Narrow Pulse Butterfly Laser Driver

Product Description

The maximum pulse peak current that the driver can provide is ≈2A, if it is greater than this value, the driver may be damaged. So don't try peak current higher than 2A. The maximum pulse peak current that the laser can withstand is different, and the ratio between the pulse width and the repetition frequency is relatively large. Usually, when the repetition frequency is low and the pulse width is narrow, the peak current that can be tolerated is larger.

Features

- Laser plug and play.
- Compatible with 14PIN and 10PIN various wavelength butterfly lasers
- TTL, LVTTL rising edge trigger.
- 9V~15V single power supply.
- Laser current limiting, temperature, power supply reverse connection protection.
- Pulse width monitoring output.
- Integrated temperature control.
- 0.5ns~10ns pulse width adjustable range, repetition frequency 20Hz~50MHz.
- 0.3A~2A peak drive current.
- Built-in 1MHz trigger.
- Full load power consumption<2W
- 62mm×55mm small volume

Applications

- MOPA seed light source
- Lidar
- TOF imaging
- Laser ranging
- OTDR
- Pulsed laser testing and screening

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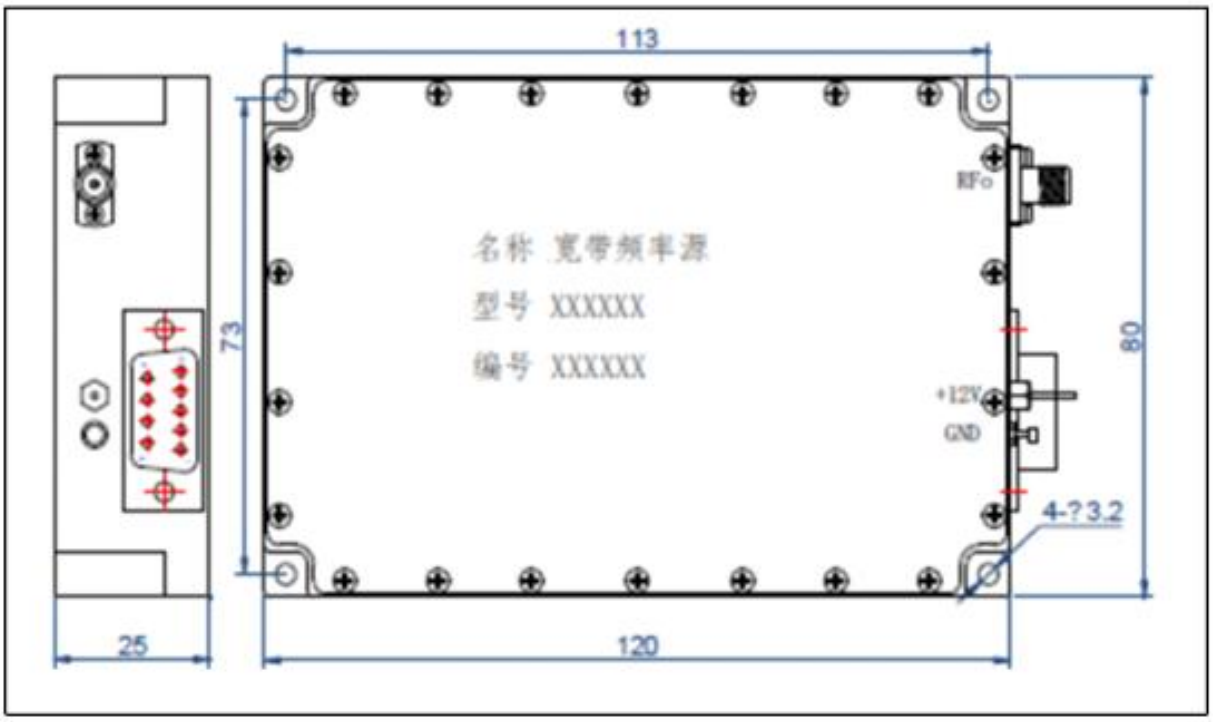
First-Time User Instructions

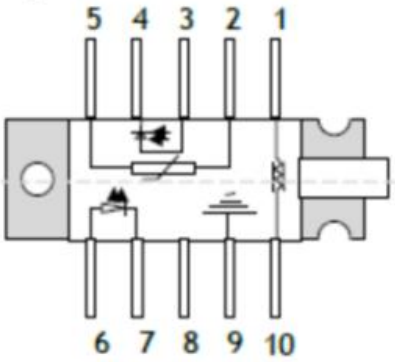
Due to the large high-frequency impedance of the laser socket, a bias voltage far exceeding the rated operating voltage of the laser is required to drive the loop to the target peak current. Therefore, please refer to the following instructions and steps before starting to use to ensure that the laser and driver work normally without accidental damage.

