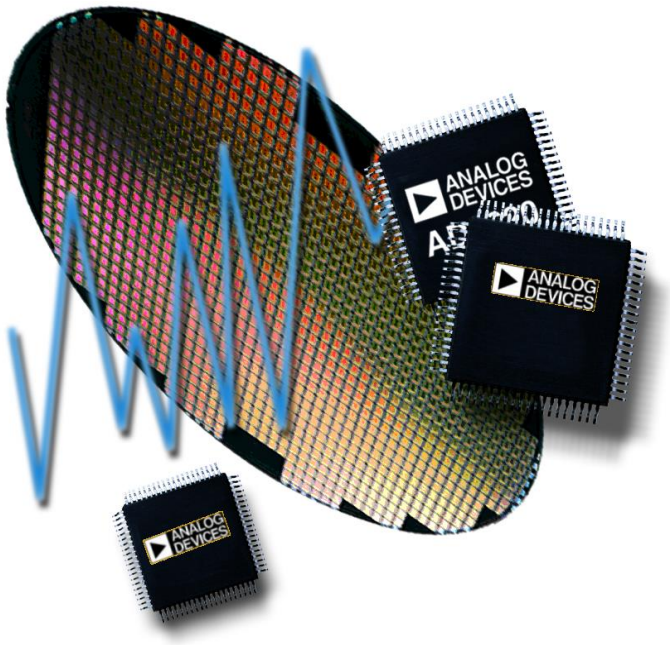

Reliability Report

Report Title: LT3922-1 Die Revision H Automotive Grade 0 Qualification

Report Number: 19584

Revision: A

Date: 13 January 2023

Summary

This report documents the successful completion of the automotive reliability qualification requirements for the release of the LT3922-1 product in a 28-LFCSP package. The LT3922-1 is a monolithic, synchronous, step-up DC/DC converter that utilizes fixed-frequency, peak current control and provides PWM dimming for a string of LED's.

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 #	LT3922-1	LT3922-1	LTC7060	LT8365	LT8374
Operating Temperature	-40°C to +150°C	-40°C to +150°C	-40°C to +150°C	-40°C to +150°C	-40°C to +150°C
Die Id	8VL3922-1XV	8VL3922-1XV	8VL7060XV	8VL8365XV	8VL8374XV
Die Size (mm)	1.74 x 2.88	1.74 x 2.88	1.56 x 2.35	1.28 x 2.85	1.79 x 1.94
Wafer Fabrication Site	Vanguard	Vanguard	Vanguard	Vanguard	Vanguard
Wafer Fabrication Process	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS	0.35µm DMOS
Die Substrate	Si	Si	Si	Si	Si
Metallization / # Layers	AlCu / 3	AlCu / 3	AlCu / 3	AlCu / 3	AlCu / 4
Polyimide	No	No	No	No	No
Passivation	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	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Early Life Failure Rate (ELFR)	B2	AEC-Q100-008	Ta=150°C, 48 Hours	LT8300	Q17324.1ELF1	0/147	RH
					Q17324.1ELF2	0/147	RH
					Q17324.1ELF3	0/147	RH
					Q17324.1ELF4	0/147	RH
					Q17324.1ELF5	0/147	RH
					Q17324.1ELF6	0/147	RH
				LT8365	Q14979.1ELFR	0/800	RH
					Q14979.2ELFR	0/800	RH
					Q14979.ELFR	0/800	RH
				LT8390	Q16133.1ELFR	0/800	RH
				LT8648S	EO9353.ELFR	0/800	RH
High Temperature Operating Life (HTOL)	B1	JESD22-A108	Ta=150°C, Biased, 1,000 Hours	LT8374	Q17806.1HTOL	0/77	RHC
				LT8390	Q16133.1HTOL	0/77	RHC
					Q16133.2.HTOL	0/77	RHC
					Q16133.3HTOL	0/77	RHC
				LT8390A	Q17879.1HTOL	0/77	RCH
				LT8391D	Q17987.1HTOL	0/77	RCH
				LT8648S	EO9459L.HTOL	0/77	RHC
				LTC7060	Q16176.2HTOL	0/77	RHC
					Q16176.3HTOL	0/77	RHC
				LTC7804	Q16620.1HTOL.1	0/77	RCH
				LTC7818	EO9477L.HTOL	0/77	RHC
					EO9507L.HTOL	0/77	RHC
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 2,000 Hours	LT8390	Q16133.1HTS	0/45	RH
					Q17464.1HTS	0/45	RH
					Q19204.2HTS	0/45	RH
				LT8648S	EO9353F.HTS	0/45	RH

