Produkte
Products

Prüfbericht-Nr.: *Test Report No.*:	**NN2010SV 001**	**Auftrags-Nr.:** *Order No.*:	**158214805**	**Seite 1 von 14** *Page 1 of 14*
Kunden-Referenz-Nr.: *Client Reference No.*:	**N/A**	**Auftragsdatum:** *Order date*:	**03.08.2020**	
Auftraggeber: *Client*:	**Dickie Toys Hong Kong Ltd. 19/F., Prudential Tower, The Gateway, Harbour City, 21 Canton Road, Tsimshatsui, Kowloon, Hong Kong**			
Prüfgegenstand: *Test item*:	**Short Range Device - Radio Controlled Toy Transmitter (2.4GHz)**			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	**24050**			
Auftrags-Inhalt: *Order content*:	**FCC Certification**			
Prüfgrundlage: *Test specification*:	**FCC Part 15 Subpart C, ANSI C63.10-2013**			
Wareneingangsdatum: *Date of receipt*:	**27.07.2020**			
Prüfmuster-Nr.: *Test sample No.*:	**A002875220-005**			
Prüfzeitraum: *Testing period*:	**06.08.2020 – 17.08.2020**			
Ort der Prüfung: *Place of testing*:	**Hong Kong**			
Prüflaboratorium: *Testing laboratory*:	**TÜV Rheinland Hong Kong Ltd.**			
Prüfergebnis*: *Test result**:	**Pass**			

geprüft von / *tested by*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
25.08.2020	Benny Lau / Senior Project Manager	

kontrolliert von / *reviewed by*:

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
25.08.2020	Sharon Li / Unit Senior Manager	

Sonstiges / *Other*: FCC ID: NLB24050TX

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *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*

Table of Content

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2410 - 2475MHz
Type of modulation	GFSK
Number of channels	66
Type of antenna	Wire Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	4.5 VDC

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: NLB24050TX

Models	Product description
24050	Short Range Device - Radio Controlled Toy Transmitter (2.4GHz)

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 and capable to transmit continuously at the lowest, middle and highest frequency channels is provided by the applicant for the 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 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:

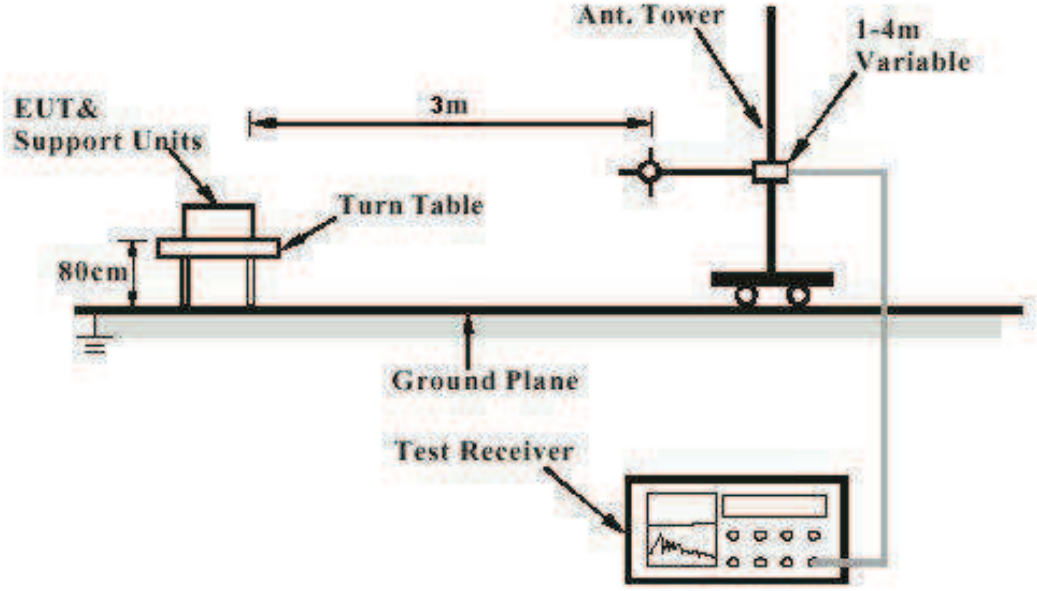
FS = R + AF + CF + FA – PA

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.

