

FCC Test Report

Product Name : REMOTE CONTROLLER
Model No. : 28595 SU102
FCC ID. : 2ABPM28595-SU102

Applicant : Whetron electronic Co., Ltd.
Address : No.16, Singye Rd., Ta Fa Ind., Daliao Dist.,
Kaohsiung City 831, Taiwan (R.O.C.)

Date of Receipt : 2014/01/06
Issued Date : 2014/01/17
Report No. : 1410156R-RFUSP14V00
Report Version : V1.0



The test results relate only to the samples tested.

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Test Report Certification

Issued Date : 2014/01/17

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 Applicant : Whetron electronic Co., Ltd.
 Address : No.16, Singye Rd., Ta Fa Ind., Daliao Dist., Kaohsiung City
 831, Taiwan (R.O.C.)
 Manufacturer : Whetron electronic Co., Ltd.
 Model No. : 28595 SU102
 FCC ID. : 2ABPM28595-SU102
 EUT Voltage : DC 3V
 Trade Name : LUXGEN
 Applicable Standard : FCC 15 Subpart C Section 15.231(b): 2012
 Test Result : Complied


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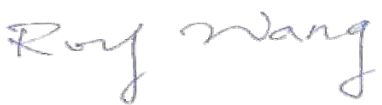
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : 

 (Carol Tsai / Engineering Adm. Specialist)

Reviewed By : 

 (Quale Tang / Senior Engineer)

Approved By : 

 (Roy Wang / Director)

Laboratory Information

We, **Quietek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	:	TAF, Accreditation Number: 1313
USA	:	FCC, Registration Number: 365520
Canada	:	IC, Submission No: 150981

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/tw/ctg/cts/accreditations.htm>

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

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.

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TABLE OF CONTENTS

Description	Page
1. General Information.....	5
1.1. EUT Description	5
1.2. Operation Description.....	6
1.3. Test Mode	7
1.4. Tested System Details	8
1.5. Configuration of tested System	8
1.6. EUT Exercise Software	8
1.7. Test Facility.....	9
2. Radiated Emission.....	10
2.1. Test Equipment.....	10
2.2. Test Setup	11
2.3. Limits	12
2.4. Test Procedure	13
2.5. Test Specification.....	13
2.6. Uncertainty	13
2.7. Test Result.....	14
2.8. Test Photo	19
3. Occupied Bandwidth.....	21
3.1. Test Equipment.....	21
3.2. Test Setup	21
3.3. Limits	21
3.4. Test Specification.....	21
3.5. Uncertainty	21
3.6. Test Result.....	22
4. Duty cycle	23
4.1. Test Equipment.....	23
4.2. Test Setup	23
4.3. Limits	23
4.4. Test Specification.....	23
4.5. Uncertainty	23
4.6. Test Result.....	24
5. Transmitter time	26
5.1. Test Equipment.....	26
5.2. Test Setup	26
5.3. Limits	26
5.4. Test Specification.....	26
5.5. Uncertainty	26
5.6. Test Result.....	27
Attachment.....	28
EUT Photograph.....	28

1. General Information

1.1. EUT Description

Product Name	REMOTE CONTROLLER
Trade Name	LUXGEN
Model No.	28595 SU102
Frequency Range/Channel Number	315 MHz / 1 Channel
Antenna Gain	0dBi
Type of Modulation	ASK
Antenna Type	Soldered on PCB

Working Frequency of Each Channel	
Channel	Frequency
01	315MHz

Note:

1. This device is a REMOTE CONTROLLER included a 315MHz transmitter function.
2. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.3. Test Mode

QuieTek verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

Pre-Test Mode	
TX	Mode 1: Transmit
Final Test Mode	
TX	Mode 1: Transmit

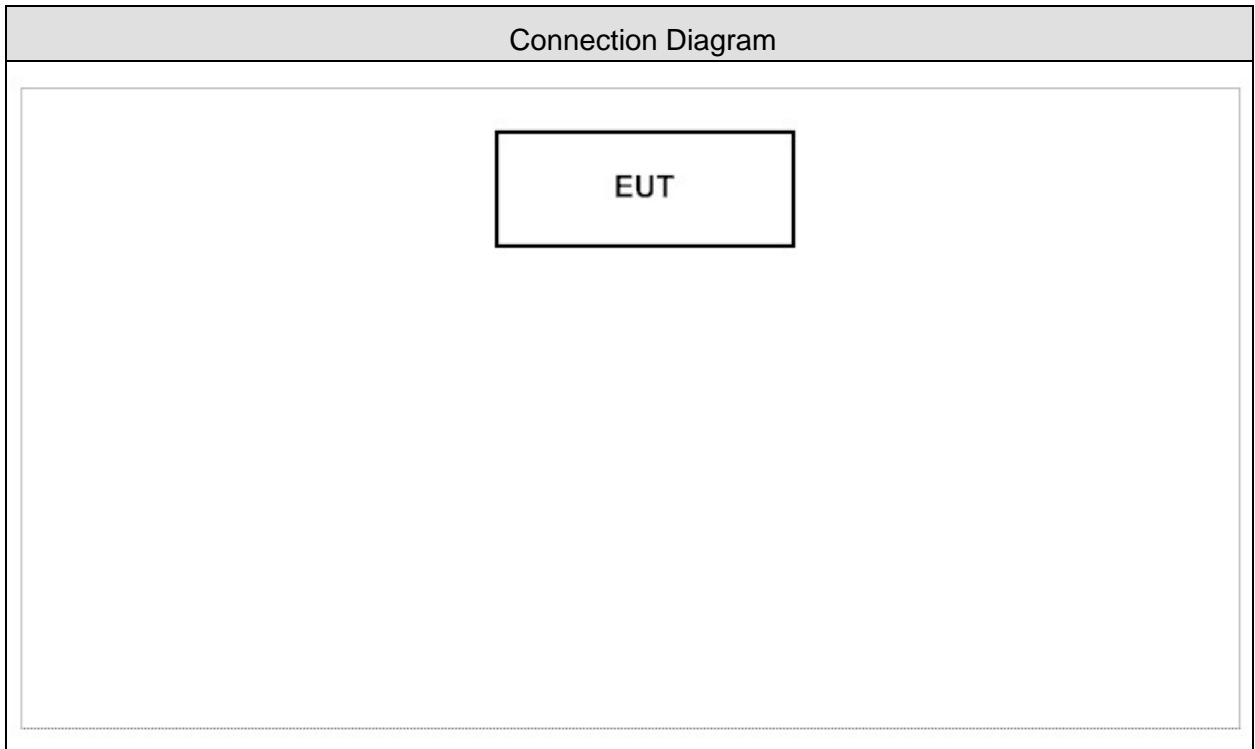
Emission	
Performed Item	
Conducted Emission	No
Radiated Emission	Yes
Occupied Bandwidth	Yes
Duty cycle	Yes
Transmitter time	Yes

