

Produkte
 Products


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Auftraggeber: Client:	Stadlbauer Marketing + Vertrieb GmbH Rennbahn Allee1 5412 Puch, Salzburg Austria		
Gegenstand der Prüfung: Test Item:	Short Range Device - Radio Control Toy Transmitter (2.4GHz Transceiver)		
Bezeichnung: Identification:	10111	Serien-Nr.: Serial No.:	Engineering sample
Wareneingangs-Nr.: Receipt No.:	00130315060-001	Eingangsdatum: Date of Receipt:	15.03.2013
Zustand des Prüfgegenstandes bei Anlieferung: Condition of test item at delivery:	Test sample(s) is/are not damaged and suitable for testing.		
Prüfört: Testing Location:	Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong TÜV Rheinland Hong Kong Ltd. 8/F., First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong		
Prüfgrundlage: Test Specification:	FCC Part 15 Subpart C ANSI C63.4-2003 CISPR 22:1997		
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:		
23.04.2013	Mika Chan Senior Project Engineer		23.04.2013
			Thomas Berns Certifier
Datum Date	Name/Stellung Name/Position	Unterschrift Signature	Datum Date
			Name/Stellung Name/Position
			Unterschrift Signature
Sonstiges:	FCCID: YFA200201210111		
Other Aspects:	This test report is issued for "Class II permissive change" of the previously tested EUT of Stadlbauer model 10111 in test report number 14031101 001. For details, please refer to "Remark" on page 5.		
Abkürzungen:	P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations:	P(ass) = passed F(ail) = failed N/A = not applicable 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. <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

	Transceiver
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	stand alone radio device
Connection to public utility power line	No
Nominal voltage	V_{nor} : 3.7V
Independent Operation Modes	Page scan Inquiry scan Connection state - Data Link

Product function and intended use

The submitted sample is a radio control toy transmitter 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. Thanks to powerful lithium polymer rechargeable battery, continuous play for up to eight hours is possible and standby operation for over 80 days. WIRELESS+ offers cordless freedom for up to six drivers at the racetrack.

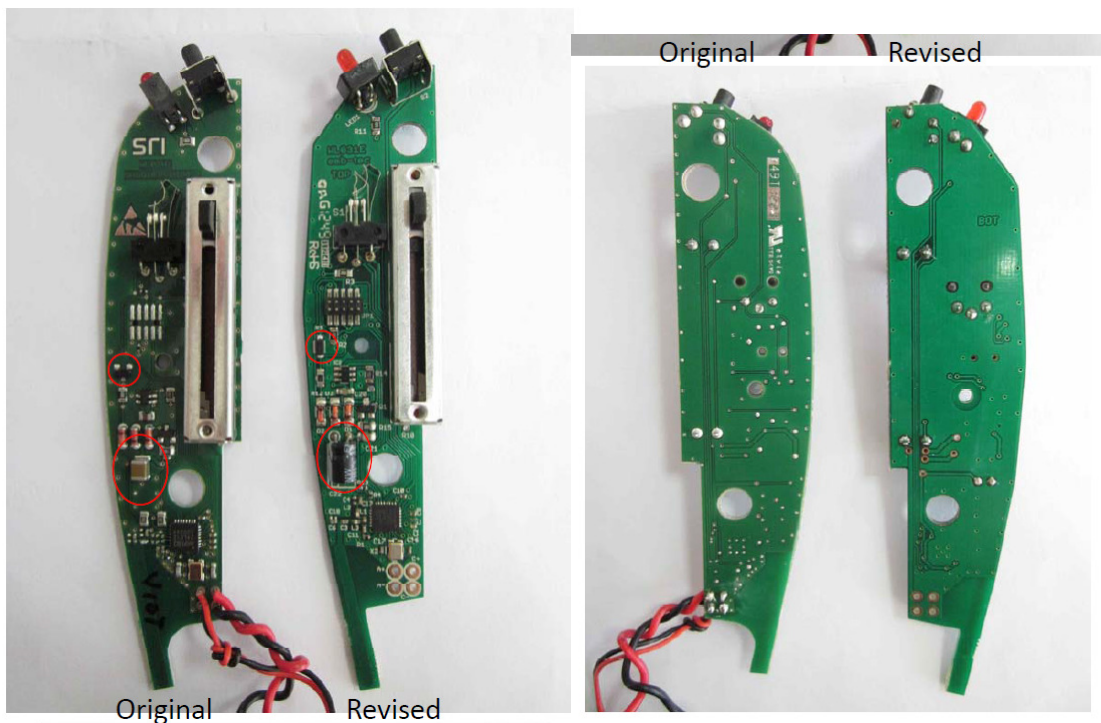
Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User Manual
Label Artwork

Remark

Change as follow:

- PCB layout change



To show compliance Radiated Spurious Emission was repeated on the revised sample.

