network

Flashlink User Manual

ADC-SDI-CC

Multi standard NTSC, PAL, YPbPr, RGB-Decoder/Converter

Component and Composite Analogue Video Converter

network-electronics.com

Rev. 3

Revision history

The latest version is always available in pdf-format on our web-site:

http://www.network-electronics.com/

Current revision of this document is the uppermost in the table below.

Revision	**Replaces**	**Date**	Change Description
3	2	2008-07-14	Added Declaration of Conformity.
2	1	2007-10-23	New front page and removed old logo.
1	0	2007-10-09	Added Materials Declaration and EFUP
0	B	03.03.05	Specification update and changed ConQuer to flashlink®.
B	A	02.09.04	First preliminary release
A		12.08.04	

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Quick Start Guide for ADC-SDI-CC

Without GYDA controller ***(This is the default setting upon shipping)***

1. Set DIP-switch 1 on (towards backplane), switches 2 and 3 according to the input mode you want (see *Table 2* on page 9).

2. Insert ADC-SDI-CC into a slot in the sub-rack.

3. Attach Analogue input (CVBS, S-Video, RGB+sync or YPbPr) and SDI-output to the backplane module (see Figure 2 on page 7).

4. Power on. After some seconds the ADC-SDI-CC will be running, and the input detected. All LED's will be green and the SDI output active. If this is not the case, please see section 5.2 Front Panel - Status Monitoring on page 12.

With GYDA controller (firmware> 1.1)

Insert ADC-SDI-CC into a slot in the sub-rack.

Attach Analogue input (CVBS, S-Video, RGB+sync or YPbPr) and SDI-output to the backplane module (see Figure 2 on page 7).

Power on. After a few seconds the ADC-SDI-CC will be running, and the card detected by GYDA. Use GYDA to set up which analogue video format to use, CVBS, S-Video, RGB+sync or YPbPr. All LED's will now be green and the SDI output active. The card settings are stored on the card which means that the card will remember its configuration despite any eventual power loss.

1. General

The **flashlink**® ADC-SDI-CC is a high quality digital video decoder that digitises and decodes all popular baseband video formats into SDI 4:2:2 digital component video. The ADC-SDI-CC supports the analogue-to-digital conversion of component RGB and YPbPr signals, as well as the decoding of NTSC and PAL composite and S-video into component digital video. This decoder features four 10-bit A/D converters running with 2 x oversampling (27MHz), which are then digitally filtered and decimated to the 1 x pixel rate giving a higher signal-to-noise ratio for each input channel.

When used with the GYDA control system, gain adjustments may be made to each analogue input.

Composite video decoding utilises a 5-line adaptive comb filter for both the luma and chroma signal paths to reduce cross-luma and cross-chroma artefacts. A alternative chroma trap filter is also available. On composite and S-video inputs, the user can control video characteristics such as contrast, brightness, saturation and hue via the GYDA control interface. The GYDA system controller is used with all flashlink and flashlink modules providing a common control and monitoring platform.

ADC-SDI-CC features:

- Multi-standard NTSC, PAL, YPbPr, RGB Decoder/Converter
- 10 bit 4:2:2 SDI video quality
- 5 line adaptive comb filter for NTSC/PAL decoding
- EDH generation and insertion
- 2 x oversampling of both composite and component video
- 10 bit component 8:8:8 oversampling with digital 4:2:2 decimation and down-conversion
- VBI data transparent
- 3 SDI outputs

