

Fast Laser Amplifier Interlock Module (FLAIM)

Summary: Some optical components, notably nanophotonic waveguides, can be damaged by high peak intensities, which can be generated when energized optical amplifiers are suddenly seeded. The Octave Photonics Fast Laser Amplifier Interlock Module (FLAIM) protects sensitive optical components from high peak intensities by quickly sending an interlock signal to an optical amplifier when the input light to the amplifier is lost. The FLAIM is a compact benchtop module that provides an adjustable input threshold for tripping the protection circuitry, shutting off the connected amplifier with a response time <1 ms. When used properly, the FLAIM can protect valuable optical components from accidental damage.



FLAIM front panel



FLAIM back panel

Specification	FLAIM
Input/output connections	BNC
Interlock response time	<1 ms
Ranges for input voltage	5, 2.5, 0.5 volts
Interlock latching	On or off via switch
Dimensions (excluding connectors)	150x150x85 mm
Typical electrical power draw	0.1 Watts (20 mA at 5 V)

Application: protecting nanophotonic devices from optical damage

Nanophotonic waveguides combine extremely tight optical mode confinement with high material nonlinearity. This combination allows low-energy input pulses to reach peak intensities nearing 10^{12} W/cm². However, since these intensities approach the optical damage threshold of the waveguide material, special care must be taken to ensure the seed laser system does not output large transient pulses. Uncontrolled pulse amplification will permanently damage the waveguide module.

The most common scenario for optical damage in a research-lab setting is when an optical amplifier is energized before a stably mode-locked seed laser is connected. This can happen, for example, if the seed laser loses its mode-locked state while the amplifier is running. To prevent damage, the amplifier must be turned off before re-modelocking the seed laser. The FLAIM can be used to quickly turn off an optical amplifier system in the event of momentary or extended disruptions of the seed light.