

Test sample:
Canon 1D Mk IV

Camera details:

Very high resolving professional camera with a 16 Megapixel on a 1.3-crop sensor. The default range of compression modes is good to moderate. The camera provides four option, which quality level is to be determined in the JPEG quality menu option. The 'large' option features a compression rate of 1:7, which is good to very good. The M1 to S quality options compress' moderately with a rate of 1:12 respectively 1:10 at S option. Flexibility of resolution is good.

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 a quite aggressive fine detail image processing strategy to increase resolution marks. Artefact rating is quite restricted: 4.5.

Dynamic ranges:

Important note:

Due to the two new cameras with extremely exceeded high ISO range, the highest ISO marks in DCTau needed a re-calibration. This mainly applies to the ISO range of 25.000 to 100.00.

Input dynamic ranges shows a moderate performance with lower absolute range at ISO 50 which indicates light over saturation at this ISO speed. Therefore it is not recommendable. At ISO 100 and ISO 200, ISO 12800 through ISO 51200 input dynamic ranges are good. The best relative performance with very good marks is given from ISO 400 to ISO 6400. At ISO 102400 input dynamic range is moderate. ISO 400 or ISO 800 seem to be the sensor's native speed, which makes sense regarding the very high pixel integration. The camera applies high partial signal improvement and faces trade-off's to handle the combination of wide ISO range and extreme pixel integration. Output signal range, which is a counterpart to high input dynamic range, provides good performance at ISO 50, good to moderate and amazingly from ISO 100 to ISO 25600, moderate at ISO 51200 and moderate to restricted performance at ISO 102400.

OEFCF:

The tonal reproduction shown by the OEFCF function is inverse-s-shaped, that means highlight and shadow areas are visibly soft while regions of midrange brightness show higher contrast. This strategy is well suited to enhance perceptual sharpness and visual pleasantness and does increase the resolution marks of most public and industrial tests. The disadvantages are inaccurate tone reproduction, higher artefacts and usually enhanced visual corner shading. This strategy is well suited to amateurs and fast photography, but less suited to sophisticated photography or precise object reproduction. Remarkably the OEFCF is very stable over the full ISO range, except ISO 50 where an increased highlight contrast occurs due to over saturation of the sensor.

Noise:

Total noise is lowest at ISO 50. The relative marks, which respect the noise-ISO speed

relation, shows a good to very good mark at ISO 50, ISO 100 and ISO 3200. From ISO 200 to ISO 1600 noise is very good. At ISO 6400 noise performance is good, at ISO 12800 and 25600 it shows moderate performance. At 51200 it is critical and at ISO 102400 it is poor. Noise character shows very constant representation from ISO 50 to ISO 12800. Luminance noise of high frequency is dominant and increases steadily with ISO speed. Chroma noise is low and starts lightly at ISO 12800. At ISO 12800 to ISO 51200 shadow to midrange regions show isolated “salt&pepper” pixel. Soft chroma noise increases visibly. At ISO 102400 noise character changes totally and shows a very artificial mixture of luminance artefacts and intensively coloured spots.

Shadow noise compensation:

According to the very high pixel integration and the extremely wide ISO range a corresponding amount of signal processing and optimisation is to be expected: from ISO 50 to ISO 800 the noise peak has been set to midrange brightness image regions to enable high resolution marks. From this brightness on to the shadows, noise gets constantly reduced down by a rate of -75% to -80%. This represents a very high amount of scene information elimination from -18% to -14%, which affects a wide brightness range of the image. From ISO 1600 the noise compensation strategy changes a bit. The noise peak shifts down to brightness 70-90, so the brightness range affected by noise compensation shrinks. The degree of compensation decreases too and shows a rate around -70 to -55%, which still represents a very strong partial information deletion. The total amount of eliminated scene information over the complete ISO range is -11.4% which is a restricted mark and may affect image homogeneity and content quite visibly.

Sharpening:

The implementation of sharpening is well to moderately balanced. Most edge enhancement takes place in regions of midrange brightness. Thus black or white signal clipping doesn't occur, but images become still get more brilliant. Edge character is visibly affected, as both the dark and the bright side show a visible dark and bright enhancement line. This restricts post processing flexibility. The camera seems to apply chrominance reduction at edges, as chromatic flare occurs on some parts of sharp edges and doesn't on others. Sharpening is almost constant at any orientation, a good design to provide constant pictorial results.

