

Extended Low ISO Range

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In the camera's normal range (base ISO up to the extended high ISO range), the JPEG and the raw data respond in a linear fashion to changes in ISO. Within that range, increasing the exposure or the ISO will brighten the image and simultaneously increase the raw values moving both the raw and JPEG histograms to the right. *

Some cameras offer extended ISO ranges below and above the normal range. The low range can extend about one full stop below base ISO but you should be aware that highlights may be overexposed.

The higher range might go as much as two stops above the normal range particularly prone to noise.

In both extended ranges, the linear relationship of ISO and exposure may not apply. Because of this it would be difficult to see the effects of either extended range.

But the low ISO range can be easily examined to see how two brands, Nikon and Sony, address this.

For both brands, measurements were taken of the JPEG and raw values that were produced in the extended low range. In the first test, a constant exposure was used from base ISO in 1/3 stop increments down to one stop below base. In the second test, the exposure was reduced in step with the ISO so that the JPEG brightness would remain the same. What will be shown is that the JPEG ISO which defines the brightness of the camera's JPEG, becomes disconnected from the ISO used when the raw data is recorded. But Nikon and Sony do it in a slightly different manner.

First, Nikon's approach as measured with a Z7 with a base ISO of 64:

Nikon Z7 @ f/5.6	JPEG ISO	1/ss	raw	log(raw)	+/-	raw ISO
Same Exposure	125	25	2649.20	11.37	1.03	125
darker JPEG	100	25	2070.50	11.02	0.67	100
	80	25	1642.35	10.68	0.34	80
Base ISO	64	25	1299.75	10.34	0.00	64
	50	25	1306.70	10.35	0.01	64
	39	25	1299.55	10.34	0.00	64
	31	25	1298.65	10.34	0.00	64

Using the same exposure, as the JPEG ISO gets lower, the image gets darker. The raw values also get lower until base ISO. But the raw data does not change below base ISO.

Sony's approach is different.

Sony A7 III @ f/5.6	JPEG ISO	1/ss	raw	log(raw)	+/-	raw ISO
Same Exposure	200	30	2123.50	11.05	0.97	200
darker JPEG	160	30	1730.00	10.76	0.67	160
	125	30	1370.35	10.42	0.33	125
Base ISO	100	30	1086.70	10.09	0.00	100
	80	30	1697.10	10.73	0.64	160
	64	30	1357.25	10.41	0.32	125
	50	30	1084.85	10.08	0.00	100

Using the same exposure, as the JPEG ISO gets lower, the camera's image gets darker. The raw values also get lower until base ISO. But the raw data does not change below base ISO for the Nikon. But the ISO used to record the raw values is double the ISO used for the JPEG for the Sony.

In both cameras, the ISO used to record the raw data never drops below base ISO. But if the image is within a stop of blowing out the raw highlights at base ISO, those highlights will probably blow out if the ISO used for the JPEG drops below base ISO.

The decoupling of the JPEG and raw ISO is only used for the camera's JPEG. If you intend to record the raw data and create an image on your computer, there is no point in using the extended low ISO range in any camera. In fact, *there is no point in using any feature on your camera that decouples the JPEG and raw ISO* between the base ISO to the highest normal ISO before the extended high ISO settings.

* There are some cameras where they can be deliberately disconnected. Fuji, Canon and Olympus (maybe others) have a way to disconnect the ISO used for the JPEG from the ISO used to record the raw file by raising the base used to create the JPEG. You can find more information about this at [Ins and outs of ISO: where ISO gets complex](#). But if you are developing from raw, these approaches are of no use.

For example, Fujifilm Dynamic Range Settings will affect the resulting JPEG coming from the camera by decoupling the ISO used for the JPEG from the one used for the raw data. But it *does not improve the dynamic range of the camera*. It serves no purpose if you are going to develop the image from raw on your computer.