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EMC TEST REPORT

ON

OKI Ltd.

**Optional Serial/Memory Interface
for the
OKIpage 10i Printer.**



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Serial Number:- 411

Issued to :- Mr R. White, OKI Ltd., 3 Castlecary Road, Wardpark North, Cumbernauld, G68 0BN	Order No :- PN00248
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**ELECTROMAGNETIC
COMPATIBILITY
TEST REPORT
on**

Optional Serial/Memory Interface
for the
OKIpage 10i Printer

Report No :- 4215 / 1600 / A / TR

Date :- 24th October 1997

Prepared by :- <i>B. Tait</i> B. Tait	Approved Signatory :- <i>D.T. Hambley</i> D.T. Hambley
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IT IS CERTIFIED THAT THE TESTS DETAILED IN THIS REPORT HAVE BEEN CARRIED OUT AS SPECIFIED WITH THE RESULTS SHOWN TO THE REQUIREMENTS OF THE CONTRACT.

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**SECTION 1
INTRODUCTION**

1.1. General.

This report contains the results of EMC tests performed on the Optional Serial/Memory Interface for the OKIpage 10i Printer (herein called the equipment under test [EUT]) received at the EMC Test Centre on the 14th October 1997 and tested in the period 15th October 1997 to 16th October 1997. The tests were carried out in the EMC Test Centre, GEC Marconi Avionics, Donibristle, Dunfermline.

This report is written assuming the reader is familiar with the terms used in the field of EMC.

1.2. Client.

The tests were performed for

OKI Ltd.
3 Castlecary Road,
Wardpark North,
Cumbernauld,
G68 0BN

Contact name : Mr. R. White.

1.3. Equipment Under Test (EUT).

The EUT consisted of :-

	type no.	serial no.
Optional Serial/Memory Interface	None	008
hosted by :- Printer	OKIpage 10i	None

with the following interconnecting cables:-

Cable 1 Serial Interface Cable, Multicore, screened.

The rationale for selection of the EUT was as follows :-

The EUT was configured in as real life a configuration as possible. The operational mode selected for test was realised by a PC driven application which continuously exercised the print function. This configuration is considered to be the most emissive state.

1.4. EUT Support Equipment.

The EUT support equipment consisted of :-

	type no.	serial no.
Laptop PC	Ezbook Active Matrix Color	167206
AC Adapter	PA-1000	A9526624

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1.5 NAMAS Accreditation

Opinions and interpretations expressed herein are outside the scope of NAMAS Accreditation.

1.6. Abnormalities/Departures from Standard Conditions

None.

1.7. FCC Registration

The EMC Test Centre, GEC Marconi Avionics, is a registered test facility with the Federal Communications Commission (FCC). The appropriate FCC reference number is 31040/SIT 13000B3, Dated 13 May 1994 and reconfirmed 22 July 1997.

SECTION 2
SPECIFICATIONS, LIST OF TESTS and TEST RESULTS SUMMARY

2.1. Specifications and Related Documents.

The relevant EMC specifications are;
47CFR (1995); Part 15, Sub Part B. Unintentional Radiators; Conducted and Radiated Emission Limits.

47CFR (1995) refers to the following specification :-

ANSI C63-4 (1992) Methods of Measurements of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range 9 kHz to 40 GHz.

2.2. List of Tests.

The following is the list of tests which were required for compliance with the above specifications;

Radiated Emission Test, 30 MHz to 1000 MHz.

The sequence of testing is described in Section 6 of this report.

2.3. Summary of Test Results.

The following is a brief summary of the test results. Detailed data are contained in Section 6 of this report.

2.3.1. Radiated Emission Test, 30 MHz to 1000 MHz.

The EUT and its associated cabling complied with the relevant specification limit by a margin of 4.5 dB.

2.3.2. EUT Submitted.

It should be noted that these results apply only to the particular EUT submitted, in the configuration used and in the mode of operation tested.

**SECTION 3
TEST EQUIPMENT USED**

3.1. Test Equipment.

	<u>Serial No.</u>	<u>Last Cal.</u>	<u>Next Cal.</u>
1. <u>Receivers.</u>			
1.01 Rohde & Schwarz ESVS20	827131/009	07/07/97	07/04/98
1.02 Hewlett Packard 8574A:			
8568B Spectrum Analyser	3217A05565	01/04/97	01/01/98
85662A Display	3144A20662	01/04/97	01/01/98
85685A RF Preselector	3146A01322	01/04/97	01/01/98
85650A Quasi-Peak Adapter	3145A01606	01/04/97	01/01/98
2. <u>Aerials.</u>			
2.01 Chase Bilog 6112A	2262	09/05/97	09/05/98
2.02 Chase Bilog 6112A	2263	09/05/97	09/05/98
3. <u>Amplifiers.</u>			
3.05 Voltage / Frequency Converter	T034A101-01	No Cal. Required (Note 1)	

Note 1. This item was used to provide 110 Vac 60 Hz power to EUT.

