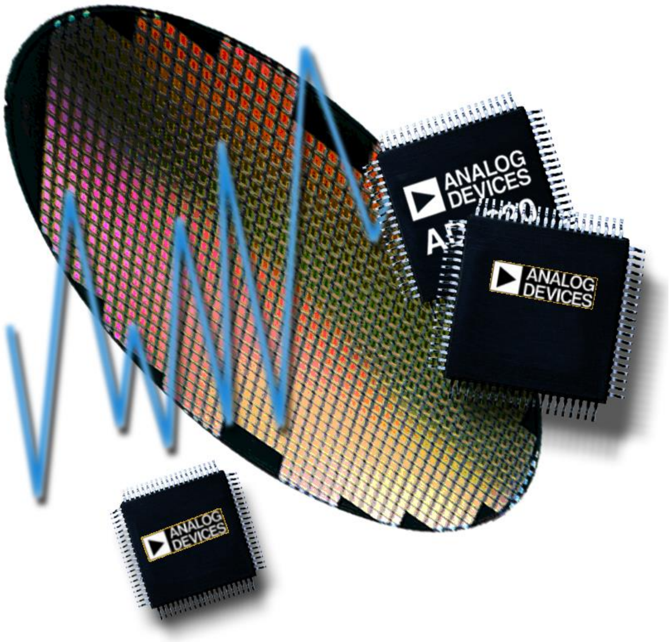

Reliability Report

Report Title: LTC3302 Die Revision Automotive Grade 1 Qualification

Report Number: 23629

Revision: A

Date: 28 March 2025

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the LTC3302 product with a die revision for metal mask change in a 12-LFCSP_SS package. The LTC3302 is a 5V, 2A Synchronous Step-Down Regulator.

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	C1, C2 are only applicable for wire bond package. C5 is only applicable for BGA package. C3, C4 and C6 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	TDDB	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- 0.25um BCDMOS

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data	
Generic/Root Part #	LTC3302	LTC3304	LTC3310S
Die Id	TMQK34 / B	TMPF86 / C	TMIQ98
Die Size (mm)	1.68 x 1.22	1.68 x 1.68	1.65 x 2.41
Wafer Fabrication Site	TSMC Fab8	TSMC Fab8	TSMC Fab8
Wafer Fabrication Process	0.25um BCDMOS	0.25um BCDMOS	0.25um BCDMOS
Die Substrate	Si	Si	Si
Metallization / # Layers	AlCu/5	AlCu/5	AlCu/5
Polyimide	No	No	No
Passivation	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN

Die/Fab Test Results

Table 2: Die/Fab Test Results - 0.25µm BCDMOS at TSMC Fab8

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Early Life Failure Rate (ELFR)	B2	AEC Q100-008	Ta=150°C, Tj=152°C, Biased, 48 Hours	LTC3310S	971845.1	0/800	RH
					971846.1	0/800	RH
					971847.1	0/800	RH
High Temperature Operating Life (HTOL)	B1	JESD22-A108	Ta=125°C, Tj=126°C, Biased, 1,000 Hours	LTC3302	Q19103.1.HO	0/77	RCH
				LTC3304	Q18124.1HTOL	0/77	RCH
			Ta=150°C, Tj=152°C, Biased, 1,000 Hours	LTC3310S	971845.1	0/77	RCH
					971846.1	0/77	RCH
					971847.1	0/77	RCH
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 1,000 Hours	LTC3304	Q18124.1HTS	0/45	RH
			150°C, 2,000 Hours	LTC3310S	EO9302F.HTS	0/45	RH
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LTC3304	Q18124.HAST1	0/77	RH
					Q18124.HAST2	0/77	RH
					Q18124.HAST3	0/77	RH
				LTC3310S	EO9302K.BHAST	0/77	RH
					EO9303K.BHAST	0/77	RH
					EO9304K.BHAST	0/77	RH

[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 3: Package/Assembly Product Characteristics - 12-LFCSP_SS at UTAC Bangkok

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data	
Generic/Root Part #	LTC3302	LTC3303	LTC3304
Package	12-LFCSP_SS	12-LFCSP_SS	12-LFCSP_SS
Body Size (mm)	2.00 x 2.00 x 0.75	2.00 x 2.00 x 0.75	2.00 x 2.00 x 0.75
Assembly Location	UTAC Bangkok	UTAC Bangkok	UTAC Bangkok
MSL/Peak Reflow Temperature(°C)	1 / 260	1 / 260	1 / 260
Mold Compound	Sumitomo G700LTDG	Sumitomo G700LTDG	Sumitomo G700LTDG
Leadframe Material	Copper	Copper	Copper
Lead Finish	100Sn	100Sn	100Sn

Package/Assembly Test Results

Table 4: Package/Assembly Test Results - LFCSP_SS at UTAC Bangkok

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	LTC3304	Q18124.1HTS	0/45	RH
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LTC3304	Q18124.HAST1	0/77	RH
					Q18124.HAST2	0/77	RH
					Q18124.HAST3	0/77	RH
Solder Heat Resistance (SHR)	A1	J-STD-020	MSL-1	LTC3303	Q19084.1	0/30	RH
				LTC3304	Q18124.1	0/11	RH
					Q18124.2SHR	0/11	RH
Temperature Cycling (TC)[1]	A4	JESD22-A104	-65°C/+150°C, 500 Cycles	LTC3304	Q18124.1TC	0/77	RH
					Q18124.2	0/77	RH
					Q18124.2TC	0/77	RH
Unbiased HAST (UHST)[1]	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	LTC3304	Q18124.1UHAST	0/77	R
					Q18124.2UHAST	0/77	R
					Q18124.3	0/77	R

[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 5: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class	eTest Temp
FICDM	LTC3302	12-LFCSP_SS	JS-002	1Ω, Cpkg	±1250V	C3	RH
HBM	LTC3302	12-LFCSP_SS	ESDA/JEDEC JS-001	1.5kΩ, 100pF	±4000V	3A	RH

Table 5: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T_A)	Class	eTest Temp
JESD78	LTC3302	+200mA, -200mA	+8.25V	125°C	II	RH

Approvals

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