

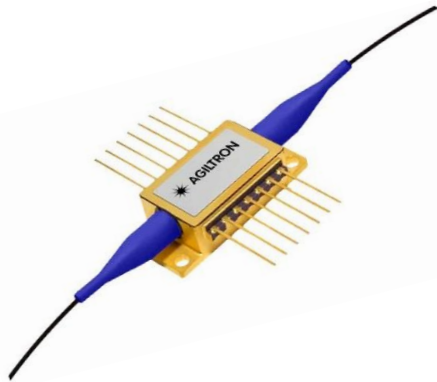
# Ultrafast Fiber Optical Shutter/Switch – 1ns

1550nm, SM, PM Bidirectional



DATASHEET

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The UFSS is an ultra-fast fiber optical shutter or 1x1 switch based on a semiconductor amplifier, offering a rapid switching speed of approximately 1 ns. It combines low polarization sensitivity, wide optical bandwidth, and a high extinction ratio. Utilizing the gain and absorption properties of a multiple quantum well (MQW) structure, the UFSS provides effective light blocking without introducing reflections, making it ideal for high-performance and precision applications. Designed to handle high gain and signal levels, the UFSS ensures reliable operation at input power levels of 15 dBm or higher. It is housed in an industry-standard 14-pin butterfly package and available with either single-mode (SM) or polarization-maintaining (PM) fiber pigtails, terminated with FC/APC connectors. For PM fiber models, the connector key is aligned to the slow axis. An all-in-one plug-and-play benchtop version is also offered, integrating the driver and power supply, with an SMA front control input and a 100-240 VAC power input at the back for convenience. This versatile optical switch is tailored for advanced optical systems demanding fast, precise signal control.

## Features

- SM, PM Fiber
- Low Polarization Sensitivity
- Wide Optical Bandwidth
- High Extinction Ratio
- 14-pin Butterfly Package
- Key-Aligned to the Slow Axis

## Applications

- High Speed Optical Switching
- Test
- Instrumentation

## Specifications

| Parameter                                                | Min  | Typical       | Max  | Unit       |
|----------------------------------------------------------|------|---------------|------|------------|
| Operating Current                                        |      | 500           |      | mA         |
| Operating Wavelength                                     | 1528 |               | 1562 | nm         |
| Optical Isolation ( $P_{IN}/P_{OUT}$ ) @ 0 mA & 1550 nm) | 42   |               |      | dB         |
| Extinction Ratio (On/Off @ $P_{IN} = -20$ dBm & 1550 nm) |      | 60            |      | dB         |
| Switching Speed                                          |      | 1             |      | ns         |
| Max Output Power for CW Input Signal                     |      | 17            |      | dBm        |
| Max Output Power for Modulated Input Signal              |      | 9             |      | dBm        |
| Saturation Output Power (@ -3 dB)                        | 12   | 14            |      | dBm        |
| Small Signal Gain Across BW (@ $P_{IN} = -20$ dBm)       | 10   | 13            |      | dB         |
| Polarization Dependent Gain                              |      | 1             | 1.8  | dB         |
| Noise Figure                                             |      | 8.0           | 9.5  | dB         |
| Forward Voltage                                          |      | 1.6           | 1.8  | V          |
| Chip Length                                              |      | 1.5           |      | mm         |
| Waveguide Refractive Index                               |      | 3.2           |      |            |
| TEC Current                                              |      | 0.23          | 1.5  | A          |
| TEC Voltage                                              |      | 0.5           | 4.0  | V          |
| Thermistor Resistance                                    |      | 10            |      | k $\Omega$ |
| Fiber Type                                               |      | SMF-28-J9     |      |            |
| Fiber Length                                             |      | $1.5 \pm 0.1$ |      | m          |
| Fiber Connector                                          |      | FC/APC        |      |            |



