[Optoelectronic Communication] What should we pay attention to when operating optoelectronic devices?

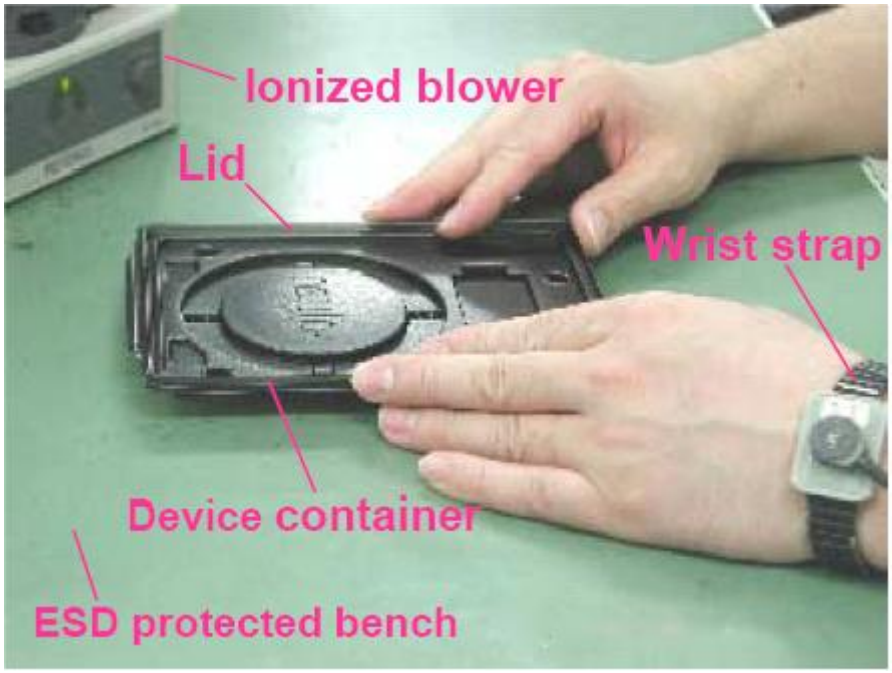
Procedure for taking out the optical device from the package

1. Before opening the device packaging box, you need to prepare the following electrostatic protection facilities:

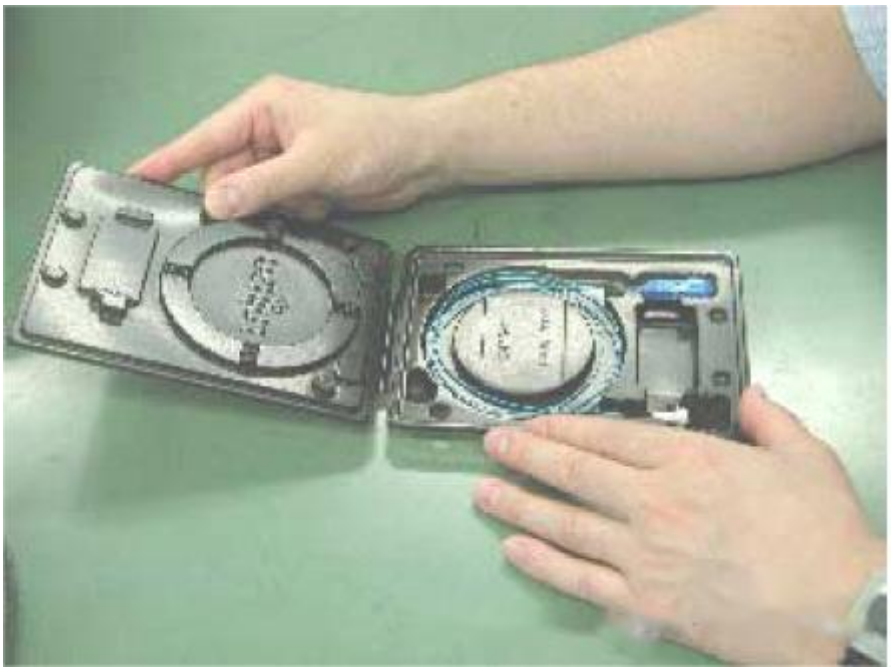
a. Anti-static workbench

b. Anti-static wrist strap with grounding wire

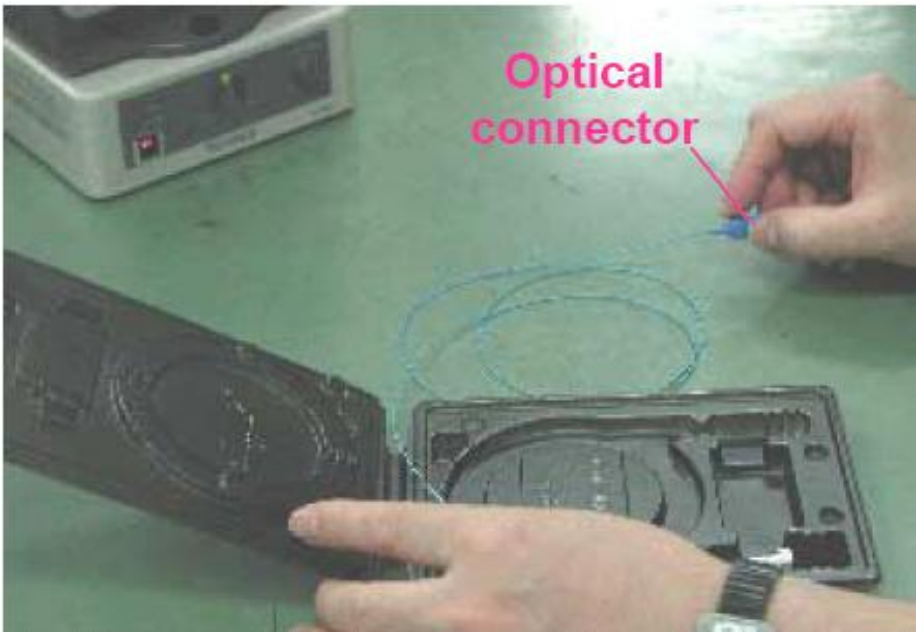
c. Ion blower (preferable if available)



2.Place your right thumb on the corner of the packaging box cover and carefully open the box cover (applicable to APD/PIN/LD coaxial package and independently packaged optical devices).

