FCC ID TEST REPORT

for

RF Remote Controller

Model: HS-ZSD14-RF01

FCC ID: 2ABUOHS-ZSD

Prepared for: Taizhou Heystar Electronic Technology Co., Ltd
Shuangqiao Village, Dayang Str.area, Linhai City, Zhejiang Province, China

Prepared by: Shenzhen TCT Testing Technology Co.,Ltd
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Report Number：TCT140211006F2-1
Date of Test： Feb. 05~Feb. 17, 2014
Date of Report： Feb. 17, 2014

The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from TCT Testing Technology.

Table of Contents

1.0 General Details 4
1.1 Test Lab Details 4
1.2 Applicant Details 4
1.3 Description of EUT 5
1.4 Statement: N.A. 5
1.5 Test Engineer 5
2.0 Test equipments and Associated Equipment used during the test. 6
2.1 Test Equipments 6
2.2 AE used during the test 6
2.3. Block Diagram of EUT Configuration 6
3.0 Technical Details 7
3.1 Summary of test results 7
3.2 Test Standards 7
4.0 EUT Modification 7
5.0 Measurement Uncertainty（95% confidence levels, k=2) 7
6.0 Power Line Conducted Emission Test 8
6.1 Schematics of the test 8
6.2 Test Method and test Procedure 8
6.3 EUT Operating Condition 8
6.4 Test Equipment 8
6.5 Conducted Emission Limit 9
6.6 Test specification: 9
6.7 Test result 9
7.0 Manually Activated Transmitter 12
7.1 Block diagram of Test setup 12
7.2 Limit 12
7.3 Test Equipment 12
7.4 Test specification 12
7.5 Test result 12
8.0 Radiated Emission Test 14
8.1 Test Method and test Procedure: 14
8.2 Block diagram of Test setup 14
8.3 Limit 16
8.4 Test Equipment 17
8.5 Test specification 17
8.6 Test result 18
9.0 Occupied Bandwidth 22
9.1 Block diagram of Test setup 22
9.2 Test Specification 22
9.3 Test Equipment 22
9.4 Limit 22
9.6 Test Result 23

10.0 Antenna Requirement 24
10.1 Standard Applicable 24
10.2 Antenna Specification 24

1.0 General Details

1.1 Test Lab Details

Name :	Shenzhen Tongce Testing Lab
Address:	1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Telephone:	13410377511
Fax:	--

The test facility is recognized, certified, or accredited by the following organizations:

FCC Registration Number: 572331

Shenzhen TCT Testing Technology Co., Ltd., Shenzhen EMC Laboratory: Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

Registration Number: 572331

Industry Canada (IC)

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

Registration Number IC: 10668A-1

1.2 Applicant Details

Applicant:	Taizhou Heystar Electronic Technology Co., Ltd
Address:	Shuangqiao Village , Dayang Str.area,Linhai City,Zhejiang Province,China
Telephone:	0576-85137979
Fax:	0576-85137791

Manufacturer:	Huizhou City Zhongkai Hi-tech Zone Bao Rong electronic Products Processing Department
Address:	1-3F, No.15 Da Ling Bei Village, Pingnan, Zhongkai Hi-tech District, Huizhou
Telephone:	--
Fax:	--

1.3 Description of EUT

Product:	RF Remote Controller
Model No.:	HS-ZSD14-RF01
Additional Model No.:	N.A.
Brand Name:	HEY STAR
Rating:	DC 3V via Lithium battery The battery information：DC 3V Model: CR2025
Operation Frequency:	433.92MHz
Modulation:	ASK
Antenna Designation:	A loop antenna and the maximum gain is 0 dBi.

1.4 Statement: N.A.

1.5 Test Engineer

The sample tested by

Printed name: Jack Kang

2.0 Test equipments and Associated Equipment used during the test.

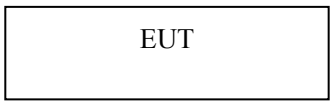
2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 07, 2013	July 06, 2014
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 07, 2013	July 06, 2014
Pre-amplifier	Teseq	LNA6900	--	July 08, 2013	July 07, 2014
Pre-amplifier	Agilent	8447D	83153007374	July 08, 2013	July 07, 2014
Pre-amplifier	Agilent	8449B	3008A01738	July 08, 2013	July 07, 2014
Loop antenna	A.R.A.	PLA-1030/B	1029	July 08, 2013	July 07, 2014
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 08, 2013	July 07, 2014
Horn Antenna	ETS LINDGREN	3117	--	July 08, 2013	July 07, 2014
EMI Test Receiver	R&S	ESCS30	100139	July 7, 2013	July 6, 2014
LISN	AFJ	LS16C	16010222119	July 7, 2013	July 6, 2014

2.2 AE used during the test

Equipment type	Manufacturer	Model
N.A.		
N.A.		
N.A.		
N.A.		

