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Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3463 (IC)
TCB ID: DE 0001

Accredited by the
German Accreditation Council
DAR–Registration Number
DAT-P-176/94-D1

Independent ETSI
compliance test house

Accredited Bluetooth® Test Facility (BQTF)

Test report no.	**:**	**2-4112-01-02/05**
Applicant	**:**	**Feig Electronics GmbH**
Type	**:**	**ID ISC.LRM2000 Transponder reader**
Test Standard	**:**	**FCC Part 15 / RSS210**
FCC ID	**:**	**PJMLRM2000**
Certification No. IC	**:**	

Table of contents

1 General information

1.1. Administrative data of the test facility

1.1.1 Identification of the testing laboratory

Company name:	Cetecom ICT Services GmbH
Address:	Untertürkheimerstr. 6-10 D-66117 Saarbruecken Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF) Federal Communications Commission (FCC) Identification/Registration No : 90462
Responsible for testing laboratory:	Harro Ames Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

1.2. 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 generalizations 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.

..... / .....
Responsible for testing laboratory
(Harro Ames / Dirk Hausknecht)

..... / .....
Responsible for test report
(Harro Ames / Dirk Hausknecht)

1.3 Details of Applicant

Name	:	Feig Electronic GmbH
Address	:	Lange Straße 4
City	:	D-35781 Weilburg-Waldhausen
Country	:	Germany
Phone	:	+49 (0) 6471 31 09-0
Fax	:	+49 (0) 6471 31 09-99
Contact	:	Mr. Elmar Reichwein
Phone	:	+49 (0) 6471 31 09-38
Fax	:	+49 (0) 6471 31 09-99
e-mail	:	elmar.reichwein@feig.de

1.4 Application Details

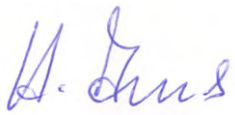
Date of receipt of application	:	2005-11-22
Date of receipt of test item	:	2005-11-22
Date(s) of test	:	2005-11-22 to 2005-11-23
Date of report	:	2005-12-27

1.5 Test Item

Type of equipment	:	Modular RF-ID Transponder reader system
Model name	:	ID ISC.LRM2000
Manufacturer	:	Feig Electronic GmbH
Address	:	Lange Strasse 4
City	:	D-35781 Weilburg-Waldhausen
Country	:	Germany
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 6
Open Area Test Site Industry Canada Number	:	3463
Frequency Range (or fixed frequency)	:	Tx: 13.56 MHz Rx: 13.56 MHz
Field Strength (at what distance)	:	52.5 dBµA/m in 10m (conf 3)
Occupied Bandwidth (99% BW)	:	**1 kHz**
Type of Modulation	:	N0N (inductive loop)
Antenna Information	:	Loop antenna
Emission Designator	:	1k00N0N
Transmitter Spurious (worst case)	:	-9.0 dBµA/m in 10m (conf 3)
Receiver Spurious (worst case)	:	Not possible
IC no.	:	
FCC ID	:	PJMLRM2000

ATTESTATION:
DECLARATION OF COMPLIANCE: I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager :



2005-11-29	Harro Ames	
Date	Name	Signature

1.6 Test Setup

Hardware	**:**	**Reader:** **ID ISC.LRM 2000** **Multiplexer:** **ID ISC.ANT.MUX** **Power-splitter:** **ID ISC.ANT.PS-B** **Antennas:** **ID ISC.ANT 1400/760 TypeA** **(consists of the antenna , power splitter and reader)** **ID ISC.ANT 1400/760 Type B** **(consists of the antenna only)** **ID ISC.ANT 1400/760 Type C** **(consists of the antenna, multiplexer and reader)** **ID ISC.ANT 800/600** **ID ISC.ANT 300/300**

The system consists of the reader module and either a multiplexer module with 1, 2 or 3 up to 8 antennas or with a power-splitter module and 1 or 2 antennas or the reader module with a single ID ISC.ANT 800/600 or ID.ISC.ANT 300/300 or ID.ISC.ANT1400/760.
We tested all combinations up to 3 antennas.
The magnetic field strength was the same for all antenna configurations with the ID ISC.ANT 1400/760, as the input energy is the same in any case, because the field is increased by the number of antennas and decreased by using the power-splitter.
The system with multiplexer uses only one antenna at any time, the RF is switched between the antennas.
It is possible to use the reader with one antenna, with two antennas and one multiplexer or one power splitter, with three antennas and one multiplexer or two power splitters or with up to 8 antennas and a multiplexer.

Additional measurements were performed with the reader and the ID ISC.ANT 800/600 and ID ISC.ANT 300/300 antennas.

The system is modular and can be set depending on the requirements of using.

The system is delivered without dedicated power supply.
So we used for testing a power supply from our house.

1.7 Test Specifications

FCC:	**CFR Part 15.209 and 15.225**
IC:	**RSS 210, Annex 2.6**

2 Statement of Compliance

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

2.1 Summary of Measurement Results

2.1.1 CFR 47 Part 15 Radio frequency devices

Section in this Report	Test Name / Section FCC Part 15	Test Name / Section RSS 210	applicable	Verdict
4.1	§ 15.35 (c) Timing of the transmitter (Duty cycle correction factor)	6.5 Pulsed Operation	NO	
4.2	§ 15.225 (a) FIELDSTRENGTH OF FUNDAMENTAL	Annex 2.6	YES	pass
4.3	§ 15.225 (b,c,d) FIELDSTRENGTH OF HARMONICS and SPURIOUS	Annex 2.6	YES	pass
4.4	§ 15.225 (e) Frequency tolerance	Annex 2.6	YES	pass
4.5	§ 15.107 / 15.207 Conducted Limits	Section 6.6 , 7.4	YES	pass

3 Measurements and results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.
The receiving antennas are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set-ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.
The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.
Antennas are conform with ANSI C63.2-1996 item 15.

9 kHz – 150 kHz : Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.
30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna
200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna
>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.109 and 15.107

4 FCC Part 15 Subpart B

4.1 Timing of the transmitter

Not applicable

Reference

FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	RSS 210, ISSUE 5 6.5 Pulsed operation

Limits: § 15.35 (c)

(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

4.2 Field strength of the fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (a)
IC:	RSS 210, Annex 2.6

Maximum output power (quasi peak) - (radiated)

Measured at 10m distance, recalculated to 30m according to FCC part15.31 (f2)
No difference between a system with one antenna, with two antennas or with three antennas.
There is also no influence of using the multiplexer or the power-splitters.
See 1.6

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)		
Frequency			13.56 MHz	13.56 MHz
Antenna type: ID ISC.ANT 1400/760			In 10m	Calculated in 30m
T_{nom} +23 °C	24V DC		93.5 dBµV/m	73.5 dBµV/m
Maximum deviation from output power under extreme test conditions (dBc)		not applicable		
Measurement uncertainty		±3dB		

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Limits **SUBCLAUSE § 15.225 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
13.553 to 13.567	15848 µV/m (84 dBµV/m)	30
	158489 µV7m (104 dBµV/m)	10
		Recalculated acc. to FCC part15.31 (f2)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (a)
IC:	RSS 210, Annex 2.6

Maximum output power (quasi peak) - (radiated)

Measured at 10m distance, recalculated to 30m according to FCC part15.31 (f2)

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)		
Frequency			13.56 MHz	13.56 MHz
Antenna type: ID ISC.ANT 800/600			In 10m	Calculated in 30m
T_{nom} +23 °C	24V DC		103.5 dBµV/m	83.5 dBµV/m
Maximum deviation from output power under extreme test conditions (dBc)		not applicable		
Measurement uncertainty		±3dB		

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Limits **SUBCLAUSE § 15.225 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
13.553 to 13.567	15848 µV/m (84 dBµV/m)	30
	158489 µV7m (104 dBµV/m)	10
		Recalculated acc. to FCC part15.31 (f2)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (a)
IC:	RSS 210, Annex 2.6

Maximum output power (quasi peak) - (radiated)

Measured at 10m distance, recalculated to 30m according to FCC part15.31 (f2)

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)		
Frequency			13.56 MHz	13.56 MHz
Antenna type: ID ISC.ANT 300/300			In 10m	Calculated in 30m
T_{nom} +23 °C	24V DC		93.5 dBµV/m	73.5 dBµV/m
Maximum deviation from output power under extreme test conditions (dBc)		not applicable		
Measurement uncertainty		±3dB		

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Limits **SUBCLAUSE § 15.225 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
13.553 to 13.567	15848 µV/m (84 dBµV/m)	30
	158489 µV7m (104 dBµV/m)	10
		Recalculated acc. to FCC part15.31 (f2)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

4.3 Field strength of harmonics and spurious

Reference

FCC:	CFR Part SUBCLAUSE § 15.209 (a)
IC:	RSS 210, Annex 2.6

Antenna type: ID ISC.ANT 1400/760

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBµV/m) Average/QP	limit max. allowed emmision power		results
13.56					Operating frequency
27.1	*	19.0 dBµV/m QP	29.5 dBµV/m		pass
40.8		28.2 dBµV/m QP	40.0 dBµV/m		pass
67.8		26.1 dBµV/m QP	40.0 dBµV/m		pass
150.3		28.4 dBµV/m QP	43.5 dBµV/m		pass
203.1		30.2 dBµV/m QP	43.5 dBµV/m		pass
298.6		28.5 dBµV/m QP	46.0 dBµV/m		pass
487.6		39.4 dBµV/m QP	46.0 dBµV/m		pass
Measurement uncertainty			± 3dB		

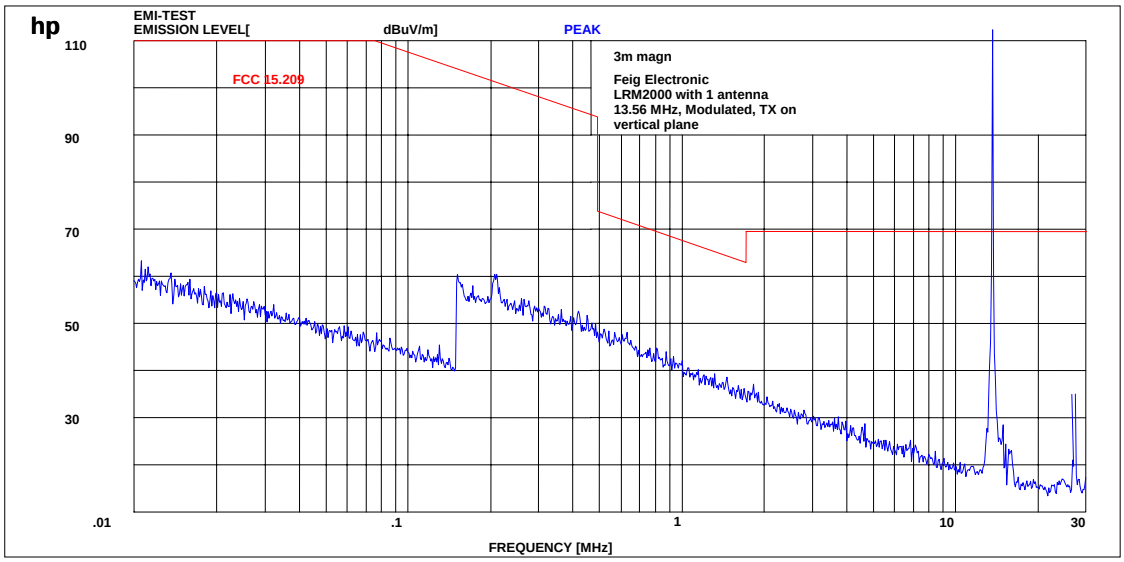
RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Limits **SUBCLAUSE § 15.209 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30.0 – 88.0	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

Plots of measurements

Plot 1:
Part 15.209 Magnetics TX with one antenna



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 3 planes, the plot shows the worst case

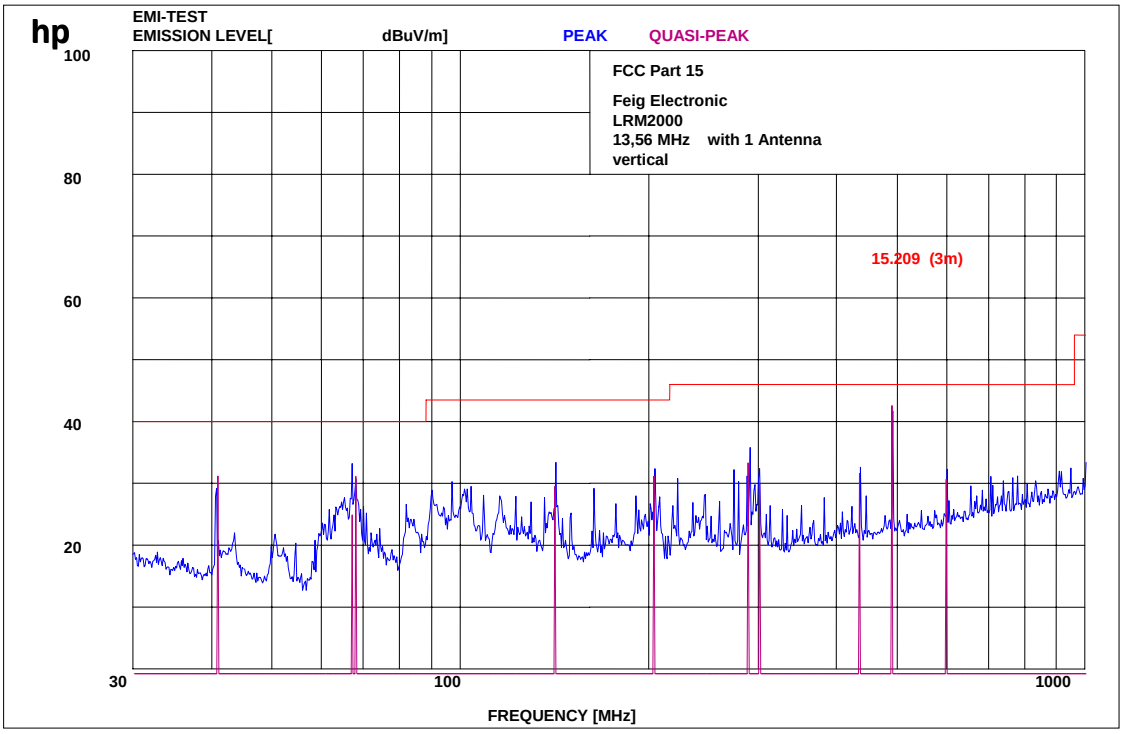
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dBµV/m)	30
30 - 88	100 (40 dBµv/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