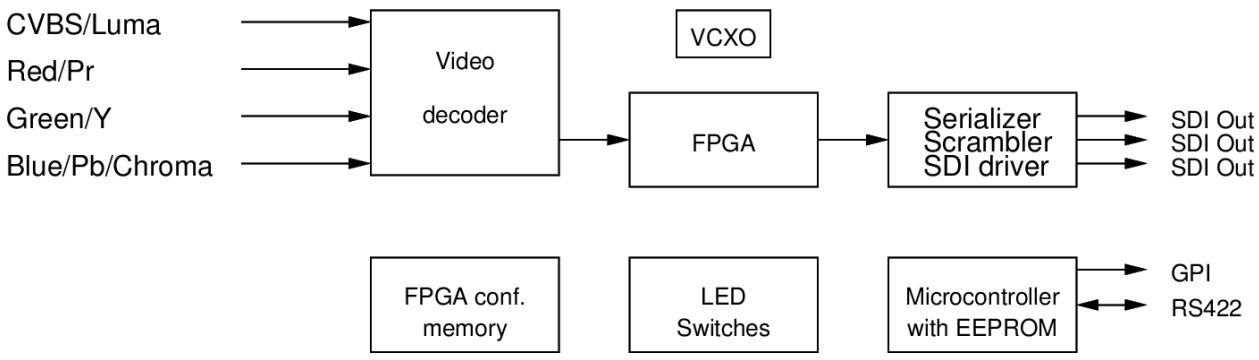


Figure 1 – Simplified block diagram of the ADC-SDI-CC card

2. Specifications

Digital Serial Output

Signal type:	SMPTE 259M / ITU-R BT.601
Connector:	BNC
Impedance:	75 ohm
Return loss:	>15dB @ 270MHz
Jitter:	< 0.2UI
Peak to peak signal level:	800mV ± 80mV

Composite and Y/C Input:

Signal type:	Composite video, PAL 625/50Hz or NTSC 525/60Hz Y / C (S-video)
Connector:	BNC
Impedance:	75 ohm
Signal level:	1Vp-p
Return loss:	>40dB

Component and RGB Input:

Signal rate:	625/50Hz or 525/60Hz
Signal type:	RGB without setup, with separate sync. SMPTE / EBU Y, Cr, Cb
Connector:	BNC
Impedance:	75 ohm
Signal level:	Y = 1Vp-p. Cb, Cr, R, G, B = 0.7Vp-p
Return loss:	>40dB

Processing Performance:

Signal path:	10 bits
Sampling:	27MHz, 2 x oversampling
Luma/Chrome separation:	selectable 5 line adaptive comb filter or chroma trap filter
Video bandwidth:	6MHz
Hue Accuracy	0.5° typical
Colour Saturation Accuracy	0.8% typical
Luminance Nonlinearity	0.6% typical
SNR (unified weighted):	66dB typical
Diff. gain:	<1.0%
Diff. phase:	<1.0°
Video processing delay	3 video lines

Power:	+5V DC / 2.75W -15V DC / 0.5W

3. Connector module

The ADC-SDI-CC has a dedicated connector module: ADC-SDI-CC-C1. This module is mounted at the rear of the sub-rack. The module is shown in Figure 2 .

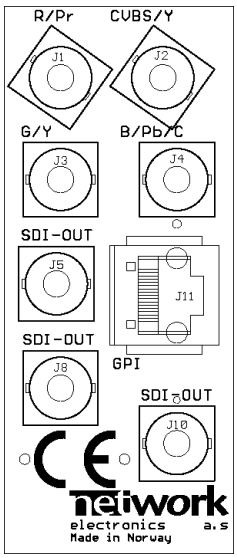


Figure 2 - ADC-SDI-CC-C1 connector module.

3.1 Correspondence of connectors and signals

The ADC-SDI-CC-C1 connector module has 7 BNC's:

CVBS/Y	Analogue input: CVBS, SYNC for RGB or S-Video Luma.
R/Pr	Analogue input: Red or component Pr.
G/Y	Analogue input: Green or component Y.
B/Pb/C	Analogue input: Blue, component Pb or S-Video Chroma.
SDI-OUT	Digital SDI output
SDI-OUT	Digital SDI output
SDI-OUT	Digital SDI output

SDI1, SDI2 and SDI3 are equivalent SDI outputs.

Note: The analogue inputs are internally terminated with 75Ω on the ADC-SDI-CC card.

3.2 Mounting the connector module

The details of how the connector module is mounted, is found in the user manual for the sub-rack frame FR-2RU-10-2.

This manual is also available from our web site: http://www.network-electronics.com/

