

Phase Reference Module for the DSA8300*1 Sampling Oscilloscope



Features & Benefits

- Extremely Low Jitter <math><200\text{ fs}_{\text{RMS}}</math> (typical)
- Flexible Operation
 - Triggered
 - Untriggered (Free-running) Acquisition Without Trigger Signal
- Support for Enhanced Acquisition Modes (FrameScan®)
- Wide and Continuous Frequency Range 2 GHz - 60 GHz
- 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 Telecom and Datacom Components and Systems Operating at 10 Gb/s and Faster

Extremely Low Jitter, Flexible Signal Acquisition Solution

The 82A04 Phase Reference Module extends the capability of the DSA8300*1 digital serial analyzer sampling oscilloscope mainframe 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 82A04 input.

The benefits of using the sample position information based on a clock signal are two-fold – an extremely low jitter of <math><200\text{ fs}_{\text{RMS}}</math> (typical), 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 82A04 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. The separate DSP per acquisition slot architecture of the DSA8300 enables the acquisition rate in the Phase Reference mode to reach over 40 kS/s*2.

*1 Also compatible with DSA8200, TDS/CSA8200 sampling oscilloscopes.

*2 Typical performance, some settings will lower the throughput.

Modes of Operation

The operation of the phase reference is based on the acquisition of a clock synchronous to the signal under observation. This clock can be a user-supplied signal (e.g. a clock from a BERT), or the clock output of one of the DSA8300 clock recovery or optical modules. In addition, the user can also provide a traditional external trigger signal either to the Direct Trigger input, or to the Trigger Prescaler input of the mainframe.

Phase Ref Free-Run – With no external trigger to the DSA8300 mainframe needed, the 82A04 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 – When the DSA8300 mainframe is supplied with both the reference clock and a traditional external trigger, the mainframe triggers on the trigger signal, and uses the phase reference information from the 82A04 to minimize the jitter. Otherwise the acquisition process doesn’t change from traditional acquisition, the signal remains referenced to the trigger point.

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 needs to be stable during the characterization and afterward. The instrument indicates when characterization is necessary.

Performance You Can Count On

Depend on Tektronix to provide you with performance you can count on. In addition to industry-leading service and support, this product comes backed by a three-year warranty as standard.

Characteristics

Characteristic	Description
Acquisition Modes	Free Run Synchronous, Triggered Synchronous
Mainframe Resources	Any one active*3 small (electrical) module slot. Both acquisition channels associated with the slot became unavailable. Only one 82A04 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

*3 Channels not displaced by a large (optical) module.

Reference Clock Parameters Supported

Characteristic	Description
Amplitude	
Operational	100 mV _{P-P} - 1.8 V _{P-P} Jitter performance guaranteed from 600 mV _{P-P} - 1.8 V _{P-P}
Guaranteed Frequency Range	2 GHz - 25 GHz continuous; for non-sinewave reference clock signal in the 2 GHz - 8 GHz range an additional filter*4 typically is required
	2 GHz - 60 GHz continuous with Option 60G; for non-sinewave reference clock signal in the 2 GHz - 8 GHz range an additional filter*4 typically is required

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

System Performance

Characteristic	Description
Jitter	System jitter of 200 fs _{RMS} typical, on a 10 GHz or faster acquisition module, in DSA8300 mainframe, with f ≥ 8 GHz, VREF ≥ 0.6 V Phase Reference Signal
	System jitter of 280 fs _{RMS} typical, on a 10 GHz or faster acquisition module, in DSA8300 mainframe, with 2 GHz ≤ f < 8 GHz, VREF ≥ 0.6 V Phase Reference Signal

Time Accuracy (Time Base) and Timing Deviation (Phase Reference)

Characteristic	Description
Phase Reference Time Base (Triggered)	
Maximum timing deviation relative to phase reference signal	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)	
Maximum timing deviation relative to phase reference signal	0.1% or better of phase reference signal period (typical)

Input

Characteristic	Description
Input Impedance	50 Ω ±0.5 Ω AC (5 pF typical AC coupling) 1.85 mm female (‘V’) connector Precision adapter to 2.92 mm female included with 50 Ω SMA termination

Environmental

Matches the mainframe specifications.

Physical Characteristics

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

Ordering Information

82A04

Phase Reference Module.

Includes: User manual (1); Precision adapter 1.85/2.4 mm male to 2.92 mm female included with 50 Ω SMA termination (1), three-year warranty.

82A04 Options

Option	Description
Opt. 60G	Extends the BW range to 60 GHz
Filter	For non-sinusoidal phase reference clock signal with frequency below 8 GHz please also order appropriate filter from the accessory list below

Service Options

Option	Description
Opt. C5	Calibration Service 5 Years
Opt. R5	Repair Service 5 Years

Other Accessories

Accessory	Description
020-2566-xx	82A04 Filter 2 GHz. Filter kit for non-sinusoidal phase reference clock signal with frequency between 2 GHz and 4 GHz
020-2567-xx	82A04 Filter 4 GHz. Filter kit for non-sinusoidal phase reference clock signal with frequency between 4 GHz and 6 GHz
020-2568-xx	82A04 Filter 6 GHz. Filter kit for non-sinusoidal phase reference clock signal with frequency between 6 GHz and 8 GHz
80N01	Sampling Module Extender Cable (2 meter)*5
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)*5

Tektronix recommends using quality high-performance interconnect cables with these high-bandwidth products in order to minimize measurement degradation and variations. The W.L. Gore & Associates' cable assemblies, accessible at <http://www.gore.com/tektronix>, are compatible with the 2.92 mm, 2.4 mm, and 1.85 mm connector interface of the 80E0x modules. Assemblies can be ordered by contacting Gore, at the URL above.

*5 The 82A04 module does not require particularly high spectral fidelity in the clock signal passed to it; the signal can be BW limited (e.g. 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. Similarly the module extender cables are of lesser benefit to the 82A04 than to the usual acquisition modules.



Product(s) are manufactured in ISO registered facilities.



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

Contact Tektronix:

ASEAN / Australasia (65) 6356 3900
Austria 00800 2255 4835*
Balkans, Israel, South Africa and other ISE Countries +41 52 675 3777
Belgium 00800 2255 4835*
Brazil +55 (11) 3759 7627
Canada 1 800 833 9200
Central East Europe and the Baltics +41 52 675 3777
Central Europe & Greece +41 52 675 3777
Denmark +45 80 88 1401
Finland +41 52 675 3777
France 00800 2255 4835*
Germany 00800 2255 4835*
Hong Kong 400 820 5835
India 000 800 650 1835
Italy 00800 2255 4835*
Japan 81 (3) 6714 3010
Luxembourg +41 52 675 3777
Mexico, Central/South America & Caribbean 52 (55) 56 04 50 90
Middle East, Asia, and North Africa +41 52 675 3777
The Netherlands 00800 2255 4835*
Norway 800 16098
People's Republic of China 400 820 5835
Poland +41 52 675 3777
Portugal 80 08 12370
Republic of Korea 001 800 8255 2835
Russia & CIS +7 (495) 7484900
South Africa +41 52 675 3777
Spain 00800 2255 4835*
Sweden 00800 2255 4835*
Switzerland 00800 2255 4835*
Taiwan 886 (2) 2722 9622
United Kingdom & Ireland 00800 2255 4835*
USA 1 800 833 9200

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

Updated 10 February 2011

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28 Apr 2011

85W-17640-7

