Preliminary
7/1/02

4.8 GS/s Universal, High Speed Arbitrary Waveform Generator

Introduction

Building on thirty years of success developing state-of-the-art measurement solutions, Analogic introduces the DBS2055 — a powerful adaptation of our most advanced broadband stimulus instrument, the DBS2050A.

Engineers and scientists who rely on ultra-high-performance arbitrary waveform generators can anticipate significant performance improvements from this new instrument. The DBS2055 can:

- Generate arbitrary waveforms, including Pulse Pattern and Sinusoidal stimulus, over a frequency range of DC to 2 GHz with up to 8 bits of vertical resolution and over 60 dB of programmable gain and offset
- Produce rise/fall times of < 250 ps
- Play back waveforms with sample rate jitter of < 10 ps RMS
- Increase memory efficiency by > 100 times over conventional AWG designs by using the flexible waveform and sequence memory architecture
- Use waveform-independent runtime parameters to change the output level and offset “on the fly”
- Preload up to 4,096 unique waveforms in memory and seamlessly link them for playback (creating very long waveform playback periods), using Dynamic Waveform Sequencing
- Advance from one waveform to the next using conditional waveform repeat (loop) counts as well as internal or external trigger events
- Synchronize the analog outputs with up to 6 independent TTL level markers
- Generate precise standard waveforms: square, sine, positive and negative ramps, pulse, noise, triangle, positive and negative haversines, sin(x)/x, and DC

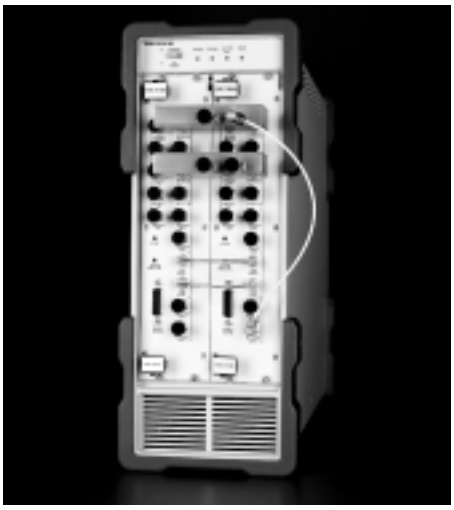
Bring your next high-speed analog or mixed signal design to market faster while dramatically reducing errors or oversights in critical design verifications. The DBS2055 is ideal for use on the production floor or in the laboratory.

General Description

The DBS2055 has three modes of operation: single channel, synchronous dual channel, and synchronous quad channel.

In single channel mode the unit operates at the highest sample rate, 4.8 GS/s, using the internal time base. Single channel mode produces the fastest edges and covers the widest bandwidth. Dual synchronous mode takes advantage of the DBS2055’s unique architecture to produce matched waveforms with negligible time skew and jitter of <10 ps RMS. Quad channel mode extends this capability to four waveforms with an individual sample rate of 1.2 GS/s. In single or dual sync modes the unit produces true differential or single ended waveforms with full scale output levels up to 4.0V peak to peak.

continued



Features

- Sampling Rate: 4.8 GS/s
- Bandwidth: 1.9 GHz
- Waveform Resolution: 8-Bit
- Voltage Range: 4.0V peak-to-peak in X4 Output Mode
- Voltage Offset: ±3.5 VDC
- Waveform Memory: 8 Mbytes
- Sequence Memory: 4k Segments
- 100% Performance Tested with NIST Traceable Cert. of Comp.
- Application Development: VXI Plug and Play Compliant Drivers for Win 98, NT, 2K
- IEEE-488/1394/100Base-T Ethernet

Applications

- Automatic Test Equipment
- HDD Read/Write Chan. Development
- Telecom/Datacom
- Mass Storage
- RADAR
- Ultrasonics
- Navigation
- LAN/WAN
- Wireless
- RF Controls
- Fiber

