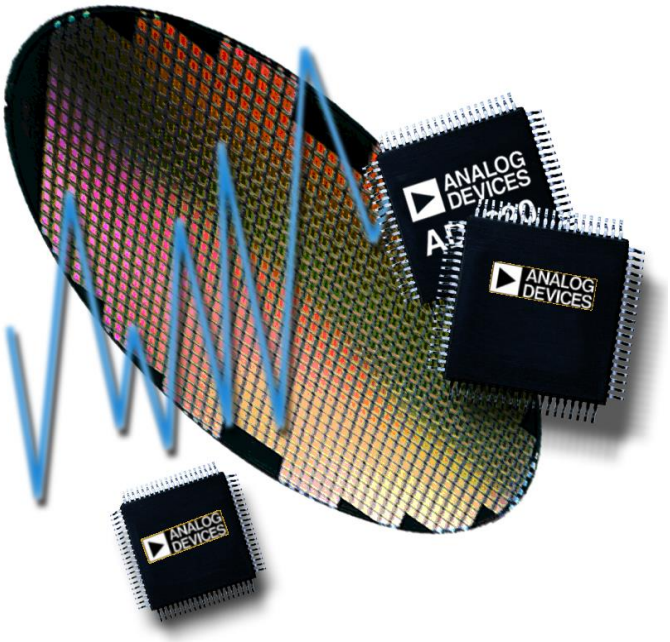

Reliability Report

Report Title: ADM1281 Die Revision C Qualification

Report Number: 22355

Revision: A

Date: 7 May 2025

Summary

This report documents the successful completion of the reliability qualification requirements for the release of the die revision of the ADM1281 product in a 32-LFCSP package. The ADM1281 is a hot swap controller that allows a circuit board to be removed from or inserted into a live backplane. It also features current, voltage, power and temperature readback via an integrated 12-bit analog-to-digital converter (ADC), accessed using a PMBus™ interface.

Die/Fab Product Characteristics

Table 1: Die/Fab Product Characteristics – 0.18um BCDMOS at Dongbu HiTek

Product Characteristics	Product(s) to be qualified
Generic/Root Part #	ADM1281
Die Id	D184AN36001U A
Die Size (mm)	3.165 x 2.620
Wafer Fabrication Site	Dongbu HiTek Fab 1
Wafer Fabrication Process	0.18um BCDMOS
Die Substrate	Si
Metallization / # Layers	AlCu(0.5%)/4
Polyimide	No
Passivation	No

Die/Fab Test Results

Table 2: Die/Fab Test Results – 0.18um BCDMOS at Dongbu HiTek

Test Name	Spec	Conditions	Generic/ Root Part #	Lot #	Fail/SS
Early Life Failure Rate (ELFR)	JESD22-A108	125°C<Tj<135°C, Biased, 48 Hours	ADM1281	Q21381.1.ELADONGBU-NP	0/667
				Q21381.2.ELADONGBU-NP	0/667
				Q21381.3.ELADONGBU-NP	0/667
				Q22355.1.ELArevC-SiP3	0/800
High Temperature Operating Life (HTOL)	JESD22-A108	125°C<Tj<135°C, Biased, 1,000 Hours	ADM1281	Q22355.1.HOrevC-SiP3	0/77
				Q21381.1.HODONGBU-NP	0/77
				Q21381.2.HODONGBU-NP	0/77
				Q21381.3.HODONGBU-NP	0/77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADM1281	Q21381.1.HSDONGBU-NP	0/45
Highly Accelerated Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	ADM1281	Q21381.1.HA3DONGBU-NP	0/45
				Q21381.2.HA1DONGBU-NP	0/45
				Q21381.3.HA2DONGBU-NP	0/45

[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 - LFCSP at ASE (AEK)

