

TEST REPORT

FCC, CFR 47, part 15, subpart C, Intentional – Radiators, section 15.231

Report Reference No. : 132092R1 TRF FCC

Tested by (name+signature)..... : G. Curioni



Approved by (name+signature) : P. Barbieri



Date of issue..... : 2009-12-17

Testing Laboratory : **Nemko Spa**

Address..... : Via del Carroccio, 4
I-20046 Biassono MI (Italy)

Testing location/ procedure : Full application of Harmonised standards ☐
Partial application of Harmonised standards ☐
Other standard testing methods ☒
Non-standard testing methods ☐
SINAL accredited test report ☐

Testing location/ address..... : Nemko Spa - Via del Carroccio, 4 - I-20046 Biassono MI (Italy)

Applicant's name : Meta System S.p.A.

Address..... : Via majakovskij, 10/b/c/d/e; 42124 Reggio Emilia Italy

Test specification:

Standard : FCC, CFR 47, Part 15, July 10, 2008

Test procedure..... : NEMKO WML 0177/1002/0077

Non-standard test method..... : N/A

Test Report Form No. : TRF EMC SpA

TRF Originator : Nemko Spa

Master TRF : Nemko Spa

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Test item description..... : Automatic remote transmitter control

Trade Mark..... :



Manufacturer..... : Meta System S.p.A.

Model/Type reference..... : ID Tag (Variant on page 10).

Ratings..... : 3 Vdc, 433.9 MHz

FCC -- T E S T R E P O R T

Test Report No. : 132092R1 TRF FCC	2009-12-17 Date of issue
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Type / Model : ID Tag

Equipment : The E.U.T. was composed of single unit

Applicant : Meta System S.p.A.

Address : Via Majakovskij, 10 b/c/d/e

I-42124 Reggio Emilia Italy

Manufacturer : Meta System S.p.A.

Address : Via Majakovskij, 10 b/c/d/e

I-42124 Reggio Emilia Italy

Test Result according to the standards on page 4:	Positive
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

- **NEMKO WM L0177:** General routines for using instruments at Nemko
- **NEMKO WM L1002:** Measurement Uncertainty - Policy and Statement
- **NEMKO WM L0077:** General routines to perform EMC tests
- **ANSI C63.4**
- **FCC, CFR 47, Part 15, Subpart C**
Radio frequency devices, Intentional Radiators (July 10, 2008)
- **ANSI C63.4-2003**

2 SUMMARY

GENERAL REMARKS:

The “ID-Tag” in fact is a radio control on 433.9 MHz transmitting cyclical pulses, with “strip line” integral antenna.

FINAL ASSESSMENT:

The RF requirements pertaining to the technical standards and tested operation modes are

■ - Fulfilled.

The equipment under test

■ - Fulfilled the RF requirements cited on page 4.

Date of receipt of test sample : 2009-09-28

Testing started on : 2009-10-02

Testing completed on : 2009-10-29

3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage : ☐ 230V/50 Hz / 1 ϕ ☐ 115V/60Hz / 1 ϕ
☐ 400V/50 Hz 3PE ☐ 400V/50 Hz 3NPE
☒ 3 V DC ☐ 24 V ac

3.2 Short description of the Equipment under Test (EuT)

The E.U.T. was a radio control transmitting cyclical pulses to keep inhibited the vehicular antitheft device.

Number of tested samples: 1

Serial number: Not labelled

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- ☒ - Normal working (periodic transmissions at regular predetermined interval, long duty cycle)
- ☒ - Forced continuous TX (for testing, short duty cycle)

Operation mode 1 : Normal Working

Operation mode 2 : forced TX

EuT configuration:

The EUT was tested as a single device.

The following peripheral devices and interface cables were connected during the measurement :

<input type="radio"/> None	Purpose :	Radiated emissions
<input type="radio"/> Test fixture	Purpose :	Conducted emissions
<input type="radio"/> --	Purpose :	--

- ☒ unscreened cables
- ☐ screened cables/terminations

3.3 TECHNICAL VARIANT

MODEL: KLS

Trade Mark: Meta System

Differences against the tested model ID Tag: Commercial name only.

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
Via del carroccio, 4
I-20046 Biassono MI

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 18-30 °C

Humidity: 30-60 %

Atmospheric pressure: 860-1060 hPa

4.3 Definitions of symbols used in this test report

- - The black square indicates that the listed condition, standard or equipment is applicable for this report.
- - The empty circle indicates that the listed condition, standard or equipment is **not** applicable for this report.

4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Nemko Spa Technical Procedure WML1002. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Nemko Spa laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	Antenna distance 1m, 3m, 10m (30÷6000) MHz	± 5.0 dB	(1)
Conducted Emission	9 kHz ÷ 30 MHz	± 3.0 dB	(1)
Clicks	9 kHz ÷ 30 MHz	± 3.0 dB	(1)
Radiated Power Emission	(30÷300) MHz	± 3.5 dB	(1)
Harmonic Current Emission	50 Hz ÷ 2 kHz	2%	(1)
Voltage Fluctuation Emission	--	2%	(1)
Radiated Immunity	20 MHz ÷ 3 GHz	(0.0 ÷ 6.0) dB	(1)
Conducted RF Immunity	9 kHz ÷ 230 MHz	± 2.0 dB	(1)
ESD Immunity	Amplitude	10%	(1)
Burst Immunity	Amplitude	10%	(1)
	Duration	30%	
Surge Immunity	Amplitude	10%	(1)
	Front Time	20% or 30%	
	Half Value	20% or 30%	
Dips Immunity	Amplitude	5%	(1)
	Duration	5%	
Magnetic Field Immunity	50 Hz	± 2.0dB	(1)
Damped Magnetic Field Immunity	100 kHz, 1 MHz	± 3 dB ampl. ± 10% freq.	(1)
Oscillatory Wave Immunity	Amplitude - 100 kHz, 1 MHz	10%	(1)
	Front Time - 100 kHz, 1 MHz	20%	
	Oscillation frequency - 100 kHz, 1 MHz	10%	
Low Frequency Immunity	15 Hz ÷ 150 kHz	± 2.0 dB	(1)

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;

5 TEST CONDITIONS AND RESULTS

5.1 RF tests

According to Section 15.31 Measurement standards

TESTING WAS PERFORMED WITH A NEW BATTERY

Set parameters:

Normal running: TX on: = 17 m s, TX off = 31.3 s. Continuous cyclical operated.

For testing: TX forced = TX on: 17 ms, TX off = 9.25 ms.

5.2 Section 15.231 (a) (3)

The total duration of transmissions does not exceed more than two seconds per hour.

