

Straubing, 17 October 2003

**TEST - REPORT**

**No. 55106-30649**

**for**

**TX Ferrari F137**

**Remote Control Transmitter**

**Applicant:** META SYSTEM S.p.A.

**Test Specification:** FCC Code of Federal Regulations,  
Part 15 Subpart C, Section 15.231

---

**Note:**

The test data of this report relate 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. Administrative Data.....	3
2. Identification of Test Laboratory .....	4
3. Operation Mode of EUT.....	5
4. Configuration .....	6
5. Measuring Methods .....	7
5.1. Field Strength of Emissions, Prescans in a fully-anechoic room (30 MHz – 1 GHz) .....	8
5.2. Fieldstrength of Emissions, Measurement at Open Area Test Site (30 MHz – 1 GHz) .....	9
5.3. Fieldstrength of Emissions above 1 GHz .....	10
6. Photographs Taken During Testing .....	11
7. List of Measurements .....	16
8. Referenced Regulations .....	19
Charts taken during testing .....	20

## 1. Administrative Data

<b>Test item (EUT)</b>	
Type designation	TX Ferrari F137
Serial number(s):	S4684 LS/C
Type of equipment:	Remote Control Transmitter
Parts/accessories:	1
FCC-ID:	
<b>Technical data</b>	
Frequency range	433.05 – 434.79 MHz
Operational frequency	433.92 MHz
Type of modulation	10K0A1D
Pulse frequency	N/A
Pulse width	N/A
Antenna	Integrated
Power supply	2 x 3 V lithium battery
<b>Applicant:</b> (full address)	
	META SYSTEM S. p. A. Via Majakovskij, 10/b/c/d/e I-42100 Reggio Emilia Italy
Contract identification:	---
Contact person:	Mr. Giorgio Maldini
Manufacturer:	META SYSTEM
<b>Application details</b>	
Receipt of EUT:	30 September 2003
Date of test:	October 2003
Note:	
Responsible for testing:	Mr. Martin Steindl
Responsible for test report:	Mr. Martin Steindl

## 2. Identification of Test Laboratory

DETAILS OF THE TEST LABORATORY	
COMPANY NAME:	Senton GmbH EMI/EMC Test Center
ADDRESS:	Aeussere Fruehlingsstrasse 45 D-94315 Straubing Germany
LABORATORY ACCREDITATION:	DAR-Registration No. TTI-P-G 062/94-01
FCC TEST SITE LISTING	90926
INDUSTRY CANADA TEST SITE REGISTRATION	IC 3050
NAME FOR CONTACT PURPOSES:	Mr. Johann Roidt
TELEPHONE: (+49) (0)9421 5522-0	FAX: (+49) (0)9421 5522-99

PERSONNEL INVOLVED IN THIS TEST REPORT	
LABORATORY MANAGER:	 Mr. Johann Roidt
RESPONSIBLE FOR TESTING:	Mr. Martin Steindl
RESPONSIBLE FOR TEST REPORT:	Mr. Martin Steindl

SUMMARY OF TEST RESULTS	
The tested sample complies with the requirements set forth in the <b>FCC Code of Federal Regulations</b> <b>Part 15, Subpart C, Section 15.231</b>	

### **3. Operation Mode of EUT**

While one button is pressed, the transmitter continuously sends the corresponding datagram. When the button is released, the transmitter stops working instantly.

#### 4. Configuration

<b>Configuration of the EUT</b>
Not applicable

<b>Cables connected to the EUT</b>
Not applicable

<b>Peripheral devices connected to the EUT</b>
Not applicable

## 5. Measuring Methods

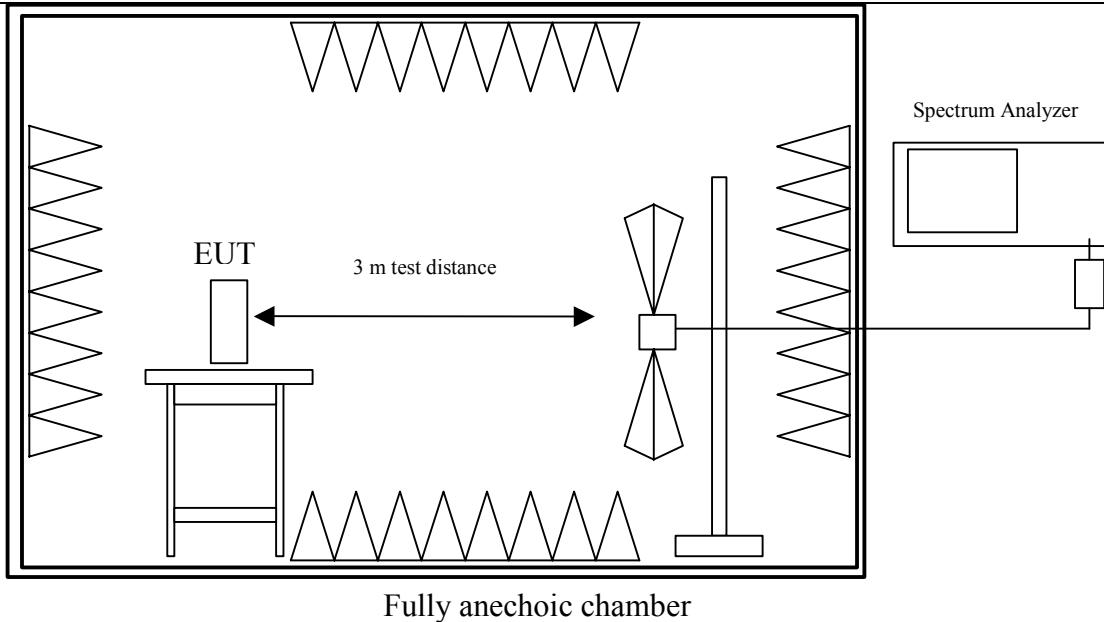
## 5.1. Field Strength of Emissions, Prescans in a fully-anechoic room (30 MHz – 1 GHz)

Rules and Specifications:	Sections 15.109 & 15.231
Guide:	ANSI C63.4 1997

### Measurement Procedure:

Radiated emissions are measured over the frequency range from 30 MHz to 1 GHz.

Measurements were 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 bandwidth set to 100 kHz. All tests were performed at a test-distance of 3 meters. 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.



Fully anechoic chamber

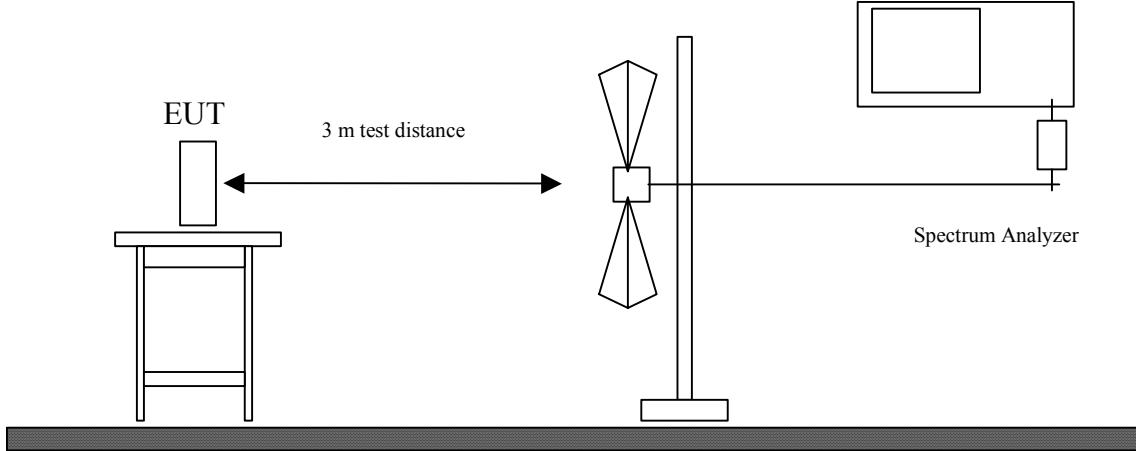
### Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
113	Preamplifier	CPA9231A	3393	Schaffner
141	Biconical antenna	HK 116	829708/006	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
003	Fully anechoic room	No. 2	1452	Albatross Projects