TEC default lock temperature: 25°C; TEC maximum operating voltage: 2V; TEC maximum operating current: 1A.

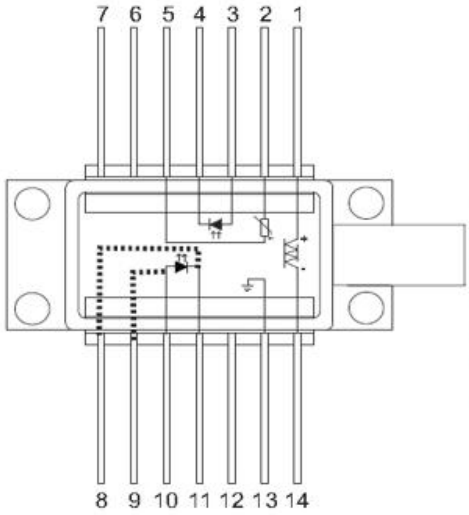


（*可按用户需求定制尺寸）

LED-3	电源指示	输入电源指示



Pin	Description	Pin	Description
1	TEC (+)	6	Laser anode (+)
2	Thermistor	7	Laser cathode (-)
3	Monitor anode (-)	8	NC
4	Monitor cathode (+)	9	Package ground
5	Thermistor	10	TEC (-)



Pin	Function	Pin	Function
1	Cooler (+)	8	(*) LD Cathode (-)
2	Thermistor	9	(*) LD Anode (+)
3	PD Anode (+)	10	LD Anode (+)
4	PD Cathode (-)	11	LD Cathode (-)
5	Thermistor	12	nc
6	nc	13	Case ground
7	nc	14	Cooler (-)

（图二：激光器管脚定义）

Steps

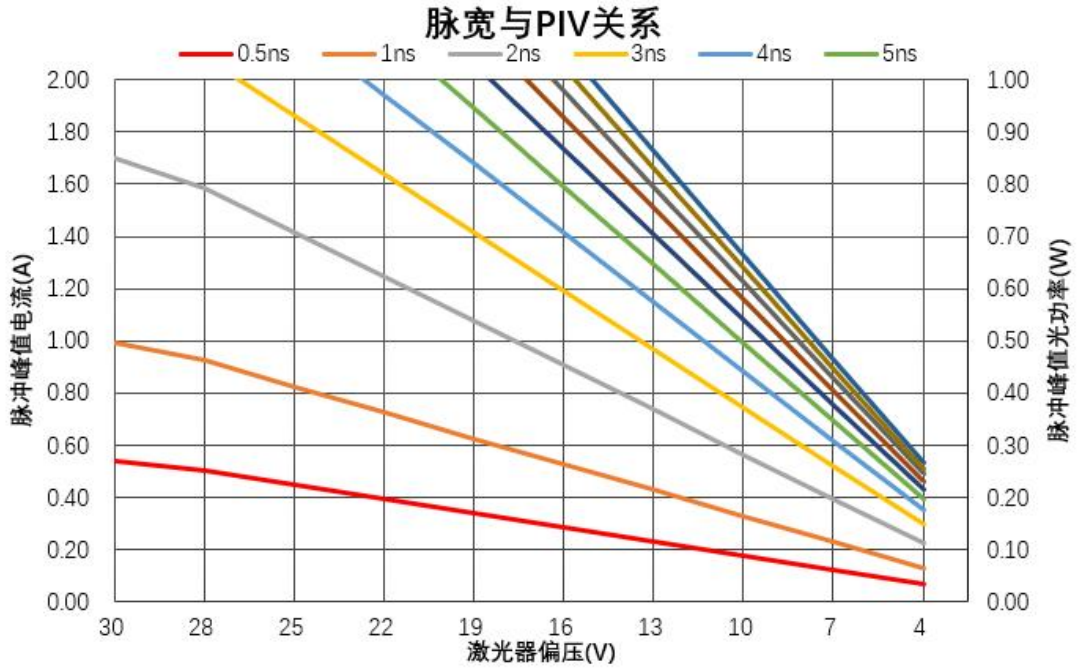
1. Do not install the laser when powering on for the first time, short "JP1" with a jumper cap, or connect "EXT IN" through an external signal source, and input a low-frequency TTL or LVTTL signal (10kHz~1MHz) to trigger the driver.

2. Connect "PW-OUT" to the oscilloscope, connect the power supply to "DC IN", and observe the pulse waveform of the oscilloscope. Adjust "Rset-1" to determine whether the pulse width is within the range of 0.5ns~10ns. If it is normal, please adjust the pulse width to be slightly smaller than the target value.

