

FCC CERTIFICATION
On Behalf of
Eastern Times Technology Co., Ltd.

Wireless Optical Mouse
Model No.: DS-2121

FCC ID: TUVMSEA

Prepared for : Eastern Times Technology Co., Ltd.
Address : Building 5, Penghua Industry Park, Heping Rd.(W),
Longhua, Shenzhen, Guangdong, P.R. China

Prepared by : ACCURATE TECHNOLOGY CO. LTD
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Report Number : ATE20052250
Date of Test : December 12, 2005
Date of Report : December 16, 2005

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Test Report Certification

Applicant : Eastern Times Technology Co., Ltd.
Manufacturer : Eastern Times Technology Co., Ltd.
EUT Description : Wireless Optical Mouse
(A) MODEL NO.: DS-2121
(B) SERIAL NO.: N/A
(C) POWER SUPPLY: 2.4V DC (“AAA” batteries 2×)

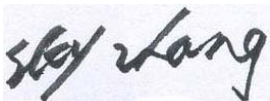
Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.227: 2004 & ANSI C63.4: 2003

The device described above is tested by ACCURATE TECHNOLOGY 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 Section 15.227 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : December 16, 2005

Prepared by : 
(Engineer)

Reviewer : 
(Quality Manager)

Approved & Authorized Signer : 
(Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Wireless Optical Mouse
Model Number	:	DS-2121
Power Supply	:	2.4V DC (“AAA” batteries 2×), Can use USB cable to charge
Applicant Address	:	Eastern Times Technology Co., Ltd. Building 5, Penghua Industry Park, Heping Rd.(W), Longhua, Shenzhen, Guangdong, P.R. China
Manufacturer Address	:	Eastern Times Technology Co., Ltd. Building 5, Penghua Industry Park, Heping Rd.(W), Longhua, Shenzhen, Guangdong, P.R. China
Date of sample received	:	December 12, 2005
Date of Test	:	December 16, 2005

1.2. Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen, May 10, 2004 Accredited by FCC, May 10, 2004 The Certificate Registration Number is 253065 Accredited by Industry Canada, May 18, 2004 The Certificate Registration Number is IC 5077
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3. Measurement Uncertainty

Conducted Emission Uncertainty = ± 2.66 dB

Radiated Emission Uncertainty = ± 4.26 dB

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

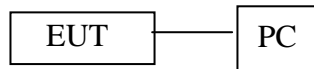
Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	12.16.2006
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	12.16.2006
Loop Antenna	Schwarzbeck	FMZB1516	113	12.16.2006
Bilog Antenna	Chase	CBL6112B	2591	12.16.2006
Spectrum Analyzer	Anritsu	MS2651B	6200238856	12.16.2006
Pre-Amplifier	Agilent	8447D	2944A10619	12.16.2006
L.I.S.N.	Rohde&Schwarz	ESH3-Z5	100305	12.16.2006
L.I.S.N.	Rohde&Schwarz	ESH3-Z5	100310	12.16.2006
Signal Generator	GW	GAG-810	0913317	12.16.2006

3. CONDUCTED EMISSION FOR FCC PART 15 SECTION

15.207(A)

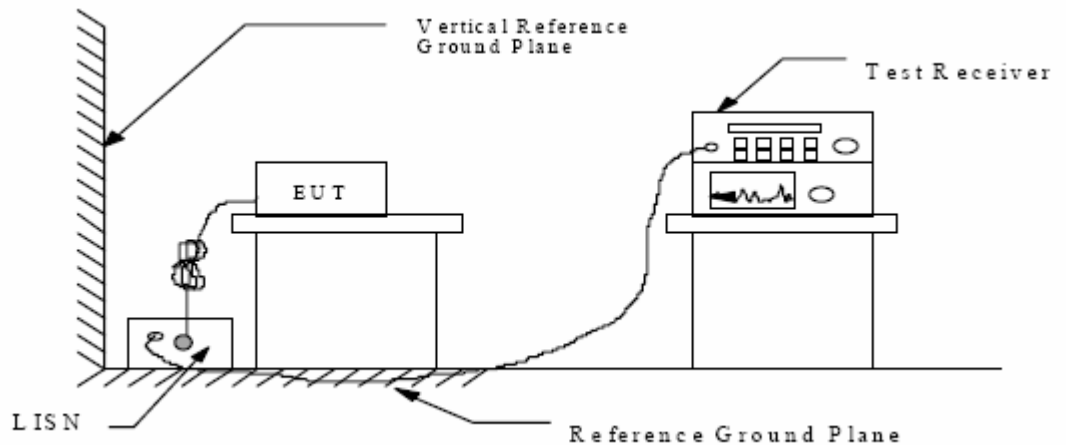
3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Optical Mouse)

3.1.2. Shielding Room Test Setup Diagram



(EUT: Wireless Optical Mouse)

3.2. The Emission Limit For Section 15.207(a)

6.2.1 Radiation Emission Measurement Limits According to Section 15.207(a)

Frequency (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

3.3.EUT Configuration on Measurement

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

3.3.1. Wireless Optical Mouse (EUT)

Model Number : DS-2121
Serial Number : N/A
Manufacturer : Eastern Times Technology Co., Ltd.

3.4.Operating Condition of EUT

3.4.1.Setup the EUT and simulator as shown as Section 6.1.

3.4.2.Turn on the power of all equipment.

3.4.3. Let the EUT work in Charge modes (use USB cable connect to PC) measure it.

3.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2003 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

All the scanning waveforms are attached in Appendix I.

3.6. Power Line Conducted Emission Measurement Results

PASS.

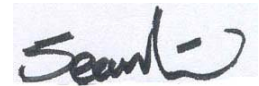
The frequency range from 150kHz to 30MHz is checked.

