

# FCC CERTIFICATION RADIO MEASUREMENT TECHNICAL REPORT

On Model Name: UHF Reader

Model Numbers : RFS2212 / RFS2214

Trademark : Raifu

FCC ID : UAWRAIFU200691501

Prepared for Jiangsu Raifu Intelligent Tech. Co., Ltd.

According to FCC Part 15 (2006), Subpart C

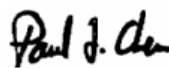
Test Report #: JIA-0605-0396SH-FCC

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Reviewed by: Harry Zhao

QC Manager: Paul Chen

Test Report Released by:



Paul Chen

2006, June 14

Date

### **Test Location**

*Tests performed at EMC Compliance Management Group (China) in a Certified ANSI Semi-Anechoic Chamber and Shielded Room performed testing.*

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### **Accreditation Bodies**

*EMC Compliance Management Group is a fully accredited Test Laboratory for ITE, ISM and Telecommunications Products.*



*In compliance with the site registration requirements of Section 2.948 of the FCC Rules to perform EMI measurements for the general public.*



*Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code # 200068-0.*

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*This test report relates to the abovementioned equipment under test (EUT). Without the permission of EMC Compliance Management Group Test Lab this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. The manufacturer has sole responsibility of continued compliance of the device.*

### ***Statement of Measurement Uncertainty***

*The data and results referenced in the document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.*

### ***Administrative Data***

*Test Sample : UHF Reader*

*Model Numbers : RFS2212 / RFS2214*

*Models Tested : RFS2212 / RFS2214*

*Trade Mark : Raifu*

*Date Tested : 2006, May 24 and June 28*

*Applicant : Jiangsu Raifu Intelligent Tech. Co., Ltd.  
Sanbao Tech Park, 1 Huangzhuang Road,  
Maqun Tech Park, Qixia District, Nanjing,  
China*

*Telephone : 86-25-84356665*

*Fax : 86-25-84356669*

*Manufacturer : Jiangsu Raifu Intelligent Tech. Co., Ltd.  
Sanbao Tech Park, 1 Huangzhuang Road,  
Maqun Tech Park, Qixia District, Nanjing,  
China*

### **EUT Description**

Jiangsu Raifu Intelligent Tech. Co., Ltd. Model numbers RFS2212 / RFS2214 (referred to as the EUT in this test report) are UHF Readers. RFS2212 has 2 antennas; RFS2214 has 4 antennas.

The antennas will be panel antennas, and the EUT must be professionally installed.

The technical parameters of the reader and the antenna are as below:

Name	UHF Reader
Model Numbers	RFS2212/ RFS2214
Frequency	902.6 ~ 927.4 MHz
Hopping Channels	63
Channel Spacing	400 KHz
Channel Dwell Time	< 0.4 Seconds
RF Transmitter	20~ 30dBm
Modulation Method	ASK
Power Consumption	15 Watts
Communications Interface	RS-232, RS485
Inputs/Outputs	2 Weigand port, 2 Trigger input, 2 relay switch, 2 com port, power
Antenna Port	2 coax antenna (RFS2212), 4 coax antenna (RFS2214)
Dimensions	(L) 21 cm (8.2 in) x (W) 20 cm (7.9 in) x (D) 5 cm (2 in)
Weight	Approximately 1.5 kg
Operating Temperature	0°C to +50°C (+32 °F to +122°F)

#### **Panel antenna:**

Name	Panel antenna
Model Number	RFA-900E
Frequency	902MHz ~ 928 MHz
Polarization	Circular
Horizontal 3dB Beamwidth	62°
Vertical 3dB Beamwidth	65°
Gain	5.75dBi
VSWR	<1.3
Input Impedance	50 $\Omega$
Maximum Input Power	200W
Lightning Protection	Direct Ground
Dimensions (LxWxH)	280x200x75(mm)
Weight of Antenna	2 kg
Radome Material	UPVC

### ***Type of Deriver***

*Model RFS 2212 and RFS 2214 are identical except the antenna ports: the RFS 2212 has 2 antenna ports and the RFS 2214 has 4 antenna ports, the only difference is the antenna switch.*



## **Test Summary**

*The Electromagnetic Compatibility requirements on TAT-E for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.*

<b>EMC Test Items</b>			
<i>Reference FCC Part 15 (2006), Subpart C</i>			
<b>Specification</b>	<b>Description</b>	<b>Test Results</b>	<b>Remark</b>
<i>FCC Part 15.203</i>	<i>Antenna Requirement</i>	<i>Compliance</i>	<i>See the antenna statement.</i>
<i>FCC Part 15.205</i>	<i>Restricted Band of Operation</i>	<i>Compliance</i>	<i>Refer to Attachment 1</i>
<i>FCC Part 15.209</i>	<i>Radiated Emission Limits</i>	<i>Compliance</i>	<i>Attachment 1</i>
<i>FCC Part 1.1307(b)(1) &amp; 2.1093</i>	<i>RF Exposure</i>	<i>Compliance</i>	<i>Attachment 2</i>
<i>FCC Part 15.207</i>	<i>Conducted Limits</i>	<i>Compliance</i>	<i>Attachment 3</i>
<i>FCC Part 15.247(a)</i>	<i>Bandwidth</i>	<i>Compliance</i>	<i>Attachment 4</i>
<i>FCC Part 15.247(d)</i>	<i>Emissions at Antenna Port</i>	<i>Compliance</i>	<i>Attachment 5</i>
<i>FCC Part 15.247 (b) (2)</i>	<i>Maximum Peak Power</i>	<i>Compliance</i>	<i>Attachment 6</i>
<i>FCC Part 15.247(d)</i>	<i>Band Edge</i>	<i>Compliance</i>	<i>Attachment 7</i>
<i>FCC Part 15.247(a) (1) (i)</i>	<i>Number of Hopping Channels</i>	<i>Compliance</i>	<i>Attachment 8</i>
<i>FCC Part 15.247(a) (1)</i>	<i>Hopping Channel Separation</i>	<i>Compliance</i>	<i>Attachment 9</i>
<i>FCC Part 15.247(a) (1) (i)</i>	<i>Time of Occupying</i>	<i>Compliance</i>	<i>Attachment 10</i>

### **Test Mode Justification**

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

### **Antenna Statement**

*Statement:*

*The antenna must be professionally installed. Only panel antenna described in the EUT description will be used with the reader. Professional installers will be provided with antenna installation instructions.*

### **EUT Exercise Software**

*Software "Reader 2200" was used in during the test.*

### **Equipment Modification**

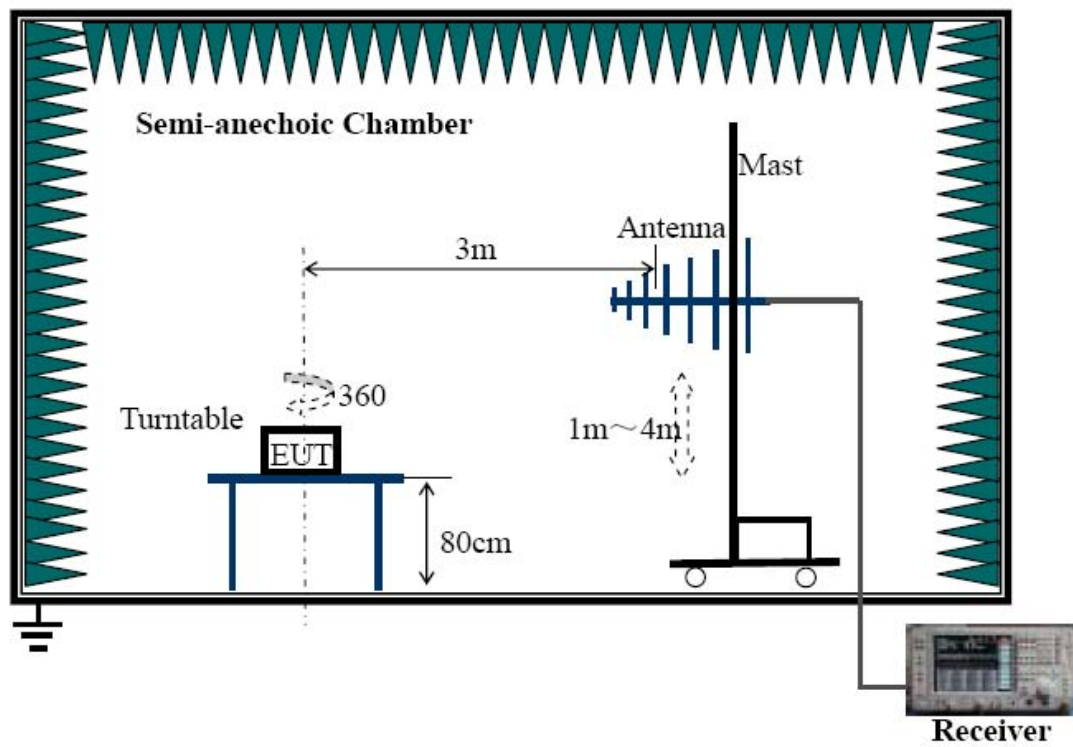
*Any modifications installed previous to testing by Jiangsu Raifu Intelligent Tech. Co., Ltd. will be incorporated in each production model sold or leased in United States.*

*There were no modifications installed by EMC Compliance Management Group (China) test personnel.*

## Test System Details

EUT				
<b>Model Numbers:</b>		RFS2212 / RFS2214		
<b>Models Tested:</b>		RFS2212 / RFS2214		
<b>Trademark::</b>		Raifu		
<b>Serial Number:</b>		Engineering Sample		
<b>Input Voltage:</b>		120V~ 60Hz		
<b>Description:</b>		UHF Reader		
<b>Manufacturer:</b>		Jiangsu Raifu Intelligent Tech. Co., Ltd.		
Support Equipment				
Description	Model Number	Serial Number	Manufacturer	Power Cable Description (Meters)
NOTEBOOK	EVO N600C	3J26KZG1C17Y	COMPAQ	1.8M UNSHIELDED
Cable Description				
None				

