



AT4 wireless S.A.
 Parque Tecnológico de Andalucía,
 c/ Severo Ochoa nº 2
 29590 Campanillas/ Málaga/ España
 Tel. 952 61 91 00 - Fax 952 61 91 13
 MÁLAGA, C.I.F. A29 507 456
 Registro Mercantil Tomo 3693 Libro 2604
 Folio 174 Hoja MA3729

TEST REPORT (Modification 1)

REFERENCE STANDARDS: EN 55022 (2006) / A1 (2007); EN 61000-6-2 (2005)

&

EN 55024 (1998) / A1 (2001) / A2 (2003)

Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement;

Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity for industrial environments

&

Information technology equipment. Immunity characteristics. Limits and methods of measurement.

MIE :	34614REM.001A1
Approved by (name / position & signature)	Rafael López EMC Manager
Elaboration date	2012-06-22
Identification of item tested	SPEC + FMC-DIO-5chTTLA Starter kit
Trademark	Seven Solutions
Model and/or type reference	SPEC, FMC-DIO-5CHTTLA
Serial number	HCCFEIA__-CR000008, 7S-FMC-DIO-V1-test HW Version: SPEC-V4, FMC-DIO-5CHTTLA-V1 SW Version: PTS repository revision 08b5b09b
Features	A simple 4-lane PCIe carrier for FPGA Mezzanine Cards (VITA 57). It has memory and clocking resources and supports the White Rabbit timing and control network (SPEC). Plus a five-port digital IO card in FMC formfactor (FmcDIO5chTTLA).
Description	PC with a PCI Express card (SPEC) including a Mezzanine card (FMC-DIO-5chTTLA card) (both cards assembled as a sandwich).
Applicant	SEVEN SOLUTIONS S.L.
Address..... :	C/ Baza, parcela 19, nave 3. Polígono Industrial Juncaril. 18210 Peligros. Granada. Spain.
CIF/NIF/Passport..... :	B18763979
Contact person..... :	Rodrigo Agis
Telephone / Fax..... :	690944362
e-mail..... :	ragis@sevensols.com

Test samples supplier	SEVEN SOLUTIONS S.L.
Address	C/ Baza, parcela 19, nave 3. Polígono Industrial Juncaril. 18210 Peligros. Granada. Spain.
CIF/NIF/Passport.....	B18763979
Contact person	Rodrigo Agis
Telephone / Fax	690944362
e-mail	ragis@sevensols.com
Manufacturer	SEVEN SOLUTIONS S.L.
Address	C/ Baza, parcela 19, nave 3. Polígono Industrial Juncaril. 18210 Peligros. Granada. Spain.
CIF/NIF/Passport.....	B18763979
Contact person	Rodrigo Agis
Telephone / Fax	690944362
e-mail	ragis@sevensols.com
Standard.....	EN 55022 (2006) / A1 (2007); EN 61000-6-2 (2005) & EN 55024 (1998) / A1 (2001) / A2 (2003)
Test Method requested.....	PEEM002; PEEM009; PEEM012; PEEM013; PEEM074; PEEM075.
Non-standardized test method	N/A
Report template No.	FDT11_11

INDEX

Competences and guarantees	4
General conditions	4
Uncertainty.....	4
Usage of samples.....	5
Testing period	5
Environmental conditions	6
Summary	7
Remarks and comments	7
Testing verdicts	7
APPENDIX A	10 Pages
APPENDIX B	2 Pages

Competences and guarantees

AT4 wireless is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 203.

AT4 wireless is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: The client.

Sample S/03 is composed of the following elements:

<u>Control N°</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial number</u>	<u>Reception date</u>
34614/01	PC with a PCI Express card (SPEC)	SEVEN SOLUTION S.L.	SPEC, FMC-DIO-5CHTTLA	HCCFEIA__-CR000008, 7S-FMC-DIO-V1-test	2012-05-17
34614/03	PCI express card	SEVEN SOLUTION S.L.	(SPEC)	---	2012-05-17

The sample S/03 includes the next modifications: It was added a filter code PREFILTER FI-2ZFM to the PC mains input and it was shielded the enclosure of the PC.

The sample **S/06** is the sample S/03 without modifications and replacing the power supply unit by a new one model NOX URANO 600W. It was changed too the filter code PREFILTER FI-2ZFM by a filter code EPCOS B84112-B - B10.

