

# World's Smallest Lasers

for Spectroscopy, Quantum and LiDAR

## CW Lasers

- >20 Wavelengths
- MM/SM/PM fiber
- Single-frequency options







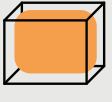
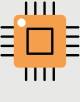
## Combiners

- 405 nm to 1064 nm
- 4 wavelengths
- Free-space or Fiber

## Q-switch Lasers

- 1029 nm
- High pulse energy
- SLM option

# The MatchBox Platform

Space-grade robustness 	TEC Cooled 
PM SM MM Fiber Coupling 	Automatic Power Control 
OEM Dedicated Design 	USB or UART Control 
Self-Contained Unit 	Smart Electronics 



## Applications

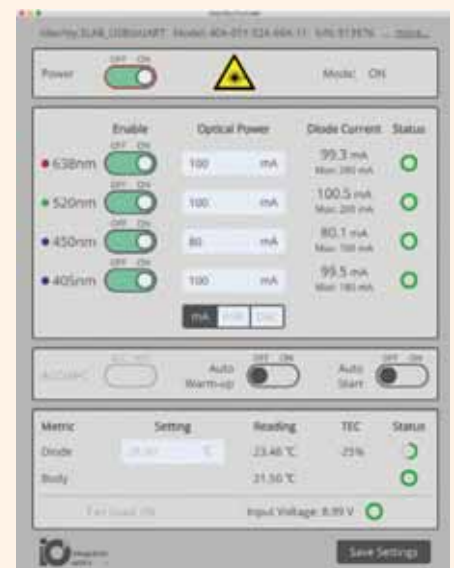
- CW LASERS (REGULAR SPECTRUM)**
- Fluorescence spectroscopy
  - Scanning Microscopy
  - Particle analysis
  - Sorting
  - Flow cytometry
  - Excitation

- PULSED LASERS**
- Range Finding
  - Laser Induced Breakdown Spectroscopy (LIBS)
  - Laser Seeding
  - Raman Spectroscopy
  - Holography
  - Supercontinuum Generation

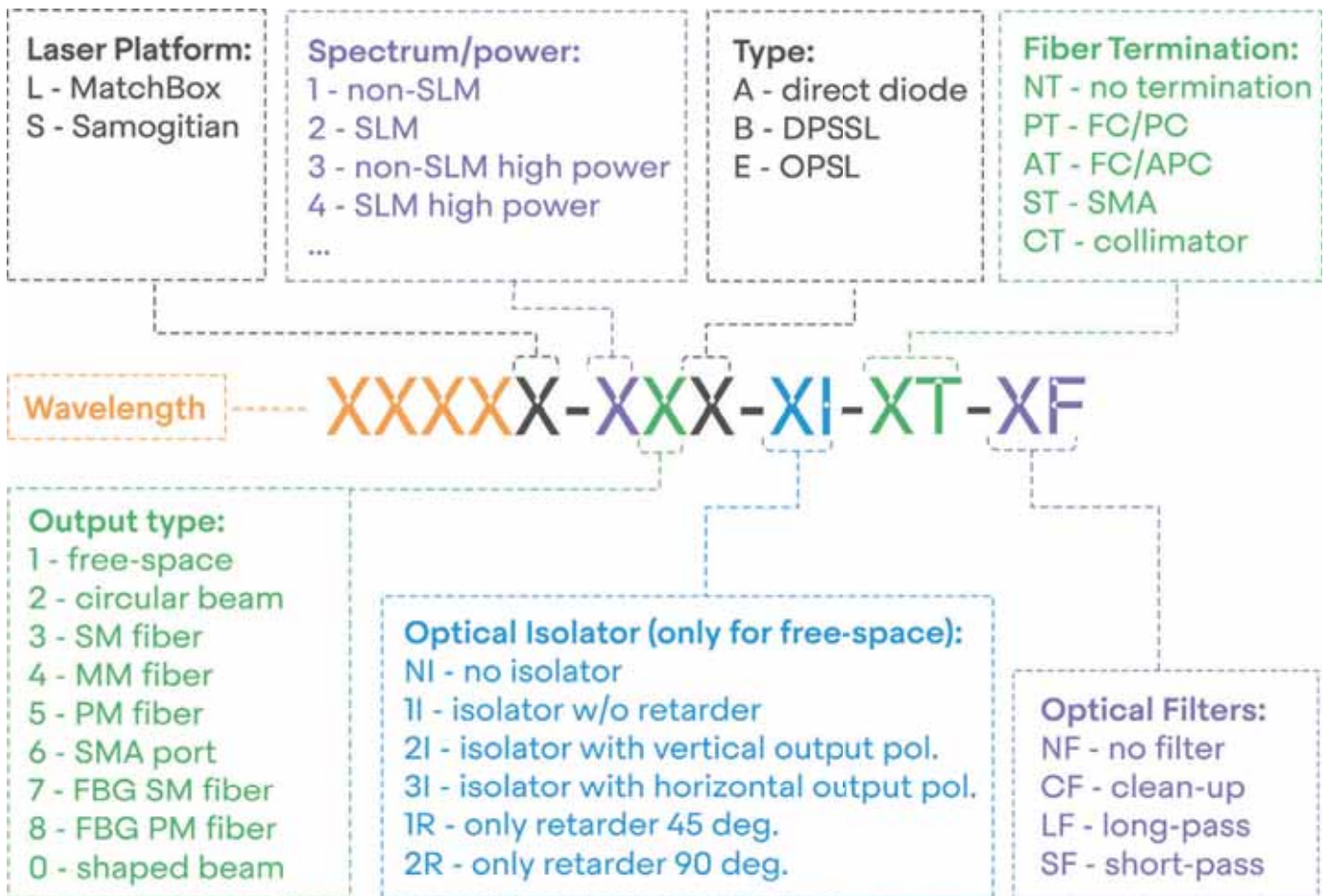
- CW LASERS (NARROW SPECTRUM)**
- Raman Spectroscopy
  - Holography
  - Inspection
  - Metrology
  - Interferometry
  - Laser Seeding
  - Quantum cryptography

- WAVELENGTH COMBINER**
- Diagnostic
  - Sorting
  - Illumination
  - Microscopy
  - Flow cytometry

## Control Software

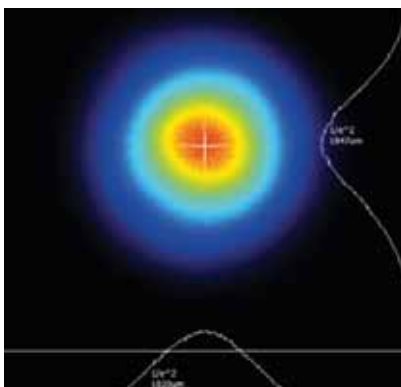


# Part numbers of CW Lasers

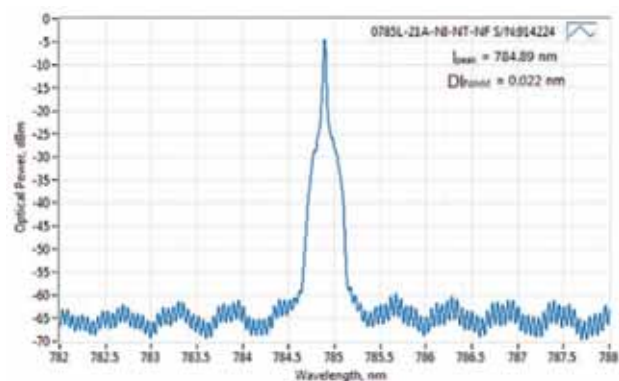


## General Information

Each produced laser comes with a comprehensive test report



Beam profile of 1064L-11B (far field)



