



FCC CERTIFICATION TEST REPORT

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EQUIPMENT FCC ID : MX5402920001

Written by : D. RAUD

January 18, 2002

Test report # : 019054DR

TEST LAB FCC ID: I6U

This report concerns :

Original grant ☒

Class II change ☐

Equipment tested : Radio Frequency Identifier for CARD PRINTER

Equipment FCC ID : MX5402920001

Designed by : ZEBRA TECHNOLOGIES

ZI rue d'AMSTERDAM

44470 VARADES - FRANCE

Manufactured by : ELTRON

1001 Flynn Road

CAMARILLO - CA 93012

Deferred grant requested per 47 CFR 0.457 (d)(1)(ii)

YES ☐

NO ☒

if yes, defer until :

Company Named agrees to notify the Commission by :

of the intended date of announcement of the product so that the grant can be issued on the date

Transition rules requested per 15.377

YES ☐

NO ☒

If no, assumed Part 15, Subpart B for intentional or unintentional radiator

The new 47 CFR [10-1-96 edition] provision

Technical control: Olivier ROY

GYL technologies
1, rue Fleming 49066 ANGERS
Tel : 02.41.36.22.33
Fax : 02.41.36.22.23

Quality Control: Lucien MONTIEL



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1 E.U.T TECHNICAL DESCRIPTION

1.1 PRODUCT DESCRIPTION

The 13,56 MHz Radio Frequency Identifier (RFID) is composed of :

A transceiver (emitter and receiver) placed on an electronic board (see exhibit 7)

A passive transceiver embedded in the printing ribbon frame (see exhibit 7)

This features is used in printer family range whose purpose is printing cards. Its primary function is to check if the inserted printing ribbon is the right one. Pictures given in exhibit 9. show how the RFID cards are mounted on two different printer models

1.2 LIST OF EMI CRITICAL COMPONENTS

ITEM	Reference	Frequency	Manufacturer
Oscillator	ABLS-10.000-18-R70-B-4-Y-FT	10.00 MHz	Prime Elect
Oscillator	ABLS-13.5600-18-R70-B-4-Y-FT	13.56 MHz	Prime Elect
Ferrite bead	Steward: LI0805H121R		Kent Elect.
Inductance	0805CS-681XJBC	680 nH 5%	Coilcraft
Inductance	0805CS-391XGBC	390 nH 2%	Coilcraft
Inductance	0805CS-821XGBC	820 nH 2%	Coilcraft

1.3 TESTED SYSTEMS DETAILS

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

Description Model & Serial number	FCC ID	Cable description	Cable termination	Length (m)
Radio Frequency Identifier (RFID)	Submitted for Grant	None	None	None
Printer Model 210	FCC Class B Test report 019054 DK	serial shielded cable parallel shielded cable	Plastic molded	2 m 1,8 m
DELL Portable PC	DoC	USB shielded cable	metallic	1,5 m
EOS ZVC65SG24E AC/DC adapter or PowerBox SPN-270-24 AC/DC adapter		unshielded cable	plastic molded jack	1.5m
Printer Model 310	FCC Class B Test report 019041CH	USB shielded cable parallel shielded cable	Plastic molded	2 m 1,8 m
NEC POWERMATE PC model NLX7YA06402US	DoC	USB shielded cable	metallic	1,5 m
Zenith Display ZCM1426-XT	CKLHCM-427	shielded cable	Plastic molded	1m
Mouse Microsoft	C3KKMP5	unshielded cable	Plastic molded	1.5 m



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1.4 TEST METHODOLOGY AND PROCEDURE

Both conducted and radiated testing were performed in accordance with ANSI C63.4 procedure, as revised in 1992. The specification used was the Class B limits of FCC Rules Part 15 Subpart B for conductive (§ 15-107) and radiated (§ 15-109) interference measurements and Subpart C (§ 15.201 to 15.209 and §15.225) for intentional radiator.

Final radiated measurement is performed with an antenna located at 3 meters distance from EUT (Preliminary radiated emission test (prescan) was realized at a distance of 1 meter in the underground of open area test site)

1.5 TEST SITE

The open area test site and conducted measurement facility used to collect the radiated data is located at the following address:

GYL TECHNOLOGIES
18 Rue du Nid de Pie
49008 ANGERS Cedex 01
France

This site has been fully described in a report dated September 20, 2000 submitted to your Office, and accepted in a letter dated June 18, 2001

