TEST REPORT OF A W-CDMA SUBSCRIBER TERMINAL, MODEL CPE-400-270, BRAND SOMA NETWORKS, IN ACCORDANCE WITH 47 CFR PART 27 (2005-10-01).

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MEASUREMENT/TECHNICAL REPORT

Sanyo Electric Co., Ltd.

Model : CPE-400-270

FCC ID: AEZCPE-400-270

October 20, 2006

This report concerns:	Original grant/certification ~~Class 2 change~~ ~~Verification~~	
Equipment type:	Licensed non-broadcast station transmitter	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	~~Yes~~	No
Report prepared by:	Company name	: Sanyo Electric Co., Ltd. Testing Laboratory
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The data taken for this test and report herein was done in accordance with 47 CFR Part 27 (Miscellaneous Wireless Communications Services) and the measurement procedures of ANSI C63.4: 2003. Sanyo Electric Co., Ltd. Testing Laboratory at Kobe-city, Japan, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: October 20, 2006 Signature: Hiroyuki Wada

H. Wada
Sanyo Electric Co., Ltd. Testing Laboratory

Description of test item

Test item	:	W-CDMA subscriber terminal
Manufacturer	:	Sanyo Electric Co., Ltd.
Brand	:	SOMA Networks
Model	:	CPE-400-270
Serial numbers	:	1306419001
Revision	:	-
Receipt number	:	1
Receipt date	:	October 13, 2006

Applicant information

Applicant's representative	:	Mr. O. Shimizu
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Test(s) performed

Location	:	Kobe-city
Test(s) started	:	October 14, 2006
Test(s) completed	:	October 18, 2006
Purpose of test(s)	:	Type approval / certification
Test specification(s)	:	47 CFR Part 27 (2005-10-01)

Test engineer(s) : K. Yamamoto 

I. Nakajo 

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1 General information

1.1 Product description

The W-CDMA subscriber terminal, brand SOMA Networks, model CPE-400-270, is designed to operate in the frequency band of 2305 - 2315 MHz, where the definitions of the various frequency blocks in this frequency range are listed en defined in 47 CFR Part 27, section 27.5 (a)(1) and 27.5 (a)(2).

The W-CDMA subscriber terminal, brand SOMA Networks, model CPE-400-270, utilizes W-CDMA technology and does not contain any analog voice circuitry.

The W-CDMA subscriber terminal, brand SOMA Networks, model CPE-400-270, incorporates an integral antenna, having a gain of 4.5 dBi max.

1.2 Related submittal(s) and/or Grant(s)

Not applicable.

1.3 Tested system details

Details and an overview of the system and all its components, as it has been tested, can be found in table 1 below. FCC ID's are stated in this overview where applicable. The EUT is listed in the first row of this table 1.

Description	Model number	Serial number	FCC ID	Cable descriptions
W-CDMA subscriber terminal	CPE-400-270	1306419001	AEZCPE-400-270	-Shielded USB cable to notebook computer -Unshielded ethernet cable to notebook computer -Unshielded cable to telephone 1 -Unshielded cable to telephone 2
AC/DC power adapter 100-240 VAC/1 Amps to +12 VDC/2.5 Amps	0322B1230	A30627187234	n.a.	-Unshielded DC power cord to EUT -Unshielded power cord to AC mains
Telephone	RadioShack	40332314	n.a.	-Unshielded cable to EUT
Telephone	P88-0071-0	87218758	n.a.	-Unshielded cable to EUT
Notebook computer	PSA10N-28RU1	Z3050606J	n.a. (DoC)	-Unshielded ethernet cable and Shielded USB cable to EUT

Table 1 - Tested system details overview.

1.4 Test methodology

The test methodology used is based on the requirements of 47 CFR Part 27 (2005-10-01), sections 27.50 (a)(1), 27.53 (a)(1), 27.53 (a)(3) and 27.54.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters. Below 30 MHz the radiated emission tests were carried out at measurement distances of 3 and 10 meters. The test results regarding the radiated emission tests on frequencies below 30 MHz have been extrapolated in order to determine the field strength of the measured values at measurement distances of 30 and 300 meters.

The bandwidth of the receiver is switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

Radiated emission tests on frequencies above 1 GHz were performed with appropriate pre-amplifiers, antennas and a spectrum analyzer. At frequencies on which radiated emissions were found the level at the input of the pre-amplifier was reproduced by means of a RF signal generator. The output level of the signal generator was then increased with the antenna factor in order to obtain the actual field strength value for each individual frequency on which radiated emissions were found.

1.5 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at Sanyo Electric Co., Ltd. Testing Laboratory, located at 7-3-2 Higashimachi, Ibukidai, Nishi-ku, Kobe-city, Hyogo Prefecture, 651-2242 , Japan.

The description of the test facilities has been filed at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public (47 CFR Part 2, section 2.948).

The list of all public test facilities is available on the Internet at http://www.fcc.gov.

1.6 Product labeling

In accordance with 47 CFR Part 2.925 (a)(1), the FCC ID shall be placed on a label, which is attached to the EUT.

For further details about the labeling requirements (size, legibility, etc.) as set by the Federal Communications Commission see 47 CFR Part 2.925 and 47 CFR Part 2.926.

1.7 System test configuration

1.7.1 Justification

The system was configured for testing in a typical fashion (as an end-user would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

Tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

Further details may be found in table 2 below.

Channel	Transmitter frequency (MHz)	Maximum rated output power (dBm,EIRP)
A	2307.5	+31.5
B	2312.5	+31.5

Table 2 - Specification of channels and rated maximum output power (dBm, EIRP).

1.7.2 EUT exercise software

The EUT could be enabled for operation on channel A (2307.5 MHz) and channel B (2312.5 MHz) by means of test software, which was supplied by the manufacturer of the EUT. The test software could also be used to switch of the modulation of the carrier for those tests where this was necessary.

1.8 Special accessories

No special accessories are used and/or needed to achieve compliance with the appropriate sections of 47 CFR Part 27 (Miscellaneous Wireless Communications Services).

1.9 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the appropriate sections of 47 CFR Part 27 (Miscellaneous Wireless Communications Services).

1.10 Configuration of the tested system

Not applicable. See table 1 in section 1.3 of this test report.

1.11 Block diagram(s) of the EUT

The block diagram is available as part of the documentation which is to be submitted to the FCC/TCB.

2 Transmitter tests

2.1 RF output power (conducted)

RF output power measurements (conducted) have been carried out in accordance with 47 CFR Part 27.50 (a)(1) and 47 CFR Part 2.1046.

The maximum RF output power (conducted) was measured directly at the antenna connector in order to obtain reliable measurement results for a worst case MPE estimation.

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).
The measurements have been performed while using a power meter which was calibrated in terms of a RMS-equivalent voltage. The power meter was used in order to enable a measurement over the full bandwidth of the channel.

Power measurement (conducted method):

The following procedure was used for the measurements.

1) Set the EUT to maximum power and to the lowest channel.

2) A power meter was used to measure the power output.

3) Correct for any external attenuation used for the protection of the input of the sensor head. Also set the power sensor correction by setting up the frequency range that will be measured. Correct for any measurement cable loss.

4) Repeat this for all other channels which are to be tested.

2.1.1 Test results

The results of the tests on the EUT, carried out in accordance with 47 CFR Part 27.50 (a)(1) and 47 CFR Part 2.1046, are depicted in table 3.

Test conditions		RF output power (conducted, dBm)	
		channel A	channel B
T_{nom} = +20 °C	V_{nom} = 120 VAC	26.60	26.71
Antenna gain (peak, dBi)		4.5	4.5
Output power (calculated, dBm, EIRP)		31.10	31.21

Table 3 - Maximum RF output power (conducted)

2.2 RF output power (EIRP)

RF output power measurements (EIRP) have been carried out in accordance with 47 CFR Part 27.50 (a)(1) and 47 CFR Part 2.1046.

The maximum radiated RF output power was measured by using the substitution measurement method.

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

Power measurement (radiated method):

The following procedure was used for transmitters that do not use external antennas.

1) Set the EUT to maximum power and to the lowest channel.

2) A spectrum analyzer was use to measure the power output. The search antenna was located 3 meters from the EUT.

3) The spectrum analyzer resolution and video bandwidth was set to 5 MHz to measure the power output. No amplifier was used since the fundamental will cause the amplifier to saturate.

4) The EUT was then rotated for a complete 360 degrees and the search antenna was raised and lowered to maximize the fundamental. Both vertical and horizontal polarizations were performed. All correction factors are applied to the fundamental.

5) Substitution is then performed. Substitution method is performed by replacing the EUT with a horn antenna, which factors can be reference to a half-wave dipole, and with a signal generator. The signal generator power level is adjusted until a similar level, which was measured, in step 4, is achieved on the spectrum analyzer. The level on the signal generator is than added to the antenna factor, in dBi, which will give the corrected value.

6) Steps 1 to 5 are repeated for all other channels which are to be tested.

2.2.1 Test results

The results of tests on the EUT, carried out in accordance with 47 CFR Part 27.50 (a)(1) and 47 CFR Part 2.1046, are depicted in table 4 and table 5.

Test conditions	RF output power (EIRP, dBm)	
	channel A	channel B
Observed level on spectrum analyzer (dBm)	-8.65	-8.18
Correction factor (dB)	38.55	38.05
Radiated RF output power (EIRP, dBm)	29.90	29.87

Table 4 - Maximum RF output power (EIRP) with the antenna in a vertical position

Test conditions	RF output power (EIRP, dBm)	
	channel A	channel B
Observed level on spectrum analyzer (dBm)	-15.82	-15.47
Correction factor (dB)	38.35	39.05
Radiated RF output power (EIRP, dBm)	22.53	23.58

Table 5 - Maximum RF output power (EIRP) with the antenna in a horizontal position

2.3 Occupied bandwidth

Occupied bandwidth measurements have been carried out in accordance with 47 CFR Part 2.1049.

Both the occupied bandwidth at -26 dB below maximum RF output power and the 99% occupied bandwidth tests were carried out. The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

Occupied bandwidth (conducted method):

Either for analog, digital, or data modulations, occupied bandwidth was performed. The EUT was set to transmit the appropriate modulation at maximum power. The bandwidth was measured using following methods:

1) 26 dB was subtracted to the maximum peak of the emission. Then the display line function was used to, in conjunction with the marker delta function, to measure the emissions bandwidth.

2) The built-in 99% function of the spectrum analyzer was used.

3) For the above two methods a resolution and video bandwidth of 50 kHz (which is 1% of the maximum allowable emission bandwidth of 5 MHz, see also 47 CFR Part 27, section 27.53 (a)(4)) was used to measure the emission's bandwidth. An offset in reading in dB was set which is identical to the maximum antenna peak gain in dBi + measurement cable loss in dB.

Plots of the measurements have been made available on the next pages of this test report.

2.3.1 Test results

The results of tests on the EUT, carried out in accordance with 47 CFR Part 2.1049, are depicted in table 6 and table 7.

