TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14036670 001**	**Seite 1 von 12** *Page 1 of 12*
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:*	**900028**	**Serien-Nr.:** *Serial No.:* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000083759-001 -** **A000083754-007**	**Eingangsdatum:** *Date of Receipt:* **10.07.2014**
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test sample(s) is/are not damaged and suitable for testing.	
Prüfort: *Testing Location:*	**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:*		
29.10.2014	Benny Lau Project Manager	Benny	29.10.2014	Sharon Li Section Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges: **FCC ID: YFA900028**
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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Test Summary

Conducted Emissions

Result: N/A

20dB bandwidth

Result: Pass

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2410-2471 MHz
Type of modulation	FHSS modulation
Number of channels	60
Type of antenna	Integral
Power level	fix
Connection to public utility power line	No
Nominal voltage	V_{nor}: 3.0Vdc (2 x 1.5V AAA)

Product function and intended use

The equipment under test (EUT) is a transmitter operating at 2.4GHz. It is a remote controller of RC toy car. And it is powered by 3.0Vdc (2 x 1.5V AAA batteries).

FCC ID: YFA900028900028

Models	Product description
900028	Radio Controlled Toy Transmitter

Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User manual
Rating Label

Independent Operation Modes

The basic operation modes are:

- Transmitting control signal for the RC toy car.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

- None.

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

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)

Radiated Emission				
Equipment	**Manufacturer**	**Type**	**Cal. Date**	**Cal. Due Date**
3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	April. 6 2013	April. 5 2015
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	N/A	N/A
ESU EMI Test Receiver	Rohde & Schwarz	ESU26	June. 27 2014	June. 27 2015
Loop Antenna	Zhinan	ZN30900A	June. 27 2014	June. 27 2015
Bi-log Hybrid Antenna	SCHWARZBECK	VULB9163	Mar. 09 2014	Mar. 08 2015
Double-ridged horn antenna	SCHWARZBECK	9120D	Mar. 09 2014	Mar. 08 2015
Horn Antenna	ETS-LINDGREN	3160-09	Mar. 09 2014	Mar. 08 2015
RF Amplifier	HP	8347A	June. 27 2014	June. 27 2015
RF Amplifier	HP	8349B	June. 27 2014	June. 27 2015
EMI Test Software	AUDIX	E3	N/A	N/A
Coaxial cable	GTS	N/A	June. 27 2014	June. 27 2015
Coaxial Cable	GTS	N/A	June. 27 2014	June. 27 2015
Thermo meter	N/A	N/A	April. 6 2013	April. 5 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	Dec 03 2012	Dec 03 2014

Bandwidth				
Equipment	**Manufacturer**	**Type**	**Cal. Date**	**Cal Due Date**
Spectrum Analyzer	Rohde& Schwarz	FSP30	Dec. 02 2012	Dec. 03 2014

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 15.207 – Conducted Emission 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**
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.

Test Specification : ANSI C63.4 – 2003
Mode of operation : Tx mode
Port of testing : Enclosure
RBW/VBW : 10 kHz/ 30 kHz
Supply voltage : 3.0VDC (2x1.5V AAA new batteries)
Temperature : 23ºC
Humidity : 50%

Results: Pass

Frequency (MHz)	20 dB left (MHz)	Limit (MHz)	20 dB right (MHz)	Limit (MHz)
2410	2409.520	> 2400	2411.460	< 2483.5
2450	2448.580	> 2400	2450.820	< 2483.5
2471	2469.560	> 2400	2471.880	< 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 : 120 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.0VDC (2x1.5V AAA new batteries)
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 2410-2471MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2409.830	87.66	114.0 / P
2409.830	69.05	94.0 / A

Fundamental Frequency 2410-2471MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2409.830	89.40	114.0 / P
2409.830	71.47	94.0 / A

Harmonics 2410-2471MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4819.500	43.57	74.0 / P
4819.500	30.10	54.0 / A
7229.600	56.81	74.0 / P
7229.600	40.01	54.0 / A

Harmonics 2410-2471MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4819.500	51.71	74.0 / P
4819.500	40.10	54.0 / A
7229.600	56.22	74.0 / P
7229.600	40.20	54.0 / A

Fundamental Frequency 2450MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2450.010	91.52	114.0 / P
2450.010	72.43	94.0 / A

Fundamental Frequency 2450MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**

2450.010	91.87	114.0 / P
2450.010	72.08	94.0 / A
Harmonics 2450MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4900.100	50.16	74.0 / P
4900.100	31.66	54.0 / A
7350.320	56.58	74.0 / P
7350.320	39.43	54.0 / A
Harmonics 2450MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4900.100	51.69	74.0 / P
4900.100	32.70	54.0 / A
7350.320	57.75	74.0 / P
7350.320	38.82	54.0 / A
Fundamental Frequency 2471MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2470.800	90.26	114.0 / P
2470.800	70.74	94.0 / A
Fundamental Frequency 2471MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2470.800	90.63	114.0 / P
2470.800	71.73	94.0 / A
Harmonics 2471MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4942.200	49.01	74.0 / P
4942.200	30.94	54.0 / A
7412.800	54.06	74.0 / P
7412.800	32.00	54.0 / A
Harmonics 2471MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4942.200	52.65	74.0 / P
4942.200	33.97	54.0 / A
7412.800	55.49	74.0 / P
7412.800	37.70	54.0 / A

Subclause 15.205, 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 : 120 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.0VDC (2x1.5V AAA new batteries)
Frequency range : 9kHz to tenth harmonic
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: Pass

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

Tx frequency 2410-2471MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	38.61	74.0 / P
2400.000	26.40	54.0 / A

Tx frequency 2410-2471MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	41.82	74.0 / P
2400.000	26.54	54.0 / A

Tx frequency 2450MHz 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 2450MHz 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 2471MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	37.79	74.0 / P
2483.500	25.95	54.0 / A

Tx frequency 2471MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	38.02	74.0 / P
2483.500	25.21	54.0 / A