1.6 LIST OF MEASUREMENT APPARATUS

APPARATUS	MANUFACTURER	REFERENCE	SERIAL NUMBER	VERIFICATION DATE
RECEIVERS				
CISPR Receptive chain :	Hewlett Packard	HP 8574A		28/11/2000
Quasi-Peak Detector	Hewlett Packard	HP 85650A	2811A01134	28/11/2000
Spectrum Analyzer	Hewlett Packard	HP 8568B	2816A116603	28/11/2000
Pre-selector	Hewlett Packard	HP 85685A	287A00784	28/11/2000
EMI Software (For conducted emission)	Hewlett Packard	HP 85869A		28/11/2000
REMS Software (For radiated emission)	Hewlett Packard	HP 85879A Rev A.02.01		28/11/2000
ARTIFICIAL MAINS NETWORKS				
LISN	Rohde & Schwarz	ESH2-Z5	871777/031	28/11/2000
LISN	Rohde & Schwarz	ESH2-Z5	872094/037	28/11/2000
ANTENNAS				
Bilog	Chase	CBL6112	2290	28/11/2000
H Field loop antenna	Rohde & Schwarz	HFH2-Z2	8719200/36	28/11/2000

2 PRODUCT LABELLING

2.1 FCC ID LABEL



A label on the equipment, except the header giving :

Manufacturer name

Printer model

Serial number

Part number

shows the following statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The user manual also provides the information, required by section 15.105, to the user. The following statement is placed in a prominent location in the manual: (see attached user manual abstract)

2.2 LOCATION OF THE LABEL ON EUT

At the bottom of the printers





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3 SYSTEM TEST CONFIGURATION

3.1 JUSTIFICATION

Two printers, representing the worst case applications, were selected to validate the RFID for the whole printer family range.

Different printed circuit shape but same components, circuitry and electrical schematic

Distance and positioning versus motherboard

Number of electronic cards

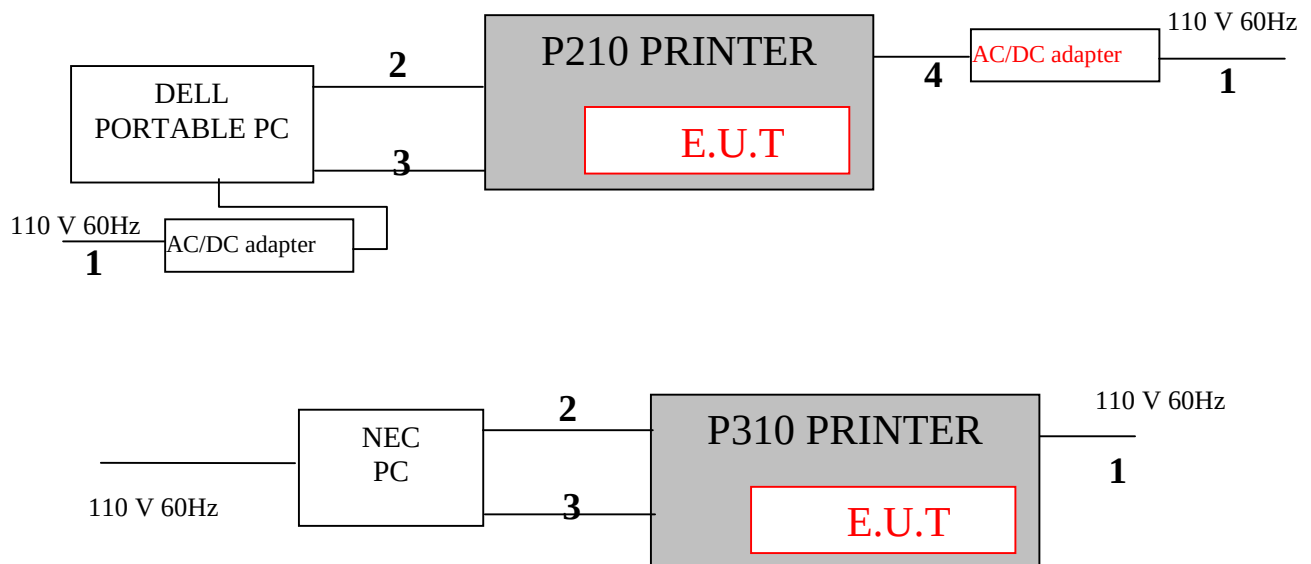
Internal wiring complexity

Plastic and metal enclosures

In both cases, the hereunder-described test configuration was chosen to place the equipment under test in the worst case conditions and having the RFID device working in a continuous mode.

For each configuration, two conducted lines perturbations measurements are performed, one on external power supply of the P.C and one on the mains cord of the E.U.T. The radiated perturbations or emissions measurements are also performed with EUT and P.C in the field measurement area.

