Test Report

Product Name : Wireless AV Sender with remote control extender

Model No. : TTA-23R

FCC ID.: O6LTTA-23R

Applicant : TRANWO TECHNOLOGY CORP.

Address : 6F., No.49,Guangming 6th Rd.,JubeiCity, Hsinchu ,Taiwan ,R.O.C

Date of Receipt : May 21, 2002

Date of Test : Sep 02, 2002

Report No. : 025H048FI

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 : Sep 02, 2002
Report No. : 025H048FI

QuieTek Corporation
Accredited by NIST (NVLAP)
NVLAP Lab Code: 200347-0

Product Name	: Wireless AV Sender with remote control extender
Applicant	: TRANWO TECHNOLOGY CORP.
Address	: 6F., No.49,Guangming 6th Rd.,JubeiCity, Hsinchu ,Taiwan ,R.O.C
Manufacturer	: TRANWO TECHNOLOGY CORP.
Model No.	: TTA-23R
FCC ID.	: O6LTTA-23R
Rated Voltage	: AC 120V/60Hz
Trade Name	: TRANWO
Measurement Standard	: FCC Part 15 Subpart C Paragraph 15.231
Measurement Procedure	: ANSI C63.4:1992
Test Result	: Complied

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Documented By : (Ellie Cheng)

Tested By : (Ken Hsu)

Approved By : (Kevin Wang)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	: Wireless AV Sender with remote control extender
Trade Name	: TRANWO
FCC ID.	: O6LTTA-23R
Model No.	: TTA-23R
Type of Modulation	: ASK
Antenna type	: Soldered on PCB
Operator Selection of Operating Frequency	: Not Applied
Operating Frequency	: 433.92MHz
IR Mouse Cable	: Non-Shielded, 0.2m
RCA Cable	: Non-Shielded, 1.4m
Power Adapter (Mode 1)	: AC adapter, D9300 Cable Out: Non-Shielded, 3.4m
Power Adapter (Mode 2)	: AHEAD, MW35-090030 Cable Out: Non-Shielded, 3.4m

Note:

1. This device is a 2.4GHz Wireless AV Sender with remote control extender included a 2.4GHz receiving function, a 433MHz transmitting function.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
3. 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 025H048F, certified under Declaration of Conformity.
4. QuieTek had verified the construction and function in typical operation, then shown in this test report.

EMI Mode Mode 1: D9300
Mode 2: MW35-0900300

1.2. Operation Description

The EUT is a 433MHz transmitter. The infrared remote control signal can be transferred to 433MHz 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.

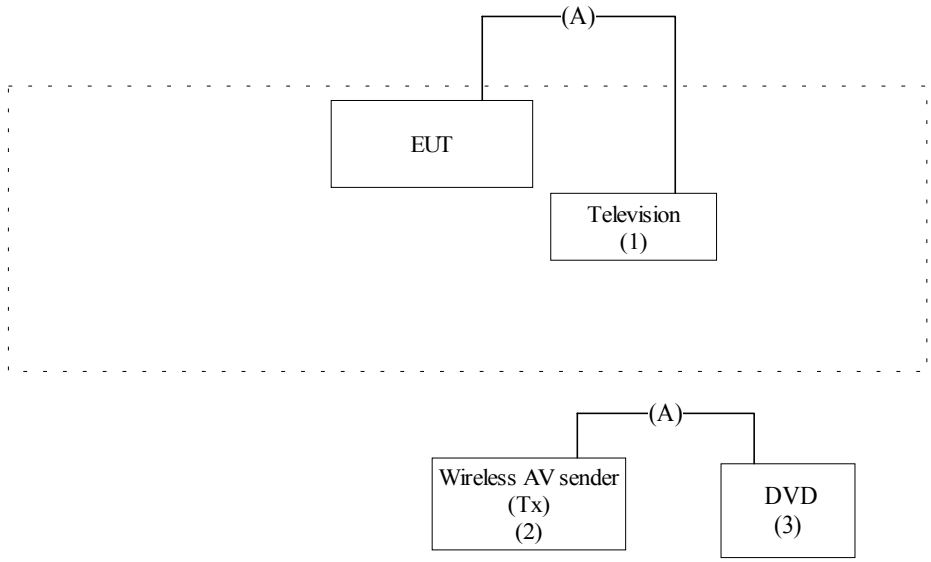
1.3. Tested System Details

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)	Television	SONY	PWM-14M2U	2018559	Non-shielded, 1.8m
(2)	Wireless AV sender	TRANWO	TTA-23T	N/A	--
(3)	DVD	Panasonic	DVD-A120TN	9542160	Non-shielded, 1.7m

Signal Cable Type		Signal cable Description
A.	RCA Cable	Non-shielded, 1.4m, 2 Pcs

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1.5.1 Setup the EUT and simulators as shown on 1.4.