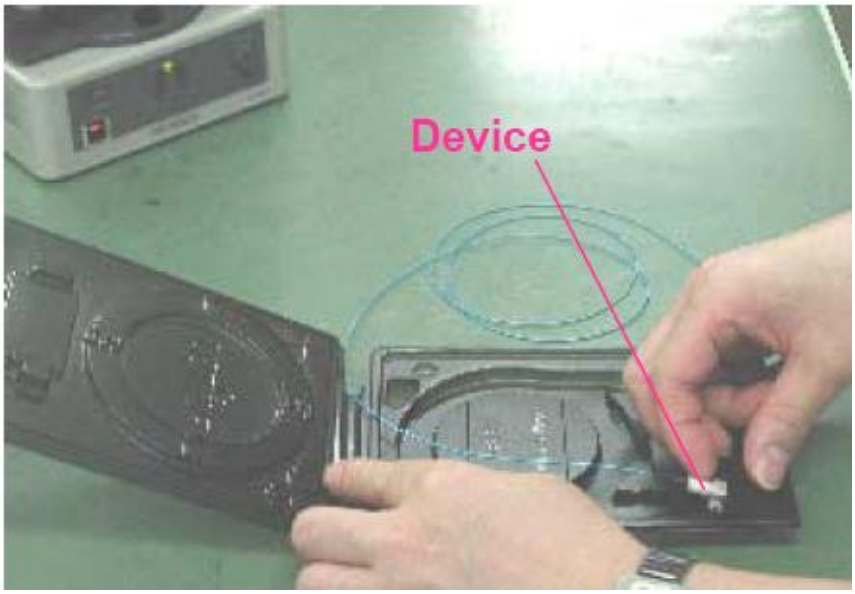


3. Hold the device packaging box with your left hand, and slowly take the optical connector out of the packaging box with the thumb, index finger and middle finger of your right hand. Place the optical connector on the workbench.



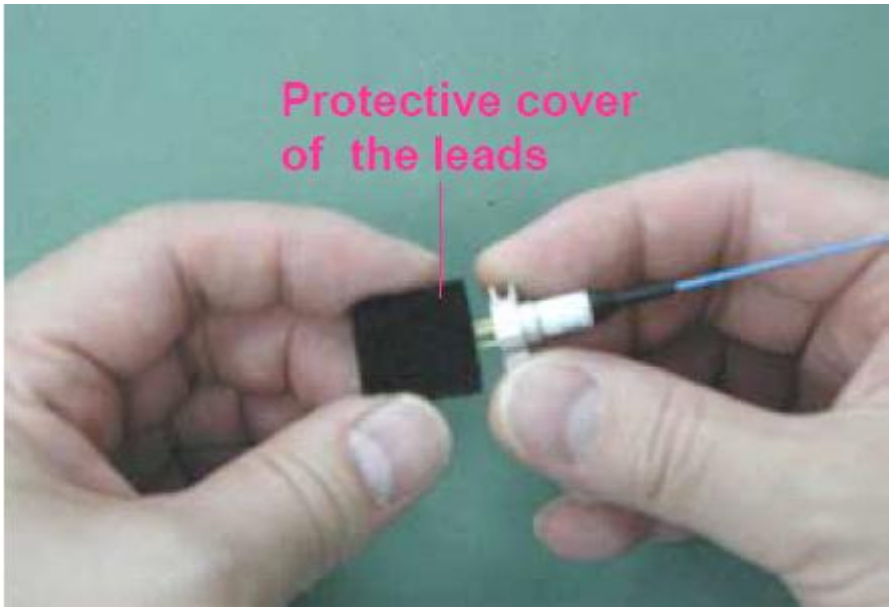
Note: Do not bend or twist the optical fiber during operation, and do not apply excessive force to the optical connector.

4.Hold the device packaging box with your left hand, and use the thumb, index finger and middle finger of your right hand to slowly take out the optical device with the protective cover from the packaging box.

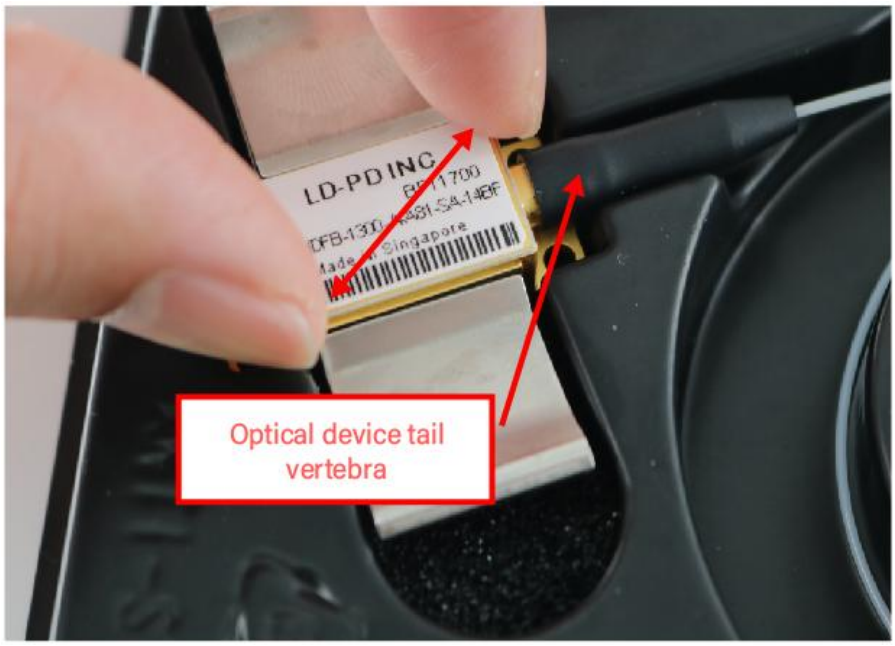


Note: Do not bend or twist the optical fiber during operation, and do not apply excessive force to the optical connector.

5.Remove the protective cover on the pins (here is an anti-static sponge)

