



HD DAC – D/A converter



Instruction manual

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Safety warning

- Read this manual carefully before operating the HD DAC;
- Should you have any questions on how to setup or use your HD DAC, please contact your Nagra dealer;
- Audio Technology Switzerland SA declines any responsibility in the event of an accident caused by the non-observance of these instructions or any other form of user negligence;
- There are no user adjustments inside the HD DAC or the power supply, do not attempt to open them.

Warranty

Audio Technology Switzerland SA certifies that this device has been inspected and tested before leaving the factory.

Every Nagra unit goes through our test laboratory. The result of the measurements is recorded in the "Protocol" documentation that comes with your device.

We guarantee our products against all manufacturing defects, for a period of three years for the HD DAC and six months for the tube, running from the date of delivery to the customer (validated by the serial number on the device casing and the invoice from an official Nagra dealer). This warranty is only valid for the original purchaser of new equipment.

This limited warranty covers the repair and replacement of defective parts, excluding any other remedy.

The absence of a serial number invalidates the warranty.

We decline any responsibility for damages resulting directly or indirectly from the use of our products.

As we constantly strive to improve our products, we reserve the right to modify them or change their specifications without notice.



Disposal of old electrical & electronic equipment (Applicable in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local authority, your household waste disposal service or the shop where you purchased the product.

Applicable to the following devices: HD DAC D/A converter.

Congratulations

Congratulations! You have just acquired one of the best digital-to-analog converters ever built.

The HD DAC was created by an engineering team with more than 60 years' experience designing world-class products for the professional audio, national security and military businesses. The professional and Hi-Fi product ranges are designed by the same Research and Development department.

Nagra launched its Hi-Fi range to allow the wider public to benefit from technical advances that are often the privilege reserved for professionals. In so doing, the ultimate sonic excellence has been shared throughout the Hi-Fi range.

Ever since its creation in 1951, Nagra has been building devices that offer unparalleled performance, and the company has received many awards for its technical innovations and the excellence of its products over the years. Among the most prestigious, Nagra has been awarded three Oscars® and an Emmy®.

Our experience, precision and dedication to detail has been implemented to do service to music, your music. This is why we wish you many hours of listening pleasure and memorable moments enjoying your HD DAC.

Thank you for your trust.

Package contents

In addition to this Instruction manual and the HD DAC itself, the box contains:

- Mains power cord*;
- A printed record of the exact measurements, response curve characteristics of your device, measured in the Nagra laboratory;
- DAC Remote control (2 x AAA cells inside);
- A pair of "Haute Horlogerie" grade microfiber gloves;
- An Allen key (Hex) driver to open the HD DAC (for dealer use only).
- A USB key with PC and MAC configuration information

Please contact your Nagra dealer if anything is missing.

* Depending on the country of purchase, the cable supplied by Nagra will feature a European, Swiss or US mains power plug.

Installation

Positioning

In order to avoid risks of fire and electric shock, the HD DAC should be used exclusively indoors.

If possible, it is preferable not to place other HiFi elements on top of your HD DAC and free access to the ventilation holes, located under the device and on the top surface (above the tube), must be maintained at all times to allow sufficient natural cooling during operation.

The Nagra HD DAC must be placed on a stable horizontal surface. We strongly recommend the use of the special anti-vibration support plates, HD VFS, Vibration Free Supports, developed by Nagra. These consist of two solid aluminum isolated plates that use the same silicon base damping material as the Nagra CD mechanics. These plates will eliminate any mechanical vibrations that may interfere with the sonic excellence of your HD DAC.

Powering the HD DAC

The HD-DAC has a unique powering system, with totally independent supply sources for the digital and analog portions of the electronics. This dual powering system was developed to eliminate any interference between the different elements and guarantee an uncompromising audio transparency.

There are two methods of powering the HD DAC; the first uses two individual ACPS stand-alone power units, the second uses two outputs of the Nagra MPS unit.

Connecting the ACPS II modules

Verify that the main selector on the front panel is in the **OFF** position. Insert the LEMO plug from each the ACPS II power supplies into the Analog and Digital LEMO DC input connectors on the right side of the rear panel.



The LEMO plug features a red dot that must be facing upwards for correct alignment with the socket and insertion into the power input connectors.

You will hear a distinct “click”, indicating that the plugs are securely locked in place.