1.5.2 Turn on the power of all equipment.

1.5.3 The EUT will receive the signal form transmitter.

1.5.4 Repeat the above procedure 1.5.2 to 1.5.3

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

August 30, 2001 Accreditation on NVLAP
NVLAP Lab Code: 200347-0

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.
TEL : 886-3-592-8858 / FAX : 886-3-592-8859
E-Mail: service@quietek.com

2. Conducted Emission

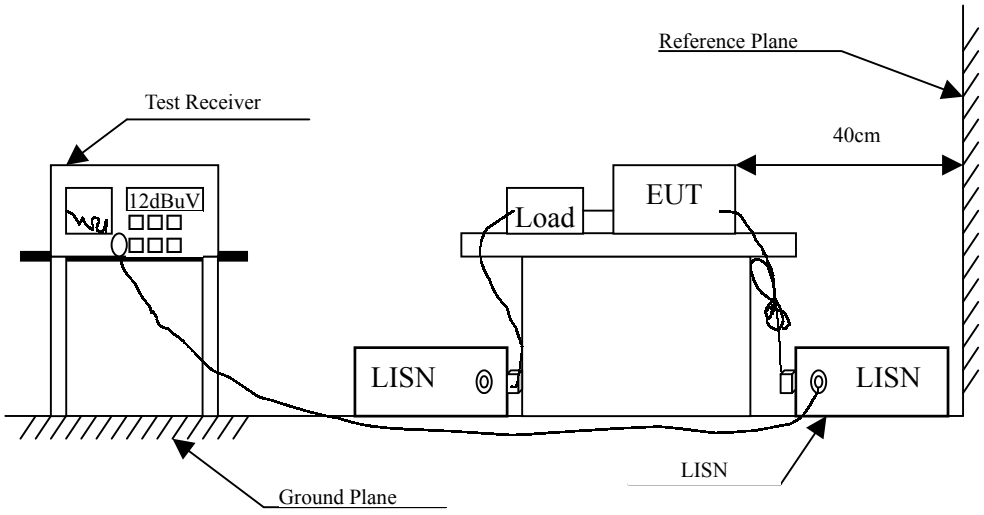
2.1. Test Equipment

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, 2002	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2002	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2002	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	No.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 Subpart B Paragraph 15.207 (dBuV) Limit		
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 : Wireless AV Sender with remote control extender
Test Item : Conducted Emission Data
Test Mode : Mode 1: D9300

	Frequency	Cable Loss	LISN Factor	Reading Level	Emission Level	Limits
	MHz	dB	dB	dBuV	dBuV	dBuV
Line 1						
Quasi-Peak:						
	0.450	0.06	0.20	25.52	25.78	48.00
	0.680	0.08	0.24	27.31	27.63	48.00
*	0.759	0.09	0.25	31.11	31.45	48.00
	0.868	0.09	0.27	28.31	28.67	48.00
	1.200	0.11	0.30	23.07	23.48	48.00
	1.290	0.12	0.30	23.64	24.06	48.00
Line 2						
Quasi-Peak:						
*	0.500	0.06	0.21	32.73	33.01	48.00
	0.540	0.07	0.22	32.39	32.68	48.00
	0.669	0.08	0.24	30.24	30.56	48.00
	0.751	0.08	0.25	30.09	30.43	48.00
	0.907	0.09	0.27	28.03	28.39	48.00
	0.989	0.10	0.28	27.09	27.47	48.00

Remarks:

1. All Readings below 1GHz are Quasi-Peak value.
2. " * " means that this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

Product : Wireless AV Sender with remote control extender
Test Item : Conducted Emission Data
Test Mode : Mode 2: MW35-0900300

