



# Test Report

Product Name	Transmitter
Model No.	AP-KEY-014
FCC ID.	YGN-APKEY014

Applicant	American Technology Components Inc.
Address	2905 Lavanture Place, Elkhart IN. 46514 USA

Date of Receipt	May 24, 2010
Issued Date	Jun. 24, 2010
Report No.	105361R-RUSP41V01
Report Version	V1.0

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

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

# Test Report Certification

Issued Date : Jun. 24, 2010

Report No. : 105361R-RFUSP41V01



Product Name	Transmitter
Applicant	American Technology Components Inc.
Address	2905 Lavanture Place, Elkhart IN. 46514 USA
Manufacturer	Serenity Technology Co., Ltd.
Model No.	AP-KEY-014
FCC ID.	YGN-APKEY014
EUT Rated Voltage	DC 12V(Power by Battery)
EUT Test Voltage	DC 12V(Power by Battery)
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2009 ANSI C63.4: 2003
Test Result	Complied

Test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

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

Documented By :

*Joanne Lin*

(Adm. Specialist / Joanne Lin)



Tested By :

*Tom Hsieh*

( Engineering Vice Supervisor /  
Tom Hsieh )



Testing Laboratory

0914

Approved By :

*Vincent Lin*

( Manager / Vincent Lin)

# TABLE OF CONTENTS

Description	Page
<b>1. General Information .....</b>	<b>4</b>
1.1. EUT Description.....	4
1.2. Operation Description .....	5
1.3. Tested System Details.....	6
1.4. Configuration of tested System .....	6
1.5. EUT Exercise Software .....	6
1.6. Test Facility .....	7
<b>2. Conducted Emission.....</b>	<b>8</b>
2.1. Test Equipment.....	8
2.2. Test Setup .....	8
2.3. Limits .....	9
2.4. Test Procedure .....	9
2.5. Test Specification .....	9
2.6. Uncertainty .....	9
2.7. Test Result .....	10
<b>3. Radiated Emission.....</b>	<b>11</b>
3.1. Test Equipment.....	11
3.2. Test Setup .....	12
3.3. Limits .....	13
3.4. Test Procedure .....	14
3.5. Test Specification .....	14
3.6. Uncertainty .....	14
3.7. Test Result .....	15
<b>4. Transmit time.....</b>	<b>22</b>
4.1. Test Equipment.....	22
4.2. Test Setup .....	22
4.3. Limits .....	22
4.4. Test Specification .....	22
4.5. Uncertainty .....	22
4.6. Test Result .....	23
<b>5. Occupied Bandwidth.....</b>	<b>24</b>
5.1. Test Equipment.....	24
5.2. Test Setup .....	24
5.3. Limits .....	24
5.4. Test Specification .....	24
5.5. Uncertainty .....	24
5.6. Test Result .....	25

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

## 1. General Information

### 1.1. EUT Description

Product Name	Transmitter
Model No.	AP-KEY-014
FCC ID	YGN-APKEY014
Frequency Range	303.5MHz
Number of Channels	1
Type of Modulation	ASK
Antenna Type	Printed on PCB

Frequency of Each Channel:

Channel	Frequency
Channel 1:	303.5MHz

Note:

1. The EUT is a Transmitter with a built-in 303.5 MHz transmitter.
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.

## 1.2. Operation Description

The EUT is a Transmitter, operation frequency in 303.5 MHz, The antenna type is Printed on PCB and the data modulation is ASK.

The AP-KEY-014 is powered by a +12V DC 23A battery. There are four channel outputs controlled by AP-KEY-014. The LED of AP-KEY-014 will start flashing when a button is pressed. Press down buttons will activate relative outputs. The relative outputs will keep activated until you release buttons. Double-key (key1 + key2 or key3 + key4) operation is allowed in this device.

