PHILIPS

Philips Electronics Industries (Taiwan) Ltd - EMC Lab. 5, Tze Chiang 1 Road, Chungli Industrial Park, Chungli, Taoyuan, Taiwan Tel.: +886-3-454-9862 Fax.: +886-3-454-9887 E-mail: ronnie.yang@philips.com	FCC Test Report	Report No.: TYR87-2003 Date : 04 March, 2002 Page : 1 of 28

Customer : Philips Electronics Industries

Name : Mr. S.T. Huang – EE LCD
Address : 5, Tze Chiang 1 Road,
Zip/City : Chungli Industrial Park,
Country : Chungli, Taiwan, R.O.C.

Equipment Under Test (including peripherals) :

FCC ID. : A3KM109
Model Name : 201B40
Serial Number : TY0105716
Description : 21" XGA monitor, Max. resolution 1920x1440/75Hz

EMC Standards : FCC Part 15 of October 01,1999 Class B
ANSI C63.4-1992

Result : PASSED the limits/test-levels in the standards.

Note : The results in this report apply only to the sample(s) and mode(s) tested. It is the manufacturer's responsibility to assume the continued EMC compliance of production models.

Date of receipt of EUT : 04 Feb. 2002

Date of performance of test : 07 Feb., 2002 to 09 Feb., 2002

C.C. Wu - EMC Test Engineer

Ronnie Yang - EMC Manager
NVLAP Signatory

Table of contents

1. Summary of test results

Test	Standard	Result	Note
Emission, ANSI C63.4-1992			
Conducted emission	FCC Part 15	**Passed**	
Radiated emission	FCC Part 15	**Passed**	

Remark:

The test sample fully complies with the requirements set forth in : FCC Part 15 Class B.

2. General Information of EUT

The EUT, 21" color monitor :

Model No. : 201B40
FCC ID : A3KM109
Brand : Philips

The color monitor automatically scans horizontal frequencies between 30KHz and 115KHz , and vertical frequencies between 50Hz and 160Hz. This color monitor displays sharp and brilliant images of text and graphics with a maximum resolution up to 1920x1440 pixels.

The monitor has 8 factory-preset modes as indicated in the following table:

Mode	Resolution	H. freq. / V. freq	Standard
1.	1024 x 768	60.023Khz/75.029Hz	(VESA/75)
2.	1024 x 768	68.677Khz/84.997Hz	(VESA/85)
3.	1280 x 1024	79.976Khz/75.024Hz	(VESA/75)
4.	1280 x 1024	91.146Khz/85.024Hz	(VESA/85)
5.	1600 x 1200	93.75Khz/75.000Hz	(VESA/75)
6.	1600 x 1200	106.25Khz/85.000Hz	(VESA/85)
7.	1792 x 1344	106.3Khz/75.000Hz	(VESA/75)
8.	1920 x 1440	112.50Khz/75.000Hz	(VESA/75)

3. Test Equipment

Test equipment used for line Conducted and Radiated emissions as following.
All equipment were calibrated according to ANSI C63.4-1992 and ISO-9000 requirement unless otherwise specified.
Traceability to R.O.C. and international standards is assured by using calibrated all equipment.

- For Conducted Emissions Test:

Test Equipment	Model No.	Serial No.	Last Calibrate	Next Calibrate
Spectrum	HP8568B	2415A00346	05/16/2001	05/16/2002
EMI Receiver	R & S ESCS30	830245/026	06/09/2001	06/08/2002
LISN	EMCO 3825/2	9311-2153	12/04/2001	06/04/2002
LISN	EMCO 3825/2	9311-2154	12/04/2001	06/04/2002
RF Cable	8-meter	N/A	05/28-2001	05/28/2002

- For Radiated Emissions Test:

Test Equipment	Model No.	Serial No.	Last Calibrate	Next Calibrate
Spectrum	HP8568B	2415A00346	08/15/2001	08/15/2002
RF Preselector	HP85685A	2901A00946	08/15/2001	08/15/2002
QP Adapter	HP85650A	2043A00366	08/15/2001	08/15/2002
EMI Receiver	HP85460A	3441A00199	09/11/2001	09/11/2002
RFI Filter Section	HP85460A	3330A00177	09/11/2001	09/11/2002
EMI Receiver	R & S ESVS30	841977/006	05/28/2001	05/28/2002
Biconical Antenna	EMCO 3110B	3222	04/27/2001	04/27/2002
Biconical Antenna	EMCO 3110B	3224	04/27/2001	04/27/2002
Log-Periodic Antenna	EMCO 3146A	1424	04/27/2001	04/27/2002
Log-Periodic Antenna	EMCO 3146A	1425	04/27/2001	04/27/2002
Turn Table	EMCO 1060	1068	05/26/2001	05/26/2002
Antenna Tower	EMCO 1050	1113	05/26/2001	05/26/2002
RF Cable	M17/75-RG214-NE	N/A	05/26/2001	05/26/2002

4. Test Configuration of EUT and Peripherals

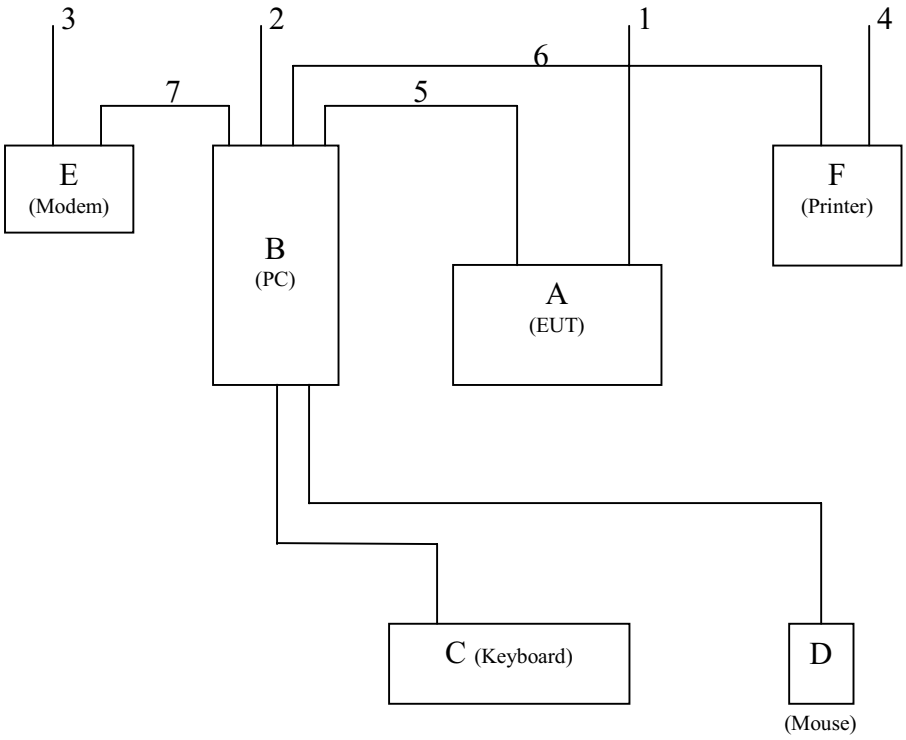
The system was configured for testing in a typical fashion (as a customer would normally use it) according to ANSI C63.4-1992, please see the photographs for detail. For system measurement, the EUT "201B40" were connected to:

	Description	Brand/ Model No.	Serial No.	FCC ID	Remark
A	15" LCD monitor	Philips 201B40	TY0105716	A3KM109	EUT
B	PC	Compaq ENC P866	5K15FXHZ2013	FCC logo	
C	Keyboard	Compaq KB-9963	B26950GGALP13Q	FCC Logo	
D	Mouse	Compaq M-S48a		JNZ201213	
E	Modem	USRobotics 268	2680559278575	CJE-0318	
F	Printer	HP 2225C	3145S02419	DSI6XU2225	

Connected Cables

No.	Description	Manufacturer	Length	Shielded	Remark
1	Power Cord	Long Shine	1.8 meters	No	for EUT
2	Power Cord	Acer	1.8 meters	No	for PC
3	Power Cord	Aceex	2.0 meters	No	for Modem
4	Power Cord	HP	1.8 meters	No	for Printer
5	Video Cable	Long Shine	1.5 meters	Yes	
6	Printer Cable	HP	1.8 meters	Yes	
7	Modem Cable	Aceex	1.5 meters	Yes	

System Block Diagram of Test Configuration



5. Test Procedure

Test was performed by:

PHILIPS ELECTRONICS INDUSTRIES (TAIWAN) LTD.
CONSUMER ELECTRONICS DIVISION
- EMC LAB

5, Tze Chiang 1 Road, Chungli Industrial Park
P.O. Box 123, Chungli, Taoyuan, Taiwan
Tel : 886-3-4549862 Fax : 886-3-4549887
Internet: ronnie.yang@philips.com

The test was performed in accordance with ANSI C63.4-1992, "AMERICAN NATIONAL STANDARD FOR MEASUREMENT OF RADIO-NOISE EMISSION FROM LOW-VOLTAGE ELECTRICAL AND ELECTRONIC EQUIPMENT IN THE RANGE OF 9KHz TO 40GHz"

Both conducted and radiated testing were performed according to the procedure in ANSI C63.4-1992. Conducted testing was performed in screen room and radiated testing was performed in open site at an antenna to EUT distance of 3-meter on horizontal and vertical polarization.

First, pre-scan all modes in screen room then select 3 higher modes (worst case) were tested and reported.

The line conductive interference was tested with 110VAC and 220VAC receptively. Unshielded power cord was used during test.

D-sub I/F cable with two ferrite cores was used.
BNC I/F cable with one ferrite cores was used.

Tested and reported modes as following:

File No.	Resolution	Frequencies	I/F Cable	Figure	
				Conducted	Radiated
EMI02-007	1920x1440	113KHz/75Hz	D-sub	Figure 1, 2	Figure 7
EMI02-007A	1920x1440	113KHz/75Hz	BNC	Figure 3, 4	Figure 8
EMI02-007B	1600x1200	106.3KHz/85Hz	D-sub	Figure 5, 6	Figure 9

Set up the EUT and all peripherals as chapter 6 of ANSI C63.4-1992 for AC power line conducted emissions testing and radiated emissions testing.

Turn on the power of EUT and all peripherals, select an appropriate displaying mode using the "setup" software. Then run an EMI test program "HTEST.EMI" as a basic software to execute the EUT operating under test. A pattern of scrolling H's should be displayed on the monitor.

Step 1 : Run the "HTEST.EMI" on personal computer then sends "H" character to monitor continuously until full screen.

Step 2 : Personal computer sends a complete line of continuously repeating "H" to HP 2225C printer.

Step 3 : Personal computer sends a file of "H" pattern to floppy disk then read a file of "H" pattern from floppy disk.
Step 4 : Personal computer sends a file of "H" pattern to hard disk then read a file of "H" pattern from hard disk.
Step 5 : Personal computer sends a file of "H" patter to USRobotics 268 modem.
Step 6 : Return to step 1

All data in this report are "PEAK" value within 15dB margin unless otherwise noted.

6. Measurement Uncertainty

The system uncertainty listed below are based on the instrument absolute specifications, and do not include uncertainties of the equipment under test.

Uncertainty for Radiated Emissions Test at 3 meters Test Site.

Source of Measurement Uncertainty	Uncertainty/dB
Antenna factor calibration	+/-2.0
Cable loss calibration	+/-0.5
Receiver specification	+/-1.0
Antenna position ver.	+/-2.0
Measurement distance ver.	+/-0.5
Site imperfections	+/-2.0
Mismatch	+/-1.1
System repeatability	+/-0.5

Uncertainty for Conducted Emissions Test at 3 meters Test Site.

Source of Measurement Uncertainty	Uncertainty/dB
LISN specification	+/-2.0
Cable loss calibration	+/-0.5
Receiver specification	+/-1.0
Pulse limiter Spec.	+/-0.3
Measurement distance ver.	+/-0.5
Site imperfections	+/-2.0
System repeatability	+/-0.5

7. Conducted Emissions Test

Conducted Emissions

FCC Part 15

Operating conditions EUT:

EUT powered on with scrolling "H" pattern.

Limits:

Frequency range (MHz)	Class A (dBuv) QP	Class B (dBuv) QP
0.45 – 1.705	60.0	48.0
1.705 – 30.0	69.5	48.0

Test Result :

Passed FCC Class B Limits

Option:
The following option may be employed if the conducted emissions exceed the limits, as appropriate, when measured using instrumentation employing a quasi-peak detector function: If the level of the emission measured using the quasi-peak instrumentation is 6dB, or, more higher than the level of the same emission measured with instrumentation having an average detector and a 9KHz minimum bandwidth, that emission is considered broadband and the level obtained with the quasi-peak detector may be reduced by 13dB for comparison to the limits.

Remark:

Date of Test	: 07 Feb, 2002 to 09 Feb, 2002
Test Engineer	: C.C.Wu

For detail measurement results see next pages.