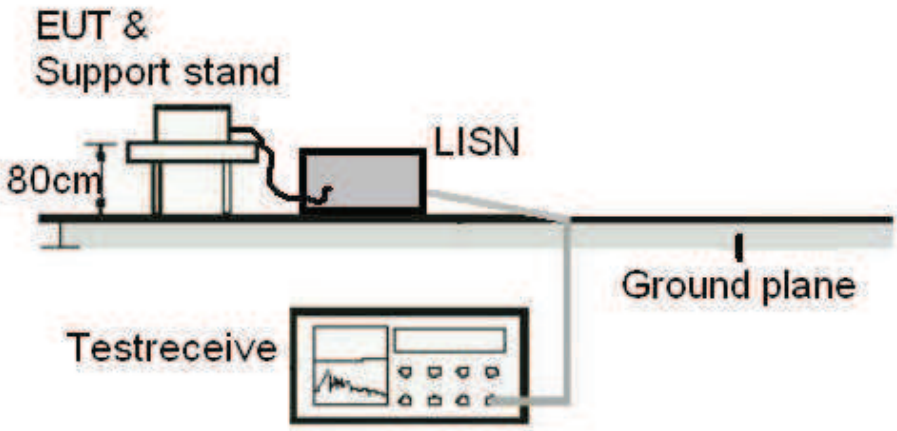
Test Setup Diagram

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

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber (SiteVSWR)	Frankonia	Nil	16-May-20	16-May-21
Standard Gain Horn	ETS-Lindgren	3160-07	4-Sep-18	4-Sep-20
Standard Gain Horn	ETS-Lindgren	3160-08	26-Sep-18	26-Sep-20
Standard Gain Horn	ETS-Lindgren	3160-10	3-Oct-18	3-Oct-20
Double-Ridged Waveguide Horn	EMCO	3116	5-Oct-18	5-Oct-20
Double-Ridged Waveguide Horn	EMCO	3117	30-Aug-18	30-Aug-20
Test Receiver	R & S	ESU40	10-Oct-19	10-Oct-20
Coaxial cable	Huber+Suhner	CNM-NMCMILX800-473	4-Oct-18	4-Oct-20
Microwave Preamplifier	COM-POWER Corporation	PAM-118A	6-Mar-20	6-Mar-21
Preamplifier 18GHz to 40GHz with cable	A.H. Systems, Inc.	PAM-1840VH	30-Jan-20	30-Jan-21
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30-Oct-19	30-Oct-21
High Frequency Cable	Pasternack	PE3VNA4001-3M	29-Jan-19	29-Jan-21

Radio Test

Equipment	**Manufacturer**	**Type**	**Cal. Date**	**Due Date**
Spectrum Analyzer	R & S	FSP40	17-Jan-20	17-Jan-21

Measurement Uncertainty

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

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

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: b) Manufacturer and model no: c) Peak Gain:	Fixed Integral wire antenna N/A 0 dBi
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 : 17.08.2020 Mode of operation : Tx mode Port of testing : Antenna port Supply voltage : 4.5 VDC Temperature : 23ºC 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)
2410	2409.450	> 2400	2410.622	< 2483.5
2443	2442.465	> 2400	2443.593	< 2483.5
2475	2474.465	> 2400	2475.600	< 2483.5

Subclause 15.249(a) – Field Strength of Fundamental and Harmonics **Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 06.08.2020
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 4.5 VDC
Temperature : 25ºC
Humidity : 56%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: PASS.

Fundamental Frequency 2410MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2410.500	98.8	114.0 / PK
2410.500	66.9	94.0 / AV

Fundamental Frequency 2410MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2410.025	99.0	114.0 / PK
2410.025	68.5	94.0 / AV

Harmonics 2410MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4820.721	61.4	74.0 / PK
4820.721	33.6	54.0 / AV
7230.000	49.3	74.0 / PK
7230.000	29.8	54.0 / AV

Harmonics 2410MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
4820.001	63.0	74.0 / PK
4820.001	34.7	54.0 / AV
7230.192	52.4	74.0 / PK
7230.192	30.4	54.0 / AV

Fundamental Frequency 2443MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2443.349	98.3	114.0 / PK
2443.349	68.2	94.0 / AV

Fundamental Frequency 2443MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2443.012	97.6	114.0 / PK
2443.012	68.9	94.0 / AV

Harmonics 2443MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4886.849	63.8	74.0 / PK
4886.849	34.6	54.0 / AV
7328.535	43.4	74.0 / PK
7328.535	29.6	54.0 / AV
Harmonics 2443MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4886.025	64.8	74.0 / PK
4886.025	35.9	54.0 / AV
7329.038	52.9	74.0 / PK
7329.038	30.9	54.0 / AV
Fundamental Frequency 2475MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2474.990	99.9	114.0 / PK
2474.990	71.3	94.0 / AV
Fundamental Frequency 2475MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2475.041	97.2	114.0 / PK
2475.041	68.3	94.0 / AV
Harmonics 2475MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4950.006	62.0	74.0 / PK
4950.006	34.3	54.0 / AV
9899.179	56.3	74.0 / PK
9899.179	32.6	54.0 / AV
Harmonics 2475MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4950.000	65.1	74.0 / PK
4950.000	36.1	54.0 / AV
9900.705	51.3	74.0 / PK
9900.705	31.7	54.0 / AV

Subclause 15.249(d),15.205 – Out Of Band Radiated Emission	**Pass**

Test Specification : ANSI C63.10 – 2013
Test date : 06.08.2020
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 4.5 VDC
Temperature : 25ºC
Humidity : 56%

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 2410MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2397.996	60.3	74.0 / PK
2397.996	36.8	54.0 / AV

Tx frequency 2410MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2398.019	59.5	74.0 / PK
2398.019	34.2	54.0 / AV

Tx frequency 2443MHz 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 2443MHz 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**
2487.009	61.8	74.0 / PK
2487.009	35.8	54.0 / AV

Tx frequency 2475MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2487.009	59.9	74.0 / PK
2487.009	34.5	54.0 / AV