

# High Efficiency Telecom Transmission Gratings T-940C Series

## Features:

- Ultra-High Diffraction Efficiency.
- Very Low Polarization Sensitivity.
- Excellent Feature Fidelity and Groove Uniformity.
- Only fused Silica and robust dielectrics are used, no polymers.
- Extreme environmental stability. Telcordia qualified.
- Each grating is a master: low light scatter, no ghosting.
- Very competitive pricing.
- Strict quality control. LightSmyth is ISO 9001:2008 certified.

## Applications:

- Optical telecommunications (ROADM, WSS, WDM MUX/DEMUX)
- Pulse compression
- Spectral beam combining
- Remote optical sensors and spectroscopy



LightSmyth Technologies' transmission gratings are fabricated on fused silica substrates and robust dielectric films by state-of-the-art projection photolithography and reactive ion etch. These high fidelity semiconductor fabrication methods enable precise realization of sophisticated proprietary grating designs that provide diffraction efficiency close to 100% and line spacing control to 1 part per million. No other grating technology is capable of achieving this degree of performance combined with the cost effectiveness and reproducibility afforded by semiconductor volume fabrication technology.

*Left: Typical absolute diffraction efficiency of 940 grooves/mm Telecom Transmission Grating for Cband.*

# High Efficiency Telecom Transmission Gratings

## T-940C Series

| Optical                                    |                  |                  |          |
|--|------------------|------------------|----------|
| Description                                | Value            |                  | Units    |
|  | T-940C-[size]-94 | T-940C-[size]-92 |          |
| Line Density                               | 940.07           |                  | Lines/mm |
| Line Density Uniformity                    | ± 0.001          |                  | Lines/mm |
| Angle of Incidence (AOI) <sup>1</sup>      | 46.5 ±1          |                  | °        |
| Wavelength Range                           | 1526 to 1566     |                  | nm       |
| Optimal polarization <sup>2</sup>          | Any              |                  |          |
| Diffraction Efficiency <sup>3,4</sup>      | ≥ 94             | ≥ 92             | %        |
| Polarization Dependent Loss <sup>3,4</sup> | ≤ 0.2            | ≤ 0.25           | dB       |
| Spectral Non-Uniformity <sup>3,4</sup>     | ≤ 0.2            |                  | dB       |
| Spatial PDL Non-Uniformity <sup>3,4</sup>  | ≤ 0.1            |                  | dB       |
| Insertion Loss Ripple <sup>4,5</sup>       | ≤ 0.1            | ≤ 0.15           | dB       |

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

<sup>2</sup> p-polarization: electric field vector is perpendicular to the grating lines; s-polarization is orthogonal to p.

<sup>3</sup> Determined from parabolic fit of efficiency as a function of wavelength for s- and p- polarization.

<sup>4</sup> Worst case in the operational wavelength range.

<sup>5</sup> Determined by Fast Fourier Transform method.

| Mechanical               |  |
|--------------------------|--|
| Dimension tolerances     | ±0.2 for grating size and width        |
| Substrate Thickness      | 0.675 ± 0.050 mm                       |
| Material                 | Fused silica, dielectric layers        |
| Scratch/Dig <sup>6</sup> | 60/40 standard, 40/20 and 20/10 custom |

Note: <sup>6</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>7</sup>                                     | Substrate height, mm <sup>7</sup> | Clear aperture width, mm <sup>8</sup> | Clear aperture height, mm <sup>8</sup> |
| T-940C-2409-94              | 24.0   | 9.0                               | 23.0                                  | 8.0                                    |
| T-940C-2414-94              | 24.0   | 14.0                              | 23.0                                  | 13.0                                   |
| T-940C-2414-92              | 24.0   | 14.0                              | 23.0                                  | 13.0                                   |
| Custom dimensions           | Any rectangle fitting within 135 mm diameter circle (e.g. 130x20 mm) |                                   |                                       |  |

Notes: <sup>7</sup> Width is perpendicular to grating grooves, height is along the grating grooves.

<sup>8</sup> Clear aperture is centered on the substrate.