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IIDC Functional Conformance Test Specification Revision 1.3

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Abstract
This specification defines the IIDC functional conformance test definition

Keywords
1394 Digital Camera, IIDC, Compliance test

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Foreword (This foreword is not part of 1394 Trade Association Specification 2007003)

This specification was accepted by the Board of Directors of the 1394 Trade Association. Board of Directors acceptance of this specification does not necessarily imply that all board members voted for acceptance. At the time it accepted this specification, the 1394 Trade Association. Board of Directors had the following members:

Eric Anderson, Chair
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Revision history

Revision 1.0 (Jun 10, 2004)

First ballot draft

Revision 1.1 (Aug 2,2004)

Revised ballot draft taking into account comments from first ballot

Revision 1.2 (Sep 7, 2004)

Editorial Changes from second ballot

Revision 1.3 (April 13, 2007)

Update for IIDC V1.31, i.e. IEEE1394b-2002 support

IIDC Functional Conformance Test Specification Revision 1.3

1 Scope and purpose

1.1 Scope

This specification defines a "Functional Operability Test Suite" intended to verify the compliance of an IIDC device to the IIDC 1394-based Digital Camera Specification. This specification applies to the following:

- IIDC cameras that support essential functions of IIDC specification.

These are the minimum requirements for IIDC compliance.

1.2 Purpose

The purpose of this specification is to describe the test specifications to check the conformity of an IIDC camera device to the IIDC 1394-based Digital Camera Specification version 1.04, 1.20, 1.30, and 1.31.

2 Normative references

2.1 Reference scope

The specifications and standards named in this section contain provisions, which, through reference in this text, constitute provisions of this 1394 Trade Association specification. At the time of publication, the editions indicated were valid. All specifications and standards are subject to revision; parties to agreements based on this 1394 Trade Association Specification are encouraged to investigate the possibility of applying the most recent editions of the specifications and standards indicated below.

2.2 Approved references

The following standards contain provisional contents. All the standards listed are normative references. Informative references are given in Annex A. The editions indicated are valid at the time of publication. All standards are subject to revision. Try to apply the most recent editions, which are listed below as of today.

[R1] ANSI/IEEE Std 1212-2001, Bus Architecture/Microprocessor/Microcomputer

[R2] IEEE Std 1394-1995, Standard for a High Performance Serial Bus

[R3] IEEE Std 1394a-2000, Standard for a High Performance Serial Bus - Amendment 1

[R4] IEEE Std 1394b-2002, Standard for a High Performance Serial Bus - Amendment 2

[R5] TA2002005, Base 1394 Test Suite Definition, Rev. 1.0

[R6] TA 2003017, IIDC 1394-based Digital Camera Specification Version 1.31

3 Definitions and notation

3.1 Definitions

3.1.1 Conformance

Several keywords are used to differentiate levels of requirements and optionality, as follows:

3.1.1.1 expected: A key word used to describe the behavior of the hardware or software in the design models *assumed* by this Specification. Other hardware and software design models may also be implemented.

3.1.1.2 may: A key word that indicates flexibility of choice with *no implied preference*.

3.1.1.3 shall: A key word indicating a mandatory requirement. Designers are *required* to implement all such mandatory requirements.

3.1.1.4 should: A key word indicating flexibility of choice with a strongly preferred alternative. Equivalent to the phrase *is recommended*.

3.1.1.5 reserved codes: A set of codes for a reserved field that are defined in this specification, but not otherwise used. Future specifications may implement the use of these codes. A product implementing this specification shall not generate, nor receive these codes.

3.1.1.6 reserved fields: A set of bits for a reserved field that are defined in this specification, but are not otherwise used. Products that implement this specification shall zero these fields and shall not check the reserved field's value. Products that implement future revisions of this specification may set these codes as defined by the specification.

3.1.2 Glossary

The following terms are used in this specification:

3.1.2.1 byte: Eight bits of data, used as a synonym for octet.

3.1.2.2 CSR Architecture: A convenient abbreviation of the following reference (see clause 2): ISO/IEC 13213 : 1994 [ANSI/IEEE Std 1212, 1994 Edition], Information Technology—Microprocessor systems— Control and Status Register (CSR) Architecture for Microcomputer Buses.

3.1.2.3 quadlet: Four bytes of data.

3.1.2.4 Isochronous: A term that indicates the essential characteristic of a time-scale or signal, such that the time intervals between consecutive instances either have the same duration or duration's that are integral multiples of the shortest duration. In the context of Serial Bus, "isochronous" is taken to mean a bounded worst-case latency for the transmission of data; physical and logical constraints that introduce jitter preclude the exact definition of "isochronous".

