Test sample:
Sigma SD14 camera test

Camera details:
Semi-professional camera with a very special sensor technology. The APS-sized Foveon sensor features 4.5 Million elements in the classical sensor matrix, but each element contains three different layers. These layers are sensitive for red, green and blue light and therefore represent three light sensitive elements. The manufacturer claims, that the camera provides 14 megapixel, from the classical point of view, it is 4.5 megapixel spatial sampling rate. The 14 megapixel mode is an interpolation mode. According to the manufacturer's classification, the camera has been tested in this 14 megapixel mode. Compression is well balanced and features good results at high and normal quality options. Low quality shrinks the images little to much.

Coefficient of resolution:
SLR camera test marks are evaluated with a reference lens. Therefore specific resolution marks are not applicable in a SLR camera test.

Artefact rating:
The camera itself uses an aggressive balanced fine detail image processing strategy. Artefact rating is restricted: 4,0.

Dynamic ranges/OECF:
To arrange three colour sensitive layer in a sandwich design, these layers must be thin to handle the loss of light during penetration of the upper layers. This is capable to reduce capacity of semiconductor material and storable photon number.
At ISO 100 the camera shows a quite restricted input dynamic range of 7.6 stops only. This indicates a relevant photon over saturation of the sensor's capacity. At higher ISO speed input dynamic range is much better and increases up to a good mark of 8.3 at ISO 200 and a very good mark 8.4 stops at ISO 400. At ISO 800 input dynamic range covers 8.1 stops and 7.9 stops at ISO 1600, again very good marks. Output signal range is good from ISO 100 to ISO 800, at ISO 1600 is moderate.
The OECF is very inverse-s-shaped. Tonal reproduction is soft in image highlights and shadows. Region around midrange brightness show rather enhanced partial contrast. This strategy bias tonal accuracy significantly and enhances visual pleasantness. Highlights and shadows show less visible clipping and sharpening and brilliance are enhanced. This is to the advantage of fast photography, but to the disadvantage of accurate scene or object reproduction. Furthermore this enhances visual corner shading. Tone reproduction is less suited to the sophisticated user.

Noise:
The camera shows an excellent general noise over the full ISO range. From ISO 100 to ISO 400 luminance noise is very low. At ISO 800 and ISO 1600 it gains visibility. Noise character and frequency is not aggressive and shows no artificial textures. According to the sensor's design, chrominance noise shouldn't occur anyway, but it does with very low spatial frequency. A complementary greenish-purplish noise is visible from ISO 400 and due to the low frequency it shows higher visibility at small print sizes.

Sharpening:

Sharpening is moderately balanced and shows asymmetrical distribution over the brightness range: dark regions and edges show high sharpening while bright regions and edges don't. Dark edges show relevant black signal clipping. Purplish chromatic artefacts and flare do occur at the dark side of edges. Sharpening is less suited to the sophisticated user.

Fine image details and artefacts:
The Foveon technology doesn't need the RGB color interpolation or demosaicing, as there is no color matrix filter. But the matrix of a sensor will also lead to aliasing effects, that are not based on demosaicing only. As the surface of the sensor features 4.5 million elements only, the sampling is more or less crude and leads to relevant luminance Moiré. The numerical interpolation from 4.5 million image dots up to 14.5 million image dots, so-called 14.5 megapixel by the manufacturer, does expand these Moiré effects too.
This camera-lens-combination shows an aggressive fine detail reproduction. Horizontal and vertical structures show very strong luminance Moiré and strong aliasing. Chrominance Moiré does not occur, as no demosaicing takes place.

AF-speed/shutter delay:
Using the Sigma 17-70 2.8-4.5 DC lens, the camera shows the following results: passing the full focal range from infinity, the camera shows restricted performance around 1.24 seconds under dark conditions. Under bright light the camera shows a slightly better rate of 1.05 seconds. Using the pre-focussed mode, the shutter delay provides excellent marks under all conditions and a delay around 0.07 seconds.

