HTPC 4K

Versie: 8 Oktober 2022

Table of Contents

1. Inleiding en uitgangspunten

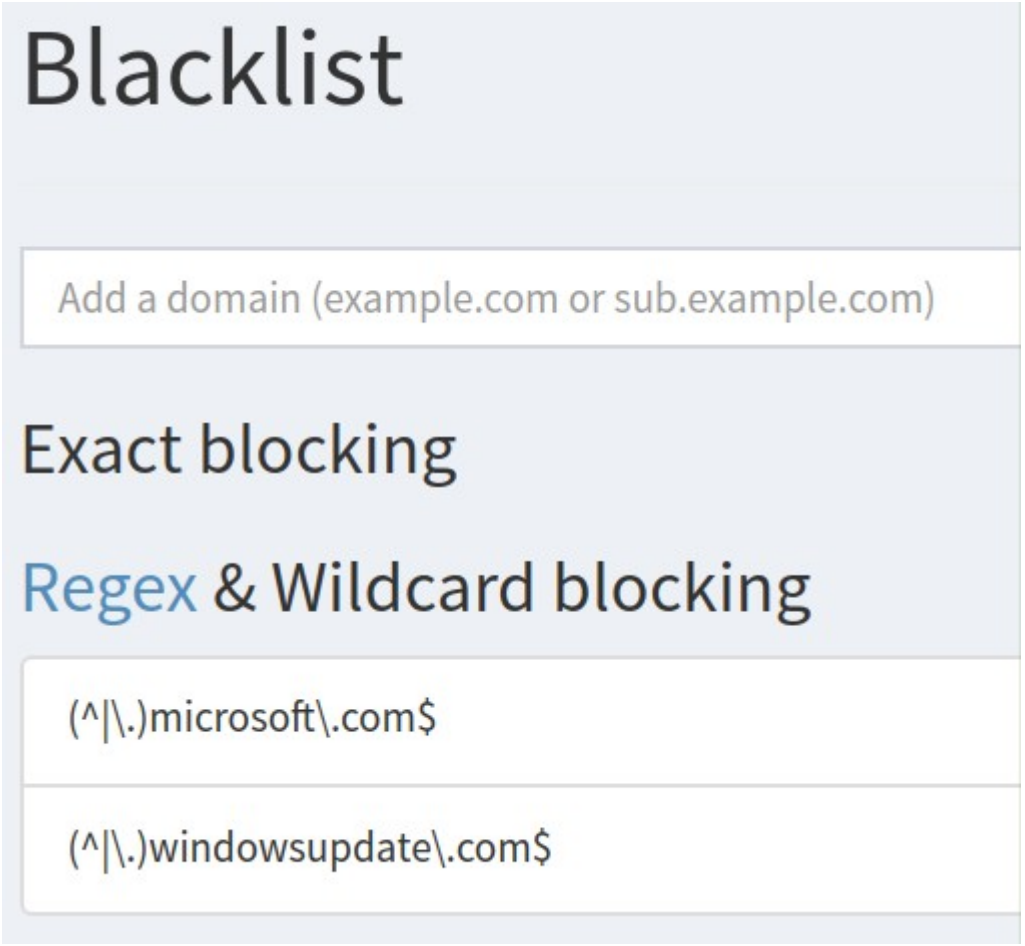
- Dit document beschrijft de configuratie van mijn HTPC
- De voornaamste doelstelling is om zowel Full HD (1080P) als UHD (4K al dan niet i.c.m. HDR) content in hoge kwaliteit te kunnen afspelen. Tevens dient HD Ready (720p) en SD content ook nog afgespeeld te kunnen worden.
- Ik gebruik op dit moment een Nvidia Geforce RTX2070 als videokaart, alle GPU gerelateerde settings en MadVR keuzes in deze guide zijn gebaseerd op dit type videokaart.
- Mijn display is een JVC X5000 projector met 4K e-shift technologie.
- Alle niet 4K content wordt geupscaled naar 4K (2160p).
- Alle HDR content (REC 2020) wordt middels tonemapping omgezet naar SDR content (REC2020) aangezien HDR op een projector met 100-150 nits per definitie niet tot een bevredigend resultaat kan leiden (zie ook het HDR hoofdstuk).

2. Benodigde software

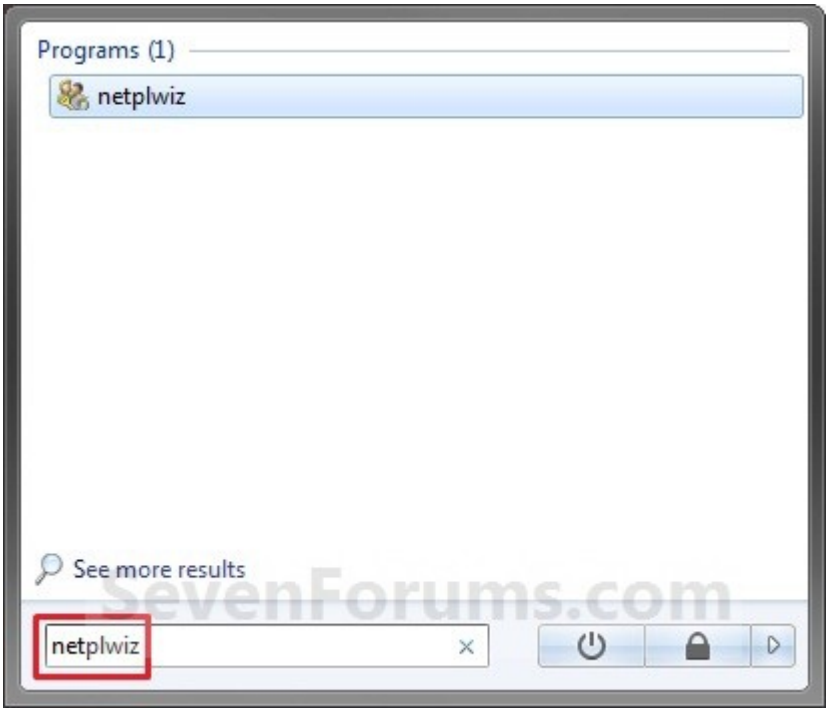
- Windows 10 Pro english/international 64bit build 1903 May 2019 (oudere versies ondersteunen mijn RTX2070 videokaart niet! Deze versie bevat nvidia driver versie 419.67, met deze versie had ik lipsync issues en daarom draai ik nu met een handmatige geinstalleerd nvidia driver studio versie 461.72.
- Kodi DSPLAYER 17.7 BetterGUI build007
    - http://nakunana24519x.bplaced.net/_tmp/k-dsp64_01/KodiSetup-17.7-BETTERGUI007-DSPlayer-x64.zip
- External LAV Filters 0.74.1
- http://nakunana24519x.bplaced.net/_tmp/k-dsp64_01/DirectShowFilters_x64-004.zip
- MadVR 0.92.17 met daaroverheen gekopieerd de dynamic tone mapping beta (madVRhdrMeasure86.zip) build 145
    - http://www.madvr.com/
    - http://madshi.net/madVRhdrMeasure145.zip (voor de beta versie)
    - Merk op dat indien een te lage LAV filter versie gebruik wordt, dit kan resulteren in een incorrect (washed out) beeld qua kleuren i.c.m. de nieuwere madvr beta's.
    - Merk op dat beta versie 113 de laatste beta versie was zonder tijdslimiet. Je kunt er dus voor kiezen om versie 113 te draaien, het loont echter de moeite (kwalitatief hogere HDR naar SDR tonemapping) om voor versie 145 te kiezen. Echter in dat geval dien je de klok van de pc terug te zetten zodat de expiration datum voorlopig niet bereikt wordt. Let op: disable in dit geval eerst de "windows time service" om te voorkomen dat windows 10 alsnog de tijd weer update naar de huidige tijd.
- Asus GPU Tweak II (alleen benodigd voor het tweaken van Asus videokaarten)
    - https://www.asus.com/us/site/graphics-cards/gpu-tweak-ii/

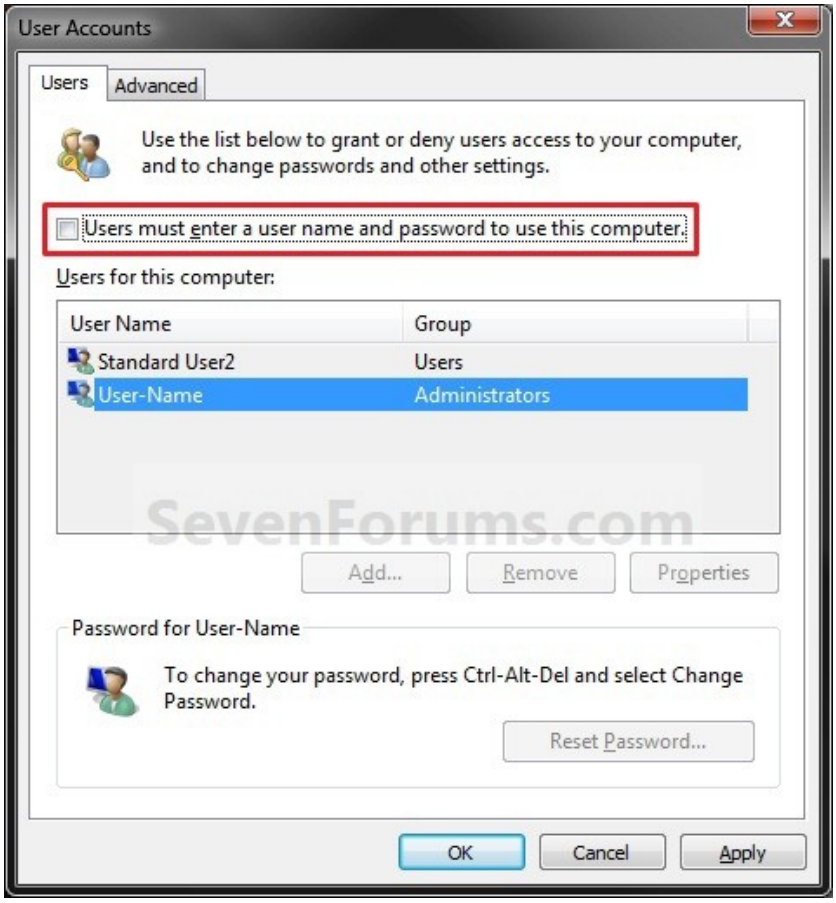
3. Installatie/configuratie Windows 10

- Gebruik de gratis tool rufus http://rufus.akeo.ie/ om een correct werkende bootable USB stick van de windows ISO te maken.
- Indien alleen een windows upgrade (en geen versie installatie) gewenst is kan vanuit de bestaande windows 10 versie de setup.exe van de USB stick gestart worden.
- Installeer Windows 10 Pro (60.000 MB partitie)
- Installeer nvidia video studio driver versie 456.71
- Gebruik gpedit om windows updates te disablen:
    - Open the Run command (Win + R), in it type: gpedit.msc and press enter
    - Navigate to: Computer Configuration -> Administrative Templates -> Windows Components -> Windows Update
    - Open this and change the Configure Automatic Updates setting to '2 - Notify for download and notify for install'
    - In de recentere versie van Windows 10 werkt dit niet meer, de updates worden toch geforceerd door Micoroft. Om dit te voorkomen heb ik een raspberry pi met pi hole geinstalleerd met de volgende blacklist:

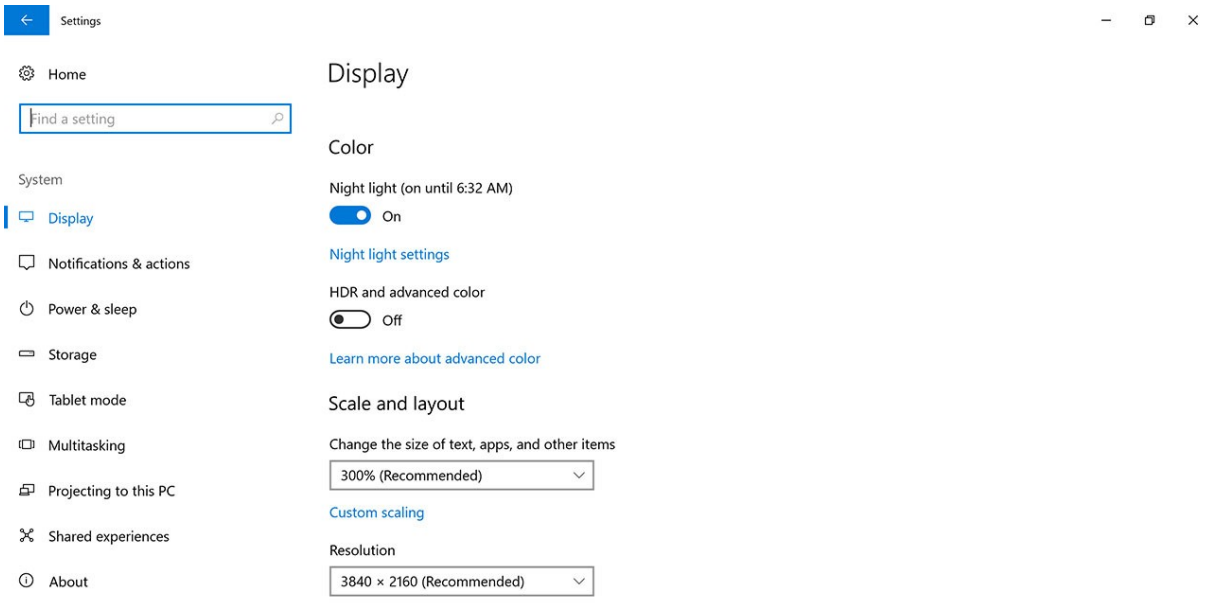


- Disable de Windows Update Service voor de zekerheid ook in de windows services
- Turn off firewall
- Turn off messages in Action Center
- User Account Control → Never Notify
- Show all icons in taskbar
- Zet in control panel sounds options de windows geluiden op none
- Configureer TCP/IP settings (192.168.1.39)
- Folder Options → show hidden files
- Maak een gebruiker ronald aan
- Zorg dat deze gebruiker automatisch inlogged
    - o netplwiz


Programs (1)
netplwiz
See more results
netplwiz

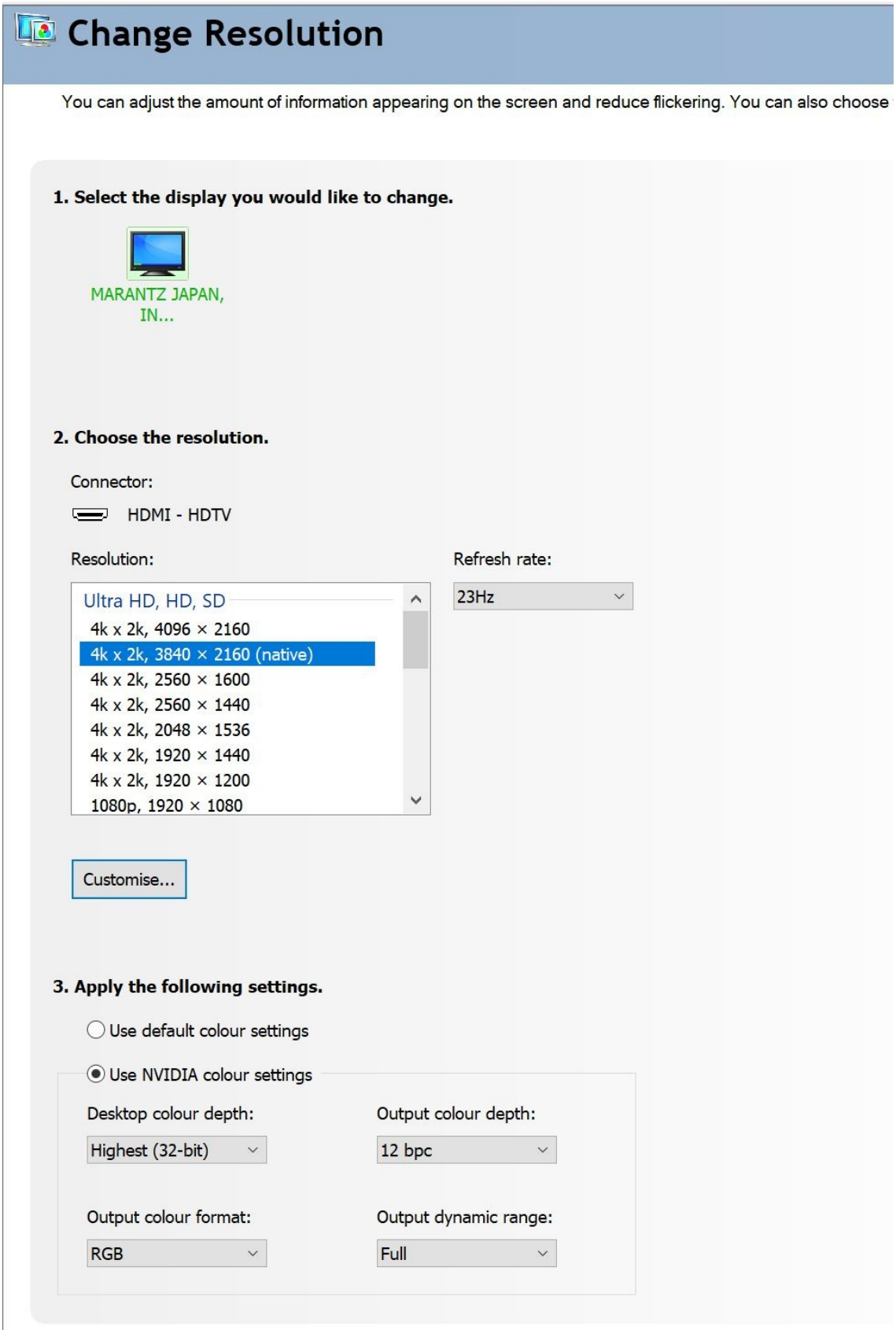
o 
User Accounts
Users
Advanced
Use the list below to grant or deny users access to your computer, and to change passwords and other settings.
Users must enter a user name and password to use this computer.
Users for this computer:
User Name
Group
Standard User2
Users
User-Name
Administrators
Add...
Remove
Properties
Password for User-Name
To change your password, press Ctrl-Alt-Del and select Change Password.
Reset Password...
OK
Cancel
Apply

    - Wijzig het power schema zodat de pc en het scherm niet vanzelf in slaap modus gaan
- Installeer winscp (voor filetransfer)
- Installeer irfanview (voor screenshots)
- Installeer Open Hardware Monitor (voor monitoring)
- Installeer Madvr en geef de Users groep Full Control rechten op de MadVR folder zodat MadVR zijn settings.bin file kan bijwerken. (read only leidt tot het crashen van MadVR).
- Installeer Kodi
    - Disable PVR addons
    - Disable Music Visualization addons
- Voeg Kodi toe aan het startmenu (C:/Program Data/Microsoft/Windows/Menu Start/Programs/Startup)
- Zet HDR uit in de windows display settings
-



4. Configuratie Nvidia Control Panel

- Maak een custom resolutie 3840x1920@23.976Hz@8bit met Output Dynamic Range op “Full” aan en gebruik deze als default resolutie. Madvr kiest dan tijdens het afspelen van een film de juiste resolutie om de content af te spelen.
- Disable Stereoscopic 3D
- Gebruik GEEN NVIDIA beeldverbeteringen, dit geeft een digitale look en doet de voordelen van MadVR deels teniet.

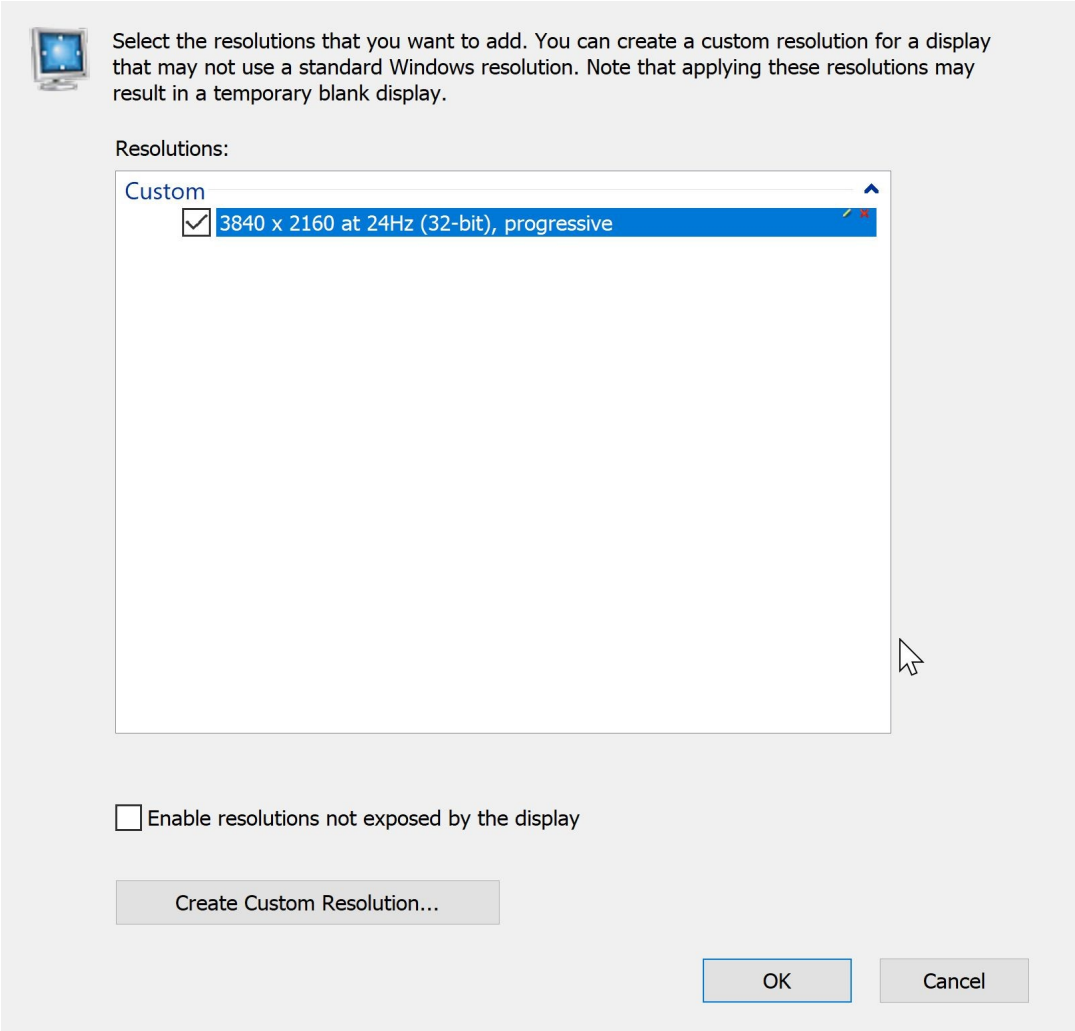

Change Resolution
You can adjust the amount of information appearing on the screen and reduce flickering. You can also choose
1. Select the display you would like to change.
MARANTZ JAPAN, IN...
2. Choose the resolution.
Connector:
HDMI - HDTV
Resolution:
Refresh rate:
Ultra HD, HD, SD
4k x 2k, 4096 × 2160
4k x 2k, 3840 × 2160 (native)
4k x 2k, 2560 × 1600
4k x 2k, 2560 × 1440
4k x 2k, 2048 × 1536
4k x 2k, 1920 × 1440
4k x 2k, 1920 × 1200
1080p, 1920 × 1080
23Hz
Customise...
3. Apply the following settings.
Use default colour settings
Use NVIDIA colour settings
Desktop colour depth:
Highest (32-bit)
Output colour depth:
12 bpc
Output colour format:
RGB
Output dynamic range:
Full
Description:

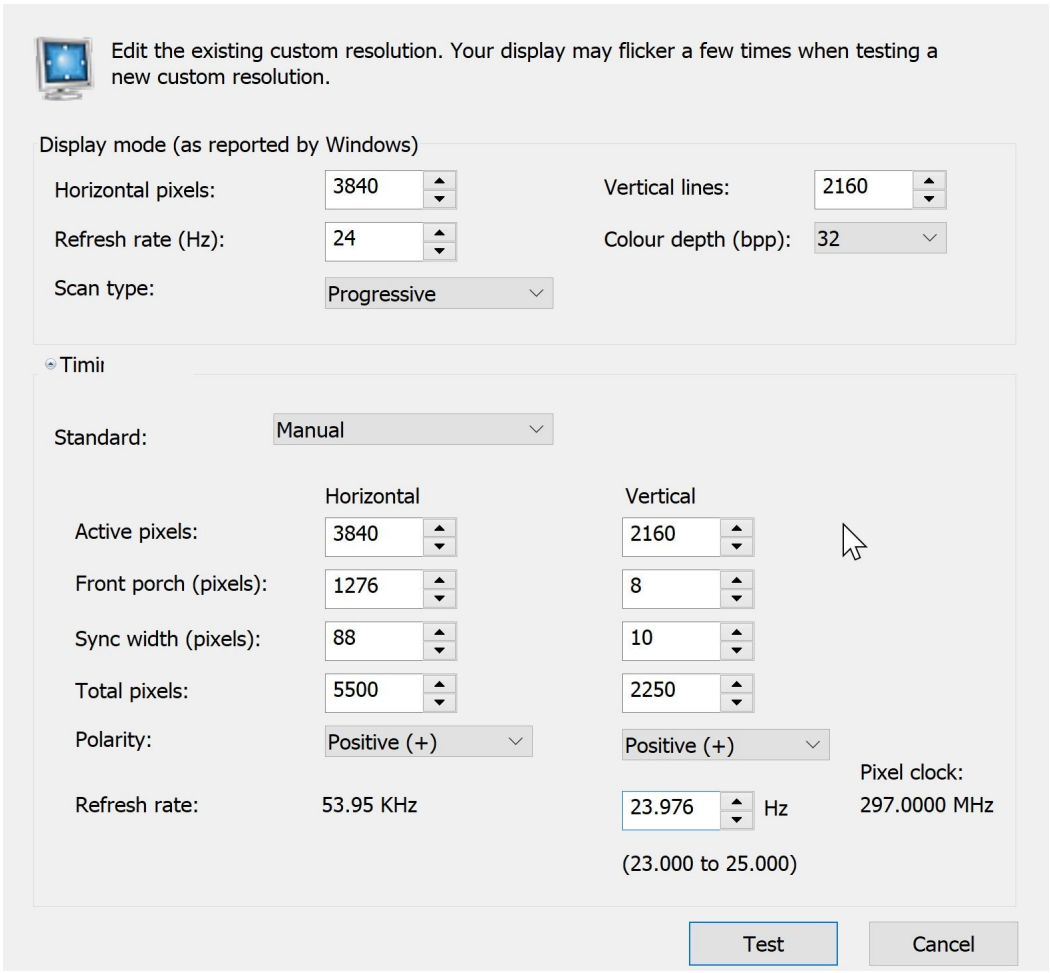
The bit depth does not influence "colorfulness" and is instead a measure of how well colors blend together to prevent color banding. Higher bit depths are useful for lossy image processing such as mastering and compression. Presenting an image with at least 8-bits (16 million colors steps plus dithering) involves incredibly small blending that is difficult for human eyes to detect when content is graded correctly. Human beings can see an estimated 10 million colors shades across the visible spectrum. Having a new standard with one billion available color shades sounds great, but it isn't a change likely to make a visible difference. If banding isn't present, our simple human vision cones will perceive the additional steps as being the same continuous colors.

10-bit output requires the following is checked in *general settings*:

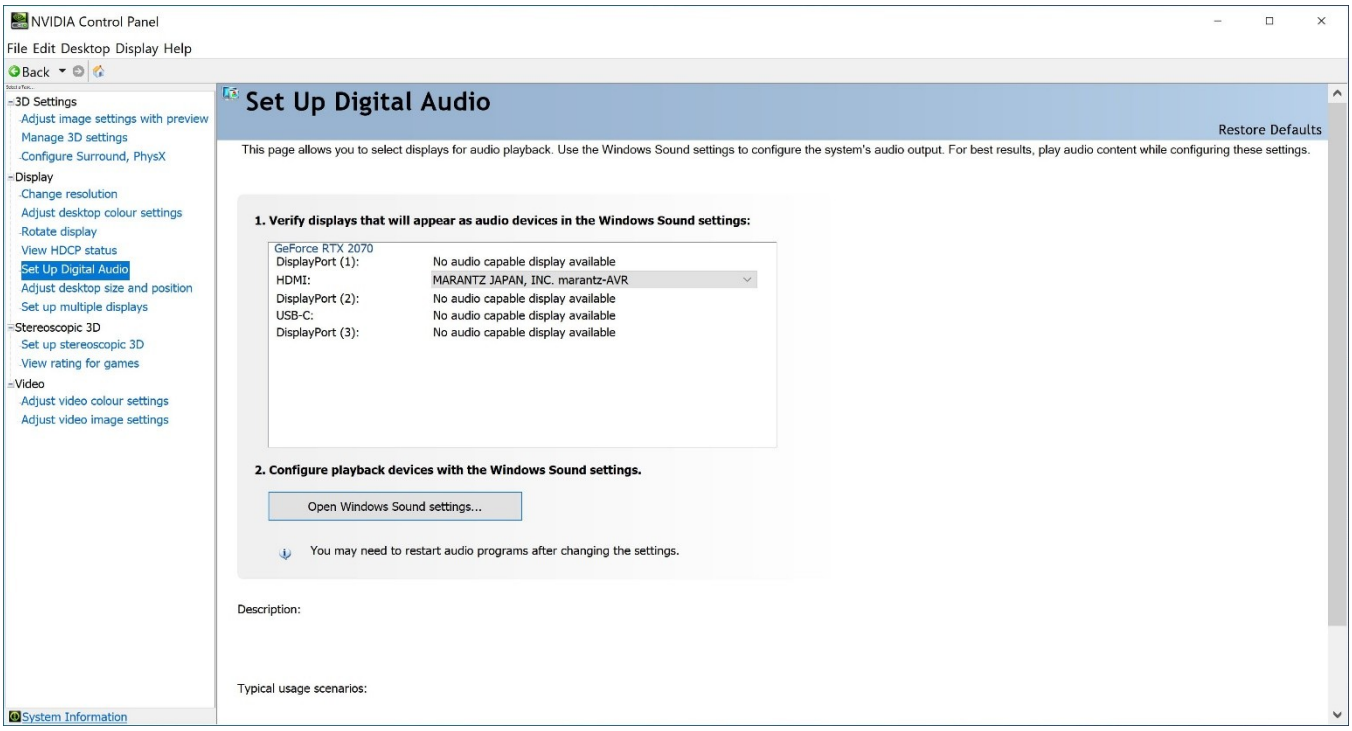
- **use Direct3D 11 for presentation (Windows 7 and newer)**

Merk op dat dus voor BT2020 colorspace 10 of 12 bit geen noodzaak is, 8 bit is dus ook mogelijk en kan een verstandige keuze zijn om problemen met HDMI overdracht te voorkomen bij hogere frame rates (60 Hz!). Zelf heb ik echter wel voor 12 bit gekozen zodat ik gebruik kan maken van de optie “report BT.2020 to display” in MadVR, deze optie werkt namelijk niet goed (resulteert in paars beeld) in 8 bit.

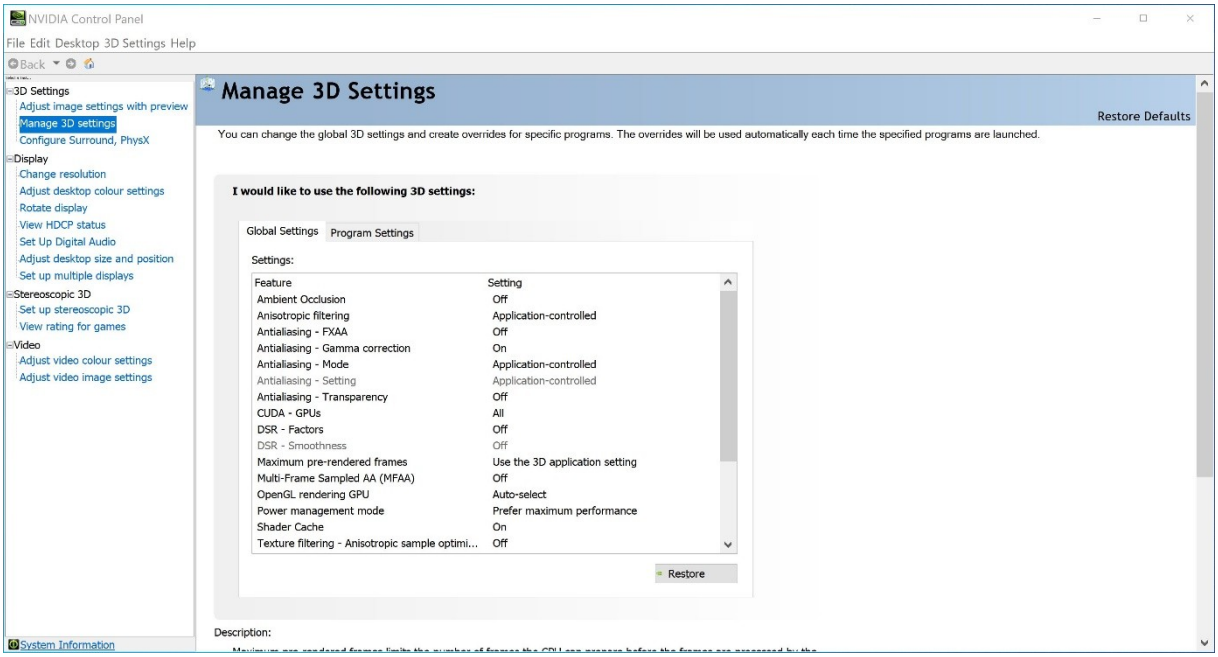



Edit the existing custom resolution. Your display may flicker a few times when testing a new custom resolution.
Display mode (as reported by Windows)
Horizontal pixels:
3840
Vertical lines:
2160
Refresh rate (Hz):
24
Colour depth (bpp):
32
Scan type:
Progressive
Timi
Standard:
Manual
Horizontal
Vertical
Active pixels:
3840
2160
Front porch (pixels):
1276
8
Sync width (pixels):
88
10
Total pixels:
5500
2250
Polarity:
Positive (+)
Positive (+)
Pixel clock:
Refresh rate:
53.95 KHz
23.976
Hz
297.0000 MHz
(23.000 to 25.000)
Test
Cancel

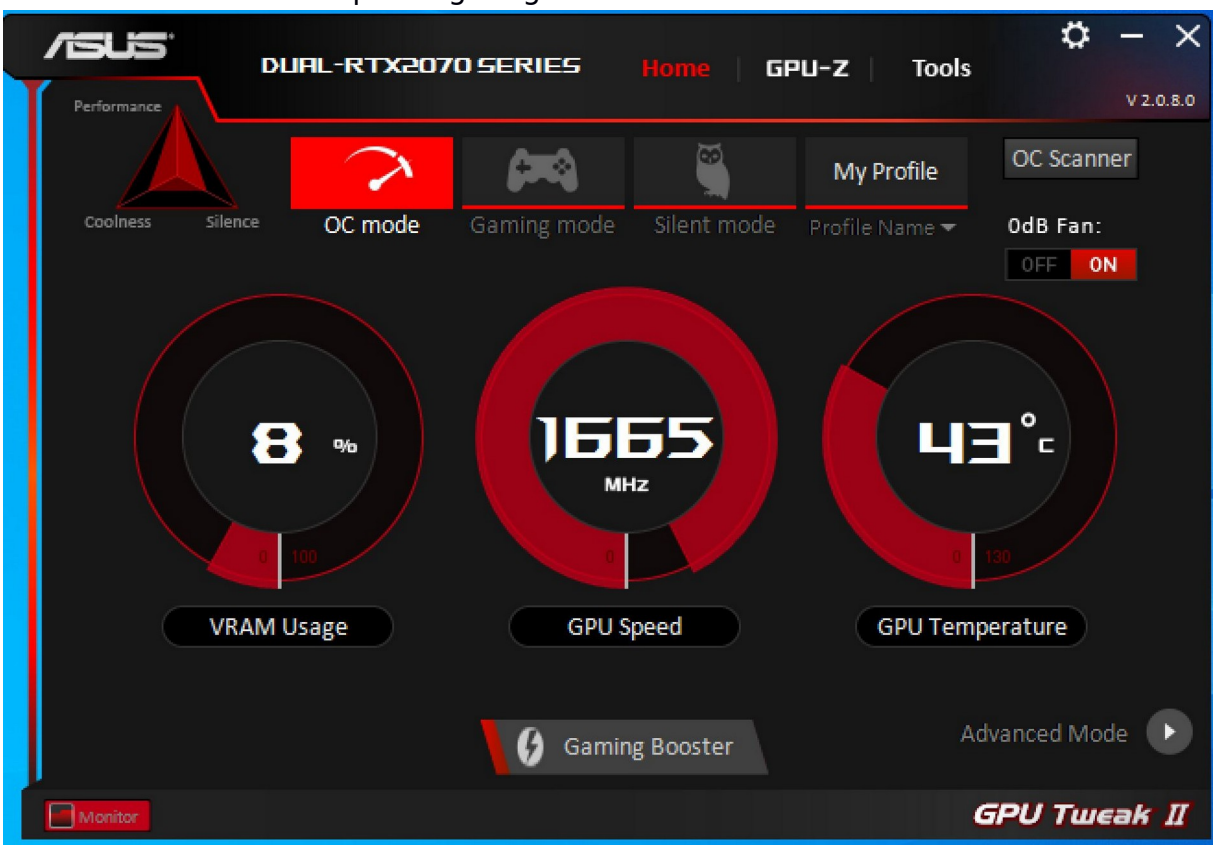
- Configureer sound settings (Surround Processor)

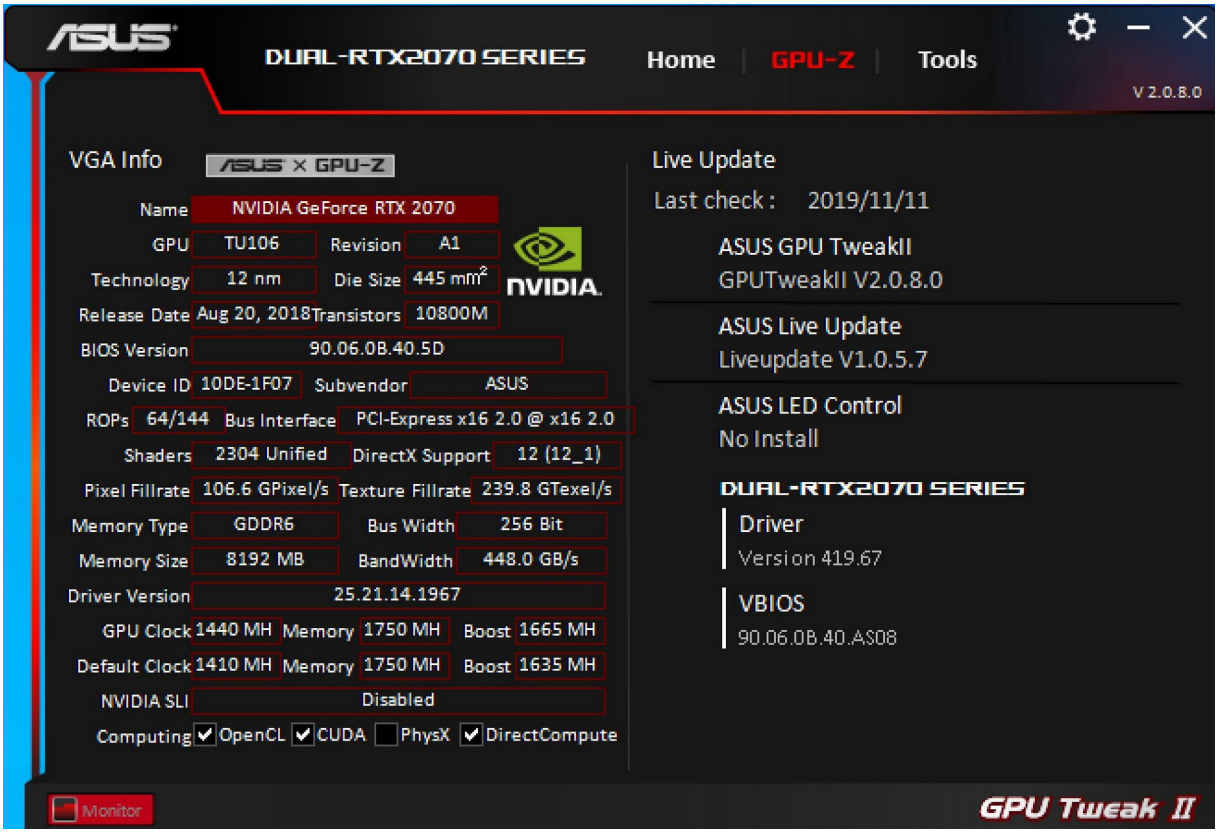


- Zet bij de 3D settings de Power Management Mode op “Prefer Maximum Performance”.

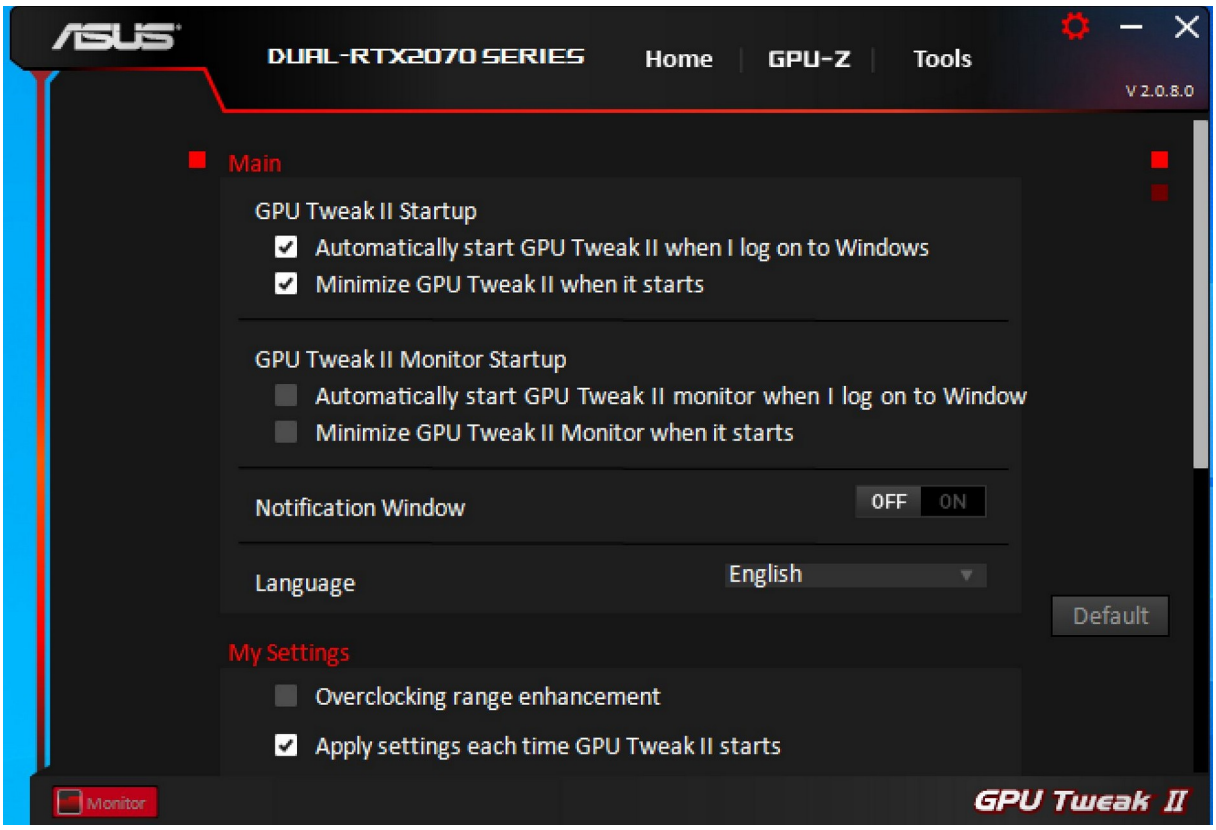


- Installeer Asus GPU Tweak II en wijzig Gaming Mode (de default) naar OC mode voor meer performance. De kaart blijft hierbij stabiel en wordt ook niet warmer dan pakweg 57 graden.





- Zie screenshot hieronder om de juiste instellingen te kiezen voor het automatisch opstarten van GPU Tweak II zonder dat deze op de voorgrond komt.



5. Software Omschrijving

5.1 Kodi DSPLAYER

DSPlayer is a DirectShow-based media player for Kodi Entertainment Center. DSPlayer development is handled through its own branch, which is kept in sync with changes to the official Kodi codebase.

The player is designed to work with or replace the default Kodi media player, DVDPlayer, while offering full integration with the existing Kodi interface. This means all media databases and player controls will function in the same manner as a standard Kodi installation.

DSPlayer is installed on Windows operating systems through custom installation packages, which are made available in conjunction with official releases of Kodi.

5.2 Sanear

The main benefit of Sanear (onderdeel van Kodi) is eliminating the frame drops that occur due to the framerate of the video (display) clock not perfectly matching the audio clock. This typically happens with 24Hz material that is actually rendered at 23.976 fps. A number of factors including the specific A/V equipment and GPU used can lead to reported framerates that differ by decimal places from the actual rate of consumption by the display. A reported 23.972 fps from the video clock, for example, can lead to one dropped frame per minute. These frame drops are clock corrections called clock jitter.

Sanear syncs the clocks by resampling the audio. The audio stream is unpacked as multichannel PCM and slowed down or sped up by inaudible amounts to match the required composition rate. With Sanear in place, dropped frames should be eliminated or reduced to one per hour at most.

5.3 MadVR

madVR is a high quality video renderer (GPU assisted). features:

- high quality chroma upsampling
- high quality scaling (bicubic, mitchell, lanczos, spline etc)
- high quality YCbCr -> RGB conversion
- gamut & gamma correction for display calibration
- full 16bit processing queue
- final 16bit processing result is dithered down to RGB output bitdepth
- bypasses graphics card's video (damage) algorithms
- all work is done via GPU shaders
- no shortcuts, highest quality has priority over anything else.
- Both 32bit and 64 bit version included.

The quality of madVR with LAV Filters is capable of besting even high-end Blu-ray or UHD players with a capable graphics card and some knowledge of correct set-up.

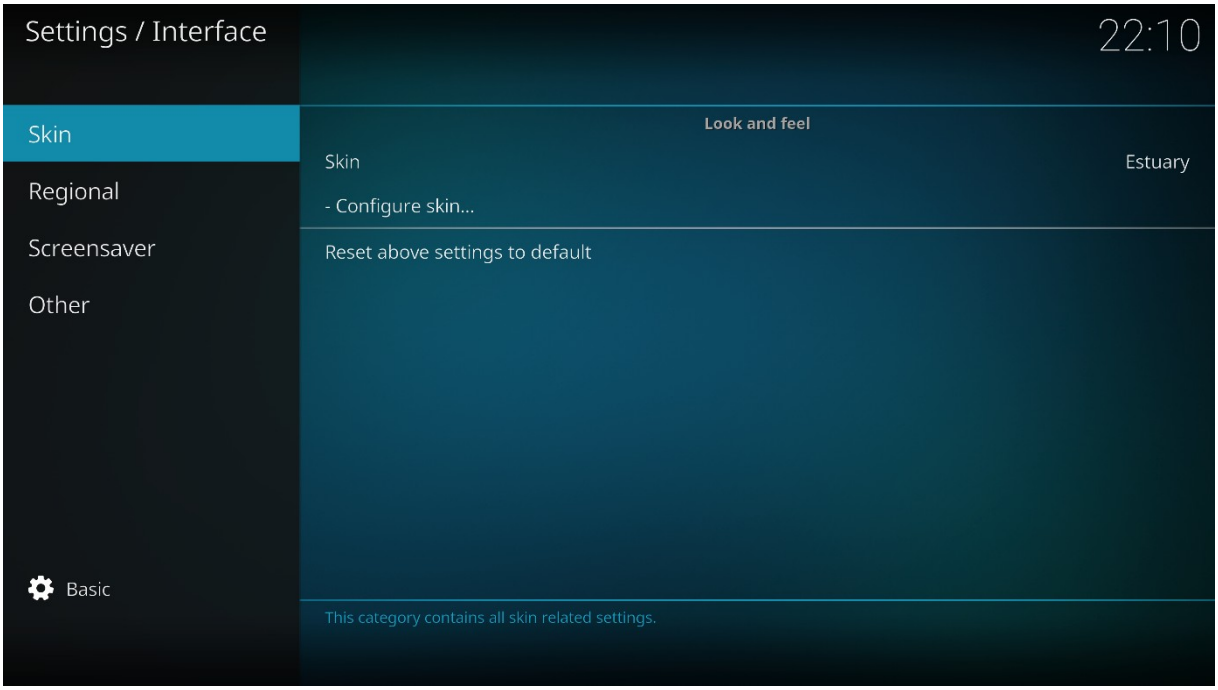
It should offer an immediate advantage over DVDPlayer, where output is done at 8-bits without dithering. madVR offers full 16-bit processing dithered to 10-bits or less.

madVR also comes packaged with advanced scaling algorithms such as Jinc, super-xbr and NNEDI3, which possess less ringing and lower levels of aliasing than traditional resizers.

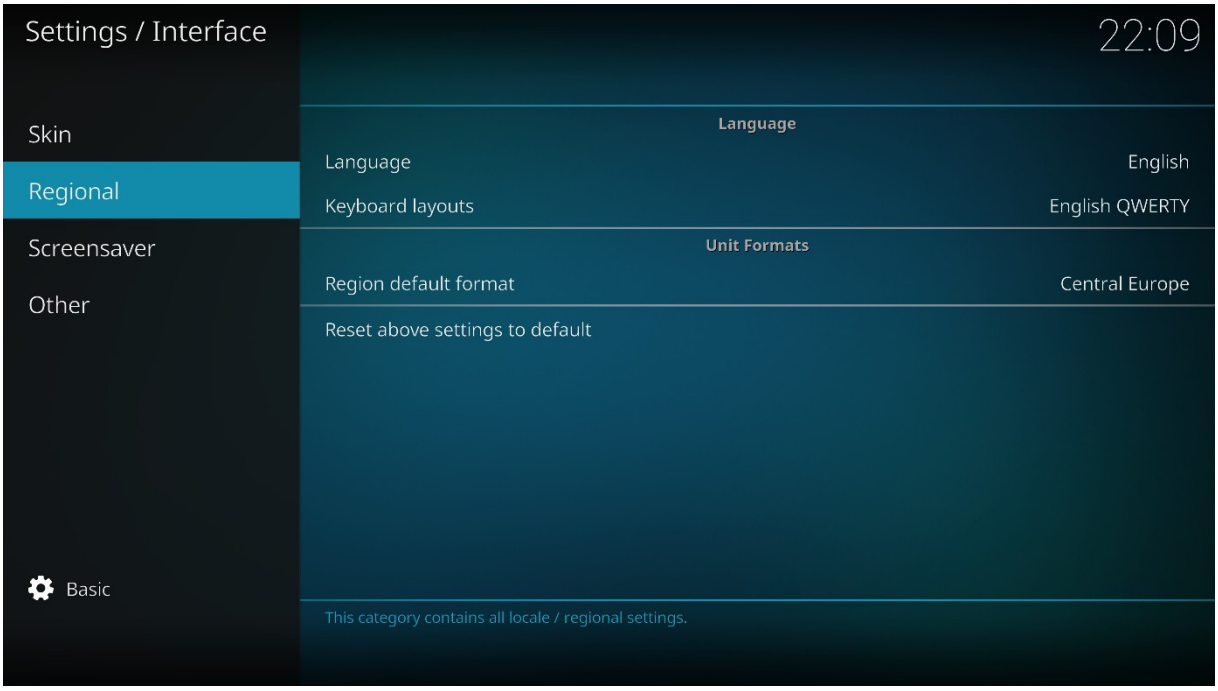
Its dithered output will produce a more precise image with fewer rounding errors and less overall noise, while its upscaling is capable of rendering a cleaner, sharper image. This should even be apparent with content displayed at its native resolution.