2.3. Block Diagram of EUT Configuration



Note: New batteries are used for E.U.T during the test

3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result	Notes
Conduction Emission, 0.15MHz to 30MHz	**15.207**	**PASS**	**N.A.**
Manually Activated Transmitter	**15.231(a)**	**PASS**	**Complies**
Radiation Emission	**15.231(b), 15.205, 15.209, 15.35**	**PASS**	**Complies**
Occupied Bandwidth	**15.231(c)**	**PASS**	**Complies**

3.2 Test Standards

FCC Part 15:2012 Subpart C, Paragraph 15.231

4.0 EUT Modification

No modification by Shenzhen TCT Testing Technology Co., Ltd

5.0 Measurement Uncertainty（95% confidence levels, k=2)

No.	Item	MU
1.	Radio Frequency	±1×10^{-9}
2.	Temperature	±0.1℃
3.	Humidity	±1.0%
4.	RF power, conducted	±0.34dB
5.	RF power density, conducted	±1.45dB
6.	Spurious emissions, conducted	±3.70dB
7.	All emissions, radiated	±4.50dB

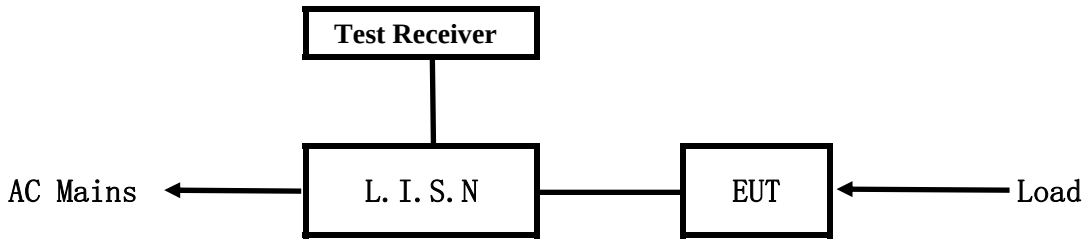
Note: 1) The EUT is a RF remote controller. The EUT is powered by battery, and a New Battery was used during all tests.

2) Working transmission frequency: 433.92MHz

3) N.A. means Not Applicable.

6.0 Power Line Conducted Emission Test

6.1 Schematics of the test



EUT: Equipment Under Test

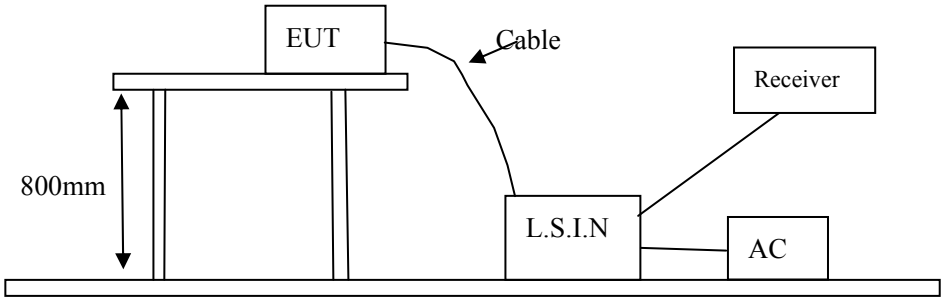
6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2009and ANSI C63.4-2003.

The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



6.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009 and ANSI C63.4-2003

1) Setup the EUT and simulators as shown on the following

2) Enable AF signal and confirm EUT active to normal condition

6.4 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
EMI Test Receiver	R&S	ESCS30	100139	July 7, 2013	July 6, 2014
LISN	AFJ	LS16C	16010222119	July 7, 2013	July 6, 2014

6.5 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1) *Decreasing linearly with logarithm of frequency.

2）The tighter limit shall apply at the transition frequencies

6.6 Test specification:

Environmental conditions: Temperature: 26° C Humidity: 55% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

--

6.7 Test result

N.A.

The requirements are FULFILLED

Remarks: The power supply of this equipment is a battery, so this test item is not applicable

A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

EUT Description:	N.A.
Operation Mode:	N.A.
Tested By:	N.A.
Test date:	N.A.

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

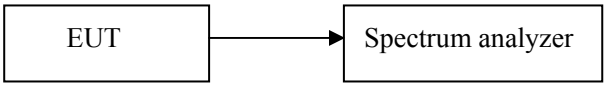
B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

EUT Description:	N.A.
Operation Mode:	N.A.
Tested By:	N.A.
Test date:	N.A.

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

7.0 Manually Activated Transmitter

7.1 Block diagram of Test setup



7.2 Limit

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released; A transmitter activated automatically shall cease transmission within 5 seconds after activation.

