



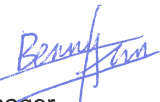
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|--|--|---|-----------------------------|--|---|
| Prüfbericht-Nr.: <i>Test Report No.:</i> | 50147136 001 | Auftrags-Nr.: <i>Order No.:</i> | 144184117 | Seite 1 von 14 <i>Page 1 of 14</i> | |
| Kunden-Referenz-Nr.: <i>Client Reference No.:</i> | N/A | Auftragsdatum: <i>Order date:</i> | 16.05.2018 | | |
| Auftraggeber: <i>Client:</i> | Guangdong Songyang Plastic Toys Co. Ltd | | | | |
| Prüfgegenstand: <i>Test item:</i> | R/C HELICOPTER | | | | |
| Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i> | SY.8088-27,SY.8088-40S,SY.8088-57,SY.8088-58,SY.8088-42,SY.8088-43, SY.8088-64,SY.8088-65 | | | | |
| Auftrags-Inhalt: <i>Order content:</i> | FCC Certification | | | | |
| Prüfgrundlage: <i>Test specification:</i> | FCC Part 15 Subpart C ANSI C63.10-2013 | | | | |
| Wareneingangsdatum: <i>Date of receipt:</i> | 14.05.2018 |  | | | |
| Prüfmuster-Nr.: <i>Test sample No.:</i> | A000739907-005~007 | | | | |
| Prüfzeitraum: <i>Testing period:</i> | 22.05.2018 - 23.05.2018 | | | | |
| Ort der Prüfung: <i>Place of testing:</i> | TÜV Rheinland Hong Kong Ltd. | | | | |
| Prüflaboratorium: <i>Testing laboratory:</i> | TÜV Rheinland Hong Kong Ltd. | | | | |
| Prüfergebnis*: <i>Test result*:</i> | Pass | | | | |
| geprüft von / tested by: | | kontrolliert von / reviewed by: | | | |
| 24.05.2018 | David Cheng Test Engineer |  | 24.05.2018 | Benny Lau Senior Project 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> | Unterschrift <i>Signature</i> |
| Sonstiges / Other: FCC ID: 2AEXV12345678 | | | | | |
| Zustand des Prüfgegenstandes bei Anlieferung: <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>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.</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> | | | | | |

Table of Content

| | Page |
|---|----------------|
| Cover Page | 1 |
| Table of Content | 2 |
| Product information | 4 |
| Manufacturers declarations | 4 |
| Product function and intended use..... | 4 |
| Submitted documents..... | 4 |
| Independent Operation Modes | 4 |
| Related Submittal(s) Grants | 4 |
| Remark | 4 |
| Test Set-up and Operation Mode | 5 |
| Principle of Configuration Selection | 5 |
| Test Operation and Test Software..... | 5 |
| Special Accessories and Auxiliary Equipment..... | 5 |
| Countermeasures to achieve EMC Compliance..... | 5 |
| Test Methodology | 6 |
| Radiated Emission | 6 |
| Field Strength Calculation..... | 6 |
| Test Setup Diagram | 7 |
| Test Facility | 8 |
| Test Laboratory Information | 8 |
| List of Test and Measurement Instruments | 9 |
| Measurement Uncertainty | 10 |
| Results FCC Part 15 – Subpart C / RSS-210 Issue 8 | 11 |
| FCC 15.203 – Antenna Requirement 1..... | Pass..... 11 |
| FCC 15.204 – Antenna Requirement 2..... | Pass..... 11 |
| FCC 15.207 – Conducted Emission on AC Mains | N/A..... 11 |
| Subclause 15.215 (c) – 20 dB Bandwidth..... | Pass..... 11 |
| Subclause 15.249 (a) – Field Strength of Fundamental and Harmonics..... | Pass..... 12 |
| Subclause 15.249 (d), 15.205 – Out Of Band Radiated Emission | Pass..... 14 |
| Appendix 1 – Test protocols | 3 pages |
| Appendix 2 – Test setup | 2 pages |

Appendix 3 – EUT External Photos 3 pages
Appendix 4 – EUT Internal Photos 3 pages
Appendix 5 – RF exposure information..... 2 pages

Product information

Manufacturers declarations

| | Transmitter |
|---|--|
| Operating frequency range | 2405 - 2475MHz |
| Type of modulation | GFSK |
| Number of channels | 64 |
| Type of antenna | Wire Antenna |
| Power level | fix |
| Connection to public utility power line | No |
| Nominal voltage | V _{nor} : 6.0 VDC (4 x 1.5V AA batteries) |

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: 2AEXV12345678

| Models | Product description |
|--|----------------------------|
| SY.8088-27,SY.8088-40S,SY.8088-57,SY.8088-58,SY.8088-42,SY.8088-43,SY.8088-64,SY.8088-65 | R/C HELICOPTER |

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 provided by the applicant are used for the testing.