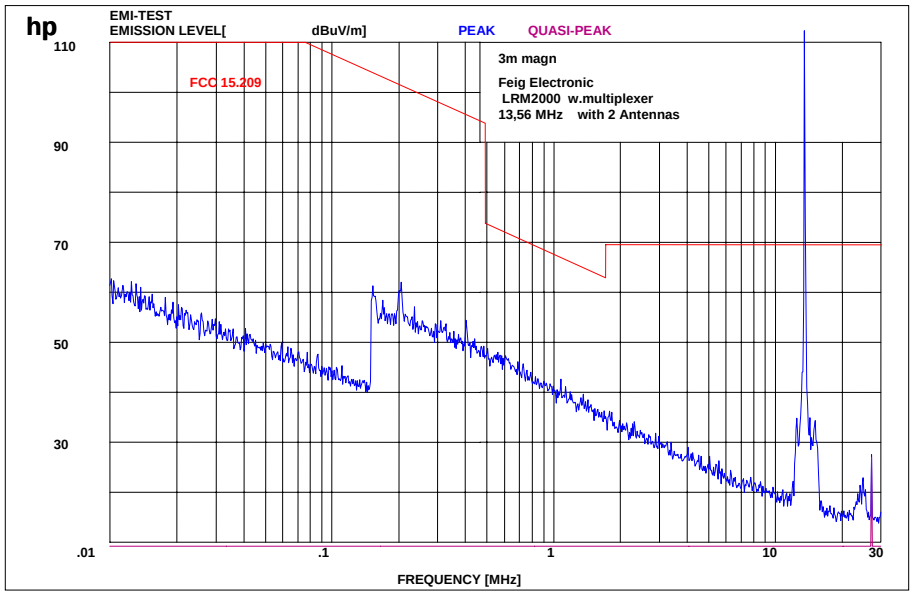
Plot 2:

TX (30 MHz to 1 GHz) with one antenna



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 3:
Part 15.209 Magnetics TX with multiplexer and two antennas



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 3 planes, the plot shows the worst case

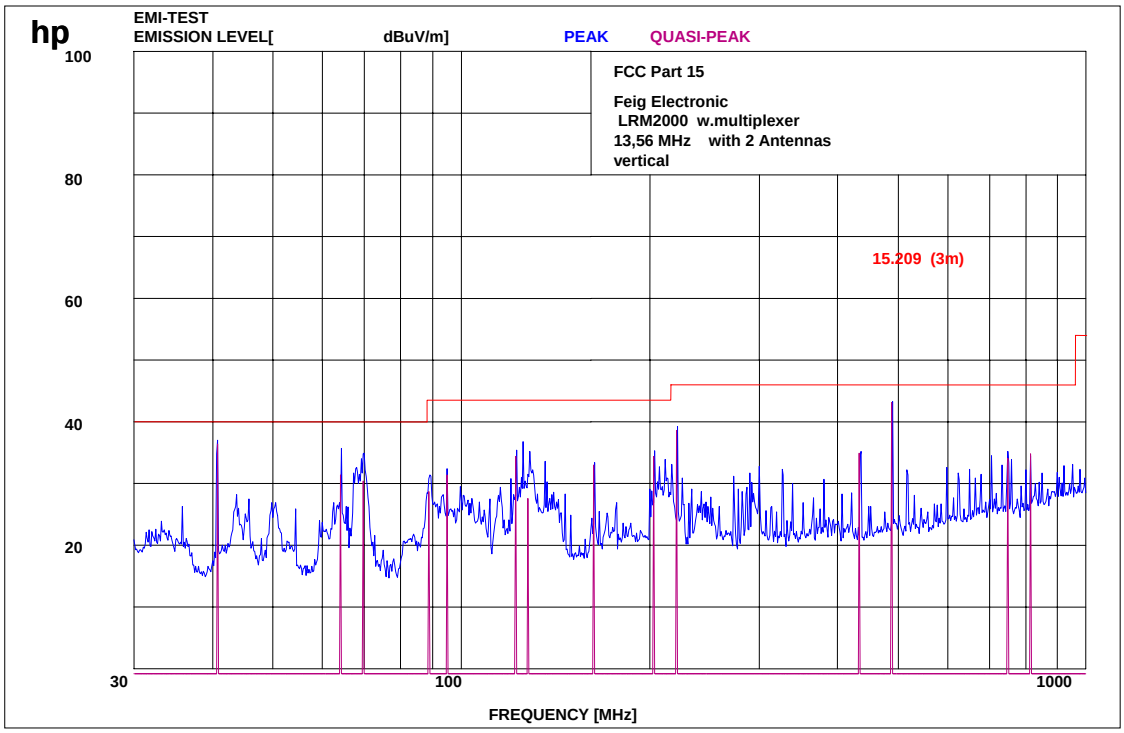
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dBµV/m)	30
30 - 88	100 (40 dBµv/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

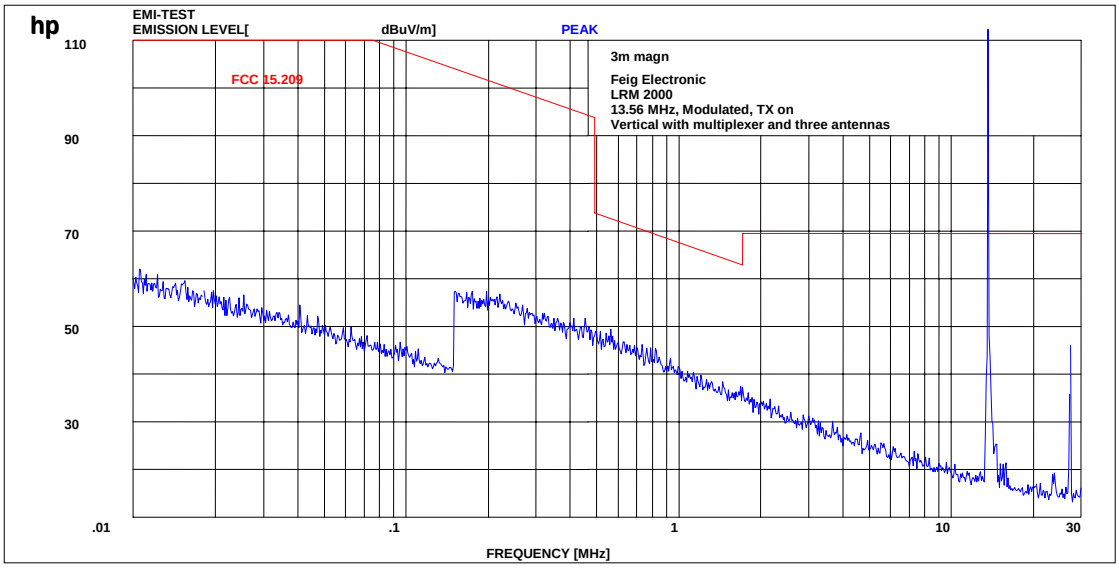
Plot 4:

TX (30 MHz to 1 GHz) with multiplexer and two antennas



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 5:
Part 15.209 Magnetics TX with multiplexer and three antennas



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 3 planes, the plot shows the worst case

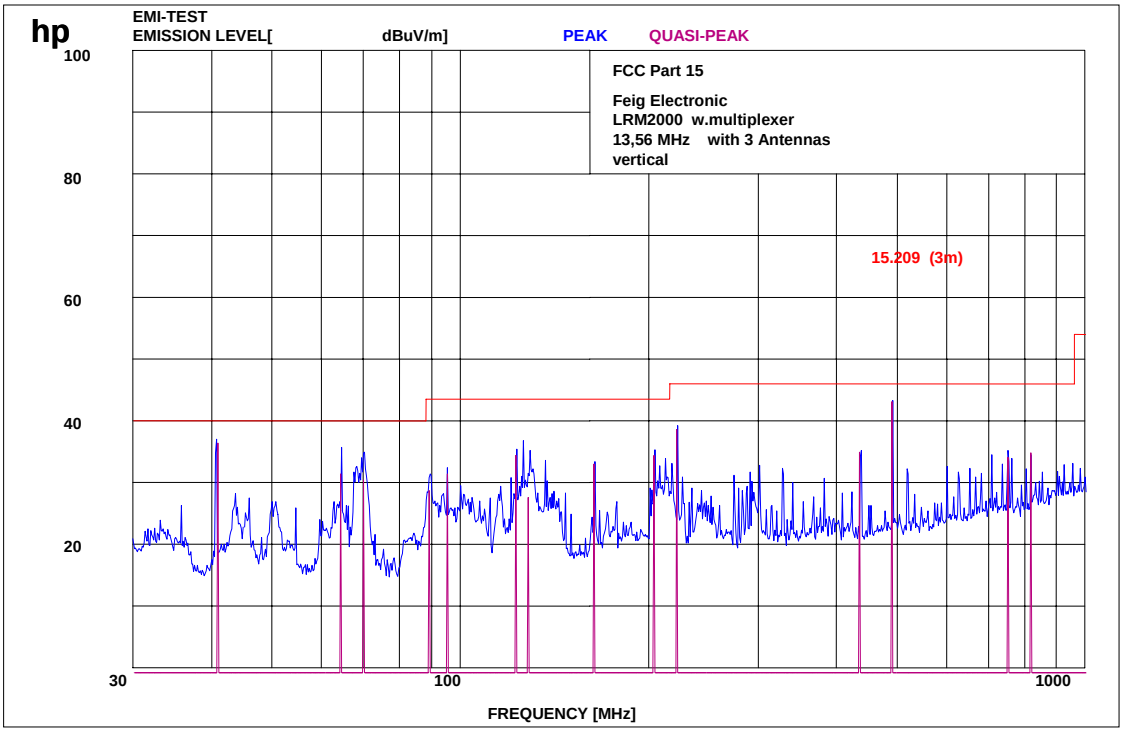
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dBµV/m)	30
30 - 88	100 (40 dBµv/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 6:

TX (30 MHz to 1 GHz) with multiplexer and three antennas

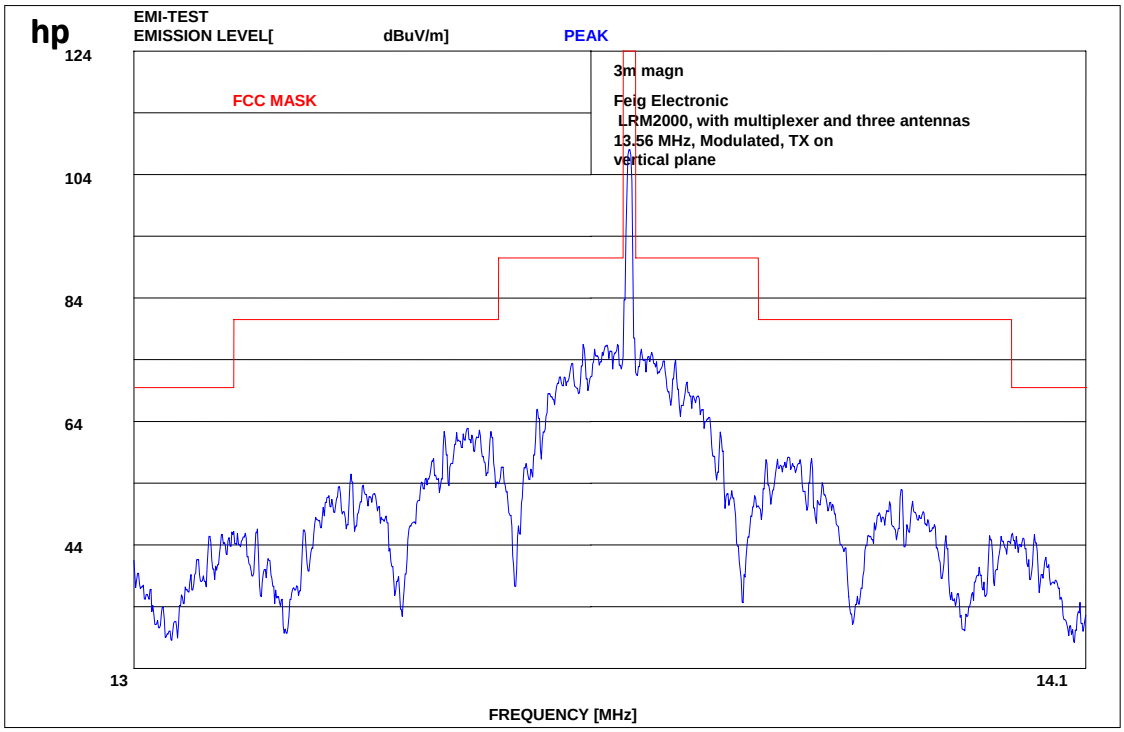


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 7

Spectrum mask part15.225 (a,b,c,d)

Limits recalculated from 30m to 3m with 40 dB/decade according to FCC 15.31 (f2)