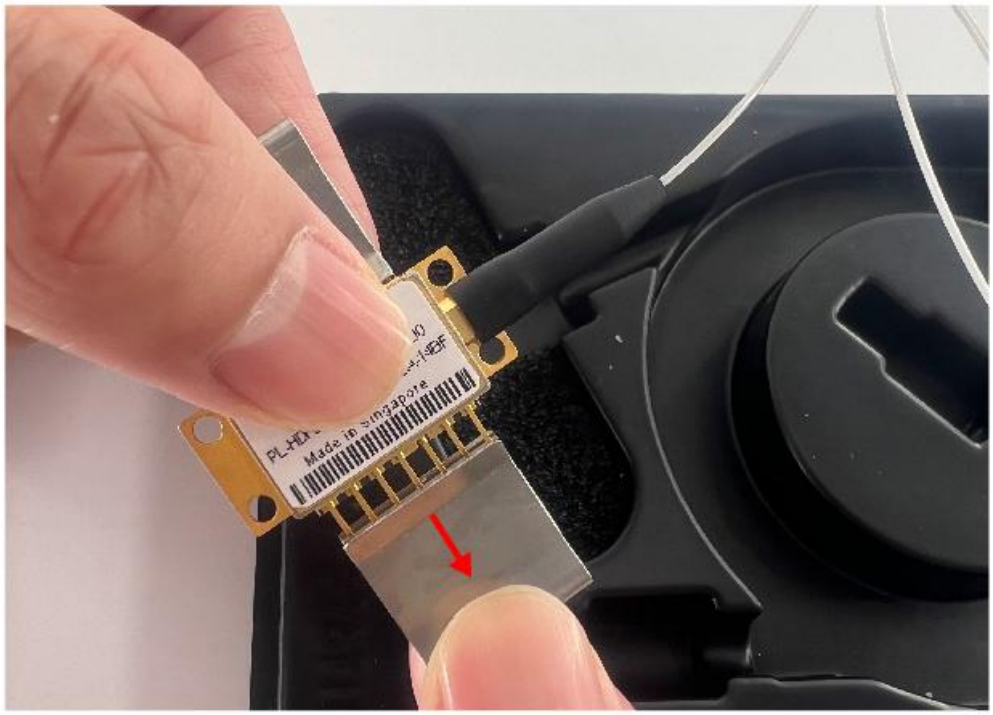


6.For butterfly-packaged devices (usually lasers), hold the opposite corners of the laser with your thumb and index finger, and carefully take it out of the packaging box.



Note: Pay attention to protect the device pins and tail vertebra during operation, and do not apply any force to the tail vertebra.

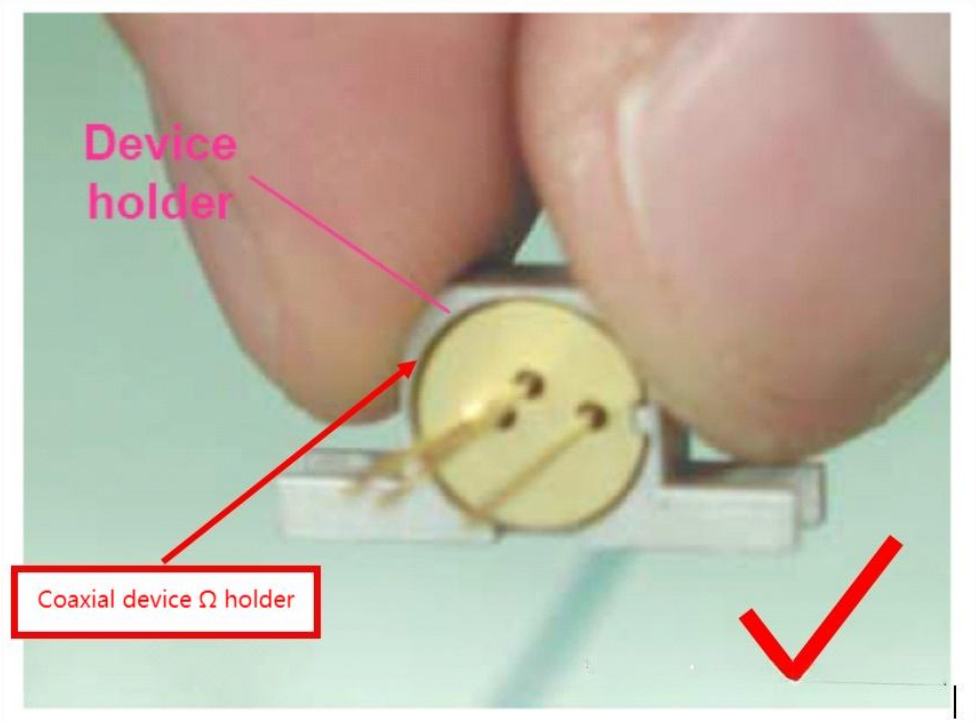
7. Hold the upper and lower sides of the device with the thumb and index finger of your left hand respectively. Use the thumb and index finger of your right hand to hold the clip and carefully pull it out to remove the clip. Similarly, remove the protective clip on the other side.



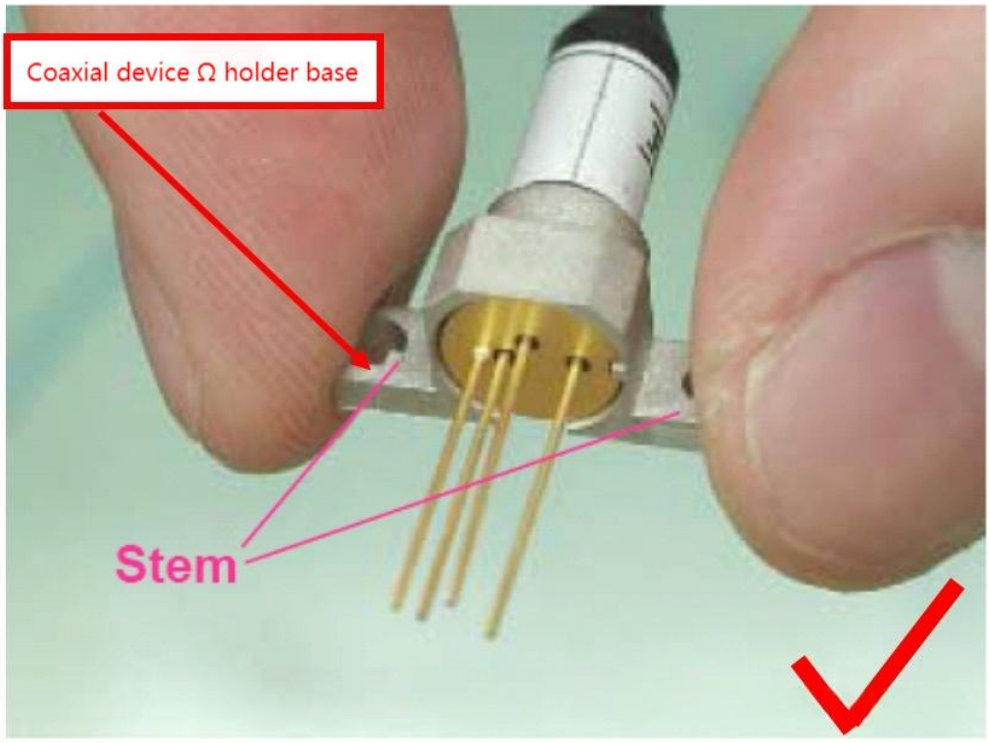
Note: Pay attention to protect the device pins and tail cone during operation.