Special accessories and auxiliary equipment

Nil

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

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 15.204 – Antenna Information		Pass
Requirement:	Provide information for every antenna proposed for the use with the EUT	
Results:	a) Antenna type:	PCB antenna
	b) Manufacturer and model no:	N.A.
	c) Gain with reference to an isotropic radiator:	2.3 dBi
Verdict:	Pass	
Subclause 15.207 – Disturbance Voltage on AC Mains		N/A
The EUT cannot operate during battery charging.		
Subclause 15.247 (a)(1) – Carrier Frequency Separation		Pass
Remark: Test result refers to test report 14031101 001.		
Subclause 15.247 (a)(1)(iii) – Number of hopping channels		Pass
Remark: Test result refers to test report 14031101 001.		
Subclause 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)		Pass
Remark: Test result refers to test report 14031101 001.		
Subclause 15.247 (a) – 20 dB Bandwidth		Pass
Remark: Test result refers to test report 14031101 001.		
Subclause 15.247 (a) – Hopping Sequence		Pass

Requirement: The hopping sequence is generated and provided with an example.
<p>Hopping sequence</p> <p>The Receiver sends every 16 milliseconds a beacon telegram to the hand throttles. The telegram includes the frequencies for the next four hopping steps.</p> <p>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.</p> <p>The time slots for the six addresses are:</p> <p>Address 1: + 2 milliseconds</p> <p>Address 2: + 4 milliseconds</p> <p>Address 3: + 6 milliseconds</p> <p>Address 4: + 8 milliseconds</p> <p>Address 5: + 10 milliseconds</p> <p>Address 6: + 12 milliseconds</p> <p>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.</p>

Subclause 15.247 (a) – Equal Hopping Frequency Use	Pass
Requirement: Each of the transmitter's hopping channels is used equally on average.	
<p>Equal hopping frequency use</p> <p>In a fixed period, the probability for each available channel to be chosen is equal.</p>	

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.	
<p>Receiver input bandwidth</p> <p>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.</p>	

Subclause 15.247 (a) – Receiver Hopping Capability	Pass
Requirement: The associated receiver has the ability to shift frequencies in synchronisation with the transmitted signals.	
<p>Receiver hopping Capability</p> <p>The Receiver sends every 16 milliseconds a beacon telegram to the hand throttles. The telegram includes the frequencies for the next four hopping steps.</p>	

Subclause 15.247 (b)(1) – Peak Output Power					Pass
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 : 3.7VDC, internal battery 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.					
Results: For test protocols please refer to Appendix 1, page 2-3.					
GFSK Modulation					
Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2410	-4.47	0.00	-4.470	0.125 / 21.0	Pass
2440	-5.41	0.00	-5.410	0.125 / 21.0	Pass
2472	-6.36	0.00	-6.360	0.125 / 21.0	Pass
Subclause 15.247 (d) – Band edge compliance of conducted emissions					Pass
Remark: Test result refers to test report 14031101 001.					
Subclause 15.205 – Band edge compliance of radiated emissions					Pass
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 : 3.7VDC, internal battery Temperature : 23°C Humidity : 50%					
Requirement: Radiated emissions which fall in the restricted bands, as defined in 15.205 (a), must also comply with the radiated emission limits specified in 15.209(a).					
Results: There is no peak found in the restricted bands. For test protocols refer to Appendix 1, page 23-30.					

Subclause 15.247 (d) – Spurious Conducted Emissions	Pass
Remark: Test result refers to test report 14031101 001.	

Subclause 15.247 (c) – Spurious Radiated Emissions	Pass	
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 : 3.7VDC, internal battery Temperature : 23°C Humidity : 50%		
Requirement:	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).	
Results:	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
496.001	27.80	46 / QP
4819.775	54.60	74.0 / PK
4820.272	33.27	54.0 / AV
7230.480	53.27	74.0 / PK
7230.128	35.75	54.0 / AV
Tx frequency 2410MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4820.160	50.59	74.0 / PK
4819.903	32.93	54.0 / AV
7229.455	57.74	74.0 / PK
7229.839	36.03	54.0 / AV
Tx frequency 2440MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
496.001	29.30	46 / QP
4881.105	51.27	74.0 / PK
4880.032	32.45	54.0 / AV
7319.358	55.24	74.0 / PK

7320.272	35.90	54.0 / AV
Tx frequency 2440MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4879.951	47.65	74.0 / PK
4879.951	32.11	54.0 / AV
7320.528	59.52	74.0 / PK
7320.048	36.31	54.0 / AV
Tx frequency 2472MHz Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
496.001	27.20	46 / QP
4944.923	55.04	74.0 / PK
4944.121	33.23	54.0 / AV
7415.868	55.57	74.0 / PK
7416.060	35.95	54.0 / AV
Tx frequency 2472MHz Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4943.615	48.81	74.0 / PK
4944.176	32.69	54.0 / AV
7415.679	58.85	74.0 / PK
7416.208	36.37	54.0 / AV