# Double-Spot (DS) with suppressed higher orders

A Binary grating with a duty cycle of 50%, a.k.a Double-Spot, is a common DOE used in material processing. However this design is problematic in applications sensitive to the energy in the higher orders (±3, ±5). To solve this problem, Holo/Or designed a product with a 66% reduction in energy in the nearby higher orders. This technique can be adapted to any of our existing designs and as well as to custom designs. The additional energy is deflected into much higher orders (±20-30) and spread out among more orders making it is easier to block and/or often less harmful to the manufacturing process. This reduction of undesired orders has a tradeoff versus diffraction efficiency- it is slightly reduced from 81% to 76%.

Part Number DS-261 is an example of the new design. Its specifications are displayed below and compared with the classical design (for example DS-001).

| | **Efficiency in desired orders(±1)** | **Order ±3 (from input)** | **Order ±5 (from input)** | **Order ±3 (normalized)** | **Order ±5 (normalized)** |
|---|---|---|---|---|---|
| **Classic design** | 81.06 [%] | 4.5 [%] | 1.6 [%] | 11.1 [%] | 4.0 [%] |
| **New design** | 76.36 [%] | 2.5 [%] | 0.2 [%] | 6.6 [%] | 0.6 [%] |

Table 1. Beam splitter low orders. New design versus classical design.

Intensity per order from total intesnity left, zoom on small values right