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Find the *Analogic DBS9905* at our website: *Click HERE*

DBS9905/ DBS907/907AB

1 GS/s VXI Waveform Digitizer Plug-In Module

Plugs into the Analogic DBS9905 "C" Size VXI Carrier Module

Introduction

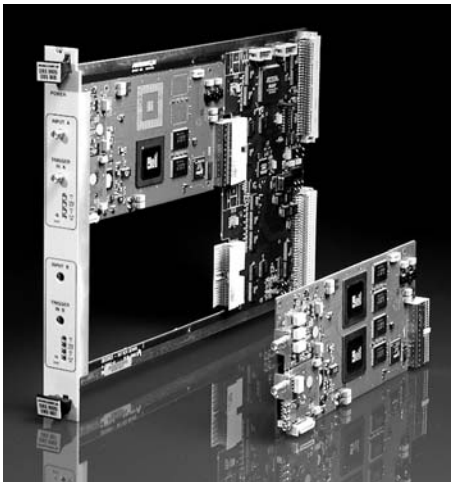
The Analogic DBS907 is a 1 GigaSamples/second Waveform Digitizer that plugs into the DBS9905 "C" size VXI carrier module. One or two DBS907s can be installed in a single DBS9905. This mezzanine board concept enables a single VXI chassis slot to provide multiple functions, thereby maximizing VXI resources and decreasing the cost per slot. The DBS907 provides a combination of speed, resolution, and size that, until now, was unavailable, and it builds on the Analogic tradition of providing the highest possible state-of-the-art performance at the lowest price available.

The DBS907's broad sampling rate range of 100 S/s to 1 GS/s coupled with an input bandwidth of DC to 500 MHz (–3 dB), 8-bit resolution and 2 MegaSamples (8 MS for DBS907LM) on-board memory position it for use in Telecommunications, Magnetic Media, Automotive, Time-of-Flight Mass Spectroscopy, Computing, Particle Physics, Military, Explosive-Weapons and Ballistic Testing applications. User programmable configuration of the DBS907's front end further optimizes the digitizer's performance and can be used to satisfy specific requirements in these and other applications.

General Description

Each DBS907 is a single-channel, 8-bit, 1 GS/s Waveform Digitizer with 2 MS (8 MS for DBS907LM) of on-board memory. The DBS907 front end can be programmed for AC or DC coupling and 50Ω or 1 MΩ input impedance, making it easily adaptable for use with either coaxial transmission cable or high impedance probes. The high impedance mode also features very low, 10 pF capacitance that helps minimize the loading effect that can occur when probing high frequency circuits. A programmable amplifier is used to optimize the DBS907's dynamic range by scaling the input to a Full Scale Range (FSR) that is appropriate for the signal of interest. Available ranges are; 50 mV, 100 mV, 200 mV, 500 mV, and 1V, 2V and 5V on the DBS907 and LM versions, plus 10V, 20V, 50V on the extended DBS907AB version. A variable offset of ±2V for all mV ranges or ±20V for the higher FSRs, and up to ±200V for the DBS907AB can also be employed to maintain the digitizer's dynamic range in instances where the signal of interest is not centered around 0V.

A crystal-controlled time base, accurate to ±25 ppm, is used to clock the DBS907's ADC subsystem. A Trigger Time Interpolator (TTI), with 5 ps resolution max, is also used to measure the time from the trigger to the first sample point. The sampling rate has a range of 100 S/s to 1 GS/s and is programmed in increments of 1, 2, 2.5, 4 or 5 (e.g., 1 MS/s, 2 MS/s, 2.5 MS/s, 4 MS/s, 5 MS/s, 10 MS/s, etc.). For divergent sample rates or to synchronize the ADC clock with the signal of interest, an external clock signal input is available. Data acquisition may be triggered from the input signal itself, (internal trigger), an external signal input or VXI TTLTRG lines. Trigger condition can be more precisely defined by selecting the trigger slope and trigger level (threshold) as well as a trigger coupling mode, DC or AC LFReject. The trigger level is defined as a set voltage at which the selected trigger source will produce a valid trigger. (NOTE: All trigger circuits have sensitivity levels that must be exceeded in order for reliable triggering to occur.) Regardless of the trigger source, data is captured around the specified trigger event and stored as user-defined, pre- or post-trigger data. A pre-trigger delay can be adjusted from 0% (all data points acquired after the trigger) to 100% (all data points acquired before the trigger) of the acquisition frame, or anywhere in between. Post-trigger delay can be adjusted between 0 and 200 million samples. Data from the ADC is stored in on-board