After connection of the two LEMO plugs, connect the ACPS II to the mains power outlet using the IEC cable supplied with each ACPS II module. The red LED should light indicating correct operation.

If the LED is off, check the connection of the IEC mains cable and the mains supply to the mains plug. If the problem persists, please contact your Nagra dealer for assistance.



Before disconnecting the LEMO plugs, ensure that the mains power has been disconnected and that the main selector on the front panel of the HD DAC is set to the OFF position.



Grip the fluted section of the plug, between thumb and index finger as shown in the picture and pull the crown of the connector backwards.

Connecting to a Nagra MPS

The HD DAC will reveal its full potential with the full chassis power supply Nagra MPS which was specifically designed to provide several independent power sources for different NAGRA Hi Fi elements.

The MPS is connected to the HD DAC using LEMO to LEMO cables supplied with the MPS unit. The LEMO with the black Ring should be plugged into the MPS and the other end into the HD DAC

If available, we recommend using output 1 for the digital DC input and output 2 for the DC analog input.

Always use the first available output of the MPS for the digital section and the consecutive one for the analog input.

Rear panel connection block

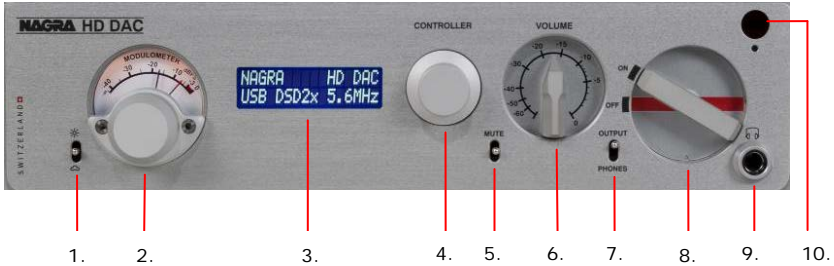


1. Ground connector (see note below)
2. The analog output section, provides both RCA or XLR, which should NOT be used simultaneously. The XLR outputs are unbalanced (asymmetrical). Should you need transformer balanced outputs, please contact your Nagra dealer.
3. Digital inputs section (from left to right):
 - The I²S (RJ 45 connector) is a proprietary Nagra input reserved for data connection to future products
 - The USB connector is for receiving digital audio from a PC or MAC computer
 - TOSLINK is a standard optical data connection
 - Two AES / EBU XLR inputs conforming to the AES-3 standard
 - Two S/PDIF inputs, 1 on BNC, 1 on RCA
4. DC power inputs
 - Analog, powers the analog part
 - Digital, powers the digital part

Note about the Ground connector

This connection is seldom used but may solve specific setup issues concerning "hum". Your Nagra dealer will assist you on when and how to use this connector.

Front panel



1. This switch adjusts the intensity of the Modulometer back-light and the main display. Pushed up increases the intensity, while down will reduce it, there are 6 levels of intensity
2. Nagra Modulometer indicates the digital input level in dB FS (Full Scale) of the currently selected input. 0 dB being the maximum level. The black pointer corresponds to the signal on the left channel and the red pointer to that of the right channel.
3. Dual line LCD display for operating mode and menu display
4. Controller knob, which has several features, described below
5. MUTE, when muted a blinking X will appear in the right-hand corner of the LCD display, push down to cancel the mute. MUTE can also be achieved using the remote control
6. Volume adjustment potentiometer
7. This switch selects the routing of the analog outputs: **OUTPUT** is for the line (RCA or XLR) output, **PHONES** for headphone jack
8. The Main selector is the principal activation switch for the HD DAC. In the **OFF** position the HD DAC is in "Standby" mode*.
9. Headphone output jack
10. Infra Red sensor window for the remote control, and its activation LED

* In standby mode the power consumption is less than 100 mW.

Please note that when turned **ON**, the HD DAC will go through a 2 minute pre-heating phase. This is in order to optimize the warming-up of tubes and critical components. This will allow your HD DAC to offer excellent performance for a longer period, by managing the critical components gently.

Note: In case of an accidental return to the **OFF** position for less than 2 seconds, the HD DAC will not shut down.


Setting your HD DAC

Using the rotary controller knob along with the LCD display your HD DAC can be personalized to integrate it into your system. Please take a moment to learn more about the settings that you can change to enjoy your music more.

The controller knob

The controller knob can be rotated or pressed to access different functions of your HD DAC.