Conclusion:
The camera is a very specialised concept. The biggest advantage is, that not chromatic Moiré occurs. Compression is also well set. But the new sensor technology shows some trade-offs: input dynamic range cannot compete at ISO 100 and artefact rating is quite high, at higher ISO speed performance is good. The internal interpolation from 4.5 megapixel sensor resolution to 14 megapixel picture resolution misses the chance to apply efficient anti-aliasing to the image data. Sharpening is not well balanced, as dark signal clipping and color fringes are induced into the image. Tonal reproduction is designed to meet the needs of enhanced visual pleasantness instead of tonal accuracy or object reproduction. Noise is well set, just some low frequent chromatic spots may occur at high ISO speed.

At all the camera shows an interesting technology, but also some restrictions and some non optimal designed aspects.

# DCTau 4.1 SLR camera test

Tested range: 5 ISO speeds

## 1. Camera details

| | | |
|---|---|---|
| Sample | Sigma SD14 | |
| Image width | 4608 | pixel |
| Image height | 3072 | pixel |
| File size, uncompressed | 41473 | kilobytes |

| Compression resolution | quality | Bitmap file size | compressed file size | ratio |
|---|---|---|---|---|
| 14MP | fine | 41473 | 5491 | 8 |
| 14MP | stand | 41473 | 2797 | 15 |
| 14MP | low | 41473 | 1330 | 31 |
| 4.5MP | fine | 13613 | 2299 | 6 |
| 4.5MP | stand | 13613 | 1227 | 11 |
| 4.5MP | low | 13613 | 619 | 22 |

