

# 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 oscilloscope<sup>1</sup> 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.

### Notice to EU customers

This product is not updated to comply with the RoHS 2 Directive 2011/65/EU and will not be shipped to the EU. Customers may be able to purchase products from inventory that were placed on the EU market prior to July 22, 2017 until supplies are depleted. Tektronix is committed to helping you with your solution needs. Please contact your local sales representative for further assistance or to determine if alternative product(s) are available. Tektronix will continue service to the end of worldwide support life.

### 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

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

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.

## Specifications

All specifications are guaranteed unless noted otherwise.

### General

<b>Acquisition modes</b>	Free Run Synchronous, Triggered Synchronous
<b>Mainframe resources</b>	Any one active <sup>2</sup> 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
<b>Compatible mainframes</b>	DSA8300, DSA8200, CSA/TDS8200. Does not operate in the CSA/TDS8000 or 8000B mainframes

### Reference clock parameters supported

<b>Operational amplitude</b>	100 mV <sub>p-p</sub> to 2.0 V <sub>p-p</sub>
<b>Guaranteed frequency range</b>	<p>2 GHz - 32 GHz continuous; for a nonsinewave reference clock signal in the 2 GHz - 8 GHz range an additional filter <sup>3</sup> 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 <sup>3</sup> 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

<b>Jitter</b>	<p>System jitter of &lt;100 fs<sub>RMS</sub>, on a 10 GHz or faster acquisition module, in DSA8300 mainframe, with <math>f \geq 8</math> GHz, VREF <math>\geq 0.6</math> V phase reference signal</p> <p>System jitter of 140 fs<sub>RMS</sub> typical, on a 10 GHz or faster acquisition module, in DSA8300 mainframe, with <math>2 \text{ GHz} \leq f &lt; 8 \text{ GHz}</math>, VREF <math>\geq 0.6</math> V phase reference signal</p>
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<sup>2</sup> Channels that are not displaced by an installed optical (large) module.

<sup>3</sup> See list of accessories at the end of this datasheet for recommended filters.

**Time accuracy (time base) and timing deviation (phase reference)****Phase reference time base (triggered)**

<b>Maximum timing deviation relative to phase reference signal</b>	Horizontal position >40 ns after trigger event: 0.2% of phase reference signal period (typical)
	Horizontal position ≤40 ns after trigger event: 0.4% of phase reference signal period (typical)

**Phase reference time base (free run)**

<b>Maximum timing deviation relative to phase reference signal</b>	0.1% or better of phase reference signal period (typical)
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**Input**

<b>Input impedance</b>	50 Ω ±0.5 Ω AC (5 pF typical AC coupling)
<b>Connector</b>	1.85 mm female ('V') connector Precision adapter to 2.92 mm female included with 50 Ω SMA termination

**Physical characteristics****Dimensions**

<b>Width</b>	79 mm (3.1 in)
<b>Height</b>	25 mm (1.0 in)
<b>Depth</b>	135 mm (5.3 in)

<b>Weight</b>	0.4 kg (13 oz)
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**Environment**

<b>Environmental</b>	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

## 82A04B options

Opt. 60G Extends the BW range to 60 GHz

## 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.



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



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**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tek.com](http://www.tek.com).

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