

APPLICATION FOR CERTIFICATION  
On Behalf of

Jasco Products Company LLC

Solid Button RF Remote

Model Number: ST-602

Prepared for : Jasco Products Company LLC  
311 Northwest 122<sup>nd</sup> Street Oklahoma City, OK 73114  
United States

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Report Number : ACS-F07028  
Date of Test : Dec.27, 2006~Jan.23, 2007  
Date of Report : Feb.01, 2007

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## TEST REPORT DECLARATION

Applicant : Jasco Products Company LLC  
 Manufacturer : Smart Technologies & Investment Limited  
 EUT Description : Solid Button RF Remote  
 (A) MODEL NO. : ST-602  
 (B) SERIAL NO. : N/A  
 (C) POWER SUPPLY : Battery 6V

Test Procedure Used:

FCC Rules and Regulations Part 15 Subpart C 2006

The device described above is tested by Audix Technology (Shenzhen) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits for radiated and conducted emissions. The test results are contained in this test report and Audix Technology (Shenzhen) Co., Ltd. is assumed full responsibility for the accuracy and completeness of tests. Also, this report shows that EUT is technically compliant with FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shenzhen) Co., Ltd.

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

Date of Test : Dec.27, 2006~Jan.23, 2007

Prepared by :

YoYo Wang

YoYo Wang / Assistant

Reviewer :

Sean Xing  
Sean Xing / Assistant Manager

**AUDIX**

信華科技(深圳)有限公司

Audix Technology (Shenzhen) Co., Ltd.

EMC 部門報告專用章

Stamp only for EMC Dept. Report

Signature: Ken Lu 2/5/07

Approved & Authorized Signer :

Ken Lu / Deputy Manager

Name of the Representative of the Responsible Party : \_\_\_\_\_

Signature : \_\_\_\_\_

# 1. SUMMARY OF STANDARDS AND RESULTS

## 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

<b>EMISSION</b>		
<b>Description of Test Item</b>	<b>Standard</b>	<b>Results</b>
Radiated Emission Test	FCC Part 15: 15.231 ANSI C63.4: 2003	PASS
Band Edge Compliance Test	FCC Part 15: 15.231	PASS
Stop Transmitting Time Test	FCC Part 15: 15.231	PASS
20 dB Bandwidth Test	FCC Part 15: 15.231	PASS

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Description : Solid Button RF Remote

Model Number : ST-602

Applicant : Jasco Products Company LLC  
311 Northwest 122<sup>nd</sup> Street Oklahoma City, OK 73114 United States

Manufacturer : Smart Technologies & Investment Limited  
Units C&D, 18/F Spectrum Tower, No.53 Hung to Road, Kwun Tong Kowloon HongKong

Date of Test : Dec.27, 2006~Jan.23, 2007

## 2.2. Test Facility

### Site Description

- 3m Anechoic Chamber : Jun. 13, 2006 File on Federal Communication Commission  
Registration Number: 90454
- 3m & 10m Anechoic Chamber : Mar.15, 2004 File on Federal Communication Commission  
Registration Number: 794232
- EMC Lab. : Accredited by DATech, German  
Registration Number: DAT-P-091/99-01  
Feb. 02, 2004
- Accredited by NVLAP, USA  
NVLAP Code: 200372-0  
Apr.01, 2006

## 2.3. Measurement Uncertainty

No.	Item	Uncertainty	Remark
1.	Uncertainty for Conducted Emission Test	1.22dB	
2.	Uncertainty for Radiated Emission Test	3.14dB	3m Chamber
3.	Uncertainty for Radiated Emission Test	3.18dB	10m Chamber
4.	Uncertainty for Power Clamp Test	1.38dB	

### **3. POWER LINE CONDUCTED EMISSION TEST**

According to Paragraph (f) of FCC Part 15 section 15.231, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

## 4. RADIATED EMISSION TEST

### 4.1. Test Equipment

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

#### 4.1.1. For Anechoic Chamber

Frequency rang: 30~1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Spectrum	HP	85422E	3625A00181	May 15, 06	1 Year
2.	Test Receiver	Rohde & Schwarz	ESVS20	830350/005	May 15, 06	1 Year
3.	Amplifier	HP	8447D	2944A07794	Sep. 12,06	1/2 Year
4.	Bilog Antenna	Schaffner	CBL6111C	2598	Jan. 11, 06	1 Year
5.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.1	Jul. 30, 06	1/2 Year
6.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.2	Jul. 30, 06	1/2 Year
7.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.3	Jul. 30, 06	1/2 Year
8.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.4	Jul. 30, 06	1/2 Year
9.	Coaxial Switch	Anritsu	MP59B	M73989	Jul. 30, 06	1/2 Year

Frequency rang: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Jun.01, 06	1 Year
2.	Test Receiver	Rohde & Schwarz	ESVS20	830350/005	May.15, 06	1 Year
3.	Amplifier	HP	8447D	2944A07794	Mar.13, 06	1/2 Year
4.	Bilog Antenna	Schaffner	CBL6111C	2598	Jan. 11, 06	1 Year
5.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.1	Jul. 28, 06	1/2 Year
6.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.2	Jul. 28, 06	1/2 Year
7.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.3	Jul. 28, 06	1/2 Year
8.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.4	Jul. 28, 06	1/2 Year
9.	Coaxial Switch	Anritsu	MP59B	M73989	Jul. 28, 06	1/2 Year
10.	Spectrum	Agilent	E4407B	MY41440292	May.15, 06	1 Year
11.	Amp	HP	8449B	3008A00863	May.15, 06	1 Year
12.	Antenna	EMCO	3115	9607-4877	Jan. 23, 07	1.5 Year