A brief press of the controller knob will reverse the absolute phase of the audio signals, a  symbol will appear on the LCD's right-hand upper corner. A subsequent brief press will return to the initial phase position.

Accessing the menu mode

All menu related features are managed using the controller knob, which can be rotated or pressed.

Press and hold the Controller knob for 5 seconds to access the menus.

You can navigate within the menu tree through the different topics by rotating the Controller. Press and hold the controller to select the highlighted menu. To exit the menu, press the Controller twice in quick succession; you may also simply wait a few seconds and the menu will close automatically.

How to operate the Controller knob

Controller	Normal operation	Inside menu
Rotate	Change input	Scroll up or down
Press once	Change phase	Validate, go forward
Press twice	-	Go back, exit menu
Press and hold (5 S)	Access menus	
Don't touch anything	Enjoy the music	Exit menu

We suggest you to navigate inside the menu to get familiar with the navigation controller, then you can start setting-up the various possibilities.

When an menu option can be changed, the second line of the display will blink until either you select the another option or no selection is made and the menu returns to the previous state automatically.

Menu tree or map

Below is the menu tree or map, that will help you localizing the function you are looking for. It may look complex, but actually once you have set-up your HD DAC, you won't need to change it often or at all! Explanations as to how to modify the selections are given below.

LANGUAGE	ENGLISH FRANCAIS DEUTSCH ESPANOL ITALIANO	
- INPUT NAMES --	AES 1 AES 2 S/PDIF 1 S/PDIF 2 OPTICAL USB I2S DEFAULT NAMES	
INPUT ASSIGNMENT	AES 1 (for every input)	DISABLED REMOTE A REMOTE B REMOTE C REMOTE D REMOTE E REMOTE F NO REMOTE DEFAULT ASSIGN
AUDIO SETTINGS	LINE LEVEL LINE MODE ABSOLUTE PHASE USB POWER MODE	LOW HIGH VARIABLE DIRECT NORMAL INVERTED ALWAYS ON IF INPUT ACTIVE
--- ABOUT ---	SOFTWARE OPERATING TIME TUBE TIME S/N DAC INFO	

Setting the language

You might want to start by setting the language!

First, press and hold the Controller button for 5 seconds to enter the menu mode and the following display will be shown.



--- LANGUAGE ---
ENGLISH

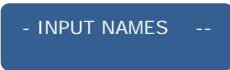
Press the Controller for 1 s, then “ENGLISH” will start to flash. Rotate the controller to the desired language and press the controller once more to make the desired selection

Naming of the digital inputs

Each of the digital inputs of the HD DAC can be named by the user to identify different sources easily. 14 characters are available to name each of your digital inputs. Each name can include letters, numbers and special characters, which are presented in the following order:

A...Z a...z _-*#/./...;0123456789

First, press and hold the Controller button for 5 seconds to enter the menu mode, then turn the controller until the following display is shown:



- INPUT NAMES --

Press the Controller button to go enter this menu



AES 1
AES 1

AES 1 is the first digital input in the list, rotate the controller until the desired input to be named is on the display and press the controller once more. An

underscore “_” will appear beneath the first character of the current name (as shown) and rotating the controller knob will scroll through the available characters. Each consecutive press of the controller will move to the next character. Once the entire name is complete, press and hold the controller until it leaves the menu mode. The new name will now be displayed for the desired input.

Example:

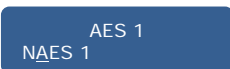
Press the Controller button once.

You see a “_” blinking under the A.



AES 1
BES 1

Rotate the Controller clock-wise, the letters are changing, to select a given character, press the Controller once



AES 1
NAES 1

You can now select the second character, you may also insert a space, a space is considered as a character.

AES 1
NAGRA CDI

Once you are done, simply press and hold Controller button for a few seconds, the underscore will disappear; showing you the name has been stored.

Note If you wait for a few seconds without making any input, your selection will be cancelled and the menu closes automatically.

Resetting input names

If you are unhappy with the name you have chosen, you can reset all the input names to "Factory Settings".

Go in the Input Names Menu, scroll to the last one:

DEFAULT NAMES
PRESS CTRL

Press and hold the Controller button and all the names will be reset.

Input assignment

The HD DAC features a wide array of inputs. You may not need all of them. To make input selection easier, you can decide which input you want to be active, and on which remote button it will be accessible.

