APPENDIX 5

EMITECH TEST REPORT REF. RM-04-10584 (EMC)

ORIGINAL EN ROUGE

E.M.C TEST REPORT

According to the standard :
RTCA DO 160 D – Issue 1997

Equipment under test :
ADT 406 S
P/N: 01N65920 S/N: 040001

Company :
ELTA

Distribution : Mr LABRIFFE **(Company : ELTA)**

Number of pages : 40

Ed.	Date	Page(s) modified	Written by		Verified by		Approved by	
			Name	Visa	Name	Visa	Name	Visa
0	17/09/04	First edition	A. CHARPENTIER	AC	V. MELCHOR		Le Responsable Qualité C. VINAY	

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NAME OF THE EQUIPMENT UNDER TEST : ADT 406 S
P/N: 01N65920
S/N: 040001

MANUFACTURER'S NAME : ELTA

COORDINATES OF THE COMPANY INTRODUCING THE EQUIPMENT :

Company : ELTA

Address : Service PBA
14, place Marcel Dassault BP48
31702 BLAGNAC CEDEX FRANCE

Responsible : Mr. LABRIFFE

DATES OF TESTS : The 1st and 2nd September 2004

TEST LOCATION : EMITECH laboratory at Montigny le Bretonneux (78) - France

TESTS OPERATOR : A. CHARPENTIER

CONTENTS

1. INTRODUCTION

This document provides EMC test results performed on **ADT 406 S P/N : 01N65900 S/N : 040001** according to the documents referenced here below.

2. REFERENCE DOCUMENTS

RTCA DO 160 D – Issue 1997
Section 19 Induced signal susceptibility
Section 20 Radio frequency susceptibility (radiated)
Section 21 Radiated emission – Electric field

3. EQUIPMENT UNDER TEST CONFIGURATION

The equipment ADT 406 S is supplied by lithium battery

Equipment control procedure:

- Activation control
- Test control (Auto test)
- Activation (Led)
- Reset

Configurations:

Radiated emission: 2 modes:	- armed
	- ON (with load 50 Ω)
Susceptibility: 1 mode:	- armed

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4. CONCLUSIONS

TEST PERFORMED	SPECIFICATION		REMARKS
	Successful	Failed	
Radiated emission – Electric field	✓		No peak above the limit.
Radio frequency radiated susceptibility	✓		
Induced signal susceptibility	✓		No susceptibility found.

5. TEST RESULTS

5.1 *Radiated emission – Electric field*

(According to RTCA DO 160 D, Section 21, Category M)

- Purpose of the test

  This test determines if the equipment powered and operating in its functional mode as defined chapter 3 must not emit electric field level in excess of the specified limits.

- Test category : M

- Frequency range analysis : From 2 MHz to 6 GHz

- Specified limits

  They are plotted on test figures and compared with spectrum measurements.

- Resolution bandwidths

  Measurements are carried out in peak detection with resolution bandwidths, which are described in the table hereafter. in peak detection mode. The used video resolution bandwidths are at the minimum 3 times the used resolution bandwidths.

Frequency range		Resolution
Fmin	Fmax	
2 MHz	10 MHz	1 kHz
10 MHz	30 MHz	1 kHz
30 MHz	200 MHz	10 kHz
200 MHz	400 MHz	10 kHz
400 MHz	1 GHz	100 kHz
1 GHz	6 GHz	1000 kHz

- Test set-up

The test set-up is performed according to Figure 5.1.1.

The equipment is spaced 5cm above the ground plane with dielectric shims and run in a distance of 10cm in parallel to the leading edge of the ground plane.

The receiving antenna is placed at 1 meter from the equipment and its cables. It is placed in the middle of the installation for frequencies lower than 1GHz, and in front of the equipment for the upper frequencies.

From 2 MHz to 25MHz, measurements are performed with a rod antenna only in vertical polarization

For frequencies upper than 25MHz, the field is measured in the both vertical and horizontal polarizations with biconical, logperiodic and horn antennas; in this case, a low noise amplifier is used.

Photographies are given Pictures 5.1.2 and 5.1.3.

- Apparatus list

N°Emitech	Category	Marque	Type
01/017	Preamplifier	Mini-Circuits	ZFL-1000LN
01/146	Pré-Amplifier	Miteq	AMF-6D-010250-70-7P
02/017	Spectrum analyzer	Hewlett Packard	8566 A
16/006	Shielded enclosure	Sidétel	C.4
24/070	Rod antenna	Rohde et Schwarz	HFH2-Z6
24/145	Biconical antenna	Electro-Métrics	BIA-30HF
24/151	Log-periodic antenna	Electro-Métrics	LPA-30
24/284	Horn antenna	Emco	3115
34/012	Software	Emitech	UTEM3H4

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- Test results

The equipment is tested in configuration:
- armed
- with load 50 Ω, equipment ON (see picture 5.1.4)
- Beacon in emission with antenna, equipment ON (see picture 5.1.5)

Figure n°	Polarization of antenna (VP / HP)	Configuration	Remarks
5.1.6 and 5.1.7	VP	Armed	The equipment is compliant.
5.1.8	HP		
5.1.9 and 5.1.10	VP	With load 50 Ω Equipment ON	The equipment is compliant.
5.1.11	HP		
5.1.12 to 5.1.14	VP	Beacon in emission with antenna equipment ON	The measurement corresponding at frequencies of the equipment, the measures are normally over the limit.

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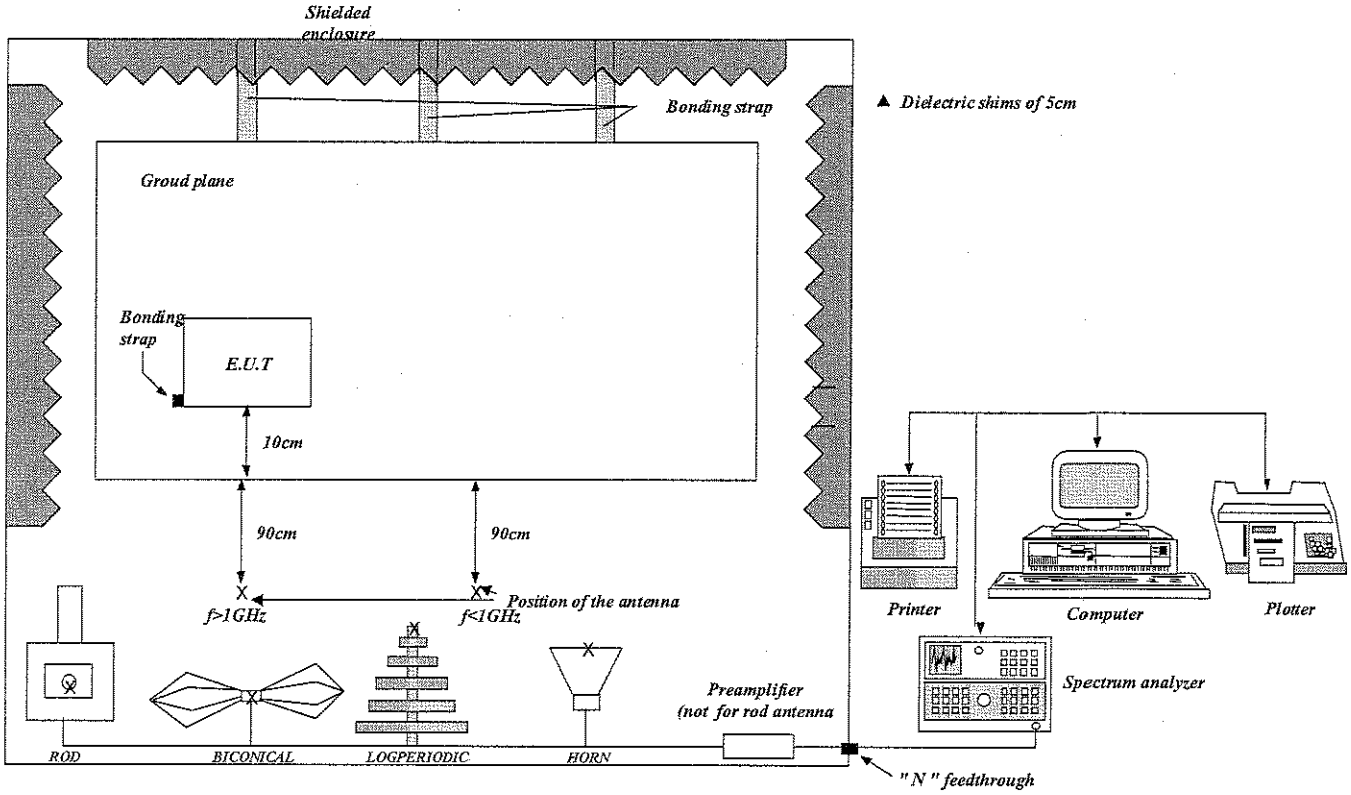
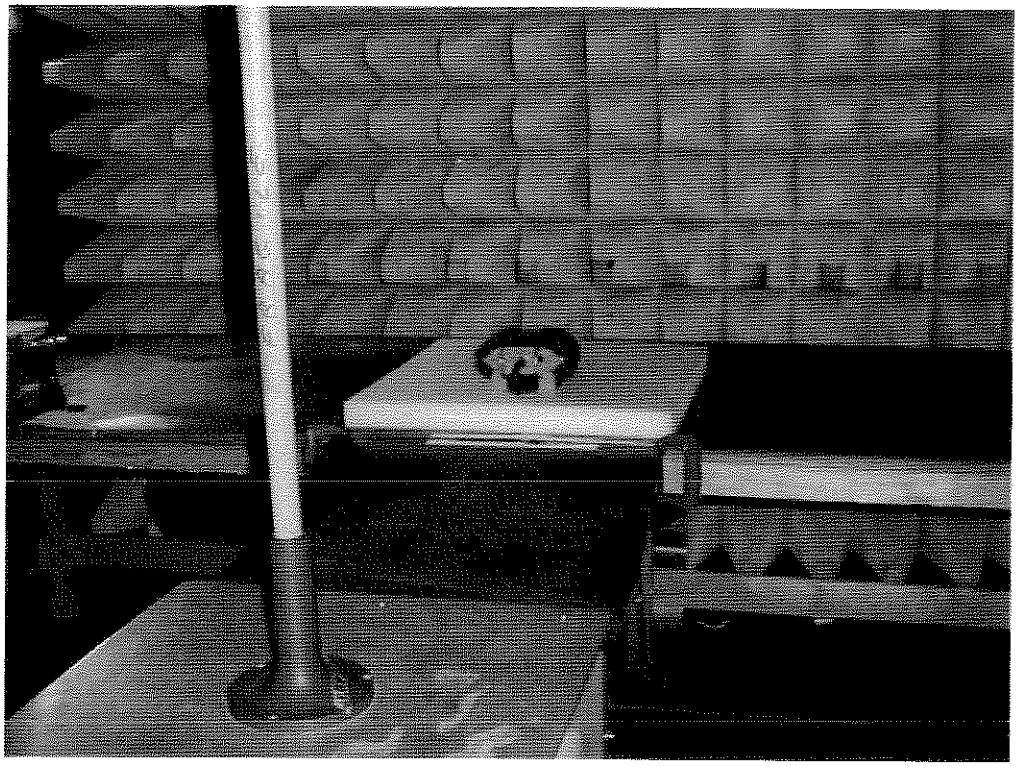
Figure 5.1.1

