



Product/Process Change Notice - PCN 23_0054 Rev. -

Analog Devices, Inc. One Analog Way, Wilmington, MA 01887, USA

This notice is to inform you of a change that will be made to certain ADI products (see Appendix A) that you may have purchased in the last 2 years. **Any inquiries or requests with this PCN (additional data or samples) must be sent to ADI within 30 days of publication date.** ADI contact information is listed below.

PCN Title:	Qualification of Alternate Wafer Fab Site for MEMS Products - ADXL345-EP, ADXL350, ADXL375
Publication Date:	21-Apr-2023
Effectivity Date:	24-Jul-2023 <i>(the earliest date that a customer could expect to receive changed material)</i>
Revision Description:	Initial Release.

Description Of Change:

The current fabrication process for the MEMS wafer begins at TSMC, Hsinchu, Taiwan, and completes at Analog Devices, Wilmington, MA, USA (ADWL). A MEMS process that is performed entirely at ADWL is being added as an alternate fab site.

Reason For Change:

This change will ensure continuity of supply.

Impact of the change (positive or negative) on fit, form, function & reliability:

There is no impact to fit, form, function, or reliability.

Product Identification *(this section will describe how to identify the changed material)*

Date Code will be used for product identification.

Summary of Supporting Information:

Qualification has been performed per Industry Standard Test Methods. See attached Qualification Reports.

Supporting Documents

Attachment 1: Type: Qualification Results Summary

[ADI_PCN_23_0054_Rev_-_Qualification_Report_ADXL345.pdf...](#)

Attachment 2: Type: Qualification Results Summary

[ADI_PCN_23_0054_Rev_-_Qualification_Report_ADXL350.pdf...](#)

Attachment 3: Type: Qualification Results Summary

[ADI_PCN_23_0054_Rev_-_Qualification_Report_ADXL375_ADXL377.pdf...](#)

Note: If applicable, the device material declaration will be updated due to material change.

ADI Contact Information:

For questions on this PCN, please send an email to the regional contacts below or contact your local ADI sales representatives.

Americas:	Europe:	Japan:	Rest of Asia:
PCN_Americas@analog.com	PCN_Europe@analog.com	PCN_Japan@analog.com	PCN_ROA@analog.com

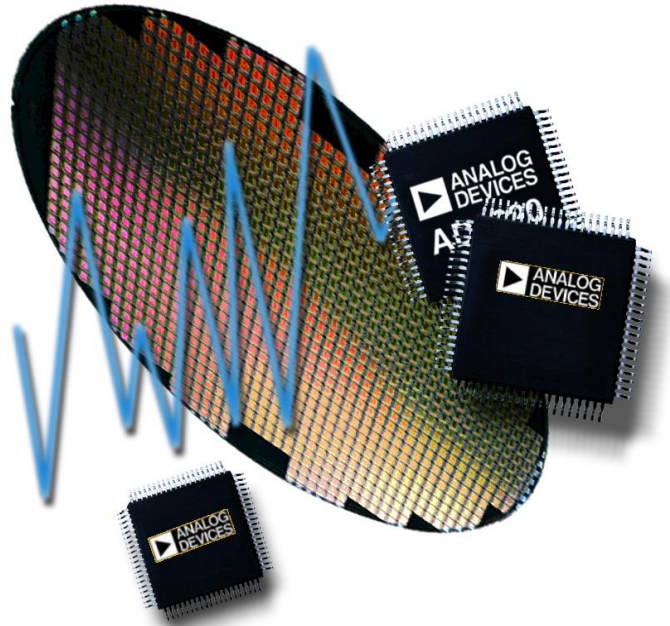
Appendix A - Affected ADI Models:

Added Parts On This Revision - Product Family / Model Number (10)

ADXL345 / AD22392Z-RL7	ADXL345 / ADXL345TCCZ-EP	ADXL345 / ADXL345TCCZ-EP-RL7	ADXL350 / ADXL350BCEZ-RL	ADXL350 / ADXL350BCEZ-RL7
ADXL375 / ADXL375BCCZ	ADXL375 / ADXL375BCCZ-RL	ADXL375 / ADXL375BCCZ-RL7	ADXL375 / ADXL375SCCZ-EP	ADXL375 / ADXL375SCCZ-EP-RL7

Appendix B - Revision History:

Rev	Publish Date	Effectivity Date	Rev Description
Rev. -	21-Apr-2023	24-Jul-2023	Initial Release.