3.1.3 Abbreviations

The following are abbreviations that are used in this specification:

IIDC Industrial and Instrumentation Digital Camera

4 TEST Procedure

4.1 Overview

4.1.1 Test Policy

This document shows the functional conformance test procedure of the IIDC camera specification. Should problems occur during the test, testers should investigate and solve the problems by themselves.

4.1.2 Test Environment

Test should be run in the environment shown in Figure 1, one PC and one target device connected to each other with an IEEE1394 cable. If necessary, use a IEEE1394 hub or power repeater as shown in Figure 2.

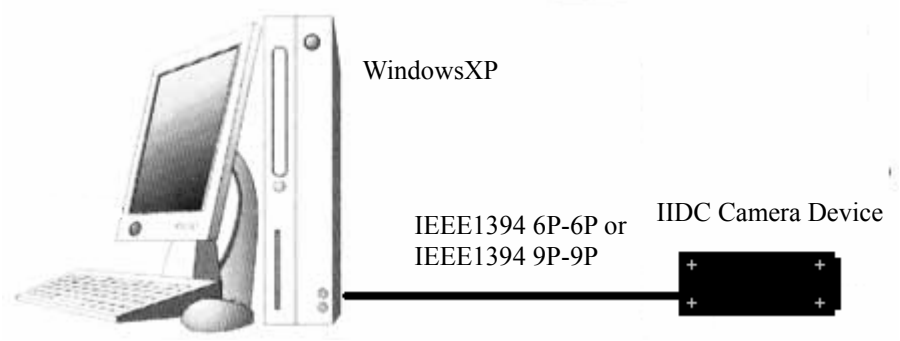

Figure 1 – Test Environment (6P-6P or 9P-9P Connection)

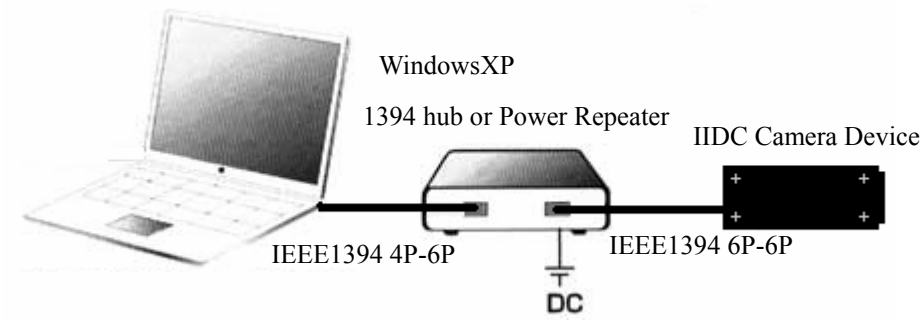

Figure 2 – Test Environment (4P-6P Connection)

In principle, the test procedure described in the following sections is not limited to a specific operating system running on the host computer. However, it is expected that the Functional Test Procedure is carried out using the official test tool “Inspector” as indicated by the 1394 Trade Association. This tool is currently only available for Microsoft Windows XP operating system.

4.2 Test Procedure

4.2.1 TEST0 Device Recognition by Plug & Play

It is necessary to check whether the device is recognized correctly at the beginning of a test. It is a simple test to search for the target device. Test program should recognize the target device automatically by just connecting the target device to PC. After implementing the following minimum checkpoints, an appropriate topology map will be displayed as shown in Figure 3.

1) SelfID Packet

2) Implementation of ConfigurationROM (BusInfoBlock)

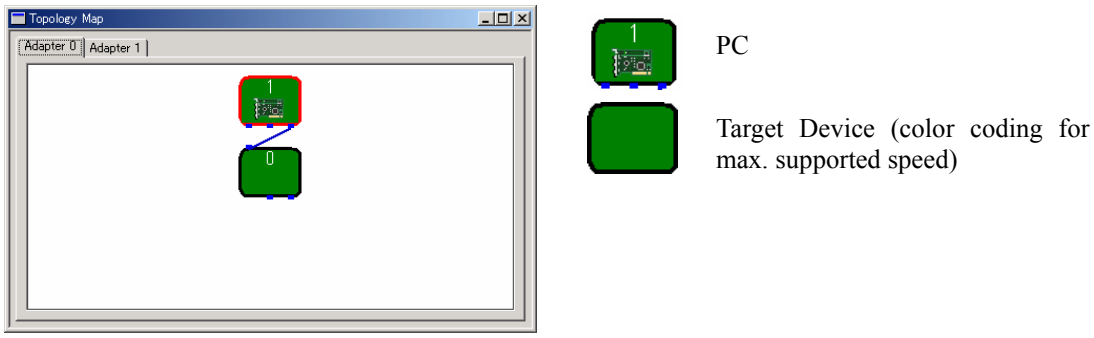

Figure 3 – Displayed Topology (an example)

4.2.2 TEST1 ConfigurationROM conformity test

The test program reads the configurationROM of the target device. It compares whether the contents of ConfigurationROM agree with the values the respective IIDC specification expects.