### 4.2. Block Diagram of Test Setup

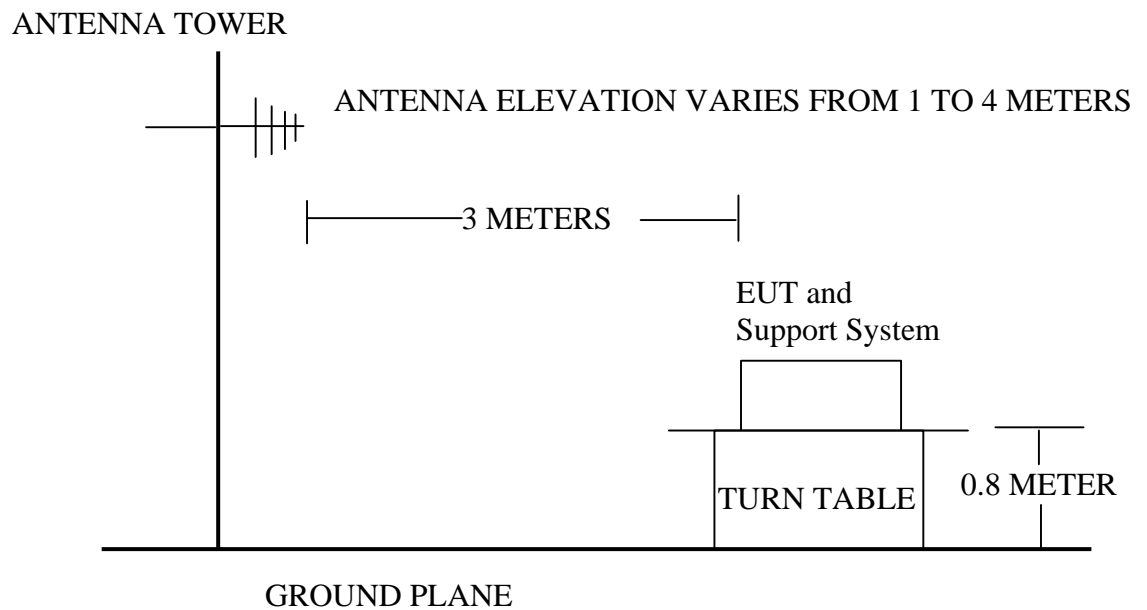
#### 4.2.1. Block Diagram of connection between EUT and simulators

EUT

*(EUT: Solid Button RF Remote)*



## 4.2.2. Anechoic Chamber Setup Diagram



## 4.3. Radiated Emission Limit 30~1000MHz Standard: FCC Part 15

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Local Oscillator:	3	100.80 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 80.80 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Above 1000	3	Other: 74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

- Remark :
- (1) Emission level  $\text{dB}\mu\text{V} = 20 \log$  Emission level  $\mu\text{V}/\text{m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

## 4.4. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

## 4.4.1. Solid Button RF Remote (EUT)

Model Number : ST-602  
 Serial Number : N/A  
 Manufacturer : Smart Technologies & Investment Limited

#### 4.5. Operating Condition of EUT

4.5.1. Setup the EUT as shown in Section 4.2..

4.5.2. Let the EUT work in test modes (TX) and test it.

#### 4.6. Test Procedure

The EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2003 on radiated emission Test.

This test was performed with EUT in horizontal position and vertical position, the highest emission levels was found when the EUT in a horizontal position as show in test photo. And this position was made for final emission test.

The bandwidth of the EMI test receiver (R&S ESVS20) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the VBW is set at 300kHz and RBW is set at 120kHz for measurement below 1GHz.

The frequency range from 30MHz to 1000MHz and above 1000MHz are checked.

The test modes (TX Mode) is tested in Anechoic Chamber and all the scanning waveforms are reported on Section 4.7.

#### 4.7. Radiated Emission Test Results

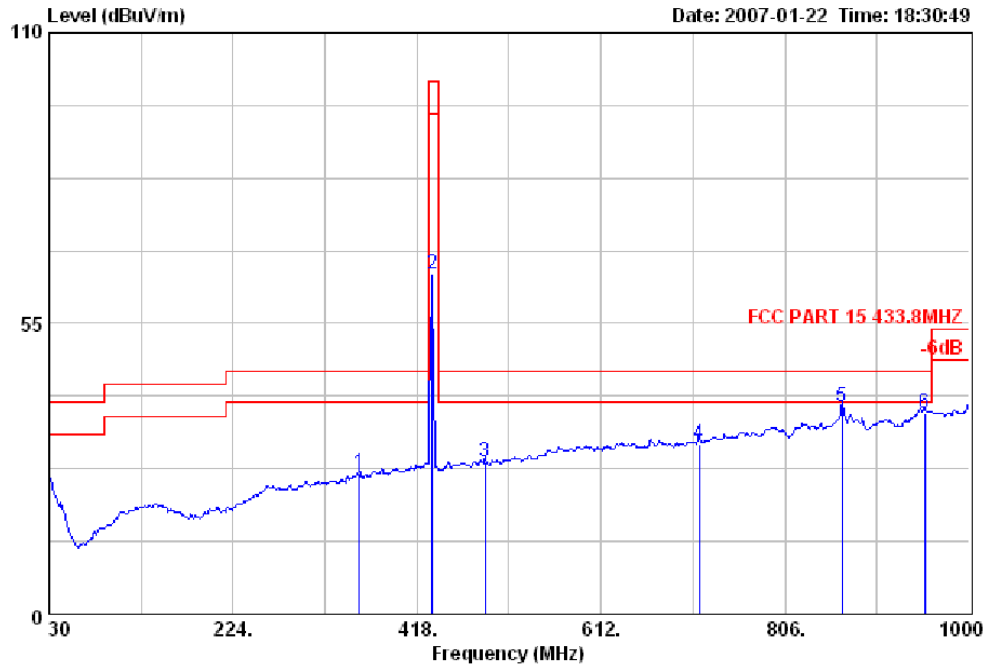
**PASS.**

The frequency range from 30MHz to 1000MHz and above 1GHz. is investigated. Please see the following pages.