Test conditions		Occupied bandwidth (MHz @ -26 dB)	
		channel A	channel B
T_{nom} = +20 °C	V_{nom} = 120 VAC	4.65	4.63

Table 6 - Occupied bandwidth (-26 dB below maximum RF output power)

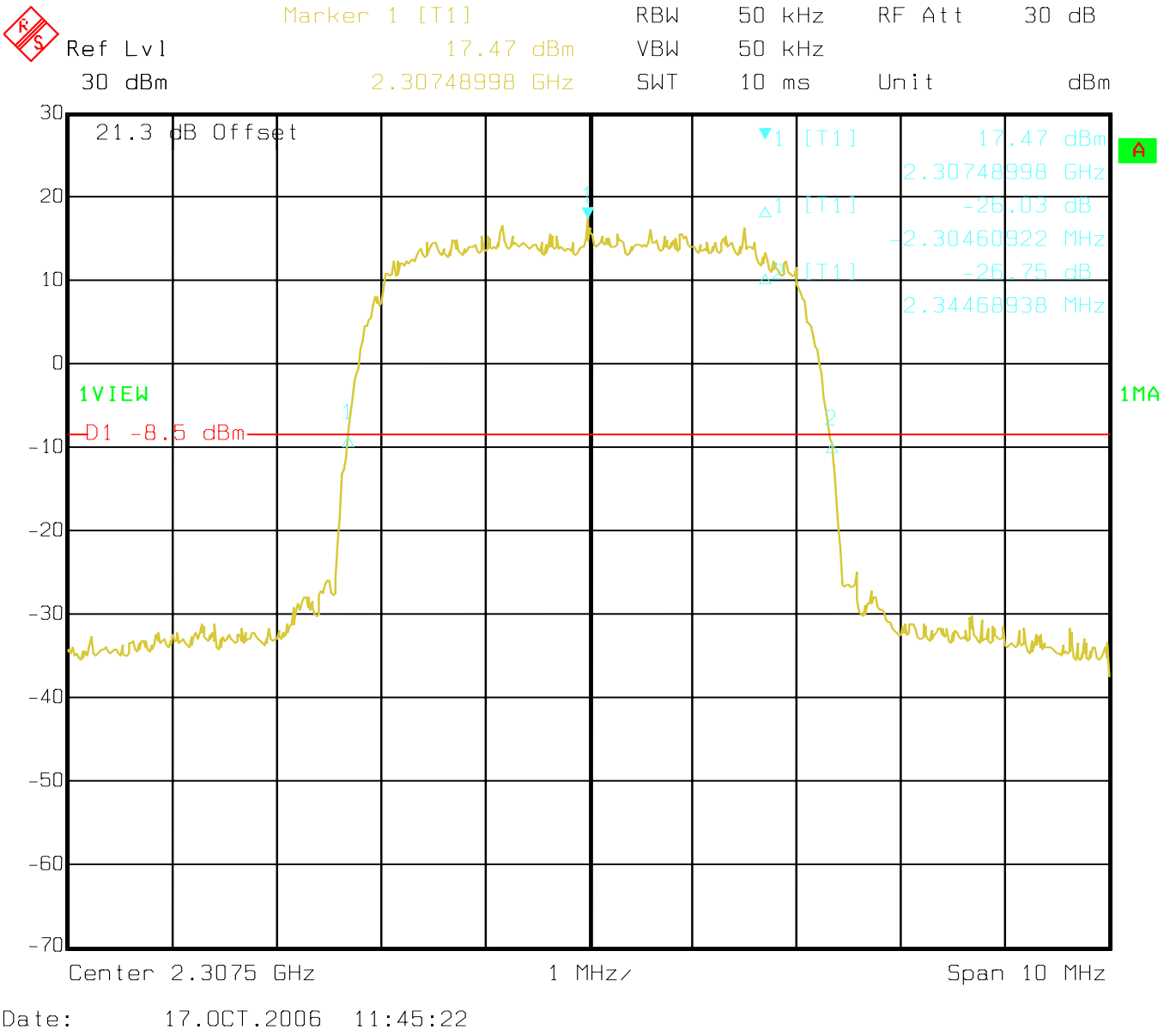
Test conditions		Occupied bandwidth (MHz @ 99%)	
		channel A	channel B
T_{nom} = +20 °C	V_{nom} = 120 VAC	4.13	4.13

Table 7 - Occupied bandwidth (99%)

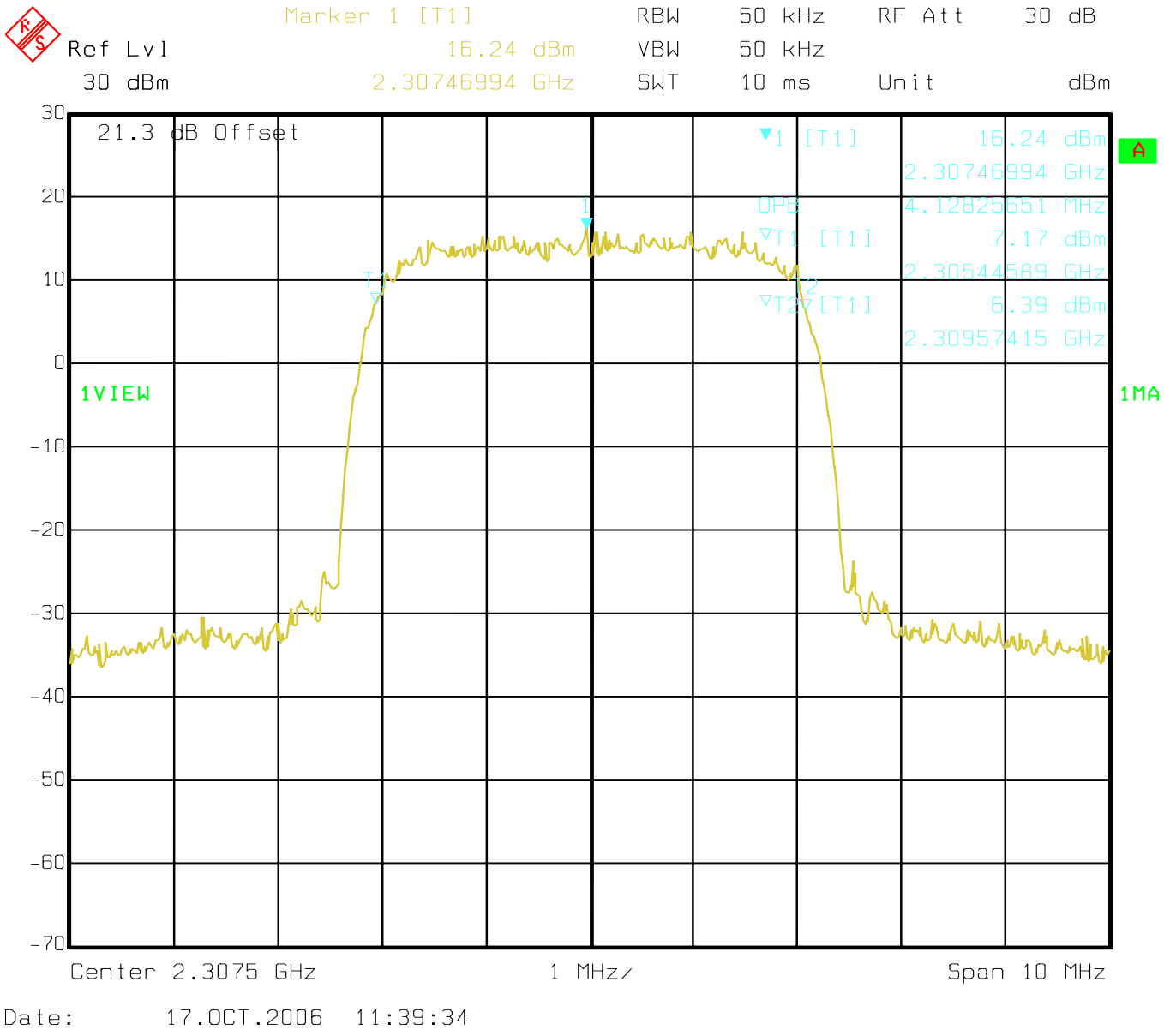
2.3.2 Limit

The maximum allowable occupied bandwidth is 5 MHz.

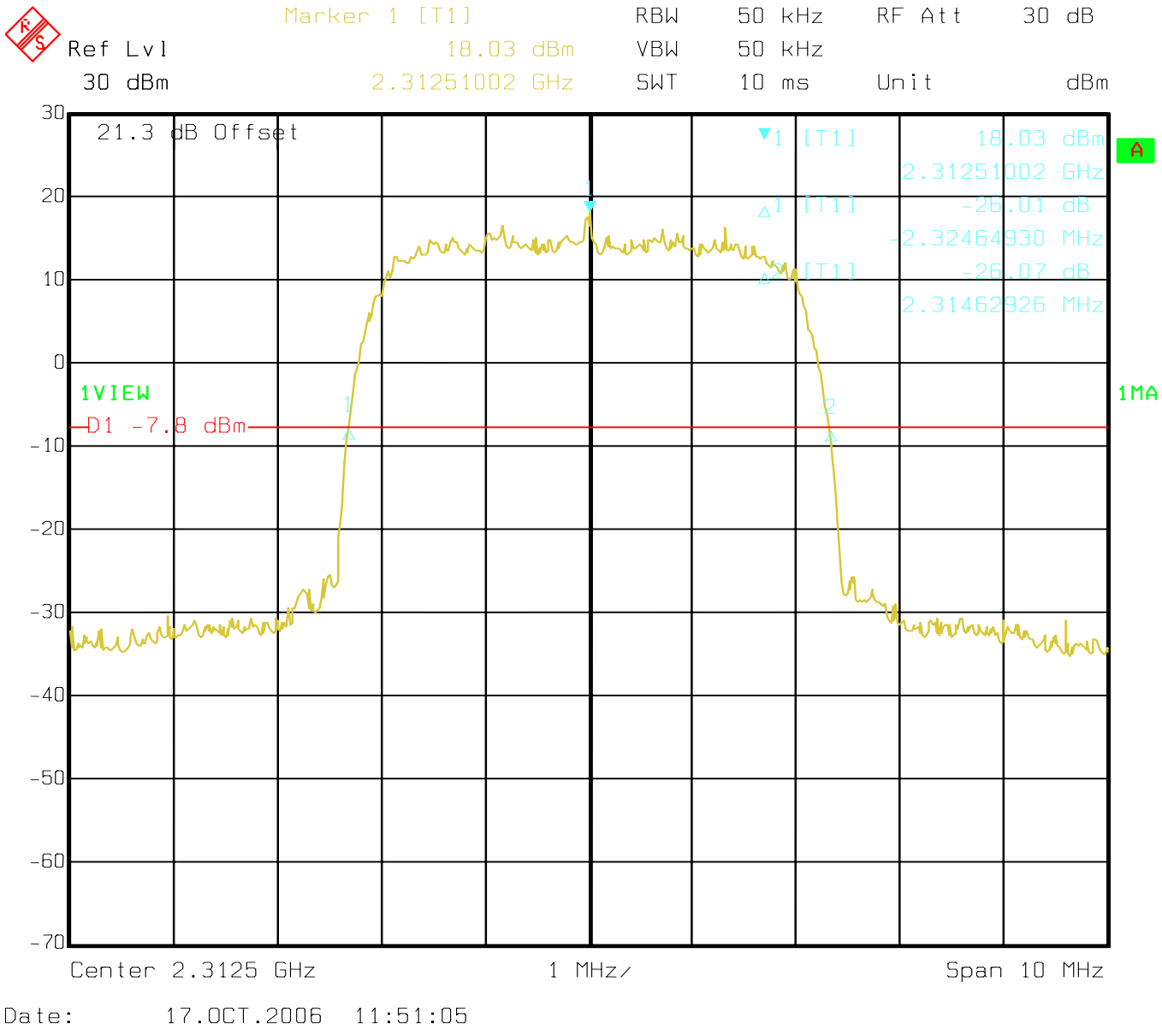
2.3.3 Plots of test results (occupied bandwidth)