Illustration of the correct operation method of optical devices

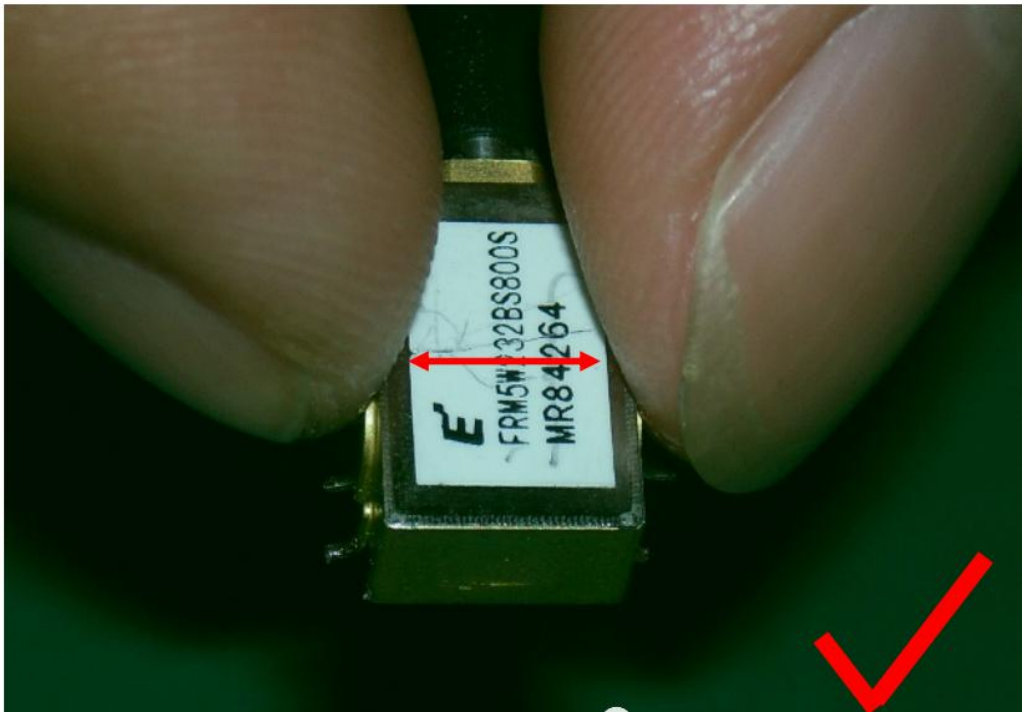
1. When grabbing a coaxial packaged optical device, hold the arc part of the " Ω " bracket of the device with your thumb and index finger.



2. When grabbing a coaxial packaged optical device, in addition to 1, you can also use your thumb and index finger to hold both ends of the " Ω " bracket base of the device respectively.



3. When grabbing the Mini-DIL packaged optical device, hold the upper edges of the device with your thumb and index finger respectively.

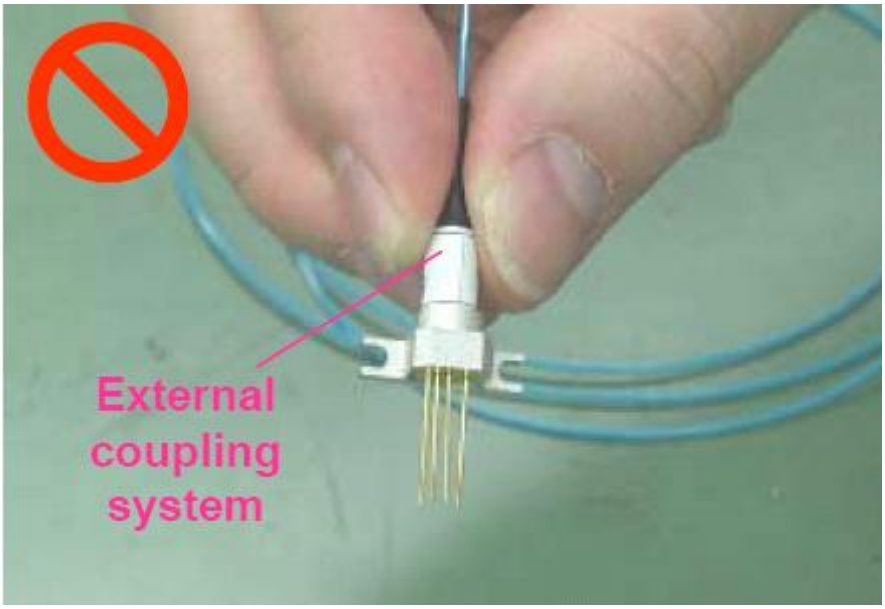


4. When grabbing a butterfly-shaped packaged optical device, hold the two opposite corners of the upper part of the optical device with your thumb and index finger respectively.

5. When grabbing the optical module product, hold the module metal box with one hand and the optical fiber and optical fiber connector with the other hand.

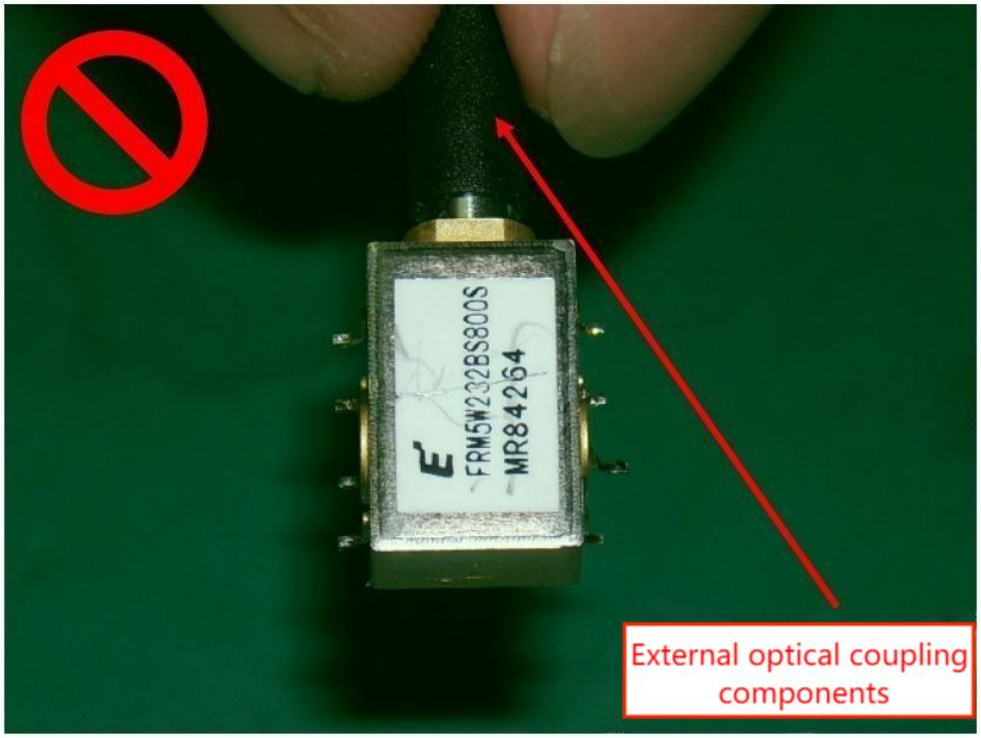
Illustration of incorrect operation methods of optical devices

1.It is prohibited to grab the tail vertebra of coaxial packaged optical devices (external optical coupling components).



