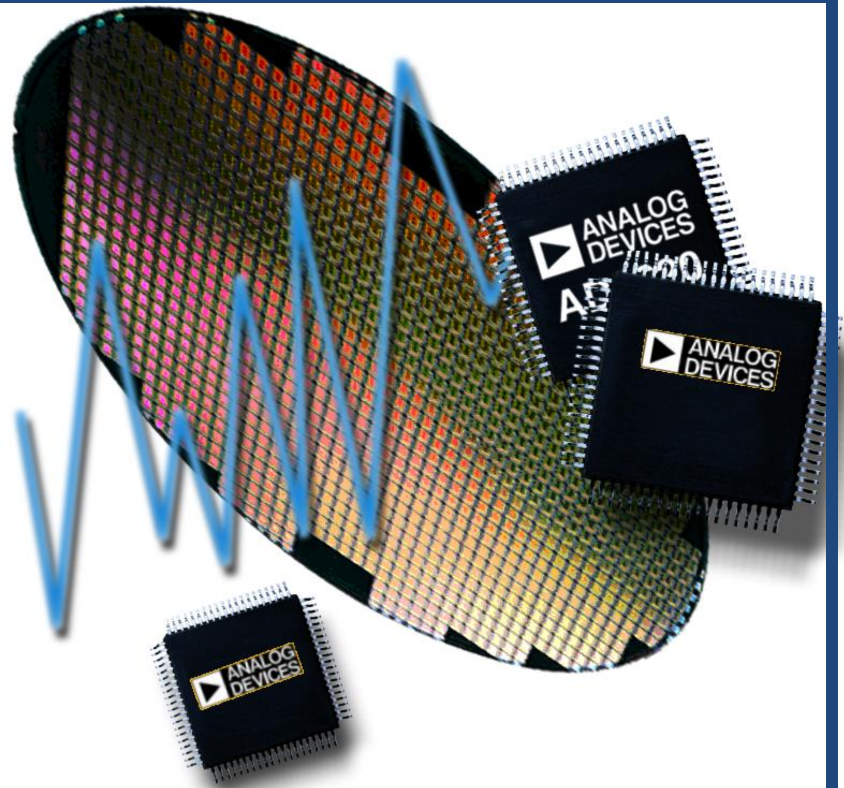

Reliability Report

Report Title: AD8609 at TSMC

Report Number: 8566

Revision: A

Date: 23 September 2010

Summary

This report documents the successful completion of the reliability qualification requirements for release of the AD8609 product at TSMC in a 14-SOIC_N, 14-TSSOP_4.4 package. The AD8609 is a quad precision micro-power, rail-to-rail input/output operational amplifier that features very low offset voltage as well as low input voltage and current noise.

Table 1: AD8609 Product Characteristics

Die/Fab

Die ID	6475Y
Die Size (mm)	2.08 x 2.51
Wafer Fabrication Site	TSMC Fab 9
Wafer Fabrication Process	0.6µm CMOS
Transistor Count	870
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu
Die Overcoat	Polyimide

Package/Assembly

Available Package	14-SOIC_N	14-TSSOP_4.4
Body Size (mm)	3.90 x 8.65 x 1.50	4.40 x 5.00 x 1.00
Assembly Location	Amkor-P	Amkor-P
Molding Compound	Sumitomo G600	Sumitomo G700K
Wire Type	Gold	Gold
Wire Diameter (mils)	1.00	1.00
Die Attach	Ablestik 84-1LMIS R4	Ablestik 8290
Lead Frame Material	Copper	Copper
Lead Finish	Matte Sn	Matte Sn
Moisture Sensitivity Level	1	1
Maximum Peak Reflow Temperature (°C)	260	260

Description / Results of Tests Performed

Tables 2, 3 and 4 provide a description of the qualification tests conducted and the associated test results for products manufactured on the same technologies as described in Table 1. All devices were electrically tested before and after each stress. Any device that did not meet all electrical data sheet limits following stressing would be considered a valid (stress-attributable) failure unless there was conclusive evidence to indicate otherwise.

Table 2: SOIC_N Package at Amkor-P Qualification Test Results

Test Name	Spec	Conditions	Device	Lot #	Sample Size	Qty. Failures
Autoclave (AC)[1]	JESD22-A102	121°C, 100%RH, 2atm, 96 hours	ADP3630	Q7738.100	77	0
				Q7738.101	77	0
				Q7738.2	77	0
			OP291	Q7802.5	77	0
				Q7802.6	77	0
				AC24228.1	77	0
				AC24229.1	77	0
				AC24230.1	77	0
Highly Accelerated Temperature and Humidity Stress (HAST)[1]	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 hours	ADP3630	Q7738.200	77	0
				Q7738.201	77	0
				Q7738.3	77	0
			OP291	AC24231.1	77	0
				AC24232.1	77	0
				AC24233.1	77	0
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1000 hours	OP291	AC24237.1	77	0
Solder Heat Resistance (SHR)[1]	ADI-0049	See Footer[1]	AD8609	Q8566.100	30	0
Temperature Cycling (TC)[1]	JESD22-A104	-65°C / +150°C, 500 cycles	ADP3630	Q7738.400	77	0
				Q7738.5	77	0
			OP291	Q7802.1	77	0
				Q7802.2	77	0
		-65°C / +150°C, 2000 cycles	OP291	AC24234.1	69	0
				AC24235.1	73	0
				AC24236.1	75	0

1) These Samples were subjected to preconditioning (per J-STD-020 Level 1) prior to the start of the stress test. Level 1 preconditioning consists of the following:

- Bake: 24 hrs @ 125ºC,
- Soak: Unbiased Soak: 168 hrs @ 85ºC, 85%RH,
- Reflow: 3 passes through an oven with a peak temperature of 260ºC.

