

Produkte
Products

Prüfbericht - Nr.: 14018424 001 <i>Test Report No.:</i>		Seite 1 von 13 <i>Page 1 of 13</i>			
Auftraggeber: Armour Automotive Limited <i>Client:</i> Woolmer Way, Bordon Hampshire GU35 9QE United Kingdom					
Gegenstand der Prüfung: Low Power Transmitter - Bluetooth Car Kit with Remote Control <i>Test Item:</i> (433.92MHz)					
Bezeichnung: <i>Identification:</i>	iOTALK1	Serien-Nr.: <i>Serial No.:</i> Engineering sample			
Wareneingangs-Nr.: <i>Receipt No.:</i>	080515009-1	Eingangsdatum: 15.05.2008 <i>Date of Receipt:</i>			
Prüfort: <i>Testing Location:</i>	TÜV Rheinland Hong Kong Ltd. 9th Floor, Oriental News Building, 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, Oriental News Building, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong				
geprüft / tested by:	kontrolliert / reviewed by:				
15.07.2008 Datum Date	Hugo Wan Name/Stellung Name/Position	 Hugo Wan Project Manager Signature	17.05.2008 Datum Date	Thomas Berns Name/Stellung Name/Position	 Thomas Berns Manager Signature
Sonstiges / Other Aspects:					
FCC ID VUHIOTALK1R					
Abkürzungen: P(pass) = entspricht Prüfgrundlage F(fail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet			Abbreviations: P(pass) = passed F(fail) = failed N/A = not applicable N/T = not tested		
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. <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>					

Test Summary

Periodic Operation Device

Result: Pass

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

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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 08
Biconical Antenna	Rohde & Schwarz	HK116	841489/016	08 Mar 09
Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/020	28 Feb 09
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 product under test is a wireless car kit 433MHz remote control. It consists of a remote control transmitter and a car kit receiver and are powered by batteries and 12V car battery respectively. The car kit, on one hand, can connect with Bluetooth device for wireless audio link transmission. On the other hand, the remote control transmitter can control the function of car kit wirelessly. Hence the car kit consists of Bluetooth transceiver and 433MHz receiver, the remote control is a 433MHz transmitter.

The remote control 433MHz 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: VUHIOTALK1R

Models	Product descriptions
iOTALK1	Bluetooth Car Kit with Remote Control

Ratings and System Details

	Transmitter
Operated Frequency	: 433.92 MHz
Number of channels	: 1
Type of antenna	: Integral antenna
Power supply	: 1 x CR2 size battery, operated at 3.0V
Ports	: none
Equipment Class	: B

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Independent Operation Modes

The basic operation mode is:

- Receiving control signal from the corresponding remote control transmitter.

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 = $20 \log \text{duty cycle}$.

Test Results

Periodic Operation Device

Section 15.231(a)

RESULT:

Pass

The transmitter consists of several manual switches. 4 button switches were selected for testing. The transmission duration was tested to comply with 15.231 (a) requirement.

For details, please refer to Appendix 1 page 1-3.

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	433.924	64.8	100.8	-36.0

Polarization: Horizontal

Detector	Frequency (MHz)	Field Strength at 3m (dB μ V/m)	Limit (dB μ V/m)	Delta to Limit (dB)
QP	433.924	72.6	100.8	-8.0

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 (dB μ V/m)	Detector (QP / PK / AV)	Limit at 3m (dB μ V/m)	Delta to Limit (dB)
867.848	39.6	QP	60.8	-21.2
*1301.819	41.1	PK	74.0	-32.9
	38.5	AV	54.0	-15.5
1735.633	39.8	PK	80.8	-41.0
	35.3	AV	60.8	-25.5
2169.719	48.4	PK	80.8	-32.4
	47.1	AV	60.8	-13.7
2603.678	44.1	PK	80.8	-36.7
	41.4	AV	60.8	-19.4
3038.117	41.8	PK	80.8	-39.0
	37.4	AV	60.8	-23.4
3471.578	52.9	PK	80.8	-27.9
	51.1	AV	60.8	-9.7
*3905.601	48.4	PK	74.0	-25.6
	39.1	AV	54.0	-14.9
*4339.703	45.6	PK	74.0	-28.4
	36.8	AV	54.0	-17.2

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)
867.848	48.5	QP	60.8	-12.3
*1301.731	44.7	PK	74.0	-29.3
	42.8	AV	54.0	-11.2
1735.529	43.4	PK	80.8	-37.4
	37.8	AV	60.8	-23.0
2169.743	49.7	PK	80.8	-31.1
	48.5	AV	60.8	-12.3
2603.846	46.6	PK	80.8	-34.2
	44.6	AV	60.8	-16.2
3037.243	45.9	PK	80.8	-34.9
	40.1	AV	60.8	-20.7
3471.442	54.4	PK	80.8	-26.4
	52.4	AV	60.8	-8.4
*3905.774	48.8	PK	74.0	-25.2
	39.6	AV	54.0	-14.4
*4339.412	44.7	PK	74.0	-29.3
	36.4	AV	54.0	-17.6

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	$20 \log(1099.67) = 60.8$	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	$20 \log(100) = 40.00$	3
88-216	150	$20 \log(150) = 43.52$	3
216-960	200	$20 \log(200) = 46.02$	3
960-2500	500	$20 \log(500) = 53.98$	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.

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 26.6kHz and 26.4kHz respectively apart from the centre modulated carrier, the bandwidth of the emission is 0.012 % of the centre frequency. Therefore, the EUT meets the requirement of section 15.231(c).

For test results refer to Appendix 1, page 3.

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.