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Short Analysis and Comparison of Sony SCL Prime Lenses

a lens test report by
Kamerawerk GmbH, 2014

Lenses tested by
Christian Witschi, Martin Schächli

Analysed by
Christoph Skofic

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Figure 1: Sony SCL Lenses img src: <http://www.filmmandigitaltimes.com>

1 Introduction

With this lens-test report we would like to provide a comparison between the new Sony SCL-PK6/F CineAlta PL Mount lenses and other state of the art products such as Cooke S4, Zeiss Compact Prime and Arri Ultra Prime lenses.

The results of this evaluation are astonishing, even though Sony SCL lenses are available for a fraction of the price they offer impressive imaging capabilities, equal to Compact Prime or Ultra Prime lenses. Aside from that, this evaluation reveals unique the characteristics of a Cooke S4 35mm prime lens which are responsible for its special look compared to other lenses.

2 Measurement Range

Eleven areas were selected for measurements. Because of the slanted-edge method all measurement areas need to be located on respective image structures.

Areas 1 to 4 show vertical and horizontal MTF values near to the image center. Areas 5-7 represent MTF values close to the image boarder. Finally areas 8-11 represent MTF values at the image corner.

It is important to mention that MTF as well as edge profile can differ significantly between position 1 and position 7. Lenses with weaker imaging performance show low MTF values especially towards the image boarder and image corners, whereas MTF stays on high values in the image center.

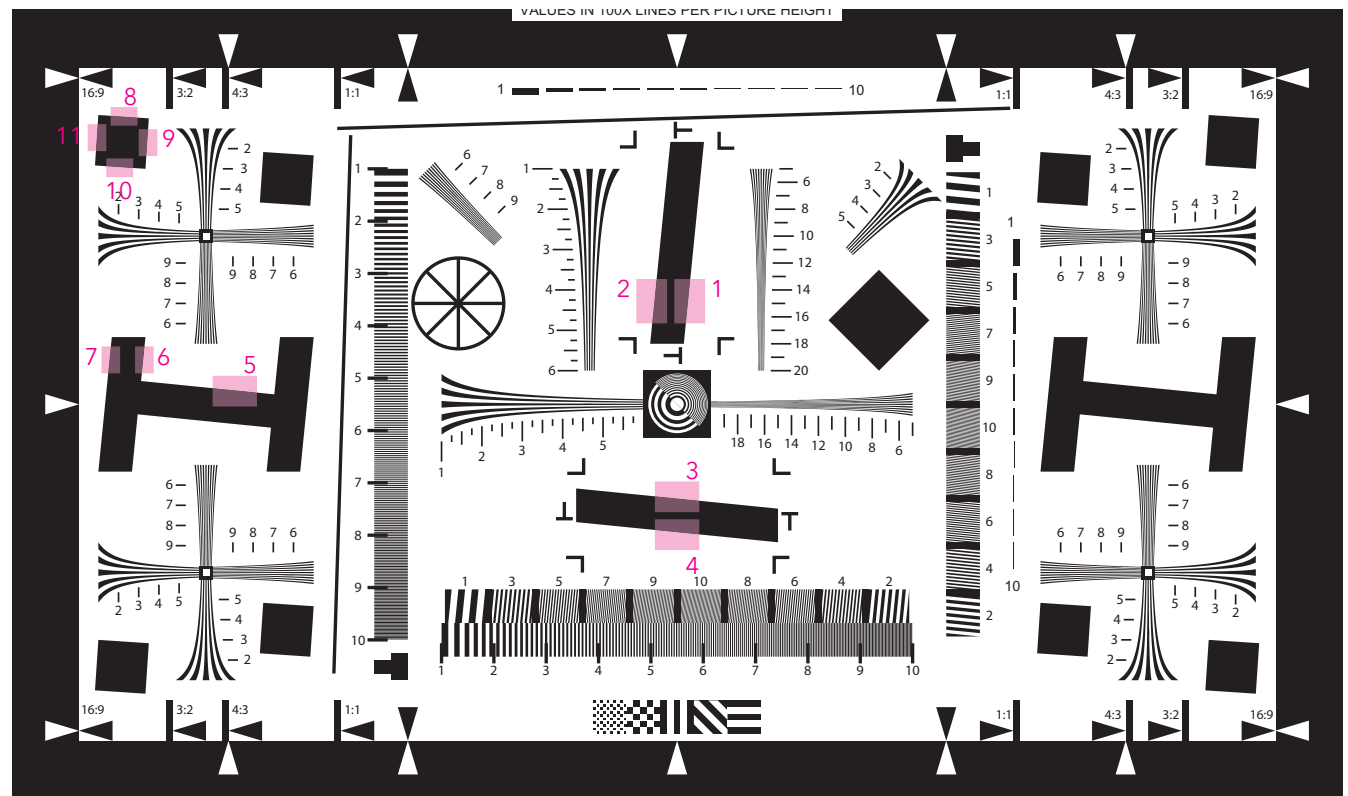


Figure 9: ISO 12233 Resolution Chart [img src: http://www.graphics.cornell.edu/~westin/misc/ISO_12233-reschart.pdf](http://www.graphics.cornell.edu/~westin/misc/ISO_12233-reschart.pdf)

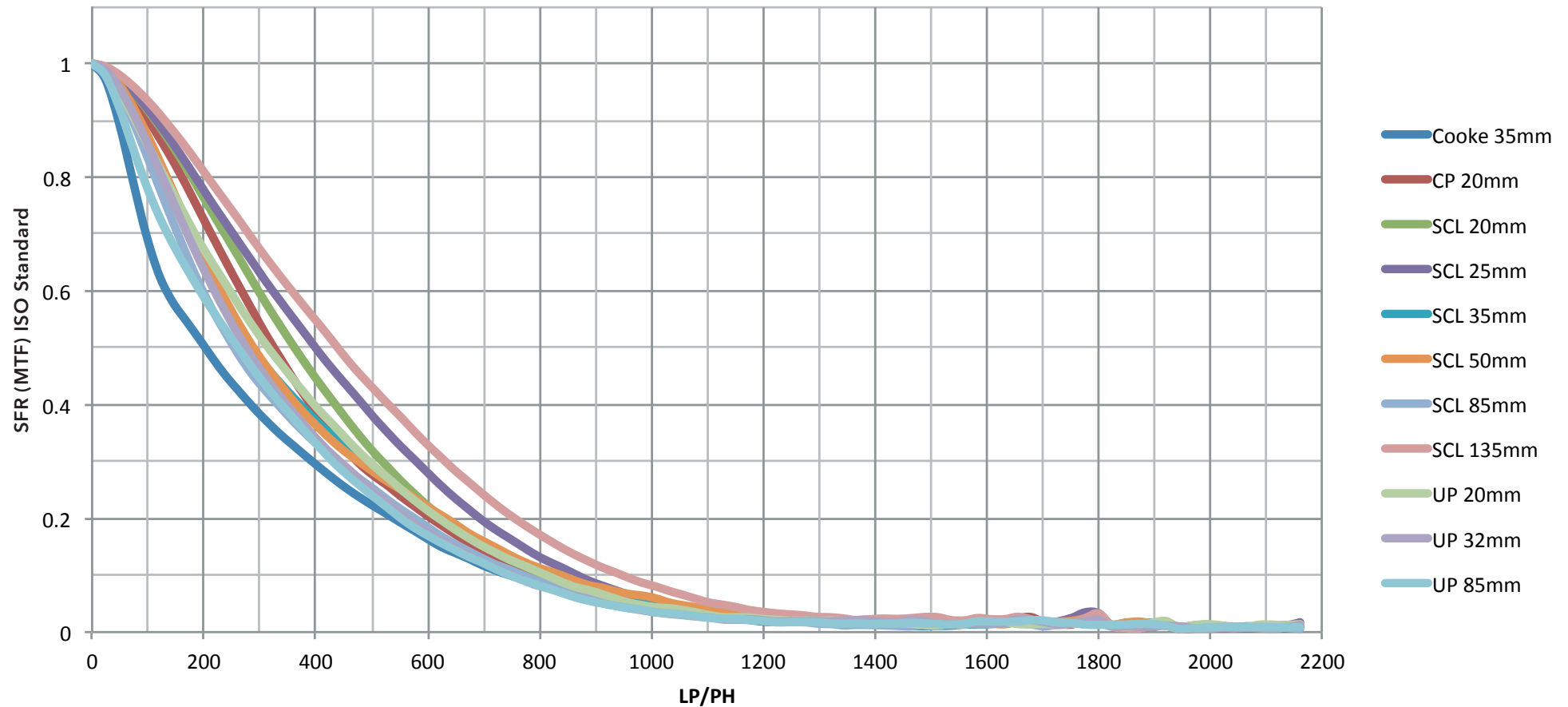


Figure 13: Total-MTF mean comparison of all lenses, img src: Kamerawerk GmbH

3 Results and Discussion

In the following paragraphs we will compare our measurements and discuss advantages and disadvantages for each lens in detail. Due to the fact that image aberrations are more likely to be visible at low T-Stop values, all stated measurements in this report were performed at T2.0 (except for Compact Prime 20mm: T2.9).

3.1 MTF (SFR) Comparison

Figure 13 shows a comparison of all measured total-MTF mean values (Modulation Transfer Function). It can be seen, that the contrast performance (sharpness) of all lenses is quite similar. However, Cooke S4 35mm lens has weakest MTF values, whereas Sony SCL 135mm, 25mm and 20mm lenses show best MTF values.

