



Test Report Class II Change

Product Name : Wireless Color Camera System

Model No. : TTA-41T

FCC ID.: O6LGIGAAIR-30T

Applicant : TRANWO TECHNOLOGY CORP.

Address : 6F, No. 49, Guangmin 6th Rd., Jubei City, Hsin
Chu, Taiwan, R.O.C.

Date of Receipt : Jun. 22, 2001

Date of Test : Jul. 20, 2001

Report No. : 016H042FI

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 : Jul. 20, 2001

Report No. : 016H042FI

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

Product Name : Wireless Color Camera System

Applicant : TRANWO TECHNOLOGY CORP.

Address : 6F, No. 49, Guangmin 6th Rd., Jubei City, Hsin
Chu, Taiwan, R.O.C.

Manufacturer : TRANWO TECHNOLOGY CORP.

Model No. : TTA-41T

FCC ID. : O6LGIGAAIR-30T

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

Trade Name : TRANWO

Measurement Standard : FCC Part 15 Subpart C Paragraph 15.249

Measurement Procedure : ANSI C63.4:1992

Test Result : Complied



NVLAP Lab Code: 200347-0

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

Documented By

A handwritten signature in black ink, appearing to be 'Kim Hung', written over a horizontal line.
(Kim Hung)

Tested By

A handwritten signature in black ink, appearing to be 'Vincent Lin', written over a horizontal line.
(Vincent Lin)

Approved By

A handwritten signature in black ink, appearing to be 'Kevin Wang', written over a horizontal line.
(Kevin Wang)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	4
1.1. EUT Description	4
1.2. Tested System Details	5
1.3. Configuration of tested System.....	5
1.4. EUT Exercise Software.....	5
1.5. Test Facility	6
2. Conducted Emission.....	7
2.1. Test Equipment List.....	7
2.2. Test Setup	7
2.3. Limits	7
2.4. Test Procedure.....	8
2.5. Test Result of Conducted Emission.....	9
3. Radiated Emission.....	10
3.1. Test Equipment.....	10
3.2. Test Setup	10
3.3. Limits	11
3.4. Test Procedure.....	12
3.5. Test Result of Radiated Emission	13
4. EMI Reduction Method During Compliance Testing	20
5. Attachment.....	21
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name : Wireless Color Camera System
Trade Name : TRANWO
FCC ID. : O6LGIGAAIR-30T
Model No. : TTA-41T
Frequency Range : 2400 MHz to 2483.5MHz
Channel Number : 4
Frequency of each Channel : Channel 1: 2434MHz, Channel 2: 2453MHz,
Channel 3: 2473MHz, Channel 4: 2411MHz
Type of Modulation : FM
Operator Selection of : Manual Switch
Operating Frequency
Power Adapter : AHEAD, MW35-0900300U
Cable Out: Non-shielded, 3.6m

Note:

1. This device is a Wireless Color Camera System included a 2.4GHz transmitting function.
2. The class II change is owing to the change of CCD from black and white to color type.
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.
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 007H029F, certified under verification.

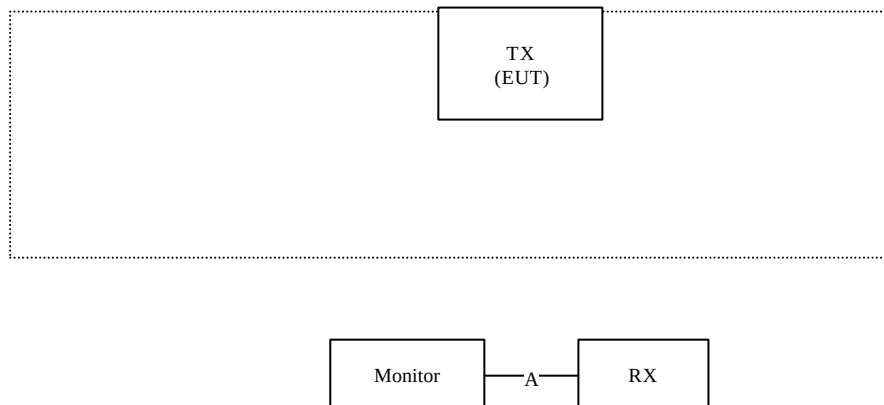
1.2. Tested System Details

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)	RECEIVER	TRANWO	GIGAAIR-10R	N/A	Non-shielded, 3.6m
(2)	Monitor	SONY	KV-14NX	103125	Non-shielded, 1.8m