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Data: 1 File: D:\2007 Report Data\S\Shenshi1.EMI (8)



Site no. : Audix 3# Chamber Data no. : 1  
 Dis. / Ant. : 3m 2769FACTOR3M Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 433.8MHZ  
 Env. / Ins. : 25°C/55% ESVS20 Engineer : Skyle  
 EUT : Solid Button RF Remote M/N:ST-602  
 Power Rating : Battery 6V  
 Test Mode : Tx Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	356.89	15.14	4.50	6.93	26.57	46.00	19.43	QP
2	433.88	17.00	5.11	42.20	64.31	100.80	36.49	Peak
3	489.78	17.80	5.52	5.48	28.80	46.00	17.20	QP
4	715.79	20.72	6.44	5.13	32.29	46.00	13.71	QP
5	866.14	22.88	7.52	8.81	39.21	46.00	6.79	Peak
6	953.44	24.27	8.13	5.73	38.13	46.00	7.87	QP

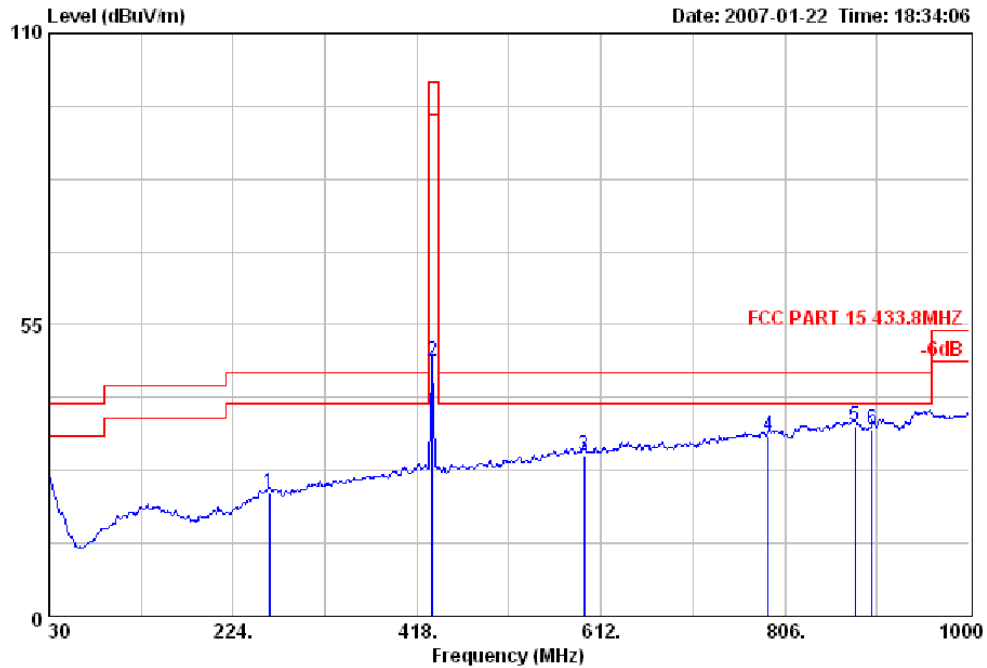
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported

Fundamental and Harmonics Average Result					
Freq(MHz)	Peak Level (dBμV/m)	PDCF(dBμV/m) (see Section 8)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Conclusion
433.88	64.31	-4.96	59.35	80.80	PASS
866.14	39.21	-4.96	34.25	60.80	PASS



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Data: 2 File: D:\2007 Report Data\S\Shenshi1.EMI (8)



Site no. : Audix 3# Chamber Data no. : 2  
 Dis. / Ant. : 3m 2769FACTOR3M Ant. pol. : VERTICAL  
 Limit : FCC PART 15 433.8MHZ  
 Env. / Ins. : 25°C/55% ESVS20 Engineer : Skyle  
 EUT : Solid Button RF Remote M/N:ST-602  
 Power Rating : Battery 6V  
 Test Mode : Tx Mode

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	261.83	13.88	3.87	5.59	23.34	46.00	22.66	QP
2	433.88	17.00	5.11	26.00	48.11	100.80	52.69	Peak
3	594.54	19.60	5.92	4.91	30.43	46.00	15.57	QP
4	788.54	21.87	7.04	5.03	33.94	46.00	12.06	QP
5	879.72	23.00	7.47	5.47	35.94	46.00	10.06	Peak
6	898.15	22.92	7.46	4.73	35.11	46.00	10.89	QP

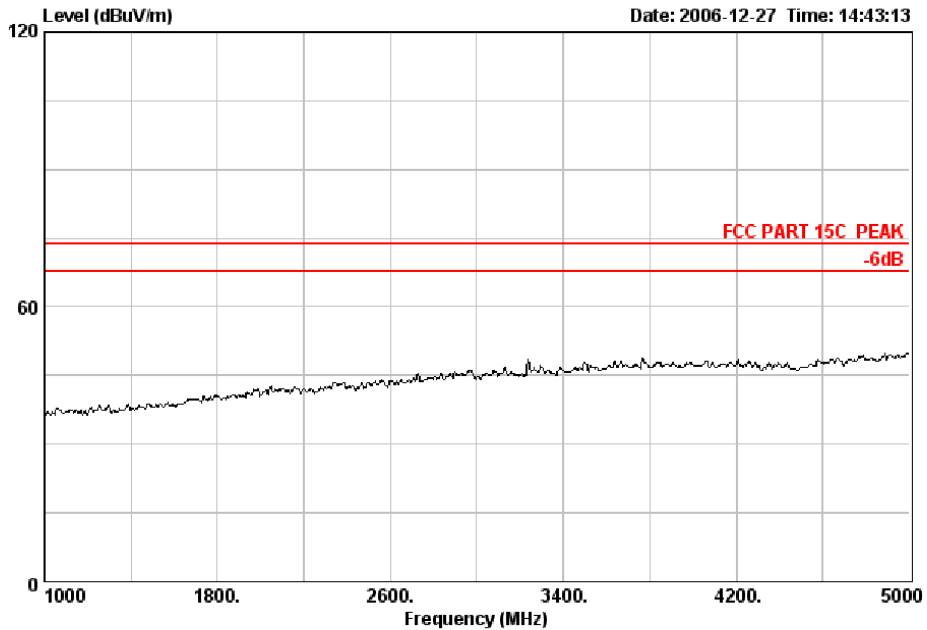
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported

Freq(MHz)	Peak Level (dBμV/m)	PDCF(dBμV/m) (see Section 8)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Conclusion
433.88	48.11	-4.96	43.15	80.80	PASS
879.72	35.94	-4.96	30.98	60.80	PASS



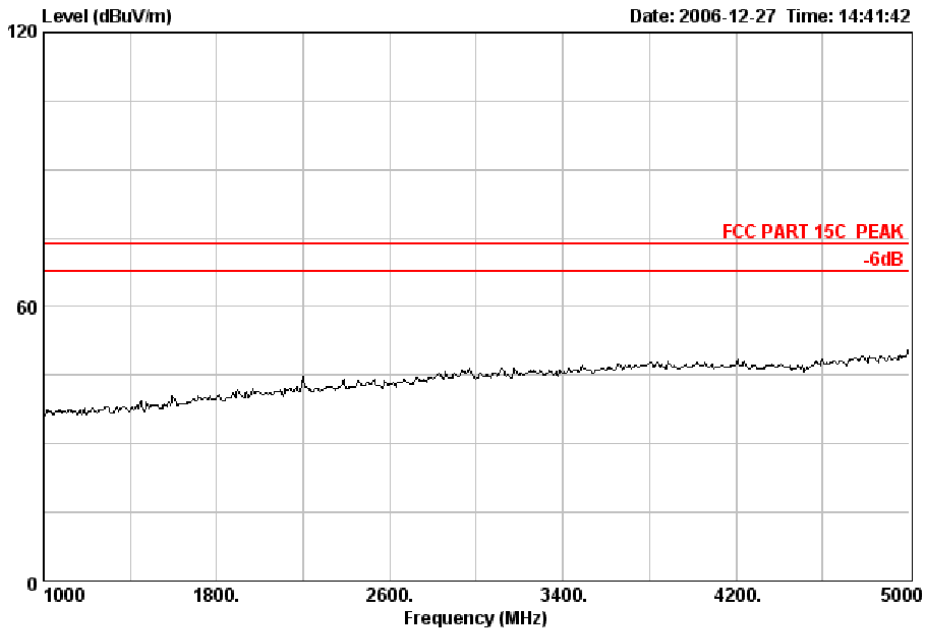
No.6, Ke Feng Road, Block 52,  
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 Fax: +86-755-26632877  
 Postcode: 518057

Data: 2 File: D:\2006 DATA\2006 Report Data\smart\ASC6QH175-1.EMI (10) Date: 2006-12-27 Time: 14:43:13



Site no. : Audix No.1 Chamber Data no. : 2  
 Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23°C/54% Engineer : Jamy  
 EUT : Solid Button RF Remote M/N:ST-602  
 Power Rating : Battery 6V  
 Test Mode : Tx Mode

Data: 1 File: D:\2006 DATA\2006 Report Data\smart\ASC6QH175-1.EMI (10) Date: 2006-12-27 Time: 14:41:42



Site no. : Audix No.1 Chamber Data no. : 1  
 Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23°C/54% Engineer : Jamy  
 EUT : Solid Button RF Remote M/N:ST-602  
 Power Rating : Battery 6V  
 Test Mode : Tx Mode

