How to choose the right grating

A diffraction grating is an optical element that separates incident polychromatic radiation into its constituent wavelengths. A grating consists of series of equally spaced parallel grooves formed in a reflective coating deposited on a suitable substrate. The way in which the grooves are formed separates gratings in two types, holo-graphic and ruled.

The ruled gratings are physically formed onto a reflective surface with a diamond on a ruling machine. Gratings produced from laser constructed interference patterns and a photolithographic process are known as holographic gratings.

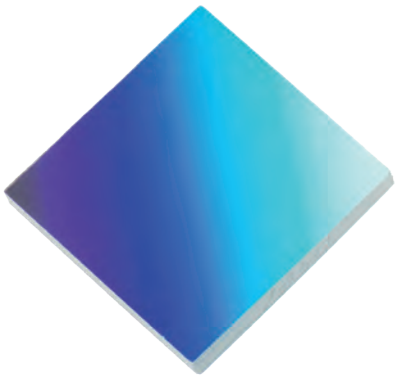
Avantes AvaSpec spectrometers come with a permanently installed grating that must be specified by the user. Additionally, the user needs to indicate what wavelength range needs to reach the detector. Sometimes the specified usable range of a grating is larger than the range that can be projected on the detector. In order to cover a broader range, a dual or multi-channel spectrometer can be chosen. In this configuration each channel may have different gratings covering a segment of the range of interest.

In addition to broader range, a dual or multi-channel spectrometer also affords higher resolution for each channel.
For each spectrometer type a grating selection table is shown in the spectrometer platform section.

Table 2 illustrates how to read the grating selection table. The spectral range to select in Table 2 depends on the starting wavelength of the grating and the number of lines/mm; the higher the wavelength, the bigger the dispersion and the smaller the range to select.

In Figure 2, grating efficiency curves are shown. When looking at the grating efficiency curves, please realize that the total system efficiency will be a combination of fiber transmission, grating and mirror efficiency, detector quantum efficiency and coating sensitivities. The dual-blazed grating is a 300 lines/mm broadband grating (covering 200-1100 nm) that has optimized efficiency in both UV and NIR.

Different diffraction gratings



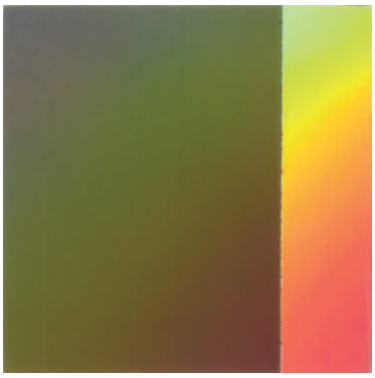


Table 2 Example of Spectral Range and Gratings

Use	Useable range (nm)	Spectral range (nm)	Lines/mm	Blaze (nm)	Order code
UV/VIS/NIR	200-1100	900	300	300	UA
UV/VIS	200-850	520	600	300	UB
UV	200-750	250-220*	1200	250	UC
UV	200-650	165-145*	1800	UV	UD
UV	200-580	115-70*	2400	UV	UE
UV	220-400	70-45*	3600	UV	UF
UV/VIS	250-850	520	600	400	BB
		800			VA

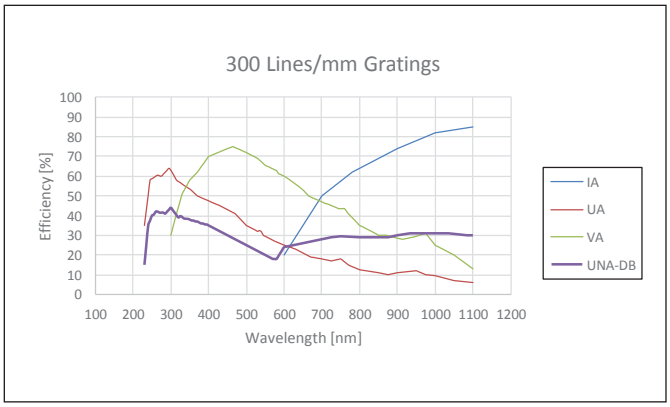
Please select Spectral range bandwidth from the useable Wavelength range, for example: grating UE (200-315 nm)
* the spectral range depends on the starting wavelength of the grating; the higher the wavelength, the smaller the range. For example: Grating UE (510-580 nm)

