

PRODUCT CATALOGUE



Iranian National Center For Laser Science & Technology

WWW.INLC.IR

V1

Introduction

Section 5 - Optics&Coating

Section 1 - Laser Diode Thechnologies

Section 2 - Fiber Laser

Section 3 - Disk Laser

Section 4 - Micro Laser

Introduction

Introduction of center

Laser is an amplified and powerful beam of light that does not exist in nature in normal condition; however, it can be produced by special tools and technology. Laser is different form typical sources of light. It has special capabilities and applications. Over fifty years have passed since laser's invention and it has found a particular position around the world in recent years. Most of technology fields and industrial developments are related to it. Laser has been one of the main tools in research and science development. Today, performing lots of strategic and important projects in science and research centers would be impossible without it. In medical field laser is one of the main tools now. By using laser, diagnosis and treatment of the diseases is done faster. The use of laser also has a great significance in industry. Manufacturing the accurate and sensitive tools in industries with advanced technologies is easy by using laser. Atom fission, atom interaction study, chemical reactions investigation, and many other usages in research are all owe to laser. Laser has a basic role in researches and a key role in industry. These widespreadutilizations of laser show that it has a lot of applications in strategic industries and is a tool for developing in any country, and without using it most of society needs in the field of industry, medicine, and research are not resolved and the development in these fields will not be achieved. Therefore, using of laser technology can be considered as one of the essentials to develop a country



Currently, laser technology is one of the advanced technologies on the world level and its increasingly development process is impressive. Although laser technology, on the national and international level, is at the same level of other significant technologies such as aerospace, stem cells, Nano, and nuclear technology, from the global point of view laser has a great significance due to its wide range of functions in different fields and sciences. Islamic republic of Iran has established the national center for laser as a strategic center on the national level. This center started its activities in order to achieve ۲۰۰۶ science and technology since and develop laser technology and managed its measures by defining and notifying national and strategic macro missions to it. Today, with God's grace and authorities special attention, we see valuable achievements in this technology in the country

National center for laser science and technology established in ۲۰۰۶ as a research center to perform the national plans which is important to the country regarding to time and performance. The objective of establishing this national center is to follow national plans and consider to laser technology in short-term and long-term economic and industrial development plans in the country. This center consists of equipped and advanced laboratories and its mission is to perform the national plans in the field of laser sciences and its applications. These plans usually are not performed by other centers due to the operation span and the sensitivity of administrative processes. Iranian National Center for Laser Science and Technology(INCL) provides the necessary platform for researches about laser utilization, developing sciences related to laser, theoretical and applied training in different levels that results in forming and localizing the necessary



technical knowledge to create essential industries and provide for basic needs of country. This center codifies the part of laser technology, which entails the society's interests, in the form of technical knowledge packages and gives them to the knowledge based companies. These companies produce different kinds of medical, academic, and industrial lasers, optics and lasers items and also provide general and specialized laser services including kinds of welding, cutting, drilling, hardening, and etc. We see a good performance from these companies with the support of INCL.

Laser Diode Technologies

Linear Array Semiconductor Laser Single Array Package CW & QCW Mode

Description

The high power linear array semiconductor lasers operate at a typical wavelength of 808 nm. Standard product is up to 60 W and 180 W output power in linear package at CW and QCW mode, respectively. These lasers have input for water cooling with a recirculative water chiller to cool the diode.



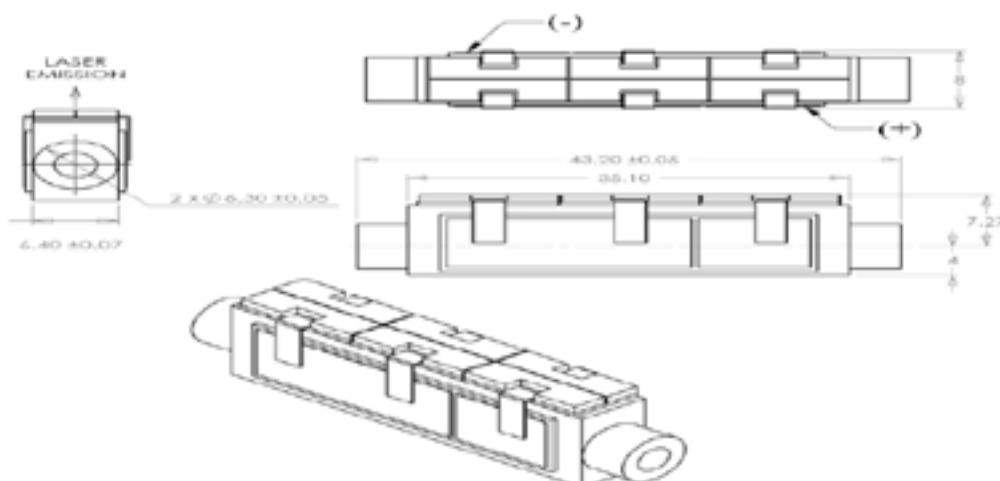
Applications

- Pumping of solid state lasers and fiber lasers
- Medical Equipment
- Processing material
- Cutting
- Welding

Typical Specifications

| Operation Mode | CW | QCW | |
|------------------------------|-----|-----|-----|
| Optical Output Power | 60 | 180 | W |
| Center Wave Length Range | 808 | | nm |
| Center Wave Length Tolerance | 4± | | nm |
| Slop Efficiency | 2.8 | 3 | W/A |
| Spectral Width (FWHM) | 4 | | nm |
| Power Conversion Efficiency | 40 | | % |
| Series Resistance | 41 | | mΩ |
| Threshold Current | 3.5 | 16 | A |
| Operating Current | 28 | 80 | A |
| Operating Voltage | 5.4 | 5.7 | V |

Package Dimensions (Unit: mm)



Laser Diode Technologies

Linear Array Semiconductor Laser Double Array Package CW & QCW Mode



Description

The high power linear array semiconductor lasers operate at a typical wavelength of 808 nm. Standard product is up to 240 W and 720 W output power in double array package at CW and QCW mode, respectively. These lasers have input for water cooling with a recirculative water chiller to cool the diode.

