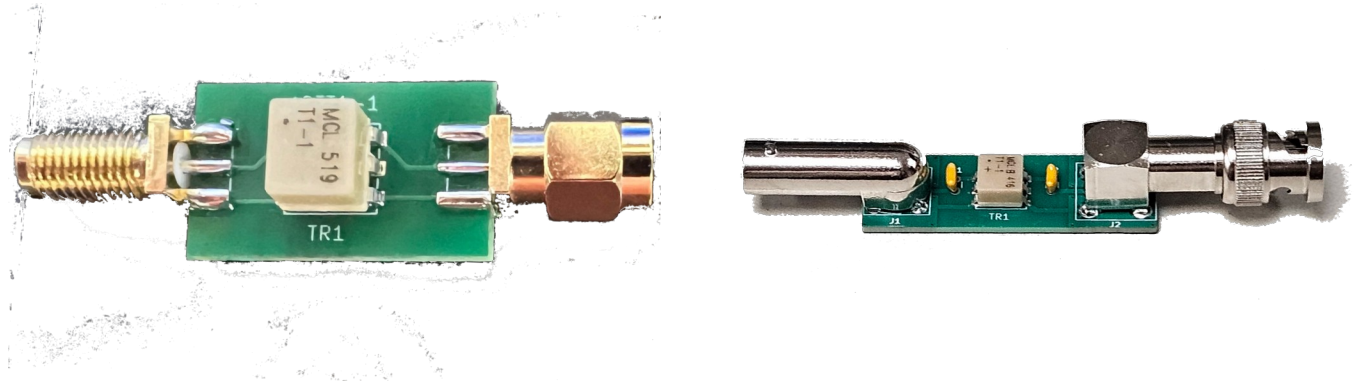


# HF Small-Signal Isolation Transformer Assembly and Operation Manual

Revision A

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## Introduction

The TAPR Small-Signal Isolation Transformer is designed to reduce common-mode signal coupling into HF receivers, or to break ground loop conditions between test equipment components carrying sensitive signals. It is available in versions with SMA or BNC connectors.

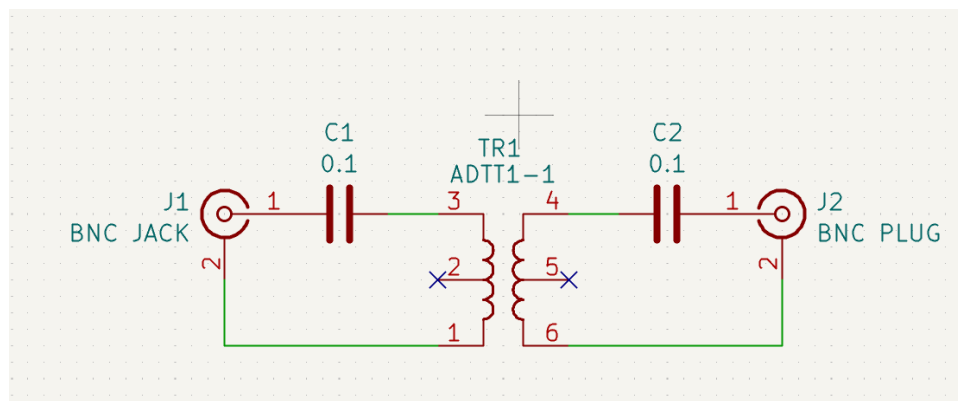
**IMPORTANT NOTE:** The isolator is intended to handle low level (<20 dBm) signals. Do not use it in high-power signal paths.

# Circuit Description

The Isolation Transformer is simply a 1:1 transformer covering the HF frequency range, connected to input and output connectors. The transformer breaks DC continuity between the input and output and thus reduces transmission of common mode signals from one side to the other.

The SMA version consists of nothing more than this. The BNC version includes capacitors for the input and output which can be installed to break the DC path between signal input and ground. This is useful if the input or output signals carry a DC voltage; without the blocking capacitor current would flow through the transformer to ground, at best wasting power and at worst burning out the transformer winding. The capacitors cause virtually no change in the RF characteristics of the unit.

