

## TEST REPORT

**Report Number: 30264991**

**Project Number: 3026499**

**ReportDate: June 25, 2002**

Testing performed on the

**Wireless PC Camera transmitter**

**Model Number: V-RA7**

**FCC ID: DZL201544**

to

**FCC Part 15.249**

for

**Logitech, Inc.**



**Test Performed by:**

Intertek Testing Services  
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**Test Authorized by:**

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6/28/02



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### 1.0 Summary of Tests

TEST	REFERENCE	RESULT
Field Strength of Fundamental	15.249a	Complies
Field Strength of Harmonics	15.249a	Complies
Radiated Emissions outside the band	15.249c	Complies
Radiated Emissions in restricted bands	15.205	Complies
Line Conducted Emissions	15.207	Complies
Antenna requirement	15.203	Complies

## 2.0 General Description

### 2.1 Product Description

EUT is a wireless video camera. The camera can be used within a 75-foot radius (minimum) of the host PC in a home or office environment.

- A wireless PC Camera for the High End retail market segment.
- Wireless camera has an integral antenna, microphone, 4 channel selection, viewfinder with integrated siting/tally/streaming LED, on/off power pushbutton, LCM display for status, pushbutton shutter switch, battery and wall adapter power jack.
- Indoor use only.
- Camera uses a “desktop” power adapter of 12-foot total length with 3’ to mains and 9’ to camera.
- Camera case design supports a fixed antenna not to exceed 57 x 10 x 3 mm in size.
- Camera horizontal Field of View when pointed straight:  $45 \pm 3$  degrees.
- Low-battery indication: 3 level ICON will display battery life.
- Camera will automatically power down after 5 minutes if the LCM mode is set to “Auto-off” and the AC adapter is not plugged into the camera or a video is not being captured. This feature can be overridden.
- A battery connection that allows a “9 Volt” rectangular type of battery to power the camera.
- Battery life, for a standard alkaline battery must be greater than 2 hours continuous service.

### Overview of the EUT

<b>Applicant name &amp; address</b>	Logitech Inc. 6505 Kaiser Drive Fremont, CA 94555, USA
<b>Manufacturer name &amp; address</b>	Suzhou Logitech Electronic, Ltd. No. 168 Bin He Road Standard Plant Suzhou City, P.R.C.
<b>Trade Name &amp; Model No.</b>	Model # V-RA7
<b>FCC Identifier</b>	DZL201544
<b>Use of Product</b>	A wireless PC Camera for the High End retail market segment
<b>Type of Transmission</b>	Analog
<b>Type of Modulation</b>	Video modulation: FM, BW: 8 MHz Audio modulation: FM, BW: 10 kHz
<b>Rated RF Output</b>	1 mW
<b>Frequency Range</b>	2415 – 2468.5 MHz
<b>Number of Channel(s)</b>	4 selectable channels
<b>Antenna(s) &amp; Gain</b>	permanently connected antenna, dipole type, 1 dBi gain, omni-directional in horizontal plane.

A prototype version of the EUT was received on June 3, 2002 in good operating condition. As declared by the Applicant, it is identical to production units.

### 2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application.

### 2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Data Sheet**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

### 2.4 Test Facility

The 10m anechoic chamber 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 and NVLAP accredited.

