

**SGS-CSTC Standards
Technical Services Co., Ltd.**

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TEST REPORT

Application No. : SHEMO09070085901
Applicant: ZHANGZHOU JIMEI ELECTRONIC CO.,LTD.
FCC ID: VI7H998
Fundamental Frequency : 433.94MHz
Equipment Under Test (EUT):
Name: Weather station transmitter
Model No.: H998
Standards: FCC PART 15 SUBPART C, Section 15.231(e)
Date of Receipt: July 30,2009
Date of Test: August 3,2009 to August 28,2009
Date of Issue: August 31,2009
Test Result : **PASS ***

* In the configuration tested, the EUT complied with the standards specified above.

Approved by:



Tino Pan
E&E Section Manager

Tested By:



San Yuan
EMC TEST Engineer

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2 Test Summary

The customer requested FCC tests for a 433MHz transmitter.			
Test	Test Requirement	Standard Paragraph	Result
Restricted bands of operation	FCC PART 15	Section 15.205	PASS
Radiated Emission Limits	FCC PART 15	Section 15.209	PASS
Operation mode	FCC PART 15	Section 15.231(e)	PASS
Field Strength of Fundamental and Spurious Emissions	FCC PART 15	Section 15.231(e)	PASS
Bandwidth	FCC PART 15	Section 15.231(c)	PASS

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4 General Information

4.1 Client Information

Applicant Name: ZHANGZHOU JIMEI ELECTRONIC CO.,LTD.
Applicant Address: HENGY ROAD,LANTIAN INDUSTRIAL DISTRICT,
ZHANGZHOU,FUJIAN,CHINA

4.2 Details of E.U.T.

Name: Weather station transmitter
Model No.: H998
Power Supply: DC 3V(AAA×2Batteries)
Power Cord: N/A

4.3 Description of Support Units

The EUT was tested as an independent unit: a 433.94MHz radio transmitter

4.4 Test Location

Tests were performed at:

SGS-CSTC EMC Laboratory, No.588 West Jindu Road, Songjiang District, Shanghai, China

Tel:+86 21 6191 5666 Fax:+86 21 6191 5655

No tests were sub-contracted.

4.5 Other Information Requested by the Customer

None.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 402683

EMC Laboratory has been registered and fully described in a report filed with the (FCC)

Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 402683.

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5 Test Results

5.1 Test Instruments

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100324	2009-4-21	2010-4-20
2	EMI test receiver	Rohde & Schwarz	ESU40	100109	2009-6-4	2010-6-3
3	Bilog Antenna	TESEQ	CBL6112D	23193	2009-5-14	2010-5-14
4	Horn Antenna	EMCO	3115	9100284	2009-4-11	2010-4-10
5	Horn Antenna	EMCO	3115	100285	2008-10-9	2009-10-8
6	ANTENNA	SCHWARZBECK	VULB9168	9168-313	2009-5-29	2010-5-28
7	VHAP PRECISION HALFWAVE DIPOLES	R&S	VHAP	1096+1097	2009-5-18	2010-5-17
8	Atmosphere pressure meter	Shanghai ZhongXuan Electronic Co;Ltd	BY—2003P	--	2008-10-21	2009-10-20
9	CLAMP METER	FLUKE	316	86080010	2009-4-21	2010-4-20
10	Thermo-Hygrometer	ZHICHEN	ZC1-2	01050033	2008-10-21	2009-10-20
11	Digital illuminance meter	TES electrical electronic Corp.	TES-1330A	050602219	2008-10-21	2009-10-20
12	TEMPERATURE& HUMIDITY BOX	KSON	THS-D2C-100	K40723	2008-11-18	2009-11-17
13	High-low temperature cabinet	Shanghai YuanZhen	GW2050	--	2009-6-18	2010-6-17
14	DC power	KIKUSUI	PMC35—3	NF100260	--	--

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5.2 E.U.T. Operation

Input voltage: DC 3V (AAA×2Battery)
Operating Environment:
Temperature: 25.0 °C
Humidity: 56 % RH
Atmospheric Pressure: 1008 mbar
EUT Operation: Test the EUT in transmitting mode.

