TÜV Rheinland
Product Safety GmbH
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TÜV

Prüfbericht - Nr.: *Test Report No.*	**14005578 001**	Seite 1 von 13 *Page 1 of 13*

Auftraggeber: *Client:*	**Lucky Plastic Factory Ltd.** **Suite 907-908** **Chinachem Golden Plaza** **77 Mody Road** **T.S.T. East, Kowloon** **Hong Kong**
Gegenstand der Prüfung: *Test item:*	**Lower Power Transmitter**
Bezeichnung: *Identification:*	**Refer to section 3.1**
Serien-Nr.: *Serial No.*	**Engineering Sample**
Wareneingangs-Nr.: *Receipt No.:*	**040127026**
Eingangsdatum: *Date of receipt:*	**27.01.2004**
Prüfort: *Testing location:*	**Refer to section 2.1**
Prüfgrundlage: *Test specification:*	**FCC Part 15, Subpart C**
Prüfergebnis: *Test Result*	**Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage.** The a. m. test item passed.

geprüft / *tested by:*	**kontrolliert** / *reviewed by*
P.Poon	**T.Berns**
15.05.2004	15.05.2004
Datum *Date*	**Datum** *Date*
Unterschrift *Signature*	**Unterschrift** *Signature*

Sonstiges / *Other Aspects:*

FCC ID: NEX-9405-49

Abkürzungen:		Abbreviations:	
OK, Pass	= entspricht Prüfgrundlage	OK, Pass	= passed
Fail	= entspricht nicht Prüfgrundlage	Fail	= failed
N/A	= nicht anwendbar	N/A	= not applicable

Dieser Prüfbericht bezieht sich nur auf den o.g. Prüfgegenstand und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products.

TEST SUMMARY

7.1.1 RADIATED EMISSION OF CARRIER FREQUENCY
Resullt: Pass

7.1.2 SPURIOUS RADIATED EMISSIONS
Resullt: Pass

7.1.3 BANDWIDTH MEASUREMENT
Resullt: Pass

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test Results
Appendix 2: Test Setup
Appendix 3: External Photographs of EUT
Appendix 4: Internal Photographs of EUT
Appendix 5: FCCID Label, Block Diagram, Schematics and User Manual

2 Test Sites

2.1 Test Facilities

TÜV Rheinland Hong Kong Ltd.
Unit 8, 25th Floor, Skyline Tower
39 Wang Kwong Road,
Kowloon Bay
Hong Kong

Hong Kong Productivity Council'
HKPC Building
78 Tat Chee Avenue
Kowloon
Hong Kong

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

	Kind of Equipment	Manufacturer	Type	S/N
☐	Test Receiver	Rohde & Schwarz	ESH-3	890173/033
☐	L/I/S/N	Rohde & Schwarz	ESH 3-Z5	849876/026
☐	Oscilloscope	HP	54713B	US34510455
☐	Test Receiver	Rohde & Schwarz	ESVP	882402/033
☐	Absorbing Clamp	Rohde & Schwarz	MDS-21	979 3/4
☒	Test Receiver	Rohde & Schwarz	ESVS30	842807/009
☒	Biconical Antenna	Rohde & Schwarz	HK116	841489/015
☒	Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
☐	Universal Power Analyzer	Voltech	PM3000A	9915
☐	Reference Impedance Network	Voltech	IEC 555 Standard	9946
☐	AC Power Source	California Instr.	4500L	HK51895
☐	Trip-Loop Antenna	Chase	LLA6142	1019
☐	Double Ridge Horn Antenna	EMCO	3115	9002-3351
☐	Double Ridge Horn Antenna	EMCO	3116	9002-3347
☐	RF Comms Test Set	HP	8920B	US36492628
☐	Spectrum Analyser + Tracking Gen.	HP	8596E	3639A00758
☐	Signal Generator	Rohde & Schwarz	SMY 01	844146/024
☐	Signal Generator	Rohde & Schwarz	SMY 01	844146/023
☐	BiLog Antenna	EMCO	3143	9607-1287
☐	Isotropic Field Probe	Holladay	HI-4422	90956
☐	Power Amplifier	Kalmus	757-LC	7620-1
☐	Power Amplifier	Kalmus	122-FC	7620-2
☐	Coupling Clamp	Schaffner	CDN 126	312
☐	Couple Device Network	Fischer	CDN-M2	9604
☒	Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30
☐	Temperature Chamber	Binder	MK 240	9020-0028
☐	EFT,ESD,SURGE, DIPS tester	Schaffner	Best 96	IN3796-011

3 General Product Information

3.1 Product Function and Intended Use

The equipment under test (EUT) is a transmitter for a RC toy car operating at 49.860MHz. The EUT has two control rods for commanding the forward, backward, left and right movement of the associated receiver.