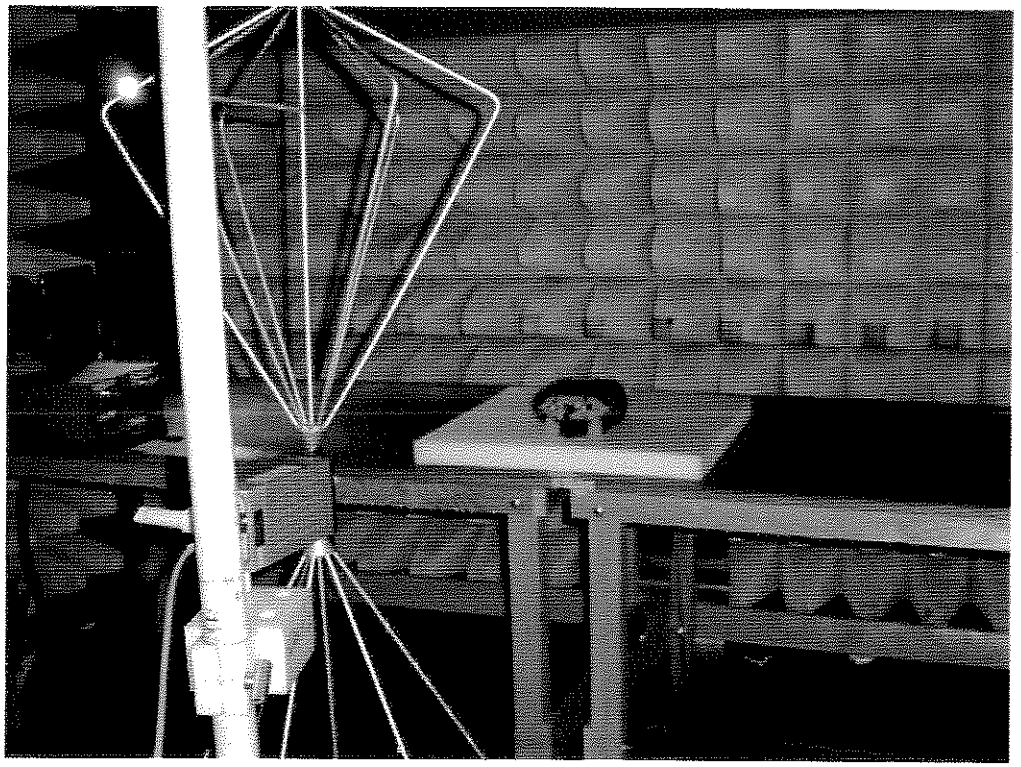
RADIATED EMISSION - ELECTRIC FIELD



Picture 5.1.2

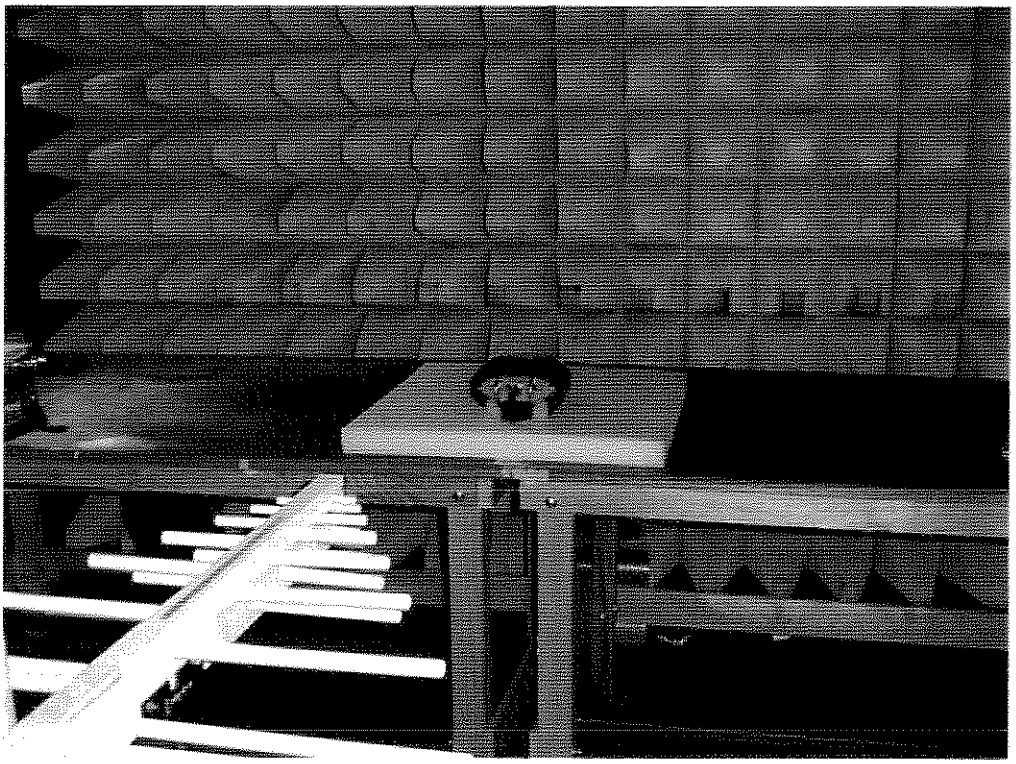


Test from 2 MHz to 25 MHz

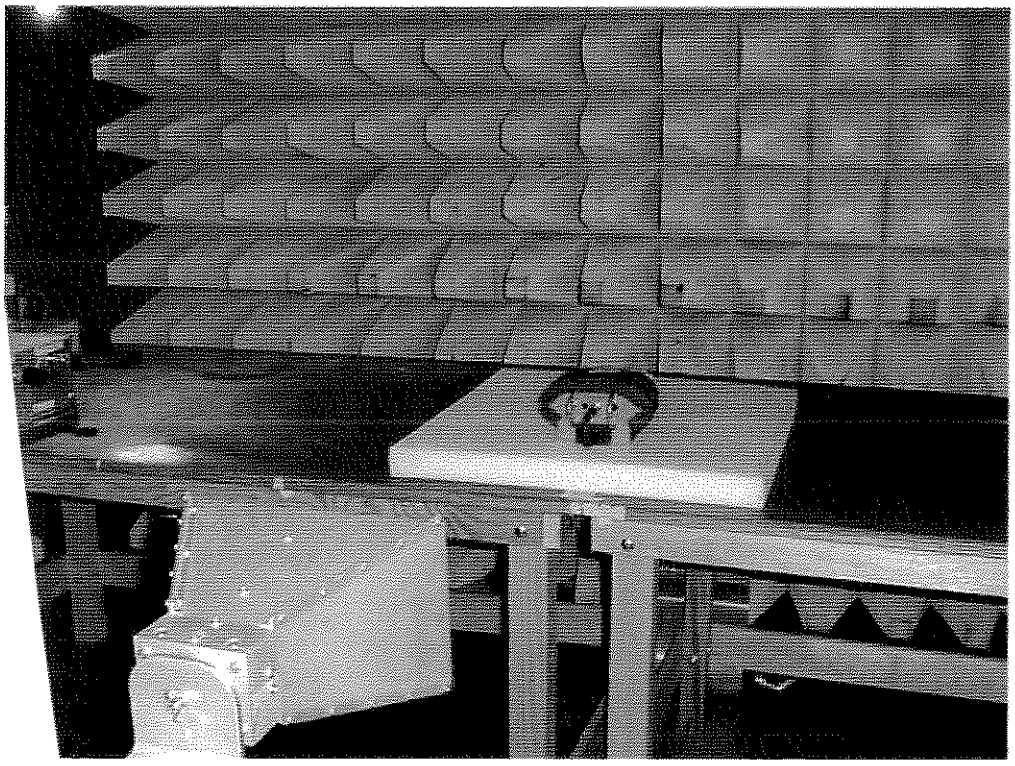


Test from 25 MHz to 200 MHz

Picture 5.1.3

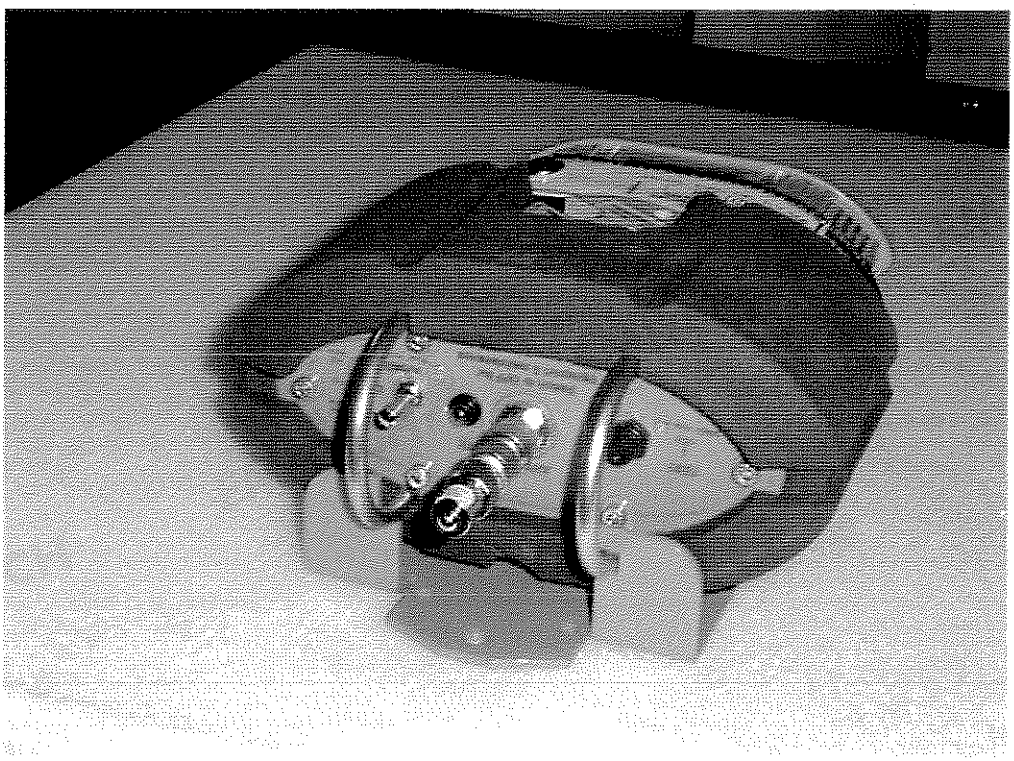


Test from 200 MHz to 1 GHz



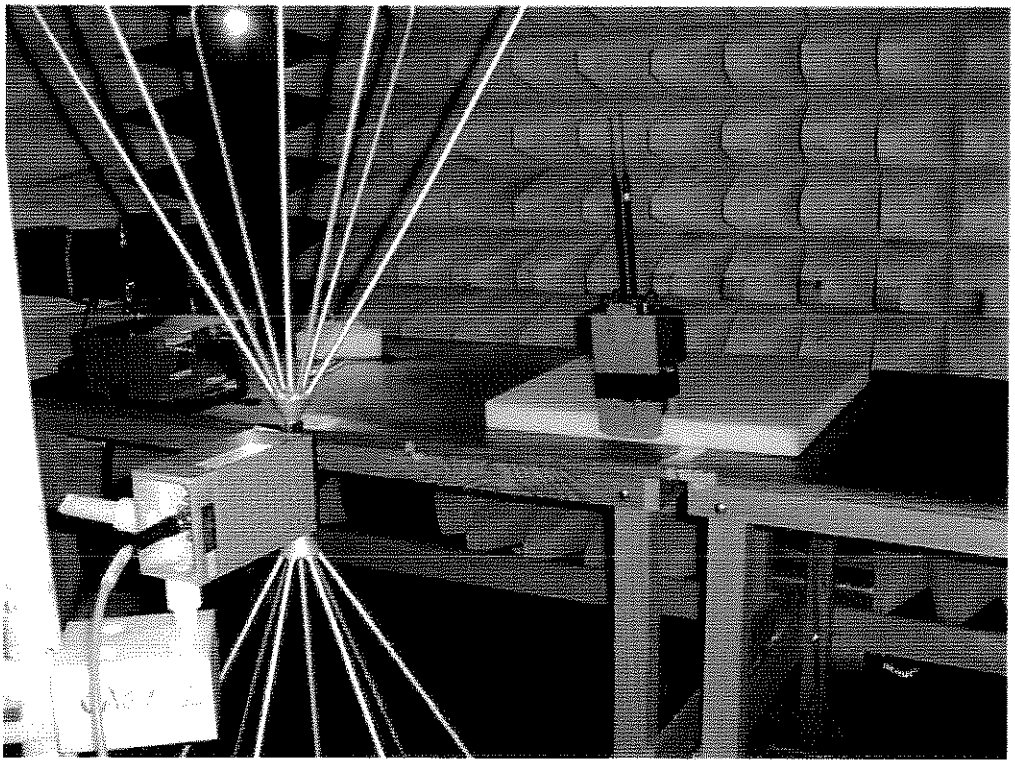
Test from 1 GHz to 6 GHz

Picture 5.1.4



Equipment tested with loads 50 Ω and ON

Picture 5.1.5



Beacon in emission with antenna, equipment ON

Figure 5.1.6

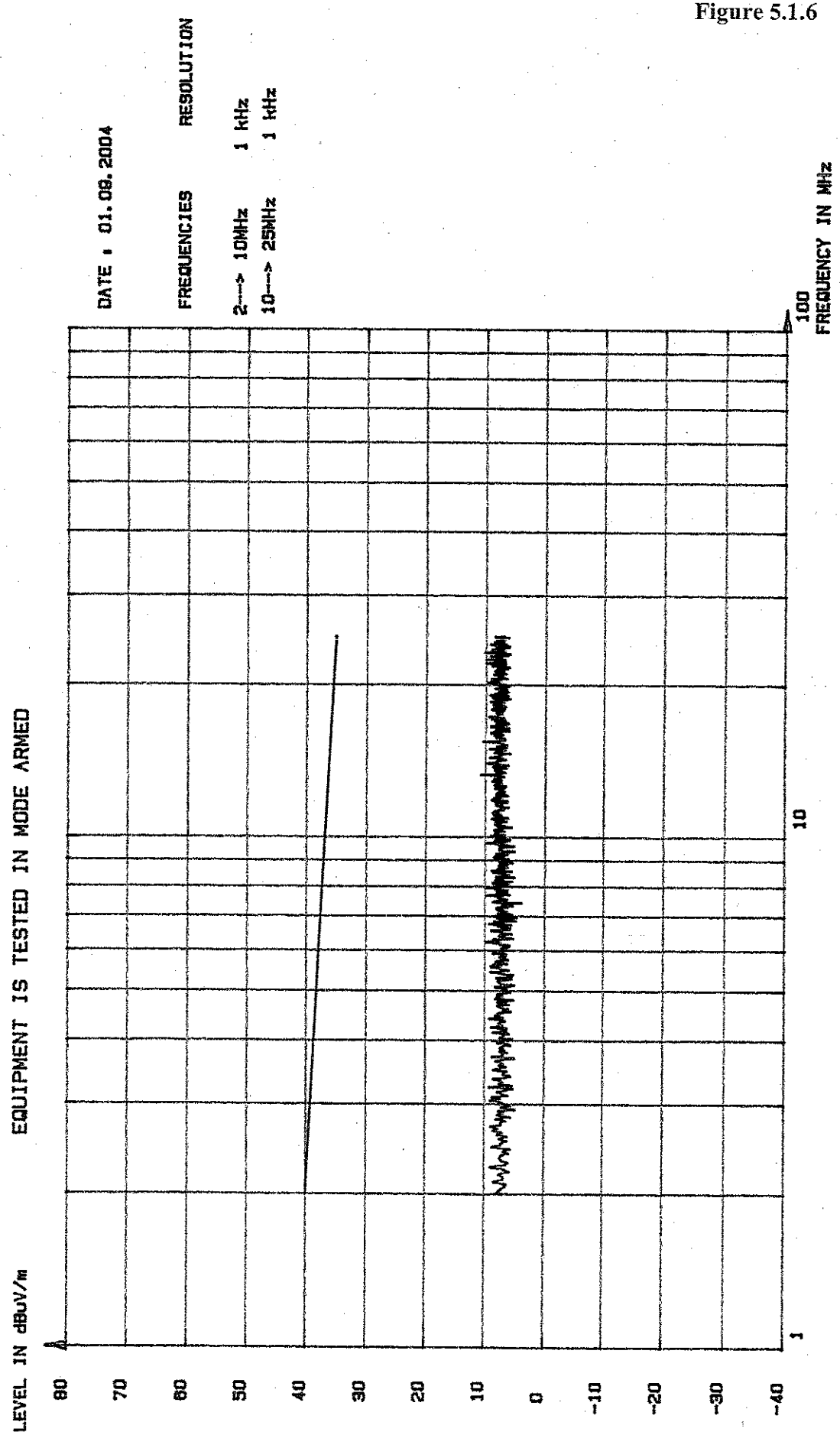

ADT 4065 P/N: 01N65920 S/N: 040001
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO 160D - SECTION 21
VERTICAL POLARIZATION
EQUIPMENT IS TESTED IN MODE ARMED
DATE : 01.08.2004
FREQUENCIES RESOLUTION
2---> 10MHz 1 kHz
10---> 25MHz 1 kHz
LEVEL IN dBuV/m
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
1
10
100
FREQUENCY IN MHz