	Signal Cable Type	Signal Cable Description
A.	RCA cable	Non-shielded, 1.8m

1.3. Configuration of tested System



1.4. EUT Exercise Software

- 1.4.1 Setup the EUT and display as shown on 1.3.
- 1.4.2 Turn on the power of all equipment.
- 1.4.3 The EUT will transmit the radio signal from transmitter.
- 1.4.4 Repeat the above procedure 1.4.2 to 1.4.3

1.5. 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: N0.75-1, Wang-Yeh Valley, Yung-Hsing,
Chiung-Lin, Hsin-Chu County,
Taiwa, R.O.C.

2. Conducted Emission

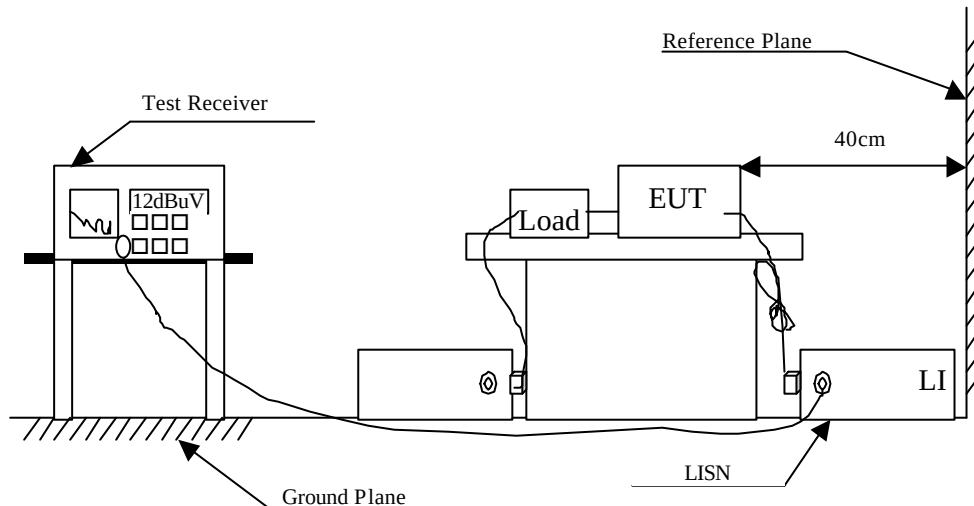
2.1. Test Equipment List

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 : Wireless Color Camera System
 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:

*0.485	0.06	0.10	30.84	31.00	48.00
0.630	0.08	0.10	28.46	28.64	48.00
0.720	0.08	0.10	22.98	23.16	48.00
0.796	0.09	0.10	20.37	20.56	48.00
0.978	0.10	0.10	21.12	21.32	48.00
20.431	0.36	0.46	20.30	21.12	48.00

Line 2

Quasi-Peak:

*0.454	0.06	0.10	26.73	26.89	48.00
0.501	0.06	0.10	24.92	25.08	48.00
0.598	0.07	0.10	23.25	23.42	48.00
0.747	0.08	0.10	18.23	18.41	48.00
1.028	0.10	0.10	14.78	14.98	48.00
20.423	0.36	0.46	24.62	25.44	48.00

Remarks :

1. “ * ” means that this data is the worst emission level.
2. The average measurement was not performed when the peak measured data under the limit of average detection.

