

Test Report, Measurements of RFI

The following pages show the test setup and the test results for Olicom RF3530. There are two reports one showing test using unshielded cable and one for shielded cable.

TEST REPORT



DELTA

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**Measurements of radio frequency interference from
OC-3530 using unshielded cable
Manufactured by Olicom A/S
Project no.: K220578-2
Date: 1998-05-29**

Title Measurements of radio frequency interference from
OC-3530 using unshielded cable

Test object OC-3530

Report no. DANAK-193866

Project no. K220578-2

Dates of test 1998-03-05 and 1998-03-06

Client Olicom A/S
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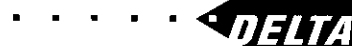
Contact person Mr. Bo Bøgeskov Thomsen

Manufacturer Olicom A/S

Specifications EN 55022 class B
FCC Rules and Regulations part 15, subpart B, class B
VCCI class B

Test personnel Henrik Egeberg Nielsen

Results The emission from the OC-3530 was below the limit of EN
55022 class B, FCC Rules and Regulations part 15, subpart
B, class B and VCCI class B when using UTP cable.



Date 1998-05-29

Project manager

A handwritten signature in black ink, appearing to read "Christian Maarssø", written over a horizontal line.

Christian Maarssø, B.Sc.E.E., EMC
DELTA Electronics Testing

Responsible

A handwritten signature in black ink, appearing to read "Jørgen Duvald Christensen", written over a horizontal line.

Jørgen Duvald Christensen
Department Manager, EMC
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1. SUMMARY OF TEST RESULTS

The results of the emission tests can be summarised as follows:

Emission tests	EN 55022 class B	FCC class B*	VCCI class B	CISPR 22 class B
Conducted emission, AC mains	Passed	Passed	Passed	Passed
Radiated electromagnetic field	Passed	Passed*	Passed	Passed

Abbreviations : Passed : The emission was below the limit.
Not done : No test was performed.
N/A : Not applicable.
Not relevant : The test was not relevant for the test object.

* The FCC class B was demonstrated by compliance with EN 55022:1994, class B.

The test results relate only to the specimen tested.

2. TEST SPECIMEN

Category	:	Computer network
Manufacturer	:	Olicom A/S
Model/Type	:	OC-3530
Part no.	:	-
Serial no.	:	133430004
Supply voltage	:	115 / 230 VAC
Operational mode	:	H-test. See <i>section 3.1</i> .

3. GENERAL TEST CONDITIONS

3.1 Test set-up

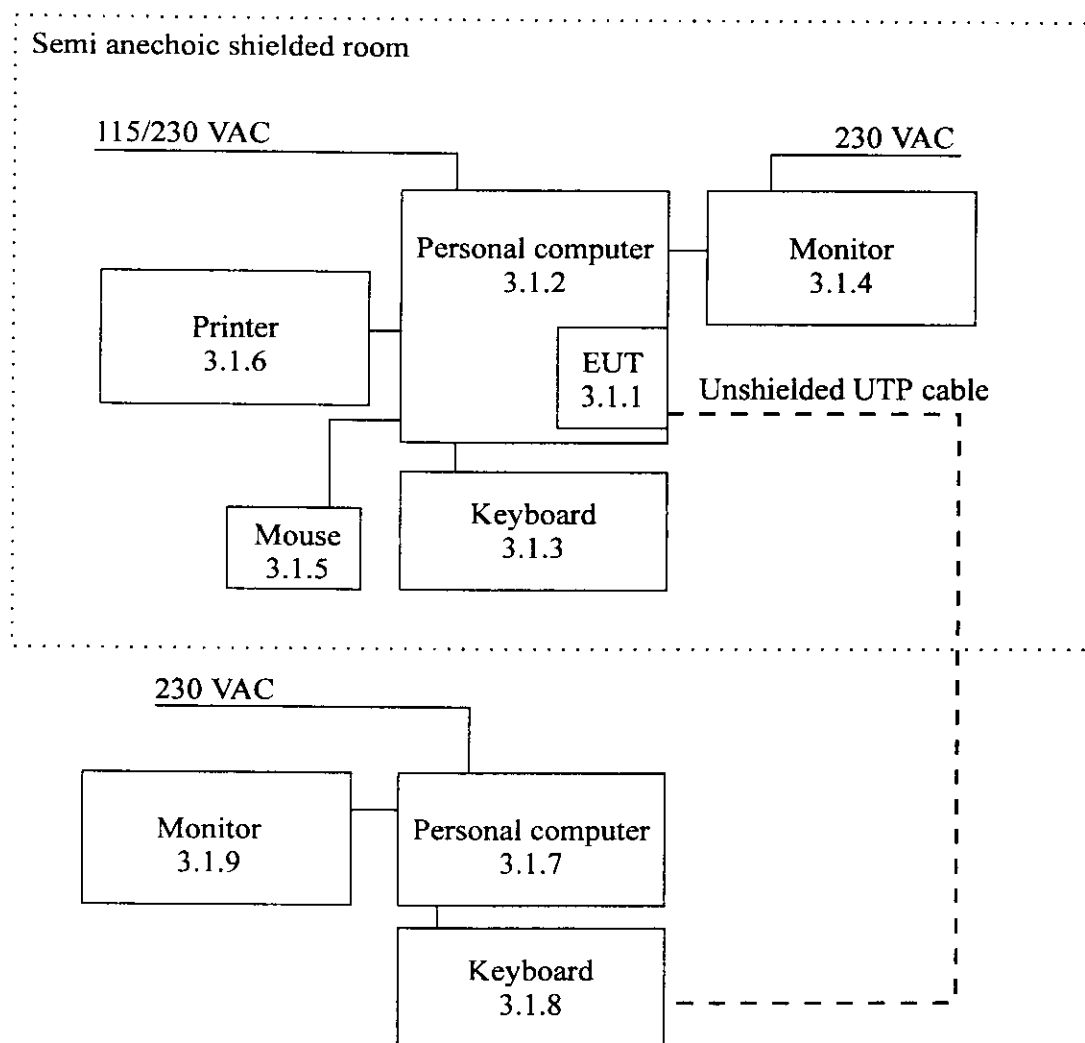


FIG. 1 Test set-up including test object and peripheral equipment.

