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REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:

TWENTY PENCE TEST SITE

Twenty Pence Road,
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Cambridge
U.K.
CB4 4PS

on

BEWATOR COTAG Ltd.

4922 Data Adaptor
4988 Data Converter

dated

16 October 1999

Equipment Under Test (EUT):	4922 reader /4988 converter
Test Commissioned by:	BEWATOR COTAG Mercers Row Newmarket Road Cambridge CB5 8EX
Representative:	Martin Young
Test Started:	8 October 1999
Test Completed:	8 October 1999
Test Engineer:	Dave Smith
Date of Report:	16 October 1999
Report:	

Written by:	Dave Smith	Checked by:	Derek Barlow
Signature:	D.A.Smith	Signature:	D.Barlow
Date:	26 Oct '99	Date:	26/10/99

Test Standards Applied

CFR 47 : 1998 Class B	*Code of Federal Regulations: Part 15 Subpart B- Radio Frequency Devices - Unintentional Radiators*	**PASS**

Test Results Summary

CFR 47 : 1998 PASS

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Conducted Emissions	ac power	ANSI C63.4:1992	FCC(B)	PASS	
Radiated Emissions		ANSI C63.4:1992	FCC(B)	PASS	

Contents

1 EUT Details

1.1 General

The EUT consisted of a Model 4922 Dual Pinpad Reader and a Model 4988 Pinpad Data Converter. These devices are additional peripherals for the Model P900 Cardkey System.

The Model 4922 and the Model 4988 are not intentional radiators and therefore the rules of CFR47 part 15 subsection B were applied.

The EUT contained no clocks or circuitry operating at or above 108MHz.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	FCC ID
1	Bewator Cotag	4922 data adaptor + 4988 data convertor	EUT		
2	Bewator Cotag	P900	Control Unit		EZO5PQP900
3	Bewator Cotag	090	Reading Head		
4	Belser	A9526	110V - 24V ac adaptor	BE11645000AA 0001	

1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

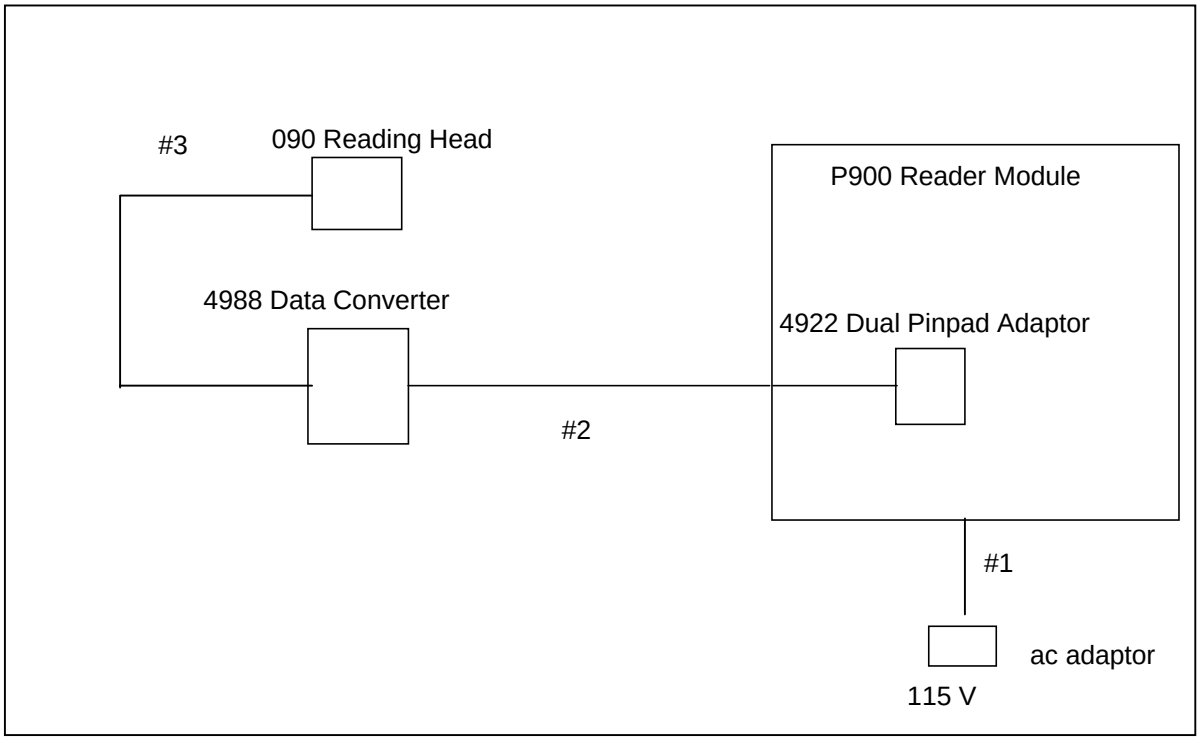
Mod No:	Details
0	As received on 8 October 1999.

