



MAXPHOTONICS CO.,LTD

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**MFP-20**  
**Pulsed Fiber Laser**

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**User Manual**

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**Please take time to read and understand this User's Guide and familiarize yourself with the information that we have compiled for you before you use the product. This User's Guide should stay with the product to provide you and all future users and owners of the product with important operating, safety and other information.**

**The MAXPHOTONICS Laser Model MFP-20 is a Class IV laser product. Before turn on the power of 220VAC please make sure that the interface is exact, otherwise, the laser model will be shattered.**

**This laser emits more than 20 Watts of invisible laser radiation in the optical band near 1064 nm.**

**Avoid eye or skin exposure to direct or scattered radiation emitted from the optical output.**

**Do not open the device. There are no user serviceable parts, equipment or assemblies associated with this product. All service and maintenance will be performed only at the factory.**

**Do not looking the optical output directly through eyes, please make sure to wearing the laser safety glasses when operation.**

## Safety Information

### Safety Conventions



**Be careful**  
**Avoid direct laser irradiation**

This symbol indicates laser radiation. We place this symbol on products which have a laser output.



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## 1. Description

### 1.1 Description

MFP-20 pulsed Ytterbium fiber laser is the one of most advanced products of MAXPHOTONICS. It is a revolutionary, new, high-performance OEM device which was developed for integration into high-speed, high resolution laser marking systems.

The main advantage of the MFP-20 offers over ten times improvement in per-Watt optical power efficiency as well as low power consumption and practical robust design over traditional diode-pumped solid-state lasers, and is suitable for either laboratory or field operation. The source has a compact, rugged, stand-alone, ready-to-use, turn-key design and can be directly integrated into user's apparatus.

The laser emits periodical pulse train at 1064 nm wavelength and peak power up to 20 KW. Pulse repetition rate can be controlled either via separate remote control unit or by external PC. The laser requires an 24V external DC power supply.

## 1.2 Accessories

Please check the included accessories according to Table 1.

Tab. 1

Items	Quantity	Note
Instruction manual	1	

## 1.3 Environment and Precautions

Power supply voltage for MFP-20 is 24±1 V DC.

**WARNING:** Always use your laser device in conjunction with properly grounded power source.

**CAUTION:** Before supplying the power to the instrument, make sure that the correct voltage of the DC power source is used (24 V). Failure to use the correct voltage could cause damage to the instrument.

**WARNING:** No operator serviceable parts inside. Refer all servicing to qualified MAXPHOTONICS personnel. To prevent electrical shock, do not remove covers. Any tampering with the product will void the warranty.

**WARNING:** This device has output optical head connected to the MFP-20 by fiber cable. So please, be careful dealing with output head. Do not separate the fiber and the laser head.

**WARNING:** If this instrument is used in a manner not specified in this document, the protection provided by the instrument may be impaired. This product must be used only in normal conditions.

**WARNING:** Do not install collimator when laser is active.



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- WARNING:** MFP-20 Fiber Laser Module has three fans at the rear panel for active cooling. Make sure that there is sufficient airflow to cool the device.
- WARNING:** NEVER look directly into output head and make sure that you wear appropriate laser safety glasses at all times while operating the product.
- WARNING:** When you marking on the copper material, please do not to make the marking area in the central ,or it will be damaged the laser.
- WARNING:** Power supply interruption is very dangerous for the equipment, please provide continuous uninterrupted power supply voltage
- CAUTION:** In addition to the manual of controls or adjustments or performance, other operations may cause the risk of radiation exposure
- CAUTION:** It's essential to keep the output lens cleaning. After use, please re-covered the collimator.. Do not touch the output lens,. Please use the lens tissue to clean it and do not use any solvents to clean.
- CAUTION:** Please follow the above guides to process, if not, it will cause damage to the optics components, which should be excluded in the warranty range.