3.2 EUT TEST CONFIGURATION DIAGRAM



- 1 Mains power cord 1.5m long (2 wires + ground)
- 2 parallel shielded cable
- 3 USB shielded cable
- 4 24 V dc cable



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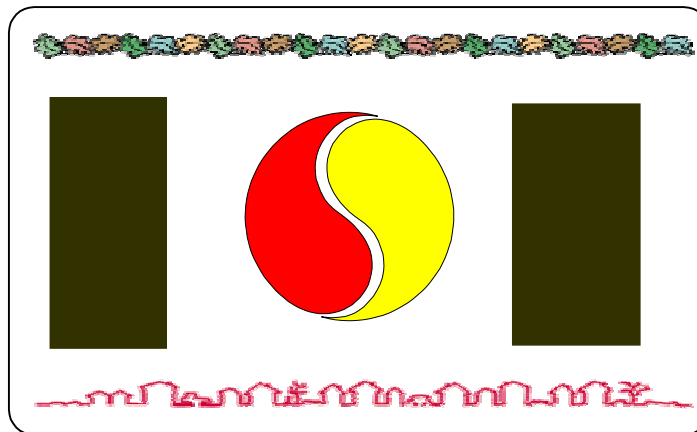
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3.3 EUT EXERCISING CONDITIONS

Conducted and radiated measurement are made when printing a typical card with contrast and saturation parameters set to default values (Word 97) as shown by the hereunder figure.

In order to have the equipment running in the worst case conditions, Open area measurement are made in USB mode and parallel mode.



[illegible]



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4.3 SUMMARY OF 6 HIGHEST SIGNALS PER WIRE MEASURED ON EACH CONFIGURATION

PRODUCT P210 Printer model	Test Result	MINIMUM MARGIN				Data and Plot on following pictures
		WIRE LINE		NEUTRAL LINE		
		dBµV	MHz	dBµV	MHz	
with EOS AC/DC adapter	Pass	35.3	0.5147	33.2	0.504	Appendix P210 1-1 to 1-8
	Pass	29.4	0.6087	32.3	0.6537	
	Pass	29.9	0.7962	32.4	0.6732	
	Pass	32.6	0.888	30.3	0.8917	
	Pass	29.5	1.011	31.4	1.028	
	Pass	36.6	13.52	37	13.52	
with Power Box AC/DC adapter	Pass	35.3	0.4693	37.1	0.4732	Appendix P210 1-9 to 1-16
	Pass	38.7	3.301	36.1	2.948	
	Pass	35.6	11.53	41.1	12.54	
	Pass	46.2	13.52	46.9	13.52	
	Pass	35.2	19.72	39.7	14.95	
	Pass	37	20.74	36.9	16.33	

PRODUCT P310 Printer model	Test Result	MINIMUM MARGIN				Data and Plot on following pictures
		WIRE LINE		NEUTRAL LINE		
		dB μ V	MHz	dB μ V	MHz	
using Parallel interface in standby then printing mode	Pass	38.1	13.52	38.8	13.52	Appendix P310 1-1 to 1-4
	Pass	32.8	13.86	33.9	14.1	
	Pass	33.8	15.08	33.9	15.08	
	Pass	32.2	15.72	30.3	16.33	
	Pass	28.7	16.74	35.6	24.94	
	Pass	34.8	24.94	27.8	26.23	
using USB interface in standby then printing mode	Pass	13.52	36.3	13.52	36.4	Appendix P310 1-5 to 1-8
	Pass	14.4	32.8	14.4	33	
	Pass	15.99	30.4	15.14	32.3	
	Pass	17.24	28.7	15.85	30	
	Pass	24.94	38.8	24.94	38.8	
	Pass	26.23	34.8	26.9	33.6	

CISPR RECEPTIVE CHAIN H.P 8574A CONFIGURATION		
Quasi-Peak Adapter	Normal mode, Band With = 9 kHz	
Spectrum Analyzer	Resolution Band With = 100 kHz Video Band With = 300 kHz	
	Sweep min	Peak measurement : 100 ms/MHz Quasi-peak measurement : 200s/MHz
Pre-selector	Normal mode, Internal preamplifier : 20 dB	

All readings are quasi-peak unless stated otherwise.



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4.4 TEST SET UP PICTURES

P210 PRINTER



P310 PRINTER





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5 OPEN FIELD RADIATED EMISSION (§ 15.109 class B)

5.1 TEST RESULTS MEASUREMENTS

During testing no significant emission problem was observed. The minimum margin measured is around 3dB

The following data tables lists the most significant emission frequencies, measured level, correction factor (includes cable and antenna corrections), corrected reading and the limit. The highest peaks are measured in quasi-peak detection mode. Correction factors are mentioned in the appendixes given the detailed results

5.2 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and cable loss, and subtracting the preamplifier gain (if any) from the measurements reading. The basic equation with a sample calculation is

$$FS = RA + AF + CF + PG,$$

Where: FS = Field Strength; RA = Receiver Amplitude; AF = Antenna Factor;
CF = Cable loss; PG = Preamplifier Gain (Pre-selector)

Assuming a receiver reading. The antenna factor and the cable loss are added while the internal pre-selector gain of 20 dB is subtracted, giving the field strength. REMS software performs calculation and result are given in column ABS of Measurements results table.