Figure 5.1.7

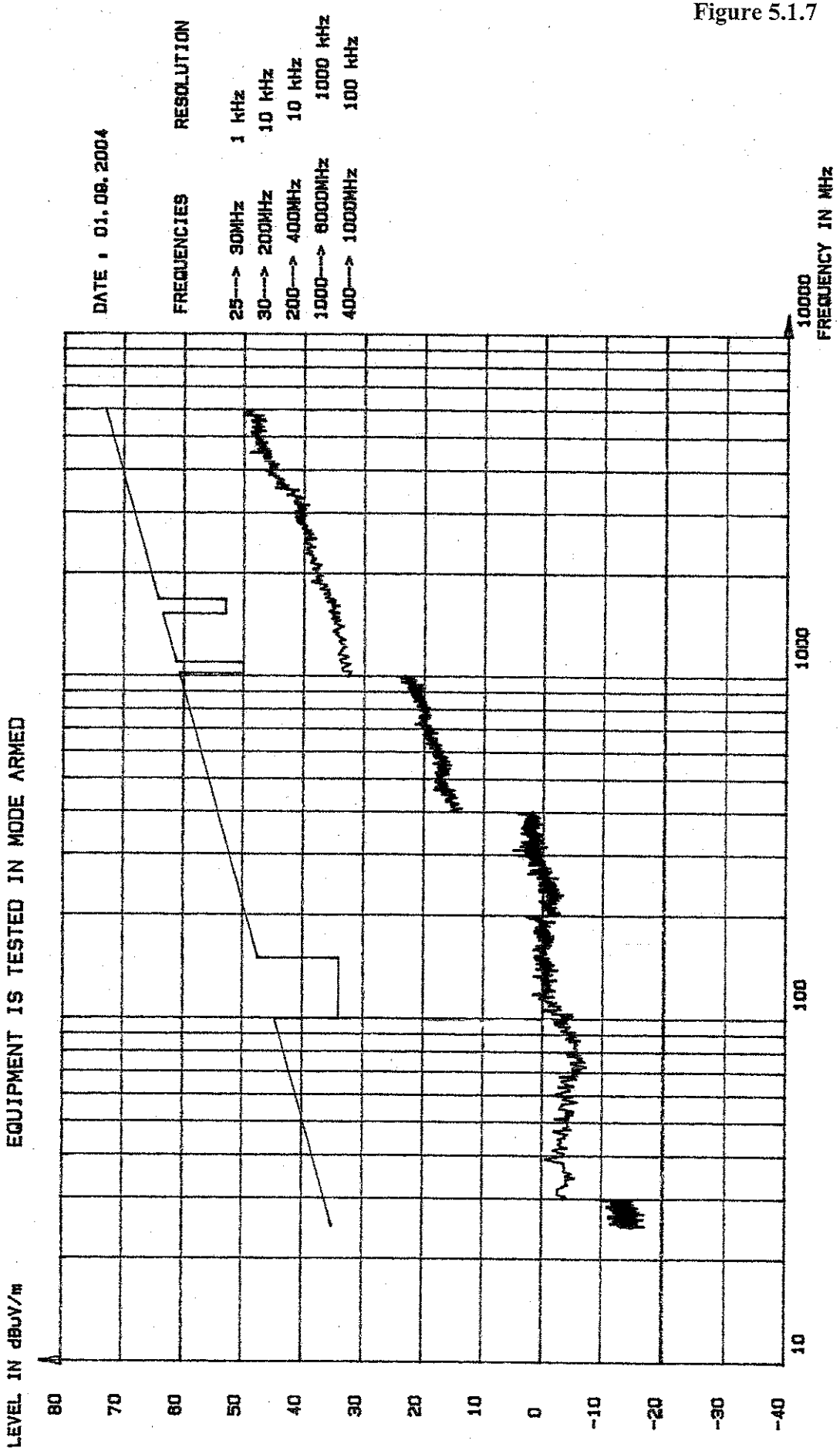

ADT 4065 P/N: 01N65920 S/N: 040001
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO 160D -- SECTION 21
VERTICAL POLARIZATION
EQUIPMENT IS TESTED IN MODE ARMED
DATE : 01.08.2004
FREQUENCIES RESOLUTION
25---> 30MHz 1 kHz
30---> 200MHz 10 kHz
200---> 400MHz 10 kHz
1000---> 8000MHz 1000 kHz
400---> 1000MHz 100 kHz
LEVEL IN dBuV/m
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
10
100
1000
10000
FREQUENCY IN MHz

Figure 5.1.8

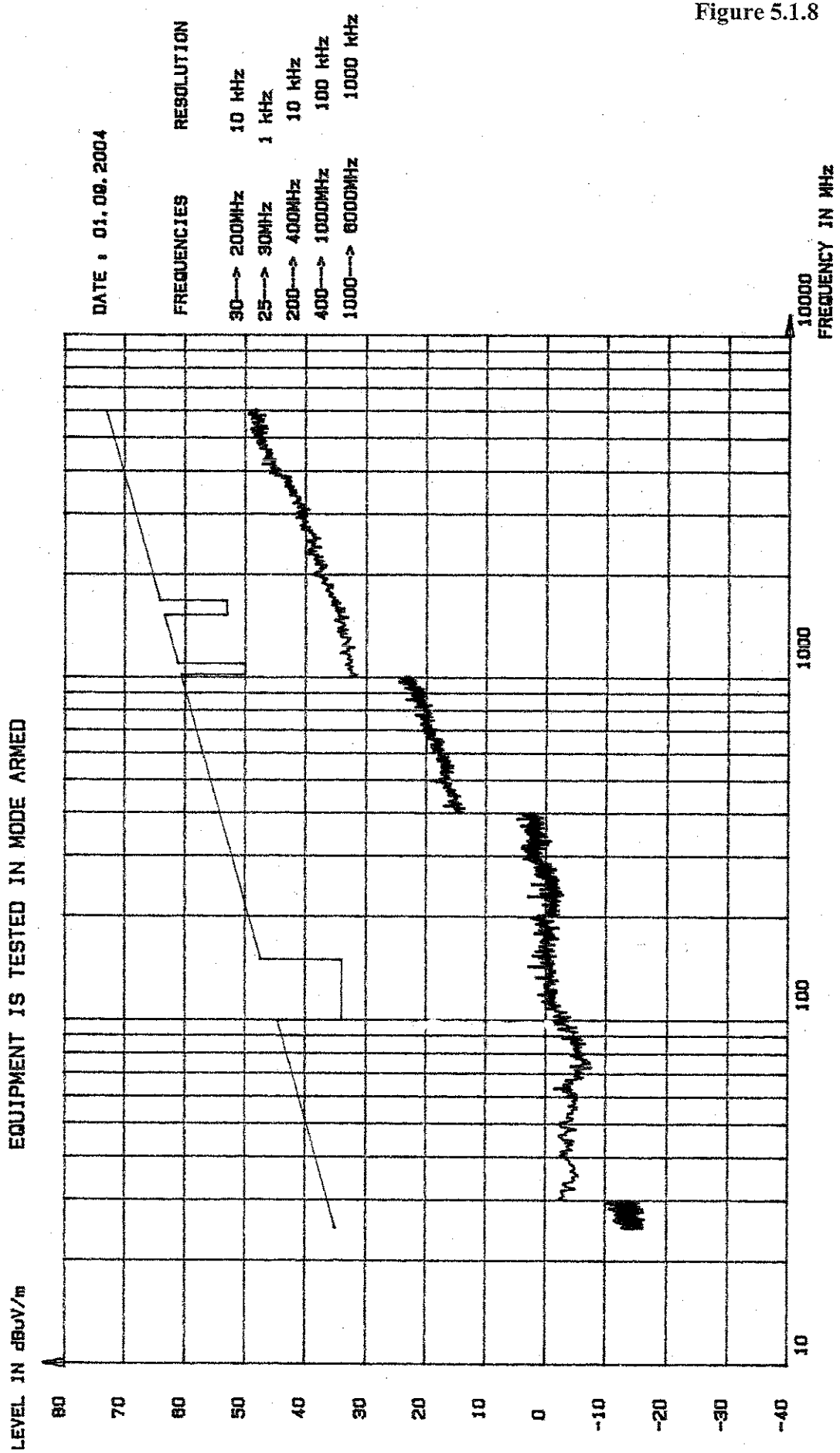

ADT 406S P/N: 01N65920 S/N: 040001
RADIATED SUSCEPTIBILITY - ELECTRIC FIELD
ACCORDING TO RTCA DO 160D - SECTION 21
HORIZONTAL POLARIZATION
EQUIPMENT IS TESTED IN MODE ARMED
DATE : 01.09.2004
FREQUENCIES RESOLUTION
30---> 200MHz 10 kHz
25---> 30MHz 1 kHz
200---> 400MHz 10 kHz
400---> 1000MHz 100 kHz
1000---> 8000MHz 1000 kHz
LEVEL IN dBuV/m
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
10
100
1000
10000
FREQUENCY IN MHz

Figure 5.1.9

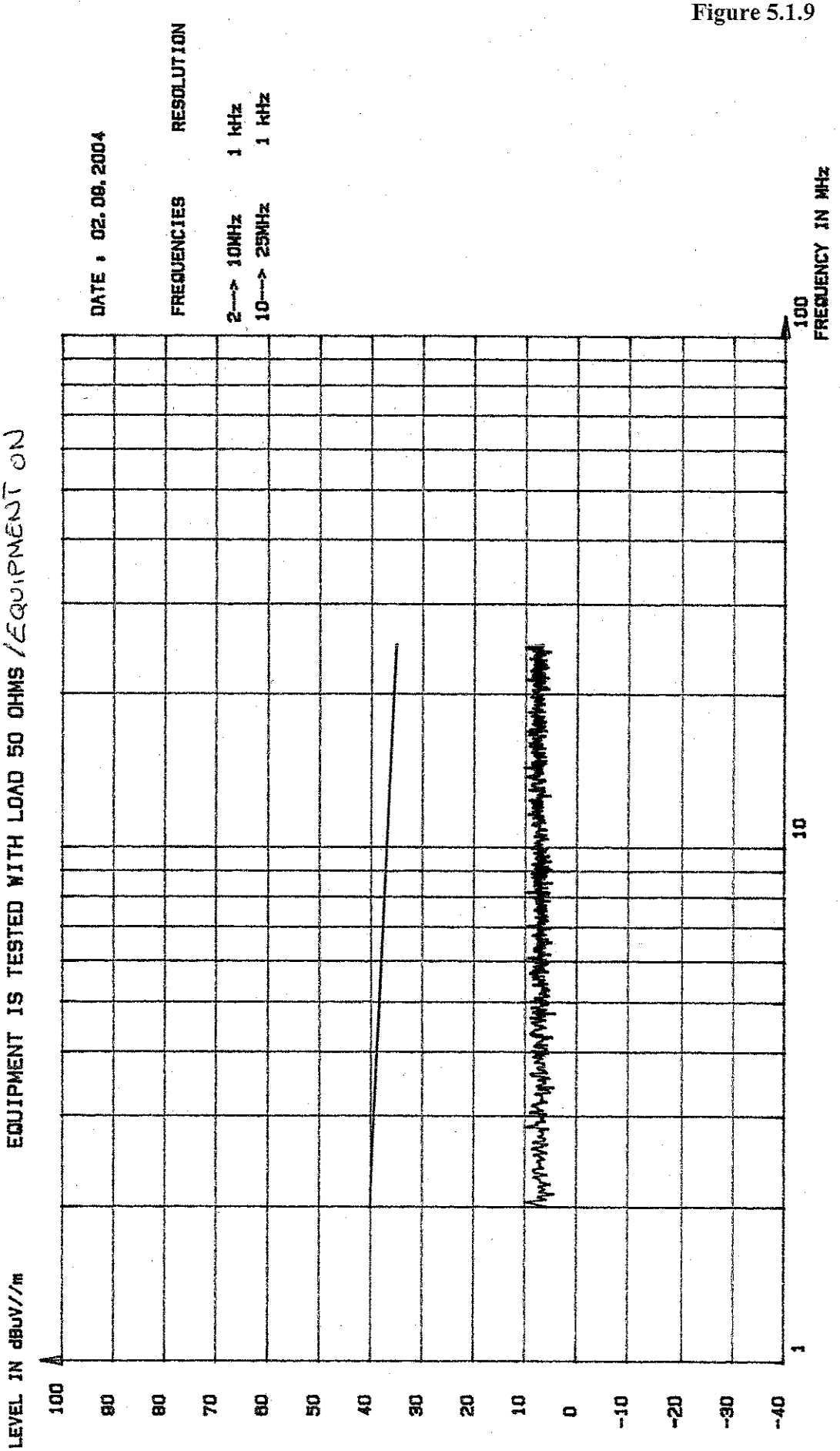

ADT 406S P/N: 01N65920 S/N: 040001
RADIATED EMISSIONS - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECTION 20
VERTICAL POLARIZATION
EQUIPMENT IS TESTED WITH LOAD 50 OHMS /EQUIPMENT ON
DATE : 02.08.2004
FREQUENCIES RESOLUTION
2---> 10MHz 1 kHz
10---> 25MHz 1 kHz
LEVEL IN dBuV/m
100
80
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
1
10
100
FREQUENCY IN MHz