## 5.2. Fieldstrength of Emissions, Measurement at Open Area Test Site (30 MHz – 1 GHz)

Rules and Specifications:	Sections 15.109 & 15.231
Guide:	ANSI C63.4 1997

Measurement Procedure:
Measurement Procedure:
<p>For final testing an open-area test-side was used. Radiated emissions are measured over the frequency range from 30 MHz to 1 GHz.</p> <p>Measurements were made in both the horizontal and vertical planes of polarisation at a open area test side using a spectrum analyser with the detector function set to CISPR. All test were performed at a test distance of 3 meters. During the tests the EUT is rotated all around, and the receiving-antenna is rased and lowered from 1m to 4m to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions.</p>



### Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	EMI Receiver	ESVP	881414/009	Rohde & Schwarz
141	Biconical antenna	HK 116	829708/006	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
003	Open Field Test Site	No. 1	N/A	Senton

### 5.3. Fieldstrength of Emissions above 1 GHz

Rules and Specifications:	Sections 15.109 & 15.209
Guide:	ANSI C63.4 1997

#### Measurement Procedure:

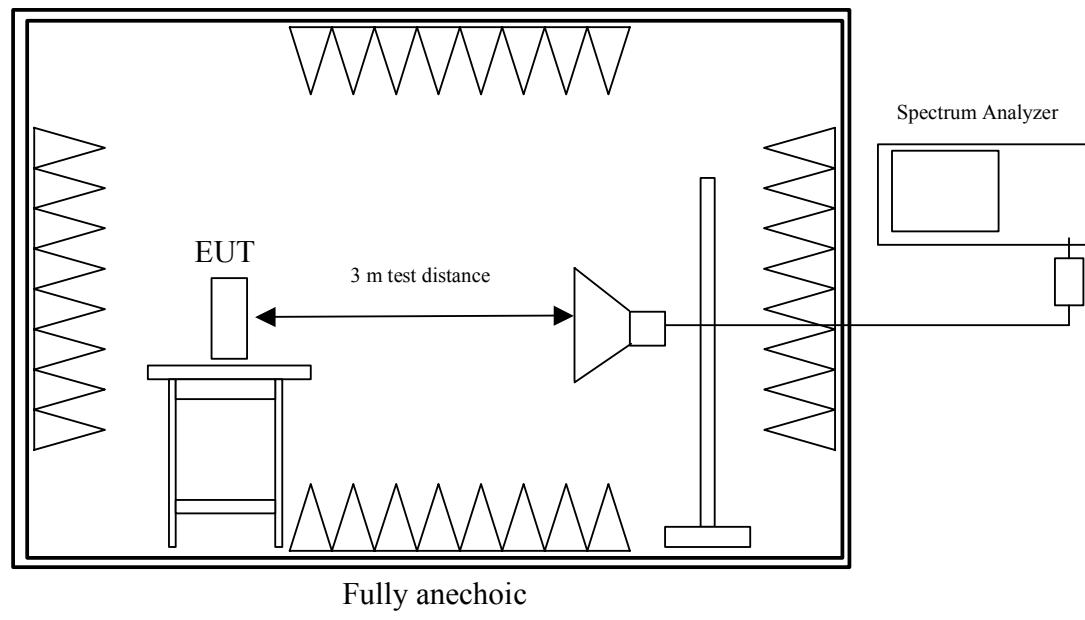
Radiated emissions are measured in the frequency range 1 GHz to the 10<sup>th</sup> harmonic of the maximum frequency of the EUT.

Resolution and video bandwidth of the spectrum analyzer are set to 1 MHz. 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. Additional measurements are performed at critical frequencies with reduced span.

EUT is rotated all around and receiving antenna is raised and lowered to find the maximum levels of emission. The cables and equipment are placed and moved within the range of position likely to find their maximum emissions.

All tests are performed in a fully-anechoic chamber with a test-distance of 3 meters.

If required preamplifiers are used for the whole frequency range. Special care is taken to avoid overload in transmit mode (using appropriate attenuators and filters if necessary).



#### Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
145	Horn antenna	3115	9508-4553	EMCO
146	Horn antenna set	3160-03-09	9112-1003	EMCO
114	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
115	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
003	Fully anechoic room	No. 2	1452	Albatross Projects

## 6. Photographs Taken During Testing

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







**Test setup for radiated emission measurement  
(open-area test-side)**



## 7. List of Measurements

FCC Part 15			
Section(s):	Test	Page(s)	Result
15.205	Restricted Bands		Pass
15.207	AC powerline emissions		Not applicable
15.231 (a) (1)	Periodic operation		Pass
15.231 (b)	Duty Cycle Correction		Not applicable <sup>1</sup>
15.231 (b)	Field strength of emissions	---	Pass
15.231 (c)	Bandwidth of emissions	---	Pass

<sup>1</sup> The tested sample meets the requirements of section 15.231 of the FCC Rules without duty cycle correction factor.

## Field strength of emissions

Rules and Specifications:	15.231 (b) Radiated Emission Limits		
Guide:	ANSI C63.4		
Limit:	In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under Section 15.231 shall not exceed the following:		
	Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
	40.66 – 40.70	2.250	225
	70 – 130	1.250	125
	130 - 174	1.250 to 3.750**	125 to 375 **
	174 - 260	3.750	375
	260 – 470	3750 to 12.500**	375 to 1250 **
	above 470	12.500	1250

\*\* linear interpolations

Test Site:	Open Area Test Site (< 1 GHz), Fully anechoic chamber (> 1 GHz)		
Distance:	3 Meter		

Frequency (MHz)	Detector	Antenna Polarization	Analyzer Reading (dB $\mu$ V)	Antenna Correction (dB/m)	Duty Cycle Correction (dB/m)	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
433.8	QP	Hor	54,7	19,50	0	74,20	80,82	-6,6
867.6	QP	Hor	22,90	27,20	0	50,10	62,00	-11,9
1300	AV	Ver	20,23	27,82	0	48,05	62,00	-14,0
1738	AV	Hor	18,45	29,67	0	48,12	62,00	-13,9
2170	AV	Hor	14,67	31,36	0	46,03	62,00	-16,0
2602	AV	Hor	19,76	32,61	0	52,37	62,00	-9,6
3040	AV	Hor	16,23	34,41	0	50,64	62,00	-11,4

\*\*\* = All emissions showed more than 20 dB margin to the limit

A negative value for Margin indicates, that the limit is kept.

### Sample calculation of erp values:

$$\text{Field Strength (dB $\mu$ V/m)} = \text{Analyzer Reading (dB $\mu$ V)} + \text{Antenna Correction (dB/m)} + \text{Duty Cycle Correction (dB)}$$