The order code is defined by 2 letters: the first is the Blaze (U= 250/300 nm or UV for holographic, B=400 nm, V=500 nm or VIS for holographic, N=750 nm, I=1000 nm) and the second the nr of lines/mm (Z=150, A=300, B=600, C=1200, D=1800, E=2400, F=3600 lines/mm)

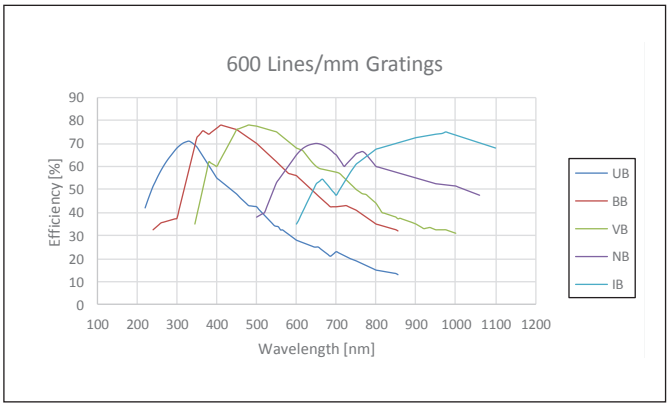
For newer types a different nomencla-ture is used stating the product line, lines/mm and blaze.

