

Prüfbericht - Nr.: Test Report No.	14010952 001	Seite 1 von 12 Page 1 of 12	
Auftraggeber: Applicant	Lucky Plastic Factory Ltd. Suite 502, Chinachem Golden Plaza 77 Mody Road T.S.T. East, Kowloon Hong Kong		
Gegenstand der Prüfung: Test item	Low Power Transmitter		
Bezeichnung: Identification	Refer to page 6.	Serien-Nr.: Serial No.	Engineering sample
Wareneingangs-Nr.: Receipt No.	050502049- 050502052	Eingangsdatum: Date of receipt	02.05.2005
Prüfört: Testing location	TÜV Rheinland Hong Kong Ltd. Unit 8, 25 th Floor, Skyline Tower, 39 Wang Kwong Road, Kowloon Bay Kowloon, Hong Kong Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong		
Prüfgrundlage: Test specification	FCC Part 15, Subpart C		
Prüfergebnis: Test Result	Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage. The above mentioned product was tested and passed .		
geprüft / tested by:		kontrolliert / reviewed by:	
08.09.2005	Hugo Wan	08.09.2005	Thomas Berns
Datum Date	Name Name	Datum Date	Name Name
	Unterschrift Signature		Unterschrift Signature
Sonstiges: FCCID: NEX-9436-49			
Other Aspects			
Abkürzungen:	OK, Pass, P = entspricht Prüfgrundlage	Abbreviations:	OK, Pass, P = passed
	Fail, F = entspricht nicht Prüfgrundlage		Fail, F = failed
	N/A = nicht anwendbar		N/A = not applicable
	NT = nicht getestet		NT = not tested
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. This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any safety mark on this or similar products.			

Test Summary

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Bandwidth Measurement

Result: Pass

Contents

List of Test and Measurement Instruments.....	4
General Product Information	5
Product Function and Intended Use.....	5
Circuit Description	5
Ratings and System Details	5
Independent Operation Modes.....	6
Submitted Documents	6
Related Submittal(s) Grants	6
Test Set-up and Operation Mode.....	7
Principle of Configuration Selection	7
Test Operation and Test Software	7
Special Accessories and Auxiliary Equipment	7
Countermeasures to achieve EMC Compliance.....	7
Test Methodology	8
Radiated Emission	8
Field Strength Calculation	8
Test Results	9
Radiated Emission of Carrier Frequency Section 15.235(a)	9
Spurious Radiated Emissions Section 15.235(b).....	10
Bandwidth Measurement Section 15.235(b).....	12
Appendix 1: Test Results	
Appendix 2: Test Setup	
Appendix 3: EUT External Photo	
Appendix 4: EUT Internal Photo	
Appendix 5: FCCID Label, Block Diagram, Schematics and User manual.	

List of Test and Measurement Instruments

Kind of Equipment	Manufacturer	Type	S/N
Test Receiver	Rohde & Schwarz	ESVS30	842807/009
Biconical Antenna	Rohde & Schwarz	HK116	841489/015
Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
Double Ridge Horn Antenna	EMCO	3115	9002-3351
Double Ridge Horn Antenna	EMCO	3115	9002-3347
Signal Generator	Rohde & Schwarz	SMY 01	844146/024
Signal Generator	Rohde & Schwarz	SMY 01	844146/023
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30

General Product Information

Product Function and Intended Use

The equipment under test (EUT) is a transmitter for a RC toy car operating at 49.860 MHz. The EUT has two control rods for commanding the forward, backward, left and right movement of the associated receiver.

Due to declaration from the manufacturer, it is deemed that the transmitter of 9437, 9438, 9439, 9440, 9441, 9416, 9418 and 9419 are same in circuit design, PCB layout and housing as the transmitter of 9436. Hence, all testing was conducted on the representative model: 9436.

FCCID: NEX-9436-49

Model	Product description
9436	1:20 ProRacer Mini Crusher Ford Bronco
9437	1:20 ProRacer Mini Crusher GM Colorado
9438	1:20 ProRacer Mini Crusher Avalanche
9439	1:20 ProRacer Mini Crusher Jeep Rescue
9440	1:20 ProRacer Mini Crusher Ford Explore Sport Trac
9441	1:20 ProRacer Hummer
9416	1:14 ProRacer Ford Focus WRC
9418	1:14 ProRacer Citroen WRC
9419	1:14 ProRacer Subaru WRC

Circuit Description

IC and the associated circuit act as AF-Modulator. Q18 and the associated circuit act as a RF-transmitter. Q17 together with 27.145 MHz crystal oscillator drive the base of Q18, signal from Q17 and the modulation provided by IC are then summed into Q18. The matching network at output of Q18 is to limit the harmonic content and provide the proper coupling to antenna output.