After construction checking and declaration from the manufacturer, it is deemed that that 9389, 9406, 9407 and 9408 are same in circuit design and PCB layout as 9405, they only differ in the cosmetic design. Hence, all testing was conducted on the representative model: 9405.

FCCID: NEX-9405-49

Model	**Product description**
9389	3" R/C Smart
9405	Micro Subaru
9406	Micro Mitsubishi
9407	3" R/C Roadster
9408	Micro Citroen

3.2 Circuit Description

IC1 and the associated circuit act as AF-Modulator. Q2 and the associated circuit act as a RF-amplifier. Q1 together with 49.860MHz crystal acts as an oscillator to drive the base of Q2, signal from Q1 and the modulation provided by IC1 are then summed into Q2. The matching network at output of Q1 is to limit the harmonic content and provide the proper coupling to antenna output.

3.3 Ratings and System Details

		Transmitter
Frequency range	:	49.860MHz
Number of channels	:	1
Type of antenna	:	Integral antenna
Power supply	:	Battery operated 3x1.5V "AAA" size batteries.
Ports	:	none
Protection Class	:	III

3.4 Independent Operation Modes

The basic operation modes are:

- Power: On and Off
- Two control rods for commanding the left and right, forward and backward movement of the associated receiver.

For further information refer to User Manual

3.5 Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- Rating label
- User manual

3.6 Related Submittal(s) Grants

This is a single application for certification of the transmitter, the receiver for this transmitter is authorized by the Certification procedure.

4 Test Set-up and Operation Mode

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation should refer to Section 5 and 7.

- There was no special software to exercise the device.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

-none

4.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Circuit Diagram or the Technical Construction File. No additional measures were employed to achieve compliance.

5 Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2001.

The equipment under test (EUT) was placed at the middle of the 80cm height turntable, and the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

The frequency range scanned is from the lowest radio frequency signal generated in the device which greater than 9 KHz to the tenth harmonic of the higest fundamental frequency or 40GHz, whichever is lower.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in section 7.1.1 and 7.1.2 of this test report.

6 Field Strength Calculation

The field strength at 3m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attentuation Factor in dB.
FA = Filter Attenutaion Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

7 Test Results

7.1.1 Radiated Emission of Carrier Frequency

RESULT: **Pass**

Test Specification : FCC Part 15 section 15.235(a)
Test Method : ANSI 63.4-2001
Measurement Location: Semi Anechoic Chamber
Measurement Distance: 3m
Detector Function : Peak and average
Measurement BW : 100KHz
Supply Voltage : DC 4.5V

Polarization: Vertical

Detector function	Frequency (MHz)	Reading (dBuV)	Antenna Factor (dBuV/m)	Attentuation of cable (dB)	Measured Field strength at 3m (dBuV/m)	Delta to Limit (dB)
Peak	49.860	42.60	12.9	0.5	56.0	44.0
Average	49.860	41.40	12.9	0.5	54.8	25.2

Polarization: Horizontal

Detector function	Frequency (MHz)	Reading (dBuV)	Antenna Factor (dBuV/m)	Attentuation of cable (dB)	Measured Field strength at 3m (dBuV/m)	Delta to Limit (dB)
Peak	49.860	35.10	12.9	0.5	48.5	51.5
Average	49.860	34.20	12.9	0.5	47.6	52.4

Limit **Section 15.235 (a)**

Frequency within the band	Peak Emission		Average Emission	
	(microvolts / meter)	dBμV/m	(microvolts / meter)	dBμV/m
49.82-49.94MHz	100,000	80.0	10,000	100.0

According to section 15.35(b), When average radiated emission measurements are specified, including emission measeurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

7.1.2 Spurious Radiated Emissions

RESULT: **Pass**

Test Specification : FCC Part 15 section 15.209
Test Method : ANSI 63.4-2001
Measurement Location : Semi Anechoic Chamber
Measurement Distance : 3m
Detector Function : Quasi Peak
Measurement BW : 100KHz
Supply Voltage : DC 4.5V
Measuring Frequency Range : 30-1000MHz