## 3.0 System Test Configuration

### 3.1 Support Equipment and description

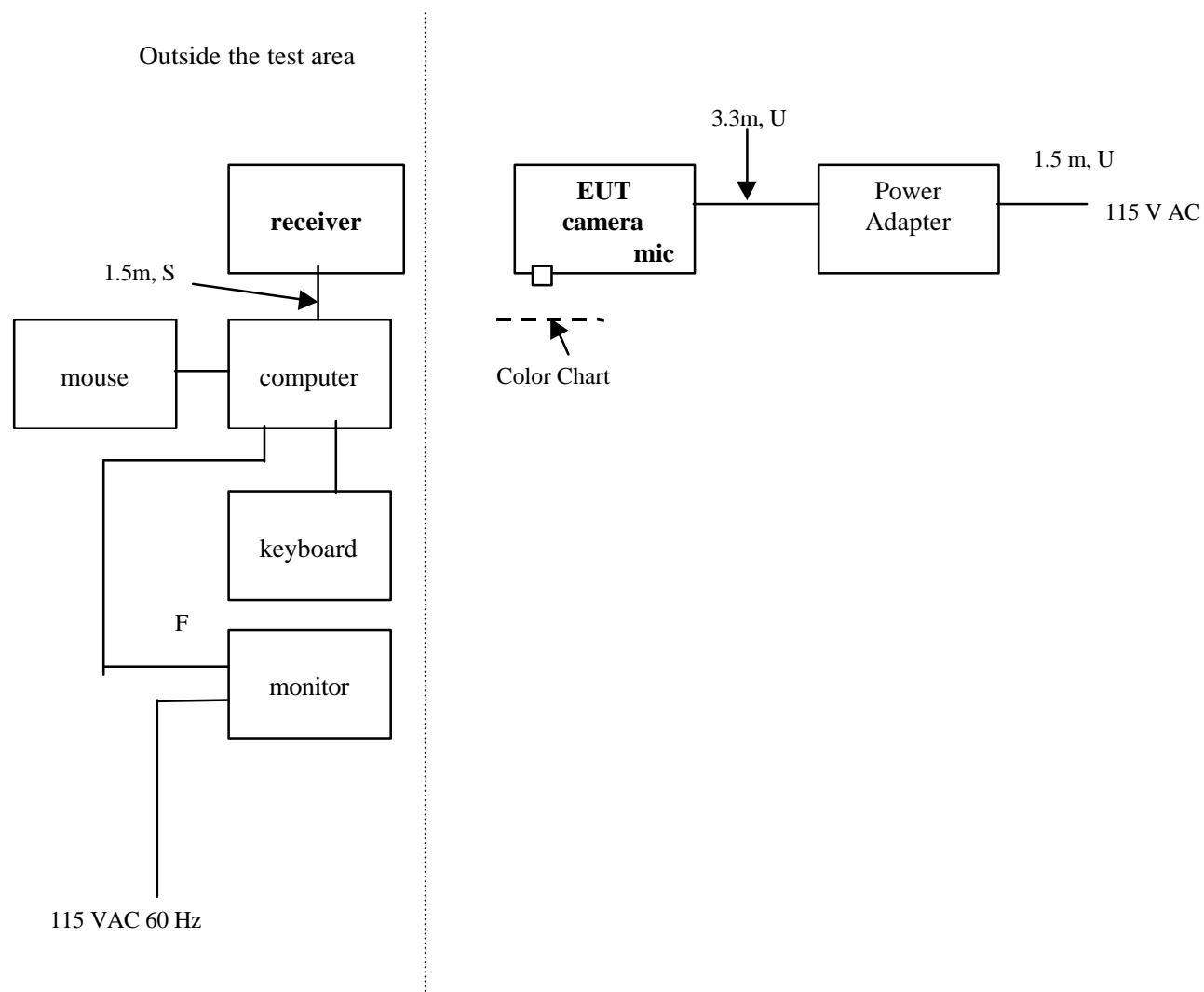
#### System Support Equipment

Description	Manufacturer	Model Number	Serial Number
Computer	Dell Computer	Dimension 8100	Not labeled
Monitor	Dell Computer	E770s	BH68-001760-00
Keyboard	Dell Computer	SK-8100	Not labeled
Mouse	Logitech	M-S34	LNA12817335
Receiver	Logitech	C-UB6	Not labeled

#### Cables Associated with EUT

Description	Length	Shielding	Ferrites	Connection	
				From	To
DC cable	3.3 m	No	No	camera	AC/DC adapter
AC cable	0.7 m	No	No	AC/DC adapter	AC mains

## 3.2 Block Diagram of Test Setup



**S** = Shielded  
**U** = Unshielded

**F** = With Ferrite  
**M** = Meter

### 3.3 Justification

For emission testing, the test procedures, as described in American National Standards Institute C63.4-1992, were employed. 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.

If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT was wired to transmit full power. Care was taken to ensure proper power supply voltages during testing.

### 3.4 Software Exercise Program

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.

### 3.5 Mode of operation during test

During the test the camera continuously transmitted the video modulated signal which can be received by the receiver and displayed on the monitor. As a test signal, a GretagMacbeth<sup>TM</sup> ColorChecker Color Rendition Chart was placed in front of the camera at 15-20 cm.

### 3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by Logitech prior to compliance testing).

### 3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.



## 4.0 Measurement Results

### 4.1 Transmitter Radiated Emissions FCC Rules 15.249, 15.209

#### Requirements

The Field Strength of emissions shall not exceed the following levels:

94 dB(μV/m) for fundamental frequency,

54 dB(μV/m) for harmonics.

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

#### Procedure

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. The signal is maximized through rotation and placement in the three orthogonal axes.

During the test the EUT is rotated and the antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

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.

Radiated emission measurements were performed from 30 MHz to 25 GHz.

Analyzer resolution is:

100 kHz or greater for frequencies 1000 MHz and below,

1 MHz for frequencies above 1000 MHz. For those frequencies peak and average values were measured.

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.

#### 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 is as follows:

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

Where FS = Field Strength in dB (μV/m)

RA = Receiver Amplitude (including preamplifier) in dB (μV)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(1/m)

AG = Amplifier Gain in dB

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## Test Result

The data below shows the significant emission frequencies, the limit and the margin of compliance.

### Radiated emissions at fundamental frequency

Frequency MHz	Antenna polarizati on H/V	SA reading dB(uV)	Detector P/A	Antenna Factor dB(1/m)	Preamp Gain dB	Cable loss dB	FS dB(uV/m)	FS Limit dB(uV/m)	Margin dB
2415.0	V	66.8	Peak	29.4	0	1.5	97.7	114.0	-16.3
2415.0	V	62.5	Ave	29.4	0	1.5	93.4	94.0	-0.6
2450.5	V	65.9	Peak	29.5	0	1.7	97.1	114.0	-16.9
2450.5	V	61.5	Ave	29.5	0	1.7	92.7	94.0	-1.3
2468.5	V	66.7	Peak	29.5	0	1.8	98.0	114.0	-16.0
2468.5	V	61.8	Ave	29.5	0	1.8	93.1	94.0	-0.9

FS – Field Strength

### Radiated emissions at harmonics

#### Channel 1

Frequency MHz	Antenna polarizati on H/V	SA reading dB(uV)	Detector P/A	Antenna Factor dB(1/m)	Preamp Gain dB	Cable loss dB	FS dB(uV/m)	FS Limit dB(uV/m)	Margin dB
4830.0	H	46.8	Peak	34.5	36.5	4.4	49.2	74.0	-24.8
4830.0	H	39.5	Ave	34.5	36.5	4.4	41.9	54.0	-12.1
7245.0	H	45.2	Peak	37.6	36.7	7.5	53.6	74.0	-20.4
7245.0	H	36.6	Ave	37.6	36.7	7.5	45.0	54.0	-9.0
9660.0	V/H	34.7 *	Peak	38.9	36.7	10.5	47.4	74.0	-26.6
9660.0	V/H	26.4 *	Ave	38.9	36.7	10.5	39.1	54.0	-14.9

#### Channel 3

Frequency MHz	Antenna polarizati on H/V	SA reading dB(uV)	Detector P/A	Antenna Factor dB(1/m)	Preamp Gain dB	Cable loss dB	FS dB(uV/m)	FS Limit dB(uV/m)	Margin dB
4901.0	V	44.6	Peak	34.5	36.5	4.4	47.0	74.0	-27.0
4901.0	V	37.9	Ave	34.5	36.5	4.4	40.3	54.0	-13.7
7351.5	H	44.6	Peak	37.6	36.7	7.5	53.0	74.0	-21.0
7351.5	H	36.5	Ave	37.6	36.7	7.5	44.9	54.0	-9.1
9802.0	V/H	35.3 *	Peak	38.9	36.7	10.5	48.0	74.0	-26.0
9802.0	V/H	27.0 *	Ave	38.9	36.7	10.5	39.7	54.0	-14.3

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Channel 4

Frequency	Antenna polarizati on	SA Reading	Detector	Antenna Factor	Preamp Gain	Cable loss	FS	FS Limit	Margin
MHz	H/V	dB(uV)	P/A	dB(1/m)	dB	dB	dB(uV/m)	dB(uV/m)	dB
4937.0	V	43.7	Peak	34.5	36.5	4.4	46.1	74.0	-27.9
4937.0	V	37.8	Ave	34.5	36.5	4.4	40.2	54.0	-13.8
7405.5	H	44.1	Peak	37.6	36.7	7.5	52.5	74.0	-21.5
7405.5	H	36.2	Ave	37.6	36.7	7.5	44.6	54.0	-9.4
9874.0	V/H	35.5 *	Peak	38.9	36.7	10.5	48.2	74.0	-25.8
9874.0	V/H	26.8 *	Ave	38.9	36.7	10.5	39.5	54.0	-14.5

\* Noise floor

Note: All other emissions not reported are noise floor which is at least 10 dB below the limit.

