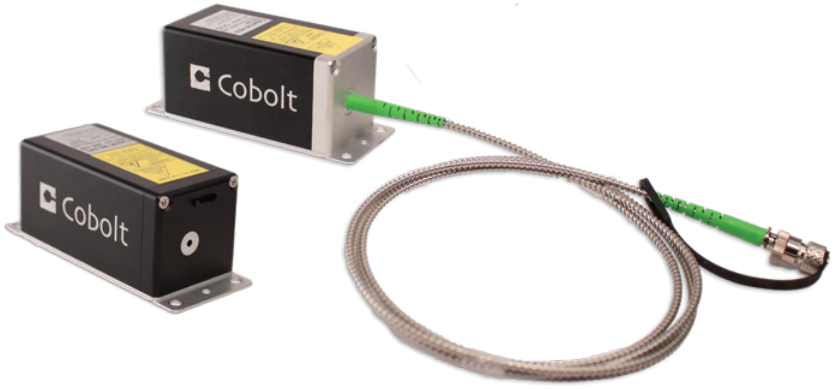
Cobolt 06-01 Series

Plug & Play | Modulatable | Continuous Wave lasers



Applications

蛍光顕微鏡
超解像顕微鏡
フローサイトメトリー
オプトジェネティクス
量子光学

Cobolt 06-01シリーズは、コンパクトな筐体に高性能を凝縮した単一波長レーザーモジュールです。業界標準のプラグ＆プレイ形式を採用し、波長が異なっても同一フットプリントを維持しているため、システム設計の柔軟性に優れています。

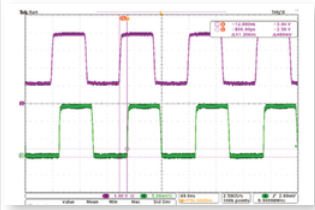
主な特長

- 出力は最大400 mW、波長は375 nmから1064 nmまで幅広く対応
- 蛍光イメージングで需要の高い532 nm、553 nm、561 nm、594 nmなどの固体レーザーをラインナップ
- 高性能LDモジュール（MLD）とLD励起固体レーザー（DPL）のラインナップ
- 高速で強度変調が可能。完全消光（dark state）にも対応
- 全てのLDにクリーンアップフィルターを内蔵
- フリースペースとファイバーピグテールに対応
- HTCure™テクノロジーによる気密封止・恒久アライメントで高い堅牢性を実現

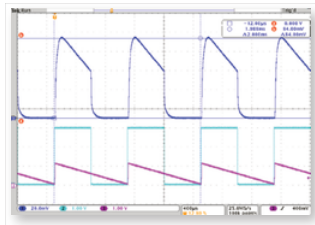
主な用途

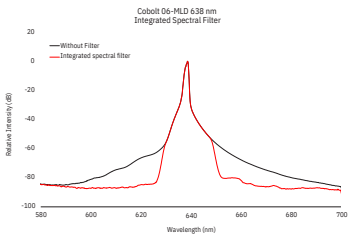
共焦点顕微鏡、フローサイトメトリー、蛍光分析、レーザーコンバイナー（C-FLEX）への組み込み、分析機器へのOEM統合など、高い要求が求められる蛍光分析アプリケーションに最適です。

Cobolt 06-MLD
Typical Digital Modulation at 10 MHz
(Lasersignalin magenta)

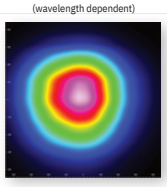


Cobolt 06-DPL
Typical Mixed Digital and Analog Modulation at 1 kHz

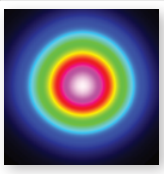




Cobolt 06-MLD
M2 < 1.2 - 1.4
(wavelength dependent)



Cobolt 06-DPL
M2 < 1.1



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Cobolt 06-01 Series

Optical specifications

	375	395	405	415	425	445	457	473	488
Platform	06-MLD								
Center Wavelength (nm)	375 ± 5	395 ± 5	405 ± 5	415 ± 5	425 ± 5	445 ± 5	457 ± 5	473 ± 5	488 ± 3
Spectral bandwidth (FWHM)	< 1.2 nm								< 1.5 nm
Free beam power (mW)	70	120	150 365	120	120	100 400	100 400	100 300	100 200 300
Power stability over 8 hrs (%)	< 1.0								
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.2								
Beam diameter at aperture (µm)	700 ± 100								
Beam symmetry	> 0.90:1								
Beam divergence (full angle, mrad)	< 1.1			< 1.2				< 1.3	
Spatial mode (TEM_{00})	M2 < 1.2								
Fiber pigtailed power (mW)	25	25	75 150	60	60	50 200	50 200	50 150	30* 100* 150
Power stability over 8 hrs (%)	< 2.0								
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.3								
Fiber exit ferrule	End-cap (red boot)								
Fiber Output	FC/APC, Narrow key								
Fiber Type	SM/PM								
Polarisation	PER > 100:1 (> 20 dB), ± 3° relative to key, vertical								
MFD (µm)	3.5 ± 0.5								4.0 ± 0.5
Standard Fiber Length	1 m								
Jacketing	Ø 3mm, stainless steel								
Warranty***	12 mo., 5000 hrs	24 months, unlimited hours							

