

# Optical Modules for DSA8300\*1 Sampling Oscilloscope

## 80C07B, 80C08C, 80C10B, 80C11, 80C12, 80C14, 80C25GBE Data Sheet



### Features & Benefits

- 10 Gb/s Telecom and Datacom
  - Highly Accurate ER Calibrated (Extinction Ratio) Measurement Option for Increased Repeatability and Transferability of the Measurement
  - 80C14 – Low-noise, High Optical Sensitivity, Broad Wavelength Conformance Testing for 10GbE, 40GbE (R4), 100GbE (X10) LAN, WAN, FEC, 10G Fibre Channel, 16G Fibre Channel (14.025 Gb/s), 14G Infiniband FDR (14.06250 Gb/s)
  - 80C08C and 80C12 (w/ Option 10G) – Low-noise, High Optical Sensitivity, and Broad Wavelength Conformance Testing for 10 GbE, 40 GbE (R4), 100 GbE (X10) LAN, WAN, FEC, 10G Fibre Channel, and 10 Gb/s Telecom Standards and FEC Rates
  - 80C11 30 GHz Optical Bandwidth Conformance Testing and Characterization for 10 Gb/s Telecom and Datacom Standards and FEC Rates
  - 80C14 Clock Recovery for Rates  $\geq 10$  Gb/s is Supported by CR175A (Sold Separately)
  - 80C08C and 80C11 Integrated Clock Recovery supports All Current 10 Gb/s Standards or User-defined Rates from 9.8 to 12.6 Gb/s (CR4)
  - 80C12 Clock Recovery for 10 Gb/s Rate is supported by the 80A05 Module or CR125A Clock Recovery Instrument (Sold Separately)
- 100 Gb/s and 40 Gb/s Telecom and Datacom
  - 80C10B 80 GHz Optical Bandwidth and Lowest Noise Capability for Performance Testing and Signal Characterization of 40 Gb/s NRZ, RZ, or Optical Duobinary Data Formats
  - New 80C10B Option F1 provides Optical Reference Receivers for Conformance Testing of 25.781 Gb/s (100GBase-ER4 and 100GBase-LR4), 27.739 Gb/s (100GBase-ER4 FEC and 100GBase-LR4 FEC), 39.813 Gb/s (OC-768/STM-256, VSR-2000 G.693, 40G NRZ G.959.1), 41.25 Gb/s (40GBase-FR), 43.018 Gb/s (OTU3, VSR-2000 w/ FEC, 4x10G LAN PHY OTU3) in a single module
  - New 80C25GBE module provides 65 GHz full bandwidth and fully integrated selectable reference receiver filtering, enabling conformance testing at either 1310 nm or 1550 nm for 27.739G (100GBase-LR4+FEC and 100GBase-ER4+FEC), and 25.781G (100GBase-LR4 and 100GBase-ER4)
  - 80C10B and 80C25GBE Clock Recovery for 25-44.5 Gb/s Rates is Supported by the CR286A-HS or Similar\*2 (Sold Separately) and the New Option CRTP (Electrical Signal Outputs to 44.5 Gb/s)
- Tributary Telecom and Datacom
  - 80C07B and 80C12 provide Excellent Optical Sensitivity and Broad Wavelength Test Capability
  - 80C07B, 80C12 Multirate Telecom Conformance Testing Solutions from 125\*3 Mb/s (OC-3/STM-4) through 11.317 Gb/s (10GFC w/ FEC) and Multirate Datacom Conformance Testing Solutions for Fibre Channel, Gigabit Ethernet, and Infiniband Standards

### Applications

- High-speed Optical Communications Testing
- Extinction Ratio and Q-factor Measurements
- Eye-pattern and Pulse Shape Analysis
- Relaxation Oscillation Testing
- Optical Signal Analysis
- Compliance Testing
- NRZ, RZ, and Optical Duobinary Signal Characterization

\*1 Also compatible with DSA8200, TDS/CSA8200, TDS/CSA8000B, and TDS/CSA8000 sampling oscilloscopes.

\*2 Contact Tektronix for details.

\*3 125 Mb/s is supported by selecting 155 Mb/s rate.

## **DSA8300\*1 Series Sampling Oscilloscope Optical Modules**

The DSA8300 Series Sampling Oscilloscope, when configured with one or more optical sampling modules, provides complete optical test solutions for Telecom (125 Mb/s to 44.50 Gb/s) or Datacom (Gigabit Ethernet, 10 GbE, 40 GbE, 100 GbE, Fibre Channel to 10 GFC, and InfiniBand) applications, as well as general-purpose optical component testing.

Each optical module includes all the elements necessary for optical testing:

- Optical-to-Electrical Converter
- Average Power Monitor
- One or More Reference Receiver Filters
- A Full Bandwidth Optical Path
- Optional Integrated Clock Recovery (80C07B and 80C08C)
- 80C10B and 80C25GBE, when equipped with Opt. CRTP and 80C12, provide electrical clock recovery signal pickoff
- Universal Optical Input Connector

### **New: ER Calibrated (Extinction Ratio)**

To increase the level of transferability of the ER measurement, ER Calibrated reduces the uncertainty of ER results through Tektronix calibration of the module against a calibrated, known, high ER source. This optional feature is available on most 10G modules (see Ordering Information).

