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, holographic 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 2a and 2b 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 all new dual-blazed grating is a 300 lines/mm broadband grating (covering 200-1100 nm) that has optimized efficiency in both UV and NIR. In Figure 2c the grating dispersion curves are shown for the AvaSpec-ULS2048.

### Table 2 Example of Spectral range and gratings

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

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 nomenclature is used stating the product line, lines/mm and blaze.
Figure 2a Grating Efficiency Curves

300 lines/mm Gratings

![300 Lines/mm Gratings](image)

600 lines/mm Gratings

![600 Lines/mm Gratings](image)

1200 lines/mm Gratings

![1200 Lines/mm Gratings](image)

1800 lines/mm Gratings

![1800 Lines/mm Gratings](image)

2400 lines/mm Gratings

![2400 Lines/mm Gratings](image)

3600 lines/mm Gratings

![3600 Lines/mm Gratings](image)
Figure 2b Grating Efficiency Curves

HS 500 lines/mm Gratings

NIR 075-150 lines/mm Gratings

HS 200-300 lines/mm Gratings

NIR 200-300 lines/mm Gratings

NIR 400-600 lines/mm Gratings

HS 1200 lines/mm Gratings

NIR 75-150 lines/mm Gratings

HS 830-1000 lines/mm Gratings

NIR 075-150 lines/mm Gratings

NIR 400-600 lines/mm Gratings