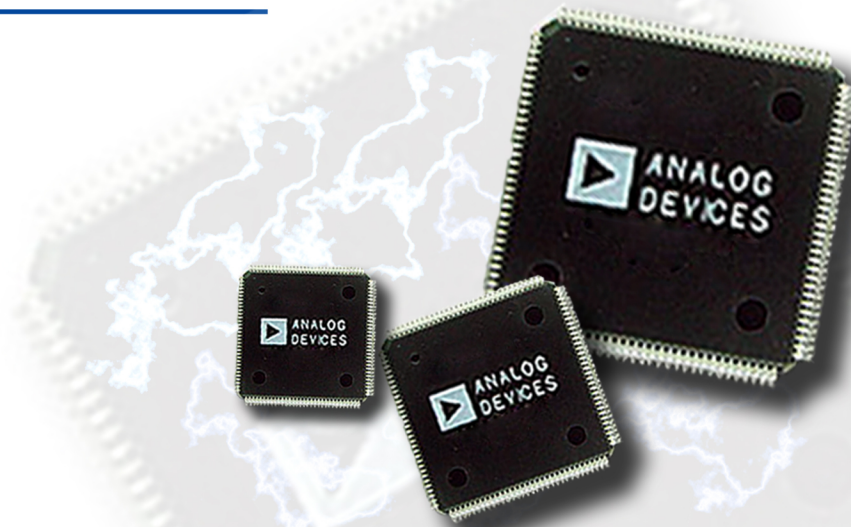




ESD Classification Report

Report Title: OP249ESD Classification

Report Number: 847

Date: 08 February 2010

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Introduction

This report documents the results of the test performed to characterize the ESD robustness of the OP249. Units were subjected to Human Body Model (HBM), Machine Model (MM) and Field Induced Charge Device Model (FICDM).

Description/ Results of Tests Performed

Samples of 24 serialized units for each lot were used in the evaluation and range of applied voltage was from 0.5 kV to 4.0 kV in HBM. Another 15 serialized units were used in the MM and voltage range was from 0.05 kV to 0.40 kV. In FICDM, 18 serialized units were used and voltage range was from 0.125 kV to 1.5 kV. As accept/reject criteria, all samples were electrically tested to data sheet limit before and after ESD stressing.

ESD Test Plan

Below is the test plan that was used in the HBM:

Device Data:

Device Name	OP249	
Device Description	8L_SOICN	
No Pins	8	
Last Modified	Friday, February 05, 2009 10:00	
Pins Groups	Type	Pins in Group
vneg	power	2
vpos	power	6
io	i/o	1, 3-5, 7, 8

Mil Zap Only

Test Name	Mil Zap Only
Test Type	ESD Mil Zap Only
Zap Pins	io, vneg, vpos
Supply 1 Pins	vneg
Supply 2 Pins	vpos
I/O Pins	io
Stress Value	4.00 kVolts
Pulse Model	Stress using the "HBM" model.
Pulse Sequence	Stress using Positive then Negative discharges
Number of Pulses	At each polarity, stress the device 1 time
Pulse Interval	Between each stress pulse, wait 0.30 second.
Discharge all pins	No

Below is the test plan that was used in the MM:

Device Data:

Device Name	OP249	
Device Description	8L_SOICN	
No Pins	8	
Last Modified	Friday, February 05, 2009 10:00	
Pins Groups	Type	Pins in Group
vneg	power	2
vpos	power	6
io	i/o	1, 3-5, 7, 8

Mil Zap Only

Test Name	Mil Zap Only
Test Type	ESD Mil Zap Only
Zap Pins	io, vneg, vpos
Supply 1 Pins	vneg
Supply 2 Pins	vpos
I/O Pins	io
Stress Value	0.40 kVolts
Pulse Model	Stress using the "MM" model.
Pulse Sequence	Stress using Positive then Negative discharges
Number of Pulses	At each polarity, stress the device 3 times
Pulse Interval	Between each stress pulse, wait 1 second.
Discharge all pins	No