CE

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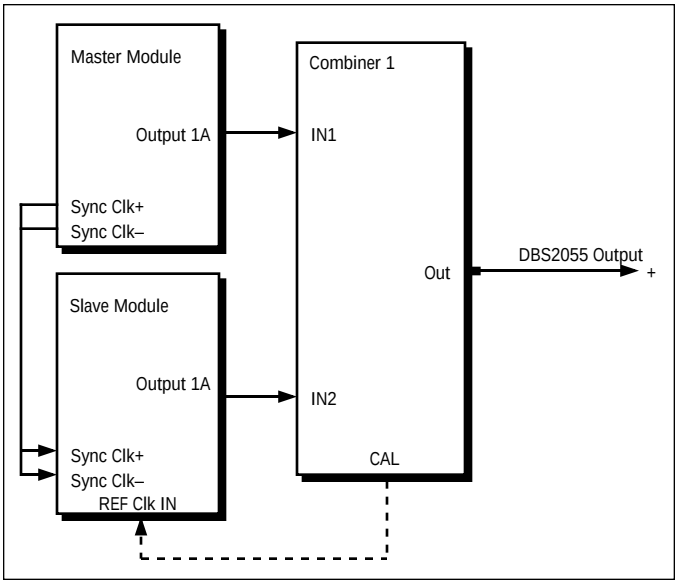
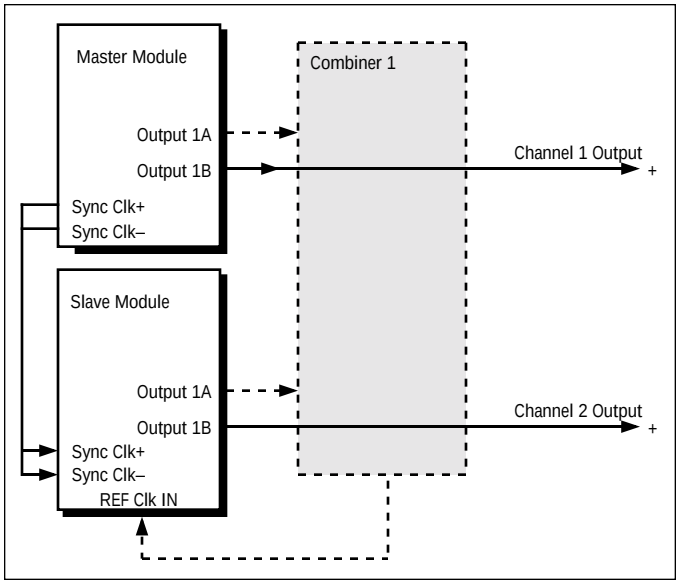
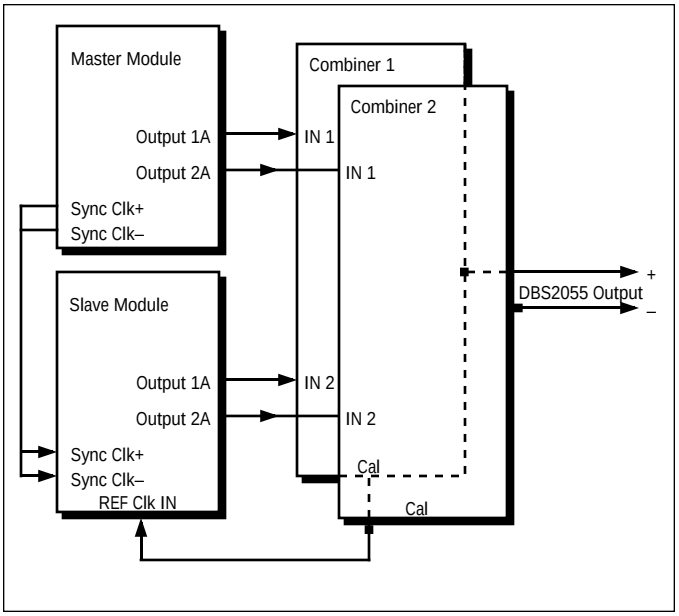


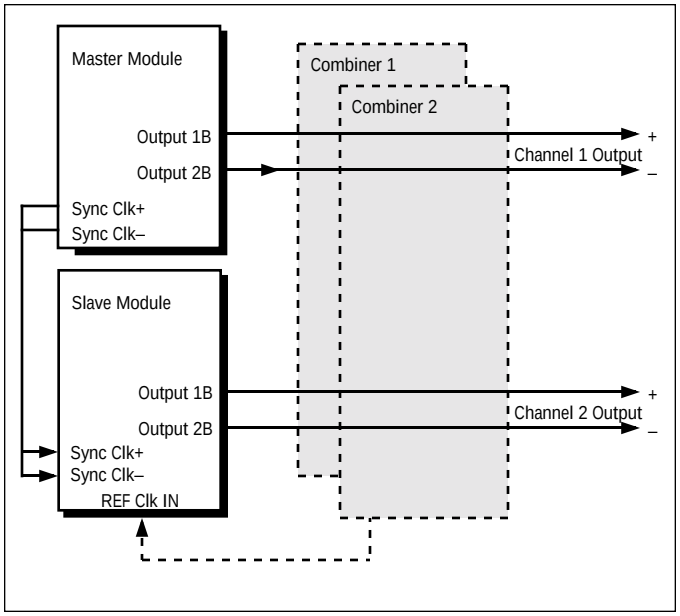
DBS2055 Single Channel Mode (Single Ended Output)



DBS2055 Dual Synchronous Mode (Single Ended Outputs)



DBS2055 Single Channel Mode (Differential Output)



DBS2055 Dual Synchronous Mode (Differential Outputs)

Continued from page 1

The provided waveform pre-compensation algorithms can be used to exchange output level for dramatic increases in analog bandwidth. The operator defines the desired signal bandwidth and the waveforms conform to the desired frequency response. The DBS2055 also achieves stunning frequency response over the full bandwidth of operation. Amplitude flatness is less than ±0.5 dB up to 700 MHz.

