

DATA SHEET

ATN3580 Series: Fixed Attenuator Pads

Applications

- Attenuators

Features

- Specified flat response to 40 GHz
- Return loss > 15 dB
- Available at 1-10, 12, 15, 20, 30, and 40 dB
- Power handling to 1 W CW
- Rugged thin-film silicon chips
- Lead (Pb)-free, RoHS-compliant, and Green™

Description

The ATN3580 series of attenuator chips incorporates thin-film resistors on high-resistivity silicon to achieve precision attenuation, tight flatness and excellent return loss to 40 GHz. The design uses a balanced TEE resistive structure to assure broad bandwidth performance. The thin-film technology offers improved power-handling capability in comparison to the traditional thick-film printed attenuator. All ATN3580 attenuator chips are specified for their attenuation at DC.

The absolute maximum ratings are shown in Table 1. Electrical specifications and minimum return loss are provided in Tables 2 and 3, respectively. Typical performance characteristics are shown in Figures 1 and 2. Drawings for suggested die mount and ribbon attachment, product outlines, and a suggested land pattern are shown in Figures 3 through 7.



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free.



For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.



Table 1. Absolute Maximum Ratings¹

| Characteristic | Value |
|-------------------------------------|-------------------|
| Incident power @ 25 °C | 1 W |
| Operating temperature | -55 °C to +150 °C |
| Storage temperature | -65 °C to +150 °C |
| Electrostatic discharge: | |
| Charged-Device Model (CDM), Class 4 | 1000 V |
| Human Body Model (HBM), Class 2 | 2000 V |
| Machine Model (MM), Class B | 200 V |

¹ Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

ESD HANDLING: *Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 2. Electrical Specifications at 25 °C¹

| Nominal Attenuation (dB) | DC Tolerance (dB) | Attenuator Flatness | | | Outline Drawing | Part Number |
|--------------------------|-------------------|---------------------|----------------------|--------------------|-----------------|-------------|
| | | 0.1 to 12 GHz (dB) | 0.1 to 26.5 GHz (dB) | 0.1 to 40 GHz (dB) | | |
| 1 | ±0.15 | ±0.1 | ±0.25 | ±0.50 | 516-060 | ATN3580-01 |
| 2 | ±0.15 | ±0.1 | ±0.25 | ±0.50 | 516-060 | ATN3580-02 |
| 3 | ±0.25 | ±0.1 | ±0.25 | ±0.50 | 516-060 | ATN3580-03 |
| 4 | ±0.25 | ±0.1 | ±0.25 | ±0.50 | 516-060 | ATN3580-04 |
| 5 | ±0.25 | ±0.1 | ±0.25 | ±0.50 | 516-060 | ATN3580-05 |
| 6 | ±0.25 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-06 |
| 7 | ±0.25 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-07 |
| 8 | ±0.35 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-08 |
| 9 | ±0.35 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-09 |
| 10 | ±0.35 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-10 |
| 12 | ±0.50 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-12 |
| 15 | ±0.50 | ±0.2 | ±0.30 | ±0.50 | 518-060 | ATN3580-15 |
| 20 | ±1.10 | ±0.5 | ±1.0 | ±2.0 | 518-060 | ATN3580-20 |
| 30 | ±1.60 | ±0.5 | ±1.0 | ±2.0 | 518-060 | ATN3580-30 |
| 40 | ±1.60 | ±0.5 | ±1.0 | ±2.0 | 518-060 | ATN3580-40 |

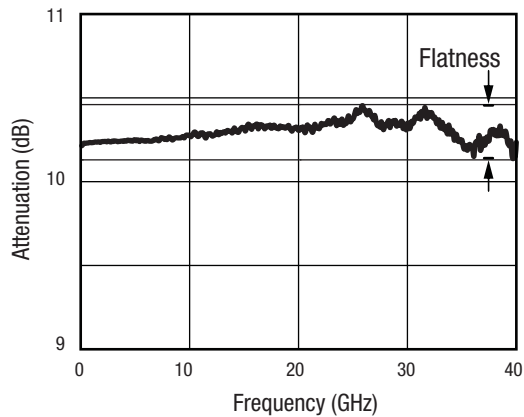
¹ Performance is guaranteed only under the conditions listed in this table.