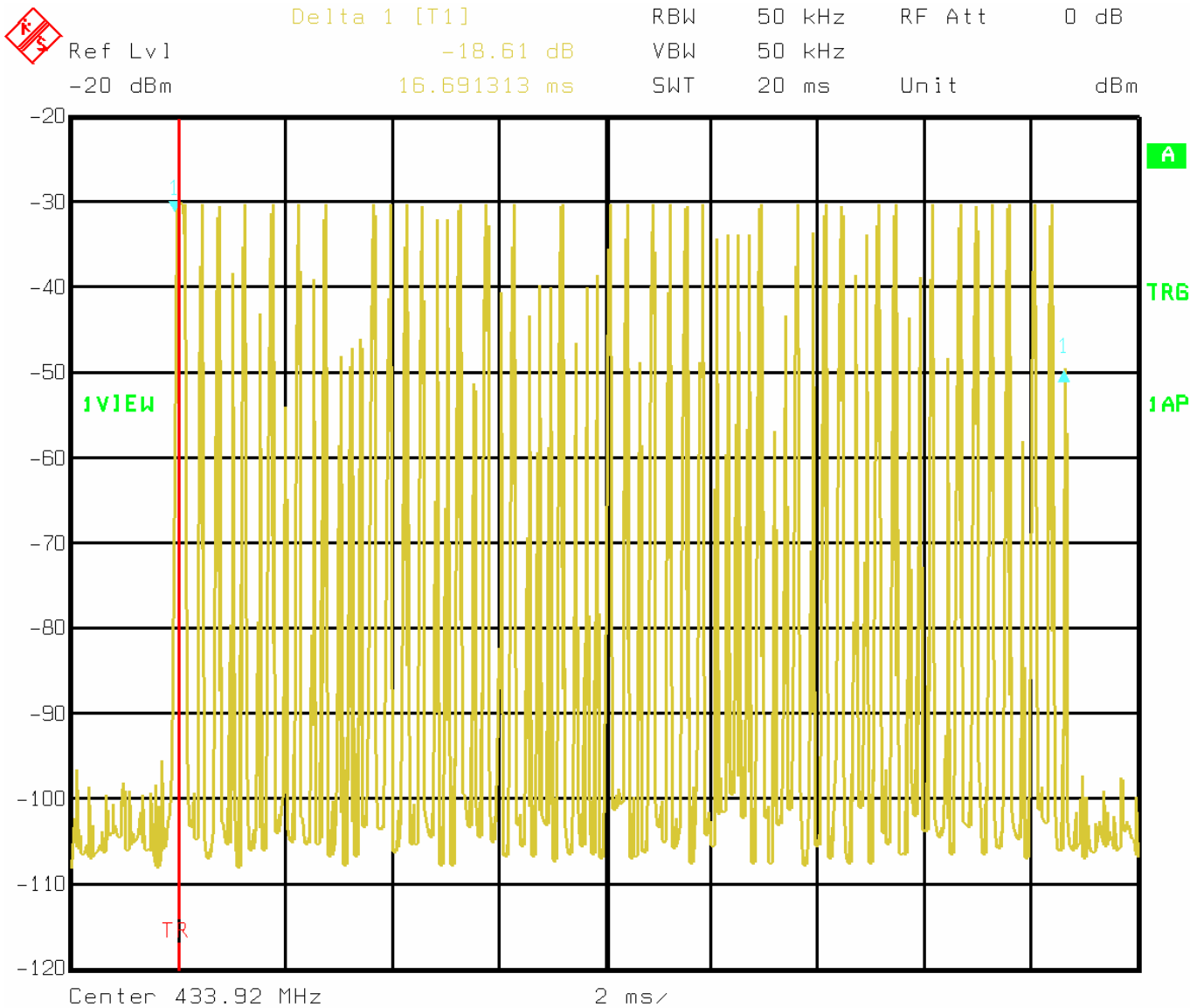
The requirements are **Fulfilled**

Normal working: TX on (0.017 s) : TX off (31.3 s) = x : 3600 s x = 1.95 s (≤ 2 s)

