



Reliability Report

Report Title: AD242XW Automotive Grade 2
Testing for Analog Devices Beaverton
Wafer Fab

Report Number: 20034

Revision: C

Date: 4 January 2025

Summary

This report documents the results of Automotive Grade 2 qualification tests performed on a sample of AD2428W devices fabricated at Analog Devices Wafer Fab in Beaverton, Oregon.

AECQ100 Qualification Test Methods and Summary

AEC Test Group	AEC Stress Test Name	Abbreviation	AEC Test #	Reference
Group A ACCELERATED ENVIRONMENT STRESS TESTS	Preconditioning	PC	A1	Table 2 and Table 4
	Temperature Humidity Bias or Biased-HAST	THB or HAST	A2	
	Autoclave or Unbiased HAST or Temperature Humidity (without Bias)	AC, UHST, or TH	A3	
	Temperature Cycle	TC	A4	
	Power Temperature Cycling	PTC	A5	
	High Temperature Storage Life	HTSL	A6	
Group B ACCELERATED LIFETIME SIMULATION TESTS	High Temperature Operating Life	HTOL	B1	Table 2
	Early Life Failure Rate	ELFR	B2	
	NVM Endurance, Data Retention, and Operational Life	EDR	B3	
Group C PACKAGE ASSEMBLY INTEGRITY TESTS	Wire Bond Shear	WBS	C1	• Tests C3-6 are qualified and controlled with inline monitors and may be viewed on-site at Analog Devices.
	Wire Bond Pull Strength	WBP	C2	
	Solderability	SD	C3	
	Physical Dimensions	PD	C4	
	Solder Ball Shear	SBS	C5	
	Lead Integrity	LI	C6	
Group D DIE FABRICATION RELIABILITY TESTS	Electromigration	EM	D1	Die Fabrication Reliability data may be viewed on-site at Analog Devices.
	Time Dependent Dielectric Breakdown	TDDDB	D2	
	Hot Carrier Injection	HCI	D3	
	Negative Bias Temperature Instability	BTI	D4	
	Stress Migration	SM	D5	
Group E ELECTRICAL VERIFICATION TESTS	Pre- and Post-Stress Electrical Test	TEST	E1	Table 5 and Table 6
	Electrostatic Discharge Human Body Model	HBM	E2	
	Electrostatic Discharge Charged Device Model	CDM	E3	
	Latch-Up	LU	E4	• For Tests E5, E6 and E7, ADI New Product Yield Analysis Testing Guidelines meet AEC Q100 requirements. • Results for Tests E7-E11 are available as applicable on a case by case basis. • Test E12 results may be viewed on-site at Analog Devices
	Electrical Distributions	ED	E5	
	Fault Grading	FG	E6	
	Characterization	CHAR	E7	
	Electromagnetic Compatibility	EMC	E9	
	Short Circuit Characterization	SC	E10	
	Soft Error Rate	SER	E11	
	Lead (Pb) Free	LF	E12	
	Group F DEFECT SCREENING TESTS	Process Average Test	PAT	
Statistical Bin/Yield Analysis		SBA	F2	
Group G CAVITY PACKAGE INTEGRITY TESTS	Mechanical Shock	MS	G1	<Applicable only for Cavity Packages>
	Variable Frequency Vibration	VFV	G2	
	Constant Acceleration	CA	G3	
	Gross/Fine Leak	GFL	G4	
	Package Drop	DROP	G5	
	Lid Torque	LT	G6	
	Die Shear	DS	G7	
	Internal Water Vapor	IWV	G8	

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics – 0.18 μ m BCDMOS

Product Characteristics	Products Qualified By this Report	Qualification Vehicle
Generic/Root Part #	AD2426WCCSZ-RL,	AD2428W
Die Id	AD2427WCCSZ,	2428W-B0CJ0X0F3
Die Size (mm)	AD2427WCCSZ-RL,	3.0900000 x 3.0900000
Wafer Fabrication Site	AD2428WCCSZ,	I_ADBN1B08
Wafer Fabrication Process	AD2428WCCSZ-RL,	0.18 μ m BCDMOS
Die Substrate	AD2426BCPZ,	Si
Metallization / # Layers	AD2426KCPZ,	AlCu(0.5%)/6
Polyimide	AD2427BCPZ,	Yes
Passivation	AD2427KCPZ, AD2428BCPZ, and AD2428KCPZ	undoped-oxide/SiN

Die/Fab Test Results
Table 2: Die/Fab Test Results - 0.18 μ m BCDMOS at ADI-Beaverton

