

Straubing, 07 December 2005

T E S T - R E P O R T

No. 55106-050766 (Edition 2)

for

E52

Remote Control Transmitter

Applicant: Meta Systems S.p.A.

Test Specifications: FCC Code of Federal Regulations,
CFR 47, Part 15,
Sections 15.205, 15.215 and 15.231

Industry Canada Radio Standards
Specifications
RSS-Gen Issue 1 and
RSS-210 Issue 6, Sections 2.2, A1.1
(Category I Equipment)

Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

Table of Contents

1	Description of the Equipment Under Test (EUT)	3
2	Administrative Data.....	4
3	Identification of the Test Laboratory	5
4	Summary	6
5	Operation Mode and Configuration of EUT.....	7
6	Measurement Procedures.....	8
6.1	Bandwidth Measurements	8
6.2	Pulse Train Measurement	9
6.3	Radiated Emission in Fully or Semi Anechoic Room.....	10
6.4	Radiated Emission at Open Field Test Site.....	12
7	Photographs Taken During Testing	13
8	Test Results.....	18
8.1	Occupied Bandwidth.....	20
8.2	Bandwidth of the Emission	25
8.3	Bandwidth of Momentary Signals	27
8.4	Designation of Emissions	28
8.5	Pulse Train Measurement	29
8.6	Restricted Bands of Operation	30
8.7	Periodic Operation Requirements	31
8.8	Radiated Emission Measurement 30 MHz to 5 GHz	32
8.9	Exposure of Humans to RF Fields.....	33
9	Referenced Regulations	34
10	Charts taken during testing	35

1 Description of the Equipment Under Test (EUT)

General data of EUT	
Type designation ¹ :	E52
Parts ² :	
Serial number(s):	
Manufacturer:	Meta System S.p.A.
Type of equipment:	Remote Control Transmitter
Version:	As delivered
FCC ID:	P3OS4911
Additional parts/accessories:	---

Technical data of EUT	
Application frequency range:	433.05 - 434.79 MHz
Frequency range:	433.05 – 434.79 MHz
Operating frequency:	433.9 MHz
Type of modulation:	ASK
Pulse train:	96.1 ms
Pulse width:	96.1 ms
Number of RF-channels:	1
Channel spacing:	Not Applicable
Designation of emissions ³ :	10K0A1D
Type of antenna:	Integrated
Size/length of antenna:	18 x 10 mm
Connection of antenna:	<input type="checkbox"/> detachable <input checked="" type="checkbox"/> not detachable
Type of power supply:	Battery supply
Specifications for power supply:	nominal voltage: 3.0 V minimum voltage: 2.7 V maximum voltage: 3.3 V

¹ Type designation of the system if EUT consists of more than one part.

² Type designations of the parts of the system, if applicable.

³ Also known as "Class of Emission".

2 Administrative Data

Application details	
Applicant (full address):	Meta Systems S.p.A. Via Majakovskij, 10/b/c/d/e I-42100 Reggio Emilia
Contact person:	Mr. Giogio Maldini
Contract identification:	
Receipt of EUT:	29 November 2005
Date(s) of test:	November – December 2005
Note(s):	

Report details	
Report number:	55106-050766
Edition:	2
Issue date:	07 December 2005

3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	Senton GmbH EMI/EMC Test Center
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-171/94-02
FCC test site registration number	90926
Industry Canada test site registration:	IC 3050
Contact person:	Mr. Johann Roidt
	Phone: (+49) (0)9421 5522-0 Fax: (+49) (0)9421 5522-99

4 Summary

Summary of test results

The tested sample complies with the requirements set forth in the
Code of Federal Regulations CFR 47, Part 15, Sections 15.205, 15.215 and 15.231(a)-(d)
of the Federal Communication Commission (FCC) and the
Radio Standards Specifications
RSS-Gen Issue 1 and
RSS-210 Issue 6, Sections 2.2, A1.1.1 to A1.1.4 (Category I Equipment)
of Industry Canada (IC).

Personnel involved in this report

Laboratory Manager:



Mr. Johann Roidt

Responsible for testing:



Mr. Martin Steindl

Responsible for test report:

Mr. Martin Steindl

5 Operation Mode and Configuration of EUT

Operation Mode(s)

Transmitting continuously with normal modulation.

Configuration(s) of EUT

The EUT was configured as stand alone device.

As handheld device the EUT was measured in three positions.

List of ports and cables

Port	Description	Classification ⁴	Cable type	Cable length
	Not Applicable			

List of devices connected to EUT

Item	Description	Type Designation	Serial no. or ID	Manufacturer
	Not Applicable			

List of support devices

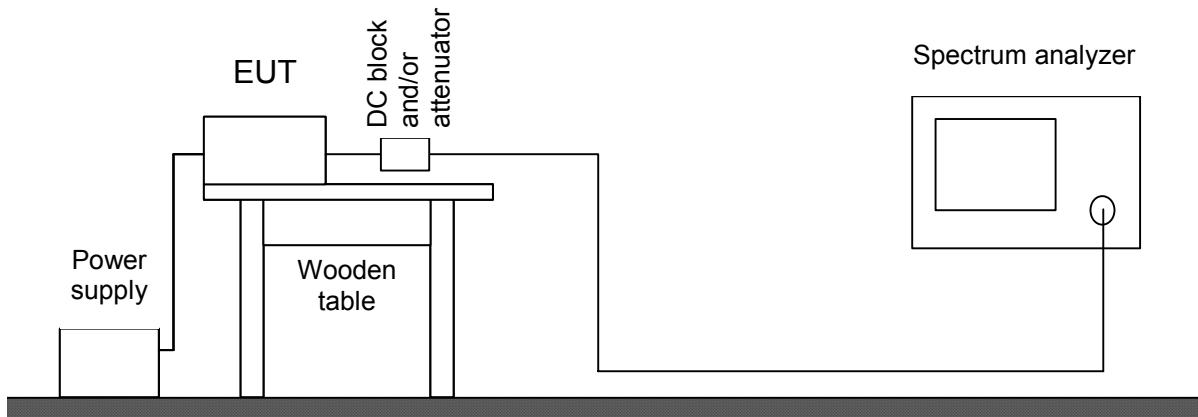
Item	Description	Type Designation	Serial no. or ID	Manufacturer
	Not Applicable			

⁴ Ports shall be classified as ac power, dc power or signal/control port

6 Measurement Procedures

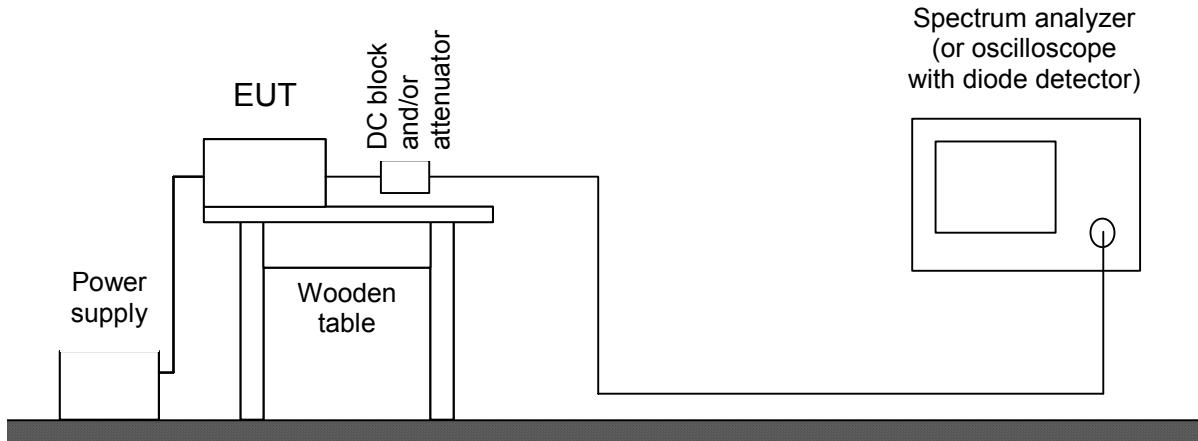
6.1 Bandwidth Measurements

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.202(a) CFR 47 Part 15, section 15.215(c) IC RSS-Gen Issue 1, sections 4.4.1 and 4.4.2 IC RSS-210 Issue 6, section A1.1.3 ANSI C63.4, annex H.6
Guide:	ANSI C63.4 / IC RSS-Gen Issue 1, sections 4.4.1 and 4.4.2
Measurement setup:	<input type="checkbox"/> Conducted: See below <input checked="" type="checkbox"/> Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.3)
<p>If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.</p> <p>If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range.</p> <p>The analyzer settings are specified by the test description of the appropriate test record(s).</p>	



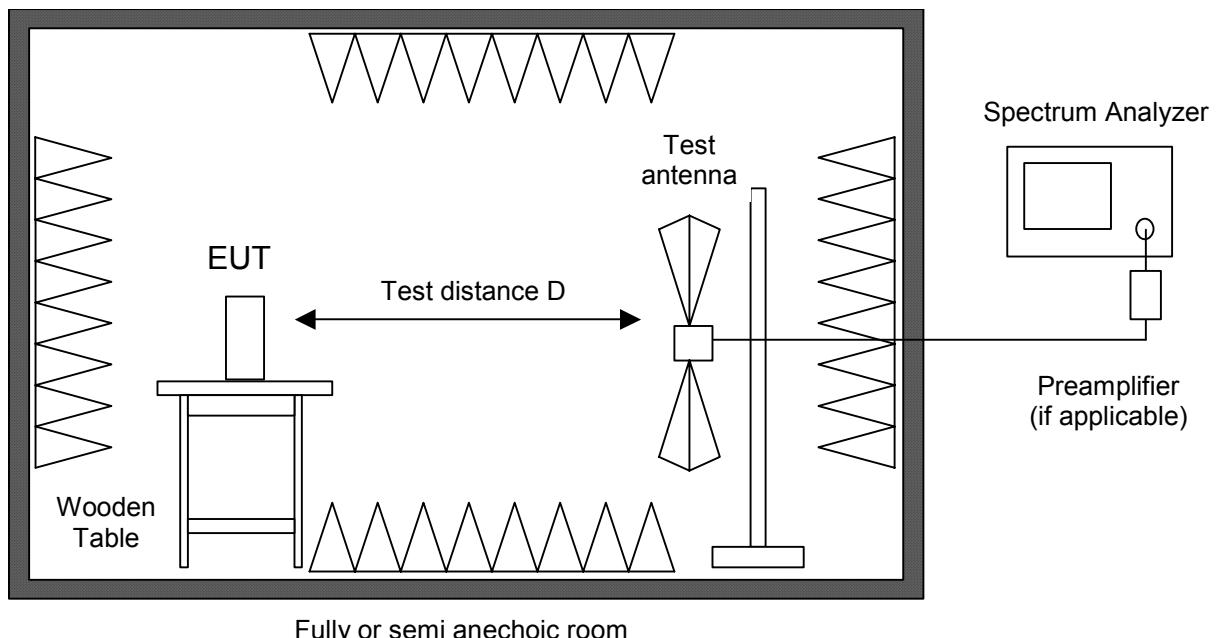
6.2 Pulse Train Measurement

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 1, section 4.3
Guide:	ANSI C63.4
Measurement setup:	<input type="checkbox"/> Conducted: See below (direct connection or via test fixture) <input checked="" type="checkbox"/> Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.3)
<p>If antenna is detachable pulse train measurements shall be performed at the antenna connector (conducted measurement). The RF output terminals are connected to a spectrum analyzer or to a diode detector in combination with an oscilloscope. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.</p> <p>If antenna is not detachable a test fixture may be used instead of direct connection to RF output terminals.</p> <p>If radiated measurements are performed similar test setups and instruments are used as with radiated emission measurements for the appropriate frequency range. However, the spectrum analyzer may be replaced by a diode detector connected to an oscilloscope.</p>	



6.3 Radiated Emission in Fully or Semi Anechoic Room

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.215(b) and 15.231 IC RSS-210 Issue 6, section A1.1.2
Guide:	ANSI C63.4
Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.	
Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).	
Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.	
All tests below 18 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance is reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.	
If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.	
Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.	
During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.	
For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully or semi anechoic room are indicated as prescans.	

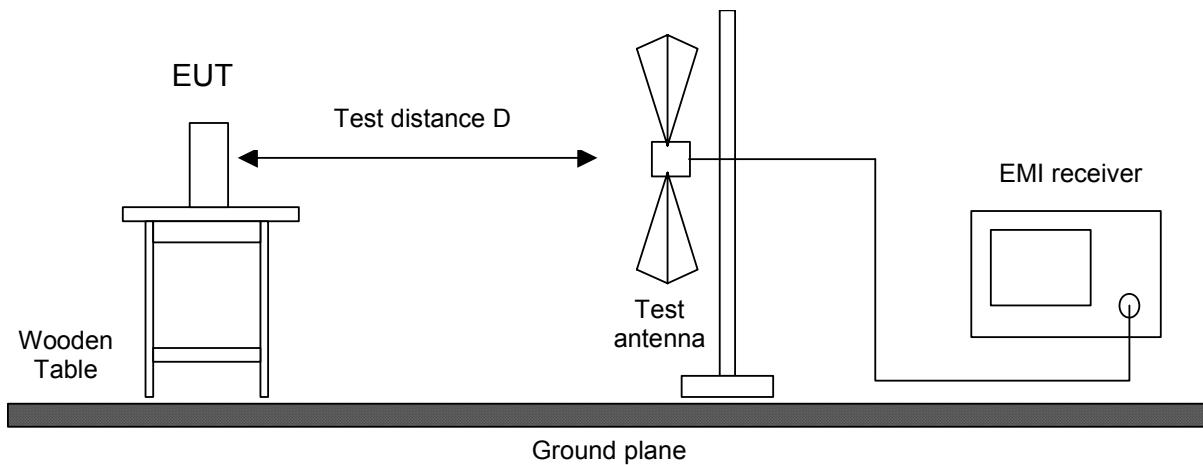


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/>	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
<input type="checkbox"/>	Spectrum analyzer	R 3271	05050023	Advantest
<input type="checkbox"/>	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
<input checked="" type="checkbox"/>	Preamplifier	CPA9231A	3393	Schaffner
<input type="checkbox"/>	Preamplifier	R14601		Advantest
<input checked="" type="checkbox"/>	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
<input type="checkbox"/>	Preamplifier 0.5-8 GHz	AMF-4D-005080-25-13P	860149	Miteq
<input type="checkbox"/>	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
<input type="checkbox"/>	External Mixer	WM782A	845881/005	Tektronix
<input type="checkbox"/>	Harmonic Mixer	FS-Z30	843389/007	Rohde & Schwarz
	Accessories			
<input checked="" type="checkbox"/>	Trilog broadband antenna	VULB 9163	9163-188	Schwarzbeck
<input checked="" type="checkbox"/>	Horn antenna	3115	9508-4553	EMCO
<input type="checkbox"/>	Horn antenna	3160-03	9112-1003	EMCO
<input type="checkbox"/>	Horn antenna	3160-04	9112-1001	EMCO
<input checked="" type="checkbox"/>	Horn antenna	3160-05	9112-1001	EMCO
<input type="checkbox"/>	Horn antenna	3160-06	9112-1001	EMCO
<input type="checkbox"/>	Horn antenna	3160-07	9112-1008	EMCO
<input type="checkbox"/>	Horn antenna	3160-08	9112-1002	EMCO
<input type="checkbox"/>	Horn antenna	3160-09	9403-1025	EMCO
<input type="checkbox"/>	Horn antenna	3160-10	399185	EMCO
<input checked="" type="checkbox"/>	Fully anechoic room	No. 2	1452	Albatross Projects
<input checked="" type="checkbox"/>	Semi-anechoic room	No. 3	1453	Siemens

6.4 Radiated Emission at Open Field Test Site

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.215(b) and 15.231 IC RSS-210 Issue 6, section A1.1.2
Guide:	ANSI C63.4
Radiated emission at open field test site is measured in the frequency range 30 MHz to 1 GHz using a biconical antenna up to 300 MHz and a logarithmic periodic antenna above. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.	
If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.	
Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in the fully anechoic room. EUT is rotated all around and receiving antenna is raised and lowered within 1 meter to 4 meters to find the maximum levels of emission. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.	
For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.	



Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
<input checked="" type="checkbox"/>	EMI receiver	ESVP	881414/009	Rohde & Schwarz
<input checked="" type="checkbox"/>	Biconical antenna	EG 1	HK 116	Rohde & Schwarz
<input checked="" type="checkbox"/>	Log. per. antenna	EG 1	HL 223	Rohde & Schwarz
<input checked="" type="checkbox"/>	Open field test site	EG 1	1450	Senton

7 Photographs Taken During Testing

**Test setup for radiated emission measurement
(fully anechoic room)**



Figure 1: EUT flat on table



Figure 2: EUT on long side

**Test setup for radiated emission measurement
(fully anechoic room) - continued -**



Figure 3: EUT in upright position

**Test setup for radiated emission measurement
(open field test site)**



**Test setup for radiated emission measurement
(open field test site) - continued -**



8 Test Results

FCC CFR 47 Parts 2 and 15			
Section(s)	Test	Page	Result
2.1046(a)	Conducted output power	---	Not applicable
2.202(a)	Occupied bandwidth	20	Recorded
15.215(c) 15.231(c)	Bandwidth of the emission	25	Test passed
2.201, 2.202	Class of emission	28	Calculated
15.35(c)	Pulse train measurement for pulsed operation	29	Recorded
15.205(a)	Restricted bands of operation	30	Test passed
15.207	Conducted AC powerline emission 150 kHz to 30 MHz	---	Not applicable
15.231(a)	Periodic operation requirements	31	Test passed
15.205(b) 15.231(b)	Radiated emission 9 kHz to 30 MHz	---	Not applicable according to CFR 47 Part 15, section 15.33(a)
15.205(b) 15.215(b) 15.231(b)	Radiated emission 30 MHz to 5 GHz	32	Test passed
15.231(d)	Carrier frequency stability	---	Not applicable

IC RSS-Gen Issue 1			
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
4.6	Transmitter output power (conducted)	---	Not applicable
4.4.1	Occupied Bandwidth	20	Recorded
3.2(h), 8	Designation of emissions	28	Calculated
4.3	Pulsed operation	29	Recorded
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz	---	Not applicable
5.5	Exposure of Humans to RF Fields	33	Exempted from SAR and RF evaluation

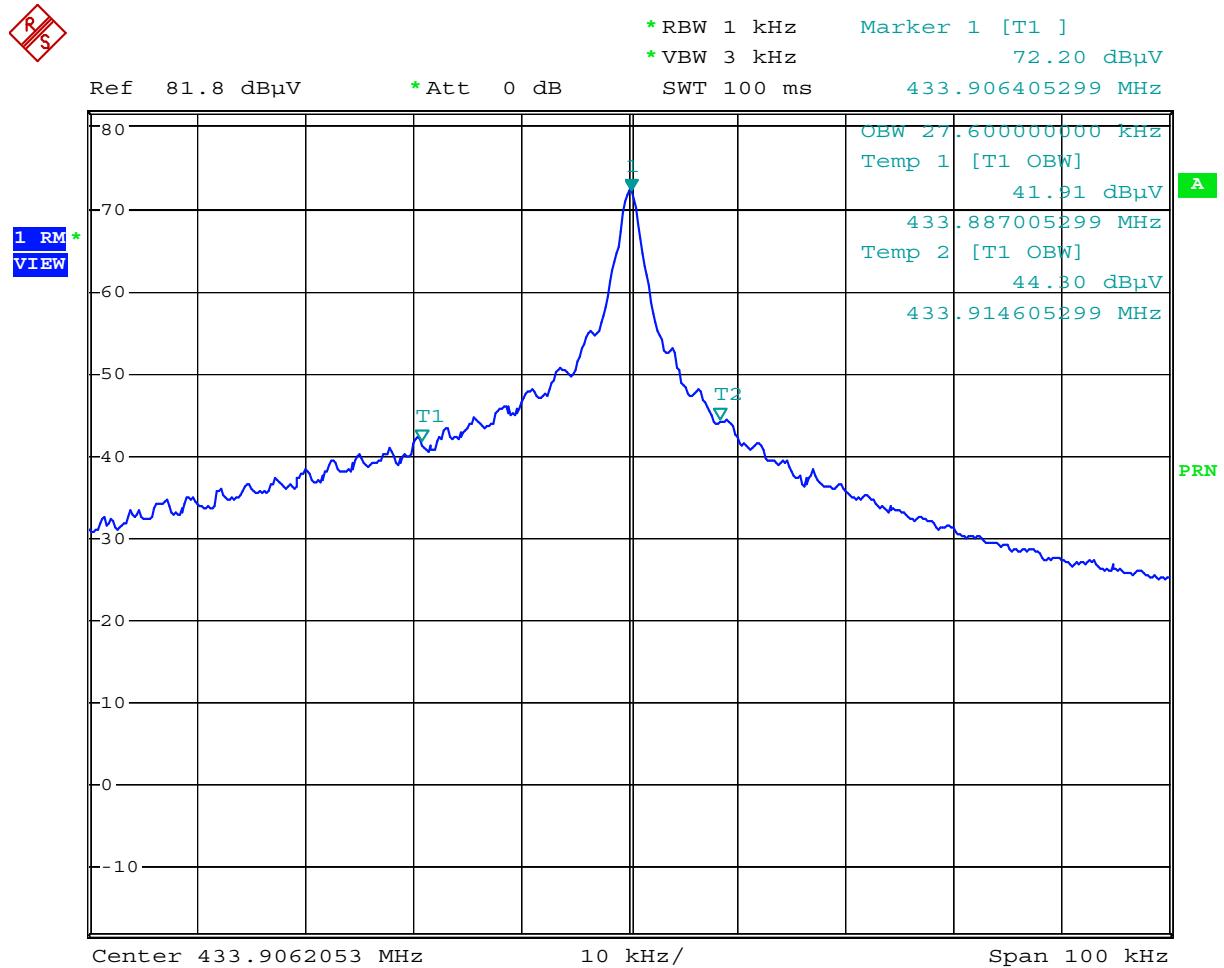
IC RSS-210 Issue 6			
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
2.2(a)	Restricted bands and unwanted emission frequencies	30	Test passed
A1.1.1	Requirements for momentarily operated devices	31	Test passed
A1.1.2 2.2(b)(c), 2.6	Unwanted emissions 9 kHz to 30 MHz	---	Not applicable according to IC RSS-Gen Issue 1, section 4.7
A1.1.2 2.2(b)(c), 2.6	Unwanted emissions 30 MHz to 5 GHz	32	Test passed
A1.1.3	Bandwidth of momentary signals	27	Test passed
A1.1.4	Carrier frequency stability	---	Not applicable

8.1 Occupied Bandwidth

Rules and specifications:	CFR 47 Part 2, section 2.202(a) ANSI C63.4, annex H.6								
Guide:	ANSI C63.4								
Description:	<p>The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.</p> <p>The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier.</p> <p>The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:</p> <table border="1"><thead><tr><th>Fundamental frequency</th><th>Minimum resolution bandwidth</th></tr></thead><tbody><tr><td>9 kHz to 30 MHz</td><td>1 kHz</td></tr><tr><td>30 MHz to 1000 MHz</td><td>10 kHz</td></tr><tr><td>1000 MHz to 40 GHz</td><td>100 kHz</td></tr></tbody></table> <p>The video bandwidth shall be at least three times greater than the resolution bandwidth.</p>	Fundamental frequency	Minimum resolution bandwidth	9 kHz to 30 MHz	1 kHz	30 MHz to 1000 MHz	10 kHz	1000 MHz to 40 GHz	100 kHz
Fundamental frequency	Minimum resolution bandwidth								
9 kHz to 30 MHz	1 kHz								
30 MHz to 1000 MHz	10 kHz								
1000 MHz to 40 GHz	100 kHz								
Measurement procedure:	Bandwidth Measurements (6.1)								

Comment:	
Date of test:	30 November 2005
Test site:	Fully anechoic room, cabin no. 2

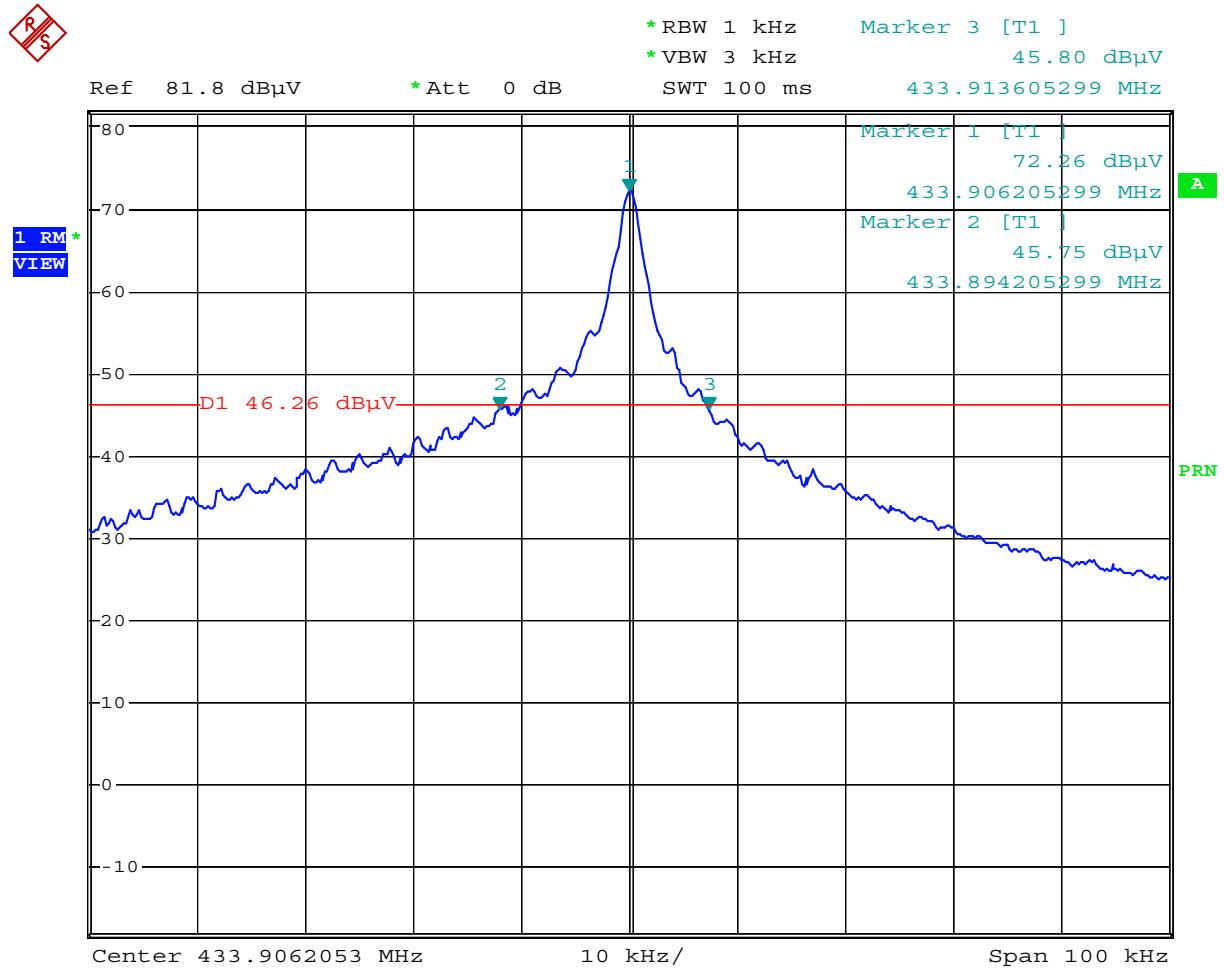
Occupied Bandwidth (99 %):



Comment: Meta050766: Occupied Bandwidth
Date: 30.NOV.2005 15:40:06

Occupied Bandwidth (99 %): **27.6 kHz**

Occupied Bandwidth (-26 dB):



Comment: Meta050766: Occupied Bandwidth
Date: 30.NOV.2005 15:41:25

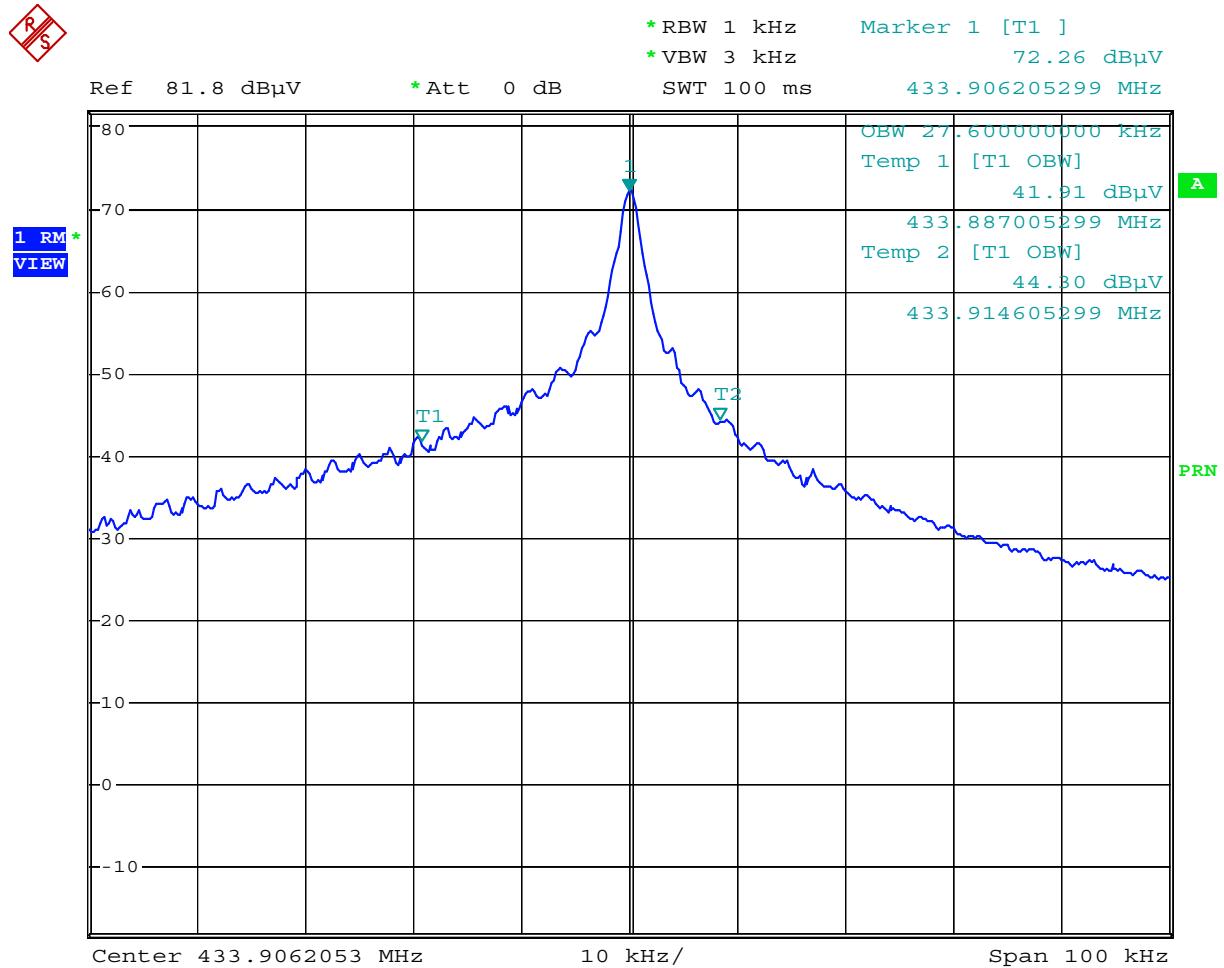
Occupied Bandwidth (-26 dB): **19.4 kHz**