1.4. Tested System Details

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

N/A

1.5. Configuration of tested System



1.6. EUT Exercise Software

1	Setup the EUT as shown in section 1.5.
2	Turn on the EUT power.
3	The RF signal's status will continue transmit through EUT.
4	Repeat the above procedure.

1.7. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 15 C 15.231 Radiated Emission	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Occupied Bandwidth	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Duty Cycle	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Transmitter Time	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000

2. Radiated Emission

2.1. Test Equipment

The following test equipments are used during the test:

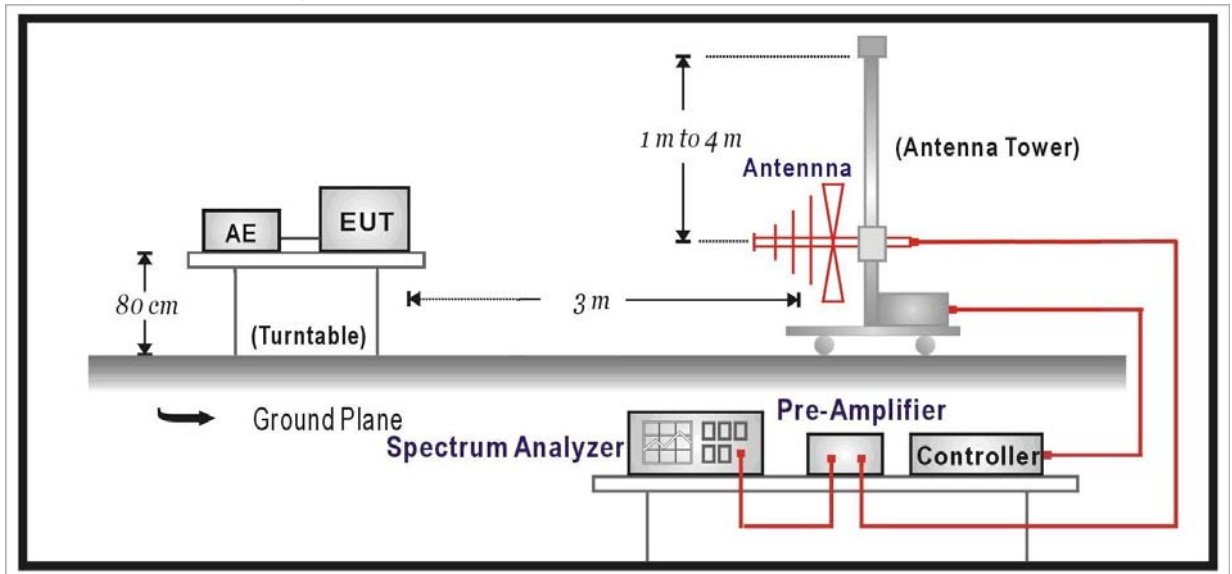
Radiated Emission / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	SCHAFFNER	CBL6112B	2895(CB1)	2014/08/14
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120	D743	2014/02/17
Pre-Amplifier	MITEQ	AMF-4D	888003	2014/06/09
Pre-Amplifier	QuieTek	AP-025C	CHM-0706049	2014/02/19
Spectrum Analyzer	Agilent	E4440A	MY46187335	2014/01/27
k Type Cable	Huber Suhner	Sucoflex 102	25623/2	2014/02/21

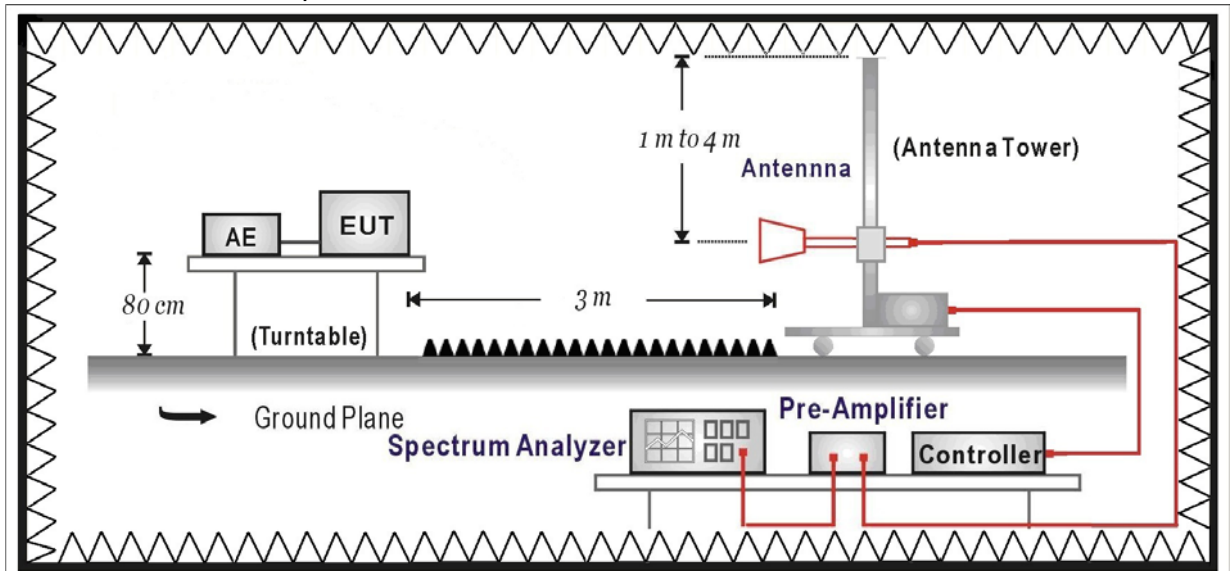
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



