



Test Report

Product Name : A/V Sender
Model No. : AWW398, V111, D111
FCC ID.: NGVAWV398RX

Applicant : AIRWAVE TECHNOLOGIES INC.
Address : 3F, No.9, Industry E. Rd. IX, Science-Based
Industrial Park, Hsin Chu, Taiwan, R.O.C.

Date of Receipt : Sep. 6, 2001
Date of Test : Oct. 2, 2001
Report No. : 019H017-1FI

The Test Results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

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

Test Report Certification

Test Date : Oct. 2, 2001

Report No. : 019H017-1FI



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200347-0

Product Name : A/V Sender

Applicant : AIRWAVE TECHNOLOGIES INC.

Address : 3F, No.9, Industry E. Rd. IX, Science-Based
Industrial Park, Hsin Chu, Taiwan, R.O.C.

Manufacturer : AIRWAVE TECHNOLOGIES INC.

Model No. : AWW398, V111, D111

FCC ID. : NGVAWV398RX

Rated Voltage : AC 120V/60Hz Output: DC 9V/300mA

Trade Name : AIRWAVE, Lorex, Sylvania

Measurement Standard : FCC Part 15 Intentional Radiators for Subpart C
Paragraph 15.231

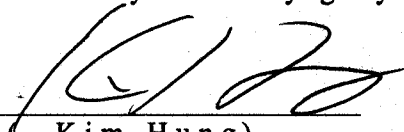
Measurement Procedure : ANSI C63.4:1992

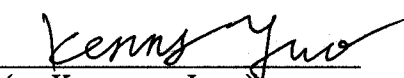
Test Result : Complied

The Test Results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuietTek Corporation.

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

Documented By : 
(Kim Hung)

Tested By : 
(Kenny Jwo)

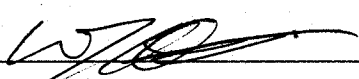
Approved By : 
(Kevin Wang)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	: A/V Sender
Trade Name	: AIRWAVE, Lorex, Sylvania
FCC ID.	: NGVAWV398RX
Model No.	: AWV398, V111, D111
Working Frequency	: 418MHz
Channel Number	: 1
Type of Modulation	: ASK
Operator Selection of	: Manual Switch
Operating Frequency	
Coaxial Cable	: Shielded, 1.0m
RCA Cable (3*3)	: Non-shielded, 1.2m
Power Adapter	: DVE, DV-0930-4109
	Cable Out: Non-shielded, 1.8m

Note:

1. This device is a 418MHz A/V Sender with an Infrared Remote function.
2. The different between model names was for different brand name.
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
4. This device is a composite device in accordance with Part 15 regulations. The function for the receiver was, measured and made a test report that the report number is 019H017-1F, certified under verification.

1.2. Operation Description

The EUT is a 418MHz transmitter. The infrared remote control signal can be transferred to 418MHz radio frequency in ASK modulation. The transmission antenna is soldered on the EUT.

The super generations type receiver was used. An external excitation was used when the test of receiver was performed.

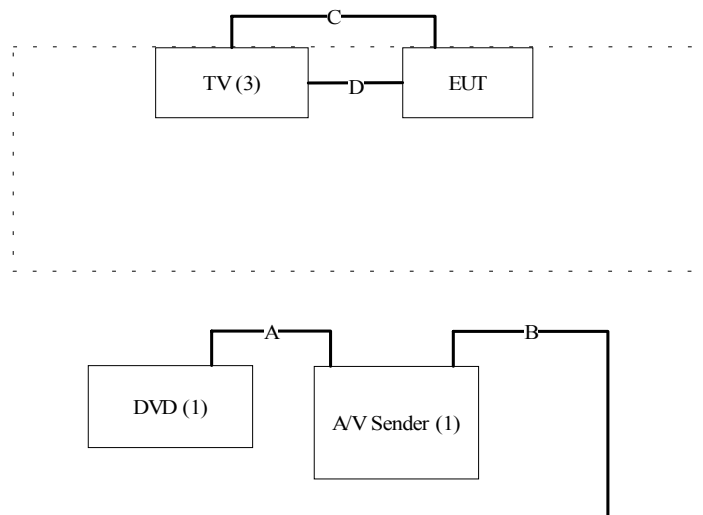
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	A/V Sender	AIRWAVE	AWV398	N/A	Non-shielded, 0.8m
(2)	DVD	SONY	DVP-K800D	960E411	Non-shielded, 1.8m
(3)	Television	SONY	PWM-14M2U	2018559	Non-shielded, 1.8m

