

APPLICATION FOR CERTIFICATION

On Behalf of
MSI Sensors (ASIA) Ltd.

Temperature Module

Model Number: TH400 Accessory

Prepared for : MSI Sensors (ASIA) Ltd.
4A, F1.6, Tian'an Cyber Park, Shenzhen.

Prepared By : Audix Technology (Shenzhen) Co., Ltd.
No. 6, Ke Feng Rd., 52 Block,
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Report Number : ACS-F05068
Date of Test : Mar. 07, 2005
Date of Report : Mar.15, 2005

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APPENDIX I

(5 pages)

TEST REPORT DECLARATION

Applicant : MSI Sensors (ASIA) Ltd.
Manufacturer : MSI Sensors (ASIA) Ltd.
EUT Description : Temperature Module
(A) MODEL NO. : TH400 Accessory
(B) SERIAL NO. : F2005031501
(C) POWER SUPPLY : Battery DC 4.5V

Test Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Apr. 2004.

The device described above is tested by Audix Technology (Shenzhen) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits for radiated and conducted emissions. The test results are contained in this test report and Audix Technology (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy and completeness of tests. Also, this report shows that EUT is technically compliant with FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shenzhen) Co., Ltd.

Date of Test : Mar. 07, 2005

Prepared by :

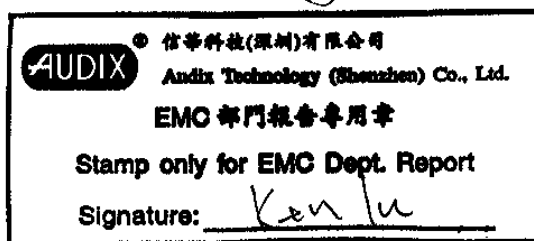
Susan Liu

Susan Liu / Assistant

Reviewer :

Lake Wang

Lake Wang / Supervisor



Approved & Authorized Signer : Ken Lu / Assistant Manager

Name of the Representative of the Responsible Party : _____

Signature : _____

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Temperature Module
Model Number	:	TH400 Accessory
Applicant	:	MSI Sensors (ASIA) Ltd. 4A, F1.6, Tian'an Cyber Park, Shenzhen.
Manufacturer	:	MSI Sensors (ASIA) Ltd. 4A, F1.6, Tian'an Cyber Park, Shenzhen.
Date of Test	:	Mar. 07, 2005

1.2. Test Facility

Site Description

3m Anechoic Chamber	:	Certificated by FCC, USA Registration Number: 90454 Aug. 15, 2003
3m & 10m Anechoic Chamber	:	Certificated by FCC, USA Registration Number: 794232 Mar. 15, 2004
EMC Lab.	:	Certificated by DATech, German Registration Number: DAT-P-091/99-01 Feb. 02, 2004
		Certificated by NVLAP, USA NVLAP Code: 200372-0 Mar. 31, 2004
		Certificated by Nemko, Norway Aut. No.: ELA135 April. 22, 2004
		Certificated by Industry Canada Registration Number: IC 5183 Jul. 28, 2004
Name of Firm	:	Audix Technology (Shenzhen) Co., Ltd.
Site Location	:	No. 6, Ke Feng Rd., 52 Block, Shenzhen Science & Industrial Park, Nantou, Shenzhen, Guangdong, China

1.3. Test Uncertainty

No.	Item	Uncertainty	Remark
1.	Uncertainty for Conducted Emission Test	1.22dB	
2.	Uncertainty for Radiated Emission Test	3.14dB	3m Chamber
3.	Uncertainty for Radiated Emission Test	3.18dB	10m Chamber
4.	Uncertainty for Power Clamp Test	1.38dB	

2. POWER LINE CONDUCTED EMISSION TEST

According to Paragraph (f) of FCC Part 15 section 15.107, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

3. RADIATED EMISSION TEST

3.1. Test Equipment

The following test equipments are used during the radiated emission Test :

3.1.1. For Anechoic Chamber

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Spectrum	HP	85422E	3625A00181	May 24, 04	1 Year
2.	Test Receiver	Rohde & Schwarz	ESVS20	830350/005	May 24, 04	1 Year
3.	Amplifier	HP	8447D	2944A07794	Sep.16, 04	1/2 Year
4.	Bilog Antenna	Schaffner	CBL6111C	2598	Jan.12, 05	1 Year
5.	PC	N/A	586ATX3	N/A	N/A	N/A
6.	Printer	HP	Laserjet6P	SGCF019673	N/A	N/A
7.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.1	July 31, 04	1/2 Year
8.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.2	July 31, 04	1/2 Year
9.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.3	July 31, 04	1/2 Year
10.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.4	July 31, 04	1/2 Year
11.	Coaxial Switch	Anritsu	MP59B	M73989	Nov. 26, 04	1/2 Year

