

### 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/OP215](http://www.analog.com/OP215)

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

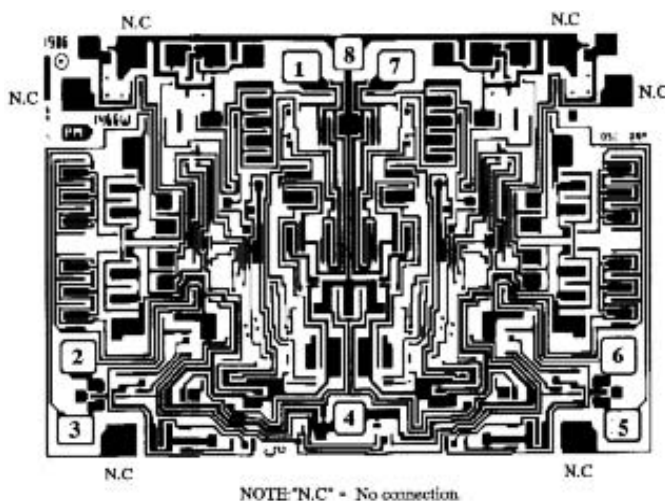
<u>Part Number</u>	<u>Description</u>
OP215-000C	Dual Precision JFET-Input Operational Amplifier
OP215R000C	Radiation Tested Dual Precision JFET-Input Operational Amplifier

### 3.0 Die Information

#### 3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
75 mil x 110 mil	19 mil $\pm$ 2 mil	Al/Cu

#### 3.2 Die Picture



- 1 OUTPUT A
- 2 -INPUT A
- 3 +INPUT A
- 4  $-V_S$
- 5 +INPUT B
- 6 -INPUT B
- 7 OUTPUT B
- 8  $+V_S$

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Rev. F

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## 3.3 Absolute Maximum Ratings 1/

Supply Voltage ( $V_S$ ) .....	$\pm 22V$
Differential Input Voltage .....	$\pm 40V$
Input Voltage ( $V_{IN}$ ) <u>2/</u> .....	$\pm 20V$
Output Short-Circuit Duration .....	Indefinite
Storage Temperature Range .....	$-65^{\circ}C$ to $+150^{\circ}C$
Junction Temperature ( $T_J$ ) .....	$+150^{\circ}C$
Ambient Operating Temperature .....	$-55^{\circ}C$ 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/ Unless otherwise specified, the absolute maximum negative input voltage is equal to the negative power supply.

## 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 <u>1/</u>	Limit Min	Limit Max	Units
Input Offset Voltage	$V_{IO}$	$R_S = 50\Omega$		$\pm 1$	mV
Input Offset Current	$I_{IO}$			$\pm 50$	pA
Input Bias Current	$I_{IB}$			$\pm 100$	pA
Large Signal Voltage Gain	$A_{VO}$	$V_{OUT} = \pm 10V$ , $R_L \geq 2k\Omega$	150		V/mV
Output Voltage Swing	$V_O$	$R_L \geq 2k\Omega$	$\pm 11$		V
Supply Current	$I_S$	$V_O = 0V$		8.5	mA
Slew Rate	SR	$A_{VCL} = +1$ , $R_L \geq 2k\Omega$ , $C_L = 100pF$	10		V/ $\mu s$
Common-Mode Rejection Ratio	CMRR	$V_{CM} = IVR$	86		dB
Power Supply Rejection Ratio	PSRR	$V_S = \pm 10V$ to $\pm 16V$		51	$\mu V/V$
Input Voltage Range	IVR		$\pm 10.2$		V

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	$V_{IO}$	$R_S = 50\Omega$ M, D, L, R	1		$\pm 1$	mV
			2, 3		$\pm 2$	
			1		$\pm 3$	
Input Offset Current <u>2/</u>	$I_{IO}$	$T_J = +25^\circ\text{C}, -55^\circ\text{C}$	1, 3		$\pm 50$	pA
		$T_J = +125^\circ\text{C}$	2		$\pm 8$	nA
		M, D, L, R	1		$\pm 300$	pA
Input Bias Current <u>2/</u>	$I_{IB}$	$T_J = +25^\circ\text{C}, -55^\circ\text{C}$	1, 3		$\pm 100$	pA
		$T_J = +125^\circ\text{C}$	2		$\pm 10$	nA
		M, D, L, R	1		$\pm 6$	nA
Large Signal Voltage Gain	$A_{VO}$	$V_{OUT} = \pm 10\text{V}, R_L \geq 2\text{k}\Omega$ M, D, L, R	4	150		V/mV
			5, 6	30		
			1	10		
Output Voltage Swing <u>3/</u>	$V_O$	$R_L \geq 2\text{k}\Omega$	4	$\pm 11$		V
		$R_L \geq 10\text{k}\Omega$	5, 6	$\pm 12$		
Supply Current	$I_S$	$V_O = 0\text{V}$	1		8.5	mA
		M, D, L, R	4		8.5	
Slew Rate <u>3/</u>	SR	$A_{VCL} = +1, R_L \geq 2\text{k}\Omega,$ $C_L = 100\text{pF}$	4	10		V/ $\mu\text{s}$
Common-Mode Rejection Ratio <u>3/</u>	CMRR	$V_{CM} = \text{IVR}$	1	86		dB
			2, 3	82		
Power Supply Rejection Ratio <u>3/</u>	PSRR	$V_S = \pm 10\text{V to } \pm 16\text{V}$	1		51	$\mu\text{V/V}$
			2, 3		100	
Input Voltage Range <u>3/</u>	IVR		1, 2, 3	$\pm 10.2$		V

Table II Notes:

1/  $V_S = \pm 15\text{V}$  and  $V_{CM} = 0\text{V}$ , unless otherwise specified.2/  $T_A = -55^\circ\text{C}$  for  $I_{IO}$  and  $I_{IB}$  tests, subgroup 3, is guaranteed by  $T_A = +25^\circ\text{C}$  test.3/ 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		$\pm 2$		$\pm 3$	$\pm 1$	mV
		2, 3				$\pm 4$		
Input Bias Current	$I_{IB}$	1, 3		$\pm 175$		$\pm 250$	$\pm 75$	pA
		2				$\pm 10$		nA
Input Offset Current	$I_{IO}$	1, 3		$\pm 87$		$\pm 125$		pA
		2				$\pm 8$		nA

## 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	06-NOV-01
B	Add radiation limits. Update web address. Exchange file name with PM108.	9-JAN-03
C	Update 1.0 Scope Description	20-Jul-2007
D	Update header/footer and add to 1.0 Scope description.	Mar. 3, 2008
E	Add Junction Temperature (T <sub>J</sub> ).....+150°C to 3.3 Absolute Max. Ratings	April 2, 2008
F	Updated Section 4.0c note to indicate pre-screen temp testing being performed	5-JUN-2009