	505	515	520	532	553	561	594
Platform	06-MLD			06-DPL			
Center Wavelength (nm)	505 ± 3	515 ± 3	520 ± 5	532.1 ± 0.3	552.8 ± 0.3	561.2 ± 0.3	593.6 ± 0.3
Spectral bandwidth (FWHM)	< 1.5 nm			< 1 MHz			
Output power (mW)	80	80 150	80	50 100 200 400	25 50 100	25 50 100 200	50 100 150
Power stability over 8 hrs (%)	< 1.0			< 2.0			
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.2			< 0.25			
Beam diameter at aperture (µm)	700 ± 100			700 ± 70			
Beam symmetry	> 0.90:1			> 0.95:1			
Beam divergence (full angle, mrad)	< 1.3			< 1.2			< 1.4
Spatial mode (TEM_{00})	M2 <1.2			M2 < 1.1			
Fiber pigtailed power (mW)	40	40 75	40	25 50 100 200**	25 50	25 50 100	50
Power stability over 8 hrs (%)	< 2.0						
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.3						
Fiber exit ferrule	No end-cap (green boot)						
Fiber Output	FC/APC, Narrow key						
Fiber Type	SM/PM						
Polarisation	PER > 100:1 (> 20 dB), ± 3° relative to key, vertical						
MFD (µm)	4.0 ± 0.5						4.5 ± 0.5
Standard Fiber Length	1.0						
Jacketing	Ø 3mm, stainless steel						
Warranty***	24 months, unlimited hours						

*Withoutend-cap in standardconfiguration
** With end-cap in standard configuration
*** Warranty coveres laser only, 12 months limited warranty on fiber workmanship

Cobolt 06-01 Series

Optical Performance Specifications

	633	638	642	647	660	675	685	690	705
Platform	06-MLD								
Center Wavelength (nm)	633 ± 3	638 ± 5	642 ± 5	647 -1/+4	660 ± 5	675 ± 5	685 ± 5	690 ± 5	705 ± 10
Spectral bandwidth (FWHM)	< 1.2 nm								< 2 nm
Output power (mW)	80	180	180	130	100	200	40	200	30
Power stability over 8 hrs (%)	< 1.0						< 2.0		
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.2						< 0.5	< 0.2	
Beam diameter at aperture (µm)	700 ± 100								
Beam symmetry	> 0.90:1								
Beam divergence (full angle, mrad)	< 1.6						< 1.75		< 1.9
Spatial mode (TEM_{00})	M^2 <1.2								
Fiber pigtailed power (mW)	50	80	80	60	50	100	20	100	15
Power stability over 8 hrs (%)	< 2.0								
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.3						< 0.6	< 0.3	
Fiber exit ferrule	No end-cap (green boot)								
Fiber Output	FC/APC, Narrow key								
Fiber Type	SM/PM								
Polarisation	PER > 100:1 (> 20 dB), ± 3° relative to key, vertical								
MFD (µm)	4.5 ± 0.5								
Standard Fiber Length	1.0								
Jacketing	Ø 3mm, stainless steel								
Warranty***	24 months, 5000 hours								

	730	785	808	830	850	915	940	975	1064
Platform	06-MLD								
Center Wavelength (nm)	730 ± 5	785 ± 5	808 ± 5	830 ± 5	850 ± 10	915 ± 10	940 ± 10	975 ± 5	1064 ± 10
Spectral bandwidth (FWHM)	< 2 nm								
Output Power (mW)	50	250	120	250	200	250	250	250	200
Power stability over 8 hrs (%)	< 2.0								
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.2						< 0.5		
Beam diameter at aperture (µm)	700 ± 100								
Beam symmetry	> 0.90:1								
Beam divergence (full angle, mrad)	< 1.9	< 2.0	< 2.6	< 2.3			< 2.6		< 3.0
Spatial mode (TEM_{00})	M2 < 1.2		M2 < 1.3				M2 < 1.4		
Fiber pigtailed power (mW)	20	100	50	100	20	100	100	100	100
Power stability over 8 hrs (%)	< 2.0								
Noise, 20 Hz – 2 MHz (RMS, %)	< 0.3						< 0.5		
Fiber exit ferrule	No end-cap (green boot)								
Fiber Output	FC/APC, Narrow key								
Fiber Type	SM/PM								
Polarisation	PER > 100:1 (> 20 dB), ± 3° relative to key, vertical								
MFD (µm)	4.5 ± 0.5		5.5 ± 0.5						6.6 ± 0.5
Standard Fiber Length	1.0								
Jacketing	Ø 3mm, stainless steel								
Warranty***	24 months, 5000 hours								