Spectrum of 0785L-21A SLM laser (linewidth measurement limited by spectrum analyzer)

# Specifications of SLM CW Lasers (Class 3B)

	Output power, mW	Power Stability, % RMS, 8 hrs*	Noise, % RMS, 20 Hz to 20 MHz*	Spectral Line-width FWHM, pm*	Polarization contrast*	M <sup>2</sup> effective*	Transversal modes
0405L-21A	50	0.05	0.2	0.1	2000:1	1.3	TEM00
0405L-23A	20	0.1	0.2	0.1	N/A	1.05	TEM00
0405L-24A	40	0.03	0.2	0.1	N/A	N/A	Multimode
0405L-25A	20	0.1	0.2	0.1	20 dB	1.05	TEM00
0405L-26A	40	0.03	0.2	0.1	N/A	N/A	Multimode
0405L-41A	100	0.05	0.2	0.1	2000:1	1.3	TEM00
0405L-43A	50	0.1	0.2	0.1	N/A	1.05	TEM00
0405L-44A	80	0.1	0.2	0.1	N/A	N/A	Multimode
0405L-45A	50	0.1	0.2	0.1	20 dB	1.05	TEM00
0405L-46A	80	0.1	0.2	0.1	N/A	N/A	Multimode
0488L-21A	30	0.02	0.1	0.1	2000:1	1.50	TEM00
0488L-23A	10	0.2	0.2	0.1	N/A	1.05	TEM00
0488L-24A	15	0.2	0.2	0.1	N/A	N/A	Multimode
0488L-25A	10	0.2	0.2	0.1	23 dB	1.05	TEM00
0488L-26A	15	0.2	0.2	0.1	N/A	N/A	Multimode
0520L-21A	40	0.05	0.5	0.1	2000:1	1.40	TEM00
0520L-23A	25	0.05	0.5	0.1	N/A	1.05	TEM00
0520L-24A	35	0.05	0.5	0.1	N/A	N/A	Multimode
0520L-25A	25	0.05	0.5	0.1	27 dB	1.05	TEM00
0520L-26A	35	0.05	0.5	0.1	N/A	N/A	Multimode
0532L-21B	50	0.05	0.5	0.1	2000:1	1.05	TEM00
0532L-23B	25	0.1	0.6	0.1	N/A	1.05	TEM00
0532L-24B	40	0.1	0.7	0.1	N/A	N/A	Multimode
0532L-25B	25	0.08	0.5	0.1	25 dB	1.05	TEM00
0532L-26B	40	0.1	0.7	0.1	N/A	N/A	Multimode
0532L-41B	100	0.05	0.5	0.1	2000:1	1.05	TEM00
0532L-43B	50	0.07	0.5	0.1	N/A	1.05	TEM00
0532L-44B	80	0.05	0.5	0.1	N/A	N/A	Multimode
0532L-45B	50	0.10	0.5	0.1	23 dB	1.05	TEM00
0532L-46B	80	0.05	0.5	0.1	N/A	N/A	Multimode
0532L-61B	200	0.13	0.4	0.1	1000:1	1.05	TEM00
0532L-63B	100	0.06	0.4	0.1	N/A	1.05	TEM00
0532L-64B	150	1.00	0.5	0.1	N/A	N/A	Multimode
0532L-65B	100	0.10	0.5	0.1	23 dB	1.05	TEM00
0532L-66B	150	1.00	0.5	0.1	N/A	N/A	Multimode
0633L-21A	70	0.02	0.14	0.1	1500:1	1.3	TEM00
0633L-23A	35	0.04	0.1	0.1	N/A	1.05	TEM00
0633L-24A	40	0.05	0.2	0.1	N/A	N/A	Multimode
0633L-25A	35	0.05	0.15	0.1	25 dB	1.05	TEM00
0633L-26A	40	0.05	0.2	0.1	N/A	N/A	Multimode
0638L-21A	100	0.02	0.12	0.1	2000:1	1.3	TEM00
0638L-23A	60	0.05	0.25	0.1	N/A	1.05	TEM00
0638L-24A	80	0.1	0.25	0.1	N/A	N/A	Multimode
0638L-25A	60	0.04	0.1	0.1	27 dB	1.05	TEM00
0638L-26A	80	0.10	0.25	0.1	N/A	N/A	Multimode
0783L-21A	110	0.03	0.15	0.1	2000:1	1.2	TEM00
0783L-23A	70	0.03	0.15	0.1	N/A	1.05	TEM00
0783L-24A	80	0.03	0.15	0.1	N/A	N/A	Multimode
0783L-25A	70	0.05	0.15	0.1	27 dB	1.05	TEM00
0783L-26A	80	0.03	0.15	0.1	N/A	N/A	Multimode
0785L-21A	130	0.02	0.10	0.1	2000:1	1.2	TEM00
0785L-23A	80	0.03	0.15	0.1	N/A	1.05	TEM00
0785L-24A	100	0.05	0.15	0.1	N/A	N/A	Multimode
0785L-25A	80	0.03	0.15	0.1	27 dB	1.05	TEM00
0785L-26A	100	0.05	0.15	0.1	N/A	N/A	Multimode

	Output power, mW	Power Stability, % RMS, 8 hrs*	Noise, % RMS, 20 Hz to 20 MHz*	Spectral Line- width FWHM, pm*	Polarization contrast*	M <sup>2</sup> effective*	Transversal modes
0830L-21A	100	0.02	0.20	0.1	2000:1	1.3	TEM00
0830L-23A	70	0.05	0.25	0.1	N/A	1.05	TEM00
0830L-24A	80	0.05	0.25	0.1	N/A	N/A	Multimode
0830L-25A	70	0.05	0.25	0.1	27 dB	1.05	TEM00
0830L-26A	80	0.05	0.25	0.1	N/A	N/A	Multimode
1030L-21B	400	0.1	1.5	0.2	1000:1	1.05	TEM00
1030L-23B	200	0.1	1.5	0.2	N/A	1.05	TEM00
1030L-24B	300	0.1	1.5	0.2	N/A	N/A	Multimode
1030L-25B	200	0.2	1	0.2	23 dB	1.05	TEM00
1030L-26B	280	1	0.5	0.2	N/A	N/A	Multimode
1064L-21B	400	0.1	0.3	0.2	1500:1	1.1	TEM00
1064L-23B	200	0.1	1	0.2	N/A	1.05	TEM00
1064L-24B	300	0.1	1	0.2	N/A	N/A	Multimode
1064L-25B	200	0.2	0.9	0.2	23 dB	1.05	TEM00
1064L-26B	280	1	0.5	0.2	N/A	N/A	Multimode

\* Typical performance (full specification available at <https://integratedoptics.com/products/cw-lasers>)

Note: Product specifications are subject to change without prior notice to improve reliability, function or design or otherwise.