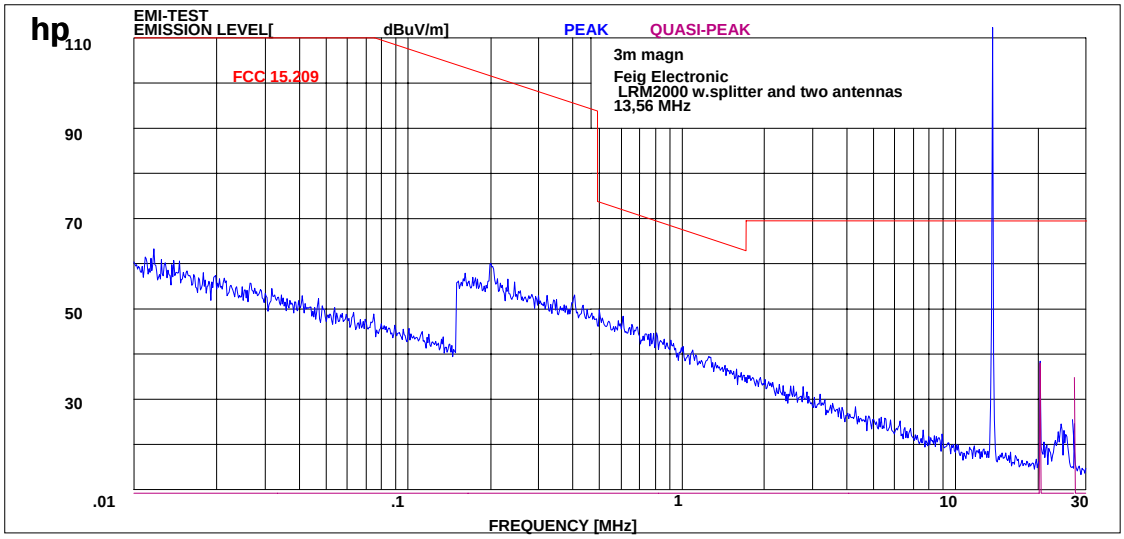


RBW /VBW 9 kHz

The transmitter holds the requirements of FCC 15.225 (a,b,c and d)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 8:
Part 15.209 Magnetics TX with power-splitter and two antennas



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 3 planes, the plot shows the worst case

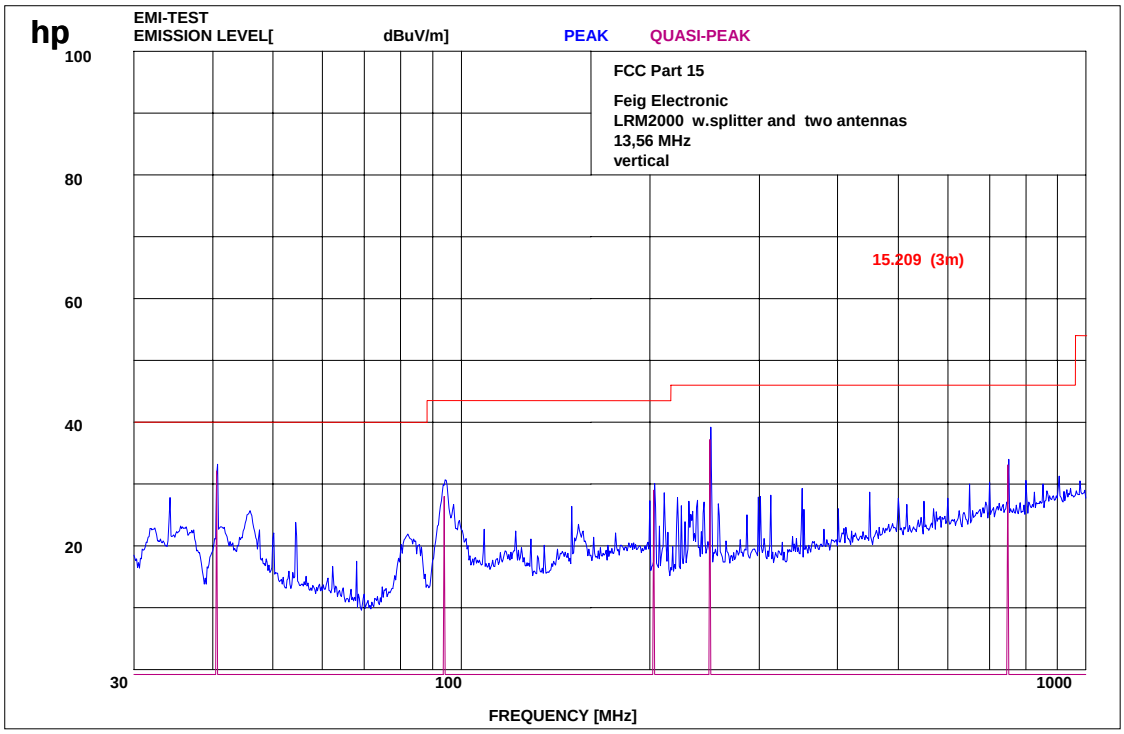
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dBµV/m)	30
30 - 88	100 (40 dBµv/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

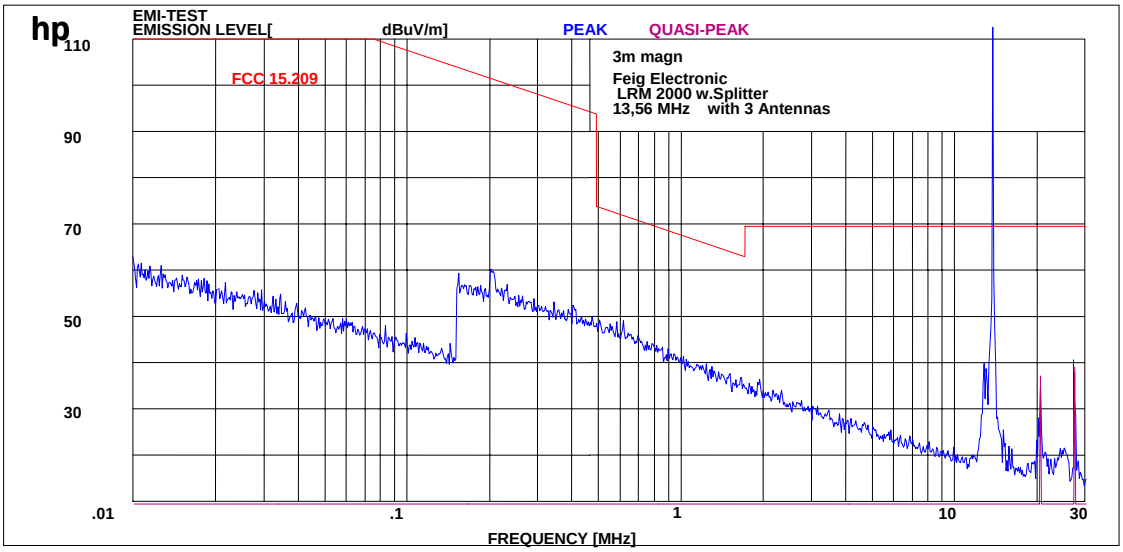
Plot 9:

TX (30 MHz to 1 GHz) with powersplitter and two antennas



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 10:
Part 15.209 Magnetics TX with power-splitter and three antennas



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 3 planes, the plot shows the worst case

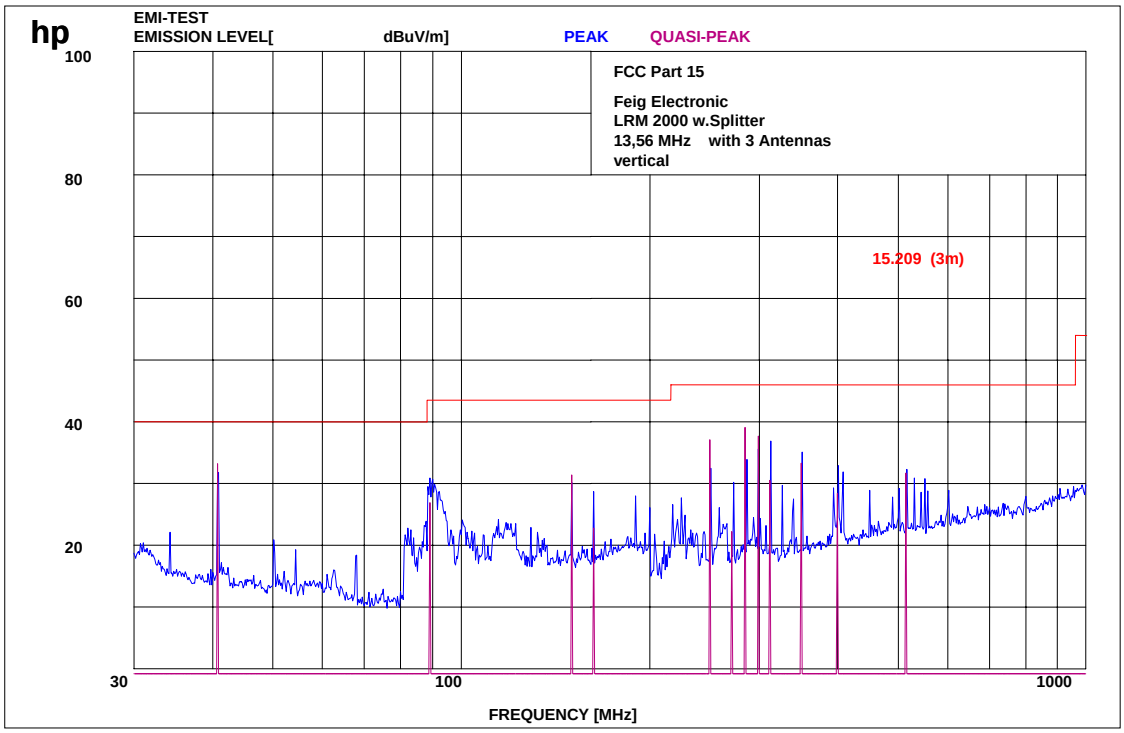
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 - 30	30 (29.5 dBµV/m)	30
30 - 88	100 (40 dBµv/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 11:

TX (30 MHz to 1 GHz) with power-splitter and three antennas



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Antenna type: ID ISC.ANT 800/600

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBµV/m) Average/QP	limit max. allowed emmision power		results
13.56					Operating frequency
27.12		15.0 dBµV/m QP	29.5 dBµV/m		pass
108.5		33.6 dBµV/m QP	43.5 dBµV/m		pass
133.9		33.4 dBµV/m QP	43.5 dBµV/m		pass
284.1		33.2 dBµV/m QP	46.0 dBµV/m		pass
299.6		33.9 dBµV/m QP	46.0 dBµV/m		pass
432.9		35.0 dBµV/m QP	46.0 dBµV/m		pass
813.3		33.4 dBµV/m QP	46.0 dBµV/m		pass
Measurement uncertainty			± 3dB		

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

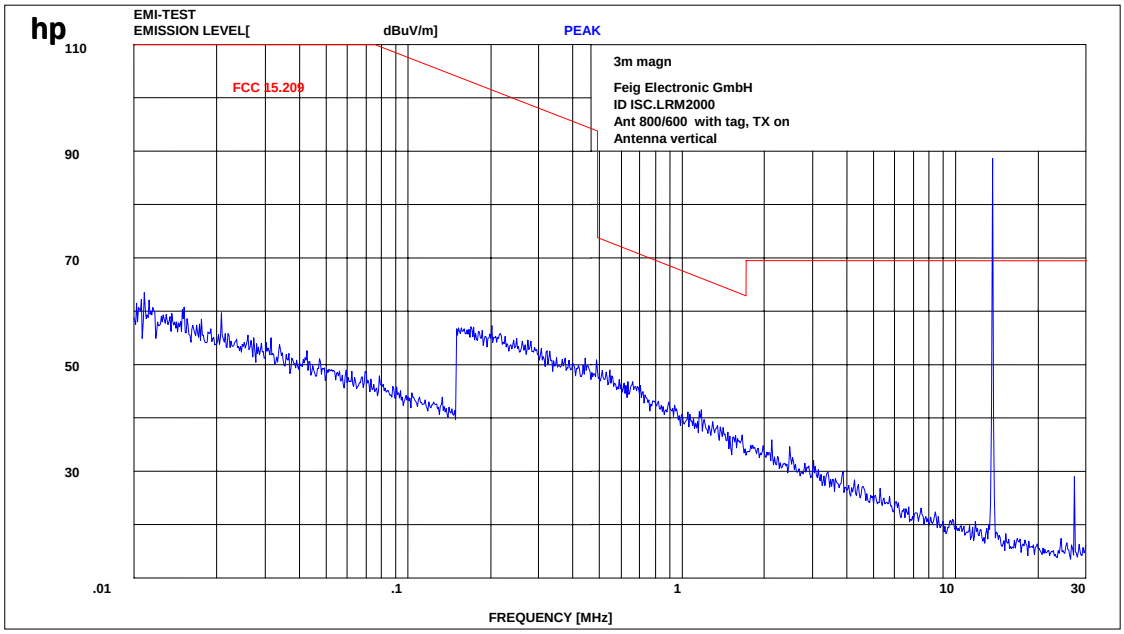
Limits **SUBCLAUSE § 15.209 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30.0 – 88.0	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plots of measurements

Plot 12:
Part 15.209 Magnetics TX



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 2 planes, the plot shows the worst case

