PSION DACOM PLC, DACOM HOUSE, PRESLEY WAY, CROWNHILL, MILTON KEYNES MK8 0EF, UK
Telephone: +44 (0) 1908 261686 Facsimile: +44 (0) 1908 261688
Internet Home Page: http://www.psiondacom.com Internet email: dacom@psion.com

Exhibit D

Test Results

FCC Rules Part 15, Class B

REPORT ON MEASUREMENTS OF RADIO FREQUENCY INTERFERENCE FROM THE PSION DACOM GOLD CARD NET GLOBAL 56k + 10/100 CARD BUS

TRIPLE C SAMPLE No: 3C98/1072/S1

TEST SPECIFICATION: FCC RULES PART 15B CLASS B

TRIPLE C REPORT No: 3C98/1090/1

TRIPLE C

Test Report

TRIPLE C

REPORT ON MEASUREMENTS OF RADIO FREQUENCY INTERFERENCE FROM THE PSION DACOM GOLD CARD NET GLOBAL 56k + 10/100 CARD BUS

TRIPLE C SAMPLE No: 3C98/1072/S1

TEST SPECIFICATION: FCC RULES PART 15B CLASS B

TRIPLE C REPORT No: 3C98/1090/1

Report By:	Steven Youngman
Tested By:	Steven Youngman
Date of Test:	19th October 1998

Released by: J. GORDON-COLEBROOKE Date: 5/11/1998

TRIPLE C
UNIT 5
LAWN FARM BUSINESS CENTRE
GRENDON UNDERWOOD
BUCKINGHAMSHIRE
HP18 0QX
ENGLAND

Telephone: **01296 770088**
Facsimile: **01296 770014**

TABLE OF CONTENTS

REPORT SUMMARY SHEET

Test:	RADIO FREQUENCY INTERFERENCE EMISSIONS
Test Specification:	FCC RULES PART 15 SUBPART B CLASS B
Test Plan Dated:	16th October 1988
Test Objective:	COMPLIANCE
Manufacturer:	PSION DACOM PLC.
Equipment under test:	GOLD CARD NET GLOBAL 56k + 10/100 CARD BUS
Date Equipment received:	19th October 1998
Triple C Sample Number:	3C98/1072/S1
Test requested by:	PSION DACOM PLC. DACOM HOUSE PRESLEY WAY CROWN HILL MILTON KEYNES MK8 0EF
Customer Representative:	STEPHEN MARLOW
PO Number:	N09163
Test date:	19th October 1998
Test result:	PASS

	SIGNATURE	DATE
Test Engineer	Signature: Name: Steven Youngman	26/10/98
Report Approved by	Signature: Name: James Gordon - Colebrooke	5/11/98
Amended by	Signature: Name: James Gordon - Colebrooke	

REPORT ON MEASUREMENTS OF RADIO FREQUENCY INTERFERENCE FROM THE PSION DACOM GOLD CARD NET GLOBAL 56k + 10/100 CARD BUS

1. INTRODUCTION

This report summarises the measurements of radio frequency interference made on the equipment listed in Section 2 with the standards listed in Section 3.

2. EQUIPMENT UNDER TEST

2.1 IDENTIFICATION OF EUT

Manufacturer:	PSION DACOM PLC.
Model Name:	GOLD CARD NET GLOBAL 56k + 10/100 CARD BUS
Triple C Sample Number:	3C98/1072/S1
Country of Origin:	UNITED KINGDOM
Voltage Rating:	3.3Vdc (Host PC)

Build Status

Was Equipment Standard?	☒ yes	☐ no	if no see below
Deviations from Standard Build	N/A		
Was Equipment Modified During Test?	☐ yes	☒ no	if yes see section 2.7

2.2 DECLARED INTERFERENCE SOURCES

The client declared the following interference sources within the EUT that may directly contribute to the levels of the radio interference from the unit:-

Oscillator Frequencies:	25MHz and 28.224MHz (Gold Card).
Clock Frequencies:	None Declared.
I/O Ports:	1 x PSTN Port and 1 x Fast Ethernet port.
PSU:	Switched Mode (Lap top PC).
Thermostats / relays:	None.
Other Sources:	None Declared.

2.3 DECLARED SUPPRESSION MEASURES

The client declared the following suppression measures:-

Filters:	I/O data lines of Gold Card.
Multilayer pcb:	Yes, with ground plane on the Gold Card.
Metal Case:	Yes, Gold Card.
Conductive Coating on case:	None Declared.
Ferrites:	None Declared.
Others:	Metal to metal contacts on case panels (Gold Card).