**SECTION 4
TEST CONDITIONS**

4.1. Test Environment.

All tests were performed under the following environmental conditions:

Temperature range	15 - 35 degrees C
Humidity range	25 - 75 %
Pressure	860-1060 mbar

4.2. Test Areas.

The Radiated Emission tests were performed initially in the screened room detailed above (SR1) to obtain a pre compliance emission profile and then transferred to a 3m Open Area Test Site (OATS) for the formal test measurement.

4.3. EUT Power.

The 110V 60 Hz EUT power was produced by the Voltage / Frequency Converter, T034A101-01.

SECTION 5
TEST SAMPLE OPERATION AND MONITORING

A Block Diagram of the EUT Configuration is contained in Appendix C.

5.1 EUT Configuration, as defined by the client.

During the EMC tests the EUT was configured as follows :-

The EUT was fitted with a 32 M-Byte DRAM SIMM and a Post-Script Flash SIMM.
The host was powered by 110 Vac, 60 Hz, and was serially interfaced to a Laptop PC.

5.2. Modes Of Operation, as defined by the client.

During all EMC tests the EUT was configured as follows :-

The EUT was operated via a Self Test application which continuously exercised the print function.

5.3. EUT Monitoring, as defined by the client.

During the EMC tests the EUT was monitored as follows :-

No external EUT Monitoring equipment was required.

SECTION 6 TEST RESULTS

Photographs of the EUT cabling are contained in Appendix B.

6.2. Radiated Emissions Test, 30 MHz to 1000 MHz.

6.2.1. Pre-compliance Measurement.

The EUT was configured in the test room on a 80 cm high table and powered from the 110V 60 Hz mains supply.

The measurement was performed with an antenna to EUT separation distance of 3 m. The pre compliance measurement was used to obtain a Radiated Emission profile thus allowing the OATS measurements to be performed without the danger of overlooking any potential non compliant emissions. This measurement was performed using peak detection.

The layout of the EUT cabling was adjusted to give maximum emissions, and fixed in this "worst case" position for all subsequent radiated emissions testing.

The measured signal levels at some of the above frequencies failed to comply with the specification limit under screened room measurement conditions.

6.2.2. OATS Measurement.

The EUT was then installed in the Open Area Test Site (OATS) on a 80 cm high table, powered from the 110V 60 Hz mains supply and measurements performed at an antenna to EUT separation distance of 3 m.

The frequencies at which the measured level (QP) in the screened room (pre-compliance measurement) were greater than -6 dB of the limit line were measured individually using a manually tuned receiver in accordance with ANSI C63.4-1992.

The signal levels at these frequencies were found to comply with the specification limit.

During characterisation of the EUT, emissions were detected at frequencies :-

200.5850 MHz, 272.512 MHz, 668.575 MHz.

However, during formal measurements on the OATS these emissions were masked by the presence of ambient signals.

The procedures of EN 55022 Clause 11.4 were then followed in an attempt to measure the levels of these emissions. The levels presented in this report are those measured under these modified conditions and an increased level of uncertainty can be expected for these emission frequencies.

The emission measured at 125.9932 MHz was found to fall within the uncertainty relative to the specification limit. The compliance statements above are therefore made at a lower than 95 % confidence level. The measured result, however, indicates a high probability that this emission complies with the specification limit.

Results sheets for the compliance test are contained in Appendix A of this test report.



MEASUREMENT / TECHNICAL REPORT

PERSONAL COMPUTER AND PERIPHERALS

for

OKI Ltd

Optional Serial / Memory Interface

for the

OKIpage 10i Printer.

MEASUREMENT / TECHNICAL REPORT
OKI Optional Serial / Memory Interface.
FCC ID: NTS00025302YA
23 February 1998

This report concerns : <i>(check one)</i> Original grant <input checked="" type="checkbox"/> YES <input type="checkbox"/> Class II change <input type="checkbox"/>	
* Class B verification <input type="checkbox"/> * Class A verification <input type="checkbox"/> * Class I change <input type="checkbox"/>	
Equipment type : EXPANSION CARD FOR PRINTER.	
Request issue of grant : <i>(check one)</i> <input checked="" type="checkbox"/> YES Immediately upon completion of review <input type="checkbox"/> Defer grant per 47 CFR 0.457(d)(ii) until _____ date _____ Company _____ Name agrees to notify the Commission by _____ date _____ of the intended date of the product so that the grant can be issued on that date	
Confidentiality of grant: <input type="checkbox"/> Application requests the existence of this grant to be kept confidential until _____ date _____. The announcement of this product before this date via freedom of information would be detrimental to Company Name, and therefore must be considered a business secret. Public announcement of this product will not be made prior to this date. <i>(Max 60 days after grant issued)</i>	
Limits used: <i>(check one)</i> CISPR 22 _____ Part 15 _____ YES _____	
Measurement procedure used in ANSI C63.4-1992 unless another is specified. Other test procedure : _____	
Application for Certification prepared by: David T Hambley EMC Test Centre Maxwell Building, Donibristle Industrial Park, Dunfermline, Fife. UK. KY11 5LB Tel: 44 01383 822131 ext 3131 Fax: 44 01383 825396 email: david.hambley@gecm.com	Applicant for this device Robert White OKI (UK) Ltd 3 Castlecary Road, Wardpark North, Cumbernauld, UK. G68 0DA. Tel: 44 01236 50 2736 Fax: 44 01236 50 2787 email: robert.white@mailhost.okiuk.co.uk

