

# VCSEL Installation

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The purpose of this document is to show how the VCSEL is installed in the laser system, so that I am not the only one who is capable of changing the lasers. If there are ever any questions, please email me at [ntbelc@wm.edu](mailto:ntbelc@wm.edu).

**Step 1:** Disconnect the power supply from the bias-T at the white 3-pin connector, and unscrew any external rf from the SMA connector on the bias-T. Remove the blue cover, unscrew the metal clamp, and unscrew the bias-T from the VCSEL. The bias-T is taped to the metal holding block with double-sided tape, so it is a little bit tough to take off. When pulling up to take the bias-T off of the tape, be careful not to pull too hard on the laser, as the copper block that holds the laser can also come unglued.

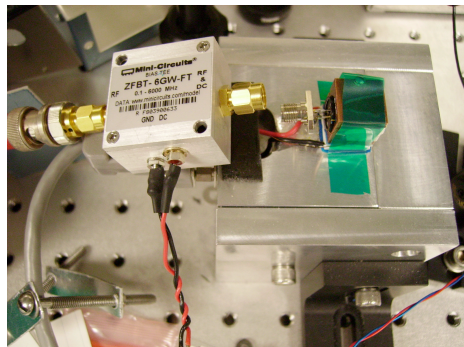


Figure 1: Step 1: Removing the bias-T from the VCSEL.

**Step 2:** Unscrew the black collimating screw from the collimating tube. The collimating screw is the piece that holds the laser against the collimating lens, and it is attached by threads at the back of the copper block (end closest to bias-T). There are two small holes on the collimating screw, so a small object is needed to fit in one of the holes to unscrew it. In the past, I have used a razor blade edge, but anything that will fit in the hole will work.

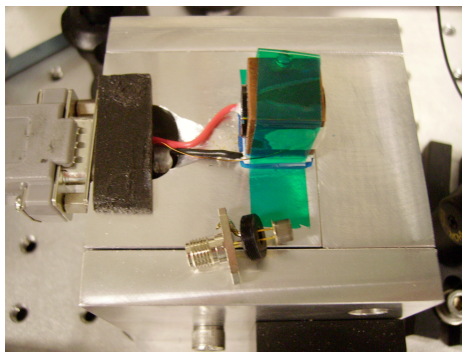


Figure 2: Step 2: Unscrewing the collimating screw.

**Step 3:** Desolder the old VCSEL from the SMA connector. There will be two pieces remaining: the SMA connector, and the collimating screw.



Figure 3: Step 3: Desolder the VCSEL from the SMA connector.

**Step 4:** With the grounding strap around your wrist, clip a small amount (less than 5 mm) of the leg of the VCSEL with the black at the VCSEL cap. This leg will attach into the middle of the SMA connector, and the leg with gold at the cap will attach to the case of the SMA.

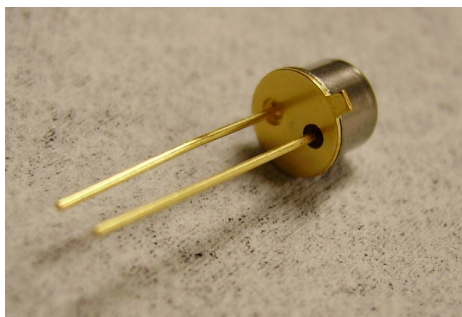


Figure 4: Step 4: Clip the leg of the VCSEL with black at the cap a small amount.

**Step 5:** Still with the grounding strap on your wrist, place the legs of the VCSEL through the collimating screw, and solder the leg with the black at the cap to the

middle prong of the SMA connector and the leg with the gold at the cap to the case of the SMA connector. The holes in the collimating screw must be facing the SMA connector, otherwise there is no way to tighten the collimating screw to its tightest position.

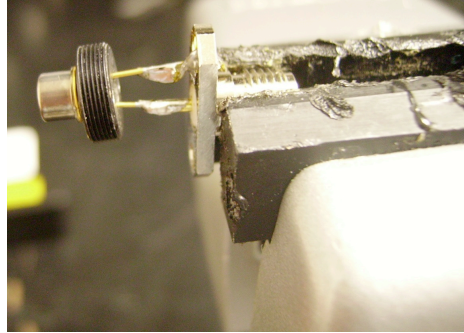


Figure 5: Step 5: Solder the VCSEL to the SMA connector.

**Step 6:** Cut out three small squares from a notecard (they should fit inside the collimating screw), and cut two of the four corners out as in figure 7. These pieces of notecard will go between the collimating screw and the VCSEL, to reduce the space between the screw and the laser, so the laser will not move.

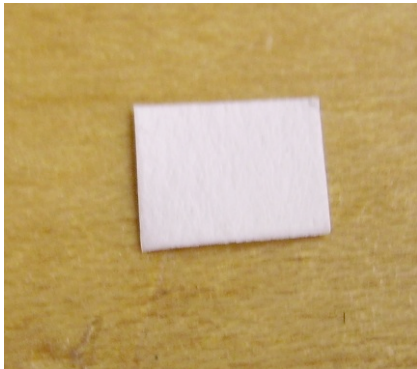


Figure 6: Step 6: A square from a notecard.



Figure 7: Step 6: Corners cut out of the square.

**Step 7:** Reattach the grounding strap to your wrist, and place the pieces of notecard and place them between the two legs of the laser between the collimating screw and the laser head. The tweezers are a necessary tool, because the pieces of paper are too small to grab with fingers.

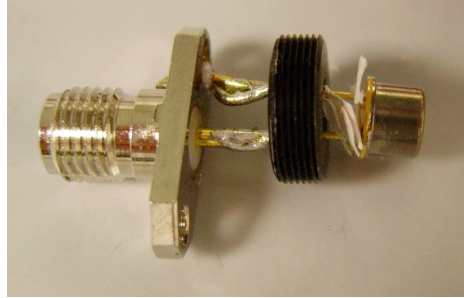


Figure 8: Step 7: Place the three notepad pieces between the collimating screw and the VCSEL head, between the legs of the VCSEL.

**Step 8:** Again with the grounding strap on your wrist, place connected VCSEL to SMA connector back into collimating tube and tighten the collimating screw to the tightest position. The VCSEL will move around a bit when tightening down the collimating screw, so try to keep the head as parallel to the collimating lens as you can. The laser light from the VCSEL needs to be more or less straight from the point where it exits the collimating lens, neither pointing high or low nor left or right. Reattach the bias-T to the SMA connector on the VCSEL, and also to the double-sided tape.

**Step 9:** Recollimate the VCSEL by shining it at a distance onto a piece of paper or the wall using the front screw on the collimating tube. By turning the screw clockwise or counterclockwise, the distance of the collimating lens from the VCSEL changes. This changes the focal point of the laser, and collimates the beam. The goal is to not get a focal point at any one place on the laser path, but to have a round disk of light the entire length of the path. The laser is easier to see as the power is increased, but it is a good idea to not drive the laser past about 1.75 mA of current.

Good luck, hope everything works, and if not, just think the problem through.