

# TWO PORT STANDARD SETS

## MILLIMETER WAVEGUIDE — 33 TO 110 GHz

Model J322A

### Features

- 2 Port Calculable Standards
- Reduced Height 1.00, 1.10, 1.25, 1.50, 2.00 VSWR Spacers
- Length is Quarter Wavelength at Midband



### Description

Maury waveguide two port standard sets are ideally suited for use as verification standards in vector network analyzer measurements. They provide a broad range of S-parameters that are directly calculable from the mechanical dimensions of the devices. These two port standards are based on earlier work by Beatty [1].

The sets consist of flange sized spacers with reduced height waveguide apertures to produce an accurately known VSWR. They are approximately one-quarter waveguide wavelength long at the phase midband frequency. Precision indexing holes in the two port standard provide excellent alignment and measurement repeatability when indexed to other precision devices that have indexing holes such as Maury calibration kits.

Each set consists of the following items:

- a) Five spacers (with corresponding VSWR's of 1.00, 1.10, 1.25, 1.50, and 2.00).
- b) Mounting hardware; indexing pins and special long screws.
- c) Wooden instrument case, foam lined.

The individual spacers are engraved with their VSWR value for ease of identification.

[1] Beatty, R. W. — NBS Technical Note 657. "Calculated and Measured S<sub>11</sub>, S<sub>21</sub> and Group Delay for Simple Types of Coaxial and Rectangular Waveguide 2-port Standards."

### Application

These two port standard sets are extremely stable, easy to use standards for a variety of calibration applications. Their simple geometry allows direct calculations from the mechanical dimensions of a broad range of S-parameters such as; reflection, loss, transfer and group delay characteristics. They are ideally suited to be used as verification standards for vector network analyzer applications.

### Specifications

1. **Frequency Range:** 33 to 110 GHz in waveguide bands.
2. **Mismatch Values (VSWR):** 1.00, 1.10, 1.25, 1.50 and 2.00 mismatch values are achieved by reducing the narrow dimension ("b"), while maintaining the broad dimension ("a"), at nominal value of the waveguide.
3. **Length:** The length of the individual mismatch spacers is approximately one-quarter waveguide wavelength at the phase midband frequency in their respective bands; refer to the chart on page 2 for frequency and mechanical length.
4. **Flanges:** Precision cover flanges with indexing holes (Maury indexing pin technique).
5. **Material and Finish:** Individual spacers are fabricated from aluminum and irridited, then the flange faces are lapped to base metal. All hardware provided, indexing pins and screws, are fabricated from stainless steel.



## Chart

Model	Frequency Range (GHz)	WR No.	Equivalent Flange <sup>2</sup>	Quarter Wavelength Frequency — GHz	Length in Inches	Waveguide Tolerance <sup>3</sup>
J322A	33.0 — 50.0	22	MPF22	40.824	.0946 ± .0005	± .0005
T322A	40.0 — 60.0	19	MPF19	49.261	.0777 ± .0005	± .0005
V322A	50.0 — 75.0	15	MPF15	61.518	.0630 ± .0005	± .00025
Y322A	60.0 — 90.0	12	MPF12	73.772	.0529 ± .0005	± .00025
Z322A	75.0 — 110.0	10	MPF10	91.221	.0424 ± .0005	± .00025

<sup>2</sup> Flanges are provided with precision indexing holes. Interface information will be provided upon request.

<sup>3</sup> This is the mechanical tolerance applied to the "a" and "b" dimension of the waveguide.