## Configuration of Tested System



***EUT Sample Photos of RFS2214 / RFS2212  
RFS2214***



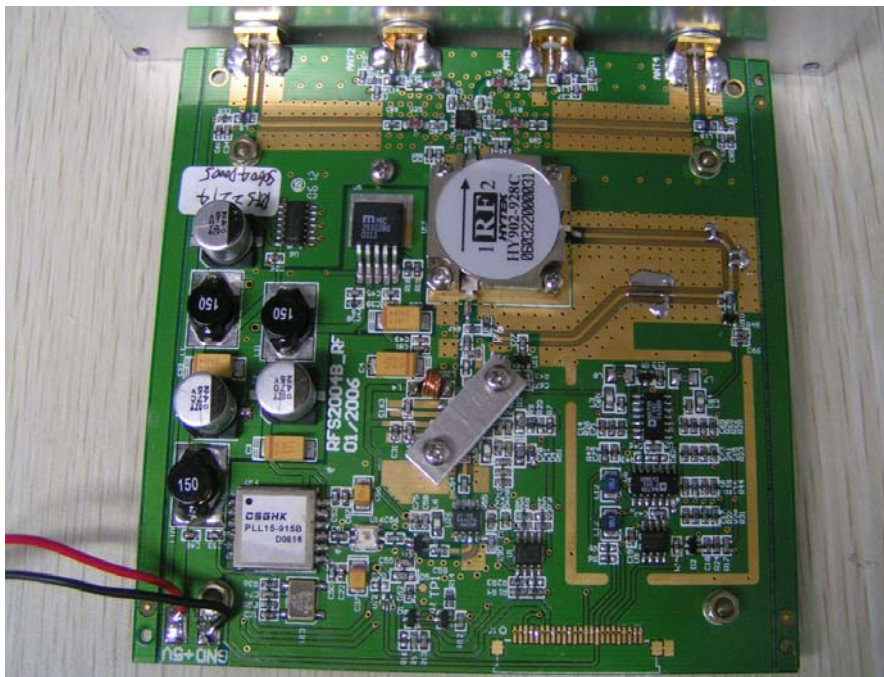
***Front View***



***Rear View***

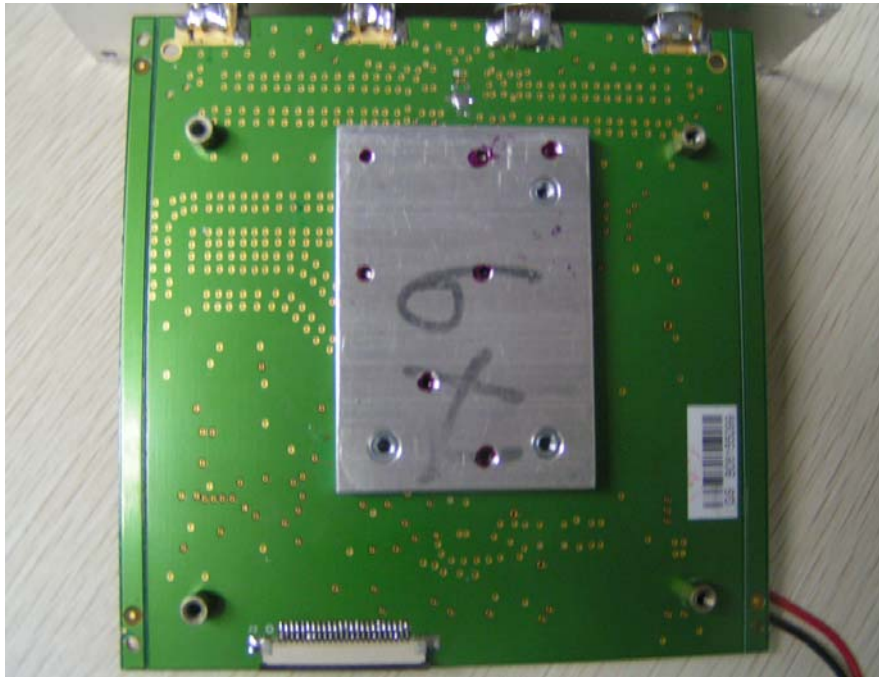


***Uncovered***

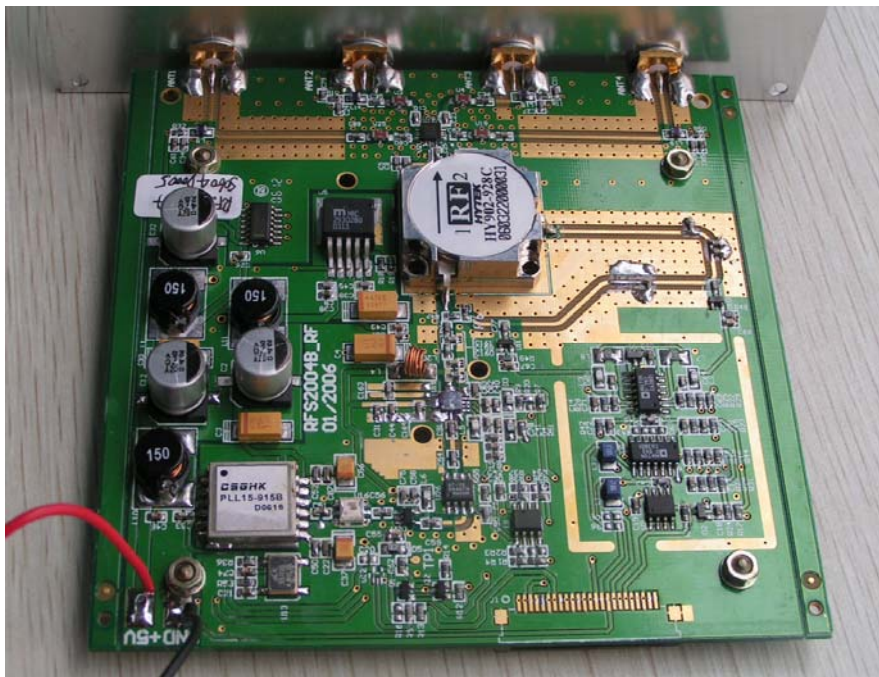


***Main Board #1 Front View***

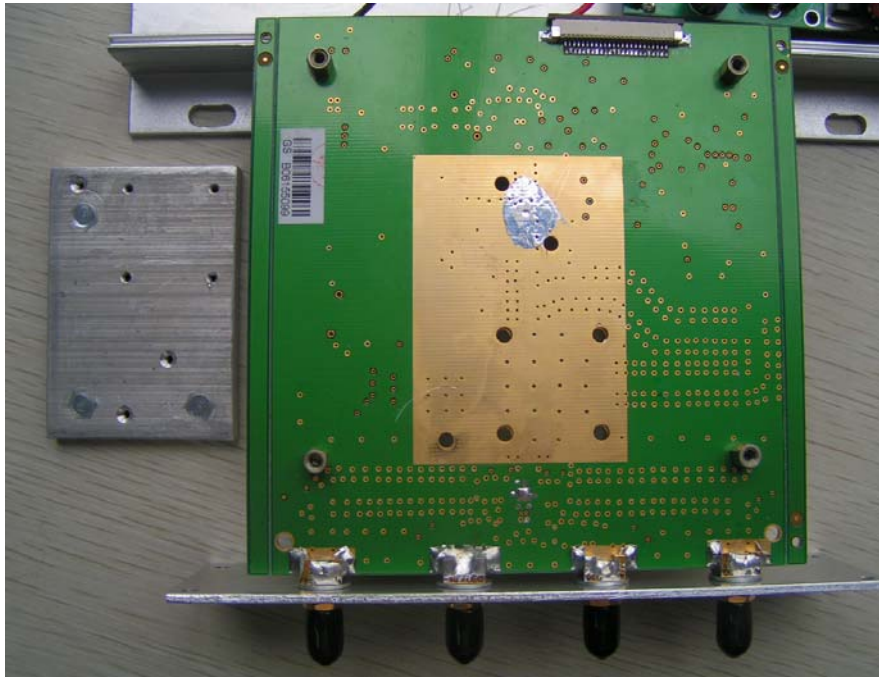




***Main Board #1 Rear View***

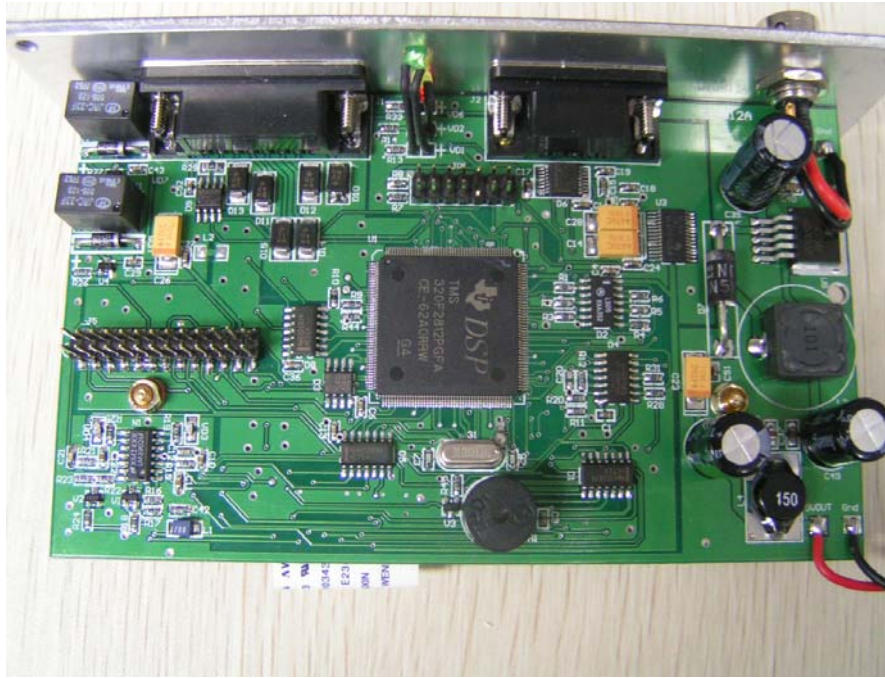


***Main Board #1 Screw Holder Removed Front View***



***Main Board #1 Screw Holder Removed Rear View***

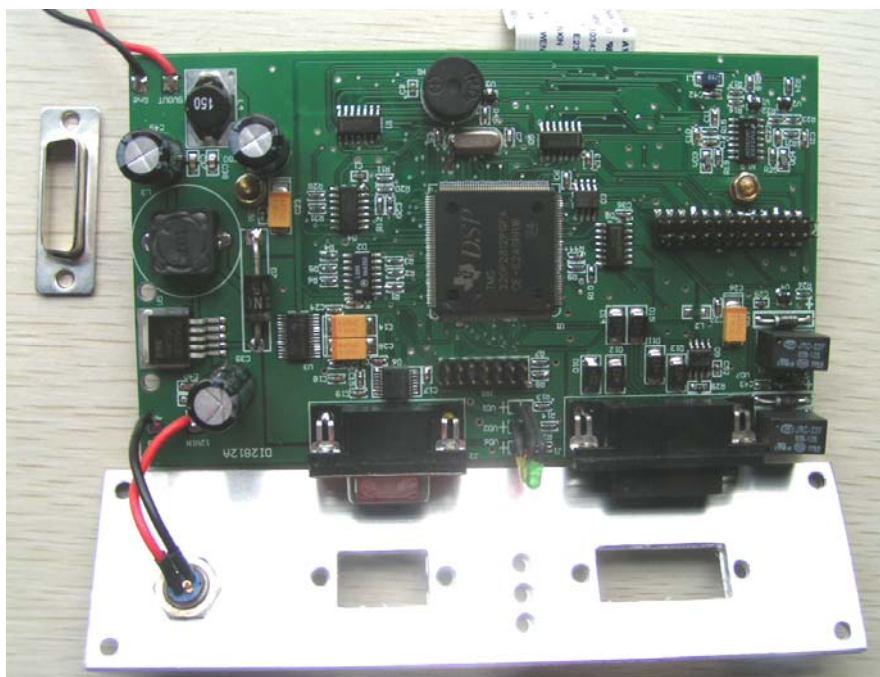




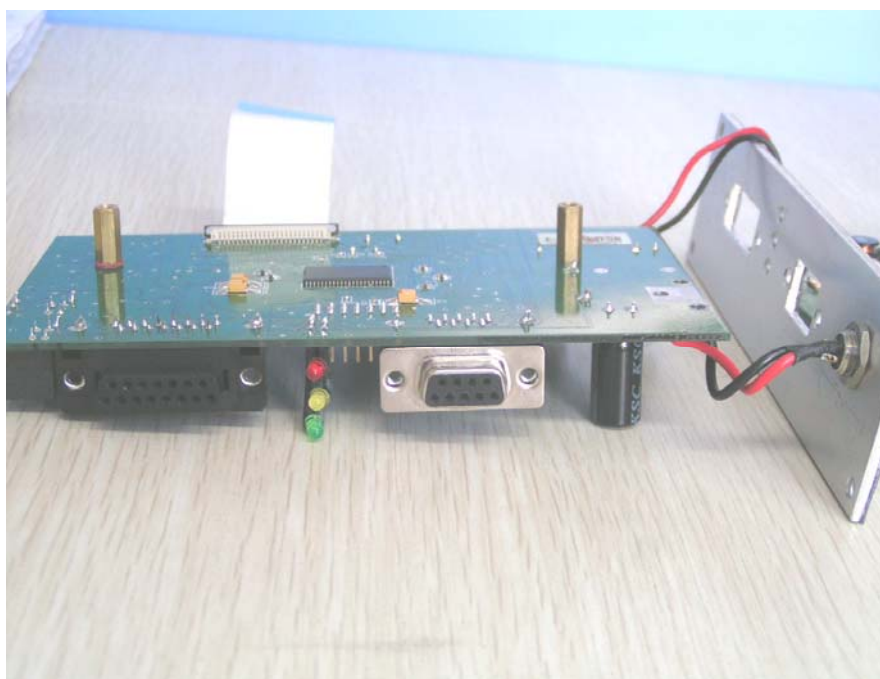
**Main Board #2 Front View**



**Main Board #2 Rear View**



***Main Board #2 Side Shell removed***



***Main Board #2 Side Connector View***





***Main Chip and Crystal on the Main Board 2#***



***Serial Line***



***Panel antenna***



***Power Adapter Front View***



### Power Adapter Rear View



### Power Adapter – Label View

## **RFS2212**



**Front View**

## ATTACHMENT 1 –FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.209 FCC Part 15.205
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED:</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	No Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, June 27
<b>SETUP METHOD:</b>	ANSI C63.4 : 2003		
<b>TEST PROCEDURE:</b>	<p>a. The EUT was placed on a rotatable table with 0.8 meters above ground.</p> <p>b. The EUT was set 3 meters from the interference-receiving antenna, which was mounted on the top of a variable height antenna tower.</p> <p>c. The antenna was varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna were set to make measurement.</p> <p>d. For each suspected emission the EUT was arranged to its worst case and then change the antenna tower height (from 1m to 4m) and turn table (from 0 degree to 360 degree) to find the maximum reading.</p> <p>e. If the emission level of the EUT in peak mode was 20 dB lower than the specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be tested using the quasi-peak method in about six maximal points and the results will be reported.</p> <p>f. Broadband antenna (Calibrated antenna) was used as receiving antenna below 1000MHz. Horn antenna were used as receiving antenna above 1000MHz.</p> <p>g. The bandwidth is 120 kHz below 1000 MHz, and 1 MHz above 1000 MHz</p> <p>Explanation of the Correction Factor are given as follows:</p> $FS = RA + AF + CF - AG - DC$ <p>Where: FS = Field Strength</p> <p>RA = Receiver Amplitude</p> <p>AF = Antenna Factor</p> <p>CF = Cable Attenuation Factor</p> <p>AG = Amplifier Gain</p> <p>DC = Duty Cycle Correction Factor</p>		

CONTINUE ON THE NEXT PAGE...



<b>TESTED RANGE:</b>	30MHz to 10,000MHz
<b>TEST VOLTAGE:</b>	120V / 60Hz
<b>TEST STATUS:</b>	Keep Tx in continuous transmission mode, modulated, all antenna ports were connected by panel antenna
<b>RESULTS:</b>	The EUT meets the requirements of field strength test.  The test results relate only to the equipment under test provided by client.
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB



*For Channel 1*  
*Test Results (30MHz~1GHz)*

<i>Horizontal</i>								
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	39.32	12.7	0.3	21.0	40.0	-19.0	25	100
2	200.00	8.6	1.5	36.0	43.5	-7.5	209	100
3	666.04	19.1	2.8	19.5	46.0	-26.5	219	288
4	902.60	20.3	3.7	112.6	---	---	178	163
<i>Vertical</i>								
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	200.00	8.6	1.5	37.4	43.5	-6.1	309	120
2	400.60	15.5	1.8	37.5	46.0	-8.5	28	200
3	453.87	16.3	2.0	27.3	46.0	-18.7	208	199
4	902.60	20.3	3.7	111.9	---	---	176	100
Note: All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.								

*For Channel 1*  
**Test Results (1GHz~10GHz)**

<i>Horizontal</i>									
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected AV Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Corrected PK Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)
1	1119.37	25.2	5.0	33.8	54.0	-20.2	40.8	74.0	-33.2
2	1904.65	29.7	6.9	39.7	54.0	-14.3	44.9	74.0	-29.1
3	2089.11	31.5	8.3	40.5	54.0	-13.5	50.1	74.0	-23.9
<i>Vertical</i>									
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected AV Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Corrected PK Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)
1	1119.25	25.2	5.0	36.8	54.0	-17.2	42.8	74.0	-31.2
2	1904.65	29.7	6.9	40.1	54.0	-13.9	44.0	74.0	-30.0
3	2089.11	31.5	8.3	40.8	54.0	-13.2	47.6	74.0	-26.4
Note: All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time. A video filter was not used.									

*For Channel 32*  
*Test Results (30MHz~1GHz)*

<i>Horizontal</i>								
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	42.98	11.5	0.4	23.6	40.0	-16.4	290	177
2	289.07	12.9	1.5	28.9	46.0	-17.1	209	189
3	398.11	15.5	1.8	30.6	46.0	-15.4	19	129
4	914.98	20.3	3.7	109.5	---	---	178	150
<i>Vertical</i>								
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	87.09	8.6	0.7	28.5	40.0	-11.5	209	108
2	305.98	13.0	1.5	30.1	46.0	-15.9	187	119
3	672.33	19.0	2.8	32.1	46.0	-13.9	201	118
4	914.98	20.3	3.7	113.1	---	---	148	107
Note: All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.								

*For Channel 32*  
**Test Results (1GHz~10GHz)**

<i>Horizontal</i>									
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected AV Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Corrected PK Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)
1	1830.00	29.3	7.0	37.2	54.0	-16.8	45.5	74.0	-28.5
2	2745.09	32.6	8.6	39.4	54.0	-14.6	49.8	74.0	-24.2
3	5636.40	33.1	11.2	41.7	54.0	-12.3	53.7	74.0	-20.3
<i>Vertical</i>									
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected AV Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Corrected PK Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)
1	1830.00	29.3	7.0	40.1	54.0	-13.9	50.1	74.0	-23.9
2	2745.09	32.6	8.6	44.3	54.0	-9.7	53.9	74.0	-20.1
3	5636.40	33.1	11.2	42.9	54.0	-11.1	52.6	74.0	-21.4
Note: All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time. A video filter was not used.									

*For Channel 63*  
**Test Results (30MHz~1GHz)**

<i>Horizontal</i>								
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	67.90	5.2	0.7	30.5	40.0	-9.5	209	200
2	238.43	10.9	1.5	26.4	46.0	-19.6	315	199
3	701.99	18.8	3.0	28.7	46.0	-17.3	39	178
4	927.01	20.4	3.7	114.9	---	---	109	168
<i>Vertical</i>								
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	40.23	12.7	0.4	29.4	40.0	-10.6	89	156
2	387.56	15.2	1.7	27.5	46.0	-18.5	109	149
3	409.22	15.5	1.8	28.8	46.0	-17.2	244	165
4	927.01	20.4	3.7	110.7	---	---	156	130
Note: All readings are quasi-peak unless stated otherwise, using a QP bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.								

*For Channel 63*  
**Test Results (1GHz~10GHz)**

<i>Horizontal</i>									
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected AV Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Corrected PK Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)
1	1854.09	31.4	7.0	37.6	54.0	-16.4	42.3	74.0	-31.7
2	3987.40	32.9	9.6	39.2	54.0	-14.8	44.5	74.0	-29.5
3	5896.00	33.1	11.2	40.8	54.0	-13.2	51.2	74.0	-22.8
<i>Vertical</i>									
Signal	Frequency (MHz)	Antenna Factor (dB)	Cable Factor (dB)	Corrected AV Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Corrected PK Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)
1	1854.09	31.4	7.0	38.9	54.0	-15.1	47.6	74.0	-26.4
2	3987.40	32.9	9.6	40.8	54.0	-13.2	51.2	74.0	-22.8
3	5896.00	33.1	11.2	41.1	54.0	-12.9	53.5	74.0	-20.5
Note: All readings are average and peak unless stated otherwise, using a bandwidth of 1000kHz, with a 30 ms sweep time. A video filter was not used.									