3.2. Block Diagram of Test Setup

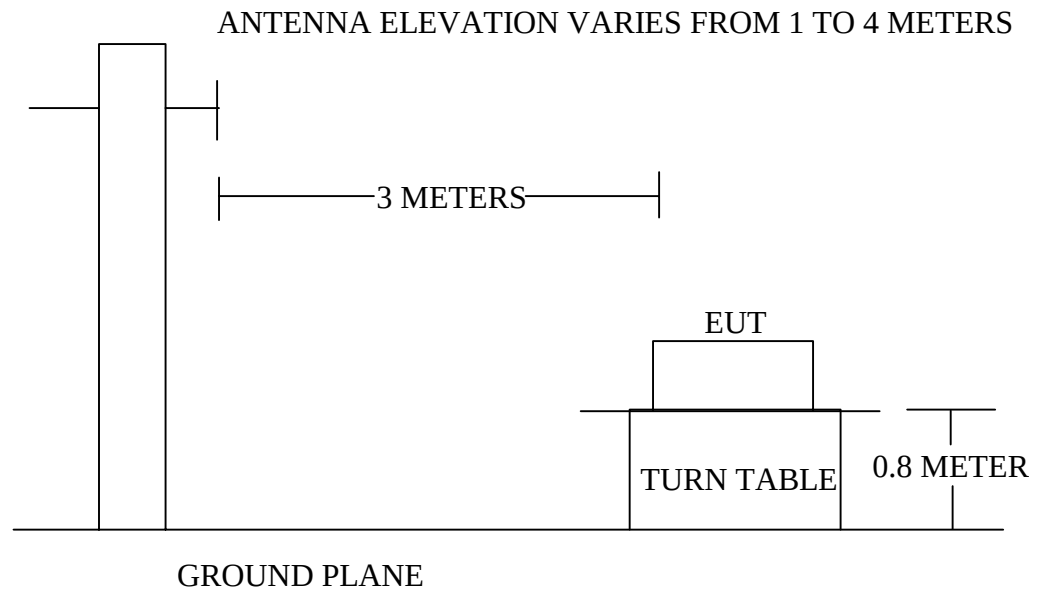
3.2.1. Block Diagram of connection between EUT and simulators



(EUT: Temperature Module)

3.2.2. Anechoic Chamber Setup Diagram

ANTENNA TOWER



3.3. Radiated Emission Limit (FCC Part 15.231(e))

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
433.9 Fundamental	3	92.9 $\text{dB}(\mu\text{V})/\text{m}$ (Fundamental) 72.9 $\text{dB}(\mu\text{V})/\text{m}$ (Spurious)	

- Remark :
- (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$
 - (2) The smaller limit shall apply at the cross point between two frequency bands.
 - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

3.4. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.4.1. Temperature Module (EUT)

Model Number : TH400 Accessory
 Serial Number : F2005031501
 Manufacturer : MSI Sensors (ASIA) Ltd.

3.5. Operating Condition of EUT

3.5.1. Setup the EUT as shown in Section 3.2..

3.5.2. Let the EUT work in test modes (ON) and test it.

3.6. Test Procedure

The EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2003 on radiated emission Test.

The bandwidth of the EMI test receiver (R&S ESVS20) is set at 120kHz.

The frequency range from 30MHz to 1000MHz and above 1000MHz are checked.

The test modes (ON) is tested in Anechoic Chamber and all the scanning waveforms are attached in Appendix I.

3.7. Radiated Emission Test Results

PASS.

The frequency range from 30MHz to 1000MHz is investigated.
Please see the following pages.

Date of Test :	Mar.07, 2005	Temperature :	23°C
EUT :	Temperature Module	Humidity :	54%
Model No. :	TH400 Accessory	Test Mode :	ON
Test Engineer:	Seco		

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Over Limits dBμV/m	Limits dBμV/m
433.900	16.71	4.90	33.08	54.68	-38.22	92.90
867.800	22.07	7.27	9.40	38.74	-34.16	72.90

Remark: 1. All readings are peak values.
2. Emission Level = Antenna Factor + Meter Reading+Cable Loss
3.The bandwidth of the RBW is set at 1MHz and VBW is set at 1MHz.

