



Test Report

Product Name : ORO Remote Controller
 Model No. : ORC01
 FCC ID. : W55FDBFM1B2

Applicant : Oro Technology Co., LTD
 Address : 3F, No.32-1, 24th Road, Industrial Park, Taichung 408,
 Taiwan

Date of Receipt : 2012/04/27
 Issued Date : 2012/05/09
 Report No. : 125022R-RFUSP41V01
 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 : 2012/05/09

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 Applicant : Oro Technology Co., LTD
 Address : 3F, No.32-1, 24th Road, Industrial Park, Taichung 408,
 Taiwan
 Manufacturer : Oro Technology Co., LTD
 Model No. : ORC01
 FCC ID. : W55FDBFM1B2
 EUT Voltage : Battery 3V
 Trade Name : ORO
 Applicable Standard : FCC 15 Subpart C Section 15.231(b): 2011
 Test Result : Complied

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Documented By :

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Approved By :

Roy Wang

(Roy Wang / Manager)

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1. General Information

1.1. EUT Description

Product Name	ORO Remote Controller
Trade Name	ORO
Model No.	ORC01
Frequency Range	433.98 MHz
Antenna Gain	0dBi
Channel Number	1
Type of Modulation	FSK, ASK
Channel Control	Auto
Antenna Type	PCB layout

Working Frequency of Each Channel	
Channel	Frequency
001	433.98 MHz

Note:

1. This device is an ORO Remote Controller included a 433.98MHz transceiver 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.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 125022R-RFUSP37V02 under Declaration of Conformity.

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

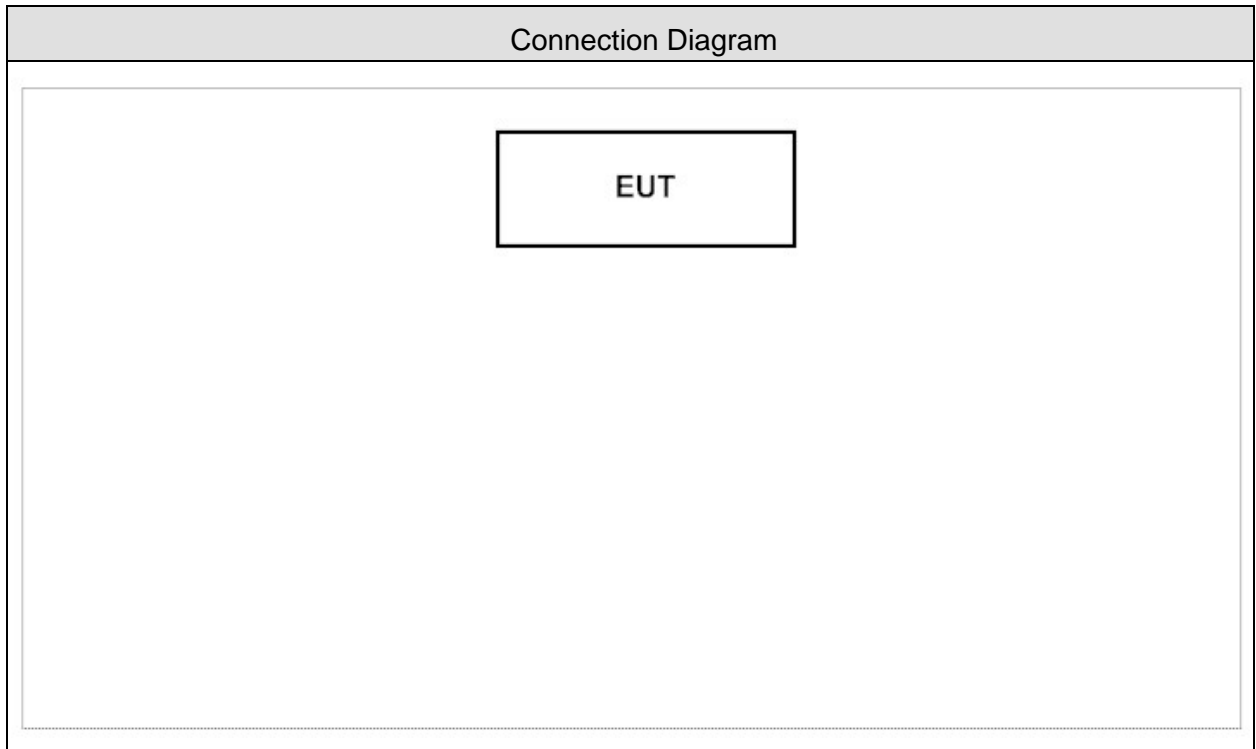
Emission	
Performed Item	
Conducted Emission	No
Radiated Emission	Yes
Occupied Bandwidth	Yes
Duty cycle	Yes
Transmitter time	Yes

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	48
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Occupied Bandwidth	15 - 35	25
Humidity (%RH)		25 - 75	48
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Duty Cycle	15 - 35	25
Humidity (%RH)		25 - 75	48
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Transmitter Time	15 - 35	25
Humidity (%RH)		25 - 75	48
Barometric pressure (mbar)		860 - 1060	950-1000

Site Description: September 27, 2010 File on
Federal Communications Commission
Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 365520
Accredited by TAF
Accreditation Number: 1313
Effective through: December 27, 2013



