Parameter	T_{amb}=25°C	T_{amb}=Operating Range	Test Conditions
DIGITAL INPUTS			
Input High Voltage V_{INH}	2.4 V min	2.4 V min	
Input Low Voltage V_{INL}	0.8 V max	0.8 V max	
Input Leakage Current I_{IN}	±1 µA max	±1 µA max	V_{IN}=0 V and V_{DD}
Input Capacitance C_{IN}	8 pF max[5]	8 pF max[5]	
POWER Requirements			
V_{DD}	+15 V ± 10%	+15 V ± 10%	Rated Accuracy
V_{DD} Range[5]	+5 V to +16 V	+5 V to +16 V	Functionality with Degraded Performance
I_{DD}	2 mA max	2 mA max	Digital Inputs=V_{INL} or V_{INH}

NOTES
[1] "FSR" is Full-Scale Range.
[2] Full Scale (FS)=(V_{REF}).
[3] Max gain change from T_{amb}=+25°C to T_{min} or T_{max} is ±0.1% FSR
[4] AC parameter, sample tested to ensure specification compliance.
[5] Guaranteed, not tested.
[6] Absolute temperature coefficient is approximately - 350 ppm/°C.
Specifications subject to change without notice.

Terminology

RELATIVE ACCURACY: Relative accuracy or end-point nonlinearity is a measure of the maximum deviation from a straight line passing through the endpoints of the DAC transfer function. It is measured after adjusting for ideal zero and full scale and is expressed in % of full-scale range or (sub) multiples of 1LSB.

RESOLUTION: Value of the LSB. For example, a unipolar converter with n bits has a resolution of (2^{-n}) (V_{REF}). A bipolar converter of n bits has a resolution fo [$2^{-(n-1)}$] (V_{REF}). Resolution in no way implies linearity.

SETTLING TIME: Time required for the output function of the DAC to settle to within ½ LSB for a given digital input stimulus, i.e., 0 to Full Scale.

GAIN ERROR: Gain error is a measure of the output error between an ideal DAC and the actual device output. It is measured with all is in the DAC after offset error has been adjusted out and is expressed in Least Significant Bits. Gain error is adjustble to zero with an external potentiometer.

FEEDTHROUGH ERROR: Error caused by capacitive coupling from V_{REF} to output with all switchues OFF.

OUTPUT CAPACITANCE: Capacity from I_{OUT1} and I_{OUT2} terminals to ground.

OUTPUT LEAKAGE CURRENT: Current which appears on I_{OUT1} terminal with all digital inputs LOW or on I_{OUT2} terminal when all inputs are HIGH.

CMOS Low Cost 10-Bit Multiplying DAC.

Features

Lowest Cost 10-Bit DAC
Low Cost AD7520 Replacement
Linearity: 1/2, 1 or 2LSB
Low Power Dissipation
Full Four-Quadrant Multiplying DAC
CMOS/TTL Direct Interface
Latch Free (Protection Schottky Not Required)
End-Point Linearity

Applications

Digitally Controlled Attenuators

Programmable Gain Amplifiers

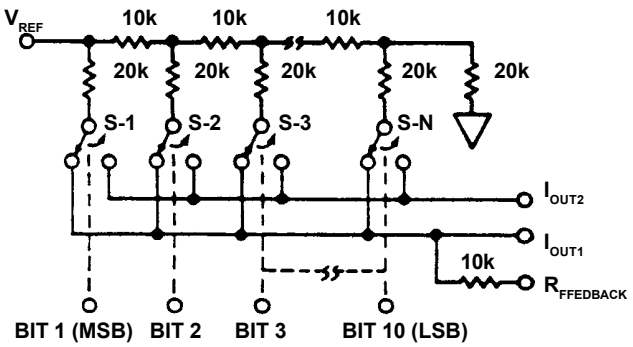
Function Generation

Linear Automatic Gain Control

General Description

The AS7533 is a low cost 10-bit 4-quadrant multiplying DAC manufactured using an advanced thin-film-on-monolithic-CMOS wafer fabrication process.
Pin and function equivalent to the industry standard AD7520, the AS7533 is recommended as a lower cost alternative for old AD7520 sockets or new 10-bit DAC designs.
AS7533 application flexibility is demonstrated by its ability to interface to TTL or CMOS, operate on +5 V to +15 V power, and provide proper binary scaling for reference inputs of either positive or negative polarity.