WARNING: Forces exerted on the tailbone may dislocate the optical coupling components, resulting in irreversible and permanent damage to the device!

2. It is prohibited to grab the tail vertebra of Mini-DIL packaged optical devices (external optical coupling components).



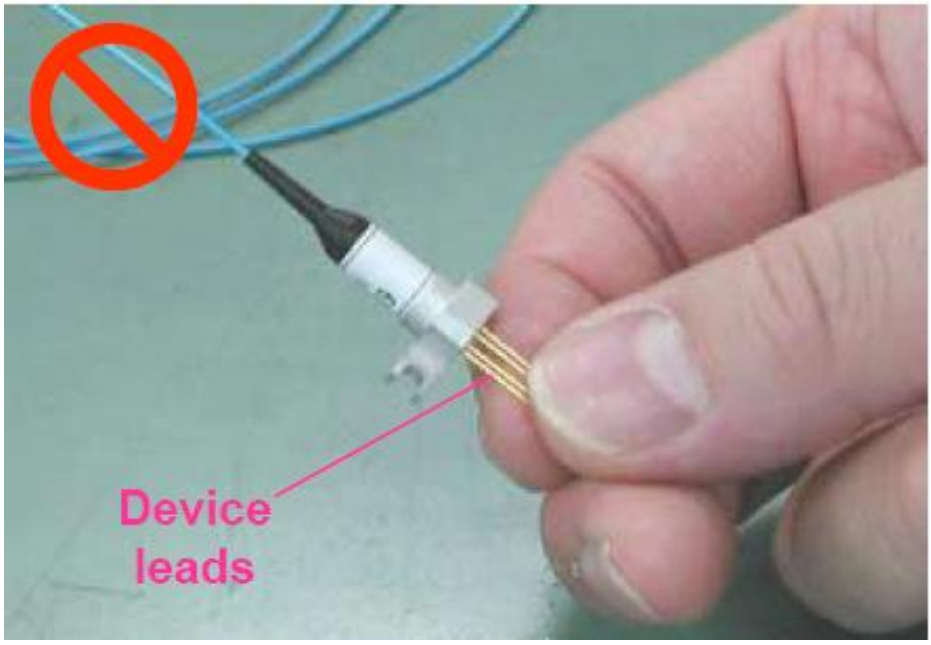
WARNING:

Forces exerted on the tailbone may dislocate the optical coupling components, resulting in irreversible and permanent damage to the device!

3. It is prohibited to grab the tail vertebra of butterfly-shaped packaged optical devices (external optical coupling components)

WARNING: Forces exerted on the tailbone may dislocate the optical coupling components, resulting in irreversible and permanent damage to the device!

4. Do not grab the metal pins of optical devices directly with your hands.

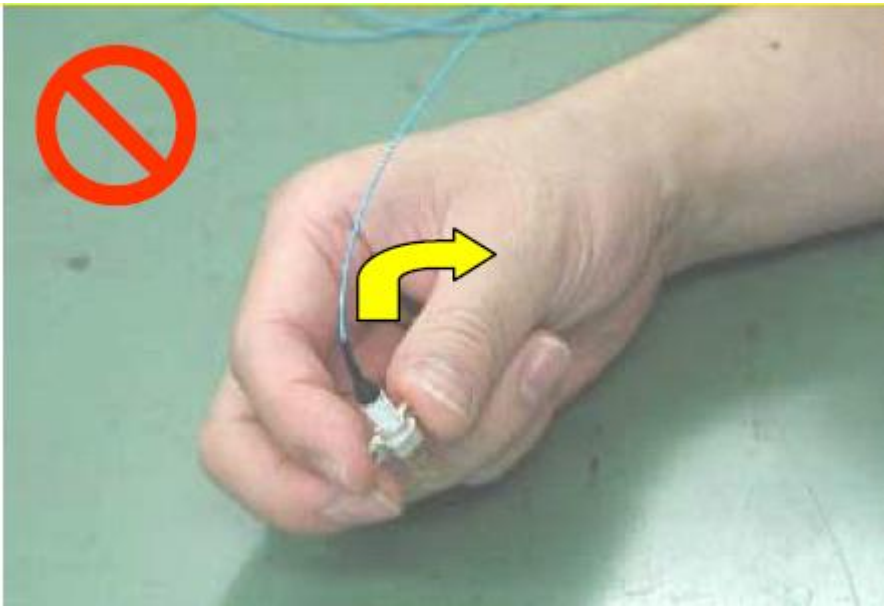


Warning: It is possible to cause electrostatic damage to the device!

5. It is prohibited to grab the pin clip on one side to take out the butterfly package optical device from the packaging box.

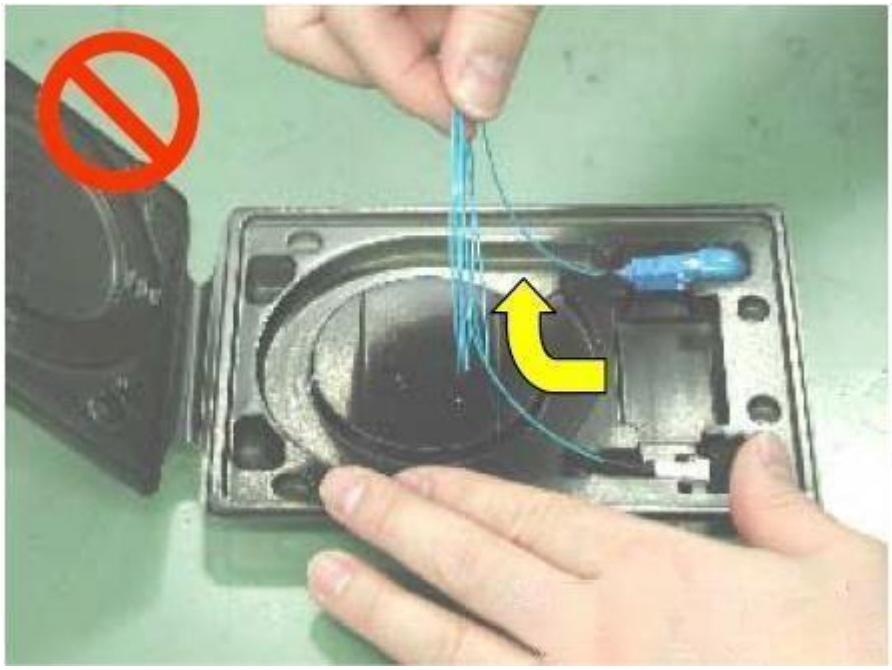
Warning: May cause deformation or damage to device pins

6. It is prohibited to exert excessive lateral force when pulling the optical fiber.



Warning: When operating optical devices, the maximum tensile force acting on the optical fiber shall not exceed 5N, and the bending radius of the optical fiber shall not be less than 35mm. Fiber damage will cause optical power to decrease. Please operate with caution!

