

Introduction

Purpose:

- To introduce Thin Film Technology's (TFT's) High Power Chip Attenuator product.

Objectives:

- Attenuation definition and technology
- Markets and applications.
- TFT High Power Chip Attenuator advantages.
- TFT High Power Chip Attenuator characteristics and typical performance.

Content:

- 7 slides

Learning Time:

- 8 minutes

Welcome to Thin Film Technology's High Power Chip Attenuator Product Training Module. This module will provide an overview of the features of TFT's HPA Series Attenuator products, typical applications, key characteristics and an explanation of the technology.

Product Definition

Attenuators:

- Attenuators are passive electronic devices that reduce the amplitude, or power of a signal without appreciably distorting its waveform. In essence, an attenuator is the opposite of an amplifier, though the two work by different methods. While an amplifier provides gain, an attenuator provides loss, or negative gain.
- Attenuators in circuits are used to lower power. In measuring signals, attenuators are used to lower the amplitude of the signal by a known amount in order to enable measurements, or to protect the measuring device from signal levels that might damage it.

High Power Attenuators:

- High Power Attenuators can withstand input powers of hundreds of watts. Thin Film Technology's High Power Attenuators are produced on Alumina Nitride ceramic which has a high thermal conductivity and allows for increased heat dissipation at higher power levels. Careful attention to design and manufacturing provides for superior frequency response performance and very tight tolerances.

Attenuators are passive components which are used to reduce a signal in an electronic device. TFT specializes in the design and manufacture of films used to fabricate attenuator products. Key features of this technology are base substrates materials, thin film characteristics, and electrical design concepts.

Chip Attenuator Markets & Applications

Cellular Base Stations



Test Instruments



Radar Systems



Network Systems



Electro-Optical Systems



Radio Links

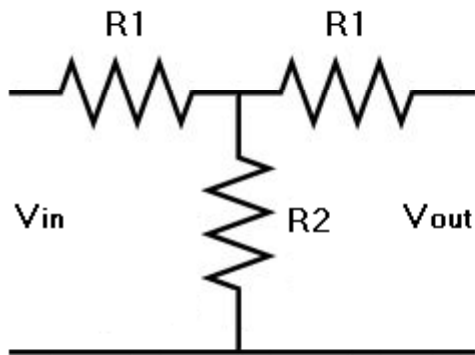


TFT's High Power product attenuates signals by a specified amount while withstanding power up to hundreds of watts. It offers excellent attenuation and has the capability to dissipate high power while having robust life & reliability performance. These products can be used in base stations, radio links, test instruments, radar systems, etc. A common application is the suppression of reflected signals in Isolators. Isolators utilizing this chip attenuator provide excellent decoupling of the load and generator in amplifier stages as well as reducing noise from other adjacent transmitters when multiple transmitters & receivers are connected to one antenna. One enduring feature is the excellent return loss characteristics on RF signals.

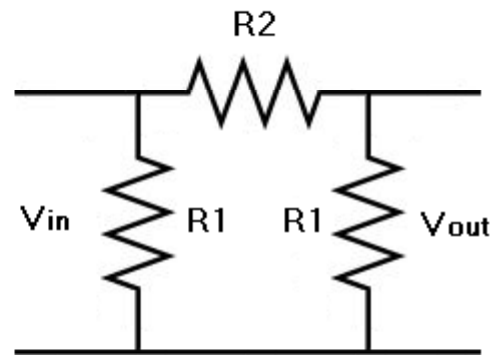
TFT Chip Attenuator Advantages

- Provides 30 dB of attenuation up to several GHz of frequency.
- Protects active components in radio links.
- Superior solution to simple termination resistors.

“T” type attenuator circuit diagram



“pi” type attenuator circuit diagram

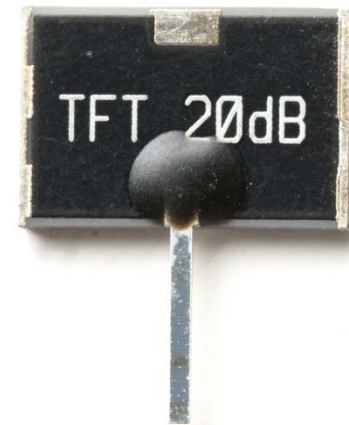


This high power device is ideally suited for surface mount connectors in isolators and it provides 30 dB of attenuation up to several GHz frequency thus protecting active components in radio links.

