

APPLICATION FOR CERTIFICATION  
On Behalf of

Smart Technologies & Investment Ltd.

Wireless Wand KIT

Model No.	Brand Name
SD2707	Smartec
R4500	GTO PRO
FM130	MIGHTY MULE

Prepared for : Smart Technologies & Investment Ltd.  
Unit C&D, 18/F Spectrum Tower, 53 Hung To Road, Kwun  
Tong, Kowloon, Hong Kong.

Prepared By : Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Ke Feng Rd., 52 Block,  
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Report Number : ACS-F08133  
Date of Test : Feb.21~22, 2008  
Date of Report : Mar.11, 2008

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## TEST REPORT CERTIFICATION

Applicant : Smart Technologies & Investment Ltd.  
 Manufacturer : Smart Electronic Industrial (DONGGUAN) Co., Ltd.  
 EUT Description : Wireless Wand KIT

(A) Model No.& Brand Name	Model No.	Brand Name
	SD2707	Smartec
	R4500	GTO PRO
	FM130	MIGHTY MULE

(B) Serial No. : N/A  
 (C) Power Supply : DC 3V

Test Procedure Used:

FCC Rules and Regulations Part 15 Subpart C 2007

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.

Date of Test : Feb.21~22, 2008

Prepared by : YoYo Wang / Assistant

Reviewer : Iceman Hu / Supervisor

Approved & Authorized Signer : Ken Lu / Deputy Manager

# 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>
Conducted Emission Test	FCC Part 15C: 15.231 ANSI C63.4: 2003	N/A
Radiated Emission Test	FCC Part 15C: 15.231 ANSI C63.4: 2003	PASS
Stop Transmitting Time Test	FCC Part 15C: 15.231	PASS
20 dB Bandwidth Test	FCC Part 15C: 15.231	PASS

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Description : Wireless Wand KIT

Model Number	Model No.	Brand Name
	SD2707	Smartec
	R4500	GTO PRO
	FM130	MIGHTY MULE

1. Test Model No.: SD2707.

2. Model No. and Brand Name are different only.

Operation frequency : 318MHz

Modulation : ASK

Applicant : Smart Technologies & Investment Ltd.  
Unit C&D, 18/F Spectrum Tower, 53 Hung To Road,  
Kwun Tong, Kowloon, Hong Kong.

Manufacturer : Smart Electronic Industrial (DONGGUAN) Co., Ltd.  
QingLong Road, LongJianTian-Cun, HuangJiang-Zhen,  
DongGuan, GuangDong, China

Date of Test : Feb.21~22, 2008

Date of Receipt : Feb.20, 2008

Sample Type : Series production

## 2.2. Test Facility

### Site Description

Name of Firm : Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Ke Feng Rd., 52 Block, Shenzhen  
Science & Industrial Park, Nantou,  
Shenzhen, Guangdong, China

3m Anechoic Chamber : Jun.13, 2006 File on  
Federal Communication Commission  
Registration Number: 90454

3m & 10m Anechoic Chamber : Jan.31, 2007 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, 2007

## 2.3. Measurement Uncertainty

No.	Item	Uncertainty
1.	Uncertainty for Conducted Emission Test	1.22dB
2.	Uncertainty for Radiated Emission Test<1GHz	4.62dB
3.	Uncertainty for Radiated Emission Test>1GHz	4.79dB
4.	Uncertainty for Frequency measure	$0.42 \times 10^{-6}$

### **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.	3#Chamber	AUDIX	N/A	N/A	Dec.20.07	1/2 Year
2.	EMI Spectrum	Agilent	E7403A	MY42000106	May 11, 07	1 Year
3.	Test Receiver	Rohde & Schwarz	ESVS20	830350/005	Dec.19, 07	1 Year
4.	Amplifier	HP	8447D	2944A04738	Jan.09, 08	1/2 Year
5.	Bilog Antenna	Schaffner	CBL6111C	2598	Feb.22, 07	1 Year
6.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.1	Jan.09, 08	1/2 Year
7.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.2	Jan.09, 08	1/2 Year
8.	RF Cable	FUJIKURAw	RG-55/U	3# Chamber No.3	Jan.09, 08	1/2 Year
9.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.4	Jan.09, 08	1/2 Year
10.	Coaxial Switch	Anritsu	MP59B	M73989	Jan.09, 08	1/2 Year