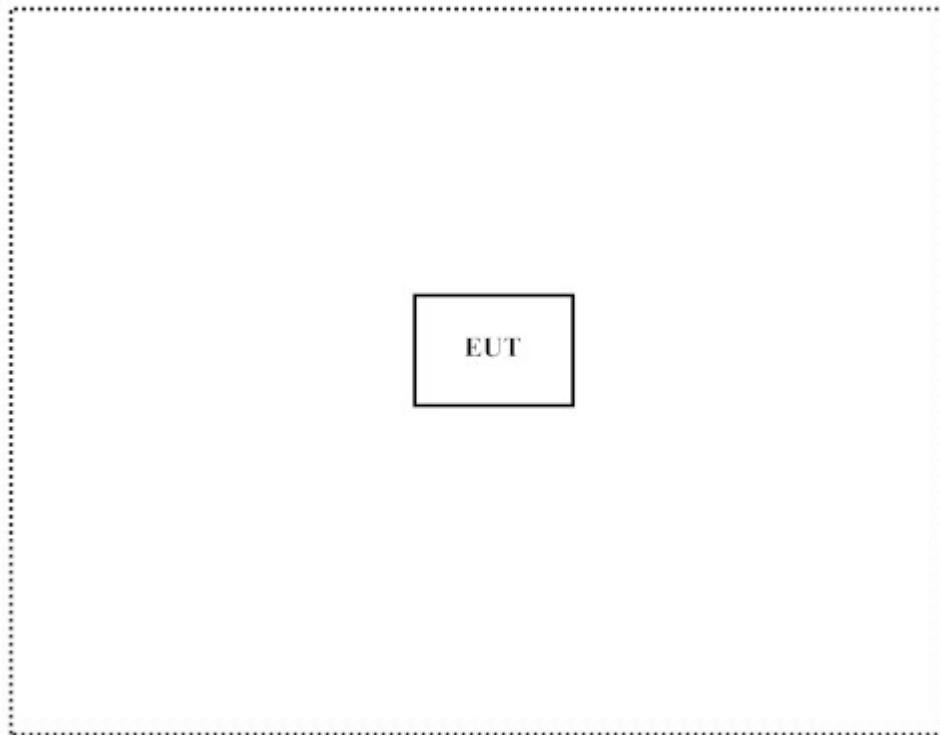
Test Mode	Mode 1: Transmit
-----------	------------------

### 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	N/A	N/A	N/A	N/A	N/A

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

1	Setup the EUT as shown in section 1.4.
2	Install the battery.
3	Press the test button of the EUT.
4	Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission	15 - 35	22
Humidity (%RH)		25 - 75	55
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Occupied Bandwidth	15 - 35	22
Humidity (%RH)		25 - 75	55
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Radiated Emission	15 - 35	22
Humidity (%RH)		25 - 75	55
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/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/>

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



Accreditation on NVLAP  
NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation  
Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
Lin-Kou Shiang, Taipei,  
Taiwan, R.O.C.  
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789  
E-Mail : [service@quietek.com](mailto:service@quietek.com)

FCC Accreditation Number: TW1014



## 2. Conducted Emission

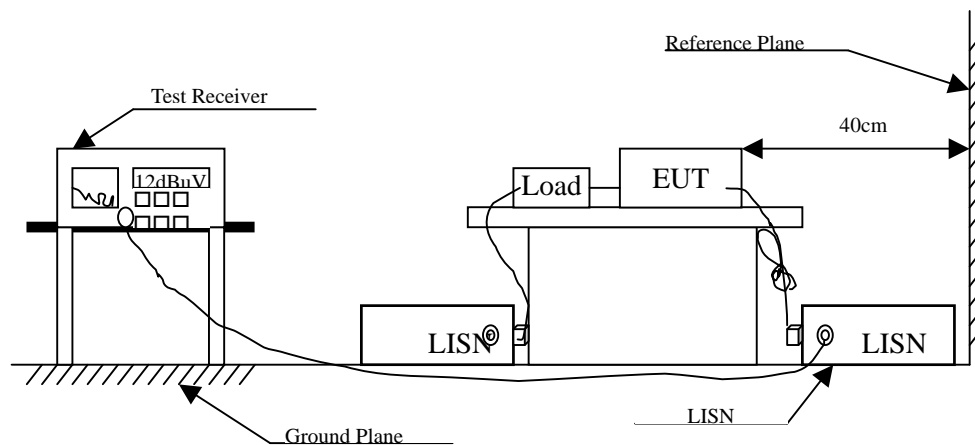
### 2.1. Test Equipment

The following test equipment are used during the test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2010	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2010	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2010	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2010	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

### 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 C63.4: 2003 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

### 2.6. Uncertainty

$\pm 2.26$  dB

## 2.7. Test Result

Owing to the EUT use battery supply voltage, this test item is not performed.