Date of Test :	Mar.07, 2005	Temperature :	23°C
EUT :	Temperature Module	Humidity :	54%
Model No. :	TH400 Accessory	Test Mode :	ON
Test Engineer:	Seco		

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Over Limits dBμV/m	Limits dBμV/m
433.900	16.26	4.90	33.53	54.68	-38.22	92.90
867.800	22.26	7.27	9.21	38.74	-34.16	72.90

Remark: 1. All readings are peak values.
2. Emission Level = Antenna Factor + Meter Reading+Cable Loss
3.The bandwidth of the RBW is set at 1MHz and VBW is set at 1MHz.

Reviewer :

Wabe Wang

Date of Test : Mar.07, 2005 Temperature : 23°C
 EUT : Temperature Module Humidity : 54%
 Model No. : TH400 Accessory Test Mode : ON
 Test Engineer: Seco

Frequency MHz	Probe Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Over Limits dBμV/m	Limits dBμV/m	Preamp Factor dB/m	Remark
1296.000	24.36	2.38	47.75	37.61	-35.29	72.90	36.88	Peak
1740.000	26.23	2.75	46.80	40.09	-32.81	72.90	35.69	Peak
1296.000	24.99	3.06	38.00	31.32	-21.58	52.90	34.73	Average
1740.000	26.72	1.97	41.99	36.80	-16.10	52.90	33.88	Average

Remark: 1. All readings are Peak and Average values.

2. Emission Level = Probe Factor + Meter Reading+Cable Loss-Preamp Factor

3.The bandwidth of the RBW is set at 1MHz and VBW is set at 1MHz.

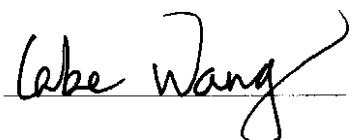
Date of Test : Mar.07, 2005 Temperature : 23°C
 EUT : Temperature Module Humidity : 54%
 Model No. : TH400 Accessory Test Mode : ON
 Test Engineer: Seco

Frequency MHz	Probe Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Over Limits dBμV/m	Limits dBμV/m	Preamp Factor dB/m	Remark
1296.000	24.36	2.38	45.77	35.63	-37.27	72.90	36.88	Peak
1740.000	26.23	2.75	45.22	38.51	-34.39	72.90	35.69	Peak
2168.000	27.62	3.03	38.53	34.18	-38.72	72.90	35.00	Peak
1296.000	24.36	2.38	41.77	31.63	-21.27	52.90	36.88	Average
1740.000	26.23	2.75	40.22	33.51	-19.39	52.90	35.69	Average
2168.000	27.62	3.03	35.53	31.18	-21.72	52.90	35.00	Average

Remark: 1. All readings are Peak and Average values.

2. Emission Level = Probe Factor + Meter Reading+Cable Loss-Preamp Factor

3.The bandwidth of the RBW is set at 1MHz and VBW is set at 1MHz.

Reviewer : 

4. BANDWIDTH TEST

4.1. Test Equipment

The following test equipments are used during the bandwidth test:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4407B	MY41440292	May 24, 04	1 Y
2.	Antenna	EMCO	3115	9607-4877	Jun 15, 04	1.5 Y

4.2. Test Standard

The test completeness FCC Part 15.231(c)

