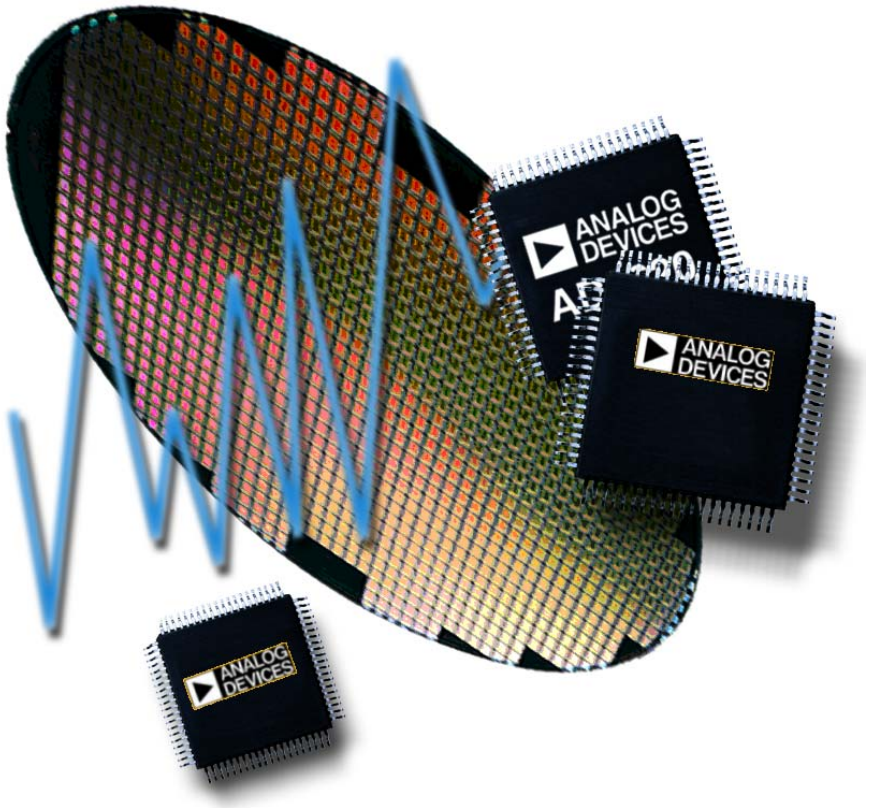

Reliability Report

Report Title: AD7689/82, AD7949 Die Revision

Report Number: 7555

Date: 11/13/2008

Analog Devices Reliability . 804 Woburn Street. Wilmington, MA 01887-3462
Tel: 781.935.5565 Fax: 781.937.2024 www.analog.com

Summary

This report documents the successful completion of the reliability qualification requirements for a die revision of AD7689, AD7682, AD7949 product in a 20-LFCSP package. The AD7689, AD7682, AD7949 are 4/8-channel, 16-bit, charge redistribution successive approximation register (SAR) analog-to-digital converters (ADCs) that operate from a single power supply, VDD. These converters contain all components for use in a multichannel, low power data acquisition system, including a true 16-bit SAR ADC with no missing codes; a 8-channel (AD7689), low crosstalk multiplexer useful for configuring the inputs as single ended (with or without ground sense), differential, or bipolar; an internal low drift reference (selectable 2.5 V or 4.096 V) and buffer; a temperature sensor; a selectable one-pole filter; and a sequencer that is useful when channels are continuously scanned in order.

Qualification tests were performed using AD7699, which uses the same die and package as the AD7689, AD7682 and AD7949.

