



TEST REPORT

Product : 1/5 RC CAR
Trade mark : N/A
Model/Type reference : KM-001, KM-002, KM-2.0EX, KM-3.0EX,
KM-T1000, KM-T1000GT, KM-T2000,
KM-X1
Serial Number : N/A
Ratings : DC 12V
Report Number : EESZG03070010
Date : Apr. 02, 2014
Regulations : See below

Test Standards	Results
<input checked="" type="checkbox"/> ETSI EN 300 440-1 V1.6.1	PASS
<input checked="" type="checkbox"/> ETSI EN 300 440-2 V1.4.1	PASS
<input checked="" type="checkbox"/> ETSI EN 301 489-1 V1.9.2	PASS
<input checked="" type="checkbox"/> ETSI EN 301 489-3 V1.6.1	PASS

Prepared for:

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NO.55 zhenye road, weitang industrial zone, Jiashan, Zhejiang, China.

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Apr. 02, 2014

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(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant: JIASHAN KINGMOTOR SPORT TECHNOLOGY CO.,LTD
NO.55 zhenye road, weitang industrial zone, Jiashan,
Zhejiang, China.

R&TTE Directive: 1999/5/EC

Product: 1/5 RC CAR

Trade mark: N/A

Model/Type reference: KM-001, KM-002, KM-2.0EX, KM-3.0EX, KM-T1000,
KM-T1000GT, KM-T2000, KM-X1

Model difference: All the models are identical except outer colors.

Serial Number: N/A

Report Number: EESZG03070010

Sample Received Date: Mar. 08, 2014

Sample tested Date: Mar. 08, 2014 to Apr. 02, 2014

2. TEST SUMMARY

The complete list of measurements is given below:

Subclause	Parameter to be measured	Result	Remark
ETSI EN 300 440-2V1.4.1			
4.2.1.1	Equivalent isotropically radiated power	Pass	See clause 9.1 in this report
4.2.1.2	Permitted range of operating frequencies	Pass	See clause 9.2 in this report
4.2.1.3	Unwanted emissions in the spurious domain for TX	Pass	See clause 9.3 in this report
4.2.1.4	Duty cycle	N/A	The device is not RFID transmitter.
4.2.2.1	Adjacent channel selectivity	N/A	The receiver category of EUT is 3.
4.2.2.2	Blocking or desensitization		
4.2.2.3	Spurious radiations for RX	Pass	See clause 10.1 in this report

Subclause	Parameter to be measured	Result	Remark
ETSI EN 301 489-1V1.9.2			
8.2	Radiated emission (RE)	N/A	There is no any ancillary equipment during the test.
8.4	Conducted emission (CE)	N/A	The power supply of device is by DC battery.
8.5	Harmonic current emissions		
8.6	Voltage fluctuations and flicker		
9.2	RF electromagnetic field (80MHz to 1GHz and 1.4GHz to 2.7GHz) (RS)	Pass	See clause 11.1.1 in this report
9.3	Electrostatic discharge (ESD)	Pass	See clause 11.1.2 in this report
9.4	Fast transients common mode (EFT)	N/A	The power supply of device is by DC battery.
9.5	RF common mode 0.15MHz to 80MHz (CS)		
9.6	Transients and surges	N/A	The EUT is not equipment for vehicular use.
9.7	Voltage dips and interruptions	N/A	The power supply of device is by DC battery.
9.8	Surges, line to line and line to ground		

3. TEST METHODOLOGY

3.1 Test facility

Centre Testing International (Shenzhen) Corporation
 Hongwei Industrial Zone, 70 Area, Bao'an District, Shenzhen, Guangdong, China

3.2 Test standards

ETSI EN 300 440-1 V1.6.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and test methods

ETSI EN 300 440-2 V1.4.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive

ETSI EN 301 489-1 V1.9.2 Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

ETSI EN 301 489-3 V1.6.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz

4. RATINGS AND SYSTEM DETAILS

Items	Description
Rating	DC 12V
Intentional Transceiver	Intentional Transmitter
Modulation	GFSK
Frequency Range	2.40~2.4835GHz
Channel Number	16
Antenna Type	External
Connector	fixed on board

The test model is KM-001, and test results are applicable to others.