6. Kodi Settings

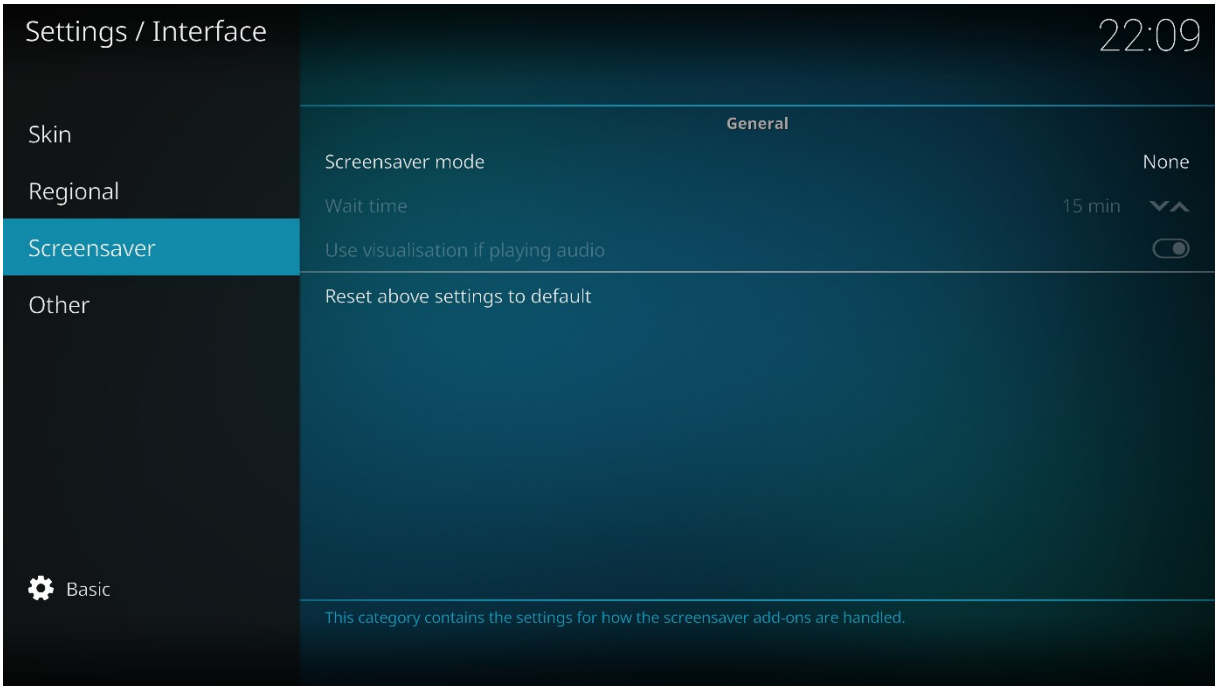
6.1 Kodi Interface Settings



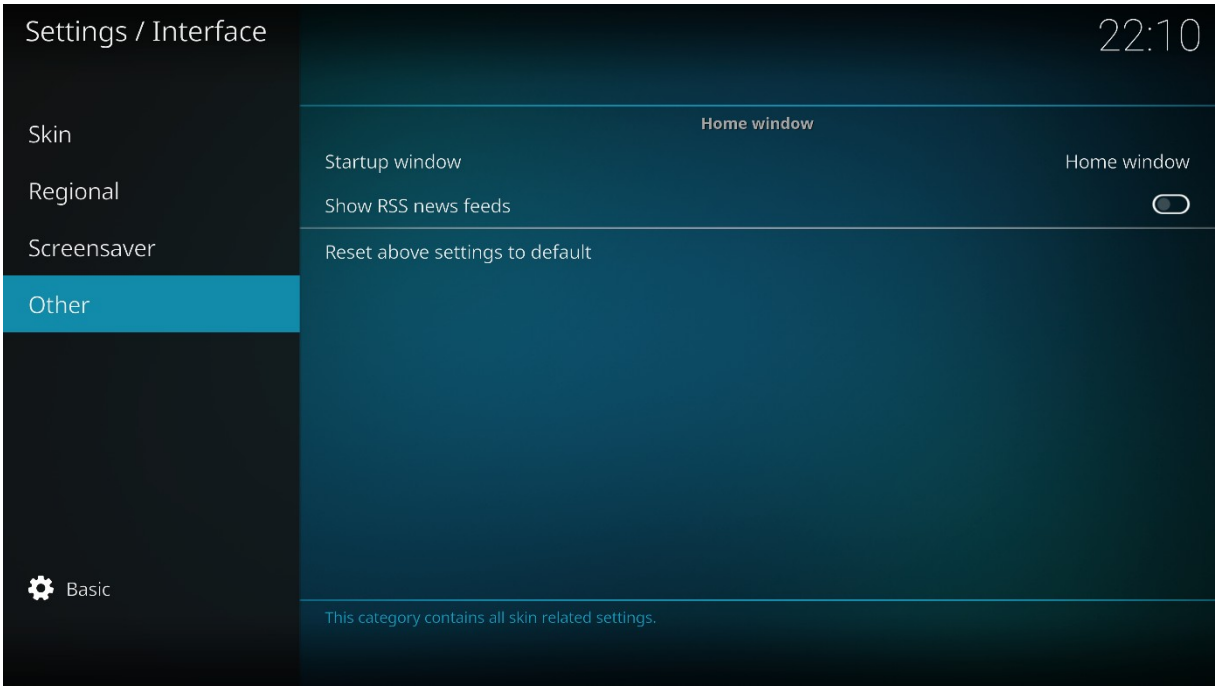
- Op dit moment gebruik ik de default skin van kodi 17.
- Disable de irritante GUI sounds.



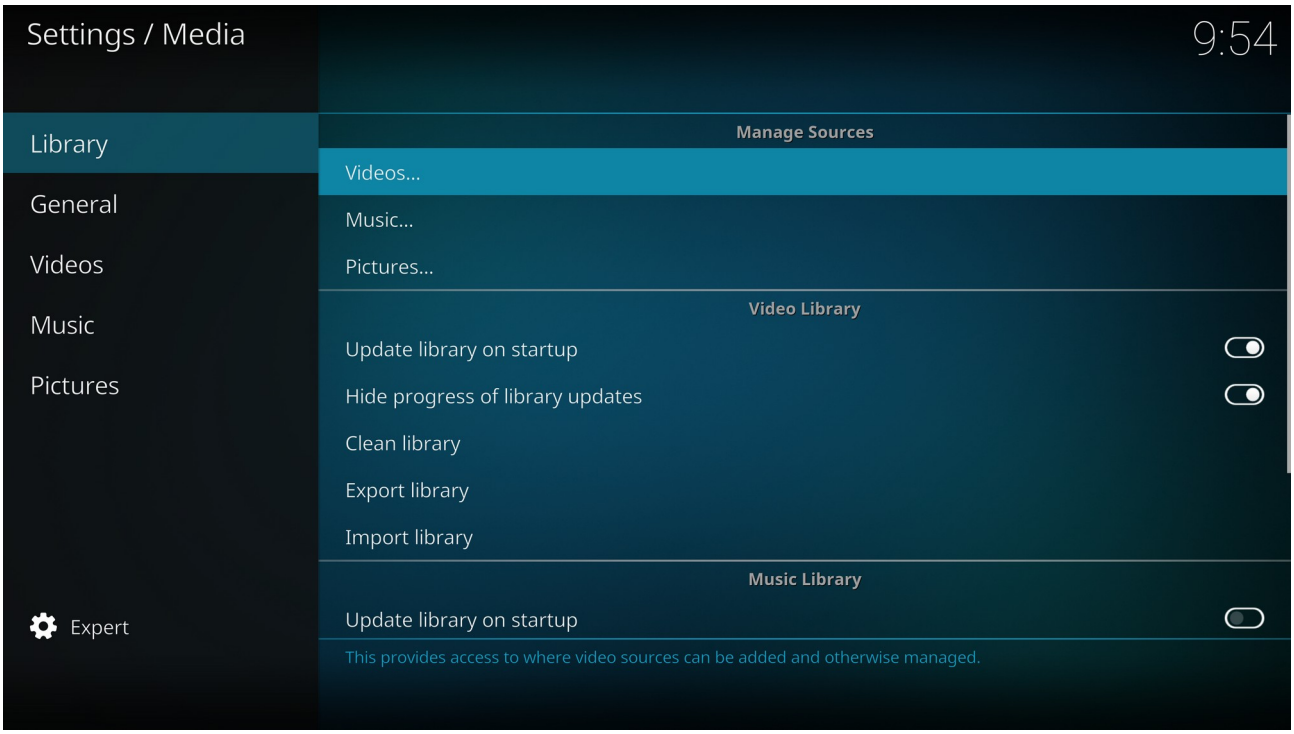
- Zet de region op Central Europe.



- Zet screensaver mode op None.

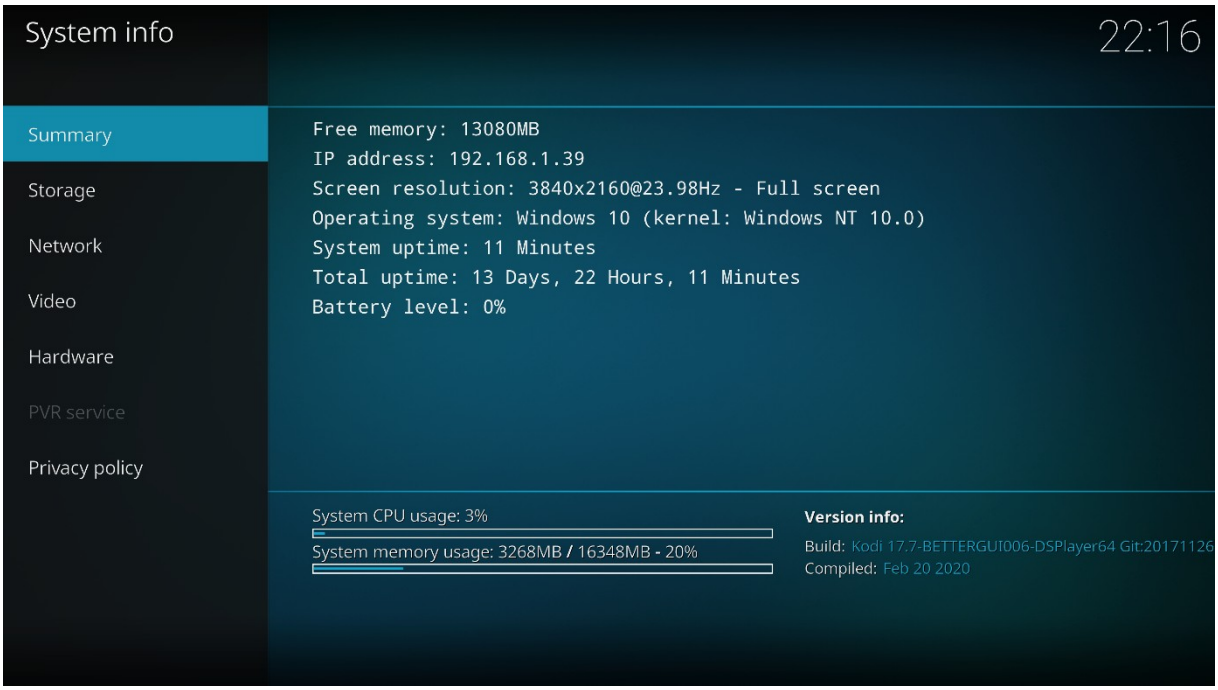


6.2 Kodi Media Settings



- Laat de library automatisch updaten bij het starten van Kodi
- Verberg de library update progress status

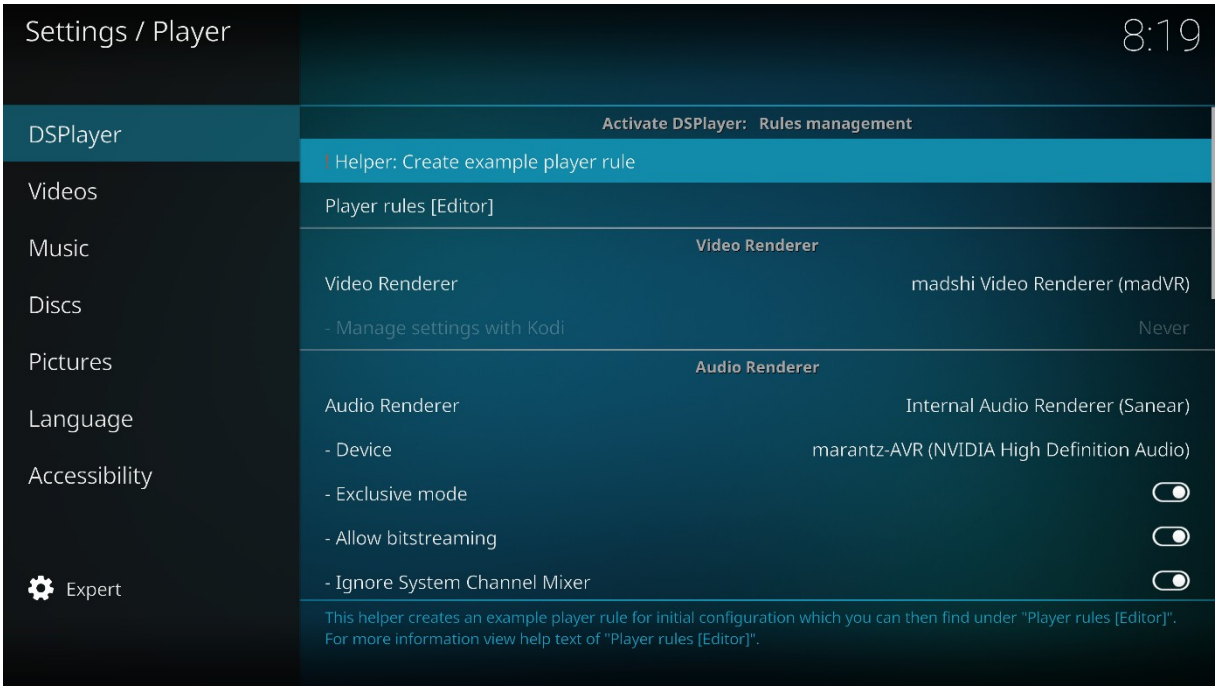
6.3 Kodi DSplayer 17.7 BetterGUI Settings



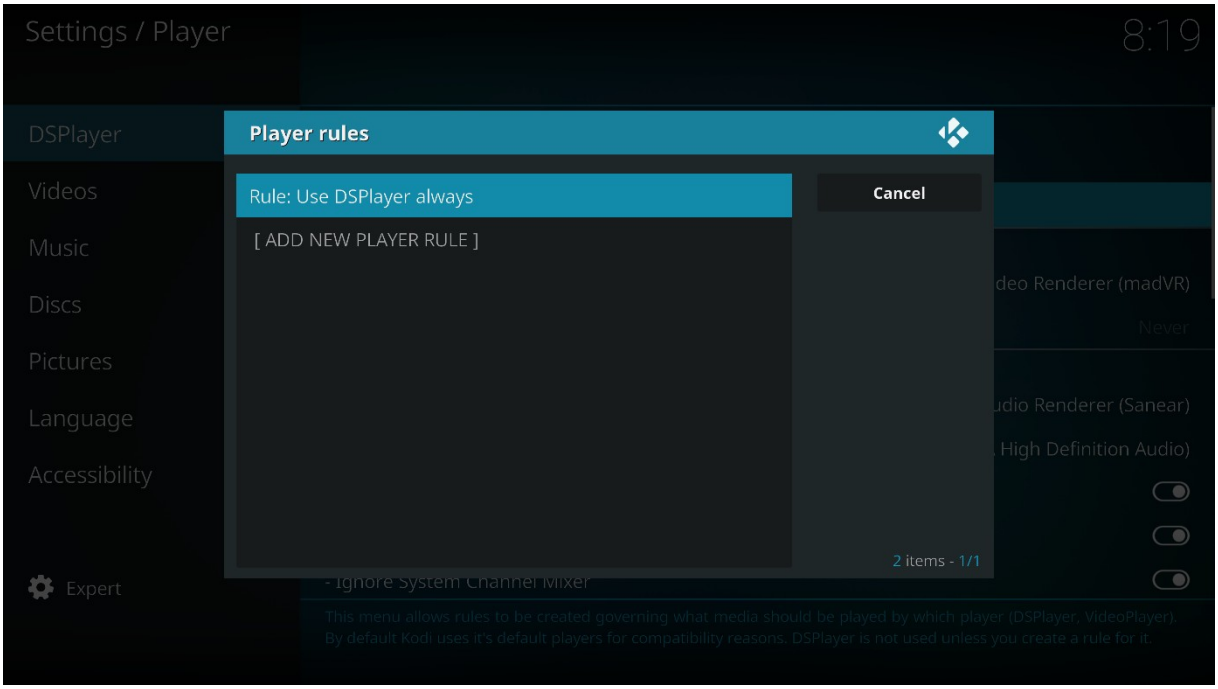
- ! New/reworked features (Please read carefully!):
  ***Settings -> Player -> DSPlayer -> Activate DSPlayer: Rules management* -> ! Helper: Create example player rule**
  ***Settings -> Player -> DSPlayer -> Activate DSPlayer: Rules management* -> Player Rules [Editor]**

  This replaces the old "VideoPlayer merits" feature which sadly was buggy and not an ideal approach in itself.
  Kodi DSPlayer now defaults to the default players (VideoPlayer, PAPlayer) like Original Kodi would to avoid all the compatbility issues with Live-TV and media which is not suited for DSPlayer.
  To enable DSPlayer, you can now easily add a simple rule via the self explanatory player rules editor.
  You can use **"! Helper: Create example player rule"** to create an example player rule which is a good starting point (read help texts)

  Side notes: Using Original Kodi defaults and only selectively creating a simple rule for all your DSPlayer-enabling-needs should be the better way to go and lead to avoiding many incompatibility issues right from the start.
  The new approach most likely will be less confusing than the old default "Just use DSPlayer for EVERYTHING" approach which resulted in many people wondering why LiveTV and other stuff did not work correctly anymore.

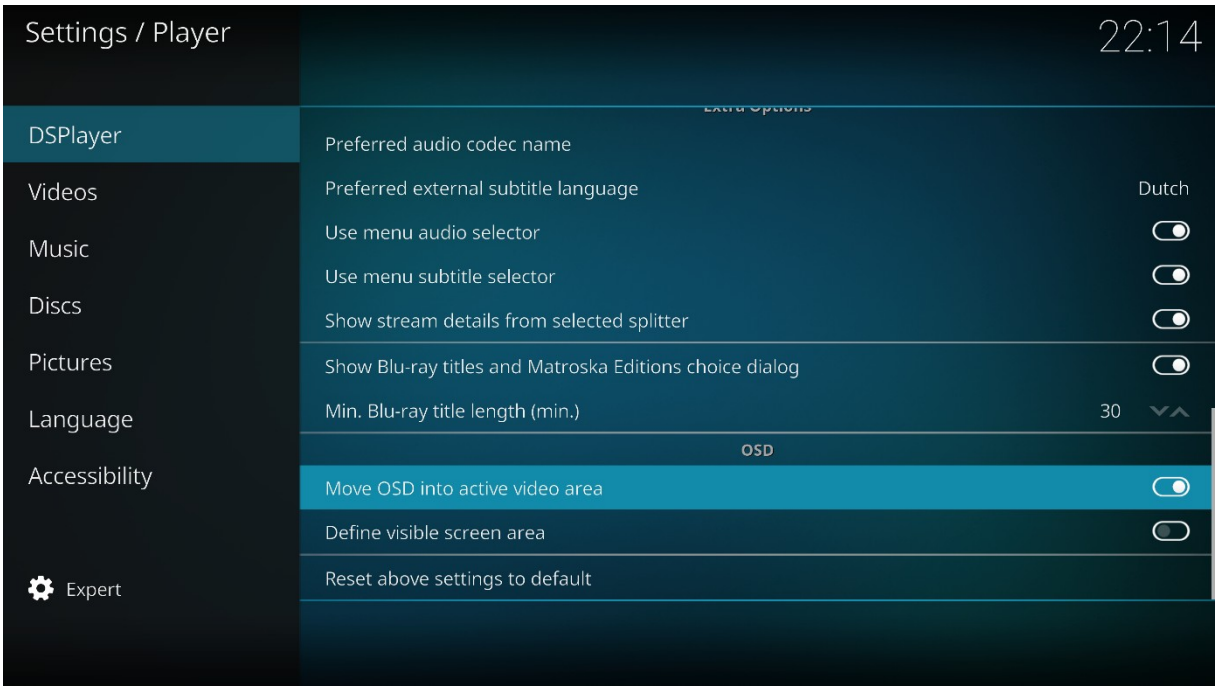


- Gebruik madVR als video renderer
- Gebruik Sanear als audio renderer, deze geeft minder clock deviation (en dus minder vaak frame drops) dan reclock
- Kies bij Audio Renderer Device je surround processor/receiver
- Gebruik Kodi in exclusive mode

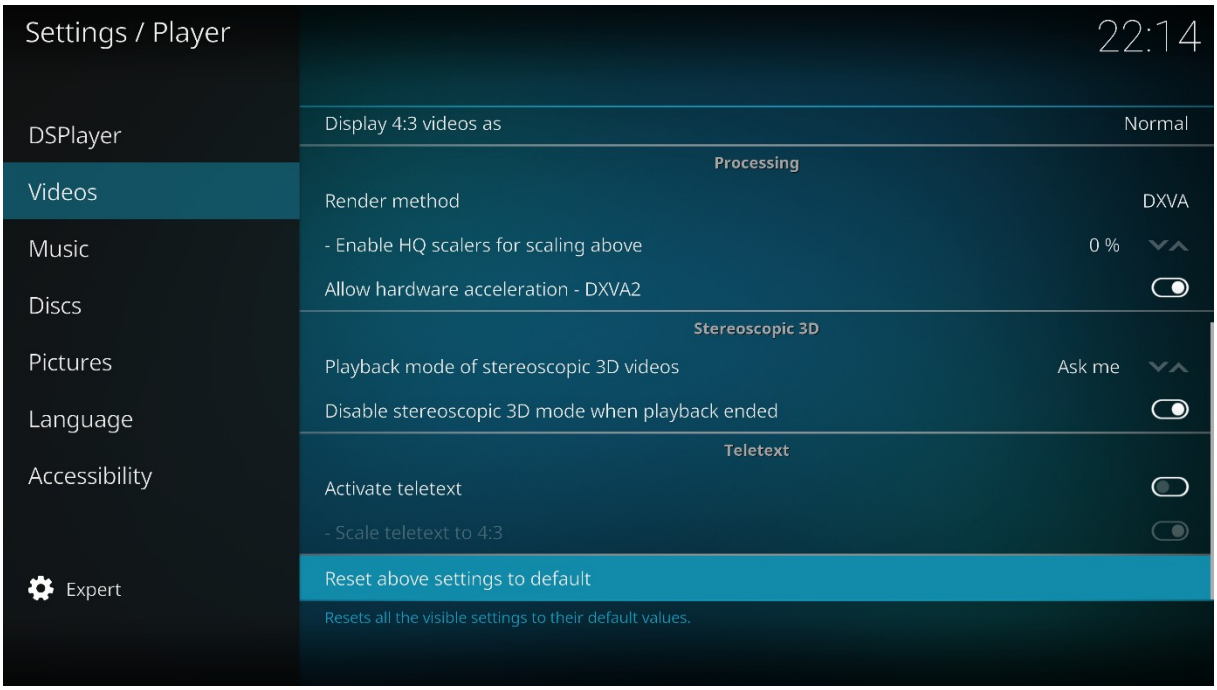


- Vul een wildcard “.” In voor file types om er zeker van te zijn dat dsplayer voor alle af te spelen formaten gebruikt wordt. De maker van DSplayer 17.7 ontmoedigd dit omwille van compatibiliteits issues met bijv. live TV streaming, maar aangezien ik mijn HTPC alleen gebruik om films af te spelen kies ik ervoor om DSplayer toch weer als default player te configureren.
- DSPlayer uses the madshi Video Renderer. madVR must be installed manually before playback. Configuration is possible during playback by choosing the madVR tray icon from the Windows Taskbar.

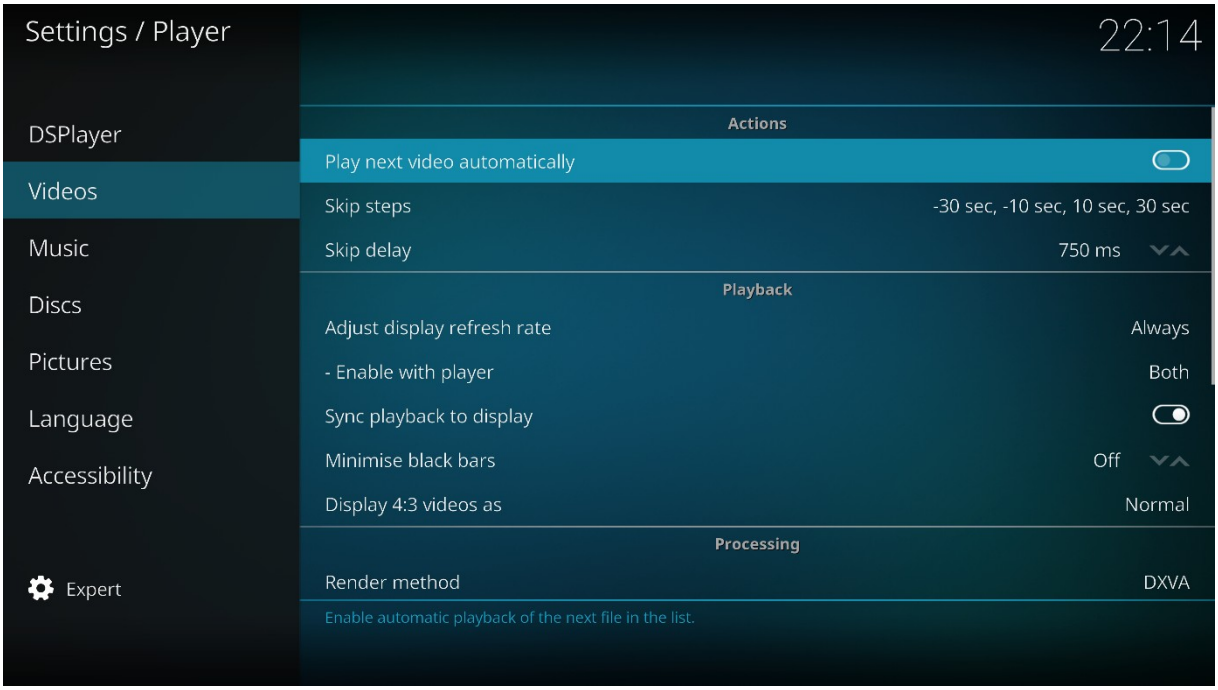
6.4 Kodi Player Other Settings



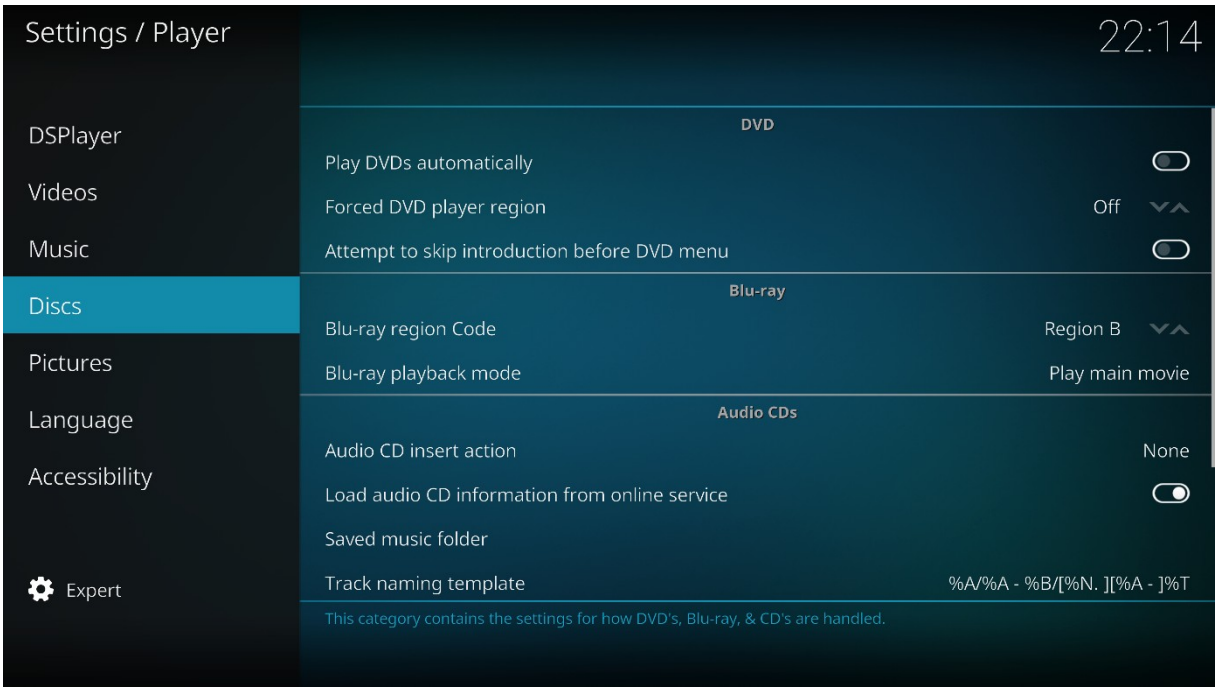
- Zet de preferred subtitle language op Dutch
- Enable Move OSD into active video area



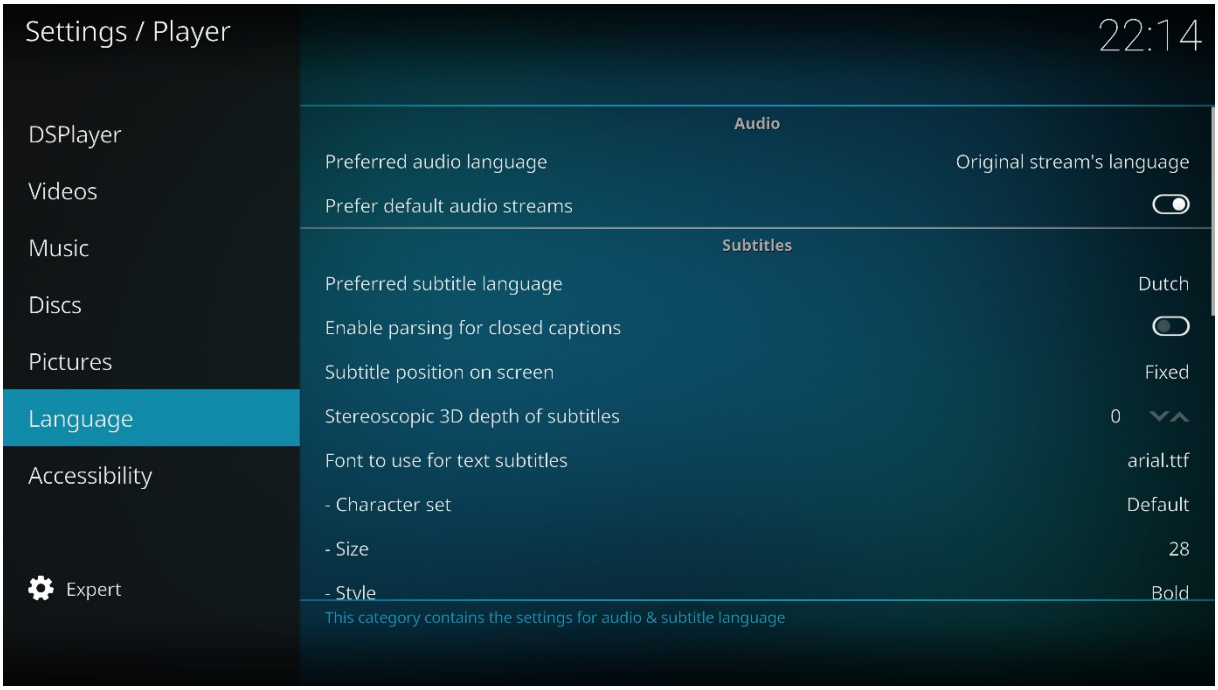
- Zet de Render Method op DXVA.
- Enable allow hardware acceleration DXVA2.



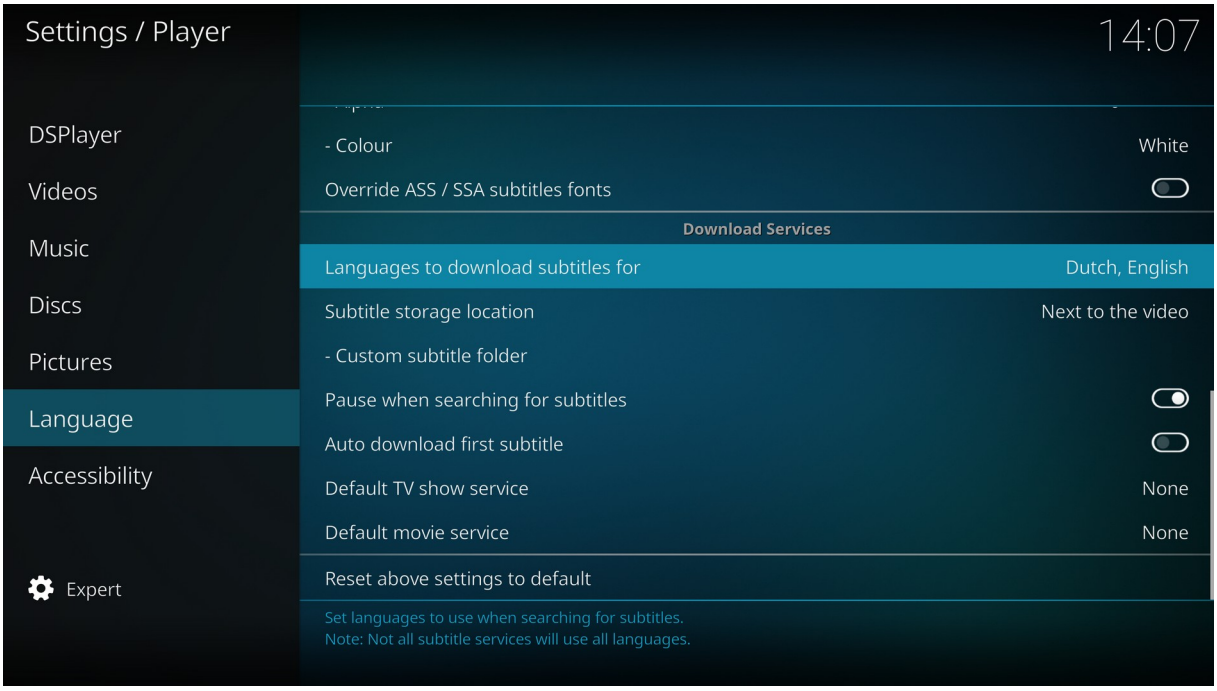
- Enable Sync Playback to Display



- Zet de Blu-ray region code op B.
- Zet de Blu-ray playback mode op Play main movie.

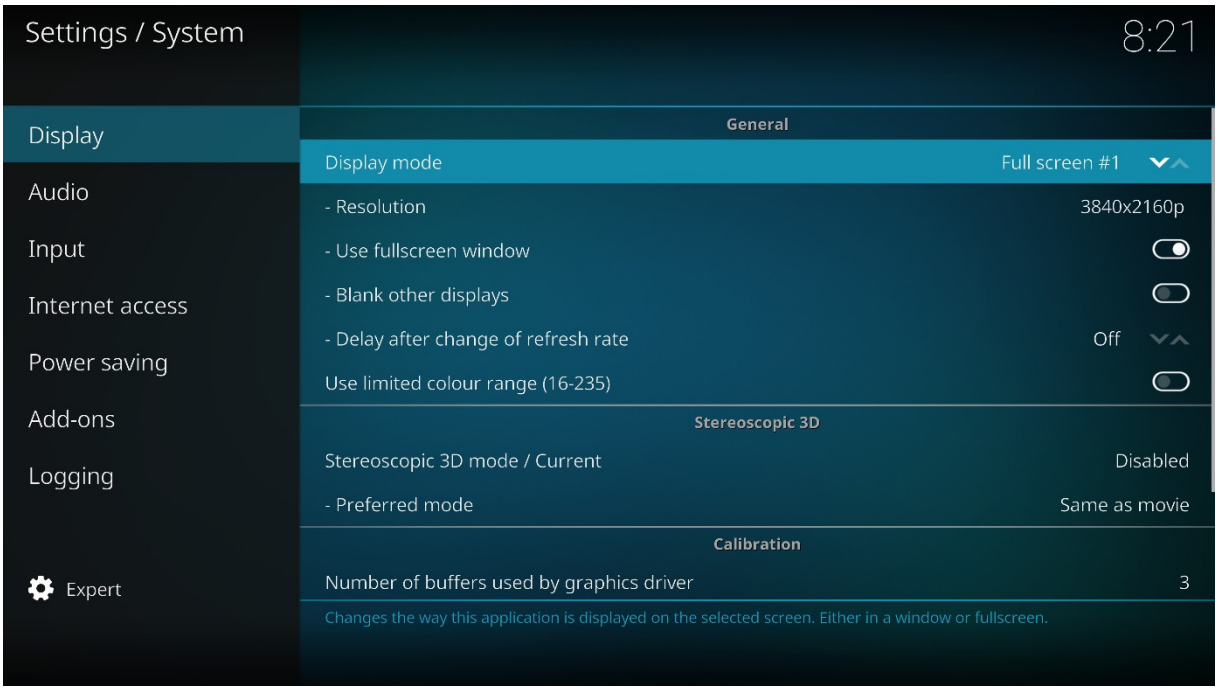


- Zet de Preferred audio language op English.

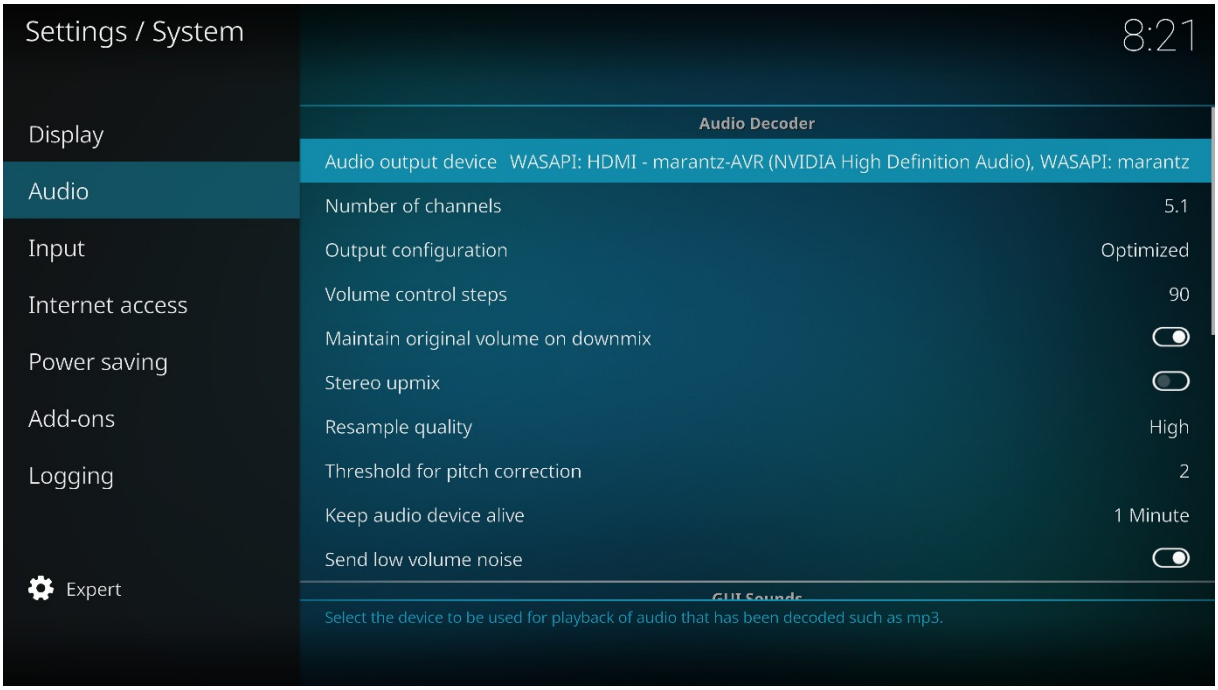


- Gebruik de mogelijkheid om ondertitels te downloaden (via Kodi OSD menu). Installeer hiervoor de opensubtitles.org add-on.

6.5 Kodi System Settings



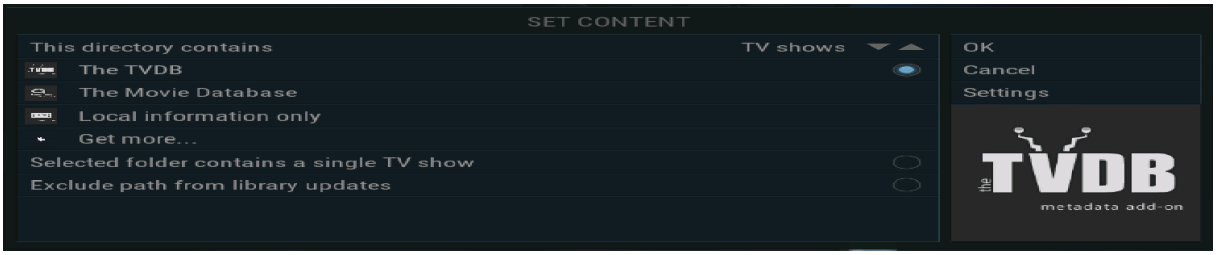
- Zet display mode op full screen.
- Zorg dat use fullscreen window UIT staat.
- Zet “Use limited colour range (16-235) UIT! Aangezien de videokaart settings op pc levels (0-255) ingestelt staat, zorgt het uit laten van deze setting er namelijk voor dat het kodi menu ook in pc levels wordt gedisplayed waardoor de kleuren in deze menu’s blijven kloppen evenals de grijstinten en het zwart nivo. Deze setting heeft GEEN invloed op de afgespeelde content.



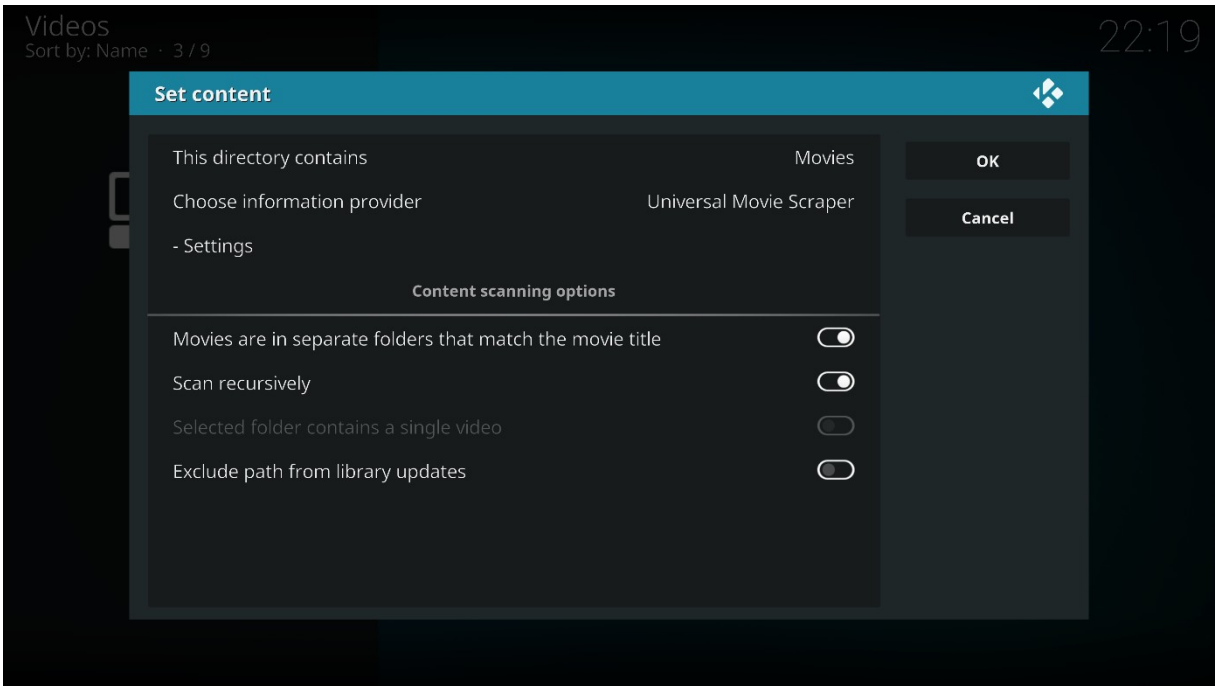
- Selecteer de surround processor als default audio device, let op dat je het WASAPI device kiest en NIEThet Directsound device. Indien je soms wel en soms geen lipsync issues hebt is de kans groot dat hier per ongeluk voor het Directsound device is gekozen.
- Kies 5.1 als number of channels.
- Zet output configuration op Optimized
- Zet Resample Quality op High.

- Zet GUI sounds op never.
- Selecteer ook voor Audio Passthrough de surround processor als audio device, let wederom op dat je het WASAPI device kiest en NIET het Directsound device. Indien je soms wel en soms geen lipsync issues hebt is de kans groot dat hier per ongeluk voor het Directsound device is gekozen.

6.6 Kodi Content Scrapers



- Kodi's movie scraper verwacht een specifieke naamconventie (voorbeelden):
  - Everest (2015)
  - Star Wars: The Force Awakens (2015)
- Als scraper voor films gebruik ik de Universal Movie Scraper addon. Deze scraper is welliswaar trager dan de default scraper, maar vind veel meer film titels!
  Universal Scraper is currently the most customizable scraper by collecting information from the following supported sites: IMDb, TMDb, Rotten Tomatoes, Trakt.tv, OFDb.de, port.hu. This scraper is currently the flagship of the Team-Kodi scrapers. The initial search can be done either on TMDb or IMDb (according to the settings), but following that it can be set field by field that from which site you want that specific information.

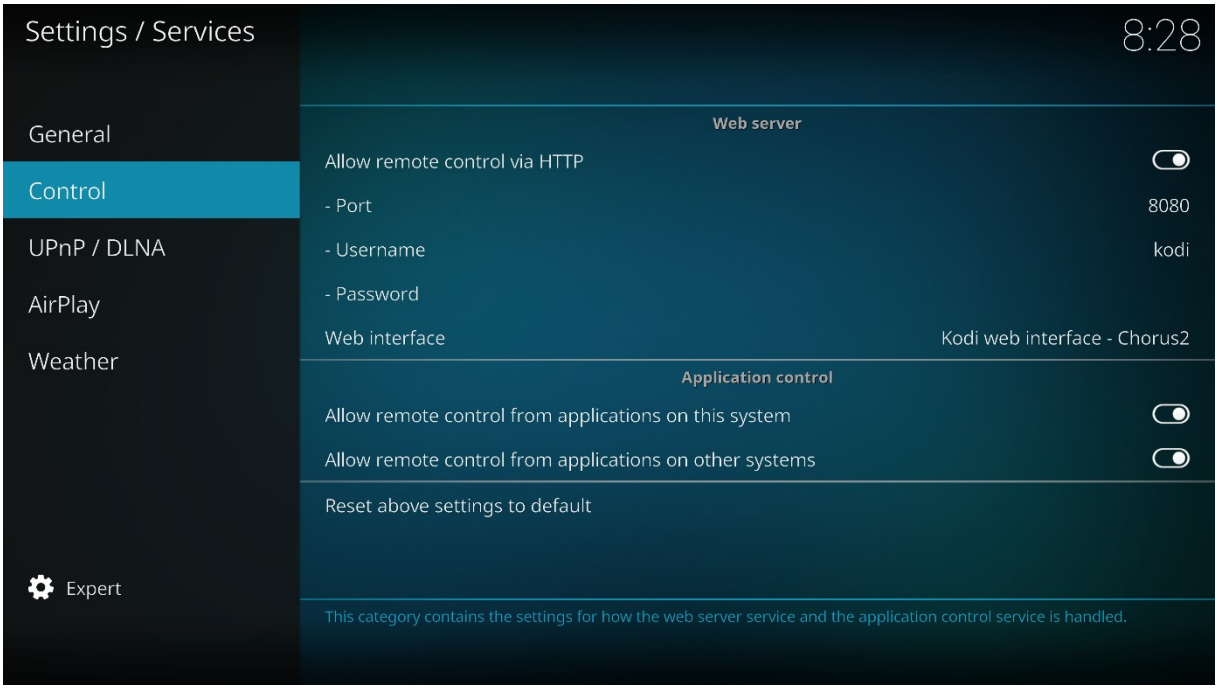


6.6.1. Advanced settings

Voeg het volgende toe aan advancedsettings.xml (in de Kodi Userdata folder) om dubbele iconen (tijdens een library update) van een film te voorkomen:

```
<advancedsettings>

<video>

    <excludefromscan action="append">

      <regexp>(?i)[\\/](auxdata|backup|clipinf|playlist|stream|certificate)[\\/]</regexp>

      <regexp>(?i)movieobject\.bdmv</regexp>

      <regexp>(?i)VTS_\w+.IFO</regexp>

      <regexp>(?i)VTS_\w+.VOB</regexp>

    </excludefromscan>

</video>

</advancedsettings>
```

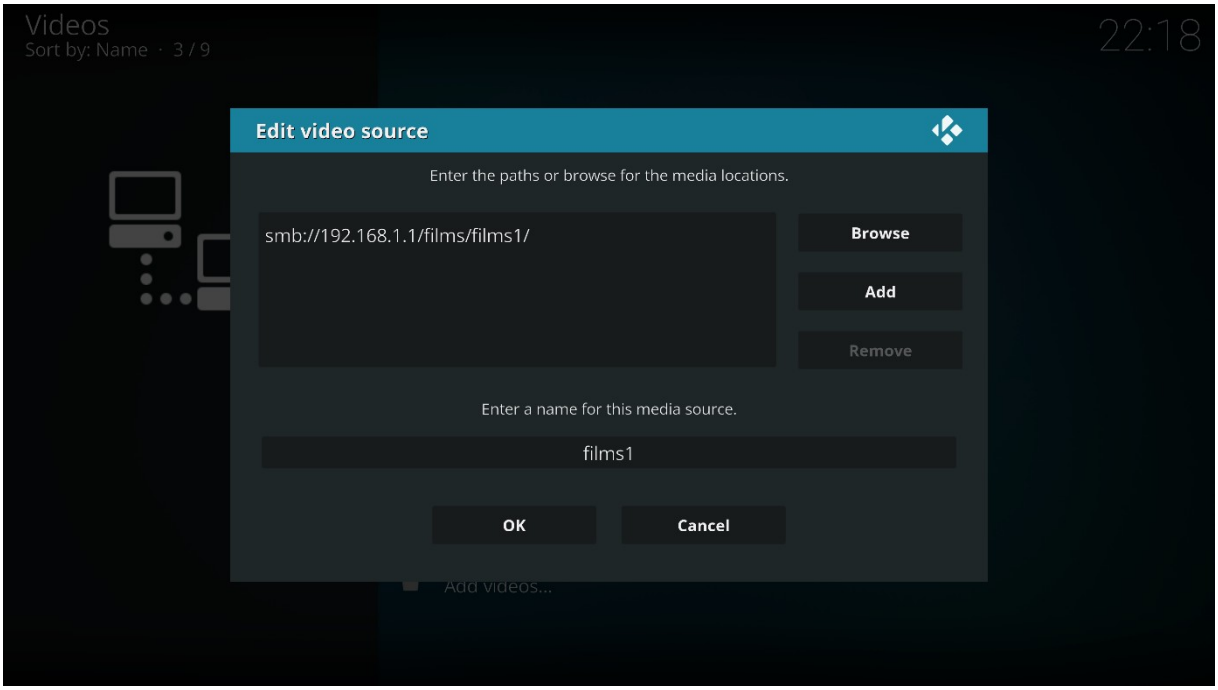
6.7 Kodi Remote Control

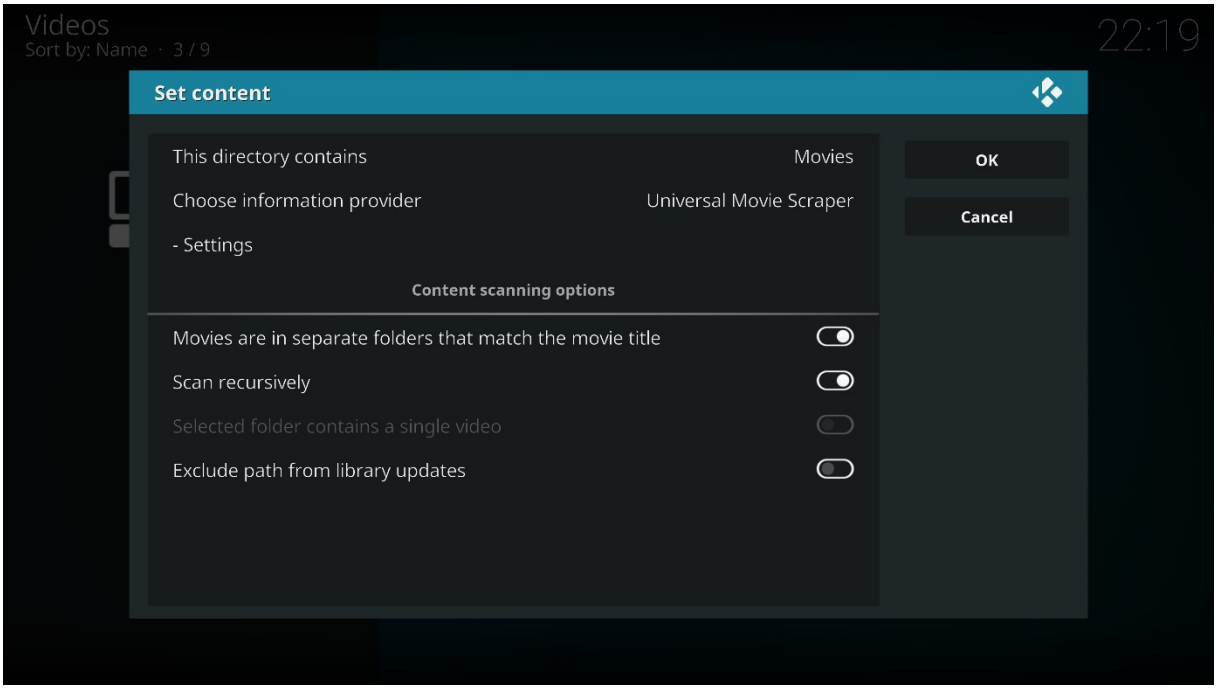


- Enable remote control via HTTP

6.8 Kodi media shares

NFS client windows 10 werkt niet betrouwbaar genoeg voor streaming via Kodi. Vandaar dat ik de Kodi SMB functionaliteit gebruik om toegang tot de media te verschaffen. Hieronder een voorbeeld van 1 van de shares.





Relevant gedeelte van smb.conf op mijn linux server:

```
[global]
      smb passwd file = /etc/samba/smbpasswd
      guest account = ronald
      netbios name = hammie
      workgroup = beestjes
      debug level = 3
      username map = /etc/samba/smbusers
      null passwords = yes
      encrypt passwords = true
      security = user
      public = yes
      panic action = /usr/share/samba/panic-action %d
      passdb backend = smbpasswd
      allow hosts = 192.168.1.
      load printers = yes
      printcap name = cups
      printing = cups
      socket options = TCP_NODELAY SO_RCVBUF=8192 SO_SNDBUF=8192
      mangled names = no     #dit is nodig om special characters in film dir namen toe te staan

[films]
path = /films
public = yes
only guest = yes
writable = yes
```

6.9 Kodi network buffers

Om buffer issues te voorkomen kunnen preventief de netwerk buffer instellingen van Kodi gewijzigd worden. Om dit te doen, creëer de file advancedsettings.xml in de kodi users directory met de volgende inhoud:

```
<advancedsettings>
<network>
<buffermode> 1 </buffermode>
<readbufferfactor> 4 </readbufferfactor>
<cachemembuffersize> 104857600 </cachemembuffersize>
</network>
</advancedsettings>
```

Buffermode – The “what”

The first Kodi cache setting we’re going to look at is the Buffermode. Buffermode controls how Kodi uses the cache during playback. More specifically, it controls which files get buffered. This is the “what files” will get buffered.

It can have four settings:

SETTING	EXPLANATION
0	This is the default value. This buffers all internet filesystems (http, ftp, webdav, etc.)
1	This buffers all filesystems, both Internet and Local
2	Only buffers true Internet file systems (http, etc.)
3	No buffer

Readbufferfactor – The “speed”

Readbufferfactor is the setting that controls how quickly Kodi will fill the cache. By default, it is set to “1”, which means that Kodi will only look ahead slightly to store what’s coming next. Think of this setting as the “speed” in which Kodi fills the buffer.

If your network is unreliable, slow or you have a fair amount of interference in your home, you’ll want to increase this value.