You don't really need a schematic, but here one is (of the BNC version; the SMA version is identical but without the capacitors):



# Assembly

The SMA version of the isolator comes with the connectors installed, so the only assembly required is to solder the six pins of the transformer. The dot or triangle on the top of the transformer should be aligned with the “TR-1-1” name silkscreened on the board, but in truth that’s just for aesthetics – the transformer can be installed in either orientation with the same performance.

The BNC version requires soldering the transformer, the input and output connectors, and installing either the two 0.1uF capacitors, or if not used, a jumper wire in their place (you can use one of the capacitor leads for that). **In most cases, the capacitors should be installed; only use a jumper wire if you have determined that a direct DC return path is desired in your application.**<sup>1</sup>

It may be easiest to install the transformer and capacitors on the BNC version before installing the connectors.<sup>2</sup> The connector bodies have a lot of thermal mass and a 50-80 watt soldering iron is better for soldering the ground pins than a smaller iron.

Once assembly is complete, the piece of clear heat-shrink tubing can be placed over the circuit board and shrunk in place using a heat gun.

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1 A future version of the SMA board may include similar capacitors. Blocking the DC path wasn’t an issue for the application in mind when the SMA board was designed, so the capacitors weren’t considered at that time.

2 The impedance of the BNC connectors is not clearly specified by the manufacturer; it is difficult to find BNC male connectors of this type and we had to take what we could get, so these may actually be 75 ohm units. At HF frequencies, the resulting mismatch has no practical impact, and isn’t worth worrying about. Unlike type N connectors, BNC 50 and 75 ohm versions will interconnect reliably and without damage (the center pins are the same size in both versions).