Table 3. Minimum Return Loss S₁₁¹

| | 0.1 to 7 GHz (dB) | 0.1 to 12 GHz (dB) | 0.1 to 26.5 GHz (dB) | 0.1 to 40 GHz (dB) |
|----------------|-------------------|--------------------|----------------------|--------------------|
| ATN3580 Series | 22 | 20 | 18 | 15 |

¹ Performance is guaranteed only under the conditions listed in this table.

Typical Performance Characteristics



**Figure 1. ATN3580-20
Typical Insertion Loss vs Frequency**



**Figure 2. ATN3580-20
Typical Return Loss vs Frequency**

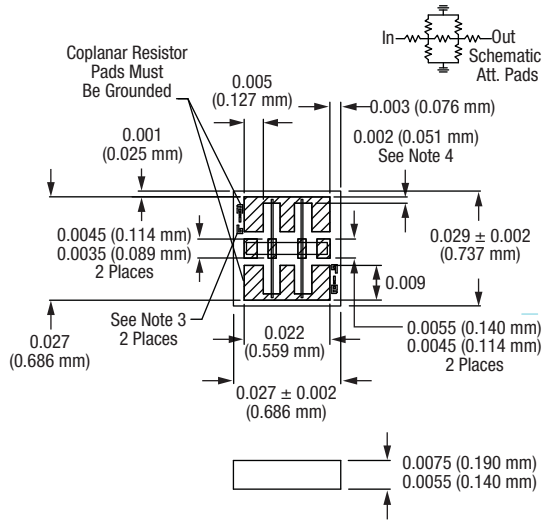
Suggested Die Mount and Ribbon Attachment Drawings, Outline Drawings, and a Suggested Land Pattern



Figure 3. Suggested Die Mount and Ribbon Attachment (1 to 5 dB)

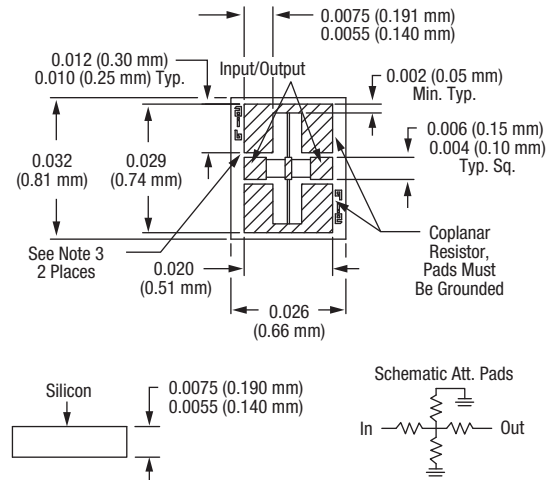


Figure 4. Suggested Die Mount and Ribbon Attachment (≥ 6 dB)