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Early Life Failure Rate (ELFR)	B2	AEC Q100-008	T _A = 105°C, 48 Hours	AD2428W	Q20034.1.15A	0/200	RH
					Q20034.1.15B	0/200	RH
					Q20034.1.15C	0/200	RH
					Q20034.1.15D	0/200	RH
					Q20034.2.6A	0/200	RH
					Q20034.2.6B	0/200	RH
			Q20034.2.6C		0/200	RH	
			Q20034.2.6D		0/200	RH	
			T _A = 125°C, 48 Hours		Q20034.1.1A	0/217	RH
					Q20034.1.1B	0/216	RH
					Q20034.1.1C	0/216	RH
					Q20034.1.1D	0/151	RH
Q20034.1.10	0/77	RHC					
Q20034.2.1	0/77	RHC					
High Temperature Operating Life (HTOL)	B1	JESD22-A108	T _A = 105°C, 1,000 Hours	AD2428W	Q20034.1.1	0/77	RHC
High Temperature Operating Life (HTOL) ¹			T _A = 105°C, 1,000 Hours				
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 1,000 Hours	AD2428W	Q20034.1.2	0/45	RH
Highly Accelerated Stressed Test (HAST) ¹	A2	JESD22-A110	130°C, 85%RH, 33.3 psia, Biased, 96 Hours	AD2428W	Q20034.1.6	0/77	RH
					Q20034.1.11	0/77	RH
					Q20034.2.2	0/77	RH

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

Package/Assembly Product Characteristics

Table 3: Package/Assembly Product Characteristics - 32-LFCSP_SS at UTAC (UT2)

Product Characteristics	Product Qualified by This Report	Qualification Vehicle
Generic/Root Part #	AD2426WCCSZ-RL,	AD2428W
Package	AD2427WCCSZ,	32-LFCSP_SS
Body Size (mm)	AD2427WCCSZ-RL,	5.00 x 5.00 x 0.75
Assembly Location	AD2428WCCSZ,	UTAC (UT2)
MSL/Peak Reflow Temperature(°C)	AD2428WCCSZ-RL,	3 / 260°C
Mold Compound	AD2426BCPZ,	Sumitomo G700LTD
Die Attach/Underfill/TIM	AD2426KCPZ,	Ablestik 8600 conductive
Leadframe Material	AD2427BCPZ,	Copper
Lead Finish	AD2427KCPZ,	Matte Sn
Wire Bond Material/Diameter (mils)	AD2428BCPZ, and AD2428KCPZ	GMG 4N Gold / 1.00

Package/Assembly Test Results
Table 4: Package/Assembly Test Results - LFCSP_SS at UTAC (UT2)

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 1,000 Hours	AD2428W	Q20034.1.2	0/45	RH
Solder Heat Resistance (SHR)	A1	J-STD-020	MSL-3	AD2428W	Q20034.1.14	0/11	R
					Q20034.1.3	0/11	R
					Q20034.2.5	0/11	R
Temperature Cycling (TC) ¹	A4	JESD22-A104	-65°C/+150°C, 1,000 Cycles	AD2428W	Q20034.1.4	0/77	RH
					Q20034.1.12	0/77	RH
					Q20034.2.3	0/77	RH
Unbiased HAST (UHST) ¹	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	AD2428W	Q20034.1.13	0/77	R
					Q20034.1.5	0/77	R
					Q20034.2.4	0/77	R
Highly Accelerated Stressed Test (HAST) ¹	A2	JESD22-A110	130°C, 85%RH, 33.3 psia, Biased, 96 Hours	AD2428W	Q20034.1.6	0/77	RH
					Q20034.1.11	0/77	RH
					Q20034.2.2	0/77	RH
Wire Bond Pull	A4	MIL-STD-883, M2011	Post-TCT	AD2428W	Q20034.1.15	0/5	-
					Q20034.2.6	0/5	-
					Q20034.3.1	0/5	-

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

ESD and Latch-Up Test Results

Table 5: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class	eTest Temp
FICDM	AD2428W	32-LFCSP_SS	AEC Q100-011	1Ω, Cpkg	±1250V	C3	RH
HBM	AD2428W	32-LFCSP_SS	AEC-Q100-002	1.5kΩ, 100pF	±2000V	2	RH

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T _A)	Class	eTest Temp
JESD78	AD2428W	+200mA, -200mA	+2.97/5.445/12.0V	105°C	II	RH

Approvals

Reliability Engineer: Denis Belisle