



Produkte
Products

Prüfbericht - Nr.: 14020723 001		Seite 1 von 13
<i>Test Report No.:</i>		<i>Page 1 of 13</i>
Auftraggeber: <i>Client:</i>	Soundmax Electronics Limited 17/F., Eu Yan Sang Tower 11-15 Chatham Road South T.S.T., Kowloon Hong Kong	
Gegenstand der Prüfung: <i>Test Item:</i>	Low Power Transmitter - Remote Control (433.92MHz)	
Bezeichnung: <i>Identification:</i>	RF-007, AQ-RF-3, AQ-RF-1, AQ-RF-3F, AQ-RF-3FB	Serien-Nr.: Engineering sample <i>Serial No.:</i>
Wareneingangs-Nr.: <i>Receipt No.:</i>	090227089	Eingangsdatum: 27.02.2009 <i>Date of Receipt:</i>
Prüfört: <i>Testing Location:</i>	TÜV Rheinland Hong Kong Ltd. 9th Floor, Emperor International Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong	
Prüfgrundlage: <i>Test Specification:</i>	FCC Part 15, Subpart C	
Prüfergebnis: <i>Test Result:</i>	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>	
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland Hong Kong Ltd. 9th Floor, Emperor International Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong	
geprüft / tested by:	kontrolliert / reviewed by:	
19.03.2009 Hugo Wan Project Manager		19.03.2009 Thomas Berns Manager
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
		
Sonstiges / Other Aspects:		
FCC ID W6B0000000000002		
Abkürzungen:	<i>P(ass) = entspricht Prüfgrundlage</i>	Abbreviations:
	<i>F(ail) = entspricht nicht Prüfgrundlage</i>	<i>P(ass) = passed</i>
	<i>N/A = nicht anwendbar</i>	<i>F(ail) = failed</i>
	<i>N/T = nicht getestet</i>	<i>N/A = not applicable</i>
		<i>N/T = not tested</i>
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</p> <p><i>This test report relates to the a. m. test sample. 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 safety mark on this or similar products.</i></p>		

Test Summary

Periodic Operation Device

Result: Pass

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

Contents

List of Test and Measurement Instruments.....	4
General Product Information	5
Product Function and Intended Use.....	5
Ratings and System Details.....	5
Independent Operation Modes.....	6
Submitted Documents	6
Related Submittal(s) Grants	6
Test Set-up and Operation Mode.....	7
Principle of Configuration Selection	7
Test Operation and Test Software	7
Special Accessories and Auxiliary Equipment.....	7
Countermeasures to achieve EMC Compliance.....	7
Test Methodology	8
Radiated Emission.....	8
Field Strength Calculation	8
Test Results	9
Periodic Operation Device Section 15.231(a).....	9
Radiated Emission of Carrier Frequency Section 15.231(b).....	10
Spurious Radiated Emissions Section 15.231(b).....	11
Bandwidth Measurement Section 15.231(c).....	13
Appendix 1: Test Results	
Appendix 2: Test Setup	
Appendix 3: EUT External Photo	
Appendix 4: EUT Internal Photo	
Appendix 5: FCCID Label, Block Diagram, Schematics and User manual.	

List of Test and Measurement Instruments

Hong Kong Productivity Council (Registration number: 90656)

Kind of Equipment	Manufacturer	Type	S/N	Cal Due Date
Semi-anechoic Chamber	Frankonia	Nil	Nil	28 Mar 09
Test Receiver	Rohde & Schwarz	ESU26	100050	06.Aug.09
Biconical Antenna	Rohde & Schwarz	HK116	100242	22 May 10
Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/020	21 May 10
Horn Antenna	EMCO	3115	9002-3351	27 Feb 10
Coaxial Cable 50ohm	Rosenberger	RTK081-05S-05S-10m	LA2-001-10M / 002	15 May 09
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30	28 Feb 10
Active Loop Antenna	EMCO	6502	9107-2651	20-Dec-09

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a wireless remote control transmitter operating at 433.92MHz. It is used with a corresponding receiver which is connected to a DVD/CD player for controlling the AV function of the DVD/CD player.

The remote control transmitter was tested in this test report.

The transmitter meets the requirement on periodic transmission as specified in Part 15.231 (a). For details, please refer to Appendix 1 page 1.

FCC ID: W6B0000000000002

Models	Product descriptions	Brands
RF-007	Remote Control	SOUNDMAX
AQ-RF-3	Remote Control	AQUATIC
AQ-RF-1	Remote Control	AQUATIC
AQ-RF-3F	Remote Control	AQUATIC
AQ-RF-3FB	Remote Control	AQUATIC

Ratings and System Details

Transmitter	
Operated Frequency	: 433.92 MHz
Number of channels	: 1
Type of antenna	: Integral antenna
Power supply	: 1 x CR2430 battery (coin type lithium battery), operated at 3.0V DC
Ports	: none
Equipment Class	: B

www.tuv.com

Independent Operation Modes

The basic operation mode is:

- Transmitting control signal to the corresponding remote control receiver.

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- FCC ID label

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Test Set-up and Operation Mode

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.

Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

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

- none

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm 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.

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

Field Strength Calculation

The field strength at 3 m 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:

$$FS = R + AF + CF + FA - PA$$

$$\text{System Factor} = CF + FA - PA.$$

Where FS = Peak Value of Field Strength in dBuV/m at 3 meters.