Figure 1

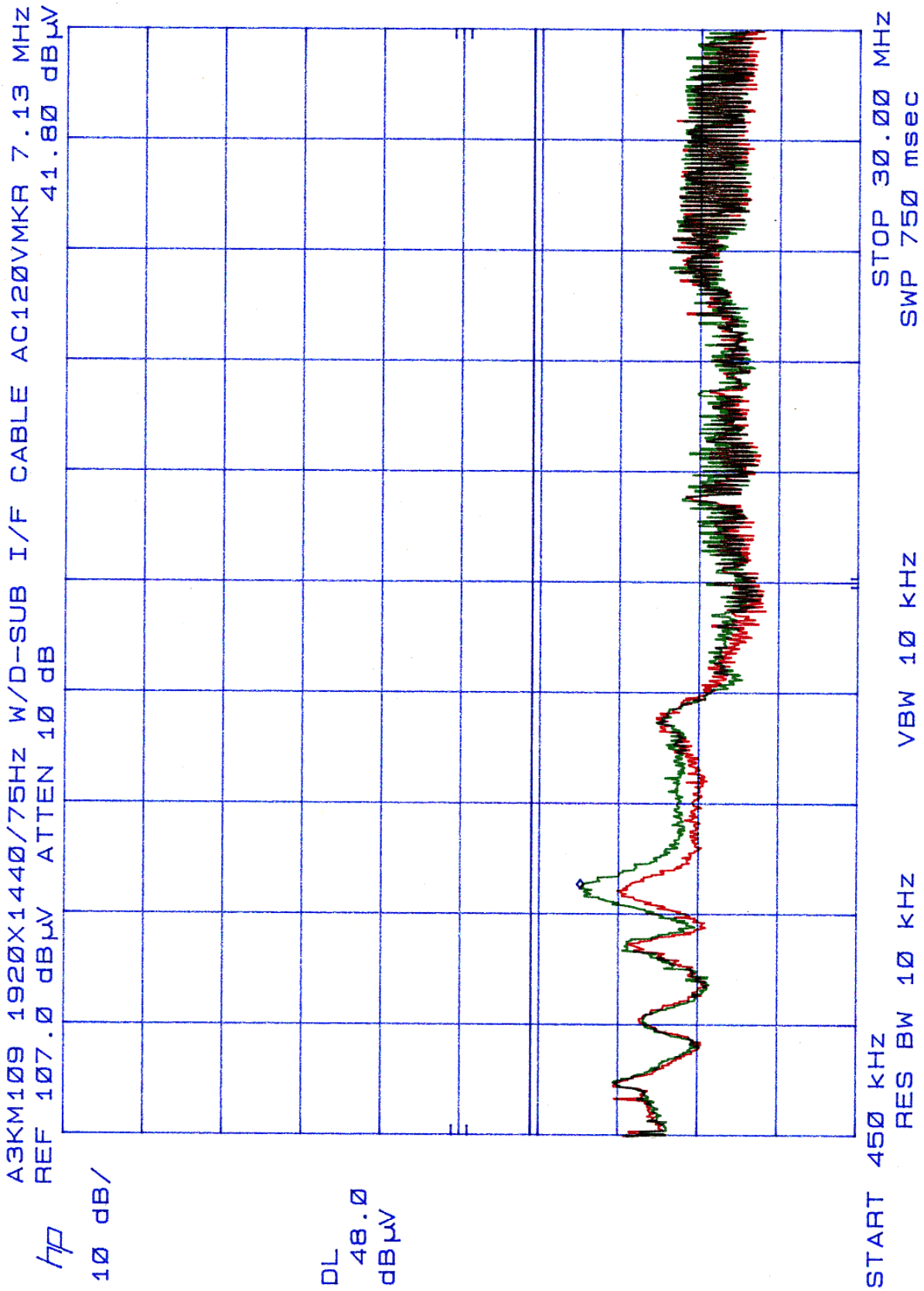

A3KM109 1920X1440/75Hz W/D-SUB I/F CABLE AC120VMKR 7.13 MHz
REF 107.0 dBµV ATTEN 10 dB 41.80 dBµV
10 dB/
DL
48.0
dBµV
START 450 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 750 msec

Figure 2

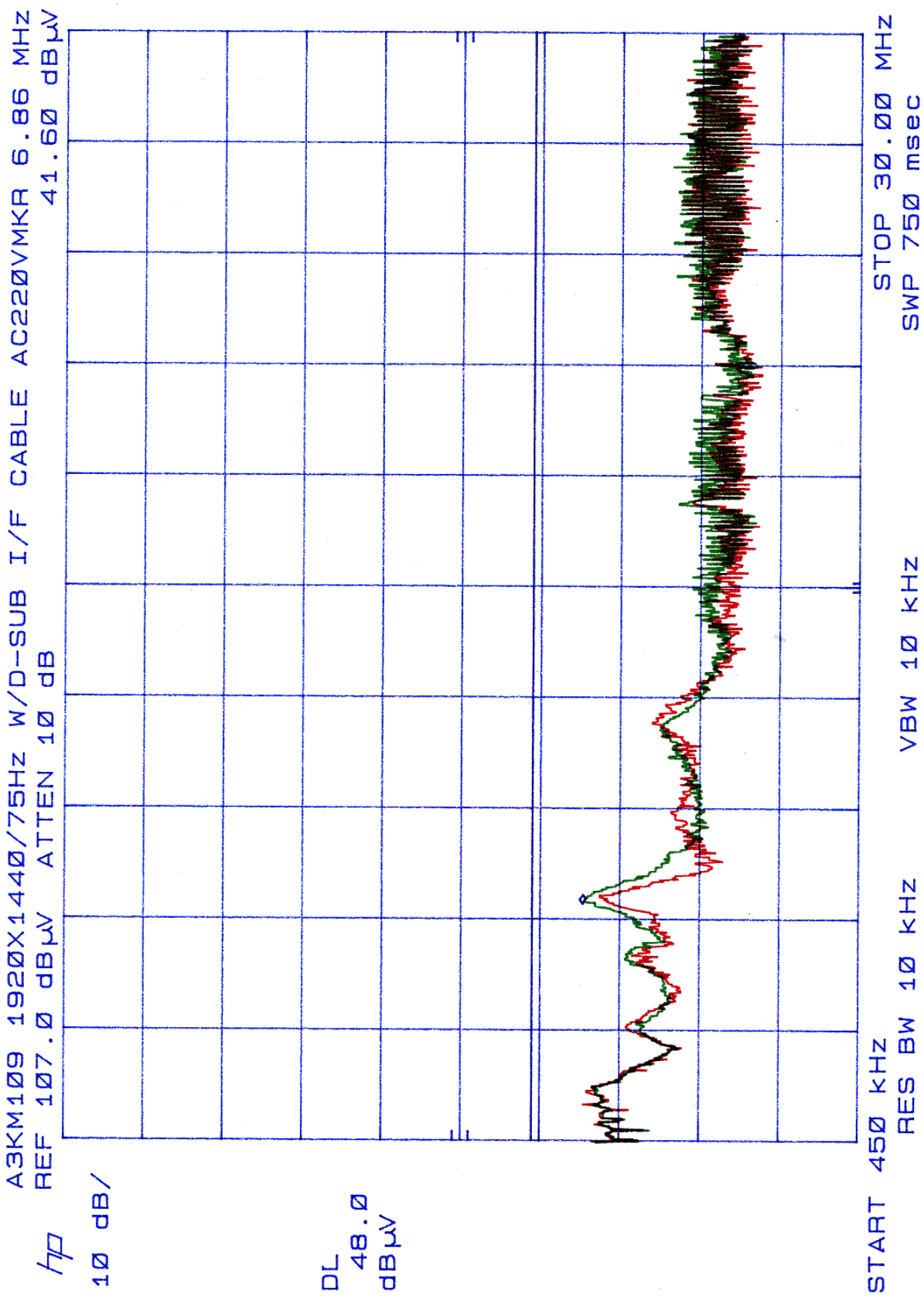

A3KM109 1920X1440/75Hz W/D-SUB I/F CABLE AC220VMKR 6.86 MHz
REF 107.0 dBµV ATTEN 10 dB
41.60 dBµV
10 dB/
DL
48.0
dBµV
START 450 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 750 msec

