



# A Test Lab Techno Corp.

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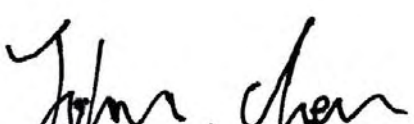
## Part 15 C Measurement Report



<b>Report No.</b>	<b>: 0910FR12</b>
<b>Applicant</b>	<b>: GRAND MATE CO., LTD.</b>
<b>Product Type</b>	<b>: Remote Control Transmitter</b>
<b>Trade Mark</b>	<b>: GRANDMATE</b>
<b>Model No</b>	<b>: RFC</b>
<b>FCC ID</b>	<b>: UMP-RFC</b>
<b>Dates of Test</b>	<b>: Sep. 16 ~ 17, 2009 ; Nov. 11, 2009</b>
<b>Test Specification</b>	<b>: FCC Part 15 Subpart C (15.231)</b> <b>ANSI C63.4: 2003</b>
<b>Location of Test Lab.</b>	<b>: Chang-an Lab.</b>

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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4. This document may be altered or revised by A Test Lab Techno. Corp. personnel only, and shall be noted in the revision section of the document.

  
\_\_\_\_\_  
**Miller Lee**                      **20091112**  
**Approve Signer**

  
\_\_\_\_\_  
**John Cheng**                      **20091112**  
**Testing Engineer**



# CERTIFICATION

We here by verify that:

The above equipment was tested by A Test Lab Techno Corp. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2003 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.231.

The Test results of this report relate only to the tested sample indentified in this report.

EUT : Remote Control Transmitter

Applicant : GRAND MATE CO., LTD.  
NO.30 LUGONG S 2nd RD,LUGANG TOWN,  
CHANGHUA HSIEN 505 Taiwan

Trade Mark : GRANDMATE

Model No : RFC

FCC ID : UMP-RFC

Approved by : Miller Lee  
Miller Lee 2009/11/12

Prepared by : John Cheng  
John Cheng 2009/11/12

***A Test Lab Techno Corp.***

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## 1. General

### 1.1 Description of Equipment under Test (EUT)

Applicant	:	GRAND MATE CO., LTD.
Applicant Address	:	NO.30 LUGONG S 2nd RD,LUGANG TOWN, CHANGHUA HSIEN 505 Taiwan
Manufacturer	:	GRAND MATE CO., LTD.
Manufacturer Address	:	NO.38, YUAN-CHEN RD, TAIPING CITY, TAICHUNG, TAIWAN, R.O.C.
Trade Mark	:	GRANDMATE
Product Model	:	RFC
Product Type	:	Remote Control Transmitter
FCC ID	:	UMP-RFC
Frequency Range	:	315.038 MHz
Channel Number	:	1 CH
Type of Modulation	:	ASK
Power Supply	:	1.5 Vdc / AAA Battery * 3PCS
Type of Antenna	:	PCB Antenna

During testing the EUT was operated at Tx or Rx mode for each emission measured. This was done in order to ensure that maximum emission levels were attained.

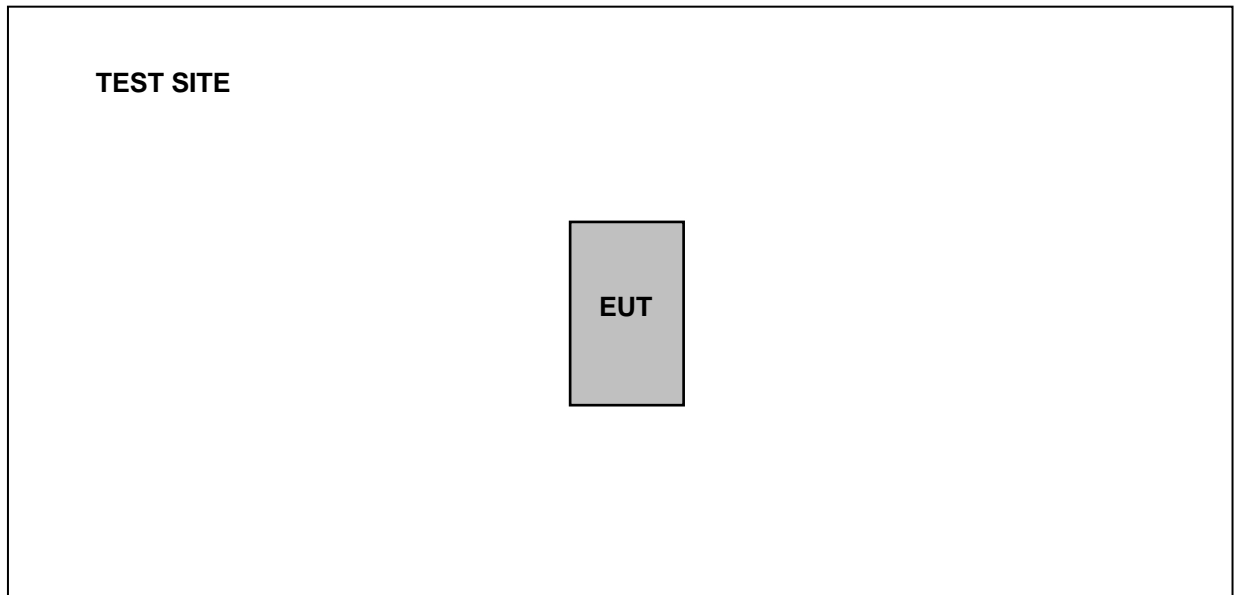
### 1.2 Summary of Tests

Applied Standard : FCC Part 15, Subpart C (Section 15.231)			
Reference	Test	Results	Note
15.231 (b), 15.209	Radiated Emissions	PASS	-----
15.231 (c)	99% Bandwidth / 20dB Bandwidth	PASS	-----