5.3 SUMMARY OF 6 HIGHEST SIGNALS MEASURED ON THE P210 CONFIGURATION

PRODUCT	Result	MINIMUM MARGIN		Data and Plot on following Pictures
		dBµV	MHz	
P210 Printer equipped with EOS AC/DC adapter	Pass	37.2	60.022	Appendix P210 2-1 and 2-2
	Pass	38.5	120.056	
	Pass	43.5	288.000	
	Pass	44.2	612.161	
	Pass	41.9	612.166	
	Pass	44.3	636.118	

PRODUCT	Result	MINIMUM MARGIN		Data and Plot on following Pictures
		dBµV	MHz	
P210 Printer equipped with Power Box AC/DC adapter	Pass	37.6	83.992	Appendix P210 2-3
	Pass	36.0	96.031	
	Pass	40.7	516.098	
	Pass	41.4	540.121	
	Pass	41.1	612.124	
	Pass	38.6	636.110	



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5.4 SUMMARY OF 6 HIGHEST SIGNALS MEASURED ON THE P310 CONFIGURATION

5.4.1 USB INTERFACE STANBY AND PRINTING MODE

PRODUCT	Result	MINIMUM MARGIN		Data and Plot on following Pictures
		dB μ V	MHz	
P310 Printer equipped with Tektris power supply	Pass	37.2	58.973	Appendix P310 2-1 to 2-2
	Pass	32.1	63.980	
	Pass	38.4	200.453	
	Pass	35.2	255.988	
	Pass	38.9	352.007	
	Pass	41.7	767.995	

5.4.2 PARALLEL INTERFACE STANBY AND PRINTING MODE

PRODUCT	Result	MINIMUM MARGIN		Data and Plot on following Pictures
		dB μ V	MHz	
P310 Printer equipped with Tektris power supply	Pass	33.4	44.260	Appendix P310 2-3 to 2-4
	Pass	31.4	56.710	
	Pass	37.0	58.973	
	Pass	34.1	63.989	
	Pass	38.4	200.453	
	Pass	42.2	768.002	

CISPR RECEPTIVE CHAIN H.P 8574A CONFIGURATION		
Quasi-Peak Adapter	Normal mode	
	Band With = 120 kHz	
Spectrum Analyzer	Resolution Band With = 1 MHz	
	Video Band With = 3 MHz	
	Sweep min	Peak measurement : 1 ms/MHz Quasi-peak measurement : 20s/MHz
Pre-selector	Normal mode Internal preamplifier : 20 dB	

All readings are quasi-peak unless stated otherwise.



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6 FIELD STRENGTH OF INTENTIONAL RADIATOR VERSUS PART 15 SUBPART C §15.225, 15.209, 15.205

6.1 MEASUREMENT OF FREQUENCY STABILITY(§15.225 (C))

Nominal value at 20 °C temperature and 5 V voltage: 13,559 MHz

Test Conditions		Frequency (MHz)				Test Results
Temperature	Voltage	Low limit	Measured	High limit	Measured	
-20 °C	4.25 V	13.5577	13.5588	13.5603	13.5588	Pass
+ 50°C	4.25 V		13.5588		13.5588	Pass
-20 °C	5.75 V		13.5589		13.5589	Pass
+ 50°C	5.75 V		13.5589		13.5589	Pass

6.2 HARMONIC LEVEL MEASUREMENT

Measurements were performed on fundamental frequency h1 until the 10th harmonic. Preliminary spectrum signature was conducted at 1 meter from EUT, final measurement being conducted at 3 meters distance from EUT according to ANSIC63.4 measurement method described in §8.

Test conditions: see § 3.1 to 3.3 of this report

Peak detection is used instead of average; the result is equal for continuous wave

RBW = 100 kHz for fundamental frequency (h1) measurement (VBW=3*RBW)

RBW = 5 kHz for harmonic greater than fundamental frequency (h1) measurement (VBW=3*RBW)

6.2.1 MEASUREMENT DONE ON PRINTER P210 MODEL

Harmonic number	Frequency (MHz)	Antenna factor dB D= 3m	Cable loss dB	Measured level dBµV/m		Limit (D=3m) dBµV/m (**)		Margin	Results
				D= 1m	D= 3m	§ 15.225	§15.209		
h1	13.5591553	20	0.9	75.2	54	80		-26	Pass
h2	27.1183106	20	0.8	24.3	15.1		40	-24.9	Pass
h3	40.6774659	13.8	1.0		29.2		40	-10.8	Pass
h4	54.2366212	9.0	1.0		17.2		40	-22.8	Pass
h5	67.7957765	7.2	1.2		24.4		40	-15.6	Pass
h6	81.3549318	8.7	1.3		27.3		40	-12.7	Pass
h7	94.9140871	11.5	1.5		31.2		40	-8.8	Pass
h8	108.473242	12.5	1.5		27.4		40	-12.6	Pass
h9	122.032398	13.2	1.6		27.1		40	-12.9	Pass
h10	135.591553	12.9	1.7		25.2		40	-14.8	Pass