Polarization: Vertical

Frequency (MHz)	Reading (dBuV/m)	Antenna Factor (dBuV/m)	Attentuation of cable (dB)	Field strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
99.72	7.50	10.70	0.70	18.90	43.50	-24.60
177.08	0.55	15.35	1.00	16.90	43.50	-26.60
186.08	0.30	15.80	1.00	17.10	43.50	-26.40
199.70	0.50	16.30	1.10	17.90	43.50	-25.60
299.17	4.10	13.00	1.30	18.40	46.00	-27.60
359.00	2.30	14.80	1.50	18.60	46.00	-27.40
418.84	1.70	16.10	1.70	19.50	46.00	-26.50
478.67	1.10	17.30	2.00	20.40	46.00	-25.60
615.43	3.20	19.30	2.10	24.60	46.00	-21.40

Polarization: Horizontal

Frequency (MHz)	Reading (dBuV/m)	Antenna Factor (dBuV/m)	Attentuation of cable (dB)	Field strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
99.72	7.40	10.70	0.70	18.80	43.50	-24.70
149.16	1.60	14.30	0.90	16.80	43.50	-26.70
198.68	0.00	16.30	1.10	17.40	43.50	-26.10
249.31	3.55	11.65	1.20	16.40	46.00	-29.60
299.17	0.70	13.00	1.30	15.00	46.00	-31.00
359.00	0.10	14.80	1.50	16.40	46.00	-29.60
418.84	0.10	16.10	1.70	17.90	46.00	-28.10
478.67	0.10	17.30	2.00	19.40	46.00	-26.60
615.43	2.80	19.30	2.10	24.20	46.00	-21.80

For test results refer to Appendix 1, page 3-6

Limit **Section 15.209**

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

Field strength limits within the restricted bands using average detector:

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dBµV/m)	Measurement distance (meters)
30-88	100	20*log(100) = 40.0	3
88-216	150	20*log(150) = 43.5	3
216-960	200	20*log(200) = 46.0	3
Above 960	500	20*log(500) = 54.0	3

According to section 15.35(b), on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated.

7.1.3 Bandwidth Measurement

RESULT: **Pass**

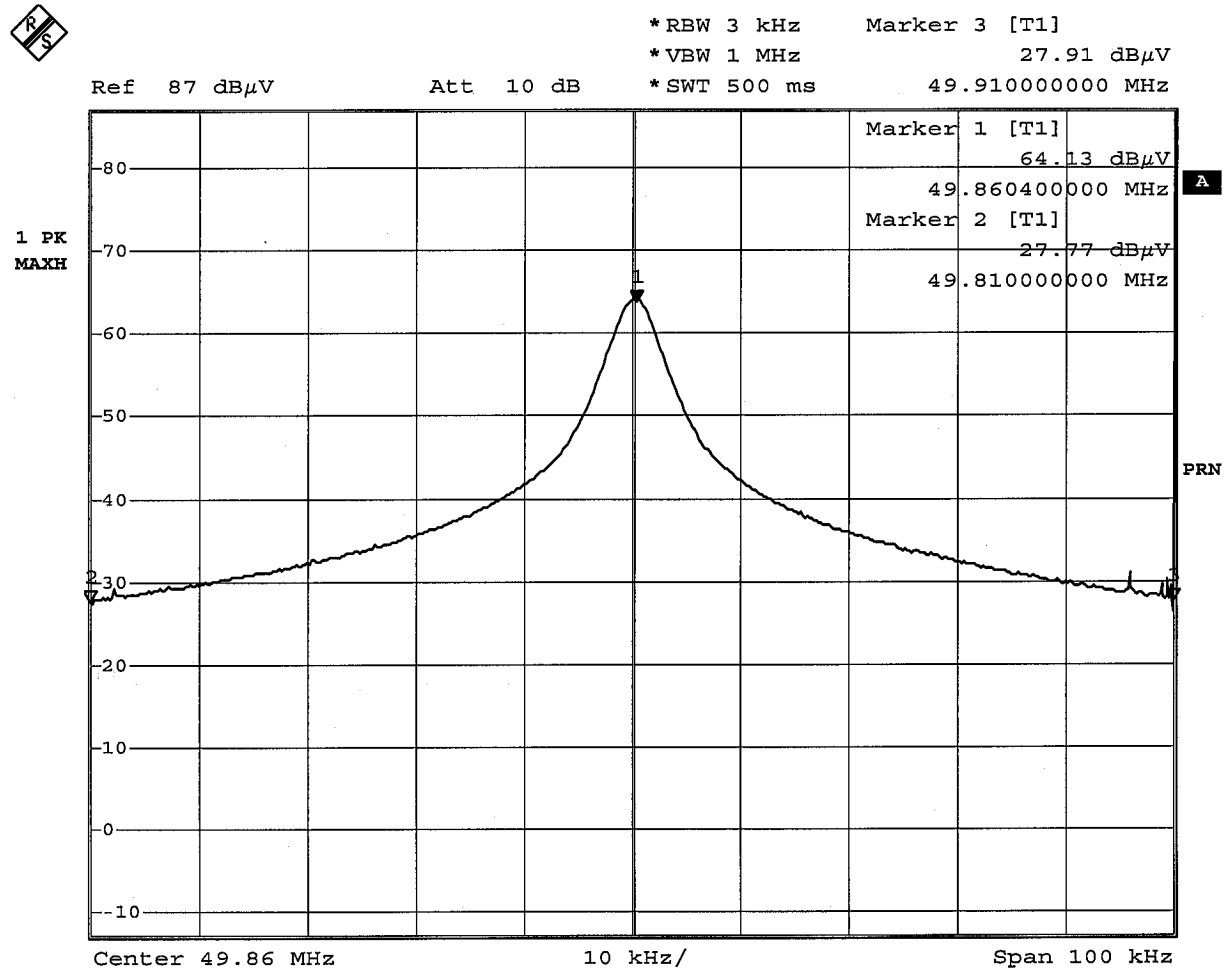
Test Specification	:	FCC Part 15 section 235(b)
Port of Testing	:	Antenna port
Detector Function	:	Peak
Supply Voltage	:	DC 4.5V
Temperature	:	22°C
Humidity	:	50%

