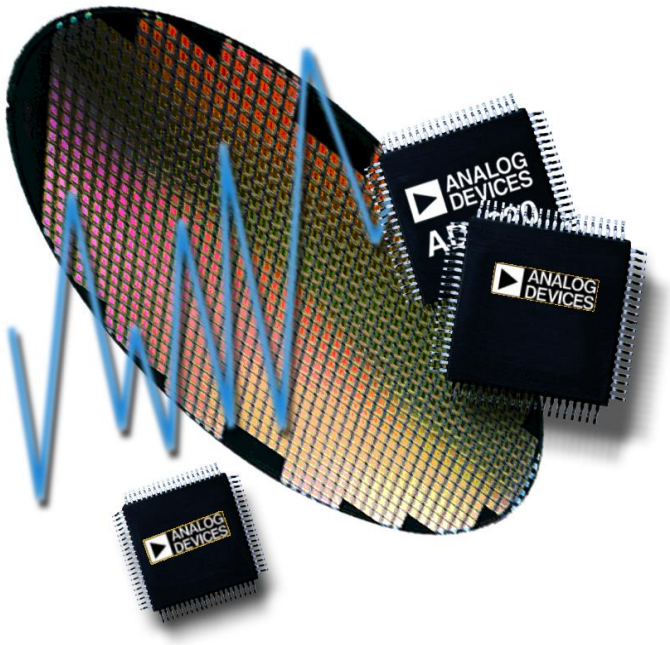

Reliability Report

Report Title: LTC7825 Assembly Process Change Qualification

Report Number: 20412

Revision: A

Date: 8 February 2024

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the LTC7825 product in a 28-LGA package. This reliability report addresses the LTC7825 die thickness change from 450um to 200um. The LTC7825 is a Fully Integrated 24V/10A DC/DC Converter.

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics- 0.18um DMOS

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data				
Generic/Root Part #	LTC7825	LTC7825-1	LTC7050	LTC4246	LTC4249	AD4630-24
Die Id	7825	7825	7050	4246	4249	TMMP79
Die Size (mm)	3.45 x 4.50	3.45 x 4.50	7.30 x 3.80	2.68 x 2.83	2.59 x 2.29	3.09 x 3.17
Wafer Fabrication Site	TSMC Fab 8B	TSMC Fab 8B	TSMC Fab 8B	TSMC Fab 8B	TSMC Fab 8B	TSMC Fab 8B
Wafer Fabrication Process	0.18um DMOS	0.18um DMOS	0.18um DMOS	0.18um DMOS	0.18um DMOS	0.18um DMOS
Die Substrate	Si	Si	Si	Si	Si	Si
Metallization / # Layers	AlCu / 4	AlCu / 4	Al / 4	AlCu / 5	AlCu / 5	AlCu / 6
Polyimide	No	No	No	No	No	No
Passivation	oxide/SiN	oxide/SiN	oxide/SiN	oxide/SiN	oxide/SiN	oxide/SiN

Die/Fab Test Results

Table 2: Die/Fab Test Results - 0.18um DMOS at TSMC Fab-8B

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Operating Life (HTOL)	JESD22-A108	Ta=125°C, Biased, 1,000 Hours	LTC7825-1	Q19529.1HTOL	0/77
			LTC7050	Q16791.1HTOL	0/77
				Q16791.3HTOL	0/77
				Q16791.4HTOL	0/77
			LTC4246	Q16817.15HTOL	0/77
		Ta=150°C, Biased, 1,000 Hours	LTC4249	Q16228.1HTOL	0/77
		125°C<Tj<135°C, Biased, 1,000 Hours	AD4630-24	Q16582.1HTOL	0/77
				Q16582.2HTOL	0/77
				Q16582.3HTOL	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	LTC7825-1	Q19529.3HTS	0/45
			LTC7050	EO9554F.HTS	0/45
			LTC4246	Q16817.3	0/45
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LTC7825	Q19529.4BHAST	0/77
				Q19529.5HAST	0/77
				Q19529.6HAST	0/77
			LTC7050	EO9556K.BHAST	0/77
				EO9555K.BHAST	0/77
				Q16791.1BHAST	0/77
			LTC4246	Q16817.13	0/77
				Q16817.2	0/77
			LTC4249	Q16228.1BHAST	0/77

[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 - 28-LGA at ASE

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data
Generic/Root Part #	LTC7825	LTC7825-1
Package	28-LGA	28-LGA
Body Size (mm)	4.00 x 5.00 x 0.95	4.00 x 5.00 x 0.95
Assembly Location	ASE	ASE
MSL/Peak Reflow Temperature(°C)	3 / 260°C	3 / 260°C
Mold Compound	Sumitomo G311E	Sumitomo G311E
Lead Finish	Au	Au
Bumping Process	Electroplating/CU Pillar	Electroplating/CU Pillar
Bump Diameter (mm)	0.085	0.085

Package/Assembly Test Results

Table 4: Package/Assembly Test Results - LGA at ASE

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	LTC7825-1	Q19529.3HTS	0/45
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LTC7825	Q19529.4BHAST	0/77
				Q19529.5HAST	0/77
				Q19529.6HAST	0/77
Temperature Cycling (TC)[1]	JESD22-A104	-65°C/+150°C, 500 Cycles	LTC7825	Q19529.1TC	0/77
			LTC7825-1	Q19529.2TC	0/77
				Q19529.3TC	0/77
		-65°C/+150°C, 1,000 Cycles	LTC7825	Q20412.1.TC[2]	0/77
Unbiased HAST (UHST)[1]	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	LTC7825	Q19529.1UHAST	0/77
			LTC7825-1	Q19529.2UHAST	0/77
				Q19529.3UHAST	0/77

[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] Stress test with 200um die.

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
FICDM	LTC7825	28-LGA	JS-002	1Ω, Cpkg	±1250V	C3
HBM	LTC7825	28-LGA	ESDA/JEDEC JS-001	1.5kΩ, 100pF	±1000V	1C

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T_A)	Class
JESD78	LTC7825[2]	+200mA, -200mA	+6.5/12/13.5/41V	25°C	I

[2] Stress test with 200um die.

Approvals

Reliability Engineer: Katherine Cayago