### **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.

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

**Optical Sampling Modules**

<b>Module</b>	<b>Description</b>
80C07B Multirate, Datacom and Telecom	The 80C07B module is a broad wavelength (700 to 1650 nm) multirate optical sampling module optimized for testing datacom/telecom signals from 125 to 2500 Mb/s. With its amplified O/E converter design, this module provides excellent signal-to-noise performance, allowing users to examine low-power optical signals. The 80C07B can be optionally configured with clock recovery that supports 125, 155, 622, 1063, 1250, 2125, 2488, 2500, and 2666 Mb/s rates.
80C08C Multirate, Broad Wavelength, High Sensitivity 10 Gb/s	The 80C08C module is a broad wavelength (700 to 1650 nm) multirate optical sampling module providing datacom rate testing for 10GbE, 40GbE-R4, 100GbE-SR10 applications at 9.953, 10.3125, 11.0957 Gb/s and 10G Fibre Channel applications at 10.51875 Gb/s and 11.317 Gb/s. The 80C08C also provides telecom rate testing at 9.953, 10.664, and 10.709 Gb/s. With its amplified O/E converter design, this module provides excellent signal-to-noise performance and high optical sensitivity, allowing users to examine low power level optical signals. The 80C08C can be optionally configured with clock recovery options that can support any standard or user-defined rate in the continuous range from 9.8 to 12.6 Gb/s.
80C10B Multirate Datacom and Telecom 40 Gb/s and 100 Gb/s	The 80C10B module provides integrated and selectable reference receiver filtering, enabling conformance testing at either 1310 nm or 1550 nm for 39.813 Gb/s (OC-768/STM-256, VSR2000 G.693, 40G NRZ G.959.1), 41.25 Gb/s (40GBase-FR), and 43.018 Gb/s [G.709 FEC, OTU3, (4x10G LAN PHY)] rates. In addition to the filter rates, the user may also choose selectable bandwidths of 30 GHz, 65 GHz, and 80 GHz for 80C10B for optimal noise vs. bandwidth performance for accurate signal characterization. The 80C10B is optionally available with Option F1 which extends filter selections to include 27.739 Gb/s (100GBase-LR4 + FEC and 100GBase-ER4 + FEC), and 25.781 Gb/s (100GBase-LR4 and 100GBase-ER4). When equipped with Option CRTP an electrical signal pickoff is provided for clock recovery. Clock recovery, to 28.6 Gb/s, for the 80C10B is provided using the CR286A clock recovery instrument (sold separately). The 80C10B is also optionally available in a bundled ordering configuration which includes a 70+ GHz electrical sampling channel.
80C11 Multirate, 10 Gb/s Datacom and Telecom	The 80C11 module is a long wavelength (1100 to 1650 nm) multirate optical sampling module optimized for testing 10 Gb/s datacom and telecom standard rates at 9.953, 10.3125, 10.51875, 10.664, 10.709, 11.0957, 11.317, and 14.025 Gb/s. With its high optical bandwidth of up to 30 GHz (typical) it is well suited for general-purpose high-performance 10 Gb/s optical component testing. The 80C11 can be optionally configured with clock recovery options that can support any standard or user-defined rate in the continuous range from 9.8 to 12.6 Gb/s.
80C12 Multirate Datacom and Telecom	The 80C12 module is a broad wavelength (700 to 1650 nm) multirate optical sampling module providing 1G, 2G, 4G, 8G, and 10G telecom and datacom testing. This highly flexible module can be configured to support either lower data rate applications (1 to 8.5 Gb/s) or a wide variety of 10 Gb/s applications. The low data rate applications include: 1, 2, 4, and 8G Fibre Channel, multilane standards such as 10GBase-X4 and 4-Lane 10 Gb/s Fibre Channel, and Infiniband SDR and DDR rates. The supported 10 Gb/s application includes both datacom and telecom application. The supported 10 Gb/s datacom applications include 10GbE, 40GbE-R4, 100GbE-SR10 applications at 9.953, 10.3125, 11.0957 Gb/s and 10G Fibre Channel applications at 10.51875 Gb/s and 11.317 Gb/s. The 80C12 also provides telecom rate testing at 9.953, 10.664, and 10.709 Gb/s. With its amplified O/E converter design, this module provides excellent signal-to-noise performance and high optical sensitivity, allowing users to examine low power level optical signals. Clock recovery for the 80C12 is provided using the 80A05 module or CR125A clock recovery instrument (sold separately).
80C14 Multirate Datacom and Telecom	The 80C14 module is a broad wavelength (700 to 1650 nm) multirate optical sampling module providing 8G, 10G, and 16G telecom and datacom testing. The supported 10 Gb/s datacom applications include: 10GbE, 40GbE-R4, 100GbE-SR10 applications at 9.953, 10.3125, and 11.0957 Gb/s. Fibre Channel applications include: 8.500, 10.51875, 11.317, and 14.025 Gb/s. The 80C14 also provides telecom rate testing at 9.953, 10.664, 10.709, and 12.5 Gb/s. With its amplified O/E converter design, this module provides excellent signal-to-noise performance and high optical sensitivity, allowing users to examine low power level optical signals. Clock recovery for the 80C14 is provided by the CR175A or CR286A (sold separately).
80C25GBE Multirate Datacom 100 Gb/s	80C25GBE module provides 65 GHz full bandwidth and integrated and selectable reference receiver filtering, enabling conformance testing at either 1310 nm or 1550 nm for 27.739G (100GBase-LR4+FEC and 100GBase-ER4+FEC), and 25.781G (100GBase-LR4 and 100GBase-ER4). When equipped with Option CRTP an electrical signal pickoff is provided for clock recovery. Clock recovery for the 80C25GBE is provided using the CR286A clock recovery instrument (sold separately). Clock recovery for the 80C25GBE is provided using the CR286A clock recovery instrument (sold separately).