The field strength of any emissions appearing between the band edges and up to 10KHz above and below the band edges is at least 26dB below the carrier. At the lower edge 49.81MHz and upper edge 49.91 MHz are 36.36dB and 36.22dB below the carrier respectively.

For test results refer to Appendix 1, page 1-2

Limit **Section 15.235(b)**

The field strength of any emissions appearing between the band edges and up to 10KHz above and below the band edges shall be attenuated at least 26dB below the level of the unmodulated carrier or to the general limits in Section 15.209, whichever permits the higher emission levels.



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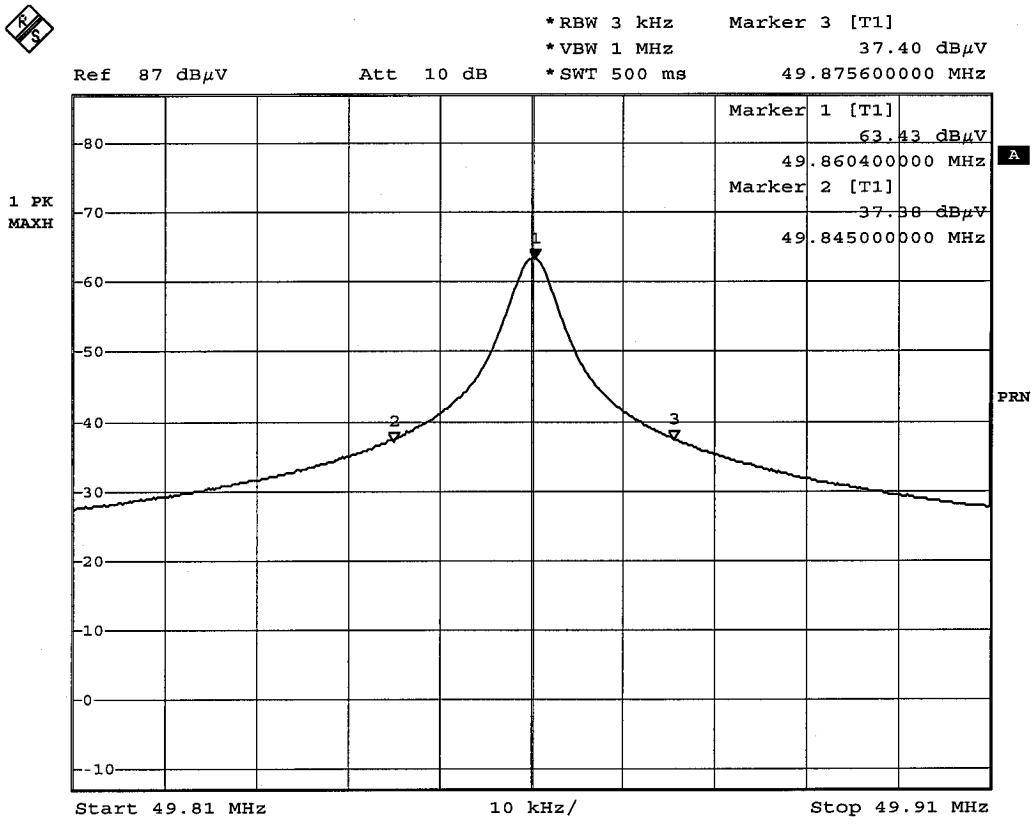

