16-Bit Precision, 16-Channel Multiplexer – Simultaneous S/H

in a "C" Size VXI Module

Introduction

The DBS 8710 is the first high speed, high precision multiplexer that combines 16 very accurate sample-and-hold (S/H) channels with a 400 kHz aggregate sampling rate in a VXI "C" size module. Compatible with VXI specification Rev. 1.3 regarding the P2 connector, this 16-channel, differential, simultaneous S/H multiplexer occupies a single slot in a VXI chassis and provides an unmatched price/performance ratio when used in combination with the Analogic DBS 8700/8701 Digitizer modules. Reflecting the Analogic expertise in precision analog signal conditioning, the DBS 8710 is designed to meet the stringent demands of fast and accurate measurements associated with multichannel, simultaneous sampling in applications such as vibration analysis, rotating machinery testing, automotive and jet engine testing, and analysis of large mechanical structures and other complex mechanisms.

Sixteen shielded, differential inputs are provided with both voltage and current protection and a passive, one-pole, low-pass filter. Each pair of inputs is buffered via an instrumentation amplifier with an excellent common mode rejection ratio (CMRR) into a 16-bit accuracy, superior performance, S&H circuit. All input channels are simultaneously switched from sampling (track) mode to hold mode. The held voltages from user selected input channels are then sequentially digitized by the DBS 870x digitizer module. The simultaneous clocking of all S/H circuits and the addressing of multiplexers are performed by the digital subsection of DBS 8710 that buffers and decodes the control signals received from an associated DBS 8700/8701 digitizer. All digital controls are exchanged via VXI lines located on the P2 connector. For self-test purposes, a reference and/or a ground voltage can be switched into two S/H inputs. The status of the pass/fail test may be displayed by a green/red light emitting diode (LED) indicator mounted on the front panel of the module. The same panel provides two 8-channel input connectors and two output connectors. A 3-position address DIP switch is located inside the module.

Two ultra-low-noise DC-DC converters, requiring only +5V input, generate the power for the entire analog section of the module. Being fully isolated, the DBS 8710 provides a complete system solution for an analog multiplexer with simultaneous sampling. Multiple modules can be interconnected with a single digitizer module such as the DBS 8700/8701 to produce a precision front-end with up to 128 simultaneous S/H channels.

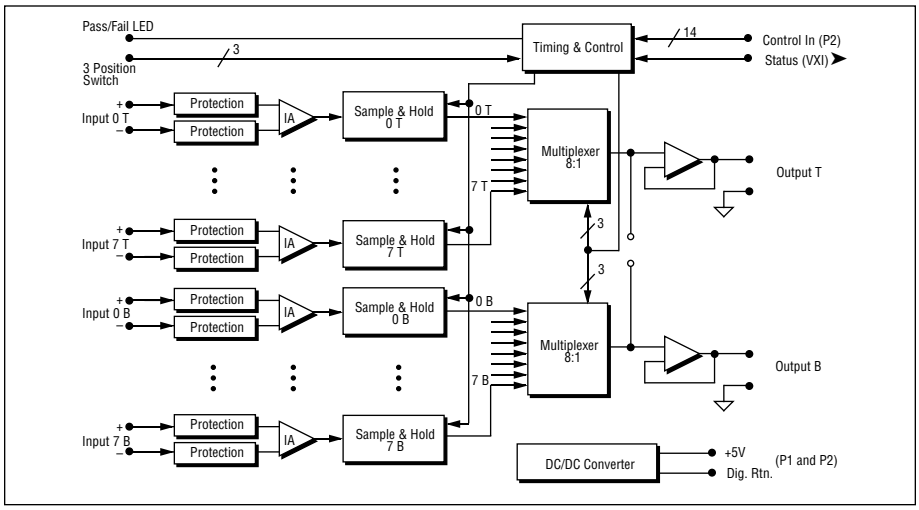
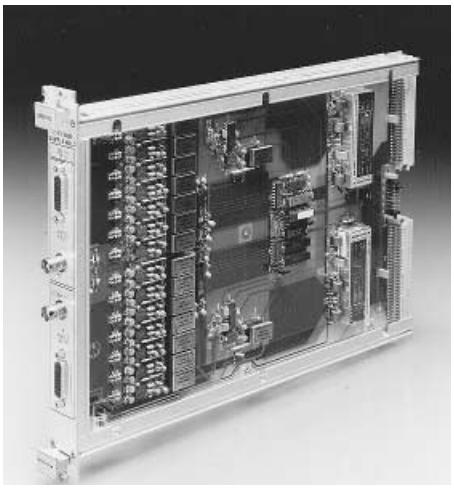


Figure 1. The DBS 8710 Block Diagram.