### 3. Radiated Emission

#### 3.1. Test Equipment

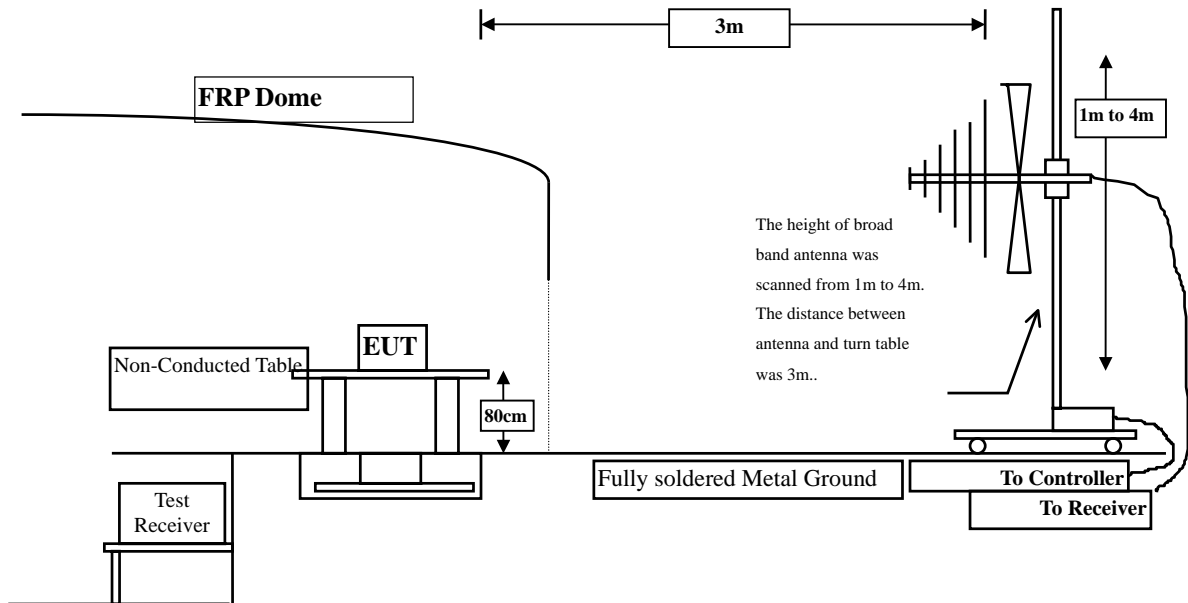
The following test equipment are used during the test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input checked="" type="checkbox"/> Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2010
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