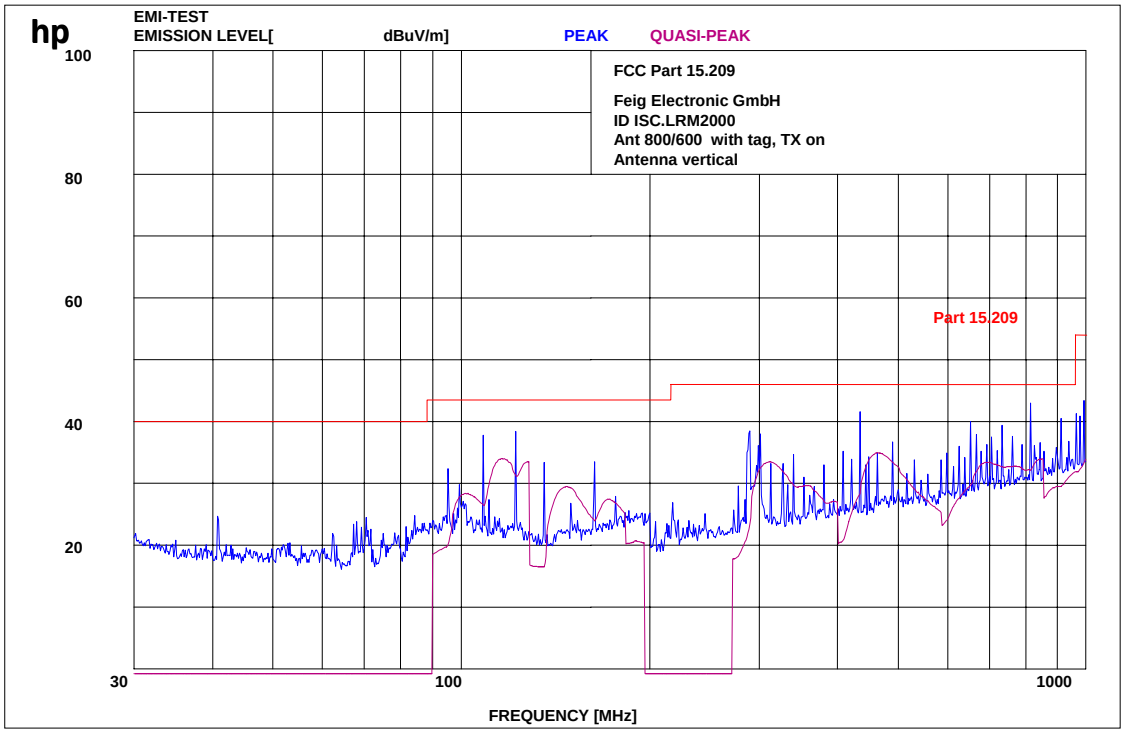
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 13:

TX (30 MHz to 1 GHz)

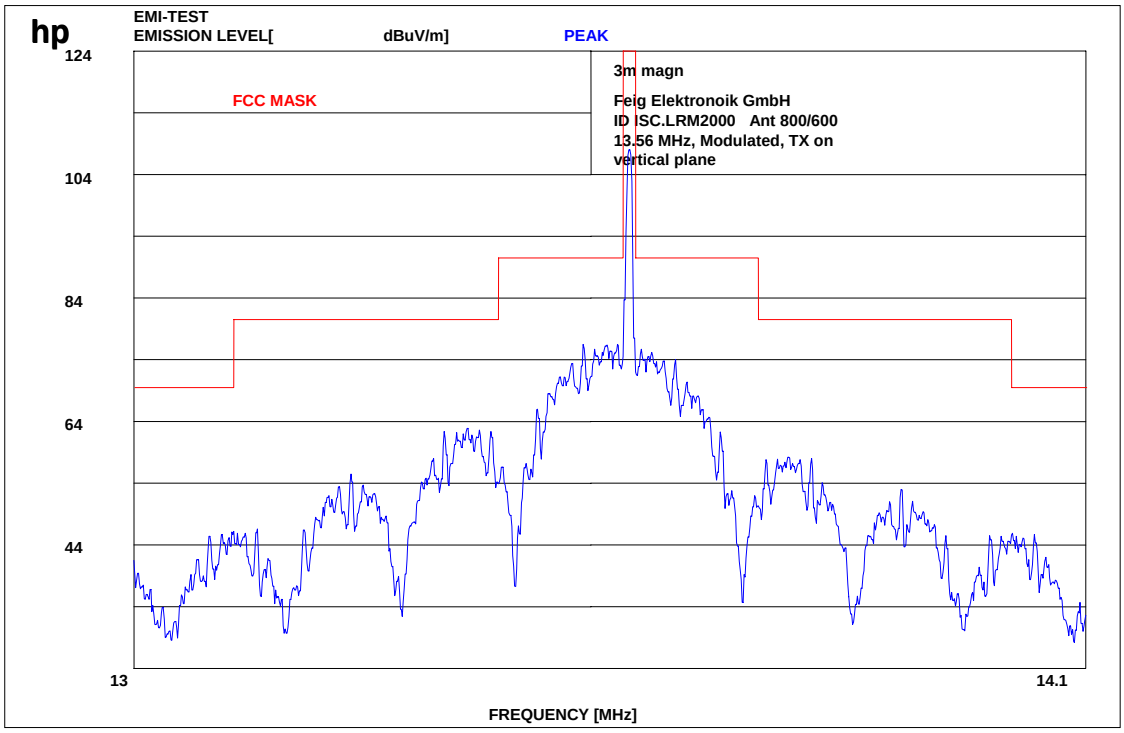


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 14:

Spectrum mask part15.225 (a,b,c,d)

Limits recalculated from 30m to 3m with 40 dB/decade according to FCC 15.31 (f2)



RBW /VBW 9 kHz

The transmitter holds the requirements of FCC 15.225 (a,b,c and d)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Antenna type: ID ISC.ANT 300/300

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dBµV/m) Average/QP	limit max. allowed emmision power		results
13.56					Operating frequency
27.12		23.5 dBµV/m QP	29.5 dBµV/m		pass
81.4		32.4 dBµV/m QP	40.0 dBµV/m		Pass
284.0		38.9 dBµV/m QP	46.0 dBµV/m		Pass
487.6		33.6 dBµV/m QP	46.0 dBµV/m		Pass
813.2		34.9 dBµV/m QP	46.0 dBµV/m		Pass
Measurement uncertainty			± 3dB		

RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

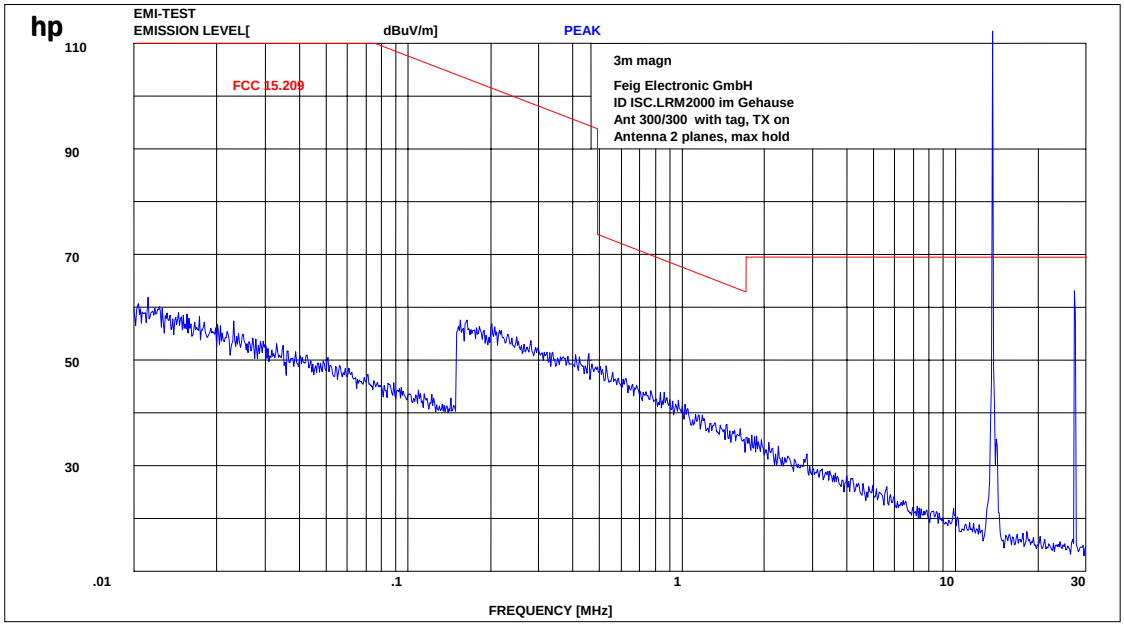
Limits **SUBCLAUSE § 15.209 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (µV/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30.0 – 88.0	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plots of measurements

Plot 15:
Part 15.209 Magnetics TX



RBW/VBW : 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

(to convert the measuring distance from 10m to 30m and 30 to 300m a correction factor from 40 dB/decade was used. Here we use 60 dB to recalculate from 10m to 300m)

Measurement distance 10 m
This measurement was done in 2 planes, the plot shows the worst case

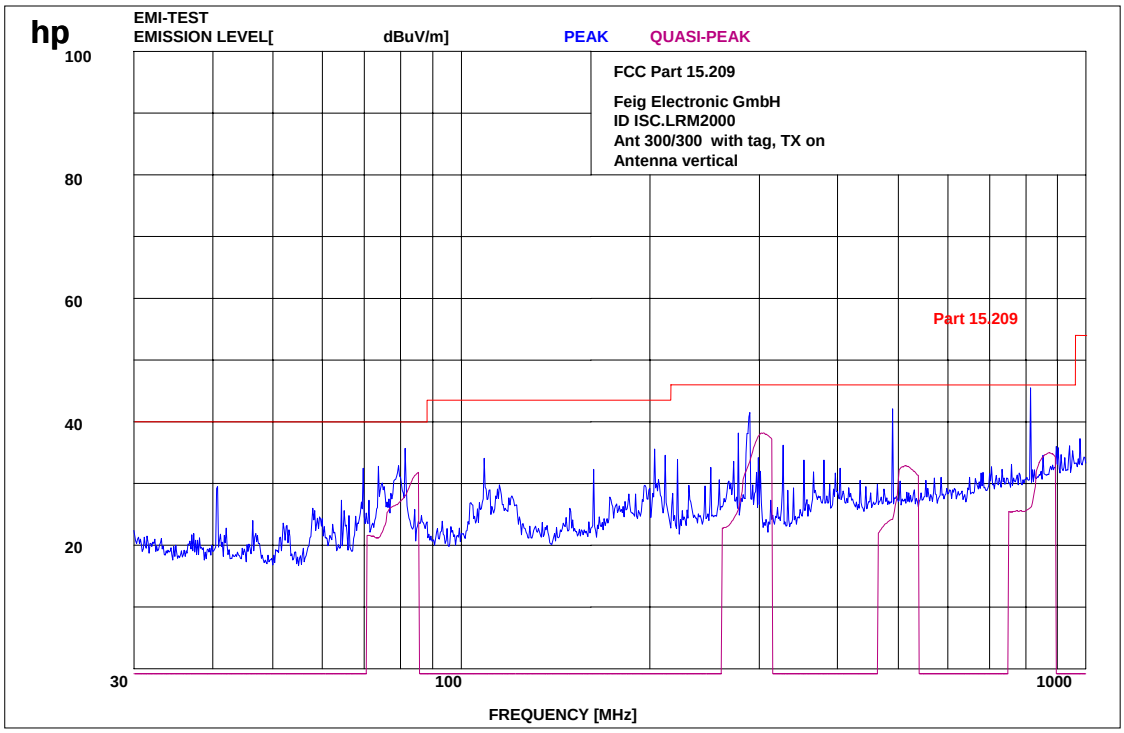
Limits **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 16:

TX (30 MHz to 1 GHz)

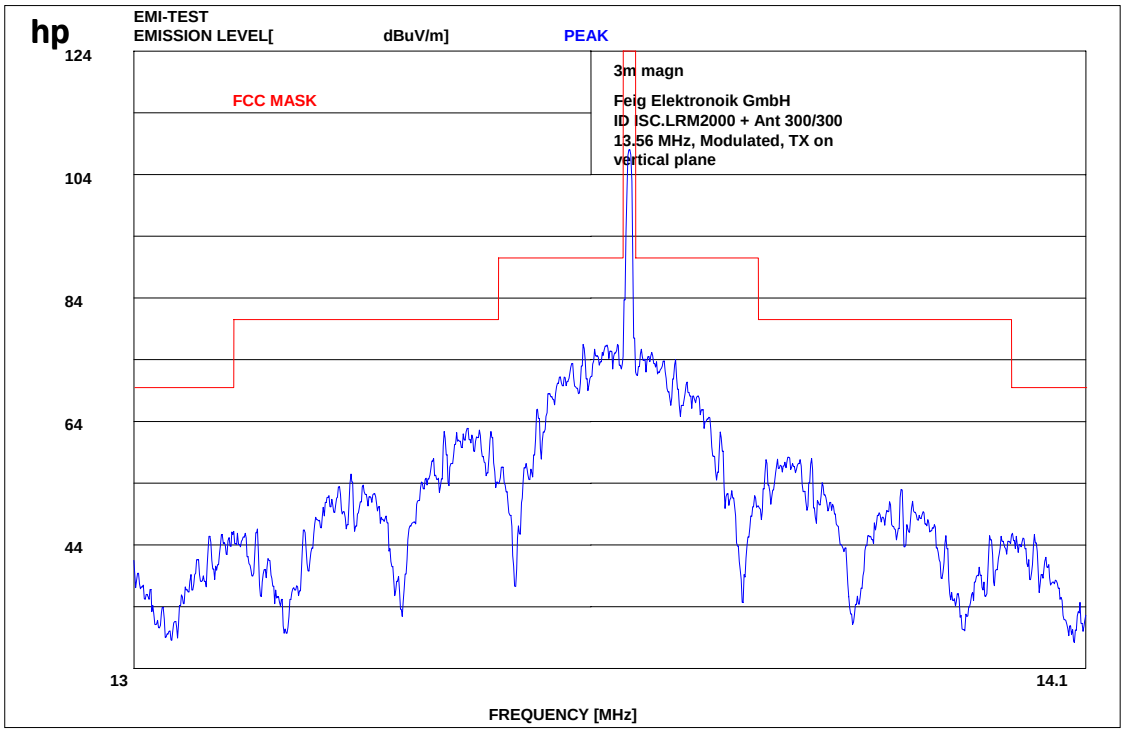


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Plot 17:

Spectrum mask part15.225 (a,b,c,d)

Limits recalculated from 30m to 3m with 40 dB/decade according to FCC 15.31 (f2)



RBW /VBW 9 kHz

The transmitter holds the requirements of FCC 15.225 (a,b,c and d)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