	Signal Cable Type	Signal Cable Description
A.	RCA cable (3*3)	Non-shielded, 1.2m
B.	IR Cable	Non-shielded, 3.0m
C.	RCA cable (3*3)	Non-shielded, 1.2m
D.	Coaxial Cable	Shielded, 1.0m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT and simulators as shown on 1.4.
- (2) Turn on the power of all equipment.
- (3) Keep the EUT transmit during the test.
- (4) Repeat the above procedure (2) to (3).

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: November 3, 1998 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2

September 30, 1998 Accreditation on NVLAP
NVLAP Lab Code: 200347-0



Site Name: Quietek Corporation

Site Address: No.75-1, Wang-Yeh Valley, Yung-Hsing,
Chiung-Lin, Hsin-Chu County,
Taiwan, R.O.C.

2. Conducted Emission

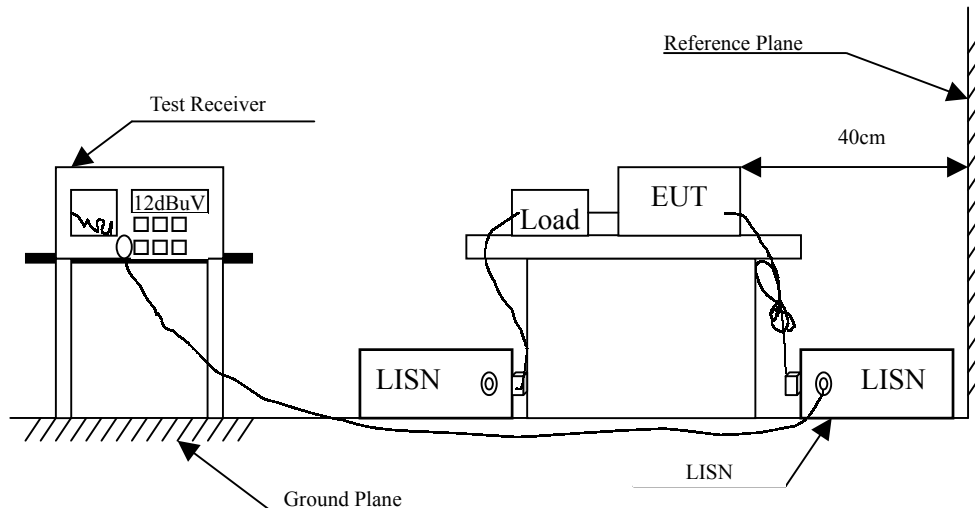
2.1. Test Equipment List

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2001	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2001	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2001	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	N0.2 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	uV	dBuV
0.45 - 30	250	48.0

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:1992 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Result of Conducted Emission

Product : A/V Sender
Test Item : Conducted Emission Test
Test Mode : Normal Operation

Frequency	Cable	LISN	Reading Level	Measurement Level	Limits
	Loss	Factor			
MHz	dB	dB	dBuV	dBuV	dBuV

Line 1

Quasi-Peak:

0.471	0.06	0.21	20.08	20.35	48.00
0.811	0.09	0.26	25.92	26.27	48.00
1.024	0.10	0.28	23.56	23.94	48.00
1.266	0.11	0.30	20.58	21.00	48.00
*20.037	0.35	0.56	28.14	29.06	48.00
28.880	0.40	0.60	27.16	28.15	48.00

Line 2

Quasi-Peak:

*0.501	0.06	0.21	32.09	32.37	48.00
0.645	0.08	0.24	28.41	28.73	48.00
0.821	0.09	0.26	30.71	31.06	48.00
1.048	0.10	0.28	29.44	29.83	48.00
25.040	0.38	0.58	22.83	23.79	48.00
29.270	0.40	0.60	26.49	27.48	48.00

Remarks :

1. “ * ” means that this data is the worst emission level.

