
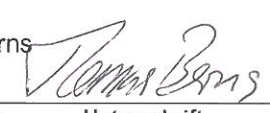


Produkte  
 Products

<b>Prüfbericht - Nr.:</b> 14031380 002		Seite 1 von 12 Page 1 of 12			
<i>Test Report No.:</i>					
<b>Auftraggeber:</b> <i>Client:</i>	Stadlbauer Marketing + Vertrieb GmbH Rennbahn Allee1 5412 Puch, Salzburg Austria				
<b>Gegenstand der Prüfung:</b> <i>Test Item:</i>	Short Range Device - Radio Control Toy Receiver (2.4GHz Transceiver)				
<b>Bezeichnung:</b> <i>Identification:</i>	10112	<b>Serien-Nr.:</b> <i>Serial No.:</i>	Engineering sample		
<b>Wareneingangs-Nr.:</b> <i>Receipt No.:</i>	00130315060-001	<b>Eingangsdatum:</b> <i>Date of Receipt:</i>	15.03.2013		
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of test item at delivery:</i>	Test sample(s) is/are not damaged and suitable for testing.				
<b>Prüfört:</b> <i>Testing Location:</i>	<b>Hong Kong Productivity Council</b> HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong  <b>TÜV Rheinland Hong Kong Ltd.</b> 8/F., First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong				
<b>Prüfgrundlage:</b> <i>Test Specification:</i>	<b>FCC Part 15 Subpart C</b> <b>ANSI C63.4-2003</b> <b>CISPR 22:1997</b>				
<b>Prüfergebnis:</b> <i>Test Results:</i>	<b>Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.</b>  The above mentioned product was tested and <b>passed</b> .				
<b>Prüflaboratorium:</b> <i>Testing Laboratory:</i>	<b>TÜV Rheinland Hong Kong Ltd.</b> 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong				
<b>geprüft/ tested by:</b>	<b>kontrolliert/ reviewed by:</b>				
23.04.2013	Mika Chan Senior Project Engineer		23.04.2013	Thomas Berns Certifier	
<i>Datum</i> <i>Date</i>	<i>Name/Stellung</i> <i>Name/Position</i>	<i>Unterschrift</i> <i>Signature</i>	<i>Datum</i> <i>Date</i>	<i>Name/Stellung</i> <i>Name/Position</i>	<i>Unterschrift</i> <i>Signature</i>
<b>Sonstiges:</b> Other Aspects:	<b>FCCID: YFA200201210112</b> This test report is issued for "Class II permissive change" of the previously tested EUT of Stadlbauer model 10112 in test report number 14031380 001. For details, please refer to "Remark" on page 5.				
<b>Abkürzungen:</b>	<i>P(ass) = entspricht Prüfgrundlage</i> <i>F(ail) = entspricht nicht Prüfgrundlage</i> <i>N/A = nicht anwendbar</i> <i>N/T = nicht getestet</i>		<b>Abbreviations:</b>	<i>P(ass) = passed</i> <i>F(ail) = failed</i> <i>N/A = not applicable</i> <i>N/T = not tested</i>	
<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> <i>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.</i>					

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## Product information

### Manufacturers declarations

	<b>Transceiver</b>
Operating frequency range	2410 - 2472 MHz
Type of modulation	FHSS modulation
Number of channels	32
Channel separation	2 MHz
Type of antenna	PCB Antenna
Antenna gain (dBi)	2.3
Power level	fix
Type of equipment	Plug in radio device
Connection to public utility power line	No
Nominal voltage	$V_{\text{nom}}$ : 5.0VDC from control unit
Independent Operation Modes	Page scan Inquiry scan Connection state - Data Link

## Product function and intended use

The submitted sample is a radio control toy receiver operating at 2.4GHz based on the WIRELESS+ technology.

WIRELESS+ is the latest new cordless racetrack delight for Carrera DIGITAL124 and Carrera DIGITAL 132. The 2.4 GHz radio technology with frequency-hopping is free of interference and offers a range of up to 15 metres. WIRELESS+ offers cordless freedom for up to six drivers at the racetrack.