The EUT passed by 0.6 dB at fundamental frequency and by 9 dB at harmonics.

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### 4.2 AC Line Conducted Emission FCC Rule 15.207

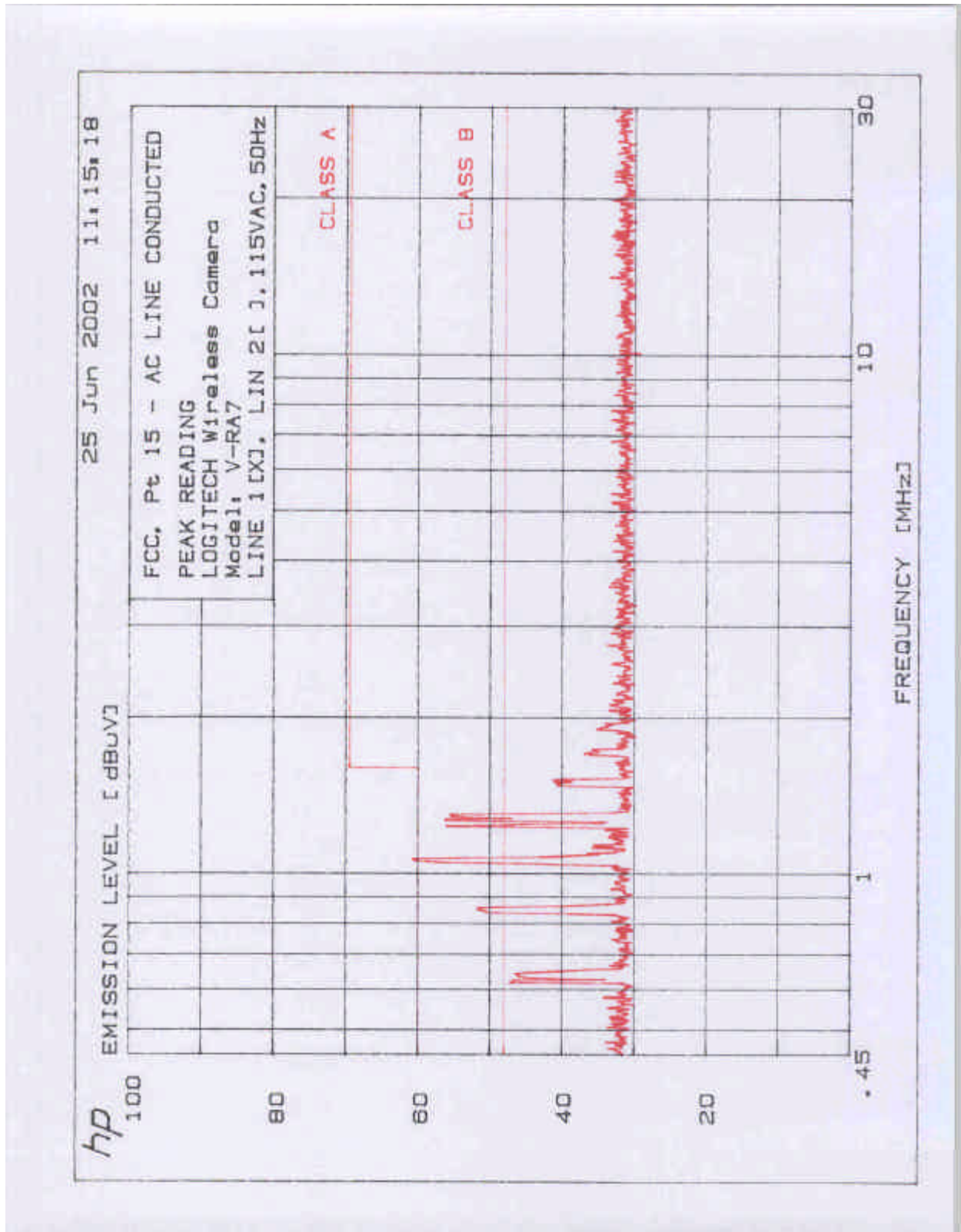
AC line conducted emission test was performed according the ANSI C63.4 standard. The EUT was connected to AC Line through the LISN.