### 1.3 Description of Support Equipment

Describe	Manufacturer	Model	Serial No.	FCC ID
N/A	-----	-----	-----	-----

## 1.4 Configuration of System under Test



During testing put the EUT on the table.

## 1.5 General Test Procedure

### Conducted Emissions

The EUT is placed on the turntable, which is 0.8m above ground plane. According to the requirement is Section 13.1.4.1 of ANSI C63.4. Conducted emissions from the EUT measured in the frequency range between 0.15MHz and 30MHz using CISPR Quasi-peak and average detector modes.

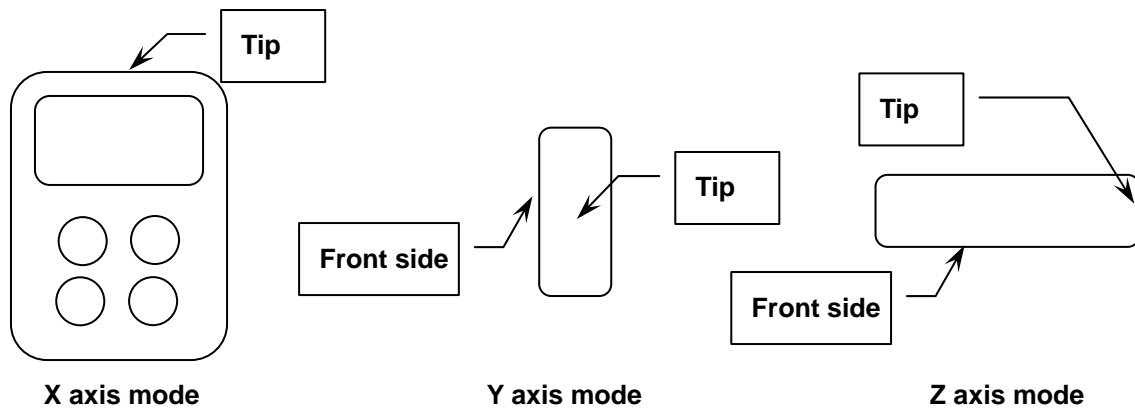
### Radiated Emissions

The EUT is placed on a turn table, which is 0.8m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurement were made according to the requirement in 13.1.4.1 ANSI C63.4.

## 1.6 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions which the EUT was considered likely to encounter in normal use were investigated. Using a test program which sent a continuous data and transferred data to and from the EUT was proven to worst case emissions. The system's physical layout and cabling was randomly arranged to ensure that maximum emission levels were attained.

By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report



## 1.7 Measurement Uncertainty

Description		Uncertainty
Radiated Emissions	30 MHz – 18 GHz	± 3.072 dB
	18 GHz – 40 GHz	± 3.622 dB
Conducted Emission		± 2.240 dB

## 1.8 General Information of Test Site

Test Site Location: No. 140 -1, Changan Street, Bade City, Taoyuan County, Taiwan R.O.C.

TEL: 886-3-271-0188 FAX: 886-3-271-0190

Registration Number : 854525

Designation Number : TW1330

The chamber meets the characteristics of ANSI C63.4:2003. This site is on file with the FCC.