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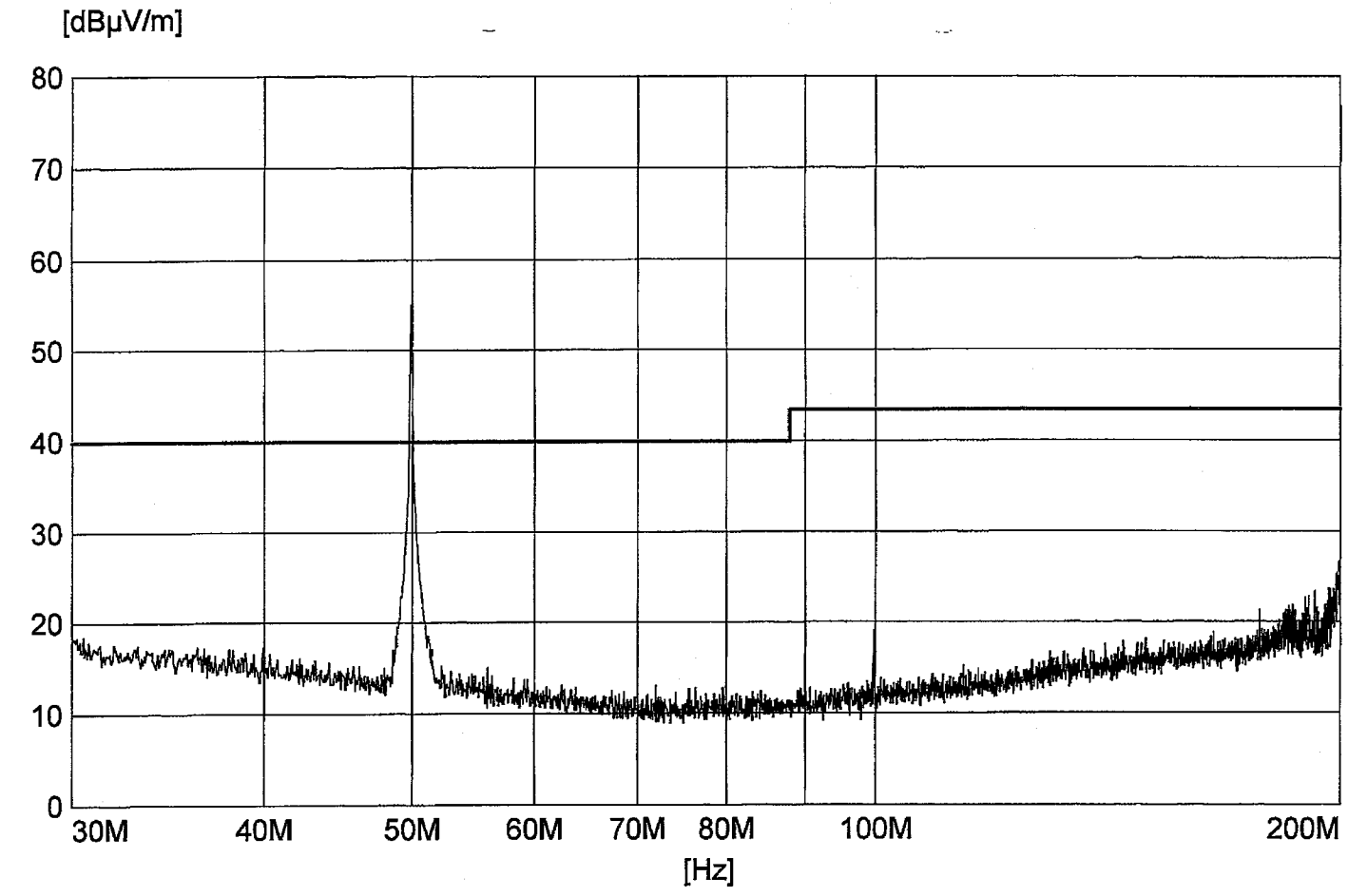
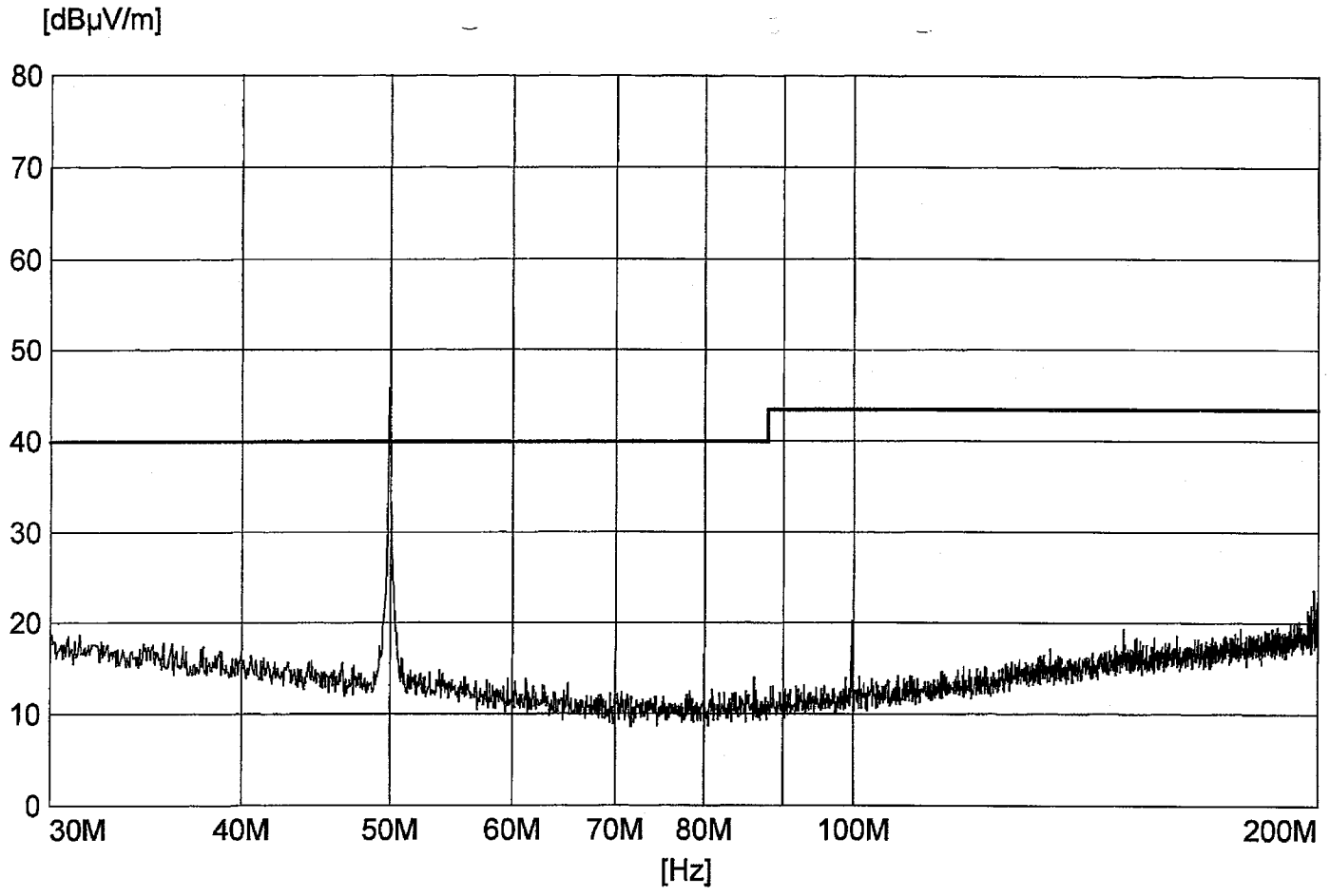