5. TEST EQUIPMENT LIST

Instrumentation: The following list contains equipments used at CTI for testing.

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

3M Full-anechoic Chamber - Radio-frequency electromagnetic field Test (IEC/EN 61000-4-3)

Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
ESG Vector signal generators	Agilent	E4438C	MY45095744	01/18/2015
Power Amplifier	AR	150W1000	0322288	07/19/2014
Power Amplifier	AR	25S1G4A	0321112	07/19/2014
Stacked double Log.-Per. Antenna	schwarzbeck	STLP 9128 E special	9128ES-110	06/25/2014
Horn Antenna	AR	ATH800M5GA	0342530	06/25/2014

Shielding Room No. 3 - ESD Test (IEC/EN 61000-4-2)

Equipment	Manufacturer	Model	Serial No.	Due Date
ESD Simulator	TESEQ	NSG437	478	08/22/2014

RF Test Equipments

Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
Spectrum Analyzer	R&S	FSP40	100416	07/06/2014

Receiver	R&S	ESCI	100435	07/19/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	618	06/25/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	619	06/25/2014
Horn Antenna	ETS-LINGREN	3117	00057407	07/19/2014
Horn Antenna	ETS-LINGREN	3117	00057362	07/19/2014
Microwave Preamplifier	Agilent	8449B	3008A02425	04/16/2014
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Temperature & Humidity Chamber	ESPEC	EL-04KA	N/A	08/03/2014
ESG Vector signal generators	Agilent	E4438C	MY45095744	01/18/2015
Signal Generator	IFR	2023B	202307/883	01/18/2015

6. UNCERTAINTY OF MEASUREMENT

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement items	Value
Radiated emission	±4.6 dB
Radio Frequency	±1 x 10 ⁻⁸
total RF power, conducted	±0.22 dB
spurious emissions, conducted	±2.3 dB
all emissions, radiated	±5.1dB
temperature	0.2°C
DC Voltage	±0.06 %

7. LABORATORY ACCREDITATIONS AND LISTINGS

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

8. SUPPORT EQUIPMENT

No.	Device Type	Manufacturer	Model	Series No.	Data Cable
1.	---	---	---	---	---

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

9. TRANSMITTER REQUIREMENT & TEST SUITES

9.1 Equivalent isotropically radiated power

Test Limits

The equivalent isotropic radiated power (e.i.r.p.) shall be equal to or less than 10 dBmW.

Test Results

Temperature (°C)	Voltage (V)	Equivalent isotropic radiated power (dBm)			
		Low CH.	Middle CH.	High CH.	Limit
T _{nor} = 25	12.0	7.3	6.9	6.3	10mW(10dBm)
T _{min} = -20	12.0	7.7	7.1	6.8	
	9.5	7.6	7.4	7.2	
T _{max} = 55	12.0	7.4	7.2	6.9	
	9.5	7.4	7.1	6.7	

Note:

The power supply of TX unit is by battery (AAA alkaline battery), and the extreme voltage is 9.5V.

9.2 Permitted range of operating frequencies

Test Limits

The width of the power spectrum envelope is $f_H - f_L$ for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of f_L and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) and the necessary bandwidth of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the band 2.4 GHz to 2.4835 GHz ($f_L > 2.4$ GHz and $f_H < 2.4835$ GHz).