Features

- ❑ 1 GS/s Sampling Rate
- ❑ 500 MHz Bandwidth
- ❑ 2 MS Acquisition Memory (8 MS Option)
- ❑ Internal Calibration
- ❑ Input Protection
- ❑ Pre- and Post-Triggering
- ❑ High Resolution Trigger Timer Interpolator
- ❑ Low Power Consumption
- ❑ VXI Plug & Play Software
- ❑ TV Trigger
- ❑ High Voltage Option
- ❑ Trigger Holdoff
- ❑ 2 Channel Sychronization
- ❑ VXI Backplane Triggers

Applications

- ❑ Telecommunications
- ❑ Magnetic Media
- ❑ Ultrasonic
- ❑ Radar
- ❑ ATE
- ❑ Vibration Analysis
- ❑ Time-of-Flight Mass Spectroscopy
- ❑ Beam Instrumentation

VXI bus

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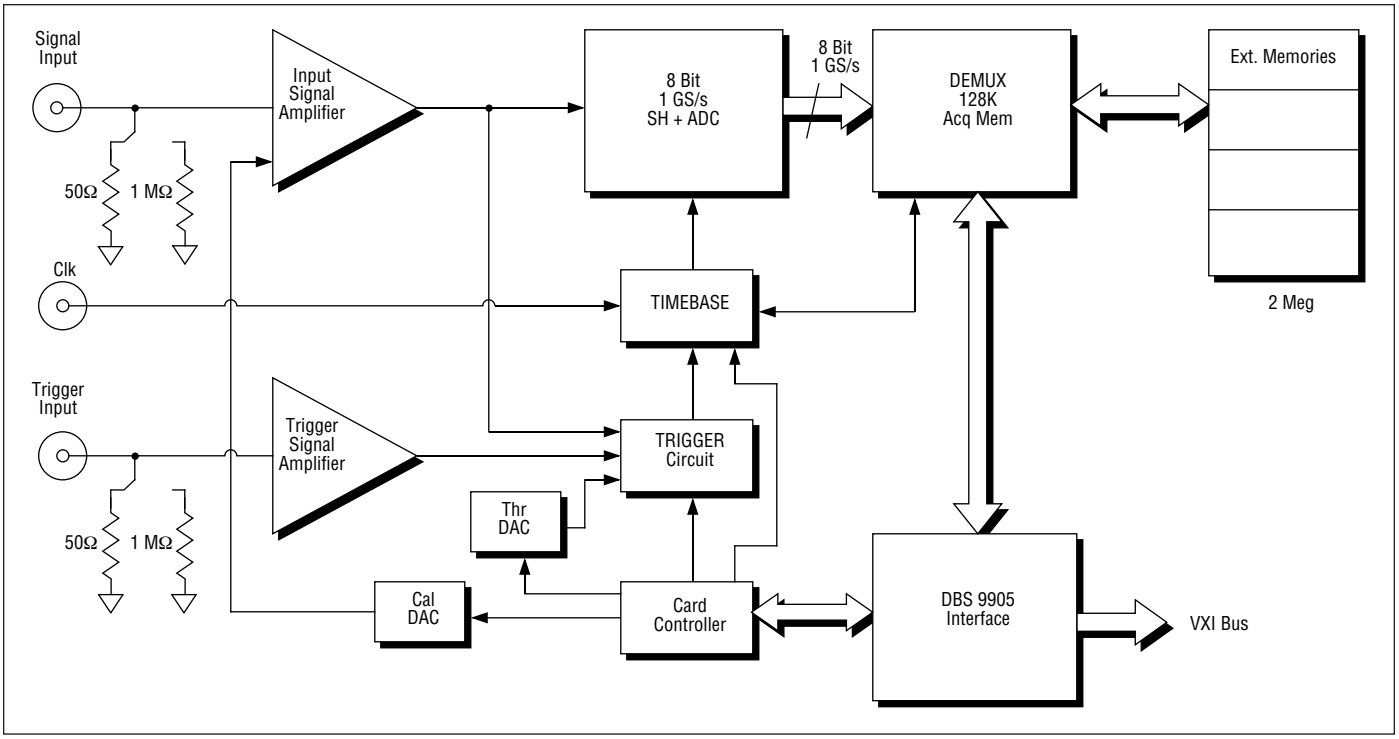