# Regular Spectrum CW Lasers (Class 3B)

	Output power, mW	Power Stability, % RMS, 8 hrs*	Noise, % RMS, 20 Hz to 20 MHz*	Spectral Line- width FWHM, nm*	Polarization contrast / extinction*	M <sup>2</sup> effective*	Transversal modes
0405L-11A	180	0.1	0.10	0.5	2000:1	1.3	TEM00
0405L-13A	100	0.04	0.20	0.5	N/A	1.05	TEM00
0405L-14A	150	0.05	0.2	0.5	N/A	N/A	Multimode
0405L-15A	100	0.04	0.2	0.5	30 dB	1.05	TEM00
0405L-16A	150	0.05	0.2	0.5	N/A	N/A	Multimode
0450L-11A	60	0.05	0.40	0.8	2000:1	1.4	TEM00
0450L-13A	35	0.05	0.25	0.8	N/A	1.05	TEM00
0450L-14A	50	0.05	0.25	0.8	N/A	N/A	Multimode
0450L-15A	35	0.05	0.25	0.8	23 dB	1.05	TEM00
0450L-16A	50	0.1	0.25	0.8	N/A	N/A	Multimode
0488L-11A	40	0.02	0.3	0.5	1500:1	1.2	TEM00
0488L-13A	20	0.05	0.5	0.5	N/A	1.05	TEM00
0488L-14A	30	0.1	0.5	0.5	N/A	N/A	Multimode
0488L-15A	20	0.05	0.5	0.5	27 dB	1.05	TEM00
0488L-16A	30	0.05	0.5	0.5	N/A	N/A	Multimode
0505L-11A	60	0.02	0.5	0.7	2000:1	1.25	TEM00
0505L-13A	30	0.05	0.5	0.7	N/A	1.05	TEM00
0505L-14A	50	0.05	0.5	0.7	N/A	N/A	Multimode
0505L-15A	30	0.05	0.5	0.7	23 dB	1.05	TEM00
0505L-16A	50	0.05	0.5	0.7	N/A	N/A	Multimode
0520L-11A	80	0.02	0.50	1	3000:1	1.4	TEM00
0520L-13A	40	0.02	0.3	1	N/A	1.05	TEM00
0520L-14A	70	0.03	0.5	1	N/A	N/A	Multimode
0520L-15A	40	0.02	0.4	1	29 dB	1.05	TEM00
0520L-16A	70	0.02	0.4	1	N/A	N/A	Multimode
0532L-11B	200	0.06	2.5	0.1	1000:1	1.2	TEM00
0532L-13B	100	0.5	5	0.1	N/A	1.05	TEM00
0532L-14B	160	0.04	5	0.1	N/A	N/A	Multimode
0532L-15B	100	0.5	5	0.1	23 dB	1.05	TEM00
0532L-16B	150	0.5	5	0.1	N/A	N/A	Multimode
0633L-11A	90	0.05	0.25	0.5	2000:1	1.2	TEM00
0633L-13A	60	0.05	0.25	0.5	N/A	1.05	TEM00
0633L-14A	80	0.05	0.25	0.5	N/A	N/A	Multimode
0633L-15A	60	0.05	0.25	0.5	27 dB	1.05	TEM00
0633L-16A	80	0.05	0.25	0.5	N/A	N/A	Multimode
0638L-11A	170	0.05	0.13	0.7	2000:1	1.15	TEM00
0638L-13A	100	0.03	0.20	0.7	N/A	1.05	TEM00
0638L-14A	150	0.05	0.25	0.7	N/A	N/A	Multimode
0638L-15A	100	0.03	0.15	0.7	31 dB	1.05	TEM00
0638L-16A	150	0.05	0.25	0.7	N/A	N/A	Multimode
0660L-11A	110	0.05	0.2	0.7	3000:1	1.25	TEM00
0660L-13A	70	0.05	0.25	0.7	N/A	1.05	TEM00
0660L-14A	90	0.1	0.25	0.7	N/A	N/A	Multimode
0660L-15A	70	0.1	0.25	0.7	27 dB	1.05	TEM00
0660L-16A	90	0.1	0.25	0.7	N/A	N/A	Multimode
0785L-11A	170	0.03	0.1	0.1	2000:1	1.2	TEM00
0785L-13A	120	0.02	0.25	0.5	N/A	1.05	TEM00
0785L-14A	150	0.02	0.35	0.2	N/A	N/A	Multimode
0785L-15A	120	0.05	0.25	0.5	27 dB	1.05	TEM00
0785L-16A	150	0.05	0.25	0.2	N/A	N/A	Multimode
0830L-11A	130	0.05	0.10	0.5	2000:1	1.4	TEM00
0830L-13A	70	0.05	0.25	0.5	N/A	1.05	TEM00
0830L-14A	90	0.05	0.25	0.5	N/A	N/A	Multimode
0830L-15A	70	0.05	0.25	0.5	27 dB	1.05	TEM00