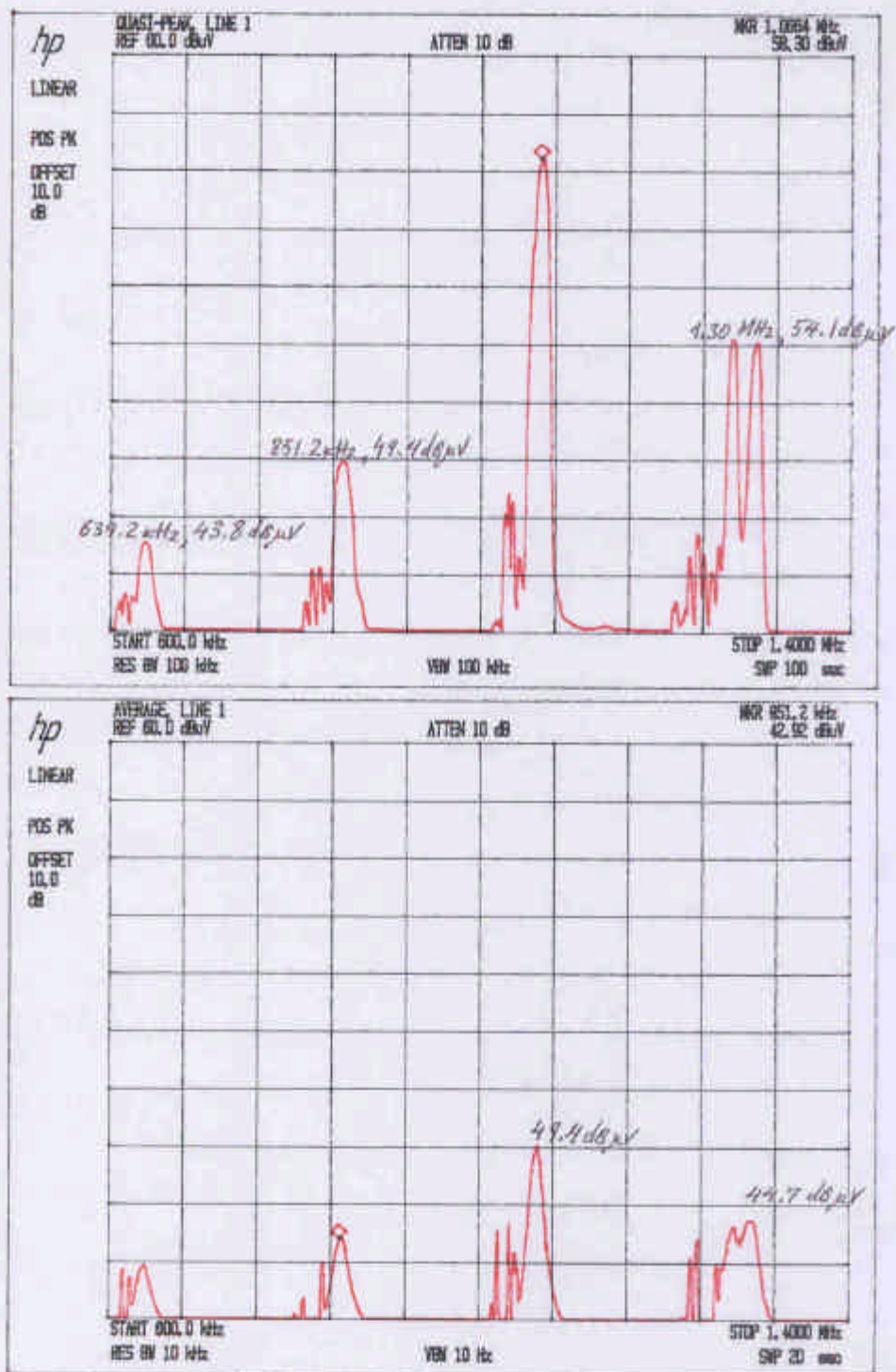
A complete scan from 0.45 - 30 MHz was made.

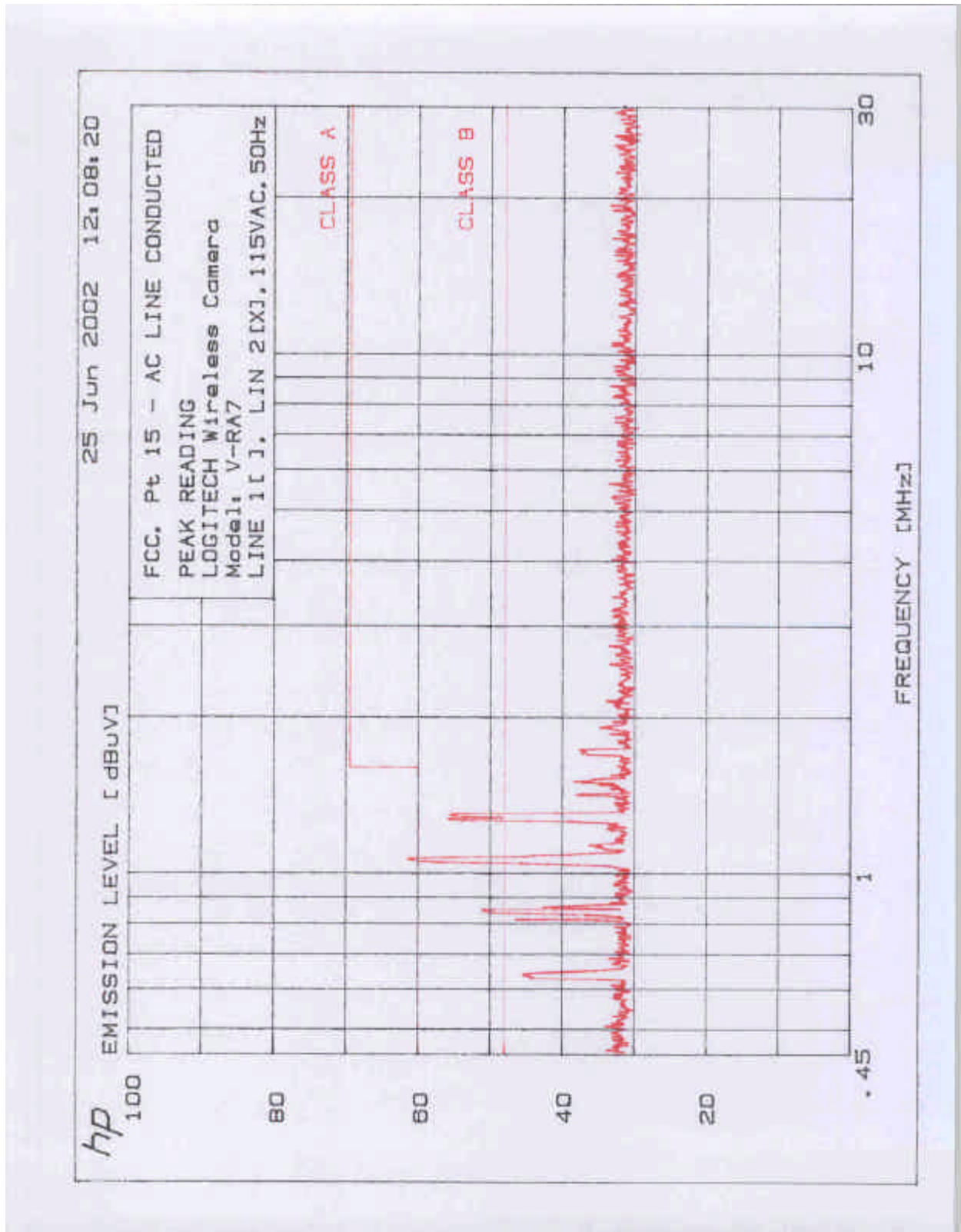
For the test result, see table below and attached plots.