3. Radiated Emission

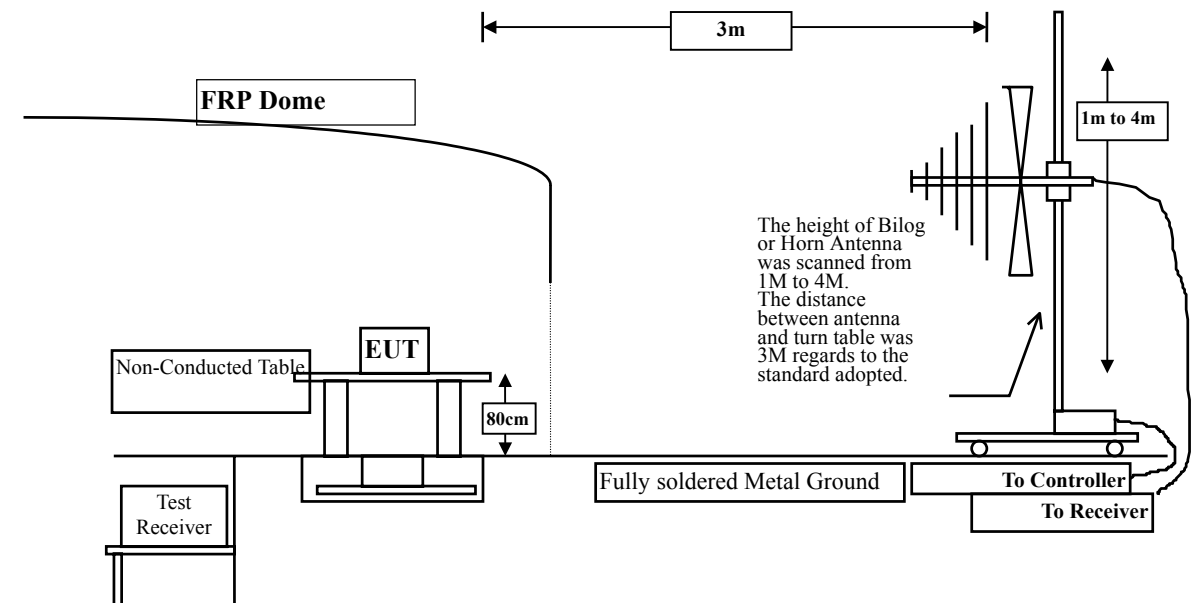
3.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2001
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2001
		Pre-Amplifier	HP	8447D/3307A01812	May, 2001
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2001
	X	Horn Antenna	EM	EM6917 / 103325	May, 2001
Site # 2	X	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2001
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2001
		Pre-Amplifier	HP	8447D/3307A01814	May, 2001
	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2001
	X	Horn Antenna	EM	EM6917 / 103325	May, 2001

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

3.2. Test Setup



3.3. Limits

➤ FCC Part 15 Subpart C Paragraph 15.231 Limit

Fundamental Frequency MHz	Field strength of fundamental		Field Strength of spurious emissions	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66-40.70	2250	67.0	225	47.0
70-130	1250	61.9	125	41.9
130-174	1250-3750 ¹	61.9 – 71.5	125-375 ¹	41.9 – 51.5
174-260	3750	71.5	375	51.5
260-470	3750-12500 ¹	71.5 – 81.9	375-1250 ¹	51.5 – 61.9
above 470	12500	81.9	1250	61.9

Remarks :

1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ Frequencies in restricted band are complied to limits on Paragraph 15.209.

Frequency MHz	15.209 Limits (dBuV/m @3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remarks :

1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 kHz and above 1GHz is 1MHz.

The frequency range from **30MHz to 10th harmonics** is checked.