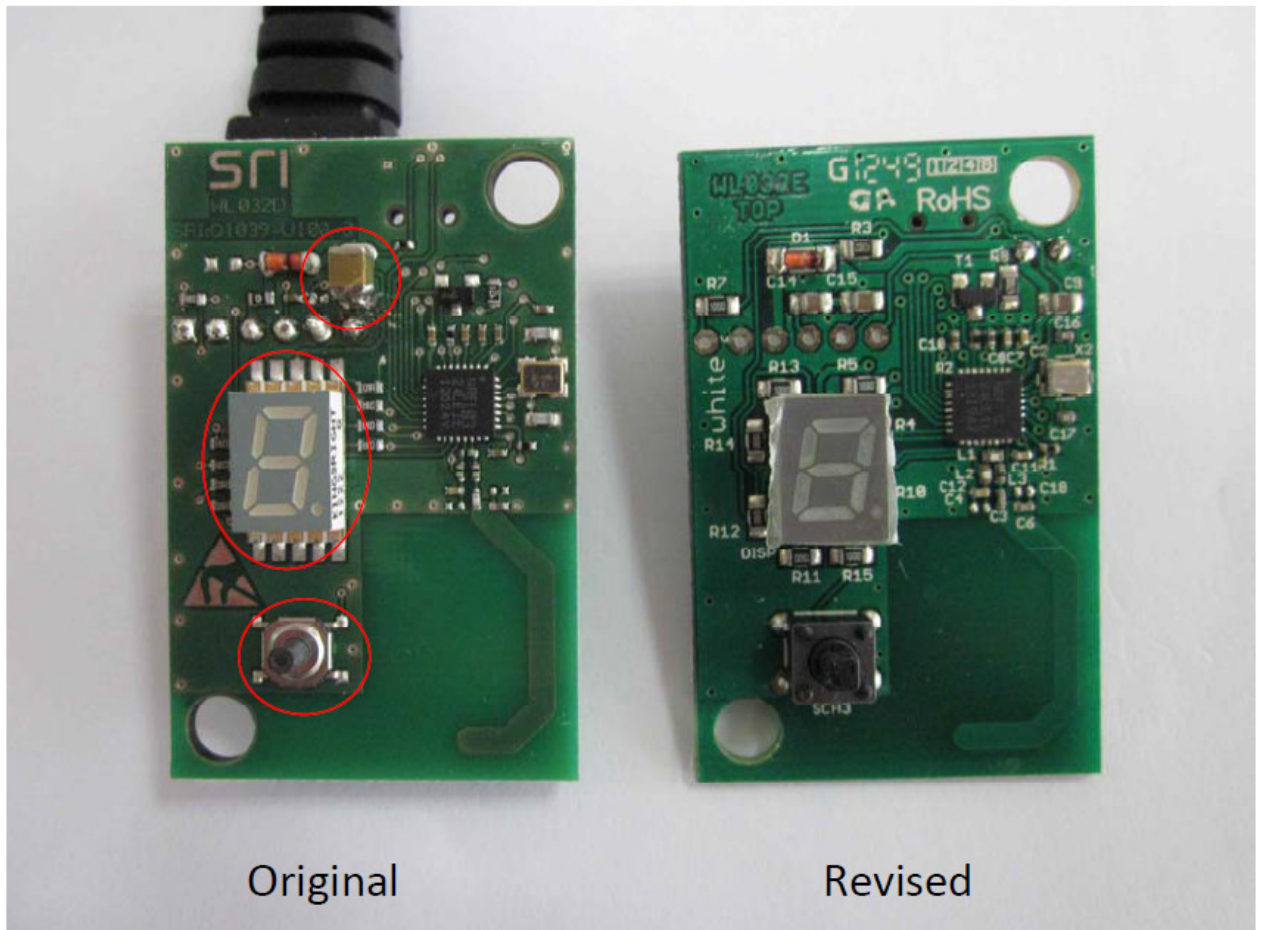
## Submitted documents

Circuit Diagram  
Block Diagram  
Bill of material  
User Manual  
Label Artwork

