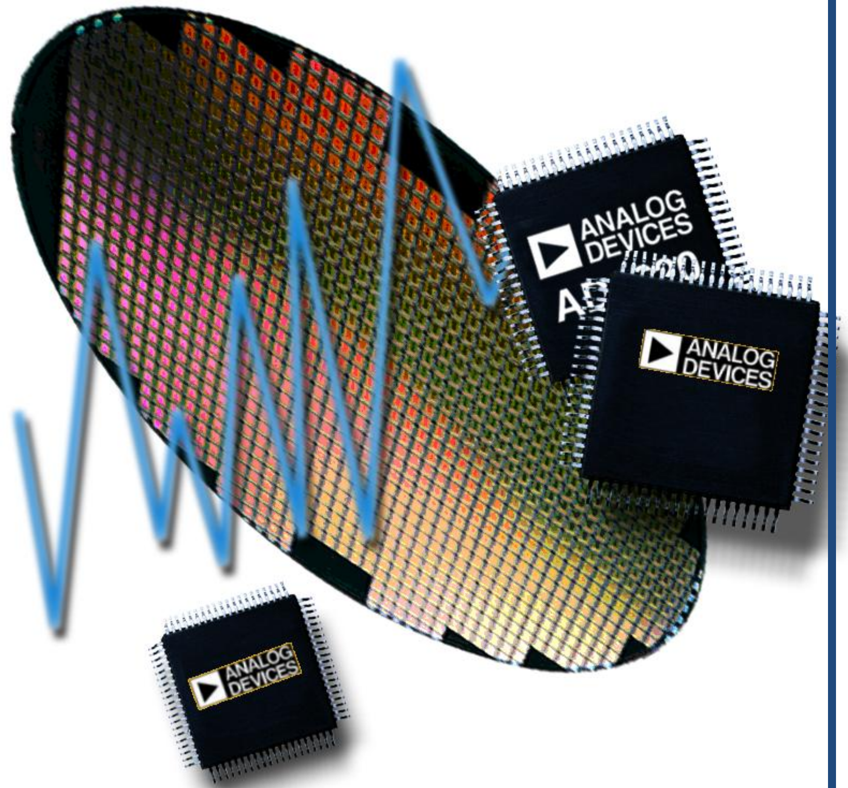

Reliability Report

Report Title: AD8675 Die Revision (Rev. X)

Report Number: 7343

Revision: A

Date: 15 September 2009

Summary

This report documents the successful completion of the reliability qualification requirements for release of the AD8675 product in an 8-MINI_SO and 8-SOIC_N package. The die revision was to improve parameter performance at hot temperature. The AD8675 precision operational amplifier has ultralow offset, drift, and voltage noise combined with very low input bias currents over the full operating temperature range.

Table 1: AD8675 Product Characteristics

Die/Fab

Die ID	2503x
Die Size (mm)	1.31 x 1.31
Wafer Fabrication Site	ADI-Limerick
Wafer Fabrication Process	High Voltage Bipolar
Transistor Count	77
Passivation Layer	undoped-oxide/OxyNitride
Bond Pad Metal Composition	AlCu
Die Overcoat	Polyimide

Package/Assembly

Available Package	8-SOIC_N	8-MINI_SO
Body Size (mm)	4.00 x 5.00 x 1.50	3.00 x 3.00 x 1.25
Assembly Location	Amkor-P	Carsem-M
Molding Compound	Sumitomo 6600H	Sumitomo 6600H
Wire Type	Gold	Gold Tanaka M3
Wire Diameter (mils)	1.00	1.00
Die Attach	Ablestik 84-1LMIS R4	Ablestik 84-1LMIS R4
Lead Frame Material	Copper	Copper
Lead Finish	Tin Plate	Tin Plate
Moisture Sensitivity Level	1	1
Maximum Peak Reflow Temperature (°C)	260	260

Description / Results of Tests Performed

Tables 2 and 3 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: Package Qualification Test Results

Test Name	Specification	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures
Autoclave (AC)[1]	JESD22-A102	121°C 100%RH 2atm 96 hours	AD8630	Amkor-P 14-SOIC_N	Q7954.5	77	0
					Q7954.6	77	0
					Q7954.7	77	0
			AD8617	Carsem-M 8-MINI_SO	Q7277.1	77	0
			AD8656		Q7055.1	77	0
					Q7055.6	77	0
			AD8692		Q7248.2	77	0
					Q7248.3	77	0
					Q7248.4	77	0
			ADA4505-2		Q7200.10	77	0
					Q7200.8	77	0
					Q7200.9	77	0
			AD8276	Amkor-P 8-SOIC_N	Q7770.2	77	0
			ADA4692-2		Q7559.1	77	0
					Q7559.2	77	0
			ADR02		Q6969.12	77	0
					Q6969.13	77	0
					Q6969.2	77	0
Biased HAST (HAST)[1]	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	AD8617	Carsem-M 8-MINI_SO	Q7277.2	77	0
			AD8656		Q6888.10	77	0
					Q6888.8	77	0
					Q6888.9	77	0
			AD8656		Q7055.14	77	0
					Q7055.15	77	0
			AD8692		Q7248.10	77	0
					Q7248.8	77	0
					Q7248.9	77	0
			ADA4627-1	Amkor-P 8-SOIC_N	Q7472.6	77	0
					Q7472.7	77	0
					Q7472.8	77	0
			ADA4692-2		Q7559.4	77	0
					Q7559.5	77	0
			OP291		AC24687.1	77	0
					AC24688.1	77	0
					AC24689.1	77	0
High Temperature Storage Life (HTSL)	JESD22-A103	150°C 1,000 hours	AD5660	Carsem-M 8-MINI_SO	AC49684.1	77	0
			AD8692		Q7248.12	77	0
					Q7248.13	77	0
			AD8629	Amkor-P 8-SOIC_N	Q7892.3	45	0
			ADA4627-1		Q7472.5	77	0
			OP484	Amkor-P 14-SOIC_N	AC17816.1	77	0
			AD8617	Carsem-M 8-MINI_SO	Q7277.11	45	0