Limit ≤ 2 seconds per hour

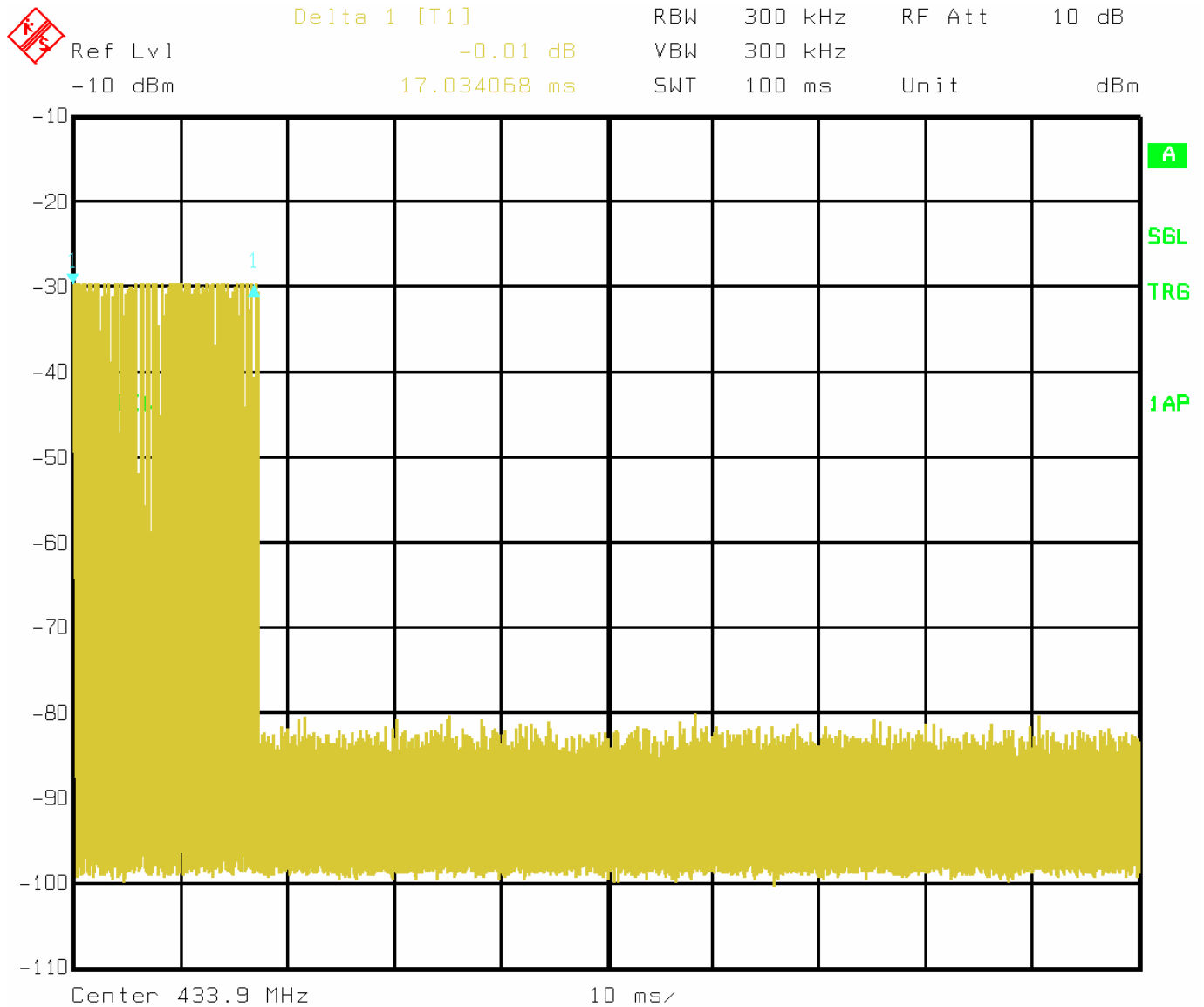
Remarks: See the following graphics

TX on (normal working) : 17 ms



Date: 02.OCT.2009 09:23:32

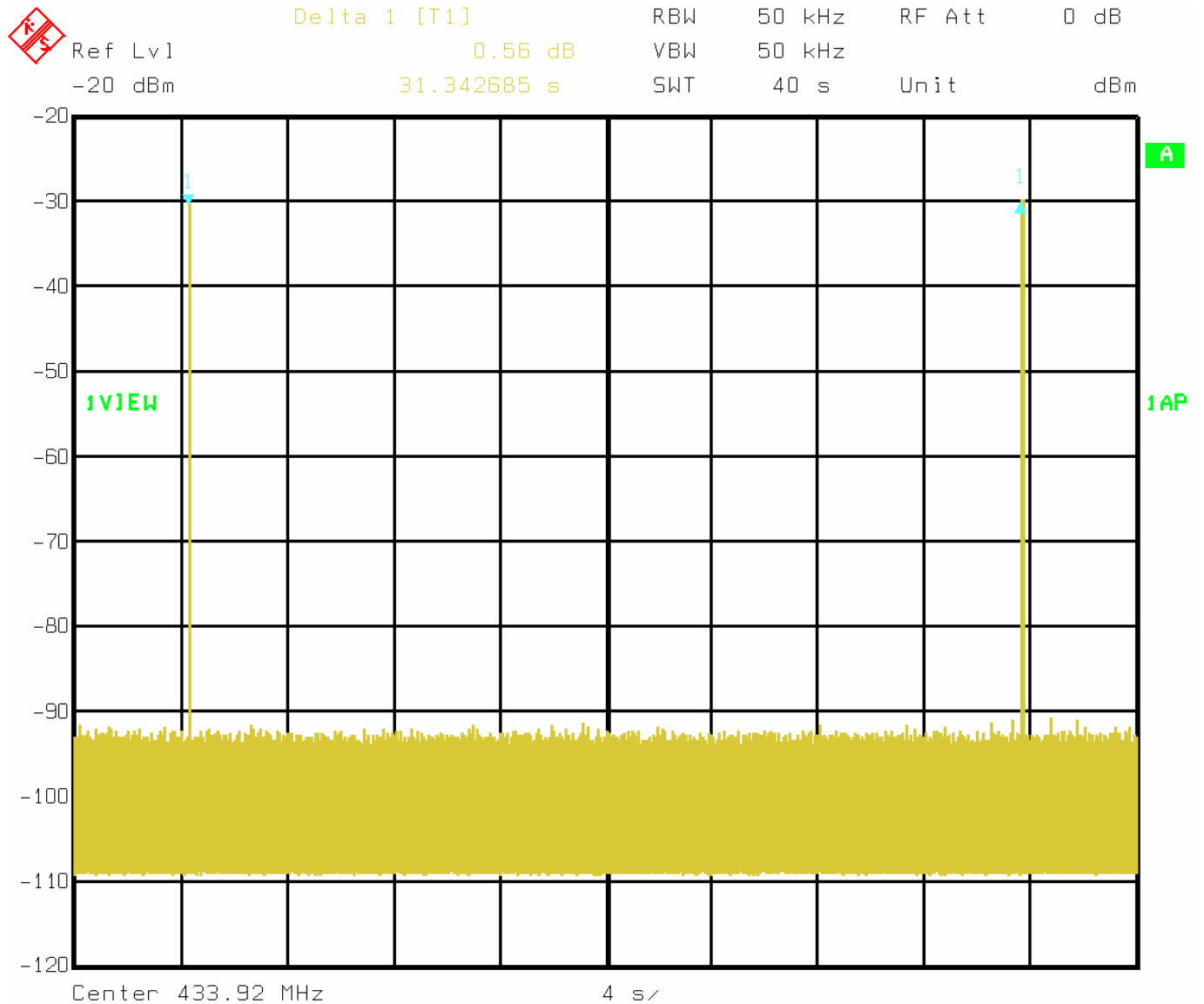
Long duty cycle, start: TXon by 100 ms



Date: 28.OCT.2009 11:12:18

Correction factor $20 \log (17. \text{ ms}/100 \text{ ms}) = -15.4 \text{ dB}$.

