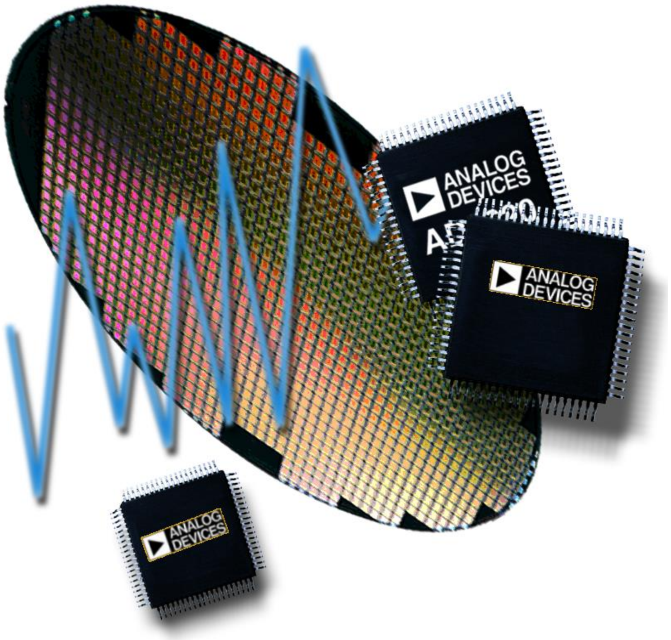

Reliability Report

Report Title: Qualification of ADI Camas Wafer Fab Bipolar Process for Non-Automotive Products

Report Number: 24165

Revision: A

Date: 30 May 2025

Summary

This report documents the reliability qualification requirements for the release of the BIPOLAR Process at Analog Devices Camas Wafer Fabrication Facility. The products listed below were selected to cover the technology being released.

The products are:

The AD624 is a high precision, low noise, instrumentation amplifier designed primarily for use with low level transducers.

The AD712 is a high speed, precision, monolithic operational amplifier. The very low offset voltage and offset voltage drift are the results of advanced laser wafer trimming technology.

The AD8221 is a gain programmable, high performance instrumentation amplifier. AD8221 maintains a minimum CMRR of 80 dB to 10 kHz for all grades at G = 1.

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics - Bipolar at ADI Camas

Product Characteristics	Product(s) to be qualified		
Generic/Root Part #	AD624	AD712	AD8221
Die Id	6W624DV*01 A	6W712DRV*01 A	6W8221ARV*01 A
Die Size (mm)	2.69 x 4.41	1.83 x 2.87	1.58 x 2.23
Wafer Fabrication Site	ADI-Camas	ADI-Camas	ADI-Camas
Wafer Fabrication Process	Bipolar	Bipolar	Bipolar
Die Substrate	Si	Si	Si
Metallization / # Layers	AlCu(0.5%)/1	AlCu(1.0%)/1	AlCu(1.0%)/2
Polyimide	Yes	Yes	Yes
Passivation	doped-oxide/SiN	doped-oxide/SiN	doped-oxide/SiN

Die/Fab Test Results

Table 1.1: Die/Fab Test Results – Bipolar at ADI Camas

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Operating Life (HTOL)	B1	JESD22-A108	125°C<Tj<135°C, Biased, 500 Hours	AD624	Q21497.1.HO1	0/77
					Q21497.2.HO2	0/77
					Q21497.3.HO3	0/77
				AD712[1]	Q21302.1.HO2_RES	0/77
					Q21302.2.HO3_RES	0/77
					Q21302.3.HO1_RES	0/77
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 500 Hours	AD624	Q21497.1.HS1	0/77
			150°C, 1000 Hours	AD712	Q21302.1.HS1_RES	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST)	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	AD712[1]	Q21302.1.HA2_RES	0/77
					Q21302.2.HA3_RES	0/77
					Q21302.3.HA1_RES	0/77
Unbiased HAST (UHST)	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	AD712[1]	Q21302.1.UH2_RES	0/77
					Q21302.2.UH3_RES	0/77
					Q21302.3.UH1_RES	0/77
Temperature Cycling (TC)	A4	JESD22-A104	-65°C/+150°C, 500 Cycles	AD624	Q21497.1.TC1	0/77
					Q21497.2.TC2	0/77
					Q21497.3.TC3	0/77
				AD712[1]	Q21302.1.TC2_RES	0/77
					Q21302.2.TC3_RES	0/77
					Q21302.3.TC1_RES	0/77