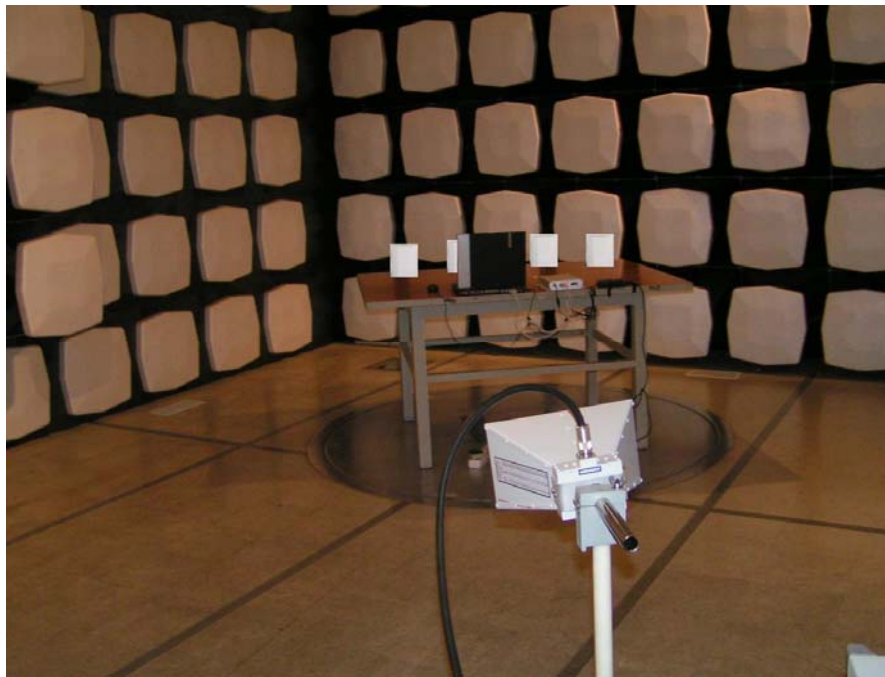
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
Bilog Antenna	CHASE	CBL6112	117.0800.20	02/17/06	02/16/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	513	03/20/06	03/19/07
Anechoic Chamber	LINDGREN	FACT-3	601	01/10/06	01/10/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hanyzhan  
SENIOR ENGINEER



***Radiated Emissions Test Set-up (Below 1GHz)***



***Radiated Emissions Test Set-up (Above 1GHz)***



## ATTACHMENT 2 – RF EXPOSURE CALCULATION

<b>CLIENT:</b> Jiangsu Raifu Intelligent Tech. Co., Ltd.		<b>TEST STANDARD:</b> FCC 1.1307(b)(1) FCC 2.1093																																																																		
<b>MODEL NUMBERS:</b> RFS2212 / RFS2214		<b>PRODUCT:</b> UHF Reader																																																																		
<b>MODEL TESTED:</b> RFS2214																																																																				
<b>SERIAL NO.:</b> Engineering Sample		<b>EUT DESIGNATION:</b> RF Equipment																																																																		
<b>TEMPERATURE:</b> 21°C		<b>HUMIDITY:</b> 53%RH																																																																		
<b>ATM PRESSURE:</b> 101.6 kPa		<b>GROUNDING:</b> No Grounding																																																																		
<b>TESTED BY:</b> Shi Xiting		<b>DATE OF TEST:</b> 2006, May 24																																																																		
<b>SETUP METHOD:</b>	N/A																																																																			
<b>TEST PROCEDURE:</b>	<p>According to § 15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.</p> <p>According to § 1.1310 and § 2.1093 RF exposure is calculated.</p> <p>Limits for General Population/Uncontrolled Exposure</p> <p style="text-align: center;">TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)</p> <table><tr><th>Frequency range (MHz)</th><th>Electric field strength (V/m)</th><th>Magnetic field strength (A/m)</th><th>Power density (mW/cm<sup>2</sup>)</th><th>Averaging time (minutes)</th></tr><tr><td colspan="5"><b>(A) Limits for Occupational/Controlled Exposures</b></td></tr><tr><td>0.3–3.0</td><td>614</td><td>1.63</td><td>*{100}</td><td>6</td></tr><tr><td>3.0–30</td><td>1842/f</td><td>4.89/f</td><td>*(900/f<sup>2</sup>)</td><td>6</td></tr><tr><td>30–300</td><td>61.4</td><td>0.163</td><td>1.0</td><td>6</td></tr><tr><td>300–1500</td><td></td><td></td><td>f/300</td><td>6</td></tr><tr><td>1500–100,000</td><td></td><td></td><td>5</td><td>6</td></tr><tr><td colspan="5"><b>(B) Limits for General Population/Uncontrolled Exposure</b></td></tr><tr><td>0.3–1.34</td><td>614</td><td>1.63</td><td>*{100}</td><td>30</td></tr><tr><td>1.34–30</td><td>824/f</td><td>2.19/f</td><td>*(180/f<sup>2</sup>)</td><td>30</td></tr><tr><td>30–300</td><td>27.5</td><td>0.073</td><td>0.2</td><td>30</td></tr><tr><td>300–1500</td><td></td><td></td><td>f/1500</td><td>30</td></tr><tr><td>1500–100,000</td><td></td><td></td><td>1.0</td><td>30</td></tr></table> <p>f = frequency in MHz * = Plane-wave equivalent power density NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.</p>			Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)	<b>(A) Limits for Occupational/Controlled Exposures</b>					0.3–3.0	614	1.63	*{100}	6	3.0–30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6	30–300	61.4	0.163	1.0	6	300–1500			f/300	6	1500–100,000			5	6	<b>(B) Limits for General Population/Uncontrolled Exposure</b>					0.3–1.34	614	1.63	*{100}	30	1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	30	30–300	27.5	0.073	0.2	30	300–1500			f/1500	30	1500–100,000			1.0	30
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)																																																																
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***MPE PREDICTION:***

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

902.6MHz – 927.0MHz

Maximum peak output power at antenna input terminal: 30dBm=1000mW

Predication frequency: 900MHz

Antenna gain: 6dBi

Prediction distance: 30cm

Power density at predication frequency at 30cm: 0.53 mW/cm<sup>2</sup>

MPE limit for uncontrolled exposure at prediction frequency: 0.6mW/cm<sup>2</sup>

***TEST RESULT:***

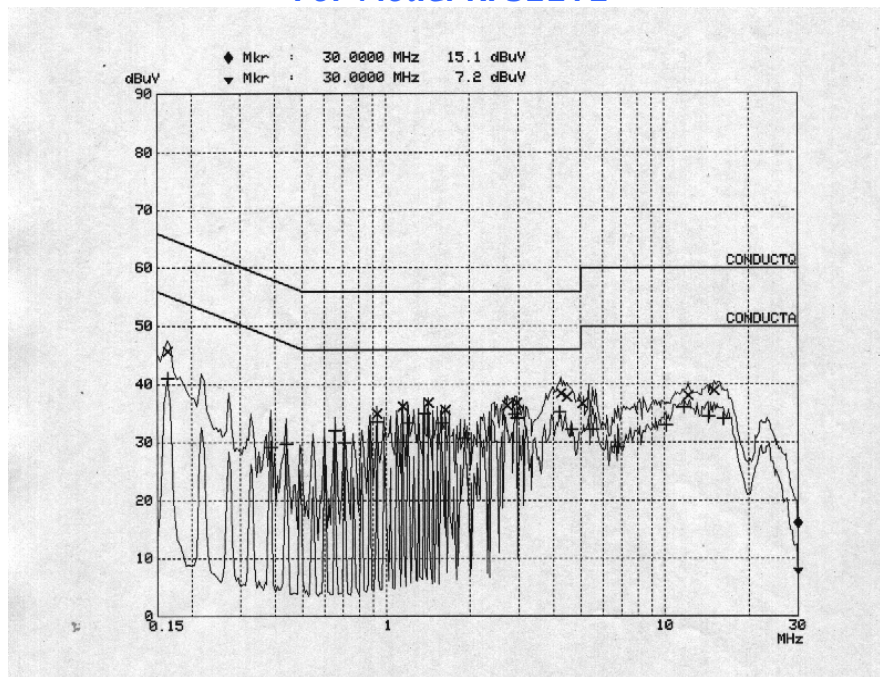
The EUT is a fixed outdoor device. 0.6mW/cm<sup>2</sup> limit applies. The prediction distance is 30cm.

### ATTACHMENT 3 – CONDUCTED EMISSION TEST RESULTS

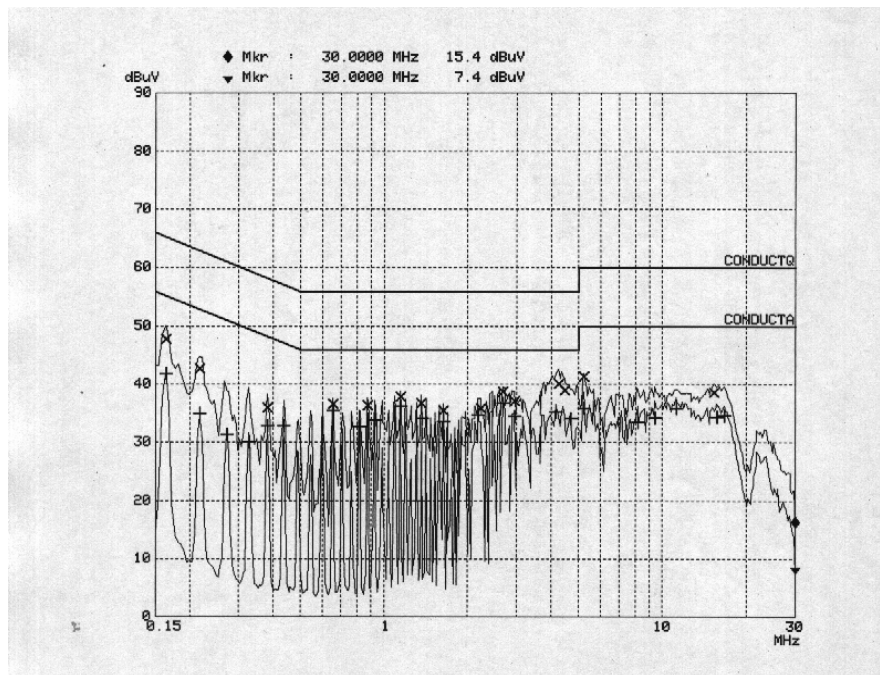
<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC 15.107/207
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED:</b>	RFS2212 / RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	No Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 : 2003, FCC 15.107/207		
<b>TEST PROCEDURE:</b>	<p>a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.</p> <p>b. Connect EUT to the power mains through a line impedance stabilization network (LISN)</p> <p>c. The LISN provides 50ohm coupling impedance for the measuring instrument</p> <p>d. Both sides of AC line were checked for maximum conducted interference.</p> <p>e. The frequency range from 150KHz to 30MHz was searched..</p> <p>f. Set the test-receiver system to Peak Detect Function and Specified bandwidth.</p> <p>g. If the emission level of the EUT in peak mode was 20 dB lower than the specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be tested using the quasi-peak method in about six maximal points and the results will be reported.</p>		
<b>TESTED RANGE:</b>	0.15MHz-30MHz		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Keep Tx in continuous transmission mode, modulated, other antenna ports were terminated by 50ohm impendence.		
<b>RESULTS:</b>	<p>The EUT meets the requirements of test reference for Conducted Emissions on line N by 14.6 dB of Quasi-Peak detector and 11.6 dB of Average Detector.</p> <p>The EUT meets the requirements of test reference for Conducted Emissions on line N by 17.5 dB of Quasi-Peak detector and 10.9 dB of Average Detector.</p> <p>The test results relate only to the equipment under test provided by client.</p>		

<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB

**For Model RFS2212**



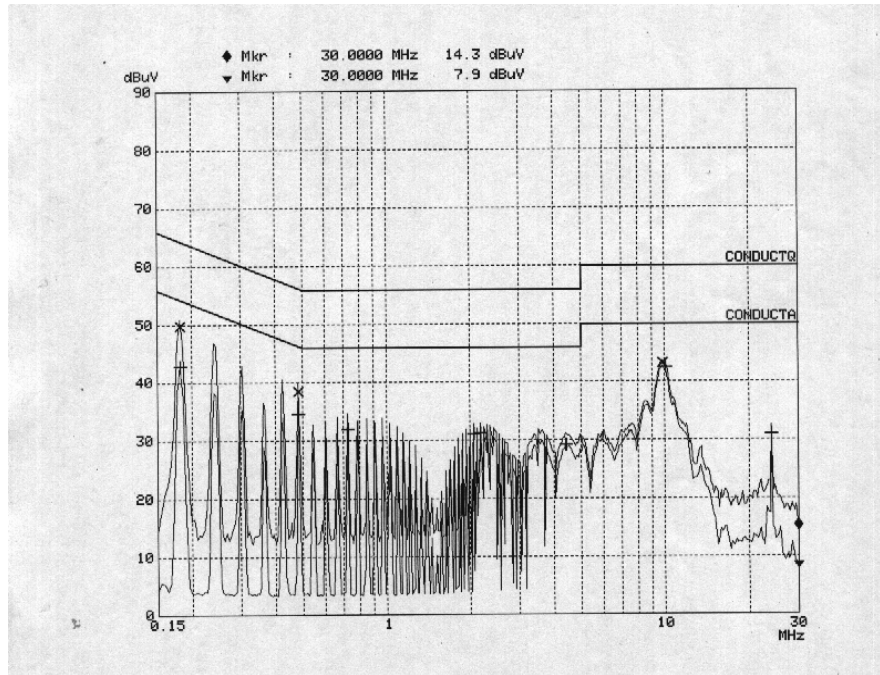
**Line L Conducted Emission Graph**



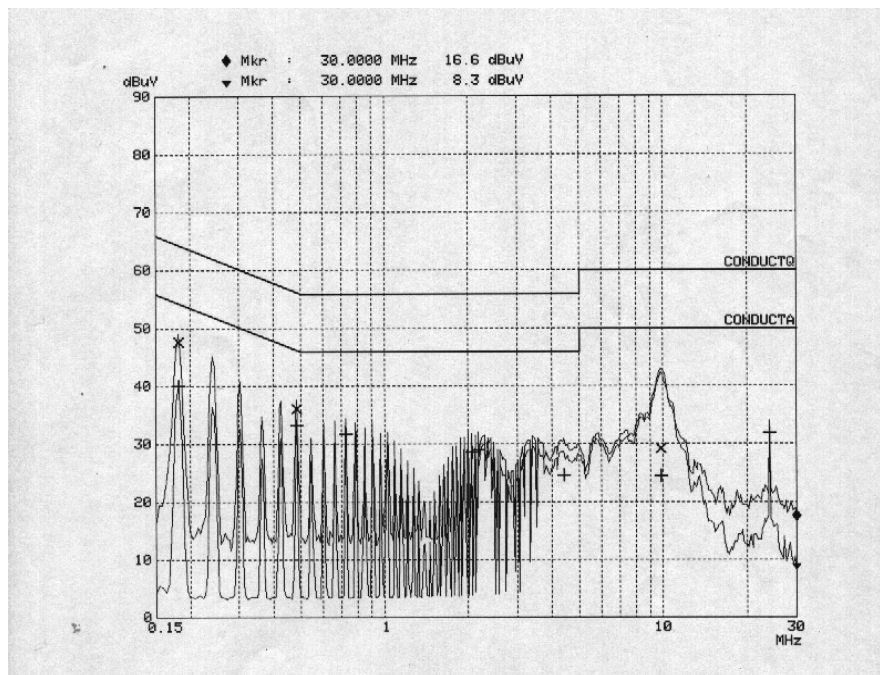
**Line N Conducted Emission Graph**

Line L (Hot Lead)								
Signal	Frequency (MHz)	Corrected QP Level (d)	Limits QP (dBuV)	Margin QP (dB)	Frequency (MHz)	Corrected AVE Level (dBuV)	Limits AVE (dBuV)	Margin AVE (dB)
1	4.2542	38.5	56.0	-17.5	4.2540	35.1	46.0	-10.9
2	4.5700	37.9	56.0	-18.1	4.4700	32.3	46.0	-13.7
3	14.8965	39.0	60.0	-21.0	14.9945	34.5	50.0	-15.5
Line N (Neutral Lead)								
Signal	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Margin QP (dB)	Frequency (MHz)	Corrected AVE Level (dBuV)	Limits AVE (dBuV)	Margin AVE (dB)
1	1.4289	36.9	56.0	-19.1	1.4190	34.9	46.0	-11.1
2	2.6789	36.4	56.0	-19.6	2.7285	34.4	46.0	-11.6
3	2.9946	36.9	56.0	-19.1	2.9445	34.3	46.0	-11.7
Note: All readings are using a bandwidth of 9 kHz, with a 30 ms sweep time. A video filter was not used.								

