

TEST NUMBER - 206-00

FEDERAL COMMUNICATIONS COMMISSION

PART 15.249 CERTIFICATION TESTING 902 - 928 MHz

Subpart C - Intentional Radiators

for

Safety 1ST, Inc.
45 Dan Road
Canton, MA 02021
(800) 962 7233

of

900 MHz In Sight Hand-Held TV-Video Monitor
48020T

FCCID#: MNJ48020T

on

April 18, 2000

by

Larry K. Stillings

Larry K. Stillings



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

TABLE OF CONTENTS

- Test Description
- Test Results and Conclusions
- Test Procedures
- Part 15 Subpart C Test Limits
- Measurement Uncertainty Budget and Calculations
- Test Facility Description
- Test Setup and Connection Information
- Test Measurements and Results
 - Radiated Measurements
 - Radiated Output Power & Occupied Bandwidth
 - Conducted Measurements
- Notes and Comments



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

TEST DESCRIPTION

1. TEST OBJECTIVE

To test the 900 MHz In Sight Hand-Held TV-Video Monitor 48020T to FCC Part 15.249, Subpart C limits and write a report.

2. E.U.T. DESCRIPTION

GENERAL

The 900 MHz In Sight Hand-Held TV-Video Monitor 48020T is a 3 channel color transmitter operating in the 902 to 928 MHz band. The 3 channels transmit at 908.9, 915.4 and 921.9 MHz.

SERIAL NUMBERS:

Pre production unit



TEST NUMBER - 206-00
Safety 1ST, Inc.
900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

TEST RESULTS AND CONCLUSIONS

PRODUCT TESTED - 900 MHz In Sight Hand-Held TV-Video Monitor

MODEL NUMBER - 48020T

RADIATED TEST RESULTS

The test results show that the emissions radiated from this equipment are in compliance with FCC Rules, Part 15, Subpart C, Section 15.209.

OCCUPIED BANDWIDTH & OUTPUT POWER

The test results show that the occupied bandwidth and output power of this equipment are in compliance with FCC Rules, Part 15, Subpart C, Section 15.239.

CONDUCTED TEST RESULTS

The test results show that the emissions conducted through the power line from this equipment are in compliance with FCC Rules, Part 15, Subpart C, Section 15.207.

ANALYSIS AND CONCLUSIONS

Based upon the radiated and conducted measurements we find that this equipment is within the limits of the FCC Rules, Part 15, Subpart C.

NOTES (Special conditions unique to this test)

None



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

TEST PROCEDURES

1. TEST EQUIPMENT

- A. HP 8546A (9 kHz - 6.5 GHz) EMI Receiver w/ RF Filter Section, S/N 3704A00323 / 3650A00360. Calibration Date 3-28-2000, calibrated annually.
- B. HP 8593E (9 kHz - 26.5 GHz) Spectrum Analyzer, S/N 3829A03887. Calibration Date 9-3-1999, calibrated annually.
- C. Electro-Metrics BiConical Antenna, Model EM6912A, S/N 149. Calibration Date 2-22-2000, calibrated annually.
- D. Electro-Metrics Log Periodic Antenna, Model EM-6950, S/N 1017. Calibration Date: 2-22-2000, calibrated annually.
- E. Electro-Metrics Double Ridged Guide Antenna, Model EM-6961, S/N 6337. Calibration Date: 7-14-1999, calibrated annually.
- F. HP 1 - 26.5 GHz Preamplifier, Model 08449B, S/N 3008A01323. Calibration Date: 9-29-1999, calibrated annually.
- G. LISN, Compliance Worldwide, Model 50 μ H / 50 ohm, S/N 100. Calibration Date 2-22-2000, calibrated annually.

2. FREQUENCY RANGE TO BE SCANNED.

- A. Radiated Test from 30 MHz to 40 GHz (or the 10th harmonic of the highest frequency whichever is lower).
- B. Conducted Test from 450 kHz to 30 MHz.