4. Configuration and Setup

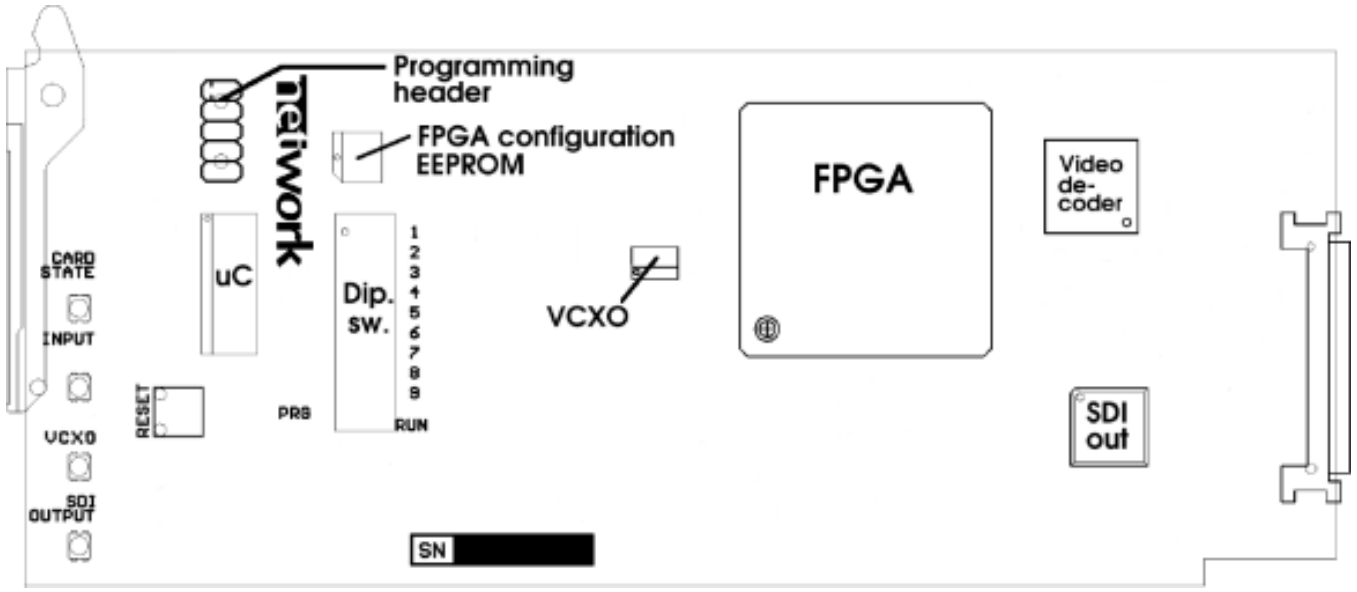


Figure 3 - ADC-SDI-CC simplified silkscreen.

4.1 Setting the DIP switches

The ADC-SDI-CC card has a Dual-Inline switch (DIP-switch) that has 10 individual On/Off switches. The purpose of these switches is to provide an easy interface to some of the most used features of the ADC-SDI-CC card, without the need of a GYDA controller. The switches are numbered from '1' towards the top of the card, see Figure 3 . A switch is *off* when the tap is placed in direction of the front handle.

Switch #	Function	Comment
1	Manual mode *on*/*off*	When *on*, enables switches 2, 3, 4, 5, 6 and 8.
2	Input Channel select	According to Table 3.
3	Input Channel select	
4	Mark Field 1 enable *on*/*off*	When *on*, the *Mark Field 1*-feature enabled.
5	Comb filter/Trap filter	When *on*, the comb filter is selected. When *off*, the trap filter is selected.
6	Pedestal *on*/*off*	If a setup level of 7,5 IRE is present on your analogue video, set to *on*. When black level is 0 IRE, set to *off*. This setting only applies to 525 lines video standard.
7	Reserved	
8	Factory Reset *on*/*off*	To reset the internal EEPROM.
9	Reserved	
10	Run mode *on*/*off*	For factory use only

Table 1: Summary of the DIP switches. Switch 7, 9 and 10 are mainly for factory use, while switches 1, 2, 3, 4, 5 and 6 will be used when no GYDA controller is available.

Switch 1 - Manual mode

Switch 1 is the manual mode switch. If *on*, the ADC-SDI-CC may be operated with the switches. If *off*, the ADC-SDI-CC is to be used with a GYDA controller.

Factory setting is switch 1 in *on* position

With switch 1 *off*:
While in automatic mode, switches 2, 3, 4, 5, 6 and 8 do not have any effect.

With switch 1 *on*:
In manual mode, the functionality of switches 2, 3, 4, 5 , 6 and 8 is as follows:

Switches 2 and 3
These two switches determine the input selection. See *Table 2*.

Factory setting is switch 2 and switch 3 *off*.

Sw #3	Sw #2	Input Channel Select
0	0	CVBS
0	1	S-Video
1	0	YPbPr
1	1	RGBS

Table 2: Manual selection of video mode

Switch 4
Switch 4 turns on/off the *Mark Field 1*-feature. With switch 4 *off* the *Mark Field 1*-feature is disabled, with switch 4 *on* the *Mark Field 1*-feature is enabled and the card inserts a marker on line x of each field 1. This features gives improved encoding quality when used with an encoder like the DAC-SDI which can use this feature.

