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SENSOR CONFIGURATION GUIDE

Model S155001A0: 1550 nm

Lepton's S155001A0 is a highly versatile device, with features not found on competitive sensors. It's fast, has a wide optical dynamic range, tunable narrow spectral acceptance window, and exhibits excellent photon number discrimination. The following provides information that will be useful when configuring the sensor.

User-supplied Hardware/Setup. In order to power up the unit, supplies for +15 V (+11.5 to +15.5 V, 30 mA) and +5 V (+4.5 to +5.5 V, 1.0 A) are required, as well as a variable +0.25 V to +1.0 V for gain control. If the fan is attached to the +15 V supply, an additional 160 mA will be required from that power supply. A banana plug/ribbon cable interface is available from Lepton to facilitate connection with the sensor's PCB. A multimeter with clip leads is suggested to access PCB voltages for tuning and sensitivity adjustments.

A light source at 1550 nm is required (tunable, if desired). The sensor input is via a single-mode fiber with a FC/APC connector. The sensor is capable of single photon detection/counting, but it also can be used for sensing at higher light levels. The maximum ***average*** allowable sensor output current is 100 μA - this will occur at about 100 nW of (DC) input optical power at 1550 nm. Lepton recommends configuring the device at lower power levels if possible. Alternatively, the gain control can be adjusted to lessen the output current. Pulsed applications need only comply with the average current requirement.

The sensor has a high-impedance current output, for which ***a DC path to ground is required***. A picoammeter following the sensor is suitable for DC measurements, or the user may prefer other electronics for pulsed-mode evaluations. In order to avoid charge build up at the output, it is recommended to connect the output electronics prior to powering up the sensor.

Power Up. Confirm that the +15 V, +5 V, and +0.8 V (nominal) gain control supplies are within the ranges stated above. Connect these (and GROUND) to the banana plugs on the interface cable, and connect the sensor's SMA output to the desired meter or other electronics. Plug the interface ribbon cable onto the PCB to power up the device. Allow 15 min for the device to reach thermal equilibrium after power up.

Setup of Potentiometers. There are three potentiometers on the PCB, and three associated voltage set point outputs on the interface board. The potentiometers are preset at Lepton, but not fixed. The voltages correspond to

the outer front-end package temperature (V_{PKG}), front-end sensitivity (V_{SENS}), and the position of the spectral acceptance window (V_{TUNE}). Refer to Fig. 1 below to associate the potentiometers with their voltages.

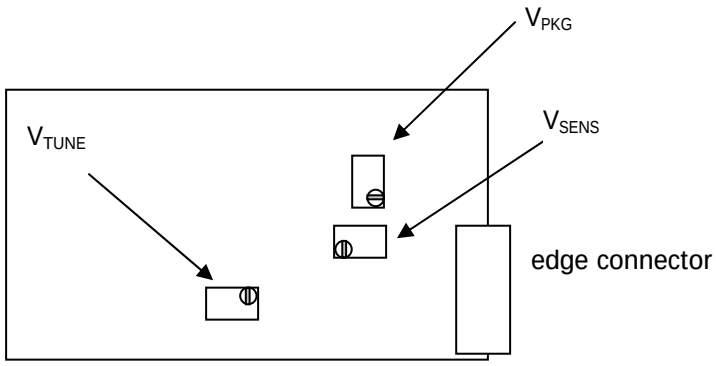

Figure 1. Potentiometers and associated voltages.

V_{PKG}. The front-end package temperature has been set to 25°C (V_{PKG} = 0.750 V). There should be no need to adjust the pot during evaluation. Some sensitivity advantage can be gained by lowering the temperature; conversely the temperature could be increased to lower power consumption if the unit finds itself in a higher ambient. Please consult with Lepton if it is desired to adjust the pot.

V_{SENS}. The front-end sensitivity voltage has been set to V_{SENS} = 0.440 V. Lowering the voltage will decrease sensitivity as well as the noise count rate, but changes will be somewhat erratic. Adjustments of V_{SENS} can be used in conjunction with changes in the gain control to optimize performance. Lepton may be able to suggest an appropriate setting based on the application.

V_{TUNE}. The sensitivity window has been set with its maximum at 1550.0 nm, or V_{TUNE} = 0.315 V, which is the design wavelength for the device. Adjustments to the pot (filter) setting can be made to maximize sensitivity as the input signal wavelength changes. Any move away from 1550.0 nm will incur a modest sensitivity penalty, as shown below in Fig. 2. The sensor is capable of tuning over ± 10 nm, but the provided range on the PCB is about ± 3 nm to accommodate signal drift. If the input wavelength is known, use Fig. 2 to find the appropriate V_{TUNE} setting, then dither to maximize sensitivity. Refer to the data sheet for additional information.

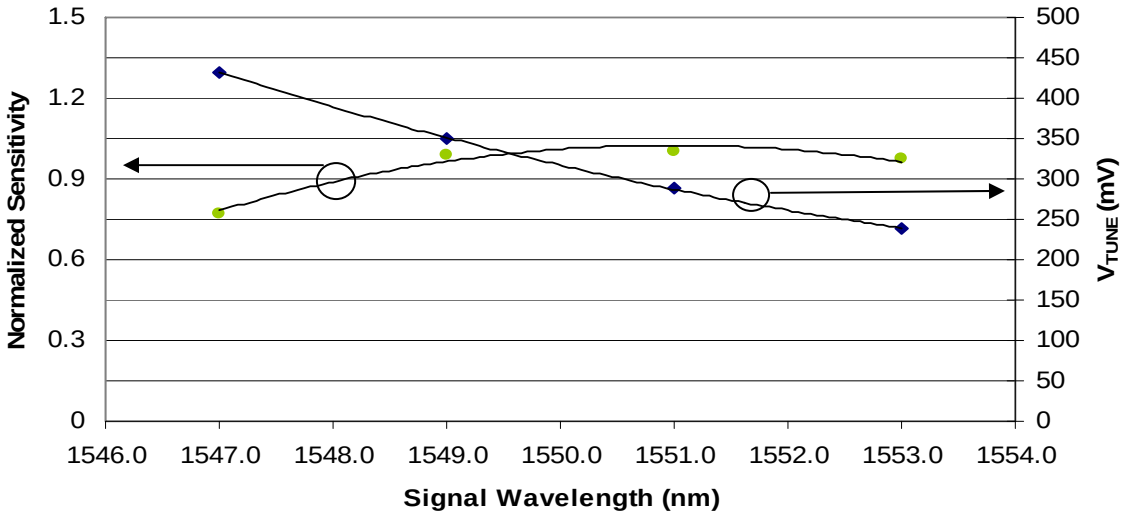

Fig. 2. Appropriate V_{TUNE} vs Signal Wavelength.

Please contact Douglas Herr with any technical questions at 717.560.0664 or dherr@lepton-tech.com.