3. Radiated Emission

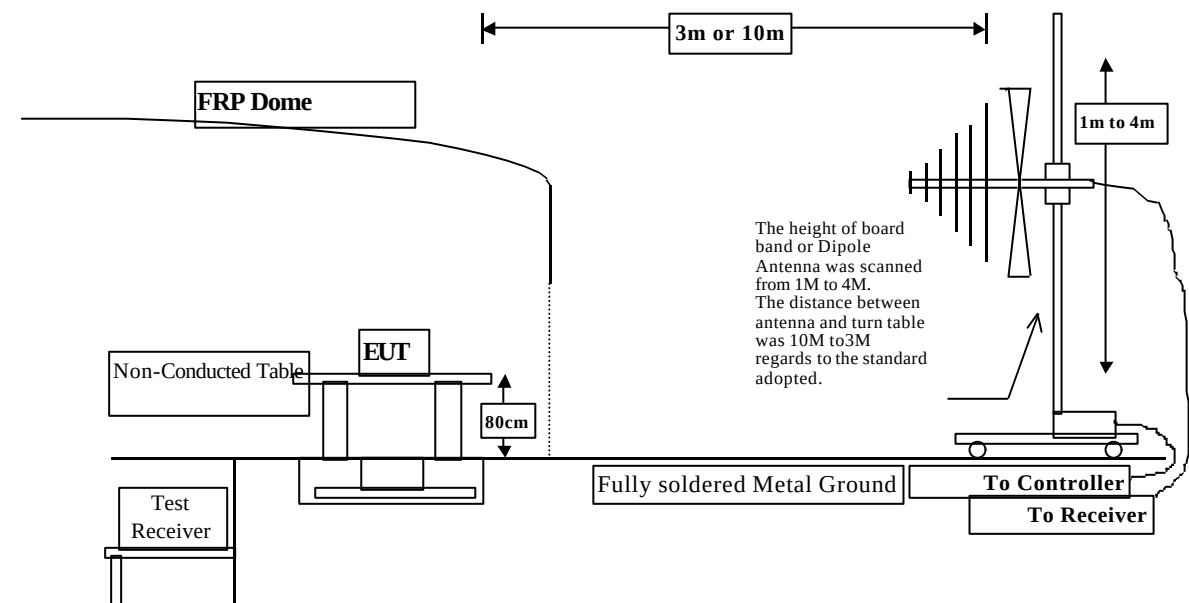
3.1. Test Equipment

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., 2000
	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., 2000
	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

➤ Fundamental and Harmonics Emission Limits

Frequency MHz	Field Strength of Fundamental (mV/m @3m)	Field Strength of Fundamental (dBuV/m @3m)	Field Strength of Harmonics (uV/m @3m)	Field Strength of Harmonics (dBuV/m @3m)
2400-2483.5	50	94 (Average) 114 (Peak)	500	54 (Average) 74 (Peak)

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	50dB below of the fundamental (dBuV/m @3m)	15.209 Limits (dBuV/m @3m)	General Radiated Limits (dBuV/m @3m)
30-88	40	40	40
88-216	43.5	43.5	43.5
216-960	44	46	46
Above 960	44	54	54

Remarks :

1. RF Line Voltage (dBuV) = 20 log RF Line Voltage (uV)
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.

Radiated emissions were investigated over the frequency range from 30MHz to 1GHz using a receiver bandwidth of 120kHz. Radiated was performed at an antenna to EUT distance of 3 meters.

3.5. Test Result of Radiated Emission

Product : Wireless Color Camera System
 Test Item : Fundamental 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

=====

Peak Detector (Horizontal)

Channel 1

2434.000	3.86	29.31	0.00	51.03	84.19	29.81	114.00
----------	------	-------	------	-------	-------	-------	--------

Channel 3

2471.900	3.91	29.44	0.00	50.41	83.76	30.24	114.00
----------	------	-------	------	-------	-------	-------	--------

Channel 4

2412.500	3.84	29.26	0.00	50.09	83.19	30.81	114.00
----------	------	-------	------	-------	-------	-------	--------

Peak Detector (Vertical)