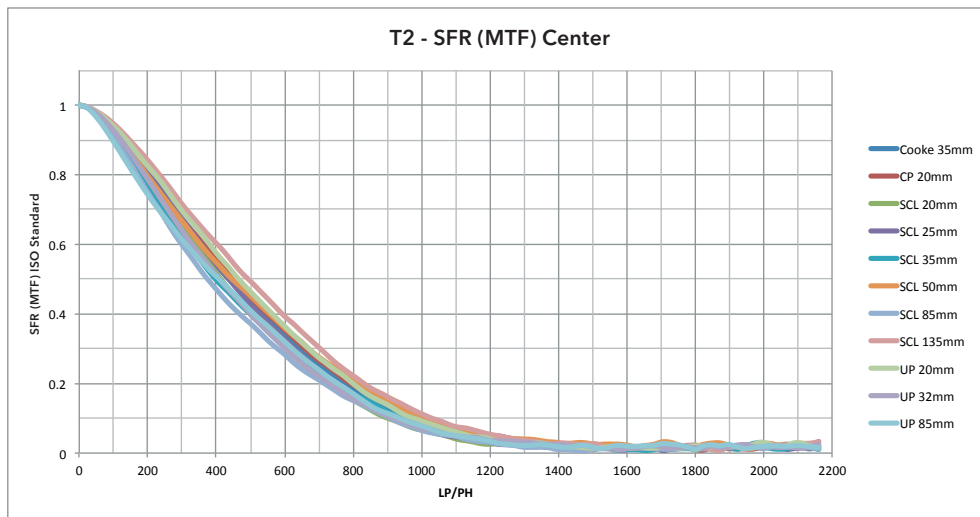


Figure 14: Center-MTF mean comparison of all lenses, img src: Kamerawerk GmbH

Figures 14 and 15 demonstrate differences between MTF values measured at the image center compared to MTF values measured at image corners. Figure 14 compares contrast transfer functions at the image center. All single curves represent mean values generated through averaging measurement positions 1-4. The graph shows that contrast rendition at the image center is similar for all tested lenses. Furthermore it can be concluded that focus settings of all lenses were equal. The differences of the curves conforms a misadjustment of the focus-wheel between 1-2mm, which is actually not visible at standard viewing conditions.

Figure 15 compares MTF mean values at the image corner, which were generated through averaging MTF values of measurement positions 8-11. Compared to figure 14 one can notice significant differences of the contrast performance between the lenses. The Cooke S4 35mm lens shows weakest MTF values at the image corners resulting in a soft,

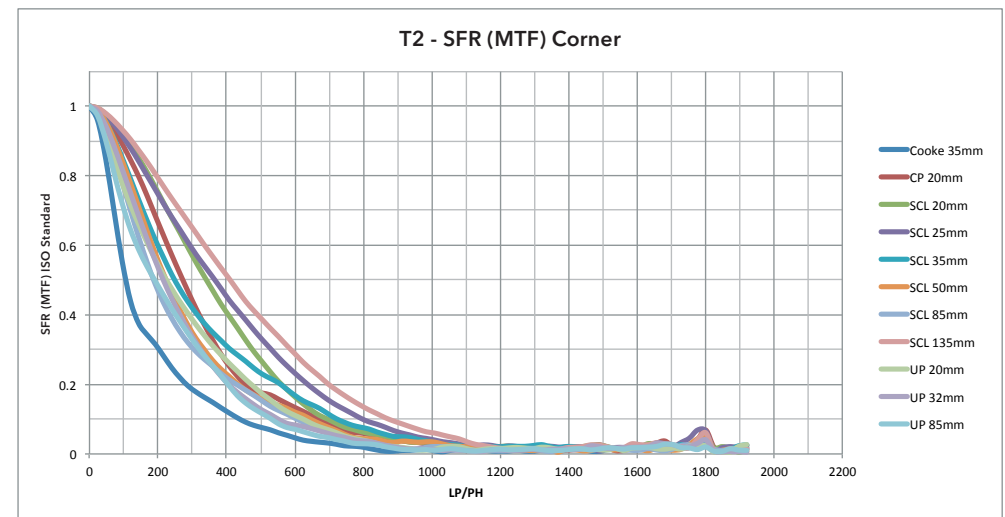


Figure 15: Corner-MTF mean comparison of all lenses, img src: Kamerawerk GmbH

blurred image appearance towards the boarder. This poor corner-MTF performance is also reason for the decreased total-MTF value presented at Figure 13. On the other side Sony SCL lenses especially SCL 135mm, SCL 25mm and SCL 20mm, show best MTF values at the image corner and therefore a low decrease from center- to corner MTF values, resulting in an uniform appearance of sharpness across the image field.

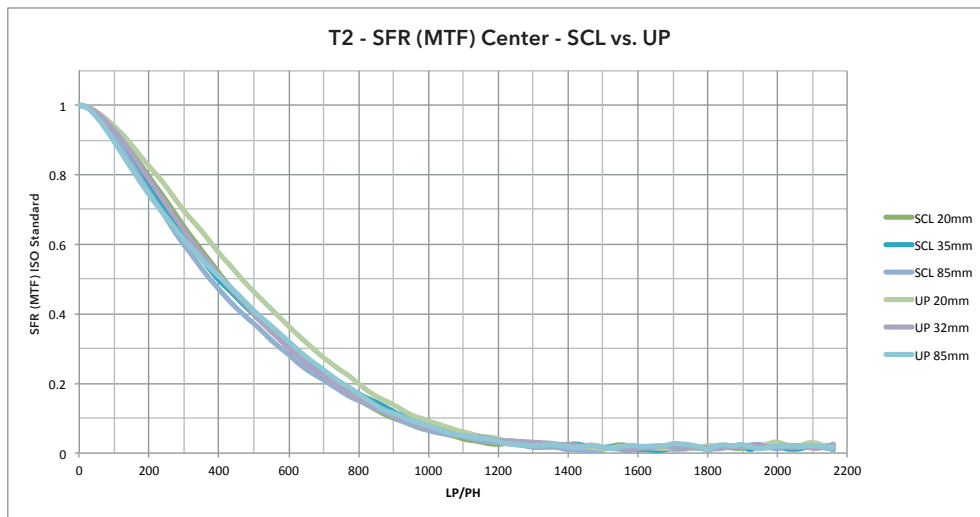


Figure 16: Center-MTF mean comparison SCL vs. UP lenses, img src: Kamerawerk GmbH

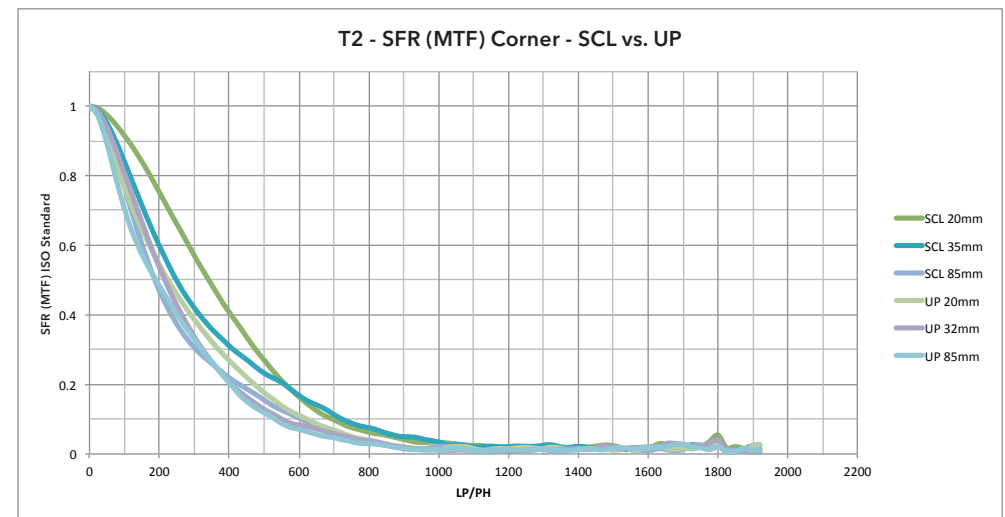


Figure 17: Corner-MTF mean comparison SCL vs. UP lenses, img src: Kamerawerk GmbH

Figures 16 and 17 only compare Sony SCL and Arri Ultra Prime lenses. Figure 16 illustrates center-MTF values and figure 17 corner-MTF values. Again, MTF mean values are quite equal at the image center. However Arri Ultra Prime 20mm shows a slightly higher MTF curve, a distinction which is hardly visible to the eye. Thus differences of the image performance get more likely visible towards the image boarder. Nevertheless also the curves in figure 17 show only minor differences, except for the SCL 20mm lens, which is the only lens with a significantly higher MTF value at the image corner. All together the two figures demonstrate very well how similar contrast transfer characteristics of Sony SCL and Arri Ultra Prime lenses are.

The same conclusion is also true for the comparison of all 20mm lenses tested (figures 18 and 19).

On the other side the comparison of 35mm lenses (figures 20 and 21) shows strong distinctions between center-MTF and corner-MTF curves. Interestingly, the Cooke S4 35mm lens has better MTF values in the image center than its competitors, however at the same time there is a massive decrease of contrast performance towards the image corners.

