Low-Noise Precision Instrumentation Amp

AMP01

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/marketSolutions/militaryAerospace/pdf/Die_Broc.pdf 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/AMP01

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

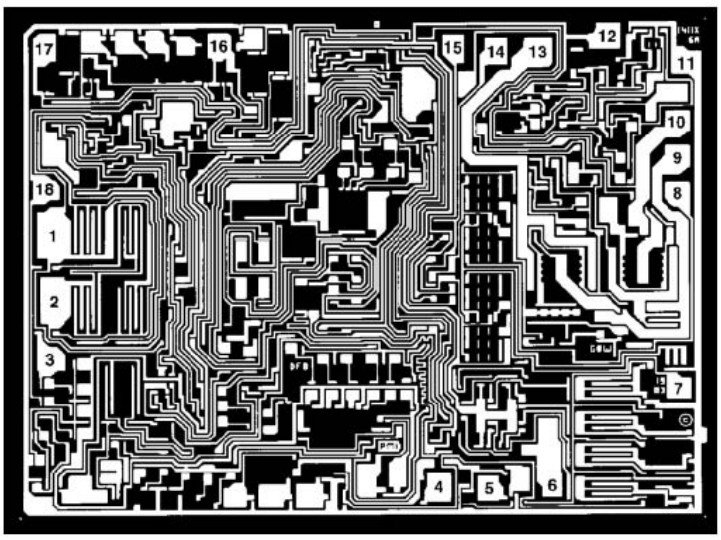
Part Number	Description
AMP01-000C	Low-Noise Precision Instrumentation Amplifier

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
111 mil x 149 mil	**19 mil ± 2 mil**	**Al/Cu**

3.2 Die Picture



1. R_G
2. R_G
3. –INPUT
4. V_{OOS} NULL
5. V_{OOS} NULL
6. TEST PIN*
7. SENSE
8. REFERENCE
9. OUTPUT
10. V– (OUTPUT)
11. V–
12. V+
13. V+ (OUTPUT)
14. R_S
15. R_S
16. V_{IOS} NULL
17. V_{IOS} NULL
18. +INPUT

Make no electrical connection to unlabeled pads.

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700 www.analog.com
Fax: 781.326.8703

3.3 Absolute Maximum Ratings 1/

Supply Voltage (V_S)	±18V dc
Common Mode Input Voltage	Supply Voltage
Differential Input Voltage:	
$R_G \geq 2k\Omega$	±20V dc
$R_G < 2k\Omega$	±10V dc
Output Short Circuit Duration	Indefinite
Storage Temperature Range	-65°C to +150°C
Ambient Operating Temperature Range	-55°C to +125°C
Junction Temperature (T_J)	+150°C

Absolute Maximum Ratings Notes:

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.

4.0 Die Qualification

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

(a) Qual Samples Size and Qual Acceptance Criteria – 25/2

(b) Qual Sample Package – DIP

(c) Pre-screen electrical test over temperature performed post-assembly prior to die qualification.

Table I -Dice Electrical Characteristics						
Parameter	Symbol	Conditions 1/		Limit Min	Limit Max	Units
Input Bias Current	I_B				±4	nA
Input Offset Current	I_{IO}				1	nA
Offset Referred to Input vs. Positive Supply	+PSR	V+ = +5V to +15V, V- = -15V	G = 1000	120		dB
			G = 100	110		
			G = 10	95		
			G = 1	75		
Offset Referred to Input vs. Negative Supply	-PSR	V- = -5V to -15V, V+ = +15V	G = 1000	105		dB
			G = 100	90		
			G = 10	70		
			G = 1	50		
Input Voltage Range	IVR			±10		V
Common Mode Rejection	CMR	V_{CM} = IVR	G = 1000	125		dB
			G = 100	120		
			G = 10	100		
			G = 1	85		
Gain Equation Accuracy	GE	$G = 20R_S/R_G$			0.8	%
Output Short Circuit Current	I_{OS+}			60	120	mA
	I_{OS}			-120	-60	
Reference Input Resistance	R_{INREF}			35	65	kΩ
Quiescent Current	I_Q	+V Linked to $+V_{OP}$ -V Linked to $-V_{OP}$			4.8	mA
Input Offset Voltage	V_{IOS}				120	µV
Output Offset Voltage	V_{OOS}				6	mV
Output Voltage Swing	V_O	R_L = 2kΩ		±13		V
		R_L = 500Ω		±13		
		R_L = 50Ω		±2.5		

Table I Notes:

1/ V_S = ±15V, R_S = 10kΩ, R_L= 2kΩ, T_A = 25°C, unless otherwise specified.