Channel 1

2434.000	3.86	29.31	0.00	52.07	85.23	28.77	114.00
----------	------	-------	------	-------	-------	-------	--------

Channel 3

2472.300	3.91	29.44	0.00	51.40	84.75	29.25	114.00
----------	------	-------	------	-------	-------	-------	--------

Channel 4

2412.500	3.84	29.26	0.00	49.91	83.01	30.99	114.00
----------	------	-------	------	-------	-------	-------	--------

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
4. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Color Camera System
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Channel 1

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit
	Loss	Factor		Level			
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
=====							
Peak Detector (Horizontal)							
4867.950	6.30	33.54	34.76	44.76	49.85	24.15	74.00
7301.930	8.38	36.31	34.90	43.31	53.09	20.91	74.00
9735.960	10.24	37.45	35.10	42.94	55.53	18.47	74.00
12169.81	11.98	39.17	34.56	41.43	58.01	15.99	74.00
Average Detector (Horizontal)							
9735.910	10.24	37.45	35.10	34.56	47.15	6.85	54.00
12169.96	11.98	39.17	34.56	32.43	49.01	4.99	54.00
Peak Detector (Vertical)							
4867.930	6.30	33.54	34.76	44.64	49.73	24.27	74.00
7301.920	8.38	36.31	34.90	46.06	55.84	18.16	74.00
9735.920	10.24	37.45	35.10	42.63	55.22	18.78	74.00
12169.89	11.98	39.17	34.56	42.86	59.44	14.56	74.00
Average Detector (Vertical)							
7301.950	8.38	36.31	34.90	40.44	50.22	3.78	54.00
9735.890	10.24	37.45	35.10	33.79	46.38	7.62	54.00
12169.93	11.98	39.17	34.56	33.82	50.40	3.60	54.00

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
4. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Color Camera System
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Channel 3

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

=====

Peak Detector (Horizontal)

4943.900	6.38	33.64	34.72	43.29	48.59	25.41	74.00
7415.890	8.46	36.41	34.90	39.75	49.72	24.28	74.00
9887.440	10.36	37.48	35.10	41.54	54.27	19.73	74.00
12358.79	12.11	39.24	34.41	41.23	58.17	15.83	74.00

Average Detector (Horizontal)

9888.280	10.36	37.48	35.10	32.25	44.98	9.02	54.00
12360.03	12.11	39.24	34.41	32.61	49.55	4.45	54.00

Peak Detector (Vertical)

4944.340	6.38	33.64	34.72	43.71	49.01	24.99	74.00
7415.610	8.46	36.41	34.90	41.76	51.73	22.27	74.00
9888.320	10.36	37.48	35.10	41.32	54.05	19.95	74.00
12362.95	12.11	39.24	34.41	42.35	59.29	14.71	74.00

Average Detector (Vertical)

9888.320	10.36	37.48	35.10	32.21	44.94	9.06	54.00
12359.59	12.11	39.24	34.41	35.63	52.57	1.43	54.00

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
4. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Color Camera System
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Channel 4

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit
	Loss	Factor		Level			
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
=====							
Peak Detector (Horizontal)							
4824.940	6.27	33.50	34.77	43.71	48.71	25.29	74.00
7237.410	8.32	36.24	34.90	43.85	53.51	20.49	74.00
9649.890	10.18	37.43	35.10	42.87	55.38	18.62	74.00
12062.22	11.91	39.13	34.65	41.57	57.96	16.04	74.00
Average Detector (Horizontal)							
9649.910	10.18	37.43	35.10	34.64	47.15	6.85	54.00
12062.30	11.91	39.13	34.65	32.49	48.88	5.12	54.00
Peak Detector (Vertical)							
4824.940	6.27	33.50	34.77	43.31	48.31	25.69	74.00
7237.380	8.32	36.24	34.90	46.33	55.99	18.01	74.00
9649.830	10.18	37.43	35.10	43.15	55.66	18.34	74.00
12062.49	11.91	39.13	34.65	42.10	58.49	15.51	74.00
Average Detector (Vertical)							
7237.370	8.32	36.24	34.90	42.24	51.90	2.10	54.00
9649.940	10.18	37.43	35.10	35.30	47.81	6.19	54.00
12062.40	11.91	39.13	34.65	33.69	50.08	3.92	54.00