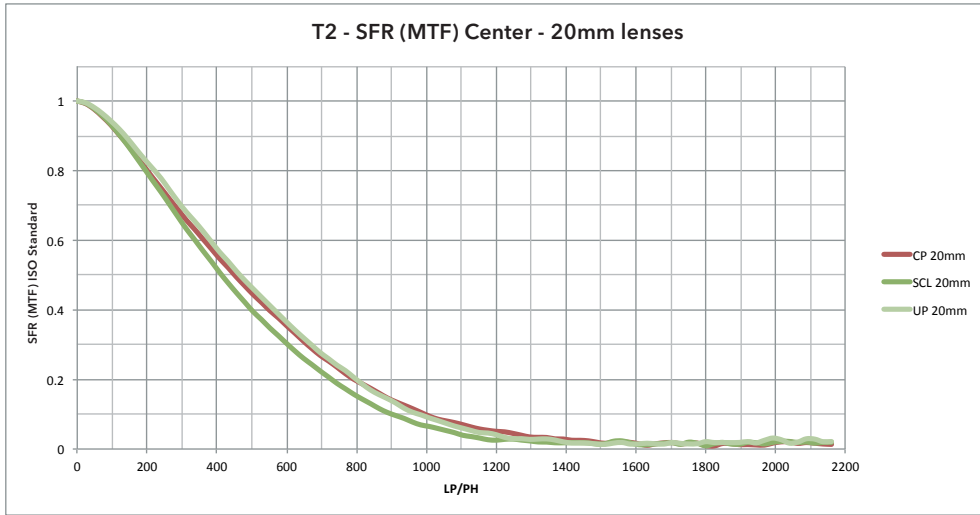


Figure 18: Center-MTF mean comparison of 20mm lenses, img src: Kamerawerk GmbH

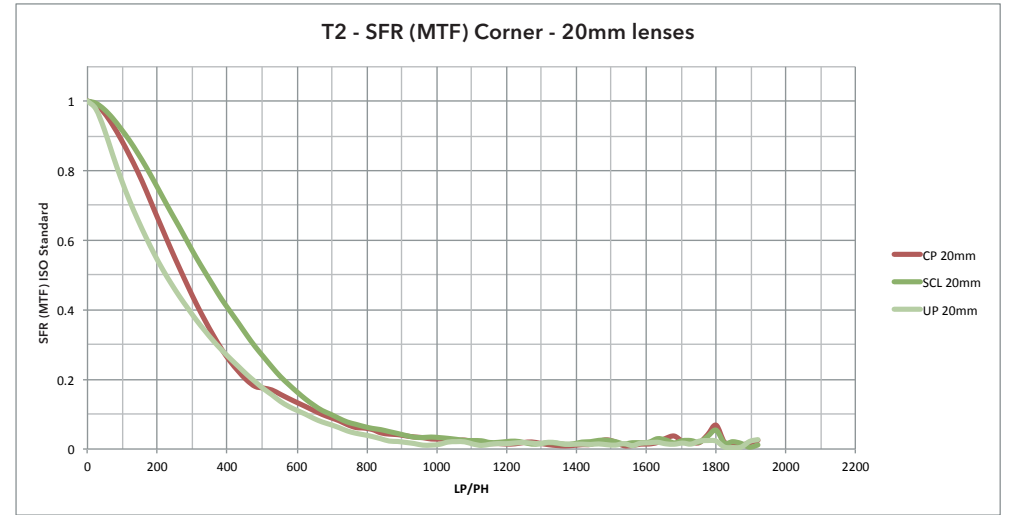


Figure 19: Corner-MTF mean comparison of 20mm lenses, img src: Kamerawerk GmbH

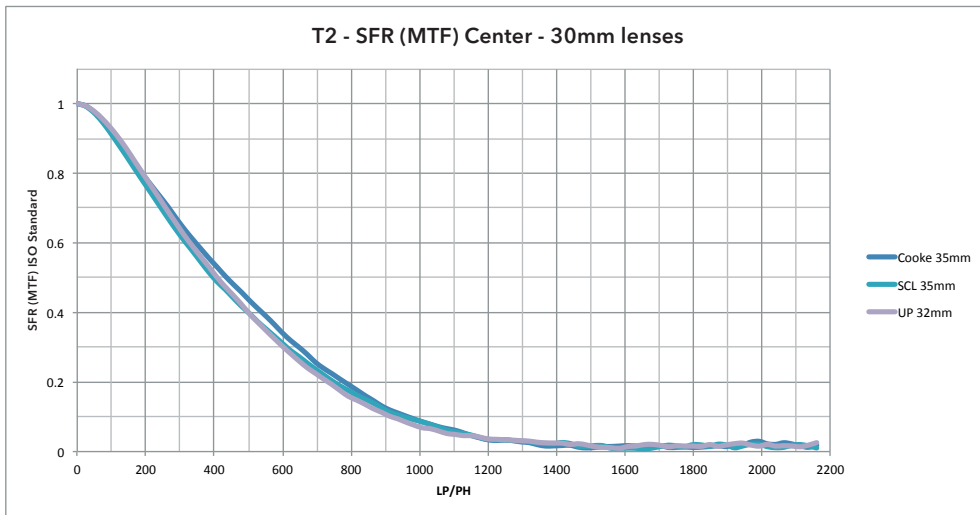


Figure 20: Center-MTF mean comparison of 30mm lenses, img src: Kamerawerk GmbH

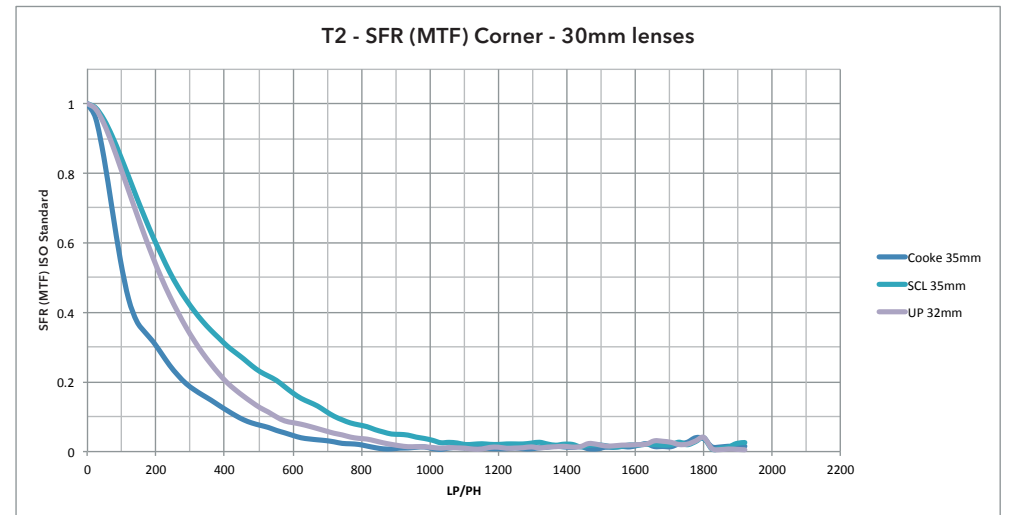
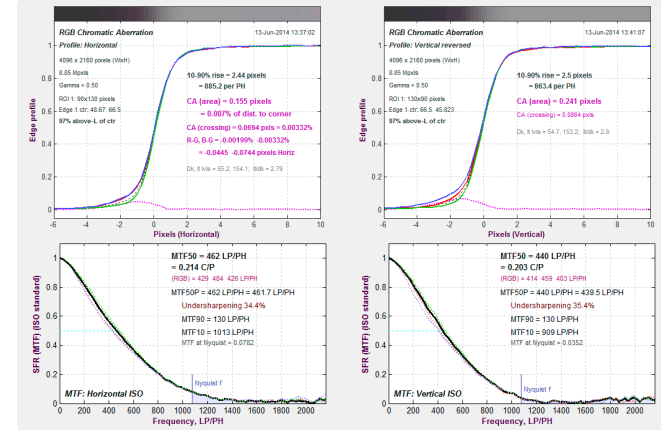
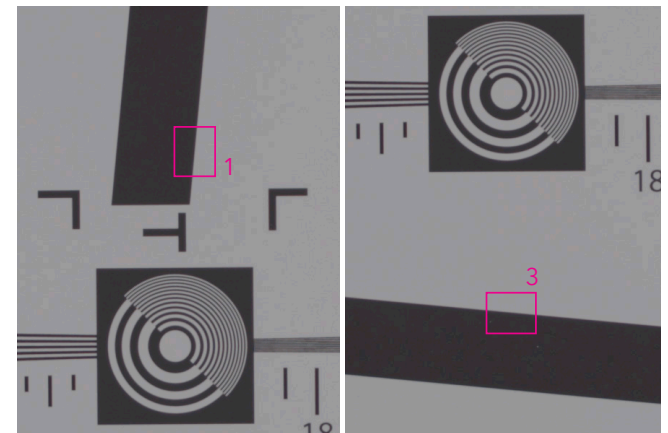
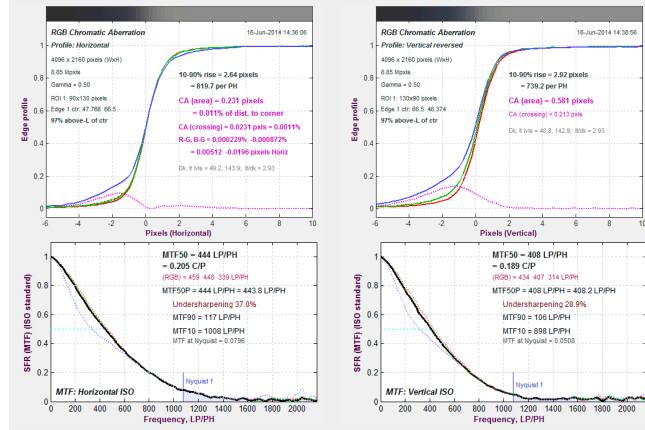
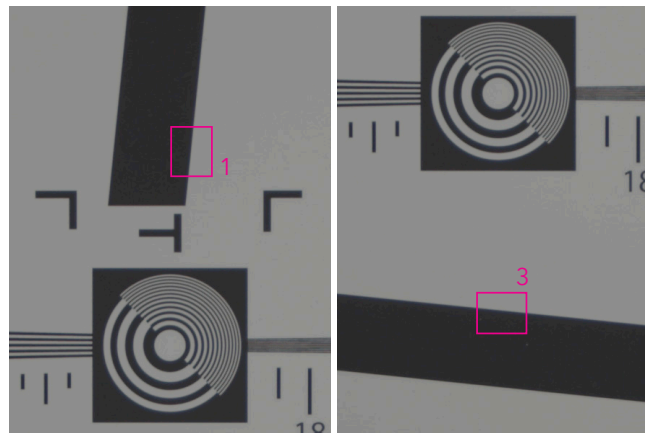
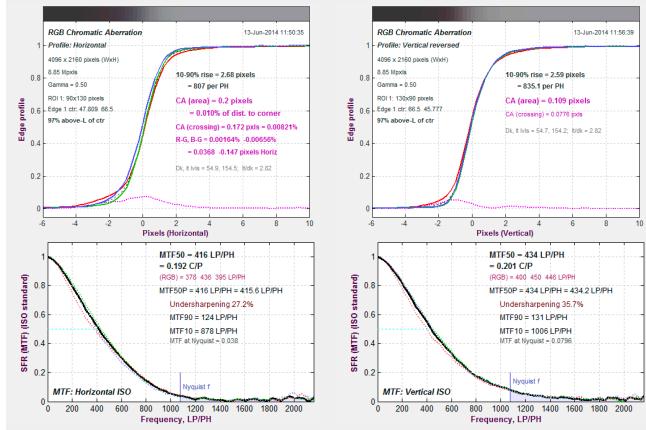
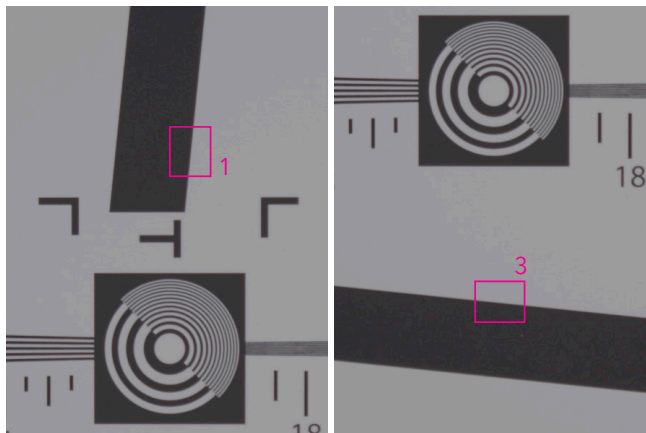


