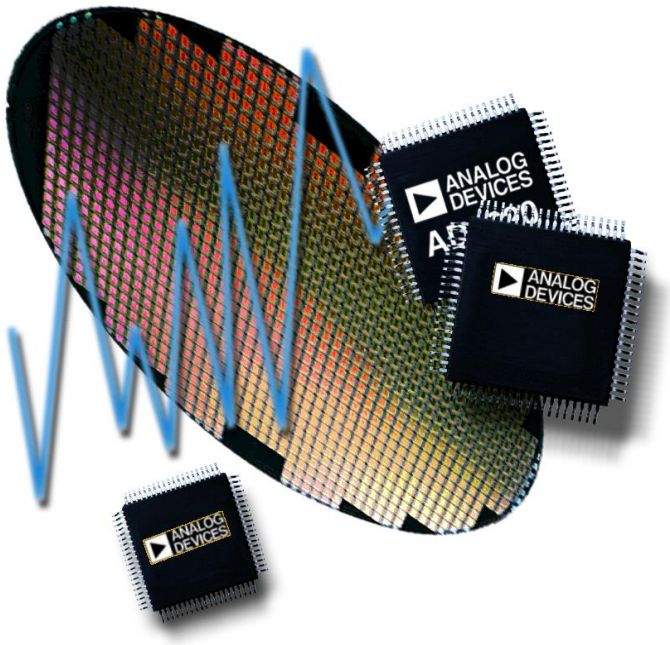

Reliability Report

Report Title: LT3073 Assembly Process Change Qualification

Report Number: 21631

Revision: A

Date: 29 April 2024

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the LT3073 product in a 22-LGA package with 200um die thickness. The LT3073 is a low voltage, ultra-low noise, and ultra-fast transient response linear regulator. The device supplies up to 3A with a typical dropout voltage of 45mV. A 4.7µF reference bypass capacitor decreases output voltage noise to 1.2µV_{RMS}. The wide bandwidth and high PSRR permit the use of small ceramic capacitors, saving bulk capacitance and cost. The LT3073 is ideal for powering high-performance FPGAs, data converters, RF, and noise-sensitive signal chain applications.

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics- 0.35µm DMOS

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data							
Generic/Root Part #	LT3073	LT3046	LT3120	LTC7060	LT8390	LT8624S	LT8638S	LT8648S	LT8650S
Die Id	3073	3046	3120	7060	8390	8624	8638S	8648	8VL8650
Die Size (mm)	2.50 x 2.60	1.65 x 1.71	3.30 x 2.70	1.65 x 2.46	1.52 x 2.44	1.77 x 1.57	4.02 x 2.59	6.20 x 2.70	1.75 x 3.88
Wafer Fabrication Site	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1
Wafer Fabrication Process	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS
Die Substrate	Si	Si	Si	Si	Si	Si	Si	Si	Si
Metallization / # Layers	AlCu/4	AlCu/3	AlCu/3	AlCu/3	AlCu/3	AlCu/2	AlCu/3	AlCu/3	AlCu/3
Polyimide	No	No	No	No	No	No	No	No	No
Passivation	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN

Die/Fab Test Results

Table 2: Die/Fab Test Results - 0.35µm DMOS at Vanguard-Taiwan

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Operating Life (HTOL)	JESD22-A108	Ta=125°C, Biased, 1,000 Hours	LT8624S	Q19343.1HTOL	0/77
		Ta=150C, Biased, 1,000 Hours	LTC7060	EO9373L.HTOL	0/77
				Q16176.2HTOL	0/77
				Q16176.3HTOL	0/77
			LT8390	Q16133.1HTOL	0/77
				Q16133.2.HTOL	0/77
				Q16133.3HTOL	0/77
			LT8650S	Q20616.3HTOL	0/77
			LT8648S	Q20710.2HTOL	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 2,000 Hours	LT8650S	Q20616.3HTS	0/77
			LT8638S	Q20120.2HTS	0/45
			LT8648S	Q20710.2HTS	0/45
Highly Accelerated Temperature and Humidity Stress Test (HAST)	JESD22-A110	130C 85%RH 33.3 psia, Biased, 192 Hours	LT3120	Q16667.1BHAST	0/77
				Q16667.2BHAST	0/77
				Q16667.3BHAST	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LT3046	Q19043.BH2	0/77
				Q19043.CH1	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST)[2]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LT8650S	Q20616.2HAST	0/77
				Q20616.3HAST	0/77
				Q20616.4HAST	0/77
	JESD22-A110	130C 85%RH 33.3 psia, Biased, 192 Hours	LT8648S	Q20710.1HAST	0/77
				Q20710.2HAST	0/77