7.3 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 7, 2013	July 6, 2014

7.4 Test specification

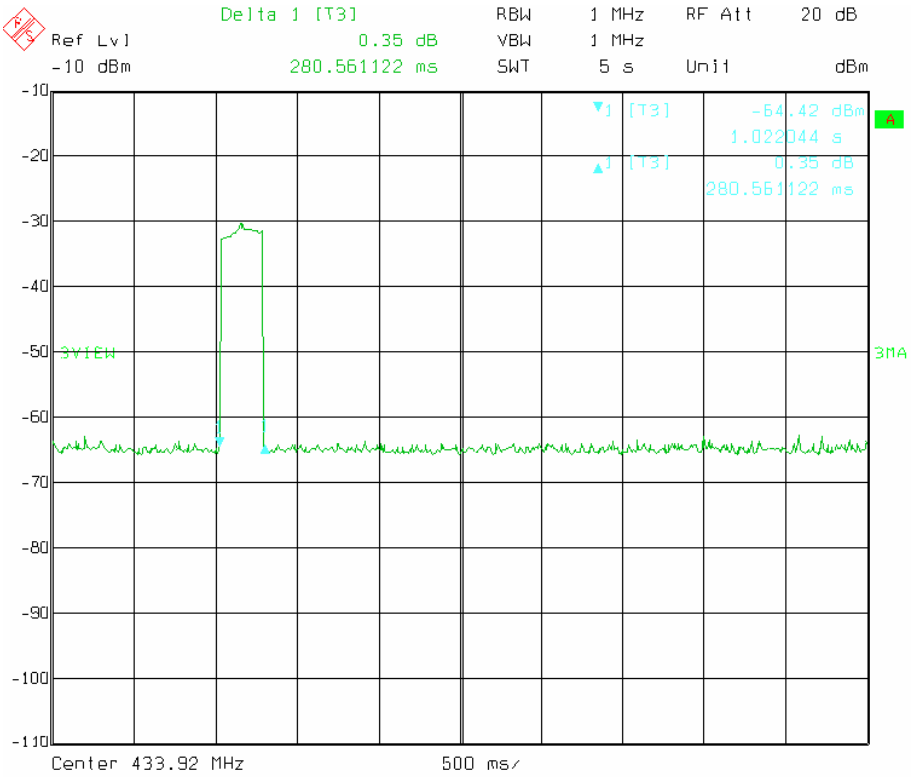
Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

7.5 Test result

Result: Pass

Test data

Working Mode	Working Frequency(MHz)	Activate Time(s)	Limit(s)
Transmitting	433.92	0.281	5



8.0 Radiated Emission Test

8.1 Test Method and test Procedure:

1) The EUT was tested according to ANSI C63.10 –2009 and ANSI C63.4-2003.

2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009 and ANSI C63.4-2003.

3) The frequency spectrum from 9kHz to 5GHz was investigated. All readings from 9kHz to 30MHz are quasi-peak values with a resolution bandwidth of 10 kHz, measured with loop antenna. All readings from 30MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz, measured with Bi-log antenna.All readings are above 1 GHz are peak values with a resolution bandwidth of 1 MHz, measured with horn antenna.

4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for above 30MHz each frequency. The antenna high is 1 m to find the maximum emission for each frequency below 30MHz

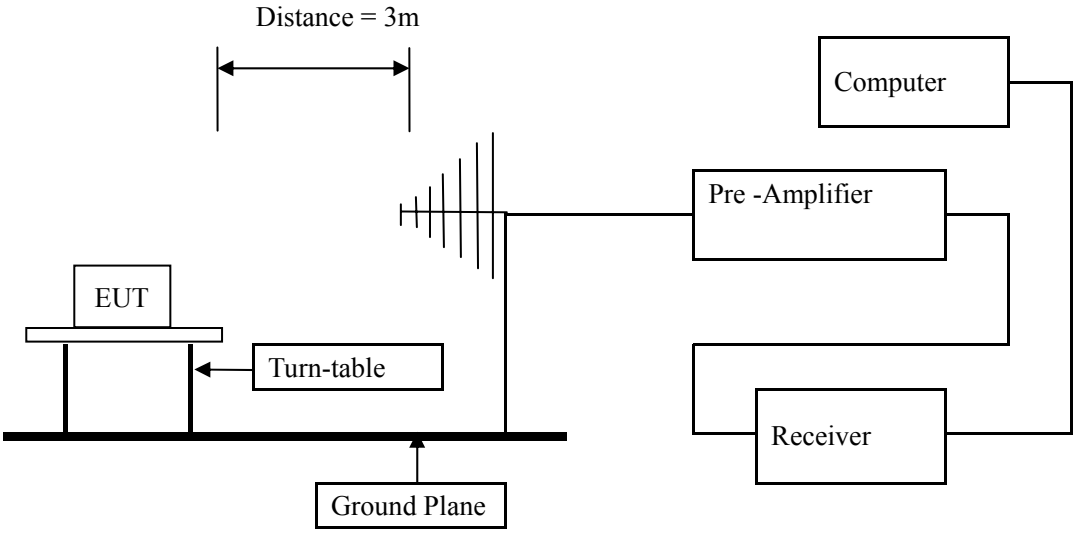
5) Tested distance: 3 meters

6) The antenna polarization: Vertical polarization and Horizontal polarization.