Reliability Report

Report Title: ADXL345 Sensor Fab Site Transfer
from TSMC to ADWL Qualification

Report Number: 20368

Revision: A

Date: 13 April 2023

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the ADXL345 product in 14-LGA package with XC312A Wilmington only flow MEMS sensor. The ADXL345 is an ultralow power 3 Axis Low g accelerometer with digital output.

Substitution data was used as applicable where equivalent sensor structures were previously qualified on the Wilmington full flow or where the cap seal dimensions were the same

Die/Fab Product Characteristics

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

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	ADXL345
Die Id	TMAF24 A_T1 / XA345D
Die Size (mm)	2.25 x 1.45
Wafer Fabrication Site	TSMC Fab-11
Wafer Fabrication Process	0.35µm CMOS
Approximate Transistor Count	80,200
Die Substrate	Si
Metallization / # Layers	AlCu / 3
Polyimide	No
Passivation	undoped-oxide/SiN

Table 1.2: Die/Fab Product Characteristics- MEMS

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data	
Generic/Root Part #	ADXL345	ADXL313	ADXL335
Die Id	XC312A	XC365	TC335B 1
Die Size (mm)	1.29 x 1.52	1.29 x 1.52	1.29 x 1.52
Wafer Fabrication Site	ADI-Wilmington	ADI-Wilmington	TSMC Fab-2b
Wafer Fabrication Process	MEMS	MEMS	MEMS
Die Substrate	Si	Si	Si
Polyimide	No	No	No
Passivation	doped-oxide/SiN	doped-oxide/SiN	doped-oxide/SiN

Table 1.3: Die/Fab Product Characteristics- MEMS Cap

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data	
Generic/Root Part #	ADXL345	ADXL313	ADXL335
Die Id	C345B	C313	ADXL335CAP
Die Size (mm)	1.29 x 1.52	1.29 x 1.52	1.29 x 1.52
Wafer Fabrication Site	ADI-Wilmington	ADI-Wilmington	ADI-Wilmington
Wafer Fabrication Process	MEMS cap	MEMS Cap	MEMS Cap
Die Substrate	Si	Si	Si
Polyimide	No	No	No
Passivation	None	None	None

Die/Fab Test Results
Table 2.1: Die/Fab Test Results – MEMS at ADI-Wilmington

Test Name	Specification	Conditions	Device	Lot #	Fail/SS
Group D ²	MIL-STD-883, M5005	Sub 4, Shock/Vib./Cent., Single Duration	ADXL313	Q10157.DG1	0/39
				Q10157.DG2	0/39
				Q10157.DG3	0/39
Mechanical Shock Powered ²	IEC 68 Part 2-27 Testgroup Ea	10,000g, 5 Shock Pulses, 0.5ms, Single Duration	ADXL313	Q10157.PM1	0/10
				Q10157.PM2	0/10
				Q10157.PM3	0/10
Random Drop ²	AEC-Q100 Test G5	10 drops from 1.2m Single Duration	ADXL313	Q10157.RD1	0/25
				Q10157.RD2	0/25
				Q10157.RD3	0/25
Autoclave (AC) ¹	JESD22-A102	121°C, 100%RH, 2atm, 96 Hours	ADXL335	Q8304.1	0/77
				Q8304.2	0/77
				Q8304.4	0/77
Temperature Cycling (TC) ¹	JESD22-A104	-55°C/+125°C, 1,000 Cycles	ADXL335	Q9169.TC1	0/77
				Q9169.TC2	0/77
				Q9169.TC3	0/77
				Q9169.TC4	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125°C, Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

² Electrical test was performed at room temperature.

Table 3: Die/Fab Test Results – 0.35µm CMOS at TSMC Fab-11

Test Name	Specification	Conditions	Device	Lot #	Fail/SS
Early Life Failure Rate (ELFR)	MIL-STD-883, Method 1015	150°C, 48 Hours	ADXL345	Q8378.14	0/320
				Q8378.15	0/320
				Q8378.16	0/160
				Q8378.19	0/160
				Q8378.20	0/320
				Q8378.21	0/320
				Q8378.22	0/160
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 Hours	ADXL345	Q9681.10	0/77
				Q9681.11	0/77
				Q9681.12	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL345	Q9681.19	0/77
				Q9681.20	0/77
				Q9681.21	0/77
				Q9681.31	0/77
				Q9681.32	0/77
High Temperature Operating Life (HTOL) ¹	JESD22-A108	Ta=150C, Biased, 500 Hours	ADXL345	Q9681.1	0/77
				Q9681.2	0/77
				Q9681.3	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125°C, Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