*For Model RFS2214*



**Line L Conducted Emission Graph**



**Line N Conducted Emission Graph**

Line L (Hot Lead)								
Signal	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Margin QP (dB)	Frequency (MHz)	Corrected AVE Level (dBuV)	Limits AVE (dBuV)	Margin AVE (dB)
1	0.1815	49.8	64.4	-14.6	0.1815	42.8	54.4	-11.6
2	0.4830	38.4	56.2	-17.8	0.4830	34.6	46.2	-11.6
3	9.8105	43.2	60.0	-16.8	9.8105	42.1	50.0	-17.9
Line N (Neutral Lead)								
Signal	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Margin QP (dB)	Frequency (MHz)	Corrected AVE Level (dBuV)	Limits AVE (dBuV)	Margin AVE (dB)
1	0.1815	47.7	64.4	-16.7	0.1815	40.1	54.4	-14.3
2	0.4830	36.1	56.2	-20.1	0.4830	33.2	46.2	-13.0
3	9.7925	29.3	60.0	-30.7	9.7925	24.5	50.0	-25.5
Note: All readings are using a bandwidth of 9 kHz, with a 30 ms sweep time. A video filter was not used.								



Test Equipment	Model	Manufacturer	Serial No.	Last Cal.	Cal. Due
EMI receiver (9k-30M)	R&S	ESCS30	1102.4500.30	02/26/06	02/25/07
LISN	R&S	ESH3-Z5	831.5518.52	02/26/06	02/25/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hangzhu  
SENIOR ENGINEER



***Conducted Emission Test Set-up - Front View***

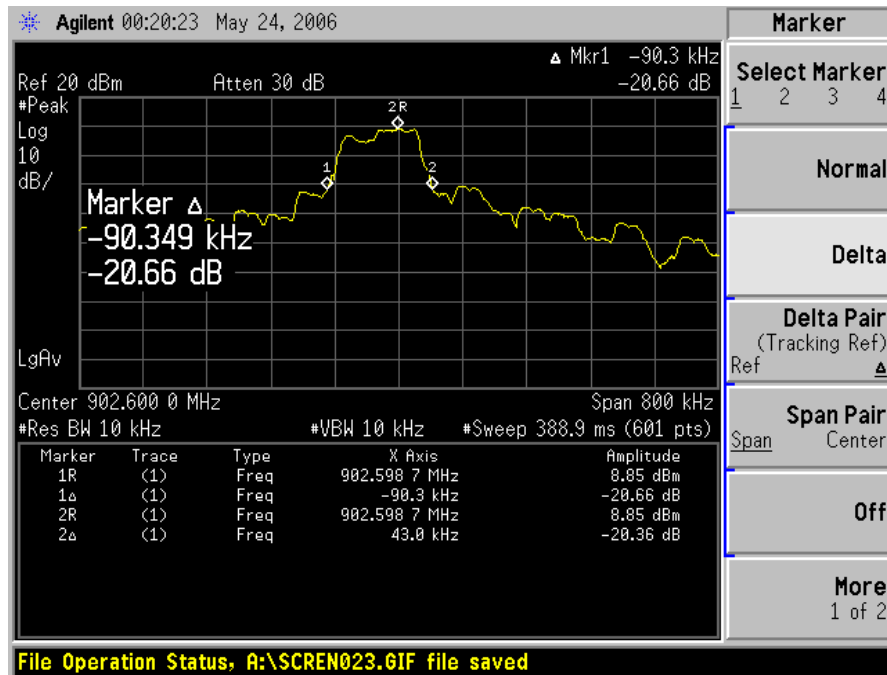


***Conducted Emission Test Set-up - Side View***

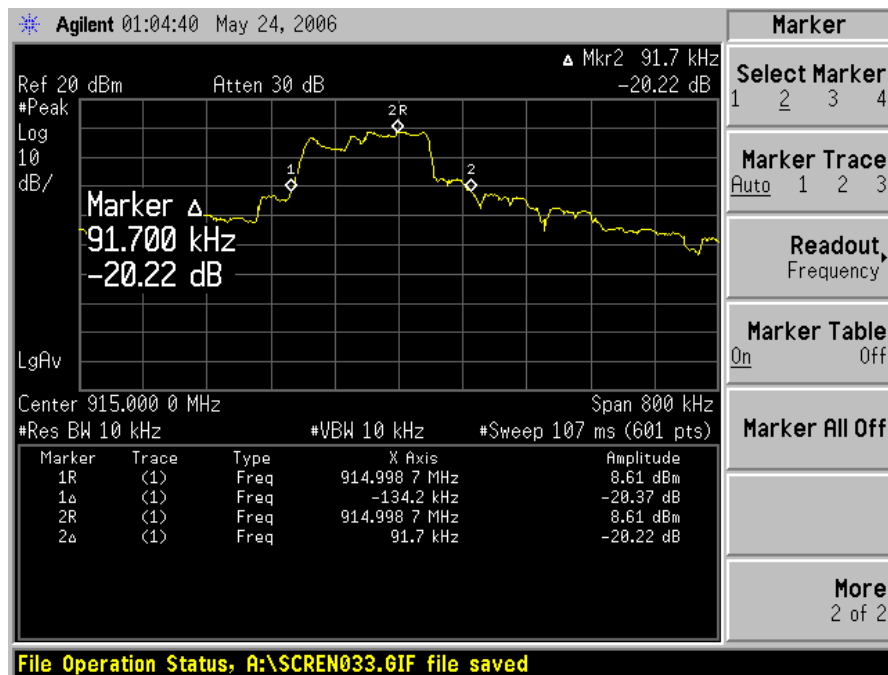
**ATTACHMENT 4 – BANDWIDTH**

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (a)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 - 2003		
<b>BANDWIDTH REQUIREMENT:</b>	FCC 15.247 (a) (1) (i) The maximum allowed 20dB bandwidth of the hopping channel is 500kHz.		
<b>TEST PROCEDURE:</b>	<p>Set the spectrum as follow:</p> <p>Span=approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel;</p> <p>RBW=1% of the 20dB bandwidth; VBW<math>\geq</math>RBW; Sweep=Auto; Detector=Peak; Trace=Maxhold;</p> <p>Use the search peak function to set the marker to the peak of the emission;</p> <p>Use the delta-mark function to measure 20dB down to both sides of the emission;</p> <p>The 20dB BW is the delta reading between two 20dB down marker.</p>		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping at channel 1, channel 32, channel 63		
<b>RESULTS:</b>	The EUT meets the bandwidth requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

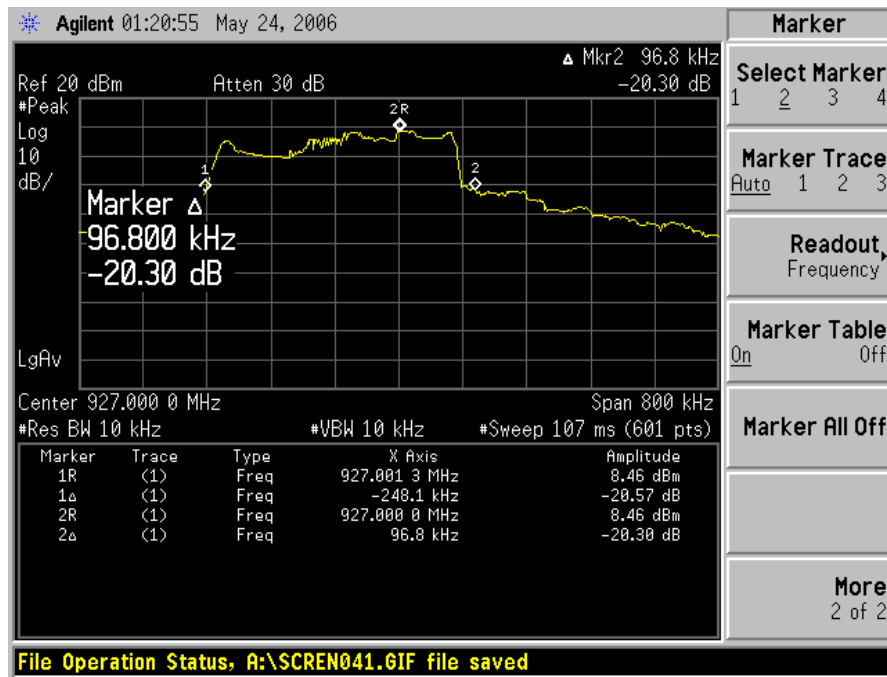
## Model RFS2214



Channel 1



Channel 32



Channel 63

### Test Result

Channel	20dB Bandwidth	Limit	Result
1	$90.3+43.0=133.3\text{kHz}$	500kHz	Pass
32	$134.2+91.7=225.9\text{kHz}$		Pass
63	$248.1+96.8=344.9\text{kHz}$		Pass

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hangzhu  
SENIOR ENGINEER

***Model RFS2214***



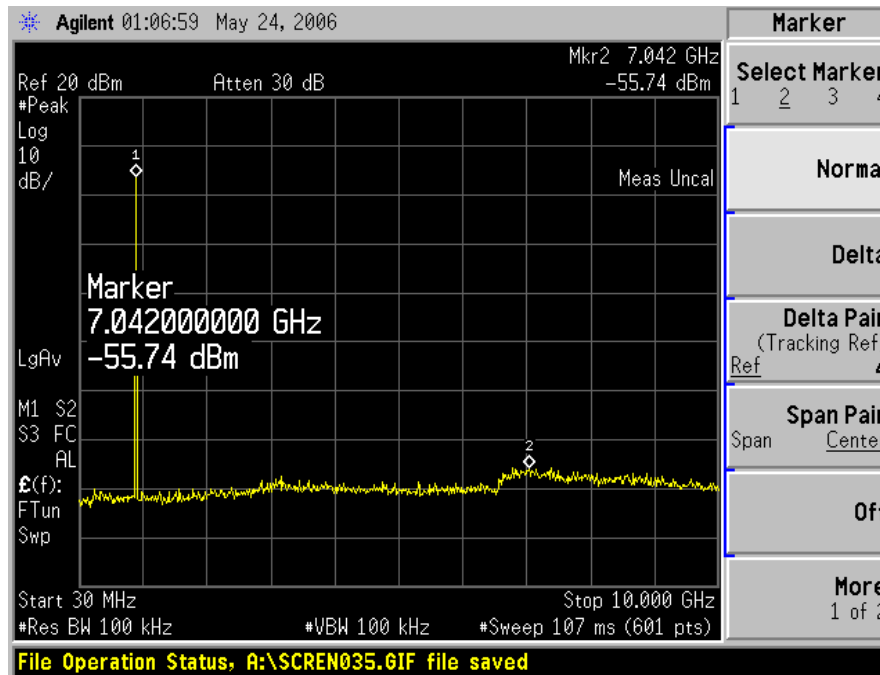
***Bandwidth Test Set-up***



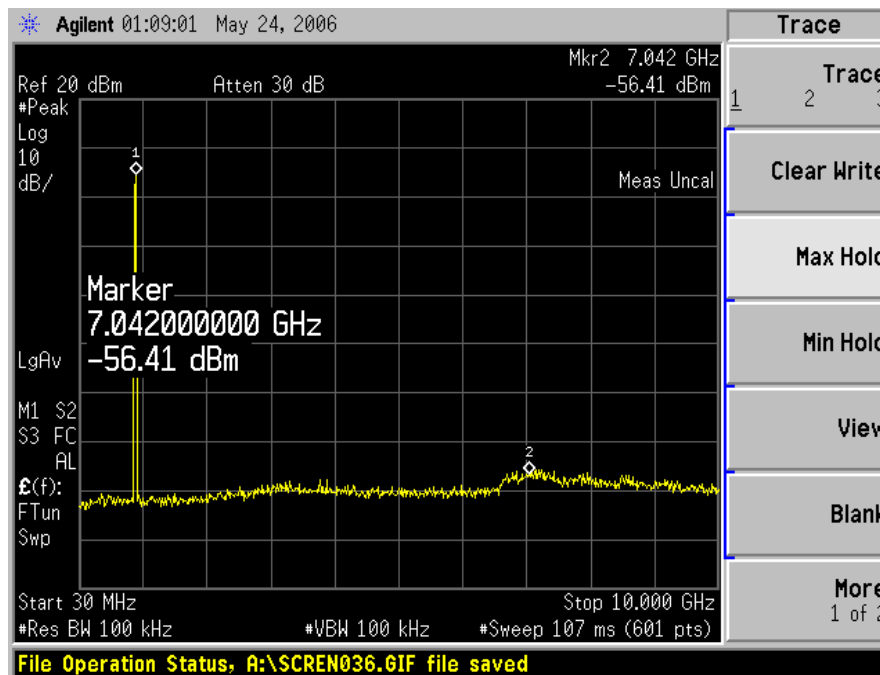
**ATTACHMENT 5 – Emissions at Antenna Port**

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (d)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 – 2003		
<b>TEST REQUIREMENT:</b>	FCC 15.247 (d) Radiation emissions which fall in the restricted bands, as defined in Section 15.205(a), must comply with the radiated emissions limites specified in 15.209(a).		
<b>TEST PROCEDURE:</b>	Set the spectrum as follow:  Span=from 30MHz to tenth harmonic frequency (10GHz); RBW=100kHz; VBW $\geq$ RBW; Sweep=Auto; Detector=Peak; Trace=Maxhold		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping at channel 1, channel 32, channel 63		
<b>RESULTS:</b>	The EUT meets the emissions at antenna port requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