No.	Content of Test	Remarks
1.	It checks whether BusInfoBlock can be read correctly.	
1-1	It checks whether the length of BusInfoBlock is in agreement with the value which the specification expects.	It shall be 4.
1-2	It checks whether the value of rom_crc is correct.	
1-3	It checks whether BusID conforms to the specification.	It shall be 0x 31333934
1-4	It checks whether the value of isc bit is correct.	It shall be 1
1-5	It checks whether the Vendor ID is as expected.	Confirmed by the Test Operator.
1-6	It checks whether the Chip ID is as expected.	Confirmed by the Test Operator.
1-7	It checks whether max_rec is as expected.	Confirmed by the Test Operator.
2	It checks whether RootDirectory can be read correctly.	
2-1	It checks whether the CRC value for RootDirectory is correct.	
2-2	When NodeUniqueID is implemented, it checks whether NodeUniqueID can be read correctly.	If the target device is compliant with 1394-1995
2-3	When NodeUniqueID is implemented, it checks whether the CRC value of NodeUniqueID is correct.	If the target device is compliant with 1394-1995
3.	It checks whether UnitDirectory can be read correctly.	
3-1	It checks whether the CSR value of UnitDirectory is correct.	
3-2	It checks whether the SpecID conforms to the specification.	It shall be 0x0000A02D
3-3	It checks whether the SW_Version conforms to the specification.	It shall be 0x00000103, 0x00000102, 0x00000101 or 0x00000100.

4.	It checks whether UnitDependentInfo can be read correctly.	
4-1	It checks whether the CRC value of UnitDependentInfo is correct.	
4-2	It checks whether the value of Command Register Base Address can be read correctly.	
5.	It checks whether VendorNameLeaf can be read correctly.	
5-1	It checks whether the CRC value of VendorNameLeaf is correct.	
5-2	It checks whether the VendorName is as expected	Confirmed by the Test Operator.
6.	It checks whether ModelNameLeaf can be read correctly.	
6-1	It checks whether the CRC value of ModelNameLeaf is correct.	
6-2	It checks whether the ModelName is as expected	Confirmed by the Test Operator.

4.2.3 TEST2 **Default device status**

The test program reads the Current Default values from the Format/Mode/FrameRate CSR space of target device. Test Operator checks whether those values are as expected.

No.	Content of Check Point	Remarks
1.	It checks whether the Register of Current Video Format (608h) can be read correctly.	
2.	Is Current Video Format as expected?	
3.	It checks whether the Register of Current Video Mode (604h) can be read correctly.	
4.	Is Current Video Mode as expected?	
5.	It checks whether the Register of Current Frame Rate (600h) can be read correctly.	except Format7
6.	Is Current Frame Rate as expected when the Current Video Format is other than Format7?	except Format7
7.	It checks whether the Register of ISO_Channel / ISO_Speed (60Ch) can be read correctly.	
8.	Is Current Isochronous Channel as expected?	
9.	Is Current Isochronous Speed as expected?	

(The above address is byte offset from the Base Address)

4.2.4 TEST3 Format/Mode/FrameRate Inquiry Register Check

The test program checks the Format/Mode/FrameRate CSR space of the target device for the necessary adjustments to the Current Video Format/Mode/FrameRate.

No.	Content of Test	Remarks
1.	It checks whether the Inquiry Register of Video Format (100h) can be read correctly.	
2.	It checks whether the Inquiry Register of Video Mode (180h - 19Ch) can be read correctly.	Only the register corresponding to existing Format.
3.	It checks whether the Inquiry Register of FrameRate (200h - 2DFh) can be read correctly.	If the target device supports additional formats to Format7 Only the register corresponding to existing combination of Format and Mode.
4.	It checks whether the Inquiry Register of Offset Address for Format7 Register Space. (2E0h - 2F0h)	If the target device supports Format7
5.	It checks the bit of the Inquiry Register for Video Format which is corresponding to the Current Video Format.	It shall be 1.
6.	It checks the bit of the Inquiry Register for Video Mode which is corresponding to Current Video Mode.	It shall be 1.
7.	It checks the bit of the Inquiry Register for FrameRate which is corresponding to Current FrameRate.	Except Format7 It shall be 1.
8.	It checks whether the offset address for Format7 is correct.	Only Format7

(The above address is byte offset from the Base Address)

4.2.5 TEST4 Feature Control Inquiry Register Check

The test program reads the Inquiry Register for Feature Control.

No.	Content of Test	Remarks
1.	It checks whether the Inquiry Register of BasicFuntion (400h) can be read correctly.	
2.	It checks whether the Inquiry Register of Feature_HI (404h) can be read correctly.	
3.	It checks whether the Inquiry Register of Feature_LO (408h) can be read correctly.	
4.	It checks whether the Inquiry Register of Advanced Feature (480h) can be read correctly.	If the target device supports Advanced Feature.