R = Peak Reading of Spectrum Analyzer in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

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

Average value of FS = FS –Average factor.

Average Factor = 20 log duty cycle.

www.tuv.com

Test Results

Periodic Operation Device

Section 15.231(a)

RESULT:

Pass

The transmitter consists of several manual switches. 4 button switches were checked with same performance in transmission duty cycle and hence only one button was randomly selected for testing. The transmission duration was tested to comply with 15.231 (a) requirement.

For details, please refer to Appendix 1 page 1.

Radiated Emission of Carrier Frequency
Section 15.231(b)
RESULT:
Pass

Test Specification : FCC Part 15 Section 15.231(b)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : CISPR quasi-peak
 Measurement BW : 120 kHz
 Supply Voltage : DC 3.0V

Polarization: Vertical

Detector	Frequency (MHz)	Field Strength at 3m (dB μ V/m)	Limit (dB μ V/m)	Delta to Limit (dB)
QP	433.808	73.4	80.8	-7.4

Polarization: Horizontal

Detector	Frequency (MHz)	Field Strength at 3m (dB μ V/m)	Limit (dB μ V/m)	Delta to Limit (dB)
QP	433.811	66.7	80.8	-14.1

Limit
Section 15.231(b)

Frequency within the band (MHz)	Peak Emission		Average Emission	
	(μ V/m)	(dB μ V/m)	(μ V/m)	(dB μ V/m)
433.92	109966.8	100.8	10996.68	80.8

According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement 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.

Spurious Radiated Emissions
Section 15.231(b)
RESULT:
Pass

Test Specification : FCC Part 15 Section 15.231(b)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : 30MHz – 1GHz: CISPR quasi-peak QP
 1GHz – 5GHz: PK / AV
 Measurement BW : 30MHz – 1GHz: 120 kHz
 1GHz – 5GHz: 1MHz
 Supply Voltage : DC 3.0V
 Measuring Frequency Range : 30-5000MHz

Polarization: Vertical

Frequency (MHz)	Field strength at 3m (dBµV/m)	Detector (QP / PK / AV)	Limit at 3m (dBµV/m)	Delta to Limit (dB)
867.618	43.0	QP	60.8	-17.8
1301.420	37.0	PK	74.0	-37.0
	33.4	AV	54.0	-20.6
1735.232	36.4	PK	80.8	-44.4
	31.6	AV	60.8	-29.2
2169.040	32.3	PK	80.8	-48.5
	37.2	AV	60.8	-23.6
2602.848	38.0	PK	80.8	-42.8
	34.1	AV	60.8	-26.7
3036.656	43.1	PK	80.8	-37.7
	34.5	AV	60.8	-26.3
3470.464	43.2	PK	80.8	-37.6
	37.6	AV	60.8	-23.2
3904.272	45.0	PK	74.0	-29.0
	34.4	AV	54.0	-19.6
4338.080	44.9	PK	74.0	-29.1
	33.6	AV	54.0	-20.4

Polarization: Horizontal

Frequency (MHz)	Field strength at 3m (dB μ V/m)	Detector (QP / PK / AV)	Limit at 3m (dB μ V/m)	Delta to Limit (dB)
867.624	39.8	QP	60.8	-21.0
1301.433	36.7	PK	74.0	-37.3
	28.2	AV	54.0	-25.8
1735.244	38.7	PK	80.8	-42.1
	33.6	AV	60.8	-27.2
2169.055	39.6	PK	80.8	-41.2
	33.6	AV	60.8	-27.2
2602.866	40.2	PK	80.8	-40.6
	34.4	AV	60.8	-26.4
3036.677	42.5	PK	80.8	-38.3
	37.1	AV	60.8	-23.7
3470.488	43.3	PK	80.8	-37.5
	36.9	AV	60.8	-23.9
3904.299	45.1	PK	74.0	-28.9
	34.5	AV	54.0	-19.5
4338.110	44.3	PK	74.0	-29.7
	34.4	AV	54.0	-19.6

- Remark: (1) '*' indicates the frequency of the emissions fall into the restricted band.
 (2) There is no spurious emission found between lowest oscillating frequency to 30 MHz.
 (3) Within the frequency range 30-5000MHz, other than harmonics, there are no other spurious emissions found in the measurement.

Limit
Section 15.231(b)

Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
433.92	1099.67	$20 \cdot \log(1099.67) = 60.8$	3

Section 15.209

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

Limit
Section 15.209

Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
30-88	100	$20 \cdot \log(100) = 40.00$	3
88-216	150	$20 \cdot \log(150) = 43.52$	3
216-960	200	$20 \cdot \log(200) = 46.02$	3
960-2500	500	$20 \cdot \log(500) = 53.98$	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

www.tuv.com

Bandwidth Measurement

Section 15.231(c)

RESULT:

Pass

Test Specification : FCC Part 15 section 15.231(c)
Port of Testing : Coupling device
Detector Function : Peak
Supply Voltage : DC 3.0V

Refer to the data graph, the 20dB points at lower edge and at higher edge are 37.6kHz and 24.8kHz respectively apart from the centre modulated carrier, the bandwidth of the emission is 0.014 % of the centre frequency. Therefore, the EUT meets the requirement of section 15.231(c).

For test results refer to Appendix 1, page 2.

Limit

Section 15.231(c)

The bandwidth of the emission shall be no wider than 0.25% if the center frequency for devices operating above 70MHz and below 900MHz.