ITS Intertek Testing Services

APPLICATION FOR FCC CERTIFICATION
For
Radio Shack, A Division of Tandy Corporation

Scanning Receiver
Model: 20-196 (PRO-2067)
FCC ID: AAO2000196

Job # J99023439
Report #J99023439b

Date of Testing: September 14, 1999
Date of Report: September 29, 1999

Number of Pages: 19 + data pages

NVLAP®

Intertek Testing Services NA Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

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AUTHORIZATION LETTER

Please see attached page

ATTESTATION LETTER TO FCC §15.121

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TEST REPORT

0.0 Summary of Test Results

Radio Shack, A Division of Tandy Corporation - Model: 20-196 (PRO-2067)
FCC ID: AAO2000196

TEST	REFERENCE	RESULTS
Radiated Emission	15.109	Complies
Conducted Emission	15.107	Complies

We attest to the accuracy of this report:

Ollie Moyrong
Test Engineer

David Chernomordik
EMC Site Manager

1.0 General Description

1.1 Product Description

The General Research of Electronics, Inc. Model No.: 20-196 (PRO-2067) is a scanning receiver used to listen to police and fire departments, ambulance services, government agencies, private companies, amateur radio services, aircraft and military operations.

Please refer to the attached users manual for more details.

A pre-production version of the sample was received on September 13, 1999 in good condition.

1.2 Related Submittal(s) Grants

This is an Application for Certification of a scanning receiver.

1.3 Test Methodology

Both AC mains line-conducted (if applicable) and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Section"** of this Application.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is Site 1. This test facility and site measurement data have been fully placed on file with the FCC.

2.0 System Test Configuration

2.1 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For the measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power without modulation.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Detector function is in peak mode. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance if measured at a closer distance..

2.2 EUT Exercising Software

For emissions testing, the units were setup to receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

2.3 Mode of Operation

The EUT was tested in two modes and the worst case emission was recorded:

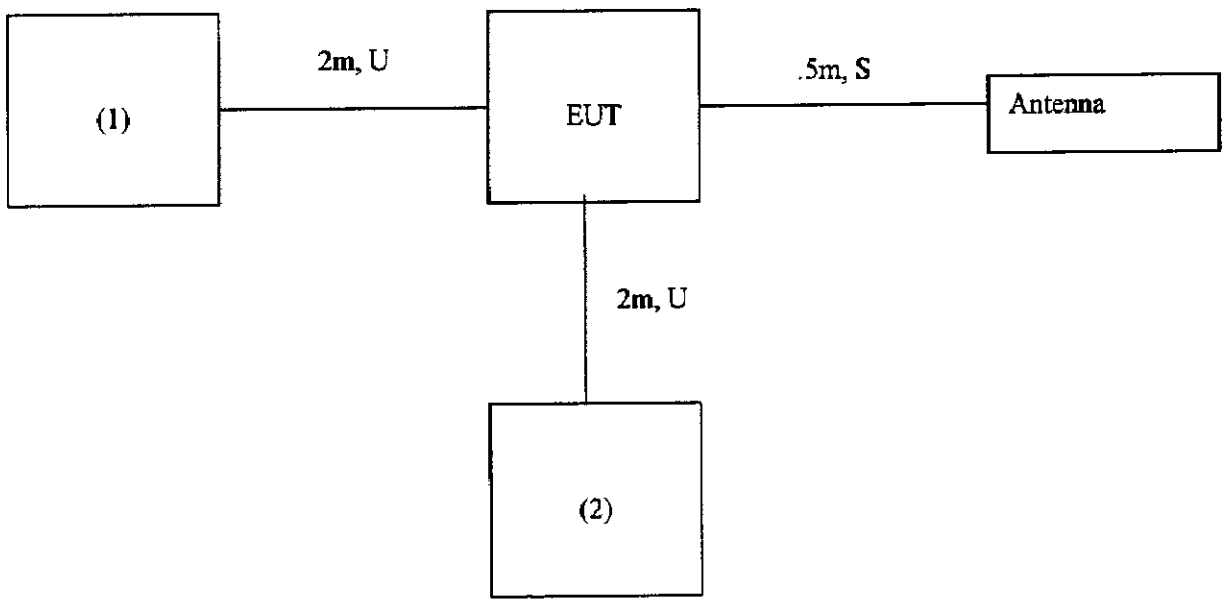
1. EUT was set to constantly receive at a particular frequency.
2. EUT was set to constantly scan and receive a particular band.

