

Near IR detector for LIDAR

Technology Research Program
T103-03MM

400 Keuro

Closing date for proposals: 9th of January 2006

“to develop a detector at the 1600nm or 2000 nm for monitoring CO₂ with a satellite LIDAR”

ACTIVITY WORK PROGRAM LOGICAL DIAGRAM

Task 1: Critical review of requirements, identification of the most promising detector design for development for the 1600 nm and 2000 nm bands

Milestone 1: Selection of detector and spectral range

Task 2: Detailed Design and Test Plan

Milestone 2: Detailed Design Review

Task 3: Development of the optimised detector

Milestone 3: Test Readiness Review

Task 4: Test of the devices

Milestone 4: Demonstration

Task 5: Conclusions and Development Roadmap

Performance requirements for an analog /photon counting operation

Parameter	Value	Comments
Quantum efficiency (QE)	$QE/F > 0.20$	
Noise equivalent power	$< 25 \text{ fW}/\sqrt{\text{Hz}}$	Noise is including the dark current, the proximity electronics such as pre-amplifier.
Gain	> 10	
Excess noise factor (F)	$QE/F > 0.20$	
Linearity	better than 0.1% (TBC) over a decade	
Gain stability	$< 0.1\%$	Short term (28s)
Recovery from saturation	To be defined	Fast recovery from saturation

Timing requirements

Parameter	Value	Comments
Pulse repetition frequency	10-100 Hz typically	Shall not be a driver for the design
Number of samples to be acquired	50 (TBC)	
Time gate	66ns to 200ns	
Correlation between consecutive samples	<10% (TBC)	

Optical interface requirements

Parameter	Value	Comments
Optical spot diameter	150 μ m	Typically
Wavelength	1570-1650 nm and 2050-2290nm	Both wavelength ranges shall be assessed up to the end of task 1.
Typical laser linewidth	< 1 GHz larger linewidth is acceptable for testing if it is proved that it has no impact on the measured performance	The detector is to be optimised for one wavelength, in the spectral range given in the Table
Signal level	4nW to 1 μ W	
Saturation level	TBD by ESA	