



Reliability Report

Report Title: AD8522 transfer to ADLK 8inch

Report Number: 9108

Revision: A

Date: 18 November 2010

Summary

This report documents the successful completion of the reliability qualification requirements for release of the AD8522 product in a 14-PDIP, 14-SOIC_N package. The AD8522 is a 5V Serial Input Dual 12-bit DAC

Table 1: AD8522 Product Characteristics

Die/Fab

Die ID	8YJ72E01
Die Size (mm)	1.56 x 2.24
Wafer Fabrication Site	Limerick 8"
Wafer Fabrication Process	0.6um HVCMOS
Transistor Count	2 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu
Die Overcoat	Polyimide

Package/Assembly

Available Package	14-PDIP	14-SOIC_N
Body Size (mm)	19.05 x 6.35 x 5.00	8.75 x 4.00 x 1.50
Assembly Location	Carsem-S	Carsem-M
Molding Compound	Sumitomo G600C	Sumitomo 6600H
Wire Type	Gold Tanaka M3	Gold Tanaka M3
Wire Diameter (mils)	1.30	1.00
Die Attach	Ablestik 84-1LMIS R4	Ablestik 84-1LMIS R4
Lead Frame Material	Copper	Copper
Lead Finish	Matte Sn	Matte Sn
Moisture Sensitivity Level	NA	1
Maximum Peak Reflow	NA	260C +0/-5C

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	Spec	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures
Autoclave (AC)	JESD22-A102	121°C 100%RH 2atm 96 hours	AD677	Carsem-S 16-PDIP	Q8060.113	50	0
			AD711	Carsem-S 8-PDIP	Q7874.54	50	0
			AD734	Carsem-S 14-PDIP	Q8276.8	50	0
			AD835	Carsem-S 8-PDIP	Q8865.179	50	0
			AD8048		AB76376.1	77	0
			AD844		AB76377.1	77	0
			AD8522	Carsem-S 14-PDIP	AC83257.1	77	0
AC83258.1	77	0					
Autoclave (AC) ¹	JESD22-A102	121°C 100%RH 2atm 96 hours	AD620	Carsem-M	Q7876.14	50	0
			AD7893	8-SOIC_N	Q7874.193	50	0
			AD8277	Carsem-M 14-SOIC_N	Q8092.10	77	0
					Q8092.8	77	0
					Q8092.9	77	0
Q8151.100	77	0					
Autoclave (AC) ²	JESD22-A102	121°C 100%RH 2atm 96 hours	OP484	Carsem-M 14-SOIC_N	Q8151.101	77	0
Autoclave (AC) ³	JESD22-A102	121°C 100%RH 2atm 168 hours	AD589	Carsem-M 8-SOIC_N	L67391.3	45	0
			ADM707		M92988.1	45	0
			ADP3417		L90180.1	45	0
			AD712	Carsem-M 8-SOIC_N	M46430.1	45	0
			AD822		M46431.1	45	0
					M51171.1	45	0
					L47534.1	45	0
ADP3418	M16261.1	77	0				
Autoclave (AC) ¹	JESD22-A102	121°C 100%RH 2atm 168 hours	ADM202E	Carsem-M 16-SOIC_N	R86152.1	45	0
			ADM485	Carsem-M 8-SOIC_N	O71761.1	45	0
			AD712	Carsem-M 8-SOIC_N	Q5677.1	77	0
					Q5677.3	77	0
Autoclave (AC) ¹	JESD22-A102	121°C 100%RH 2atm 96 hours	AD42/322	Carsem-M 14-SOIC_N	f161313.4	99	0
					f161315.10	10	0
					f161315.5	77	0
Biased HAST (HAST)	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	AD734	Carsem-S 14-PDIP	Q8276.9	50	0
			ADM690	Carsem-S 8-PDIP	Q7498.32	50	0
Biased HAST (HAST) ³	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	AD830	Carsem-M 8-SOIC_N	M90593.1	45	0
					M90844.1	45	0

