# Subsampling Test Documentation

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BUROSCH

Subsampling Test Pattern

Using the Subsampling Test Pattern you may check if your TV device and / or your BD player apply color subsampling internally. The test image was produced specifically for use on modern TV displays. If color subsampling exists, the playback of photos and artificial graphics on the screen deteriorates - so that for instance narrow lines and small details will be blurred or disappear completely.

Overview
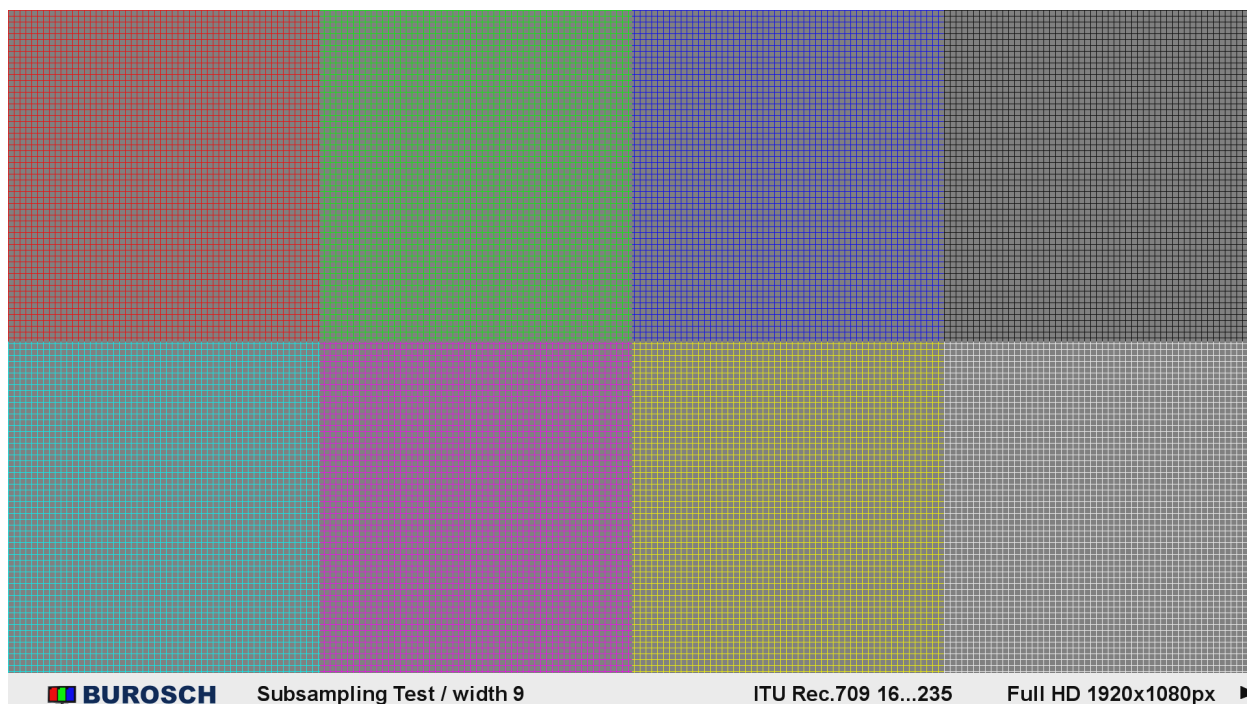
The test pattern is constructed as a grid with eight different sections. The background is of uniform gray color (RGB # 7F7F7F). The individual lines of the grating are each exactly one pixel wide and have eight pixels distance from one another – so, in both the vertical and horizontal directions, there's a line every 9 pixels. The lines of the different sections, from left to right and top to bottom are colored red (RGB # EB1010), green (RGB # 10EB10), blue (RGB # 1010EB), black (RGB # 101010), cyan (RGB # 10EBEB), magenta (RGB # EB10EB), yellow (RGB # EBEB10) and white (RGB # EBEBEB).
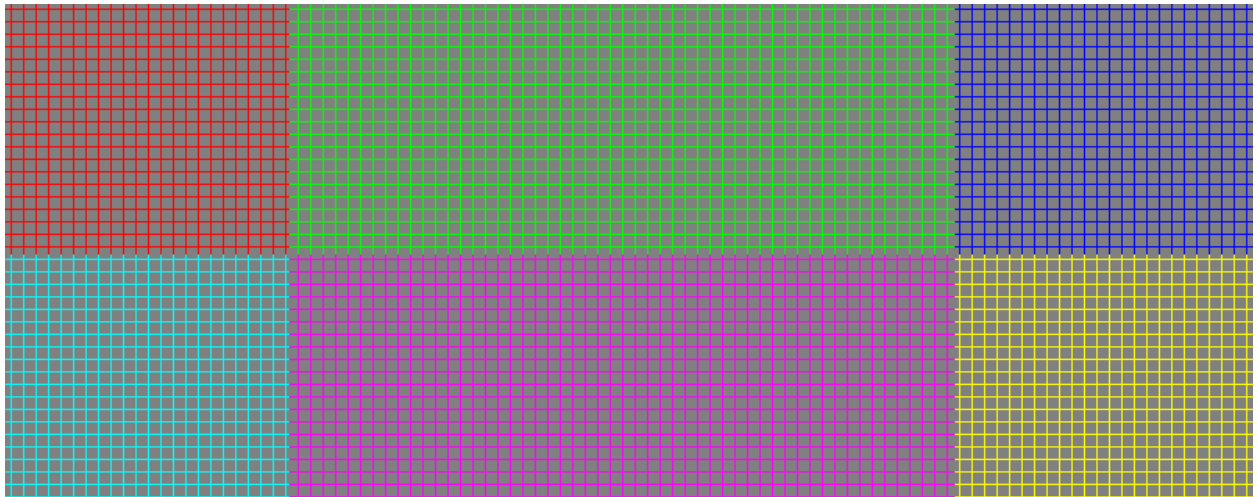
Test Pattern Usage

