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TEST REPORT PER
FCC PART 15.249 LOW POWER
UNLICENSED INTENTIONAL RADIO

Applicant	SHANGHAI HELANG ELECTRONICS CO., LTD.
Address	NO. 960, SHENGLONG RD, JIU FU ECONOMIC DEVELOPMENT ZONE JIUTING TOWN, SONGJIANG DISTRICT
	SHANGHAI 201615 CHINA, P.C.
FCC ID	STPHL24T6
Product Description	REMOTE CONTROL
Date Sample Received	3/27/2007
Date Tested	4/3/07
Tested By	Richard Block
Approved By	Mario de Aranzeta
Report Number	729UT7TestReport.doc
Test Results	☒ PASS ☐ FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Certificate # 0955-01

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STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made by me or under my supervision, at TIMCO ENGINEERING, INC. located at 849 N.W. State Road 45, Newberry, Florida 32669.



Authorized by: Mario de Aranzeta

Signature: On file

Function: Engineer

Date: April 10, 2007

Tested by: Richard Block

Signature: on file

Date: 4/9/07

REPORT SUMMARY

Disclaimer	The test results relate only to the items tested.
Purpose of Test report	To demonstrate the DUT complies with FCC Pt 15.249 requirements to a 2.4 GHz low power intentional radio.
Applicable Standard	Pt 15.249, Pt 15.209, ANSI C63.4: 2003
Related Report(s)/Grant(s)	Pt 15 Subpart B digital portion verified.

TEST ENVIRONMENT

Test Facility	All tests were performed by Timco Engineering Inc. which is located at 849 NW State Road 45 Newberry, FL 32669 USA
Test Condition	Normal Temperature: 23°C Relative Humidity: 55%

TEST SETUP

Deviation from the Standard(s)	N/A
Modification to the DUT	N/A
Test Exercise (e.g. software description, test signal, etc.)	The DUT was placed in continuous transmit mode of operation according to the applicant's instruction
Test Supporting Equipment	The DUT is a stand-alone device. No supporting equipment was connected to the DUT during the testing.

DUT SPECIFICATION

DUT Description	2.4 GHz Remote Toy Controller		
FCC ID	STPHL24T6		
Model Number	24T6		
Serial Number	N/A		
Operating Frequency	Tx: 2.405 - 2.480 GHz Rx: Same as Tx		
No. of Channels	FHSS		
DUT Power Source	☐ 110-120Vac/50- 60Hz		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna	Integrated. Permanent attached.		
Antenna Connector	N/A		

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/20/07	3/19/10
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Analyzer Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/05	9/5/07
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08
LISN	Electro-Metrics	EM-7820	2682	CAL 4/28/05	4/28/07
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/14/05	12/14/07

TEST PROCEDURE

Radiation Interference: The test was performed according to ANSI C63.4-2003 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Pre-selector, a Hewlett Packard Model 85650A Quasi-Peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz with an appropriate sweep speed and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

Formula Of Conversion Factors: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL	= FS
33	20 dBuV	+ 10.36 dB	+ 0.5	= 30.86 dBuV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

ANSI Standard C63.4-2003 Measurement Procedures: The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The UUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

RADIATION INTERFERENCE

Rules Part No.: Pt 15.249, 15.209

Requirements:

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) μ V/m @ 300 meters
490 to 1705 kHz	24000/F (kHz) μ V/m @ 30 meters
1705 kHz to 30 MHz	29.54 dB μ V/m @ 30 meters
30 – 88	40.0 dB μ V/m @ 3 meters
80 – 216	43.5 dB μ V/m @ 3 meters
216 – 960	46.0 dB μ V/m @ 3 meters
Above 960	54.0 dB μ V/m @ 3 meters
Part 15.249	
Fundamental 902 – 928 MHz	94.0 dB μ V/m @ 3 meters
Fundamental 2400 – 2483.5 MHz	94.0 dB μ V/m @ 3 meters
Harmonics	54.0 dB μ V/m @ 3 meters

