China

FCC - TEST REPORT

Report Number	:	**68.910.15.003.01**	Date of Issue:	January 19, 2015

Model	:	**ECB0099131**
Product Type	:	Elica Remote Control
Applicant	:	Elica S.P.A
Address	:	Via Ermanno Casoli, 2, Fabriano(AN), ITALY
Production Facility	:	Colorful Intelligent Technology Co., Limited
Address	:	F Buildding, Julong Industrial, Tianxin Meitang Community, Huangjiang Town, Dongguan, Guangdong, China
Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	21

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1 Table of Contents

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	502708
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3 Description of the Equipment Under Test

Product:	Elica Remote Control
Model no.:	ECB0099131
FCC ID:	TMQECB0099131
Brand Name:	elica
Options and accessories:	NIL
Rating:	DC 4.50V by 3*AAA Batteries
RF Transmission Frequency:	433.92MHz
Modulation:	GFSK
Antenna Type:	PCB
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Remote Control operated at 433.92MHz

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China

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	---	---	N/A
§15.231(a)	Radiated Emission of Carrier Frequency	11	Site 1	Pass
§15.231 (b)	Radiated Emission, 30MHz to 4.5GHz	13	Site 1	Pass
§15.247(e)	Bandwidth Measurement	16	Site 1	Pass
§15.205	Average Factor	17	Site 1	Pass
§15.231(a)	Transmitter Time	19	Site 1	Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a permanently ceramic antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: TMQECB0099131 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: December 18, 2014

Testing Start Date: December 18, 2014

Testing End Date: January 6, 2015

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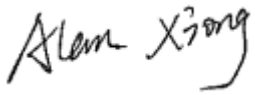
Reviewed by:

John Zhi
EMC Project Manager

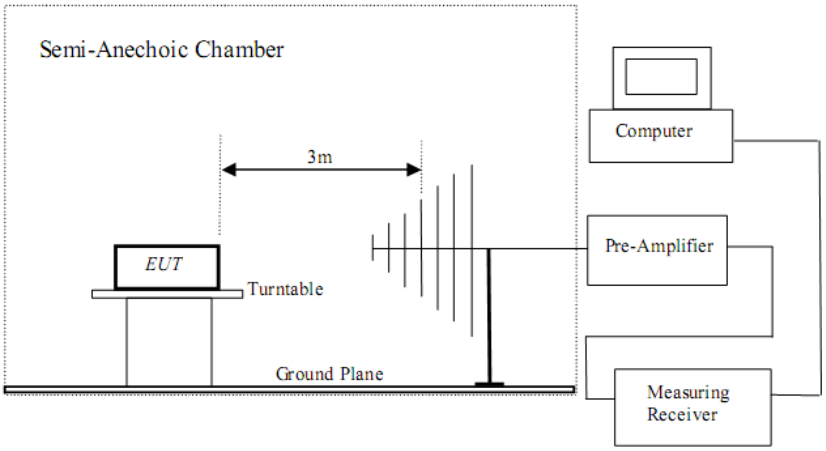
Prepared by:



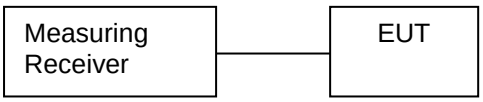
Alan Xiong
EMC Project Engineer

7 Test Setups

7.1 Radiated test setups



7.2 Conducted RF test setups



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8 Test Methodology

8.1 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules.

8.2 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 + System Factor
System Factor = AF + CF + FA – PA

Where FS = Net Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer / Test Receiver 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.

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9 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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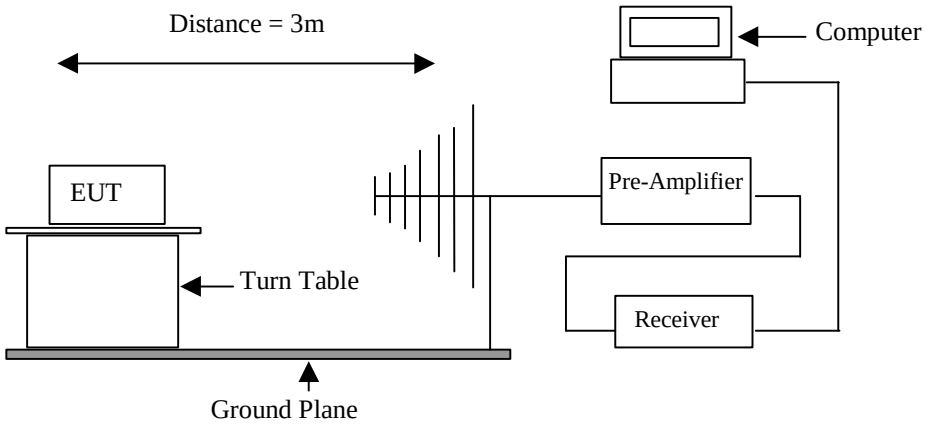
10 Technical Requirement