## 2. Radiated Emissions Requirements

### 2.1 Test Procedure

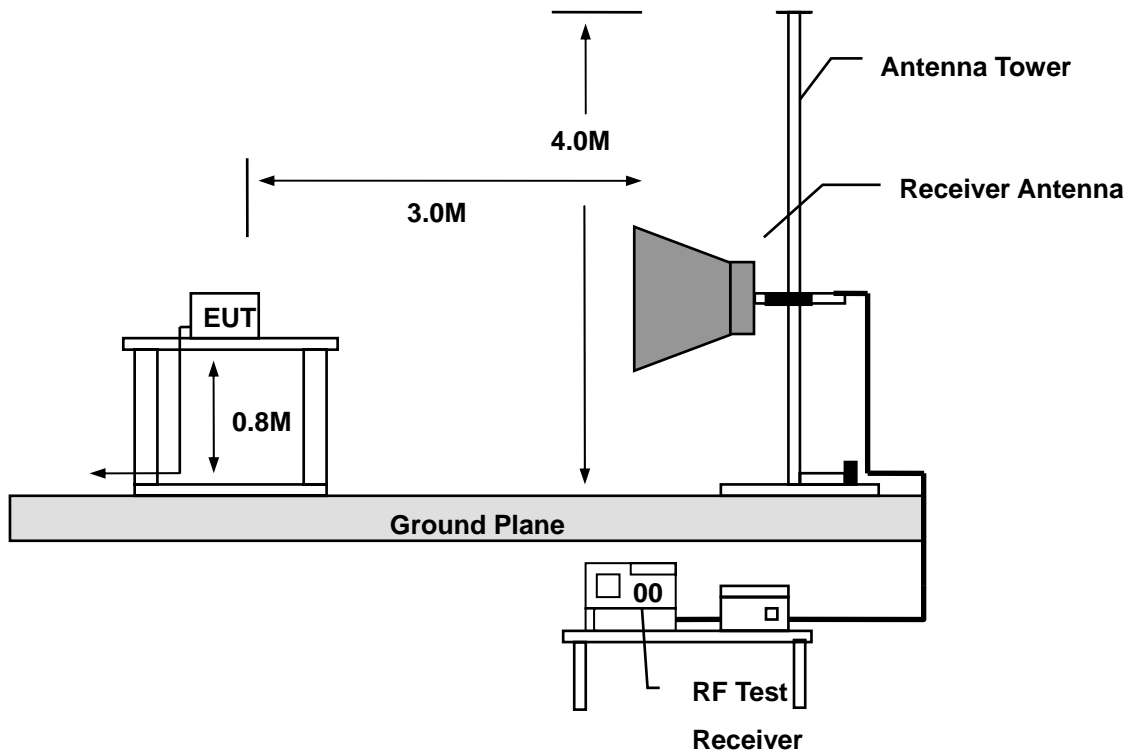
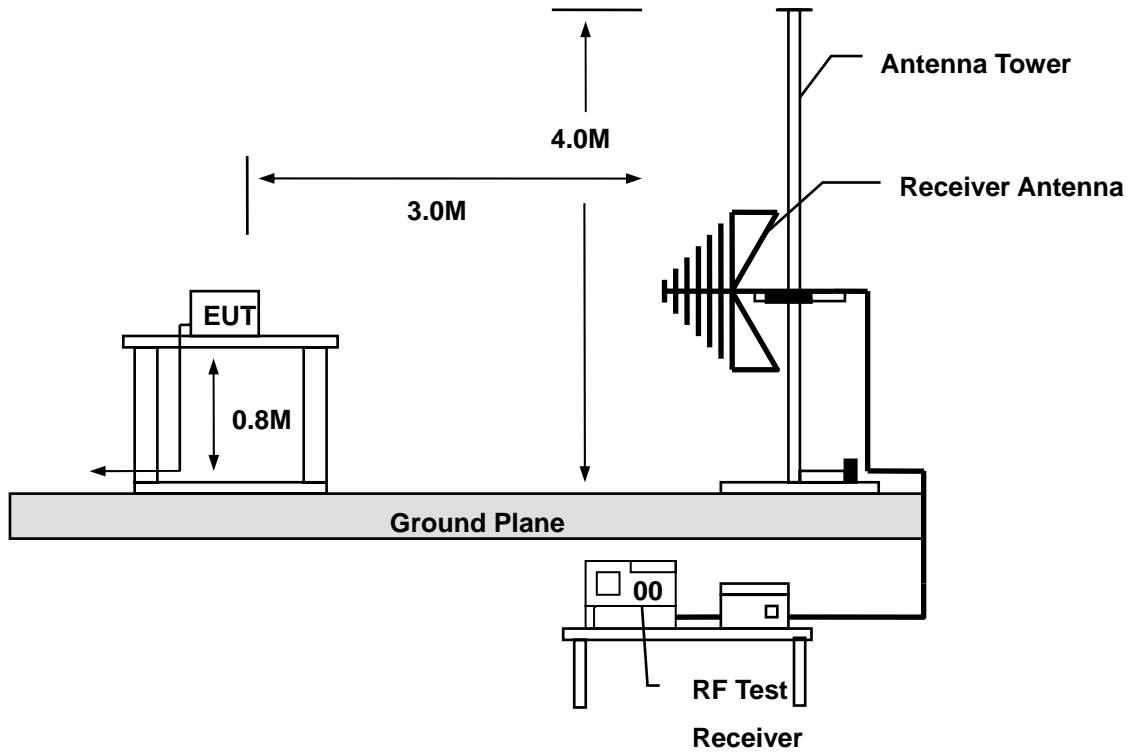
Radiated emission measurements frequency range were performed from 30MHz to 5GHz. Spectrum Analyzer Resolution Bandwidth set to 100kHz or greater for frequencies from 30MHz to 1GHz, and set 1MHz Resolution Bandwidth for frequencies above 1GHz. The EUT is place on non-conductive turntable for the test. If peripheral devices apply to the EUT, the peripheral devices will be connected to EUT and whole system. During the emission test, the signal is maximized through rotation and all cables were present worst-case emissions. The height of antenna and polarization is constantly changed for exploring maximum signal reading. The height of antenna can be up form reference ground to 4 meter and down to 1 meter.