First, make sure that your TV is setup correctly in terms of format and overscan. We recommend using our First Check Full HD test image. The test image can be found at: http://www.burosch.de/testbilder-uebersicht/311-first-check-full-hd-testbild.html

When finished, load the Subsampling Test Pattern for display on your screen. Now look at the individual sections of the test pattern, starting with the black and white sections on the right. If you already notice errors such as blurred or non-existent lines in these two sections, your display is not setup correctly in terms of format and overscan. Check again with the First Check test image and make sure that the white and black grid are now displayed correctly.

Now, shift your attention to the colored six sections on the left side. Check each section individually, paying special attention to the presence of all lines or blurred lines and check for any discoloration. Only when all lines are displayed correctly, your playback device does not apply color subsampling internally. Please also refer to the examples in the following section.

Examples

Here you can see, using an enlarged section of the image, some examples with explanations. The examples show how an incorrect reproduction of the image can look in practice. Take note that your display program (eg your browser) must be able to display images with a width of at least 900px.

Optimal Reproduction: Nothing is wrong with this reproduction. If your display shows the test pattern this way, no internal color subsampling is applied and hence the playback device works perfectly in terms of color subsampling.
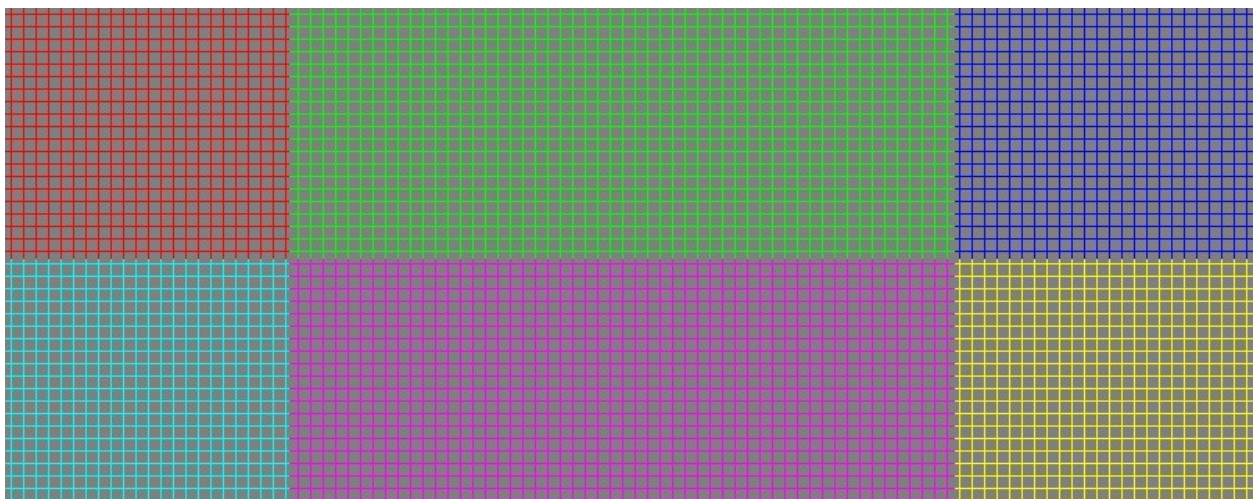
Blurred Lines: The TV set applies color subsampling internally in both the horizontal and vertical direction, trying to counteract the negative effects with an interpolation algorithm. The effect is visible here through the blurred and faded lines.

