



**Q-SWITCHED PULSED FIBER LASER
(MFPN-20M-100M)2.0st Generation**

USER GUIDE

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Preface

Thank you for using the Q-Switched Pulsed Fiber Laser (MFPN-20M-100M) Series products from Maxphotonics. We compile this document for you in order that the laser is used and maintained properly. Due to the limited level of the translators, coupled with time constraints, there are some careless mistakes in this document, and your understanding will be much appreciated. Thank you again for using Maxphotonics' products.

Please take time to read and understand this User's Guide and familiarize yourself with the operating and maintenance instructions before you use the product. We recommend that the operator read the Section titled "Safety Information" prior to operating 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.

We identify the parts to which you need to pay special attention in the document with underscore. Please notice those information to prevent the unnecessary damages.

Company Profile

Found in 2004, Maxphotonics is one of the first fiber laser manufacturers in China. It is also the first in China to realize independent intellectual property rights and vertical integration in the core technologies of fiber lasers and optical devices. One of the national high-tech enterprises. Maxphotonics has developed into an internationally renowned laser manufacturer that develops, manufactures and sells fiber lasers and core optical components.

Maxphotonics specializes in the research, development, production and sales of fiber lasers, including pulsed fiber lasers, continuous fiber lasers and direct diode

lasers. It also implements pump sources, combiners, fiber gratings, isolators, laser output heads, and stripping. Optical devices such as molds, acousto-optic modulators, and pattern matchers are produced autonomously. Products are widely used in marking, engraving, cutting, drilling, cladding, welding, surface treatment, rapid prototyping and additive manufacturing processes.

More informations, please visit our website:

<http://en.maxphotonics.com>

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Chapter 1

Characteristic Explain

The Q-Switched Pulsed Fiber Laser (MFPN-20M-100M) Series products provide a wide range of lasers, the emission wavelength of which is centered at 1064 ± 5 nm. They are air-cooled and maintenance-free and deliver high efficiency, high reliability, and high performance on marking and engraving, which makes them ideal tools in this area.

Maxphotonics' Q-Switched Pulsed Fiber Laser (MFPN-20M-100M) Series are Class 4 laser products and are designed and tested with safety. By following this User Guide and applying sound laser safety practices, it will be a safe and reliable device.

Laser light exhibits unique characteristics that may pose safety hazards. Therefore, the laser light can't be normally associated with other light sources, and all operators and people near the laser must be aware of these special hazards.

In order to ensure the safe operation and optimal performance of the product, please follow all warnings and safety instructions in this guide during process of operation, maintenance and service.




For ensuring the safety of operators, operators are urged not to open the equipment privately at all times. There are no user serviceable parts, equipment or assemblies associated with this product. Lasers of unauthorized disassembly shall not be subject to warranty.

Chapter 2

General Safety Information

1-Safety Conventions

All safety warning symbols during operating process of the laser include:

SYMBOLS	DESCRIPTION
	<p>WARNING : Refer to a potential Electrical Hazards to human body; It requires certain procedures; otherwise, it may result in bodily harm to you and/or others. In order to ensure the personal safety of operators, do not violate the requirement of the WARNING sign.</p>
	<p>CAUTION : Refers to a potential hazard on product. It requires certain procedures; otherwise, it may result in damage to the product or components. In order to ensure normal use of equipment, do not violate the requirement of the CAUTION sign.</p>
	<p>WARNING : Refers to a potential Laser Hazard. The symbol represents laser radiation. The symbol is pasted on laser output end.</p>
<p>NO SYMBOL</p>	<p>IMPORTANT : Refers to any information regarding the operation of the product. Please do not overlook this information.</p>

NOTE :

© This product is classified as a Class IV laser product. This product emits light with a wavelength of about 1064nm up to 20~100W, which is not in the visible range, but these beams may cause irreversible damage to the retina and cornea. Chuangxin Laser recommends that you always wear qualified and safe protective glasses when operating the laser.

2-Laser Protection

1.Laser Protection Requirements

You must wear the safety protective glasses while operating the laser, and rationally select the safety protective glasses according to the lasing wavelength of the laser. If the device is a tunable laser or Raman product, it emits light over a range of wavelengths and the end user should confirm the laser safety eyewear used protects against light emitted by the device over its entire range of wavelength.

2.Laser Protective Equipment Suppliers

Maxphotonics recommends material or equipments provided by following laser protective equipment suppliers for you, including LaserVision USA, Kentek Corporation, Rochwell Laser Industries, etc. All the supplier information is provided by Maxphotonics only for the convenience to use, so Maxphotonics assumes no responsibility for any problem caused by using the products of abovementioned suppliers.

3-General Safety Instructions

In order to ensure the safe operation and optimal performance of the product, please follow these warnings and cautions in addition to the other information contained elsewhere in this document.

