

High Speed Multimode Fiber Scrambler/Speckle Remover

150kHz, 350-2500nm, 50 to 500 μm fiber core



DATASHEET

[Return to the Webpage](#)



Features

- Compact
- Reliable
- High speed
- Efficient
- Can be made with custom fiber

Applications

- DNA sequencing
- Multimode fiber sensing
- Test and measurement
- MM to SM coupling
- Free-space optical communication



Legal notices: All product information is believed to be accurate and is subject to change without notice. Information contained herein shall legally bind Agiltron only if it is specifically incorporated into the terms and conditions of a sales agreement. Some specific combinations of options may not be available. The user assumes all risks and liability whatsoever in connection with the use of a product or its application.

Rev 02/03/26

The MMSP removes speckle patterns from multimode fiber, addressing issues in applications requiring uniform, stable light output. This multimode scrambler effectively randomizes speckle patterns at a high frequency (>150 kHz), producing a uniform and stationary light distribution for cameras or detectors with averaging times over 80 ms. The all-fiber optical path minimizes insertion loss, and the fiber undergoes special surface treatment for high reliability under stress. Ideal for DNA sequencing, multimode fiber sensing, and testing of multimode fiber devices, the MMSP is a plug-and-play benchtop unit with a default-enabled TTL input and a 24 V power supply included.

Specifications

Parameter		Min	Typical	Max	Unit
Operating Wavelength Range		530		1630	nm
Scrambling Frequency		80		150	kHz
Insertion Loss	635nm			1 ^[1]	dB
	with PC connector	50			dB
Return Loss		55			dB
Scrambling Efficiency ^{[2], [3]}		80			%
Flatness ^[4]		20			%
Ripple ^[5]		10			%
Optical Power Handling			500		mW
Fiber Type		50/125 μm step index standard, others optional			
Fiber NA		0.2			
Power Supply		+24VDC/1.5A			
Enable/Disable Signal	enabled	TTL high			
	disabled	TTL low			
Operating Temperature		10		40	°C
Storage temperature		-20		70	°C
Dimensions		230 (L) x 105 (W) x 65 (H)			mm

Notes:

Specifications in this table are based on a 50 μm step-index multimode fiber.

[1] Includes connectors.

[2] Scrambling Efficiency: Defined

as $(\text{Light energy} \geq 80\% \text{ of maximum intensity} / \text{Total energy}) \times (\text{Area over which intensity is} \geq 80\% \text{ of maximum intensity} / \text{Total core area})$

[3] Measured with an 80 ms integration time at 635 nm.

[4] Flatness: Calculated as $(\text{Maximum intensity} - \text{Minimum intensity}) / (\text{Maximum intensity} + \text{Minimum intensity})$ expressed as a percentage of maximum intensity, where maximum and minimum values are determined over the center 80% of the fiber core area.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link](#):

[+1 781-935-1200](tel:+17819351200)

sales@agiltron.com

www.agiltron.com

Information contained herein is deemed to be reliable and accurate as of the issue date. We reserve the right to change the design or specifications at any time without notice. Agiltron is a registered trademark of Optowares Corporation in the U.S. and other countries.

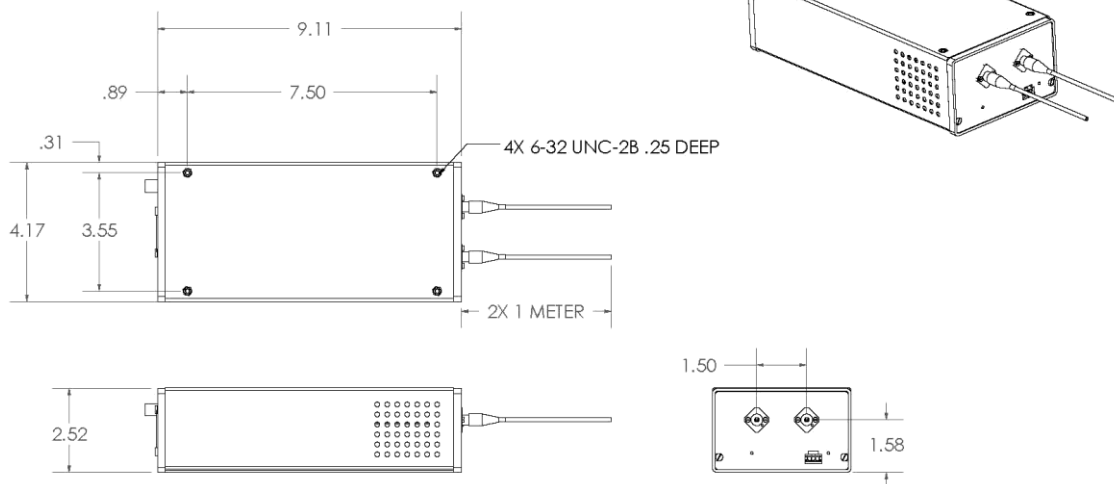
High Speed Multimode Fiber Scrambler/Specckle Remover