Package/Assembly Product Characteristics
Table 4: Package/Assembly Product Characteristics - 14-LGA at AMKOR (AP3)

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	ADXL345
Package	14-LGA
Body Size (mm)	3.00 x 5.00 x 0.95
Assembly Location	AMKOR (AP3)
MSL/Peak Reflow Temperature(°C)	3 / 260
Mold Compound	Sumitomo G770
Die Attach/Underfill/TIM	Ablestik 2300 / N/A
Leadframe Material	BT Resin / HL-832NX-A
Lead Finish	Au
Wire Bond Material/Diameter (mils)	Tanaka GPG 2N Gold / 1.00

Package/Assembly Test Results

Table 5: Package/Assembly Test Results - 14-LGA at AMKOR (AP3)

Test Name	Specification	Conditions	Device	Lot #	Fail/SS
Unbiased HAST (UHST) ¹	JESD22-A118	130°C, 85%RH, 2atm, 96 Hours	ADXL345	Q9681.13	0/77
				Q9681.14	0/77
				Q9681.15	0/77
Group D	MIL-STD-883, M5005	Sub 4, Shock/Vib./Cent./Seal, Single Duration	ADXL345	Q9327.13	0/20
				Q9327.14	0/20
				Q9327.15	0/20
Random Drop	CAM0091	10 drops from 1.2m, Single Duration	ADXL345	Q9681.25	0/35
				Q9681.26	0/35
				Q9681.27	0/35
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 Hours	ADXL345	Q9681.10	0/77
				Q9681.11	0/77
				Q9681.12	0/77
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 500 Cycles	ADXL345	Q9681.7	0/77
				Q9681.8	0/77
				Q9681.9	0/77
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 1000 Cycles, 1 Cycle per Hour	ADXL345	Q9681.4	0/77
				Q9681.5	0/77
				Q9681.6	0/77
Solder Heat Resistance (SHR) ¹	ADI-0049	MSL-3	ADXL345	Q9327.16	0/11
				Q9327.17	0/11
				Q9327.23	0/11
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL345	Q9681.19	0/77
				Q9681.20	0/77
				Q9681.21	0/77
				Q9681.31	0/77
				Q9681.32	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125°C, Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

ESD Test Results

The results of Human Body Model (HBM), Machine Model (MM), and Field-Induced Charged Device Model (FICDM) ESD testing are summarized in Table 6. ADI measures ESD results using stringent test procedures based on the specifications listed. Any comparison with another supplier's results should ensure that the same ESD test procedures have been used. For further details, please see the EOS/ESD chapter of the ADI Reliability Handbook (available via the 'Quality and Reliability' link on [Analog Devices' web site](#)).

Table 6: ADXL345 ESD Test Results

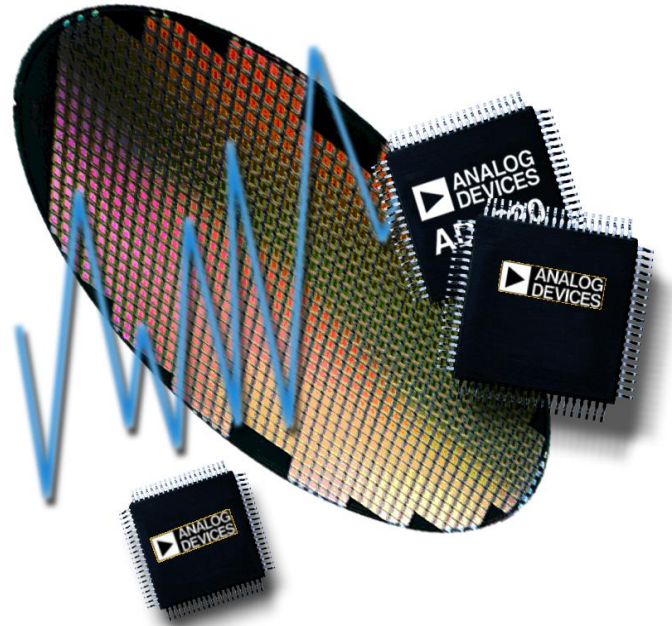
ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	14-LGA	ANSI/ESD STM5.3.1-1999	1Ω, Cpkg	±1500V	NA	NA
		JESD22-C101		±1500V	NA	IV
HBM	14-LGA	ANSI/ESD STM5.1-2007	1.5kΩ, 100pF	±2000V	NA	NA
		ESDA/JEDEC JS-001-2011		±2000V	NA	2
MM	14-LGA	ANSI/ESD STM5.2-1999	0Ω, 200pF	±200V	NA	M3
		JESD22-A115		±200V	NA	NA