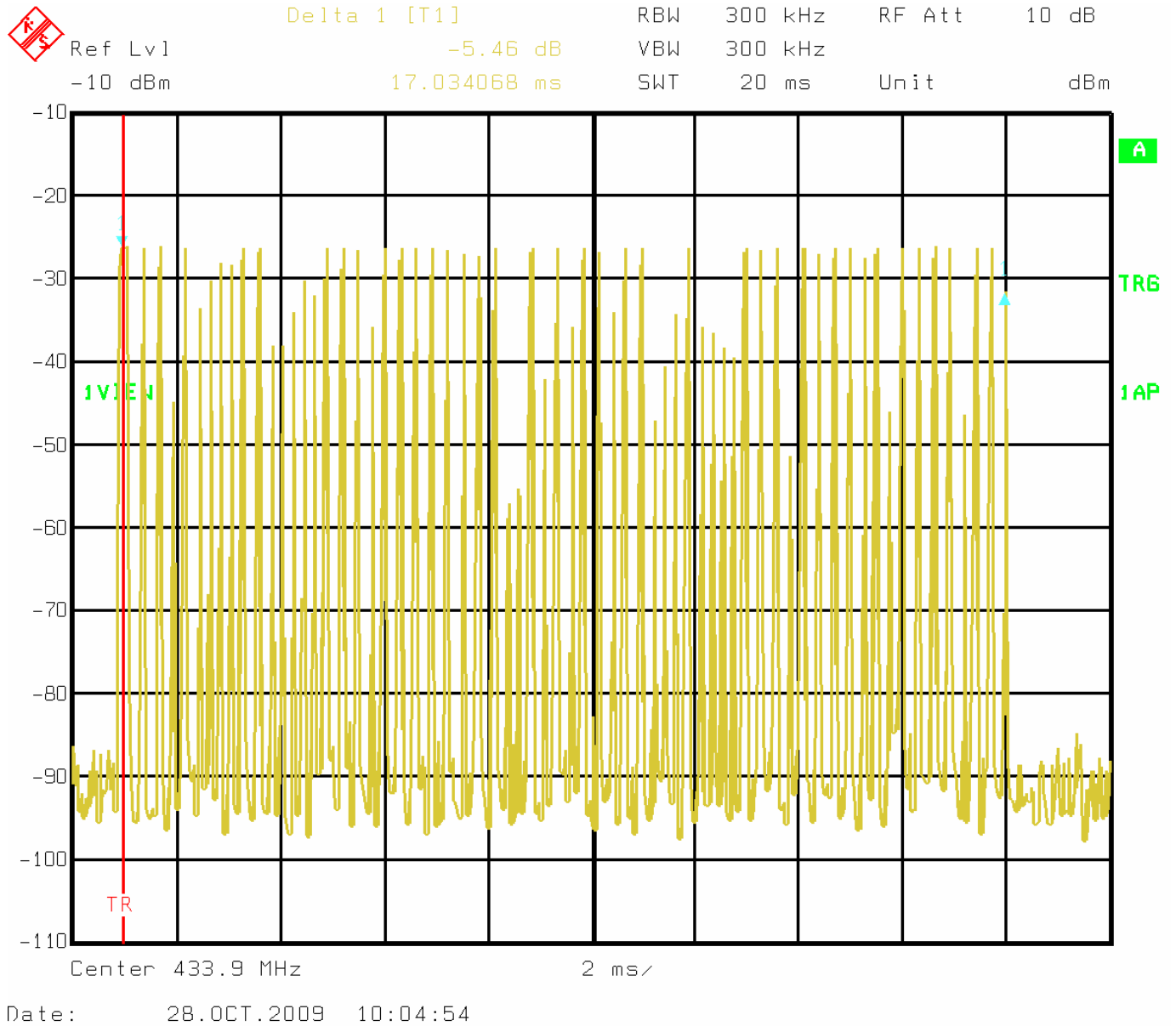
Long duty cycle: (normal working) TXon+ TXoff = 31.34 s :