	Output power, mW	Power Stability, % RMS, 8 hrs*	Noise, % RMS, 20 Hz to 20 MHz*	Spectral Line- width FWHM, nm*	Polarization contrast / extinction*	M <sup>2</sup> effective*	Transversal modes
0830L-16A	90	0.05	0.25	0.5	N/A	N/A	Multimode
0850L-11A	150	0.03	0.25	0.1	1000:1	1.3	TEM00
0850L-13A	100	0.03	0.25	0.1	N/A	1.05	TEM00
0850L-14A	130	0.03	0.25	0.1	N/A	N/A	Multimode
0850L-15A	100	0.03	0.25	0.1	27 dB	1.05	TEM00
0850L-16A	130	0.03	0.25	0.1	N/A	N/A	Multimode
0915L-11A	170	0.05	0.25	0.5	2000:1	1.2	TEM00
0915L-13A	80	0.05	0.25	0.5	N/A	1.05	TEM00
0915L-14A	140	0.05	0.25	0.5	N/A	N/A	Multimode
0915L-15A	80	0.05	0.25	0.5	27 dB	1.05	TEM00
0915L-16A	140	0.05	0.25	0.5	N/A	N/A	Multimode
0980L-31A	180	0.2	0.25	0.5	2000:1	N/A	Multimode
0980L-34A	140	1	0.25	0.5	N/A	N/A	Multimode
0980L-36A	140	1	0.25	0.5	N/A	N/A	Multimode
1030L-11B	500	0.1	1.5	0.7	1000:1	1.05	TEM00
1030L-13B	350	0.1	1.5	0.7	N/A	1.05	TEM00
1030L-14B	400	0.1	1.5	0.7	N/A	N/A	Multimode
1030L-15B	350	0.1	1.5	0.7	27 dB	1.05	TEM00
1030L-16B	400	0.1	1.5	0.7	N/A	N/A	Multimode
1064L-11B	500	0.1	1.5	0.1	1500:1	1.1	TEM00
1064L-13B	300	0.1	1.5	0.1	N/A	1.05	TEM00
1064L-14B	400	0.1	1.5	0.1	N/A	N/A	Multimode
1064L-15B	300	0.1	1.5	0.1	27dB	1.05	TEM00
1064L-16B	400	0.1	1.5	0.1	N/A	N/A	Multimode
1123L-11B	200	0.2	3	0.7	1000:1	1.1	TEM00
1123L-13B	100	0.5	3	0.7	N/A	1.05	TEM00
1123L-14B	160	0.5	3	0.7	N/A	N/A	Multimode
1123L-15B	100	0.5	3	0.7	23 dB	1.05	TEM00
1123L-16B	160	0.5	3	0.7	N/A	N/A	Multimode
1319L-11B	200	0.2	3	0.7	1000:1	1.1	TEM00
1319L-13B	100	0.5	3	0.7	N/A	1.05	TEM00
1319L-14B	160	0.5	3	0.7	N/A	N/A	Multimode
1319L-15B	100	0.5	3	0.7	23 dB	1.05	TEM00
1319L-16B	160	0.5	3	0.7	N/A	N/A	Multimode
1342L-11B	200	0.2	3	0.7	1000:1	1.1	TEM00
1342L-13B	100	0.5	3	0.7	N/A	1.05	TEM00
1342L-14B	160	0.5	3	0.7	N/A	N/A	Multimode
1342L-15B	100	0.5	3	0.7	23 dB	1.05	TEM00
1342L-16B	160	0.5	3	0.7	N/A	N/A	Multimode
1550L-11A	120	0.2	0.25	8	1500:1	1.2	TEM00
1550L-13A	60	0.05	0.25	8	N/A	1.05	TEM00
1550L-14A	200	0.2	0.25	10	N/A	N/A	Multimode
1550L-15A	60	0.05	0.25	8	27 dB	1.05	TEM00
1550L-16A	200	0.2	0.25	10	N/A	N/A	Multimode

\* Typical performance (full specification available at <https://integratedoptics.com/products/cw-lasers>)

Custom: other wavelengths and configurations are available on request.

Note: Product specifications are subject to change without prior notice to improve reliability, function or design or otherwise.

# High Power (Class 4) Lasers

Platform	Output power, mW	Power Stability, % RMS, 8 hrs*	Noise, % RMS, 20 Hz to 20 MHz*	Spectral Line-width FWHM, nm*	Polarization contrast / extinction*	Transversal modes
0405L-31A	500	0.2	0.8	1	2000:1	Multimode
0405L-34A	400	1	0.8	1	N/A	Multimode
0405L-36A	400	1	0.8	1	N/A	Multimode
0450L-31A	400	0.1	0.25	1.4	100:1	Multimode
0450L-34A	300	0.1	0.25	1.4	N/A	Multimode
0450L-36A	300	0.1	0.25	1.4	N/A	Multimode
0638L-31A	600	0.1	0.3	1	500:1	Multimode
0638L-34A	500	0.5	0.4	1	N/A	Multimode
0638L-36A	500	0.5	0.4	1	N/A	Multimode
0785L-31A	1500	0.2	0.4	1	500:1	Multimode
0785L-34A	1000	1	0.4	1	N/A	Multimode
0785L-36A	1000	1	0.4	1	N/A	Multimode
0785L-41A	1000	0.07	0.8	0.05	1500:1	Multimode
0785L-44A	800	0.04	0.4	0.05	N/A	Multimode
0785L-46A	800	0.05	0.4	0.05	N/A	Multimode
0808L-31A	3000	1	0.25	1	100:1	Multimode
0808L-34A	1600	1	0.25	1	N/A	Multimode
0808L-36A	1600	1	0.25	1	N/A	Multimode
0830L-31A	1100	1	0.25	1	100:1	Multimode
0830L-34A	1000	1	0.25	1	N/A	Multimode
0830L-36A	1000	1	0.25	1	N/A	Multimode
0830L-41A	450	0.1	0.3	0.05	100:1	Multimode
0830L-44A	400	0.1	0.3	0.05	N/A	Multimode
0830L-46A	400	0.1	0.3	0.05	N/A	Multimode
0915L-34A	2000	1	0.25	1	N/A	Multimode
0915L-36A	2000	1	0.25	1	N/A	Multimode
0940L-34A	2000	1	0.25	1	N/A	Multimode
0940L-36A	2000	1	0.25	1	N/A	Multimode
0975L-34A	2000	1	0.25	1	N/A	Multimode
0975L-36A	2000	1	0.25	1.5	N/A	Multimode
1064L-34A	1000	1	0.25	1.5	N/A	Multimode
1064L-36A	1000	1	0.25	1.5	N/A	Multimode
1550L-34A	1000	1	0.25	2	N/A	Multimode
1550L-36A	1000	1	0.25	2	N/A	Multimode

\* Typical performance (full specification available at <https://integratedoptics.com/products/cw-lasers>)

Note: Product specifications are subject to change without prior notice to improve reliability, function or design or otherwise.

# Other parameters of CW lasers

## Beam properties:

- Beam diameter at aperture (1/e<sup>2</sup>): <2 mm for diode and ~1 mm for DPSS
- Beam divergence (full angle): <1.5 mrad for diode and DPSS, except for transversal multimode lasers
- Beam pointing stability: <5  $\mu$ rad/C°

## Modulation:

- Fast TTL modulation (up to 10 MHz in ACC mode) is available for non-SLM diode lasers
- Typical rise time of diode non-SLM lasers is 17ns
- Typical fall time of diode non-SLM lasers is 13 ns
- Modulation of DPSS lasers (up to ~50 Hz) is implemented upon request
- Modulation of OPS lasers (up to ~1 kHz) is implemented upon request
- For SLM diode and all DPSS lasers, the TTL pin is configured for fan speed control

## Fiber specs:

- Default connector for SLM laser is FC/APC.
- Default connector for regular spectrum lasers is FC/PC
- Standard length of a fiber is 1 m to 1.2 m. Other fiber lengths are available upon request.
- Polarization rotation (PM fiber): less than 5 degree
- Default core diameter for MM fibers is 105  $\mu$ m. Other core diameters are available upon request.

## Physical properties:

- Control interface type: UART serial bus, convertible to USB or RS232 using standard accessories
- External power supply requirement: +5VDC, 5A for DPSS, 1.5 A for diode up to 200 mW
- Dimensions (L-W-H): 50 x 30 x 18 mm (excluding pins and output window)
- Beam height from the base: 10.4 mm (+/- 0.3 mm)
- Heatsink requirement: diode <1 °C/W, DPSS <0.5 °C/W
- Optimum heatsink temperature (non-condensing): +15...+30 °C
- Max. heatsink temperature 40 °C
- Internal temperature stabilization: TEC
- Overheat protection: Yes
- Storage temperature (non-condensing): -10 to +50 °C
- General warranty: 14 months, or 10000 hours, whichever occurs first. Exceptions apply.
- Shock resistance >70G in XYZ. Please contact us for space compliance data.