Frequency rang: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	MY41440292	May 11, 07	1 Year
2.	Amp	HP	8449B	3008A00863	May 11, 07	1 Year
3.	Antenna	EMCO	3115	9607-4877	Jan. 23, 07	1.5 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May 11, 07	1 Year
5.	Antenna	ETS	3116	00060088	May. 28, 07	1 Year

### 4.2. Block Diagram of Test Setup

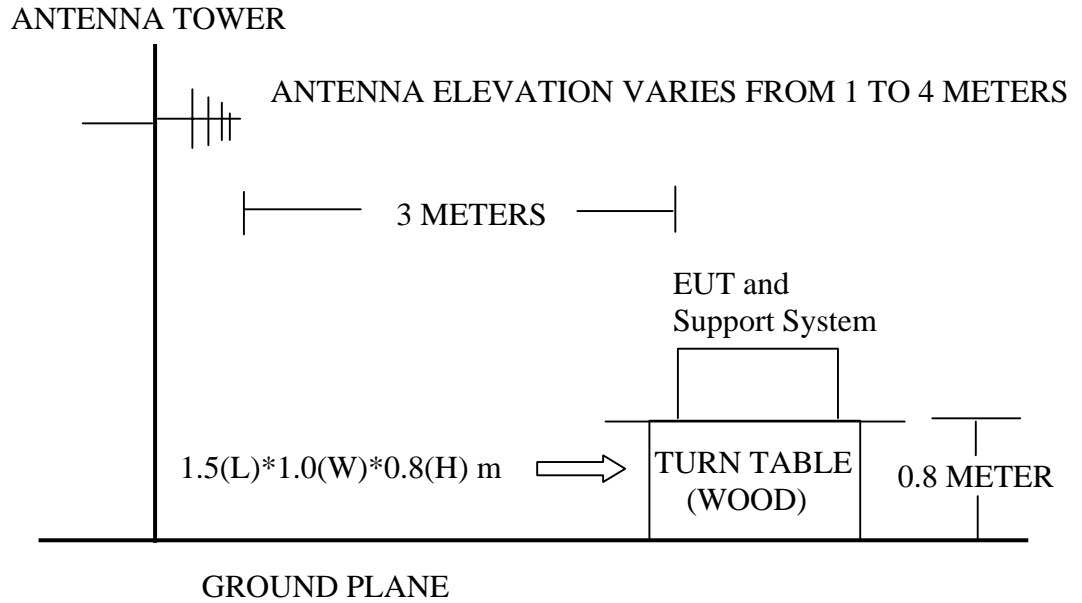
#### 4.2.1. Block Diagram of connection between EUT and simulators



*(EUT: Wireless Wand KIT)*



4.2.2. Anechoic Chamber Setup Diagram



4.3. Radiated Emission Limit (15.231 section b)

Fundamental Frequency(MHz)	Field Strength of Fundamental	Field Strength of Spurious emissions
318	AV:75.8 dBuV/m at 3m distance PK:95.80 dBuV/m at 3m distance	AV:55.8 dBuV/m at 3m distance PK:75.80 dBuV/m at 3m distance

Note: The spurious emissions appearing within the frequency band listed in 15.205 shall also comply with limits shown in section 15.209

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. Wireless Wand KIT (EUT)

Model Number : SD2707  
Serial Number : N/A

## 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.

The bandwidth of the VBW is set at 300kHz and RBW is set at 120kHz for measurement below 1GHz and 1MHz RBW,1MHz VBW for frequency above 1GHz

The frequency range from 30MHz to 5000MHz are checked.

Three EUT position(X,Y,Z) were checked, and worse case was happened in Y position, so Y position was chose for final measurements.