2.4 SUPPORT EQUIPMENT

The following lists the equipment that was used to support the EUT during the test program.

Description:	LAP TOP PC
Manufacturer:	IBM
Model Name:	THINK PAD
Serial Number:	55881SW
Powered By:	16Vdc (PSU)

Description:	PSU
Manufacturer:	IBM
Model Number:	83H6339
Serial Number:	J14HL36515Y
Powered By:	110Vac

Description:	LAP TOP PC
Manufacturer:	DELL
Model Number:	PPL
Serial Number:	00060888-12800-847-0041
Powered By:	20Vdc (PSU)

Description:	PSU
Manufacturer:	DELL
Model Number:	PA-2
Serial Number:	00085391
Powered By:	230Vac

Description:	8 PORT HUB
Manufacturer:	3 COM
Model Number:	3C16720
Serial Number:	7WJF007139
Powered By:	5Vdc (PSU)

Description:	PSU
Manufacturer:	BTC
Model Number:	ADP-305
Serial Number:	X97110161
Powered By:	230Vac

Description:	TELEPHONE LINE SIMULATOR
Manufacturer:	CHESILVALE
Model Number:	TSLS
Serial Number:	0005/592/3990
Powered By:	230Vac

2.6 OPERATING MODE

Ethernet transmitting to remote and V34bis modem carrier.

Special Test Software required: ☒

Description: CHATTER - Remote PC.
CHATSVR - Test PC.
ROCKWELL Diagnostic programme.

Simulators Used: ☒

Description: Chesilvale TSLS Telephone line simulator.

2.7 MODIFICATIONS MADE TO EUT DURING TEST

There were no modifications made to the EUT during testing.

3. TEST SPECIFICATIONS USED

The EUT was tested against the requirements of the following test specification:-

Test Specification:	FCC RULES PART 15 SUBPART B, FCC ANSI 63.4-1992
Classification:	Class B
Purpose of test:	Allow declaration to FCC RULES PART 15 SUBPART B, FCC ANSI 63.4-1992. Class B

3.1 ADDITIONS, DEVIATIONS AND / OR EXCLUSIONS FROM SPECIFICATION

There were no Additions, Deviations or Exclusions from the test specification during testing.

4. SUMMARY OF TESTS

4.1 CONDUCTED INTERFERENCE (0.45 MHZ - 30 MHZ)

4.1.1 OPERATING ENVIRONMENT

Test Location: ☒ Screened room (7.0m x 4.0m x 3.0m): D=40cms, H=80cms

Temperature: 17.0 °C

Humidity: 44 %

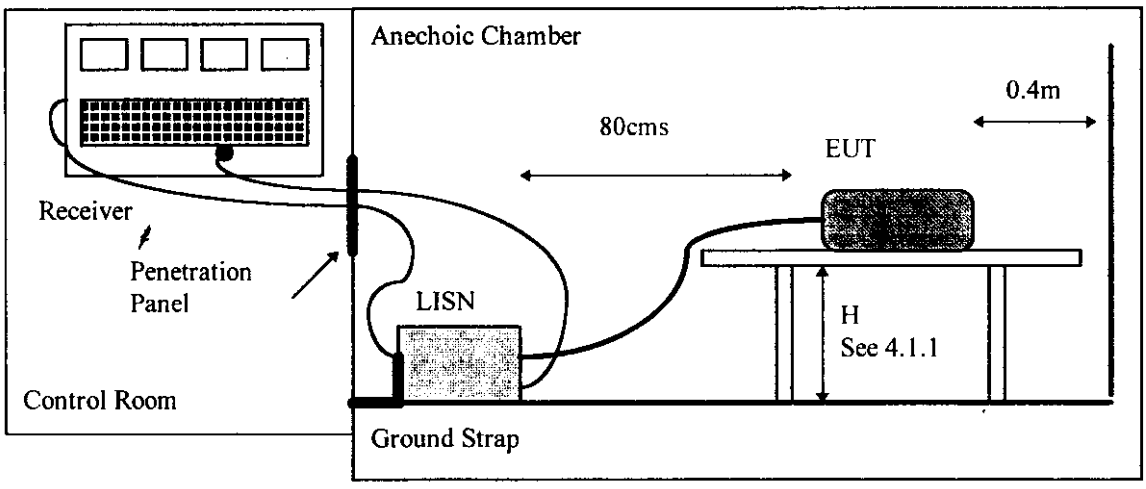
4.1.2 LIST OF TEST EQUIPMENT

The following test equipment was used to carry out the testing for conducted emissions.

