



12-Bit, Current Output, Complete High Speed D/A Converter

AD565

1.0 SCOPE

This specification documents the detail requirements for space qualified die manufactured on Analog Devices, Inc.'s QML certified line per MIL-PRF-38534 class K except as modified herein.

The manufacturing flow described in the STANDARD DIE PRODUCTS PROGRAM brochure at <http://www.analog.com/aerospace> is to be considered a part of this specification.

This data sheet specifically details the space grade version of this product. A more detailed operational description and a complete data sheet for commercial product grades can be found at www.analog.com/AD565

2.0 Part Number. The complete part number(s) of this specification follow:

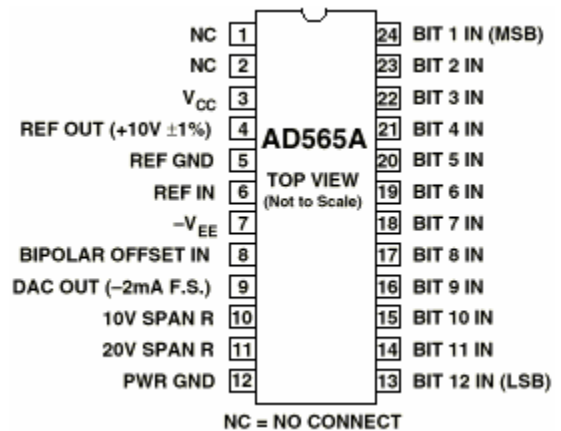
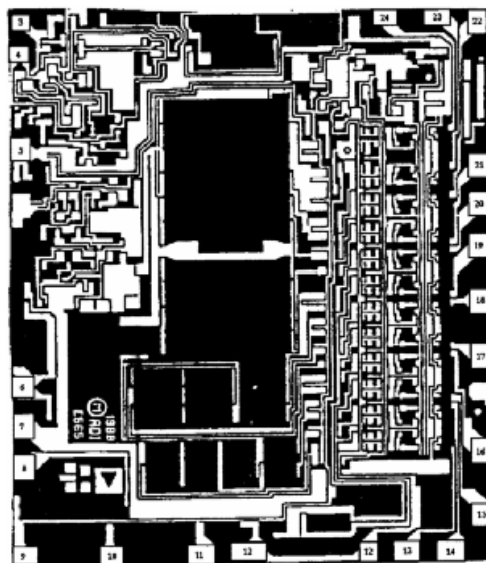
Part Number	Description
AD565-000C	12-Bit, Current Output, Complete High Speed D/A Converter

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness mil	Bond Pad Metalization
119 mil x 146 mil	19 mil ± 2 mil	Al/Cu

3.2 Die Picture



ASD0012329

Rev. D

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3.3 Die Qualification

In accordance with class-K version of MIL-PRF-38534, Appendix C, Table C-II, except as modified herein.

(a) Qual Sample Size and Qual Acceptance Criteria – 10/0

(b) Qual Sample Package – Sidebraced DIP

(c) Pre-screen test post assembly required prior to die qualification, to remove all assembly related rejects.

4.0 Dice Electrical Characteristics

Table I

Parameter	Symbol	Conditions Note 1	Limit Min	Limit Max	Units
Relative Accuracy	RA	All bits w/ positive errors on All bits w/ negative errors on		±0.5	LSB
Differential Nonlinearity	DNL	Major transition		±0.75	LSB
Gain Error	A _E	R _{REF} = 50Ω fixed		±0.25	% of FS
Offset Error	V _{OS}			±0.05	% of FS
Bipolar Zero Error Note 2	B _{PZE}	R _{BO} = 50Ω fixed		±0.15	% of FS
Reference Output Voltage	V _{REF}	Note 3	9.90	10.10	V
Output Current	I _{OUT}	Unipolar (all bits on)	-1.6	-2.4	mA
		Bipolar (all bits on)	-0.8	-1.2	
Power Supply Rejection Ratio	PSRR	V _S = +11.4V to +16.5V dc		±10.0	PPM of FRS/%
		V _S = -11.4V to -16.5V dc		±25.0	
Power Supply Current Note 4, 5	I _{CC}			+5.0	mA
	I _{EE}			-18.0	
Power Dissipation	P _D			345.0	mW
Digital Input High Voltage	V _{IH}		2.0	5.5	V
Digital Input Low Voltage	V _{IL}			0.8	V
Digital Input High Current	I _{IH}	V _{IH} = 5.5V		300.0	μA
Digital Input Low Current	I _{IL}	V _{IL} = 0V		100.0	μA

