

The Supercam Local Oscillator Multiplexing Unit

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Abstract— With an array receiver, LO power must be efficiently distributed among pixels. Depending on the mechanical and optical constraints of the array, a balanced distribution can be achieved using quasioptical techniques or waveguide injection. With the quasioptical approach, dielectric beam splitters or holographic phase gratings are used to divide the LO energy between array pixels. We have chosen to use a hybrid waveguide/quasioptical LO power injection scheme. The LO power for the Supercam is provided by a single solid-state, synthesizer-driven source from Virginia Diode Inc. The active multiplier chain consists of a high power solid-state amplifier followed by a series of tunerless, broadband multipliers. The output of the chain is coupled to an eight-way waveguide corporate power divider with splitblock machineable waveguide twists. Each of the eight outputs provides the drive power for a 1x8 subarray via an identical 8 way corporate divider with diagonal waveguide feedhorn outputs. The complete 64-way power divider was constructed with the Kern micromilling machine at the University of Arizona, and consists of 17 waveguide splitblocks. The measured beampattern of the complete LO unit with optics shows that LO power is divided evenly to within 10% over all 64 pixels, with good optical quality and high efficiency. We present the design, fabrication and measured performance of this waveguide multiplexer and its associated LO source and optics unit.