

# APPLICATION FOR FCC CERTIFICATION

**Samsung Electronics Co., Ltd.**

**Set Top Box**

**Model: SMT-F200**

**FCC ID: A3LF200**

Report # J98023722

Number of Pages: 12 pp. + Supporting Data and Documents

**Date of Report: August 28, 1998**

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The results contained in this report were derived from measurements performed on the identified test samples.  
Any implied performance of other samples on this report is dependent on the representative of the samples tested.



## SUMMARY OF RESULTS

**Samsung Electronics Co., Ltd. - Model: SMT-F200**  
**FCC ID: A3LF200**

TEST REFERENCE	FCC PART	RESULTS
Radiated Emissions	15.109	Pass
AC Conducted Emissions	15.107	Pass
Output Signal Level	15.115(b)	Pass
Out-of-band Spurious	15.115(b)	Pass
Transfer Switch Requirements	15.115(c)	Pass



EMC Site Mgr.: \_\_\_\_\_

Date September 1, 1998

David



Engineering Mgr.: \_\_\_\_\_

Date September 1, 1998

C.K. Li

## Table of Contents

1.0	<b><u>General Description</u></b> .....	1
1.1	Product Description.....	1
1.2	Related Submittal(s) Grants .....	2
1.3	Test Methodology.....	2
1.4	Test Facility .....	2
2.0	<b><u>System Test Configuration</u></b> .....	3
2.1	Justification .....	3
2.2	EUT Exercising Software.....	3
2.3	Operation mode .....	3
2.4	Test Setup Configuration and Support Equipment List .....	4
	2.4.1 Supporting Equipment.....	4
	2.4.2 Test Setup block diagram.....	4
2.5	Equipment Modification .....	5
3.0	<b><u>Radiated and AC Conducted Emissions</u></b> .....	6
3.2	Radiated Emission Data .....	7
3.4	Conducted Emission Data .....	8
4.0	<b><u>Output signal Level</u></b> .....	9
5.0	<b><u>Output Terminal Spurious Emissions</u></b> .....	10
6.0	<b><u>Transfer Switch Characteristics</u></b> .....	11
7.0	<b><u>List of Exhibits</u></b> .....	12

## 1.0 General Description

### 1.1 Product Description

Type of product: TV interface Device

Product description	Yes	No
<b>w/ Master antenna</b>		X
<b>Addressable</b>		X
<b>Descramble capability to premium channels</b>		X

The Model SMT-F200 is an interactive TV box.

Please refer to the attached for technical description and marketing information.

## 1.2 Related Submittal(s) Grants

This is a single application for Certification of a TV interface device.

## 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All Radiated tests were performed in Open Area Test Sites 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 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.

All tests were performed with a video source connected. If the EUT can be operated with either internal or external video sources, both would be used. All RF terminals were terminated in their proper impedance during testing. Tests were performed of the output signal level, transfer switch and output terminal conducted interference at each channel on which the EUT is capable of operation.

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. Detector function is in peak mode unless otherwise specified.

### 2.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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

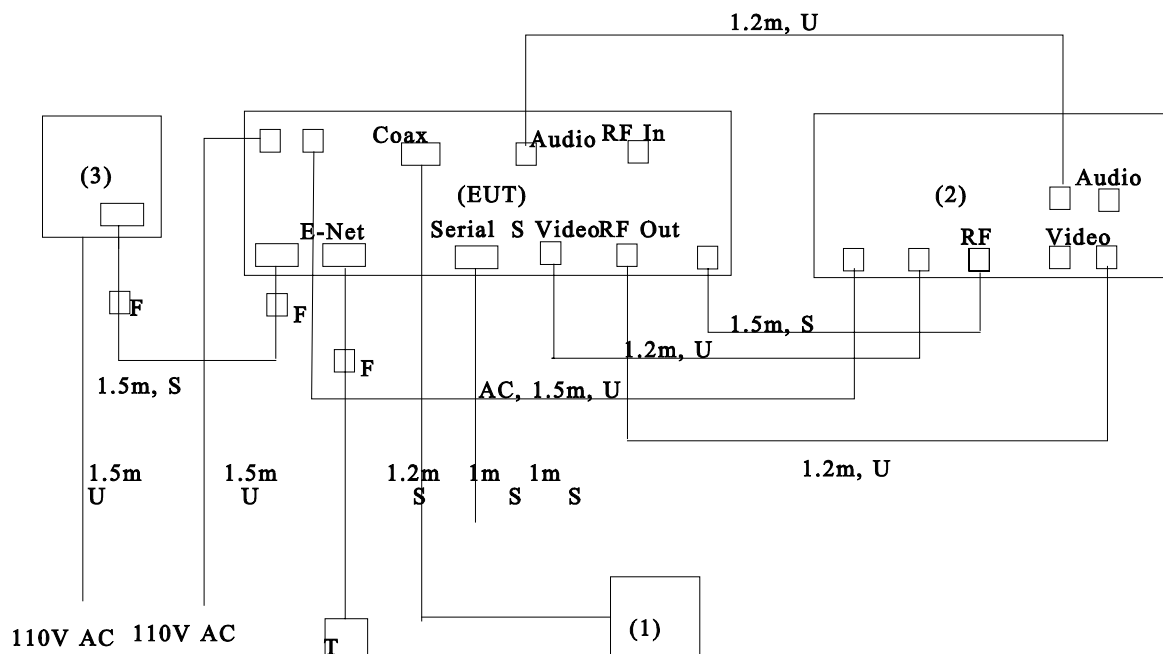
### 2.3 Operation mode

Converting TV signal to Channel 3 or 4.