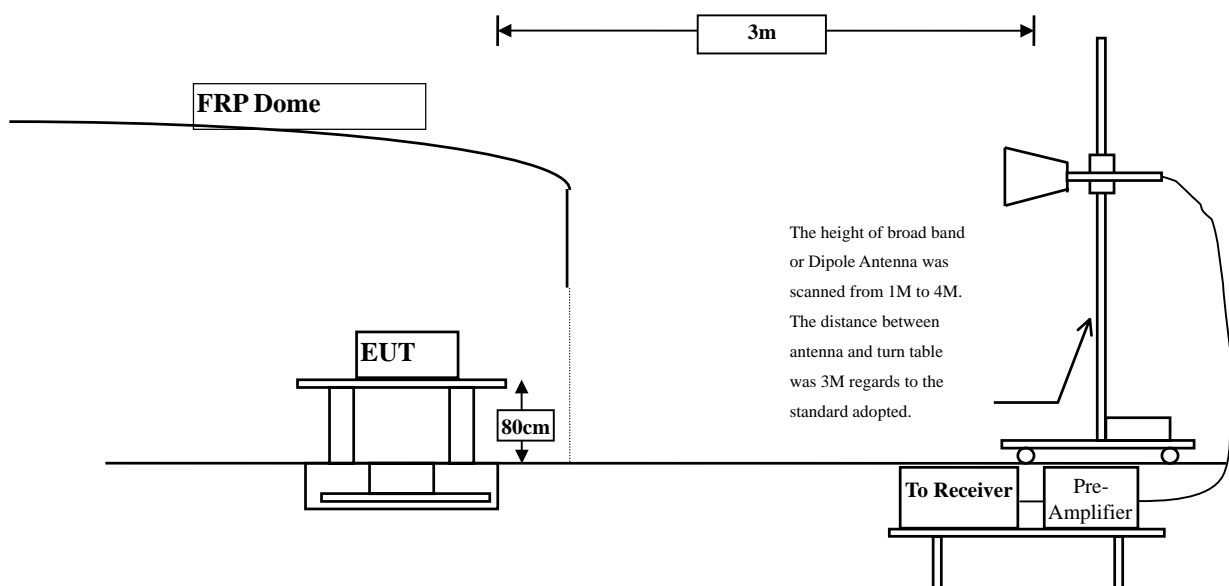
- Note:
1. All instruments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

### 3.2. Test Setup

#### Radiated Emission Below 1GHz



#### Radiated Emission Above 1GHz



### 3.3. Limits

#### ➤ Fundamental and Harmonics Emission Limits

Fundamental Frequency MHz	Field Strength of Fundamental	Field Strength of Spurious Emission
40.66-40.70	2250	225
70-130	1250	125
130-174	1250-3750	125-375
174-260	3750	375
260-470	3750-12500	375-1250
above 470	12500	1250

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 <sup>1</sup>	300
0.490-1.705	24000/F(kHz)	See Remark <sup>1</sup>	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**

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

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 C63.4:2003 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 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

### **3.6. Uncertainty**

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

### 3.7. Test Result

Product	Transmitter		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/23	Test Site	No.3 OATS

#### Fundamental Power (Peak Detector) (X- Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
303.600	-3.066	70.970	67.904	-27.008	94.912
<b>Vertical</b>					
303.600	-6.794	53.699	46.905	-48.007	94.912

Note:

1. The Average Limit =  $41.6667 \times (303.6) - 7083.3333 = 74.912 \text{ dBuV/m}$   
The Peak Limit =  $74.912 \text{ dBuV/m} + 20 \text{ dB} = 94.912 \text{ dBuV/m}$
2. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
3. 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.

Product	Transmitter		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/23	Test Site	No.3 OATS

### Fundamental Power (Peak Detector) (Y- Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
303.600	-3.066	66.536	63.470	-31.442	94.912
<b>Vertical</b>					
303.600	-6.794	48.082	41.288	-53.624	94.912

Note:

1. The Average Limit =  $41.6667 \times (303.6) - 7083.3333 = 74.912 \text{ dBuV/m}$   
The Peak Limit =  $74.912 \text{ dBuV/m} + 20 \text{ dB} = 94.912 \text{ dBuV/m}$
2. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
3. 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.



Product	Transmitter		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/23	Test Site	No.3 OATS

### Fundamental Power (Peak Detector) (Z- Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
303.600	-3.066	65.246	62.180	-32.732	94.912
<b>Vertical</b>					
303.600	-6.794	49.393	42.599	-52.313	94.912

Note:

- The Average Limit =  $41.6667 \times (303.6) - 7083.3333 = 74.912 \text{ dBuV/m}$   
The Peak Limit =  $74.912 \text{ dBuV/m} + 20 \text{ dB} = 94.912 \text{ dBuV/m}$
- Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
- 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.