Figure 21: Corner-MTF mean comparison of 30mm lenses, img src: Kamerawerk GmbH

3.2 Lens Comparison - Details

Considering the test results stated earlier, it is important to mention that MTF values are not the only factor representing the quality of a lens. Furthermore also edge profiles and chromatic aberration are also important indicators for imaging capabilities of a lens. The following chapter contains a detailed comparison of all lenses which have been tested. To simplify reading of this comparison only 4 different measurement regions are considered. Positions 1 and 3 should provide information correlated to the image center and positions 6 and 7 should represent quality issues related to the image boarder.

Measurement results for each position individually (1-11) are provided in the appendix later in this document.



Sony SCL 20mm T2.0

MTF50 = 416 LP/PH MTF50 = 434 LP/PH
MTF10 = 878 LP/PH MTF10 = 1006 LP/PH
10-90% rise = 2,68 pixels 10-90% rise = 2,59 pixels

Spatial frequencies for MTF50 and MTF are comparable to the Compact Prime 20mm lens. Furthermore the edge profile shows a steep slope and only minor chromatic aberration.

Compact Prime 20mm T29

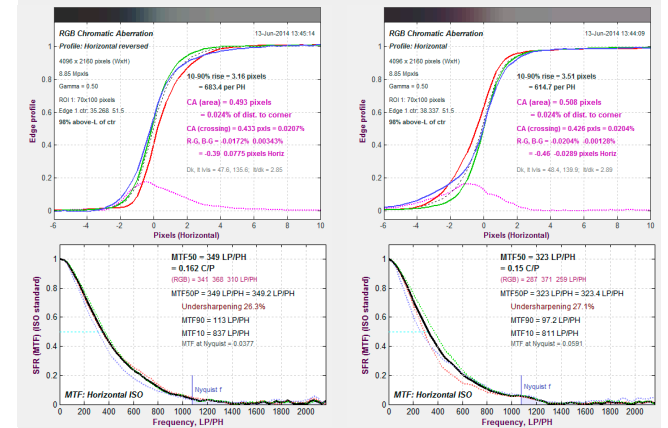
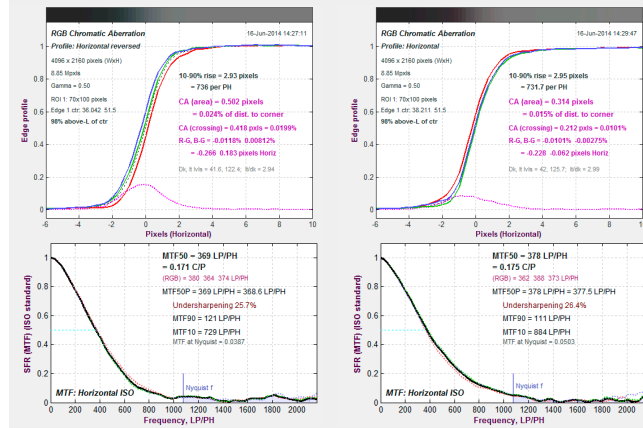
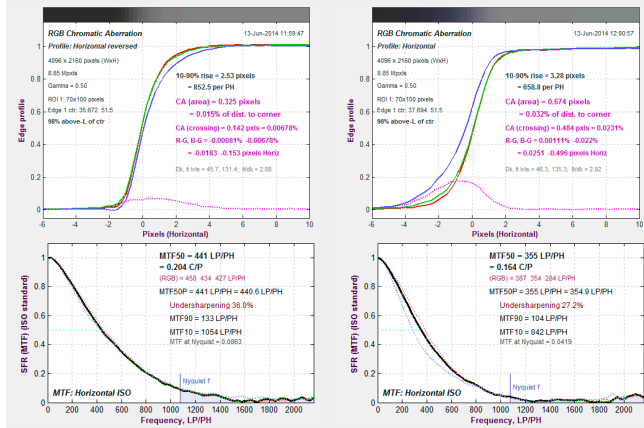
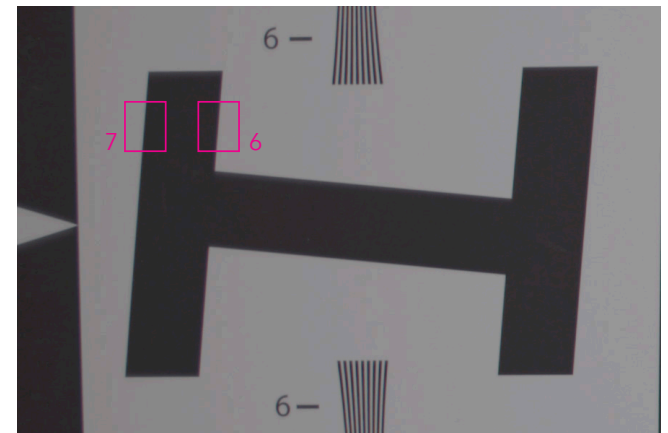
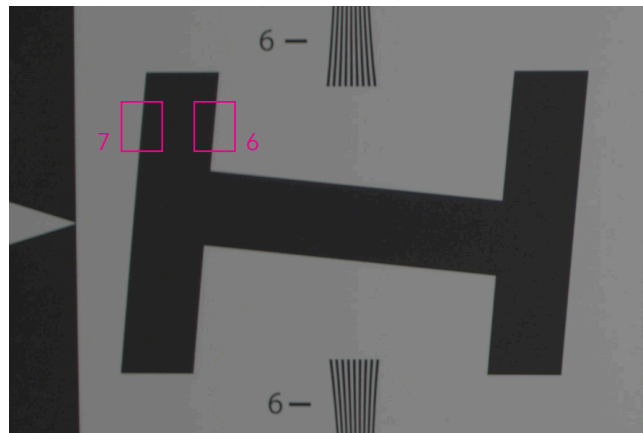
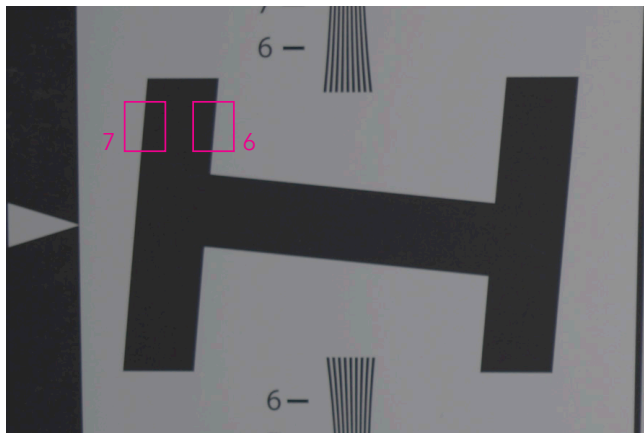
MTF50 = 444 LP/PH MTF50 = 408 LP/PH
MTF10 = 1008 LP/PH MTF10 = 898 LP/PH
10-90% rise = 2,64 pixels 10-90% rise = 2,92 pixels

Good MTF values. However the edge profile shows an offset of the blue channel, leading to a bluish color fringe in the black part of the measurement area.

Ultra Prime 20mm T2.0

MTF50 = 462 LP/PH MTF50 = 440 LP/PH
MTF10 = 1013 LP/PH MTF10 = 909 LP/PH
10-90% rise = 2,44 pixels 10-90% rise = 2,5 pixels

High spatial resolution at MTF50 as well as MTF10 and steep slopes of the edge profile curves with almost no chromatic aberration.



Sony SCL 20mm T2.0

MTF50 = 441 LP/PH MTF50 = 355 LP/PH
 MTF10 = 1054 LP/PH MTF10 = 842 LP/PH
 10-90% rise = 2,53 pixels 10-90% rise = 3,28 pixels

Very good contrast and sharpness performance at POS 7. MTF values as well as 10%-90% rise are better than in the image center. At POS 6 MTF10 is significantly decreased. The edge profile displays a wide rise distance due to flare effects, as well as a bluish color shift.