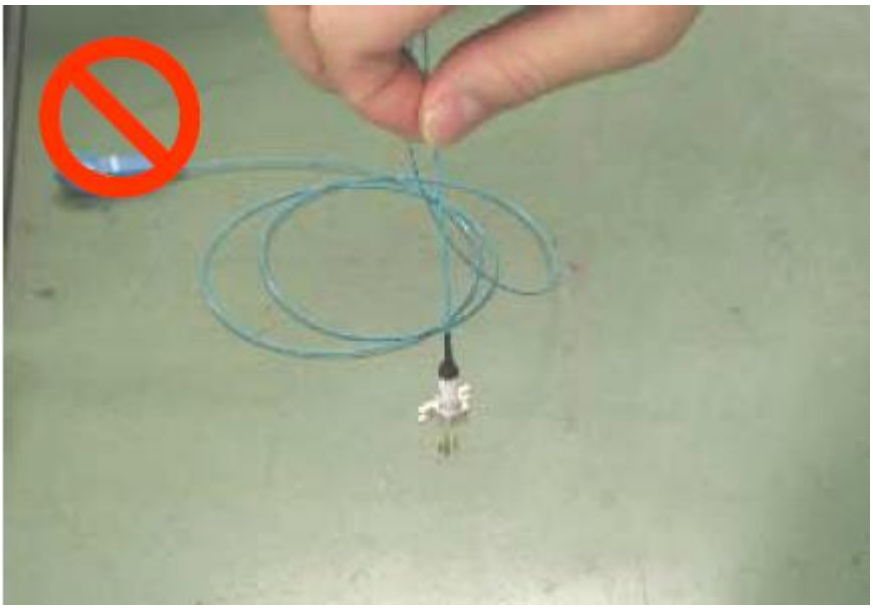
7. It is prohibited to pull the optical fiber without grasping the device properly.



8. It is forbidden to pull the optical fiber without grasping the device properly.

Warning: When operating optical devices, the maximum tensile force acting on the optical fiber shall not exceed 5N, and the bending radius of the optical fiber shall not be less than 35mm. Fiber damage will cause optical power to decrease. Please operate with caution!

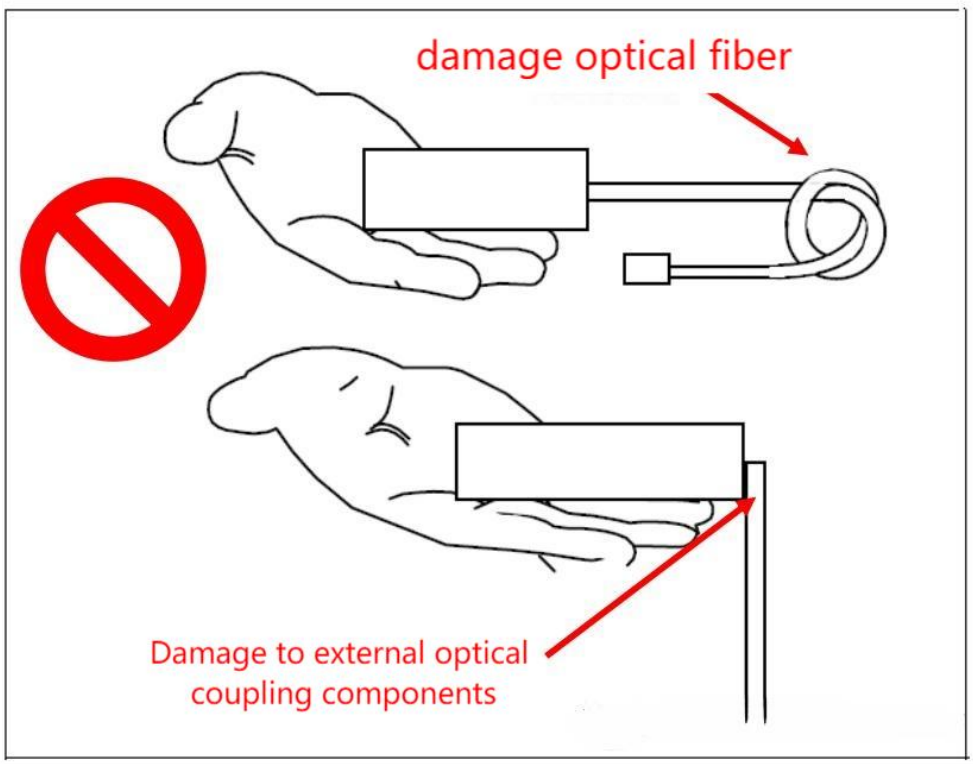
9. It is forbidden to let the device hang down while holding the optical fiber.



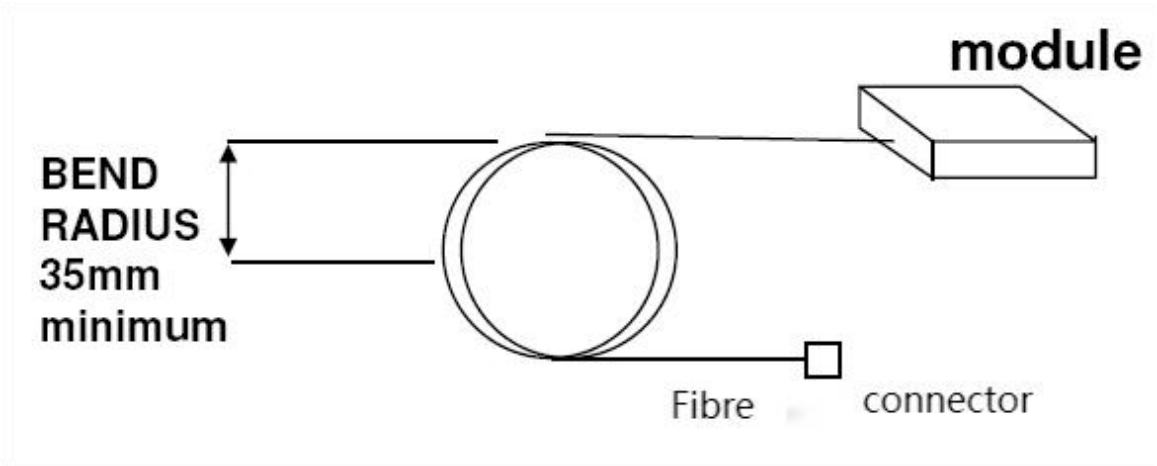
10. Do not let the device hang down while holding the optical fiber.