### 2.2 Test Equipment List

Describe	Manufacturer	Model	Serial Number	Calibration	
				Cal. Date	Due Date
Spectrum Analyzer	Agilent	E4408B	MY45107753	Jun. 23, 2009	Jun. 23, 2010
Pre Amplifier	Agilent	8449B	3008A02237	Jul. 01, 2009	Jul. 01, 2010
Pre Amplifier	Agilent	8447D	2944A10961	Jun. 30, 2009	Jun. 30, 2010
Test Receiver	R&S	ESCI	100367	Jul. 01, 2009	Jul. 01, 2010
Biconilog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	Aug. 04, 2009	Aug. 04, 2010
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	Jul. 01, 2009	Jul. 01, 2010
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	Jun. 30, 2009	Jun. 30, 2010
Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120E	0899	Jun. 23, 2009	Jun. 23, 2010

## 2.3 Test Configuration

### Measurement of radiated emission







## 2.4 Test condition

EUT tested in accordance with the specifications given by the manufacturer, and exercised in the most unfavorable manner.

## 2.5 Radiated Emissions Limits

According to FCC 15.231(b) requirement:

In addition to the provisions of §15.205, the field strength of emissions from intentional radiator operated under this section shall not exceed the following:

### Fundamental and harmonics emission limits

Frequency range (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	( $\mu$ V/m@3m)	(dB $\mu$ V/m@3m)	( $\mu$ V/m@3m)	(dB $\mu$ V/m@3m)
315.038	2417.311	67.67	241.7311	47.67

### General Radiated emission Limit

Frequency range (MHz)	15.209 Limits	
	( $\mu$ V/m@3m)	(dB $\mu$ V/m@3m)
30 – 88	100	40
88 – 216	150	43.5
216 – 960	200	46
Above 960	500	54

Remark

1. The table above tighter limit applies at the band edges.
2. The measurement distance in meters, which that between form closest point of EUT to instrument antenna.



## 2.6 Calculation of Average Factor

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

Please see the diagrams below.

(\*) FCC: When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

### Duty Cycle Results

Item	Results	Note
Length of a complete pulse train	119.2 > 100.00 ms	Section 2.7 (*)
Long Pulse (Number of Pulse)	17.00	-----
Short Pulse (Number of Pulse)	33.00	-----
Long Pulse (T)	0.575 ms	-----
Short Pulse (T)	0.400 ms	-----
Total ON interval in a complete pulse train	22.975 ms	-----
Duty Cycle	22.975	-----
Averaging Factor (20 log * Duty Cycle )	-12.77	-----