In the Menu, go to "INPUT ASSIGNEMENT"

INPUT ASSIGNMENT

Select this menu

AES 1

Select the input you want to de-activate

For each input, you can select the following:

DISABLED -
REMOTE BUTTON A to F

The input is deactivated
Allocate the remote letter you want of
choice for any input

NO REMOTE BUTTON

The input is active, but does not have a
remote button assigned to it. However,
you can activate it using the
CONTROLLER button.

If you wish to return to the factory settings on the input assignment function, in the input selection, you can scroll to "

DEFAULT ASSIGN
PRESS CTRL

Press and hold the Controller to restore factory settings.

Audio settings

Line level

In order to match levels with your preamplifier or your power amplifier, the HD DAC features two selectable output levels. For a 0 dB FS (maximum level) you may select either 1.3 V (LOW) or 2 V (HIGH) rms as your analog output level.

To change the level, go to:



This is the state the HD DAC is currently set.

To change the level, press the Controller and select LOW or HIGH, then confirm by pressing once again the Controller.

Line mode

The HD DAC can operate as a pure D/A converted connected to an external preamplifier or integrated amplifier. In this case, you should have a fixed output

level: DIRECT.

Should you wish to use its built-in volume control, you should select a VARIABLE output.

If you select DIRECT, then the signal won't pass through the potentiometer, and no control is possible.

You may select DIRECT or VARIABLE, it won't affect the headphone amplifier, the latter will always go through the potentiometer allowing the playback level to be adjusted.

Go to:

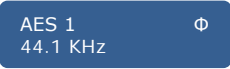


By default, VARIABLE is selected, as show here.

Note: When you change the setting from VARIABLE to DIRECT, the HD DAC will be muted, a blinking X will appear on the display. This is just to remind you that you are now in DIRECT mode, the signal will be at full level. If you have changed this setting by accident, there is time to come back to VARIABLE before damaging your hearing or your speakers.

Absolute phase

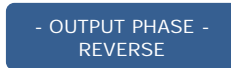
You can change the absolute phase at any time while listening by pressing the CONTROLLER button once (short time).



A Phi symbol will appear on the right top corner of the LCD screen. By pressing again on the Controller button, the phase will come back to normal.

Note, this is the absolute phase, so both signals will be inverted.

You may also define the default phase inside the Audio Settings:



USB power

When using the USB input, a significant amount of power is dedicated to specific USB circuits. If you don't use the USB input, you can de-activate the USB circuit.



This way you can save power consumption and avoid powering unnecessary components.

About

This part of the menu will provide you with useful information about your HD DAC.



Software version



You can check that your HD DAC comes with the latest software version. Should we release a new software version, we will advise your dealer and also Announce it on our website.

Operation time



This counter will let you know how many hours the HD DAC has been powered on. This counter can't be reset.

Tube time

TUBE TIME
12 h 51 min

This counter will let you know how many hours the tube has been powered for. Whenever you change the tube, you can reset it. Normally the internal tube of the HD DAC should last for a minimum of 5'000 hours of normal operation

Resetting the tube time counter

TUBE TIME
12 h 51 min

Press and hold the Controller knob

TUBE TIME
RESET COUNTER?

Press and hold the Controller knob to confirm

TUBE TIME
0 h 0 min

The counter is reset.

Serial number

SERIAL NUMBER
7055110XXXXXX

This serial number can't be changed or erased. Should your HD DAC be stolen, please send us your HD DAC serial number we will track this unit if it ever reaches a Nagra dealer or service center.

DAC Info

DAC INFO
Rev 0x22 T=51°C

This information is for Nagra servicing, it displays the D/A board internal software version as well as its temperature. A temperature of 51°C is typical and should not worry you.

USB set-up with computers

Due to the rapidly changing nature of the computer world, all computer related set-up information is to be found on the supplied USB key.

MAC

The Nagra HD DAC is recognized as a playback device, no further software is required. Simply select the Nagra HD DAC device in the audio settings menu.

PC

You will need to install a driver and update your ASIO drivers as well; the drivers are to be found on the USB key supplied with your HD DAC.