1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.

Operating Mode	Details
1	Normal operating mode with system scanning keypad.

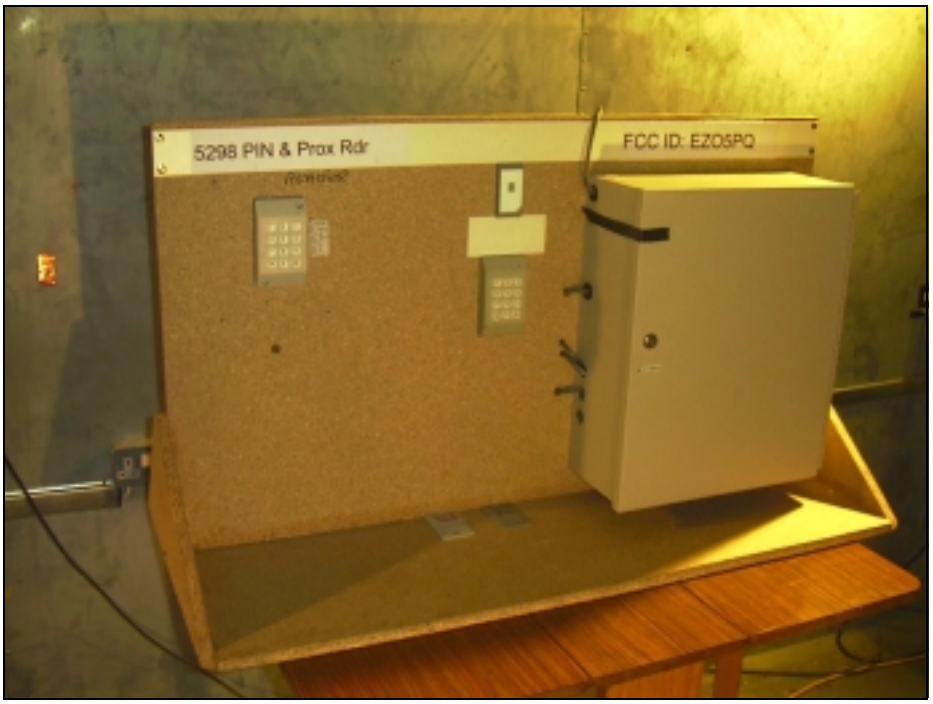
Figure 1 General Arrangement of EUT and Peripherals



#1 1.5m spiral wrap screen
#2 2m braid screen data cable
#3 2m braid screen data cable

Photograph 1 Conducted Emissions - Back

Photograph 2 Conducted Emissions - Front



Photograph 3 Radiated Emissions - Back

Photograph 4 Radiated Emissions - Front

2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Manufacturer	Model	Description	Serial	Cal Date
R1	Chase	LHR7000	RF Receiver 10kHz - 30MHz	1056	30 June 99
R4	Rohde and Schwarz	ESVHS10	RF Receiver 20MHz - 1GHz	843744/00	23 June 99
R5 R5B	Hewlett Packard Hewlett Packard	HP 8595E HP87405A	Spectrum Analyser Pre-amp	3412A00701 3207A00322	1 Oct 98
L1	EMCO	1912.5	LISN	1358	18 Mar 99
L2	Rohde and Schwarz	ESH3-Z5	LISN	843862/009	18 Mar 99
A2	EMCO	3146	Log Periodic Antenna 200MHz - 1GHz	2011	15 Jul 99
A4	Chase	CBL6112	Bilog Antenna 30MHz - 2GHz	2027	15 Jul 99
A5	Chase	CBL111A	Bilog Antenna 30MHz - 1GHz	1760	15 Jul 99

3 Test Methods

3.1 Conducted Emissions - ac power

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Bench top EUTs and peripheral equipment are normally placed on a 0.8m high non-conducting bench, positioned 0.4m from one of the metallic walls of a screened room. Floor standing EUTs are normally placed 0.1m above the metallic floor of the screened room. Mains leads are bundled so as not to exceed 1m.

