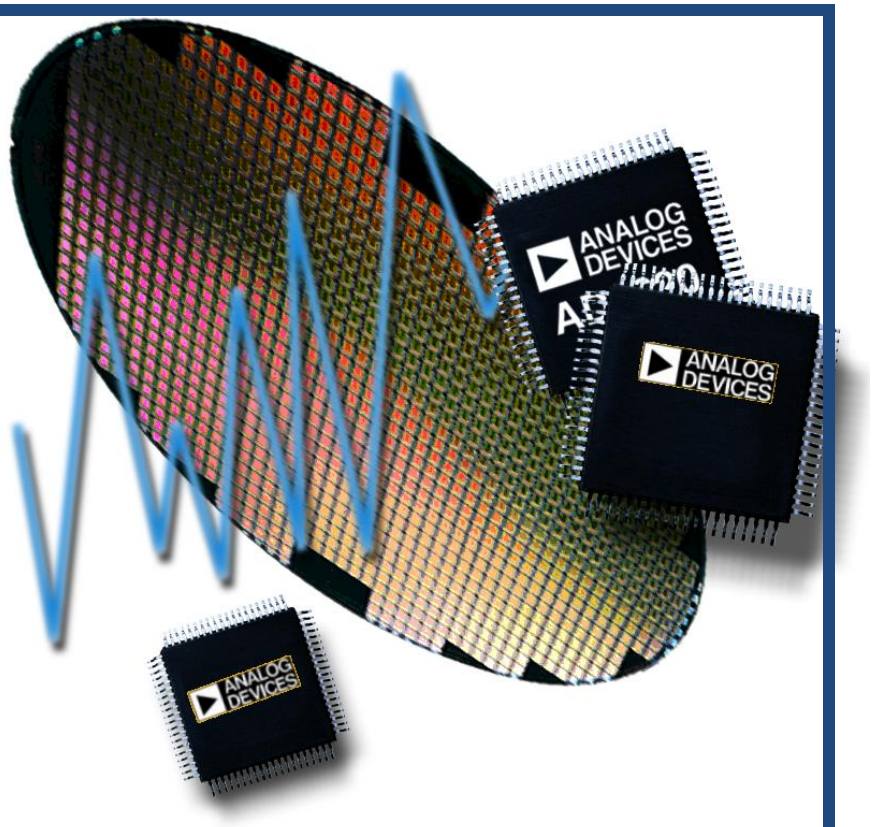

Reliability Report

Report Title: AD5669 New Product Family

Report Number: 8290

Revision: A

Date: 30 July 2010

Summary

This report documents the successful completion of the reliability qualification requirements for release of the AD5628, AD5629, AD5629R, AD5648, AD5668, AD5669, AD5669R product in a 14-TSSOP_4.4, 16-LFCSP, 16-TSSOP_4.4 package. The AD5628, AD5629, AD5629R, AD5648, AD5668, AD5669, AD5669R is/are Low Power Octal 12-bit buffered Vout DAC, Low Power Octal 12-bit buffered Vout DAC, Low Power Octal 12-bit buffered Vout DAC, Low Power Octal 14-bit buffered Vout DAC, Low Power Octal 16-bit buffered Vout DAC, Low Power Octal 16-bit Buffered Voltage o/p D, Low power octal 16-bit Vout buffered DAC.

Table 1: AD5669 Product Characteristics

Die/Fab

Die ID	I10
Die Size (mm)	2.65 x 2.65
Wafer Fabrication Site	Limerick 8"
Wafer Fabrication Process	0.6um CMOS
Transistor Count	21 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu

Package/Assembly

Available Package	16-TSSOP_4.4	16-LFCSP
Body Size (mm)	4.4 x 5.0 x 1.0	4.00 x 4.00 x 0.75
Assembly Location	Amkor-P	SCM
Molding Compound	Sumitomo G700K	Sumitomo G770
Wire Type	Gold	Gold MKE-UR2
Wire Diameter (mils)	1.00	1.00
Die Attach	Ablestik 8290	Ablestik 8290
Lead Frame Material	Copper	Copper
Lead Finish	Matte Sn	Matte Sn
Moisture Sensitivity Level	1	3
Maximum Peak Reflow	260C	260C

Table 2: AD5648 Product Characteristics

Die/Fab

Die ID	I10
Die Size (mm)	2.65 x 2.65
Wafer Fabrication Site	Limerick 8"
Wafer Fabrication Process	0.6um CMOS
Transistor Count	21 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu

Package/Assembly

Available Package	14-TSSOP_4.4
Body Size (mm)	4.4 x 5.0 x 1.0
Assembly Location	Amkor-P
Molding Compound	Sumitomo G700K
Wire Type	Gold
Wire Diameter (mils)	1.00
Die Attach	Ablestik 8290
Lead Frame Material	Copper
Lead Finish	Matte Sn
Moisture Sensitivity Level	1
Maximum Peak Reflow Temperature (°C)	260C

Table 3: AD5668 Product Characteristics

Die/Fab

Die ID	I10
Die Size (mm)	2.65 x 2.65
Wafer Fabrication Site	Limerick 8"
Wafer Fabrication Process	0.6um CMOS
Transistor Count	21 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu

Package/Assembly

Available Package	16-TSSOP_4.4
Body Size (mm)	4.4 x 5.0 x 1.0
Assembly Location	Amkor-P
Molding Compound	Sumitomo G700K
Wire Type	Gold
Wire Diameter (mils)	1.00
Die Attach	Ablestik 8290
Lead Frame Material	Copper
Lead Finish	Matte Sn
Moisture Sensitivity Level	1
Maximum Peak Reflow Temperature (°C)	260C

Table 4: AD5628 Product Characteristics

Die/Fab

Die ID	I10
Die Size (mm)	2.65 x 2.65
Wafer Fabrication Site	Limerick 8"
Wafer Fabrication Process	0.60 Cmos
Transistor Count	21 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu

Package/Assembly

Available Package	14-TSSOP_4.4
Body Size (mm)	4.4 x 5.0 x 1.0
Assembly Location	Amkor-P
Molding Compound	Sumitomo G700K
Wire Type	Gold
Wire Diameter (mils)	1.00
Die Attach	Ablestik 8290
Lead Frame Material	Copper
Lead Finish	Matte Sn
Moisture Sensitivity Level	1
Maximum Peak Reflow Temperature (°C)	260C

Description / Results of Tests Performed

Tables 5 and 6 provide a description of the qualification tests conducted and the associated test results for products manufactured on the same technologies as described in Tables 1, 2, 3, and 4. 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 5: Package Qualification Test Results

Test Name	Spec	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures
Autoclave (AC)[1]	JESD22-A102	121°C 100%RH 2atm 96 hours	ADD5201	SCM 28-LFCSP	Q7851.100	55	0
					Q7851.101	55	0
					Q7851.102	55	0
Autoclave (AC)[2]	JESD22-A102	121°C 100%RH 2atm 168 hours	ADM211E	Amkor-P 28-TSSOP	N78354.1	77	0
					N78355.1	77	0
					N78356.1	77	0
Autoclave (AC)[2]	JESD22-A102	121°C 100%RH 2atm 96 hours	ADUC814	Amkor-P 28-TSSOP	Q7612.1	77	0
					Q7612.3	77	0
					Q7612.4	77	0
Autoclave (AC)[1]	JESD22-A102	121°C 100%RH 2atm 96 hours	ADF4153	SCM 20-LFCSP	Q7434.13	77	0
					Q7434.14	77	0
					Q7434.15	77	0
Biased HAST (HAST)[2]	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	ADM211E	Amkor-P 28-TSSOP	N78357.1	77	0
					N78360.1	77	0
Biased HAST (HAST)[1]	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	ADF7020	SCM 48-LFCSP	Q7434.4	60	0
					Q7434.5	60	0
					Q7434.6	60	0
High Temperature Storage Life (HTSL)	JESD22-A103	150°C 1,000 hours	ADM211E	Amkor-P 28-TSSOP	N78361.1	77	0
Solder Heat Resistance (SHR)[3]	ADI-0049	See Footer	ADF4602	SCM 40-LFCSP	Q7614.44	30	0
Solder Heat Resistance (SHR)[1]	ADI-0049	See Footer	AD8345	Amkor-P 16-TSSOP_4.4	Q7668.174	15	0
			AD8396	SCM 16-LFCSP	Q7974.2	30	0
			AD8432	SCM 24-LFCSP	Q7909.4	30	0
			AD8624	SCM 16-LFCSP	Q8059.6	30	0
			ADA4091-4		Q7827.6	30	0
			ADA4424-6	Amkor-P 38-TSSOP_4.4	Q7885.5	30	0
Solder Heat Resistance (SHR)[2]	ADI-0049	See Footer	ADM211E	Amkor-P 28-TSSOP	N78364.1	11	0
					N78365.1	11	0
Solder Heat	ADI-0049	See Footer	ADUC814	Amkor-P	Q7612.11	16	0

