



DVDO iScan Mini™

4K Ultra HD Video Scaler, Enhancement, Display Setup



User's Guide

Version 1.0

Important Safety Information

- Follow all instructions
- Use only a dry cloth to clean
- Use caution not to block any vents in either unit
- Indoor use only: To reduce the risk of electric shock, do not use near water or expose to rain or moisture. Keep away from excess moisture
- Do not use near heat sources such as room heaters, hot A/V equipment
- Read all warnings
- Use only accessories approved by DVDO including mounting brackets
- Unplug the device during lightning storms or when unused for long periods of time
- Keep away from open flames
- Protect all connected cords including power cords from being pinched, compressed, stepped on
- Do not open the case. All servicing should be done only by qualified and approved service personnel
- Electrical Input Rating: Power over USB 5Vdc 350mA. Caution: Use Only the supplied AC/DC Adapter.
- Operating temperature range: e.g. 0 to 40°C.
- For charging the connected Phone/Tablet (MHL) from the HDMI connector, use a 5Vdc 3A supply.
- To disconnect power sources, remove the AC/DC adapters from the wall outlets and any USB connection.

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Overview

Thank-you for purchasing the DVDO iScan Mini – 4K Video Scaler, Enhancement and Display setup tool. It is ideal as an add-on to an A/V Receiver or Video Processor to improve the picture quality of existing content on a 4K Ultra HD TV.

Key Features

- VRS[®] ClearView™
- Internet Video Cleanup
- Detail Enhancement for increased image depth and clarity
- SD smoothing and mosquito noise reduction
- Edge enhancement to bring out detail
- Ringing suppression
- Scaling up to 4K/60 – Auto, DVDO (Manual), and Bypass modes
- On-Screen Video EDID Editing
- Display set-up tools
- Digital Audio stripping to S/PDIF – with multiple EDID modes to force the audio you want
- Built in IR receiver plus IR input port for attaching a dongle if required
- Dedicated remote for easy mode changes
- USB powered from TV/Computer or included USB power adapter (5V@1A)
- Optional 5V@3A power adapter available to enable charging attached MHL devices.
- Built-in display setup test patterns for basic display adjustments.

iScan Mini - Adaptive 4K UHD Picture Enhancement in a Hide-Behind-the-TV Package

4K Ultra HD TVs are now readily available and deliver pristine video resolution with 8 million pixels. However, with the exception of some proprietary media players, most of today's content is not native 4K, but available on DVD and

DVDO iScan Mini - 4K Scaler / Video Enhancement

Blu-ray discs or streamed over the Internet in a highly compressed format. Artifacts generated from compression or the use of low quality scalers can result in reduced picture quality. iScan Mini is specifically designed to automatically upscale both SD and HD sources up to 4K resolution while enhancing original source content. Other key features also include video setup and adjustment tools, EDID editing, and S/PDIF digital audio output . In addition, the iScan Mini's small package size enables a clean set up, which can be placed behind an existing A/V Receiver, Video Processor or even wall mounted TV.

VRS® ClearView™ Technology: Video Processing

VRS ClearView technology has powered many generations of DVDO's video processors and other home theater products. The iScan Mini features the latest generation of VRS ClearView technology including advanced 4K scaling as well as enhancement technologies to remove jaggies and mosquito noise from poor quality sources, while at the same time increasing the depth and clarity of images, making any video pop.

iScan Mini sharpens Blu-ray-quality video, bringing out details and nuances not visible in the original content. It also incorporates picture enhancement presets designed for those who prefer ease of use and also provides all the necessary controls to save multiple custom settings. Since SD and HD video require different enhancements, iScan Mini automatically switches between enhancement presets based on the input video type.

Demo Mode:

A unique split screen demo mode is available allowing you to easily see the before and after for video enhancements. Two different sweep modes let you pause an image and the sweeping bar enhances the video as it sweeps across.

VRS ClearView Technology: Adaptive Scaling

VRS ClearView Technology features 4K adaptive studio quality scaling for discerning videophiles with large screen displays or projectors. iScan Mini's state-of-the-art 4K scaler will scale video and graphics optimally, bringing out details without any ringing on text or around black-bars, unlike embedded scalers in many displays or source devices.

DVDO iScan Mini - 4K Scaler / Video Enhancement

iScan Mini provides three scaling modes:

- **Auto mode** scales anything up to 4K or the best resolution the display can handle
- **DVDO mode** scales compatible frame rate input video to a manually chosen resolution for those who want more control
- **Off mode** disables the iScan Mini's scaler (set to 1:1 mode) while keeping other processing active

The iScan Mini works just as well with 1080p displays, scaling and enhancing SD and 720p content, bringing out hidden details, and correcting mosquito artifacts and compression noise from your SD and Internet streaming sources.

Display Setup

iScan Mini enables basic display setup by providing the test patterns necessary to adjust brightness, contrast, sharpness, color/saturation levels, over scan, and resolution verification. For full 4K display set up including professional color calibration, DVDO's AVLab TPG™ (test pattern generator) is recommended. The detailed setup instructions provided in the user's guide will allow any display to be quickly adjusted for optimal viewing.

EDID Editing

Not all TVs report their capabilities correctly and sometimes professional installers want to force a specific video format. In particular, 4K is a new technology and not all displays handle it the same way. On-screen EDID editing capabilities allow the professional installer control to fix incompatibility issues.

Digital Audio Out

Have a soundbar or older A/V receiver that doesn't support HDMI®? iScan Mini will send audio from its HDMI or MHL input to its S/PDIF output in auto, stereo PCM, or AVR compatibility mode.

DVDO iScan Mini - 4K Scaler / Video Enhancement

In the Box

- iScan Mini
- Remote Control
- USB and HDMI cable

Input/Output

Input Panel

1. Power in: Power using a USB cable direct to a USB port on the TV. If insufficient, the included USB wall adapter can also be used – 5V/1A. If using an MHL source and you want to charge at the same time, use a 5V/3A wall adapter (sold separately)
2. Power indicator – Green LED indicates power is on
3. HDMI/MHL input: Accepts up to 4K HDMI or up to 1080p/60 MHL
4. Input indicators (Red = HDMI input active, Blue = MHL input active)



Output Panel

1. HDMI output (to display)
2. IR receive: Built in IR receiver and 1/8" connection for IR receive dongle (e.g. Monoprice.com 8060)
http://www.monoprice.com/Product?c_id=109&cp_id=10110&cs_id=1011009&p_id=8060&seq=1&format=2
3. S/PDIF optical output



Connections

iScan Mini is normally connected as the last device before the display HDMI input. It is small enough to be hidden behind an AVR or a wall mounted TV. It should be mounted in such a way as to make the IR receiver capable of receiving commands from the remote control. If this is not possible, an IR extender cable

(http://www.monoprice.com/Product?c_id=109&cp_id=10110&cs_id=1011009&p_id=8060&seq=1&format=2) can be used.

When used as a test pattern generator, no input is required.

Controls: buttons and the remote

iScan Mini has three physical buttons:

- Enhancement button manually cycles through Enhancement presets (Low, High, User1, User2, Off)
 - When mode is changed, an on-screen message will indicate the new mode
- Scaling button manually cycles through scaling presets (Auto, DVDO, off)
 - When mode is changed, an on-screen message will indicate the new mode
- F/W update button (recessed) – While iScan Mini is connected directly to a PC with a USB cable, press the F/W update button for 2 seconds to enter firmware update mode.

DVDO iScan Mini - 4K Scaler / Video Enhancement



The iScan Mini remote is specifically designed to allow fast access to controls.

Auto: Automatically scale to the best resolution the TV supports

DVDO: Scale to the specific resolution preset using the OSD

Off: Let the TV handle all scaling

Low: DVDO preset, minor enhancements. Use for already "good" video to make it pop

High: DVDO preset, extreme enhancement. Use for SD or internet video to fix compression noise, clean up low resolution "jaggies", reduce ringing, and enhance both detail and edges.

Off: Turn off all enhancements

User 1 / 2: Direct access to two enhancement settings that the user can adjust and save using the OSD

Demo: Cycles through different split screen demo modes where you can see before and after enhancements at the same time so you can get the adjustments just right.

Top three buttons are three categories of test patterns: display patterns, color bars, pluge patterns

Bottom three turn test patterns on and off as well as allow you to directly cycle through the patterns.

MENU: Brings up On-screen display (OSD) menu.