Figure 5.1.10

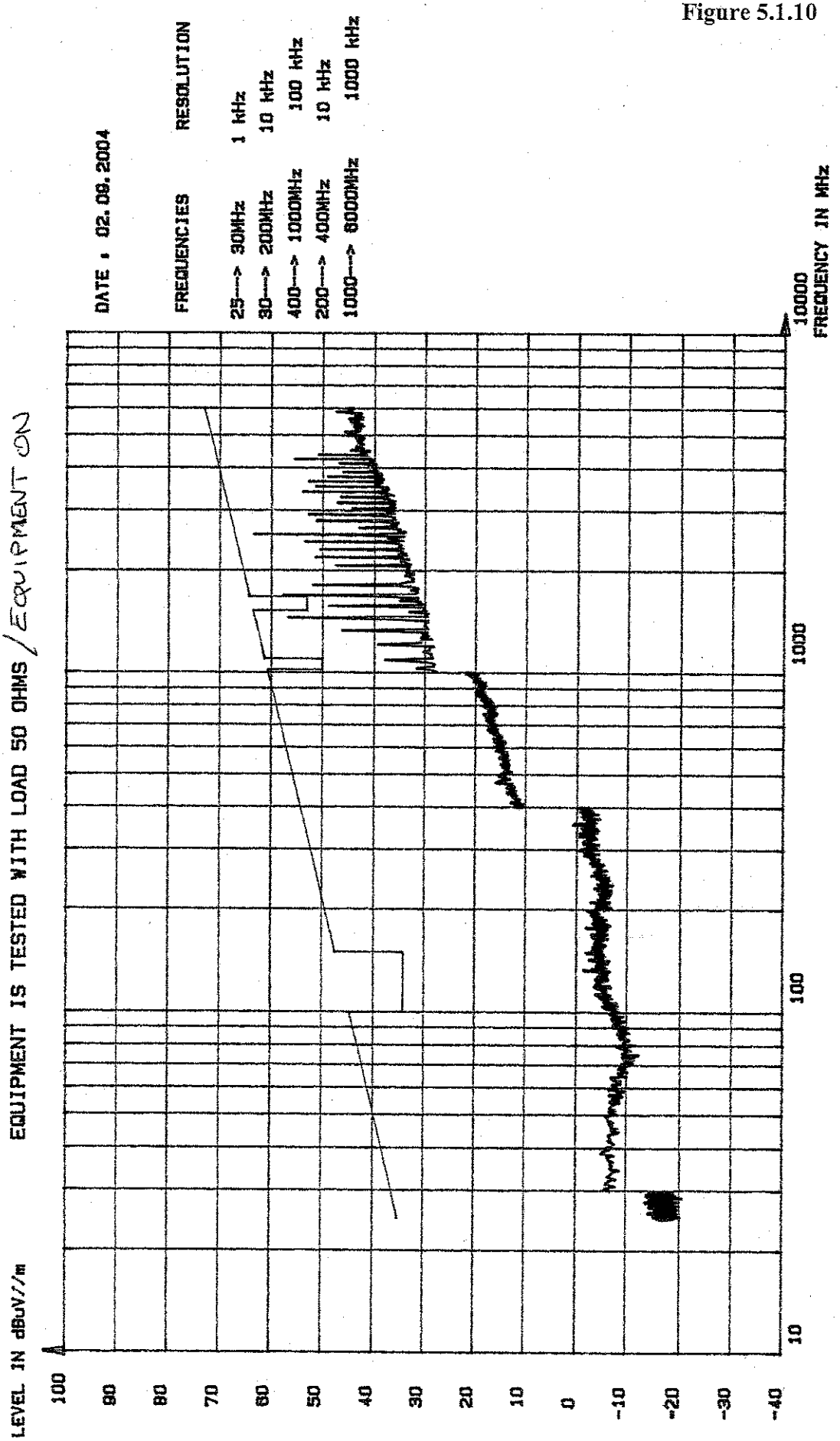

ADT 406S P/N: 01N65920 S/N: 040001
RADIATED EMISSIONS - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECTION 20
VERTICAL POLARIZATION
EQUIPMENT IS TESTED WITH LOAD 50 OHMS / EQUIPMENT ON
DATE : 02.09.2004
FREQUENCIES RESOLUTION
25---> 30MHz 1 kHz
30---> 200MHz 10 kHz
400---> 1000MHz 100 kHz
200---> 400MHz 10 kHz
1000---> 8000MHz 1000 kHz
LEVEL IN dBuV/m
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
10
100
1000
10000
FREQUENCY IN MHz

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Figure 5.1.11

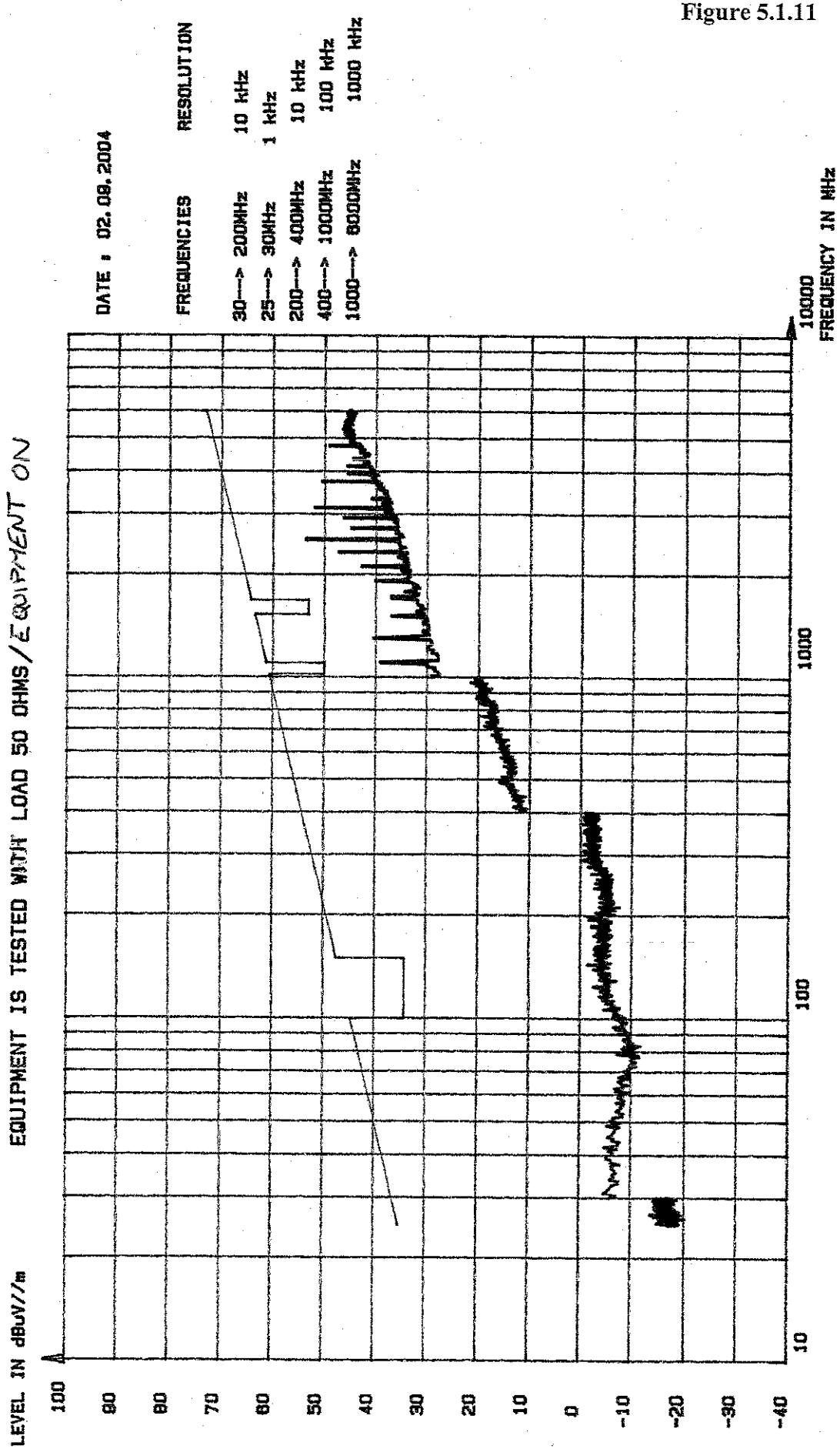

Figure 5.1.12

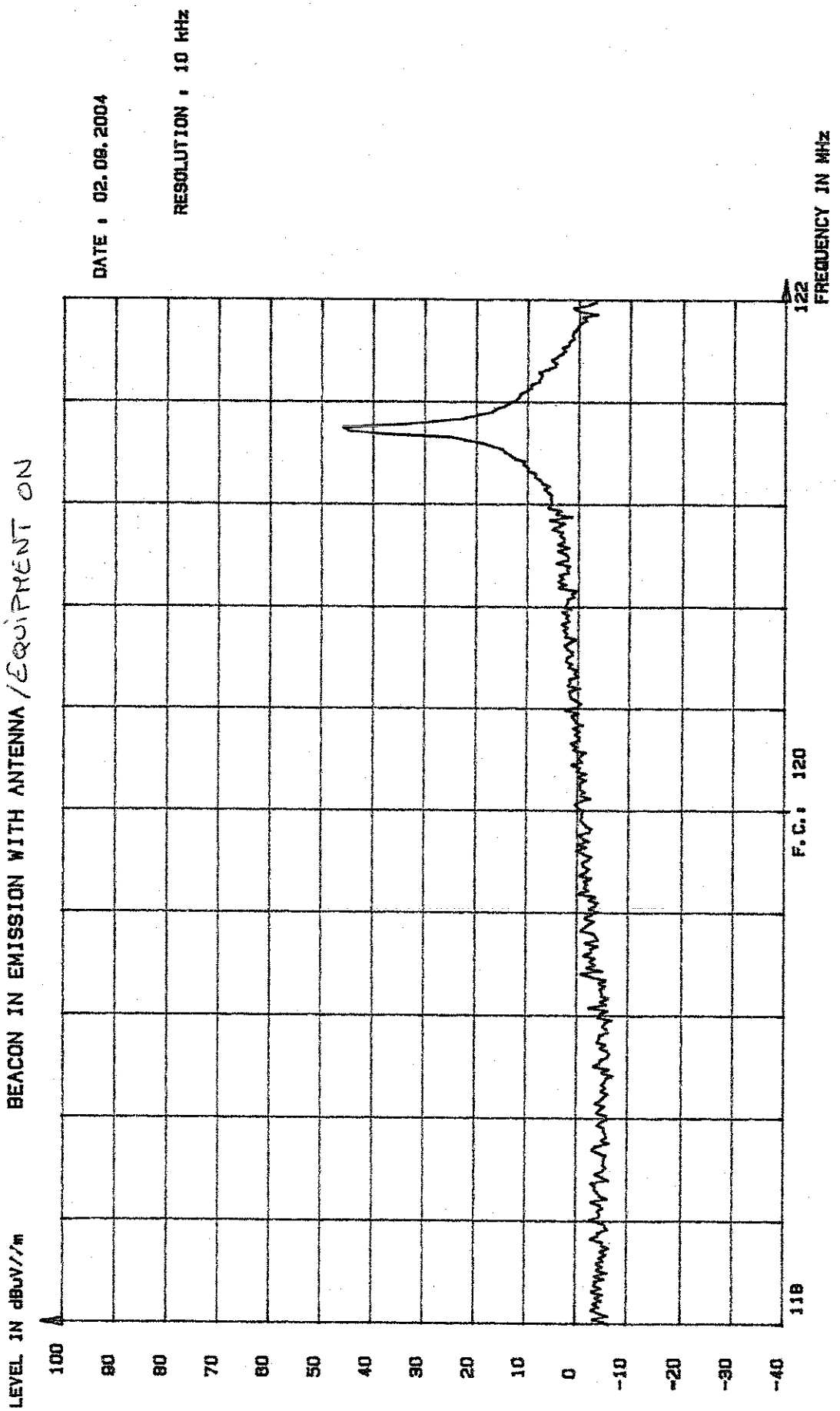
ADT 406S P/N: 01N65920 S/N: 040001
RADIATED EMISSIONS - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECTION 20
VERTICAL POLARIZATION
BEACON IN EMISSION WITH ANTENNA / EQUIPMENT ON
DATE : 02.09.2004
RESOLUTION : 10 kHz
LEVEL IN dBuV/m
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
118
F.C. : 120
122
FREQUENCY IN MHz

Figure 5.1.13

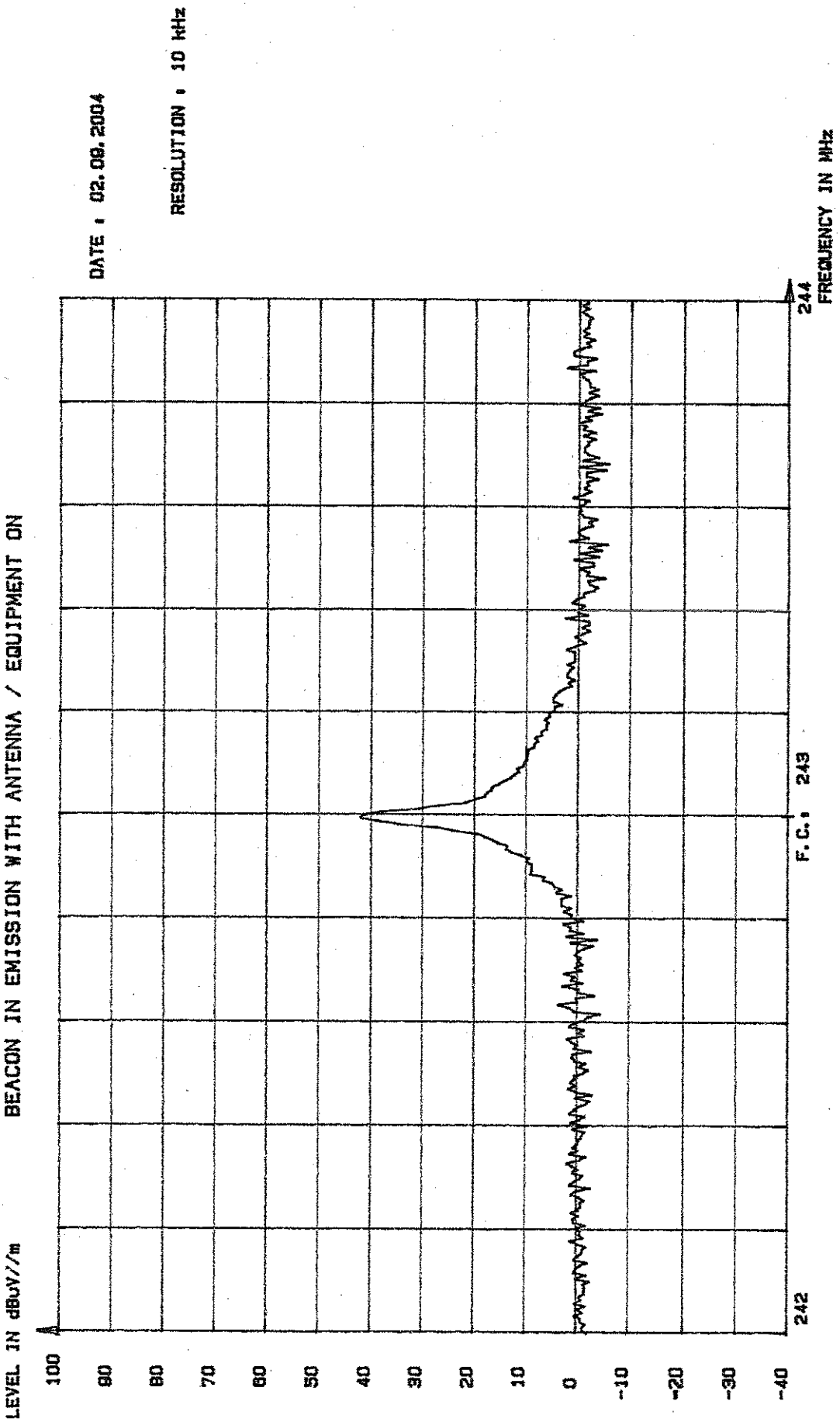
ADT 406S P/N: 01N65920 S/N: 040001
RADIATED EMISSIONS - ELECTRIC FIELD
ACCORDING TO RTCA DO160D - SECTION 20
VERTICAL POLARIZATION
BEACON IN EMISSION WITH ANTENNA / EQUIPMENT ON
DATE : 02.09.2004
RESOLUTION : 10 kHz
LEVEL IN dBuV/m
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
242
F.C.: 243
244
FREQUENCY IN MHz