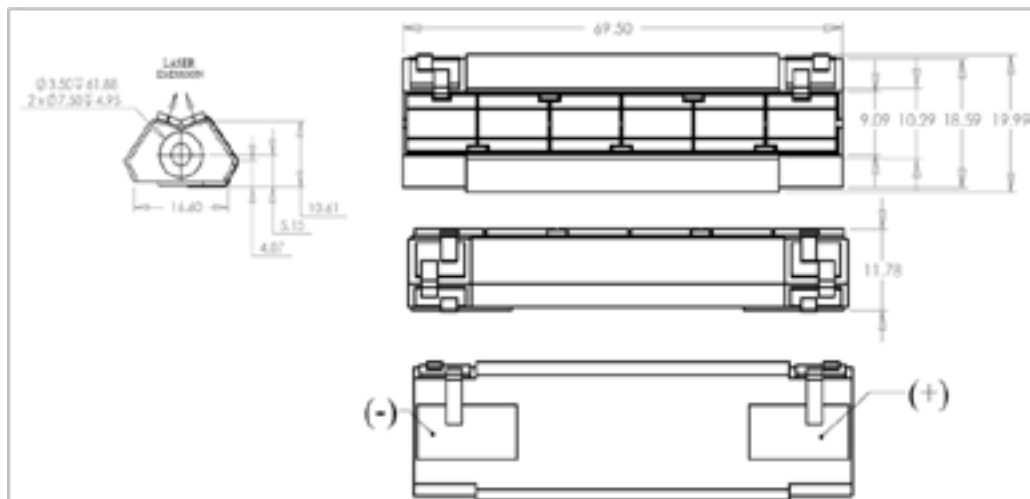
Applications

- Pumping of solid state lasers and fiber lasers
- Medical Equipment
- Processing material
- Cutting
- Welding

Typical Specifications

| Operation Mode | CW | QCW | |
|------------------------------|------|-----|-----|
| Optical Output Power | 240 | 720 | W |
| Center Wave Length Range | 808 | | nm |
| Center Wave Length Tolerance | 4± | | nm |
| Slop Efficiency | 10.8 | 12 | W/A |
| Spectral Width (FWHM) | 4 | | nm |
| Power Conversion Efficiency | 40 | | % |
| Series Resistance | 80 | | mΩ |
| Threshold Current | 3.5 | 14 | A |
| Operating Current | 28 | 80 | A |
| Operating Voltage | 22.8 | 23 | V |

Package Dimensions (Unit: mm)



Laser Diode Thechnologies

Stacked Array Semiconductor Laser Horizontal Array Package QCW Mode

Description

The high power stacked array semiconductor lasers operate at a typical wavelength of 808 nm. Standard product is up to 600 W and 1200 W output power in horizontal array package at QCW mode.

These lasers require an external heatsink like as TEC or water cooled.

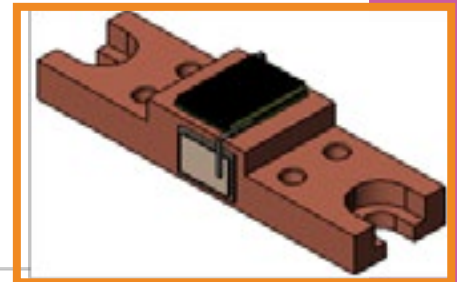


Applications

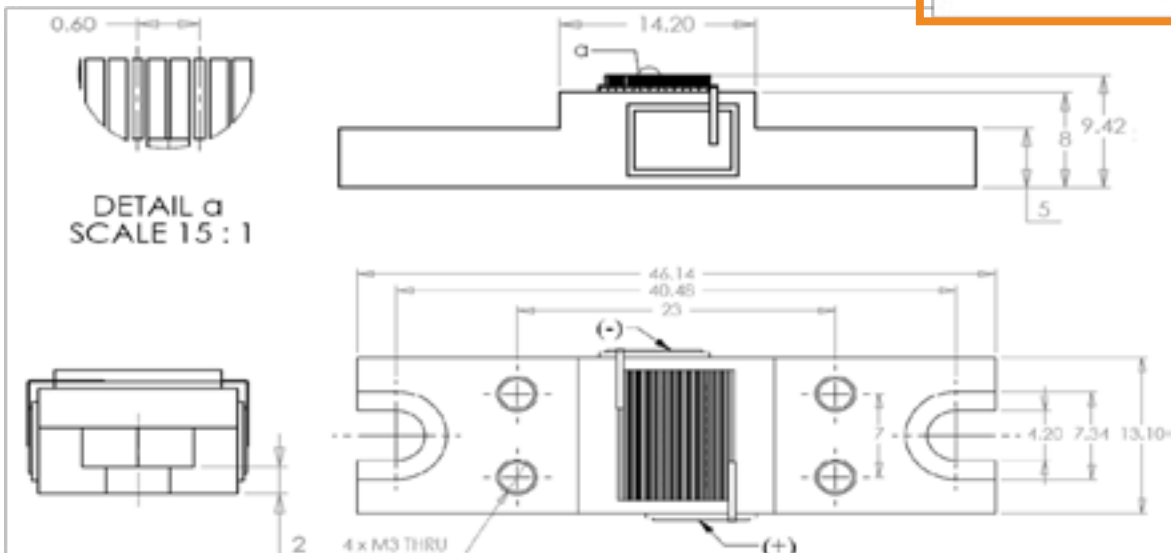
Industrial Pumping Applications
Medical systems
Aerospace & Defense Applications