## 2. Resolution aspects

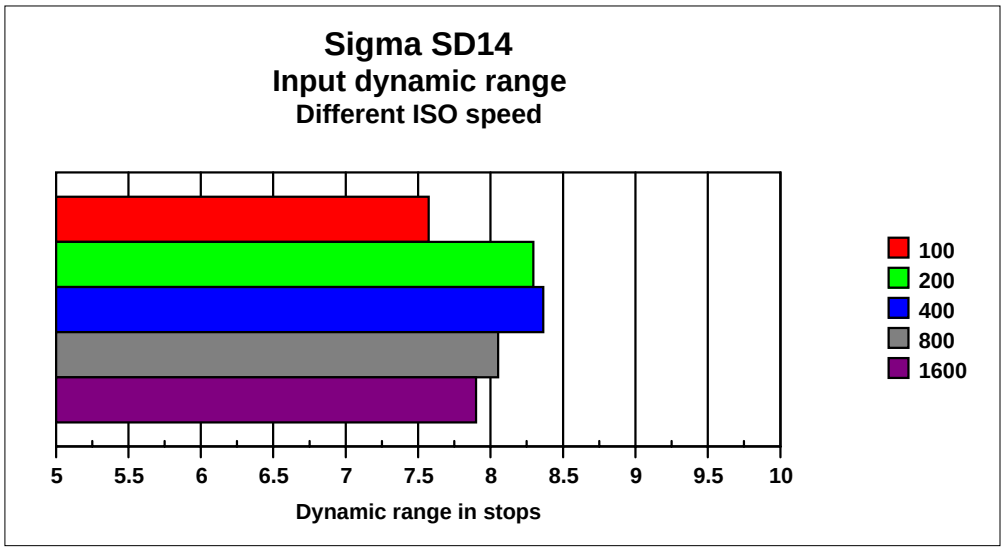
Artefact rating 4.0

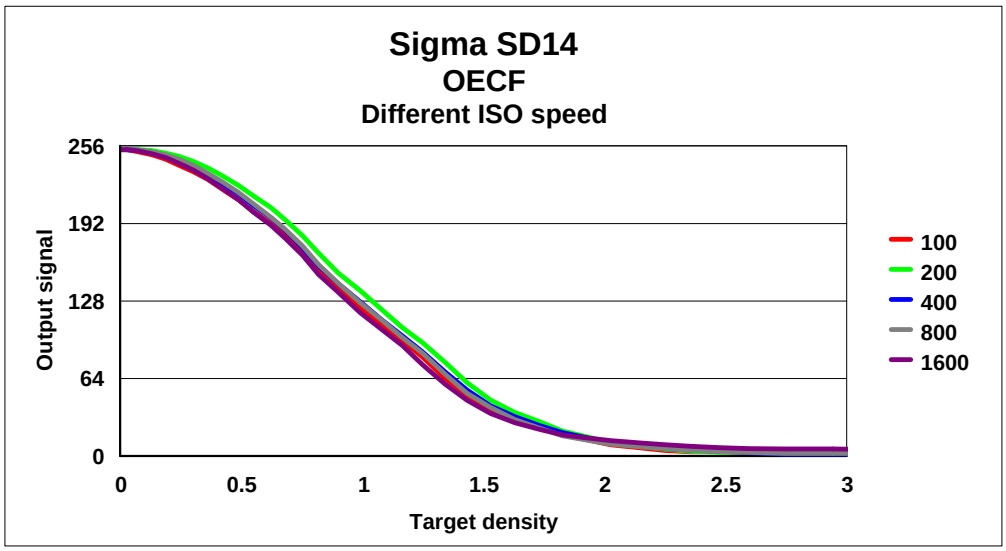
 

### 3. OECF

| ISO speed | 100 | 200 | 400 | 800 |
|---|---|---|---|---|
| Input dynamic range | 7.6 | 8.3 | 8.4 | 8.1 |
| Input density range | 2.27 | 2.49 | 2.51 | 2.42 |
| Mark | 4.3 | 2.0 | 1.3 | 1.3 |
| Highlight mark | 253 | 253 | 253 | 253 |
| Shadow mark | 3.7 | 2.7 | 1.7 | 2.3 |
| Output signal range | 250 | 251 | 252 | 252 |

| ISO speed | 1600 |
|---|---|
| Input dynamic range | 7.9 |
| Input density range | 2.37 |
| Mark | 0.8 |
| Highlight mark | 253 |
| Shadow mark | 5.5 |
| Output signal range | 249 |



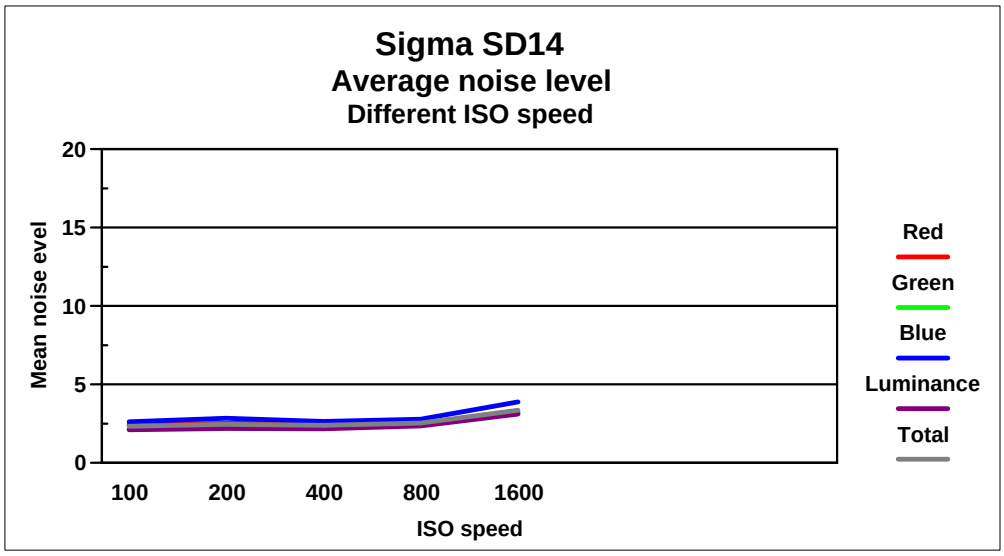

 