More information on inputs and formats

The HD DAC comes with 7 different digital inputs. Please find the format compatibility in the following table:

Input	For	Format
AES 1 and 2	Professional sources	Up to 192 kHz 24 bits
S/P Dif 1 and 2	Consumer sources	Up to 192 kHz 24 bits
Optical (TOSLINK)	Consumer sources	Up to 192 kHz 24 bits (with high quality optical fiber)
USB	UAC2*	Up to 384 kHz 32 bits (or DXD) DSD 2x
I ² S	Proprietary Nagra	This is NOT an RJ 45 Ethernet connector, but a dedicated Nagra input for future products

* UAC2 stands for "USB Audio Class 2" works to connect computers PC or Mac as well as other computer type devices.

Connecting the HD DAC to your system



You may use either RCA or XLR connectors to connect your HD DAC to your preamplifier or amplifier.

Do not use both outputs in parallel.

XLR output are unbalanced, should you require balanced (Symmetrical) output optional

transformers can be custom built for you. Please contact your Nagra dealer to know more about this option.

It is strongly recommended to use high quality cables throughout your system to benefit from the exceptional audio quality available.

Setting the headphone amplifier level

The headphone amplifier output level can be adjusted, by the means of jumpers, to match the sensitivity of your headset.

The settings to change your headphone amplifier are inside the HD DAC so your dealer should adjust it upon delivering of the unit.



The headphone amplifier is located on the right-hand side of the HD DAC.

Here are the two sets of jumpers.

No attenuation (factory setting)



6 dB attenuation (-6 dB)



Limited power output



Note: When listening through headphones, the perceived level is always lower than the actual level. Beware of possible damage to your hearing when listening too loud and make sure to adjust the headphone amplifier accordingly.

If you are in any doubt, please use the "Limited power output". Also be careful of possible high level differences, when switching from the external output to the headphone output and vice versa.

Operating your HD DAC

Nagra Modulometer



The Modulometer, or “modulation meter” was inherited from the second professional recorder developed by Nagra back in 1952, the Nagra II. The Modulometer is a typical Nagra precision instrument that displays the necessary information to make the best possible recordings.

In the case of the HD DAC, the Modulometer displays the digital input level. The 0 dB corresponds to full scale signal, meaning the maximum digital level.

The modulometer, in the HD DAC is a twin pointer digitally controlled instrument.

Left channel - black pointer

Right channel - red pointer

Modulometer and display intensity adjustment



This two-way toggle switch allows you to adjust the display and Modulometer backlight intensity. Pushing the toggle UP will increase the intensity, pushing it down will lower the intensity all the way to complete extinction. There are 7 different intensity levels.

Removing the battery protection



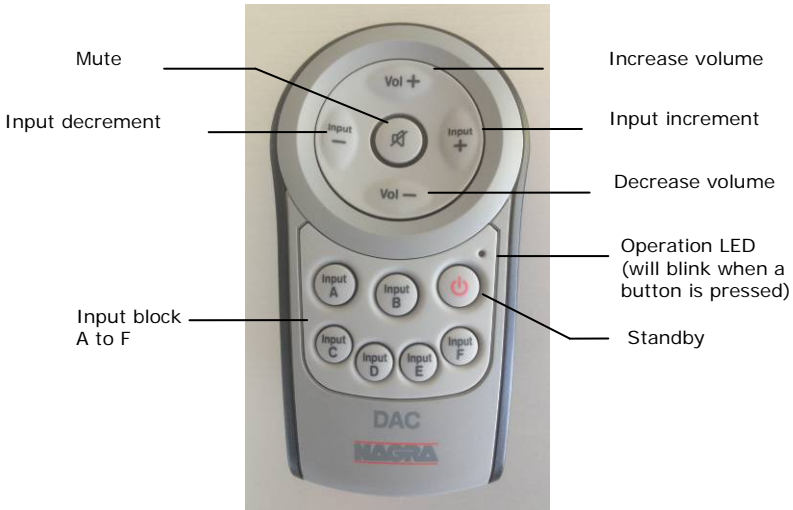
Two AAA dry cells are already installed in your remote at the factory. Removing the plastic strip will connect the batteries and the remote will become active.



Simply tear the plastic strip

Remote control

The HD DAC comes with a new style remote control.



You may also use the Nagra RCU or RCU-II remote controls. As they use a different communication protocol, please contact your Nagra dealer to make the necessary adjustments inside your HD DAC.

Using a “universal remote” with the HD DAC

The HD DAC responds to IR (Infra Red) signals coded in Philips RC-5 format. The HD DAC is allocated a system number 17 for preamplifiers.