## Compatibility:

- RoHS
- General Product Safety Directive (GPSD) 2001/95/EC
- Electromagnetic Compatibility (EMC) Directive 2004/108/EC
- IEC60825-1:2014 (compliant only using additional accessories)

## Unified Physical Control Interface

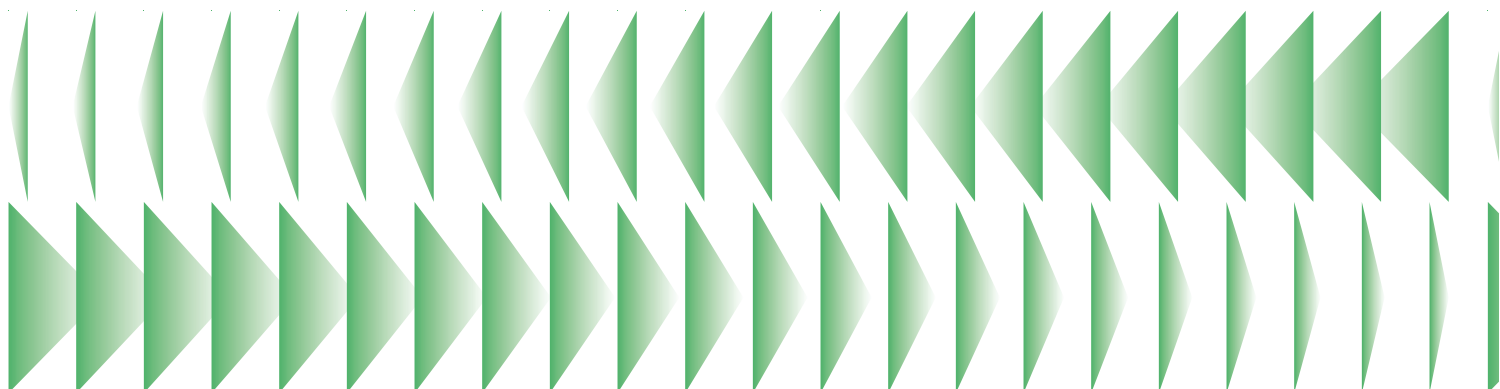
Vcc and GND pins are for +5 VDC power supply;  
Tx and Rx pins are for UART communication;  
TTL pin is used for digital modulation;  
For DPSS and VBG diode lasers, the TTL pin  
is configured for FAN control of a compatible heatsink.



# MatchBox Accessories

## BREAK-OUT-BOX

An optional accessory which simplifies installation and use of MatchBox lasers. It provides DATA, POWER connections as well as interlock, TTL modulation and fan control pins.



## HEATSINKS

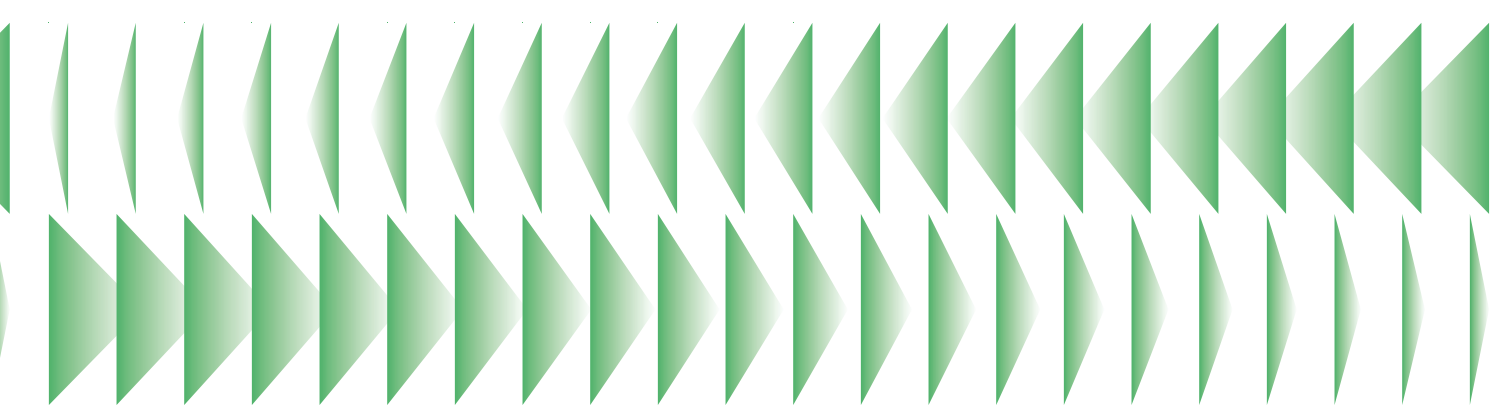
We offer a range of heatsinks - from cost effective sinks with fan cooling to high- end TEC coolers.

## SHUTTERS

several shutter options are provided with extra functionality of lens holder (for beam expanders), optical isolator holders, cage bench adapters.

## POWER SUPPLIES

our break-out-boxes are now standartized for PD (Power Delivery standard), thus we are offering several models of PD power supplies.



# Wavelength Combiners

A powerful and highly integrated solution for particle analysis, flow cytometry and microscopy applications.