## 5. EDGE BAND TEST

### 5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Jun.01, 06	1 Year

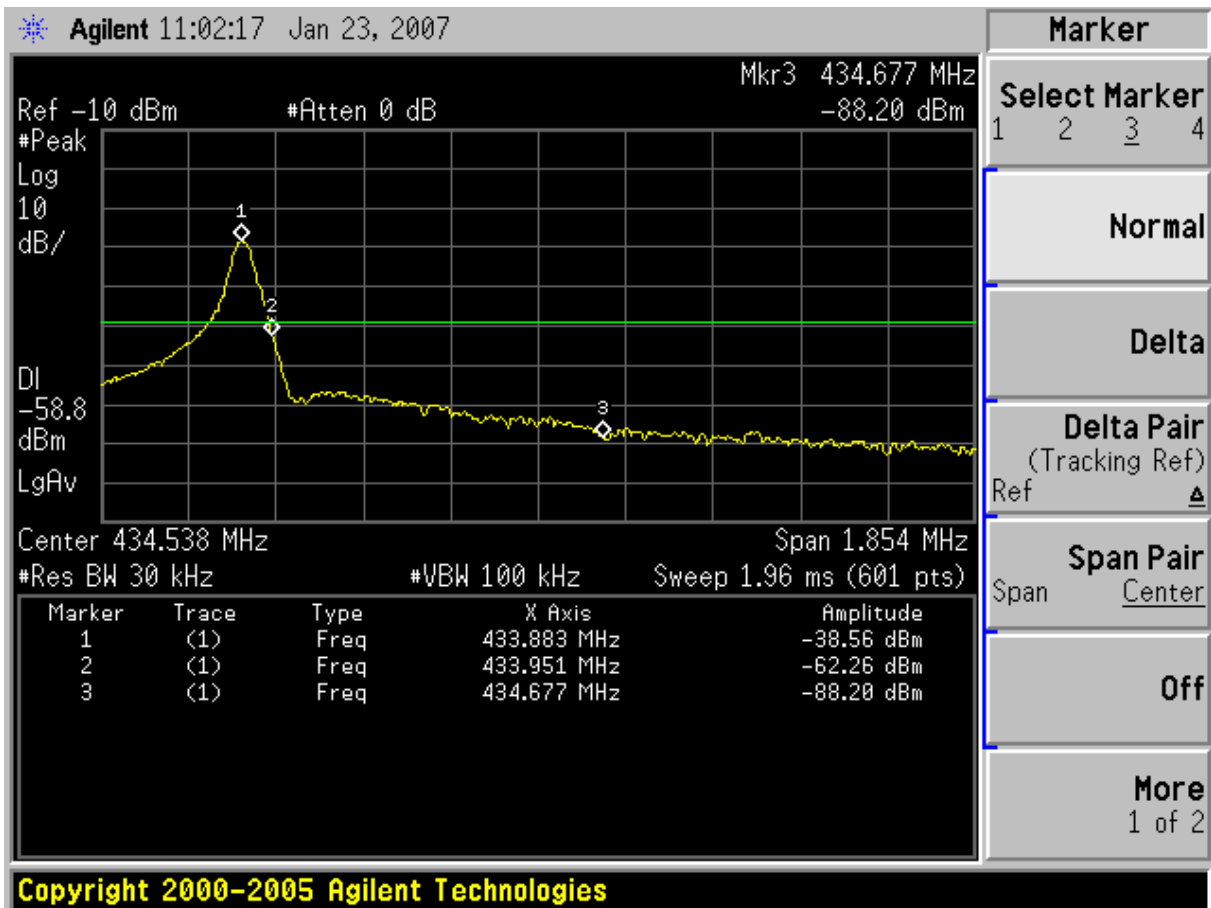
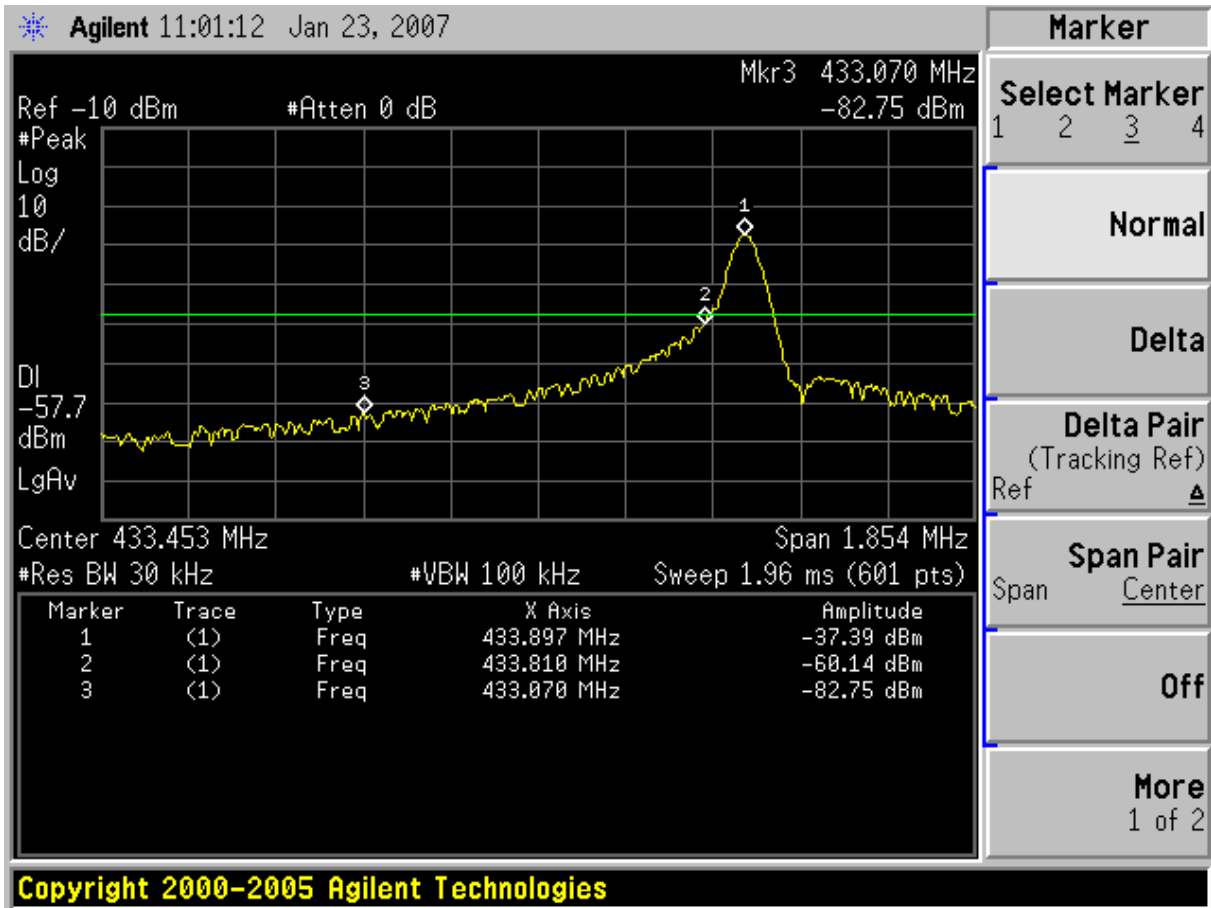
### 5.2. Test Information

EUT:	Solid Button RF Remote
M/N:	ST-602
Test Date:	Jan.23, 2007
Ambient Temperature:	23°C
Relative Humidity:	50%
Test standard:	FCC PART 15C: 15.231
Test mode:	Transmitting
Test Frequency:	433.8MHz
Test By:	Jamy

### 5.3. Test Results

**PASS.**

The testing data was attached in the next page.