## 4.7. Radiated Emission Test Results

**PASS.**

The frequency range from 30MHz to 5000MHz was investigated. All the Peak emissions comply with Average limit, so average emissions were deemed to meet Average limit and measurements with the average detector is unnecessary. All the emissions detected were not located in the frequency band listed in section 15.205, It's not need to comply with limit specified in section 15.209

EUT: Wireless Wand KIT      Model No. : SD2707

Test Date: Feb.21, 2008      Temperature: 23°C      Humidity: 54%

The details of test modes are as follows :

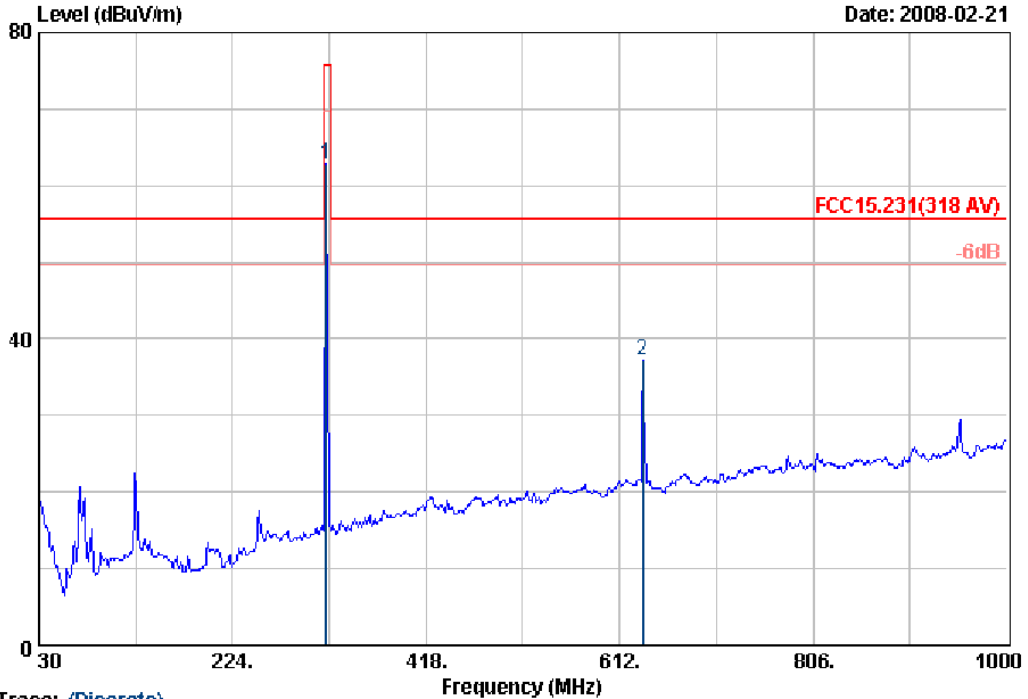
Test Mode	Frequency (MHz)	Test Mode	Reference Test Data No.	
			Horizontal	Vertical
1.	30~1000	Tx Mode	#2	#1
2.	1000~5000	Tx Mode	#4	#3



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Data: 2 File: D:\2008 Report Data\SMART\ACS8QH016.EMI (2)

Date: 2008-02-21



Trace: (Discrete)

Site no. : 3# Chamber Radiation Data no. : 2  
 Dis. / Ant. : 3m 2598 Ant. pol. : HORIZONTAL  
 Limit : FCC15.231(318 AV)  
 Env. / Ins. : 24°C/56% ESVS20 Engineer : Jamy  
 EUT : Wireless Wand KIT M/N:SD2707  
 Power Rating : DC 3V  
 Test Mode : TX  
 Memo :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Emission				Remark
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
1	318.09	14.12	1.62	47.14	62.88	75.80	12.92	Peak
2	635.28	20.20	2.32	14.68	37.20	55.80	18.60	Peak