(**) Unit change: 80 dBµV/m = 10 mV/m, 40dBµV/m = 0.1mV/m



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6.2.2 MEASUREMENT DONE ON PRINTER P310 MODEL USING USB INTERFACE

Harmonic number	Frequency (MHz)	Antenna factor dB D= 3m	Cable loss dB	Measured level dB μ V/m		Limit (D=3m) dB μ V/m ^(**)		Margin	Results
				D= 1m	D= 3m	§ 15.225	§ 15.209		
h1	13.5591553	20	0.9	62	34.5	80		-45.5	Pass
h2	27.1183106	20	0.8	23.2	23.2		40	-16.8	Pass
h3	40.6774659	13.8	1.0	20	4.8		40	-35.2	Pass
h4	54.2366212	9.0	1.0	14.9	8.2		40	-31.8	Pass
h5	67.7957765	7.2	1.2	9.56	16.5		40	-23.5	Pass
h6	81.3549318	8.7	1.3	5.5	4.1		40	-35.9	Pass
h7	94.9140871	11.5	1.5	9.2	17.2		40	-22.8	Pass
h8	108.473242	12.5	1.5	0.2	1.2		40	-38.8	Pass
h9	122.032398	13.2	1.6	10.8	5.8		40	-34.2	Pass
h10	135.591553	12.9	1.7	5.6	11.6		40	-28.4	Pass

6.2.3 MEASUREMENT DONE ON PRINTER P310 MODEL USING PARALLEL INTERFACE

Harmonic number	Frequency (MHz)	Antenna factor dB D= 3m	Cable loss dB	Measured level dB μ V/m		Limit (D=3m) dB μ V/m ^(**)		Margin	Results
				D= 1m	D= 3m	§ 15.225	§ 15.209		
h1	13.5591553	20	0.9	62	34.5	80		-45.5	Pass
h2	27.1183106	20	0.8	23.2	23.2		40	-16.8	Pass
h3	40.6774659	13.8	1.0	20.4	15.5		40	-24.5	Pass
h4	54.2366212	9.0	1.0	15.4	11.4		40	-28.6	Pass
h5	67.7957765	7.2	1.2	6.9	17.1		40	-22.9	Pass
h6	81.3549318	8.7	1.3	3.1	1.1		40	-38.9	Pass
h7	94.9140871	11.5	1.5	10.2	11.2		40	-28.8	Pass
h8	108.473242	12.5	1.5	1.2	1.2		40	-38.8	Pass
h9	122.032398	13.2	1.6	12.8	8.8		40	-31.2	Pass
h10	135.591553	12.9	1.7	8.6	10.6		40	-29.4	Pass



