



# Voltage to Frequency Converter

## AD537

### 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/AD537](http://www.analog.com/AD537)

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

<u>Part Number</u>	<u>Description</u>
<b>AD537-703D</b>	Voltage to Frequency Converter with 0 to 150kHz frequency range

#### 2.1 Case Outline.

<u>Letter</u>	<u>Descriptive designator</u>	<u>Case Outline (Lead Finish per MIL-PRF-38535)</u>
X	GDIP1-T14 or CDIP2-T14	14-Lead side-brazed ceramic dual-in-line package

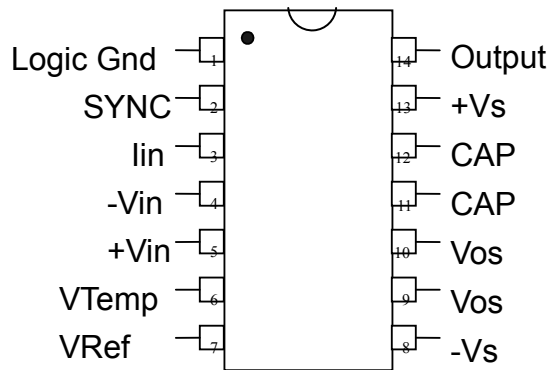


Figure 1 - Terminal Connections

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

Voltage, Rated Performance Single Supply .....	4.5 to 36V
Voltage, Rated Performance Dual Supply .....	$\pm 5\text{V}$ to $\pm 18\text{V}$
Operating Temperature Range .....	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Storage Temperature Range .....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Lead Temperature (Soldering, 10 sec.) .....	$+300^\circ\text{C}$

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Rev. B

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## 3.1 Thermal Characteristics:

Thermal Resistance, 14 DIP (X) Package

Junction-to-Case ( $\Theta_{JC}$ ) = 25°C/W Max

Junction-to-Ambient ( $\Theta_{JA}$ ) = 95°C/W Max

## 4.0 Table I. Electrical Table:

<b>Table I</b>						
Parameter See notes at end of table	Symbol	Conditions Note 1/	Sub- group	Limit Min	Limit Max	Units
Frequency Range	$F_o$		1	0	150	Khz
Linearity Error (Nonlinearity)	LE	$F_o = 10\text{Khz}$	1		0.07	%
		$F_o = 100\text{Khz}$	4		0.1	%
Gain Error (Full-Scale Calibration Error)	$A_E$	$C=0.01\mu\text{F}$ , $I_m=1.00\text{mA}$	1	-5	5	%
Gain vs. Supply	$\Delta A_E / \Delta V_S$	$F_o = 10\text{Khz}$ , $15\text{V} < V_S < 20\text{V}$	1		0.1	%/V
Gain Drift	$\Delta A_E / \Delta T$	+25C to +125C	2	-250	250	ppm/C
		+25C to -55C	3	-250	250	
Voltage Input Range	$V_{IR}$	$V_S$ Single Supply	1	0	+ $V_S-4$	V
		$V_S$ Dual Supply	1	- $V_S$	+ $V_S-4$	V
Input Bias Current	$I_{IB}$		1	-100	+100	nA
Input Resistance 4/	$R_I$			250		Mohms
Input Offset Voltage 2/	$V_{OS}$		1		2	mV
Offset vs. Supply	$\Delta V_{OS} / \Delta V_S$	$15\text{V} < V_S < 20\text{V}$	1		100	uV/V
Offset Drift	$\Delta V_{OS} / \Delta T$	+25C to +125C	2	-10	10	uV/C
		+25C to -55C	3	-10	10	
Voltage Ref Absolute Value 3/	$V_{REF}$		1	-5	5	%
$V_{REF}$ vs. Temp	$\Delta V_{REF} / \Delta T$	+25C to +125C	2	-100	100	ppm/C
		+25C to -55C	3	-100	100	
$V_{REF}$ vs. Supply	$\Delta V_{REF} / \Delta V_S$	$15\text{V} < V_S < 35\text{V}$	1		0.03	%/V
Initial Calibration - Absolute Temperature Reference	$V_{Temp}$		1	278	318	mV
Output Voltage Logic Low	$V_{OL}$	$I_{SINK} = 10\text{mA}$	1,2,3		0.4	V
Output Leakage Current	$I_{OH}$	Logic 1	1,2,3		2	uA
Quiescent Current	$I_S$	$V_S = 5\text{V} \ \& \ 36\text{V}$	1,2,3		2.5	mA

### TABLE I NOTES:

- 1  $T_a = +25\text{C}$ ,  $V_S = +15\text{V}$ ,  $C = 0.01\mu\text{F}$  unless otherwise noted
- 2 Trimmable for 14 pin DIP package only.
- 3 Nominal value 1.00V.
- 4 Guaranteed by design

#### 4.1 Table II. 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 <u>1/</u> <u>2/</u>
Group A Test Requirements	1, 2, 3, 4
Group C end-point electrical parameters	1 <u>2/</u>
Group D end-point electrical parameters	1
Group E end-point electrical parameters	N/A

Notes:

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

2/ See table III for delta limits.

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

Table III				
TEST TITLE	BURN-IN ENDPOINT	LIFETEST ENDPOINT	DELTA LIMIT	UNITS
Is@15V	2.5	2.5	±0.3	mA
Vos	2	2	±1	mV

#### 5.0 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, test condition B.

#### 6.0 MIL-STD-38535 QMLV exceptions:

6.1 Full WLA per MIL-STD-883 TM 5007 is not available for this product. SEM Inspection only is available per MIL-STD-883, TM2018.

# AD537

Rev	Description of Change	Date
A	Initiate	July 17, 2007
B	Update header/footer and add to 1.0 Scope description.	March 6, 2008