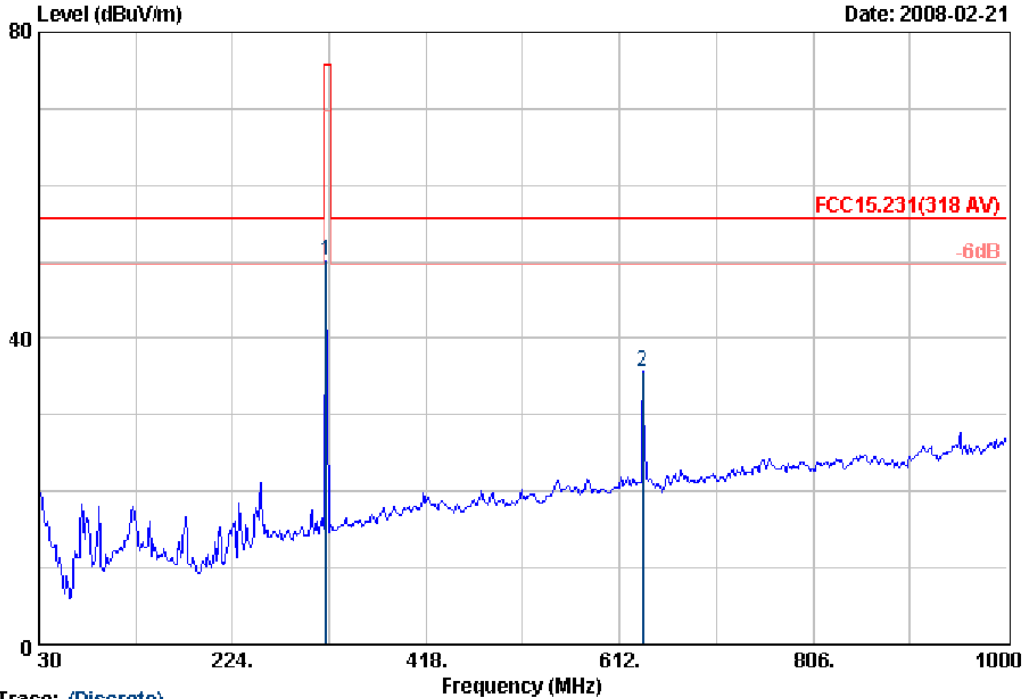
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



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 Postcode:518057

Data: 1 File: D:\2008 Report Data\SMART\ACS8QH016.EMI (2)

Date: 2008-02-21



Trace: (Discrete)

Site no. : 3# Chamber Radiation Data no. : 1  
 Dis. / Ant. : 3m 2598 Ant. pol. : VERTICAL  
 Limit : FCC15.231(318 AV)  
 Env. / Ins. : 24\*C/56% ESVS20 Engineer : Jamy  
 EUT : Wireless Wand KIT M/N:SD2707  
 Power Rating : DC 3V  
 Test Mode : TX  
 Memo :

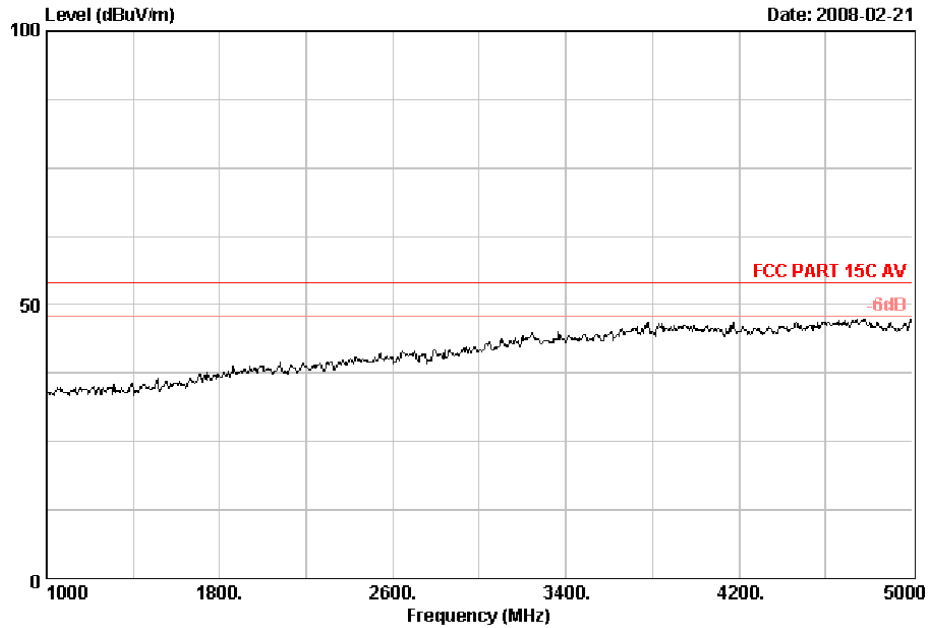
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	318.09	14.12	1.62	34.33	50.07	75.80	25.73	Peak
2	635.28	20.20	2.32	13.11	35.63	55.80	20.17	Peak