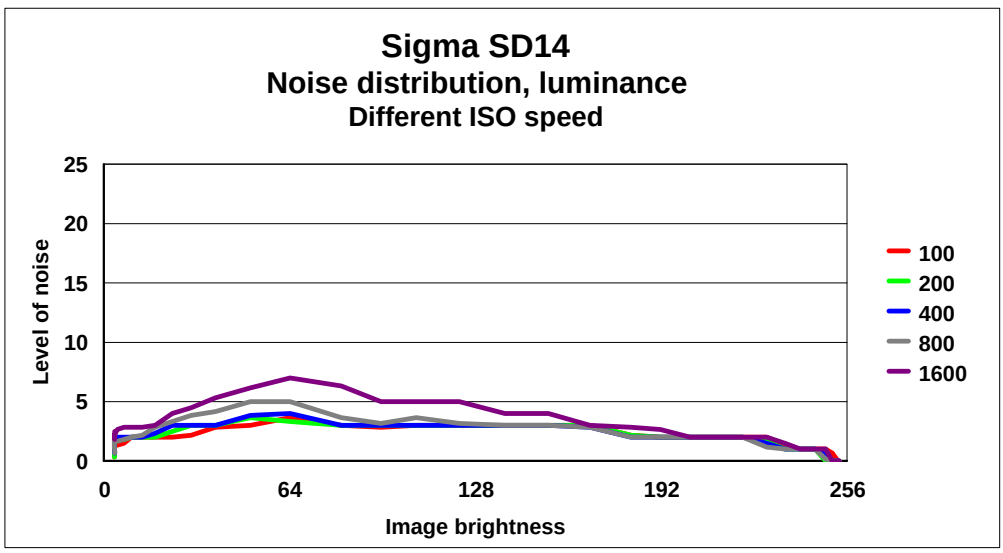
## 4. Noise

**Average noise level:**

| **ISO speed** | **100** | **200** | **400** | **800** |
|---|---|---|---|---|
| Red | 2.4 | 2.5 | 2.5 | 2.5 |
| Green | 2.2 | 2.3 | 2.3 | 2.5 |
| Blue | 2.6 | 2.8 | 2.6 | 2.8 |
| Luminance | 2.1 | 2.2 | 2.2 | 2.4 |
| **Total** | **2.3** | **2.5** | **2.4** | **2.5** |

| **ISO speed** | **1600** |
|---|---|
| Red | 3.2 |
| Green | 3.2 |
| Blue | 3.9 |
| Luminance | 3.1 |
| **Total** | **3.4** |