AD7689/AD7682/AD7949 Product Characteristics

Die/Fab

Maximum Power Dissipation (W)	0.130
Device / Die ID	TMX307E
Die Size (mm)	3.90 x 4.00
Wafer Fabrication Site	TSMC Fab - 09
Wafer Fabrication Process	0.5um DPTM CMOS
Transistor Count	28000
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlCu
Polyimide Layer	No

Package/Assembly

Available Package(s)	20-LFCSP
Body Size (mm)	4.00 x 4.00 x 0.85
Assembly Location	AMKOR-K
Die Attach	Ablestik 8290
Lead Frame Material	Copper
Bond Wire Type	Gold
Bond Wire Dia. (mils)	1.00
Mold Compound	Sumitomo G700
Lead Finish	Tin Plate
Moisture Sensitivity Level	3
Maximum Peak Reflow (°C)	260

Package/Assembly Qualification Test Results

The below table provides a description of the Assembly/Package qualification tests conducted and the associated test results on the AD7689/82, AD7949 and other products manufactured on the same technologies as described in the product characteristics table.

Test Name	Conditions	Duration	Generic	Rellab Lot #	Sample Size	Qty Failed	Qual #
Autoclave	121C 100%RH 2atm	P168	AD5232	R86113.1	45	0	5951
Autoclave	121C 100%RH 2atm	P168	AD5233	M90584.1	45	0	4505
Autoclave	121C 100%RH 2atm	P168	AD8403	O37370.1	45	0	5758
Autoclave	121C 100%RH 2atm	P168	AD8403	O69702.1	45	0	5949
Autoclave	121C 100%RH 2atm	P96	AD8403	AA89110.1	50	0	6731
Autoclave	121C 100%RH 2atm	P96	AD8511	AA76624.1	50	0	6731
Autoclave	121C 100%RH 2atm	P96	AD8511	AB55232.1	50	0	7046
Autoclave	121C 100%RH 2atm	P96	AD9203	AC80562.1	50	0	7438
Autoclave	121C 100%RH 2atm	P96	ADW12003	Q6782.1	45	0	6782
Autoclave	121C 100%RH 2atm	P96	ADW12003	Q6782.2	45	0	6782
HAST	130C 85%RH 2atm, Biased	P96	AD5232	R86114.1	45	0	5951
HAST	130C 85%RH 2atm, Biased	P96	AD5232	AB57529.1	50	0	7046
HAST	130C 85%RH 2atm, Biased	P96	AD8403	AC79324.1	50	0	7198
HAST	130C 85%RH 2atm, Biased	P96	AD8511	AB52789.1	50	0	7046
HAST	130C 85%RH 2atm, Biased	P96	ADM211	AB24545.1	25	0	6933
HAST	130C 85%RH 2atm, Biased	P96	ADM211E	N78358.1	77	0	5551
HAST	130C 85%RH 2atm, Biased	P96	ADM9240	M90914.1	45	0	4808
HTS	150C	P1000	ADF4106	F150489.10	77	0	3314
HTS	150C	P1000	ADF4106	F150103.10	77	0	3314
HTS	125C	P1000	ADF4106	f155443.4	20	0	3453
HTS	125C	P1000	ADF4106	f155444.4	21	0	3453
HTS	125C	P1000	ADF4106	f155445.4	77	0	3453
HTS	125C	P1000	ADF4112	K38917.1	77	0	3453
HTS	125C	P1000	ADF4112	K38918.1	75	0	3453
HTS	150C	P1000	ADW12003	Q6782.3	45	0	6782
Temp Cycle	-65C/+150C	P500	AD5232	R86115.1	45	0	5951
Temp Cycle	-65C/+150C	P500	AD5233	N91216.1	45	0	5175
Temp Cycle	-65C/+150C	P500	AD8403	O37372.1	45	0	5758
Temp Cycle	-65C/+150C	P500	AD8403	O69703.1	45	0	5949
Temp Cycle	-65C/+150C	P500	AD8511	AA76626.1	50	0	6731
Temp Cycle	-65C/+150C	P500	AD8511	AB55233.1	50	0	7046
Temp Cycle	-65C/+150C	P500	AD9203	AC80563.1	50	0	7438
Temp Cycle	-65C/+150C	P500	ADM211	AB24546.1	50	0	6933

Test Name	Conditions	Specification	Device	Package	Lot #	Sample Size	Qty. Rejects
SHR [1]	See Below	ADI-0049	AD7699	20-LFCSP	Q7555.4	30	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 @ 125°C
- Unbiased Soak: 192 hrs @ 30°C, 60%RH
- Reflow: 3 passes through an oven with a peak temperature of 260+0/-5°C

Samples of the many devices manufactured with these 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.