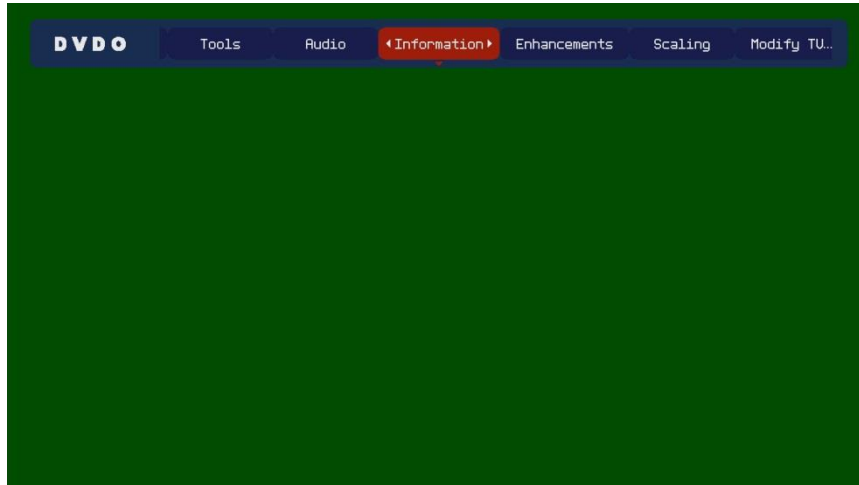
EXIT: Exits OSD menu and other special functions.

Navigation buttons: Used for OSD menu selections.

Info: Brings up on-screen information window

Audio: Cycles through S/PDIF Audio output modes

On-Screen Display and iScan Mini Controls



Main Menu:

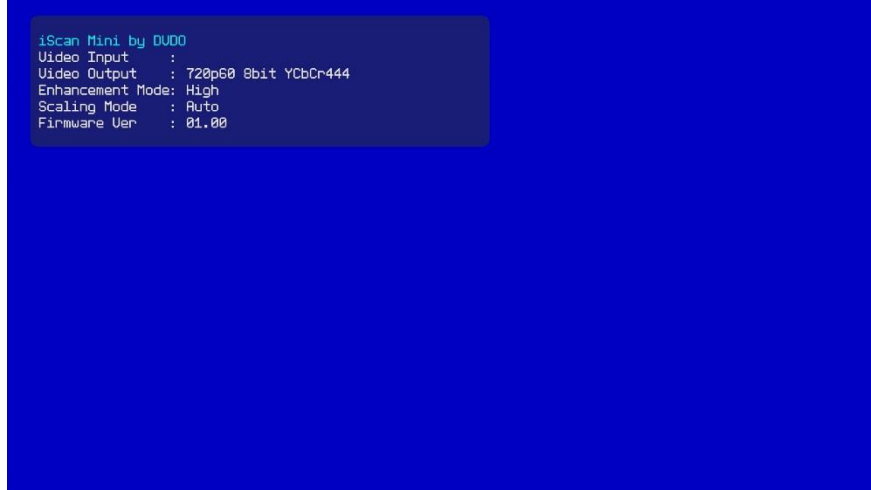
Pressing *MENU* on the remote control brings up the main menu. The Up/Down/Left/Right and OK buttons are used to navigate within the menu system

Information:

The information screen provides basic information about the current status of iScan Mini input and output formats.



DVDO iScan Mini - 4K Scaler / Video Enhancement

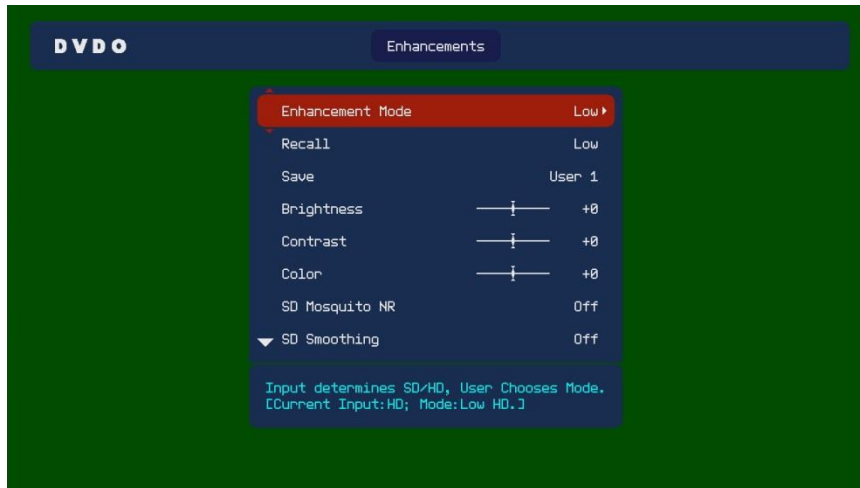


Info Pop-Up Window:

Pressing the Info button on the remote control brings up a pop-up window that provides more information about current iScan Mini status including enhancement mode and scaling mode.

DVDO iScan Mini - 4K Scaler / Video Enhancement

Enhancements:



The Enhancement menu provides access to video adjustments, video processing settings, and allows the user to recall or save custom enhancement settings.

All settings in this menu can be adjusted and saved to two User memories.

All video and processing settings are described below

Enhancement Mode – selects the current enhancement setting (Low, High, User 1, User 2, Off)

Recall – User can recall any saved memory (Low, High, User1, User2) and the contents of that memory are displayed on the controls in the menu below.

Save – Once a memory is recalled and then changed to get the best possible performance, the user can save the settings into User1 or User2 memory location.

**** NOTE:** Because Standard Definition [SD] and High Definition [HD] content require different settings, iScan Mini automatically switches between two memory sets based on what kind of video is present on the input. So there are actually 8 memories; Low(SD), Low(HD), High(SD), High(HD), User1(SD), User1(HD), User2(SD), User2(HD). If the current input is SD (480 or 576) and you choose recall User1, it will recall User1(SD). If the current input is HD (720-4K) and you choose save>User1 it will save current settings into User1(HD). The Current SD/HD mode is shown at the bottom of the menu when Enhancement mode is highlighted.

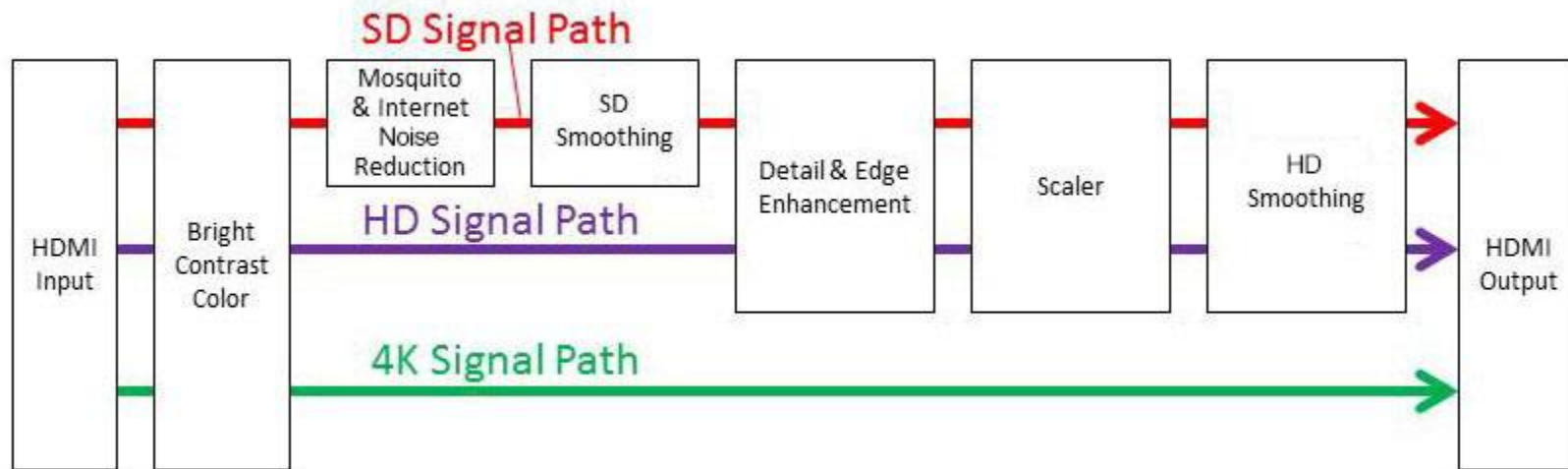
If you recall any memory and make any changes to those settings, the current mode changes automatically to Manual. To keep the new settings you must save them into a User location.

