Prüfbericht-Nr.: *Test Report No.*:	**15080254 001**	**Auftrags-Nr.:** *Order No.*:	**154094529**	**Seite 1 von 17** *Page 1 of 17*
Kunden-Referenz-Nr.: *Client Reference No.*:	**342220**	**Auftragsdatum:** *Order date*:	**04.13.2015**	
Auftraggeber: *Client*:	**Intex Development Company limited** 9/F., Dah Sing Financial Centre, 108 Gloucester Road, Wanchai, Hong Kong			
Prüfgegenstand: *Test item*:	**Transmitter for Swim Trainer**			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	**SM24101** **FCC ID: SVYSM24101-T**			
Auftrags-Inhalt: *Order content*:	**Complete test**			
Prüfgrundlage: *Test specification*:	**FCC CFR47 Part 15, Subpart C Section 15.231** **ANSI C63.10: 2013**			
Wareneingangsdatum: *Date of receipt*:	**03.16.2015**			
Prüfmuster-Nr.: *Test sample No.*:	**A000174975-003**			
Prüfzeitraum: *Testing period*:	**03.16.2015 to 06.25.2015**			
Ort der Prüfung: *Place of testing*:	**MRT Technology(Suzhou) Co., Ltd.**			
Prüflaboratorium: *Testing laboratory*:	**TÜV Rheinland (Shanghai) Co., Ltd.**			
Prüfergebnis*: *Test result**:	**Pass**			

geprüft von / *tested by*:			**kontrolliert von** / *reviewed by*:		
03.01.2017	Elliot Zhang / Senior Project Engineer		03.01.2017	Shi Li / Section Manager	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	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*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 CONDUCTED EMISSION
RESULT: N/A

5.1.3 RADIATED SPURIOUS EMISSIONS
RESULT: PASS

5.1.4 20DB BANDWIDTH
RESULT: Pass

5.1.5 DEACTIVATION TIME
RESULT: Pass

5.1.6 DUTY CYCLE
RESULT: Pass

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1. General Remarks

1.1 Complementary Materials

Null.

2. Test Sites

2.1 Test Facilities

MRT Technology (Suzhou) Co., Ltd.

D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 809388.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 11384A.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radiated Test Equipments

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	12.08.2017
EMI Test Receiver	R&S	ESR7	101209	11.03.2017
Preamplifier	Schwarzbeck	BBV 9721	9721-008	04.16.2017
Preamplifier	Agilent	83017A	MY53270040	03.29.2017
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	12.14.2017
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	11.07.2017
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	11.07.2017
Broadband Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170549	01.04.2018
Digital Thermometer & Hygrometer	Minggao	N/A	N/A	11.30.2017

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	05.08.2017
USB Wideband Power Sensor	Boonton	55006	8911	05.08.2017
Temperature/Humidity Meter	Yuhuaze	N/A	N/A	12.20.2017

Conducted Emission Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	11.03.2017
Two-Line V-Network	R&S	ENV216	101683	11.03.2017
Two-Line V-Network	R&S	ENV216	101684	11.03.2017
Temperature/Humidity Meter	Yuhuaze	N/A	N/A	12.20.2017

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a Swimming train machine which consist of a Remote controller and a swimming train machine.

The aim of this report is to evaluate the RF performance of the Remote Controller.

For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

	Transmitter	Receiver
Equipment Class	DSC	CYY
Type Designation	SM24101	SM24101
Frequency Band	315MHz	315MHz
Antenna Type	PCB antenna	External antenna
Antenna Gain	2.5dBi	2.5dBi
Rated Voltage	DC 3V (Battery: 1X3V CR2032)	AC 120V 60Hz

Note:

1. The external antenna used for the receiver is supplied by ASIAN CREATION COMMUNICATION CO.,LTD. And the model no. is AC-Q315.
2. This report is just for the transmitter part. For the receiver part, please refer to the report No. 15087906 001 issued by TÜV Rheinland (Shanghai) Co.,Ltd.

3.3 Independent Operation Modes

The basic operation modes are:

A. On-The transmitter was powered on and kept transmitting during the test.
B. Standby- The transmitter was powered on and not transmit during the test.
C. Off-The transmitter was powered off.

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- PCB Layout
- Photo Document
- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

Software used for testing: Null.

4.3 Special Accessories and Auxiliary Equipment

Null.

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

According to the manufacturer declared, the EUT has one PCB antenna, the directional gain of antenna is 2.5dBi and the PCB antenna is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Table 3: Antenna Requirement

FCC 15.203 – Antenna Requirement 1		
Requirement:	No antenna other than that furnished by the responsible party shall be used with the device. ☒ Use of a permanently attached antenna, or ☐ Use an antenna that uses a unique coupling to the intentional radiator.	
Results:	Antenna type:	PCB antenna
Verdict:	PASS	

FCC 15.204 – Antenna Requirement 2	
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 type antenna can be used
Verdict:	PASS

5.1.2 Conducted Emission

RESULT: **N/A**

Test standard : FCC Part 15.207

Note:
This device is powered by battery, so the conducted emission test is not required.