4.4 Frequency tolerance

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (e)
IC:	RSS 210, Annex 2.6

Frequency tolerance (nominal frequency 13.56 MHz)								
Over temperature variation			Over voltage variation					
Limit is +/- 1.356 kHz			Limit is +/- 1.356 kHz			MHz		
T (°C)]	Delta Frequency (kHz)	result	Power voltage	Delta Frequency (kHz)	result	F [MHz]	Detector	Level [µV/m]
-20°	+0.112	Pass	98V	+0.020	Pass			
-10°	+0.108	Pass	104V	+0.043	Pass			
0°	+0.104	Pass	110V	+0.060	Pass			
10°	+0.090	Pass	115V	+0.074	Pass			
20°	+0.074	Pass	121V	+0.081	Pass			
30°	+0.064	Pass	127V	+0.075	Pass			
40°	+0.053	Pass	132V	+0.072	Pass			
50°	+0.038	Pass						
Measurement uncertainty			±1 Hz					

f < 1 GHz : RBW/VBW: 10 kHz

Limits **SUBCLAUSE § 15.225**

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency (here 1.356 kHz) over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

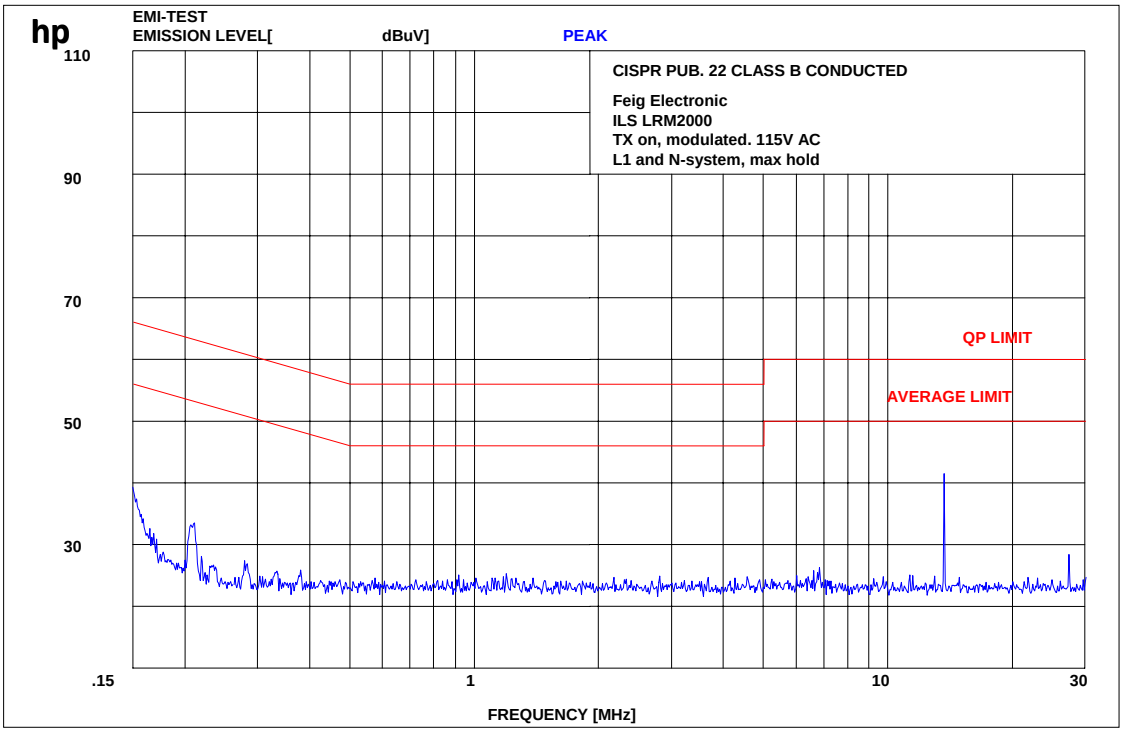
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

4.5 Conducted Limits

Reference

FCC:	CFR Part 15.207, 15.107
IC:	RSS 210, Issue 4, Section 6.6 , 7.4

The measurement was performed with a power supply from our house as the customer does nor deliver any power supply.



Limits: § 15.107 / 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Used Testequipment

Device	Manufacturer	Type	S/N Number	Inv. No. Cetecom
Spektrum Analyser	HP	8566B	2747A05306	300001000
Spektrum Analyser Display	HP	85662A	2816A16541	300002297
Quasi-Peak-Adapter	HP	85650A	2811A01131	300000999
Power Dupply	HP	6032A	2818A03450	300001040
Power Attenuator	Byrd	8325	1530	300001595
Bikonical Antenna	EMCO	3104	3758	300001602
Log. Period. Antenna	EMCO	3146	2130	300001603
Double Ridged Antenna	EMCO	HP 3115P	3088	300001032
Active Loop Antenna	EMCO	6502	2210	300001015
Antenna VDE/FCC		HP11965B		300002298
SRM-Drive	HP	9144A	2823e46556	300001044
Software	HP	EMI		300000983
Busisolator	Kontron			300001056
Absorberhalle	MWB		87400/02	300000996
Salzsäule	Kontron			300001055
Antenna	R&S	HMO20	832211/003	300002243
Indukt.Tast Antenna	R&S	HFH 2 Z4	881468/026	300001464
System-Rack	HP I.V.	85900	*	300000222
Spectrum Analyzer	HP	8566B	2747A05275	300000219
Quasi-Peak-Adapter	HP	85650A	2811A01135	300000216
RF-Preselector	HP	85685A	2837A00779	300000218
Rahmen Antenne	R&S	HFH2-Z2	891847-35	300001169
Leitungsteiler	HP	11850C		300000997
Breitband-Hornantenne EMI	HP	35155P		300002300
PC	HP	Vectra VL		300001688
VHF Meßantenne	Schwarzbeck	VHA 9103		300001778
Spectrum Analyzer Display	HP	85662A	2816A16497	300001690
VHF Meßantenna	Schwarzbeck	VHA 9103		300001780
Biconical Antenna	EMCO	3104 C	9909-4868	300002590

SRD Laboratory:

Device	300001207	**Type**	**S/N Number**	**Inv. No. Cetecom**
Spectrum Analyzer	300001208	494AP	B010241	300000863
Spectrum Analyzer	HP	71210A (70000)	2731A02347	300000321
Spectrum Analyzer Display	HP	70206A	2840A01553	300002017
Reference Frequency	HP	70310A	2736A00707	300002018
Local Oscillator	HP	70900A	2842A02221	300002019
ZF-Modul 10Hz-300 kHz	HP	70902A	2840A02145	300002020
ZF-Modul 100 kHz-3 MHz	HP	70903A	2835A01069	300002021
HF-Teil für 71210A 100Hz- 22GHz	HP	70908A		300002022
Spectrum Analyzer 2	HP	85660B	3138A07614	
Spectrum Analyzer Display 2	HP	85662A	3144A20627	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Signal Generator DC-600 KHz	HP	8904A	2822A01213	300001157
Signal Generator DC-600 KHz	HP	8904A	2822A01214	300001158
Powersupply	HP	6038A	3122A11097	300001204
Netznachbildung	R&S	ESH3-Z5	828576/020	300001210
Amplituden Controller	R&S	SMDU-Z2	871829/051	300002309
Trenntrafo	Erfi	913501		300001205
Trenntrafo	Grundig	RT5A	9242	300001627
Relais Matrix	HP	3488A	2719A15013	300001156
Multimeter	Siemens	Multizet		300001102
Peak Power Calibrator	HP	8900B		300001084
Schallgeber	Schomandl	SG 1	10159	300001209
Schallgeber	Schomandl	SG 2	10176	300002473
Filter	FSY Microwave			300001206
Attenuatorer	Pro Nova			300002476
Klimaschrank	Heraeus Voetsch	VUK04/500		300001012
Spectrum Analyzer 3	HP	8566A	1925A00257	300001098
Spectrum Analyzer Display 3	HP	85662	1925A00860	300002306
Oszilloscope	Tektronix	2432	110261	300001165
Radiocom. Analyzer	R&S	CMTA 54	894043/010	300001175
Powersupply	HP	6038A	2848A07027	300001174
Signal Generator 0.01-1280 MHz	HP	8662A	2224A01012	300001110
Signal Generator (Funktions)	R&S	AFGU	862490/032	300001201
Trenntrafo	Erfi	MPL	91350	300001155
Relais Matrix	R&S	PSU	893285/020	300001173
Power Meter	HP	436A	2101A12378	300001136
Powersensor	HP	8484A	2237A10156	300001140
Powersensor	HP	8482A	2237A06016	300001139
Relais Matrix	R&S	PSU	282628/004	300001214
Powersupply	Zentro		2007	300001109
Oszilloscope	Tektronix	7633		300001111
Klimaschrank	Heraeus Voetsch	VUK04/500	32926	300001500
Quasi-Peak Adapter	HP	85650A	2811A01204	300002308
Radiocom. Analyzer	R&S	CMTA 84	894199/012	300001176
Oszilloscope	HP	54510A	3022A02062	300001202
Funkmeßplatz	Schomandl	FD1000	34982	300001115
Signal Generator	R&S	SMPC	882416/019	300001162
Frequency counter	HP	5340A	2116A08138	300001104
Power Meter	HP	436A	2031U01461	300001105
Powersensor	HP	8482A		300001106
Powersensor	HP	8484A		300001107
Powersensor	HP	8485A		300001108
Powersupply	HP	6038A	2752A04866	300001161
Reflectionsmeter	R&S	NAP	879191	300001132
Signal Generator NF	R&S	SPN	880139/068	300001142
Trenntrafo	Erfi	MPL	91350	300001151
Attenuator	JFW	30 db	1350h/104	300001703
Attenuator	JFW	10 db	1350h/103	300001704
Attenuator	JFW	20 db	1350h/106	300001705
Attenuator	JFW	20 db	1350h/105	300001766
Filter	Spinner	153755		300001791

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Powersensor	HP	8484A	2237A10494	300001666
Powersupply	HP	6038A	3122A11097	300001204
Netznachbildung	R&S	ESH3-Z5	828576/020	300001210
Amplituden Controller	R&S	SMDU-Z2	871829/051	300002309
Trenntrafo	Erfi	913501		300001205
Trenntrafo	Grundig	RT5A	9242	300001627
Relais Matrix	HP	3488A	2719A15013	300001156
Multimeter	Siemens	Multizet		300001102
Peak Power Calibrator	HP	8900B		300001084
Schallgeber	Schomandl	SG 1	10159	300001209
Schallgeber	Schomandl	SG 2	10176	300002473
Filter	FSY Microwave			300001206
Attenuatorer	Pro Nova			300002476
Klimaschrank	Heraeus Voetsch	VUK04/500		300001012
Spectrum Analyzer 3	HP	8566A	1925A00257	300001098
Spectrum Analyzer Display 3	HP	85662	1925A00860	300002306
Oszilloscope	Tektronix	2432	110261	300001165
Radiocom. Analyzer	R&S	CMTA 54	894043/010	300001175
Powersupply	HP	6038A	2848A07027	300001174
Signal Generator 0.01-1280 MHz	HP	8662A	2224A01012	300001110
Signal Generator (Funktions)	R&S	AFGU	862490/032	300001201
Trenntrafo	Erfi	MPL	91350	300001155
Relais Matrix	R&S	PSU	893285/020	300001173
Power Meter	HP	436A	2101A12378	300001136
Powersensor	HP	8484A	2237A10156	300001140
Powersensor	HP	8482A	2237A06016	300001139
Relais Matrix	R&S	PSU	282628/004	300001214
Powersupply	Zentro		2007	300001109
Oszilloscope	Tektronix	7633		300001111
Klimaschrank	Heraeus Voetsch	VUK04/500	32926	300001500
Quasi-Peak Adapter	HP	85650A	2811A01204	300002308
Radiocom. Analyzer	R&S	CMTA 84	894199/012	300001176
Oszilloscope	HP	54510A	3022A02062	300001202
Funkmeßplatz	Schomandl	FD1000	34982	300001115
Signal Generator	R&S	SMPC	882416/019	300001162
Frequency counter	HP	5340A	2116A08138	300001104
Power Meter	HP	436A	2031U01461	300001105
Powersensor	HP	8482A		300001106
Powersensor	HP	8484A		300001107
Powersensor	HP	8485A		300001108
Powersupply	HP	6038A	2752A04866	300001161
Reflectionsmeter	R&S	NAP	879191	300001132
Signal Generator NF	R&S	SPN	880139/068	300001142
Trenntrafo	Erfi	MPL	91350	300001151
Attenuator	JFW	30 db	1350h/104	300001703
Attenuator	JFW	10 db	1350h/103	300001704
Attenuator	JFW	20 db	1350h/106	300001705
Attenuator	JFW	20 db	1350h/105	300001766
Filter	Spinner	153755		300001791
Powersensor	HP	8484A	2237A10494	300001666