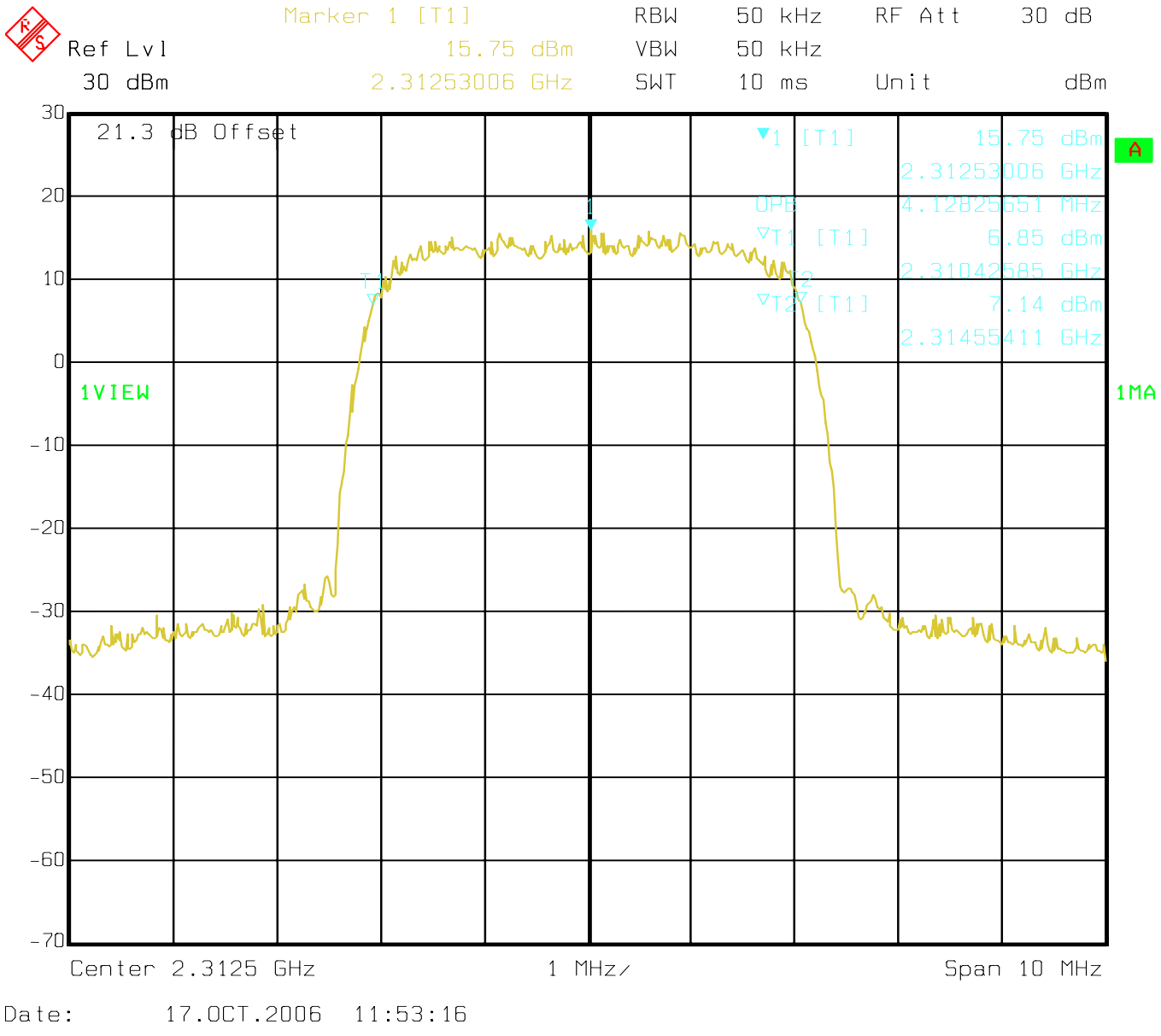
Plot 1 - Occupied bandwidth (-26 dB, channel A, 2307.5 MHz)



Plot 2 - Occupied bandwidth (99%, channel A, 2307.5 MHz)



Plot 3 - Occupied bandwidth (-26 dB, channel B, 2312.5 MHz)



Plot 4 - Occupied bandwidth (99%, channel B, 2312.5 MHz)

2.4 Spurious emissions at the antenna terminals

2.4.1 Spurious emissions at the antenna terminals in accordance with 47 CFR Part 27.53 (a)(1)

Spurious emissions measurements have been carried out in accordance with 47 CFR Part 27.53 (a)(1) and 47 CFR Part 2.1051 at the antenna terminals of the EUT.

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

Antenna Conducted Emissions:

For spurious emission measurements at the antenna terminal the following procedure was performed:

1) Set the transmitting signal on the highest operating frequency (channel B: 2312.5 MHz). Power is set to maximum.

2) Set an offset in reading in dB which is identical to the maximum antenna peak gain in dBi + measurement cable loss in dB.

3) Set the spectrum analyzer display line function to -50 dBm.

4) Set the spectrum analyzer bandwidth to 1MHz.

5) For the spectrum analyzer, the start frequency was set to 2320 MHz and the stop frequency set to 2345 MHz. The level of all spurious or intermodulation emissions must not exceed the -50 dBm limit.

6) Steps 2 to 5 were repeated with the transmitting signal set on the lowest operating frequency (channel A: 2307.5 MHz).

Plots of the measurements have been made available on the next pages of this test report.

2.4.1.1 Test results

Please refer to the plots 5-6 on the next pages of this test report for the test results of the spurious emissions measurements in the frequency range of 2320 MHz to 2345 MHz.

2.4.1.2 Limit.

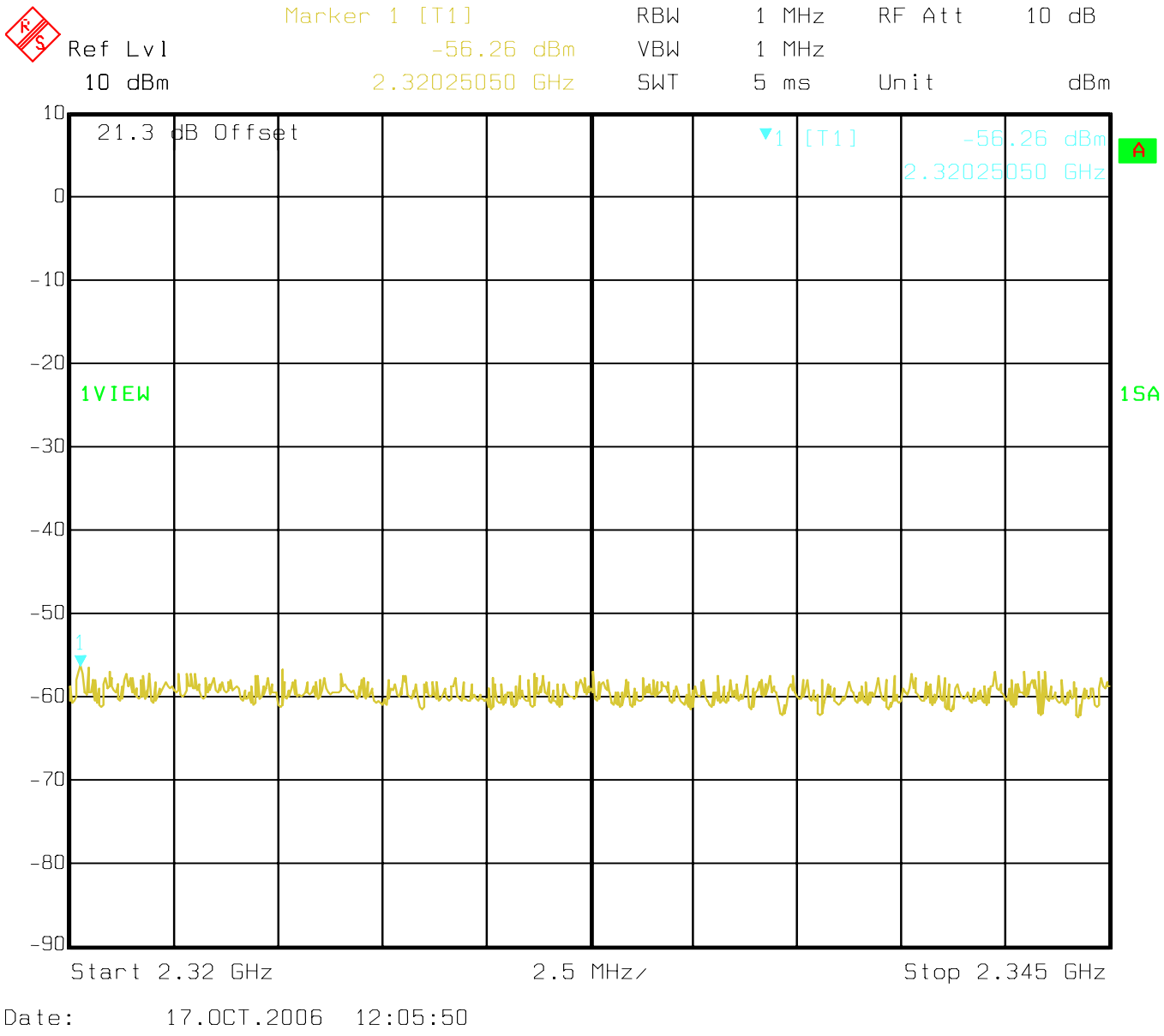
The spurious emissions limit at the antenna terminals is obtained as follows (with reference to 47 CFR Part 27.53 (a)(1)):