## 2.4 Test Setup Configuration and Support Equipment List

### 2.4.1 Supporting Equipment:

Item #	Description	Model No.	Serial No.	FCC ID
1	Leader NTSC Pattern Generator	LCG-412B	1367791	N/A



2	Hitachi Monitor	CT13PNB	F1J01241	N/A
3	HP Printer	2225C+	3120S96606	DSI6XU2225

### 2.4.2 Test Setup block diagram:

Note: Serial port is for future use.

* = EUT ** = No ferrites on video cable T = Termination	S = Shielded; U = Unshielded	F = With Ferrite
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## 2.5 Equipment Modification

Any modifications installed previous to testing by Samsung Electronics Co., Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were made to the EUT by Intertek Testing Services.

### 3.0 **Radiated and AC Conducted Emissions**

AC line conducted emission measurements were performed from 0.45 MHz 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). Configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

## 3.2 Radiated Emission Data

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

Judgement : Passed by 5.1 dB

**Radiated Emissions Test Data**

Company: SAMSUNG  
EUT: Set-top box  
Project #: J98023722  
Test Mode: normal

Model #: SMT-F200  
S/N or FCC: Not labelled  
Engineer: DC  
Date of Test: 08/14/98

Initial: *DC*

	Antenna	Pre-Amp	Cable A	Cable B	OCF
Number:	2	5	J	0	0
Model:	EMCO 314	CDI_P950	None	None	None

	Standard_	FCC Part 15B
Limits_	2	
Test Distance_	3	meters

Frequency	Reading	Det.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. F.	Net	Limit @3m	Margin
MHz	dB(uV)	P/A/Q	H/V	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB
66.4	40.4	p	V	6.0	18.9	0.0	0.0	27.5	40.0	-12.5
72.4	36.4	p	V	5.6	18.9	0.0	0.0	23.1	40.0	-16.9
110.6	41.5	p	V	7.2	19.0	0.0	0.0	29.7	43.5	-13.8
122.9	44.2	p	V	7.1	19.0	0.0	0.0	32.3	43.5	-11.2
135.0	46.0	Q	V	8.9	19.1	0.0	0.0	35.8	43.5	-7.7
147.5	38.2	p	V	10.8	18.9	0.0	0.0	30.1	43.5	-13.4
155.5	35.3	p	H	9.9	18.9	0.0	0.0	26.3	43.5	-17.2
165.9	39.7	p	V	9.4	18.9	0.0	0.0	30.2	43.5	-13.3
172.0	35.0	p	V	9.0	18.9	0.0	0.0	25.1	43.5	-18.4
207.4	38.3	p	H	11.1	18.5	0.0	0.0	30.9	43.5	-12.6
216.0	47.5	Q	H	11.3	18.5	0.0	0.0	40.3	46.0	-5.7
259.2	45.5	Q	H	12.5	18.2	0.0	0.0	39.8	46.0	-6.2
270.0	46.3	Q	H	12.8	18.2	0.0	0.0	40.9	46.0	-5.1
294.9	30.9	p	H	13.8	17.8	0.0	0.0	26.9	46.0	-19.1
324.0	40.0	p	H	14.9	17.9	0.0	0.0	37.0	46.0	-9.0
362.9	38.9	Q	H	15.9	17.4	0.0	0.0	37.4	46.0	-8.6
518.4	37.5	Q	H	18.2	16.6	0.0	0.0	39.1	46.0	-6.9

**Notes:** a) P: Peak; A: Average; Q: Quasi Peak; H: Horizontal; V: Vertical; OCF: Other Correction Factor; DF: Distance Factor  
b) Insert. Loss = Cable A + Cable B + OCF.  
c) Negative signs (-) in Margin column signify levels below the limits.  
d) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