Waveform pre-compensation involves the application of principles from sampling theory that compensates for the frequency response of the system, including cables.

Waveform creation and editing software is provided by Wavesmith™, a versatile waveform development system for Windows. This tool provides a “no programming required” work environment for rapid prototyping of user waveforms, as well as direct control of all instrument functions.

HDD-NARB, Hard Disk Drive Read/Write Channel Testing

HDD/NARB is an application specific software tool that, when combined with the DBS2055, tackles one of the toughest problems faced by developers in the hard disk drive industry: managing the rapid advances in Read/Write channel complexity, data rates and sensitivity. An HDD-NARB and DBS2055 can literally replace the physical media head.

HDD-NARB generates accurate and precise pulse patterns representative of actual drive media, waveforms that are critical to design verification by both chip and disk drive manufacturers. HDD-NARB will easily model media noise, thermal asperities, and dropouts – the three deadly effects that plague disk drives.

DBS2055
Specifications

OUTPUT CHARACTERISTICS		
Parameter	*Conditions*	*Value*
X1 OUTPUT MODE		
Max. Amplitude	Differential	2.0 Vp-p
	Single-Ended	1.0 Vp-p
Accuracy	50Ω Terminated	±2.0% at full scale
Gain Ctrl Accuracy	25° ±5°C	±1% of setting, ±.00025 V/V
Resolution		>3500 steps/60 dB
Flatness (3)	0.5 Vp-p, 4.8 GS/s <30 MHz	±0.2 dB
	0.5 Vp-p, 4.8 GS/s <300 MHz	±0.3 dB
	0.5 Vp-p, 4.8 GS/s <700 MHz	±0.5 dB
Bandwidth (Small Signal)	<0.1 Vp-p 4.8 GS/s	1.9 GHz
Rise/Fall Time (3)	0.1 Vp-p, 4.8 GS/s	<250 ps
Amplitude Control Settling Time		50 ns to within 10% of final 200 ns to within 20% of final
X4 OUTPUT MODE		
Max. Amplitude	Single-Ended Only	4.0 Vp-p
Accuracy	50Ω Terminated	±2.0% at full scale
Gain Ctrl Accuracy	25° ±5°C	±1% of setting, ±.00025 V/V
Flatness (1)	Sinusoid 2.0 Vp-p	±0.5 dB to 30 MHz
		±2.0 dB to 100 MHz
Bandwidth	<2.0 Vp-p	>165.0 MHz
Rise/Fall Time	<2.0 Vp-p	<2.2 ns
	<4.0 Vp-p	<2.5 ns
DC OFFSET		
Resolution		2.0 mV
Range	Differential	±2.0V
	Single-Ended Mode	±3.5V
Accuracy Single-Ended Output	Output Mode (X1)	±2.0% of setting ±20 mV
	Output Mode (X4)	±2.0% of setting ±80 mV
Accuracy Differential Output	Common Mode X1 Output Mode	±2.0% of setting ±20 mV
	Differential X1 Output Mode	±2.0% of setting ±30 mV
Offset Control Settling Time		6 µs to within 2% of new setting Max.

SINEWAVE CHARACTERISTICS		
Parameter	*Conditions*	*Value*
X1 OUTPUT MODE		
SFDR		
<10 MHz	Measured from 1 MHz to Nyquist. 1.0 Vp-p 4.8 GS/s	>45 dBc
<50 MHz		>40 dBc
<200 MHz		>30 dBc
SINAD	50 MHz Carrier 1.0 Vp-p 4.8 GS/s 5 MHz to Nyquist	>37 dBc
X4 OUTPUT MODE		
SFDR		
<50 MHz	Measured from 1 MHz to 600 MHz 4.0 Vp-p 0V Offset	>40 dBc
SINAD	50 MHz Carrier 4.0 Vp-p 5 MHz to 605 MHz BW	37 dBc

FILTER CHARACTERISTICS		
Parameter	*Conditions*	*Value*
Type	3-pole Bessel Low Pass	
–3 dB Bandwidth	Selectable	2 MHz
		20 MHz
		200 MHz
Rise Time		0.35/Bandwidth

