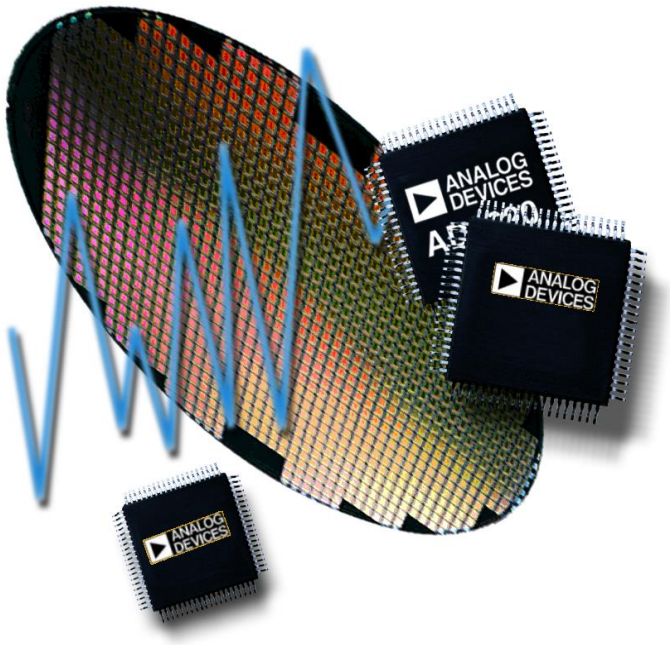

Reliability Report

Report Title: LT3935 Assembly Process Change Qualification

Report Number: 21218

Revision: A

Date: 21 November 2024

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the LT3935 product in a 28-LGA package. The LT3935 is a monolithic, synchronous, step-down DC/DC converter that utilizes fixed-frequency, peak current control and provides PWM dimming for a string of LEDs.

Die/Fab Product Characteristics

Table 1.1: Die/Fab Product Characteristics- 0.35µm DMOS

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data				
Generic/Root Part #	LT3935	LT3073	LT3120	LT8386	LT8386	LT8638S
Die Id	3934	3073	3120	445	8386B	8638S
Die Size (mm)	2.32 x 2.98	2.50 x 2.60	3.30 x 2.70	1.88 x 0.64	1.87 x 2.73	4.02 x 2.59
Wafer Fabrication Site	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1
Wafer Fabrication Process	0.35um DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS
Die Substrate	Si	Si	Si	Si	Si	Si
Metallization / # Layers	AlCu/2	AlCu/4	AlCu/3	AlCu/2	AlCu/2	AlCu/3
Polyimide	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

Table 1.2: Die/Fab Product Characteristics- 0.35µm DMOS

Product Characteristics	Product(s) used for Substitution Data			
Generic/Root Part #	LT8640A	LT8641	LT8650S-1	LT8650S/SP/SPA
Die Id	8640	8641	8650	8650
Die Size (mm)	1.66 x 2.83	1.66 x 2.83	1.75 x 3.88	1.75 x 3.88
Wafer Fabrication Site	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1	Vanguard Fab1
Wafer Fabrication Process	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS
Die Substrate	Si	Si	Si	Si
Metallization / # Layers	AlCu/3	AlCu/3	AlCu/3	AlCu/3
Polyimide	No	No	No	No
Passivation	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN

Die/Fab Test Results

Table 2.1: 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=150C, Biased, 1,000 Hours	LT3120	Q16667.1HTOL	0/77
				Q16667.2HTOL	0/77
				Q16667.3HTOL	0/77
			LT3935	Q16621.4HTOL	0/77
		150°C<Tj<175°C, Biased, 2,000 Hours	LT8650SPA	Q20156.1HTOL	0/77
		150°C<Tj<175°C, Biased, 1,000 Hours	LT8650S	Q20616.3HTOL	0/77
		Ta=150C, Biased, 1,000 Hours	LT8386	Q17381.1HTOL	0/77
				Q17381.2HTOL	0/77
			LT8650S-1	EO9526L.HTOL	0/77
			LT8650SP	Q17503.1HTOL	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 2,000 Hours	LT3120	Q16667.1HTS	0/45
		175°C, 1,000 Hours	LT3935	Q16621.1HTS175C	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, 96 Hours	LT8640A	Q17048.1BHAST	0/77
				Q17048.2BHAST	0/77
			LT8641	Q20259.129_Auto	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST)[2]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LT3073	Q17611.1BHAST	0/77
			LT8650S	Q20616.2HAST	0/77
				Q20616.3HAST	0/77
				Q20616.4HAST	0/77
			LT8638S	Q20120.1HAST	0/77
				Q20120.3HAST	0/77
		130C 85%RH 33.3 psia, Biased, 192 Hours	LT8386	Q17381.LOT2BHAST	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 3.1: Package/Assembly Product Characteristics - 28-LGA at ASE (AEK)