## 6. STOP TRANSMITTING TIME TEST

### 6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Jun.01, 06	1 Year

### 6.2. Test Information

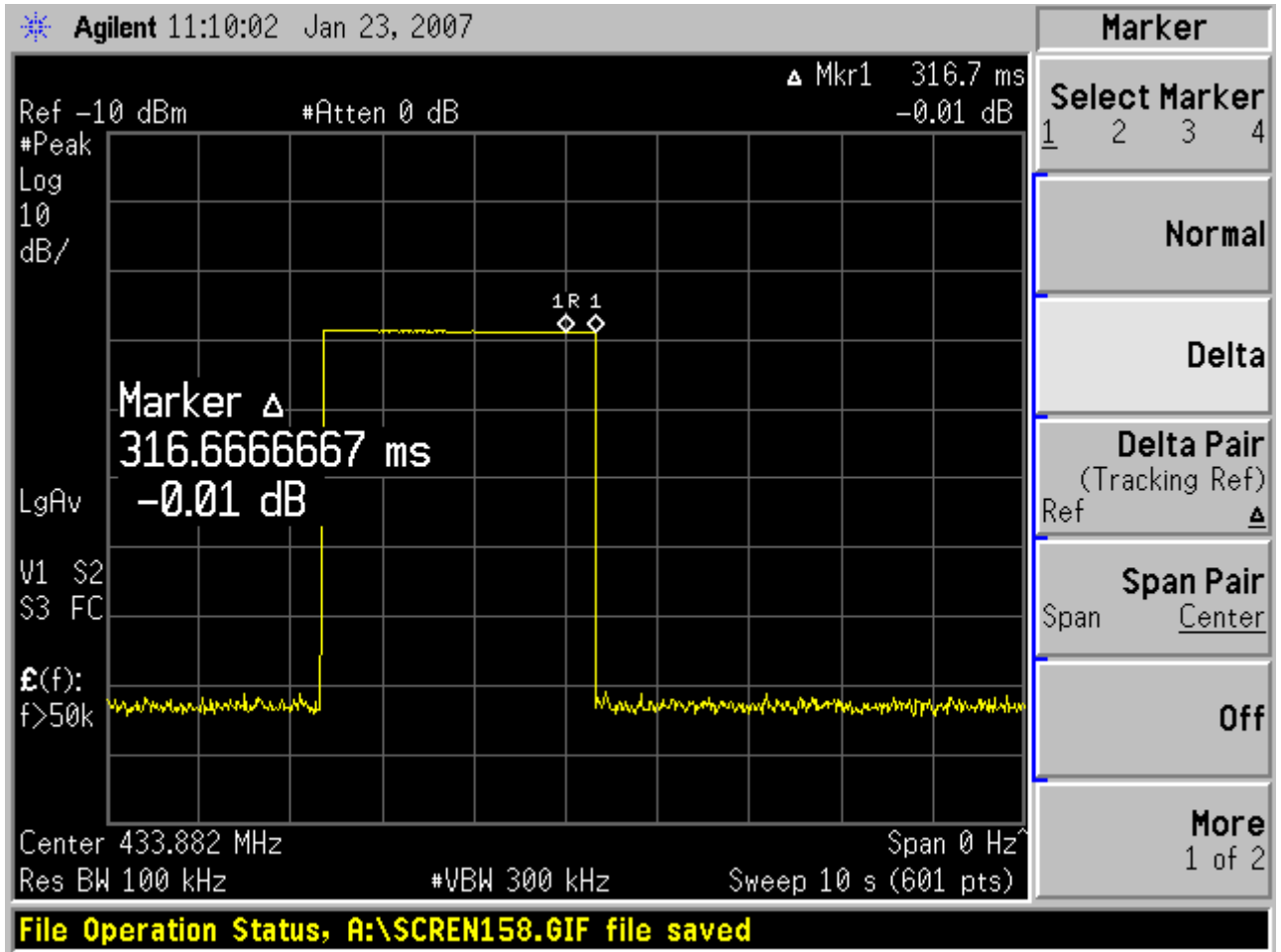
EUT:	Solid Button RF Remote
M/N:	ST-602
Test Date:	Jan.23, 2007
Ambient Temperature:	23°C
Relative Humidity:	50%
Test standard:	FCC PART 15C: 15.231
Test mode:	Transmitting
Test Frequency:	433.8MHz
Test By:	Jamy

### 6.3. Test Results

Set the spectrum to zero span, activated the EUT by manually, And then, we could see the transmitting wave in the spectrum, when the time marker went to "1R", released the EUT, After 316.7ms, we could see the EUT stop transmitting.

Frequency (MHz)	Stop Transmitting Time	Limit: not more than 5 seconds of being released	Conclusion
433.856	316.7ms	5s	PASS





## 7. 20 DB BANDWITH TEST

### 7.1. Test Equipment

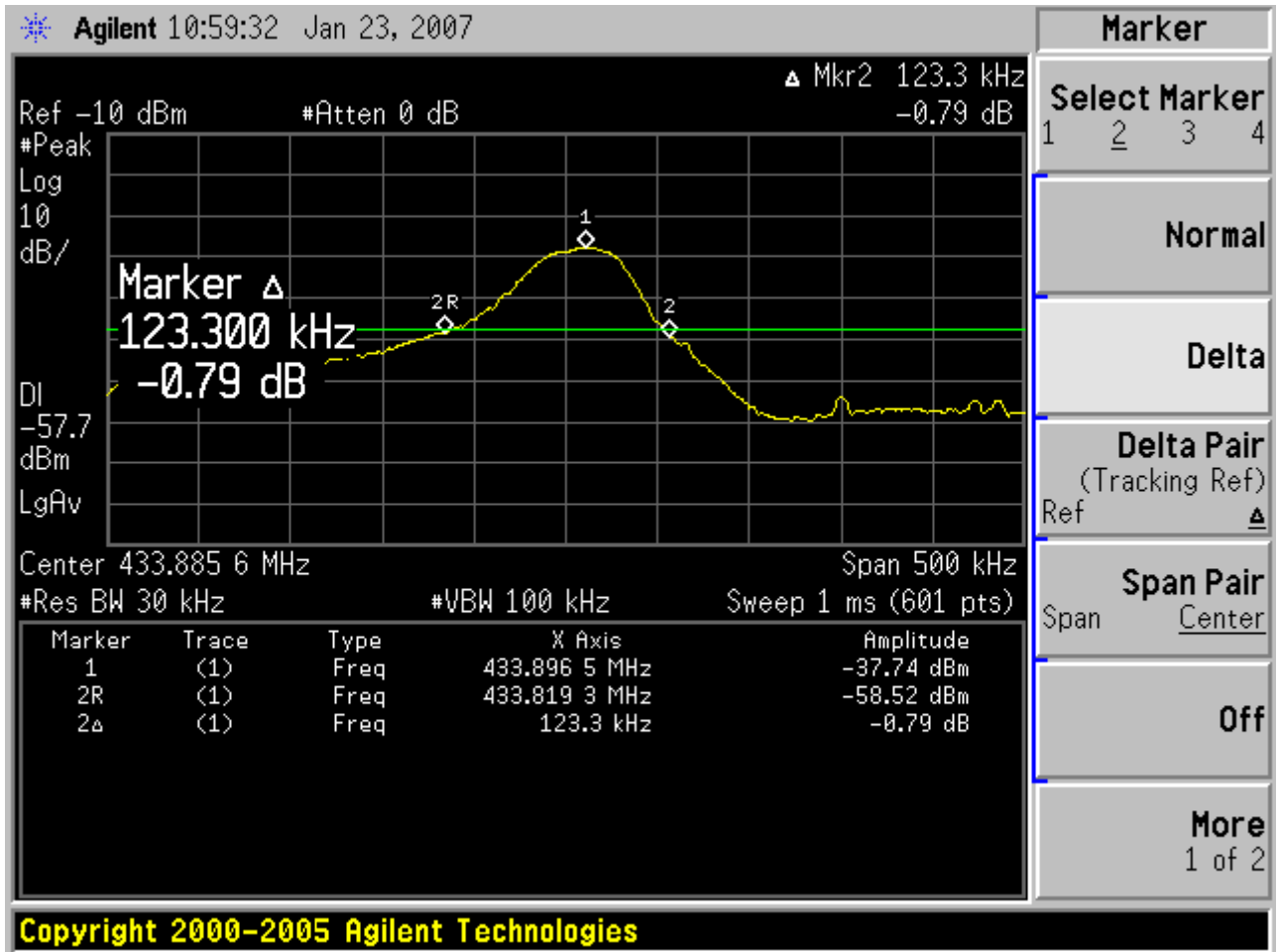
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Jun.01, 06	1 Year