1. Specular Reflection

There are often numerous secondary laser beams produced at various angles in the output port of the laser. These divergent beams are produced when the primary beam of laser reflects off a smooth surface, and they are called specular reflections. Although these secondary beams may be less powerful than the total power emitted from the primary beam, the intensity may be great enough to cause damage to the eyes and skin as well as surface of materials.

WARNING :

⊙ You must exercise caution to avoid/minimize specular reflections as these laser radiations are invisible!

2. Safety Instructions of Accessories

WARNING :

⊙ This device has an output optical head connected to the laser by a fiber cable. Please, be careful dealing with the output head.

3. Optical Operating Instructions

We strongly recommend that you read the following procedures before operating the laser:

- (1) When the power is turned on, do not look directly at the laser light exit hole;
- (2) Avoid placing the laser and related optical output devices on the same level as the eyes;
- (3) Reasonable selection of safety protection equipment according to the laser output power and wavelength requirements to ensure the safety of operators;
- (5) When the laser is working, do not install the sight;
- (6) Please make sure to use the sight when the laser is turned off (such as installing the sight on the fixture or observing the end face with an optical

instrument).

(7) Please use the defocusing method to mark on the high-reflection material, otherwise the laser will be directly damaged.

(8) When the finish of some high-reflection or mirror marking materials exceeds grade 9 or above, there may be a risk of missing marking in the center marking, which shall be subject to the actual application.

(9) For the collimated output, do not touch the output lens or any solvent to clean it, you can use lens tissue paper to clean the output lens. After use, please replace the protective cover of the sight.

WARNING :

☉ Make sure that the individual protective equipment meets the output power and wavelength range of the laser.

☉ Never look directly into the optical fiber or the collimator, and Use appropriate laser safety eyewear when operating this device.

☉ Optical damage may result from failure to comply with the above instructions. Such damage is not covered by the warranty.

WARNING:

☉ Use of controls or adjustments or performance of procedures other than those set forth in this User's Guide and related documents may result in hazardous radiation exposure.

4 .Electrical Operating Instructions

Q-Switched pulsed fiber laser (MFPN-20M-100M) Series supply voltage:24VDC.

Cable Color	Supply
BROWN	+24VDC
BLUE	GND
YELLOW-GREEN	SHELL

WARNING :

⦿ Please ensure that the equipment case is well grounded. Interruption at any point in the ground loop may cause personal injury. The interruption of the power supply voltage is very dangerous to the equipment. Please provide a continuous and uninterrupted power supply voltage.

⦿ Before powering the laser, please make sure that the DC power supply voltage (24VDC) is used correctly and the wiring is correct. Any wrong wiring method may cause injury to personnel or equipment;

⦿ Before turning on the laser, please check whether the voltage is normal.

⦿ This product has no parts, components or components that need to be repaired by the user. All maintenance work must be completed by professionals of Chuangxin Laser;

⦿ In order to avoid short circuit, please do not remove the case, disassemble the laser and damage related labels without authorization, there will be danger of electric shock or burns, and any product disassembled or tampered with by yourself will no longer enjoy the warranty right.

5.Environment Conditions and Precautions

We strongly recommend that you read the following procedures before operating the laser:

(1) Please ensure that the work area is properly ventilated and the laser is placed in a cabinet with temperature and humidity control and dust-proof functions. Do not expose the laser to high temperature and high humidity.

(2) There are at least two fans on the rear panel of the laser module for heat dissipation. Please ensure that the minimum distance between the fan guard

and external objects is not less than 7cm, so that there is enough airflow to cool the equipment.

(3) Please make sure that the temperature and humidity of the operating environment are within the specified range before starting the equipment.

WARNING :

© Optical damage may result from failure to comply with the above instructions. Such damage is not covered by the warranty.

6.Routine Maintenance

(1) Avoid the impaction on the shipper rod of worktable when the laser is working.

(2) The laser and optical lens are fragile, please handle with care.

(3) Stop running once device failure, and provide professional treatment.



(4) Please follow a set sequence of on-off.

(5) The limitation on surface of marking machine is within the working area.

(6) Keep the device clean and indoor.

7.Safety Labels and Labeling Locations

The following shows the pictures of tags and their positions on the product:

Pictures of label	Label name	Label location
	Light Emission	Top Cover
	CAUTION	Top Cover

4-Additional Safety Information

For additional information regarding Laser Safety, please refer to the list below:

Laser Institute of America(LIA)

13501 Ingenuity Drive, Suite 128

Orlando,Florida 32826

Phone:407 380 1553,Fax: 407 380 5588

Toll Free:1 800 34 LASER

American National Standards Institute

ANSI Z136.1, American National Standard for the Safe Use of Lasers

(Available through LIA)

International Electro-technical Commission

IEC 60825-1, Edition 1.2

Center for Devices and Radiological Health

21 CFR 1040.10 - Performance Standards for Light-Emitting Products

US Department of Labor - OSHA

Publication 8-1.7 - Guidelines for Laser Safety and Hazard Assessment.