Figure 3

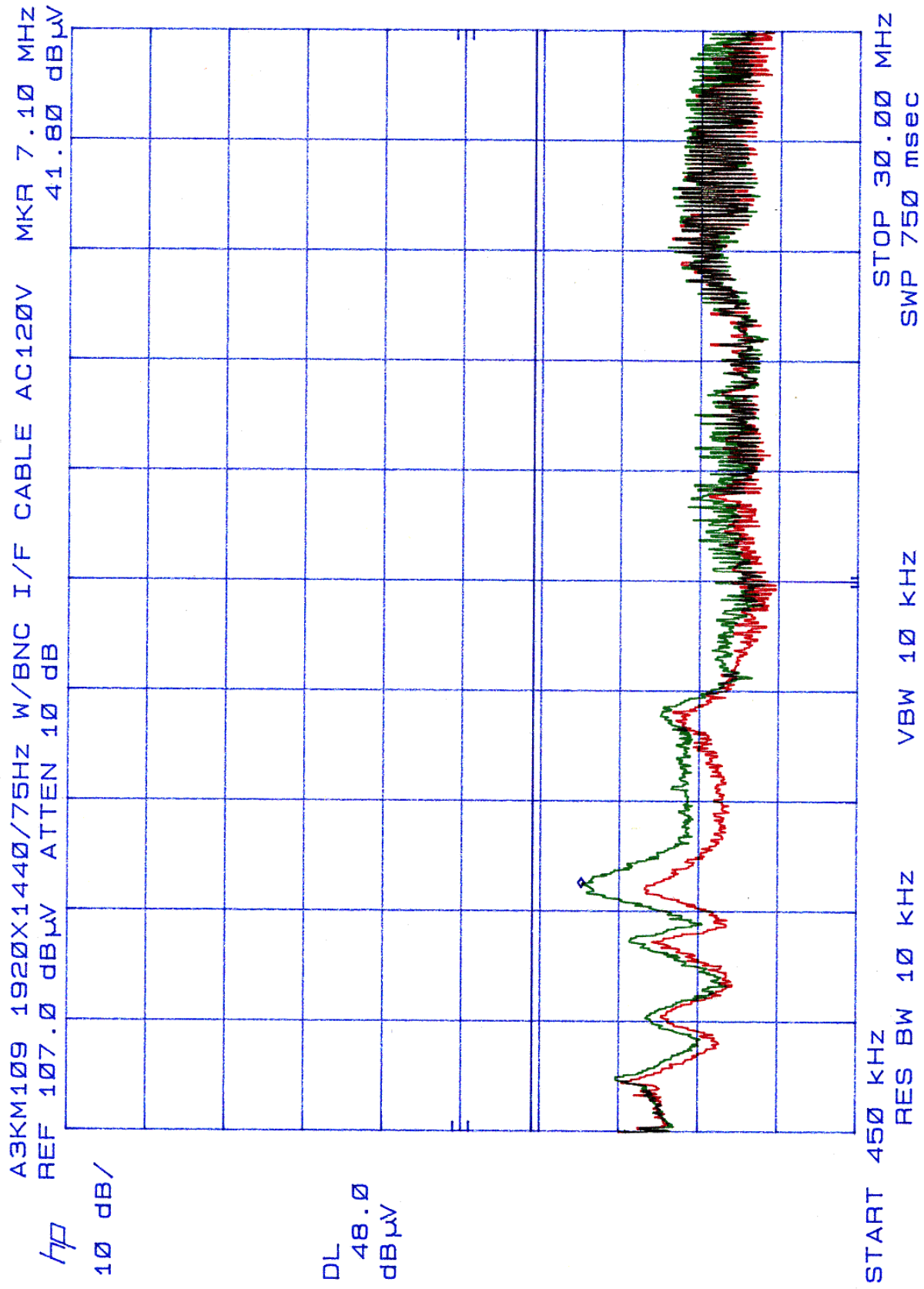

A3KM109 1920X1440/75Hz W/BNC I/F CABLE AC120V
REF 107.0 dBµV ATTEN 10 dB
MKR 7.10 MHz
41.80 dBµV
10 dB/
DL
48.0
dBµV
START 450 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 750 msec

