DAS/DVS Integrated Module

User Manual

(Version V4.01)

Special Notes

The following special notes are described in the user manual and are reiterated here to ensure you use the module correctly:

◆ The module power supply voltage is 1 2 V/4A.
Note that if the power supply output current is lessthan 4A, the module may not start up properly.

◆ The output optical power from the Sensor port is relatively high (approx. 500mW). Before powering on, ensure the Sensor port is connected to the sensing fiber or to a flange for attenuation.
Never look directly into this port with the naked eye.

◆ Do not adjust fiber connectors while the Raman pump is on,as this may burn the end face of the fiber connector.

◆ Before connecting fiber connectors, clean the end face with alcohol to prevent dust and other contaminants from affecting the fiber connection quality, which could distort the signal curve or damage the end face.

◆ The modulation signal for the AOM is TTL level. It is recommended that the high level of the modulation signal be between 3.5-5.0V.

Overview

The DAS/DVS integrated module incorporates an ultra-narrow linewidth laser source, AOM (Acousto-Optic Modulator), AOM driver, pulsed EDFA, optical circulator, Raman amplifier, coherent receiver module, etc. It only requires a high-speed data acquisition card to form a complete DAS (Distributed Acoustic Sensing) or DVS (Distributed Vibration Sensing) measurement system. This module features high integration, compact size, and uses a proprietary coherent receiver module offering high signal-to-noise ratio for coherent detection, thereby extending the sensing distance of the distributed fiber optic acoustic sensing system. This module provides high-quality supporting products and solutions specifically for distributed fiber optic acoustic sensing and perimeter security equipment manufacturers.

Features

- ◆ High Integration (UNL, AOM, EDFA, Raman)
- ◆ Modular Design
- ◆ Flexible Control Methods
- ◆ High Stability and Reliability
- ◆ Customizable Mechanical Structure

Applications

- ◆ φ-OTDR Systems
- ◆ DAS Distributed Acoustic Sensing
- ◆ DVS Distributed Vibration Sensing
- ◆ Optical Research

Performance Parameters

Module Parameter	Min	Typ	Max	Unit
Sensing Distance			60	km
Pulse Width	50		500	ns
Warm-up Time		<5		Min
Operating Voltage	11.5	12	12.5	V
Power Consumption	12	18	25	W
Operating Temperature	-20		60	℃
Storage Temperature	-30		70	℃
Communication Interface		TTL Serial		
Communication Protocol		Modbus-RTU		

Ultra-Narrow Linewidth Laser	Min	Typ	Max	Unit	Remarks
Operating Wavelength		1550.12		nm	
Output Power		10	13	dBm	
Linewidth		<3		kHz	
Relative Intensity Noise (RIN)		<120		dB/Hz	
Wavelength Drift		±1		pm	
Power Stability			±2%		Full temperature range
Side Mode Suppression Ratio (SMSR)	60			dB	