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:

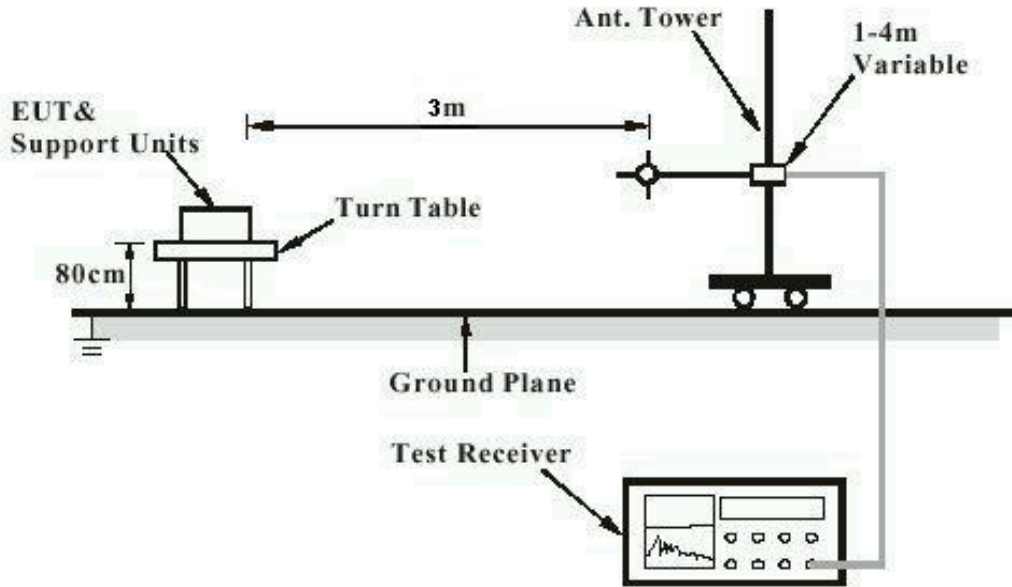
$$FS = R + AF + CF + FA - PA$$

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.

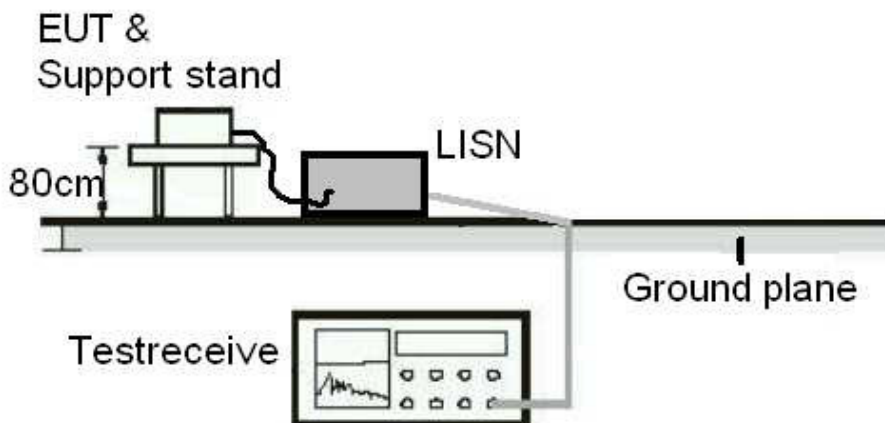
Test Setup Diagram

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 |

List of Test and Measurement Instruments

TÜV Rheinland Hong Kong Ltd

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 | 7-Sep-17 | 7-Sep-18 |
| Active Loop Antenna | EMCO | 6502 | 30-Oct-17 | 30-Oct-18 |
| Bi-conical Antenna | R & S | HK116 | 7-Jun-16 | 7-Jun-18 |
| Log Periodic Antenna | R & S | HL223 | 31-May-16 | 31-May-18 |
| Horn Antenna | EMCO | 3115 | 28-Mar-18 | 28-Mar-20 |
| Double-Ridged Waveguide Horn | EMCO | 3116 | 17-Jun-16 | 17-Jun-18 |
| Double-Ridged Waveguide Horn | EMCO | 3117 | 22-Jun-16 | 22-Jun-18 |
| Coaxial cable | Harbour | LL335 | 10-Jun-14 | 10-Jun-16 |
| High Frequency Cable | Pasternack | PE3VNA4001-3M | 27-Jan-17 | 27-Jan-18 |
| Microwave amplifier 0.5-26.5GHz, 25dB gain | HP | 83017A | 18-Jul-16 | 18-Jul-18 |
| Preamplifier 18GHz to 40GHz with cable | A.H. Systems, Inc. | PAM-1840VH | 27-Jan-17 | 27-Jan-18 |
| 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 | 03-May-18 | 02-May-19 |