5.3 Test Procedure & Measurement Data

5.3.1 Operation Mode

Test Requirement: FCC Part15 C 15.231(e)
Test date: August 27,2009
Operation mode Requirement

- (1) A manually operated transmitter shall employ a switch that will Automatically the transmitter within not more than 5 seconds of Being released.
- (2) A transmitter activated automatically shall cease transmission Within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted .However, polling or supervision transmissions, including data, to determine system integrity of transmitters used on security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter, There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
- (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
- (5) In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

RESULTS

The EUT meets the operation mode requirement. The test result Relate only to the equipment under test provided by client.

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FCC Rules (15.231 e)

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 second.

Conclusion

This device is a automatic transmissions at a periodic rate. And that meet the operation mode description of 15.231(e), Please refer to following data.

Operated Frequency	Duration of each transmission	Limit(s)	Result
433.94MHz	0.849	1	Pass

Operated Frequency	Silent period(s)	Limits 1(s)	Limits 2(s)	Result
433.94MHz	56.971-0.849=56.122	$>(30 \times 0.849 = 25.47)$	>10	PASS

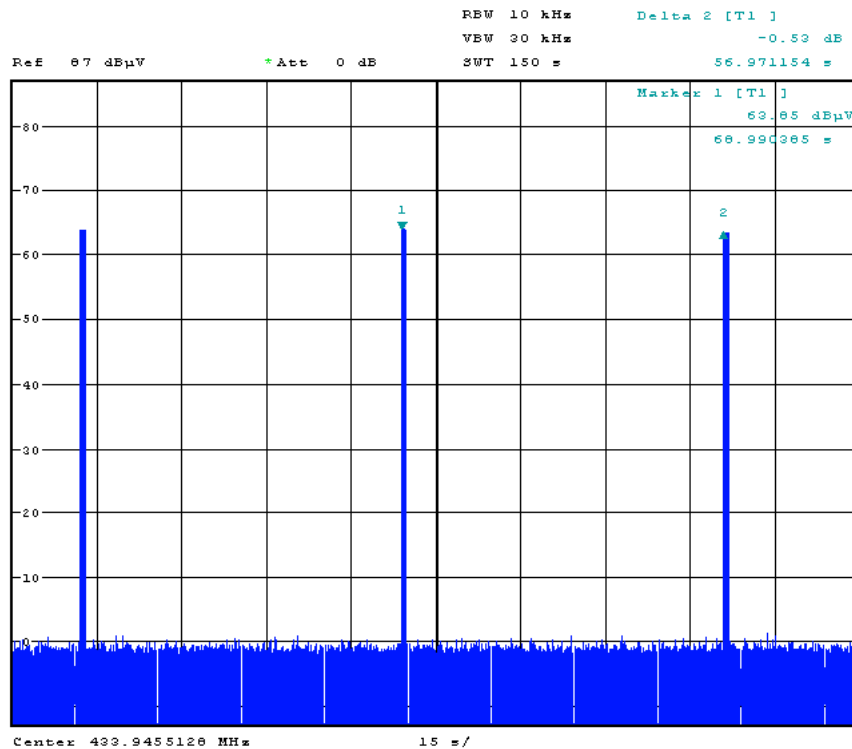
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Sweep time: 150s, RBW=10kHz, VBW=30kHz



