



Internally Trimmed Precision IC Multiplier

ANALOG DEVICES INC

AD632

1.1 Scope.

This specification covers the detail requirements for an internally trimmed monolithic four-quadrant analog multiplier/divider.

1.2 Part Number.

The complete part number per Table 1 of this specification is as follows:

Device	Part Number ¹
-1	AD632S(X)/883B
-2	AD632T(X)/883B

NOTE

¹See paragraph 1.2.3 for package identifier.

1.2.3 Case Outline.

See Appendix 1 of General Specification ADI-M-1000: package outline:

(X)	Package	Description
D	D-14	14-Pin DIP
H	H-10A	10-Pin Metal Package

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

Supply Voltage	$\pm 22\text{V}$
Internal Power Dissipation	500mW
Output Short-Circuit to Ground	Indefinite
Input Voltage, $X_1, X_2, Y_1, Y_2, Z_1, Z_2$	$\pm V_S$
Rated Operating Temperature Range	-55°C to $+125^\circ\text{C}$
Storage Temperature Range	-65°C to $+150^\circ\text{C}$
Lead Temperature (Soldering 10sec)	$+300^\circ\text{C}$

1.5 Thermal Characteristics.

Thermal Resistance θ_{JC}	$= 25^\circ\text{C/W}$ for H-10A
θ_{JA}	$= 150^\circ\text{C/W}$ for H-10A
θ_{JC}	$= 25^\circ\text{C/W}$ for D-14
θ_{JA}	$= 95^\circ\text{C/W}$ for D-14

Table 1.

Test	Symbol	Device	Design Limit @ +25°C	Sub Group 1	Sub Group 2, 3	Sub Group 4	Test Condition ¹	Units
Relative Accuracy ²	RA	-1	1	1	2		$V_X = -10V, -10, +10, +10$	±% FS max
		-2	0.5	1	1	0.5	$V_Y = -10V, +10V, -10, +10$	
Multiplier Accuracy Drift	TC _{MA}	-1	0.02		0.02			±%/°C max
		-2	0.01		0.01			
Nonlinearity, X Input	NL _X	-1	0.6				$V_X = 20V$ pk-pk	±% max
		-2	0.3			0.3	$V_Y = +10V$	
Nonlinearity, Y Input	NL _Y	-1	0.2				$V_Y = 20V$ pk-pk	±% max
		-2	0.10			0.10	$V_X = +10V$	
Output Offset Voltage	V _{OS}	-1	30	30	80		$V_X = V_Y = V_Z = 0V$	±mV max
		-2	15	30	45	15		
Output Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	-1	500		500		$V_X = V_Y = V_Z = 0V$	± $\mu V/^\circ C$ max
		-2	300		300			
Offset Voltage (X)	V _{OSX}	-1	20	20			$V_X = V_Z = 0V$	±mV max
		-2	10	20		10	$V_Y = \pm 10V$	
Offset Voltage (Y)	V _{OSY}	-1	20	20			$V_Y = V_Z = 0V$	±mV max
		-2	10	20		10	$V_X = \pm 10V$	
Input Bias Current X, Y or Z Inputs	I _{IB}	-1, 2	2	2			$V_X = V_Y = V_Z = 0V$	± μA max
Input Offset Current X, Y or Z Inputs	I _{IO}	-1, 2	2	2			$V_X = V_Y = V_Z = 0V$	± μA max
Supply Current From V _{CC}	I _{CC}	-1, 2	6.0	6.0			R _L = No Load	+mA max
Supply Current From V _{EE}	I _{EE}	-1, 2	6.0	6.0				-mA max
Common-Mode Rejection Ratio X, Y, or Z Inputs	CMR _X	-1	60			60	$-10V \leq V_X \leq +10V$	dB min
		-2	70			70	$V_Y = +10V$	
	CMR _Y	-1	60			60	$-10V \leq V_Y \leq +10V$	dB min
		-2	70			70	$V_X = +10V$	
Output Voltage Swing	V _{OP}	-1, 2	11	11	11			±V min
Slew Rate	SR	-1, 2	18				$V_{OUT} = 20V$ pk-pk	V/ μs min
1% Amplitude Error	A _E	-1, 2	50				$V_X = 2V$ pk-pk C _{LOAD} = 1000pF, $V_Y = +10V$	kHz min
Feedthrough, X Input ³	FRR	-1	0.70				Y Nulled, X = 20V	±% FS max
		-2	0.30			0.30	pk-pk @ 50Hz	
Feedthrough, Y Input ³	FRR	-1	0.40				X Nulled, Y = 20V	±% FS max
		-2	0.10			0.10	pk-pk @ 50Hz	

NOTES

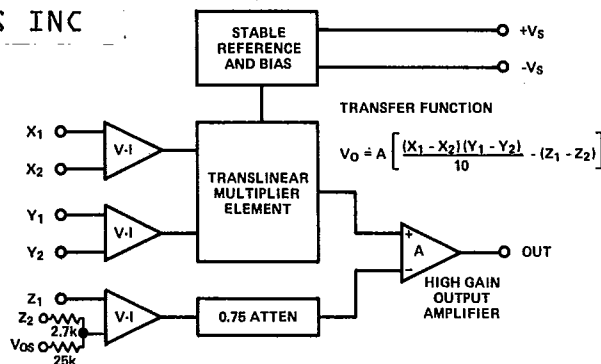
¹T_A = +25°C, V_S = ±15V, unless otherwise noted.²Figures given are percent of full-scale, ±10V (i.e., 0.01% = 1mV).³Irreducible component due to nonlinearity: excludes effects of offsets.

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65E D

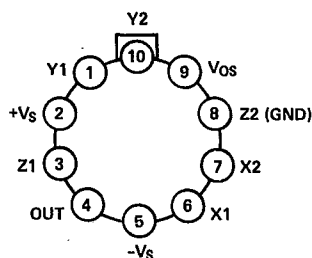
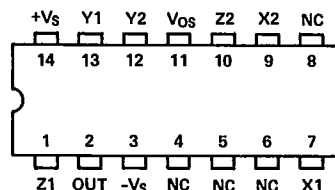
3.2.1 Functional Block Diagram and Terminal Assignments.

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Pin Assignments

Top View

H-Package
TO-100D-Package
TO-116

3.2.4 Microcircuit Technology Group.

This microcircuit is covered by technology group (49).

4.2.1 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).