The setting value is a multiplier of the default limit. Kodi looks at the average speed that the video will play at. Higher resolution\bitrate videos will stream at a higher speed.

The default setting is usually pretty good. I recommend only a slight increase to 1.5.

If you make the other changes and still have issues, you can change this value to as high as 4. If you have a high amount of RAM in your device, you could go even higher than that.

Basically, you can increase this value as much as you want. Kodi won't crash, but it may end up using all of the bandwidth you have in the device. At that point, you won't see any improvement in increasing the number. You'll also not be able to do *anything* else on your device while you're watching a video.

7. Using external LAV+XySub Filters

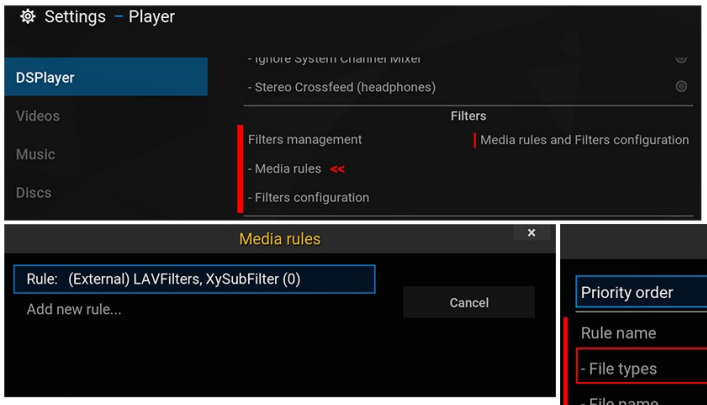
7.1 Update LAV filters

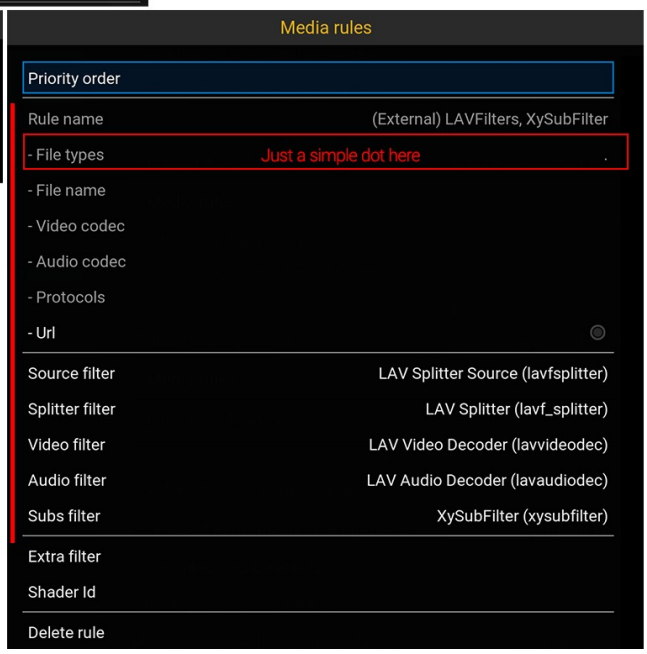
Kodi 17.6 gebruikt intern LAV filters versie 0.71. Updating the internal LAVFilters+XySubFilter is not recommended for multiple reasons.

If you want to be up to date with todays newer versions of LAVFilters + XySubFilter it's in any case _highly_ recommended that you switch to external filters by using
Kodi DSPlayer "Filters management" setting "Media rules and Filters configuration"
while adding just one "Media rule" for all files with setting *File types: .* (just a dot in the File type field) with the external updated versions of LAVFilters (LAV Source Filter, LAV Splitter, LAV Video Decoder, LAV Audio Decoder) + XySubFilter chosen.

Beginning from Kodi 17.6 build006 you can now use the new function under

***Settings -> Player -> DSPlayer -> Filters -> Filters management -> Media rules and Filters configuration -> !* Helper: Create example media rule**
This helper creates an example media rule for initial configuration (using external LAVFilters+XySubFilter) which you can then find under "Media rules [Editor]". External LAVFilters+XySubFilter have to be installed/registered on your system!



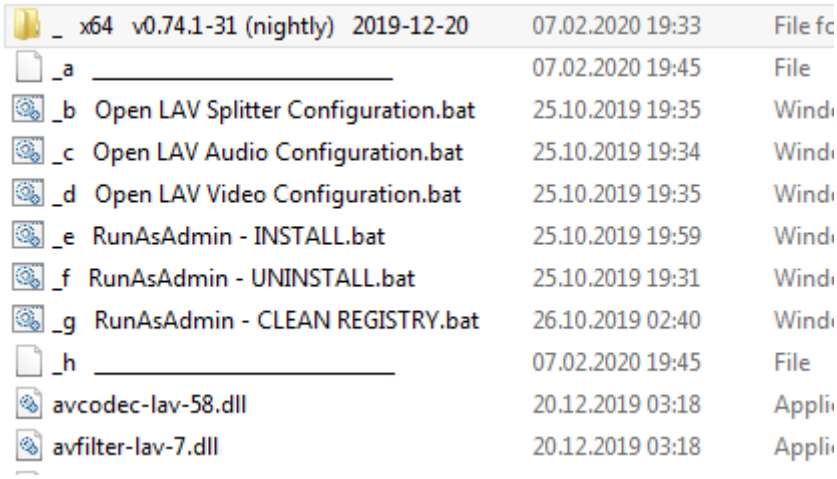


Quick Install external filters:

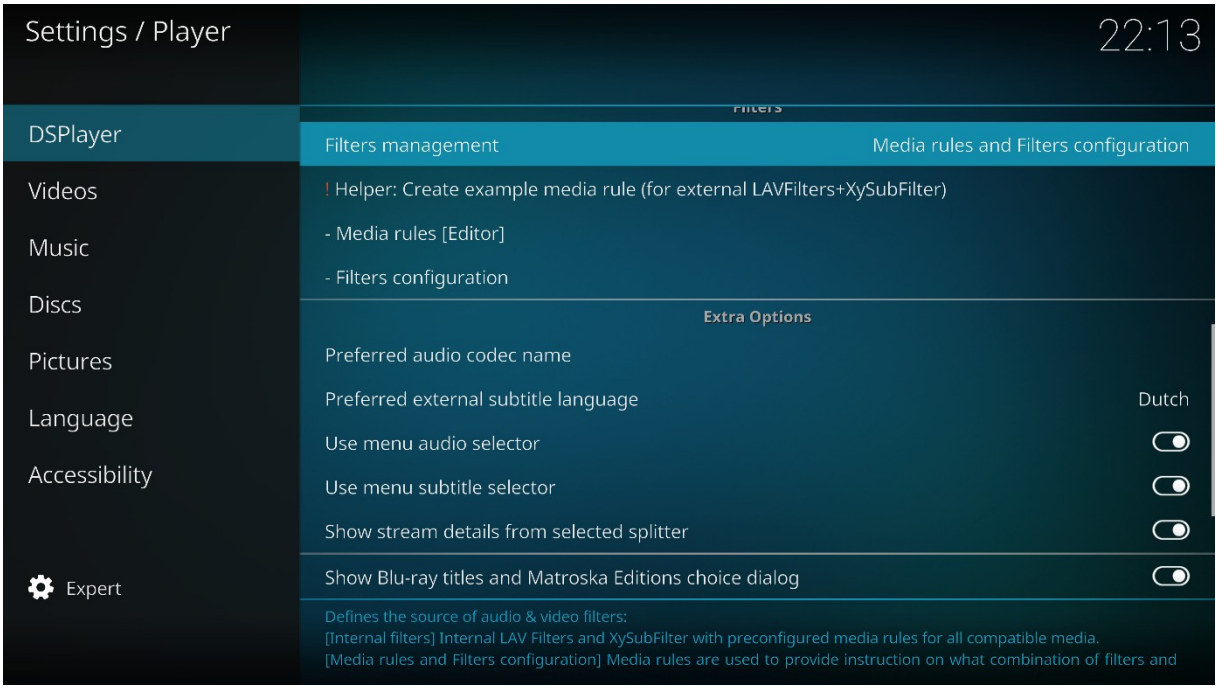
External Filters Bundle (LAVFilters x64, XySubFilter x64, AC3Filter x64):

http://nakunana24519x.bplaced.net/_tmp/k-dsp64_01/DirectShowFilters_x64-004.zip

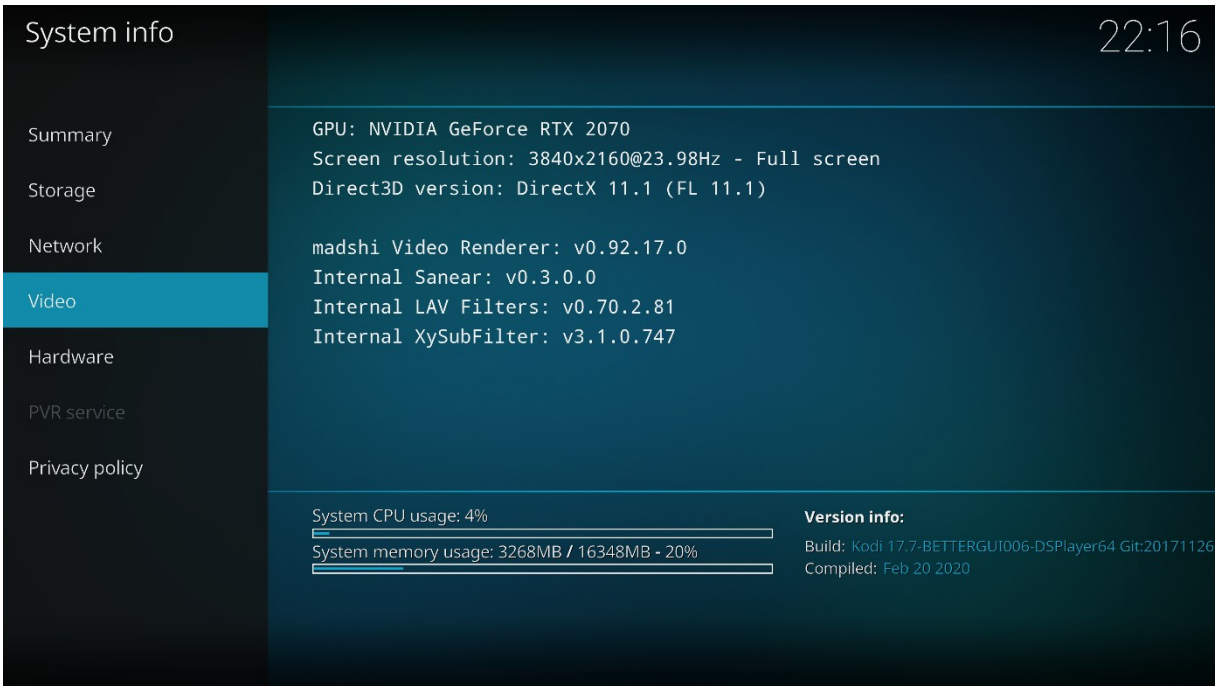
- Create a folder named C:\DirectShowFilters_x64\ and extract the 4 folders from inside zip file right in this created folder.
- Have a look inside the folders, for example C:\DirectShowFilters_x64\LAVFilters_x64\
There you can find easy access files for install/uninstall/registry-clean
- AC3Filter is of course only *optional* - not everyone needs it

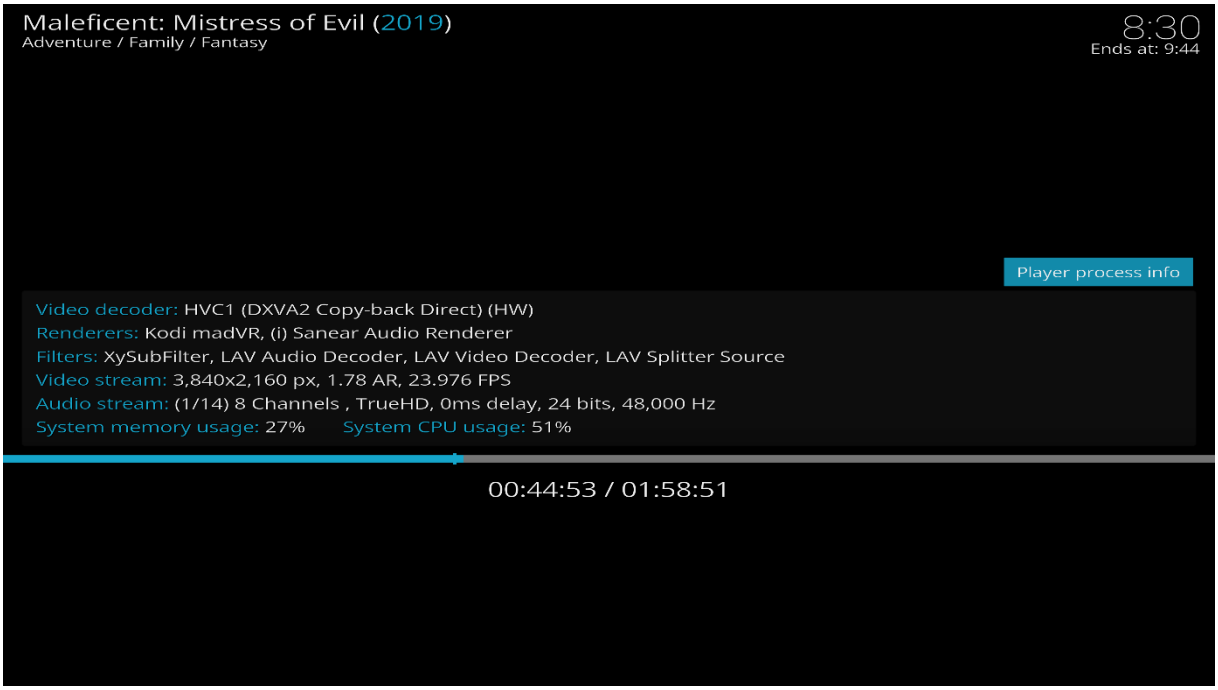


7.2 Configuratie LAV filters in Kodi



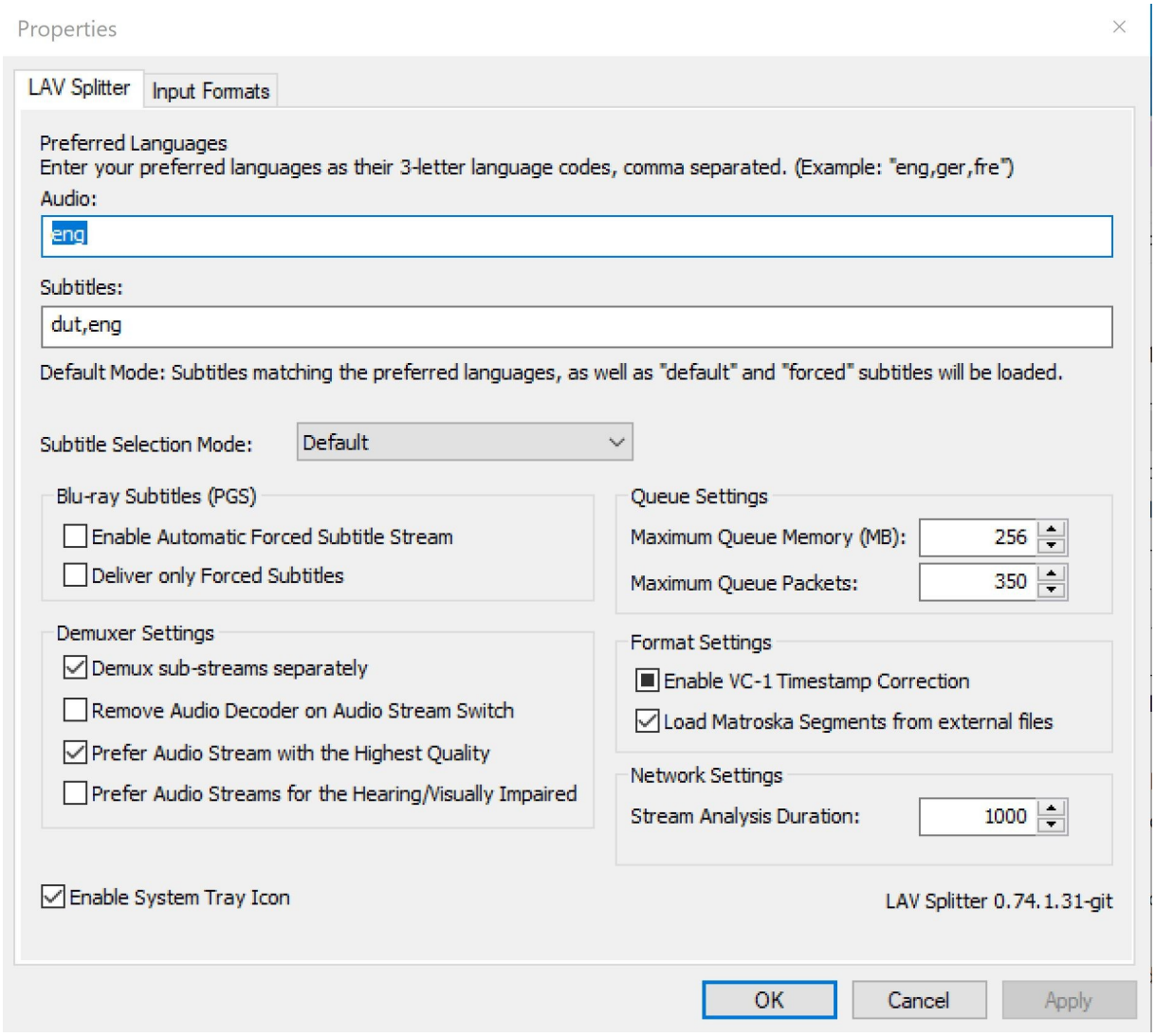
- Ensure Media Rules and Filters configuration (external **filters)** is selected from this menu to leverage the externally installed LAV Filters and XySubFilter.
- Merk op dat Direct3D11 gekozen is voor Direct3D presentation (versie 9 is minder efficient en zorgt voor hogere madvr rendertijden.





- To confirm the correct filters are being loaded during playback, **press O** while playing any video.

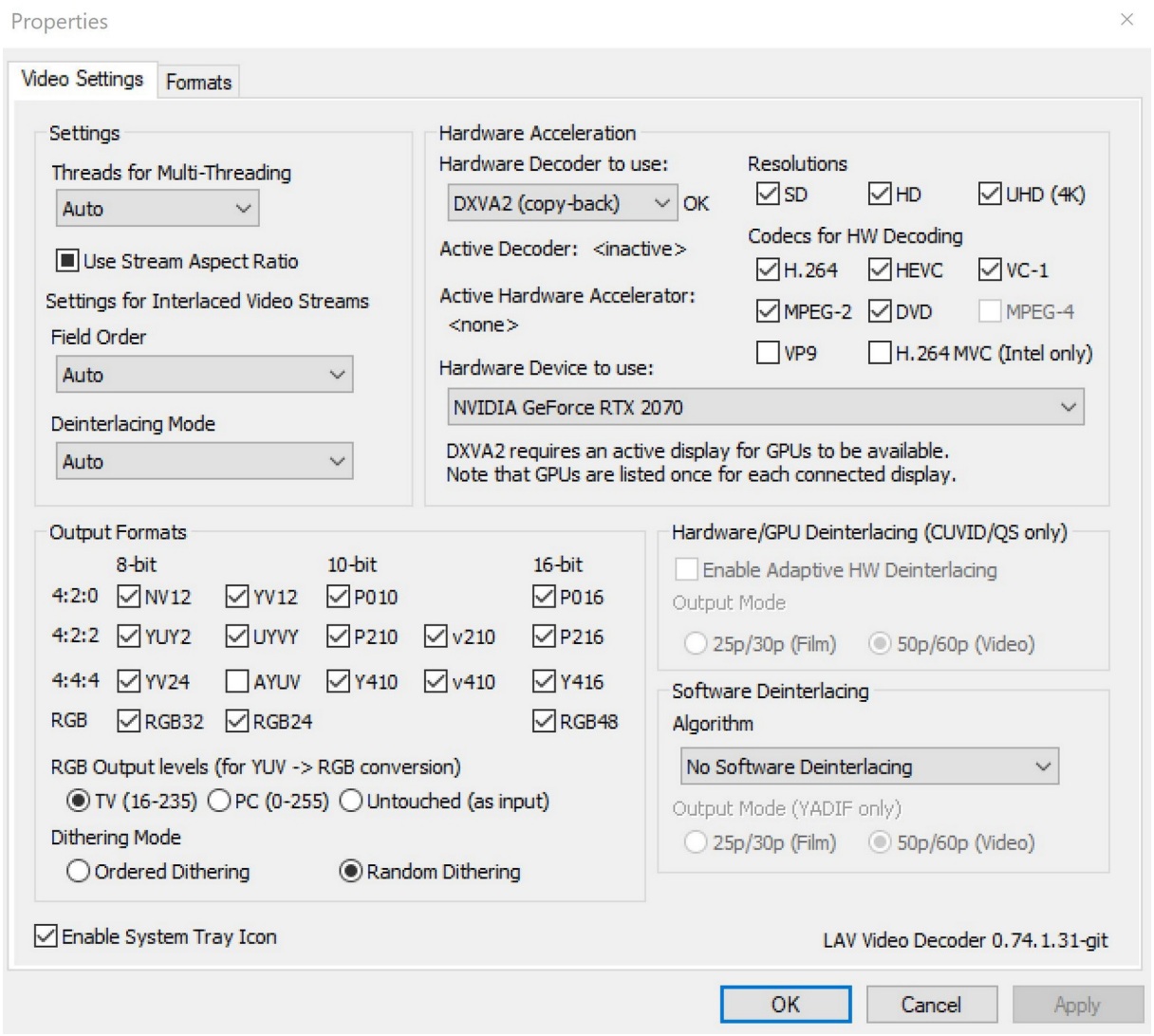
7.3 Configuratie LAV Splitter



Merk op dat:

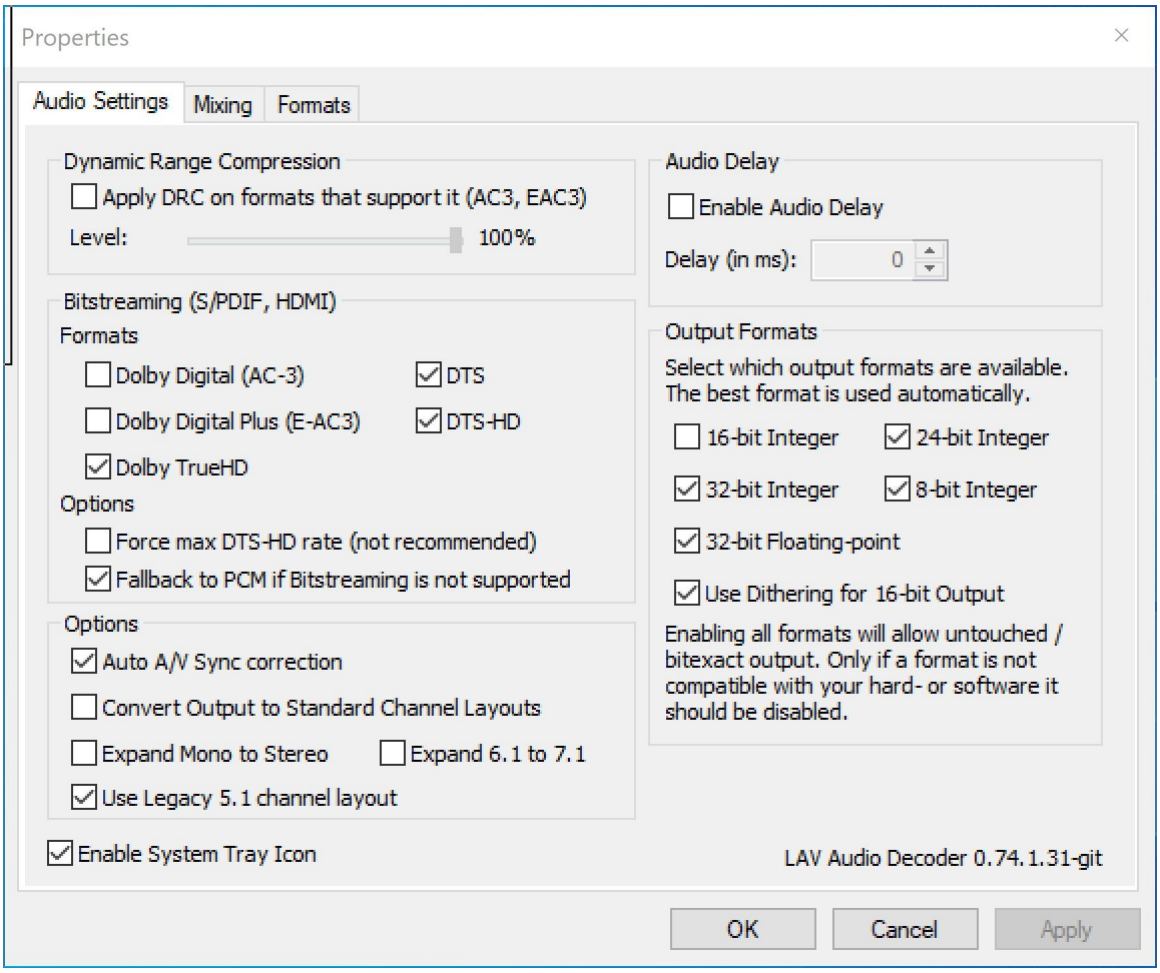
- De subtitle selection mode op default dient te staan.
- De preferred audio language op engels (eng) staat.
- De preferred subtitle language nederlands (dut) is met als tweede keuze engels (eng).
- de PSG forced subtitle opties uit staan.
- Prefer audio stream with highest quality aan staat.

7.4 Configuratie LAV Video Filter



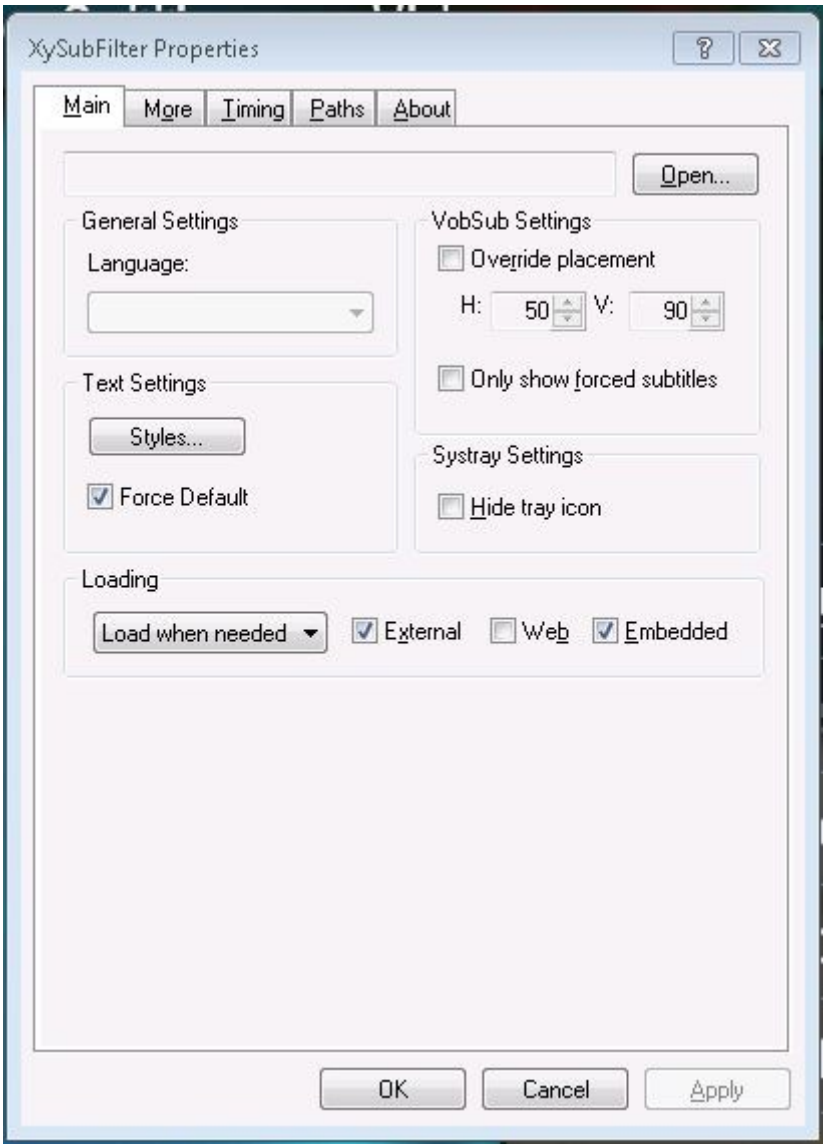
- Merk op dat DXVA Copy Back vereist is om zwarte balken te kunnen detecteren, in mijn geval is dit vanwege de plaatsing van mijn projector noodzakelijk om kodi bij 21:9 content het beeld op het doek omhoog te schuiven.

7.5 Configuratie LAV Audio Filter



- Enable Auto A/V sync correction
- Enable Use Legacy 5.1 channel layout
- Enable bitstreaming in elk geval voor Dolby Atmos en DTS-X audio tracks, aangezien voor deze formaten de decoding in de surround processor dient te gebeuren.

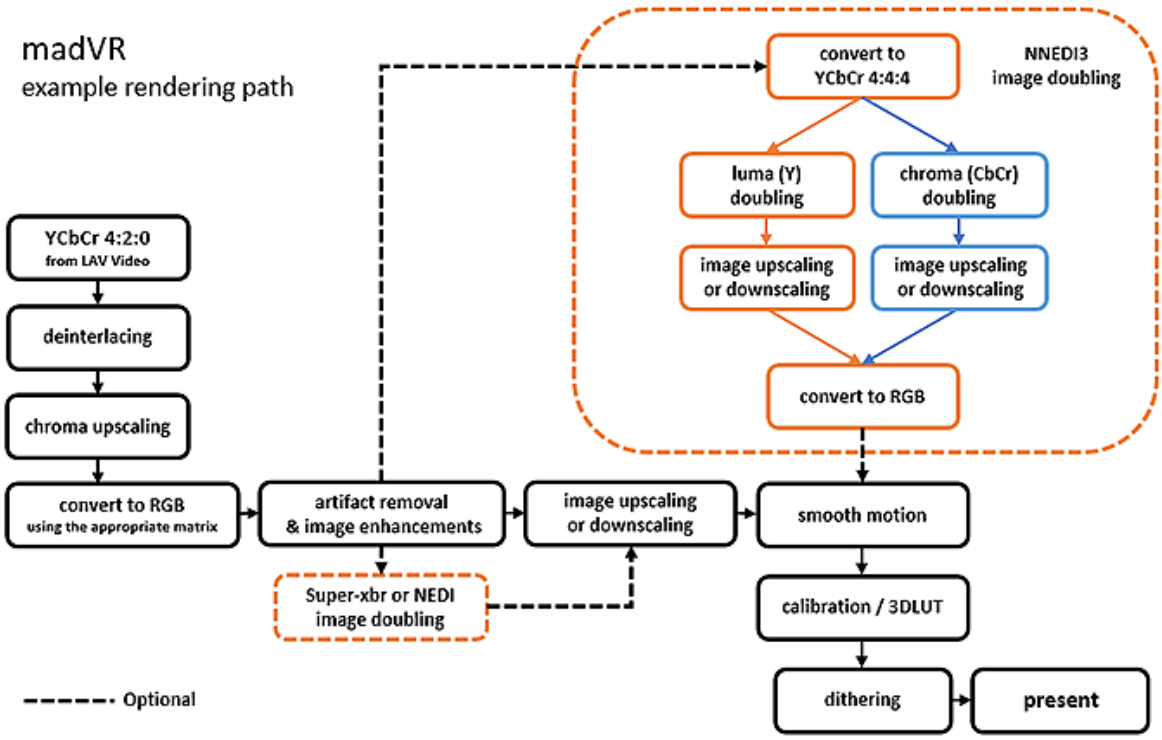
7.6 Configuratie LAV Subtitle Filter



Merk op dat:

- Only show forced subtitles uit staat.
- Force default aan staat.
- Loading op Load when needed staat.
- Er ook een aantal subtitle settings gezet dienen te worden in Settings -> videos (zie screenshot hieronder).

8. MadVR Configuratie



8.1 How to configure profile rules

The madVR settings profiling logic is very flexible, but also requires a bit of scripting for best effect. Script language is pretty easy. Basically scripting is expected to be a string of "if", "else if" and "else" statements. Every "if" (or "else if") statement contains of one or more value comparisons and selects one profile to be activated. Each value comparison must be placed in brackets. By using the logical operations "and" or "or" you can check multiple values to create more complex decisions.

Let's look at an example. The following script selects one of 4 profiles, depending on the source dimensions and the frame rate after deinterlacing. I think the script is pretty much self explaining:

Code:

```
if      (srcWidth <= 1050) and (srcHeight <= 768) and (deintFps < 31) "SD
24fps"
else if (srcWidth <= 1050) and (srcHeight <= 768)                     "SD
60fps"
else if                                              (deintFps < 31) "HD
24fps"
else                                                                 "HD
60fps"
```

Supported keywords and operators:

Code:

```
if/else statements:     "if", "else if", "elseif", "elsif", "else"
logical operators:      "and", "or", "&&", "||"
equal check:            "==", "="
unequal check:          "!=", "<>", "#"
bigger/smaller check:   "<", ">", "<=", ">="
boolean "not" operator: "not", "!"
```

Supported numerical values:

Code:

```
srcWidth, srcHeight                                 src width/height (cropping
according to settings)
croppedSrcWidth, croppedSrcHeight                   cropped   src width/height
uncroppedSrcWidth, uncroppedSrcHeight               uncropped src width/height
AR, uncroppedAR, encodedAR                          cropped AR (aspect ratio),
uncropped AR, encoded AR,
targetWidth, targetHeight                           width/height after scaling
(cropping according to settings)
croppedTargetWidth, croppedTargetHeight             width/height after scaling
cropped   source
uncroppedTargetWidth, uncroppedTargetHeight         width/height after scaling
uncropped source
scalingFactor.x/y                                   overall scaling factor
fps, deintFps, bitDepth                             source frame rate, framer-
ate after deinterlacing, bitdepth
displayMode.x/y, refreshRate                        display mode information
runtime                                             movie runtime (in minutes)
```

Supported boolean values:

Code:

```
4:2:0, 4:2:2, 4:4:4, RGB     which pixel format does the source have?
HDR                          is the video HDR?
srcInterlaced                is the source interlaced?
```

```
filmMode                      is film mode (IVTC) active?
MPEG2, VC-1, h264             which codec is the source encoded in?
fseMode, overlay, windowed    rendering mode
AMD, nVidia, Intel            which GPU manufacturer are we rendering on?
smoothMotion                  is smooth motion FRC active?
variableAR                    does this video have variable ARs?
hdr                           is the video HDR?
```

Supported string values:
Code:

```
mediaPlayer                    media player exe file name
filePath, fileName, fileExt    e.g. "c:\movie.mkv", "movie.mkv", "mkv",
wildcards supported
display                        name of the active display device
```

One more example to show how to use numerical, boolean and string values:
Code:

```
if ((not 4:2:0) or (AR = 16:9)) and (fileName = "*horribleSubs*.mkv")
"Weird profile" else "Normal profile"
```

8.1.1 Lens Memory rule

if (AR < 2.2) "16:9" else "21:9"

8.1.2 Scaling rules

If (hdr) and (AR < 2.2) "hdr-16:9"

if (hdr) and (AR <= 2.2) “hdr-21:9”

if (srcWidth > 1920) "2160p"

else if (srcWidth <= 1920) and (srcHeight > 1080) "2160p"

else if (deintFps <= 25) and (srcWidth > 1280) and (srcWidth <= 1920) and (AR < 2.2) "1080p24-16:9"

else if (deintFps <= 25) and (srcWidth > 1280) and (srcWidth <= 1920) and (AR >= 2.2) "1080p24-21:9"

else if (deintFps <= 25) and (srcWidth <= 1280) and ((srcHeight > 720) and (srcHeight <= 1080)) "1080p24"

else if (deintFps > 25) and (srcWidth > 1280) and (srcWidth <= 1920) "1080p60"

else if (deintFps > 25) and (srcWidth <= 1280) and ((srcHeight > 720) and (srcHeight <= 1080)) "1080p60"

else if (deintFps <= 25) and (srcWidth > 960) and (srcWidth <= 1280) "720p24"

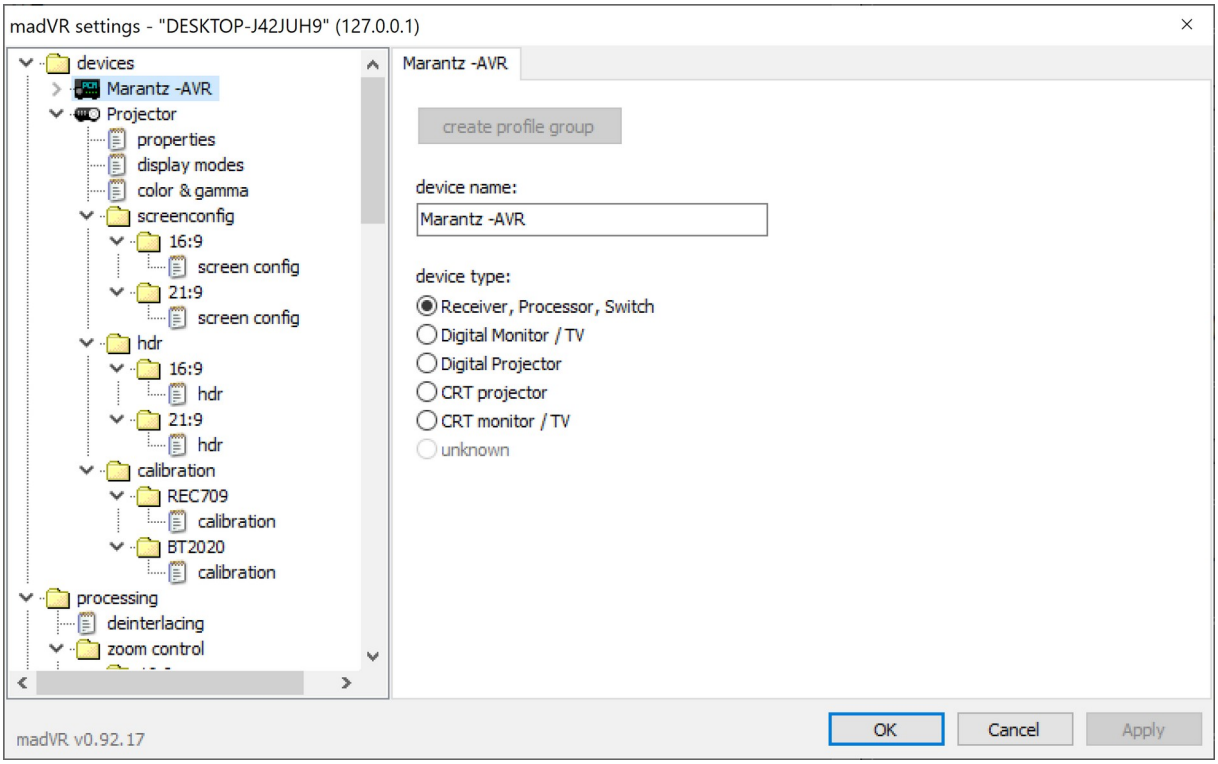
else if (deintFps <= 25) and (srcWidth <= 960) and ((srcHeight > 540) and (srcHeight <= 720)) "720p24"

else if (deintFps > 25) and (srcWidth > 960) and (srcWidth <= 1280) "720p24"

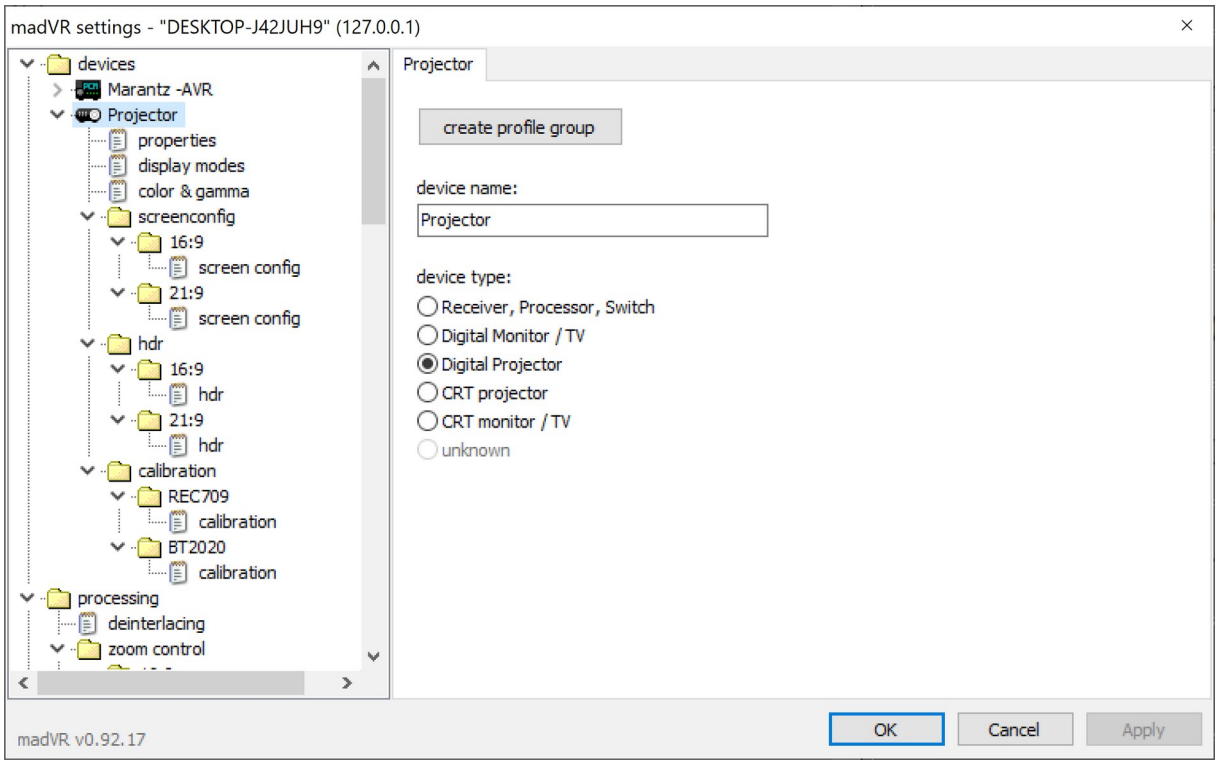
else if (deintFps > 25) and (srcWidth <= 960) and ((srcHeight > 540) and (srcHeight <= 720)) "720p24"

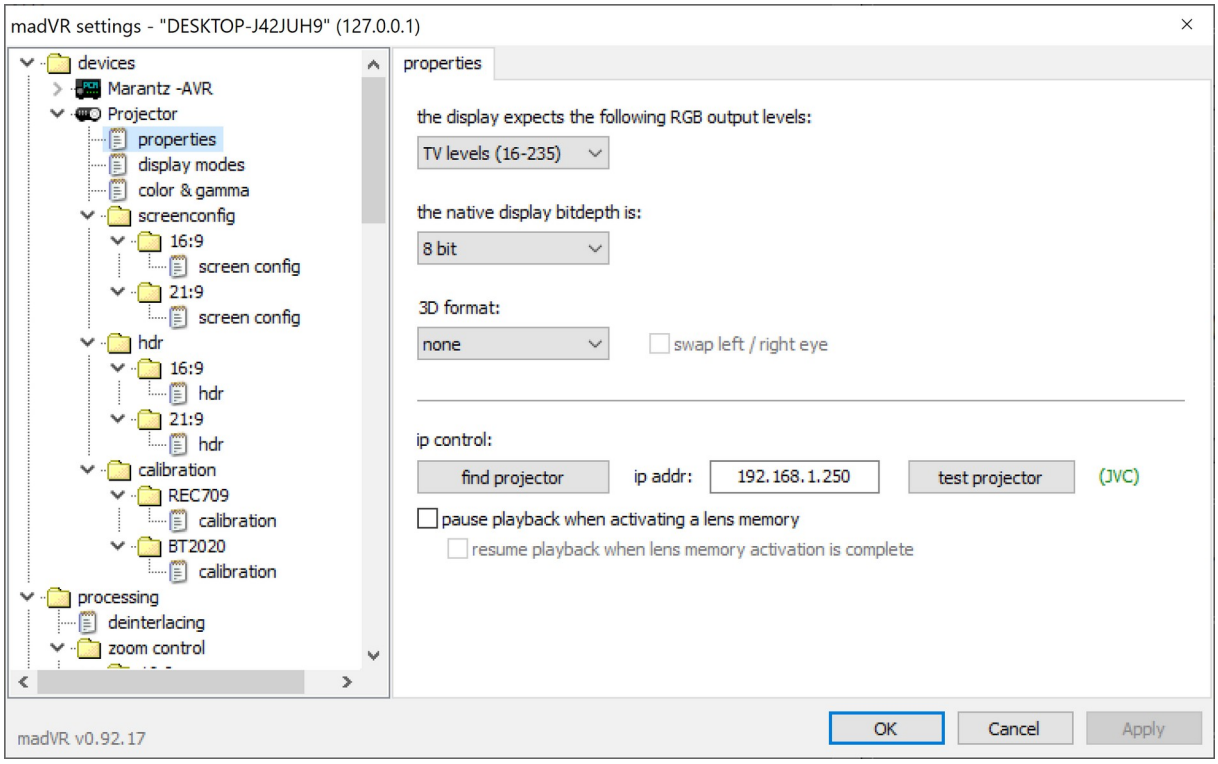
else if (srcWidth <= 960) and (srcHeight <= 540) "SD"

8.2 Devices

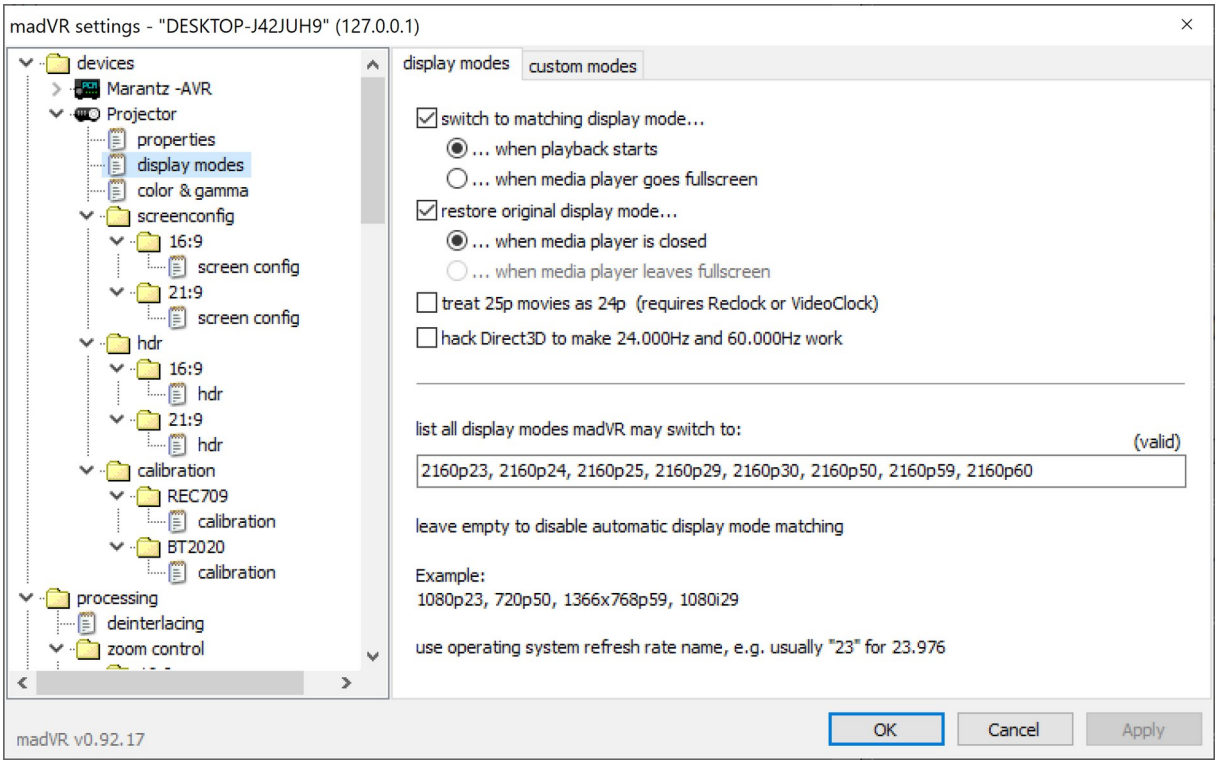

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
devices
Marantz -AVR
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
processing
deinterlacing
zoom control
Marantz -AVR
create profile group
device name:
Marantz -AVR
device type:
Receiver, Processor, Switch
Digital Monitor / TV
Digital Projector
CRT projector
CRT monitor / TV
unknown
madVR v0.92.17
OK
Cancel
Apply

8.3 Projector

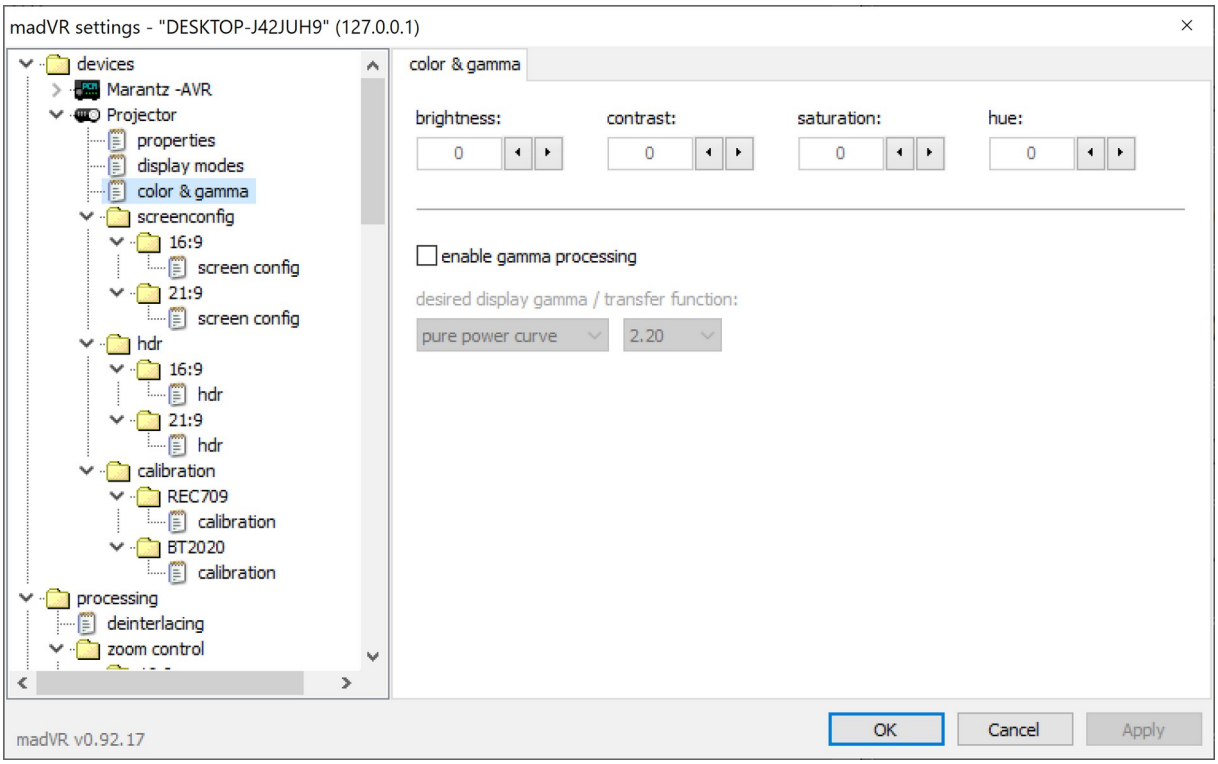




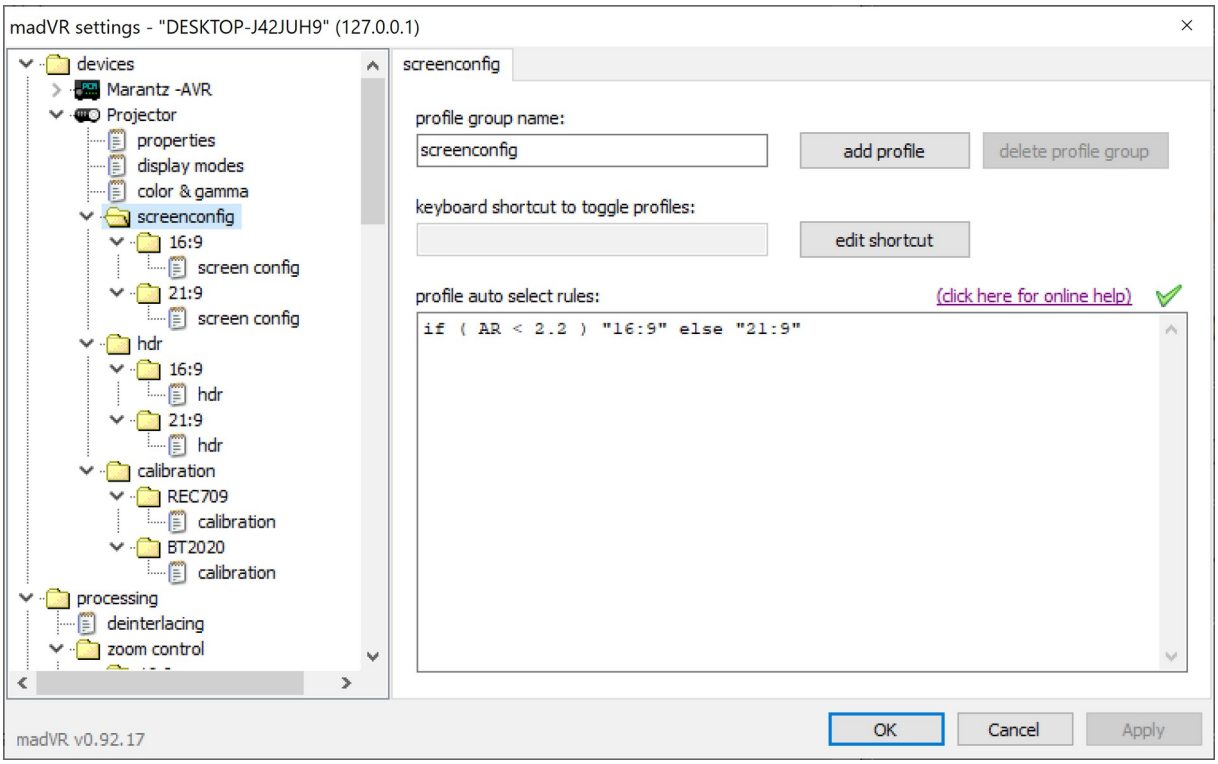
- Zet RGB output levels op 16-235
- Zet de native display bitdepth op 8 bit (verschil met 10 bit is voor het menselijk oog toch niet zichtbaar en het helpt tevens om problemen bij 60Hz te voorkomen)