During normal operation, if you have User1 enhancement mode selected (either by using the remote to select it directly or using the OSD), iScan mini will apply the corresponding enhancement memory based on the input type; User1(SD) if an SD signal (480 or 576) is present and User1(HD) if an HD signal (720 up to 4K) is present.

DVDO iScan Mini - 4K Scaler / Video Enhancement

Enhancement Controls:

The input type determines which controls apply to the video signal.



Brightness, Contrast and Color apply to all video types and can be adjusted using the built-in test patterns.

Brightness

Adjusts the black level of the overall image from the iScan Mini. When you make an adjustment to brightness, all video levels, from black to peak white, are shifted up or down. Brightness is also known as Black Level adjustment.

Contrast

Video contrast works by adjusting the level of white. *Contrast* is complimentary to the *Brightness* control. *Contrast* controls should be used carefully because if overly adjusted, some details in lighter areas can become less visible.

Color (Saturation)

Color refers to the mix of “color” vs. “brightness” in the picture. Increasing *Color* makes colors look more vivid. Decreasing *Color* makes colors look “washed out.” Changes to either *Brightness* or *Contrast* can change your Color Saturation. You can use this control to balance the mix of color in an image.

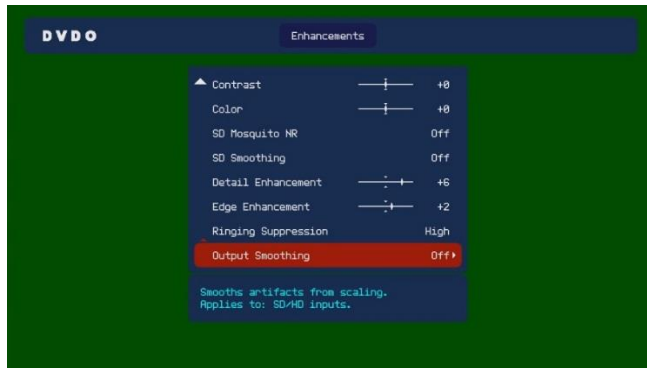
DVDO iScan Mini - 4K Scaler / Video Enhancement

Mosquito & Internet Noise Reduction will only affect SD video types and is used to reduce the effects of mosquito noise and video compression artifacts. Mosquito Noise is a type of image noise that is caused by video compression in cable, satellite and broadcasts. It is typically visible on SD content as a fuzzy 'halo' around object edges. Use higher setting for noisier images.



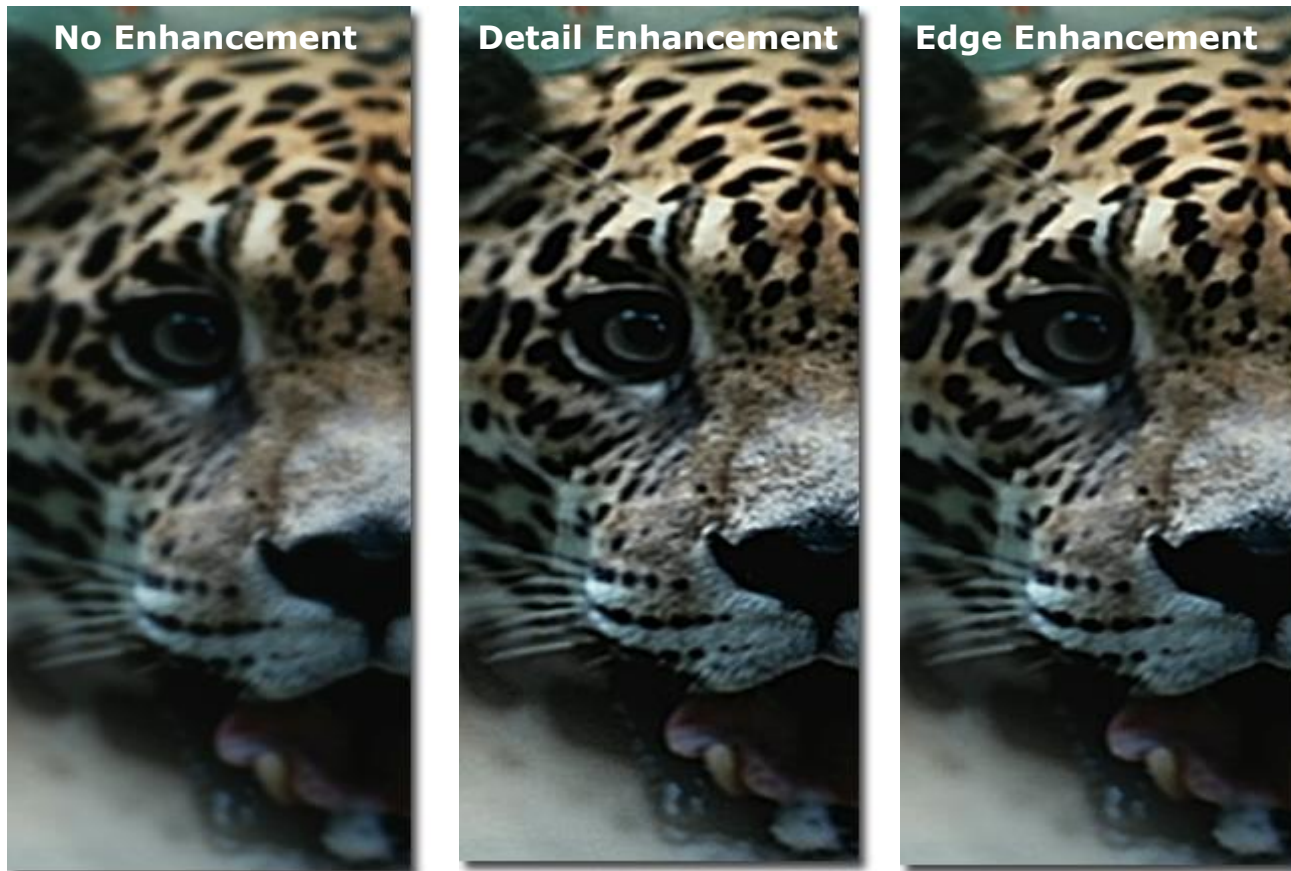
DVDO iScan Mini - 4K Scaler / Video Enhancement

SD Smoothing will only affect SD video types and is used to reduce “jaggies” present in low resolution video before the signal is scaled