Maximum RF output power (radiated) is: 31.5 dBm = 1.41 Watts = P

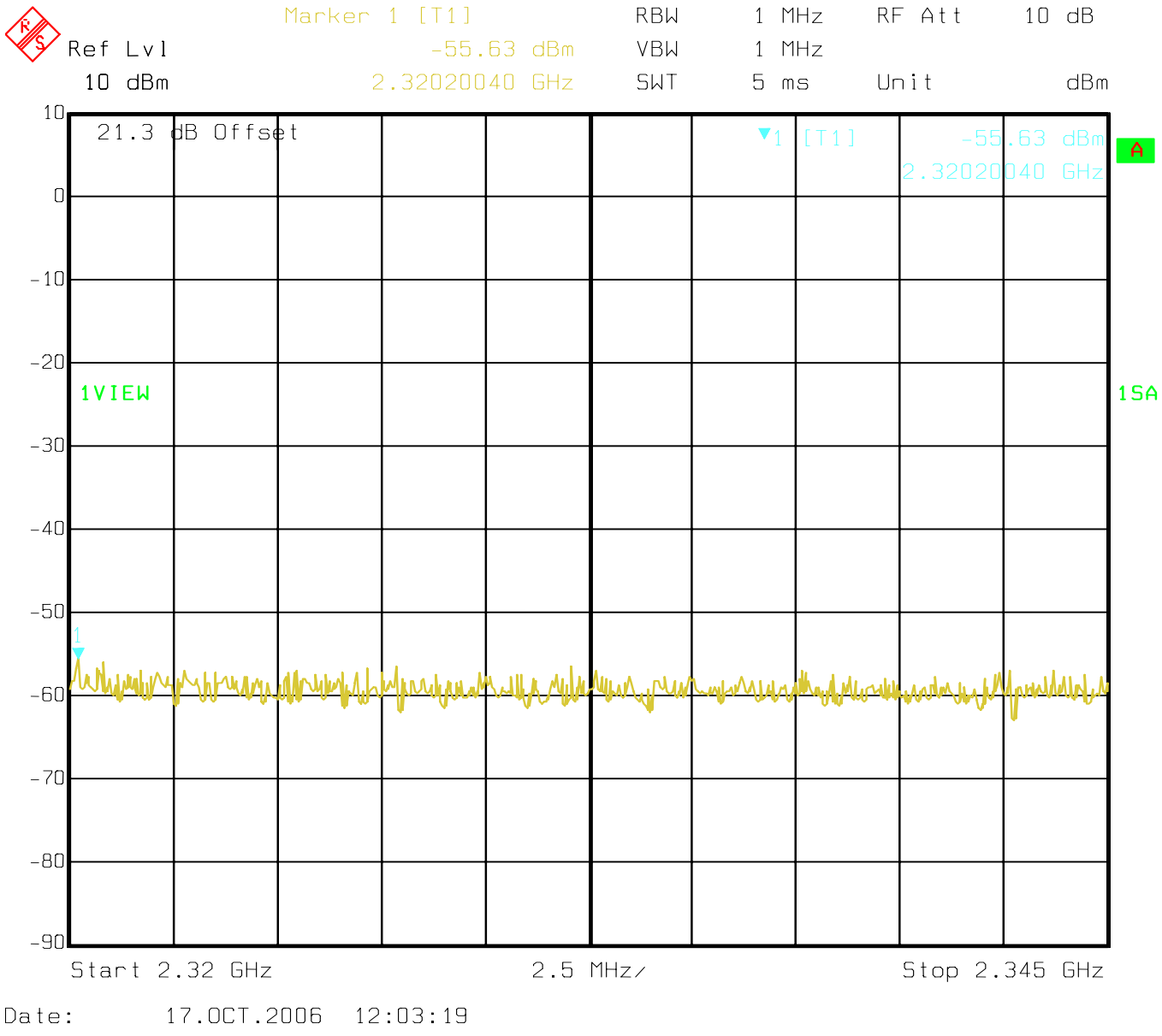
Minimum attenuation below carrier = 80 + 10 log (P) = 80.5 dB

Limit is: 31.5 dBm – 80.5 dB = -50 dBm

2.4.1.3 Plots of test results (spurious emissions at the antenna terminals)



Plot 5 - Spurious emissions at the antenna terminals (2320 MHz to 2345 MHz, channel B, 2312.5 MHz)



Plot 6 - Spurious emissions at the antenna terminals (2320 MHz to 2345 MHz, channel A, 2307.5 MHz)

2.4.2 Spurious emissions at the antenna terminals in accordance with 47 CFR Part 27.53 (a)(3)

Spurious emissions measurements have been carried out in accordance with 47 CFR Part 27.53 (a)(3) and 47 CFR Part 2.1051 at the antenna terminals of the EUT.

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

Antenna Conducted Emissions:

For spurious emission measurements at the antenna terminal the following procedure was performed:

1) Set the transmitting signal on the lowest operating frequency (channel A: 2307.5 MHz). Power is set to maximum.

2) Set an offset in reading in dB which is identical to the maximum antenna peak gain in dBi + measurement cable loss in dB.

3) Set the spectrum analyzer display line function to -40 dBm.

4) Set the spectrum analyzer bandwidth to 1MHz.

5) For the spectrum analyzer, the start frequency was set to 30 MHz and the stop frequency set to 2300 MHz. The level of all spurious or intermodulation emissions must not exceed the -40 dBm limit. Then the start frequency was set to 2370 MHz and the stop frequency set to 10 GHz. The level of all spurious or intermodulation emissions must not exceed the -40 dBm limit. Then the start frequency was set to 10 GHz and the stop frequency set to 24 GHz. The level of all spurious or intermodulation emissions must not exceed the -40 dBm limit.

6) Steps 2 to 5 were repeated with the transmitting signal set on all other channels which are to be tested.

Plots of the measurements have been made available on the next pages of this test report.

2.4.2.1 Test results

Please refer to the plots 7-12 on the next pages of this test report for the test results of the spurious emissions measurements in the frequency range of 30 MHz to 2300 MHz, 2370 MHz to 10 GHz and 10 GHz to 24 GHz.

2.4.2.2 Limit.

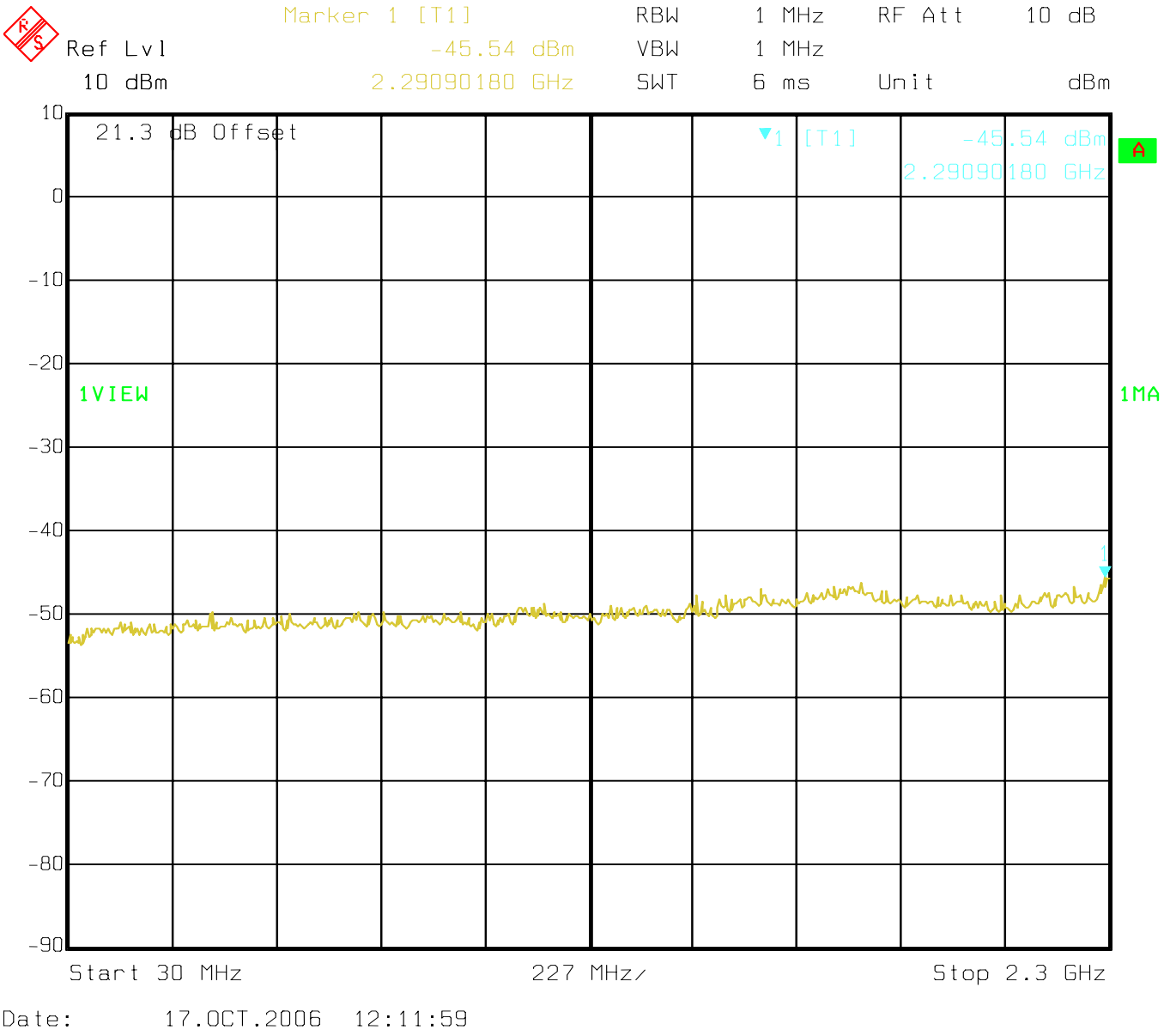
The spurious emissions limit at the antenna terminals is obtained as follows (with reference to 47 CFR Part 27.53 (a)(3)):

Maximum RF output power (radiated) is: 31.5 dBm = 1.41 Watts = P

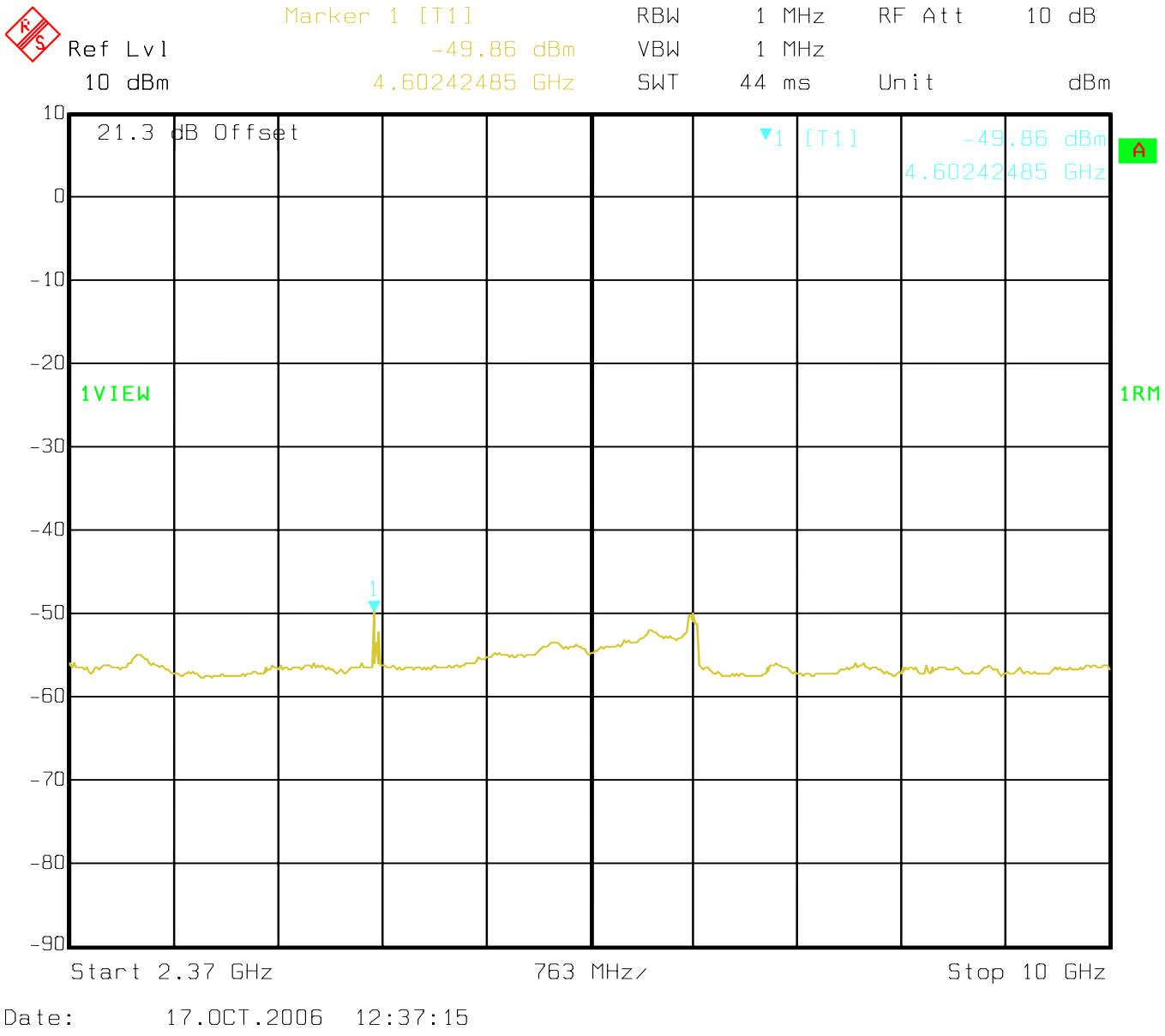
Minimum attenuation below carrier = 70 + 10 log (P) = 71.5 dB

