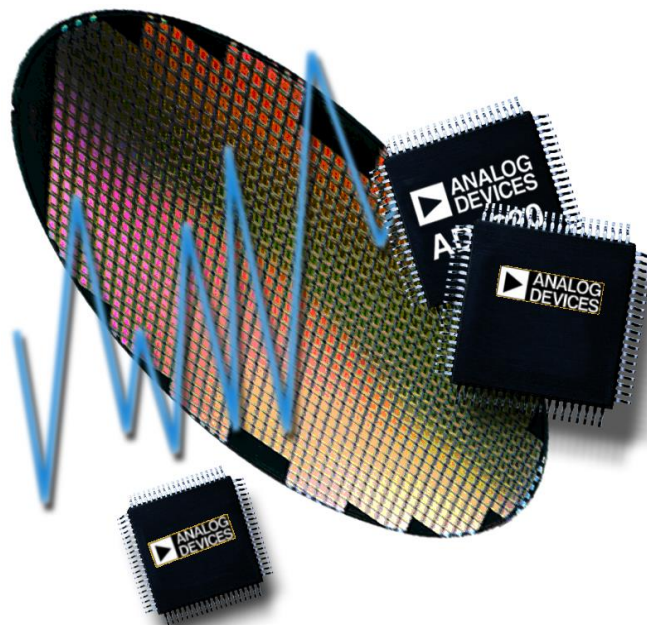




Reliability Report

Report Title: AD243x (AD2435) Demeter Copper
(Cu) Wire Assembly at SC3
Qualification

Report Number: 19515

Revision: B

Date: 14 May 2025

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the AD2431W, AD2432W, AD2433W, and AD2435W product in a 48-LFCSP package with copper bond wires at Assembly Site STATS ChipPAC China Plant 3 (SC3). The AD243xW is an Automotive Audio Bus (A2B®) product that provides a multichannel, I2S/TDM link over distances of up to 15m between nodes. It embeds bidirectional synchronous pulse-code modulation (PCM) data (for example, digital audio), clock, and synchronization signals onto a single unshielded twisted pair (UTP) differential cable.

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 and Table 4
	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	• Test C2 (and C1 for Cu Wire) are shown in Table 4. • 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	
	Electrical Distributions	ED	E5	• 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
	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	F1	ADI New Product Yield Analysis Testing Guidelines meet AECQ100 Requirements.
	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 – 0.18µm BCDMOS

Product Characteristics	Products to be qualified	Products used for Substitution Data	
Generic/Root Part #	AD243xW	AD2410W	AD70-063Z
Die Id	TMMS27 E	TMEU79 A	TMLW24 A/8YU24 A
Die Size (mm)	3.68 x 2.93	3.09 x 3.09	3.92 x 6.67
Wafer Fabrication Site	TSMC Fab-8B	TSMC Fab-8B	TSMC Fab-8B/ADI-Limerick
Wafer Fabrication Process	0.18µm BCDMOS	0.18µm BCDMOS	0.18µm BCDMOS
Die Substrate	Si	Si	Si
Metallization/# Layers	AlCu(0.5%)/6	AlCu(0.5%)/5	AlCu(0.5%)/6
Polyimide	Yes	Yes	Yes
Passivation	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN

Die/Fab Test Results

Table 2: Die/Fab Test Results – 0.18µm BCDMOS at TSMC Fab-8B

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Early Life Failure Rate (ELFR)	B2	AEC-Q100-008	T _a = 95°C, T _j = 125°C, 48 Hours	AD2410W	Q13204.23	0/2010	RH ²
			T _a = 105°C, T _j = 130°C, 48 Hours	AD70-063Z	Q16277.12	0/50	R
					Q16277.11	0/46	R
					Q16277.10	0/150	R
					Q16277.9	0/120	R
					Q16277.8	0/125	R
					Q16277.7	0/125	R
High Temperature Operating Life (HTOL) ¹	B1	JESD22-A108	T _a = 87°C, T _j = 125°C, Biased, 1,000 Hours	AD2435W	Q14813.23	0/77	RHC ³
					Q14813.24	0/77	RHC ³
					Q14813.25	0/77	RHC ³

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.

² Pre- and post-stress electrical test was performed at room and hot temperatures.

³ Pre- and post-stress electrical test was performed at cold, room, and hot temperatures.