Date of Test:	<u>December 19, 2005</u>	Temperature:	<u>22°C</u>
EUT:	<u>Wireless Optical Mouse</u>	Humidity:	<u>50%</u>
Model No.:	<u>DS-2121</u>	Power Supply:	<u>120V a.c./60Hz</u>
Test Mode:	<u>Charge</u>	Test Engineer:	<u>Pei</u>

Test Line	Frequency MHz	Emission Level(dBμV)		Limits(dBμV)		Margin(dBμV)	
		QP	AV	QP	AV	QP	AV
Va	0.190	44.4	40.1	64.0	54.0	19.6	13.9
Va	0.515	35.1	28.7	56.0	46.0	20.9	17.3
Va	0.535	35.2	29.7	56.0	46.0	20.8	16.3
Va	0.935	37.0	28.8	56.0	46.0	19.0	17.2
Va	1.030	33.1	26.3	56.0	46.0	22.9	19.7
Va	1.395	33.3	27.5	56.0	46.0	22.7	18.5
Va	3.280	38.4	37.3	56.0	46.0	17.6	8.7
Va	14.600	39.0	36.1	60.0	50.0	21.0	13.9
Va	29.825	30.2	29.0	60.0	50.0	29.8	21.0
Vb	0.190	43.4	36.3	64.0	54.0	20.6	17.7
Vb	0.515	34.8	28.3	56.0	46.0	21.2	17.7
Vb	0.535	35.0	29.6	56.0	46.0	21.0	16.4
Vb	0.935	37.2	29.1	56.0	46.0	18.8	16.9
Vb	1.030	34.0	28.1	56.0	46.0	22.0	17.9
Vb	1.395	33.8	28.4	56.0	46.0	22.2	17.6
Vb	1.720	33.1	25.5	56.0	46.0	22.9	20.5
Vb	2.570	34.0	31.1	56.0	46.0	22.0	14.9
Vb	5.030	32.9	27.5	60.0	50.0	27.1	22.5
Vb	14.375	39.9	32.7	60.0	50.0	20.1	17.3
Vb	29.650	30.1	29.1	60.0	50.0	29.9	20.9

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

Reviewer : _____



4. RADIATED EMISSION FOR FCC PART 15 SECTION 15.227(B)

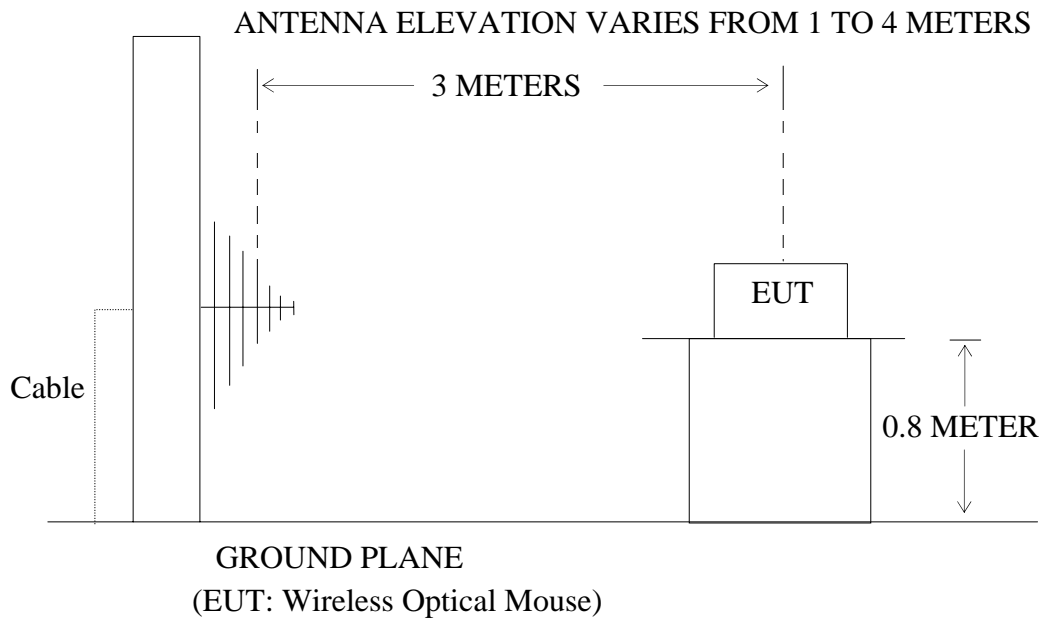
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Optical Mouse)

4.1.2. Anechoic Chamber Test Setup Diagram



4.2. The Field Strength of Radiation Emission Measurement Limits

4.2.1. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209

Radiation Emission Measurement Limits According to Section 15.209(a)

Frequency (MHz)	Limit,		The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those
	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dBμV/m)	
30 - 88	100	40	
88 - 216	150	43.5	

216 - 960	200	46	frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
Above 960	500	54	

4.3. Configuration of EUT on Measurement

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

4.3.1. Wireless Optical Mouse (EUT)

Model Number : DS-2121
 Serial Number : N/A
 Manufacturer : Eastern Times Technology Co., Ltd.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 3.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in TX modes(on) measure it.

4.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 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 polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to FCC Part 15 Subpart C on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120KHz in 30-1000MHz. The frequency range from 30MHz to 1000MHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

4.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 1000MHz is investigated.