Limit is: 31.5 dBm – 71.5 dB = -40 dBm

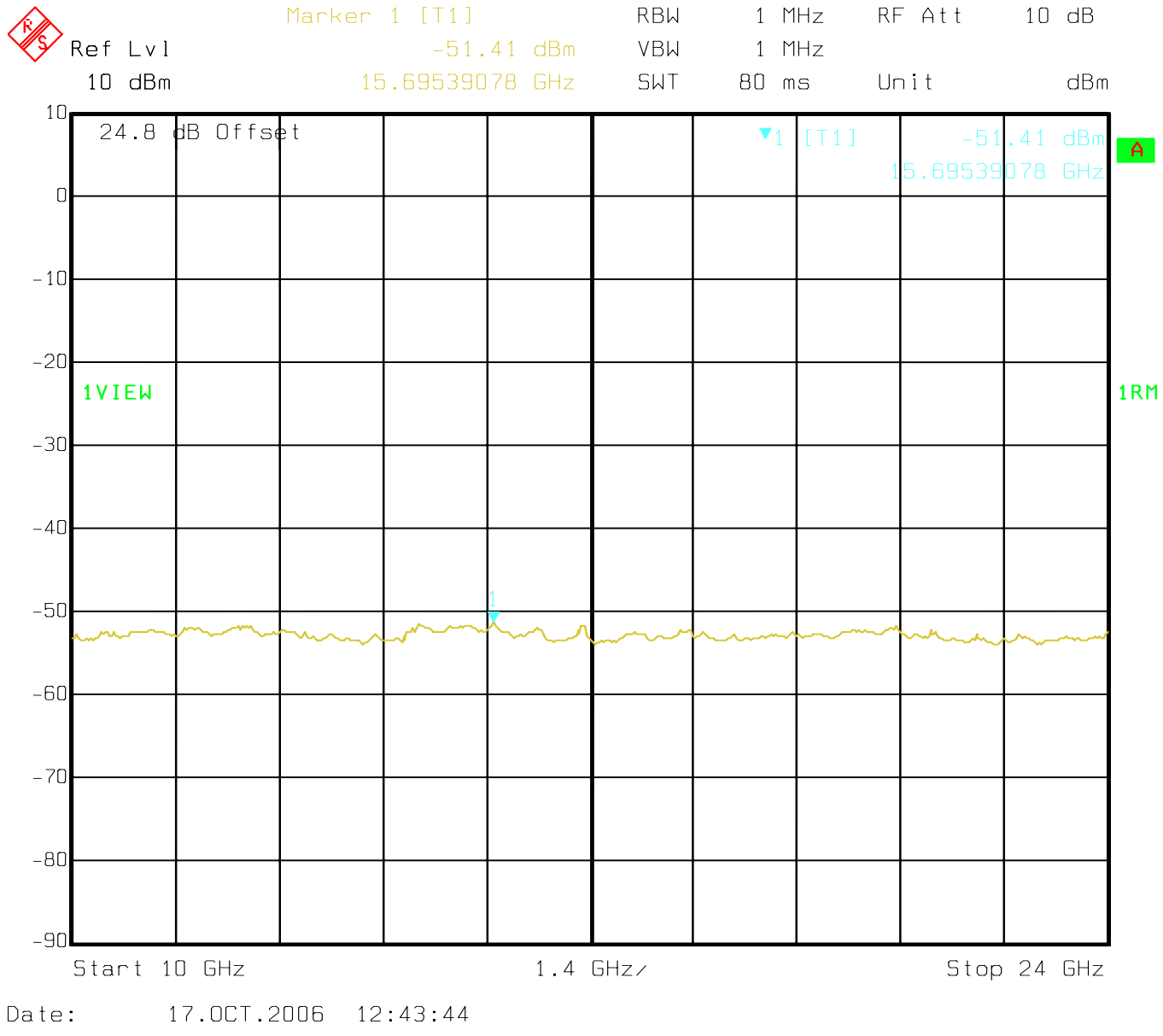
2.4.2.3 Plots of test results (spurious emissions at the antenna terminals)



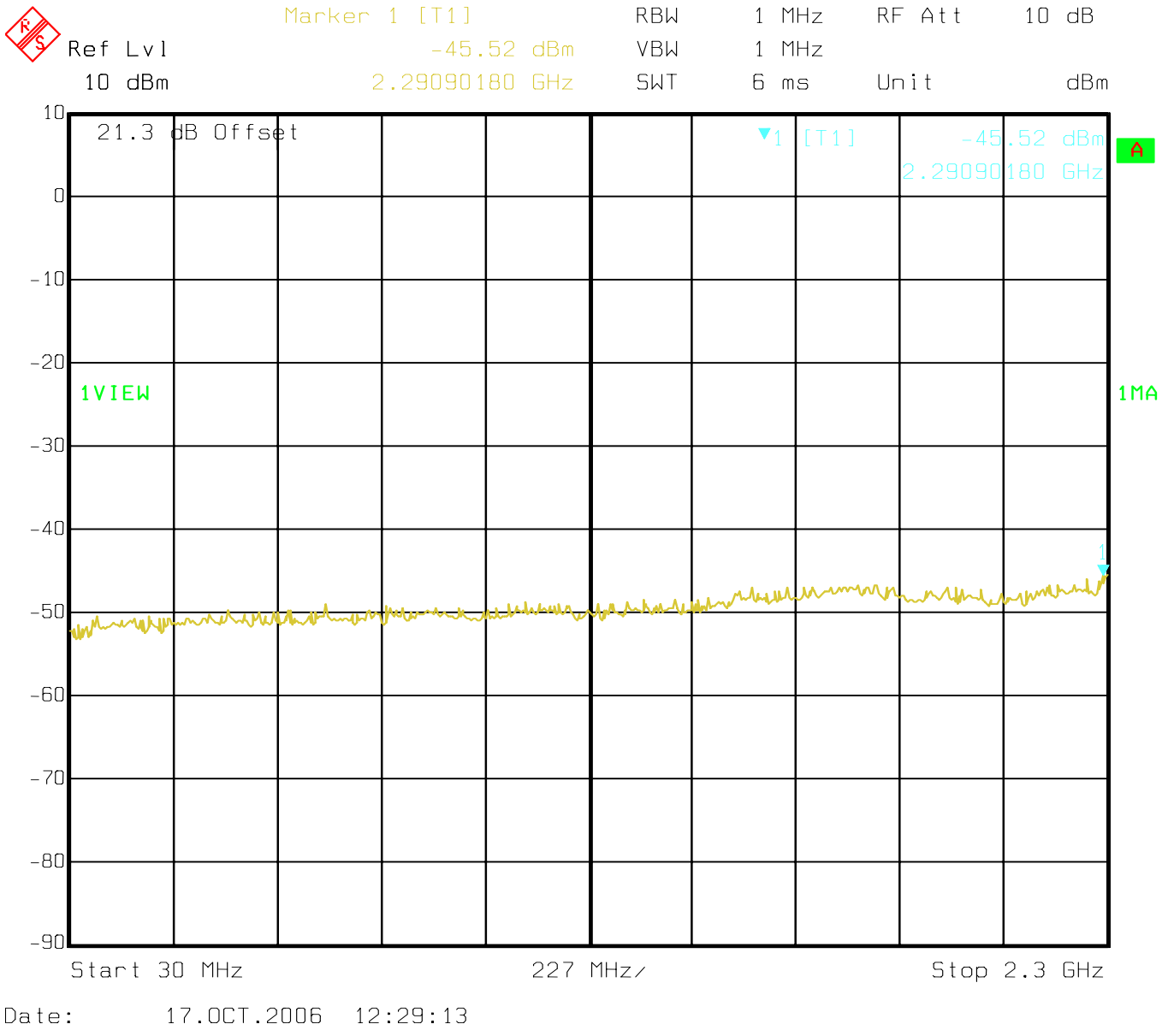
Plot 7 - Spurious emissions at the antenna terminals (30 MHz to 2300 MHz, channel A, 2307.5 MHz)



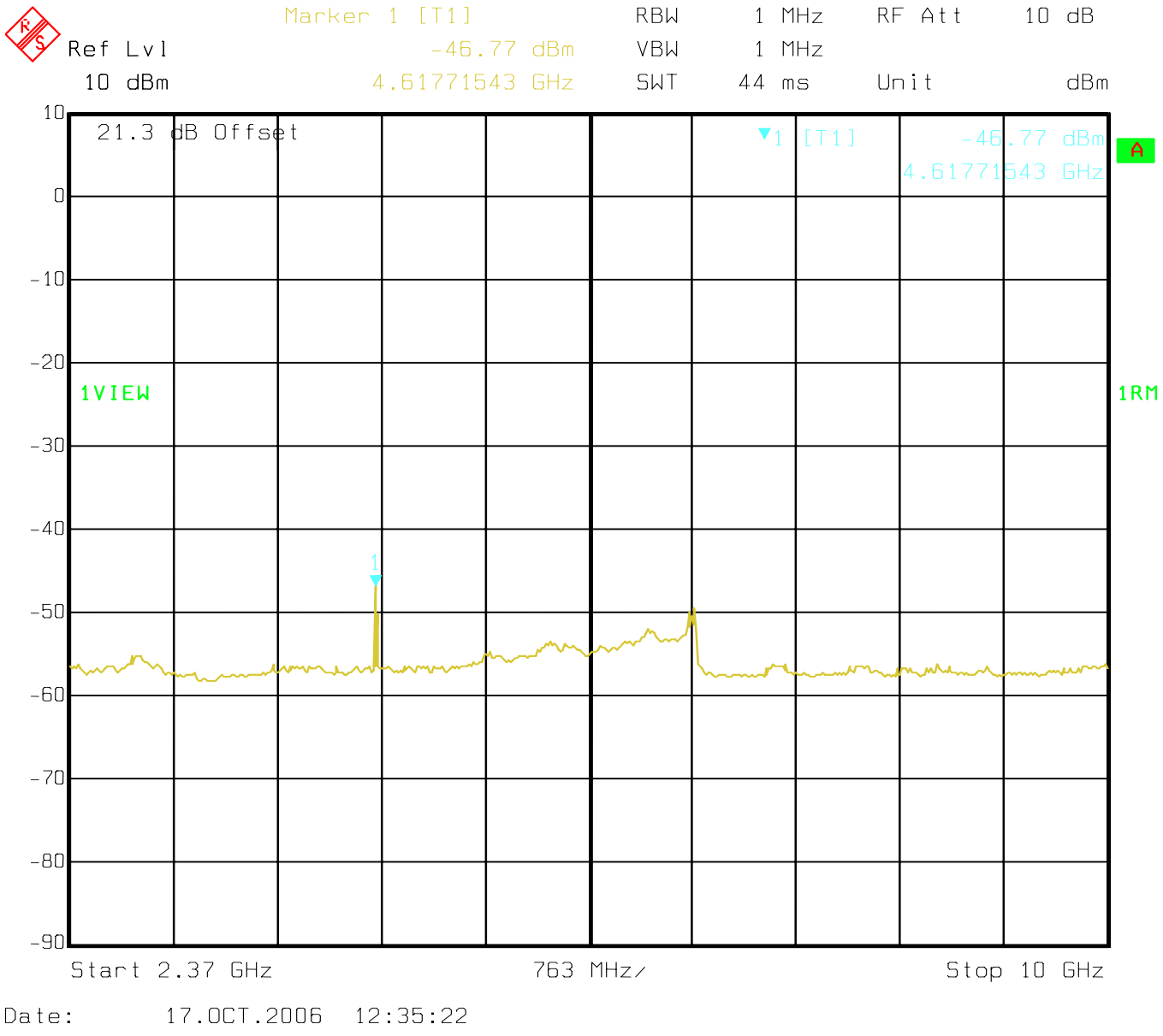
Plot 8 - Spurious emissions at the antenna terminals (2370 MHz to 10 GHz, channel A, 2307.5 MHz)