Accredited by NVLAP
NVLAP Lab Code: 200347-0
Effective through: September 30, 2012



Site Name: Quietek Corporation

Site Address: No.75-1, Wang-Yeh Valley, Yung-Hsing,
Chiung-Lin, Hsin-Chu County,
Taiwan, R.O.C.
TEL : 886-3-592-8858 / FAX : 886-3-592-8859
E-Mail : service@quietek.com

2. Radiated Emission

2.1. Test Equipment

The following test equipments are used during the test:

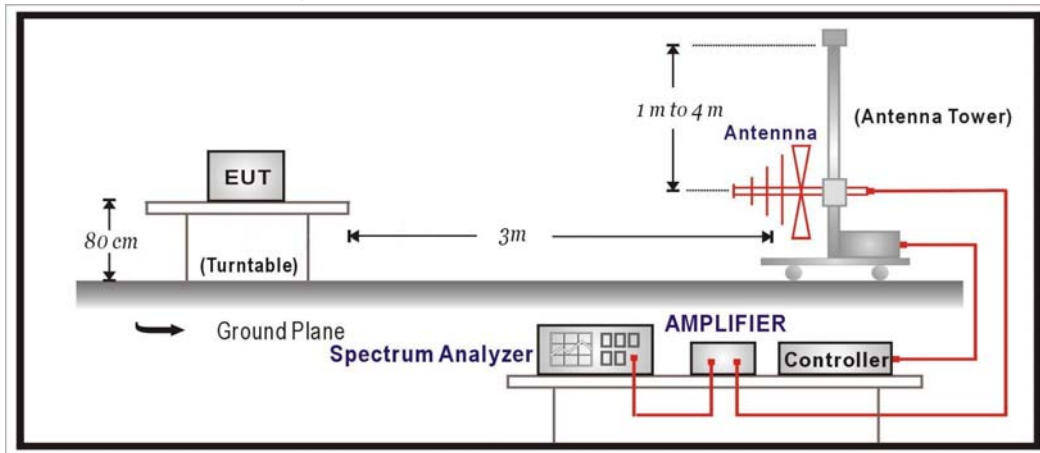
Radiated Emission / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	SCHAFFNER	CBL6112B	2895	2012/08/14
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120D	743	2013/02/02
Pre-Amplifier	MITEQ	AMF-4D-005180-24-10P	888003	2012/12/05
Pre-Amplifier	QuieTek	AP-025C	CHM-0706049	2013/02/02
Spectrum Analyzer	Agilent	E4440A	MY46187335	2013/02/07
Coaxial Cable	Huber+Suhner AG	Sucoflex 102	25623/2	2012/03/21

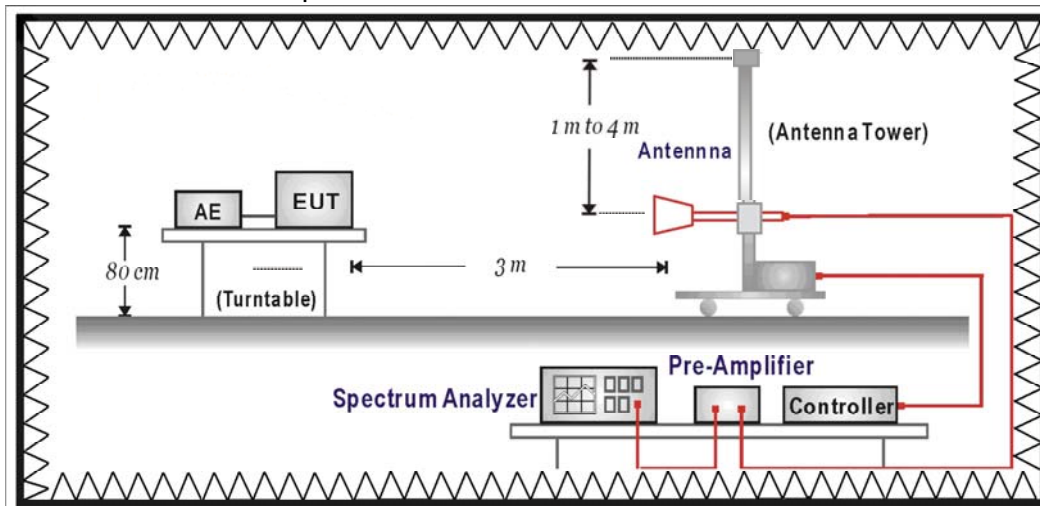
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

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): 2011

2.6. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

2.7. Test Result

Product	ORO Remote Controller				
Test Item	Fundamental Radiated Emission				
Test Mode	Mode 1: Transmit				
Date of Test	2012/05/07	Test Site	CB1		

Frequency (MHz)	Correct Factor(dB)	Reading Level (dBuV)	Peak Emission Level (dBuV/m)	Average Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)
Horizontal						
433.98 (X-axis)	15.632	51.209	66.841	60.393	100.83	80.83
433.98 (Y-axis)	15.633	51.413	67.047	60.599	100.83	80.83
433.98 (Z-axis)	15.632	57.933	73.565	67.117	100.83	80.83
Vertical						
433.98 (X-axis)	15.632	55.387	71.019	64.571	100.83	80.83
433.98 (Y-axis)	15.632	57.433	73.065	66.617	100.83	80.83
433.98 (Z-axis)	15.633	39.978	55.612	49.164	100.83	80.83