Sony SCL Lens Comparison by Kamerawerk GmbH, 2014

Compact Prime 20mm T29

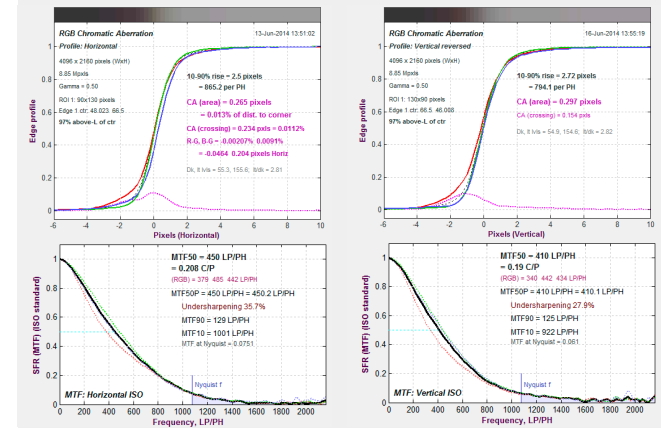
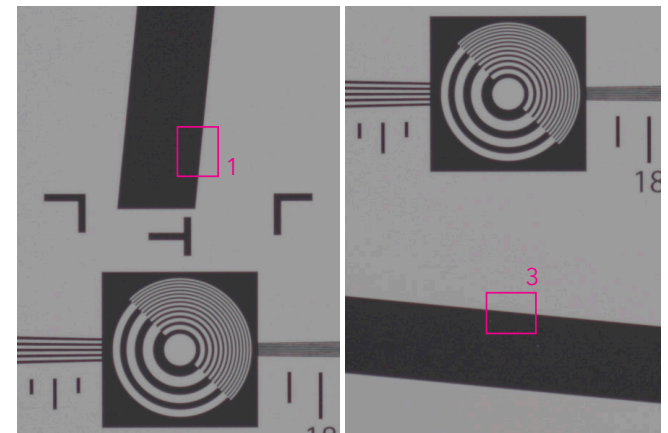
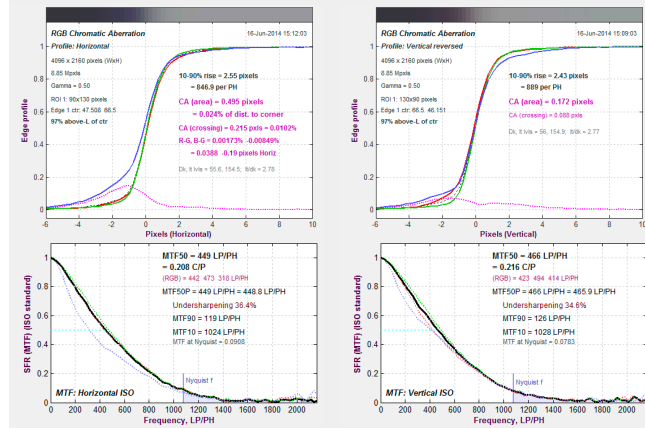
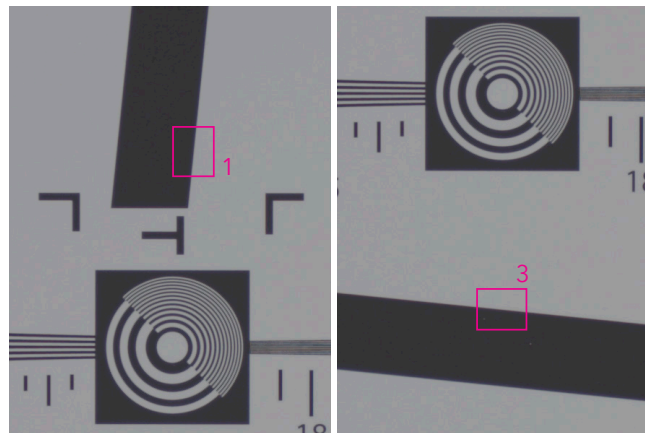
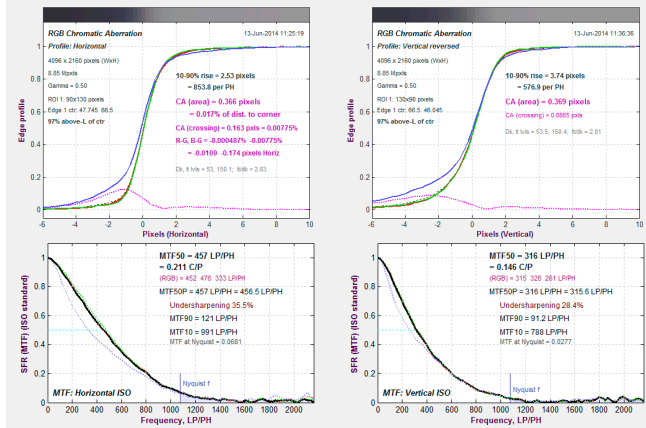
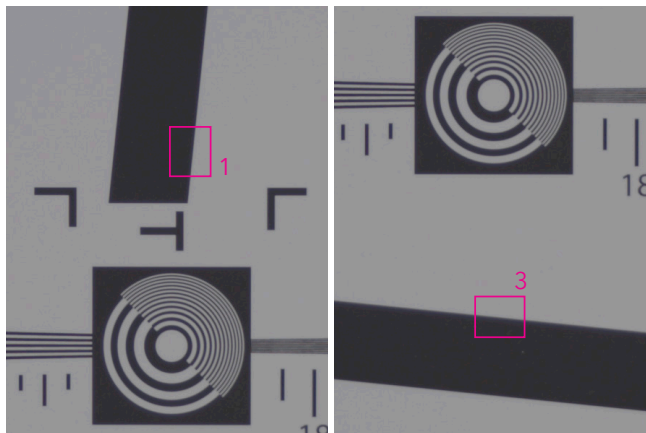
MTF50 = 369 LP/PH MTF50 = 378 LP/PH
 MTF10 = 729 LP/PH MTF10 = 884 LP/PH
 10-90% rise = 2,93 pixels 10-90% rise = 2,95 pixels

Decent MTF and rise distance values. Color offsets are leading to a greenish color fringe at POS 7 and to a reddish color fringe at POS 6.

Ultra Prime 20mm T2.0

MTF50 = 349 LP/PH MTF50 = 323 LP/PH
 MTF10 = 837 LP/PH MTF10 = 811 LP/PH
 10-90% rise = 3,16 pixels 10-90% rise = 3,51 pixels

Decent MTF values, but wide rise distances and strong color offsets, leading to a bluish/greenish edge at POS 7 and to a reddish color fringe at POS 6.



Sony SCL 35mm T2.0

MTF50 = 457 LP/PH MTF50 = 316 LP/PH
 MTF10 = 991 LP/PH MTF10 = 788 LP/PH
 10-90% rise = 2,53 pixels 10-90% rise = 3,74 pixels

The edge profile of POS 3 shows a shallow rise of the curve and a shift of the blue channel. The same blue offset is notable at POS 1 however the slope of the corresponding edge profile is steeper. Also MTF values for both positions are a bit lower.

Cooke S4 35mm T2.0

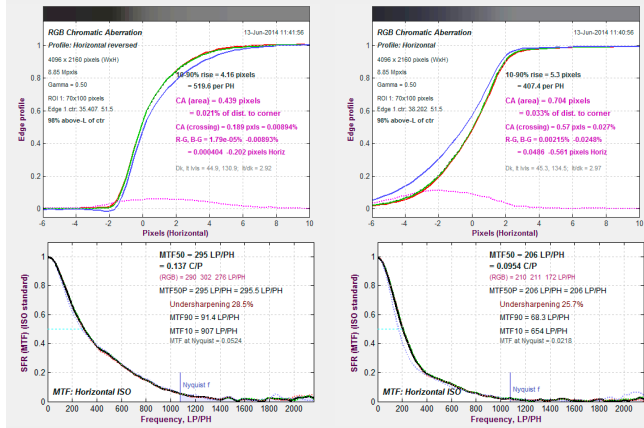
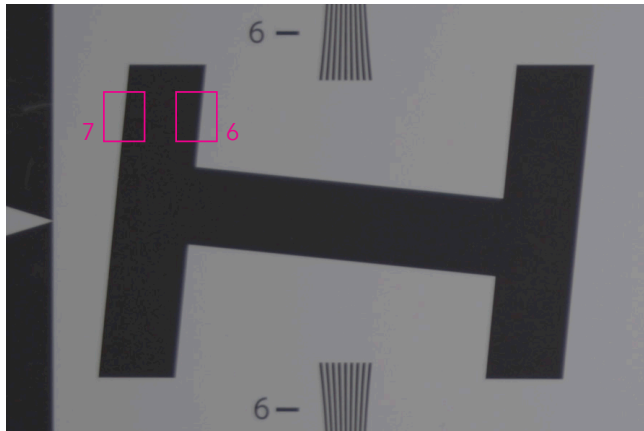
MTF50 = 449 LP/PH MTF50 = 466 LP/PH
 MTF10 = 1024 LP/PH MTF10 = 1028 LP/PH
 10-90% rise = 2,55 pixels 10-90% rise = 2,43 pixels

Very good performance of rise distance and MTF. The edge profile of POS 1 shows an offset of the blue channel in the black part of the sample, leading to a bluish appearance of the edge. At POS 3 there is a minor bluish color shift at the black part and a magenta one at the light part.

Ultra Prime 32mm T2.0

MTF50 = 450 LP/PH MTF50 = 410 LP/PH
 MTF10 = 1001 LP/PH MTF10 = 922 LP/PH
 10-90% rise = 2,5 pixels 10-90% rise = 2,72 pixels

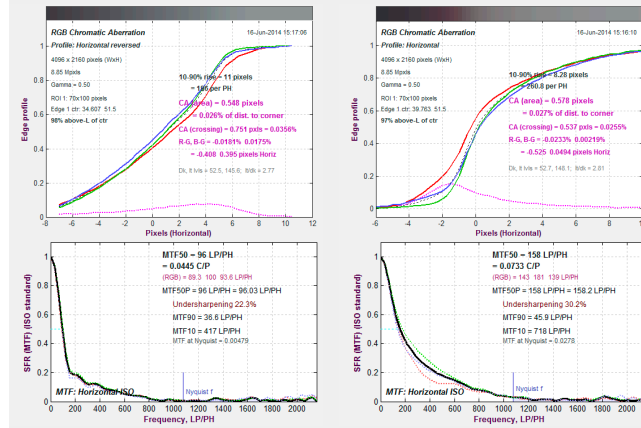
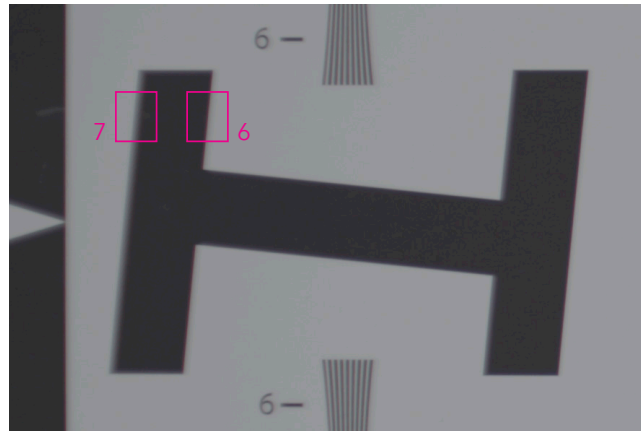
Good edge profiles and MTF values. The offset of the red channel at POS 1 and POS 3 is leading to a reddish color fringe. Furthermore at POS 1 the blue channel shows a negative offset at mid-tone values. However, this offset is not visible.