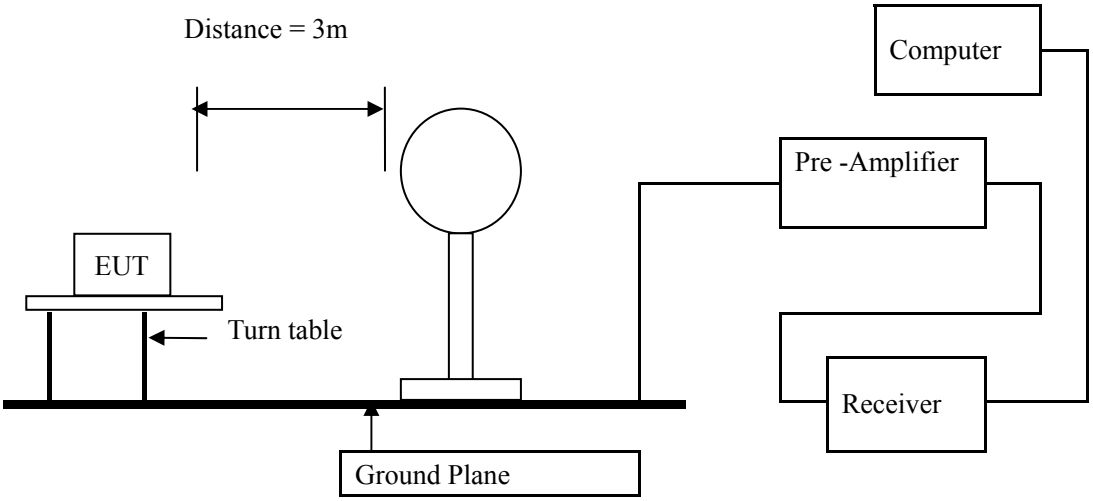
7) Each azimuth of E.U.T will be tested.

8.2 Block diagram of Test setup

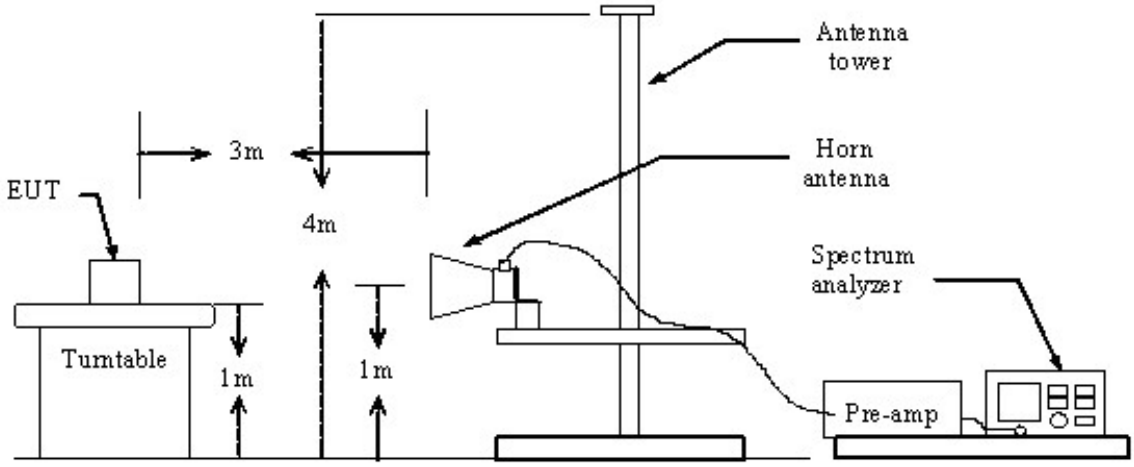
Block diagram of Test setup for frequency 30-1000MHz



Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



8.3 Limit

According to 15.231(b) requirements, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following

Fundamental Frequency (MHz)	Filed Strength of Fundamental (microvolts/meter)	Filed Strength of Spurious Emission (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750*	125 to 375*
174-260	3750	375
260-470	3750 to 12500*	375 to 1250*
Above 470	12500	1250
*Linear interpolations		
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, μV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]		

For this E.U.T

Working Frequency(MHz)	Filed Strength of Fundamental(dB μ V/m)	Filed Strength of Spurious Emission(dB μ V/m)
433.92	80.8	60.8
Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions.		