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

3. TEST PROCEDURES.

Radiated test procedure

The EUT, associated cables and peripheral devices are placed on the supporting table and any support equipment is placed off the site. The EUT is turned on and any necessary operating or test software installed and allowed to warm up. The frequency band from 30 MHz to 40 GHz is scanned. When an emission is found the emission is maximized by varying the bundle position of the connecting cables, the antenna height, the antenna polarization (vertical and horizontal) and the table orientation (360 degrees). The maximum reading is recorded and the next signal is searched for.

Conducted test procedure

The power line of the EUT is connected to the LISN (Line Impedance Stabilization Network). A measurement of the emissions are made from the power line for both phase and neutral on the analyzer in the frequency range from 450 kHz to 30 MHz. The maximum readings are recorded for each phase.

All measurements are made according to the procedures defined in: "ANSI C63.4-1992 Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz, American National Standard for (ISBN 1-55937-215-5).



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

PART 15 SUBPART C TEST LIMITS

1. 15.209, 15.235 & 15.249 Radiation Limits (Quasi-Peak):

Frequency MHz	Distance meters	Limit dB μ V/m	Limit μ V/m
1.705 - 30	30	29.5*	30*
30 - 88	3	40.0	100
49.82 - 49.90	3	80.0*	10,000*
88 - 216	3	43.5	150
216 - 960	3	46.0	200
902 - 928	3	94.0*	50,000*
960 - 1000	3	54.0	500
1000 - 40000	3	54.0*	500*

*NOTE: Average Limits

2. 15.207 Conduction Limits (Quasi-Peak):

Frequency MHz	Limit dB μ V/m	Limit μ V/m
0.450 - 30.0	48.0	250



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

MEASUREMENT UNCERTAINTY BUDGET AND CALCULATIONS

These measurement uncertainties were calculated in accordance with the requirements of the NAMAS Document Draft NIS63 with a confidence level of 95%.

Measurement Uncertainty for Radiated Emissions Measurements 30 MHz - 1000 MHz

Contribution	Distribution	Uncertainty (dB)	
		Biconical Antenna 3m-10m	Log-Periodic Antenna 3m-10m
Antenna factor calibration	Gaussian (2s)	± 1.0	± 1.0
Cable loss calibration	Gaussian (2s)	± 0.5	± 0.5
EMI receiver specification	Rectangular	± 0.5	± 0.5
Antenna factor variation with height	Rectangular	± 2.0	± 0.5
Antenna directivity	Rectangular	± 0.5	$\pm 3.0/\pm 0.5$
Antenna phase center variation	Rectangular	± 0.0	$\pm 1.0/\pm 0.2$
Antenna factor frequency interpolation	Rectangular	± 0.2	± 0.2
Measurement distance variation	Rectangular	± 0.5	± 0.5
Site imperfections	Rectangular	± 1.0	± 1.0
Mismatch	U-shaped	± 1.2	± 0.5
Random	Gaussian (1s)	± 0.7	± 0.7
Total uncertainty at 95% min confidence probability		$\pm 4.1/4.2$	$\pm 4.7/3.0$

References:

1. ANSI C63.6-1988 - American National Standard Guide for the computation of errors in open area test sites.
2. ANSI C63.5-1988 - American National Standard for the calibration for antennae used for radiated emission measurements in Electromagnetic Interference control.
3. Draft NIS63 - The treatment of uncertainty in EMC measurements.



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

Measurement Uncertainty Calculation

Total Uncertainty

$$U = 2\sqrt{S_{s1}^2 + S_{s2}^2 + \dots + S_{sm}^2 + S_r^2}$$

Total Uncertainty for Biconical Antenna at 3 meters

$$U = 2\sqrt{\frac{1.0^2}{2} + \frac{0.5^2}{2} + \frac{1.5^2+2.0^2+0.5^2+0.2^2+0.5^2+1.0^2}{3} + \frac{1.2^2}{2} + 0.7^2} = 4.06\text{dB}$$

Total Uncertainty for Biconical Antenna at 10 meters

$$U = 2\sqrt{\frac{1.0^2}{2} + \frac{0.5^2}{2} + \frac{1.5^2+2.0^2+0.5^2+0.2^2+0.5^2+1.0^2}{3} + \frac{1.2^2}{2} + 0.7^2} = 4.15\text{dB}$$