Laser Safety Equipment

Laurin Publishing

Laser safety equipment and Buyer's Guides

Chapter 3

Product Description

1-Property Introductions

MFPN-20M-100M Q-switched fiber laser adopts Q-switch (photoelectric switch) main oscillator and high-power fiber amplifier (MOPA) structure. The emission wavelength is 1064nm, and the operating parameters are set through the 25Pin control interface. It is a fiber laser with high electro-optical conversion efficiency, good beam quality, and maintenance-free. It is aimed at commercial and civilian lasers. It is mainly used for metal/non-metal marking, non-high reflective material removal surface coating, etc. It has a compact structure and uses a fiber ribbon isolator to output. It is an ideal laser source for laser marking.

Main Features:

- (1) Short optical pulses, high peak power, a wide range of PRR.
- (2) Superior reliability, long lifetime.
- (3) No shadow or virtual open circuit phenomenon when processing on special materials.
- (4) Universal DB-25 interface.

Applications:

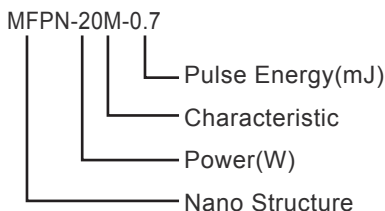
- (1) Commercial/Civilian
- (2) Scientific research

2-Laser Model Designation Codes

Model	Model Coding Rules
MFPN-20M	Maxphotonics Q-Switched Pulsed Fiber Laser 20W
MFPN-25M	Maxphotonics Q-Switched Pulsed Fiber Laser 25W
MFPN-30M	Maxphotonics Q-Switched Pulsed Fiber Laser 30W
MFPN-50M	Maxphotonics Q-Switched Pulsed Fiber Laser 50W
MFPN-100M	Maxphotonics Q-Switched Pulsed Fiber Laser 100W

Product family code definition:

Brand Name	Category	Product Series	Series Type	Series Code
M:MAX	F:Fiber laser	P: Pulsed	Vacancy: The default pulse width is not adjustable (Q-Switch acousto-optic Q-switching)	MFP
			T: Tunable	MFPT
			P: Picosecond	MFPP
			F: Femtosecond	MFPF
			N: Nano	MFPN



3-Certification

Maxphotonics certifies that this equipment has been thoroughly tested and inspected and meets published specifications prior to shipping. Upon receiving your equipment, check whether the packaging and accessories have been damaged in transit. If damage is apparent, please contact Maxphotonics immediately.

Chapter 4

Specification

1-Optical Characteristic Parameters

Version: 2.0st Generation

Characteristic	MFPN-20M-0.7	MFPN-25M-0.6	MFPN-30M-1	MFPN-50M-1.1	MFPN-100M-1.6	Unit
Operating mode	Pulse					
Skew normal	Random					
Center wavelength	1064±3					nm
Output average power@25 C	18.5±0.5	26±1	31±1	51±1	100~110	W
Repeat frequency	27~62	40~60	30~60	45~170	20~200	kHz
Optical pulse width	80~110				150~190	ns
Beam Quality (M ²)	<1.6					/
Full power frequency	27	40	30	45	65	kHz
Maximum pulse energy	0.7	0.6	1	1.1	1.6	mJ
Peak power	7	6	11	12	10	kW
output stability	<5					%
Power adjustment range	10~100					%
Output type	QCS					/
Spot diameter 1/e ²	6~8				4~6	mm
Beam ellipticity	≥90					%
Fiber Armor Cable Length	1.9			3	3	m
Turn-on delay	70-130					us
Light off delay	20-60					us