Functional Block Diagram.



Absolute maximum ratings*

V_{DD} to GND ..... -0.3 V, +17 V
R_{FB} to GND ..... ±25 V
V_{REF} to GND ..... ±25 V
Digital Input Voltage Range ..... -0.3 V to V_{DD} +0.3 V
OUT1, OUT2 to GND ..... -0.3 V to V_{DD} +0.3 V
Operating Temperature Range
Commercial (J, K, L Versions) ..... -40°C to +85°C
Industrial (A, B, C Versions) ..... -40°C to +85°C
Storage Temperature ..... -65°C to +150°C
Lead Temperature (Soldering, 10sec) ..... +300°C

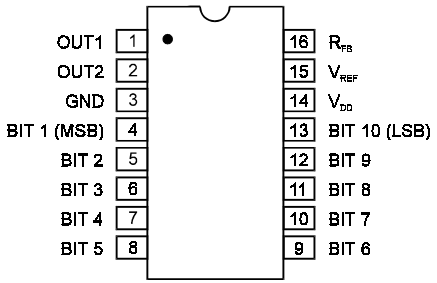
** Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

Ordering Guide

Type	Temperature Range	Nonlinearity (% FSR max)	Package Option
AS7533JN	-40°C to +85°C	±0.2	Plastic
AS7533KN	-40°C to +85°C	±0.1	Plastic
AS7533LN	-40°C to +85°C	±0.05	Plastic
AS7533AQ	-40°C to +85°C	±0.2	Ceramic
AS7533BQ	-40°C to +85°C	±0.1	Ceramic
AD7533CQ	-40°C to +85°C	±0.05	Ceramic

Pin Configurations

DIP Plastic, Ceramic



2.50mm step, 7.5mm base

Specifications

(V_{DD}=+15V, V_{OUT1}=V_{OUT2}=0V; V_{REF}=+10V unless otherwise noted)

Parameter	T_{amb}=25°C	T_{amb}=Operating Range	Test Conditions
STATIC ACCURACY			
Resolution	10 bit	10 bit	
Relative Accuracy[1]			
AS7533J, A	±0.2%FSR max	±0.2%FSR max	
AS7533K, B	±0.1%FSR max	±0.1%FSR max	
AS7533L, C	±0.05%FSR max	±0.05%FSR max	
Gain Error[2,3]	±1.4% FS max	±1.5% FS max	Digital Inputs=V_{INH}
Supply Rejection[4]			
$\Delta Gain/\Delta V_{DD}$	0.005% / %	0.008% / %	Digital Inpust=V_{INH} V_{DD}=+14 V to +17 V
Output Leakage Current			
I_{OUT1}	±50 nA max	±200 nA max	Digital Inputs=V_{INL}; V_{REF}=±10V
I_{OUT2}	±50 nA max	±200 nA max	Digital Inputs=V_{INH}; V_{REF}=±10V
DYNAMIC ACCRUACY			
Output Current Settling Time	600 ns max[4]	800 ns[5]	To 0.05% FSR; R_{LOAD}=100Ω; Digital Inputs=V_{INH} to V_{INL} or V_{INL} to V_{INH}
Feedthrough Error	±0.05%FSR max[5]	±0.1%FSR max[5]	Digital Inputs=V_{INH}; V_{REF}=±10 V, 100 kHz sine wave.
REFERENCE INPUT			
Input Resistance (Pin 15)	5kΩ min,20kΩ max	5kΩ min,20kΩ max[6]	
ANALOG OUTPUTS			
Output Capacitance			
C_{OUT1}	100 pF max[5]	100 pF max[5]	Digital Inputs=V_{INH}
C_{OUT2}	35 pF max[5]	35 pF max[5]	
C_{OUT1}	35 pF max[5]	35 pF max[5]	Digital Inputs=V_{INL}
C_{OUT2}	100 pF max[5]	100 pF max[5]	