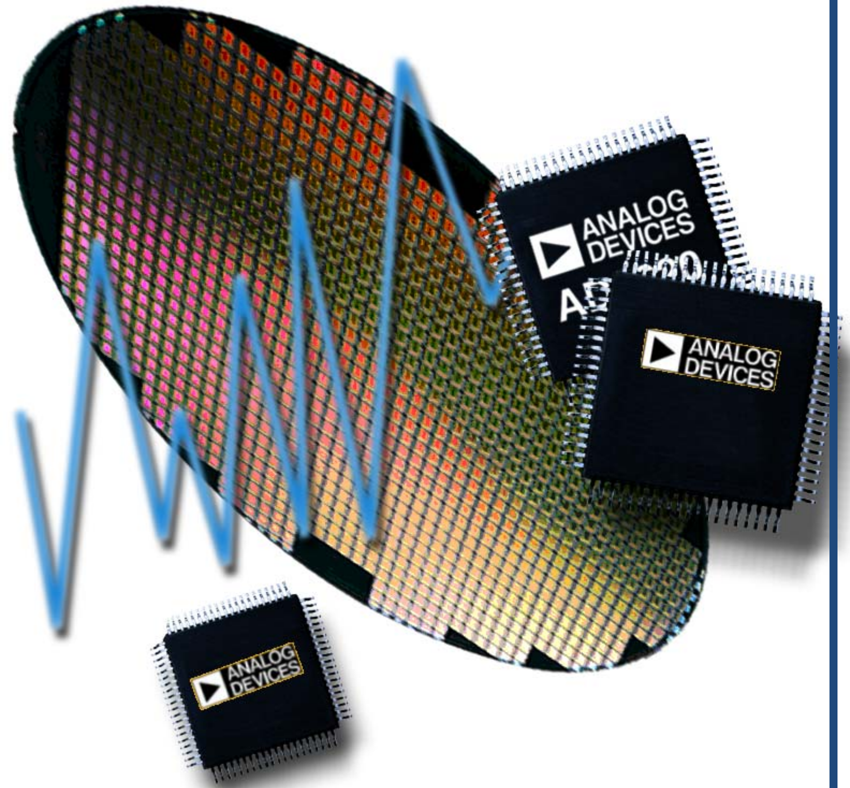

Reliability Report

Report Title: AD5764R New Product Qual

Report Number: 7140

Revision: B

Date: 12th June 2009

Summary

This report documents the successful completion of the reliability qualification requirements for release of the AD5744R, AD5762R, AD5763, AD5764, AD5764R, AD5765 products in a 32-TQFP package.

The AD5764 is a quad, 16-bit, serial input, bipolar voltage output DAC that operates from supply voltages of ±11.4 V to ±16.5 V. Nominal full-scale output range is ±10 V. The AD5764 provides integrated output amplifiers, reference buffers, and proprietary power-up/power-down control circuitry. The part also features a digital I/O port, which is programmed via the serial interface. The part incorporates digital offset and gain adjust registers per channel.

AD5764R quad, 16-bit DACs, Programmable output range: ±10V, ±10.2564V, or ±10.5263V; ±1 LSB max INL error, ±1 LSB max DNL error On-chip 5V reference: 10 ppm/°C 32 lead TQFP.

AD5744R quad, 14-bit DACs, Programmable output range: ±10V, ±10.2564V, or ±10.5263V; ±1 LSB max INL error, ±1 LSB max DNL error On-chip 5V reference: 10 ppm/°C 32 lead TQFP.

AD5765 quad, 16-bit DACs, Programmable output range: ±4.096, ±4.201V, or ±4.312V; ±1 LSB max INL error, ±1 LSB max DNL error 32 lead TQFP.

AD5762R Complete dual, 16-bit DACs, Programmable output range: ±10V, ±10.2564V, or ±10.5263V; ±1 LSB max INL error, ±1 LSB max DNL error On-chip 5V reference: 10 ppm/°C 32 lead TQFP.

AD5763 Complete dual, 16-bit DACs, Programmable output range: ±4.096, ±4.201V, or ±4.312V
±1 LSB max INL error, ±1 LSB max DNL error 32 lead TQFP.