Factory setting is switch 4 in *on* position.

Switch 5
Switch 5 selects which filter to use when separating Luma from Chroma in CVBS. With switch 5 *on*, the 5-line comb filter is selected, with switch 5 *off*, the chroma trap filter is selected.

Factory setting is switch 5 in *on* position.

Switch 6
Switch 6 selects whether pedestal is present on the analogue video. With switch 6 *on*, the black level will be set to 7,5 IRE. With switch 6 *off*, the black level will be 0 IRE. This switch only affects 525 lines video. Typically a black level of 7,5 IRE is used in the USA and 0 IRE in Japan.

Factory setting is switch 6 in *on* position.

Switches 7 and 9 - Reserved
These switches are reserved and should always be in the *off* position.

Factory setting are switch 7 and 9 in *off* position.

Switch 8 - Reset to factory default
ADC-SDI-CC contains an EEPROM which stores the configuration of the card. Switch 8 can be used to reset the EEPROM to the factory default. Follow the procedure described below.

	Action	Comment
1	Power down.	
2	Turn switch 8 *on*.	Switch 1 must also be turned *on* for this to have effect.
3	Power up.	ADC-SDI-CC enters a special state where the EEPROM is restored to factory default values. This is flagged by the Card State LED, which starts to blink yellow.
4	Power down.	
5	Turn switch 8 *off*.	If you want the DIP switches to be placed in the factory default position, this is the time to do so: Switch 10 should, as always, be turned to the *on* position. Switch 1 may be turned *on* or *off*.
6	Power up.	The card EEPROM is now reset to factory settings.

Table 3: Method to restore the ADC-SDI-CC card to factory settings. Remember to let some seconds pass by each time you power down, to allow capacitors to be fully discharged.

Switch 10 - Run mode
Switch 10 is purely used for service upgrade of the ADC-SDI-CC card. It should always be in the *on* position. If switch 10 is in the *off* position, the Card State LED will light up red, and the ADC-SDI-CC card will enter programming mode. This causes no harm, but the card will not work in this mode.

Factory setting is switch 10 in *on* position.

4.2 Reset

The push-button just behind the front LEDs is a reset switch, see Figure 3 . It has the same effect as a *power off – power on* cycle.

5. Module status

The status of the module can be monitored in two ways.

1. GYDA System Controller (optional).
2. LED's at the front of the sub-rack.

The LED's are mounted on the module itself, whereas the GYDA System Controller is a separate module which gives detailed information on the card status. The functions of the LED's are described on the next page. The GYDA controller is described in a separate user manual. This manual is available on our web site: http://www.network-electronics.com/

5.1 GPI ALARM – Module Status Outputs

These outputs can be used for wiring up alarms for third party control systems. The GPI outputs are open collector outputs, sinking to ground when an alarm is triggered. The GPI connector is shown in Figure 4 .

Electrical Maximums for GPI outputs
Max current: 100mA
Max voltage: 30V

ADC-SDI-CC module GPI pinning:

Signal	Name	Pin #	Mode
Status	General error status for the module.	Pin 1	Open Collector
Input	No video input detected	Pin 2	Open Collector
VCXO	Module not gen-locked to video input	Pin 3	Open Collector
SDI Output	No SDI output present	Pin 4	Open Collector
Ground	0 volt pin	Pin 8	0V.

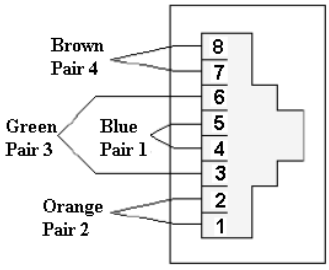
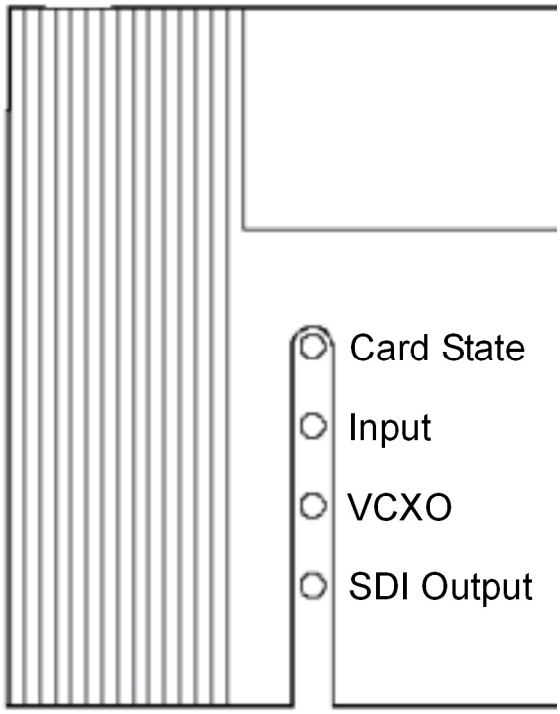


