

1.0 SCOPE

This specification documents the detailed requirements for Analog Devices space qualified die including die qualification as described for Class K in MIL-PRF-38534, Appendix C, Table C-II 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 datasheet specifically details the space grade version of this product. A more detailed operational description and a complete datasheet for commercial product grades can be found at <https://www.analog.com/media/en/technical-documentation/data-sheets/AD648.pdf>.

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

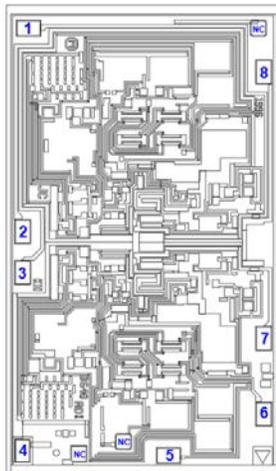
<u>Part Number</u>	<u>Description</u>
AD648-000C	Dual Precision, Low Power BiFET Operational Amplifier Die.

3.0 Die Information

3.1. Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
71 mil x 117 mil	mil \pm 2 mil	AlCu

3.2. Die Picture



Terminal number	Terminal symbol
1	OUT
2	-IN
3	+IN
4	-Vs
5	+IN
6	-IN
7	OUT
8	+Vs

Figure 1 - Terminal connections.

4.0 Absolute Maximum Ratings ^{1/}

Supply Voltage (Vs)± 18.0 V
 Differential Input Voltage-Vs and +Vs
 Output Short Circuit DurationIndefinite
 Storage Temperature.....-65°C to +150°C
 Ambient Operation Temperature Range (TA).....-55°C to +125°C

^{1/} Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

5.0 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 – 25/2
 - (b) Qual Sample Package – Cerdip
 - (c) Pre-screen electrical test over temperature performed post-assembly prior to die qualification.

6.0 Dice Electrical Characteristics

Table I - Die Electrical Characteristics					
Parameter	Symbol	Conditions TA = 25°C	Min	Max	Unit
Input offset voltage	Vios	Vs=±15V ; Vcm=0V	-0.5	0.5	mV
Input bias current	±Ib	Vs=±15V ; Vcm=0V	-20	20	pA
Input offset current	±Is	Vs=±15V ; Vcm=0V	-10	10	pA
Power supply rejection ratio	PSRR	Vs=±4.5V to ±18V	87		dB
Common mode rejection ratio	CMRR	Vs=±15V, VCM=11V to -11V	71		dB
		Vs=±15V, VCM=10V to -10V	77		
Open-loop Gain	AOL	Vs=±15V, RL = 5 kΩ	170		V/mV
		Vs=±15V, RL = 10 kΩ	320		
Output voltage swing		Vs=±15V, RL = 10 kΩ	10		V
Supply Current	I _{sy}	Vs=±15V ; Vcm=0V		0.5	mA

Table II - Electrical Characteristics for Qualification Samples

Parameter	Symbol	Conditions 1/ 2/ -55°C ≤ TA ≤ +125°C ±Vs = ±15 V, unless otherwise specified	Group A subgroups	Min	Max	Unit
Offset voltage	VOS	Vcm = 0 V and Vcm = 10 V	1	-2.0	2.0	mV
			2, 3	-3.0	3.0	
Input bias current	IB	Vcm = 0 V	1	-20	20	pA
			2, 3	-8.0	8.0	nA
Input offset current	IOS	Vcm=0 V	1	-10	10	pA
			2, 3	-6.0	6.0	nA
Power supply rejection ratio	PSRR	Vs=±4.5V to ±18V	1	80		dB
			2, 3	76		
Common mode rejection ratio	CMRR	VS=±15V, VCM=11V to -11V	1, 2, 3	70		dB
		VS=±15V, VCM=10V to -10V	1, 2, 3	76		
Open-loop Gain	AOL	VS=±15V, RL = 5 kΩ	1, 2, 3	150		V/mV
		VS=±15V, RL = 10 kΩ	1, 2, 3	300		
Output voltage swing	Vo	RL = 5 kΩ	1, 2, 3	±11		V
		RL = 10 kΩ	1, 2, 3	±12		
Supply Current	Isy		1		0.4	mA
			2, 3		0.5	
Slew Rate	SR	Unity gain	1, 2, 3	1		V/us
Vos Match		Vcm = 0 V and Vcm = 10 V	1	-2.0	2.0	mV
			2, 3	-3.0	3.0	
Ib Match		Vcm = 0 V	1	-10	10	pA
			2, 3	-8.0	8.0	nA
Ios Match		Vcm = 0 V	1	-10	10	pA
			2, 3	-10	10	nA
Negative Short Circuit Current	-Isc		1	-50	-15	mA
			2, 3	-50	-5	
Positive Short Circuit Current	+Isc		1	15	50	mA
			2, 3	5	50	

Table III Burn-in and operating life test delta parameters 1/ 2/

Parameters	Symbol	Condition	Limits		Units
			Min	Max	
Input offset voltage	V _{ios}	V _S = ±15V	-500	500	μV

Table III Notes:

1/ Deltas are performed at room temperature.

2/ 240 hour burn-in and 1,000 hour operating life test.

Rev	Description of Change	Date
A	Initiate	07-06-2020