Figure 1. DBS907 Block Diagram.

memory. Trigger hold off is also provided with a range of 6.5 ms maximum at a resolution of 100 ns. The amount of data stored is programmable and can range from 100 samples to the full 2 MS (8 MS for DBS907LM). TV trigger with support for either 625 lines per frame (50 Hz) or 525 lines per frame (60 Hz) is standard on DBS907AB or DBS907ALMB configurations.

The DBS9905 carrier can take one or two DBS907 or DBS908 modules. It supports all VXI required modes of operation including: MODID slot detection, SYSFAIL, Dynamic Configuration, VXI Backplane Trigger, Interrupts, A16: A24: A32: D16: D32.

Software

A VXI Plug & Play compliant software driver is supplied that supports all functions of the DBS907 and provides automatic recognition and configuration for all plug-in modules that are installed in the DBS9905 carrier unit. The source code is included as well as .DLL files to allow easy porting to most popular programming environments. These drivers exceed VXI Plug & Play requirements to help ensure that system integration and software development time are reduced to an absolute minimum.

In addition, a comprehensive set of measurement functions is available: Frequency, Volts amplitude, Volts average, Volts maximum, Volts peak-to-peak, Volts minimum, VAC RMS, VDC, +Pulse Width, –Pulse Width, Rise Time, Fall Time, Period, Duty Cycle, Delay, Volts Base, Volts Top, Overshoot.

Operations supported include: Add, Substract, Multiply, Divide, FFT.

Each 907 module contains an EEPROM device that identifies its type and all optional features so that the driver can completely configure the system as required to be VXI Plug&Play compliant.

Modes of Operation

The DBS907 has two acquisition modes, Single and Sequence. These modes provide an efficient means of utilizing memory while taking advantage of the DBS907's high sampling rate.

Single Acquisition Mode

Acquired waveforms are the result of a series of ADC measurements (sample points) taken at a uniform clock rate. In this mode the user selects the desired sampling rate and acquisition memory size and sets the number of segments to 1. Each waveform is then recorded using a single trigger.

Sequence Acquisition Mode

In this mode the acquisition memory is divided into a preselected number of segments between two and four thousand. Each segment is then used to store waveforms acquired from successive triggers. In this mode the trigger re-arm time is less than 800 ns, resulting in very low "dead time" (when the digitizer cannot acquire data from a new trigger event). In this mode each trigger event is time stamped. Readout of the individual trigger time stamps makes it possible to determine the time (with 5 ps resolution) between one trigger to any other trigger in the sequential acquisition.

Multi-Module Synchronization

All DBS907 digitizers include a proprietary, high bandwidth, auto-synchronous bus system, ASBus, that distributes both the clock and trigger signals along an optional, module-to-module, plug-in, bus connector. This allows two digitizers to work together sychronously to, in effect, create a 2-channel system.

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DBS9905/ DBS907/907AB

Specifications

SIGNAL INPUT		
Parameter	*Condition*	*Value*
Bandwidth	DBS907 –3 dB, 50Ω	250 MHz on 50 mV range 500 MHz on ranges >50 mV
	DBS907AB –3 dB, 50Ω	250 MHz on 50 mV range 500 MHz on ranges ≤500 mV 300 MHz on ranges >500 mV
Full Scale Range (p-p)	DBS907	50 mV, 100 mV, 200 mV, 500 mV, 1V, 2V, 5V
	DBS907AB	50 mV, 100 mV, 200 mV, 500 mV, 1V, 2V, 5V 10V, 20V, 50V
Offset Range	≤ 500 mV FSR	±2V range
	≥ 1V FSR	±20V range
	≥ 10V FSR	±200V range
Input Impedance	Programmable	1 MΩ/10 pF; 50Ω ±0.5%
Number of Channels		1 or 2 single-ended
Input Coupling	Programmable	AC or DC
Over Voltage Protection	@1 MΩ Input Impedance (907)	±100V (DC+peak AC < 10 kHz)
	@1 MΩ Input Impedance (907AB)	±250V (DC+peak AC < 10 kHz)
	@50Ω Input Impedance	±5V DC (500 mW) or 5V RMS
Overload Recovery Time	@2% FSR with 2 x FSR positive or negative 100 ns pulse returning to 0V	15 ns (typ.)
Overshoot	With 500 ps rise time pulse	< 20% of step FSR</=5V < 30% of step FSR>5V
Long Term Settling Time	Step amplitude (80% FSR)	50 ns (typ.) to ±3% of step
Connector Type		SMA or BNC

