

82A04B Datasheet

Phase Reference Module for the DSA8300 Sampling Oscilloscope



The 82A04B Phase Reference Module extends the capability of the DSA8300 Digital Serial Analyzer sampling oscilloscope¹ by providing extremely low jitter/drift sample position information to the mainframe. This sample position information is based on the phase of a clock the user provides to the 82A04B input.

Key performance specifications

- Extremely low jitter <math><100\text{ fs}_{\text{RMS}}</math>
- Wide and continuous frequency range 2 GHz - 60 GHz

Key features

- Flexible operation:
 - Triggered
 - Untriggered (Free-running) Acquisition Without Trigger Signal
- Support for enhanced acquisition modes (FrameScan®)
- Small module implementation allows:
 - Acquisition on six other channels
 - Placement close to the DUT with module extender cable
- Fast acquisition rate

Applications

- Design, verification, and manufacturing of computer, telecom, and datacom components and systems operating at 10 Gb/s and faster

Extremely low jitter solution

The benefits of the 82A04B using the sample position information based on a clock signal are two-fold - an extremely low jitter of <math><100\text{ fs}_{\text{RMS}}</math>, and the possibility of a triggerless acquisition. The typical application is the acquisition and analysis of very high-speed optical and electrical signals in high-speed communication devices and systems and similar areas.

The 82A04B together with the DSA8300 implements the phase reference time-base functionality in a novel way, giving the user the freedom to select from time base and acquisition modes without compromises; any phase-reference frequency within the operating range is accommodated, and even the advanced features, such as FrameScan®, remain available.

Modes of operation

The operation of the phase reference module is based on the acquisition of a clock synchronous to the signal under observation. This clock can be a user-supplied signal (for example, a clock from a BERT), or the clock output of one of the DSA8300 clock recovery or optical modules.

- **Phase Ref Free-Run** - With no external trigger to the DSA8300 mainframe needed, the 82A04B module can, together with the mainframe, create a time base based on the phase of the reference clock (effectively the time base of the instrument functions as a "Phase-base" instead). The signal displayed on the screen will therefore repeat after one period of the reference clock. All user controls remain enabled, even while the horizontal position has relative meaning only. The timing information presented by the oscilloscope is based solely on the phase reference clock frequency as entered by the user in the Input Freq field of the Phase Reference Setup dialog.
- **Phase Ref Triggered** - By providing the phase reference clock to both the phase reference module and the Clock Input of the instrument, the DSA8300's Advanced Trigger feature (Option ADVTRIG) can acquire repetitive pattern data (as opposed to only eye diagrams or clock signals) with very low jitter.
- **Characterize** - To operate properly in either the Phase Ref Triggered or the Phase Ref Free-Run modes the Phase Reference module has to first characterize the phase reference signal. The signal must be stable during the characterization and afterward. The instrument indicates when characterization is necessary.

¹ Also compatible with DSA8200 and TDS/CSA8200 sampling oscilloscopes.

Specifications

All specifications are guaranteed unless noted otherwise.

General

Acquisition modes	Free Run Synchronous, Triggered Synchronous
Mainframe resources	Any one active ² small (electrical) module slot. Both acquisition channels associated with the slot became unavailable. Only one 82A04B module can be activated in a mainframe at a time
Compatible mainframes	DSA8300, DSA8200, CSA/TDS8200. Does not operate in the CSA/TDS8000 or 8000B mainframes

Reference clock parameters supported

Operational amplitude	100 mV _{p-p} to 2.0 V _{p-p}
Guaranteed frequency range	<p>2 GHz - 32 GHz continuous; for a nonsinewave reference clock signal in the 2 GHz - 8 GHz range an additional filter ³ typically is required</p> <p>2 GHz - 60 GHz continuous with Option 60G; for a nonsinewave reference clock signal in the 2 GHz - 8 GHz range an additional filter ³ typically is required</p> <p>The 82A04B module does not require particularly high spectral fidelity in the clock signal passed to it; the signal can be BW limited (such as by the cable) since there can be no ISI issues (as the signal is a clock); it is sufficient to supply a signal that is stable, free from unstable moding, and has the appropriate amplitude.</p>

System performance

Jitter	<p>System jitter of <100 fs_{RMS}, on a 10 GHz or faster acquisition module, in DSA8300 mainframe, with $f \geq 8$ GHz, VREF ≥ 0.6 V phase reference signal</p> <p>System jitter of 140 fs_{RMS} typical, on a 10 GHz or faster acquisition module, in DSA8300 mainframe, with $2 \text{ GHz} \leq f < 8 \text{ GHz}$, VREF ≥ 0.6 V phase reference signal</p>
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Time accuracy (time base) and timing deviation (phase reference)