Form factors of TFT Attenuator

- Power dissipation up to 100 Watts.
- Attenuation values of 20 or 30 dB.
- Attenuation tolerances ± 0.7 dB.
- Impedance 50 Ω
- Frequency bandwidth from DC up to 2.5 GHz.
- VSWR 1.25:1 max.
- Available with tab or without tab mounting.
- DC Resistance 51 Ω $\pm 1.5\Omega$
- 3725 English size

20dB product without tab

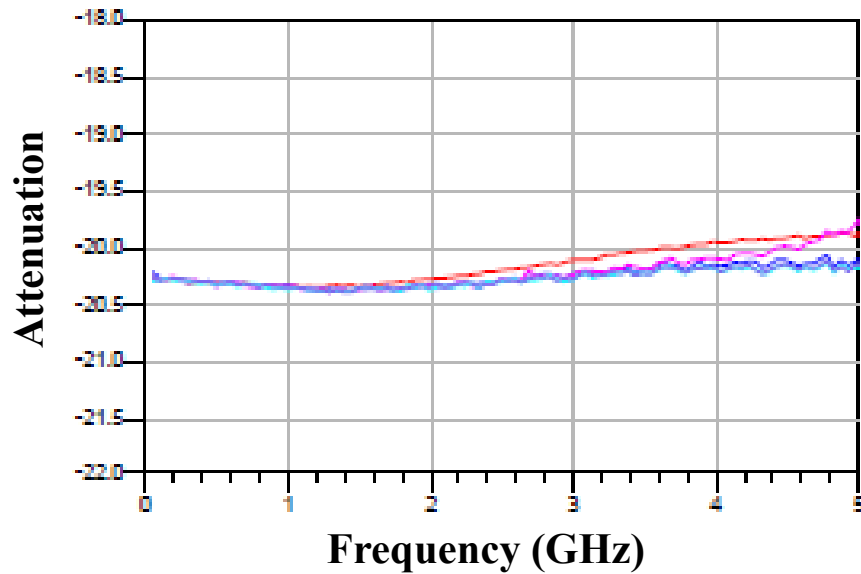


20dB product with tab

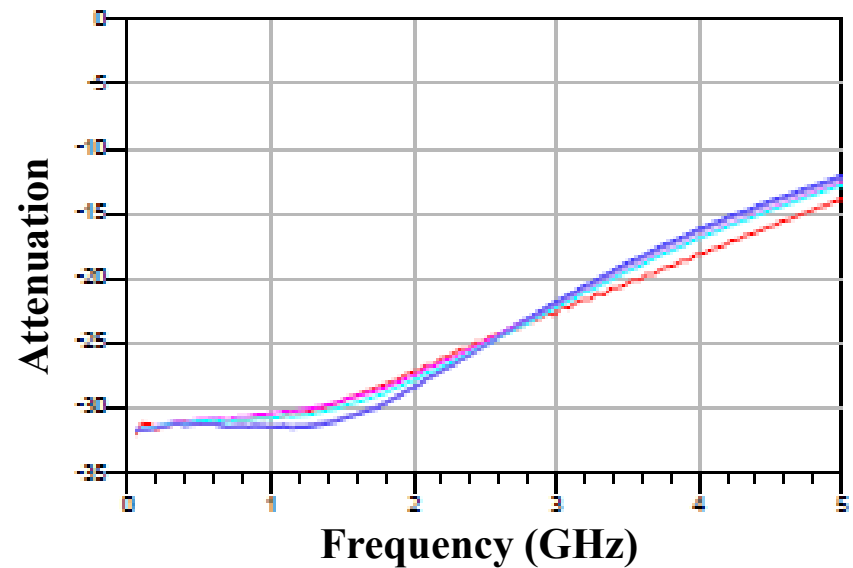
TFT's attenuator is offered in a package with two styles of termination. Top mounted Input and Outputs with tab or without a tab attached. The entire backside of the component is metalized to allow for connection to ground.

Typical Frequency Performance

Insertion Loss 20 dB



Return Loss 20 dB



The utilization of advanced simulation software provides for complex designs delivering stable attenuation across a wide band of frequencies. We offer superior products derived from precise designs using detailed simulations that fit effortlessly in to your applications.

Summary

- **Tight attenuation tolerance**
- **Excellent impedance control**
- **Superior frequency performance**
- **Smaller size than alternative technologies**
- **Variety of package styles and configurations available**

If your project requires precise attenuation with tight impedance matching, look to TFT's Chip Power Attenuator to provide not only excellent performance, but also robust life & reliability.