



# ***Reliability Report***

**Report Title:** LTC7103 and LTC7103-1 Automotive Grade 0 Die Revision Qualification

**Report Number:** 20757

**Revision:** A

**Date:** 30 April 2025

## Summary

This report documents the successful completion of the reliability qualification requirements for the release of the LTC7103 and LTC7103-1 products in a 36-LFCSP package. The LTC7103 is a 105V, 2.3A Low EMI Synchronous Step-Down Regulator with PassThru and LTC7103-1 is a 105V, 2.3A Low EMI Synchronous Step-Down Regulator with Fast Current Programming.

**AECQ100 Qualification Test Methods and Summary**

AEC Test Group	AEC Stress Test Name	Abbreviation	AEC Test#	Reference
<b>Group A</b> ACCELERATED ENVIRONMENT STRESS TESTS	Preconditioning	PC	A1	<a href="#">Table 2</a> , and <a href="#">Table 4</a>
	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	
<b>Group B</b> ACCELERATED LIFETIME SIMULATION TESTS	High Temperature Operating Life	HTOL	B1	<a href="#">Table 2</a> , and <a href="#">Table 4</a>
	Early Life Failure Rate	ELFR	B2	
	NVM Endurance, Data Retention, and Operational Life	EDR	B3	
<b>Group C</b> PACKAGE ASSEMBLY INTEGRITY TESTS	Wire Bond Shear	WBS	C1	<ul style="list-style-type: none"> <li>• Test C2 (and C1 for Cu Wire) are shown in <a href="#">Table 4</a>.</li> <li>• Tests C3-6 are qualified and controlled with inline monitors and may be viewed on-site at Analog Devices.</li> </ul>
	Wire Bond Pull Strength	WBP	C2	
	Solderability	SD	C3	
	Physical Dimensions	PD	C4	
	Solder Ball Shear	SBS	C5	
	Lead Integrity	LI	C6	
<b>Group D</b> 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	
<b>Group E</b> ELECTRICAL VERIFICATION TESTS	Pre- and Post-Stress Electrical Test	TEST	E1	<a href="#">Table 5</a> and <a href="#">Table 6</a> <ul style="list-style-type: none"> <li>• For Tests E5, E6 and E7, ADI New Product Yield Analysis Testing Guidelines meet AEC Q100 requirements.</li> <li>• Results for Tests E7-E11 are available as applicable on a case by case basis.</li> <li>• Test E12 results may be viewed on-site at Analog Devices</li> </ul>
	Electrostatic Discharge Human Body Model	HBM	E2	
	Electrostatic Discharge Charged Device Model	CDM	E3	
	Latch-Up	LU	E4	
	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	
	<b>Group F</b> DEFECT SCREENING TESTS	Process Average Test	PAT	
Statistical Bin/Yield Analysis		SBA	F2	
<b>Group G</b> 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- 0.6um BCDMOS – ADI-Camas**

Product Characteristics	Product(s) to be qualified		Product(s) used for Substitution Data		
Generic/Root Part #	LTC7103	LTC7103-1	LTC3639	LTC3871	LTC7000
Die Id	7103B	7103B-1	3639B	3871	7000
Die Size (mm)	2.74 x 3.15	2.74 x 3.15	2.69 x 1.65	2.82 x 2.67	1.78 x 1.57
Wafer Fabrication Site	ADI-Camas	ADI-Camas	ADI Camas	ADI Camas	ADI Camas
Wafer Fabrication Process	0.6um BCDMOS	0.6um BCDMOS	0.6um BCDMOS	0.6um BCDMOS	0.6um BCDMOS
Die Substrate	Si	Si	Si	Si	Si
Metallization / # Layers	AlCu/3	AlCu/3	AlCu/3	AlCu/3	AlCu/3

**Die/Fab Test Result**
**Table 2: Die/Fab Test Results - 0.6um BCDMOS at ADI-Camas**

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp			
Early Life Failure Rate (ELFR)	B2	AEC-Q100-008	Ta=150C, Tj=154C, Biased, 48 Hours	LTC3639	Z52442.ELFR	0/800	RH			
					Z52464.ELFR	0/800	RH			
					Z52502.ELFR	0/800	RH			
			Ta=150C, Tj=159C, Biased, 48 Hours	LTC7000	Z45229.1C_ELF	0/800	RH			
					Z45296.1C_ELF	0/800	RH			
					Z45352.1C_ELF	0/800	RH			
High Temperature Operating Life (HTOL)	B1	JESD22-A108	Ta=150C, Tj= 150C, Biased, 1,000 Hours	LTC7103	Q20757.1.HO-Direv	0/77	RCH			
					Ta=150C, Tj=152C, Biased, 1,000 Hours	LTC3871	Z52576.1a.HTOL	0/77	RHC	
							Z52577.1a.HTOL	0/77	RHC	
			Z52675.1a.HTOL	0/77			RHC			
			Ta=150C, Tj= 159C, Biased, 1,000 Hours	LTC7000	Z45229.1	0/77	RHC			
					Z45296.1	0/77	RHC			
					Z45352.1	0/77	RHC			
			Ta=150C, Tj=154C, Biased, 1,000 Hours	LTC3639	Z52442.HTOL	0/77	RHC			
					Z52464.HTOL	0/77	RHC			
					Z52502.HTOL	0/77	RHC			
			High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 2,000 Hours	LTC3639	Z52464.HTS	0/45	RH
							LTC3871	Z52675.HTS	0/45	RH
LTC7000	Z45229.HTS	0/45					RH			
Highly Accelerated Temperature and Humidity Stress Test (HAST) <sup>1</sup>	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LTC3639	Z52442.JHAST	0/77	RH			
					Z52464.JHAST	0/77	RH			
					Z52502.JHAST	0/77	RH			
				LTC3871	Z52576.JHAST	0/77	RH			
					Z52675.JHAST	0/77	RH			
					Z52577.JHAST	0/77	RH			
			130C 85%RH 33.3 psia, Biased, 96 Hours	LTC7000	Z45229.JHAST	0/77	RH			
					Z45296.JHAST	0/77	RH			
					Z45352.JHAST	0/77	RH			