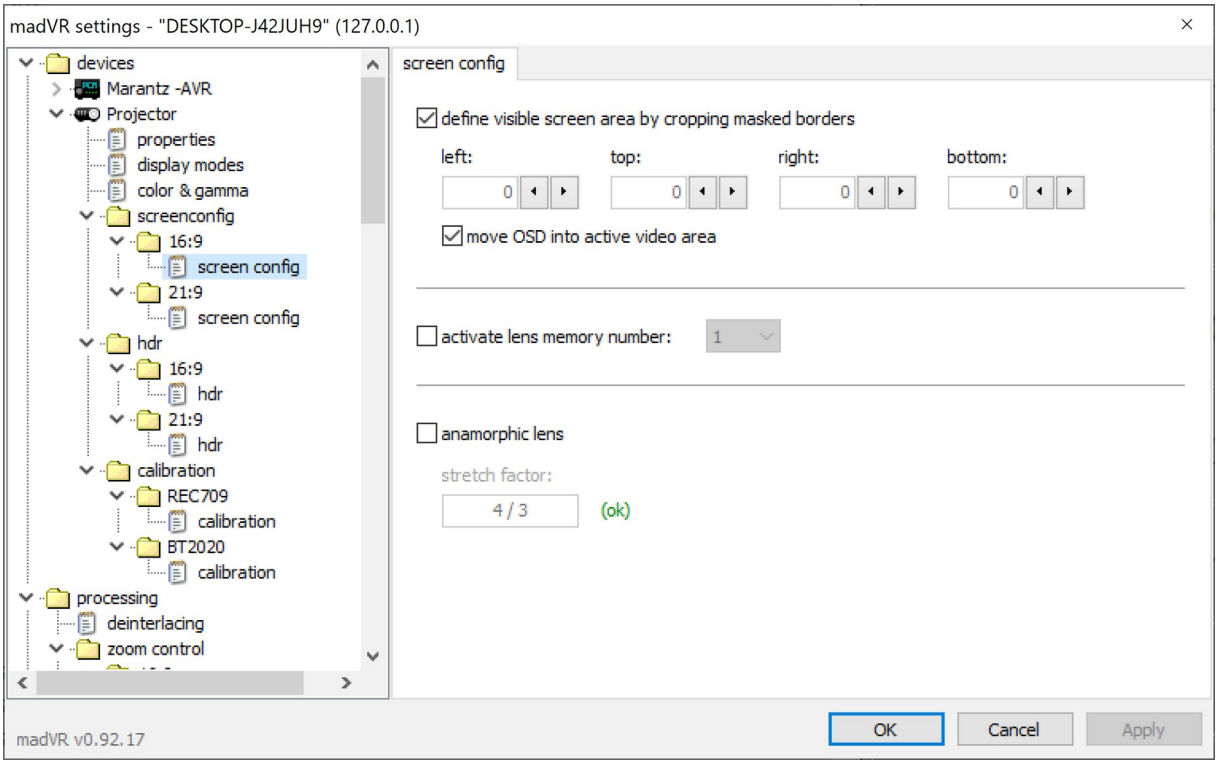
4K Display: **2160p23, 2160p24, 2160p25, 2160p29, 2160p30, 2160p50, 2160p59, 2160p60**

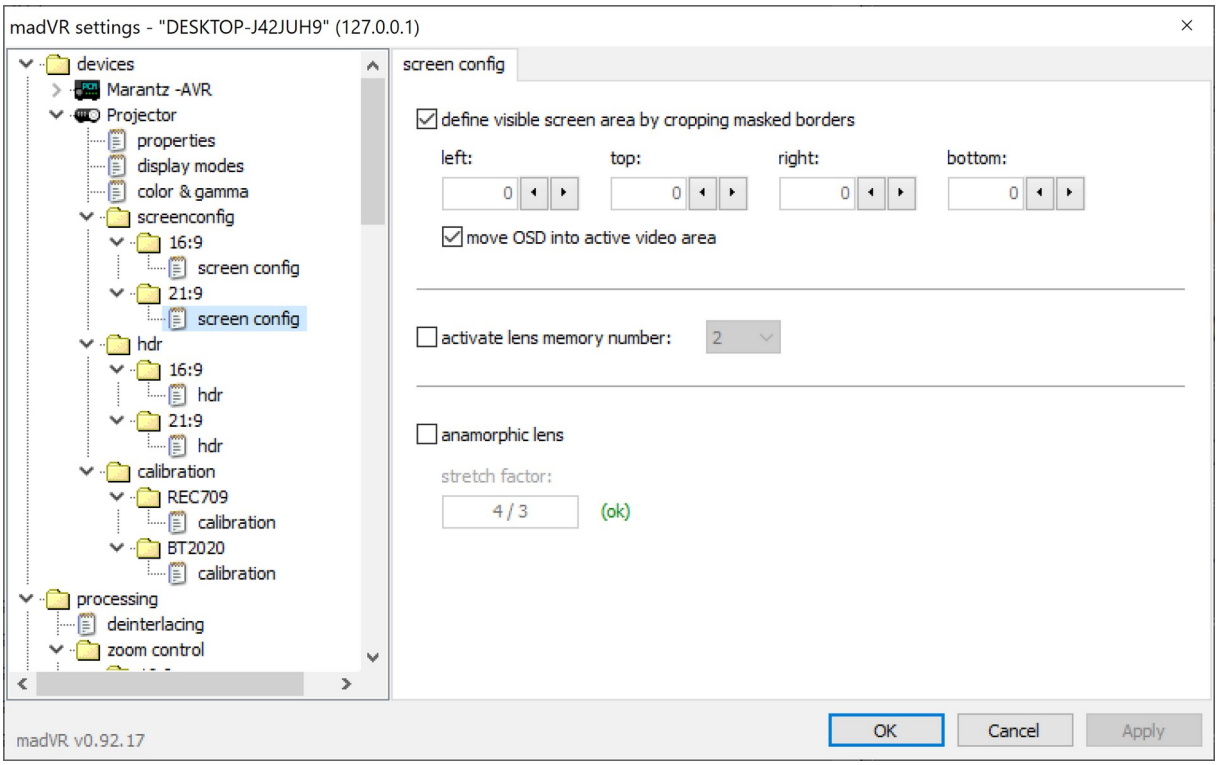


8.3.1 Screenconfig



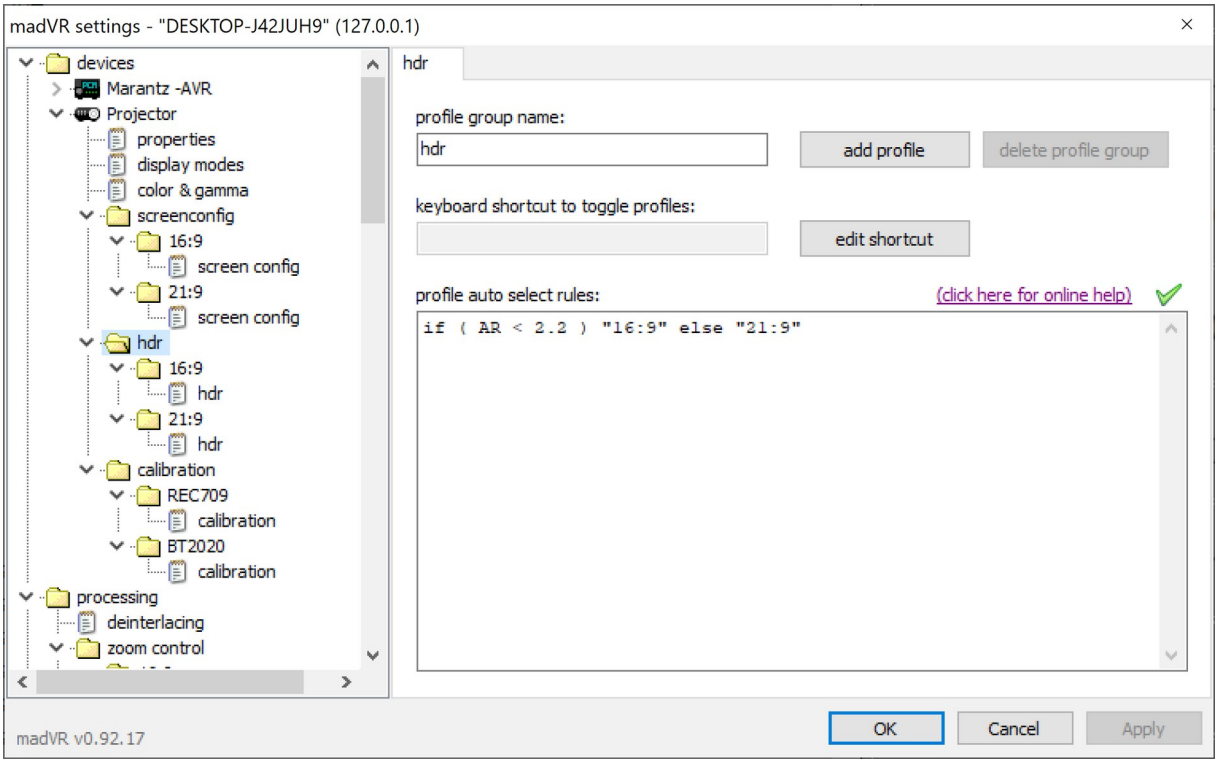
- Dit geeft de mogelijkheid om het beeld automatisch te laten in of uitzoomen. Ik gebruik dit echter niet meer vanwege het feit dat er films zijn die tijdens de film steeds wisselen van aspect ratio.

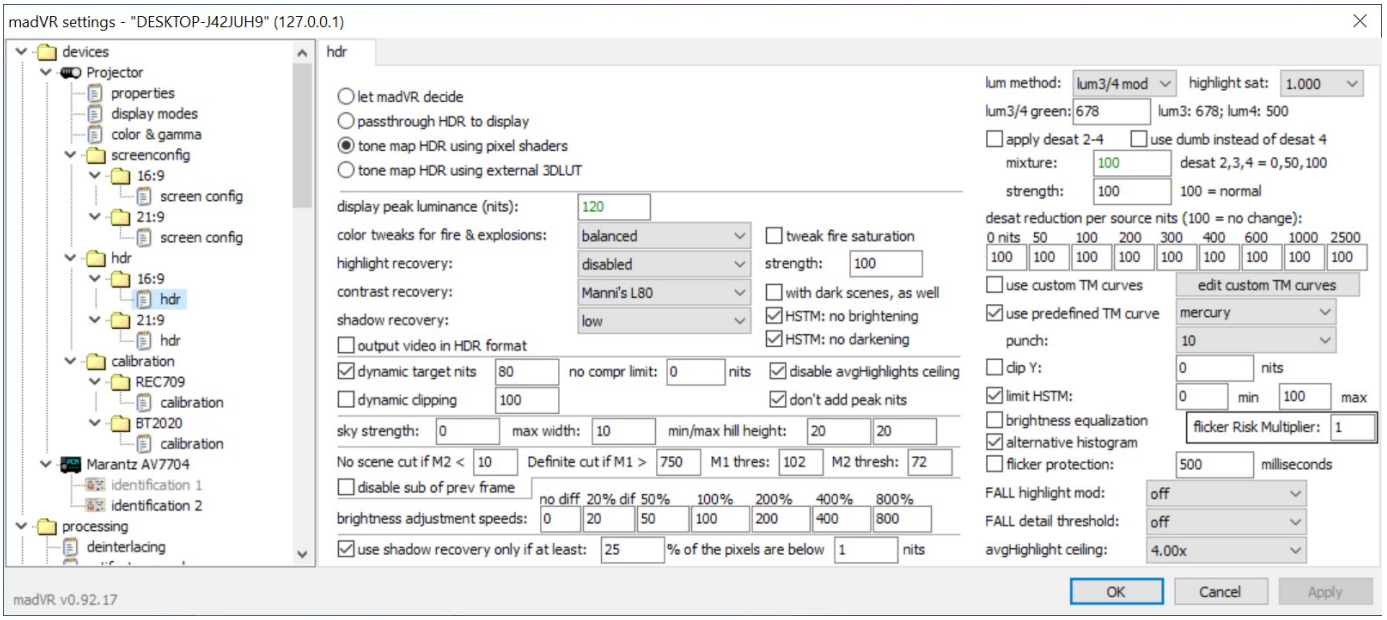

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
devices
Marantz -AVR
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
processing
deinterlacing
zoom control
screen config
define visible screen area by cropping masked borders
left:
top:
right:
bottom:
0
move OSD into active video area
activate lens memory number:
1
anamorphic lens
stretch factor:
4 / 3
(ok)
madVR v0.92.17
OK
Cancel
Apply

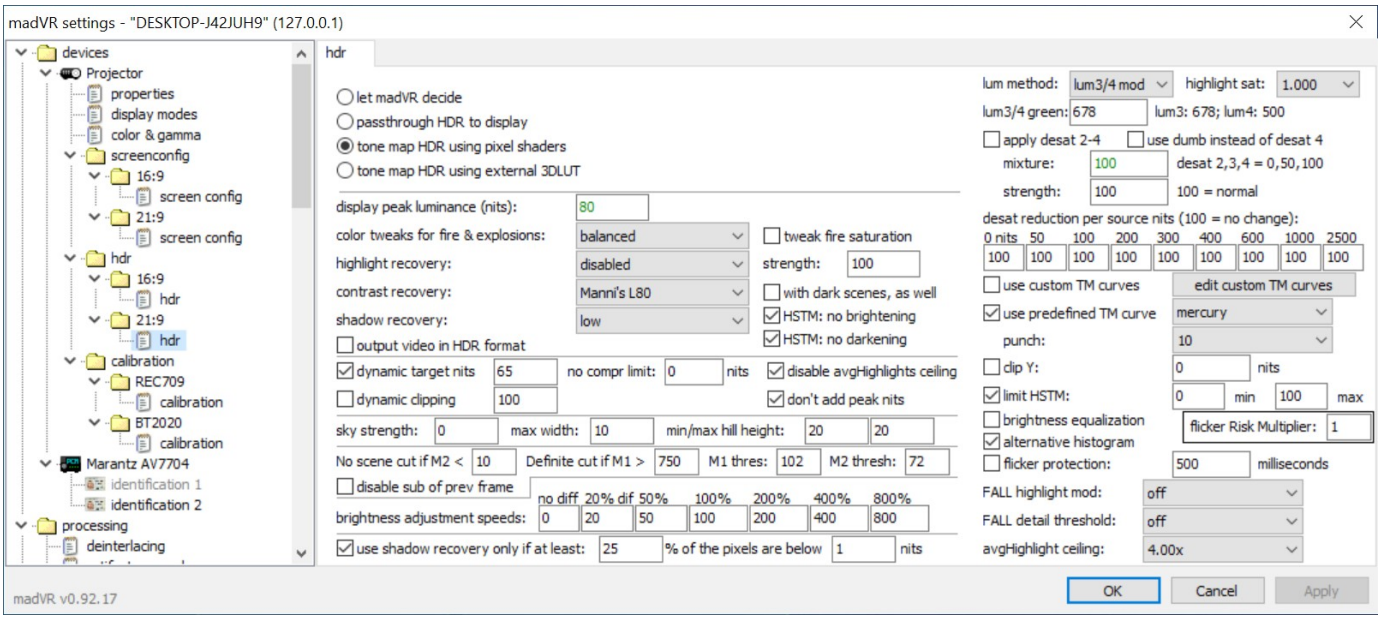

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
devices
Marantz -AVR
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
processing
deinterlacing
zoom control
screen config
define visible screen area by cropping masked borders
left:
top:
right:
bottom:
0
move OSD into active video area
activate lens memory number:
2
anamorphic lens
stretch factor:
4 / 3
(ok)
madVR v0.92.17
OK
Cancel
Apply

8.3.2 HDR

- Zet HDR BT2020 om naar SDR BT2020, rekening houdend met de lichtsterkte van de projector.

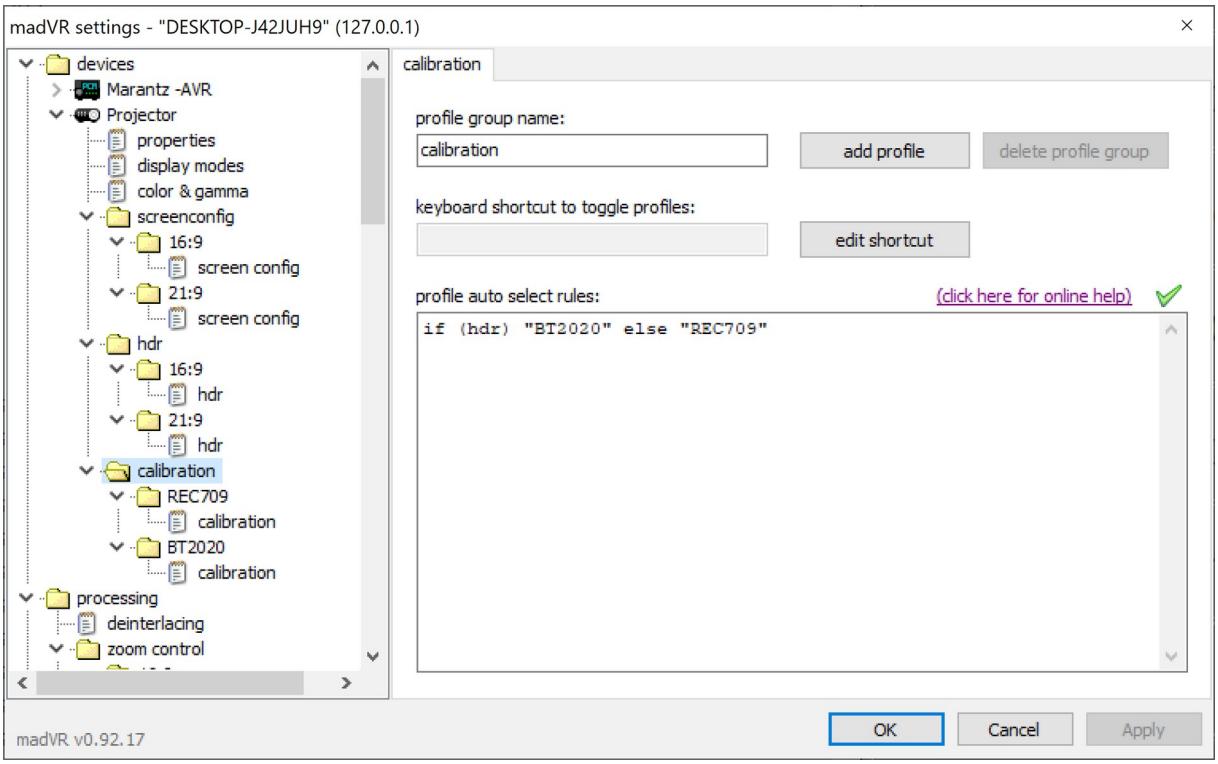


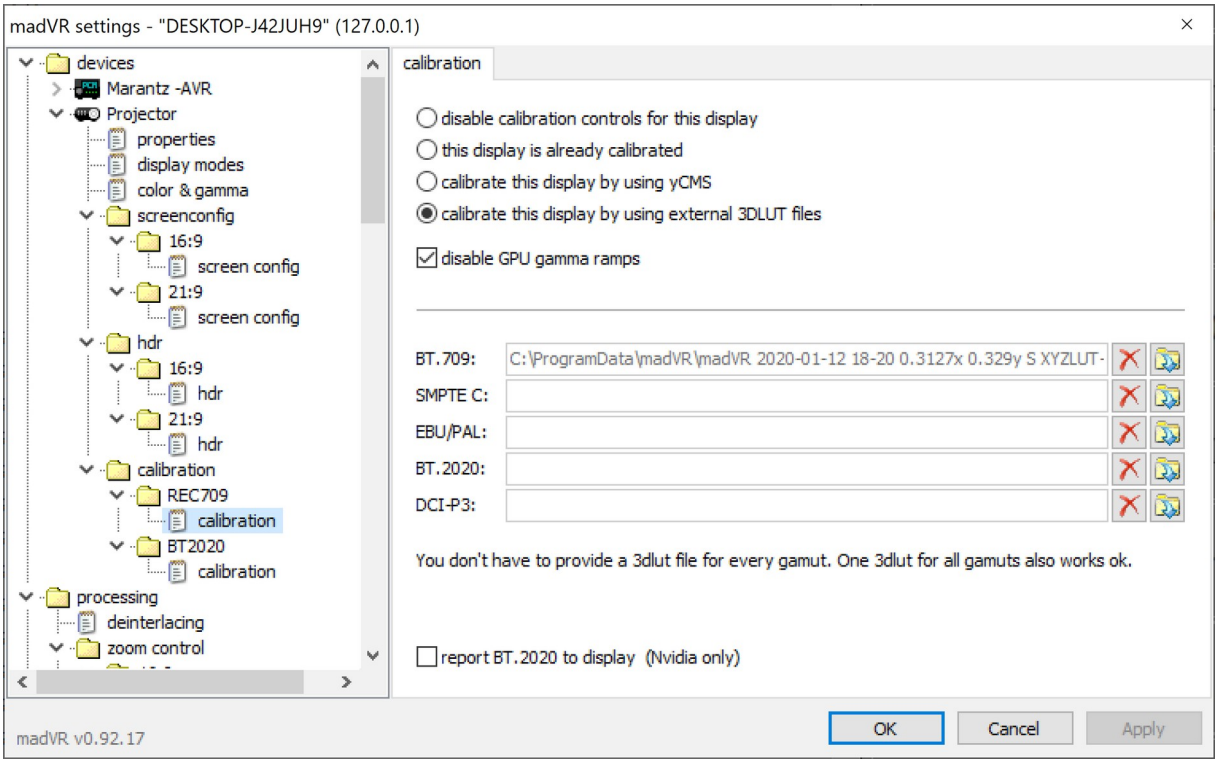


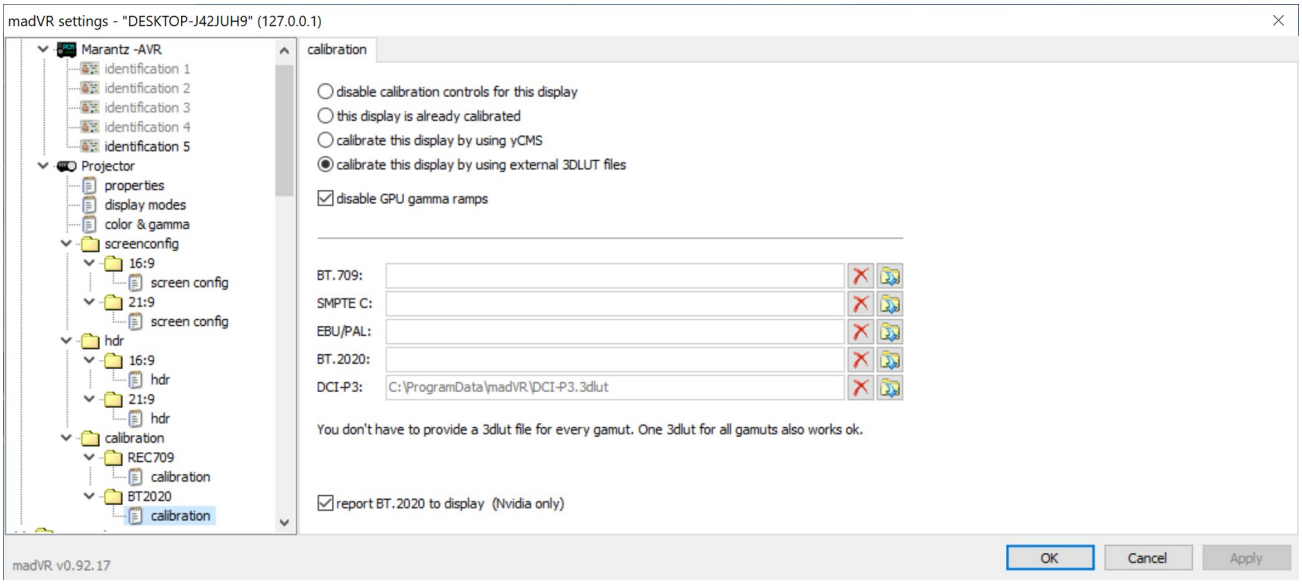


- Voor contrast recovery kan gekozen worden uit een aantal HSTM curve’s. Op dit moment geef ik de voorkeur aan Manni’s L80.
- De predefined Mercury TM curve geeft erg mooie resultaten, dit in combinatie met een punch setting van 10
- Lum method op lum3/4 mod: green 678
- Shadow recovery op low
- Highlight recovery disabled
- Dynamic target nits op ongeveer 2/3 van display peak luminance nits.

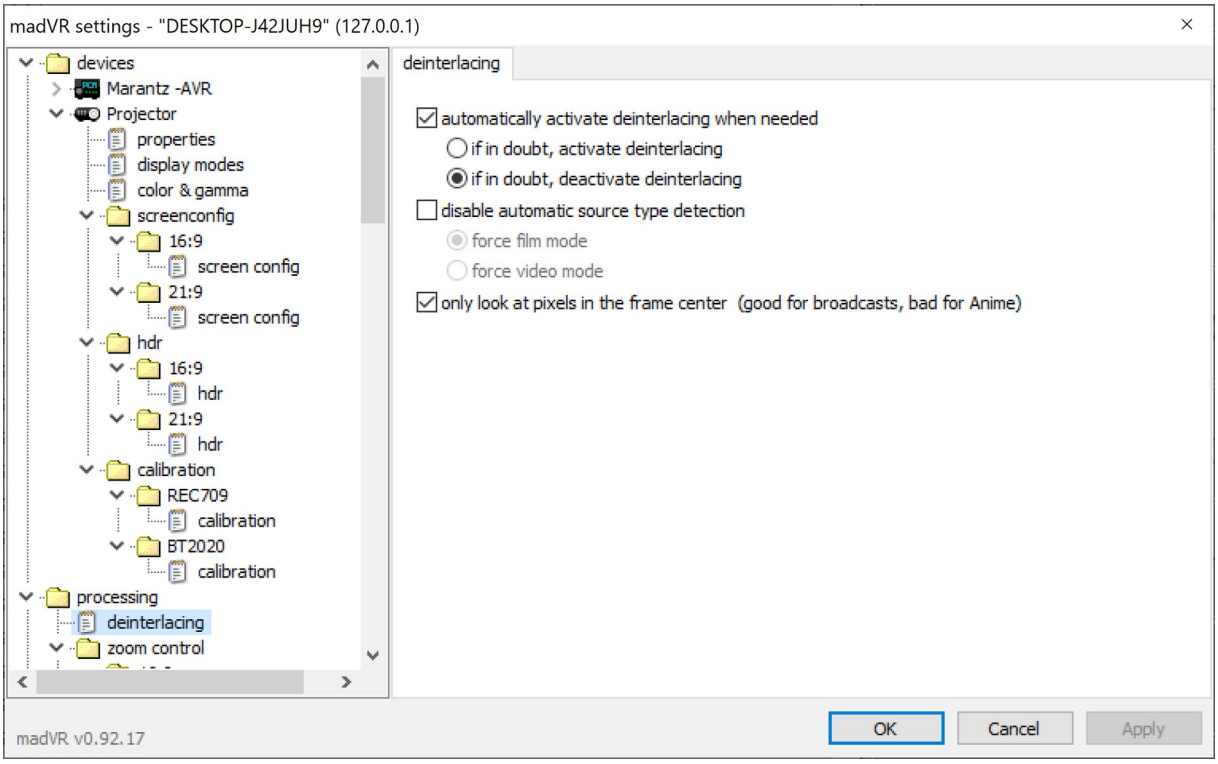
8.3.3 Calibration

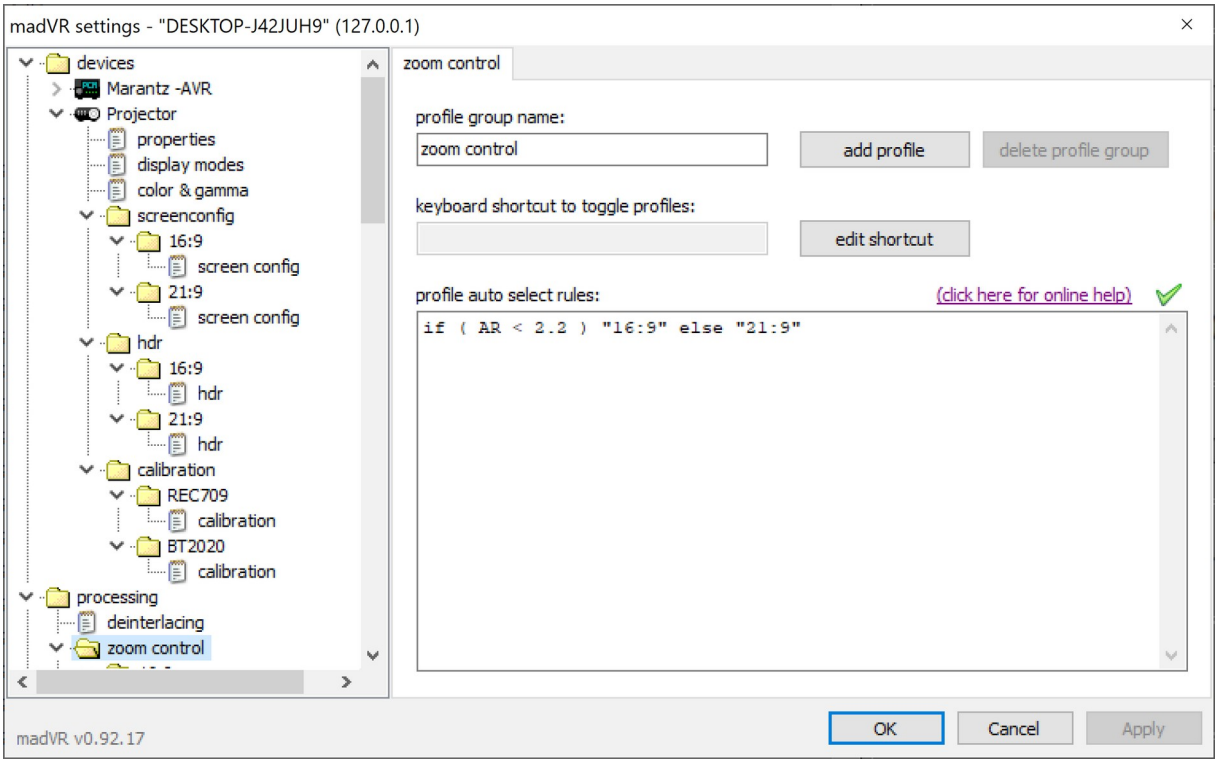


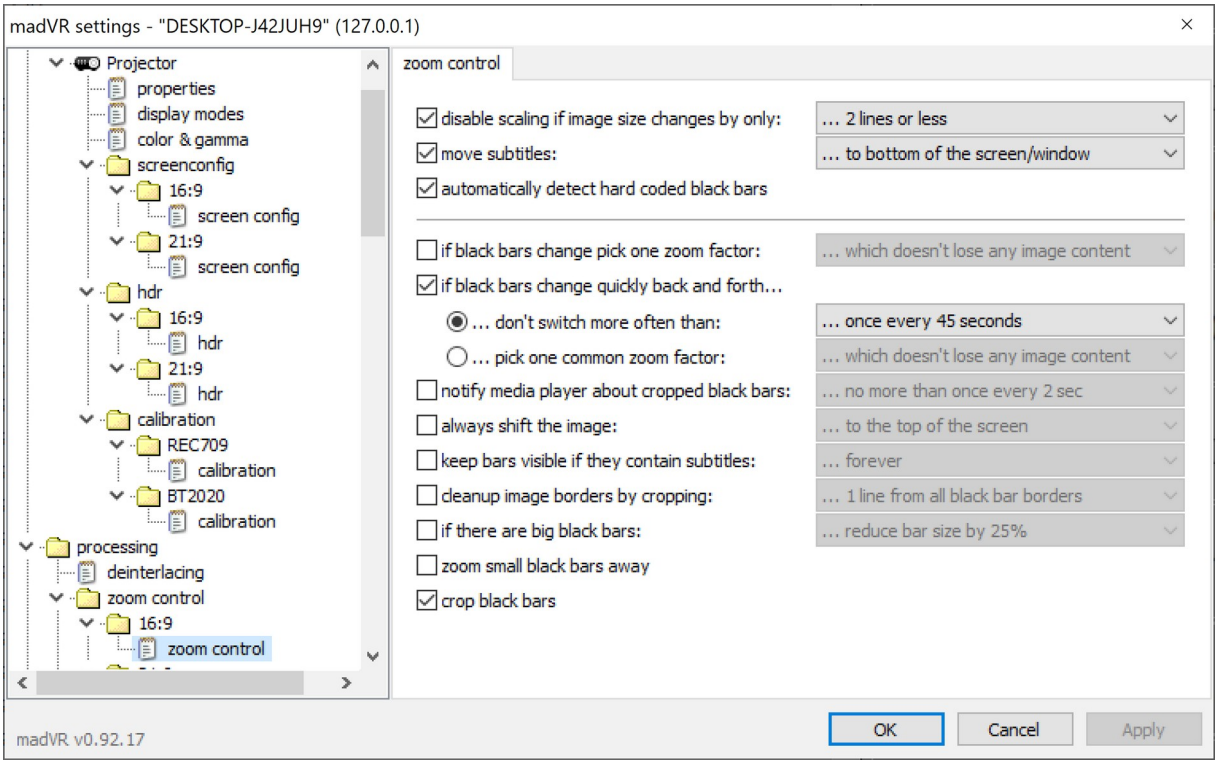

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
devices
Marantz -AVR
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
processing
deinterlacing
zoom control
calibration
disable calibration controls for this display
this display is already calibrated
calibrate this display by using yCMS
calibrate this display by using external 3DLUT files
disable GPU gamma ramps
BT.709:
C:\ProgramData\madVR\madVR 2020-01-12 18-20 0.3127x 0.329y S XYZLUT-
SMPTE C:
EBU/PAL:
BT.2020:
DCI-P3:
You don't have to provide a 3dlut file for every gamut. One 3dlut for all gamuts also works ok.
report BT.2020 to display (Nvidia only)
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
Marantz -AVR
identification 1
identification 2
identification 3
identification 4
identification 5
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
calibration
disable calibration controls for this display
this display is already calibrated
calibrate this display by using yCMS
calibrate this display by using external 3DLUT files
disable GPU gamma ramps
BT.709:
SMPTE C:
EBU/PAL:
BT.2020:
DCI-P3:
C:\ProgramData\madVR\DCI-P3.3dlut
You don't have to provide a 3dlut file for every gamut. One 3dlut for all gamuts also works ok.
report BT.2020 to display (Nvidia only)
madVR v0.92.17
OK
Cancel
Apply

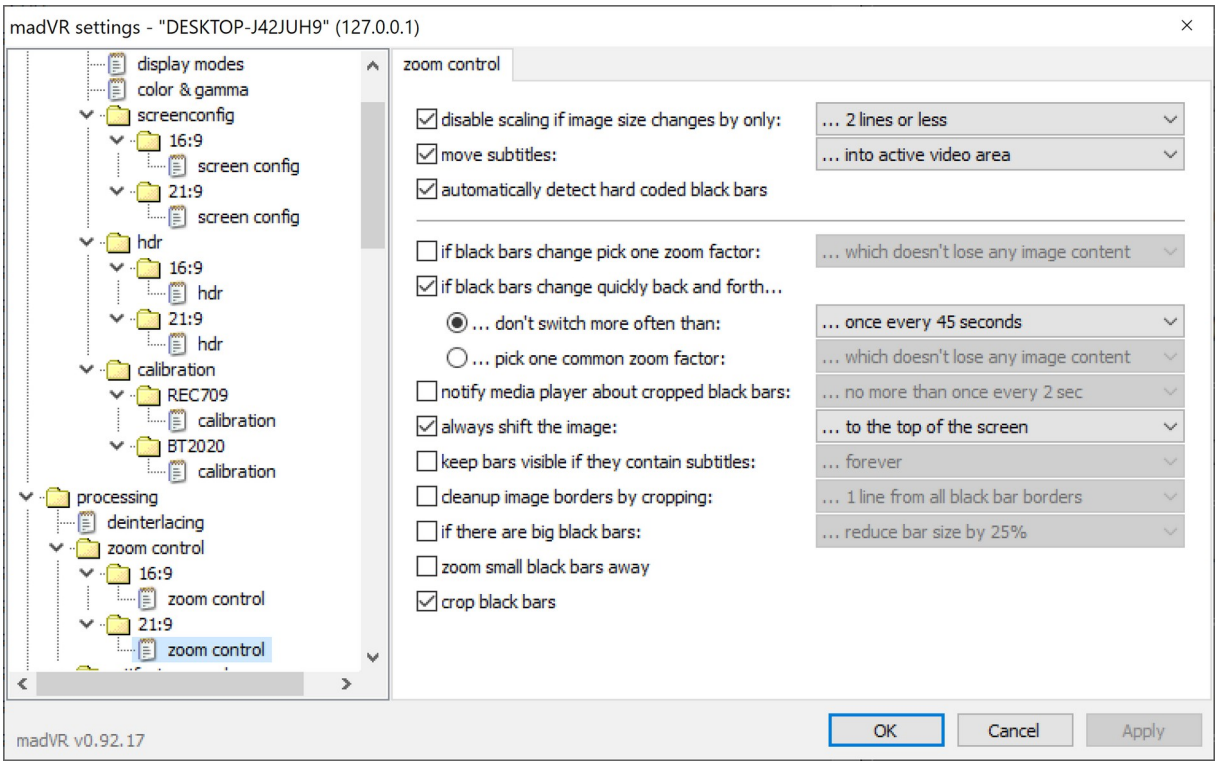
8.4 Processing



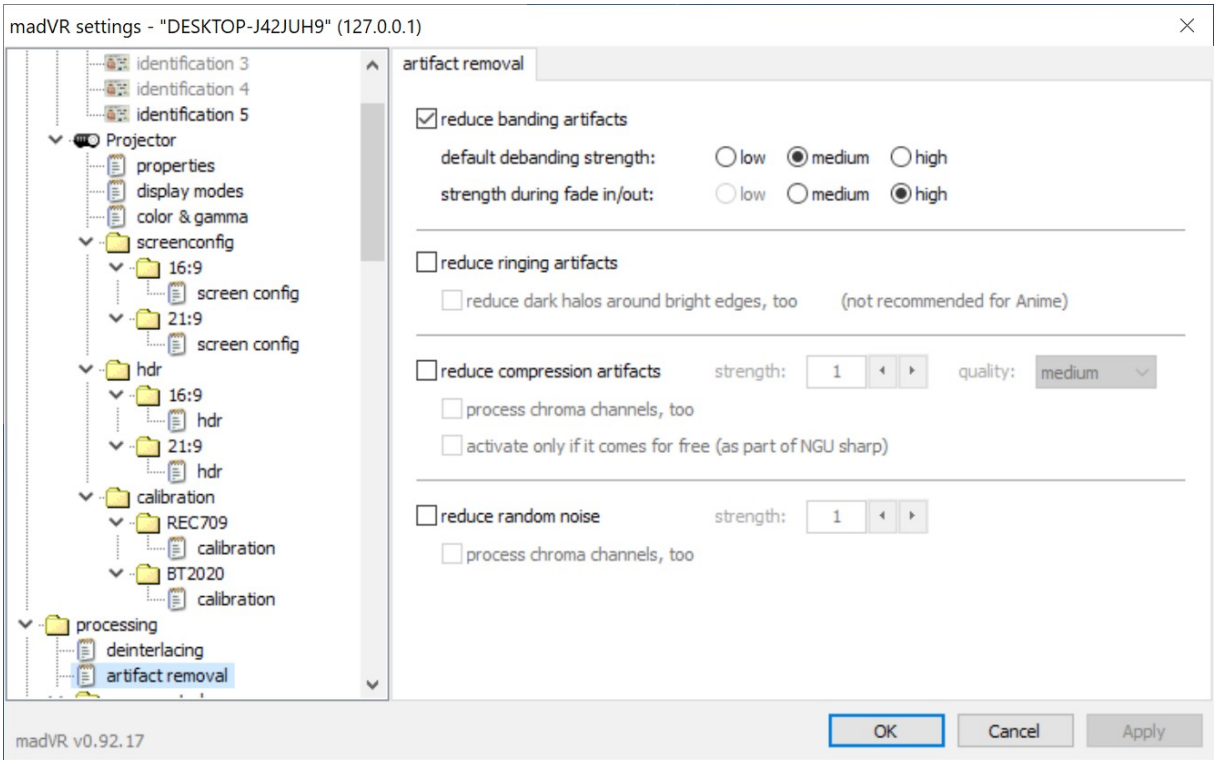




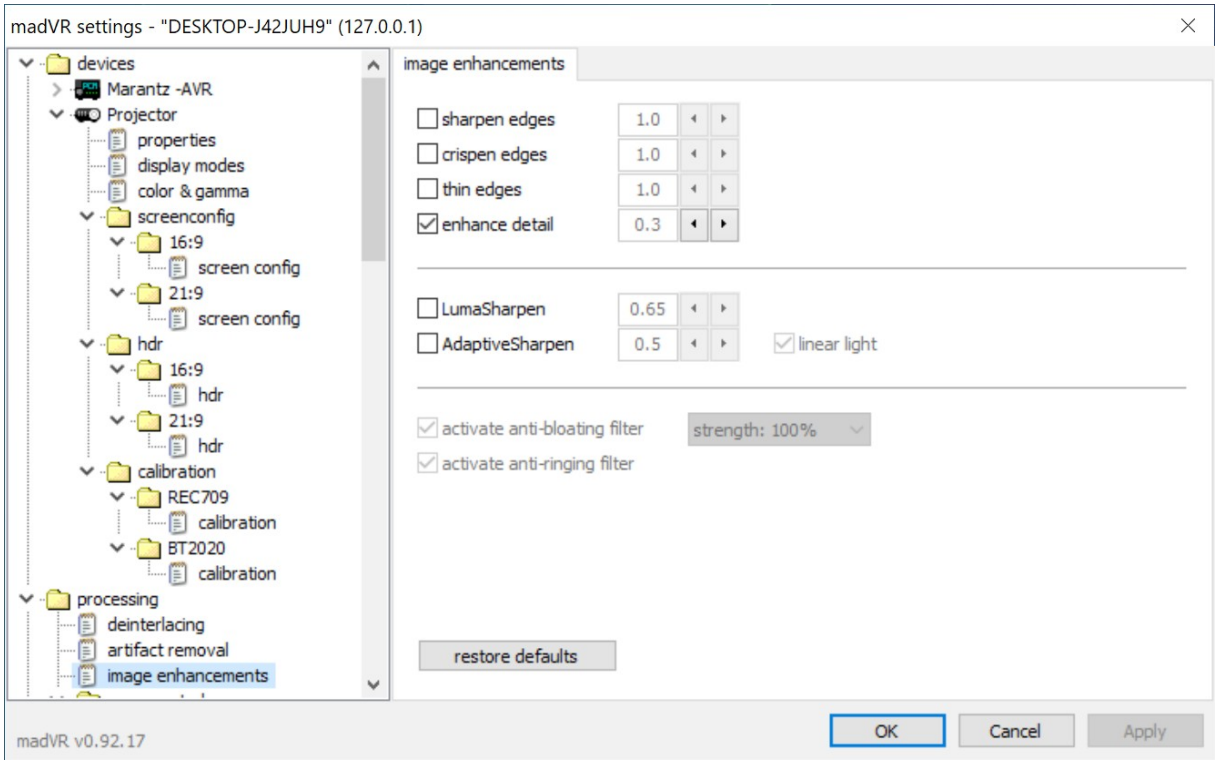
Sommige netflix series hebben een afwijkende aspect ratio waardoor in 16:9 zoom mode er toch kleine zwarte balken onder en boven ontstaan, om te voorkomen dat madvr in 16:9 zoom mode toch de video omhoog gaat schuiven heb ik ervoor gekozen om op basis van aspect ratio te zorgen dat er in 16:9 zoom mode de optie “always shift the image” uit staat.



- Verwijder black bars zodat MadVR onderscheid kan maken tussen 16:9 en cinemascope aspect ratio movies. Black bars zijn namelijk hard encoded op blu-ray, waardoor de aspect ratio altijd 16:9 is en de resolutie altijd 1920x1080, ongeacht of de film zelf in 16:9 of cinemascope formaat is.
- Zoom small black bars away niet gebruiken! Dit kost teveel GPU performance.



- Artifact removal



- Image enhancements vind plaats VOOR de (chroma) upscaling en dus direkt op het bron materiaal. Upscaling Refinement vind plaats NA de (chroma) upscaling. Ik kom tot de conclusie dat “crispen edges” en “enhance detail” aanzetten bij beiden het beste resultaat geeft.
- Echter crispen edgesvoor upscaling kost teveel GPU performance en die enable ik daarom alleen NA upscaling bij upscaling refinement. Enhance detail kan wel ongestraft bij beiden gebruikt worden.
- De waarde voor enhance detail heb ik op 0.3 staan voor een in mijn ogen natuurlijk plaatje.

8.5 Scaling

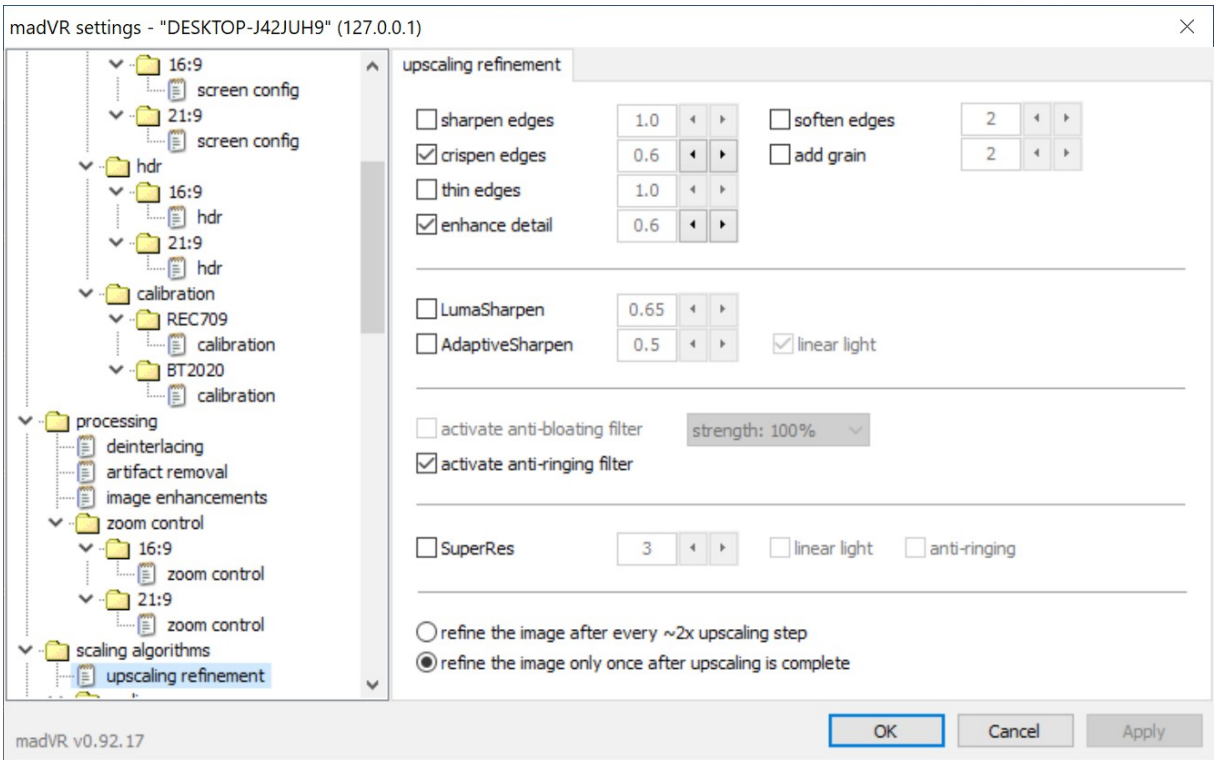
Most video is stored using chroma subsampling in a 4:2:0 video format. In simple terms, what this means is that the video is basically stored as a black-and-white “detail” image (luma) with a lower resolution “color” image (chroma) layered on top. This works because the detail image helps to mask the low resolution of the color image that is being layered on top.

So the scaling options in madVR are broken down into three different categories: **Chroma Upscaling**, which is the color layer. **Image Upscaling**, which is the detail (luma) layer.**Image downscaling**, which only applies when the image is being displayed at a lower resolution than the source—1080p content on a 720p display, or in a window on a 1080p display for example.

Chroma upscaling is performed on all videos—it takes the quarter resolution chroma image, and upscales it to the native luma resolution of the video. If there is any further scaling to be performed; whether that is up-scaling or downscaling, then the image upscaling/downscaling algorithm is applied to both chroma and luma.

- Voor het kwalitatief beste resultaat is het aan te raden om voor chroma upsampling en image upsampling hetzelfde algoritme te kiezen
- Hoge kwaliteit image upscaling (of downscaling) is belangrijker is (qua subjectieve weergave perceptie) dan dezelfde kwaliteit chroma upscaling. Dit is uiteraard niet van toepassing als er alleen chroma upscaling nodig is.
- If you have a high-quality source (ie. artifact free), then NGU Sharp is likely going to be better.
- On sources with artifacts, NGU Anti-Alias is superior, since it manages to hide certain amounts of artifacts, while NGU Sharp would emphasize them to some degree. Om deze reden kies ik dus voor NGU Anti-Alias als preferred upscaling algoritme.

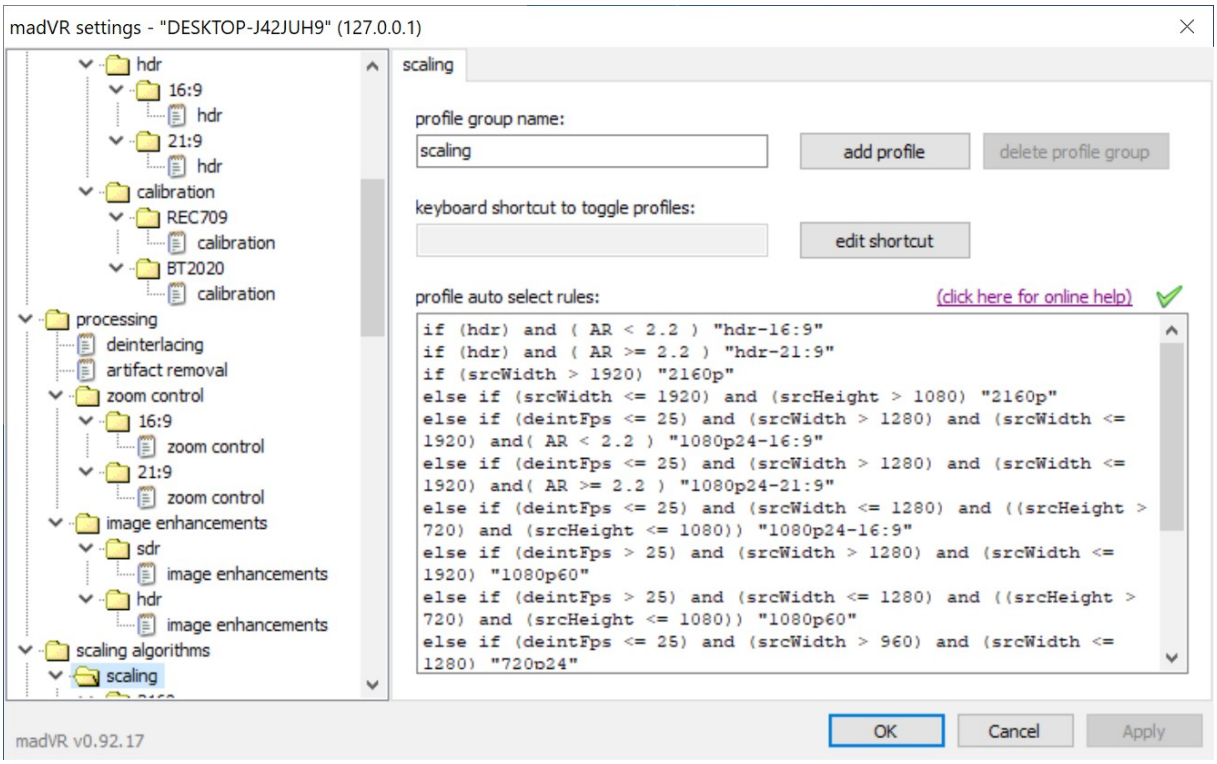
8.5.1 Upscaling Refinement



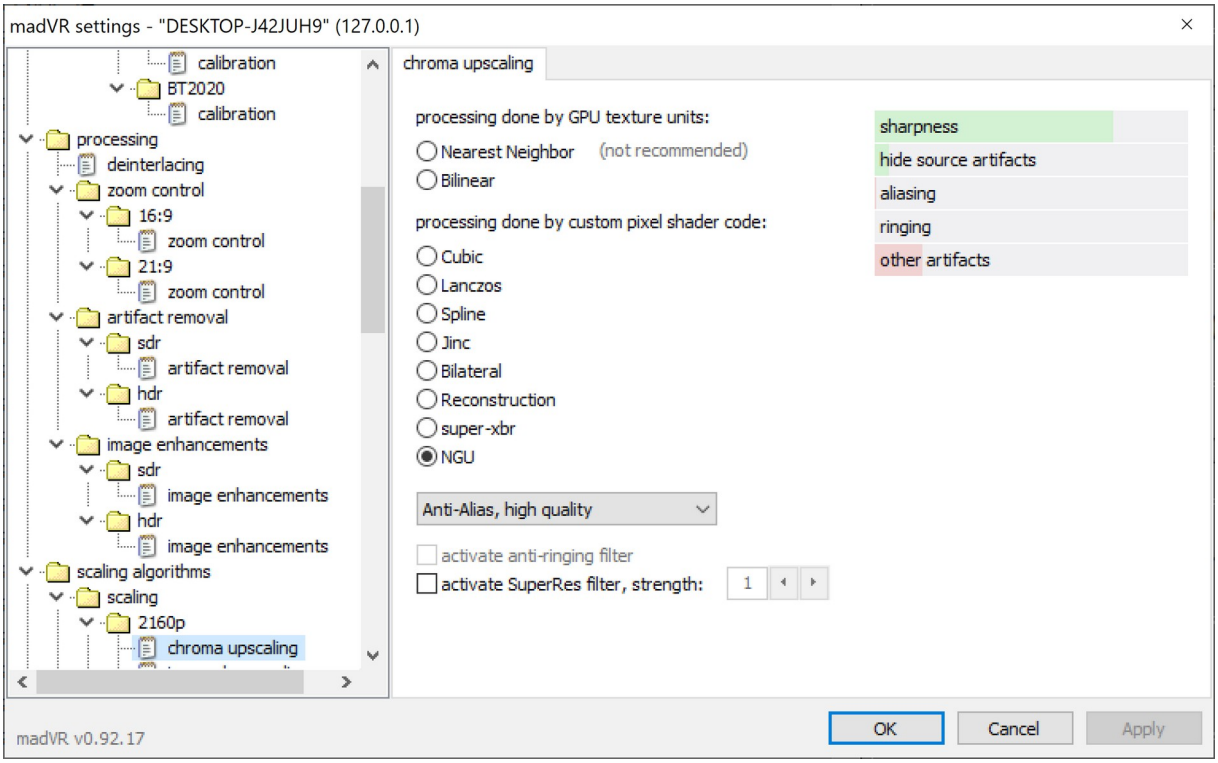
- Sharpen edges: [1.0] Only sharpens edges instead of textures like skin or cloth. Avoids sharpening artifacts too much.
- Crispen edges: [1.0] A tamed version of FineSharp, a sharpener originally by Didée that attempts to keep local energy close to the original. Better used with higher quality sources because it sharpens artifacts.
- Thin edges: [1.0] As its name implies. Good for SD Anime or cartoons.
- Enhance detail: [1.0] Sharpens textures like skin or cloth, also sharpens artifacts.
- LumaSharpen: [0.65] Blurs the original pixel with the surrounding pixels and then subtracts the blur. Avoids sharpening artifacts.
- AdaptiveSharpen: [0.5] Tries to sharpen medium sharp edges the most, it avoids sharpening near flat areas and very sharp edges.
- Activate anti-ringing filter: A post process method to reduce ringing that runs after each ringing sharpener.