ESD Test Plan

Below is the test plan that was used in the FICDM:

Test Name	OP249_8L_SOICN.cdm
Device Name	OP249
DUT Pin Count	8
Date Created	At: 10:23:15, On: 02/05/10
Outline File Name	C:\ProgramFiles\Rcdm\Outlines\8L_SOICN.out
Charge Pin(s)	Field Charge
Discharge Pin(s)	1-8
Test Delays	Charge/Discharge delay of 100msecs; Delay between Charge of 100 msecs
Stress Level (V)	Discrete Levels: 125V
Stress Polarity/Sequence	Positive and Negative
Number of Stresses	3
Stress Algorithm	Pause between stress levels. Drive zap detector and report failure.
Discharge Head	ESDA
Comments	*

ESD Testing Results

The results of the ESD testing are summarized in Table 1. Table 2 shows the first failing parameter of the first unit that failed.

Table 1. OP249 ESD Characterization Results

ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Voltage	First Fail Voltage	Class
HBM	8L SOICN	ESD Assoc. STM5.1- 2001	1.5k Ω , 100pF	NA	+/- 0.5 kV	1A
MM	8L SOICN	JESD22-A115-A	R = 0, C = 200pF	+/- 0.10kV	+/-0.20 kV	M2
FICDM	8L SOICN	ESD Assoc. STM5.3.1-1999	1 Ω , Cp kg	+/- 1.5kV	NA	C6

Table 2. OP249 Failed Parameter Information

ESD Model	Device No.	Stress Voltage	First Failed Parameter
HBM	1	+/- 0.5 kV	Test # 220 + Psrr(B)
MM	34	$\pm$ 0.20kV	Test # 110 Vos(A) Vs=+-15V
FICDM	NA	NA	NA

*ADI measures ESD results using stringent test procedures based on the specifications listed in the above table. Any comparison with another supplier's result should ensure that the same ESD test procedures have been used. For further details please see the EOS/ESD chapter on the ADI Reliability Handbook at <http://www.analog.com/corporate/quality/manuals/>.

Human Body Model (HBM) and Machine Model (MM) were performed on the **OP249** using the Thermokeytek MK2 Test System. Field Induced Charge Device Model (FICDM) was performed on the **OP249** using the RCDM3. During the testing of each sample in HBM and MM, one positive and one negative discharge were applied to each of the following combinations:

- (1) Every individual pin to vneg (pin 2)
- (2) Every individual pin to vpos (pin 6)
- (3) Every individual I/O pin to the group of all other I/O pins

Field-Induced Charge Device Model (FICDM) ESD Classification testing was conducted on the **OP249** using the ThermoKeyTek (Robotic) RCDM3 Test System. During FICDM testing of the **OP249** samples, the device was charged via a field plate and a discharge pin made contact with each individual device pin to discharge it through a 1 Ω resistor to ground. Three positive and three negative discharges were applied to every pin.

Conclusion

The qualification of **OP249** has been successfully completed. The part has been classified as **Class 1A** for **HBM**, **Class M2** for **MM**, and **Class C6** for **FICDM**. In **HBM**, the first fail voltage is **+/-0.5kV** while in **MM** and **FICDM**, the part has a passing voltage of **+/-0.10 kV** and **+/-1.5 kV** respectively.

Failure Analysis (FA) to root-cause, as well as a review of the ESD design structure, is recommended to enhance the ESD robustness.

Supporting Documents:

-  [HBM Waveform Verification Report](#)
-  [MM Waveform Verification Report](#)
-  [FICDM Waveform Verification Report](#)
-  [HBM Classification Report](#)
-  [MM Classification Report](#)
-  [FICDM Classification Report](#)
-  [HBM/MM/FICDM Post ATE Data log \(1-60\)](#)
-  [FICDM Post ATE Data log \(62-67\) ~ Revalidation at +/-125V](#)