2.3 Support Equipment List and Description

a) The FCC ID's for all equipment used in the tested system (included inserted cards, which have grants) are:

Item #	Description	Model No.	Serial No.	FCC ID
1	Sony Speaker	N/A	N/A	N/A
2	Goodwill Industries DC Power Supply	GPR-6030	8690196	N/A

b) Equipment Setup Block Diagram



* = EUT
** = No ferrites on video cable

S = Shielded;
U = Unshielded

F = With Ferrite

2.4 Equipment Modification

Any modifications installed previous to testing by Radio Shack, A Division of Tandy Corporation will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

3.0 Emission Results

AC line conducted emission measurements were performed from 0.45 MH to 30 MHz. Analyzer resolution is 10 kHz or greater.

Radiated emission measurements were performed from 30 MHz to 5000 MHz. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

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. All measurements were performed with peak detection unless otherwise specified.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG + DF

where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
DF = Distance Factor

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dμV/m
RR = RA - AG in dBμV
LF = CF + AF + DF in dB

Assume a receiver reading of 52.0 dBμV 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, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

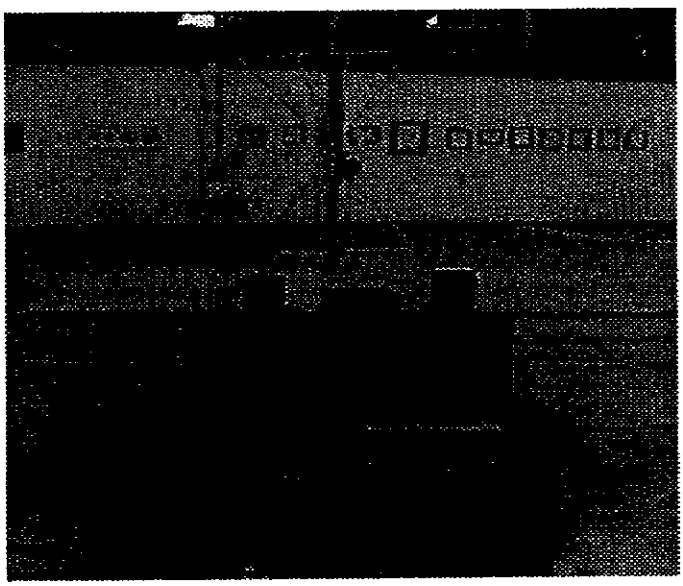
RA = 52.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBμV/m

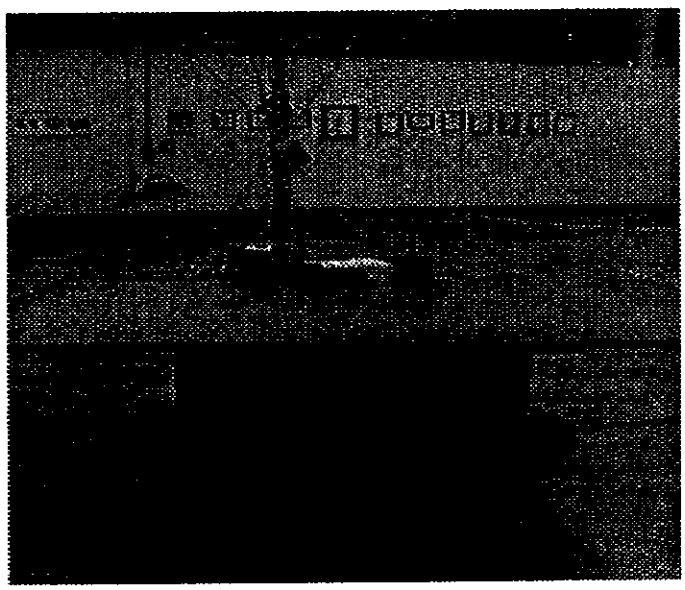
DF = 0 dB
RR = 23.0 dBμV
LF = 9.0 dB

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at 702.5 MHz





3.3 Radiated Emission Data

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 4.5 dB

ITS Intertek Testing Services

Job No.: J99023439
Company: GRE America
Model: 20-196 (PRO-2067)
Test Mode: Rx
Engineer: Ollie Moyrong
Date: 9_14_99

