





**Report Title:** EP130 8" Transfer Qualification of the

**ADUM1220, ADUM1223, ADUM1230** 

and ADUM1233

**Report Number: 5958** 

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## **Summary**

This report documents the successful completion of the reliability qualification requirements for release of the ADUM1220, ADUM1223, ADUM1230 and ADUM1233 products.

The ADUM1220, ADUM1223, ADUM1230 and ADUM1233 are isolated half-bridge gate drivers that employs Analog Devices iCoupler technology to provide independent and isolated high-side and low-side outputs. Combining high speed CMOS and monolithic transformer technology, these isolated components provide outstanding performance characteristics superior to optocoupler-based solutions.

The ADUM1220 is the main vehicle used for this qual. The ADUM1223 is a variant of the ADUM1220 while the ADUM1233 has the same die as the ADUM1223, and the ADUM1230 has the same die as the ADUM1220.

## Table 1. ADUM1220/30 Product Characteristics

### **Device**

Device / Die ID	ADuM1220GD	ADuM1220TC	ADuM1220IC(TMN188A)
Die Size (mm)	0.870 x 0.860	1.12 x 1.92	0.89 x 1.27
Wafer Fabrication Site	ADI-Limerick	TSMC Fab - 09	TSMC Fab - 09
Wafer Fabrication Process	H6DPTM	0.6um	DPTM CMOS
Passivation Layer	undoped-oxide/SiN	doped-oxide/SiN	undoped-oxide/SiN
Bond Pad Metal Composition		AlCu	

## Package/Assembly

Available Package(s)	16-SOICWB
Body Size (mm)	7.60 x 10.50 x 2.35
Assembly Location	Carsem-M
Die Attach	Ablestik 84-3J
Lead Frame Material	Copper
Bond Wire Type	Gold
Bond Wire Dia. (mils)	1.30
Mold Compound	Sumitomo 6600H
Lead Finish	S.B. 100Sn
Moisture Sensitivity Level	1
Maximum Peak Reflow (°C)	260C (-5C/+0C)



## Table 2. ADUM1223/33 Product Characteristics

#### **Device**

Device / Die ID	ADuM1223GD	ADuM1223TC	ADuM1220IC(TMN188-0001A)
Die Size (mm)	0.870 x 0.860	1.12 x 1.92	0.89 x 1.27
Wafer Fabrication Site	ADI-Limerick	TSMC Fab - 09	TSMC Fab - 09
Wafer Fabrication Process	H6DPTM	0.6	um DPTM CMOS
Passivation Layer	undoped-oxide/SiN	doped-oxide/SiN	undoped-oxide/SiN
<b>Bond Pad Metal Composition</b>		AlCu	

Package/Assembly

16-SOICWB
7.60 x 10.50 x 2.35
Carsem-M
Ablestik 84-3J
Copper
Gold
1.30
Sumitomo 6600H
S.B. 100Sn
1
260C (-5C/+0C)

# **Description/Results of Tests Performed**

Table 3 thru 5 provide a description of the qualification tests conducted and the associated test results on the ADG1208, ADP3120A, ADUM1220, and ADUM1223 and other products manufactured on the same technologies as described in the product characteristics tables.

**Table 3. ADUM1220 Qualification Test Results** 

	Conditions	Specification	Device	Fab Process	Lot Num	Sample Size	Qty. Rejects
				MCM:	R69986.1	168	0
				NA, 0.6um	R69986.2	168	0
				DPTM	R69986.3	168	0
				CMOS, and	R69986.4	166	0
		NAUL OTD 000		H6DPTM	R76048.1	168	0
ELF	125C 48hrs	MIL-STD-883, Method 1015	ADUM1220		R76048.2	168	0
					R76048.3	167	0
					R76048.4	166	0
					R86341.1	250	0
					R86341.2	250	0
					R86341.3	168	0