10.1 Radiated Emission of Fundamental Frequency

Test Requirement:	FCC part 15 section 15.231(a)
Test Method:	ANSI C63.4:2003
Test Date:	2014-12-22
Mode of Operation:	Transmitting mode.
Detector Function	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:



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Results: PASS

Radiated Emissions							
Value	Emissions Frequency **MHz**	E-Field Polarity	Field Strength at 3m **dBµV/m**	Average Factor **dB**	Net Field Strength at 3m **dBµV/m**	Limit **dBµV/m**	Delta to Limit **dBµV/m**
PK	433.920	H	75.23	0.00	75.23	100.83	-25.6
AV	433.920	H	75.23	-11.57	63.66	80.83	-17.17
PK	433.920	V	86.33	0.00	86.33	100.83	-14.5
AV	433.920	V	86.33	-11.57	74.76	80.83	-6.07

Note:

Remark:
-Calculated measurement uncertainty: 4.83dB(H)&4.91dB(V)
-Refer to section 10.4 for average factor calculation.

Limits for Fundamental Frequency: [Section 15.231(a)]:

Fundamental Frequency	Field Strength of Fundamental	Field Strength of Fundamental
[MHz]	[µV/m]	[dBµV/m]
433.92	10996.67	80.83

Compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR peak detector.

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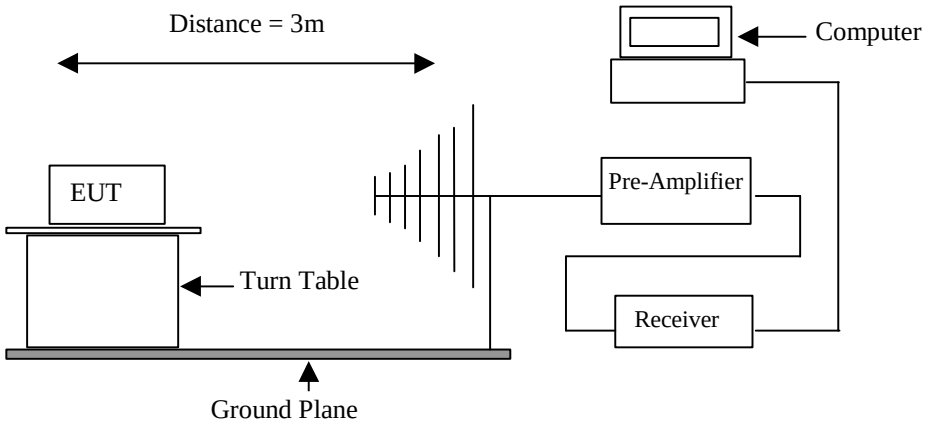
10.2 Spurious Radiated Emission

Test Requirement:	FCC part 15 section 15.231(a)
Test Method:	ANSI C63.4:2003
Test Date:	2015-01-06
Mode of Operation:	Transmitting mode.
Detector Function	Quasi-peak (Below 1000 MHz) Average and Peak (Above 1000 MHz)
Measurement BW	120 kHz (Below 1000 MHz) 1 MHz (Above 1000 MHz)

Test Setup:



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Results: PASS

Value	Emissions Frequency **MHz**	E-Field Polarity	Field strength at 3m **dBµV/m**	Average Factor **dB**	Net Field Strength at 3m **dBµV/m**	Limit **dBµV/m**	Delta to Limit **dBµV/m**
AV	867.84	V	43.72	-11.57	32.15	60.83	-28.68
AV	3037.44	V	52.98	-11.57	41.41	60.83	-19.42
AV	3471.36	V	57.68	-11.57	46.11	60.83	-14.72
AV	3905.28	V	45.97	-11.57	34.40	54.00	-19.60
AV	867.84	H	35.00	-11.57	23.43	60.83	-37.40
AV	3037.44	H	55.50	-11.57	43.93	60.83	-16.90
AV	3471.36	H	54.30	-11.57	42.73	60.83	-18.10
AV	3905.28	H	46.87	-11.57	35.30	54.00	-18.70

Note: No further spurious emissions found between 30 MHz and lowest internal used/generated frequency.