Table 3: TSSOP_4.4 Package at Amkor-P Qualification Test Results

Test Name	Spec	Conditions	Device	Lot #	Sample Size	Qty. Failures
Autoclave (AC)[1]	JESD22-A102	121°C, 100%RH, 2atm, 96 hours	ADA4891-4	Q8362.8	77	0
				Q8362.9	77	0
				Q8362.10	77	0
			AD7398W	Q8451.1P	77	0
				Q8451.2P	77	0
				Q8451.3P	77	0
			ADG711	Q8484.100	77	0
				Q8484.101	77	0
				Q8484.102	77	0
Highly Accelerated Temperature and Humidity Stress (HAST)[1]	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 hours	ADA4891-4	Q8362.11	77	0
				Q8362.12	77	0
				Q8362.13	77	0
			AD7398W	Q8451.1A	77	0
				Q8451.3A	77	0
			ADG711	Q8484.200/A	77	0
				Q8484.201/A	77	0
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1000 hours	AD7490	Q8293.200	77	0
				Q8293.201	77	0
				Q8293.202	77	0
			AD7398W	Q8451.1H	77	0
Solder Heat Resistance (SHR)[1]	ADI-0049	See Footer[1]	AD8609	Q8566.101	30	0
Temperature Cycling (TC)[1]	JESD22-A104	-65°C / +150°C, 500 cycles	ADA4891-4	Q8362.14	77	0
				Q8362.15	77	0
				Q8362.16	77	0
			AD7398W	Q8451.1T	62	0
				Q8451.2T	62	0
				Q8451.3T	72	0
		-65°C / +150°C, 1000 cycles	ADR293	Q8493.400	77	0
				Q8493.401	77	0
				Q8493.402	77	0

1) These Samples were subjected to preconditioning (per J-STD-020 Level 1) prior to the start of the stress test.
Level 1 preconditioning consists of the following:

- Bake: 24 hrs @ 125ºC,
- Soak: Unbiased Soak: 168 hrs @ 85ºC, 85%RH,
- Reflow: 3 passes through an oven with a peak temperature of 260ºC.

Table 4: 0.6µm CMOS at TSMC Fab-9 Fab Qualification Test Results

Test Name	Spec	Conditions	Device	Lot #	Sample Size	Qty. Failures
Early Life Failure Rate (ELFR)	MIL-STD-883, Method 1015	125°C, 48 hours	AD8628	Q8479.82	240	0
				Q8479.83	240	0
				Q8479.84	240	0
				Q8479.85	240	0
			ADE7753	Q7670.0201	250	0
				Q7670.0202	250	0
				Q7670.0203	250	0
				Q7670.0204	250	0
				Q7670.0205	250	0
				Q7670.0206	245	0
				Q7670.0207	250	0
				Q7670.0208	250	0
			ADE7755	Q7615.9	300	0
				Q7615.2	300	0
			ADE7753	AC80569.1	220	0
				AC80569.3	220	0
Highly Accelerated Temperature and Humidity Stress (HAST)	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 hours	AD8615	Q8060.37	75	0
			AD8630	Q7954.13	77	0
				Q7954.14	77	0
				Q7954.15	77	0
			AD8692	Q7248.9	77	0
				Q7248.10	77	0
				Q7248.8	77	0
			ADA4692-2	Q7559.4	77	0
			ADA4692-2	Q7559.13	77	0
			ADA4692-2	Q7559.5	77	0
High Temperature Operating Life (HTOL)	JESD22-A108	125°C ‹ Tj ‹ 135°C, Biased, 1000 hours	AD8601	Q7454.5	77	0
				Q7454.6	77	0
				Q7454.7	77	0
			AD8605	3343	77	0
			AD7873	Q7321.9	77	0
				7321.7	77	0
				7321.8	77	0
		150°C ‹ Tj ‹ 175°C, Biased, 500 hours	ADA4505-2	Q8001.1	77	0
				Q8001.6	77	0
			AD8606	3275	77	0
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1000 hours	AD8629	Q7892.3	45	0
			AD8630	Q7954.8	45	0
			AD8648	Q7588.15	45	0
			AD8692	Q7248.12	77	0
				Q7248.13	77	0
			ADA4692-2	Q7559.6	77	0
		125°C, 1000 hours	AD8605	M16355.1	45	0
				159715.1	45	0
				159715.1	45	0

Samples of the many devices manufactured with these package and process technologies are continuously undergoing reliability evaluation as part of the ADI Reliability Monitor Program. Additional qualification data is available on Analog Devices' web site.

ESD Test Results

The results of Human Body Model (HBM) and Field Induced Charged Device Model (FICDM) ESD testing are summarized in the ESD Results Table. ADI measures ESD results using stringent test procedures based on the specifications listed. Any comparison with another supplier's results should ensure that the same ESD test procedures have been used. For further details, please see the EOS/ESD chapter of the ADI Reliability Handbook (available via the 'Quality and Reliability' link at the Analog Devices' web site).

Table 5: AD8609 ESD Test Results

ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	14-SOIC_N	ANSI/ESD STM5.3.1-1999	1Ω, Cpkg	±1500V	NA	C6
	14-TSSOP_4.4			±1500V	NA	C6
HBM	14-SOIC_N	ANSI/ESD STM5.1-2007	1.5kΩ, 100pF	±4000V	NA	3A

Latch-Up Test Results

Six samples of the AD8609 were latch-up tested at T_A=25ºC per JEDEC Standard JESD78, Class I, Level A. All six devices passed.

Approvals

Reliability Engineer: Li Li Tay

This report has been approved by electronic means (5.0).

Additional Information

Data sheets and other additional information are available on Analog Devices' web site.