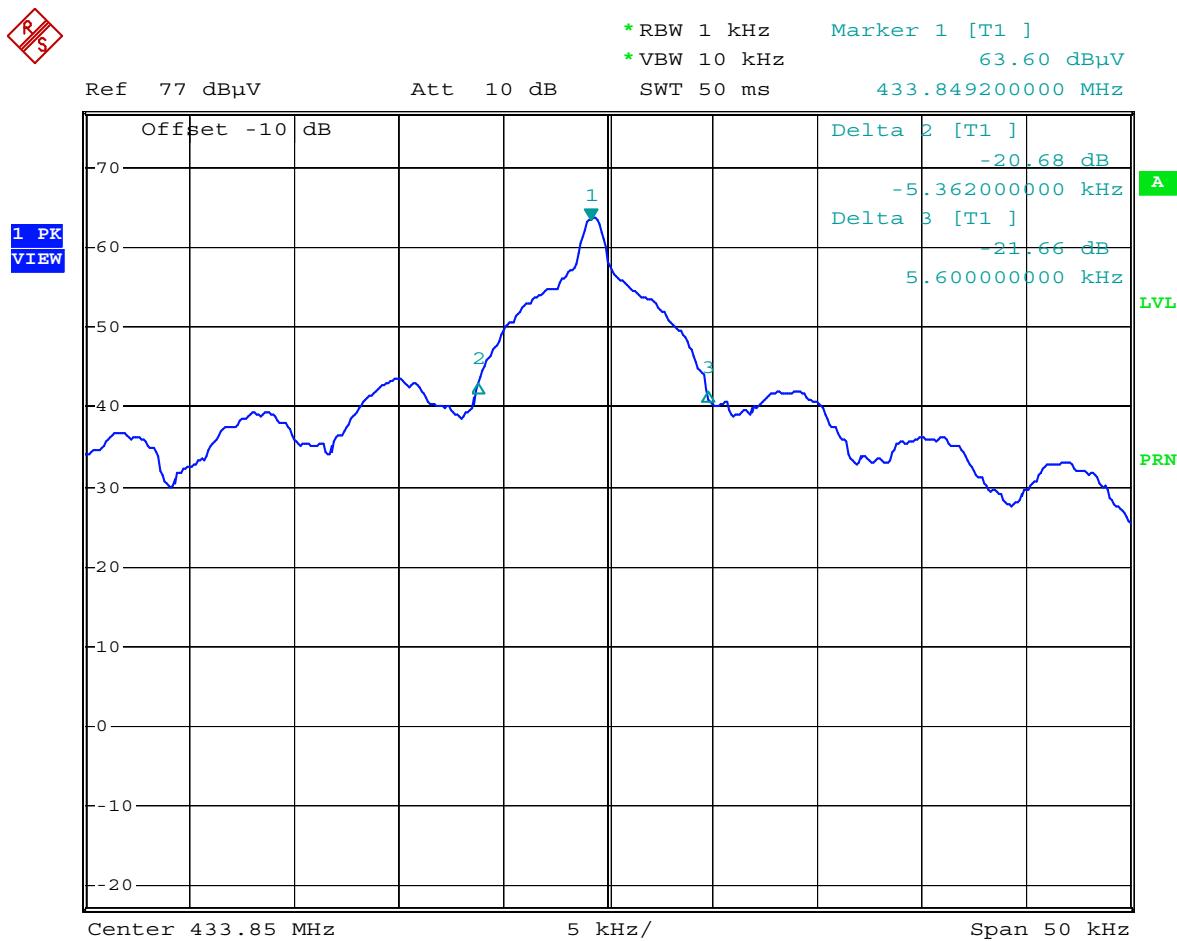
Test Results:	Pass	
---------------	------	--

FCC-ID:

Test Report No.: 55106-30649

## Bandwidth of Emission

Rules and Specifications:	15.231 c
Guide:	ANSI C63.4
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB from the modulated carrier



Comment A: Meta 30649: Bandwidth of Emission  
 Date: 16.OCT.2003 12:35:14

<b>Test Results:</b>	Pass	Bandwidth of Emission $= 5.6 \text{ kHz} = 0.0012 \%$
----------------------	------	--

## 8. Referenced Regulations

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

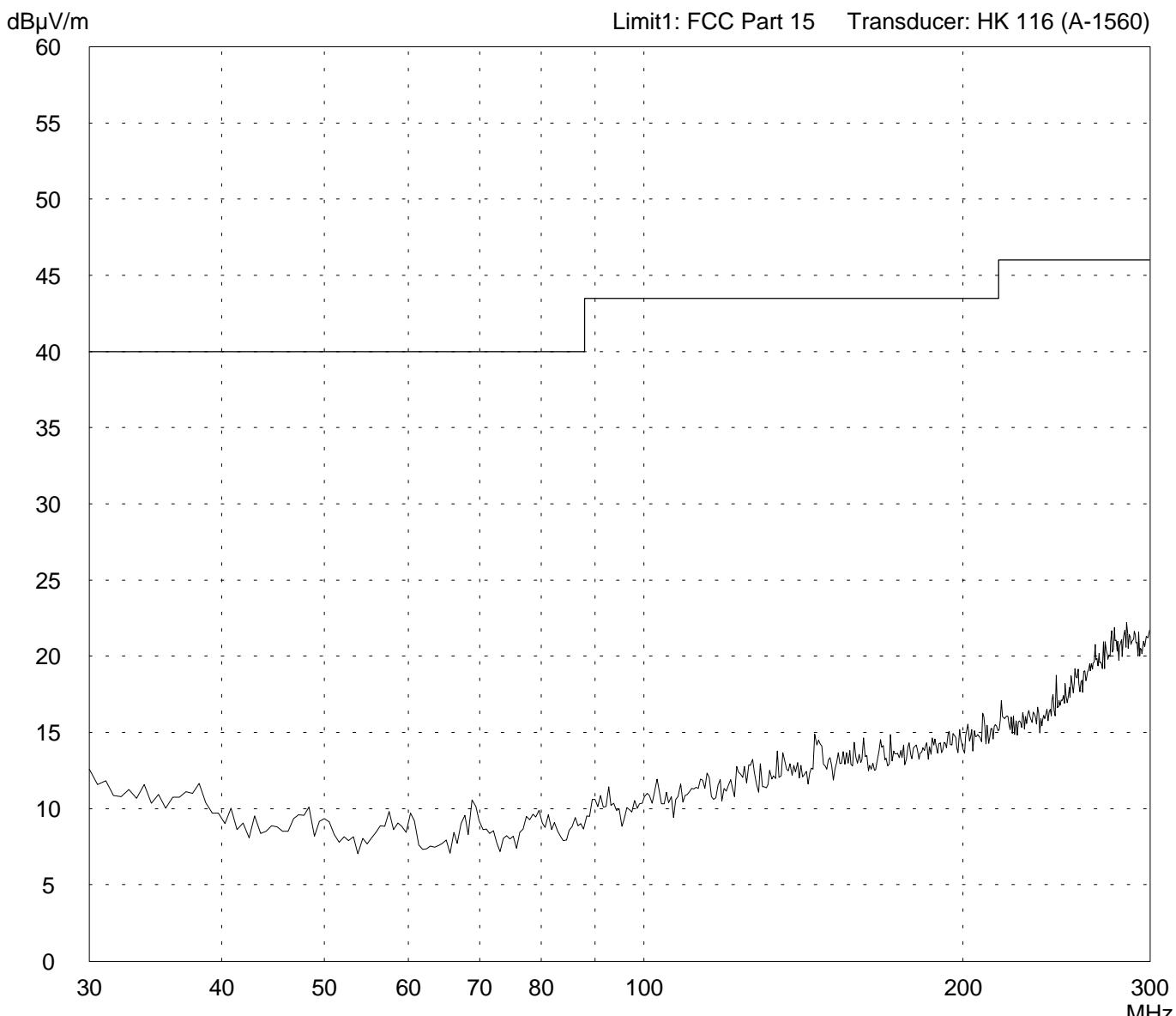
<input checked="" type="checkbox"/>	FCC Part 2	Code of Federal Regulations Part 2 Frequency allocation and radio treaty matters; General rules and regulations	October 01, 1999
<input type="checkbox"/>	FCC Part 15 Subpart A	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)	May 30, 2002
<input type="checkbox"/>	FCC Part 15 Subpart B	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)	May 30, 2002
<input checked="" type="checkbox"/>	FCC Part 15 Subpart C	Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)	May 30, 2002
<input type="checkbox"/>	FCC Part 74 Subpart H	Code of Regulations Part 15 (Radio Frequency Devices), Subpart H (Low Power Auxiliary Stations) of the Federal Communication Commission (FCC)	October 20, 1997
<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 - 40 GHz	October, 1992
<input type="checkbox"/>	RSS-210	Radio Standards Specification RSS-210 Issue 2 for Low Power Licence-Exempt Radiocommunication Devices of Industry Canada	February 24, 1996

**Charts taken during testing**

# Radiated Emission Test 30 MHz - 300 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: TX Ferrari F137	Comment: - 2 x 3 V lithium battery supply
Serial no.: sample 01	- sending pulsed - EUT in pneumatic system - EUT on long side
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: 10/02/2003	Operator: M. Steindl
Test performed: automatically	File name: default.emi

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



Result: Prescan	Project file: 55106-30649	Page	of	Pages
--------------------	------------------------------	------	----	-------