Note1:

Peak Measurement Level = Reading Level + Correct Factor

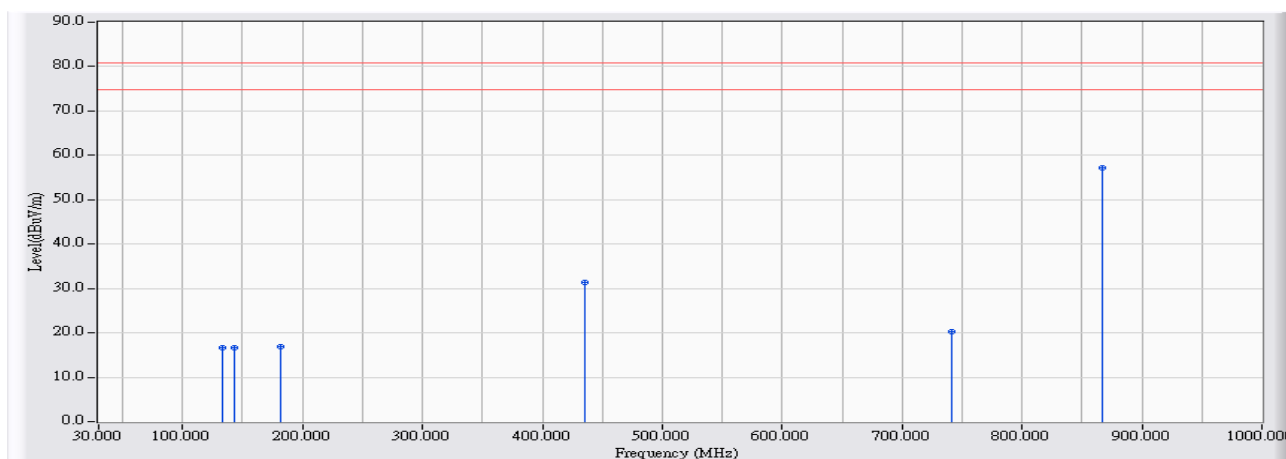
Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)

Duty Cycle= Ton/ Toff=(47.6ms/100ms)=0.476

20*Log(Duty Cycle) = -6.448

30MHz-1GHz Spurious :

Site : CB1	Time : 2012/05/06 - 13:23
Limit : FCC_SPARTC_15.231(b)_H_433.98MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - HORIZONTAL	Power : Battery 3V
EUT : ORO Remote Controller	Note : TX_ axis Z

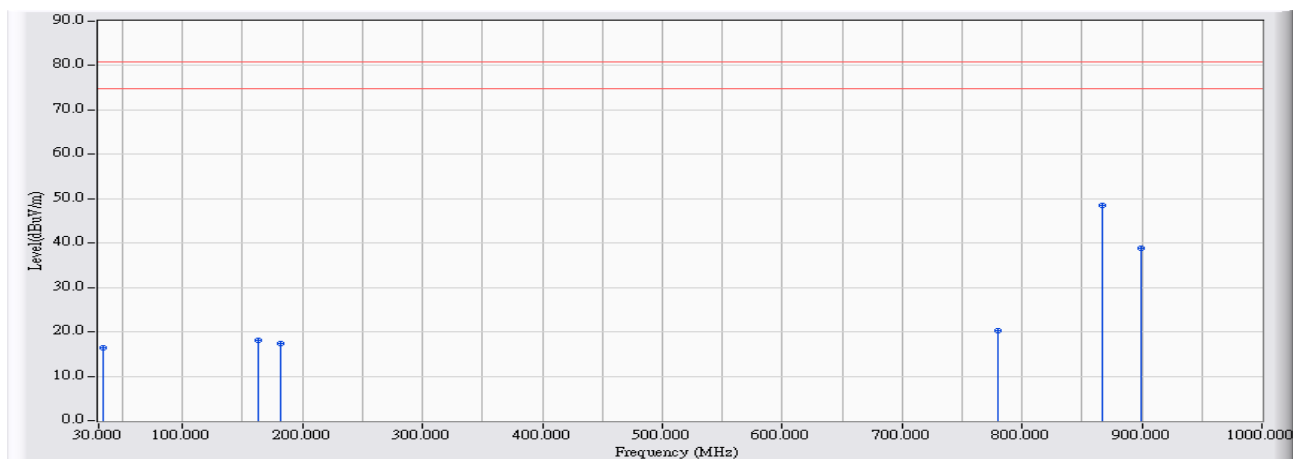


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		133.467	-12.568	29.307	16.739	-64.091	80.830	PEAK
2		143.167	-13.105	29.785	16.680	-64.150	80.830	PEAK
3		181.967	-14.715	31.718	17.003	-63.827	80.830	PEAK
4		435.783	-6.628	38.067	31.439	-49.391	80.830	PEAK
5		741.333	-3.401	23.771	20.370	-60.460	80.830	PEAK
6	*	867.433	-2.214	59.356	57.141	-23.689	80.830	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB1	Time : 2012/05/06 - 13:31
Limit : FCC_SPARTC_15.231(b)_H_433.98MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_30-1G-1_0901 - VERTICAL	Power : Battery 3V
EUT : ORO Remote Controller	Note : TX_ axis Z