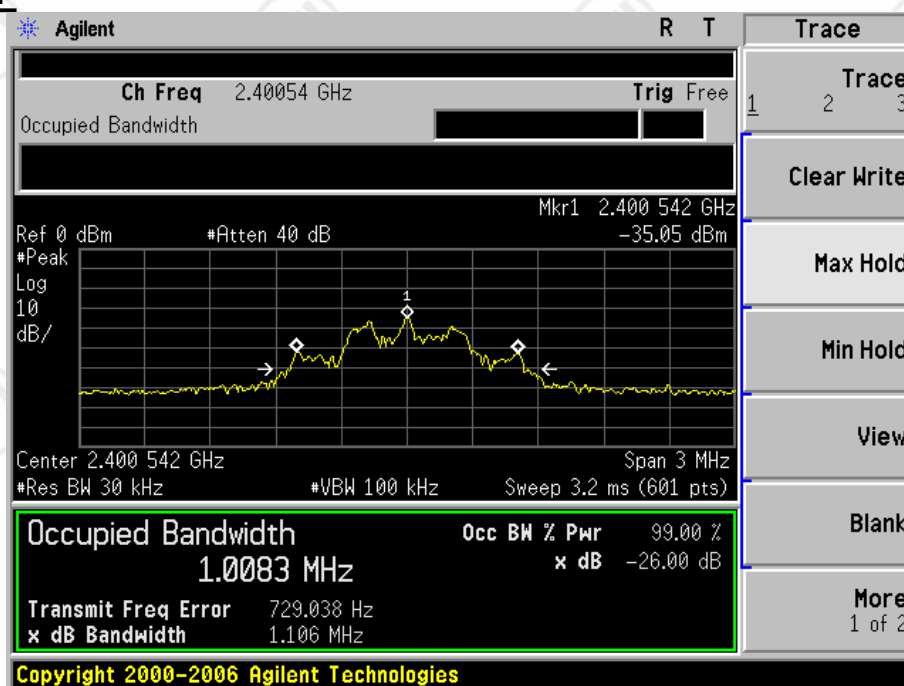
Test Results

TEST CONDITIONS		FREQUENCY (GHz)			
		Lowest Frequency		Highest Frequency	
Temperature (°C)	Voltage(V)	Measure result	Limit	Measure result	Limit
T _{nor} = 25	12.0	2.400309	>2.4 GHz	2.476131	<2.4835 GHz
T _{min} = -20	12.0	2.400282		2.476256	
	9.5	2.400312		2.476106	
T _{max} = 55	12.0	2.400314		2.476126	
	9.5	2.400311		2.476158	

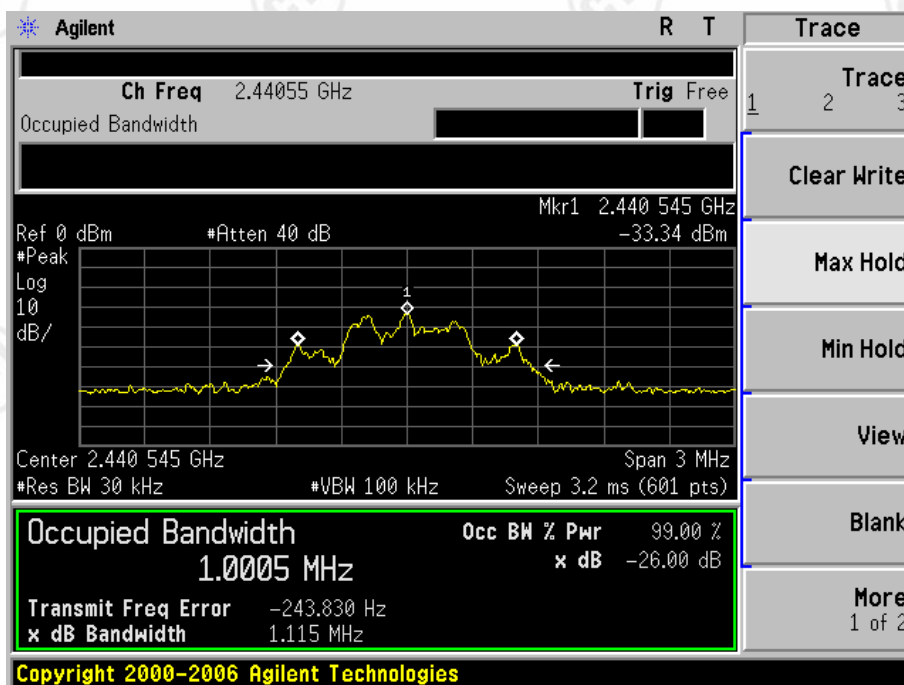
Note:

The power supply of TX unit is by battery (AAA alkaline battery), and the extreme voltage is 9.5V.