Sony SCL 35mm T2.0

MTF50 = 295 LP/PH MTF50 = 206 LP/PH
 MTF10 = 907 LP/PH MTF10 = 654 LP/PH
 10-90% rise = 4,16 pixels 10-90% rise = 5,3 pixels

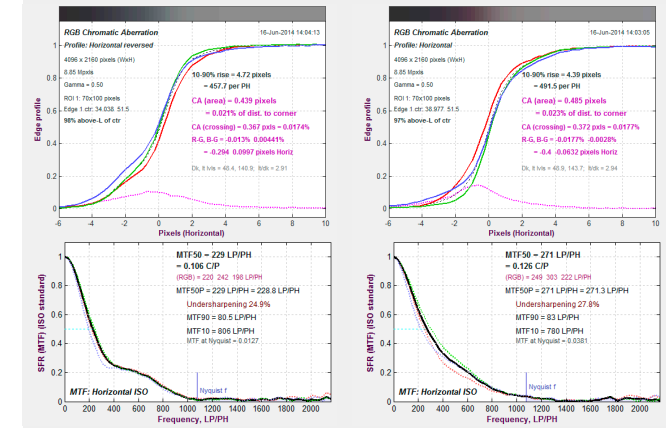
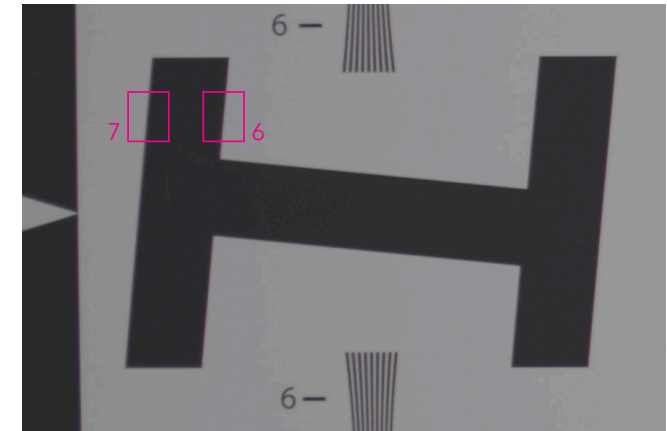
Area 6 shows a soft edge (flat slope) and low MTF values due to flare effects. Furthermore, there is an offset of the blue channel, resulting in a bluish color fringe. Whereas POS 7 still shows a very steep edge curve with only minimal blue offset.



Cooke S4 35mm T2.0

MTF50 = 96 LP/PH MTF50 = 158 LP/PH
 MTF10 = 417 LP/PH MTF10 = 718 LP/PH
 10-90% rise = 11 pixels 10-90% rise = 8,28 pixels

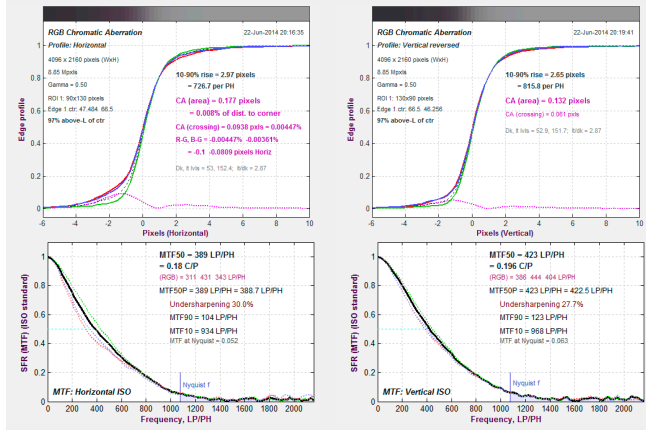
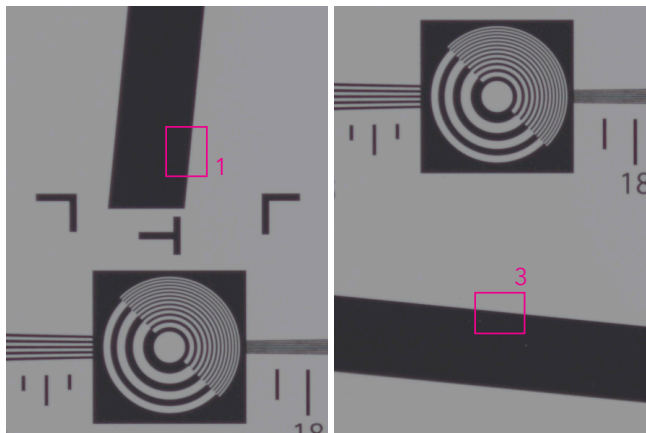
This measurement demonstrates the soft characteristic of the Cooke S4 towards the boarder. Compared to its competitive lenses, low MTF values and flat edge profiles seem unfavourable. However it is this characteristic which leads to the unique look of Cooke lenses.



Ultra Prime 32mm T2.0

MTF50 = 229 LP/PH MTF50 = 271 LP/PH
 MTF10 = 806 LP/PH MTF10 = 780 LP/PH
 10-90% rise = 4,72 pixels 10-90% rise = 4,39 pixels

This lens is quite similar to the SCL35mm lens. It has slightly higher MTF values but it shows stronger chromatic aberration (POS 6 reddish, POS 7 bluish). POS 7 shows a shallow "soft" rise of the edge profile.



Sony SCL 85mm T2.0

MTF50 = 389 LP/PH

MTF50 = 423 LP/PH

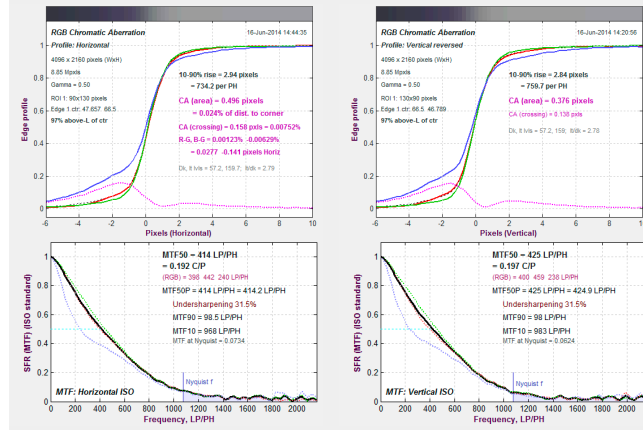
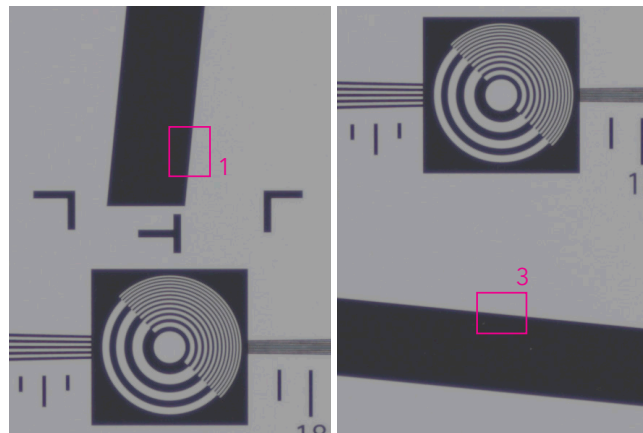
MTF10 = 934 LP/PH

MTF10 = 968 LP/PH

10-90% rise = 2,97 pixels

10-90% rise = 2,65 pixels

Decent spacial frequencies at MTF10 and MTF50. At POS 1 the edge profile shows a negative offset of the green channel, leading to a reddish appearance of the edge. Edge profile at POS 3 is ideal.



