DATASHEET

Broadband Tunable External Cavity Laser

Integrated Spectral Bench (ISB5)

Broadband Tunable External Cavity Laser Spectrometer: 1 Gain Chip: 930nm, PM Fiber, High Degree of Polarization, Tuning Range: 920nm-940nm, FWHM: 0.5nm, Light Output Power >10mW.

DAYY Part Number: ASM004503

DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (403) 400-2438, www.dayyphotonics.com

A. PRODUCT DESCRIPTION

DAYY Photonics Broadband Tunable External Cavity Laser (G5) is a tunable external cavity laser that can be tuned across a range a large wavelength range. DAYY Photonics laser tuning is done with an independent electric signal, replacing the classical method of thermal tuning, which provides only a few nanometres of tuning range. The Broadband Tunable External Cavity Laser is designed for scalability, utilizing only one gain chip for fixed or multiple tuning range capability.

The tunable laser includes and a proprietary driver and controller, which enable the light power and wavelength to be easily adjusted. A Graphical User Interface (GUI) with a USB or RS232 connection allows for external monitoring and adjustment capabilities. The tunable laser light output utilizes a standard FC/APC connector (FC/PC or SMA available upon request).

B. KEY FEATURES

- Tuning range 920nm-940nm
- Output power: 10mW per wavelength
- FWHM: ~0.5nm @ 930nm
- Internally optimized for maximum coupling efficiency with PM780-HP Fiber
- Light output connector: FC/APC (optional: FC/PC or SMA)
- Multiple communication interfaces: USB, and RS-232
- User-friendly GUI and custom API available for test automation

C. APPLICATIONS

- Optical Component Testing
- Telecom Test Equipment
- Medical Optical Coherence Tomography
- Industrial Optical Coherence Tomography
- Spectroscopy
- Metrology
- Biomedical Imaging Systems
- Optical Sensing
- White Light Interferometry
- Research and Development

DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (403) 400-2438, www.dayyphotonics.com

D. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Minimum	Maximum	Unit
DRIVER POWER SUPPLY SPECIFICATIONS					
Input Power Supply Voltage	V_S	CW	10	14	V
Input Power Supply Current	I_S	CW	5	-	A
TEMPERATURE SPECIFICATIONS					
Case Temperature (see note 2)	T_{Case}		-20	60	°C
Storage Temperature (see note 4)	T_{stg}	No condensation, Unbiased	-40	85	°C
Storage Humidity (see note 4)	RH_{stg}		5	85	%RH
Ambient Operating Temperature (See note 3)	T_{OP}		0	50	°C

Notes:

1. *Please note that exceeding the Absolute Maximum Ratings above may cause device failure. DAYY Photonics does not bear responsibility for laser power damage that is attributed to electrostatic discharge, excessive current levels, and current spikes (transients).*
   Any attempts to increase the laser drive current above the pre-set limits or recommended specification limits, can damage the device, and nullify the warranty period. It should be emphasized that the current limit set points cannot be exceeded.
2. *For optimum performance of the Integrated Spectral Bench (ISB5), the ISB5 must be operated within the specified temperature ranges. The tunable laser has an internal thermoelectric cooler (TEC) to remove heat from the light source and dissipate it through the ISB5 case. It is required to provide free air circulation around the ISB5 device. It is always recommended to cool down the unit with a fan, and/or to mount the ISB5 on an appropriate heatsink, capable of dissipating up to 10W. The thermal resistance between ISB5 metal case and heatsink can be minimized by applying thermal grease, thermal glue or thermal pad between the contact surfaces.* ***When the tunable laser is used without a heatsink, maximum ambient operating temperature is 40˚C.*** *The specification lists the operating temperature for the electrical/optical characteristics, which is the temperature of the ISB5 during the time that the specifications were measured. Variation in temperature beyond what is specified can have a significant effect on the optical characteristics, like changes in wavelength or drop in output power.*
3. *Storage temperature and relative humidity should be chosen so the dew point of the humid air around the package is below the storage temperature of the package, to avoid condensation inside the ISB5 enclosure.*

DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

E. OPTICAL AND ELECTRICAL SPECIFICATIONS (see note 5)

Parameter	Symbol	Condition	Minimum	Typical	Maximum	Unit
DRIVER POWER SUPPLY SPECIFICATIONS						
Input Power Supply Voltage	V_S	CW	10	12	14	V
Input Power Supply Current	I_S	CW	5	-	-	A
Input Power Supply Voltage Ripple and Noise	γ	CW	-	-	200	mVpp
OPTICAL SPECIFICATIONS						
Center Wavelength (see note 5)	CWL	CW T_{OP} = 25˚C T_{TEC} = 21˚C	-	930	-	nm
PM Fiber Coupled Power	P	CW T_{OP} = 25˚C T_{TEC} = 21˚C I_{OP}	10	-	-	mW
Bandwidth FWHM (see note 6)	B_{FWHM}	CW T_{OP} = 25˚C T_{TEC} = 21˚C I_{OP}	-	0.5	-	nm
Tuning range	TR	CW T_{OP} = 25˚C T_{TEC} = 21˚C I_{OP}	-	920-940	-	nm
Wavelength Tuning Resolution	WT	CW T_{OP} = 25˚C T_{TEC} = 21˚C I_{OP}	-	10	-	pm
Wavelength Accuracy	WA	CW T_{OP} = 25˚C T_{TEC} = 21˚C I_{OP}	-	+/- 10	-	pm
Wavelength Repeatability	WR	CW T_{OP} = 25˚C T_{TEC} = 21˚C I_{OP}	-	+/- 10	-	pm
Number of Simultaneous Wavelengths Output	SC	CW T_{OSE2} = 25˚C T_{TEC} = 21˚C I_{OP}	-	-	1	#
RIN	RIN		-	< -130	-	dB/Hz
Power Stability (After 1h warm up)	P_{STAB}	@25˚C ± 1˚C	-	< 0.1	-	dB
Warmup Time	W		5	15	30	Min
Operating Current	I_{OP}	CW T_{OP} = 25˚C T_{TEC} = 21˚C	-	-	400	mA
Current Setting Resolution	R_{IOP_SET}		-	-	0.1	mA

DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

Laser Current Reading Resolution	R_{IOP_READ}		-	0.1	-	mA

LIGHT OUTPUT CONNECTOR						
Type of Fiber Connector			-	FC/PC, FC/APC, SMA	-	
TEC SPECIFICATIONS						
Laser TEC Temperature Setpoint	T_{Laser_SET}		0	-	40	°C
TEC Temperature Setpoint Resolution	R_{Laser_SET}		-	0.1	-	°C
TEC Temperature Reading	T_{Laser_READ}		-40	-	100	°C
TEC Temperature Reading Resolution	R_{Laser_READ}		-	0.1	-	°C
TEMPERATURE SPECIFICATIONS						
Heatsink Temperature Reading Range	T_{HS}		-40	-	100	°C
Heatsink Temperature Reading Resolution	R_{THS}		-	0.1	-	°C

Notes:

5. *Center Wavelength is defined as the cavity highest gain wavelength.*
6. *FWHM is defined as the -3dB bandwidth*
7. *Polarization Extinction Ratio is defined as the ratio of optical powers of perpendicular polarizations, expressed in decibels (dB).*

DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

F. PLOTS - Test performed at T_{OP}=25°C and T_{TEC}=21°C

FIG. 1: ISB5 OUTPUT POWER VS CURRENT

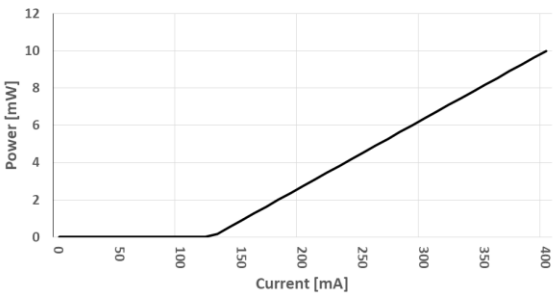
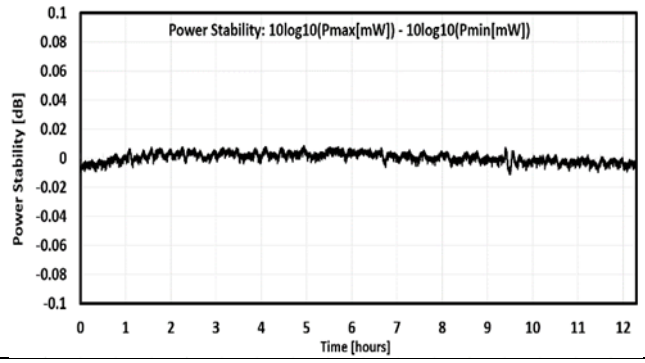
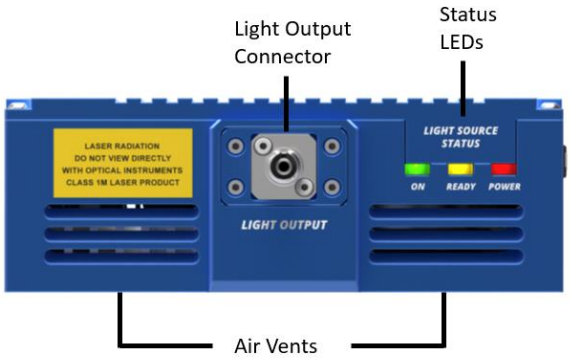
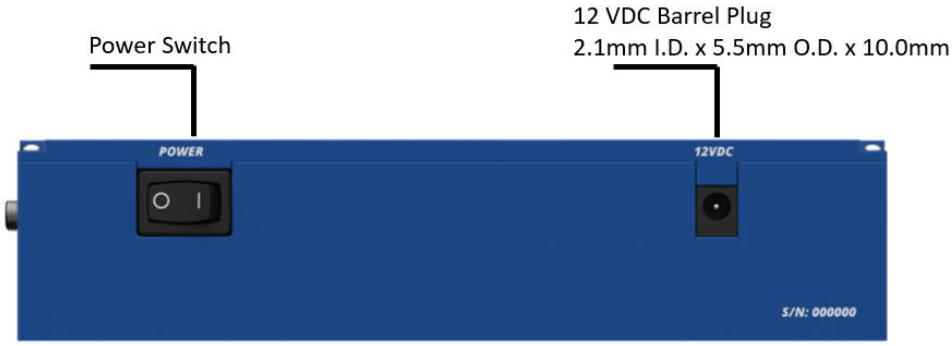


FIG. 2: ISB5 TYPICAL POWER STABILITY



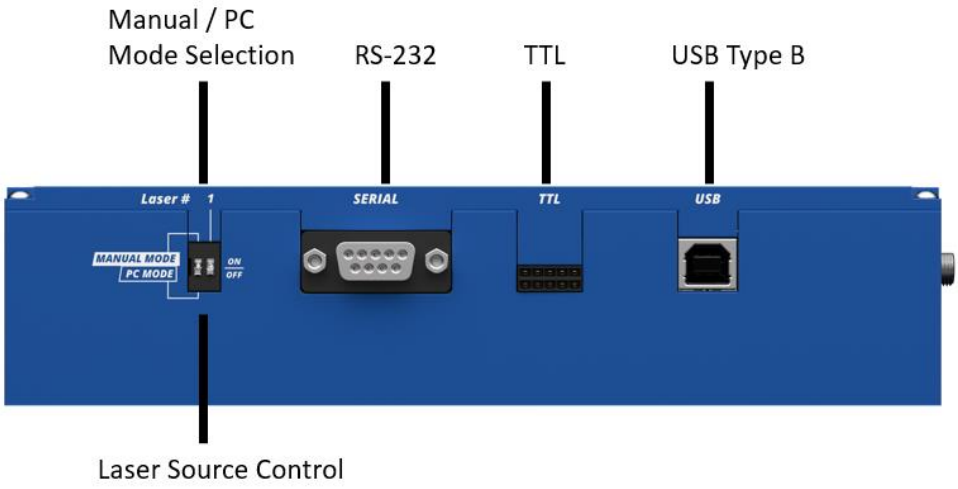
G. ISB Interface



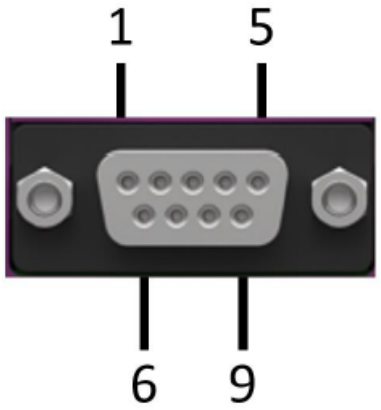


DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

ISB Interface Cont.