Warning: When operating optical devices, the maximum tensile force acting on the optical fiber shall not exceed 5N, and the bending radius of the optical fiber shall not be less than 35mm. Fiber damage will cause optical power to decrease. Please operate with caution!

11. It is forbidden to hold the module box with your hands while letting the device pigtails hang freely. It is prohibited to tie optical fibers (the bending radius is too small)

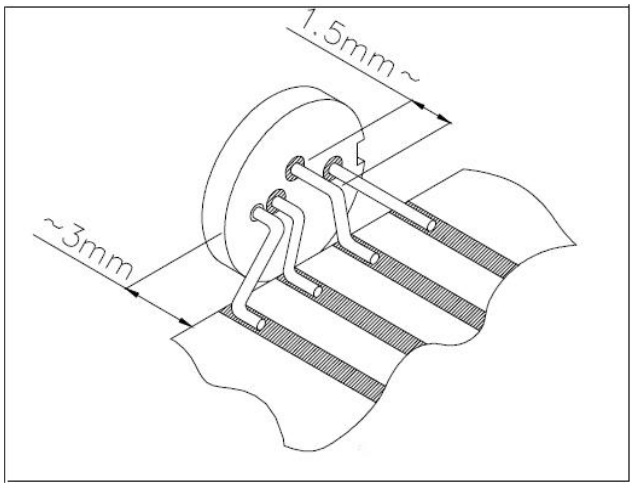


The bending radius refers to the minimum radius that an optical fiber can withstand without performance degradation or complete damage when it is bent. As shown in the figure below, the bending radius should generally not exceed 35mm.



Optical device pin forming, trimming and installation fixing

1. Reference example for shaping and trimming pins of coaxial packaged optical devices

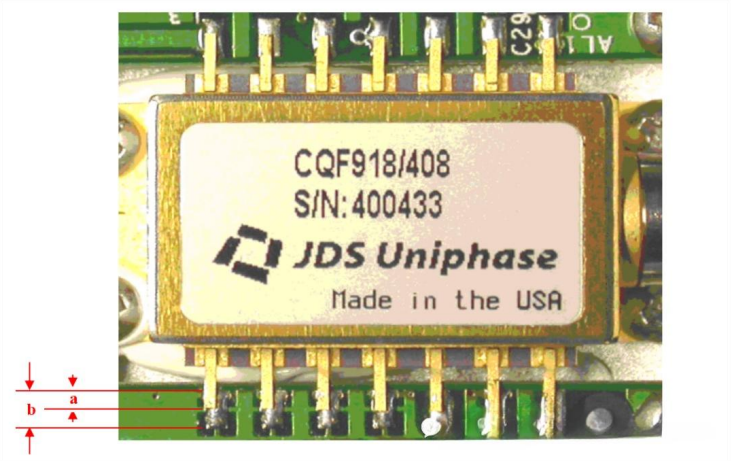


Note: Do not use tools to put stress on the root of the device pins during operation to prevent damage to the pins.

2. Example of pin trimming of butterfly package optical device. What types of optical module packages are there?

The overlap length (a) of the trimmed pin and the pad is approximately 1/2 to 2/3 of the total length (b) of the pad.

That is: b/2 ≤ a ≤ 2b/3



Notice:

- The tools used during operation should not put stress on the roots of the device pins to prevent damage to the pins.

- Pay attention to protecting the tail vertebra of the device during operation. The force exerted on the tail vertebra may cause the optical coupling components to dislocate, resulting in irreversible and permanent damage to the device!

3. Butterfly laser installation and fixation steps:

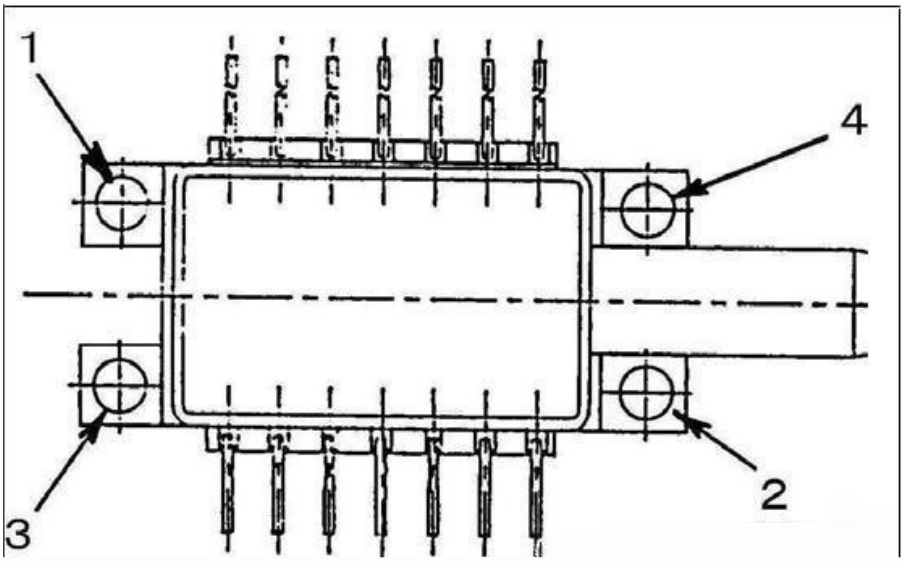
a. Clean the heat sink of the laser.