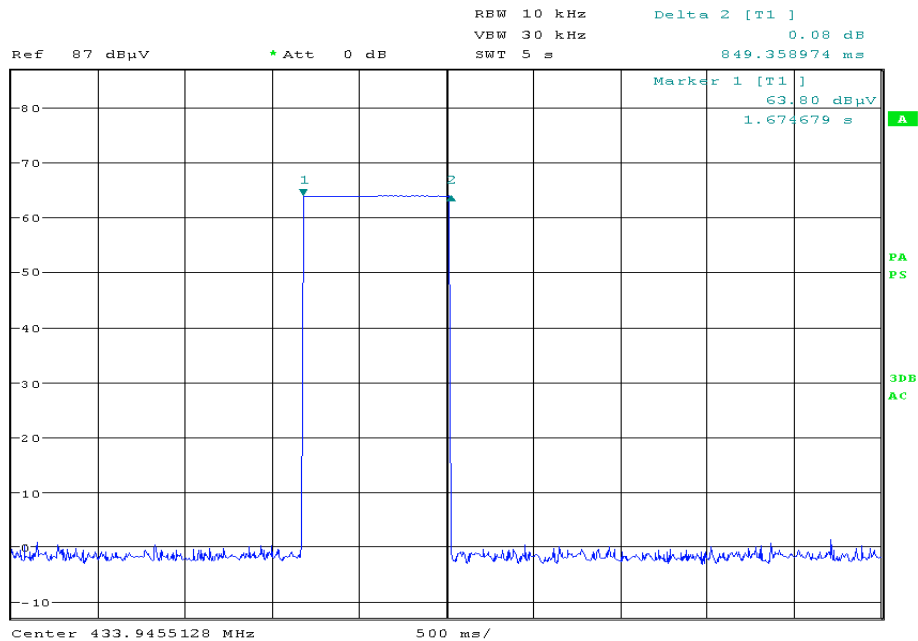
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Sweep time: 5s ,RBW=10kHz,VBW=30kHz



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5.3.2 Radiated Emission Measurement

- Test Requirement:** FCC Part 15.209, FCC Part 15.231(e), ANSI C63.4 :2003
- Test date** August 25, 2009
- Test Procedure:**
- The EUT was placed on a turn table with 0.8 meters above ground. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
 - The EUT was set 3 meters from the interference-receiving antenna, which was mounted on the top of a variable height antenna tower. and also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions.
 - If the emission level of the EUT in pek mode was 20dB 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.
 - Broadband antenna (Calibrated antenna) was used as receiving antenna below 1000MHz. Horn antenna were used as receiving antenna above 1000MHz
 - Radiated emissions measured in frequency range from 30MHz-1GHz were made with an instrument use Peak/QP detector mode. RBW=100KHz, VBW=300KHz
 - Radiated emissions measured in frequency range above 1GHz were made with an instrument use Peak detector mode, Peak mode: RBW=1MHz, VBW=3MHz

Results The EUT meets the requirements of test reference for Radiated Emissions. The test results relate only to equipment under test provided by client.

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Section 15.205 Restricted bands of operation:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

The fundamental is not in a restricted band, and the fundamental & spurious emission in the restricted bands comply with the general emission limits of 15.209

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Field strength limits of 15.209:

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

<i>Other Frequency (MHz)</i>	<i>Field strength</i>	
	<i>(uV/meter)</i>	<i>dB uV/meter</i>
<i>30-88</i>	<i>100</i>	<i>40.0</i>
<i>88-216</i>	<i>150</i>	<i>43.5</i>
<i>216-960</i>	<i>200</i>	<i>46.0</i>
<i>Above 960</i>	<i>500</i>	<i>54.0</i>

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15.231(e) Fundamental and Harmonics emission limits:

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

<i>Fundamental Frequency(MHz)</i>	<i>Field Strength of Fundamental (microvolts/meter)</i>	<i>Field Strength of Spurious Emission (microvolts/meter)</i>
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500**	50 to 150**
174-260	1,500	150
260-470	1,500 to 5,000**	150 to 500**
Above 470	5,000	500

** linear interpolations

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

For the band 130-170MHz,

$\mu\text{V/m at 3 meters} = 22.72727(F) - 2454.545$;

For the band 260-470MHz

$\mu\text{V/m at 3 meters} = 16.6667(F) - 2833.3333$;

The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level.

The above field strength limits are specified at a distance of 3meter, The tighter limits apply at band edges.

In the above table, base on the average value of the measure emissions

The fundamental frequency of the EUT is 433.94 MHz

The limit for average field strength dBuV/m for the fundamental emission= 72.87 dBuV/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dBuV/m for the spurious emission=52.87 dBuV/m. Spurious in the restricted bands must be less than 52.87 dBuV/m or 15.209, Whichever limit permits a higher field strength.