The EUT is powered using a 50ohm/50uH Line Impedance Stabilisation Network (LISN). Peripherals are powered using a second a 50ohm/50uH LISN. These LISNs are bonded to the screened room floor.

With the correct supply voltage applied to the EUT scans are performed on both the live and neutral line outputs of the LISN using quasi-peak detection over the specified frequency range. The results of these scans are shown in the plots section at the end of the report.

Significant emissions identified by the scans are measured and the results tabulated. The table of results is shown in the conducted emissions results section.

3.2 Radiated Emissions

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range 30MHz to 1GHz with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using a CISPR16 quasi-peak receiver. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.

4.1 Conducted Emission Results

Test Equipment:	Factor Set 1: EMLISN	RG214	10 m cable

Conducted Emissions

Company:	BEWATOR COTAG Ltd.	*Product:*	4922 reader/4988 converter
Date:	8 October 1999	*Test Eng:*	Dave Smith
Ports:	ac power		
Test:	ANSI C63.4:1992 using limits of		FCC(B)
Ports:			
Test:			

Test	Op Mode	Mod State	Line (L/N)	Fact Set	Freq. MHz	Det qp/av	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV	Limit FCCB dBuV/m	Margin FCCB dBuV/m	Limit	Margin	Notes
C1	*1*	*0*	*L*	*1*	*5.544*	*qp*	*50.1*	*0.2*	*50.3*	*48.0*	*-2.3*			*#1*
C1	1	0	L	1	5.544	av	39.1	0.2	39.3	48.0	8.7			
C1	1	0	L	1	5.544	qp	37.1	0.2	37.3	48.0	10.7			#2
C1	1	0	L	1	7.392	qp	36.8	0.2	37.0	48.0	11.0			
C1	1	0	L	1	9.239	qp	39.2	0.2	39.4	48.0	8.6			
C1	1	0	L	1	14.783	qp	39.1	0.2	39.3	48.0	8.7			
C1	1	0	L	1	16.632	qp	30.6	0.3	30.9	48.0	17.1			
C1	1	0	L	1	29.564	qp	38.4	0.3	38.7	48.0	9.3			
C2	*1*	*0*	*N*	*1*	*5.545*	*qp*	*55.6*	*0.2*	*55.8*	*48.0*	*-7.8*			*#1*
C2	1	0	N	1	5.545	av	44.6	0.2	44.8	48.0	3.2			
C2	1	0	N	1	5.545	qp	42.6	0.2	42.8	48.0	5.2			#2
C2	1	0	N	1	5.894	qp	39.0	0.2	39.2	48.0	8.8			
C2	1	0	N	1	7.391	qp	34.6	0.2	34.8	48.0	13.2			
C2	1	0	N	1	14.783	qp	34.7	0.2	34.9	48.0	13.1			
C2	1	0	N	1	9.240	qp	41.6	0.2	41.8	48.0	6.2			
C2	1	0	N	1	29.566	qp	39.6	0.3	39.9	48.0	8.1			
Results							**Minimum Margin PASS/FAIL**			**3.2 dB PASS**				

Notes	Comments and Observations
	Results of scans shown in Plot 1 and Plot 2
#1	Exceeded limit of 48dBuV but average reading was more than 6dB below quasi-peak reading therefore 13dB reduction of quasi-peak reading permitted by 15.207.
#2	Reading when 13dB reduction applied.