The complete system used during the tests consisted of the following units:

3.1.1 EUT

Manufacturer	:	Olicom A/S
Model/Type	:	OC-3530
Part no.	:	-
Serial no.	:	133430004

3.1.2 Personal computer

Manufacturer : Gateway 2000
Model/type : ATX Tower
Part no. : -
Serial no. : 5614156
FCC ID : HWYTHP5133T

3.1.3 Keyboard

Manufacturer : Digital
Model/type : RT102
Part no. : 120117 Rev. A
Serial no. : 70540913
FCC ID : AQ6-MTN4XZ15

3.1.4 Monitor

Manufacturer : Gateway 2000
Model/type : CPD-15F23
Part no. : -
Serial no. : 8273058
FCC ID : AK8CPD15SF1

3.1.5 Mouse

Manufacturer : Logitech
Model/type : M-RB24
Part no. : -
Serial no. : MA1039300161
FCC ID : DZLMRB24T

3.1.6 Printer

Manufacturer : Hewlett Packard
Model/type : DeskJet 550 C
Part no. : -
Serial no. : 3316S41924
FCC ID : B94C212X

3.1.7 Personal Computer

Manufacturer : NEC
Model/type : MT-2300-20002
Part no. : -
Serial no. : 4X02969UB
FCC ID : B7Z14

3.1.8 Keyboard

Manufacturer	:	Gateway 2000
Model/type	:	2194013-XX-XXX
Part no.	:	-
Serial no.	:	101KEYBPS2
FCC ID	:	D7J2194013-XX

3.1.9 Monitor

Manufacturer	:	KFC
Model/type	:	-
Part no.	:	CB1414VL
Serial no.	:	CAKKU6938116
FCC ID	:	-

4. TESTS AND RESULTS

4.1 Conducted emission, AC mains (EN 55022, class B)

Requirements		
Specification	EN 50081-1:1992	
Test method	EN 55022:1994 (CISPR 22:1993), class B	
Frequency range	0.15 - 30 MHz	
Limit: (quasi-peak)	0.15-0.50 MHz: (decreasing lin. with the logarithm of freq.) 0.50-5 MHz: 5-30 MHz:	66-56 dB μ V 56 dB μ V 60 dB μ V
Limit: (average)	0.15-0.50 MHz: (decreasing lin. with the logarithm of freq.) 0.50-5 MHz: 5-30 MHz:	56-46 dB μ V 46 dB μ V 50 dB μ V
Supply voltage	230 VAC	
Test record sheets	Annex 2	

Results:

The emission was within the specified limits.

Comments:

None.

4.2 Conducted emission, AC mains (FCC, class B / EN 55022, class B)

Requirements		
Specification	FCC Rules and Regulations part 15, subpart B class B, demonstrated by compliance with EN 55022:1994, class B	
Test method	CISPR 22:1993	
Frequency range	0.15 - 30 MHz	
Test set-up	ANSI C63.4:1992	
Limit: (quasi-peak)	0.15-0.50 MHz: (decreasing lin. with the logarithm of freq.)	66-56 dB μ V
	0.50-5 MHz:	56 dB μ V
	5-30 MHz:	60 dB μ V
Limit: (average)	0.15-0.50 MHz: (decreasing lin. with the logarithm of freq.)	56-46 dB μ V
	0.50-5 MHz:	46 dB μ V
	5-30 MHz:	50 dB μ V
Supply voltage	115 VAC	
Test record sheets	Annex 3	

Results:

The emission was within the specified limits.

Comments:

None.

4.3 Conducted emission, AC mains (VCCI, class B)

Requirements		
Specification	VCCI:1989	
Test method	EN 55022:1994 (CISPR 22:1993), class B	
Frequency range	0.15 - 30 MHz	
Limit: (quasi-peak)	0.15-0.50 MHz:	66-56 dB μ V
	0.50-5 MHz:	56 dB μ V
	5-30 MHz:	60 dB μ V
Limit: (average)	0.15-0.50 MHz:	56-46 dB μ V
	0.50-5 MHz:	46 dB μ V
	5-30 MHz:	50 dB μ V
Supply voltage	230 VAC	
Test record sheets	Annex 4	

Results:

The emission was within the specified limits.

Comments:

None.

4.4 Radiated electromagnetic field (EN 55022, class B)

Requirements		
Specification	EN 50081-1:1992	
Test method	EN 55022:1994 (CISPR 22:1993), class B	
Measuring distance	10 m	
Frequency range	30 - 1000 MHz	
Limit: (quasi-peak)	30-230 MHz: 230-1000 MHz:	30 dB μ V/m 37 dB μ V/m
Supply voltage	115 VAC	
Test record sheets and photos		<i>Annex 5</i>

Results:

The emission was within the specified limits.

Comments:

None.

4.5 Radiated electromagnetic field (FCC, class B / EN 55022, class B)

Requirements		
Specification	FCC Rules and Regulations part 15, subpart B, class B, demonstrated by compliance with EN 55022:1995, class B	
Test method	EN 55022:1995 (CISPR 22:1993), class B	
Test set-up	ANSI C63.4:1992	
Measuring distance	10 m	
Frequency range	30 - 1000 MHz	
Limit: (quasi-peak)	30-230 MHz: 230-1000 MHz:	30 dB μ V/m 37 dB μ V/m
Supply voltage	115 VAC	
Test record sheets and photos		<i>Annex 6</i>

Results:

The emission was within the specified limits.

Comments:

None.

4.6 Radiated electromagnetic field (VCCI, class B)

Requirements		
Specification	VCCI:1989	
Test method	EN 55022:1994 (CISPR 22:1993), class B	
Measuring distance	10 m	
Frequency range	30 - 1000 MHz	
Limit:	30-230 MHz:	30 dB μ V/m
(quasi-peak)	230-1000 MHz:	37 dB μ V/m
Supply voltage	115 VAC	
Test record sheets and photos	Annex 7	

Results:

The emission was within the specified limits.

Comments:

None.

ANNEX 1

List of instruments

(1 page)

LIST OF INSTRUMENTS

EC NO.	INSTRUMENT	MANUFACTURER	TYPE
29797	BILOG ANTENNA	CHASE	CBL 6111A
29301	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5
29337	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5
29772	MEASURING RECEIVER	ROHDE & SCHWARZ	ESVP
29300	MEASURING RECEIVER	ROHDE & SCHWARZ	ESH-3
29570	SOFTWARE v. 1.04	ROHDE & SCHWARZ	ESK-1

ANNEX 2

Test record sheets regarding
conducted emission, AC mains (EN 55022, class B and VCCI, class B)

(2 pages)