### 7.2. Test Information

EUT:	Solid Button RF Remote
M/N:	ST-602
Test Date:	Jan.23, 2007
Ambient Temperature:	23°C
Relative Humidity:	50%
Test standard:	FCC PART 15C: 15.231
Test mode:	Transmitting
Test Frequency:	433.8MHz
Test By:	Jamy

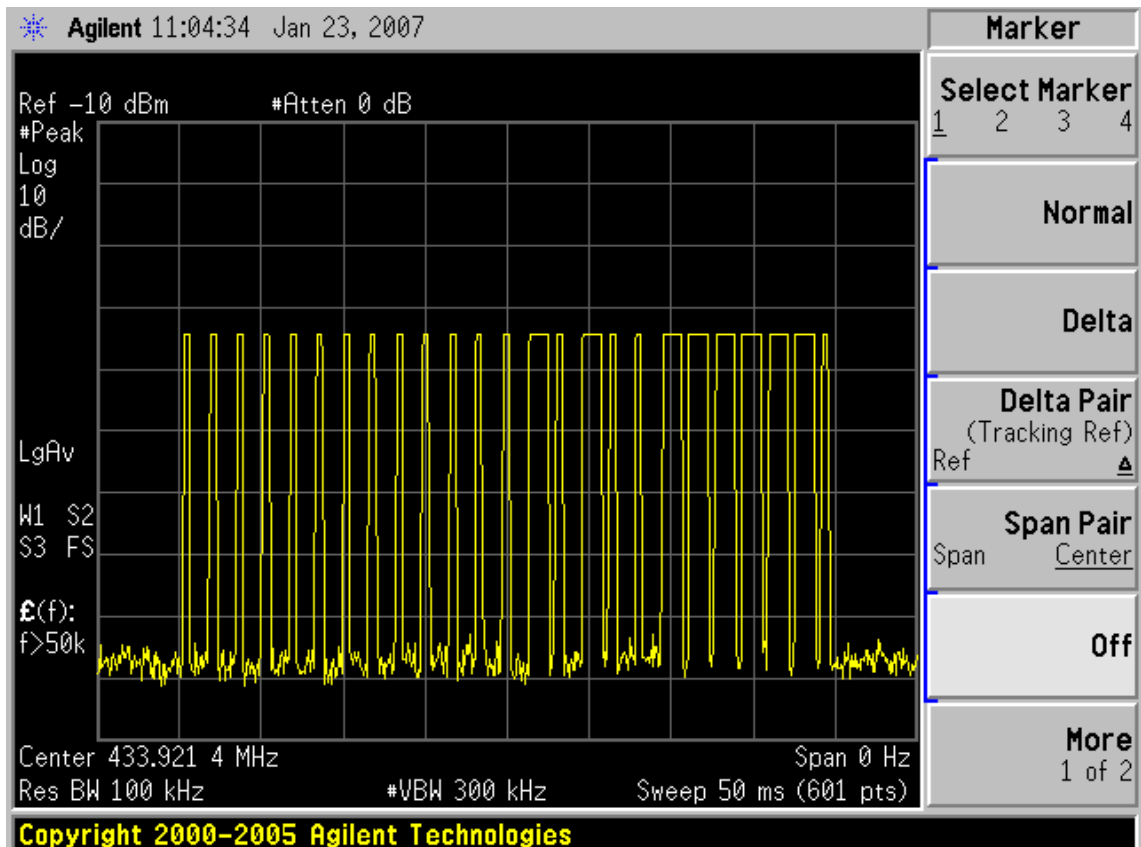
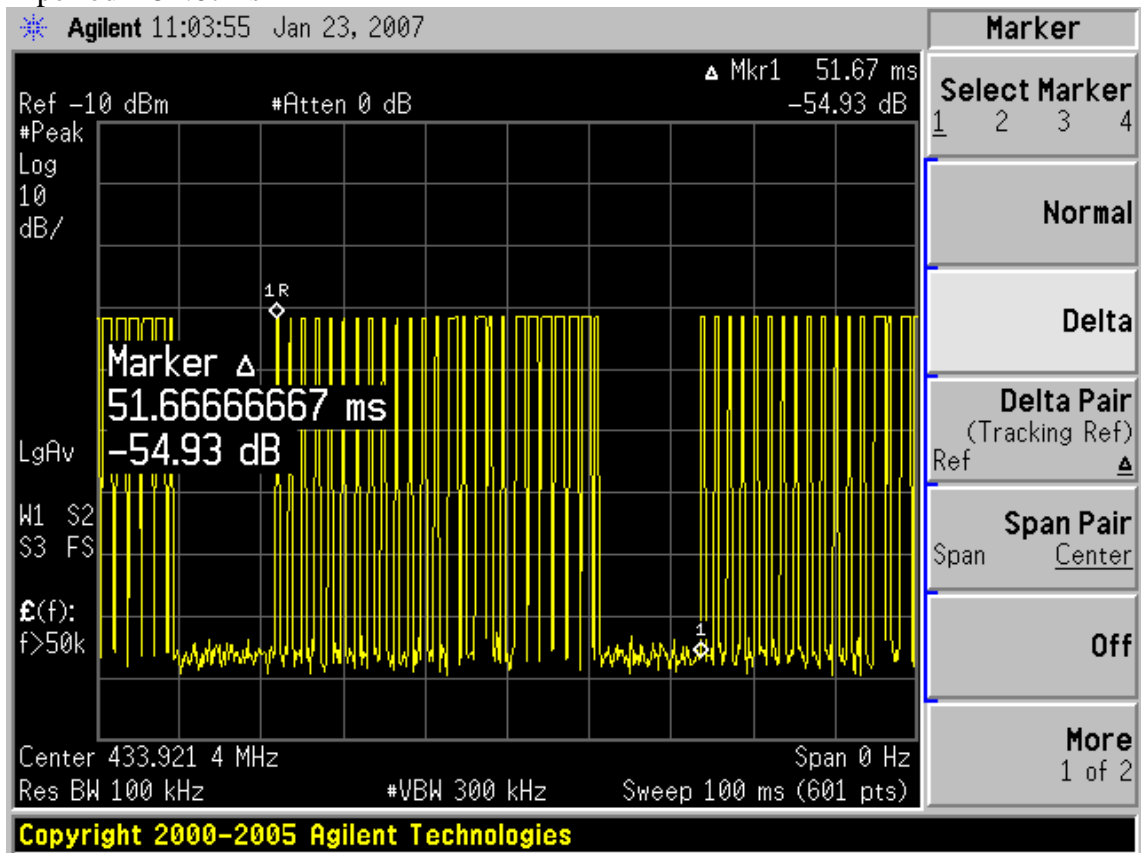
### 7.3. Test Results