Approvals

Reliability Engineer: Michael Walornyj

Additional Information

Data sheets and other additional information are available on [Analog Devices' web site](#)



Reliability Report

Report Title: ADXL350 Sensor Fab Site Transfer
from TSMC to ADWL Qualification

Report Number: 20049

Revision: A

Date: 10 February 2023

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the ADXL350 product in a 16-LGA_CAV package with XC350 Wilmington only flow MEMS sensor. The ADXL350 is a high performance small, thin, low power, 3-axis accelerometer with high resolution (13-bit) and selectable measurement ranges up to $\pm 8g$.

Substitution data was used as applicable where equivalent sensor structures were previously qualified on the Wilmington full flow or where the cap seal dimensions were the same.

Die/Fab Product Characteristics

Table 1.1: Die/Fab Product Characteristics- 0.35um CMOS

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	ADXL350
Die Id	TMAF24 A_T1 / XA345D
Die Size (mm)	2.25 x 1.40
Wafer Fabrication Site	TSMC Fab-11
Wafer Fabrication Process	0.35um CMOS
Die Substrate	Si
Approximate Transistor Count	80,200
Metallization / # Layers	AlCu / 3
Polyimide	No
Passivation	undoped-oxide/SiN

Table 1.2: Die/Fab Product Characteristics- MEMS

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data		
Generic/Root Part #	ADXL350	ADXL375	AD22365	ADXL313
Die Id	XC350 1	XC377 0	XC365 5	XC313 1
Die Size (mm)	1.155 x 1.34	1.155 x 1.34	1.29 x 1.515	1.29 x 1.515
Wafer Fabrication Site	ADI-Wilmington	ADI-Wilmington	ADI-Wilmington	ADI-Wilmington
Wafer Fabrication Process	MEMS	MEMS	MEMS	MEMS
Die Substrate	Si	Si	Si	Si
Metallization / # Layers	AlCu / 1	AlCu / 1	AlCu / 1	AlCu / 1
Polyimide	No	No	No	No
Passivation	None	None	None	None

Table 1.3: Die/Fab Product Characteristics- MEMS Cap

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data		
Generic/Root Part #	ADXL350	ADXL375	AD22365	ADXL313
Die Id	C350	C345C	C365	C313
Die Size (mm)	1.155 x 1.34	1.155 x 1.34	1.29 x 1.515	1.29 x 1.515
Wafer Fabrication Site	ADI-Wilmington	ADI-Wilmington	ADI-Wilmington	ADI-Wilmington
Wafer Fabrication Process	MEMS	MEMS	MEMS	MEMS
Die Substrate	Si	Si	Si	Si
Polyimide	No	No	No	No
Passivation	None	None	None	None

