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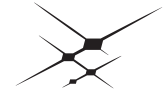
## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





DATA SHEET

# AV113-12LF: HIP3™ Variable Attenuator 2.1 to 2.3 GHz

## Features

- Low loss 1.4 dB typical
- Attenuation 18 dB typical
- Good VSWR <1.5:1 typical
- Small SOIC-8 package
- For IMT-2000 applications
- MSL-1 @ 260 °C per JEDEC J-STD-020



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.

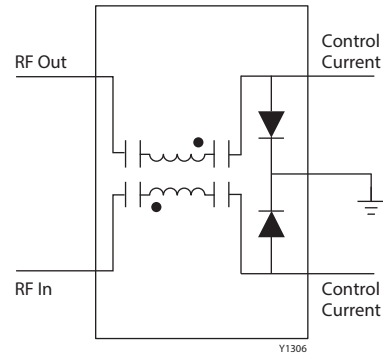


Figure 1. AV113-12LF Functional Block Diagram

## Description

The AV113-12 is a current controlled, variable attenuator from Skyworks series of HIP3™ components. It is designed to meet the wide dynamic range required in IMT-2000 applications. A monolithic quadrature hybrid is teamed with a silicon PIN diode pair in a plastic surface mount package, reducing size and assuring consistency from part to part. AV113-12LF is packaged in a lead (Pb)-free, fully RoHS-compliant SOIC-8 package.

Figure 1 shows the functional block diagram of the AV113-12LF. The pinout is shown in Figure 2.

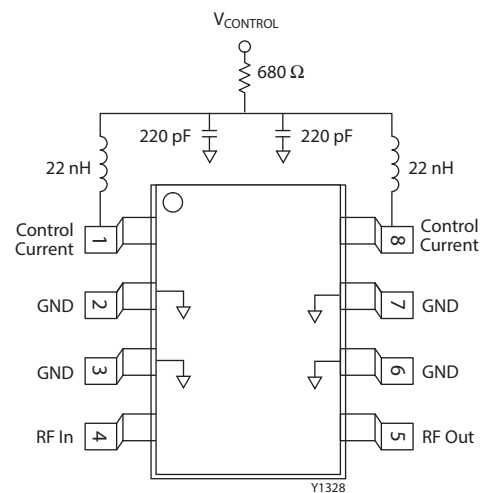


Figure 2. AV113-12LF Pinout Diagram

### Electrical and Mechanical Specifications

The absolute maximum ratings for the AV113-12LF are shown in Table 1. Electrical specifications are provided in Table 2, and operating characteristics are shown in Table 3.

Typical performance characteristics are shown in Figures 3 through 6.

**Table 1. AV113-12LF Absolute Maximum Ratings (Note 1)**

| Parameter   | Symbol           | Minimum | Maximum                          | Units |
|---|------------------|---------|----------------------------------|-------|
| RF input power  |                  |         | 0.5 W CW, 4 W @ 12.5% duty cycle |       |
| Control current   |                  |         | 50 mA per diode                  | mA    |
| Operating temperature                                       | T <sub>A</sub>   | -40     | +85                              | °C    |
| Storage temperature   | T <sub>STG</sub> | -65     | +150                             | °C    |
| Maximum reverse diode voltage                               |                  |         | -10                              | V     |
| Electrostatic discharge:<br>Human Body Model (HBM), Class 0 | ESD              |         | 125                              | V     |

**Note 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.

**CAUTION:** 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. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

**Table 2. AV113-12LF Electrical Specifications (Note 1)**

(Top = 25 °C, Unless Otherwise Noted)

| Parameter                             | Minimum | Typical | Maximum | Units |
|---------------------------------------|---------|---------|---------|-------|
| Frequency                             | 2.1     |         | 2.3     | GHz   |
| Insertion loss (0 mA control current) |         | 1.4     | 1.6     | dB    |
| Attenuation @ 1.0 mA control current  | 16.5    | 18      |         | dB    |
| VSWR all ports                        |         | 1.5     |         |       |
| Input 3rd order intercept point       |         | +40     |         | dBm   |
| Group delay                           |         | 0.4     | 0.8     | ns    |

**Note 1:** Performance is guaranteed only under the conditions defined in this table.

**Table 3. AV113-12LF Operating Characteristics (Note 1)**

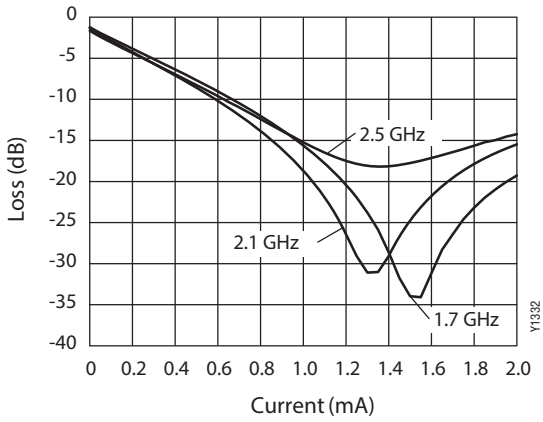
(Top = 25 °C, 0 V, 5 V, Unless Otherwise Noted)

| Parameter   | Condition            | Minimum | Typical | Maximum | Units |
|---|----------------------|---------|---------|---------|-------|
| Switching characteristics (Note 2):                 |                      |         |         |         |       |
| Rise, fall  | 10/90% or 90/10% RF  |         |         | 5       | µs    |
| On, off   | 50% CTL to 90/10% RF |         |         | 8       | µs    |
| Video feedthru (peak)                               |                      |         |         | 2       | mV    |
| Maximum input power for <1 dB attenuation variation |                      |         | +15     |         | dBm   |