Package/Assembly Product Characteristics

Table 3: Package/Assembly Product Characteristics – 48-LFCSP at STATS ChipPAC China Plant 3 (SC3)

Product Characteristics	Products to be qualified
Generic/Root Part #	AD243xW
Package	48-LFCSP
Body Size (mm)	7.00 x 7.00 x 0.75
Assembly Location	STATS ChipPAC China Plant 3 (SC3)
MSL/Peak Reflow Temperature(°C)	3/260°C
Mold Compound	Sumitomo G700LA
Die Attach/	Hitachi EN 4900GC conductive
Leadframe Material	Copper
Lead Finish	Matte Sn
Wire Bond Material/Diameter (mils)	PdCuAu 3N/0.80

Package/Assembly Test Results

Table 4: Package/Assembly Test Results - LFCSP at STATS ChipPAC China Plant 3 (SC3)

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	AD2435W	Q19515.1.4	0/45	RH ²
					Q19515.2.4	0/45	RH ²
					Q19515.3.4	0/45	RH ²
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, P192	AD2435W	Q19515.1.1	0/77	RH ²
					Q19515.2.1	0/77	RH ²
					Q19515.3.1	0/77	RH ²
Solder Heat Resistance (SHR)	A1	J-STD-020	MSL-3	AD2435W	Q19515.1.3	0/11	R ³
					Q19515.2.3	0/11	R ³
					Q19515.3.3	0/11	R ³
Temperature Cycling (TC) ¹	A4	JESD22-A104	-55°C/+125°C, 2,000 Cycles	AD2435W	Q19515.1.2	0/77	RH ²
					Q19515.2.2	0/77	RH ²
					Q19515.3.2	0/77	RH ²
Unbiased HAST (UHST) ¹	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	AD2435W	Q19515.1.5	0/77	R ³
					Q19515.2.5	0/77	R ³
					Q19515.3.5	0/77	R ³

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.

² Pre- and post-stress electrical test was performed at room and hot temperatures.

³ Pre- and post-stress electrical test was performed at room temperature.

Approvals

Reliability Engineer: Eric Marks

Appendix

AEC -Q006 – Qualification Requirements for Products using Cu Wire Interconnections

Step	Qualification Step / Stress Test	TC (-65°C to 150°C) JESD22-A104	THB (85°C/85% RH) JESD22A-101	PTC (-40°C to 125°C) JESD22-A104	HTSL (150°C) JESD22-A103
1	Initial Sampling (T0) ¹	Sample Sizes as required			
2	CSAM @ T0	Sample Sizes as required			
3	Preconditioning to MSLx	3x77	3x77	1x45	--
4	CSAM after PC	3x22	3x22	1x22	--
5	ATE Test ¹	3x77	3x77	1x45	3x45
6	Stress 1x	3x77	3x77	1x45	3x45
7	ATE Test ¹	3x77	3x77	1x45	3x45
8	CSAM post-1x Stress	3x22	3x22	--	--
9a	Ball + Stitch/Wedge Pull	3x3	3x3	--	--
9b	Ball Shear	3x3	3x3	--	--
10	Cross-Section	3x1	3x1	--	3x1
11	Stress 2x	3x70	3x70	1x45	3x44
12	ATE Test ¹	3x70	3x70	1x45	3x44
13	CSAM post-2x Stress	3x22	3x22	--	--
14a	Ball + Stitch/Wedge Pull	3x2	3x2	--	--
14b	Ball Shear	3x2	3x2	--	--
15	Cross-Section	3x1	3x1	--	3x1

¹ This footnote should highlight the ATE temperature used.

REL Lot number		Q19515.1.2	Q19515.1.1	Q19515.1.4	Q19515.2.2	Q19515.2.1	Q19515.2.4	Q19515.3.2	Q19515.3.1	Q19515.3.4
AEC#	Test	TC	THB	HTS	TC	THB	HTS	TC	THB	HTS
1	Initial Sampling (T0) ¹	0/77	0/77	0/45	0/77	0/77	0/45	0/77	0/77	0/45
2	CSAM @ T0	0/22	0/22	--	0/22	0/22	--	0/22	0/22	--
3	Preconditioning to MSL 3	0/77	0/77	--	0x77	0x77	--	0x77	0x77	--
4	CSAM after PC	0/22	0/22	--	0/22	0/22	--	0/22	0/22	--
5	ATE Test ¹	0x77	0x77	0/45	0x77	0x77	0/45	0x77	0x77	0/45
6	Stress 1x	0x77	0x77	0/45	0x77	0x77	0/45	0x77	0x77	0/45
7	ATE Test ¹	0x77	0x77	0/45	0x77	0x77	0/45	0x77	0x77	0/45
8	CSAM post-1x stress	0/22	0/22	--	0/22	0/22	--	0/22	0/22	--
9a	Ball + Stitch/Wedge Pull	0/3	0/3	--	0/3	0/3	--	0/3	0/3	--
9b	Ball Shear	0/3	0/3	--	0/3	0/3	--	0/3	0/3	--
10	Cross-section	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
11	Stress 2x	0/70	0/70	0/44	0/70	0/70	0/44	0/70	0/70	0/44
12	ATE Test ¹	0/70	0/70	0/44	0/70	0/70	0/44	0/70	0/70	0/44
13	CSAM post-2x Stress	0/22	0/22	--	0/22	0/22	--	0/22	0/22	--
14a	Ball + Stitch/Wedge Pull	0/2	0/2	--	0/2	0/2	--	0/2	0/2	--
14b	Ball Shear	0/2	0/2	--	0/2	0/2	--	0/2	0/2	--
15	Cross-section	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

¹These samples were tested at the ATE in Ambient and Hot temperature.