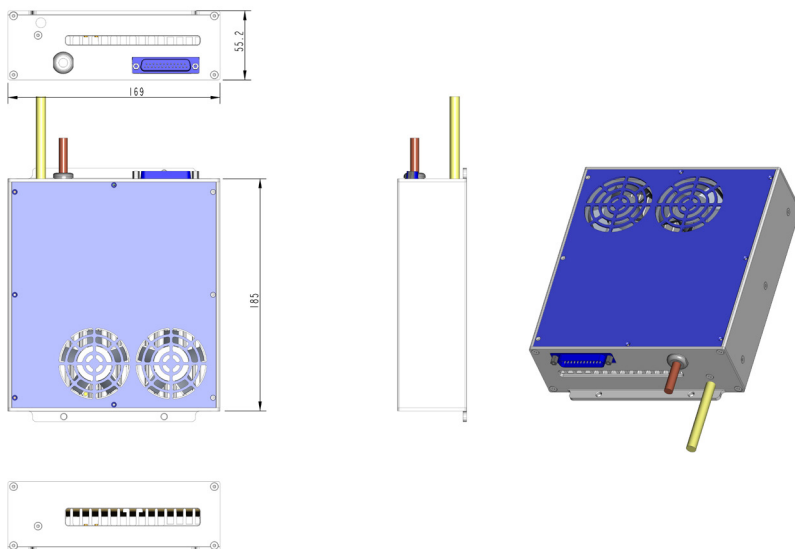
2-General Characteristic Parameters

Version: 2.0st Generation

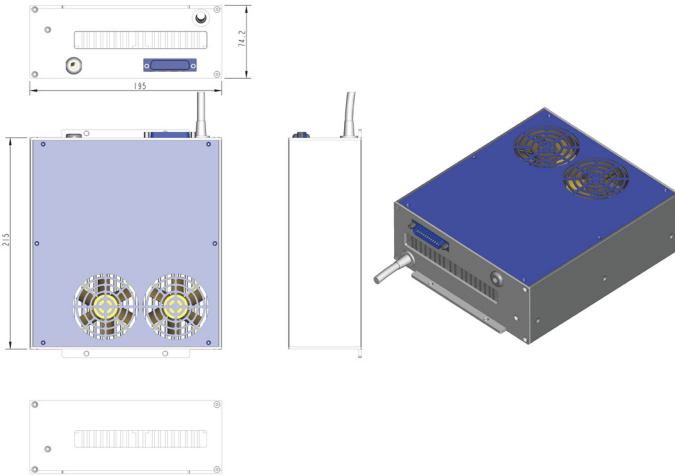
Characteristic	MFPN-20M	MFPN-25M	MFPN-30M	MFPN-50M	MFPN-100M	Unit
Operating Voltage	24					DC
Power consumption	<90	<110	<120	<200	<410	W
Laser cooling method	Air cooling					
Size	202*169*55	202*169*55	232*195*74.2	232*195*74.2	297*210*80	mm
Weight	2.2	2.2	3.5	3.5	5	kG
Working temperature	10~40					℃
Storage ambient temperature	-10~+60					℃
Working environment humidity	10%~95%					%

3-Structural Layout

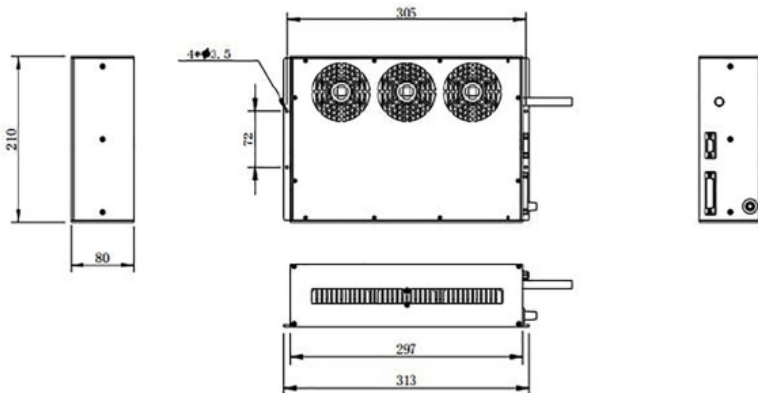
20~25M The external dimensions of the laser are shown in the figure below (unit: mm)



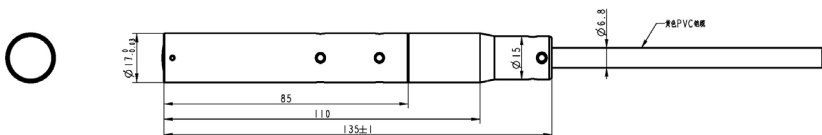
30~50M The external dimensions of the laser are shown in the figure below (unit: mm)



100M The external dimensions of the laser are shown in the figure below (unit: mm)



The appearance size of the output head of the laser is shown in the following figure (unit: mm)



Chapter 5

Operation Guide

Packing List :

Contents	Quantity
User Guide+ Qualified Test Result	1
Power Wire (Optional)	1

CAUTION :

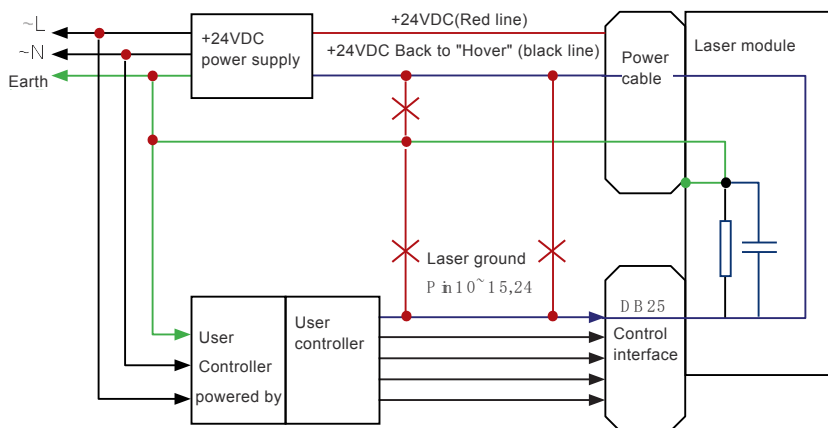
◎ If any damage of the external package and internal parts has been found upon receipt of product, please contact Maxphotronics Co., Ltd. or designated agent immediately.