Phase reference time base (triggered)	
Maximum timing deviation relative to phase reference signal	<p>Horizontal position >40 ns after trigger event: 0.2% of phase reference signal period (typical)</p> <p>Horizontal position ≤ 40 ns after trigger event: 0.4% of phase reference signal period (typical)</p>
Phase reference time base (free run)	
Maximum timing deviation relative to phase reference signal	0.1% or better of phase reference signal period (typical)

² Channels that are not displaced by an installed optical (large) module.

³ See list of accessories at the end of this datasheet for recommended filters.

Input

Input impedance	50 Ω \pm 0.5 Ω AC (5 pF typical AC coupling)
Connector	1.85 mm female ("V") connector Precision adapter to 2.92 mm female included with 50 Ω SMA termination

Physical characteristics

Dimensions	
Width	79 mm (3.1 in)
Height	25 mm (1.0 in)
Depth	135 mm (5.3 in)
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Weight	0.4 kg (13 oz)

Environment

Environmental	Matches the mainframe specifications.
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Ordering information

Models

82A04B	Phase Reference Module
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Standard accessories

071-3124-XX	82A04B Phase Reference Module User Manual
174-1427-00	Cable assembly, Coax; 50 Ohm, 20 in, SMA, M-M
020-3088-XX	TekScope application software install kit for DSA8300
020-2734-XX	TekScope application software install kit for CSA/DSA/TDS8000 instruments
015-1022-01	Terminator; coaxial; 50 Ω , 0.5 W, SMA
011-0187-XX	Adapter, RF, 2.4 mm or 1.85 mm Male to 2.92 mm Female

Warranty

Warranty	One (1) year
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82A04B options

Opt. 60G	Extends the BW range to 60 GHz
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Service options

Opt. C5	Calibration Service 5 Years
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

Recommended accessories

020-2566-xx	Filter 2 GHz. Filter kit for nonsinusoidal phase reference clock signals with frequency between 2 GHz and 4 GHz
020-2567-xx	Filter 4 GHz. Filter kit for nonsinusoidal phase reference clock signals with frequency between 4 GHz and 6 GHz
020-2568-xx	Filter 6 GHz. Filter kit for nonsinusoidal phase reference clock signals with frequency between 6 GHz and 8 GHz
80X01	Sampling Module Extender Cable (1 meter)
80X02	Sampling Module Extender Cable (2 meter)
011-0157-xx	Connector Adapter. (2.4 mm or 1.85 mm male to 2.92 mm female) DC to 40 GHz
Interconnect cables (3rd party)	Tektronix recommends using quality high-performance interconnect cables with high-bandwidth 80E00 modules to minimize measurement degradation and variations. The W.L. Gore & Associates' cable assemblies are compatible with the 2.92 mm, 2.4 mm, and 1.85 mm connector interface of the 80E00 modules. Contact Gore (http://www.gore.com/tektronix) to order cable assemblies.



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

ASEAN / Australasia (65) 6356 3900
Belgium 00800 2255 4835*
Central East Europe and the Baltics +41 52 675 3777
Finland +41 52 675 3777
Hong Kong 400 820 5835
Japan 81 (3) 6714 3010
Middle East, Asia, and North Africa +41 52 675 3777
People's Republic of China 400 820 5835
Republic of Korea +822 6917 5084, 822 6917 5080
Spain 00800 2255 4835*
Taiwan 886 (2) 2656 6688

Austria 00800 2255 4835*
Brazil +55 (11) 3759 7627
Central Europe & Greece +41 52 675 3777
France 00800 2255 4835*
India 000 800 650 1835
Luxembourg +41 52 675 3777
The Netherlands 00800 2255 4835*
Poland +41 52 675 3777
Russia & CIS +7 (495) 6647564
Sweden 00800 2255 4835*
United Kingdom & Ireland 00800 2255 4835*

Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
Canada 1 800 833 9200
Denmark +45 80 88 1401
Germany 00800 2255 4835*
Italy 00800 2255 4835*
Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90
Norway 800 16098
Portugal 80 08 12370
South Africa +41 52 675 3777
Switzerland 00800 2255 4835*
USA 1 800 833 9200

* European toll-free number. If not accessible, call: +41 52 675 3777

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