Die/Fab Test Results
Table 2: Die/Fab Test Results – MEMS at ADI-Wilmington

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Group D	MIL-STD-883, M5005	Sub 4, MEMS XL, Shock/Vib./Cent-30kg/Seal	AD22365	Q8641.22	0/20
				Q8641.23	0/20
				Q8641.24	0/20
		Sub 4, Shock/Vib/Cent., Single Duration	ADXL313	Q10262.GD1	0/39
				Q10157.GD1	0/39
				Q10157.GD2	0/39
				Q10157.GD3	0/39
		Mechanical Shock - Powered	IEC 60068-2-27	2,000g, 5 Shock Pulses, 0.5ms, Single Duration	AD22365
Q19470.2.3	0/20				
Q19470.3.3	0/20				
10,000g, 5 Shock Pulses, 0.1ms, Single Duration	AD22365			Q8641.43	0/10
				Q8641.44	0/10
				Q8641.45	0/10
	ADXL313			Q17046.1.3	0/32
				Q17046.1.4	0/32
				Q17046.2.2	0/32
Q10157.PM1	0/10				
	Q10157.PM2			0/10	
	Q10157.PM3			0/10	
Mechanical Shock – Un-Powered	IEC 60068-2-27	2,000g, 5 Shock Pulses, 0.5ms, Single Duration	AD22365	Q19470.1.4	0/15
				Q19470.2.4	0/15
				Q19470.3.4	0/15
		10,000g, 5 Shock Pulses, 0.1ms, Single Duration	AD22365	Q17046.1.6	0/32
				ADXL313	Q17046.1.5
			ADXL313	Q17046.2.3	0/32
Random Drop	AEC-Q100 Test G5	10 drops from 1.2m, Single Duration	AD22365	Q8641.40	0/35
				Q8641.41	0/35
				Q8641.42	0/35
			ADXL313	Q10262.RD1	0/25
				Q10157.RD1	0/25
				Q10157.RD2	0/25
				Q10157.RD3	0/25
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 1,000 Cycles	ADXL375	Q19936.TC1	0/77
				Q19936.TC2	0/77
				Q19936.TC3	0/77
Unbiased HAST (UHST) ¹	JESD22-A118	110C 85%RH 17.7 psia, P264	ADXL375	Q19936.UH1	0/77
				Q19936.UH2	0/77
				Q19936.UH3	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125°C, Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

Table 3: Die/Fab Test Results – MEMS Cap at ADI-Wilmington

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 1,000 Cycles	ADXL375	Q19936.TC1	0/77
				Q19936.TC2	0/77
				Q19936.TC3	0/77
Unbiased HAST (UHST) ¹	JESD22-A118	110C 85%RH 17.7 psia, P264	ADXL375	Q19936.UH1	0/77
				Q19936.UH2	0/77
				Q19936.UH3	0/77

Table 4: Die/Fab Test Results – 0.35um CMOS at TSMC Fab-11

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL350	Q9692.10	0/77
				Q9692.11	0/77
				Q9692.12	0/77
High Temperature Operating Life (HTOL) ¹	JESD22-A108	125°C<T _j <135°C, Biased, 1,000 Hours	ADXL350	Q9572.1	0/77
				Q9572.2	0/77
				Q9572.3	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 Hours	ADXL350	Q9692.1	0/77
				Q9692.2	0/77
				Q9692.3	0/77
Early Life Failure Rate (ELFR)	MIL-STD-883, M1015	125°C, 48 Hours	ADXL345	Q10844.62	0/2010
				Q10554	0/1750
				Q10206	0/2210

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125°C, Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

Package/Assembly Product Characteristics
Table 5: Package/Assembly Product Characteristics - 16-LGA_CAV at AMKOR (AP3)

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	ADXL350
Package	16-LGA_CAV
Body Size (mm)	4.00 x 3.00 x 1.2
Assembly Location	AMKOR (AP3)
MSL/Peak Reflow Temperature(°C)	3 / 260°C
Mold Compound	N/A
Die Attach/Underfill	Dow Corning 7920 non-conductive / N/A
Leadframe Material	BT Resin
Lead Finish	Au
Wire Bond Material/Diameter (mils)	Tanaka GPG 2N Gold / 1.00

Package/Assembly Test Results
Table 6: Package/Assembly Test Results – LGA at AMKOR (AP3)

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Group D	MIL-STD-883, M5005	Sub 4, Shock/Vib./Cent., Single Duration	ADXL350	Q9692.13	0/20
				Q9692.14	0/20
				Q9692.15	0/20
Random Drop	CAM0091	10 drops from 1.2m, Single Duration	ADXL350	Q9080.31	0/10
				Q9080.32	0/10
				Q9080.33	0/10
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 500 Cycles	ADXL350	Q9692.4	0/77
				Q9692.5	0/77
				Q9692.6	0/77
Unbiased HAST (UHST) ¹	JESD22-A118	130C 85%RH, 2atm, 96 Hours	ADXL350	Q9692.7	0/77
				Q9692.8	0/77
				Q9692.9	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL350	Q9692.10	0/77
				Q9692.11	0/77
				Q9692.12	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	130°C, 85%RH, 2atm, Biased, 96 Hours	ADXL350	Q9692.1	0/77
				Q9692.2	0/77
				Q9692.3	0/77
Solder Heat Resistance (SHR) ¹	ADI-0049	MSL-3	ADXL350	Q9692.16	0/11
				Q9692.17	0/11
				Q9692.18	0/11

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake: 24 hrs @ 125°C, Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with a peak temperature of 260°C.