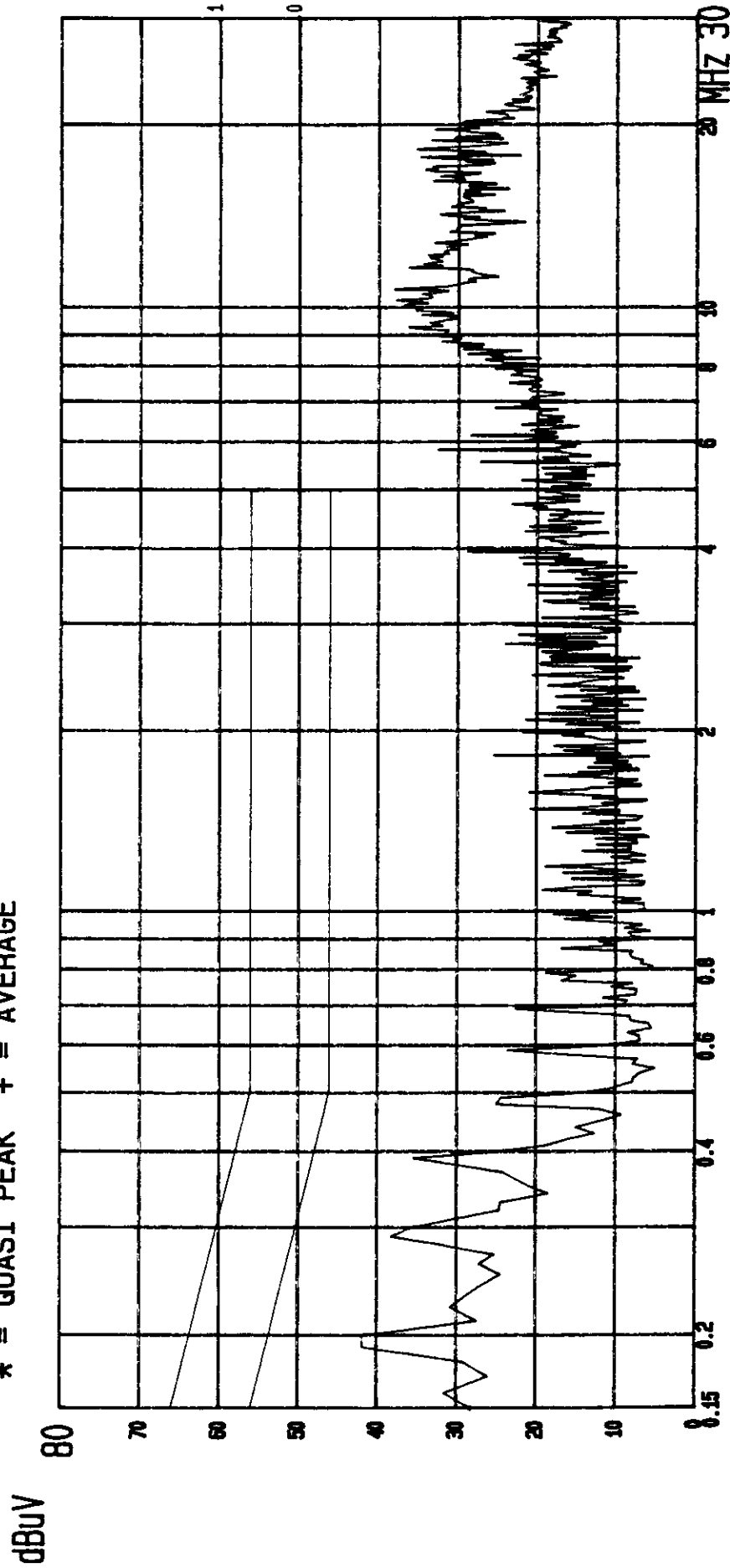
DELTA Electronics Testing EMC dept. Conducted emission, mains

Start of Test: 05.MAR'98 10:13
E.U.T.: OC-3630. (10)
Oper. Condition: H-TEST. UTP CABLE.
Operator: Proj. no: K220578- -HEN
Test Spec: EN 55022 CLASS B. 0.15-30 MHz.

Final evaluation: Quasi Peak/average

* = QUASI PEAK + = AVERAGE

Start Fr. 0.1500 Stop Fr. 30.0000
MHz MHz
IF-BW Detec Att. Peak LN
kHz dB s
0.010



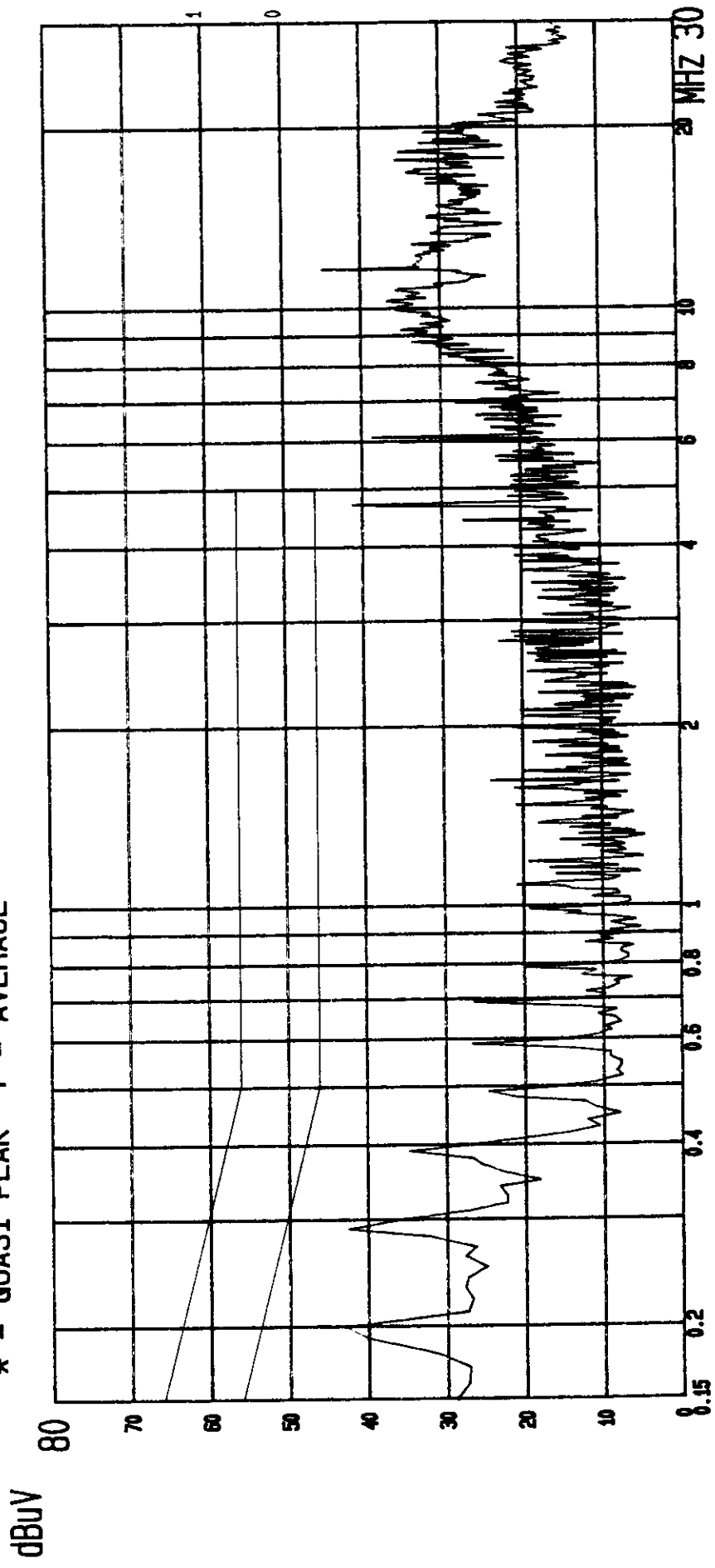
DELTA Electronics Testing EMC dept. Conducted emission, mains

Start of Test: 06.MAR'98 10:19
E.U.T.: OC-3530. (11)
Oper. Condition: H-TEST. UTP CABLE.
Operator: Proj. no: K220578- -HEN
Test Spec:
EN 55022 CLASS B. 0.15-30 MHz.