Auxiliary elements used with the samples S/03 & S/06:

<u>Control N°</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial number</u>	<u>Reception date</u>
34614/02	PC Screen	---	---	---	2012-05-17
34614/04	Communication cables	---	---	---	2012-05-17
34614/05	PC keyboard	---	---	---	2012-05-17
34614/06	PC mouse	---	---	---	2012-05-17
34614/07	PC mains cable	---	---	---	2012-05-17

The **sample S/08** is composed of the next elements:

<u>Control N°</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial number</u>	<u>Reception date</u>
34614/03	PCI express card	SEVEN SOLUTION S.L.	(SPEC)	---	2012-05-17
34614/08	USB memory 1	---	---	---	2012-05-25

Auxiliary elements used with the sample S/08:

<u>Control N°</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial number</u>	<u>Reception date</u>
34614/01	PC with a PCI Express card (SPEC)	SEVEN SOLUTION S.L.	SPEC, FMC-DIO-5CHTTLA	HCCFEIA__-CR000008, 7S-FMC-DIO-V1-test	2012-05-17
34614/02	PC Screen	---	---	---	2012-05-17
34614/04	Communication cables	---	---	---	2012-05-17
34614/05	PC keyboard	---	---	---	2012-05-17
34614/06	PC mouse	---	---	---	2012-05-17
34614/07	PC mains cable	---	---	---	2012-05-17

NOTE: The PC is considered an auxiliary element, the equipment under test is supplied with the PC voltage.

Testing period

The performed test started on 2012-05-17 and finished on 2012-05-25.

The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 80 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 34614REM.001 related with the same samples, in the next clauses and sub-clauses:

By client request it was modified the test report to make it compatible with the regulation or license OHR (Open Hardware), therefore it has been necessary to eliminate the text "IMPORTANT: Not parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless S.A. " of the page 2, and the text "4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies " of the General conditions paragraph of the page 4.

Summary

Considering the results of the performed test according to standard **EN 55022 (2006) / A1 (2007) & EN 55024 (1998) / A1 (2001) / A2 (2003) & EN 61000-6-2 (2005)**, the item/s under test is/are **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

The tests have been realized by the technical personnel: José Manuel Márquez, Pedro Manuel Valenzuela, Domingo Gálvez & Antonio Ruiz.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $I = \pm 4,37$ dB for quasi-peak measurements, $I = \pm 4,28$ dB for peak measurements ($k = 2$).

The conducted emission test is not included in the test report because the client declares that the equipment under test was only the PCI cards and they are powered through the PCI Express.

Testing verdicts

Not applicable: NA
 Pass.....: P
 Fail: F
 Not measured.....: NM

APPENDIX A

Test Result

APPENDIX A CONTENT:

DESCRIPTION OF THE OPERATION MODES.....	9
FAILS CRITERIA FOR IMMUNITY TEST	9
MONITORING FOR IMMUNITY TEST	10
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.	11
IMMUNITY TO RADIATED DISTURBANCES, INDUCED BY RADIOFREQUENCY FIELDS	13
ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST	14
ELECTROSTATIC DISCHARGE IMMUNITY TEST.....	15
IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIOFREQUENCY FIELDS	16
MAGNETIC FIELDS IMMUNITY TEST	17

DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for himself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

In the following table appears the operation modes used by the samples tested to that it refers the present test report.

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Equipment realizing a cyclical test. Power supply: 230Vac.

FAILS CRITERIA FOR IMMUNITY TEST

Fail Criteria A:

The apparatus or sub-system shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus or sub-system is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus or sub-system if used as intended.

Fail Criteria B:

The apparatus or sub-system shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus or sub-system is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus or sub-system if used as intended.

Fail criteria C:

Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

MONITORING FOR IMMUNITY TEST

For every operation mode applied to the EUT it's realizes a monitoring associated with each one of the immunity test, in accordance with the following table.

OPERATION MODE	CONTINUOUS PHENOMENA MONITORING	TRANSIENT PHENOMENA MONITORING
OM#01	By means of a CCTV system it was monitored that the equipment remains working correctly in the selected operation mode, by means of a SW it was evaluated continuously the correct performance of the PCI Express card and the communication ports. Finished the test it was checked the correct system performance and the produced mistakes by means of a backup of the SW.	By means of a CCTV system it was monitored that the equipment remains working correctly in the selected operation mode, by means of a SW it was evaluated continuously the correct performance of the PCI Express card and the communication ports. Finished the test it was checked the correct system performance and the produced mistakes by means of a backup of the SW.