Table I Notes:

1. V_{CC} = +15V, V_{EE} = -15V, V_{IH} = 2.0V, V_{IL} = 0.8V, T_A = 25°C.
2. MSB on, all other bits off.
3. The reference output is loaded with 0.5mA reference input current, 1.0mA bipolar offset current, and 1.5mA additional current.
4. Guaranteed for +11.4 ≤ V_{CC} ≤ +16.5V.
5. Guaranteed for -11.4 ≤ V_{EE} ≤ -16.5V.

4.1 Electrical Characteristics for Qual Samples

Table II						
Parameter	Symbol	Conditions Note 1	Sub- groups	Limit Min	Limit Max	Units
Relative Accuracy	RA	All bits w/ positive errors on	1		±0.5	LSB
		All bits w/ negative errors on	2, 3		±0.75	
Differential Nonlinearity	DNL	Major transition	1		±0.75	LSB
			2, 3		±1.0	
Gain Error	A _E	R _{REF} = 50Ω fixed	1		±0.25	% of FS
Gain Error Temperature Coefficient	TCA _E		2, 3		±30.0	ppm of FS/°C
Offset Error	V _{OS}		1		±0.05	% of FS
Offset Error Temperature Coefficient	TCV _{OS}		2, 3		±2.0	ppm of FS/°C
Bipolar Zero Error Note 2	B _{PZE}	R _{BO} = 50Ω fixed	1		±0.15	% of FS
Bipolar Zero Error Temperature Coefficient Note 2	TCB _{PZE}		2, 3		±10.0	ppm of FS/°C
Reference Output Voltage Note 3	V _{REF}		1, 2, 3	9.90	10.10	V
Reference Output Current Note 4	I _{REF}		1	1.5		mA
Output Current	I _{OUT}	Unipolar (all bits on)	1	-1.6	-2.4	mA
		Bipolar (all bits on)		-0.8	-1.2	
Power Supply Rejection Ratio	PSRR	V _S = +11.4V to +16.5V dc	1		±10.0	PPM of FRS/%
		V _S = -11.4V to -16.5V dc			±25.0	
Power Supply Current Note 4, 5	I _{CC}		1		+5.0	mA
	I _{EE}				-18.0	
Power Dissipation	P _D		1		345.0	mW
Digital Input High Voltage	V _{IH}		1	2.0	5.5	V
Digital Input Low Voltage	V _{IL}		1		0.8	V
Digital Input High Current	I _{IH}	V _{IH} = 5.5V	1		300.0	μA
Digital Input Low Current	I _{IL}	V _{IL} = 0V	1		100.0	μA

Table II Notes:

1. V_{CC} = +15V, V_{EE} = -15V, V_{IH} = 2.0V, V_{IL} = 0.8V.
2. MSB on, all other bits off.
3. In subgroup 1, the reference output is loaded with 0.5mA reference input current, 1.0mA bipolar offset current, and 1.5mA additional current. In subgroup 2 and 3, only the 0.5mA reference input current is applied. The reference must be buffered to supply external loads at elevated temperatures.
4. Guaranteed for +11.4 ≤ V_{CC} ≤ +16.5V.
5. Guaranteed for -11.4 ≤ V_{EE} ≤ -16.5V.

4.2 Delta Parameter Table

Table III								
Parameter	Symbol	Sub-groups	Post Burn In Limit		Post Life Test Limit		Life Test Delta	Units
			Min	Max	Min	Max		
Gain Error	A _E	1		±0.25		±0.30	±0.05	% of FS
Bipolar Zero Error	B _{PZE}	1		±0.15		±0.225	±0.075	% of FS

5.0 Life Test/Burn-In Information

- 5.1** HTRB is not applicable for this drawing.
- 5.2** Burn-in is per MIL-STD-883 Method 1015 test condition B or C.
- 5.3** Steady state life test is per MIL-STD-883 Method 1005.

Rev	Description of Change	Date
A	Initiate	June 26, 2001
B	Update web address. Fix footer	Jan. 25, 2002
C	Update web address.	Aug. 5, 2003
D	Update header/footer & add to 1.0 Scope description.	Feb. 26, 2008