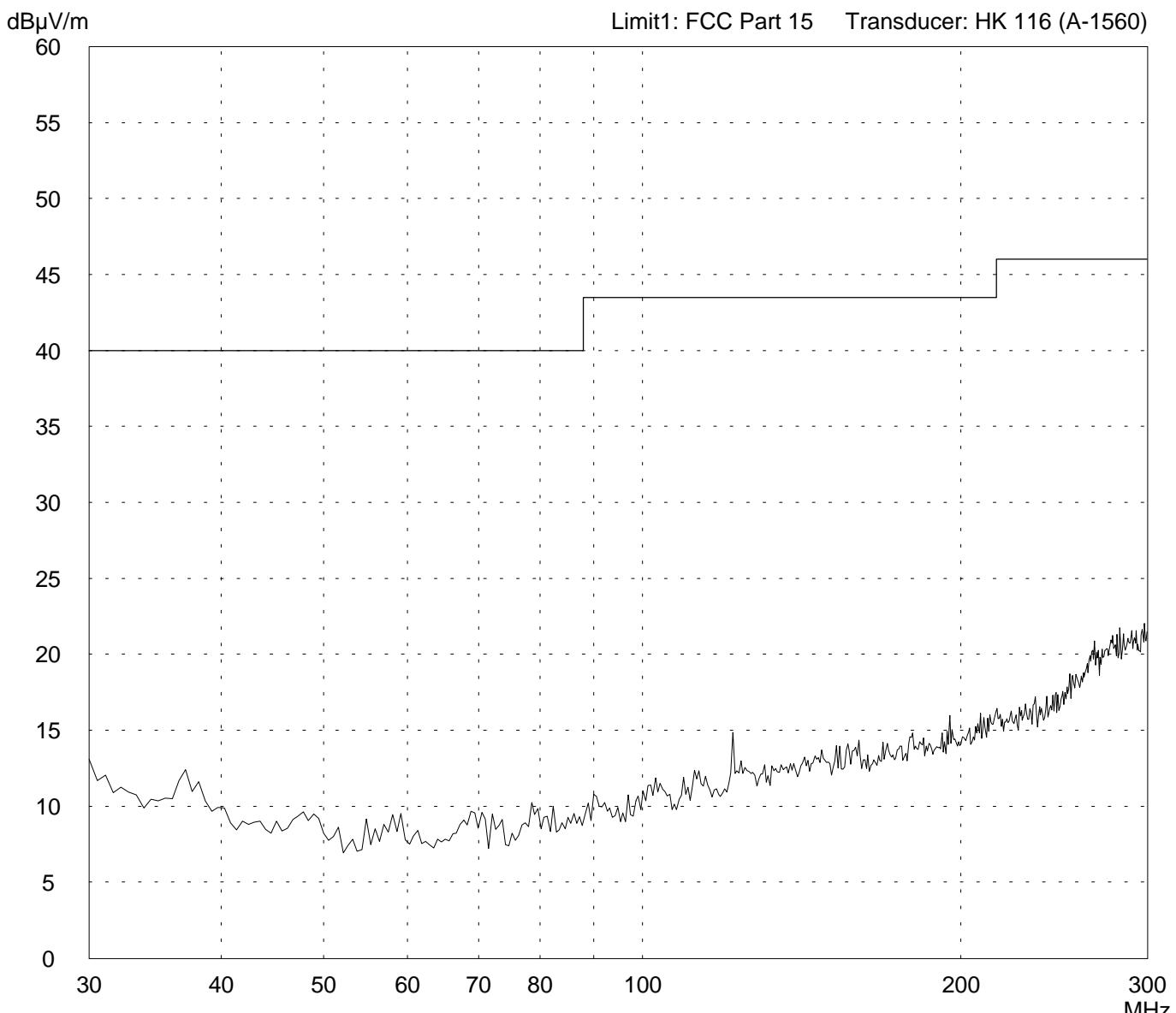
# Radiated Emission Test 30 MHz - 300 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model:		
TX Ferrari F137		
Serial no.:		
sample 01		
Applicant:		
META SYSTEM S. p. a.		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres		
Vertical Polarization		
Date of test:	Operator:	
10/02/2003	M. Steindl	
Test performed:	File name:	
automatically	default.emi	

Comment:	
- 2 x 3 V lithium battery supply	
- sending pulsed	
- EUT in pneumatic system	
- EUT on long side	

Detector:	
Peak	

List of values:	
10 dB Margin	50 Subranges



Result:			
Prescan			

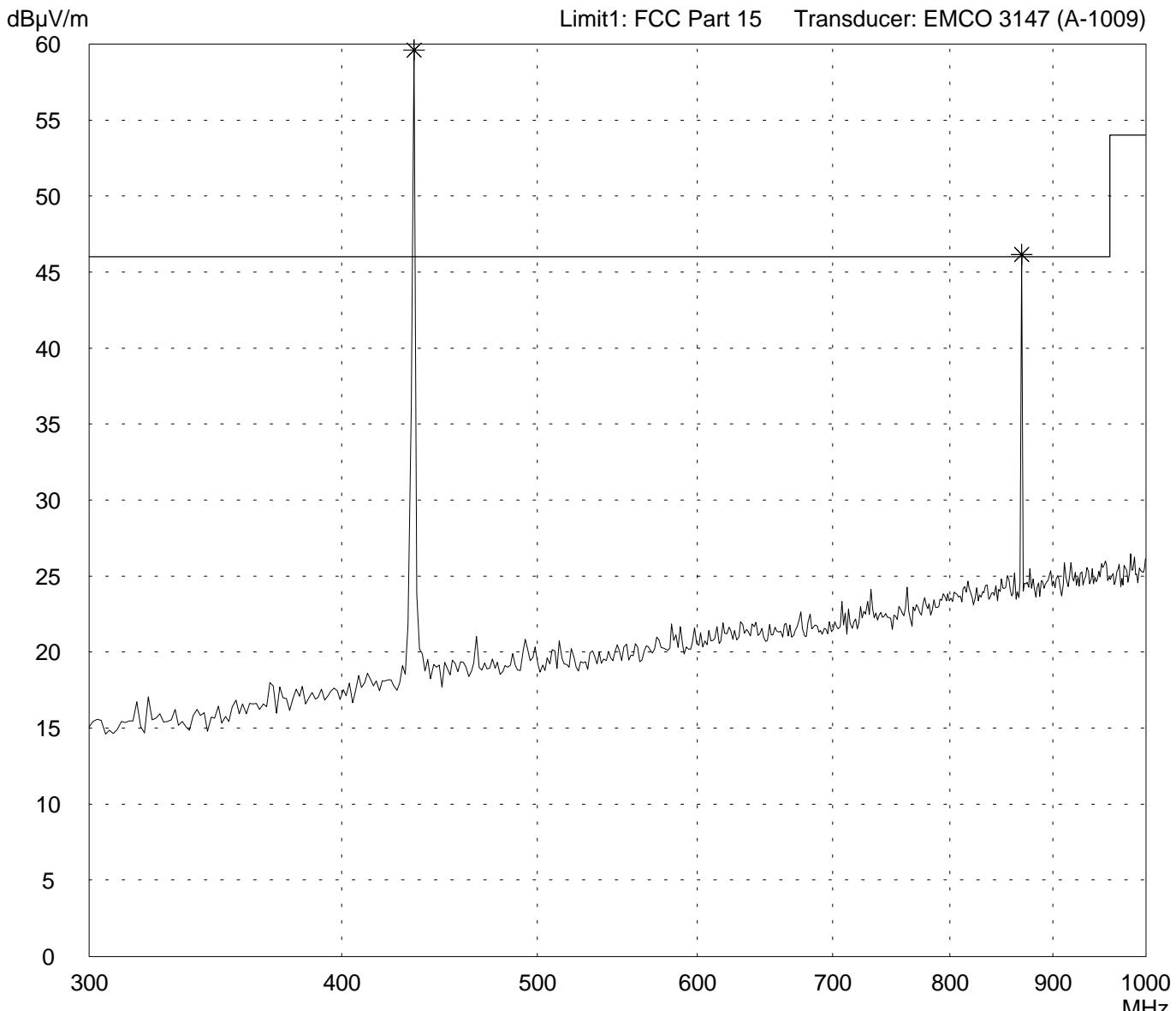
Project file:			
55106-30649			

Page    of    Pages

# Radiated Emission Test 300 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: TX Ferrari F137	Comment: - 2 x 3 V lithium battery supply
Serial no.: sample 01	- sending pulsed - EUT in pneumatic system - EUT on long side
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: 10/02/2003	Operator: M. Steindl
Test performed: automatically	File name: default.emi

