

# High Precision Digitizers

## 16-Bit at 200 kHz or 400 kHz

### in a "C" Size VXI Module

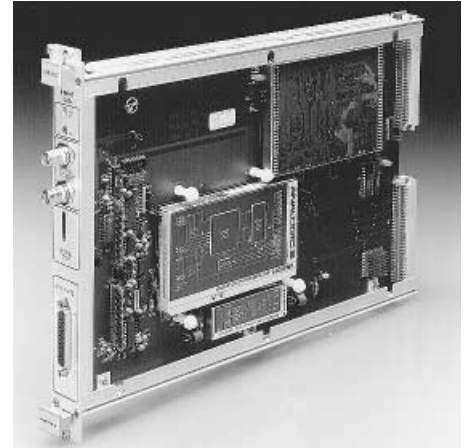
#### Introduction

The DBS 8700/8701 features the first 200 kHz/400 kHz, high resolution, multi-channel Digitizing Systems that combine the superior precision of 16-bit measurement with high throughput in a "C" size VXI module. Fully compatible with VXI specification Rev. 1.3, a DBS 8700/8701 occupies a single slot in a "C" size VXI chassis and provides an unparalleled price/performance ratio when used alone or in combination with other VXI modules (multiplexers, or digital-to-analog converters) within the Analogic DBS 8700/8701 series. Reflecting the many years of Analogic experience in precision instrumentation, a DBS 8700/8701 is designed to meet the stringent demands of fast and accurate measurements associated with multichannel applications such as vibration analysis, the testing of rotating machinery, and automotive and jet engine testing, as well as the analysis of large mechanical structures and other complex mechanisms.

Eight shielded, differential inputs are provided with both voltage and current protection. The unit is directly expandable to 256 channels with the Analogic family of DBS multiplexer modules. Input signals are multiplexed via an instrumentation amplifier and a programmable gain amplifier, with four software selectable gains, into an ultrafast, high resolution, sampling analog-to-digital converter. The acquisition time, hold-mode settling time and droop rate ensure 16-bit system performance up to the maximum sampling rate.

The DBS 8700/8701 provides a powerful 2-channel, on-board DMA controller as a standard feature. The DMA controller executes fast transfers over the VMEbus (P1) sending data directly into the system's memory, significantly enhancing total system performance by dramatically reducing the I/O overhead of the bus.

Three flexible trigger sources are available: a user-supplied outside trigger, an internal trigger derived from a precision clock residing on the module, and a data dependent trigger produced by the occurrence of a specified event on a selected channel. Before beginning the data acquisition, trigger information, as well as channel selection inside a scan, and gain setting are downloaded into the timing and control unit resident on the DBS 8700/8701 module. For ease of integration, a selection of available software drivers is offered for use with the card. No coding is required by the user; all necessary commands are included in the driver.



#### Features

- 16-Bit Resolution & Accuracy
- 200 kHz or 400 kHz Throughput Rate
- On-Board Sequencer
- 8 Differential Inputs
- Expandability up to 256 Channels
- Simultaneous Sampling via Companion Multiplexer Module DBS 8710
- Dynamically Set Gain per Channel
- Peak Distortion -96 dB (DBS 8700)  
-91 dB (DBS 8701)
- Variable Sampling Rate
- Multiple Sample Clock Sources
- Versatile Trigger Unit
- Software Drivers Available

#### Applications

- Real Time Data Acquisition
- Precision Instrumentation
- Automatic Test Equipment
- Monitoring and Control



**ANALOGIC**  
The World Resource  
for Precision Signal Technology

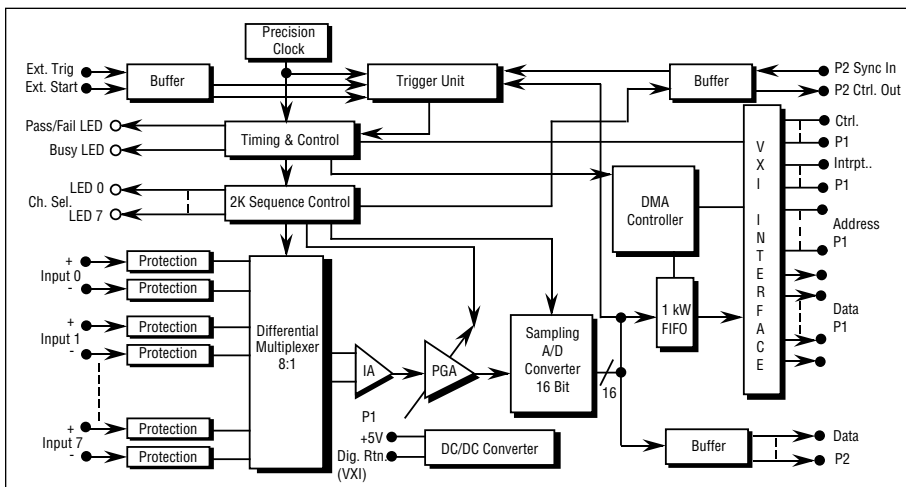


Figure 1. The DBS 8700/8701 Block Diagram.