3.5. Test Result of Radiated Emission

Product : A/V Sender
Test Item : Fundamental Radiated Emission Data
Test Site : No.1 OATS
Test Mode : Normal Operation

Freq.	Cable	Probe	PreAMP	Reading	Measurement
	Loss	Factor		Level	
MHz	dB	dB/m	dB	dBuV	dBuV/m

Horizontal: Peak Detector

418.060	1.44	15.85	26.06	79.91	71.14
---------	------	-------	-------	-------	-------

Peak: 71.14 dBuV/m

Duty Cycle: 0.562

Average Measure= Peak +Duty Cycle= 71.14+ 20 log (0.562)= 66.13 dBuV/m

Average Limit= 20 log (41.6667*418.06-7083.3333)= 80.29 dBuV/m

Vertical: Peak Detector

418.060	1.44	16.42	26.06	76.54	68.34
---------	------	-------	-------	-------	-------

Peak: 68.34 dBuV/m

Duty Cycle: 0.562

Average Measure= Peak +Duty Cycle= 68.34+ 20 log (0.562)= 63.33 dBuV/m

Average Limit= 20 log (41.6667*418.06-7083.3333)= 80.29 dBuV/m

Note:

1. Average Limit= 20 log (41.6667*(F) - 7083.3333).
2. Emission Level = Reading Level + Antenna Factor + Cable loss

Product : A/V Sender
Test Item : Harmonic Radiated Emission Data
Test Site : No.1 OATS
Test Mode : Normal Operation

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit
	Loss	Factor		Level			
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal: Peak Detector

831.220	2.18	19.80	26.03	38.11	34.06	27.84	61.90
1253.855	2.42	25.52	35.54	52.58	44.97	4.72	54.00
1672.081	2.97	27.05	35.09	54.35	49.28	12.62	61.90
2090.306	3.48	28.42	34.90	45.75	42.75	19.15	61.90
2508.131	3.95	29.53	34.90	49.00	47.57	14.33	61.90
2926.006	4.40	30.59	34.99	40.86	40.87	21.03	61.90
3344.006	4.84	31.38	35.07	47.38	48.53	13.37	61.90
3726.106	5.21	32.01	34.88	39.37	41.72	20.18	61.90
4180.106	5.67	32.72	34.71	39.26	42.94	11.06	54.00

Vertical: Peak Detector

831.220	2.18	20.00	26.03	38.71	34.86	27.04	61.90
1254.050	2.42	25.52	35.54	53.80	46.19	15.71	61.90
1672.081	2.97	27.05	35.09	56.59	51.52	2.48	54.00
2089.931	3.48	28.42	34.90	48.61	45.61	16.29	61.90
2508.106	3.95	29.53	34.90	51.48	50.05	11.85	61.90
2926.281	4.40	30.59	34.99	42.17	42.18	19.72	61.90
3344.031	4.84	31.38	35.07	48.97	50.12	11.78	61.90
3762.056	5.26	32.10	34.83	39.45	41.98	19.92	61.90
4180.031	5.67	32.72	34.71	40.04	43.72	10.28	54.00

Note:

1. Emission Level = Reading Level + Antenna Factor + Cable loss
2. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : A/V Sender
 Test Item : General Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit
MHz	Loss	Factor		Level			
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal:

*68.800	1.18	6.76	26.86	46.60	27.67	12.33	40.00
115.360	1.37	11.70	26.88	35.80	21.99	21.51	43.50
268.620	2.00	12.17	26.94	38.00	25.22	20.78	46.00
335.550	2.27	12.70	26.89	36.00	24.08	21.92	46.00
454.860	2.76	14.18	26.71	38.40	28.63	17.37	46.00
747.800	2.21	19.34	26.37	25.15	20.33	25.67	46.00

Vertical:

*50.370	1.10	6.24	26.86	42.40	22.88	17.12	40.00
67.830	1.17	6.56	26.86	40.40	21.27	18.73	40.00
133.790	1.44	11.82	26.89	35.20	21.57	21.93	43.50
268.620	2.00	12.17	26.94	35.00	22.22	23.78	46.00
454.860	2.76	14.18	26.71	35.60	25.83	20.17	46.00
728.400	1.80	19.29	26.29	24.85	19.66	26.34	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Antenna Factor + Cable loss- Pre Amp.