Remark:
- Calculated measurement uncertainty: 4.89dB(H)&4.88dB(V).
- Refer to section 10.4 for average factor calculation.

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Limits for Radiated Emission [Section 15.231(a)]:

Fundamental Frequency [MHz]	Field Strength of Spurious Emission [μV/m]	Field Strength of Spurious Emission [dBμV/m]
433.92	1099.67	60.83

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in section 15.209, whichever permits a higher field strength.

Limit for Radiated Emission Falling in Restricted Bands [Section 15.209]:

Frequency (MHz)	Field Strength [μV/m]	Field Strength [dBμV/m]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

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.

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

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10.3 Bandwidth Measurement

Test Requirement:	FCC part 15 section 15.231 (c)
Test Method:	ANSI C63.4:2003
Test Date:	2015-01-06
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

Results: PASS

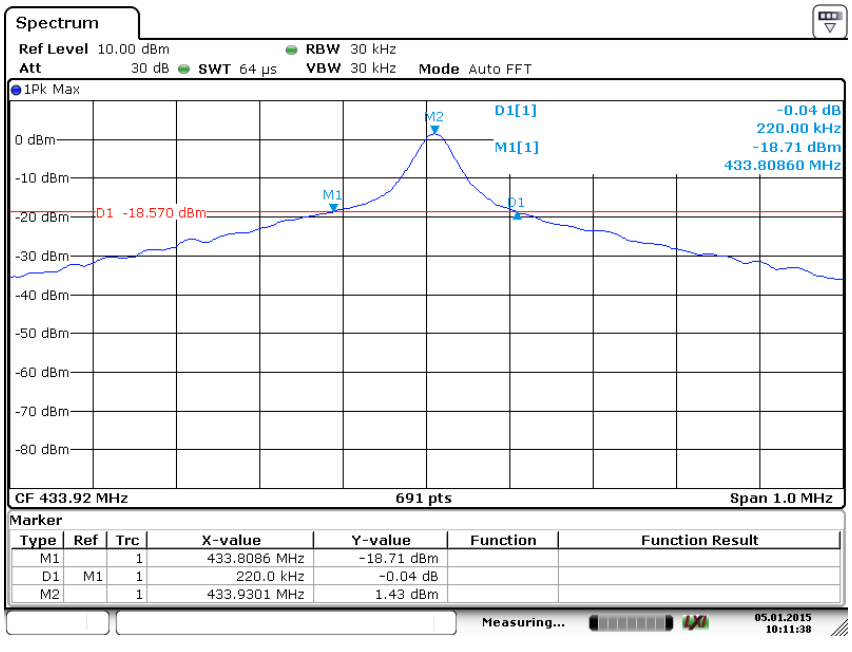
Refer to the data graph, the 20dB points at lower edge and at higher edge are 433.8086MHz and 433.9301MHz, so the bandwidth of the emission is 0.051% of the centre frequency. Therefore, the EUT meets the requirement of section 15.231(c).

Limit for Bandwidth [Section 15.231 (c)]

The bandwidth of the emission shall be no wider than 0.25% if the centre frequency for devices

operating above 70MHz and below 900MHz.

Test Result: Result data graph is shown in the following for reference.



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10.4 Average Factor

Average factor in dB = 20 log (duty cycle)

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector.

The duty cycle is the total signal on time per one transmission.

The duration of one cycle = 34.797ms

Effective period of the cycle = (0.71261 x 7ms +0.34913 x 12ms) / 34.797ms

= 26.38%

Duty cycle = 26.38%

Therefore, the averaging factor is 20 log (0.2638)
= -11.57dB

Remark:
- Refer to the following graph for the detail.