Test Data: All data were recorded using average detector. The highest fundamental emission is 66.68 dB μ V/m. The highest harmonics emission is 51.9 dB μ V/m. The DUT appears to meet the requirements.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dB μ V	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dB μ V/m	Margin dB
2,405.00	2,405.00	26.30	H	3.18	32.33	61.81	32.19
2,405.00	2,405.00	30.00	V	3.18	32.33	65.51	28.49
2,405.00	4,810.00	-4.50	V	4.91	34.35	34.76	19.24
2,405.00	4,810.00	-3.90	H	4.91	34.35	35.36	18.64
2,405.00	7,215.00	-0.50	V	5.73	36.16	41.39	12.61
2,405.00	7,215.00	-0.10	H	5.73	36.16	41.79	12.21
2,405.00	9,620.00	-2.70	H	6.79	37.54	41.63	12.37
2,405.00	9,620.00	-2.70	V	6.79	37.54	41.63	12.37
2,405.00	12,025.00	-2.80	H	7.82	38.91	43.93	10.07
2,405.00	12,025.00	-2.60	V	7.82	38.91	44.13	9.87
2,405.00	14,430.00	1.10	V	9.07	40.45	50.62	3.38
2,405.00	14,430.00	1.20	H	9.07	40.45	50.72	3.28

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,442.00	2,442.00	26.90	H	3.21	32.44	62.55	31.45
2,442.00	2,442.00	29.20	V	3.21	32.44	64.85	29.15
2,442.00	4,884.00	-3.60	V	4.94	34.41	35.75	18.25
2,442.00	4,884.00	-2.50	H	4.94	34.41	36.85	17.15
2,442.00	7,326.00	-2.00	V	5.80	36.29	40.09	13.91
2,442.00	7,326.00	-0.90	H	5.80	36.29	41.19	12.81
2,442.00	9,768.00	-2.60	V	6.83	37.72	41.95	12.05
2,442.00	9,768.00	-1.90	H	6.83	37.72	42.65	11.35
2,442.00	12,210.00	-2.70	V	7.95	38.98	44.23	9.77
2,442.00	12,210.00	-2.20	H	7.95	38.98	44.73	9.27
2,442.00	14,652.00	1.50	V	9.16	40.66	51.32	2.68
2,442.00	14,652.00	2.00	H	9.16	40.66	51.82	2.18