Final evaluation: Quasi Peak/average

* = QUASI PEAK + = AVERAGE

Start Fr. 0.1500 Stop Fr. 30.0000
MHz MHz
IF-BW Detec 10 Peak LN
kHz for dB s 0.010



ANNEX 3

Test record sheets regarding
conducted emission, AC mains (FCC class B)

(4 pages)

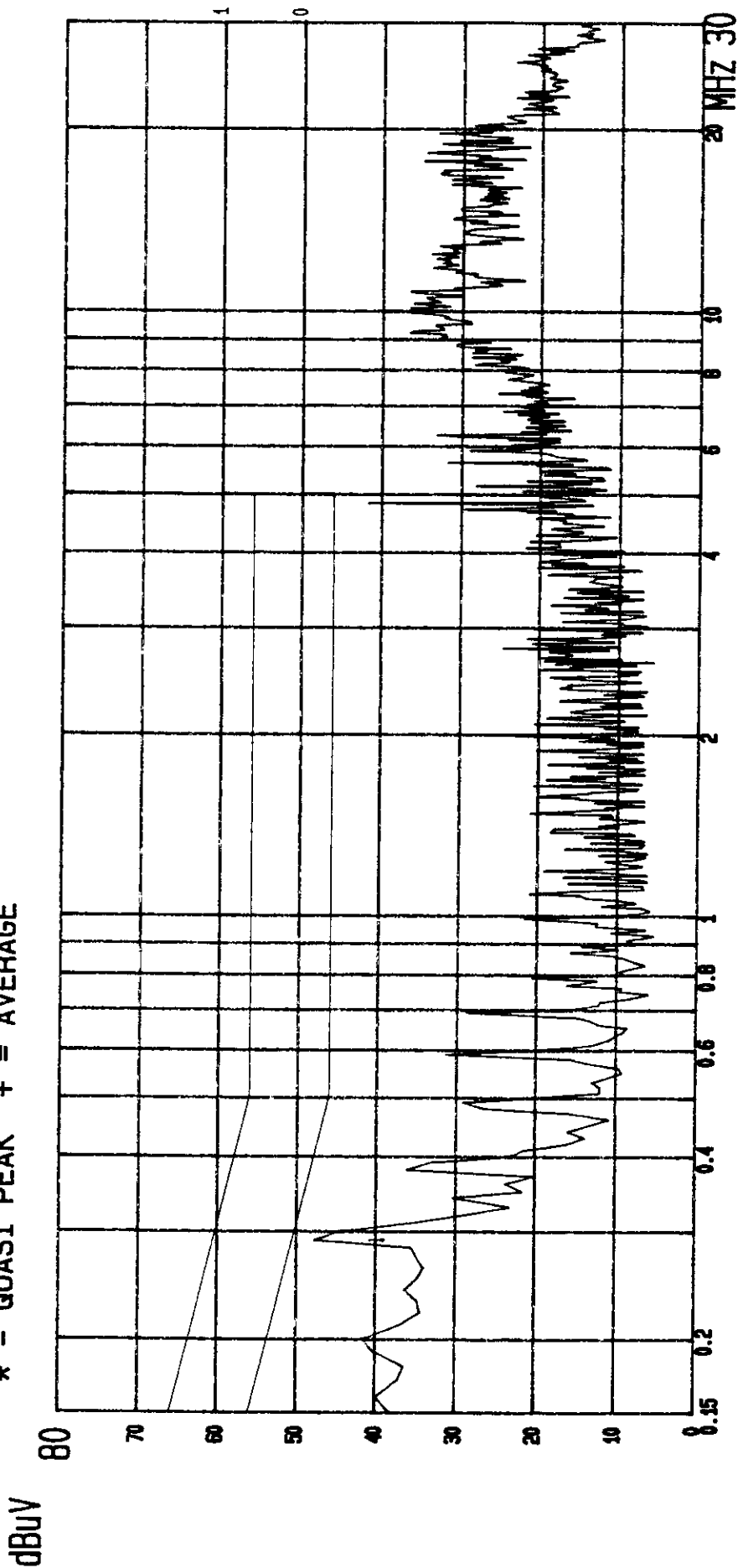
DELTA Electronics Testing EMC dept. Conducted emission, mains

Start of Test: 05.MAR'98 09:51
E.U.T.: DC-3530. (8)
Oper. Condition: H-TEST, UTP CABLE.
Operator: Proj. no: K220578- -HEN
Test Spec: EN 55022 CLASS B. 0.15-30 MHz.

Start Fr. 0.1500 Stop Fr. 30.0000
MHz kHz
Att. dB 10 Peak LN 0.010
Type

Final evaluation: Quasi Peak/average

* = QUASI PEAK + = AVERAGE



DELTA Electronics Testing EMC dept. Conducted emission, mains

Start of Test: 06-MAR'98 08:51 (8)
 E.U.T.: 0C-3630.

Guess1 Peak values			
no list available			
Average values Frequency MHz	Peak dBuV	Average dBuV	Average-Margin dB
0.2900	47.8	40.1	-10.5
* Limit exceeded			

DELTA Electronics Testing EMC dept. Conducted emission, mains

Start of Test: 05.MAR'98 10:01
 E.U.T.: OC-3590.

(9)

Guess1 Peak values
 no list available

Average values Frequency MHz	Peak dBuV	Average dBuV	Average-Margin dB
0.2500	49.6	42.7	-7.9