Used	Equipment	Last Calibration	EID Number	Serial Number
☒	6 metre cable	12 May 1998	3C/0216	None
☒	7 metre cable	12 May 1998	3C/0217	None
☒	Rhode & Schwarz ESHS10 HF Receiver	21 March 1998	3C/0113	862970/007
☒	Rhode & Schwarz ESH3-Z5 LISN	4 February 1998	3C/0114	863794/021

Measurements were made on both live and neutral lines of the mains network over the frequency range 0.45 MHz - 30 MHz.

4.1.3 TEST CONFIGURATION



4.2 RADIATED ELECTRIC FIELD (30 MHZ - 1000 MHZ)

4.2.1 OPERATING ENVIRONMENT

Test Location: Pre Scan - ☐ Anechoic Chamber (7.4m x 4.5m x 3.75m)
☒ Screened Room (7.0m x 4.0m x 3.0m)
and Open Field (10m) Test Site

Temperature: 17.0 °C

Humidity: 44 %

4.2.2 LIST OF TEST EQUIPMENT

The following test equipment was used to carry out the pre scan for radiated emissions.

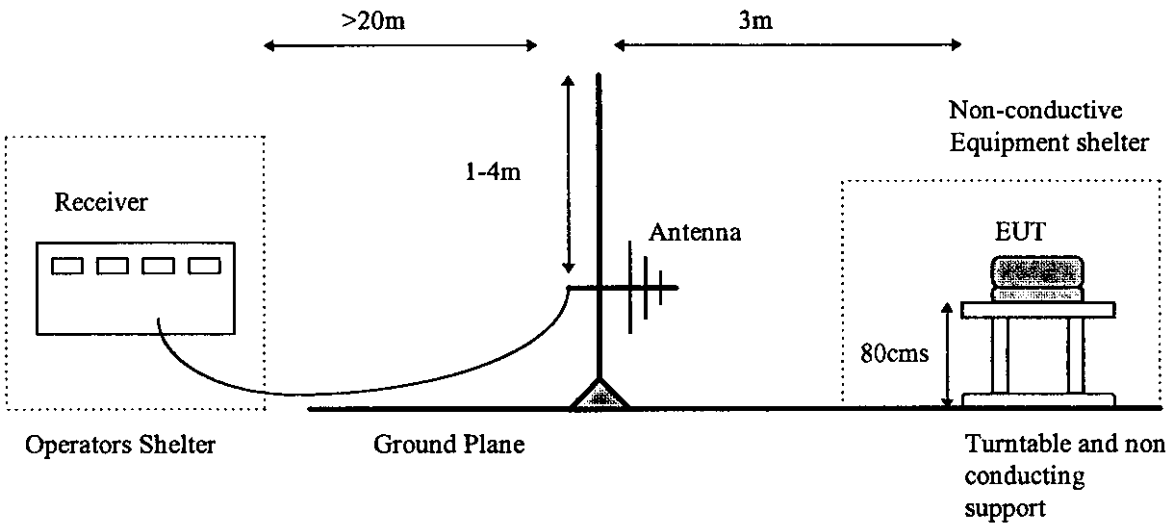
Used	Equipment	Last Calibration	EID Number	Serial Number
☐	3 metre cable	6 January 1998	3C/0202	None
☐	10 metre cable	6 January 1998	3C/0119	M372
☐	1.8 metre cable	23 December 1997	3C/0201	None
☒	6 metre cable	14 April 1998	3C/0221	None
☒	7 metre cable	15 April 1998	3C/0218	None
☒	Advantest R4131 Spectrum Analyser	17 January 1998	3C/0151	050340359
☐	Advantest R4131 Spectrum Analyser	19 January 1998	3C/0144	81720043
☐	Rhode & Schwarz ESVS10 VHF Receiver	19 June 1998	3C/0172	843207/014
☐	ARA LPB2510/A Antenna	12 October 1998	3C/0196	1074
☒	Rhode & Schwarz HK116 Biconical	25 April 1996	3C/0175	843562/008
☒	Rhode & Schwarz HL223 Log Periodic	3 April 1996	3C/0176	843338/024

The following test equipment was used to carry out the testing for radiated emissions on the open field test site.