Occupied Bandwidth (continued)

Rules and specifications:	IC RSS-Gen Issue 1, section 4.4.1
Guide:	IC RSS-Gen Issue 1, section 4.4.1
Description:	<p>If not specified in the applicable RSS the occupied bandwidth is measured as the 99% emission bandwidth.</p> <p>The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.</p> <p>The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.</p>
Measurement procedure:	Bandwidth Measurements (6.1)

Comment:	
Date of test:	30 November 2005
Test site:	Fully anechoic room, cabin no. 2

Occupied Bandwidth (99 %):



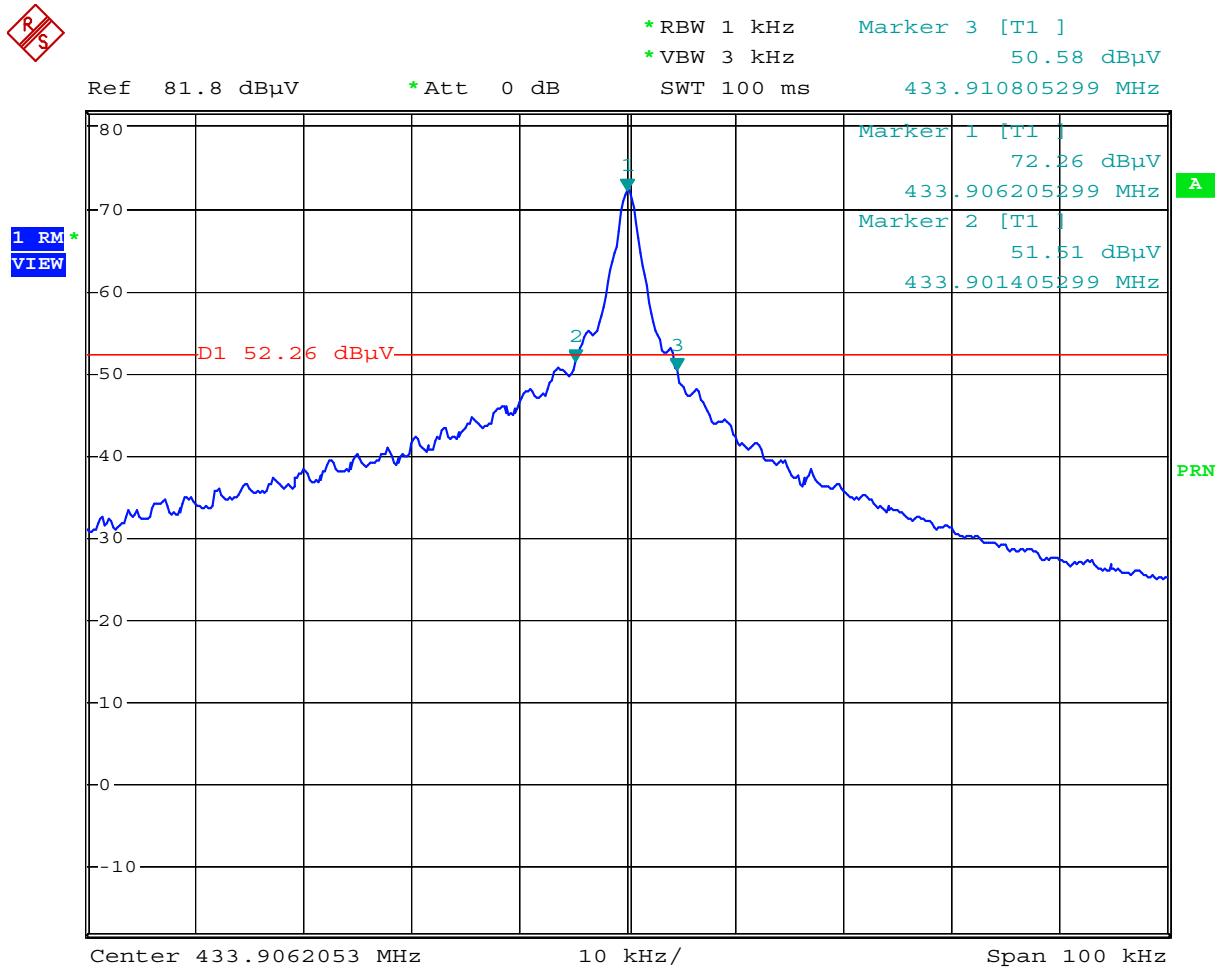
Comment: Meta050766: Occupied Bandwidth
Date: 30.NOV.2005 15:42:39

Occupied Bandwidth (99 %): **27.6 kHz**

8.2 Bandwidth of the Emission

Rules and specifications:	CFR 47 Part 15, section 15.215(c)								
Guide:	ANSI C63.4								
Description:	<p>The 20 dB bandwidth of the emission is measured as the frequency range defined by the points that are 20 dB down relative to the maximum level of the modulated carrier.</p> <p>For intentional radiators operating under the alternative provisions to the general emission limits the requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.</p> <p>The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:</p> <table border="1"><thead><tr><th>Fundamental frequency</th><th>Minimum resolution bandwidth</th></tr></thead><tbody><tr><td>9 kHz to 30 MHz</td><td>1 kHz</td></tr><tr><td>30 MHz to 1000 MHz</td><td>10 kHz</td></tr><tr><td>1000 MHz to 40 GHz</td><td>100 kHz</td></tr></tbody></table> <p>The video bandwidth shall be at least three times greater than the resolution bandwidth.</p>	Fundamental frequency	Minimum resolution bandwidth	9 kHz to 30 MHz	1 kHz	30 MHz to 1000 MHz	10 kHz	1000 MHz to 40 GHz	100 kHz
Fundamental frequency	Minimum resolution bandwidth								
9 kHz to 30 MHz	1 kHz								
30 MHz to 1000 MHz	10 kHz								
1000 MHz to 40 GHz	100 kHz								
Measurement procedure:	Bandwidth Measurements (6.1)								

Comment:	
Date of test:	30 November 2005
Test site:	Fully anechoic room, cabin no. 2



Comment: Meta050766: Bandwidth of Emission
Date: 30.NOV.2005 15:43:53

Permitted frequency band:	433.05 - 434.79 MHz	
20 dB bandwidth:	9.4 kHz	
Carrier frequency stability:	<input type="checkbox"/> specified	<input checked="" type="checkbox"/> not specified
Maximum frequency tolerances:		
Bandwidth of the emission:	within permitted frequency band ⁵ : <input checked="" type="checkbox"/> yes <input type="checkbox"/> no	

Test Result:	Test passed
--------------	-------------

⁵ If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

8.3 Bandwidth of Momentary Signals

Rules and specifications:	IC RSS-210 Issue 6, section A1.1.3
Guide:	IC RSS-Gen Issue 1, section 4.4.1
Limit:	For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 and 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

Operating frequency:	433.8 MHz
Bandwidth limit:	108.45 kHz
Occupied bandwidth:	27.6 kHz
Emission bandwidth within bandwidth limit:	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no

Test Result:	Test passed
--------------	-------------

8.4 Designation of Emissions

Rules and specifications:	CFR 47 Part 2, sections 2.201 and 2.202 IC RSS-Gen Issue 1, sections 3.2(h) and 8
Guide:	ANSI C63.4 / TRC-43

Type of modulation:	Amplitude Modulation
---------------------	----------------------

B_n = Necessary Bandwidth	$B_n = 2BK$
B = Modulation rate	$B = 5 \text{ kHz}$
K = Overall numerical factor	$K = 1$
Calculation:	$B_n = 2 \cdot (5 \text{ kHz}) \cdot 1 = 10 \text{ kHz}$

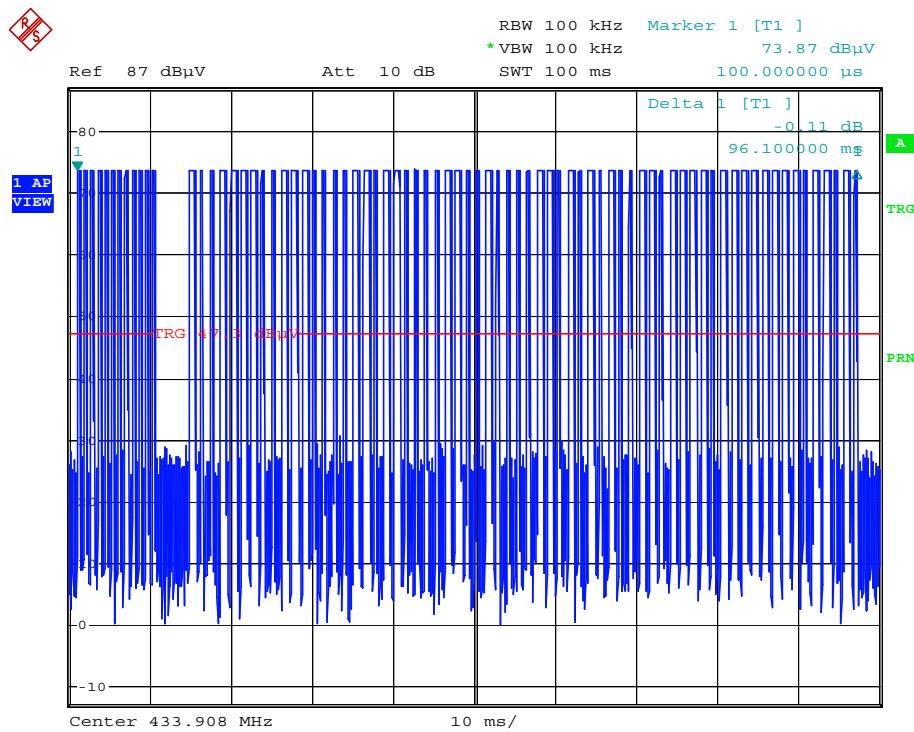
Designation of Emissions:	10K0A1D
---------------------------	----------------

8.5 Pulse Train Measurement

Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 1, section 4.3
Guide:	ANSI C63.4
Measurement procedure:	Pulse Train Measurement (6.2)

Comment:	
Date of test:	30 November 2005
Test site:	Fully anechoic room, cabin no. 2

Total Pulse Train:



Comment: Meta050766: Duty Cycle Correction
Date: 30.NOV.2005 15:23:22

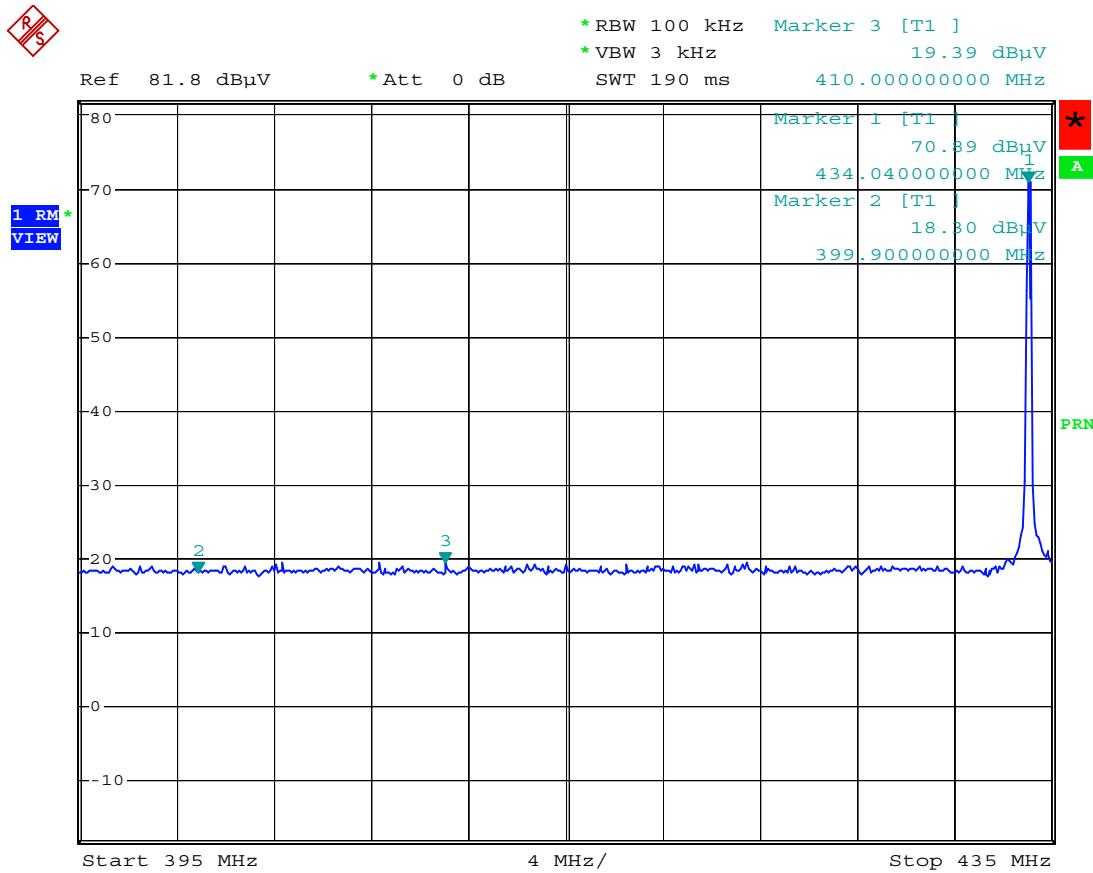
Calculation of pulse train correction:

TX-On-Time (worst case):	T_{on} = 48.51 ms
Pulse Train Time:	T_{pt} = 96.1 ms
Period Time:	T_{period} = 100.0 ms
Pulse Train Correction:	C_{pt} = $20 \cdot \log(T_{on} / T_{period})$ dB = -6.28 dB

8.6 Restricted Bands of Operation

Rules and specifications:	CFR 47 Part 15, section 15.205(a) IC RSS-210 Issue 6, section 2.2(a)
Guide:	ANSI C63.4
Limit:	Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a) or IC RSS-210 Issue 6, section 2.2(a).
Measurement procedure:	Radiated Emission in Fully or Semi Anechoic Room (6.3)

Comment:	
Date of test:	30 November 2005
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters



Test Result:	Test passed
--------------	-------------

8.7 Periodic Operation Requirements

Rules and specifications:	CFR 47 Part 15, section 15.231(a) IC RSS-210 Issue 6, section A1.1.1
Guide:	---

Periodic operation requirements		Applicable	Declared by applicant	Test performed	Passed
The transmitter is used for					
<input type="checkbox"/> security or safety applications <input checked="" type="checkbox"/> other applications		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The transmitter is operated					
<input checked="" type="checkbox"/> manually <input type="checkbox"/> automatically		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic operation according to					
<input checked="" type="checkbox"/> CFR 47 Part 15, section 15.231(a) / IC RSS-210 Issue 6, section A1.1.1					
Only control signals are sent and there is no continuous transmission		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A manually operated transmitter employs a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A transmitter activated automatically ceases transmission within 5 seconds after activation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodic transmissions at regular predetermined intervals are		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> not performed					
<input type="checkbox"/> performed with total transmission time of two seconds per hour or less (for polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications)					
<input type="checkbox"/> CFR 47 Part 15, section 15.231(e) / IC RSS-210 Issue 6, section A1.1.5					
The device is provided with a means for automatically limiting operation so that the duration of each transmission is not greater than one second and the silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 seconds.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Result may be based on the appropriate declaration of the applicant (i.e. no test is performed). However, in this case there is no verification by the test laboratory.