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6.3 TEST SET UP PICTURES

P210 set up



P310 set up





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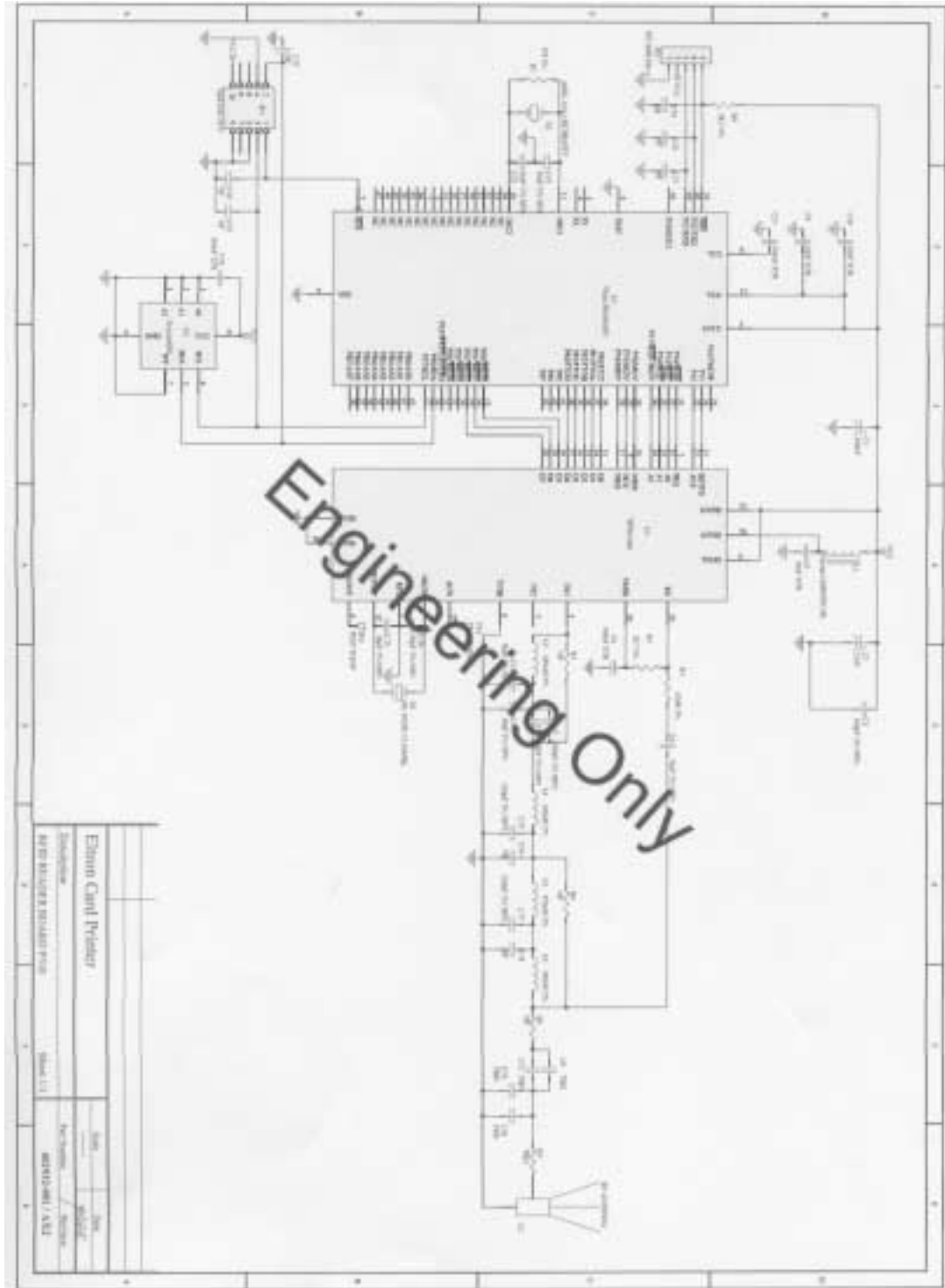
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7 INTENTIONAL RADIATOR DESCRIPTION

7.1 ELECTRICAL SCHEMATIC





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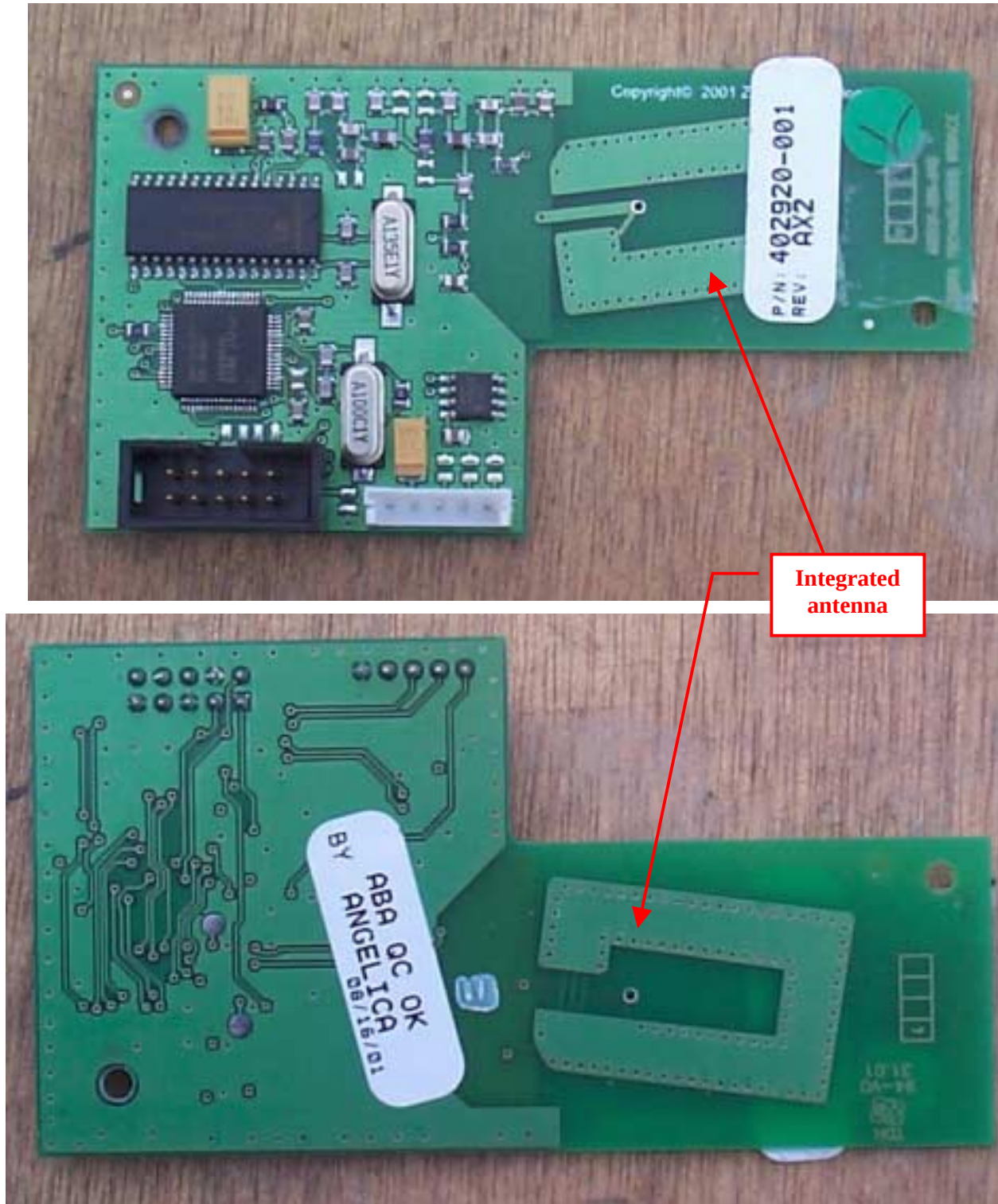
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7.2 P210 RFID BOARD LAYOUT





