Ultra-Low-Loss Single or Dual 1xN Fiber Optic Switch Module

(0.3dB low loss, all fiber type, all wavelength, bidirectional, N up to 300, 70dB on/off)

(Protected by U.S. patents 7224860, 6757101, 6577430 and pending patents)

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The LBSM Series optical fiber switch delivers exceptionally low insertion loss — typically around 0.3 dB — regardless of array size, and supports up to 300 fiber ports in a compact, bidirectional architecture. Compatible with any fiber type and covering a broad wavelength band from 300 nm to 2300 nm, the LBSM switch is ideal for testing environments requiring consistent optical performance. It is available in single- and dual-channel configurations, with dual channels operating simultaneously. For PM fiber versions, the switch maintains both polarization axes identically to the input fiber. Uniform optical paths are ensured across all output ports. The device is controlled via RS232 or USB and comes with intuitive graphical software. A full command set is provided for custom integration, and optional code-writing services are available to assist customer engineers with interface development.

Each switch driver includes a GUI for programming and a command set (API) so customers can develop their own control software. Python and LabVIEW interface libraries; integration support is available for a fee.

Applications

- Test
- Bio-Tech
- Instrumentation

Features

- Ultra Low Insertion Loss
- All Fiber Types
- High Modal Fidelity

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]:

RoHS COMPLIANT

Specifications

Parameter		Min	Typica	Max	Unit
Operation Wavelength	UV-VIS	200		2000	nm
	MWIR	1000		5000	
	LWIR	7000		12000	
Wavelength Band [1]		100	300	500	nm
Insertion Loss [2]			0.3	0.5	dB
Wavelength Dependence Loss			0.15	0.3	dB
Polarization Dependent Loss			0.05	0.1	dB
Cross Talk On/Off Ratio			70		dB
Extinction Ratio (PM Fiber)		22		30	dB
Return Loss	APC	55		60	dB
Repeatability			0.05	0.1	dB
Switch Time			80	200	ms
Durability		10^7			cycle
Optical Power Handling [3]			300	2000	mW
Operating Temperature		-5		65	°C
Storage Temperature		-40		85	°C
Power Supply		110 ~ 220			VAC
Package Type		2U 19" Mount Rack			

Notes:

[1]. Cover the entire operation wavelength range of each single mode fiber

[2]. Measured without connectors.

[3]. The specified maximum value is valid for wavelengths above 1310 nm; at shorter wavelengths, the optical power handling is reduced due to the smaller mode field diameter. High power version with fiber tip beam expansion is available.

The maximum rating applies to the 1×N configuration. For N×1 applications, the maximum input power is the sum of the power from all input ports. High power version is available which incorporates N number of 1x2 shutters to bypass the light.

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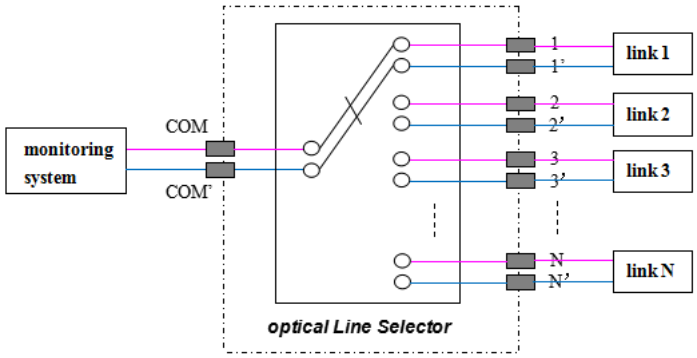
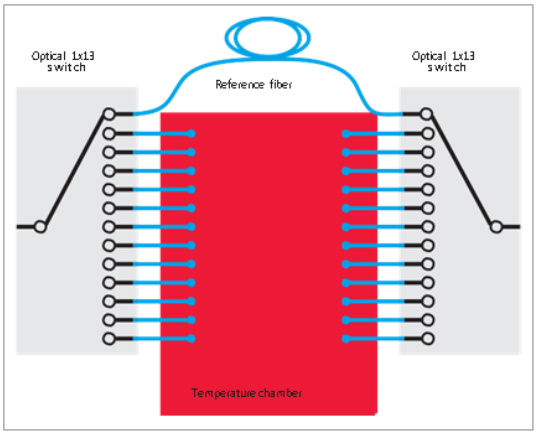
Dual Channel Optical Configuration

Two fiber channels are grouped to switch simultaneously. This is a cost effective configuration than using two 1xN switches.



