Variable Fiber Optical Splitter/Coupler

(1x2, 2x2, SM, PM)

DATASHEET

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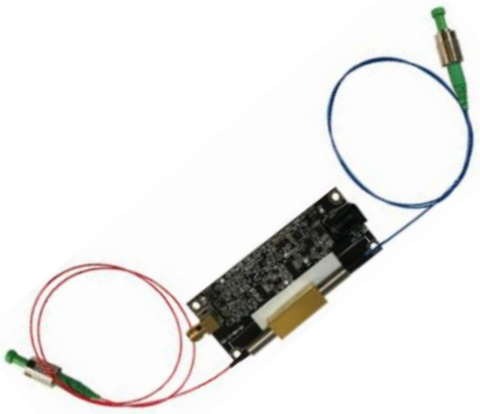

The Variable Fiber Optical Splitter/Coupler splits an incoming optical signal among the two output optical fibers (1x2) with a continuously variable ratio controlled by an input voltage signal from 0 to 5V, either DC or AC. Two inputs/outputs (Full 2x2) configuration is also available. The device does not create extra loss during the transition and is bidirectional. When the electrical control signal is removed or at 0 V, the splitter returns to the original ratio of 100:0. The all-solid-state crystal design meets the most demanding requirements of ultra-high reliability, fast response time, and continuous operation over 25 years. The Variable Fiber Optic Splitter has passed Telcordia and space reliability qualification tests.

The unit is mounted on a driving board with a control signal input SMA connector and a wall plug-in power supply. Several frequency versions of drivers are available. As an Electro-optical crystal-based device, the variable splitter output has a certain degree of variation due to environmental changes. A driver with output power stabilization via feedback control is available as Precision Variable Fiber Optical Splitter.

Features

- High Speed
- High Reliability
- Low Insertion Loss
- Compact

Applications

- Instrumentation
- Power balance
- Sensor

Specifications

Parameter		Min	Typical	Max	Unit
Central Wavelength		450		2000	nm
Insertion Loss [1]	1260~1650nm		0.6	1	dB
	850~1260nm		0.8	1.3	dB
	760~850nm		1	1.5	dB
	650 -850		1.5	1.9	dB
	450-580		2	2.5	dB
Cross Talk at 100% Split Single Stage [2]		18	25	35	dB
Cross Talk at 100% Split Dual Stage [3]		35	40	50	dB
Splitting Variation	Output 1		100 ~ 0		%
	Output 2		0 ~ 100		%
	Type		Continuous		
Repetition Rate		DC	20	1000 [3]	kHz
Response Time				1000	ns
Polarization Dependent Loss			0.1	0.35	dB
IL Temperature Dependency			0.25	0.5	dB
Polarization Mode Dispersion			0.1	0.2	ps
Return Loss		48	50	60	dB
Operating Temperature		-5		70	°C
Optical Power Handling [4]			300		mW
Storage Temperature		-40		85	°C

Notes:

[1] Excluding connectors. Wavelength < 850nm can be implemented in the special version.

[2] Cross talk is measured at 5kHz, which may be degraded at the higher repeat rate.

[3] Dual stage version is special with long lead time, please contact us.

[4] Defined at 1310/1550nm. For the shorter wavelength, the handling power may be reduced.

Rev 02/19/24

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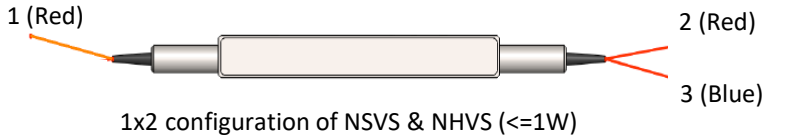
Port Diagram and Function



1x2 configuration of NSVS & NHVS (<=1W)

2x2 configuration NSVS & NHVS (<=1W)

TBD for NHVS (>1W)

For 2x2 configuration, Port 1 -> port 3 and port 2 -> port 4 respectively without voltage. When a voltage is applied, the light from port 1 splits between port 3 and 4 and the light from port 2 splits between port 4 and 3, respectively with the same ratio. Portions of lights from port 1 and 2 incoherently add at output port 3 and 4 proportionally.

Frequently Asked Questions

Q: The spec states "repetition". Does it mean that the unit only works for a periodic signal?

A: It works for any signal with a bandwidth of less than 100 kHz generally. For NP type of NSVS can reach up to 1MHz with some degradation of split ratio (not 100/0). The optical response follows the input electrical signal shape to some extent with distortion. The repetition rate is a way to indicate how fast the system can respond.

