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REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:
TWENTY PENCE TEST SITE

Twenty Pence Road,
Cottenham,
Cambridge
U.K.
CB24 8PS

on

Ipswich Software Ltd

SMI PROX

dated

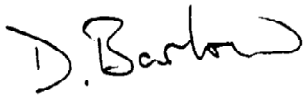
24 January 2007

Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	30/01/07		Initial release		
2	21/05/07	All	Updated FCC ID Number	DB	DS
3	29/06/07	14	Table modified to report only results within 20dB of FCC limit.	DS	CA

Based on report template:
v061115

Equipment Under Test (EUT):	**SMI PROX**
Test Commissioned by:	**Ipswich Software Ltd** **Claydon Court** **Ipswich** **Suffolk** **IP6 0AE**
Representative:	**Adam Rae**
Test Started:	**23 January 2007**
Test Completed:	**23 January 2007**
Test Engineer:	**Dave Smith**
Date of Report:	**24 January 2007**

Written by:	**Dave Smith**	**Checked by:**	**Derek Barlow**
Signature:		**Signature:**	
Date:	**24 January 2007**	**Date:**	**30 January 2007**

dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.

Test Standards Applied

CFR 47 : 2006	***Code of Federal Regulations: Pt 15 Subpart C - Radio Frequency Devices - Intentional Radiators***

CFR 47 : 2006 Class B	***Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - Unintentional Radiators***

Emissions Test Results Summary

FCC part 15 B

CFR 47 : 2006 **PASS**

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Conducted Emissions	ac power	ANSI C63.4:2003	CISPR22(B)	PASS	
Radiated Emissions		ANSI C63.4:2003	CISPR22(B)	PASS	

specs_fccv070115

FCC Part 15 C

CFR 47 : 2006 **PASS**

Test	Port	Method	Limit	PASS/FAIL	*Notes*
Conducted Emissions	ac power	ANSI C63.4:2003	CISPR22(B)	PASS	
Radiated Emissions		ANSI C63.4:2003	Table 15.209	PASS	

specs_fccv070115

Contents

1 EUT Details

1.1 General

The EUT was an SMI PROX card reader. The device is a card which is designed to slot into a handheld computer. The device is an intentional radiator operating at a nominal frequency of 125kHz. The antenna is integral to the EUT.

The EUT takes power from the handheld computer which is normally battery powered. As a worse case configuration the tests were performed with the handheld computer located in a cradle with the charging power supply connected to ac power.

The maximum clock frequency of the digital electronics within the card is 2MHz.

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:	Notes
1	Ipswich Software Ltd	SMI PROX	EUT		
2	Dell	X51v	PDA	TW-0JC414-72371-64K-01H8	
3	Dell	Axim 51/X51v	Cradle	TW-OJC659-72371-64I-019R	
4	Dell	U2373	PSU	TW-OJC659-72371-64I-019R	
5	HID corp	HID PROX card	card with tag		

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.

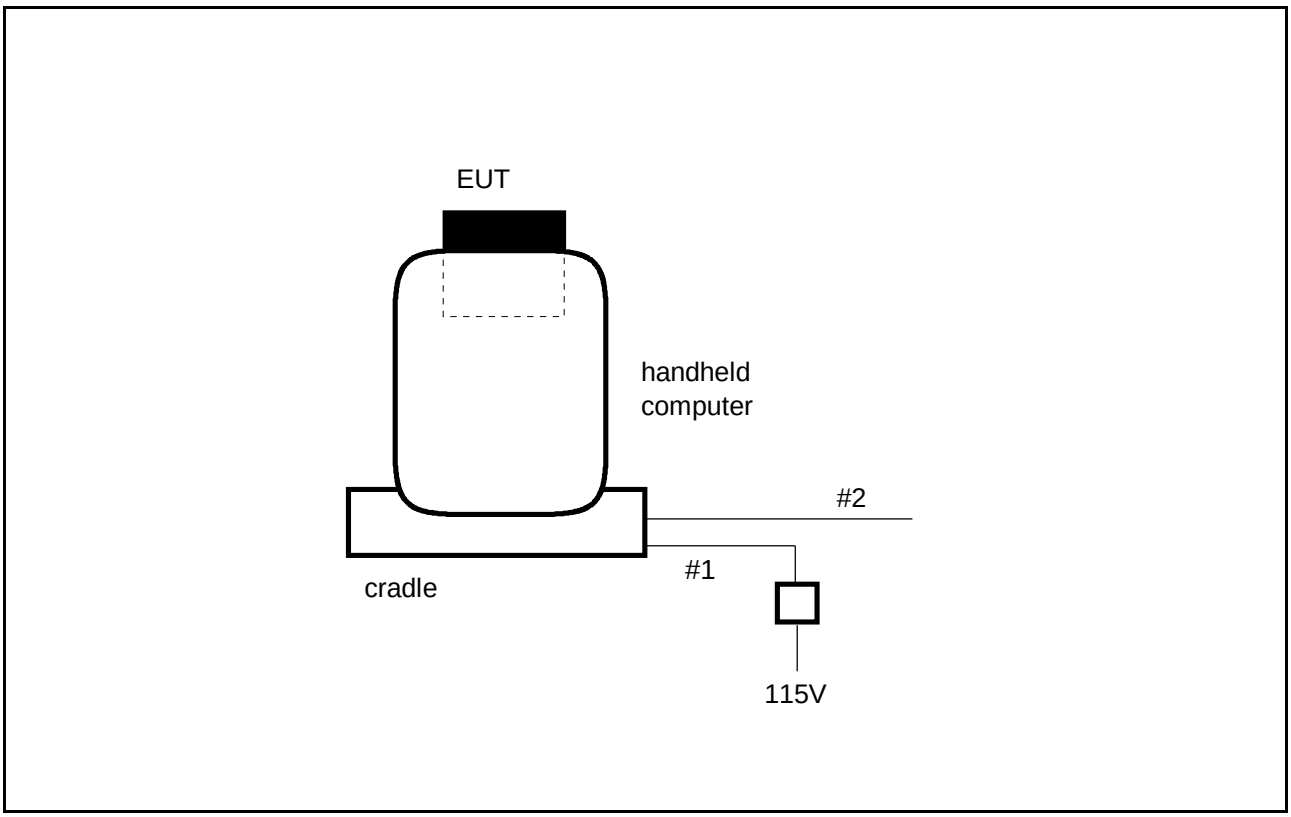
Mod No:	Details
0	Original unit. No modificatons were made during the course of testing.