ESD Test Results

The results of Human Body Model (HBM), Machine Model (MM), and Field-Induced Charged Device Model (FICDM) ESD testing are summarized in Table 7. ADI measures ESD results using stringent test procedures based on the specifications listed. Any comparison with another supplier's results should ensure that the same ESD test procedures have been used. For further details, please see the EOS/ESD chapter of the ADI Reliability Handbook (available via the 'Quality and Reliability' link on [Analog Devices' web site](#)).

Table 7: ADXL350 ESD Test Results

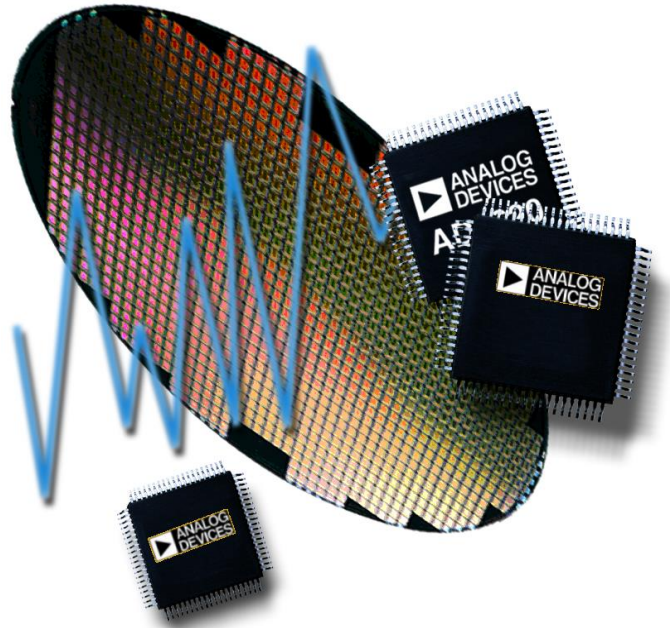
ESD Model	Package	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	16-LGA_CAV	JESD22-C101	1Ω, Cpkg	±750V	±1000V	III
HBM	16-LGA_CAV	ESDA/JEDEC JS-001-2011	1.5kΩ, 100pF	±2000V	NA	2
MM	16-LGA_CAV	JESD22-A115	0Ω, 200pF	±200V	NA	NA

Latch-Up Test Results

Six samples of the ADXL350 were latch-up tested at $T_A=25^{\circ}\text{C}$ per JEDEC Standard JESD78, Class I, Level A. All samples passed.

Approvals

Reliability Engineer: Michael Walornyj



Reliability Report

Report Title: ADXL375/377 Sensor Fab Site
Transfer from TSMC to ADWL

Report Number: 19936

Revision: A

Date: 4 April 2023

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the ADXL375 product in a 14-LGA package with XC377 Wilmington only flow MEMS sensor. This qualification also covers the ADXL377 in 16-LFCSP which also uses the XC377 Wilmington only flow MEMS sensor.

The ADXL375 uses the ADXL377 sensor (low power 3-axis accelerometer) paired with the ADXL345 rev D ASIC and packaged in the 14 lead LGA ADXL345.

The ADXL377 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs in a 16 lead LFCSP package.

Die/Fab Product Characteristics

Table 1.1: Die/Fab Product Characteristics- 0.35um CMOS

Product Characteristics	Product(s) to be qualified		Product(s) used for Substitution Data
Generic/Root Part #	ADXL375	ADXL377	ADXL345
Die Id	XA345D	S08D3CS35D17 / A	XA345D
Die Size (mm)	2.25 x 1.45	1.60 x 1.53	2.25 x 1.45
Wafer Fabrication Site	TSMC Fab-11	Magnachip CF-4	TSMC Fab-11
Wafer Fabrication Process	0.35um CMOS	0.35um CMOS	0.35um CMOS
Die Substrate	Si	Si	Si
Metallization / # Layers	AlCu(0.5%)/3	AlCu(0.5%)/3	AlCu(0.5%)/3
Polyimide	No	No	No
Approximate Transistor Count	80,200	80,200	80,200
Passivation	undoped-oxide/SiN	undoped-oxide/SiN	undoped-oxide/SiN