Frequency	QP Reading,  Line 1	Ave. Reading,  Line 1	Corrected QP Reading Line 1	QP Reading,  Line 2	Ave. Reading,  Line 2	Corrected QP Reading Line 2	QP Limit	Margin
kHz	dB(uV)	dB(uV)	dB(uV)	dB(uV)	dB(uV)	dB(uV)	dB(uV)	dB
639.2	43.8	-	43.8	42.2	-	42.2	48.0	-4.2
851.2	49.4 *	42.9	36.4	48.9	42.1	35.9	48.0	-11.6
1066	58.3 *	49.4	45.3	58.9	50.9	45.9	48.0	-2.1
1300	54.1 *	44.7	41.1	53.4	43.7	40.4	48.0	-6.9

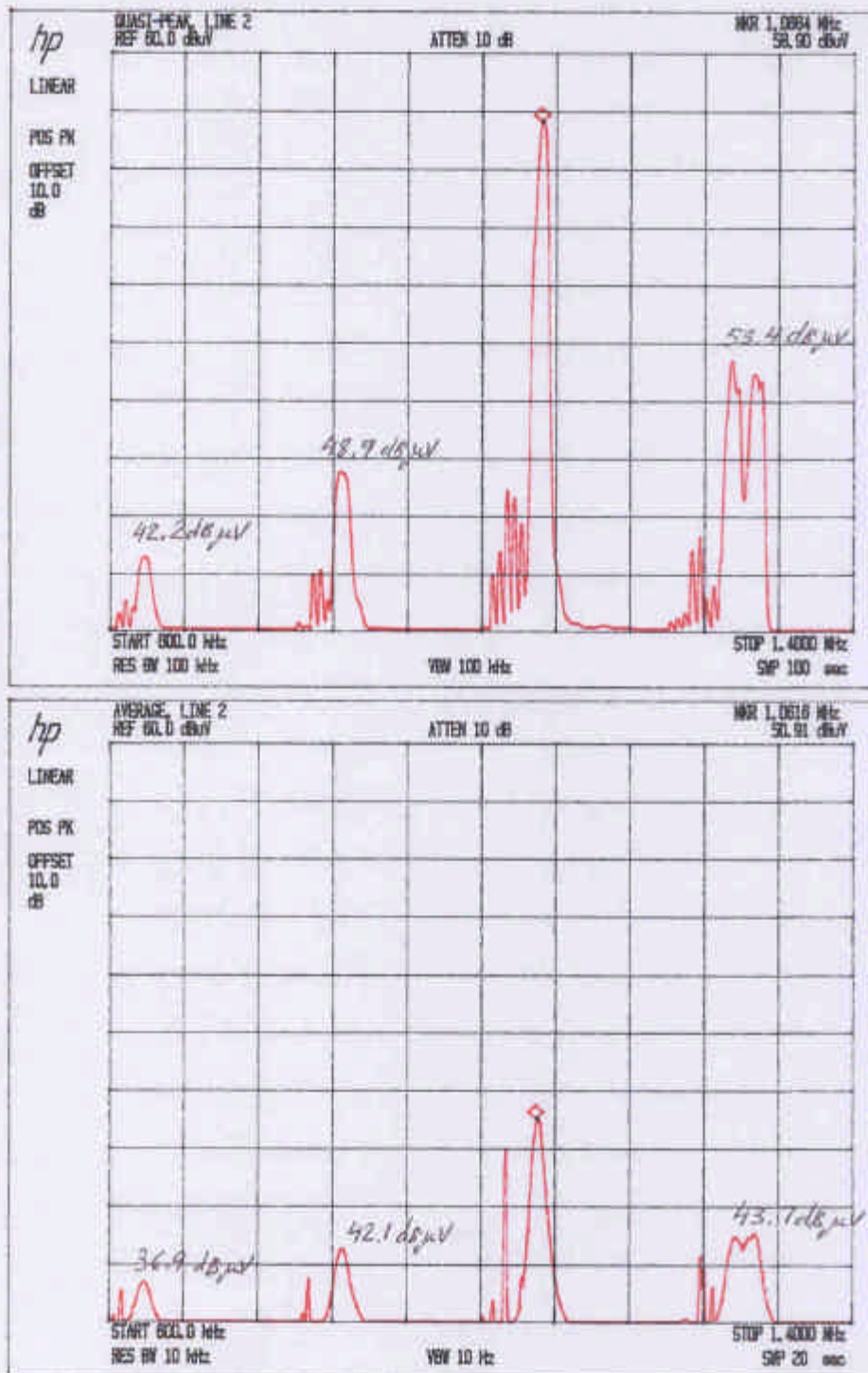
\* broadband emissions: the difference between Quasi-peak and Average readings is more than 6 dB. Therefore, the QP reading was reduced by 13 dB, as per FCC Part 15.207(b).











