

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/OP07

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

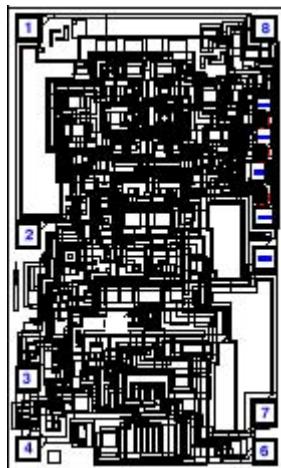
<u>Part Number</u>	<u>Description</u>
OP07-000C	Ultra-Low Offset Voltage Operational Amplifier
OP07R000C	Radiation Tested Ultra-Low Offset Voltage Operational Amplifier

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
57 mil x 93 mil	19 mil \pm 2 mil	Al/Cu

3.2 Die Picture



1. V_{IO} TRIM
2. -INPUT
3. +INPUT
4. $-V_S$
5. NC
6. OUTPUT
7. $+V_S$
8. V_{IO} TRIM

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Rev. I

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3.3 Absolute Maximum Ratings ^{1/}

Supply Voltage (V_S)	$\pm 22V$ dc
Input Voltage (V_{IN}) ^{2/}	$\pm 22V$ dc
Differential Input Voltage	$\pm 30V$ dc
Output Short Circuit Duration.....	Indefinite
Storage Temperature Range	$-65^{\circ}C$ to $+150^{\circ}C$
Junction Temperature.....	$+150^{\circ}C$
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/} For supply voltage less than $\pm 22V$, the absolute maximum input voltage is equal to the supply voltage.

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 – 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}		-25	+25	μV
Input Bias Current	$+I_{IB}$		-2	+2	nA
	$-I_{IB}$		-2	+2	
Input Offset Current	I_{IO}		-2	+2	nA
Power Supply Rejection Ratio	PSRR	$V_S = \pm 3V$ to $\pm 18V$	-10	10	$\mu V/V$
Input Voltage Range	IVR		± 13		V
Common Mode Rejection Ratio	CMRR	$V_{CM} = IVR$	110		dB
Supply Current	I_S	No Load		4	mA
Output Voltage Swing	V_{OP}	$R_L = 1k\Omega$	± 10		V
		$R_L = 2k\Omega$	± 12		
Open Loop Voltage Gain	A_{VS}	$V_{OUT} = \pm 10V, R_L = 2k\Omega$	300		V/mV
Slew Rate	$+SR, -SR$	$V_{IN} = \pm 5V, A_{VS} = 1$	0.08		V/ μs

Table I Notes:

^{1/} $V_S = \pm 15V, V_{CM} = 0V,$ and $T_A = 25^{\circ}C,$ unless otherwise specified.

Table II - Electrical Characteristics for Qual Samples

Parameter	Symbol	Conditions <u>1/</u>	Sub-groups	Limit Min	Limit Max	Units
Input Offset Voltage	V_{IO}		1	-25	25	μV
			2, 3	-60	60	
			M, D, L, R <u>3/</u>	1	-400	
Input Offset Current	I_{IO}	$V_{CM} = 0V$	1	-2	2	nA
			2, 3	-4	4	
			M, D, L, R <u>3/</u>	1	-25	
Supply Current <u>2/</u>	I_S		1		4	mA
			2, 3		5	
			M, D, L, R <u>3/</u>	1		
Input Offset Voltage Temperature Sensitivity <u>2/</u>	$\Delta V_{IO}/\Delta t$		2, 3	-0.6	0.6	$\mu V/^\circ C$
Input Voltage Range <u>2/</u>	IVR		1, 2, 3	-13	13	V
Power Supply Rejection Ratio <u>2/</u>	PSRR	$V_S = \pm 3V$ to $\pm 18V$	1	-10	10	$\mu V/V$
			2, 3	-20	20	
Input Offset Adjustment Range <u>2/</u>	$+V_{IO\ ADJ}$		1	0.5		mV
	$-V_{IO\ ADJ}$				-0.5	
Output Voltage Swing <u>2/</u>	V_{OP}	$R_L = 1k\Omega$	1, 2, 3	-10	10	V
		$R_L = 2k\Omega$		-12	12	
Open Loop Voltage Gain	A_{VS}	$V_{out} = \pm 10V, R_L = 2k\Omega$	1	300		V/mV
			2, 3	200		
			M, D, L, R <u>3/</u>	1	100	
Common Mode Rejection Ratio <u>2/</u>	CMRR	$V_{CM} = IVR$	1	110		dB
			2, 3	106		
Slew Rate <u>2/</u>	$\pm SR$	$V_{IN} = \pm 5V, A_V = 1$	4	0.08		V/ μS

Table II Notes:

- 1/ $V_S = \pm 15V$ and $V_{CM} = 0V$, unless otherwise specified.
- 2/ This parameter not tested post irradiation.
- 3/ Devices tested at 100Krad 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}	4	-60	60	-135	135	± 75	μV
		5, 6			-170	170		
Input Bias Current	$+I_{IB}$	1	-3	+3	-4	+4	± 1	nA
		2, 3			-6	+6		
	$-I_{IB}$	1	-3	+3	-4	+4	± 1	
		2, 3			-6	+6		
Input Offset Current	I_{IO}	1	-3	+3	-4	+4		nA
		2, 3			-6	+6		

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	2 Nov. 2001
B	Change PSRR range from ± 4.5 to $\pm 20V$ to ± 3 to $\pm 18V$ on Table I. Update web address	20 Dec. 2001
C	Add radiation part. Update web address	Feb. 10, 2003
D	Die picture labeled incorrectly, update to current revision.	July 22, 2003
E	Update 1.0 Scope description.	23 Jul. 2007
F	Update header/footer & add to 1.0 scope description.	Feb. 13, 2008
G	Add Junction Temperature.+150°C to 3.3 Absolute Max. Ratings	March 31, 2008
H	Updated Section 4.0c note to indicate pre-screen temp testing being performed.	June 5, 2009
I	Updated fonts and sizes to ADI standards	Sept 27, 2011