5.1.3 Radiated Spurious Emissions

RESULT: **PASS**

Date of testing	:	05.11.2015
Test standard	:	FCC Part 15.205 FCC Part 15.209 FCC Part 15.231(b)
Kind of test site	:	3m Semi-Anechoic Chamber
Operation Mode	:	A

Table 4: Radiated Emission of Fundamental Emission

Frequency [MHz]	Reading Level [dBuV]	Factor [dB]	Duty Cycle Factor [dB)	Measure Level [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
315.180	48.849	14.892	N/A	63.741	95.600	-31.859	PK	H
315.180	48.849	14.892	-17.440	46.301	75.600	-29.299	AV	H
315.180	44.708	14.892	N/A	59.600	95.600	-36.00	PK	V
315.180	44.708	14.892	-17.440	42.160	75.600	-33.44	AV	V

Table 5: Spurious Radiated Emission

Frequency [MHz]	Reading Level [dBuV]	Factor [dB]	Duty Cycle Factor [dB)	Measure Level [dBuV/m]	Limit [dBuV/m]	Over Limit [dB]	Type	Pol.
629.945	44.753	20.319	N/A	65.072	75.600	-10.528	PK	H
629.945	44.753	20.319	-17.440	47.632	55.600	-7.968	AV	H
945.195	44.876	24.303	N/A	69.179	75.600	-6.421	PK	H
945.195	44.876	24.303	-17.440	51.739	55.600	-3.861	AV	H
1262.500	78.074	-8.445	N/A	69.629	75.6	-5.971	PK	H
1262.500	78.074	-8.445	-17.440	52.189	55.6	-3.411	AV	H
1575.000	72.544	-7.683	N/A	64.861	74.0	-9.139	PK	H
1575.000	72.544	-7.683	-17.440	47.421	54.0	-6.579	AV	H
1890.000	69.877	-6.366	N/A	63.511	75.6	-12.089	PK	H
1890.000	69.877	-6.366	-17.440	46.071	55.6	-9.529	AV	H
629.945	43.798	20.319	N/A	64.117	75.600	-11.483	PK	V
629.945	43.798	20.319	-17.440	46.677	55.600	-8.923	AV	V
945.195	46.640	24.303	N/A	70.943	75.600	-4.657	PK	V
945.195	46.640	24.303	-17.440	53.503	55.600	-2.097	AV	V
1260.000	77.786	-8.460	N/A	69.326	75.6	-6.274	PK	V
1260.000	77.786	-8.460	-17.440	51.886	55.6	-3.714	AV	V
1575.000	67.490	-7.683	N/A	59.807	74.0	-14.193	PK	V
1575.000	67.490	-7.683	-17.440	42.367	54.0	-11.633	AV	V
1890.000	64.370	-6.366	N/A	58.004	75.6	-17.596	PK	V
1890.000	64.370	-6.366	-17.440	40.564	55.6	-15.036	AV	V