Ratings and System Details

	Transmitter
Frequency range	: 49.860 MHz
Number of channels	: 1
Type of antenna	: Integral antenna
Power supply	: Battery operated 9V
Ports	: none
Protection Class	: III

Independent Operation Modes

The basic operation modes are:

- Remote Control: On and Off

For further information refer to User Manual

Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- Label artwork

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

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.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- none

Countermeasures to achieve EMC Compliance

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

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the 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 section 7.1.1 and 7.1.2 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 Results

Radiated Emission of Carrier Frequency

Section 15.235(a)

RESULT:
Pass

Test Specification : FCC Part 15 Section 15.235(a)
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Peak and Average
 Measurement BW : 100 kHz
 Supply Voltage : DC 9V

Polarization: Vertical

Detector function	Frequency	Reading	Antenna Factor	Attenuation of cable	Measured Field strength at 3m	Delta to Limit
	(MHz)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	(dB)
Peak	49.86	36.3	12.9	0.5	49.7	50.3
Average	49.86	24.8	12.9	0.5	38.2	41.8

Polarization: Horizontal

Detector function	Frequency	Reading	Antenna Factor	Attenuation of cable	Measured Field strength at 3m	Delta to Limit
	(MHz)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	(dB)
Peak	49.86	18.6	12.9	0.5	31.8	-68.2
Average	49.86	7.5	12.9	0.5	20.7	-59.3

Limit
Section 15.235(a)

Frequency within the band	Peak Emission		Average Emission	
	(microvolt/meter)	dBμV/m	(microvolt/meter)	dBμV/m
49.82-49.90 MHz	100,000	100.0	10,000	80.0

According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

Spurious Radiated Emissions**Section 15.235(b)****RESULT:****Pass**

Test Specification : FCC Part 15 Section 15.209
 Test Method : ANSI 63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Measurement Distance : 3m
 Detector Function : Quasi Peak
 Measurement BW : 100 kHz
 Supply Voltage : DC 9V
 Measuring Frequency Range : 30-1000MHz

Polarization: Vertical

Frequency	Reading	Antenna Factor	Attenuation of cable	Field strength at 3m	Limit at 3m	Delta to Limit
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
99.721	17.62	10.68	0.70	29.0	43.50	-14.50
149.582	14.53	14.27	0.90	29.7	43.50	-13.80
199.443	25.28	10.52	1.09	36.9	43.50	-6.60
249.304	10.25	11.55	1.10	22.9	46.00	-23.10
299.165	9.62	12.98	1.30	23.9	46.00	-22.10
349.020	12.03	14.33	1.45	27.8	46.00	-18.20
398.880	6.06	15.74	1.50	23.3	46.00	-22.70
448.740	5.31	16.69	1.90	23.9	46.00	-22.10
498.600	5.03	17.57	2.00	24.6	46.00	-21.40
548.460	5.49	17.87	2.04	25.4	46.00	-20.60

Polarization: Horizontal

Frequency	Reading	Antenna Factor	Attenuation of cable	Field strength at 3m	Limit at 3m	Delta to Limit
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
99.721	10.92	10.68	0.70	22.3	43.5	-21.20
149.582	12.83	14.27	0.90	28.0	43.5	-15.50
199.443	23.79	10.52	1.09	35.4	43.5	-8.10
249.304	20.45	11.55	1.10	33.1	46.0	-12.90
299.161	12.72	12.98	1.30	27.0	46.0	-19.00
349.020	6.82	14.33	1.45	22.6	46.0	-23.40
398.880	10.06	15.74	1.50	27.3	46.0	-18.70
448.740	6.41	16.69	1.90	25.0	46.0	-21.00
498.600	5.33	17.57	2.00	24.9	46.0	-21.10
548.460	5.39	17.87	2.04	25.3	46.0	-20.70

Remark: There is no spurious emission found between lowest oscillating frequency 12MHz to 30 MHz.

Limit**Section 15.209**

Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), also comply with the radiated emission limits specified in Section 15.209.

Limit for Radiated Emission under Section 15.209:

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

Bandwidth Measurement

Section 15.235(b)

RESULT:

Pass

Test Specification	:	FCC Part 15 section 15.235(b)
Port of Testing	:	Coupling
Detector Function	:	Peak
Supply Voltage	:	DC 9V

The field strength of any emissions appearing between the band edges and up to 10kHz above and below the band edges is at least 26dB below the carrier. At the lower edge 49.81MHz and upper edge 49.91 MHz are 32.73 dB and 32.69 dB below the carrier respectively.

For test results refer to Appendix 1, page 1.

Limit

Section 15.235(b)

The field strength of any emissions appearing between the band edges and up to 10kHz above and below the band edges shall be attenuated at least 26dB below the level of the unmodulated carrier or to the general limits in Section 15.209, whichever permits the higher emission levels.