DVDO iScan Mini - 4K Scaler / Video Enhancement

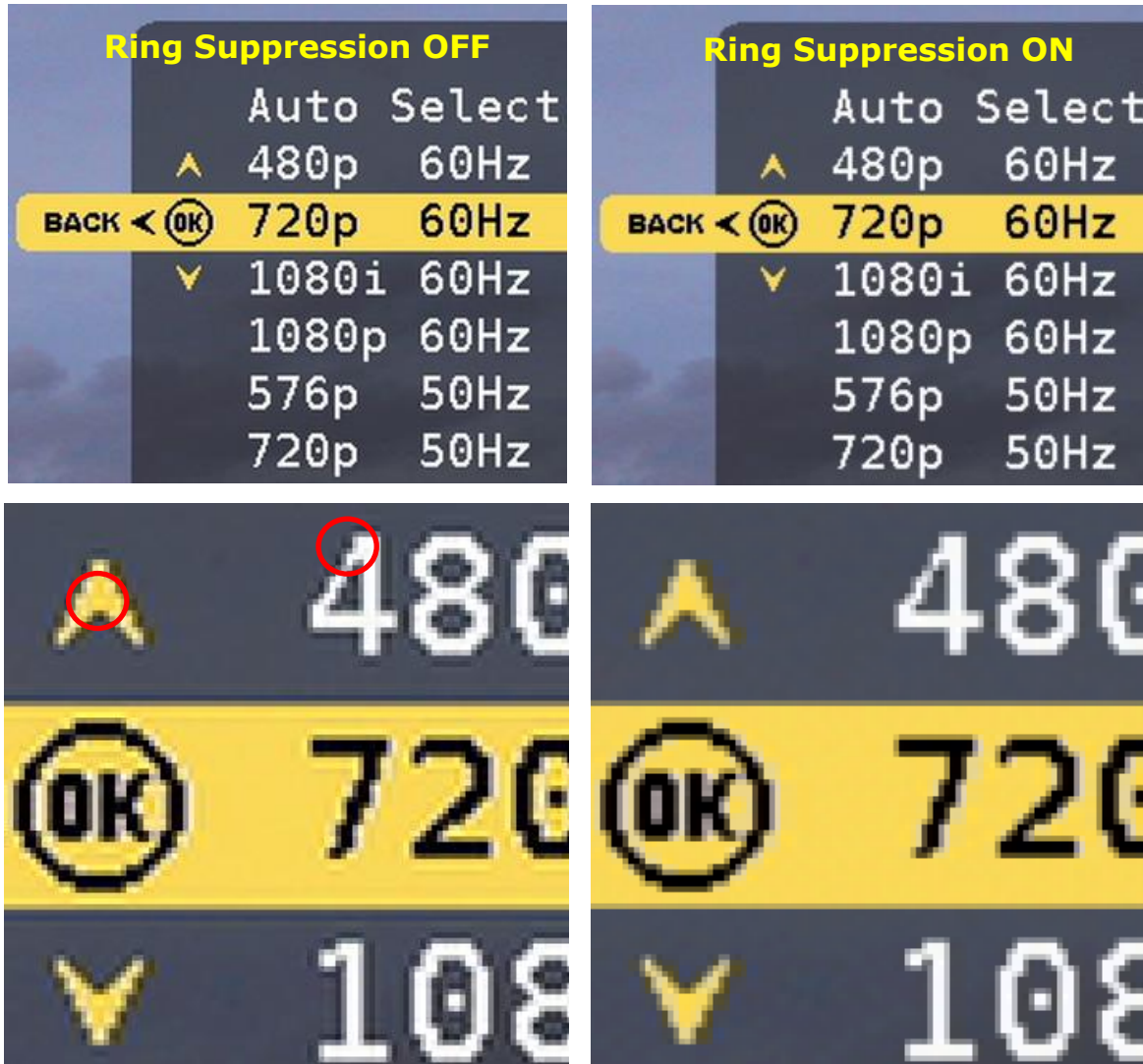
Detail Enhancement will affect both SD and HD video types and is used as an overall enhancement much like the Adobe unsharp mask. It sharpens fine aspects of the picture on a pixel by pixel basis. A high setting can make crisp images appear almost 3D and sharpen fine granular detail.



Edge Enhancement will affect both SD and HD video types and is used specifically to sharpen object edges. This control is especially useful if you have a noisy image but you still want to sharpen the image... This example with the control at maximum enhances fine details (notice the lace is now crisp, individual teeth can be seen) and the main image is given a slight shadow making it appear almost 3D. (Face enlarged to see the detail)

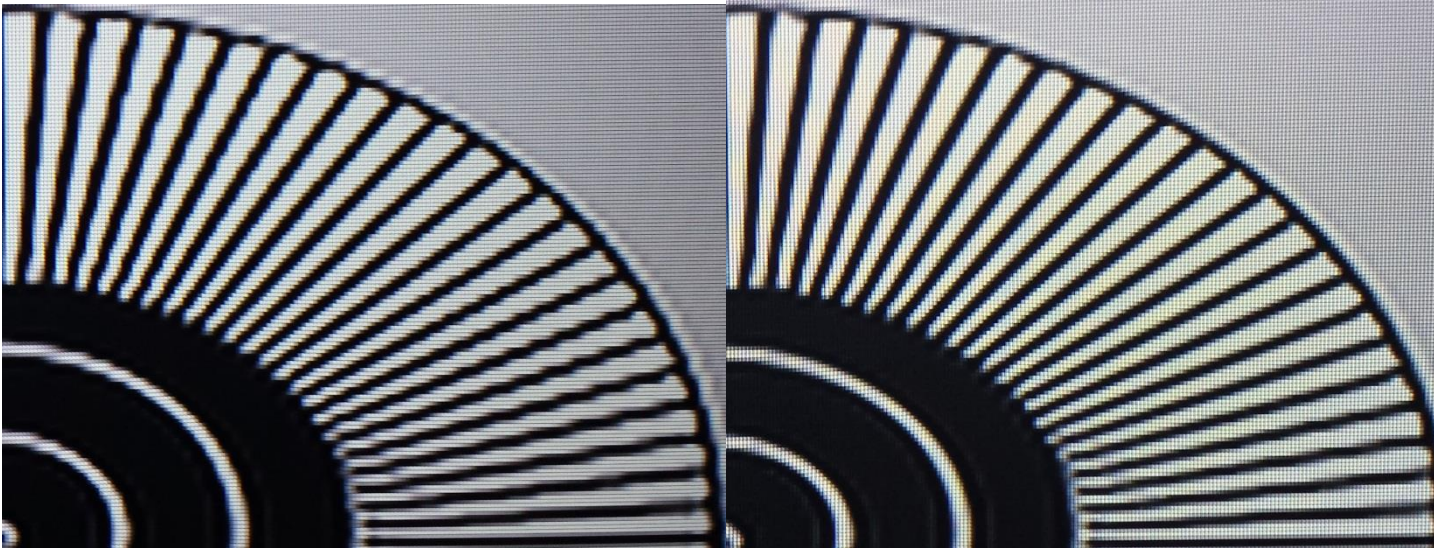
DVDO iScan Mini - 4K Scaler / Video Enhancement

Ringling Suppression will affect both SD and HD video types and is specifically used to reduce ringing in high contrast areas of scaled video such as around black bars, text and graphics. The iScan Mini's adaptive scaler will suppress ringing around scaled text and graphics while preserving the resolution of the natural video content. See the example below. Using ringing suppression, scaled video will look clean and smooth while maintaining detail.

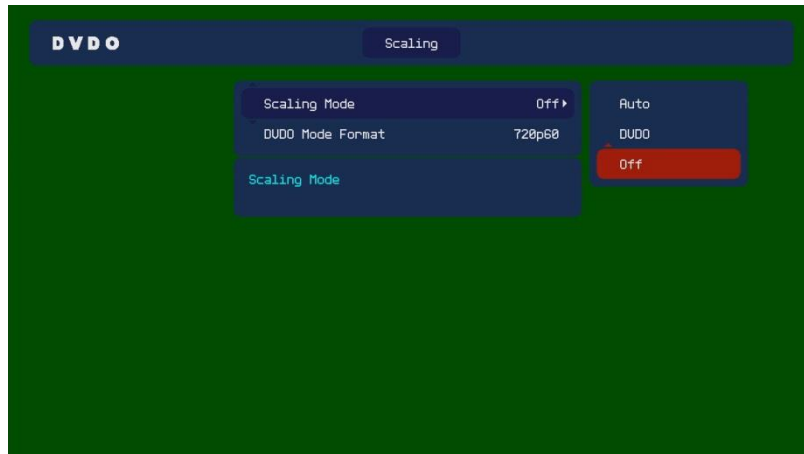


DVDO iScan Mini - 4K Scaler / Video Enhancement

HD Smoothing will affect SD or HD OUTPUT video types and is specifically used to smooth jaggies that occur around object edges after the video is scaled. The jaggies are very visible when the scaling ratio is large. In the example below the video is scaled from 480 to 1080. On the left you can see the jaggies created and on the right smoothed.



Scaling Modes

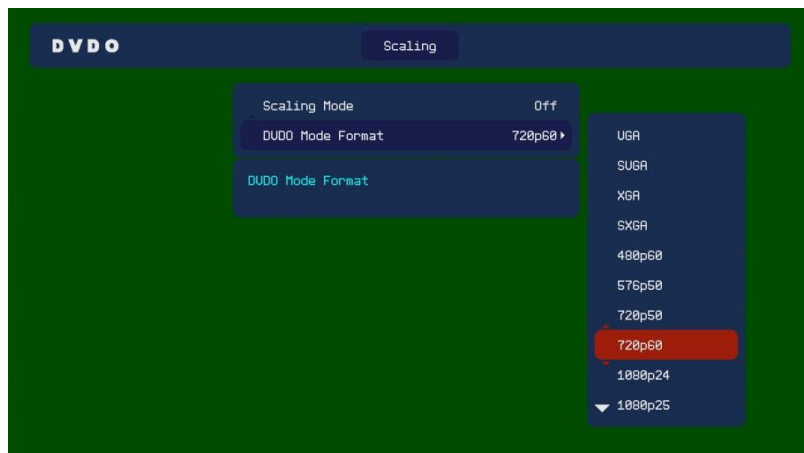


From the scaling menu, you can choose one of three modes:

- Auto Mode: iScan Mini reads the capability of the TV (EDID) and passes that back to the current source. Once video is sent from the source, Mini determines if it can be scaled up to the native resolution of the display with the same frame rate (auto is always 1:1 frame rate). If something is provided that cannot be scaled, it is simply passed through with a warning message.

