

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Design Study on a G-Band Folded Waveguide Traveling Wave Tube Amplifier Using 3D CFDTD PIC Method for Future Advanced Imaging Applications M. C. LIN, Hanyang University, HEATHER SONG, University of Colorado, Colorado Springs, JINWOO SHIN, JOONHO SO, Agency for Defense Development — Design study on a G-band (220 GHz) folded waveguide traveling wave tube (FWTWT) is presented. Due to ease of fabrication, wide bandwidth, and versatility in operation, a FWTWT structure was chosen for future advanced broadband amplifier for imaging applications. The cold test simulations were carried out employing finite element method (FEM) to determine dispersion relation, circuit dimensions, and operating beam parameters of the device. Beam optics study was performed to eliminate interception to the circuit wall and minimize beam scalloping. While precise control of beam location and size is very important to device performance, hot test simulations based on a 3D conformal finite-difference time-domain (CFDTD) particle-in-cell (PIC) method have been extensively used to predict performance of the beam transport and stability characteristics in order to optimize the electrical operating parameters. The 3D CFDTD PIC simulations of the full model have demonstrated a greater than 26 dB large signal gain at 220 GHz and beam voltage of approximately 18 kV. The effects of beam filling ratio, magnetic field, and beam interception on the gain have been studied in considerable detail and will be presented.

Ming-Chieh Lin
Hanyang Univ

Date submitted: 27 Jul 2016

Electronic form version 1.4