Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14050400 001**	**Seite 1 von 14** *Page 1 of 14*
Auftraggeber: *Client:*	**Stadlbauer Marketing + Vertrieb GmbH** **Rennbahn Allee 1, 5412 Puch, Salzburg, Austria**	
Gegenstand der Prüfung: *Test Item:*	**Short Range Device - Radio Control Toy Transmitter (2.4GHz)**	
Bezeichnung: *Identification:*	**370401017**	**Serien-Nr.:** *Serial No.:* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000579281-007**	**Eingangsdatum:** *Date of Receipt:* **06.07.2017**
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test sample received is not damaged and suitable for testing.	
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 3/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong **Hong Kong Productivity Council** HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong	
Prüfgrundlage: *Test Specification:*	**FCC Part 15 Subpart C** **RSS-210 Issue 9** **RSS-Gen Issue 4** **RSS-102 Issue 5** **ANSI C63.10-2013**	
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.** 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong	

geprüft/ *tested by:* | **kontrolliert/** *reviewed by:*

Datum / Date	Name/Stellung / Name/Position	Unterschrift / Signature	Datum / Date	Name/Stellung / Name/Position	Unterschrift / Signature
12.07.2017	Joey Leung, Project Manager		12.07.2017	Benny Lau, Senior Project Manager	

Sonstiges: Other Aspects
FCC ID: YFA370401017
IC: 12260A-370401017

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	

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.

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.

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2420 - 2465MHz
Type of modulation	GFSK
Type of antenna	Integral wire antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	V_{nor}: 3.0V (2 x 1.5V AAA size battery)

Product function and intended use

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

FCC ID: YFA370401017 / IC: 12260A-370401017

Models	Product description
370401017	Radio Controlled Toy Transmitter

Submitted documents

Technical Description
Circuit Diagram
Block Diagram
Bill of Materials
User Manual
Label

Independent Operation Modes

The basic operation mode is transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

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

- None

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013. The radiated emission measurements of the receiver part were performed according to the procedures in ANSI C63.4-2014.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and 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:

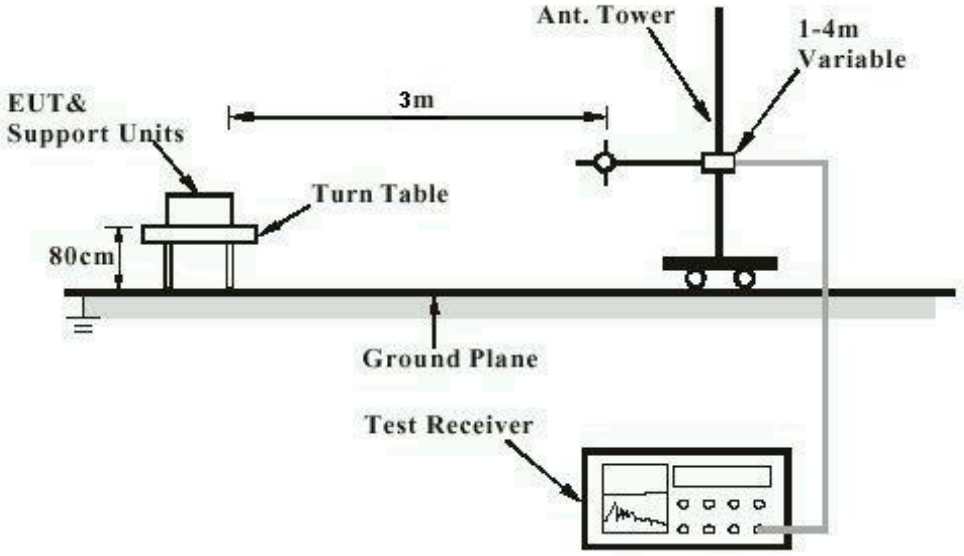
FS = R + AF + CF + FA – PA

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.

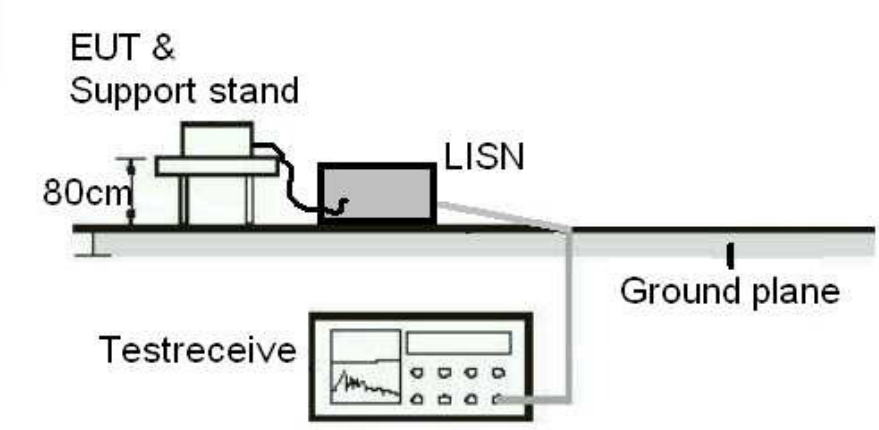
Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



List of Test and Measurement Instruments

Hong Kong Productivity Council (FCC Registration number: 90656 / IC Registration number: 4780A-1)