Q: What is the difference between NS splitter and NS switch?

A: The device is the same; however, NS splitter is driven by an analogy circuit, while NS switch by a digital circuit that is much faster.

Q: Does the splitter maintain the splitting ratio once set by the control signal?

A: The electro-optical device maintains the splitting ratio to a certain range over a certain time period.

Please order the precision splitter version for applications that require maintaining a precise ratio.

Operation Instruction

1. Plug in the accompanied power supply
2. Plug in a 0-5V control signal to the input SMA connector (golden color). One can use a DC power supply first, and then a function generator. The optical output will change from maximum to minimum or from minimum to maximum depending on which port is measured.
3. Do not adjust settings on the board

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Regular Driving Board Selection

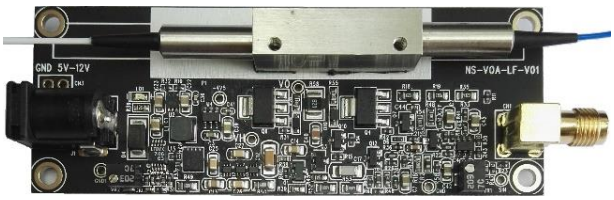
The module comprises a NanoSpeed (NS) switch mount either on a VOA control circuit board or a feedback control board. Below 100kHz repetition rate and feedback control configurations, the module uses the standard version of NVOA of a single stage or dual stage. For a high repeat rate up to 1MHz repletion, the module uses NP type of VOA with a special driver.

Driver's repeat Rate	Part Number (P/N)
20 kHz	NVDR-113235112
100 kHz	NVDR-112221112
1000 kHz [1]	NVDR-1PH210121
Power regulation driver [2]	NRDR-33001111

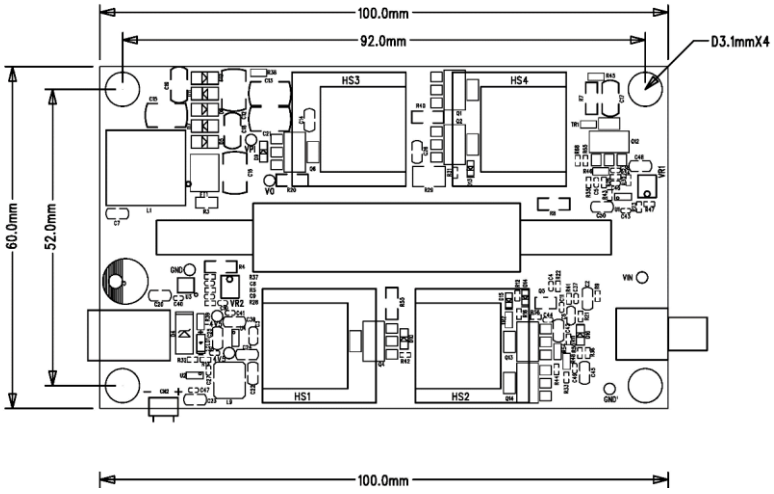
[1]: This 1MHz driver is limited to the fixed split ratio < 80% at the repeat rate > 500kHz.

[2]: The power in one output port #2 is regulated at the fixed level while the power in another output may vary as the input power is changing. This fixed level is preset, and unchangeable in the OEM version. This device can also be used as laser power stabilizer. The average response for the feedback control loop is micron-seconds.

Electronics PCB Dimensions (mm)



20kHz driver (87mmx32mm)



100kHz driver (100mmx60mm)

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

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Ordering Information

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength [1]**	**Driver**	**Configuration**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [3]**
NSVS-	1x2 = 12 2x2 = 22	2000nm = 2 1060nm = 1 1310nm = 3 1550nm = 5 1625nm = 6 850nm = 8 780 = 7 650 = E 550 = F 400 = G Special = 0	20kHz = 2 100kHz = 3 No Drift [2] = 6 Special = 0	Single-Stage = 1 Special = 0	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = 5 PM980 = 9 Special = 0	Bare fiber = 1 900um tube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

[1]: Wavelength <850nm or >1900nm (red colored) will be implemented in the special version with a long lead-time.

[2]: One tap version stabilizes optical outpower in one output. If the input power is kept a constant, the splitter ratio is also stabilized. If the input power varies, only the power level in one output is stabilized. This device can also be used as laser power stabilizer. The average response for the feedback control loop is micron-second.

[3]: For optical power >1W, the high-power connector is recommended. Please contact us.

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 μm) 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 how handling by expanding the core side at the fiber ends.