Figure 4

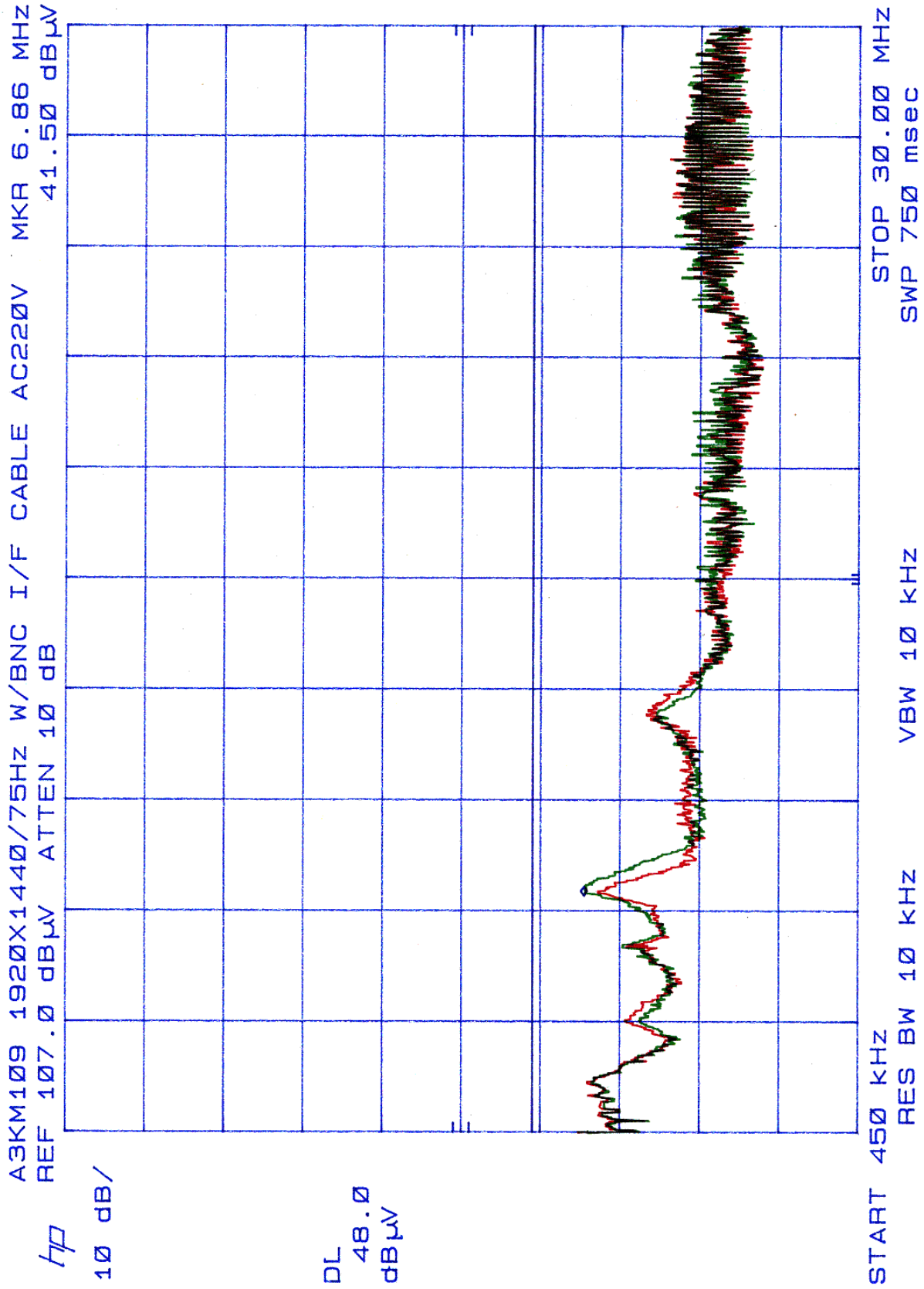

A3KM109 1920X1440/75Hz W/BNC I/F CABLE AC220V MKR 6.86 MHz
REF 107.0 dBμV ATTEN 10 dB 41.50 dBμV
10 dB/
DL
48.0
dBμV
START 450 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 750 msec

Figure 5

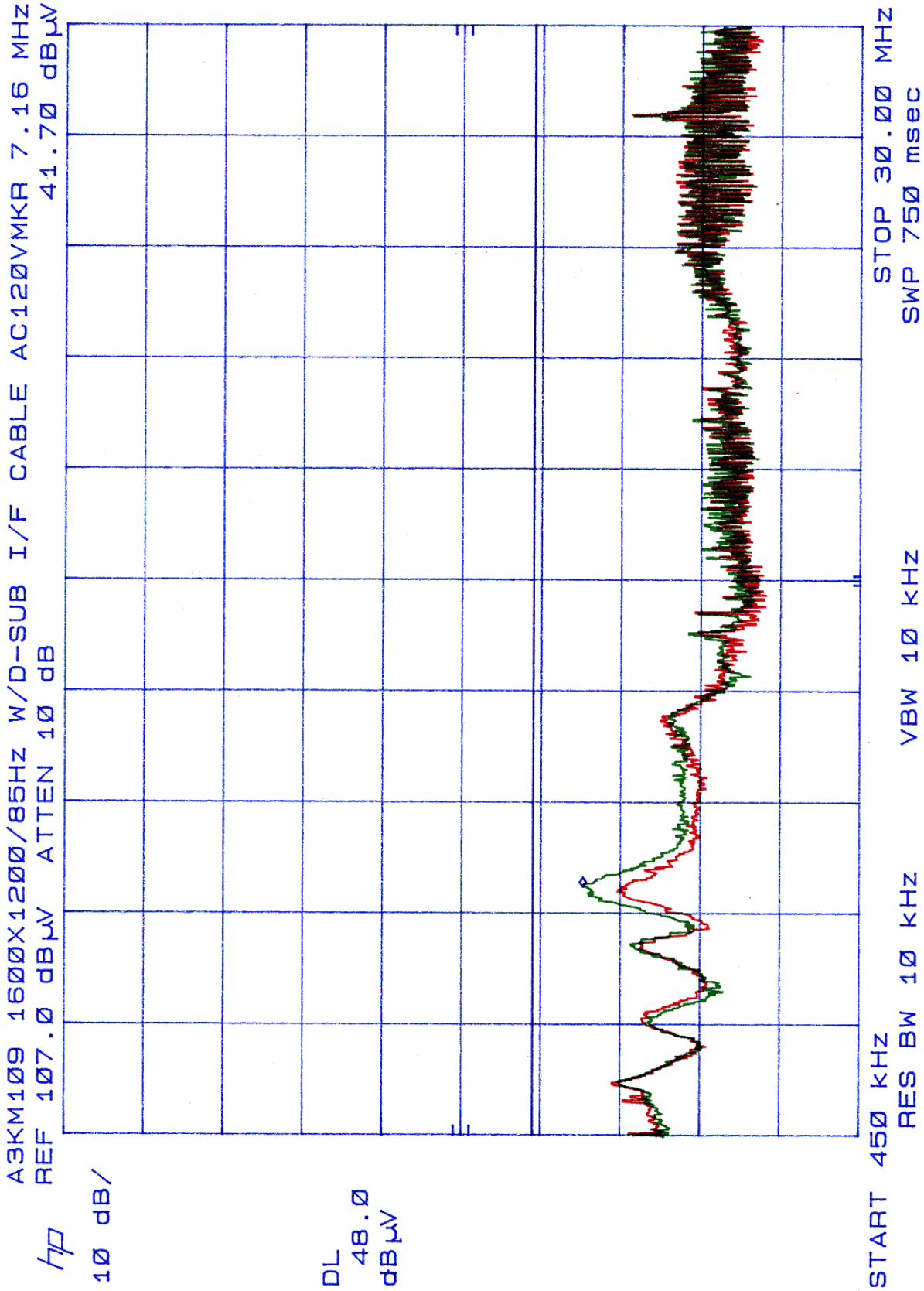
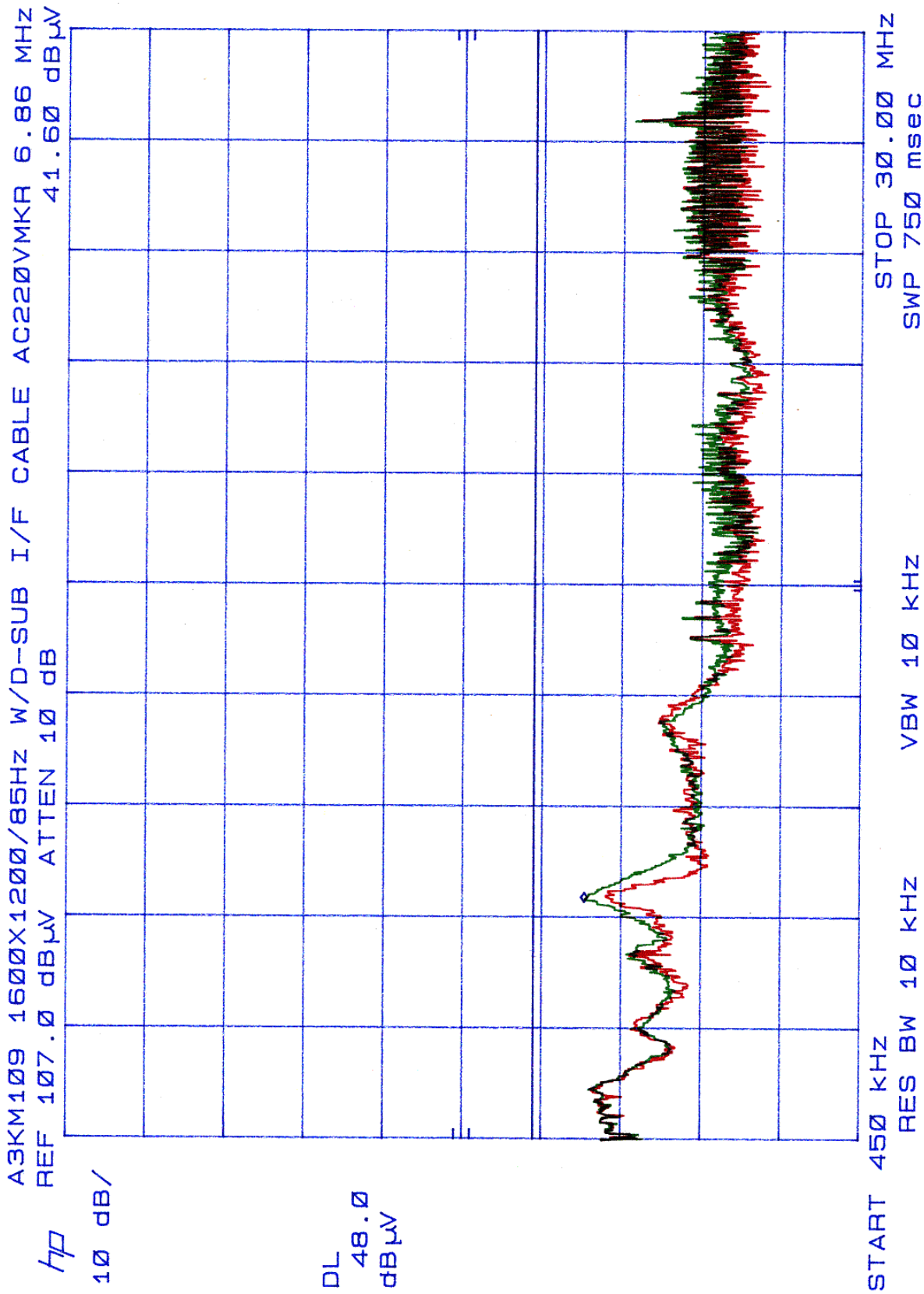