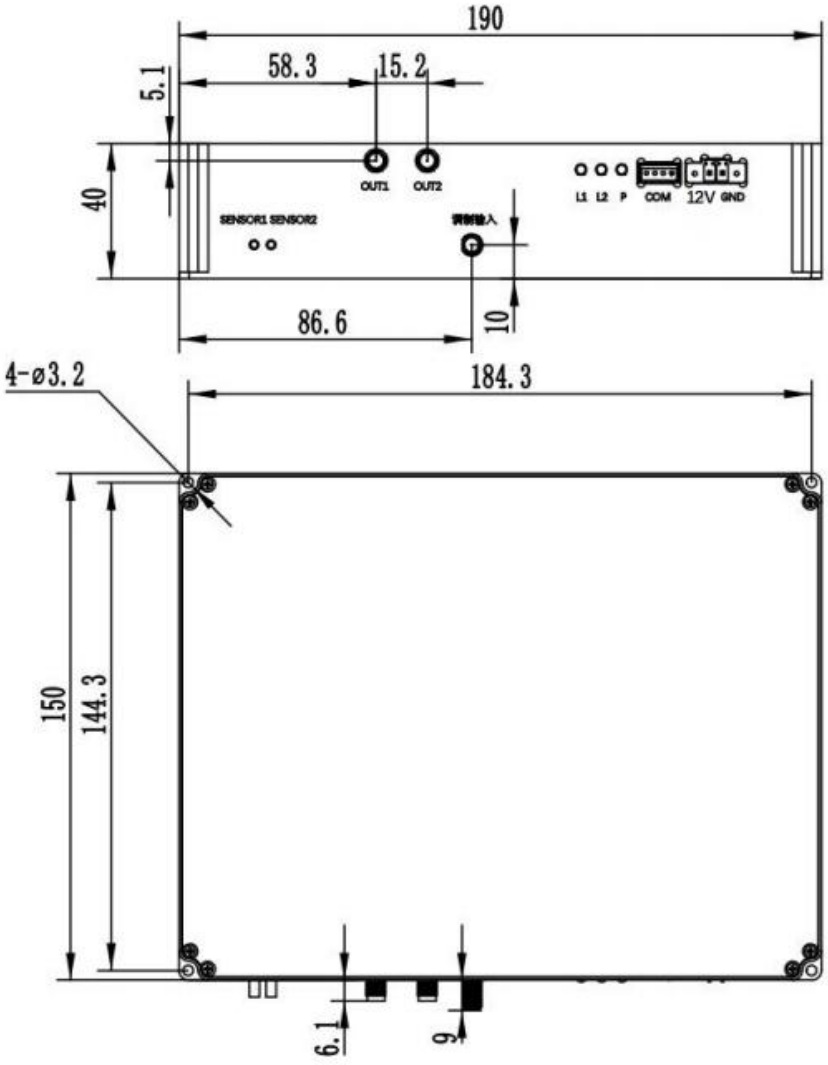
Pulsed EDFA	Min.	Type.	Max.	Unit	Notes
Operating wavelength range		1550.12		nm	
Input peak optical power		10		dBm	
Input average optical power	-35	-30		dBm	
Output peak optical power		23		dBm	
Output average optical power			0	dBm	
repetition rate			100	kHz	
coefficient of noise		5.5		dB	
Polarization Related Gain			0.5	dB	
polarization mode dispersion			0.5	ps	

AOM	Min.	Type.	Max.	Unit	Notes
Operating wavelength range	1520	1550	1580	nm	
Average optical power			0.5	W	
Maximum pulsed light power			0.5	kW	
insertion loss		2.5	3	dB	
extinction ratio	50			dB	
Rise/fall time			30	ns	
frequency		80		MHz	
standing wave ratio (physics)		1.2:1			
Input Impedance		50		Ω	
RF power		2.5		W	
frequency shift		80		MHz	customizable

Raman Amplifier	Min.	Type.	Max.	Unit	Notes
Laser Wavelength		1455		nm	
Output Power Range		25	26	dBm	
Balance detector	**Min.**	**Type.**	**Max.**	**Unit**	**Notes**
bandwidths			200	MHz	
gain (electronics)		50		kV/A	
NEP			30	pW/Sqrt(Hz)	

Mechanical Dimensions

The dimensions of the DAS/ DVS integrated module and the AOM driver are provided below. The overall dimensions of the integrated module are 190×150×40mm (excluding connectors and fibers). To ensure proper heat dissipation, install the module in a well-ventilated environment. Please use the appropriate protective caps for fiber flanges and coaxial connectors when not in use to prevent contamination



Ordering Information

Mode No.	Channels	Distance	Intermediate Frequency	Laser linewidth	Features
GY-DAS-V4-40-1-A80	1	≤40km	80M	＜3k	Great Value for the Price
GY-DAS-V4-40-2-A80	2	≤40km	80M	＜3k	Great Value for the Price
GY-DAS-V4-40-1-A200	1	≤40km	200M	＜3k	Adjustable Spatial Resolution
GY-DAS-V4-40-2-A200	2	≤40km	200M	＜3k	Adjustable Spatial Resolution
GY-DAS-V4-40-1-A80-1k	1	≤40km	80M	＜1k	High-Performance Light Source
GY-DAS-V4-40-1-A200-1k	1	≤40km	200M	＜1k	High-Performance Light Source
GY-DAS-V4-60-1-A80	1	≤60km	80M	＜3k	Long-Range Detection
GY-DAS-V4-60-2-A80	2	≤60km	80M	＜3k	Long-Range Detection
GY-DAS-V4-60-1-A200	1	≤60km	200M	＜3k	Long-Range Detection
GY-DAS-V4-60-2-A200	2	≤60km	200M	＜3k	Long-Range Detection