150kHz, 350-2500nm, 50 to 500 μm fiber core



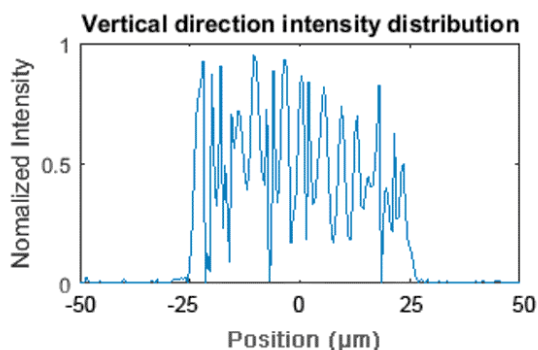
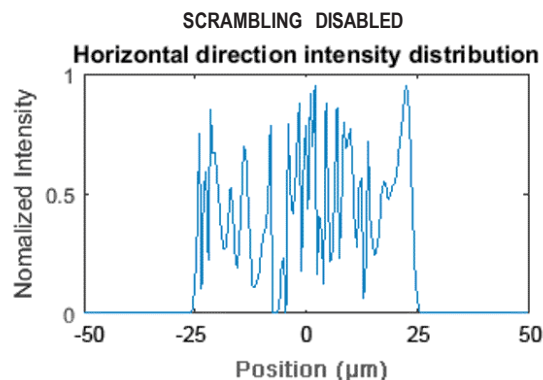
DATASHEET

Mechanical Dimensions (inches)



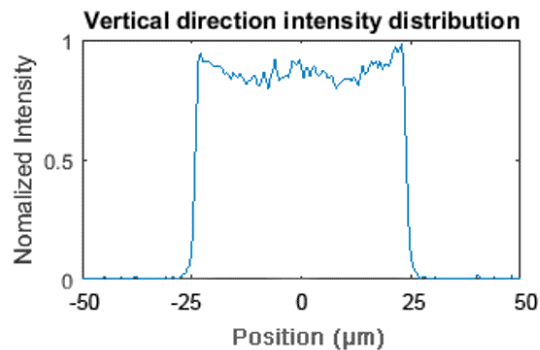
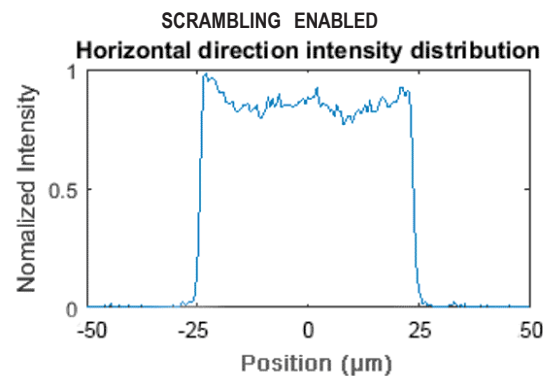
*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Direction Intensity Distribution



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

Note: Data in Figures 3-6 taken at 635nm with 80 ms integration time.



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

P +1 781-935-1200

E sales@agiltron.com

W www.agiltron.com

Information contained herein is deemed to be reliable and accurate as of the issue date. We reserve the right to change the design or specifications at any time without notice. Agiltron is a registered trademark of Optowares Corporation in the U.S. and other countries.

High Speed Multimode Fiber Scrambler/Speckle Remover

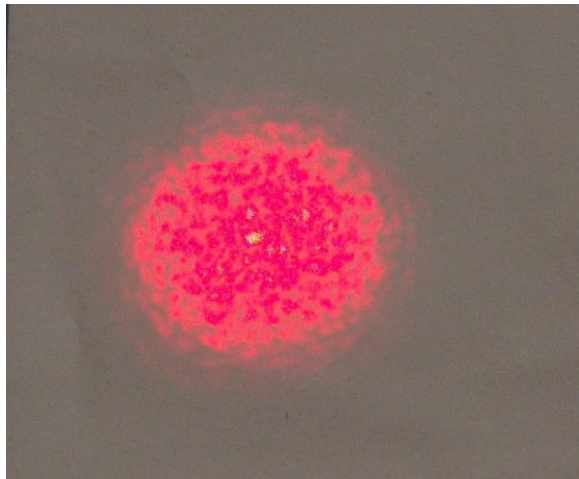
150kHz, 350-2500nm, 50 to 500 μm fiber core