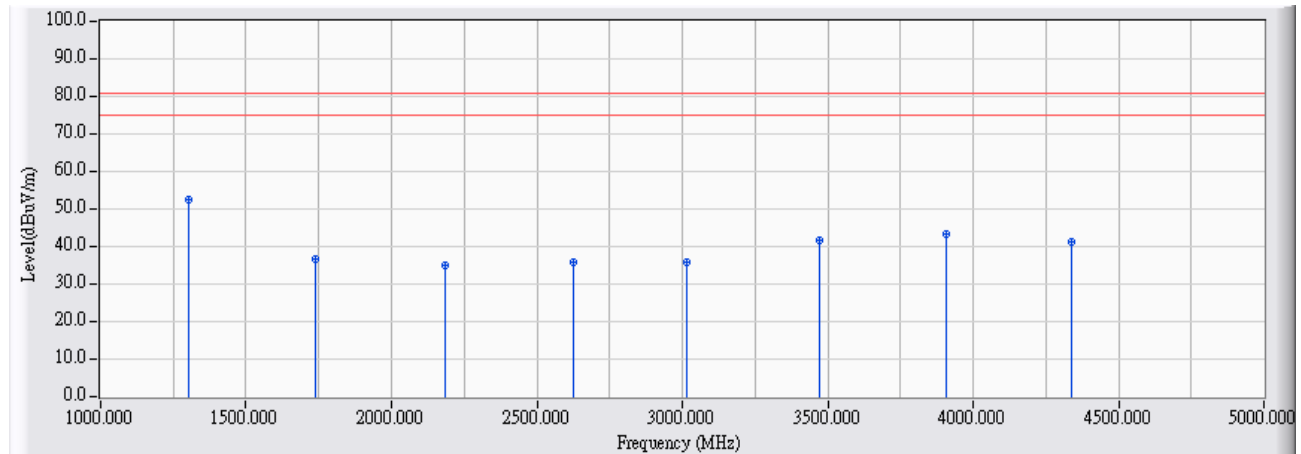
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		33.233	-10.505	26.807	16.302	-64.528	80.830	PEAK
2		162.567	-14.034	32.213	18.179	-62.651	80.830	PEAK
3		181.967	-14.715	31.977	17.262	-63.568	80.830	PEAK
4		780.133	-2.904	23.083	20.180	-60.650	80.830	PEAK
5	*	867.433	-2.214	50.788	48.573	-32.257	80.830	PEAK
6		899.767	-2.011	40.852	38.841	-41.989	80.830	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Above 1GHz Spurious:

Site : CB1	Time : 2012/05/06 - 14:50
Limit : FCC_SPARTC_15.231(b)_H_433.98MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - HORIZONTAL	Power : Battery 3V
EUT : ORO Remote Controller	Note : TX_ axis Z

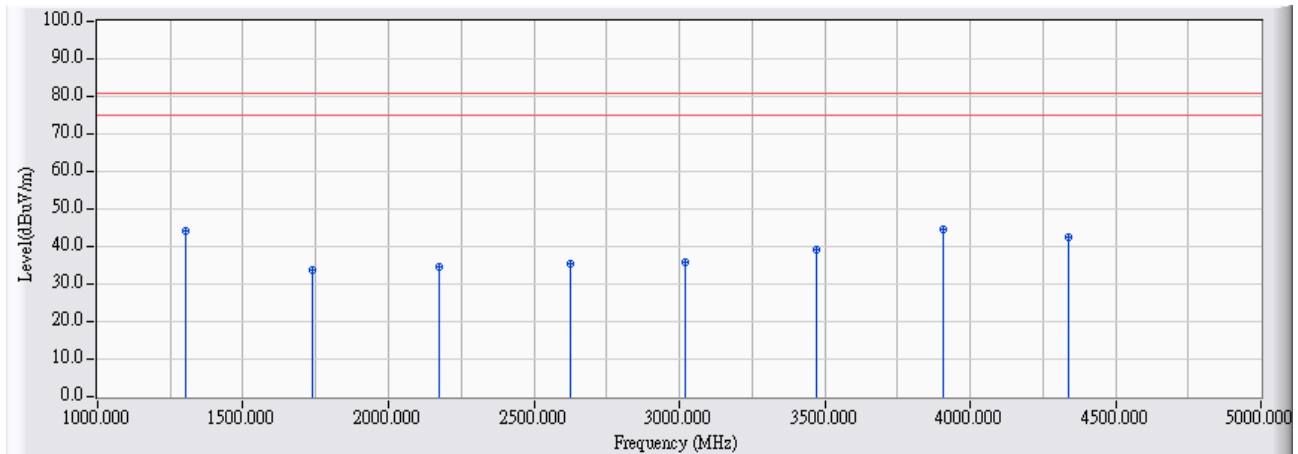


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	1302.360	-10.609	62.940	52.331	-28.499	80.830	PEAK
2		1735.920	-9.684	46.430	36.747	-44.083	80.830	PEAK
3		2182.730	-7.375	42.300	34.925	-45.905	80.830	PEAK
4		2625.300	-6.172	41.890	35.718	-45.112	80.830	PEAK
5		3014.030	-5.100	41.020	35.920	-44.910	80.830	PEAK
6		3472.510	-3.325	44.950	41.625	-39.205	80.830	PEAK
7		3905.490	-2.280	45.620	43.340	-37.490	80.830	PEAK
8		4339.380	-0.912	42.320	41.409	-39.421	80.830	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= Ton/ Toff=(47.6ms/100ms)=0.476
20*Log(Duty Cycle) = -6.448
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB1	Time : 2012/05/06 - 14:40
Limit : FCC_SPARTC_15.231(b)_H_433.98MHz_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G-1_0901 - VERTICAL	Power : Battery 3V
EUT : ORO Remote Controller	Note : TX_ axis Z



