

PBAR Note No. 600
Dimension Data of Coax-Waveguide Couplers and Waveguide Terminators
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05/1998

Two sets of coax-waveguide couplers (pick-up) and waveguide terminators for 4-8 GHz cooling system (frequency band 1 and band 4) have been designed, fabricated and tested. The dimension data of these couplers and terminators are described in the following.

1. Terminators

All terminators are conventional cone-type terminator made of MF190. Other shapes such as pyramid were tried in design (using HFSS simulation), the results were not desirable. The length of terminators are 3 inches which is maximum allowed space for terminators. Shown in Figure 1 and 2 are terminators for frequency band 1 and 4.

To improve vacuum pumping capability, there will be a section of waveguide (with open end) above the terminators (see Figure 3 and 4.)

2. Couplers

Shown in Figure 5 is the dimension data of coax-waveguide coupler for frequency band 1. The width (2.362 inch) and height (0.585 inch) of the waveguide used in the test is slightly different from the final version of frequency band 1. However this should not affect the validity of the coupler.

Shown in Figure 6 is the dimension data of coax-waveguide coupler for frequency band 4.

3. Measurement

Since only one coupler was made for band 1, the performance of the coupler and terminator of band 1 was measured together: they were connected with a section of waveguide. The S11 is less than -20 db between 3.9 GHz and 5.9 GHz. Also measurement was made with an opening above the terminator as shown in Figure 3. S11 is less than -20 db between 4.2 GHz and 5.8 GHz.

Measurements for band 4 were made with two configurations: (1) one coupler and one terminator connected with a section of waveguide, (2) two couplers connected with a section of waveguide. In configuration 1, S11 is about -25 db between 7GHz and 8.8 GHz (with or without open end above the terminator.). In case 2, S11 is about -20 db between 7 GHz and 8.5 GHz.

Note. The open end above the terminator was shorted and the height was adjusted. The S11 was not affected a lot by such adjustments.

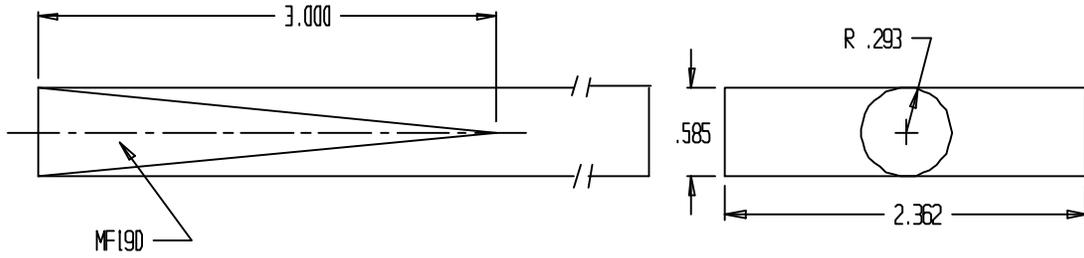


Figure 1. Terminator for Band 1

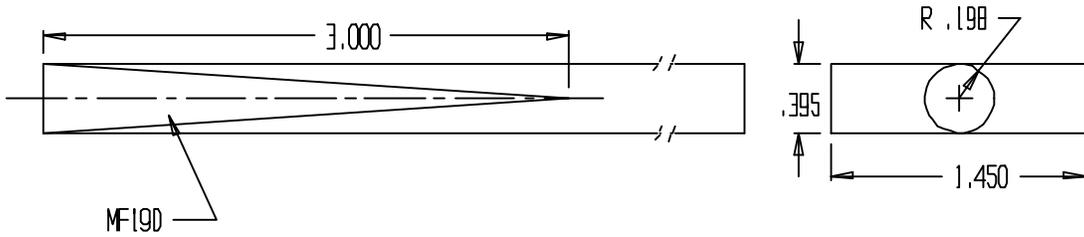


Figure 2. Terminator for Band 4

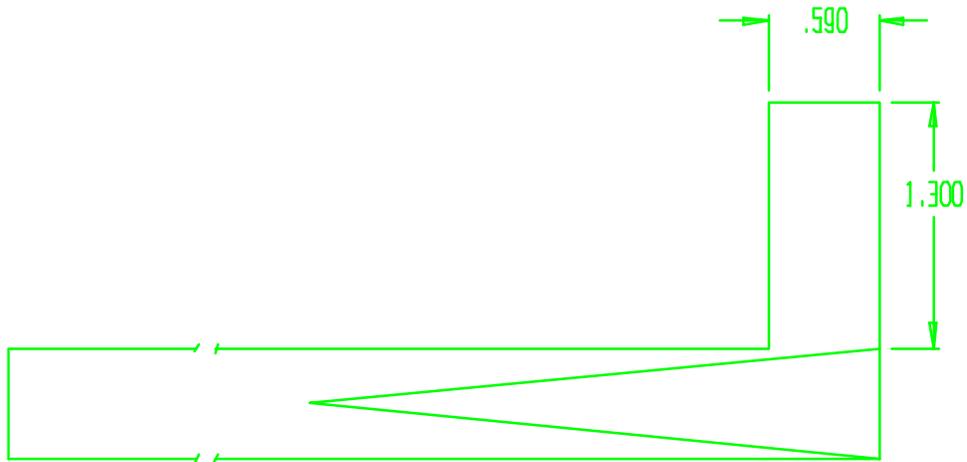


Figure 3. Terminator with open elbow (Band 1)

