



AS633 , AS534 - 4-quadrant multiplier

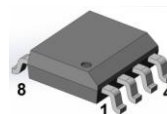
FEATURES

- 4-quadrant multiplication
- Laser trimmed total error <1%
- Bandgap reference
- Maximum supply voltage $\pm 22V$

APPLICATIONS

For electronic music
Multiplication, division, squaring
Modulation/demodulation, phase detection
Voltage-controlled amplifiers/attenuators/filters

AS633D, AS633*D
SOIC-8 (150mil)



AS534H
TO5-12



General Description

The AD633 is a functionally complete, four-quadrant, analog multiplier. It includes high impedance, differential X and Y inputs, and a high impedance summing input (Z). The low impedance output voltage is a nominal 10 V full scale provided by a laser trimmed bandgap reference.

The AS633 / AS534 is laser calibrated to a guaranteed total accuracy of 1 % of full scale. Nonlinearity for the Y input is typically less than 0.1% and noise referred to the output is typically less than 100 μV rms in a 10 Hz to 10 kHz bandwidth. A 1 MHz bandwidth, 35 V/ μs slew rate, and the ability to drive capacitive loads make the AS633 useful in a wide variety of applications where simplicity is a key concern.

The versatility of the AS633 is not compromised by its simplicity.

The Z input provides access to the output buffer amplifier, enabling the user to sum the outputs of two or more multipliers, increase the multiplier gain, convert the output voltage to a current, and configure a variety of applications.

AS534 benefits from differential inputs (X, Y and Z) , high impedance for :

$$[(X_1 - X_2)(Y_1 - Y_2)/SF] - (Z_1 - Z_2)$$

transfer function. AS534 is available in TO5-12 package.

Pin Information

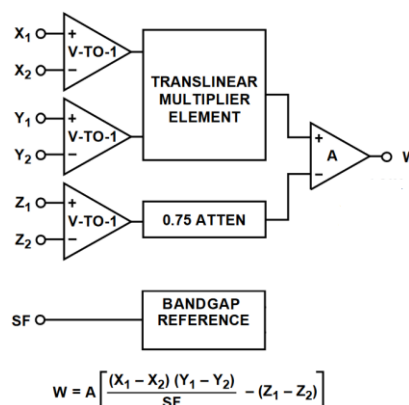
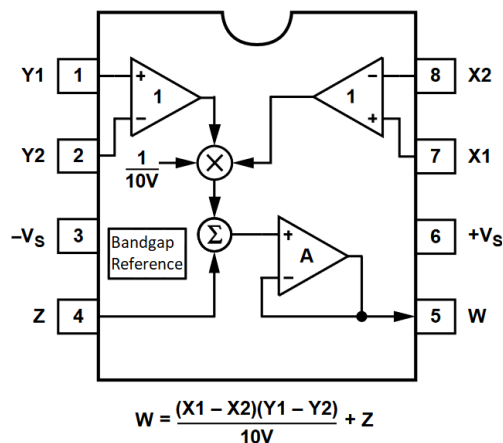
AS633

SOIC-8 Pin No	Pin Name	Description
1	Y1	Y1 Multiplicand Noninverting input
2	Y2	Y1 Multiplicand Inverting Input
3	-Vs	Negative Supply
4	Z	Summing Input
5	W	Product Output
6	+Vs	Positive Supply
7	X1	X1 Multiplicand Noninverting Input
8	X2	X2 Multiplicand Inverting Input

AS534

TO5-12 Pin No	Pin Name	Description
1	X2	X2 Multiplicand Inverting Input
2	SF	Scale Factor Input
3	Y1	Y1 Multiplicand Noninverting Input
4	Y2	Y1 Multiplicand Inverting Input
6	-Vs	Negative Supply
7	Z2	Summing Inverting Input
8	Z1	Summing Noninverting Input
9	W	Product Output
10	+Vs	Positive Supply
12	X1	X1 Multiplicand Noninverting Input
5,11	NC	Not connected

Block Diagram





Absolute Maximum Ratings

Voltage between +V_s and -V_s Pins 44V
Input voltage (X1, X2, Y1, Y2, Z) for AS633, AS633* ± V_s
(X1, X2, Y1, Y2, Z1, Z2) for AS534 ± V_s