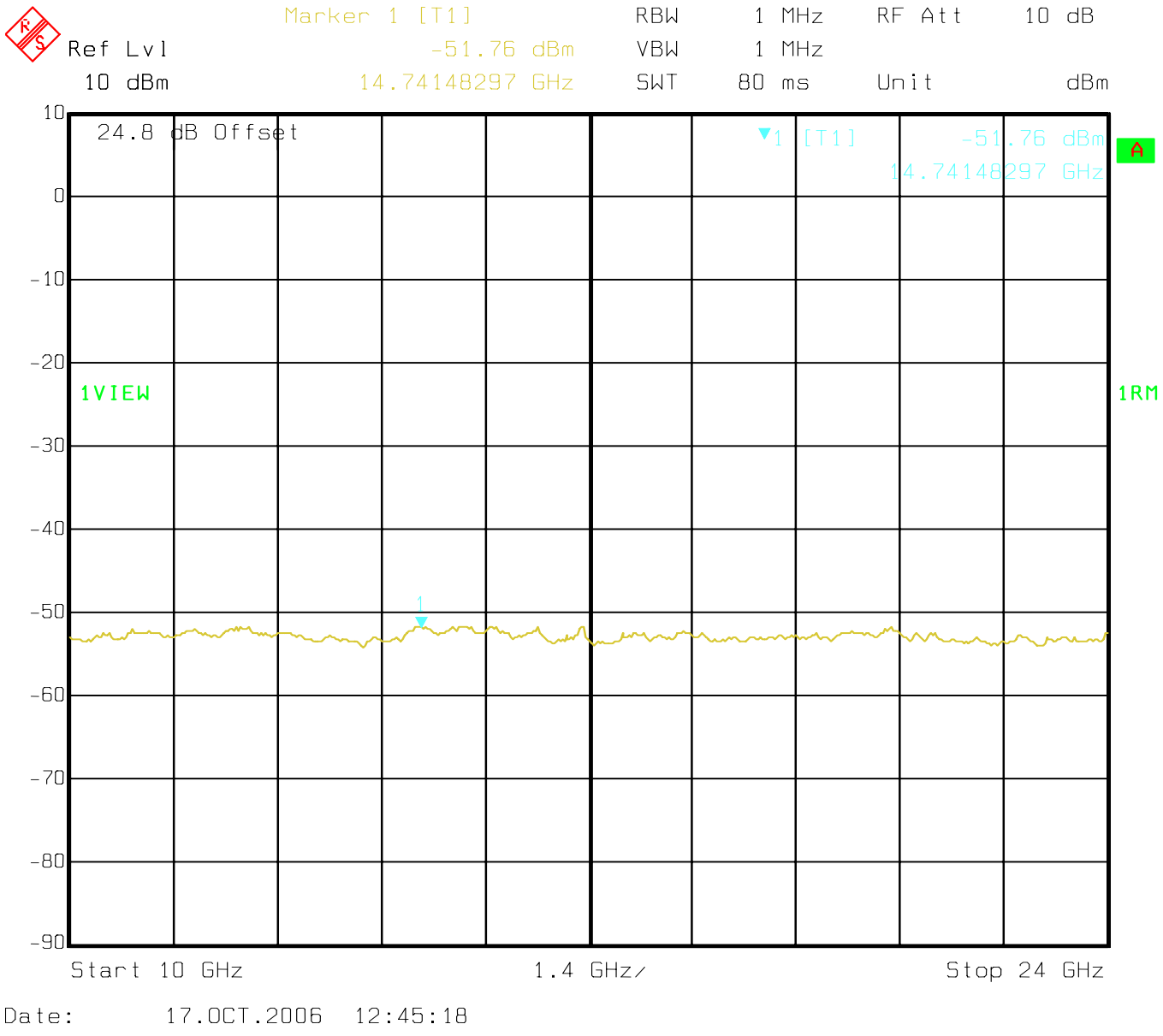
Plot 9 - Spurious emissions at the antenna terminals (10 GHz to 24 GHz, channel A, 2307.5 MHz)



Plot 10 - Spurious emissions at the antenna terminals (30 MHz to 2300 MHz, channel B, 2312.5 MHz)



Plot 11 - Spurious emissions at the antenna terminals (2370 MHz to 10 GHz, channel B, 2312.5 MHz)



Plot 12 - Spurious emissions at the antenna terminals (10 GHz to 24 GHz, channel B, 2312.5 MHz)

2.4.3 Spurious emissions (bandedges) at the antenna terminals in accordance with 47 CFR Part 27.53 (a)(3)

Spurious emissions (bandedges) measurements have been carried out in accordance with 47 CFR Part 27.53 (a)(3) and 47 CFR Part 2.1051 at the antenna terminals of the EUT.

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

Antenna Conducted Emissions:

For spurious emission measurements at the antenna terminal the following procedure was performed:

1) Set the transmitting signal on the lowest operating frequency in the first frequency block (channel A: 2307.5 MHz). Power is set to maximum.

2) Set an offset in reading in dB which is identical to the maximum antenna peak gain in dBi + measurement cable loss in dB.

3) Set the spectrum analyzer display line function to -13 dBm. Set one marker on 2305 MHz, set a second marker on 2310 MHz.

4) Set the spectrum analyzer bandwidth to 50 kHz (which is 1% of the maximum allowable emission bandwidth of 5 MHz, see also 47 CFR Part 27, section 27.53 (a)(4)).

5) For the spectrum analyzer, the start frequency was set to 2300 MHz and the stop frequency set to 2320 MHz. The level of all spurious or intermodulation emissions must not exceed the -13 dBm limit.

6) Set the transmitting signal on the highest operating frequency (channel B: 2312.5 MHz). Power is set to maximum.

7) Set an offset in reading in dB which is identical to the maximum antenna peak gain in dBi + measurement cable loss in dB.

8) Set the spectrum analyzer display line function to -13 dBm. Set one marker on 2310 MHz, set a second marker on 2315 MHz.

9) Set the spectrum analyzer bandwidth to 50 kHz (which is 1% of the maximum allowable emission bandwidth of 5 MHz, see also 47 CFR Part 27, section 27.53 (a)(4)).

10) For the spectrum analyzer, the start frequency was set to 2305 MHz and the stop frequency set to 2325 MHz. The level of all spurious or intermodulation emissions must not exceed the -13 dBm limit.

Plots of the measurements have been made available on the next pages of this test report.

2.4.3.1 Test results

Please refer to the plots 13-14 on the next pages of this test report for the test results of the spurious emissions measurements in the frequency range of 2300 MHz to 2320 MHz and 2305 MHz to 2325 MHz.

2.4.3.2 Limit.

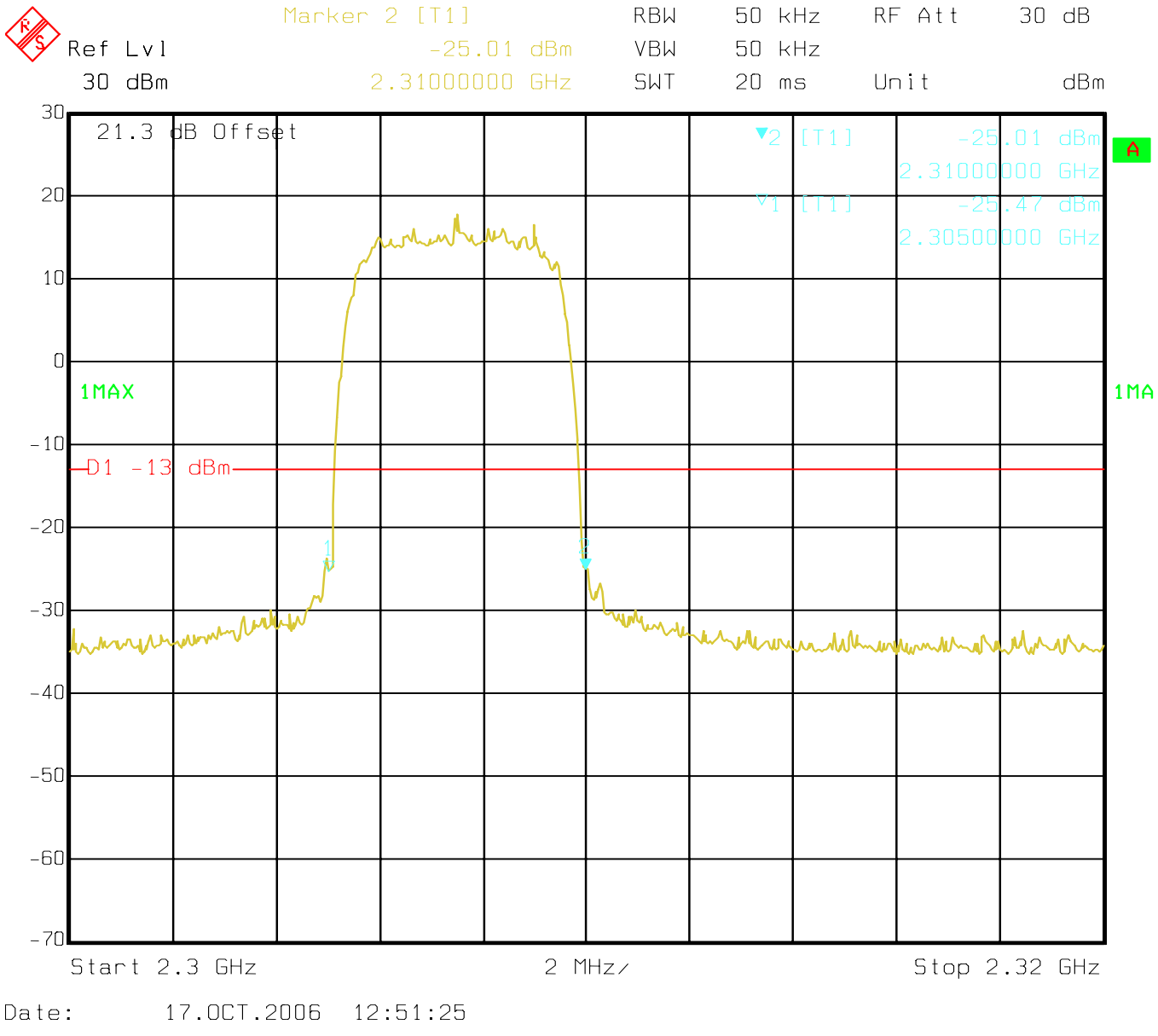
The spurious emissions limit at the antenna terminals is obtained as follows (with reference to 47 CFR Part 27.53 (a)(3)):