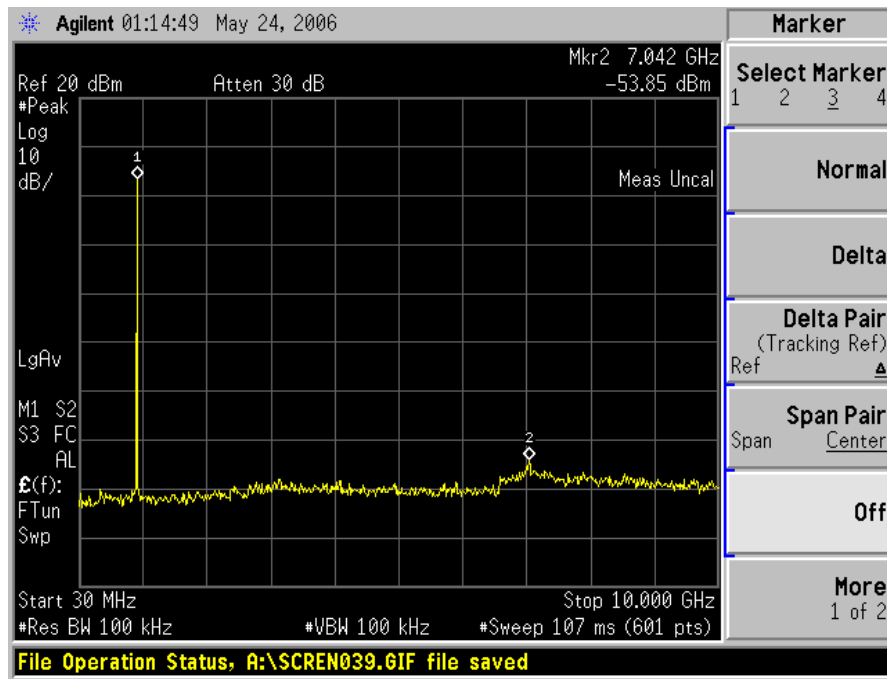
## Model RFS 2214



Channel 1



Channel 32



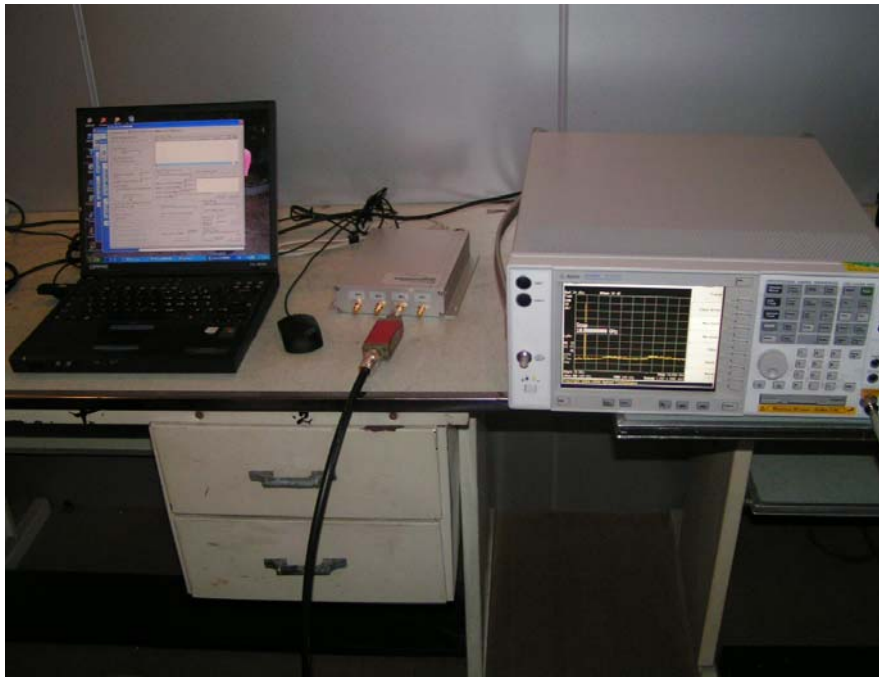
Channel 63

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hangzhu  
SENIOR ENGINEER

***Model RFS2214***

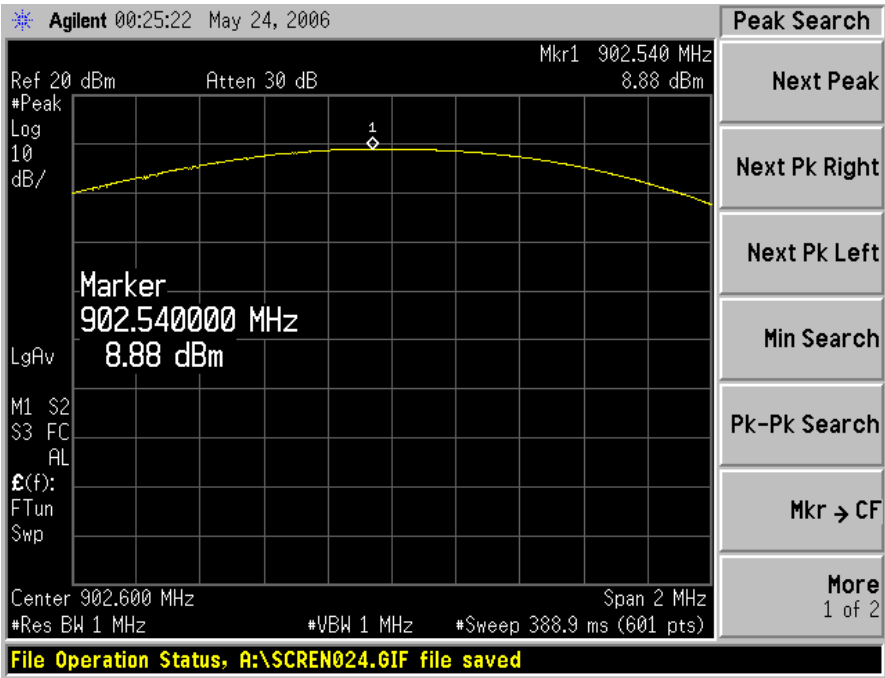


***Emissions at Antenna Port Test Set-up***

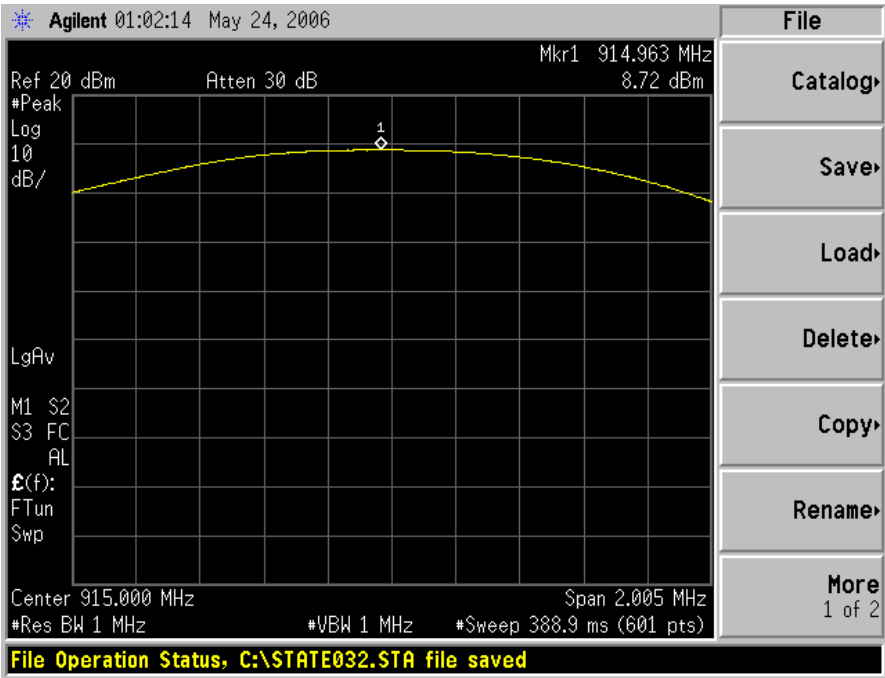
**ATTACHMENT 6 – Maximum Peak Output Power Test**

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (b) (2)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2212 / RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 - 2003		
<b>TEST REQUIREMENT:</b>	FCC 15.247 (b) (2) For frequency hopping systems operating in the 902-928MHz band: 1 watt for system employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.		
<b>TEST PROCEDURE:</b>	Set the spectrum as follow:  Span=2MHz, centered on a hopping channel; RBW=1MHz; VBW $\geq$ RBW; Sweep=Auto; Detector=Peak; Trace=Maxhold;  Allow the trace to stabilize and use the search peak function to set the marker to the peak of the emission.		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping at channel 1, channel 32, channel 63		
<b>RESULTS:</b>	The EUT meets the maximum peak conducted output power requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

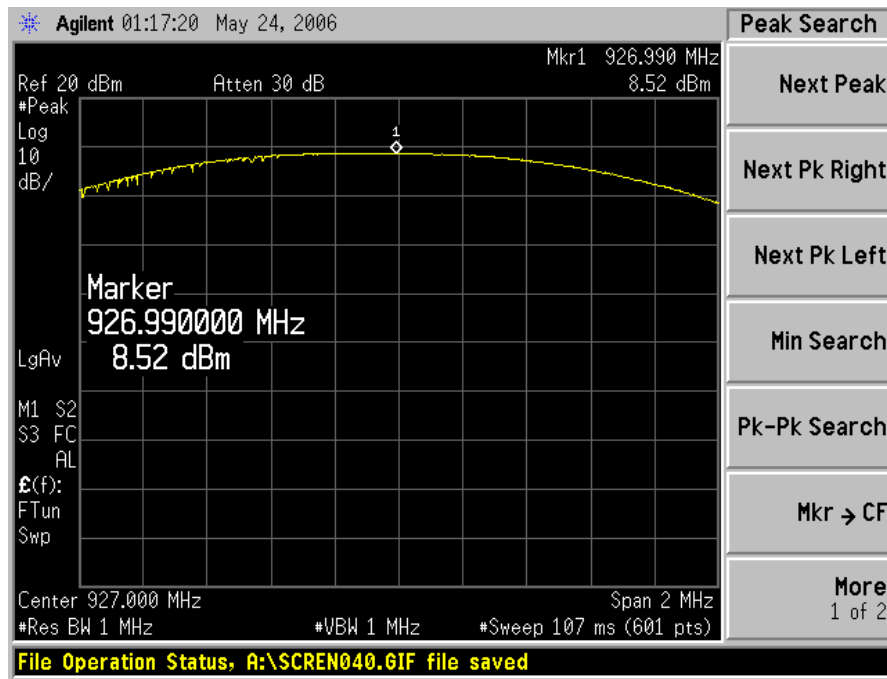
*Model RFS2214 Antenna Port 1*



*Channel 1*



*Channel 32*



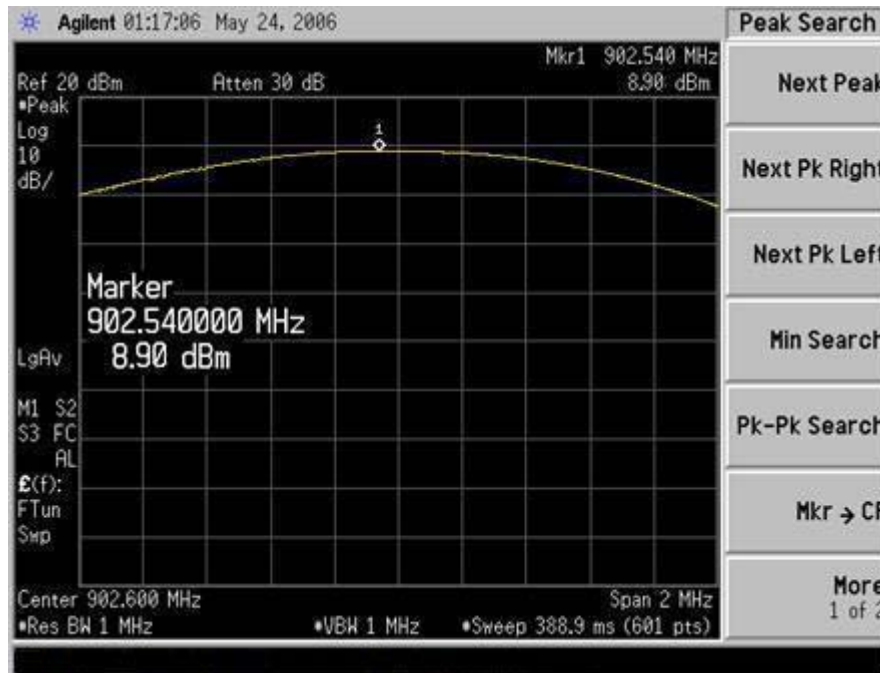
Channel 63

### Test Result

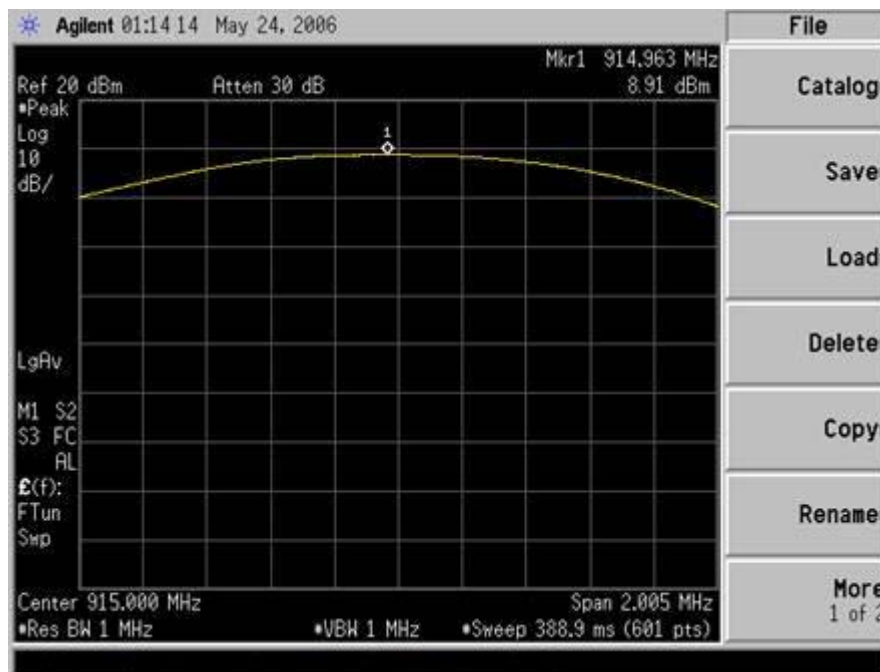
Channel	Peak Power	Limit	Result
1	$8.88 + 19.23 = 28.11 \text{ dBm}$	30dBm	Pass
32	$8.72 + 19.41 = 28.13 \text{ dBm}$		Pass
63	$8.52 + 19.59 = 28.11 \text{ dBm}$		Pass



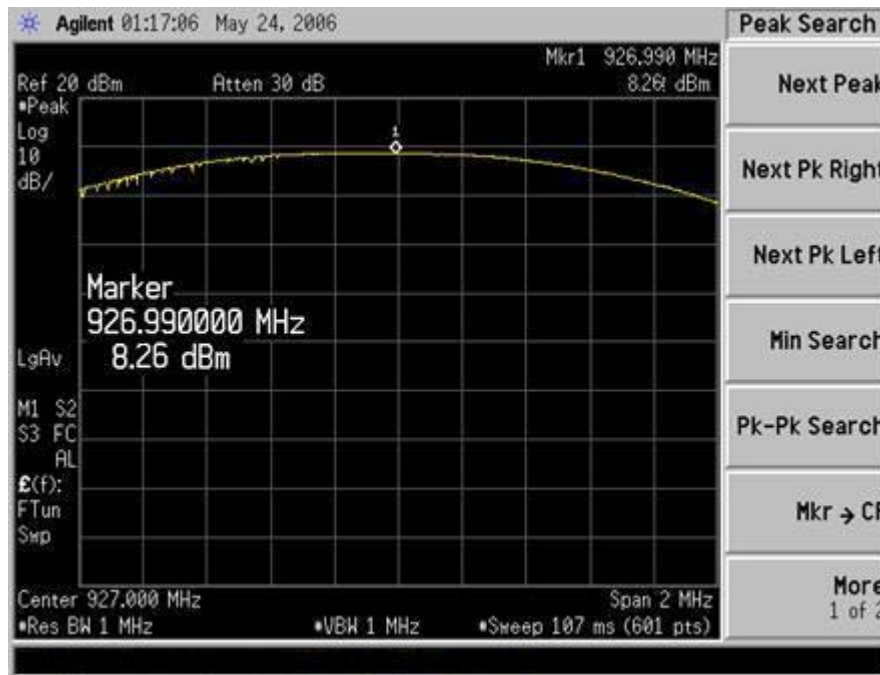
## Model RFS2214 Antenna Port 2



Channel 1



Channel 32

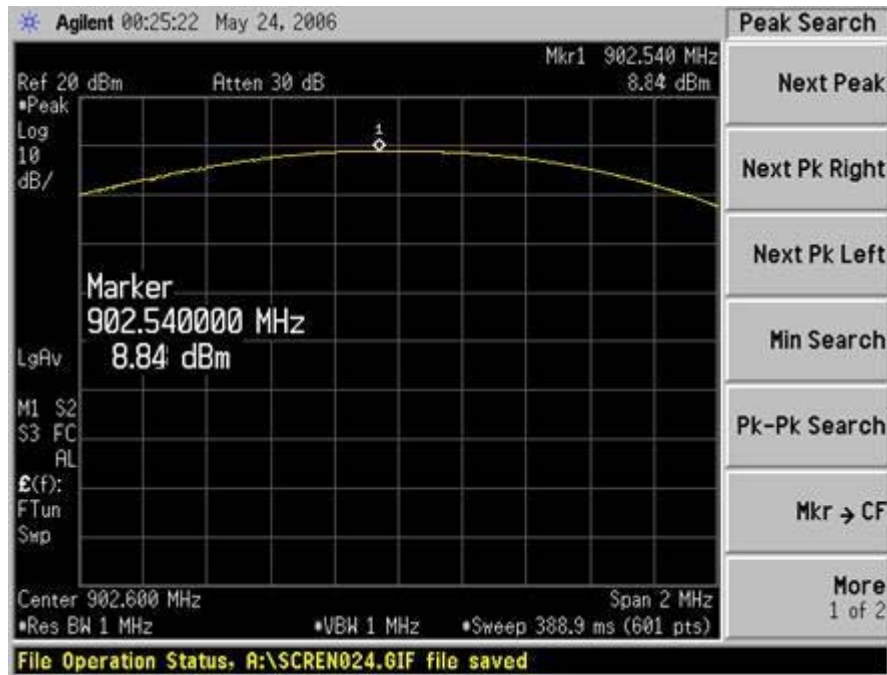


Channel 63

### Test Result

Channel	Peak Power	Limit	Result
1	$8.90 + 19.23 = 28.13 \text{ dBm}$	30 dBm	Pass
32	$8.91 + 19.41 = 28.32 \text{ dBm}$		Pass
63	$8.26 + 19.59 = 27.85 \text{ dBm}$		Pass

