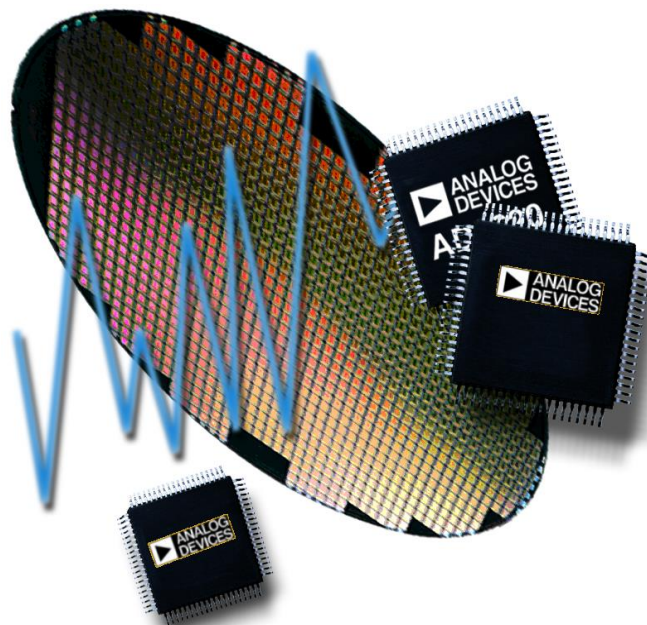




Reliability Report

Report Title:	Qualification of ADI Limerick Wafer Fab XF40 Process for Non-Automotive Products
Report Number:	24280
Revision:	A
Date:	24 June 2025

Summary

This report documents the reliability qualification requirements for the release of the XF40 wafer fabrication process for non-automotive products at Analog Devices Limerick Wafer Fabrication Facility. The products listed below were selected to cover the technology being released.

The products are:

The OP2177 is a high precision, dual op-amp featuring low offset voltage and drift, low input bias current, and low noise with minimal power consumption.

The AD623 is an integrated supply instrumentation amplifier which delivers rail-to-rail output swing on a single supply (3V to 12V).

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics – XF40 at ADLK

Product Characteristics	Product(s) to be qualified	
Generic/Root Part #	OP2177	AD623
Die Id	8YZ23 A	8YZ52 B
Die Size (mm)	1.48 x 1.37	1.07 x 1.17
Wafer Fabrication Site	ADLK	ADLK
Wafer Fabrication Process	XF40	XF40
Die Substrate	Si	Si
Metallization / # Layers	AlCu(0.5%)/3	AlCu(0.5%)/2
Polyimide	Yes	No
Passivation	doped-oxide/SiN	doped-oxide/SiN

Die/Fab Test Results

Table 1.1: Die/Fab Test Results – XF40 at ADLK

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	OP2177	Q21073.1.HO1_RES	0/77
					Q21073.2.HO2_RES	0/77
					Q21073.3.HO3_RES	0/77
				AD623	Q21074.1.HO1_RES ¹	0/77
					Q21074.3.HO(L2)_RES	0/77
					Q21074.2.HO2_RES ¹	0/77
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 500 Hours	OP2177	Q21073.1.HT1_RES	0/77
			150°C, 1000 Hours	AD623	Q21074.1.HT1_RES	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST)	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours ¹	OP2177	Q21073.1.HA1_RES	0/77
					Q21073.2.HA2_RES	0/77
					Q21073.3.HA3_RES	0/77
				AD623	Q21074.1.HA1_RES	0/77
					Q21074.2.HA2_RES	0/77
Unbiased HAST (UHST)	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours ¹	OP2177	Q21073.1.UH1_RES	0/77
					Q21073.2.UH2_RES	0/77
					Q21073.3.UH3_RES	0/77
				AD623	Q21074.1.UH1_RES	0/77
					Q21074.2.UH2_RES	0/77
Temperature Cycling (TC)	A4	JESD22-A104	-65°C/+150°C, 500 Cycles ¹	OP2177	Q21073.1.TC1_RES	0/77
					Q21073.2.TC2_RES	0/77
					Q21073.3.TC3_RES	0/77
				AD623	Q21074.1.TC1_RES	0/77
					Q21074.2.TC2_RES	0/77

¹These 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 - 8-MINI_SO at ASE (AET)

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	OP2177
Package	8-MINI_SO
Body Size (mm)	8.65 x 3.90 x 1.38
Assembly Location	ASE (AET)
MSL/Peak Reflow Temperature(°C)	MSL 1 / 260°C
Mold Compound	Sumitomo G700LY
Die Attach/Underfill/TIM	Hitachi EN 4900GC conductive
Leadframe Material	Copper
Lead Finish	100 Sn
Wire Bond Material/Diameter (mils)	Tanaka GPG-2 2N Gold / 0.80

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

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	AD623
Package	8-SOIC_N
Body Size (mm)	3.00 x 3.00 x 0.85
Assembly Location	ASE (AET)
MSL/Peak Reflow Temperature(°C)	MSL 1 / 260°C
Mold Compound	Hitachi CEL 9240HF10AK
Die Attach/Underfill/TIM	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 - 8-MINI_SO at ASE (AET)

Test Name	AEC #	Spec	Conditions	Generic	Lot #	Fail/SS
Solder Heat Resistance (SHR)	A1	J-STD-020	MSL1	OP2177	Q21073.1.SH1_RES	0/15
					Q21073.2.SH2_RES	0/15
					Q21073.3.SH3_RES	0/15
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	OP2177	Q21073.1.HA1_RES	0/77
					Q21073.2.HA2_RES	0/77
					Q21073.3.HA3_RES	0/77
Unbiased HAST (UHST) ¹	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	OP2177	Q21073.1.UH1_RES	0/77
					Q21073.2.UH2_RES	0/77
					Q21073.3.UH3_RES	0/77
Temperature Cycling (TC) ¹	A4	JESD22-A104	-65°C/+150°C, 500 Cycles	OP2177	Q21073.1.TC1_RES	0/77
					Q21073.2.TC2_RES	0/77
					Q21073.3.TC3_RES	0/77

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

Test Name	AEC #	Spec	Conditions	Generic	Lot #	Fail/SS
Solder Heat Resistance (SHR)	A1	J-STD-020	MSL1	AD623	Q21074.1.SH1_RES	0/15
					Q21074.3.SH(L2)_RES	0/15
					Q21074.2.SH2_RES	0/15
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	AD623	Q21074.1.HA1_RES	0/77
					Q21074.2.HA2_RES	0/77
Unbiased HAST (UHST) ¹	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	AD623	Q21074.1.UH1_RES	0/77
					Q21074.2.UH2_RES	0/77
Temperature Cycling (TC) ¹	A4	JESD22-A104	-65°C/+150°C, 500 Cycles	AD623	Q21074.1.TC1_RES	0/77
					Q21074.2.TC2_RES	0/77

¹These 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	OP2177	8-MINI_SO	JS-002	1 Ω , Cpkg	1250V	C3
	AD623	8-SOIC	JS-002	1 Ω , Cpkg	1250V	C3
HBM	OP2177	8-MINI_SO	JS-001	1.5k Ω , 100pF	1500V	1C
	AD623	8-SOIC	JS-001	1.5k Ω , 100pF	4000V	3A

Latch Up Test Result

Latch-up testing was not performed since XF40 is a dielectrically isolated wafer fabrication process that provides inherent latch-up immunity.

Approvals

Reliability Engineer: Jenny Lou Sagisi