Used	Equipment	Last Calibration	EID Number	Serial Number
☒	20 metre cable	24 December 1997	3C/0120	M373
☒	Chase CBL6111 Bilog Aerial	19 December 1997	3C/0140	1381
☐	ARA LPB2510/A Antenna	12 October 1998	3C/0196	1074
☒	Chase UHR 4000 UHF Receiver	16 February 1998	3C/0106	6087
☐	Rhode & Schwarz ESVS10 VHF Receiver	19 June 1998	3C/0172	843207/014

4.2.3 TEST CONFIGURATION

The following diagram shows the open field test set up.



4.2.4 TEST PROCEDURE

Following the pre scans, the EUT was set up on the open-field test site. The unit was positioned 3 metres from the measuring aerial, 0.8 metres above the ground plane on a non-conducting support. The measuring aerial was initially set at a height of 1 metre from the ground plane and measurements for both polarisations of the aerial were taken to determine the maximum field strength. Additionally, the aerial height was changed between 1 and 4 metres, the equipment under test was rotated through 360° and the orientation of the cables and items in the test set-up were altered to obtain a further maximum indication on the measuring receiver.

Correction factors to compensate for the losses associated with the aerial and cables were applied to the set readings to give the levels of radiated electric field intensity to allow for direct comparison to the limits of the chosen specification.

5. SUMMARY OF RESULTS

The results of the work conducted are contained in figures 1,2,4 and 6. These show measurements recorded using equipment with a quasi-peak or average detector and bandwidths complying with CISPR Publication Number 16.

5.1 CONDUCTED INTERFERENCE (0.45 MHZ TO 30 MHZ)

Test Result: PASS

Figures 1 and 2 show the levels of conducted interference voltage, measured at the mains terminal connection of the Palmtop PC's power supply. The unit was fully operational throughout testing.

As can be seen from the graph and results, the unit was found to comply with the requirements of FCC RULES PART 15B CLASS B. The minimum margin of compliance was recorded at a frequency of 2.63MHz, with a level of 132.58μV, 117.41μV below the limit. The signal was narrowband in nature.

A list of the 6 highest recorded levels are shown in table 1 below:-

Frequency (MHz)	Recorded Level (μV)	Limit (μV)	Result (Pass/Fail)
2.155	23.06	250	PASS
2.63	132.58	250	PASS
5.92	29.54	250	PASS
9.18	46.50	250	PASS
10.585	45.81	250	PASS
29.235	56.62	250	PASS

Table 1

Photographs of the configuration giving the maximum levels of interference are shown in figure 3.

5.1.1 OBSERVATIONS AND RECOMMENDATIONS

None.

5.2 RADIATED ELECTRIC FIELD (30 MHZ TO 1000 MHZ)

Test Result: PASS

Figures 4 and 5 show the levels of radiated electric field recorded from the PSION DACOM, GOLD CARD NET GLOBAL 56k + 10/100 CARD BUS during the pre-scan phase. The unit was found to comply with the requirements of FCC RULES PART 15B CLASS B when tested on the OAT's. The minimum margin of compliance was achieved at 66.485MHz, with a level of 30.19μV, 69.81μV below the limit.

The formula used for the derivation of field strength was:-

X dB(μV/m) = Level (dBμV) + Cable Loss (dB) + Antenna Factor (dB)

The value obtained in X dB(μV/m) was then changed to μV to allow direct comparison with the FCC limits. An example of the Calculations is shown below:-

Frequency (MHz)	Level (μV)	Cable Loss (dB)	Antenna Factor (dB)	=	Field Strength (dBμV)	=	Field Strength (μV)
80	22.0	1.45	7.0		30.45		33.30

A list of the 6 highest recorded levels are shown in table 2 below:-

Frequency (MHz)	Recorded Level (μV)	Limit (μV)	Result (Pass/Fail)
66.485	30.19	100	PASS
66.515	26.91	100	PASS
239.125	72.44	200	PASS
254.010	84.13	200	PASS
299.530	54.32	200	PASS
395.200	47.31	200	PASS

Table 2

Photographs of the configuration giving the maximum levels of interference are shown in figure 6.

5.2.1 OBSERVATIONS AND RECOMMENDATIONS

None.

