

Produkte
Products

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|--|---|--|--|
| Prüfbericht - Nr.: 14045192 001 <i>Test Report No.:</i> | | Seite 1 von 12 <i>Page 1 of 12</i> | |
| Auftraggeber: <i>Client:</i> | | Dickie Toys Hong Kong Ltd. 19/F., Prudential Tower, The Gateway, Harbour City 21 Canton Road, Tsimshatsui, Kowloon, Hong Kong | |
| Gegenstand der Prüfung: <i>Test Item:</i> | | Short Range Device - Radio Controlled Toy Transmitter (2.4GHz) | |
| Bezeichnung: <i>Identification:</i> | 24007 | Serien-Nr.: <i>Serial No.:</i> | Engineering sample |
| Wareneingangs-Nr.: <i>Receipt No.:</i> | A000391070-007 | Eingangsdatum: <i>Date of Receipt:</i> | 09.07.2016 |
| Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of test item at delivery:</i> | | Test sample is not damaged and suitable for testing. | |
| Prüfört: <i>Testing Location:</i> | | TÜV Rheinland Hong Kong Ltd. 8/F, First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong | |
| Prüfgrundlage: <i>Test Specification:</i> | | FCC Part 15 Subpart C ANSI C63.10-2013 | |
| Prüfergebnis: <i>Test Results:</i> | | Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage. The above mentioned product was tested and passed . | |
| Prüflaboratorium: <i>Testing Laboratory:</i> | | 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: | |
| 15.08.2016 | Joey Leung Project Manager | 15.08.2016 | 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: <i>Other Aspects</i> | | FCC ID: NLB24007TX | |
| 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 |
| <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 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></p> | | | |



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Product information

Manufacturers declarations

| | Transmitter |
|---|---------------------------------------|
| Operating frequency range | 2405 - 2475MHz |
| Type of modulation | GFSK |
| Type of antenna | Wire Antenna |
| Power level | fix |
| Connection to public utility power line | No |
| Nominal voltage | V_{nom} : 9.0 V (6F22 size battery) |

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: NLB24007TX

| Models | Product description |
|---------------|----------------------------------|
| 24007 | Radio Controlled Toy Transmitter |

Submitted documents

Circuit Diagram
 Block Diagram
 Bill of material
 User manual
 Rating Label

Independent Operation Modes

The basic operation mode is 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.

During testing, the EUT was programmed to test mode by manufacturer. Change of transmitting frequency can be achieved by pressing a built-in button on EUT. Output power of EUT was set to fixed level throughout 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 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 the turntable is 3 meters far from the measuring antenna. In addition, 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:

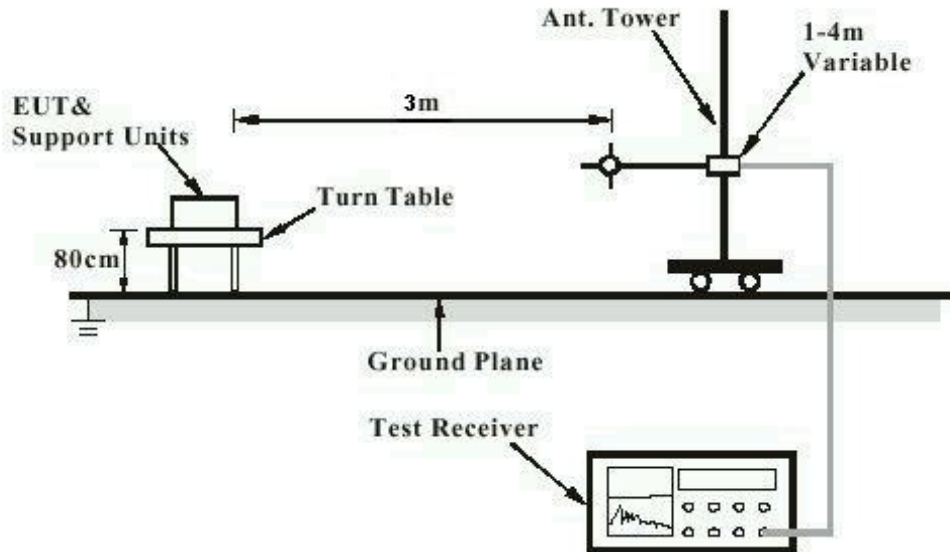
$$FS = R + AF + CF + FA - PA$$

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.