4.2 Radiated Emissions Results

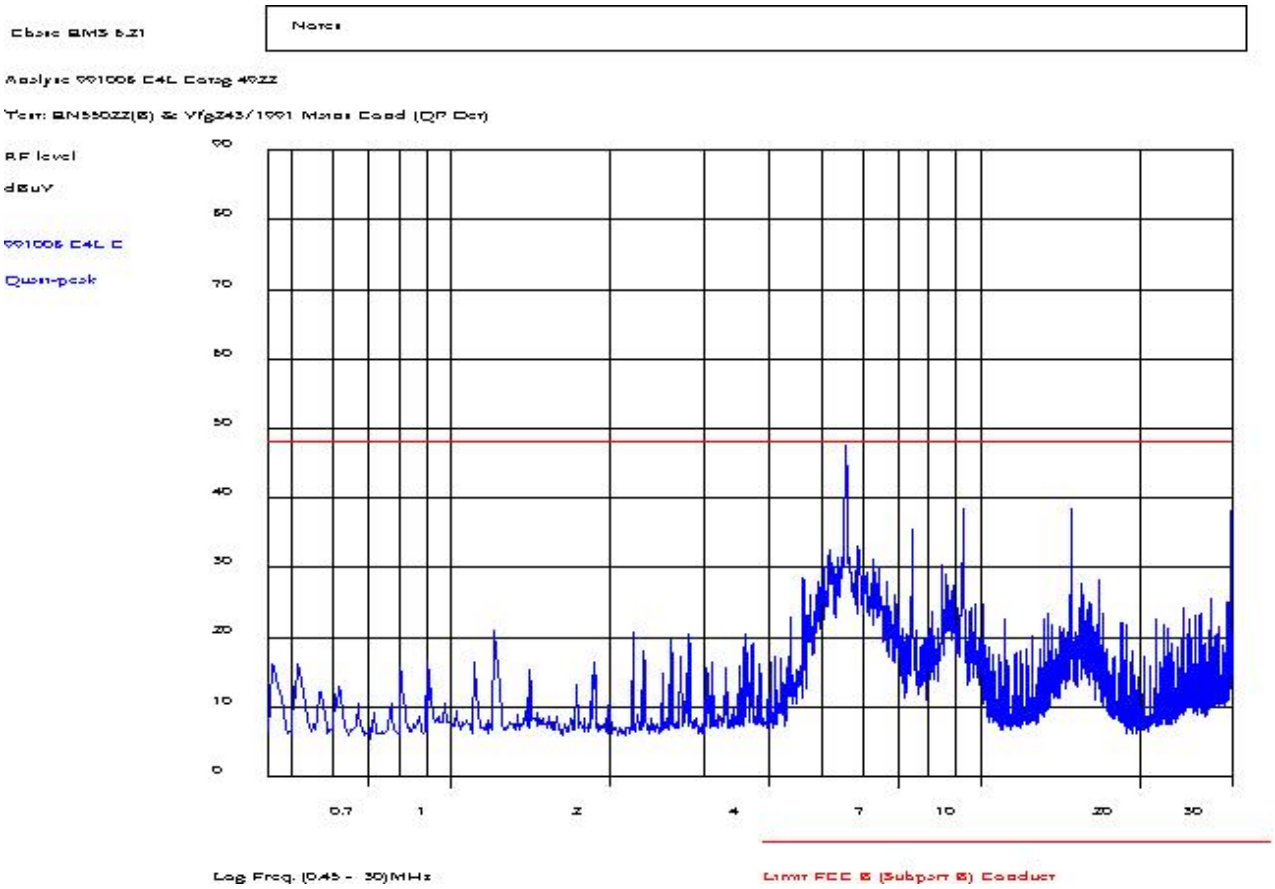
Test Equipment: Factor Set 1: HFBilog RG214 25 m cable

Radiated Emissions

Company:	BEWATOR COTAG Ltd.	*Product:*	4922 reader/4988 converter
Date:	8 October 1999	*Test Eng:*	Dave Smith
Test:	ANSI C63.4:1992 using limits of		FCC(B)
Test:			

Test	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Total Level dBuV/m	Limit FCCB dBuV/m	Margin FCCB dBuV/m	Limit	Margin	Notes
R1	1	0	3	1	31.450	V	4.0	18.8	22.8	40.0	17.2			
	1	0	3	1	36.980	V	8.3	15.6	23.9	40.0	16.1			
	1	0	3	1	44.351	H	19.7	11.7	31.4	40.0	8.6			
	1	0	3	1	64.672	H	8.7	7.6	16.3	40.0	23.7			
	1	0	3	1	105.350	V	23.1	13.4	36.5	43.5	7.0			
	1	0	3	1	110.884	H	24.5	13.9	38.4	43.5	5.1			
	1	0	3	1	112.713	H	26.1	14.0	40.1	43.5	3.4			
	1	0	3	1	120.106	H	20.0	14.2	34.2	43.5	9.3			
	1	0	3	1	168.200	H	13.4	12.3	25.7	43.5	17.8			
	1	0	3	1	214.367	H	25.6	11.7	37.3	43.5	6.2			
	1	0	3	1	216.210	H	22.4	11.7	34.1	46.0	11.9			
	1	0	3	1	218.058	H	24.1	11.7	35.8	46.0	10.2			
Results								Minimum Margin PASS/FAIL		3.4 dB PASS				