**Optical Modules: 80C07B**

Module	80C07B										
Opt.	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	CR1
Bandwidth (GHz)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Wavelength Range (nm)	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650
Fibre Input (µm)	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5
Mask Test Sensitivity (dBm)	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22
Number of Channels	1	1	1	1	1	1	1	1	1	1	1
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery											
125 Mb/s <sup>3</sup>	■	■	■	■							◆
155 Mb/s	■	■	■	■							◆
622 Mb/s	■				■	■	■				◆
1063 Mb/s		■			■			■	■		◆
1250 Mb/s			■			■		■		■	◆
2125 Mb/s				■			■		■	■	◆
2488 Mb/s	■	■	■	■	■	■	■	■	■	■	◆
2500 Mb/s	■	■	■	■	■	■	■	■	■	■	◆
3.125 Gb/s											
3.188 Gb/s											
3.32 Gb/s											
4.25 Gb/s											
9.95 Gb/s											

<sup>3</sup> 125 Mb/s is supported by selecting 155 Mb/s rate.

**Optical Modules: 80C08C, 80C10B, 80C11, and 80C25GBE**

Module	80C08C				80C10B*4			80C11				80C25GBE	
	CR1	CR2	CR4		CRTP	F1		CR1	CR2	CR3	CR4		CRTP
Bandwidth (GHz)	10	10	10	10	80		65	30	30	30	30	30	65
Wavelength Range (nm)	700-1650	700-1650	700-1650	700-1650	1290-1330 1520-1620		1290-1330 1520-1620	1100-1650	1100-1650	1100-1650	1100-1650	1100-1650	1290-1330 1520-1620
Fibre Input (µm)	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9		9	9	9	9	9	9	9
Mask Test Sensitivity (dBm)	-16	-15	-15	-15	-7		-8	-9	-9	-9	-9	-9	-8
Number of Channels	1	1	1	1	1		1	1	1	1	1	1	1
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery													
9.95 Gb/s	■	◆		◆				◆■	◆	◆	◆	◆	
10.31 Gb/s	■	◆	◆	◆				■				◆	
10.52 Gb/s	■		◆	◆				■				◆	
10.66 Gb/s	■			◆				■	◆	◆		◆	
10.71 Gb/s	■			◆				■			◆	◆	
11.1 Gb/s	■			◆				■				◆	
11.3 Gb/s	■			◆				■				◆	
25.78 Gb/s						◆*5	■					■	◆*5
27.74 Gb/s						◆*5	■					■	◆*5
39.81 Gb/s					■	◆*2	■						◆*2
41.25 Gb/s					■	◆*2	■						◆*2
43.02 Gb/s					■	◆*2	■						◆*2

\*2 Contact Tektronix for details.

\*4 Option CRTP reduces sensitivity by 0.6 dB (max) and increases noise by 15% (max).

\*5 Clock recovery with CR286A-HS (sold separately).

**Optical Modules: 80C12 and 80C14**

Module	80C12							80C14			
	Opt.	F1	F2	F3	F4	F5	F6	FC	10G	CR*6, 7	CR*7
Bandwidth (GHz)	4.25	9	9	4.25	9	9	9	9	10		14
Wavelength Range (nm)	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650		700-1650
Fibre Input (µm)	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5	9 or 50 or 62.5		9 or 50 or 62.5
Mask Test Sensitivity (dBm)	-19	-19	-19	-19	-19	-19	-19	-19	-14		-15
Number of Channels	1	1	1	1	1	1	1	1	1		
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery											
155 Mb/s										◆*6	
622 Mb/s										◆*6	
1063 Mb/s	■		■							◆*6	
1250 Mb/s										◆*6	
2125 Mb/s	■	■	■	■			■			◆*6	
2488 Mb/s										◆*6	
2500 Mb/s										◆*6	
3.125 Gb/s				■	■	■	■	■		◆*6	
3.188 Gb/s				■	■	■	■	■		◆*6	
3.32 Gb/s								■		◆*6	
4.25 Gb/s	■	■		■	■					◆*6	
8.5 Gb/s*8		■	■		■	■	■	■	■	◆*9	■ ◆*9
9.95 Gb/s									■	◆*7	■ ◆*7
10.31 Gb/s*8									■	◆*7	■ ◆*7
10.52 Gb/s									■	◆*7	■ ◆*7
10.66 Gb/s									■	◆*7	■ ◆*7
10.71 Gb/s									■	◆*7	■ ◆*7
11.1 Gb/s									■	◆*7	■ ◆*7
11.3 Gb/s									■	◆*7	■ ◆*7
12.5 Gb/s											■ ◆*7
14.025 Gb/s											■ CR175A
14.063 Gb/s											■ CR175A

\*6 With 80A05, CR125A, or CR175A.