### 1.4 Specification

#### OPTICAL CHARACTERISTICS

Mode of Operation	Pulsed
Output Beam Mode	$M^2 < 1.8$
Polarization	Random
Central Emission Wavelength, nm	1064 +/- 2
Nominal Average Output Power, W	20
Output Power Tunability, W	0 to 20
Long-Term Average Output Power Instability (over 5 hours), %	< 5
Pulse Duration at 20 kHz, ns	70--120



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Pulse Repetition Rate, kHz	22—70
Nominal Peak Power (pulse energy/FWHM pulse duration), kW	> 5
Peak Power Instability, %	< 5
Residual Pump Power at the Output, dB	<-60

### OPTICAL OUTPUT

Output Fiber, $\mu\text{m}$	20 / 125 / 3000/7000
Output Fiber Length, m	1.9/2.5/3
Output Collimator	Bulk Lens
Output Beam Diameter ( $1/e^2$ ), mm	6-9

### PUMP DIODES

Emission Wavelength, nm	970 +/- 10
Stripe, $\mu\text{m}$	1x100
MTTF ( 20 °C ), hours	> 30 000

### ELECTRICAL CHARACTERISTICS

Supplied Voltage, V DC	24
Nominal Total Current ( at 24 V, 20 °C ), A	< 8,5
Maximum Total Current, A	< 15
Typical Power Consumption ( at 20 °C ), W	< 140

### GENERAL CHARACTERISTICS

Operating Temperature Range, °C	0 to (+40)
Storage Temperature, °C	(-10) to (+60)
Cooling Method	4 fans
Warm-up Time, s :	10

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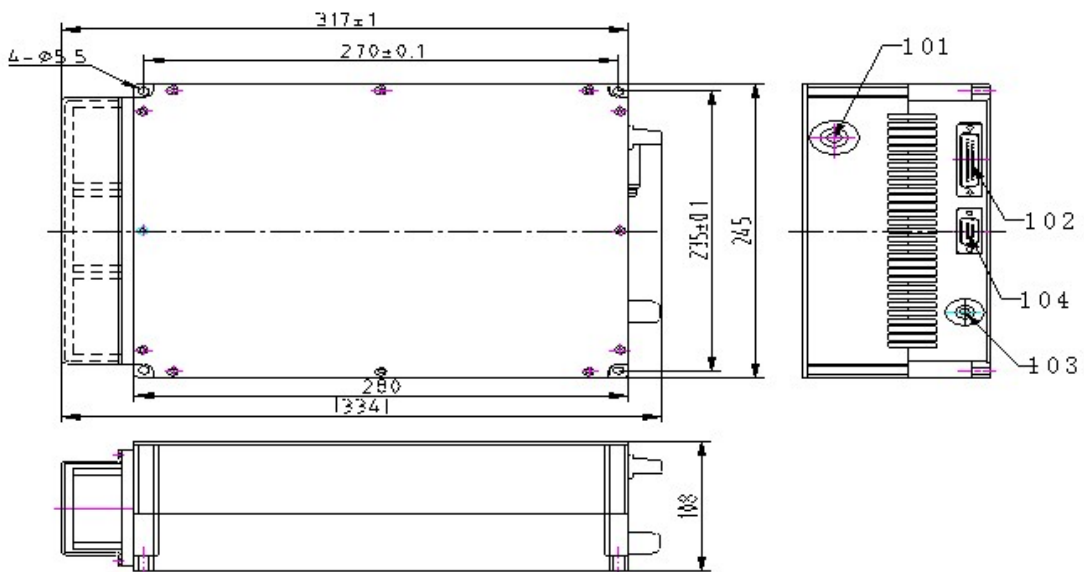
Humidity, %	10 to 95
Weight, kg	10

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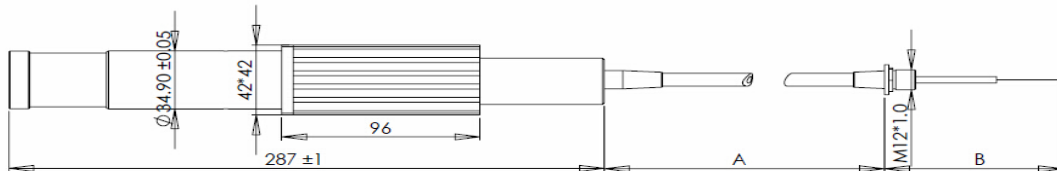
## 2.Installation

