Technical data in direct comparison

between the QHY 600 models and the ZWO ASI 6200 MM Pro
("if two do the same thing it is not the same")

Camera Model	QHY600-L	QHY 600M Photographic Version	QHY 600M Pro Scientific Profes-sional Version	QHY 600M EB/Pro-L Early Bird Version	ZWO ASI 6200 MM Pro
Sensor Sony IMX 455 BSI	Yes				
No. of pixels	effective usable pixels 9576 x 6388 61,17 MP				
Pixelsize	3,76 µm x 3,76 µm				
Quality of sensor:	C (Consumer)	K (Industry)	K (Industry)	K (Industry)	Consumer
Industry/Consumer Grad Chip	All Mono version of QHY600PH & QHY600Pro use IMX455 industry grade sensor (Grade-K) The sensor is available as -C (Customer Grade) and -K (Industry Grade), read more in our blog: Why are the QHY600 monochrome CMOS cameras more expensive than similar models from other manufacturers?				
quantum efficiency	> 87%				Peak 80 %
Full Well Capacity (without binning)	51 ke-				51 ke-
Full Well Capacity Binning at x2, x3	>204 ke- and >408 ke-				Software - and Hardware bin-ning at x2, x3 No specification about full well
Full Well Capacity in the extended dy-namic range (Extended dynamic range - HDR) Mode	Binning 1 x 1 > 80 ke- Binning 2 x 2 > 320 ke- Binning 3 x 3 > 720 ke-				Full Well in ZWO HCG Mode Not specified
Software Binning	x2, x3, x4				x2, x3, x4
A/D Conversion	16-bit (0-65535 Level) at 1X1 18-bit at 2X2 19-bit at 3X3, 20-bit at 4X4 Software Binning				16-bit (0-65535 Lev-el) no further specification of AD in binning modes

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Computer Interface USB 3.0	Yes				
Computer Interface 2*10 Gigabit Fiber Port	No	No	Yes	Yes with optional Upgrading from EB/Pro-L to Pro Version	No
		Fiber optics allow extremely fast data transport and much longer distances without loss than with USB. The data has a time stamp and is protected against signal interference unlike USB. But fiber optic cables are sensitive to folds and damage			
Download speed FPS (16bit)	2,5 FPS - USB 3.0	2,5 FPS - USB 3.0	4 FPS - Fiber Port 10 Gb	2,5 FPS - USB 3.0 with optional Upgrading from EB/Pro-L to Pro Version 4 FPS - Fiber Port 10 Gb	2 FPS - USB 3.0
8K 30FPS Videostream	No	No	Yes	Yes with optional Upgrading from EB/Pro-L to Pro Version	No
			Not yet supported by the driver, can be output when upgrading to the Pro version.		
Built-in Image Buffer DDR RAM	1 GB (8 GBit)	1 GB (8 GBit)	2 GB (16 GBit)	2 GB (16 GBit)	256 MB
	The significantly higher RAM memory enables the BSI sensor to be read out smoothly and simultaneously. This especially reduces the amplifier glow, because there is no data delay when reading the sensor.				
Non-volatile memory / On camera storage	64 MB Build-in total 64MByte Flash Memory. 10MBytes user-accessible space for stellar ROI frames for analysis of exoplanet investigation, occultations, atmospheric seeing measurement, focus, optical analysis, etc. Supports 100*100 image x 500 frames, 50*50 image x 4000 frames, 25*25 image x16000 frames, 10*10 image x 250000 frames				192 KB

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Dark Current	0.0022e-/p/s @ -20C 0.0046e-/p/s @ -10C				This value is not comparable, because it depends on the gain, which QHY divides from 0-100 below, other manufacturers from 0-450
Read noise	1,0e - 3,7e (Standardmode)				1,5e - 3,5e
Shutter type	Electronic Rolling Shutter				
Cooling System	Dual Stage TEC cooler				
Delta T below ambient	35°C Basic and readout noise are extremely low and reach peak values already at -10°C. Less cooling increases life duration. Very low sensor temperatures can lead to rapid icing the sensor.				35°C
Watercooling	Nein	available, by order Delta T below ambient 45°C	available, by order Delta T below ambient 45°C	available, with upgrade from EB to PRO-L Delta T below ambient 45°C	Not available
Anti-Dew Heater	Yes Prevents dew fogging from inside and outside. The sensor chamber can also be dehumidified very easily without sending it back, everything necessary is included with the camera.				Yes
GPIO	No	No	4PIN, high speed with flexible FPGA conntrol. Can be used as trigger in/out, multiple camera sync capture control, high precision GPS time measurement etc.	Yes with optional Upgrading from EB/Pro-L to Pro Version	No
Multiple Read out Modi	4	4	4	4	1

Camera Model	QHY600-L	QHY 600M Photographic Version	QHY 600M Pro Scientific Professional Version	QHY 600M EB/Pro-L Early Bird Version	ZWO ASI 6200 MM Pro
Firmware/FPGA remote Upgrade	Supported Via Camera USB Port				Not specified
Hardware Frame Sequence Number	Yes				Not specified
Reboot the camera without disconnecting the USB plug	Yes The camera can be restarted by switching the power supply on/off and then reconnects to the PC without disconnecting the USB connection. In remote operation a MUST HAVE! This successfully brings one of the most hated disadvantages of USB-3 technology in QHY cameras under control.				No
Interface for GPS hardware time signal	No	No	Yes	available, with upgrade from EB to PRO-L	No
Back Focal Length	17,5mm				
Special Short Backfocus Version with 7mm	Nein	available, by order			No
Telescope Interface	M54 x0.75	M54 x0.75	M54 x0.75	M54 x0.75	M54 x0.75

The data, and/or specifications in the ZWO column come from the original Website of ZWO ASI

https://astronomy-imaging-camera.com/product/asi6200mm-pro-mono

and from the original operating manual of the ZWO ASI 6200 MM Pro

https://astronomy-imaging-camera.com/manuals/ASI6200_Manual_EN.pdf

In case these data do change or are found to be altered, we will be thankful to learn about it, in order to actualize this spreadsheet.

EXPLANATIONs/Comments:

1. **Extended Dynamic Range = HDR mode**

   In the EDR setting the BSI sensor is read out two times. This extends the already very good real and native 16Bit dynamic range even further. This allows longer exposures without reaching saturation too quickly (= overexposure). With light intensive optics it is possible to expose longer without burning out (= being saturated). A greater depth of the signal is achieved, weaker structures can already be captured in the individual image, and as a whole they become more clearly visible. *Note:* EDR must be selected in the driver, only then darks, bias and flats are in the available mode for recording.

2. **1 GB or 2 GB DDR Ram:**

   In order to enable a smooth and simultaneous readout of the BSI sensor, QHY has increased the DDR Ram 4 to 8 times compared to many other manufacturers on the market. This helps to control the highly feared Amp Light Glow, because the large DDR Ram prevents data jams when reading out the sensor.

3. **Reboot the camera without disconnecting the USB cable**

   The camera can be restarted by power on/off and it will automatically reconnect to the PC. **In remote operation a MUST HAVE!** This ability remedies one of the most hated downsides of USB-connection. At the same time, the robust Industry-Grade Chip of the QHY 600 is the secure solution to survive repeated power loss and uncontrolled cooling and heating of the Peltier - compared to a regular consumer CMOS-chip.

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