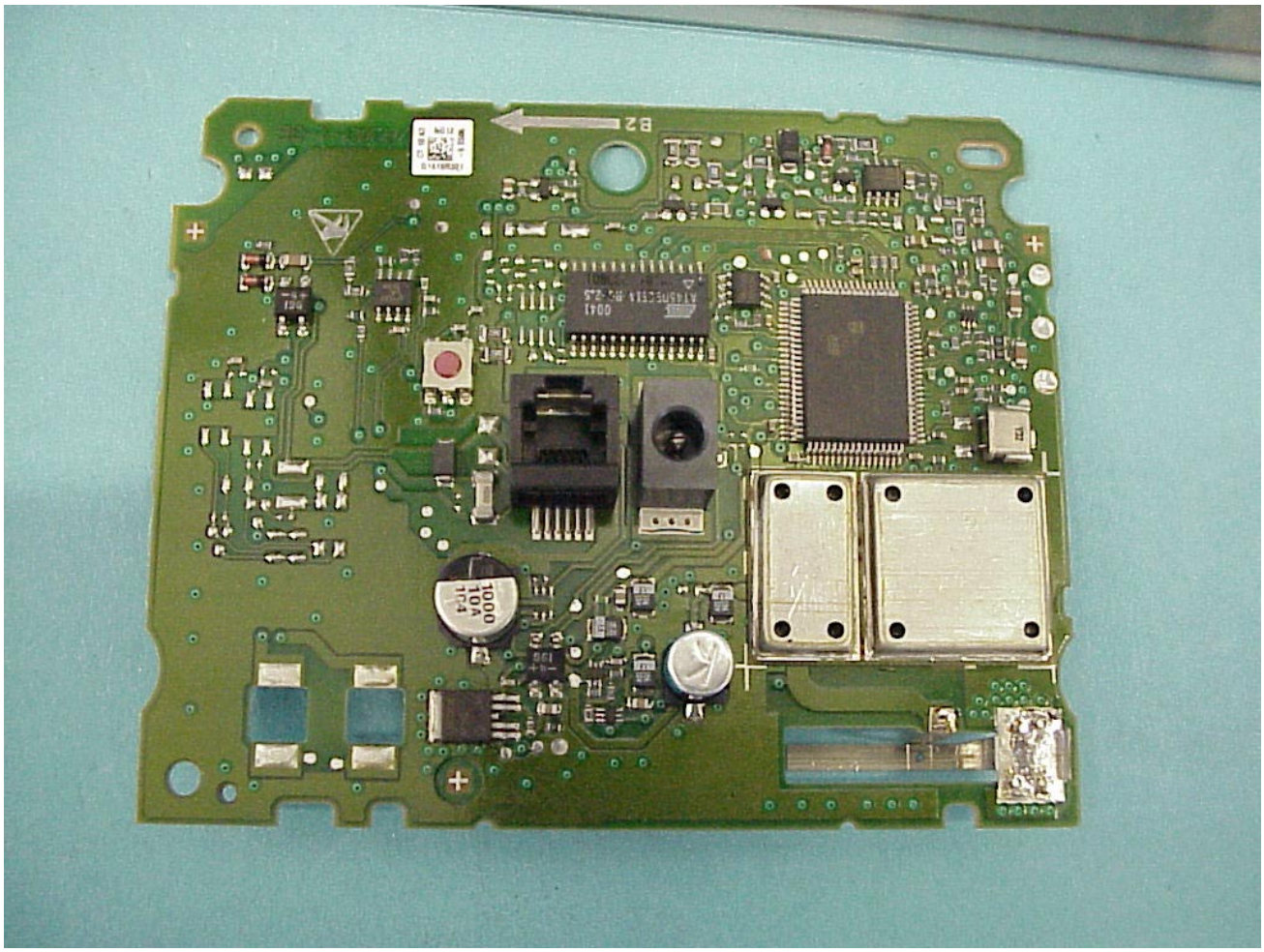
Photographs of the equipment

Photographs of the equipment

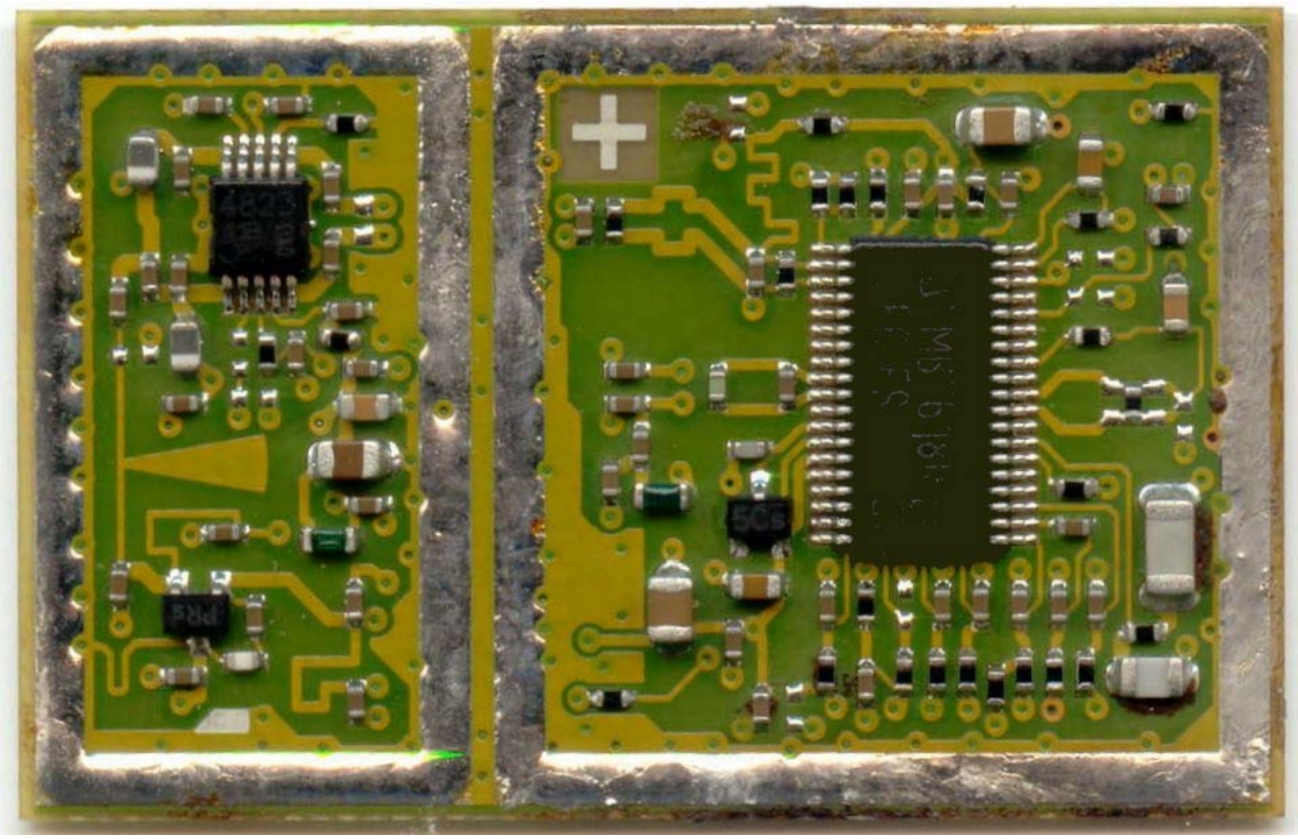
