

C.1 A frequency-scanned slotted waveguide array sensor for detecting W-band emissions

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A frequency-scanned slotted waveguide array for detecting W-band thermal emissions via an acousto-optic Bragg cell receiver has been developed. This paper considers its design and fabrication.

The geometrical parameters of the slotted waveguide determine the frequency scanning characteristics of the array. These parameters are optimised for detecting a 9 GHz band centred on 94 GHz. Silicon dielectric waveguide has been considered because it allows the RF band to scan wider angular fields of view than metal WR-10 waveguide would permit. The waveguide size has been optimised for single mode (E_{11}^y) wave propagation and the slot spacing chosen such that broadside radiation occurs at the band's centre frequency.

A practical implementation of this design has been modelled. The electromagnetic response of this structure has been simulated using Ansoft's High Frequency Structure Simulator (HFSS), a frequency-domain Finite Element Method (FEM) software package, and the results of this analysis are discussed.