Spatial Mode Scrambler – ModeMixer™

MMS-001B

Speckle patterns from a multi-mode fiber can cause problems in many applications that require uniform, stable light distributions at the fiber output. ModeMixer™ is specially designed to solve this problem. Based on General Photonics' patented fiber squeezer technology, ModeMixer™ effectively randomizes multimode speckle patterns over time by modulating multiple sections of a continuous fiber with multiple fiber squeezers. The light distribution at the output appears uniform and stationary when viewed by cameras or detectors with refresh rates lower than ModeMixer™'s scrambling rate. In addition, the all-fiber optical path minimizes the scrambler's insertion loss. Most importantly, the fiber used for this device undergoes a special surface treatment to prevent breakage under stress, ensuring high device reliability. ModeMixer™ enables applications from DNA sequencing to multimode fiber sensing and test and measurement of multimode fiber devices.

Preliminary Specifications

Operating Wavelength Range	530 to 1630 nm
Fiber type	50/125 µm step index standard, others optional
Scrambling frequency	500 Hz ± 100 Hz
Insertion loss	0.1 dB excluding connector loss
Return loss	45 dB
Maximum ripple[2]	1 dB max, 0.5 dB typical
Scrambling efficiency[1, 2]	> 80% (effective power)
Optical power handling	5000 mW
Operating temperature	0 to 70°C
Storage temperature	−20 to 70°C
Power supply	+24VDC/1.5A
Dimensions	9.11" (L) x 4.17" (W) x 2.52"(H)

Notes:

1. Scrambling efficiency is defined as (Light energy ≥ 80% of maximum intensity/Total energy)* (area over which intensity is ≥ 80% of maximum intensity /total core area).
2. Measured over 80 ms integration time at 635 nm.

Applications:

- DNA sequencing
- Multimode fiber sensing
- Test and measurement

Unique Features:

- Compact
- Reliable
- High speed
- Efficient

Ordering Information:

MMS – 001B – XX

Connector Type:
FC/PC, FC/APC,
SC/PC, SC/APC, or
NC = no connectors

Making Light Work Lighter
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GP-DS-MMS-001B-10
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Typical Performance Data:

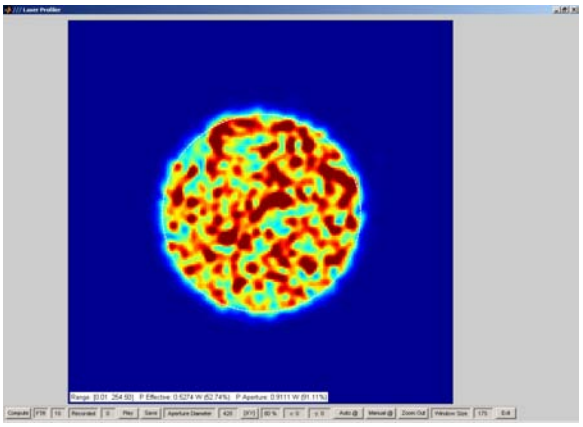

Figure 1. 2-D beam profile with scrambler disabled.

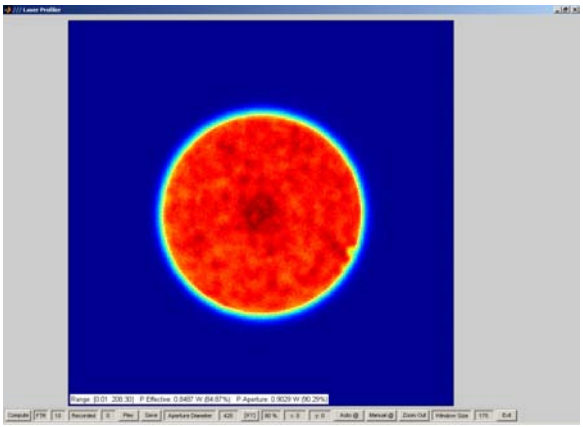

Figure 2. 2-D beam profile with scrambler enabled

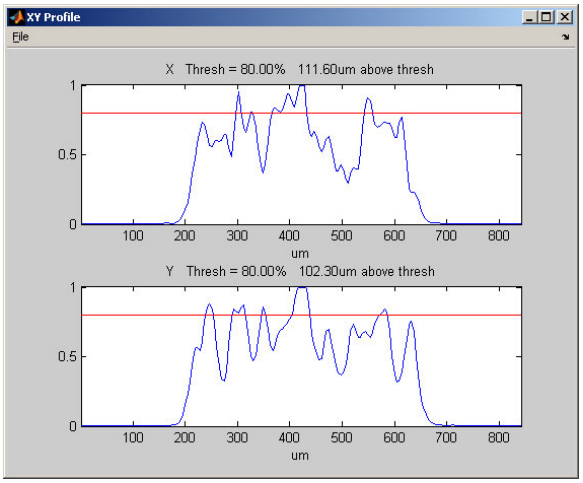

Figure 3. X and Y cross-sectional beam profiles with scrambler disabled.

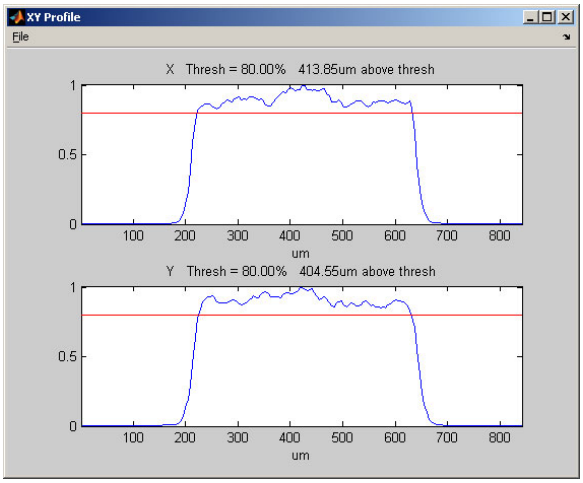

Figure 4. X and Y cross-sectional beam profiles with scrambler enabled.