# DBS 8700/8701

## Specifications<sup>1</sup>

### ANALOG INPUTS

Number of Channels

Input Ranges

Gain 1

Gain 2

Gain 4

Gain 8

Input Bias Current

Input Resistance

Input Capacitance

Common Mode Voltage

Input Overvoltage Protection

Input Current Protection

### DBS 8700

8 differential,  
expandable to 256

**DBS 8700-B05 DBS 8700-B10 DBS 8700-U10**

±5V,

±2.5V,

±1.25V,

±0.625V,

±10V,

±5V,

±2.5V,

±1.25V,

0 to +10V

0 to +5V

0 to +2.5V

0 to +1.25V

### DBS 8701

8 differential,  
expandable to 256

**DBS 8701-B05 DBS 8701-B10 DBS 8701-U10**

±5V,

±2.5V,

±1.25V,

±0.625V,

±10V,

±5V,

±2.5V,

±1.25V,

0 to +10V

0 to +5V

0 to +2.5V

0 to +1.25V

### CLOCK/TRIGGER INPUTS

Logic Levels, LSTTL/CMOS Compatible  
Logic "0"

Logic "1"

Termination

0.8V Max.

2.0V Min.

50Ω

0.8V Max.

2.0V Min.

50Ω

### AMPLIFIER CHARACTERISTICS

Gain

Offset Voltage

Slew Rate

CMRR

Full Power Bandwidth

Settling Time To ±0.001%  
(10V Step, Gain = 1)

1, 2, 4, 8 (±0.02% Max.)

±10 mV Max.

12 V/μs Min.

100 dB @ 60 Hz Typ.

200 kHz

1.5 μs Typ.

1, 2, 4, 8 (±0.02% Max.)

±10 mV Max.

80 V/μs Min.

100 dB @ 60 Hz Typ.

400 kHz

1.5 μs Typ.

### DYNAMIC CHARACTERISTICS

Maximum Sampling Rate

Noise

(Referred to input and measured over  
700 kHz equivalent noise bandwidth)

Differential Crosstalk

S/H Aperture Delay

S/H Aperture Jitter

S/H Feedthrough

Peak Distortion<sup>(2,4)</sup>

Total Harmonic Distortion<sup>(3,4)</sup>

204.8 kHz

(0.5 LSB + 30 μV) RMS

−96 dB (@ 1 kHz) Typ.

25 ns Typ.

±400 ps RMS Max.

−90 dB (@ 1 kHz) Typ.

−96 dB Typ. (@ 10 kHz)

−91 dB Typ. (@ 10 kHz)

409.6 kHz

(0.5 LSB + 50 μV) RMS

−90 dB (@ 1 kHz) Typ.

25 ns Typ.

±100 ps RMS Max.

−90 dB (@ 1 kHz) Typ.

−91 dB Typ. (@ 10 kHz)

−90 dB Typ. (@ 10 kHz)

### TRANSFER CHARACTERISTICS (A/D CONVERTER)

Resolution

Quantization Error

Integral Non-Linearity

No Missing Codes

Full Scale Range (Gain Accuracy)

Monotonicity

16 Bits

±0.5 LSB Max.

±0.003% FSR Max.

Guaranteed from  
0°C to +50°C

±0.01%

Guaranteed

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±0.5 LSB Max.

±0.003% FSR Max.

Guaranteed from  
0°C to +50°C

±0.01%

Guaranteed

### STABILITY (0°C TO +50°C)

Required Warm-up Time  
(for ultimate specifications)

Offset Tempco

Gain Tempco

Differential Non-Linearity Tempco

Precision Clock

Recommended Recalibration Interval

15 minutes

50 μV/°C Max.

20 ppm FSR/°C Max.

±1 ppm FSR/°C Max.

±10 ppm, 0-50°C

6 months

15 minutes

50 μV/°C Max.

20 ppm FSR/°C Max.

±1 ppm FSR/°C Max.

±10 ppm, 0-50°C

6 months

### TRIGGER (START/STOP) MODES

Internal

External (TTL Active Low)

Data Dependent

Software write to register.

Automatically synchronized  
with on-board precision clock.

Via front panel BNC or TTLTRG Line

Generated at the occurrence  
of a predefined value and slope, at a  
specified channel

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Automatically synchronized  
with on-board precision clock.

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of a predefined value and slope, at a  
specified channel

**SAMPLE CLOCK****DBS 8700**

Internal via programmable, 10 bit divider and 3.6864 MHz  $\pm 0.001\%$  Clock.  
Produces 3.6k samples/sec to 204.8k samples/sec in 1006 steps.

