TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14037736 001**	**Seite 1 von 11** *Page 1 of 11*

Auftraggeber: *Client:*	**Stadlbauer Marketing + Vertrieb G.m.b.H** **Rennbahn Allee 1** **5412 Puch / Salzburg** **Austria**
Gegenstand der Prüfung: *Test Item:*	**Short Range Device - Radio Control Toy Transmitter (2.4GHz)**
Bezeichnung: *Identification:*	**401011** **370401011**
Serien-Nr.: *Serial No.:*	**Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000137893-001**
Eingangsdatum: *Date of Receipt:*	**01.12.2014**
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test sample is not damaged and suitable for testing.
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 8/F, First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong **Global United Technology Services Co., Ltd.** 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, China
Prüfgrundlage: *Test Specification:*	**FCC Part 15 Subpart C** **ANSI C63.4-2003**
Prüfergebnis: *Test Results:*	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
08.12.2015	Hugo Wan Senior Project Manager		08.12.2015	Sharon Li Department Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges: **FCC ID YFA401011**
Other Aspects

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2410 - 2470 MHz
Type of modulation	GFSK
Number of channels	61
Type of antenna	Wire Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	V_{nor}: 9.0 V

Product function and intended use

The equipment under test (EUT) is a radio control toy transmitter operating at 2.4GHz. It is powered by batteries only.

The manufacturer declares that the EUT has 2 models as listed in the below table. They are all identical in electrical, PCB layout and components used except the model number only.
Due to the manufacturer declaration of equivalence, the model 401011 was provided by client as a representative for testing and construction photo taking.

Models	Product description
401011, 370401011	Radio Controlled Toy Transmitter

Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User manual
Rating Label

Special accessories and auxiliary equipment

Nil

Independent Operation Modes

The basic operation modes are:

- Transmitting control signal for the RC toy quadcopter.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

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

Where FS = Field Strength in dBuV/m at 3 meters.
R = 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.

List of Test and Measurement Instruments

Global United Technology Services Co., Ltd. (Registration number: 600491)

Equipment	Manufacturer	Type	S/N	Cal. Date	Cal. Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	--	5 Apr 2015	4 Apr 2017
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	--	N/A	N/A
ESU EMI Test Receiver	R&S	ESU26	--	8 Jun 2015	7 Jun 2016
Loop Antenna	Zhinan	ZN30900A	--	8 Jun 2015	7 Jun 2016
Bi-log Hybrid Antenna	SCHWARZBECK	VULB9163	--	8 Mar 2015	8 Mar 2016
Double-ridged horn antenna	SCHWARZBECK	9120D	--	8 Mar 2015	8 Mar 2016
Horn Antenna	ETS-LINDGREN	3160-09	--	8 Mar 2015	8 Mar 2016
RF Amplifier	HP	8347A	--	8 Jun 2015	7 Jun 2016
RF Amplifier	HP	8349B	--	8 Jun 2015	7 Jun 2016
EMI Test Software	AUDIX	E3	--	N/A	N/A
Coaxial cable	GTS	N/A	--	8 Jun 2015	7 Jun 2016
Coaxial Cable	GTS	N/A	--	8 Jun 2015	7 Jun 2016
Thermo meter	N/A	N/A	--	8 Jun 2015	7 Jun 2016

Results FCC Part 15 – Subpart C

Subclause 15.203 – Antenna Information	**Pass**
Requirement:	No antenna other than that furnished by the responsible party shall be used with the device
Results:	Permanent attached antenna
Verdict:	Pass

Subclause 15.204 – Antenna Information	**Pass**
Requirement:	Provide information for every antenna proposed for the use with the EUT
Results:	a) Antenna type: Wired b) Manufacturer and model no: N/A c) Gain with reference to an isotropic radiator: 0 dBi
Verdict:	Pass

Subclause 15.207 – Disturbance Voltage on AC Mains	**N/A**
There is no AC power input or output ports on the EUT.	

Subclause 15.215 (c) – 20 dB Bandwidth	**Pass**
Test Specification : ANSI C63.4 – 2003 Mode of operation : Tx mode Port of testing : Enclosure RBW/VBW : 100 kHz / 300 kHz Supply voltage : 9.0VDC, 6 x 1.5V AA size new battery Temperature : 23ºC Humidity : 50%	
Requirement:	The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.
Results:	For test protocols refer to Appendix 1, page 2-3.

Frequency (MHz)	**20 dB left (MHz)**	**Limit (MHz)**	**20 dB right (MHz)**	**Limit (MHz)**
2410	2407.496	> 2400	2410.956	< 2483.5
2440	2437.400	> 2400	2440.984	< 2483.5
2470	2466.360	> 2400	2471.552	< 2483.5

Subclause 15.249 (a) – Radiated Emission (Fundamental and Harmonics) **Pass**

Test Specification : ANSI C63.4 – 2003
Mode of operation : Tx mode
Port of testing : Enclosure
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 9.0VDC, 6 x 1.5V AA size new battery
Temperature : 23ºC
Humidity : 50%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: PASS

Fundamental Frequency 2410MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2409.950	67.17	114.0 / P
2409.950	36.87	94.0 / A

Fundamental Frequency 2410MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2409.950	74.92	114.0 / P
2409.950	43.37	94.0 / A

Harmonics 2410MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4819.830	45.74	74.0 / P
4819.830	31.15	54.0 / A

Harmonics 2410MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4819.830	57.97	74.0 / P
4819.830	35.39	54.0 / A

Fundamental Frequency 2440MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2440.020	68.91	114.0 / P
2440.020	40.28	94.0 / A

Fundamental Frequency 2440MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2440.020	78.38	114.0 / P
2440.020	47.14	94.0 / A

Harmonics 2440MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4880.000	42.27	74.0 / P
4880.000	27.88	54.0 / A
Harmonics 2440MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4880.000	51.74	74.0 / P
4880.000	30.59	54.0 / A
Fundamental Frequency 2470MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2470.010	69.48	114.0 / P
2470.010	41.81	94.0 / A
Fundamental Frequency 2470MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2470.010	78.65	114.0 / P
2470.010	47.64	94.0 / A
Harmonics 2470MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4940.400	42.57	74.0 / P
4940.400	28.50	54.0 / A
Harmonics 2470MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4940.400	57.58	74.0 / P
4940.400	35.57	54.0 / A

Subclause 15.249 (d) – Spurious Radiated Emissions	**Pass**

Test Specification : ANSI C63.4 - 2003
Mode of operation : Tx mode
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 9.0VDC, 6 x 1.5V AA size new battery
Temperature : 23ºC
Humidity : 50%

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Results: All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Tx frequency 2410MHz — Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / P
No peak found	---	54.0 / A

Tx frequency 2410MHz — Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / P
No peak found	---	54.0 / A

Tx frequency 2440MHz — Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / P
No peak found	---	54.0 / A

Tx frequency 2440MHz — Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / P
No peak found	---	54.0 / A

Tx frequency 2470MHz — Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2487.971	46.25	74.0 / P
2487.971	28.03	54.0 / A

Tx frequency 2470MHz — Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2488.038	62.91	74.0 / P

2488.038	34.67	54.0 / A