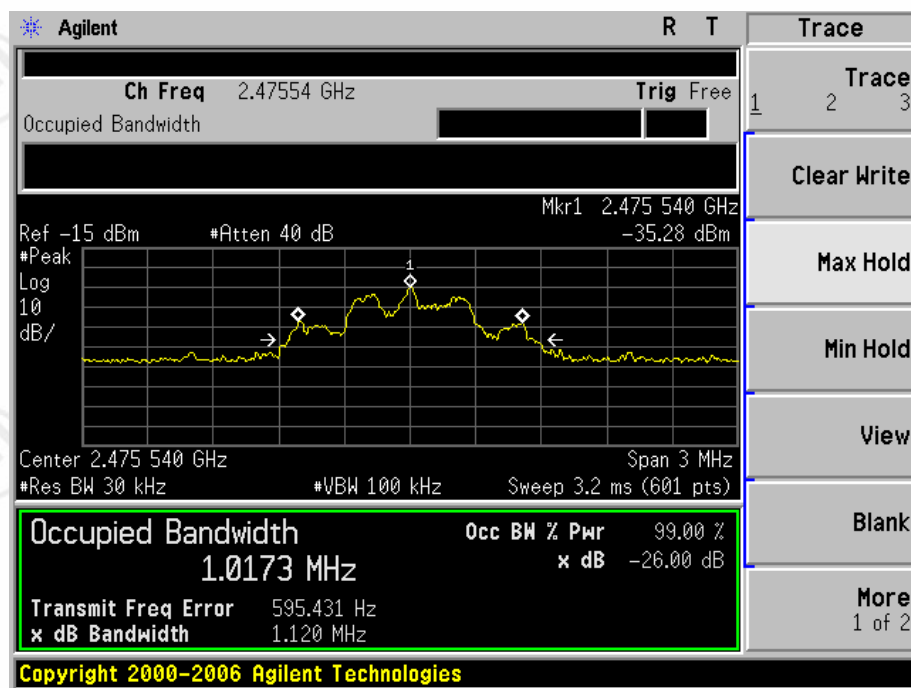
99% OBW:



Low Channel



Middle Channel



High Channel

9.3 Unwanted emissions in the spurious domain

Test Limits

The power of any radiated emission shall not exceed the values given in below.

Frequency range	Limit when operating	Limit when in standby
47 MHz to 74 MHz 87.5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	-54 dBm	-57 dBm
Other frequencies $\leq 1\,000$ MHz	-36 dBm	-57 dBm
Frequencies $> 1\,000$ MHz	-30 dBm	-47 dBm

Test Results

Pass.

The EUT has no standby mode.

Frequency (GHz)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization
Low Channel				
4.892	-41.50	-30.0	-11.50	H
7.337	-40.63	-30.0	-10.63	H
9.783	-44.61	-30.0	-14.61	H
12.229	-43.61	-30.0	-13.61	H
4.892	-42.61	-30.0	-12.61	V
7.337	-41.50	-30.0	-11.50	V
9.783	-44.72	-30.0	-14.72	V
Middle Channel				
4.930	-45.50	-30.0	-15.50	H
7.395	-40.04	-30.0	-10.04	H
9.860	-46.53	-30.0	-16.53	H
12.325	-41.63	-30.0	-11.63	H
4.930	-46.50	-30.0	-16.50	V
7.395	-41.61	-30.0	-11.61	V
9.860	-47.04	-30.0	-17.04	V
High Channel				
4.962	-45.50	-30.0	-15.50	H
7.443	-40.53	-30.0	-10.53	H
9.924	-46.52	-30.0	-16.52	H
12.405	-45.53	-30.0	-15.53	H
4.962	-46.50	-30.0	-16.50	V
7.443	-41.61	-30.0	-11.61	V
9.924	-47.41	-30.0	-17.41	V
12.405	-46.71	-30.0	-16.71	V

Remark:

1. The test frequency from 25MHz up to 25GHz.
2. If the emission level is too low to be measured, it is not reported.
3. The result basic equation calculation is as follows: Margin = Emission Level - Limit

10. RECEIVER REQUIREMENT & TEST SUITES

10.1 Spurious radiations

Test Limits

The spurious emissions of the receiver shall not exceed the values in below tables in the indicated bands.