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

LIMITS:	Product standard :	EN 55022 (2006) / A1 (2007)
	Test standard :	EN 55022 (2006) / A1 (2007)

CLASS B

Frequency range (MHz)	Measured field limit a 10 m (dB μ V/m) Quasi-Peak measurement
30 a 230	30
230 a 1000	37

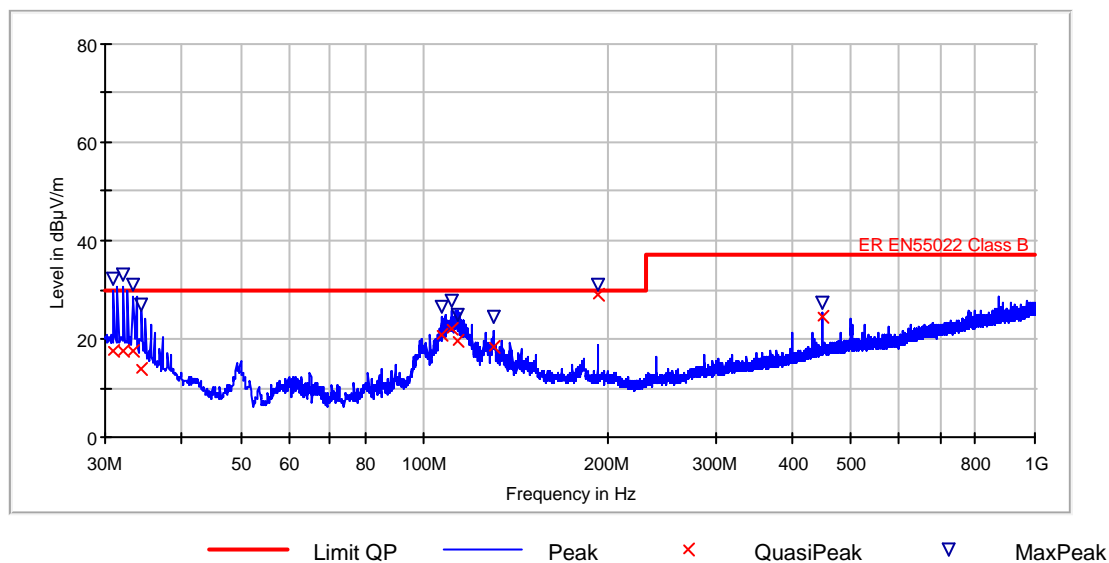
TESTED SAMPLES:	S/03
TESTED OPERATION MODES:	OM#01
TEST RESULTS :	CRmmnn: CR, Condición de Radiación; mm: Sample number; nn: Operation mode.

CRmmnn	Description	Result
CR0301	30 MHz – 1000 MHz	P

Radiated Emission: CR0301

Project: 34614REM.001
 Company: SEVEN SOLUTIONS, S.L.
 Sample: S/03
 Operation mode: OM#01
 Setup: EMI radiated
 Mode: EUT ON. Equipment realizing a cyclical test.

ESIB 55022 class B Bilog Hybrid AMP1658



Maximized

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Antenna height (cm)	Polarity	Turntable position (deg)
31.007515	17.5	32.2	185.00	V	68.0
32.200000	17.7	33.2	185.00	V	68.0
33.400000	17.7	31.0	185.00	V	68.0
34.500000	14.0	27.1	185.00	V	68.0
106.617535	20.9	26.6	131.00	V	277.0
110.900000	22.2	27.7	256.00	V	-2.0
113.500000	19.5	25.0	185.00	V	68.0
130.041583	18.4	24.5	172.00	V	0.0
191.998998	29.1	31.1	399.00	H	291.0
450.019038	24.6	27.3	187.00	H	122.0

**IMMUNITY TO RADIATED DISTURBANCES, INDUCED BY
RADIOFREQUENCY FIELDS**

LIMITS:	Product standard :	EN 55024 (1998) / A1 (2001) / A2 (2003) & EN 61000-6-2 (2005)
	Test standard :	EN 61000-4-3 (2006) / A1 (2008) / A2 (2010)

RANGE	FREQUENCY	MODULATION	STEP	LEVEL
A	80 – 1000MHz	AM	1KHz 80%	10 V/m
B	1400 – 2000MHz	AM	1KHz 80%	3 V/m
C	2000 – 2700MHz	AM	1KHz 80%	1 V/m

Note: These are the most restrictive levels for the standard applied.

TESTED SAMPLES:	S/06
TESTED OPERATION MODES:	OM#01
FAIL CRITERIA AND MONITORING:	A
ZONES/COUPLING CABLES (ACPL):	

ACPL	DESCRIPTION
1	EUT frontal
2	EUT rear side
3	EUT left side
4	EUT right side

TEST RESULTS :	
-----------------------	--

ACPL	RANGES	S/	OM#	COMMENTS	RESULT
1	A; B & C	06	01	No fails detected	P
2	A; B & C	06	01	No fails detected	P
3	A; B & C	06	01	No fails detected	P
4	A; B & C	06	01	No fails detected	P

ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST

LIMITS:	Product standard :	EN 55024 (1998) / A1 (2001) / A2 (2003) & EN 61000-6-2 (2005)
	Test standard :	EN 61000-4-4 (2004)

TYPE	APPLICATION	LEVEL(kV)	Repetition Rate(kHz)
1	AC Power supply	±2kV	5kHz
2	Communications	±1kV	5kHz