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



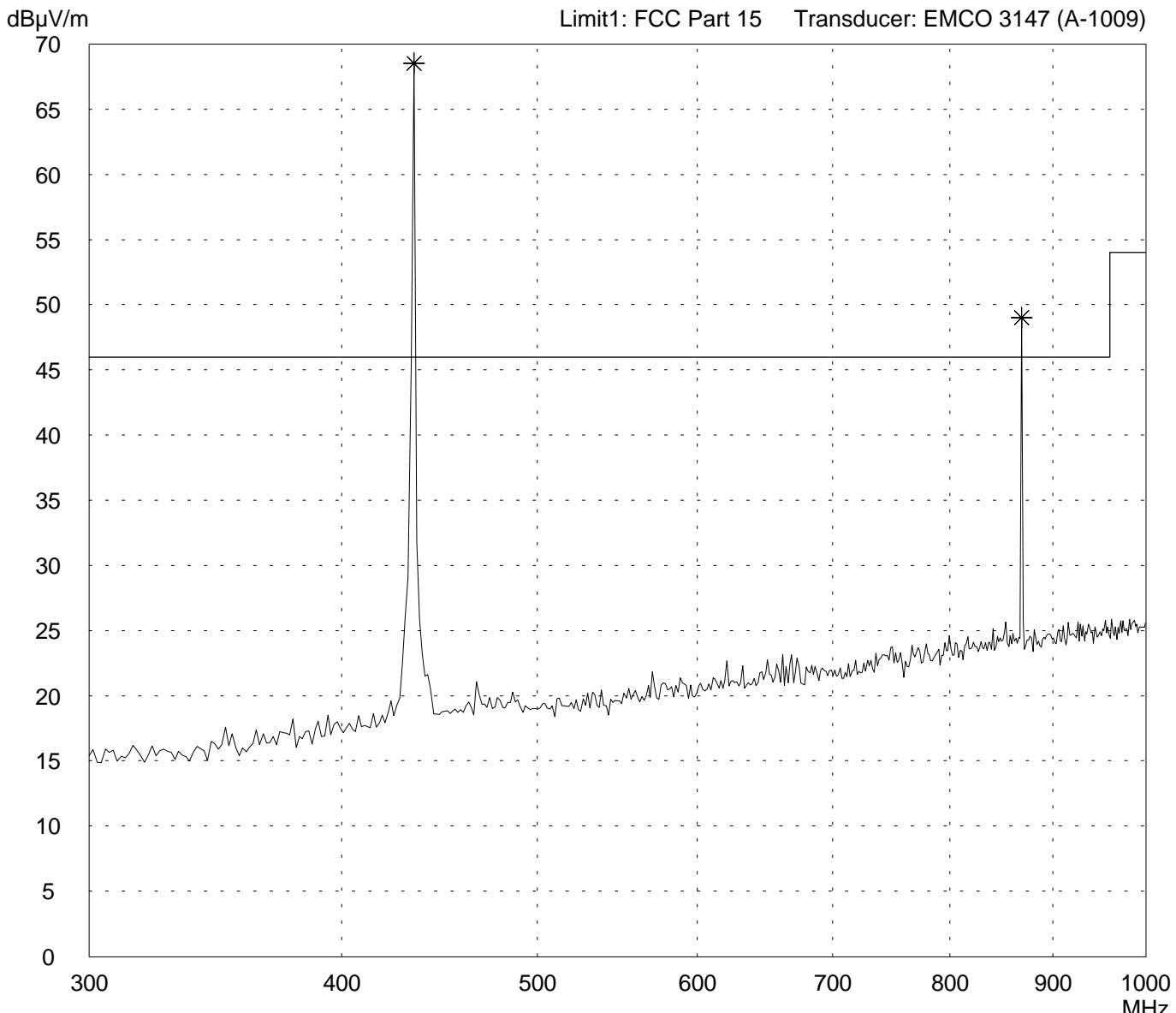
Result: Prescan	Project file: 55106-30649	Page	of	Pages
--------------------	------------------------------	------	----	-------

**Radiated Emission Test 300 MHz - 1 GHz  
acc. to FCC Part 15 (Fully Anechoic Chamber)**

Model:		
TX Ferrari F137		
Serial no.:		
sample 01		
Applicant:		
META SYSTEM S. p. a.		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres		
Vertical Polarization		
Date of test:	Operator:	
10/02/2003	M. Steindl	
Test performed:	File name:	
automatically	default.emi	

Comment:	
- 2 x 3 V lithium battery supply	
- sending pulsed	
- EUT in pneumatic system	
- EUT on long side	