Product	Transmitter		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/19	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Peak Limit dBuV/m	Average Limit dBuV/m
<b>Harmonic Radiated Emission</b>						
<b>Horizontal</b>						
<b>Peak</b>						
1214.400	-3.650	64.130	60.479	-13.521	74.000	54.000
1518.000	-3.757	50.020	46.263	-27.737	74.000	54.000
1821.600	-4.364	38.200	33.836	-40.164	74.000	54.000
2125.200	-3.156	38.770	35.615	-38.385	74.000	54.000
2428.800	-0.909	37.510	36.602	-37.398	74.000	54.000
2732.400	-1.029	37.840	36.811	-37.189	74.000	54.000
3036.000	-1.446	40.500	39.054	-34.946	74.000	54.000
<b>Average</b>						
1214.400	-3.650	50.400	46.750	-7.250	74.000	54.000

Note:

1. Measurement Level = Reading Level +Correct Factor.
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.

Product	Transmitter		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/19	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Peak Limit dBuV/m	Average Limit dBuV/m
<b>Harmonic Radiated Emission</b>						
<b>Vertical</b>						
<b>Peak</b>						
1214.400	-3.075	58.470	55.394	-18.606	74.000	54.000
1518.000	-1.583	53.300	51.717	-22.283	74.000	54.000
1821.600	-2.667	42.710	40.043	-33.957	74.000	54.000
2125.200	-2.359	37.250	34.892	-39.108	74.000	54.000
2428.800	-1.612	37.800	36.188	-37.812	74.000	54.000
2732.400	-1.186	40.870	39.684	-34.316	74.000	54.000
3036.000	-1.366	40.150	38.784	-35.216	74.000	54.000
<b>Average</b>						
1214.400	-3.075	48.300	45.220	-8.780	74.000	54.000

Note:

1. Measurement Level = Reading Level +Correct Factor.
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.

Product	Transmitter		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/23	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector</b>					
607.200	4.518	58.504	63.021	-11.891	74.912
<b>Average Detector</b>					
607.200	4.518	38.082	42.599	-12.313	54.912
<b>Vertical</b>					
<b>Peak Detector</b>					
607.200	-1.584	49.446	47.861	-27.051	74.912
<b>Average Detector</b>					
607.200	-1.584	38.873	37.288	-17.624	54.912

Note:

1. The 2<sup>nd</sup> Harmonic limit is 20dB below the maximum permitted fundamental level, Peak Limit=74.912dBuV/m, Average Limit=54.912dBuV/m.
2. Measurement Level = Reading Level + Correct Factor.

Product	Transmitter		
Test Item	General Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/23	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Quasi-Peak</b>					
152.800	-10.116	42.416	32.300	-11.200	43.500
455.800	-0.502	31.922	31.420	-14.580	46.000
631.200	1.593	27.357	28.950	-17.050	46.000
910.800	6.164	25.716	31.881	-14.119	46.000
<b>Vertical</b>					
<b>Quasi-Peak</b>					
161.300	-6.533	39.133	32.600	-10.900	43.500
455.360	-5.290	33.440	28.150	-17.850	46.000
655.300	-4.302	35.702	31.400	-14.600	46.000
910.800	2.422	23.109	25.531	-20.469	46.000

Note:

1. All Reading Levels are quasi-peak values.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

#### 4. Transmit time

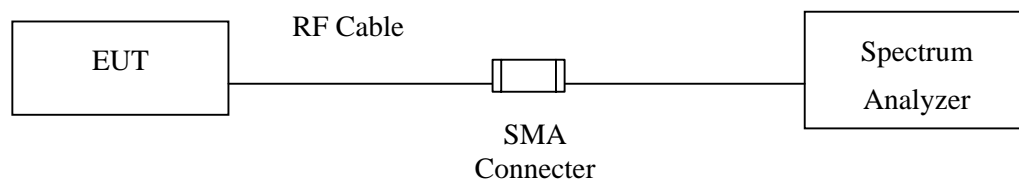
##### 4.1. Test Equipment

The following test equipment are used during the test:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010