19 Oct 1998 10:10

TRIPLE C, JOB NUMBER 3C98/1090

CONDUCTED INTERFERENCE

EUT:	GOLD CARD NETGLOBAL 56k + 10/100 CARDBUS
Manuf:	PSION DACOM PLC
Op Cond:	SCREENED ROOM
Operator:	STEVEN YOUNGMAN
Test Spec:	FCC RULES PART 15, SUBPART B, CLASS B
Comment:	SERIAL NUMBER: 3C98/1072/S1 - IBM
	ETHERNET TRANSMITTING TO REMOTE AND V34bis MODEM CARRIER
File:	1090-1.dat : New Measurement

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450kHz	2MHz	500Hz	10kHz	PK	100msec	Auto	OFF	60dB
2MHz	30MHz	5kHz	10kHz	PK	20msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	2	150kHz	30MHz	3C0217
	3	150kHz	30MHz	3C0216

Final Measurement: X QP
Meas Time: 2sec
Subranges: 8
Acc Margin: 25 dB

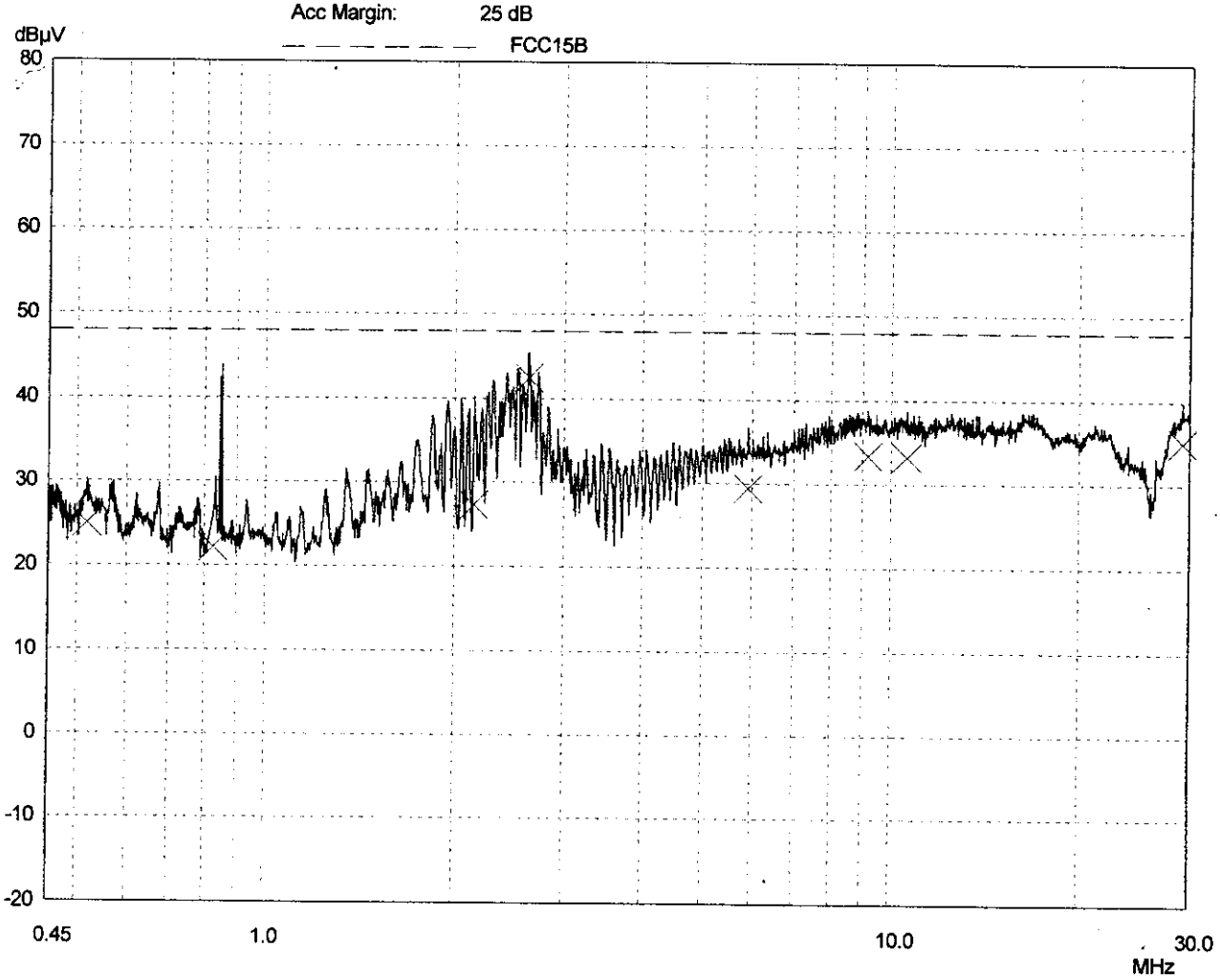


Figure 1

19 Oct 1998 10:10

TRIPLE C, JOB NUMBER 3C98/1090
CONDUCTED INTERFERENCE

EUT: GOLD CARD NETGLOBAL 56k + 10/100 CARDBUS
Manuf: PSION DACOM PLC
Op Cond: SCREENED ROOM
Operator: STEVEN YOUNGMAN