\*7 With 80A05 Option 10G, CR125A, or CR175A.

\*8 Draft version of the 8.5GFC filter. T11 committee redefined this filter at the April 2008 meeting. New 8.5GFC filter, as defined by T11 committee in April 2009, is identical to the 10GBase-R 10.313G filter and is available for 80C12 Option 10G modules and 80C14 modules; and is identified as 10Base-R.

\*9 With CR125A or CR175A.

**80A05, CR125A, CR175A, and CR286A Electrical Clock Recovery**

Product Feature	80A05		CR125A	CR175A	CR286A
	Standard	Option 10G			
<b>Supported Specifications</b>					
Enumerated Standards					
OC3/STM1	155.52 Mb/s	■	■	◆*10	◆*10
OC12/STM4	622.08 Mb/s	■	■	■	■
Fibre Channel	1.063 Gb/s	■	■	■	■
Gigabit Ethernet	1.25 Gb/s	■	■	■	■
SAS Gen I	1.50 Gb/s	◆*11	◆*11	■	■
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	◆*11	◆*11	■	■
Infiniband®	2.50 Gb/s	■	■	◆*10	◆*10
2.5G G.709 FEC	2.666 Gb/s	■	■	◆*10	◆*10
SAS Gen II	3.0 Gb/s	◆*11	◆*11	■	■
XAUI, 10GBase-X	3.125 Gb/s	■	■	◆*10	◆*10
10GB Fibre Channel x4	3.188 Gb/s	■	■	◆*10	◆*10
4 GB Fibre Channel	4.25 Gb/s	■	■	■	■
FB-DIMM1	3.2, 4.0, 4.8 Gb/s		◆*10, 11	■	■
PCI Express II	5.0 Gb/s		◆*10, 11	■	■
FB-DIMM2	4.8, 6.4, 8.0, 9.6 Gb/s		◆*10, 11	■	■
OIF CEI	6+ Gb/s		◆*10	■	■
2x XAUI	6.25 Gb/s		■	◆*10	◆*10
8 GB Fibre Channel*8	8.50 Gb/s		■	■	■
OC192/STM64	9.953 Gb/s		■	■	■
XFP/XFI	9.95-11.2		◆*10	■	■
10GBase-W	9.953 Gb/s		■	◆*10	◆*10
10GBase-R*8	10.31 Gb/s		■	■	■
10GB Fibre Channel	10.51 Gb/s		■	◆*10	◆*10
G.975 FEC	10.66 Gb/s		■	◆*10	◆*10
G.709 FEC	10.71 Gb/s		■	◆*10	◆*10
OIF CEI	11+ Gb/s		◆*10	■	■
10 GbE w/ FEC	11.10 Gb/s		■	◆*10	◆*10
Super FEC	12.50 Gb/s		■	◆*10	◆*10
16GFC	14.025 Gb/s		■	◆*10	◆*10
14G Infiniband FDR	14.063 Gb/s		■	◆*10	◆*10
100GbE-LR4/ER4	25.7 Gb/s		■	■	◆*10
100GbE-LR4/ER4 FEC	28.8 Gb/s		■	■	◆*10
Additional enumerated standard rates are supported with 8000 Series Firmware Releases higher than 2.4.x					
Clock Recovery Ranges for Custom (User-specified) Rates (in addition to enumerated lists above)	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	150 Mb/s to 12.5 Gb/s continuous	150 Mb/s to 17.5 Gb/s continuous	150 Mb/s to 28.6 Gb/s continuous
Sensitivity (Clock recovery will lock, differential data is given for each input)					
Lowest Supported Rate to 2.70 Gb/s	Differential ≤8 mV <sub>p-p</sub> Single Ended 10 mV <sub>p-p</sub>		Differential 15 mV (typ) Single Ended 30 mV (typ)		
2.70 to 11.19 Gb/s	Differential ≤12 mV <sub>p-p</sub> Single Ended 15 mV <sub>p-p</sub>				
11.19 to 12.60 Gb/s	Differential ≤15 mV <sub>p-p</sub> Single Ended 20 mV <sub>p-p</sub>				

\*8 Draft version of the 8.5GFC filter. T11 committee redefined this filter at the April 2008 meeting. New 8.5GFC filter, as defined by T11 committee in April 2009, is identical to the 10GBase-R 10.313G filter and is available for 80C12 Option 10G modules and 80C14 modules; and is identified as 10Base-R.