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



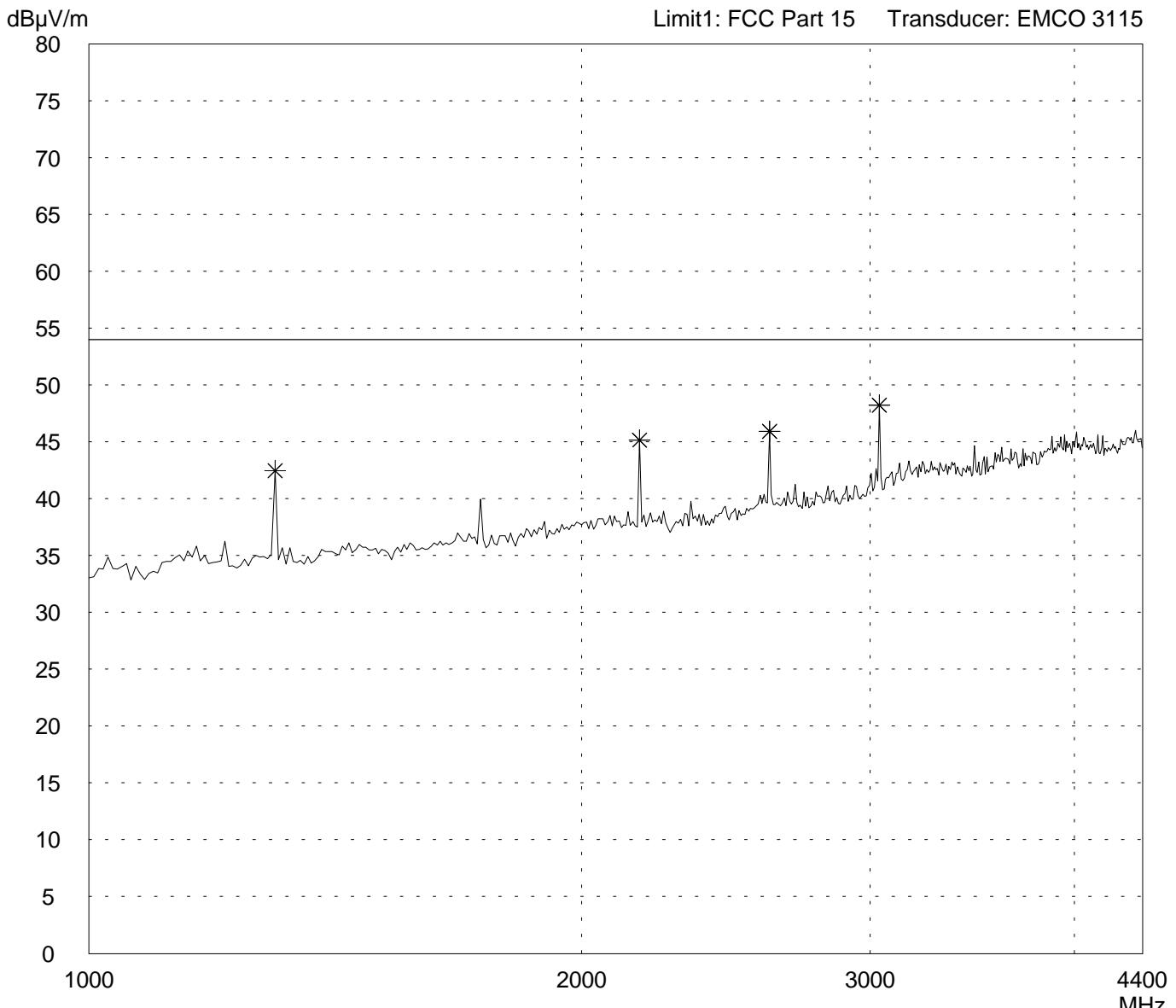
Result:			
Prescan			

Project file:			
55106-30649			

Page      of      Pages

# Radiated Emission Test 1 GHz - 4.4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: TX Ferrari F137	Comment: - 2 x 3 V lithium battery supply
Serial no.: sample 01	- sending pulsed - EUT in pneumatic system
Applicant: META SYSTEM S. p. a.	- EUT flat on table
Test site: Fully anechoic room, cabin no. 2	- Note: with WHKS1000-10SS high pass filter
Tested on:  Test distance 3 metres Horizontal Polarization	
Date of test: 12/08/2003	Operator: M. Steindl
Test performed: automatically	File name: default.emi
Detector: Peak	List of values: Selected by hand



Result:

Prescan

Project file:

55106-30649

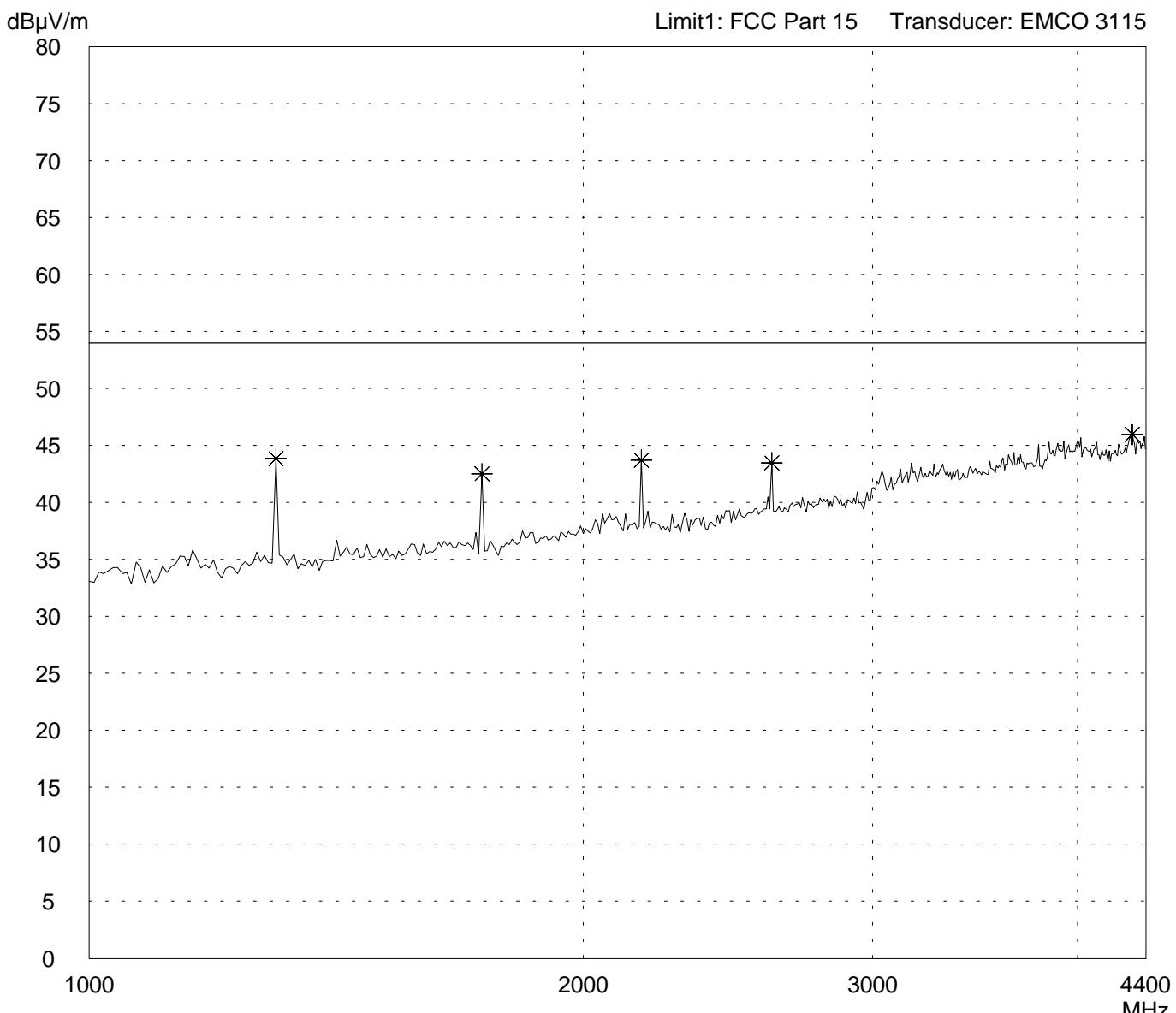
Page      of      Pages

# Radiated Emission Test 1 GHz - 4.4 GHz acc. to FCC Part 15 (EMCO 3115)

Model:	TX Ferrari F137
Serial no.:	sample 01
Applicant:	META SYSTEM S. p. a.
Test site:	Fully anechoic room, cabin no. 2
Tested on:	
Test distance 3 metres	
Vertical Polarization	
Date of test:	Operator:
12/08/2003	M. Steindl
Test performed:	File name:
automatically	default.emi

Comment:
- 2 x 3 V lithium battery supply
- sending pulsed
- EUT in pneumatic system
- EUT flat on table
- Note: with WHKS1000-10SS high pass filter