### 2.1 Installation Measurement Picture

#### 2.1.1



### 2.1.2 Isolator Measurement



### 2.2 Installation Method

- 1). Connected the electrical mold and optics mold. That means connecting the cable and radio cable (If the single radio cable) to the two ends of the molds separately.
- 2). Check that the AC voltage selector (24) set to the correct voltage, then plug the remote control unit into the mains supply.
- 3). Install the external DC power supply (24 V) and connect the laser module DC power

### 3. External Layout

#### 3.1 25 pin D-shape connector pin assignment

PIN No.	Description															
1-8 (D0-D7)	TTL/CMOS levels. Power Setting (0-FFh or 0...255). LSB (D0) corresponds to Pin number 1, MSB (D7) corresponds to pin 8. 00h (0): Minimum output power FFh (255): Maximum output power Disconnected corresponds to 00h.															
9	Latch. Latches power setting simultaneously with rising edge.															
10-15, 24	Ground															
16, 21	Laser alarms status.															
	<table border="1"> <thead> <tr> <th>Pin 16</th> <th>Pin 21</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>LOW</td> <td>LOW</td> <td>Laser temperature is out of operating temperature range</td> </tr> <tr> <td>LOW</td> <td>HIGH</td> <td>Normal operation</td> </tr> <tr> <td>HIGH</td> <td>LOW</td> <td>Laser has automatically switched OFF due to high optical "Back Reflection" returned to the laser</td> </tr> <tr> <td>HIGH</td> <td>HIGH</td> <td>MO failure</td> </tr> </tbody> </table>	Pin 16	Pin 21	Status	LOW	LOW	Laser temperature is out of operating temperature range	LOW	HIGH	Normal operation	HIGH	LOW	Laser has automatically switched OFF due to high optical "Back Reflection" returned to the laser	HIGH	HIGH	MO failure
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	LOW	HIGH	Normal operation													
HIGH	LOW	Laser has automatically switched OFF due to high optical "Back Reflection" returned to the laser														
HIGH	HIGH	MO failure														
17	Auxiliary 5±0.25VDC power supply for independent guide laser operation. Maximum load current is 0.15A.															
18	Master Oscillator (MO) ON/OFF signal. TTL/CMOS levels. HI: MO ON LOW or disconnected: MO OFF															
19	Laser Modulation input (Power Amplifier ON/OFF input). TTL/CMOS levels. HI: PA ON LOW or disconnected: PA OFF															
20	Pulse Repetition rate (Synchronization) input TTL/CMOS levels square wave. Refer to the specification for operating PRR range. Duty cycle in the range from 0.1 to 0.9.															
22	Guide Laser (red diode) ON/OFF input. TTL/CMOS levels. HI or disconnected: ON LOW: OFF															
23	Emergency Stop Input HI: OK (Normal operation) LOW or disconnected: STOP (Laser automatically switches OFF)															
25	Laser output power monitor (average power). Current loop 4-20mA, recommended load is 200 Ohm. Calibration: 4mA=0W, 10mA=Maximum power.															

**Control Interface Operation as followings**

- 1.This laser is controlled by connecting through the DB25 interface, the detail information please view above sheet
2. Pin1~8 are the main line of setting the power of 8 bit,Pin1 is LSB, Pin8 is MSB. The input range of this Pin is 0~255, and with 0~100% standard power data. e.g.: please see as following sheet

	Setup1	Setup 2	Setup 3	Setup 4	Setup 5
Pin1	0	0	0	0	1
Pin2	0	0	0	0	1
Pin3	0	0	0	0	1
Pin4	0	0	0	0	1
Pin5	0	0	0	1	1
Pin6	0	0	1	1	1
Pin7	0	1	1	1	1
Pin8	1	1	1	1	1
Current	50%	75%	87.5%	93.75%	100%
The power of the laser	35%	65%	85%	92%	100%

4. Pin16 and Pin21 are for warning, the 2 Pin show the situation as followings.

Pin 16	Pin 21	Alarm status
LOW	LOW	Laser temperature is out of operating temperature range
LOW	HIGH	Normal operation
HIGH	LOW	Laser has automatically switched OFF* due to high optical "Back Reflection" returned to the laser
HIGH	HIGH	MO failure

5. Pin18 is the switch sign of MO (main surge) .MO should be turn on before 4ms when open the Booster (BS) .After turning on the MO ,the laser will have some electricity consumption.