With ferrites on the "Printer" cable and on the "Ethernet" cable

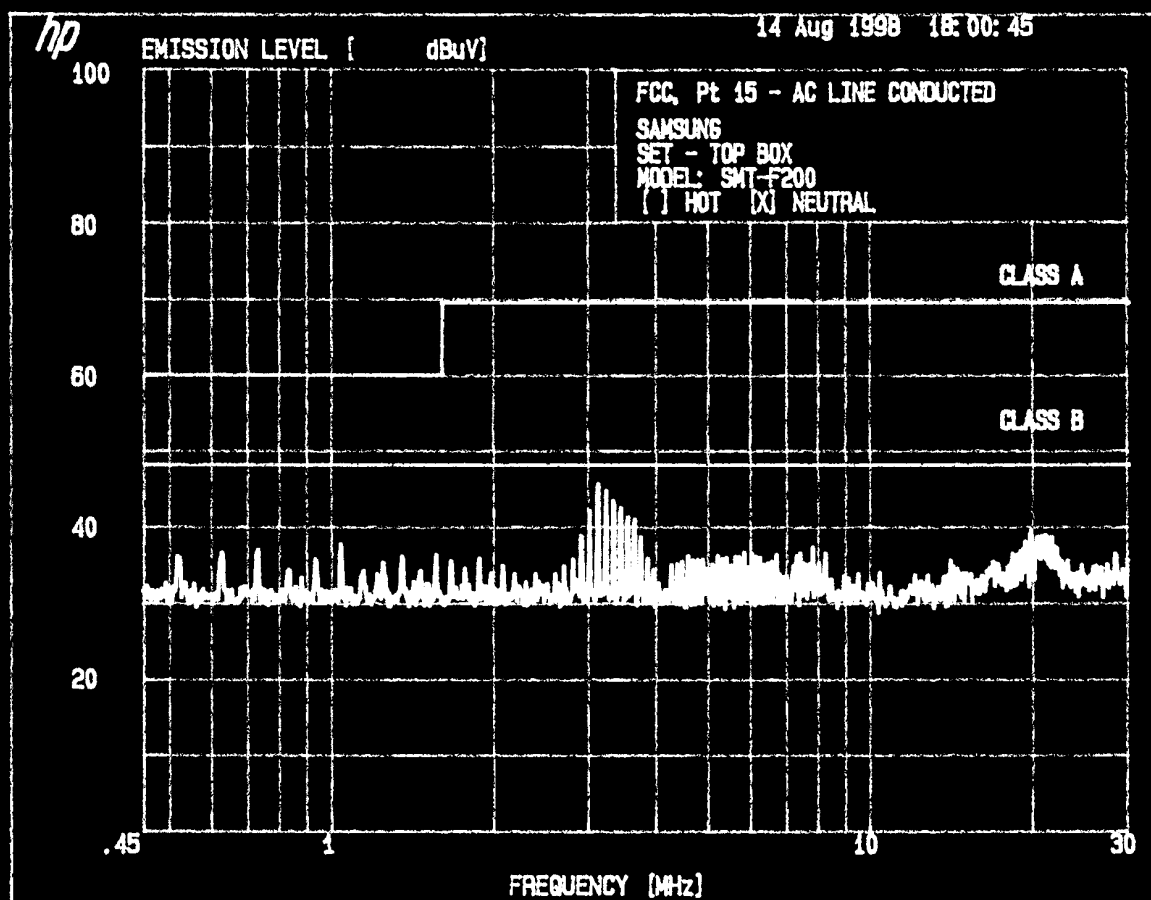
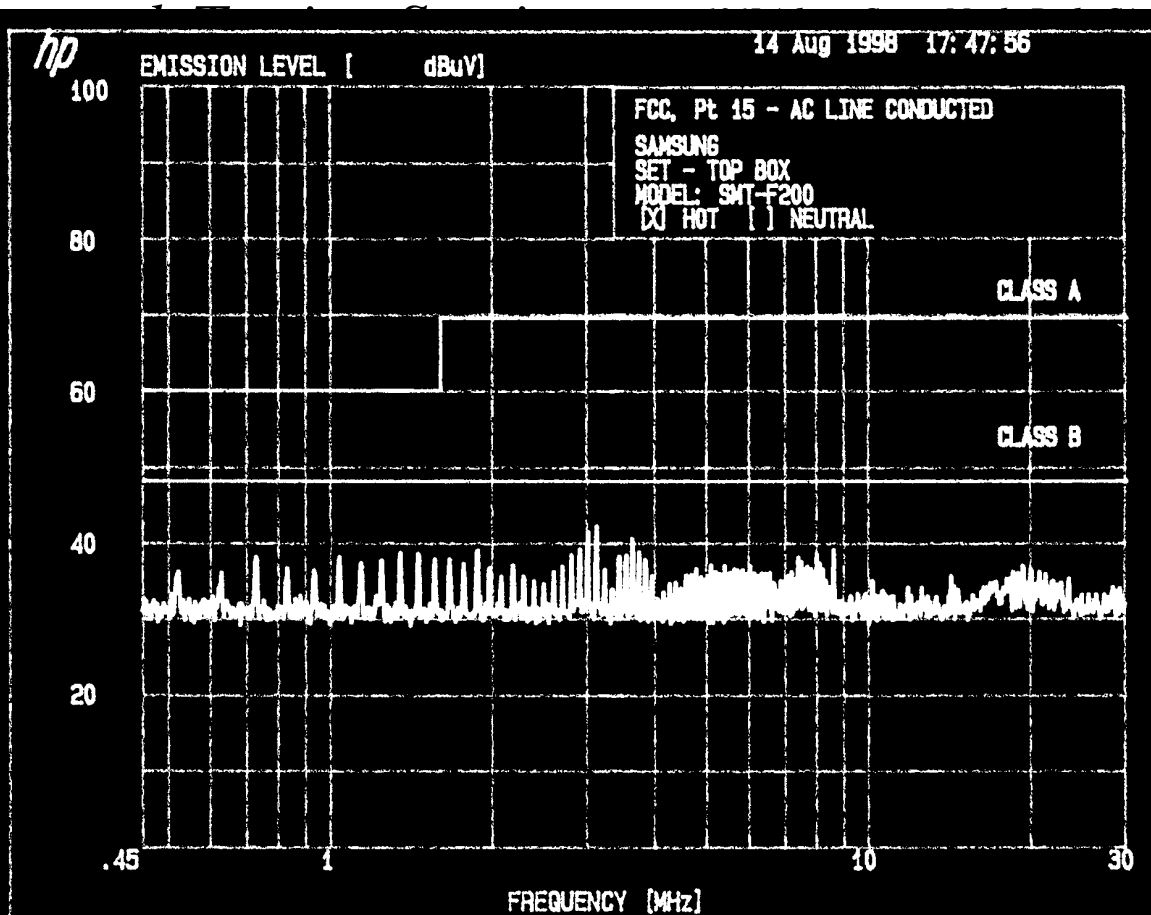
k:\measheet\rad\_cal