Typical Specifications

| | | | |
|------------------------------|-----|------|-----|
| Optical Output Power | 600 | 1200 | W |
| Number of Bar | 10 | 15 | # |
| Center Wave Length Range | 808 | | nm |
| Center Wave Length Tolerance | 4± | | nm |
| Slop Efficiency | 11 | 12 | W/A |
| Spectral Width (FWHM) | 3 | | nm |
| Power Conversion Efficiency | 45 | | % |
| Series Resistance | 44 | 55 | mΩ |
| Threshold Current | 16 | 11 | A |
| Operating Current | 80 | 100 | A |



Package Dimensions (Unit: mm)



Laser Diode Technologies

Single Bar Semiconductor Laser CS Package CW & QCW Mode



Description

The single bar semiconductor lasers operate at a typical wavelength of 808 nm. Standard product in the single bar laser is up to 20 W and 60 W output power in CS package at CW and QCW mode, respectively.

These lasers require an external heatsink like as TEC cooled.

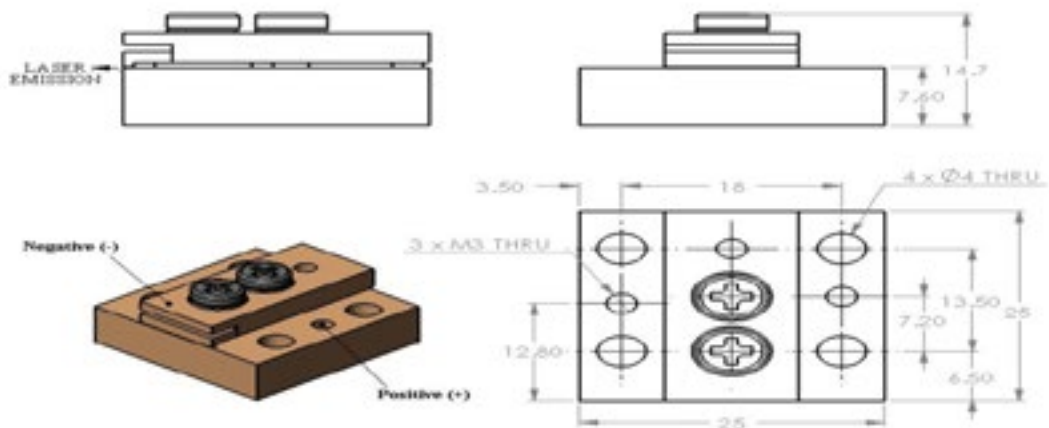
Applications

Medical Equipment
Laser Therapy
Research Activities
Plastic Welding
Dental

Typical Specifications

| Operation Mode | CW | QCW | |
|------------------------------|------|------|-----|
| Optical Output Power | 20 | 60 | W |
| Center Wave Length Range | 808 | | nm |
| Center Wave Length Tolerance | 4± | | nm |
| Slop Efficiency | 0.93 | 1 | W/A |
| Spectral Width (FWHM) | 3 | | nm |
| Power Conversion Efficiency | 45 | | % |
| Series Resistance | 7 | | mΩ |
| Threshold Current | 3.5 | 11.5 | A |
| Operating Current | 28 | 80 | A |
| Operating Voltage | 1.6 | 1.7 | V |

Package Dimensions (Unit: mm)



Laser Diode Technologies

Single Bar Semiconductor Laser CSR Package CW mode

Description

The single bar semiconductor laser nm. 808 operates at a typical wavelength of Standard product in the single bar laseris 10W output powerin CSR package at up to .CW mode
This laser requires an external heatsinklike .as TEC cooled

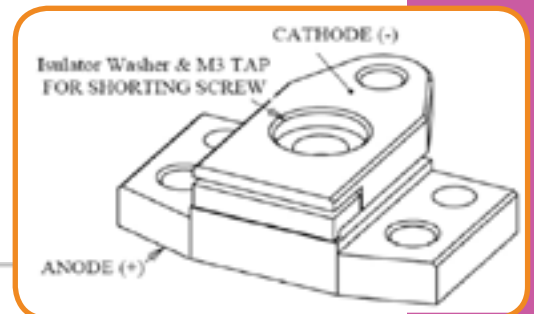


Typical Specifications

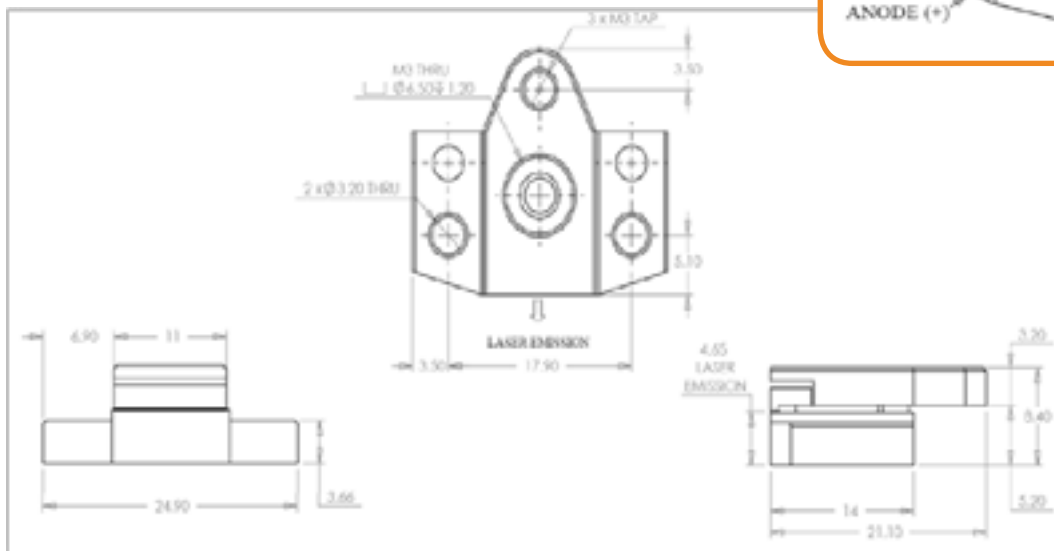
| | | |
|------------------------------|------|-----|
| Output Power | 10 | W |
| Center Wave Length Range | 808 | nm |
| Center Wave Length Tolerance | 4± | nm |
| Slop Efficiency | 0.95 | W/A |
| Spectral Width (FWHM) | 2.5 | nm |
| Power Conversion Efficiency | 50 | % |
| Series Resistance | 8 | mΩ |
| Threshold Current | 3.5 | A |
| Operating Current | 15 | A |
| Operating Voltage | 1.9 | V |

