

FCC Test Report

Product Name	Radio remote control transmitter
Model No.	SOE
FCC ID	NBGSOE

Applicant	Hella KGaA Hueck & Co.
Address	Rixbecker Strasse 75, 59552 Lippstadt, Germany

Date of Receipt	Apr. 01, 2016
Issued Date	Apr. 15, 2016
Report No.	1640140R-RFUSP14V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report

Issued Date : Apr. 15, 2016

Report No. : 1640140R-RFUSP14V00



Product Name	Radio remote control transmitter
Applicant	Hella KGaA Hueck & Co.
Address	Rixbecker Strasse 75, 59552 Lippstadt, Germany
Manufacturer	1. Hella KGaA Hueck & Co. 2. Hella Shanghai Electronics Co. Ltd (HSE)
Model No.	SOE
FCC ID	NBGSOE
EUT Rated Voltage	DC 3V(Power by Battery)
EUT Test Voltage	DC 3V(Power by Battery)
Trade Name	HELLA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2014 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :

April Chen

(Adm. Specialist / April Chen)

Tested By :

Ivan Chuang

(Assistant Engineer / Bill Lin)

Approved By :

Vincent Lin

(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. General Information

1.1. EUT Description

Product Name	Radio remote control transmitter
Trade Name	HELLA
Model No.	SOE
FCC ID	NBGSOE
Frequency Range	434.42MHz
Number of Channels	1
Type of Modulation	ASK
Antenna Information	Loop Antenna on PCB

Frequency of Each Channel:

Channel	Frequency
Channel 1:	434.42MHz

Note:

1. The EUT is a Radio remote control transmitter with a built-in 434.42 MHz transmitter.
2. The antenna of EUT is conform to FCC 15.203
3. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231(e).
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
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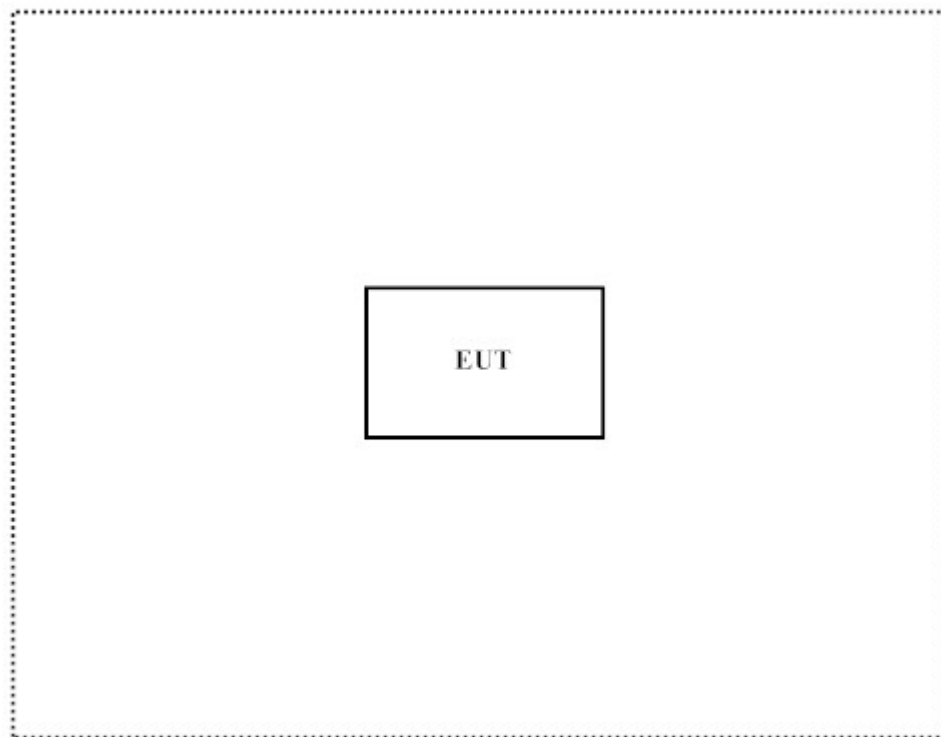
1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
N/A					