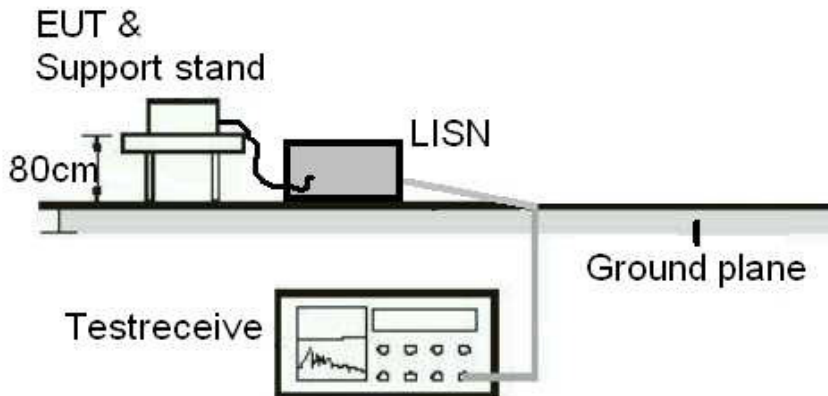
Test Setup Diagram

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)



List of Test and Measurement Instruments

Hong Kong Productivity Council (FCC Registration number: 90656)

Radiated Emission

| Equipment | Manufacturer | Type | S/N | Last Cal. Date | Cal. Due Date |
|--|--------------|--------|------------|----------------|---------------|
| Semi anechoic Chamber | Frankonia | Nil | Nil | 14 Apr 2016 | 14 Apr 2017 |
| Test Receiver | R & S | ESU40 | 100190 | 07 Dec 2015 | 07 Dec 2016 |
| Bi conical Antenna | R & S | HK116 | 100241 | 01 Sep 2015 | 01 Sep 2017 |
| Log Periodic Antenna | R & S | HL223 | 841516/017 | 01 Sep 2015 | 01 Sep 2017 |
| Coaxial cable | Harbour | LL335 | N/A | 10 Jun 2016 | 10 Jun 2018 |
| Microwave amplifier 0.5 26.5GHz, 25dB gain | HP | 83017A | 3950M00241 | 18 Jul 2016 | 18 Jul 2018 |
| High Pass Filter (cutoff freq. =1000MHz) | Trilithic | 23042 | 9829213 | 28 Oct 2015 | 28 Oct 2017 |
| Horn Antenna | EMCO | 3115 | 9002 3347 | 26 Aug 2015 | 26 Aug 2017 |
| Active Loop Antenna | EMCO | 6502 | 9107-2651 | 15 Aug 2015 | 15 Aug 2016 |

TÜV Rheinland Hong Kong Ltd

Radio Frequency Test

| Equipment | Manufacturer | Type | S/N | Last Cal. Date | Cal. Due Date |
|-------------------|-----------------|-------|--------|----------------|---------------|
| Spectrum Analyzer | Rohde & Schwarz | FSP30 | 100610 | 20 Jan 2016 | 19 Jan 2017 |

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is $\pm 3.43\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 4.68\text{dB}$ (30MHz to 200MHz) and $\pm 5.73\text{dB}$ (200MHz to 1000MHz) and $\pm 5.57\text{dB}$ (above 1GHz).