Model: 9405

Freq	PK	AV	QP
49.860	56.0	54.8	–
99.720	–	–	18.9
177.08	–	–	16.9
186.08	–	–	17.1

FCC
4PMBs Tx
operating
Vert.



Model: 9405

MES TUV120304B12.PK
LIM FCC P15.109 Class B

Freq	PK	Av	QP
49.86	48.5	47.6	–
99.72	–	–	18.8
149.16	–	–	16.8
198.68	–	–	17.4

FCC
49MHz TX
~~Vert~~ Hori.
(operating)

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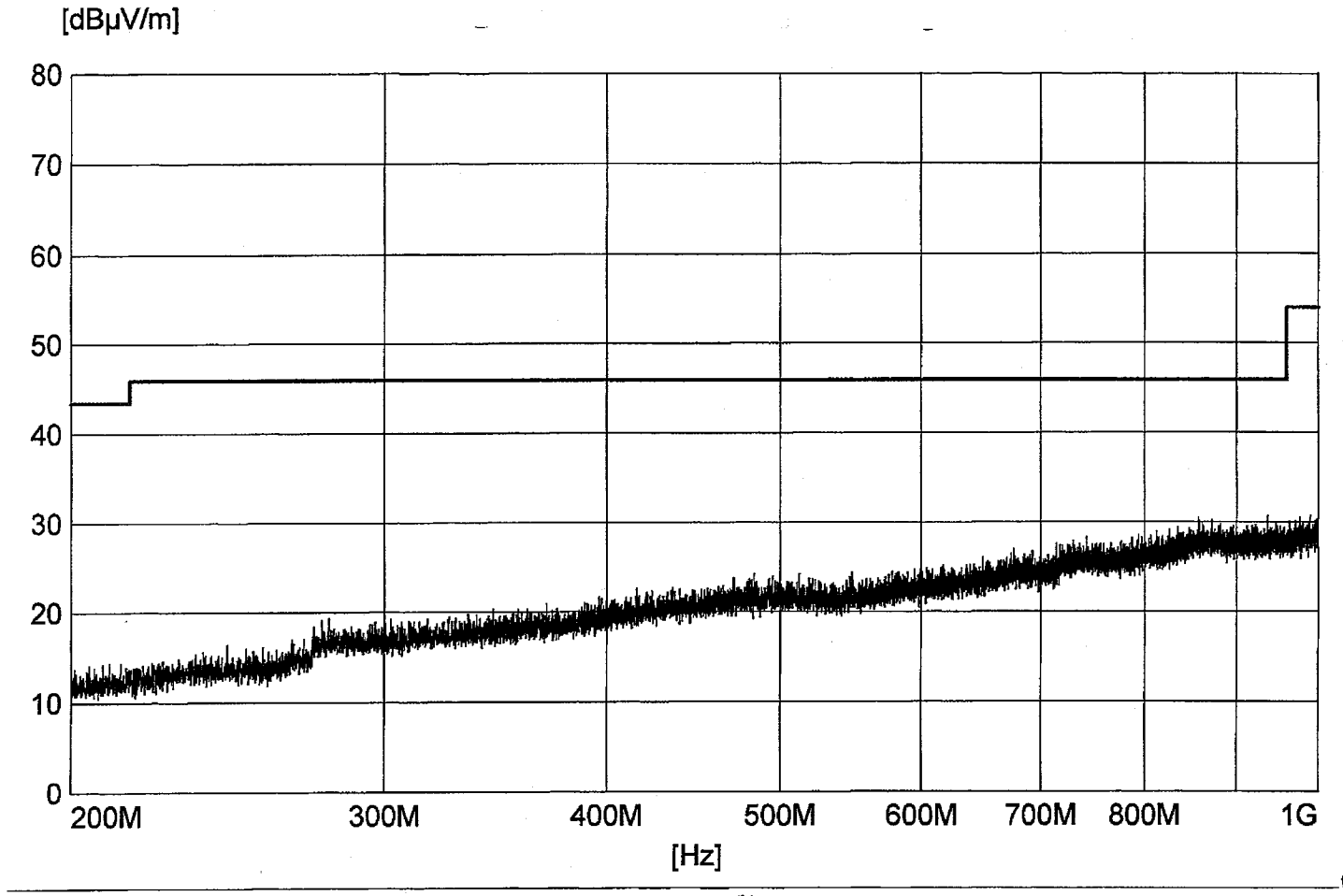

