



# 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](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](http://www.analog.com/OP270)

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

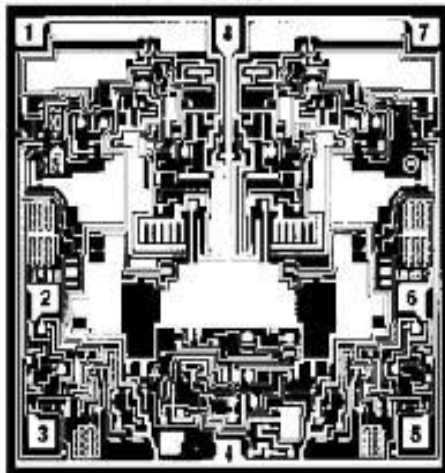
Part Number	Description
OP270-000C	Dual Very Low-Noise Precision Operational Amplifier
OP270R000C	Radiation Tested Dual Very Low-Noise Precision Operational Amplifier

### 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<sub>S</sub>
- 5 +IN B
- 6 -IN B
- 7 OUT B
- 8 +V<sub>S</sub>

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Rev.H

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**3.3 Absolute Maximum Ratings <sup>1/</sup>**

Supply Voltage (V <sub>S</sub> ).....	±18V
Differential Input Voltage <sup>2/</sup> .....	±1V
Differential Input Current <sup>2/</sup> .....	±25mA
Input Voltage (V <sub>IN</sub> ).....	Supply Voltage
Output Short-Circuit.....	Continuous
Storage Temperature Range .....	-65°C to +150°C
Junction Temperature (T <sub>J</sub> ).....	+150°C
Ambient Operating Temperature Range.....	-55°C to +125°C

Absolute Maximum Ratings Notes:

<sup>1/</sup>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.

<sup>2/</sup> 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 <sup>1/</sup>	Limit Min	Limit Max	Units
Input Offset Voltage	V <sub>IO</sub>			75	μV
Input Offset Current	I <sub>IO</sub>	V <sub>CM</sub> = 0V		10	nA
Input Bias Current	I <sub>B</sub>	V <sub>CM</sub> = 0V		20	nA
Large Signal Voltage Gain Output Voltage Swing	A <sub>VO</sub>	V <sub>O</sub> = ±10V, R <sub>L</sub> = 2kΩ	750		V/mV
	V <sub>O</sub>	R <sub>L</sub> = 2kΩ	±12		V
Input Voltage Range	IVR		±12		V
Common Mode Rejection	CMR	V <sub>CM</sub> = IVR	106		dB
Power Supply Rejection Ratio	PSRR	V <sub>S</sub> = ±4.5V to ±18V		3.2	μV/V
Supply Current <sup>2/</sup>	I <sub>SY</sub>	No Load		6.5	mA

Table I Notes:

- <sup>1/</sup> V<sub>S</sub> = ±15V, R<sub>S</sub> = 50 Ω, and T<sub>A</sub> = +25°C, unless otherwise specified.
- <sup>2/</sup> I<sub>SY</sub> 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 <sub>IO</sub>	1		±110		±145	±35	μV
		2, 3				±250		
Input Bias Current	I <sub>B</sub>	1		±30		±40	±10	nA
		2, 3				±80		
Input Offset Current	I <sub>IO</sub>	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