4. Occupied Bandwidth of Raidated Emission

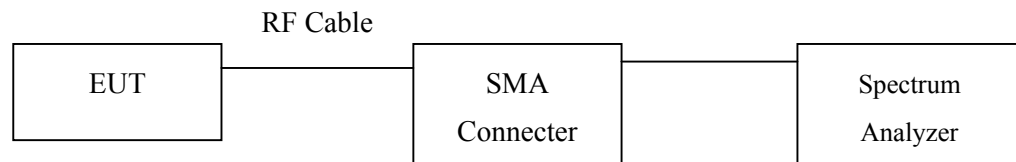
4.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2001
X	Horn Antenna	EM	EM6917 / 103325	May, 2001

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
2. Mark "X" test instruments are used to measure the final test results.

4.2. Test Setup



4.3. Test Condition

Standard Temperature and Humidity, Standard Test Voltage

4.4. Limits

- (1) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.
- (2) The bandwidth of the emission shall be no wider than 0.5% of the center frequency for devices operating above 900MHz.

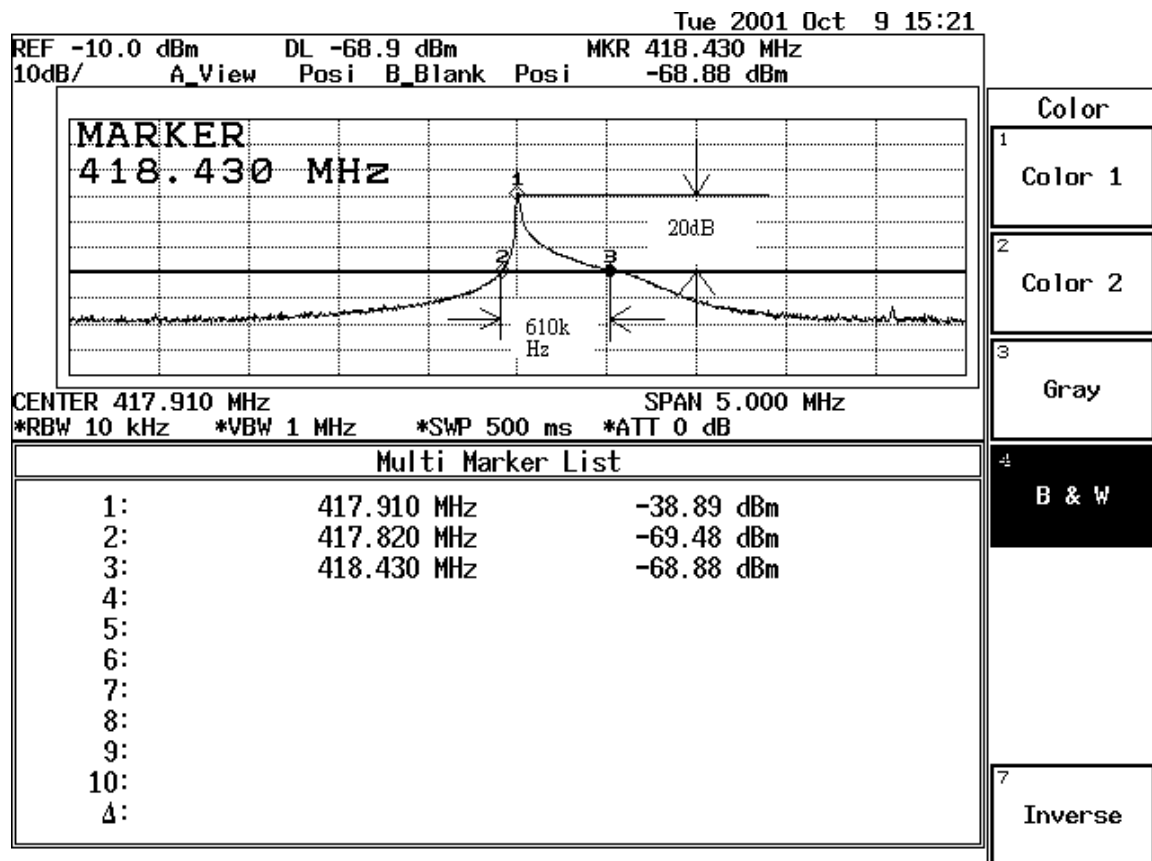
4.5. Test Procedure

The bandwidth of radiated emission is measured under the EUT condition produced the generated carrier signal.