Figure 2 Grating Efficiency Curves

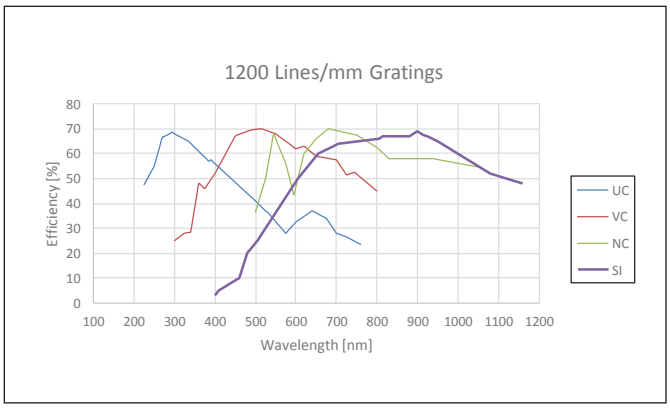
300 lines/mm gratings



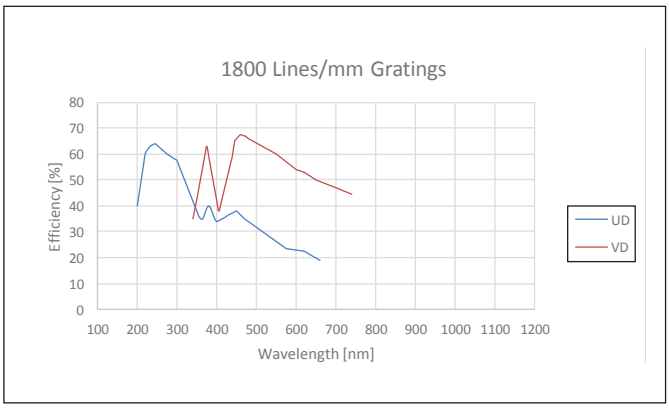
600 lines/mm gratings



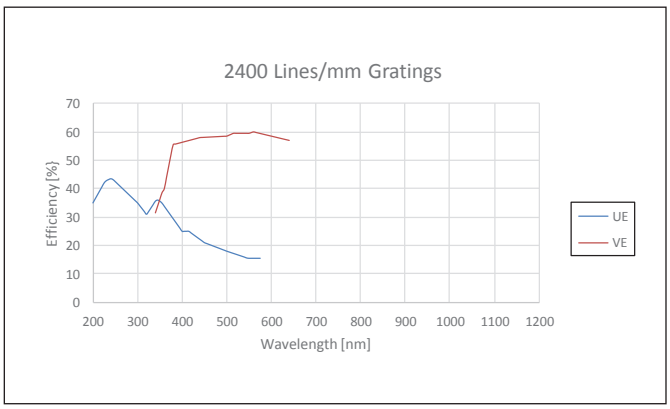
830 & 1200 lines/mm gratings



1800 lines/mm gratings



2400 lines/mm gratings



3600 lines/mm grating

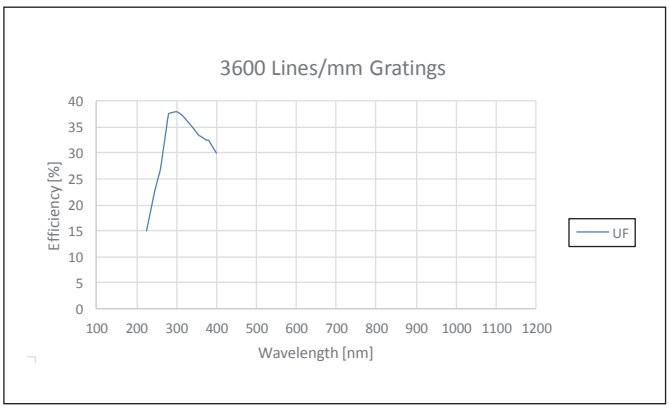


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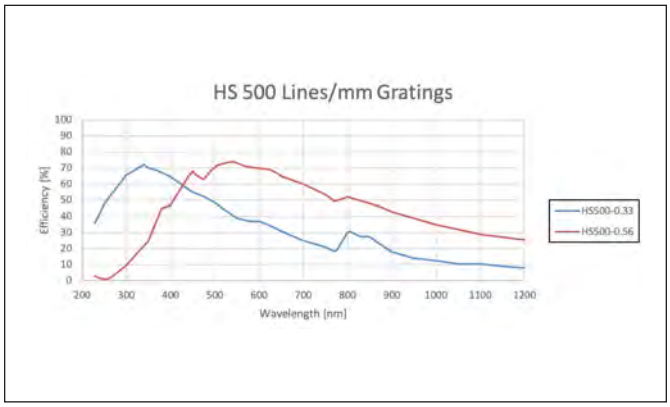
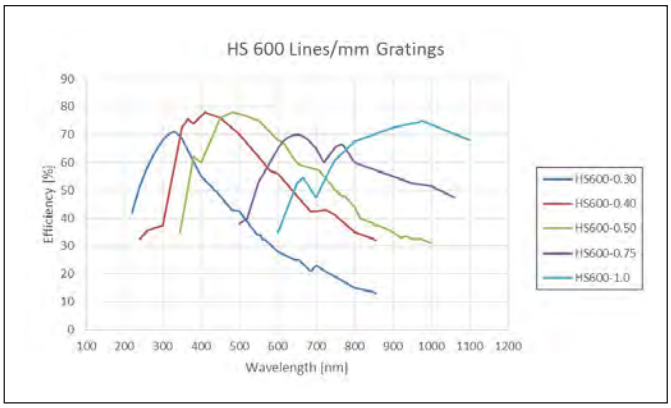
Figure 2 Grating Efficiency Curves