### Model RFS2214 Antenna Port 3



Channel 1



Channel 32



Channel 63

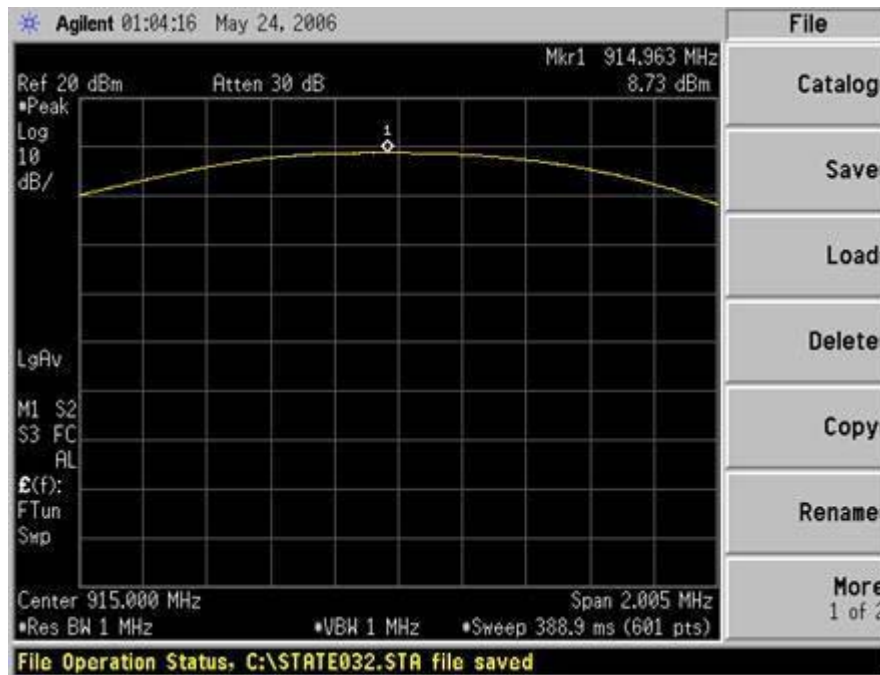
### Test Result

Channel	Peak Power	Limit	Result
1	$8.84 + 19.23 = 28.07 \text{ dBm}$	30 dBm	Pass
32	$8.73 + 19.41 = 28.14 \text{ dBm}$		Pass
63	$8.62 + 19.59 = 28.21 \text{ dBm}$		Pass

## Model RFS2214 Antenna Port 4



Channel 1



Channel 32



Channel 63

### Test Result

Channel	Peak Power	Limit	Result
1	$8.90 + 19.23 = 28.13 \text{ dBm}$	30 dBm	Pass
32	$8.73 + 19.41 = 28.14 \text{ dBm}$		Pass
63	$8.66 + 19.59 = 28.25 \text{ dBm}$		Pass

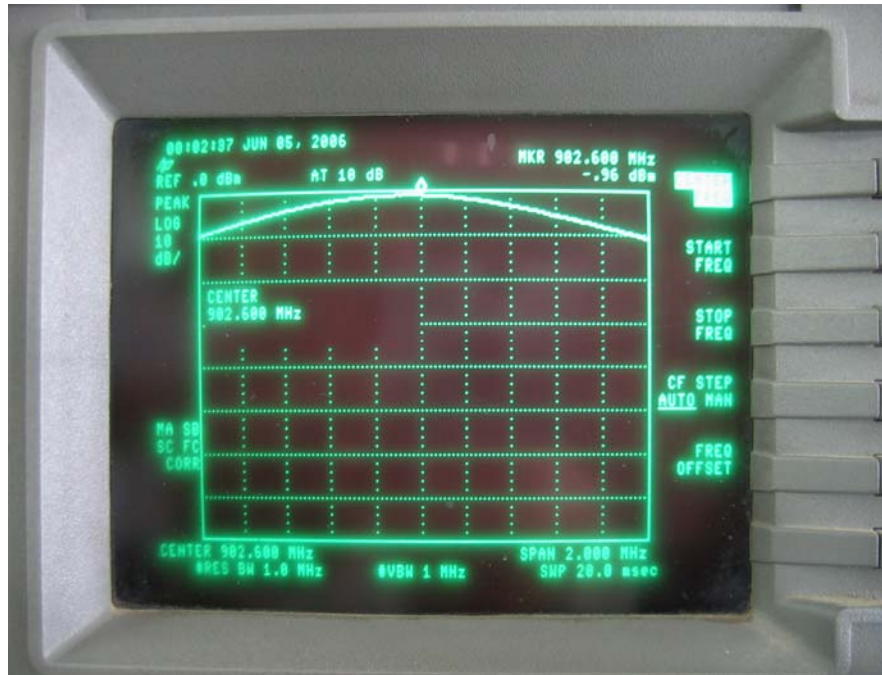
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

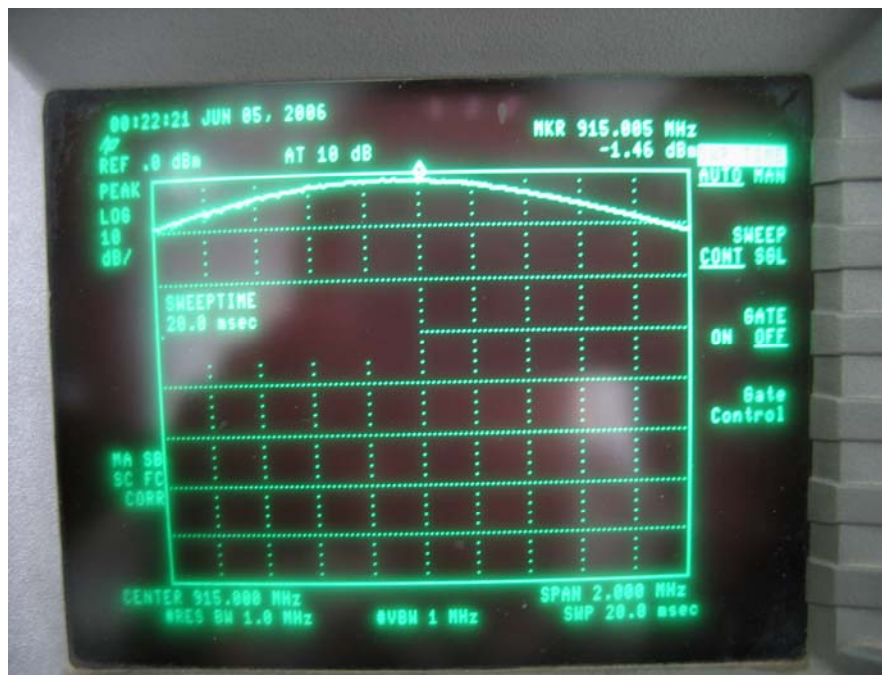
REVIEWED BY: Hangzhu  
SENIOR ENGINEER



## Model RFS2212 Antenna Port 1

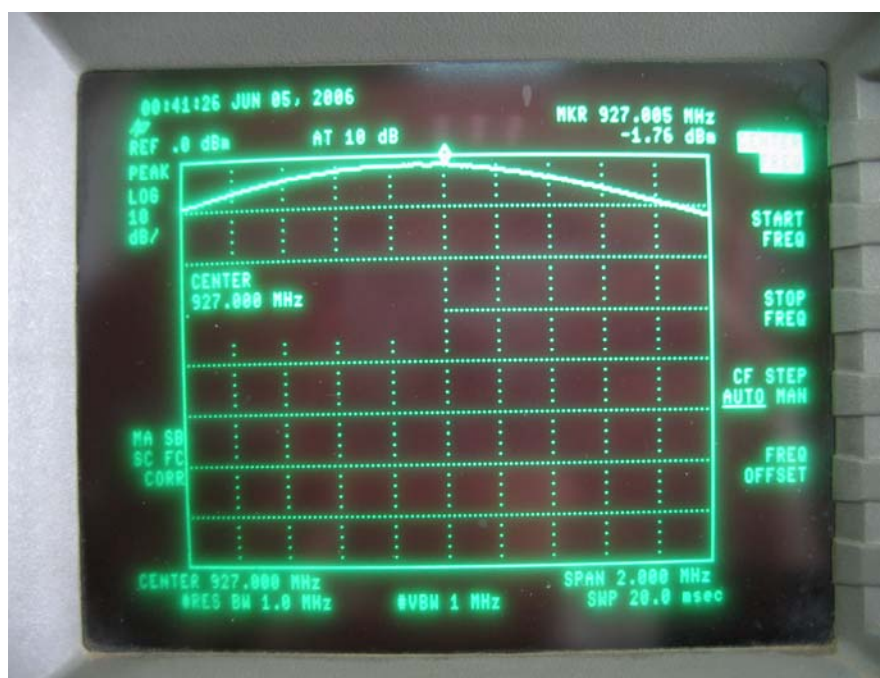


Channel 1



Channel 32





Channel 63

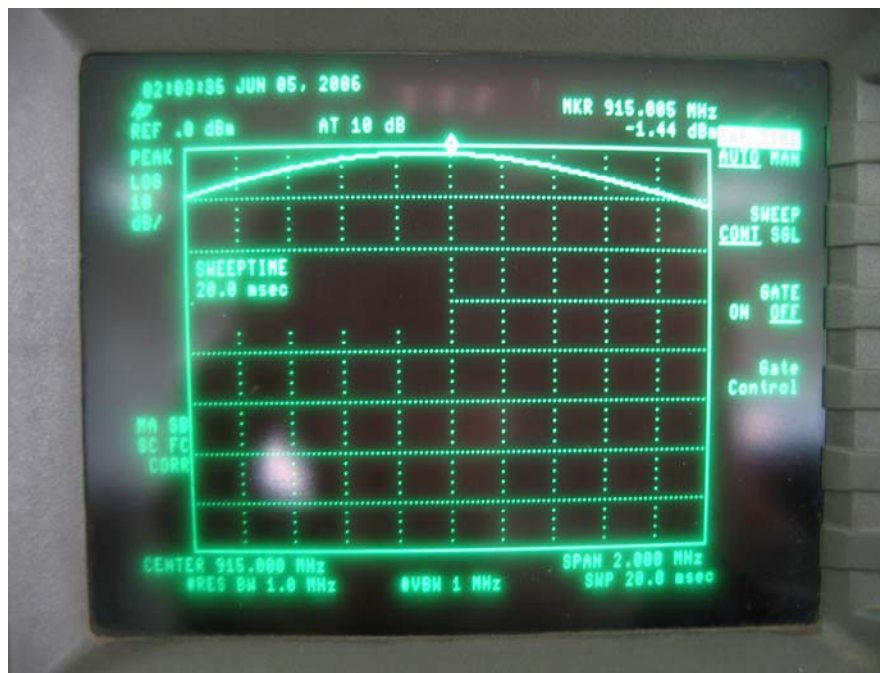
### Test Result

Channel	Peak Power	Limit	Result
1	$-0.96+29.35=28.39\text{dBm}$	30dBm	Pass
32	$-1.46+29.43=27.97\text{dBm}$		Pass
63	$-1.76+29.65=27.89\text{dBm}$		Pass

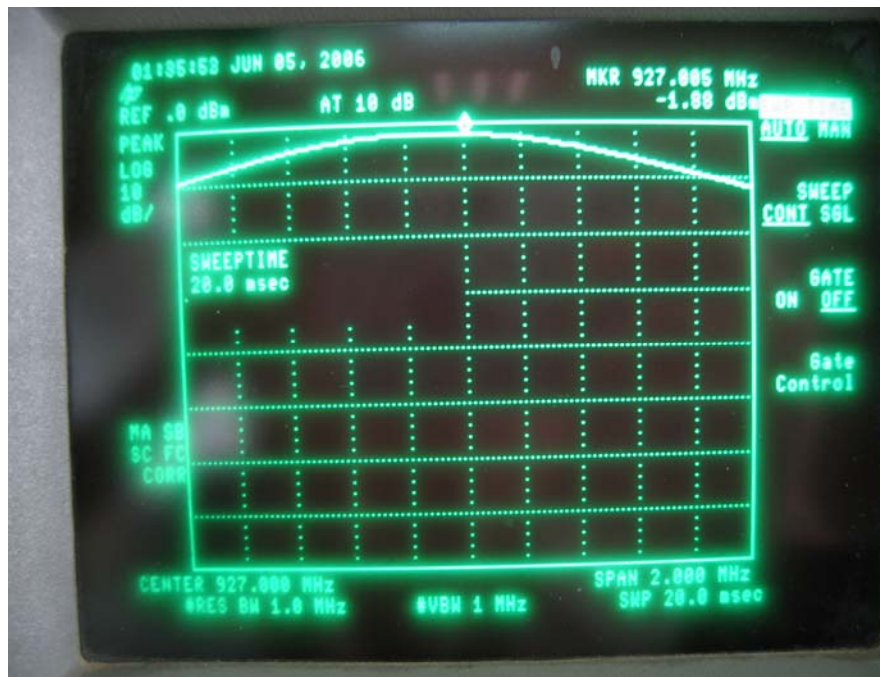
## Model RFS2212 Antenna Port 2



Channel 1



Channel 32



Channel 63

### Test Result

Channel	Peak Power	Limit	Result
1	$-0.95+29.35=28.40\text{dBm}$	30dBm	Pass
32	$-1.44+29.43=27.99\text{dBm}$		Pass
63	$-1.88+29.65=27.77\text{dBm}$		Pass

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	8593E	3628A00167	04/21/06	04/20/07
30dB Attenuator	SETP	50HF-030	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