Notes	Comments and Observations
	Results of screened room scans shown in Plot 3 to Plot 4

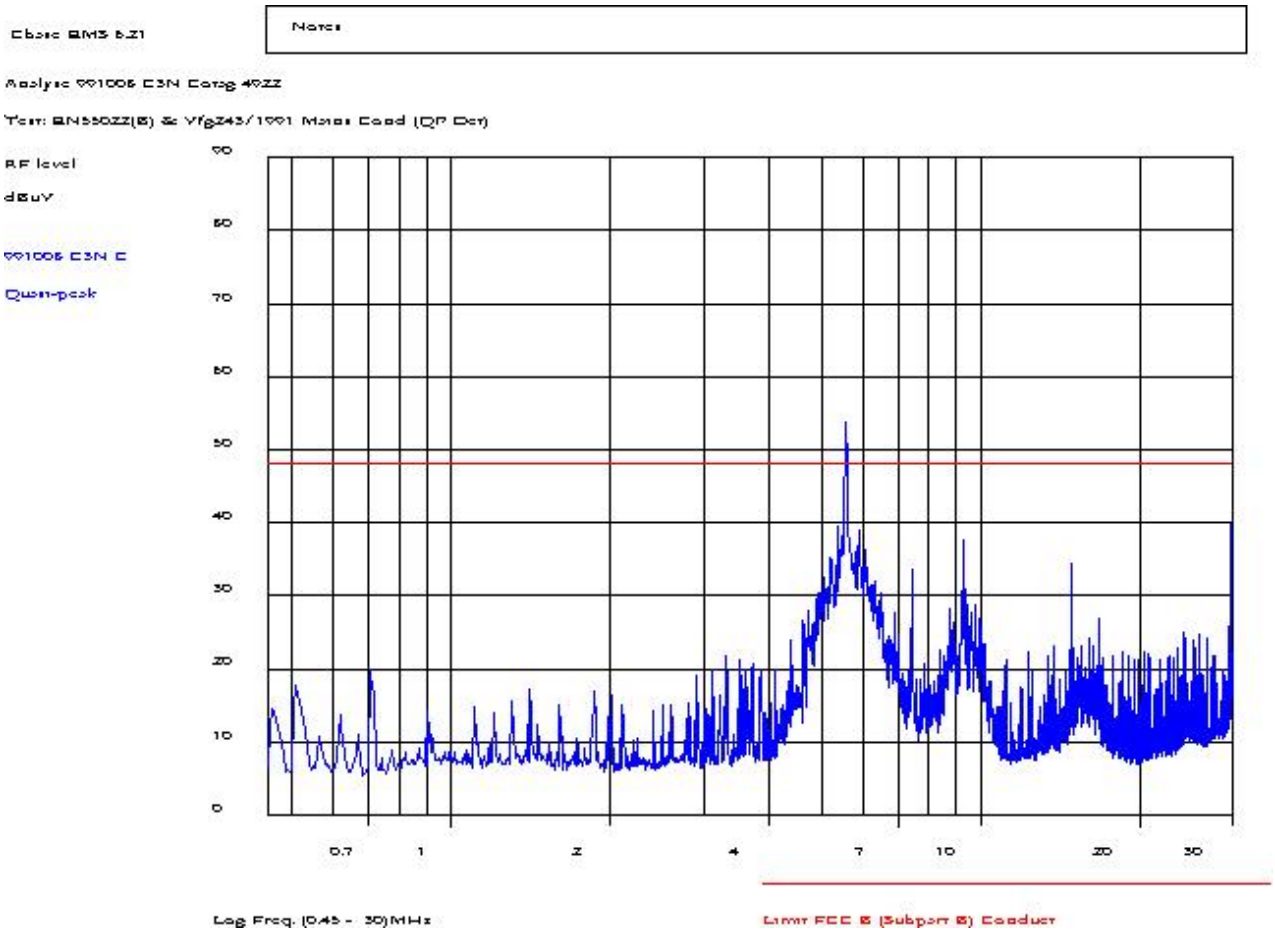


Frequency List (MHz)