Fine image details and artefacts:

The camera features a sophisticated and rather aggressive low-pass-filter design and frequency based contrast enhancement. To increase resolution marks, very high frequency aspects are allowed to pass through the low-pass-filter. Vertical and horizontal structures show lightly visible chromatic artefacts, but almost no luminance Moiré. Diagonal and slanted structures show very strong luminance Moiré and quite visible chrominance Moiré around 135° orientation. Diagonal structures show normal aliasing. This artefact rating causes reasonable restrictions to technical reproduction of textured image details and sophisticated imaging.

Shutter delay:

Using the Canon EF 24-70 2.8 lens, the camera shows the following results: passing the full focal range from infinity to our test distance, the camera shows a good to very good mark of 0.346 seconds. The camera is little faster under bright scene conditions than under dimmed. Using the pre-focussed mode, the shutter delay provides a good to very good mark and a delay around 0.097 seconds.

Conclusion:

The 1D Mk IV shows a difficult decision in camera design: on one hand the pixel integration is very high. This restricts the photon count and flexibility of specs based on a high photon number's flexibility. To implement an extremely wide ISO range needs this flexibility. Thus the recommendable ISO range covers 100 to 25800. At ISO 50 input dynamic range and tonal reproduction are affected by light over saturation. At ISO 51200 and 102400 noise and fine detail show reasonable to critical restrictions.

The general performance is straightforward designed to meet the press' preferences: tonal reproduction address' to fast photography instead of flexible post processing, so does the enhanced sharpening level. Input dynamic ranges are quite good and noise is visible but natural over the preferred ISO range. Shadow noise is highly compensated, which pretends better input dynamic range and standard noise test marks, but deletes and affects scene information quite visibly. Fine details are very aggressive, a consequence of the fast and crisp photography strategy. The AF speed is good to very good, the shutter delay under pre-focussed use is good to very good. Compression is well designed and provides good scene content preservation.

DCTau 5.0 SLR camera test

Tested range: 12 ISO speeds

1. Camera details

Sample	Canon EOS 1D Mk IV
Image width	4896 pixel
Image height	3264 pixel
File size, uncompressed	46819 kilobytes

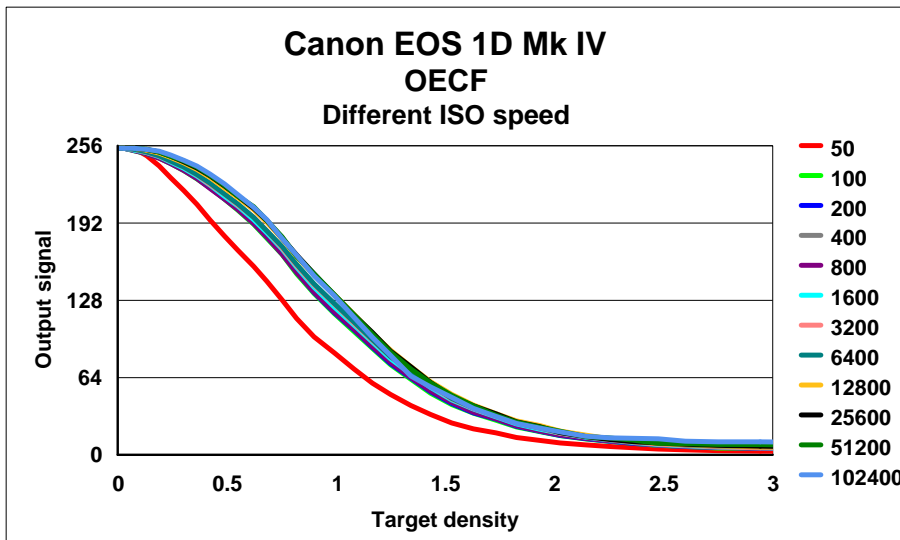
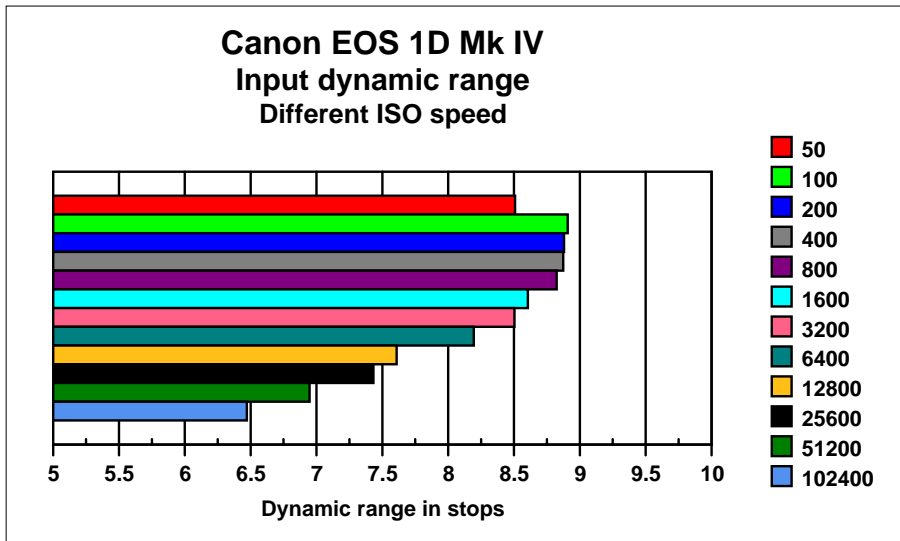
Compression resolution	quality	Bitmap file size	compressed file size	ratio
16 MP	L	46819	6300	7
12 MP	M1	36451	3022	12
8 MP	M2	24643	2060	12
4 MP	S	11705	1147	10