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



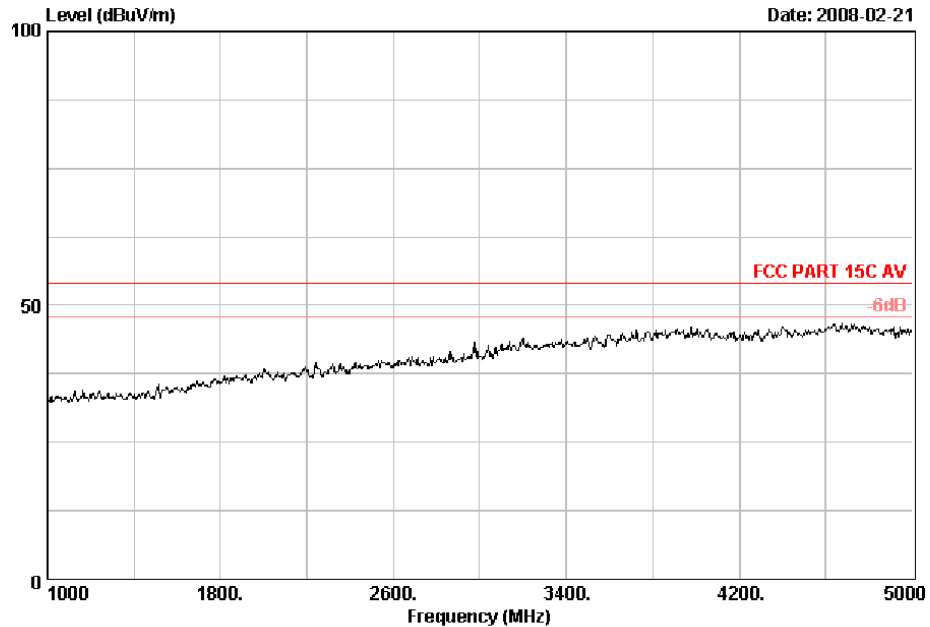
No.6 Ke Feng Road,B1:ck 52,  
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 Fax:+86-755-26632877  
 Postcode:518057

Data: 4 File: D:\2008 report data\S\Smart\ACS8QH016.EMI (4) Date: 2008-02-21



Site no. : Data no. : 4  
 Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C AV  
 Env. / Ins. : 23°C/54% Engineer : Jamy  
 EUT : Wireless Wand KIT M/N:SD2707  
 Power Rating : DC 3V  
 Test Mode : TX

Data: 3 File: D:\2008 report data\S\Smart\ACS8QH016.EMI (4) Date: 2008-02-21



Site no. : Data no. : 3  
 Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : VERTICAL  
 Limit : FCC PART 15C AV  
 Env. / Ins. : 23°C/54% Engineer : Jamy  
 EUT : Wireless Wand KIT M/N:SD2707  
 Power Rating : DC 3V  
 Test Mode : TX

## 5. STOP TRANSMITTING TIME TEST

### 5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	MY41440292	May 11, 07	1 Year
2.	Antenna	EMCO	3115	9607-4877	Jan. 23, 07	1.5 Year
3.	HF Cable	Hubersuhne	Sucoflex104	-	May 11, 07	1 Year