Ultra Prime 85mm T2.0

MTF50 = 414 LP/PH

MTF50 = 425 LP/PH

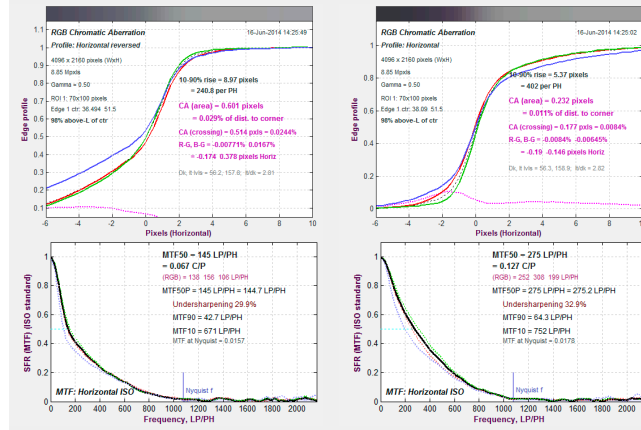
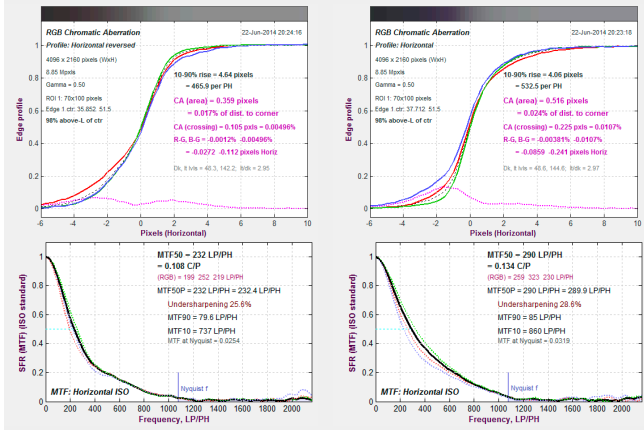
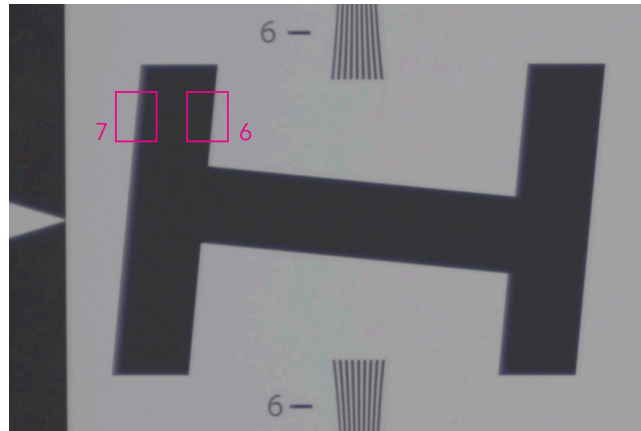
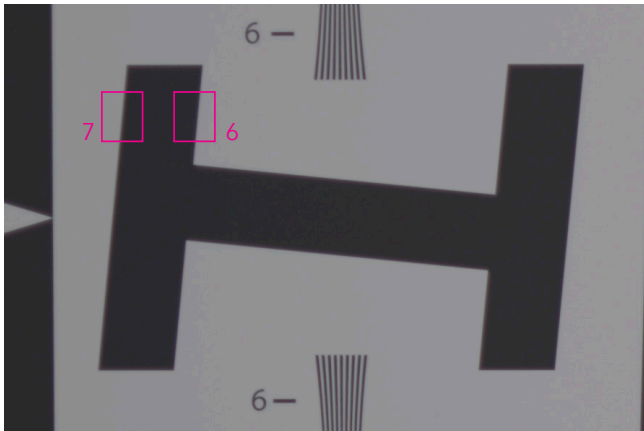
MTF10 = 968 LP/PH

MTF10 = 983 LP/PH

10-90% rise = 2,94 pixels

10-90% rise = 2,84 pixels

Good MTF values. Edge profile reveals a strong offset of the blue channel at the black part of the image sample. A bluish color fringe is the result.



Sony SCL 85mm T2.0

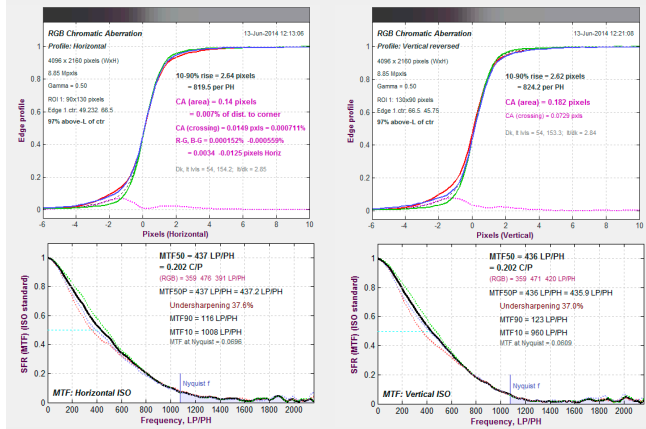
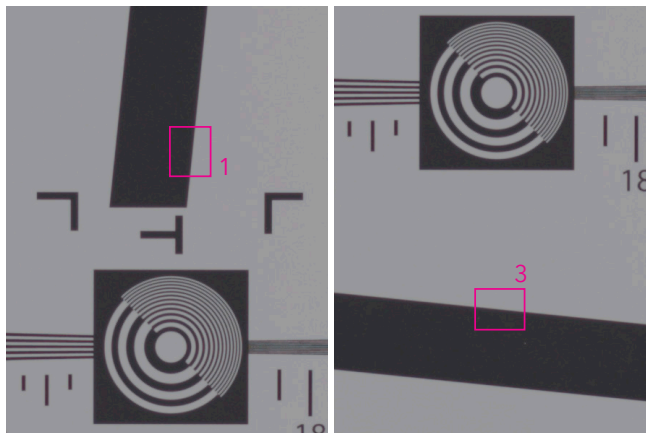
MTF50 = 232 LP/PH MTF50 = 290 LP/PH
 MTF10 = 737 LP/PH MTF10 = 860 LP/PH
 10-90% rise = 4,64 pixels 10-90% rise = 4,06 pixels

Ultra Prime 85mm T2.0

MTF50 = 145 LP/PH MTF50 = 275 LP/PH
 MTF10 = 671 LP/PH MTF10 = 752 LP/PH
 10-90% rise = 8,97 pixels 10-90% rise = 5,37 pixels

At POS7 low values at MTF50 as well as a flat slope of the edge profile are given, which results in a soft appearance of this edge. Edge profile of POS 6 is steeper, but shows various offsets of each channel, creating a purple fringe.

POS 7 shows low spacial resolution at MTF50, a flat slope of the edge profile and a large offset of the blue channel. Edge profile of POS 6 is steeper, but with a flat shoulder. Also at POS 6 various offsets of each channel are issuing chromatic aberration.



Sony SCL 50mm T2.0

MTF50 = 437 LP/PH

MTF50 = 436 LP/PH

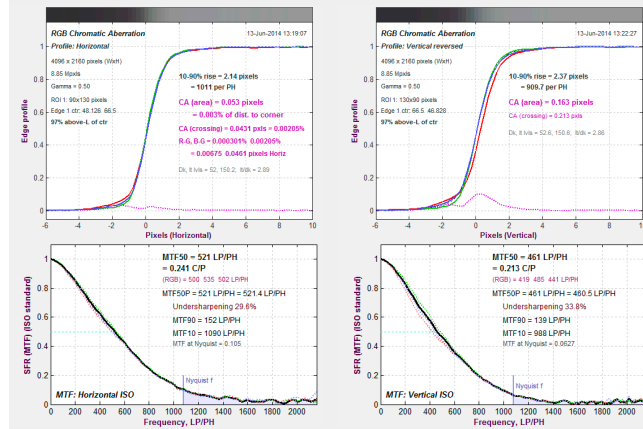
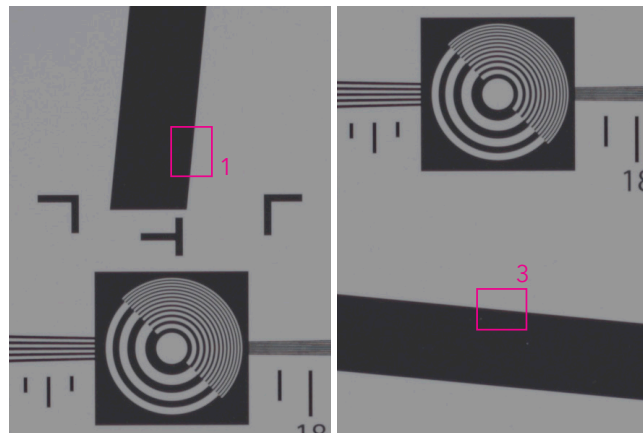
MTF10 = 1008 LP/PH

MTF10 = 960 LP/PH

10-90% rise = 2,64 pixels

10-90% rise = 2,62 pixels

Very good edge profiles and high spacial frequencies at MTF10. The edge profiles show offsets in the dark regions, creating a reddish color fringe at both positions.



Sony SCL 135mm T2.0

MTF50 = 521 LP/PH

MTF50 = 461 LP/PH

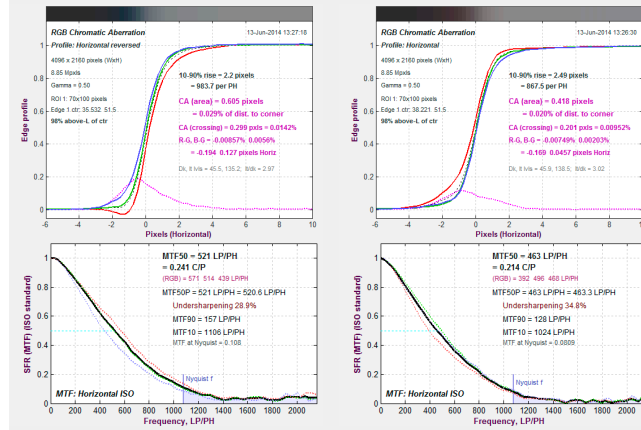
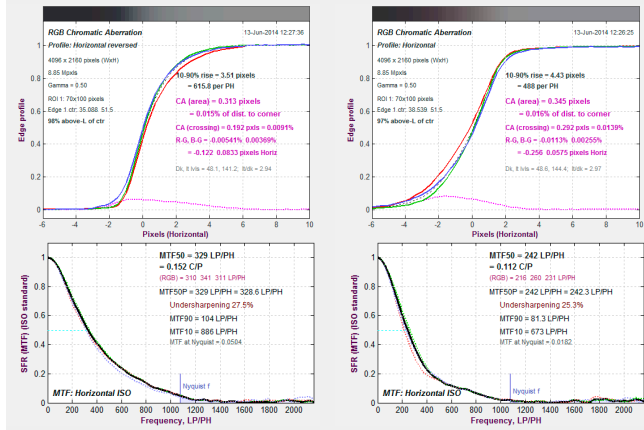
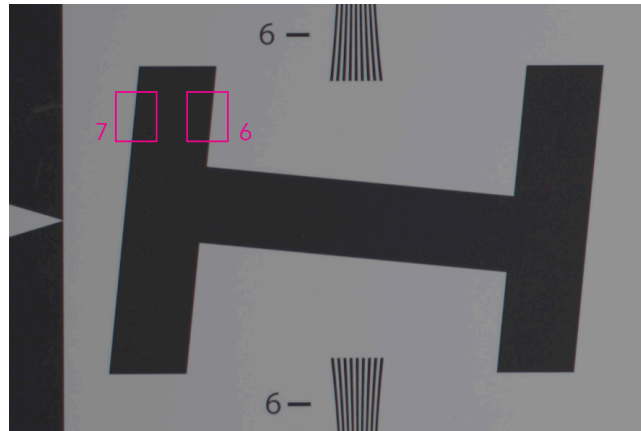
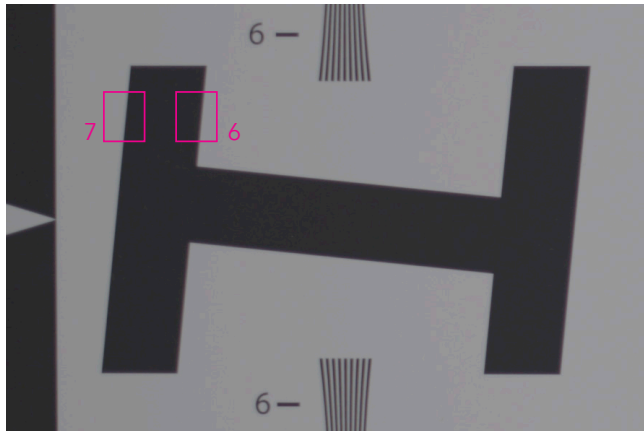
MTF10 = 1090 LP/PH