DIGITAL CONVERSION		
Parameter	*Condition*	*Value*
Conversion Rate	Internal Clock	100 S/s to 1 GS/s
Acquisition Memory Size		2 MS (8 MS for DBS907LM)
Resolution		8 bits (1:256)

TRIGGER (INTERNAL & EXTERNAL)		
Parameter	*Condition*	*Value*
Slope	Programmable	Positive or Negative
Coupling	Programmable	DC or AC (50 kHz LFReject)
Trigger Sensitivity	Internal Trigger	From DC to 500 MHz: levels >15% FSR
	External Trigger	From DC to 250 MHz: levels >1V From DC to 500 MHz: levels >2V
Internal Trigger Threshold		Adjustable over ±60% of FSR
Pre-Trigger Delay		0% to 100% of data set
Post-Trigger Delay		0 to 200 MSamples
Hold Off	Programmable	100 ns to 6.5 ms
Hold Off Resolution		1 event or 100 ns
Trig. Threshold	Variable	–3V to +3V
Max. Input Voltage	50Ω input	± 5V DC (500 mW)
	1M input	±100 (DC peak AC <10 KHz) VDC
Impedance	Programmable	1 MΩ or 50Ω
TV Trigger	Programmable DBS907AB or DBS907ALMB	525 lines/frame or 625 lines/frame

TIME BASE		
Parameter	*Condition*	*Value*
Clock Accuracy	Internal Clock	< 25 ppm
Acquisition Modes	Single Shot	100 to 2M or 8 Msamples
	Sequence	1 to 4k or 8k segments
Trigger Dead Time	Sequence Mode	800 ns Min.
Trigger Time Interpolator	Sequence Mode	5 ps resolution

SYSTEM PERFORMANCE		
Parameter	*Condition*	*Value*
DC Accuracy	All ranges >50 mV	< ±(2% FSR +0.4% x Offset) ±1% FSR typ.
	50 mV range	±(2.5% FSR +0.4% x Offset) ±1% FSR typ.
Integral Linearity		< ±1% FSR
ENOB (at 1 GS/s)	DC – 20 MHz	> 6.5 Min.
	20 – 100 MHz	> 6.0
SFDR	100 MHz	44 dB typ.
Temperature Drift	Offset	1000 ppm FSR/°C Typ.
	Gain	200 ppm FSR/°C Typ.
SNR	All ranges	37 dB Min.

EXTERNAL INPUTS FOR CLOCK & REFERENCE		
Parameter	*Condition*	*Value*
External Clock Frequency		10 MHz to 500 MHz Sine or Square Wave
External Reference Clock Freq.		10 MHz Sine or Square Wave
Clock/Ref. Threshold	Variable	–3V to +3V
Clock/Ref Amplitude	Minimum	1V pk-pk
Connector Type		MMCX

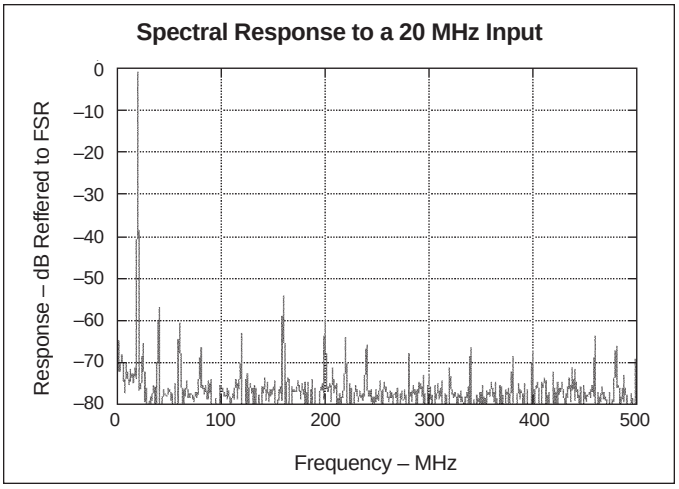
DBS9905/DBS907 POWER REQUIREMENTS TYP.		
Supply Voltage	***Single Channel***	***Dual Channel***
+12 VDC	0.03A	0.04A
–12 VDC	0.03A	0.06A
+5 VDC	1.9A	3.4A
–5.2 VDC	1.6A	2.9A
–2 VDC	0.05A	0.05A
Total Watts	19W	33W