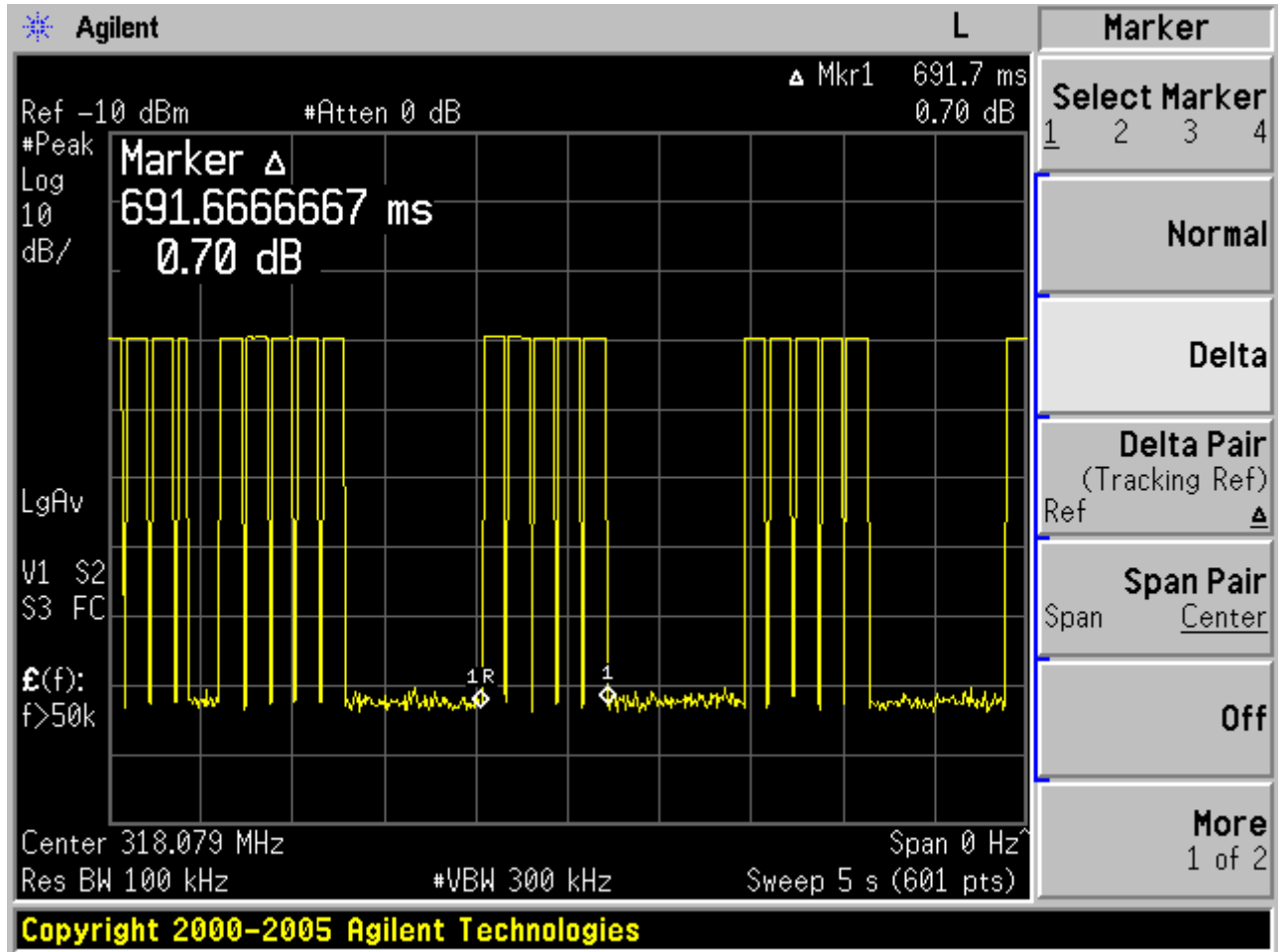
### 5.2. Test Information

EUT:	Wireless Wand KIT
M/N:	SD2707
Test Date:	Feb.22, 2008
Ambient Temperature:	23°C
Relative Humidity:	50%
Test standard:	FCC PART 15C: 15.231
Test mode:	Transmitting
Test Frequency:	318MHz
Test By:	Jamy

### 5.3. Test Results

Set the spectrum to zero span, activated the EUT by manually after 691.67ms, the EUT stop transmitting.