	Frequency	Cable Loss	LISN Factor	Reading Level	Emission Level	Limits
	MHz	dB	dB	dBuV	dBuV	dBuV
Line 1						
Quasi-Peak:						
*	0.481	0.06	0.21	33.54	33.81	48.00
	0.528	0.07	0.22	32.23	32.52	48.00
	0.595	0.07	0.23	27.43	27.73	48.00
	0.841	0.09	0.26	25.72	26.07	48.00
	0.895	0.09	0.27	24.81	25.17	48.00
	0.981	0.10	0.28	22.67	23.05	48.00
Line 2						
Quasi-Peak:						
*	0.450	0.06	0.20	32.48	32.74	48.00
	0.500	0.06	0.21	31.18	31.46	48.00
	0.579	0.07	0.23	26.52	26.82	48.00
	0.723	0.08	0.25	22.08	22.41	48.00
	0.805	0.09	0.26	23.29	23.64	48.00
	0.895	0.09	0.27	21.84	22.20	48.00

Remarks:

1 All Readings below 1GHz are Quasi-Peak value.
2. " * " means that this data is the worst emission level.
3. Emission Level = Reading Level + LISN Factor + Cable Loss.

3. Radiated Emission

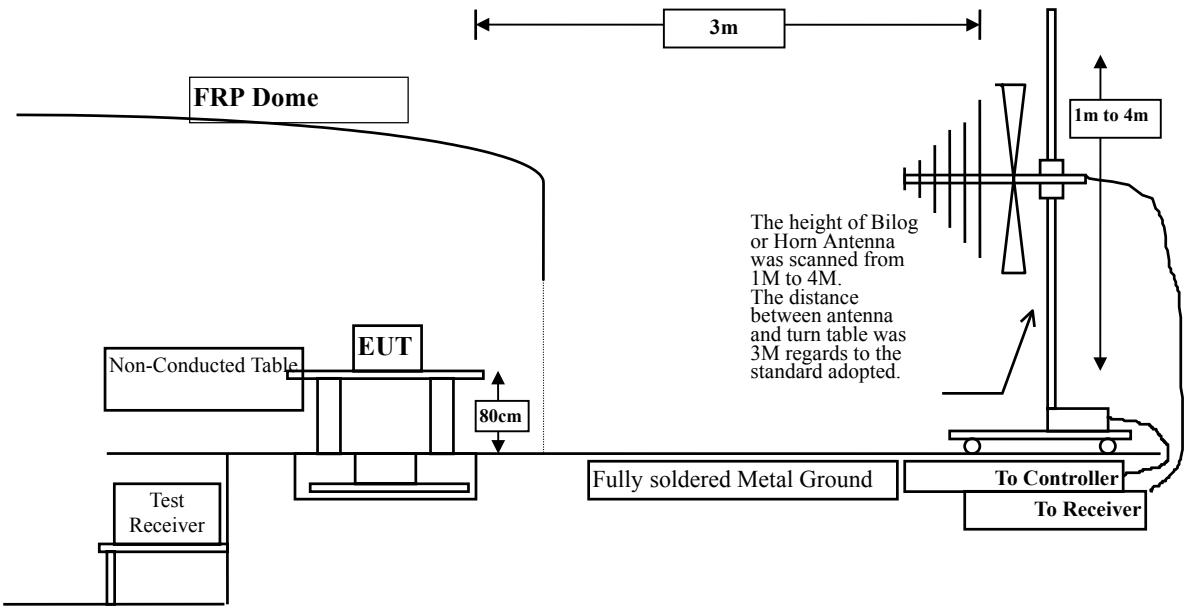
3.1. Test Equipment

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, 2002
	X	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
	X	Pre-Amplifier	HP	8447D/3307A01812	May, 2002
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2001
	X	Horn Antenna	EM	EM6917 / 103325	May, 2002
Site # 2		Test Receiver	R & S	ESCS 30 / 825442/17	May, 2002
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2002
		Pre-Amplifier	HP	8447D/3307A01814	May, 2002
		Bilog Antenna	Chase	CBL6112B / 2455	Sep.,2001
		Horn Antenna	EM	EM6917 / 103325	May, 2002

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	82.0	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 Paragraph15.209.