RELIABILITY		
Parameter	*Condition*	*Value*
MTBF Combined DBS9905 and DBS907	Determined by the Generic Parts Count method of MIL-HDBK-217F for a ground benign environment at a temperature of 25°C	>25,000 Hrs

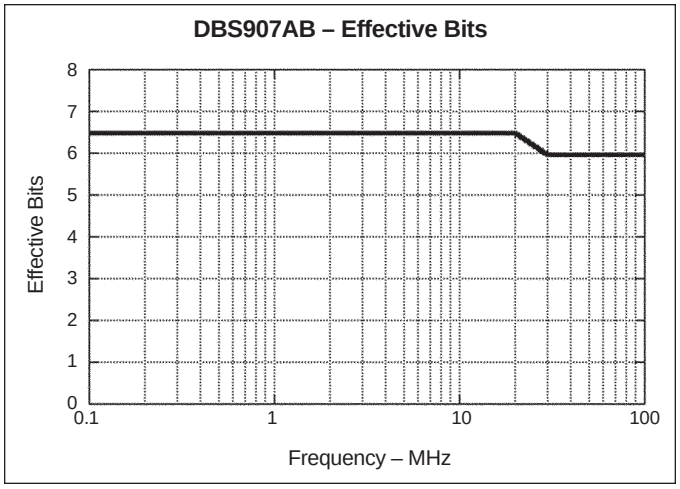
GENERAL		
Parameter	*Condition*	*Value*
Operating Temperature	5% to 90% humidity (non-Condensing)	0°C to 40°C
Storage Temperature		–25°C to +75°C
Required Airflow		4 liters/sec Min.

Specifications subject to change without notice

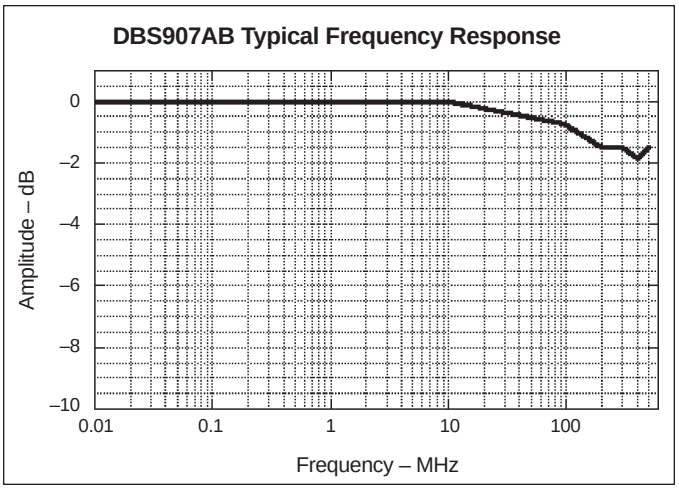
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DBS907AB on the 500 mV Scale with a 90% FSR signal at 1 GS/s. Spectrally pure 20 MHz sine wave input.



DBS907AB on the 1 Volt range with 80% FSR sine waves of 20 MHz and 100 MHz sampled at 1 GS/s.



DBS907AB on the 200 mV Scale with 160 mV pk-pk sine wave input at 1 GS/s.

Ordering Guide

Carrier Module

DBS9905- **XX** **X** **AA** **BB**

SP = Standard with manuals and black plastic carring case

S* = SMA connector
B* = BNC connector

Module A code

Module B code

Plug-in Modules

Model Number	Output* Connector	Memory Size	Module Code
DBS907	SMA	2 MS	01
DBS907AB	BNC	2 MS	51
DBS907LM	SMA	8 MS	02
DBS907ALMB	BNC	8 MS	52

*Connector type must match on carrier and both modules A and B

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