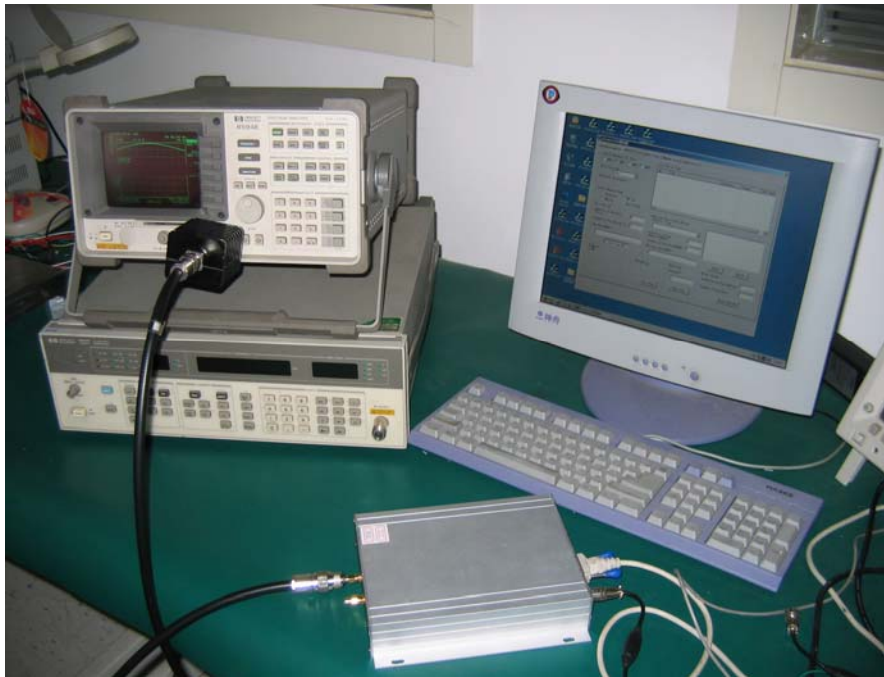
REVIEWED BY: Hangzhu  
SENIOR ENGINEER

***Model RFS2214***



***Emissions at Antenna Port Test Set-up***

***Model RFS2212***



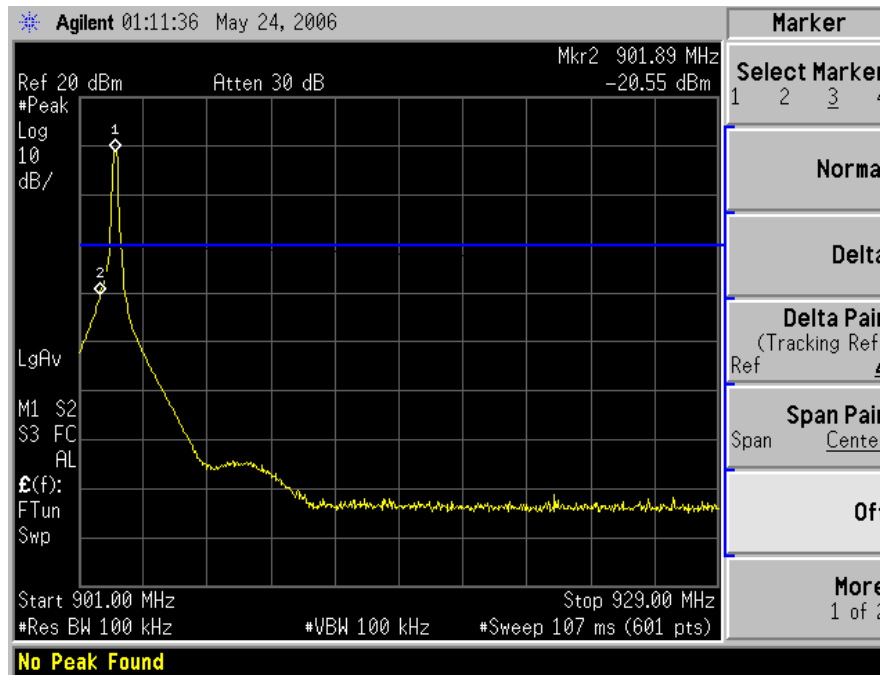
***Emissions at Antenna Port Test Set-up***



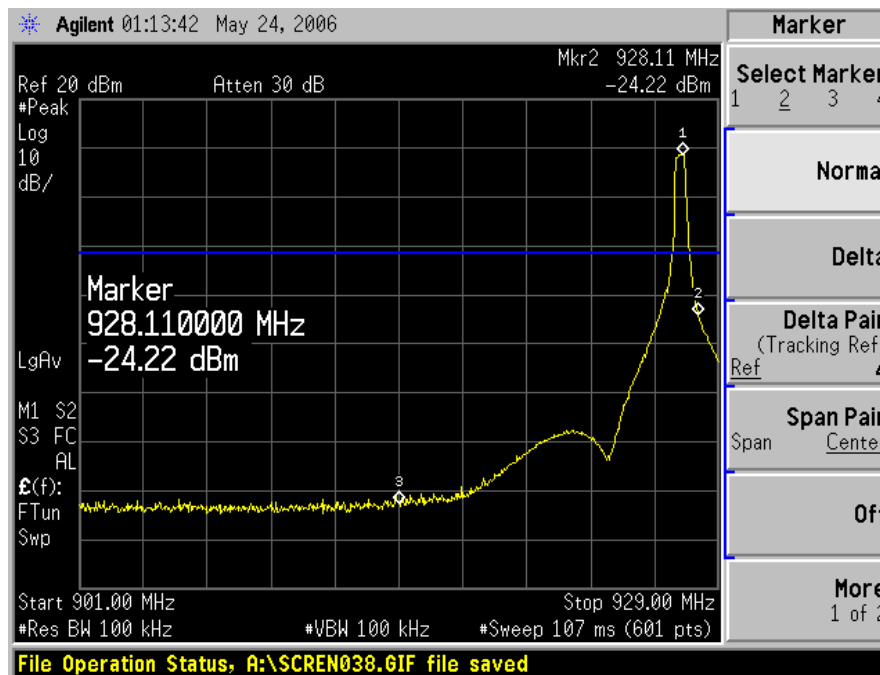
## ATTACHMENT 7 – Band Edge Test

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (d)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 - 2003		
<b>BANDEDGE REQUIREMENT:</b>	FCC 15.247 (d) In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiators shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.		
<b>TEST PROCEDURE:</b>	<p>Set the spectrum as follow:</p> <p>Span=wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.</p> <p>RBW=100kHz; VBW<math>\geq</math>RBW; Sweep=Auto; Detector=Peak; Trace=Maxhold;</p> <p>Allow the trace to stabilize and use the search peak function to set the marker to the peak of the useful emission, then use delta-mark function to mark the maximum emission outside of the band, record the delta level to see if it's more than 20dB.</p>		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping at channel 1, channel 32, channel 63		
<b>RESULTS:</b>	The EUT meets band edge requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

## Model RFS 2214



Channel 1



Channel 63

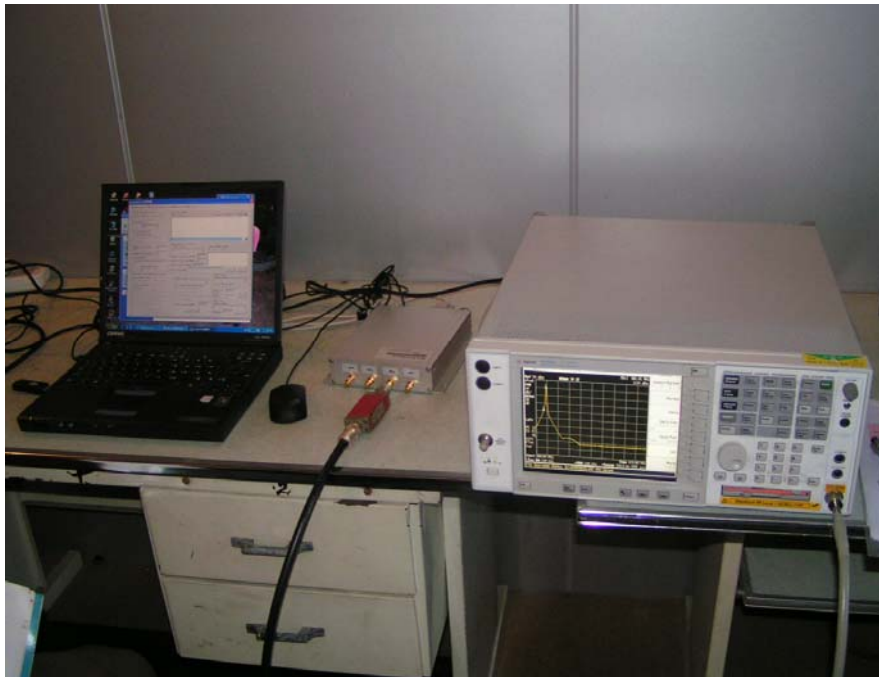


Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hangzhu  
SENIOR ENGINEER

***Model RFS2214***

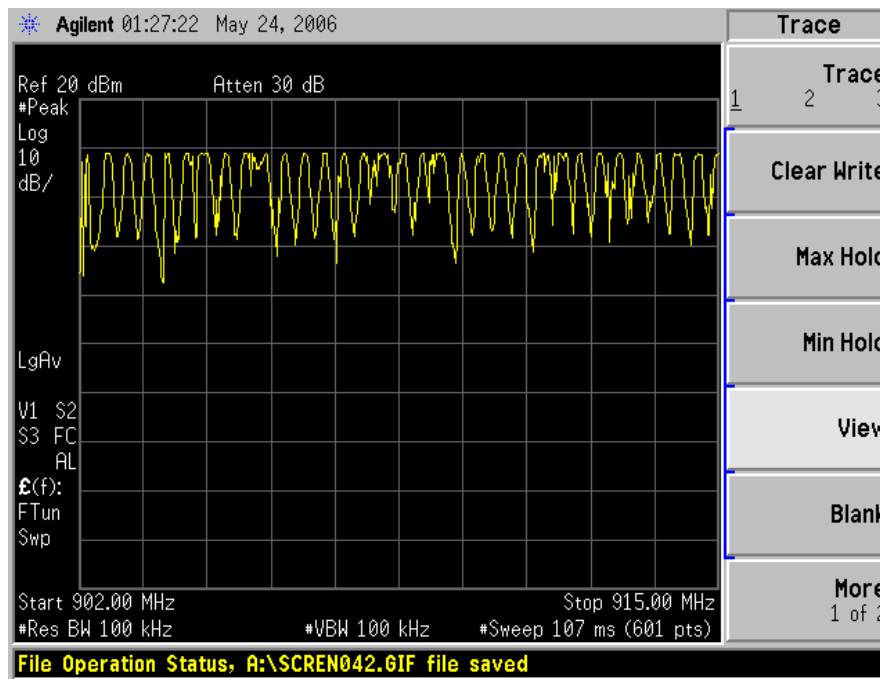


***Emissions at Antenna Port Test Set-up***

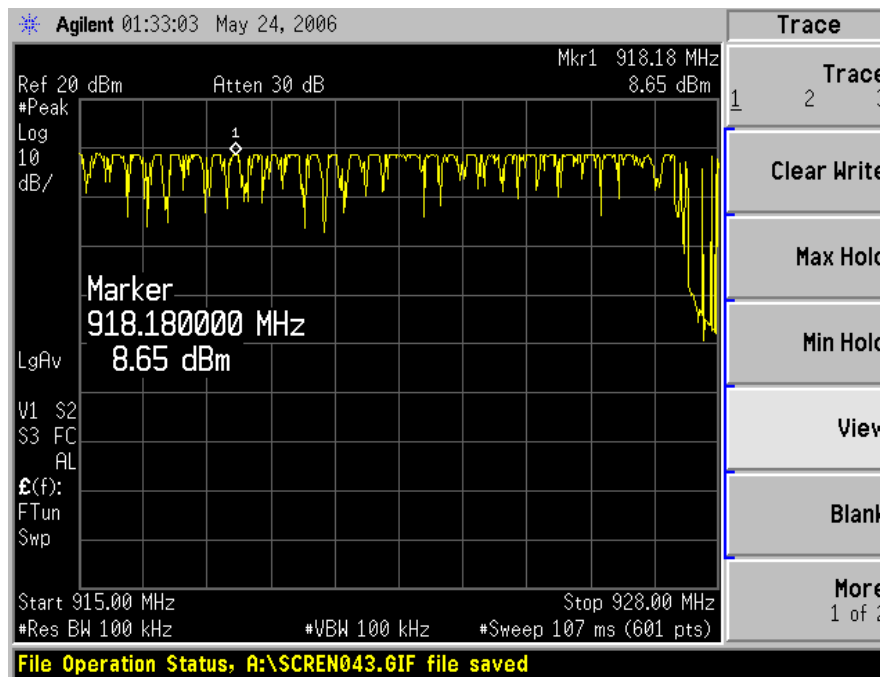
## ATTACHMENT 8 – Number of Hopping Channels

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (a) (1) (i)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 - 2003		
<b>TEST REQUIREMENT:</b>	FCC 15.247 (a) (1) (i) For frequency hopping systems operating in the 902-928MHz band: if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20dB bandwidth of the hopping channel is 250kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 seconds period.		
<b>TEST PROCEDURE:</b>	Set the spectrum as follow:  Span=the frequency band of operation RBW=1% of the span; VBW $\geq$ RBW; Sweep=Auto; Detector=Peak; Trace=Maxhold;  Allow the trace to stabilize and count the number of hopping channels.		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping enable		
<b>RESULTS:</b>	The EUT has 63 hopping numbers, it meets number of hopping channels requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

## Model RFS2214



902-915MHz



915-928MHz

Result: Total 63 Channels

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hanyzha  
SENIOR ENGINEER

***Model RFS2214***

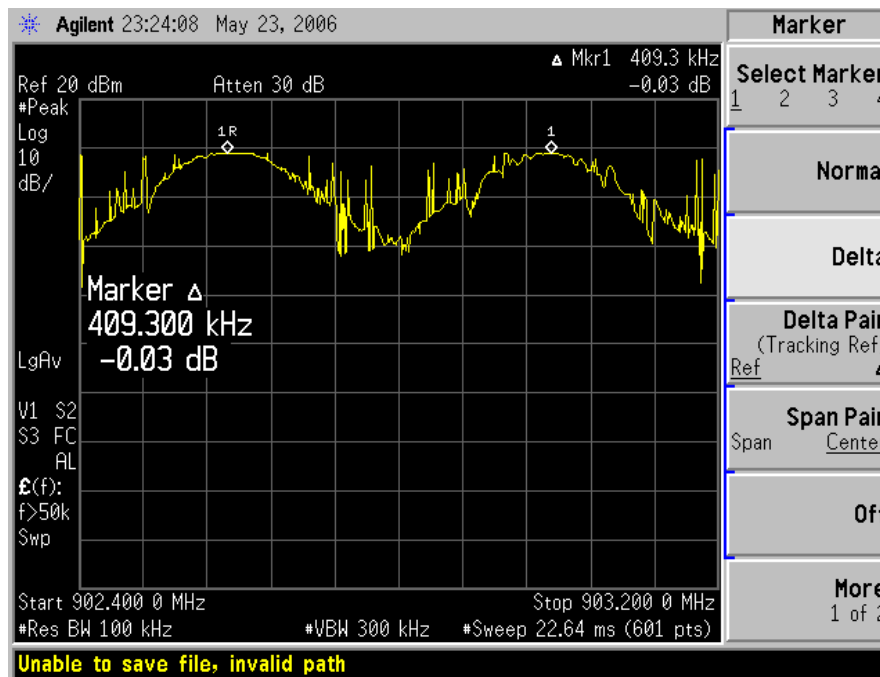


***Number of Hopping Channels Test Set-up***

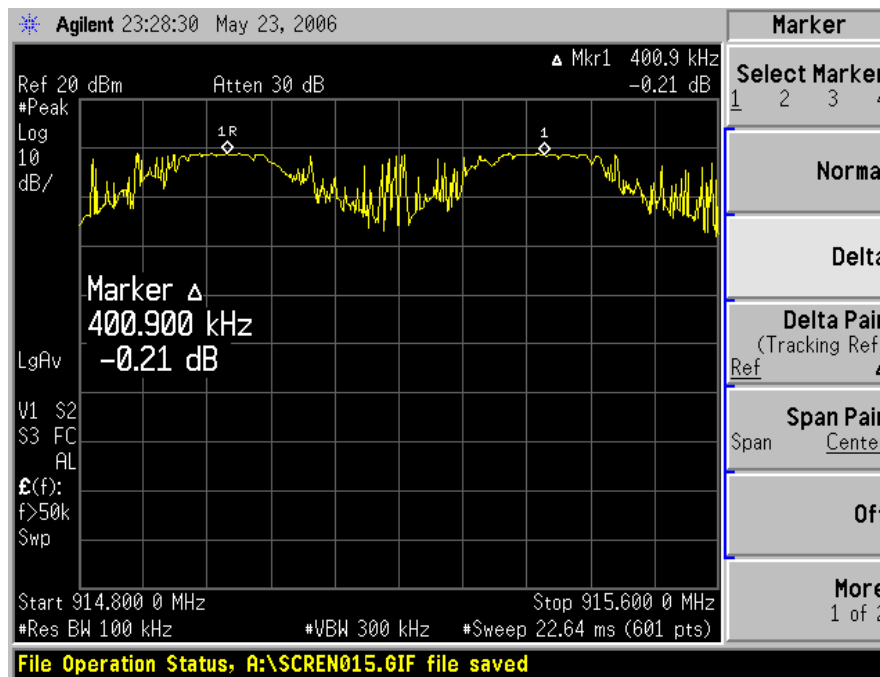
**ATTACHMENT 9 – Hopping Channels Separation**