2.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.231(b) Limits				
Fundamental Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66-40.70	2250	67.04	225	47.04
70-130	1250	61.94	125	41.94
130-174	1250-3750	61.94-71.48	125-375	41.94-51.48
174-260	3750	71.48	375	51.48
260-470	3750-12500	71.48-81.94	375-1250	51.48-61.94
above 470	12500	81.94	1250	61.94

- 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.

2.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarizations 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 C63.4: 2009 on radiated measurement.

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

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The frequency range from 30MHz to 10th harmonics is checked.

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2012

2.6. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

2.7. Test Result

Product	REMOTE CONTROLLER		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2014/01/14	Test Site	CB1

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Peak Measurement Level (dBuV/m)	Average Measurement Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)
Horizontal						
315.000 (X-axis)	13.112	58.425	71.537	63.178	95.623	75.623
315.000 (Y-axis)	13.112	51.121	64.233	55.874	95.623	75.623
315.000 (Z-axis)	13.112	54.055	67.167	58.808	95.623	75.623
Vertical						
315.000 (X-axis)	13.112	41.521	54.633	46.274	95.623	75.623
315.000 (Y-axis)	13.112	58.236	71.348	62.989	95.623	75.623
315.000 (Z-axis)	13.112	55.627	68.739	60.380	95.623	75.623

Note1:

Peak Measurement Level = Reading Level + Correct Factor

Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)

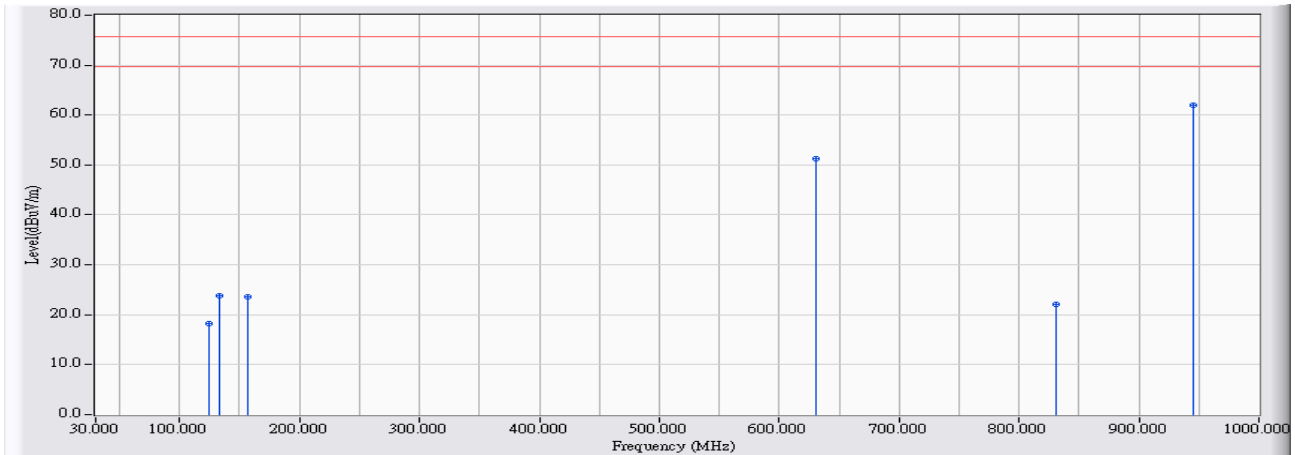
Duty Cycle(Only Ton)= Ton/ Ton+off=(0.471 μ s/0.987 μ s)=0.477

Duty Cycle=(Ton/(Ton+Toff))* Duty Cycle(Only Ton) =(80.1ms/100ms)*0.477=0.382

20*Log(Duty Cycle) = -8.359

30MHz-1GHz Spurious :

Site : CB1	Time : 2014/01/14 - 18:51
Limit : FCC_SpartC_15.231(B)_H_315MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-2_1011 - HORIZONTAL	Power : DC 3V
EUT : REMOTE CONTROLLER	Note : X Axis