1.3 EUT Operating Modes

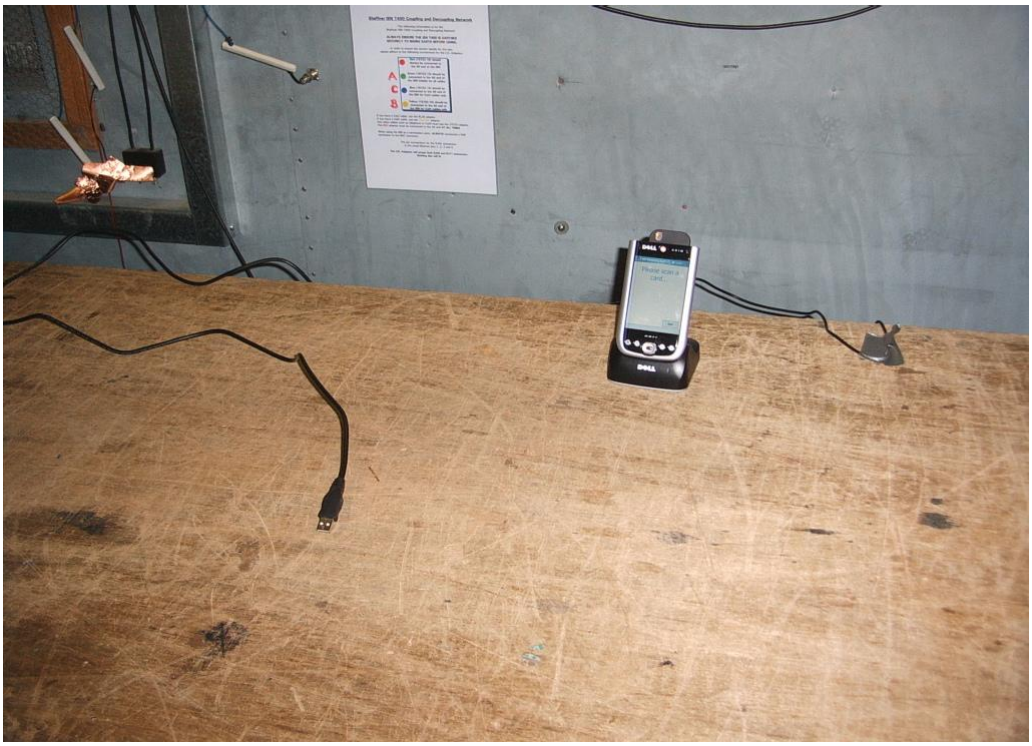
The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of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

Operating Mode	Details
1	Normal operating mode. Transmitting at nominal 125kHz and waiting to detect card.

Figure 1 General Arrangement of EUT and Peripherals



	Description	Type	Length	Notes
#1	DC power	Unscreened	2m	
#2	USB link	Screened	2m	This is part of cradle and does not form part of EUT.



Photograph 1 Conducted Emissions - Front

Photograph 2 Conducted Emissions - Back

Photograph 3 Radiated Emissions <30MHz - Flat on Bench

Photograph 4 Radiated Emissions <30MHz - Upright

Photograph 5 Radiated Emissions >30MHz - Front

Photograph 6 Radiated Emissions >30MHz - Back

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:	Details	Cal Date	Serial Number
A12	Chase Bilog CBL6111A	10 Oct 2006	1012
A5	Chase Bilog CBL6111A	31 August 2006	1760
A9	EMCO 6502 Loop	11 June 2006	2139
L1	EMCO 3825/2 LISN	9 June 2006	1358
R1	CHASE LHR 7000	10 June 2006	1056
R4	R&S ESVS10	31 May 2006	421872
R5	HP 8595E Spec. Analyser	12 June 2006	3412A00701
R5B	dB Technology Pre-amp	12 June 2006	dB001

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 - Below 30MHz

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 specified in the test standard using an appropriate loop antenna. 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. The open area test site does not have a ground plane. Maximised readings are obtained by rotating the EUT through 360°. The receiving antenna remains at a fixed height of 1m. Measurements are made with the receiving antenna both coaxial and perpendicular to the EUT.