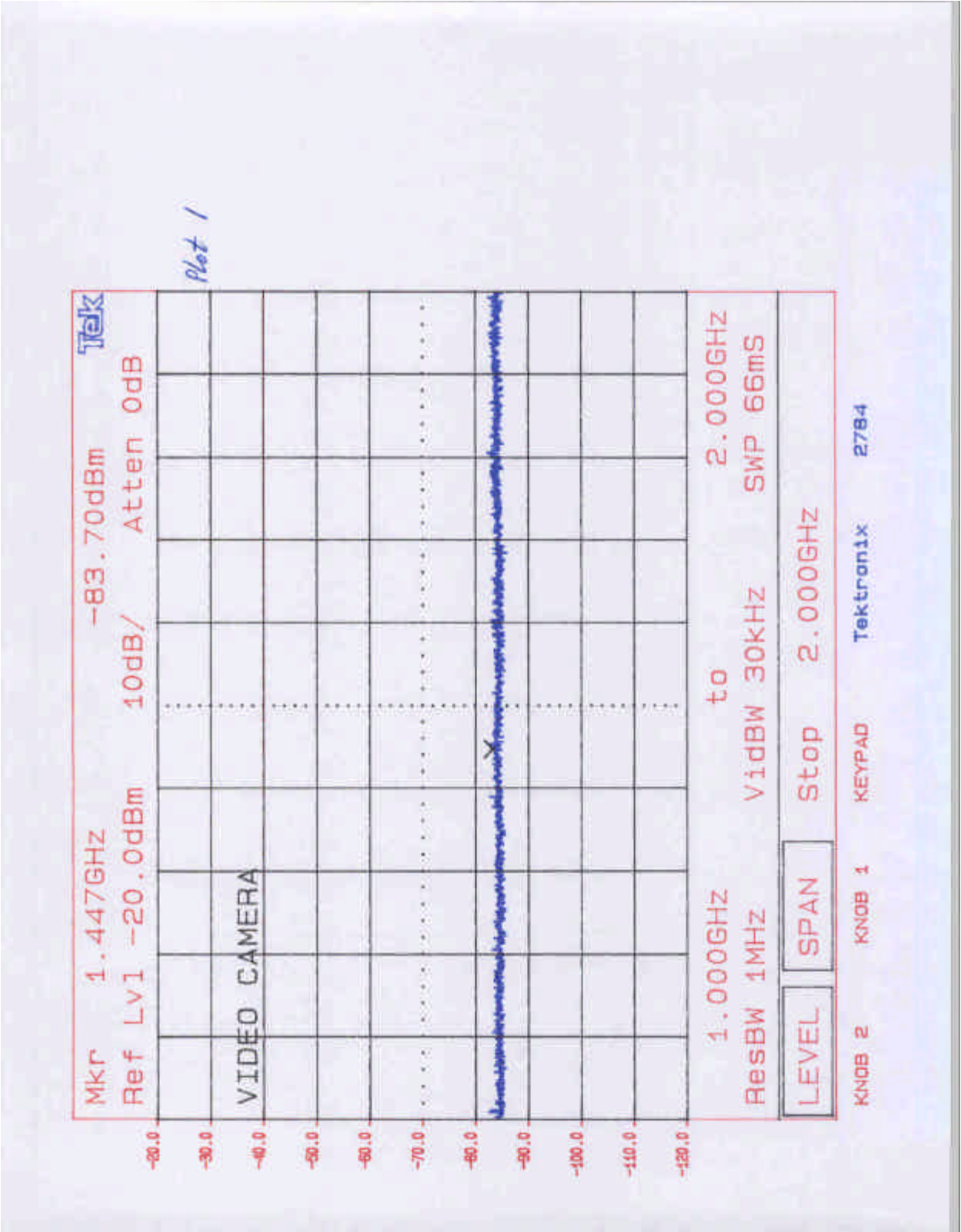


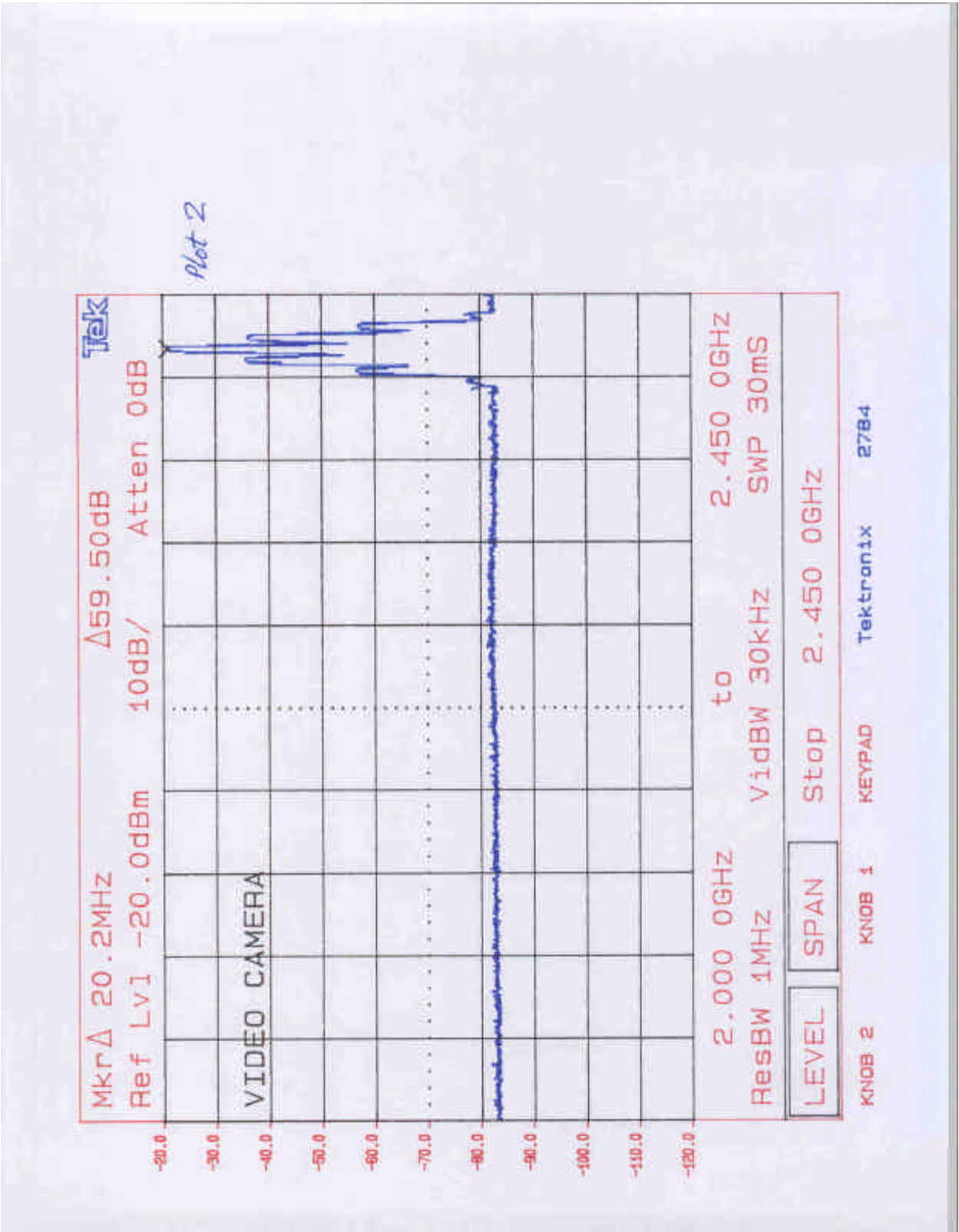
### 4.3 Out of Band Emission Plots

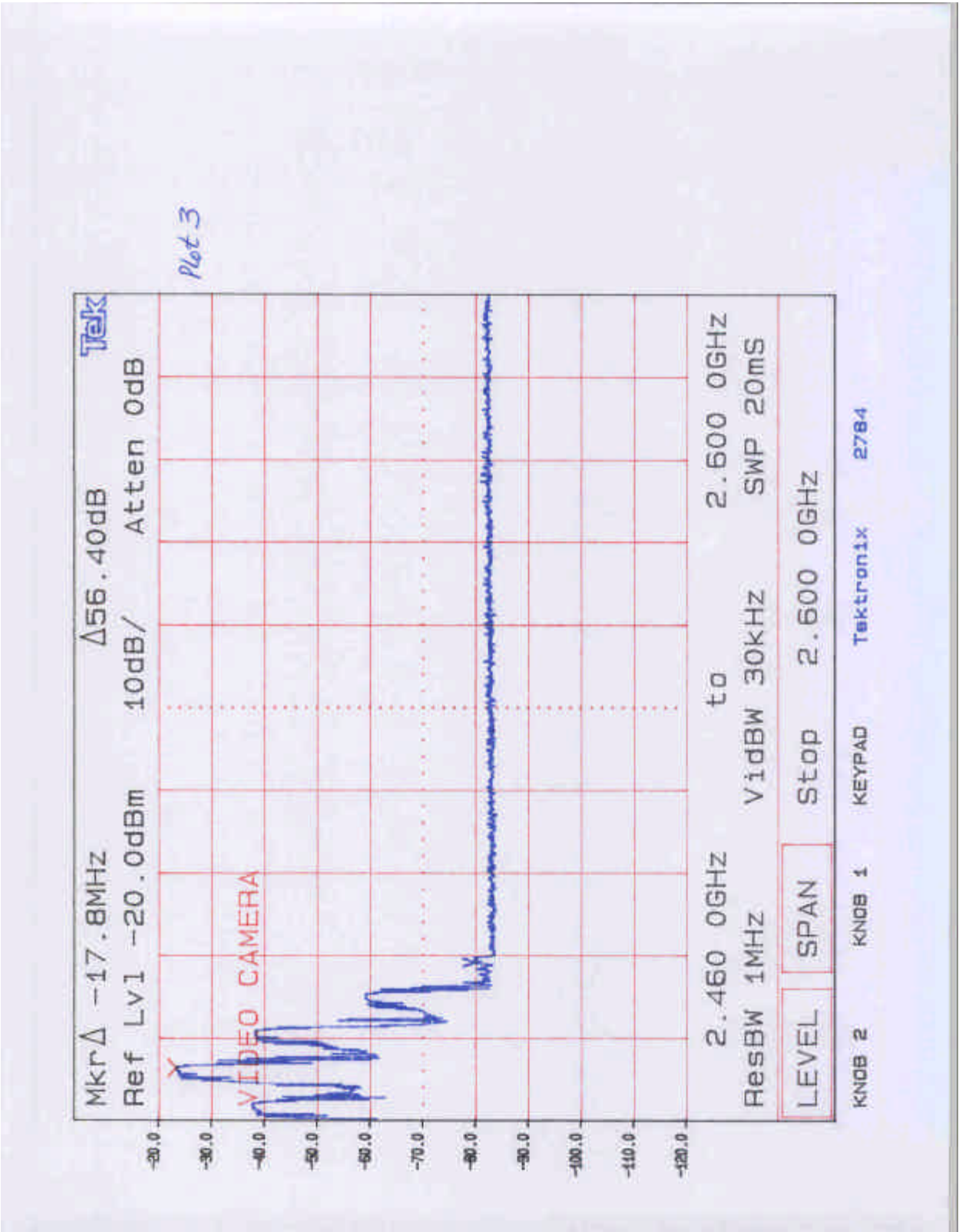
The horn antenna was placed close to the transmitter (3-4 cm). The spectrum analyzer reading was plotted. The following plots show the relative spurious emission level of the transmitter.