Date of Test:	<u>December 16, 2005</u>	Temperature:	<u>20°C</u>
EUT:	<u>Wireless Optical Mouse</u>	Humidity:	<u>50%</u>
Model No.:	<u>DS-2121</u>	Power Supply:	<u>2.4V DC (“AAA”battery 2×)</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Andy</u>

Polarization	Frequency (MHz)	Reading(dBμV/m)	Factor Corr.(dB)	Result(dBμV/m)	Limits(dBμV/m)	Margin(dBμV/m)
		QP		QP	QP	QP
Horizontal	351.586	50.2	-17.7	32.5	46	13.5
Horizontal	459.765	51.5	-16.0	35.5	46	10.5
Horizontal	892.486	46.6	-12.0	34.6	46	11.4
Vertical	81.136	48.8	-24.4	24.4	40.0	15.6
Vertical	513.817	52.2	-15.0	37.2	46	8.8
Vertical	552.942	51.5	-14.4	37.1	46	8.9

The spectral diagrams in appendix 1 display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

$$\text{Where Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

Date of Test: December 16, 2005 Temperature: 20°C
 EUT: Wireless Optical Mouse Humidity: 50%
 Model No.: DS-2121 Power Supply: 5V DC power by PC usb port
 Test Mode: Charge Test Engineer: Andy

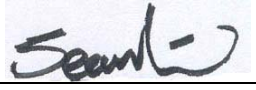
Polarization	Frequency (MHz)	Reading(dBμV/m)	Factor Corr.(dB)	Result(dBμV/m)	Limits(dBμV/m)	Margin(dBμV/m)
		QP		QP		
Horizontal	228.276	56.8	-22.2	34.6	46	11.4
Horizontal	333.246	55.9	-18.3	37.6	46	8.4
Horizontal	352.685	53.1	-17.7	35.4	46	10.6
Horizontal	440.160	49.6	-16.1	33.5	46	12.5
Vertical	131.082	51.6	-21.0	30.6	43.5	12.9
Vertical	461.543	52.6	-15.9	36.7	46	9.3
Vertical	480.982	47.8	-15.6	32.2	46	13.8
Vertical	566.513	47.8	-14.4	33.4	46	12.6

The spectral diagrams in appendix 1 display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

$$\text{Where Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

Reviewer : 

5. FUNDAMENTAL RADIATED EMISSION FOR FCC PART 15

SECTION 15.227(A)

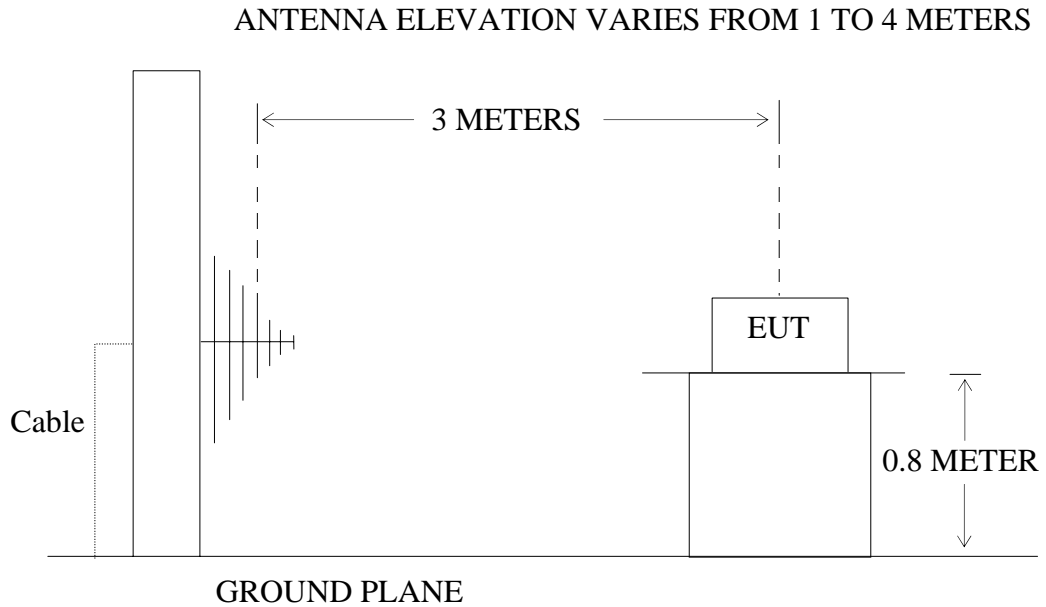
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Optical Mouse)

5.1.2. Anechoic Chamber Test Setup Diagram



(EUT: Wireless Optical Mouse)

5.2. The Emission Limit For Section 15.227(a)

4.2.1 The field strength of any emission within this band shall not exceed 10,000microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emission apply.

5.3.EUT Configuration on Measurement

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

5.3.1. Wireless Optical Mouse (EUT)

Model Number : DS-2121
Serial Number : N/A
Manufacturer : Eastern Times Technology Co., Ltd.

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 4.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in TX mode (On) measure it.

5.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. calibrated Loop antenna is used as receiving antenna. In order to find the maximum emission levels, all of the interface cables must be manipulated according to FCC Part 15 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 9KHz in 9kHz-30MHz

5.6. The Emission Measurement Result

PASS.

Date of Test:	<u>December 16, 2005</u>	Temperature:	<u>20°C</u>
EUT:	<u>Wireless Optical Mouse</u>	Humidity:	<u>50%</u>
Model No.:	<u>DS-2121</u>	Power Supply:	<u>2.4V DC ("AAA"battery 2×)</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Andy</u>

Fundamental Radiated Emissions

Test conditions		Fundamental Frequency	
		27.045MHz	
T _{nom} (20°C)	Unit	(dBμV/m)/(μ V/m) AV	(dBμV/m)/(μ V/m) PEAK
			60.6/1,072
limit		80/10,000	100/100,000
Note: Measurement was performed with modulated signal with average detector and peak			

The spectral diagrams in appendix 1.

Reviewer : 

6. BAND EDGES

6.1.The Requirement

5.1.1. The wanted emission within the band 26.96-27.28MHz.

6.2.EUT Configuration on Measurement

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

6.2.1.Wireless Optical Mouse (EUT)

Model Number : DS-2121
Serial Number : N/A
Manufacturer : Eastern Times Technology Co., Ltd.

6.3.Operating Condition of EUT

6.3.1.Setup the EUT and simulator as shown as Section 4.1.

6.3.2.Turn on the power of all equipment.

6.3.3.Let the EUT work in TX mode (On) measure it.

6.4.Test Procedure

The transmitter output was fed into the spectrum analyzer and photo was taken. The vertical scale is set to 10dB per division; the horizontal scale is set to 32kHz per division. Star frequency are 26.96MHz, stop frequency are 27.28MHz .
RBW are 3kHz, VBW are 3kHz, Sweep time are 50ms.