5.544	16.632		
7.392	29.564		
9.239			
14.783			

PLOT 1 Conducted Emission Scan - Live

Test	Line	Mod	Op. Mode	Test Engineer	Date
C1	L	0	1	DS	8 Oct 99

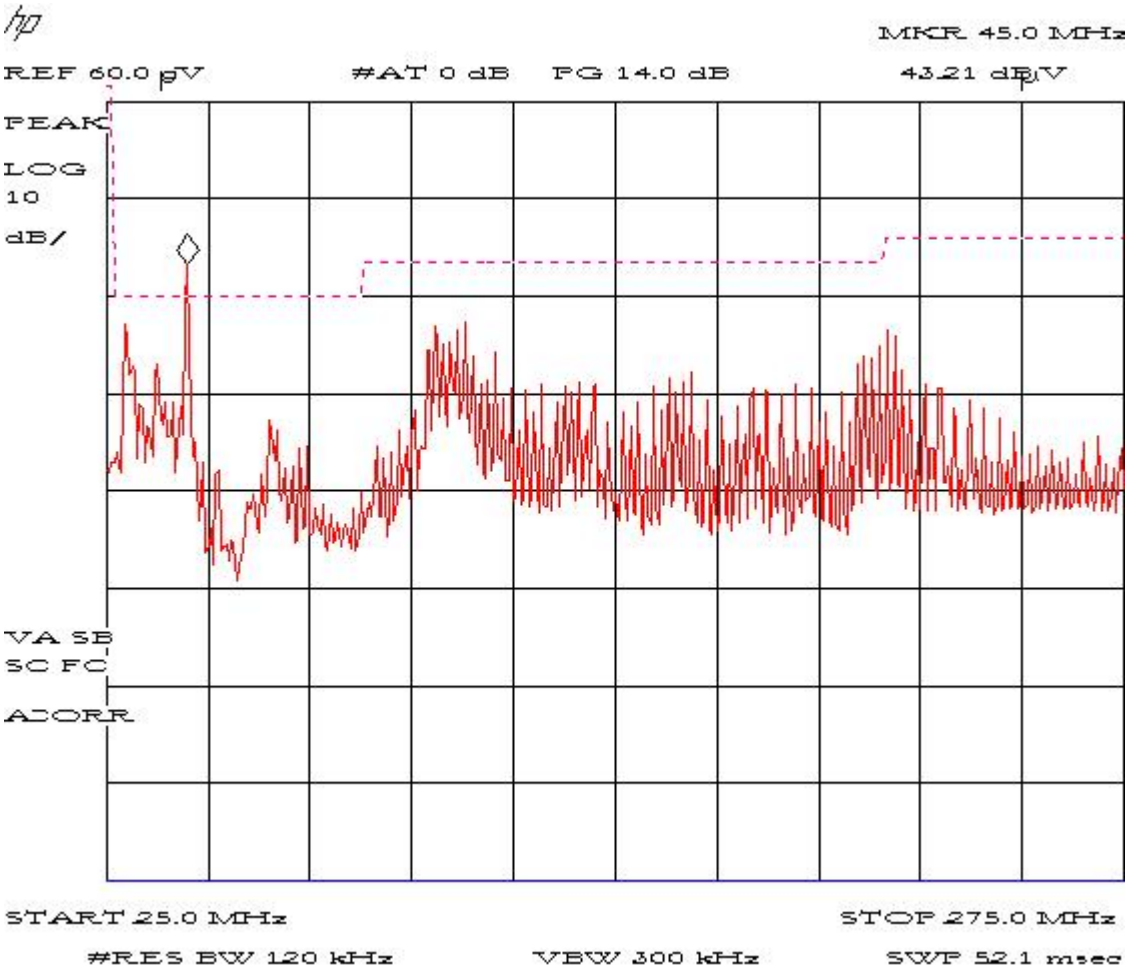


Frequency List (MHz)

