

1.0 SCOPE

This specification documents the detail requirements for space qualified product manufactured on Analog Devices, Inc.'s QML certified line per MIL-PRF-38535 Level V except as modified herein.

The manufacturing flow described in the STANDARD SPACE LEVEL PRODUCTS PROGRAM brochure is to be considered a part of this specification.

<http://www.analog.com/aerospace>

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/OP22

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

<u>Part Number</u>	<u>Description</u>
OP22-903J	Programmable Micropower Operational Amplifier

3.0 Case Outline.

<u>Letter</u>	<u>Descriptive designator</u>	<u>Case Outline (Lead Finish per MIL-PRF-38535)</u>
J	MACY1-X8	8-Lead metal can (TO)

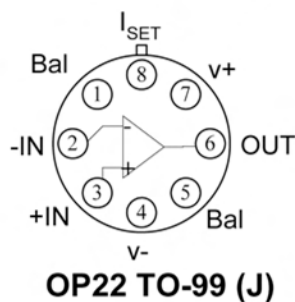


Figure 1 - Terminal connections.

4.0 Absolute Maximum Ratings. ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Supply Voltage.....	$\pm 18\text{V}$
Power Dissipation.....	500mW
Differential Input Voltage.....	$\pm 30\text{V}$
Input Voltage	Supply Voltage
Operating Temperature Range.....	-55°C to $+125^\circ\text{C}$
Storage Temperature Range.....	-65°C to $+150^\circ\text{C}$
Lead Temperature (Soldering, 60 sec.).....	$+300^\circ\text{C}$
Dice Junction Temperature (T_J).....	-65°C to $+150^\circ\text{C}$

4.1 Thermal Characteristics:

Thermal Resistance, TO-99 (J) Package

Junction-to-Case (Θ_{JC}) = 45°C/W Max

Junction-to-Ambient (Θ_{JA}) = 150°C/W Max

5.0 **Electrical Table:**

TABLE I						
Parameter See notes at end of table	Symbol	Conditions Note 1	Sub- group	Limit Min	Limit Max	Units
Input Offset Voltage	V_{OS}		1 2, 3		300 400	μV
Input Offset Current	I_{OS}		1 2, 3		1 1	nA
Input Bias Current	I_B	$I_{SET} = 1\mu A$	1, 2, 3		± 5	
		$I_{SET} = 10\mu A$	1, 2, 3		± 30	
Input Voltage Range (Note 2)	IVR		1 2, 3	-15 -15	13.5 13.2	V
		$V_- = 0V, V_+ = 5V$	1 2, 3	0 0	3.5 3.2	
Common-Mode Rejection	CMR		1	100		dB
		$I_{SET} = 1\mu A$	2, 3	80		
		$I_{SET} = 10\mu A$	2, 3	90		
Power Supply Rejection Ratio (Note 3) (No Load)	PSRR	$V_S = \pm 1.5V, \pm 15V$ Or $V_- = 0V, V_+ = 3V$ to $30V$	1 2, 3		6 10	$\mu V/V$
Output Voltage Swing	V_O	$V_S = \pm 1.5V, R_L = 100K\Omega,$ $I_{SET} = 1\mu A$	1 2, 3	± 0.8 ± 0.65		V
		$V_S = \pm 1.5V, R_L = 10K\Omega,$ $I_{SET} = 10\mu A$	1 2, 3	± 0.8 ± 0.65		
		$R_L = 100K\Omega, I_{SET} = 1\mu A$	1 2, 3	± 14.0 ± 13.6		
		$R_L = 10K\Omega, I_{SET} = 10\mu A$	1 2, 3	± 14.0 ± 13.6		
Large-Signal Voltage Gain	A_{VO}	$V_O = \pm 10V, R_L = 100K\Omega,$ $I_{SET} = 1\mu A$	1 2, 3	1000 200		V/mV
		$V_O = \pm 10V, R_L = 10K\Omega,$ $I_{SET} = 10\mu A$	1 2, 3	1000 500		
Supply Current	I_{SY}	$V_S = \pm 1.5V, I_{SET} = 1\mu A$	1 2, 3		12.5 14	μA
		$I_{SET} = 1\mu A$	1 2, 3		17 18	
		$V_S = \pm 1.5V, I_{SET} = 10\mu A$	1 2, 3		125 140	
		$I_{SET} = 10\mu A$	1 2, 3		170 180	

NOTES:

- $V_S = \pm 15V, R_S = 50\Omega, V_{CM} = 0V, I_{SET} = 1\mu A$ or $10\mu A$, Unless otherwise specified.
- IVR is defined as the V_{CM} range used for the CMR test.
- $V_{CM} = 1.5V$ for Single Supply Test

5.1 **Electrical Test Requirements:**

Table II

Test Requirements	Subgroups (in accordance with MIL-PRF-38535, Table III)
Interim Electrical Parameters	1
Final Electrical Parameters	1, 2, 3, 4, 5, 6 <u>1/</u> <u>2/</u>
Group A Test Requirements	1, 2, 3, 4, 5, 6
Group C end-point electrical parameters	1 <u>2/</u>
Group D end-point electrical parameters	1
Group E end-point electrical parameters	1

1/ PDA applies to Subgroup 1. Delta's excluded from PDA.

2/ See Table III for delta parameters. See table I for conditions.

5.2 Table III. Burn-in test delta limits.

Table III				
TEST TITLE	BURN-IN ENDPOINT	LIFETEST ENDPOINT	DELTA LIMIT	UNITS
V_{OS} <u>1/</u>	300	375	± 75	μV
I_B <u>1/</u>	5	6.5	1.5	nA
I_B <u>2/</u>	30	36	6.0	nA

1/ $I_{SET} = 1\mu A$

2/ $I_{SET} = 10\mu A$

6.0 Life Test/Burn-In Circuit:

5.1 HTRB is not applicable for this drawing.

5.2 Burn-in is per MIL-STD-883 Method 1015 test condition B.

5.3 Steady state life test is per MIL-STD-883 Method 1005.

Rev	Description of Change	Date
A	Initiate	July 24, 2000
B	Update web address	Feb. 18, 2002
C	Update web address. Add note 1 to VOS on Table III. Delete BI circuits.	May 29, 2003
D	Update package offering.	Oct. 10, 2007