Signal Cable Type	Signal cable Description
N/A	

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in section 1.4.
2	Inserts the battery.
3	Start transmits continually.
4	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site: <http://www.quietek.com/chinese/about/certificates.aspx?bval=5>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site: <http://www.quietek.com/>

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

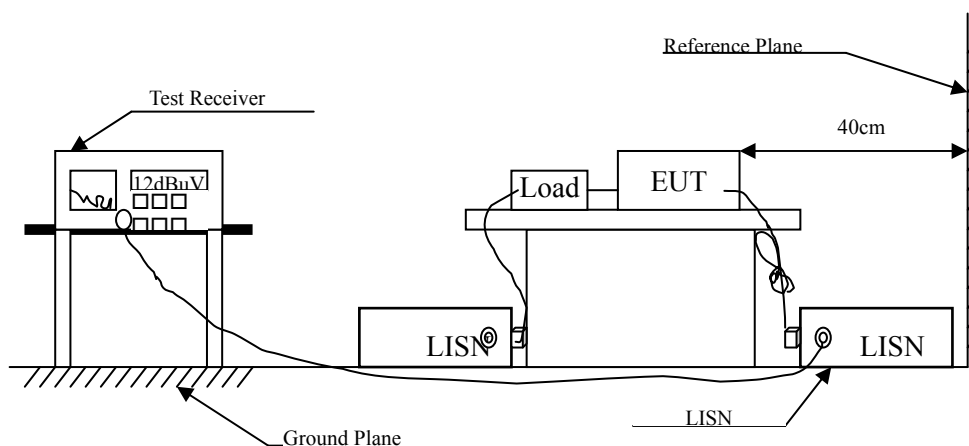
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2015	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2016	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2016	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2016	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2016	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBUV)		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(e)

2.6. Uncertainty

± 2.26 dB

2.7. Test Result

Owing to the DC operation of EUT, this test item is not performed.

3. Radiated Emission

3.1. Test Equipment

The following test equipments are used during the radiated emission test:

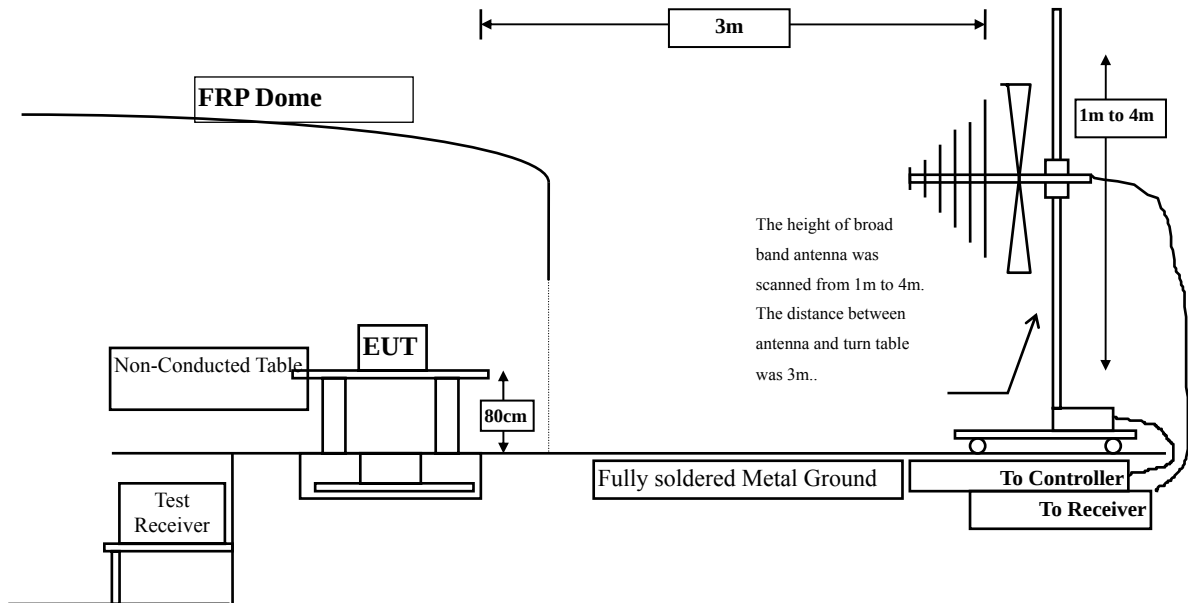
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2015
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2015
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2015
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2015
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2015