5.545	9.240		
5.894	29.566		
7.391			
14.783			

Plot 2 Conducted Emission Scan - Neutral

Test	Line	Mod	Op. Mode	Test Engineer	Date
C2	N	0	1	DS	8 Oct 99

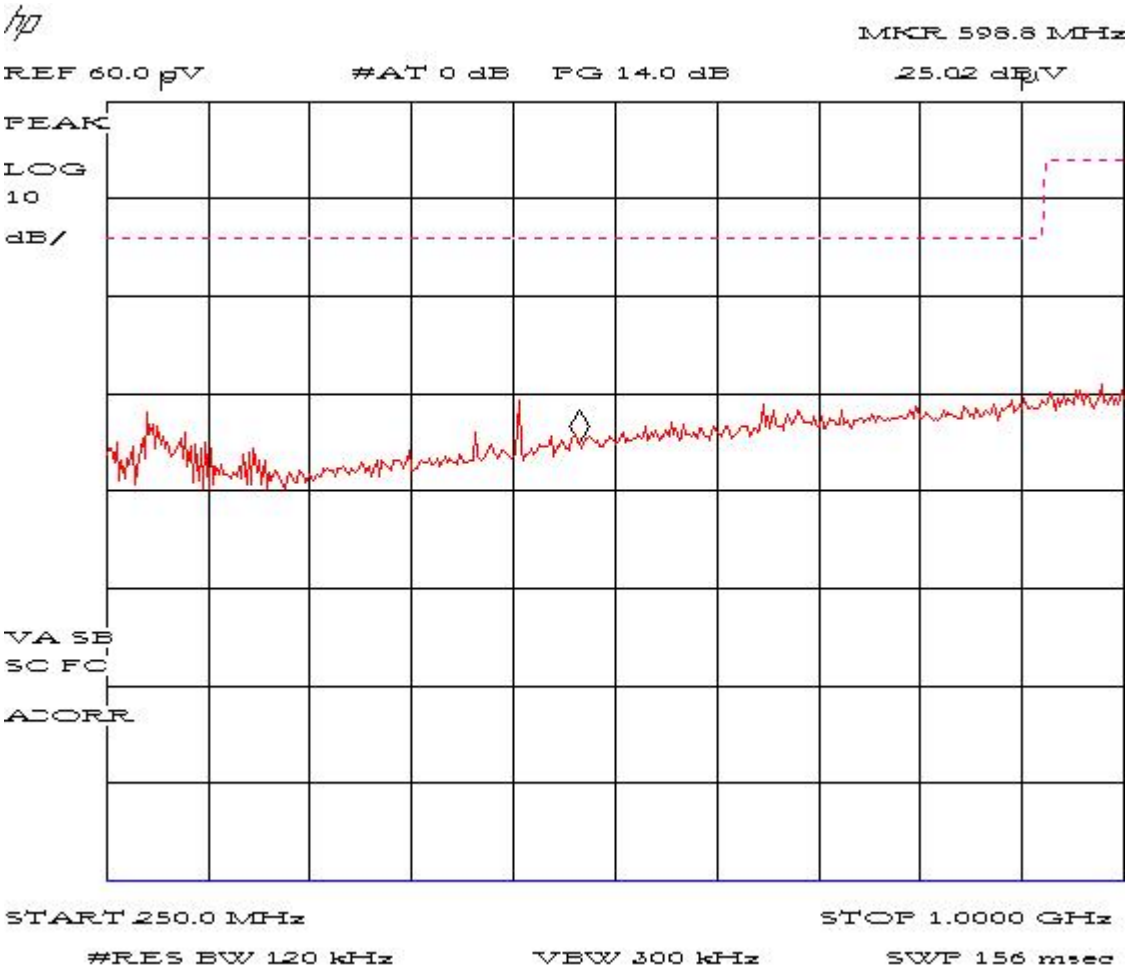


Frequency List (MHz)

31.450	112.713		
36.980	120.106		
44.351	168.200		
64.672	214.367		
105.350	216.210		
110.884	218.058		

Plot 3 Radiated Emission Scan: 25MHz - 275MHz

Test	Pol	Dist. (m)	Height (m)	Mod	Op. Mode	Test Engineer	Date
R1	V+H	3	1	0	1	DS	8 Oct 99



PLOT 4 Radiated Emission Scan: 250MHz - 1GHz

Test	Pol	Dist. (m)	Height (m)	Mod	Op. Mode	Test Engineer	Date
R1	V+H	3	1	0	1	DS	8 Oct 99