SuperRes: [3] This is a post process method. use linear light: Ideally use the same method that the source was originally downscaled with when it was mastered

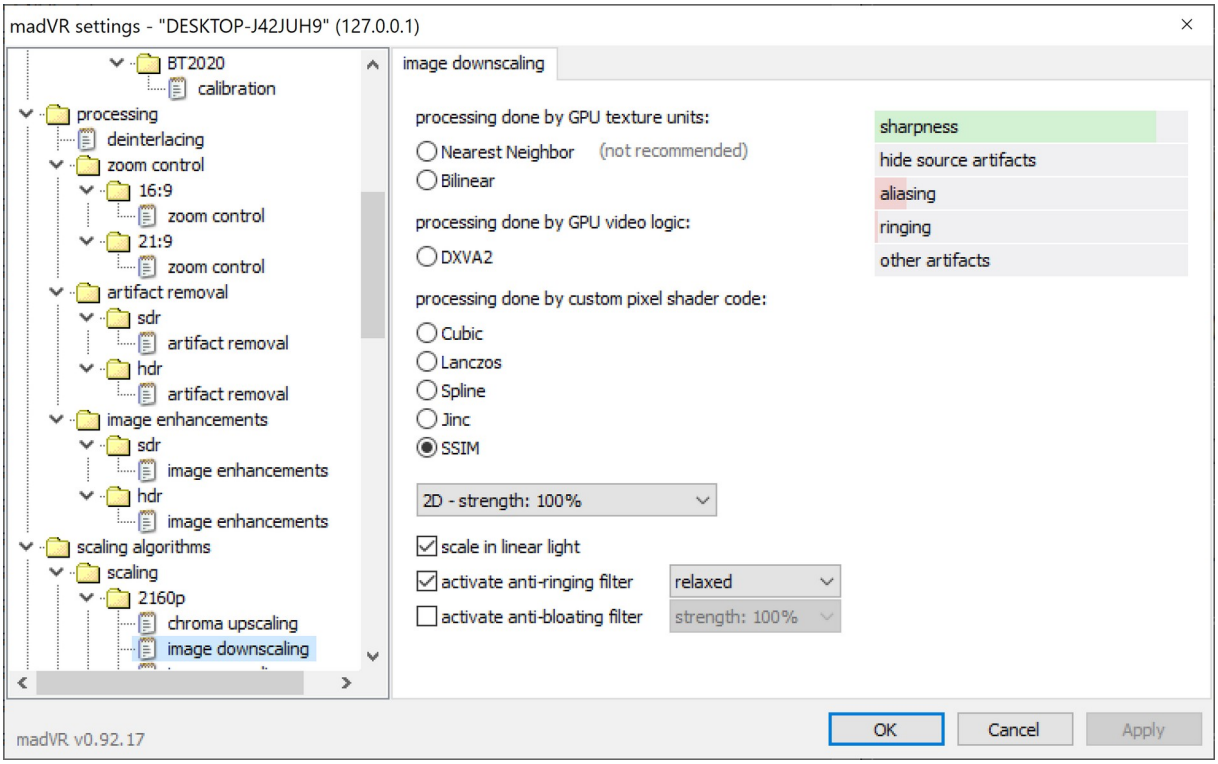
8.5.2 Upscaling rules



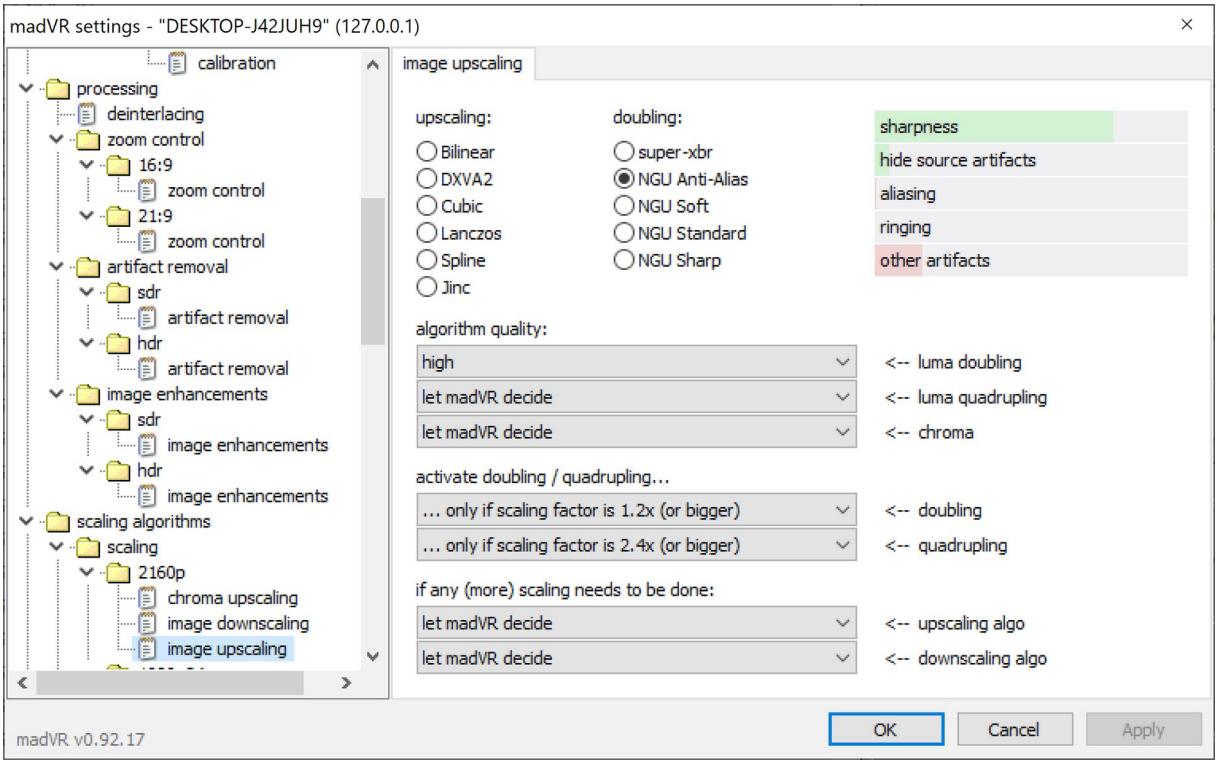
8.5.3 Chroma upscaling van 2160p content



- Alleen de Chroma upscaling settings zijn relevant voor dit type content.



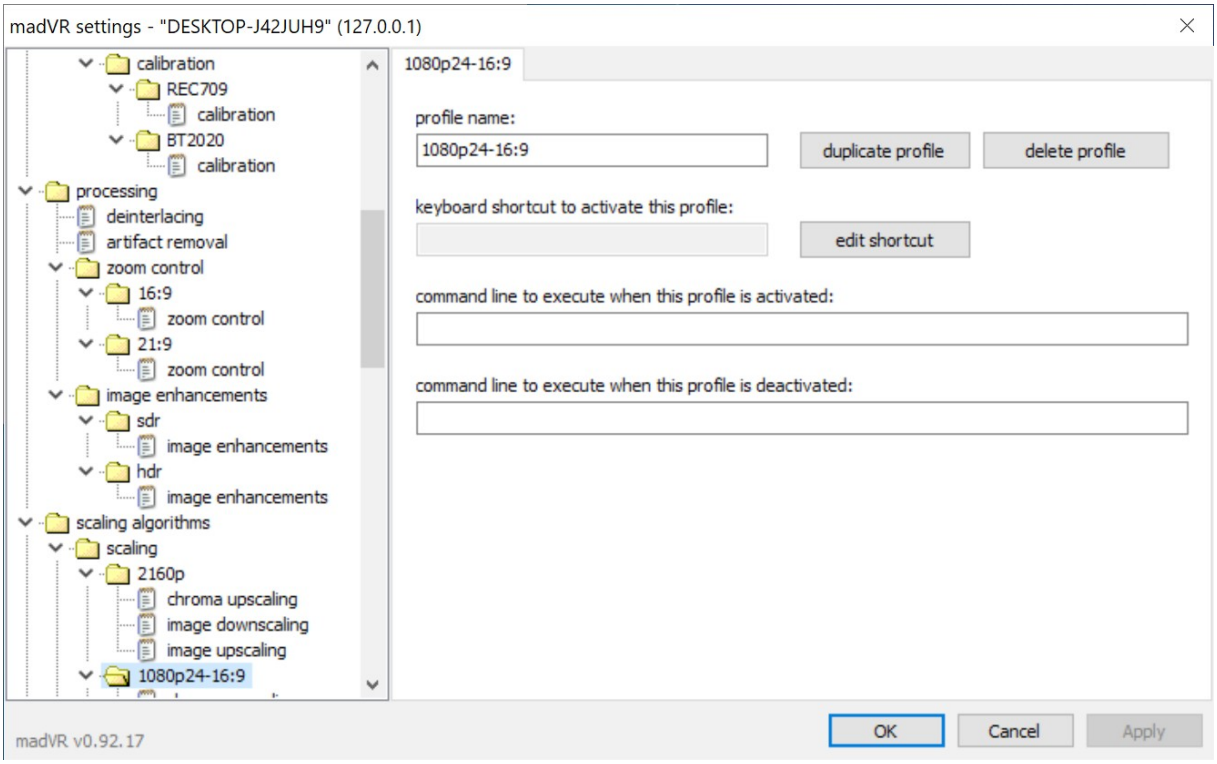
- Image downscaling is niet aan de orde voor dit type content.

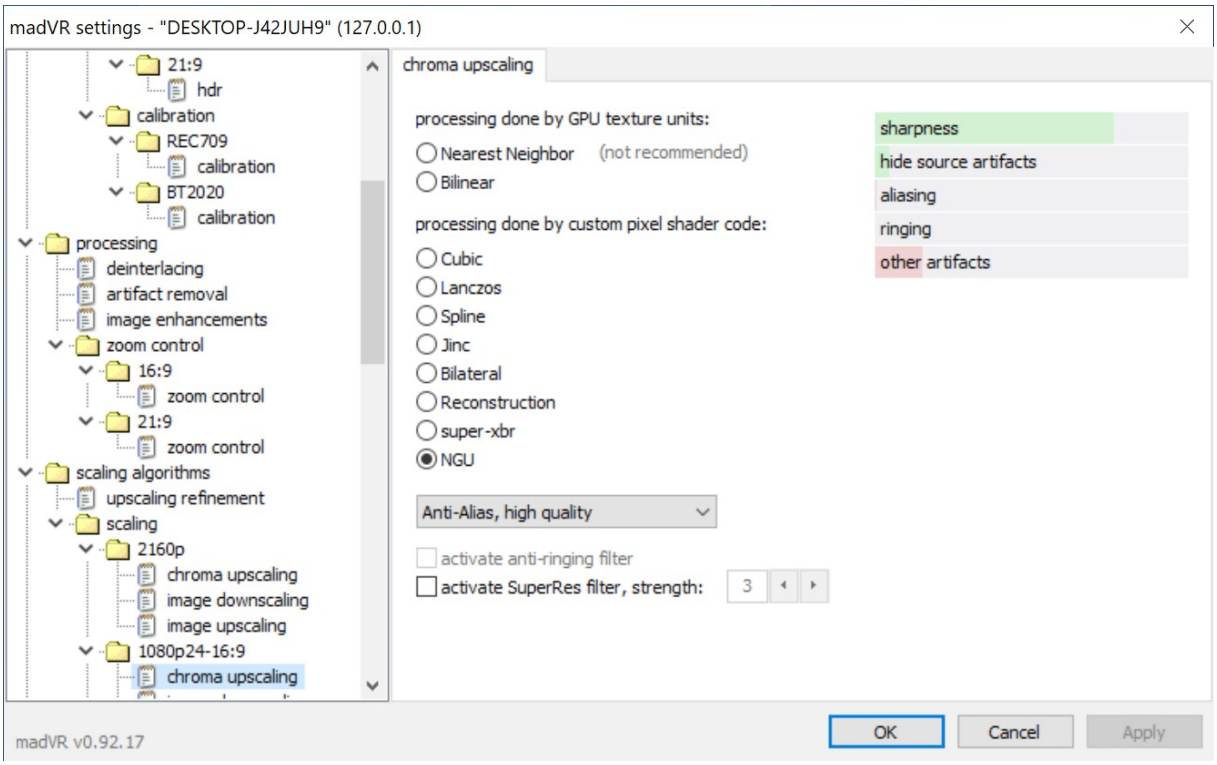


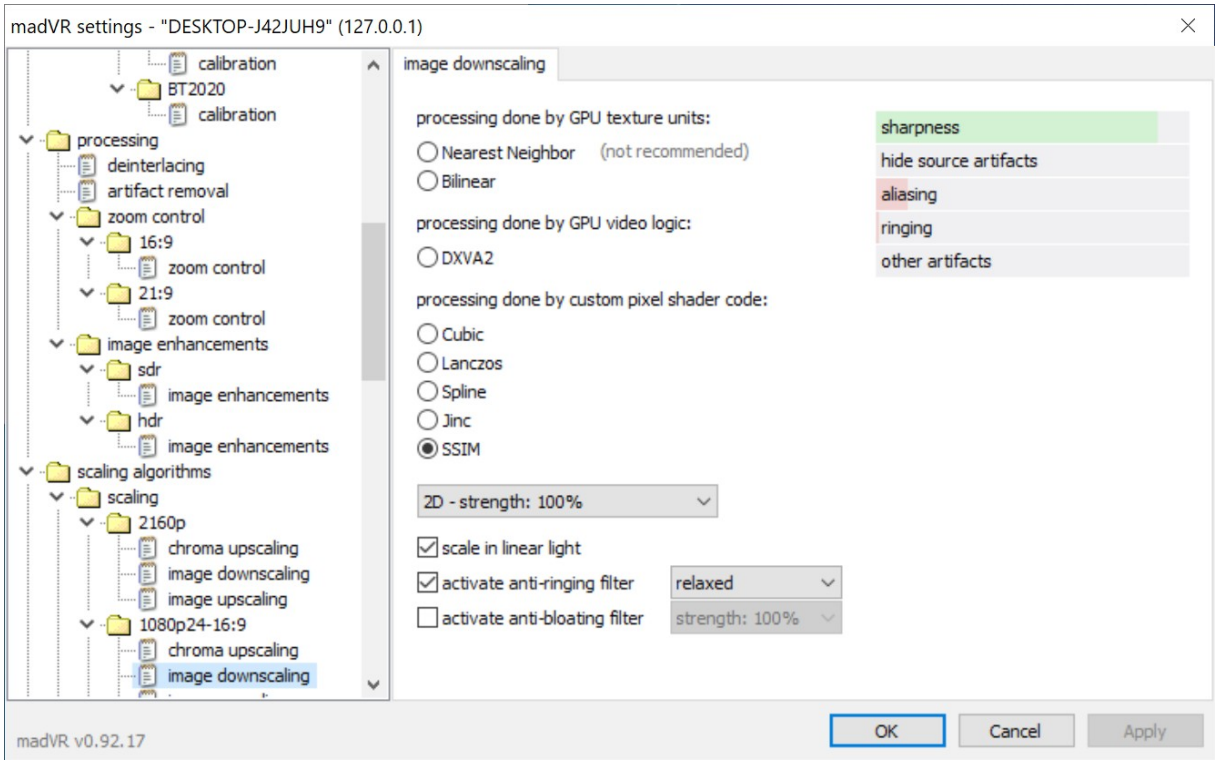
- Image upscaling is niet aan de orde voor dit type content.

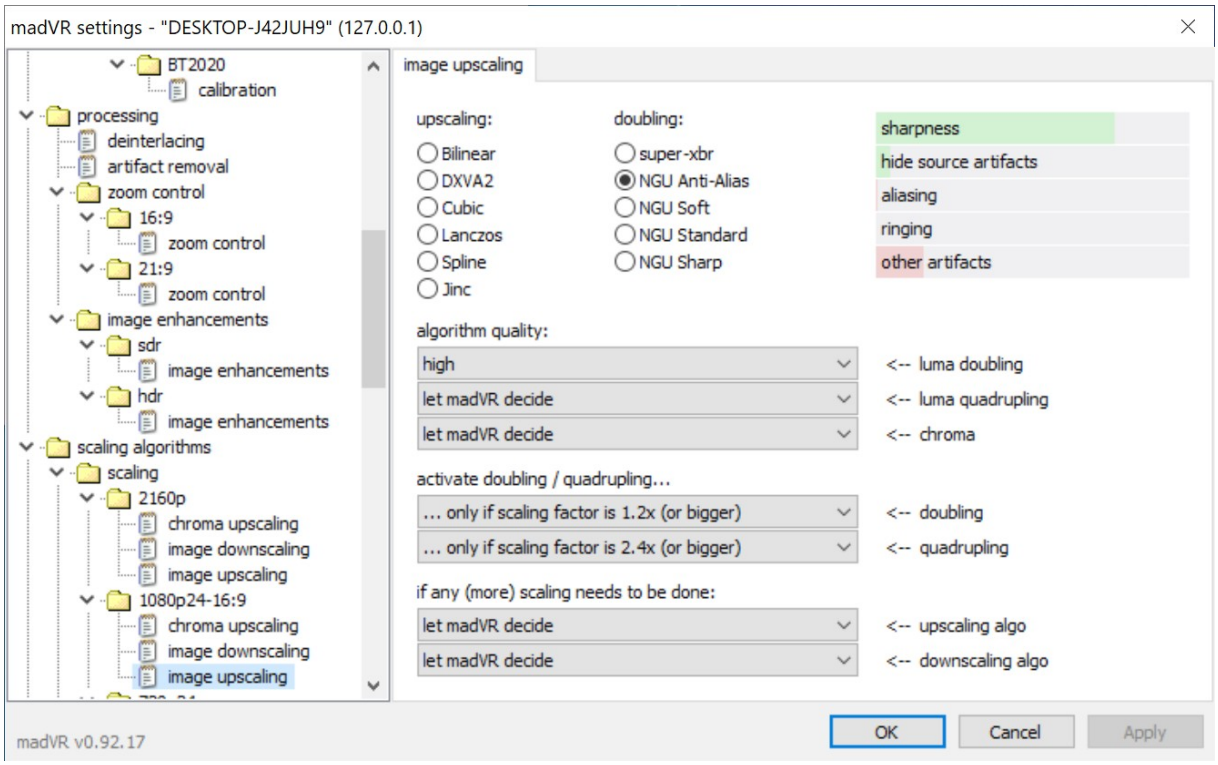
8.5.4 Image upscaling 1080p@24fps content naar 2160p

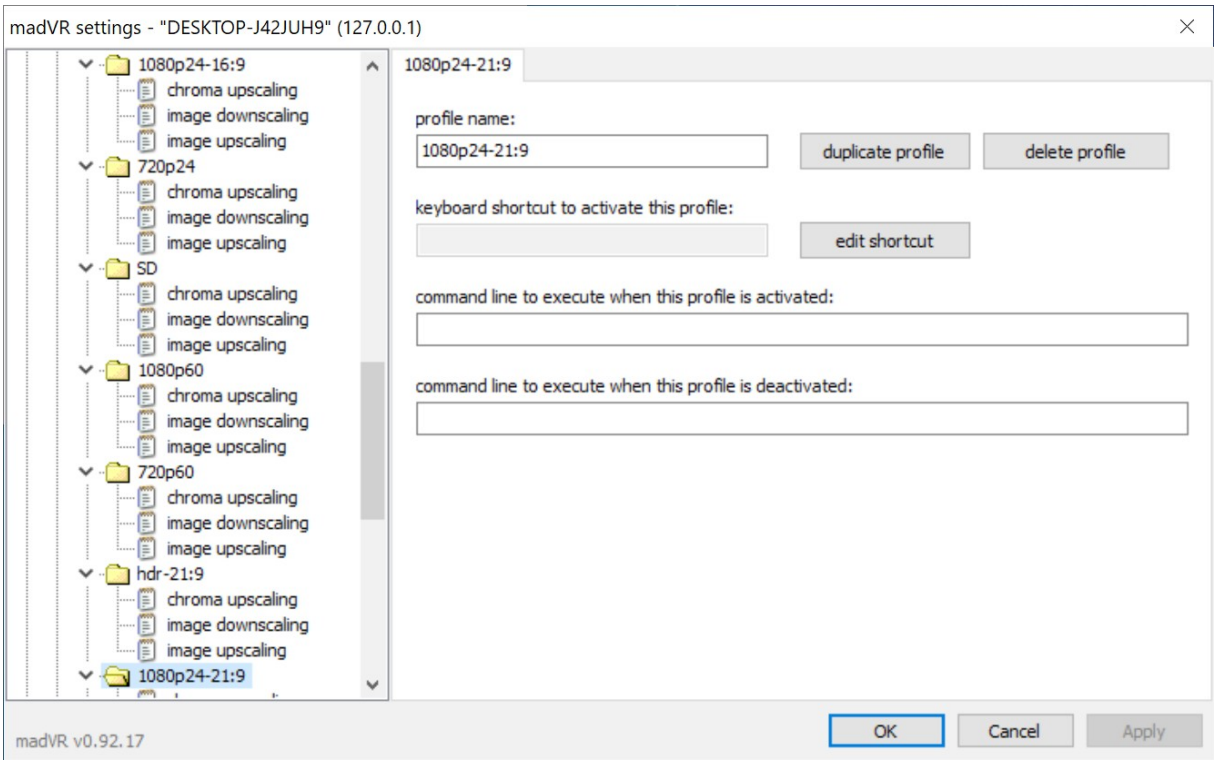
Om het onderste uit de kan te halen met mijn RTX2070 videokaart maak ik bij HDR een onderscheid tussen 16:9 en 21:9 materiaal. 21:9 materiaal vereist immers minder processing wegens de zwarte balken en kan daarom in iets hogere settings draaien. Met mijn RTX2070 kaart is high bij 16:9 de hoogst mogelijke setting. Bij 21:9 kan ik echter de very high quality setting kiezen.

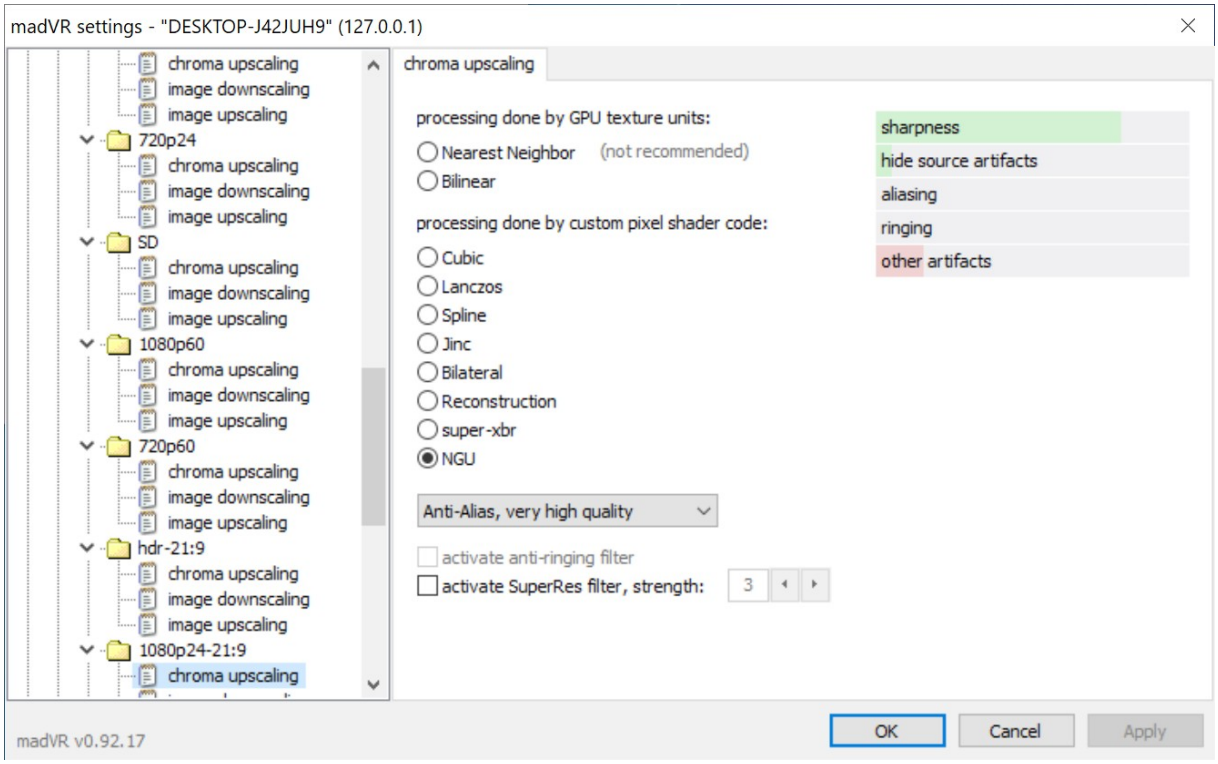


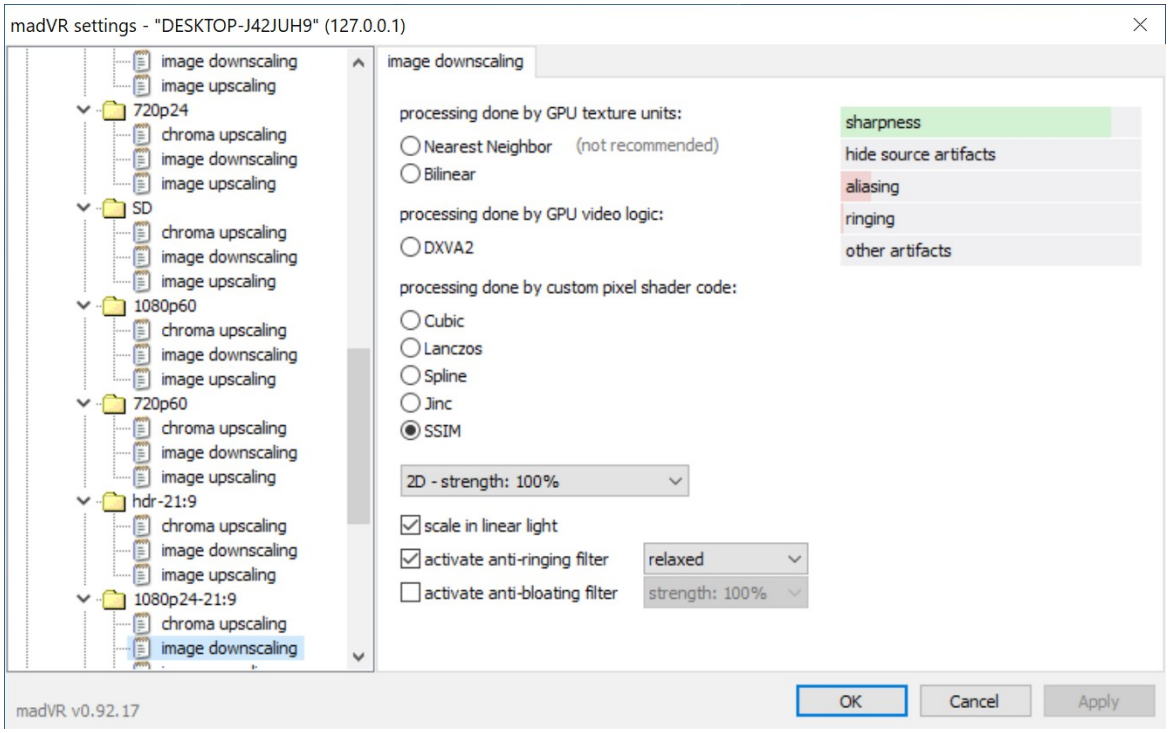

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
processing
deinterlacing
artifact removal
image enhancements
zoom control
16:9
zoom control
21:9
zoom control
scaling algorithms
upscaling refinement
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
chroma upscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
Bilateral
Reconstruction
super-xbr
NGU
Anti-Alias, high quality
activate anti-ringing filter
activate SuperRes filter, strength: 3
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply

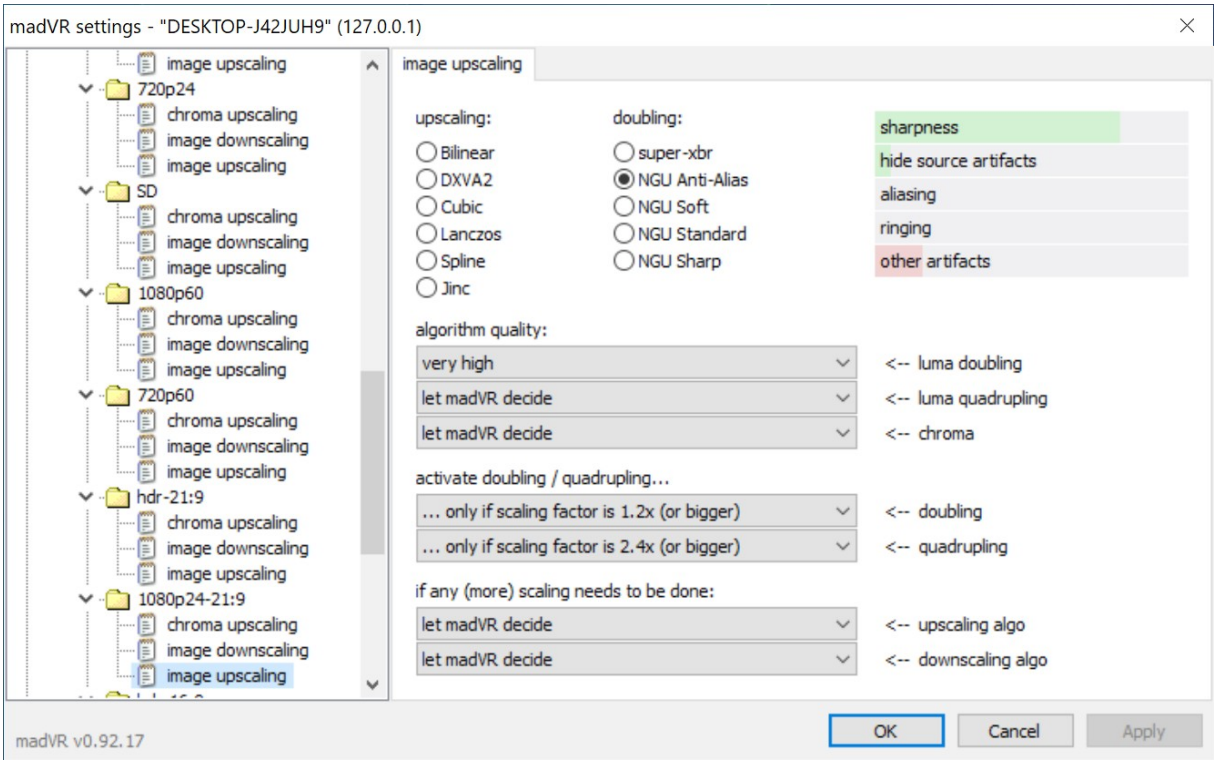

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
calibration
BT2020
calibration
processing
deinterlacing
artifact removal
zoom control
16:9
zoom control
21:9
zoom control
image enhancements
sdr
image enhancements
hdr
image enhancements
scaling algorithms
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by GPU video logic:
DXVA2
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
SSIM
2D - strength: 100%
scale in linear light
activate anti-ringing filter
relaxed
activate anti-bloating filter
strength: 100%
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
BT2020
calibration
processing
deinterlacing
artifact removal
zoom control
16:9
zoom control
21:9
zoom control
image enhancements
sdr
image enhancements
hdr
image enhancements
scaling algorithms
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
high
<-- luma doubling
let madVR decide
<-- luma quadrupling
let madVR decide
<-- chroma
activate doubling / quadrupling...
... only if scaling factor is 1.2x (or bigger)
<-- doubling
... only if scaling factor is 2.4x (or bigger)
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
<-- upscaling algo
let madVR decide
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

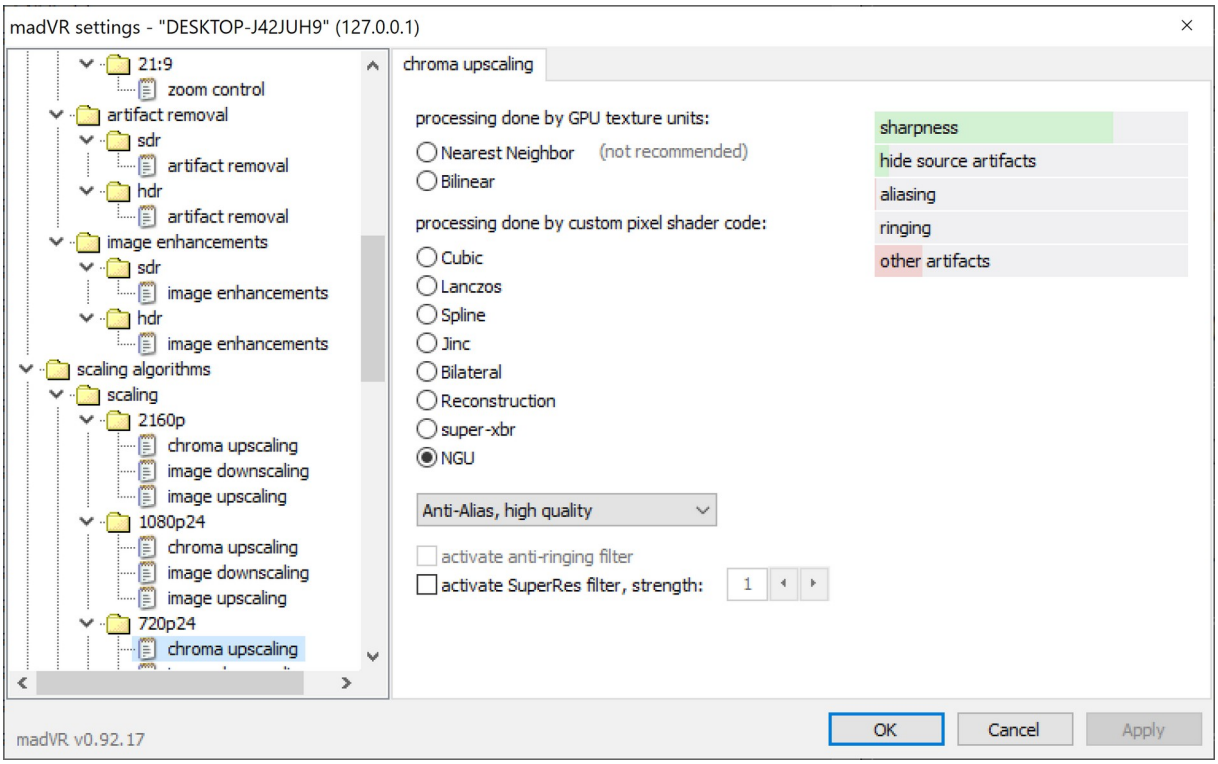

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
1080p24-21:9
profile name:
1080p24-21:9
duplicate profile
delete profile
keyboard shortcut to activate this profile:
edit shortcut
command line to execute when this profile is activated:
command line to execute when this profile is deactivated:
madVR v0.92.17
OK
Cancel
Apply

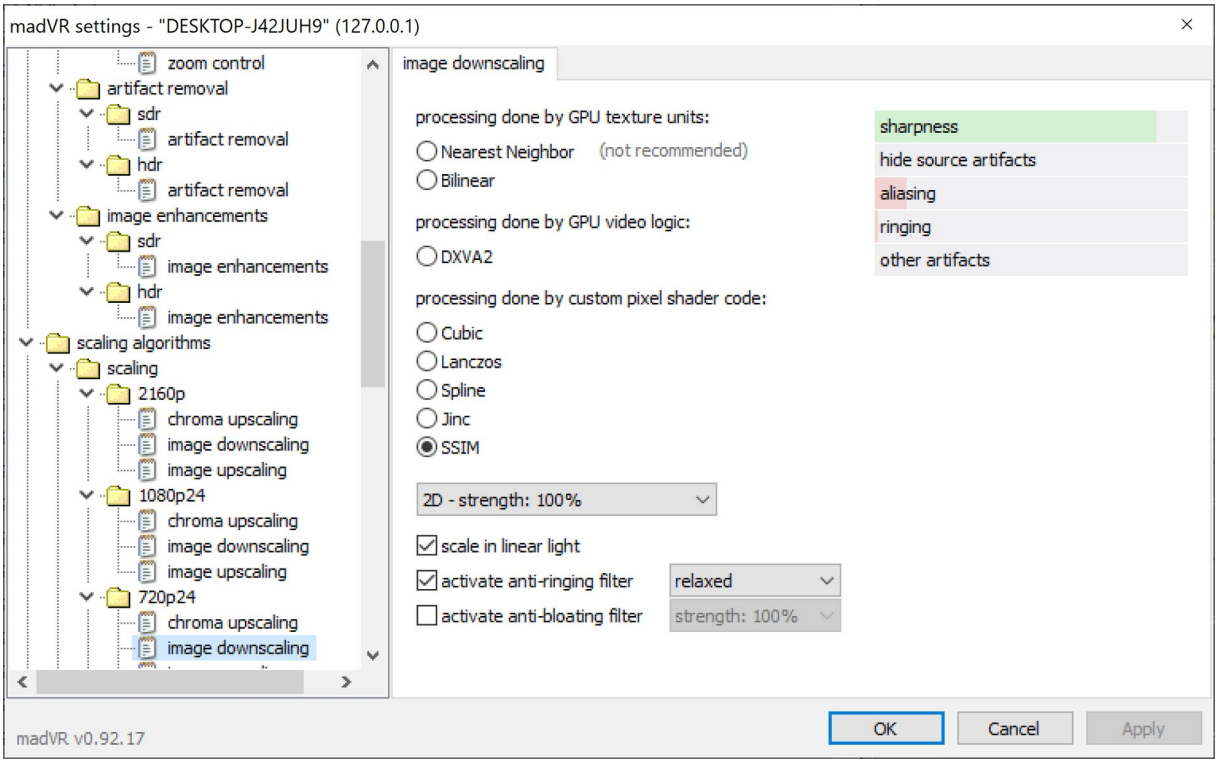

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
chroma upscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
Bilateral
Reconstruction
super-xbr
NGU
Anti-Alias, very high quality
activate anti-ringing filter
activate SuperRes filter, strength:
3
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply

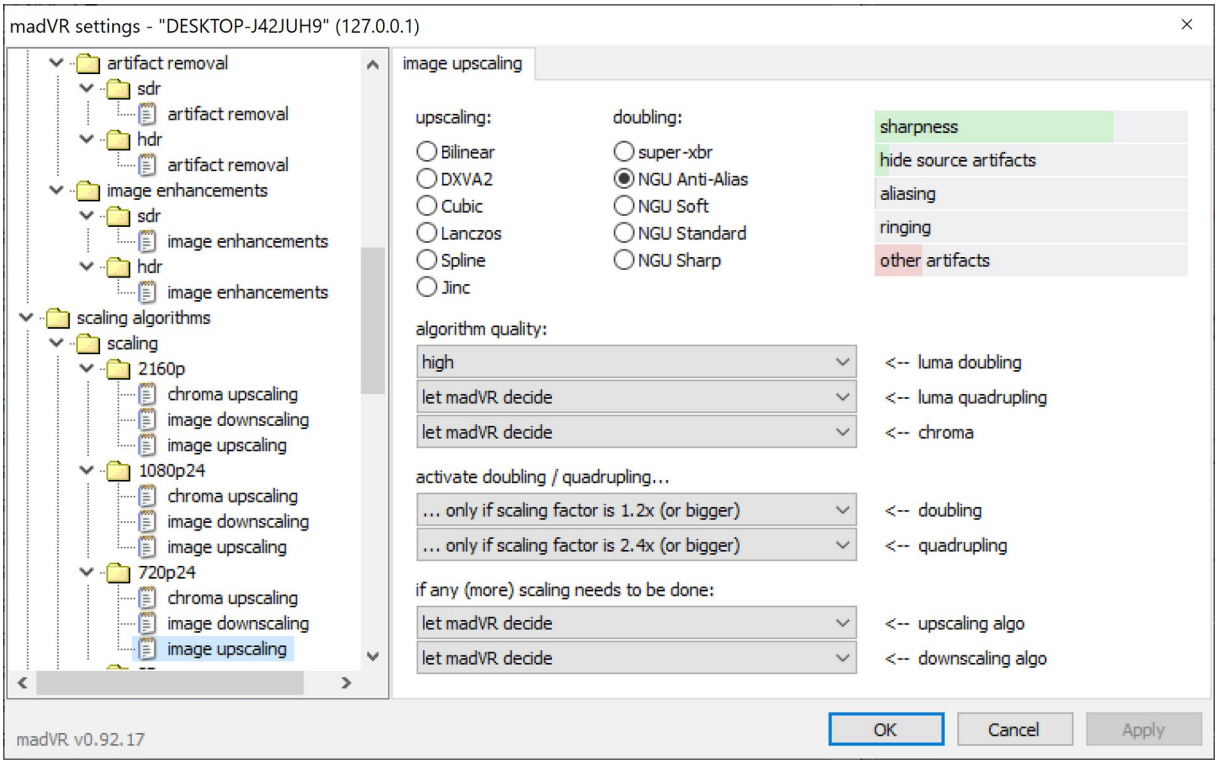

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image downscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by GPU video logic:
DXVA2
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
SSIM
2D - strength: 100%
scale in linear light
activate anti-ringing filter
relaxed
activate anti-bloating filter
strength: 100%
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
very high
<-- luma doubling
let madVR decide
<-- luma quadrupling
let madVR decide
<-- chroma
activate doubling / quadrupling...
... only if scaling factor is 1.2x (or bigger)
<-- doubling
... only if scaling factor is 2.4x (or bigger)
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
<-- upscaling algo
let madVR decide
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

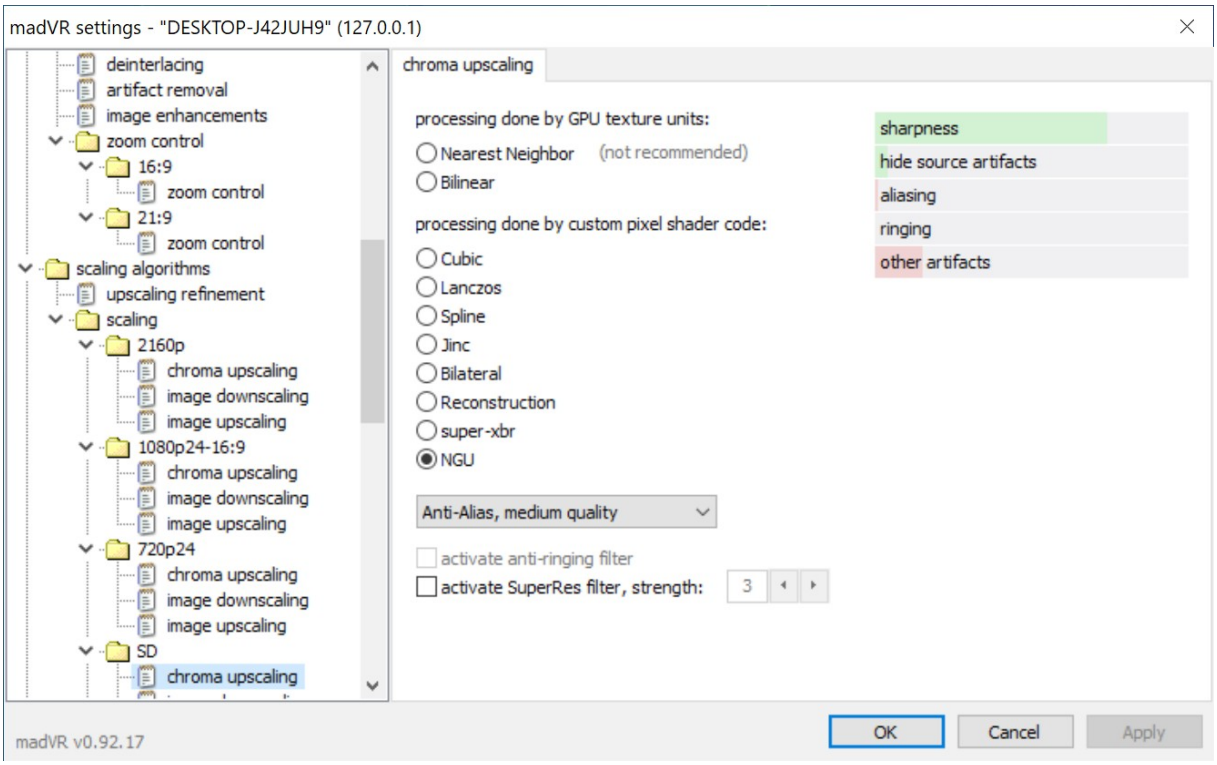
8.5.5 Upscaling 720p@24fps content naar 2160p

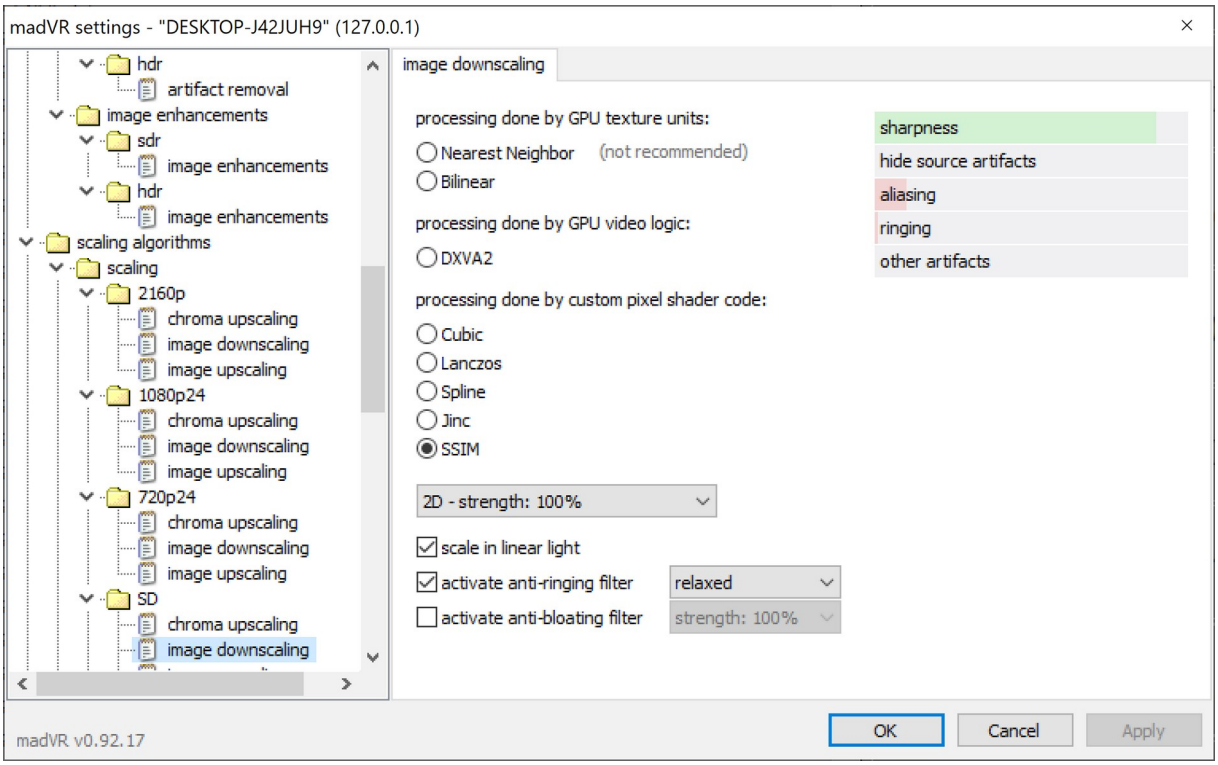


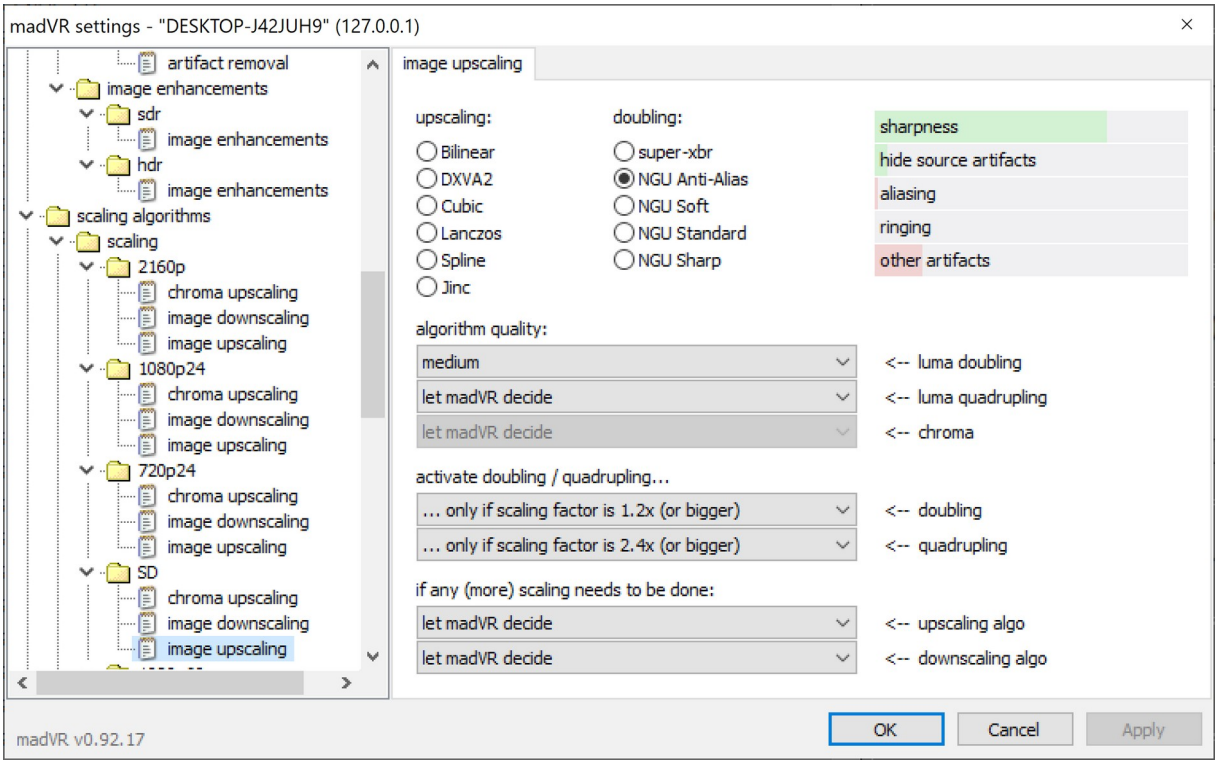



madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
artifact removal
sdr
artifact removal
hdr
artifact removal
image enhancements
sdr
image enhancements
hdr
image enhancements
scaling algorithms
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
high
let madVR decide
let madVR decide
<-- luma doubling
<-- luma quadrupling
<-- chroma
activate doubling / quadrupling...
... only if scaling factor is 1.2x (or bigger)
... only if scaling factor is 2.4x (or bigger)
<-- doubling
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
let madVR decide
<-- upscaling algo
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

