


<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>50224348 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>158102183</b>	<b>Seite 1 von 15</b> <i>Page 1 of 15</i>	
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	<b>N/A</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	<b>12.02.2019</b>		
<b>Auftraggeber:</b> <i>Client:</i>	<b>Stadlbauer Marketing + Vertrieb G.m.b.H</b> <b>Rennbahn Allee 1, 5412 Puch</b> <b>Salzburg, Austria</b>				
<b>Prüfgegenstand:</b> <i>Test item:</i>	<b>Short Range Device - Toy Car Remote Control (2.4GHz)</b>				
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	<b>370410382/410382</b>				
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	<b>FCC and ISED Certification</b>				
<b>Prüfgrundlage:</b> <i>Test specification:</i>	<b>FCC Part 15 Subpart C, ANSI C63.10-2013</b> <b>RSS-210 Issue 9, RSS-Gen Issue 5</b>				
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	<b>22.02.2019</b>				
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	<b>A000879915-001</b>				
<b>Prüfzeitraum:</b> <i>Testing period:</i>	<b>28.02.2019 - 05.03.2019</b>				
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	<b>TÜV Rheinland Hong Kong Ltd.</b>				
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	<b>TÜV Rheinland Hong Kong Ltd.</b>				
<b>Prüfergebnis*:</b> <i>Test result*:</i>	<b>Pass</b>				
<b>geprüft von / tested by:</b>		<b>kontrolliert von / reviewed by:</b>			
					
08.03.2019	Benny Lau / Senior Project Manager	08.03.2019	Sharon Li / Unit Senior Manager		
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges / Other:</b>		FCC ID: YFA370410382 IC: 12260A-370410382			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
<p>* 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</p> <p>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</p>					
<p><b>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.</b></p> <p><i>This test report only 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 test mark.</i></p>					

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## Product information

### Manufacturers declarations

	Transmitter
Operating frequency range	2420 - 2465MHz
Type of modulation	GFSK
Number of channels	4
Type of antenna	Wire Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	3.0 VDC

### 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: YFA370410382/ IC: 12260A-370410382

Models	Product description
370410382/410382	Short Range Device - Toy Car Remote Control (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.

- Test mode samples with maximum RF output power and duty cycle and capable to transmit continuously at the lowest, middle and highest frequency channels is provided by the applicant for the testing.

### 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 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:

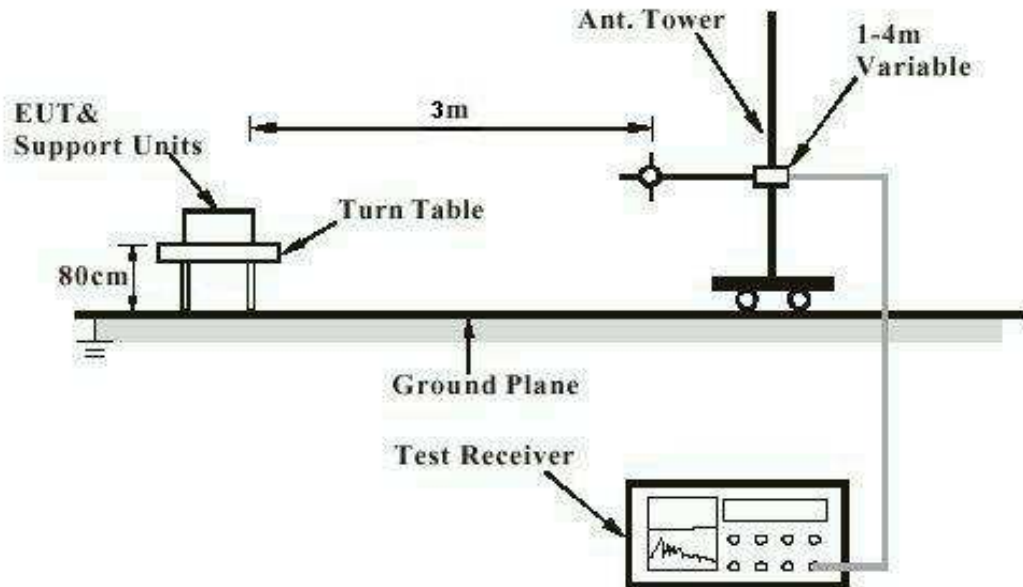
$$FS = R + AF + CF + FA - PA$$

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.