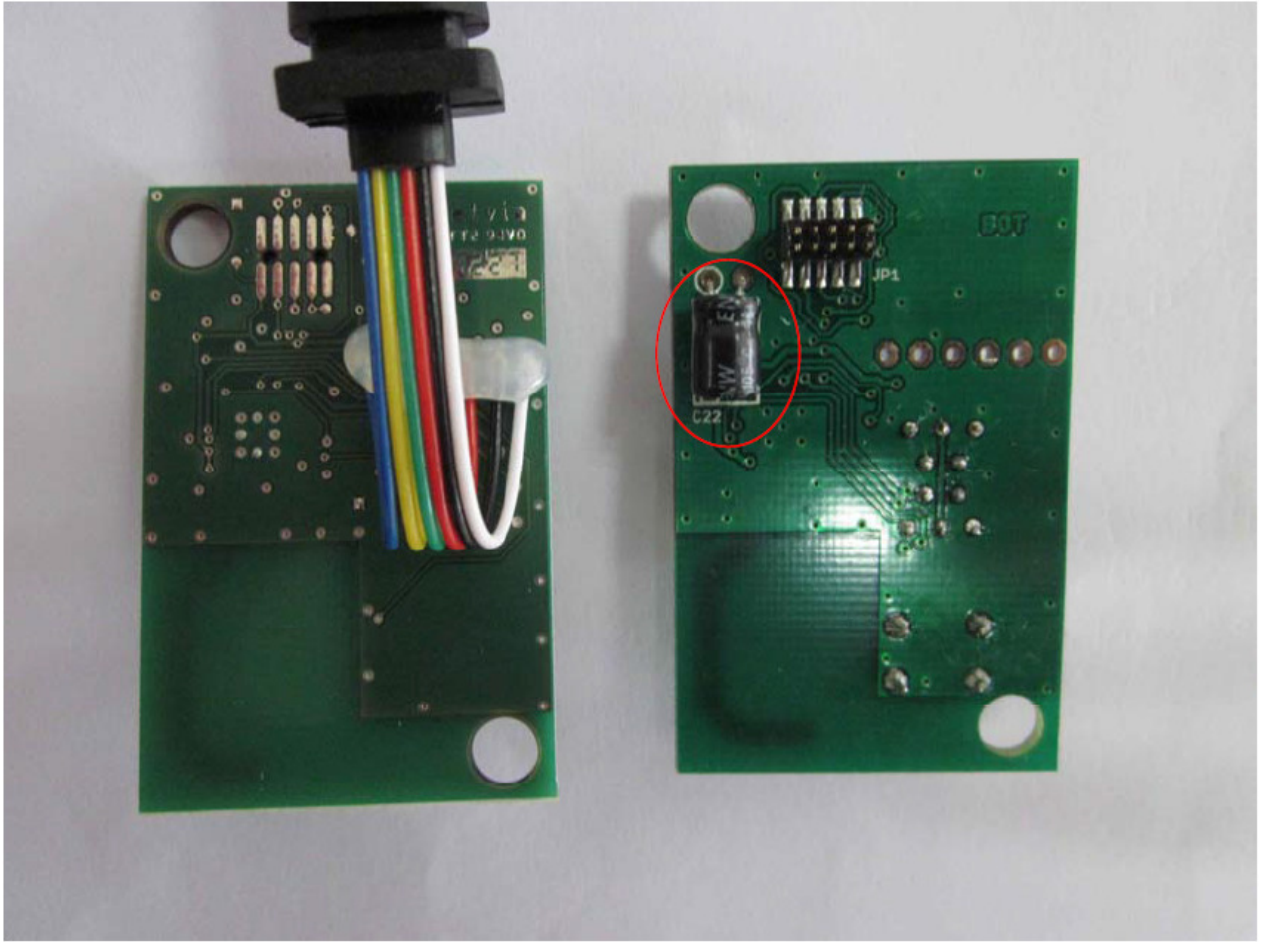
## Remark

Change as follow:

- PCB layout change







**Special accessories and auxiliary equipment**

AC/DC Adaptor :



Control Unit:



## List of Test and Measurement Instruments

### Hong Kong Productivity Council (Registration number: 90656)

Equipment	Manufacturer	Type	S/N	Due Date
Semi-anechoic Chamber	Frankonia	Nil	Nil	25-May-13
Test Receiver	R & S	ESU40	100190	26-May-13
Bi-conical Antenna	R & S	HK116	100242	05-May-13
Log Periodic Antenna	R & S	HL223	841516/020	06-May-13
Coaxial cable 50ohm	Rosenberger	RTK081-05S-05S-10m	LA2-001-10M / 001	15-Nov-13
Microwave amplifier 0.5-26.5GHz, 25dB gain	HP	83017A	3950M00241	03-Oct-13
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	9829213	28-Oct-13
Horn Antenna	EMCO	3115	9002-3351	11-May-13
Double-Ridge Waveguide Horn	EMCO	3116	2616	11-May-13
Active Loop Antenna	EMCO	6502	9107-2651	21-Jun-13
FSP 30 Spectrum Analyser	R & S	FSP 30	100007	17-Sep-13

## Results FCC Part 15 – Subpart C

<b>Subclause 15.203 – Antenna Information</b>		<b>Pass</b>
<b>Requirement:</b>	No antenna other than that furnished by the responsible party shall be used with the device	
<b>Results:</b>	Permanent attached antenna	
<b>Verdict:</b>	Pass	
<b>Subclause 15.204 – Antenna Information</b>		<b>Pass</b>
<b>Requirement:</b>	Provide information for every antenna proposed for the use with the EUT	
<b>Results:</b>	a) Antenna type:	PCB antenna
	b) Manufacturer and model no:	N.A.
	c) Gain with reference to an isotropic radiator:	2.3 dBi
<b>Verdict:</b>	Pass	
<b>Subclause 15.207 – Disturbance Voltage on AC Mains</b>		<b>Pass</b>
Remark: Test result refers to test report 14031380 001.		
<b>Subclause 15.247 (a)(1) – Carrier Frequency Separation</b>		<b>Pass</b>
Remark: Test result refers to test report 14031380 001.		
<b>Subclause 15.247 (a)(1)(iii) – Number of hopping channels</b>		<b>Pass</b>
Remark: Test result refers to test report 14031380 001.		
<b>Subclause 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)</b>		<b>Pass</b>
Remark: Test result refers to test report 14031380 001.		
<b>Subclause 15.247 (a) – 20 dB Bandwidth</b>		<b>Pass</b>
Remark: Test result refers to test report 14031380 001.		
<b>Subclause 15.247 (a) – Hopping Sequence</b>		<b>Pass</b>
<b>Requirement:</b>	The hopping sequence is generated and provided with an example.	



**Hopping sequence**

The Receiver sends every 16 milliseconds a beacon telegram to the hand throttles. The telegram includes the frequencies for the next four hopping steps.

The hand throttles receive this telegram and after a time, depends on the address, every throttle sends a telegram back to the receiver. The telegram consists in each case a value for the position of the throttle and the status of the lane switch button.

The time slots for the six addresses are:

Address 1: + 2 milliseconds

Address 2: + 4 milliseconds

Address 3: + 6 milliseconds

Address 4: + 8 milliseconds

Address 5: + 10 milliseconds

Address 6: + 12 milliseconds

The frequencies for the hopping process are 2410, 2412, 2414 ... 2472 MHz. This produces a total of 32 several frequencies. The frequency for the next hopping step is generated from a true random number generator.

**Subclause 15.247 (a) – Equal Hopping Frequency Use**
**Pass**

Requirement: Each of the transmitter's hopping channels is used equally on average.

**Equal hopping frequency use**

In a fixed period, the probability for each available channel to be chosen is equal.

**Subclause 15.247 (a) – Receiver Input Bandwidth**
**Pass**

Requirement: The associated receiver(s) complies with the requirement that its input bandwidth matches the bandwidth of the transmitted signal.

**Receiver input bandwidth**

The receiver bandwidth is equal to the transmitter bandwidth in the 32 hopping channel mode, which is 2MHz. The receiver bandwidth was verified during RF conformance testing.

**Subclause 15.247 (a) – Receiver Hopping Capability**
**Pass**

Requirement: The associated receiver has the ability to shift frequencies in synchronisation with the transmitted signals.

**Receiver hopping Capability**

The Receiver sends every 16 milliseconds a beacon telegram to the hand throttles. The telegram includes the frequencies for the next four hopping steps.