Test Spec: FCC RULES PART 15, SUBPART B, CLASS B
Comment: SERIAL NUMBER: 3C98/1072/S1 - IBM
ETHERNET TRANSMITTING TO REMOTE AND V34bis MODEM CARRIER
File: 1090-1.dat : New Measurement

Scan Settings (2 Ranges)

Frequencies		Receiver Settings						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450kHz	2MHz	500Hz	10kHz	PK	100msec	Auto	OFF	60dB
2MHz	30MHz	5kHz	10kHz	PK	20msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	2	150kHz	30MHz	3C0217
	3	150kHz	30MHz	3C0216

Final Measurement: X QP
Meas Time: 2sec
Subranges: 8
Acc Margin: 25 dB

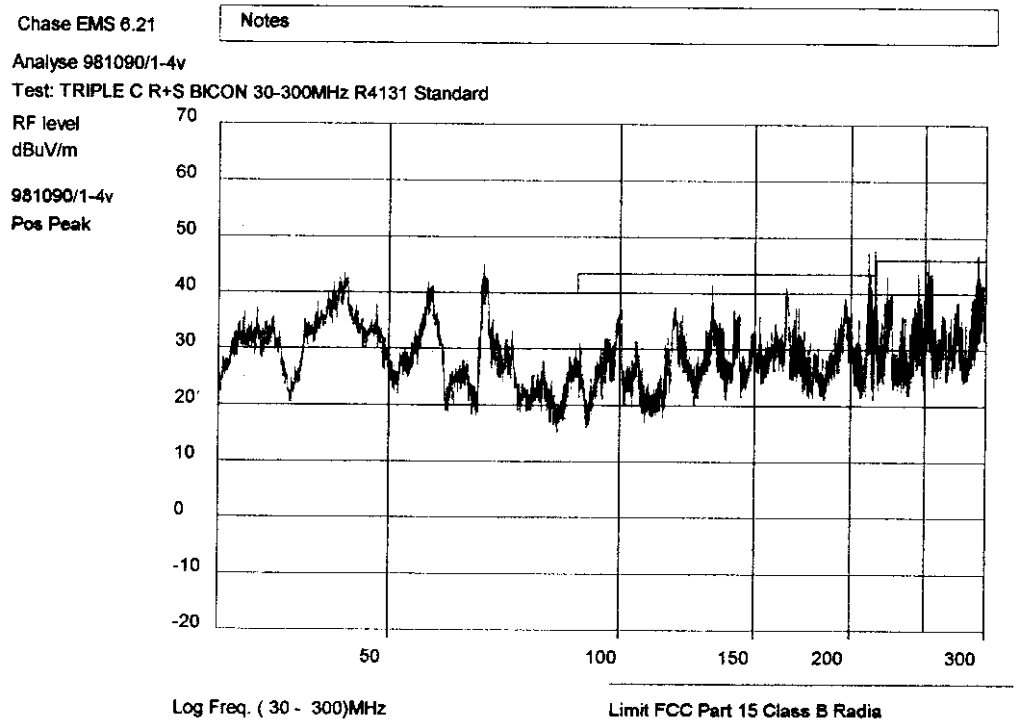
Final Measurement Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.51949	24.99	48.00	23.01	N	gnd
0.8272	22.15	48.00	25.85	L1	gnd
2.155	27.26	48.00	20.74	N	gnd
2.63	42.45	48.00	5.55	N	gnd
5.92	29.41	48.00	18.59	N	gnd
9.18	33.35	48.00	14.65	N	gnd
10.585	33.22	48.00	14.78	N	gnd
29.235	35.06	48.00	12.94	N	gnd