A3KM109 1600X1200/85Hz W/D-SUB I/F CABLE AC120VMKR 7.16 MHz
REF 107.0 dBµV ATTEN 10 dB 41.70 dBµV
10 dB/
DL
48.0
dBµV
START 450 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 750 msec

Figure 6


A3KM109 1600X1200/85Hz W/D-SUB I/F CABLE AC220VMKR 6.86 MHz
REF 107.0 dBμV ATTEN 10 dB
41.60 dBμV
10 dB/
DL
48.0
dBμV
START 450 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 750 msec

8. Radiated Emission Test

Radiated Emissions

FCC Part 15

Operating conditions EUT:

EUT powered on with scrolling "H" pattern.

Limits:

Frequency range (MHz)	Class A at 10m (dBuv) QP	Class B at 3m (dBuv) QP
30.0 – 88.0	39.0	40.0 Quasi-Peak
88.0 – 216.0	43.5	43.5 Quasi-Peak
216.0 – 960.0	46.5	46.0 Quasi-Peak
960.0 – 1000.0	49.5	54.0 Quasi-Peak
Above 1000.0	49.5	54.0 Average

Test Result :

Passed FCC Class B Limits

Remark:

Date of Test	: 07 Feb, 2002 to 09 Feb, 2002
Test Engineer	: C.C.Wu

For detail measurement results see next pages.

Radiated RF Level – Peak Value

Frequency (MHz)	Horizontal (dBuv/m)	Vertical (dBuv/m)	FCC/B Limit (dBuv/m)
69.62	32.9	31.5	40
121.86	31.26	35.46	43.5
156.67	28.55	30.85	43.5
174.09	30.52	30.02	43.5
261.13	39.24	37.74	46
306.05	29.724	29.524	46
318.05	30.472	29.872	46
330.76	30.144	29.544	46
557.09	33.268	33.468	46
572.73	34.852	35.452	46
591.92	35.904	AMBIENT	46
609.3	34.988	34.688	46
626.73	37.68	36.18	46

Spectrum Analyzer Setting:
RBW: 100KHz
VBW: 100KHz

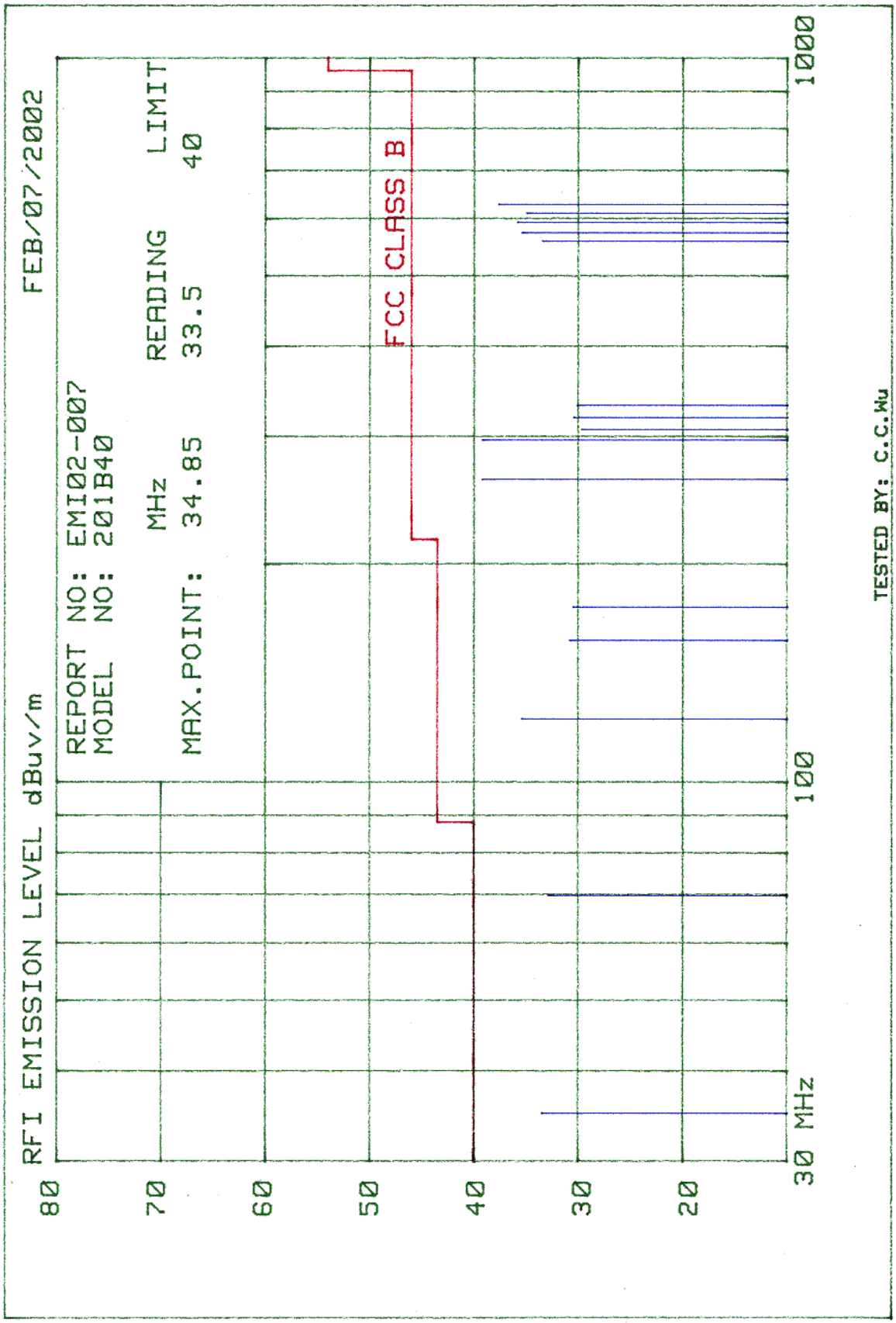
Quasi-peak Values were taken with Rohde & Schwarz ESVS 30 EMI test receiver.