MTF10 = 988 LP/PH

10-90% rise = 2,14 pixels

10-90% rise = 2,37 pixels

Very high spatial frequencies at MTF10 and MTF50. Ideal edge profile at POS 1. Edge profile at POS 2 shows a minor offset of the red channel.



Sony SCL 50mm T2.0

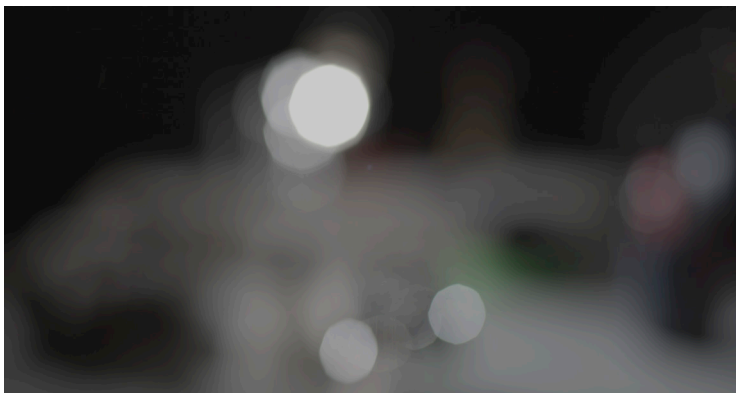
MTF50 = 329 LP/PH MTF50 = 242 LP/PH
 MTF10 = 886 LP/PH MTF10 = 673 LP/PH
 10-90% rise = 3,51 pixels 10-90% rise = 4,43 pixels

POS 6 shows especially low spatial frequencies at MTF50, illustrating the soft visual impression of this edge. Edge profile of POS 7 is may steeper, but its shoulder proceeds in a flattened shape.

Sony SCL 135mm T2.0

MTF50 = 521 LP/PH MTF50 = 463 LP/PH
 MTF10 = 1106 LP/PH MTF10 = 1024 LP/PH
 10-90% rise = 2,2 pixels 10-90% rise = 2,49 pixels

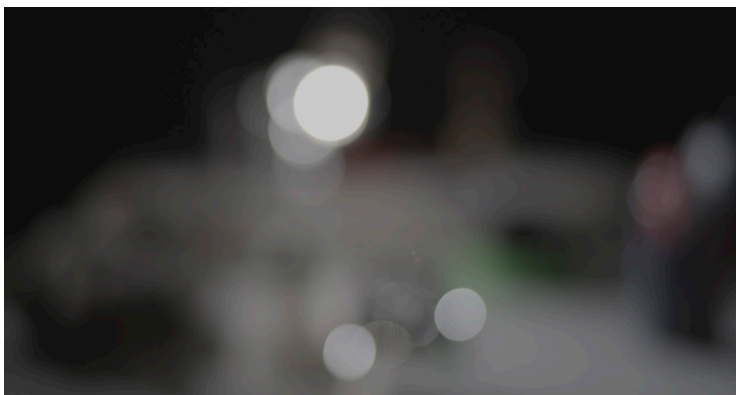
High spatial frequencies at MTF50 as well as MTF10 for both positions. Also edge profiles show an decent shape, however at both positions also show significant chromatic aberrations. The edge at POS 6 consequently appears reddish and the edge at POS 7 bluish.



Cooke S4 35mm T2.0

left: scene in focus
right: scene out of focus

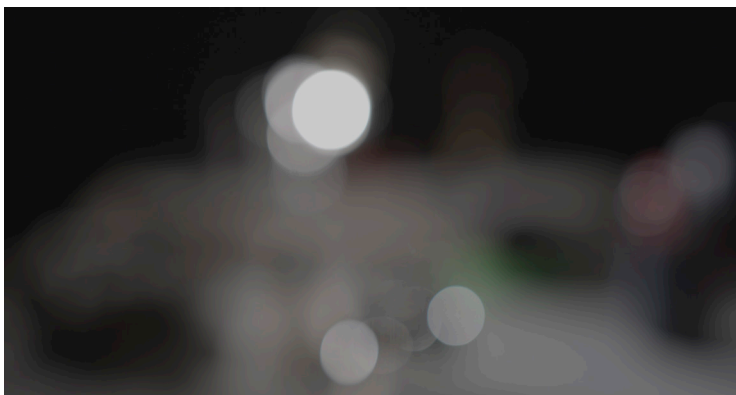
Highlights are angularly in shape of an octagon.



Sony SCL 35mm T2.0

left: scene in focus
right: scene out of focus

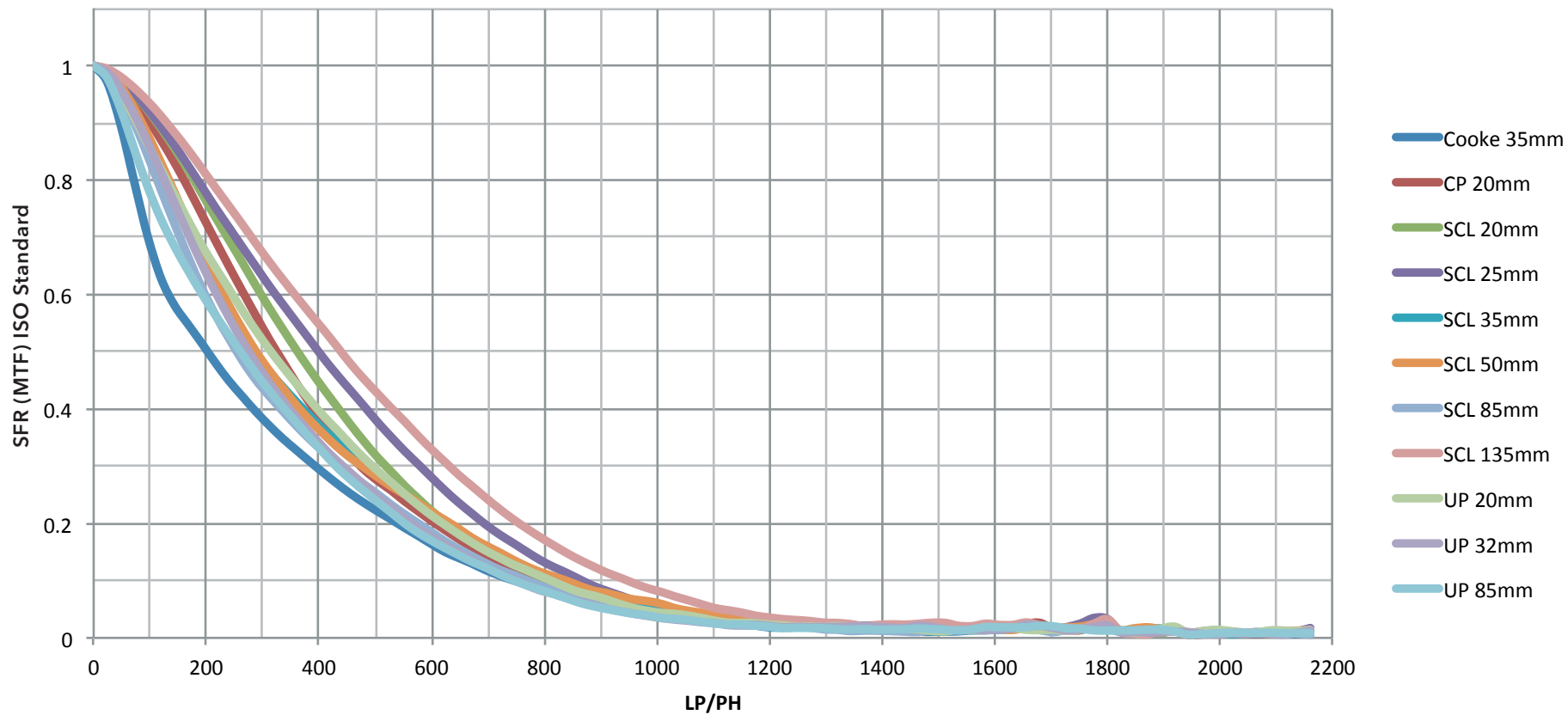
Circular Highlights, comparable with the characteristic of the Ultra Prime 32mm lens.



Ultra Prime 32mm T2.0

left: scene in focus
right: scene out of focus

Circular Highlights.



MTF mean comparison of all lenses, img src: Kamerawerk GmbH

3.3 Conclusion

The tested Sony SCL PL Mount prime lenses have shown great imaging characteristics. Contrast performance, sharpness and chromatic aberration are equal if not even better compared to its competitor lenses Cooke S4, Arri Ultra Prime or Zeiss Compact Prime. As illustrated in the figure above, SCL 135mm, 25mm and 20mm actually show best mean MTF characteristics of all lenses! All together, we have to say, Sony SCL lenses are a fantastic choice, for a low price!