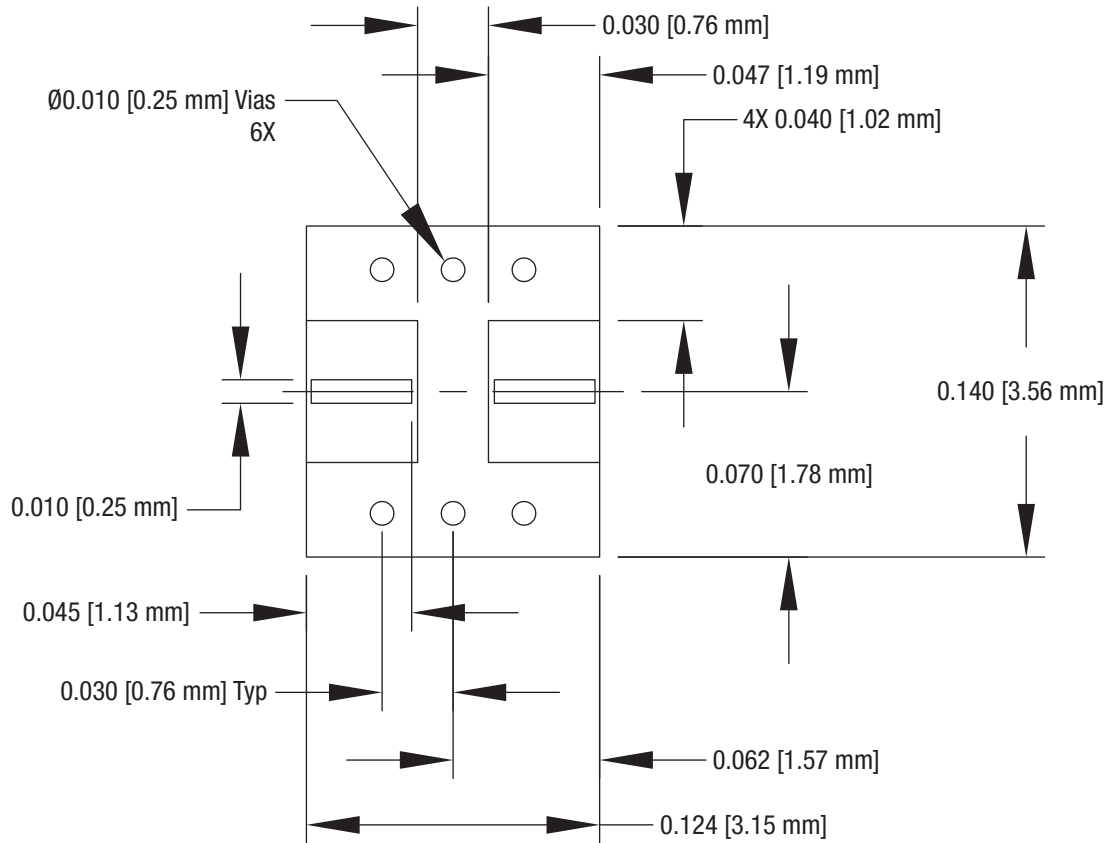
1. Cross hatching = gold contact areas.
2. Dimensions not specified in this drawing vary per attenuation value.
3. Indicates attenuation value.
4. This dimension can be as high as 0.012 for high attenuation values.

Figure 5. 518-060 Outline Drawing



1. Cross hatching = gold contact areas.
2. Dimensions not specified in this drawing vary per attenuation value.
3. Indicates attenuation value.
4. This dimension can be as high as 0.012 for high attenuation values.

Figure 6. 516-060 Outline Drawing



Notes:

1. Material: Alumina 99.6%
Dielectric Constant: 9.9
Effective Dielectric Constant: 6.8
Transmission Line Width: 0.010 inch
Substrate Thickness: 0.010 inch
Coplanar Gap: 0.025 inch
2. Plating: Gold 100 to 150 micro-inches

3. Unless otherwise specified:
Dimensions are in inches
Tolerances on finish: RMS 63
Angles $\pm 0.5^\circ$ Fractions: $\pm 1/64$
4 place decimals: ± 0.0005
3 place decimals: ± 0.005
2 place decimals: ± 0.02
4. Commercial published tolerances shall apply to tubing, bar, plate, etc. All threads to be Class 2A or Class 2B. Plated parts must fit gauges and meet specified tolerances after plating.

200141-007

Figure 7. Suggested Land Pattern

Copyright © 2002-2008, 2013-2014, 2018 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks and the Skyworks symbol are trademarks or registered trademarks of Skyworks Solutions, Inc. or its subsidiaries in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at www.skyworksinc.com, are incorporated by reference.