Applications

Medical Equipment
Laser Therapy
Research Activities
Dental



Package Dimensions (Unit: mm)



Laser Diode Thechnologies

Single EmitterSemiconductorLaser To3 Package CW Mode



Description

The single emitter semiconductor laser operates at a typical wavelength of 808 nm. Standard product in the single emitter laser is up to 1000 mW output power in TO3 package.

This laser requires an external heatsink to cool the semiconductor laser.

Applications

Spectroscopy
Laser Ranging
Research Activities
Industrial Use

Typical Specifications

| | | |
|------------------------------|------|-----|
| Output Power | 1000 | mW |
| Center Wave Length Range | 808 | nm |
| Center Wave Length Tolerance | 4± | nm |
| Slop Efficiency | 1 | W/A |
| Spectral Width (FWHM) | 1.8 | nm |
| Power Conversion Efficiency | 45 | % |
| Series Resistance | 500 | mΩ |
| Threshold Current | 200 | mA |
| Operating Current | 1200 | mA |
| Operating Voltage | 2 | V |

Fiber Laser

Industrial 10W - YFL-10- CW

Description

Inlc YFL-10-CW series represent new generation of diodepumped single-mode CW Ytterbium fiber laser systems of near infrared spectral range (1090-1060 nm) with unique compact design and high quality laser beam. The YFL-10-CW features are ultra-low amplitude noise, high stability and ultra-long pump diode lifetime. Users can customize the YFL-10-CW Series to meet their requirements by selecting output power, wavelength, linewidth and computer interface



Applications

Fine Cutting
Sintering
Welding
Engraving
Drilling
Scientific Experiments

Standard Specifications

| | |
|----------------------|-------------|
| Wavelength | 1080 nm |
| Mode of Operation | CW |
| Polarization State | Random |
| Output Fiber Type | Single Mode |
| Highly Efficient: | >%65 |
| Line-width (FWHM-nm) | 0.2 |

Typical Specifications

| | |
|-----------------------------------|--------------------|
| Output Power <i>W</i> | 10 |
| Beam Quality <i>M²</i> | $a < 1.3$ |
| Output Power Stability, | (%) 0.5± |
| Ambient Temperature (°C) | 45 - 5 |
| Weight, (kg) | 10 |
| Cooling System | Air & Water Cooled |
| Dimensions, <i>W x D x H (mm)</i> | 300 x 220 x 71 |
| Operating Voltage, (V DC) | 5 |
| Max. Current, (A) | 45 |
| Warranty | One year |

Fiber Laser

Q-Switched 40W YFL-40- QS

Description

INLC's YFL-40-QS series is an active acousto-optic Q-Switched fiber laser which provides high peak power with average power up to 40 W. The all fiber configuration of YFL-40-QS series allows for short pulse duration < 10 ns at repetition rate range 200-40 kHz and very high beam quality at the full range operation. The compact design and air-cooling system of YFL-40-QS series make it easy to be utilized in industrial systems.



Applications

Materials Processing
Ablation
Micromachining
Scribing
Solar/Photovoltaic
Scientific Research
Marking

| <i>Standard Specifications</i> | |
|--------------------------------|-------------|
| Wavelength | 1064 nm |
| Mode of Operation | Pulsed |
| Polarization State | Random |
| Output Fiber Type | Single Mode |
| Highly Efficient: | $>60\%$ |
| Line-width (FWHM-nm) | 2 |

| <i>Typical Specifications</i> | |
|--|-----------------|
| Output Power KW | 100 |
| Average Power, (W) | 40 |
| Beam Quality M^2 | $a < 1.3$ |
| Output Power Stability, | (%) $0.5 \pm$ |
| Ambient Temperature ($^{\circ}\text{C}$) | 5 - 45 |
| Weight, (kg) | 18 |
| Cooling System | Air Cooled |
| Dimensions, W x D x H (mm) | 450 x 200 x 170 |
| Operating Voltage, (V DC) | 220 |
| Max, Current, (A) | 5 |
| Warranty | One year |

Fiber Laser

Narrow Band 200W CW YFL-200- SM

Description

Inlc YFL-200-SM series represent new generation of diode-pumped single-mode CW Ytterbium fiber laser systems of near infrared spectral range (1090-1060 nm) with unique narrow band and high quality laser beam.. The YFL-200-SM features are ultra-low amplitude noise, high stability and ultra-long pump diode lifetime. Users can customize the YFL-200-SM Series to meet their requirements by selecting output power, wavelength, linewidth and computer interface



Applications

Fine Cutting
Sintering
Welding
Engraving
Drilling
Scientific Experiments

Standard Specifications

| | |
|----------------------|-------------|
| Wavelength | 1080 nm |
| Mode of Operation | CW |
| Polarization State | Random |
| Output Fiber Type | Single Mode |
| Highly Efficient: | >%65 |
| Line-width (FWHM-nm) | 0.3 |