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Fundamental and spurious emission data:

Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Pream p Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Remark
433.9	57.45	17.4	0.35	--	75.2	92.87	17.67	PEAK
433.9	45.04	17.4	0.35	--	62.79	72.87	10.08	AVERAG
867.8	26.9	23.10	0.50	--	50.5	72.87	22.37	PEAK
867.8	14.49	23.10	0.50	--	38.09	52.87	14.78	AVERAG
1301.7*	60.98	24.60	0.52	42.2	43.9	74.00	30.1	PEAK
1301.7*	48.57	24.60	0.52	42.2	31.49	54.00	22.51	AVERAG
1735.6	38.9	24.90	0.70	42.2	22.3	72.87	50.57	PEAK
1735.6	26.49	24.90	0.70	42.2	9.89	52.87	42.98	AVERAG
2169.5	34.1	26.10	0.75	42.4	18.55	72.87	54.32	PEAK
2169.5	21.69	26.10	0.75	42.4	6.14	52.87	46.73	AVERAG
2603.4	33.92	27.90	0.90	42.5	20.22	72.87	52.65	PEAK
2603.4	21.51	27.90	0.90	42.5	7.81	52.87	45.06	AVERAG
3037.3	36.74	28.20	1.00	42.7	23.24	72.87	49.63	PEAK
3037.3	24.33	28.20	1.00	42.7	10.83	52.87	42.04	AVERAG
3471.2	35.72	28.50	1.10	42.8	22.52	72.87	50.35	PEAK
3471.2	23.31	28.50	1.10	42.8	10.11	52.87	42.76	AVERAG
3905.1*	37.08	29.50	1.20	42.8	24.98	74.00	49.02	PEAK
3905.1*	24.67	29.50	1.20	42.8	12.57	54.00	41.43	AVERAG
4339.0*	40.33	30.4	1.21	42.9	29.04	74.00	44.96	PEAK
4339.0*	27.92	30.4	1.21	42.9	16.63	54.00	37.37	AVERAG

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Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Pream p Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Remark
433.9	62.42	17.4	0.35	--	80.17	92.87	12.7	PEAK
433.9	50.01	17.4	0.35	--	67.76	72.87	5.11	AVERAG
867.8	36.81	23.10	0.50	--	60.41	72.87	12.46	PEAK
867.8	24.4	23.10	0.50	--	48	52.87	4.87	AVERAG
1301.7*	72.12	24.60	0.52	42.2	55.04	74.00	18.96	PEAK
1301.7*	59.71	24.60	0.52	42.2	42.63	54.00	11.37	AVERAG
1735.6	40.08	24.90	0.70	42.2	23.48	72.87	49.39	PEAK
1735.6	27.67	24.90	0.70	42.2	11.07	52.87	41.8	AVERAG
2169.5	36.12	26.10	0.75	42.4	20.57	72.87	52.3	PEAK
2169.5	23.71	26.10	0.75	42.4	8.16	52.87	44.71	AVERAG
2603.4	36.44	27.90	0.90	42.5	22.74	72.87	50.13	PEAK
2603.4	24.03	27.90	0.90	42.5	10.33	52.87	42.54	AVERAG
3037.3	39.85	28.20	1.00	42.7	26.35	72.87	46.52	PEAK
3037.3	27.44	28.20	1.00	42.7	13.94	52.87	38.93	AVERAG
3471.2	42.71	28.50	1.10	42.8	29.51	72.87	43.36	PEAK
3471.2	30.3	28.50	1.10	42.8	17.1	52.87	35.77	AVERAG
3905.1*	43.72	29.50	1.20	42.8	31.62	74.00	42.38	PEAK
3905.1*	31.31	29.50	1.20	42.8	19.21	54.00	34.79	AVERAG
4339.0*	42.48	30.4	1.21	42.9	31.19	74.00	42.81	PEAK
4339.0*	30.07	30.4	1.21	42.9	18.78	54.00	35.22	AVERAG

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Other emission data:

All reading bellow 1GHz are Quasi-peak, above 1G are average value.