TESTED SAMPLES:	S/06
TESTED OPERATION MODES:	OM#01
FAIL CRITERIA AND MONITORING:	B
ZONES/COUPLING CABLES (ACPL):	

ACPL	DESCRIPTION	TYPE
A	AC power supply line (N = Neutral)	1
B	AC power supply line (L1 = Phase)	1
C	Ground line (PE)	1
D	Interconnection cable 1	2
E	Interconnection cable 2	2
F	Interconnection cable 3	2
G	Interconnection cable 4	2
H	Interconnection cable 5	2

TEST RESULTS :	
-----------------------	--

ACPL	S/	OM#	COMMENTS	RESULT
A	06	01	No fails detected	P
B	06	01	No fails detected	P
C	06	01	No fails detected	P
D	06	01	No fails detected	P
E	06	01	No fails detected	P
F	06	01	No fails detected	P
G	06	01	No fails detected	P
H	06	01	No fails detected	P

ELECTROSTATIC DISCHARGE IMMUNITY TEST.

LIMITS:	Product standard :	EN 55024 (1998) / A1 (2001) / A2 (2003) & EN 61000-6-2 (2005)
	Test standard :	EN 61000-4-2 (2009)

COUPLING	LEVEL
Direct contact discharge:	± 4 kV
Indirect contact discharge:	± 4 kV
Air discharge:	± 8 kV

TESTED SAMPLES:	S/08
TESTED OPERATION MODES:	OM#01
MONITORING AND FAIL CRITERIA :	B
NUMBER OF DISCHARGES FOR POINT	10
ZONES/COUPLING CABLES (ACPL):	

ACPL	DESCRIPTION	COUPLING TYPE			
		ICH	ICV	DC	DA
1	EUT frontal		X		
2	EUT right side		X		
3	EUT rear side		X		
4	EUT left side		X		
5	External metallic enclosure of the PCI card			X	
6	Enclosure of the 5 connectors of the communication ports cables			X	
7	Frame of the optical output port			X	
8	Optical output cover				X

COUPLING RESUME : ICH (Indirect by contact on horizontal plane)
 ICV (Indirect by contact on vertical plane), DC (Direct by contact), DA (Direct by air)

TEST RESULTS :

CPL	S/	OM#	COMMENTS	RESULT
1	08	01	No fails detected	P
2	08	01	No fails detected	P
3	08	01	No fails detected	P
4	08	01	No fails detected	P
5	08	01	No fails detected	P
6	08	01	No fails detected	P
7	08	01	No fails detected	P
8	08	01	No fails detected	P

IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIOFREQUENCY FIELDS

LIMITS:

Product standard :

EN 55024 (1998) / A1 (2001) / A2 (2003) & EN 61000-6-2 (2005)

Test standard :

EN 61000-4-6 (2009)

RANGE	FRECUENCY	MODULATION	STEP	LEVEL
A	150 KHz - 80 MHz	AM Fmod: 1 KHz Prof: 80%	LOG-1%	10 Vrms

Note: These are the most restrictive levels for the standard applied.

TESTED SAMPLES:

S/06

TESTED OPERATION MODES:

OM#01

FAIL CRITERIA AND MONITORING:

A

ZONES/COUPLING CABLES (ACPL):

ACPL	DESCRIPTION
1	AC power supply input
2	Interconnection cable 1
3	Interconnection cable 2
4	Interconnection cable 3
5	Interconnection cable 4
6	Interconnection cable 5

TEST RESULTS :

ACPL	RANGE	S	OM#	COMMENTS	RESULT
1	A	06	01	No fails detected.	P
2	A	06	01	No fails detected.	P
3	A	06	01	No fails detected.	P
4	A	06	01	No fails detected.	P
5	A	06	01	No fails detected.	P
6	A	06	01	No fails detected.	P

MAGNETIC FIELDS IMMUNITY TEST				
LIMITS:	Product standard:	EN 55024 (1998) / A1 (2001) / A2 (2003) & EN 61000-6-2 (2005)		
	Test standard:	EN 61000-4-8 (2010)		
		FREQUENCY	LEVEL	
		50 Hz	30 A/m	
Note: These are the most restrictive levels for the standard applied.				
TESTED SAMPLES:		S/08		
TESTED OPERATION MODES:		OM#01		
FAIL CRITERIA AND MONITORING:		A		
ZONES/COUPLING CABLES (ACPL):				
ACPL	DESCRIPTION			
1	Field strength level on axis X.			
2	Field strength level on axis Y.			
3	Field strength level on axis Z.			
TEST RESULTS :				
ACPL	S	OM#	COMMENTS	RESULT
1	08	01	No fails detected.	P
3	08	01	No fails detected.	P
2	08	01	No fails detected.	P

APPENDIX B: Pictures