* Limit exceeded

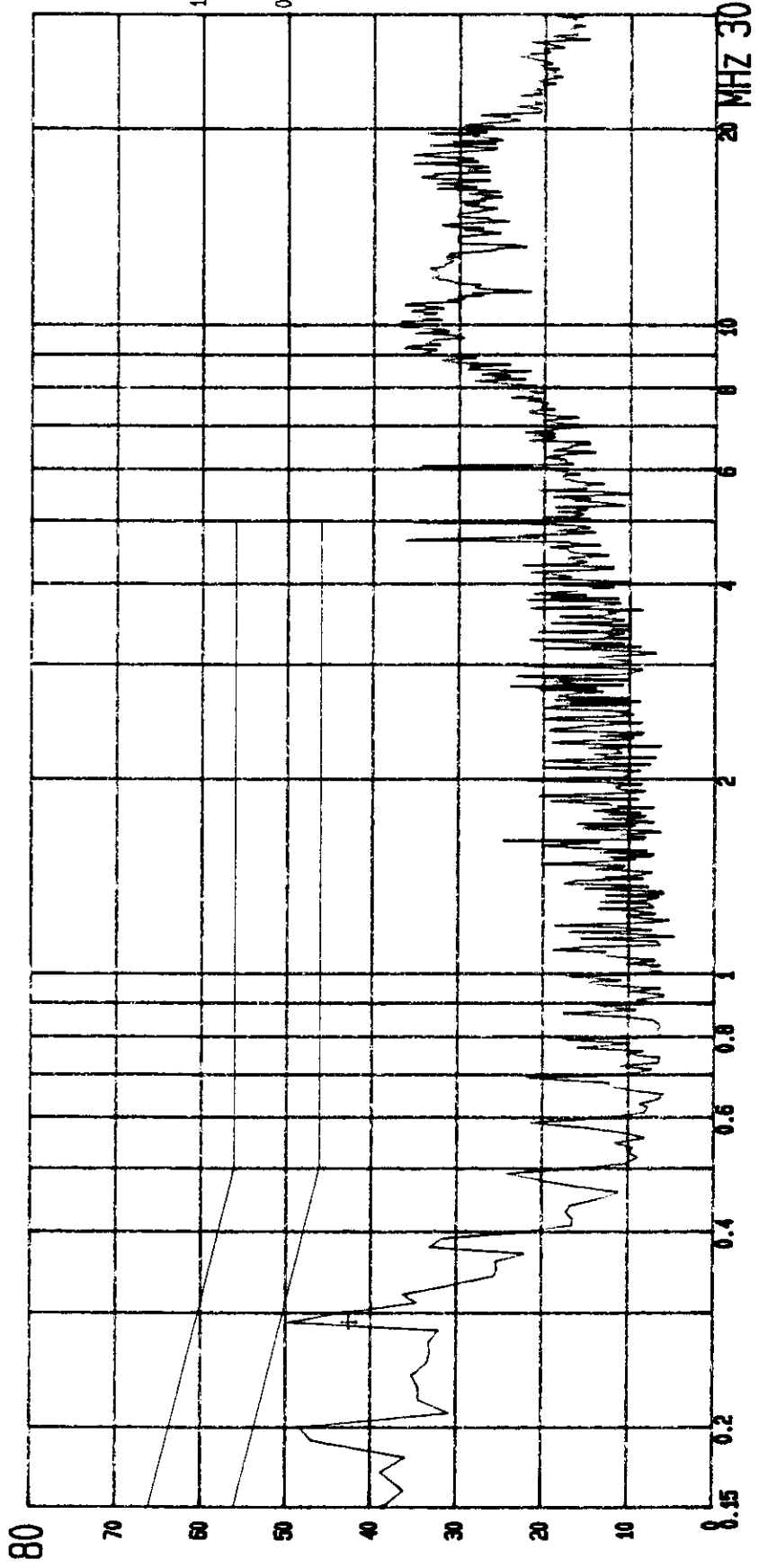
DELTA Electronics Testing EMC dept. Conducted emission, mains

Start of Test: 06.MAR'98 10:01
E.U.T.: OC-3530.
Oper. Condition: H-TEST. UTP CABLE.
Operator: Proj. no: K220578- -HEN
Test Spec: EN 55022 CLASS B. 0.15-30 MHz.

Final evaluation: Quasi Peak/average

* = QUASI PEAK + = AVERAGE

dBuV



Start Fr. 0.1500 Stop Fr. 30.0000 Att. dB 0.010
MHz kHz for s type

ANNEX 4

Test record sheets regarding
conducted emission, AC mains (VCCI, class B)

(2 pages)

DELTA Electronics Testing EMC dept. Conducted emission, mains

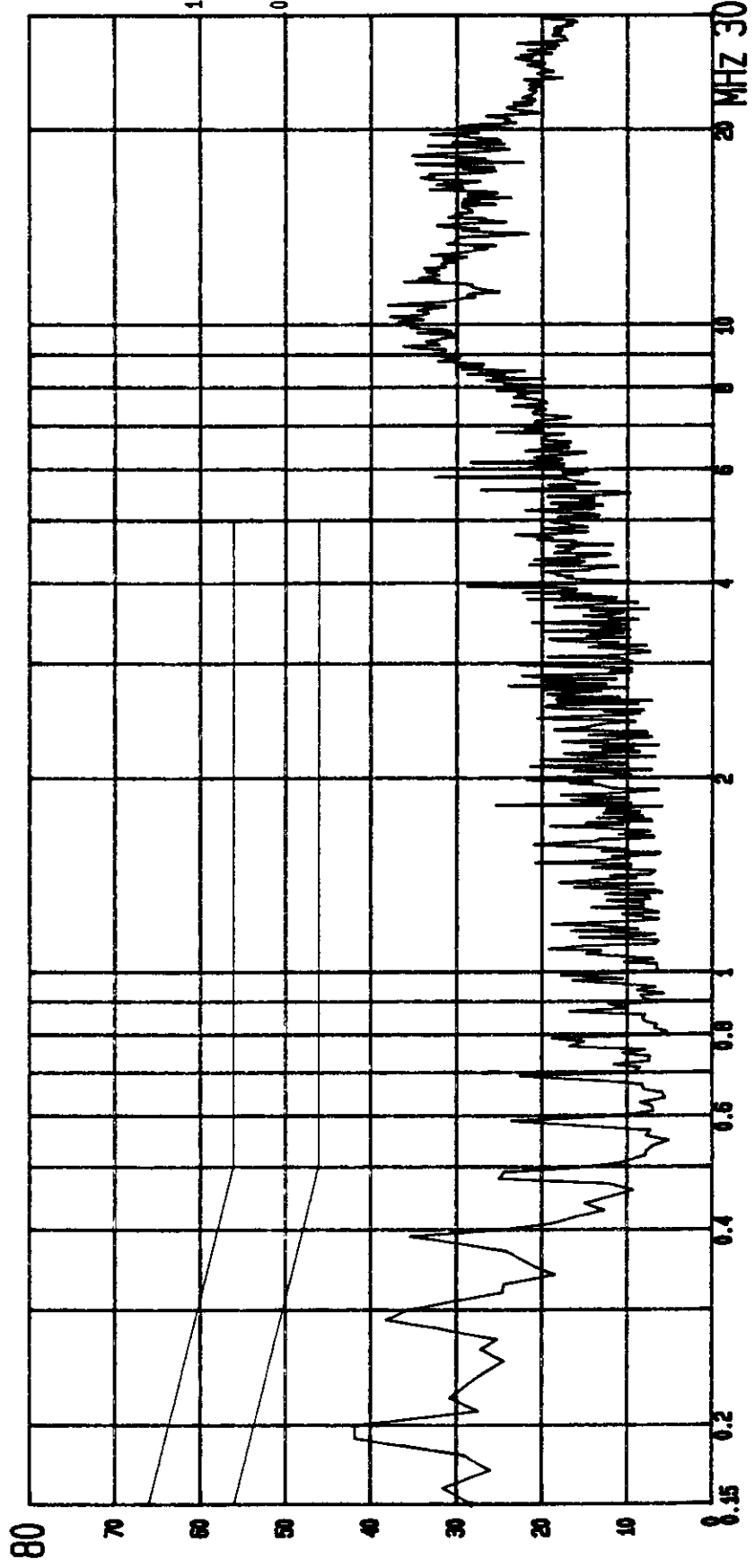
Start of Test: 06.MAR'98 10:13
E.U.T.: OC-3630. (10)
Oper. Condition: H-TEST. UTP CABLE.
Operator: Proj. no: K220578- -HEN
Test Spec: EN 55022 CLASS B. 0.15-30 MHz.