[1] These samples were subjected to preconditioning at MSL 1 with 3x reflow peak temp of 260°C prior to the start of the stress test

Package/Assembly Product Characteristics

Table 2.1: Package/Assembly Product Characteristics - 16-SBDIP at ANALOG DEVICES (ADPI)

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	AD624
Package	16-SBDIP
Body Size (mm)	21.34 x 7.87 x 3.56
Assembly Location	ADPI
Substrate Material	B20255-5B
Lid Shield Material	B21242-C
Die Attach	Henkel JM7000 conductive
Leadframe Material	N/A
Lead Finish	Au
Wire Bond Material/Diameter (mils)	B2012M-04_Aluminum / 1.25

Table 2.2: Package/Assembly Product Characteristics - 8-SOIC_N at ASE (AET)

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	AD712
Package	8-SOIC_N
Body Size (mm)	5.00 x 4.00 x 1.50
Assembly Location	ASE (AET)
MSL/Peak Reflow Temperature(°C)	MSL 1 / 260°C
Mold Compound	Hitachi CEL 9240HF10AK
Die Attach	Hitachi EN 4900GC conductive
Leadframe Material	Copper
Lead Finish	100 Sn
Wire Bond Material/Diameter (mils)	Heraeus AW7 4N Gold / 1.30

Package/Assembly Test Results

Table 3.1: Package/Assembly Product Characteristics - 16-SBDIP at ANALOG DEVICES (ADPI)

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Temperature Cycling (TC)	A4	JESD22-A104	-65°C/+150°C, 500 Cycles	AD624	Q21497.1.TC1	0/77
					Q21497.2.TC2	0/77
					Q21497.3.TC3	0/77

Table 3.2: Package/Assembly Product Characteristics - 8-SOIC_N at ASE (AET)

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Solder Heat Resistance (SHR)	A1	J-STD-020	MSL1	AD712	Q21302.1.SH2_RES	0/77
					Q21302.2.SH3_RES	0/77
					Q21302.3.SH1_RES	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	AD712	Q21302.1.HA2_RES	0/77
					Q21302.2.HA3_RES	0/77
					Q21302.3.HA1_RES	0/77
Unbiased HAST (UHST) [1]	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	AD712	Q21302.1.UH2_RES	0/77
					Q21302.2.UH3_RES	0/77
					Q21302.3.UH1_RES	0/77
Temperature Cycling (TC)[1]	A4	JESD22-A104	-65°C/+150°C, 500 Cycles	AD712	Q21302.1.TC2_RES	0/77
					Q21302.2.TC3_RES	0/77
					Q21302.3.TC1_RES	0/77

[1] These samples were subjected to preconditioning at MSL 1 with 3x reflow peak temp of 260°C prior to the start of the stress test

ESD and Latch-Up Test Results

Table 4: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class
FICDM	AD624	16-SBDIP	JS-002	1Ω, Cpkg	1000V	C3
	AD712	8-SOIC	JS-002	1Ω, Cpkg	1250V	C3
	AD8221	8-SOIC	JS-002	1Ω, Cpkg	1250V	C3
HBM	AD624	16-SBDIP	JS-001	1.5kΩ, 100pF	500V	1B
	AD712	8-SOIC	JS-001	1.5kΩ, 100pF	1500V	1C
	AD8221	8-SOIC	JS-001	1.5kΩ, 100pF	1000V	1C

Table 5: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-voltage	Temperature (T_A)	Class
JESD78	AD624	± 200 mA	± 22.5V	25 °C	I
JESD78	AD712	± 200 mA	± 22.5V	25 °C	I
JESD78	AD8221	± 200 mA	± 22.5V	25 °C	I

Approvals

Reliability Engineer: Eunice Dionisio