

15, rue de la Claie
Z.I. Angers-Beaucouzé
49070 BEAUCOUZÉ
Tél. 02 41 73 26 27
Fax 02 41 73 26 40
e-mail : atlantique@emitech.fr
R.C.S. ANGERS 95 B 543
SIRET 344 545 645 00055

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FCC CERTIFICATION RADIO Measurement Technical Report

standard to apply:
FCC Part 15.231

Equipment under test:
REMOTE CONTROL OR24

FCC ID:
B4SOR24

Company:
X-10 France

DISTRIBUTION: Mr ROSSI

Company: X-10 France

Number of pages: 18 including 4 annexes

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			Name	Visa	Name	Visa
0	20-Oct-05	Creation	L. BERTHAUD	LB	P. BONNENFANT	

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.

This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

PRODUCT: REMOTE CONTROL

Reference / model: OR24

Serial number: not communicated

MANUFACTURER: X-10
Together Rich Industrial Park B,
Sanwei Industrial District, Xixiang Town
Shenzhen (China)

COMPANY SUBMITTING THE PRODUCT:

Company: X-10 France

Address: 3, rue de Penthièvre
75008 PARIS
FRANCE

Responsible: Mr ROSSI

DATE(S) OF TEST: 18 and 19 October 2005

TESTING LOCATION: EMITECH ATLANTIQUE open area test site in LA POUEZE
(49) FRANCE
Registration Number by FCC: 101696/FRN: 0006 6490 08

TESTED BY: L. BERTHAUD

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1.INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: REMOTE CONTROL OR24 in accordance with normative reference.

2.PRODUCT DESCRIPTION

ITU Emission code: 200 KL1D

Class: B (residential environment)

Intermittent control signals with no continuous transmission, the transmitter operates only when a key is depressed.

Utilization: universal remote control

Antenna type: internal antenna

Operating frequency: 433.92 MHz

No of channels: 1

Channel spacing: not concerned

Frequency generation: ☒ SAW Resonator ☐ Crystal ☐ Synthetiser

Modulation: ☒ Amplitude (pulsed modulated device) ☐ Digital ☐ Frequency ☐ Phase

Power source: alkaline batteries LR03 (2 x 1.5 V)

Power level, frequency range and channels characteristics are not user adjustable.

The details pictures of the product and the circuit boards are joined with this file.

3.NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below. They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

FCC Part 15 (2005)	Code of Federal Regulations Title 47 - Telecommunication Chapter 1 - Federal Communications Commission Part 15 - Radio frequency devices Subpart C - Intentional Radiators
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ANSI C63.4 (01)	American National Standard for Methods of measurement of Radio-Noise from low-voltage. Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
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4.TEST METHODOLOGY

Radio performance tests procedures given in part 15:

Paragraph 203: antenna requirement (Subpart C intentional Radiators)

Paragraph 205: restricted bands of operation (Subpart C intentional Radiators)

Paragraph 209: radiated emission limits; general requirements (Subpart C intentional Radiators)

Paragraph 231: periodic operation in the band 40.66 – 40.7 MHz and above 70 MHz
(Subpart C intentional Radiators)

Paragraph 33: frequency range of radiated measurements

Paragraph 35: measurement detector functions and bandwidths

5.TEST UNIT CONFIGURATION

JOINED DOCUMENTATIONS

“Synoptic “

“Block diagram “

“External photos and Product labeling “

“Assembly of components “

“Internal photos “

“Layout pcb “

“Bil of materials “

“Schematics “

“Product description “

“User guide “

6.TESTS AND CONCLUSIONS

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.231	PERIODIC OPERATION IN THE BAND 40.66 – 40.7 MHz and above 70 MHz					
a)		X				Note 2
b)		X				Notes 3 and 5
c)		X				Note 4
d)				X		
e)				X		

NAp: Not Applicable

NAs: Not Asked

Note 1: internal antenna without connector.

Note 2: the equipment is manually operated and employ a switch that deactivates automatically the transmitter and ceases transmission within 5 seconds after activation.
The transmitter does not perform periodic transmissions.
The transmitter is not activated automatically.