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

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

##### 4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231

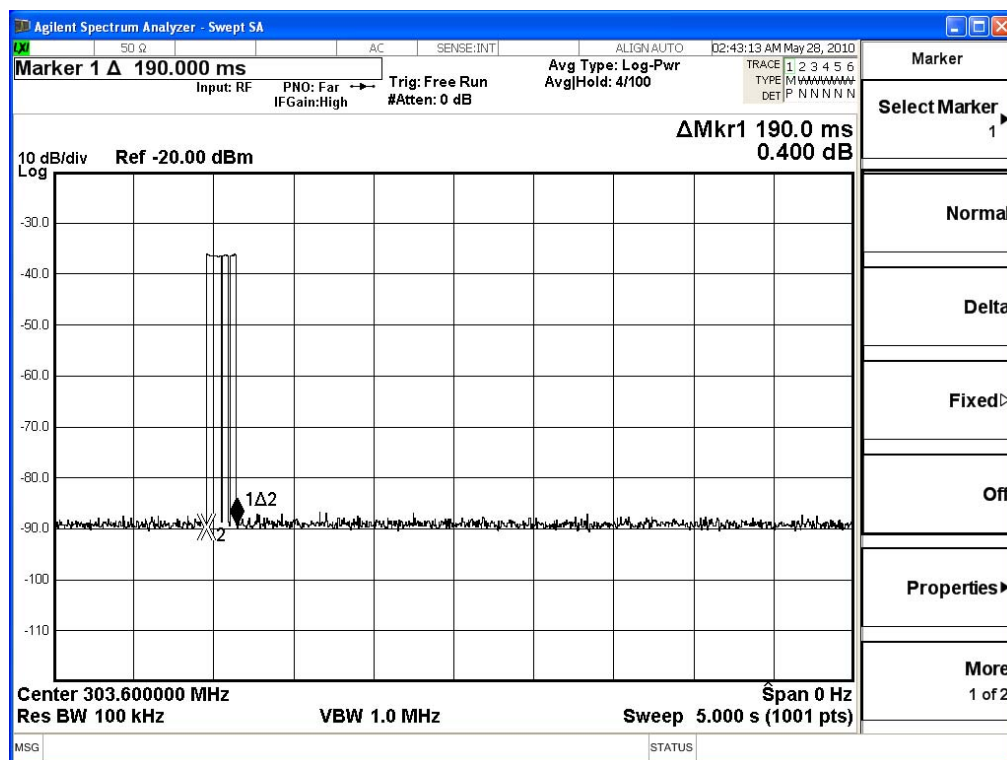
##### 4.5. Uncertainty

± 25ms

#### 4.6. Test Result

Product	Transmitter		
Test Item	Transmit time		
Test Mode	Mode 1: Transmit		
Date of Test	2010/05/28	Test Site	No.3 OATS

Channel No.	Frequency (MHz)	Measurement Value (Sec)	Limit (Sec)	Result
1	303.6	0.19	< 5	Pass



## 5. Occupied Bandwidth

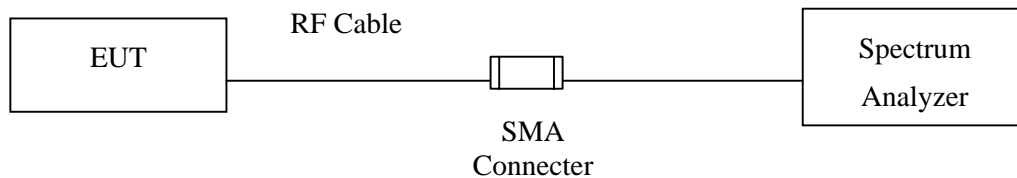
### 5.1. Test Equipment

The following test equipment are used during the test:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010

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

### 5.5. Uncertainty

± 150Hz



## 5.6. Test Result

Product	Transmitter		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2010/06/23	Test Site	No.3 OATS

Channel No.	Frequency (MHz)	Measurement Value (MHz)	Limit (MHz)	Result
1	303.6	0.072	0.76	Pass

Note: Limit = 303.6MHz \* 0.25% = 0.76MHz

**Figure Channel 1:**