Total Uncertainty for Log-Periodic Antenna at 3 meters

$$U = 2\sqrt{\frac{1.0^2}{2} + \frac{0.5^2}{2} + \frac{1.5^2+0.5^2+3.0^2+1.0^2+0.2^2+0.5^2+1.0^2}{3} + \frac{0.5^2}{2} + 0.7^2} = 4.70\text{dB}$$

Total Uncertainty for Log-Periodic Antenna at 10 meters

$$U = 2\sqrt{\frac{1.0^2}{2} + \frac{0.5^2}{2} + \frac{1.5^2+0.5^2+0.5^2+0.2^2+0.2^2+0.5^2+1.0^2}{3} + \frac{0.5^2}{2} + 0.7^2} = 3.03\text{dB}$$



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

**Measurement Uncertainty for Conducted Emissions Measurements
0.450 - 30 MHz**

Contribution	Distribution	Uncertainty 0.45 MHz - 30MHz
EMI Receiver Specification	Rectangular	± 1.5
LISN Specification	Rectangular	± 1.5
Cable Calibration	Gaussian (2s)	± 0.2
Mismatch	U-Shaped	± 0.6
Random	Gaussian (1s)	± 0.8
Total uncertainty at 95% min confidence probability		± 3.1

References:

1. ANSI C63.6-1988 American National Standard Guide for the computation of errors in open area test sites.
2. Draft NIS63 The treatment of uncertainty in EMC measurements.

Measurement Uncertainty Calculation

Total Uncertainty

$$U = 2 \sqrt{S_{s1}^2 + S_{s2}^2 + \dots + S_{sm}^2 + S_r^2}$$

Total Uncertainty for Conducted Emissions

$$U = 2 \sqrt{\frac{1.5^2 + 1.5^2}{3} + \frac{0.2^2}{2} + \frac{0.6^2}{2} + 0.8^2} = 3.05 \text{ dB}$$



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

TEST FACILITY DESCRIPTION

In keeping with the requirements of Section 2.948 of the Federal Communications Commission's Rules, Compliance Worldwide has filed a Test Facility Description with the F.C.C.

Anyone wishing to review this Test Facility Description is referred to registration number 96392. This is currently on file at the FCC's Authorization and Evaluation Lab in Columbia, Maryland, U.S.A.

DATE ON FILE: March 6, 2000



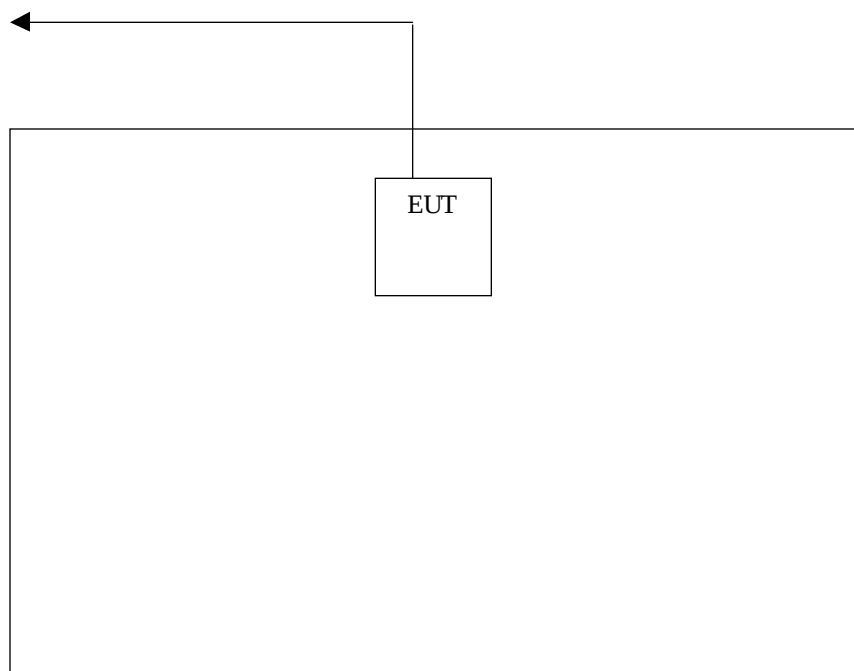
TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

**TEST SET UP
AND
PERIPHERAL CONNECTION INFORMATION**

To 120 VAC via 9 VDC Transformer



Operating Frequencies within the E.U.T.:



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

PLEASE NOTE - EUT (equipment under test) is 900 MHz In Sight Hand-Held TV-Video Monitor.