Model: 8405

MES TUV120304B09.PK
LIM FCC P15.109 Class B

Freq	QP
299.17	18.4
359.00	18.6
418.84	19.5
478.67	20.4

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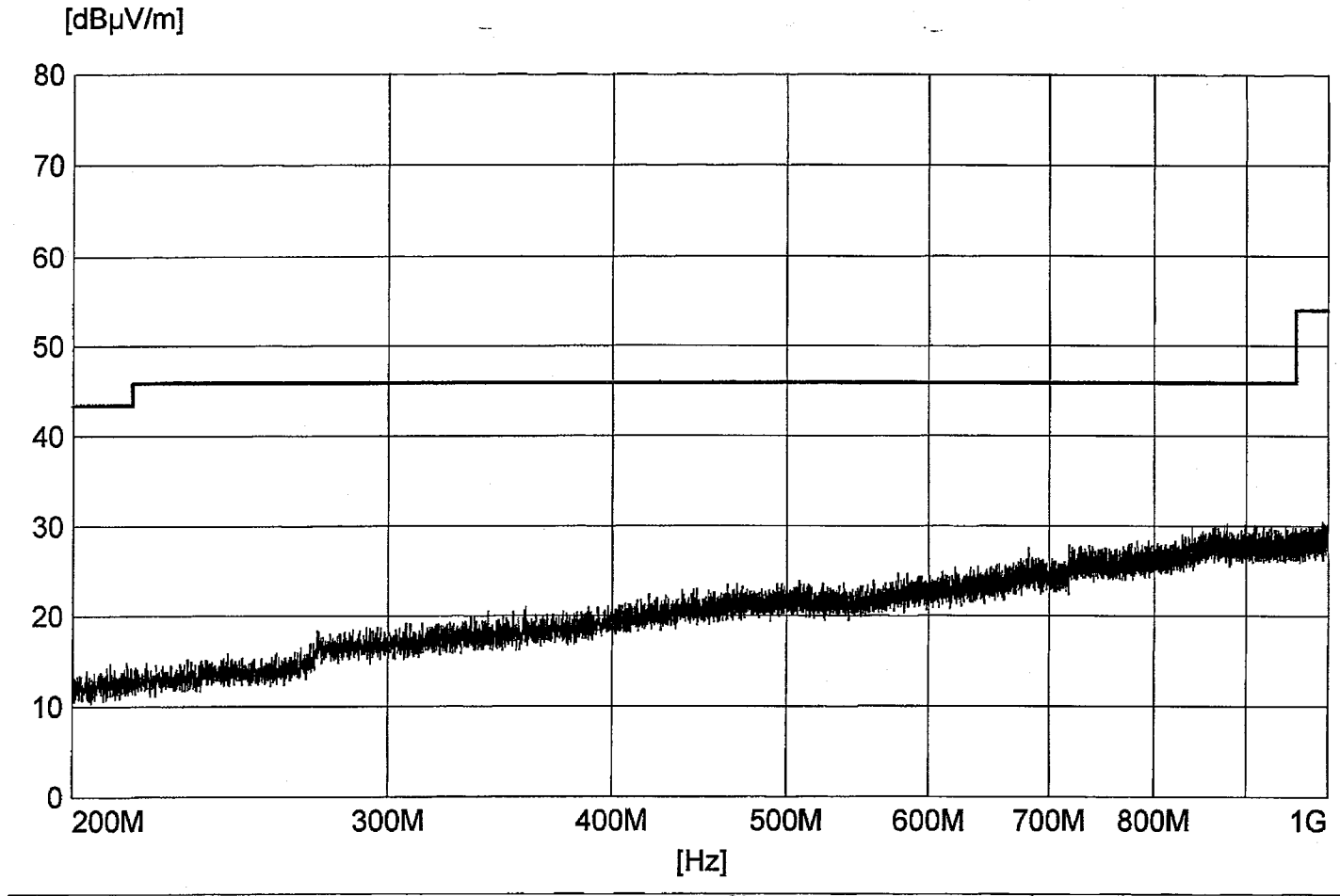
FCC
<19MHz
Vert.
Operating)



Model: 9608

Freq	QP	Freq	QP
249.31	16.4	448.84	17.9
299.17	15.0	478.67	19.4
359.00	16.4	615.43	24.2

FCC
QP Mode
Worst.
(operating)