Example: input 480/60 – output 4K/60

Input 1080/24 – output 4K/24



- DVDO (Manual) mode: When activated, you can choose a preferred output resolution. The entire display capability (EDID) is passed back to the source and if the input can be scaled to the preferred output it will be, if not it is passed through. DVDO mode is always a 1:1 frame rate so only identical frame rates are scaled.

Example: set output to 4K60

Input 720p/60 – output 4K/60

Input 1080p24 – output 1080p24 (pass through)

- Off mode: no scaling, output = input

*** Note: iScan Mini does not deinterlace or perform Frame Rate Conversion.

Modify EDID

Basic display EDID editing is provided to allow forcing of specific resolutions by a professional installer. Modifying an EDID can result in improper or unexpected operation or no picture or audio. Please use this only if you are comfortable with EDIDs and have modified them before.



Procedure for modifying EDID is:

1. Capture EDID from display
2. Modify EDID as needed – The on screen menu allows you to remove resolutions but not add them. (Adding a resolution can result in no picture)
3. Save EDID to memory
4. Choose “Use Saved” in the EDID Mode selection

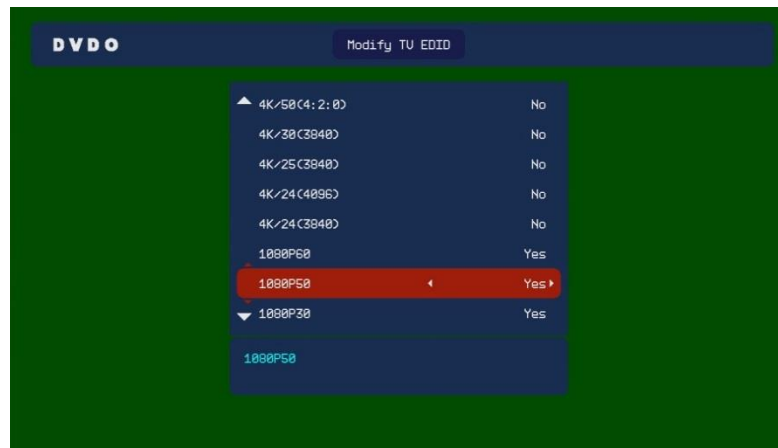
To use the TV 's EDID again, choose “Use TV the EDID Mode selection.

Example: Installer would like to force 4K/24

Set Scaling mode to DVDO (Manual) mode, Modify EDID to remove all non-24-Hz frame force source to provide a 24 Hz frame rate be scaled.

Example: Installer wants to run a 8x8 matrix at always and scale up for one TV.

Set Scaling mode to auto, use Modify EDID to 4K and 720 resolutions from EDID

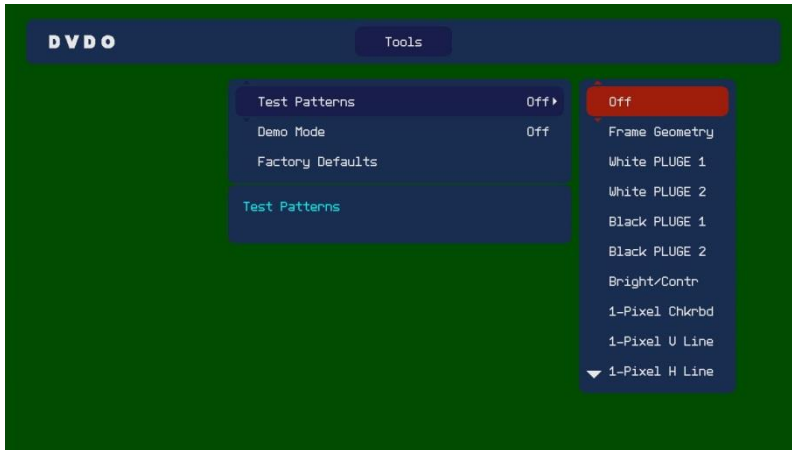


EDID” in scaling. use rates to that can 1080p remove

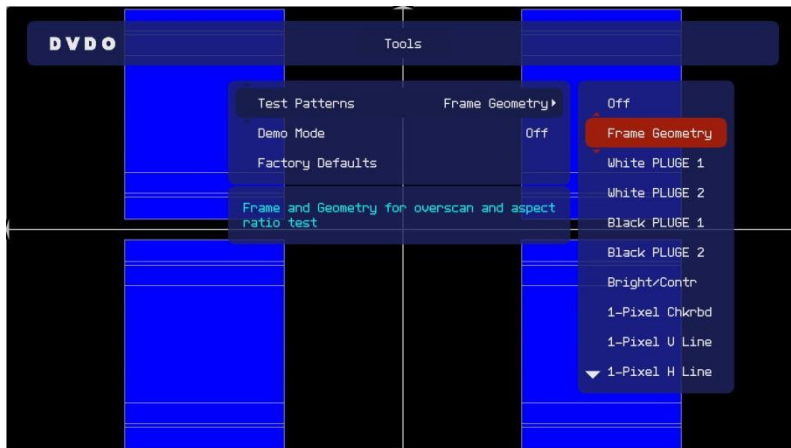
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Tools

Built-in tools allow display adjustment and evaluation of settings.



Test patterns can be accessed through the OSD or directly from the provided remote control. Detailed setup instructions are provided below with descriptions of each test pattern in a separate section



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Demo Mode: This is a special mode that allows you to quickly see the results of applied enhancements. Split screen shows no enhancements on the left side and applied enhancements on the right.

Slow and Fast moving bar also show applied enhancements on the left and no enhancements on the right. So as the bar sweeps across the screen it updates the picture real time. Note that enhancements are easier to see and adjust with a still image.



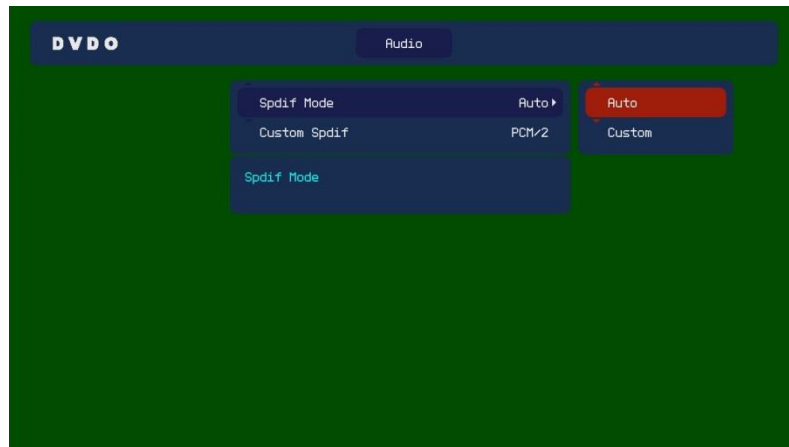
Factory Defaults resets all settings to defaults. To activate, select this option and press OK to confirm within 3 seconds.

DVDO iScan Mini - 4K Scaler / Video Enhancement

Audio Output to S/PDIF

If there is a need to extract audio from the HDMI stream and output to S/PDIF instead (e.g. Soundbar, DVI only TV, or whole home audio feed), the iScan Mini optical S/PDIF audio output can be used.

Note that while iScan Mini does not have an audio processor, the Audio menu does allow you to modify the audio part of the EDID so that the proper audio for your application can be requested from the source.



Auto Mode makes no modification to the audio portion of the EDID presented by the attached display. Since most displays only have stereo PCM in their audio EDID, That is what the source will send. If you connect the optical S/PDIF to an AVR or soundbar, only stereo audio will be heard. Also, if the TV asks for True-HD audio (incompatible with S/PDIF) there will be no output from the optical S/PDIF output.

Custom mode allows you to select a specific audio format to request from the source. When activated, the audio portion of the EDID from the TV is completely removed and replaced with the selection in the next menu.

Custom S/PDIF can be selected to be PCM/2, meaning stereo PCM only or you can select AVR which applies a full selection of audio formats that most AVRs and soundbars are capable of decoding.