*** Warranty coveres laser only, 12 months limited warranty on fiber workmanship

Cobolt 06-01 Series

Modulation Specificaitons

Product	06-MLD	06-DPL
Nominal Wavelength	375 - 520 nm, 633 - 1064 nm	532 - 594 nm
Digital power modulation		
Modulation frequency	DC - 10 MHz	DC - 1 kHz
Rise/fall time	< 2.5 ns*	< 100 µs
Extinction ratio	> 10 000 000 : 1 (>70dB)	
Input signal - Low	0 - 0.8 V	
Input signal - High	2 - 5 V	
Input signal - Impedance	2 kW	
Analog power modulation		
Modulation frequency	DC - 10 Hz	DC - 1 kHz
Rise/fall time	< 10 ms	< 100 µs
Extinction ratio	> 10 000 000 : 1 (>70dB)	
Input signal	0 - 1 V -or- 0 - 5 V	
Threshold voltage	37 ± 5 mV (0 - 1 V) 68 ± 5 mV (0 - 5 V)	< 0.1 V (0 - 1 V) < 0.5 V (0 - 5 V)
Input signal - Impedance	2 kW -or- 50 W	
Digital current modulation		
Max. modulation frequency	> 100 MHz	> 10 kHz
3 dB Bandwidth	150 MHz	---
Rise/fall time	< 2.5 ns*	< 30 µs
Input signal - Low	0 - 0.8 V	
Input signal - High	2 - 5 V	
Input signal - Impedance	2 kW	
Analog current modulation		
Max. modulation frequency	> 300 kHz **	> 10 kHz
Rise/fall time	< 2 µs	< 30 µs
Input signal		
Threshold voltage	37 ± 5 mV (0 - 1 V) 68 ± 5 mV (0 - 5 V)	
Input signal - Impedance	2 kW -or- 50 W	

* Rise and fall time increased to up to 250 ns for IR wavelengths
** Up to 2 MHz analog modulation available on the 06-01 Series legacy 5 V lasers, see datasheet on hubner-photonics.com

Model Number

WWWW-06-XX-PPPP-CCCC

Wavelength

01 Free beam, MLD
51 Free beam, DPL (high power)
91 Free beam, DPL
03 Fiber pigtailed, MLD
53 Fiber pigtailed, DPL (high power)
93 Fiber pigtailed, DPL
X6 Fiber coupled option - MM fiber
X7 Fiber coupled option - SM/PM

Power

Configuration:
1100 = CE / CDRH Compliant
1200 = OEM Laser product
1XXX = Custom OEM laser product

Fiber coupled option

This device is sensitive to Elecrostatic Discharge (ESD).

WARNING
VISIBLE OR INVISIBLE
LASER RADIATION
Avoid Exposure to beam
Class 3B Laser Product
Classified per
IEC 60825-1:2014

Wvl (nm)		Max.Pwr (mW)	Wvl (nm)	Max.Pwr (mW)	Wvl (nm)	Max.Pwr (mW)	Wvl (nm)	Max.Pwr (mW)
375	395	200	505	120	642	200	808	200 200 300
405	415	200	515	200	647	200	830	450 400 400
425	445	450	520	200	660	150	850	400
457	473	200	532	499	675	300	915	
488		200	553	400	685	100	940	
		499	561	400	690	300	975	
		499	594	499	705	100	1064	
		450	633	120	730	100		
		499	638	200	785	499		

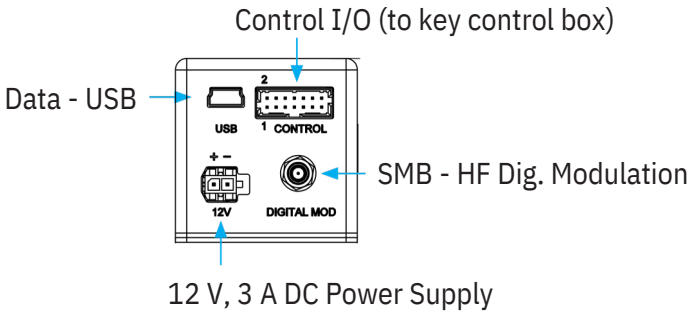
Cobolt 06-01 Series

Operational Environment

Product	06-MLD	06-DPL
Power supply requirements	12 VDC, 3 A	
Intended use environment	Laboratory (indoor)	
Maximum baseplate temperature	50 °C	
Ambient temperature, operation	10 to 40°C	
Ambient temperature, storage	-10 to +60°C	
Humidity	0-90% RH non-condensing	
Ambient Air pressure	950-1050 mbar	
Laser Head heat sink thermal impedance (at 40°C ambient)	< 0.4 K/W	< 0.8 K/W
Maximum heat dissipation of Laser Head	< 25 W	

