



**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/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 data sheet for commercial product grades can be found at <http://www.analog.com/REF01>

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

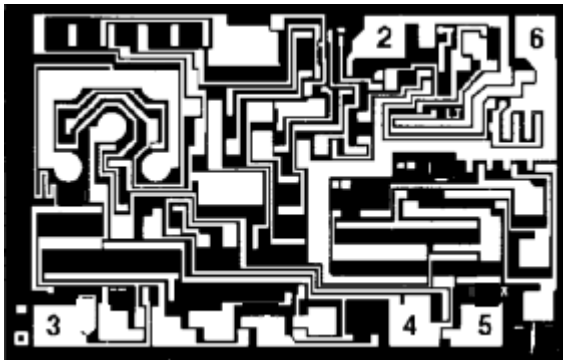
<u>Part Number</u>	<u>Description</u>
REF01-000C	Linear, Positive 10-Volt Adjustable Precision Voltage Reference
REF01R000C	Radiation tested Linear, Positive 10-Volt Adjustable Precision Voltage Ref.

**2.1 Die Information**

**2.1.1 Die Dimensions**

Die Size	Die Thickness	Bond Pad Metalization
74.2 mil x 51.8 mil	19 mil ± 2 mil	Al/Cu

**2.1.2 Die Picture**



- 1. NC
- 2.  $V_{IN}$
- 3. NC
- 4. GND
- 5. TRIM
- 6.  $V_{OUT}$
- 7. NC
- 8. NC

Figure 1 - Terminal connections.

### 3.0 Absolute Maximum Ratings <sup>1/</sup>

Input Voltage ( $V_{IN}$ ).....	40V dc
Output Short Circuit Duration .....	Indefinite
Storage Temperature.....	-65°C to +150°C
Junction Temperature ( $T_J$ ).....	150°C
Ambient Operating Temperature Range ( $T_A$ ).....	-55°C to +125°C

### 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 – 25/2
- (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
Quiescent Supply Current	$I_{SY}$	$I_L = 0mA$		1.35	mA
Output Adjustment Range	$\Delta V_{TRIM}$	$V_{REF} = 0, 10V$ $R_P = 10k\Omega$	$\pm 3.0$	$\pm 99$	%
Output Voltage	$V_O$	$I_{SINK} = 300\mu A$	9.952	9.995	V
		$I_L = 0mA$	9.95	9.98	
Line Regulation	$LN_{reg}$	$V_{IN} = 13V$ to $33V$	0	0.01	%/V

Table I Notes:

<sup>1/</sup>  $V_{IN} = 15V$ ,  $T_A = 25^\circ C$ , unless otherwise specified.

Table II - Electrical Characteristics for Qual Samples						
Parameter	Symbol	Conditions <u>1/</u> <u>2/</u> <u>3/</u> -55°C ≤ T <sub>A</sub> ≤ 125°C unless otherwise specified	Sub-groups	Limit Min	Limit Max	Units
Quiescent Supply Current	ISY	No Load	1		1.4	mA
			2, 3		2	
		M, D, P, L, R	1		1.4	
Output Adjustment Range	ΔVTRIM	RP = 10kΩ <u>4/</u> , T <sub>A</sub> = 25°C	1	±3.0		%
Output Voltage	VO	IL = 0mA	1	9.95	10.05	V
			2, 3	9.905	10.095	
		M, D, P, L, R	1	9.94	10.06	
Short Circuit Current	IOS	VO = 0V, T <sub>A</sub> = 25°C <u>4/</u>	1	15	60	mA
Sink Current	IS	T <sub>A</sub> = 25°C <u>4/</u>	1	-0.3		mA
Load Regulation	LDreg	IL = 0mA to 10mA <u>5/</u> <u>6/</u>	1		0.01	% / mA
			M, D, P, L, R	1		
		IL = 0mA to 8mA <u>5/</u> <u>6/</u>	2, 3		0.015	
Line Regulation	LNreg	V <sub>IN</sub> = 13V to 33V <u>5/</u>	1		0.01	% / V
			2, 3		0.015	
		M, D, P, L, R	1		0.03	
Load Current	IL	T <sub>A</sub> = 25°C <u>4/</u> <u>7/</u>	1	10		mA
			2, 3	8		
Output voltage noise	enp-p	0.1 Hz to 10Hz <u>4/</u>	4		150	μVp-p
Output Voltage Temperature Coefficient	TCVO	-55°C ≤ T <sub>A</sub> ≤ 125°C <u>4/</u> <u>8/</u>	5, 6		±25	ppm/°C

Table II Notes:

- 1/ V<sub>IN</sub> = 15V, unless otherwise specified.
- 2/ Devices supplied to this drawing meet all levels M, D, P, L, and R of irradiation however this device is only tested at the R level. Pre and post irradiation values are identical unless otherwise specified in table II. When performing post irradiation electrical measurements for any RHA level, T<sub>A</sub> = 25°C.
- 3/ These parts may be dose rate sensitive in a space environment and may demonstrate low dose rate effects. Radiation end point limits for the noted parameters are guaranteed only for the conditions specified in MIL-STD-883, method 1019, condition A.
- 4/ Not tested post irradiation.
- 5/ Line and Load regulation specifications include the effect of self-heating.
- 6/ LDreg = (ΔVOUT / ΔIOUT) / VOUT x 100 = % / mA
- 7/ Minimum load current guaranteed by load regulation test.
- 8/ TCVo = ABS ((VMAX - VMIN) / 10 V) x (1 / 180°C) x (10<sup>6</sup>) where -55°C ≤ T<sub>A</sub> ≤ 125°C.

Table III - Endpoint and Delta Limits (+25°C)						
(Product is tested in accordance with Table II with the following exceptions)						
Parameter	Symbol	Sub-groups	End-point		Delta	Units
			Min	Max		
Output Voltage	VO	1	9.95	10.05	±0.006	V

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

Rev	Description of Change	Date
A	Initiate	12-MAR-2008
B	Update document format.	6-JAN-2009
C	Updated Section 4.0c note to indicate pre-screen temp testing being performed.	5-JUN-2009
D	Removed "ADI INTERNAL USE" from page 1 of ASD	13-JUL-2009
E	Updated fonts and sizes to ADI standard	15- Nov-2011