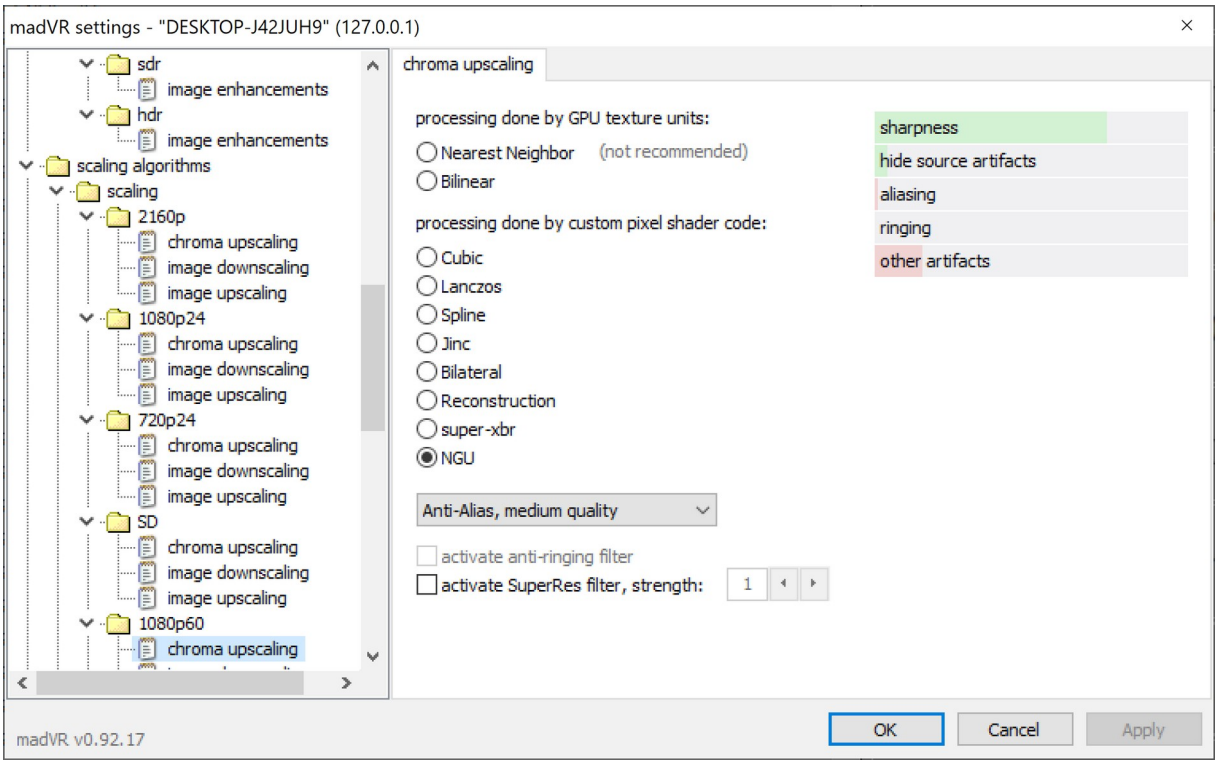
8.5.6 Upscaling SD content naar 2160p

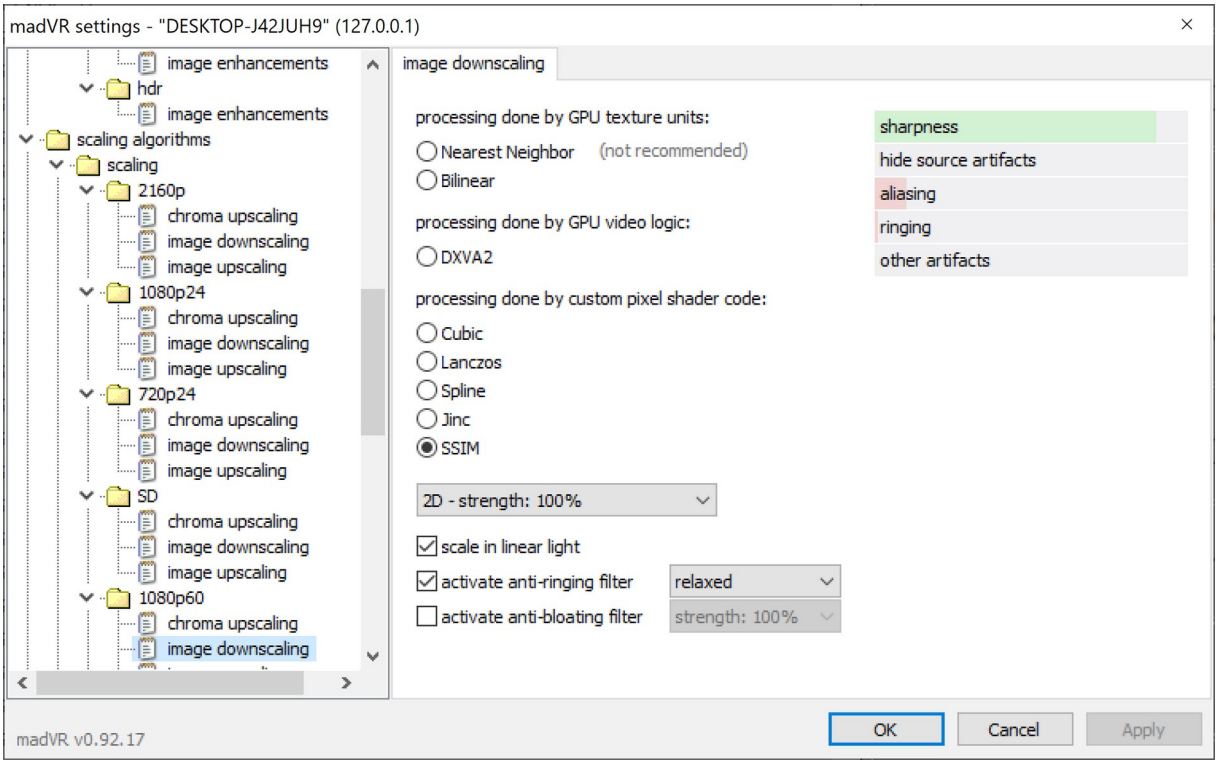


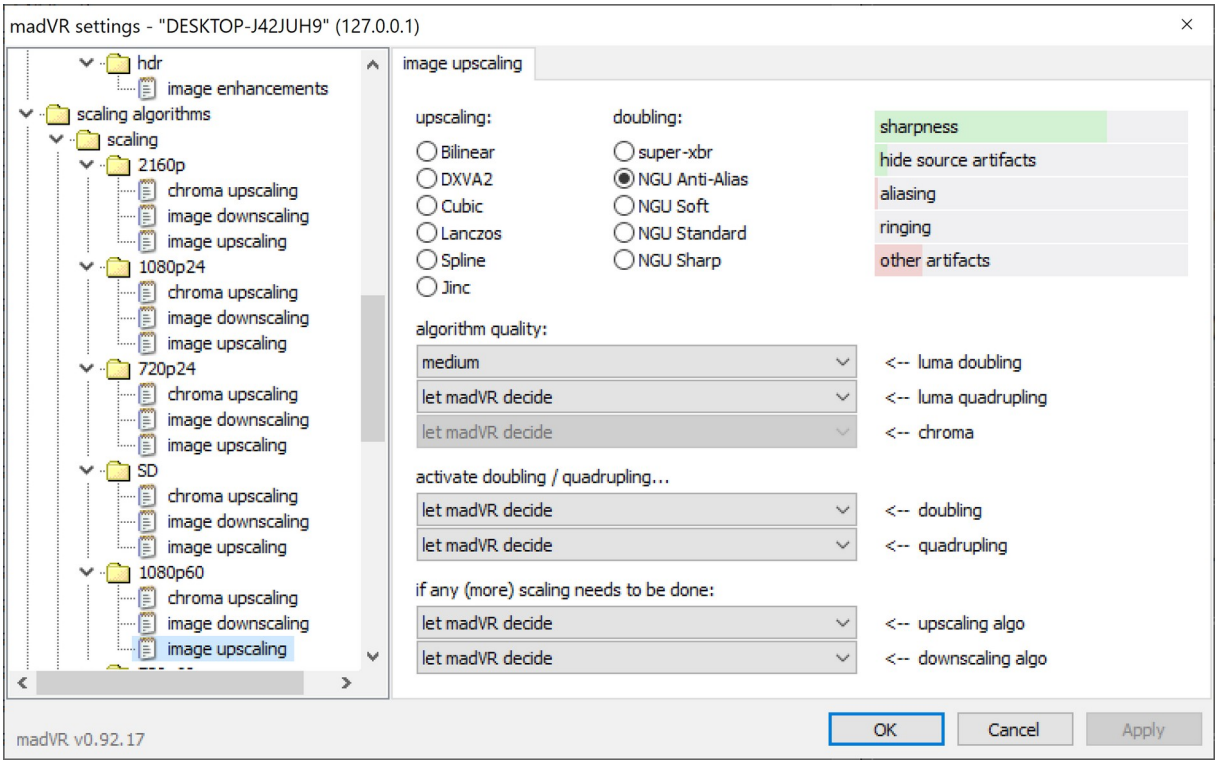



madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
artifact removal
image enhancements
sdr
image enhancements
hdr
image enhancements
scaling algorithms
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
medium
let madVR decide
let madVR decide
<-- luma doubling
<-- luma quadrupling
<-- chroma
activate doubling / quadrupling...
... only if scaling factor is 1.2x (or bigger)
... only if scaling factor is 2.4x (or bigger)
<-- doubling
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
let madVR decide
<-- upscaling algo
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

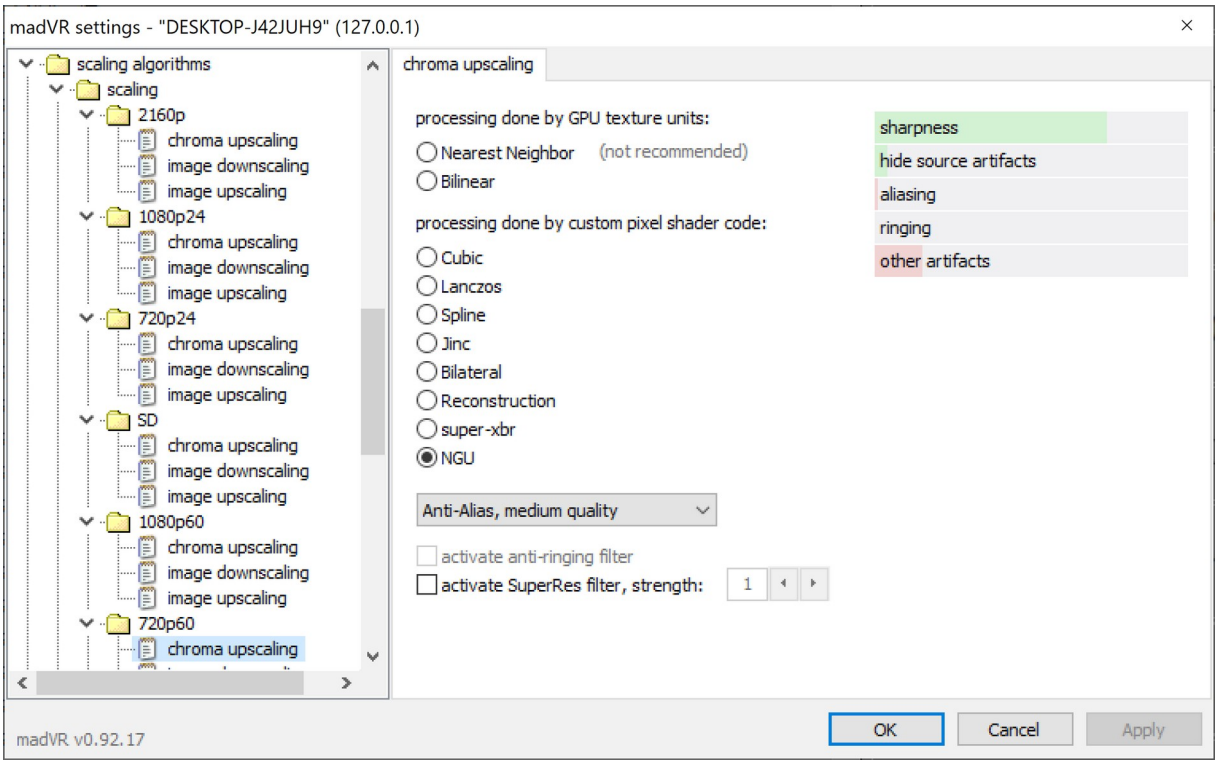
8.5.7 Image Upscaling 1080p@50/60fps content naar 2160p

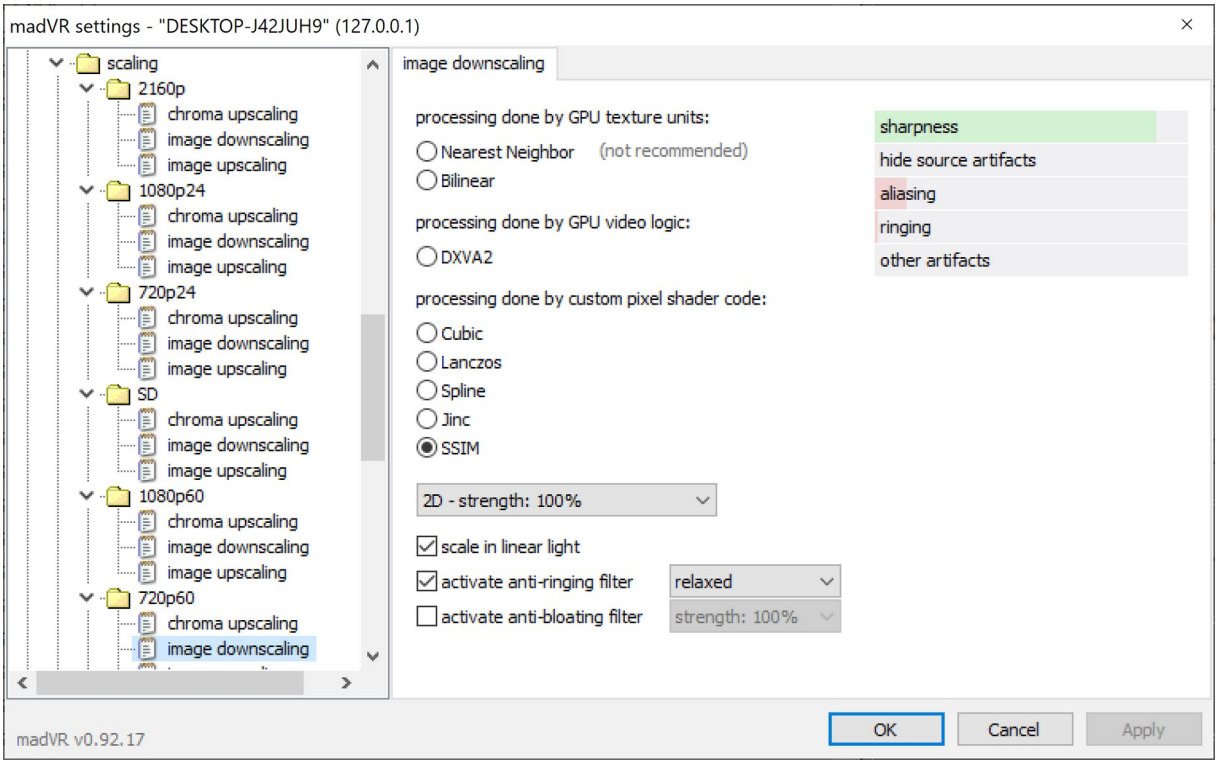


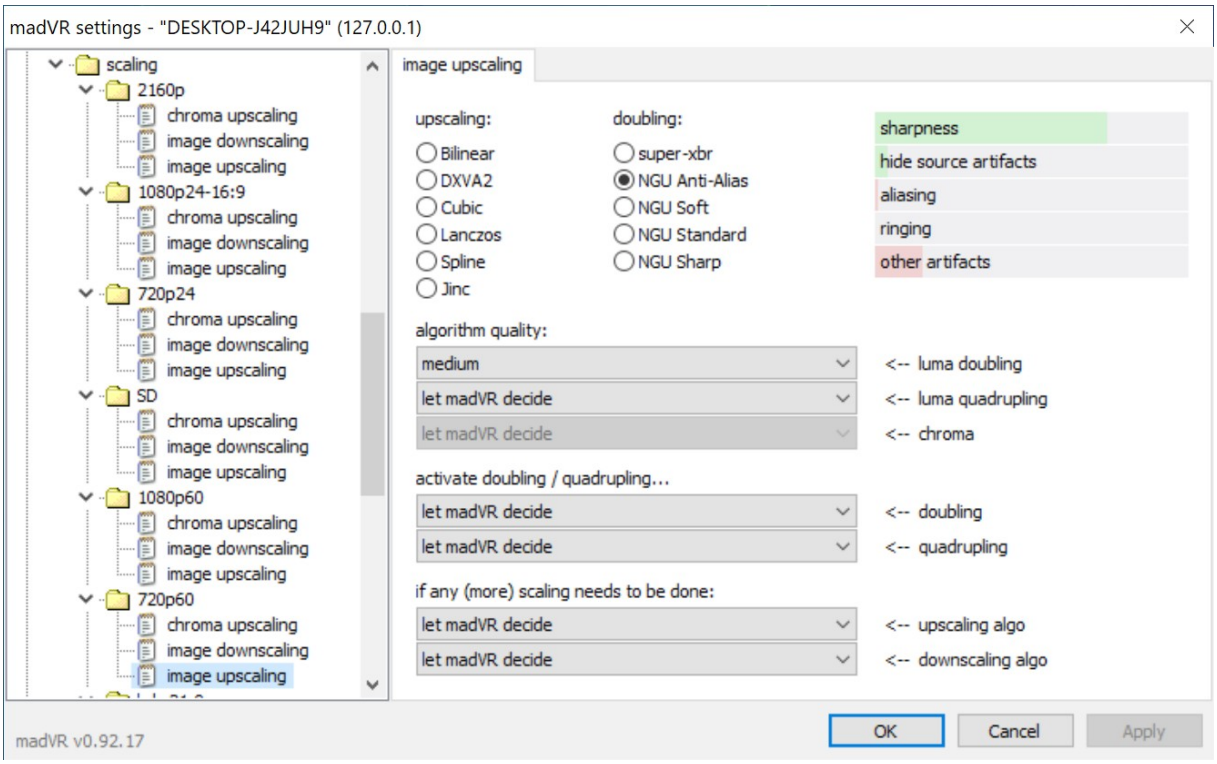



madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
hdr
image enhancements
scaling algorithms
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
medium
let madVR decide
let madVR decide
<-- luma doubling
<-- luma quadrupling
<-- chroma
activate doubling / quadrupling...
let madVR decide
let madVR decide
<-- doubling
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
let madVR decide
<-- upscaling algo
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

8.5.8 Upscaling 720p@50/60fps content naar 2160p

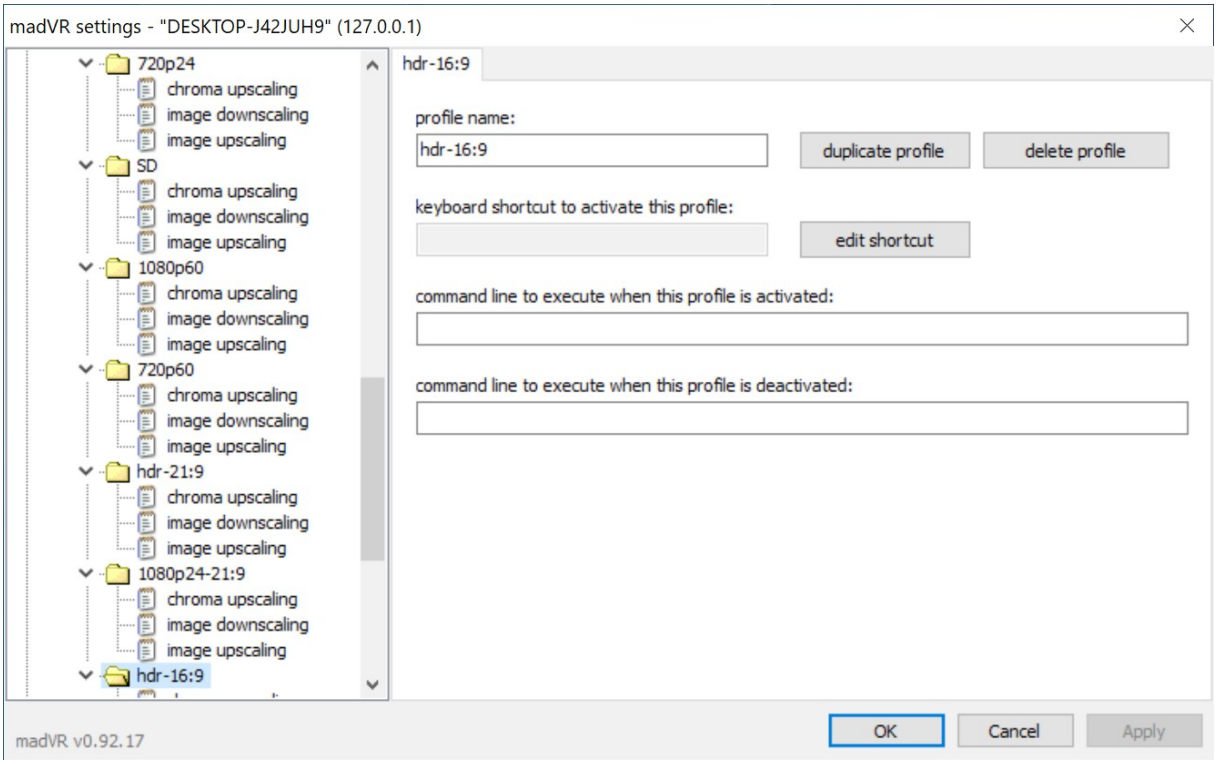


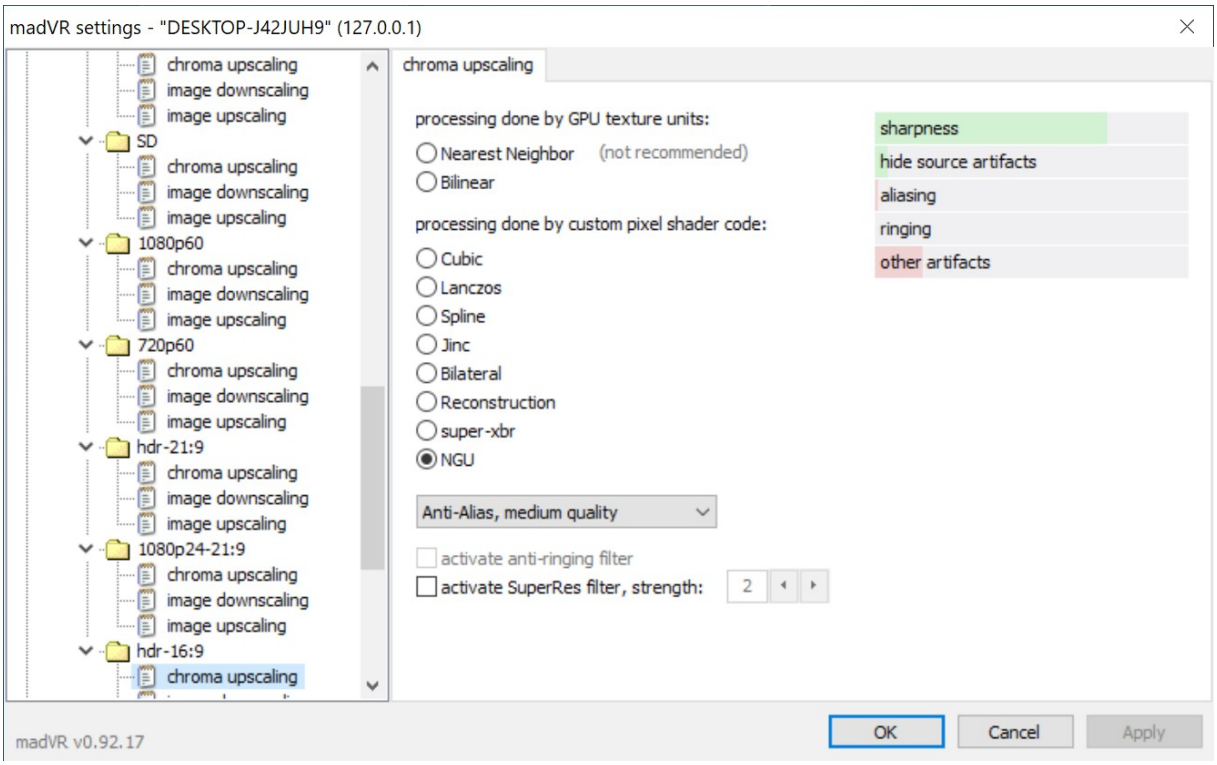


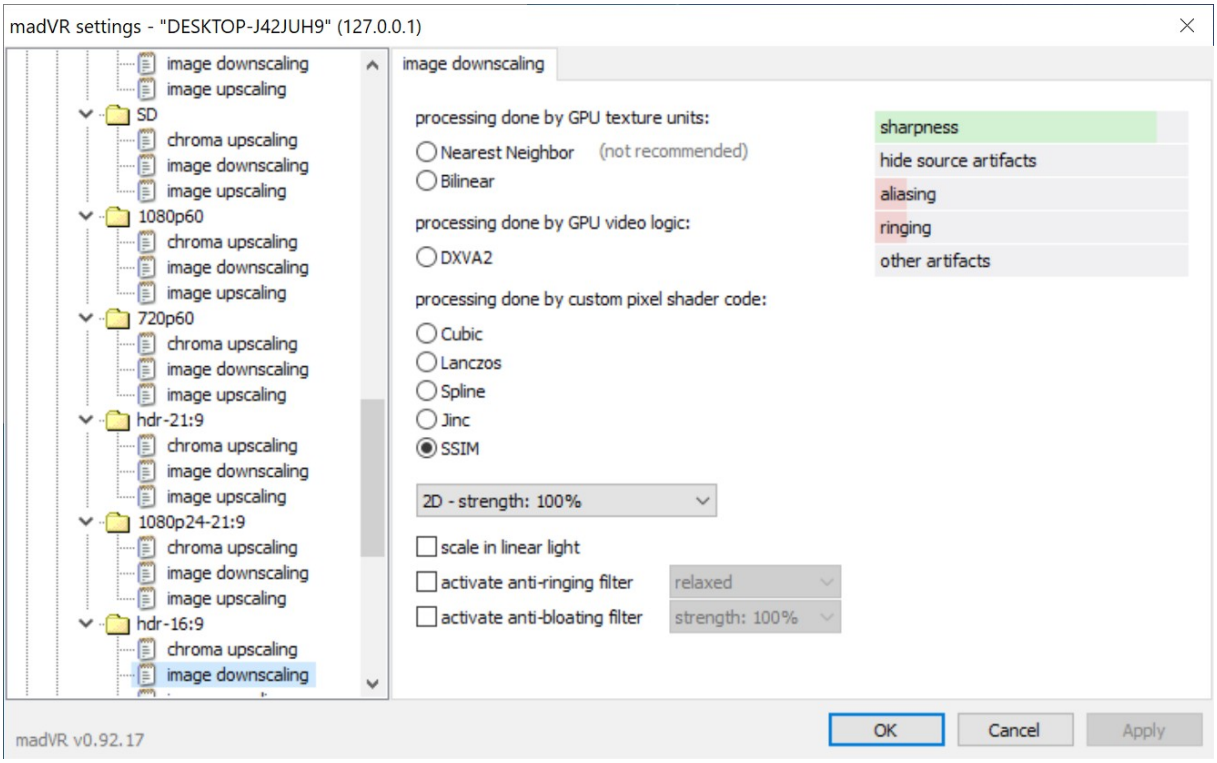

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
scaling
2160p
chroma upscaling
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
medium
<-- luma doubling
let madVR decide
<-- luma quadrupling
let madVR decide
<-- chroma
activate doubling / quadrupling...
let madVR decide
<-- doubling
let madVR decide
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
<-- upscaling algo
let madVR decide
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

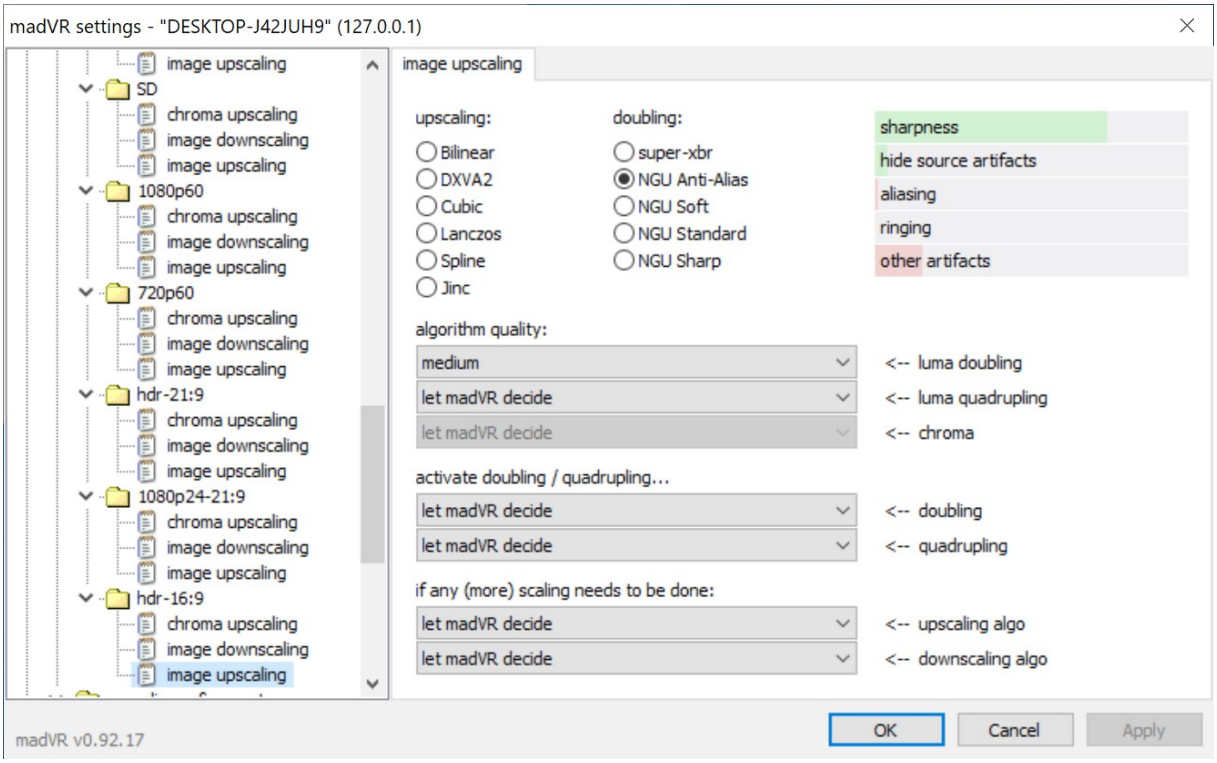
8.5.9 Upscaling HDR content

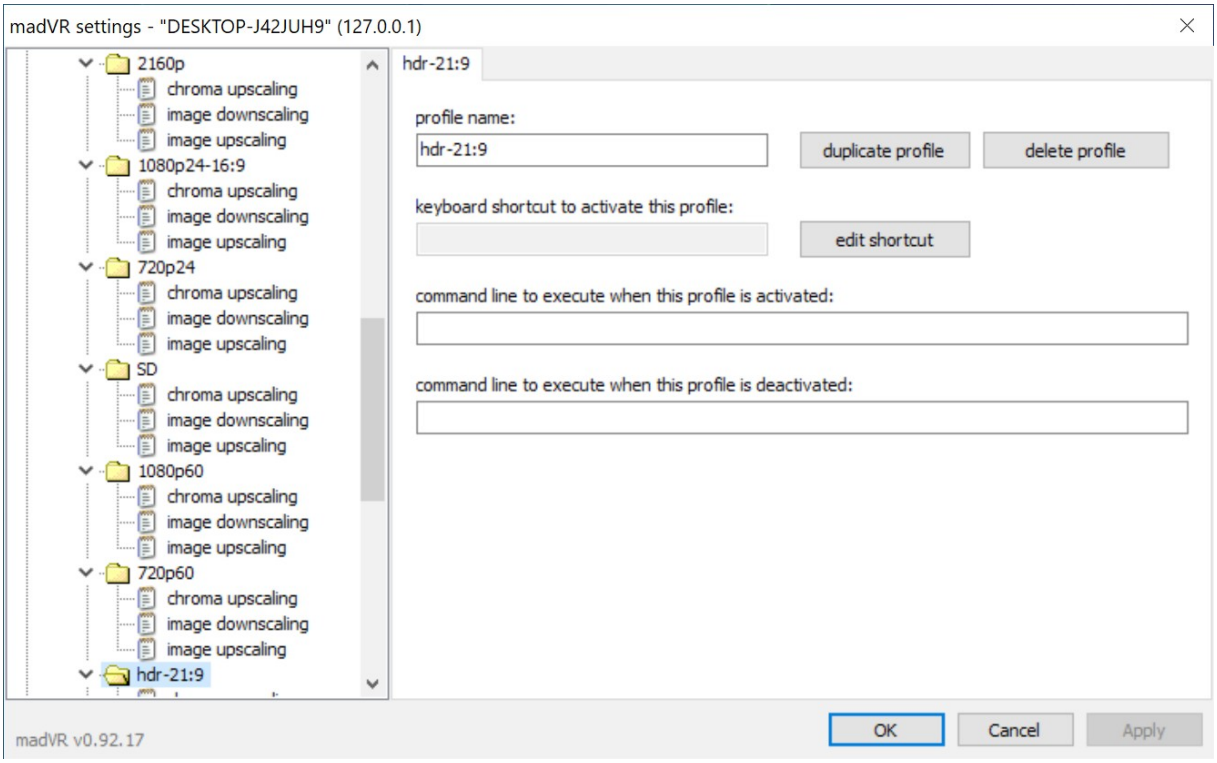
Om het onderste uit de kan te halen met mijn RTX2070 videokaart maak ik bij HDR een onderscheid tussen 16:9 en 21:9 materiaal. 21:9 materiaal vereist immers minder processing wegens de zwarte balken en kan daarom in iets hogere settings draaien. Met mijn RTX2070 kaart is medium bij 16:9 de hoogst mogelijke setting. Bij 21:9 kan ik echter de high quality setting kiezen.

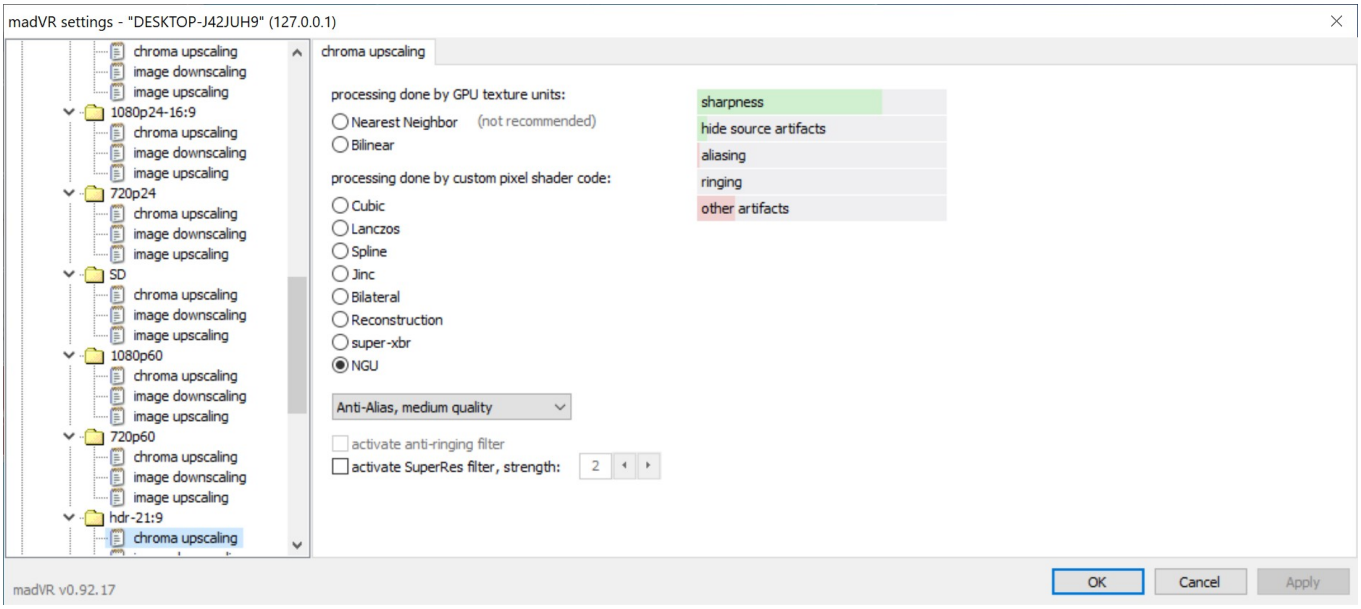


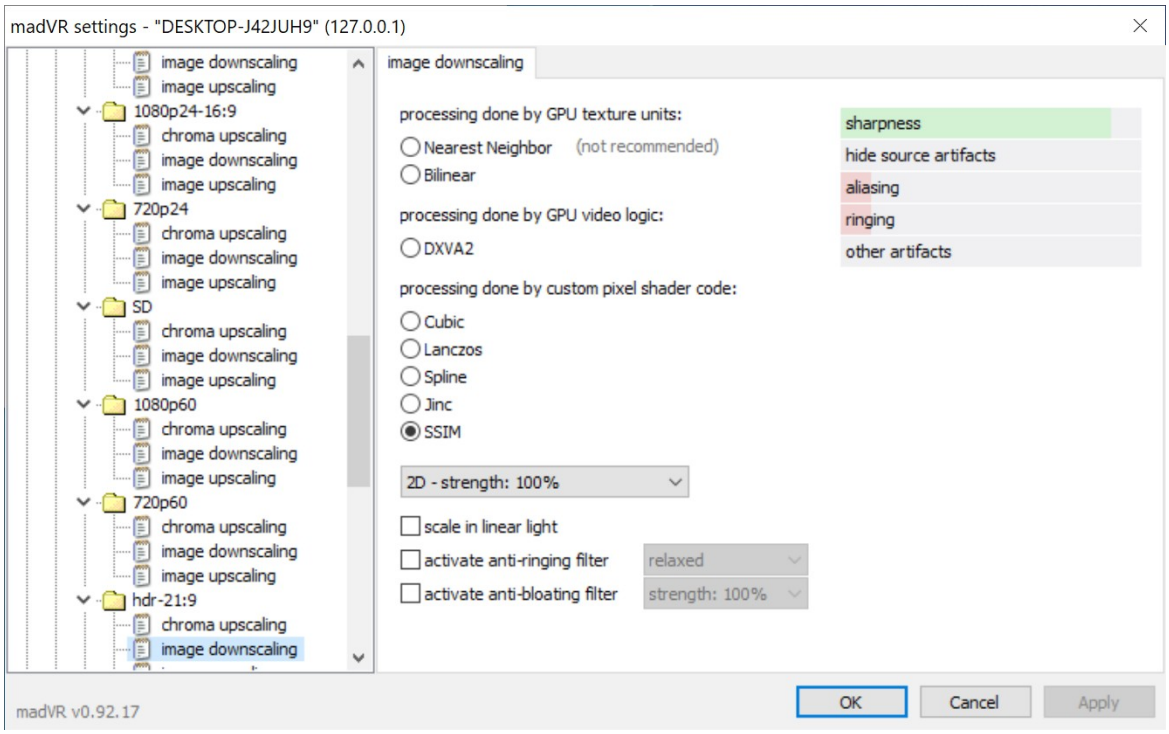


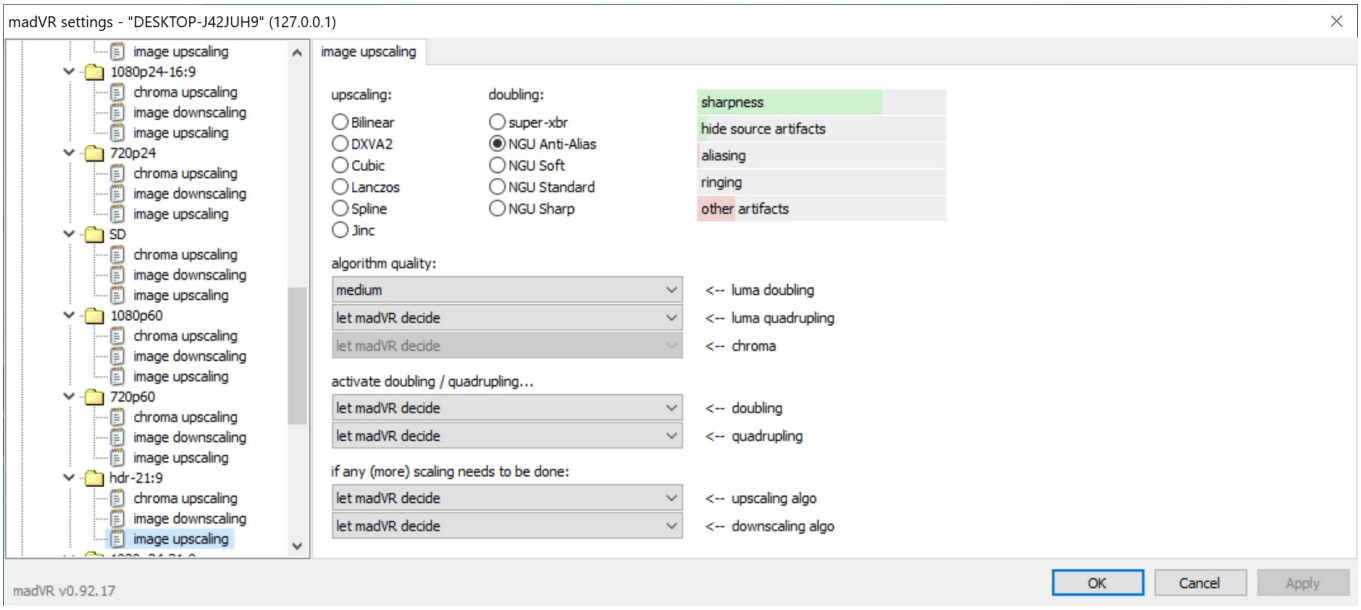

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image upscaling
hdr-16:9
chroma upscaling
image downscaling
image downscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by GPU video logic:
DXVA2
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
SSIM
2D - strength: 100%
scale in linear light
activate anti-ringing filter
relaxed
activate anti-bloating filter
strength: 100%
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image upscaling
hdr-16:9
chroma upscaling
image downscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
algorithm quality:
medium
let madVR decide
let madVR decide
<-- luma doubling
<-- luma quadrupling
<-- chroma
activate doubling / quadrupling...
let madVR decide
let madVR decide
<-- doubling
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
let madVR decide
<-- upscaling algo
<-- downscaling algo
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
2160p
chroma upscaling
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
hdr-21:9
profile name:
hdr-21:9
duplicate profile
delete profile
keyboard shortcut to activate this profile:
edit shortcut
command line to execute when this profile is activated:
command line to execute when this profile is deactivated:
madVR v0.92.17
OK
Cancel
Apply

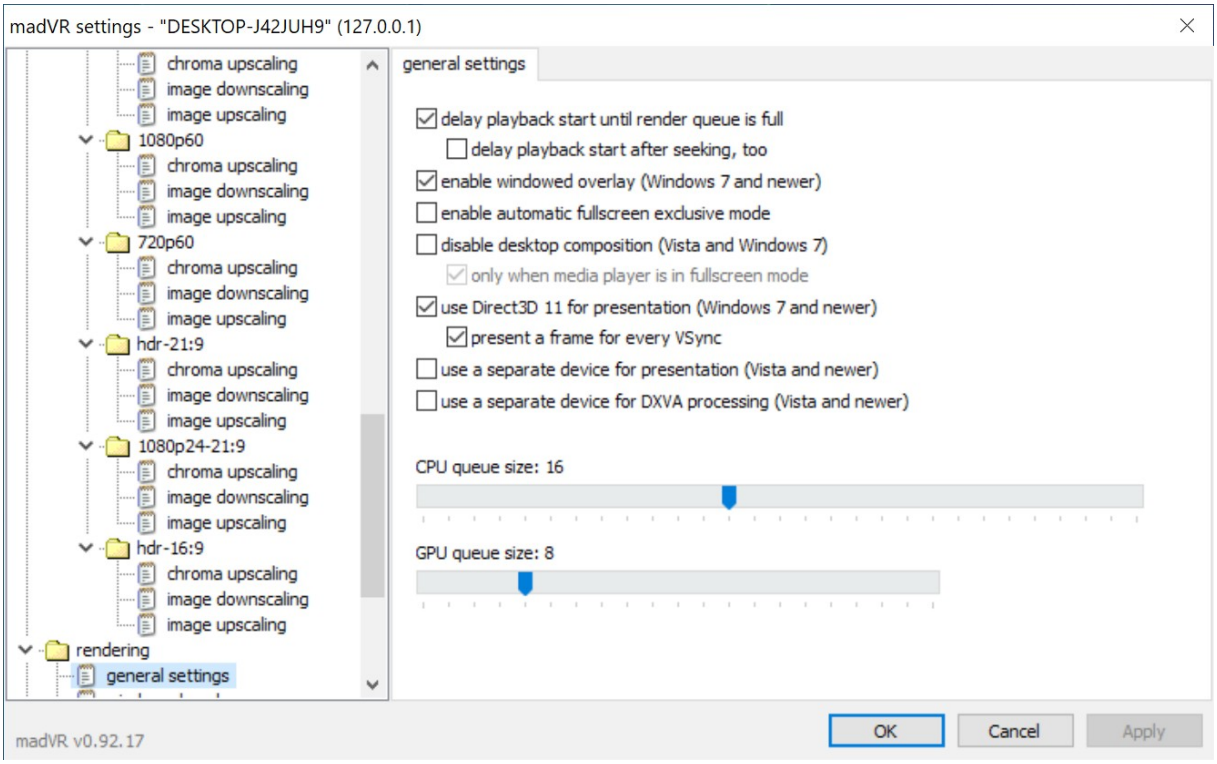

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
chroma upscaling
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
chroma upscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
Bilateral
Reconstruction
super-xbr
NGU
Anti-Alias, medium quality
activate anti-ringing filter
activate SuperRes filter, strength:
2
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply

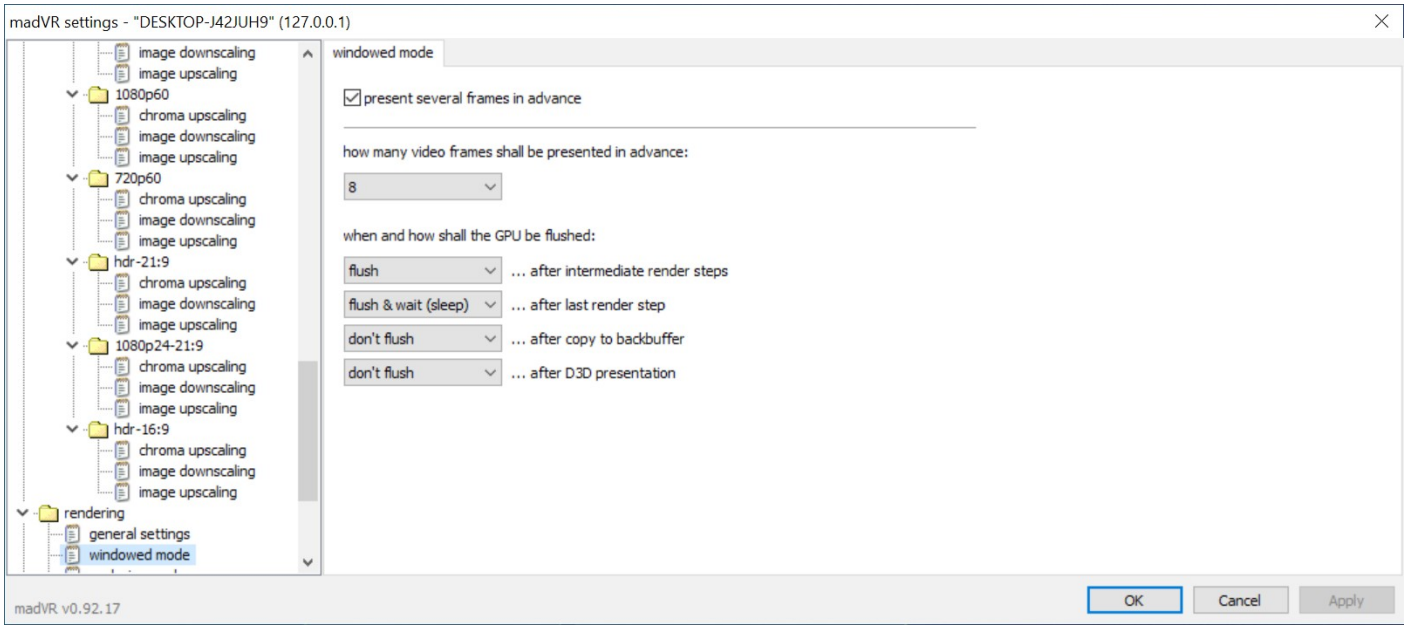

madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image downscaling
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image downscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by GPU video logic:
DXVA2
processing done by custom pixel shader code:
Cubic
Lanczos
Spline
Jinc
SSIM
2D - strength: 100%
scale in linear light
activate anti-ringing filter
relaxed
activate anti-bloating filter
strength: 100%
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image upscaling
1080p24-16:9
chroma upscaling
image downscaling
image upscaling
720p24
chroma upscaling
image downscaling
image upscaling
SD
chroma upscaling
image downscaling
image upscaling
1080p60
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
upscaling:
Bilinear
DXVA2
Cubic
Lanczos
Spline
Jinc
doubling:
super-xbr
NGU Anti-Alias
NGU Soft
NGU Standard
NGU Sharp
sharpness
hide source artifacts
aliasing
ringing
other artifacts
algorithm quality:
medium
<-- luma doubling
let madVR decide
<-- luma quadrupling
let madVR decide
<-- chroma
activate doubling / quadrupling...
let madVR decide
<-- doubling
let madVR decide
<-- quadrupling
if any (more) scaling needs to be done:
let madVR decide
<-- upscaling algo
let madVR decide
<-- downscaling algo
madVR v0.92.17
OK
Cancel
Apply

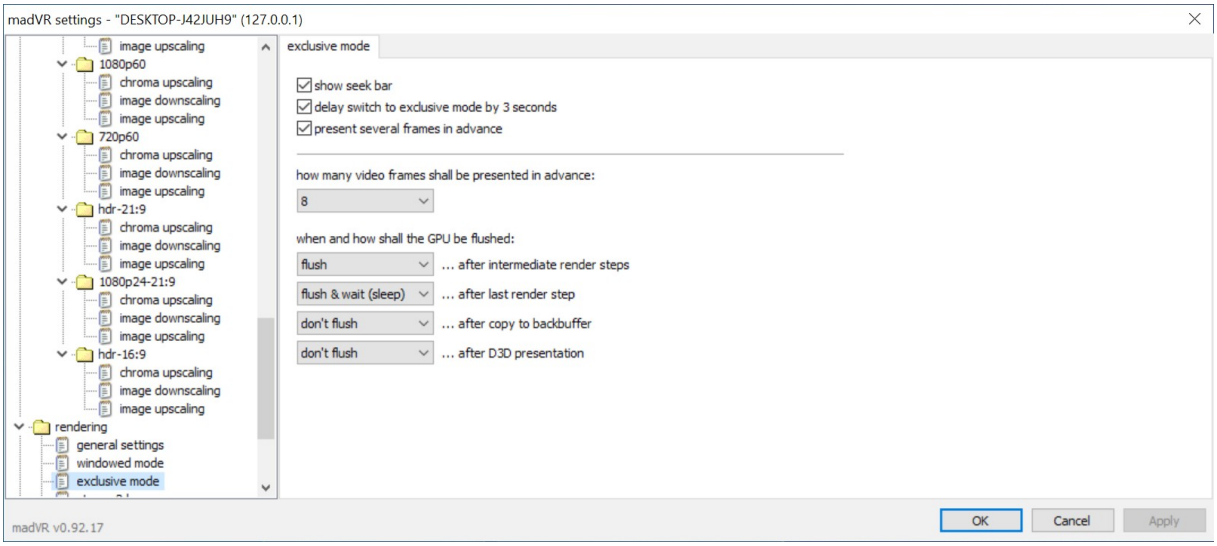
8.6 Rendering

This section deals with what are mostly performance-related settings, and options that may be required to get the best performance out of your specific graphics card. Unless you are actually experiencing performance issues, most of these settings are best left alone.

