Dual Very Low-Noise Precision Operational Amplifier

OP270

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/OP270

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

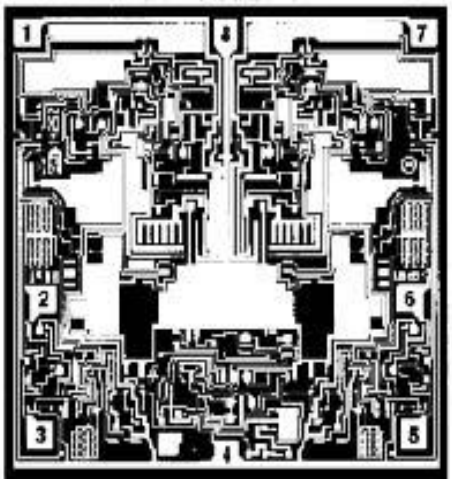
Part Number	Description
OP270-000C	Dual Very Low-Noise Precision Operational Amplifier
OP270R000C	Radiation Tested Dual Very Low-Noise Precision Operational Amplifier

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
94 mil x 92 mil	19 mil ± 2 mil	Al/Cu

3.2 Die Picture



1 OUT A
2 -IN A
3 +IN A
4 $-V_S$
5 +IN B
6 -IN B
7 OUT B
8 $+V_S$

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
Differential Input Voltage 2/..... ±1V
Differential Input Current 2/…..... ±25mA
Input Voltage (V_{IN})…..... Supply Voltage
Output Short-Circuit…..... Continuous
Storage Temperature Range .....-65°C to +150°C
Junction Temperature (T_J).....+150°C
Ambient Operating Temperature Range…….....-55°C to +125°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.

2/ The inputs are protected by back-to-back diodes. Current limiting resistors are not used in order to achieve low noise performance. If the differential input voltage exceeds ±1.0V, the input current should be limited to ±25mA.

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 Sample Size and Qual Acceptance Criteria – 10/0
(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 Offset Voltage	V_{IO}			75	µV
Input Offset Current	I_{IO}	V_{CM} = 0V		10	nA
Input Bias Current	I_B	V_{CM} = 0V		20	nA
Large Signal Voltage Gain Output Voltage Swing	A_{VO}	V_O = ±10V, R_L = 2kΩ	750		V/mV
	V_O	R_L = 2kΩ	±12		V
Input Voltage Range	IVR		±12		V
Common Mode Rejection	CMR	V_{CM} = IVR	106		dB
Power Supply Rejection Ratio	PSRR	V_S = ±4.5V to ±18V		3.2	µV/V
Supply Current 2/	I_{SY}	No Load		6.5	mA

Table I Notes:
1/ V_S = ±15V, R_S = 50 Ω, and T_A = +25°C, unless otherwise specified.
2/ I_{SY} limit equals the total for both amplifiers.

Table II - Electrical Characteristics for Qual Samples						
Parameter	**Symbol**	**Conditions 1/**	**Sub-groups**	**Limit Min**	**Limit Max**	**Units**
Input Offset Voltage	VIO		1		75	µV
			2, 3		175	
		M, D, L, R 3/	1		200	
Input Offset Current	IIO	VCM = 0V	1		10	nA
			2, 3		30	
		M, D, L, R 3/	1		100	
Input Bias Current	IB	VCM = 0V	1		20	
			2, 3		60	
		M, D, L, R 3/	1		1000	
Large Signal Voltage Gain	AVO	VO = ±10V, RL = 2kΩ	4	750		V/mV
			5, 6	400		
		M, D, L, R 3/	4	100		
Output Voltage Swing 4/	VO	RL = 2kΩ	4, 5, 6	±12		V
Average Input Offset Voltage Drift 4/	TCVOS		2, 3		1	µV/°C
Input Voltage Range 4/	IVR		1, 2, 3	±12		V
Common Mode Rejection 4/	CMR	VCM = IVR	1	106		dB
			2, 3	100		
Power Supply Rejection Ratio 4/	PSRR	VS = ±4.5V to ±18V	1		3.2	µV/V
			2, 3		5.6	
Supply Current 2/	ISY	No Load	1		6.5	mA
			2, 3		7.5	
		M, D, L, R 3/	1		6.5	

Table II Notes:

1/ V_S = ±15V, R_S = 50 Ω, unless otherwise specified.
2/ I_{SY} limit equals the total for both amplifiers.
3/ Devices tested at 100Krad irradiation.
4/ The parameter not tested post irradiation.

Table III - Life Test Endpoint and Delta Parameter (Product is tested in accordance with Table II with the following exceptions)								
Parameter	**Symbol**	**Sub-groups**	**Post Burn In Limit**		**Post Life Test Limit**		**Life Test Delta**	**Units**
			Min	**Max**	**Min**	**Max**		
Input Offset Voltage	V_{IO}	1		±110		±145	±35	µV
		2, 3				±250		
Input Bias Current	I_B	1		±30		±40	±10	nA
		2, 3				±80		
Input Offset Current	I_{IO}	1		±15		±20		nA
		2, 3				±40		

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	15-NOV-01
B	Delete AVO with 10KΩ load. Update web site address	20-Dec-01
C	Add Radiation part. Update web address	10-Feb-03
D	Update 1.0 Scope description.	26-Jul-2007
E	Update header/footer and add to 1.0 scope description.	Feb. 29,2008
F	Add Junction Temperature (TJ)....+150°C to Absolute Maximum Ratings	April 3, 2008
G	Updated Section 4.0c note to indicate pre-screen temp testing being performed.	6-JUN-2009
H	Updated fonts and sizes to ADI standard. Update Die Picture.	3-Oct-2011