Electrical Clock Recovery Module

80A05 Module for DSA8300*1 Series Oscilloscopes Datasheet

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.

Features & Benefits

- Electrical Clock Recovery for:
  - Enumerated Bit Rates between 50 Mb/s and 12.6 Gb/s
  - Provides fully integrated 80C12B Electrical Clock Recovery Support
- Clean 50 Ω Path for the Best Signal Acquisition Fidelity

Applications

- Serial Data Link and Device Characterization for Computer, Communications, and Consumer Applications
- Compliance Testing of Electrical Signaling
- High-speed Optical Communications Testing
- Jitter, Noise, BER, and Signal Impairment Analysis

The **80A05 Electrical Clock Recovery Module** enables clock recovery for electrical signals (or optical signals when an electrical data pick-off is provided – such as with the 80C12B optical sampling module). Additionally, the 80A05 provides internal routing of the recovered clock for triggering of the DSA8300*1 Series oscilloscopes.

The 80A05 recovers clocks from serial data streams for all of the most common electrical standards in the 50 Mb/s to 3.188 Gb/s range (continuous coverage) plus the (fixed) rate of 4.25 Gb/s. Option 10G adds support for user-selectable rates in the following ranges:

- 3.267 to 4.250 Gb/s;
- 4.900 to 6.375 Gb/s; and
- 9.800 to 12.60 Gb/s range

The 80A05 provides high level of integration and the best sensitivity available, and is the optimal solution for testing of optical transmitter components and electrical components of optical systems. The 80A05 PLL loop bandwidth selection is automatic with no interaction, leading to easy setup and operation.

The 80C12B optical module with the appropriate 80A05 clock recovery module provides a complete solution for optical rates between 155 Mb/s and 12.6 Gb/s. For additional clock recovery choices see CR125A, CR175A, and CR286A information.

The 80A05 module accepts either single-ended or differential signals. With either single-ended or differential signals, the attenuated but otherwise unmodified input signal is available on output connectors on the front panel of the modules. The signal path to these front-panel outputs has been carefully designed to preserve signal fidelity well beyond the frequency corresponding to the maximum bit rate addressed by the clock recovery circuit. The front-panel output signals can therefore be connected to a high-frequency sampling module (such as 80E07) and be acquired for analysis while preserving high-frequency features of the signal.

Tektronix clock recovery solutions combine simplicity of use with excellent flexibility; the full rate recovered clock or its sub-rate is available on the modules' front panel to clock or trigger other equipment.

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 one-year warranty as standard.

*1 Also compatible with DSA8200, CSA/TDS8200, CSA/TDS8000B, and CSA/TDS8000 sampling oscilloscopes.

Characteristics

Supported Specifications

Specification		Standard	Option 10G
OC3/STM1	155.52 Mb/s	■	■
OC12/STM4	622.08 Mb/s	■	■
Fibre Channel	1.063 Gb/s	■	■
Gigabit Ethernet	1.25 Gb/s	■	■
SATA Gen I	1.50 Gb/s	♦*3	♦*3
2 GB Fibre Channel	2.125 Gb/s	■	■
OC48/STM16	2.488 Gb/s	■	■
2 GB Ethernet	2.50 Gb/s	■	■
PCI Express I	2.50 Gb/s	♦*3	♦*3
Infiniband®	2.50 Gb/s	■	■
2.5G G.709 FEC	2.666 Gb/s	■	■
SATA Gen II	3.0 Gb/s	♦*3	♦*3
XAUI, 10GBASE-X	3.125 Gb/s	■	■
10 GB FibreChannel x4	3.188 Gb/s	■	■
4 GB FibreChannel	4.25 Gb/s	■	■
FB-DIMM1	3.2, 4.0, 4.8 Gb/s		♦*2, 3
PCI Express II	5.0 Gb/s		♦*2, 3
FB-DIMM2	4.8, 6.4, 8.0, 9.6 Gb/s		♦*2, 3
OIF CEI	6+ Gb/s		♦*2
2x XAUI	6.25 Gb/s		■
8 GB Fibre Channel	8.50 Gb/s		
OC192/STM64	9.953 Gb/s		■
XFP/XFI	9.95-11.2 Gb/s		♦*2
10GBASE-W	9.953 Gb/s		■
10GBASE-R	10.31 Gb/s		■
10 GB Fibre Channel	10.51 Gb/s		■
G.975 FEC	10.66 Gb/s		■
G.709 FEC	10.71 Gb/s		■
OIF CEI	11+ Gb/s		
10 GbE w/ FEC	11.10 Gb/s		■
Super FEC	12.50 Gb/s		■
		Additional enumerated standard rates are supported with 8300*1 Series firmware releases higher than 2.4.x	

Rates Supported: ■ = Filter, ♦ = Optical Clock Recovery

*2 The standard is not enumerated, but is supported as a custom rate.

*3 No spread-spectrum clocking support.