3.3 Radiated Emissions - Above 30MHz

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 specified in the test standard 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 Emissions (Power) - Results

Factor Set 1:	L1_04B	CSET001_04A	-	-
Factor Set 2:	-	-	-	-
Factor Set 3:	-	-	-	-
Test Equipment:	R1 L1			

Conducted Emissions (Power)

Company:	Ipswich Software Ltd	*Product:*	SMI PROX
Date:	23/01/07	*Test Eng:*	Dave Smith
Ports:	ac power		
Test:	ANSI C63.4:2003 using limits of		CISPR22(B)
Ports:			
Test:	using limits of		

Plot	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 CISPR22(B) dBuV	Margin CISPR22(B) dB	Notes
	115V											
1	1	0	L	1	0.201	qp	37.4	10.2	47.6	63.6	15.9	
1	1	0	L	1	0.201	av	25.3	10.2	35.5	53.6	18.0	
1	1	0	L	1	0.345	qp	35.0	10.2	45.2	59.1	13.8	
1	1	0	L	1	0.345	av	12.6	10.2	22.8	49.1	26.2	
2	1	0	N	1	0.209	qp	33.4	10.2	43.6	63.2	19.6	
2	1	0	N	1	0.209	av	17.3	10.2	27.5	53.2	25.7	
2	1	0	N	1	0.345	qp	34.0	10.2	44.2	59.1	14.8	
2	1	0	N	1	0.345	av	7.0	10.2	17.2	49.1	31.8	
Results								Minimum Margin		13.8	dB	
								PASS/FAIL		PASS		

Notes	Comments and Observations
	Results of scans shown in plot 1 and plot 2.

4.2 Radiated Emissions Results - Below 30MHz

Factor Set 1:	A9_HI_V_04A	DB_E_TO_H_05A	-	RG214_04A	25 m cable
Factor Set 2:	A9_HI_V_04A	-	-	RG214_04A	25 m cable
Factor Set 3:	-	-	-	-	
Test Equipment:	R1 A9 CSET005				

Radiated_Emissions

Company:	Ipswich Software Ltd	*Product:*	SMI PROX
Date:	23/01/07	*Test Eng:*	Dave Smith
Ports:			
Test:	ANSI C63.4:2003 using limits of		Table 15.209
Ports:			
Test:	using limits of		

Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor	Corr'n Factor	Total Level dBuV/m	Limit 15.209 dBuV/m	Margin 15.209 dB	Notes
	Peak:												
3	1	0	3	2	0.126		54.6	10.7		65.3	105.6	40.3	
	QPeak:												
3	1	0	3	2	0.126		47.8	10.7		58.5	105.6	47.1	
Results							Minimum Margin PASS/FAIL				40.3	dB	

Notes	Comments and Observations
	Results of scans shown in plots 3 to 5. Measured with EUT both upright and flat on bench. Upright position found to produce highest emissions. Also measured with receiving antenna both face on and perpendicular to EUT. In all cases turntable rotated through 360°. Highest reading of these positions recorded above. Screened room plots and measurements on open area test site showed no other emissions within 20dB of the FCC limit. Limits adjusted for 3m test distance using a factor of 40dB per decade as described in CFR 47 15.31 f(2) Total level (dBuV/m) = reciever reading (dBuV) + Correction Factor (dB/m)

4.3 Radiated Emissions Results - Above 30MHz

Factor Set 1:	A12_FS_06A	-	-	RG214_04A	25 m cable
Factor Set 2:	-	-	-	-	
Factor Set 3:	-	-	-	-	
Test Equipment:	R4 A12 CSET005				

Radiated_Emissions

Company:	Ipswich Software Ltd	*Product:*	SMI PROX
Date:	23/01/07	*Test Eng:*	Dave Smith
Ports:			
Test:	ANSI C63.4:2003 using limits of		CISPR22(B)
Ports:			
Test:	using limits of		

Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit CISPR22(B) dBuV/m	Margin CISPR22(B) dB	Notes
6	1	0	10	1	58.600	V	10.2	6.3		16.5	30.0	13.5	
6	1	0	10	1	58.600	H	2.0	6.3		8.3	30.0	21.7	
6	1	0	10	1	192.500	V	3.6	10.5		14.1	30.0	15.9	
6	1	0	10	1	192.500	H	1.0	10.5		11.5	30.0	18.5	
7	1	0	10	1	416.000	V	4.4	20.1		24.5	37.0	12.5	
7	1	0	10	1	416.000	H	5.5	20.1		25.6	37.0	11.4	
7	1	0	3	1	520.000	V	17.0	22.5		39.5	47.5	7.9	#1
7	1	0	3	1	520.000	H	16.9	22.5		39.4	47.5	8.0	#1