6.5. The Measurement Result

The EUT does meet the FCC requirement.

The spectral diagrams in appendix 1.

APPENDIX I (Test Curves)

CONDUCTION EMISSION STANDARD FCC PART15B 19. Dec 05 16:42

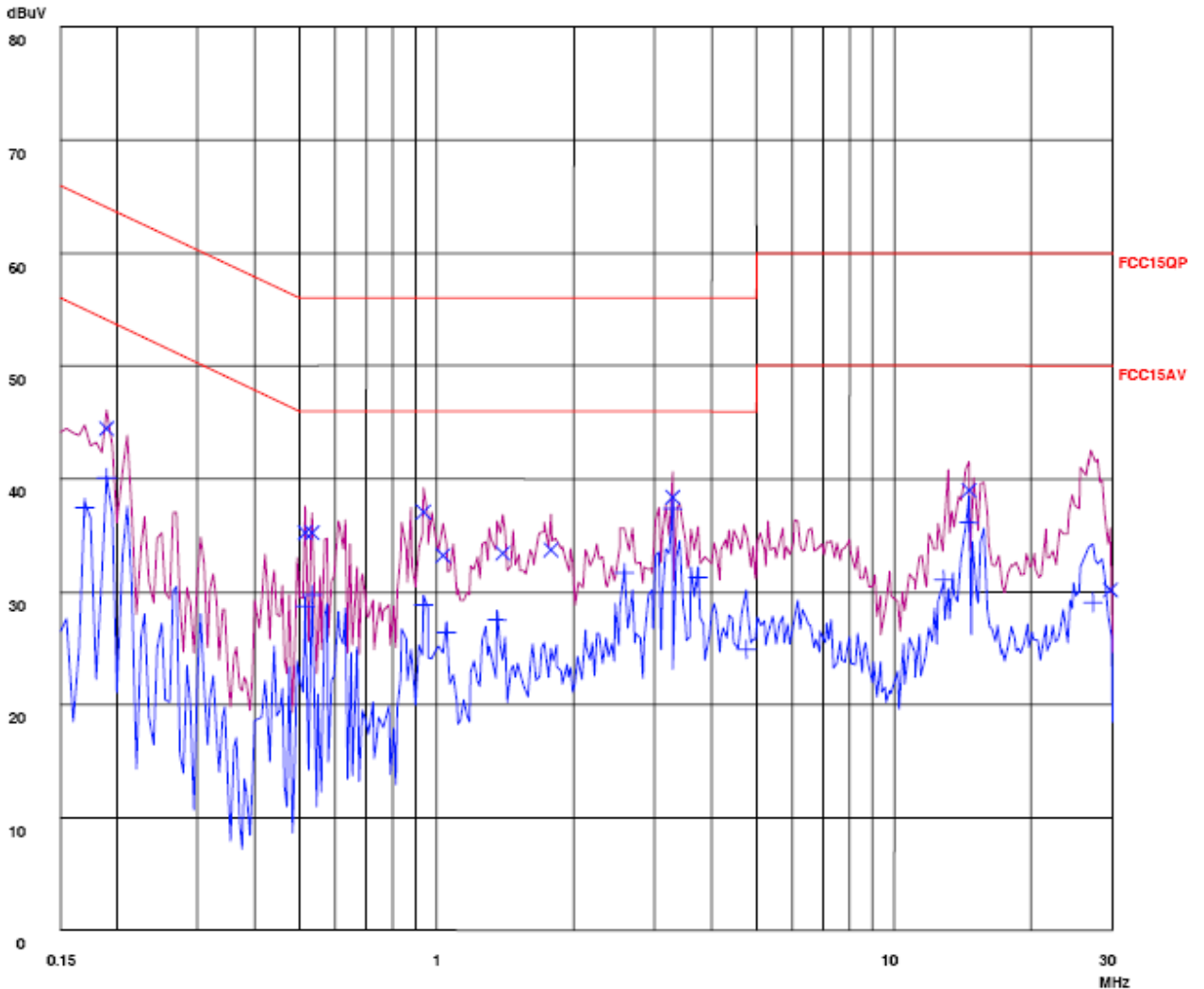
EUT: Wireless Optical Mouse MIN:DS-2121
 Manuf: Eastern Times
 Op Cond: Charge
 Operator: Pei
 Test Spec: Va 120V/60Hz
 Comment: Tem22°C Humi50%
 File name: 2.RES

Scan Settings (3 Ranges)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten Preamp
150k	2M	5k	9k	PK+AV	10ms AUTO LN	OFF
2M	10M	10k	9k	PK+AV	1ms AUTO LN	OFF
10M	30M	25k	9k	PK+AV	1ms AUTO LN	OFF