8.8 Radiated Emission Measurement 30 MHz to 5 GHz

Rules and specifications:	CFR 47 Part 15, sections 15.205, 15.215(b) and 15.231(b) IC RSS-210 Issue 6, section A1.1.2				
Guide:	ANSI C63.4				
Limit:	<p>In addition to the provisions of section 15.205, the field strength shall not exceed the levels as listed in the table below or the general limits shown in section 15.209, whichever limit permits a higher field strength.</p> <p>In no case shall the level of the unwanted emissions exceed the field strength of the fundamental emission.</p>				
Frequency of Emission (MHz)	Field Strength of Fundamental (dB μ V/m)	Field Strength of Spurious Emissions (dB μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB μ V/m)
40.66 - 40.70	2,250	67.0	225 **	47.0	
70 - 130	1,250	61.9	125	41.9	
130 - 174	1,250 to 3,750 *	61.9 to 71.5	125 to 375 *	41.9 to 51.5	
174 - 260	3,750	71.5	375	51.5	
260 - 470	3,750 to 12,500 *	71.5 to 81.9	375 to 1,250 *	51.5 to 61.9	
Above 470	12,500	81.9	1,250	61.9	
* linear interpolations			** for harmonics only		
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.3) Radiated Emission at Open Field Test Site (6.4)				

Comment:					
Date of test:	30 November 2005				
Test site:	Frequencies \leq 1 GHz: Open field test site Frequencies $>$ 1 GHz: Fully anechoic room, cabin no. 2				
Test distance:	3 meters				

Test Result:	Test passed
--------------	-------------

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dB μ V)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
433.900	horizontal	Peak	59.3	19.3	-6.3	72.3	80.8	8.5
867.800	horizontal	Peak	23.7	26.7	-6.3	44.1	60.8	16.7
1738.000	vertical	Peak	19.1	31.0	-6.3	43.7	60.8	17.1
2170.000	vertical	Peak	25.4	32.8	-6.3	51.8	60.8	9.0
2602.000	vertical	Peak	31.8	34.1	-6.3	59.7	60.8	1.2
3040.000	vertical	Peak	13.8	36.1	-6.3	43.6	60.8	17.2
3472.000	horizontal	Peak	13.2	37.6	-6.3	44.6	60.8	16.3
4338.500	vertical	Peak	12.7	33.8	-6.3	40.3	54.0	13.8

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Correction Factor (dB/m)} + \text{Pulse Train Correction (dB)}$$

8.9 Exposure of Humans to RF Fields

Rules and specifications:	IC RSS-Gen Issue 1, section 5.5
Guide:	IC RSS-102 Issue 1, section 4.1

Exposure of Humans to RF Fields		Applicable	Declared by applicant	Measured	Exemption
The transmitter is for					
<input type="checkbox"/> fixed use	<input type="checkbox"/> mobile use	<input checked="" type="checkbox"/> portable use	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The antenna is					
<input type="checkbox"/> detachable					
The output power (TP in watts) is measured at the antenna connector: $TP = \dots \text{W}$					
Numerical gain of the antenna: $G = \dots$					
<input checked="" type="checkbox"/> not detachable					
A field strength measurement is used to determine the output power (TP in watts) given by ⁶ : $TP = \frac{(FS \cdot D)^2}{30 \cdot G} \Rightarrow TP = 5.09 \mu\text{W}$					
with: Field strength ⁷ in V/m: $FS = 72.3 \text{dB}\mu\text{V/m}$ $= 4.12 \text{ mV/m}$					
Distance between the two antennas in m: $D = 3 \text{ m}$					
Numerical gain of the antenna: $G = 1$					
SAR and RF evaluation					
$EIRP = G \cdot TP \Rightarrow EIRP = 5.09 \mu\text{W}$					
<input checked="" type="checkbox"/> Transmitter is operating at frequencies below 1.0 GHz with an output power TP equal to or less than 200 milliwatts (mW). <input type="checkbox"/> Transmitter is operating at frequencies between 1.0 and 2.2 GHz with an output power TP equal to or less than 100 milliwatts (mW). <input type="checkbox"/> Transmitter is for mobile use and operating frequency is below 1.5 GHz with effective radiated power (ERP) of 1.5 watts or less (i.e. EIRP of 2.5 watts or less). <input type="checkbox"/> Transmitter is for mobile use and operating frequency is above 1.5 GHz with ERP of 3 watts or less (i.e. EIRP of 5 watts or less). <input type="checkbox"/> SAR and/or RF evaluation is documented in test report no.					

⁶ The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.

⁷ If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

9 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

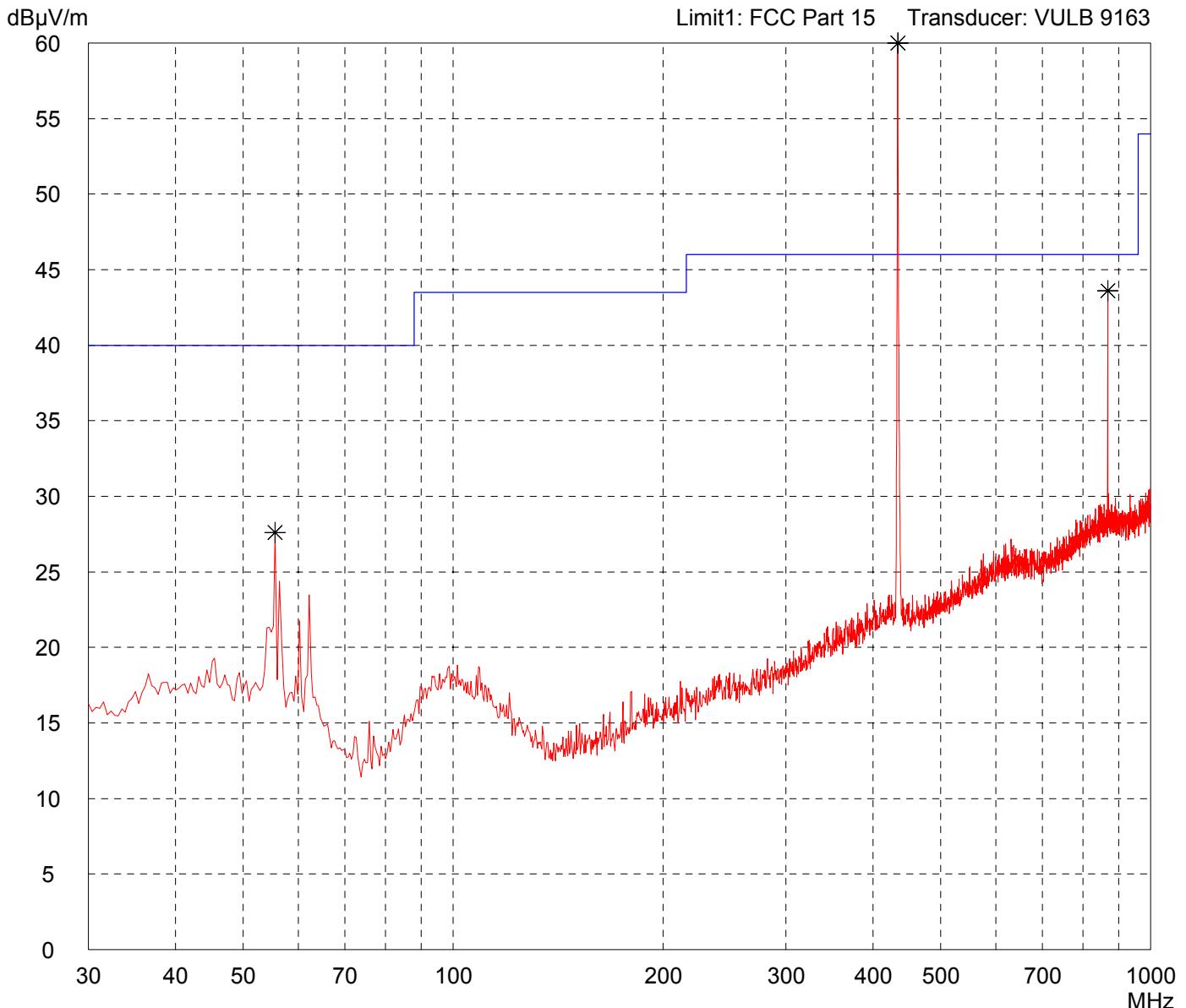
<input checked="" type="checkbox"/>	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 10, 2004
<input checked="" type="checkbox"/>	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	September 19, 2005
<input checked="" type="checkbox"/>	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	December 11, 2003 (published on January 30, 2004)
<input checked="" type="checkbox"/>	RSS-Gen	Radio Standards Specification RSS-Gen Issue 1 containing General Requirements and Information for the Certification of Radiocommunication Equipment, published by Industry Canada	September 2005
<input checked="" type="checkbox"/>	RSS-210	Radio Standards Specification RSS-210 Issue 6 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada	September 2005
<input type="checkbox"/>	RSS-310	Radio Standards Specification RSS-310 Issue 1 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	September 2005
<input checked="" type="checkbox"/>	RSS-102	Radio Standards Specification RSS-102 Issue 1: Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields, published by Industry Canada	September 25, 1999
<input type="checkbox"/>	ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 4 for Digital Apparatus, published by Industry Canada	February 7, 2004
<input checked="" type="checkbox"/>	CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement"	1997
<input type="checkbox"/>	CAN/CSA-CEI/IEC CISPR 22	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	2002
<input checked="" type="checkbox"/>	TRC-43	Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada	October 9, 1982

10 Charts taken during testing

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT flat on table
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: last.emi

Detector: Peak	List of values: Selected by hand
-------------------	-------------------------------------



Result: Prescan

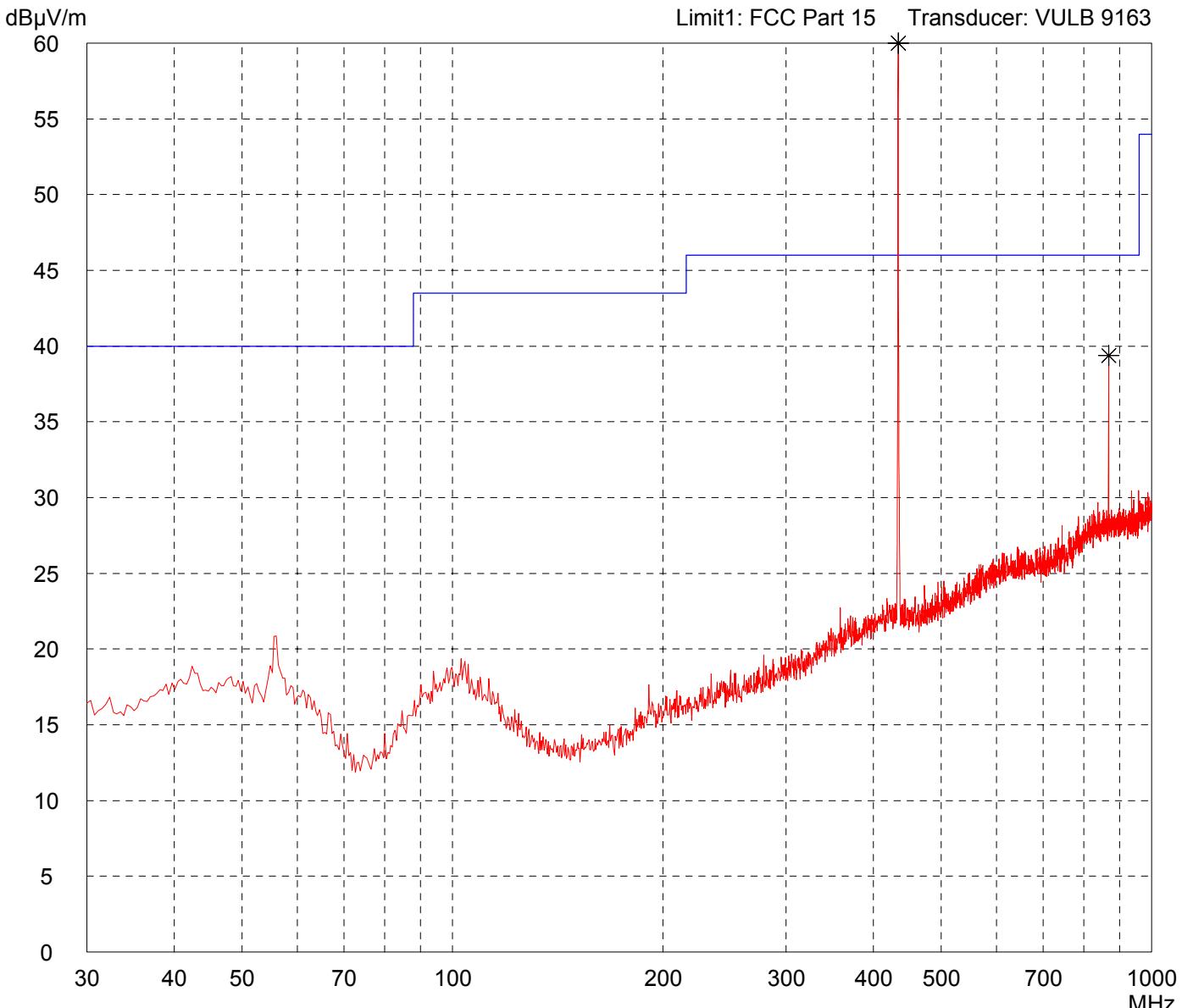
Project file: 55106-50766	Page of Pages
------------------------------	---------------

Radiated Emission Test 30 MHz - 1 GHz

acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: E52	Comment:
Serial no.: ---	- 3 V lithium battery supply
Applicant: Meta System S.p.A.	- transmitting continuously
Test site: Fully anechoic room, cabin no. 2	- EUT flat on table
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values:
	10 dB Margin 50 Subranges



Result: Prescan

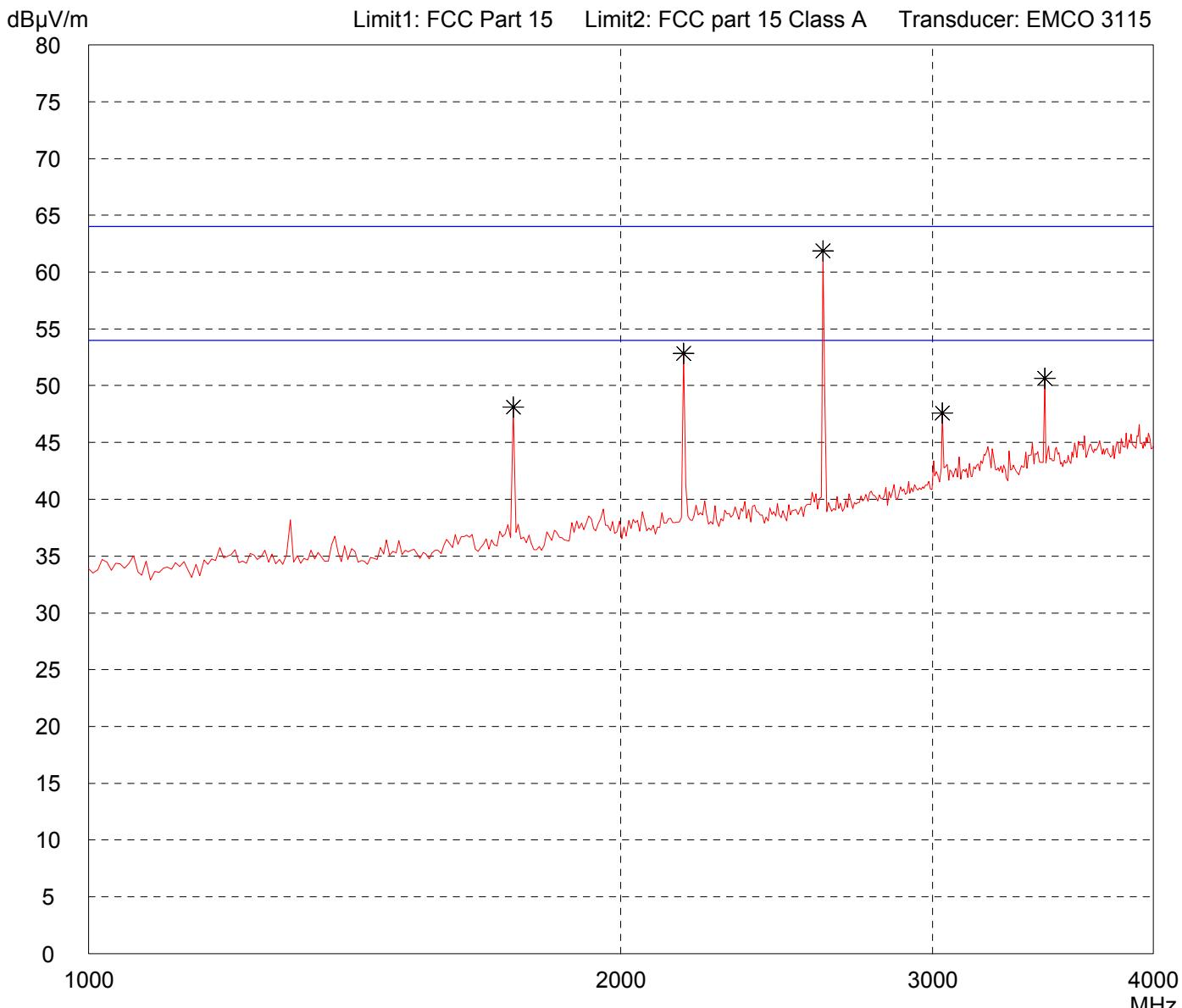
Project file: 55106-50766	Page of Pages
------------------------------	-------------------------

Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT flat on table
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: Selected by hand



Result: Prescan

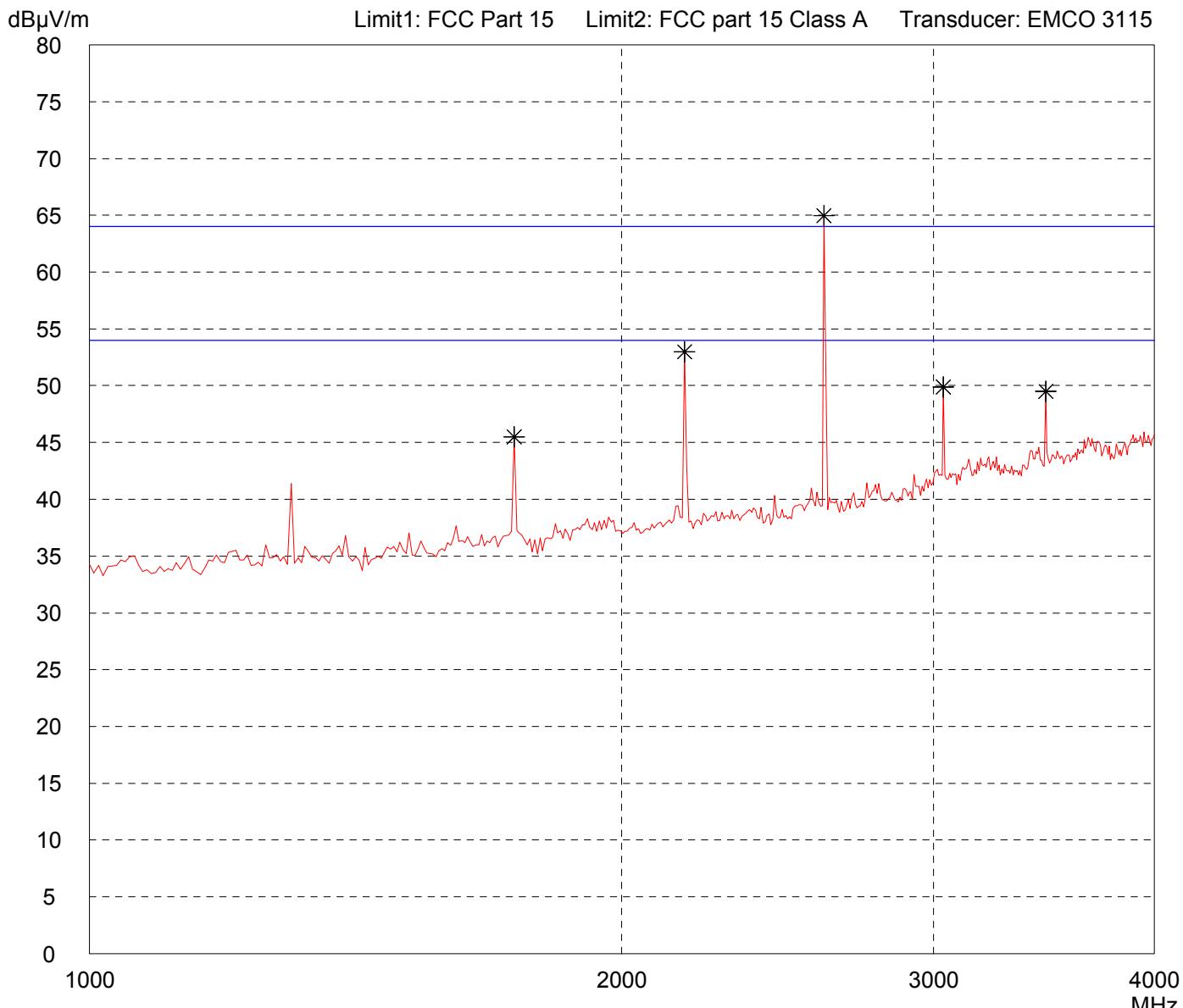
Project file: 55106-50766	Page	of	Pages
------------------------------	------	----	-------

Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT flat on table
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: Selected by hand



Result: Prescan

Project file: 55106-50766	Page of Pages
------------------------------	-------------------------

Radiated Emission Test 3.95 GHz - 5 GHz acc. to FCC Part 15 (EMCO 3160)

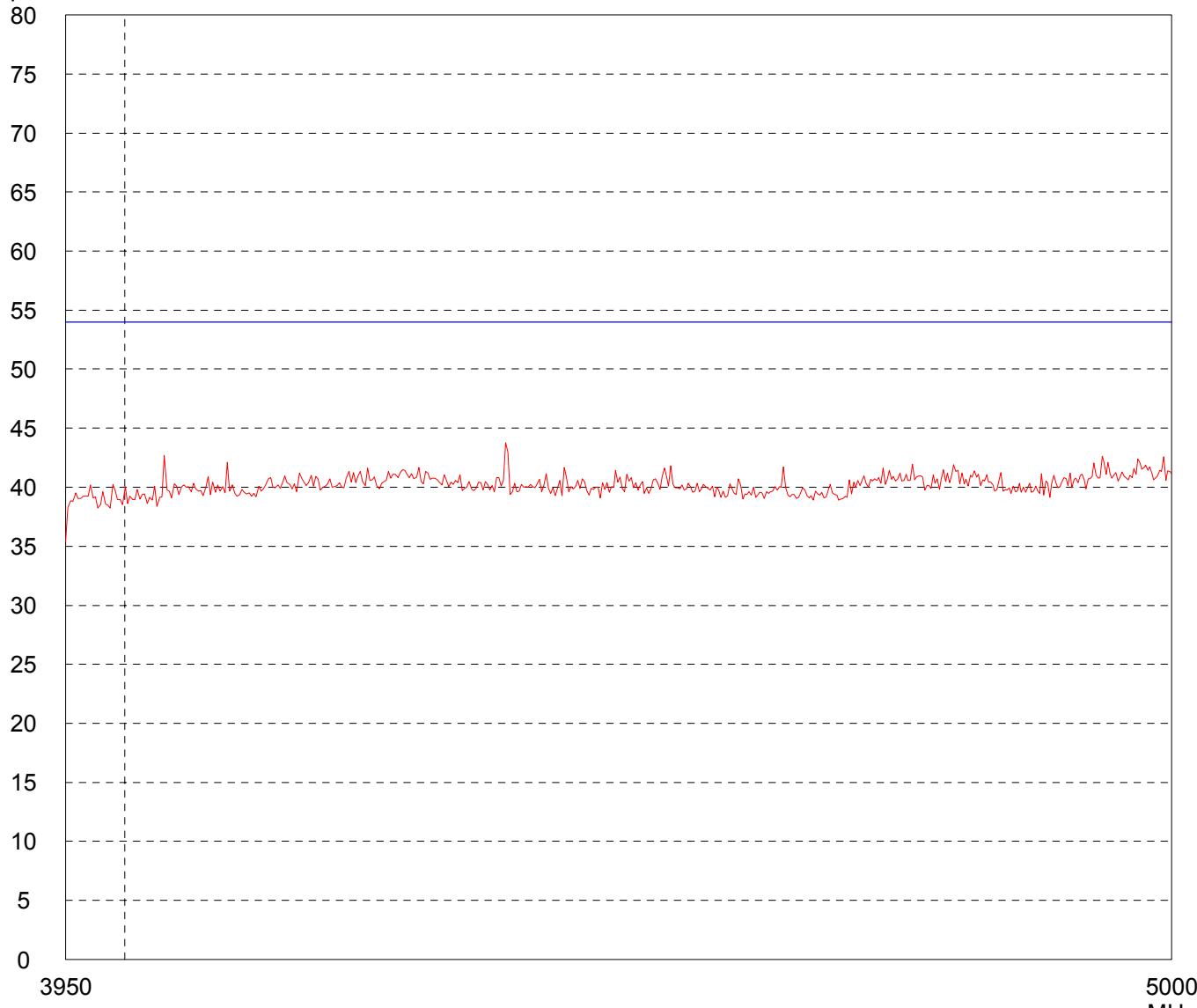
Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT flat on table
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: 10 dB Margin	50 Subranges
---------------------------------	--------------

dB μ V/m

Limit1: FCC Part 15 Transducer: EMCO 3160



Result:
Prescan

Project file:
55106-50766

Page of Pages

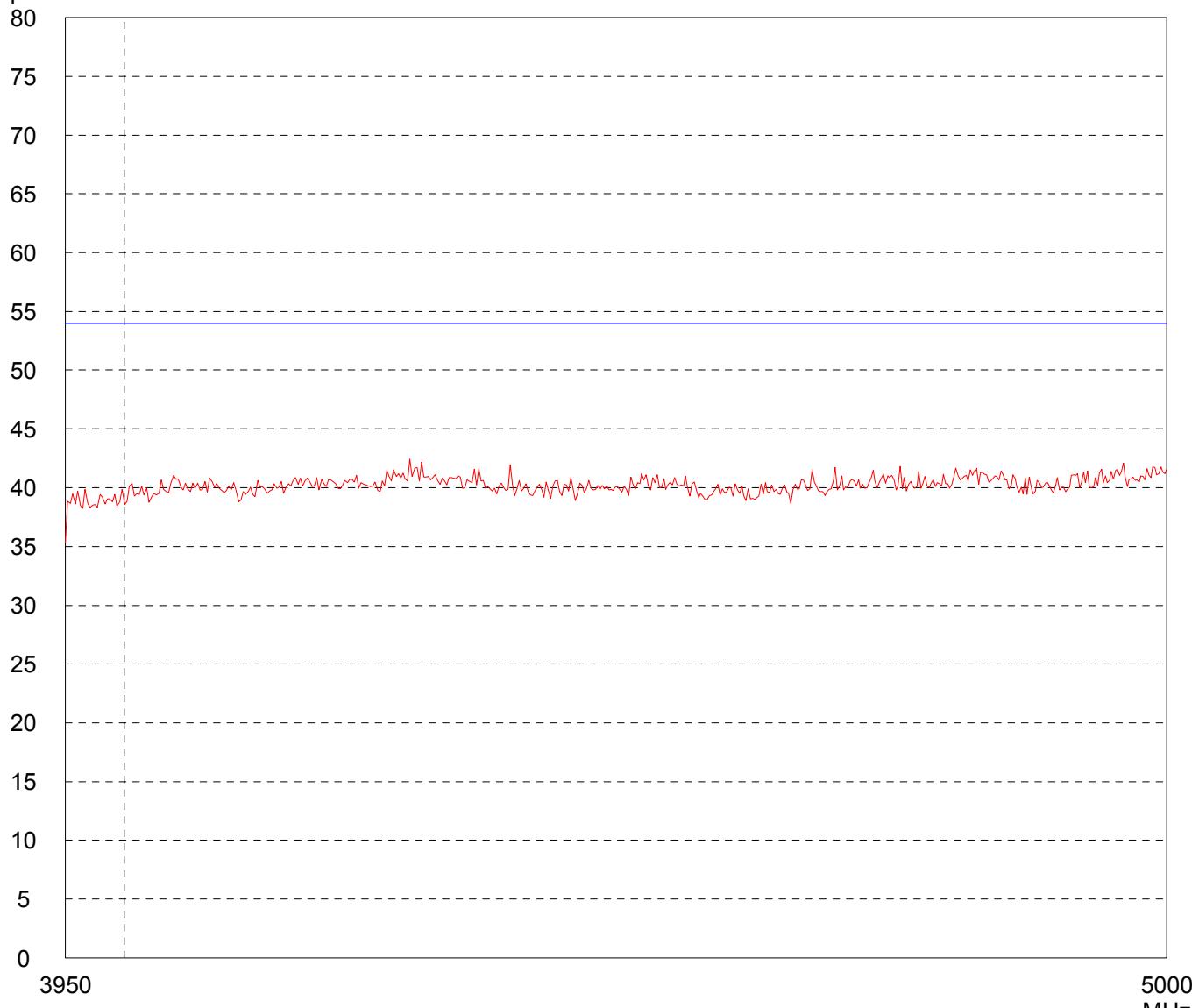
Radiated Emission Test 3.95 GHz - 5 GHz acc. to FCC Part 15 (EMCO 3160)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT flat on table
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: 10 dB Margin	50 Subranges
-------------------	---------------------------------	--------------

dB μ V/m

Limit1: FCC Part 15 Transducer: EMCO 3160



Result:

Prescan

Project file:

55106-50766

Page of Pages

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

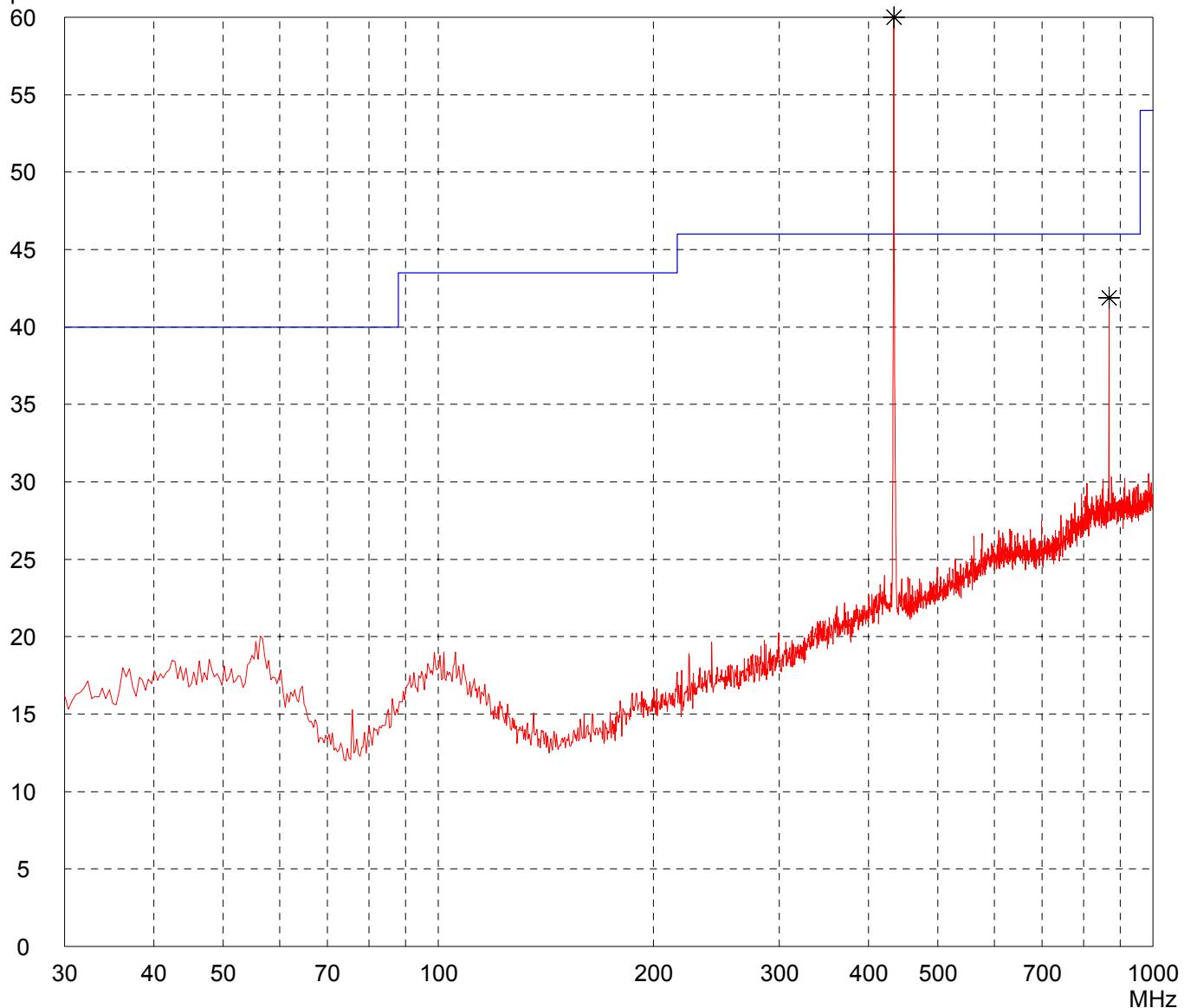
Model: E52	Comment:
Serial no.: ---	- 3 V lithium battery supply
Applicant: Meta System S.p.A.	- transmitting continuously
Test site: Fully anechoic room, cabin no. 2	- EUT on long side
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: 10 dB Margin	50 Subranges
-------------------	---------------------------------	--------------

dB μ V/m

Limit1: FCC Part 15

Transducer: VULB 9163



Result:
Prescan

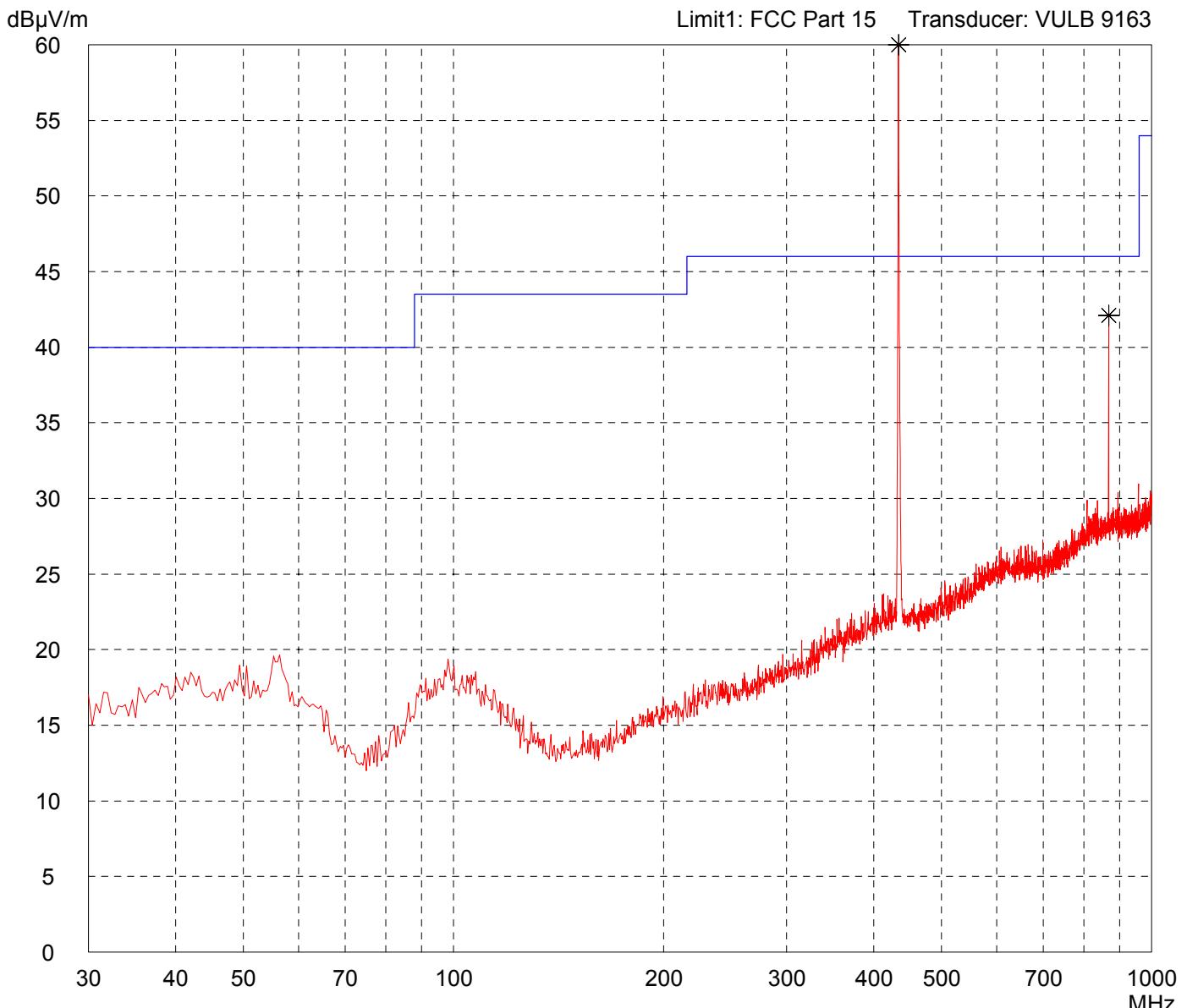
Project file:
55106-50766

Page of Pages

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT on long side
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: 10 dB Margin	50 Subranges
-------------------	---------------------------------	--------------



Result: Prescan

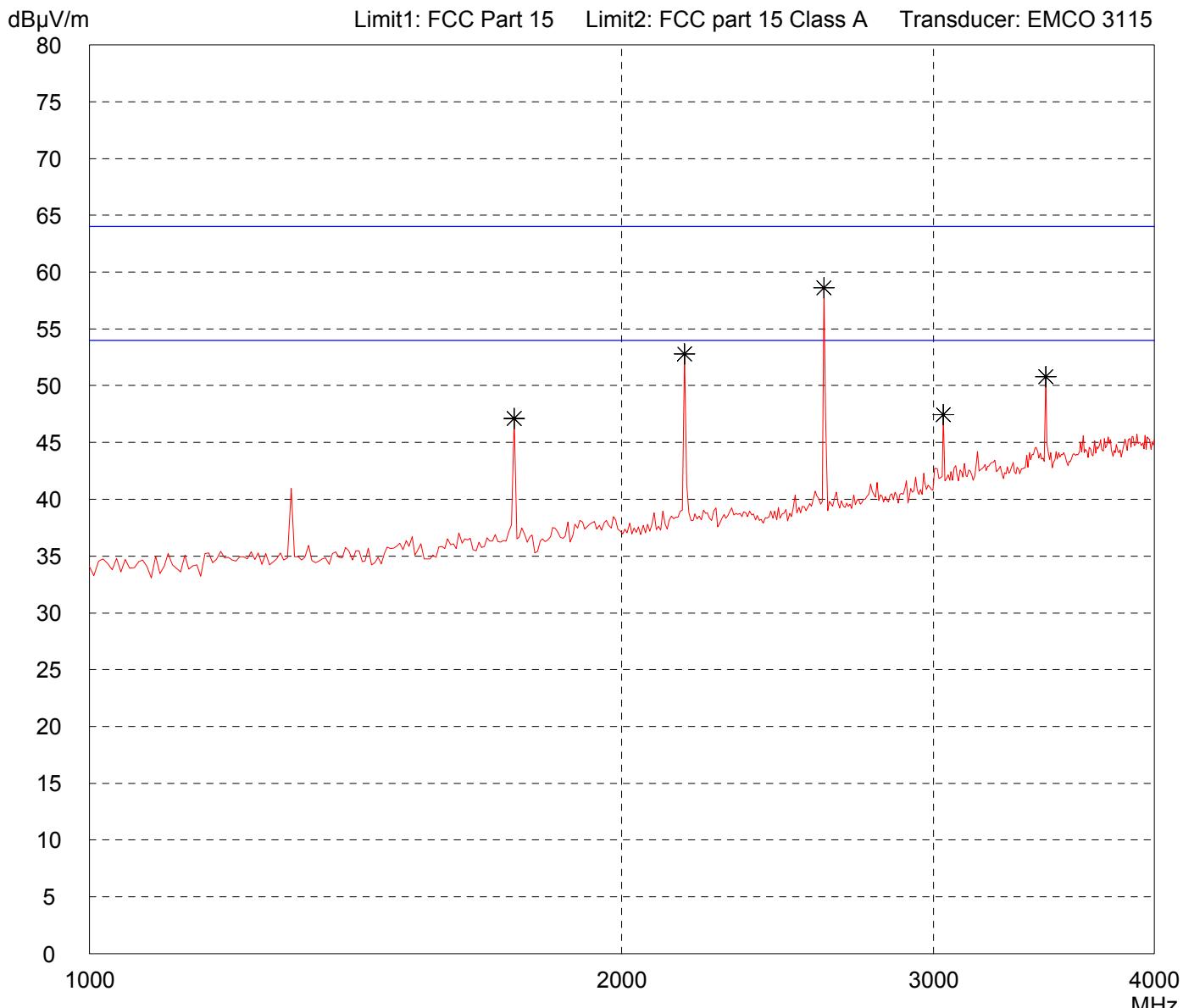
Project file: 55106-50766	Page	of	Pages
------------------------------	------	----	-------

Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT on long side
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: Selected by hand



Result: Prescan

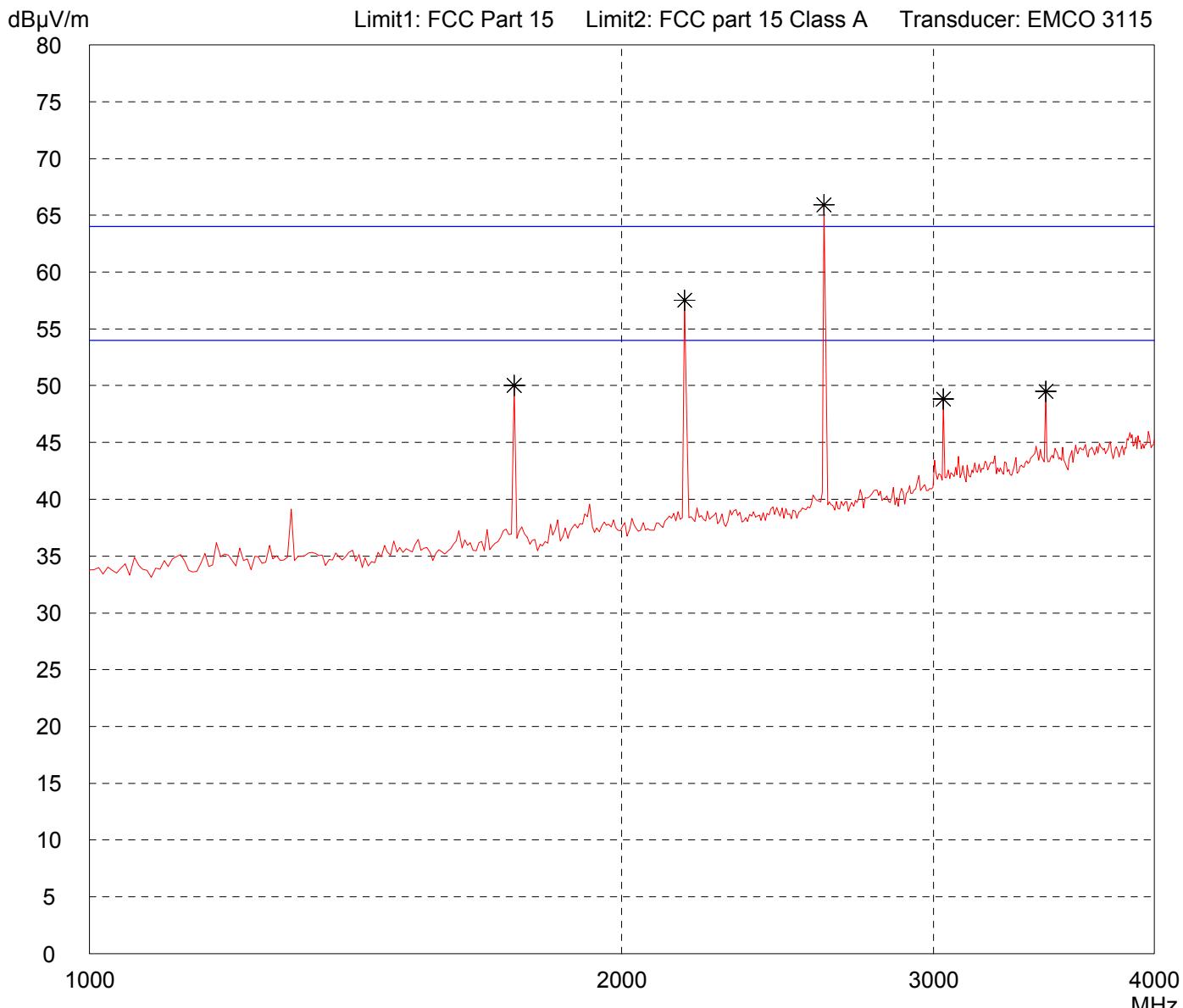
Project file: 55106-50766	Page of Pages
------------------------------	-------------------------

Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT on long side
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: Selected by hand



Result: Prescan

Project file: 55106-50766	Page	of	Pages
------------------------------	------	----	-------

Radiated Emission Test 3.95 GHz - 5 GHz acc. to FCC Part 15 (EMCO 3160)