\*10 The standard is not enumerated but is supported as a custom rate.

\*11 No spread spectrum clocking support.

## Characteristics

### Optical Sampling Module Characteristics

Module	Application Type	Standards and Supported Filtering Rates*12	Number of Input Channels	Effective Wavelength Range	Calibrated Wavelengths
80C07B	Tributary Datacom/Telecom	Standard Included: OC-48/STM-16 (2.488 Gb/s), Infiniband SDR, 2 GbE (2.500 Gb/s); Optional (choose any two): OC-3/STM-1 (155 Mb/s), OC-12/STM-4 (622 Mb/s), Fibre Channel (1.063 Gb/s), GbE (1.250 Gb/s), 2G Fibre Channel (2.125 Gb/s)	1	700 nm to 1650 nm	780 nm, 850 nm, 1310 nm, and 1550 nm (±20 nm)
80C08C	10 Gb/s Datacom/Telecom	OC-192/STM-64 (9.953 Gb/s), 10GBase-W (9.953 Gb/s), 10GBase-R, 40GBase-R4, 100GBase-SR10 (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s), 10GBase-LRM, 40GBase-SR4, 100GBase-SR10, 40GBase-LR4	1	700 nm to 1650 nm	780 nm, 850 nm, 1310 nm, and 1550 nm (±20 nm)
80C10B	100 Gb/s and 40 Gb/s Datacom and Telecom	OC-768/STM-256 (39.813 Gb/s), OTU3, VSR-2000 G.693, 40G NRZ G.959.1, FEC (43.018 Gb/s), OTU3 (44.5 Gb/s), 40GBase-FR (41.25 Gb/s), 100GBase-LR4 (25.781 Gb/s, FEC 27.739 Gb/s), 100GBase-ER4 (25.781 Gb/s, FEC 27.739 Gb/s)	1	1310 nm and 1550 nm	1310 nm and 1550 nm (±20 nm)
80C11	10 Gb/s Datacom/Telecom	OC-192/STM-64 (9.953 Gb/s), 10GBase-W (9.953 Gb/s), 10GBase-R, 40GBase-LR4 (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s), 40GBase-LR4, 16GFC (14.025 Gb/s)	1	1100 nm to 1650 nm	1310 nm and 1550 nm (±20 nm)
80C12	1 to 8.5 Gb/s Datacom/Telecom	Fibre Channel (1.063 Gb/s), 2G Fibre Channel (2.125 Gb/s), 4G Fibre Channel (4.250 Gb/s), 10GBase-X4 (3.125 Gb/s), 8G Fibre Channel (8.50 Gb/s)*8, 10GFC-X4 (3.1875 Gb/s), VSR5-3318 (3.318 Gb/s), 1x Infiniband SDR (2.5 Gb/s), 10GBase-LRM, 40GBase-SR4, 100GBase-SR10, 40GBase-LR4	1	700 nm to 1650 nm	850 nm, 1310 nm, and 1550 nm (±20 nm)
	10 Gb/s Datacom/Telecom	OC-192/STM-64 (9.953 Gb/s), 10GBase-W (9.953 Gb/s), 10GBase-R*8, 40GBase-R4, 100GBase-SR10 (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s)			
80C14	8.5 to 14 Gb/s Datacom/Telecom	8GFC (8.500 Gb/s), OC-192/STM-64 (9.953 Gb/s), 10GBase-W (9.953 Gb/s), 10GBase-R, 40GBase-R4, 100GBase-SR10 (10.31 Gb/s), 10G Fibre Channel (10.52 Gb/s), ITU-T G.975 FEC (10.664 Gb/s), ITU-T G.709 (10.709 Gb/s), 12.5 G+FEC, 10 GbE FEC (11.1 Gb/s), 10 GFC FEC (11.3 Gb/s), 16GFC (14.025 Gb/s), 14G Infiniband FDR (14.0625 Gb/s)	1	700 nm to 1650 nm	850 nm, 1310 nm, and 1550 nm (±20 nm)
80C25GBE	100 Gb/s Datacom	100GBase-LR4 (25.781 Gb/s, FEC 27.739 Gb/s), 100GBase-ER4 (25.781 Gb/s, FEC 27.739 Gb/s)	1	1310 nm and 1550 nm	1310 nm and 1550 nm (±20 nm)

\*8 Draft version of the 8.5GFC filter. T11 committee redefined this filter at the April 2008 meeting. New 8.5GFC filter, as defined in ANSI FC-PI-4 (Rev 8), is identical to the 10GBase-R 10.313G filter and is available for 80C12 Option 10G modules and 80C14 modules; and is identified as 10GBase-R.

\*12 Bandwidths shown are warranted unless printed in an italic typeface which represents a typical value. 80C08C, 80C12: Bandwidths and optical filters valid for OMA ≤500 uW (1550/1310 nm), OMA ≤860 uW (850 nm), OMA ≤1020 uW (780 nm).