**Notes:** MO and Pin18 should be turning on at the same time.

6. Pin19 is the input end of launching controller Booster (BS) .when level is H, please turn on the BS, when level is L, please turn off BS, when the Pin19 change to lever



H, the laser will be out after stated delay. When the level is L, the laser will be turned off after stated delay.

**Notes:**

- a. MO should be turned on before 4ms of BS, if not, it will be no laser output.
- b. If turning on the BS first, then the MO, the laser will be out after 1~4ms. The above two situation is not list in the manual as they are unusual operation, please try to avoid them. BS should be turned on together with the data rising.

7. Pin20 is the input interface of in-phase, The pulse of laser output should be the same steps with signal rising at the stated range ,the pulse repetition rate from this side to input (PRR) (referring the limitation of PRR) .

Notes: if the input PRR above the stated range, the protection system of laser will protect the loop and recruit the loss pulse or limitation the data of PRR.

8. Pin23 is the input interface of “emergency stop”. When running ok, the level should be H, once the level change to L, the laser will be stopped automatically ( the same with MO&BS) which isn’t depend on the other control signal. When restart the laser, please make sure that the level of MO &BS should be down to L (if the original is H) .If need the laser running normally, this signal should be at H level 2  $\mu$  s earlier before offering the MO&BS.

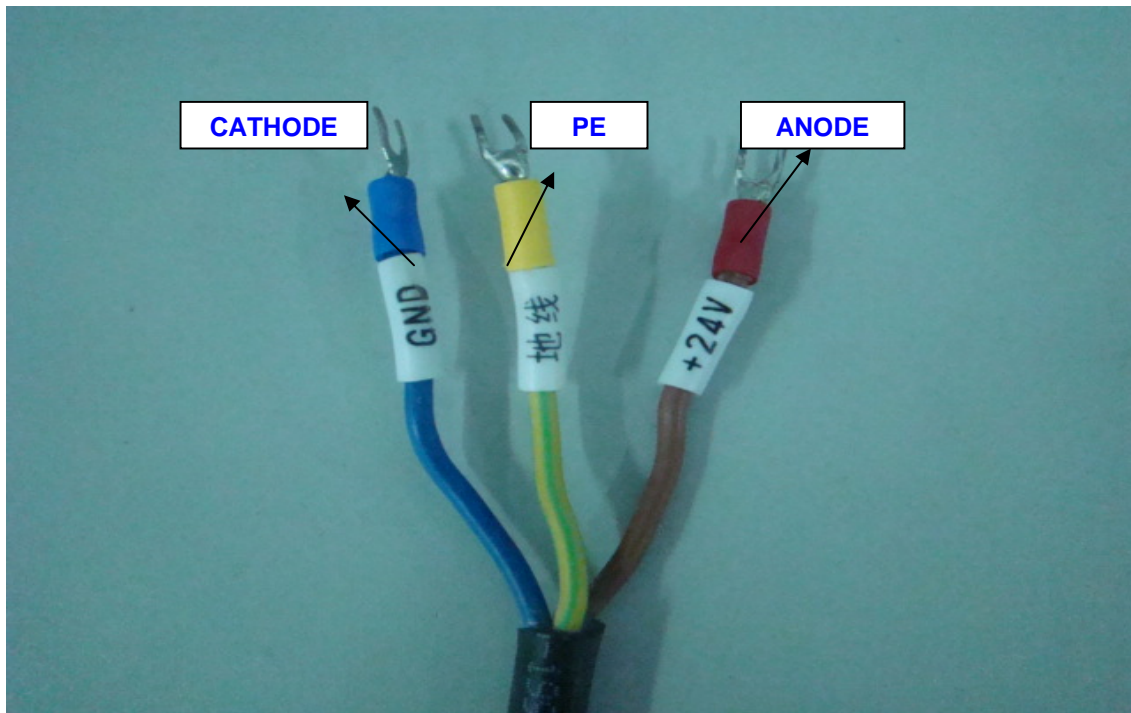
**Laser Running**

- 1. Please take off the protecting covering from the laser output head.
  - 2. Please connected the laser mold and control system through DB-25 interface, please make reference from the leading of DB25 if necessary
  - 3. Please make sure that the following interface at the initialization rightly
    - a) Pin18, 19, 22, 23 at level L ;
    - b) The Repetition frequency of Pin20 at the stated range
  - 4. Connected the 24VDC power and laser power line (+24V to brown, ground to green/yellow, - to blue)
  - 5. Laser will be running after 120s when gaining the 24VDC power (warming-up time) .  
Notes: it’s allowing to offer the 24VDC main power first, then make the control signal initial
  - 6. Make the emergency stop to (Pin23) H.
  - 7. Set up the required power through Pin1~8.
-