D-SUB CONNECTOR PIN OUT



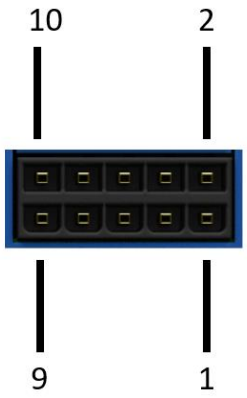
Pin 2: RXD Recevied Data
Pin 3: TXD Transmit Data
Pin 5: Ground

Baud Rate 115200, 1 stop bit, no parity

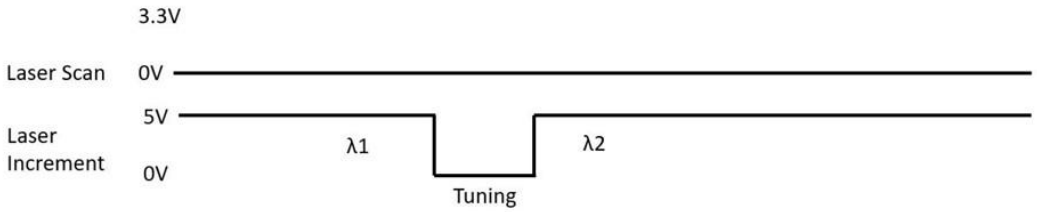
DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

ISB Interface Cont.

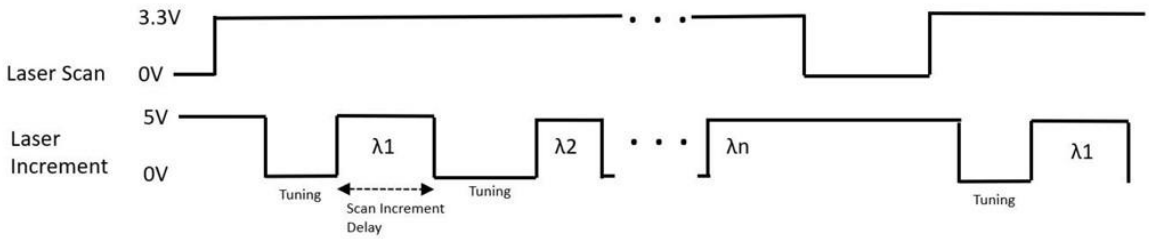
TTL CONNECTOR PIN OUT

	Pin 1: NC Pin 2: Laser Scan (Output) Pin 3: Laser Increment (Output) Pin 4: NC Pin 5: NC Pin 6: NC Pin 7: NC Pin 8: NC Pin 9,10: Ground TTL Voltage Range: 0-3.3V Mates with #IPS1-105-01-L-D-RA or equivalent