Radiated Emission

Equipment	Manufacturer	Type	S/N	Last Cal. Date	Cal. Due Date
Semi anechoic Chamber	Frankonia	Nil	Nil	25 Apr 2017	25 Apr 2018
Test Receiver	R & S	ESU40	100190	26 Jul 2016	26 Jul 2017
Bi conical Antenna	R & S	HK116	100241	01 Sep 2015	01 Sep 2017
Log Periodic Antenna	R & S	HL223	841516/017	01 Sep 2015	01 Sep 2017
Coaxial cable	Harbour	LL335	N/A	10 Jun 2016	10 Jun 2018
Microwave amplifer 0.5 26.5GHz, 25dB gain	HP	83017A	3950M00241	18 Jul 2016	18 Jul 2018
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	28 Oct 2015	28 Oct 2017
Horn Antenna	EMCO	3115	9002 3347	26 Aug 2015	26 Aug 2017
Active Loop Antenna	EMCO	6502	9107-2651	27 Oct 2016	27 Oct 2017

TÜV Rheinland Hong Kong Ltd

Radio Frequency Test

Equipment	Manufacturer	Type	S/N	Last Cal. Date	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP30	100610	16 Oct 2016	15 Oct 2017

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ±3.43dB.

The estimated combined standard uncertainty for radiated emissions measurements is ±4.68dB (30MHz to 200MHz) and ±5.73dB (200MHz to 1000MHz) and ±5.57dB (above 1GHz).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C, RSS-Gen Issue 4, RSS-210 Issue 9

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type: b) Manufacturer and model no: c) Peak Gain:	Fixed Integral antenna N/A N/A
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2	**Pass**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.
Results:	Only one integral antenna can be used.
Verdict:	Pass

RSS-Gen 6.3 – External Control	**Pass**
IC Requirement:	The device shall not have any external controls accessible to the user that enable it to be adjusted, selected or programmed to operate in violation of the limits prescribed in the applicable RSS.
Results:	The device does not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this standard.
Verdict:	Pass

RSS-Gen 8.3 – Antenna Requirement		**Pass**
IC Requirement:	When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer.	
Results:	a) Antenna type: b) Manufacturer c) model no d) Gain with reference to an isotropic radiator:	Fixed Integral antenna N/A N/A 0 dBi
Verdict:	Pass	

FCC 15.207 / RSS-Gen 8.8 – Conducted Emission on AC Mains	**N/A**
There is no AC power input or output ports on the EUT.	

FCC 15.215 (c) – 20 dB Bandwidth **Pass**

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.0VDC, 2 x 1.5V AAA 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.

Frequency (MHz)	20 dB left (MHz)	Limit (MHz)	20 dB right (MHz)	Limit (MHz)
2420	2417.330	> 2400	2423.660	< 2483.5
2445	2443.050	> 2400	2447.400	< 2483.5
2465	2463.070	> 2400	2466.590	< 2483.5

RSS-Gen 6.6 – Occupied Bandwidth **Pass**

Test Specification : RSS-Gen
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.0VDC, 2 x 1.5V AAA size new battery
Temperature : 23ºC
Humidity : 50%

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

For test protocols refer to Appendix 1.

Frequency (MHz)	Left (MHz)	Right (MHz)	99% bandwidth (MHz)
2420	2417.390	2423.390	6.000
2445	2443.080	2447.340	4.260
2465	2463.710	2466.500	2.790

FCC 15.249 (a) / RSS-210 B.10 (a) – Field Strength of Fundamental and Harmonics Pass

Test Specification : ANSI C63.10 – 2013
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
RBW/VBW : 120 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.0VDC, 2 x 1.5V AAA 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.

Fundamental Frequency 2420MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2421.122	87.44	114.0 / PK
2419.888	53.65	94.0 / AV

Fundamental Frequency 2420MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2419.776	85.48	114.0 / PK
2419.888	52.82	94.0 / AV

Harmonics 2420MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4840.064	57.92	74.0 / PK
4839.872	44.20	54.0 / AV

Harmonics 2420MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4840.000	60.44	74.0 / P
4839.904	45.12	54.0 / A

Fundamental Frequency 2445MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2447.276	91.11	114.0 / PK
2444.952	56.29	94.0 / AV

Fundamental Frequency 2445MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2444.776	84.65	114.0 / PK
2444.904	53.01	94.0 / AV

Harmonics 2445MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4889.679	58.45	74.0 / P
4889.872	42.30	54.0 / A
Harmonics 2445MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4889.840	64.97	74.0 / P
4889.904	48.20	54.0 / A
Fundamental Frequency 2465MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2464.968	87.53	114.0 / PK
2464.936	54.87	94.0 / AV
Fundamental Frequency 2465MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2465.000	84.63	114.0 / PK
2465.000	52.40	94.0 / AV
Harmonics 2465MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4930.141	57.48	74.0 / P
4929.853	44.26	54.0 / A
Harmonics 2465MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4929.455	59.41	74.0 / P
4929.840	45.34	54.0 / A

FCC 15.249 (d), 15.205 / RSS-210 B.10 (b) – Out Of Band Radiated Emission **Pass**

Test Specification : ANSI C63.10 – 2013
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
RBW/VBW : 120 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.0VDC, 2 x 1.5V AAA 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: Transmitting mode comply with the field strength limit of section 15.209. There is no spurious found below 30MHz.

Tx frequency 2420MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	47.23	74.0 / PK
2400.000	32.64	54.0 / AV

Tx frequency 2420MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	44.72	74.0 / PK
2400.000	32.69	54.0 / AV

Tx frequency 2445MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
200.000	8.5	43.5 /QP
400.000	15.6	46.0 /QP

Tx frequency 2445MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
30.000	11.5	40.0 / QP
600.000	19.4	46.0 / QP

Tx frequency 2465MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	52.07	74.0 / PK
2483.500	37.10	54.0 / AV

Tx frequency 2465MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	43.87	74.0 / PK
2483.500	32.62	54.0 / AV