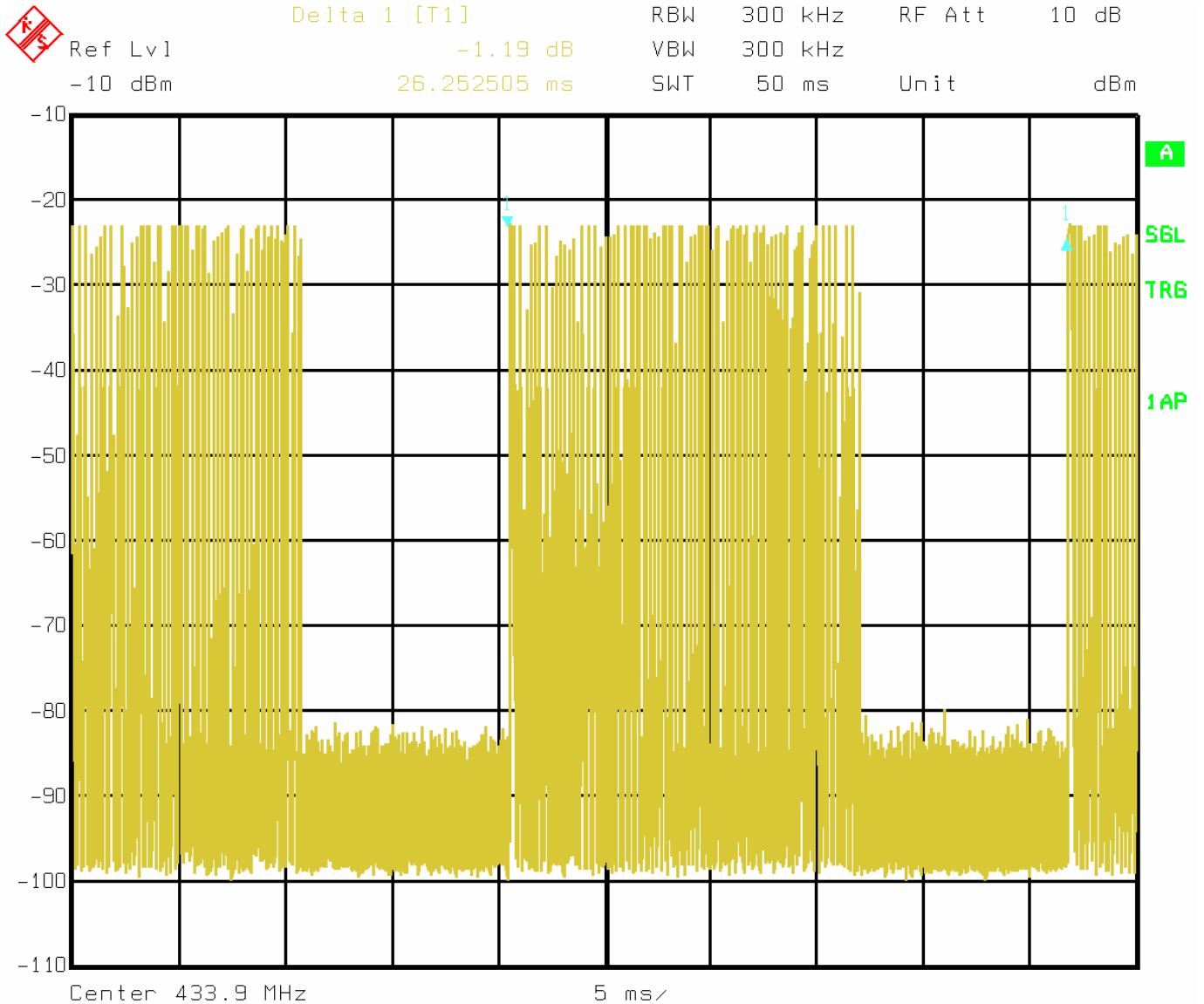
Date: 02.OCT.2009 09:55:01

Short Duty Cycle TX forced

TX on: 17 ms



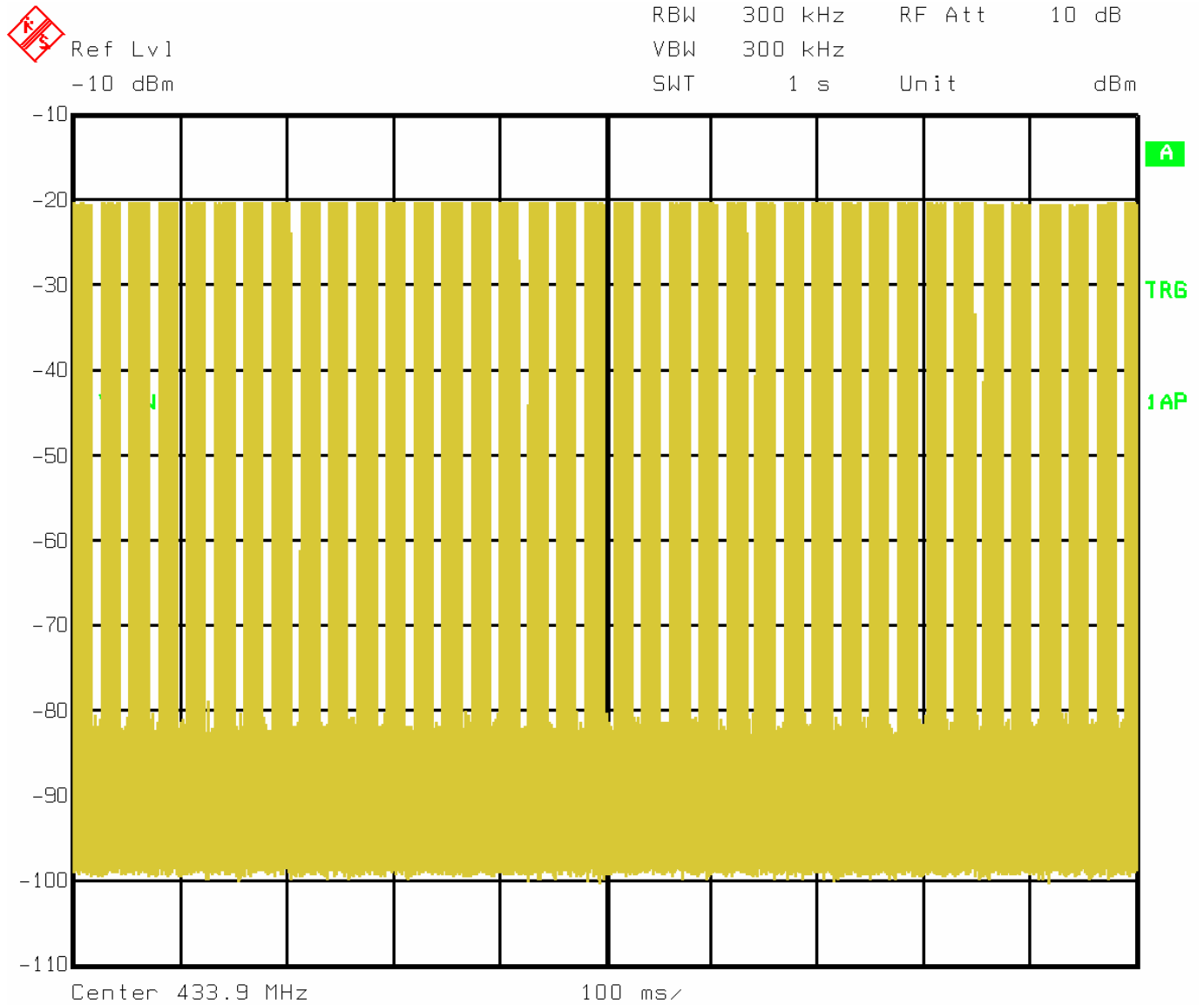
Short duty cycle TXon+TXoff :26.25 ms



Date: 28.OCT.2009 10:14:30

Short duty cycle

38 pulses by 1000 ms



Date: 27.OCT.2009 17:38:27

17 ms x 38 pulses in any 1000 ms → 646 ms TXon in any 1000 ms → 64.6 ms TXon in any 100 ms

Correction factor $20 \log (64.6 \text{ ms}/100 \text{ ms}) = -3.79 \text{ dB}$.

5.3 Section 15.231 (e)

The requirements are: **Fulfilled**

CARRIER LIMIT:

Maximum permitted fundamental field strength : 72.86 dB μ V/m at 3 m distance for 433.9 MHz carrier.

UNWANTED EMISSION LIMIT:

Maximum permitted unwanted emission level: 52.86 dB μ V/m at 3 m distance

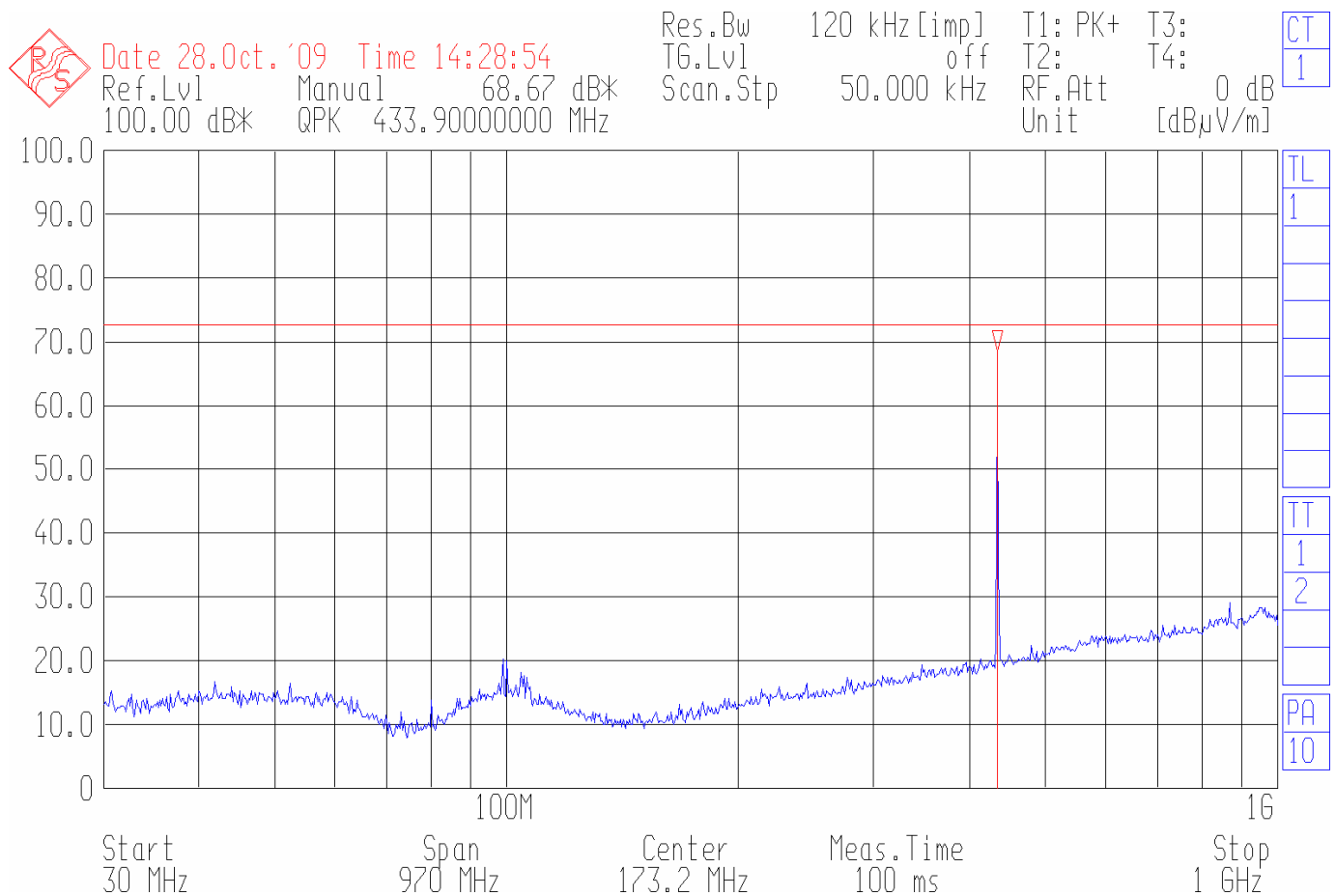
According to ANSI C63.4-2003 Section 12.1.4.1