1-Electrical Power Connection

Power wire



Recommended electrical connection diagram:



CAUTION :

- ◎ The main power supply (24VDC) must be able to provide continuous operating current (see detailed specifications in Chapter 4) and Peak current higher than 50% in 250us short cycle. Most types of lasers have a current loss of less than 10A, so their peak current loss is less than 14A.
- ◎ The power supply should maintain a stable voltage and be within the specified range (see Chapter 4 for detailed specifications). If the up and down fluctuations of the power supply voltage exceed the specification range, the laser operation will be unstable. Please pay attention to the transient load variation rate of the power supply and choose an appropriate power supply type.
- ◎ When the main power of the laser is connected, the voltage drop (especially the peak current loss) caused by the length and cross section of the laser's own power cord can be ignored.
- ◎ The 24VDC main power supply must have a floating output, and its return line can only be connected to the laser power line (blue). Incorrect connection may cause current loops to fail.
- ◎ The laser ground (DB25 Pin10-15,24) and the laser 24VDC power return line (blue line) are connected to the inside of the laser module, and the external interface of the laser module is not allowed to be connected.
- ◎ The common ground inside the module is connected to the laser case through

a 470 ohm resistor and a 47nF capacitor in parallel. This network is used to balance the voltage difference between the ground and the laser case.

© According to the design, the ground of the control card may be connected to the ground; otherwise, the ground of the control circuit is floating, indicating that the blue and yellow-green wires of the 24VDC power cable of the laser are not connected (see the red dotted line in the electrical connection diagram in this chapter for details) .

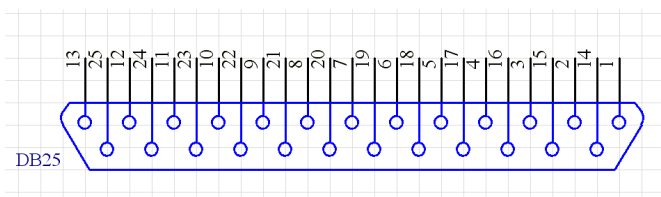
2-Control Connector Pin Assignment, DB-25 Plug

1.Pin Function

All control pins are TTL compatible, unless otherwise noted in the pin description. For the interface designs level ranges of the TTL standard should be taken into consideration.

Pin#	Description		
1-8 (D0-D7)	1.Power setting (16-bit bus. 0-FFh in hexadecimal or 0-255 in decimal formats. 2.Least significant bit (lsb) (D0) corresponds to Pin number 1, Most significant bit (msb) (D7) corresponds to pin 8. - 00h(0): Minimum output power - FFh(255): Maximum output power - 00h. Disconnected corresponds to 00h.		
9	Latch (Latches power setting into the laser by the rising edge)		
10-15	Ground		
16, 21	Laser alarms		
	Pin16	Pin21	Situation
	L	L	Out of the specified range of operating temperature
	L	H	Normal
	H	H	MO abnormal
H	L	PD alarm	
18	Master Oscillator(MO) signal: - HIGH: MO on - LOW or disconnected: MO off		
19	Booster signal (ON/OFF input) - HIGH: Booster on - LOW or disconnected: Booster off		

20	Pulse Repetition Rate (Synchronization) input Refer to PRR range. Allowed duty cycle is 0.1~0.9.
22	Guide Laser (red diode) ON/OFF input - HIGH: ON - LOW or disconnected: OFF
23	Emergency Stop Input - High: OK (Normal operation) - LOW or disconnected: STOP



2. Digital Control Interface (DB-25) Description

(1) The laser is controlled via signals applied to the DB-25 connector. Please refer to the connector interface description table above for 5.2.1 pin designation and operating levels.

(2) Pins 1 to 8 are the 8 bit bus for the output power setting. Pin 1 is the least significant bit and pin 8 is the most significant bit. Codes in the range 0...255 (0...FFh) should be applied to these pins, which correspond to the power setting of 0...100% of the specified nominal value, such as:

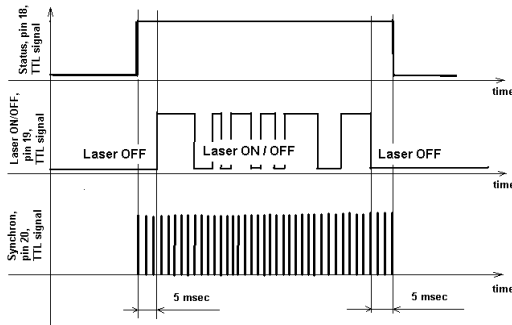
	Set 1	Set 2	Set 3	Set 4	Set 5
Pin 1	0	0	0	0	0
Pin 2	0	0	0	0	0
Pin 3	0	0	0	0	0
Pin 4	0	0	0	0	0
Pin 5	0	0	0	1	1
Pin 6	0	0	1	1	1
Pin 7	0	1	1	1	1
Pin 8	1	1	1	1	1
Current	50%	75%	87.5%	93.75%	100%
Laser Power	35%	65%	85%	92%	100%