<b>Subclause 15.247 (b)(1) – Peak Output Power</b>					<b>Pass</b>
Test Specification : FCC Part 15 Subpart A – Subclause 15.31 Mode of operation : Tx mode (2410MHz, 2440MHz, 2472MHz) Port of testing : Temporary antenna port Detector : Peak RBW/VBW : 3 MHz / 10 MHz Supply voltage : 5.0VDC from control unit Temperature : 23°C Humidity : 50%					
Requirement: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band: 0.125 Watts.					
<b>Results:</b> For test protocols please refer to Appendix 1, page 2-3.					
<b>GFSK Modulation</b>					
Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2410	-0.71	0.00	-0.710	0.125 / 21.0	Pass
2440	-2.15	0.00	-2.150	0.125 / 21.0	Pass
2472	-2.21	0.00	-2.210	0.125 / 21.0	Pass
<b>Subclause 15.247 (d) – Band edge compliance of conducted emissions</b>					<b>Pass</b>
Remark: Test result refers to test report 14031380 001.					
<b>Subclause 15.205 – Band edge compliance of radiated emissions</b>					<b>Pass</b>
Test Specification : FCC Part 15 Subpart A – Subclause 15.31 Mode of operation : Tx mode (2410MHz, 2472MHz), GFSK Port of testing : Temporary antenna port Detector : Peak RBW/VBW : 1 MHz / 1 MHz Supply voltage : 5.0VDC from control unit Temperature : 23°C Humidity : 50%					
Requirement: Radiated emissions which fall in the restricted bans, as defined in 15.205 (a), must also comply with the radiated emission limits specified in 15.209(a).					
<b>Results:</b> There is no peak found in the restricted bands. For test protocols refer to Appendix 1, page 24-31.					
<b>Subclause 15.247 (d) – Spurious Conducted Emissions</b>					<b>Pass</b>
Remark: Test result refers to test report 14031380 001.					

<b>Subclause 15.247 (c) – Spurious Radiated Emissions</b>		<b>Pass</b>
Test Specification : ANSI C63.4 – 2003 Mode of operation : Tx mode (2410MHz, 2440MHz, 2472MHz), GFSK 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 : 5.0VDC from control unit Temperature : 23°C Humidity : 50%		
<b>Requirement:</b> In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.205(c).		
<b>Results:</b> Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.  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
47.460	23.10	40 / QP
295.886	23.4	43.5 / QP
4819.871	55.13	74.0 / PK
4820.144	33.45	54.0 / AV
7231.506	65.10	74.0 / PK
7229.951	36.55	54.0 / AV
Tx frequency 2410MHz		Horizontal Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
119.957	29.40	43.5 / QP
311.884	26.20	46 / QP
4820.400	53.81	74.0 / PK
4820.032	33.18	54.0 / AV
7231.266	64.95	74.0 / PK
7230.112	36.50	54.0 / AV
Tx frequency 2440MHz		Vertical Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
46.830	23.3	40 / QP
295.892	22.4	46 / QP
4879.583	54.02	74.0 / PK
4880.112	32.70	54.0 / AV
7319.503	66.02	74.0 / PK
7320.432	36.69	54.0 / AV
Tx frequency 2440MHz		Horizontal Polarization

<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
119.956	29.5	43.5 / QP
311.885	26.0	46 / QP
4879.871	53.36	74.0 / PK
4880.000	32.76	54.0 / AV
7320.080	64.95	74.0 / PK
7319.951	36.71	54.0 / AV
Tx frequency 2472MHz Vertical Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
46.980	23.8	40 /QP
295.892	23.7	46 / QP
4943.663	54.00	74.0 / PK
4943.871	33.18	54.0 / AV
7415.983	67.73	74.0 / PK
7415.887	36.88	54.0 / AV
Tx frequency 2472MHz Horizontal Polarization		
<b>Freq MHz</b>	<b>Level dBuV/m</b>	<b>Limit/ Detector dBuV/m</b>
119.955	29.5	43.5 / QP
311.887	27.4	46 / QP
4943.926	51.58	74.0 / PK
4943.910	33.06	54.0 / AV
7415.897	67.25	74.0 / PK
7415.769	36.75	54.0 / AV