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct., 2015
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar., 2016
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2016
	X	Horn Antenna	TRC	AH-0801/95051	Aug., 2015
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2016
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul., 2015
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2015

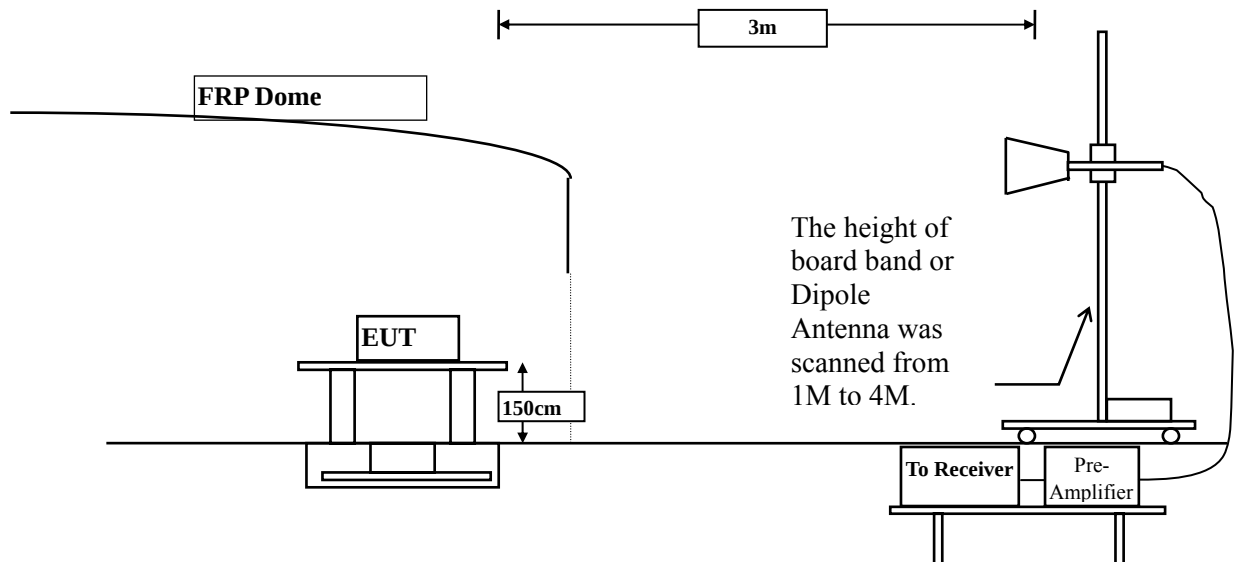
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.231(e) Limits		
Fundamental Frequency MHz	Field Strength of Fundamental	Field Strength of Spurious Emission
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1500	50 to 150
174-260	1500	150
260-470	1500 to 5000	150 to 500
above 470	5000	500

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

➤ Spurious electric field strength limits

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	See Remark ¹	300
0.490-1.705	24000/F(kHz)	See Remark ¹	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

- Remarks :
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 closed point of any part of the device or system.

3.4. Test Procedure

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10, 2013 on radiated measurement.

On the field strength of fundamental and harmonics, the limits shown are based on measuring equipment employing a average detector function. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

On the field strength of spurious electric, on any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function.

When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(e).

3.6. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

3.7. Test Result

Product	Radio remote control transmitter		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/13	Test Site	No.3 OATS

Fundamental Power (X-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

434.420	-11.679	100.000	88.321	-12.519	100.840
---------	---------	---------	--------	---------	---------

Vertical

434.420	-12.609	90.600	77.991	-22.849	100.840
---------	---------	--------	--------	---------	---------

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

434.420	-11.679	92.000	80.321	-0.519	80.840
---------	---------	--------	--------	--------	--------

Vertical

434.420	-12.609	80.700	68.091	-12.749	80.840
---------	---------	--------	--------	---------	--------

Note:

1. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
3. Limit = $20\log(4398\mu V) = 72.86\text{dB}\mu V$.