Results	Minimum Margin	7.9 dB	
	PASS/FAIL	PASS	

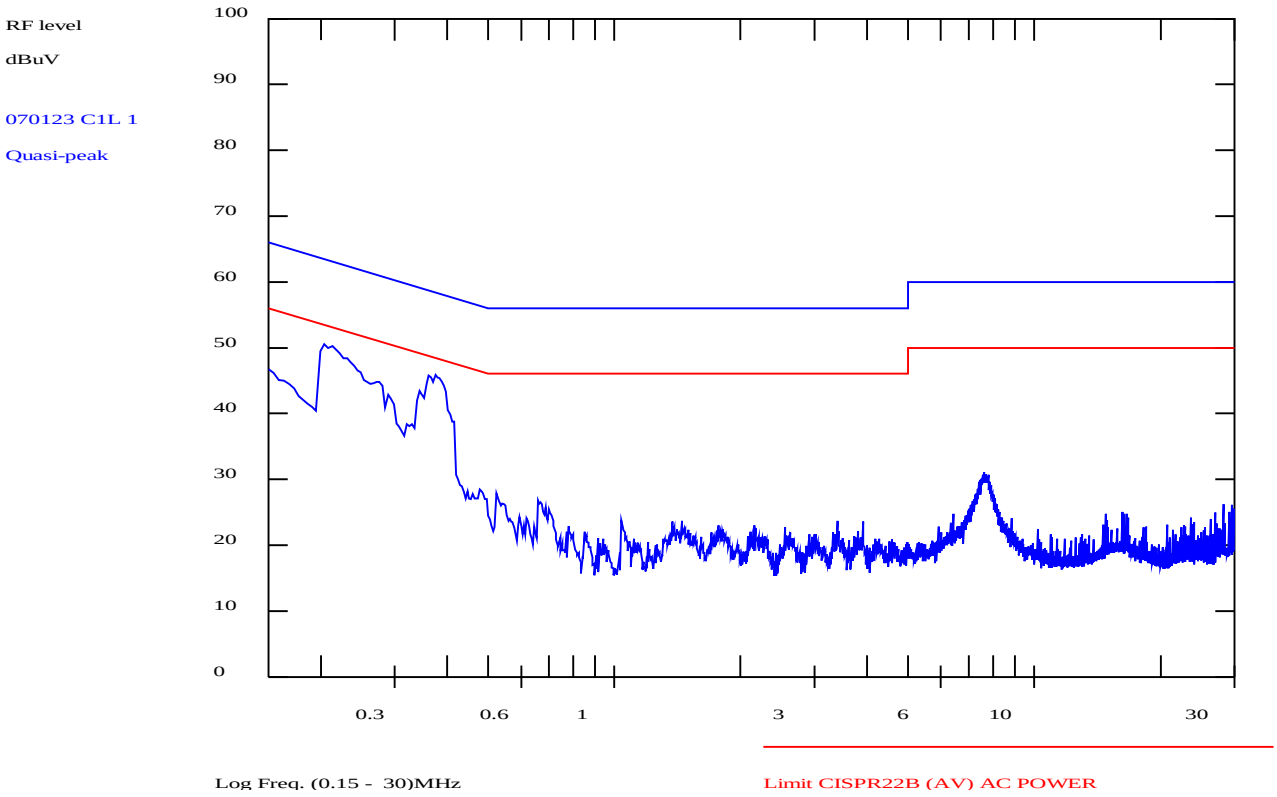
Notes	Comments and Observations
	Results of scans shown in plots 6 and 7.
#1	Measured at 3m because of high ambient.
	Total level (dBuV/m) = reciever reading (dBuV) + Correction Factor (dB/m)

Chase EMS 6.21

Notes

Analyse 070123 C1L 115V

Test: 150kHz-30MHz (L1+CSET001) dBuV



PLOT 1 Conducted Emissions - Live Line

Company:	Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC part 15	Limit:	CISPR22 B

Notes:
115V operation

Equip:R1,L1,L2,AB002,CBL005,CBL007.

Line:	Live	Attenuator:	10dB PAD	Operating Mode:	1
Detector:	QuasiPeak			Mod. State:	0
LISN:	EMCO	Filename:	C7123705.plt		

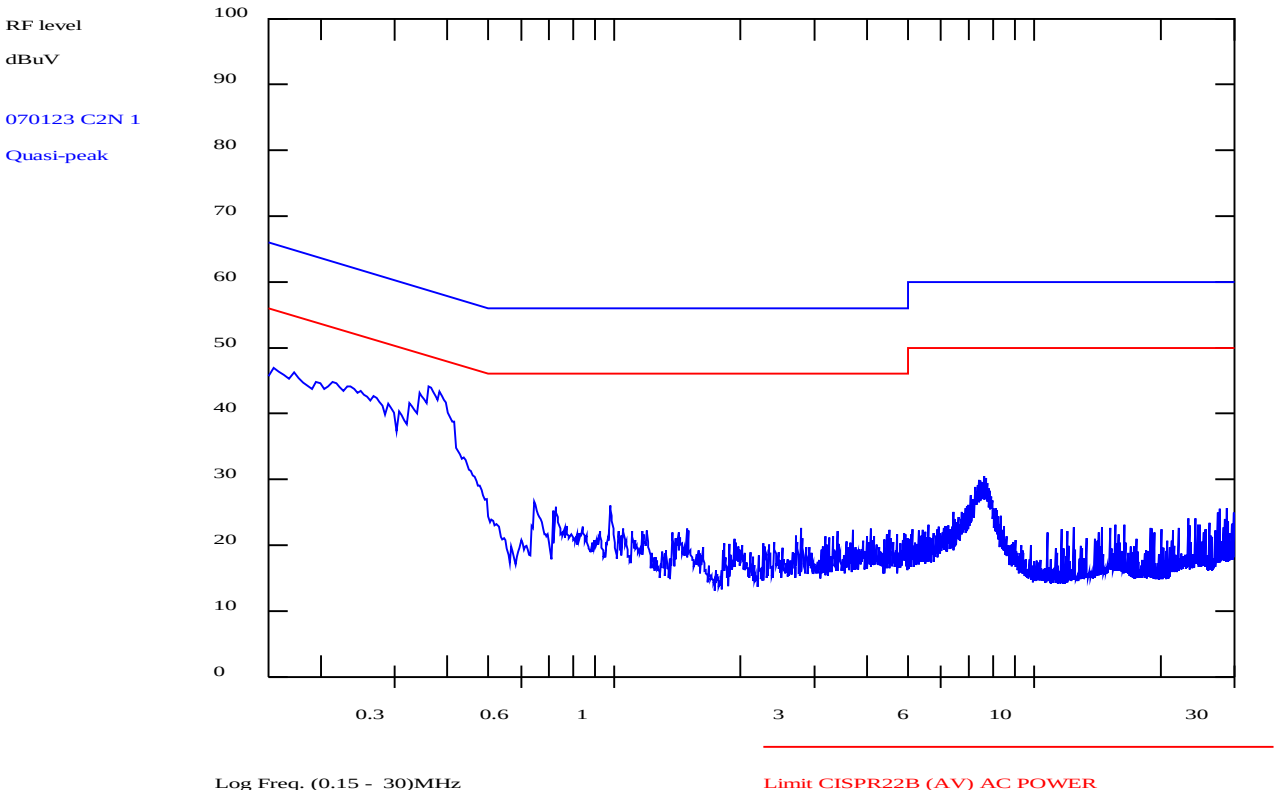
Frequency List (MHz)