* limit exceeded

Indicated Phase/PE shows Configuration of max. Emission

Figure 2


Chase EMS 6.21
Notes
Analyse 981090/1-4v
Test: TRIPLE C R+S BICON 30-300MHz R4131 Standard
RF level
dBuV/m
981090/1-4v
Pos Peak
70
60
50
40
30
20
10
0
-10
-20
50
100
150
200
300
Log Freq. (30 - 300)MHz
Limit FCC Part 15 Class B Radia

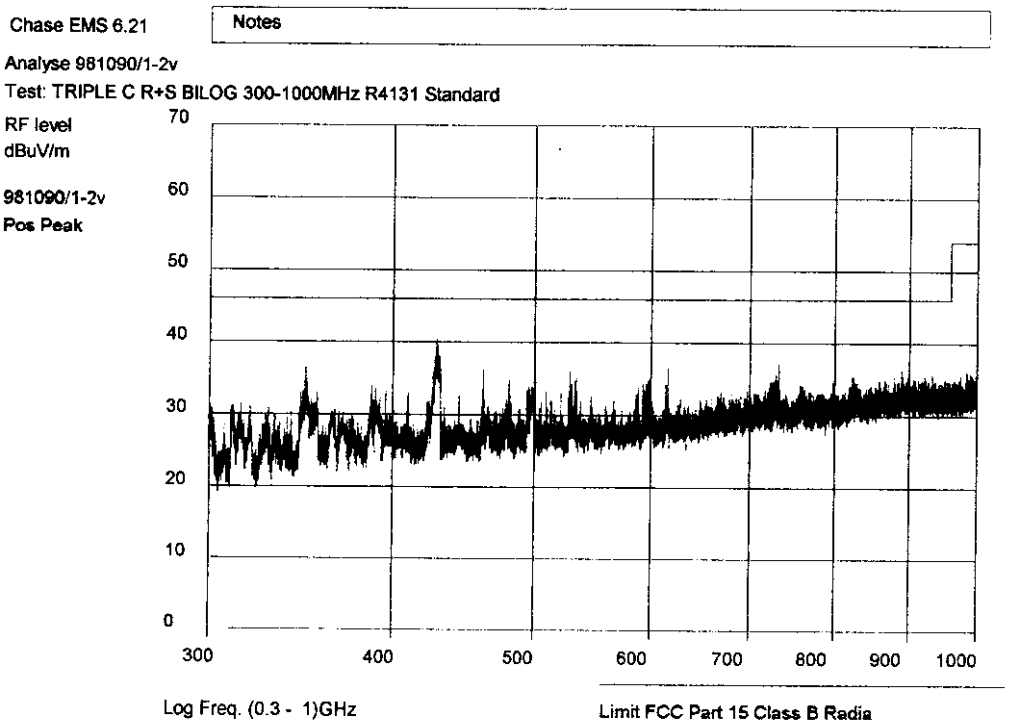
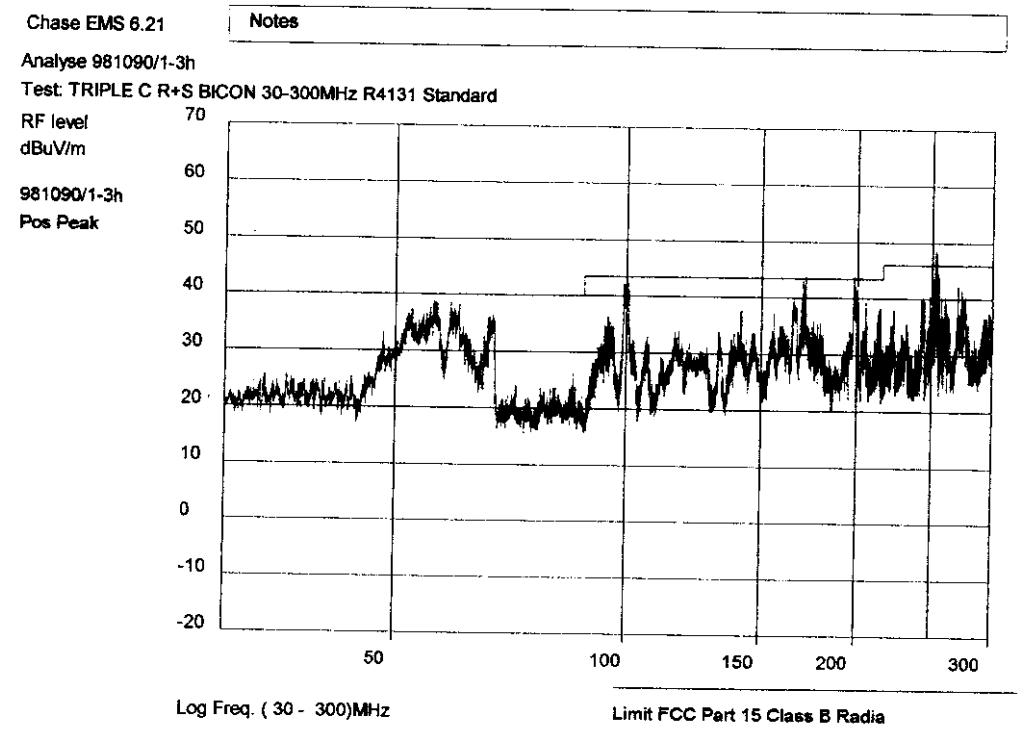

