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LDI General APD Design/Use Considerations:

This summary is intended to serve as a general guideline/checklist and overview in achieving optimum performance when incorporating LDI's InGaAs APD into a new design.

APDs are typically used in applications requiring both high bandwidth and high sensitivity. The operational wavelength of the APD is determined by its material composition. Two of the more common APD material types are Silicon and InGaAs. Silicon is used primarily at the shorter wavelengths (~850nm) whereas InGaAs is typically used at the longer (1310, 1550, 1625 nm) wavelengths. The APD described herein available from LDI is a Mesa structure InGaAs APD.

APDs differ from a photodiode in that they offer gain. Although this is a primary advantage of APDs, other characteristics that should also be considered when selecting a device are the operating wavelength, bandwidth, noise and signal handling capability of the device.

Several key points should be reviewed when developing a new design to insure that the best performance level can be achieved and that any new layout or design being considered has taken these into consideration. The following is an abbreviated list of general guidelines to consider when implementing LDI's InGaAs APD into a new design.

- ✓ Standard RF practices should be utilized when implementing new circuit card layout to minimize parasitic effects and maximize bandwidth performance. Minimize APD component lead lengths as practical.
- ✓ The use of current limiting in the reverse operating DC bias voltage line is recommended to protect against APD damage. This would insure that the maximum recommended APD current is not exceeded. This protection circuitry can be as simple as a resistive limiter or can be more complex and include circuitry which incorporates a hard current limit.
- ✓ APD characteristics in general are such that the gain (sensitivity) of the photodiode can be adjusted by varying the reverse bias applied to the device. This feature allows for the APD gain to be set optimally for a given application. It is important to note that in circuits in which the optimum gain setting may be paramount, the reverse operating voltage should be controlled to compensate for any temperature shift of the device parameters as the breakdown voltage and the operating point of device may vary with temperature.
- ✓ For low light level non-fibered applications blocking/filtering of ambient light should be considered to minimize interference from unintentional light sources.
- ✓ Linear power supply biasing should be considered where possible for low noise applications.
- ✓ APD should be located away from heat generating components.

With regards to the APD bias supply, below is a small sampling of available support components and application information for the APD bias control circuitry:

Support Components Supplier Information :

1) Maxim Integrated :
   http://pdfserv.maximintegrated.com/en/ej/EJ45.pdf (pg3)
   http://datasheets.maximintegrated.com/en/ds/MAX1932.pdf

2) Linear Technology:
   http://cds.linear.com/docs/en/lt-journal/LTMag-V19N1-07-LT3571-XinQi.pdf

Below is a general block diagram showing a sample configuration of circuit elements:

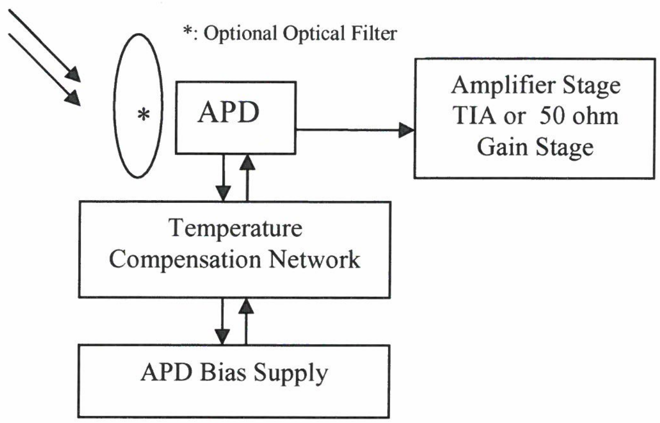

Figure 1. General Block Diagram

A sample APD response plot is included below for reference:

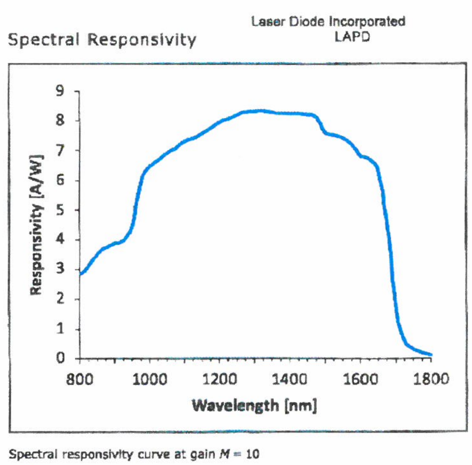

Figure 2. Sample InGaAs APD Response

The above information is intended to serve only as a general guideline. For additional detail or answers to specific questions regarding the application and use of LDI's APD product line please contact LDI Sales.