AVR selection includes AC-3/DTS 5.1 and 2 channel PCM

Updating Firmware

iScan Mini allows simple firmware update through an attached PC.

Firmware version can be checked using the OSD menu and accessing the information screen.

- Download the latest firmware from www.dvdo.com
- Press the F/W update button for 2 seconds while iScan Mini is connected to a PC via USB
- iScan Mini will be automatically installed as a removable drive.
- Go to that new drive and copy the existing firmware file to a directory on your computer (this is for backup in case you would like to return to your current firmware version for some reason)
- Delete the existing firmware file from the new drive.
- Copy the new firmware file you downloaded to the now empty drive.
- iScan Mini will automatically eject itself when the update process is complete (~10 seconds).
- Unplug and re-plug iScan Mini to reset the device.
- Go to Information screen to verify firmware version

Test Pattern List

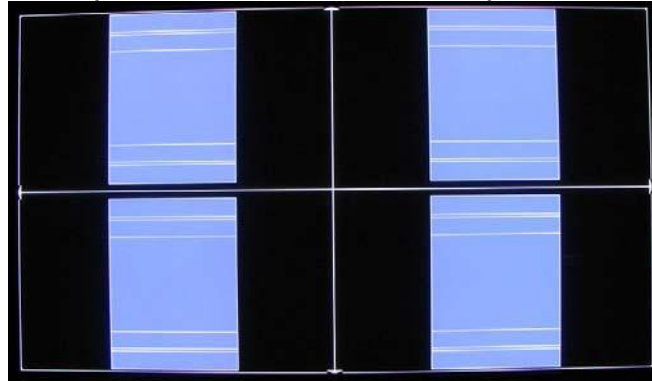
All loaded test patterns will be available from the IR remote and the OSD.

- 75% Red
- 75% Green
- 75% Blue
- 75% Cyan
- 75% Magenta
- 75% Yellow
- 75% Grey
- Frame & Geometry
- Brightness/Contrast
- Black Pluge (2)
- White Pluge (2)
- Every other pixel
- Every other Vertical line
- Every other Horizontal line
- Judder
- 8 color bars 75%
- 8 color bars 100%
- 8x3 color bars
- Grey ramp (only available while in YCbCr mode)
- Frequency Sweep (only available while in YCbCr mode)
- Cross hatch coarse
- Cross hatch fine

Test Pattern Explanations

Frame & Geometry

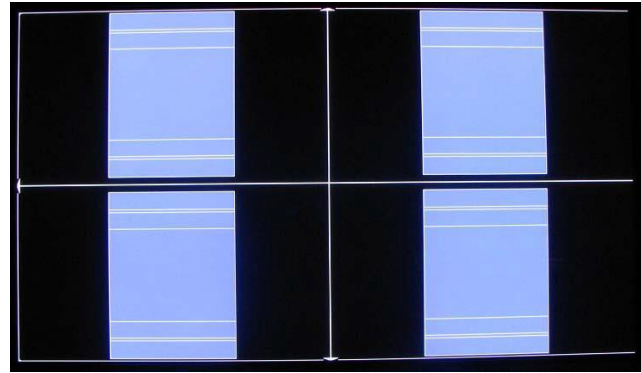
This test pattern contains two specific test features. The first is a 1-pixel wide box around the very outside of the image. This is used to determine when the entire iScan output image is visible on the display. The arrows along the middle of each edge provide an indication of the amount of overscan (if any). The blue boxes in the center of each quadrant are used for measuring display geometry. The rectangle in the center of the gray boxes should appear square on a 4:3 aspect ratio display, the next large rectangle should appear square on a 16:9 display, the next on a 1.85:1 display, and the largest rectangle should be square on a 2.35:1 display. The blue boxes are also used as an indication that the horizontal positioning of the output image is correct. This is particularly useful to align a video projector and also to visually verify that a TV is not in overscan mode. If the blue boxes are displayed as red instead of blue, then the Cb & Cr components are reversed. This can be corrected by ensuring that there is an even number of pixels in the sum of the horizontal sync and horizontal back porch.



Frame/Geometry Test Pattern Displayed Correctly (Image B)

When this test pattern is displayed correctly, it should look like this, with a one-pixel wide white border around the edge of the screen:

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Frame/Geometry Test Pattern (Image C)

As you can see in image C, the test pattern is almost displayed correctly. You can see the 1-pixel wide white border on the top, bottom and left side of the image but not on the right side of the image. By adjusting the horizontal size of this signal to 1360 (rather than 1366), we can get this test pattern displayed correctly on our display.

Vertical lines, Horizontal lines, and every other pixel:

There are three test patterns that are used to verify that the chosen output resolution is the native resolution of your display and that you are bypassing any internal processing in your display.

When the every other pixel test pattern is displayed correctly, close up you should be able to see a 1-pixel checkerboard and at proper viewing distance the image should appear as an even gray.

When this test pattern is displayed incorrectly, the resulting image does not look like a fine checkerboard and may have irregular patterns. If this is the case then the chosen output resolution may not

DVDO iScan Mini - 4K Scaler / Video Enhancement

be the native resolution of your display or your display may scale all input signals even if the input resolution is already at native resolution.

Note: If this test pattern does not appear as it should and you have chosen the native resolution of your display, you may not be able to bypass the internal processing on your display.

The 'Vertical Lines' test pattern should appear as one pixel wide black and white columns. If you see any irregular pattern(s) in the image then you know that the display is scaling the signal horizontally.

If using a projector, the vertical lines will show distortion if any keystone is used. Keystone should be avoided at all costs – instead, hang the projector in the correct position.

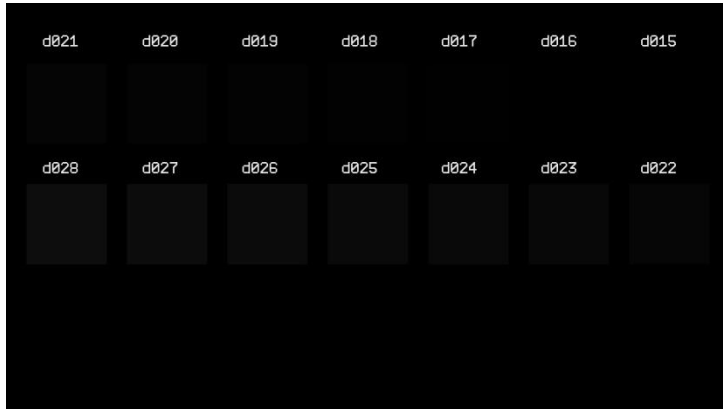
The 'Horizontal Lines' test pattern should appear as one pixel tall black and white rows. If you see any irregular pattern(s) in the image then you know that the display is scaling the signal vertically.

Judder (Frame Rate)

The Frame Rate Conversion test pattern consists of a vertical bar which moves slowly back and forth across the screen. The bar's motion is updated once in each output frame period of the IScan Mini, and it moves a fixed number of pixels horizontally in each frame period. This moving bar test pattern is intended to identify the frame rates at which a display will operate. If the display is not performing any frame rate conversion, i.e., it is actually displaying the output frame rate of the IScan Mini – the motion will be very smooth. However, if the display is performing any type of frame rate conversion there will be very noticeable stutter introduced in the smooth motion. There may also be other objectionable artifacts introduced depending on how the display actually performs the conversion. These include tearing (top and bottom portion of the bar are horizontally misaligned) and distortion.

PLUGE patterns (2 white and 2 black)

These patterns are used to visually adjust brightness (black level) and contrast (white level) as well as to verify the display is in the correct color space mode.

