

May 8, 2002

***Tandy Electronics (China) Limited
6/F & 7/F M.C. Packaging Bldg
9th District Lian Tang Ind
District Shenzhen Guangdong***

Dear Mr Tan Hui:

Enclosed you will find your file copy of a Part 15 report (FCC ID: AAO1501215).

***For your reference, TCB will normally take another 15-20 days for reviewing the report.
Approval will then be granted when no query is sorted.***

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

***Alfred Lo
Senior Technical Supervisor***

Enclosure

FCC ID: AAO1501215

Tandy Electronics (China) Limited

Application
For
Certification
(FCC ID: AAO1501215)

RF Modulator
(TV Interface Device)

WO# 0204369

AL/sa

May 8, 2002

FCC ID: AAO1501215

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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- For Terms And Conditions of the services, it can be provided upon request.

Intertek Testing Services Hong Kong Ltd.

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2713 8888 Fax: (852) 2745 8306

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LIST OF EXHIBITS

INTRODUCTION

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MEASUREMENT/TECHNICAL REPORT

Tandy Electronics (China) Limited - MODEL: Radio Shack 15-1215
FCC ID: AAO1501215

This report concerns (check one:) Original Grant X Class II Change

Equipment Type: TV interface device

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes No X

If yes, defer until:
date

Company Name agrees to notify the Commission by:
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes No X

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [12-18-01 Edition] provision.

Report prepared by:

Alfred Lo
Intertek Testing Services
Hong Kong Ltd.
2/F., Garment Centre,
576, Castle Peak Road,
Kowloon, Hong Kong
Phone: 852-2173-8545
Fax: 852-2371-0914

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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.doc
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated1.jpg, radiated2.jpg
Test Setup Photo	Conduct Emission	conduct1.jpg, conduct2.jpg, conduct3.jpg
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	ophoto1.jpg, ophoto2.jpg, ophoto3.jpg, ophoto4.jpg, ophoto5.jpg and ophoto6.jpg,
Internal Photo	Internal Photo	iphoto1.jpg, iphoto2.jpg, iphoto3.jpg, iphoto4.jpg, iphoto5.jpg, iphoto6.jpg, and iphoto7.jpg
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf and manual1.pdf
RF signal	Modulator signal output	CH3.pdf and CH4.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 General Description. .0 General Description.0 General Description.0
 General Description.0 General Description

1.1 Product Description. .1 Product Description.1 Product Description.1 Product
Description.1 Product Description

The Equipment Under Test (EUT) is a RF modulator which is designed to convert the Audio/Video signal to standard NTSC CH3 or CH4 RF signal. This EUT is energized by an AC/DC adaptor (120VAC to 9VDC, 100mA) that provided by applicant. This modulator provides 4 sets of both RCA and S-video jack for signal input. On the other hand, it can be seen that the ANT IN, TO TV 75ohms "F" connector are use for connecting the antenna outlet and the television RF signal input respectively. Moreover, the output RF signal (CH3 or CH4) can be selected by the switch on the back of the product. Furthermore, those switches on the front panel are use to select the input source (1, 2, 3 and 4).

For electronic filing, the brief circuit description is saved with filename: descri.pdf

1.2 Related Submittal(s) Grants

This is a single application for certification of a [RF modulator](#).

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1.3 Test Methodology. .3 Test Methodology.3 Test Methodology.3 Test Methodology.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated Emission measurement was performed in Open Area Test Sites and Conducted Emission was performed in shield room. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximisation emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility.

The open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

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2.0 System Test Configuration..0 System Test Configuration.0 System Test Configuration.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSIC63.4 (1992).

The EUT was powered by ac/dc adaptor, model no. is U090010D12. The unit was operated with those peripheral, placed flush with rear of tabletop.

For simplifying of test, the unit was operated with 5V VITS test signal by TV signal generator and walkman audio output source for simulating the actual usage.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The EUT was placed on turntable, which enabled the engineer to maximise emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software.

There was no special software to exercise the device. Once the unit is powered up, it transmits the typical signal continuously.

2.3 Special Accessories

For simulating the typical usage of the EUT, it was operated with:
4 x 1.5m s-video cables with termination load,
3 x 1.5m AV cables with 75Ω and 47kΩ termination load respectively and
1 x 1.5m coaxial cable (75Ω impedance) with 75Ω termination load.

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2.4 Equipment Modification

No modifications were installed by Intertek Testing Services.

2.5 Support Equipment List and Description

1. Philips Colour TV pattern generator PM5418, EW-01092. Hewlett Package Spectrum analyzer HP-8591EM, EW-06383. Auxiliary input of EUT connected to a walkman through 1.8 meter cable (Provided by ITS)

All the items listed under section 2.0 of this report are:

Confirmed by:

*Alfred Lo
Senior Technical Supervisor - Home Entertainment Electronics
Intertek Testing Services Hong Kong Ltd.
Agent for Tandy Electronics (China) Limited*

Signature

May 8, 2002 Date

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EXHIBIT 3

EMISSION RESULTS

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3.0 **Emission Results**

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation.