Test Name	Spec	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures
Biased HAST (HAST) ³	JESD22-A110	110°C 85%RH 2atm, Biased 96 hours	AD712	Carsem-M 8-SOIC_N	M57757.1	77	0
		130°C 85%RH 2atm, Biased 96 hours	AD822		M51172.1	77	0
					L47536.1	40	0
Biased HAST (HAST) ¹	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	AD712	Carsem-M 8-SOIC_N	M51057.1	77	0
			ADM202E	Carsem-M 16-SOIC_N	R86153.1	45	0
			ADM485	Carsem-M 8-SOIC_N	O71762.1	45	0
High Temperature Storage Life (HTSL)	JESD22-A103	150°C 1,000 hours	ADG508F	Carsem-M 16-SOIC_N	Q8242.1	84	0
			OP484	Carsem-M 14-SOIC_N	Q8151.300	77	0
			AD42/322		f161314.7	77	0
					f161315.6	77	0
					f161316.6	77	0
			AD8048	Carsem-S 8-PDIP	AC82787.1	77	0
					AC82788.1	77	0
					AC82789.1	77	0
			AD845	Carsem-S 14-PDIP	AB19598.1	77	0
			OP11		E111737.1	77	0
					E111738.1	77	0
					E111739.1	77	0
			OP285	Carsem-M 8-SOIC_N	E59047.1	70	0
E66778.1	77	0					
E66779.1	77	0					
Solder Heat Resistance (SHR) ⁴	ADI-0049	See Footer	AD8200	Carsem-M 8-SOIC_N	NA	160	0
Solder Heat Resistance (SHR) ⁵	ADI-0049	See Footer	AD8200	Carsem-M 8-SOIC_N	NA	160	0
Solder Heat Resistance (SHR) ¹	ADI-0049	See Footer	AD620	Carsem-M 8-SOIC_N	Q7876.15	15	0
			AD7893		Q7874.196	15	0
			AD8277	Carsem-M 14-SOIC_N	Q8092.2	11	0
					Q8092.4	11	0
					Q8092.5	11	0
AD8279		Q8149.1	30	0			
Solder Heat Resistance (SHR) ³	ADI-0049	See Footer	AD589	Carsem-M 8-SOIC_N	L67391.3	20	0
			AD822		L27914.4	10	0
			ADM707		M92989.2	20	0
			ADP3417		L90181.2	20	0
					M52595.2	20	0
Solder Heat Resistance (SHR) ¹	ADI-0049	See Footer	AD712	Carsem-M 8-SOIC_N	M51055.2	10	0
			ADM202E	Carsem-M 16-SOIC_N	R86176.1	10	0
			ADM485	Carsem-M 8-SOIC_N	O71764.1	10	0
			AD8639	Carsem-M 8-SOIC_N	Q7030.11	30	0
			AD42/322	Carsem-M 14-SOIC_N	f161314.4	10	0
					f161316.7	10	0
			AD8273		Q7455.5	30	0
			ADA4004-1	Carsem-M	Q7251.7	30	0

Test Name	Spec	Conditions	Device	Package	Lot #	Sample Size	Qty. Failures		
			ADA4004-2	8-SOIC_N	Q7249.8	30	0		
Temperature Cycling (TC)	JESD22-A104	-65°C / +150°C 500 cycles	AD677	Carsem-S 16-PDIP	Q8060.114	50	0		
			AD711	Carsem-S 8-PDIP	Q7874.55	50	0		
			AD734	Carsem-S 14-PDIP	Q8276.10	50	0		
			AD835	Carsem-S 8-PDIP	Q8865.181	50	0		
			AD813		AB73465.1	77	0		
			AD823		AB73466.1	77	0		
			AD8522	Carsem-S 14-PDIP	AC83271.1	77	0		
								AC83272.1	77
Temperature Cycling (TC) ¹	JESD22-A104	-65°C / +150°C 1,000 cycles	AD8138A	Carsem-M 8-SOIC_N	Q7625.100	77	0		
			AD7893		Q7874.195	50	0		
			-65°C / +150°C 500 cycles	AD8277	Carsem-M 14-SOIC_N	Q8092.11	77	0	
		Q8092.12				77	0		
		Q8092.13				77	0		
		Temperature Cycling (TC) ²	JESD22-A104	-65°C / +150°C 500 cycles	OP484	Carsem-M 14-SOIC_N	Q8151.401	77	0
Temperature Cycling (TC) ³	JESD22-A104	-65°C / +150°C 500 cycles	AD589	Carsem-M 8-SOIC_N	L67391.3	45	0		
			ADM707		M92989.1	45	0		
			ADP3417		L90181.1	45	0		
					M52595.1	45	0		
			AD822	Carsem-M 8-SOIC_N	L47535.1	45	0		
Temperature Cycling (TC) ¹	JESD22-A104	-65°C / +150°C 1,000 cycles	AD712	Carsem-M 8-SOIC_N	M51056.1	77	0		
			AD822		M51059.1	77	0		
		-65°C / +150°C 500 cycles	ADM202E	Carsem-M 16-SOIC_N	R86154.1	45	0		
					ADM485	Carsem-M 8-SOIC_N	O71763.1	45	0
Temperature Cycling (TC) ¹	JESD22-A104	-65°C / +150°C 500 cycles	AD712	Carsem-M 8-SOIC_N	Q5677.2	77	0		
					Q5677.4	77	0		
			AD42/322	Carsem-M 14-SOIC_N	f161314.6	77	0		
					f161315.7	77	0		
					F161316.5	77	0		
					Q8151.500	77	0		
Temperature Humidity Bias (THB) ²	JESD22-A101	85°C 85%RH, Biased 1,000 hours	OP484	Carsem-M 14-SOIC_N	Q8151.501	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 @ 85°C, 85%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.
- 2) 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 @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.
- 3) 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 @ 85°C, 85%RH, Reflow: 3 passes through an oven with a peak temperature of 240°C.
- 4) These Samples were subjected to preconditioning (per Bosch 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 @ 85°C, 85%RH, Reflow: 3 passes through an oven with a peak temperature of 240°C.