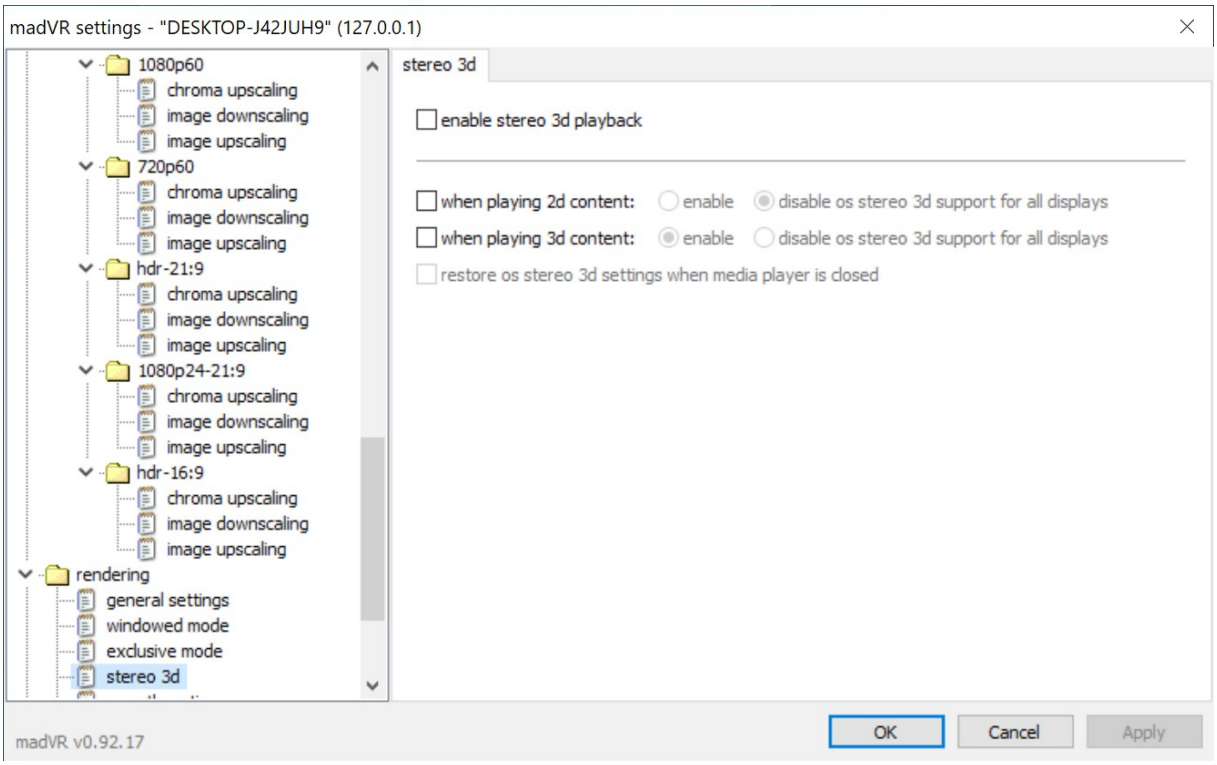


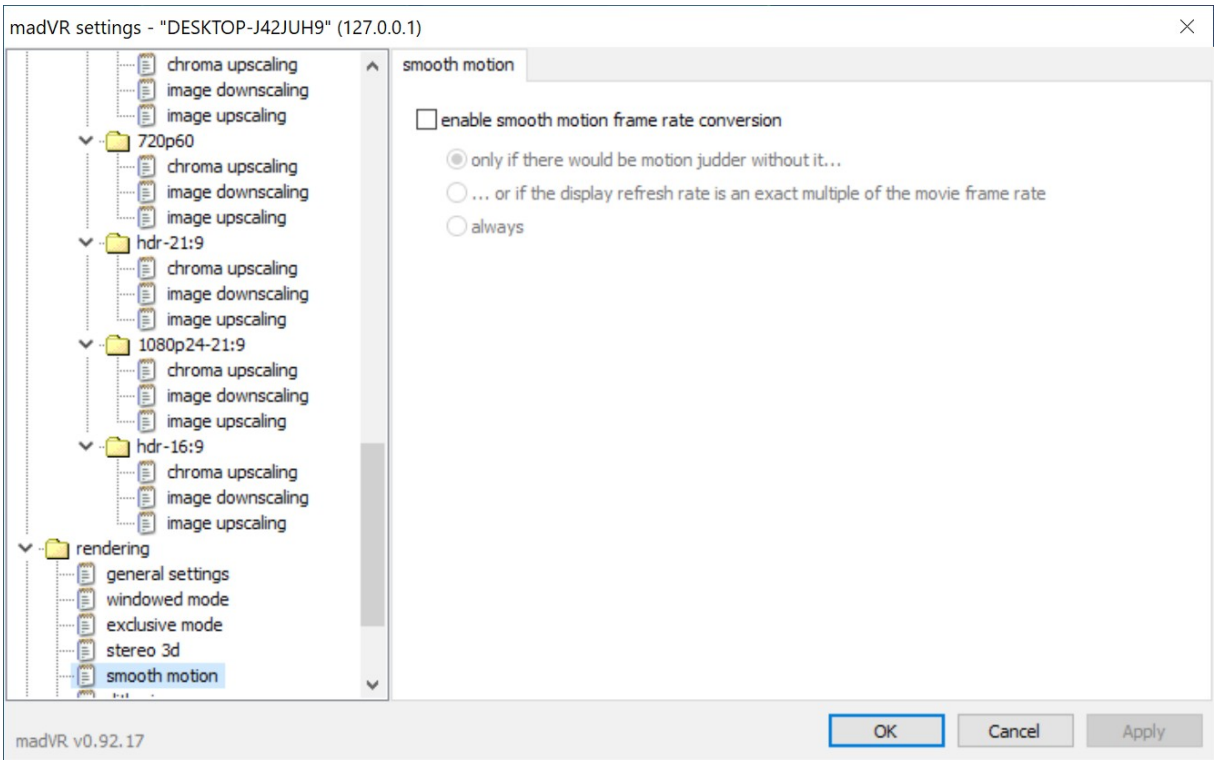


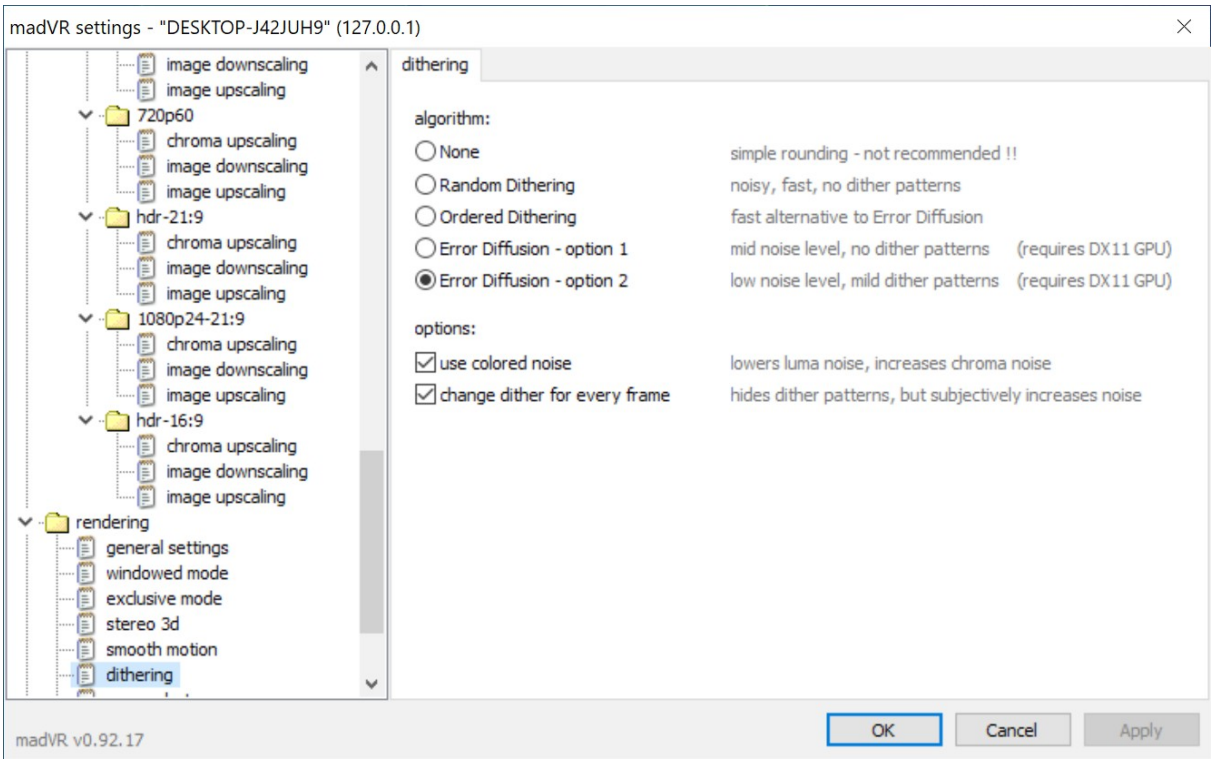
- **Make sure to set "how many video frames shall be presented in advance" to "1" in order to avoud micro stutter with some nvidia graphic cards.**

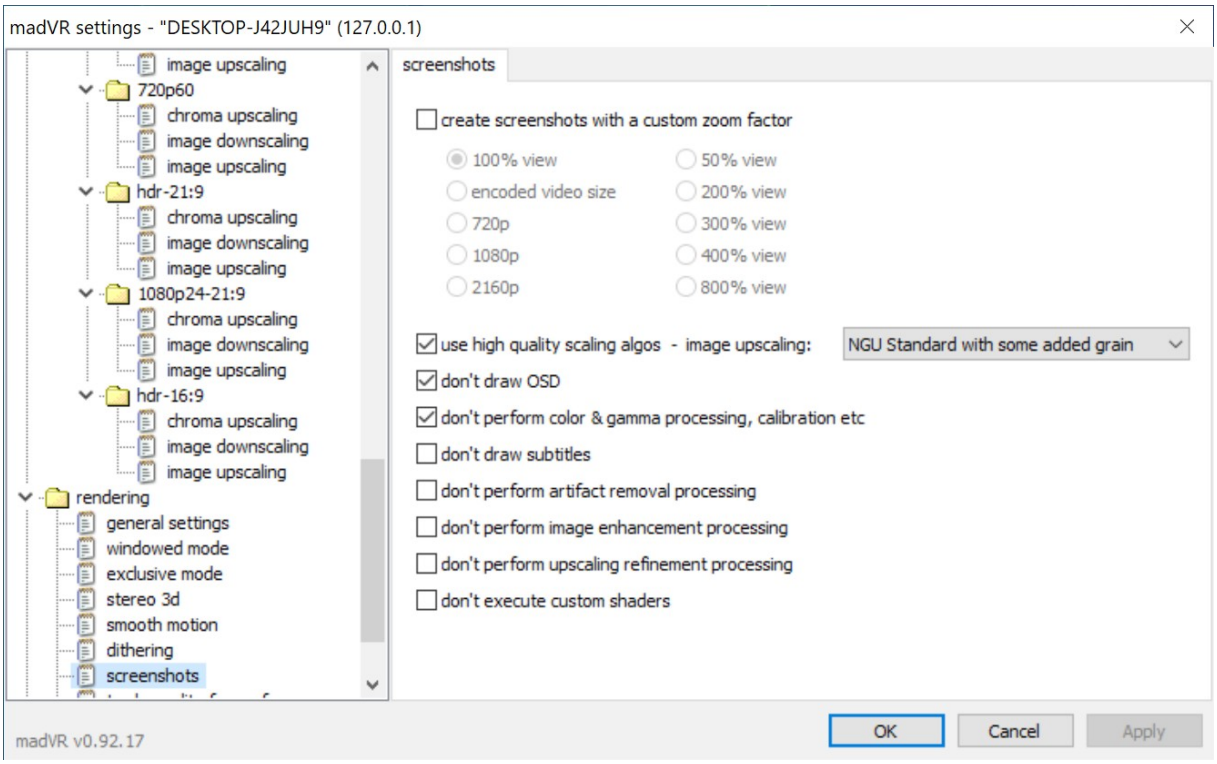


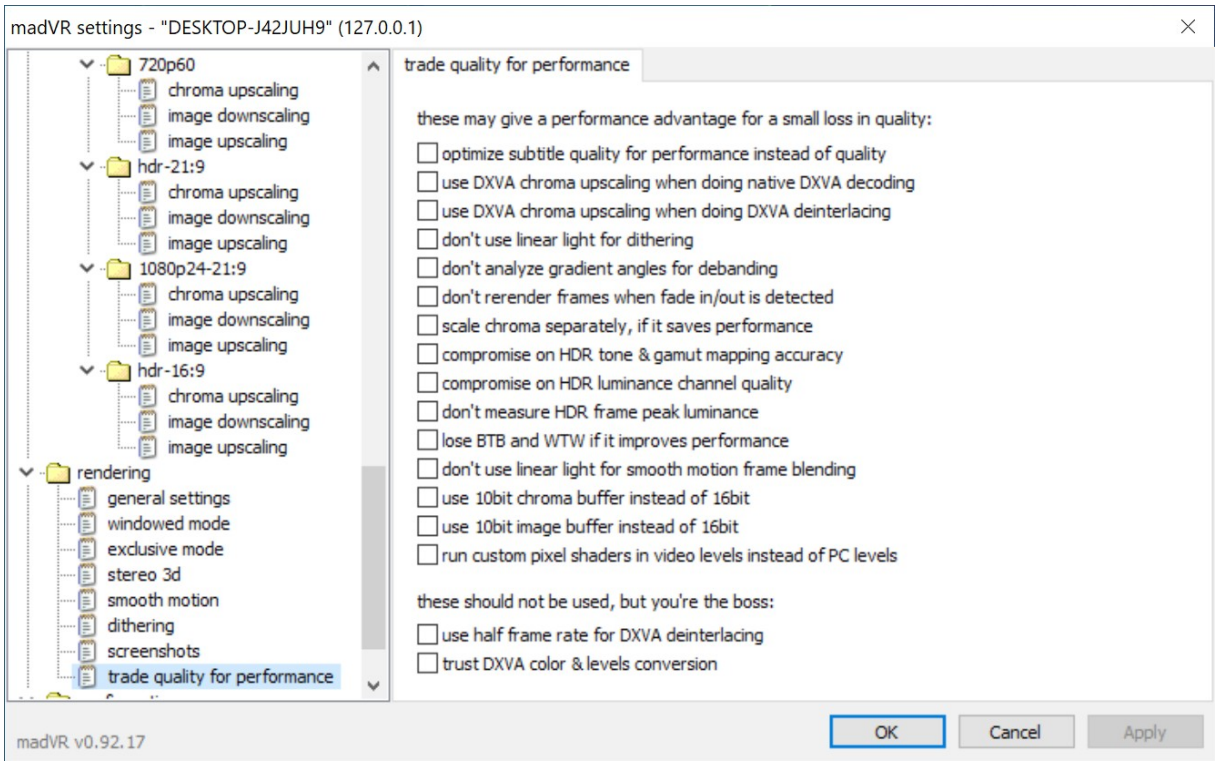
- **Make sure to set "how many video frames shall be presented in advance" to "1" in order to avoud micro stutter with some nvidia graphic cards.**




madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
chroma upscaling
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image upscaling
hdr-16:9
chroma upscaling
image downscaling
image upscaling
rendering
general settings
windowed mode
exclusive mode
stereo 3d
smooth motion
smooth motion
enable smooth motion frame rate conversion
only if there would be motion judder without it...
... or if the display refresh rate is an exact multiple of the movie frame rate
always
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image downscaling
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image upscaling
hdr-16:9
chroma upscaling
image downscaling
image upscaling
rendering
general settings
windowed mode
exclusive mode
stereo 3d
smooth motion
dithering
dithering
algorithm:
None
simple rounding - not recommended !!
Random Dithering
noisy, fast, no dither patterns
Ordered Dithering
fast alternative to Error Diffusion
Error Diffusion - option 1
mid noise level, no dither patterns
(requires DX11 GPU)
Error Diffusion - option 2
low noise level, mild dither patterns
(requires DX11 GPU)
options:
use colored noise
lowers luma noise, increases chroma noise
change dither for every frame
hides dither patterns, but subjectively increases noise
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
image upscaling
720p60
chroma upscaling
image downscaling
image upscaling
hdr-21:9
chroma upscaling
image downscaling
image upscaling
1080p24-21:9
chroma upscaling
image downscaling
image upscaling
hdr-16:9
chroma upscaling
image downscaling
image upscaling
rendering
general settings
windowed mode
exclusive mode
stereo 3d
smooth motion
dithering
screenshots
screenshots
create screenshots with a custom zoom factor
100% view
50% view
encoded video size
200% view
720p
300% view
1080p
400% view
2160p
800% view
use high quality scaling algos - image upscaling:
NGU Standard with some added grain
don't draw OSD
don't perform color & gamma processing, calibration etc
don't draw subtitles
don't perform artifact removal processing
don't perform image enhancement processing
don't perform upscaling refinement processing
don't execute custom shaders
madVR v0.92.17
OK
Cancel
Apply



- "Compromise in HDR tone & gamut mapping accurracy": don't enable this option, it will result in wrong colors
- Enable compromise on HDR luminance channel quality, deze setting aanzetten resulteert in veel lagere rendertijden. This will only affect the precision of the luminance calculation.
- Dankzij mijn RTX2070 kaart heb ik geen van deze settings nodig, mocht je toch rendertijd willen winnen kies dan bij voorkeur voor de optie “Enable compromise on HDR luminance channel quality” , dit geeft een slechts geringe degradatie in beeld kwaliteit met relatief veel winst in de rendertijd.

8.7 MadVR settings backup

MadVR bewaart zijn settings zowel in de file settings.bin als in de registry. Maak voor de zekerheid een backup van beide:

- Bewaar een kopie van de settings.bin (MadVR folder) file.
- Gebruik regedit om `HKEY_CURRENT_USER\Software\madshi\` te exporteren.

8.8 MadVR extra OSD informatie

- Voor de mensen die een nog wat uitgebreider menu willen in madVR in het OSM (on screen menu) ,maak dan een map aan daar waar MadVR op je pc staat en noem map ShowRenderSteps. Hiermee wordt de informatie in het OSM nog wat uit groter en kun je precies zien hoe de rendertijd wordt opgebouwd ,dit is erg handig om wat mee te tweaken met diversen settings.
- Hetzelfde geldt voor het aanmaken van een map genaamd Showhdrmode voor meer HDR (tonemapping) info.

9. RGB video levels

Mijn grootste issue was dat de RGB video levels niet klopten en een washed out beeld gaven. Op verschillende plekken in de keten dient een keuze gemaakt te worden tussen 16-235 of 0-255. Ik had in eerste instantie alles (kodi output settings, kodi internal filter video decoder, madvr, grafische kaart, projector. Ik had alles op 16-235 staan en het beeld bleef washed out. Hieronder staan een aantal mogelijke configuratie, uiteindelijk heb ik gekozen voor de oplossing in het rood gedrukt.

(1) Display wants 0-255. GPU and madVR are consequently also both set to 0-255.
This is the most recommended setup because it doesn't (shouldn't) have any banding problems, and still has all video, desktop and games with correct black/white levels. In this case test patterns need to have black at 0,0,0, obviously.

(2) Display wants 16-235. GPU is set to 16-235. madVR has to be set to 0-255.
This is not recommended, because the GPU stretches the madVR output, probably in 8bit without dithering, so banding could be introduced. However, this is not a big problem for ArgyllCMS. Argyll still needs to create test patterns with black at 0,0,0. The GPU will then stretch the test patterns from 0-255 to 16-235, so the display will get 16,16,16, although Argyll rendered 0,0,0. So the levels are correct.

(3) Display wants 16-235. GPU is set to 0-255. madVR is set to 16-235.
This is the recommended setup for best image quality if your display can't do 0-255. This setup results in banding-free madVR image quality. However, levels for desktop and games will be incorrect, because desktop and games will render black at 0,0,0, while the display expects black at 16,16,16. This is a problem for ArgyllCMS, because Argyll will create test patterns with black at 0,0,0, and the display will also receive these at 0,0,0. So basically Argyll test patterns will have wrong levels, which will screw up the whole calibration.

Proper RGB output levels are necessary when passing from PC to TV color spaces. When sending video via HDMI to a TV, in most cases, color spaces are set as follows (Note: LAV Video RGB settings do not apply):

(madVR) *PC levels (0-255)* -> **(GPU) *Limited Range RGB 16-235*** -> **(TV) *Output as RGB 16-235***

madVR expands the source 16-235 signal to full range RGB leaving the conversion back to 16-235 to the graphics card.

If your HTPC is a dedicated Kodi machine, an alternative approach is possible.

Alternative Color Space Configuration:

(madVR) *TV levels (16-235)* -> **(Kodi) *Use limited color range (16-235)*** -> **(GPU) *Full Range RGB 0-255*** -> **(TV) *Output as RGB 16-235***

In this configuration, the signal remains 16-235 until it reaches the TV avoiding any clipping by the GPU. This is the most pure path with the fewest color range conversions and least amount of added dithering. However, other computer applications will appear over-saturated as a result unless they are also configured to use 16-235 levels. Note: Kodi must be configured under *System -> Video output* to use a limited color range to match madVR.

A final option involves setting your TV to output RGB 0-255 and leaving all settings at full range. madVR expands the source to 0-255 and displays it full range on your television. The TV must first be calibrated while set to full range RGB. The result can vary depending on how well your TV displays whiter-than-white and blacker-than-black values.

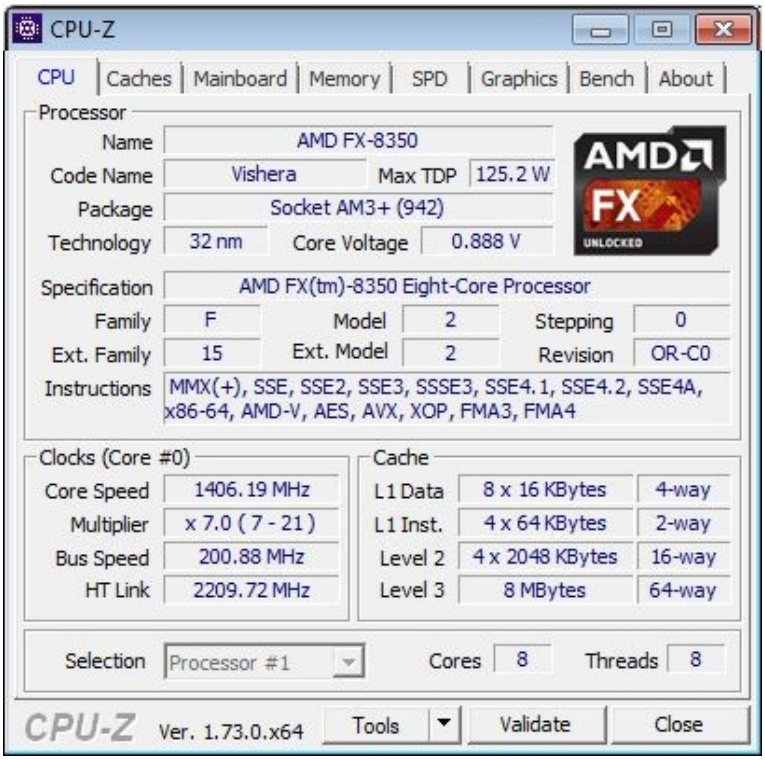
PC Color Space Configuration:

(madVR) *PC levels (0-255)* -> **(GPU) *Full Range RGB 0-255*** -> **(TV) *Output as RGB 0-255***

10. Performance tests

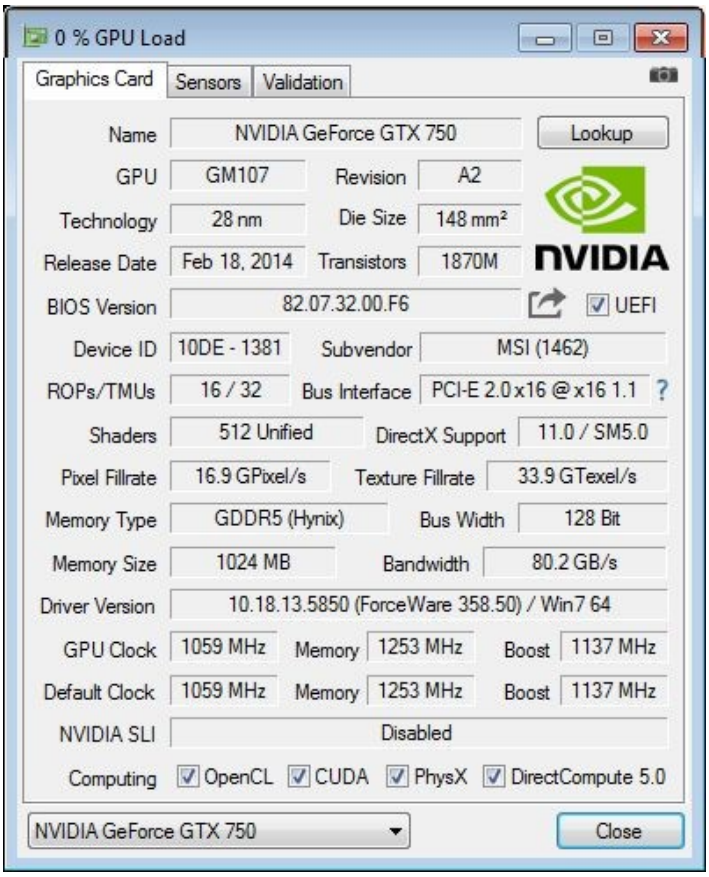
10.1 CPU load

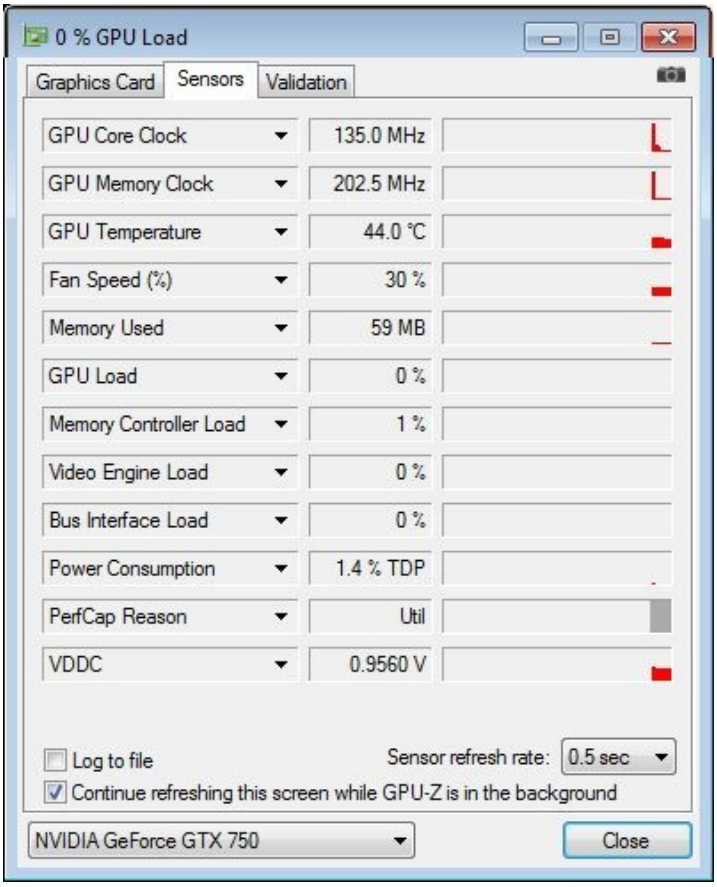
- Tijdens het afspelen van een film kan met de “O” toets de gebruikte filters en de CPU performance op het scherm gedisplayed worden.
- Met de tool CPU-Z kun je alle settings van je CPU bekijken Te downloaden op http://www.cpuid.com/softwares/cpu-z.html



10.2 GPU load

- Bekijk of de GPU belasting van de videokaart geen bottleneck vormt, dit kan met de tool GPU-Z. Te downloaden op https://www.techpowerup.com/gpuz/

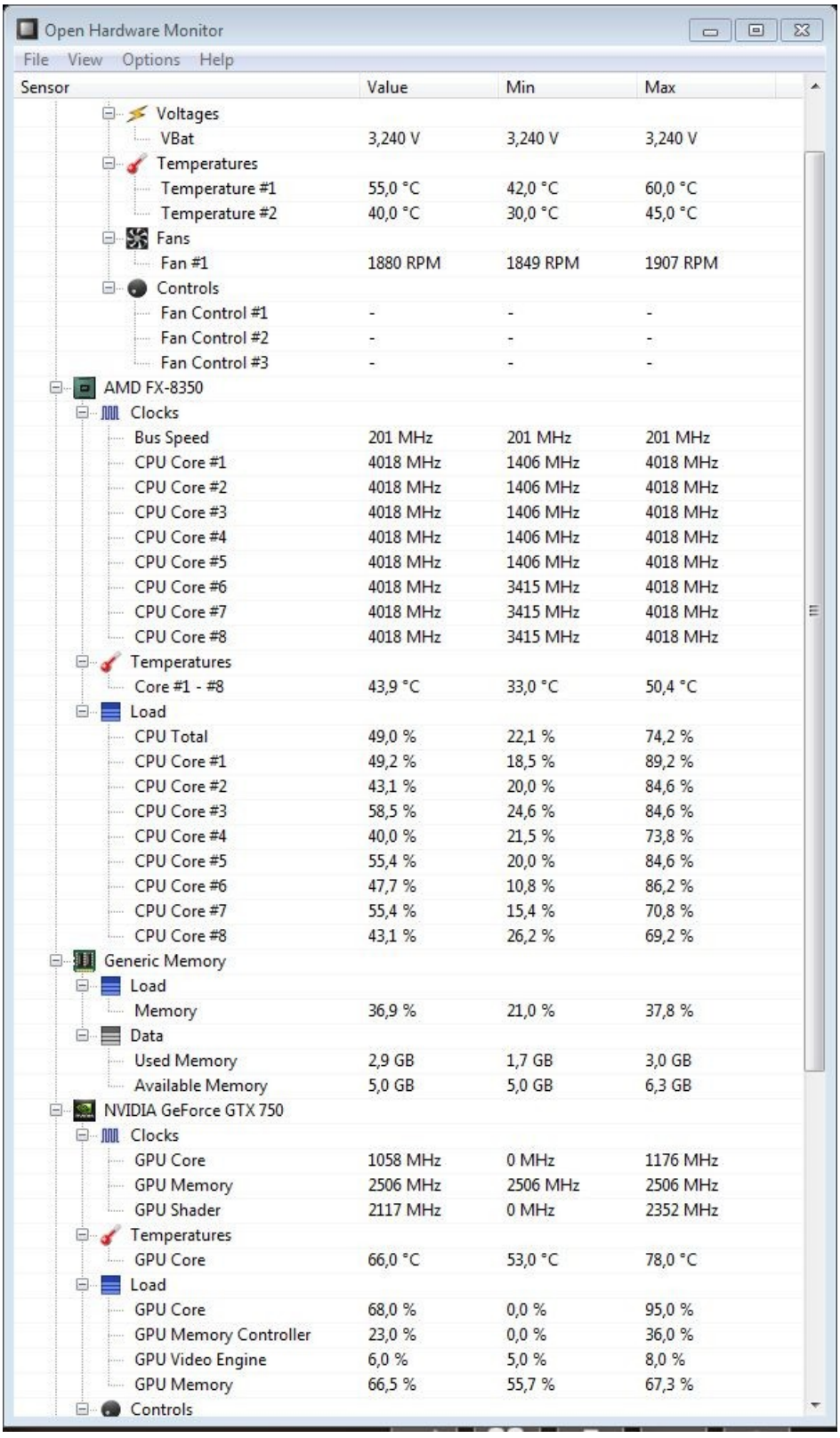



0 % GPU Load
Graphics Card
Sensors
Validation
GPU Core Clock
135.0 MHz
GPU Memory Clock
202.5 MHz
GPU Temperature
44.0 °C
Fan Speed (%)
30 %
Memory Used
59 MB
GPU Load
0 %
Memory Controller Load
1 %
Video Engine Load
0 %
Bus Interface Load
0 %
Power Consumption
1.4 % TDP
PerfCap Reason
Util
VDDC
0.9560 V
Log to file
Sensor refresh rate:
0.5 sec
Continue refreshing this screen while GPU-Z is in the background
NVIDIA GeForce GTX 750
Close

10.3 Openhardware Monitor

Een mooie alles in een hardware monitor oplossing is de opensource tool Open Hardware Monitor:

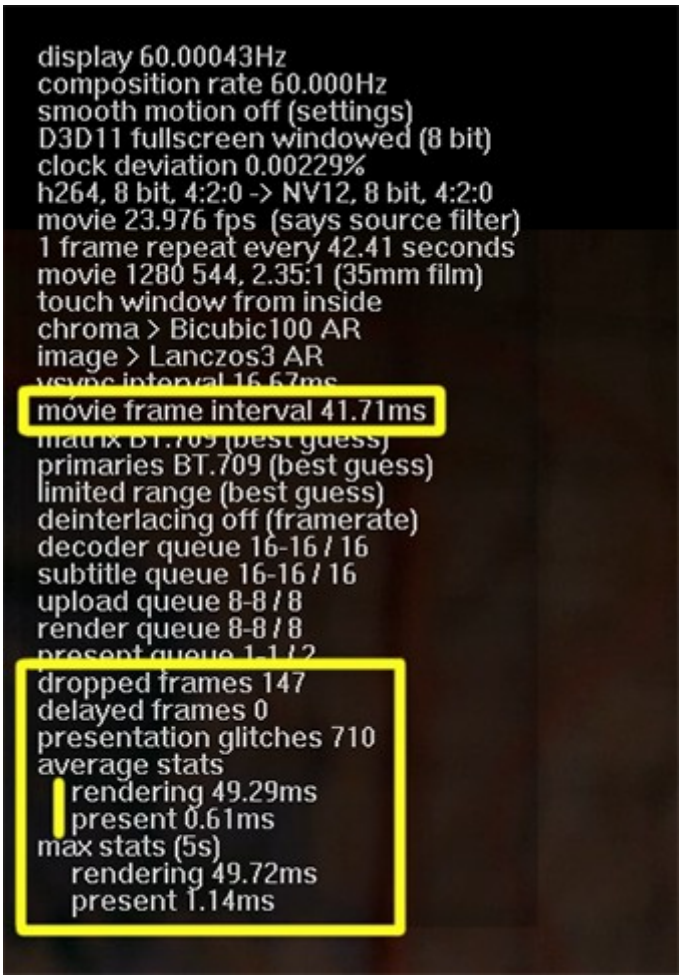
http://openhardwaremonitor.org/



Sensor	Value	Min	Max
Voltages			
VBat	3,240 V	3,240 V	3,240 V
Temperatures			
Temperature #1	55,0 °C	42,0 °C	60,0 °C
Temperature #2	40,0 °C	30,0 °C	45,0 °C
Fans			
Fan #1	1880 RPM	1849 RPM	1907 RPM
Controls			
Fan Control #1	-	-	-
Fan Control #2	-	-	-
Fan Control #3	-	-	-
AMD FX-8350			
Clocks			
Bus Speed	201 MHz	201 MHz	201 MHz
CPU Core #1	4018 MHz	1406 MHz	4018 MHz
CPU Core #2	4018 MHz	1406 MHz	4018 MHz
CPU Core #3	4018 MHz	1406 MHz	4018 MHz
CPU Core #4	4018 MHz	1406 MHz	4018 MHz
CPU Core #5	4018 MHz	1406 MHz	4018 MHz
CPU Core #6	4018 MHz	3415 MHz	4018 MHz
CPU Core #7	4018 MHz	3415 MHz	4018 MHz
CPU Core #8	4018 MHz	3415 MHz	4018 MHz
Temperatures			
Core #1 - #8	43,9 °C	33,0 °C	50,4 °C
Load			
CPU Total	49,0 %	22,1 %	74,2 %
CPU Core #1	49,2 %	18,5 %	89,2 %
CPU Core #2	43,1 %	20,0 %	84,6 %
CPU Core #3	58,5 %	24,6 %	84,6 %
CPU Core #4	40,0 %	21,5 %	73,8 %
CPU Core #5	55,4 %	20,0 %	84,6 %
CPU Core #6	47,7 %	10,8 %	86,2 %
CPU Core #7	55,4 %	15,4 %	70,8 %
CPU Core #8	43,1 %	26,2 %	69,2 %
Generic Memory			
Load			
Memory	36,9 %	21,0 %	37,8 %
Data			
Used Memory	2,9 GB	1,7 GB	3,0 GB
Available Memory	5,0 GB	5,0 GB	6,3 GB
NVIDIA GeForce GTX 750			
Clocks			
GPU Core	1058 MHz	0 MHz	1176 MHz
GPU Memory	2506 MHz	2506 MHz	2506 MHz
GPU Shader	2117 MHz	0 MHz	2352 MHz
Temperatures			
GPU Core	66,0 °C	53,0 °C	78,0 °C
Load			
GPU Core	68,0 %	0,0 %	95,0 %
GPU Memory Controller	23,0 %	0,0 %	36,0 %
GPU Video Engine	6,0 %	5,0 %	8,0 %
GPU Memory	66,5 %	55,7 %	67,3 %
Controls			

11. MadVR finetuning tips

Tijdens het afspelen van een film krijg je met CTRL+J gegevens te zien van MadVR, met CTRL+R reset je de counters van dropped frames. Let op of er tijdens het spelen veel frames gedropped worden.



- Let op dat de average frame render time ruim onder de volgende waarden blijven:

24 fps	41,7 ms
25 fps	40 ,0 ms
30 fps	33,3 ms
50 fps	20,0 ms
60 fps	16,7 ms

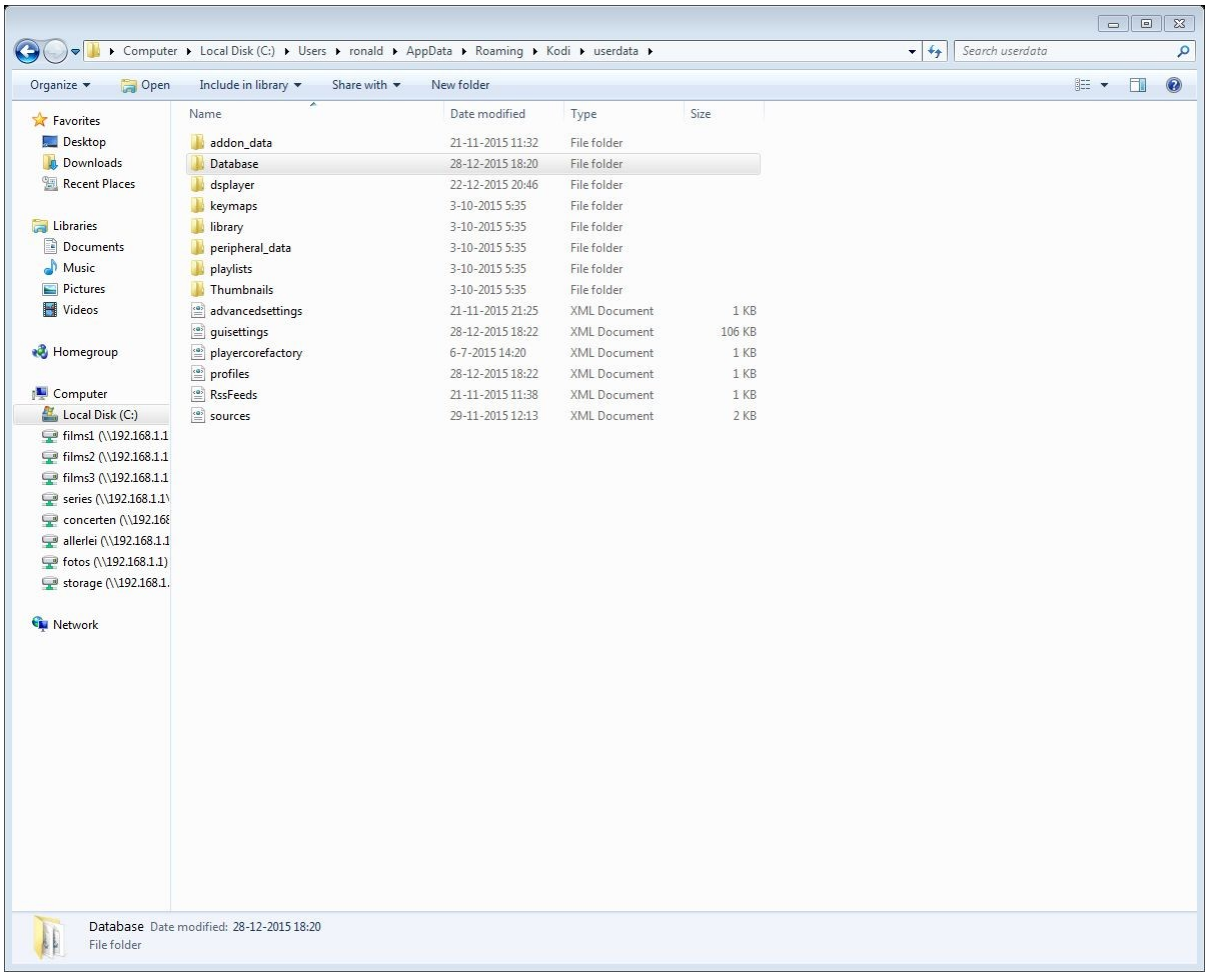
  Gebruik het monitoren van deze waarden als leidraad voor het instellenen finetunen van de madvr scaling instellingen per resolutie/framerate profiel.

- Let tevens op de MadVR routing: wordt er geupscaled of gedownscaled terwijl dit niet de bedoeling is?
- Blijf tijdens het finetunen van MadVR in gedachten houden dat hoge kwaliteit image upscaling (of dowscaling) belangrijker is (qua subjectieve weergave perceptie) dan dezelfde kwaliteit chroma upscaling.

12. Overige zaken

Gebruik het XBMC JSON device in irule.

- Als “clean library” heel lang duurt dan is dit te verhelpen door het MyVideo bestend in de Database folder in de Kodi Userdir directory weg te gooien.



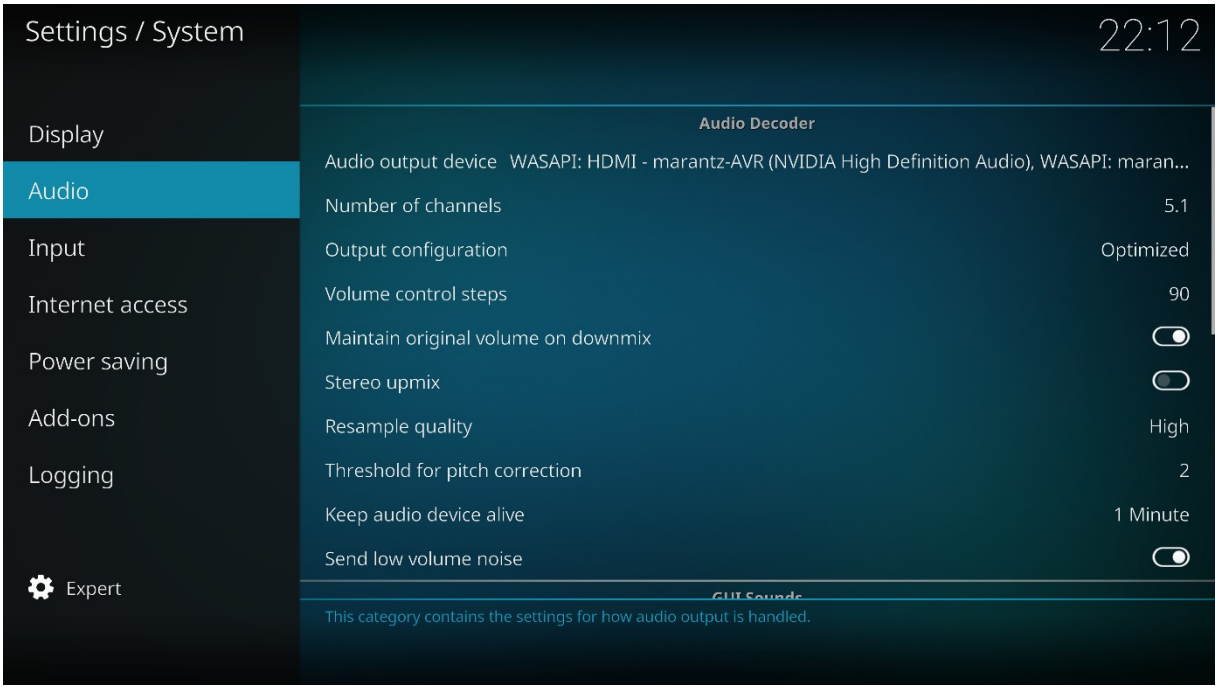
Bij het opstarten van Kodi wordt de MyVideo database dan opnieuw aangemaakt, wel moet dan nog even handmatig per library fileshare een edit gedaan worden om opnieuw de scraper in te stellen, bij het opslaan krijg je dan weer de vraag om opnieuw de inhoud te scannen.

- The community Backup add-on is a great way to backup all of your Kodi settings, add-ons, and other related files. It includes options such as automatic scheduled backups, backing up to cloud storage such as Dropbox, and configuring custom backup directories.

13. Troubleshooting

13.1 Geen geluid meer

Indien er na het wisselen van de hdmi aansluiting(en) op de video kaart geen geluid meer is, check of in Kodi bij System Audio Output settings nog het WASAPI (en niet DIRECTSOUND!) sound device geselecteerd is.



14. HDR

14.1 HDR op projectoren

HDR is currently mastered at either 1000 or 4000 "nits" (a brightness measurement). Standard Dynamic Range video is mastered at 100 nits peak brightness. The extra brightness is primarily for highlights while the average picture level brightness should look relatively the same as SDR. And the intention is that there is a much WIDER RANGE between brightest bright and darkest dark. So this means that for a display to handle HDR properly, it has to be capable of much more brightness than traditional displays while maintaining it's blacks at the same. A display can be capable of receiving an HDR signal, but that doesn't mean it will be able to actually display the new brightness range as intended.

The current range of JVC's can manage about 100-150 nits of brightness (possibly more or less depending on screen size), which is significantly less than what HDR is mastered at. In order to try to take some advantage of HDR on the JVC you need to put the projector in it's brightest mode (JVC recommends high lamp with the iris fully open). Even doing this, a good amount of those "HDR highlights" are still going to be clipped. And average brightness scenes can look dim. Setting things to make the average picture level brighter clips even more of the higlights, and at the same time, the high lamp mode with iris fully open raises your black levels. Also, the HDR mode of the JVC makes it so that the auto iris is barely functional. So you are actually decreasing the contrast ratio and dynamic range of the projector in order to try to appreciate some of those HDR highlights.

For these reasons, many people with the JVCs would prefer to be able to view UHD in 4K resolution at 10-bit wide color gamut in SDR. The HD Fury integral allows the user to do that.

Some users have been experimenting with compromises to try to get some benefit of HDR while keeping the black floor acceptable by using low lamp instead of high, or using high lamp with the manual iris closed a few clicks. Some have reported getting really nice images trying HDR on the projector, but they also say that it is still a compromise and prefer to watch some things still in SDR. Having the Integral at least allows the user to have more options to see what works best for them and what they prefer with UHD. For many, keeping one of the JVC's greatest strengths (it's black levels and contrast ratio) is more important viewing a compromised version of HDR with UHD sources.

14.2 HDR en MadVR

Dit is wat Madshi (de MadVR man) roept over HDR (september 2017):

I've just talked to Microsoft and NVidia. And the current situation is as follows:

1) In Windows 10 Creator's Update there's a new option in the OS display settings dialog named "HDR and Advanced Color". If you turn this option off, your TV will always be in switched into SDR mode. If you turn this option on, your TVwill always be switched into HDR mode. Windows does *not* support dynamically switching HDR mode on/off while you're playing an HDR movie (or playing an HDR game)! It's currently not supported, and there are no plans to add support for that. Basically Microsoft believes that if you want to use HDR at all, then you want your PC to always drive your TV via HDR mode.

2) If you switch the "HDR and Advanced Color" option off, your TV will always receive SDR from the PC. If you play an HDR movie in this situation with the madVR option "passthrough HDR content to the display" activated, the OS will perform a low quality HDR -> SDR conversion behind madVR's back. Consequently, HDR content will look "ok", but the quality is not really good. SDR content will look "perfect", though.

3) If you switch the "HDR and Advanced Color" option on, your TV will always receive HDR from the PC. If you tell madVR to "passthrough HDR content to the display" in this situation, HDR movies should look "perfect". If you play SDR content in this situation, the OS will convert SDR to HDR behind madVR's back. Consequently, SDR content will look "ok", but it will not be perfect.

4) Currently HDR and fullscreen exclusive mode is a problematic combination atm. It's partially the fault of the OS, partially of the GPU drivers, partially of madVR. It's not clear yet if this will be fixed, or when. Generally, Microsoft wants to get rid of fullscreen exclusive mode. It might suddenly disappear in a future Windows 10 version.

5) Nvidia comes to the rescue of all HTPC users who want perfect quality for both SDR and HDR content: Nvidia's private HDR API allows madVR to dynamically switch the TV into and out of HDR mode, as needed.

6) The current madVR build has a bug where Nvidia's private HDR API is only called properly in the 32bit madVR version, but not in 64bit. This will be fixed in the next build.

7) All post-Creator's-Update Nvidia drivers have a bug which result in madVR being able to switch the TV into HDR mode, but switching the TV back into SDR mode fails. You can work around this by either using Windows 8.1 instead of Windows 10. Or by installing older Nvidia drivers. E.g. with Nvidia driver 376.33 dynamic HDR switching works perfectly fine in Windows 10. Nvidia is aware of the bug in newer drivers and plans to fix that soon.

As it stands right now, for all Windows users who want to do both SDR and HDR playback in perfect quality, I can only recommend Nvidia GPUs, because only Nvidia's private API allows madVR to dynamically switch the TV between SDR <-> HDR. I'm talking to Intel, maybe they will add a private API, too. Unfortunately my AMD contacts have gone silent.

I still recommend Windows 8.1 as the best media play OS right now, as I've done for months. Windows 10 still has many stability issues, furthermore Microsoft is going into a direction which is very bad for HTPC users.

15. Madvr en JVC remote control optie 1

Het is mogelijk om madVR automatisch de JVC X5000 van user mode te laten wisselen ten behoeve van het omschakelen van BT709 naar BT2020 color space (en andere gamma en aperture waarde), zodat tussen het wisselen van SDR naar HDR (tonemapping -> SDR BT2020) content kijken of vice versa we niet steeds handmatig de projector van user mode hoeven laten schakelen.

Benodigde software:

- Python 3.5.x (geen hogere versie want deze wordt nog niet ondersteund door windows 10)
- Manni01 JVC Control for MadVR V1.3.zip
  - https://www.avsforum.com/forum/attachment.php?attachmentid=2392356&d=1524080374
- jvcprojectortools-master.zip
  - https://github.com/arvehj/jvcprojectortools

15.1 Installatie

- Installeer eerst pyton in bijvoorbeeld c:\python3
  - Vink de optie aan om python in de PATH variabele op te nemen
- Maak een directory aan c:\arvetool
- Pak de Manni01 JVC Control bestanden uit en kopieer deze naar c:\arvetool
- Pak de Arve tool (jvcprojectortools-master) bestanden uit en kopieer deze ook naar c:\arvetool

15.2 Configuratie

Edit JVC_COMMAND.BAT en zorg dat daar het volgende in staat:

```
@ECHO OFF

C:

CD /arvetool/

TIMEOUT 20

/python3/PYTHON JVC_%1.PY
```

- Voer nu jvc_network.py uit in een dos box en voer het ip adres van de projector in.

Als je een nieuwere projector hebt dan de JVC X5000 pas dan in jvc_command.py het volgende aan:

Van:

```
class Model(ReadOnly, Enum):
    """Projector model code"""

DLA_X550R_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005
F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_
x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x0
05F_x005F_x005F_x005F_x005F_x005F_x005F_X5000_XC5890R_RS400 =
b'ILAFPJ -- XHP1'
    DLA_XC6890 = b'ILAFPJ -- XHP2'

DLA_X750R_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005
F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_
x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x0
05F_x005F_x005F_x005F_x005F_x005F_x005F_X7000_XC7890R_RS500_X9
50R_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005
F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_
x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x005F_x0
05F_x005F_x005F_x005F_x005F_x005F_X9000_RS600_PX1 = b'ILAFPJ
-- XHP3'
```

Naar bijvoorbeeld:

```
class Model(ReadOnly, Enum):
    """Projector model code"""
       DLA_X5500 = b'ILAFPJ – XHR1'
```

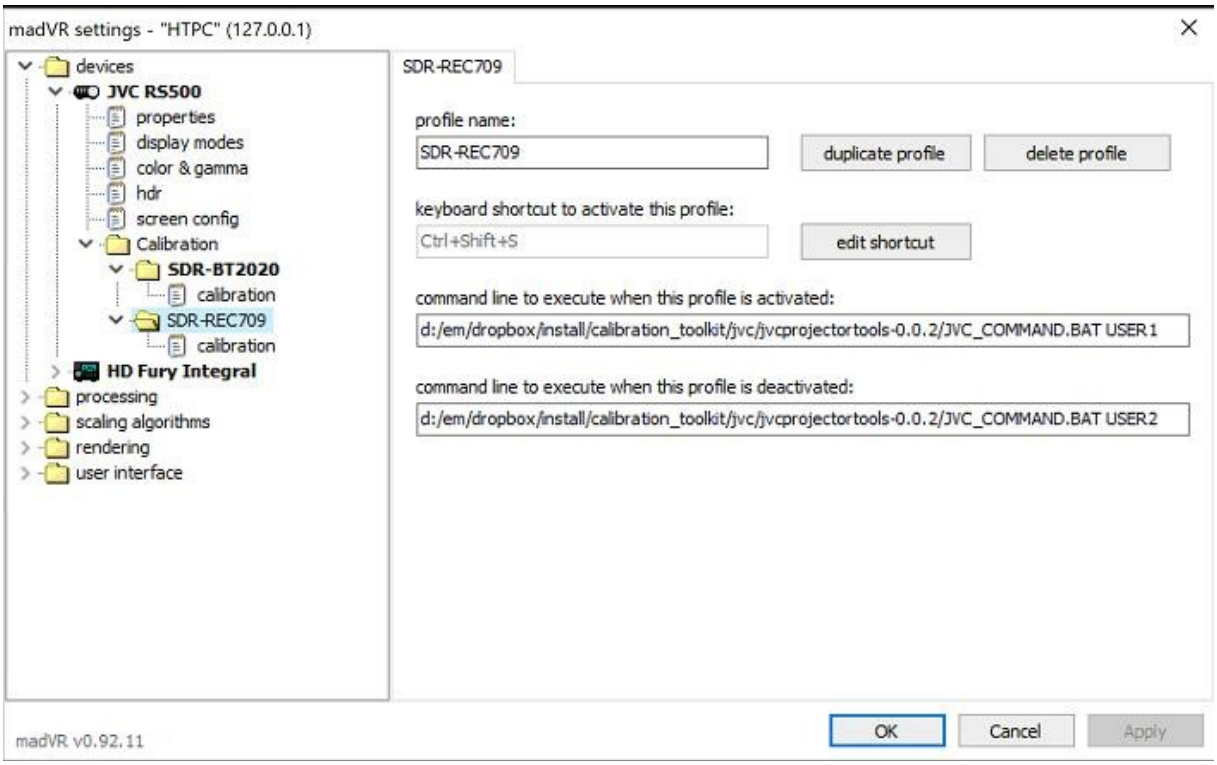
Merk op dat als je jvc_command.py uitvoer je aan de foutmelding kunt ziet dat het om XHR1 (in geval van een JVC X5500) gaat.

15.3 Testen

Nu kunnen we dit eerst handmatig testen op de commandline alvorens madVR te configureren om dit automatisch te doen.