Unpacking and checking

Open the product box and check against the table below to make sure the following accessories are included, if any are missing, please contact us promptly.

Name	Quantities
DAS/DVS integrated module	1pcs
12V Power Module	1pcs
USB to TTL Module	1pcs
SMA RF Cable	3pcs
Product Test Report	1pcs
Certificate of Conformity	1pcs
User's Manual	1pcs

Interface Definitions

The DAS/DVS integration module interfaces are defined in the following table:

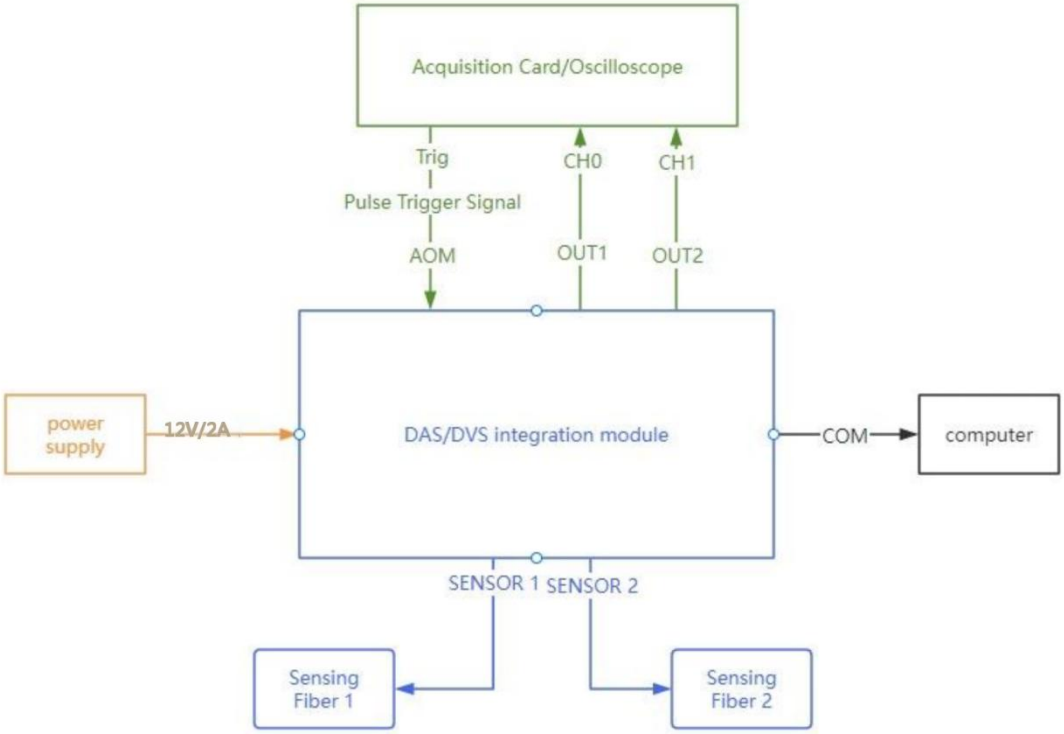
Interface Type	Silkscreen	Clarification
Green Plug-in Terminal	12V	DC power supply +12V supply
	GND	DC power supply GND
White Plug-in Terminal	TTL	Serial port, TTL level, communication with PC for parameter adjustment
SMA	modulation input	AOM modulated signal input
SMA	RF Input	Specialized for chirp models
Optical interface	Sensor1	Sensing fiber 1, default FC/APC connector, single-channel products use this interface
Optical interface	Sensor2	Connect to sensing fiber 2, default FC/APC connector
SMA	OUT1	Module channel 1 output voltage signal, single-channel products use this interface
SMA	OUT2	Module channel 2 output voltage signal