According to 15.35, on any frequency or frequencies below or equal to 1000 MHz, the limits Shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test.

According to 15.231(b) , The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.
Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1) RF Voltage (dBuV) = 20 log RF Voltage (uV)
2) In the Above Table, the tighter limit applies at the band edges.
3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
4)The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
5) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

8.4 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	July 7, 2013	July 6, 2014
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 7, 2013	July 6, 2014
Pre-amplifier	Teseq	LAN6900	--	July 8, 2013	July 7, 2014
Pre-amplifier	Agilent	8447D	83153007374	July 8, 2013	July 7, 2014
Pre-amplifier	Agilent	8449B	3008A01738	July 8, 2013	July 7, 2014
Triple-loop antenna	ROHDE&SCHWARZ	HM020	843885/002	July 8, 2013	July 7, 2014
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	July 8, 2013	July 7, 2014
Horn Antenna	ETS LINDGREN	3117	--	July 8, 2013	July 7, 2014

8.5 Test specification
Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

8.6 Test result

Result: Pass

A Fundamental Radiated Emission

Frequency (MHz)	Emission Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)	Remark
433.92	79.67	H	100.8	Peak
433.92	77.93	V	100.8	Peak

Frequency (MHz)	Peak Emission Level@3m (dBμV/m)	AV Factor (dB)	AV Emission Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)	Remark
433.92	79.67	-6.56	73.11	H	80.8	AV
433.92	77.93	-6.56	71.37	V	80.8	AV

B Harmonics and spurious Radiated Emission

Frequency (MHz)	Emission Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)	Remark
325.471	30.27	H	80.8	Peak
867.816	35.46	H	80.8	Peak
1302.610	34.52	H	74	Peak
325.471	28.45	V	80.8	Peak
867.816	33.61	V	80.8	Peak
1302.610	33.89	V	74	Peak

Frequency (MHz)	Peak Emission Level@3m (dBμV/m)	AV Factor (dB)	AV Emission Level@3m (dBμV/m)	Antenna Polarity	Limit@3m (dBμV/m)	Remark
325.471	30.27	-6.56	23.71	H	60.8	AV
867.816	35.46	-6.56	28.90	H	60.8	AV
1302.610	34.52	-6.56	27.96	H	54	AV
325.471	28.45	-6.56	21.89	V	60.8	AV
867.816	33.61	-6.56	27.05	V	60.8	AV
1302.610	33.89	-6.56	27.33	V	54	AV

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor

2) Test Frequency form 9kHz to 5GHz, the emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

3) AV=Average

4) AV Emission level = Peak Emissions level +AV Factor

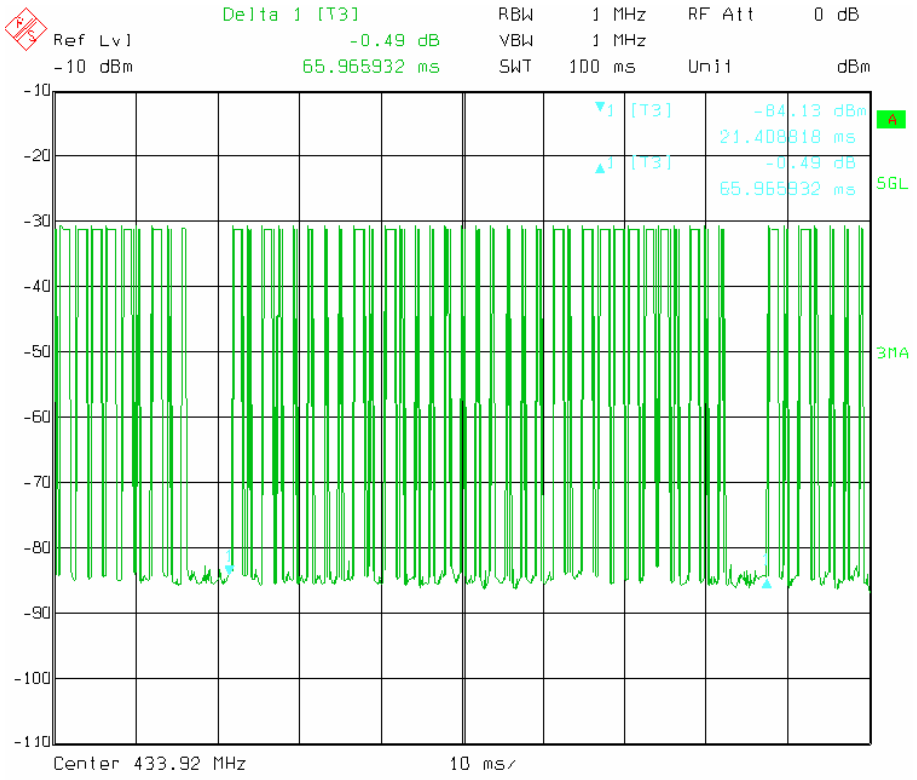
5) AV Factor = 20 log(Duty Cycle)

