

Customer Collaboration with Failure Analysis Requests

by the Worldwide Product Analysis Group

INTRODUCTION

Analog Devices, Inc., provides failure analysis as a service for products purchased directly from Analog Devices or directly from authorized distributors. A successful failure analysis begins with an understanding of the events that led up to product failure and concludes with the identification of the failure mechanism, root cause, and corrective action.

This application note provides guidance to customers to facilitate a successful failure analysis process. Additional information on returning parts for failure analysis is available on the Analog.com web site under [Quality Systems](#).

APPLICATION DESCRIPTION

Schematics illustrating the Analog Devices component and surrounding circuitry should be provided when returning components for failure analysis. This includes tolerances of supply voltages, bias voltages, and so on, as well as model numbers for any overvoltage protection devices.

If possible, return only the Analog Devices component. However, if the device is still mounted on a customer board/module, instructions on how to power up the module should be provided along with the complete layout and schematics. Any specific instructions regarding software or other equipment needed to run the module must also be provided.

FAILURE DESCRIPTION

A thorough description of the failure is essential in diagnosing potential failure mechanisms. Failure descriptions, such as *part defective*, are not very helpful. Application-specific fault descriptions are also not very helpful. Failing parameters based on the specific Analog Devices data sheet should be provided. A description of the events leading up to the failure (use conditions, voltages, temperature, and so on), in addition to anomalous electrical behavior of the component measured from its pins, can help expedite the failure analysis process.

Historical background information, such as the frequency of a given failure, the last time the failure was observed, and so on, is also requested. It is important to note and communicate the presence of any additional failing components within the system.

The following details should also be provided:

1. Type of problem (electrical, mechanical, and so on)
2. Whether Customs personnel opened the shipping box
3. Type of failure (repeatable or intermittent)
4. Point of failure (incoming, field, qualification, and so on)
5. Reported failure rate
6. Method of failure verification

ESD CONTROLS

Devices must be suitably packaged so that they are protected during shipment. Charged devices and circuit boards can discharge without detection. Although Analog Devices products feature patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions need to be taken to avoid performance degradation or loss of functionality.

ANSI/ESD S20.20 defines the requirements for establishing, implementing, and maintaining an ESD control program to protect electronic parts, assemblies, and equipment. This document can be downloaded from the Electrostatic Discharge Association website.

DEMOUNTING

Care must be taken to preserve the integrity of the package and the leads. When removing mounted components from application boards and/or reballing components, customers must employ moisture controls similar to those used for storing and mounting parts, such as those specified in JEDEC Standard J-STD-020. This standard is available for download from the JEDEC website.

ABA SWAP

ABA swap is the recommended method to confirm a failing component. The suspected failing component should be removed from the customer's failing board/system and replaced with a known good component. If the system continues to fail, then further system-level isolation is required. If the system passes with the known good component, then the original failing component should be inserted in a known good board to confirm the failure of the suspected component. The known good board should have a socket for the suspected component to prevent potential further damage of this component.

PART INFORMATION

When returning devices, it is critical to provide information regarding the lineage of the device.

The following information needs to be provided for each part returned. Some examples are provided in parentheses.

1. Specific purchase source (such as distributor name)
2. Full Analog Devices model number (AD8376ACPZ)
3. Date code (1320)
4. Lot number (86067)
5. Purchase order number
6. Customer part number

REVISION HISTORY

12/13—Revision 0: Initial Version