Frequency (MHz)	Stop Transmitting Time	Limit: not more than 5 seconds of being released	Conclusion
318	691.67ms	5s	PASS



## 6. 20 DB BANDWIDTH TEST

### 6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	MY41440292	May 11, 07	1 Year
2.	Amp	HP	8449B	3008A00863	May 11, 07	1 Year
3.	Antenna	EMCO	3115	9607-4877	Jan. 23, 07	1.5 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	May 11, 07	1 Year

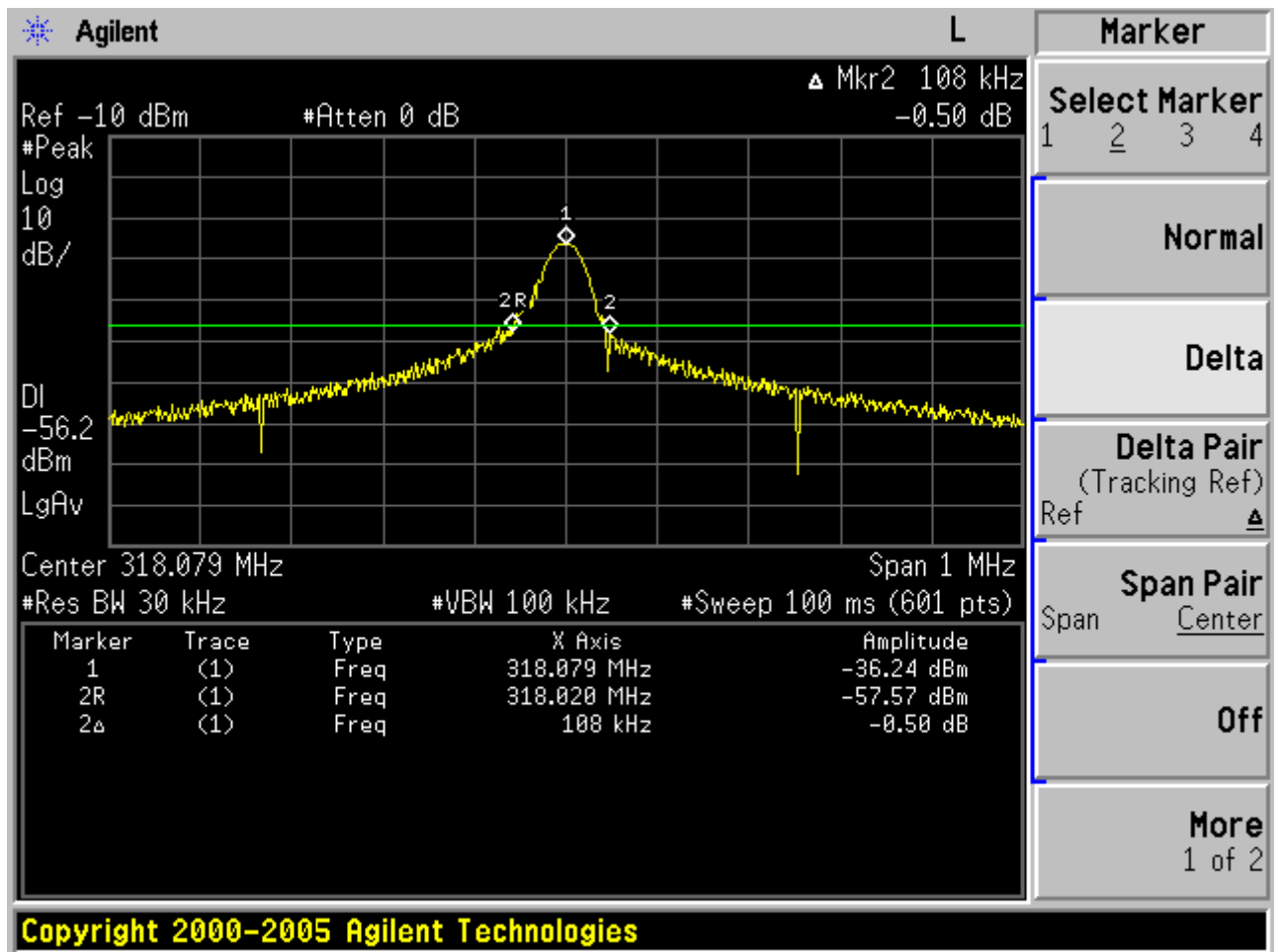
### 6.2. Test Information

EUT:	Wireless Wand KIT
M/N:	SD2707
Test Date:	Feb.22, 2008
Ambient Temperature:	23°C
Relative Humidity:	50%
Test standard:	FCC PART 15C: 15.231
Test mode:	Transmitting
Test Frequency:	318MHz
Test By:	Jamy