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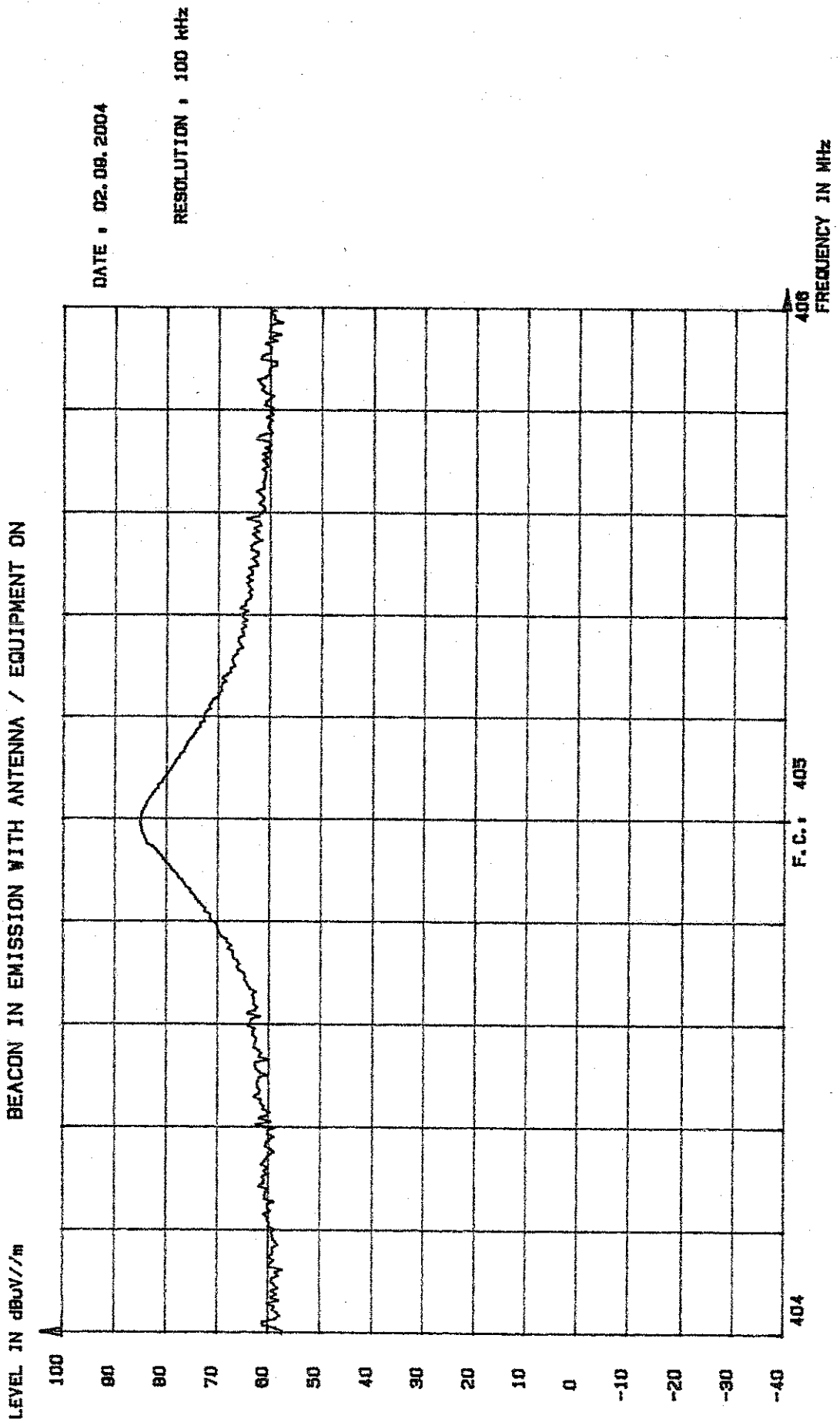
Figure 5.1.14



5.2 *Radio frequency radiated susceptibility*

(According to RTCA DO 160 D specification – Section 20.5 – Issue 1997 – Category W)

- Purpose of the test

  This test determines whether equipment will operate within performance specifications when equipment and its interconnecting wiring are exposed to a RF electric field level.

  The system powered and operating in its functional mode as defined in chapter 3 must not exhibit malfunction, degradation of performance or deviation beyond tolerances when submitted to a RF electric field level applied through antennas.

- Frequency range

  This test is performed from 100 MHz to 18 GHz.

- Test method

  Substitution method.

- Field levels

  100 V/m from 100 MHz to 18 GHz.

- Modulation characteristics

  1) Amplitude modulation with a square wave of 90 % depth, 1 kHz frequency.
  2) CW.

- Frequency sweep

  The test frequencies are logarithmically spaced according to 100 frequencies per decade.

  At each step, the specified level is established during 2 seconds and an equipment functional check is carried out.

- Test installation description

The test set-up are given Figures 5.2.1 to 5.2.2.

The fieldmeter is placed at the location of the EUT (in place of) 30 cm over the ground plane.

The transmitting antenna is placed 1 meter in front of the isotropic field sensor.

The forward power to the transmitting antenna is adjusted until the required field level is achieved. The power and corresponding field are recorded.

Application

Test apparatus is installed outside the shielded enclosure.

The equipment is installed on the ground plane according the EUT design and installation instructions.

From 100 MHz to 18 GHz, the electric field is generated by a log periodic, horn, antenna. The antenna is placed at 1 meter in front of the equipment and its interconnecting wiring. The test is performed in vertical polarization and horizontal polarizations.

Photographies are given Pictures 5.2.3 and 5.2.5.

- Apparatus list

N°Emitech	Category	Marque	Type
01/094	Amplifier	Amplifier Resarch	500W1000A
01/109	Amplifier	ETM	200LS
01/113	Amplifier	ETM	200SC
01/122	Amplifier	ETM	200IJ
04/042	Generator	Hewlett Packard	33120A
04/080	Synthesizer	Wiltron	68347B
11/026	Milliwattmeter	Giga-Tronics	8542B
11/069	Power sensor	Giga-Tronics	80401A-510
15/038	Fieldmeter	Holaday	HI-4453
16/006	Shielded enclosure	Sidétel	C.4
17/002	Coupler	Amplifier Research	DC 2000
17/004	Coupler	CMC	440065
17/080	Coupler	ETM	0.8-2.8GHz 40dB
17/081	Coupler	ETM	2.5-8GHz 40dB
17/094	Coupler	ETM	40dB - 8GHz-18GHz
24/098	Horn antenna	Oritel	CM 750/20
24/145	Biconical antenna	Electro-Métrics	BIA-30HF
24/267	Horn antenna	Emco	3106
24/273	Horn antenna	Amplifier Research	AT4003
24/275	Horn antenna	Amplifier Research	AT 4002A
34/068	Software	Emitech	IMCEM v1,9

- Test results

Applied field level is given on Figures.

The equipment is tested in mode armed.

Figure n°	Polarization	Modulation		Remark
		CW	AM	
5.2.6	Vertical	✓		No anomaly
5.2.7	Vertical		✓	No anomaly
5.2.8	Horizontal	✓		No anomaly
5.2.9	Horizontal		✓	No anomaly

No anomaly has been noticed during tests.

Figure 5.2.1

RADIATED SUSCEPTIBILITY - ELECTRIC FIELD

TEST INSTALLATION FOR CALIBRATION FROM 100 MHZ TO 18 GHZ

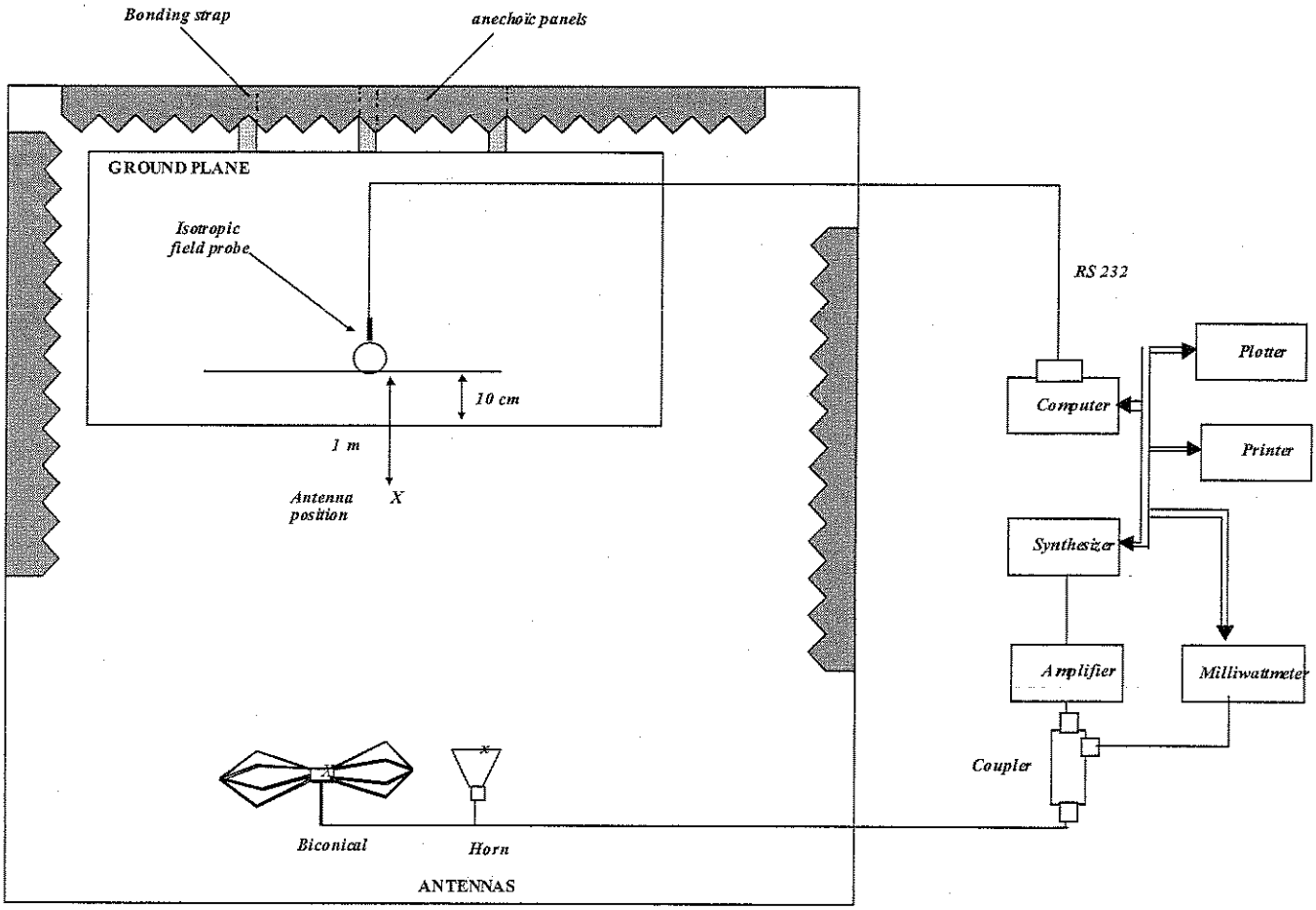
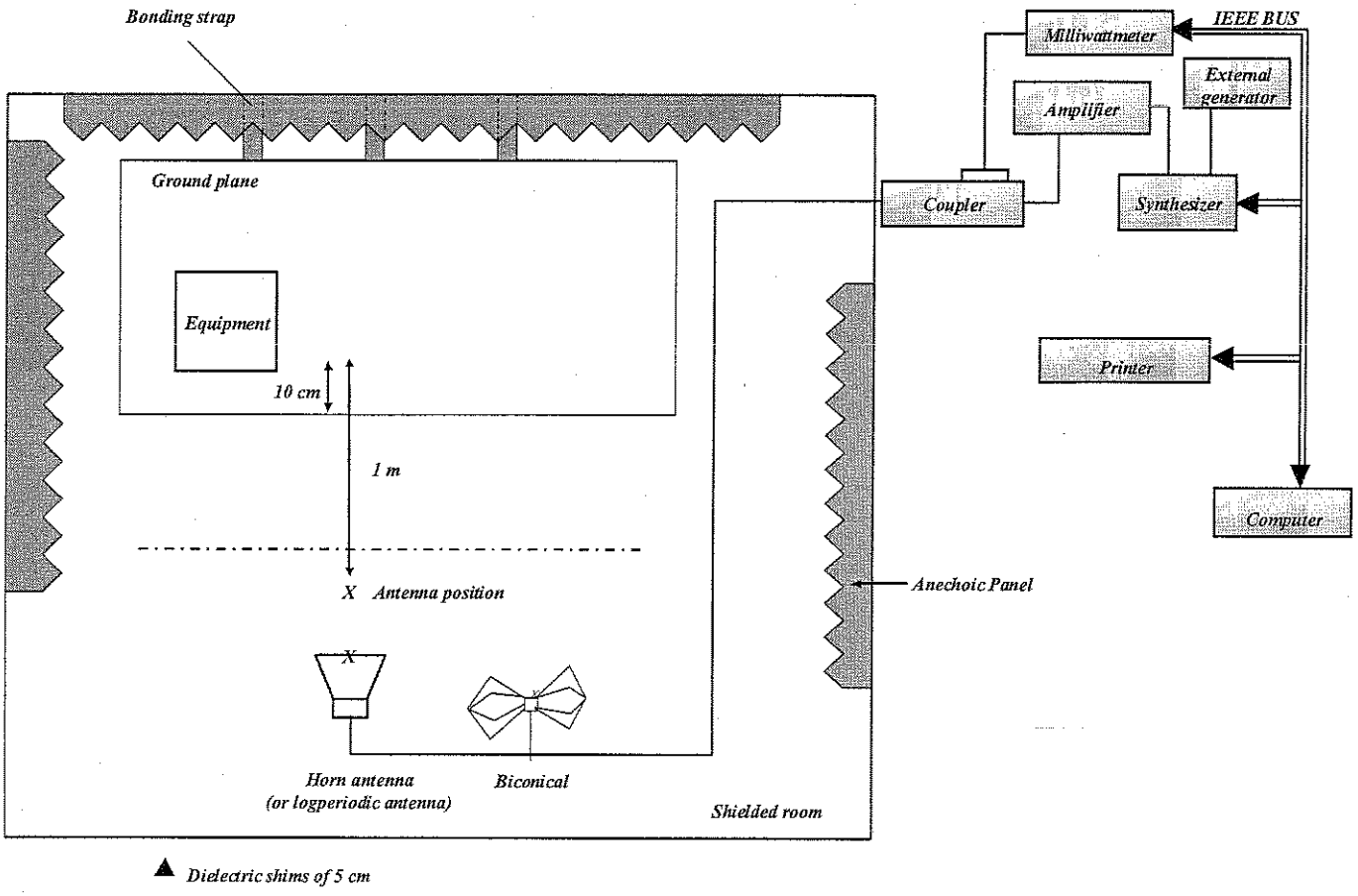