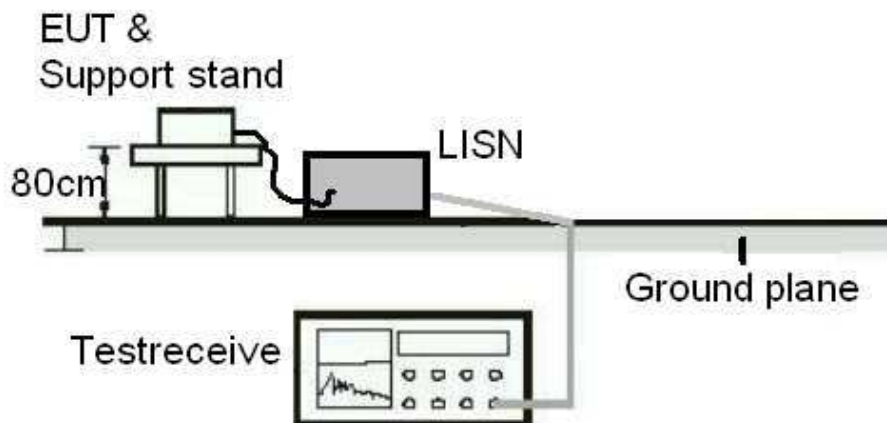
## Test Setup Diagram

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](mailto:service-gc@tuv.com)

Web: [www.tuv.com](http://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

### Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	23-Apr-18	23-Apr-19
Test Receiver	R & S	ESU40	12-Jun-18	12-Jun-19
Active Loop Antenna	EMCO	6502	25-Oct-18	25-Oct-19
Bi-conical Antenna	R & S	HK116	21-Mar-18	21-Mar-20
Log Periodic Antenna	R & S	HL223	22-Mar-18	22-Mar-20
Standard Gain Horn	ETS-Lindgren	3160-07	4-Sep-18	4-Sep-20
Standard Gain Horn	ETS-Lindgren	3160-08	26-Sep-18	26-Sep-20
Standard Gain Horn	ETS-Lindgren	3160-10	3-Oct-18	3-Oct-20
Double-Ridged Waveguide Horn	EMCO	3116	5-Oct-18	5-Oct-20
Double-Ridged Waveguide Horn	EMCO	3117	30-Aug-18	30-Aug-20
Coaxial cable	Harbour	LL335	12-Jun-18	12-Jun-19
High Frequency Cable	Pasternack	PE3VNA4001-3M	11-Dec-17	11-Dec-19
Microwave amplifier 0.5-26.5GHz, 25dB gain	HP	83017A	25-Jun-18	25-Jun-19
Preamplifier 18GHz to 40GHz with cable (EMC656)	A.H. Systems, Inc.	PAM-1840VH	29-Jan-18	29-Jan-19
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30-Oct-17	30-Oct-19

### Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	3-May-18	2-May-19

## Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is  $\pm 2.42\text{dB}$ .

The estimated combined standard uncertainty for radiated emissions measurements is  $\pm 4.81\text{dB}$  (9kHz to 30MHz) and  $\pm 4.62\text{dB}$  (30MHz to 200MHz) and  $\pm 5.67\text{dB}$  (200MHz to 1000MHz) and is  $\pm 5.07\text{dB}$  (1GHz to 8.2GHz) and  $\pm 4.58\text{dB}$  (8.2GHz to 12.4GHz) and  $\pm 4.78\text{dB}$  (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

<b>FCC 15.203 – Antenna Requirement 1</b>		<b>Pass</b>
<b>FCC Requirement:</b>	No antenna other than that furnished by the responsible party shall be used with the device	
<b>Results:</b>	a) Antenna type: Fixed Integral wire antenna b) Manufacturer and model no: N/A c) Peak Gain: 0 dBi	
<b>Verdict:</b>	Pass	
<b>FCC 15.204 – Antenna Requirement 2</b>		<b>Pass</b>
<b>FCC Requirement:</b>	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.	
<b>Results:</b>	Only one integral antenna can be used.	
<b>Verdict:</b>	N/A	
<b>RSS-Gen 6.3 – External Control</b>		<b>Pass</b>
<b>IC Requirement:</b>	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.	
<b>Results:</b>	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.	
<b>Verdict:</b>	Pass	
<b>RSS-Gen 8.3 – Antenna Requirement</b>		<b>Pass</b>
<b>IC Requirement:</b>	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.	
<b>Results:</b>	a) Antenna type: Fixed Integral wire antenna b) Manufacturer: N/A c) model no: N/A d) Gain with reference to an isotropic radiator: 0 dBi	
<b>Verdict:</b>	Pass	
<b>FCC 15.207/ RSS-Gen 8.8 – Conducted Emission on AC Mains</b>		<b>N/A</b>
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 : 05.03.2019 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 3.0 VDC Temperature : 23°C Humidity : 50%				
<b>Requirement:</b> 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.				
<b>Results:</b> 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)
2420	2417.660	> 2400	2421.160	< 2483.5
2447	2446.250	> 2400	2447.510	< 2483.5
2465	2463.690	> 2400	2466.230	< 2483.5