Product	Radio remote control transmitter		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/13	Test Site	No.3 OATS

Fundamental Power (Y-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

434.420	-11.679	101.600	89.921	-10.919	100.840
---------	---------	---------	--------	---------	---------

Vertical

434.420	-12.609	101.000	88.391	-12.449	100.840
---------	---------	---------	--------	---------	---------

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dB μ V	dB μ V/m	dB	dB μ V/m

Horizontal

434.420	-11.679	90.600	78.921	-1.919	80.840
---------	---------	--------	--------	--------	--------

Vertical

434.420	-12.609	91.200	78.591	-2.249	80.840
---------	---------	--------	--------	--------	--------

Note:

1. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
3. Limit = $20\log(4398\mu\text{V}) = 72.86\text{dB}\mu\text{V}$.

Product	Radio remote control transmitter		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/13	Test Site	No.3 OATS

Fundamental Power (Z-Line)

Peak Detector:

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m
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Horizontal

434.420	-11.679	88.700	77.021	-23.819	100.840
---------	---------	--------	--------	---------	---------

Vertical

434.420	-12.609	100.300	87.691	-13.149	100.840
---------	---------	---------	--------	---------	---------

Average Detector:

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m
------------------	-------------------------	--------------------------------	--------------------------------------	--------------	-----------------------

Horizontal

434.420	-11.679	81.300	69.621	-11.219	80.840
---------	---------	--------	--------	---------	--------

Vertical

434.420	-12.609	92.500	79.891	-0.949	80.840
---------	---------	--------	--------	--------	--------

Note:

1. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
3. Limit = $20\log(4398\mu\text{V}) = 72.86\text{dB}\mu\text{V}$.

Product	Radio remote control transmitter		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/13	Test Site	No.3 OATS

Frequency	Correct	Reading	Measurement	Margin	Peak	Average
MHz	Factor	Level	Level		Limit	Limit
	dB	dB μ V	dB μ V/m	dB	dB μ V/m	dB μ V/m

Harmonic Radiated Emission

Horizontal

Peak

1303.260	-4.803	61.780	56.977	-17.023	74.000	54.000
1737.680	-3.992	50.310	46.318	-27.682	74.000	54.000
2172.100	-2.345	40.210	37.866	-36.134	74.000	54.000
2606.520	-1.047	39.040	37.993	-36.007	74.000	54.000
3040.940	-1.422	55.290	53.869	-20.131	74.000	54.000
3475.360	-0.941	52.200	51.259	-22.741	74.000	54.000
3909.780	0.461	53.730	54.190	-19.810	74.000	54.000
4344.200	1.656	52.050	53.706	-20.294	74.000	54.000

Average Detector

1303.260	-4.803	39.630	34.827	-19.173	74.000	54.000
3909.780	0.461	35.180	35.640	-18.360	74.000	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio remote control transmitter		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/13	Test Site	No.3 OATS

Frequency	Correct	Reading	Measurement	Margin	Peak	Average
MHz	Factor	Level	Level		Limit	Limit
	dB	dB μ V	dB μ V/m	dB	dB μ V/m	dB μ V/m

Harmonic Radiated Emission

Vertical

Peak

1303.260	-4.148	57.230	53.082	-20.918	74.000	54.000
1737.680	-2.079	54.160	52.081	-21.919	74.000	54.000
2172.100	-2.075	40.370	38.295	-35.705	74.000	54.000
2606.520	-1.302	36.410	35.108	-38.892	74.000	54.000
3040.940	-1.317	48.840	47.523	-26.477	74.000	54.000
3475.360	-0.321	43.340	43.018	-30.982	74.000	54.000
3909.780	1.574	51.580	53.154	-20.846	74.000	54.000
4344.200	3.473	48.350	51.823	-22.177	74.000	54.000

Average Detector

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Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio remote control transmitter		
Test Item	General Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/13	Test Site	No.3 OATS