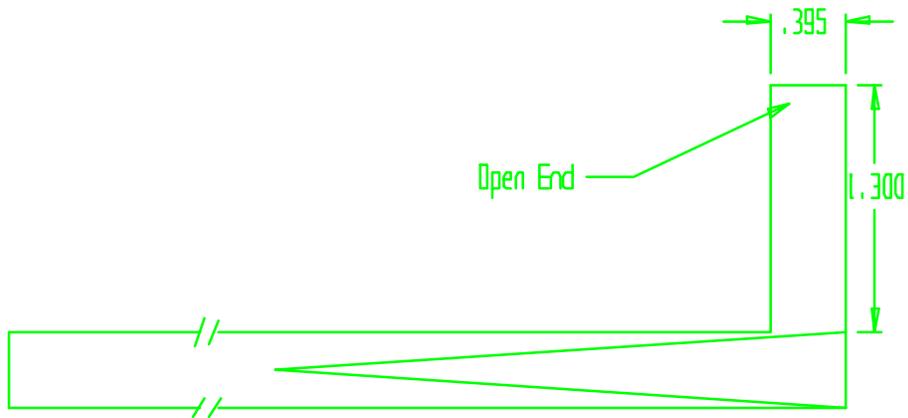


Figure 4. Terminator with open elbow (Band 4)

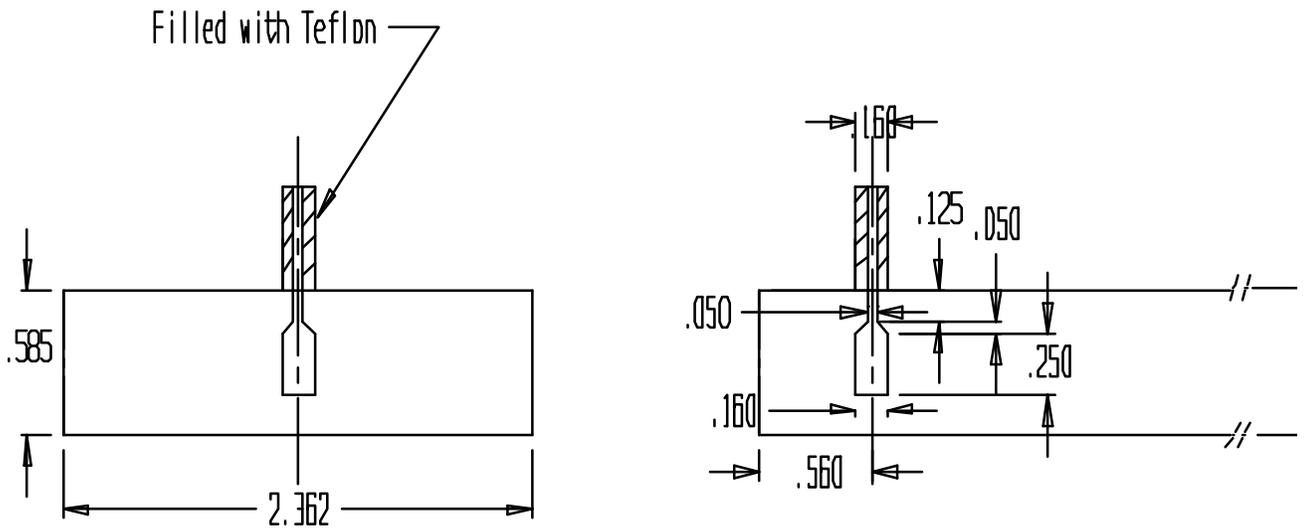


Figure 5. Coax-waveguide coupler for band 1.

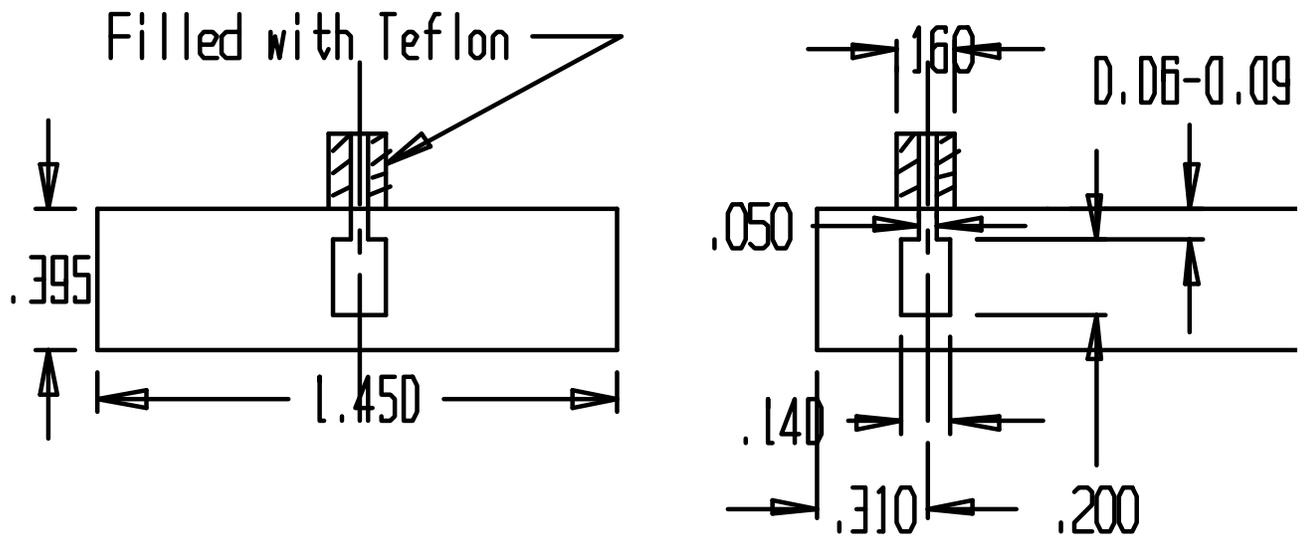


Figure 6 Coax-waveguide coupler for band 4.