Figure 4 - GPI Outlet

5.2 Front Panel - Status Monitoring

The status of the module can be easily monitored visually by the LED's at the front of the module. The LED's are visible through the front panel as shown in Figure 5 below.



(Text not printed on the front panel).

Figure 5 - Front panel indicator for ADC-SDI-CC

The ADC-SDI-CC has 4 LED's each showing status information. The position of the different LED's is shown in Figure 5 .

Diode \ state	**Red LED**	**Yellow LED**	**Green LED**	**No light**
Card State	Module is faulty	Start-up-sequence is running	Module is OK Module power is OK	Module has no power or memory fault
Input	No video input detected		Video input detected	
VCXO	No input detected	Input signal is detected. Video not yet locked or input comes from a VCR	Input signal is detected, and properly locked	
SDI Output	No SDI output		Correct SDI output	

Table 4 - Front panel LED indicator overview

6. Interface with GYDA and RS-422 command set

All commands follow the flashlink® protocol and can be used for direct control access to the module. The control system can either be a GYDA or a third-party control system with integrated flashlink® protocol. The module can also be manually controlled with a VT100 compatible terminal program.

The protocol can be found on our web page; http://www.network-electronics.com

6.1 ADC-SDI-CC Command table

Command	Response	Comment
?	Yes	The "Hello" command.
info	Yes	Gives back the card state.
CVBS	"OK"	Set video format to CVBS.
Svideo	"OK"	Set video format to S-Video.
RGB	"OK"	Set video format to component RGB + sync.
YPbPR	"OK"	Set video format to component YPbPr.
MarkF1 on	"OK"	Turn on the *Mark Field 1*-feature.
MarkF1 off	"OK"	Turn off the *Mark Field 1*-feature.
Comb on	"OK"	Set chroma luma separation filter to 5-line comb filter.
Comb off	"OK"	Set chroma luma separation filter to chroma trap filter.
Pedestal on	"OK"	Pedestal is present.
Pedestal off	"OK"	Pedestal is not present.
Calibrate	"OK"	Calibrates RGB gain. Must be in RGB and input must be 75% colour bar.
eget [0xHH]	Yes	Get a value from a numbered eeprom register.
eset [0xHH] [0xHH]	"OK"	Set a value to a numbered eeprom register.
get [0xHH]	Yes	Get a value from a numbered register.
set [0xHH] [0xHH]	"OK"	Set a value to a numbered register.

Table 5 - All commands available to the user

6.2 The "?" command

According to the flashlink®, no card can use the RS422-bus before it has been activated with the "?" (hello) command. The response from ADC-SDI-CC will be:
xxxxADC-SDI-CC
PIC sw rev X.X.X
FPGA sw rev X
Protocol ver X.X

Here xxxx denotes the source and destination rack and slot coordinates, while **X** represents a version number. As of primo July 2004, these revisions would be:
xxxxADC-SDI-CC
PIC sw rev 1.0.2
FPGA sw rev 6
Protocol ver 1.0

6.3 The "info" command

This command report the entire state of the card. An example:
xxxxCVBS
Locked 50Hz
Field 1 mark on
Comb on
Pedestal on

Status of	Status string	Comment
Input Select	CVBS	CVBS is selected
	Svideo	Svideo is selected
	YpbPr	YPbPr is selected
	RGB	RGB is selected
Analogue input.	Locked 50Hz	Locked to 625 lines 50 Hz.
	Locked 60Hz	Locked to 525 lines 60 Hz.
	Not locked 50Hz	Not locked, previously locked to 50Hz.
	Not locked 60Hz	Not locked, previously locked to 60Hz.
Field 1 marking	Field 1 marking on	The *Mark Field 1*-feature is turned on.
	Field 1 marking off	The *Mark Field 1*-feature is turned off.
Chroma filter	Comb on	Comb filter selected.
	Comb off	Chroma trap filter is selected.
Pedestal	Pedestal on	Pedestal present is selected.
	Pedestal off	Pedestal not present is selected.