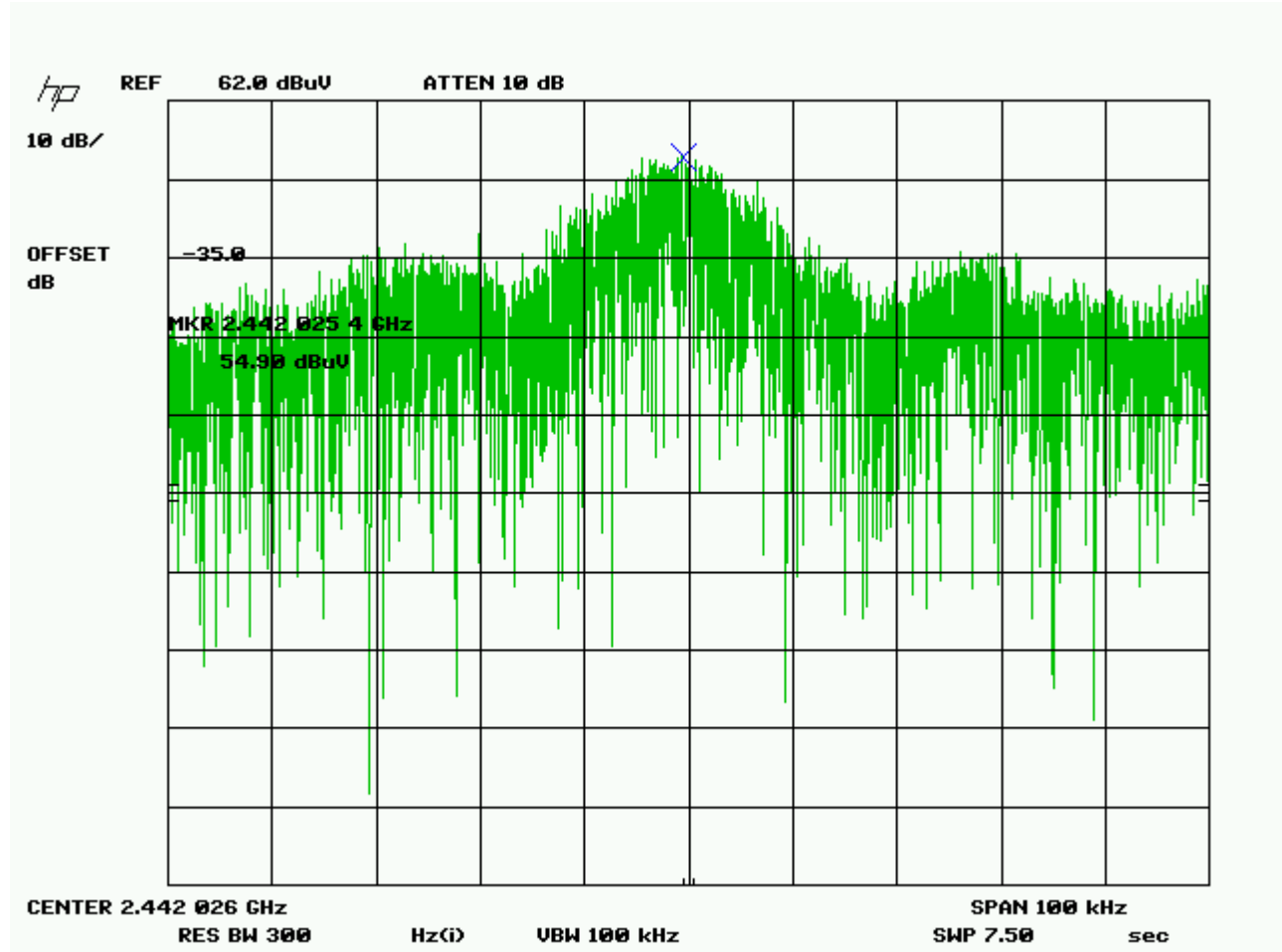
Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,480.00	2,480.00	25.50	H	3.24	32.54	61.28	32.72
2,480.00	2,480.00	30.90	V	3.24	32.54	66.68	27.32
2,480.00	4,960.00	-3.80	H	4.98	34.47	35.65	18.35
2,480.00	4,960.00	-3.80	V	4.98	34.47	35.65	18.35
2,480.00	7,440.00	-1.50	H	5.86	36.43	40.79	13.21
2,480.00	7,440.00	0.20	V	5.86	36.43	42.49	11.51
2,480.00	9,920.00	-2.60	H	6.88	37.90	42.18	11.82
2,480.00	9,920.00	-2.50	V	6.88	37.90	42.28	11.72
2,480.00	12,400.00	-2.80	H	8.08	39.06	44.34	9.66
2,480.00	12,400.00	-2.80	V	8.08	39.06	44.34	9.66
2,480.00	14,880.00	1.90	H	9.25	40.75	51.9	2.10
2,480.00	14,880.00	1.90	V	9.25	40.75	51.9	2.10

OCCUPIED BANDWIDTH

Rules Part No.: Pt 15.249 (d)

Requirements: The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of Pt 15.209.

Test Data: The plot indicates the DUT met the requirements.



POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207

Requirements:

Frequency (MHz)	Quasi Peak Limits (dBuV)	Average Limits (dBuV)
0.15 – 0.5	66 – 56 *	56 – 46 *
0.5 – 5.0	56	46
5.0 – 30	60	50
* Decrease with the logarithm of the frequency		

Test Data: The DUT is battery operated exclusively. The P/L requirement is not applicable.