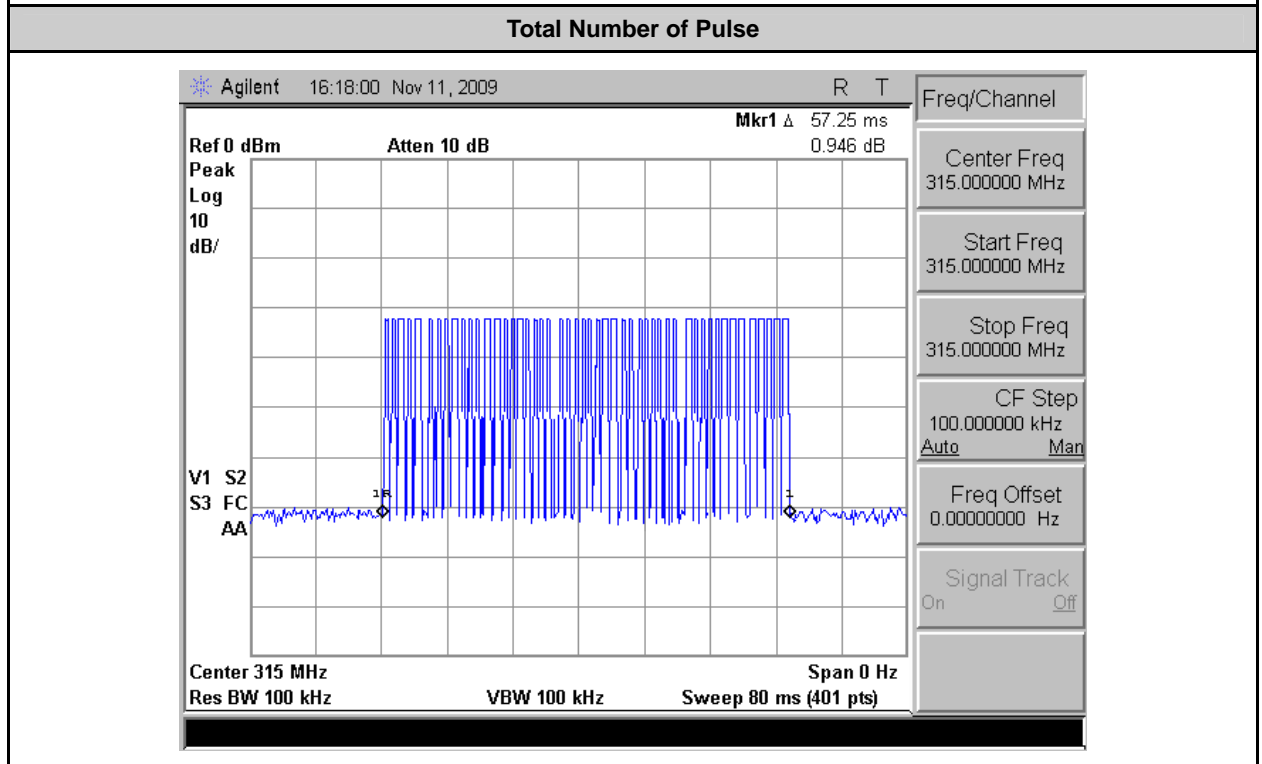
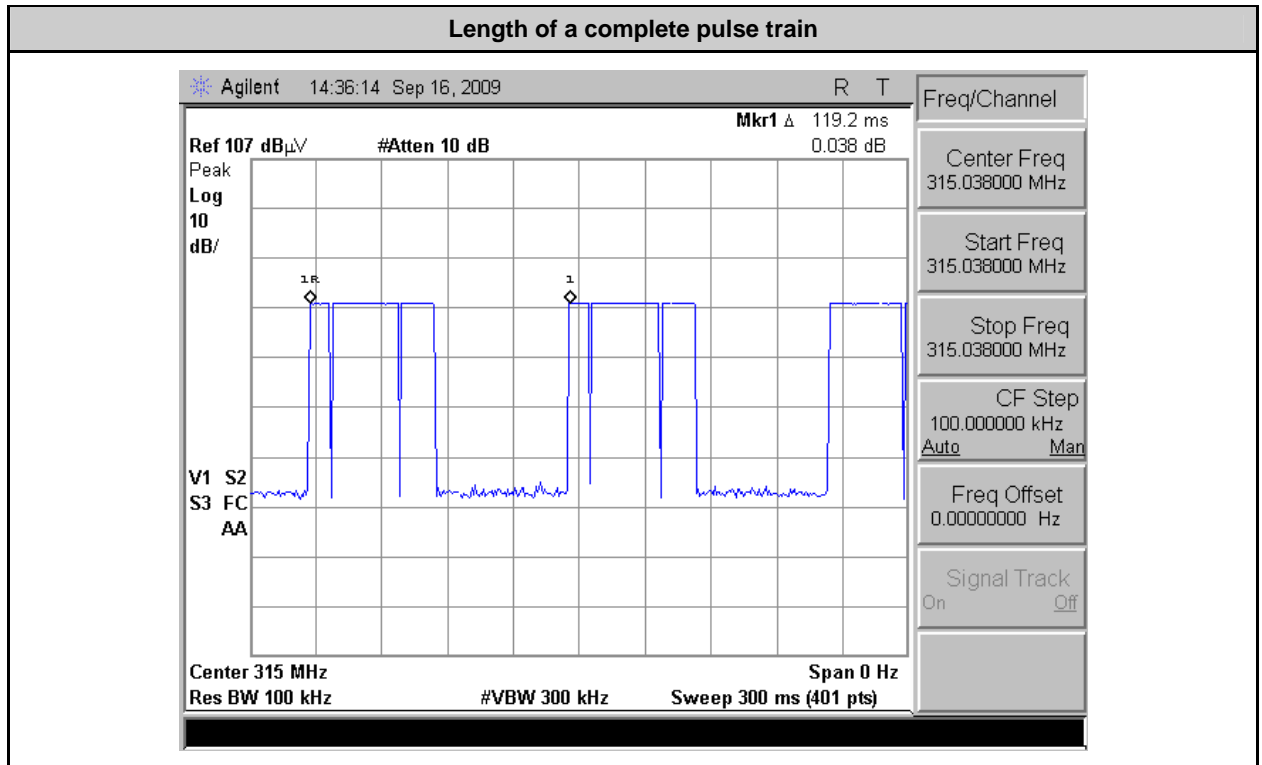
Please see the diagrams below.

Note:

1. RB=100 KHz, VB=300 KHz, SPAN=0
2. Total ON interval in a complete pulse train = (Long Pulse \* Long Pulse (Number of Pulse)) + (Short Pulse \* Short Pulse (Number of Pulse))
3. Duty Cycle= 
$$\frac{\text{(Total On Interval in a Complete Pulse Train)}}{\text{(Length of a Complete Pulse Train)}}$$

