

### 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 data sheet for commercial product grades can be found at [www.analog.com/AD9731](http://www.analog.com/AD9731)

### 2.0 Part Number. The complete part numbers per Table I of this specification follow:

<u>Part Number</u>	<u>Description</u>
<b>AD9731-703D</b>	10-bit, 170 MSPS, DAC
<b>AD9731-713D</b>	Radiation tested, 10-bit, 170 MSPS, DAC
<b>AD9731-703F</b>	10-bit, 170 MSPS, DAC
<b>AD9731-713F</b>	Radiation tested, 10-bit, 170 MSPS, DAC

### 2.1 Case Outline.

<u>Letter</u>	<u>Descriptive designator</u> <sup>1</sup>	<u>Case Outline (Lead Finish per MIL-PRF-38535)</u>
D	CDIP2-T28	28-Lead Ceramic Side Brazed DIP package
F	CDFP3-F28	28-Lead Ceramic Bottom Brazed Flatpack

<sup>1</sup> See MIL-STD-1835

### 3.0 Absolute Maximum Ratings. (T<sub>A</sub> = 25°C, unless otherwise noted)

+V <sub>S</sub> .....	+6V
-V <sub>S</sub> .....	-7V
Analog Output.....	-V <sub>S</sub> to +V <sub>S</sub>
Digital Inputs .....	-0.7V to +V <sub>S</sub>
Analog Output Current .....	30 mA
Control Amplifier Input Voltage Range .....	0V to -4V
Control Amplifier Output Current .....	±2.5 mA
Reference Input Voltage Range .....	0V to -V <sub>S</sub>
Operating Temperature Range .....	-55°C to +125°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10 sec.).....	+300°C
Maximum Junction Temperature (T <sub>J</sub> ).....	+150°C

### 3.1 Thermal Characteristics:

Thermal Resistance, SIDEBRAZED (D) Package

Junction-to-Case ( $\Theta_{JC}$ ) = 12 °C/W Max

Junction-to-Ambient ( $\Theta_{JA}$ ) = 40 °C/W Max

Thermal Resistance, BOTTOMBRAZED (F) Package

Junction-to-Case ( $\Theta_{JC}$ ) = 22 °C/W Max

Junction-to-Ambient ( $\Theta_{JA}$ ) = 66 °C/W Max

### 4.0 Electrical Table:

TABLE I						
Parameter See notes at end of table	Symbol	Conditions Note 1	Sub- group	Limit Min	Limit Max	Units
Differential Nonlinearity	DNL		1		1	LSB
			2, 3		1.5	
Integral Nonlinearity	INL		1		1	LSB
			2, 3		1.5	
Zero Scale Offset Error	IOS		1		70	μA
			2, 3		100	
Full Scale Gain Error (Note 2)	Ae		1, 2, 3		±5	% FS
Internal Reference Voltage	V <sub>REF</sub>	I <sub>REF</sub> = -50 μA to 500 μA	1	-1.35	-1.15	V
			2, 3	-1.37	-1.13	
Input Logic "1" Voltage	V <sub>IH</sub>		1, 2, 3	2		V
Input Logic "0" Voltage	V <sub>IL</sub>		1, 2, 3		0.8	
Input Logic "1" Current	I <sub>IH</sub>		1, 2, 3		50	μA
Input Logic "0" Current	I <sub>IL</sub>		1, 2, 3		100	
Positive Digital Supply Current	+I <sub>DIG</sub>		1		20	mA
			2, 3		22	
Negative Digital Supply Current	-I <sub>DIG</sub>		1		42	mA
			2, 3		47	
Negative Analog Supply Current	-I <sub>ANA</sub>		1		53	mA
			2, 3		66	

#### NOTES:

- 1 +V<sub>S</sub> = +5V, -V<sub>S</sub> = -5.2V, Clock = 125 MHz, R<sub>SET</sub> = 1.96 KΩ for 20.4 mA I<sub>OUT</sub>, V<sub>REF</sub> = -1.25V, unless otherwise specified.
- 2 Measured as an error in ratio of full-scale current to current through RSET (640 μA nominal); ratio is nominally 32. DAC load is virtual ground.