Features

- True 16-Bit Precision
- 200 kHz Sampling Rate Per Channel
  Per Output
  400 kHz Aggergate
- 16 Differential Inputs
- Voltage & Current Input Protection
- Excellent CMRR
- 16 Precision Sample-and-Hold Circuits
- 200 ps Aperture Uncertainty
- Peak Harmonic Distortion
  –96 dB
- 2 Multiplexer Outputs
- For Use with Analogic DBS 8700/8701 Digitizer Modules

Applications

- Multichannel Data Acquisition
- Simultaneous Events Analysis
- Monitoring and Control
- Automatic Test Equipment

VXI bus

CE

ANALOGIC®
The World Resource for Precision Signal Technology

DBS 8710

Specifications[1]

ANALOG INPUTS

Number of Channels
16 differential

Input Range
±10V

Input Bias Current
5 nA Max.

Input Resistance
$10^{12}\Omega$ Typ.

Input Low Pass Filter
500Ω, 2000 pF

Common Mode Voltage
±10V Max.

Input Overvoltage Protection
±25V Max.

Input Current Protection
50 mA Max.

ANALOG OUTPUTS

Number of Output Channels
2 (0ne per 8 input channels)

Output Range
±10V

Output Resistance
1Ω Typ.

Output Capacitance
5 pF Max.

INPUT BUFFER AMPLIFIER

Gain
1 ±0.02%

Offset
±2 mV Max.

Slew Rate
7 V/µs Typ.

Channel Separation
120 dB @ 1 kHz Typ.

SAMPLE-AND-HOLD CIRCUIT

Track Mode
Full Scale Linear Input Range
±10V

Full Power Bandwidth
200 kHz

Small Signal Bandwidth
2 MHz

Acquisition Time
(to 0.0015% of Step)
2.5 µs Max.

Hold Mode
Track-to-Hold Transient Settling Time
(to 0.0015 of 10V Step)
0.5 µs Typ., 1 µs Max.

Aperture Delay
25 ns Max.

Aperture Uncertainty
±200 ps RMS

Output Offset Plus Pedestal
15 mV Typ.

Droop Rate
0.3 µV/µs Max.

Dielectric Absorption Factor[5]
0.0001

DYNAMIC CHARACTERISTICS

Maximum Sampling Rate
200 kHz per channel per output
400 kHz aggregate

Differential Crosstalk
–100 dB @ 1 kHz Typ.

Peak Harmonic Distortion[2, 4]
–96 dB Typ. (@ 1 kHz)

Total Harmonic Distortion[3, 4]
–92 dB Typ. (@ 1 kHz)

Noise
(Referred to input and measured over
600 kHz bandwidth, Noise Gain = 2)
50 µV RMS Max.

Channel Switching and Settling Time to
1 LSB After 10V Step
2.5 µs Max.

TRANSFER CHARACTERISTICS

Accuracy
16 Bit

Gain
1 ±0.02%

CMRR
96 dB @ 60 Hz

Integral Non-Linearity
±0.003% FSR Max.

STABILITY (0°C to +50°C)

Required Warm-up Time
(for ultimate specifications)
15 minutes

Offset Tempco
50 µV/°C Max.

Gain Tempco
20 ppm FSR/°C Max.

Droop Rate
Doubles for every 10°C

DIGITAL CONTROL

Logic Levels
TTL/CMOS Compatible
Logic "0"
0.8V Max.

Logic "1"
2.0V Min.

Loading
1 LSTTL Load

SAMPLE-AND-HOLD

Sample
Logic "0"

Hold
Logic "1"

Required Rise Time
5 ns Typ.

Board Address Setting
3 position DIP Switch

FRONT PANEL INDICATOR

Pass/Fail LED
Green/Red

POWER REQUIRED

+5V Supply
+4.75V Min., +5.25V Max.

Power Consumption
18W Max.

ENVIRONMENTAL AND MECHANICAL

Temperature Range
Rated Performance
0°C to +50°C

Storage
–25°C to +75°C

Relative Humidity
0 to 85% non-condensing up to +40°C

Cooling
1.2 litre/sec. airflow for 10°C rise at 0.29 mm H_2O back pressure

Dimensions
"C" size VXI

Weight
2 lbs, 14 oz/1.30 kg

Front Panel Potential
Chassis Ground

Notes:

1. Unless otherwise noted, all specifications apply at +25°C.
2. Peak Distortion represents the ratio between the highest spurious frequency component below the Nyquist rate and the signal.
3. Total Harmonic Distortion represents the ratio between the RMS sum of all harmonics up to the 20th harmonic and the RMS value of the signal.
4. ±10V input signal.
5. The error voltage caused by dielectric absorption can be calculated from the following expression:

$$Err = \Delta Vin \bullet K \bullet Log_{10}[1+(Th/Ts)]$$

where

- ΔVin= the voltage difference between the previous and the current samples
- K= 0.0001, the dielectric absorption factor for the hold capacitor in the S/H circuits used in the S/H MUX
- Ts= the period that the sample/hold circuit is in the "sample" or "track" mode
- Th= the period between the end of the sample period and the instant of conversion

Also see Analogic application note AD-1046

Specifications subject to change without notice.

Ordering Guide

DBS 8710
16 Channel MUX with S/H
DBS 8710-B05
For use with DBS 8700-B05 and DBS 8701-B05

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Printed in U.S.A.

Bulletin No. 16-100543 REV 1 3/97 2.5M