2. Resolution aspects

Artefact rating 4.5

3. OECF

ISO speed	50	100	200	400
Input dynamic range	8.5	8.9	8.9	8.9
Input density range	2.55	2.67	2.66	2.66
Highlight mark	254	254	254	254
Shadow mark	3.0	5.2	5.5	5.5
Output signal range	252	250	250	250
ISO speed	800	1600	3200	6400
Input dynamic range	8.8	8.6	8.5	8.2
Input density range	2.65	2.58	2.55	2.46
Highlight mark	254	254	254	254
Shadow mark	5.5	5.5	5.8	6.5
Output signal range	250	250	249	249
ISO speed	12800	25600	51200	102400
Input dynamic range	7.6	7.4	6.9	6.5
Input density range	2.28	2.23	2.08	1.94
Highlight mark	254	254	254	254
Shadow mark	6.5	6.7	7.5	10.2
Output signal range	249	248	248	245

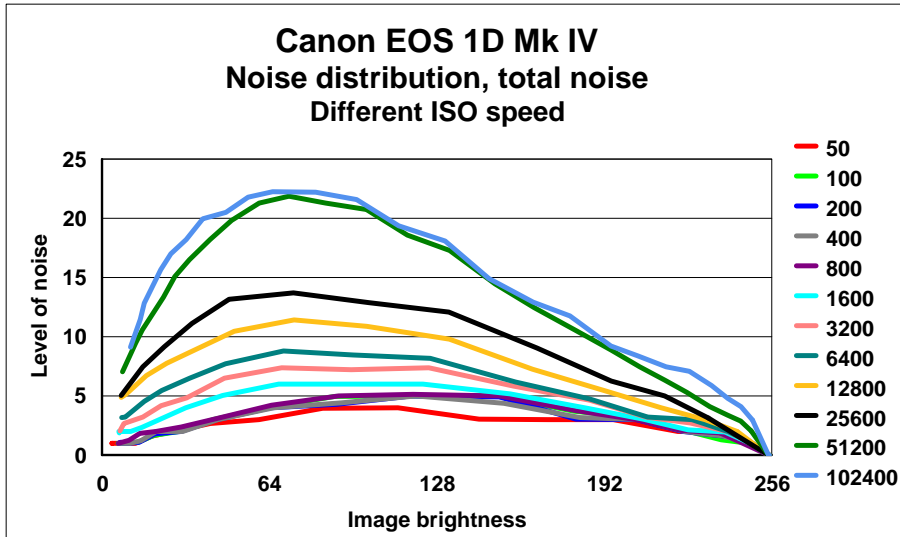
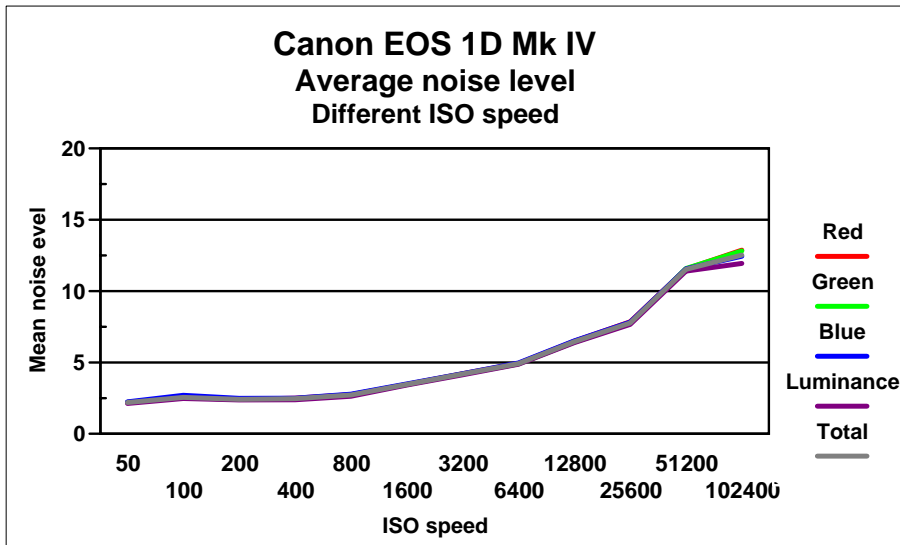


4. Noise**Average noise level:**

ISO speed	50	100	200	400
Red	2.2	2.5	2.4	2.5
Green	2.2	2.5	2.4	2.5
Blue	2.2	2.7	2.5	2.5
Luminance	2.1	2.5	2.4	2.4
Total	2.2	2.6	2.4	2.5

ISO speed	800	1600	3200	6400
Red	2.7	3.5	4.2	4.9
Green	2.7	3.4	4.2	4.9
Blue	2.8	3.5	4.2	5.0
Luminance	2.6	3.4	4.1	4.9
Total	2.7	3.5	4.2	4.9

ISO speed	12800	25600	51200	102400
Red	6.5	7.8	11.5	12.9
Green	6.4	7.7	11.6	12.8
Blue	6.5	7.8	11.6	12.4
Luminance	6.4	7.7	11.4	11.9
Total	6.5	7.8	11.5	12.5