Electrical Interfaces

Laser Head



Molex 14 pin - Control I/O (to key control box)

Pin	Function
1	Remote Interlock
2	GND
3	GND
4	RS-232 TX
5	RS-232 RX
6	LED 1B (Laser ON)
7	LED 1A (Laser ON)
8	LED 2 (Error)
9	Digital modulation input (limited to 500 kHz)
10	GND
11	Key switch
12	Remote ON/OFF
13	GND
14	Analog modulation input

Molex 2 pin - to power supply

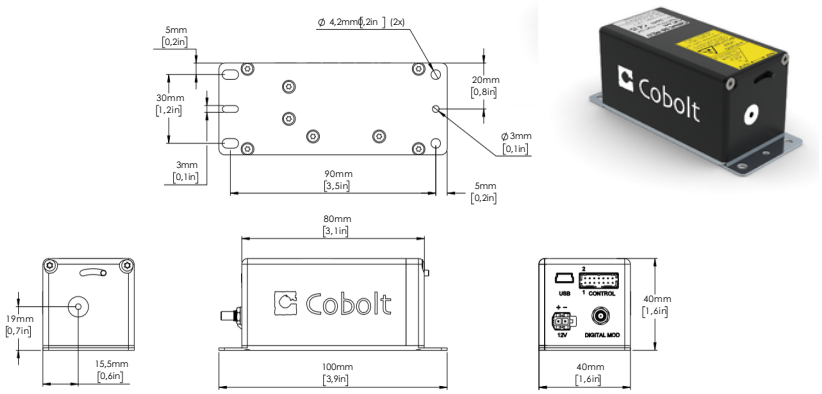
Pin	Function
1 2	+ 12 V DC, max 3 A
	GND

Communication Interface

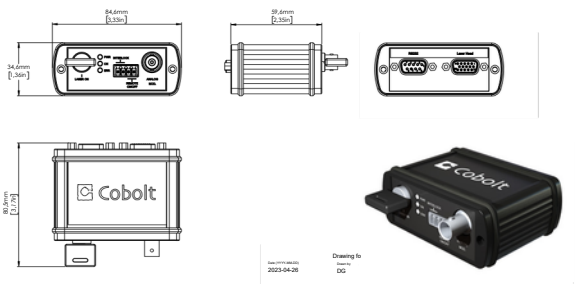
Communication	USB and RS-232
Standard Baudrate	115200

Mechanical Specifications

Laser head dimensions



Key control box dimensions



Cobolt 06-01 Series

Options and Accessories

- C-FLEX Laser Combiner
- Laser head heatsink HS-07
- Fiber coupled mounting plate FIC-05
- 2 - to - 1 Laser combiner for optogenetics

C-FLEX Laser Combiner

Heatsink HS-07

2-to-1 Laser combiner for optogenetics
Cobolt 06-01 Series with Cobolt 04-01 series

2-to-1 Laser combiner for optogenetics
Example : 06-MLD 473 and 06-DPL 594 nm

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Our Locations

Cobolt AB , a part of HÜBNER Photonics
(Sales in Norway, Sweden, Finland and Denmark)
Solna, Sweden
Phone: +46 8 545 912 30
Fax: +46 8 545 912 31
E-mail: info.se@hubner-photonics.com

HÜBNER Photonics GmbH
(Sales in Germany, Switzerland and Austria)
Kassel, Germany
Phone: +49 561 994 060-0
Fax: +49 561 994 060-13
E-mail: info.de@hubner-photonics.com

HÜBNER Photonics Inc.
(Sales in USA, Canada and Mexico)
San Jose, California, USA
Phone: +1 (408) 708 4351
Fax: +1 (408) 490 2774
E-mail: info.usa@hubner-photonics.com

HA Photonics Pty Ltd
(Sales in UK and Ireland)
London
United Kingdom
Phone: +44 7359 440 871
E-mail: info.uk@hubner-photonics.com

VALO Innovations, a part of HÜBNER Photonics
(VALO Sales and Service)
Hannover, Germany
Phone: +49 511 260 390 70
E-mail: info.valo@hubner-photonics.com

Find local sales representatives at hubner-photonics.com