Detector:	List of values:
Peak	Selected by hand

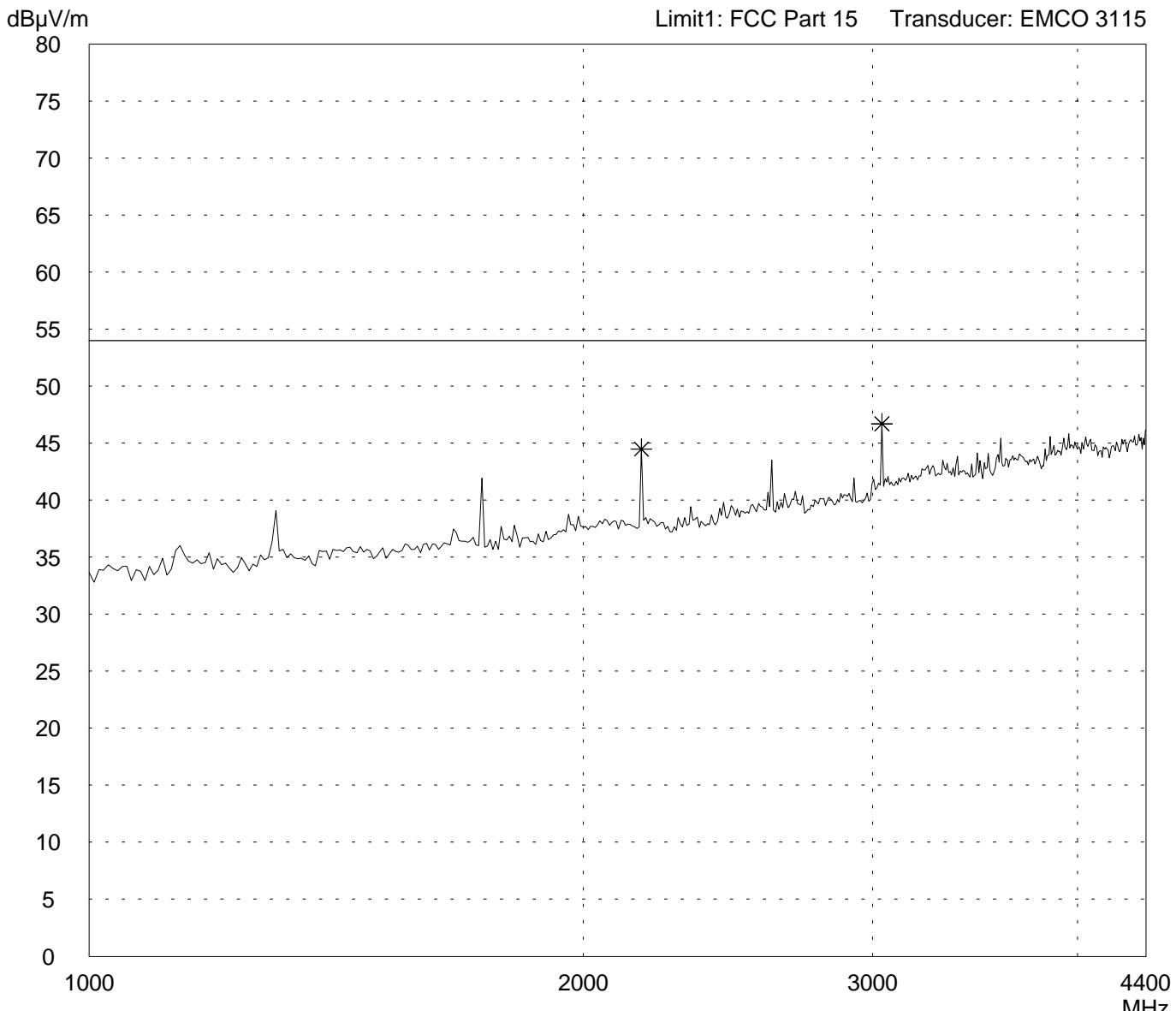


Result:
Prescan

Project file:			
55106-30649			
Page	of	Pages	

# Radiated Emission Test 1 GHz - 4.4 GHz acc. to FCC Part 15 (EMCO 3115)

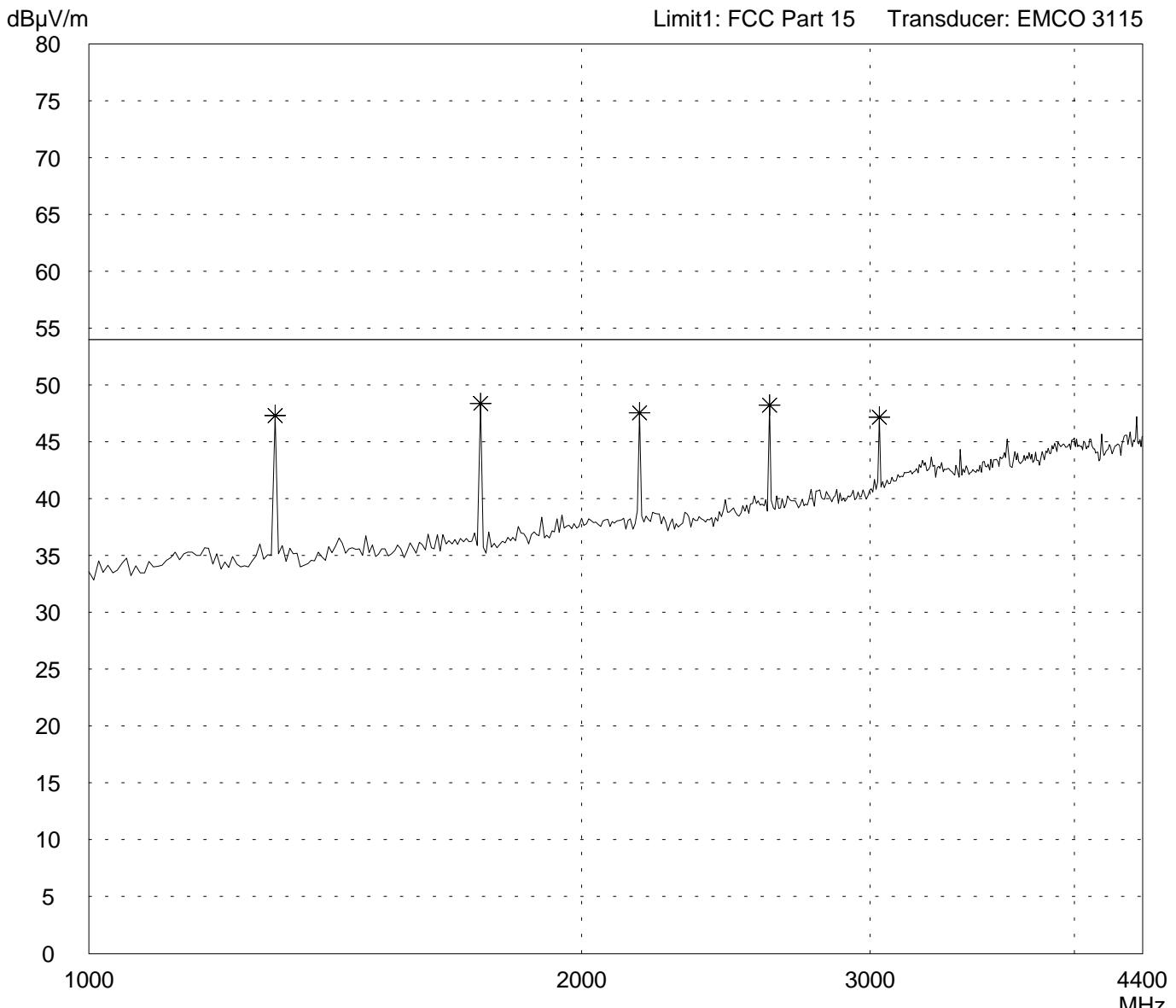
Model: TX Ferrari F137	Comment: - 2 x 3 V lithium battery supply
Serial no.: sample 01	- sending pulsed - EUT in pneumatic system
Applicant: META SYSTEM S. p. a.	- EUT on long side
Test site: Fully anechoic room, cabin no. 2	- Note: with WHKS1000-10SS high pass filter
Tested on:  Test distance 3 metres Horizontal Polarization	
Date of test: 12/08/2003	Operator: M. Steindl
Test performed: automatically	File name: default.emi
Detector: Peak	List of values: Selected by hand



Result: Prescan	Project file: 55106-30649	Page	of	Pages
--------------------	------------------------------	------	----	-------

# Radiated Emission Test 1 GHz - 4.4 GHz acc. to FCC Part 15 (EMCO 3115)

Model: TX Ferrari F137	Comment: - 2 x 3 V lithium battery supply
Serial no.: sample 01	- sending pulsed - EUT in pneumatic system
Applicant: META SYSTEM S. p. a.	- EUT on long side
Test site: Fully anechoic room, cabin no. 2	- Note: with WHKS1000-10SS high pass filter
Tested on:  Test distance 3 metres Vertical Polarization	
Date of test: 12/08/2003	Operator: M. Steindl
Test performed: automatically	File name: default.emi
Detector: Peak	List of values: Selected by hand



Result:  
Prescan

Project file:  
55106-30649

Page      of      Pages

## Radiated Emission Test 1 GHz - 4.4 GHz acc. to FCC Part 15 (EMCO 3115)

Model:	TX Ferrari F137
Serial no.:	sample 01
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:	Operator:
12/08/2003	M. Steindl
Test performed:	File name:
automatically	default.emi
Detector:	