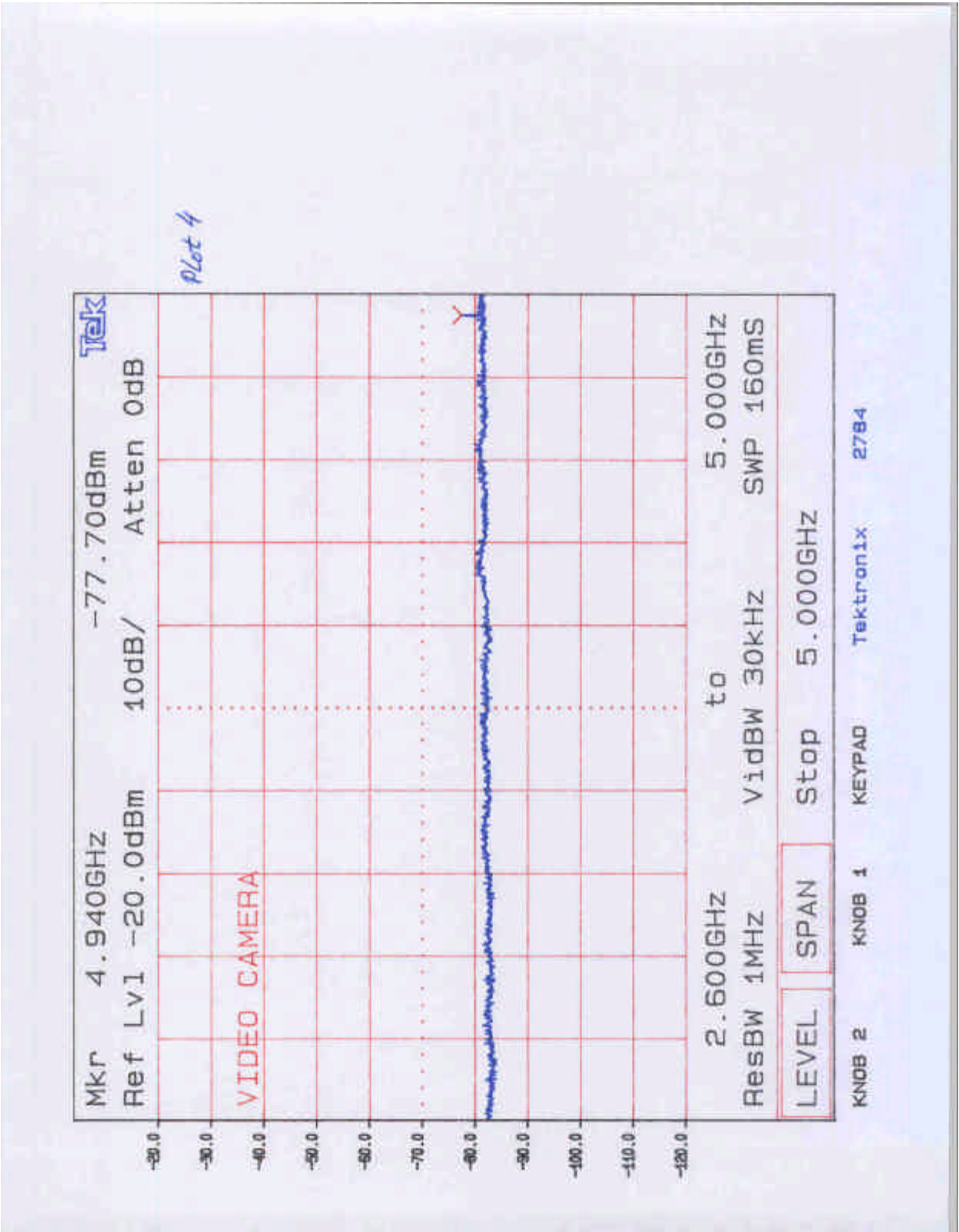
Plot #	Description
1	Scan from 1 GHz to 2 GHz
2	Scan from 2 GHz to 2.45 GHz, delta=59.5 dB between level at fundamental and level at 2.4 GHz
3	Scan from 2.46 GHz to 2.6 GHz, delta=56.4 dB between level at fundamental and level at 2.4835 GHz
4	Scan from 2.6 GHz to 5 GHz
5	Scan from 5 GHz to 20 GHz