Chase EMS 6.21

Notes

Analyse 070123 C2N 115V

Test: 150kHz-30MHz (L1+CSET001) dBuV



PLOT 2 Conducted Emissions - Neutral Line

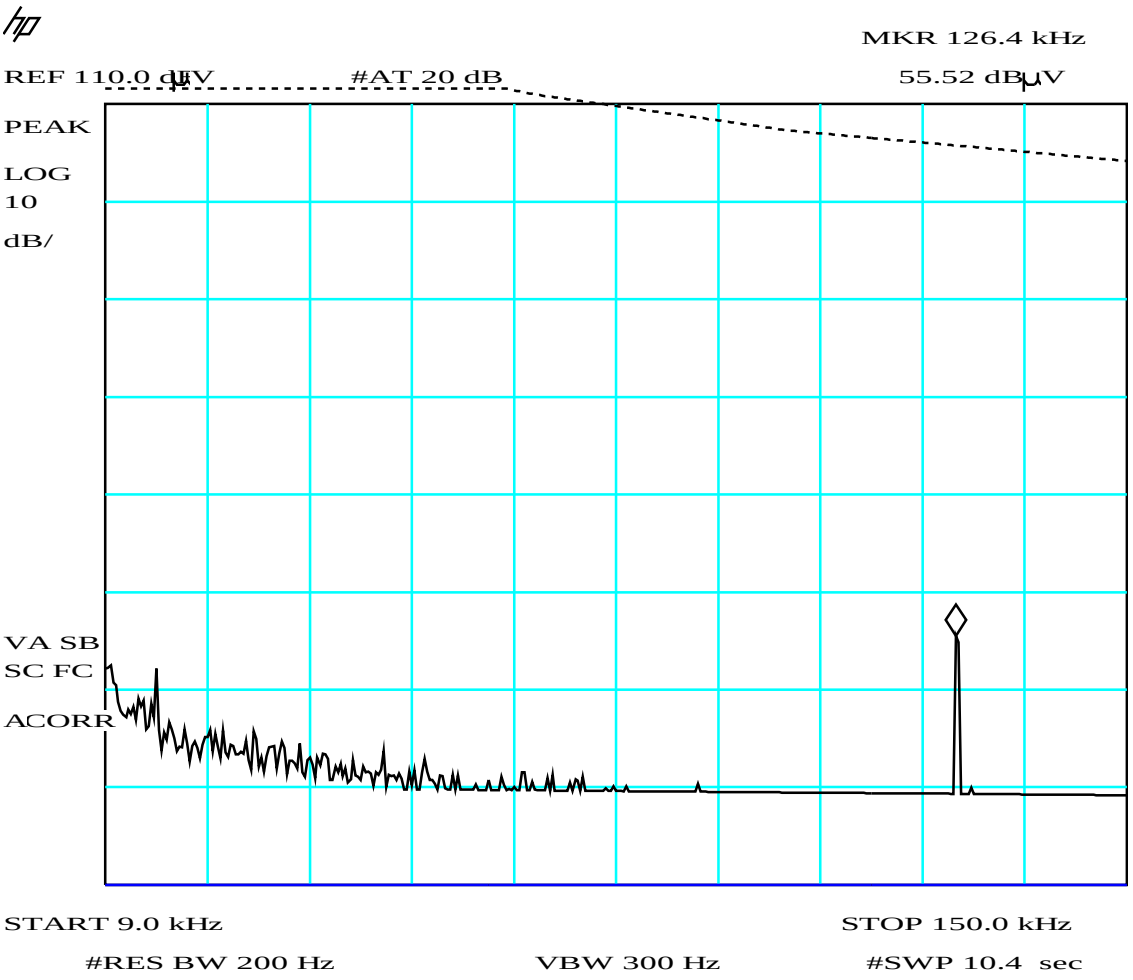
Company:	Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC part 15	Limit:	CISPR22 B

Notes:
115V operation

Equip:R1,L1,L2,AB002,CBL005,CBL007.