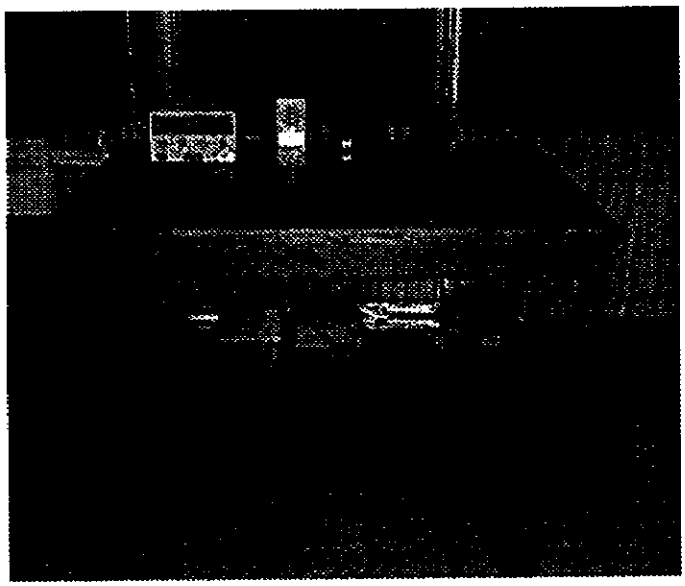
FCC Part 15.109 Class B Radiated Emissions

Tuned Frequency (MHz)	L.O. Frequency (MHz)	Antenna Location (m)	Antenna Polarization H/V	Receiver Reading (dBuV)	Antenna Factor (dB/m)	Preamp (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit At 3 m (dBuV/m)	Margin (dB)	
29.000	286.500	3.0	V	39.0	12.6	-23.2	1.7	30.1	46.0	-15.9	
39.500	297.000	3.0	V	36.1	12.9	-23.2	1.7	27.5	46.0	-18.5	
54.000	311.500	3.0	H	35.2	13.8	-23.2	1.7	27.5	46.0	-18.5	
108.000	365.500	3.0	V	37.0	15.1	-23.3	2.1	30.9	46.0	-15.1	
122.500	380.000	3.0	V	34.9	15.1	-23.3	2.1	28.8	46.0	-17.2	
136.975	394.490	3.0	V	33.8	15.2	-23.2	2.1	27.9	46.0	-18.1	
137.000	394.500	3.0	V	33.5	15.2	-23.2	2.1	27.6	46.0	-18.4	
154.000	411.500	3.0	H	38.3	16.4	-23.2	2.1	33.6	46.0	-12.4	
174.000	431.500	3.0	V	38.7	16.4	-23.2	2.1	34.0	46.0	-12.0	
380.000	637.500	3.0	H	37.9	20.3	-23.0	2.5	37.7	46.0	-8.3	
440.000	697.500	3.0	H	40.1	20.9	-23.3	2.5	40.2	46.0	-5.8	*
512.000	769.500	3.0	V	36.2	20.8	-23.0	2.7	36.7	46.0	-9.3	*
806.000	552.000	3.0	V	32.5	17.8	-23.1	2.5	29.7	46.0	-16.3	
894.000	636.500	3.0	V	36.1	19.2	-23.0	2.5	34.8	46.0	-11.2	
960.000	702.500	3.0	V	41.3	20.1	-23.0	3.1	41.5	46.0	-4.5	*
29.000	278.900	3.0	V	40.8	12.5	-23.2	1.6	31.7	46.0	-14.3	
42.600	236.100	3.0	H	38.1	11.4	-23.1	1.6	28.0	46.0	-18.0	
806.000	275.400	3.0	H	39.7	12.6	-23.2	1.6	30.7	46.0	-15.3	

Notes: Negative signs (-) in the Margin column signify levels below the limit.
Readings followed by a '*' are Quasi-peak measurements.
All other readings are peak measurements.
All other emissions not reported are at least 10 dB below the applicable limits.