4.3. Bandwidth Limit: $(0.25\% \times 433.90\text{MHz} = 1.08\text{MHz})$

$$434.303 - 433.501 = 0.802\text{MHz} < 1.08\text{MHz}$$

4.4. Test Procedure



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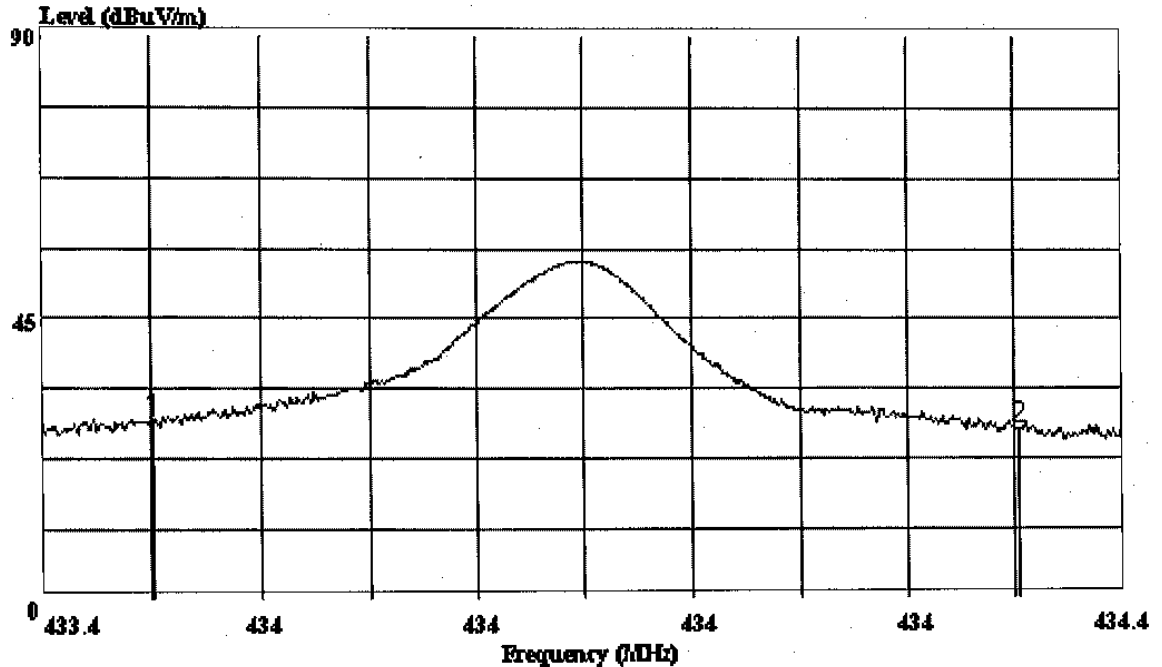
Shenzhen Science & Ind. Park

Tel: 0755-26639495~7

Fax: 0755-26632877

Data#: 24 File#: Msi.emi

Date: 2005-03-22 Time: 10:34:17



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

Condition: 3m 2598FACTOR VERTICAL

EUT : Temperature Module

M/N : TH400 Accessory

Power : Battery DC4.5V

Engineer: Seco

Memo : Temp:23' Humi:54%

: On

Page: 1

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB
1	433.501	28.59	-----	-----	7.36	16.30	4.93
2	434.303	27.18	-----	-----	5.90	16.32	4.95

APPENDIX I



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Shenzhen Science & Ind. Park