Note 3: field strength limit of fundamental ($F = 433.92$ MHz)
 $41.6667 (F) - 7083.3333 = 10996 \mu\text{V/m}$ at 3 m = $80.8 \text{ dB}\mu\text{V/m}$ at 3 m.
The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Note 4: the bandwidth of the emission at 20 dB is 512 kHz (see annex 3), less than 0.25 % of the centre frequency (1.0848 MHz).

Note 5: pulsed modulated device.

* A duty cycle correction factor has been applied to measures, we use the formulas:

$$* \text{ON TIME} = N_1 \cdot L_1 + N_2 \cdot L_2 + \dots + N_{n-1} \cdot L_{n-1} + N_n \cdot L_n$$

(where N_1 is number of type 1 pulse, L_1 is length of type 1 pulse...)

and * $\text{DUTY CYCLE} = \text{ON TIME} / 100 \text{ ms}$ or T (whichever is less, where T is the period of the pulse train).

We have found (see annex 4)

$$N_1 = 1$$

$$L_1 = 2.8 \text{ ms}$$

$$N_2 = 21$$

$$L_2 = 0.56 \text{ ms}$$

$$T = 40.5 \text{ ms}$$

$$\text{So DUTY CYCLE} = \frac{(1 \times 2.8 \text{ ms}) + (21 \times 0.56 \text{ ms})}{40.5 \text{ ms}} = 35.9 \% \text{ which gives a correction}$$

factor of -8.8 dB.

Conclusion:

The sample of REMOTE CONTROL OR24 submitted to the tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

7.RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS (TRANSMITTER)

Standard: FCC Part 15

Test procedure: paragraph 205 / 209
paragraph 231

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESVS 10	1219
Biconical antenna	Hewlet Packard 11966 C	728
Log periodic antenna	Rohde & Schwarz HL 223	1999
Double ridged guide antenna	Electrometrics EM 6961	1204
Spectrum analyzer	Rohde & Schwarz FSP40	4088
Open area test site	EMITECH	1274
Preamplifier 1 to 18 GHz	DBS Microwave DB97-1852	2648
High pass filter	Micro-tronics HPM11630	1673

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

Frequency range: from 30 MHz to harmonic 10 ($F_{\text{carrier}} \leq 1 \text{ GHz}$)

Detection mode: Quasi-peak or average ($F < 1 \text{ GHz}$)
Peak ($F > 1 \text{ GHz}$)

Bandwidth: 120 kHz ($F < 1 \text{ GHz}$)
1 MHz ($F > 1 \text{ GHz}$)

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment is blocked in continuous transmission mode, modulated by internal data signal.

Results:

Ambient temperature (°C): 24
Relative humidity (%): 68

Power source: we used for power source the internal batteries of the equipment and we noted:

Voltage at the beginning of test (V): 3.20
Voltage at the end of test (V): 3.11
Percentage of the voltage drop during the test (%): 2.8
Limits (%): ± 5

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Channel Emission

FREQUENCIES (MHz)	Detector	E.U.T. orientation	Antenna height (cm)	Polarization of antenna H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dB μ V/m)	Limits (dB μ V/m)
433.815 ⁽¹⁾	A	X	100	H	269	80.7	80.8 ⁽¹⁾
867.63	A	X	100	H	135	53.8	60.8
1301.34*	P	X	135	H	26	38	54.0*
1735.46	P	Z	154	V	174	33.6	60.8
2169.24	P	Z	118	V	239	37.4	60.8
2602.92	P	Z	149	V	182	45.6	60.8
3036.76	P	Z	141	V	138	37.1	60.8
3470.54	P	Z	141	V	0	39.8	60.8
3904.37*	P	Z	206	V	0	25.8	54.0*

⁽¹⁾ fundamental.

E.U.T.: Equipment Under Test

* restricted band of operation § 15.205.

E.U.T. orientation A: average
X: to put flat Q: quasi peak
Y: on the edge P: Peak
Z: up right

Note: 1099 μ V/m at 3 m = 60.8 dB μ V/m at 3 m 500 μ V/m at 3 m = 54.0 dB μ V/m at 3 m

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

All reading above 1 GHz were taken using a peak detector function and the duty cycle correction factor in order to determinate the average value of the emission (see §15.35; pulsed modulated devices)

□□□ End of report, 4 annexes to be forwarded □□□