External, 2.5 MHz to 4.0 MHz, TTL, 50% duty cycle clock via front panel BNC connector & Internal, programmable 10-bit divider. Min. sample rate =  $2.5 \text{ MHz} \div 1023 = 2.4\text{k}$  samples/sec.

External, 0 to 204.8 kHz sample clock via front panel BNC connector or P2 TTLTRG line per VXI spec. Clock signal is TTL active low, edge triggered with low period = 150-200 ns.

Master/slave(s) for synchronizing multiple modules via P2 TTLTRG line per VXI spec.

**DBS 8701**

Internal via programmable, 10 bit divider and 3.6864 MHz  $\pm 0.001\%$  Clock.  
Produces 3.6k samples/sec to 409.6k samples/sec in 1015 steps.

External, 2.5 MHz to 4.0 MHz, TTL, 50% duty cycle clock via front panel BNC connector & Internal, programmable 10-bit divider. Min. sample rate =  $2.5 \text{ MHz} \div 1023 = 2.4\text{k}$  samples/sec.

External, 0 to 409.6 kHz sample clock via front panel BNC connector or P2 TTLTRG line per VXI spec. Clock signal is TTL active low, edge triggered with low period = 150-200 ns.

Master/slave(s) for synchronizing multiple modules via P2 TTLTRG line per VXI spec.

**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.  $\pm 10\text{V}$  input signal.
5. Single gain setting per scan.

**DATA TRANSFER****Output Coding**

Binary, Offset Binary, Two's Complement

Binary, Offset Binary, Two's Complement

**Via VMEbus**

16-bit word transfer via on-card DMA into VXI A24 Memory using a 1k word FIFO buffer

16-bit word transfer via on-card DMA into VXI A24 Memory using a 1k word FIFO buffer

**Data Buffers**

Single buffer = 65K words Max. Multiple buffers limited only by available system A24 memory. Continuous Acquisition via multiple swinging buffers.

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**Interrupts**

FIFO status or DMA memory buffer filled

FIFO status or DMA memory buffer filled

**Via VXI Local Bus**

2 successive bytes transfer to adjacent slot

2 successive bytes transfer to adjacent slot

**VXI/VME COMPLIANCE****VXI**

Register Based, Local Bus User

Register Based, Local Bus User

**VME**

A24/16, D16, I1, Slave A24, D16 Master (DMA)

A24/16, D16, I1, Slave A24, D16 Master (DMA)

**SCAN SEQUENCE CONTROLLER****Number of Steps**

1024

1024

**Gain Change Capability**

Every scan list entry. Rated performance maintained.

Every scan list entry. Rated performance maintained.

**Maximum Number of Multiplexed Channels**

256 when using companion multiplexer modules.

256 256 when using companion multiplexer modules.

**FRONT PANEL INDICATORS****Pass/Fail LED**

Green/Red

Green/Red

**Busy LED**

Red

Red

**Channel Selection**

Green

Green

**POWER REQUIRED****+5V Supply**

+4.75V Min., +5.25V Max.

+4.75V Min., +5.25V Max.

**Power Consumption**

20W Max.

20W Max.

**ENVIRONMENTAL AND MECHANICAL****Temperature Range**

0°C to +50°C

0°C to +50°C

**Rated Performance**

-25°C to +75°C

-25°C to +75°C

**Storage****Relative Humidity**

0 to 85% non-condensing up to +40°C

0 to 85% non-condensing up to +40°C

**Cooling**

1.2 litre/sec. airflow for 10°C rise at 0.29 mm H<sub>2</sub>O back pressure

1.2 litre/sec. airflow for 10°C rise at 0.29 mm H<sub>2</sub>O back pressure

**Dimensions**

VXI "C" Size

VXI "C" Size

**Front Panel Potential**

Chassis Ground

Chassis Ground

**Weight**

3 Lb, 6oz/1.53 Kg

3 Lb, 6oz/1.53 Kg

### ***Ordering Guide***

#### **DBS 8700**

16-Bit, 200 kHz DAS/Digitizer

**DBS 8700 – B05** – Bipolar,  $\pm 5V$

**DBS 8700 – B10** – Bipolar,  $\pm 10V$

**DBS 8700 – U10** – Unipolar, 0 to  $\pm 10V$

#### **DBS 8701**

16-Bit, 400 kHz DAS/Digitizer

**DBS 8701 – B05** – Bipolar,  $\pm 5V$

**DBS 8701 – B10** – Bipolar,  $\pm 10V$

**DBS 8701 – U10** – Unipolar, 0 to  $\pm 10V$



**Analogic Corporation**  
*Measurement and Control Division*  
8 Centennial Drive  
Peabody, MA 01960-7987, USA  
Tel: (508) 977-3000  
Fax: (508) 977-6814