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Powersensor	HP	8485A	2238A00849	300001668
Bandfilter	Telonic	TTF7255EE	20293-11	300001300
Bandfilter	Telonic	TTF12555EE	20292-6	300001302
Bandfilter	Telonic	TTF25055EE	20291-8	300001304
Bandfilter	Telonic	TTF50055EE	20290-7	300001305
Bandfilter	Telonic	TTF100055EE	20289-7	300001307
Bandfilter	Telonic	TTA300055EESN	20370-2	300001312
Bandstop	Telonic	TTR3753EE1	30013-1	300001314
Bandstop	Telonic	TTR723EE	20417-2	300001316
Bandstop	Telonic	TTR95-3EE	20372-4	300001318
Bandstop	Telonic	TTR1903EE	30036-4	300001320
Bandstop	Telonic	TTR3753EE	20369-5	300001321
Bandstop	Telonic	TTR750-3EE1	90177-1	300002387
Highpass	Pro Nova	HDP120-6GG	ohne	300001348
Highpass	Pro Nova	HMC500-6AA	HJ67-01?	300001350
Highpass	Narda	NHP 9000	0004	300001362
Highpass	Narda	HDP16-6GH	JV70-01	300001364
Highpass	RSD	HDP50-6GH, HDP200-6GG		300001371
Highpass	RSD	2099-02-01		300000370
Signal Generator 0.1-2060 MHz	HP	8657A	2838U00736	300001009
Radio Code Analyzer	Schlumberger	SL4922		300001038
Signal Analyzer	B&K	2033		300001047
Frequency counter	HP	5386A	2704A01243	300000998
Laufzeitelement	WR-Elektronik			300001036
Powersupply Stromversorgung	Systron	M5P 40/15A	828233	300001291
Powersupply	Heiden	1108-32	1701	300001392
Powersupply	Heiden	1108-32	1802	300001383
Powersupply	Heiden	1108-32	003202	300001187
Powersupply	Zentro	LA 2x30/5GB1	2011	300001276
Powersupply	Zentro	LA 2x30/5GB2	2012	300001275
Powersupply	Zentro	LA 30/5GA	2041,2042	300001287
Trenntrafo	Grundig	RT5A	8781	300001277
Trenntrafo	Grundig	RT5A	9242	300001263
Multimeter	Goerz Elektro	Unigor 6e P	911 355	300001625
Multimeter	Goerz Elektro	Unigor 6e P	911 391	300001281
Climatic Box	Heraeus Voetsch	VUK04/500	32679	300000299
Powersensor + Att.	HP	8482B	2703A02586	300001492
Attenuator 30 dB	HP	8498A	1801A02445	300001475
Signal Generator NF	HP		2822A01203	300001004
Attenuator	Spinner	BN 534171 D	51881	300001516
Attenuator coaxial	Bird	8325	2429	300001513
Impulsbegrenzer	R&S	ESH 3 Z2		300001460
4Port Box	R&S	4Port Box	860457/005	300001472
Signal Generator 0.1-4200 MHz	HP	8665A	2833A0011	300002299
NF-Spektrumanalyzer	B&K	2033A		300002301
Swissphone Freifeld-Messbox	Swissphone Schweiz			300002302
Trenntrafo regelbar	Grundig	RT5H	9242	300001628
Signal Generator	HP	8111A	2215G00867	300001117

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

5 Annex B: Photographs of Test site

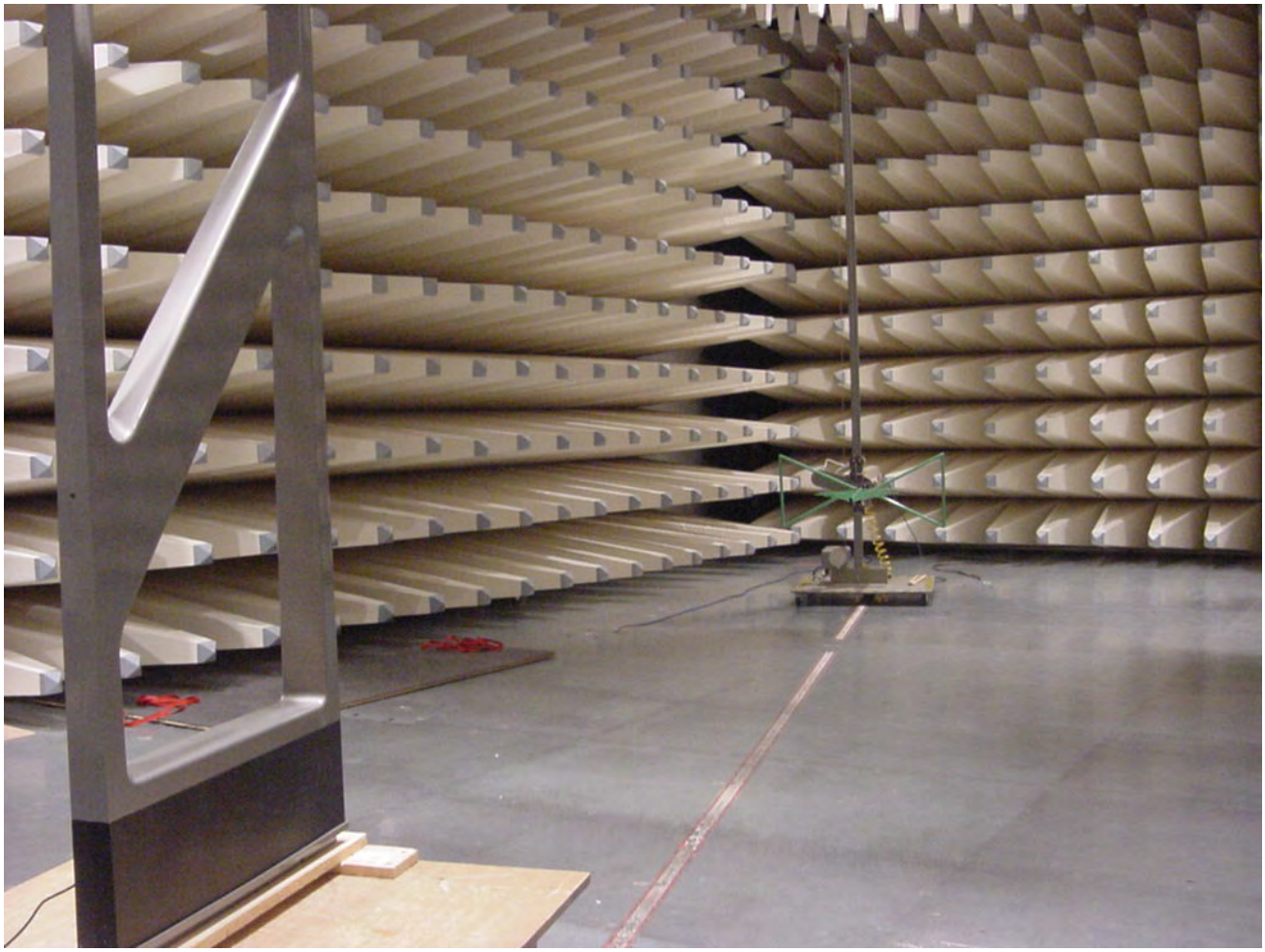
Photo 1 (Radiated Emissions):

Antenna 1400/760

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photo 2 (Radiated Emissions):

Antenna 1400/760



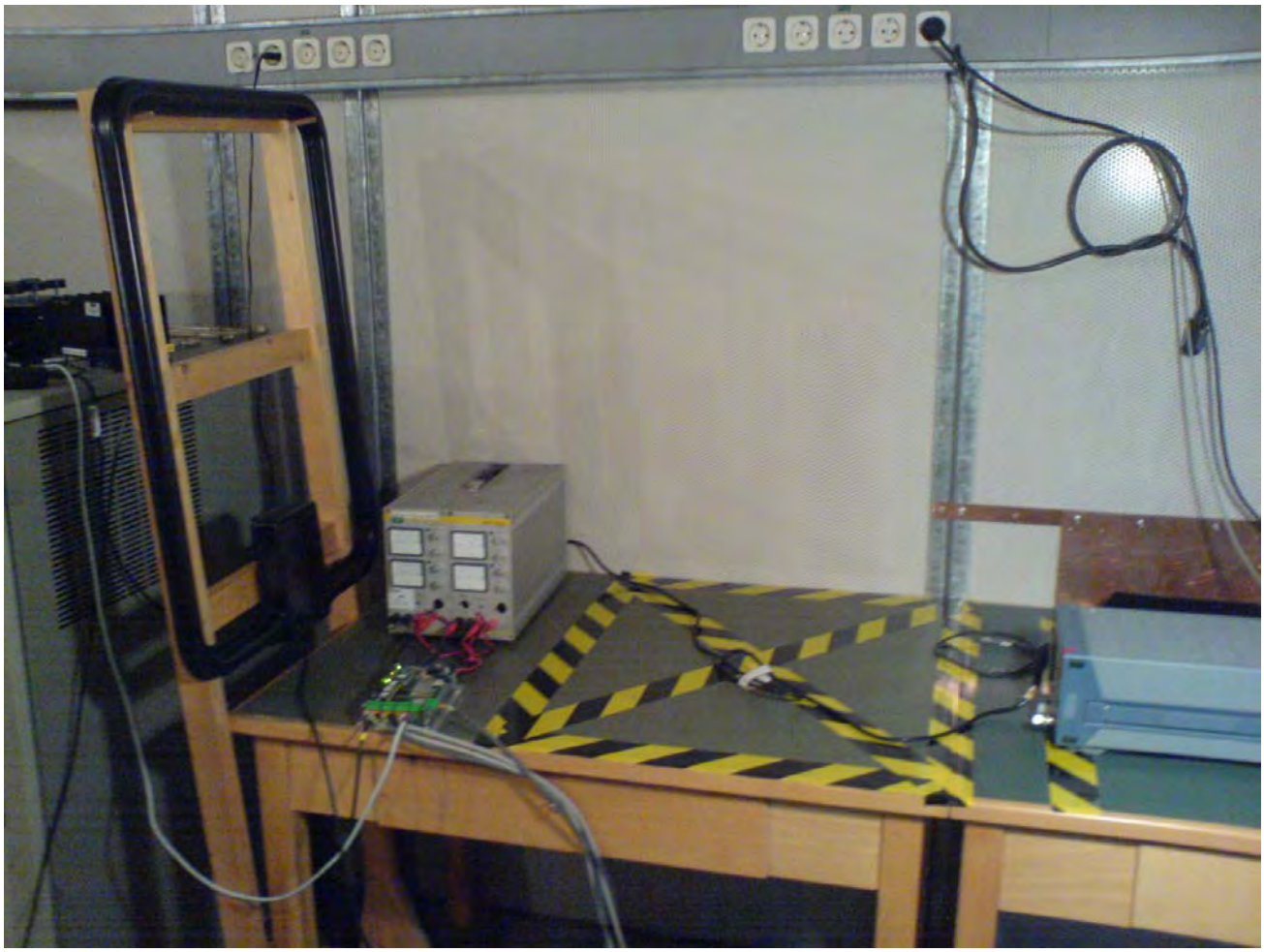
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photo 3 (Conducted Emissions):

Antenna 1400/760

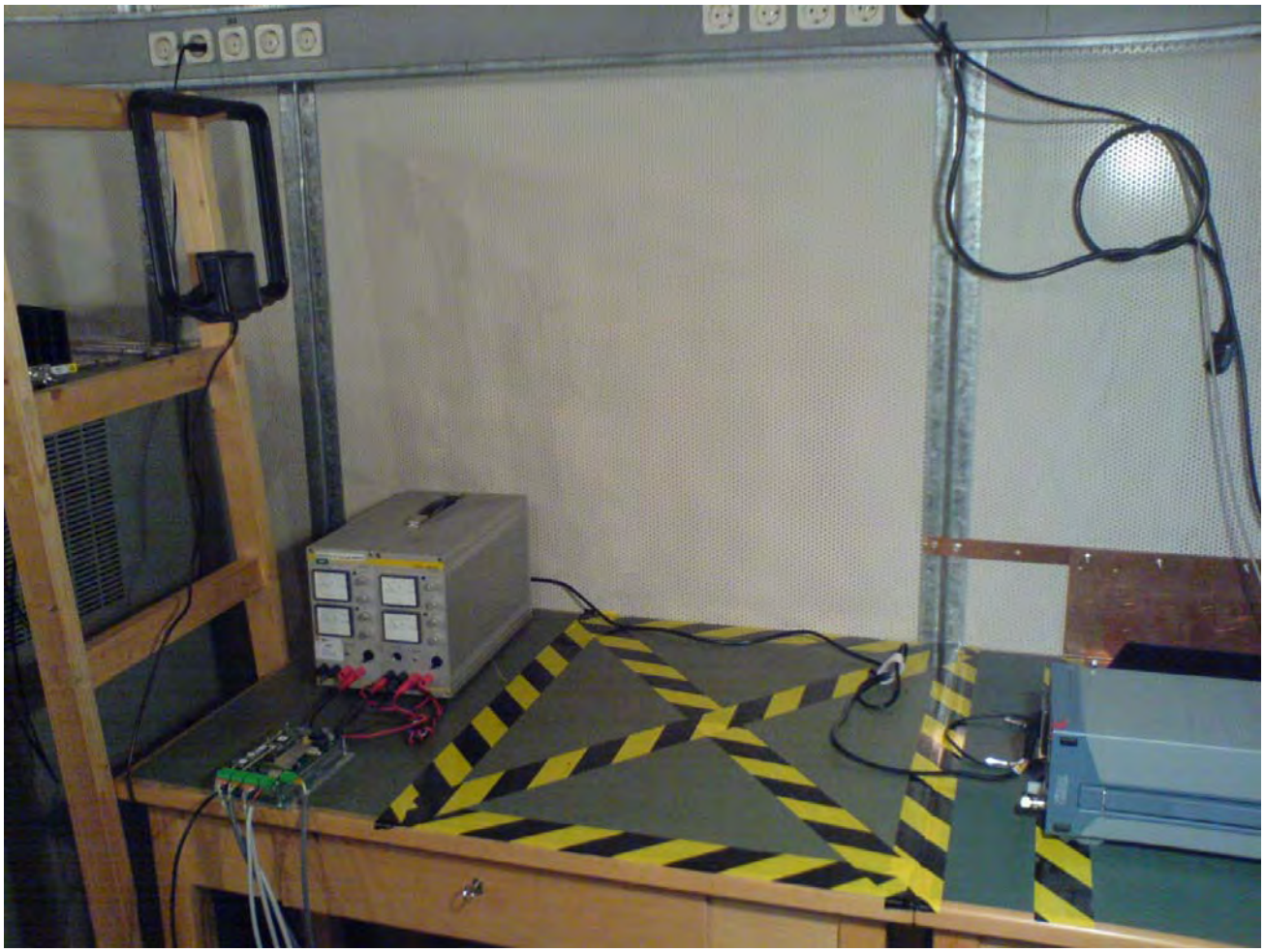
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Ant 800 / 600



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Ant 300 / 300



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

6 Annex C: Photographs of the Equipment

Photo 1: LRM2000

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photo 2:

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

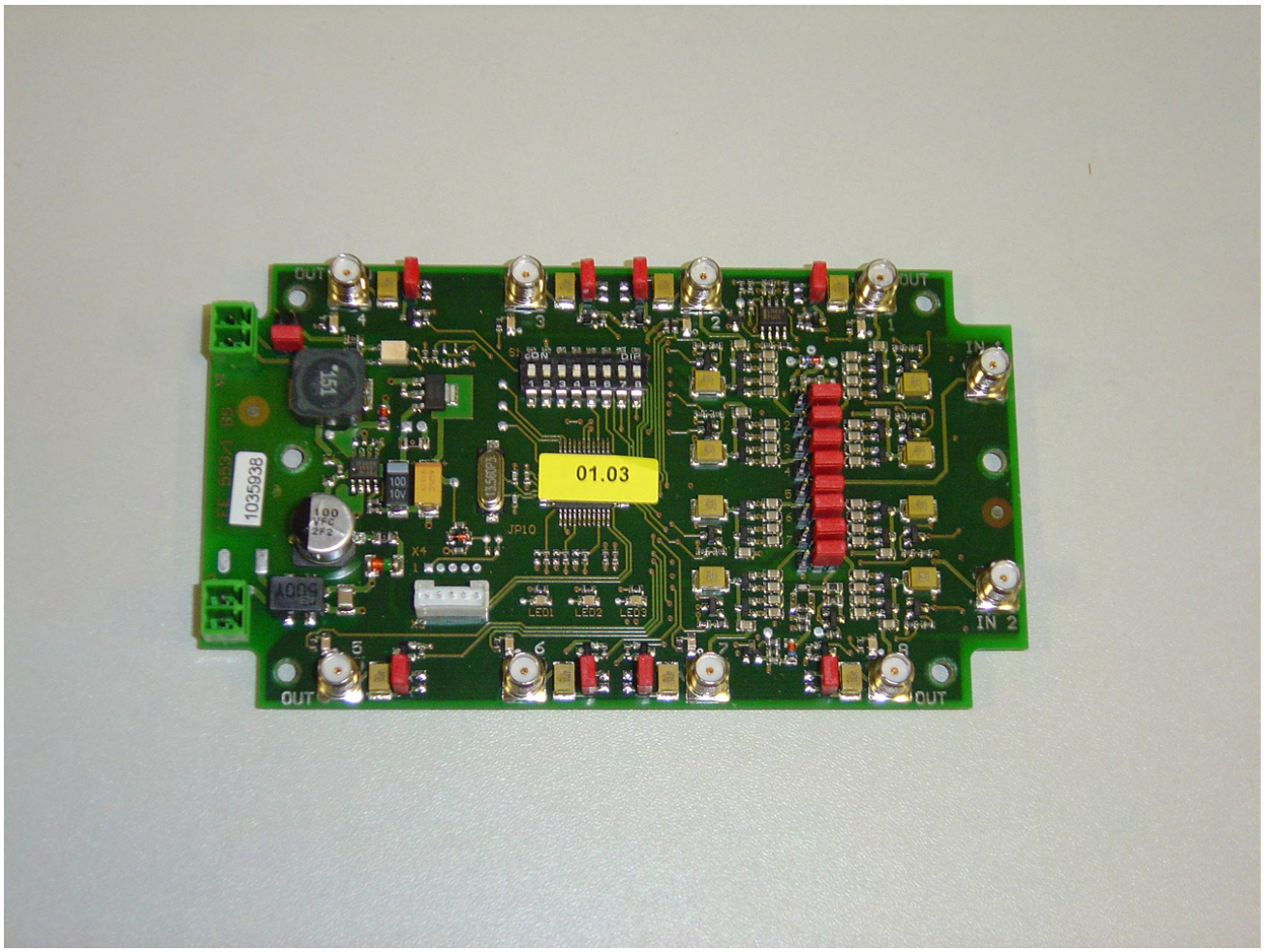
Photo 3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photo 4

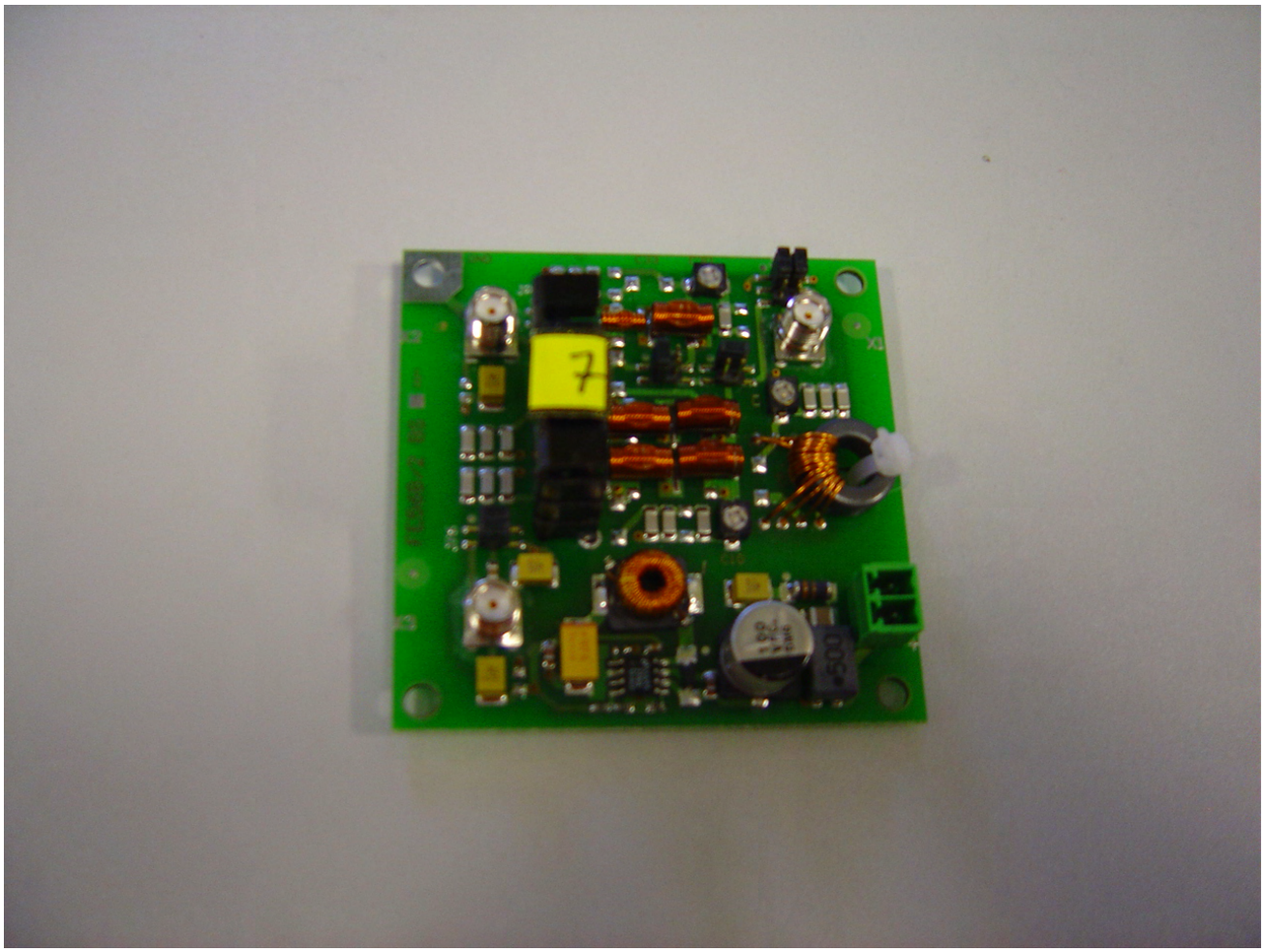
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photo 5: Multiplexer



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photo 6: Power splitter



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Photos of the different antenna possibilities

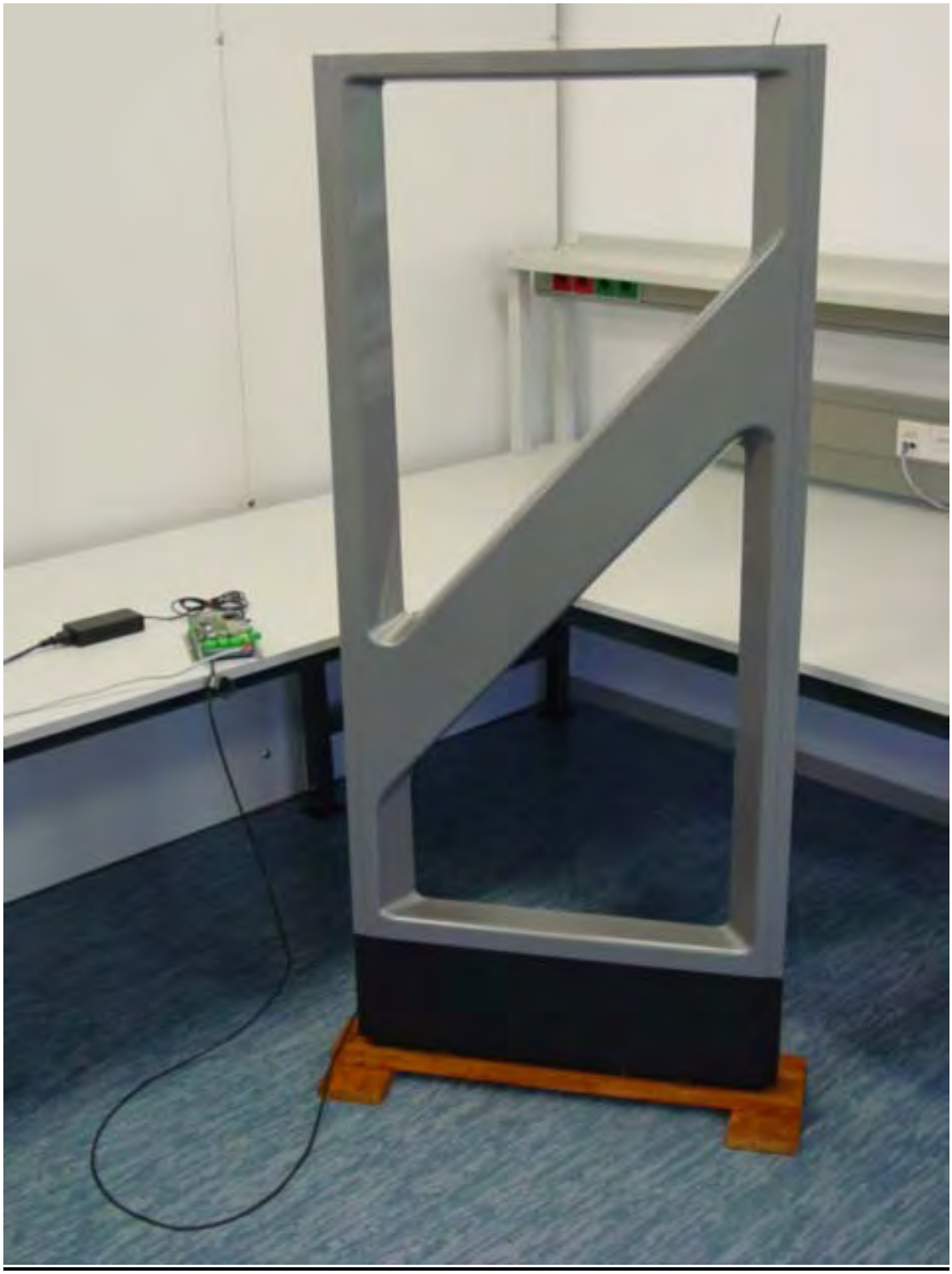
ID ISC.ANT300/300 with ID ISC.LR2000

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

ID ISC.ANT800/600 with ID ISC.LR2000

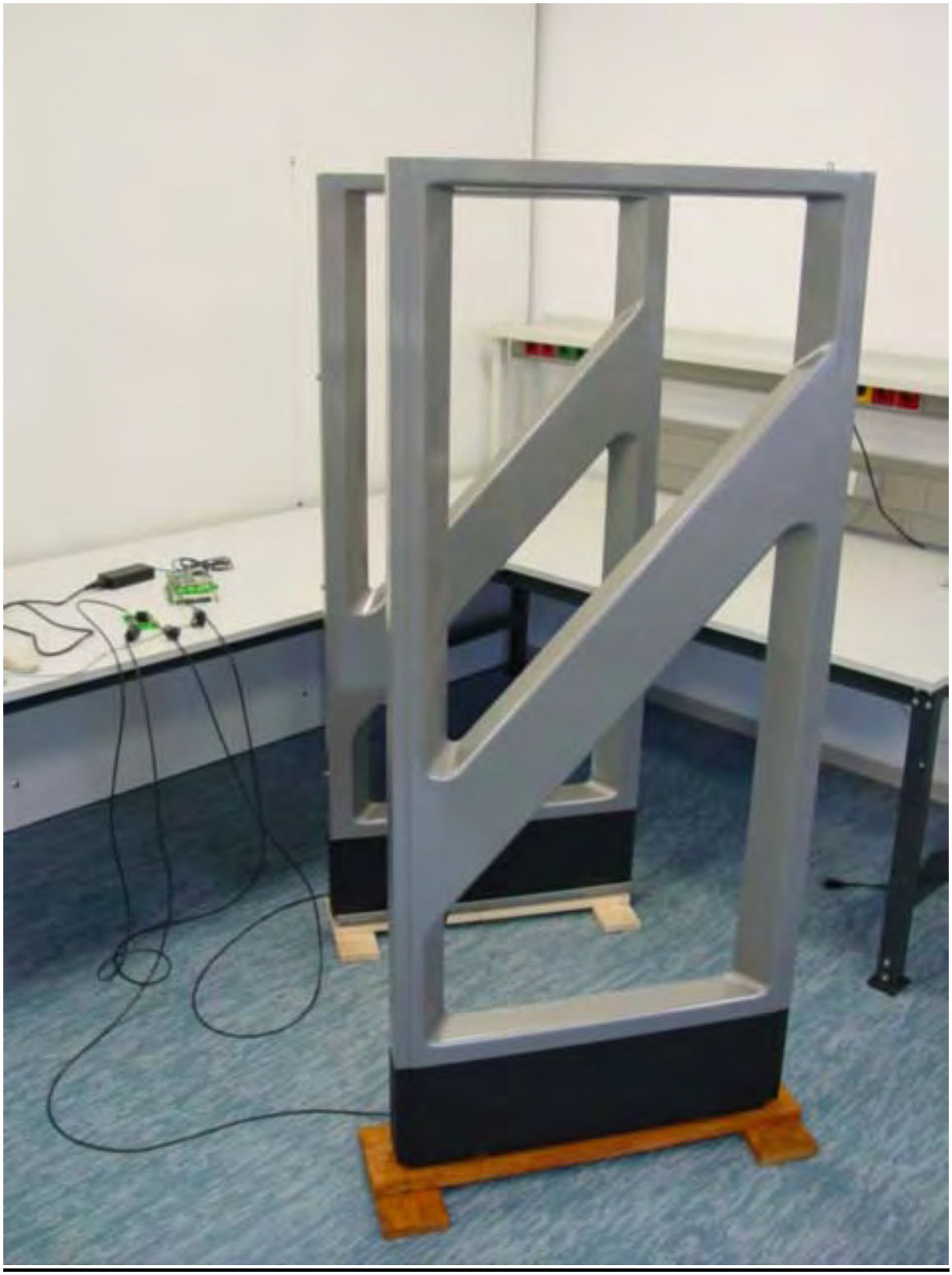
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