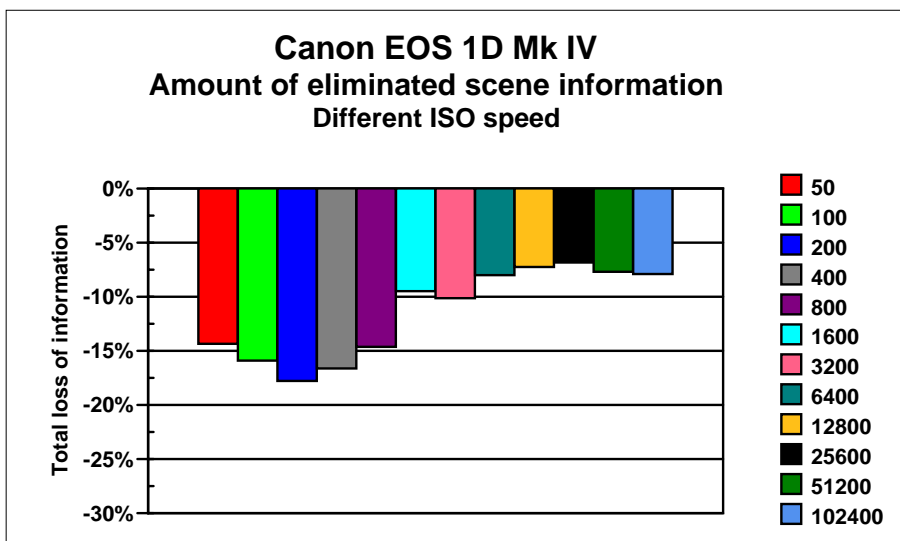
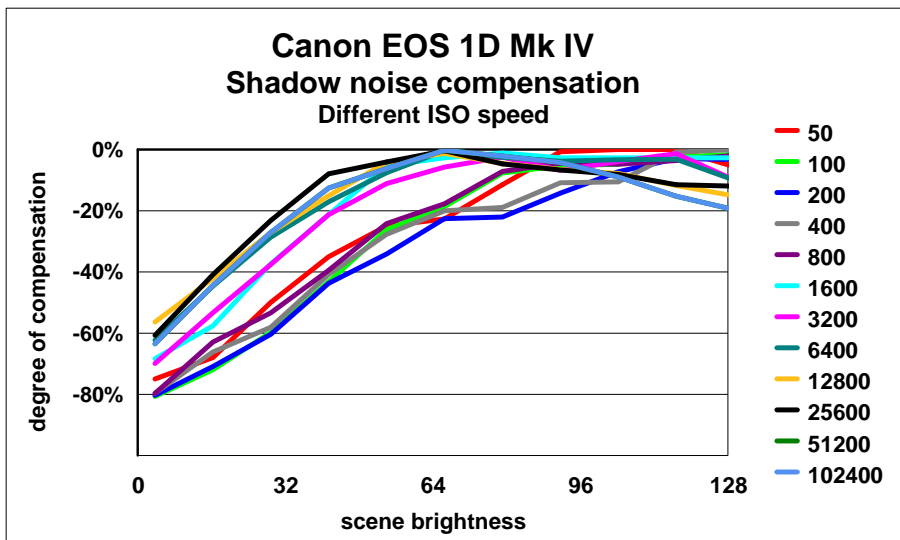
5. Shadow noise compensation

ISO speed:	50	100	200	400
Brightness showing noise maximum:	110	122	123	129
Affected brightness range:	35%	45%	45%	45%
Amount of eliminated scene information:	-14%	-16%	-18%	-17%

ISO speed:	800	1600	3200	6400
Brightness showing noise maximum:	135	84	79	72
Affected brightness range:	45%	25%	35%	25%
Amount of eliminated scene information:	-15%	-9%	-10%	-8%

ISO speed:	12800	25600	51200	102400
Brightness showing noise maximum:	70	70	72	71
Affected brightness range:	25%	25%	25%	25%
Amount of eliminated scene information:	-7%	-7%	-8%	-8%