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Quasi-Peak					
37.760	24.696	1.574	26.270	-13.730	40.000
159.980	7.892	14.015	21.907	-21.593	43.500
365.620	19.156	-1.253	17.903	-28.097	46.000
610.060	26.501	-2.164	24.337	-21.663	46.000
745.860	25.489	-2.100	23.389	-22.611	46.000
870.020	26.282	1.598	27.880	-18.120	46.000
Vertical					
Quasi-Peak					
30.000	20.440	-1.653	18.787	-21.213	40.000
134.760	14.929	9.628	24.557	-18.943	43.500
249.220	19.976	7.077	27.053	-18.947	46.000
610.060	23.301	-2.256	21.045	-24.955	46.000
800.180	24.712	-2.219	22.493	-23.507	46.000
870.020	26.542	-0.192	26.350	-19.650	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

4. Transmit time

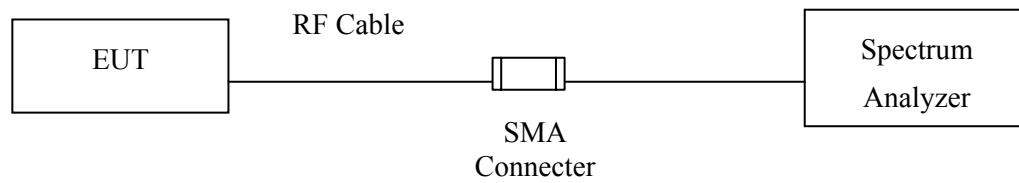
4.1. Test Equipment

The following test equipment are used during the test:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2016

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

4.2. Test Setup



4.3. Limits

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(e).

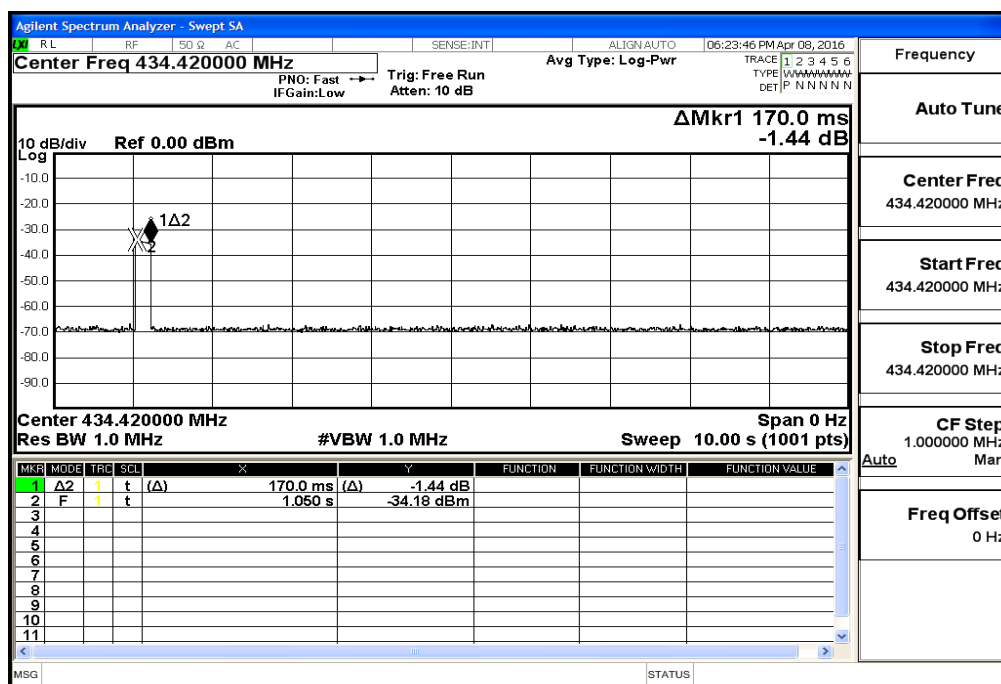
4.5. Uncertainty

± 25ms

4.6. Test Result

Product	Radio remote control transmitter		
Test Item	Transmit time		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/08	Test Site	No.3 OATS

Channel No.	Frequency (MHz)	Measurement Value (Sec)	Limit (Sec)	Result
1	434.42	0.170	< 5	Pass