RSS-Gen 6.6 – Occupied Bandwidth				Pass
<b>FCC/ IC Requirement</b> : N/A				
Test Specification : RSS-Gen Test date : 05.03.2019 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 3.0 VDC Temperature : 23°C Humidity : 50%				
<b>Results:</b> 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	2417.700	2421.100	3.40	
2447	2446.350	2447.600	1.25	
2465	2463.690	2466.350	2.66	

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

Test Specification : ANSI C63.10 – 2013  
 Test date : 28.02.2019  
 Mode of operation : Tx mode  
 Port of testing : Enclosure  
 Frequency range : 9kHz – 25GHz  
 Supply voltage : 3.0 VDC  
 Temperature : 23°C  
 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 2420MHz Vertical Polarization**

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2419.980	91.5	114.0 / PK
2419.980	62.2	94.0 / AV

**Fundamental Frequency 2420MHz Horizontal Polarization**

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2419.932	94.8	114.0 / PK
2419.932	70.7	94.0 / AV

**Harmonics 2420MHz Vertical Polarization**

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4839.955	55.5	74.0 / PK
4839.955	34.0	54.0 / AV
7259.931	48.4	74.0 / PK
7259.931	32.4	54.0 / AV

**Harmonics 2420MHz Horizontal Polarization**

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4839.951	60.2	74.0 / PK
4839.951	37.1	54.0 / AV
7259.951	52.7	74.0 / PK
7259.951	33.7	54.0 / AV

**Fundamental Frequency 2447MHz Vertical Polarization**

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2447.000	88.2	114.0 / PK
2447.000	64.5	94.0 / AV

**Fundamental Frequency 2447MHz Horizontal Polarization**

Freq	Level	Limit/ Detector
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<b>MHz</b>	<b>dBuV/m</b>	<b>dBuV/m</b>
2446.977	96.7	114.0 / PK
2446.977	73.0	94.0 / AV
Harmonics 2447MHz Vertical Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
4893.951	56.3	74.0 / PK
4893.951	34.8	54.0 / AV
7340.935	49.0	74.0 / PK
7340.935	32.7	54.0 / AV
Harmonics 2447MHz Horizontal Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
4893.955	62.3	74.0 / PK
4893.955	39.2	54.0 / AV
7340.932	55.8	74.0 / PK
7340.932	35.5	54.0 / AV
Fundamental Frequency 2465MHz Vertical Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
2465.000	86.5	114.0 / PK
2465.000	62.6	94.0 / AV
Fundamental Frequency 2465MHz Horizontal Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
2464.974	94.9	114.0 / PK
2464.974	70.8	94.0 / AV
Harmonics 2465MHz Vertical Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
4930.000	58.0	74.0 / PK
4930.000	34.0	54.0 / AV
7395.000	49.3	74.0 / PK
7395.000	33.0	54.0 / AV
Harmonics 2465MHz Horizontal Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
4929.955	58.2	74.0 / PK
4929.955	35.9	54.0 / AV
7394.929	52.4	74.0 / PK
7394.929	33.9	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 : 28.02.2019 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 3.0 VDC Temperature : 23°C 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 2420MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2400.000	53.3	74.0 / PK
2400.000	22.9	54.0 / AV
Tx frequency 2420MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2400.000	36.5	74.0 / PK
2400.000	22.7	54.0 / AV
Tx frequency 2447MHz 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 2447MHz 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 2465MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	39.6	74.0 / PK
2483.500	22.9	54.0 / AV
Tx frequency 2465MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	55.4	74.0 / PK
2483.500	36.9	54.0 / AV