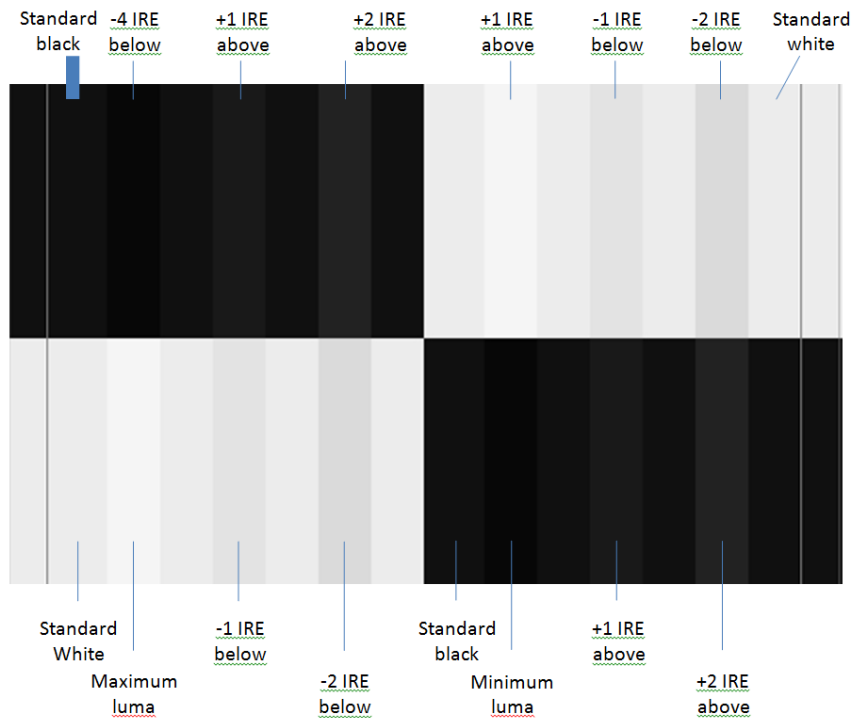


RGB video is normally sent using all 256 bits (in 8 bit color) but YCbCr (component video) sets black at 16 and white at 238. This allows room above and below the active video for below black and above white. PLUGE patterns are specifically designed to allow quick visual setting of the black and white level.

Using the black patterns (background is 16) so set the brightness level on the TV until you can just see the difference between 16 and 17. Depending on how fine the display adjustment is, you may not be able to get this exact, but 16 should be black and 17 grey. Everything below 16 should not be distinguishable. Having this setting correct will bring out the details in dark pictures.

Using the white patterns (background is 238) set the contrast level on the TV until you can just see the difference between 237 and 238. Many LED and LCD TVs will not have enough contrast range to allow this to be set completely correct, and it is normally improper to set contrast to very high values. So if you cannot make everything above 238 clip (disappear) then set contrast to around 75% and double check using a dynamic range sweep with CMS software.

Brightness & Contrast



This test pattern is composed of 4 quarter-screen blocks. Two of the blocks have a background level of standard black, and the other two blocks have a background level of standard white. Embedded in the black blocks are 3 bars. One is 4 IRE below black, one is 1 IRE above black, and the third is 2 IRE above black. Embedded in the white blocks are 3 bars.

The 'Brightness/Contrast' test pattern will assist you in setting up both the brightness (black level) and contrast (white level) of your display. The 'Brightness/Contrast' test pattern is composed of 4 quarter-screen blocks. Two of the blocks have a background level of standard black and the other two blocks have a background level of standard white. Embedded in the black blocks are 3 bars. One

is 4 IRE below black (blacker-than-black), one is 1 IRE above black, and the third is 2 IRE above black. Embedded in the white blocks are 3 bars. One is 1 IRE above white (whiter-than-white), one is 1 IRE below white, and the third is 2 IRE below white. The bottom two blocks differ slightly from these levels. For the bottom two blocks, the blacker-than-black is at the lowest possible luma level and the whiter-than-white bar is at the highest possible luma level. When the brightness and contrast are adjusted correctly, you should be able to see the 1 IRE and 2 IRE above black bars on the black background and the 1 IRE and 2 IRE below white bars should be visible on the white background. When the brightness is adjusted correctly, black objects should appear 'black' with the details still intact and lighter areas should

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be 'light', not gray, with the details still intact. When the contrast is adjusted correctly, white objects will appear 'white' with the details still intact. Because the contrast settings can affect brightness settings we recommend that you check the brightness setting after making this adjustment.

Note that the ISF PLUGE patterns are also an efficient way to set brightness and contrast.

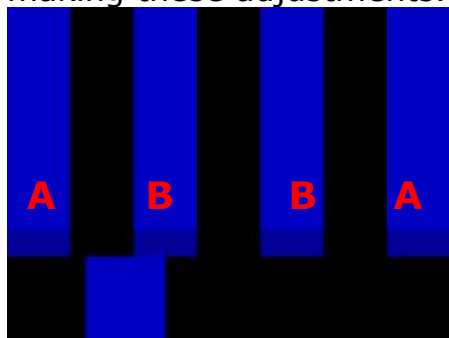
Color Bars: (8 iRE75, 8 IRE 100, 8x3)



The 'Color8 Bars75', 'Color8 Bars100', and 8x3 will assist in setting up the saturation (color) and hue (tint) of your display. The 'Color8 Bars75' test pattern consists of 8 vertical bars across the screen at a 75% saturation level. The 'Color8 Bars100' test pattern consists of 8 vertical bars across the screen at a 100% saturation level.

of your eyes. You will also need to turn off any automatic flesh tone controls on your display before making these adjustments.

From left to right the bars are: grey, yellow, cyan, green, magenta, red, blue, and black. To properly adjust the saturation and hue you will need to either set your display to "blue only" mode or use a blue colored filter held in front



Adjust Chroma/Color/Saturation control so the outer bars (and small bar under it "A") blend into each other, then adjust Tint/Hue so that the inner bars "B" blend into each other. When the Saturation and Hue are adjusted correctly, the white bar and the blue bar should be exactly the same shade when looking through the blue filter. Saturation and hue settings interact with each other so after making this setting you may want to go back and check that the saturation setting is correct.

Grey Ramp



The 'Gray Ramp' can help verify that your display is showing the gradients between black and white correctly. You should see a smooth transition between black and white with this test pattern.

This test pattern is a horizontal gray ramp. There is a black level (0 IRE) vertical bar along the left of the pattern and a white level (100 IRE) vertical bar along the right side of the pattern. Between the two bars is a monotonic gray ramp which ranges from the minimum luminance level (i.e., blacker than black) at the left to the maximum

luminance level (i.e., whiter than white) at the right. The minimum level of the ramp is a 10-bit digital value of 4 (equivalent to an 8-bit value of 1); the maximum level of the ramp is a 10-bit value of 1020 (equivalent to an 8-bit value of 254).

If iScan Mini is set to 8 bit color depth, and you are using YUV video, that means there are actually only 222 (238-16) luminance steps being sent to the display. The display then interpolates and smooths these steps to attempt to display something smooth across the screen. How much banding appears on the grey ramp gives an indication as to the video processing capabilities of your display. If the banding is noticeable, then either using deep color (10 or 12 bits) assuming your source and content is compatible or adding a high quality video processor like the DVDO iScan Duo is an excellent solution.

** Note: Grey ramp is only available if the output is set to YC

Solid colors

These patterns are normally used with a color meter and software to read specific color levels. IRE stands for International Radio Engineers and it is a *relative* scale, **NOT** an *absolute*. It defines the volt peak to peak video divided up into 140 IRE units. This is done to make numbers for luminance levels easier to communicate. In the ISF Training Manual, it is described as the amplitude of the video signal from blanking (zero volts) to peak white is 0.714286 volts or 100 IRE units. Synchronization signals extend from blanking to -0.285714 volts or -40 IRE units.

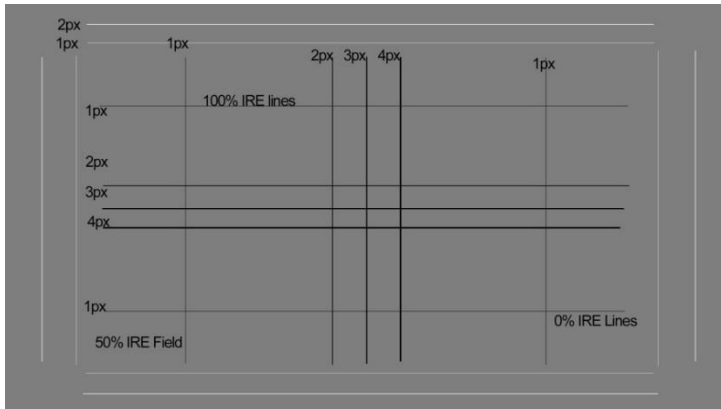
XHatch (coarse, fine, and focus):



Use this pattern to help adjust the lens on your front projector. You will also want to make sure that the focus is optimally adjusted. We have included one test pattern designed specifically for this application. On some displays, these settings, may not be available unless you get into the service menu. We recommend that you hire an ISF-certified technician to make these adjustments.