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
4. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Wireless Color Camera System
 Test Item : General Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Channel 1

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

Horizontal:

53.280	1.11	5.17	26.86	40.60	20.02	19.98	40.00
*70.740	1.18	6.98	26.87	47.40	28.70	11.30	40.00
106.630	1.33	11.64	26.88	40.20	26.29	17.21	43.50
176.470	1.62	9.26	26.90	31.80	15.77	27.73	43.50
282.200	2.05	12.30	26.94	33.60	21.01	24.99	46.00
299.660	2.12	12.53	26.95	34.80	22.50	23.50	46.00

Vertical:

*53.280	1.11	5.17	26.86	39.80	19.22	20.78	40.00
106.630	1.33	11.64	26.88	34.00	20.09	23.41	43.50
270.560	2.00	12.09	26.94	32.20	19.35	26.65	46.00
283.170	2.06	12.30	26.94	34.60	22.02	23.98	46.00
299.660	2.12	12.53	26.95	32.60	20.30	25.70	46.00
405.390	2.56	14.09	26.78	32.40	22.27	23.73	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

Product : Wireless Color Camera System
 Test Item : General Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Channel 3

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

Horizontal:

*39.700	1.06	11.66	26.85	39.80	25.67	14.33	40.00
54.250	1.12	5.04	26.86	39.40	18.69	21.31	40.00
106.630	1.33	11.64	26.88	40.40	26.49	17.01	43.50
283.170	2.06	12.30	26.94	33.00	20.42	25.58	46.00
301.600	2.13	12.55	26.95	35.00	22.73	23.27	46.00
335.550	2.27	12.70	26.89	31.20	19.28	26.72	46.00

Vertical:

*54.250	1.12	5.04	26.86	40.80	20.09	19.91	40.00
72.680	1.19	7.26	26.87	37.00	18.59	21.41	40.00
106.630	1.33	11.64	26.88	33.20	19.29	24.21	43.50
283.170	2.06	12.30	26.94	33.60	21.02	24.98	46.00
407.330	2.57	14.22	26.78	31.80	21.81	24.19	46.00
440.310	2.70	14.01	26.73	34.00	23.98	22.02	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

Product : Wireless Color Camera System
 Test Item : General Radiated Emission Data
 Test Site : No.1 OATS
 Test Mode : Channel 4

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

Horizontal:

*36.790	1.04	13.60	26.85	37.40	25.19	14.81	40.00
54.250	1.12	5.04	26.86	40.20	19.49	20.51	40.00
105.660	1.33	11.43	26.88	40.00	25.88	17.62	43.50
212.360	1.76	8.91	26.92	39.00	22.75	20.75	43.50
283.170	2.06	12.30	26.94	34.80	22.22	23.78	46.00
326.820	2.24	13.51	26.91	35.20	24.04	21.96	46.00

Vertical:

52.310	1.11	5.17	26.86	44.00	23.42	16.58	40.00
*72.680	1.19	7.26	26.87	42.40	23.99	16.01	40.00
106.630	1.33	11.64	26.88	33.40	19.49	24.01	43.50
270.560	2.00	12.09	26.94	33.00	20.15	25.85	46.00
283.170	2.06	12.30	26.94	35.40	22.82	23.18	46.00
441.280	2.70	13.91	26.73	32.80	22.68	23.32	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

4. EMI Reduction Method During Compliance Testing

No modification was made during testing.

5. Attachment

Attachment 1: EUT Test Photographs Number of Pages : 3

Attachment 2: EUT Detail Photographs Number of Pages : 9

Attachment 1 : EUT Test Photographs

Attachment 2 : EUT Detailed Photographs