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 20dB

Transducer No.	Start	Stop	Name
1	9k	30M	confac



CONDUCTION EMISSION STANDARD FCC PART15B

19. Dec 05 16:27

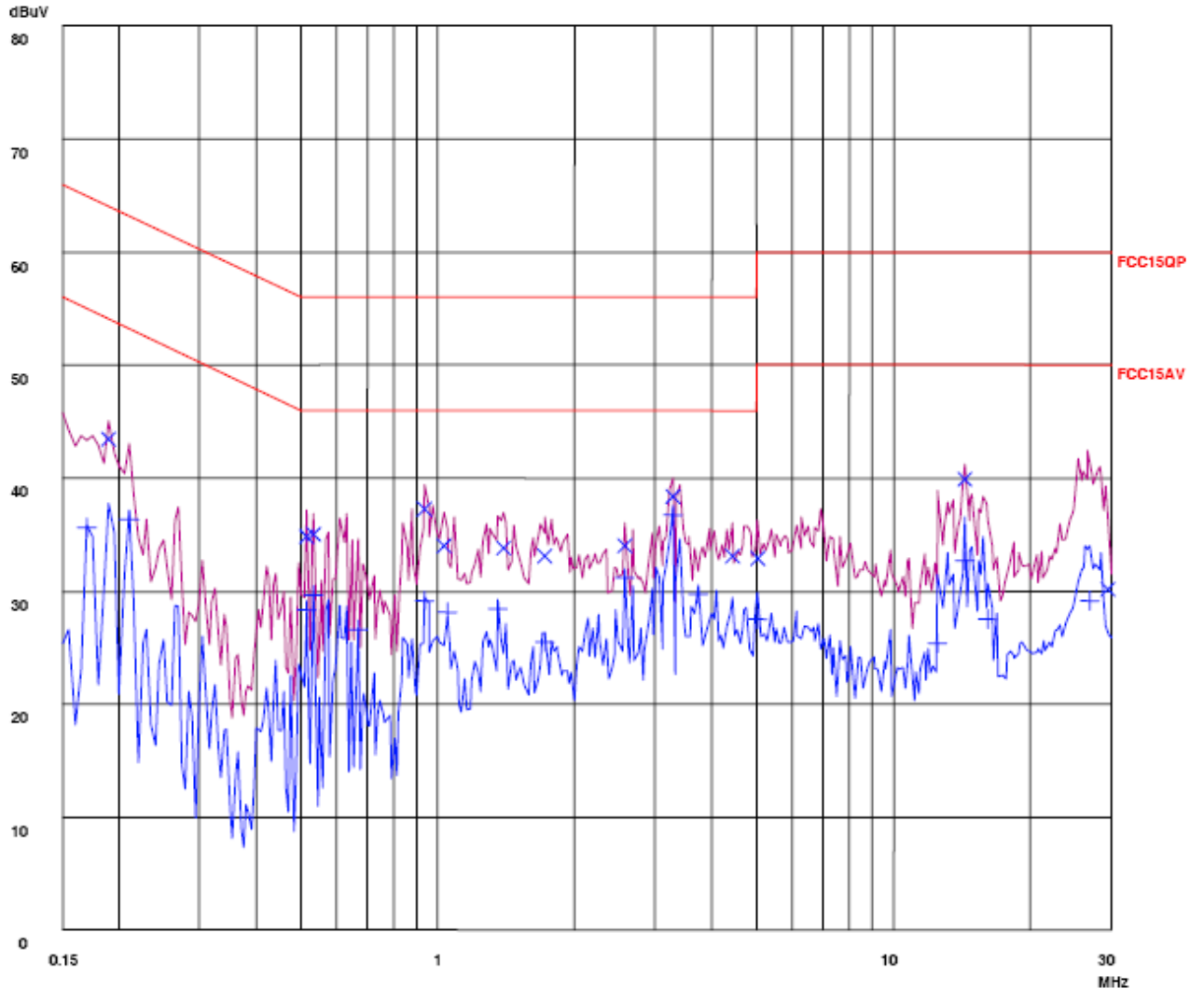
EUT: Wireless Optical Mouse M/N:D5-2121
 Manuf: Eastern Times
 Op Cond: Charge
 Operator: Pei
 Test Spec: Vb 120V/60Hz
 Comment: Tem22°C Humi50%
 File name: 2.RES

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	2M	5k	9k	PK+AV	10ms	AUTO	LN OFF
2M	10M	10k	9k	PK+AV	1ms	AUTO	LN OFF
10M	30M	25k	9k	PK+AV	1ms	AUTO	LN OFF

Final Measurement: X QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 20dB

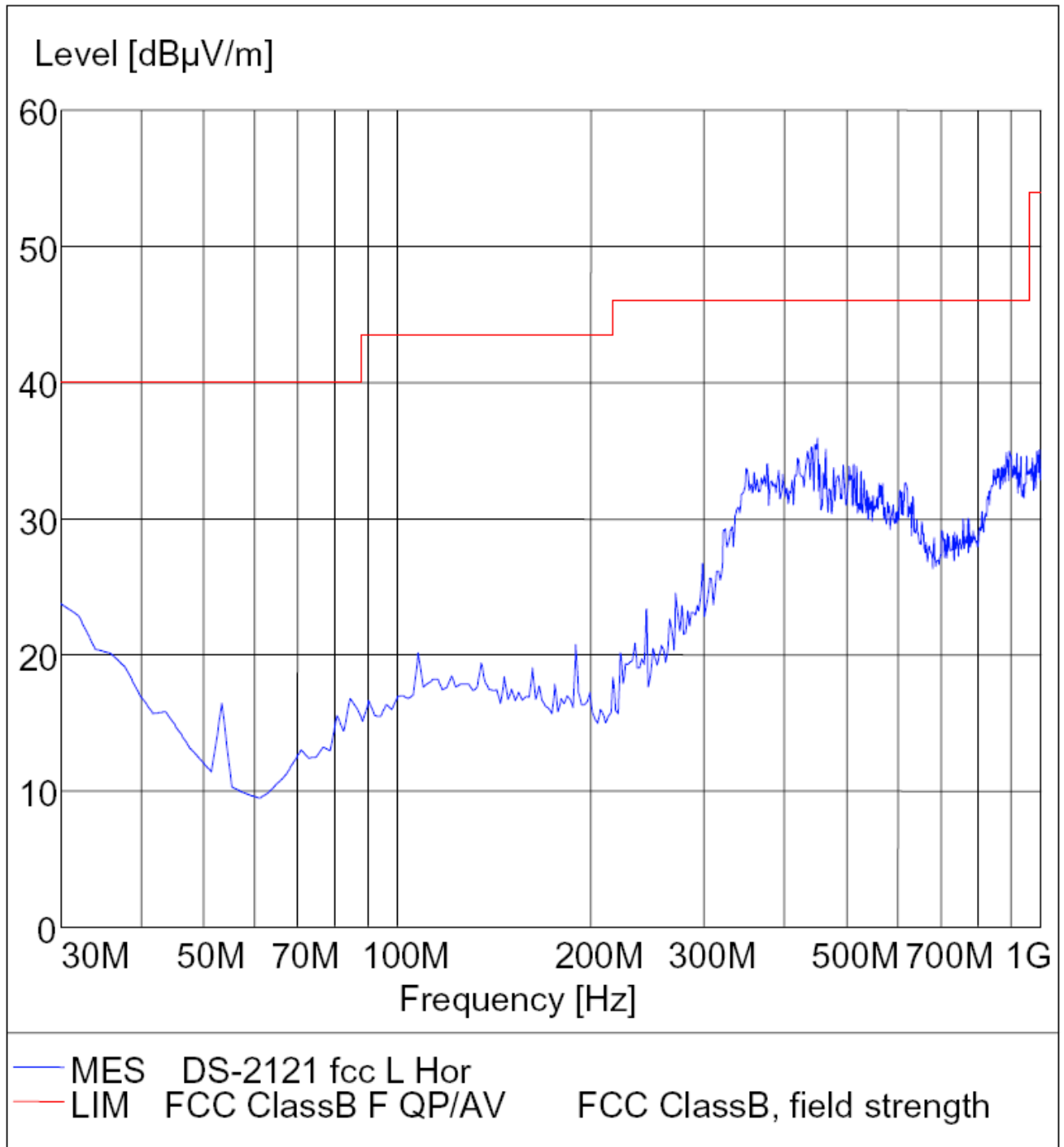
Transducer No. Start Stop Name
 1 9k 30M confac