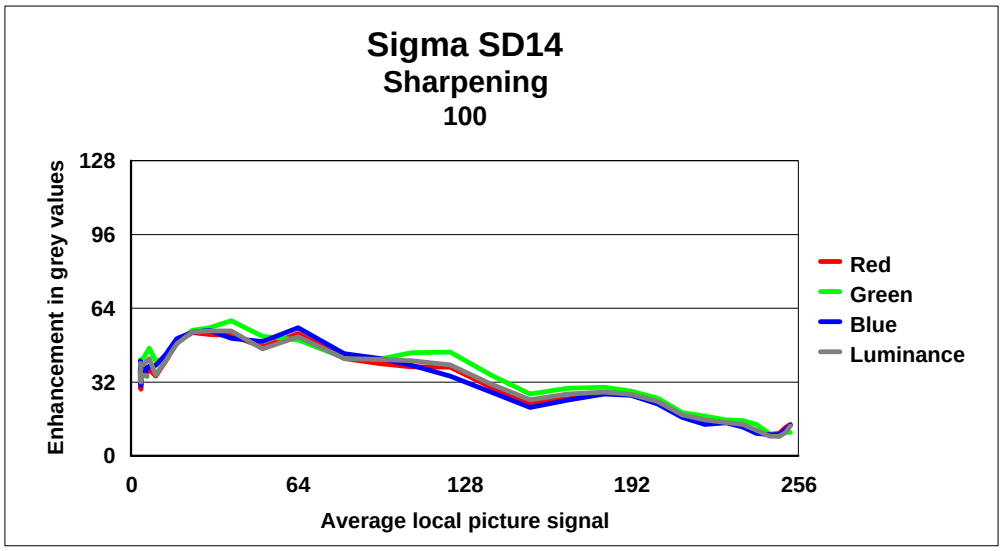


## 5. Sharpening

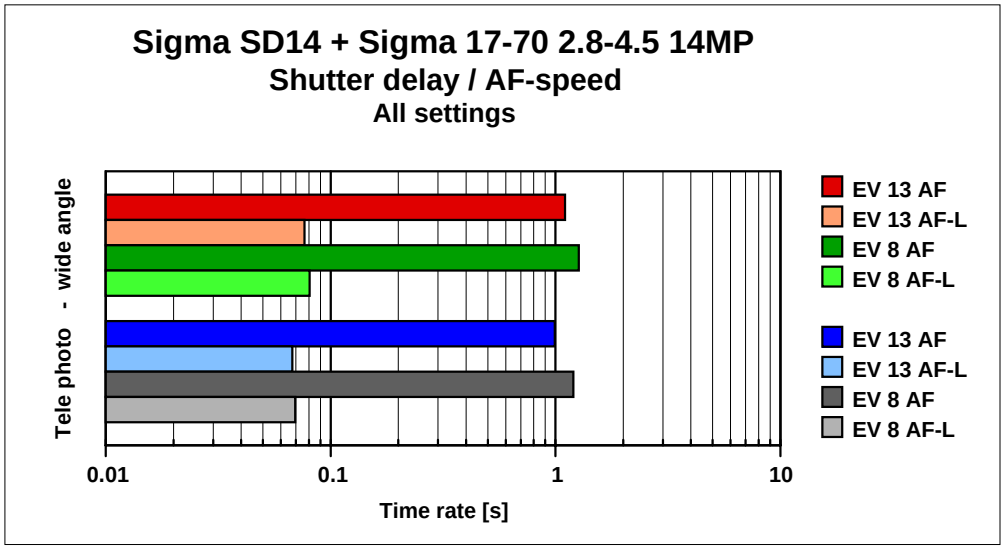
| Mean sharpening level | |
|---|---|
| 0°: | 45.2 |
| 6°: | 39.0 |
| 45°: | 21.0 |
| 90°: | 23.8 |
| 96°: | 35.1 |
| 135°: | 26.0 |
| Mean level, all directions | 31.7 |



## 6. Shutter delay / AF-speed

| Zoom position | Brightness | AF-Mode | Time rate [s] |
|---|---|---|---|
| Wide angle | EV 13 | AF | 1.107 |
| | | AF-L | 0.077 |
| | EV 8 | AF | 1.276 |
| | | AF-L | 0.081 |
| Tele photo | EV 13 | AF | 0.998 |
| | | AF-L | 0.068 |
| | EV 8 | AF | 1.207 |
| | | AF-L | 0.070 |




## 7. Marks

These marks have been calculated for this camera-lens-combination.
The range covers 0.5, best mark, to 6.5, worst mark. This represents
1.0=A to 6.0 =F in anglo-american marks.

| | Mark: |
|---|---|
| Artefact rating: | **4.0** |
| Compression: | **2.0** |
| Input dynamic range: | **2.0** |
| Output signal range: | **2.0** |
| Noise: | **0.5** |
| Sharpening: | **2.7** |
| AF-Speed: | **3.9** |
| Shutter delay: | **0.5** |