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	1301.770	-10.610	54.800	44.189	-36.641	80.830	PEAK
2	1735.920	-9.684	43.500	33.817	-47.013	80.830	PEAK
3	2176.480	-7.401	41.970	34.569	-46.261	80.830	PEAK
4	2625.050	-6.173	41.780	35.608	-45.222	80.830	PEAK
5	3021.610	-5.069	40.920	35.850	-44.980	80.830	PEAK
6	3471.510	-3.329	42.480	39.151	-41.679	80.830	PEAK
7	* 3906.570	-2.279	46.860	44.581	-36.249	80.830	PEAK
8	4340.470	-0.906	43.220	42.313	-38.517	80.830	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= Ton/ Toff=(47.6ms/100ms)=0.476
20*Log(Duty Cycle) = -6.448
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

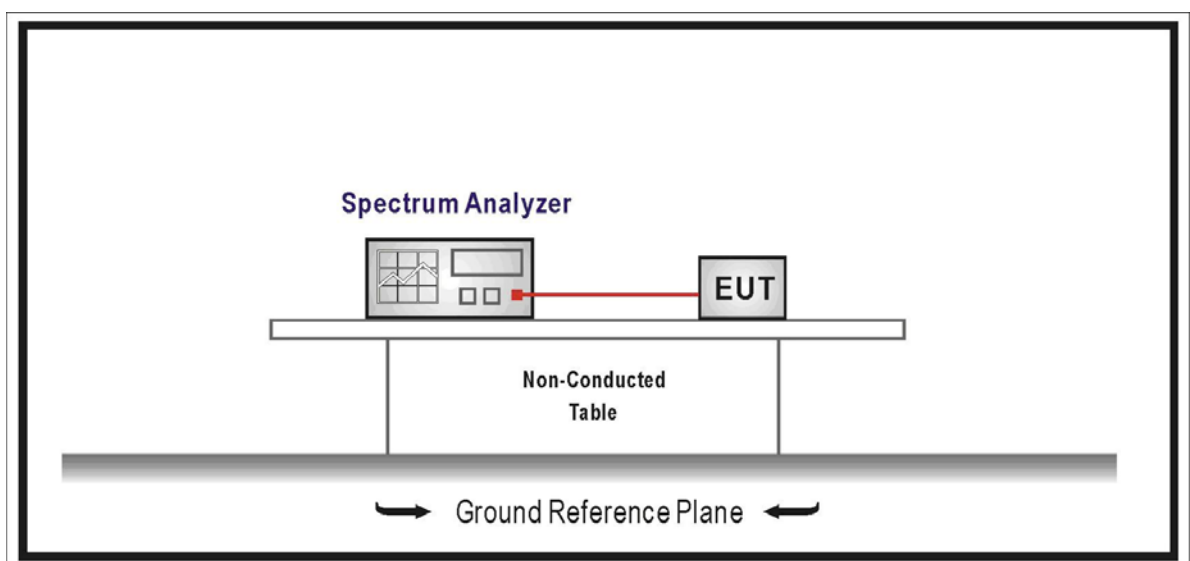
The following test equipments are used during the radiated emission tests:

Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2013/02/19

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): 2011

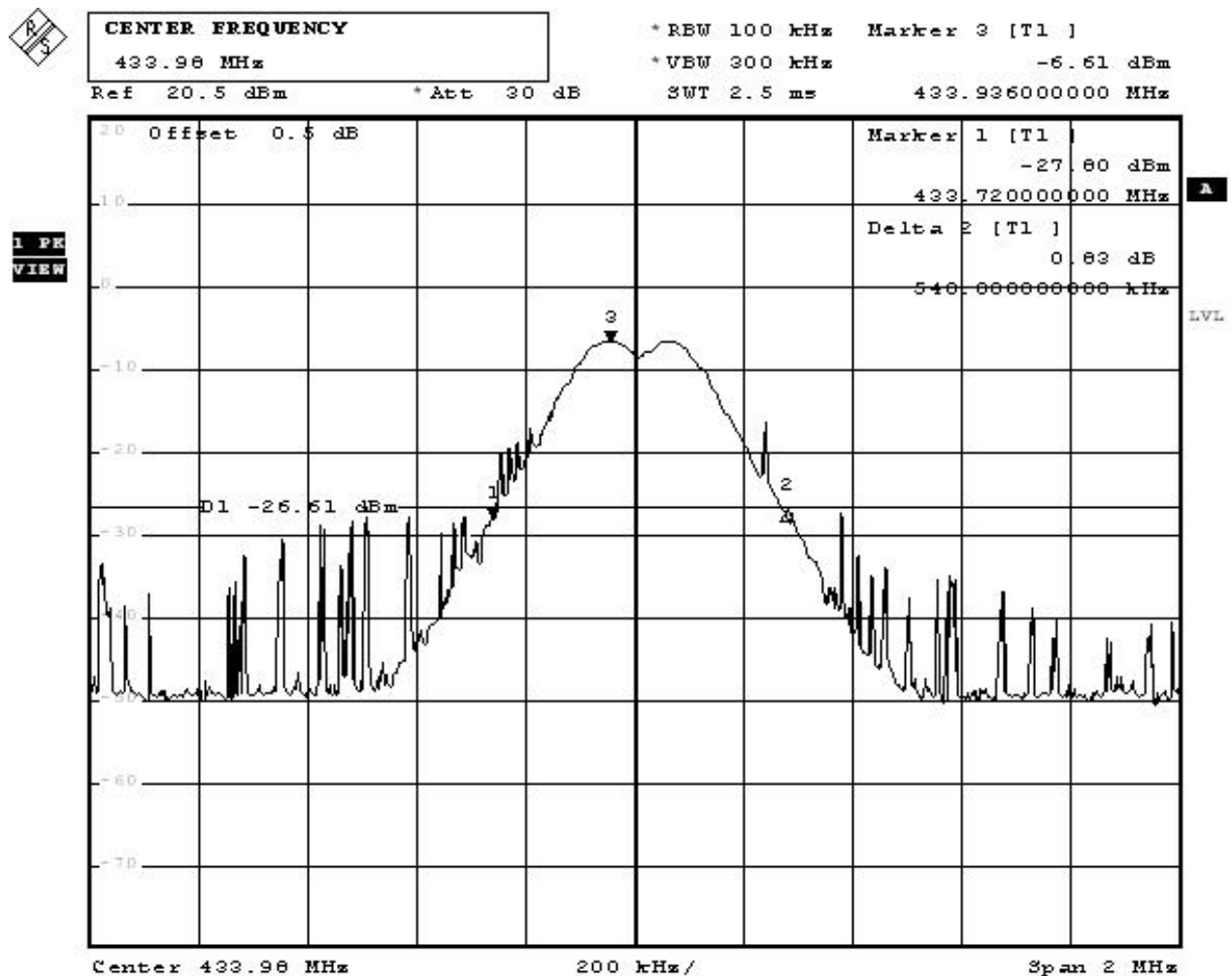
3.5. Uncertainty

$\pm 150\text{Hz}$

3.6. Test Result

Product	ORO Remote Controller		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2012/05/07	Test Site	SR7

Center Frequency	433.98 MHz
Allowable Bandwidth (70-900 MHz: 0.25%, Above 900MHz: 0.5%)	787.50 kHz
Bandwidth at 20dB down (Max)	540.00 kHz
Result	PASS



Comment: A:\2

Date: 7.MAY.2012 10:38:49

4. Duty cycle

4.1. Test Equipment

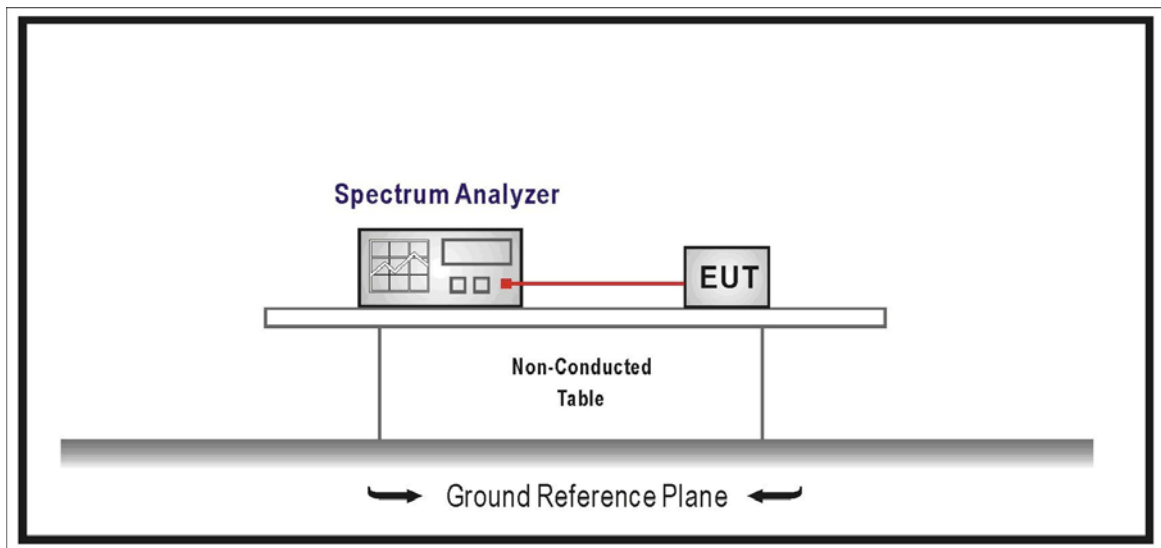
The following test equipments are used during the radiated emission tests:

Duty cycle / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2013/02/19

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): 2011

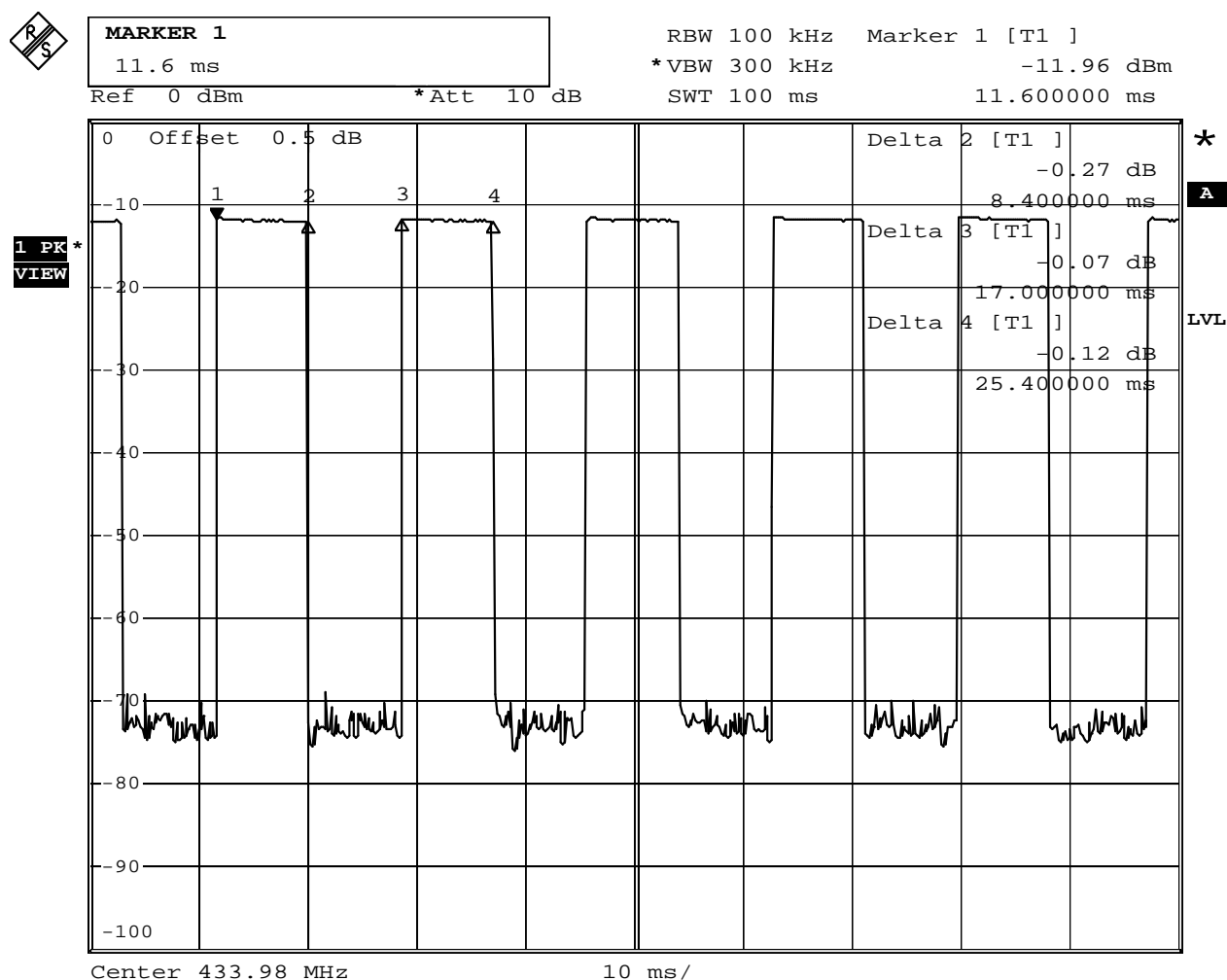
4.5. Uncertainty

$\pm 25\text{msec}$

4.6. Test Result

Product	ORO Remote Controller		
Test Item	Duty Cycle		
Test Mode	Mode 1: Transmit		
Date of Test	2012/05/07	Test Site	SR7

Center Frequency	433.98 MHz
$T_{ON} = 47.6\text{ms}$	
$T_{ON} + T_{Off} = 100\text{ms}$	
Duty Cycle = $47.6/100$	47.6%



