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High Precision Digitizers 16-Bit at 200 kHz or 400 kHz in a "C" Size VXI Module

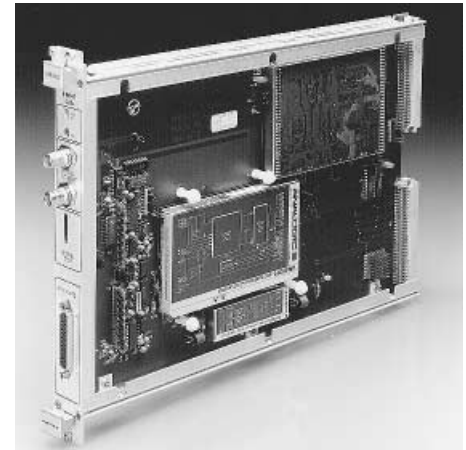
Introduction

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.

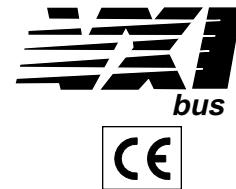


Features

- 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



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for Precision Signal Technology

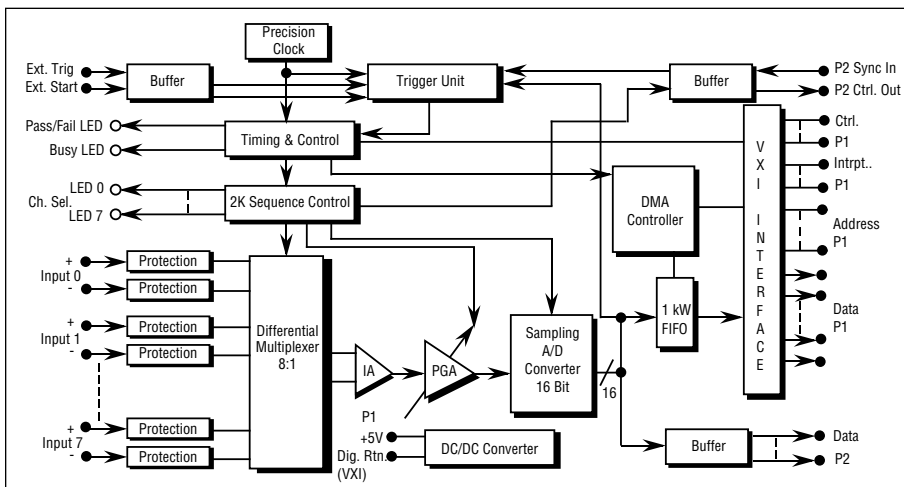


Figure 1. The DBS 8700/8701 Block Diagram.

DBS 8700/8701

Specifications¹

ANALOG INPUTS

	DBS 8700			DBS 8701		
Number of Channels	8 differential, expandable to 256			8 differential, expandable to 256		
Input Ranges	DBS 8700-B05	DBS 8700-B10	DBS 8700-U10	DBS 8701-B05	DBS 8701-B10	DBS 8701-U10
Gain 1	±5V,	±10V,	0 to +10V	±5V,	±10V,	0 to +10V
Gain 2	±2.5V,	±5V,	0 to +5V	±2.5V,	±5V,	0 to +5V
Gain 4	±1.25V,	±2.5V,	0 to +2.5V	±1.25V,	±2.5V,	0 to +2.5V
Gain 8	±0.625V,	±1.25V,	0 to +1.25V	±0.625V,	±1.25V,	0 to +1.25V
Input Bias Current	5 nA Max.			5 nA Max.		
Input Resistance	100 MΩ Typ.			100 MΩ Typ.		
Input Capacitance	70 pF Max.			70 pF Max.		
Common Mode Voltage	±10V Max.			±10V Max.		
Input Overvoltage Protection	±25V Max.			±25V Max.		
Input Current Protection	50 mA Max.			50 mA Max.		

CLOCK/TRIGGER INPUTS

Logic Levels, LSTTL/CMOS Compatible						
Logic "0"	0.8V Max.			0.8V Max.		
Logic "1"	2.0V Min.			2.0V Min.		
Termination	50Ω			50Ω		

AMPLIFIER CHARACTERISTICS

Gain	1, 2, 4, 8 (±0.02% Max.)	1, 2, 4, 8 (±0.02% Max.)
Offset Voltage	±10 mV Max.	±10 mV Max.
Slew Rate	12 V/μs Min.	80 V/μs Min.
CMRR	100 dB @ 60 Hz Typ.	100 dB @ 60 Hz Typ.
Full Power Bandwidth	200 kHz	400 kHz
Settling Time To ±0.001% (10V Step, Gain = 1)	1.5 μs Typ.	1.5 μs Typ.

DYNAMIC CHARACTERISTICS

Maximum Sampling Rate	204.8 kHz	409.6 kHz
Noise (Referred to input and measured over 700 kHz equivalent noise bandwidth)	(0.5 LSB + 30 μV) RMS	(0.5 LSB + 50 μV) RMS
Differential Crosstalk	-96 dB (@ 1 kHz) Typ.	-90 dB (@ 1 kHz) Typ.
S/H Aperture Delay	25 ns Typ.	25 ns Typ.
S/H Aperture Jitter	±400 ps RMS Max.	±100 ps RMS Max.
S/H Feedthrough	-90 dB (@ 1 kHz) Typ.	-90 dB (@ 1 kHz) Typ.
Peak Distortion ^(2,4)	-96 dB Typ. (@ 10 kHz)	-91 dB Typ. (@ 10 kHz)
Total Harmonic Distortion ^(3,4)	-91 dB Typ. (@ 10 kHz)	-90 dB Typ. (@ 10 kHz)

TRANSFER CHARACTERISTICS (A/D CONVERTER)

Resolution	16 Bits	16 Bits
Quantization Error	±0.5 LSB Max.	±0.5 LSB Max.
Integral Non-Linearity	±0.003% FSR Max.	±0.003% FSR Max.
No Missing Codes	Guaranteed from 0°C to +50°C	Guaranteed from 0°C to +50°C
Full Scale Range (Gain Accuracy)	±0.01%	±0.01%
Monotonicity	Guaranteed	Guaranteed

STABILITY (0°C TO +50°C)

Required Warm-up Time (for ultimate specifications)	15 minutes	15 minutes
Offset Tempco	50 μV/°C Max.	50 μV/°C Max.
Gain Tempco	20 ppm FSR/°C Max.	20 ppm FSR/°C Max.
Differential Non-Linearity Tempco	±1 ppm FSR/°C Max.	±1 ppm FSR/°C Max.
Precision Clock	±10 ppm, 0-50°C	±10 ppm, 0-50°C
Recommended Recalibration Interval	6 months	6 months

TRIGGER (START/STOP) MODES

Internal	Software write to register. Automatically synchronized with on-board precision clock.	Software write to register. Automatically synchronized with on-board precision clock.
External (TTL Active Low)	Via front panel BNC or TTLTRG Line	Via front panel BNC or TTLTRG Line
Data Dependent	Generated at the occurrence of a predefined value and slope, at a specified channel	Generated at the occurrence 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.

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

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 H₂O back pressure

1.2 litre/sec. airflow for 10°C rise at 0.29 mm H₂O 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

Specifications subject to change without notice.

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 $\pm 10V$

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