5) These Samples were subjected to preconditioning (per Bosch 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 @ 85°C, 85%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

Table 3: 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	AD7280	TSMC 9 8" 0.6µm CMOS, Limerick 8" 0.6µm CMOS	Q6912.26	266	0
					Q6912.20	266	0
					Q6912.41	800	0
					Q6912.34	818	0
					Q6912.42	535	0
Early Life Failure Rate (ELFR) ²	MIL-STD-883, Method 1015	125°C 48 hours	AD7656	Limerick 8" 0.6µm CMOS	Q8743.117	300	0
					Q8743.118	300	0
					Q8743.120	300	0
					Q8743.121	300	0
					Q8743.122	200	0
					Q8743.123	300	0
					Q8743.124	110	0
Early Life Failure Rate (ELFR) ¹	MIL-STD-883, Method 1015	125°C 48 hours	AD8639	Limerick 8" 0.6µm CMOS	Q8266.200	245	0
		150°C 48 hours	AD8280W		Q8266.202	310	0
					Q7618.24	84	0
					Q7618.18	87	0
					Q7618.19	87	0
					Q7618.20	87	0
					Q7618.21	26	0
Biased HAST (HAST) ^{3,2}	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	AD7545	Limerick 8" BiCMOS	Q8609.HA2 a	41	0
			ADA4665-2		Q8609.HA1 b	41	0
					Q8609.HA2 b	41	0
				Q8625.201	77	0	
				Q8663.201	77	0	
				Q8663.202	77	0	
			ADG1208	Limerick 8" 0.6µm CMOS	Q8865.70	50	0
			ADUM5400		Limerick 8" 0.6µm CMOS, Limerick 8" 0.6µm CMOS, TSMC 3C 8" 0.35µm CMOS, CHPB0108 Micromachines	Q8550.25	77
Q8550.26	77	0					
Biased HAST (HAST) ^{4,2}	JESD22-A110	130°C 85%RH 2atm, Biased 96 hours	ADUM5400	Limerick 8" 0.6µm CMOS, Limerick 8" 0.6µm CMOS, TSMC 3C 8" 0.35µm CMOS, CHPB0108 Micromachines	Q8550.27	77	0
High Temperature Operating Life (HTOL) ²	JESD22-A108	125°C < Tj < 135°C, Biased 1,000 hours	AD7656	Limerick 8" 0.6µm CMOS	Q8742.26	50	0
					Q8742.25	50	0
High Temperature Operating Life (HTOL) ^{3,2}	JESD22-A108	125°C < Tj < 135°C, Biased 1,000 hours	ADG4612	Limerick 8" 0.6µm CMOS	Q7994.2	77	0
					Q7994.3	77	0
		135°C < Tj < 150°C, Biased 750 hours	AD5781		Q8240.5	77	0

Test Name	Spec	Conditions	Device	Fab Process	Lot #	Sample Size	Qty. Failures
High Temperature Operating Life (HTOL) ^{4,5}	JESD22-A108	125°C < Tj < 135°C, Biased 1,000 hours	AD7280	TSMC 9 8" 0.6µm CMOS, Limerick 8" 0.6µm CMOS	Q6912.39	77	0
High Temperature Operating Life (HTOL) ^{4,2}	JESD22-A108	150°C < Tj < 175°C, Biased 500 hours	ADUM5400	Limerick 8" 0.6µm CMOS, Limerick 8" 0.6µm CMOS, TSMC 3C 8" 0.35µm CMOS, CHPB0108 Micromachines	Q8550.37	77	0
					Q8550.38	77	0
					Q8550.39	77	0
High Temperature Storage Life (HTSL) ²	JESD22-A103	150°C 1,000 hours	AD53565	Limerick 8" 0.6µm CMOS	Q7576.12	45	0
					Q7576.17	45	0
			AD7545	Limerick 8" BiCMOS	Q8609.HS1	77	0
					Q8609.HS2	77	0
			ADA4665-2	Limerick 8" 0.6µm CMOS	Q8625.300	77	0
					Q8663.300	77	0
			ADF4150HV	TSMC 3C 8" BiCMOS, Limerick 8" 0.6µm CMOS	Q8268.6	45	0
			ADUM5400	TSMC 9 8" None, CHPB0108 Micromachines, Limerick 8" 0.6µm CMOS, Limerick 8" 0.6µm CMOS	Q8063.9	77	0
					Q8550.10	77	0

- 1) Pre- and post-stress electrical test was performed at ambient and hot temperatures.
- 2) Electrical test was performed at ambient temperatures.
- 3) 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 @ 85°C, 85%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.
- 4) 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 @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

5) 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), Machine Model (MM), 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 4: ESD Test Results

ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	14-SOIC_N	JESD22-C101	1Ω, Cpkg	±1500V	NA	C6
HBM	14-SOIC_N	ANSI/ESDA/J EDEC JS- 001-2010	1.5kΩ, 100pF	±4000V	NA	3A
MM	14-SOIC_N	ANSI/ESD STM5.2-1999	0Ω, 200pF	±200V	NA	M3

Latch-Up Test Results

Six samples of the AD8522 were Latch-up tested at $T_A=25^{\circ}\text{C}$ 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: John Browne

Additional Information

Data sheets and other additional information are available on [Analog Devices' web site](#).