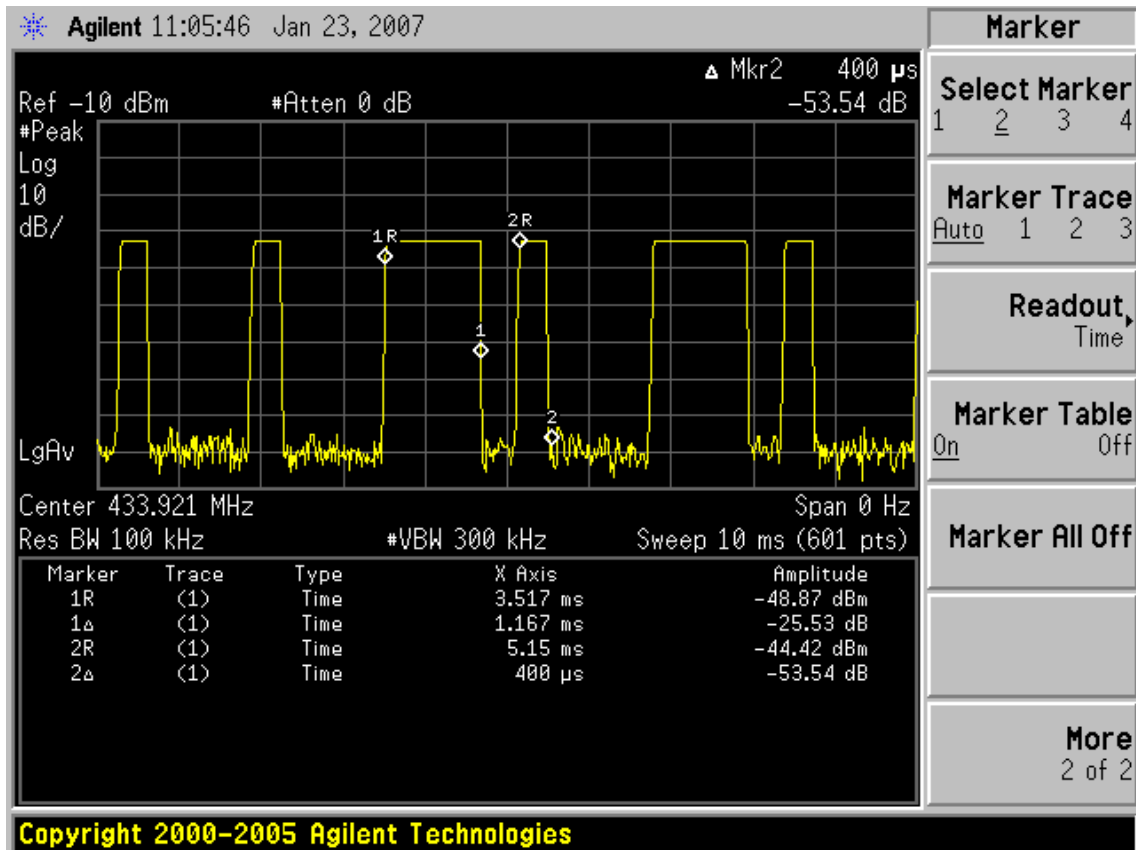
Frequency (MHz)	20 dB Bandwidth (kHz)	Limit(kHz): No wider than 0.25% of the center frequency	Conclusion
433.856	123.3	$433.8 * 0.25\% = 1.08\text{MHz}$	PASS



## 8. PULSE DESENSITIZATION CORRECTION FACTOR

T period = 51.67ms





$T_{\text{ontime}}(\text{assumed worse case}) = 25 * 1.167 \text{ms} = 29.175 \text{ms}$   
 $\text{Duty cycle} = T_{\text{ontime}} / T_{\text{period}} = 29.175 \text{ms} / 51.67 \text{ms} = 0.565$   
 $\text{PDCF} = 20 * \log(\text{Duty cycle}) = 20 * \log(0.565) = -4.96$

## **9. DEVIATION TO TEST SPECIFICATIONS**

[ NONE ]