Final evaluation: Quasi Peak/average

* = QUASI PEAK + = AVERAGE

Start Fr. 0.1500 Stop Fr. 30.0000
MHz kHz
Peak LN 0.010
Att. dB s type

dBuV



DELTA Electronics Testing EMC dept. Conducted emission, mains

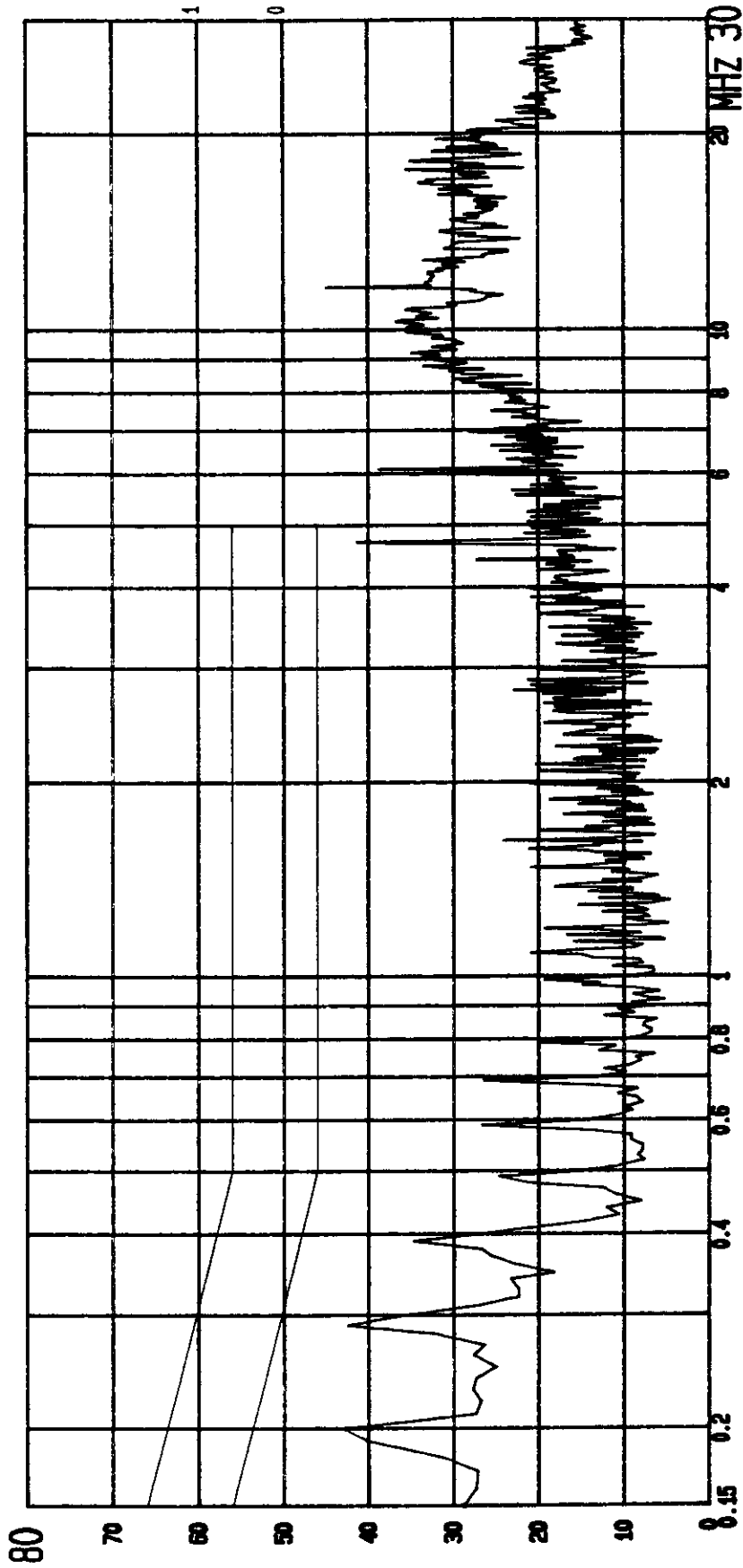
Start of Test: 06.MAR'98 10:19
E.U.T.: OC-3530. (11)
Oper. Condition: H-TEST, UTP CABLE.
Operator: Prof. no: K220578- -HEN
Test Spec: EN 55022 CLASS B. 0.15-30 MHz.

Final evaluation: Quasi Peak/average

* = QUASI PEAK + = AVERAGE

Start Fr. 0.1500 Stop Fr. 30.0000
MHz kHz
Att. dB 10 Peak LN 0.010
Trained. type

dBuV



ANNEX 5

Test record sheets and photos regarding
radiated electromagnetic field (EN 55022, class B)

(5 pages)

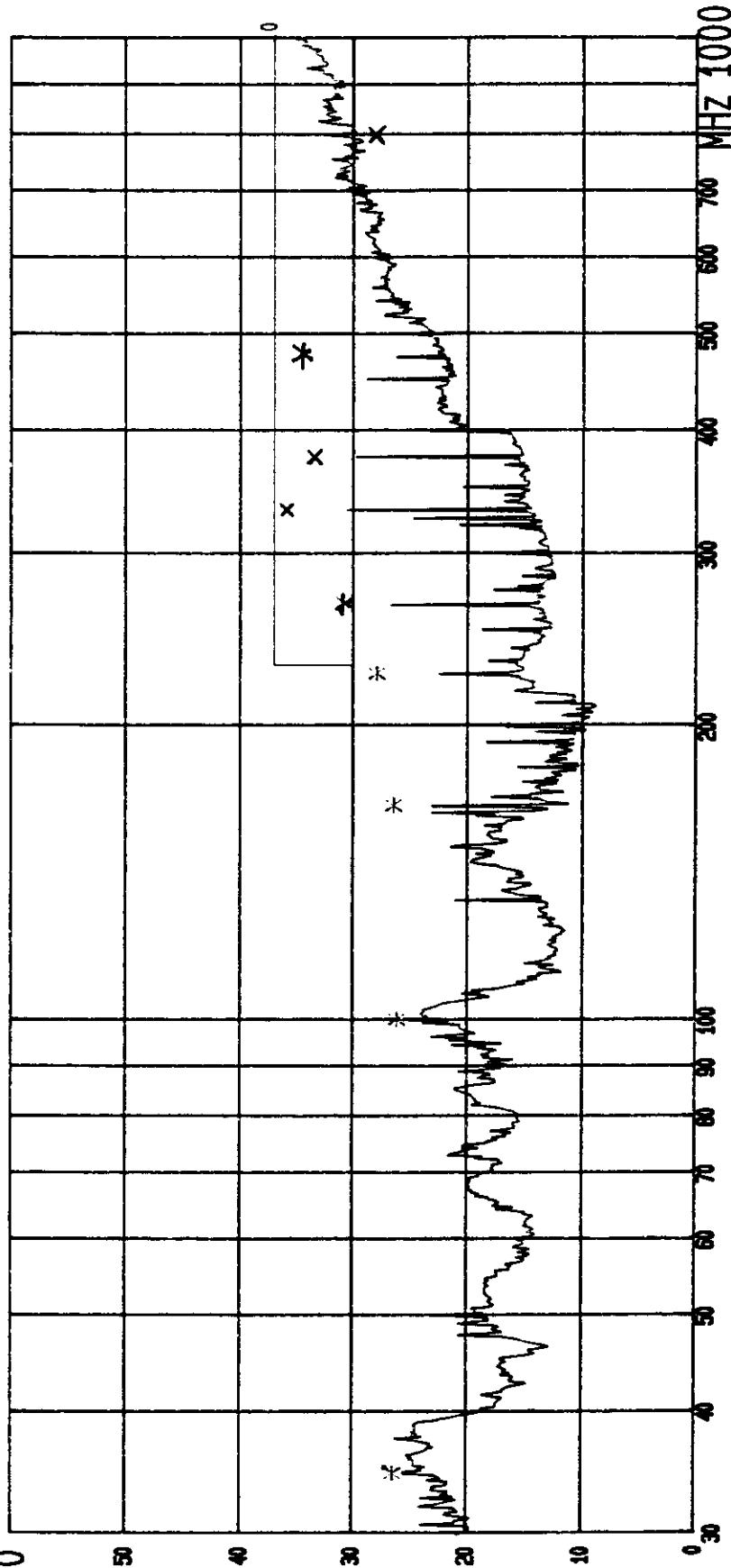
DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-3630. (2)
Oper. Condition: H-TEST. UTP CABLE.
Operator: PROJ NO: K220578- -HEN
Test Spec: EN 55022 CLASS B. 30-1000 MHz (10 METER)