FCC Part 15 Subpart B Paragraph 15.209(a) Limits		
Frequency (MHz)	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	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.

3.5. Test Result of Radiated Emission

Product : Wireless AV Sender with remote control extender
Test Item : Fundamental Radiated Emission Data
Test Site : No.1 OATS
Test Mode : Normal Operation

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal:							
Peak Detector							
434.000	1.49	21.39	0.00	51.80	74.68	26.15	100.83

Peak = 74.68dBuV/m; Duty Cycle= 20 Log (0.6);
Average = Peak +Duty Cycle= 70.243 dBuV/m
Average Limit = 41.6667* (434.000 MHz)-7083.3333=11000.015uV/m = 80.83dBuV/m
Peak Limit = 80.83 + 20dB = 100.83 dBuV/m

Vertical:							
Peak Detector							
434.000	1.49	21.81	0.00	52.25	75.55	25.28	100.83

Peak = 75.55dBuV/m; Duty Cycle= 20 Log (0.6);
Average = Peak +Duty Cycle= 71.113 dBuV/m
Average Limit = 41.6667* (434.000 MHz)-7083.3333=11000.015uV/m = 80.83dBuV/m
Peak Limit = 80.83 + 20dB = 100.83 dBuV/m

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable Loss.

Product : Wireless AV Sender with remote control extender
Test Item : Harmonic Radiated Emission Data
Test Site : No.1 OATS
Test Mode : Normal Operation

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal:							
Peak Detector							
867.800	4.46	23.83	26.06	41.65	43.88	18.12	62.00
1302.080	1.75	25.97	35.52	47.52	39.73	22.27	62.00
1735.760	1.93	27.46	35.11	53.21	47.49	14.51	62.00
2170.000	2.21	28.74	34.92	44.90	40.92	21.08	62.00
2603.980	2.61	29.89	34.97	45.64	43.18	18.82	62.00
3037.980	2.96	30.88	34.98	44.32	43.17	18.83	62.00
Vertical:							
Peak Detector							
867.900	4.46	23.83	26.06	41.12	43.35	18.65	62.00
1301.980	1.75	25.97	35.52	49.55	41.76	20.24	62.00
1736.000	1.93	27.46	35.11	52.75	47.03	14.97	62.00
2140.020	2.18	28.63	34.92	45.85	41.74	20.26	62.00
2604.060	2.61	29.89	34.97	45.02	42.56	19.44	62.00
3038.020	2.96	30.88	34.98	44.98	43.83	18.17	62.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. Emission Level = Reading Level + Probe Factor + Cable loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Wireless AV Sender with remote control extender
Test Item : Radiated Emission Data
Test Site : No.1 OATS
Test Mode : Mode 1: D9300

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal:							
259.890	1.96	18.87	26.94	28.80	22.70	23.30	46.00
363.680	2.39	19.12	26.85	29.20	23.85	22.15	46.00
416.060	2.60	20.30	26.77	33.40	29.54	16.46	46.00
482.020	2.87	20.62	26.66	31.60	28.43	17.57	46.00
*728.020	3.88	22.92	26.28	34.01	34.54	11.46	46.00
749.740	3.97	23.21	26.24	29.60	30.53	15.47	46.00
Vertical:							
55.220	1.12	21.04	26.86	29.00	24.30	15.70	40.00
422.850	2.63	20.21	26.76	30.00	26.08	19.92	46.00
482.990	2.88	20.65	26.66	33.40	30.26	15.74	46.00
728.030	3.88	22.92	26.28	31.25	31.78	14.22	46.00
819.580	4.26	23.44	26.13	30.40	31.96	14.04	46.00
*837.040	4.33	23.56	26.11	30.60	32.39	13.61	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 + Probe Factor + Cable Loss – PreAMP.