Test Name	Specification	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures
High Temperature Storage Life (HTSL)	JESD22-A103	150°C 1,000 hours	AD8656	Carsem-M 8-MINI_SO	Q7055.13	45	0
			AD8692		Q7248.14	77	0
			ADA4505-2		Q7200.11	77	0
					Q7200.12	77	0
					Q7200.13	77	0
			AD8206	Amkor-P 8-SOIC_N	Q6965.3	77	0
			AD8210		Q6106.27	77	0
					Q6106.44	77	0
			ADA4692-2		Q7559.6	77	0
			ADR02		Q6969.8	45	0
			OP291		AC24696.1	77	0
Temperature Cycling (TC)[1]	JESD22-A104	-65°C / +150°C 500 cycles	AD8617	Carsem-M 8-MINI_SO	Q7277.6	77	0
			AD8656		Q7055.11	77	0
					Q7055.12	77	0
			AD8692		Q7248.19	77	0
					Q7248.20	77	0
					Q7248.21	77	0
			ADA4505-2		Q7200.5	77	0
					Q7200.6	77	0
					Q7200.7	77	0
			AD8276	Amkor-P 8-SOIC_N	Q7770.6	77	0
			AD8629		Q7892.5	77	0
			AD8656		Q7589.3	77	0
			ADA4627-1		Q7472.12	77	0
					Q7472.13	77	0
					Q7472.14	77	0
			ADA4692-2		Q7559.7	77	0
					Q7559.8	77	0
			TMP01		E124089.1	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 3: Process Qualification Test Results

Test Name	Specification	Conditions	Device	Fab Process	Lot #	Sample Size	Qty. Failures
Early Life Failure Rate (ELFR)	MIL-STD-883, Method 1015	125°C Biased 48 hours	ADA4627-1	ADI-Limerick High Voltage Bipolar	Q7472.15.2	294	0
					Q7472.15.1	294	0
					Q7472.16.1	294	0
					Q7472.17.1	294	0
					Q7472.16.3	79	0
					Q7472.16.2	294	0
					Q7472.17.2	294	0
			AD8599		AB70364.1	360	0
					AB70364.2	300	0
			AD8675		f159575.12	416	0
					F159642.3	628	0
Biased HAST (HAST)[1]	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	ADR127		f159627.4	77	0
			AD8675		F159642.6	77	0
					f159575.6	77	0
					f159516.6	77	0
			ADA4627-1		Q7472.6	77	0
					Q7472.7	77	0
					Q7472.8	77	0
High Temperature Operating Life (HTOL)	JESD22-A108	125°C ‹ Tj ‹ 135°C, Biased 1,000 hours	AD8675		AA13505.1	85	0
					F159642.5	77	0
		150°C ‹ Tj ‹ 175°C, Biased 1,000 hours	ADA4004-4		f160129.9	77	0
High Temperature Operating Life (HTOL)[1]	JESD22-A108	125°C ‹ Tj ‹ 135°C, Biased 1,000 hours	AD8599		AB73286.1	77	0
			TMP01		E124088.1	77	0
					E195705.1	76	0
		150°C ‹ Tj ‹ 175°C, Biased 500 hours	ADA4627-1		Q7472.10	77	0
					Q7472.11	77	0
					Q7472.9	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 @ 125°C,
- Soak: Unbiased Soak: 168 hrs @ 85ºC, 85%RH,
- Reflow: 3 passes through an oven with a peak temperature of 260ºC.

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 ESD testing are summarized in the ESD Results Table. ADI measures ESD results using stringent test procedures based on the specifications listed in Table 4. 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 http://www.analog.com).

Table 4: ESD Test Results

ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	8-MINI_SO	ANSI/ESD STM5.3.1-1999	1Ω, Cpkg	±1000V	±1500V	C5
FICDM	8-SOIC_N	ANSI/ESD STM5.3.1-1999	1Ω, Cpkg	±1500V	NA	C6
HBM	8-SOIC_N	ESD Assoc. STM5.1-2001	1.5kΩ, 100pF	±1500V	±2000V	1C

Latch-Up Test Results

Six samples of the AD8675 were Latch-up tested at T_A=25ºC per JEDEC Standard JESD78, Class I, Level B. Electrical test was performed at ambient temperature. Summary of results are shown below.

Table 5: ESD Test Results

Tested Pins	Positive Trigger Polarity (mA)	Negative Trigger Polarity (mA)	V_{supply} Overvoltage (V)
Input[1]	+60	-60	-
Input[2]	+50	-50	-
Output[1]	+100	-100	-
Output[2]	+40	-40	-
Power	-	-	22.5

[1] Excluding NULL pins
[2] Including NULL pins

Approvals

Reliability Engineer: Robert Yhap
This report has been approved by electronic means (4.0)

Additional Information

Data sheets and other additional information are available on Analog Devices' web site:
http://www.analog.com