Vertical lines missing in regular distances and/or remaining vertical lines are broader: The TV device applies color subsampling in horizontal direction internally without counteracting the negative effects using interpolation. The result is mssing lines and / or broader vertical lines.

Horizontal Lines are blurred or darker than the vertical lines: The TV device applies color subsampling in vertical direction internally and counteracts the negative effects using interpolation.

Big spaces between lines: In this case, use the white and black sections for comparison. If the spaces in the colored sections are bigger than in the black / white sections, color subsampling is applied internally and no interpolation is applied to counteract the effects.
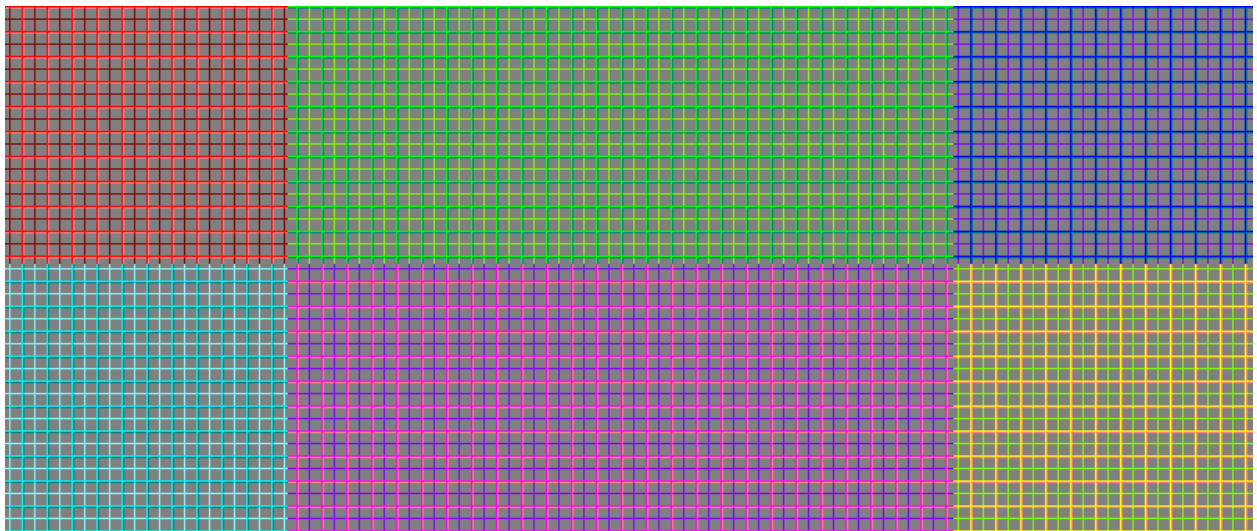
Similar problems as in the other cases, but limited to one section and/or discoloration: Your TV display does not apply color subsampling, but shows significant problems in displaying fine colored lines in a pixel exact way. With high probability this is an error in the internal software.

Technical Background

Subsampling means the digital reproduction of color (as opposed to luminance or basic brightness) with reduced resolution. As the human visual system reacts to changes in the color much less sensitive than to changes in the luminance, this is usually possible without significant loss in quality and allows for big storage and bandwidth savings. For more information on the subsampling please consult the corresponding subsection of our big JPEG report:

http://www.burosch.de/technische-informationen/339-jpeg-das-bildformat-teil-1-theorie-und-grundlagen.html

It is necessary to distinguish between desired color subsampling, which is done in still image and video codecs to save on storage space, and undesired color subsampling, which is internally performed by your playback device, possibly to save some bandwidth internally. Since color subsampling can also be introduced by a recoding (eg as a JPEG image or H.264 stream), we strongly recommend against recoding our image material on your own. Please only use our original test material to evaluate your display.

Internal subsampling is typically applied by the internal playback software and is firmly integrated into the display system. Therefore - should you have become aware of internal subsampling or a different problem (as shown in 'examples') with the help of our test pattern – fixing the problem by changing the display settings is in most cases not possible.

Imprint

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