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Rev 04/23/26

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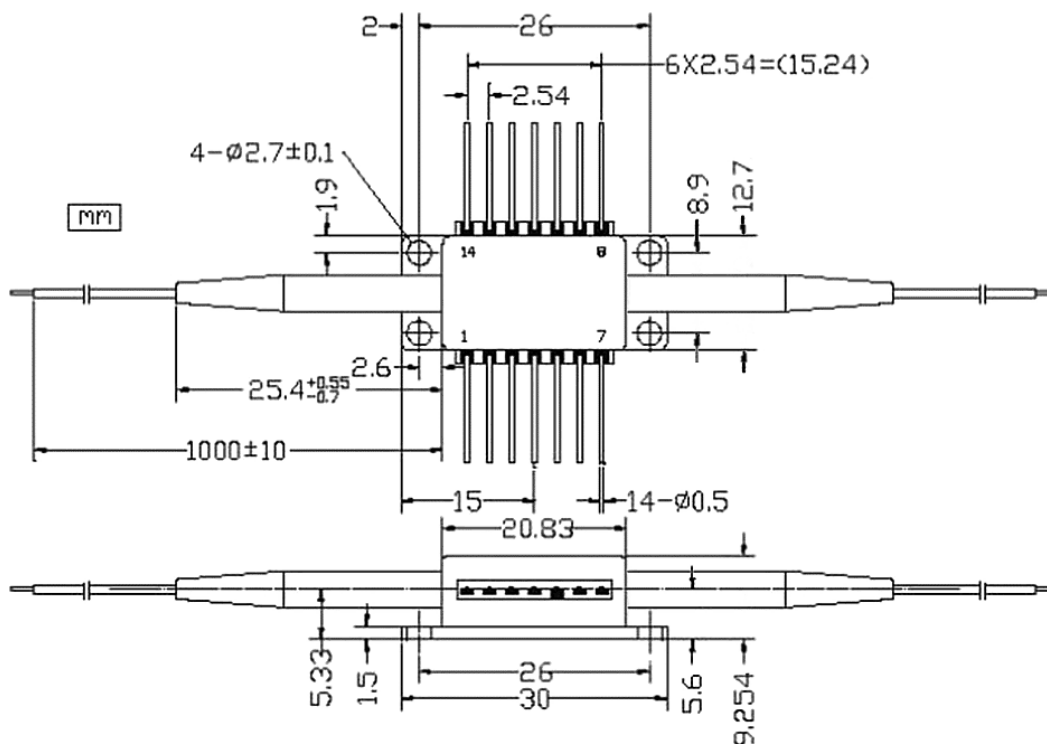
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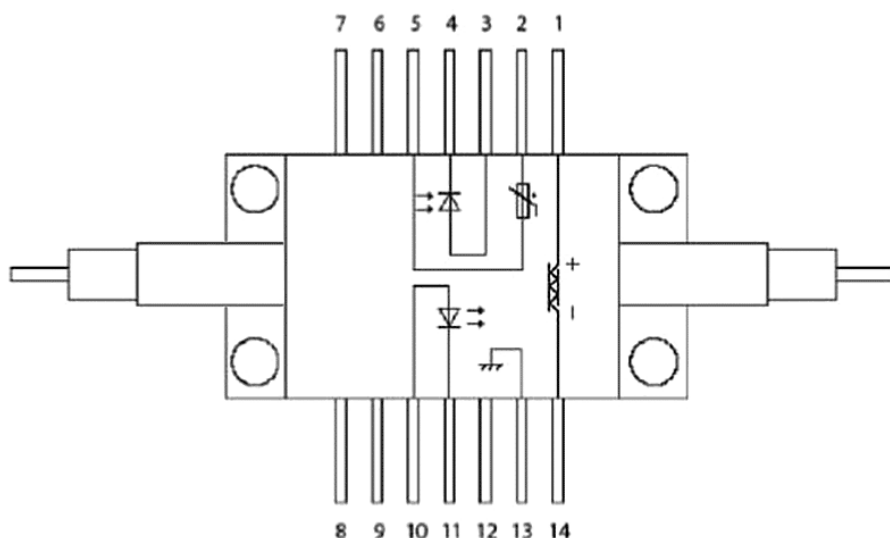
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### Mechanical Dimension (mm)



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

### PIN Assignment



#### 14-pin BTF Package

| PIN | Function            |
|-----|---------------------|
| 1   | Peltier Cooler (+)  |
| 2   | Thermistor          |
| 3   | Monitor Anode (+)   |
| 4   | Monitor Cathode (-) |
| 5   | Thermistor          |
| 6   | NC                  |
| 7   | NC                  |
| 8   | NC                  |
| 9   | NC                  |
| 10  | Laser Anode (+)     |
| 11  | Laser Cathode (-)   |
| 12  | NC                  |
| 13  | Case Ground         |
| 14  | Peltier Cooler (-)  |