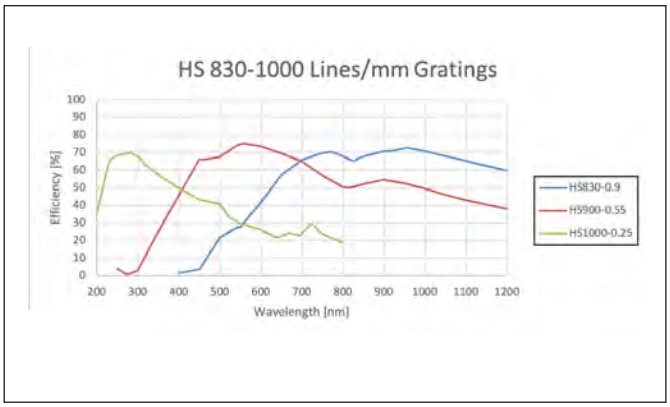
HS 500 lines/mm gratings



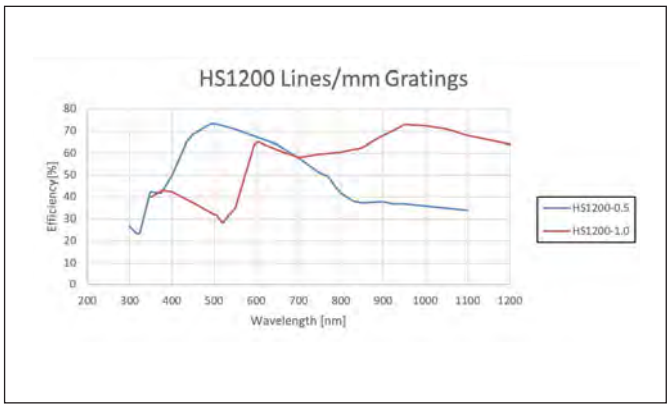
HS 600 lines/mm gratings



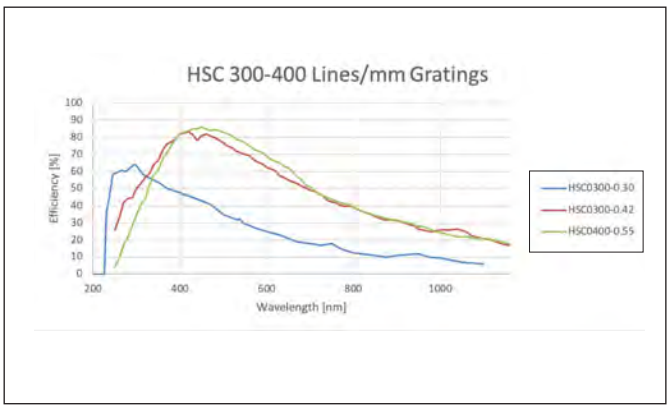
HS 830-1000 lines/mm gratings



HS 1200 lines/mm gratings



HSC 300-400 lines/mm gratings



HSC 600-830 lines/mm gratings

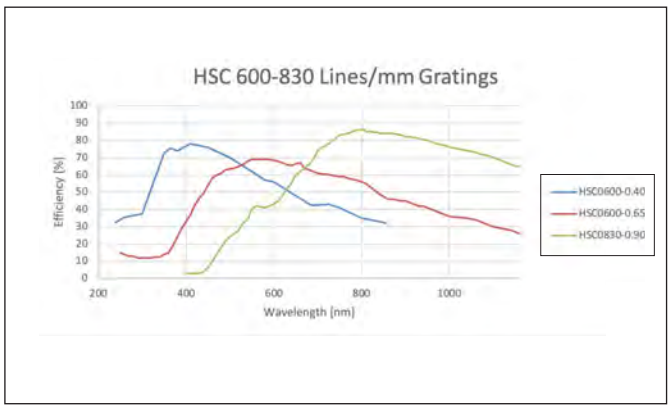
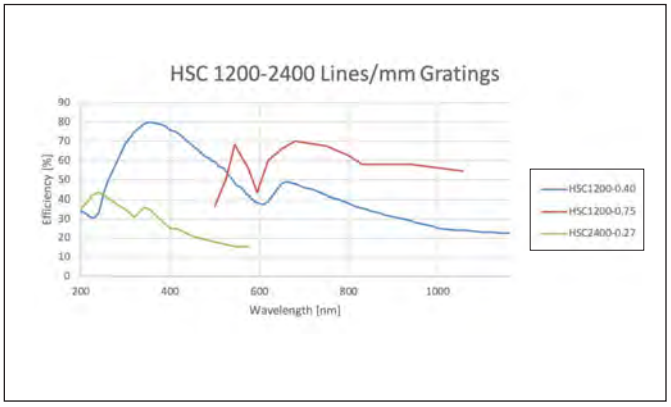
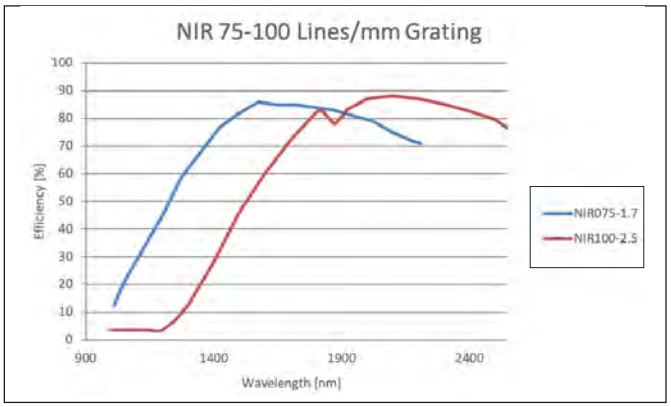