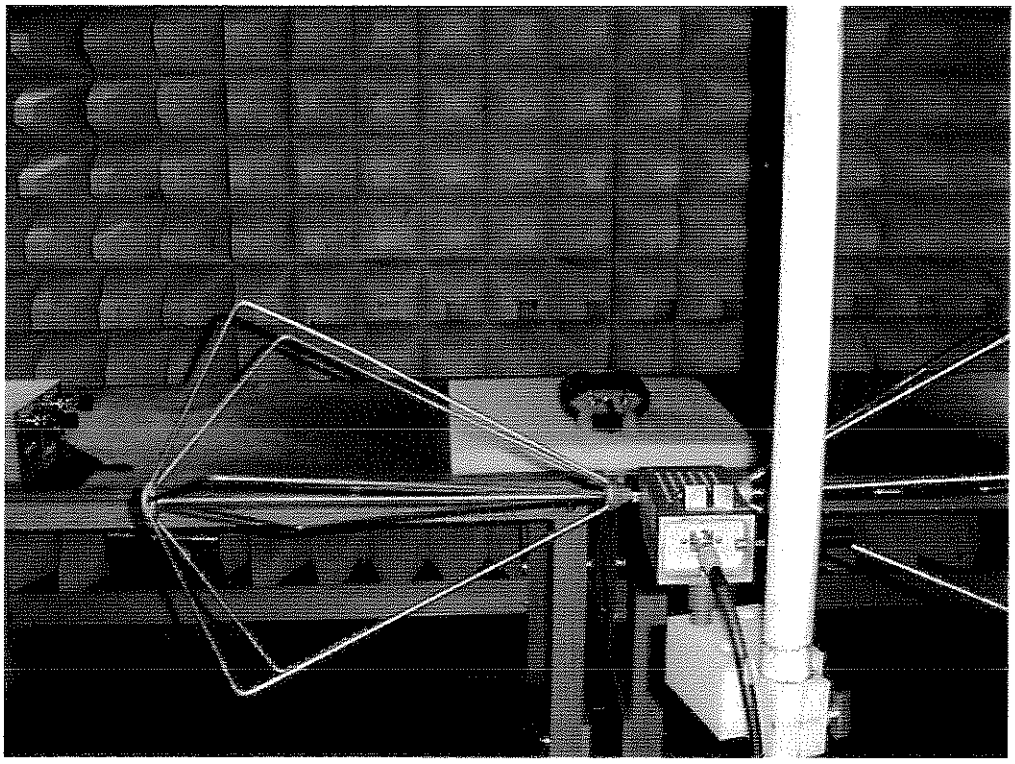
Figure 5.2.2

RADIATED SUSCEPTIBILITY - ELECTRIC FIELD

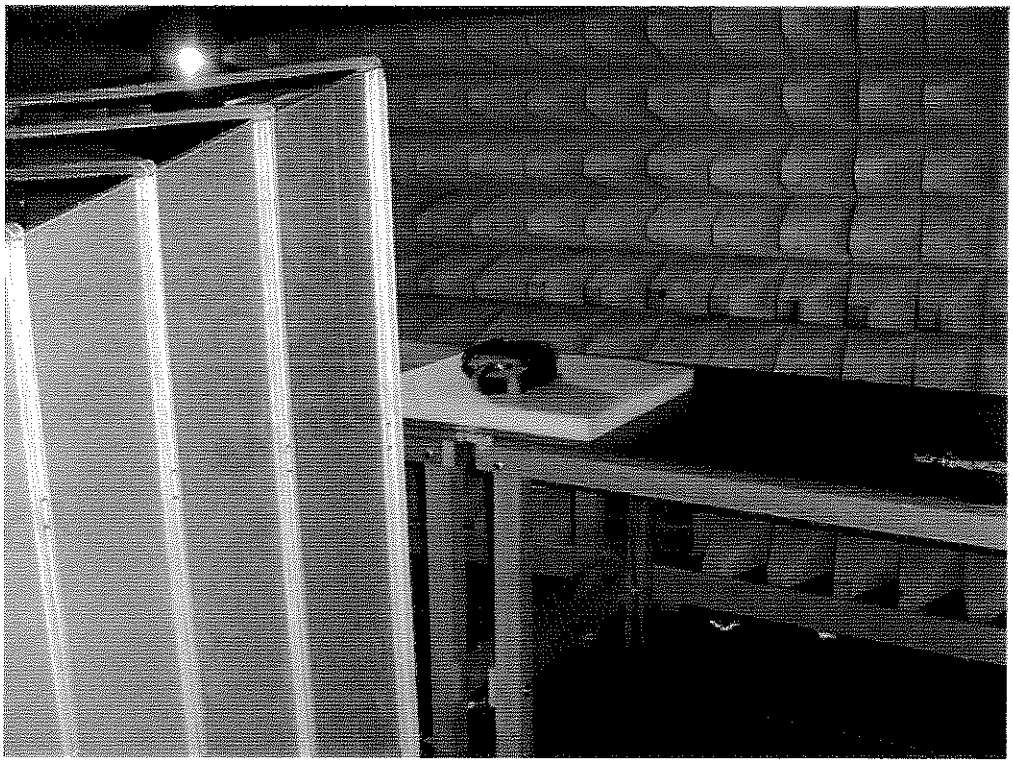
APPLICATION FROM 100 MHZ TO 18 GHZ



Picture 5.2.3

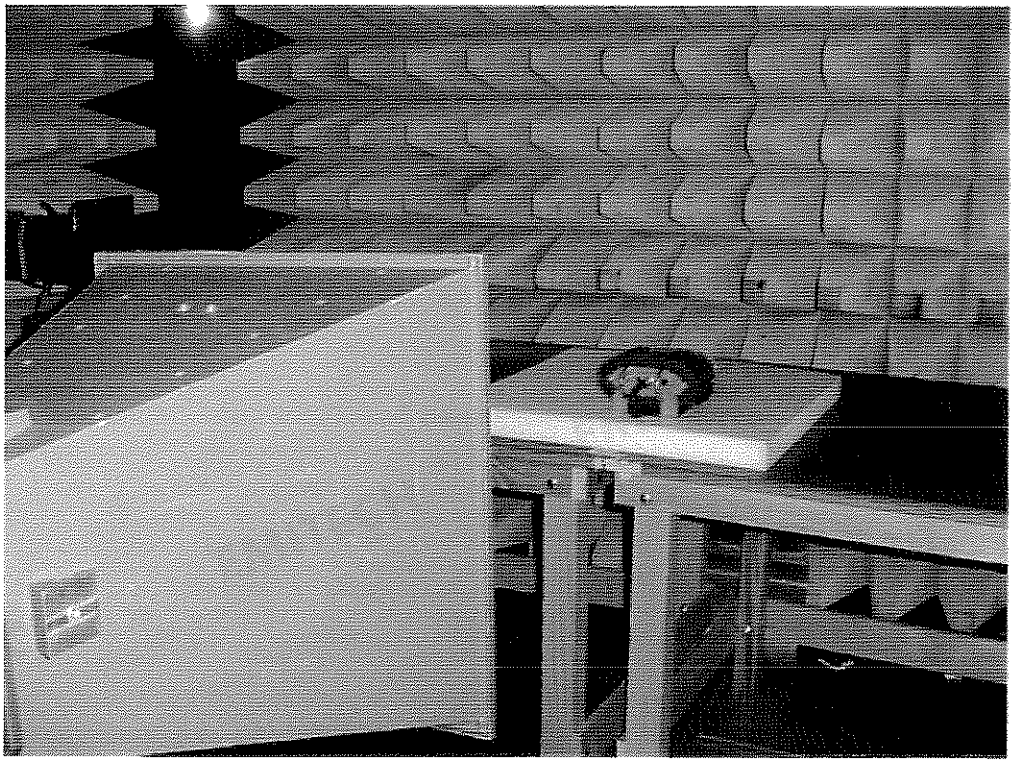


TEST FROM 100 MHZ TO 200 MHZ

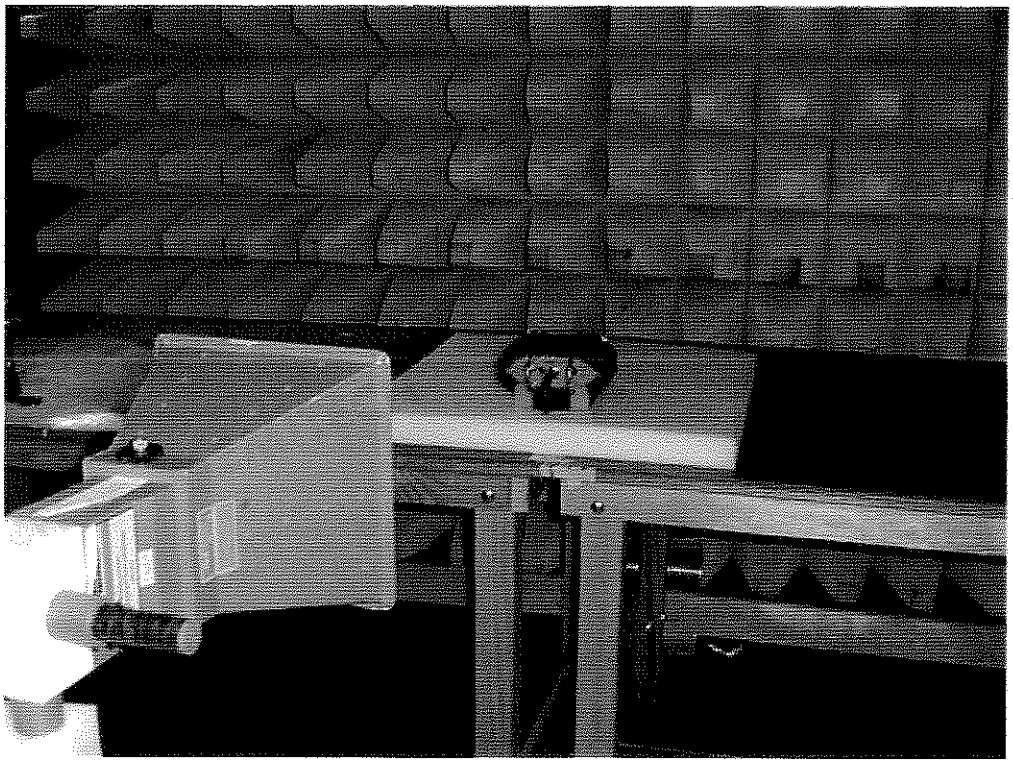


TEST FROM 200 MHZ TO 1 GHZ

Picture 5.2.4

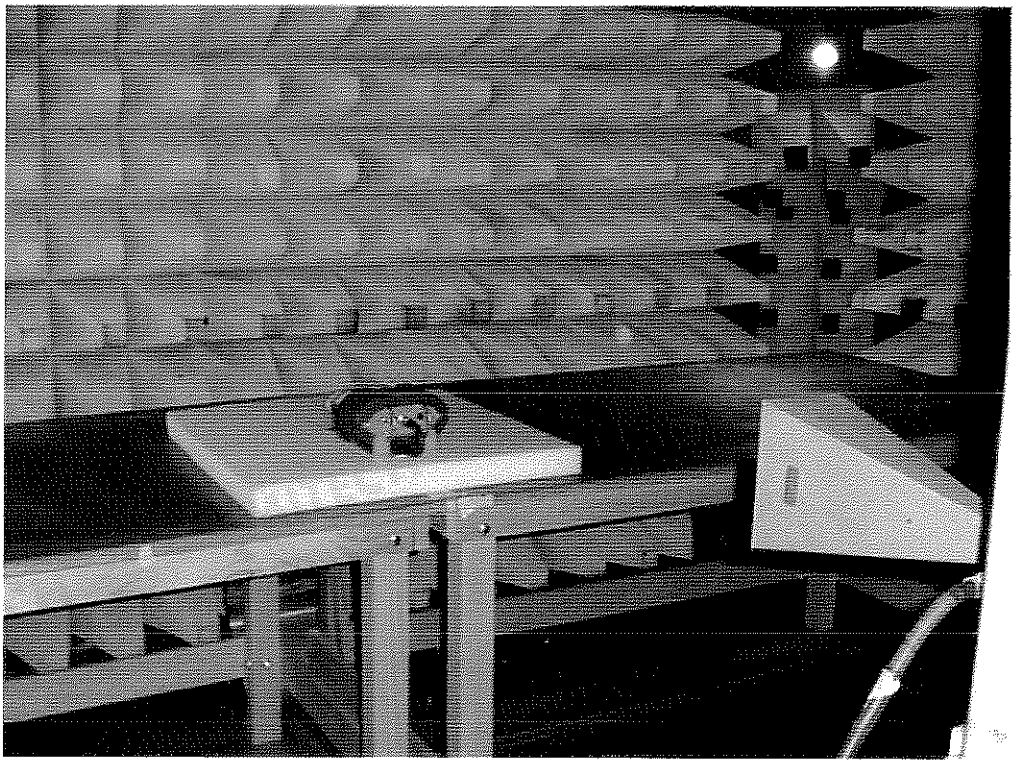


TEST FROM 1 GHZ TO 4 GHZ



TEST FROM 4 GHZ TO 8 GHZ

Picture 5.2.5



TEST FROM 8 GHZ TO 18 GHZ

Figure 5.2.6

ADT 406S P/N:01N656920 S/N:040001
RADIATED SUSCEPTIBILITY -ELECTRIC FIELD
ACCORDING TO RTCA DO 160D - SECTION 20
VERTICAL POLARIZATION
TEST WITHOUT MODULATION