4.6. Test Result of Occupied Bandwidth of Raidated Emission

Product : A/V Sender
 Test Item : Occupied Bandwidth of Raidated Emission
 Test Site : No.1 OATS
 Test Mode : Normal Operation

Center Frequency	417.82	MHz
Allowable Bandwidth (70-900 MHz:0.25%, Above 900MHz: 0.5%)	1044.55	kHz
Bandwidth at 20dB down (Max)	610	kHz
Result	Complied with regulation	



5. Duty Cycle Measurement

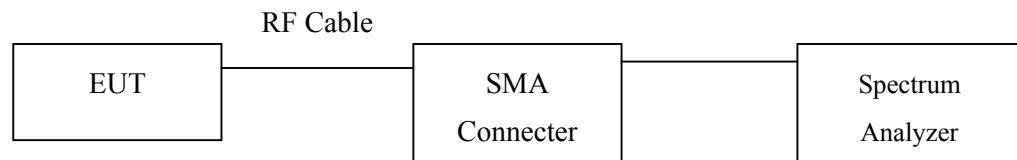
5.1. Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 2001
X	Horn Antenna	EM	EM6917 / 103325	May, 2001

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
2. Mark "X" test instruments are used to measure the final test results.

5.2. Test Setup



5.3. Test Condition

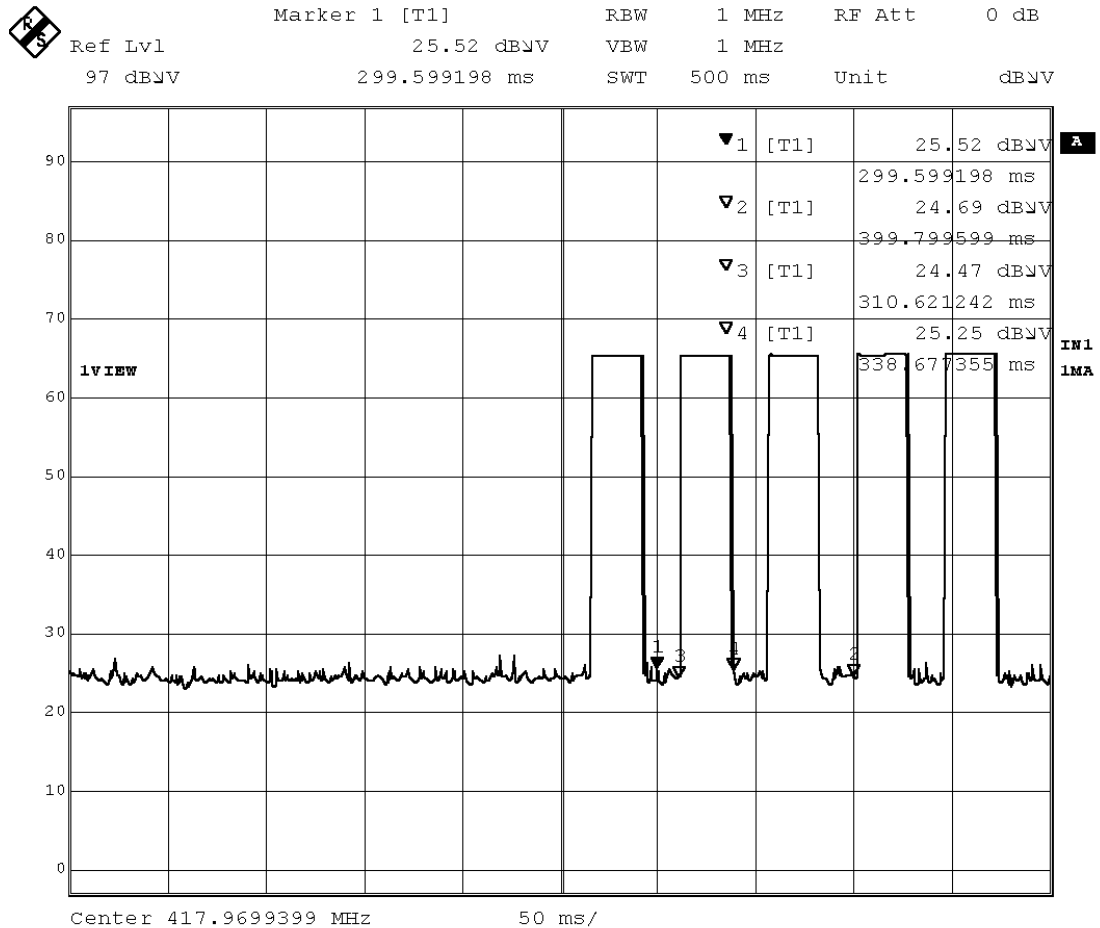
Standard Temperature and Humidity, Standard Test Voltage