The cables directly connected to this equipment are listed below. Please see below for a complete list of FCC ID's etc. on the supporting equipment.

Connection Descriptions

1.

Power Cable

(description)

EUT

(from device)

120 VAC via 9VDC Transformer

(to device)

CABLE LENGTH 1.8 Meters (S) SHIELDED or (U) UNSHIELDED __U__



TEST NUMBER - 206-00
Safety 1ST, Inc.
900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

RADIATED TEST RESULTS

Frequency Range: 30 - 9280 MHz.
Measurement Distance: 3.0 Meters.
Bandwidth: 120 kHz, Per ANSI C63.4-1992.*
Detector Functions: Peak, Quasi Peak, Average
Video Filter: 300 kHz
Table Height: 0.8 meters
Antenna Height Variation: 1 - 4 Meters.
Horizontal and Vertical Polarization Measurements Taken.

*Measurement Bandwidth is 1 MHz above 1 GHz

PLEASE SEE NEXT PAGE FOR RADIATED TEST DATA

Measurement Uncertainties

The measurement uncertainties stated were calculated in accordance with the requirements of NAMAS Document NIS63 with a confidence level of 95%. The complete measurement uncertainty budget and calculations are located in the Measurement Uncertainty section of this report.

Tests Performed	Total Uncertainty
Radiated Emissions with Biconical Antenna at 3 Meters -- 30 MHz - 200 MHz	±4.06
Radiated Emissions with Biconical Antenna at 10 Meters -- 30 MHz - 200 MHz	±4.15
Radiated Emissions with Log-Periodic Antenna at 3 Meters -- 200 MHz - 1000 MHz	±4.70
Radiated Emissions with Log-Periodic Antenna at 10 Meters -- 200 MHz - 1000 MHz	±3.03



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

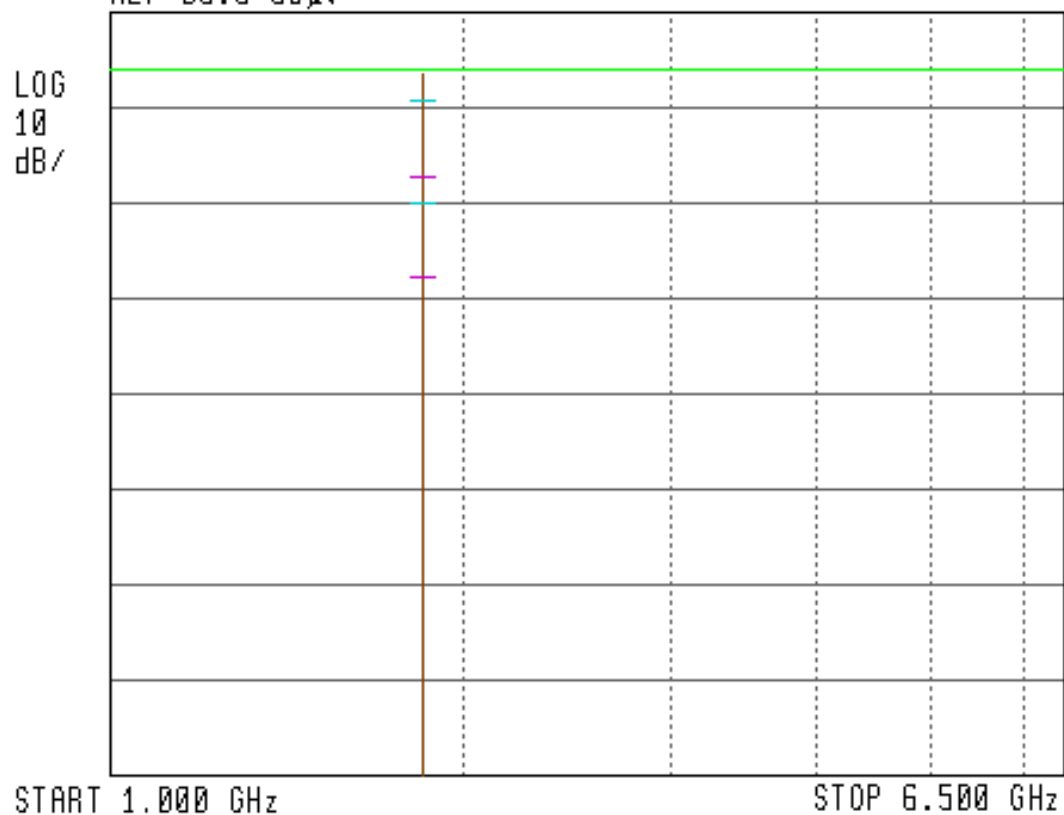
No Signals were measurable from 30 to 1000 MHz

TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

 15:42:27 APR 18, 2000
SAFETY 1ST 48020T #206-00
REF 60.0 dB μ V





TEST NUMBER - 206-00
Safety 1ST, Inc.
48020T - 48020

FCC Part 15 Subpart C

Radiated Results @ 3 Meters

Frequency MHz	Polarization H/V	Height cm	Table degrees	Peak Amplitude dB μ V	QP Amplitude dB μ V	Avg Amplitude dB μ V	Limit dB μ V	Margin dB
1843.77	V	162	16	53.5	50.8	43.1	54.0	10.9
1843.88	H	164	16	45.3	40.3	32.5	54.0	21.5



TEST NUMBER - 206-00
Safety 1ST, Inc.
900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

RADIATED OUTPUT POWER & OCCUPIED BANDWIDTH TEST RESULTS

Frequency Range: 902 - 928 MHz.
Measurement Distance: 3.0 Meters.
Bandwidth: 120 kHz, Per ANSI C63.4-1992.
Detector Functions: Peak, Quasi Peak, Average.
Video Filter: 300 kHz
Table Height: 0.8 meters
Antenna Height Variation: 1 - 4 Meters.
Horizontal and Vertical Polarization Measurements Taken.

PLEASE SEE NEXT PAGE(S) FOR OCCUPIED BANDWIDTH RADIATED TEST DATA

Measurement Uncertainties

The measurement uncertainties stated were calculated in accordance with the requirements of NAMAS Document NIS63 with a confidence level of 95%. The complete measurement uncertainty budget and calculations are located in the Measurement Uncertainty section of this report.

Tests Performed	Total Uncertainty
Radiated Emissions with Biconical Antenna at 3 Meters -- 30 MHz - 200 MHz	±4.06
Radiated Emissions with Log-Periodic Antenna at 3 Meters -- 200 MHz - 1000 MHz	±4.70

TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

14:55:04 APR 18, 2000 CHANNEL A
SAFETY 1ST 48020T #206-00

FREQ 908.9 MHz
PEAK 94.1 dB μ V
QP 92.7 dB μ V
AVG NOT SELECTED

LOG REF 100.0 dB μ V

PREAMP ON

10

dB/

ATN

30 dB

VA SB

SC FC

ACORR

CENTER 908.908 MHz

#IF BW 120 kHz

AVG BW 300 kHz

SPAN 5.000 MHz

SWP 20.0 msec

TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

15:01:00 APR 18, 2000 CHANNEL B
SAFETY 1ST 48020T #206-00

FREQ 915.4 MHz
PEAK 94.3 dB μ V
QP 92.7 dB μ V
AVG NOT SELECTED

LOG REF 100.0 dB μ V

PREAMP ON

10

dB/

ATN

30 dB

VA SB

SC FC

ACORR

CENTER 915.420 MHz

#IF BW 120 kHz

AVG BW 300 kHz

SPAN 5.000 MHz

SWP 20.0 msec

TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

15:08:42 APR 18, 2000 CHANNEL C
SAFETY 1ST 48020T #206-00

FREQ	921.9 MHz
PEAK	94.5 dB μ V
QP	92.9 dB μ V
AVG	NOT SELECTED

LOG REF 100.0 dB μ V

PREAMP ON

10

dB/

ATN

30 dB

MA SB

SC FC

ACORR

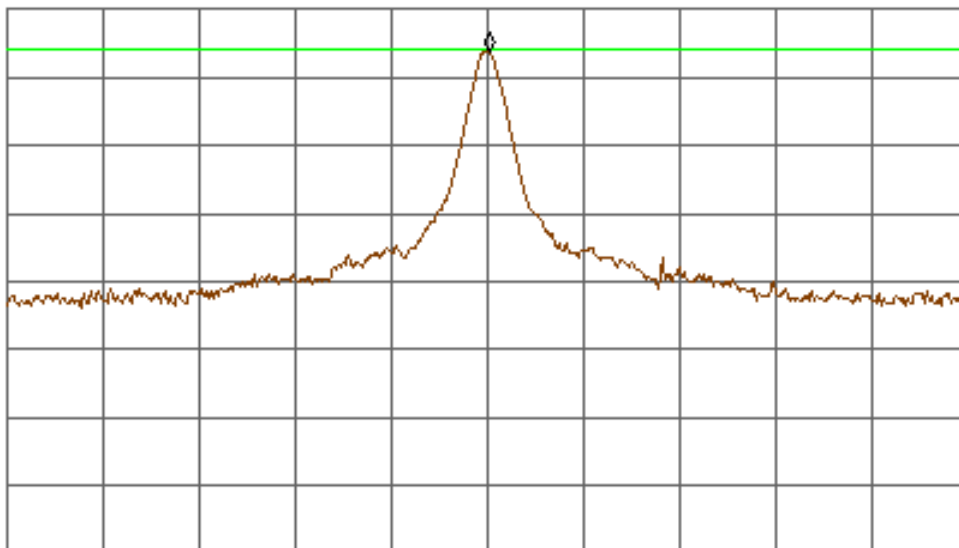
CENTER 921.908 MHz

#IF BW 120 kHz

AVG BW 300 kHz

SPAN 5.000 MHz

SWP 20.0 msec





TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

CONDUCTED TEST RESULTS

Frequency Range: 450 kHz to 30.0 MHz.
Bandwidth: 9 kHz per ANSI C63.4-1992.
Detector Functions: Peak, Quasi-Peak, Average
Table Height: 0.8 meters
Video Bandwidth: 30 kHz.

Phase and Neutral Measurements Taken.

PLEASE SEE NEXT PAGE FOR CONDUCTED TEST DATA

Measurement Uncertainties

The measurement uncertainties stated were calculated in accordance with the requirements of NAMAS Document NIS63 with a confidence level of 95%. The complete measurement uncertainty budget and calculations are located in the Measurement Uncertainty section of this report.