Frequency Range	Limit
25MHz to 1 GHz	-57 dBm
above 1 GHz	-47 dBm

Test Results

Pass.

Frequency (MHz)	Emission level (dBm)	Limit (dBm)	Margin (dB)	Antenna Polarization
---	---	---	---	H
---	---	---	---	H
---	---	---	---	H
---	---	---	---	H
---	---	---	---	V
---	---	---	---	V
---	---	---	---	V
---	---	---	---	V

Remark:

1. The test frequency from 25MHz up to 25GHz.
2. If the emission level is too low to be measured, it is not reported. All the emissions for RX mode are less than the limit 20dB, so they are not recorded.
3. According to technical experiences, all spurious emissions at the low, middle and high channel are almost the same, so that the test data of middle channel are chosen as representative for the test.
3. The result basic equation calculation is as follows:
Margin = Emission Level – Limit

11. EMC REQUIREMENT & TEST SUITES

11.1 Immunity test results

According to the clause 6 of ETSI EN 301 489-3 V1.6.1, the description of performance criteria is below:

Continuous phenomena applied to Transmitters (CT):

For equipment of type I or II including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in clause 6.3 shall apply.

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Transient phenomena applied to Transmitters (TT):

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in clause 7.2.2.

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Continuous phenomena applied to Receivers (CR):

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in clause 6.3 shall apply.

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Transient phenomena applied to Receivers (TR):

For equipment of type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in clause 7.2.2.

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence.

Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

The performance criteria according to EN 301 489-3 V1.6.1 are as follows.

The product family of Short Range Devices is divided into three classes of equipment, each having its own set of minimum performance criteria.

Class of SRD equipment	Risk assessment of receiver performance
1	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person)
2	Medium reliable SRD communication media; e.g. causing inconvenience to persons, which cannot simply be overcome by other means
3	Standard reliable SRD communication media; e.g. inconvenience to persons, which can simply be overcome by other means (e.g. manual)

General performance criteria:

The performance criteria for the different classes of SRD equipment (see table above) in combination with the different equipment types (see table 1 in the standard) during and after immunity test are specified in this clause:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria for immunity tests with power interruptions exceeding a certain time are specified in clause 6.3 of ETSI EN 301 489-3 V1.6.1, table 6 in the standard.

The EUT shall meet the performance criteria as specified in the following clause, for the SRD equipment of class 3.

Class 3 SRD equipment		
Criteria	During test	After test
A and B	May be loss of function (one or more) No unintentional responses	Operate as intended, for equipment type II the communication link may be lost, but shall be recoverable by user No degradation of performance Lost functions shall be self-recoverable

11.1.1 RF electromagnetic field (RS)

Test Specification

Basic Standard : ETSI EN 301 489-3 & EN 61000-4-3
Step Size : 10%
Modulation : 1kHz, 80% AM
Dwell Time : 1 second
Polarization : Horizontal & Vertical

Test Results

Product : 1/5 RC CAR
Model/Type reference : KM-001
Power : DC 12V **Temperature** : 18℃
Mode : TX & RX **Humidity** : 51%

Position	Frequency	Field Strength (V/m)	RF Signal (Modulation)	Polarity (H/V)	Performance Criterion	Remark
Front	80MHz-1GHz & 1.4GHz-2.7GHz	3	AM	H/V	A	EUT operated as intended, no degradation of function.
Left	80MHz-1GHz & 1.4GHz-2.7GHz	3	AM	H/V	A	
Back	80MHz-1GHz & 1.4GHz-2.7GHz	3	AM	H/V	A	
Right	80MHz-1GHz & 1.4GHz-2.7GHz	3	AM	H/V	A	