Clock Recovery Ranges for custom (user specified) rates (in addition to previous enumerated lists)

Standard	Option 10G
50 Mb/s to 3.188 Gb/s 4.25 Gb/s	50 Mb/s to 3.188 Gb/s 3.267 to 4.25 Gb/s 4.900 to 6.375 Gb/s 9.800 to 12.60 Gb/s

Sensitivity: (clock recovery will lock, differential data is given for each input)

Characteristic	Standard	Option 10G
Lowest Supported Rate to 2.70 Gb/s	Differential ≤8 mV_{p-p} Single ended 10 mV_{p-p}	
2.70 to 11.19 Gb/s	N/A	Differential ≤12 mV_{p-p} Single ended 15 mV_{p-p}
11.19 to 12.60 Gb/s	N/A	Differential ≤15 mV_{p-p} Single ended 20 mV_{p-p}
I/O		
I/O Connectors	SMA	
I/O Impedance	50 Ω	
Input **+Data In** and **–Data In**; complementary signals		
Input Voltage:		
Absolute Maximum Nondestructive	2.5 V_{p-p} (each input)	
Absolute Maximum Operational	2.0 V_{p-p} (either input) 1.0 V_{p-p} (differential, each input)	
Maximum Input Signal Skew (**+Data In** to **–Data In** under which the unit will still meet its sensitivity specification)	50 Mb/s to 2.70 Gb/s: 20% of unit interval 2.70 to 12.6 Gb/s: 20 ps	
Measured Edge Density	N/A	
Measured Phase Deviation	N/A	
Coupling		
Recovered Clock Output (to **Trigger Clock** output)	AC	
Data Input to **Data Out**	DC	
Output **+Data Out** and **–Data Out**; complementary signals		
Attenuation **+Data In** to **+Data Out** **–Data In** to **–Data Out**	6.6 dB ±0.6 dB (ratio of **+Data Out** / **+Data In**)	
Bandwidth (–3 dB) **+Data In** to **+Data Out** **–Data In** to **–Data Out**	≥20 GHz	

Recovered TRIGGER CLOCK (80A05) Output

Characteristic	Standard	Option 10G
Output Frequency		
Input Bit Rate <2.70 Gb/s	Input bit rate	
Input Bit Rate ≥2.70 Gb/s	Input bit rate / 16	
Loop Bandwidth	BW of (bit rate / 1666) till 3 Gb/s 4 MHz nominal at other ranges and BW <4 MHz at 9.953 and 10.3125 Gb/s	
Loop Bandwidth Accuracy	Nominal	
Locking Range	1000 ppm nominal	
Peaking	N/A	
Peaking Accuracy	N/A	
Jitter		
155 Mb/s to 2.70 Gb/s	0.5% of unit interval (RMS) typical	
2.70 to 6.38 Gb/s	1.27 ps_{RMS} typical	
9.80 to 12.6 Gb/s	0.6ps_{RMS} typical	
Return loss	DC to 10 GHz: 15 dB 10 GHz to 20 GHz: >10 dB	
Rise/Fall Times	TRIGGER CLOCK output: <300 ps typical (10-90%)	10 G CLOCK output: <30 ps typical (10-90%)
Amplitude	>400 mV (typical)	
Output Frequency Deviation Tracking Range (Tracking 30 to 33 kHz Triangle Modulated SSC)	N/A	

Recovered 10G CLOCK OUT (Option 10G only)

Characteristic	Standard	Option 10G
Jitter		
2.70 to 3.14 Gb/s	N/A	4x input bit rate; 2.5 ps_{RMS}
3.27 to 4.25 Gb/s		3x input bit rate; 2.5 ps_{RMS}
4.90 to 6.38 Gb/s		2x input bit rate; 2.5 ps_{RMS}
9.80 to 12.6 Gb/s		1x input bit rate; <2.0 ps_{RMS}
Amplitude		>500 mV (typical)
Trigger Output (External lock status indication)		
Interface Type	N/A	
Latency	N/A	
Trigger Input (External clock recovery lock request)		
Interface type	N/A	
Threshold	N/A	
Minimum Pulse Width	N/A	

Physical Characteristics

Dimension	mm	in.
Width	165	6.5
Height	25	1.0
Depth	305	12.0
Weight	**kg**	**lb.**
Net	1.22	2.7

Ordering Information

80A05

Multirate Electrical Clock Recovery module.
Includes: User Manual, One-year Warranty.
Note: Also used for 80C12B Optical Sampling Module Clock Recovery.

Product Options

Opt. 10G – Add bit rates:
3.267 Gb/s to 4.25 Gb/s.
4.900 Gb/s to 6.376 Gb/s.
9.800 Gb/s to 12.60 Gb/s.

Service Options

Opt. C3 – Calibration Service 3 Years.
Opt. C5 – Calibration Service 5 Years.
Opt. D1 – Calibration Data Report.
Opt. D3 – Calibration Data Report (with C3 only).
Opt. D5 – Calibration Data Report (with C5 only).
Opt. R3 – Repair Service 3 Years.
Opt. R5 – Repair Service 5 Years.
Firmware support – This module is supported on 8200*1 Series oscilloscopes running Firmware release 2.0.1.5 or later.

Interconnect Cables

015-0560-xx – (450 mm/18 in.; 1 dB loss at 20 GHz) cable is a high-quality cable recommended for work to 20 GHz.

Interconnect Cables (3rd party)

Tektronix recommends using quality high-performance interconnect cables with Tektronix high-bandwidth products in order 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. Assemblies can be ordered by contacting Gore by phone at (800) 356-4622, or on the web at www.gore.com/tektronix.

*1 Also compatible with DSA8200, CSA/TDS8200, CSA/TDS8000B, and CSA/TDS8000 sampling oscilloscopes.

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.

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

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