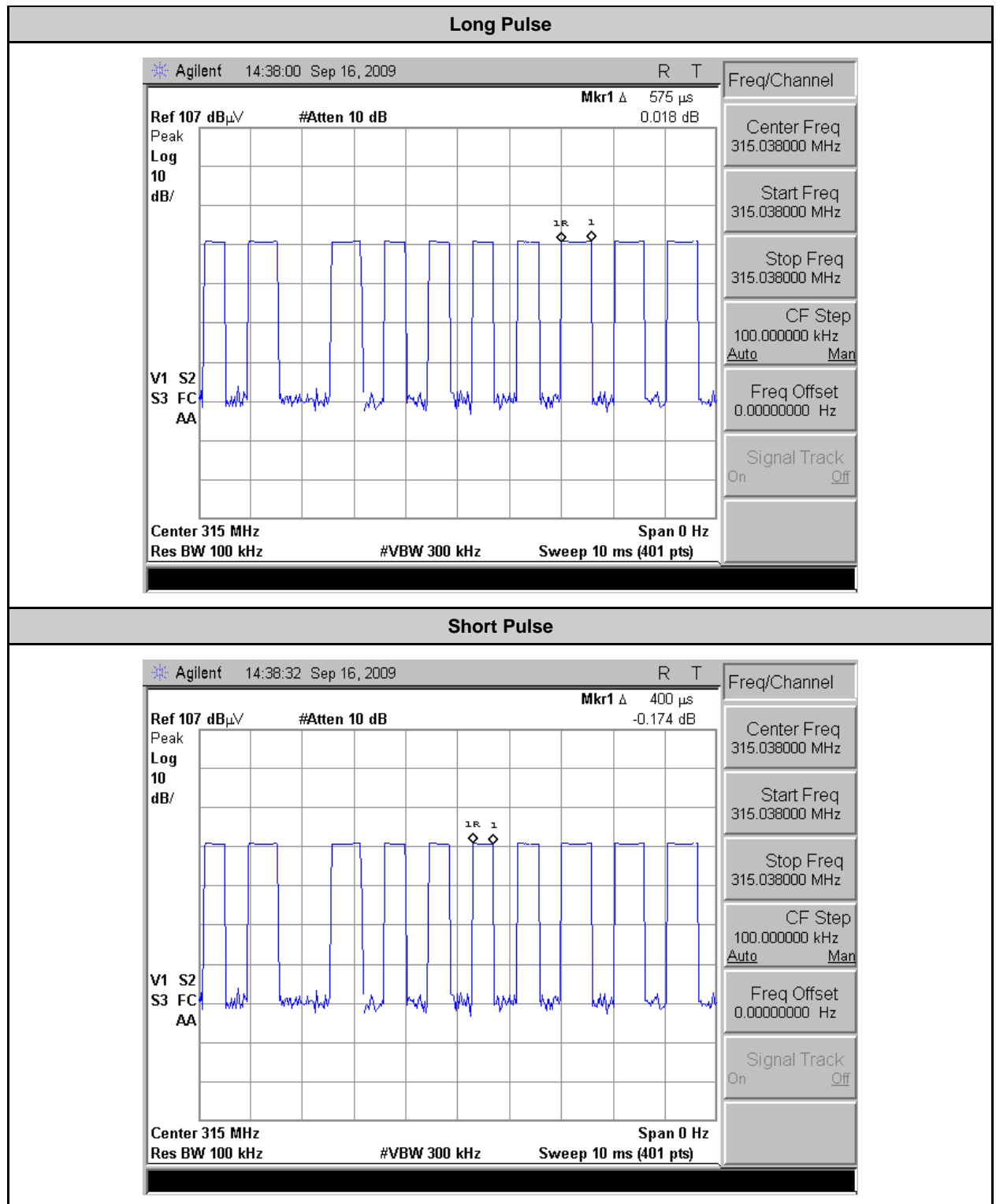


**Duty Cycle Test Diagrams**





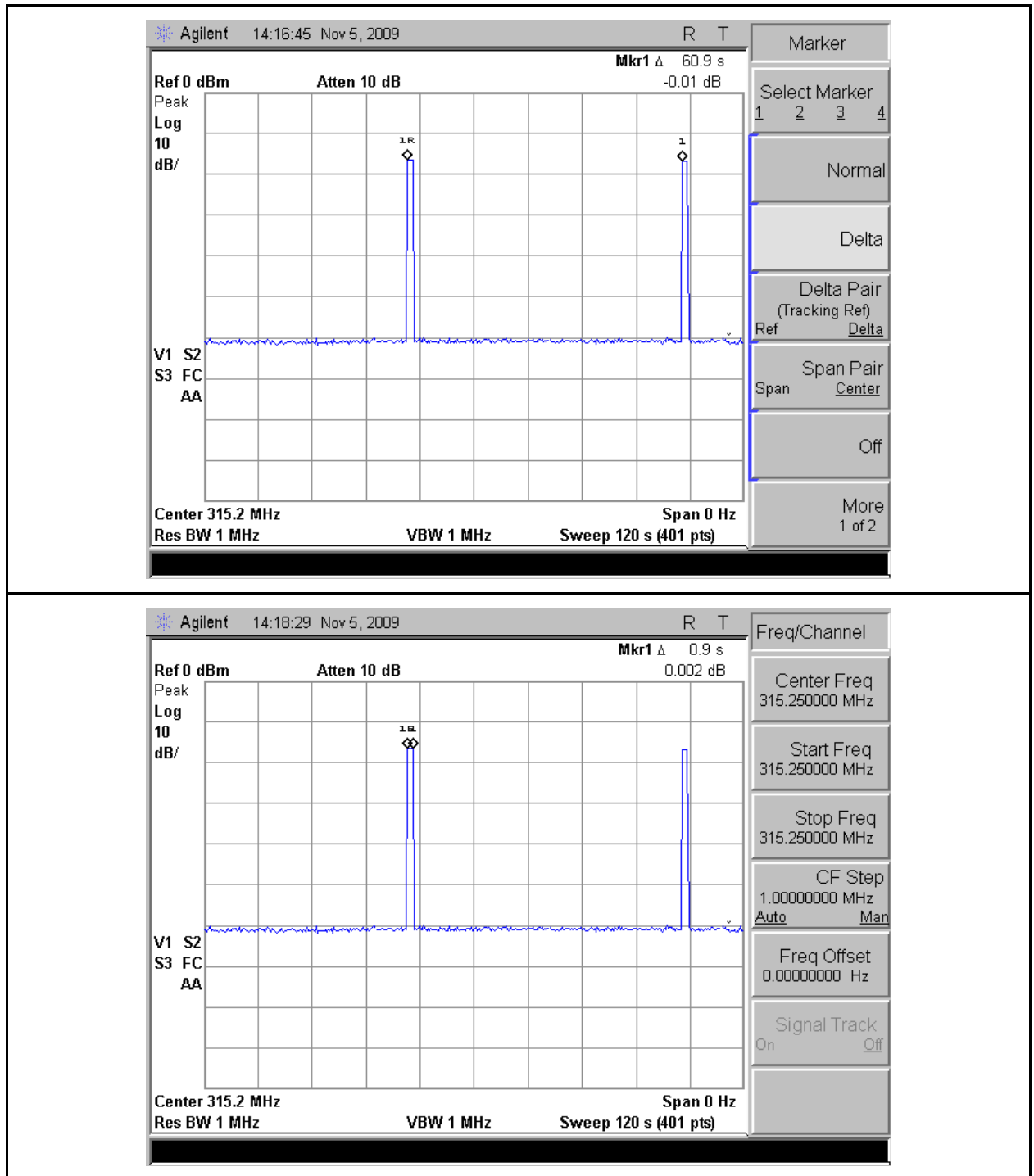
### Time Slot Test Diagrams





The EUT was complied with the requirement of FCC 15.231 (a) (1), which employed a switch that will automatically deactivate the transmitter within less than 5 seconds of being released.

And FCC 15.231(e) 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.





## 2.7 Test Result

The final test emission data is shown on as following tables.

EUT : Remote Control Transmitter  
 Model No : RFC  
 Test Mode : Radiated Emission below 1GHz  
 Test Date : 11/03/2009

Frequency (MHz)	Antenna Polarization	Reading (dB $\mu$ V)	Correction Factor (dB/m)	Corrected Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Det. Mode
45.12	V	34.40	-11.84	20.68	40.00	-19.32	Peak
100.20	V	34.03	-11.77	21.44	43.50	-22.06	Peak
157.98	V	33.79	-15.65	17.96	43.50	-25.54	Peak