DATASHEET

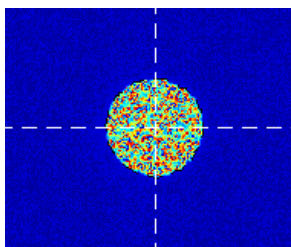
Typical Performance Data

SCRAMBLING DISABLED

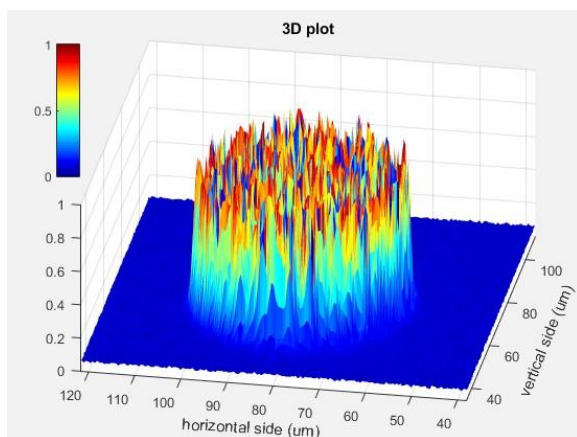


Far-field illumination pattern with scrambler disabled.

2-D Beam Profile



3-D Beam Profile



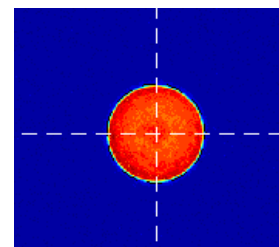
2D and 3D beam profiles with scrambler disabled.

SCRAMBLING ENABLED

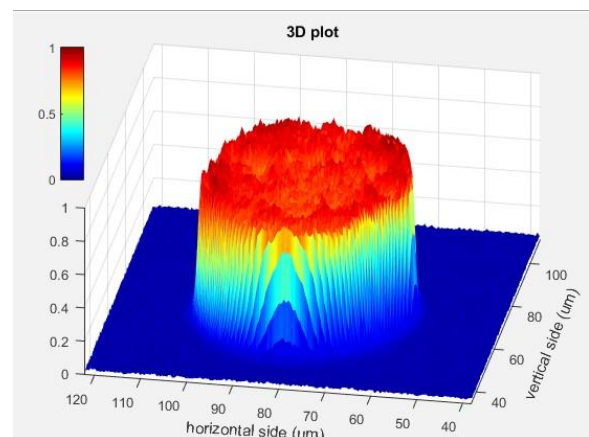


Far-field illumination pattern with scrambler enabled.

2-D Beam Profile



3-D Beam Profile



2D and 3D beam profiles with scrambler enabled

P +1 781-935-1200

E sales@agiltron.com

W www.agiltron.com

Information contained herein is deemed to be reliable and accurate as of the issue date. We reserve the right to change the design or specifications at any time without notice. Agiltron is a registered trademark of Optowares Corporation in the U.S. and other countries.

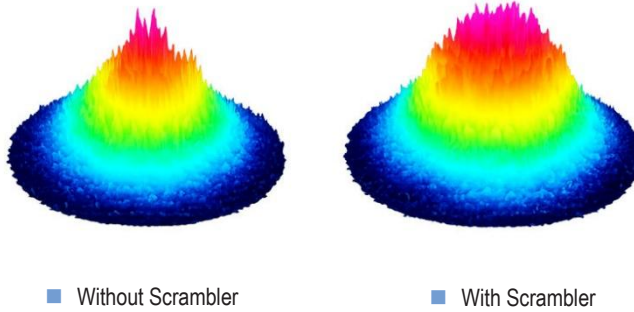
High Speed Multimode Fiber Scrambler/Speckle Remover

150kHz, 350-2500nm, 50 to 500 μm fiber core



DATASHEET

Beam spot before and after homogenization



P +1 781-935-1200

E sales@agiltron.com

W www.agiltron.com

Information contained herein is deemed to be reliable and accurate as of the issue date. We reserve the right to change the design or specifications at any time without notice.
Agiltron is a registered trademark of Optowares Corporation in the U.S. and other countries.

High Speed Multimode Fiber Scrambler/Speckle Remover

150kHz, 350-2500nm, 50 to 500 μm fiber core



DATASHEET

Ordering Information (Part Number) System

	111	☐ ☐	☐	☐	☐
Prefix	Type	Fiber Core	Fiber Cover	Pigtail Length	Connector ^{[1][2]}
MMSP-		50/125 = 50	0.9mm tube = 1 3mm tube = 3 Special = 0	1m = 1 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 SMA = S Special = 0

[2]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Application Notes

Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness

Fibers with smaller core diameters ($<5 \mu\text{m}$) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the handling by expanding the core side at the fiber ends.

+1 781-935-1200

sales@agiltron.com

www.agiltron.com

Information contained herein is deemed to be reliable and accurate as of the issue date. We reserve the right to change the design or specifications at any time without notice.
Agiltron is a registered trademark of Optowares Corporation in the U.S. and other countries.