**Comment:**

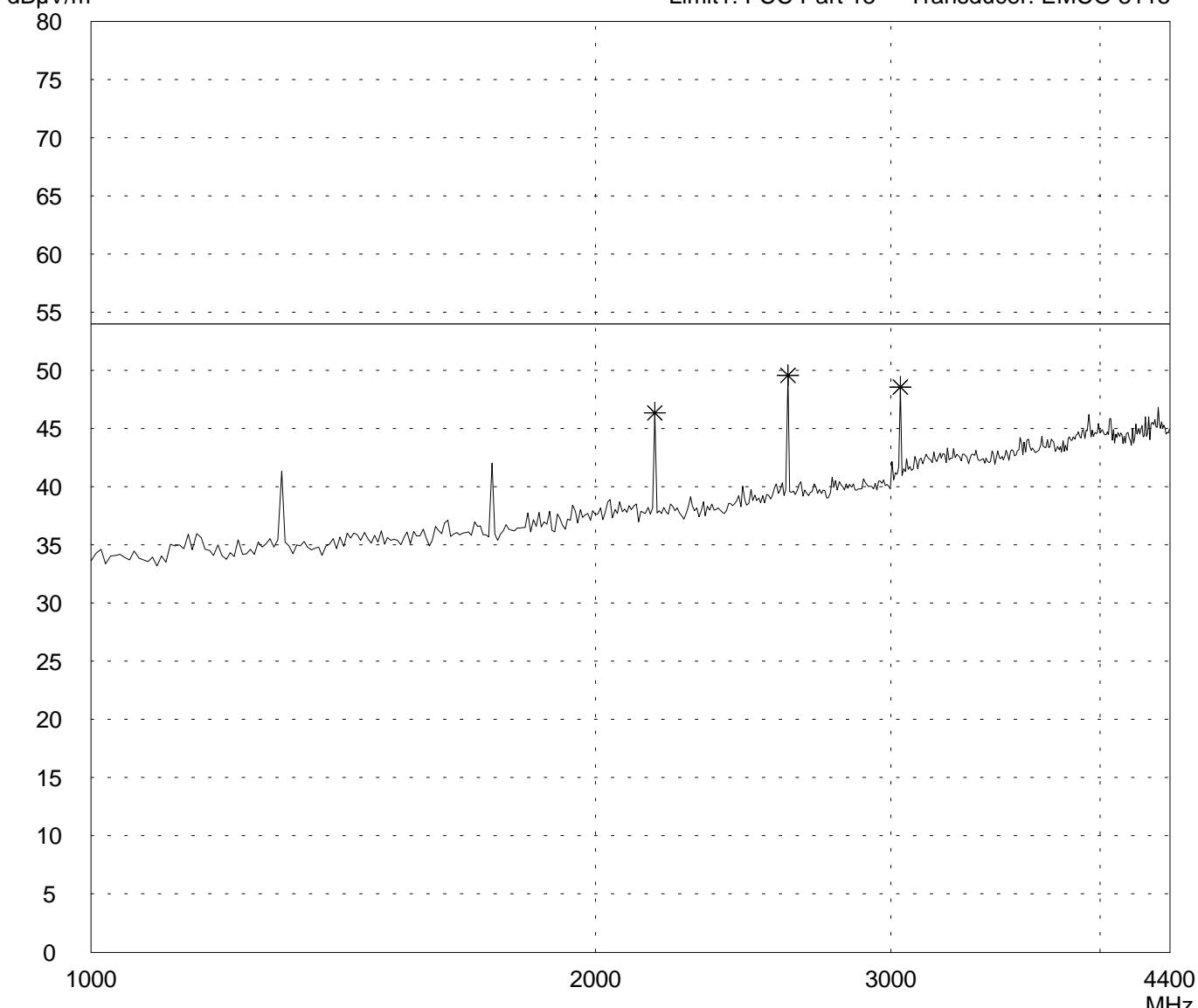
- 2 x 3 V lithium battery supply
- sending pulsed
- EUT in pneumatic system
- EUT in upright position
- Note: with WHKS1000-10SS high pass filter

Detector:  
Peak

List of values:  
Selected by hand

dBuV/m

Limit1: FCC Part 15 Transducer: EMCO 3115



## Result

## Prescan

Project file:

55106-30649

Page of Pages

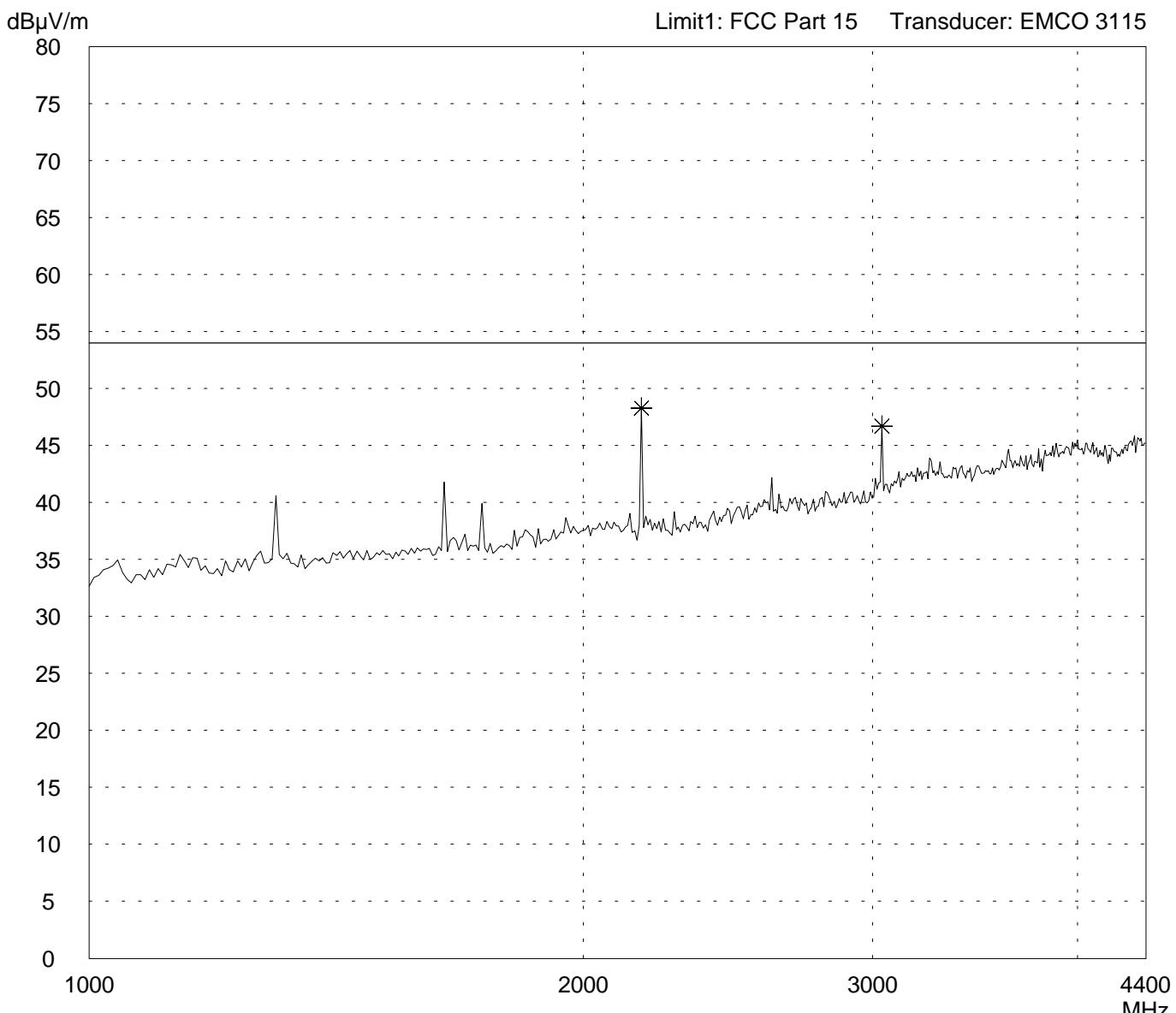
# Radiated Emission Test 1 GHz - 4.4 GHz acc. to FCC Part 15 (EMCO 3115)

Model:		
TX Ferrari F137		
Serial no.:		
sample 01		
Applicant:		
META SYSTEM S. p. a.		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres		
Vertical Polarization		
Date of test:	Operator:	
12/08/2003	M. Steindl	
Test performed:	File name:	
automatically	default.emi	

Comment:	
- 2 x 3 V lithium battery supply	
- sending pulsed	
- EUT in pneumatic system	
- EUT in upright position	
- Note: with WHKS1000-10SS high pass filter	

Detector:	
Peak	

List of values:	
Selected by hand	



Result:	
Prescan	

Project file:	
55106-30649	
Page	of

Pages