204.96	V	34.68	-13.05	22.48	43.50	-21.02	Peak
247.62	V	34.37	-11.03	20.45	46.00	-25.55	Peak
295.14	V	35.08	-10.19	21.96	46.00	-24.04	Peak
379.80	V	35.44	-8.84	26.60	46.00	-19.40	Peak
542.20	V	32.71	-6.04	26.67	46.00	-19.33	Peak
801.20	V	34.22	-2.25	31.97	46.00	-14.03	Peak
50.25	H	30.84	-12.16	18.68	40.00	-21.32	Peak
101.28	H	32.61	-11.85	20.76	43.50	-22.74	Peak
149.34	H	33.35	-16.03	17.32	43.50	-26.18	Peak
193.62	H	30.48	-13.17	17.31	43.50	-26.19	Peak
251.40	H	30.76	-10.91	19.85	46.00	-26.15	Peak
290.28	H	32.45	-10.03	22.42	46.00	-23.58	Peak
517.00	H	32.32	-6.48	25.84	46.00	-17.58	Peak
770.40	H	32.19	-2.60	29.59	46.00	-14.41	Peak
877.50	H	33.31	-0.75	32.56	46.00	-12.19	Peak

Notes:

1. Margin= Corrected Level – Limits
2. Corrected Level = Reading + Correction Factor
3. Correction Factor = Antenna Factor + Cable Loss - Preamp
4. The EUT was worst case on X axis after pretest on X & Y & Z axis setting.