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1. GENERAL INFORMATION

1.1 Product Description

The Serial/ Memory Interface (SMIF) PCB (Part No. 00025302) is a customer plug in option PCB for the Okipage 10i Printer. The SMIF PCB adds an RS232C Serial Interface (300bps to 19200bps) plus two 72 pin SIMM sockets for the customer to upgrade memory capacity of their printer using separately available SIMM cards.

SIMM1 accepts DRAM SIMM up to 32MB

SIMM2 accepts either Flash-ROM SIMM or Mask-ROM SIMM up to 8MB.

1.2 Related Submittal(s)/Grant(s)

Okipage 10i : B2KEN2905A

1.3 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system (including inserted cards, which have grants) are :

Model Number (Serial Number)	FCC ID	Description	Cable Description	Length (metre)	Connectors
Okipage 10i	B2KEN2905A	Printer	Unshielded power cord	1.7	IEC 320
Serial / Memory Interface (1)	NTS00025302 YA	Option card	Shielded serial cable	7	D Type
EZbook Active Matrix Color (2)	HLOID03	Laptop PC	None		
PA 1000 (3)	None	AC adaptor	Unshielded power & dc cord	1.7	5mm Coaxial

- (1) EUT submitted for grant.
- (2) Representative support equipment.
- (3) Cords permanently attached to the adaptor.

1.4 Test Methodology

Radiated emission testing was performed according to the procedures in ANSI C63.4-1991. Refer to report 4215 / 1600 / A / TR (Attachment A).

1.5 Test Facility

The EMC Test Centre, GEC Marconi Avionics, is a registered test facility with the Federal Communications Commission (FCC). The appropriate FCC reference number is 31040/SIT 13000B3, Dated 13 May 1994 and reconfirmed 22 July 1997.

1.6 Reference Rules Sections

Not applicable.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The EUT was configured in as real life a configuration as possible. The operational mode selected for test was realised by a PC driven application which continuously exercised the print function. This configuration is considered the most emissive state.

3.2 Video Mode Justification

The system was tested in the default 80 x 25 text mode and in the highest resolution graphics mode of 1024 x 768. Since the default text mode was found to be worst case, this mode was used to collect the included data.

3.3 EUT Exercise Software

The EUT exercise program used during radiated testing was designed to simulate the printer in its intended environment. The software was programmed into the hard disk of the laptop PC. The function of the program was such that when executed the letter 'H' was continuously transmitted serially from the laptop's serial port to the Serial / Memory Interface via an Interface cable.

The Printer was setup to enable the printing of 'H' continuously on paper so as to determine any data corruption during tests.

3.4 Special Accessories

None required.

3.5 Equipment Modifications

None required.

Application Signature Robert White Date 8/4/98

Type/Printed Name Robert White Position: Assisant manager
hardware engineering.

3.6 Configuration of Testing System

Refer to test report 4215 / 1600 / A / TR Page C1.

5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS

Refer to test report 4215 / 1600 / A / TR Page B1.

6. CONDUCTED EMISSION DATA

Not applicable as SMIF has no mains power inlet.

7. RADIATED EMISSION DATA

7.1 Test Procedure

Refer to test report 4215 / 1600 / A / TR Page 9.

7.2 Test Data

Judgment: Passed by 4.5 dB

Refer to test report 4215 / 1600 / A / TR Page A1

7.3 Field strength calculation

The Rhode & Schwarz receiver automatically applies antenna factors and cable correction by means of firmware. The results reported in 4215 / 1600 / A / TR are therefore corrected values. For information a sample calculation on the highest recorded emission is shown below.

$$F_s = V_r + AF + CI$$

Where	F_s = Field strength	dBuV/m
	V_r = Receiver voltage	dBuV
	AF = Antenna Factor	dB/m
	CI = Antenna cable loss	dB

$$F_s = 25.5 + 11.3 + 2.2 = 39 \text{ dBuV/m}$$

8. PHOTOS OF TESTED EUT

Figure 8.1 SMIF PC Board, Component Side

Figure 8.2 SMIF PC Board, Foil Side.