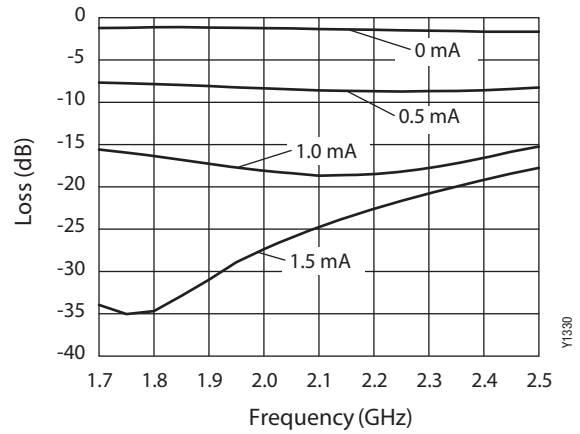
**Note 1:** All measurements made in a 50 Ω system, unless otherwise specified.

**Note 2:** 0 to 4 mA square wave total control current.

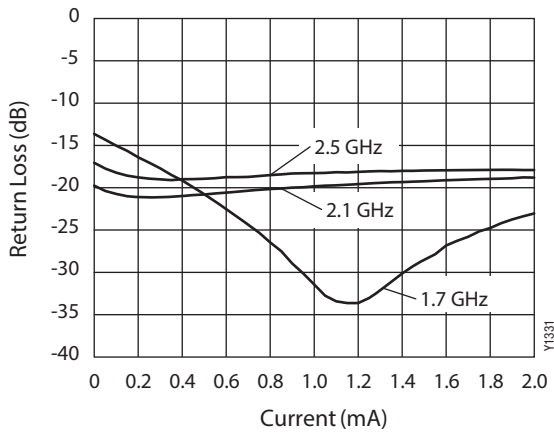
**Typical Performance Characteristics**



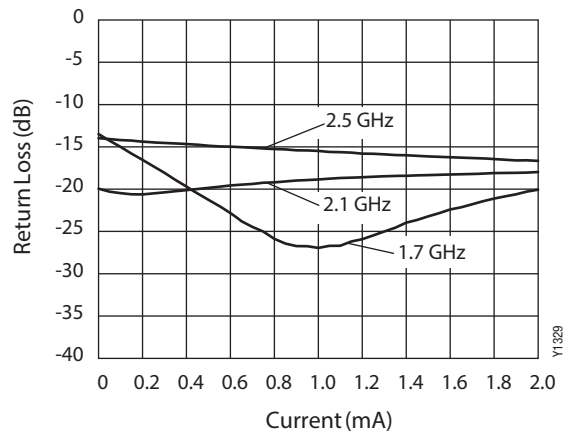
**Figure 3. Attenuation vs Control Current**



**Figure 4. Attenuation vs Frequency**



**Figure 5. Input Return Loss vs Current Control**



**Figure 6. Output Return Loss vs Current Control**



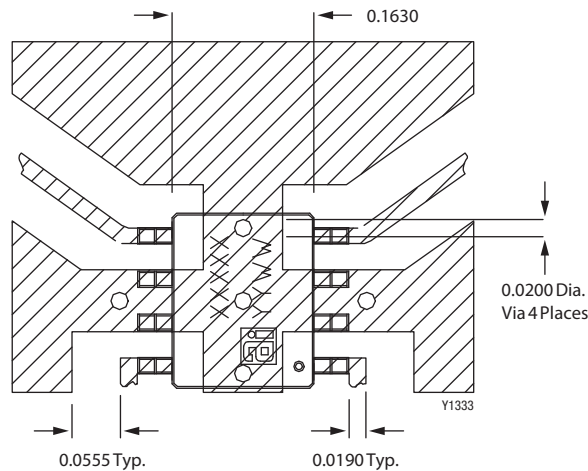
**Package and Handling Information**

The recommended board layout for the AV113-12LF is shown in Figure 7. Package dimensions for the device are shown in Figure 8.

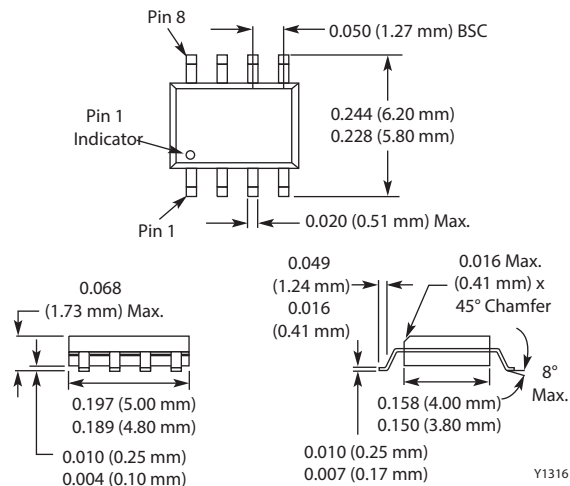
Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The AV113-12LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C for 5 seconds. They can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



**Figure 7. AV113-12LF Recommended Board Layout**



**Figure 8. AV113-12LF Package Dimensions**

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