142
Accession number:12629588
Title:Broadband conversion of TE₀₁ mode for the coaxial gyrotron at low terahertz
Authors:Nai-Ching Chen (2); Tsun-Hsu Chang (2); Ching-Yuan Yang (1)
Author affiliation:(1) Chung-Shan Inst. of Sci. & Technol., Taoyuan, Taiwan; (2) Dept. of Phys., Nat. Tsing Hua Univ., Hsinchu, Taiwan
Source title:Physics of Plasmas
Abbreviated source title:Phys. Plasmas (USA)
Volume:19
Issue:3
Publication date:March 2012
Pages:032117 (4 pp.)
Language:English
ISSN:1070-664X
CODEN:PHPAEN
Document type:Journal article (JA)
Publisher:American Institute of Physics
Country of publication:USA
Material Identity Number:AV41-2012-005
Abstract:This paper investigates the mode characteristics of coaxial waveguide and proposes a mechanism to convert a rectangular TE₁₀ mode to a coaxial TE₀₁ mode. Four-wave, eight-wave, and sixteen-wave coupling structures are developed to selectively excite the desired coaxial TE₀₁ mode with different outer to inner radius ratios. The proposed structures can suppress the unwanted parasitic modes and lead to high converting efficiency with broad bandwidth. The measured 3-dB transmission bandwidths at W-band are 13.5 GHz (14.3%), 8.5 GHz (9.0%), and 12.2 GHz (13.0%), respectively. These coaxial TE₀₁ mode converters are mutually non-overlapping in their coaxial cross-sections, and therefore can be joined concentrically and utilized to develop a multi-channel gyrotron traveling-wave tube or backward-wave oscillator in a single superconducting magnet.
Number of references:21
Inspec controlled terms:coaxial waveguides - gyrotrons - plasma filled waveguides
Uncontrolled terms:broadband conversion - coaxial gyrotron - mode characteristics - coaxial waveguide - rectangular mode - four-wave coupling structure - eight-wave coupling structure - sixteen-wave coupling structure - outer-nner radius ratios - parasitic modes - converting efficiency - transmission bandwidths - coaxial mode converters - coaxial cross-sections - multichannel gyrotron traveling-wave tube - backward-wave oscillator - single superconducting magnet - frequency 13.5 GHz - frequency 8.5 GHz - frequency 12.2 GHz
Inspec classification codes:A5275 Plasma devices and applications - A5240F Antennas in plasma; plasma-filled wave guides - B2350 Microwave tubes - B1310 Waveguides and striplines
Numerical data indexing:frequency 1.35E+10 Hz;frequency 8.5E+09 Hz;frequency 1.22E+10 Hz
Treatment:Practical (PRA); Experimental (EXP)
Discipline:Physics (A); Electrical/Electronic engineering (B)
DOI:10.1063/1.3698409
Database:Inspec

IPC Code:H01J23/00; H01J25/00; H01P3/00