5.4. Test Procedure

The bandwidth of radiated emission is measured under the EUT condition produced the generated carrier signal.

5.5. Test Result of Duty Cycle Measurement

Product : A/V Sender
 Test Item : Duty Cycle Measurement
 Test Site : No.1 OATS
 Test Mode : Normal Operation



Date: 7.SEP.2001 16:31:48

Duty Cycle:

$$(338.677\text{ms}-310.621\text{ms})*2/100\text{ms}=0.562$$

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1 : EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

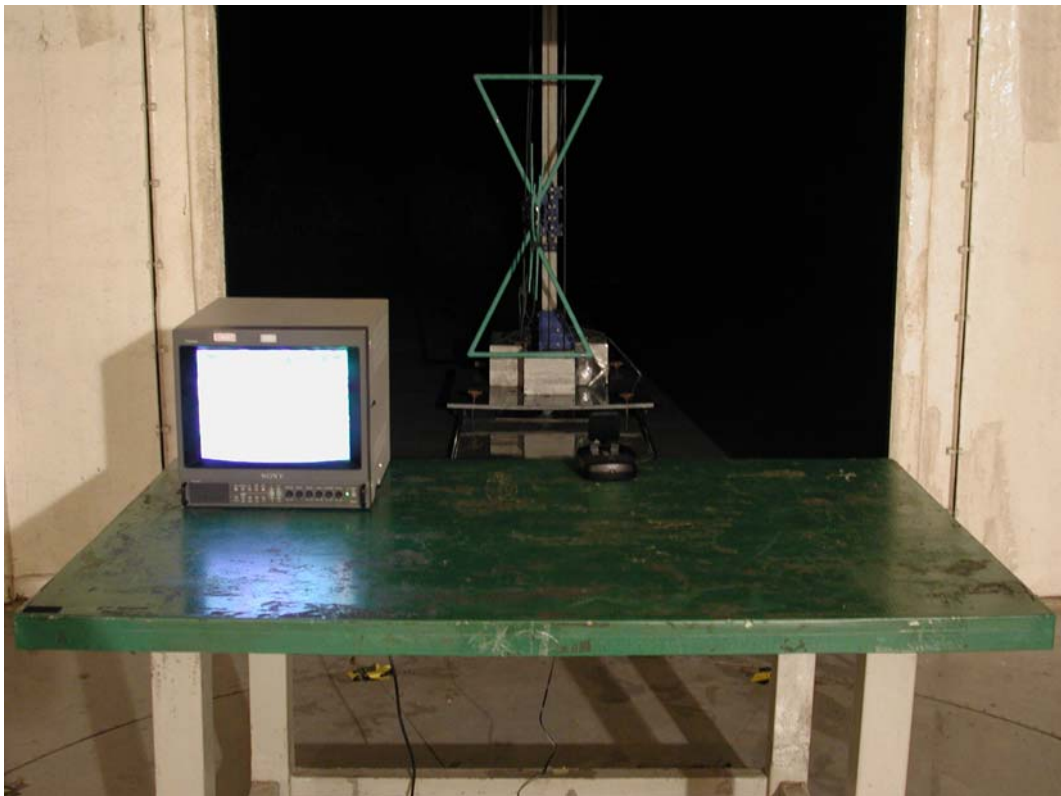
Front View of Conducted Test



Back View of Conducted Test



Front View of Radiated Test



Back View of Radiated Test



Front View of Radiated Test (Horn)