TIME BASE/SAMPLING CLOCK		
Parameter	*Conditions*	*Value*
INTERNAL SAMPLE CLOCK		
Range	Single Channel Mode	2410 MS/s to 4.8 GS/s
	Dual Channel Mode	600 S/s to 2.4 GS/s
	Quad Channel Mode	300 S/s to 1.2 GS/s
Resolution		0.4% of Desired Rate Max.
Accuracy		±2 ppm Typ.
Jitter	100 ns Measurement Window Internal Clock Only	<10 ps RMS
EXTERNAL REFERENCE CLOCK INPUT		
Range	0.8 – 1.5 Vp-p at 10 MHz	2.5 MHz to 100 MHz
Resolution		2.5 MHz Steps
Duty Cycle		50% Nom.
Impedance		50 ohms AC coupled
EXTERNAL SAMPLE CLOCK		
Range	0.8 – 1.5 Vp-p Slew Rate 0.5V/ns Applied to Master, 50Ω AC Coupled	100 kHz to 2.4 GHz

TRIGGER CHARACTERISTICS		
Parameter	*Conditions*	*Value*
MAIN TRIGGER		
Sources	Trigger A, Trigger B	
Modes	Free Run, Start, Stop, Gate and Start/Stop	
Threshold Range		±10.0V
Threshold Accuracy		±5% of Setting ±140 mV Typ.
Hysteresis		40 mVp-pk
Input Impedance		4.0 kΩ Nom.
Trigger to Output Delay	Quad Channel Mode	42 ns + 17 clock cycles
	Dual Synchronous Mode	42 ns + 35 clock cycles
	Single Channel Mode	42 ns + 70 clock cycles
BRANCH AND ADVANCE TRIGGER (Multi-Channel Mode)		
Threshold	TTL Mode	1.5V Typ.
	Zero Crossing	0V Typ.
Input Impedance		10 kΩ Nom.
Trigger to Output Delay		1.66 µs + 256/FS (2)

MARKER OUTPUTS 1, 2, 3		
Parameter	*Conditions*	*Value*
Output	No Load	TTL
Impedance		50Ω Nom.
Delay Range	Single Channel	0 to 4 x 10^6 x sample clock period Max.
Delay Resolution	Single Channel	64 x sample clock period
Pulse Width Range		0 to 2.62 x 10^5 x sample clock period Max.
Resolution Response		64 x sample clock period

DBS2055

Specifications, Cont.

PHYSICAL CHARACTERISTICS		
Parameter	*Conditions*	*Value*
Weight	Without Packaging	16 kg
Size		VXI 4-Slot Wide C Size
Cooling		4 liters min/sec/slot @ 0.5 mm H20

REGULATORY	
VXI Compliance	VXI Plug and Play Register based instrument
Electromagnetic Compatibility	EN61326-1 Class A FCC Part 15, Subpart B, Class A
Safety	EN61010-1, CSA C22.2 No. 1010.1, UL61010A-1

ENVIRONMENTAL		
Parameter	*Conditions*	*Value*
Operating Temperature Range	At Rated Air Flow Full Compliance with Specifications	10°C to 40°C
Storage Temperature Range		–20°C to +70°C
Relative Humidity	Non-Condensing	10%–90%
Total Power Dissipation	Operating	260 watts
DC Current Consumption	+5 VDC	12.4 A Max.
	–5.2 VDC	17 A Max.
	+24 VDC	0.2 A Max.
	–24 VDC	0.2 A Max.
	+12 VDC	1.4 A Max.
	–12 VDC	2.0 A Max.
	–2 VDC	7.2 A Max.
Vibration	Operating	IEC 68-2-6
	Non-Operating	IEC 68-2-6
Shock	Operating	6.0G, 11 ms _sine IEC 68-2-29
	Non-Operating	10G
Transportation		ISTA Project 2A

CALIBRATION/WARRANTY	
Warm-Up Time	15 minutes
Recommended Factory Re-Certification	Annually

Notes

All specifications are subject to change without notice.
All specifications are valid within the operating limits stated.
Calibration values are not user accessible.
All specifications are valid for 50Ω output terminations unless otherwise stated.
1. Allowance made for sin(x)/x Rolloff.
2. Fs – sample clock rate.
3. With Waveform Pre-Compensation

Shown Installed in Analogic DP7040-2 Bench Top Chassis.

ACCESSORIES	
User's Manual	
Support Software	Includes: • VXI P&P Driver for Framework, 98,2K, Win NT • LabWindows CVI Soft Front Panel Source Code • Wavesmith™ Waveform Development Software for Win NT, 98, 2K • HDD-NARB Pulse Pattern and Synthesis Software for Hard Disk Drive Industry
Contact Analogic for a complete listing of other VXI products and accessories.	

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