(3) Pins 16 and 21 are the alarm and status outputs. These pins indicate the following device states:

Pin16	Pin21	Alarm description
L	H	Normal Operation
H	H	MO Alarm

(4) Pin 18 is the Master Oscillator (MO) signal. The MO should be switched ON at least 5ms earlier than the Booster (BS) is switched ON. Once the MO is switched ON, the laser starts to consume more electrical power.

(5) Pin 19 is the Booster control input. HIGH means switching the BS on and LOW means switching it OFF. The laser starts to emit light within specified delay time after the pin 19 is set HIGH and stops emitting when the pin 19 is set LOW.



CAUTION :

⊙ The MO should be switched ON at least 5ms earlier than the BS is switched ON. The laser does not start to emit if you switch the BS ON while the MO is LOW/OFF.

⊙ If the MO is switched ON later than the BS is switched ON, the laser will emit about 1ms later than the switching of the MO. It is abnormal operation which should be avoid and not listed in the user guide. The BS switches ON simultaneously with the rising edge of the signal applied to the pin 19.

(6) Pin 20 is the Synchronization input. Pulse train with a repetition rate (PRR) within specified operating range should be applied to the pin 20 (refer to the optical specification for PRR limits). The laser emits pulses simultaneously with the rising edge of the signal.

CAUTION:

⊙ If the PRR is out of the specified range (or no PRR signal is supplied) the

laser safety circuit will substitute the missing pulses or limit the PRR.

© The laser emission is not allowed simultaneously with the guide laser. The BS is blocked internally during the guide laser operation. If pin 19 is set HIGH but the guide laser is on, the laser will not emit light, unless the guide laser is switched OFF. The MO is able to be switched ON or OFF during the guide laser is ON.

(7) Pin 23 is the “Emergency stop” input. It should be set to HIGH for normal operation. In case of dropping this pin to LOW state (even for a short period of time), the laser automatically switches OFF (similar to the state when both MO and BS are OFF). It is necessary to drop both MO and BS to LOW (if they were HIGH) before restarting the laser.

3-Laser Operation

1.Steps

All control pins are TTL compatible, unless otherwise noted in the pin description. For the interface designs level ranges of the TTL standard should be taken into consideration.

- (1) Remove the protective cap from the laser output head;
- (2) Connect the control system with the laser DB25 pin interface. For the pins to be used, refer to 5.2.2 Digital Control Interface (DB-25) Function Description;
- (3) Recommended initial state of control needle:

Pin18,19, pin is low

Pin20 repetition frequency is within the specified range

- (4) Connect the 24VDC power supply to the laser power cable (+ 24V corresponds to red, the ground wire is connected to yellow, and the negative pole is connected to the black wire);
- (5) After the laser is powered by 24VDC, it can be operated.

CAUTION:

© Please allow 24VDC main power before initializing the control signal.

- (6) Set the emergency stop input (Pin23) to H level;

- (7) Set the desired power from Pin1 ~ 8;
- (8) Set Pin18 to H level and turn on MO;
- (9) Wait for 5ms;
- (10) Fast modulation of the laser by Pin19. Enter the H / L level to control the laser on and off. The rise / fall time of the laser switch has been limited (see Chapter 4 for detailed specifications). The speed of modulation cannot be faster than the sum of rise and fall times. Typical rise / fall time is 250us, and its modulation period should be greater than 500us (corresponding frequency is 2kHz);
- (11) After completing the operation of the laser switch and waiting for the next task, if the time exceeds 20ms, it is recommended to turn off the MO, which will reduce power consumption, extend the life of the MO, and avoid the residual power output of the MO;
- (12) Turn off BS and MO after completing a task (Pin18 and Pin19 are set to L level)
- (13) Disconnect the 24VDC power supply.

