



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:

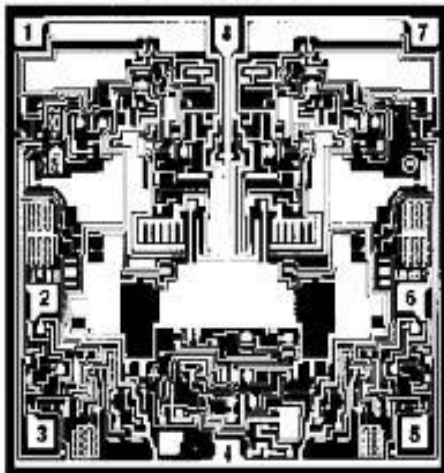
Part Number	Description
OP270-000C	Dual Very Low-Noise Precision Operational Amplifier
OP270R000C	Radiation Tested Dual Very Low-Noise Precision Operational Amplifier

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
94 mil x 92 mil	19 mil \pm 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

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Rev.H

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3.3 Absolute Maximum Ratings ^{1/}

Supply Voltage (V_S).....	$\pm 18V$
Differential Input Voltage ^{2/}	$\pm 1V$
Differential Input Current ^{2/}	$\pm 25mA$
Input Voltage (V_{IN}).....	Supply Voltage
Output Short-Circuit.....	Continuous
Storage Temperature Range	$-65^{\circ}C$ to $+150^{\circ}C$
Junction Temperature (T_J).....	$+150^{\circ}C$
Ambient Operating Temperature Range.....	$-55^{\circ}C$ to $+125^{\circ}C$

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 $\pm 1.0V$, the input current should be limited to $\pm 25mA$.

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}	$V_O = \pm 10V, R_L = 2k\Omega$	750		V/mV
	V_O	$R_L = 2k\Omega$	± 12		V
Input Voltage Range	IVR		± 12		V
Common Mode Rejection	CMR	$V_{CM} = IVR$	106		dB
Power Supply Rejection Ratio	PSRR	$V_S = \pm 4.5V$ to $\pm 18V$		3.2	$\mu V/V$
Supply Current ^{2/}	I_{SY}	No Load		6.5	mA

Table I Notes:

^{1/} $V_S = \pm 15V$, $R_S = 50 \Omega$, and $T_A = +25^{\circ}C$, unless otherwise specified.

^{2/} I_{SY} limit equals the total for both amplifiers.

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

Table II Notes:

- 1/ VS = ±15V, RS = 50 Ω, unless otherwise specified.
- 2/ ISY 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