Typical Electrical Characteristics

T_A = 20°C, V_s = +15V, -V_s = -15V, R_L ≥ 2kΩ

Parameter	Conditions	Min	Typ	Max	Units
TRANSFER FUNCTION	AS633, AS633* AS534	$W = (X1 - X2)(Y1 - Y2) / 10V + Z$ $W = A[(X1 - X2)(Y1 - Y2) / 10V - (Z1 - Z2)]$			
MULTIPLIER PERFORMANCE					
Total Error AS633*	-10 V ≤ X, Y ≤ +10 V	-1	±0.5	1	% full scale
AS633, AS534		-0.5	± 0.25	0.5	% full scale
Scale Voltage Error AS633*	SF = 10.00 V nominal	-1	± 0.5	1	% full scale
AS633, AS534		-0.5	± 0.2	0.5	% full scale
AS534	SF = 3.00 V nominal		± 0.5		% full scale
Supply Rejection	V _s = ± 14 V to ± 16 V	-0.1	± 0.01	0.1	% full scale
Nonlinearity, X	X = ± 10 V, Y = +10 V	-1	± 0.2	1	% full scale
Nonlinearity, Y	Y = ± 10 V, X = +10 V	-0.4	± 0.1	0.4	% full scale
X Feedthrough	Y1, Y2 = 0, X = ± 10 V	-1	± 0.3	1	% full scale
Y Feedthrough	X1, X2 = 0, Y = ± 10 V	-0.4	± 0.1	0.4	% full scale
Output Offset Voltage		-25	± 5	25	mV
DYNAMICS					
Small Signal Bandwidth	V _O = 0.1 V rms		1		MHz
Slew Rate	V _O = 20 V p-p		35	50	V/μs
Settling Time to 1%	ΔV _O = 20 V		0.4	2	μs
OUTPUT NOISE					
Spectral Density	f = 10 Hz to 5 MHz		0.8		μV/√Hz
Wideband Noise	f = 10 Hz to 10 kHz		1		mV rms
			90		μV rms
OUTPUT					
Output Voltage Swing		-11		11	V
Short Circuit Current	R _L = 0 Ω	-60	±35	60	mA
INPUT AMPLIFIERS					
Signal Voltage Range	Differential	-10		10	V
	Common mode	-10		10	V
Offset Voltage (X, Y)		-25	±5	25	mV
CMRR (X,Y)	V _{CM} = ±10 V, f = 50 Hz	70	80		dB
Bias Current (X, Y, Z)			0.7	2	μA
Differential Resistance			10		MΩ
POWER SUPPLY					
Supply Voltage			±15		V
Rated Performance					V
Operating Range				±22	V
Supply Current	Quiescent	±8	5.5	7	mA
		4			

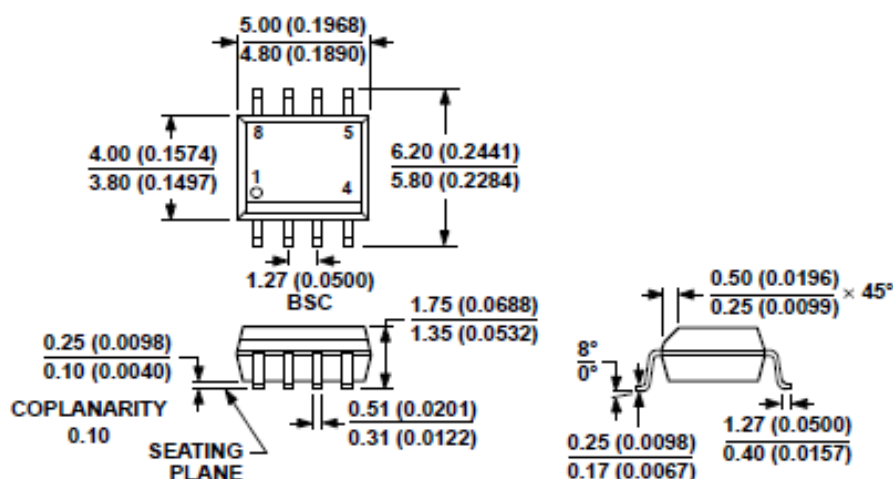


Package Information

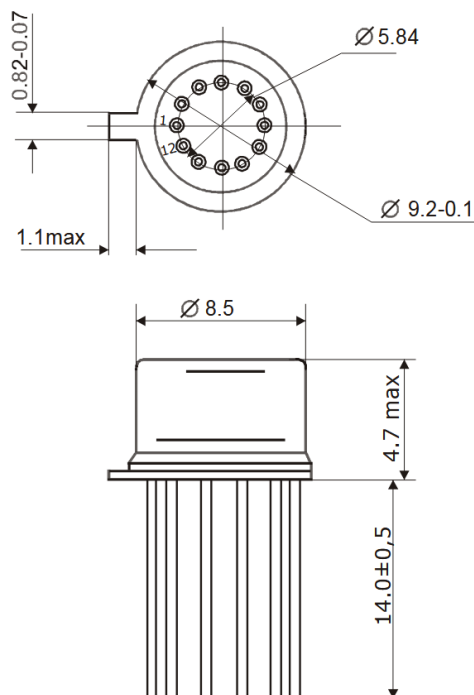
Device type	Package
AS633D	SOIC-8 (150 mil)
AS633*D	SOIC-8 (150 mil)
AS534H	TO5-12

Outline dimensions

SOIC-8 (150 mil)
Units: mm (inch)



TO5-12
Units: mm



Revision history

Date	Revision	Changes
21-Nov-2023	1	Preliminary version 1
01-Dec-2023	2	Version 1
22-Oct-2025	3	Version 2 AS534H included