2. Job characteristics

- (1) During laser operation, PRR can be changed through Pin20. When changing the PRR, please note that the time between two adjacent rising edges must not be greater than the cycle time of the lowest PRR frequency. For a laser with a minimum repetition frequency of 20kHz, it should not be greater than 50us. Otherwise, the protection circuit will automatically add missing pulses. If the PRR is greater than the specified maximum repetition frequency, the protection circuit limits it to the maximum value.
- (2) It is allowed to change the power settings of Pin1 ~ 8 during laser operation and store it in the laser. The laser will respond to the changed power setting during the specified rise time.
- (3) If Pin18 is at H level and Pin19 is at L level, there will be laser output below 20mW working wavelength.
- (4) If the temperature of the laser module exceeds + 55 ° C, the laser will automatically turn off, and at the same time at Pin16 and

F=100	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
F=160	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
F=254	A	A	A	A	A+	A+	A+	A+	A+	A+	A+
F=330	B	B	B	B	A	A	A	A	A	A+	A+
F=420	C	C	C	C	C	B	B	B	A	A	A
F=525	D	D	D	D	D	C	C	C	C	C	B

A+: The effect is very good, the laser is stronger after focusing;

A: Moderate effect, lower efficiency than A+ field lens;

B: General effect, suitable for materials that do not require high energy density;

C: Weak light, not recommended.

D: The focal length of the field lens is too large to process the material

The above is a recommendation for the combination of laser and field lens, for reference only.

CAUTION :

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Chapter 6

Common Fault Treatment

Laser Troubleshooting Table			
NO	Fault phenomenon	Check items	Troubleshooting steps
1	No laser	Power supply	1. Check whether the power supply wiring of the laser is correct, whether + 24V and GND are reversed, and whether the ground wire is grounded. 2. Whether the power supply of the laser is normal. Check whether the power supply meets the actual power supply requirements under no-load and loaded (connected to the laser) state.
		Board	3. Whether the signals of PIN18 and PIN19 are normal. 4. Whether the power supply of the marking card is normal and the signal of the control laser is normal (see the definition of DB25 port in the manual for details).
		emergency switch	5. Check whether the emergency stop switch (PIN23 pin) of the device is normal (the signal is high when the laser is working).
		Marking software	6. Whether the software settings are correct (see software settings for details). 7. Use the software laser test function to observe if there is a light spot. 8. Use the debugging software to test the laser and observe the parameters.
		DB25 signal	9. Indicate whether the optical signal is in the low state in the marking state. If in the marking state, the guide light signal is low level (PIN22 pin is "0" level), if the guide light signal is high level ("1" level). The laser is the priority output guide light. 10. Check whether the wiring of the DB25 pin serial port of the laser is correctly wired according to the wiring definition.
		Red light confirmation	11. If the red light signal is high, the red light output will be given priority. (If it is a built-in red laser, you can judge whether the laser light path is normal by detecting whether there is red light output).
		Isolator	12. Confirm whether the light spot of the isolator is normal (the light spot is round and there is no dark spot).

Laser Troubleshooting Table			
NO	Fault phenomenon	Check items	Troubleshooting steps
2	Laser Weak	Working current confirmation	1. Check whether the power supply is stable and the current reaches the rated working current.
		Optical mirror confirmation	2. Check whether the output mirror surface of the collimator is contaminated. If it is contaminated, wipe it gently with absolute ethanol in front of it. 3. Check whether other optical lenses are contaminated, such as red beam combiner, galvanometer and field lens.
		Service life confirmation	4. The power is attenuated after the laser is used for 20,000 hours, which is normal power loss.
		Signal interference	5. There is a disconnection during the marking process, usually due to signal interference. For this reason, the weak and strong current leads cannot be tied together or on the same side. The signal line uses a signal line with a shielding function; Good contact.
		Marking interface parameter confirmation	6. Check whether the pulse width frequency has been set within the required range.
		Optical path detection	7. Confirm whether the light spot of the isolator is normal (the light spot is round and there is no dark spot). 8. Check whether the output light of the laser is blocked (make sure that the output end of the isolator and the galvanometer port are on the same horizontal line during installation).
3	Laser light is unstable	Power supply	1. Check whether the power supply is stable and the current reaches the rated working current.
		Signal interference	2. There is a disconnection during the marking process, usually due to signal interference. For this reason, the weak and strong current leads cannot be bundled or walked on the same side. The signal line uses a shielded signal line; Good contact. 3. Check whether the 25-pin signal cable is an anti-interference cable, and the port is in good contact.
		Laser temperature	4. Whether the temperature of the laser case is too high, and the temperature is close to the critical temperature (reference ambient temperature 45 ~ 47 °C) will appear light unstable. 5. If the temperature of the isolator housing is too high, the light will be unstable when the temperature is close to the critical temperature (reference ambient temperature 45 ~ 47 °C).