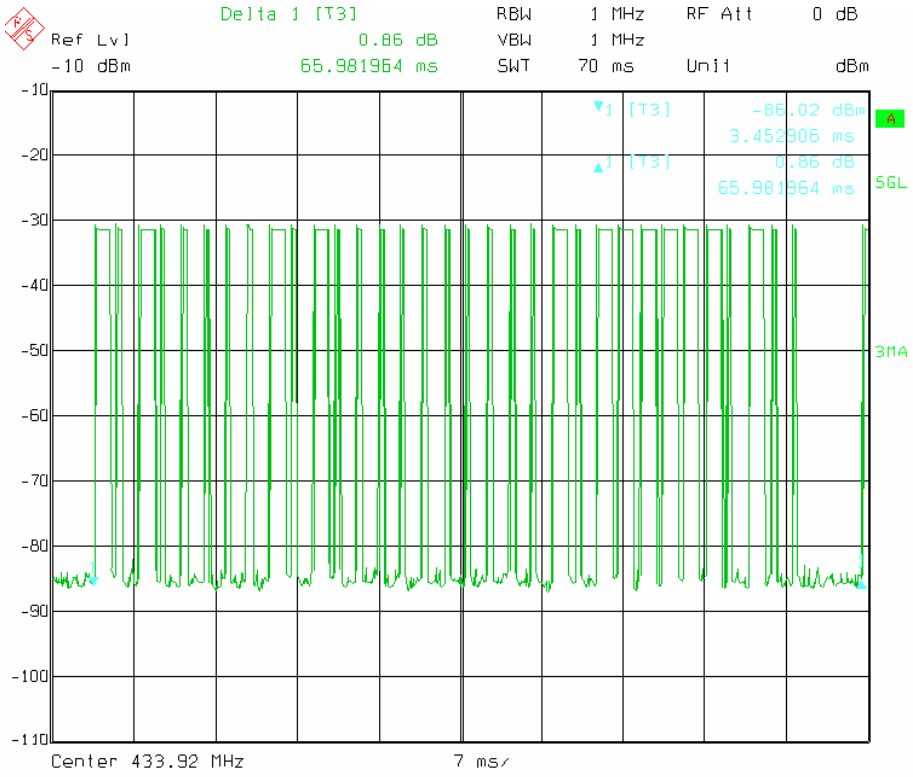
Duty cycle test data as follows

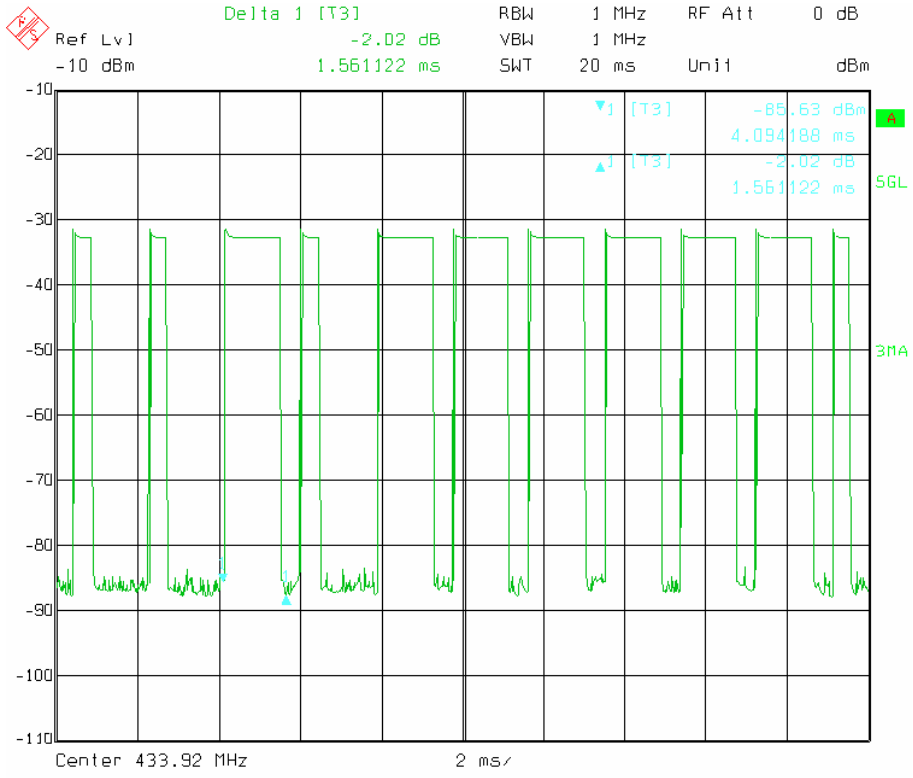
Total time one cycle	Effective time one cycle	Duty Cycle	AV Factor(dB)
65.98	31.32	0.47	-6.56

