Produkte
Products

Prüfbericht-Nr.: *Test Report No.*:	**50211800 001**	**Auftrags-Nr.:** *Order No.*:	**144203136**	**Seite 1 von 15** *Page 1 of 15*
Kunden-Referenz-Nr.: *Client Reference No.*:	**N/A**	**Auftragsdatum:** *Order date*:	**21.12.2018**	
Auftraggeber: *Client*:	**Stadlbauer Marketing + Vertrieb G.m.b.H** **Rennbahn Allee 1, 5412 Puch, Salzburg, Austria**			
Prüfgegenstand: *Test item*:	**Short Range Device - Radio Controlled Toy Transmitter (2.4GHz)**			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	**370980003, 980003**			
Auftrags-Inhalt: *Order content*:	**FCC & IC Certification**			
Prüfgrundlage: *Test specification*:	**FCC Part 15 Subpart C; RSS-Gen Issue 5; RSS-210 Issue 9** **ANSI C63.10-2013**			

Wareneingangsdatum: *Date of receipt*:	**11.12.2018**
Prüfmuster-Nr.: *Test sample No.*:	**A000851692-017**
Prüfzeitraum: *Testing period*:	**18.12.2018 – 27.12.2018**
Ort der Prüfung: *Place of testing*:	**Hong Kong**
Prüflaboratorium: *Testing laboratory*:	**TÜV Rheinland Hong Kong Ltd.**
Prüfergebnis*: *Test result**:	**Pass**

geprüft von / *tested by*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
28.01.2019	Joey Leung Project Manager	Joey Leung

kontrolliert von / *reviewed by*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
28.01.2019	Mika Chan Project Manager	Mika Chan

Sonstiges **FCC ID: YFA370980003**
Other: **IC: 12260A-370980003**

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Table of Content

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2404 - 2480MHz
Type of modulation	GFSK
Number of channels	77
Type of antenna	Wire Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	3.0V, 2 x 1.5V AA 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: YFA370980003 / IC: 12260A-370980003

Models	Product description
370980003, 980003	Short Range Device - Radio Controlled Toy Transmitter (2.4GHz)

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- 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.

- During test, RF channel & power was set and loaded into the RF IC by the customer. These settings shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

- Nil.

Countermeasures to achieve EMC Compliance

- Nil.

Test Methodology

Radiated Emission

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

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:

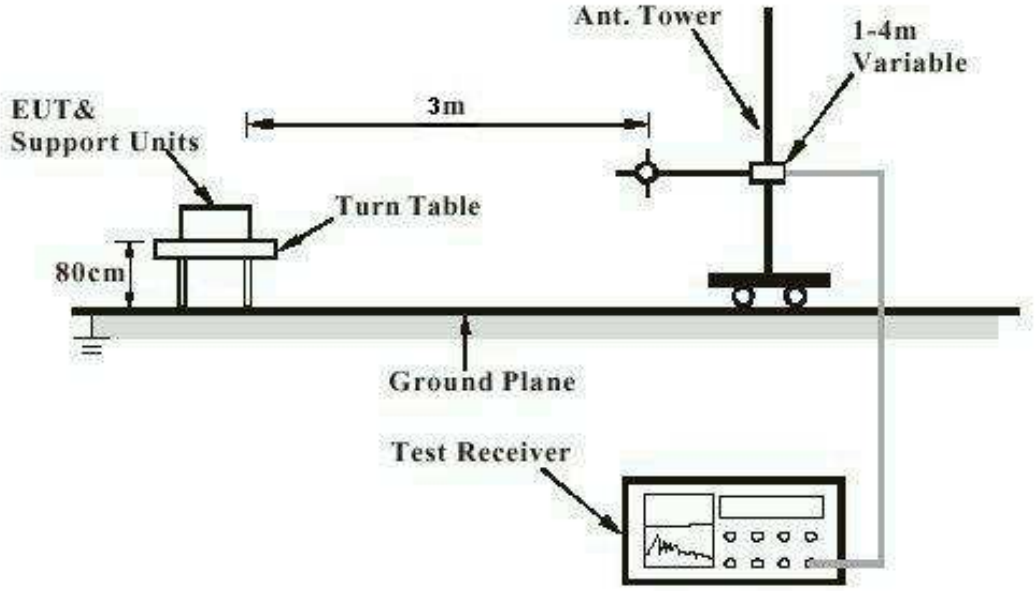
FS = R + AF + CF + FA – PA

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.