Typical Specifications

| | |
|-----------------------------|-----------------|
| Output Power W | 200 |
| Beam Quality M^2 | $a < 1.3$ |
| Output Power Stability, (%) | 0.5± |
| Ambient Temperature (°C) | 4-45 |
| Weight, (kg) | 45 |
| Cooling System | Water Cooled |
| Dimensions, W x D x H (mm) | 815 x 480 x 186 |
| Operating Voltage, (V DC) | 40 |
| Max, Current, (A) | 43 |
| Warranty | One year |

Fiber Laser

Industrial 600W YFL-600- CW

Description

600w continuous fiber laser provides high quality beam $M^2_{1.3}$ at wavelength 1082nm. It is a water cooled laser and the optical efficiency of laser is %78. This allows optimal performance for critical welding, cutting and drilling applications. Spectral width of laser is 2nm. The laser system has no sensitivity to shocking and aerosols. There is no requirement to optical alignment. These compact units are substantially more cost-effective than conventional YAG lasers due to > %30 wall-plug efficiency



Applications

Cutting of steel sheet
Drilling
Welding

| <i>Standard Specifications</i> | |
|--------------------------------|-------------|
| Wavelength | 1064 nm |
| Mode of Operation | CW |
| Polarization State | Random |
| Output Fiber Type | Single Mode |
| Highly Efficient: | >%78 |
| Line-width (FWHM-nm) | 2.3 |

| <i>Typical Specifications</i> | |
|-------------------------------|------------------|
| Output Power | W 600 |
| Beam Quality | M^2 $a < 1.3$ |
| Output Power Stability, | (%) 0.5± |
| Ambient Temperature (°C) | 5 - 45 |
| Weight, (kg) | 230 |
| Cooling System | Water Cooled |
| Dimensions, W x D x H (mm) | 600 x 950 x 1000 |
| Operating Voltage, (V DC) | 38 |
| Max, Current, (A) | 55 |
| Warranty | One year |

Fiber Laser

Fiber Bragg gratings

FBG-HR-1065-1.5-99.5-6/125
 FBG-HR-1075-1.5-99.5-6/125
 FBG-HR-1095-1.5-99.5-6/125

FBG-OC-1065-0.20-10.0-6/125
 FBG-OC-1075-0.20-10.0-6/125
 FBG-OC-1095-0.20-10.0-6/125



Description

Fiber Bragg gratings are the main components of fiber lasers that are used as laser mirrors. These mirrors are used as pairs of fiber Bragg grating, high reflection and output coupler, with the same center wavelength. Fiber lasers operate at the fiber Bragg gratings wavelength

Applications

- Fiber Laser mirrors
- Sensors
- Spectral Filter
- Dispersion compensator

| <i>Standard Specifications</i> | |
|---------------------------------------|-----------------------|
| Wavelength | 1095 - 1075 – 1065 nm |
| Spectral bandwidth ranges (@3-dB, nm) | 0.1-1.47 |
| Reflectivity (%) | 3-99.5 |
| Output Fiber Type | Single Mode |
| FBG Type | Chirped |

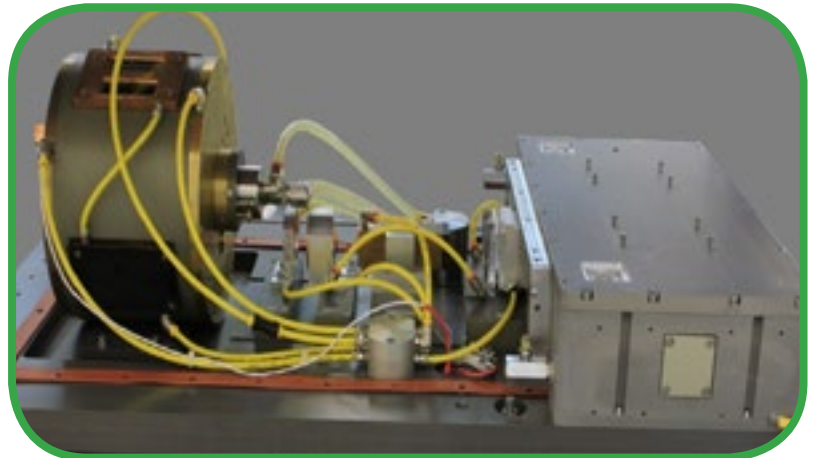
| <i>Typical Specifications</i> | | | |
|---------------------------------------|-------------|------|------|
| Central wavelength ranges (nm) | 1095 | 1075 | 1065 |
| Spectral bandwidth ranges (@3-dB, nm) | 0.22 | | 1.47 |
| Reflectivity (%) | 10 | | 99.5 |
| FBG Type | Chirped | | |
| Fiber Type | Single mode | | |

Dick Laser

1800W Disk Laser

Description

Based on thin disk technology, INLC offers an 1800W industrial thin disk laser which contains high power and good beam quality simultaneously. It is ideal for many purposes and also special purpose according to customers' specifications.



Applications

Material Processing
Welding
Cutting
Surface Treatment

Standard Specifications

| | |
|-------------------|------------------|
| Active medium | Yb:YAG thin disk |
| Wavelength | 1030 nm |
| Operating mode | CW |
| Expected lifetime | 10000 h |