Process Qualification Test Results

The below table provides a description of the process qualification tests conducted and the associated test results on the AD7689/82, AD7949 and other products manufactured on the same technologies as described in the product characteristics table.

Test Name	Conditions	Duration	Generic	Rellab Lot #	Sample Size	Qty Failed	Qual #
ELF	125C	P48	ADM1032	AA89000.1	290	0	6732
ELF	125C	P48	ADM1032	AA89000.2	290	0	6732
ELF	125C	P48	ADM1032	AA89000.3	290	0	6732
ELF	125C	P48	ADM1032	AA89000.4	140	0	6732
ELF	125C	P48	ADM1032	AB61105.1	290	0	7047
ELF	125C	P48	ADM1032	AB61105.2	290	0	7047
ELF	125C	P48	ADM1032	AB61105.3	290	0	7047
ELF	125C	P48	ADM1032	AB61105.4	140	0	7047
ELF	125C	P168	ADP3190	V62033.1 W#8	540	0	5357
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q4883.5	82	0	4883
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q4883.6	80	0	4883
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q4883.7	82	0	4883
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q4883.14	79	0	4883
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q5827.4	77	0	5827
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q5827.5	76	0	5827
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q5827.6	77	0	5827
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q7124.3	82	0	7124
HAST	130C 85%RH 2atm, Biased	P96	AD7685	Q7124.1	82	0	7124
HTOL	150C<Tj<175C, Biased	P500	ADM1032	N91255.1	45	0	5176
HTOL	150C<Tj<175C, Biased	P500	ADM1032	N91347.1	50	0	5359
HTOL	150C<Tj<175C, Biased	P500	ADM1032	N70724.1	45	0	5490
HTOL	135C<Tj<150C, Biased	P500	ADM1032	O99005.1	50	0	5610
HTOL	150C<Tj<175C, Biased	P500	ADM1032	O38083.1	45	0	5759
HTOL	125C<Tj<135C, Biased	P1000	ADM1032	AA89066.1	50	0	6732
HTOL	125C<Tj<135C, Biased	P1000	ADP3190	V62033.1	45	0	5310
HTOL	125C<Tj<135C, Biased	P1000	ADP3190	V62044.2	45	0	5310
HTOL	125C<Tj<135C, Biased	P1000	ADP3190	V62044.12	45	0	5310
HTS	150C	P1000	AD7685	Q5827.10	71	0	5827
HTS	150C	P500	AD7685	Q5827.12	81	0	5827
HTS	150C	P1000	AD7685	Q7124.13	82	0	7124

Samples of the many devices manufactured with these 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 in the table below. 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 at http://www.analog.com/world/quality/manuals/.

ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	20-LFCSP	ESD Assoc. STM5.3.1-1999	1 Ohm, Cpkg	750V	1000V	C4
HBM	20-LFCSP	ESD Assoc. STM5.1-2001	1.5 kOhm, 100pF	1000V	1250V	1C
MM	20-LFCSP	ESD Assoc. STM5.2-1999	0 Ohm, 200pF	100V	200V	M2

Latch-Up Test Results

Six samples of the AD7699 passed Latch-up testing at Ta=25ºC per JEDEC Standard JESD78, Class I.

Approvals

Reliability Engineer: LeJun Hu

Additional Information

Data sheets and other additional information are available on Analog Devices' web site at the addresses shown below.

Home Page: http://www.analog.com
Sales Info: http://www.analog.com/world/corp_fin/sales_directory/distrib.html
Reliability Data: http://www.analog.com/world/quality/read/1stpage.html
Reliability Handbook: http://www.analog.com/corporate/quality/manuals/