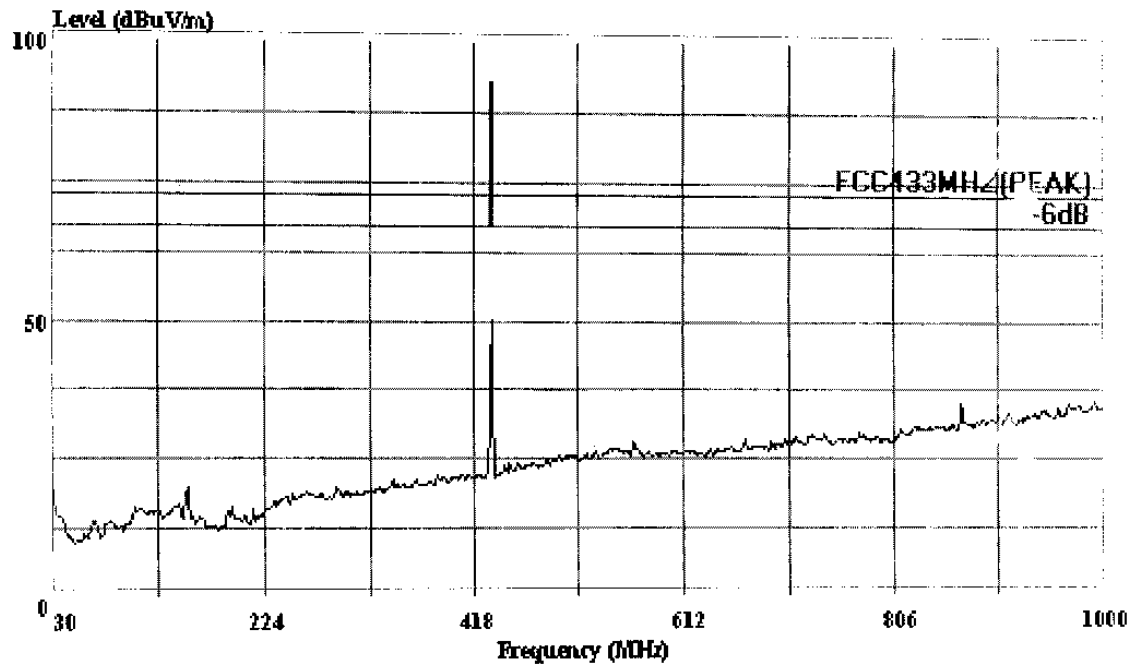
Tel: 0755-26639495-7

Fax: 0755-26632877

Data#: 20

File#: Msi.emi

Date: 2005-03-07 Time: 20:45:16



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

Condition: FCC433MHZ(PEAK) 3m 2598FACTOR HORIZONTAL

EUT : Temperature Module

M/N : TH400 Accessory

Power : Battery DC4.5V

Engineer: Seco

Memo : Temp:23' Humi:54%



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

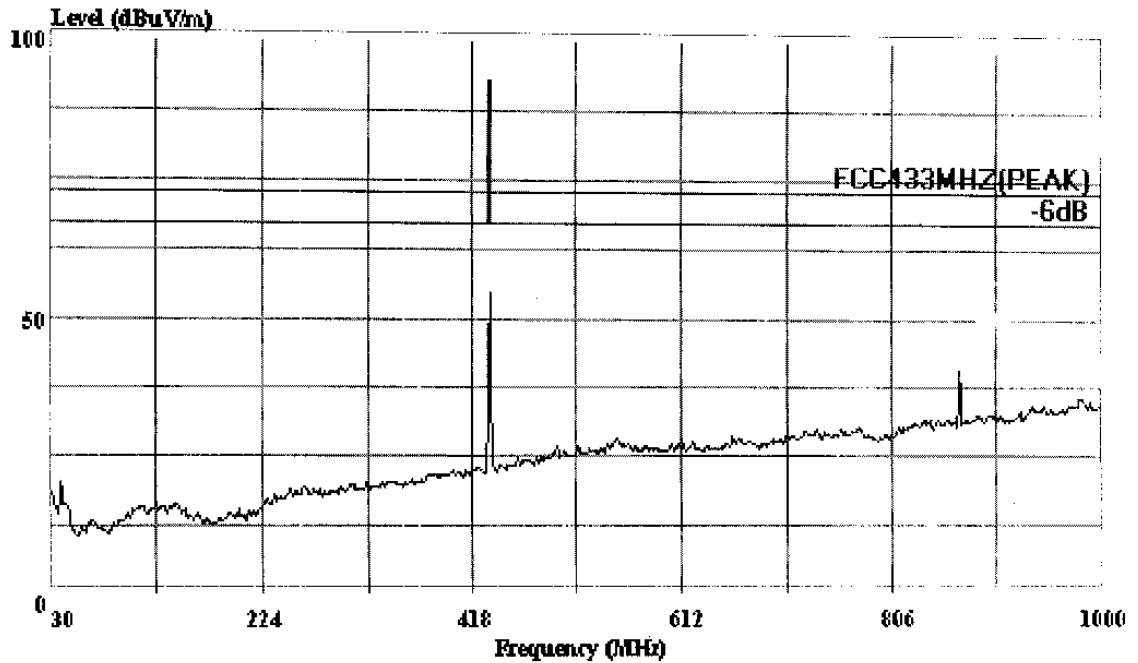
Shenzhen Science & Ind. Park

Tel: 0755-26639495~7

Fax: 0755-26632877

Data#: 19 File#: Msi.emi

Date: 2005-03-07 Time: 20:30:52



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

Condition: FCC433MHZ(PEAK) 3m 2598FACTOR VERTICAL

EUT : Temperature Module

M/N : TH400 Accessory