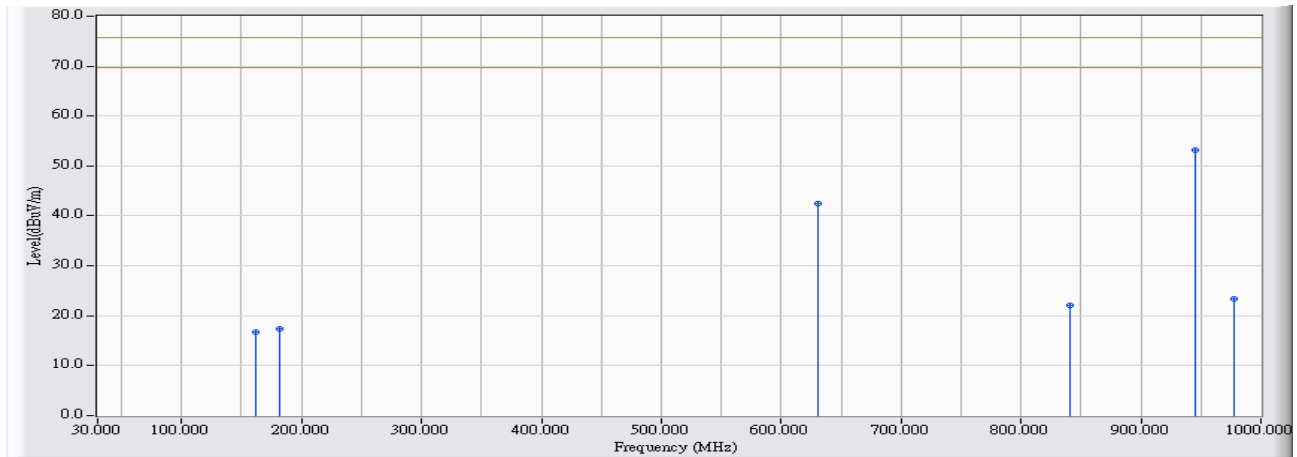


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	124.090	-22.322	40.560	18.237	-57.386	75.623	PEAK
2	132.820	-22.622	46.378	23.756	-51.867	75.623	PEAK
3	157.070	-23.718	47.255	23.537	-52.086	75.623	PEAK
4	630.430	-15.362	66.559	51.197	-24.426	75.623	PEAK
5	830.250	-13.508	35.627	22.119	-53.504	75.623	PEAK
6	* 945.680	-13.001	75.087	62.087	-13.536	75.623	PEAK

Note:

- All reading above 1GHz are performed with peak and/or average measurements as necessary.
- Peak measurement :RBW=1MHz,VBW=3MHz,Sweep:Auto.
- " * ", means this data is the worst emission level.
- Measurement Level = Reading Level + Correct Factor.
- Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 Duty Cycle(Only Ton)= Ton/ Ton+off=(0.471 μs/0.987 μs)=0.477
 Duty Cycle=(Ton/(Ton+Toff))* Duty Cycle(Only Ton) =(80.1ms/100ms)*0.477=0.382
 20*Log(Duty Cycle) = -8.359
- The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB1	Time : 2014/01/14 - 18:55
Limit : FCC_SpartC_15.231(B)_H_315MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-2_1011 - VERTICAL	Power : DC 3V
EUT : REMOTE CONTROLLER	Note : X Axis



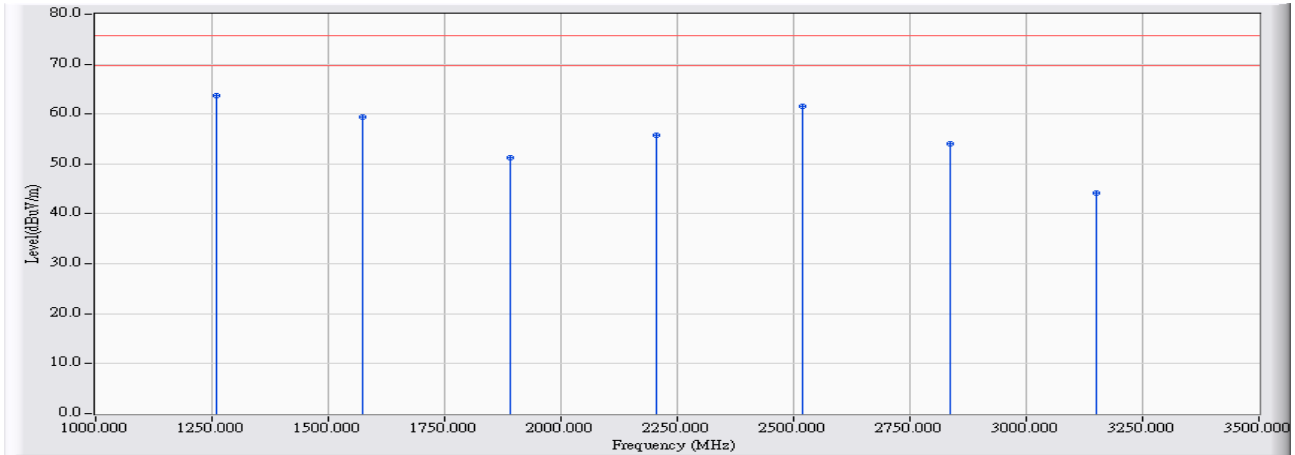
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	161.920	-23.947	40.761	16.813	-58.810	75.623	PEAK
2	181.320	-24.746	42.091	17.345	-58.278	75.623	PEAK
3	630.430	-15.362	57.911	42.549	-33.074	75.623	PEAK
4	840.920	-13.480	35.604	22.124	-53.499	75.623	PEAK
5	* 945.680	-13.001	66.261	53.261	-22.362	75.623	PEAK
6	977.690	-12.772	36.043	23.272	-52.351	75.623	PEAK

Note:

- All reading above 1GHz are performed with peak and/or average measurements as necessary.
- Peak measurement :RBW=1MHz,VBW=3MHz,Sweep:Auto.
- " * ", means this data is the worst emission level.
- Measurement Level = Reading Level + Correct Factor.
- Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 Duty Cycle(Only Ton)= Ton/ Ton+off=(0.471 μs/0.987 μs)=0.477
 Duty Cycle=(Ton/(Ton+Toff))* Duty Cycle(Only Ton) =(80.1ms/100ms)*0.477=0.382
 20*Log(Duty Cycle) = -8.359
- The average measurement was not performed when the peak measured data under the limit of peak detection.