Table 1: AD5764 Product Characteristics

Die/Fab

Maximum Power Dissipation (W)	0.300
Device / Die ID	F09A
Die Size (mm)	4.70 x 4.70
Wafer Fabrication Site	ADI-Limerick
Wafer Fabrication Process	H6DPDMPNR
Transistor Count	20 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlSiCu
Maximum Current Density (mA/µm)	0.21

Package/Assembly

Available Package	32-TQFP
Body Size (mm)	7.00 x 7.00 x 1.00
Assembly Site	STATS
Die Attach	Ablestik 3230
Lead Frame Material	C7025
Wire Type	Gold
Wire Diameter (mils)	1.00
Molding Compound	Sumitomo G700E
Moisture Sensitivity Level	3
Maximum Peak Reflow (°C)	260C(-0C/+5C)

Table 2: AD5765 Product Characteristics

Die/Fab

Maximum Power Dissipation (W)	0.312
Device / Die ID	F09B1A
Die Size (mm)	4.60 x 4.60
Wafer Fabrication Site	ADI-Limerick
Wafer Fabrication Process	H6DPDMPNR
Transistor Count	77 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlSiCu
Maximum Current Density (mA/µm)	0.40

Package/Assembly

Available Package	32-TQFP
Body Size (mm)	7.00 x 7.00 x 1.00
Assembly Site	STATS
Die Attach	Ablestik 3230
Lead Frame Material	C7025
Wire Type	Gold
Wire Diameter (mils)	1.00
Molding Compound	Sumitomo G700E
Moisture Sensitivity Level	3
Maximum Peak Reflow (°C)	260C(-0C/+5C)

Table 3: AD5764R Product Characteristics

Die/Fab

Maximum Power Dissipation (W)	0.312
Device / Die ID	F09B1A
Die Size (mm)	4.60 x 4.60
Wafer Fabrication Site	ADI-Limerick
Wafer Fabrication Process	H6DPTMPNR
Transistor Count	77 thousand
Passivation Layer	undoped-oxide/SiN
Bond Pad Metal Composition	AlSiCu
Polyimide	Yes
Maximum Current Density (mA/µm)	0.40

Package/Assembly

Available Package	32-TQFP
Body Size (mm)	7.00 x 7.00 x 1.00
Assembly Site	STATS
Die Attach	Ablestik 3230
Lead Frame Material	C7025
Wire Type	Gold
Wire Diameter (mils)	1.00
Molding Compound	Sumitomo G700E
Moisture Sensitivity Level	3
Maximum Peak Reflow (°C)	260C(-0C/+5C)

Process/Package Qualification Test Results

Table 4 and 5 provides a description of the process and package qualification tests conducted and the associated test results for products manufactured on the same technologies as described in table 1, 2, and 3. 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 a conclusive evidence to indicate otherwise.

Table 4: Process Qualification Test Results

Test Name	Conditions	Specification	Device	Fab Process	Lot #	Sample Size	Qty. Failures
High Temperature Operating Life (HTOL) ①	TA = 125°C 125°C‹Tj‹135C, Biased 168 hours	JESD22-A108	AD5765	ADI-Limerick 0.6um CMOS	S191884.5-1	45	0
	TA = 125°C 125°C‹Tj‹135C, Biased 500 hours		AD5762R		Q7140.14	45	0
			AD5762R		Q7140.5	45	0
			AD5764R		Q7140.4	45	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.

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.

Table 5: Package Qualification Test Results

Test Name	Specification	Conditions	Device	Package	Lot Number	Sample Size	Qty. Failures
Solder Heat Resistance (SHR)[1]	ADI-0049	MSL-3	AD5764	32-TQFP	f158764.6	43	0
Temperature Cycling (TC)[1]	JEDEC-STD-22, Method A104	-65C/+150C 1000cycles			f158764.5	43	0
					f158594.6	44	0
					f158188.3	44	0
					f158715.6	45	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.

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 in table 6. 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	Generic	Highest Pass Level	First Fail Level	Class
FICDM	32-TQFP	ANSI/ESD STM5.3.1-1999	1 Ohm, Cpkg	AD5764R	±1000V	-	C5
				AD5765	±1000V	-	C5
HBM	32-TQFP	ESD Assoc. STM5.1-2001	1.5 kOhm, 100pF	AD5764R	±1500V	±2000V	1C
				AD5765	±1500V	±2000V	1C

Latch-Up Test Results

Six samples of the AD5764R and AD5765 passed Latch-up testing at Ta=25°C per JEDEC Standard JESD78, Class I, Level A. All six devices passed.

Approvals

Reliability Engineer: Mark Forde
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 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/