

Photon counting detector for both passive and active space debris optical tracking

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We are presenting a new version of the photon counting detector package constructed for space debris optical tracking. The detector is based on a standard SAP500 avalanche photodiode detection chip. The new construction of detector control electronics enables to operate the detection chip both in continuous and gated modes. In both these modes the detector is capable to monitor optical signal strength – diffused Solar radiation by the space debris. Combining the continuous and gated mode enables to measure the photon fluxes over more than three orders of magnitudes ranging from one kHz to several MHz rates. In addition the gated mode is optimized for laser ranging of orbiting space debris. The two operation modes of the detector may be switched electronically. The detection chip is operated at a fixed temperature of -80C. In an active gated mode the photon detection efficiency exceeds 60% at 532 nm its timing resolution is typically better than 100 ps rms. The dark count rate in a continuous mode is within a range of 10 to 20 kHz. This detector package was developed as our contribution to the ESA activity „Space Situational Awareness programme P2-SST-VII Expert Coordination Centre; Phase II“.