Typical Specifications

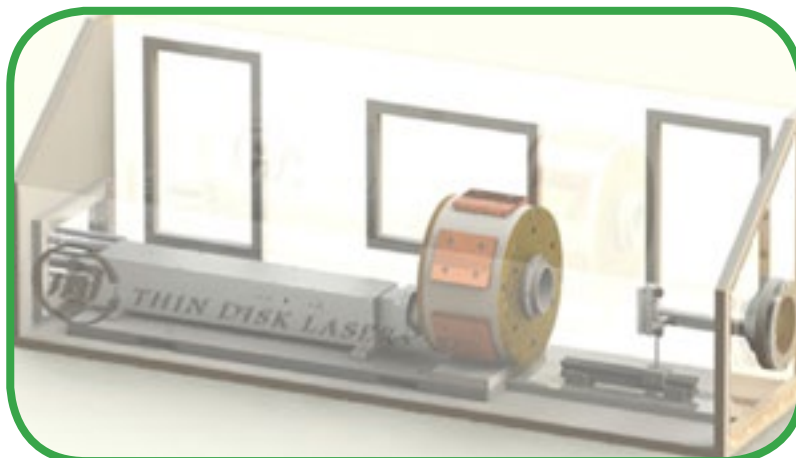
| | | |
|--------------------------------|---|----------------|
| Output Power | W | 1800 |
| Beam Parameter Product (B.P.P) | | 7 mm-mrad |
| Beam diameter at aperture | | 12 mm |
| Operating Temperature | | 15°C- 30°C |
| Weight, (kg) | | 45 |
| Cooling System | | Water Cooled |
| Dimensions, W x D x H (Cm) | | 80 x 220 x 175 |
| Weight | | 750 Kg |

Dick Laser

200W Training Disk Laser

Description

The high power 200W thin disk laser is manufactured for training in academic and research centers. The principal of laser disk design and operation can be educated using this type of disk laser system.



Applications

Training
Scientific Research

Standard Specifications

| | |
|----------------|------------------|
| Active medium | Yb:YAG thin disk |
| Wavelength | 1030 nm |
| Operating mode | CW |

Typical Specifications

| | | |
|--------------------------------|---|------------|
| Output Power | W | 200 |
| Beam Parameter Product (B.P.P) | | 12 mm-mrad |
| Weight | | 100 Kg |

Dick Laser

Low Power Disk Laser

Description

The low power thin disk laser is the second version of training disk laser of INLC. The outstanding feature of this system is the operation in the more safe conditions.



Applications

Training
Scientific Research

| <i>Standard Specifications</i> | |
|--------------------------------|-------------------------|
| <i>Active medium</i> | <i>Yb:YAG thin disk</i> |
| <i>Wavelength</i> | <i>1030 nm</i> |
| <i>Operating mode</i> | <i>CW</i> |

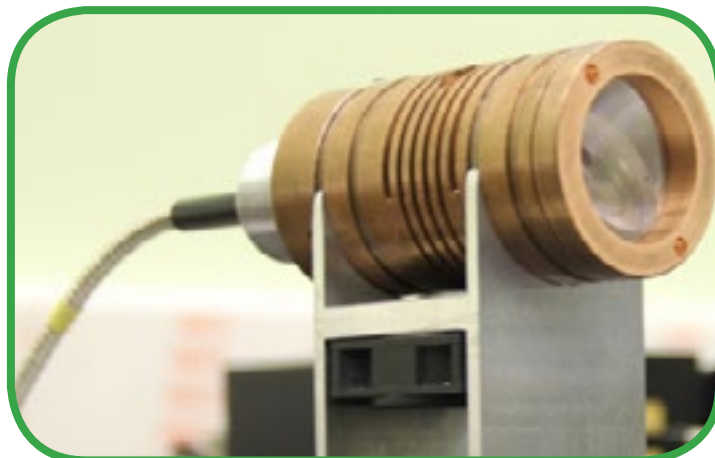
| <i>Typical Specifications</i> | | |
|-------------------------------|----------|--------------|
| <i>Output Power</i> | <i>W</i> | <i>10</i> |
| <i>M²</i> | | <i><2</i> |
| <i>Weight</i> | | <i>50 Kg</i> |

Micro Laser

Passively Q-switched Microchip Laser

Description

Passively Q-switched microchip lasers have many attractive features and have found numerous applications for their subnanosecond pulses. They are also able to produce short pulses with high repetition-rate, high quality TEM00 beam and if the output is amplified, they show much higher peak power than the ones which use modelocked technique. With these characteristics this laser has many Applications in nonlinear optics, micro-machining, Microsurgery and other fields that need short pulses with high peak power and high repetition rates.



Standard Specifications

| | |
|----------------------------|------------------|
| Wavelength | 1064nm and 532nm |
| Ultra-short pulses down to | 660ps |
| Excellent beam quality – | TEM00 |
| Efficient, air-cooled | |
| Compact package | |

Applications

Non-linear optics
Sensing and scanning applications
Raman spectrometry
Ranging
Bio photonics

Typical Specifications

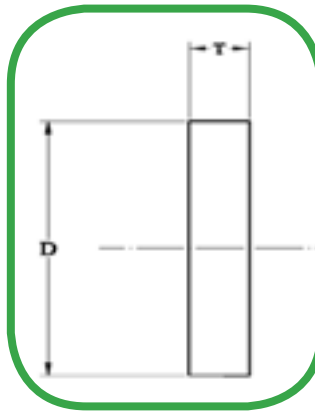
| | 1064 PQM 800,0.15 | 532 PQM 660,0.058 |
|-----------------------------|-------------------|-------------------|
| Product ID | 1064 PQM 800,0.15 | 532 PQM 660,0.058 |
| Wavelength | 1064nm | 532nm |
| Repetition Rate | 15KHz | 15KHz |
| Pulse Width(FWHM) | 800ps | 660ps |
| Output energy | 10μJ | 3.8μJ |
| Output power | 150mW | 58mW |
| Beam profile | TEM00 | TEM00 |
| Beam quality M ² | 1.2 | 1.2 |
| Peak Power | 12.5KW | 5.8KW |
| Power stability(60 min) | %1.9 | %1.9 |

Optics & Coating

Optical substrate

Description

Standard substrates are laser grade polished on surface. These substrates are ideal for beam splitters, windows, high & partial reflecting mirrors etc. Laser components require highly polished substrates as well as high performance coatings. Scattering, damage of laser light can occur if the substrate is made of inferior material or if it is inadequately polished