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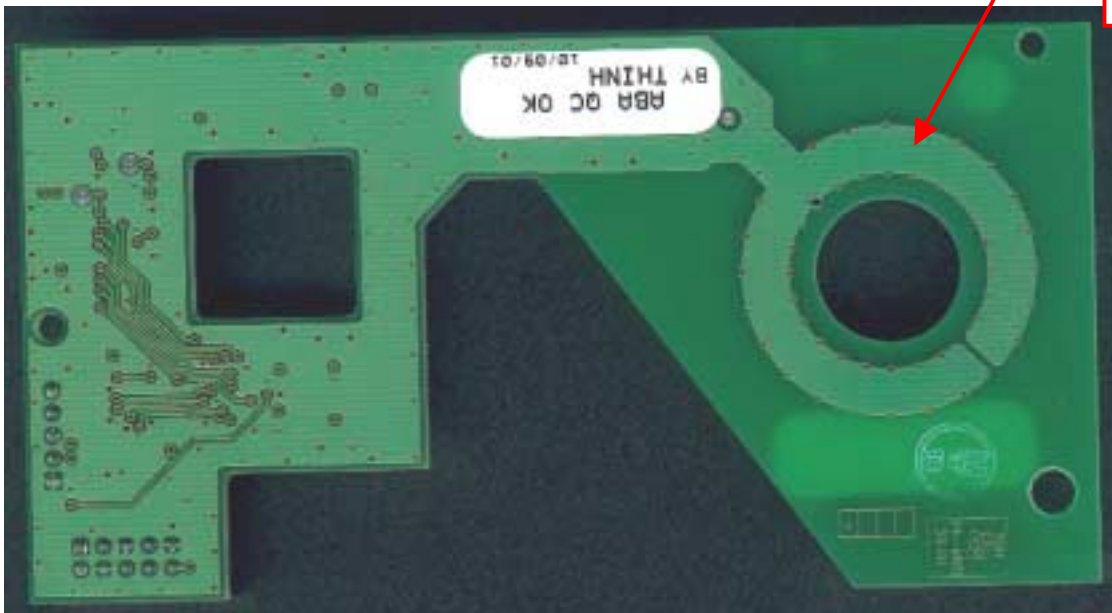
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7.3 P310 RFID BOARD LAYOUT



Integrated
antenna





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7.4 RFID ON PRINTING RIBBON



Ribbon transceiver in
normal use



DIE position

EEPROM DIE

Antenna



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8 User Notice abstract



P205/P210 Plastic Card Printer

DECLARATIONS OF CONFORMITY



European Council Directive		Compliance to Standards	
89/326/EEC modified by 92/31/EEC and 93/68/EEC	EMC Directive	EN 55022-A	RF Emissions control
	EMC Directive	EN 50082-1:1992	Immunity to Electromagnetic Disturbances
73/23/EEC modified by 93/68/EEC	Low voltage Directive	EN 60950	Product safety

Model: P210 conforms to the following specification:
FCC Part 15, Subpart A, Section 15.107(a) and Section 15.109(a)
Class B digital device

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet, prepared by the Federal Communications Commission, helpful:
How to identify and resolve Radio/TV Interference Problems. This booklet is available from the U.S. Government printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

Use of a shielded cable is required to comply within Class B limits of Part 15 of FCC Rules.

Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to this equipment not expressly approved by Eltron may cause harmful interference and void the FCC authorization to operate this equipment.

