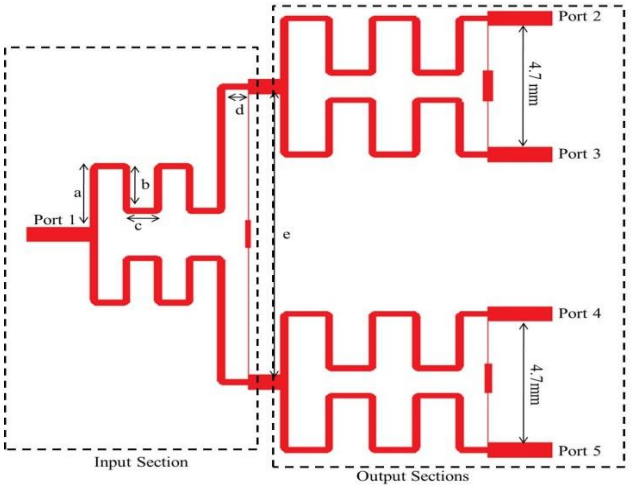

Figure 2: Layout of Y-Serpentine Model of 4-way WPD

Both the T and Y-Serpentine Models are designed using 1:2 Wilkinson Power Divider. The detailed dimensioning of 2-way WPD section is presented in table 1.

Table 1: Physical Parameters of t and y-serpentine models

Parameters (mm)	*T-Model*	*Y-Model*
a	2.37	2.37
b	1.97	1.97
c	1.18	1.18
d	0.79	0.79
e	4.9	10.98

3. Results and Discussion

Both the configurations are analyzed in MOM based electromagnetic solvers [9]. Structures are simulated on a high resistive silicon substrate (ρ>8kΩ, h=675µm, $\tan\delta$=0.001and ε_r= 11.8) for the frequency range of 1-3 GHz. RF performance of T-topology and Y-topology are shown in figure 3, 4 and 5 respectively. Table-2 summarizes the comparative performance study of both the configuration.

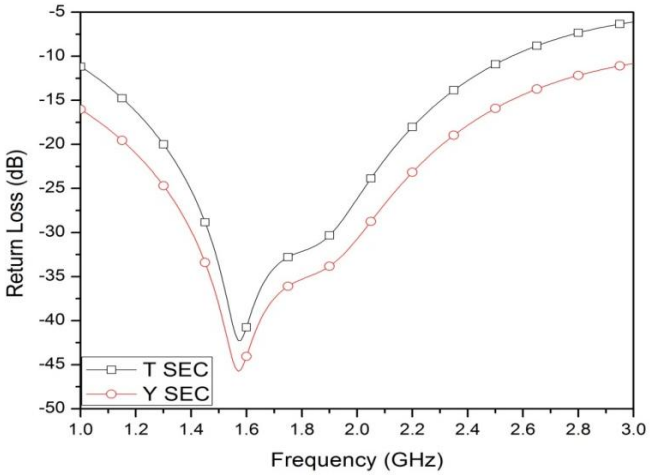

Figure 3: Return Loss characteristics

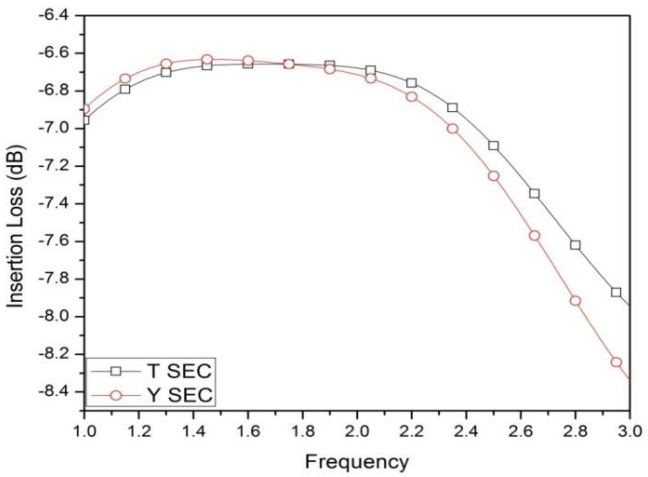

Figure 4: Insertion Loss Characteristics

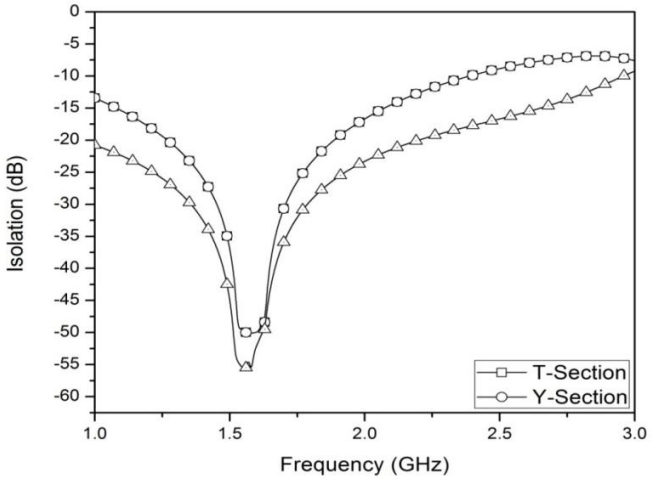

Figure 5: Isolation

Table 2: Comparison of Different 1:4 WPD Models

Parameters	*T-Model*	*Y-Model*
Operating frequency (GHz)	1.575	1.575
Return loss (dB)	-42.25	-45.75
Insertion loss (dB)	-6.66	-6.63
Isolation (dB)	-50.02	-56.28
Size (mm)	25.4×12.9	17×18.4

4. Conclusion

The two models of 1:4 Wilkinson Power Dividers have been analyzed and simulated. Y-Serpentine Model has high return loss as well as isolation in comparison to T-Serpentine Model. Also, the cover area of Y-Model is smaller than T-Model by 14.8 mm^2. So, in applications where high return loss, high isolation and smaller size is required, Y-Serpentine Model will be preferred. However, where output sections are required to be at right angles to the input section with moderate return loss and isolation values, T-Serpentine Model can be preferred. Overall, high return loss is desirable whereas the insertion loss and isolation loss should be a minimum value for power dividers. The analyses have shown that both the configurations satisfy the above constraints.

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