

Prüfbericht-Nr.: <i>Test Report No.:</i>	CN228AIG 002	Auftrags-Nr.: <i>Order No.:</i>	158254153	Seite 1 von 12 <i>Page 1 of 12</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	16.06.2022	
Auftraggeber: <i>Client:</i>	Revell GmbH 32257 BUENDE, Germany			
Prüfgegenstand: <i>Test Item:</i>	Low Power Transmitter (27.145MHz)			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	5010			
Auftrags-Inhalt: <i>Order content:</i>	Radio equipment testing			
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 Subpart C			
Wareneingangsdatum: <i>Date of receipt:</i>	17.06.2022			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A003280151-001			
Prüfzeitraum: <i>Testing period:</i>	17.06.2022 - 22.06.2022			
Ort der Prüfung: <i>Place of testing:</i>	Hong Kong			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Hong Kong Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
 15.07.2022 Eddy Tsang / Engineer		 15.07.2022 Sharon Li / Unit Senior Manager		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>
Sonstiges / Other: FCC ID: 2A7EW234905010 This report is prepared for cover photo update. "Decision Rule" document announced in our website (https://www.tuv.com/landingpage/en/qm-gcn/) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report.				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt 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				
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 duplicate in extracts. This test report does not entitle to carry any test mark.</i>				

Test Summary

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

Contents

List of Test and Measurement Instruments	4
General Product Information	5
Product Function and Intended Use	5
Ratings and System Details	5
Independent Operation Modes	6
Submitted Documents	6
Related Submittal(s) Grants	6
Test Set-up and Operation Mode	7
Principle of Configuration Selection	7
Test Operation and Test Software	7
Special Accessories and Auxiliary Equipment	7
Countermeasures to achieve EMC Compliance	7
Test Methodology	8
Radiated Emission	8
Field Strength Calculation	8
Test Results	9
Radiated Emission of Carrier Frequency Subclause 15.227(a)	9
Spurious Radiated Emissions Subclause 15.227(b)	10
Bandwidth Measurement	12
Appendix 1 Test Protocol	
Appendix 2 Test Setup	
Appendix 3 EUT External Photo	
Appendix 4 EUT Internal Photo	
Appendix 5 RF Exposure Information	

List of Test and Measurement Instruments

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Multi-functional Anechoic Chamber	Albatross	Nil	4-Jan-22	4-Jan-23
Test Receiver	R & S	ESW44	20-Sep-21	7-Sep-22
Active Loop Antenna	EMCO	6502	3-Nov-20	3-Nov-22
Bi-conical Antenna	R & S	HK116	15-Sep-20	15-Sep-22
Log Periodic Antenna	R & S	HL223	15-Sep-20	15-Sep-22
Coaxial cable	Harbour	SF118/11n/11n/12000.0	3-Aug-20	3-Aug-22

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	9-Nov-21	9-Nov-22

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a transmitter for a RC toy car operating at 27.145 MHz. The EUT has four control keys for commanding the forward, backward, left and right movement of the associated receiver.

FCC ID: 2A7EW234905010

Model	Product description
5010	Radio Control Toy Transmitter

Ratings and System Details

	Transmitter
Frequency range	: 27.145MHz
Number of channels	: 1
Type of antenna	: Permanent wired antenna
Power supply	: Battery operated 3V DC
Ports	: none
Protection Class	: III

www.tuv.com

Independent Operation Modes

The basic operation modes are:

- Remote Control: On and Off

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- Label artwork

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

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

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 were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the 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 Results

Radiated Emission of Carrier Frequency

Subclause 15.227(a)

RESULT:
Pass

Test Specification : FCC Part 15 Subclause 15.227(a)
 Test Method : ANSI 63.10-2013
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Peak and Average
 Measurement BW : 120 kHz
 Supply Voltage : DC 3V

Polarization: Vertical

Detector function	Frequency (MHz)	Measured Field strength at 3m (dBμV/m)	Delta to Limit (dB)
Peak	27.146	74.1	-25.9
Average	27.146	68.6	-11.4

Polarization: Horizontal

Detector function	Frequency (MHz)	Measured Field strength at 3m (dBμV/m)	Delta to Limit (dB)
Peak	27.146	60.5	-39.5
Average	27.146	55.0	-45.0

Limit
Subclause 15.227(a)

Frequency within the band	Peak Emission		Average Emission	
	(μV/m)	dBμV/m	(μV/m)	dBμV/m
26.96-27.28 MHz	100,000	100.0	10,000	80.0

According to section 15.35(b), when average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Spurious Radiated Emissions

Subclause 15.227(b)

RESULT:

Pass

Test Specification : FCC Part 15 Subclause 15.209
 Test Method : ANSI 63.10-2013
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Quasi Peak
 Measurement BW : 120 kHz
 Supply Voltage : DC 3V
 Measuring Frequency Range : 30-1000MHz

Polarization: Vertical

Frequency (MHz)	Field strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
54.292	21.0	40.0	-19
81.437	10.3	43.5	-33.2
*108.584	9.9	43.5	-33.6
*135.728	12.3	43.5	-31.2
*162.875	12.9	43.5	-30.6
190.021	14.9	43.5	-28.6
217.168	14.5	46.0	-31.5
*244.311	16.6	46.0	-29.4
*271.457	16.7	46.0	-29.3
298.602	20.7	46.0	-25.3

Polarization: Horizontal

Frequency (MHz)	Field strength at 3m (dBuV/m)	Limit at 3m (dBuV/m)	Delta to Limit (dB)
54.291	12.7	40.0	-27.3
81.437	8.7	43.5	-34.8
*108.584	8.5	43.5	-35.0
*135.730	10.3	43.5	-33.2
*162.876	12.4	43.5	-31.1
190.023	13.5	43.5	-30.0
217.169	14.4	46.0	-31.6
*244.316	15.4	46.0	-30.6
*271.462	16.6	46.0	-29.4
298.608	19.8	46.0	-26.2

Remark: (1) '*' indicates the frequency of the emissions fall into the restricted band as defined in Section 15.205(a). They comply with the radiated emission limits specified in Section 15.209.
 (2) There is no spurious emission found between lowest oscillating frequency to 30 MHz.

Limit**Subclause 15.209**

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 15.209.

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Measurement distance (m)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

Bandwidth Measurement

Port of Testing	:	Antenna port
Detector Function	:	Peak
Supply Voltage	:	DC 3V

The field strength of any emissions appearing at the lower edge 26.96 MHz and upper edge 27.28 MHz are 39.37 dB and 36.09 dB below the carrier respectively.

For test results refer to Appendix 1.