Table 6: The info command broken up in components.

The "info" command is composed by many minor lines, fully specified in table 6. In general, when a condition is normal, it is not reported. For instance, pedestal is reported when locked to 50Hz, even tough the setting has no effect on the video.

6.4 Video modes commands.

The CVBS, RGB, Svideo and YPbPr commands sets the video input mode. Remember that RGB -mode needs separate sync on the CVBS/Luma channel. This sync may be a synchronous CVBS-signal.

6.5 Mark Field 1, Pedestal and Comb - commands.

Commands to turn on/off the *Mark Field 1*-feature, Pedestal and the Comb filter commands are straightforward text, see *Table 5* .

6.6 get, set, eget and eset.

These commands are for internal factory use. The end-user should avoid these commands.

General environmental requirements for Network flashlink® equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:

- Operating room temperature range 0°C to 40°C
- Operating relative humidity range up to 90% (non-condensing)

2. The equipment will operate without damage under the following environmental conditions:

- Temperature range -10°C to 50°C
- Relative humidity range up to 95% (non-condensing)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Network Electronics AS. These conditions are available on the company web site of Network Electronics AS:

www.network-electronics.com

Materials declaration and recycling information

Materials declaration

For product sold into China after 1st March 2007, we comply with the "Administrative Measure on the Control of Pollution by Electronic Information Products". In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
ADC-SDI-CC	X	O	O	O	O	O

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Environmentally-friendly use period

The manual must include a statement of the "environmentally friendly use period". This is defined as the period of normal use before any hazardous material is released to the environment. The guidance on how the EFUP is to be calculated is not finalised at the time of writing. See http://www.aeanet.org/GovernmentAffairs/qfLeOpAaZXaMxqGjSFbEidSdPNtpT.pdf for an unofficial translation of the draft guidance. For our own products, Network Electronics has chosen to use the *50 year figure* recommended in this draft regulation.

Network Electronics suggests the following statement on An "Environmentally Friendly Use Period" (EFUP) setting out normal use:

> **EFUP is the time the product can be used in normal service life without leaking the hazardous materials. We expect the normal use environment to be in an equipment room at controlled temperature range (0ºC - 40ºC) with moderate humidity (< 90%, non-condensing) and clean air, not subject to vibration or shock.**

Further, a statement on any hazardous material content, for instance, for a product that uses some tin/lead solders:

> **Where a product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. The hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of "General Rule of Environment-Friendly Use Period of Electronic Information Products". This is indicated by the product marking:**

It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

Recycling information

Network Electronics provides assistance to customers and recyclers through our web site http://www.network-electronics.com. Please contact Network Electronics' Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Network Electronics or its agents for recycling, the following general information may be of assistance:

Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.

All major parts are marked or labelled to show their material content.

Depending on the date of manufacture, this product may contain lead in solder.

Some circuit boards may contain battery-backed memory devices.

EC Declaration of Conformity

MANUFACTURER	Network Electronics AS P.B. 1020, N-3204 SANDEFJORD, Norway	
AUTHORISED REPRESENTATIVE (Established within the EEA)	Not applicable	
MODEL NUMBER(S)	ADC-SDI-CC	
DESCRIPTION	Component and Composite Analogue Video Converter	
DIRECTIVES this equipment complies with	LVD 73/23/EEC EMC 2004/108/EEC	
HARMONISED STANDARDS applied in order to verify compliance with Directive(s)	EN 55103-1:1996 EN 55103-2:1996	
TEST REPORTS ISSUED BY	**Notified/Competent Body**	**Report no:**
	Nemko	E07379.00
TECHNICAL CONSTRUCTION FILE NO	Not applicable	
YEAR WHICH THE CE-MARK WAS AFFIXED	2008	
TEST AUTHORIZED SIGNATORY		
MANUFACTURER	**AUTHORISED REPRESENTATIVE (Established within EEA)**	**Date of Issue**
		2008-07-14
		Place of Issue
	Not applicable	Sandefjord, Norway

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