Hardware Commissioning

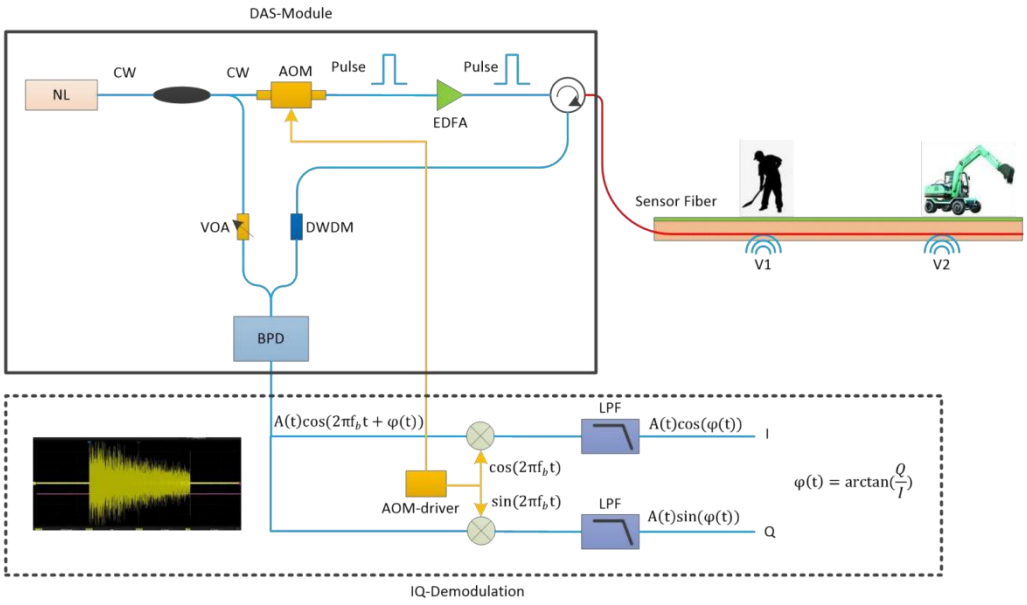
Before starting to install the equipment, please be sure to read the "User Manual" carefully and follow the operating procedures specified in the "User Manual" to carry out installation and commissioning

The test platform is shown in the figure below. **Due to the high output optical power of the Sensor port (about 500mW), make sure that the Sensor port is connected to a sensing fiber or flange for attenuation before powering on the test platform, and do not look directly at the port with your eyes.**

The whole module is connected to the sensing system, and the EDFA power, Raman amplifier power, and VOA value are adjusted through the serial port.



Optical Path Structure



PC Software Instructions

1. Before starting the PC software, connect the module to a computer USB port using the USB to TTL module, and power on the module.
2. Run the PC software "Dual-DVS.exe".
3. After opening the software, the following interface will appear. Select the corresponding COM port to which the module is connected and click "Open Serial Port" .

4. Click "Start Refresh" to obtain internal module parameters, such as module temperature, pulsed EDFA status, Raman amplifier status, etc.

5. Use the "Write Configuration" button to reset and adjust module parameters. Adjust parameters reasonably based on the connected fiber length and actual signal status. You can also control the output of internal lasers using the "Turn EDFA On/Off" EDFA) and "Turn Raman 1 On/Off" controls.

Parameter Settings Table

Recommended Settings (Refer to the test report for definitive values)

Parameter Name	Recommended Value (40Km)	Setting Range
EDFA Current Setpoint	120	70-300
Raman Current Value	2200	0-2500
VOA Voltage Value	2500	0-4000

Precautions

◆ Refer to the parameter settings table for the allowable ranges. Do not set parameters outside these ranges.

◆ When the module is not in use, it is best to turn off the Raman pump output to avoid potential harm from high power output or damage to fiber connectors.

◆ Usually, only the EDFA current and Raman current need adjustment based on fiber length and signal status. It is not recommended to turn on the Raman pump for fiber lengths less than 30km.