Ver4/5/98

### 3.4 Conducted Emission Data

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

Judgement : Passed by 2.5 dB



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=====
                        14 Aug 1998  17:47:56
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```
3. FCC CFR 47, Pt 15
   3.1  FCC, Pt 15 - AC LINE CONDUCTED
```

```
=====
SAMSUNG
SET - TOP BOX
MODEL: SMT-F200
[ ] HOT  [ ] NEUTRAL
```

PEAKS FOUND ABOVE 39 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	1.890	39.0
2	2.923	39.1
3	3.023	41.5
4	3.139	42.2
5	3.651	40.6
6	8.629	39.1

```
=====
                        14 Aug 1998  18:00:45
=====
```

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

```
=====
SAMSUNG
SET - TOP BOX
MODEL: SMT-F200
[ ] HOT  [X] NEUTRAL
```

PEAKS FOUND ABOVE 40 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	3.023	42.1
2	3.139	45.5
3	3.245	44.7
4	3.343	43.4
5	3.457	42.4
6	3.560	41.2
7	3.667	40.9

#### 4.0 Output signal Level (FCC 15.115(b)(1))

CHANNEL NUMBER	FREQUENCY MHz	OUTPUT CORRECTED uV(rms)	SPECIFIED LIMIT @ 75 $\Omega$ uV(rms)
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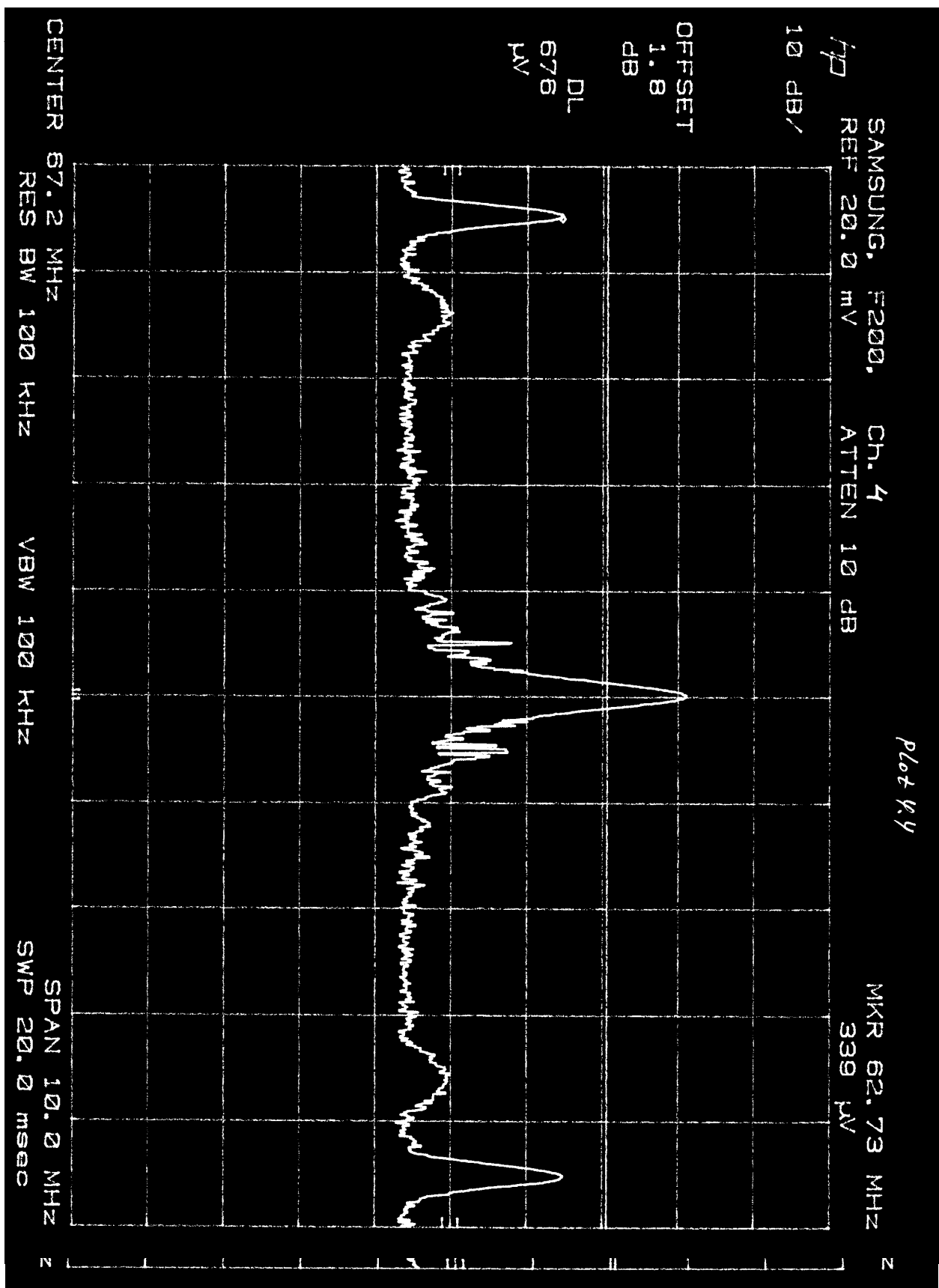
Channel 3 Video	61.26	2190	3000
Channel 3 Audio	56.72	343	671
Channel 4 Video	67.25	2400	3000
Channel 4 Audio	62.73	339	671

**Output Level Measurement Calculation Correction**

- [ ] A 300 ohm to 50 ohm matching balun was employed. Volts (300 ohm) = 2.45 x (Volts 50 ohm + balun loss). Balun Loss = .2dB of 60 MHz.
- [X] A 75 ohm to 50 ohm matching balun was employed. Volts (75 ohm) = 1.22 x (Volts 50 ohm + balun loss). Balun Loss = .1dB at 54 MHz.

<b>PLOT #</b>	<b>DESCRIPTION</b>
4.1	Channel 3, Video
4.2	Channel 3, Audio
4.3	Channel 4, Video
4.4	Channel 4, Audio





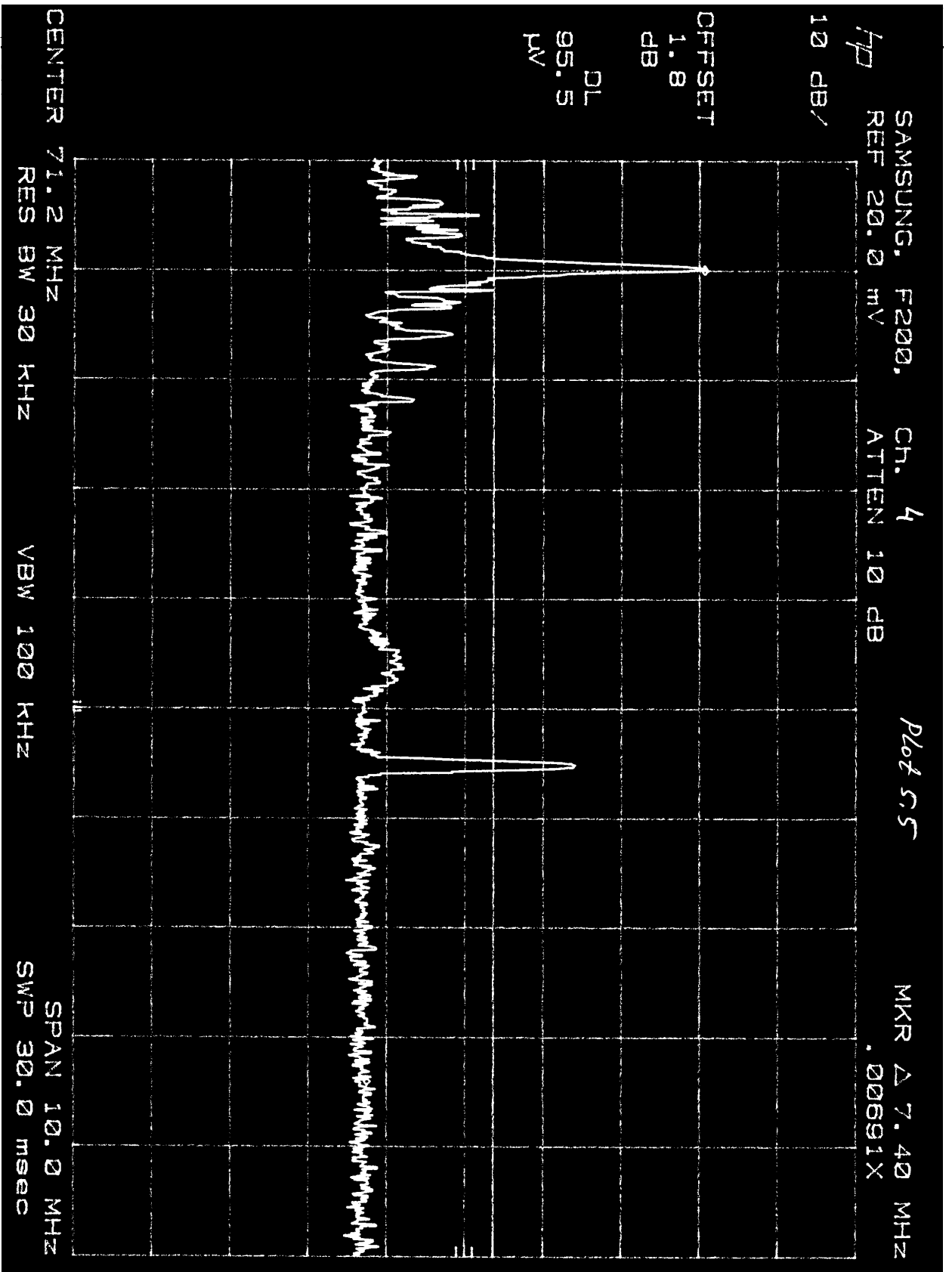