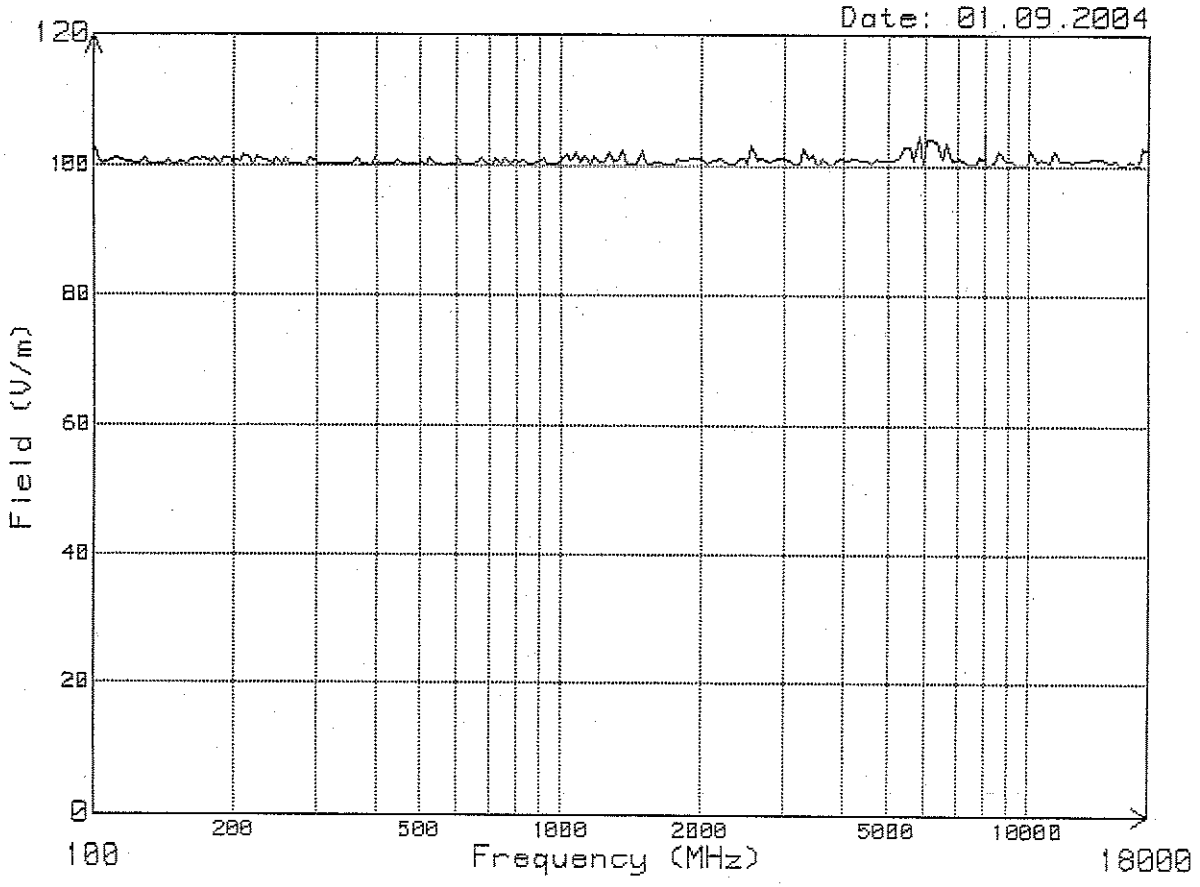


Figure 5.2.7

ADT 406S P/N:01N656920 S/N:040001
RADIATED SUSCEPTIBILITY -ELECTRIC FIELD
ACCORDING TO RTCA DO 160D - SECTION 20
VERTICAL POLARIZATION
TEST WITH MODULATION

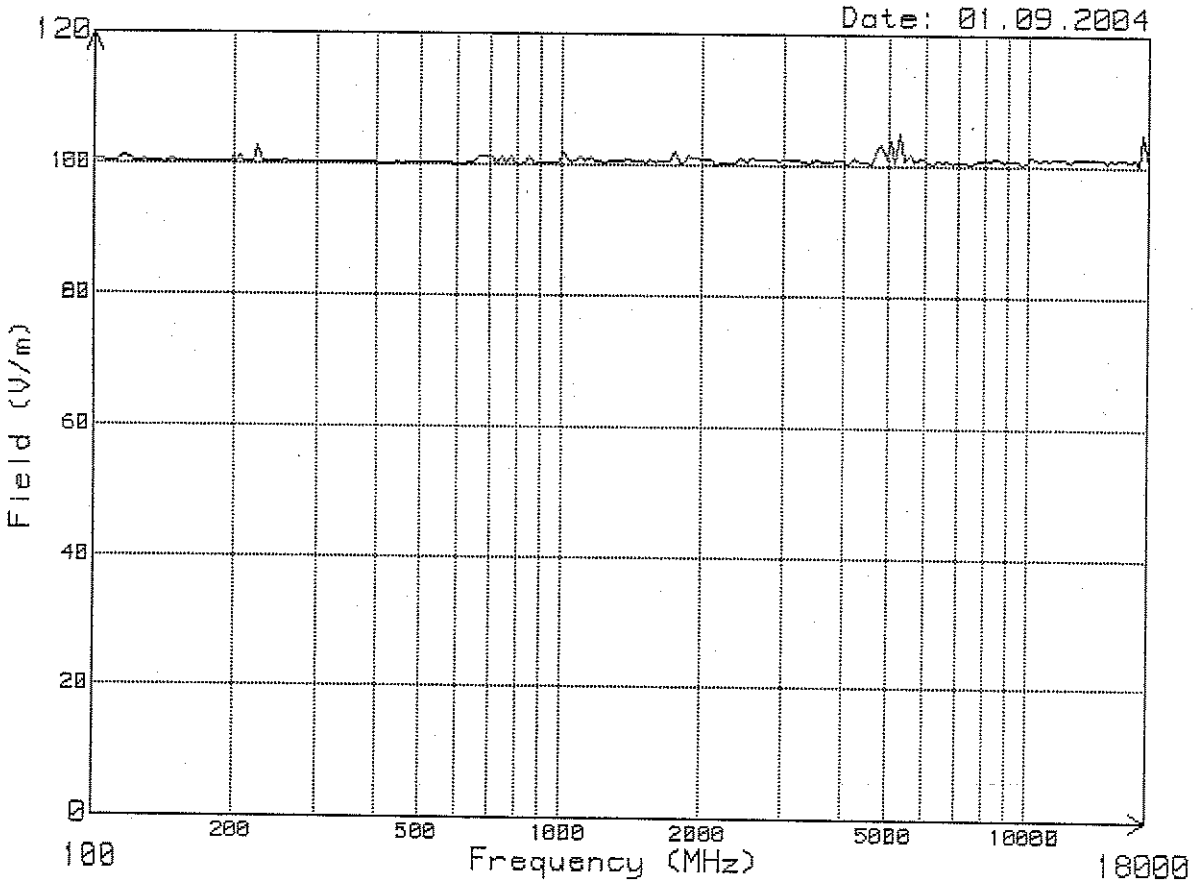


Figure 5.2.8

ADT 406S P/N:01N656920 S/N:040001
RADIATED SUSCEPTIBILITY -ELECTRIC FIELD
ACCORDING TO RTCA DO 160D - SECTION 20
HORIZONTAL POLARIZATION
TEST WITHOUT MODULATION

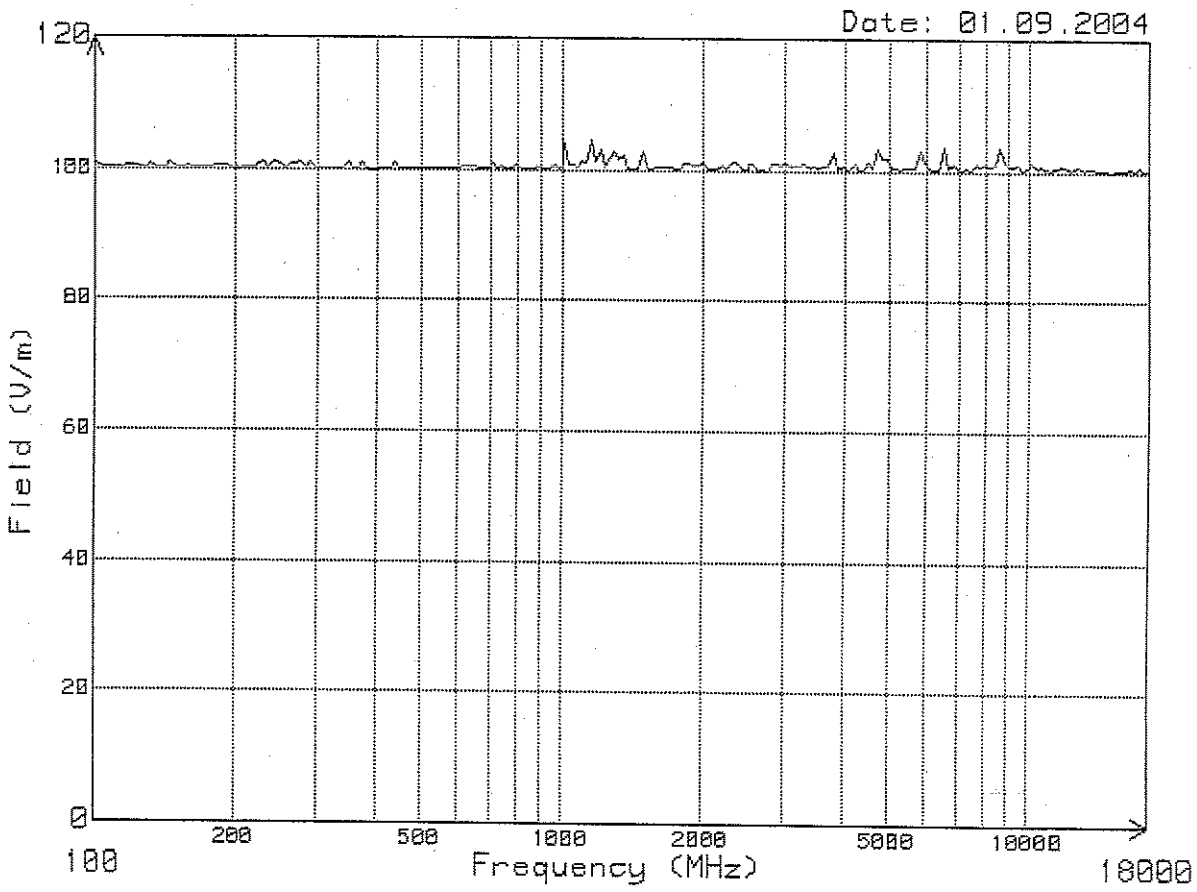
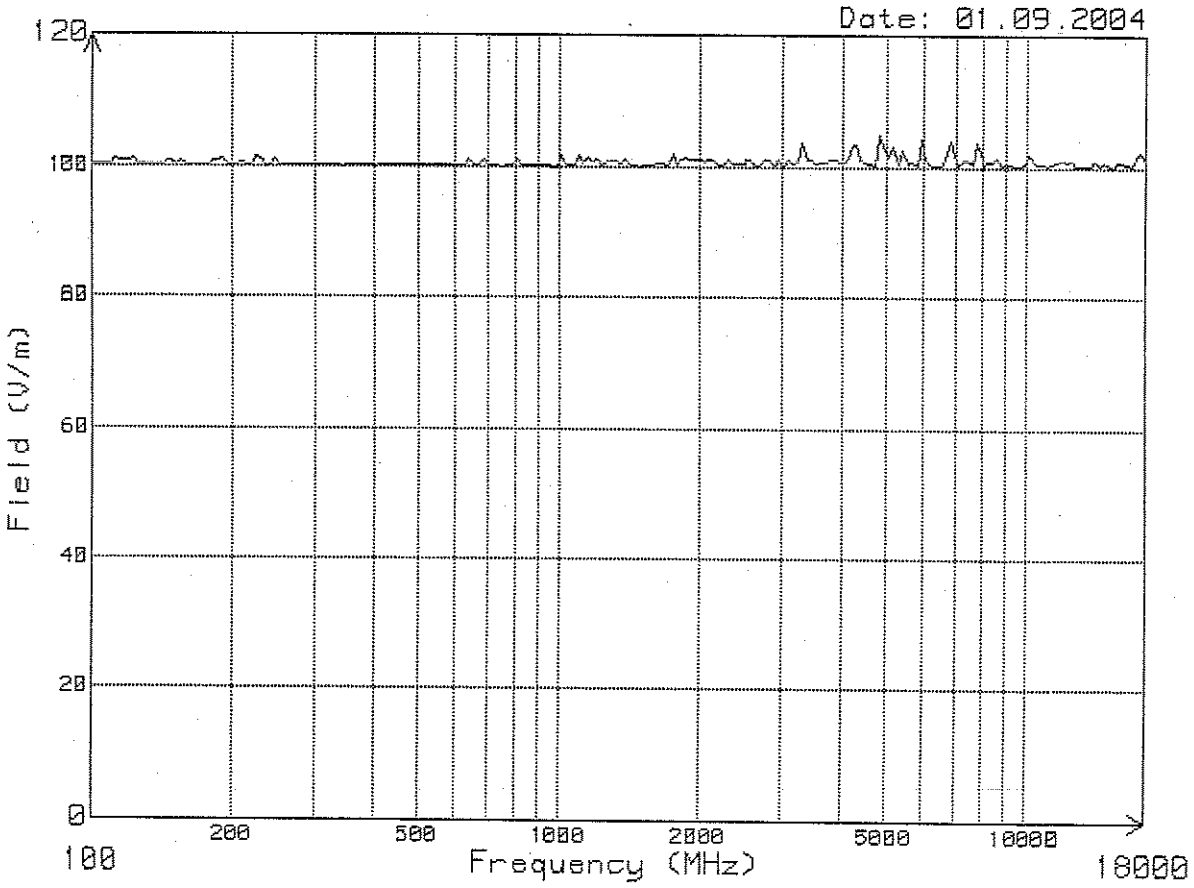