				MCM:	NA	77	0
	130C 85%RH	JEDEC-STD-		NA, 0.6um	R69990.1	77	0
HAST 1	2atm, Biased	22, Method	ADUM1220	DPTM	R69991.1	77	0
	96hrs	A110		CMOS, and H6DPTM	R86362.1	77	0
				MCM:	NA	77	0
				NA, 0.6um	R85067.1	77	0
HTOL	125C <tj<135c, Biased 1000hrs</tj<135c, 	JESD22-A108	ADUM1220	DPTM	R86352.1	76	0
	Diasca Toodiiis			CMOS, and H6DPTM	R86402.1	77	0
				MCM:	NA	77	0
	4040 4000/ BU	JEDEC-STD-		NA, 0.6um	R69988.1	77	0
Autoclave 1	121C 100%RH 2atm 168hrs	22, Method	ADUM1220	DPTM	R69989.1	77	0
	Zum rooms	A102		CMOS, and H6DPTM	R86361.1	77	0
				MCM:	NA	77	0
		JEDEC-STD-		NA, 0.6um	R69639.1	77	0
HTS	150C 1000hrs	22, Method	ADUM1220	DPTM	R69640.1	77	0
		A103		CMOS, and H6DPTM	R86351.1	77	0
				MCM:	NA	0	0
				NA, 0.6um	R69994.1	10	0
SHR 1	See Below	ADI-0049	ADUM1220	DPTM	R69995.1	10	0
				CMOS, and H6DPTM	R86364.1	10	0
				MCM:	NA	77	0
	050/ 4500	JEDEC-STD-		NA, 0.6um	R69992.1	77	0
1 emp Cycle	-65C/+150C 500cycles	22, Method	ADUM1220	DPTM	R69993.1	77	0
Autoclave 1 1:  HTS 1	500cycles	A104		CMOS, and H6DPTM	R86363.1	77	0

<sup>&</sup>lt;sup>1</sup> These Samples were subjected to preconditioning (per J-STD-020 Level 1) prior to the start of the stress test. Level 1 preconditioning consists of the following:

• Bake: 24 hrs @ 125°C

Unbiased Soak: 168 hrs @ 85°C, 85%RH

• Reflow: 3 passes through an oven with a peak temperature of 260+0/-5°C

Samples of the many devices manufactured with this packaging technology are continuously undergoing reliability evaluation as part of the ADI Reliability Monitor Program. Additional qualification data is available on Analog Devices' web site at: <a href="http://www.analog.com/corporate/quality/read/1stpage.html">http://www.analog.com/corporate/quality/read/1stpage.html</a>.