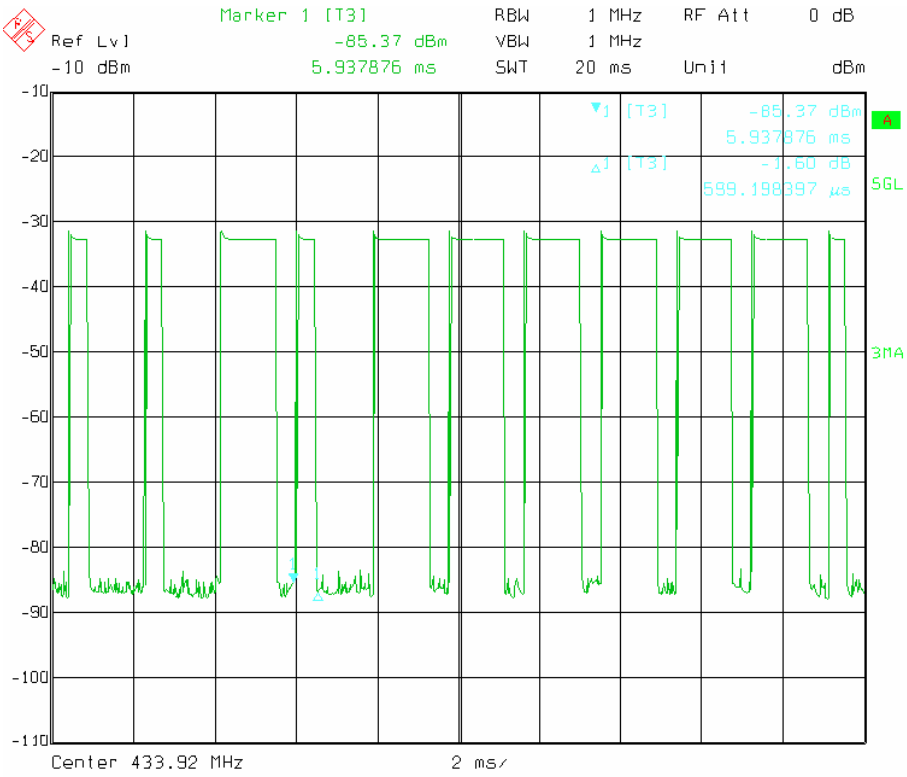
Note: Effective time one cycle=1.56*12+0.60*21=31.32

Duty Cycle= Effective time one cycle/ Total time one cycle=0.47



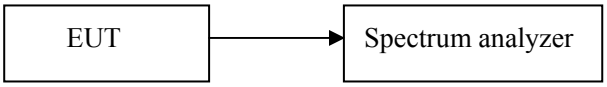

Delta 1 [T3]
0.86 dB
65.981964 ms
RBW 1 MHz
VBW 1 MHz
SWT 70 ms
RF Att 0 dB
Unit dBm
Ref Lvl
-10 dBm
1 [T3] -86.02 dBm
3.452906 ms
1 [T3] 0.86 dB
65.981964 ms
A
SGL
3MA
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 433.92 MHz
7 ms/


Delta 1 [T3]
-2.02 dB
1.561122 ms
RBW 1 MHz
VBW 1 MHz
SWT 20 ms
RF Att 0 dB
Unit dBm
Ref Lvl
-10 dBm
1 [T3] -85.63 dBm
4.094188 ms
1 [T3] -2.02 dB
1.561122 ms
A
SGL
3MA
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 433.92 MHz
2 ms/


Marker 1 [T3]
RBW 1 MHz
RF Att 0 dB
Ref Lvl
-85.37 dBm
VBW 1 MHz
-10 dBm
5.937876 ms
SWT 20 ms
Unit dBm
1 [T3] -85.37 dBm
5.937876 ms
Δ1 [T3] -1.60 dB
599.198397 µs
SGL
3MA
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 433.92 MHz
2 ms/

9.0 Occupied Bandwidth

9.1 Block diagram of Test setup



9.2 Test Specification

Environmental conditions: Temperature 22° C Humidity: 50% Atmospheric pressure: 103kPa