Table II - Electrical Characteristics for Qual Samples

Parameter	Symbol	Conditions 1/		Sub-groups	Limit Min	Limit Max	Units
Input Bias Current	I_B			1		±4	nA
				2,3		±10	
Input Offset Current	I_{IO}			1		1	nA
				2,3		3	
Input Voltage Range	IVR			1,2,3	±10V		V
Offset Referred to Input vs. Positive Supply	+PSR	V+ = +5V to +15V, V- =-15V	G = 1000	1,2,3	120		dB
			G = 100		110		
			G = 10		95		
			G = 1		75		
Offset Referred to Input vs. Negative Supply	-PSR	V- = -5V to 15V, V+ = +15V	G = 1000	1,2,3	105		dB
			G = 100		90		
			G = 10		70		
			G = 1		50		
Common Mode Rejection	CMR	V_{CM} = IVR, 1kΩ Source Imbalance	G = 1000	1	125		dB
				2,3	120		
			G = 100	1	120		
				2,3	115		
			G = 10	1	100		
				2,3	95		
			G = 1	1	85		
				2,3	80		
Gain Equation Accuracy	GE	2/		1		0.8	%
Gain Range	G			1	1	1000	V/V
Output Short Circuit Current	I_{OS+}			1	60	120	mA
	I_{OS-}				-120	-60	
Reference Input Resistance	R_{INREF}			1	35	65	kΩ
Quiescent Current	I_Q	+V Linked to $+V_{OP}$ -V Linked to $-V_{OP}$		1		4.8	mA
Input Offset Voltage	V_{IOS}			4		120	µV
				5,6		170	
Output Offset Voltage	V_{OOS}			4		6	mV
				5,6		10	
Output Offset Voltage Drift	TCV_{OOS}	RG = ∞		8		50	µV/°C
Output Voltage Swing	V_O	RL = 500Ω , 2kΩ		4	±13		V
				5,6	±12		
		RL = 50Ω		4	±2.5		
Average Input Offset Voltage Drift	TCV_{IOS}	T_A = -55°C, +125°C		8	1.0		µV/°C

Table II Notes:

1/ V_S = ±15V, R_S = 100Ω , R_L= 2kΩ , unless otherwise specified.

2/ G = $20R_S/R_G$, accuracy measured at G = 1, 10, 100, and 1000.

Table III -Life Test Endpoint and Delta Parameter
(Product is tested in accordance with Table II with the following exceptions)

Parameter	Symbol	Sub-groups	Burn In Limit Min	Burn In Limit Max	Life Test Limit Min	Life Test Limit Max	Life Test Delta	Units
Input Offset Voltage	V_{IOS}	4		160		200	±40	µV
		5, 6				250		
Output Offset Voltage	V_{OOS}	4		10		16	±6	mV
		5, 6				20		
Input Bias Current	I_B	1		±7		±10	±3	nA
		2, 3				±16		

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.

5.3 Steady state life test is per MIL-STD-883 Method 1005.

Rev	Description of Change	Date
A	Initiate	15-NOV-01
B	Update web address	Jan. 25, 2002
C	Update web address	Aug. 5, 2003
D	Correct limits on Output Offset Voltage	18-JUL-2006
E	Update 1.0 Scope Description	18-Jul-07
F	Update header/footer and add to 1.0 scope description.	Mar. 3, 2008
G	Add Junction Temperature (T_J) ....+150°C to 3.3 Absolute Max. Ratings	April 2, 2008
H	Updated Section 4.0c note to indicate pre-screen temp testing being performed.	5-JUN-2009