**Note:** Refer to Optical Sampling Modules User Manual for more detailed information.



**Optical Sampling Module Characteristics (Cont.)**

Module	Clock Recovery (Optional)	Clock Recovery Outputs	Unfiltered Optical Bandwidth*12	Absolute Maximum Nondestructive Optical Input	Internal Fibre Diameter
80C07B	Option CR1: 155 Mb/s, 622 Mb/s, 1.063 Gb/s, 1.250 Gb/s, 2.125 Gb/s, 2.488 Gb/s, 2.500 Gb/s, 2.666 Gb/s	±Clock, ±Data	2.5 GHz	5 mW average; 10 mW peak power at wavelength of highest responsivity	62.5/125 µm Multi Mode
80C08C*14	Option CR1: 9.953 Gb/s, 10.31 Gb/s; Option CR2: 10.31 Gb/s, 10.52 Gb/s; Option CR4: Continuous from 9.8 Gb/s to 12.6 Gb/s	Clock, Clock/16	10 GHz	1 mW average; 10 mW peak power at wavelength of highest responsivity	62.5/125 µm Multi Mode
80C10B	Provided by CR286A-HS or other compatible external CR units*2	ELECTRICAL SIGNAL OUT (to 44.5 Gb/s, 50 Ω, AC coupled, differential 2.92 mm female connectors, max. 1 ps diff. skew)*13	80 GHz	20 mW average; 60 mW peak power at wavelength of highest relative responsivity	9/125 µm Single Mode
80C11	Option CR1: 9.953 Gb/s; Option CR2: 9.953 Gb/s, 10.664 Gb/s; Option CR3: 9.953 Gb/s, 10.709 Gb/s; Option CR4: Continuous between 9.8 Gb/s to 12.6 Gb/s	CR1: Clock, Clock/16, Data; CR2, CR3, CR4: Clock, Clock/16	30 GHz	5 mW average; 10 mW peak power at wavelength of highest responsivity	9/125 µm Single Mode
80C12	Provided by 80A05 or CR125A (sold separately)	ELECTRICAL SIGNAL OUT	9 GHz (for all options except 10G) 10 GHz (Option 10G)	1 mW average; 10 mW peak power at wavelength of highest responsivity	62.5/125 µm Multi Mode
80C14	Provided by CR175A or CR286A (sold separately)	ELECTRICAL SIGNAL OUT (to 14.2 Gb/s, AC coupled, differential)	14 GHz	2 mW average (1310/1550 nm); 4 mW average (850 nm); 10 mW peak power at wavelength of highest responsivity	62.5/125 µm Multi Mode
80C25GBE	Provided by CR286A-HS (Sold separately)	ELECTRICAL SIGNAL OUT (to 44.5 Gb/s, 50 Ω, AC coupled, differential 2.92 mm female connectors, max. 1 ps diff. skew)*13	65 GHz	20 mW average; 60 mW peak power at wavelength of highest relative responsivity	9/125 µm Single Mode

\*2 Contact Tektronix for details.

\*12 Bandwidths shown are warranted unless printed in an italic typeface which represents a typical value. 80C08C, 80C12: Bandwidths and optical filters valid for OMA ≤500 uW (1550/1310 nm), OMA ≤860 uW (850 nm), OMA ≤1020 uW (780 nm).

\*13 With Option CRTP.

\*14 Frequency characteristic and ORR guaranteed for signals up to 500 µW<sub>pp</sub> (80C08C, 80C12), respectively 200 µW (80C07B) at 1550 nm; pro-rated (higher power) for other wavelengths.