Sharpness

As its name implies, sharpness is used to adjust the sharpness control on a display. If sharpness is set too high, then single pixel black or white lines on a grey background will appear to have a halo.



The top left of this screen (labels do not appear on the actual pattern) has a 1 pixel black cross and nearby single pixel white lines. Wider lines can be used to see the effect of sharpness control on larger video structures.

Troubleshooting:

Issue:	Possible Resolution:
No picture or TV reports signal not supported	iScan Mini is putting out a resolution or bit depth that the TV cannot handle. Press the button on the side of the Mini marked "scaling" until auto appears and a signal returns.
Grey Ramp and/or Frequency Sweep cannot be selected	These patterns are only available in YC modes – please provide a YCbCr input to switch to this mode.
Cannot change to RGB or YC444 or deep color when in 4K/60 mode	iScan Mini has a maximum output frequency of 300MHz so when in 4K/60 mode, only YC 4:2:0 8 bit is available. The OSD prevents user from making changes when in 4K/60 mode.
Will not scale from 1080p24 to 4K60	iScan Mini does not have a frame rate converter – so whatever the frame rate is on the input (in this case 24), that has to be the frame rate of the output.
I set a specific resolution (e.g. 4K/60) but sometimes iScan scales and sometimes it does not	iScan Mini does not have a frame rate converter – so in auto mode, it automatically adjusts the output to match the input, and in DVDO (manual) mode, it will scale to the selected resolution/frame rate if it can, but if it cannot it just passes the input through with no scaling so that the display can scale.

Specifications

300 MHz (4K Ultra HD) HDMI output capable of up to HDMI 2.0 4K/60 @ 4:2:0

S/PDIF optical output

IR Receiver and input port

HDMI/MHL input 300MHz capable of up to 4K/60 passthrough via HDMI or 1080p/60 via MHL. Note that mobile device charging feature requires external 5V 3A DC power supply.

HDMI certification

FCC and CE

USB firmware update using direct PC connection

USB powered (from TV, PC, external adapter) – OR - 5V, 1A USB input

Supports resolutions including: VGA, SVGA, XGA, SXGA, 480i, 480p, 576i, 576p, 720p50, 720p60, 1080i30, 1080i50, 1080i60, 1080p24, 1080p25, 1080p30, 1080p50, 1080p60, 4K24(3840), 4K24(4096), 4K25(3840), 4K30(3840), 4K50(3840) 4:2:0, 4K60(3840) 4:2:0

Operating temperature: 0-40 °C

FCC Interference and Compliance 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.

FCC WARNING

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 different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

To comply with the limits for an FCC Class B computing device, always use the shielded signal cord supplied with this unit.

The Federal Communications Commission warns that changes or modifications of the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE mark for Class B ITE (Following European standard EN55022/1998; EN61000-3-2/1995; EN61000-3-3/1995, EN55024/1998, EN60950-1/2001)

Radio Frequency Interference Statement Warning: This is a Class B product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Warranty and Getting Help

General Warranty Terms

DVDO, Inc., (DVDO), offers a limited warranty for its DVDO products. Any product first sold to you is guaranteed to be free from defects in both components and workmanship under regular uses. The warranty period commences on the date the item ships.

Attention: Your invoice with the date of purchase, model number and serial number of the product is your proof of the date of purchase.

The International Limited Warranty is applicable and shall be honored in every country where DVDO or its Authorized Service Providers offer warranty service subject to the terms and conditions provided in this International Limited Warranty Statement.

DVDO Products Warranty Period

The warranty terms for all DVDO products are: Domestic & Asia 1Year, EU & UK 2 Years

System Warranty

During the warranty period, the defective hardware of DVDO products will be either repaired or replaced, with new or like new products, at the discretion of DVDO except in the cases listed in the Limitation of Liability Clause of this document

This International Limited Warranty covers the costs of service parts and labor required to restore your product to fully functional condition. DVDO will, at its discretion, repair or replace any defective products or parts thereof covered by this International Limited warranty with refurbished parts of the product that are equivalent to new or like new products in both functionality and performance. A product or part that is repaired or replaced under this International Limited Warranty shall be covered for the remainder of the original warranty period applying to the product or part, or for 90-days, whichever expires last. All exchanged parts and products under this International Limited Warranty will become the property of DVDO.

DVDO offers no warranty of any kind for any pre-installed software, its quality, performance, functionality, or compatibility for a particular purpose. Nor does DVDO warrant that the functions contained in the software will meet specific requirements or that the operation of the software will be uninterrupted or error-free. Thus, the software is sold 'as is" unless otherwise explicitly stated in writing.

Obtaining the Warranty Service

Warranty service or Returned Merchandise Authorization (RMA) under this International Limited Warranty will be honored only if claims are made within the warranty period. For notifications to DVDO or products outside the warranty period, the process will be the same, but charges may apply. Contact details may be obtained on DVDO website

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<http://www.dvdo.com/support/rma.aspx>. Customers are requested to perform the following actions before claiming DVDO product as defective:

- (a) Owner must notify DVDO, during the warranty period, in writing of alleged defect, and allow DVDO a reasonable opportunity to inspect the allegedly defective product;
- (b) No Product may be returned without DVDO's consent, The DVDO RMA# must accompany all returns, and all returns must be delivered to DVDO within the warranty period;
- (c) Owner may, then at its own expense, return the allegedly defective Product, freight pre-paid and in the original packaging, accompanied by a brief statement explaining the alleged defect to DVDO;
- (d) If DVDO determines that any returned Product is not defective, or if DVDO determines that the defect is not covered by the warranty, DVDO will return the Product to the Owner at Owner's expense, freight collect, and Owner agrees to pay DVDO's reasonable cost of handling and testing;
- (e) Upon determining that a returned product is defective, to receive warranty service Owner will need to present the invoice showing the original purchase transaction. If shipping the product, Owner will need to package it carefully and send it, transportation prepaid by a traceable, insured method, to the DVDO Service Center. Package the product using adequate padding material to prevent damage in transit. The original container is ideal for this purpose. Include the RMA#, your name, return shipping address, email address and telephone number where you may be reached during business hours, inside the shipping package with the unit. Any replacement unit will be warranted under these Terms and Conditions for the remainder of the original warranty period or ninety (90) days whichever is longer.

Refer to user manual enclosed within the product package and/or information on <http://www.dvdo.com/support/documentation.aspx> for important tips on how to operate and troubleshoot the product.

International Warranty

Warranty may be valid when a DVDO product is purchased in one country and transferred to another country, without voiding the warranty. Please be advised that service availability and response time may vary from country to country. Warranty is transferrable within the warranty period.

DVDO is not responsible for any export and import control issues, handling fees, tariffs, import duties, and all other related fees where owner is responsible for shipping its products. This International Limited warranty does not affect your statutory rights.

Limitation of Liability

DVDO reserves the right to refuse warranty service of products under disputable conditions. DVDO also holds the rights to declare final decision whether products are within warranty conditions. The following actions and damages will result in voiding the limited warranty:

- Damage caused by act of nature, such as fire, flood, wind, earthquake, lightning, etc.

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- Damage or incompatibility caused by failure to perform a proper installation or to provide an appropriate operational environment for the product, including but not limited to unstable wired/ wireless network connection and phone lines, bad grounding, external electro-magnetic fields, direct sunlight, high humidity and vibration.
- Damage caused by impact with other objects, dropping, falls, spilled liquids, or submersion in liquids.
- Damage caused by unauthorized repair or disassembling of the product.
- Damage caused by any other abuse, misuse, mishandling, or misapplication.
- Damage caused by third party peripherals (including but not limited to visible damages on motherboard or other electronic parts of the product such as burn spots after electric discharge, melting, fusing, splitting, etc.)
- Any unauthorized software or modification of built-in software not approved by DVDO.
- The serial number of the product (or serial number stickers of its parts) has been modified, removed, blurred or damaged.
- Defects caused by transportation, handling or customer abuse.

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This Limited Warranty gives you specific legal rights. You may also have other rights that may vary from state to state or from country to country. You are advised to consult applicable state or country laws for full determination of your rights. Some

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jurisdictions do not allow the exclusion or limitation of special, incidental or consequential damages, or limitations on how long a warranty lasts, so the above exclusion and limitations may not apply to everyone

Getting Help

For service and support, contact your local dealer.

To find your dealer or to contact DVDO support, go to:

www.dvdo.com/support

or call

1-888-651-1765 for worldwide technical support

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