11.1.2 Electrostatic discharge (ESD)

Test Specification

Basic Standard : ETSI EN 301 489-3 & EN 61000-4-2
Discharge Impedance : 330 ohm / 150 pF
Discharge Mode : Single Discharge
Discharge Period : 1 discharge per second

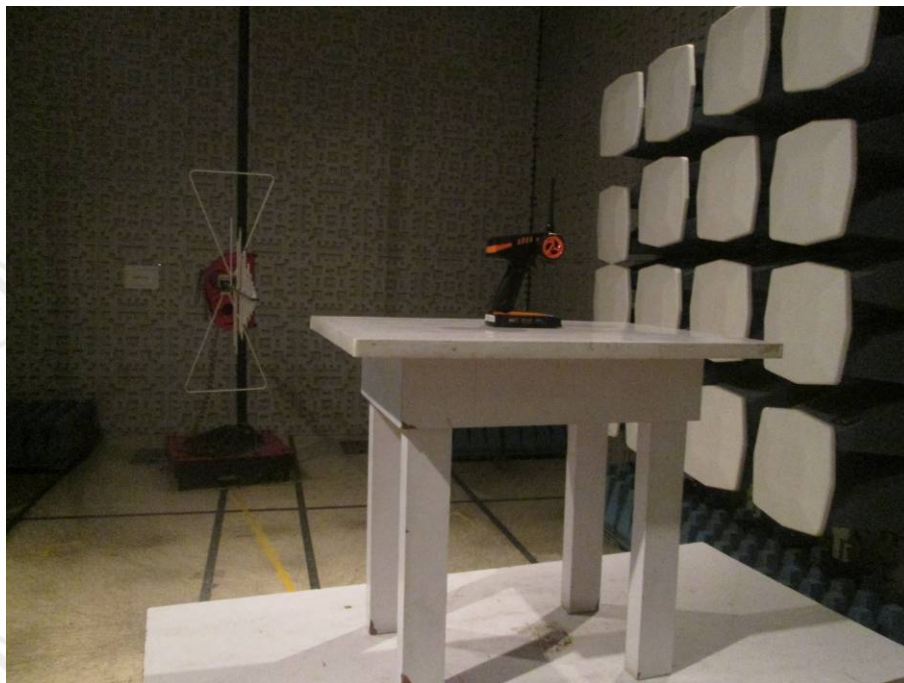
Test Results

Product : 1/5 RC CAR
Model/Type reference : KM-001
Power : DC 12V **Temperature** : 18℃
Mode : TX & RX **Humidity** : 51%

Amount of Discharges	Voltage	Coupling	Performance Criterion	Remark
Mini 10 /Point	± 2; ±4; ±8 kV	Air Discharge	A	EUT operated as intended, no degradation of function.
Mini 10 /Point	± 2; ±4 kV	Contact Discharge	A	
Mini 10 /Point	± 2; ±4 kV	Indirect Discharge HCP	A*	
Mini 10 /Point	± 2; ±4 kV	Indirect Discharge VCP	A	

*: only for TX test.

