COLD TEST ANALYSIS OF W-BAND PLANAR INTERACTION STRUCTURE DEVELOPED USING MICRO FABRICATION TECHNIQUES

S. Jain, N. Gurjar, K. Singhal, Vishant and N. Kumar

CSIR-Central Electronics Engineering Research institute

Pilani-333031, Rajasthan, India

Andrei V. Starodubov

Saratov State University, 83 Astrakhanskaya Street

Saratov, 410012 Russia

Nikita M. Ryskin

Saratov Branch IRE RAS, Saratov, 410019 Russia

Vacuum integrated technology has been a favorable choice for the generation of high frequency, high power radiation source because of their ability to handle high power in a compact size. W band (75GHz-110GHz) is considerably a high frequency band and with the increase in the frequency, the wavelength decreases which provides a limitation in developing structures with the desired machining tolerances and surface finish [1-3]. Machining tolerances and surface roughness are the important parameters for the propagation of RF signal and can considerably effect the characteristics performance of the vacuum tube [3-4]. In this paper a beam wave interaction structure for W-Band frequency has been fabricated in two halves by wire EDM micro fabrication technique and then both the parts were integrated to form a staggered double vane structure. An extensive study of SEM results of the fabricated structure accounts for the dimensional deviation of 10 microns. The interaction structure has a tapered region to ensure low impedance mismatch and better coupling with the WR-10 waveguide ports of VNA. Consequently, the fabricated structure was used to perform the cold test analysis. A waveguide casing was fabricated in accordance with dimensions of WR-10 waveguide for cold test analysis. The interaction structure was assembled inside the casing and connected with the VNA ports. The cold test analysis parameters like S11 and S12 are estimated to be less than -20 dB and near to 0 dB respectively.

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