Line:	Neutral	Attenuator:	10dB PAD	Operating Mode:	1
Detector:	QuasiPeak			Mod. State:	0
LISN:	EMCO	Filename:	C712371C.plt		

Frequency List (MHz)



PLOT 3 Radiated Emissions - 9kHz to 150kHz

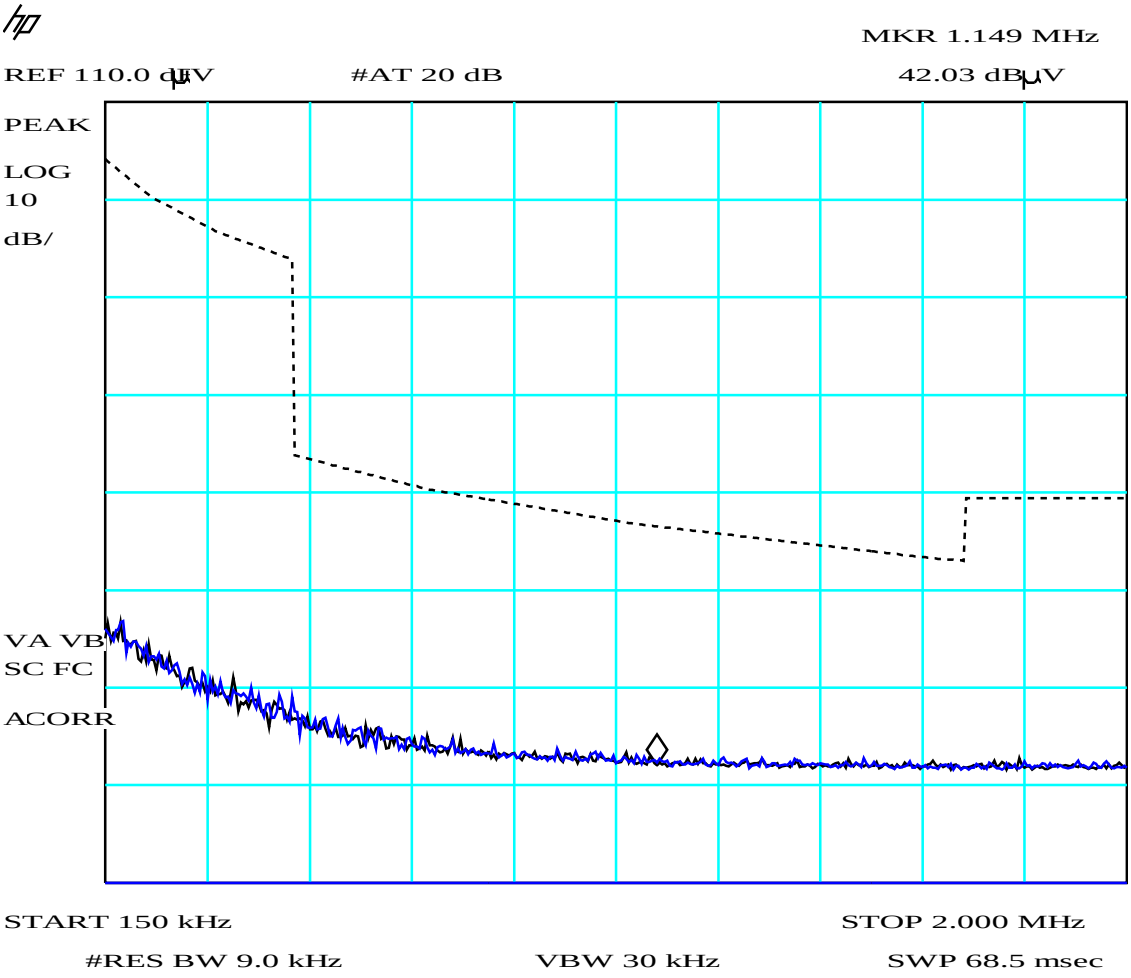
Company:	Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC 15 C	Limit:	15.209

Notes:
Limit adjusted for 3m using 40dB per decade extrapolation.
PDA in cradle. Charger connected.

Equip: R5,CBL002,Patch1,CBL003,A5,A9.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	3m	Antenna:	Loop	Mod. State:	0
Height:	1m	Filename:	H71234E0.plt		

Frequency List (Mhz)