<sup>1</sup> 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 - LFCSP at UTAC**

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data						
		LTC7818	LT8390	LTC3374A	LTC3859AL	LT8708	LTC7103	LTC7802
Generic/Root Part #	LTC7103 and LTC7103-1	LTC7818	LT8390	LTC3374A	LTC3859AL	LT8708	LTC7103	LTC7802
Package	36-LFCSP	40-LFCSP	28-LFCSP	38-LFCSP	38-LFCSP	40-LFCSP	36-LFCSP	28-LFCSP_SS
Body Size (mm)	5.00 x	6.00 x	4.00 x	5.00 x	5.00 x	5.00 x	5.00 x	4.00 x
	6.00 x	6.00 x	5.00 x	7.00 x	7.00 x	8.00 x	6.00 x	5.00 x
	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Assembly Location	UTAC	UTAC	UTAC	UTAC	UTAC	UTAC	UTAC	UTAC
MSL/Peak Reflow Temperature(°C)	1 / 260°C	1 / 260°C	1 / 260°C	1 / 260°C	1 / 260°C	1 / 260°C	1 / 260°C	1 / 260°C
Mold Compound	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD
Die Attach	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T
Leadframe Material	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper
Lead Finish	100 Sn	100 Sn	100 Sn	100 Sn	100 Sn	100 Sn	100 Sn	100 Sn
Wire Bond Material/Diameter (mils)	Gold / 1.0	Gold /1.0	Gold / 1.0	Gold / 1.0	Gold / 1.0	Gold / 1.0	Gold / 1.0	Gold / 1.0

**Package/Assembly Test Results**
**Table 4: Package/Assembly Test Results - LFCSP at UTAC**

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp				
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 2,000 Hours	LT8390	Q17464.1HTS	0/45	RH				
				LTC7103	Q20945.1.HSVANGUARD	0/45	RH				
				LTC7802	Q17135.1HTS	0/45	RH				
Highly Accelerated Temperature and Humidity Stress Test (HAST) <sup>1</sup>	A2	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LTC3859AL	Z51542.JHAST	0/77	RH				
					Z51545.JHAST	0/77	RH				
					Z51778.1a.JHAST	0/77	RH				
				LTC7103	Q20945.1.HA2VANGUARD	0/77	RH				
					Q20945.2.HA3VANGUARD	0/77	RH				
					Q20945.3.HA1VANGUARD	0/77	RH				
				LTC7818	EO9507K.BHAST	0/77	RH				
					Q16429.HASTREDO	0/77	RH				
					Q18097.16.PC.HAST	0/77	RH				
Unbiased HAST (UHST) <sup>1</sup>	A3	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	LTC3859AL	Z51542.JUHAST	0/77	R				
					Z51545.JUHAST	0/77	R				
					Z51778.1a.JUHAST	0/77	R				
				LTC7808	Q20914.2.UH1	0/77	R				
					Q20914.2.UH2	0/77	R				
					Q20914.2.UH3	0/77	R				
				LTC7802	Q17135.1UHAST	0/77	R				
				Autoclave (AC) <sup>1</sup>		JESD22-A102	121C 100%RH 33.3 psia, 168 Hours	LTC7818	EO9477A.PCT	0/77	R
									EO9507A.PCT	0/77	R
Temperature Cycling (TC) <sup>1</sup>	A4	JESD22-A104	65°C/+150°C, 2,000 Cycles	LTC3374A	1039825.2.JTC	0/77	RH				
				LTC3859AL	Z51542.JTC	0/77	RH				
					Z51545.JTC	0/77	RH				
					Z51778.1a.JTC	0/77	RH				
				LT8390	Q17464.1TC	0/77	RH				
			LTC7802	Q17135.1TC	0/77	RH					
			-55°C/+150°C, 1,500 Cycles	LTC7808	Q20914.1.TC1	0/77	RH				
					Q20914.2.TC2	0/77	RH				
					Q20914.3.TC3	0/77	RH				
Wire Bond Pull- Post TCT	C2	MIL-STD-883, M2011	3gf	LTC7808	Q20914.1.WP1	0/5	N/A				
					Q20914.2.WP2	0/5	N/A				
					Q20914.3.WP3	0/5	N/A				

<sup>1</sup> 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	LTC7103	36-LFCSP	JS-002	1Ω, Cpkg	±1250V	C3	RH
HBM	LTC7103	36-LFCSP	JS-001	1.5kΩ, 100pF	±4000V	3A	RH

**Table 6: Latch Up Test Result**

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T <sub>A</sub> )	Class	eTest Temp
JESD78	LTC7103	+200mA, -200mA	+7/100/43V	150°C	II	RH

## Approvals

Reliability Engineer: Marlo De Guzman