Chase EMS 6.21
Notes
Analyse 981090/1-2v
Test: TRIPLE C R+S BILOG 300-1000MHz R4131 Standard
RF level
dBuV/m
981090/1-2v
Pos Peak
70
60
50
40
30
20
10
0
300
400
500
600
700
800
900
1000
Log Freq. (0.3 - 1)GHz
Limit FCC Part 15 Class B Radia

Figure 4


Chase EMS 6.21
Notes
Analyse 981090/1-3h
Test: TRIPLE C R+S BICON 30-300MHz R4131 Standard
RF level
dBuV/m
981090/1-3h
Pos Peak
70
60
50
40
30
20
10
0
-10
-20
50
100
150
200
300
Log Freq. (30 - 300)MHz
Limit FCC Part 15 Class B Radia

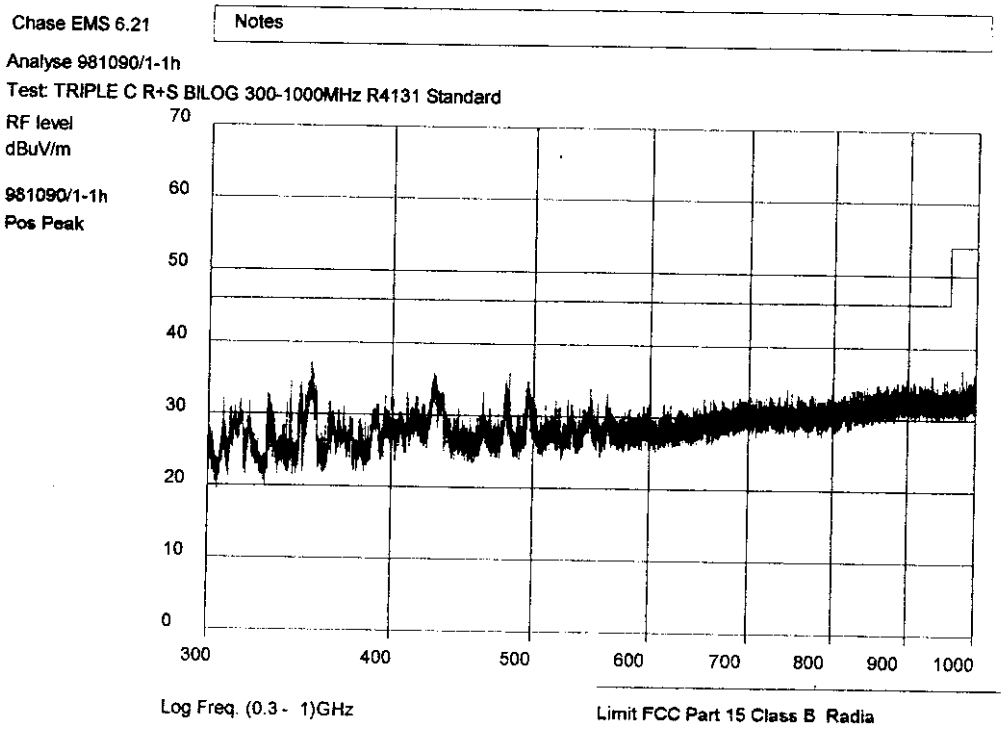

Chase EMS 6.21
Notes
Analyse 981090/1-1h
Test: TRIPLE C R+S BILOG 300-1000MHz R4131 Standard
RF level
dBuV/m
981090/1-1h
Pos Peak
70
60
50
40
30
20
10
0
300
400
500
600
700
800
900
1000
Log Freq. (0.3 - 1)GHz
Limit FCC Part 15 Class B Radia

Figure 5