**5.0 Output Terminal Spurious Emissions, FCC 15.115(b)(2)(ii)**

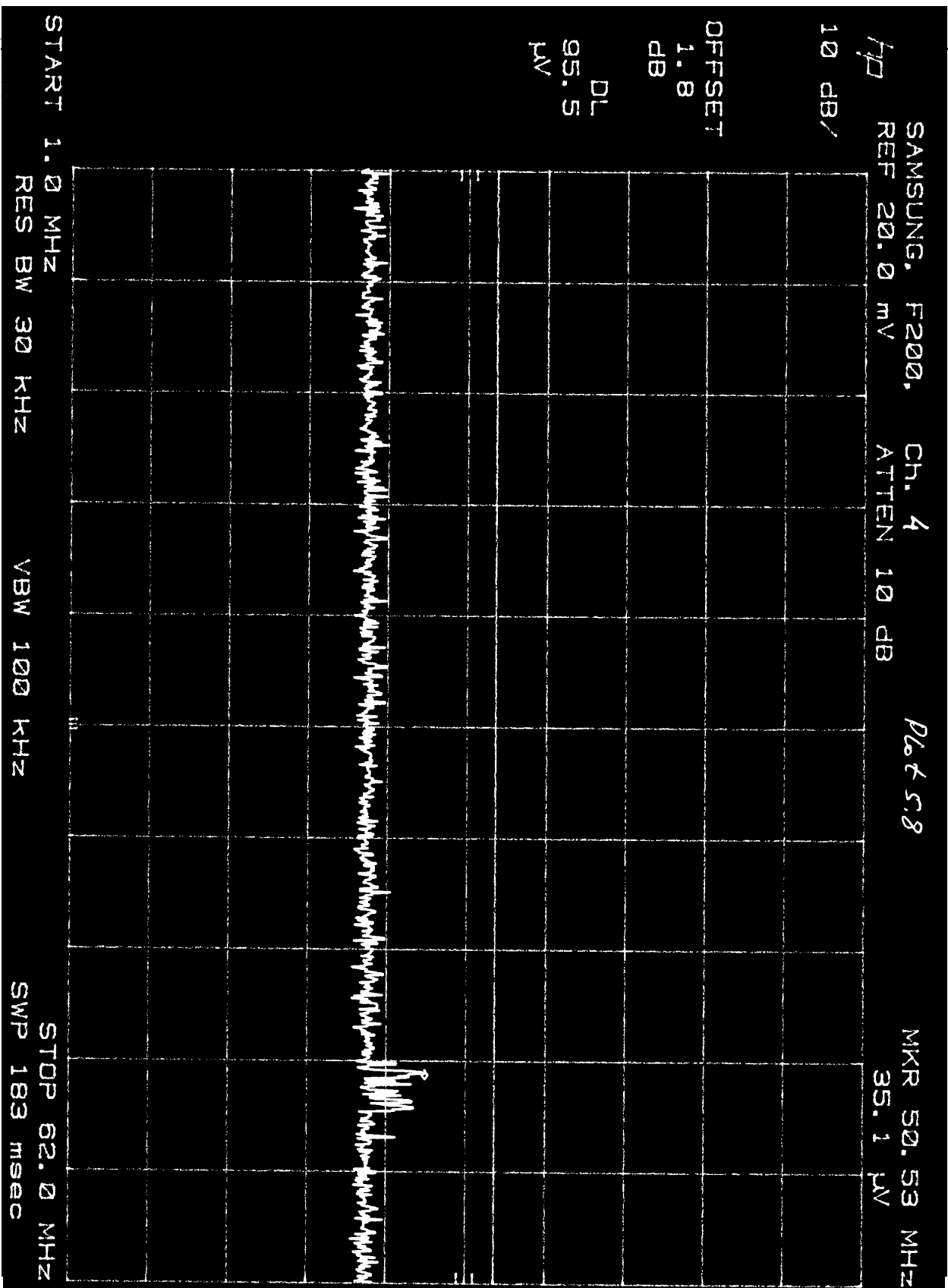
CHANNEL NUMBER	FREQUENCY MHz	OUTPUT CORRECTED uV(rms)	SPECIFIED LIMIT @ 75 $\Omega$ uV(rms)
3	7.4 MHz above the video carrier	34.7	94.8
3	4.6 MHz below the video carrier	21.6	94.8
4	7.4 MHz above the video carrier	31.3	94.8
4	4.6 MHz below the video carrier	35.1	94.8

**Output Level Measurement Calculation Correction**

- [ ] A 300 ohm to 50 ohm matching balun was employed. Volts (300 ohm) = 2.45 x (Volts 50 ohm + balun loss). Balun Loss = .2dB of 60 MHz.
- [X] A 75 ohm to 50 ohm matching balun was employed. Volts (75 ohm) = 1.22 x (Volts 50 ohm + balun loss). Balun Loss = .1dB at 54 MHz.

PLOT #	DESCRIPTION
1	Channel 3, 7.4 MHz above the video carrier
2	Channel 3, 4.6 MHz below the video carrier
3	Channel 3, more than 7.4 MHz above the video carrier
4	Channel 3, more than 4.6 MHz below the video carrier