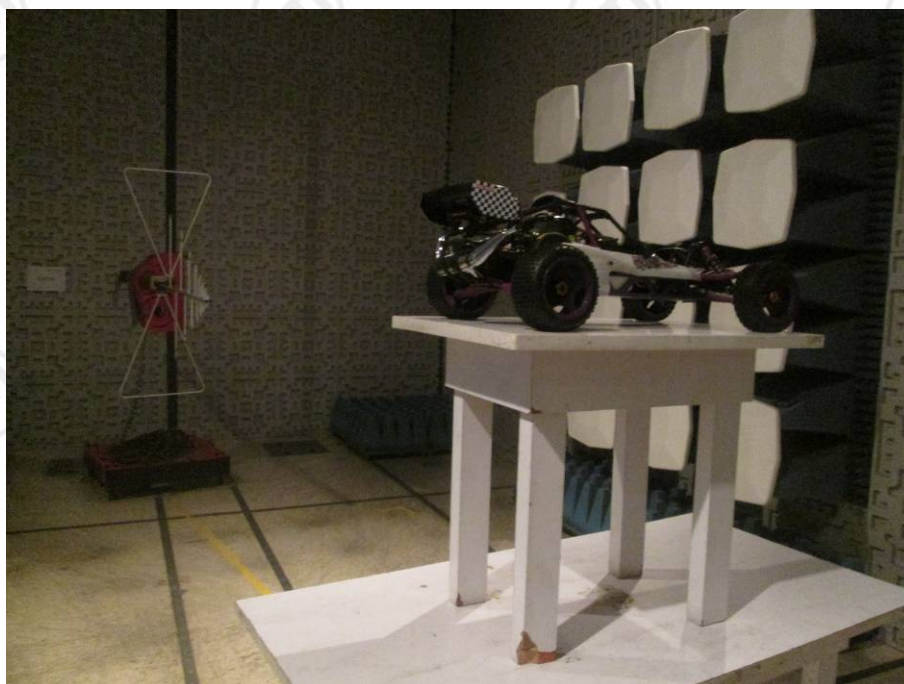
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



Radiated spurious emission Test Setup-1 (TX unit)



Radiated spurious emission Test Setup-2 (TX unit)



Radiated spurious emission Test Setup-1 (RX unit)



Radiated spurious emission Test Setup-2 (RX unit)



RF electromagnetic field Test Setup

APPENDIX 2 PHOTOGRAPHS OF EUT



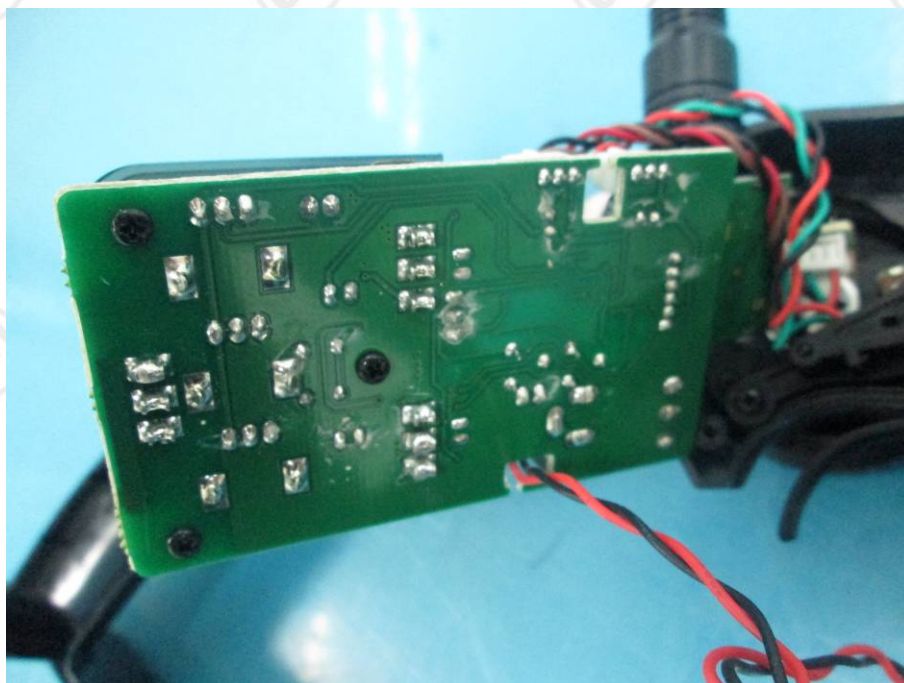
View of EUT-1 (TX unit)



View of EUT-2 (TX unit)



View of EUT-3 (TX unit)



View of EUT-4 (TX unit)



View of EUT (RX unit)

*** End of Report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.