0

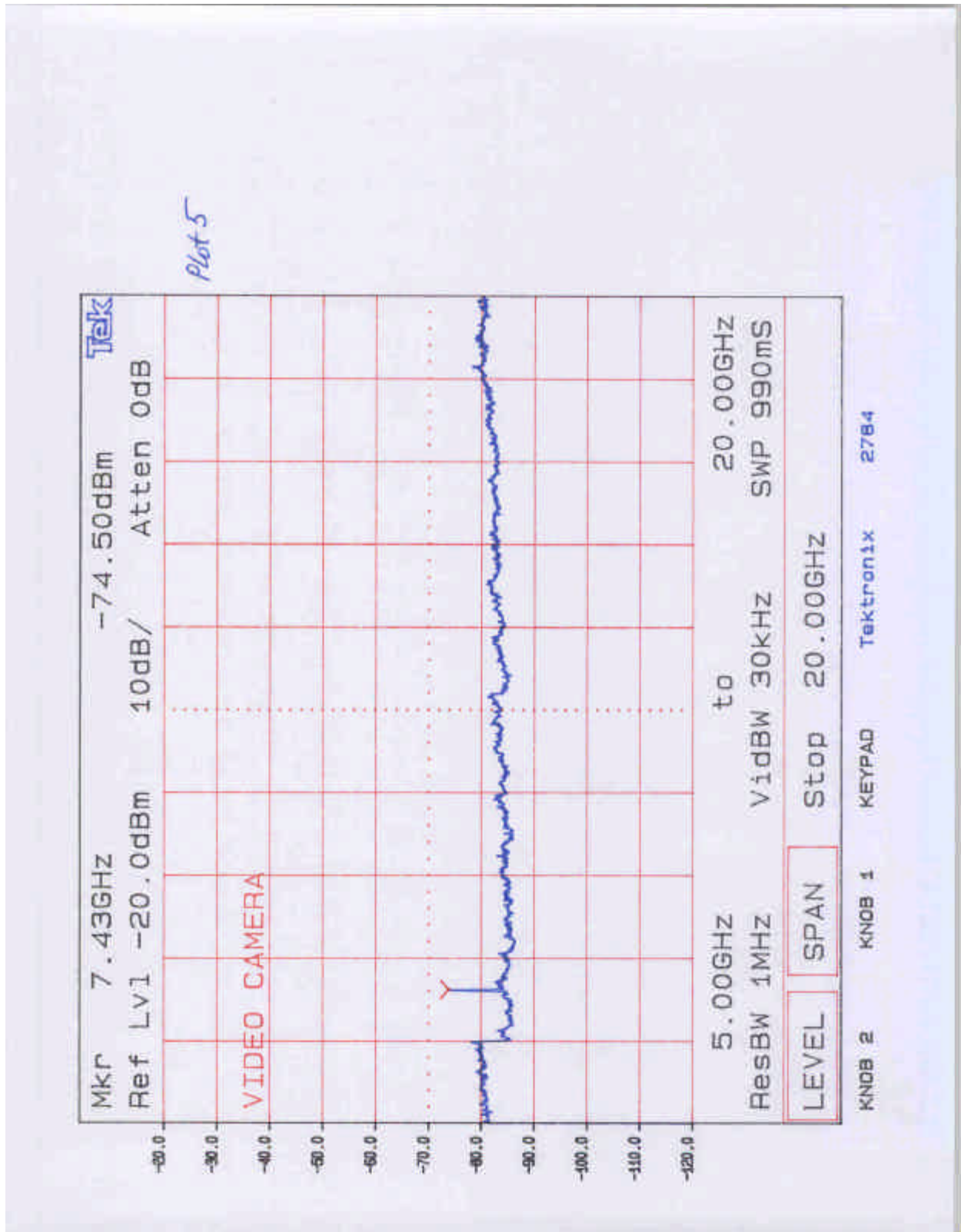












### **5.0 Antenna Requirement**

The transmitter uses a permanently connected antenna.  
Please refer to the attached documentation for details.

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### 6.0 List of test equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
Bi-Log Antenna #2	EMCO	3143	9509-1160	12	7/12/02
Pre-Amplifier	Sonoma Inst.	310	185634	12	01/10/03
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	7/20/02
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	7/20/02
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/8/02
Double-ridged Horn Antenna	EMCO	3115	8812-3049	12	4/03/03
Horn Antenna	EMCO	3160-09	-	#	#
Horn Antenna	EMCO	3160-10	-	#	#
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	04/05/03
Pre-amplifier	CTT	ACO/400	47526	12	10/5/02

# No calibration required



## 7.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3026499	DC	June 25, 2002	Original document