Typical Specifications

| <i>D(mm)</i> | <i>T (mm)</i> |
|--------------|---------------|
| 12.7mm | 3.5 |
| 12.7mm | 4.5 |
| 12.7mm | 6.35 |
| 25.4mm | 4 |
| 25.4mm | 5 |
| 25.4mm | 6.35 |
| 50.8mm | 3.2 |
| 50.8mm | 6.35 |
| 50.8mm | 10 |
| 76.2mm | 6 |
| 76.2mm | 12.7 |

Standard Specifications

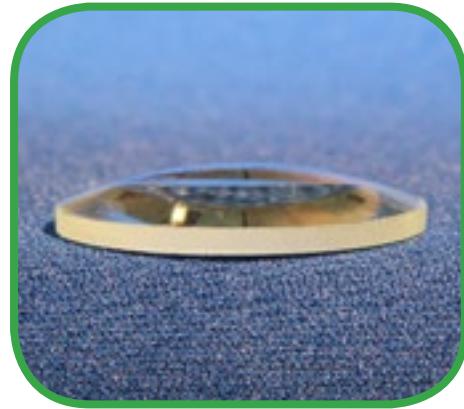
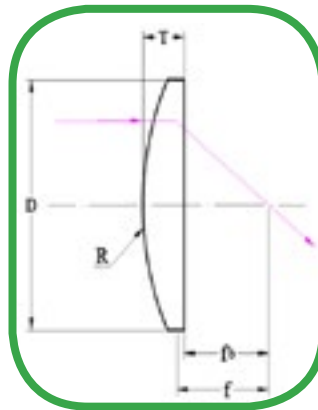
| | |
|--------------------------------|-------------|
| Diameter Tolerance (mm) | ± 0.01 |
| Thickness Tolerance (mm) | $0.1 \pm$ |
| Parallelism (arc minutes) | 3 |
| Surface Accuracy (λ) | $\lambda/4$ |
| Surface Quality | 5-10 |
| Substrate | BK7 or Fu |
| Coating | Uncoated |

Optics & Coating

Spherical Lenses Plano-Convex

Description

These lenses have positive focal length; lenses have flat surface on one side and spherical surface on the other. They are used for focusing beams in telescopes, collimators or condenser systems, Optical transceivers or other applications.



| <i>Standard Specifications</i> | |
|---------------------------------|-------------|
| Design Wavelength DWL (nm) | 632.8 |
| Diameter Tolerance (mm) | +0.0/-0.1 |
| Focal Length Tolerance (%) | 1± |
| Center Thickness Tolerance (mm) | 0.2± |
| Surface Quality | 5-10 |
| Clear Aperture (CA) | >%90 |
| Centering (arc minutes) | <3 |
| Substrate | BK7 or Fu |
| Coating | Uncoated |
| Flatness | $\lambda/4$ |

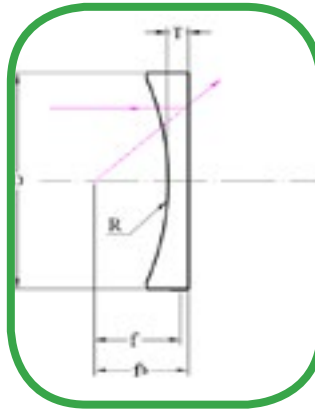
| <i>Typical Specifications</i> | | | | |
|-------------------------------|---------|---------|-----------|------------|
| $f(mm)$ | $D(mm)$ | $T(mm)$ | $f_b(mm)$ | Radius(mm) |
| 10 | 5 | 4 | 11.3 | 5.2 |
| 20 | 10 | 4 | 21.3 | 10.4 |
| 15 | 12.7 | 4.5 | 11 | 7.8 |
| 50 | 12.7 | 3.5 | 47.8 | 25.9 |
| 38.1 | 25.4 | 5 | 34.8 | 19.77 |
| 50 | 25.4 | 5.7 | 45.8 | 25.9 |
| 250 | 25.4 | 4.0 | 246.4 | 129.7 |
| 75 | 50.8 | 10.5 | 67.3 | 38.9 |
| 500 | 50.8 | 3.2 | 497.5 | 259.4 |

Optics & Coating

Spherical Lenses Plano-Concave

Description

These negative focal length lenses have flat surface on one side and spherical surface on the other. Lenses have them used in optical systems in combination with other lenses. These lenses also work as beam expanders, optical character readers, viewers, and projection systems.



| Standard Specifications | |
|---------------------------------|-----------|
| Design Wavelength DWL (nm) | 632.8 |
| Diameter Tolerance (mm) | +0.0/-0.1 |
| Focal Length Tolerance (%) | 1± |
| Center Thickness Tolerance (mm) | 0.2± |
| Surface Quality | 5-10 |
| Clear Aperture (CA) | >%90 |
| Centering (arc minutes) | <3 |
| Substrate | BK7 or Fu |
| Coating | Uncoated |
| Flatness | λ/4 |

| Typical Specifications | | | | |
|------------------------|-------|--------|---------------------|------------|
| f(mm) | D(mm) | T (mm) | f _b (mm) | Radius(mm) |
| -10 | 5 | 3 | -11.9 | -5.2 |
| -15 | 8 | 3 | -17 | -7.8 |
| -15 | 12.7 | 4 | -16.3 | -7.8 |
| -50 | 12.7 | 5 | -51.1 | -25.9 |
| -50 | 25.4 | 5 | -51.7 | -25.9 |
| -125 | 25.4 | 5 | -128.9 | -64.85 |
| -250 | 25.4 | 6 | -251.7 | -129.7 |
| -75 | 50.8 | 7 | -67.3 | -38.9 |
| -500 | 50.8 | 7 | -504 | -259.4 |