Table 1.2: Die/Fab Product Characteristics- MEMS

Product Characteristics	Product(s) to be qualified	
Generic/Root Part #	ADXL375	ADXL377
Die Id	XC377	XC377
Die Size (mm)	1.155 x 1.340	1.155 x 1.340
Wafer Fabrication Site	ADI-Wilmington	ADI-Wilmington
Wafer Fabrication Process	MEMS	MEMS
Die Substrate	Si	Si
Metallization / # Layers	AlCu(0.5%)/1	AlCu(0.5%)/1
Polyimide	No	No
Passivation	None	None

Die/Fab Test Results

Table 2: Die/Fab Test Results for ADXL375/377 MEMS at ADI-Wilmington

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Group D	MIL-STD-883, M5005	Sub 4, Shock/Vib/Cent.,	ADXL375	Q19936.1.GD1_RES	0/39
				Q19936.2.GD2_RES	0/39
				Q19936.3.GD3_RES	0/39
PMS	IEC 60068-2-27	10,000g, 5 Shock Pulses, 0.1ms, Single Duration	ADXL375	Q19936.2.MS1	0/10
				Q19936.3.MS2	0/10
				Q19936.4.MS3	0/10
Random Drop	AEC-Q100 Test G5	10 drops from 1.2m, Single Duration	ADXL375	Q19936.1.RD1_RES	0/20
				Q19936.2.RD2_RES	0/20
				Q19936.3.RD3_RES	0/20
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 500 Cycles	ADXL375	Q19936.1.TC1_RES	0/77
				Q19936.1.TC2_RES	0/77
				Q19936.3.TC3_RES	0/77
Unbiased HAST (UHST) ¹	JESD22-A118	110°C 85%RH 17.7 psia, 264hrs	ADXL375	Q19936.1.UH1_RES	0/77
				Q19936.3.UH2_RES	0/77
				Q19936.3.UH3_RES	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake:24 hrs @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with peak temperature of 260°C.

Table 3: Die/Fab Test Results for ADXL375 - 0.35um CMOS at TSMC Fab-11

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Early Life Failure Rate (ELFR)	MIL-STD-883, Method 1015	150°C, 48 Hours	ADXL345	Q8378	0/1760
	MIL-STD-883, Method 1015	Ta=125°C, 48 Hours	ADXL345	Q10554	0/2010
High Temperature Operating Life (HTOL) ¹	JESD2-A108	150°C<Tj<175°C Biased, 500 Hours	ADXL345	Q9681.1	0/77
				Q9681.2	0/77
				Q9681.3	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL375	Q13713.HS1	0/77
				Q13713.HS2	0/77
				Q13713.HS3	0/77
Temperature Humidity Bias (THB) ¹	JESD22-A101	85C 85%RH, Biased, 1000 Hours	ADXL375	Q13713.UH1	0/77
				Q13713.UH2	0/77
				Q13713.UH3	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake:24 hrs @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with peak temperature of 260°C.

Table 4: Die/Fab Test Results for ADXL377 - 0.35um CMOS at Magnachip CF-4

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Early Life Failure Rate (ELFR)	MIL-STD-883, Method 1015	Ta=125°C, 48 Hours	ADXL377	Q9687	0/1980
High Temperature Operating Life (HTOL) ¹	JESD2-A108	125°C < Tj < 135°C, Biased, 1,000 Hours	ADXL377	Q11259.9	0/77
				Q11259.10	0/77
				Q11259.11	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL377	Q11259.13	0/77
				Q11259.14	0/77
				Q11259.15	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A101	130°C, 85%RH, 2atm, Biased, 96 Hours	ADXL377	Q11259.9	0/77
				Q11259.10	0/77
				Q11259.11	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake:24 hrs @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with peak temperature of 260°C.

Package/Assembly Product Characteristics
Table 5: Package/Assembly Product Characteristics – ADXL375/377

Product Characteristics	Product(s) to be qualified	
Generic/Root Part #	ADXL375	ADXL377
Package	14-LGA	16-LFCSP
Body Size (mm)	3.00 x 5.00 x 0.95	3.00 x 3.00 x 1.45
Assembly Location	AMKOR (AP3)	AMKOR (AP1)
MSL/Peak Reflow Temperature(°C)	3 / 260°C	3 / 260°C
Mold Compound	Sumitomo G770	Sumitomo G770HCD
Die Attach/Underfill	Ablestik 2300 conductive / NA	QMI 536
Leadframe Material	BT Resin	Cu7025
Lead Finish	AU	Ag
Wire Bond Material/Diameter (mils)	Tanaka GPG 2N Gold / 1.00	Tanaka GPG 2N Gold / 0.80