5.1.4 20dB Bandwidth

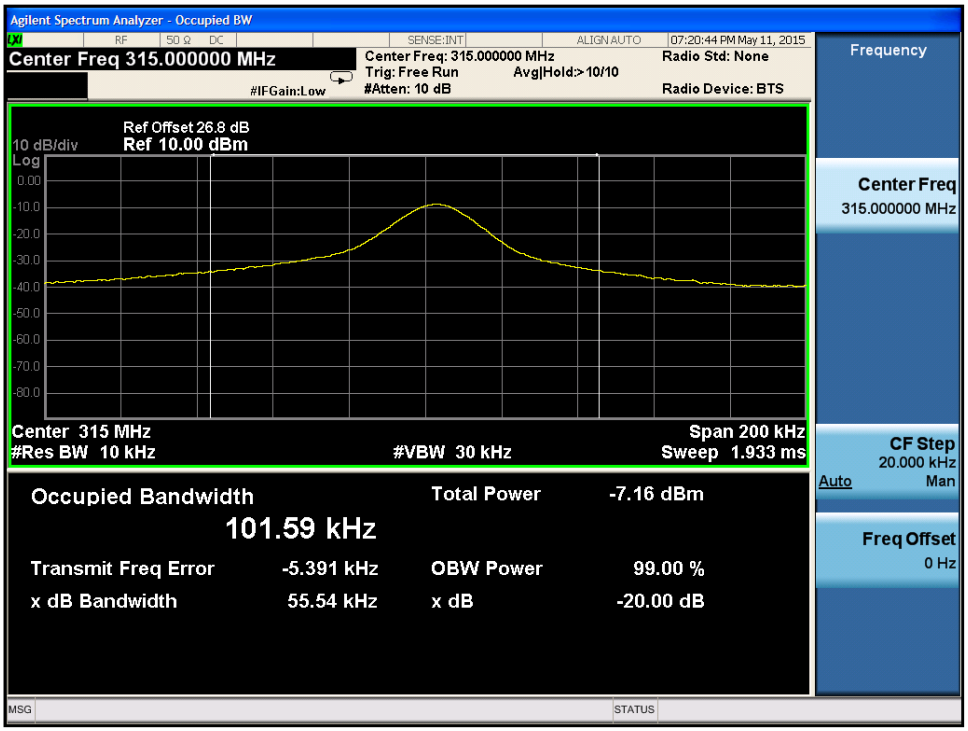
RESULT: **Pass**

Date of testing	:	05.11.2015
Test standard	:	FCC Part 15.231(c)
Kind of test site	:	Shielded room
Operation Mode	:	A

Table 6: Test result of 20dB Bandwidth

Channel Frequency [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Result
315.0	0.05554	0.25%*315=0.7875	PASS

Figure 1: Test Plot of 20dB Bandwidth



5.1.5 Deactivation Time

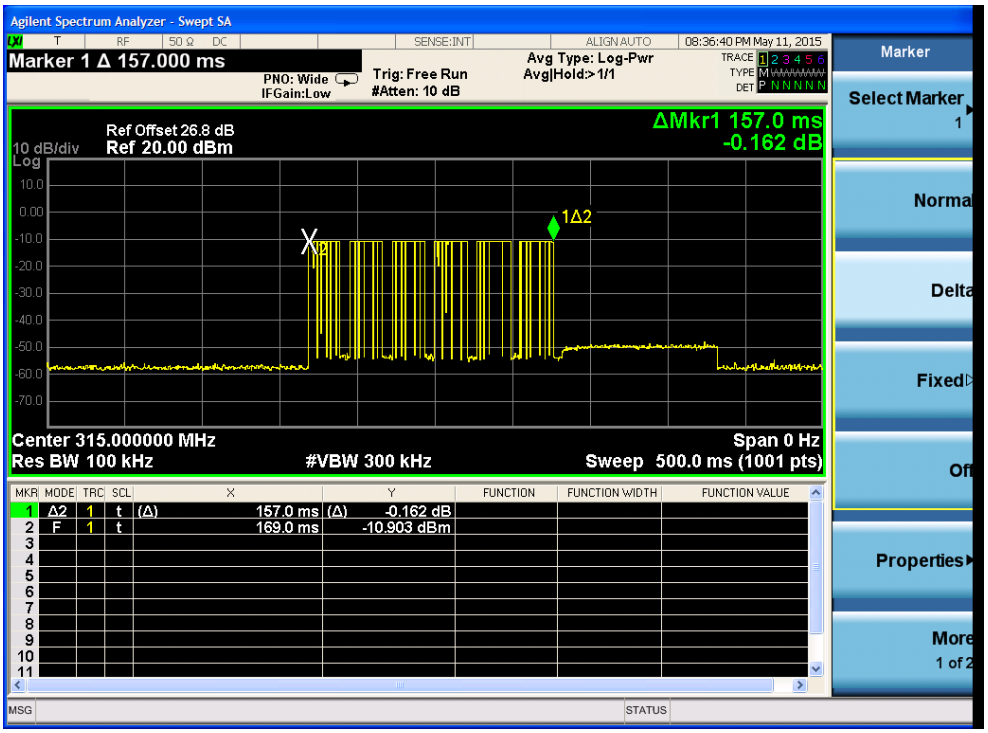
RESULT: **Pass**

Date of testing	:	05.11.2015
Test standard	:	FCC part 15.231(a)
Kind of test site	:	Shield room
Operation Mode	:	A