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$\text{FS} = \text{RA} + \text{AF} + \text{CF} - \text{AG} + \text{PD} + \text{AV}$$

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dBμV

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

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3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at
67.513 MHz

For electronic filing, the front view and back view of the test configuration photographs are saved with filename: radiated1.jpg and radiated2.jpg respectively.

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3.3 Radiated Emission Data. .3 Radiated Emission Data.3 Radiated Emission Data.3
Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by -9.3 dB margin

TEST PERSONNEL:

Signature

Lawrence H. C. Chow, Compliance Engineer
Typed/Printed Name

May 8, 2002
Date

INTERTEK TESTING SERVICES

Company: Tandy Electronics (China) Limited
Model: Radio Shack 15-1215
Worst Case Operating Mode: Modulating

Date of Test: April 8, 2002

Table 1

Radiated Emissions

		Frequency	Reading	Antenna	Pre-Amp	Net	Limit	Margin
Polarization	Channel			Factor	Gain	3m at	at 3m	
		(MHz)	(dB μ V)	(dB)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
V	3	61.813	35.5	9.9	16	29.4	40.0	-10.6
H	3	122.303	34.0	12.8	16	30.8	43.5	-12.7
H	3	183.654	31.4	16.2	16	31.6	43.5	-11.9
V	4	67.513	38.2	8.5	16	30.7	40.0	-9.3
H	4	134.213	35.9	12.3	16	32.2	43.5	-11.3
H	4	201.349	37.1	11.8	16	32.9	43.5	-10.6

- NOTES:
1. Peak Detector is used below 1000MHz unless otherwise stated.
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative sign in the column shows value below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
 5. The radiated emission test was observed up to 1G.
 6. External VITS signal 1Vp-p and then 5Vp-p were applied, and the worst case data which are shown at above were found in input signal 5Vp-p

Test Engineer: Lawrence H. C. Chow

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3.4 Conducted Emission Configuration Photograph

External VITS signal 1Vp-p and then 5Vp-p was applied, and the worst case data which are shown at above were found in input signal 5Vp-p. Worst Case Conducted Emission at 4.41 MHz

For electronic filing, the front view, rear view and side view of the test configuration photographs are saved with filename: conduct1.jpg, conduct2.jpg and conduct3.jpg.

INTERTEK TESTING SERVICES

Company: Tandy Electronics (China) Limited
Model: Radio Shack 15-1215

Date of Test: April 8, 2002

Conducted Emissions Section 15.107 Requirements

For Electronic filing, the conducted emission test result is saved with filename: conduct.pdf

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3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission are saved with filename: conduct.pdf. The data table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by -5.3 dB margin

* Peak Detector Data Unless otherwise stated.

TEST PERSONNEL:

Signature

Lawrence H. C. Chow, Compliance Engineer
Typed/Printed Name

May 8, 2002
Date

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3.6 RF Output Level Measurement

.2 Radiated Emission Configuration Photograph.2 Radiated Emission Configuration

Photograph.2 Radiated Emission Configuration Photograph

Worst Case RF output level

at

65.97 MHz

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3.7 RF Output Level Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 491 μ V margin

TEST PERSONNEL:

Signature

Lawrence H. C. Chow, Compliance Engineer
Typed/Printed Name

May 8, 2002
Date

INTERTEK TESTING SERVICES

Company: Tandy Electronics (China) Limited
Model: Radio Shack 15-1215
Worst Case Operating Mode: Modulating

Date of Test: April 8, 2002

Table 2

**RF output level measurement
pursuant to FCC Part 15 Section 15.115 Requirement**

Output Signal

Channel	Type	Frequency (MHz)	Meter Reading (dB μ V)	Pre-amp (dB)	Pad loss (dB)	Result (μ V)	Limit (μ V)	Margin (μ V)
3	Visual	61.29	72.08	22.5	8	759.8	3000	-2240.2
3	Aural	65.97	59.57	22.5	8	179.2	671	-491.8

Channel	Type	Frequency (MHz)	Meter Reading (dB μ V)	Pre-amp (dB)	Pad loss (dB)	Result (μ V)	Limit (μ V)	Margin (μ V)
4	Visual	67.29	72.36	22.5	8	781.6	3000	-2218.4
4	Aural	71.82	59.52	22.5	8	178.2	671	-492.8

- NOTES:
1. Test according to section 12.2.5 of ANSI C63.4.
 2. The 50 to 75 Ω (8dB attenuation) matching-impedance pad was employed.
 3. Negative sign in the column shows value below limit.
 4. External VITS signal 1Vp-p and then 5Vp-p were applied, and the worst case data which are shown at above were found in input signal 5Vp-p
 5. Technical Limits: Video signal: $346.4 \times \sqrt{R}$ in microvolts
 Audio signal: $77.5 \times \sqrt{R}$ in microvolts

Test Engineer: Lawrence H. C. Chow

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3.8 Spurious Emissions Measurement Worst Case Spurious Emission at 40.8 MHz

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3.9 Spurious Emissions Measurement Data.