PLOT 4 Radiated Emissions - 150KHz to 2MHz

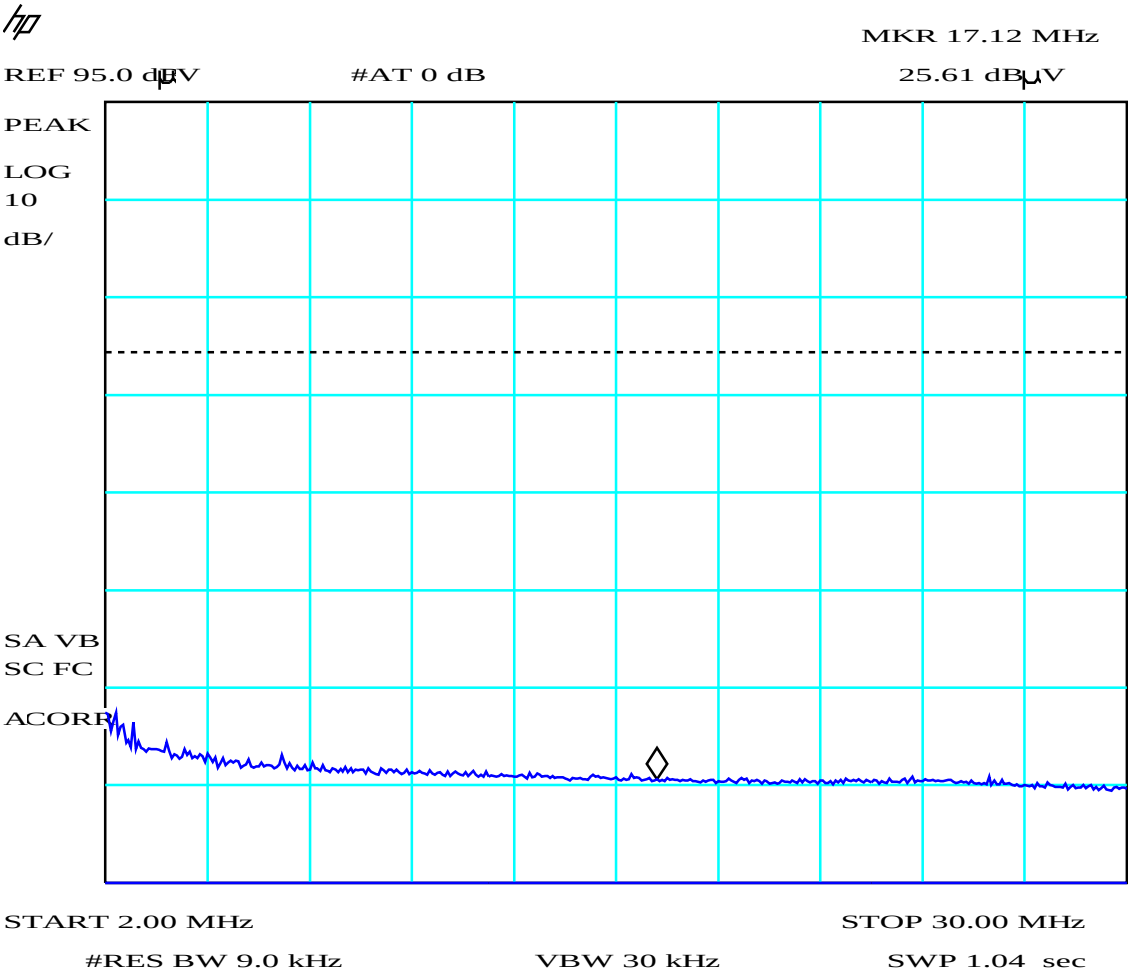
Company:	Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC 15 C	Limit:	15.209

Notes:
Limit adjusted for 3m using 40dB per decade extrapolation.
PDA in cradle. Charger connected.

Equip: R5,CBL002,Patch1,CBL003,A5,A9.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	3m	Antenna:	Loop	Mod. State:	0
Height:	1m	Filename:	H71234F0.plt		

Frequency List (Mhz)



PLOT 5 Radiated Emissions - 2MHz to 30MHz

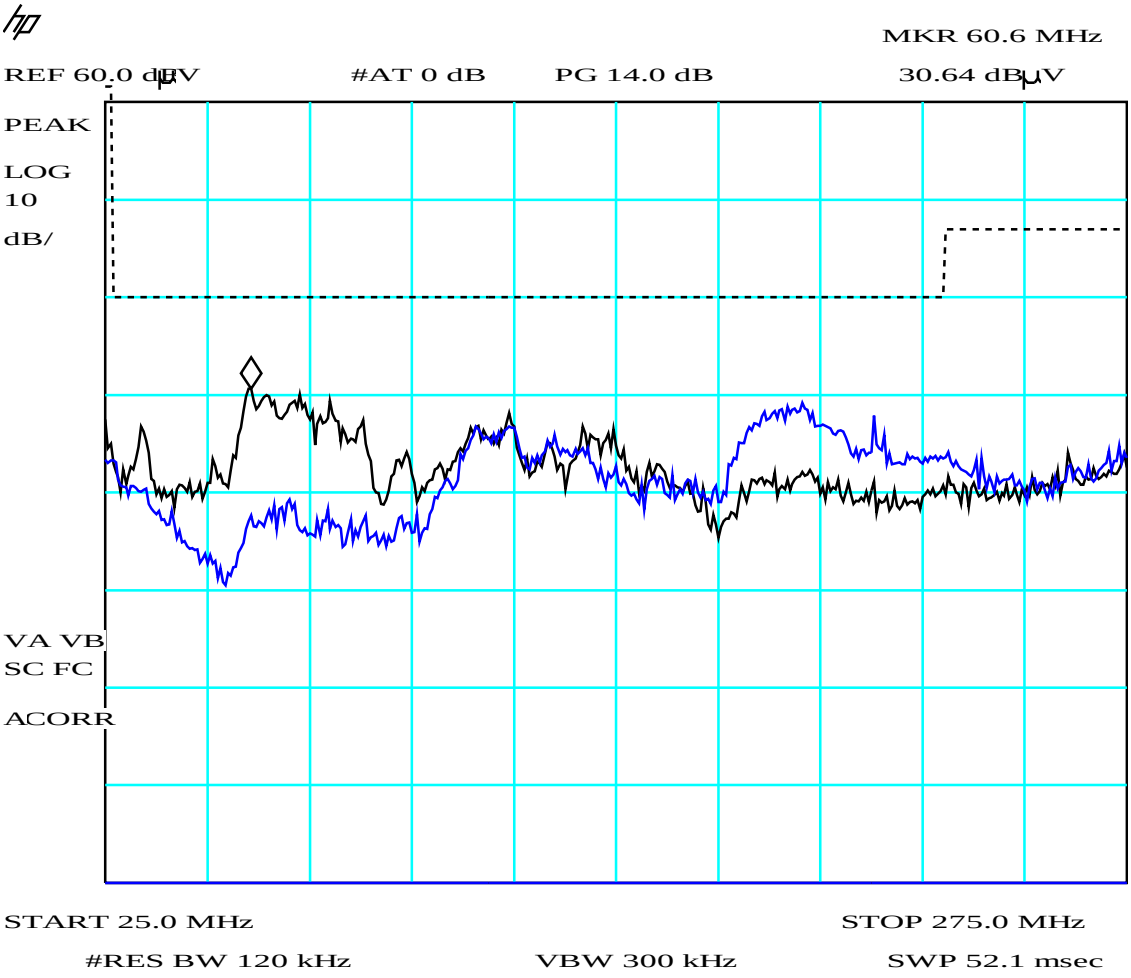
Company:	Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC 15 C	Limit:	15.209

Notes:
Limit adjusted for 3m using 40dB per decade extrapolation.
PDA in cradle. Charger connected.