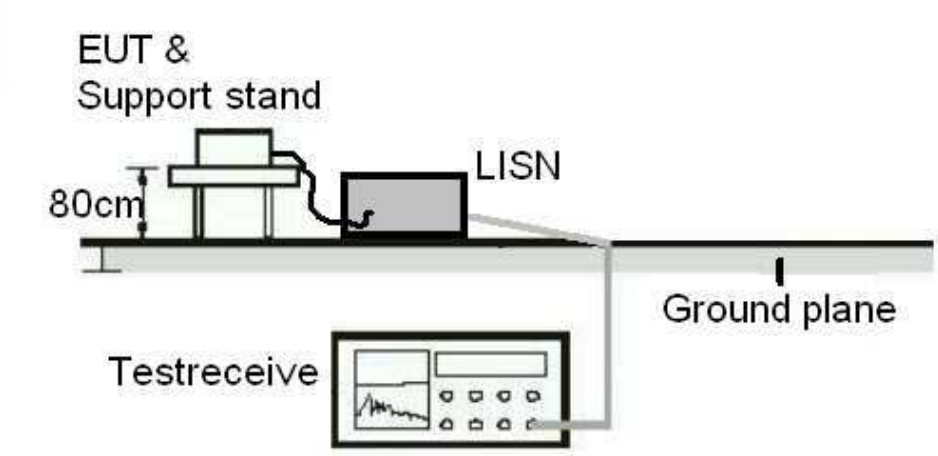
Test Setup Diagram

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)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.
Address: 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong·
Tel.: +852 2192 1000
Fax: +852 2192 1001
Email service-gc@tuv.com
Web: www.tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Type	:	Accredited Test Firm
Designation Number	:	HK0013
Test Firm Registration Number	:	371735
Scope	:	Intentional Radiators

Industry Canada

The 10m Semi-anechoic chamber used by TÜV Rheinland Hong Kong Ltd at Hong Kong Productivity Council has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

Test Site Registration Number	:	4780A-1

List of Test and Measurement Instruments

Hong Kong Productivity Council (FCC Registration number: 90656)

Radiated Emission

Equipment	Manufacturer	Type	S/N	Cal. Date	Cal. Due Date
Semi-anechoic Chamber	Frankonia	Nil	Nil	23 Apr 2018	23 Apr 2019
Test Receiver	R & S	ESU40	100190	12 Jun 2018	12 Jun 2019
Bi-conical Antenna	R & S	HK116	100241	21 Mar 2018	21 Mar 2020
Log Periodic Antenna	R & S	HL223	841516/017	22 Mar 2018	22 Mar 2020
Cable with I-Joint Conector	Huber+Suhner	CNM-NMCMILX800-473	A2803 #0001	11 Dec 2017	11 Dec 2019
Active Loop Antenna	EMCO	6502	9107-2651	25 Oct 2018	25 Oct 2019
Semi-anechoic Chamber (SiteVSWR)	Frankonia	Nil	Nil	17 May 2018	17 May 2019
Double-Ridged Waveguide Horn	EMCO	3116	00109210	05 Oct 2018	05 Oct 2020
Double-Ridged Waveguide Horn	EMCO	3117	00094998	30 Aug 2018	29 Aug 2020
Microwave amplifer 0.5-26.5GHz, 25dB gain	HP	83017A	3950M00241	18 Jul 2018	17 Jul 2020
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	168	29 Jan 2018	29 Jan 2019
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	30 Oct 2017	30 Oct 2019
High Frequency Cable	Pasternack	PE3VNA4001-3M	20160707C02493	29 Jan 2018	29 Jan 2019
Horn Antenna	EMCO	3115	9002-3347	28 Mar 2018	28 Mar 2020

TÜV Rheinland Hong Kong Ltd

Radio Test

Equipment	Manufacturer	Type	S/N	Cal. Date	Cal. Due Date
Spectrum Analyzer	R & S	FSP30	100610	03 May 2018	02 May 2019

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ±2.42dB.