EUT : Remote Control Transmitter  
 Model No : RFC  
 Test Mode : Fundamental and harmonics emissions  
 Test Date : 11/03/2009

Frequency (MHz)	Antenna Polarization	Reading (dB $\mu$ V)	Correction Factor (dB/m)	Average Factor (dB)	Corrected Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Det. Mode
315.038	V	79.45	-9.76	-----	69.69	87.67	-17.98	Peak
315.038	V	79.45	-9.76	-12.77	56.92	67.67	-10.75	Avg
630.400	V	48.29	-4.36	-----	43.93	67.67	-23.74	Peak
630.400	V	48.29	-4.36	-12.77	31.16	47.67	-16.51	Avg
945.400	V	46.31	0.26	-----	46.57	67.67	-21.10	Peak
945.400	V	46.31	0.26	-12.77	33.80	47.67	-13.87	Avg
1260.040	V	45.39	0.38	-----	45.77	67.67	-21.90	Peak
1260.040	V	45.39	0.38	-12.77	33.00	47.67	-14.67	Avg
1575.110	V	42.42	0.42	-----	42.84	67.67	-24.83	Peak
1575.110	V	42.42	0.42	-12.77	30.07	47.67	-17.60	Avg
315.038	H	85.48	-9.76	-----	75.72	87.67	-11.95	Peak
315.038	H	85.48	-9.76	-12.77	62.95	67.67	-4.72	Avg
630.400	H	54.71	-4.36	-----	50.35	67.67	-17.32	Peak
630.400	H	54.71	-4.36	-12.77	37.58	47.67	-10.09	Avg
945.400	H	56.84	0.26	-----	57.10	67.67	-10.57	Peak
945.400	H	56.84	0.26	-12.77	44.33	47.67	-3.34	Avg
1260.070	H	42.36	0.35	-----	42.71	67.67	-24.96	Peak
1260.070	H	42.36	0.35	-12.77	29.94	47.67	-17.73	Avg
1575.180	H	40.11	0.44	-----	40.55	67.67	-27.12	Peak
1575.180	H	40.11	0.44	-12.77	27.78	47.67	-19.89	Avg

Notes:

1. Margin= Corrected Level – Limits
2. Corrected Level = Reading + Correction Factor
3. Correction Factor = Antenna Factor + Cable Loss - Preamp
4. The present spurious points only shows that above noise level and the frequency range test from 30MHz to 10th harmonic of frequency.
5. The EUT was worst case on X axis after pretest on X & Y & Z axis setting.

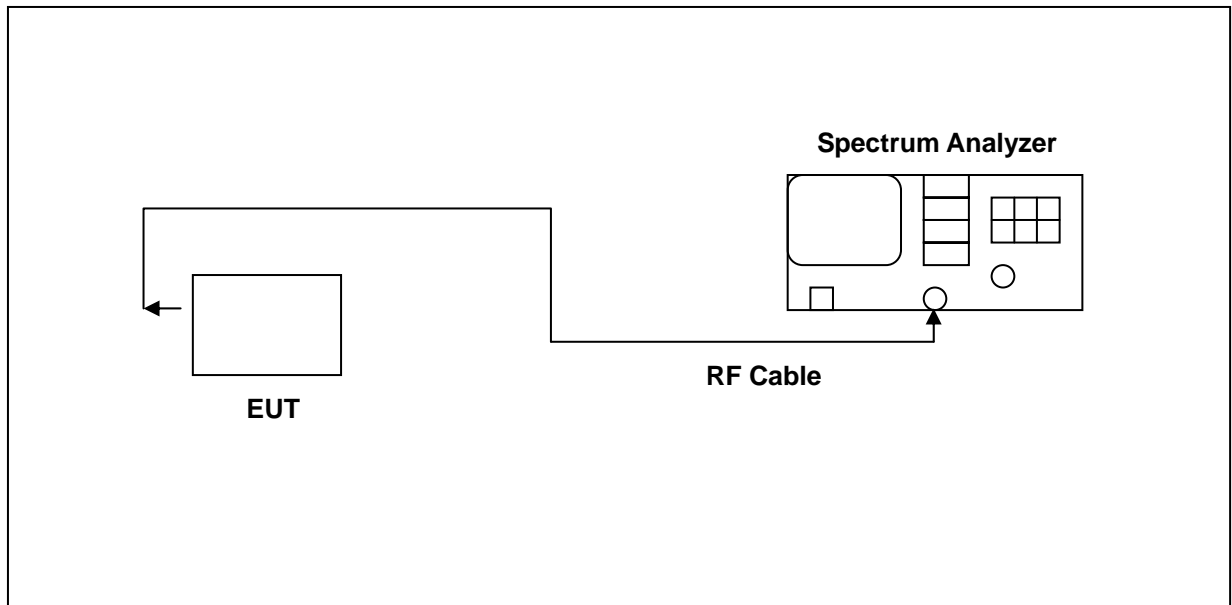
### 3. 20dB Bandwidth

#### 3.1 Test Condition & Setup

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage. The spectrum analyzer used the following settings:

1. Span = approx. 2 to 3 times the 20dB bandwidth, centered on a hopping frequency
2. VBW  $\geq$  RBW
3. Sweep = auto
4. Detector function = peak
5. Trace = max hold

#### 3.2 Test Instruments Configuration







### 3.3 Test Equipment List

Describe	Manufacturer	Model	Serial Number	Calibration	
				Cal. Date	Due Date
Spectrum Analyzer	Agilent	E4445A	MY46181986	May 14, 2009	May 14, 2010

### 3.4 Limits

According to FCC 15.231(c) requirement:

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.

$$\text{B.W Limit} = 0.25\% * f \text{ (MHz)} = 0.25\% * 315.038 \text{ MHz} = 787.595 \text{ kHz}$$

### 3.5 Test Result