Maximum RF output power (radiated) is: 31.5 dBm = 1.41 Watts = P

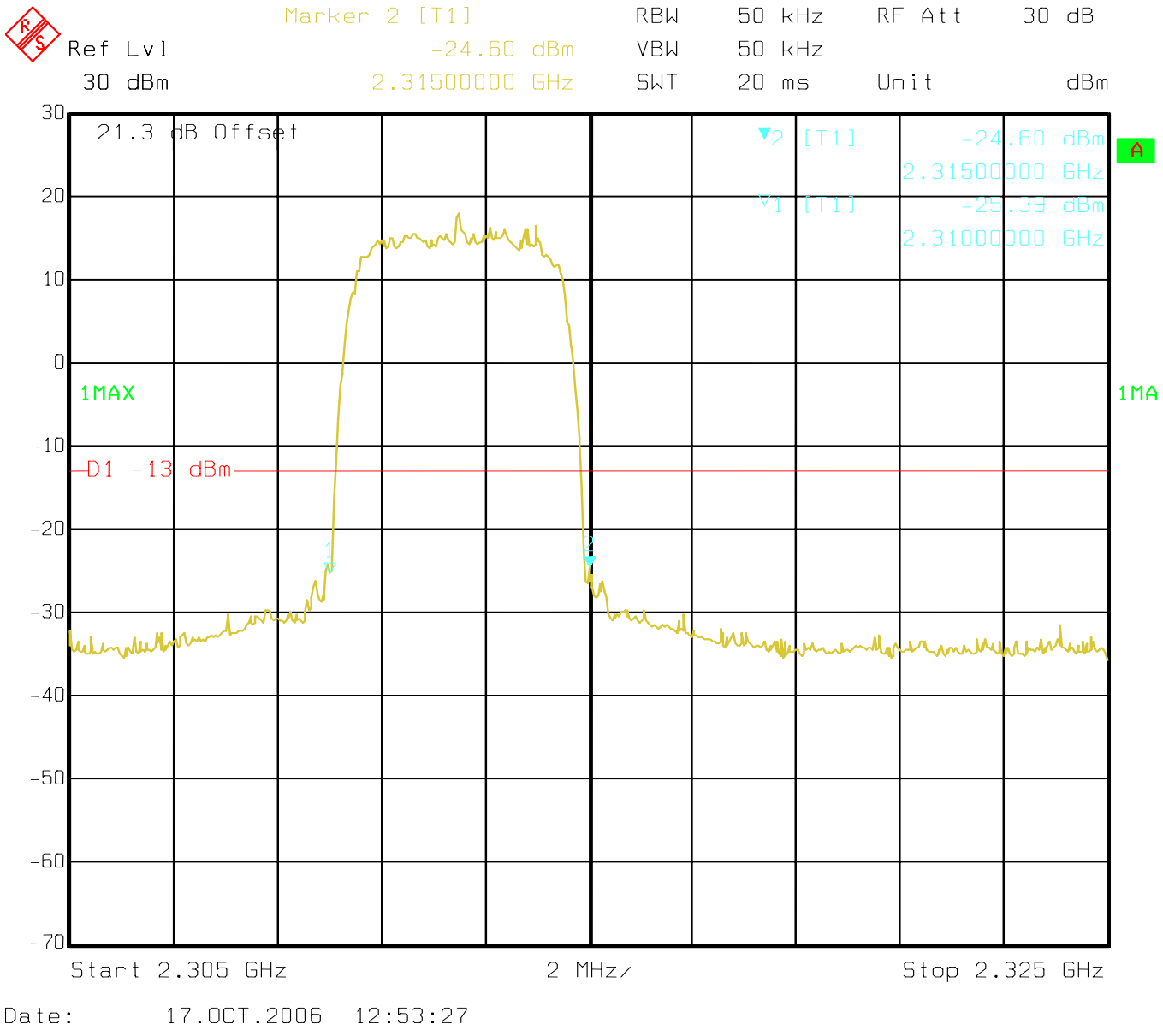
Minimum attenuation below carrier = 43 + 10 log (P) = 44.5. dB

Limit is: 31.5 dBm – 44.5 dB = -13 dBm

2.4.3.3 Plots of test results (spurious emissions (bandedges) at the antenna terminals)



Plot 13 - Spurious emissions (bandedges) at the antenna terminals (2300 MHz to 2320 MHz, channel A, 2307.5 MHz)



Plot 14 - Spurious emissions (bandedges) at the antenna terminals (2305 MHz to 2325 MHz, channel B, 2312.5 MHz)

2.5 Radiated emissions

Radiated emissions measurements have been carried out in accordance with 47 CFR Part 27.53 (a)(1), 47 CFR Part 27.53 (a)(3) and 47 CFR Part 2.1053.

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz) and the highest operating frequency (channel B: 2312.5 MHz).

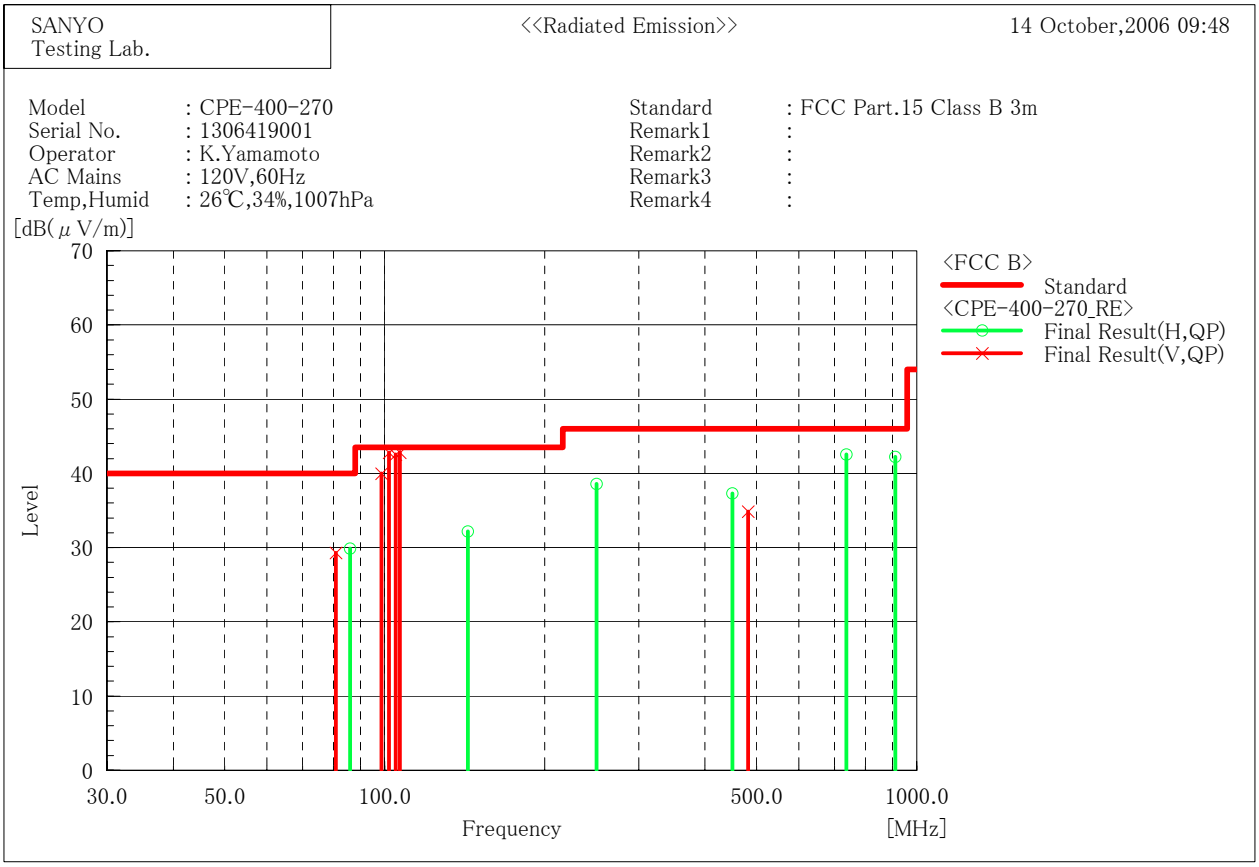
From pre-scans it showed that in the frequency range of 30 - 1000 MHz operation of the EUT on channel A: 2307.5 MHz yielded the worst-case test results. The pre-scan test results have been filed, and are available for future inspection, at the test laboratory.

In the frequency range of 1 - 24 GHz, the maximum levels of radiated emissions were measured by using the substitution measurement method.

After measuring the maximum levels of the radiated emissions on channel A: 2307.5 MHz and channel B: 2312.5 MHz with the spectrum analyzer, the EUT was replaced by a horn antenna which was connected to a RF generator. This combination of RF generator and horn antenna was used to reproduce the measured levels of the radiated emissions on channel A: 2307.5 MHz and channel B: 2312.5 MHz and to obtain the appropriate correction factor for the test setup.

2.5.1 Test results

2.5.1.1 Frequency range of 30 - 1000 MHz (EUT operating on channel A: 2307.5 MHz)



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
1	86.052	H	59.6	-29.7	29.9	40.0	10.1	387.0	190.0
2	143.241	H	54.0	-21.8	32.2	43.5	11.3	226.0	162.0
3	249.999	H	56.8	-18.2	38.6	46.0	7.4	203.0	205.0
4	449.998	H	54.2	-16.9	37.3	46.0	8.7	102.0	277.0
5	737.277	H	54.3	-11.8	42.5	46.0	3.5	121.0	206.0
6	912.068	H	51.7	-9.5	42.2	46.0	3.8	100.0	116.0
7	80.865	V	59.9	-30.6	29.3	40.0	10.7	136.0	272.0
8	98.389	V	67.2	-27.2	40.0	43.5	3.5	100.0	196.0
9	101.870	V	69.4	-26.6	42.8	43.5	0.7	100.0	199.0
10	104.742	V	68.6	-26.1	42.5	43.5	1.0	100.0	197.0
11	106.755	V	68.6	-25.8	42.8	43.5	0.7	103.0	210.0
12	482.347	V	51.3	-16.4	34.9	46.0	11.1	158.0	244.0

Graph 1 - Frequency range of 30 - 1000 MHz (EUT operating on channel A: 2307.5 MHz)

2.5.1.2 Frequency range of 1 - 24 GHz (EUT operating on channel A: 2307.5 MHz)

The results of tests on the EUT in the frequency range of 1 - 24 GHz, carried out in accordance with 47 CFR Part 27.53 (a)(1), 47 CFR Part 27.53 (a)(3) and 47 CFR Part 2.1053, are depicted in table 8.