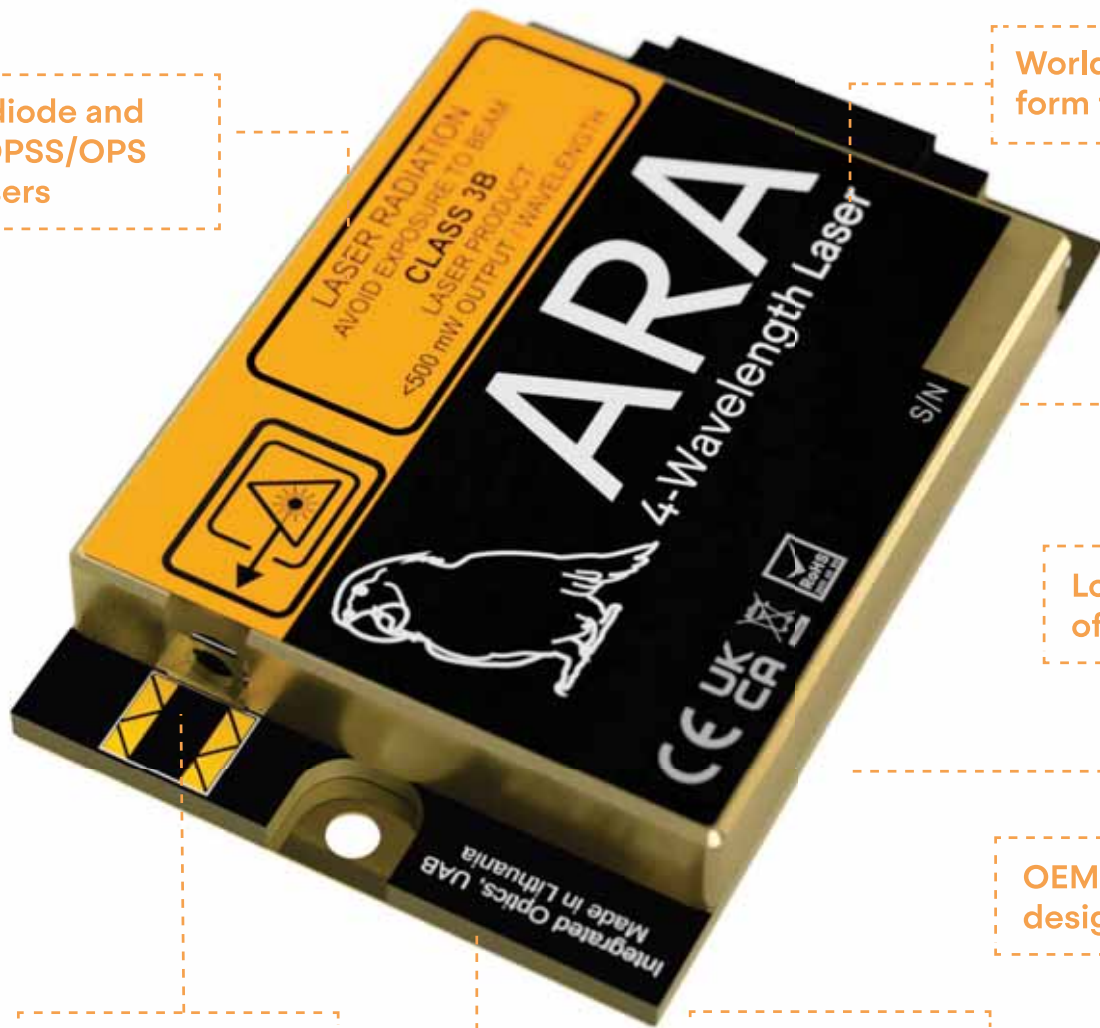


## Advantages

- 4 slots for detectors/emitters
- Free-space or multi-mode fiber output
- Color mixing
- Fast warm-up time (bi-directional TEC)
- Compatible with MatchBox accessories

A dedicated **Break-out-Box** can be purchased separately. It provides PD-type power supply support, fan control, an interlock and inputs for TTL modulation.





3 diode and 1 DPSS/OPS lasers

World's smallest form factor

Low Total Cost of Ownership

OEM dedicated design

Vast beam shaping options

Extreme mechanical stability

## Applications

Flow cytometry

Particle analysis

Sorting

Ophthalmology

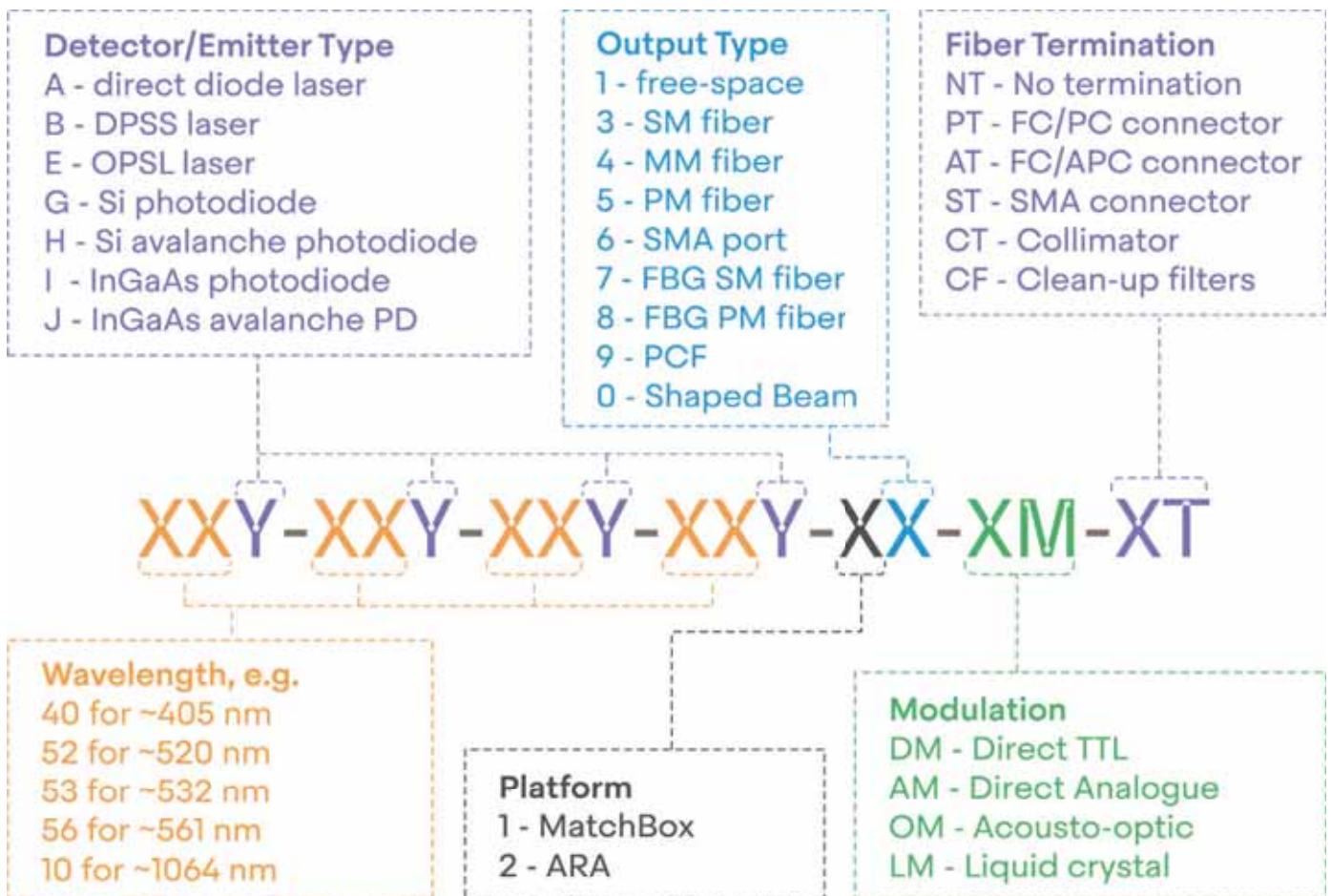
Microscopy

Illumination

Spectroscopy

# Part numbers of combiners

Based on the item code structure there are thousands of different configurations, which are theoretically possible. You are welcome to contact our sales staff in order to get a preliminary evaluation if your target configuration is potentially feasible in the MatchBox combiner platform.



## Output types



Integrated Optics uses proprietary micro-optics assembly technique, called Printed Optical Circuit Board (POCB) to assemble tiny optical components inside our lasers.

Fiber coupling is permanently carried out inside the box, on the same substrate as rest of the optics, thus alignment-free operation is ensured.