Radiated RF Level – QP Value

Frequency (MHz)	Horizontal (dBuv/m)	Vertical (dBuv/m)	FCC/B Limit (dBuv/m)
34.85	27.5	33.5	40
295.95	39.22	37.92	46

The spectrum was scanned from 30MHz to 1000MHz and the significant emissions were recorded.
Test distance between device under test and receiving antenna was 3-meter.
Sample of calculation:
Final value (dBuv/m) = Antenna Factor (dB) + Cable Loss (dB) + Reading value (dBuv/m)

Figure 7


RFI EMISSION LEVEL dBuv/m
FEB/07/2002
REPORT NO: EMI02-007
MODEL NO: 201B40
MHz READING LIMIT
MAX.POINT: 34.85 33.5 40
FCC CLASS B
80
70
60
50
40
30
20
30 MHz
100
1000
TESTED BY: C.C.Wu

Radiated RF Level – Peak Value

Frequency (MHz)	Horizontal (dBuv/m)	Vertical (dBuv/m)	FCC/B Limit (dBuv/m)
69.63	30	32.2	40
121.87	28.16	36.56	43.5
139.3	29.89	32.19	43.5
156.67	30.95	31.75	43.5
174.1	27.92	29.62	43.5
261.12	38.74	37.14	46
306.05	29.824	29.224	46
318.05	29.272	29.472	46
330.76	30.244	29.344	46
522.29	34.476	36.376	46
557.09	33.868	35.068	46
609.3	35.488	34.688	46
626.73	37.28	36.88	46
661.52	38.716	38.416	46
765.98	38.856	39.556	46

Spectrum Analyzer Setting:
RBW: 100KHz
VBW: 100KHz

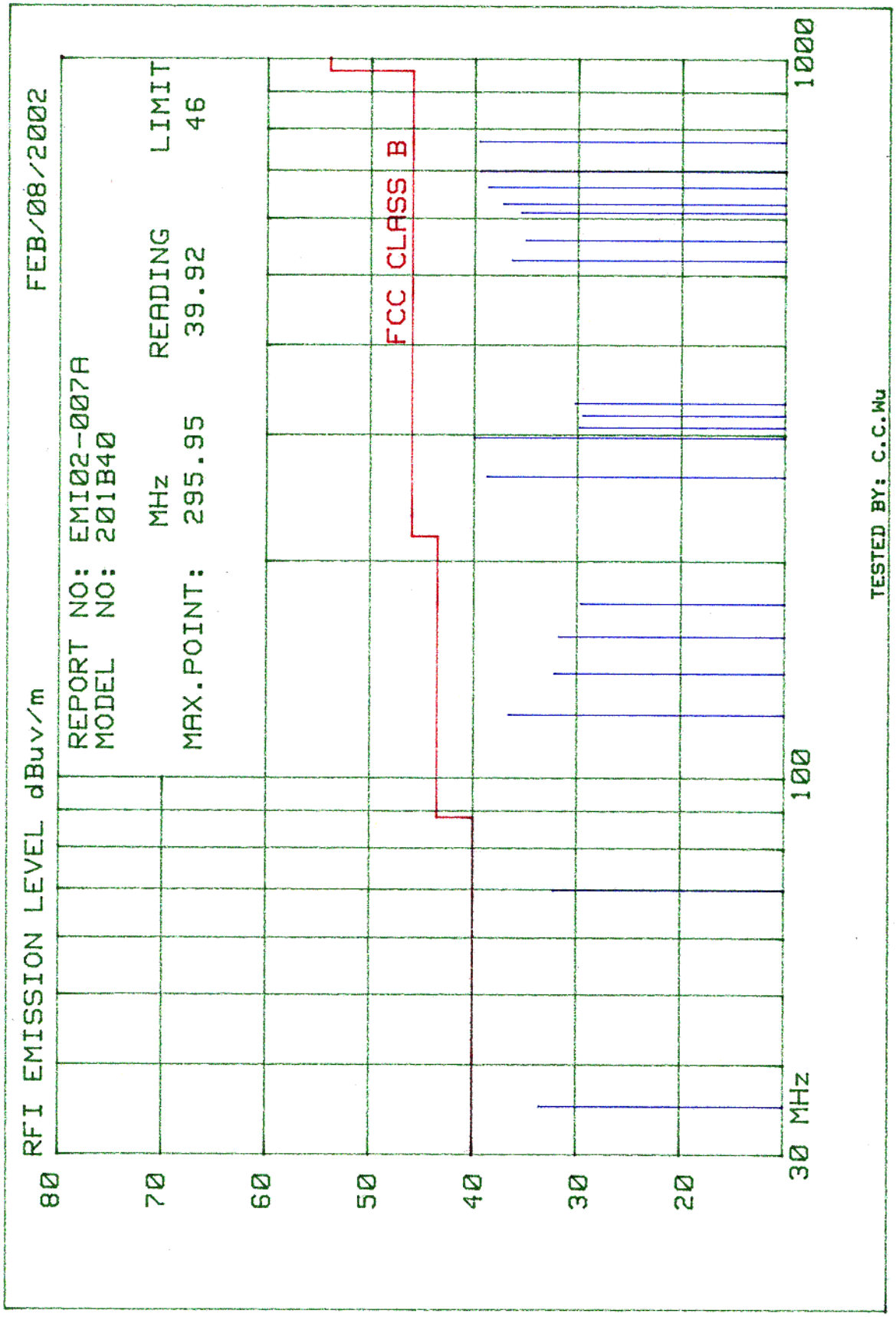
Quasi-peak Values were taken with Rohde & Schwarz ESVS 30 EMI test receiver.