Parallel Testing Configuration

In many cases, valuable signal source and analysis instrumentation can be used more effectively in a parallel-test configuration. For example, multiple cables or components can be tested together during temperature cycling. On the other hand, an increasing use of inherently parallel components, as for optical interconnections for 40G or 100G using 10 Gb/s components, calls for identical testing in multiple paths. These are well supported by the 1x13 switch configuration and the 13th path can often be used as a permanent reference path.



Module Mechanical Dimensions

2RU 19" mount rack typically. The input and output connectors are on the front panel, while the control interface and power supplier are on the rear panel.

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

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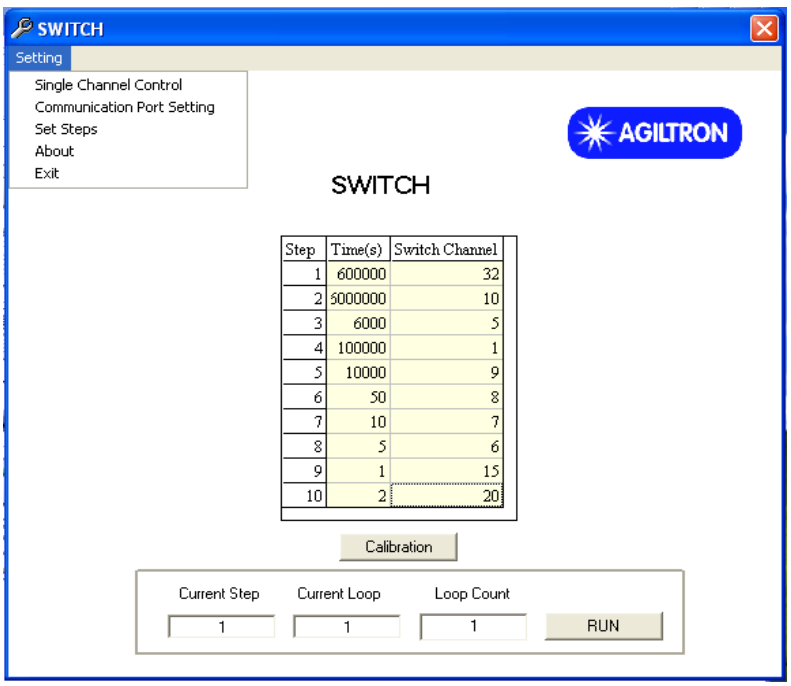
Typical Graphic User Interface



Control Interface and Power Supply

- RS 232
- Ethernet 10/100 with definable IP address
- USB
- GUI
- 110-220V (0.6 A) Power Input

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Ethernet Remote Control with Python

Several options: Telnet, HTTP/JSON API, or VISA Raw Socket mode (SCPI over TCP/IP)

```
############################################################
Telnet:

import telnetlib

HOST = "192.168.0.1"
PORT = 23

#####################
username = "admin"
password="admin"
###################
tn=telnetlib.Telnet(HOST,PORT)

reply=tn.read_until(b"username:",timeout=10)
print(reply.decode("ascii"))#debug
tn.write(username.encode("ascii")+b"\r\n")

reply=tn.read_until(b"password:",timeout=10)
print(reply.decode("ascii"))#debug
tn.write(password.encode("ascii")+b"\r\n")

reply=tn.read_until(b"telnet>",timeout=10)
print(reply.decode("ascii"))#debug

tn.write(b"setswitch 31 32 0 0\r\n")
reply=tn.read_until(b"telnet>",timeout=10)
print(reply.decode("ascii"))#debug

tn.write(b"runswitch\r\n")
reply=tn.read_until(b"telnet>",timeout=10)
print(reply.decode("ascii"))#debug

tn.write(b"quit\r\n")

############################################################
```