3.4 AC conducted Emission Configuration Photograph

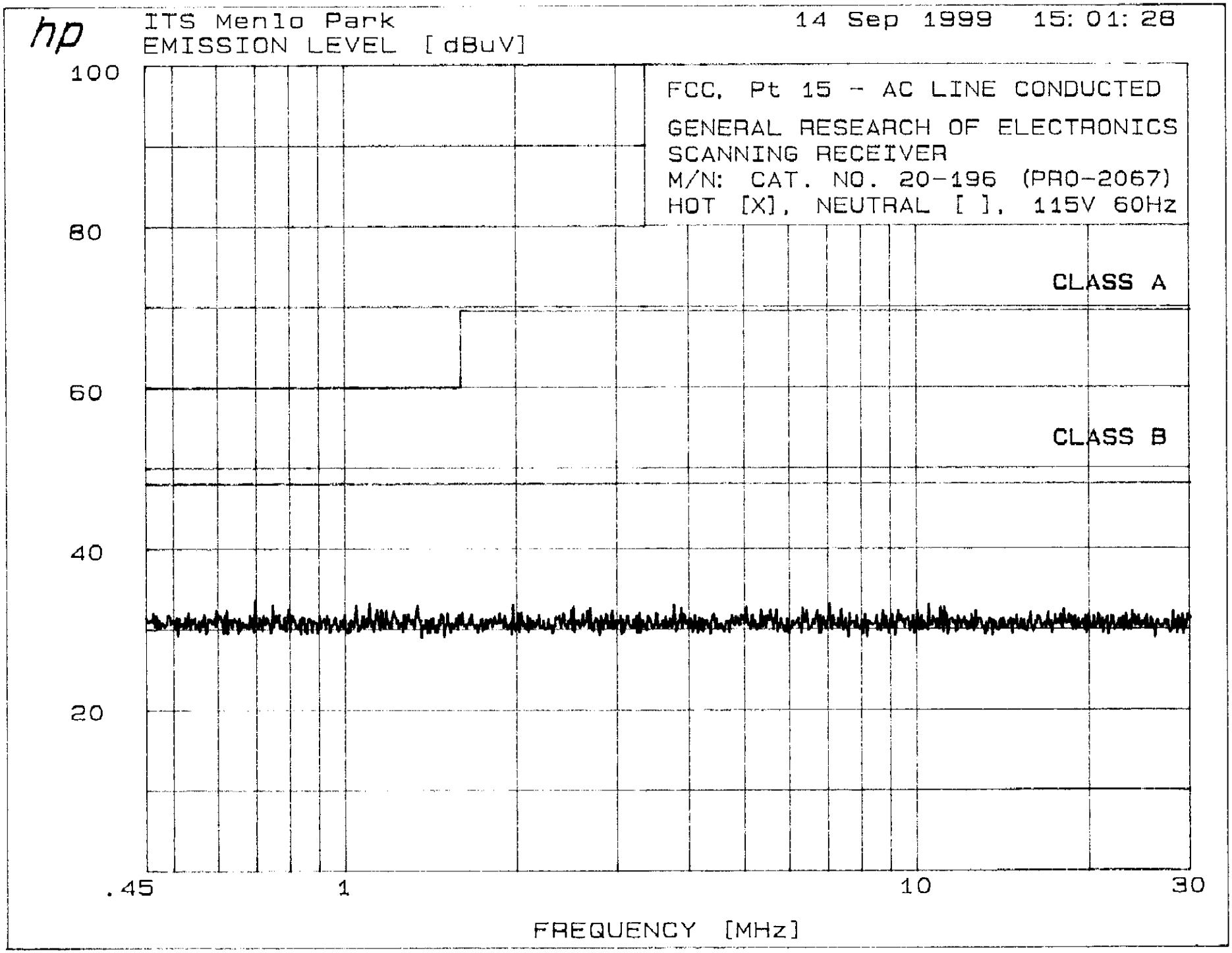
Worst Case Conducted Emission
at 0.69 MHz