Above 1GHz Spurious:

Site : CB1	Time : 2014/01/14 - 19:46
Limit : FCC_SpartC_15.231(B)_H_315MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - HORIZONTAL	Power : DC 3V
EUT : REMOTE CONTROLLER	Note : X Axis

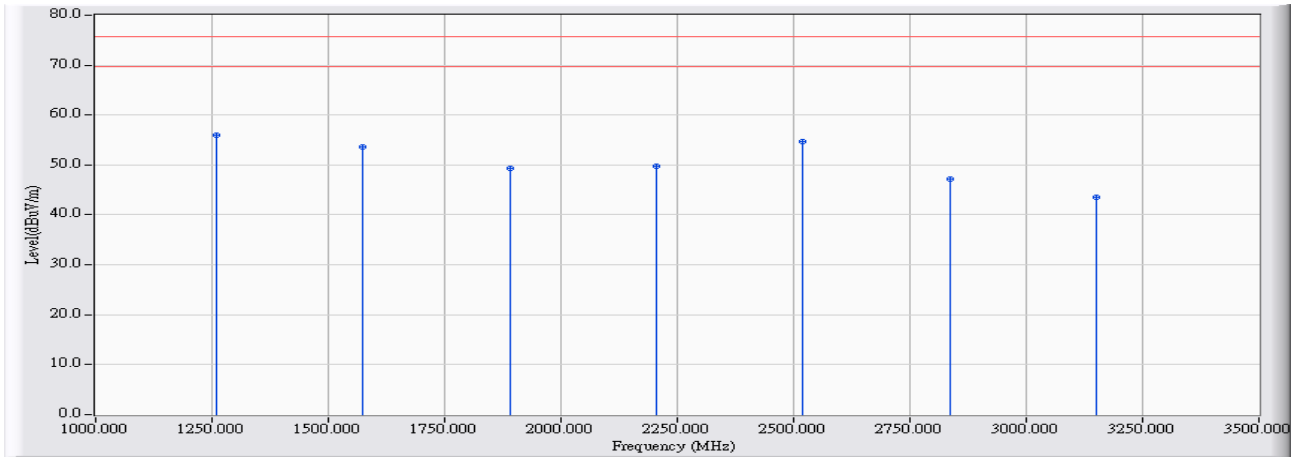


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	1260.000	-10.530	74.133	63.603	-12.020	75.623	PEAK
2		1575.000	-9.505	68.856	59.351	-16.272	75.623	PEAK
3		1890.000	-9.009	60.247	51.238	-24.385	75.623	PEAK
4		2205.000	-8.251	63.942	55.691	-19.932	75.623	PEAK
5		2520.000	-7.328	68.794	61.466	-14.157	75.623	PEAK
6		2835.000	-6.052	60.159	54.107	-21.516	75.623	PEAK
7		3150.000	-5.167	49.266	44.099	-31.524	75.623	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. “ * ”, means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 Duty Cycle(Only Ton)= Ton/ Ton+off=(0.471 μ s/0.987 μ s)=0.477
 Duty Cycle=(Ton/(Ton+Toff))* Duty Cycle(Only Ton) =(80.1ms/100ms)*0.477=0.382
 20*Log(Duty Cycle) = -8.359
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB1	Time : 2014/01/14 - 19:50
Limit : FCC_SpartC_15.231(B)_H_315MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - VERTICAL	Power : DC 3V
EUT : REMOTE CONTROLLER	Note : X Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	1260.000	-10.530	66.577	56.047	-19.576	75.623	PEAK
2		1575.000	-9.505	63.090	53.585	-22.038	75.623	PEAK
3		1890.000	-9.009	58.424	49.415	-26.208	75.623	PEAK
4		2205.000	-8.251	57.912	49.661	-25.962	75.623	PEAK
5		2520.000	-7.328	61.983	54.655	-20.968	75.623	PEAK
6		2835.000	-6.052	53.257	47.205	-28.418	75.623	PEAK
7		3150.000	-5.167	48.607	43.440	-32.183	75.623	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. “ * ”, means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 Duty Cycle(Only Ton)= Ton/ Ton+off=(0.471 μ s/0.987 μ s)=0.477
 Duty Cycle=(Ton/(Ton+Toff))* Duty Cycle(Only Ton) =(80.1ms/100ms)*0.477=0.382
 20*Log(Duty Cycle) = -8.359
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

3. Occupied Bandwidth

3.1. Test Equipment

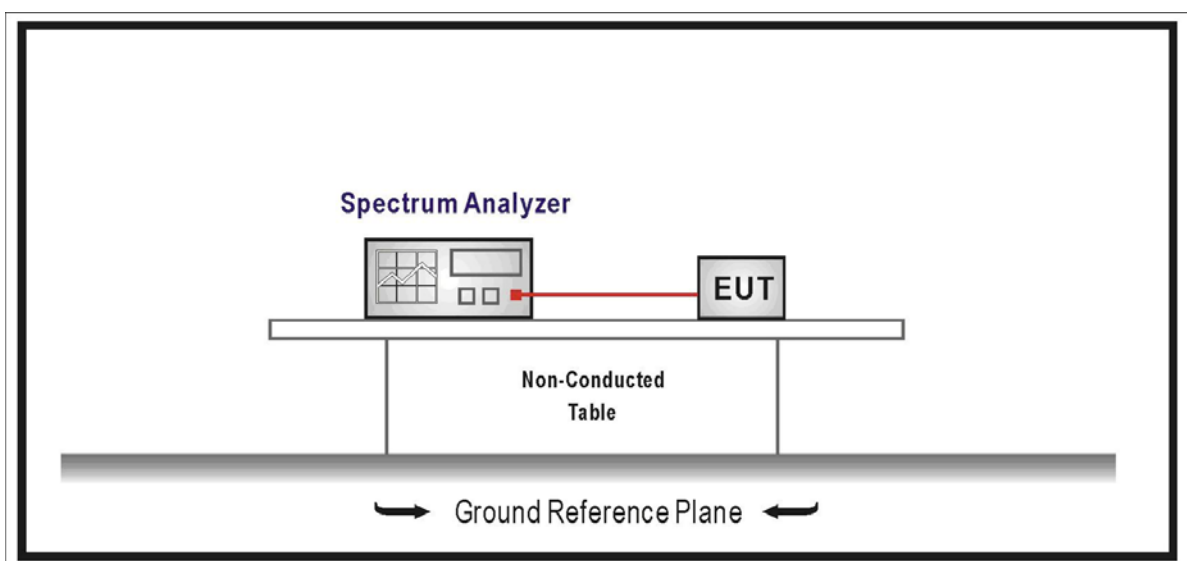
The following test equipments are used during the radiated emission tests:

Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2014/08/05

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center 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 center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

3.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2012

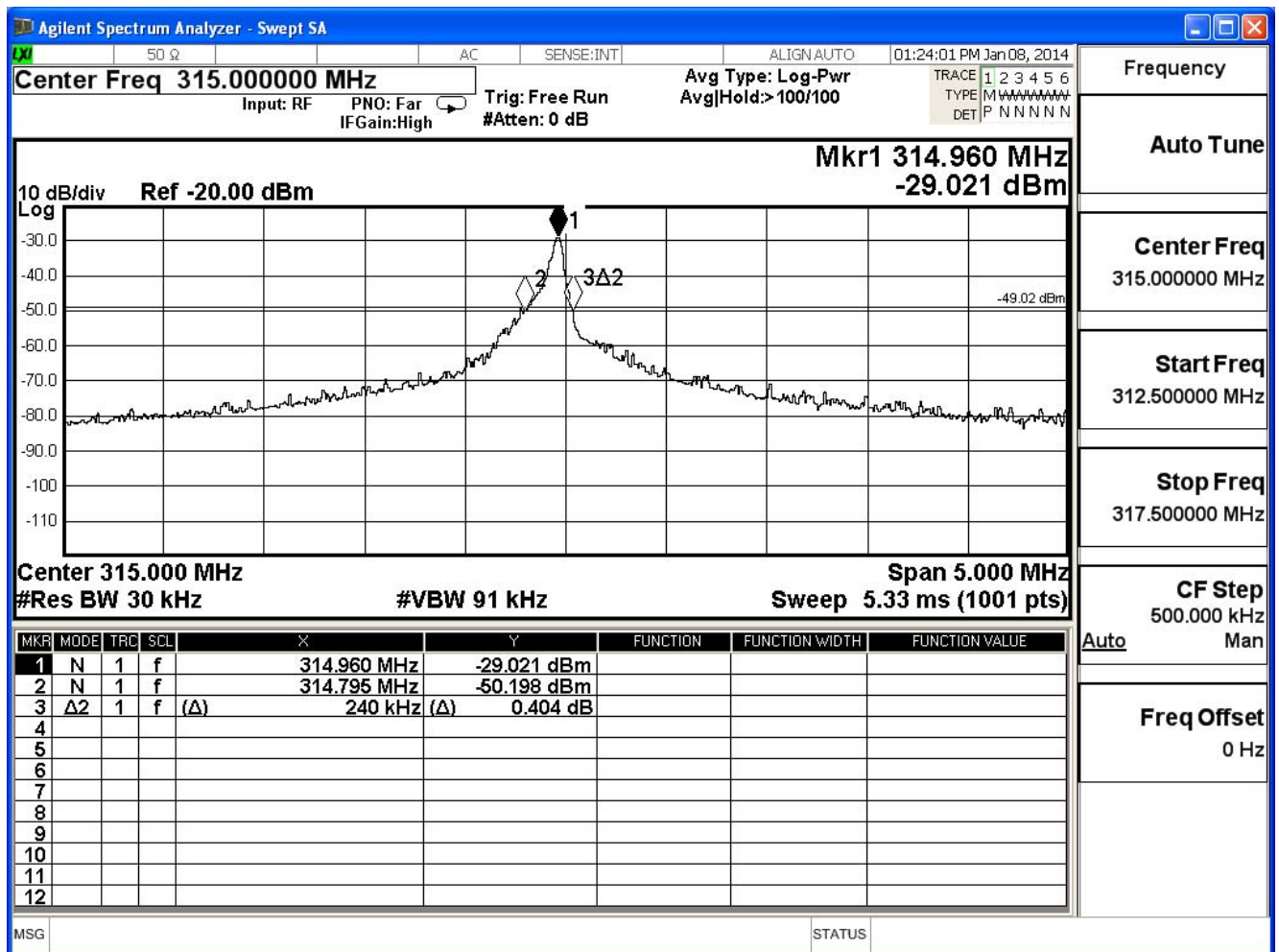
3.5. Uncertainty

± 150Hz

3.6. Test Result

Product	REMOTE CONTROLLER		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2014/01/08	Test Site	SR7

Center Frequency	315.00 MHz
Allowable Bandwidth (315 MHz: 0.25%)	787.5 kHz
Bandwidth at 20dB down (Max)	240.0 kHz
Result	PASS



4. Duty cycle

4.1. Test Equipment

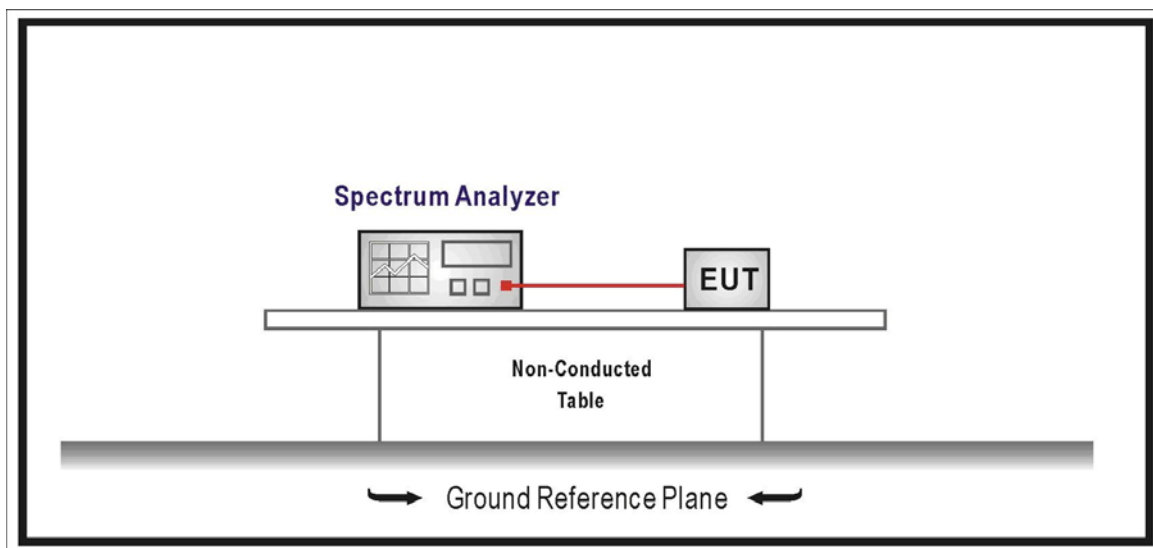
The following test equipments are used during the radiated emission tests:

Duty cycle / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2014/08/05

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

N/A

4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2012

4.5. Uncertainty

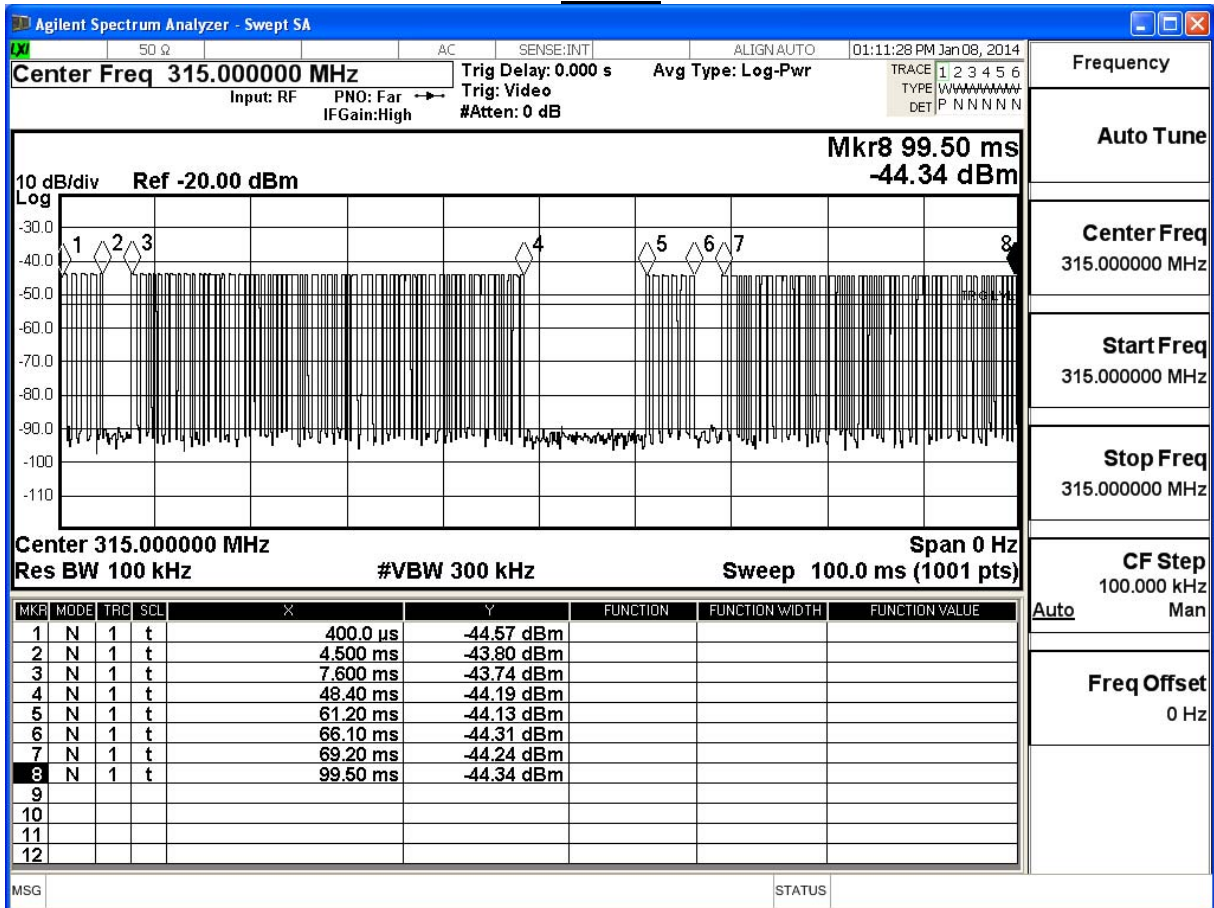
± 25msec

4.6. Test Result

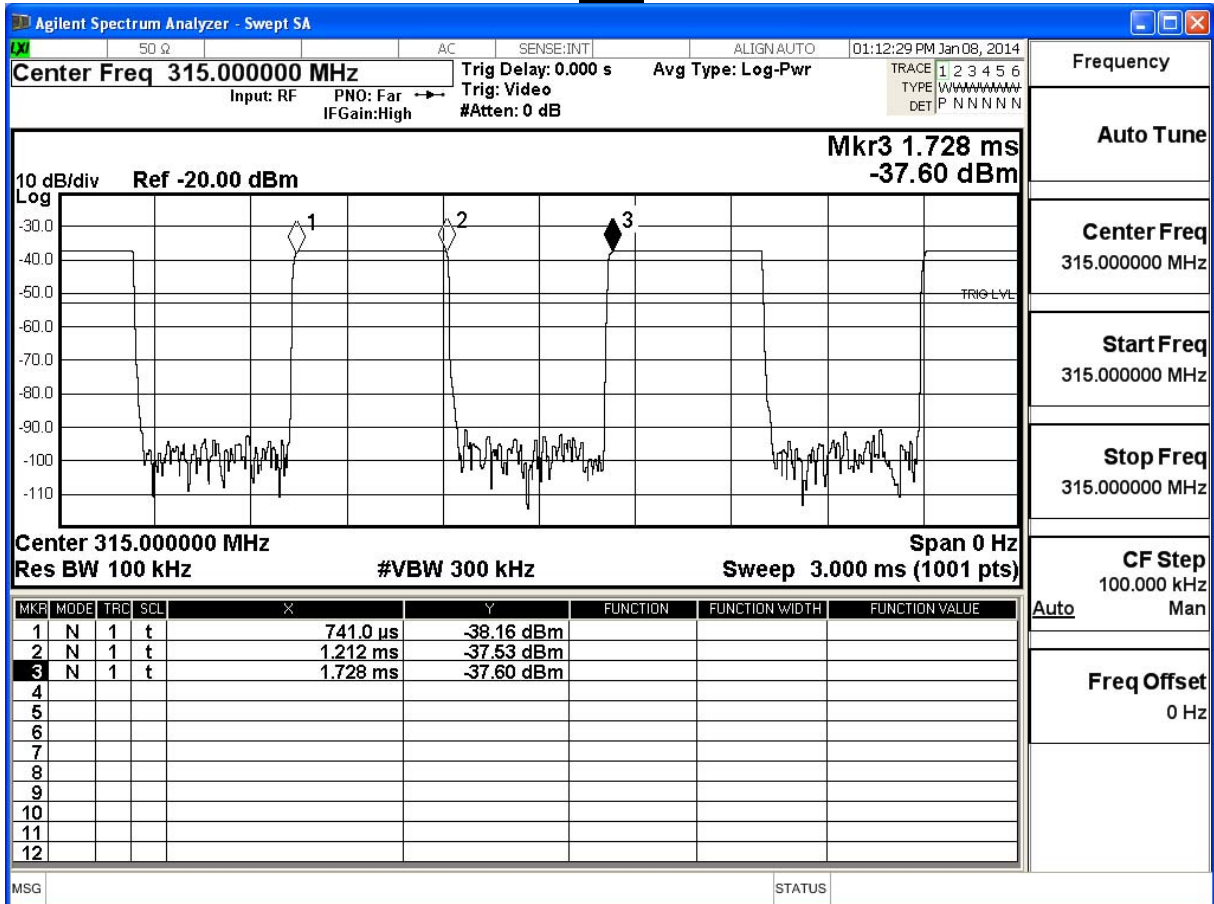
Product	REMOTE CONTROLLER		
Test Item	Duty Cycle		
Test Mode	Mode 1: Transmit		
Date of Test	2014/01/08	Test Site	SR7

Center Frequency	315.00 MHz
Duty Cycle(Only Ton) $= \text{Ton} / \text{Ton} + \text{off} = (0.471 \mu\text{s} / 0.987 \mu\text{s})$ $= 0.477$	
Duty Cycle $= (\text{Ton} / (\text{Ton} + \text{Toff})) * \text{Duty Cycle(Only Ton)} = (80.1\text{ms} / 100\text{ms}) * 0.477$ $= 0.382$	