Package/Assembly Test Results
Table 6: Package/Assembly Test Results for ADXL375 – LGA at AMKOR (AP3)

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Group D	MIL-STD-883, M5005	Sub 4, Shock/Vib/Cent.,	ADXL375	Q19936.1.GD1_RES	0/39
				Q19936.2.GD2_RES	0/39
				Q19936.3.GD3_RES	0/39
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL375	Q13713.HS1	0/77
				Q13713.HS2	0/77
				Q13713.HS3	0/77
Low Temperature Storage (LTS)	JESD22-A119	-55°C, 1,000 Hours	ADXL375	Q13713.LS1	0/77
				Q13713.LS2	0/77
				Q13713.LS3	0/77
Preconditioning	J-STD-020	MSL3	ADXL375	Q10491.UH1	0/77
				Q10491.UH2	0/77
				Q10491.UH3	0/77
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 500 Cycles	ADXL375	Q19936.1.TC1_RES	0/77
				Q19936.1.TC2_RES	0/77
				Q19936.3.TC3_RES	0/77
Temperature Humidity Bias (THB) ¹	JESD22-A101	85C 85%RH, Biased, 1000 Hours	ADXL375	Q13713.UH1	0/77
				Q13713.UH2	0/77

				Q13713.UH3	0/77
Unbiased HAST (UHST) ¹	JESD22-A118	110°C 85%RH 17.7 psia, 264hrs	ADXL375	Q19936.1.UH1_RES	0/77
				Q19936.3.UH2_RES	0/77
				Q19936.3.UH3_RES	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake:24 hrs @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with peak temperature of 260°C.

Table 7: Package/Assembly Test Results for ADXL377 – LFCSP at AMKOR (AP3)

Test Name	Spec	Conditions	Generic/Root Part #	Lot #	Fail/SS
Group D	MIL-STD-883, M5005	Sub 4, Shock/Vib./Cent. Single Duration	ADXL377	Q9687.16	0/20
				Q9687.17	0/20
				Q9687.18	0/20
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL377	Q9687.13	0/77
				Q9687.14	0/77
				Q9687.15	0/77
Autoclave (AC)	JESD22-A102	121C, 100%RH, 2atm, 96 Hours	ADXL377	Q9687.4	0/77
				Q9687.5	0/77
				Q9687.6	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADXL377	Q11259.13	0/77
				Q11259.14	0/77
				Q11259.15	0/77
Solder Heat Resistance (SHR) ¹	ADI-0049	MSL-3	ADXL377	Q9687.25	0/10
				Q9687.26	0/10
				Q9687.27	0/10
Temperature Cycling (TC) ¹	JESD22-A104	-65°C/+150°C, 500 Cycles	ADXL377	Q9687.7	0/77
				Q9687.8	0/77
				Q9687.9	0/77
Highly Accelerated Temperature and Humidity Stress Test (HAST) ¹	JESD22-A110	130°C 85%RH, Biased, 96 Hours	ADXL377	Q9687.10	0/77
				Q9687.11	0/77
				Q9687.12	0/77

¹ These samples were subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: Bake:24 hrs @ 125°C, Soak: Unbiased Soak: 192 hrs @ 30°C, 60%RH, Reflow: 3 passes through an oven with peak temperature of 260°C.

ESD and Latch-Up Test Results for ADXL345
Table 8: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class
FICDM	ADXL345	14-LGA	ANSI/ESD STM5.3.1-1999	1Ω, Cpkg	±1500V	C6
HBM	ADXL345	14-LGA	ANSI/ESD STM5.1-2007	1.5kΩ, 100pF	±2000V	2

Table 9: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T _A)	Class
JESD78	ADXL345	+100mA, -100mA	+5.4V	25°C	I

ESD and Latch-Up Test Results for ADXL377
Table 10: ESD Test Result

ESD Model	Generic/Root Part #	Package	ESD Test Spec	RC Network	Highest Pass Level	Class
FICDM	ADXL377	16-LFCSP	JESD22-C101	1Ω, Cpkg	±2000V	IV
HBM	ADXL377	16-LFCSP	ESDA/JEDEC JS-001-2011	1.5kΩ, 100pF	±3000V	2

Table 11: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T _A)	Class
JESD78	ADXL377	+100mA, -100mA	+4.95V	25°C	I

Approvals

Reliability Engineer: Michael Walornyj