Power : Battery DC4.5V

Engineer: Seco

Memo : Temp:23' Humi:54%

: On



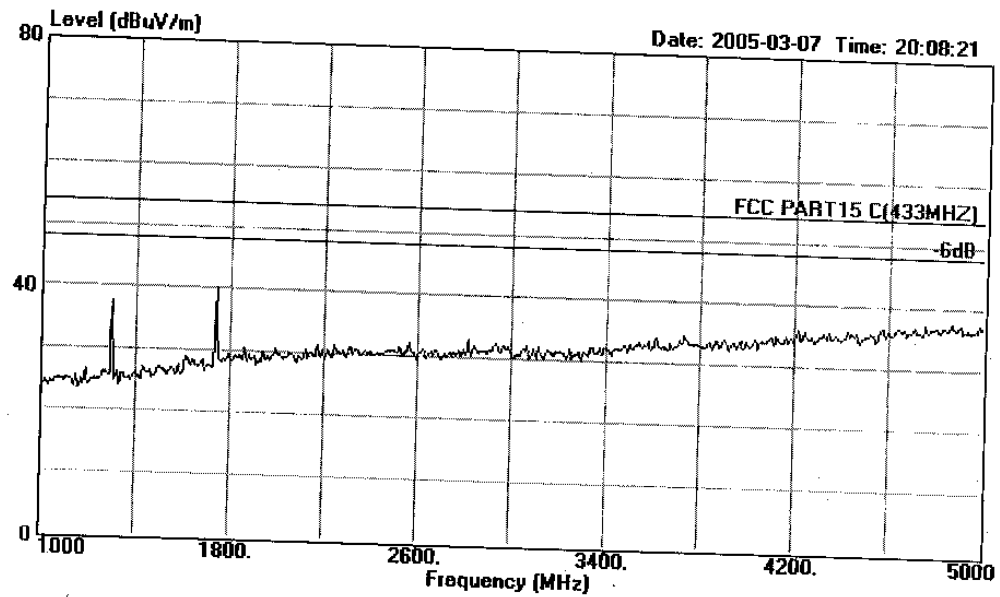
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Data#: 16

File#: C:\EMI TEST DATA\M\Msi.eml



Site : 1# Chamber
Condition : FCC PART15 C(433MHZ) 3m 3115FACTOR HORIZONTAL
EUT : Temperature Module
M/N : TH400 Accessory
Power : Battery DC4.5V
Test Engineer : Seco
Memo : Temp:23' Humi:54%
: On

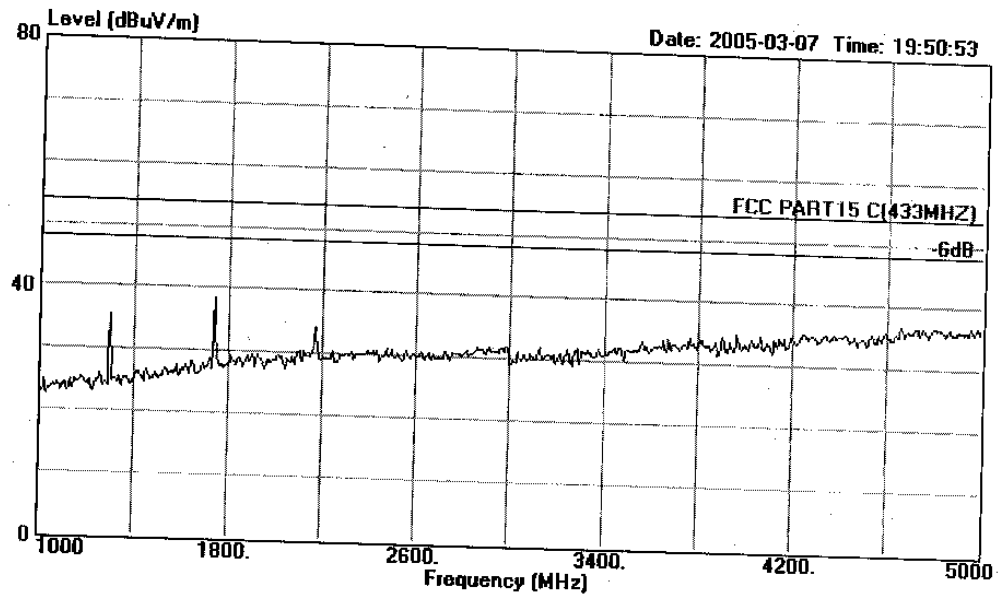


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Data#: 13

File#: C:\EMI TEST DATA\M\Msi.emi



Site : 1# Chamber
Condition : FCC PART15 C(433MHZ) 3m 3115FACTOR VERTICAL
EUT : Temperature Module
M/N : TH400 Accessory
Power : Battery DC4.5V
Test Engineer : Seco
Memo : Temp:23' Humi:54%
: On