#### 4.1 Electrical Test Requirements:

<b>Table II</b>	
Test Requirements	Subgroups (in accordance with MIL-PRF-38535, Table III)
Interim Electrical Parameters	1
Final Electrical Parameters	1, 2, 3 <u>1/</u> <u>2/</u>
Group A Test Requirements	1, 2, 3
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. Deltas excluded from PDA

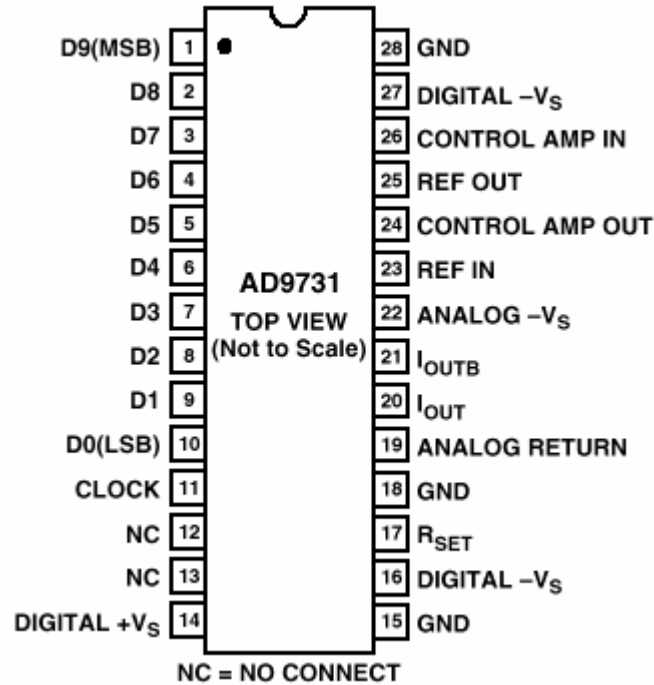
2/ See table III for delta parameters and limits.

#### 4.2 Table III. Burn-in test delta limits.

<b>Table III</b>			
TEST TITLE	ENDPOINT LIMIT	DELTA LIMIT	UNITS
$-I_{DIG}$	42	$\pm 4.2$	mA
$I_{ANA}$	53	$\pm 5.3$	mA
$+I_{DIG}$	20	$\pm 2.0$	mA
IOS	$\pm 70$	$\pm 35$	$\mu A$
Ae	$\pm 5.0$	$\pm 2.0$	%FS

# AD9731

## 5.0 Package Pin-out:



**6.0 Microcircuit Technology Group:** The microcircuit is covered by technology group 80.

**7.0 Life Test/Burn-In Circuit:** Steady state life test is per MIL-STD-883 Method 1005. Burn-in is per MIL-STD-883 Method 1015 test condition B.

**8.0 MIL-STD-38535 QMLV exceptions:**

**8.1** Full WLA per MIL-STD-883 TM 5007 is not available for this product fabricated in a QMLQ wafer process facility. SEM Inspection only is available per MIL-STD-883, TM2018.

Rev	Description of Change	Date
A	Initiate	June 30, 2000
B	Delete output compliance from Table I - guaranteed by design	Nov. 28, 2000
C	Update paragraph 1.0, added web address	Feb. 7, 2002
D	Update web address.	Mar. 18, 2003
E	Delete Burn-In circuit.	Aug. 5, 2003
F	Add AD9731-703F & AD9731-713F (flatpack version)	Oct. 27, 2003
G	Clarify SEM vs. WLA availability for QMLQ fab process	Sep. 21, 2007
H	Update header/footer & add to 1.0 Scope description	Feb. 22, 2008
I	Add descriptive designator to 2.1- Case Outline	Aug. 18, 2009