Table 7: Deactivation Time

Frequency [MHz]	On Transmission Time [s]	Limit [s]	Result
315.0	0.157	5	PASS

Figure 2: Deactivation Time

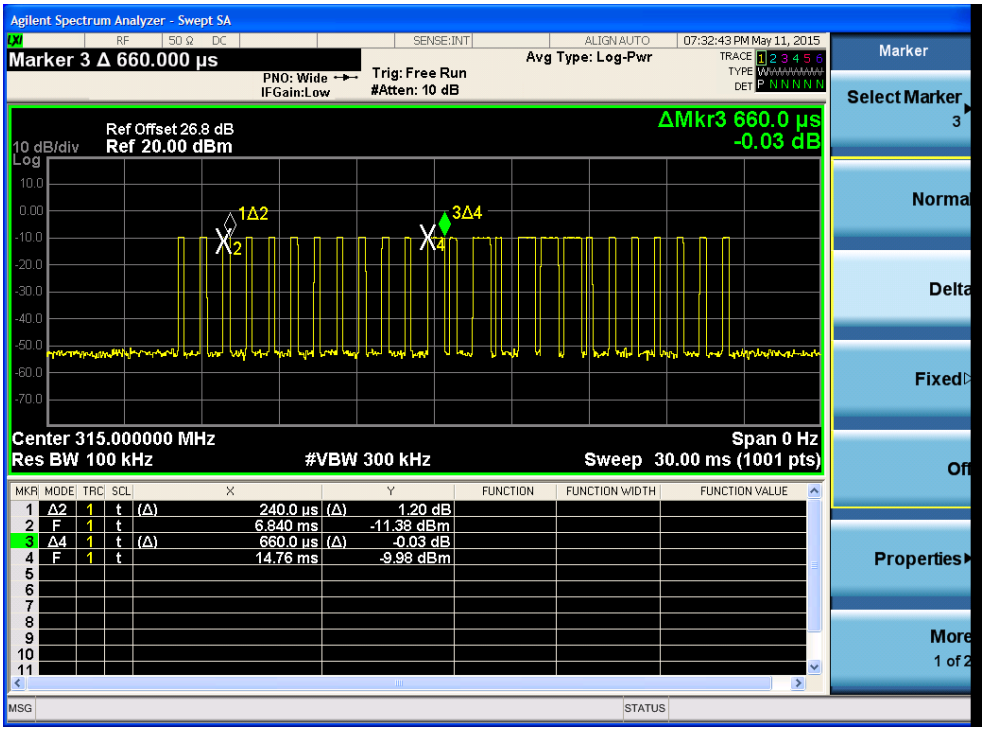


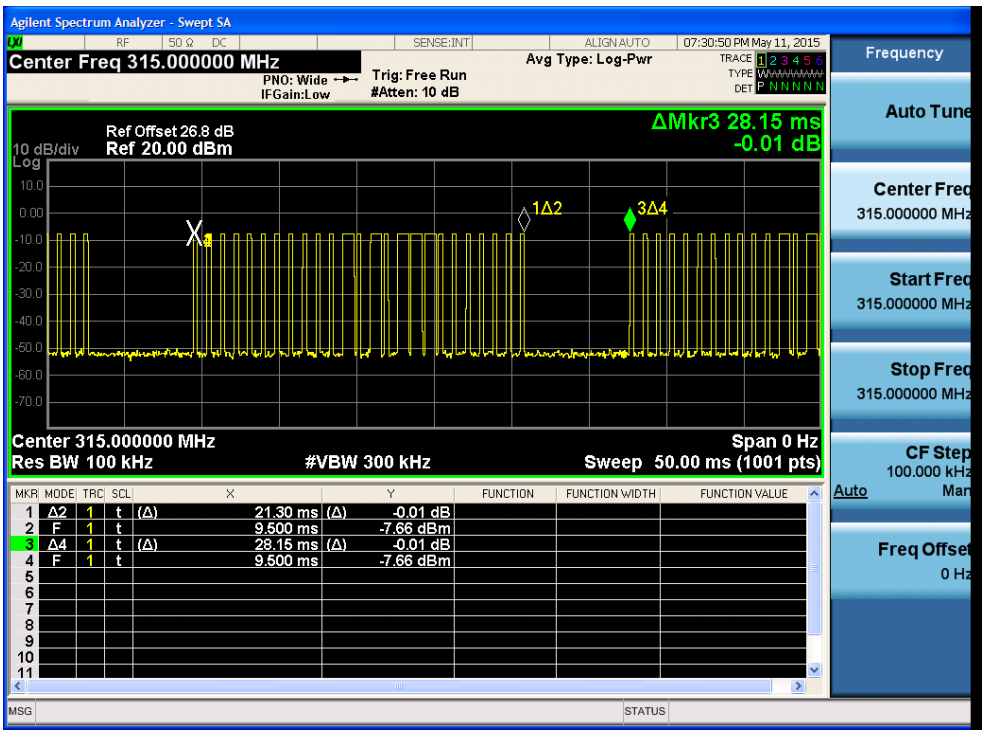
5.1.6 Duty Cycle

RESULT: **Pass**

Date of testing	:	05.11.2015
Test standard	:	FCC part 15.231(a)
Kind of test site	:	Shield room
Operation Mode	:	A

Figure 3: Test Plot of Duty Cycle





Duty Cycle:
0.24*20+0.66*5=3.78
3.78/28.15=13.43%

Duty Cycle Factor:
20*log(Duty Cycle) = 20*log(0.1343)= -17.44dB

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