3. Disconnect the power supply, disconnect the "JP1" jumper, and disconnect the "EXT IN" input. Install, secure and power on the laser after ensuring that no trigger signal is input to the driver. When the laser temperature stabilizes to 25°C, "LED-4" lights up. Connect the voltmeter to "Vb-OUT" and "GND", adjust "Rset-2", and observe the reading of the voltmeter, the adjustment range: 4V~30VDC. According to the corresponding relationship between the pulse width and PIV given in the figure below, determine the Vb voltage in combination with the target pulse width and target peak optical power. (You can also start directly from the lowest voltage).

4. Disconnect the power supply after adjusting Vb to the target value with a value lower than 30% or directly taking the lowest voltage. Connect the "JP-1" jumper cap or connect an external signal source to "EXT IN", and the initial value of the trigger signal should be as low as possible, such as 100kHz.

5. After the power is turned on, the system enters the normal working state after "LED-4" lights up. At this time, the pulse light signal can be observed through the optical power meter and photodetector. Further adjust the repetition frequency, pulse width and bias voltage as required until the output power and pulse width reach the target, and the operation process ends.



(注：该对应关系基于两个假设：①激光器等效电阻≈5Ω；②激光器 IP 效率≈2A/W)

Description of the maximum working range and the working principle of the protection circuit

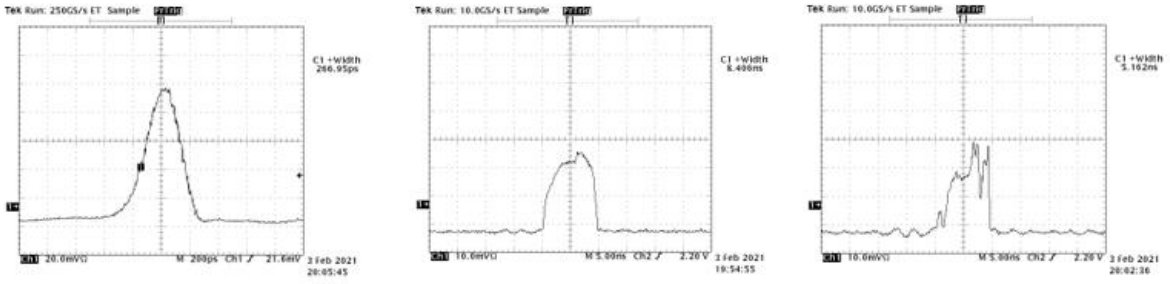
The maximum pulse peak current that the driver can provide is ≈2A, if it is greater than this value, the driver may be damaged. So don't try peak current higher than 2A. The maximum pulse peak current that a laser can withstand is different, and has a relatively large relationship with the pulse width and repetition frequency. Usually, when the repetition frequency is low and the pulse width is narrow, the peak current that can be tolerated is greater.

In order to avoid damage to the laser caused by short circuit of the cathode of the laser or overvoltage of the anode, the CW current limit of the laser is set to 100mA. While protecting the laser, it also limits the pulse current. Maximum pulse current = repetition period ÷ pulse width × 100mA. Principle of laser temperature protection: Only when the internal temperature of the laser is stable at 25°C, "Vb" will have voltage after "LED-4" is lit, otherwise the bias circuit will not work and the output will be zero. When the laser loses temperature, the bias circuit immediately stops supplying current to the laser. The driver also provides input reverse polarity protection and surge protection, the principle of which will not be described in detail here.

For higher performance, a laser welding version is available.

FAQ

Due to the different response of different lasers to the pulse current, there may be waveform problems, such as slow rising edge and high level oscillation. In addition to the stray inductance of the laser itself and the series effect of the packaging capacitor, light reflection may cause the above two situations to occur. The peak power is close to or exceeds the upper limit of the nominal CW power, and the above two situations may occur under long pulses. Usually there will be a visible critical point, showing that the optical power no longer rises with the rise of the current, or even drops. Take the CM96Z series laser as an example:



250ps/0.8A/0.5W　　8ns/0.6A/0.36W　　8ns/1.2A/0.47W

It can be seen that the narrow pulse is normal. When the pulse is long, the waveform oscillates after the peak current is greater than the nominal CW rated current, the driving current doubles, and the output power only increases by 30%. This oscillation mainly comes from the reflection coefficient of the lens, fiber coupling and FBG grating reflection. Different families of lasers behave very differently. In this case, the corresponding relationship between pulse width and current can be adjusted to find an acceptable balance point.

The relationship between the three parameters of pulse width, repetition frequency and peak current is difficult to balance perfectly due to the difference of lasers. The default typical circuit setting is 10ns pulse width, and the peak current does not change with the repetition frequency within the repetition frequency range of 50Hz~1MHz, and remains stable. It is recommended to use a duty cycle of 1% or less in the range of 0.5ns~10ns pulse width. The smaller the duty cycle, the smaller the effect of repetition frequency.