Measurement Uncertainty

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

The estimated combined standard uncertainty for radiated emissions measurements is ± 4.81 dB (9kHz to 30MHz) and ± 4.62 dB (30MHz to 200MHz) and ± 5.67 dB (200MHz to 1000MHz) and is ± 5.07 dB (1GHz to 8.2GHz) and ± 4.58 dB (8.2GHz to 12.4GHz) and ± 4.78 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 8

| | | |
|---|---|------------------------|
| 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: | Fixed Integral antenna |
| | b) Manufacturer and model no: | N/A |
| | c) Peak Gain: | N/A |
| 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: | N/A | |

| | | |
|--|--|------------|
| FCC 15.207 – 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 : 23.05.2018 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 6.0 VDC (4 x 1.5V AA batteries) Temperature : 23°C 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) |
| 2405 | 2403.700 | > 2400 | 2406.692 | < 2483.5 |
| 2445 | 2444.748 | > 2400 | 2445.492 | < 2483.5 |
| 2475 | 2474.824 | > 2400 | 2475.258 | < 2483.5 |

| Subclause 15.249 (a) – Field Strength of Fundamental and Harmonics | | Pass |
|--|---------------------|-------------------------------|
| Test Specification : ANSI C63.10 – 2013 Test Specification : 22.05.2018 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 6.0 VDC (4 x 1.5V AA batteries) 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: 2405MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2405.051 | 86.2 | 114.0 / PK |
| 2405.051 | 74.6 | 94.0 / AV |
| Fundamental Frequency: 2405MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2405.051 | 85.2 | 114.0 / PK |
| 2405.051 | 73.6 | 94.0 / AV |
| Harmonics: 2405MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 4810.102 | 57.1 | 74.0 / PK |
| 4810.102 | 44.7 | 54.0 / AV |
| 7215.153 | 67.6 | 74.0 / PK |
| 7215.153 | 50.2 | 54.0 / AV |
| Harmonics: 2405MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 4810.102 | 58.4 | 74.0 / PK |
| 4810.102 | 45.6 | 54.0 / AV |
| 7215.153 | 65.8 | 74.0 / PK |
| 7215.153 | 49.3 | 54.0 / AV |
| Fundamental Frequency: 2445MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2445.051 | 86.0 | 114.0 / PK |
| 2445.051 | 74.6 | 94.0 / AV |
| Fundamental Frequency: 2445MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2445.048 | 85.3 | 114.0 / PK |
| 2445.048 | 74.0 | 94.0 / AV |

| Harmonics: 2445MHz | | Vertical Polarization | |
|--------------------------------|--------------|-------------------------|--|
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4890.102 | 59.7 | 74.0 / PK | |
| 4890.102 | 47.2 | 54.0 / AV | |
| 7335.153 | 67.5 | 74.0 / PK | |
| 7335.153 | 50.6 | 54.0 / AV | |
| Harmonics: 2445MHz | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4890.096 | 61.3 | 74.0 / PK | |
| 4890.096 | 49.0 | 54.0 / AV | |
| 7335.153 | 67.3 | 74.0 / PK | |
| 7335.153 | 50.6 | 54.0 / AV | |
| Fundamental Frequency: 2475MHz | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2475.067 | 86.1 | 114.0 / PK | |
| 2475.067 | 74.9 | 94.0 / AV | |
| Fundamental Frequency: 2475MHz | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2475.072 | 86.2 | 114.0 / PK | |
| 2475.072 | 74.9 | 94.0 / AV | |
| Harmonics: 2475MHz | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4950.131 | 57.7 | 74.0 / PK | |
| 4950.131 | 45.4 | 54.0 / AV | |
| 7425.198 | 67.5 | 74.0 / PK | |
| 7425.198 | 50.7 | 54.0 / AV | |
| Harmonics: 2475MHz | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4950.136 | 57.8 | 74.0 / PK | |
| 4950.136 | 45.4 | 54.0 / AV | |
| 7425.200 | 67.1 | 74.0 / PK | |
| 7425.200 | 50.5 | 54.0 / AV | |

| Subclause 15.249 (d), 15.205 – Out Of Band Radiated Emission | | Pass |
|---|---------------------|-------------------------------|
| Test Specification : ANSI C63.10 – 2013 Test Specification : 22.05.2018 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz Supply voltage : 6.0 VDC (4 x 1.5V AA batteries) 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: 2405 MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2400.000 | 60.0 | 74.0 / PK |
| 2400.000 | 32.5 | 54.0 / AV |
| Tx frequency: 2405 MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2400.000 | 55.3 | 74.0 / PK |
| 2400.000 | 32.2 | 54.0 / AV |
| Tx frequency: 2445 MHz | | 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: 2445 MHz | | 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: 2475 MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2483.500 | 53.9 | 74.0 / PK |
| 2483.500 | 32.2 | 54.0 / AV |
| Tx frequency: 2475 MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2483.500 | 54.1 | 74.0 / PK |
| 2483.500 | 32.2 | 54.0 / AV |