**THE DEVICE WAS CHECKED IN THREE ORTHOGONAL AXIS TO DETERMINE THE WORST-CASE POSITION.
MEASUREMENTS WERE MADE IN THIS POSITION.**

Remarks: See the following graphics

5.3.1 Max. Carrier level

Vertical pol. The worse of two tests



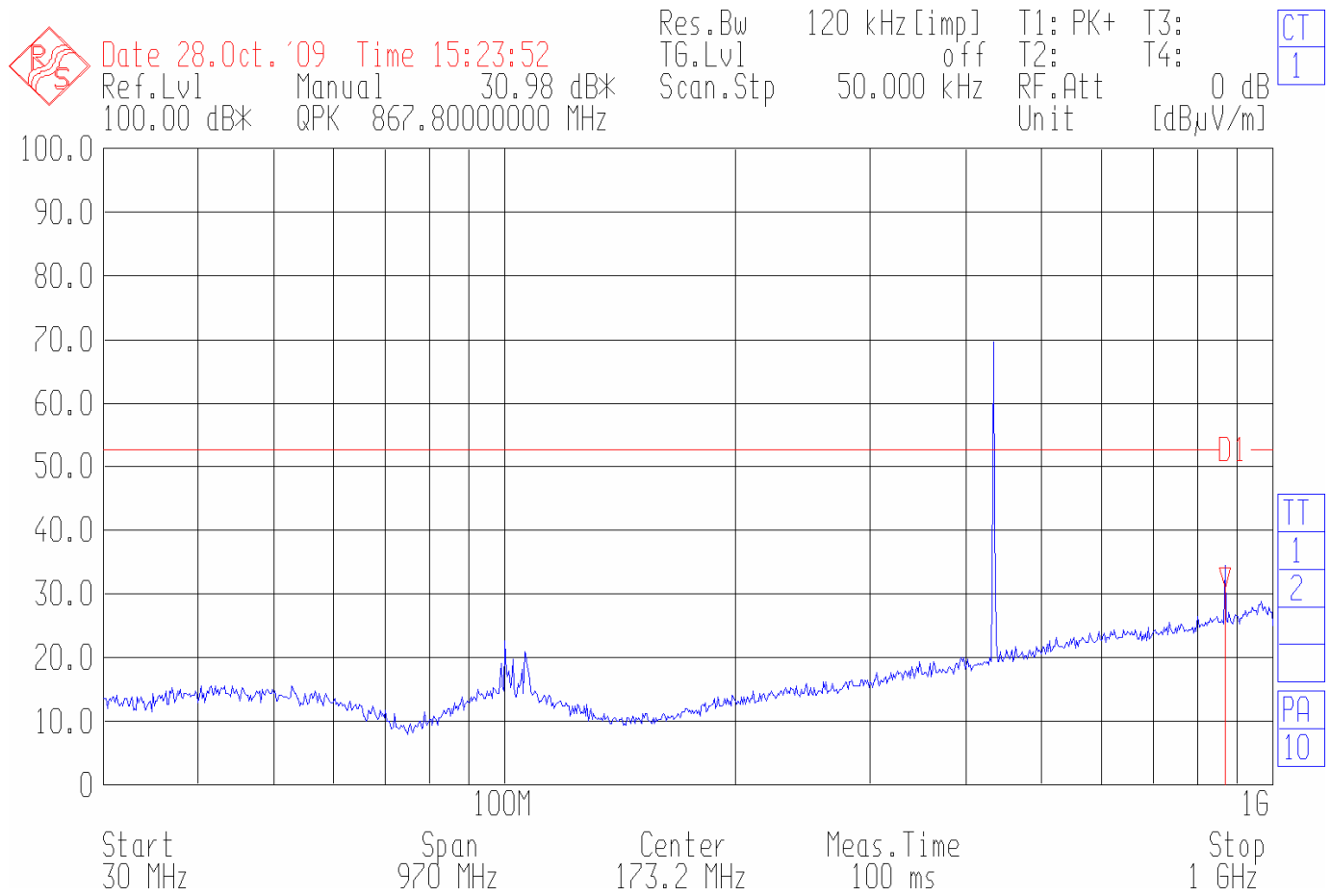
Nominal Carrier Frequency (MHz)	Q.P. Level (dBμV/m) eirp	Limit (dBμV/m)
433.9	68.67	72.86

Maximum permitted fundamental field strength : 72.86 dBμV/m at 3 m distance for 433.9 MHz carrier.

The frequency carrier fulfils the Section 15.231 (e).