8. Set up the Pin18 to and turning on MO.
9. Waiting about 4ms.
10. Through Pin19 to modulate the laser. Input H/L to control the laser's switch. The up and down time have been limited (referring the specification) The modulate speed can not be faster than the total value of up and down's time. The typical time should be 250us, the period of modulate should be above 500us (the related frequency should be 2kHz) .
11. After finished a turning on/off operation, and wait for the next task, if the time above 20ms, please turn off the MO, and it can decrease the power consumption, extend the using life of MO, and avoid the balance power output of MO.
12. When finished a task, please turn off the BS &MO (Pin18 & Pin19 should be L) .
13. Cut down the power of 24VDC .

#### Power Connected

The laser power line as followings





## 4. Operation

### 4.1 Preparing for use

4.1.1 Checking the fiber laser power, marking system power and computer connected finished

1.1.2 Checking the signal of marking system and fiber laser power.

MAXPHOTONICS CO.,LTD certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.

NOTE: Upon Receiving your device check the packaging and parts for any possible damage that may have occurred in transit. If damage is apparent please contact MAXPHOTONICS CO.,LTD immediately.

### 4.2 Operation Steps

#### 4.2.1 Operation Steps

Turn on the fiber laser power, then the marking system power(make sure that the fiber laser power on and the fan running within the 180s warm-up time of the marking system ),otherwise, should return-on according the order and turn on the computer power at the end.

#### 4.2.2 Operation steps of checking laser marking system after turning on

When start to test the fiber laser after start-up finished, please set up the power to 0W,then make a picture, marking continually and add the power from 0W to 20W. And also to test by using a camera paper, and notice that the laser must be getting stronger( the step should be taken when starting the machine each time, please turn off the machine to check when the laser does not become stronger or there isn't any laser. After the work in order, marking can be started following the normal procedure.

### 4.3 Warning

4.3.1 The highest frequency should be 70KHz

4.3.2 Please be careful when you adjust the rate of frequency when marking, or it will influence the marking results.

4.3.3 It's workable for MAXPHOTONICS fiber laser to turn off the laser power directly





## **5. Quality Assurance, Warranty and Return Process**

### **5.1 General Warranty**

The warranty of Maxphotonics fiber laser is 24 months upon the customer receive the fiber laser .

All products are warranted by MAXPHOTONICS against defects in materials and workmanship for the period of time as set forth on the applicable purchase order or in the specifications starting with the date of shipment. MAXPHOTONICS also warrants that this product will meet applicable specifications under normal use.

MAXPHOTONICS shall, at its option, repair or replace any product that proves, in the reasonable opinion of MAXPHOTONICS, to be defective in materials or workmanship during the warranty period. All products repaired or replaced under warranty are only warranted for the remaining un-expired period of time in the original warranty for the particular defective product. MAXPHOTONICS reserves the right to issue a credit note for any defective products that have proved defective through normal usage.

### **5.2 Warranty Limitations**

This warranty excludes products, parts (including fiber connectors) or equipment which have been tampered with, opened, disassembled, opened, or modified by persons other than MAXPHOTONICS personnel, misused, neglected, or damaged by accident, used in applications which exceeds their specifications or ratings, used outside of environmental specifications for the product, used with buyer software or interfacing, improperly installed, maintained or otherwise abused or used other than in accordance with the information and precautions contained in this User's Manual. It is the customer's responsibility to understand and follow operating instructions in this User's Guide and specifications prior to operation—failure to do so may result in voiding this warranty. Accessories and fiber connectors are not covered by this warranty.

Buyer must claim under the warranty in writing no later than 31 days after the claimed defect is discovered. This warranty does not extend to any third party, including without limitation Buyer's end-users or customers, and does not apply to any parts, equipment or other products not manufactured by MAXPHOTONICS.