(The above address is byte offset from the Base Address)

4.2.6 TEST5 Isochronous Transport Test

The test program sets only Iso Enable Bit to 1 in the parameters for the default state. Cameras that implement IIDC V1.31 shall start in Legacy mode. Check the following items.

No.	Content of Test	Remarks
1.	Is a certain Iso Packet received?	
2.	Is Packet Length as expected?	
3.	Is the Packet number which constitutes one frame as expected?	
4.	Is the SYNC field in the Isoc header of the first packet of a frame as expected?	It shall be 1.
5.	Is the SYNC field in the Isoc header of all packets other than the first packet of a frame as expected?	It shall be 0.

After successfully passing the above listed test, cameras that implement IIDC V1.31 shall be set into 1394b mode. Subsequently, the Isochronous Transport Test shall be repeated with the new settings for isoch. speed and channel number.

4.2.7 TEST6 Initialize Test

When the test program sets the Camera Initialize Register Bit to 1, the following registers shall be initialized to their default values.

No.	Content of Test	Remarks
1.	Is the Register of Current Video Format (608h) initialized to default value?	Confirmed by the Test Operator.
2.	Is the Register of Current Video Mode (604h) initialized to default value?	Confirmed by the Test Operator.
3.	Is the Register of Current Frame Rate (600h) initialized to default value?	If the Current Video Format is different from Format7. Confirmed by the Test Operator.
4.	Is the Register of ISO_Channel / ISO_Speed (60Ch) initialized to default value?	Confirmed by the Test Operator.
5.	Is the Register of Camera Power (610h) initialized to default value?	Confirmed by the Test Operator.
6.	Is the Register of ISO_EN/Continuous_Shot (614h) initialized to default value?	It shall be 0.
7.	Is the Register of VMode_Error_Status (624h) initialized to default value?	It shall be 0.
8.	Is the Register of Feature_Control_Error_Status_HI (640h) initialized to default value?	Only test for Features that are supported by the device. It shall be 0.
9.	Is the Register of Feature_Control_Error_Status_LO (644h) initialized to default value?	Only test for Features that are supported by the device. It shall be 0.

(The above address is byte offset from the Base Address)

4.2.8 Test Result

After all of the above test procedures are completed, the Check Sheet can be printed showing the test results.

Check Sheet lists the test results in the following format to each test item.

Result	Description
Pass	Test is complete without problem
Fail	Test is failed by a certain problem.
N/A	Test cannot be done since this function is not available.

Table 1 – Notation of Result

Make sure that no “Fail” is found in the test results.

Annex A Check Sheet (Informative)

The Following is a Check sheet sample.

IIDC Functional Conformance Test Check Sheet

Date	
Tester	
Tested Equipments	

Test1 Read Configuration ROM

	Check Point	Current Value	Result	Remarks
1	Length of BusInfoBlock			
2	rom_CRC value			
3	BusID			
4	isc bit			
5	Vendor ID			
6	Chip ID			
7	max_rec			
8	CRC of Root Directory			
9	CRC of Node Unique ID			If the target device is compliant with 1394-1995
10	CRC of Unit Directory			
11	Spec ID			
12	Software Version			
13	CRC of Unit Dependent			
14	Command Register Base			
15	CRC of Vendor Name			
16	Vendor Name			
17	CRC of Model Name			
18	Model Name			

Test2 Read default camera status

	Check Point	Current Value	Result	Remarks
1	Current Video Format			
2	Current Video Mode			
3	Current Frame Rate			Except Format7
4	Current ISO Channel			
5	Current ISO Speed			

Test3 Read Inquiery register for Format/Mode/Rate

	Check Point	Current Value	Result	Remarks
1	Video Format The bit which is corresponding to the current Format shall be 1			
2	Video Mode The bit which is corresponding to the current Mode shall be 1.			
3	Frame Rate: The bit which is corresponding to the current Frame Rate shall be 1			Except Format7
4	Offset address for Format7 register space is correct.			Only Format7

Test4 Read Feature Inquiery register				
	Check Point		Result	Remarks
1	Basic Function / Features / Advanced Feature register spaces can be read correctly.			

Test5 Isochronous Transport				
	Check Point		Result	Remarks
1	Packet length is as expected.			
2	Packet number is as expected			
3	SYNC field is as expected			

Test6 Initialize Test				
	Check Point	Current Value	Result	Remarks
1	Video Format			
2	Video Mode			
3	Frame Rate			Except Format7
4	ISO Channel			
5	ISO Speed			
6	Camera Power			
7	VMode_Error_Status			
8	I			
9	O			