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Safe Margin (dB)	Ant. Pol (H/V)
30.00	18.67	14.2	0.10	32.97	40.0	7.03	V
278.80	18.95	13.8	0.30	33.05	46.0	12.95	V
639.40	13.67	20.8	0.40	34.87	46.0	11.13	V
39.31	15.92	15.0	0.10	31.02	40.0	8.98	H
300.05	16.80	14.9	0.30	32.00	46.0	14.00	H
639.40	11.00	20.8	0.40	33.20	46.0	12.80	H

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Remark:

1. The frequency range was scanned from 30MHz to 4.5GHz, all emissions not recorded were very low against the limit.
2. According to FCC 15.35(b), maximum permitted peak field strength is 20dB above the maximum permitted average emission limit.
3. Peak Field Strength=Read Level +Factor
Factor=Antenna Fctor+Cable Loss-Preamplifier Factor
Average Field Strength=Peak Field Strength+ Duty Cycle Correction Factor
4. "*" means emission within the restricted band of part15,205, the corresponding limit as per 15.209

5. Duty Cycle Correction Factor is calculated by averaging the sum of the pulse train. Correction factor is measured as follows:

Keep the EUT in continuous transmission mode(modulated), and set the spectrum to the fundamental frequency and set the span width to 0Hz. Then connect a storage oscilloscope to the video output of the spectrum that is used to detect the pulse train. Adjust the oscilloscope settings to observe the pulse train and determine the number and width of the pulses, as well as the period of the train.

Duty Cycle Correction Factor in 0.1s at its maximum value

$$=20\log(\text{duty cycle})$$

$$=20\log(51*0.47\text{ms}/100\text{ms})$$

$$=20\log(23.97/100)$$

$$=-12.41$$

Please refer to the following test graph:

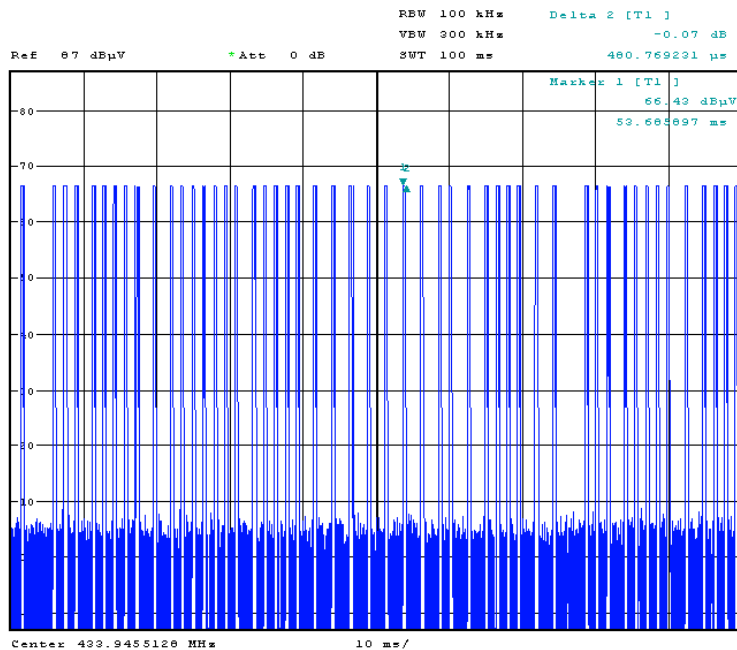
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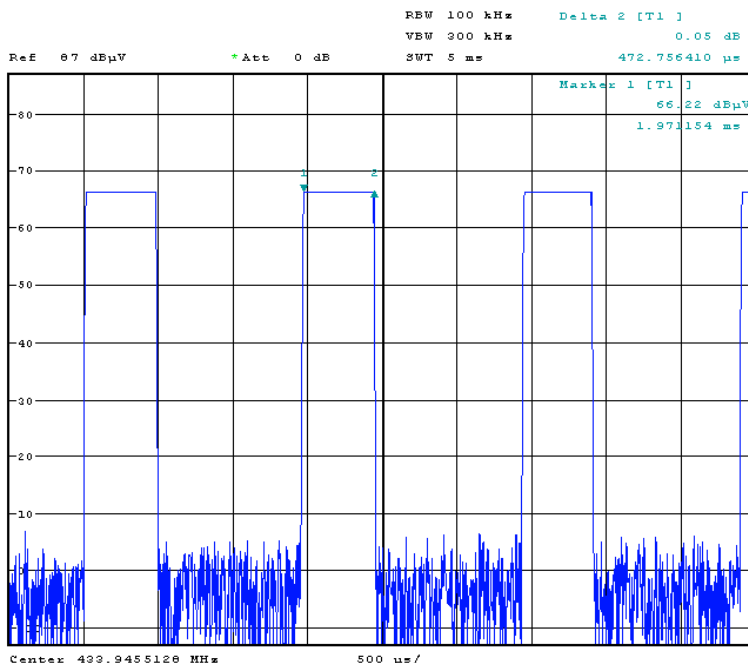
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Sweep time: 100ms ,RBW=100kHz,VBW=300kHz



