Isolation Transformer (Type N Balun)

T1100369-v1
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Theory of Operations

The design of the isolation transformer is shown in D1101077-v1. It implements a Mini-Circuits ADT1-1 transformer. The ground returns are connected through capacitors. Both connectors are isolated from the tubular case through capacitors as well.

Specifications

	Minimum	Nominal	Maximum
Intrinsic delay		1.1 ns	
Insertion loss (0.1 MHz to 200 MHz)	0.2 dB		3 dB
Insertion loss (0.1 MHz to 135 MHz)	0.2 dB		2 dB
Insertion loss (0.1 MHz to 100 MHz)	0.2 dB		1 dB
Insertion loss (0.1 MHz to 55 MHz)	0.2 dB		0.5 dB

Setup

```
$TextStyle = {FontFamily → "Helvetica", FontSize → 13};

plotopt = PlotStyle → {{Thickness [0.007], RGBColor [1, 0, 0]},
              {Thickness [0.007], RGBColor [0, 0, 1]},
              {Thickness [0.007], RGBColor [0.1, 0.7, 0.2]},
              {Thickness [0.007], RGBColor [0.5, 0.5, 0.2]}};

pathname = "C:\\Users\\daniel\\Protel\\RF\\System\\Isolation\\docs\\";
filename1 = pathname <> "RefMag.txt";
filename2 = pathname <> "RefPhase.txt";
filename3 = pathname <> "MeasMag.txt";
filename4 = pathname <> "MeasPhase.txt";
```

Import Data

- **Reference**

```
data1 = Import[filename1, "Table"];
data2 = Import[filename2, "Table"];
refdata = MapThread[{#1[[1]], 10^(#1[[2]]/20) e^(i #2[[2]] °)} &, {data1, data2}];
```

- **Measured**

```
data3 = Import[filename3, "Table"];
data4 = Import[filename4, "Table"];
measdata = MapThread[{#1[[1]], 10^(#1[[2]]/20) e^(i #2[[2]] °)} &, {data3, data4}];
```

Process Data

- **Measured – Reference**

```
data = MapThread[{#1[[1]], #1[[2]] / #2[[2]]} &, {measdata, refdata}];
```

- **Fixed Delay**

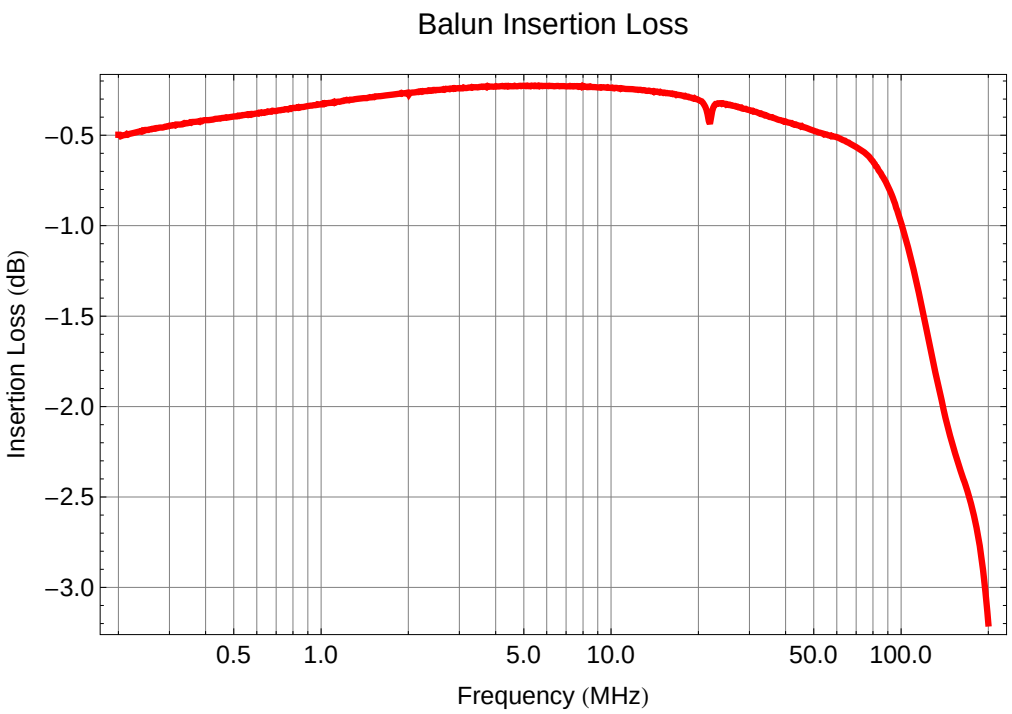
$$\frac{\text{Phase}[\text{Last}[\text{data}][[2]]]}{360\ \text{Last}[\text{data}][[1]]}$$

$$-1.09761 \times 10^{-9}$$

Plot Results

Insertion Loss

```
ListLogLinearPlot[{#[[1]]/1*^6, dB[#[[2]]]} & /@ data,
  Joined → True,
  BaseStyle → $TextStyle, PlotStyle → {{Thickness [0.007], RGBColor [1, 0, 0]}},
  PlotLabel → "Balun Insertion Loss",
  FrameLabel → {"Frequency (MHz)", "Insertion Loss (dB)"},
  PlotRange → All, Frame → True, GridLines → Automatic]
```



■ Phase Delay

```
ListLogLinearPlot[{#[[1]]/1*^6, Phase[#[[2]]] - Phase[Last[data][[2]]]/Last[data][[1]] #[[1]]} & /@ data,
 Joined → True,
 BaseStyle → $TextStyle, PlotStyle → {{Thickness[0.007], RGBColor[1, 0, 0]}},
 PlotLabel → "Balun Phase Delay",
 FrameLabel → {"Frequency (MHz)", "Phase (°)"},
 PlotRange → All, Frame → True, GridLines → Automatic]
```