Ethernet Remote Control with Python (ending)

Several options: Telnet, HTTP/JSON API, or VISA Raw Socket mode (SCPI over TCP/IP)

```
############################################################
API:
import requests

BASE_URL = "
TOKEN = "TOKEN"
def api_post(path, payload):
    r = requests.post(
        BASE_URL + path,
        json=payload,
        headers={"X-Auth-Token": TOKEN},
        timeout=3,
    )
    r.raise_for_status()
    return r.json()

def api_get(path):
    r = requests.get(
        BASE_URL + path,
        headers={"X-Auth-Token": TOKEN},
        timeout=3,
    )
    r.raise_for_status()
    return r.json()

# Set port 3
print(api_post("/api/set_permanent_port", {"port": 3}))
# Read status
print(api_get("/api/status"))

############################################################
pyVISA:
import pyvisa

HOST = "192.168.0.1"
TOKEN = "TOKEN"

rm = pyvisa.ResourceManager()

inst = rm.open_resource(f"TCPIP0::{HOST}::5025::SOCKET")
inst.read_termination = "\n"
inst.write_termination = "\n"
inst.timeout = 2000  # ms

print("IDN:", inst.query("*IDN?").strip())

# Set port
inst.write("SWITCH:PERMANENTPORT 3")
print("PORT?:", inst.query("SWITCH:PERMANENTPORT?").strip())

# Status
print("STATUS:", inst.query("SWITCH:STATUS?").strip())

############################################################
```

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Ordering Information (Part Number)

	☐☐☐	☐	☐	☐	☐	☐	☐☐	☐	☐
Prefix	**Type**	**Wavelength**	**Switch Type**	**Optical Power**	**Package [1]**	**Interface**	**Fiber Type**	**Connector [2]**	**Interface Code [3]**
FFSY-	1x4 = 004 1x8 = 008 1x16 = 016 1x32 = 032 1x64 = 064 1x84 = 084 1x128 = 128 1x256 = 256 Special =000	488 nm = 4 360 nm = A 430 nm = B 532 nm = 5 630 nm = 6 780 nm = 7 850 nm = 8 980 nm = 9 1060 nm = 1 1310 nm = 3 1550 nm = C 2000 nm = 2	Single Channel = 1 Dual Channel = 2	Regular = 1 1W (>1310nm) = 2 3W (>1310nm) = 3 5W (>1310nm) = 5 High Power Short W = 6	1U = 1 2U = 2 3U = 3 4U = 4	USB = U RS232 = R Ethernet=E GPIB = G Special = 0	***Select below***	FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 Duplex LC/PC= 8 Quad LC/PC = 9 LC/APC = A LC/UPC = U MPO = Y Special = 0	Non = N Python = P LabVIEW = L

[1]. Rack Mount Depth ~ 430mm.

[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.

[3]. GUI and a command set (API) are included. Python $**560**. LabVIEW interface libraries $**750**

Fiber Type Selection Table

01	**SMF-28**	34	**PM1550**	71	**MM 50/125µm**
02	**SMF-28e**	35	**PM1950**	72	**MM 62.5µm**
03	**Corning XB**	36	**PM1310**	73	**105/125µm**
04	**SM450**	37	**PM400**	74	**FG105LCA**
05	**SM1950**	38	**PM480**	75	**FG50LGA**
06	**SM600**	39	**PM630**	76	**STP 50/125**
07	**780HP**	40	**PM850**	77	**IRZS23**
08	**SM800**	41	**PM980**	78	**IRZS32**
09	**SM980**	42	**PM780**	79	
10	**Hi1060**	43		80	
11	**SM400**	44	**PM405**	81	**UV180nm**
12		45	**PM460**	82	**LMA-PM-10**
13		46			