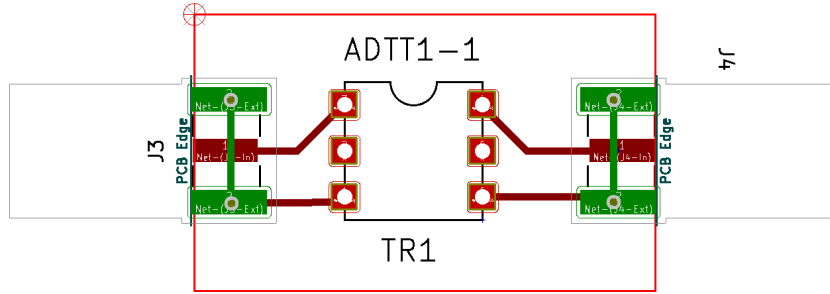


Figure 1: SMA Board Layout

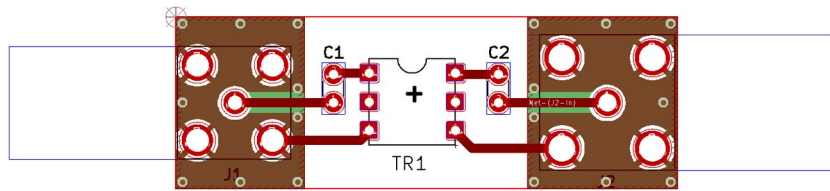


Figure 2: BNC Board Layout

# Performance

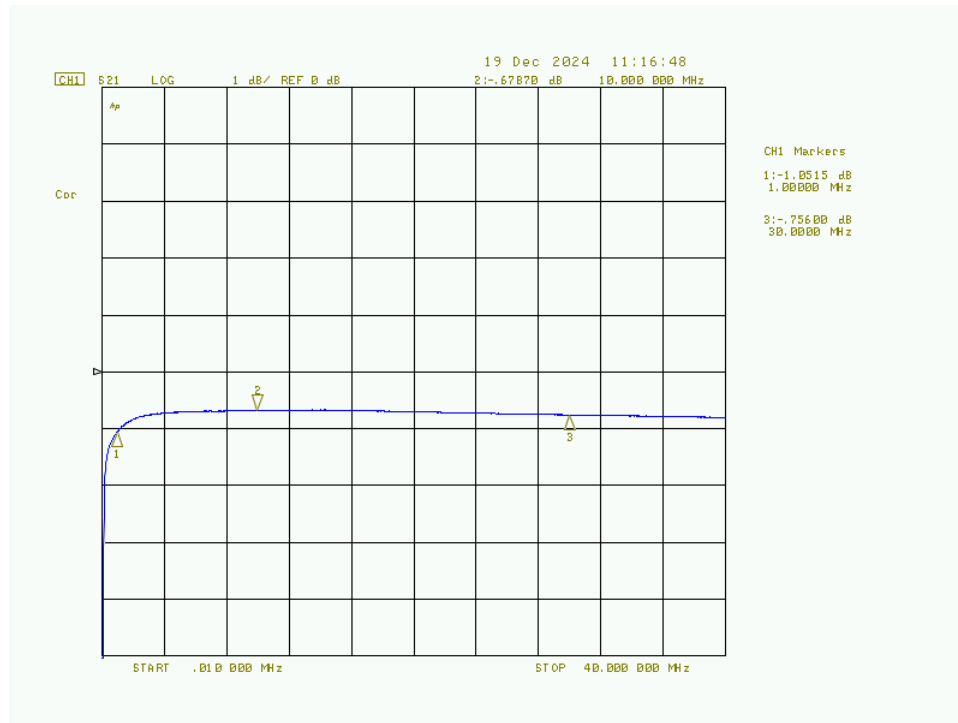


Figure 3: Insertion Loss

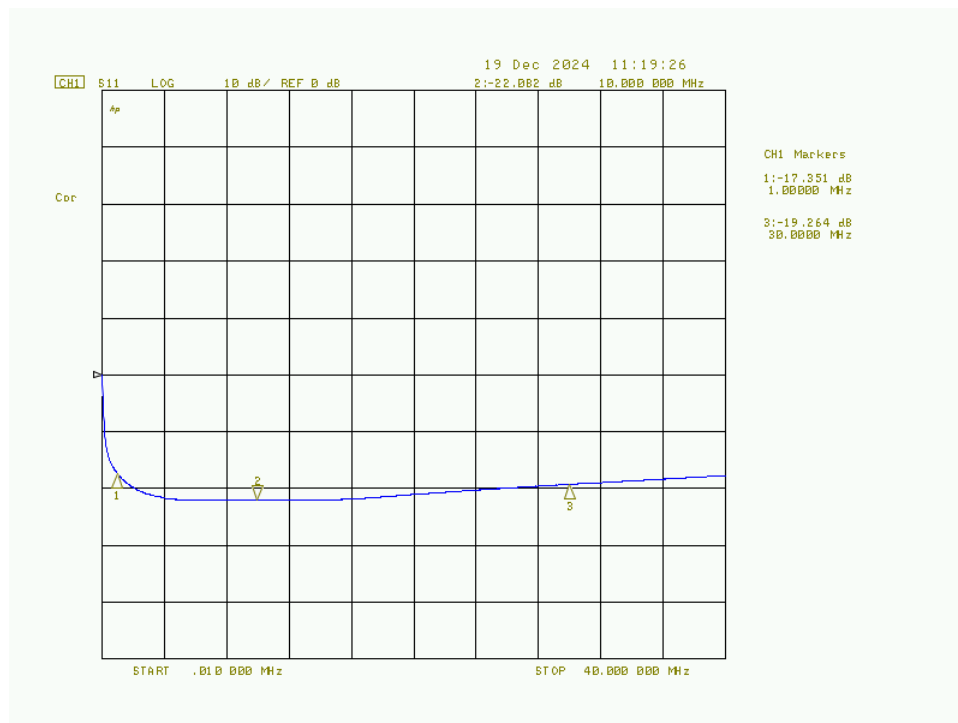


Figure 4: Return Loss

Performance of the BNC and SMA versions is virtually identical; the BNC version is shown here. Insertion loss is less than 1 dB from about 100 kHz to well above 30 MHz.