

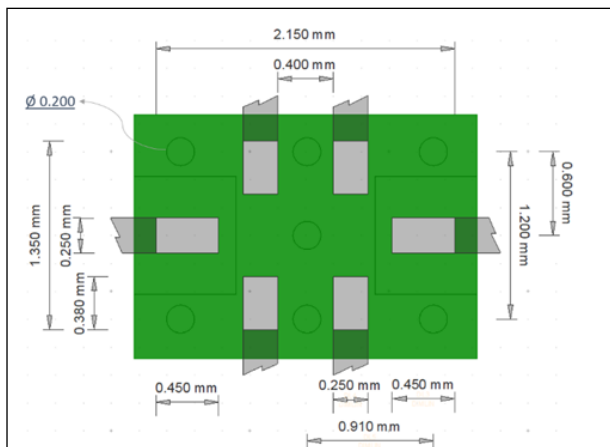
## ATQ 50GHz Performance

### Purpose:

The Thin Film Technology Corp's ATQ0805 Attenuator is designed for use in frequencies from DC to 50GHz with attenuation values from 0dB to 10dB in 1dB steps. This surface mount, 0805 chip size provides excellent performance with flat insertion loss and return low VSWR up to 50Ghz. This is an ideal low-cost solution for high frequency and high performance in Q band and mm wave signal processing applications. With the reliability of Thin Film materials and processes, the ATQ0805 is product built for the most sensitive applications.

This application note will detail the procedure Thin Film Technology Corp. has used to measure the ATQ and demonstrate the de-embedding the component from the loss of the evaluation board and thus give a true measurement result of the ATQ performance.

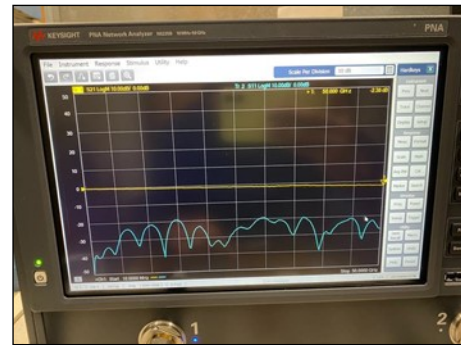
### Land Pattern and Mounting Conditions:



Land Pattern

### Equipment used:

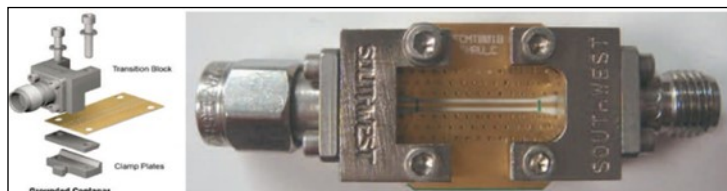
Keysight PNA network analyzer N5225B 10MHz-50GHz  
SOLT Calibration using 2.4mm DC to 50GHz VNA Keysight Calibration Kit



Keysight PNA Network Analyzer

### Solder paste:

Sample parts mounted to Rogers PCB using Indium Corporation solder paste (95.5%Sn, 3.8%Ag, 0.7%Cu) PASTEOT-800201P using a hand mounting method and TFT lead-free reflow profile.



Rogers 4350B PCB evaluated using 2.4mm, 50Ghz Southwest Microwave end launch clamps as shown above

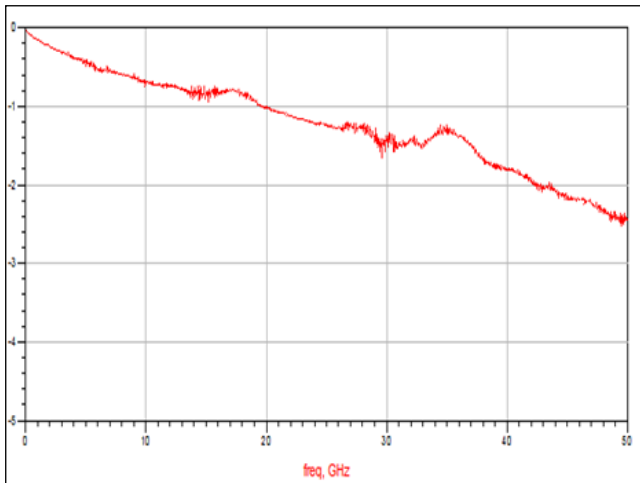
### Performance and De-embedment:

#### Measured Data:

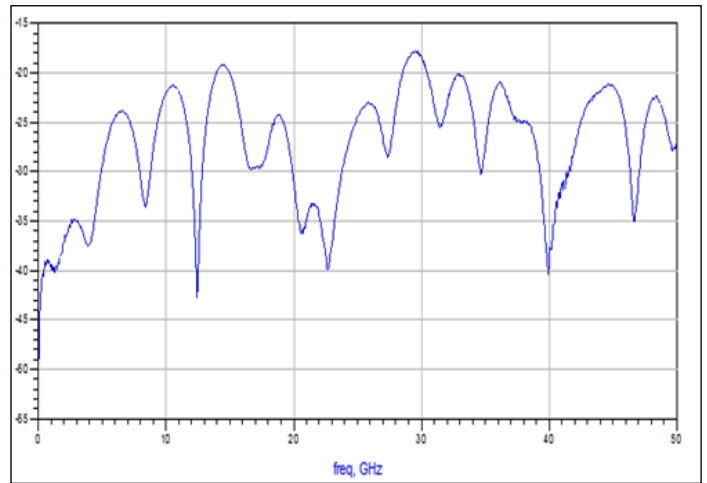
Measurements were taken of a PCB mounted ATQ0805 with specified attenuation values of 4dB and 10dB using the method described here. A thru traced PCB from the same panel as the evaluation board was also measured as a trace loss inductor. The measurement of the thru coupon is imperative to modeling any loss in the evaluation board trace.

# ATQ 50GHZ PERFORMANCE CONT.

Thru Trace Measured Data:

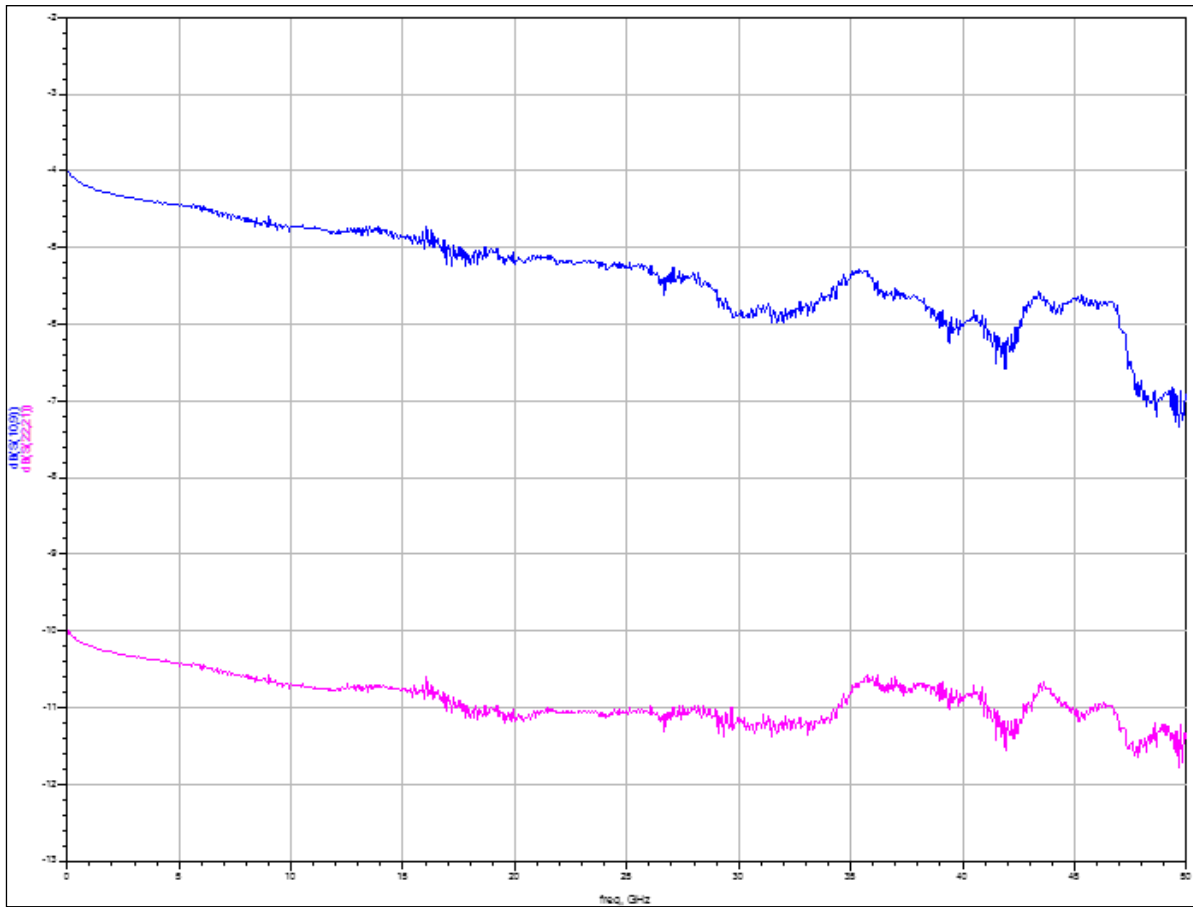


Insertion Loss



Return Loss

4dB & 10dB Raw Measurements:



Insertion Loss

# ATQ 50GHZ PERFORMANCE CONT.

## 4dB & 10dB De-embedding Measurements:

Thin Film Technology Corp utilizes Agilent’s ADS simulation software for component design and improvement. ADS is also an excellent software for modeling electrical systems. Figure 1 details a de-embedment technique schematic used to simulate the component by subtracting the trace loss model from the evaluation board measured data as well as taking into account the 50 ohm system impedance, yielding the results shown in Figure 2.