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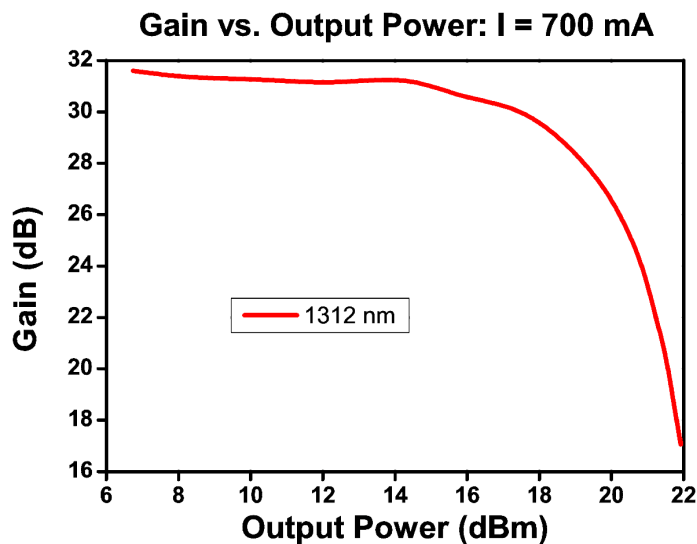
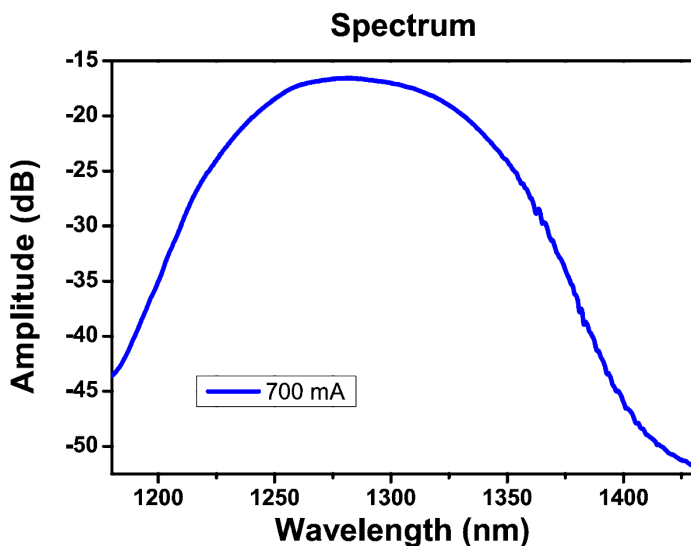
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### Typical Spectrum



### Ordering Information (Part Number)

|        | <input type="checkbox"/>                   | <input type="checkbox"/>            | <input type="checkbox"/>                               | <input type="checkbox"/> | 2                                                   | 1                             | <input type="checkbox"/> | <input type="checkbox"/>  | <input type="checkbox"/>                         | <input type="checkbox"/> | <input type="checkbox"/> |
|--------|--------------------------------------------|-------------------------------------|--------------------------------------------------------|--------------------------|-----------------------------------------------------|-------------------------------|--------------------------|---------------------------|--------------------------------------------------|--------------------------|--------------------------|
| Prefix | Wavelength                                 | Output Power                        | Isolator                                               | TEC Cooling              | Fiber Type                                          | Fiber Buffer                  | Fiber Length             | Connector <sup>[1]</sup>  | Driver <sup>[2]</sup>                            |                          |                          |
| UFSS-  | 1550nm = 15<br>1310nm = 13<br>Special = 00 | 12dBm = 1<br>18dBm = 2<br>25dBm = 3 | Non = 1<br>Output = 2<br>Input = 3<br>Output/Input = 4 | Yes = 2                  | SM28 = 1<br>PM1550 = 5<br>PM1310 = 3<br>Special = 0 | 0.9mm Tube = 3<br>Special = 0 | 1.0 m = 1<br>Special = 0 | FC/APC = 3<br>Special = 0 | Non = 1<br>Benchtop = 2<br>Module = 3<br>Kit = 4 |                          |                          |

#### Note:

[1]. The connector cannot be installed directly onto bare fiber, as it 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 can remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SM28 fiber and decreases further with smaller core fibers.

[2]. Module is a box, kit is PCB with wires. All drivers are plug-and-play units supplied with a dedicated power supply and feature an SMA control input for high-speed operation. The parameters are preset to achieve optimal performance without additional user adjustment. For the kit configuration, the diode mount is pre-configured to match the specified diode, ensuring proper alignment and ease of integration.

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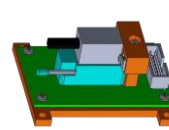
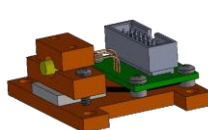
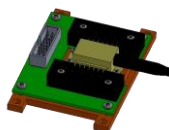
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### Benchtop Matching Driver



The Agiltron Benchtop Matching Driver is designed with low-noise drive electronics to deliver high-speed switching performance and stable operation. It features a constant current drive and an integrated temperature control unit to maintain optimal operating conditions. The system includes front-panel fiber output connectors and an SMA trigger input. The trigger logic is defined such that 0 V blocks the optical signal, while 5 V enables light transmission.

Each unit is factory preset for optimal switching performance. User adjustments are not provided, as the laser parameters are tightly interrelated with switching characteristics and overall system performance. To further enhance signal quality, the benchtop driver integrates an input isolator to reduce background amplified spontaneous emission (ASE) noise levels. The HSLD series also includes a universal power supply compatible with 100 - 240 VAC, ensuring flexibility for global operation.



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### Caution Electrostatic Sensitivity



- Never touch laser diode and the module using hands
- Always use protections when handle a laser diode
- Recommend mounting the laser diode using an ionic gun and ESD finger cots



### Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5  $\mu\text{m}$ .

Maximum power = 30 mW.



\*Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

\*IEC is a registered trademark of the International Electrotechnical Commission.

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