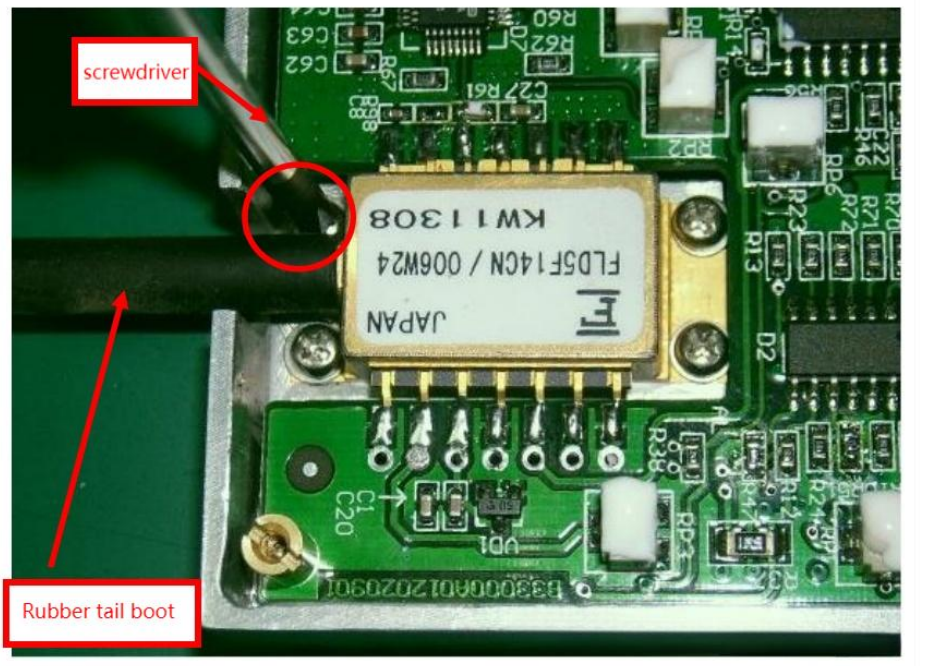
b. Apply an appropriate amount of thermal conductive silicone grease to the heat sink.

c. Place the laser on the heat sink and move it back and forth, left and right, to ensure that the silicone grease is evenly applied. Make sure the pins are aligned with the pads on the PCBA before tightening the set screws.

d. Use a torque of 5cN·M to pre-fix the screws of M2 in the order of 1→2→3→4.

e. Use a torque of 10 ~ 15cN·M and still follow the sequence of 1→2→3→4 for final fixation.





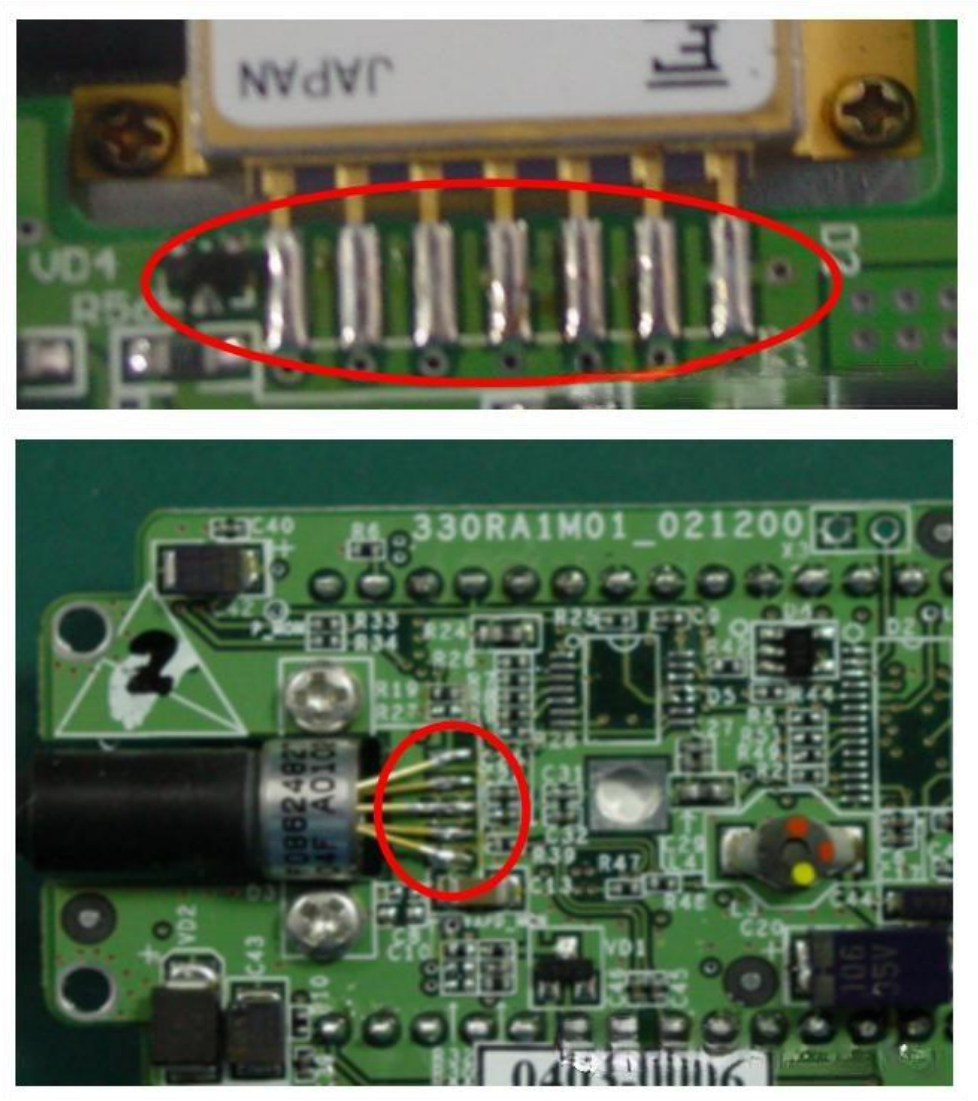
Note: Do not touch the rubber tail sleeve with the screwdriver when tightening the screws to prevent damage to the tail cone of the device, resulting in a decrease in optical power.

Optical device pin welding

1. The optical device can be soldered after the pins are formed, trimmed and installed. When soldering with 63/37 tin-lead solder, the following soldering temperatures and durations must be followed:

a. When the welding temperature is lower than 260 degrees Celsius, the maximum duration is 10 seconds.

b. When the welding temperature is lower than 400 degrees Celsius, the maximum duration is 3 seconds.



Notice:

Exceeding the above operating conditions may cause device damage.

Only use a soldering iron with a separately grounded soldering iron tip for soldering (a suspended soldering iron tip can easily induce static electricity when heated).

Static electricity resistance classification of main optical components

According to the sensitivity to static electricity, a company classifies the static electricity resistance level of its products as follows:

Class of ESD	0	I	II	III
ESD sensitivity level	less than 199V	200 to 499V	500 to 1999V	more than 2000V

Static electricity resistance test method: EIAJ ED-4701 C-111A (C=100pF, R=1.5kΩ)

Static electricity resistance level of main optical components:

Description of Device	Class of ESD	ESD sensitivity level
2.5G APD/PIN-TIA	Class 0	<199V
2.5G/1.25G 5 Pin Coaxial Receiver(ROSA)	Class I	200 to 499V
2.5G DFB LD/2.5G F-P LD	Class II	500V to 1999V