Start Fr. 29.0000 400.0 1000.0
Stop Fr. 400.0 1000.0
IF-BW 120 QP 120 peak
Detec Att. LN LN
Meas.T. 0.020 0.020
type

* = QUASI PEAK

dBuV/m 60



115 VAC.

OLICOM A/S.

**DELTA Electronic Testing EMC Department
Radiated electromagnetic field**

Start of Test: 05.MAR'98 11:51
E.U.T.: 0C-3530. (2)

Frequency MHz	Level. dBuV/m	Margin dB	Q P h/v	Pol h/v	Height m	Azimuth deg.
34.5000	26.4	-3.5		v	0.98	149
100.0000	26.1	-3.9		v	1.33	165
165.7630	26.5	-3.5		v	0.99	266
224.9710	28.0	-2.0		h	2.87	274

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-S630. (2)

m e a s u r e d v a l u e s			
Frequency MHz	Level. dBuV/m	Margin dB	Poi h/v
331.5470	35.9	-1.0	v
375.0000	33.7	-3.2	h
800.0000	26.7	-10.2	h
* Limit exceeded			
			Height m
			41
			143
			288
			Azimuth deg.

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 13:29
 E.U.T.: OC-3530. (3)

measured		values	
Frequency	Level.	Margin	Pol
MHz	dBuV/m	dB	h/v
265.2389	30.8	-6.1	v
475.0000	34.4	-2.5	v
			Height
			m
			339
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ANNEX 6

Test record sheets and photos regarding
radiated electromagnetic field (FCC, class B / EN 55022, class B)

(5 pages)

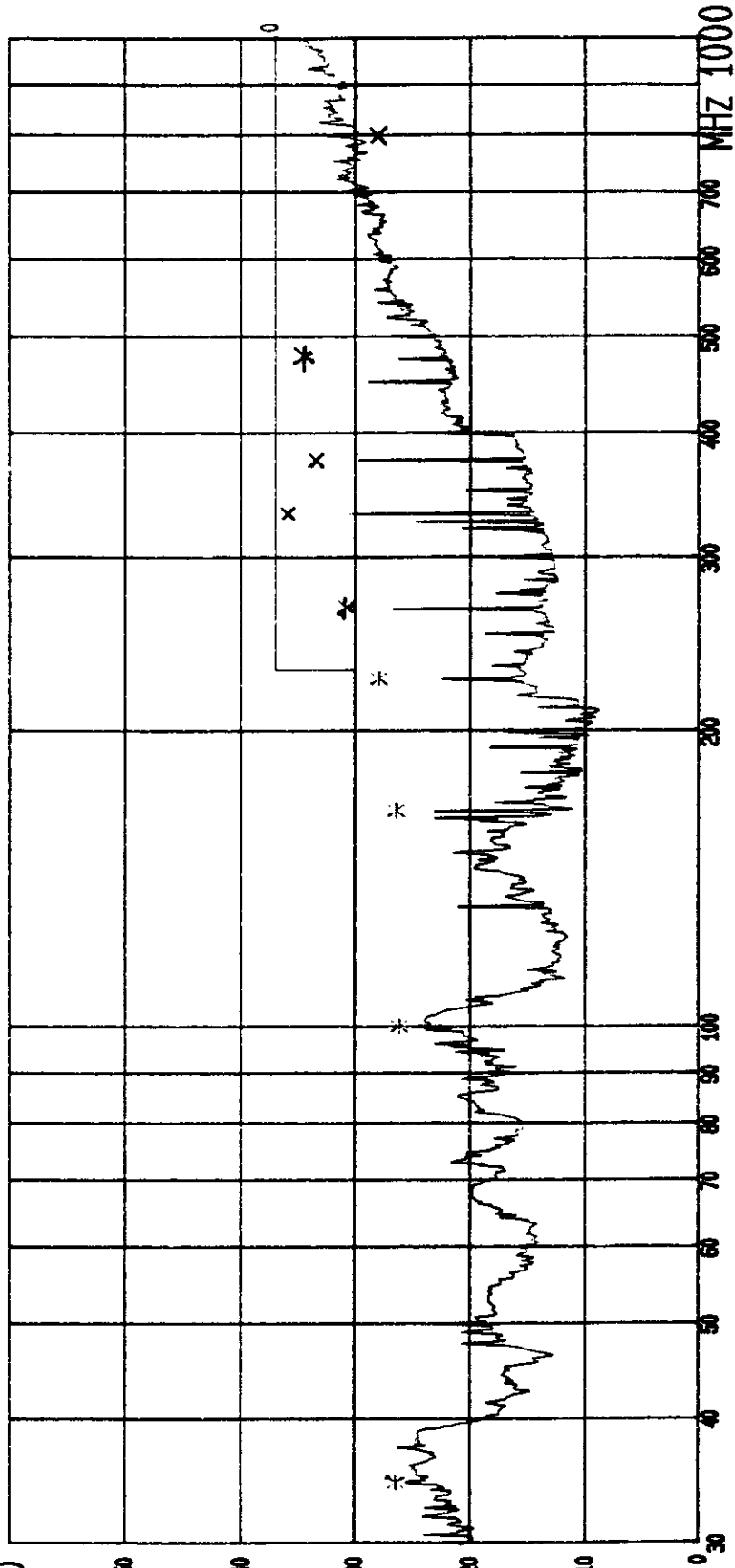
DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-3530. (2)
Oper. Condition: H-TEST. UTP CABLE.
Operator: PROJ NO: K220578- -HEN
Test Spec:
EN 55022 CLASS B. 30-1000 MHz (10 METER)

Start Fr. Stop Fr. IF-BW Detec Att. Meas.T. Transd.
MHz MHz kHz tor dB s type
29.0000 400.0 120 QP LN 0.020
400.0 1000.0 120 peak LN 0.020

* = QUASI PEAK

dBuV/m 60



115 VAC.

OLICOM A/S.