Product Characteristics	Product(s) to be qualified	Product(s) used for Substitution Data			
Generic/Root Part #	ADM1281	AD9684	AD7193	ADP5042	ADP1741
Package	32-LFCSP	48-LFCSP	32-LFCSP	20-LFCSP	16-LFCSP
Body Size (mm)	5.00 x 5.00 x 0.75	7.00 x 7.00 x 0.75	5.00 x 5.00 x 0.75	4.00 x 4.00 x 0.75	4.00 x 4.00 x 0.75
Assembly Location	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
Mold Compound	Sumitomo G700LYT	Sumitomo G700LYT	Sumitomo G700LYT	Sumitomo G700LYT	Sumitomo G700LYT
Die Attach/Underfill/TIM	Hitachi EN 4900GC conductive	Hitachi EN 4900GC conductive	Hitachi EN 4900GC conductive	Hitachi EN 4900GC conductive	Hitachi EN 4900GC conductive
Leadframe Material	Copper	Copper	Copper	Copper	Copper
Lead Finish	100Sn	100Sn	100Sn	100Sn	100Sn
Wire Bond Material/Diameter (mils)	PdCuAu 4N / 0.80	PdCuAu 4N / 1.0	PdCuAu 4N / 1.0	PdCuAu 4N / 1.0	PdCuAu 4N / 1.0

Package/Assembly Test Results

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

Test Name	Spec	Conditions	Generic/ Root Part #	Lot #	Fail/SS
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 1,000 Hours	ADM1281	Q21381.1.HSDONGBU-NP	0/45
			AD9864	Q22773.1.HS1_CuW	0/45
			AD7193	Q22774.1.HS1_CuW	0/45
		150°C, 500 Hours	ADM1281	Q22355.1.HS-SiP3	0/45
Highly Accelerated Temperature and Humidity Stress Test (HAST)[1]	JESD22-A110	130C 85%RH 33.3 psia, Biased, 96 Hours	ADM1281	Q21381.1.HA3DONGBU-NP	0/45
				Q21381.2.HA1DONGBU-NP	0/45
				Q21381.3.HA2DONGBU-NP	0/45
			AD7193	Q22774.1.HA1_CuW	0/77
				Q22774.2.HA2_CuW	0/77
				Q22774.3.HA3_CuW	0/77
			AD9864	Q22773.2.HA2_CuW	0/77
				Q22773.3.HA3_CuW	0/77
			ADP5042	Q22776.3.HA3_CuW	0/77
		130C 85%RH 33.3 psia, Biased, 192 Hours	ADP1741	Q22779.1.HA1_CuW	0/77
				Q22779.2.HA2_CuW	0/77
				Q22779.3.HA3_CuW	0/77
Temperature Cycling (TC)[1]	JESD22-A104	-65°C/+150°C, 500 Cycles	ADM1281	Q21381.1.TCDONGBU-NP	0/77
				Q21381.2.TCDONGBU-NP	0/77
				Q21381.3.TCDONGBU-NP	0/77
			AD9864	Q22773.1.TC1_CuW	0/77
				Q22773.2.TC2_CuW	0/77
				Q22773.2.TC3_CuW	0/77
			AD7193	Q22774.1.TC1_CuW	0/77
				Q22774.2.TC2_CuW	0/77
				Q22774.3.TC3_CuW	0/77
Unbiased HAST (UHST)[1]	JESD22-A118	130C 85% RH 33.3 psia, 96 Hours	ADM1281	Q21381.1.uHDONGBU-NP	0/77
				Q21381.2.uHDONGBU-NP	0/77
				Q21381.3.uHDONGBU-NP	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	ADM1281	32-LFCSP	JS-002	1Ω, Cpkg	±1250V	C3
HBM	ADM1281	32-LFCSP	JS-001	1.5kΩ, 100pF	±2000V	2

Table 6: Latch Up Test Result

LU Test Spec	Generic/Root Part #	Passing Current	Passing Over-Voltage	Temperature (T_A)	Class
JESD78	ADM1281	+200mA, -200mA	+30V	25°C	I

Approvals

Reliability Engineer: Ryan Quintin