General Info

Getting Started

Operation

Printing a card

Cleaning

Troubleshooting

Specifications

Appendix A

Appendix B

Appendix C





FCC CERTIFICATION TEST REPORT

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EQUIPMENT FCC ID : MX5402920001

Written by : D. RAUD

January 18,2002

Test report # : 019054DR

9 PRINTER MODELS USED

9.1 PRINTER MODEL 1

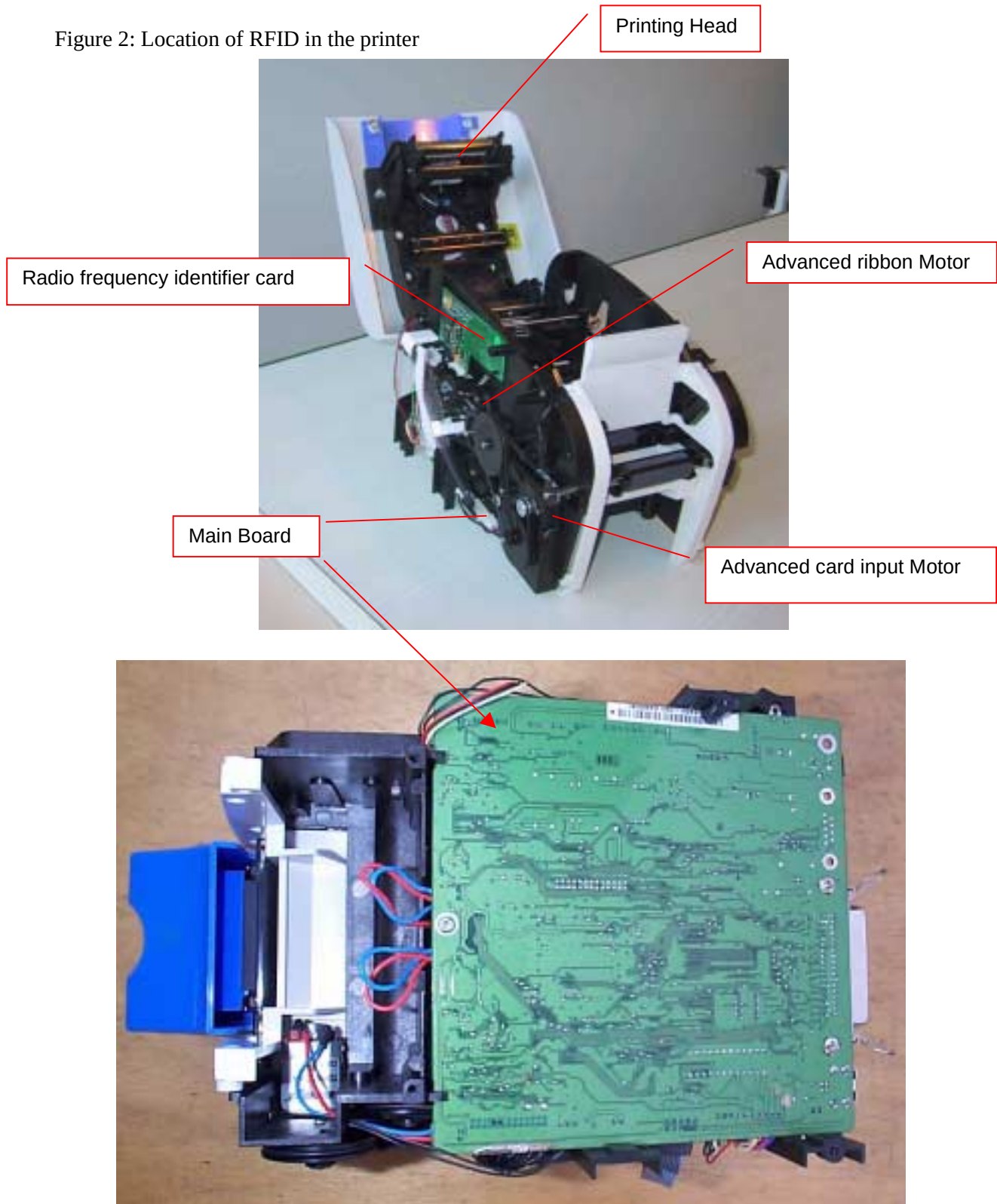
Printer Reference: P210 CEM

Serial number: P210000548

Manual: P210 User's Manual



Figure 2: Location of RFID in the printer





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EQUIPMENT FCC ID : MX5402920001

Written by : D. RAUD

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9.2 PRINTER MODEL 2

Printer Reference: P310 CEM

Serial number: None

Manual: P310 User's Manual





FCC CERTIFICATION TEST REPORT

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EQUIPMENT FCC ID : MX5402920001

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Motherboard

Magnetic card writer

USB option card

Arcotronics Filter

Smart card programming driver

Radio Frequency Identifier card located under the magnetic writer card