Should you wish to program your universal remote control, please use the following table:

Code	Function
1 to 6	Input A to F
32 & 33	Input change step-up or step-down
16	Volume Up
17	Volume Down
13	Mute
12	Standby

Burn-in period

In order to obtain optimal performance from the Nagra HD DAC, it is preferable to leave the device switched on for about 15 minutes before use, so that the internal components can reach their optimum operating temperature.

Like all tube electronic devices, the Nagra HD DAC needs a running-in period. It will reach peak performance after a few hundred hours operation.

Tube ageing

Please check in the Menu to see how many hours your tube has been operating. The HD DAC tube is a high grade military tube selected by Nagra according to exacting criteria. Their theoretical minimum useful life is 5000 hours. Actually, some tubes operate consistently for more than 10 000 hours.

Thus, the useful life of the tubes is somewhat unpredictable. Rather than replacing the tubes arbitrarily after 5000 hours, we suggest that you identify the signs of ageing:

- The distortion gently increases to an audible level;
- Presence of clicks (dry and short noise, like breaking dead wood);
- Presence of pops, short noise in the low frequencies;
- Presence of hiss, higher background noise.

As soon as one of these signs appears, please contact your Nagra dealer to order a HD DAC replacement tube kit, reference 7055761000.

Case cleaning

Clean the HD DAC casing using a soft, non-fluffy, slightly damp cloth. Do not use any cleaning products which could have a corrosive effect.

Technical specifications

Below are the typical specifications for the Nagra HD DAC.

Your own specific HD DAC's exact specifications are to be found on the "protocol" delivered with your unit.

Inputs	2 x S/P DIF, 2 AES/EBU, 1 Optical, 1 Audio USB (mode 2), 1 x I ² S (Nagra format)	
Internal processing:	5,6 MHz / 6,2 MHz	72 bits
Compatible digital formats	PCM 24 bits up to 384 kHz, DXD, DSD x 2.	
Analog outputs	1 stereo RCA 1 stereo XLR	Symmetrical on optional transformers
Output level	1.3 or 2 V rms	
Analog output Noise level:	-128 dB _r @ 1 kHz 1.3V	linear
Distortion	< 0.02%	@ -20dBFS
THD + N	< 0.03 %	@ 192 kHz
Frequency Response	5 Hz - 40 kHz	+0 / -1 dB
Crosstalk	99 dB	
Inter-channel phase	<0.1°	@ 20 kHz
Dimensions	280 x 350 x 76mm	12 x 13,7 x 3 inches
Weight	5 Kg / 11 lbs	Without power supplies

Déclaration de conformité

Declaration of conformity

FABRICANT: AUDIO TECHNOLOGY SWITZERLAND SA, 1032 Romanel, SUISSE
MANUFACTURER: AUDIO TECHNOLOGY SWITZERLAND SA, 1032 Romanel, SWITZERLAND

APPAREIL: Nagra HD DAC

MODEL: Nagra HD DAC

NORMES APPLICABLES:

APPLICABLE NORMS:

Champ électromagnétique rayonné <i>Radiated electromagnetic field</i>	EN 55022 Cl. B <i>EN 55022 Cl. B</i>
Perturbations conduites sur secteur <i>Disturbance voltage on mains terminal</i>	EN 55022 Cl. B <i>EN 55022 Cl. B</i>
Immunité aux champs électromagnétiques <i>Immunity to electromagnetic fields</i>	EN 61000-4-3 <i>EN 61000-4-3</i>
Immunité aux décharges électrostatiques <i>Immunity to electrostatic discharges</i>	EN 61000-4-2 <i>EN 61000-4-2</i>
Immunité aux transitoires électriques rapides en sèves sur câble d'alimentation <i>Immunity to burst on mains line</i>	EN 61000-4-4 level 2 (1000V) <i>EN 61000-4-4 level 2 (1000V)</i>
Immunité aux transitoires électriques rapides en sèves sur câbles d'entrées/sorties <i>Immunity to burst on input/output signal line</i>	EN 61000-4-4 level 1 (500V) <i>EN 61000-4-4 level 1 (500V)</i>
Immunité aux ondes de choc <i>Immunity to surge</i>	EN 61000-4-5 level 2 (1000V) <i>EN 61000-4-5 level 2 (1000V)</i>

Cheseaux 2ème trimestre 2014
Cheseaux 2nd quarter 2014

Nagra R&D team