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 82.2 μ V margin

TEST PERSONNEL:

Signature

Lawrence H. C. Chow, Compliance Engineer
Typed/Printed Name

May 8, 2002
Date

INTERTEK TESTING SERVICES

Company: Tandy Electronics (China) Limited
Model: Radio Shack 15-1215
Worst Case Operating Mode: Modulating

Date of Test: April 8, 2002

Table 3

**Spurious emissions measurement
pursuant to FCC Part 15 Section 15.115 Requirement**

Conducted spurious emissions measurement more than 4.6MHz below or 7.4MHz above the carrier frequency

Frequency (MHz)	Meter Reading (dBμV)	Pre-amp (dB)	Pad loss (dB)	Result (μV)	Limit (μV)	Margin (μV)
40.8	36.71	22.5	8	12.8	95	-82.2
135.41	33.6	22.5	8	9.0	95	-86.0

- NOTES:
1. Test according to section 12.2.5 of ANSI C63.4.
 2. The 50 to 75 (8dB attenuation) matching-impedance pad was employed.
 4. External VITS signal 1Vp-p and then 5Vp-p were applied, and the worst case data which are shown at above were found in input signal 5Vp-p
 4. The range for measurement is from 30MHz to 4.6MHz below the visual carrier frequency, and any emissions in range from 7.4MHz above the visual carrier frequency to 1G.
 5. The measuring instrument was set to 100kHz bandwidth and the detector function to peak mode.
 6. Technical Limits: -4.6MHz of Video carrier frequency and +7.4MHz shall not exceed $10.95 \times \sqrt{R}$ in microvolts or 39.5dBμV.

Test Engineer: Lawrence H. C. Chow

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3.10 Antenna Transfer Switch Measurement
Worst Case Antenna Transfer Switch Emission
at
67.29 MHz

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3.11 Antenna Transfer Switch Measurement Data.

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by -1.91 μ V margin

TEST PERSONNEL:

Signature

Lawrence H. C. Chow, Compliance Engineer

Typed/Printed Name

May 8, 2002

Date

INTERTEK TESTING SERVICES

Company: Tandy Electronics (China) Limited

Date of Test: April 8, 2002

Model: Radio Shack 15-1215

Worst Case Operating Mode: Modulating

Table 4

**Antenna transfer switch measurement
pursuant to FCC Part 15 Section 15.115 Requirement**

Channel	Frequency (MHz)	Meter Reading (dBm)	Pre-amp (dB)	Pad loss (dB)	Result (μ V)	Limit (μ V)	Margin (μ V)
3	61.29	-94.3	22.5	8	0.99	3	-2.01
4	67.29	-93.5	22.5	8	1.09	3	-1.91

- NOTES:
1. Test according to section 12.2.6 of ANSI C63.4.
 2. The 50 to 75 (8dB attenuation) matching-impedance pad was employed.
 3. External VITS signal 1Vp-p and then 5Vp-p were applied, and the worst case data which are shown at above were found in input signal 5Vp-p
 4. The measuring instrument was set to 100kHz bandwidth and the detector function to peak mode.

Test Engineer: Lawrence H. C. Chow

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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4.0 **Equipment Photographs**

For electronic filing, photographs of the tested EUT are saved with filename: ophoto1.jpg to ophoto6.jpg for external photo, and iphoto1.jpg to iphoto7.jpg for internal photo.

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EXHIBIT 5

PRODUCT LABELLING

5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

6.0 **Technical Specifications**

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

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EXHIBIT 7

INSTRUCTION MANUAL

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7.0 **Instruction Manual.**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf and manual1.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States. Moreover, it was said that the declaration which mention in following pages will also be committed at the time.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 **Miscellaneous Information.**

The miscellaneous information includes details of the measured [RF](#) output signal, the test procedure and calculation of factor such as pulse desensitization and averaging factor (calculation and timing diagram).

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8.1 Measured Bandwidth.

For electronic filing, the plot shows the RF output signal of the EUT is saved with filename CH3.pdf and CH4.pdf.

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8.2 Discussion of Pulse Desensitization8.2 Discussion of Pulse Desensitization8.2 Discussion of Pulse Desensitization8.2 Discussion of Pulse Desensitization

This device is a RF modulator. No desensitization of the measurement equipment is required as the transmitted signals are continuously.

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8.3 Calculation of Average Factor .2 Discussion of Pulse Desensitization.2Discussion
of Pulse Desensitization.2 Discussion of Pulse Desensitization

This device is a RF modulator. It is not necessary to apply average factor to the measurement result.

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8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of Low Power Transmitter operating under the Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 1992.

The equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the groundplane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

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8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 - 1992.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Measurements are normally conducted at a measurement distance of three meters. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.