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-3530.

(2)

m e a s u r e d			v a l u e s		
Frequency MHz	Level. dBuV/m	Margin dB	Pol h/v	Height m	Azimuth deg.
34.6000	26.4	-3.6	v	0.98	149
100.0000	26.1	-3.9	v	1.39	165
165.7630	26.5	-3.5	v	0.99	256
224.9710	26.0	-2.0	h	2.87	274
* Limit exceeded					

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: 00-3530. (2)

m e a s u r e d		Q P		V a l u e s	
Frequency MHz	Level. dBuV/m	Margin dB	Pol h/v	Height m	Azimuth deg.
331.5470	35.8	-1.0	v	0.98	41
375.0000	33.7	-3.2	h	3.15	143
800.0000	25.7	-10.2	h	2.72	288
N Limit exceeded					

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 13:29
 E.U.T.: OC-3530. (3)

m e a s u r e d				v a l u e s		
Frequency MHz	Level. dBuV/m	Margin dB	Q P h/v	Pol h/v	Height m	Azimuth deg.
265.2389	30.8	-6.1		v	1.01	339
475.0000	34.4	-2.5		v	0.99	345

* Limit exceeded

ANNEX 7

Test record sheets and photos regarding
radiated electromagnetic field (VCCI, class B)

(5 pages)

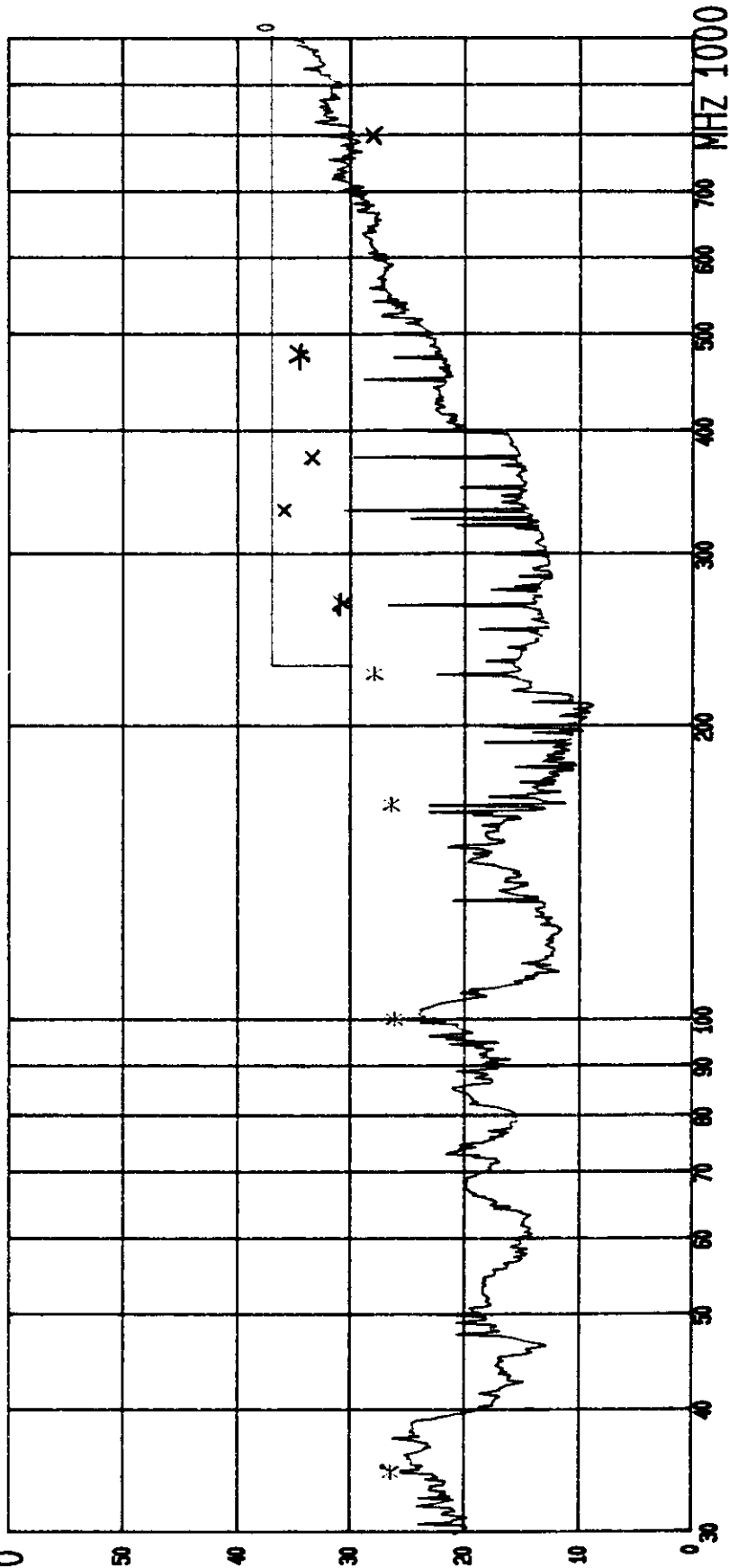
DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-3530. (2)
Oper. Condition: H-TEST. UTP CABLE.
Operator: PROJ NO: K220578- -HEN
Test Spec: EN 55022 CLASS B. 30-1000 MHz (10 METER)

Start Fr. 29.0000 400.0 400.0
MHz MHz MHz
Stop Fr. 400.0 1000.0
MHz MHz
IF-BW 120 120
kHz kHz
Detec QP Peak
Att. LN LN
dB dB
Meas. 0.020
T. 0.020
type 0.020

* = QUASI PEAK

dBuV/m 60



115 VAC.

OLICOM A/S.

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-3530.

(2)

m e a s u r e d		Q P		v a l u e s	
Frequency MHz	Level. dBuV/m	Margin dB	Pol h/v	Height m	Azimuth deg.
34.6000	26.4	-3.6	v	0.98	149
100.0000	26.1	-3.9	v	1.33	165
165.7630	26.6	-3.6	v	0.99	266
224.9710	28.0	-2.0	h	2.87	274
* Limit exceeded					

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 11:51
E.U.T.: OC-3530. (2)

m e s s u r e d			v a l u e s		
Frequency MHz	Level. dBuV/m	Margin dB	Pol h/v	Height m	Azimuth deg.
331.5470	35.8	-1.0	v	0.98	41
375.0000	33.7	-3.2	h	3.15	143
800.0000	26.7	-10.2	h	2.72	268
* Limit exceeded					

DELTA Electronic Testing EMC Department Radiated electromagnetic field

Start of Test: 05.MAR'98 13:28
E.U.T.: 00-3890. (3)

m e e u r e d				v a l u e s		
Frequency MHz	Level. dBuV/m	Margin dB	Q P	Pol h/v	Height m	Azimuth deg.
285.2389	30.6	-8.1		v	1.01	339
475.0000	34.4	-2.5		v	0.99	345

* Limit exceeded