Test Name	Spec	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures
Resistance (SHR)[2]				28-TSSOP	Q7612.12	16	0
					Q7612.9	16	0
Temperature Cycling (TC)[1]	JESD22-A104	-65°C / +150°C 500 cycles	ADD5201	SCM 28-LFCSP	Q7851.300	55	0
					Q7851.301	55	0
					Q7851.302	55	0
Temperature Cycling (TC)[2]	JESD22-A104	-65°C / +150°C 500 cycles	ADUC814	Amkor-P 28-TSSOP	Q7612.5	77	0
					Q7612.6	77	0
					Q7612.7	77	0
Temperature Cycling (TC)[1]	JESD22-A104	-65°C / +150°C 500 cycles	ADF4153	SCM 20-LFCSP	Q7434.16	77	0
					Q7434.17	77	0
					Q7434.18	77	0

1) These Samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125ºC, Soak: Unbiased Soak: 192 hrs @ 30ºC, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260ºC.

2) 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.

3) These Samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125ºC, Soak: Unbiased Soak: 192 hrs @ 30ºC, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 240ºC.

Table 6: 0.6µm CMOS at Limerick 8" Fab Qualification Test Results

Test Name	Spec	Conditions	Device	Fab Process	Lot #	Sample Size	Qty. Failures
Early Life Failure Rate (ELFR)[1]	MIL-STD-883, Method 1015	125°C 48 hours	AD8558	Limerick 8" 0.6µm CMOS	Q7175.1	135	0
					Q7175.2	135	0
Early Life Failure Rate (ELFR)	MIL-STD-883, Method 1015	125°C 168 hours	ADE7755A	Limerick 8" 0.6µm CMOS	Q4887.23	315	0
					Q4887.28	315	0
					Q4887.24	315	0
		125°C 48 hours	AD5398		AA40487.1	38	0
					AA51034.1	32	0
			AD8558		Q7175.3	135	0
					Q7174.17A_lot1	205	0
					Q7174.18A_lot1	201	0
					Q7174.19A_lot1	199	0
High Temperature Operating Life (HTOL)[2,1]	JESD22-A108	125°C ‹ Tj ‹ 135°C, Biased 1,000 hours	AD5270	Limerick 8" 0.6µm CMOS	Q7563.100	77	0
					Q7563.101	77	0
					Q7563.102	77	0
High Temperature Operating Life (HTOL)[2,1]	JESD22-A108	150°C ‹ Tj ‹ 175°C, Biased 500 hours	AD8558	Limerick 8" 0.6µm CMOS	Q7175.5	77	0
					Q7175.6	77	0
High Temperature Operating Life (HTOL)[2]	JESD22-A108	150°C ‹ Tj ‹ 175°C, Biased 500 hours	AD8558	Limerick 8" 0.6µm CMOS	Q7175.4	77	0
High Temperatur	JESD22-A108	150°C ‹ Tj ‹ 175°C,	AD8558	Limerick 8" 0.6µm	Q7174.12	77	0
					Q7174.13	77	0

Test Name	Spec	Conditions	Device	Fab Process	Lot #	Sample Size	Qty. Failures
e Operating Life (HTOL)[3,4]		Biased 1,000 hours		CMOS	Q7174.14	77	0

1) Electrical test was performed at ambient temperatures.
2) 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.
3) These Samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125ºC, Soak: Unbiased Soak: 192 hrs @ 30ºC, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260ºC.
4) Pre- and post-stress electrical test was performed at hot, ambient and cold temperatures.

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 Charge 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 7: ESD Test Results

ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	16-TSSOP_4.4	JESD22-C101	1Ω, Cpkg	±500V	±1000V	C4
	16-LFCSP			±1000V	±1500V	C5
HBM	16-LFCSP	ANSI/ESDA/JEDEC JS-001-2010	1.5kΩ, 100pF	±2000V	±2500V	2

Latch-Up Test Results

Six samples of the AD5669 were Latch-up tested at T_A=25ºC per JEDEC Standard JESD78, Class I, Level A. All six devices passed.

Approvals

This report has been approved by electronic means (5.0).
Reliability Engineer: Mark Forde

Additional Information

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