The estimated combined standard uncertainty for radiated emissions measurements is ±4.81dB (9kHz to 30MHz) and ±4.62dB (30MHz to 200MHz) and ±5.67dB (200MHz to 1000MHz) and is ±5.07dB (1GHz to 8.2GHz) and ±4.58dB (8.2GHz to 12.4GHz) and ±4.78dB (12.4GHz to 18GHz)

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-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 wire antenna N/A 0 dBi
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 wire 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.	

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

Test specification : ANSI C63.10 – 2013
Test date : 27.12.2018
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 3.0V, 2 x 1.5V AA size 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: 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)	20 dB left (MHz)	Limit (MHz)	20 dB right (MHz)	Limit (MHz)
2404	2401.680	> 2400	2407.300	< 2483.5
2440	2438.040	> 2400	2441.200	< 2483.5
2480	2478.360	> 2400	2481.000	< 2483.5

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

FCC/ IC Requirement : N/A

Test specification : RSS-Gen
Test date : 27.12.2018
Mode of operation : Tx mode
Port of testing : Temporary antenna port
Supply voltage : 3.0V, 2 x 1.5V AA size 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)
2404	2401.860	2407.240	5.380
2440	2438.280	2441.000	2.720
2480	2478.600	2480.960	2.360

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

Test specification : ANSI C63.10 – 2013
Test date : 20.12.2018
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 3.0V, 2 x 1.5V AA size 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 2404MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2404.304	89.3	114.0 / PK
2404.304	64.8	94.0 / AV

Fundamental Frequency 2404MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2404.166	89.2	114.0 / PK
2404.166	64.5	94.0 / AV

Harmonics 2404MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4808.096	54.6	74.0 / PK
4808.096	32.4	54.0 / AV
7212.625	50.8	74.0 / PK
7212.625	32.2	54.0 / AV

Harmonics 2404MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4808.600	54.3	74.0 / PK
4808.600	33.0	54.0 / AV
7212.881	48.9	74.0 / PK
7212.881	31.5	54.0 / AV

Fundamental Frequency 2440MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2440.176	89.2	114.0 / PK
2440.176	64.5	94.0 / AV

Fundamental Frequency 2440MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2440.163	89.7	114.0 / PK
2440.163	65.0	94.0 / AV
Harmonics 2440MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4880.592	56.6	74.0 / PK
4880.592	33.7	54.0 / AV
7320.913	52.8	74.0 / PK
7320.913	32.7	54.0 / AV
Harmonics 2440MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4880.608	55.2	74.0 / PK
4880.608	33.3	54.0 / AV
7320.961	48.9	74.0 / PK
7320.961	32.0	54.0 / AV
Fundamental Frequency 2480MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2480.189	88.1	114.0 / PK
2480.189	63.3	94.0 / AV
Fundamental Frequency 2480MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2480.160	88.5	114.0 / PK
2480.160	63.4	94.0 / AV
Harmonics 2480MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4960.608	54.7	74.0 / PK
4960.608	32.8	54.0 / AV
7440.913	54.1	74.0 / PK
7440.913	33.2	54.0 / AV
Harmonics 2480MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4960.592	55.0	74.0 / PK
4960.592	33.1	54.0 / AV
7440.913	50.0	74.0 / PK
7440.913	32.2	54.0 / AV

Subclause 15.249 (d), 15.205 / RSS-210 B.10 (b) – Out Of Band Radiated Emission		**Pass**
Test specification : ANSI C63.10 – 2013 Test date : 20.12.2018 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 3.0V, 2 x 1.5V AA size 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 limit of section 15.209. There is no spurious found below 30MHz.	
Tx frequency 2404MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	55.9	74.0 / PK
2400.000	24.5	54.0 / AV
Tx frequency 2404MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2400.000	58.2	74.0 / PK
2400.000	24.0	54.0 / AV
Tx frequency 2440MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Tx frequency 2440MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Tx frequency 2480MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	56.8	74.0 / PK
2483.500	26.2	54.0 / AV
Tx frequency 2480MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	57.5	74.0 / PK
2483.500	24.8	54.0 / AV