# Multi-wavelength laser specifications

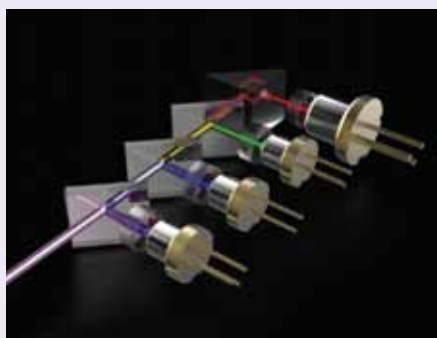
Platform	Part No.	Wavelength set, nm	Output power (free-space), mW	Output power (MM fiber), mW	Output power (SM/PM fiber), mW	Power stability, % (RMS, 8 hrs)*	Spectral line-width, nm*
MatchBox	40A-45A-48A-52A-1...	405	120	100	30	Free-space <0.2 MM fiber <0.5 SM fiber <1 PM fiber <1	0.5
		450	70	50	20		0.8
		488	40	40	20		1
		520	100	70	30		1
	40A-45A-48A-64A-1...	405	120	100	30		0.5
		450	70	50	20		0.8
		520	100	70	30		1
		638	130	100	30		0.7
	40A-48A-52A-64A-1...	405	120	100	30		0.5
		488	40	30	20		1
520		100	70	30	1		
638		130	100	30	0.7		
40A-48A-64A-78A-1...	405	120	100	30	0.5		
	488	40	30	20	1		
	638	130	100	30	0.7		
	785	120	100	30	0.2		
40A-52A-64A-78A-1...	405	120	100	30	0.5		
	520	100	90	30	1		
	638	130	100	30	0.7		
	785	120	100	30	0.2		
ARA	40A-48A-52B-64A-2...	405	120	100	25	0.5	
		488	40	40	20	1	
		532	100	90	25	0.1	
		638	130	100	25	0.7	
	40A-48A-56B-64A-2...	405	120	100	25	0.5	
		488	40	40	20	1	
		561	100	40	20	0.2	
		638	130	100	25	0.7	

\* Typical performance (full specification available at <https://integratedoptics.com/products/wavelength-combiners>)

Custom: other wavelengths on request: 505 nm, 660 nm, 830 nm, 850 nm, 1064 nm, 1470nm, 1550 nm

NOTE: Product specifications are subject to change without prior notice to improve reliability, function or design or otherwise.

## Following output types are available/ customizable:



- Collimated Free-space
- Line-focussed
- MM fiber-coupled
- SM fiber-coupled
- PM fiber-coupled
- SMA port

# Other parameters of combiners

## Beam properties:

- Beam diameter at aperture (1/e<sup>2</sup>): <2 mm
- Beam divergence (full angle): <1.5 mrad
- Beam pointing stability: <5  $\mu$ rad/C°

## Operation mode:

- Automatic Current Control (ACC)
- TTL modulation up to 10 MHz in ACC mode. Each laser diode can be modulated independently.

## Fiber specs:

- Default connector for SM/PM fiber is FC/PC
- Default connector for MM fiber is SMA
- Standard length of a fiber is 1 m to 1.2 m
- Polarization rotation (PM fiber): less than 5 degree

## Physical properties:

- Control interface type: UART serial bus, convertible to USB or RS232 using accessories
- External power supply requirement: 1.5 A and +12 VDC
- Dimensions (L-W-H): 50 x 30 x 18 mm (excluding pins and output window)
- Beam height from the base: 10.4 mm (+/- 0.3 mm)
- Heatsink requirement: <0.5 °C/W
- Optimum heatsink temperature (non-condensing): +15...+30 °C
- Max. heatsink temperature 40 °C
- Internal temperature stabilization: TEC
- Overheat protection: Yes
- Warranty: 14 months, or 10000 hours, whichever occurs first. Operational time calculation is based on an internal EPROM counter

## Compatibility:

- RoHS
- Electromagnetic Compatibility (EMC) Directive 2004/108/EC
- General Product Safety Directive (GPSD) 2001/95/EC
- IEC60825-1:2014 (compliant only using additional accessories)

## The Pinout

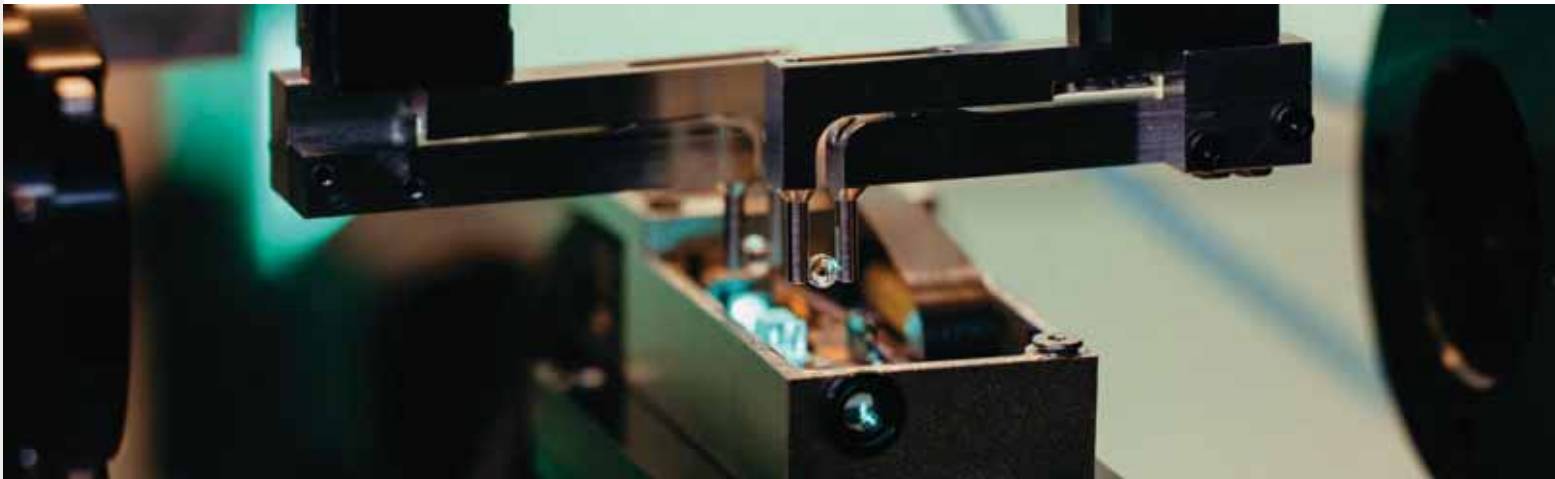
The bottom row comprises Vcc and GND pins, that are used for 12 VDC power supply; Tx and Rx pins are for UART communication; TTL pin is universally programmable and is set to fan-control mode as a default.

The row is used for TTL modulation of each installed laser diode.



# Nanosecond Pulsed Lasers

The MatchBox Series includes several variants of pulsed lasers. Matchbox lasers show that small dimensions and high performance are not mutually exclusive.