Product : Wireless AV Sender with remote control extender
Test Item : Radiated Emission Data
Test Site : No.1 OATS
Test Mode : Mode 2: MW35-0900300

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal:							
259.910	1.96	18.87	26.94	28.93	22.83	23.17	46.00
363.670	2.39	19.12	26.85	29.32	23.97	22.03	46.00
416.040	2.60	20.30	26.77	33.50	29.64	16.36	46.00
482.000	2.87	20.62	26.66	31.80	28.63	17.37	46.00
*728.020	3.88	22.92	26.28	34.52	35.05	10.95	46.00
749.710	3.97	23.21	26.24	30.82	31.75	14.25	46.00
Vertical:							
55.200	1.12	21.04	26.86	29.50	24.80	15.20	40.00
432.020	2.66	19.90	26.74	30.20	26.02	19.98	46.00
483.050	2.88	20.65	26.66	33.68	30.54	15.46	46.00
*728.040	3.88	22.92	26.28	34.20	34.73	11.27	46.00
819.550	4.26	23.44	26.13	30.26	31.82	14.18	46.00
837.040	4.33	23.56	26.11	30.40	32.19	13.81	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 + Probe Factor + Cable Loss – PreAMP.

4. Occupied Bandwidth

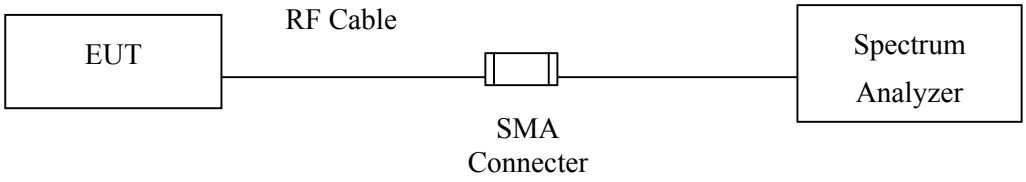
4.1. Test Equipment

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, 2002

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. 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.

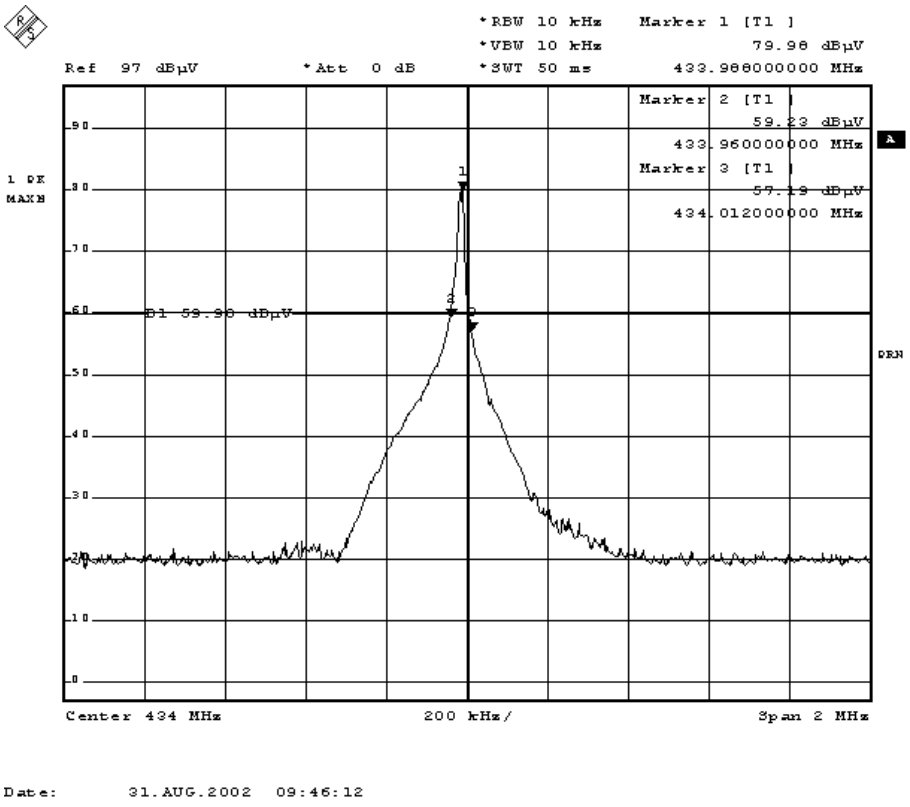
4.4. Test Procedure

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

4.5. Test Result of Occupied Bandwidth

Product : Wireless AV Sender with remote control extender
Test Item : Occupied Bandwidth Data
Test Site : No.1 OATS
Test Mode : Normal Operation