5.3.2 V. pol. 2nd harmonic

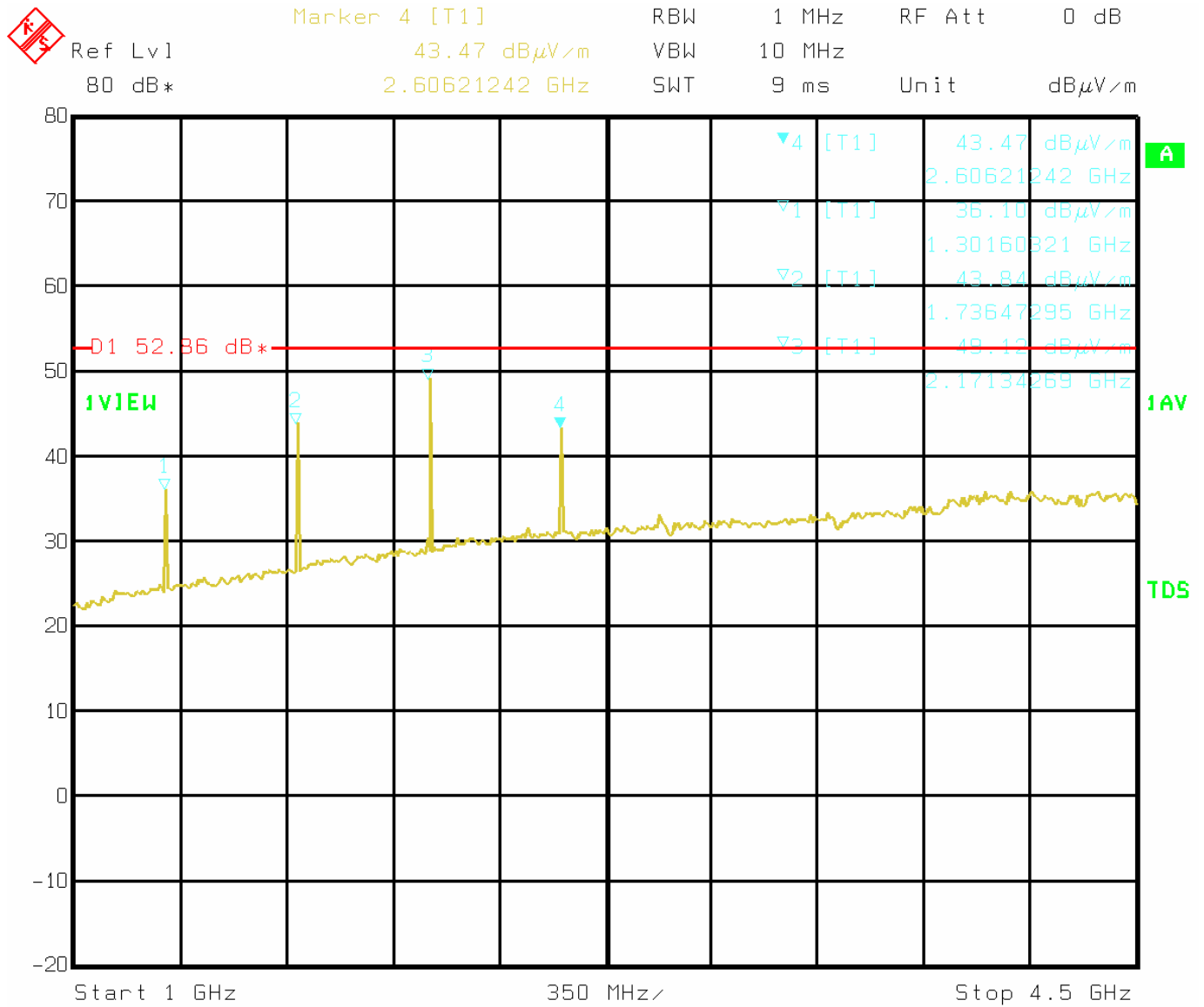
Vertical pol. The worse of two tests.



2 nd harmonic nominal Frequency (MHz)	Q. P. Level (dBμV/m) eirp	Limit dBμV/m)
867.8	30.98	52.86

Maximum permitted unwanted emission level: 52.86 dBμV/m at 3 m distance

5.3.3 V. pol. Spurious 1 to 4.5 GHz



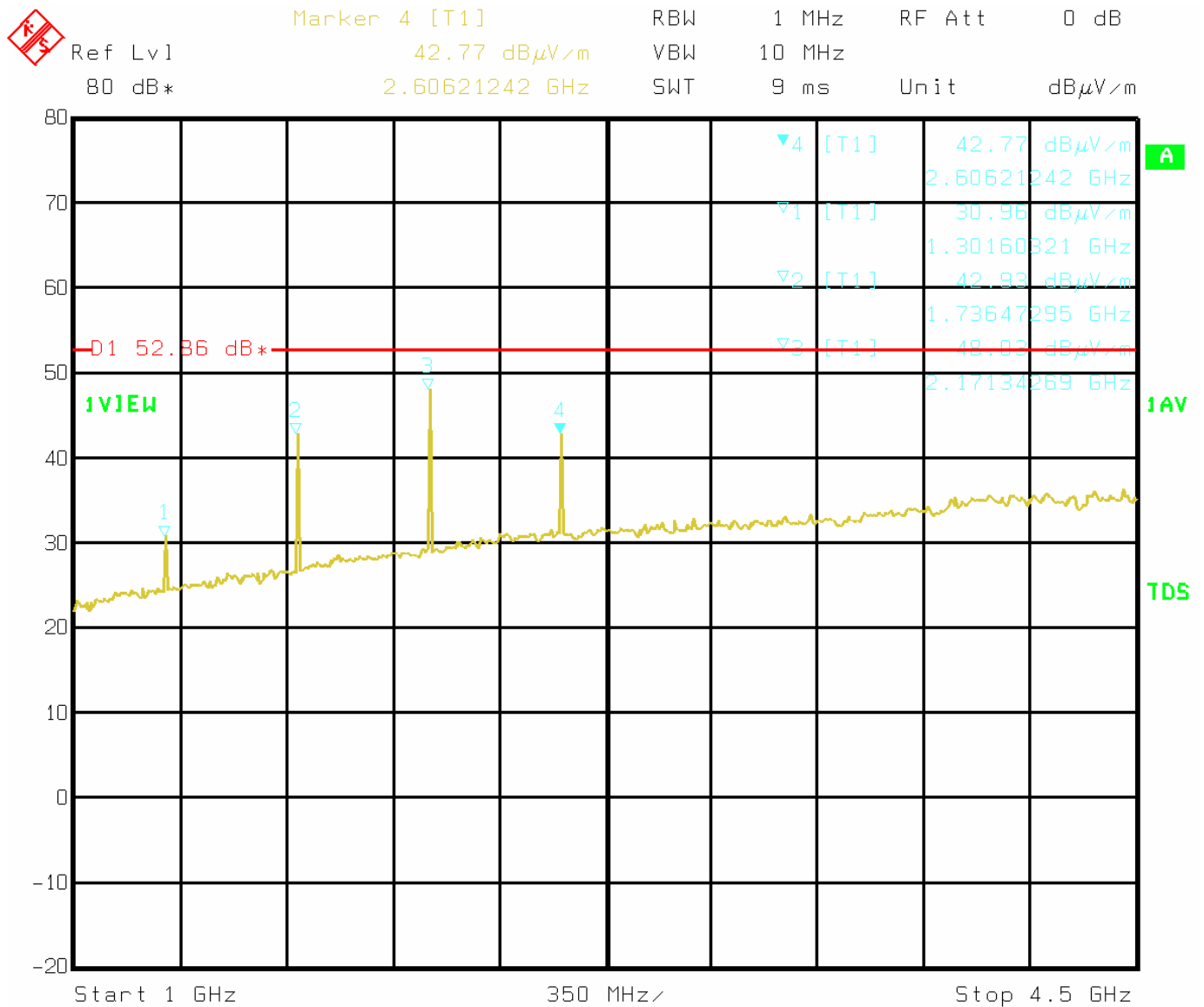
Date: 28.OCT.2009 16:45:04

Up to the 10 th harmonic of the carrier (MHz)	Max. peak Level (dB μ V/m) eirp	Limit dB μ V/m)
1301.6	36.10-15.4=20.7	52.86
1736.5	43.84-15.4=28.44	52.86
2171.3	49.12-15.4=33.72	52.86
2606.2	43.47-15.4=28.07	52.86

-15.4 dB (correction factor).