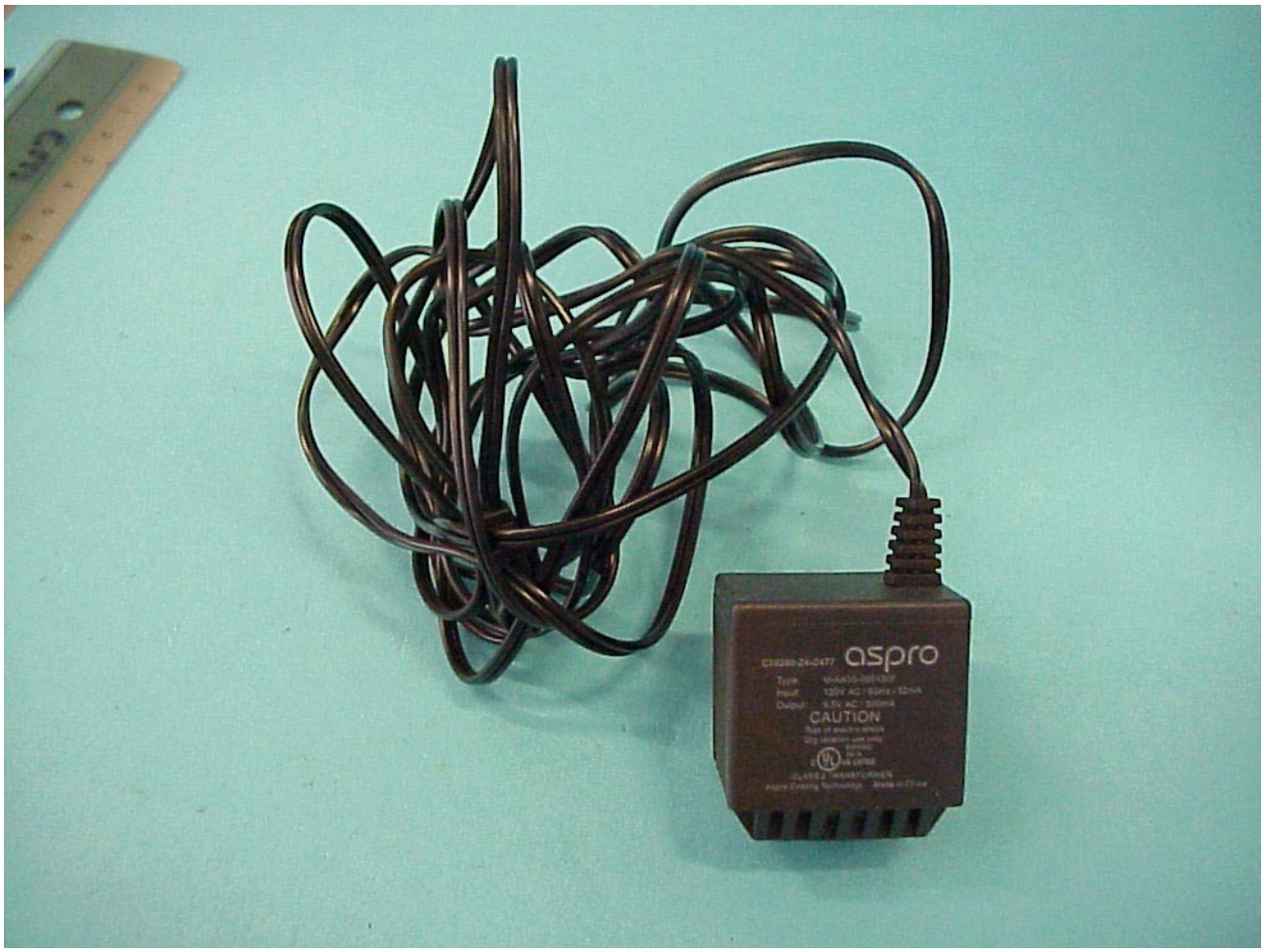
Photographs of the equipment



Photographs of the equipment



Photographs of the equipment



Photographs of the equipment