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data						
Generic/Root Part #	LT3935	LT8386	LT8638S	LT8648S	LT8686	LT8644	LT8650S	LT3073
Package	28-LGA	28-LGA	28-LGA	36-LGA	32-LGA	24-LGA	32-LGA	22-LGA
Body Size (mm)	4.00 x 5.00 x 0.95	5.00 x 4.00 x 0.94	5.00 x 4.00 x 0.94	7.00 x 4.00 x 0.94	5.00 x 5.00 x 0.95	4.00 x 4.00 x 0.95	6.00 x 4.00 x 0.94	4.00 x 3.00 x 0.95
Assembly Location	ASE (AEK)	ASE (AEK)	ASE (AEK)	ASE (AEK)	ASE (AEK)	ASE (AEK)	ASE (AEK)	ASE (AEK)
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
Mold Compound	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
Terminal Finish	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	150°C, 2,000 Hours	LT8650S	Q20616.3HTS	0/45
			LT8638S	Q20120.2HTS	0/45
			LT8648S	Q20710.2HTS	0/45
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	LT3073	Q17611.1BHAST	0/77
			LT8650S	Q20616.2HAST	0/77
				Q20616.3HAST	0/77
				Q20616.4HAST	0/77
			LT8638S	Q20120.1HAST	0/77
			LT8638S	Q20120.3HAST	0/77
			LT8686S	Q20395.1HAST	0/77
		130C 85%RH 33.3 psia, Biased, 192 Hours	LT8386	Q17381.LOT2BHAST	0/77
			LT8644S	Q16241.1BHAST	0/77
		110C 85%RH 17.7 psia, Biased, 264 Hours	LT8638S	Q20120.4HAST	0/77
Solder Heat Resistance (SHR)	J-STD-020	MSL-3	LT3935	Q21218.1.SH1	0/30
				Q21218.2.SH2	0/30
Temperature Cycling (TC)[1]	JESD22-A104	-65°C/+150°C, 1,000 Cycles	LT3935	Q21218.1.TC1	0/77
				Q21218.2.TC2	0/77
		-65°C/+150°C, 2,000 Cycles	LT8650S	Q20616.1TC	0/77
				Q20616.2TC	0/77
				Q20616.3TC	0/77
				Q20616.4TC	0/77
			LT8386	Q17381.2TC	0/77
				Q17381.3TC	0/77
				Q17381.LOT2TC	0/77
			LT8638S	Q20120.1TC	0/77
				Q20120.2TC	0/77
				Q20120.3TC	0/77

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Unbiased HAST (UHST)[1]	JESD22-A118	130C 85%RH 33.3 psia, 96 Hours	LT8648S	Q20710.1UHAST_A	0/77
				Q20710.2UHAST	0/77
			LT8650S	Q20616.1UHAST	0/77
				Q20616.2UHAST	0/77
			LT8650S	Q20616.3UHAST	0/77
			LT8686S	Q20395.1UHAST	0/77
		130C 85%RH 33.3 psia, 192 Hours	LT8386	Q17381.2UHAST	0/77
				Q17381.3UHAST	0/77
				Q17381.LOT2UHAST	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	LT3935	28-LGA	JS-002	1Ω, Cpkg	±1250V	C3
HBM	LT3935	28-LGA	ESDA/JEDEC JS-001	1.5kΩ, 100pF	±3500V	2

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T_A)	Class
JESD78	LT3935	+150mA, -150mA	+4V, 7.5V, 50V	150°C	II

Approvals

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