## Optical Sampling Module Characteristics (Cont.)

Module	Optical Return Loss	Fibre Input Accepted	RMS Optical Noise (Typical)		RMS Optical Noise (Maximum)		Independent Channel Deskew
80C07B	>14 dB (Multi Mode) >24 dB (Single Mode)	Single or Multi Mode	0.50 $\mu$ W at 155 Mb/s, 622 Mb/s, 1063 Mb/s, 1250 Mb/s; 0.70 $\mu$ W at 2.488/2.500 Gb/s		1.0 $\mu$ W at 155 Mb/s, 622 Mb/s, 1063 Mb/s, 1250 Mb/s; 1.5 $\mu$ W at 2.488/2.500 Gb/s		Standard
80C08C	>14 dB (Multi Mode) >24 dB (Single Mode)	Single or Multi Mode	1.7 $\mu$ W at all filter rates (1550/1310 nm, no CR)		3.0 $\mu$ W at all filter rates (1550/1310 nm)		Standard
80C10B*4	>30 dB	Single Mode	1310 nm	1550 nm	1310 nm	1550 nm	Standard
			21 $\mu$ W (25.8, 27.7 Gb/s)	15 $\mu$ W (25.8, 27.7 Gb/s)	38 $\mu$ W (25.8, 27.7 Gb/s)	28 $\mu$ W (25.8, 27.7 Gb/s)	
			26 $\mu$ W (30 GHz)	19 $\mu$ W (30 GHz)	45 $\mu$ W (30 GHz)	35 $\mu$ W (30 GHz)	
			28 $\mu$ W (39.8 Gb/s - 43.0 Gb/s)	20 $\mu$ W (39.8 Gb/s - 43.0 Gb/s)	50 $\mu$ W (39.8 Gb/s - 43.0 Gb/s)	38 $\mu$ W (39.8 Gb/s - 43.0 Gb/s)	
			44 $\mu$ W (65 GHz)	33 $\mu$ W (65 GHz)	75 $\mu$ W (65 GHz)	60 $\mu$ W (65 GHz)	
72 $\mu$ W (80 GHz)	55 $\mu$ W (80 GHz)	130 $\mu$ W (80 GHz)	105 $\mu$ W (80 GHz)				
80C11	>30 dB	Single Mode	5.5 $\mu$ W at all filter rates; 7.0 $\mu$ W at 14.025 GHz 10.0 $\mu$ W at 20 GHz 20.0 $\mu$ W at 30 GHz		8.0 $\mu$ W at all filter rates; 10.0 $\mu$ W at 14.025 GHz 14.0 $\mu$ W at 20 GHz 30.0 $\mu$ W at 30 GHz		Standard
80C12	>14 dB (Multi Mode) >24 dB (Single Mode)	Single or Multi Mode	1.3 $\mu$ W (all filters except Option 10G) 2.4 $\mu$ W ('Full BW' and Option 10G filters)		2.5 $\mu$ W (all filters except Option 10G) 5.0 $\mu$ W ('Full BW' and Option 10G filters)		Standard
80C14	>14 dB (Multi Mode) >24 dB (Single Mode)	Single or Multi Mode	850 nm	1310/1550 nm	850 nm	1310/1550 nm	Standard
			2.5 $\mu$ W (10G filters) 3.7 $\mu$ W (14G filters)	1.3 $\mu$ W (10G filters) 1.9 $\mu$ W (14G filters)	5 $\mu$ W (10G filters) 7 $\mu$ W (14G filters)	2.5 $\mu$ W (10G filters) 3.5 $\mu$ W (14G filters)	
80C25GBE	>30 dB	Single Mode	1310 nm	1550 nm	1310 nm	1550 nm	Standard
			21 $\mu$ W (25.8, 27.7 Gb/s)	15 $\mu$ W (25.8, 27.7 Gb/s)	38 $\mu$ W (25.8, 27.7 Gb/s)	28 $\mu$ W (25.8, 27.7 Gb/s)	
			44 $\mu$ W (65 GHz)	33 $\mu$ W (65 GHz)	75 $\mu$ W (65 GHz)	60 $\mu$ W (65 GHz)	

\*4 Option CRTP reduces sensitivity by 0.6 dB (max) and increases noise by 15% (max).

## Optical Sampling Module Characteristics (Cont.)

Module	Offset Capability	Power Meter	Power Meter Range	Power Meter Accuracy	Mask Test Optical Sensitivity*15
80C07B	Standard	Standard	+4 dBm to -30 dBm	5% of reading	-22 dBm at 155 Mb/s, 622 Mb/s; -20 dBm at 2488/2500 Mb/s
80C08C	Standard	Standard	0 dBm to -30 dBm	5% of reading	-16 dBm at all filter rates
80C10B*4, 80C25GBE	Standard	Standard	+13 dBm to -21 dBm	5% of reading	25.8 and 27.7 Gb/s: -8 dBm (1550 nm) and -7 dBm (1310 nm); 39.813 to 43.018 Gb/s: -7 dBm (1550 nm) and -6 dBm (1310 nm)
80C11	Standard	Standard	+4 dBm to -30 dBm	5% of reading	-12 dBm at all filter rates; -5 dBm at 20 GHz; -6 dBm at 30 GHz
80C12	Standard	Standard	0 dBm to -30 dBm	5% of reading	-19 dBm (for all options except Option 10G) -14 dBm (for Option 10G)
80C14	Standard	Standard	0 dBm to -30 dBm	5% of reading	-15 dBm

\*4 Option CRTP reduces sensitivity by 0.6 dB (max) and increases noise by 15% (max).

\*15 Smallest power level for mask test. Values represent theoretical typical sensitivity of NRZ eyes for comparison purposes. Assumes instrument peak-peak noise consumes most of the mask margin.

**Optical Sampling Module Characteristics (Cont.)**

Module	Extinction Ratio Calibrated Accuracy (Opt. 01 ER Calibrated)*16		
	Reference Filter in Range (Gb/s)	Repeatability (Typical) (to itself and to other 80Cxx-Opt. 01)	Accuracy
80C07B	—	Option not available	
80C08C	9.9...11.3	±0.6% (-0.39 dB / +0.42 dB at 12 dB)	±1.2% (-0.76 dB / +0.92 dB at 12 dB)
80C10B	—	Option not available	
80C11	9.9...11.3	±0.6% (-0.39 dB / +0.42 dB at 12 dB)	±1.2% (-0.76 dB / +0.92 dB at 12 dB)
80C25GBE	—	Option not available	

\*16 Low ER signals (ER ≤ 6 dB): signal passes 802.3ae-like mask (scaled horizontally for bit rate); 10<sup>5</sup> samples in mask. High ER signals (ER > 6 dB): signal passes OC-192-like mask (scaled horizontally for bit rate); 10<sup>5</sup> samples in mask.