5. Occupied Bandwidth

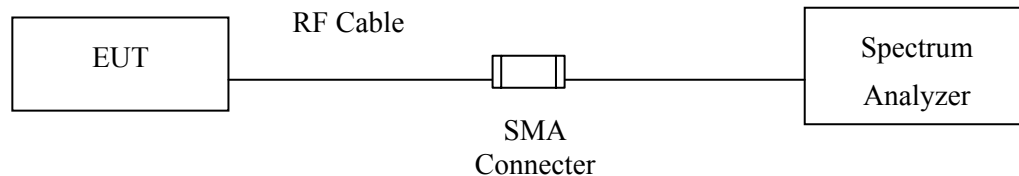
5.1. Test Equipment

The following test equipment are used during the test:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2016

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

5.2. Test Setup



5.3. Limits

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

5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(e)

5.5. Uncertainty

± 150Hz

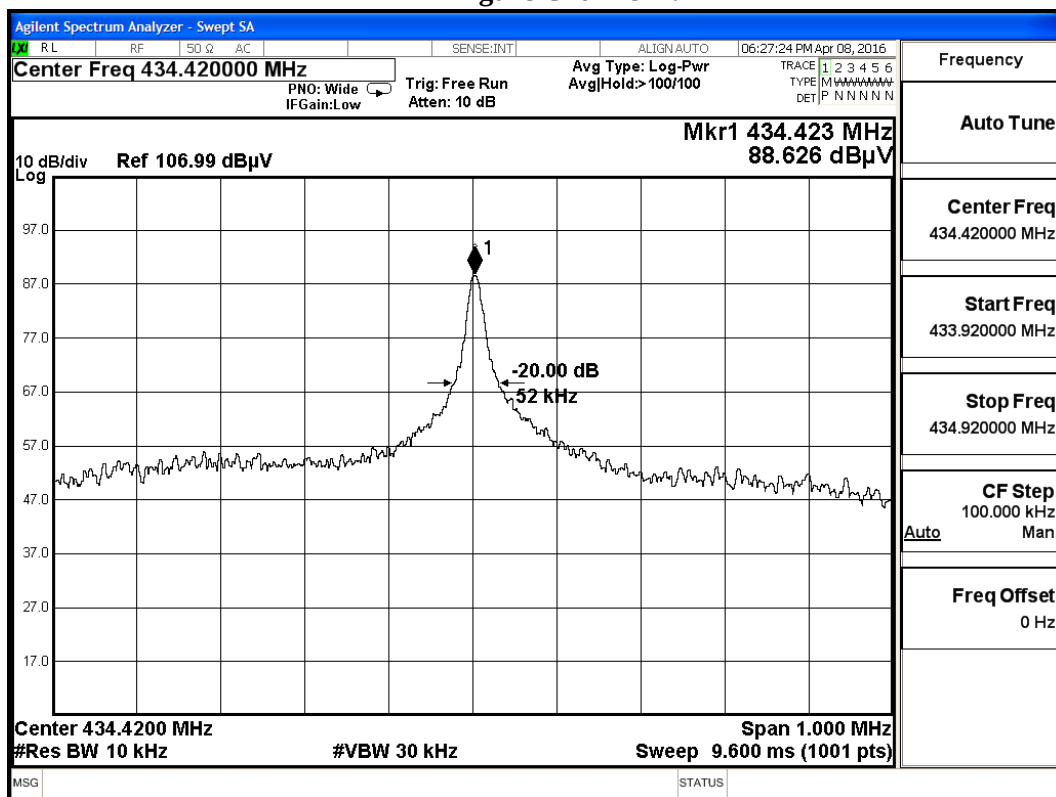
5.6. Test Result

Product	Radio remote control transmitter		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2016/04/08	Test Site	No.3 OATS

Channel No.	Frequency (MHz)	Measurement Value (MHz)	Limit (MHz)	Result
1	434.42	0.052	1.08605	Pass

Note: Limit = 434.42MHz * 0.25% = 1.08605MHz

Figure Channel 1:



Attachment 1 : EUT Test Photographs

Attachment 2 : EUT Detailed Photographs