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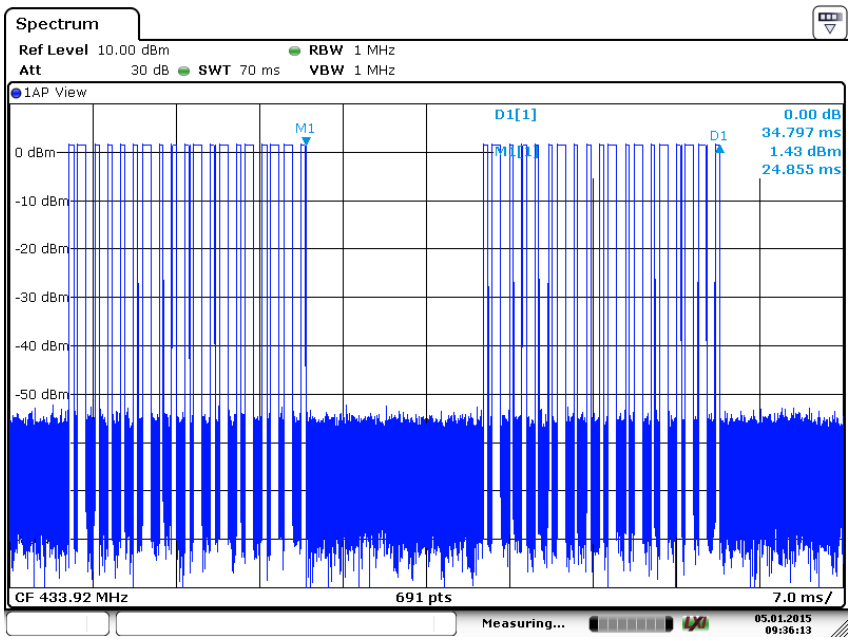

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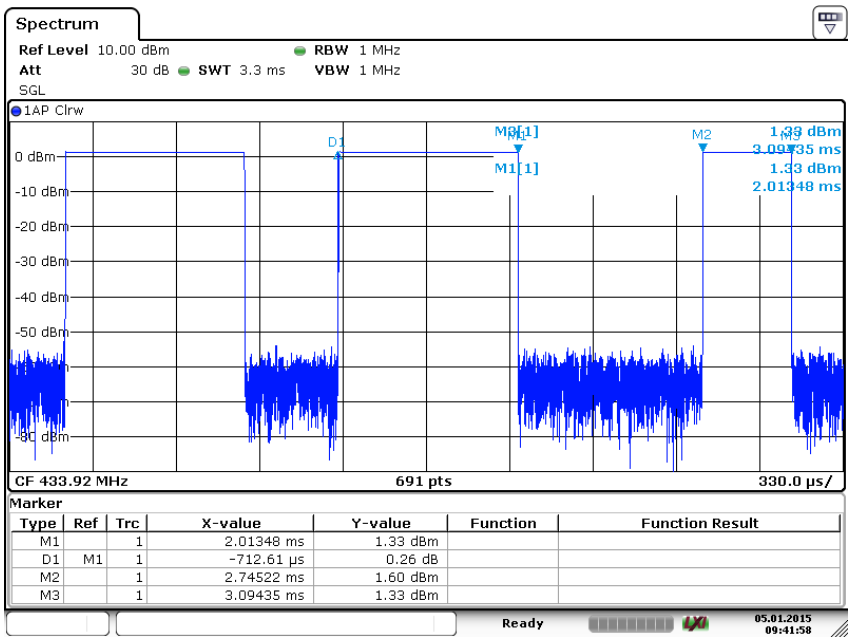

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10.5 Transmitter Time

Test Requirement:	FCC part 15 section 15.231 (a)
Test Method:	ANSI C63.4:2003
Test Date:	2015-01-06
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

Results: PASS

According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

Limit for Transmitter Time [Section 15.231 (a)(1)]

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Result: The Transmitter Time is 200ms every manually operated declared by the manufacturer

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11 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101031	2015-8-17
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2015-8-17
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2017-8-17
	Horn Antenna	Rohde & Schwarz	HF907	102294	2017-8-17
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2015-8-17
	3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% bandwidth
- Power spectral density
- Spurious RF conducted emissions
- Band edge

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12 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items	Extended Uncertainty
Radiated spurious emission	Horizontal: U=±4.83dB（30MHz~1GHz） Vertical: U=±4.91dB（30MHz~1GHz） Horizontal: U=±4.89dB（1GHz~18GHz） Vertical: U=±4.88dB（1GHz~18GHz）

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