ID ISC.ANT1400/760 with ID ISC.LR2000



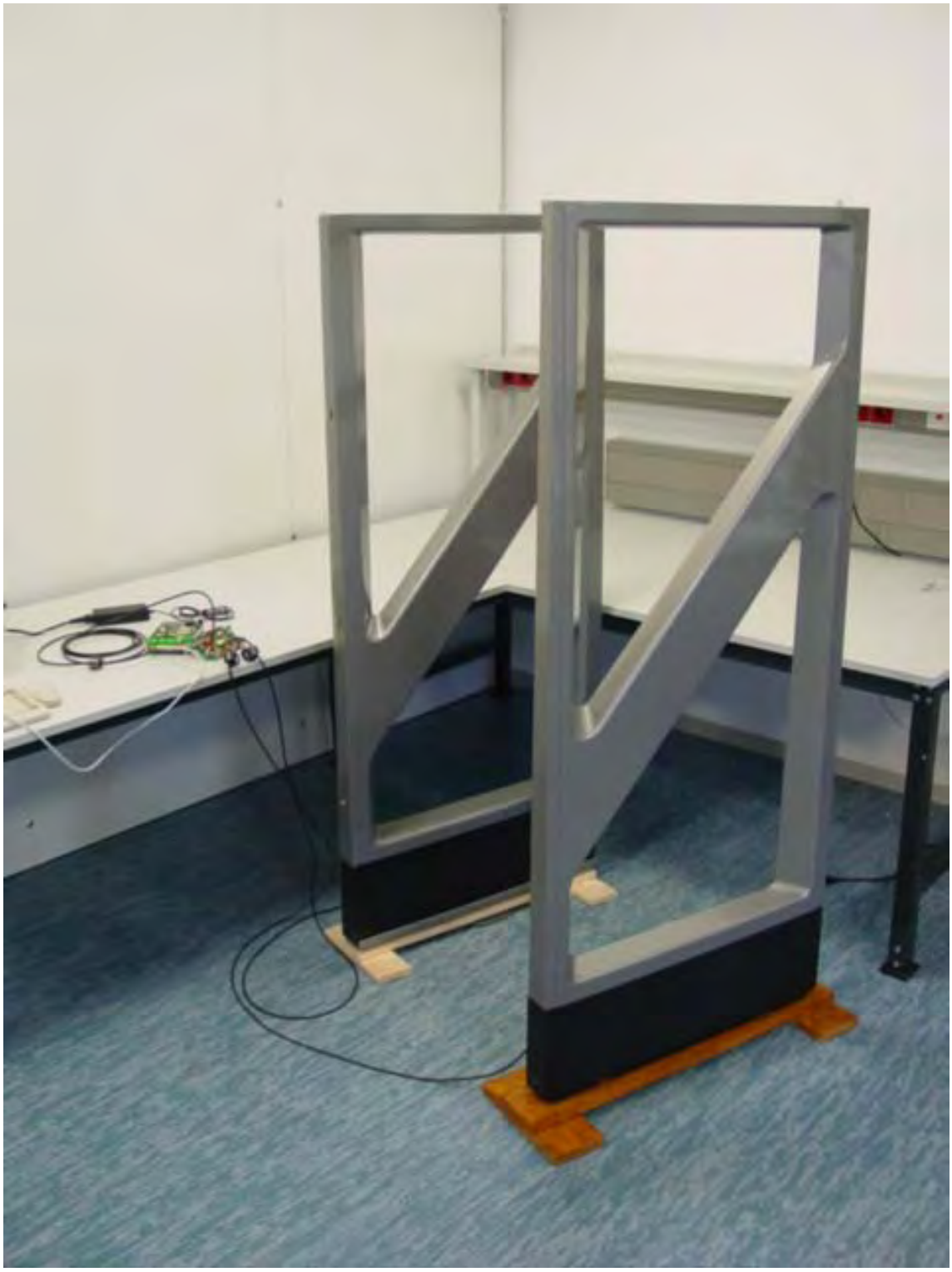
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

2* ID ISC.ANT1400/760 with ID ISC.LR2000 and Power-splitter



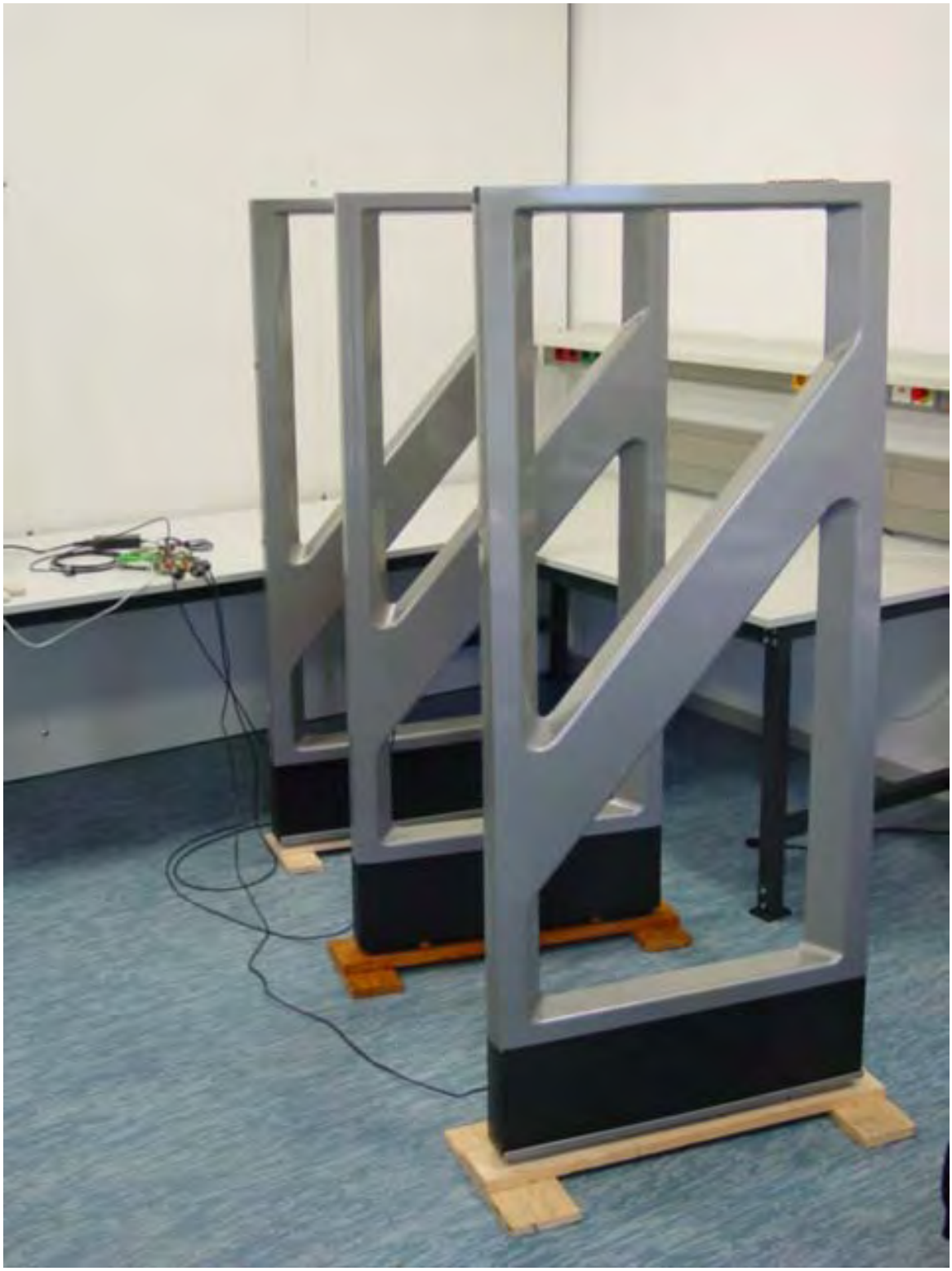
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

2* ID ISC.ANT1400/760 with ID ISC.LR2000 and Multiplexer



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

3* ID ISC.ANT1400/760 with ID ISC.LR2000 and Multiplexer



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

Measurement setup for low frequencies

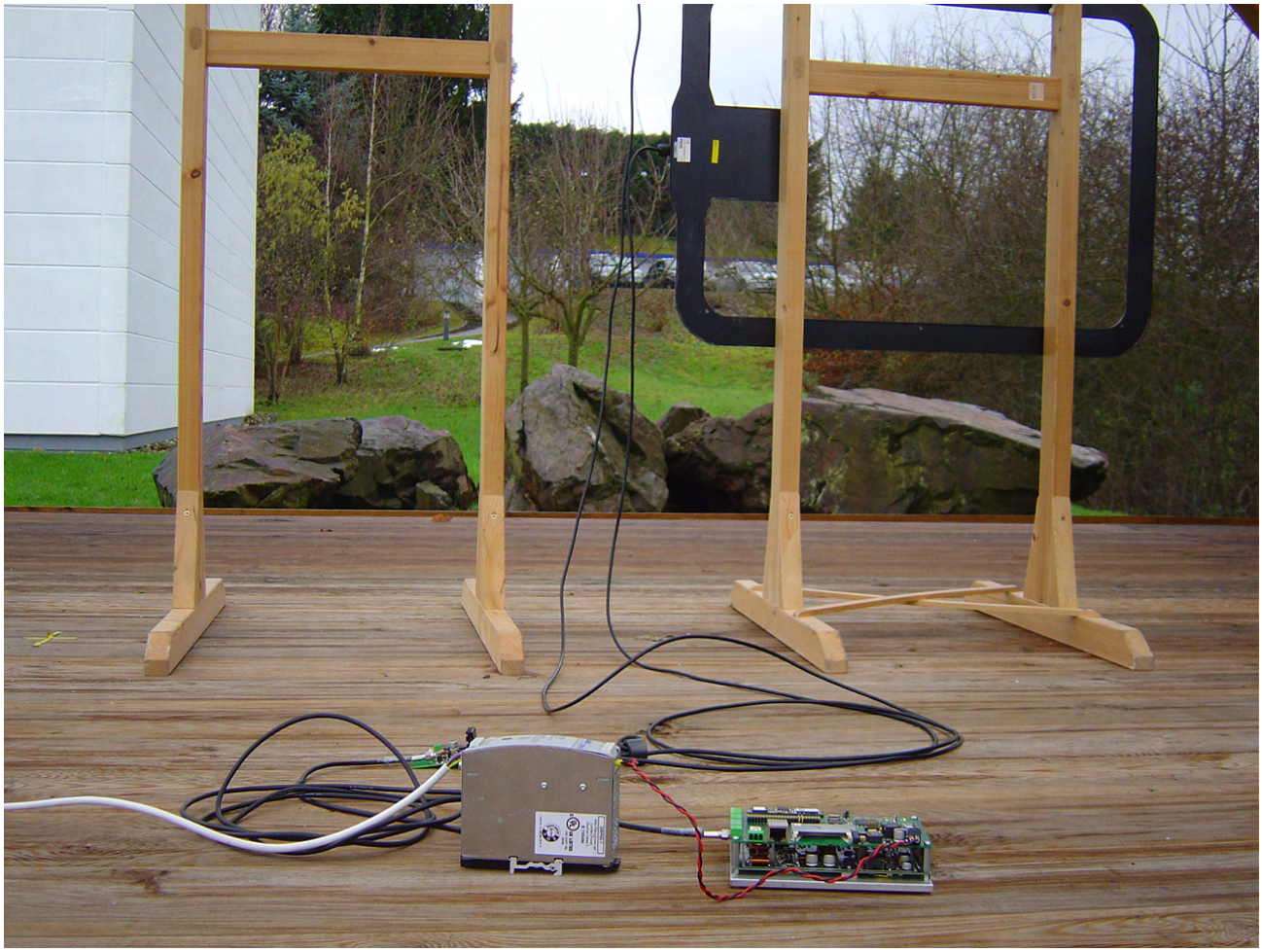
With 2* ID ISC.ANT800/600 and ID ISC.LR2000 and Power-splitter

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

With ID ISC.ANT800/600 and ID ISC.LR2000

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)

With 2* ID ISC.ANT800/600 and ID ISC.LR2000 and Multiplexer



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED :
(see test equipment listing)