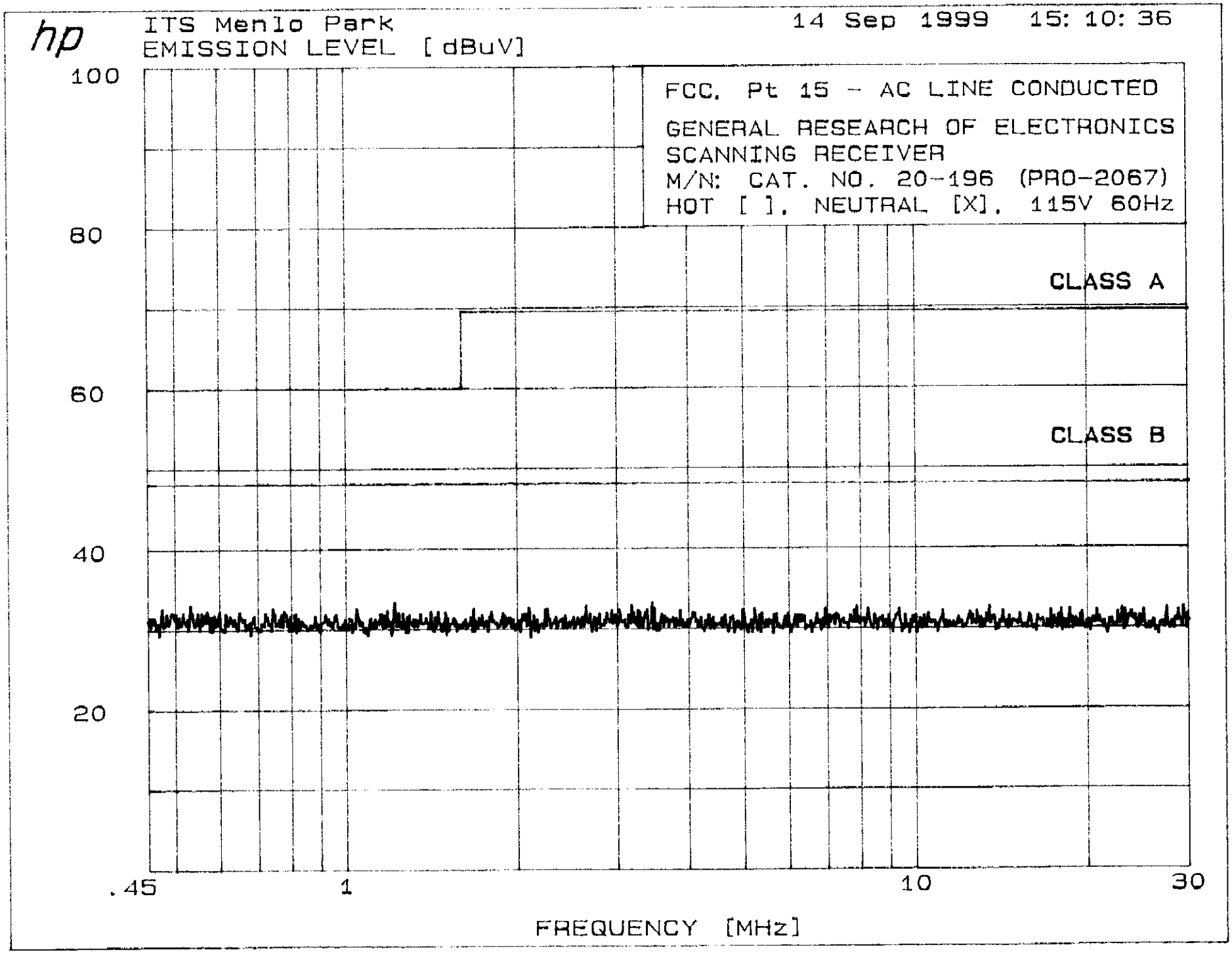


3.5 Conducted Emission Data

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 14.4 dB


hp
ITS Menlo Park
EMISSION LEVEL [dBuV]
14 Sep 1999 15:01:28
FCC, Pt 15 - AC LINE CONDUCTED
GENERAL RESEARCH OF ELECTRONICS
SCANNING RECEIVER
M/N: CAT. NO. 20-196 (PRO-2067)
HOT [X], NEUTRAL [ ], 115V 60Hz
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]


hp
ITS Menlo Park
EMISSION LEVEL [dBuV]
14 Sep 1999 15:10:36
FCC, Pt 15 - AC LINE CONDUCTED
GENERAL RESEARCH OF ELECTRONICS
SCANNING RECEIVER
M/N: CAT. NO. 20-196 (PRO-2067)
HOT [ ], NEUTRAL [X], 115V 60Hz
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

ITS Menlo Park 14 Sep 1999 15:10:36

3. FCC CFR 47, Pt 15
   3.1 FCC, Pt 15 - AC LINE CONDUCTED

GENERAL RESEARCH OF ELECTRONICS
SCANNING RECEIVER
M/N: CAT. NO. 20-196 (PRO-2087)
HOT [ ], NEUTRAL [X], 115V 60Hz

PEAKS FOUND ABOVE 33 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	.5345	33.1
2	1.221	33.4
3	3.457	33.3

4.0 Antenna Requirement

The antenna is affixed to the EUT using a unique connector that allows for replacement of a broken antenna, EUT does use a standard antenna jack or electrical connector.

5.0 Equipment Photographs

Photographs of the EUT are attached.

6.0 Product Labeling

6.1 Label Artwork

An engineering drawing of the label that will be permanently affixed to the unit is attached. This label will be attached to the unit at the location shown in Section 6.2.

6.2 Label Location

See attached page.

7.0 Technical Specifications

7.1 Receiver Block Diagram

See attached page.

7.2 Receiver Circuit Diagram

See attached page.

8.0 Instruction Manual

Attached is a preliminary copy of the Instruction Manual.

This manual will be provided to the end-user with each unit sold/leased in the United States.