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (a) (1)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21 °C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 - 2003		
<b>TEST REQUIREMENT:</b>	FCC 15.247 (a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.		
<b>TEST PROCEDURE:</b>	<p>Set the spectrum as follow:</p> <p>Span=wide enough to capture the peaks of two adjacent channels; RBW=1% of the span; VBW<math>\geq</math> RBW; Sweep=Auto; Detector=Peak; Trace=Maxhold;</p> <p>Allow the trace to stabilize and delta mark two channels peak emission, then record the frequency separation.</p>		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping enable		
<b>RESULTS:</b>	The EUT meets the hopping channels separation requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

## Model RFS2214

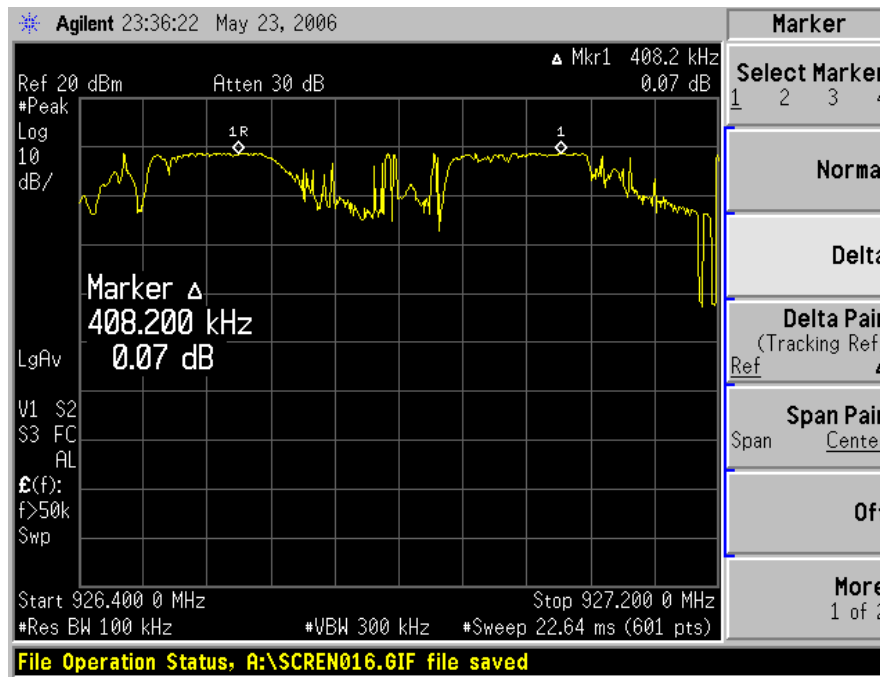


Near Channel 1



Near Channel 32





Near Channel 63

Test Result:

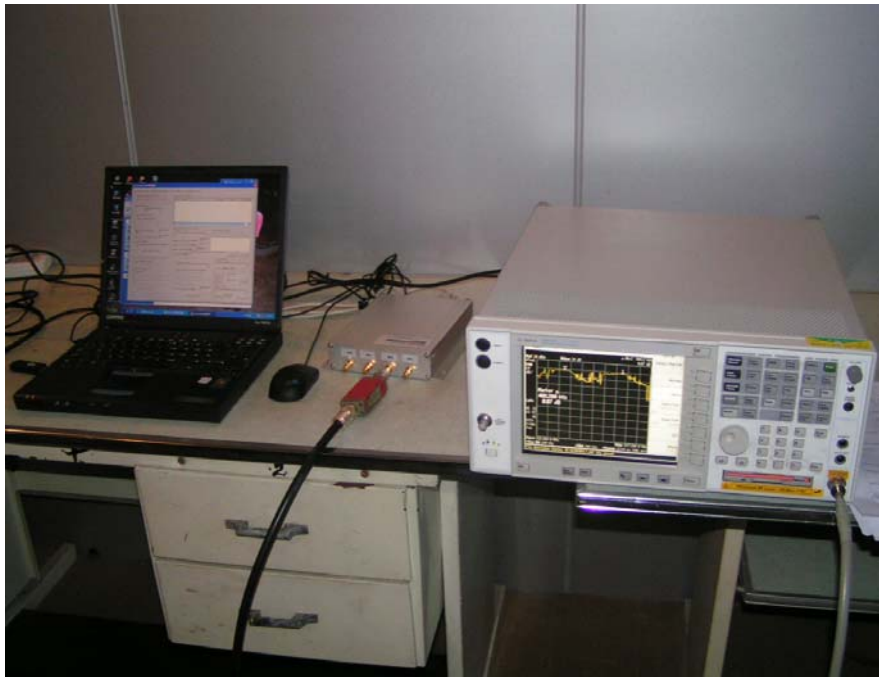
Channel	Channel Separation	Limit	Result
Near 1	409.3kHz	25kHz / 20dB Bandwidth=344.9kHz	Pass
Near 32	400.9kHz		Pass
Near 63	408.2kHz		Pass

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hanyzha  
SENIOR ENGINEER

***Model RFS2214***

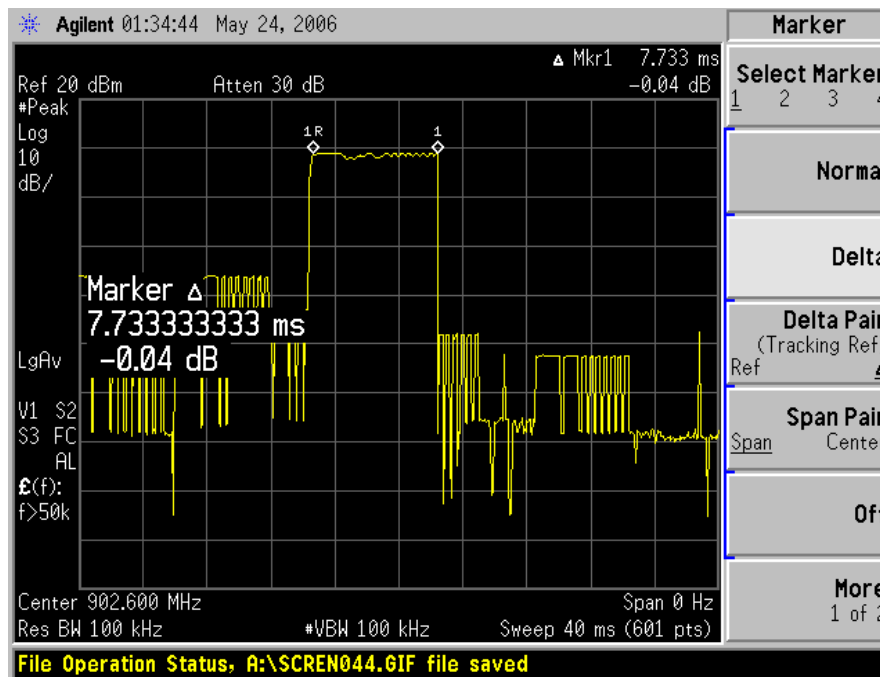


***Hopping Channels Separation Test Set-up***

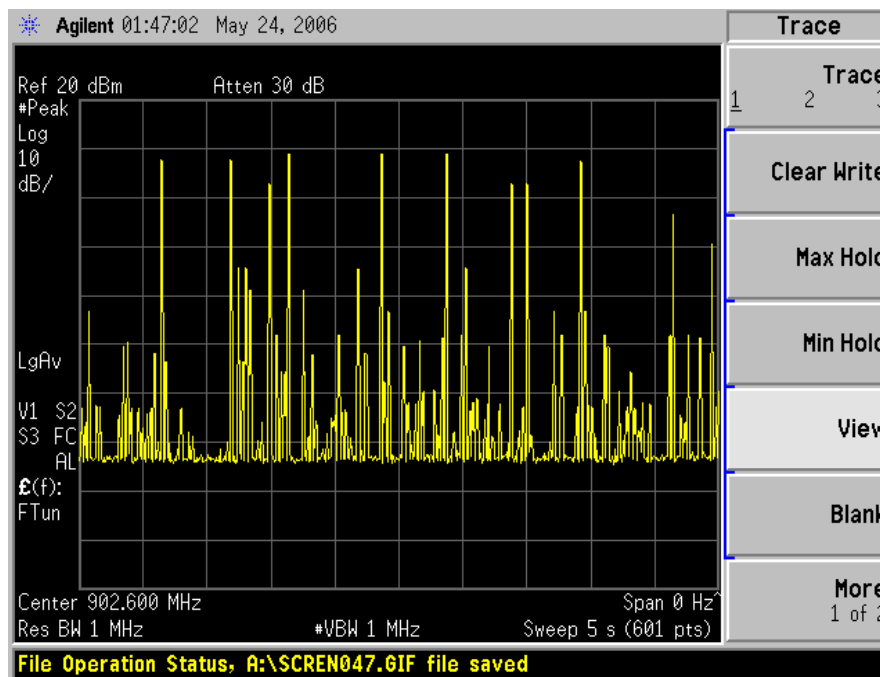
## ATTACHMENT 10 – Time of Occupying Test

<b>CLIENT:</b>	Jiangsu Raifu Intelligent Tech. Co., Ltd.	<b>TEST STANDARD:</b>	FCC Part 15.247 (a) (1) (i)
<b>MODEL NUMBERS:</b>	RFS2212 / RFS2214	<b>PRODUCT:</b>	UHF Reader
<b>MODEL TESTED</b>	RFS2214		
<b>SERIAL NO.:</b>	Engineering Sample	<b>EUT DESIGNATION:</b>	RF Equipment
<b>TEMPERATURE:</b>	21°C	<b>HUMIDITY:</b>	53%RH
<b>ATM PRESSURE:</b>	101.6 kPa	<b>GROUNDING:</b>	Grounding
<b>TESTED BY:</b>	Shi Xiting	<b>DATE OF TEST:</b>	2006, May 24
<b>SETUP METHOD:</b>	ANSI C63.4 - 2003		
<b>TEST REQUIREMENT:</b>	FCC 15.247 (a) (1) (i) For frequency hopping systems operating in the 902-928MHz band: if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20dB bandwidth of the hopping channel is 250kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 seconds period.		
<b>TEST PROCEDURE:</b>	<p>Set the spectrum as follow:</p> <p>Span=0Hz center on the hopping channel;  RBW=100kHz; VBW<math>\geq</math> RBW; Sweep=as necessary to capture the entire dwell time per hopping channel; Detector=Peak; Trace=Maxhold;</p> <p>Let the EUT transmit at its maximum data rate and allow the trace to stabilize ; record the total dwell time within the specified tiem.</p>		
<b>TEST VOLTAGE:</b>	120V / 60Hz		
<b>TEST STATUS:</b>	Hopping enable		
<b>RESULTS:</b>	The EUT meets the time of occupying requirement. The test results relate only to the equipment under test provided by client.		
<b>CHANGES OR MODIFICATIONS:</b>	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
<b>M. UNCERTAINTY:</b>	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm 2.6$ dB		

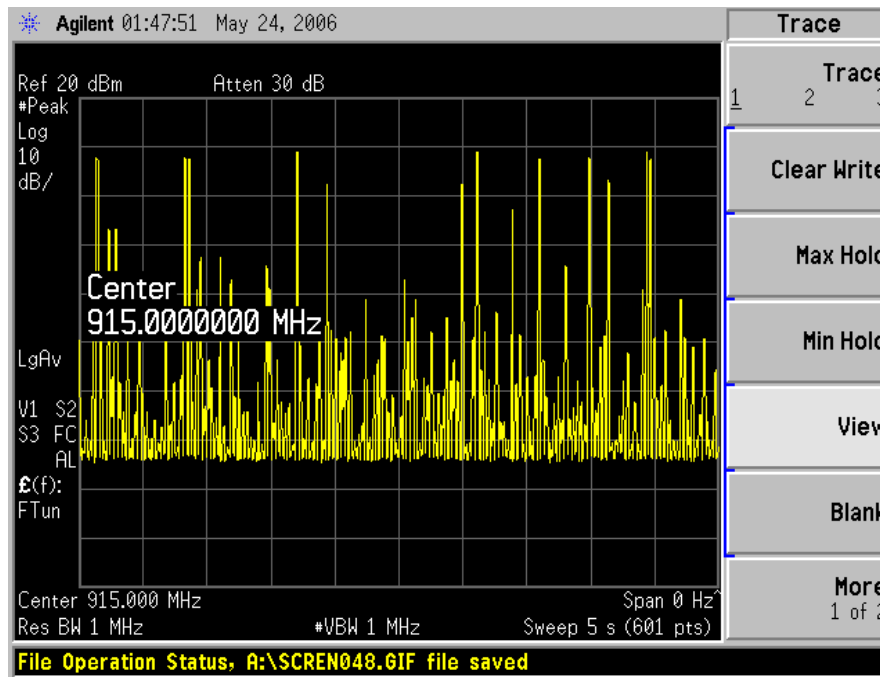
## Model RFS2214



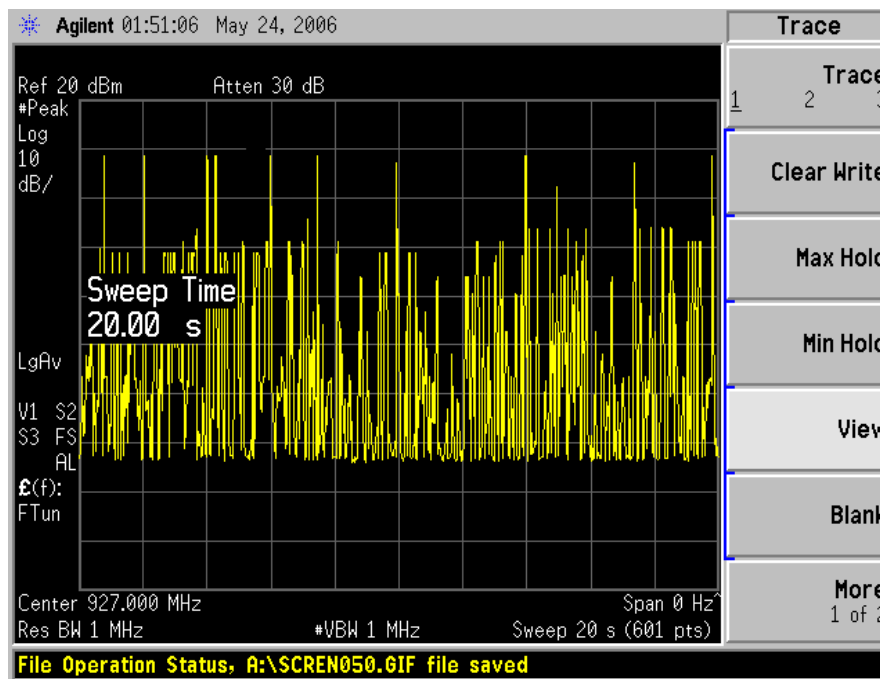
*Single Occupying Time*



*Channel 1*



Channel 32



Channel 63

**Test Result:**

<i>Channel</i>	<i>Time</i>	<i>Limit</i>	<i>Result</i>
1	$7.733\text{ms} \times 9 = 69.597\text{ms}$ within 5s, that is $69.597 \times 4 = 0.278\text{s}$ within 20s	0.4s within 20s	Pass
32	$7.733\text{ms} \times 10 = 77.33\text{ms}$ within 5s, that is $77.33 \times 4 = 0.309\text{s}$ within 20s	0.4s within 20s	Pass
63	$7.733\text{ms} \times 10 = 77.33\text{ms}$ within 20s	0.4s within 20s	Pass

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/06	03/19/07
20dB Attenuator	SETP	50HF-020	---	03/20/06	03/19/07
Shielded Room	---	P-22	---	02/20/06	02/19/07
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting  
ENGINEER

REVIEWED BY: Hanyzha  
SENIOR ENGINEER



***Model RFS2214***



***Time of Occupying Test Set-up***