[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.
[2] 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 - 22-LGA at ASE (AEK)

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data								
Generic/Root Part #	LT3073	LT3078	LT8337	LT8376	LT8386	LT8624S	LT8638S	LT8648S	LT8650S	LT8686S
Package	22-LGA	22-LGA	16-LGA	28-LGA	28-LGA	20-LGA	28-LGA	36-LGA	32-LGA	32-LGA
Body Size (mm)	4.00 x 3.00 x 0.95	3.00 x 4.00 x 0.95	3.00 x 3.00 x 0.95	5.00 x 4.00 x 0.94	5.00 x 4.00 x 0.94	4.00 x 3.00 x 0.95	5.00 x 4.00 x 0.94	7.00 x 4.00 x 0.94	6.00 x 4.00 x 0.94	5.00 x 5.00 x 0.95
Assembly Location	ASE	ASE	ASE	ASE	ASE	ASE	ASE	ASE	ASE	ASE
MSL/Peak Reflow Temperature(°C)	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C	3 / 260°C
Mold Compound	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E	Sumitomo G311E
Substrate Material	BT Resin	BT Resin	BT Resin	BT Resin	BT Resin	BT Resin	BT Resin	BT Resin	BT Resin	BT Resin
Terminal Finish	Au	Au	Au	Au	Au	Au	Au	Au	Au	Au

Package/Assembly Test Results

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

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Storage Life (HTSL)	JESD22-A103	125°C, 2,000 Hours	LT3073	Q17611.1HTS	0/45
		175°C, 1,000 Hours	LT8376	Q17426.1HTS	0/45
			LT8386	Q17381.LOT2HTS	0/45
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 192 Hours	LT8337	Q17268.1BHAST	0/77
		110C 85%RH 17.7 psia, Biased, 264 Hours	LT8650S	Q20151.1HAST	0/77
		130C 85%RH 33.3 psia, Biased, 96 Hours		Q20616.2HAST	0/77
				Q20616.3HAST	0/77
				Q20616.4HAST	0/77
		110C 85%RH 17.7 psia, Biased, 264 Hours	LT8638S	Q20120.4HAST	0/77
		130C 85%RH 33.3 psia, Biased, 96 Hours		Q20120.1HAST	0/77
				Q20120.3HAST	0/77
			LT8686S	Q20395.1HAST	0/77
		130C 85%RH 33.3 psia, Biased, 192 Hours	LT8376	Q17426.1BHAST	0/77
Solder Heat Resistance (SHR)	J-STD-020	MSL-3	LT3073	Q21631.2.SH2	0/30
			LT8648S	Q20710.1SHR	0/77
				Q20710.2SHR	0/77
			LT8650S	Q20151.2SHR	0/77
				Q20616.1SHR	0/77
				Q20616.2SHR	0/77
				Q20616.3SHR	0/77
				Q20616.4SHR	0/77
Temperature Cycling (TC)[1]	JESD22-A104	-65°C/+150°C, 1,000 Cycles	LT3073	Q21631.1.TC_Lot2	0/77
		-65°C/+150°C, 2,000 Cycles	LT8624S	Q19343.1TC	0/77
			LT8650S	Q20151.2TC	0/77
			LT8376	Q17426.1TC	0/77
			LT8386	Q17381.2TC	0/77

				Q17381.3TC	0/77
				Q17381.LOT2TC	0/77
			LT8648S	EO9237B.TC	0/77
				EO9353B.TC	0/77
				EO9508B.TC	0/77
			LT8638S	Q20120.1TC	0/77
Unbiased HAST (UHST)[1]	JESD22-A118	110C 85%RH 33.3 psia, 264 Hours	LT3078	Q19603.1UHAST	0/77
		130C 85%RH 33.3 psia, 96 Hours	LT8650S	Q20616.2UHAST	0/77
				Q20616.3UHAST	0/77
			LT8686S	Q20395.1UHAST	0/77
		130C 85%RH 33.3 psia, 192 Hours	LT8638S	EO9436K1.UHAST	0/77
		110C 85%RH 17.7 psia, 264 Hours	LT8638S	Q20120.1UHAST	0/77
				Q20120.2UHAST	0/77
				Q20120.3UHAST	0/77
				Q20120.4UHAST	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.

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	LT3073	22-LGA	JS-002	1Ω, Cpkg	±1250V	C3
HBM	LT3073	22-LGA	ESDA/JEDEC JS-001	1.5kΩ, 100pF	±2500V	2

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T_A)	Class
JESD78	LT3073	+200mA, -200mA	+8.25V	25°C	I

Approvals

Reliability Engineer: Carl Iwashita/Lanie Constantino