### **5.3 Services and Repairs**

**CAUTION:** No operator serviceable parts inside. Refer all servicing to qualified MAXPHOTONICS personnel. All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to MAXPHOTONICS Fiber Laser or its representative in your area. Items authorized for return by us must be returned in a suitable container.

Any damage noted upon receipt of the unit must be documented for appropriate claim against the carrier.

### **Changes**

We reserve the right to make changes in design or constructions of any of our products at any time without incurring any obligation to make changes or install the same on units previously purchased.



6. RMA Clearance Form

RMA File No. (req'd) \_\_\_\_\_

(given by MX.): \_\_\_\_\_

Total Number of \_\_\_\_\_

Unit(s) Returned: \_\_\_\_\_

Serial No(s):

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Please ship the unit(s) to:

**MAXPHOTONICS CO.,LTD**

Mingschin Industrial Park,Nanhuan Road ,Shajing Town,Bao'an,Shenzhen,China

**Attention: Quality Manager**

This RMA file number will expire 31 days after the faxed date from MAXPHOTONICS FIBER LASER. Thereafter, units received in under the expired RMA number will result in a longer turn around time. Please include one COPY of this form signed by the MAXPHOTONICS Fiber Laser Quality Manger with the return of your unit(s).

**INSTRUCTIONS FOR PRODUCT RETURNS**

- 1. MAXPHOTONICS Fiber Laser will only accept returns for which an approved Return Material Authorization (RMA) has been issued by MAXPHOTONICS Fiber Laser. You must first call the Quality Manager of MAXPHOTONICS CO.,LTD at +86-4006638119 to discuss the return and request a RMA number.** You must return defective products freight prepaid and insured to MAXPHOTONICS FIBER Laser at the address shown herein. All products which have returned to MAXPHOTONICS Fiber Laser but which are found to meet all previously applicable specifications for such products or which indicate damage to the fiber connectors not resulting from defect manufacturing, shall be subject to MAXPHOTONICS Fiber Laser' standard examination charge in effect at the time and these costs shall be charged to the Buyer. All products returned to MAXPHOTONICS FIBER Laser which are not accompanied by an itemized statement of defects, shall be returned to the Buyer at the Buyer's expense and MAXPHOTONICS Fiber Laser shall not carry out any evaluation of such products. MAXPHOTONICS Fiber Laser warrants to Buyer that its services, labor and replacement parts, assemblies and modules will be free of defects in material and workmanship for ninety (90) days from the date of shipment or performance of services.
- 2. Warranty Returns** - Domestic & \*International Buyers should pay for **one-way** freight costs to MAXPHOTONICS CO.,LTD. MAXPHOTONICS Fiber Laser will reimburse Buyers for applicable reasonable third-party freight costs and MAXPHOTONICS Fiber Laser will pay for freight return cost back to the Buyer.



3. **Non-Warranty Returns** - Domestic & \*International Buyers are responsible for **two-way** freight costs. If shipment consists of returns that are both warranty and non-warranty, the shipment will be considered as non-warranty. Any UNAUTHORIZED shipments billed to MAXPHOTONICS Fiber Laser without authorization will be re-invoiced to the Buyer. Confirming purchase orders are required for non-warranty returns.
4. \*International Returns must include applicable DUTIES AND TAXES, and you must mark air bills with "RETURNED FOR REPAIR". In any event, where MAXPHOTONICS Fiber Laser accepts a shipment, MAXPHOTONICS Fiber Laser will invoice to the Buyer for any charges as stated above.
5. Returns for credit will not be accepted unless authorized in advance, in writing by MAXPHOTONICS Fiber Laser, in accordance with MAXPHOTONICS Fiber Laser' Terms and Condition, including the warranty provisions. In most cases, restocking fees will apply.
6. All returns must be packaged adequately to avoid damage during shipment.
7. Complete packing list with product model and serial number will insure prompt repair, if the other terms of this form are followed.
8. See the MAXPHOTONICS Terms and Conditions for the applicable warranty for the products before you request the return of the products.

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MAXPHOTONICS CO.,LTD

Quality Manager Signature (required)

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Date