Figure 5.2.9

ADT 406S P/N:01N656920 S/N:040001
RADIATED SUSCEPTIBILITY -ELECTRIC FIELD
ACCORDING TO RTCA DO 160D - SECTION 20
HORIZONTAL POLARIZATION
TEST WITH MODULATION



5.3. *Induced signal susceptibility*

(According to DO 160 D - Section 19 - Category Z)

5.3.1 Magnetic field induced into the equipment

The equipment powered and operating in its functional mode defined chapter 3 must not exhibit malfunction, degradation of performances or deviation beyond tolerances when subjected to an induced magnetic field.

The field which is generated by the current specified below, in a straight wire radiator, which is within 0.15 m of the periphery of the unit of equipment under test.

- Current frequency: 400 Hz
- Current level: 20 Arms

- Test set-up

The test set-up is given on Figure 5.3.1.1.

The equipment is placed on a reference ground plane.

The interconnecting wire bundles are spaced 50 mm above the ground plane with wood shims.

During this test, the radiator is oriented with respect to each external surface of each unit to cause maximum interference. The length of the radiator is extend a distance of at least 0.6 m (laterally) beyond each extremity of the unit under test. The leads applying current to the radiator is routed at least 0.6 m away from any part of the unit under test and from the radiator itself.

- Apparatus list

N°Emitech	Category	Marque	Type
01/118	Amplifier	NF	HSA4014
04/042	Generator	Hewlett Packard	33120A
05/012	Oscilloscope	Tektronix	DSA 602
05/015	Oscilloscope module	Tektronix	11A32
24/228	Current probe	Pearson Electonics	3525
25/010	Transformer	Legrand	42757

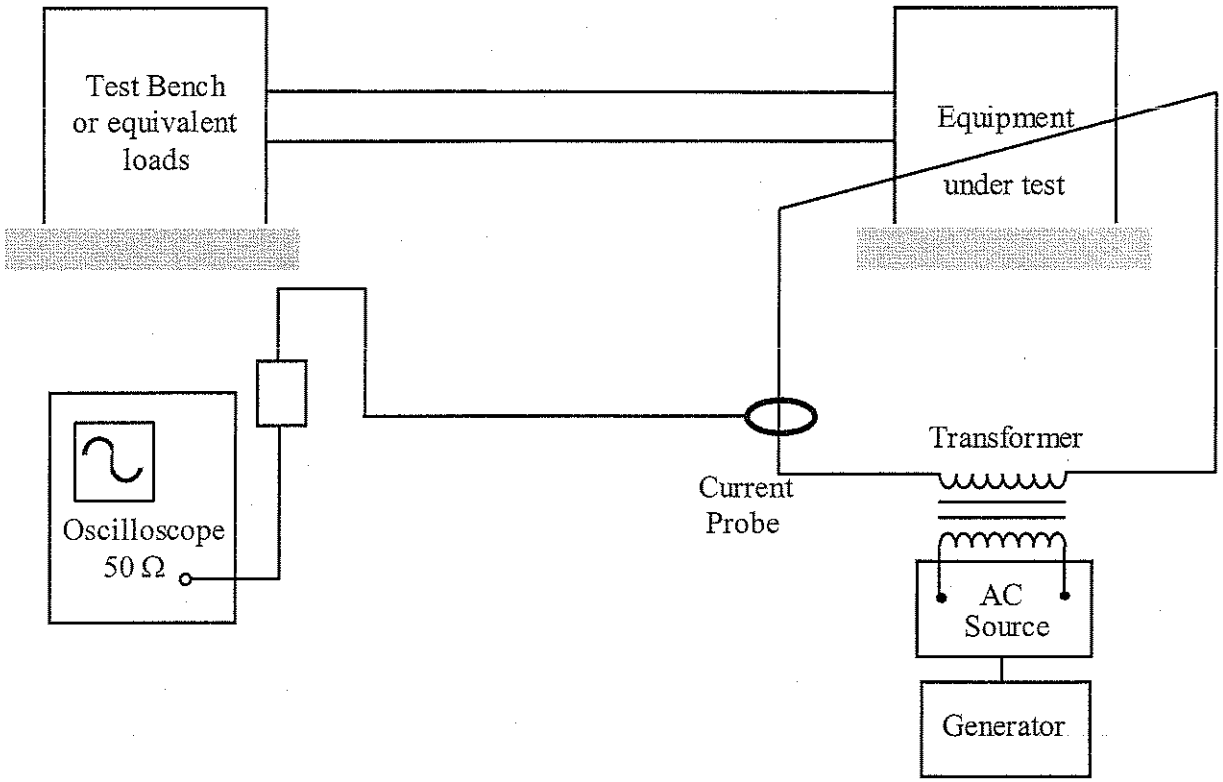
- Test results

No susceptibility is detected during this test.

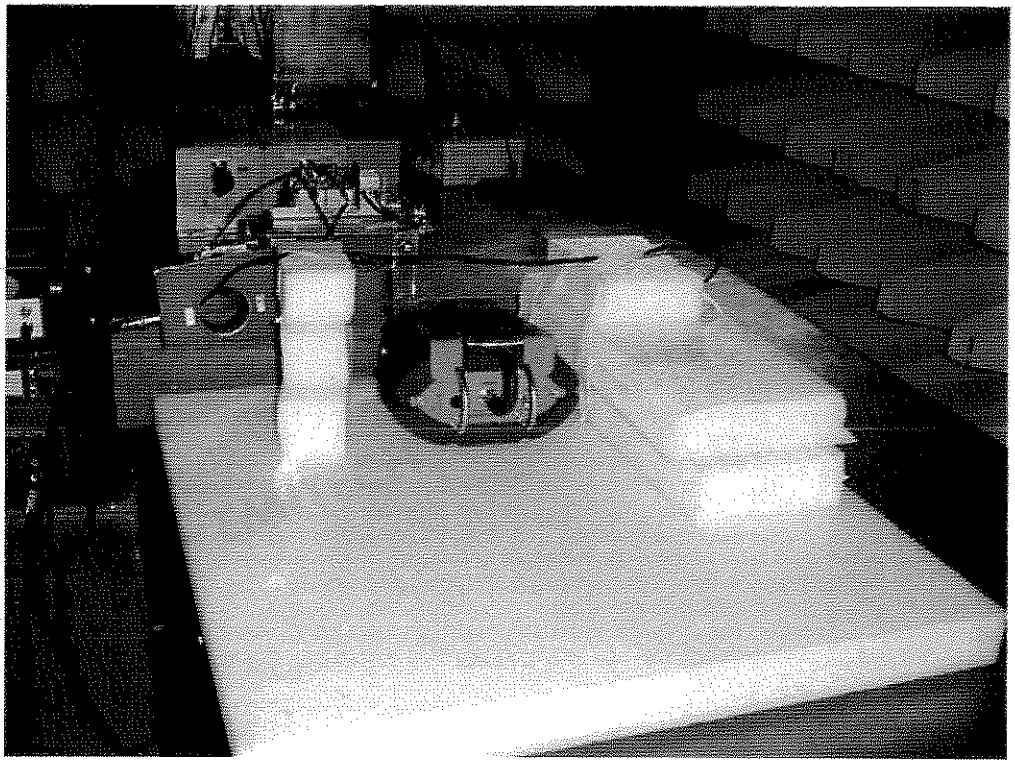
See pictures 5.3.1.2 to 5.3.1.3.

Figure 5.3.1.1

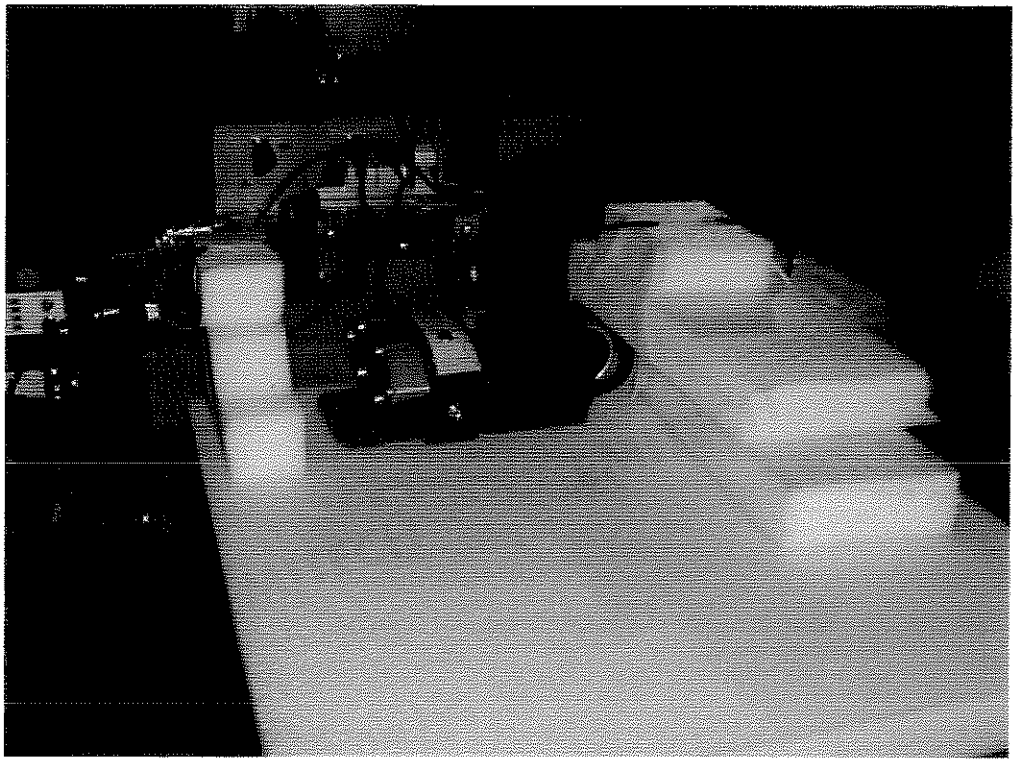
MAGNETIC FIELD INDUCED INTO THE EQUIPMENT

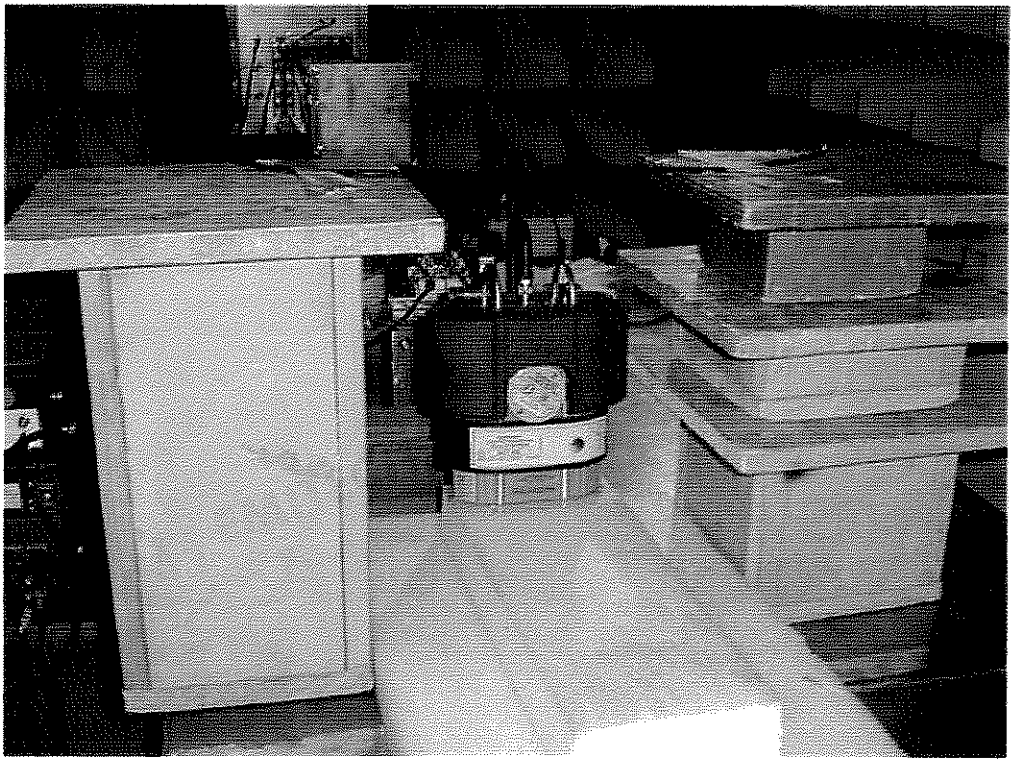


Picture 5.3.1.2



Picture 5.3.1.3





□□□ End of report □□□