Internally Trimmed Precision IC Multiplier

AD534

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 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/AD534

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

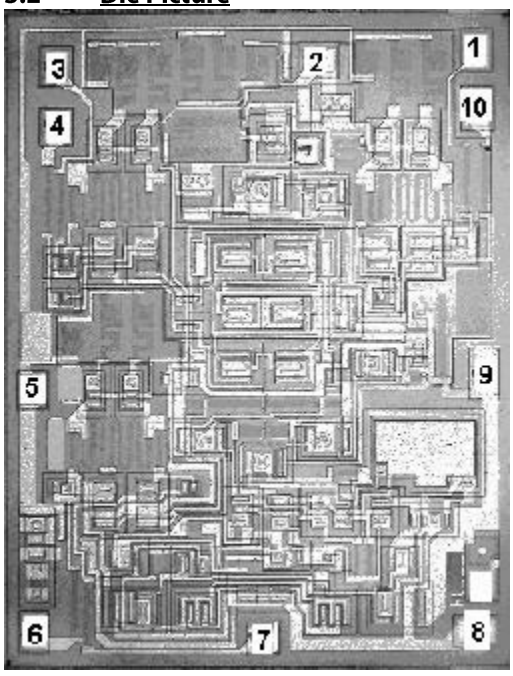
Part Number	Description
AD534-000C	Internally Trimmed Precision IC Multiplier

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
80 mil x 102 mil	19 mil ± 2 mil	Al/Cu

3.2 Die Picture



1. X2
2. SF
3. Y1
4. Y2
5. $-V_S$
6. Z2
7. Z1
8. OUT
9. $+V_S$
10. X1

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3.3 Absolute Maximum Ratings 1/

Supply Voltage..... ±22V

Output Short-Circuit to Ground..... Indefinite
Input Voltage X1, X2, Y1, Y2, Z1, Z2 ..... $\pm V_S$
Storage Temperature Range .....-65°C to +150°C
Junction Temperature (T_J).....+150°C
Operating Temperature Range.....-55°C to +125°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.

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 1/	Limit Min	Limit Max	Units
Relative Accuracy 2/		V_X = -10V, -10V, +10V, +10V; V_Y = -10V, -10V, +10V, +10V		±1	%
Nonlinearity, X Input	NL_X	V_X = 20V p-p, V_Y = +10V		±0.6	%
Nonlinearity, Y Input	NL_Y	V_Y = 20V p-p, V_X = +10V		±0.6	%
Output Offset Voltage	V_{OS}	V_X = V_Y = V_Z = 0V		±30	mV
Offset Voltage (X)	V_{OSX}	V_X = V_Z = 0V, V_Y = ±10V		±20	mV
Offset Voltage (Y)	V_{OSY}	V_Y = V_Z = 0V, V_X = ±10V		±20	mV
Input Bias Current (X, Y, or Z)	I_{IB}	V_X = V_Y = V_Z = 0V		±2	µA
Input Offset Current	I_{OS}	V_X = V_Y = V_Z = 0V		±2	µA
Positive Supply Current	I_{CC}	R_L = No Load		6	mA
Negative Supply Current	I_{EE}	R_L = No Load		6	mA
Common Mode Rejection Ratio	CMR_X	-10V ≤ V_X ≤ +10V, V_Y = +10V	70		dB
	CMR_Y	-10V ≤ V_Y ≤ +10V, V_X = +10V	70		
Output Voltage Swing	V_{OP}		±11		V

Table I Notes:
1/ V_S = ±15V, T_A = +25°C unless otherwise specified.
2/ Figures given are % of Full Scale, ±10V (i.e., 0.01% = 1mV).

Table II - Electrical Characteristics for Qual Samples						
Parameter	**Symbol**	**Conditions 1/**	**Sub-groups**	**Limit Min**	**Limit Max**	**Units**
Relative Accuracy 2/	R_A	V_X = -10V, -10V, +10V, +10V; V_Y = -10V, -10V, +10V, +10V	1, 2, 3		±1	%FS
Multiplier Accuracy Drift	TC_{MA}		2, 3		±0.01	%/°C
Nonlinearity, X Input	NL_X	V_X = 20V p-p, V_Y = +10V	1		±0.6	%
Nonlinearity, Y Input	NL_X	V_Y = 20V p-p, V_X = +10V	1		±0.6	%
Output Offset Voltage	V_{OS}	$V_X = V_Y = V_Z$ = 0V	1		±30	mV
			2, 3		±45	
Output Offset Voltage Drift	$\Delta V_{OS}/\Delta T$		2, 3		±300	µV/°C
Offset Voltage (X)	V_{OSX}	$V_X = V_Z$ = 0V, V_Y = ±10V	1		±20	mV
Offset Voltage (Y)	V_{OSY}	$V_Y = V_Z$ = 0V, V_X = ±10V	1		±20	mV
Input Bias Current (X, Y, or Z)	I_{IB}	$V_X = V_Y = V_Z$ = 0V	1		±2	µA
Input Offset Current	I_{OS}	$V_X = V_Y = V_Z$ = 0V	1		±2	µA
Positive Supply Current	I_{CC}	R_L = No Load	1		6	mA
Negative Supply Current	I_{EE}	R_L = No Load	1		6	mA
Common Mode Rejection Ratio	CMR_X	-10V ≤ V_X ≤ +10V, V_Y = +10V	4	70		dB
	CMR_Y	-10V ≤ V_Y ≤ +10V, V_X = +10V	4	70		
Output Voltage Swing	V_{OP}		1, 2, 3	±11		V

Table II Notes:

1/ V_S = ±15V, unless otherwise specified.

2/ Figures given are % of Full Scale, ±10V (i.e., 0.01% = 1mV).

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		
Relative Accuracy	R_A	1		±1.1		±1.2	±0.1	%FS

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	20-NOV-01
B	Update web address	Jan. 25, 2002
C	Update 1.0 Scope description.	26 July 2007
D	Update header/footer and add to 1.0 scope description.	Feb. 29,2008
E	Add Junction Temperature (T_J) 150°C to Absolute Maximum Ratings	April 3, 2008
F	Updated Section 4.0c note to indicate pre-screen temp testing being performed.	5-JUN-2009
G	Updated fonts and sizes to ADI standards. Update Die picture	01-Nov-2011

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