- cd C:\arvetool
- jvc_command.bat user2
    - De projector dient nu om te schakelen naar user mode 2
- jvc_command.bat user1
    - De projector dient nu terug te schakelen naar user mode 1

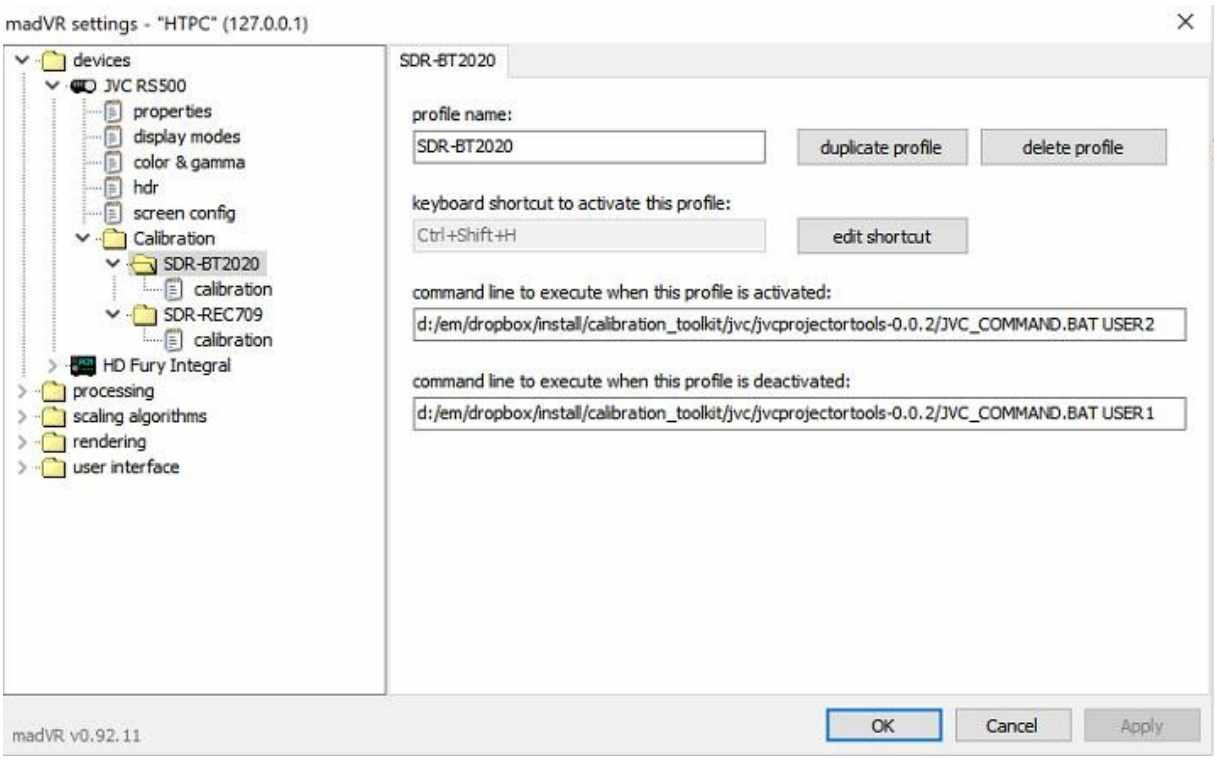
Configureer nu madVR om dit automatisch te doen:



Voer als command to activate in:

c:/arvetool/jvc_command.bat user1

Laat command to deactivate hier leeg, we willen immers na het kijken van SDR content de projector in user1 mode laten staan.



Voer als command to activate in:

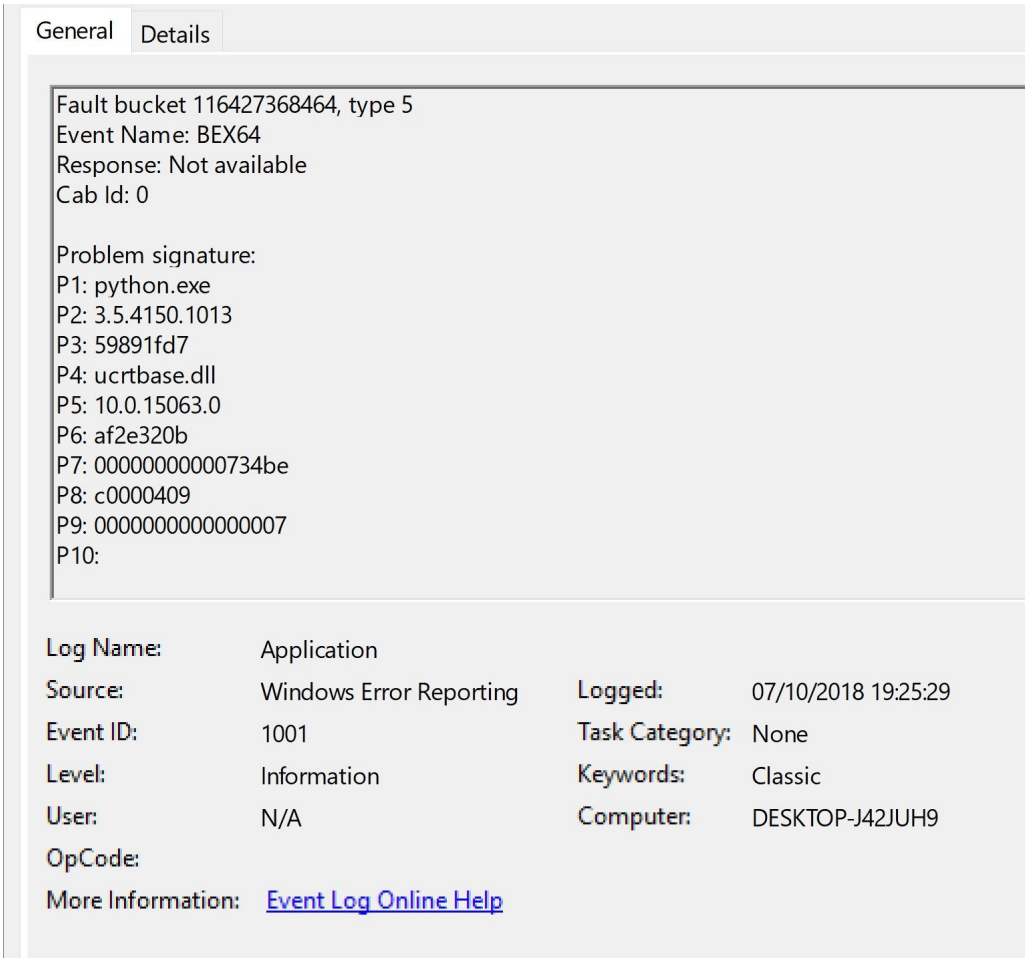
c:/arvetool/jvc_command.bat user2

Voer als command to deactivate in:

c:/arvetool/jvc_command.bat user1

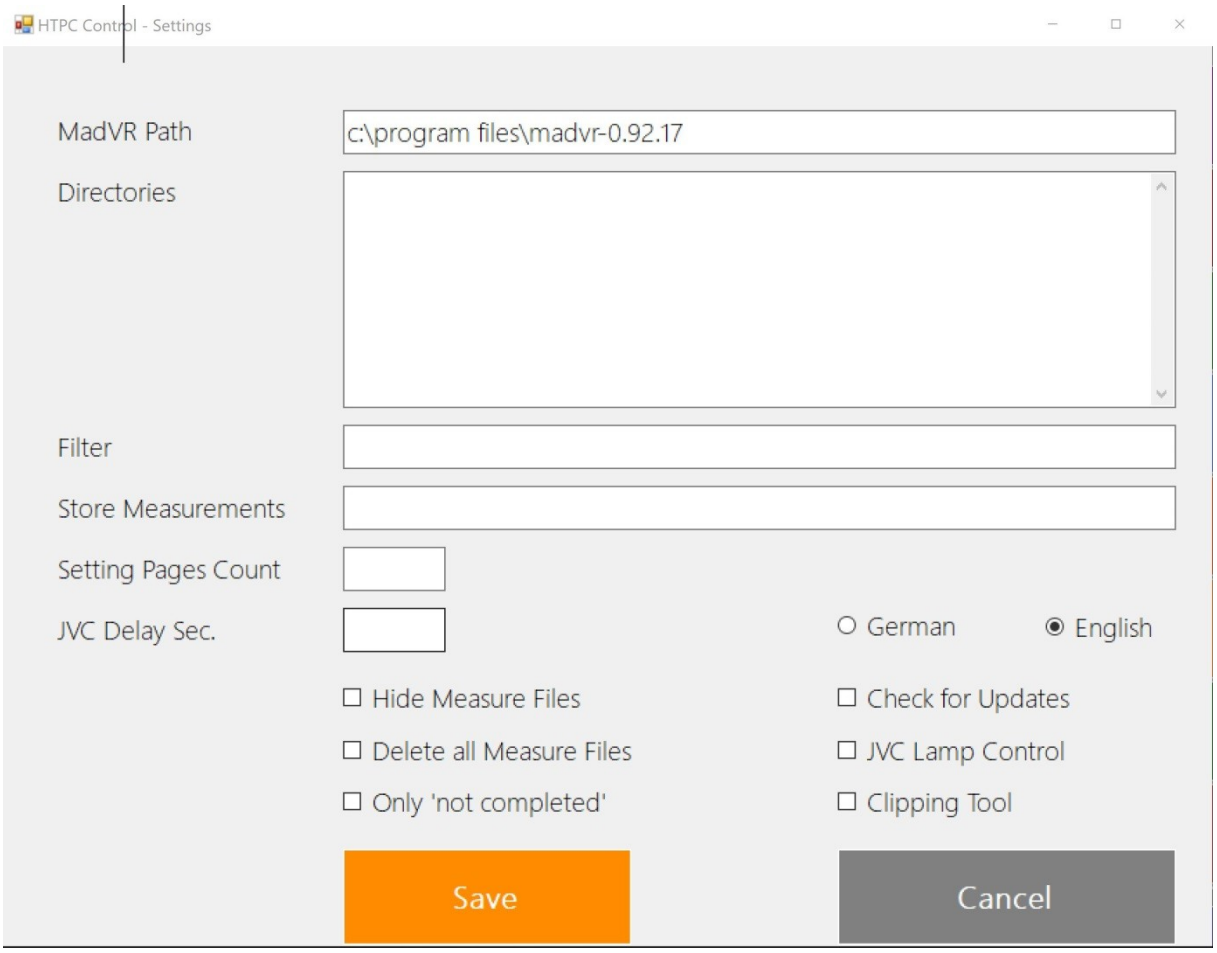
15.4 Huidige status

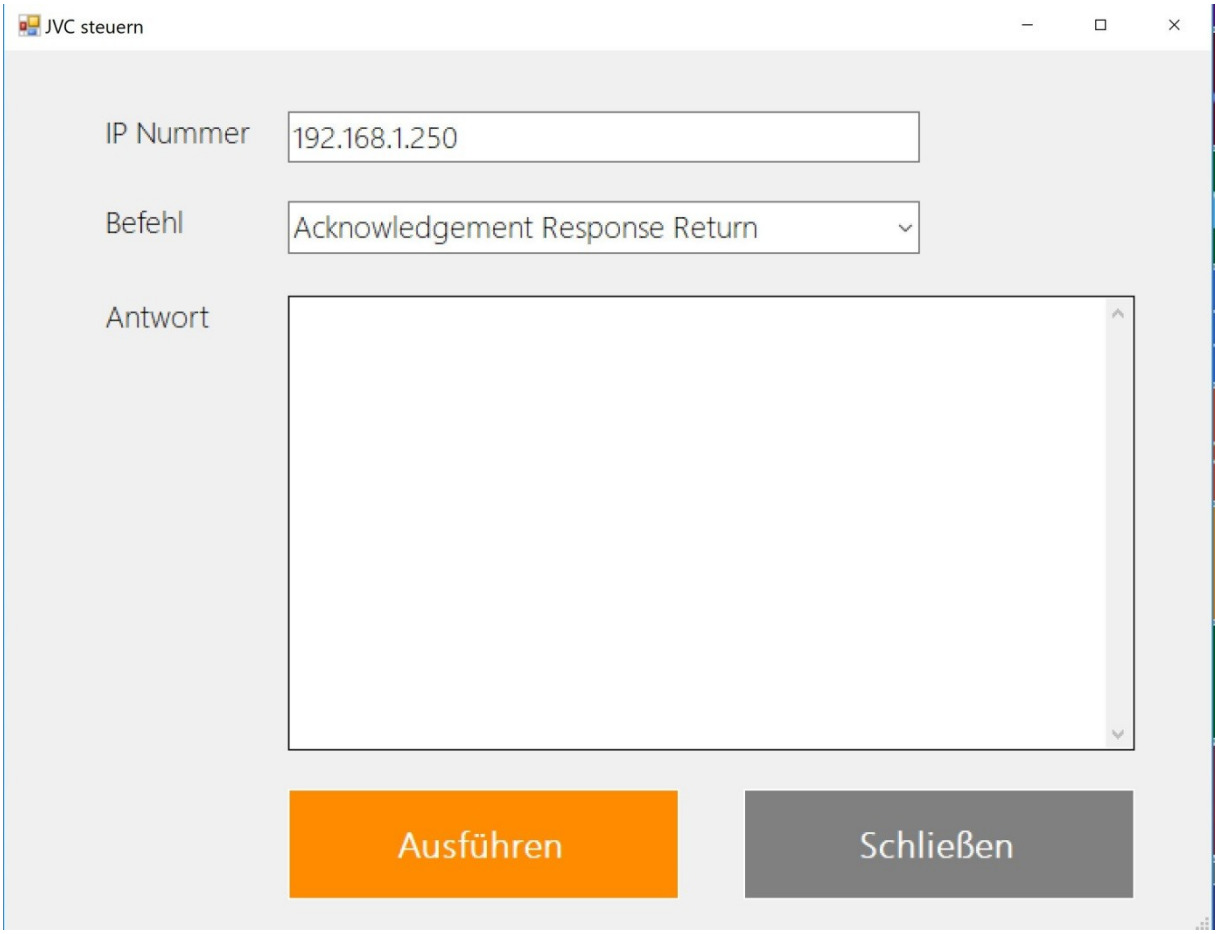
Helaas werkt het in de praktijk nog niet, ik krijg deze foutmelding in de event viewer op het moment dat madVR het jvc_command.bat script aanroept.



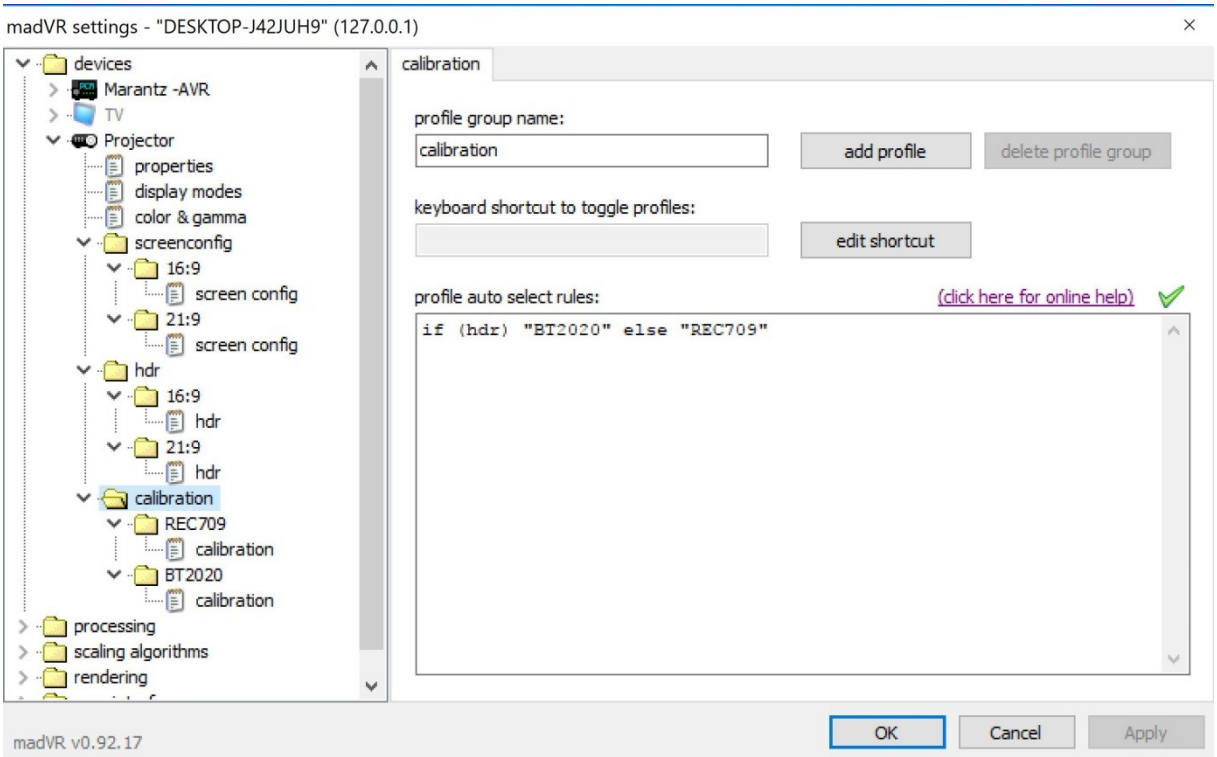
16. Madvr en JVC remote control optie 2

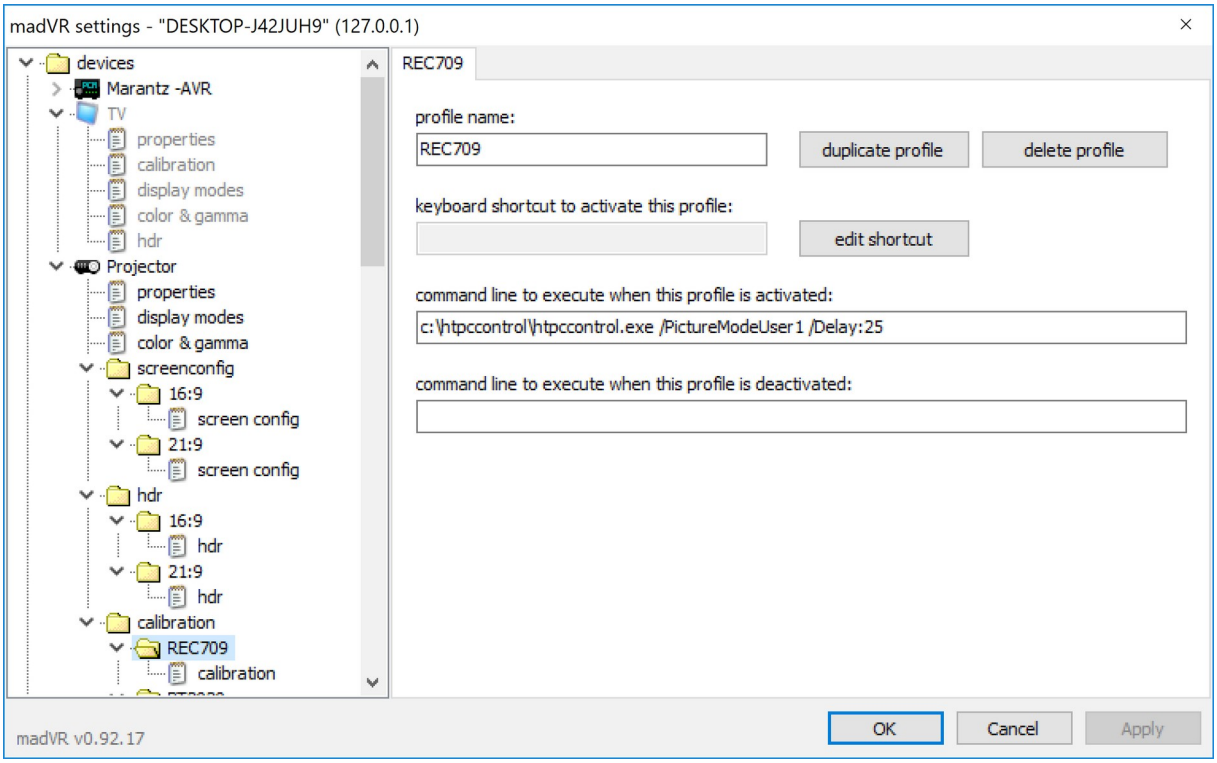
- Pak Htpccontrol.zip uit en zet de files in c:\htpccontrol\
- Start HtpcControl.exe en vul het madvr pad in bij de settings.



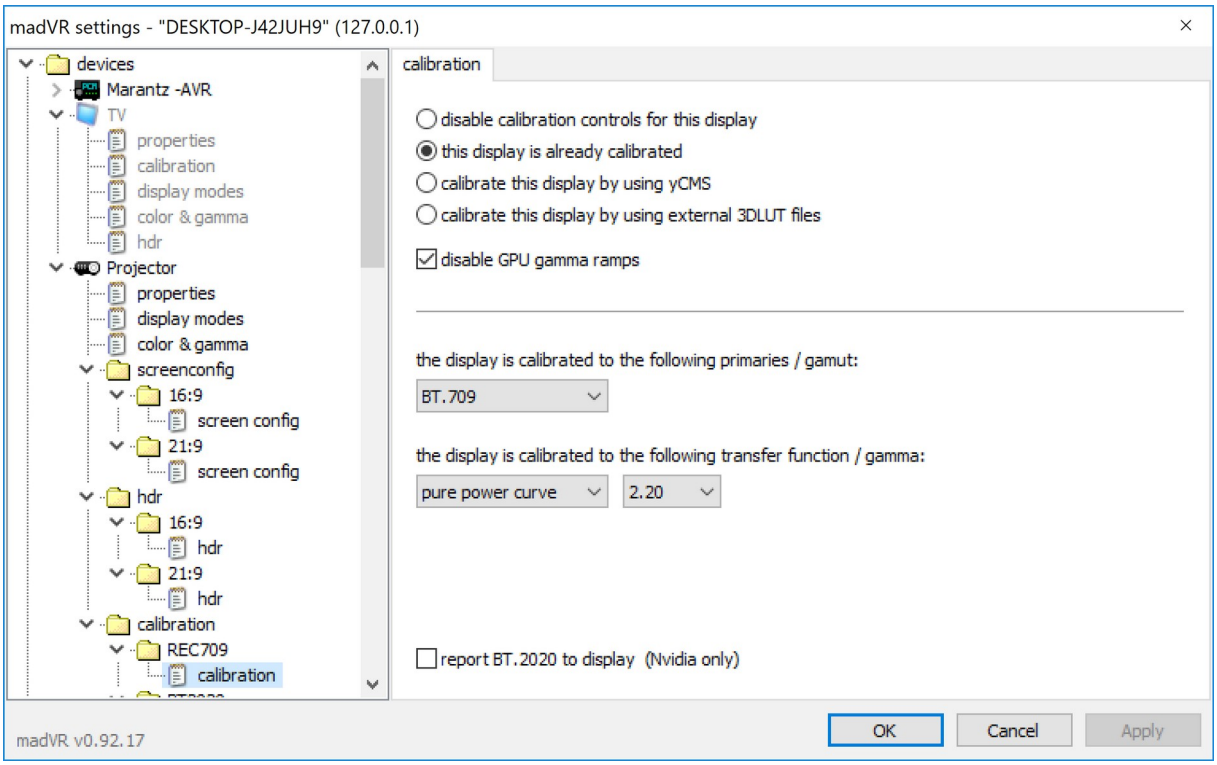


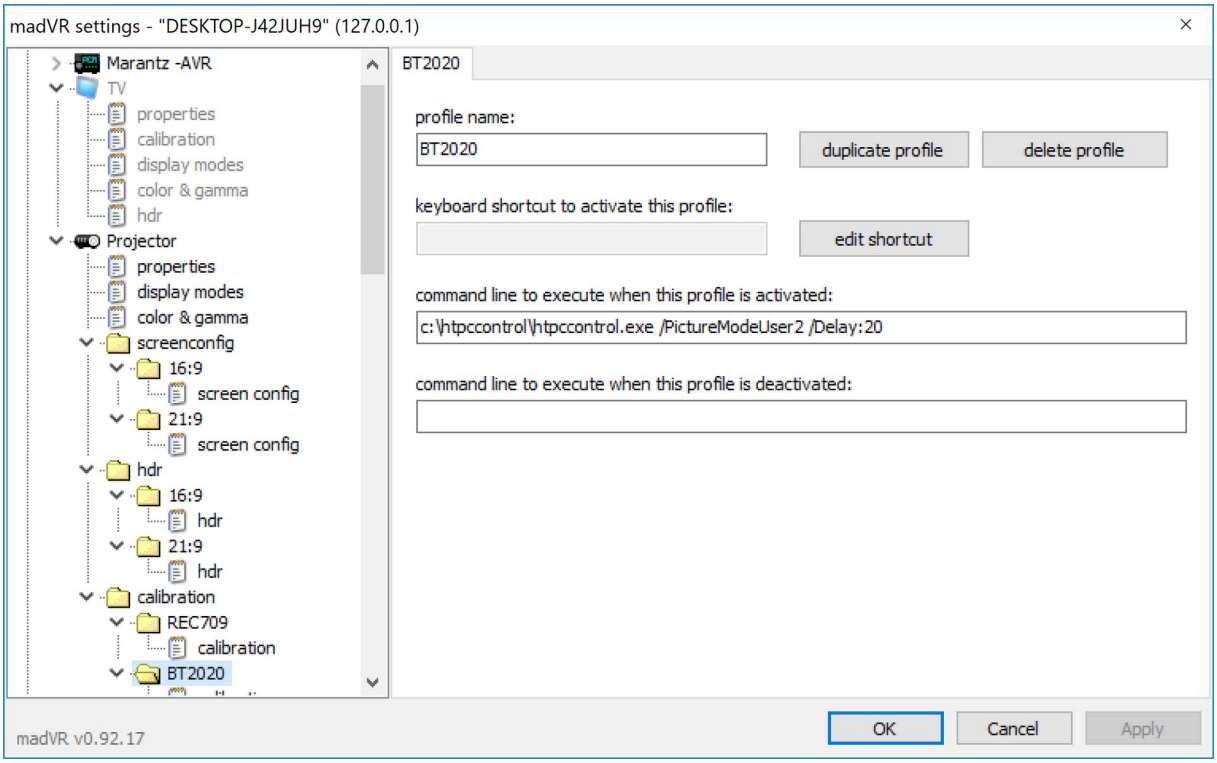
- Vul bij JVC Control het ip adres van de projector in.
- De rest van de configuratie gebeurd in madVR:

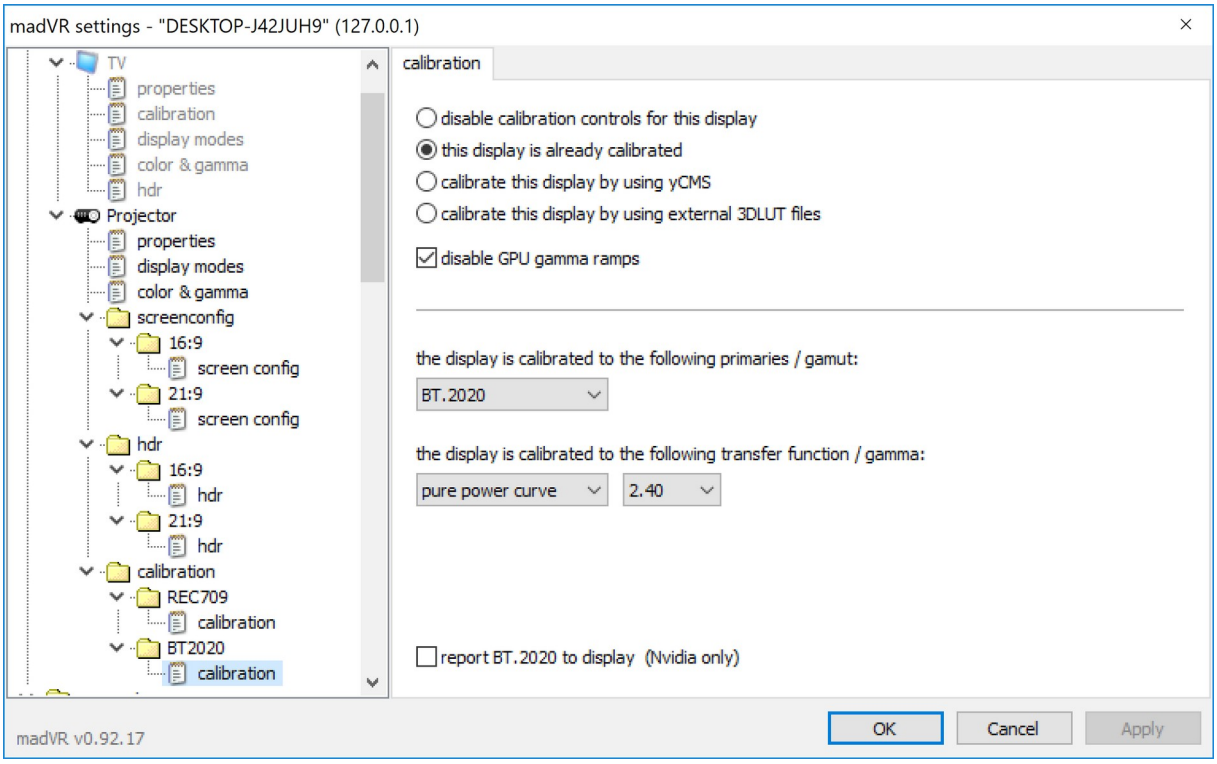




- De delay is nodig om de projector de tijd te geven te HDMI syncen, tijdens het syncen accepteert de projector geen externe commando's.
- Merk op dat deze delay 5 seconden langer is dan bij het schakelen naar BT2020. Dit is proefondervindelijk vastgesteld en noodzakelijk i.v.m. een rare bug in madvr.
- Merk op dat het geen zin heeft om een commando op te geven voor het DEACTIVEREN van een profiel, dit werkt namelijk simpelweg niet (bekende bug MadVR).




madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
Marantz -AVR
TV
properties
calibration
display modes
color & gamma
hdr
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
BT2020
profile name:
BT2020
duplicate profile
delete profile
keyboard shortcut to activate this profile:
edit shortcut
command line to execute when this profile is activated:
c:\htpccontrol\htpccontrol.exe /PictureModeUser2 /Delay:20
command line to execute when this profile is deactivated:
madVR v0.92.17
OK
Cancel
Apply


madVR settings - "DESKTOP-J42JUH9" (127.0.0.1)
TV
properties
calibration
display modes
color & gamma
hdr
Projector
properties
display modes
color & gamma
screenconfig
16:9
screen config
21:9
screen config
hdr
16:9
hdr
21:9
hdr
calibration
REC709
calibration
BT2020
calibration
calibration
disable calibration controls for this display
this display is already calibrated
calibrate this display by using yCMS
calibrate this display by using external 3DLUT files
disable GPU gamma ramps
the display is calibrated to the following primaries / gamut:
BT.2020
the display is calibrated to the following transfer function / gamma:
pure power curve
2.40
report BT.2020 to display (Nvidia only)
madVR v0.92.17
OK
Cancel
Apply

17. Windows 10 repair

De windows 10 repair optie faalt wel eens met een onduidelijke foutmelding. Start in dat geval de command prompt (een van de keuze van windows repair) en voer de volgende commando’s uit:

- bootrec.exe /rebuildbcd
- bootrec.exe /fixmbr
- bootrec.exe /fixboot
- chkdsk /r c:

18. Chromapure BT2020 calibratie

- In Options, Gamut set the Reference Gamut to 2020 and the Saturations Increments to 25%.
- In Options, Gamma set the Gamma Target to 2.4.
- On the Initial Setup page set the Color Intensity to 50%
- In the Color Management module set the saturation to 50%.
- Use the HDR Report for reporting.

19. MadVR 3DLUT calibration

Inhoud van AVS thread: https://www.avsforum.com/forum/139-display-calibration/1471169-madvr-argyllcms.html (12/12/2019)

Required Software

ArgyllCMS 32-bit
DisplayCAL
MadVR video renderer
DirectShow video player that can use MadVR (ie. Zoom Player, MPC-HC, etc.)

Required Hardware

An ArgyllCMS supported colorimeter or spectrophotometer

A. Install ArgyllCMS, DisplayCAL, and MadVR

1. Extract ArcgyllCMS to a folder of your choice (ie. C:\ArgyllCMS)
2. Install DisplayCAL to a folder of your choice
3. Extract MadVR to a folder of your choice (ie. C:\MadVR)
4. Run 'install.bat' in the MadVR folder as Administrator

19.1 Calibrating (3DLUT) for madvr tonemapping SDR with REC709

B. Create MadVR compatible 3DLUT from ArgyllCMS tools

1. Start MadVR Test Pattern Generator

1. Run madTPG.exe from the MadVR install folder
2. Enable "use fullscreen"
3. Enable "disable VideoLuts"
4. Enable "disable 3dlut"

2. Start DisplayCAL

3. Calibration, Profile, and 3D LUT Generation

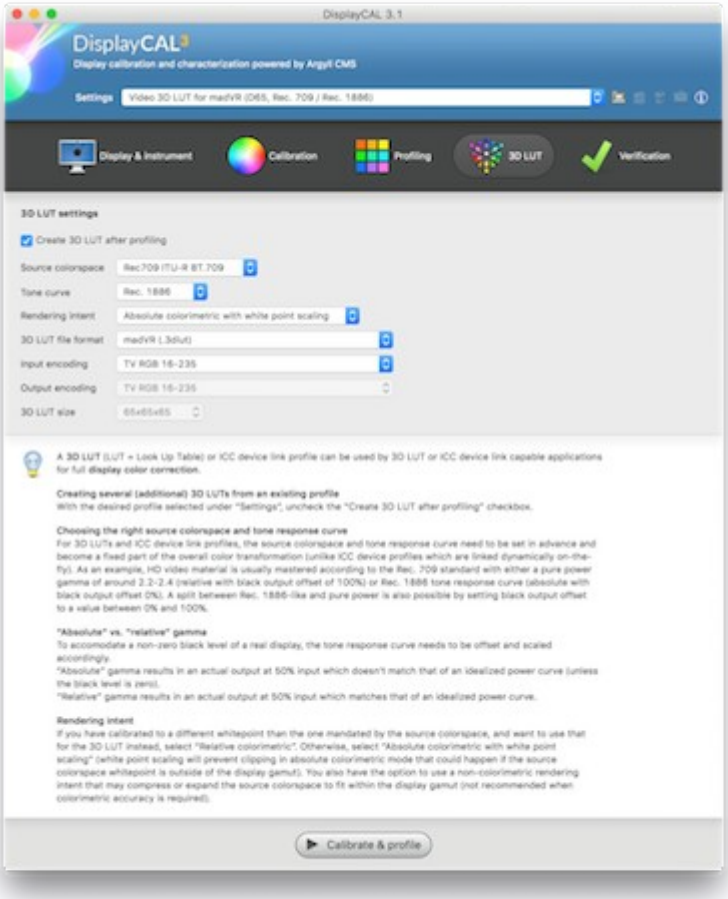
1. When running DisplayCAL for the first time, a prompt to locate the ArgyllCMS executables directory will be shown, browse to the path where ArgyllCMS is extracted and select the ‘bin’ folder
2. Click ‘File’ in the menu bar and select ‘Choose save path…’ then browse to a directory to save calibration/profile files and logs
3. ***Please make sure you read through each Notes section under each tab. These sections contain valuable information and explanation of the settings for each tab***
4. On the **Display & instrument tab**, Select 'Video 3D LUT for madVR (D65, Rec. 709 / Rec. 1886)' under Settings


DisplayCAL 3.1
DisplayCAL3
Display calibration and characterization powered by Argyll CMS
Settings
Video 3D LUT for madVR (D65, Rec. 709 / Rec. 1886)
Display & instrument
Calibration
Profiling
3D LUT
Verification
Display
Instrument
madVR
i1 DisplayPro, ColorMunki Display
Mode
LCD (generic)
White level drift compensation
Black level drift compensation
Correction
Matrix: Xrite i1 DisplayPro, ColorMunki Display & Pioneer Electronic SC-57 (X-Rite i1 Pro 2)
You should let the display warm up for at least 30 minutes before commencing measurements. If you use your instrument in contact mode, it is a good idea to leave it on the display during that time as well.
If your display is a OLED, Plasma or other technology with variable light output depending on picture content, enable white level drift compensation.
If your instrument is a spectrometer and you use it in contact mode on a display with stable black level, you may want to enable instrument black level drift compensation.
If your instrument is a colorimeter, you should use a correction suitable for your display or display technology type. Note that some instruments (ColorHug, ColorHug2, K-10, Spyder4/5) may have a correction built into some of their measurement modes.
Calibrate & profile

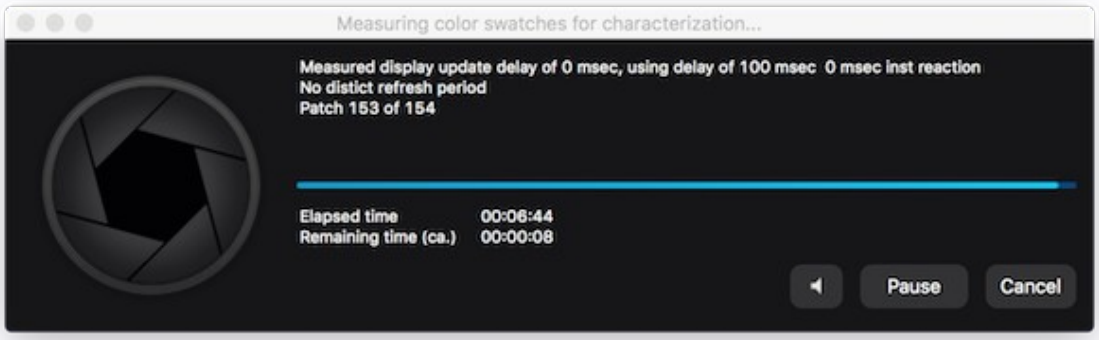
On the **Calibation** tab, keep the defaults. If you want to learn more about the effects of selecting different tone curves and gamma, please see chros73 post "Tone curve / gamma for beginners"

5. On the **Profiling** tab, slide the 'Amount of patches' slider to adjust the amount of patterns measured to create the display profile

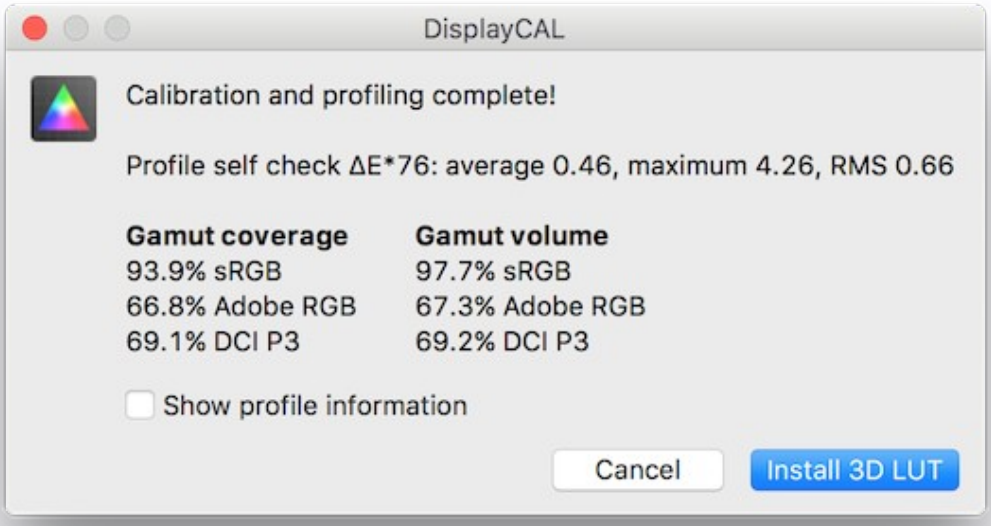
6. On the **3D LUT** tab, verify 'madVR (.3dlut)' is selected as the 3D LUT file format



7. **Note:** I use Gamma 2.2 tone curve instead of BT1886.
8. Click 'Calibrate & profile' button. The duration of the process will depend on the speed of your meter and the amount of test patterns selected
9. Measurement progress bar



10. After measurement and profile are complete, click the 'Install 3D LUT' button to automatically install the 3D LUT into MadVR. (manual 3D LUT install instructions are below)



C. Manually applying the 3D LUT file in MadVR

1. Browse to the folder where MadVR was extracted
2. Run madHcCtrl.exe
3. Right-click the MadVR tray icon and select 'Edit madVR Settings...'
4. Expand your display device under the devices node
5. Select 'calibration' menu
6. Select 'calibrate this display by using an external 3DLUT files'
7. Check 'disable GPU gamma ramps'
8. For the BT.709 field, browse to the DisplayCAL save location, the profile folder, and select the xxxx.3dlut file

19.2 Calibrating (3DLUT) for madvr tonemapping SDR with BT2020

You must not use the option “Video 3D LUT for madVR HDR (D65 Rec. 2020 / SMPTE 2084 / BT.2390)” as this is literally a HDR 3D LUT. You want to use madVR to tone-map HDR to SDR, so as you stated, you will be using SDR2020 which is NOT an HDR 3D LUT.

Instead, you need to choose “Video 3D LUT for mad VR (D65, Rec. 709 / Rec 1886)”.

You can try to do a BT2020 3D LUT for BT.2020 color profile mode on the projector (not recommended for JVC X5000 series, the colors will be incorrect), but you may find that you get posterization in the result. In that case. Instead **make your 3D LUT for DCI-P3 color space**. Also, the projector (JVC X5000) does not exceed DCI-P3 color gamut anyways, so you are not losing any color gamut. Even though movies are mastered to BT.2020 color gamut, none so far use any colors outside the DCI-P3 gamut that I have heard of or seen. Don't forget to use the DCI-P3 color profile in the projector (JVC X5000) when calibrating for DCI-P3. A JVC X5000 DCI-P3 color profile can ben found on AVS forum and then imported to the projector using the autocal software.

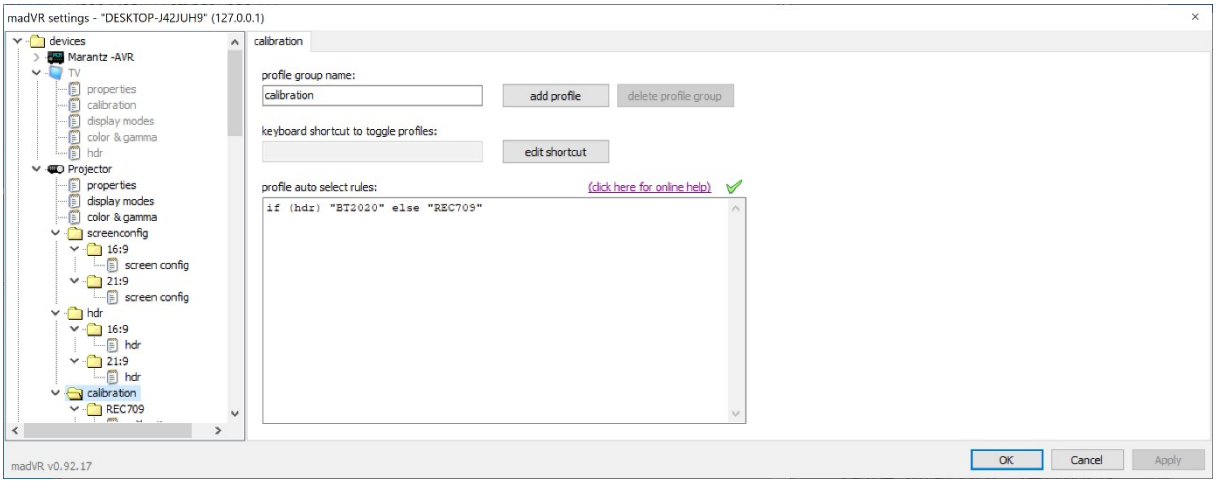
Then on the 3D LUT tab, you can select your Tone curve to Gamma 2.2 and your source colorspace to DCI-P3.

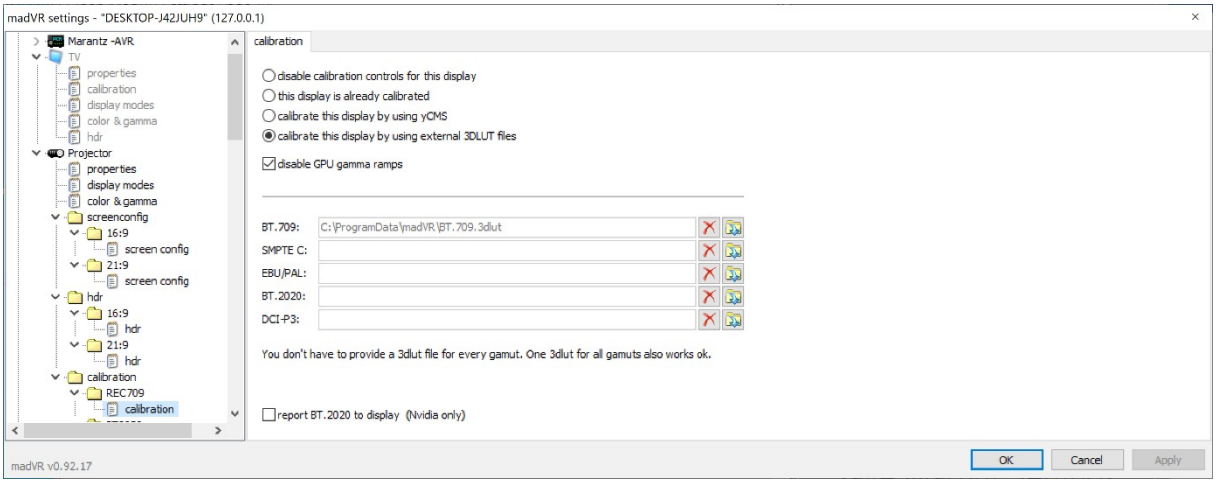
This will then generate a 3D LUT for madVR which will go in the Devices -> “your device” -> Calibration tab, in the DCI-P3 slot.

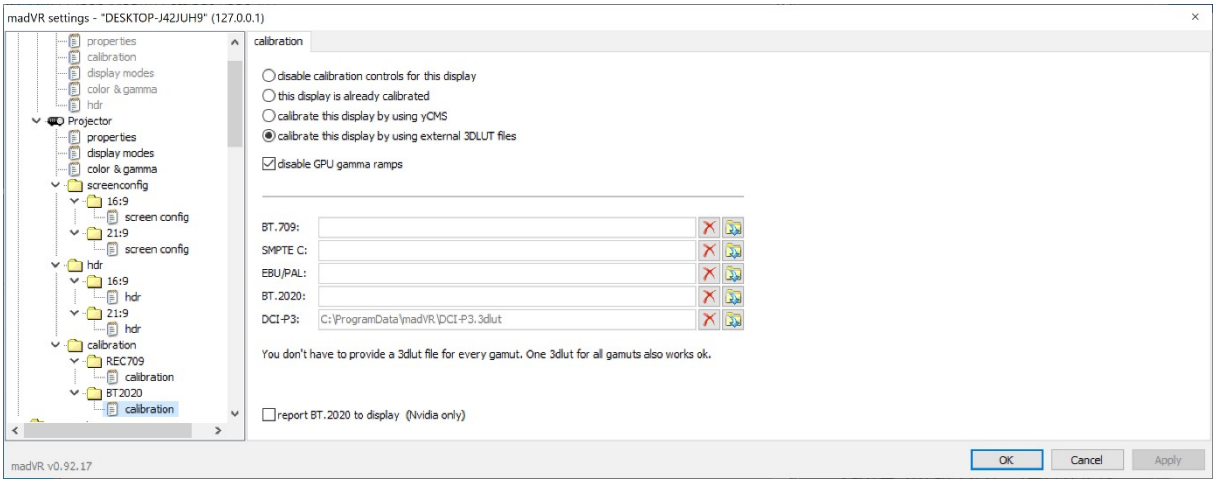
Because we are using “tone map HDR using pixel shaders” this makes an SDR 3D LUT appropriate.

19.3 MadVR 3DLUT settings

Ik doe twee 3DLUT calibraties (metingen), eentje voor REC709 en eentje voor BT2020 source content.







19.4 Displaycal correction file

Displaycal correctie files zijn te vinden op:

https://colorimetercorrections.displaycal.net/?get&type=*&manufacturer_id=JVC&instrument=*&html=1

```
Ik gebruik zelf deze:
'JVC D-ILA Family - Xrite i1 DisplayPro, ColorMunki Display & madVR
(GretagMacbeth i1 Pro).ccmx'

Met als inhoud:

CCMX

DESCRIPTOR "JVC D-ILA Family - Xrite i1 DisplayPro, ColorMunki Display &
madVR (GretagMacbeth i1 Pro)"
KEYWORD "INSTRUMENT"
INSTRUMENT "Xrite i1 DisplayPro, ColorMunki Display"
KEYWORD "TECHNOLOGY"
TECHNOLOGY "Projector"
KEYWORD "MANUFACTURER_ID"
MANUFACTURER_ID "JVC"
KEYWORD "MANUFACTURER"
MANUFACTURER "JVC D-ILA"
KEYWORD "DISPLAY"
DISPLAY "JVC D-ILA"
KEYWORD "DISPLAY_TYPE_BASE_ID"
DISPLAY_TYPE_BASE_ID "1"
KEYWORD "DISPLAY_TYPE_REFRESH"
DISPLAY_TYPE_REFRESH "NO"
KEYWORD "REFERENCE"
REFERENCE "GretagMacbeth i1 Pro"
ORIGINATOR "Argyll ccmx"
CREATED "Fri Nov 20 16:21:58 2015"
KEYWORD "COLOR_REP"
COLOR_REP "XYZ"

NUMBER_OF_FIELDS 3
BEGIN_DATA_FORMAT
XYZ_X XYZ_Y XYZ_Z
END_DATA_FORMAT

NUMBER_OF_SETS 3
BEGIN_DATA
0.955653 0.0308885 -0.00280638
-0.0262404 0.992673 0.00487496
-0.00154635 -0.00812838 0.958890
END_DATA
```

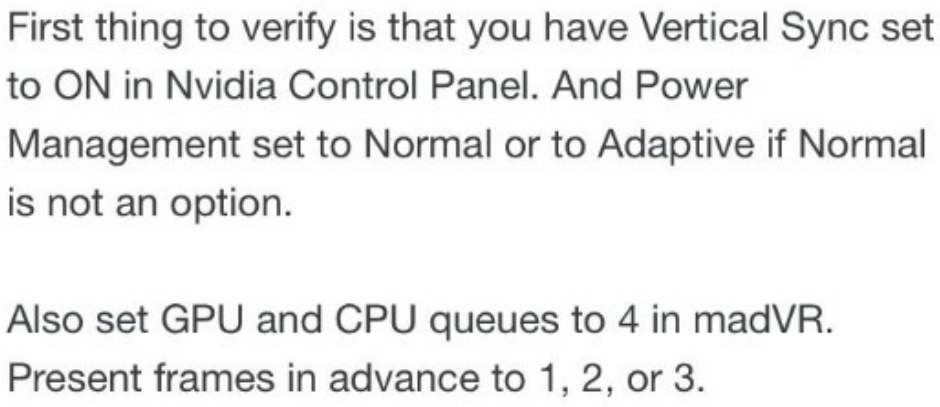
20. NVIDIA micro stutter issues

Note to JVC projector owners with Nvidia GPU

(https://drive.google.com/file/d/1gQZLfJ0w5KT7tBHCKZASSVU8vTnyPe2n/view)

If you have a Nvidia 20xx/30xx video card and you encounter micro stutter while using madVR without actually dropping frames, please try the following:

- In the Nvidia control panel, go to Manage 3D Settings, scroll all the way down and set Vertical Sync to 'On'. You can do this either globally or just for the media player exe.
- In the madVR settings, go to rendering -> general settings, and uncheck 'enable automatic fullscreen exclusive mode'
- In the madVR settings, go to rendering -> windowed mode settings, and set 'how many video frames shall be presented in advance' to 1 or a maximum of 3
- https://forum.doom9.org/showpost.php?p=1871970&postcount=151
- Every Nvidia driver after 388.59 has a faulty updated HD Audio driver in the newer Windows driver installer packages.
- If you want 3D support back in newer drivers like 430.39 from 2019-04-23 and newer, you can try 3D Fix Manager



Game Ready Driver (GRD)
Creator Ready Driver (CRD)
Studio Driver (SD)
Hotfix Driver

• **512.59**	2022-04-26	
• **512.59**	2022-04-26	
• **512.16**	2022-03-29	**only for RTX 3090 Ti**
• **512.16**	2022-03-29	**only for RTX 3090 Ti**
• **512.15**	2022-03-22	D3D9 overlay rendering was broken and now it is disabled
• **512.15**	2022-03-22	D3D9 overlay rendering was broken and now it is disabled
• **511.79**	2022-02-01	
• **511.65**	2022-02-01	
• **511.65**	2022-02-01	
• **511.33**	2022-01-27	**only for RTX 3050**
• **511.32**	2022-01-27	**only for RTX 3050**
• **511.23**	2022-01-14	
• **511.17**	2022-01-11	**only for RTX 3080 – new 12GB model**
• **511.17**	2022-01-11	**only for RTX 3080 – new 12GB model**
• **511.09**	2022-01-04	**first SD which is only available as DCH!**
• **497.29**	2021-12-20	**only DCH available!**
• **472.47**	2021-12-13	**Standard is still available!**
• **497.09**	2021-12-01	**only DCH available!**
• **496.76**	2021-11-16	**only DCH available!**
• **472.47**	2021-11-10	**Standard is still available!**
• **496.49**	2021-10-26	**only DCH available!**
• **472.39**	2021-10-26	**Standard is still available!**
• **496.13**	2021-10-12	**only DCH available!**
• **472.12**	2021-09-20	D3D9 overlay rendering is still broken
• **472.12**	2021-09-20	D3D9 overlay rendering is still broken
• **471.96**	2021-08-31	
• **471.68**	2021-08-10	

- **471.68** 2021-08-10
- **471.41** 2021-07-19
- **471.41** 2021-07-19
- **471.22** 2021-07-01
- **471.11** 2021-06-23
- **471.11** 2021-06-22
- **462.65** 2021-06-10 This version or above needed for GeForce RTX 3070 Ti
  "Includes support for the GeForce RTX 30-series desktop GPUs including the new GeForce RTX 3080 Ti and GeForce RTX 3070 Ti GPUs."
- **466.77** 2021-06-10 This version or above needed for GeForce RTX 3070 Ti
  "Includes support for the GeForce RTX 3080 Ti and GeForce RTX 3070 Ti GPUs"
  D3D9 overlay rendering is broken
- **466.74** 2021-06-08
- **466.63** 2021-06-03 This version or above needed for GeForce RTX 3080 Ti
  "Includes support for the GeForce RTX 3080 Ti GPU"
- **462.65** 2021-06-03 This version or above needed for GeForce RTX 3080 Ti
  "Includes support for the GeForce RTX 3080 Ti GPU"
  This SD is for some strange reason not for the RTX 3090.
- **466.55** 2021-05-25
- **466.47** 2021-05-18
- **462.59** 2021-05-11
- **466.27** 2021-04-29
- **466.11** 2021-04-14
- **462.31** 2021-04-14
- **465.89** 2021-03-30
- **462.07** 2021-03-22
- **461.92** 2021-03-17
- **461.92** 2021-03-16
- **461.81** 2021-03-04
- **461.72** 2021-02-25 This version or above needed for GeForce RTX 3060
  "Includes support for the GeForce RTX 3060 GPU"
- **461.72** 2021-02-25 This version or above needed for GeForce RTX 3060
  "Includes support for the GeForce RTX 3060 GPU"
- **461.51** 2021-02-05
- **461.40** 2021-01-26
- **461.40** 2021-01-26
- **461.33** 2021-01-20
- **461.09** 2021-01-07
- **460.97** 2020-12-18
- **460.89** 2020-12-15
- **460.89** 2020-12-15
- **460.79** 2020-12-09
- **457.51** 2020-12-02 This version or above needed for GeForce RTX 3060 Ti
  "Includes support for the GeForce RTX 3060 Ti GPU"