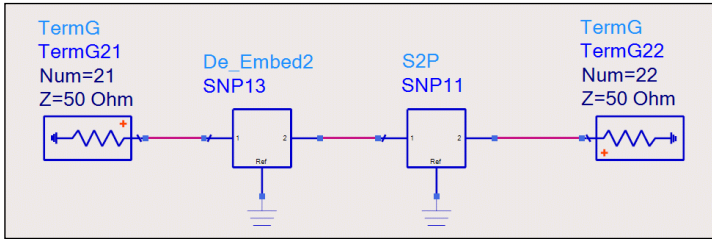


Figure 1

## Conclusion:

Subtracting the trace loss from systems measurement in theory should yield a true measurement of the component to be evaluated. The yielded model of De-embedded measurements for TFT’s ATQ0805 50GHz attenuator shows extremely favorable performance and insertion loss well out to 50GHz. The ATQ0805 is an ideal part for frequencies ranging from DC-50GHz. Please contact the factory today for an evaluation board.

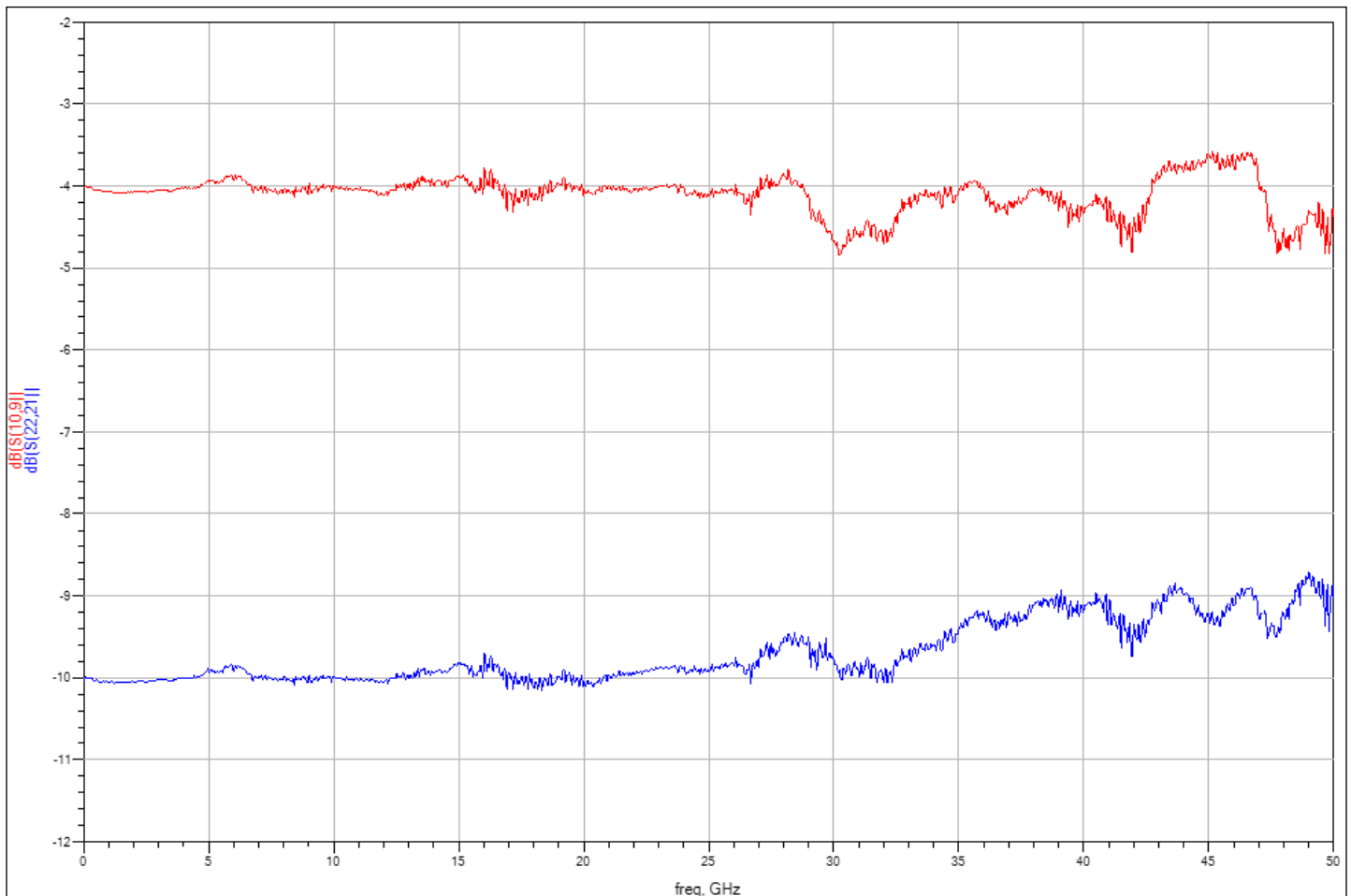


Figure 2: ATQ De-embedded Measurement