Model: E52	Comment: - 3 V lithium battery supply - transmitting continuously - EUT on long side
Serial no.: ---	
Applicant: Meta System S.p.A.	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi
Detector: Peak	List of values: 10 dB Margin 50 Subranges

dB_{UV}/m

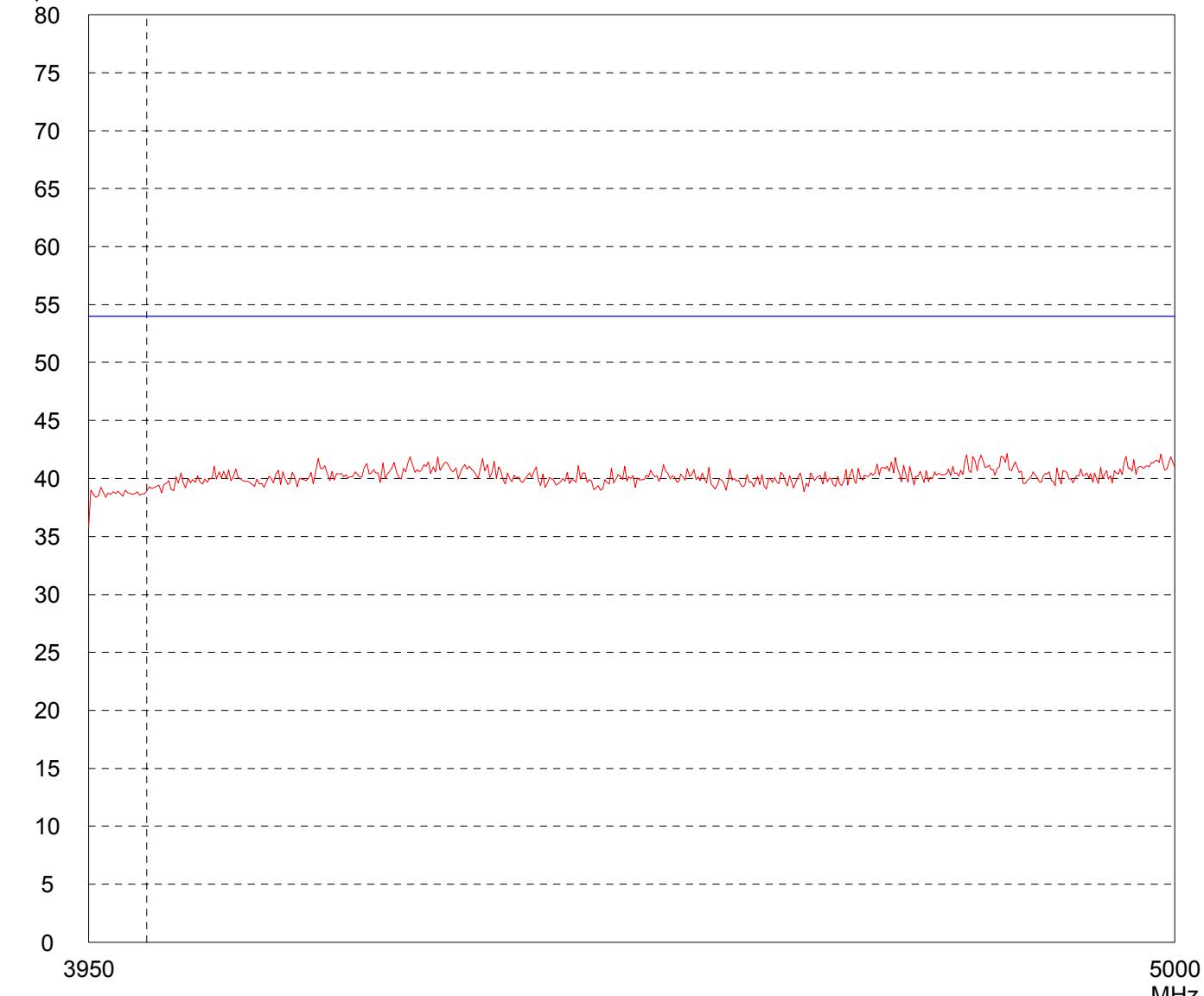
Peak

List of values:

10 dB Margin

50 Subranges

dB μ V/m



Result:

Project file:
55106-50766

Page of Pages

Radiated Emission Test 3.95 GHz - 5 GHz acc. to FCC Part 15 (EMCO 3160)

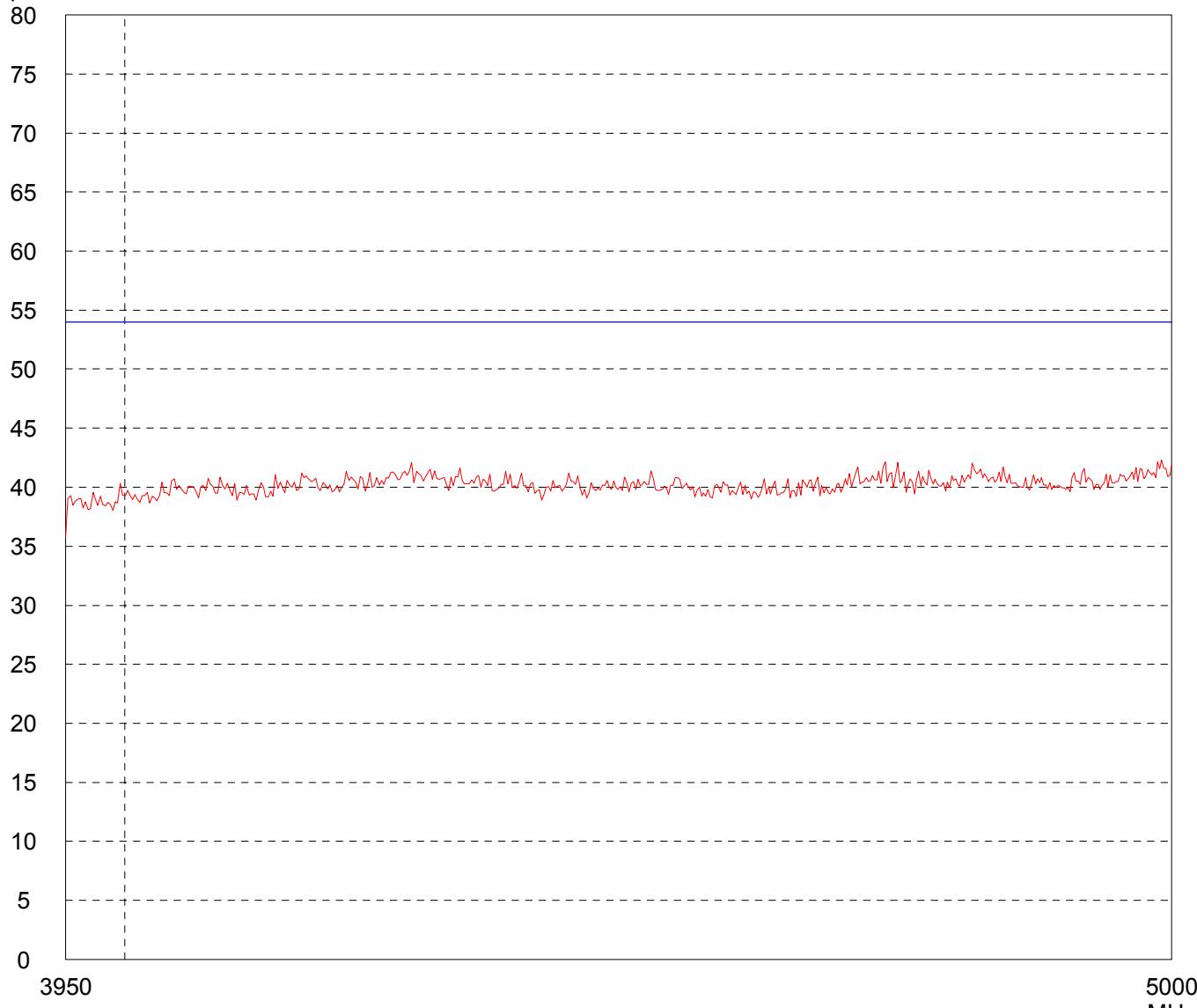
Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT on long side
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: 10 dB Margin	50 Subranges
---------------------------------	--------------

dB μ V/m

Limit1: FCC Part 15 Transducer: EMCO 3160



Result:

Prescan

Project file:

55106-50766

Page of Pages

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

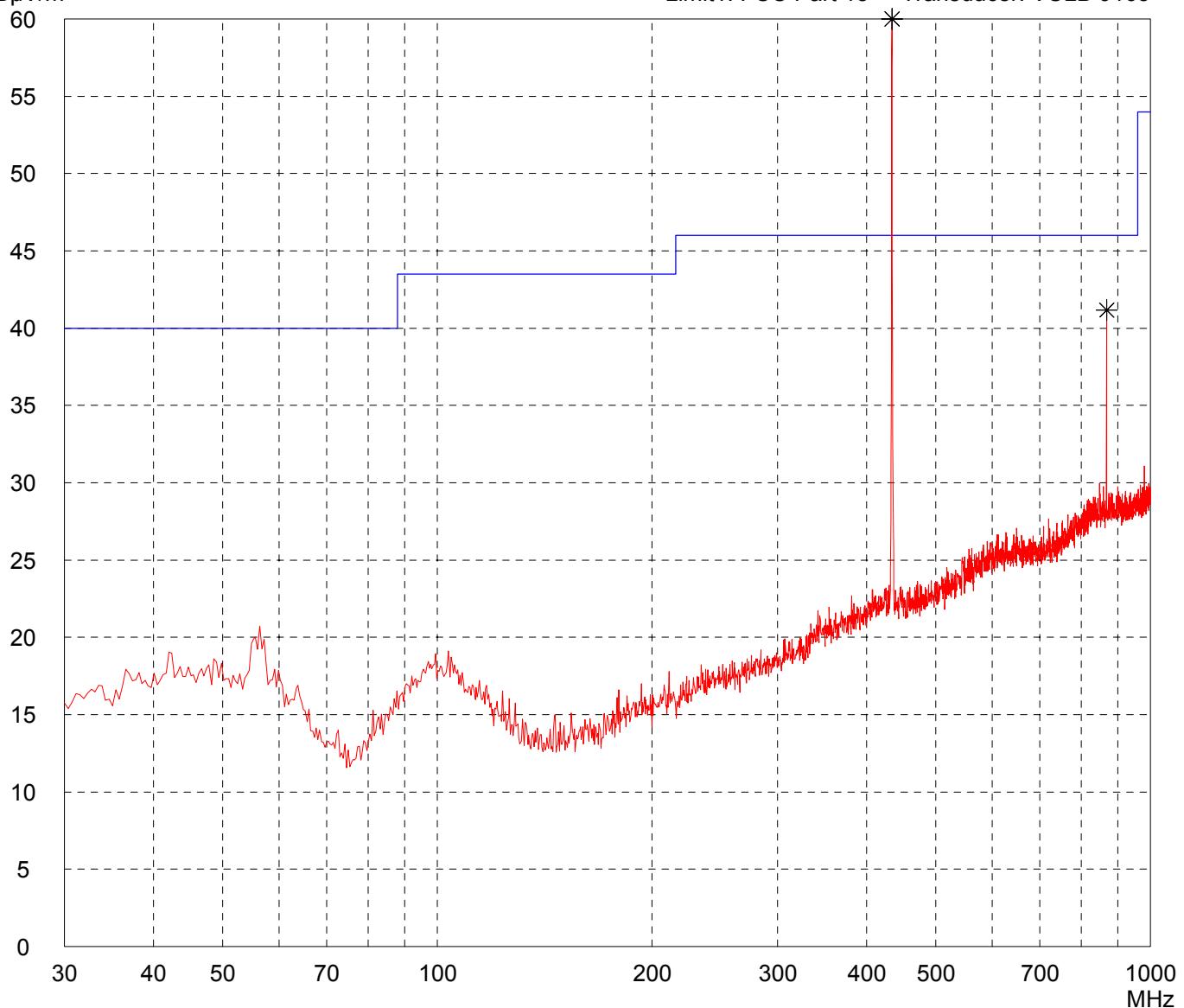
Model: E52	Comment:
Serial no.: ---	- 3 V lithium battery supply
Applicant: Meta System S.p.A.	- transmitting continuously
Test site: Fully anechoic room, cabin no. 2	- EUT in upright position
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: 10 dB Margin	50 Subranges
-------------------	---------------------------------	--------------

dB μ V/m

Limit1: FCC Part 15

Transducer: VULB 9163



Result:
Prescan

Project file:
55106-50766

Page of Pages

Radiated Emission Test 30 MHz - 1 GHz

acc. to FCC Part 15 (Fully Anechoic Chamber)

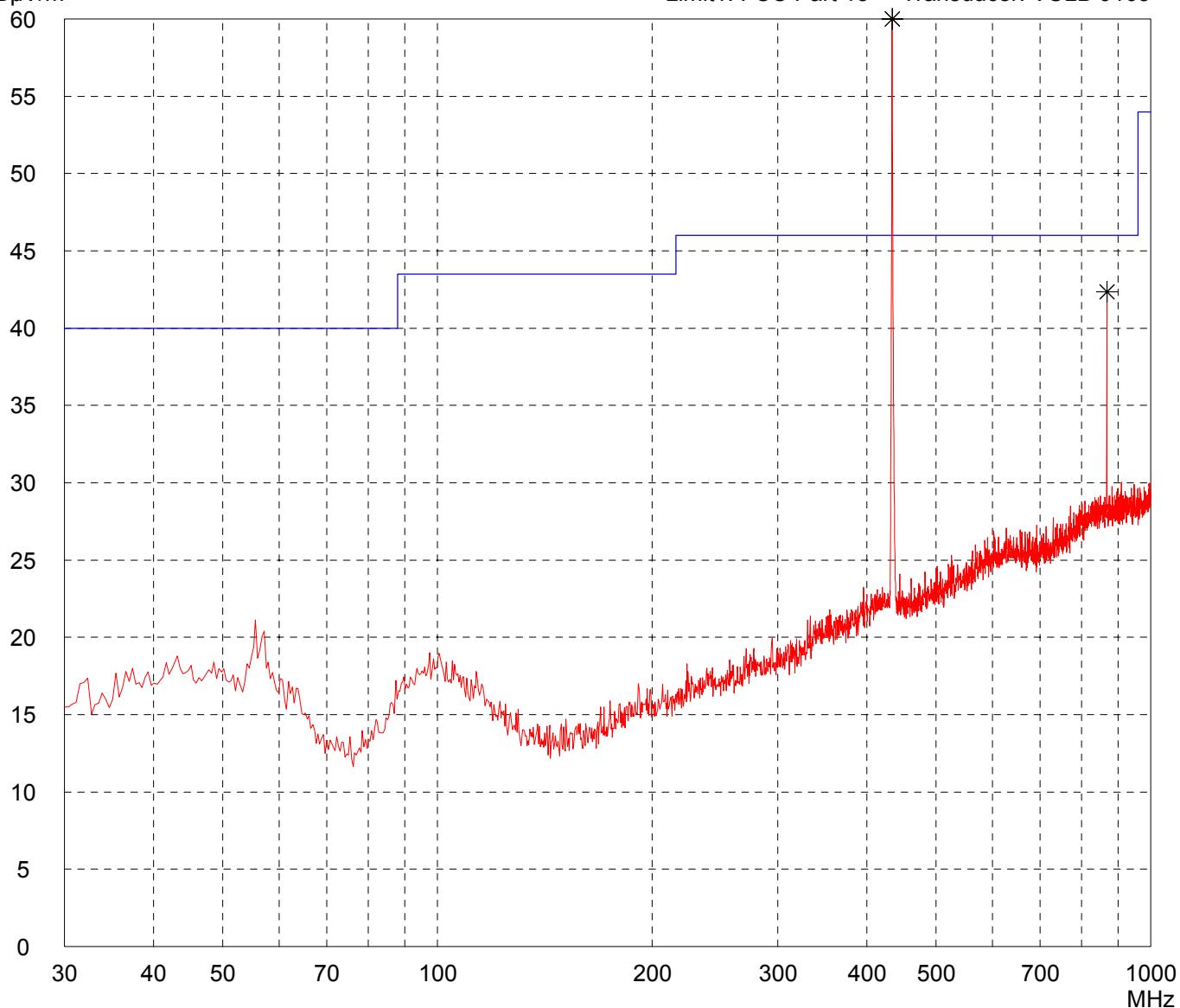
Model: E52	Comment:
Serial no.: ---	- 3 V lithium battery supply
Applicant: Meta System S.p.A.	- transmitting continuously
Test site: Fully anechoic room, cabin no. 2	- EUT in upright position
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: 10 dB Margin	50 Subranges
-------------------	---------------------------------	--------------