Radiated RF Level – QP Value

Frequency (MHz)	Horizontal (dBuv/m)	Vertical (dBuv/m)	FCC/B Limit (dBuv/m)
34.85	28.3	33.5	40
295.95	39.92	38.42	46
696.36	37.604	39.504	46

The spectrum was scanned from 30MHz to 1000MHz and the significant emissions were recorded.
Test distance between device under test and receiving antenna was 3-meter.
Sample of calculation:
Final value (dBuv/m) = Antenna Factor (dB) + Cable Loss (dB) + Reading value (dBuv/m)

Figure 8


RFI EMISSION LEVEL dBuv/m
FEB/08/2002
REPORT NO: EMI02-007A
MODEL NO: 201B40
MHz READING LIMIT
MAX.POINT: 295.95 39.92 46
FCC CLASS B
80
70
60
50
40
30
20
30 MHz
100
1000
TESTED BY: C.C.Wu

Radiated RF Level – Peak Value

Frequency (MHz)	Horizontal (dBuv/m)	Vertical (dBuv/m)	FCC/B Limit (dBuv/m)
55.07	29.25	32.05	40
68.83	26.47	28.37	40
110.11	32.3	34.2	43.5
123.82	29.32	33.22	43.5
137.58	28.18	28.68	43.5
151.34	28.65	29.15	43.5
165.07	26.95	27.15	43.5
261.43	39.24	37.84	46
288.95	38.75	37.95	46
302.72	29.512	30.812	46
343.97	30.656	29.956	46
357.72	30.3	30.4	46
385.26	31.06	31.86	46
412.76	31.256	30.656	45
467.79	32.832	33.432	46
522.85	34.284	33.784	46
591.63	34.704	35.404	46
619.12	36.308	35.708	46

Spectrum Analyzer Setting:
RBW: 100KHz
VBW: 100KHz

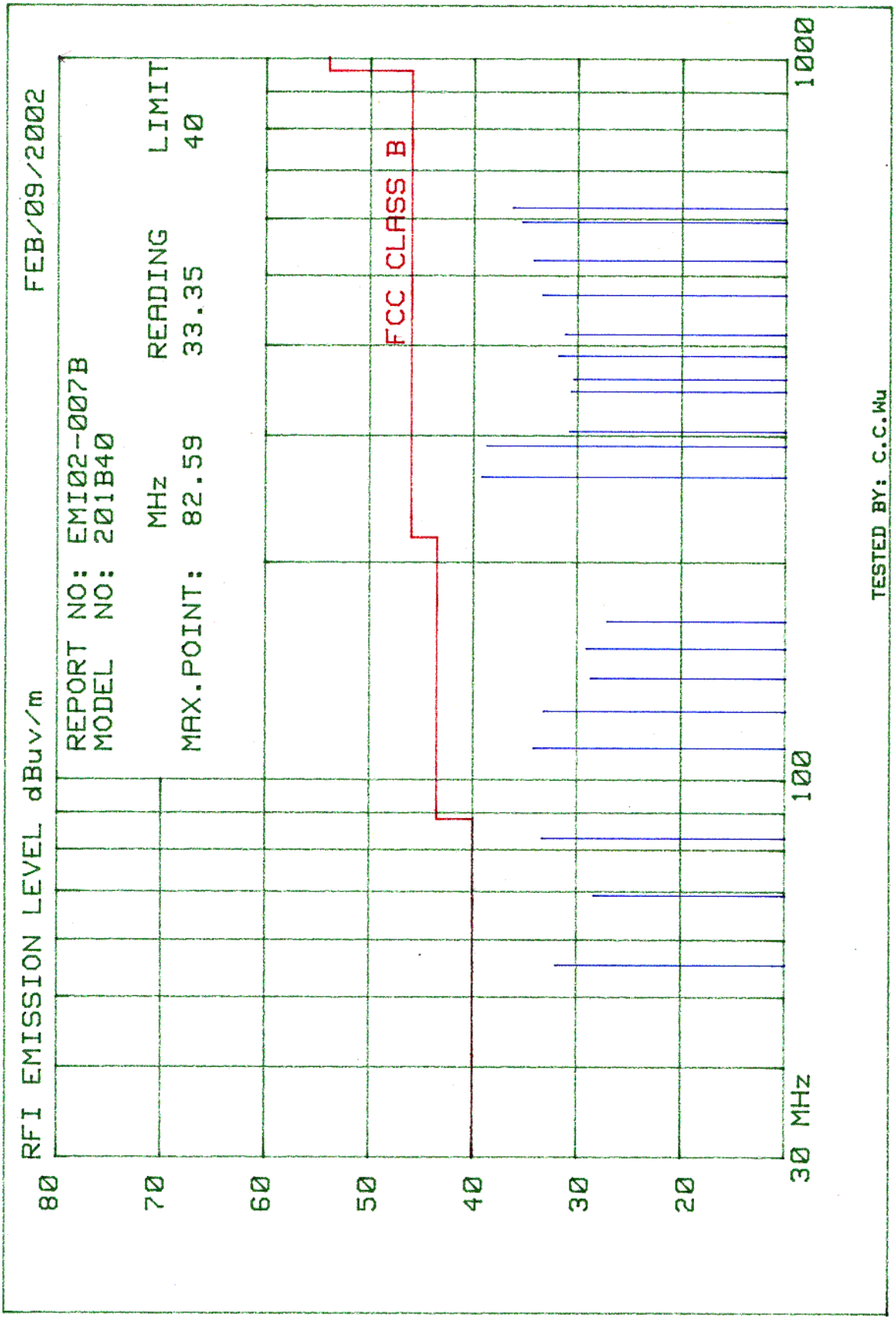
Quasi-peak Values were taken with Rohde & Schwarz ESVS 30 EMI test receiver.

Radiated RF Level – QP Value

Frequency (MHz)	Horizontal (dBuv/m)	Vertical (dBuv/m)	FCC/B Limit (dBuv/m)
82.59	30.85	33.35	40

The spectrum was scanned from 30MHz to 1000MHz and the significant emissions were recorded.
Test distance between device under test and receiving antenna was 3-meter.
Sample of calculation:
Final value (dBuv/m) = Antenna Factor (dB) + Cable Loss (dB) + Reading value (dBuv/m)

Figure 9


RFI EMISSION LEVEL dBuv/m
FEB/09/2002
REPORT NO: EMI02-007B
MODEL NO: 201B40
MAX.POINT: 82.59 MHz
READING 33.35
LIMIT 40
FCC CLASS B
80
70
60
50
40
30
20
30 MHz
100
1000
TESTED BY: C.C.Wu