



AN-13 PROTECTING LASER DIODES FROM REVERSE VOLTAGES

Laser diodes are not designed to withstand reverse voltage. Reverse voltages as low as ~2V can potentially damage the laser. Even a very short transient in the reverse direction can damage the device. This problem can arise, especially when modulating the laser on and off at high speeds. Transmission-line effects in the cabling between the laser driver and the laser diode can generate negative-going transients, even when the laser driver itself does not produce negative voltages.

For this reason, we recommend including a “reverse protection diode” in parallel with the laser diode whenever a reverse voltage could occur. The protection diode is placed in parallel with the laser diode, with its polarity reversed relative to the laser diode's polarity. If a negative voltage is applied, the protection diode conducts and clamps the reverse voltage across the laser to less than 1V.

In pulsed or modulated applications, the protection diode should be placed as close as possible to the laser diode. For example, directly across the laser package pins, or within the connector attached to the laser diode. In CW applications, the protection diode could be incorporated within the laser driver circuit board. The protection diode should be a “fast recovery” diode in order to respond to very fast transient voltages in pulsed applications. Fast-recovery “Schottky” diodes are well-suited for this purpose. One example is the diode type 1N5820, although there are many similar Schottky diode types available.