5	Channel 4, 7.4 MHz above the video carrier
6	Channel 4, 4.6 MHz below the video carrier
7	Channel 4, more than 7.4 MHz above the video carrier
8	Channel 4, more than 4.6 MHz below the video carrier





**6.0 Transfer Switch Characteristics, FCC 15.115(c)(1)**

[ ] Not applicable, transfer switch is not required when device being used results in the user no longer having need to receive over-the-air broadcast signal via a separate antenna.

[ ] Not Applicable, device does not use with a master antenna. See below for the results:

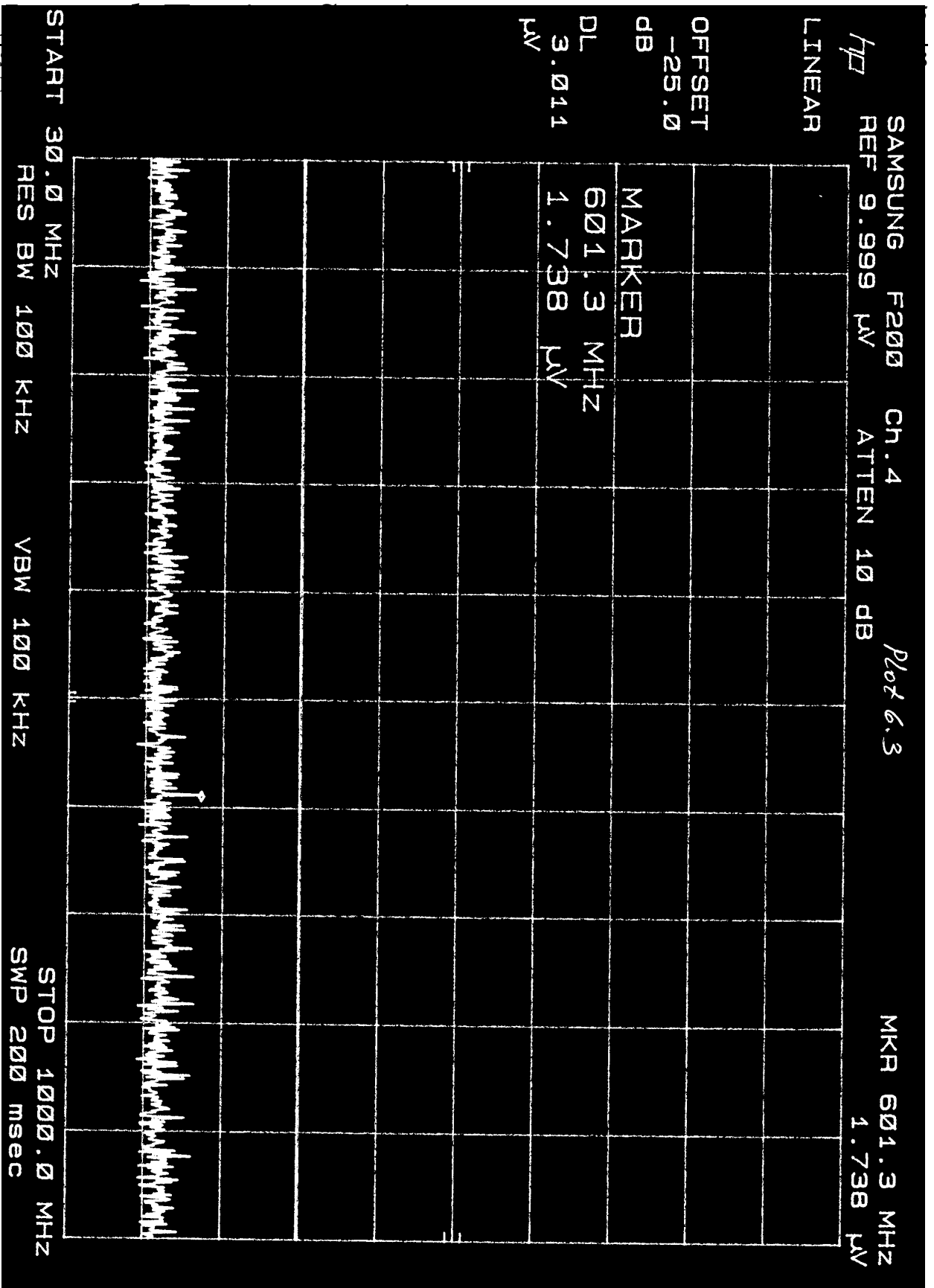
**300 Ohms Input Terminal**

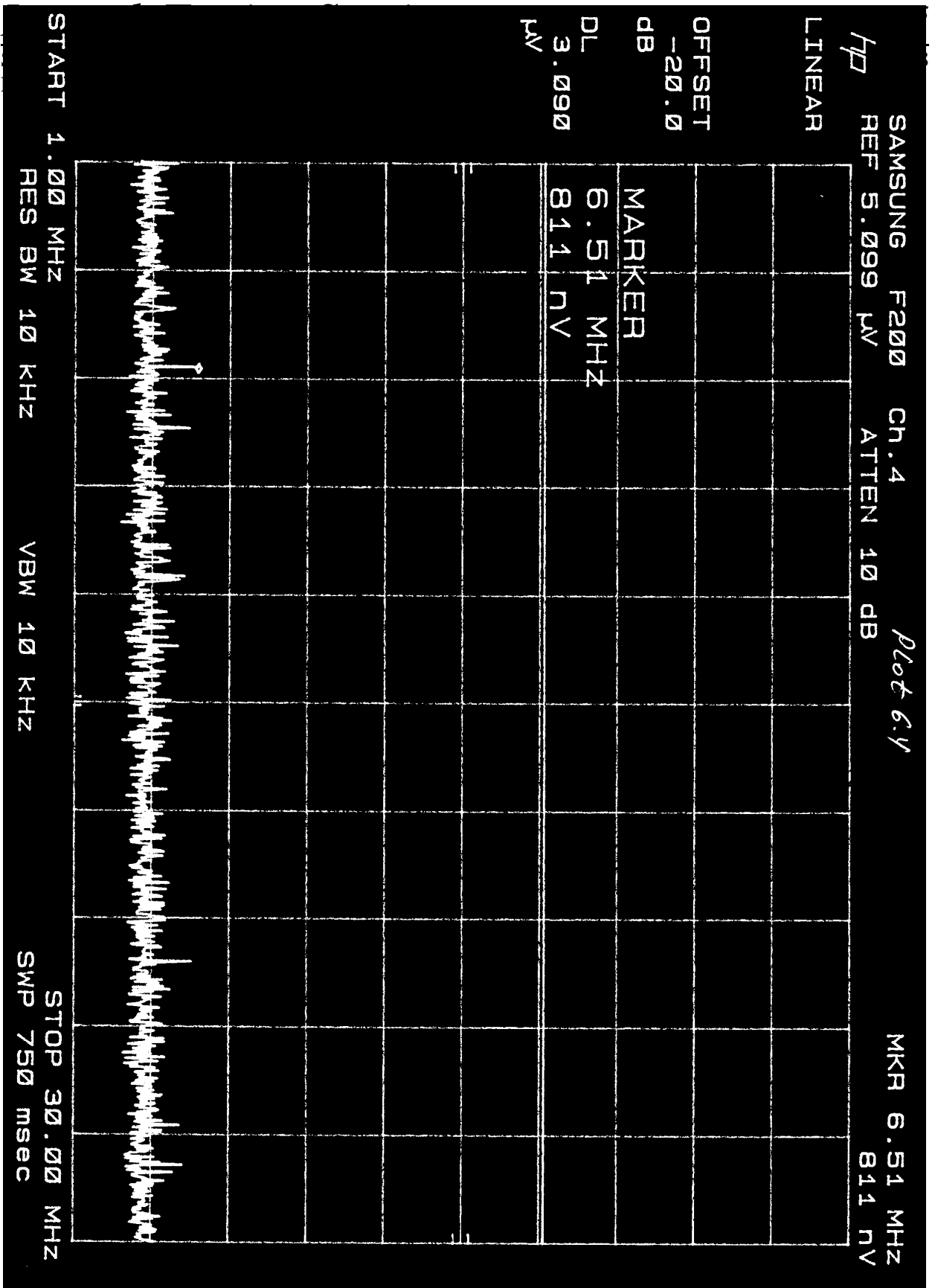
<b>SWITCH POSITION</b>	<b>CHANNEL 3 uV CORRECTED</b>	<b>CHANNEL 4 uV CORRECTED</b>	<b>SPECIFIED LIMIT (uV)</b>
Not Applicable.			

**75 Ohms Input Terminal**

<b>SWITCH POSITION</b>	<b>CHANNEL 3 uV CORRECTED</b>	<b>CHANNEL 4 uV CORRECTED</b>	<b>SPECIFIED LIMIT @ 75 <math>\Omega</math> uV</b>
Channel 3	1.68	0.74	3.0
Channel 4	0.81	1.74	3.0

<b>PLOT #</b>	<b>PLOT DESCRIPTION</b>
6.1	Channel 3, Scan 30 - 1000 MHz
6.2	Channel 3, Scan 1 - 30 MHz
6.3	Channel 4, Scan 30 - 1000 MHz
6.4	Channel 4, Scan 1 - 30 MHz





## 7.0 **List of Exhibits**

- |                  |   |
|------------------|---|
| <i>Exhibit 1</i> | <b>ID Label Format</b>                    |
| <i>Exhibit 2</i> | <b>ID Label Location</b>                  |
| <i>Exhibit 3</i> | <b>Equipment Photographs</b>              |
| <i>Exhibit 4</i> | <b>Block Diagram</b>                      |
| <i>Exhibit 5</i> | <b>Circuit Diagram</b>                    |
| <i>Exhibit 6</i> | <b>This Test Report</b>                   |
| <i>Exhibit 7</i> | <b>Test Setup Photos</b>                  |
| <i>Exhibit 8</i> | <b>Instruction Manual</b>                 |
| <i>Exhibit 9</i> | <b>Transfer switch connection diagram</b> |