dB μ V/m

Limit1: FCC Part 15

Transducer: VULB 9163



Result:
Prescan

Project file:
55106-50766

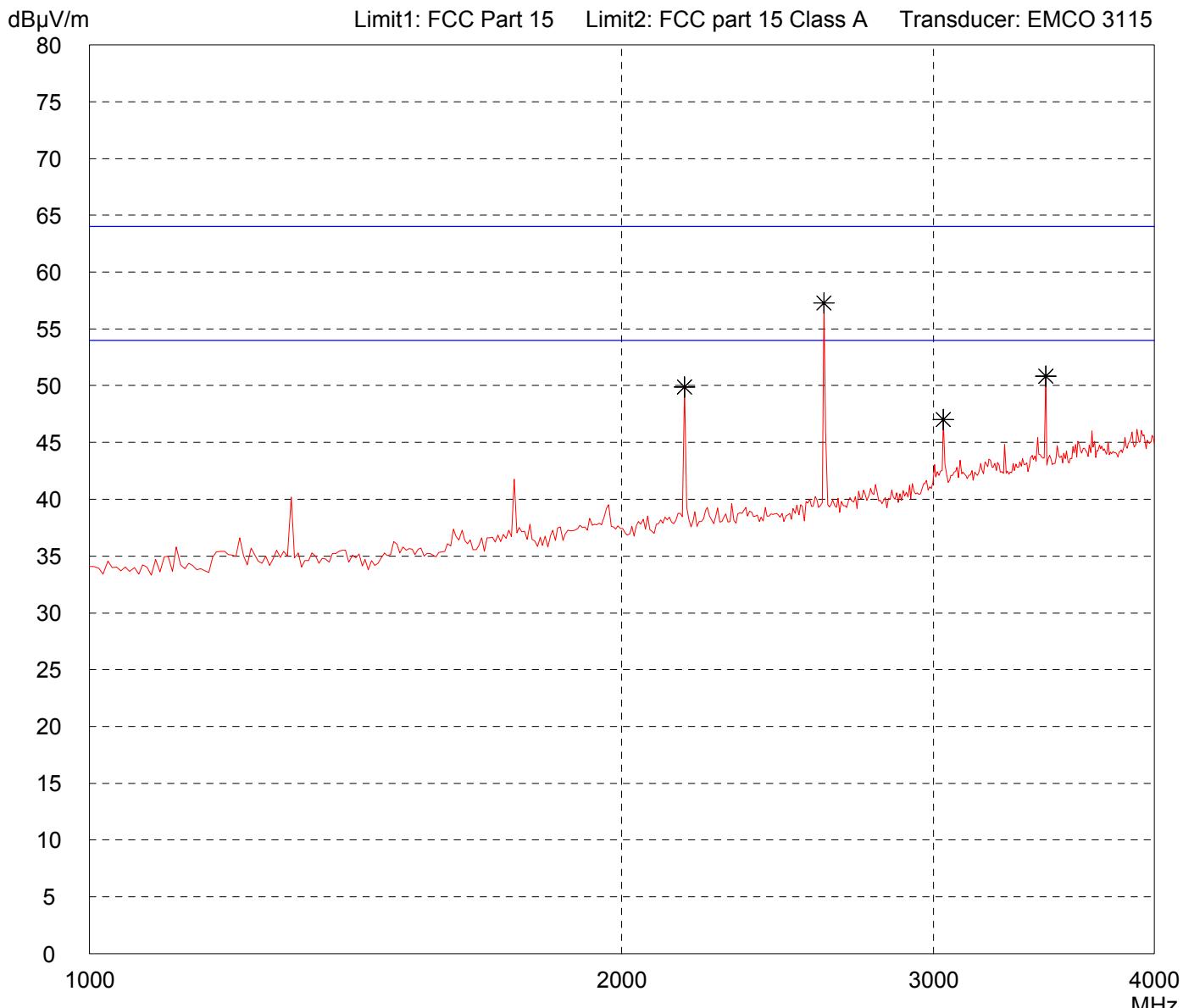
Page of Pages

Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT in upright position
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values:
Selected by hand



Result: Prescan

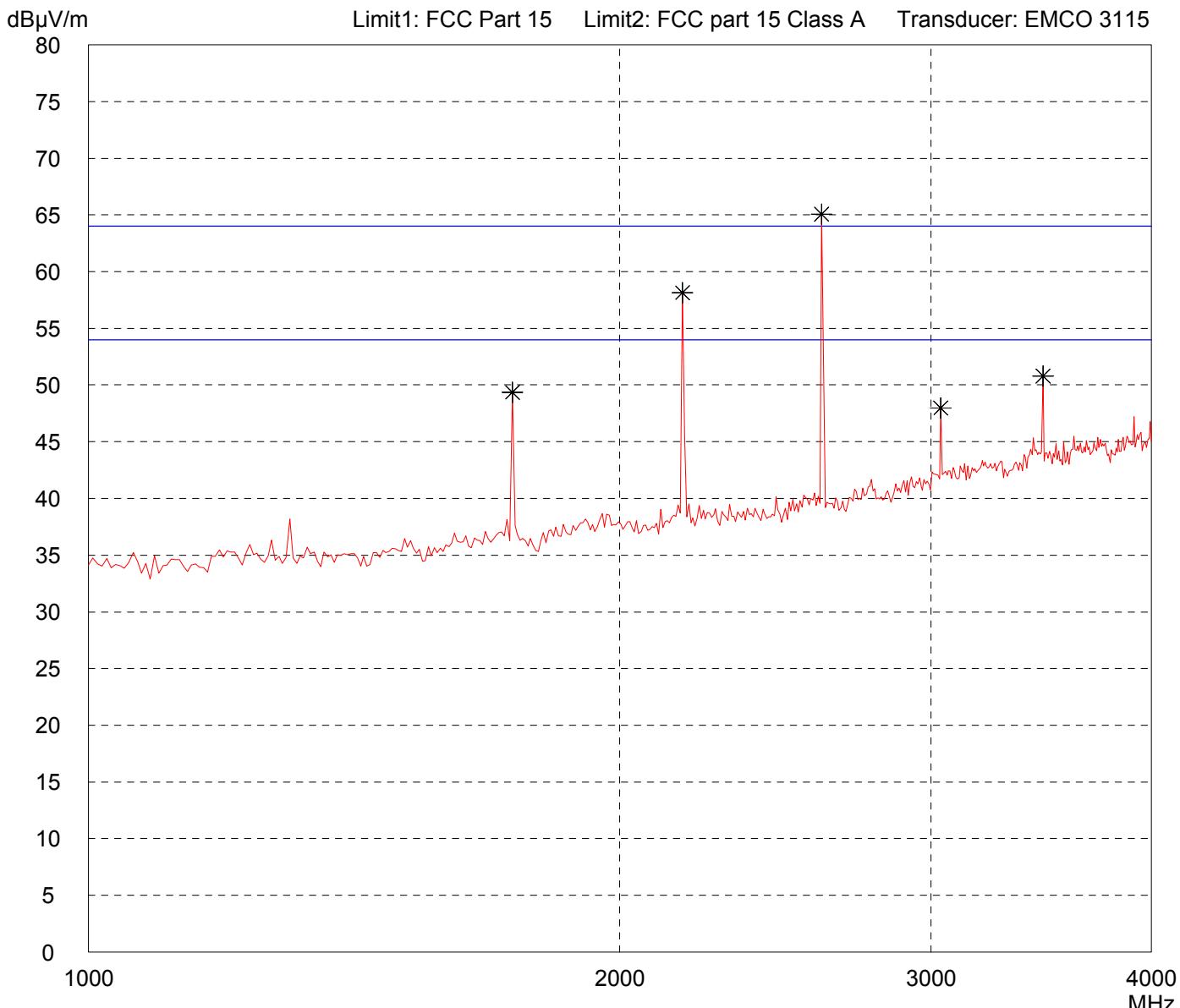
Project file: 55106-50766	Page of Pages
------------------------------	-------------------------

Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT in upright position
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values: Selected by hand



Result: Prescan

Project file: 55106-50766	Page of Pages
------------------------------	-------------------------

Radiated Emission Test 3.95 GHz - 5 GHz acc. to FCC Part 15 (EMCO 3160)

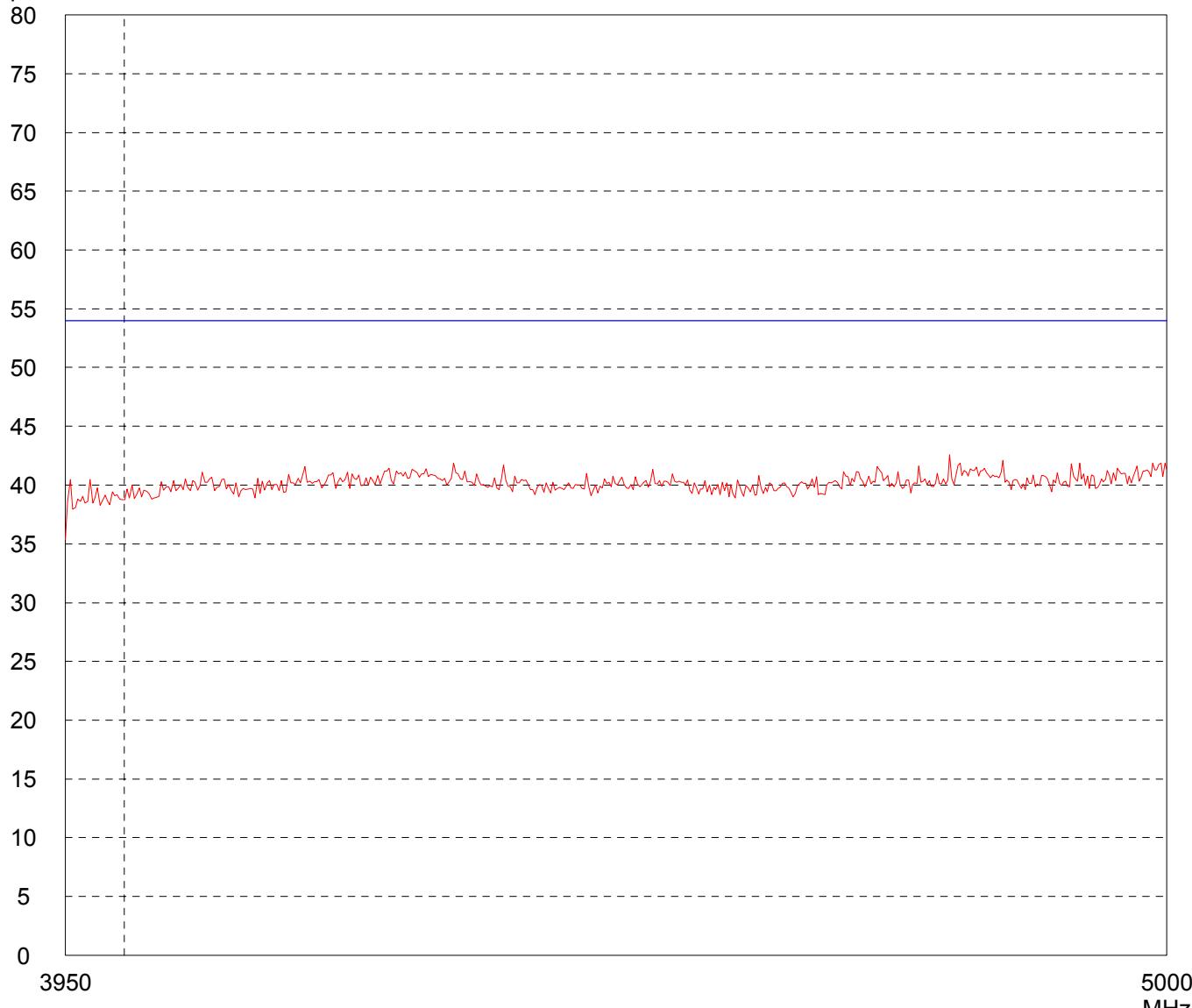
Model: E52	Comment: - 3 V lithium battery supply
Serial no.: ---	- transmitting continuously
Applicant: Meta System S.p.A.	- EUT in upright position
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 11/30/2005	Operator: M. Steindl
Test performed: automatically	File name: default.emi

Detector: Peak

List of values:
10 dB Margin 50 Subranges

dB μ V/m

Limit1: FCC Part 15 Transducer: EMCO 3160



Result: Prescan

Project file: 55106-50766	Page of Pages
------------------------------	-------------------------

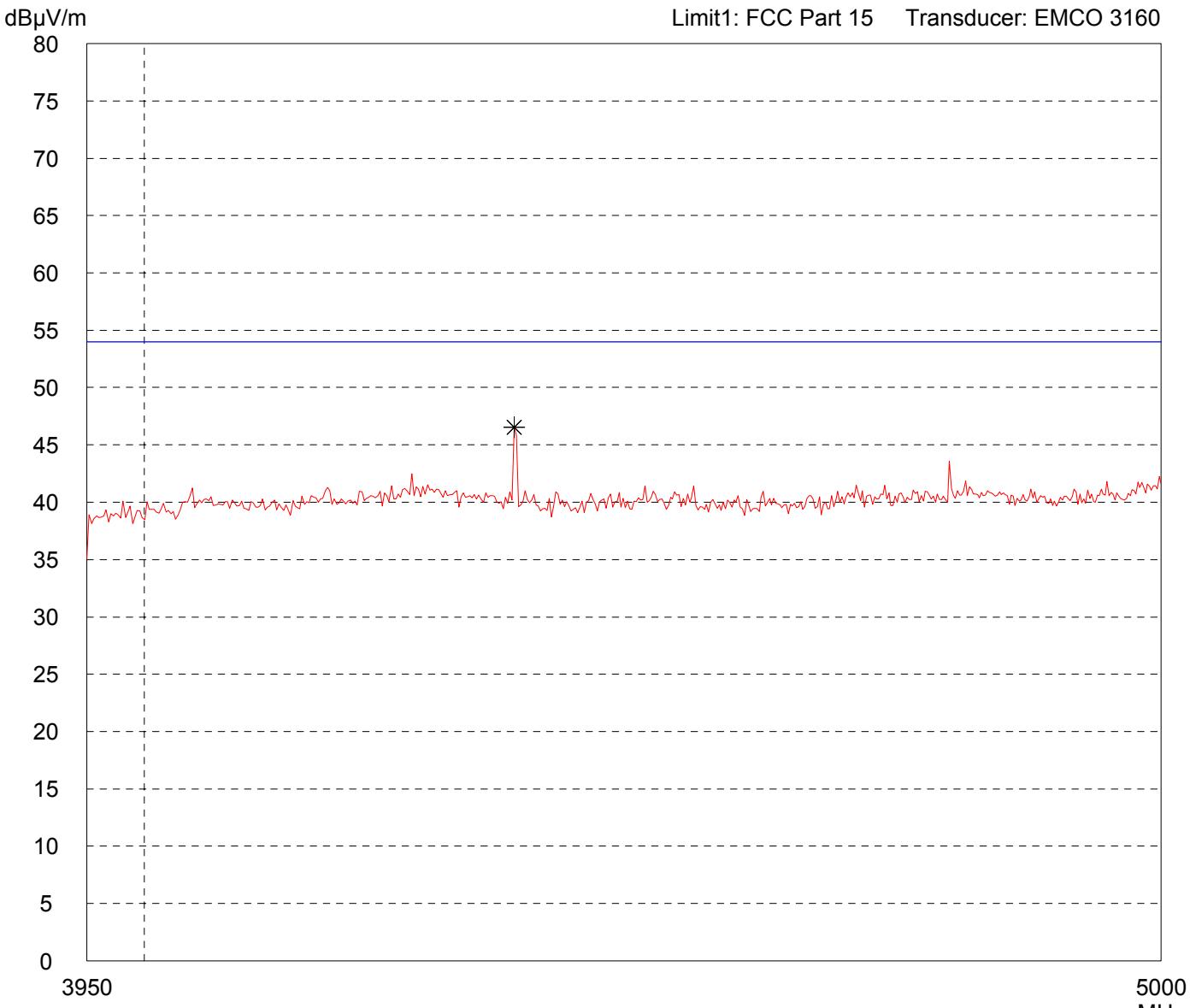
Radiated Emission Test 3.95 GHz - 5 GHz acc. to FCC Part 15 (EMCO 3160)

Model:		
E52		
Serial no.:	---	
Applicant:	Meta System S.p.A.	
Test site:	Operator:	
Fully anechoic room, cabin no. 2	M. Steindl	
Tested on:		
Test distance 3 metres		
Vertical Polarization		
Date of test:	Operator:	
11/30/2005	M. Steindl	
Test performed:	File name:	
automatically	default.emi	

Comment:	
- 3 V lithium battery supply	
- transmitting continuously	
- EUT in upright position	

Detector:	
Peak	

List of values:	
Selected by hand	



Result:	
Prescan	

Project file:	
55106-50766	

Page of Pages