Center Frequency	434	MHz
Allowable Bandwidth (70-900 MHz:0.25%, Above 900MHz: 0.5%)	1080	kHz
Bandwidth at 20dB down (Max)	52	kHz
Result	Complied with regulation	



5. Duty Cycle

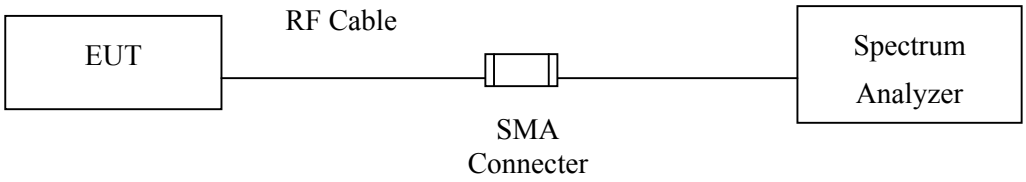
5.1. Test Equipment

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, 2002

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

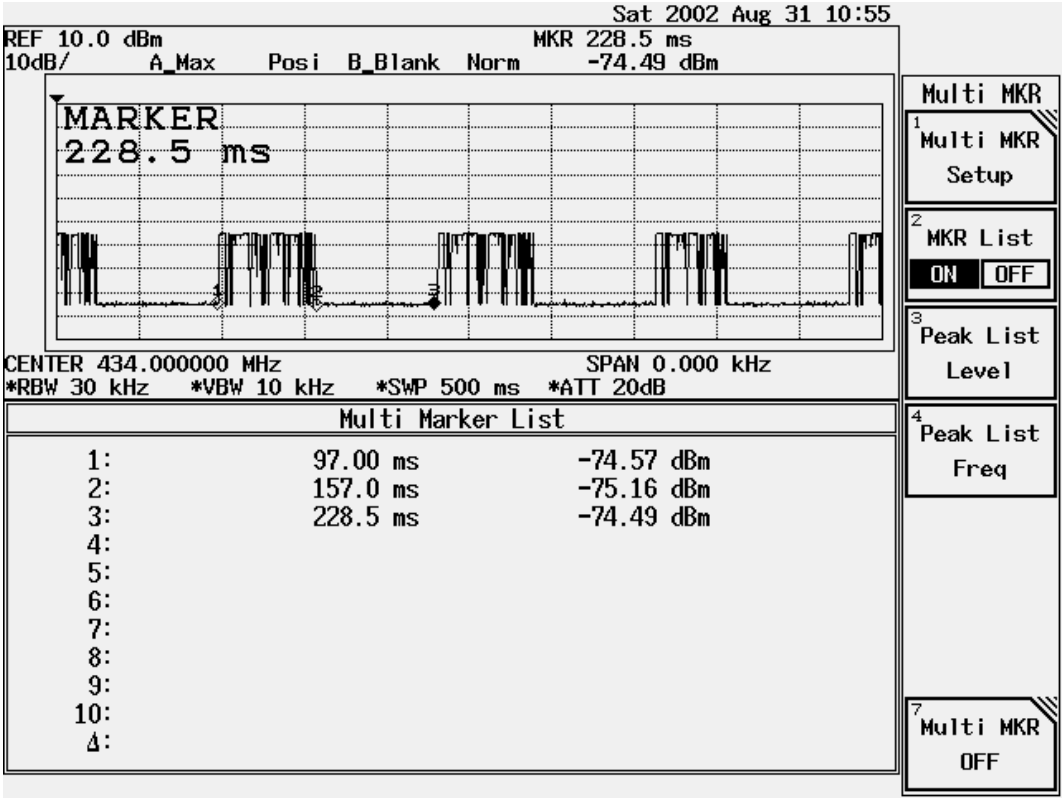


5.3. Test Proceudre

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

5.4. Test Result of Duty Cycle

Product : Wireless AV Sender with remote control extender
Test Item : Duty Cycle Data
Test Site : No.1 OATS
Test Mode : Normal Operation



Duty Cycle: 228.5-97=131.5ms > 100ms

157-97=60ms

60/100=0.6

20 log 0.6= -4.437dB

Duty Cycle= -4.437dB

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1 : EUT Test Photographs

Attachment 2 : EUT Detailed Photographs