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

| | | |
|---|---------------|-----------------------------|
| 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: | Antenna type: | Fixed Integral wire antenna |
| 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. | | |

| | | | | |
|--|--|--------------------|--------------------------|--------------------|
| FCC 15.215(c) – 20 dB Bandwidth | | Pass | | |
| Test Specification : ANSI C63.10 – 2013 Mode of operation : Tx mode Port of testing : Enclosure RBW/VBW : 100 kHz / 300 kHz Supply voltage : 9.0VDC, 6F22 size new battery 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: | For test protocols refer to Appendix 1, page 2-3. | | | |
| Frequency (MHz) | 20 dB left (MHz) | Limit (MHz) | 20 dB right (MHz) | Limit (MHz) |
| 2405 | 2403.440 | > 2400 | 2406.800 | < 2483.5 |
| 2440 | 2438.220 | > 2400 | 2441.740 | < 2483.5 |
| 2475 | 2473.360 | > 2400 | 2476.780 | < 2483.5 |

| FCC 15.249(a) – Field Strength of Fundamental and Harmonics | | Pass |
|--|---------------------|-------------------------------|
| Test Specification : ANSI C63.10 – 2013 Mode of operation : Tx mode Port of testing : Enclosure Frequency range : 9kHz – 25GHz RBW/VBW : 120kHz for f < 1 GHz 1 MHz / 3 MHz for f > 1 GHz Supply voltage : 9.0VDC, 6F22 size new battery 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 |
| 2404.760 | 90.37 | 114.0 / PK |
| 2405.561 | 45.18 | 94.0 / AV |
| Fundamental Frequency 2405MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2404.760 | 83.82 | 114.0 / PK |
| 2405.641 | 43.69 | 94.0 / AV |
| Harmonics 2405MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 4809.487 | 61.95 | 74.0 / PK |
| 4810.096 | 41.97 | 54.0 / AV |
| Harmonics 2405MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 4809.519 | 67.36 | 74.0 / P |
| 4810.000 | 43.47 | 54.0 / A |
| Fundamental Frequency 2440MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2440.192 | 89.88 | 114.0 / PK |
| 2440.481 | 44.79 | 94.0 / AV |
| Fundamental Frequency 2440MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2440.385 | 82.24 | 114.0 / PK |
| 2440.256 | 43.17 | 94.0 / AV |

| Harmonics 2440MHz | | Vertical Polarization | |
|-------------------------------|-------------------------|-----------------------------------|--|
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4879.423 | 64.87 | 74.0 / P | |
| 4880.000 | 43.09 | 54.0 / A | |
| Harmonics 2440MHz | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4880.833 | 62.13 | 74.0 / P | |
| 4880.064 | 42.25 | 54.0 / A | |
| Fundamental Frequency 2475MHz | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2474.487 | 90.34 | 114.0 / PK | |
| 2475.833 | 45.00 | 94.0 / AV | |
| Fundamental Frequency 2475MHz | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 2474.551 | 84.34 | 114.0 / PK | |
| 2475.577 | 43.98 | 94.0 / AV | |
| Harmonics 2475MHz | | Vertical Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4949.455 | 63.22 | 74.0 / P | |
| 4950.096 | 42.34 | 54.0 / A | |
| Harmonics 2475MHz | | Horizontal Polarization | |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m | |
| 4949.744 | 63.46 | 74.0 / P | |
| 4950.096 | 42.83 | 54.0 / A | |

| FCC 15.249(d), 15.205 – Out Of Band Radiated Emission | | Pass |
|---|---------------------|-------------------------------|
| Test Specification : ANSI C63.10 – 2013 Mode of operation : Tx mode Port of testing : Enclosure Detector : Peak Frequency range : 9kHz – 25GHz RBW/VBW : 1 MHz / 3 MHz for f > 1 GHz Supply voltage : 9.0VDC, 6F22 size new battery 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 2405MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2400.000 | 54.19 | 74.0 / PK |
| 2400.000 | 33.44 | 54.0 / AV |
| Tx frequency 2405MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2400.000 | 47.12 | 74.0 / PK |
| 2400.000 | 33.35 | 54.0 / AV |
| Tx frequency 2440MHz | | 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 2440MHz | | 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 2475MHz | | Vertical Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2483.500 | 51.86 | 74.0 / PK |
| 2483.500 | 33.14 | 54.0 / AV |
| Tx frequency 2475MHz | | Horizontal Polarization |
| Freq MHz | Level dBuV/m | Limit/ Detector dBuV/m |
| 2483.500 | 46.50 | 74.0 / PK |
| 2483.500 | 33.19 | 54.0 / AV |