TROUBLESHOOTING

GENERAL TEST PROCEDURE

Before diagnosing potential issues with the IR detector, detection module or measurement system, perform the following checks:

- Ensure all components of your measurement setup are connected correctly.
- Verify that all connections are snug and secure.
- Confirm that supply voltages or currents match the component specifications.
- Check whether the detector has reached its proper operating temperature (e.g., via thermistor resistance or cooler controller indicators).
- Review the attenuation/gain settings used in your measurement path.
- Check the load at the amplifier output; for high-frequency signals (>20 MHz), the output and load impedances must be matched.
- Ensure that bandwidths of all components are reasonably well-matched.
- Confirm that the detector is not saturated or damaged due to excessive irradiation – refer to the Beam Power Limitations chapter in the Precautions for use document for guidance.

If a problem still exists, try to identify and solve it by actions mentioned below.

- Cycle the power of the components off and on again.
- After shielding/switching off the radiation source, do you see any signal decrease? If yes, most probably you see a signal from the optical radiation you hope to see.

LIST OF POSSIBLE FAULTS AND SOLUTIONS

No or too weak response to optical radiation

- Refer to the GENERAL TEST PROCEDURE for initial checks.
- If you don't have another detector to verify your radiation source, try moving a hot object (e.g., your hand or a hot soldering iron) rapidly across the detector's field of view. The higher the temperature or the shorter the distance to the detector, the stronger the expected output signal.
- Test your detector with an alternative radiation source, if available. A warm or hot object moved in front of the detector is sufficient for DC- or low-frequency AC-coupled devices.
- Adjust or improve your optical alignment to maximize the signal or signal-to-noise ratio.
- Estimate the expected detector response by considering the irradiance on the active area and the responsivity of the detector (or detection module). Compare the expected value to the measured signal.
- Evaluate the system noise. Estimate noise levels based on the detector's or module's noise density (available in datasheets), and compare this to the measured response with the detector optically blinded.
- Check whether the optical radiation is strong enough to achieve a good signal-to-noise ratio – the signal should be several times greater (in peak-to-peak value) than the noise level. If the signal is lower than expected, consider increasing the radiation power incident on the detector's active area. However, also verify that the radiation is not too strong, as excessive power can saturate or damage the detector.

Excess noise

- Refer to the GENERAL TEST PROCEDURE for preliminary checks.
- Excess noise may be caused by poor electrical connections, improper grounding, ground loops, high background photon flux, or electromagnetic interference (EMI) – for example, from inductive motors driving a radiation chopper.
- You may also reduce noise by decreasing the system bandwidth, if possible.

Unstable signal

- Refer to the GENERAL TEST PROCEDURE for initial diagnostics.
- Check:
  - Cable integrity and connection quality
  - Stability of the radiation source
  - For DC or low-frequency signals, consider potential fluctuations in thermal background radiation
  - Whether the temperature set-point has been reached (especially for TE-cooled devices)

Slow signal rise/fall time

- Refer to the GENERAL TEST PROCEDURE for initial diagnostics.
- Check:
  - The pulse shape using another detector, if available
  - Operating conditions, including detector temperature, bias, and optical alignment
  - Whether the impedances of the detector, cables, preamplifier, and readout instrument are properly matched

Operating temperature not reached

- Refer to the chapter OPERATING TEMPERATURE in the Precautions for use document and the document Thermoelectric cooling, heat sinking.
- Check:
  - Thermistor resistance or cooler controller indicators
  - Ambient temperature – ensure it does not exceed the maximum allowed for the intended detector temperature
  - Supply voltages and currents for the Peltier element
  - Cooler controller circuitry and set-point configuration
  - Electrical and thermal connections
  - Detector sealing – is there any condensation or ice formation on the detector or inside the housing?

If the operating temperature remains too high or if the detector's hermetic package appears to be damaged, contact your Technical Support Team.

Changed detector resistance

- Detector resistance may naturally drift by a few percent over time.
- Larger changes are usually caused by degradation due to excessive optical irradiation or overheating of the active element – this can occur during soldering, improper TE cooler operation, or incorrect biasing.
- Check for short or open circuits in the connections.
- Inform your Technical Support Team of any suspected sources of degradation.