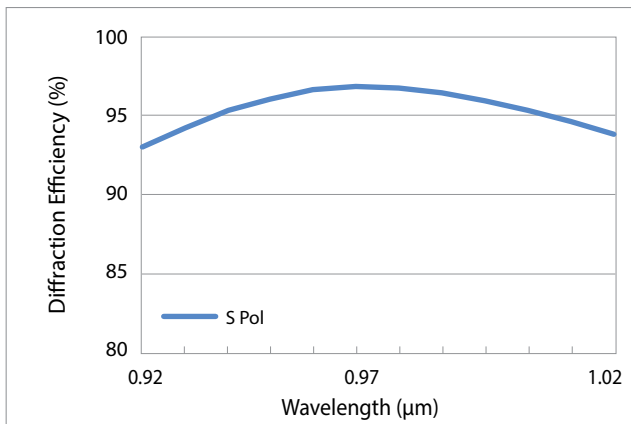


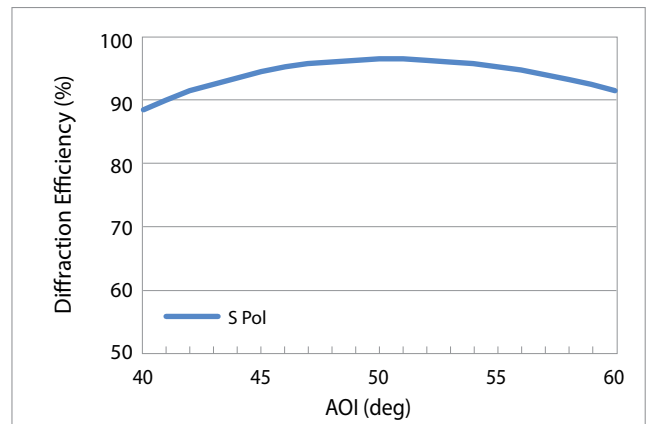
## Specification for High Efficiency Transmission Grating T-1600-970s Series

T-1600-970s series lithographically patterned diffraction transmission grating is designed to be used in demanding industrial applications. It is characterized by high efficiency, excellent long-term stability, and high power handling. Gratings produced by LightSmyth undergo extensive quality assurance, have proven reliability track record and are competitively priced.

The single polarization optimized transmission grating has 1600 lines/mm and designed to operate near 970 nm central wavelength at 50.9° angle of incidence (AOI). Extended wavelength range performance and angular sensitivity information is provided below.

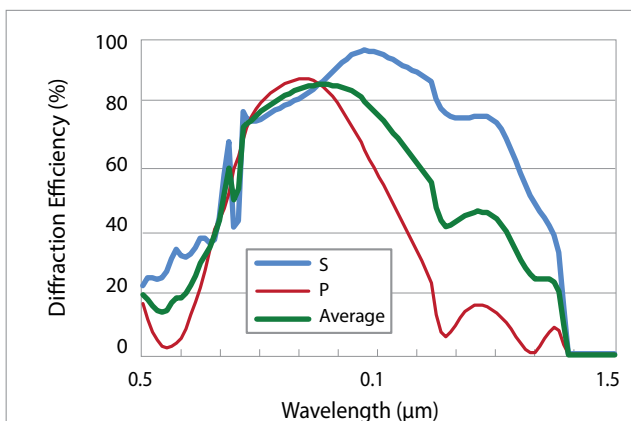


Typical absolute diffraction efficiency at AOI 50.9° \*

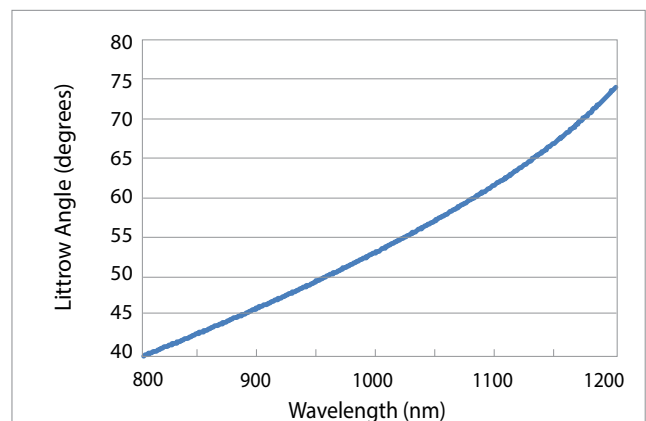


Diffraction efficiency at 970 nm as a function of AOI \*

Extended operational range: The grating may operate over broader wavelength range provided that suitable anti-reflective coating and angle of incidence is used. The plot below shows simulated performance\* over extended range assuming fixed input angle (designed Littrow angle of 50.9°), not accounting for AR coating losses. Optimal input angle for each wavelength is shown on the right.



Typical absolute diffraction efficiency at AOI 50.9° \*



Optimal input angle for each wavelength (Littrow condition)

\* simulated performance shown (for guidance only)

# Specification for High Efficiency Transmission Grating T-1600-970s Series

| Optical                               |          |          |
|---------------------------------------|----------|----------|
| Description                           | Value    | Units    |
| Line Density                          | 1600.0   | Lines/mm |
| Line Density Uniformity               | 0.001    | Lines/mm |
| Angle of Incidence (AOI) <sup>1</sup> | 50.9 ±1  | °        |
| Wavelength Range                      | 970+/-10 | nm       |
| Optimal polarization <sup>2</sup>     | S        |          |
| Diffraction Efficiency <sup>3</sup>   | ≥ 94     | %        |

Notes: <sup>1</sup> Optical grating performance will remain substantially similar over a 5° variation in angle of incidence.

<sup>2</sup> S-polarization: electric field vector is parallel to the grating lines; P-polarization is orthogonal to S.

<sup>3</sup> Worst case in the operational wavelength range for optimal polarization.

| Mechanical               |  |
|--------------------------|--|
| Dimension tolerances     | ±0.2 for grating size and width        |
| Substrate Thickness      | 0.675 ± 0.050 mm or 0.95 +/- 0.05      |
| Material                 | Fused silica, dielectric layers        |
| Scratch/Dig <sup>4</sup> | 60/40 standard, 40/20 and 20/10 custom |

Note: <sup>4</sup> As per MIL-PRF-1380B in the clear aperture; no requirements outside of the clear aperture.

| Substrate dimension options |  |                                   |                                       |  |
|-----------------------------|--|-----------------------------------|---------------------------------------|--|
| Part Number                 | Substrate width, mm <sup>5</sup>                                     | Substrate height, mm <sup>5</sup> | Clear aperture width, mm <sup>6</sup> | Clear aperture height, mm <sup>6</sup> |
| T-1600-970s-3212-94         | 31.8   | 12.3                              | 30.8                                  | 11.3                                   |
| T-1600-970s-3224-94         | 31.8   | 24.8                              | 30.8                                  | 23.8                                   |
| T-1600-970s-13020-94        | 130  | 20.0                              | 125                                   | 19.0                                   |
| Custom dimensions           | Any rectangle fitting within 135 mm diameter circle (e.g. 130x20 mm) |                                   |                                       |  |

Notes: <sup>5</sup> Width is perpendicular to grating grooves, height is along the grating grooves.

<sup>6</sup> Clear aperture is centered on the substrate.

## Typical Optical Layout

The transmission grating is designed to operate in Littrow configuration, where the angle of incidence and diffraction are the same for the central operational wavelength. Light is dispersed in the plane perpendicular to the grooves.