Laser Troubleshooting Table			
NO	Fault phenomenon	Check items	Troubleshooting steps
4	Low power	Working current confirmation	1. Check whether the power supply is stable and the current reaches the rated working current.
		Optical mirror confirmation	2. Check whether the output mirror surface of the collimator is contaminated. If it is contaminated, wipe it gently with absolute ethanol in front of it, taking care not to scratch the mirror coating. 3. Check whether other optical lenses are contaminated, such as red beam combiner, galvanometer and field lens.
		Isolator	4. Check whether the output light of the laser is blocked (the output end of the isolator and the galvanometer port should be on the same horizontal line during installation). 5. Check whether the light spot of the isolator is normal (the light spot is round and there is no dark spot).
		Service life confirmation	6. It is normal power loss for the laser to lose power after 20,000 hours of use.
		Signal interference	7. There is a disconnection during the marking process, usually due to signal interference. For this reason, the weak and strong current leads cannot be bundled or walk on the same side. The signal line uses a signal line with a shielding function; Good contact.
		Armor cable bending	8. Check whether the bending of the armor cable is too small.
		Marking interface parameter confirmation	9. Check whether the pulse width frequency has been set within the required range (only for MOPA series).
5	Laser is not powered	Power confirmation	1. Check whether the power supply wiring of the laser is correct, whether + 24V and GND are reversed, and whether the ground wire is grounded. 2. Check whether the power cord is in good contact.
6	Abnormal light spot of isolator	Isolator spot confirmation	1. Confirm whether the output light spot of the isolator is normal (the light spot is round and there is no dark spot).

Laser Troubleshooting Table			
NO	Fault phenomenon	Check items	Troubleshooting steps
7	Broken pen	Working current confirmation	1. Check whether the power supply is stable and the current reaches the rated working current.
		Signal interference	2. There is a disconnection during the marking process, usually due to signal interference. For this reason, the weak and strong current leads cannot be bundled or walked on the same side. The signal line uses a signal line with a shielding function; Good contact.
		Laser temperature	3. Check whether the laser's temperature is too high, and the temperature is close to the critical temperature (the reference temperature is 53 °C).
		Board	4. Check whether the board wiring is correct and the contact is good. 5. Check whether the 19-pin signal (board output, control board input, sampling resistance signal) is normal through an oscilloscope.
8	Light leakage	Pre-current confirmation	1. Check whether the light leakage power is between 15-20mW, and the pre-current needs to be adjusted if it exceeds.
9	Laser is not ready	DB25 check	1. Check whether the DB25 cable is in good contact.
		Laser status confirmation	2. Check whether the laser is working.
10	High temperature alarm	Signal interference	1. Detect whether there is interference in the surrounding signals.
		Laser temperature	2. If the temperature of the laser case is too high, the light will be unstable when the temperature is close to the critical temperature (reference temperature 53 °C).
		Troubleshoot PIN16 PIN21	3. PIN16 PIN21 is the alarm output, check whether the output signal of PIN16 PIN21 is normal (refer to the description of control interface in the manual).

Chapter 7

Service and Maintenance

1-Maintenance Notes

CAUTION ;

- ◎ No operator serviceable parts inside. Refer all servicing to qualified Maxphotronics personnel.
- ◎ For ensuring that the repairs or replacement within the warranty scope can be carried out, and perfectly maintaining your interests, please submit application to the Maxphotronics or the local representative after finding the faults. Upon receiving our authorization, you need to pack the product in a suitable package and return it.
- ◎ You should keep the proof when finding any damage after receiving the product, so as to claim the rights to shippers.

IMPORTANT :

- ◎ Do not send any product to Maxphotronics without RMA.
- ◎ If the product is beyond the warranty period or the warranty scope, customers shall be responsible for the repairing cost.

CHANGE :

- ◎ We have the rights to change any design or structure of our product, and the information is subject to change without notice.
- 2 - Service Statements

2-Service Statements

More problems regarding the safety, set-up, operation or maintenance can be solved by carefully reading this "User Guide". Please call the Customer Service Department for other questions.

If your problems cannot be solved over the telephone with our technical support group, you may need to return the product to Maxphotonics for further troubleshooting.

Chapter 8

Warranty Statements

1-General Items

Maxphotonics carries out warranty for any defect of the product caused by its material and production technology within the warranty period agreed in contract, and ensures that its product meet the relevant quality and specification requirements specified in the document under normal use condition.

Maxphotonics rationally determines to repair or replace the products with faults caused by its material or production technology within the warranty period, and repairs or replacement of all the products within the warranty scope are carried out according to the rest of the warranty period of primary products.

2-Warranty Limitations

Under the following circumstances, the products, parts (including the fiber connectors) or equipment are not within the warranty scope:

- (1) Tampered, opened, detached or reconstructed by personnel outside Maxphotonics;
- (2) Damaged from misuse, neglect or accident;
- (3) Used beyond the specification and technical requirements of the product;
- (4) Indirectly damaged from users' software or interfaces;
- (5) Improper installation or maintenance, or operating under conditions not included in this manual;
- (6) The fittings and the fiber connectors are not included in the warranty

scope.

Customers are obligated to understand the information above and operate according to the User Guide and specification, or the faults arising therefrom are not included in the warranty scope.

IMPORTANT:

- ◎ Within the warranty scope, purchasers must feedback within 31 days after finding the product defect.
- ◎ Maxphotonics does not grant any Third Party rights to repair or replace the parts, the equipment or other Maxphotonics products.