Radiated Disturbance

FCC Part 15

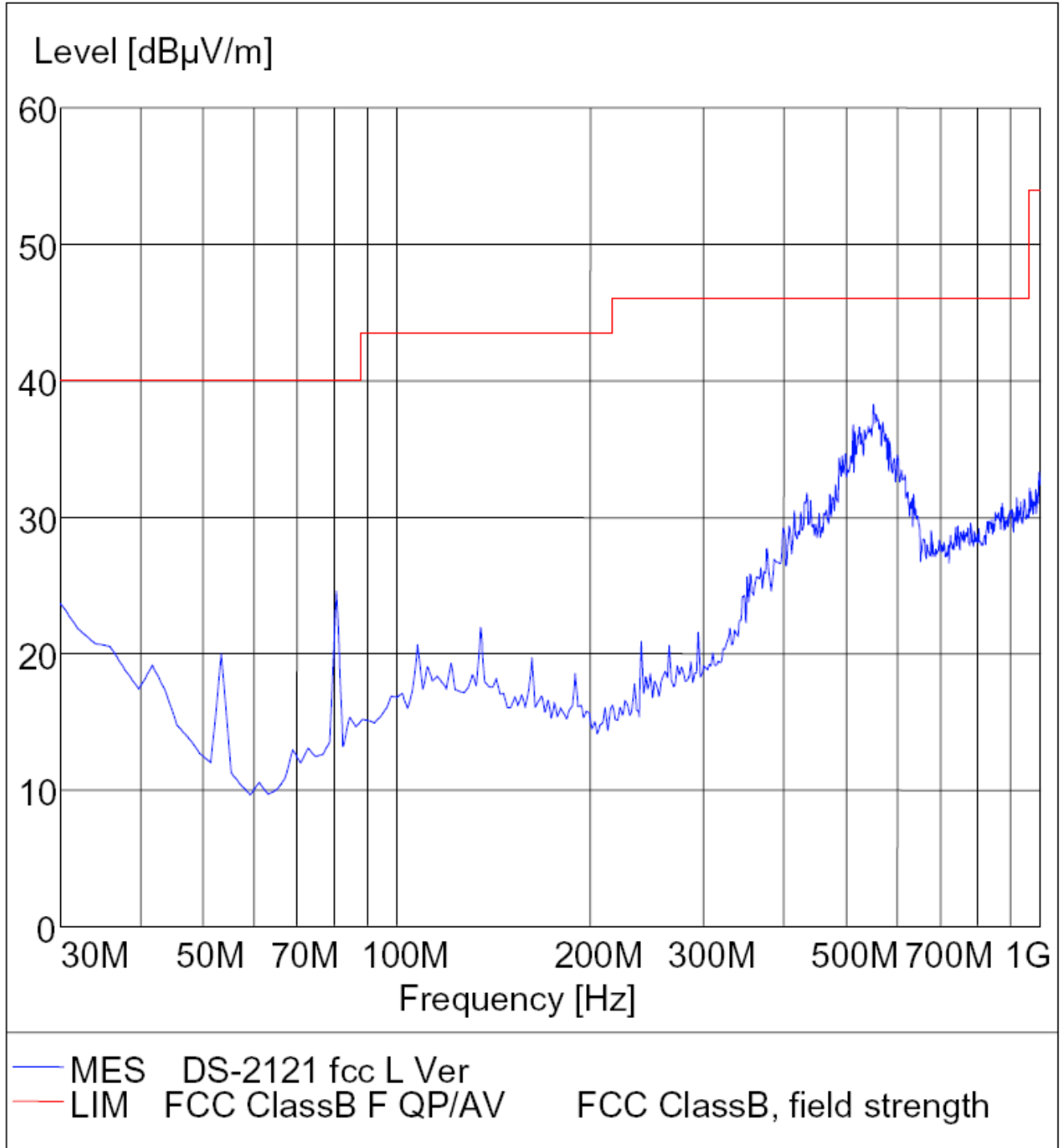
EUT: Wireless Optical Mouse M/N:DS-2121
Manufacturer: Eastern Times
Operating Condition: TX
Test Site: ATC EMC Lab.SAC
Operator: Andy
Test Specification: Horizontal
Comment : DC 2.4V
:



Radiated Disturbance

FCC Part 15

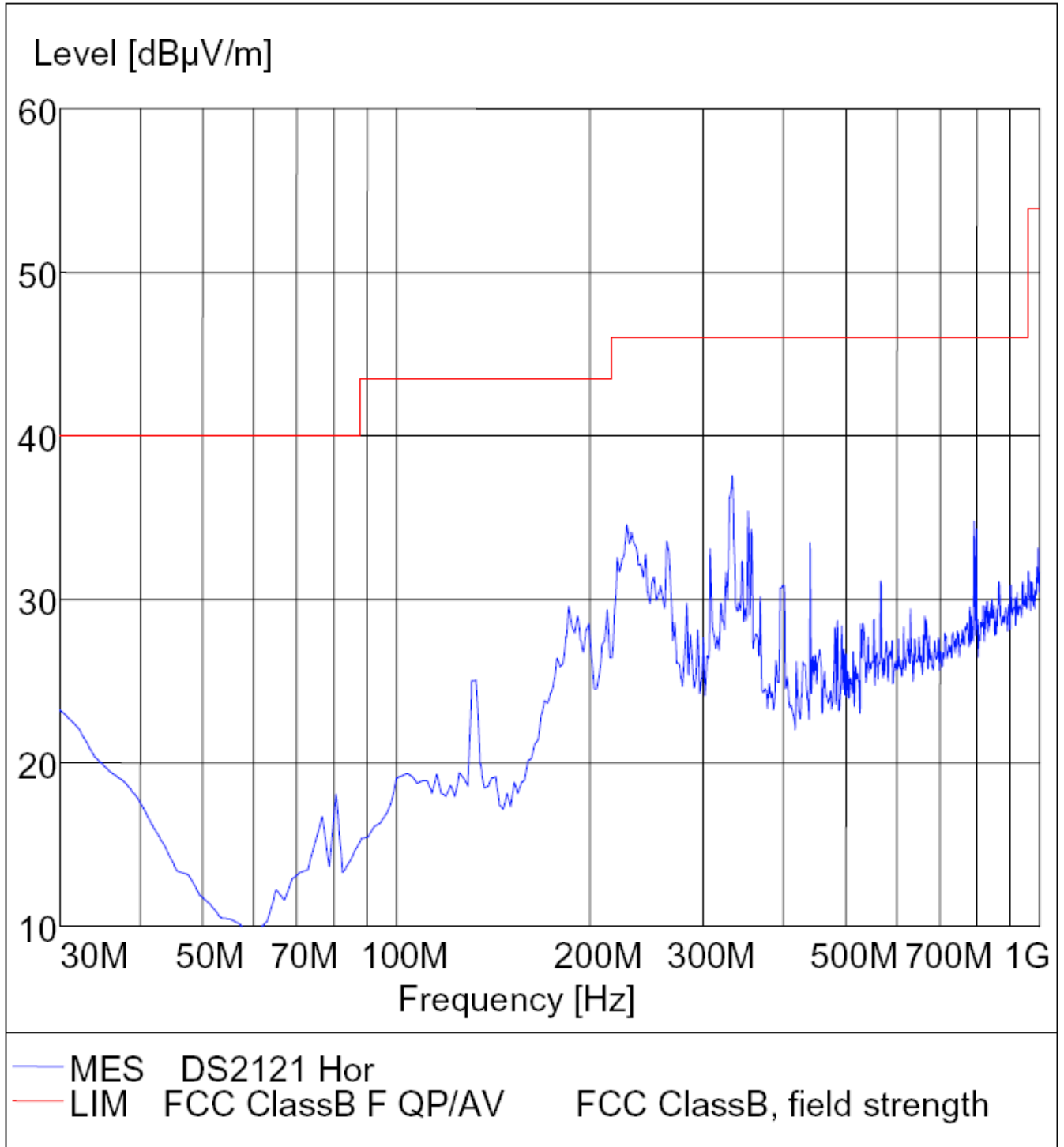
EUT: Wireless Optical Mouse M/N:DS-2121
Manufacturer: Eastern Times
Operating Condition: TX
Test Site: ATC EMC Lab.SAC
Operator: Andy
Test Specification: Vertical
Comment : DC 2.4V
:



Radiated Disturbance

FCC Part 15

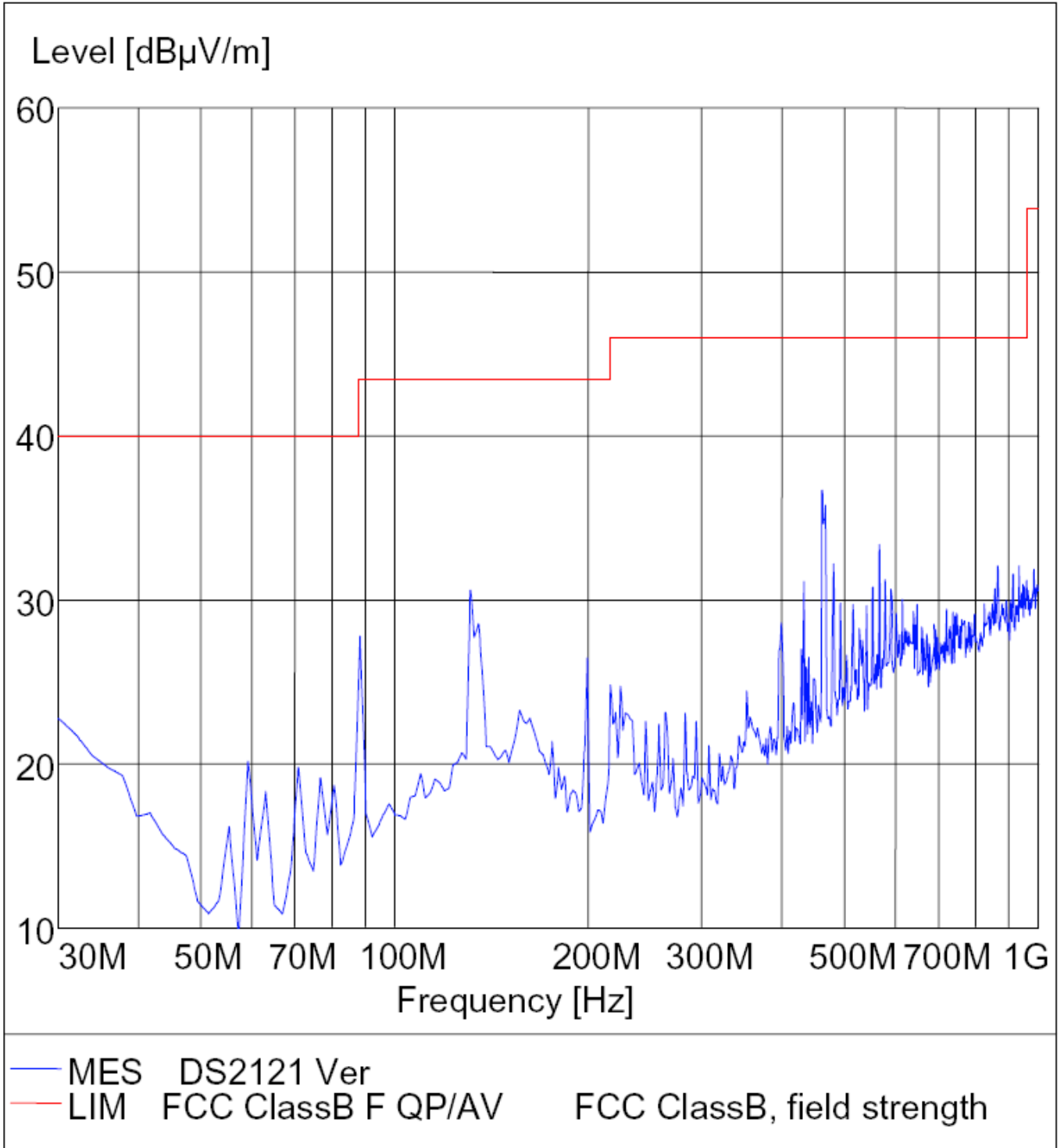
EUT: Wireless Optical Mouse M/N:DS-2121
Manufacturer: Eastern Times
Operating Condition: Charge
Test Site: ATC EMC Lab.SAC
Operator: Andy
Test Specification: Horizontal
Comment : DC 5V Power by PC



Radiated Disturbance

FCC Part 15

EUT: Wireless Optical Mouse M/N:DS-2121
Manufacturer: Eastern Times
Operating Condition: Charge
Test Site: ATC EMC Lab.SAC
Operator: Andy
Test Specification: Vertical
Comment : DC 5V power by PC





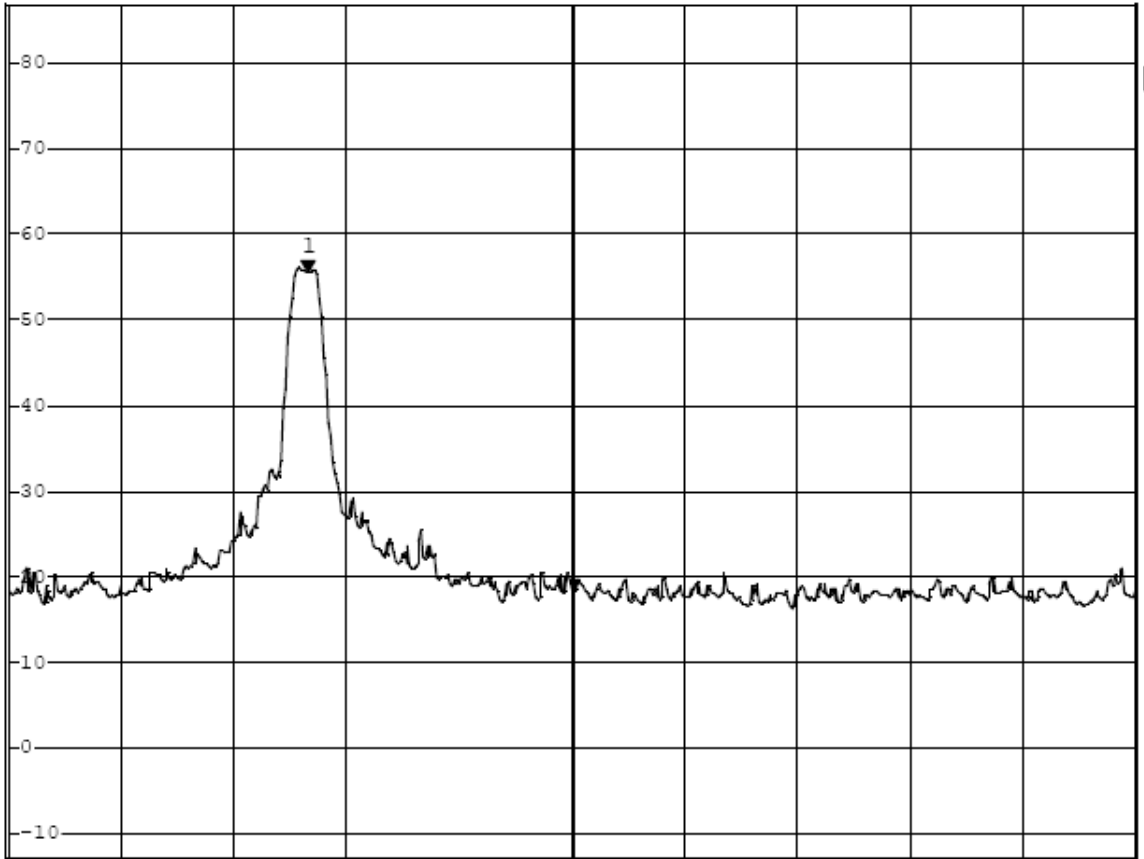
*RBW 3 kHz Marker 1 [T1]
*VBW 3 kHz 55.64 dBuV
*SWT 50 ms 27.045120000 MHz

Ref 87 dBuV

Att 10 dB

UNCAL

1 PK
VIEW



Start 26.96 MHz

32 kHz/

Stop 27.28 MHz