**Table 4. Process Qualification Test Results** 

Test Name	Conditions	Specification	Part Number	Fab Process	Lot Number	Sample Size	Qty. Rejects		
				H6DPTMI	R61593.1	450	0		
					R61593.2	220	0		
			ADC1209		PTMI R61593.1 450 0  R61593.2 220 0  R61595.1 450 0  R61595.2 220 0  R79294.1 600 0  R79294.2 70 0  R31644.2 318 0  R31644.3 352 0  R39265.2 510 0  R39266.2 270 0  R39266.3 80 0  R39266.3 80 0  R64524.1 77 0  R69861.1 77 0  R69861.1 77 0  R42849.1 77 0  R42849.2 41 0  R42849.2 41 0  R42849.2 41 0  R42849.1 77 0  R61594.1 77 0  R61594.1 77 0  R6286.1 77 0  R64525.1 77 0  R61594.1 77 0  R64525.1 77 0  R85068.1 77 0  R842849.1 77 0  R842849.1 77 0  R842849.1 77 0  R42849.1 77 0  R64525.1 77 0  R85068.1 77 0  R85068.1 77 0  R8206.1 76 0  R39266.1 76 0  R39266.1 76 0  R39266.1 77 0  R42845.1 77 0  R42845.1 77 0  R42847.1 77 0  R42847.1 77 0  R42853.1 77 0  R42853.1 77 0  R69863.1 77 0  R69863.1 77 0  R69863.1 77 0				
			ADG1208	H6DPTMI	R61595.2	number         Size         Rejects           61593.1         450         0           61593.2         220         0           61595.1         450         0           61595.2         220         0           61595.2         220         0           61595.2         220         0           61595.2         220         0           61644.3         352         0           61644.3         352         0           61644.3         352         0           61644.3         352         0           61644.3         352         0           61646.3         58         0           61626.2         270         0           61626.3         80         0           61626.3         80         0           61626.1         77         0           61686.1         77         0           612849.1         77         0           612849.1         77         0           61594.1         77         0           61594.1         77         0           61644.1         75         0           61642.1 </td <td>0</td>	0		
					R79294.1	600	0		
	1050 10hm	MIL-STD-883,			R79294.2	70	ize         Rejects           150         0           220         0           150         0           220         0           300         0           70         0           318         0           352         0           310         0           380         0           77         0		
ELF	125C 48hrs	Method 1015			R31644.2	318	0		
					R31644.3	352	0		
			A D D 0 4 0 0 A	LIC 4CV/DDDMI	R39265.2	510	0		
			ADP3120A	H6_16VDPDMI	R39265.3	58	0		
					R39266.2	270	0		
					R39266.3	80	0		
					R64524.1	77	0		
			ADG1208	H6DPTMI	R69860.1	77	0		
	130C 85%RH				R69861.1	77	0		
HAST 1	2atm, Biased	JEDEC-STD-22, Method A110			R42848.1	77	0 0 0		
	96hrs	Welliou ATTO	4 D D 0 4 0 0 4	110 40) (DDD141	R42849.1	77	0		
			ADG1208 H6DPTMI R69860.1 77 R69861.1 77 R42849.1 77 R42849.1 77 R42849.2 41 R42850.1 77 R42850.1 77 R69861.1 77 R42849.1 77 R42869.1 77 R42869.1 77 R69861.1 77 R42849.2 41 R42850.1 77 R69861.1 77 R69861.1 77 R69861.1 77 R69861.1 77 R85068.1 77 R85068.1 77 R85068.1 77 R81644.1 75 R31644.1 75 R39266.1 76	41	0				
			ADP3120A H6_16		R42850.1	77	0		
							R61594.1	77	0
				G1208 H6DPTMI	R64552.1	77	0		
LITOI	125C <tj<135c,< td=""><td>IECD00 4400</td><td></td><td></td><td>R85068.1</td><td>77</td><td>0</td></tj<135c,<>	IECD00 4400			R85068.1	77	0		
HTOL	Biased 1000hrs	JESD22-A108			R31644.1	75	0		
			ADP3120A	H6_16VDPDMI	R39265.1	76	0		
					R39266.1	76	0		
			ADC4200	LICDDTM	R64522.1	77	0		
			ADG1208	HODPINII	R69859.1	77	0		
Autoclave	121C 100%RH 2atm 168hrs	JEDEC-STD-22, Method A102			R42845.1	77	0		
	24111 1001113	Welliou A 102	ADP3120A	H6_16VDPDMI	R42846.1	77	0		
					R42847.1	77	0		
					R42851.1	77	0		
HTS	150C 1000hrs	JEDEC-STD-22, Method A103	ADP3120A	H6_16VDPDMI	R42852.1	77	0		
		Metriod A103			R42853.1	77	0		
SHR 1	See Below	ADI-0049			R64523.1	10	0		
					R64525.1	10	0		
			ADG1208	H6DPTMI	R69862.1	10	0		
						77	0		
					R69864.1	77	0		
			ADP3120A	H6_16VDPDMI	R42854.1	10	0		
					R42855.1	10	0		



					R42856.1	10	0
<b>T</b>	050/.4500	IEDEO OTD 00			R42857.1	77	0
Temp Cycle 1	-65C/+150C 500cycles	JEDEC-STD-22, Method A104	ADP3120A	H6_16VDPDMI	R42858.1	77	0
Cyclo	occoyoloc	Widalida / (101			R42859.1	77	0

<sup>&</sup>lt;sup>1</sup> These Samples were subjected to preconditioning (per J-STD-020 Level 1) prior to the start of the stress test. Level 1 preconditioning consists of the following:

• Bake: 24 hrs @ 125°C

Unbiased Soak: 168 hrs @ 85°C, 85%RH

• Reflow: 3 passes through an oven with a peak temperature of 260+0/-5°C

Samples of the many devices manufactured with these process technologies are continuously undergoing reliability evaluation as part of the ADI Reliability Monitor Program. Additional qualification data is available on Analog Devices' web site at: <a href="http://www.analog.com/corporate/quality/read/1stpage.html">http://www.analog.com/corporate/quality/read/1stpage.html</a>.

# **ESD Testing**

The results of Human Body Model (HBM), Machine Model (MM), and Field Induced Charge Device Model (FICDM) ESD testing are summarized in Table 5.

ADI measures ESD results using stringent test procedures based on the specifications listed in the above table. 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 at <a href="http://www.analog.com/corporate/quality/manuals/">http://www.analog.com/corporate/quality/manuals/</a>.

Table 5. ADG1208, ADP3120A, ADUM1220, and ADUM1223 ESD Test Results

ESD Model	Package	Generic	ESD Test Spec	RC Network	Highest Pass Level	First Fail Level	Class
FICDM	16- SOICWB	ADUM1223	ESD Assoc. STM5.3.1- 1999	1Ω, Cpkg	1500V	-	C6
FICDM	16- SOICWB	ADUM1220	ESD Assoc. STM5.3.1- 1999	1Ω, Cpkg	2000V	-	C7
FICDM	16-TSSOP	ADG1208	ESD Assoc. STM5.3.1- 1999	1Ω, Cpkg	1500V	2000V	C6
FICDM	8-SOICnb	ADP3120A	ESD Assoc. STM5.3.1- 1999	1Ω, Cpkg	1500V	2000V	C6
FICDM	8-LFCSP	ADP3120A	ESD Assoc. STM5.3.1- 1999	1Ω, Cpkg	1500V	2000V	NA
FICDM	16- SOICWB	ADUM1220	ESD Assoc. STM5.3.1- 1999	1Ω, Cpkg	2500V	3000V	NA
HBM	8-SOICnb	ADP3120A	ESD Assoc. STM5.1-2001	1.5kΩ, 100pF	1500V	2000V	1C
HBM	16-TSSOP	ADG1208	ESD Assoc. STM5.1-2001	1.5kΩ, 100pF	500	1000V	1B



НВМ	16- SOICWB	ADUM1223	ESD Assoc. STM5.1-2001	1.5kΩ, 100pF	2500V	3000V	2
НВМ	16- SOICWB	ADUM1220	ESD Assoc. STM5.1-2001	1.5kΩ, 100pF	2000V	2500V	2
MM	16- SOICWB	ADUM1223	ESD Assoc. STM5.2-1999	0Ω, 200pF	100V	200V	M2
MM	16- SOICWB	ADUM1220	ESD Assoc. STM5.2-1999	0Ω, 200pF	100V	200V	M2

# **Latch-up Testing**

Six samples of the ADUM1220, ADUM1223, ADUM1230 and ADUM1233 passed Latchup testing at Ta=25°C per JEDEC Standard JESD78, Class I, Level A.

# **Approvals**

Reliability Engineer: Mark Forde

This report has been approved by electronic means (3.3).

### **Additional Information**

Data sheets and other additional information are available on Analog Devices' web site at the addresses shown below.

Home Page: <a href="http://www.analog.com">http://www.analog.com</a>

Sales Info: <a href="http://www.analog.com/world/corp\_fin/sales\_directory/distrib.html">http://www.analog.com/world/corp\_fin/sales\_directory/distrib.html</a>

Reliability Data: <a href="http://www.analog.com/corporate/quality/read/1stpage.html">http://www.analog.com/corporate/quality/read/1stpage.html</a>

**Reliability Handbook:** <a href="http://www.analog.com/corporate/quality/manuals/">http://www.analog.com/corporate/quality/manuals/</a>