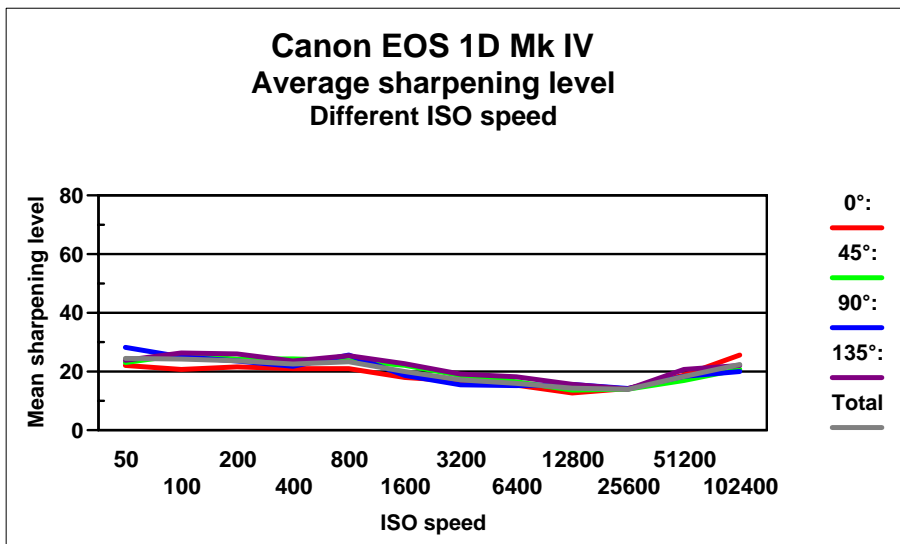
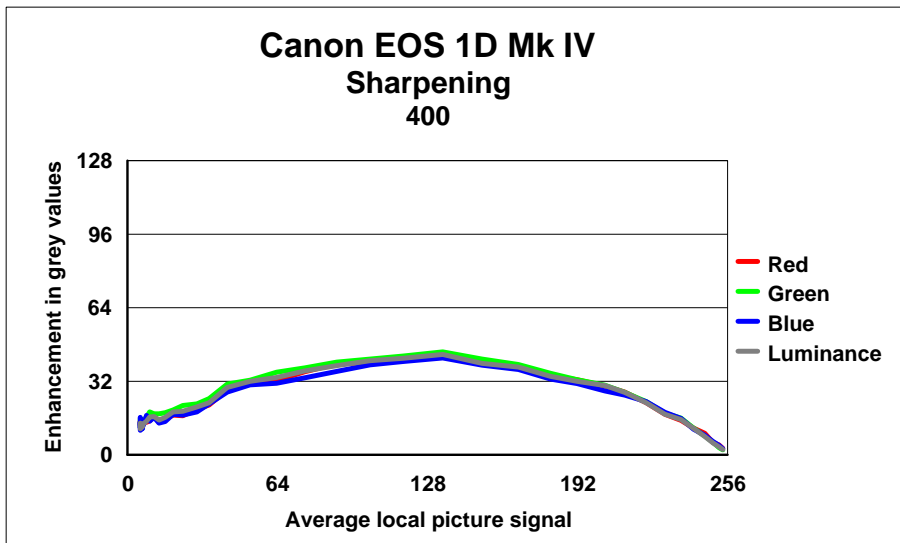
Mean mark of eliminated scene information: **-11.4%**



6. Sharpening

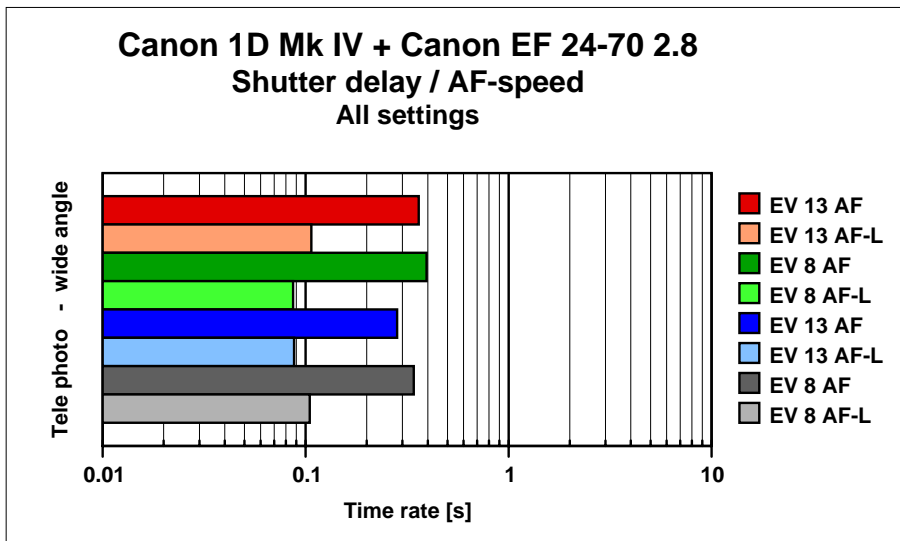
Mean sharpening level

0°:	21.6
6°:	20.7
45°:	24.2
90°:	23.6
96°:	25.8
135°:	26.0
Mean level, all directions	23.6



7. Shutter delay / AF-speed

Zoom position	Brightness	AF-Mode	Time rate [s]
Wide angle	EV 13	AF	0.362
		AF-L	0.107
	EV 8	AF	0.395
		AF-L	0.087
Tele photo	EV 13	AF	0.283
		AF-L	0.088
	EV 8	AF	0.342
		AF-L	0.105



8. 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:	4.5
Compression:	2.5
Input dynamic range:	1.8
Output signal range:	2.6
Noise:	2.3
Sharpening:	2.4
AF-Speed + shutter lag:	1.4
Shutter delay:	1.5