

1.0 SCOPE

This specification documents the detail requirements for space qualified die manufactured on Analog Devices, Inc.'s QML certified line per MIL-PRF-38534 class K except as modified herein.

The manufacturing flow described in the STANDARD DIE PRODUCTS PROGRAM brochure at <http://www.analog.com/aerospace> 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 datasheet 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:

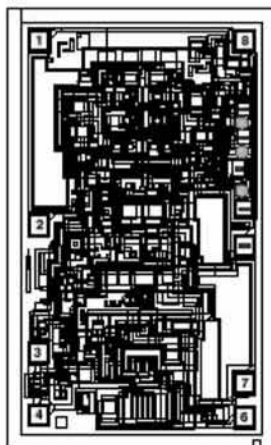
<u>Part Number</u>	<u>Description</u>
OP07-000C	Ultra-Low Offset Voltage Operational Amplifier
OP07R000C	Radiation Tested Ultra-Low Offset Voltage Operational Amplifier

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

3.3 Absolute Maximum Ratings 1/

Supply Voltage (V_S)	$\pm 22V$ dc
Input Voltage (V_{IN}) <u>2/</u>	$\pm 22V$ dc
Differential Input Voltage	$\pm 30V$ dc
Output Short Circuit Duration	Indefinite
Storage Temperature Range	$-65^{\circ}C$ to $+150^{\circ}C$
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 test post assembly required prior to die qualification, to remove all assembly related rejects.

Table I - Dice Electrical Characteristics

Parameter	Symbol	Conditions <u>1/</u>	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 1/	Sub- groups	Limit Min	Limit Max	Units
Input Offset Voltage	V _{IO}		4	-25	+25	μV
			5, 6	-60	+60	
			M, D, L, R 3/	4	-400	
Input Offset Voltage Temperature Sensitivity 2/	ΔV _{IO} /Δt		5, 6	-0.6	+0.6	μV/°C
Input Bias Current	+I _{IB}		1	-2	+2	nA
			2, 3	-4	+4	
	-I _{IB}		1	-2	+2	
			2, 3	-4	+4	
	I _{IB}		M, D, L, R 3/	1	-125	
Input Offset Current	I _{IO}		1	-2	+2	nA
			2, 3	-4	+4	
			M, D, L, R 3/	1	-25	
Power Supply Rejection Ratio 2/	PSRR	V _S = ±3V to ±18V	4	-10	10	μV/V
			5, 6	-20	20	
Input Voltage Range 2/	IVR		4, 5, 6	±13		V
Common Mode Rejection Ratio 2/	CMRR	V _{CM} = IVR	4	110		dB
			5, 6	106		
Input Offset Adjustment Range 2/	+V _{IO} ADJ		1	0.5		mV
	-V _{IO} ADJ				-0.5	
Supply Current	I _S		1		4	mA
			2, 3		5	
			M, D, L, R 3/	1		
Output Voltage Swing 2/	V _{OP}	R _L = 1kΩ	1, 2, 3	-10	10	V
		R _L = 2kΩ		-12	12	
Open Loop Voltage Gain	A _{VS}	V _{OUT} = ±10V, R _L = 2kΩ	4	300		V/mV
			5, 6	200		
		M, D, L, R 3/	4	100		
Slew Rate 2/	+SR, -SR	V _{IN} = ±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