Equip: R5,CBL002,Patch1,CBL003,A5,A9.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	3m	Antenna:	Loop	Mod. State:	0
Height:	1m	Filename:	H71234FB.plt		

Frequency List (Mhz)



PLOT 6 Radiated Emissions - 25MHz to 275MHz

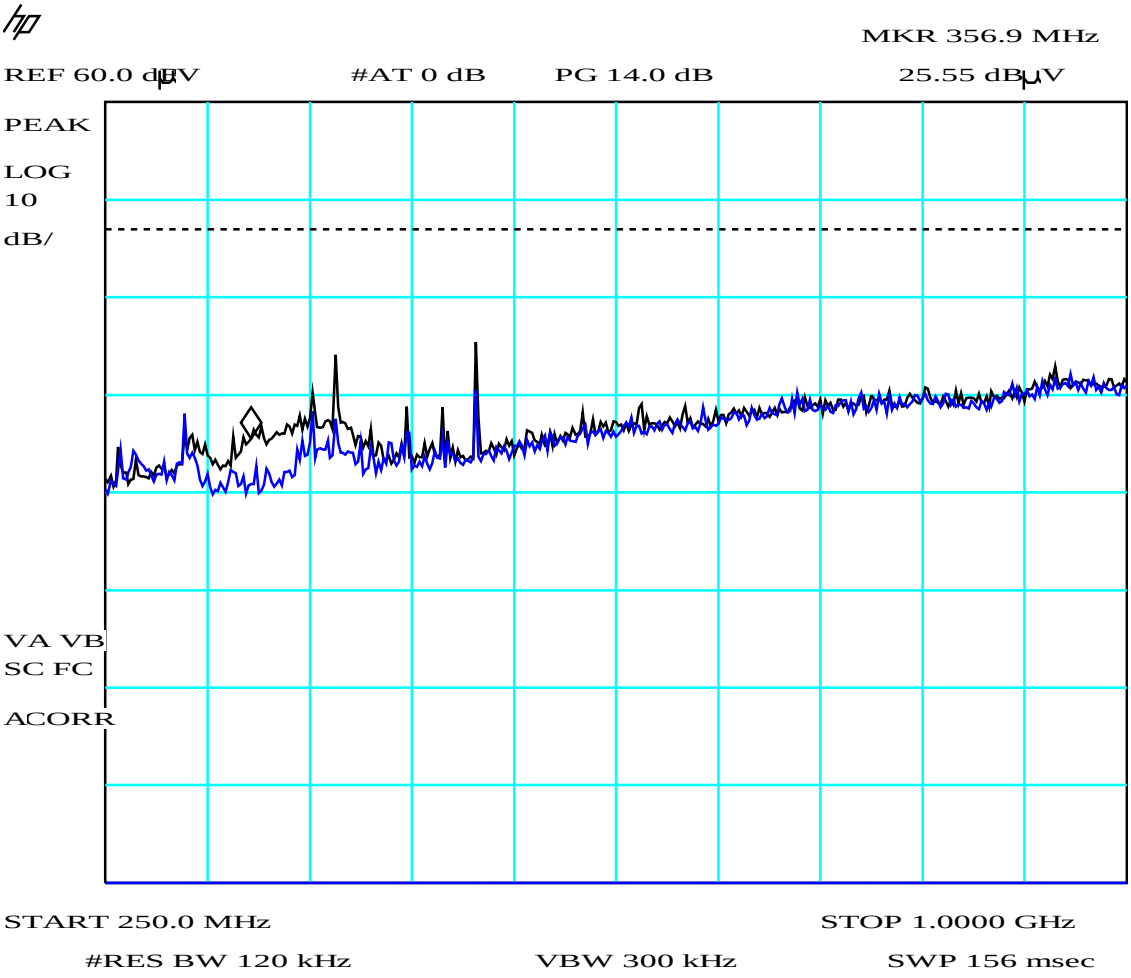
Company:	'Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	CISPR22 B

Notes:
PDA in cradle. Charger connected.

Equip: R5,R5B,CBL002,Patch1,CBL003,A5. Vertical - Black Trace, Horizontal - Blue Trace.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	3m	Antenna:	Bilog	Mod. State:	0
Height:	1m	Filename:	H7123483.plt		

Frequency List (Mhz)



PLOT 7 Radiated Emissions - 250MHz to 1GHz

Company:	'Ipswich Software Ltd	Product:	SMI PROX
Date:	23 Jan 07	Test Engineer:	Dave Smith
Test:	FCC pt 15	Limit:	CISPR22 B

Notes:
PDA in cradle. Charger connected.

Equip: R5,R5B,CBL002,Patch1,CBL003,A5. Vertical - Black Trace, Horizontal - Blue Trace.

Polarisation:	V + H	Orientation:	0 - 360°	Operating Mode:	1
Distance:	3m	Antenna:	Bilog	Mod. State:	0
Height:	1m	Filename:	H712348A.plt		

Frequency List (Mhz)