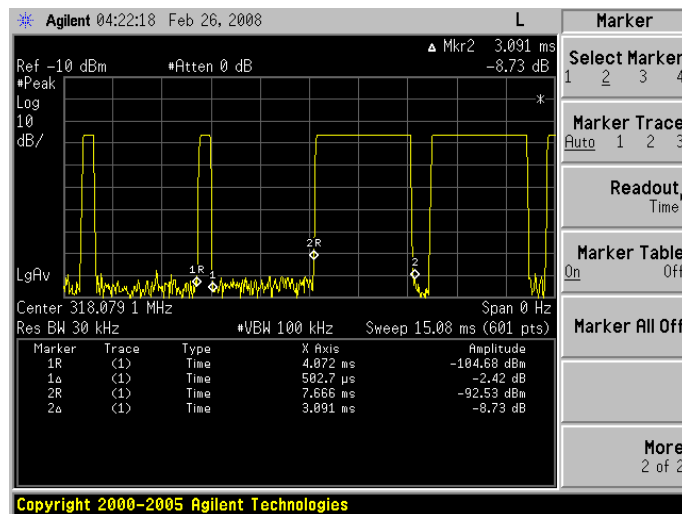
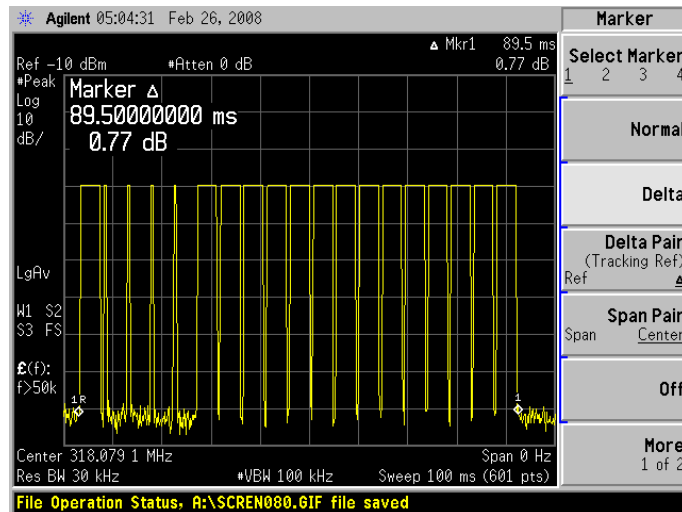
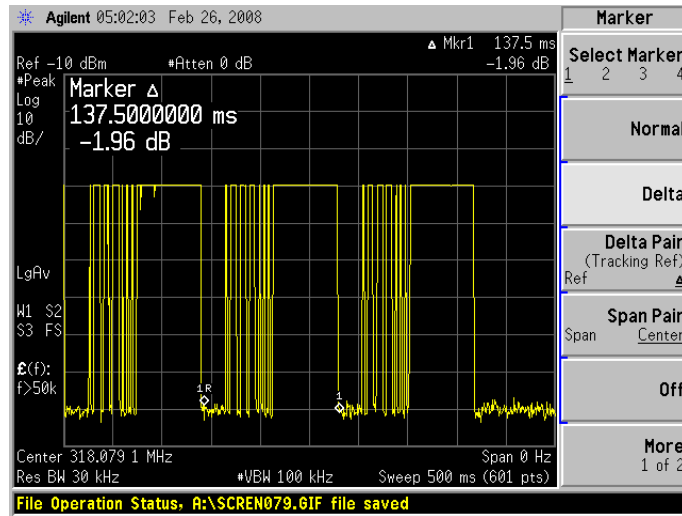
### 6.3. Test Results

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit(kHz): No wider than 0.25% of the center frequency	Conclusion
318	108	$318 * 0.25\% = 795\text{kHz}$	PASS





## 7. MODULATION INFO



## **8. DEVIATION TO TEST SPECIFICATIONS**

[ NONE ]