Maximum permitted unwanted emission level: 52.86 dB μ V/m at 3 m distance

5.3.4 H. pol. Spurious 1 to 4.5 GHz



Date: 28.OCT.2009 16:39:05

Up to the 10 th harmonic of the carrier (MHz)	Max. peak Level (dBμV/m) eirp	Limit dBμV/m)
1301.6	30.96-15.4=15.56	52.86
1736.5	42.93-15.4=27.53	52.86
2171.3	48.03-15.4=32.63	52.86
2606.2	42.77-15.4=27.37	52.86

-15.4 dB (correction factor).

Maximum permitted unwanted emission level: 52.86 dBμV/m at 3 m distance

5.4 Section 15.231 (3) (c) Bandwidth

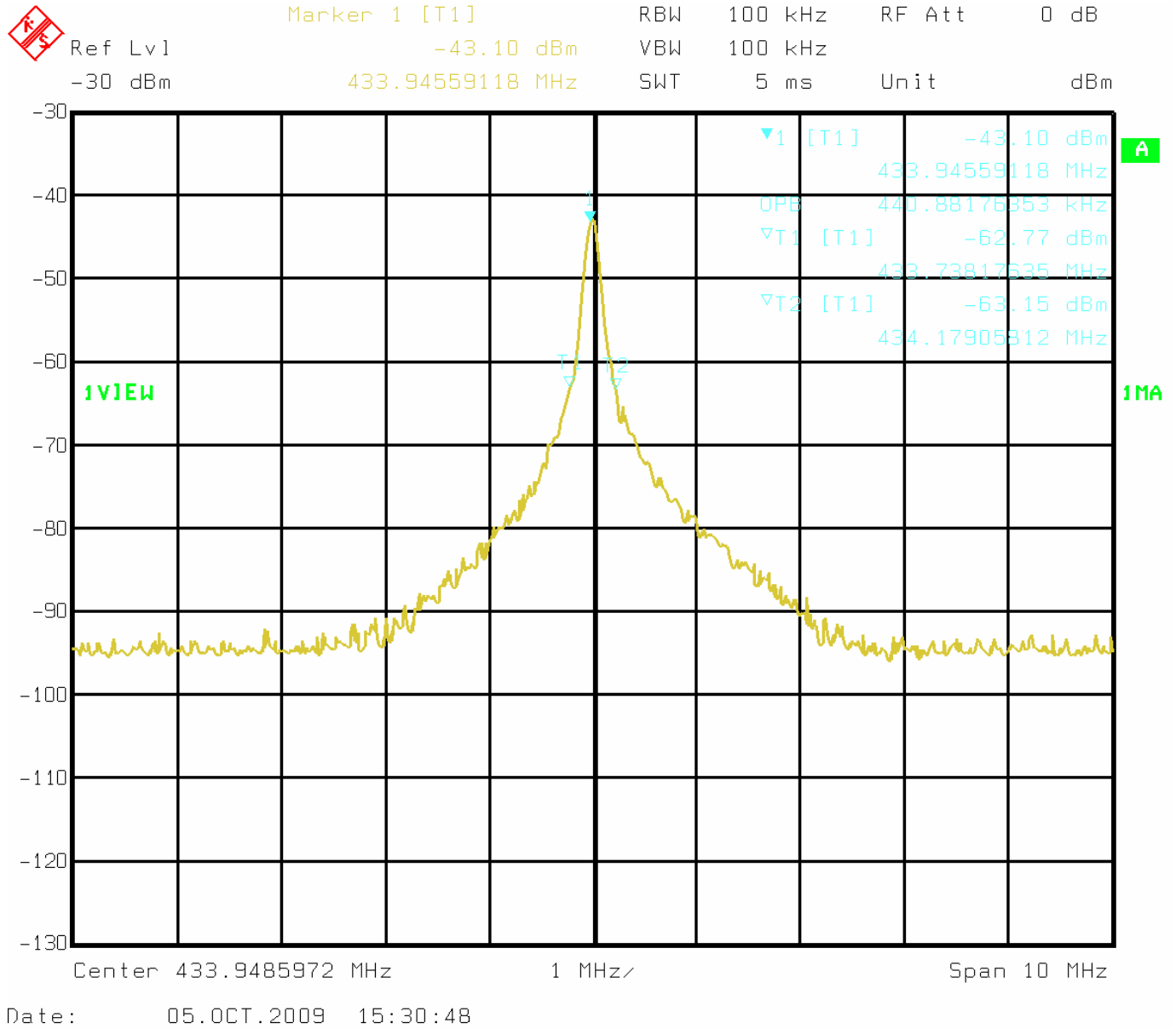
Bandwidth at 20 dB

The requirements are: **Fulfilled**

Limit: Bandwidth < 0.25% of the carrier frequency with 70 MHz < Carrier Frequency < 900 MHz

Remarks: See the following graphic

5.4.1 BANDWIDTH (20 dB)



BANDWIDTH: 440.88 KHz < 433.9 MHz x 0.25% = 1.085 MHz

5.5 Section 15.231 (e) in addition

In addition , devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

The requirements are **Fulfilled**

Limit

TX on ≤ 1 s

Silent period \geq TX on x 30 & In no case less than 10 seconds.

Remarks:

See the following pages

5.5.1

Normal working: TX on : $17 \text{ ms} \leq 1 \text{ s}$
Silent period $\geq 17 \text{ ms} \times 30 = 0.51 \text{ s}$ (silent period: 31.3 s)
Silent period $\geq 10 \text{ s}$ (silent period: 31.3 s)

6 USED TEST EQUIPMENT

<i>Equipment</i>	<i>Model</i>	<i>Manufacturer</i>	<i>Serial N°</i>
Trilog Broadband Antenna 25 ÷ 4000 MHz	Schwarzbeck	VULB 9163	VULB 9163-286
Bilog antenna 1 – 18 GHz	Schwarzbeck	STLP 9148-123	123
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137
Semi-anechoic chamber	3m semi-anechoic chamber	Nemko	70
Characterized RF cable	Sucoflex 103	Suhner	53611/3
Highpass filter	WHK0.8/13G-10EF	Wainwright	1
RF Analyzer + display unit	R&S	ESBI-RF ESAI-D	828 038/003 829 808/005
Spectrum analyzer 9kHz-40GHz	FSEK	R & S	848255/05
Test fixture	Tf	Nemko It	1
Thermohygrometer data logger	175-H2	TESTO	20012380

7 PHOTOS



7.1 Photo documentation of the test set-up