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	A2	JESD22-A110	130°C 85%RH 33.3 psia, Biased, 96 Hours	LT3922-1	EO9449K.BHAST	0/77	RH
				LT8365	EO9534K.BHAST	0/77	RH
					EO9535K.BHAST	0/77	RH
				LT8374	Q17806.2BHAST	0/77	RH
				LT8390	Q17464.1BHAST	0/77	RH
				LTC7818	EO9507K.BHAST	0/77	RH
			130°C 85%RH 33.3 psia, Biased, 192 Hours	LTC7060	EO9373K.BHAST	0/77	RH
					EO9394K.BHAST	0/77	RH
				LT8300	Q17324.1BHAST	0/77	RH
				LT8390	Q19204.2BHAST	0/77	RH
Highly Accelerated Temperature and Humidity Stress Test (HAST)[2]	A2	JESD22-A110	130°C 85%RH 33.3 psia, Biased, 192 Hours	LT8648S	EO9237K.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.
[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 – LFCSP/LFCSP_SS at UTAC

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data			
Generic/Root Part #	LT3922-1	LT3922-1	LT8708	LTC3859AL	LTC7802
Package	28-LFCSP	28-LFCSP	40-LFCSP	38-LFCSP	28-LFCSP_SS
Body Size (mm)	4.00 x 5.00 x 0.75	4.00 x 5.00 x 0.75	5.00 x 8.00 x 0.75	5.00 x 7.00 x 0.75	4.00 x 5.00 x 0.75
Assembly Location	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
Mold Compound	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD	Sumitomo G770HCD
Die Attach	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T	Ablestik 8200T
Leadframe Material	EFTEC C64T	EFTEC C64T	EFTEC C64T	Copper Alloy 194	Copper Alloy 194
Lead Finish	100Sn	100Sn	100Sn	100Sn	100Sn
Wire Bond Material/Diameter (mils)	Gold GMG / 1.30	Gold GMG / 1.30	Gold GMG / 1.0	Gold GPG / 1.0	Gold GPG / 1.0

Package/Assembly Test Results

Table 4: Package/Assembly Test Results – LFCSP/LFCSP_SS at UTAC

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Autoclave (AC)[1]	A3	JESD22-A102	121°C 100%RH 33.3 psia, 168 Hours	LT8708	Z47431.JPCT	0/77	R
					Z47929.JPCT	0/77	R
					Z48058.JPCT	0/77	R
				LT3922-1	EO9329A.PCT	0/77	R
					EO9449A.PCT	0/77	R
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 2,000 Hours	LTC3859AL	Z51545.HTS	0/45	RH
				LTC7801	Z52429.HTS	0/45	RH
				LT3922-1	EO9329F.HTS	0/45	RH
Highly Accelerated Temperature and Humidity Stress Test (HAST) [1]	A2	JESD22-A110	130°C 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
				LTC7801	Z52452.1a.JHAST	0/77	RH
				LT8708	Z47431.JHAST	0/77	RH
					Z47929.JHAST	0/77	RH
					Z48058.JHAST	0/77	RH
				LT3922-1	EO9329K.BHAST	0/77	RH
					EO9449K.BHAST	0/77	RH
Temperature Cycling (TC)[1]	A4	JESD22-A104	-65°C/+150°C, 2,000 Cycles	LTC3859AL	Z51542.JTC	0/77	RH
					Z51545.JTC	0/77	RH
					Z51778.1a.JTC	0/77	RH
				LTC7801	Z52439.2a.JTC	0/77	RH
					Z52452.1a.JTC	0/77	RH
				LT8708	Z48058.JTC	0/77	RH
				LT3922-1	EO9329B.TC	0/77	RH
					EO9449B.TC	0/77	RH
Post-TCT Wire Bond Pull	C2	MIL-STD-883 METHOD 2011	NA	LT8390	Q17464.1WBP	5	NA
Unbiased HAST (UHST)[1]	A3	JESD22-A118	130°C 85%RH 33.3 psia, 96 Hours	LTC3859AL	Z51542.JUHAST	0/77	R
					Z51545.JUHAST	0/77	R
					Z51778.1a.JUHAST	0/77	R

Test Name	AEC #	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS	eTest Temp
Unbiased HAST (UHST)[1]	A3	JESD22-A118	130°C 85%RH 33.3 psia, 96 Hours	LTC7801	Z52439.2a.JUHAST	0/77	R
High Temperature Storage Life (HTSL)	A6	JESD22-A103	150°C, 2,000 Hours	LTC7802	Q17135.1HTS	0/50	RH
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	A2	JESD22-A110	130°C 85%RH 33.3 psia, Biased, 96 Hours	LTC7806	Q17142.1PC.BHAST	0/77	RH
Temperature Cycling (TC)[1]	A4	JESD22-A104	-65°C/+150°C, 2,000 Cycles	LTC7802	Q17135.1TC	0/77	RH
Unbiased HAST (UHST)[1]	A3	JESD22-A118	130°C 85%RH 33.3 psia, 96 Hours	LTC7802	Q17135.1UHAST	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	LT3922-1	28-LFCSP	JS-002	1Ω, Cpkg	±1250V	C3	RH
HBM	LT3922-1	28-LFCSP	ESDA/JEDEC JS-001	1.5kΩ, 100pF	±3000V	2	RH

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T_A)	Class	eTest Temp
JESD78	LT3922-1	+100mA, -100mA	+40V/+4V/+2.6V	150°C	II	RH

Approvals

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