Figure 2 Grating Efficiency Curves

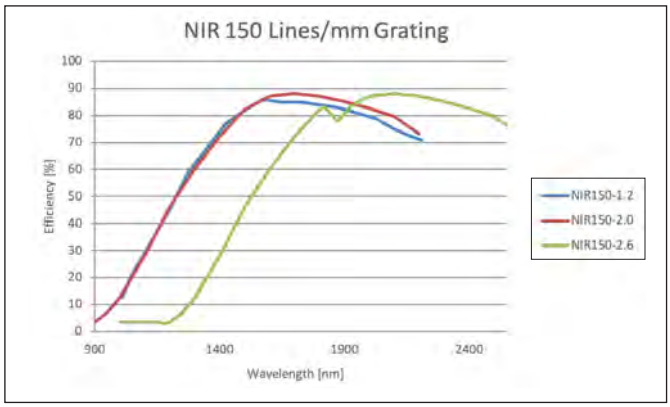
HSC 1200-2400 lines/mm gratings



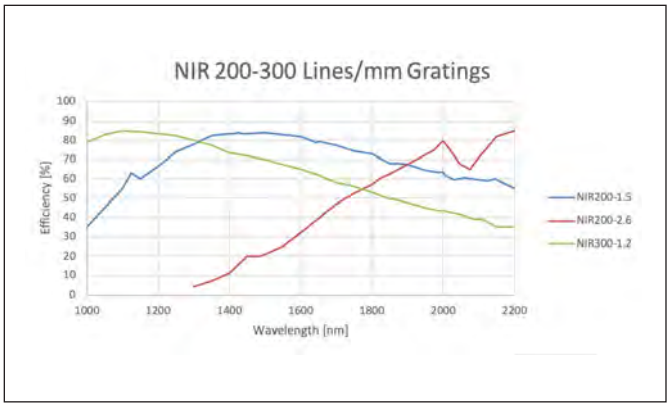
NIR 75-100 lines/mm gratings



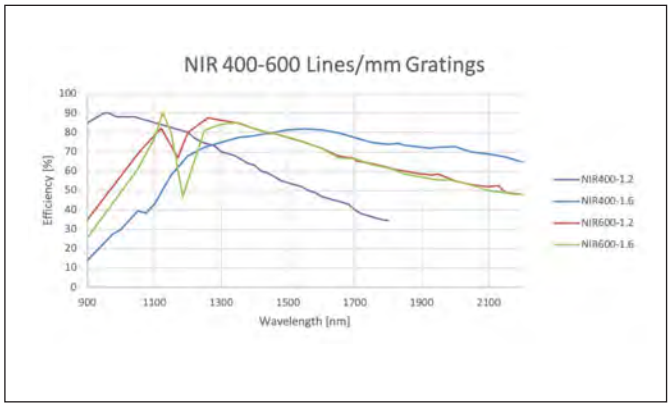
NIR 150 lines/mm gratings



NIR 200-300 lines/mm gratings



NIR 400-600 lines/mm gratings



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