Single Wavelength Mode

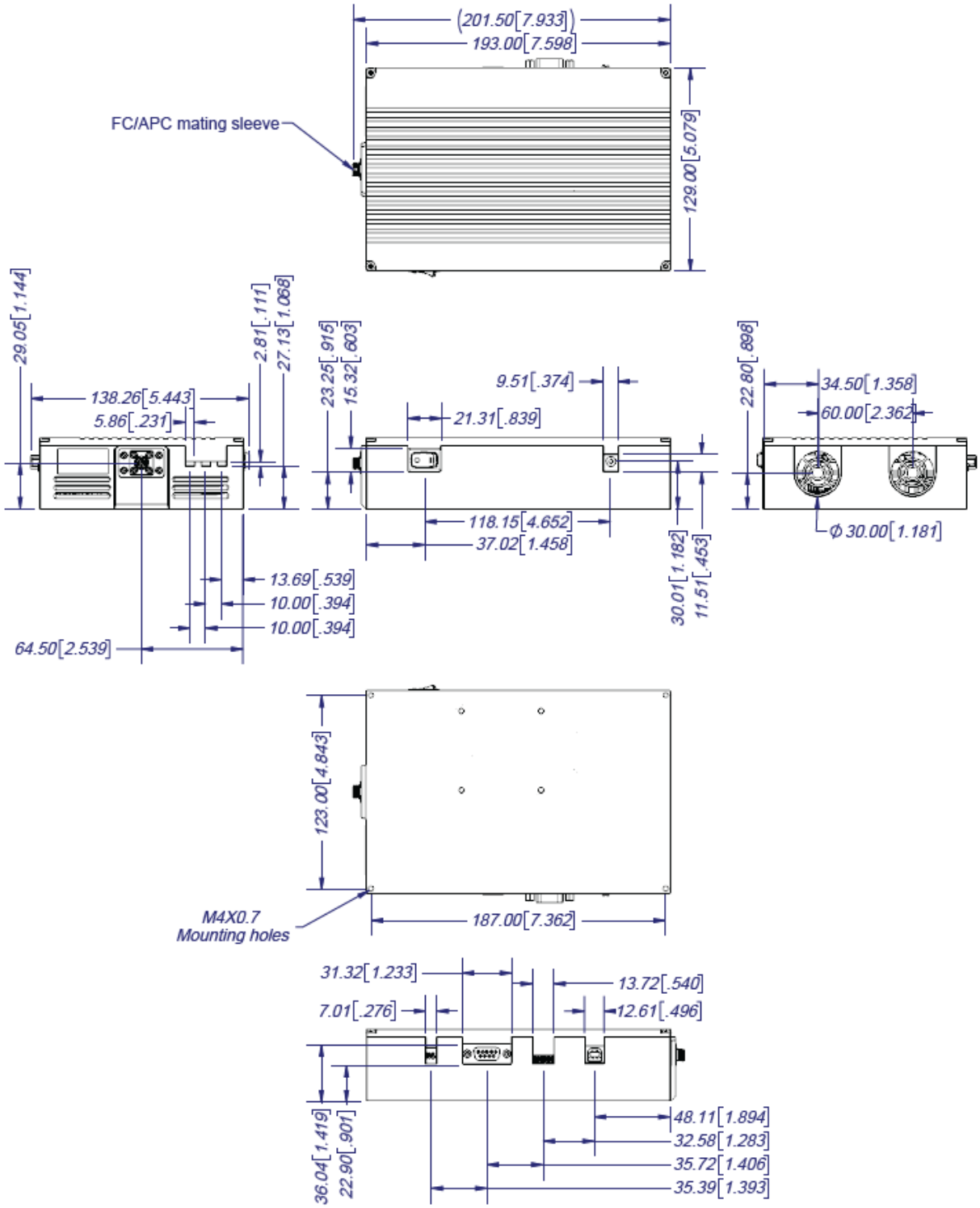


Scan Mode (Single and Continuous)



DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

H. MECHANICAL DIAGRAM – STANDARD ISB5



DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com

I. SAFETY

All statements regarding safety of operation and technical data will only apply when the unit is operated correctly.

The driver must not be operated in environments susceptible to explosion hazards. Do not obstruct the air ventilation slots. If any parts of the driver, or electronics are broken or exposed, contact DAYY's technical support and do not attempt to operate the unit.

The ISB5 a Class 1M laser product. It is safe for all conditions of use except when passed through magnifying optics such as microscopes and telescopes. It produces a beam that is divergent. If light is re-focused use protective eye wear.

J. APPLICATION PROTOCOL INTERFACE (API)

DAYY driver utilizes the MODBUS Protocol for communications. Users can find numerous detailed specifications for the protocol on the internet. MODBUS is used widely in industrial applications. The driver is designed to use this protocol over all of its communication interfaces, MODBUS – RTU is a master/slave protocol and is employed by the USB or RS232.

The MODBUS specification has outlined how a user can adapt the overall packet structure to suit each interface requirement. The primary section of a MODBUS packet is known as the Protocol Data Unit (PDU) and it is independent of the underlying communication interface. The PDU includes additional byte fields for the MODBUS transaction per the Application Data Unit (ADU).

A high-level overview of MODBUS Protocol can be found on the ISB5 User Manual. If users want to develop their own API, the ISB5 Register Map is available upon request. Please contact technical support: techsupport@dayyphotonics.com.

DAYY Photonics Corporation, 4030 8 St SE, Calgary, Canada, T2G 3A7
sales@dayyphotonics.com, +1 (587) 328-0739, www.dayyphotonics.com