

## 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.

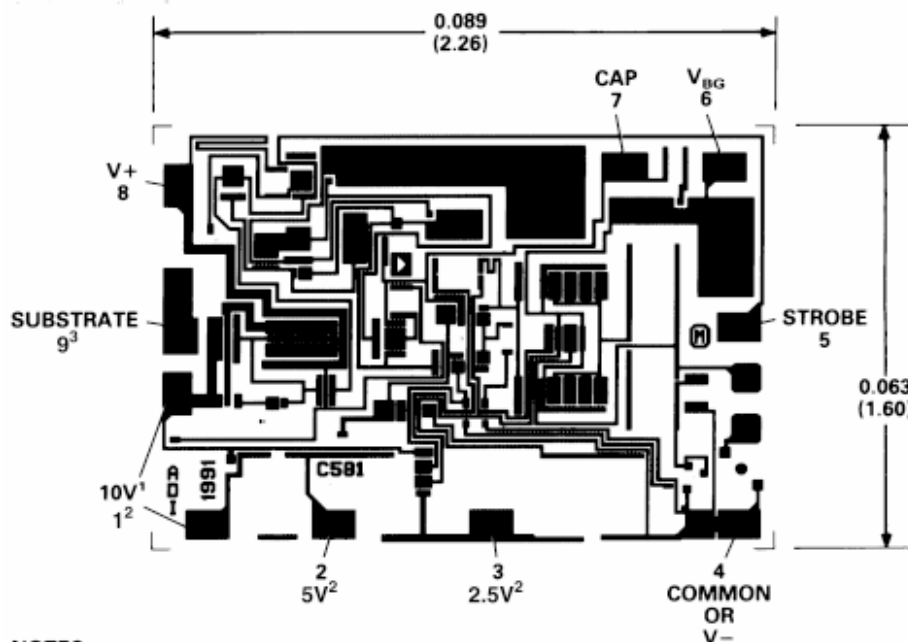
The manufacturing flow described in the STANDARD DIE PRODUCTS PROGRAM brochure at <http://www.analog.com/aerospace> is to be considered a part of this specification.

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 [www.analog.com/AD584](http://www.analog.com/AD584)

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

<u>Part Number</u>	<u>Description</u>
AD584-000C	Pin Programmable Precision Voltage Reference Die
AD584R000C	Radiation tested Pin Programmable Precision Voltage Reference Die

## 3.0 Die Information



### NOTES

- <sup>1</sup> BOTH 10V PADS MUST BE CONNECTED TO THE OUTPUT.
- <sup>2</sup> INTERCONNECTIONS REQUIRED; SEE PIN DESIGNATIONS FOR INFORMATION.
- <sup>3</sup> NOT BROUGHT OUT IN PACKAGE DEVICE.  
PAD NUMBERS CORRESPOND TO PIN NUMBERS FOR THE TO-99, 8-PIN METAL PACKAGE.

ASD0016518

Rev. E

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# AD584

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

Supply Voltage ( $V_{IN}$ ) .....	40V
Power Dissipation .....	600 mW
Storage Temperature .....	-65°C to +175°C
Ambient Operating Temperature Range ( $T_A$ ) .....	-55°C to +125°C
Junction Temperature ( $T_J$ ).....	+175°C

Absolute Maximum Ratings Notes:

<sup>1/</sup> 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.

## 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 – TO-99, 8-Pin, Metal Package

(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
Supply Current	$I_{SY}$	No Load	0.1	1.07	mA
Output Error		10 Volt		4.2	mV
		7.5 Volt		3.6	mV
		5 Volt		2.7	mV
		2.5 Volt		2.25	mV
Band Gap Voltage			-5	5	mV

Table I Notes:

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

**Table II - Electrical Characteristics for Die Qual Samples**

Parameter	Symbol	Conditions <u>1/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$	Sub- groups	Limits <u>2/</u>		Units
				Min	Max	
Quiescent Supply Current	$I_{CC}$	$V_{IN} = 38\text{ V}, V_O = 10\text{ V}$ $T_A = 25^{\circ}\text{C}$	1	0	1	mA
Output Voltage	Vout 1	$V_O = 10\text{V}, T_A = 25^{\circ}\text{C}$ M, D, L, R <u>3/</u>	1	9.97	10.03	V
				9.9	10.1	
	Vout 2	$V_O = 7.5\text{V}, T_A = 25^{\circ}\text{C}$ M, D, L, R <u>3/</u>		7.478	7.522	
				7.425	7.575	
	Vout 3	$V_O = 5.0\text{V}, T_A = 25^{\circ}\text{C}$ M, D, L, R <u>3/</u>		4.985	5.015	
				4.95	5.05	
	Vout 4	$V_O = 2.5\text{V}, T_A = 25^{\circ}\text{C}$ M, D, L, R <u>3/</u>		2.493	2.508	
				2.475	2.525	
Line Regulation <u>4/</u>	VR <sub>LINE1</sub>	$12.5\text{V} \leq V_{IN} < 15\text{V}, V_O = 10\text{ V}$	1		$\pm 0.05$	mA
			2,3		$\pm 0.10$	
	VR <sub>LINE2</sub>	$15\text{V} \leq V_{IN} \leq 30\text{V}, V_O = 10\text{ V}$	1		$\pm 0.02$	mA
			2,3		$\pm 0.05$	
Load Regulation <u>4/</u>	VR <sub>LOAD1</sub> VR <sub>LOAD2</sub> VR <sub>LOAD3</sub> VR <sub>LOAD4</sub>	$0\text{mA} \leq I_L \leq 5\text{mA}$ $V_O = 10\text{V}$ $V_O = 7.5\text{V}$ $V_O = 5.0\text{V}$ $V_O = 2.5\text{V}$	1		$\pm 50$	PPM/mA
Load Regulation <u>4/</u>	VR <sub>LOAD1</sub> VR <sub>LOAD2</sub> VR <sub>LOAD3</sub> VR <sub>LOAD4</sub>	$0\text{mA} \leq I_L \leq 5\text{mA}$ $V_O = 10\text{V}$ $V_O = 7.5\text{V}$ $V_O = 5.0\text{V}$ $V_O = 2.5\text{V}$	2,3		$\pm 100$	

<b>Table II - Electrical Characteristics for Die Qual Samples - Continued</b>						
Parameter	Symbol	Conditions <u>1/</u>	Sub- groups	Limit Min	Limit Max	Units
Output short circuit current <u>4/</u>	$I_{OS}$	$V_O = 10\text{ V}$	1, 2, 3		55	mA
Output Voltage	$DV_{out} 1/DT$	$V_O = 10V$	2, 3		$\pm 0.3$	%FS
	$DV_{out} 2/DT$	$V_O = 7.5V$				
	$DV_{out} 3/DT$	$V_O = 5.0V$				
	$DV_{out} 4/DT$	$V_O = 2.5V$				
Output noise <u>4/</u>	$N_o$	$V_O = 10\text{ V}, T_A = +25^\circ\text{C}$ $0.1\text{Hz} \leq \text{BW} \leq 10\text{Hz}$	4		50	$\mu\text{Vp-p}$
		$V_O = 10\text{ V}, T_A = +25^\circ\text{C}$ $10\text{Hz} \leq \text{BW} \leq 100\text{Hz}$			150	$\mu\text{V rms}$
Settling time <u>4/</u> 0.1% of final value (power up)	$t_s(p)$ (power)	$V_O = 10\text{ V}, I_L = 0\text{mA}$ $T_A = +25^\circ\text{C}$	9		500	$\mu\text{S}$
		$V_O = 10\text{ V}, I_L = -5\text{mA}$ $T_A = +25^\circ\text{C}$			500	

Table II Notes:

- 1./  $V_{IN} = 15\text{V}$ ,  $I_L = 0\text{mA}$  unless otherwise specified.
- 2./ The limiting terms “min” (minimum) and “max” (maximum) shall be considered to apply to magnitudes only.
- 3./ These parts may be dose rate sensitive in a space environment and may demonstrate enhanced low dose rate effects. Radiation end point limits for noted parameters are guaranteed only for conditions specified in MIL-STD-883, method 1019, condition A.
- 4./ This parameter is not tested post irradiation.

<b>Table III - Life Test Endpoint and Delta Parameter (product is tested in accordance with Table II with the following exceptions)</b>			
	Limit		
Parameter	Min	Max	Delta
VOUT1 (Err)	-30 mV	30 mV	±0.2 %
VOUT2 (Err)	-20 mV	20 mV	±0.2 %
VOUT3 (Err)	-15 mV	15 mV	±0.2 %
VOUT4 (Err)	-7.5 mV	7.5 mV	±0.2 %

## 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.

# AD584

Rev	Description of Change	Date
A	Initiate GRN023291	10/12/2007
B	Update header/footer and add to 1.0 Scope description.	March 7, 2008
C	Add Junction Temperature...+175°C to Absolute Max Ratings & remove note <u>5/</u> & <u>6/</u> from Table II	April 2, 2008
D	Correct package style	Dec. 16, 2008
E	Updated Section 4.0c note to indicated pre-screen temp testing being performed.	June 5 2009