100ms



3ms



5. Transmitter time

5.1. Test Equipment

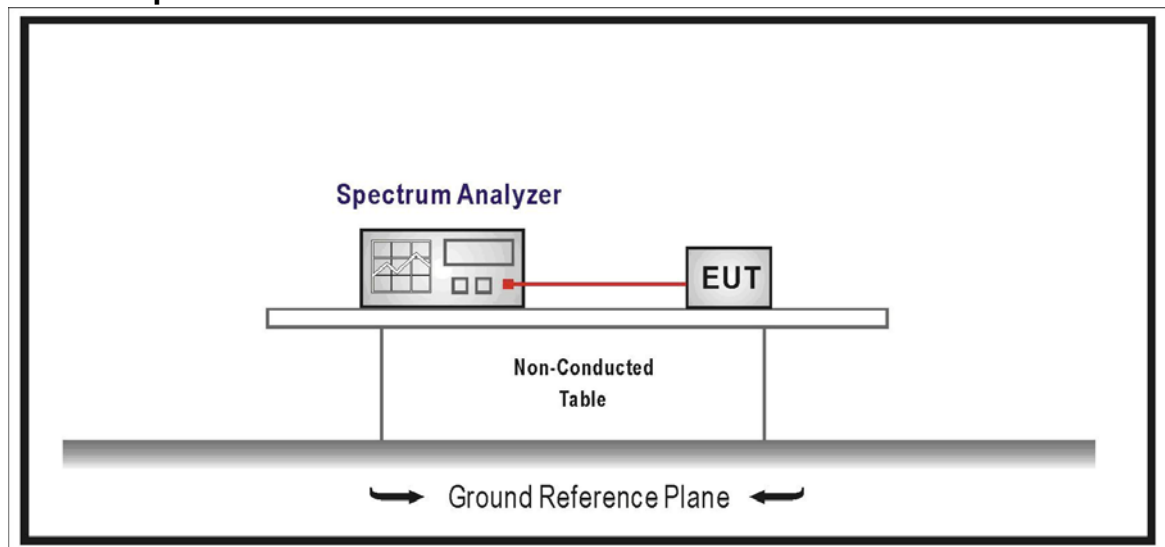
The following test equipments are used during the radiated emission tests:

Transmitter time / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2014/08/05

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

5.2. Test Setup



5.3. Limits

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.

5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2012

5.5. Uncertainty

± 25msec

5.6. Test Result

Product	REMOTE CONTROLLER		
Test Item	Transmitter time		
Test Mode	Mode 1: Transmit		
Date of Test	2014/01/15	Test Site	SR7

Center Frequency	315 MHz
Transmitter time = 0.90s < 5 sec.	Below 5 sec.
Result	PASS