Optics & Coating

| Standard Coating Specifications | |
|--|---------------------------------|
| Diameter Tolerance (mm) | +0.0/-0.1 |
| Thickness Tolerance (mm) | 0.2± |
| Surface Quality | 40-60* |
| Clear Aperture | >90 % |
| Front Surface Accuracy | $\lambda/2$ @ 632.8 nm* |
| Back Surface Accuracy | $\lambda/2$ @ 632.8 nm* |
| Front Radius of Curvature (mm) | ∞ |
| Back Radius of Curvature (mm) | ∞ |
| Parallelism (arcminutes) | 3* |
| Substrate | BK7 |
| Type | Mirror |
| Coating Specification | Ravg >%97 @ 450 nm - 20 μ m |
| Angle of Incidence (°) | not sensitive |
| Damage Threshold Pulsed (J/cm @ ...ns) | --- |
| *Substrate and Coating Specifications Can be changed (improved) upon customer request. | |



| Ø50.8 mm, Protected Silver Mirror <small>Part No: SMM B 50</small> | |
|--|------------------|
| Typical Specifications | |
| Diameter (mm) | 50.8 |
| Thickness (mm) | 6 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 633* |

| Ø25.4 mm, Protected Silver Mirror <small>Part No: SMM B 25</small> | |
|--|------------------|
| Typical Specifications | |
| Diameter (mm) | 25.4 |
| Thickness (mm) | 5 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 633* |

Description

Protected silver mirror has the highest reflectance of any protected metal coating in the visible, near IR and mid IR regions (average reflectance upper than %97 in the spectral range of 450 nm - 20 μ m). In order to protect silver mirrors from oxidation and tarnishing, these mirrors have a thin SiO₂ layer overcoat with an approximate thickness of 50 nm. Protected Silver is not sensitive to wavelength, angle of incidence and polarization, so it is useful for a wide range of low to medium power monochromatic and polychromatic applications. This coating is suited for femtosecond pulse lasers.

| Ø50.8 mm, Protected Gold Mirror <small>Part No: GMM B 50</small> | |
|--|------------------|
| Typical Specifications | |
| Diameter (mm) | 50.8 |
| Thickness (mm) | 6 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 800* |

| Ø25.4 mm, Protected Gold Mirror <small>Part No: GMM B 25</small> | |
|--|------------------|
| Typical Specifications | |
| Diameter (mm) | 25.4 |
| Thickness (mm) | 5 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 800* |

Description

Protected Gold mirror offers excellent reflectance from 700 nm through mid IR (average reflectance about 96 % and upper from 800 nm to 20 μ m). A protective dielectric overcoat is layered over the gold to help protect it from damage and make cleaning easier. Protected gold is not sensitive to wavelength, angle of incidence and polarization, so it is useful for a wide range of monochromatic and polychromatic applications.

| Ø50.8 mm, Protected Aluminum Mirror <small>Part No: AMM B 50</small> | |
|---|------------------|
| <i>Typical Specifications</i> | |
| Diameter (mm) | 50.8 |
| Thickness (mm) | 6 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 633* |

| Ø25.4 mm, Protected Aluminum Mirror <small>Part No: AMM B 25</small> | |
|---|------------------|
| <i>Typical Specifications</i> | |
| Diameter (mm) | 25.4 |
| Thickness (mm) | 5 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 633* |

Description

Protected Aluminum is the most commonly used metal coating for less demanding, general purpose applications. Aluminum mirrors provide average reflectance about 90 % and upper from 450 nm to 650 nm and upper than %95 in the spectral range from 2 μ m - 20 μ m. A SiO₂ thin layer is used to protect the aluminum coating. Protected aluminum is not sensitive to wavelength, angle of incidence and polarization, so it useful for a wide range of low power monochromatic and polychromatic applications.

| Ø50.8 mm, Enhanced Aluminum Mirror <small>Part No: EAMM B 50</small> | |
|---|------------------|
| <i>Typical Specifications</i> | |
| Diameter (mm) | 50.8 |
| Thickness (mm) | 6 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 350* |

| Ø25.4 mm, Enhanced Aluminum Mirror <small>Part No: EAMM B 25</small> | |
|---|------------------|
| <i>Typical Specifications</i> | |
| Diameter (mm) | 25.4 |
| Thickness (mm) | 5 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 350* |

Description

Enhanced Aluminum is comprised of aluminum overcoated with a multilayer dielectric film that is designed to optimize reflectance at a specific wavelength. Enhanced Aluminum is used to enhance the reflectivity of bare Aluminum, most commonly in the ultraviolet region. For example, at 350nm, Bare Aluminum will deliver about %90 reflectivity. Using Enhanced Aluminum at the same wavelength will deliver greater than %95 reflectivity. This coating is more sensitive to wavelength, angle of incidence and polarization than protective metal coatings.

| Ø50.8 mm, Dielectric Nd:YAG Mirror <small>Part No:1064 DNM B 50</small> | |
|--|------------------|
| <i>Typical Specifications</i> | |
| Diameter (mm) | 50.8 |
| Thickness (mm) | 6 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 1064* |

| Ø25.4 mm, Dielectric Nd:YAG Mirror <small>Part No: 1064 DNM B 25</small> | |
|---|------------------|
| <i>Typical Specifications</i> | |
| Diameter (mm) | 25.4 |
| Thickness (mm) | 5 |
| Coating | Protected silver |
| Design Wavelength DWL (nm) | 1064* |

Description

Nd:YAG High Reflection coatings provide high reflectance at 1064 nm wavelength. By use of Nd:YAG High Reflection coatings at the 1064 nm wavelength will deliver greater than %99 reflectivity. These coatings are specified for °0 and °45 angle of incidence. These all dielectric coatings are sensitive to polarization, wavelength and angle of incidence. They are durable and highly resistant to Nd:YAG laser damage.