Frequency (GHz)	Measurement results (dBm)		Correction factor (dB)		Test results (dBm)		Resolution bandwidth (MHz)	Limits (dBm)
	V	H	V	H	V	H		
2.185	-	-61.2	-	7.05	-	-54.15	1	-13.0
2.235	-62.0	-	7.05	-	-54.95	-	1	-13.0
6.629	-	-57.2	-	12.55	-	-44.65	1	-13.0
6.942	-55.0	-	12.35	-	-42.65	-	1	-13.0
15.255	-47.4	-	10.55	-	-36.85	-	1	-13.0
15.735	-	-48.5	-	10.65	-	-37.85	1	-13.0
20.489	-63.0	-	19.0	-	-44.0	-	1	-13.0
20.717	-	-61.0	-	19.0	-	-42.0	1	-13.0

Table 8 - Frequency range of 1 - 24 GHz (EUT operating on channel A: 2307.5 MHz)

Note: Field strength values of radiated emissions at frequencies not listed in table 8 are more than 20 dB below the applicable limit.

2.5.1.3 Frequency range of 1 - 24 GHz (EUT operating on channel B: 2312.5 MHz)

The results of tests on the EUT in the frequency range of 1 - 24 GHz, carried out in accordance with 47 CFR Part 27.53 (a)(1), 47 CFR Part 27.53 (a)(3) and 47 CFR Part 2.1053, are depicted in table 9.

Frequency (GHz)	Measurement results (dBm)		Correction factor (dB)		Test results (dBm)		Resolution bandwidth (MHz)	Limits (dBm)
	V	H	V	H	V	H		
1.721	-	-61.0	-	5.05	-	-55.95	1	-13.0
1.777	-61.2	-	5.05	-	-56.15	-	1	-13.0
6.923	-55.9	-	12.55	-	-43.35	-	1	-13.0
6.966	-	-56.8	-	12.55	-	-44.25	1	-13.0
14.653	-48.5	-	10.65	-	-37.85	-	1	-13.0
15.394	-	-48.0	-	10.55	-	-37.45	1	-13.0
20.501	-61.7	-	19.0	-	-42.7	-	1	-13.0
21.643	-	-61.0	-	19.0	-	-42.0	1	-13.0

Table 9 - Frequency range of 1 - 24 GHz (EUT operating on channel B: 2312.5 MHz)

Note: Field strength values of radiated emissions at frequencies not listed in table 9 are more than 20 dB below the applicable limit.

2.5.2 Limit.

The radiated emissions limit is obtained as follows (with reference to 47 CFR Part 27.53 (a)(1) and 47 CFR Part 27.53 (a)(3)):

Maximum RF output power (EIRP) is: 31.5 dBm = 1.41 Watts = P

Limit = P - (43 + (10 log (P)) dB) = 31.5 - (43 + (10 log (1.41))) = 31.5 dBm – 44.5 dB = -13 dBm

The limit expressed in dBuV/m @ 3 meters measurement distance can be calculated as follows:

-13.0 dBm = 50.1 x 10^{-3} mW = 50.1 x 10^{-6} Watts

E^2 = 50.1 x 10^{-6} / 0.3

E = 12.9 x 10^{-3} V/m = 12922.8 uV/m = 82.2 dBuV/m @ 3 meters measurement distance

2.6 Frequency stability over temperature variations

Frequency stability over temperature variations tests have been carried out in accordance with 47 CFR Part 27.54 and 47 CFR Part 2.1055 (a)(1).

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz). The center frequency of the spectrum analyzer was set to channel A of the EUT. Resolution bandwidth (RBW) was set to 1 kHz, video bandwidth (VBW) was set to 100 Hz. The spectrum analyzer indicated the frequency in Hz.

EUT transmitted a CW signal. The RF output power level was set to the maximum value as indicated in the user instructions before the frequency stability over voltage variations test was carried out.

The reference frequency of the channel was obtained first by carrying out the test at +20 °C and 120 VAC. The frequency drift in Hz was derived from the difference between the measured frequency at +20 °C and the measured frequency at a different ambient temperature.

2.6.1 Test results

The results of tests on the EUT, carried out in accordance with 47 CFR Part 27.54 and 47 CFR Part 2.1055 (a)(1), are depicted in table 10.

Test conditions		Frequency (GHz)	Frequency stability (drift, Hz)
T = -30 °C	V_{nom} = 120 VAC	2.307509299	-1172
T = -20 °C	V_{nom} = 120 VAC	2.307508848	-1623
T = -10 °C	V_{nom} = 120 VAC	2.307509409	-1062
T = 0 °C	V_{nom} = 120 VAC	2.307509980	-311
T = +10 °C	V_{nom} = 120 VAC	2.307510291	-180
T = +20 °C	**V_{nom} = 120 VAC**	2.307510471	**0**
T = +30 °C	V_{nom} = 120 VAC	2.307510471	0
T = +40 °C	V_{nom} = 120 VAC	2.307510471	0
T = +50 °C	V_{nom} = 120 VAC	2.307510641	+130

Table 10 - Frequency stability over temperature variations

2.6.2 Limit

The limit was calculated from the measured occupied bandwidth (-26 dB) at +20 °C and 120 VAC. The maximum allowable occupied bandwidth is 5 MHz. The limit for the maximum allowable frequency drift was calculated from:

(maximum allowable occupied bandwidth - measured occupied bandwidth) / 2

(5.00 MHz – 4.67 MHz) / 2 = 0.33 MHz / 2 = 165 kHz

2.7 Frequency stability over voltage variations

Frequency stability over voltage variations tests have been carried out in accordance with 47 CFR Part 27.54 and 47 CFR Part 2.1055 (d)(1).

The tests were performed with the EUT operating at the lowest operating frequency (channel A: 2307.5 MHz). The center frequency of the spectrum analyzer was set to channel A of the EUT. Resolution bandwidth (RBW) was set to 1 kHz, video bandwidth (VBW) was set to 100 Hz. The spectrum analyzer indicated the frequency in Hz.

EUT transmitted a CW signal. The RF output power level was set to the maximum value as indicated in the user instructions before the frequency stability over voltage variations test was carried out.

The reference frequency of the channel was obtained first by carrying out the test at +20 °C and 120 VAC. The frequency drift in Hz was derived from the difference between the measured frequency at +20 °C and the measured frequency at a different AC mains voltage.

2.7.1 Test results

The results of tests on the EUT, carried out in accordance with 47 CFR Part 27.54 and 47 CFR Part 2.1055 (d)(1), are depicted in table 11.

Test conditions		Frequency (GHz)	Frequency stability (drift, Hz)
T = +20 °C	$V_{min\ (-15\%)}$ = 102 VAC	2.307500611	0
T = +20 °C	**V_{nom} = 120 VAC**	2.307500611	**0**
T = +20 °C	$V_{max\ (+15\%)}$ = 138 VAC	2.307500611	0

Table 11 - Frequency stability over voltage variations

2.7.2 Limit

The limit was calculated from the measured occupied bandwidth (-26 dB) at +20 °C and 120 VAC. The maximum allowable occupied bandwidth is 5 MHz. The limit for the maximum allowable frequency drift was calculated from:

(maximum allowable occupied bandwidth - measured occupied bandwidth) / 2

(5.00 MHz – 4.67 MHz) / 2 = 0.33 MHz / 2 = 165 kHz

3 List of test equipment

Test Instruments used:

ID	Instruments	Maker	S/N	LAST Cal.	Next Cal.
1	Receiver ESCS30	ROHDE&SCHWARZ	S/N:100032	6/'06	6/'07
2	Spectrum Analyzer FSEM30	ROHDE&SCHWARZ	S/N:100162	9/'06	9/'07
3	Power Meter E4416A	Agilent	S/N:MY45100546	3/'06	3/'07
4	Signal Generator E8257D	Agilent	S/N:MY45140938	10/'05	10/'06
5	Temperature and Humidity Chamber PVL-4GAV5-100	TABAI ESPEC CORP.	S/N:2517520	10/'04	10/'07

Test Accessories used:

ID	Accessories	Maker	S/N	LAST Cal.	Next Cal.
11	Selector NS4008S	TOYO Corporation	S/N:0206001	7/'06	7/'07 *1
12	LISN ESH2-Z5	ROHDE&SCHWARZ	S/N 825640/015	7/'06	7/'07
13	LISN KNW-407	Kyoritsu	S/N:8-1468-3	7/'06	7/'07
14	50Ω terminator	SUHNER	S/N:50TER011	6/'04	6/'07
15	Pulse Limiter ESH3Z2	ROHDE&SCHWARZ	S/N:357.8810.52	7/'06	7/'07 *1
16	Power Sensor E9327A	Agilent	S/N:MY44420666	3/'06	3/'07
17	Band Reject Filter NF-49BT	TOYO Corporation	S/N:022		
18	Attenuator (20dB) WA4	WEINSCHEL	S/N:A677		
19	Attenuator (10dB) 6810.17.A	SUHNER	S/N:-	used for 1-8GHz measurement	
20	Attenuator (10dB) WA2-10	WEINSCHEL	S/N:A208	used for 8-18GHz measurement	

*1: On-site Calibration

Test Anntena and Amp used:

ID	Anntena , Amp	Maker (frequency band)	S/N	LAST Cal.	Next Cal.
31	Biconical BBA9106	SBK (30-300MHz)	S/N:9103 2034	6/'06	6/'07
32	Log-Peri UHALP9108A	SBK (300M-1GHz)	S/N:0498	6/'06	6/'07
33	Duble Ridged Hone Ant. BBHA9120B (Receiving)	SBK (1-8GHz)	S/N:9120B 227	8/'06	8/'07
34	Duble Ridged Hone Ant. BBHA9120B (Radiation)	SBK (1-8GHz)	S/N:9120B 228	6/'06	6/'07
35	Duble Ridged Hone Ant. BBHA9120C (Receiving)	SBK (8-18GHz)	S/N:9120C-321	9/'06	9/'07
36	Duble Ridged Hone Ant. BBHA9120C (Radiation)	SBK (8-18GHz)	S/N:9120C-322	6/'06	6/'07
37	Standard Gain Hone (With Amp.) 12A-18 115300(Receiving)	MI Technologies (18-26GHz)	S/N:22938PA	10/'05	10/'06
38	Standard Gain Hone 12A-18 115300(Radiation)	MI Technologies (18-26GHz)	S/N:22939PA	-	-
39	AMP NUL-5132	TSJ (30M-1GHz)	S/N:030528	7/'06	7/'07 *1
40	AMP TPA0108-40	TOYO Corporation (1-8GHz)	S/N:	7/'06	7/'07 *1
41	AMP TPA0618-35	TOYO Corporation (8-18GHz)	S/N:	7/'06	7/'07 *1

Measurement item	ID No.
RF output power (conducted)	3,16,18
Occupied bandwidth.	2,18
Spurious emissions at the antenna terminals.	2,18
Radiated Emissions (30M-1GHz)	1,2,11,31,32,39
Radiated Emissions (1-8GHz)	2,4,17,19,33,34,40
Radiated Emissions (8-18GHz)	2,4,20,35,36,41
Radiated Emissions (18-24GHz)	2,4,20,37,38
Conducted Emissions	1,2,11,12,13,14,15
Frequency stability over temperature variations & Frequency stability over voltage variations	2,5,18
Effective radiated power	2,3,4,16,33,34,40