9.3 Test Equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	July 7, 2013	July 6, 2014

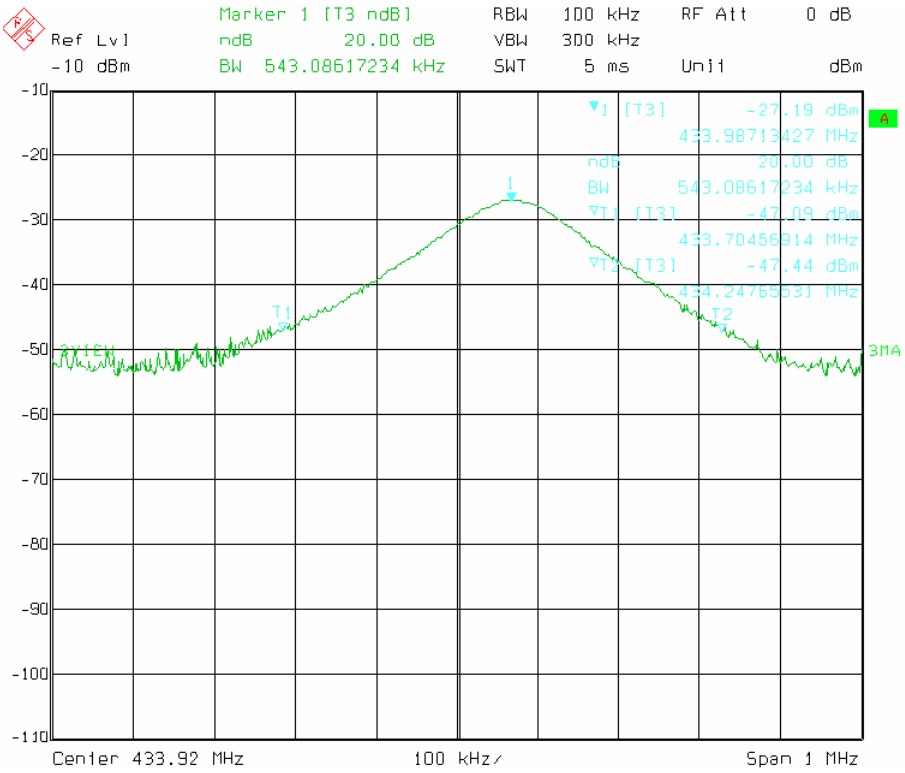
9.4 Limit

According to 15.231(c),The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

9.6 Test Result

Channel	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
(Low)	543.1	1084.8	PASS

Note: Limit = 433.92MHz *0.25% = 1084.8 kHz



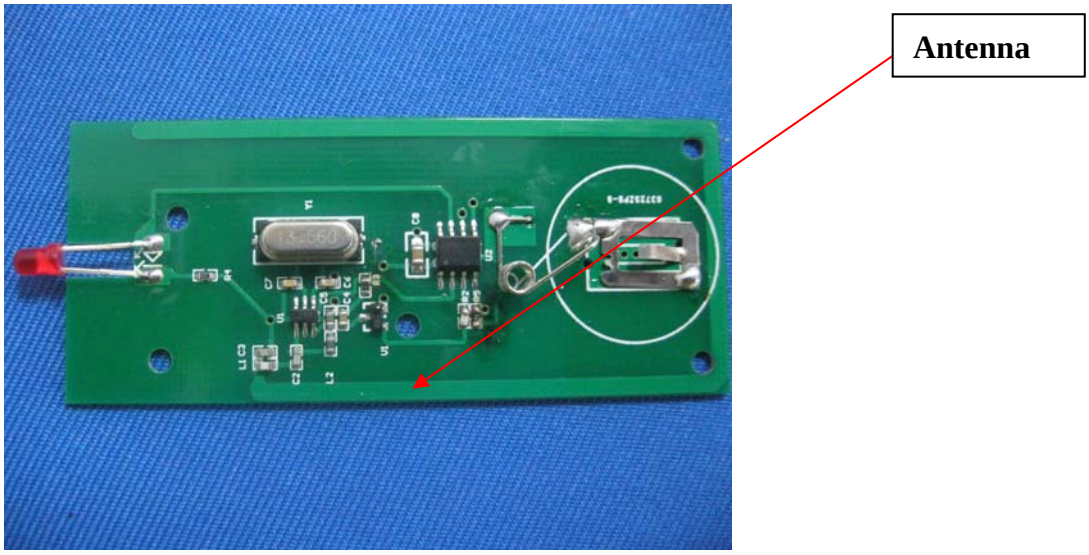
10.0 Antenna Requirement

10.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 Antenna Specification

According to the manufacturer declared, the EUT has a loop antenna; the directional gain of antenna is 0 dBi, and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



END OF REPORT