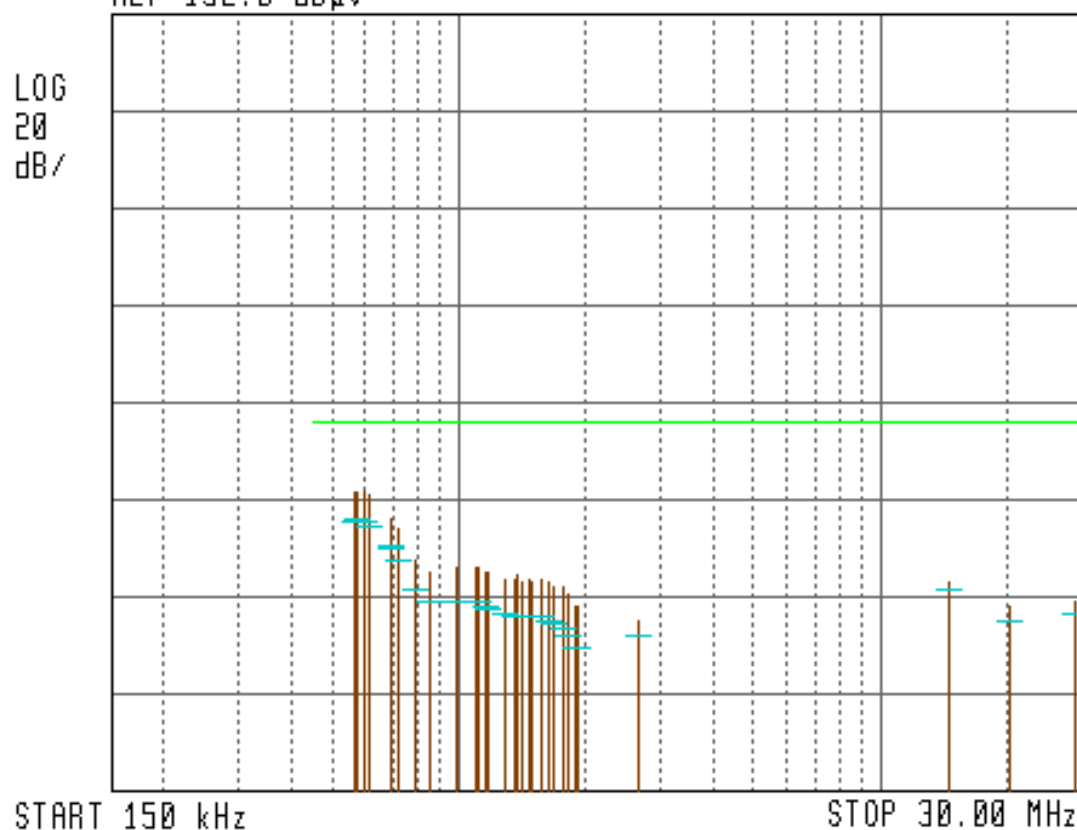
Tests Performed	Total Uncertainty
Conducted Emissions -- 0.450 MHz - 30 MHz	± 3.05

TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

16:25:16 APR 18, 2000 120 VAC PHASE
SAFETY 1ST 48020T #206-00
REF 132.0 dB μ V





TEST NUMBER - 206-00
Safety 1ST, Inc.
48020T - 48020

FCC Part 15 Subpart C

Conducted Results

Phase 120 VAC

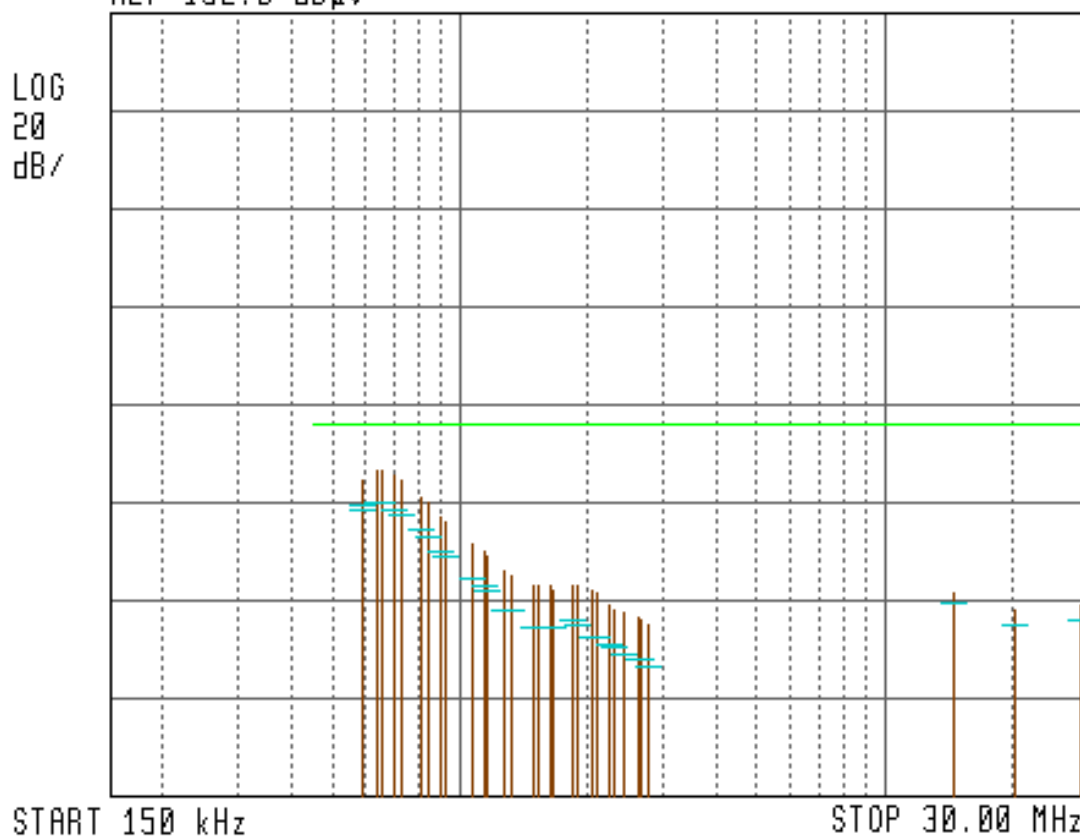
Frequency MHz	Peak Amplitude dB μ V	QP Amplitude dB μ V	Limit dB μ V	Margin dB
0.565	34.2	28.1	48.0	19.9
0.566	34.3	28.2	48.0	19.8
0.571	34.2	28.3	48.0	19.8
0.595	34.1	28.0	48.0	20.0
0.616	33.3	27.3	48.0	20.7
0.692	28.8	22.7	48.0	25.3
0.721	26.2	20.1	48.0	27.9
0.787	20.2	14.1	48.0	33.9
0.854	18.0	11.3	48.0	36.7
0.991	18.4	11.4	48.0	36.7
0.992	18.4	11.2	48.0	36.8
1.10	18.5	11.6	48.0	36.4
1.11	18.2	11.3	48.0	36.7
1.16	17.9	10.3	48.0	37.7
1.18	17.5	10.1	48.0	37.9
1.29	16.3	8.9	48.0	39.1
1.35	16.2	8.6	48.0	39.4
1.37	16.6	8.7	48.0	39.4
1.41	15.6	8.6	48.0	39.4
1.46	16.1	8.4	48.0	39.6
1.49	15.5	8.2	48.0	39.8
1.57	16.0	8.1	48.0	39.9
14.32	15.1	13.8	48.0	34.2
28.64	11.4	8.8	48.0	39.2

TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

16:38:43 APR 18, 2000 120 VAC NEUTRAL
SAFETY 1ST 48020T #206-00
REF 132.0 dB μ V





TEST NUMBER - 206-00
Safety 1ST, Inc.
48020T - 48020

FCC Part 15 Subpart C

Conducted Results

Neutral 120 VAC

Frequency MHz	Peak Amplitude dB μ V	QP Amplitude dB μ V	Limit dB μ V	Margin dB
0.587	37.5	31.3	48.0	16.7
0.591	37.5	31.5	48.0	16.6
0.640	38.7	32.1	48.0	15.9
0.654	38.9	32.2	48.0	15.8
0.699	37.9	31.2	48.0	16.8
0.727	36.9	30.3	48.0	17.7
0.808	33.4	27.1	48.0	21.0
0.838	32.2	25.5	48.0	22.5
0.899	29.4	22.4	48.0	25.6
0.919	28.4	21.4	48.0	26.6
1.06	23.9	16.9	48.0	31.1
1.13	22.3	15.1	48.0	32.9
1.15	21.6	14.3	48.0	33.7
1.27	18.7	11.0	48.0	37.0
1.32	17.8	10.3	48.0	37.8
14.32	13.8	12.3	48.0	35.7
28.64	11.1	8.6	48.0	39.4



TEST NUMBER - 206-00

Safety 1ST, Inc.

900 MHz In Sight Hand-Held TV-Video Monitor - 48020T

NOTES AND COMMENTS

(Special conditions unique to this test)

No signals were found between 30 MHz and 1 GHz per 15.209 radiated emission requirements.