Sweep time: 5ms ,RBW=100kHz,VBW=300kHz



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5.3.3 Bandwidth Measurement

Test Requirement:	FCC Part15 C 15.231(c)
Test date:	August 27, 2009
Bandwidth Requirement:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, The emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.
Test Procedure:	<p>The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.</p> <p>The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is the occupied bandwidth</p> <p>Bandwidth limit = $0.25\% \times 433.9\text{MHz} = 1.085\text{MHz}$</p>

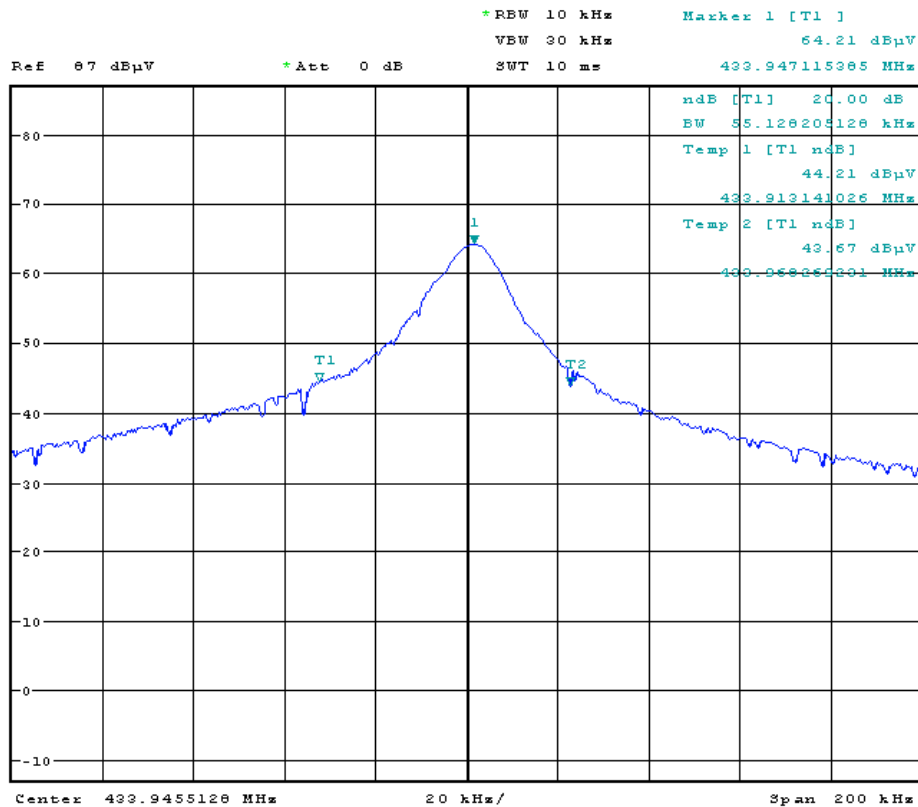
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Sweep time: 10ms ,RBW=10kHz,VBW=30kHz



Test data:

Bandwidth Limit (MHz) (Fcenter×0.25%)	Test Result (MHz)	Conduction
1.058	0.055	Pass