Comment: A:\2

Date: 7.MAY.2012 17:58:04

5. Transmitter time

5.1. Test Equipment

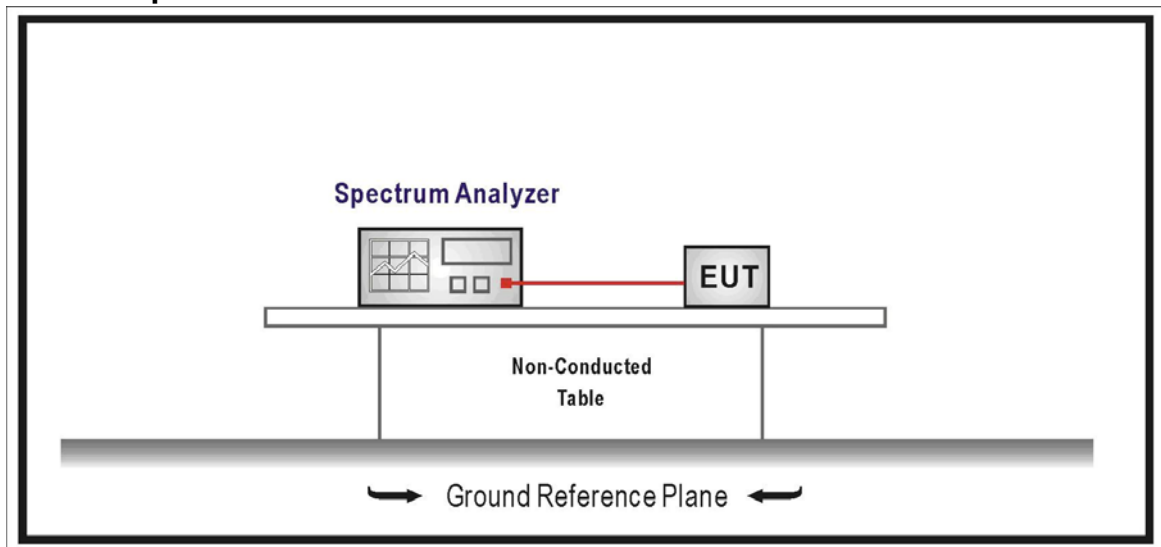
The following test equipments are used during the radiated emission tests:

Transmitter time / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2013/02/19

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

5.2. Test Setup



5.3. Limits

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

5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2011

5.5. Uncertainty

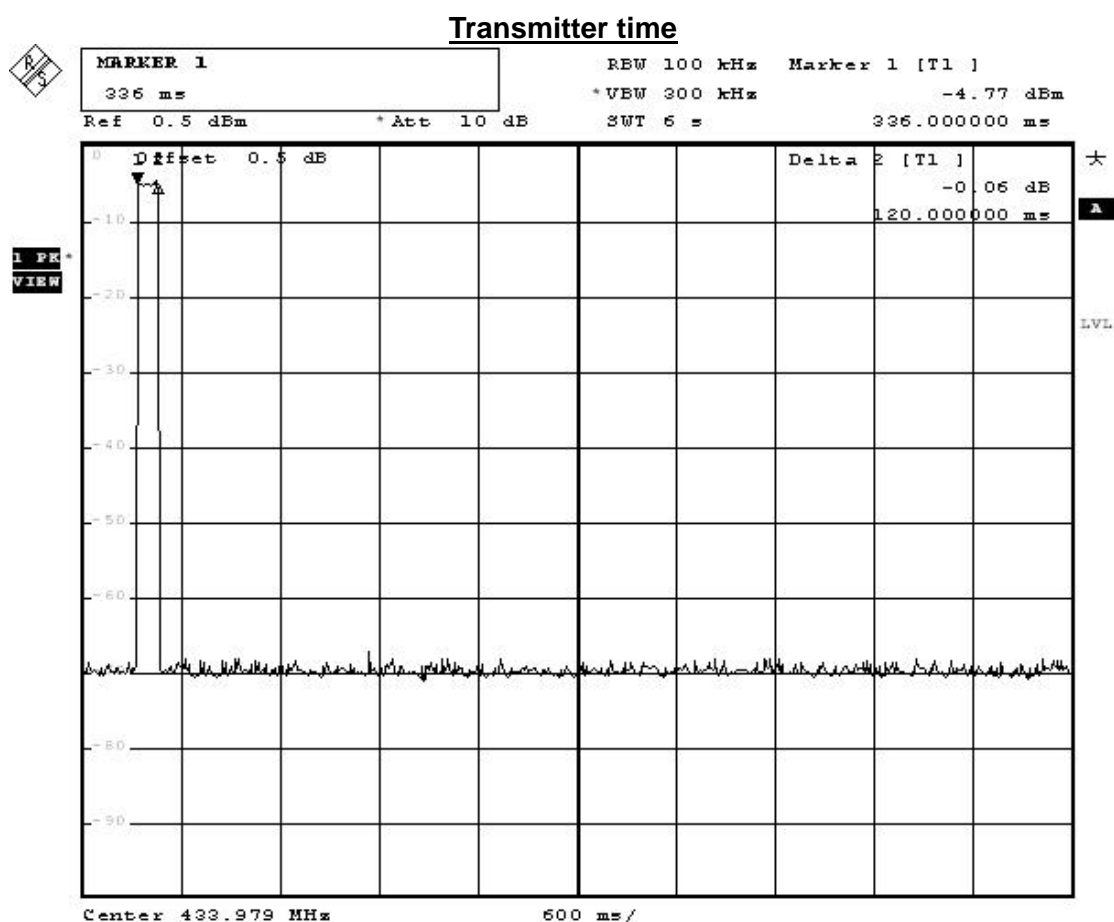
± 25msec

5.6. Test Result

Product	ORO Remote Controller		
Test Item	Transmitter time		
Test Mode	Mode 1: Transmit		
Date of Test	2012/05/07	Test Site	SR7

Center Frequency	433.98 MHz
Transmitter time = 0.12 s < 5 sec.	< 5 sec.

Result	PASS
--------	------



Comment: A:\2
Date: 7.MAY.2012 18:12:01