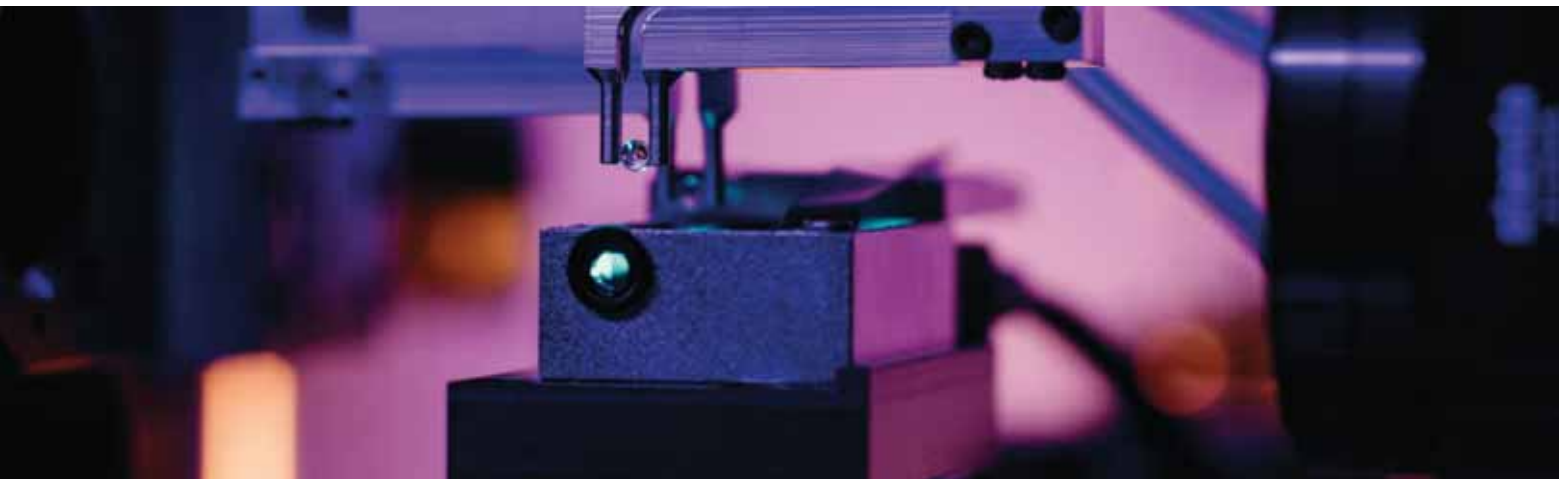
## Advantages

- Same size and a interface as of CW MatchBox lasers
- High pulse energy
- High average power
- Superb pulse-to-pulse stability in SLM operation

# Nanosecond Pulsed Lasers

## $\mu$ Flash laser

$\mu$ Flash laser is an OEM- dedicated platform, without included electronics for extremely compact and powerful LiDAR and range finding applications.



## Applications

LiDAR

Range Finding

LIBS

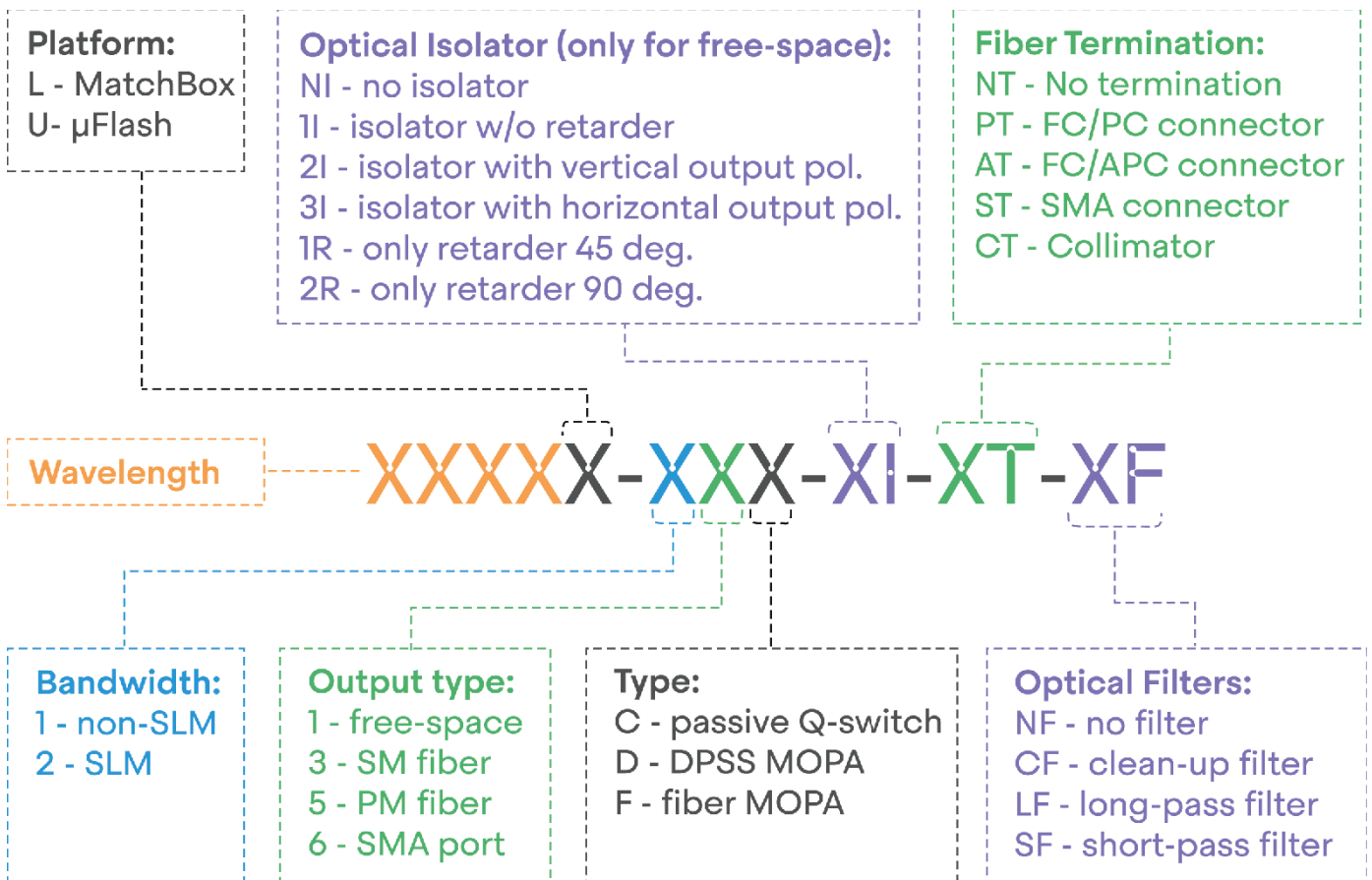
Seeding

Marking

Plasma science

Photoacoustics

# Part numbers of pulsed lasers



## Specifications

Part Number	Wavelength, nm	Spectral line-width FWHM, nm*	Pulse duration, ns	Pulse Energy, $\mu$ J	Repetition rate, kHz	Peak power, kW	Pulse-to-pulse stability, %*
1030L-11C	1029.5	0.7	1.5	100	2-3	67	10
1030L-21C	1029.5	0.0008	2.4	30	10	12	2
1030U-11C	1029.5	0.7	1.3	150	0.1	115	20

\* Typical performance (full specification available at <https://integratedoptics.com/products/nanosecond-lasers>)

- Pulse energy and repetition rate can be adjusted according to customers requirements.
- Repetition rate changes upon changing the average output power, the pulse energy remains constant.
- Triggering on request