**Physical Characteristics**

Module	Dimensions (mm/in.)			Weight (kg/lb.) Net
	Width	Height	Depth	
80C07B	165/6.5	25/1.0	305/12.0	<1.36/<3.0
80C08C	165/6.5	25/1.0	305/12.0	<1.22/<2.7
80C10B	165/6.5	25/1.0	305/12.0	<2.61/<5.75
80C11	165/6.5	25/1.0	305/12.0	<1.22/<2.7
80C12	165/6.5	25/1.0	305/12.0	<2.61/<5.75
80C14	165/6.5	25/1.0	305/12.0	<2.61/<5.75
80C25GBE	165/6.5	25/1.0	305/12.0	<2.61/<5.75

**Ordering Information**

**80C07B**

Multirate Datacom and Telecom Optical Sampling Module.  
**Includes:** User manual, FC/PC optical connector, three-year warranty.

**80C08C**

Multirate Datacom and Telecom Optical Sampling Module.  
**Includes:** User manual, FC/PC optical connector, three-year warranty.

**80C10B**

Multirate Optical Sampling Module – 80 GHz.  
**Includes:** User manual, FC/PC optical connector, three-year warranty. Clock recovery is available using the CR286A (sold separately).

**80C11**

Multirate Datacom and Telecom Optical Sampling Module.  
**Includes:** User manual, FC/PC optical connector, three-year warranty.

**80C12**

Multirate Datacom and Telecom Optical Sampling Module.  
**Includes:** User manual, FC/PC optical connector, three-year warranty. Clock recovery is available using the 80A05 or CR125A. The 80C12 Multirate Telecom and Datacom Optical Sampling Module is available with a wide variety of factory-configured signal conditioning options. These options provide a variety of reference receiver filtering and unfiltered signal acquisition bandwidths. The user must specify one of the following options when ordering this module.

**80C14**

Multirate Datacom and Telecom Optical Sampling Module.  
**Includes:** User manual, FC/PC optical connector, three-year warranty. Clock recovery is available using the CR175A (sold separately).

**80C25GBE**

Multirate Optical Sampling Module – 65 GHz.  
**Includes:** User manual, FC/PC optical connector, three-year warranty. Clock recovery is available using the CR286A (sold separately).

**Options**

Option	Description
<b>80C07B</b>	
Opt. CR1	155/622/1063/1250/2125/2488/2500/2666 Mb/s clock/data recovery. User must select any one (1) of the following filter options:
Opt. F1	155, 622 Mb/s
Opt. F2	155, 1063 Mb/s
Opt. F3	155, 1250 Mb/s
Opt. F4	155, 2125 Mb/s
Opt. F5	622, 1063 Mb/s
Opt. F6	622, 1250 Mb/s
Opt. F7	622, 2125 Mb/s
Opt. F8	1063, 1250 Mb/s
Opt. F9	1063, 2125 Mb/s
Opt. F10	1250, 2125 Mb/s

<b>80C08C</b>	
Opt. CR1	9.953, 10.31 Gb/s clock recovery
Opt. CR2	10.31, 10.52 Gb/s clock recovery
Opt. CR4	Continuous rate clock recovery supporting any standard or user-definable rate in the range from 9.8 to 12.6 Gb/s
Opt. 01	ER Calibrated (when ordered with new module); module will only work on mainframe with Windows XP and oscilloscope FW V 5.0 and higher. ER Calibrated can be ordered as an upgrade to an existing module; order Opt. 01 + Opt. IFC (factory installation); factory installation is required; module will only work on mainframe with Windows XP and oscilloscope FW V 5.0 and higher.

<b>80C10B</b>	
80C10BE1	Bundled ordering configuration includes 80C10B plus one 80E06 single-channel 70+ GHz electrical module
Opt. CRTP	ELECTRICAL SIGNAL OUTPUTS (to 44.5 Gb/s, 50 Ω, AC coupled, differential 2.92 mm female connectors, max. 1 ps differential skew)
Opt. F1	25.781, 27.739, 39.813, 41.25, 43.018 Gb/s filters, 65 GHz full bandwidth

<b>80C11</b>	
Opt. CR1	9.953 Gb/s clock recovery
Opt. CR2	9.953, 10.66 Gb/s clock recovery
Opt. CR3	9.953, 10.71 Gb/s clock recovery
Opt. CR4	Continuous rate clock recovery supporting any standard or user-definable rate in the range from 9.8 to 12.6 Gb/s
Opt. 01	ER Calibrated (when ordered with new module); module will only work on mainframe with Windows XP and oscilloscope FW V 5.0 and higher. ER Calibrated can be ordered as an upgrade to an existing module; order Opt. 01 + Opt. IFC (factory installation); factory installation is required; module will only work on mainframe with Windows XP and oscilloscope FW V 5.0 and higher.

**80C12**  
The user must specify one of the following options when ordering this module:

Option	Description
Opt. F1	1063, 2125, 4250 Mb/s filters, 4.25 GHz full bandwidth
Opt. F2	2125, 4250, 8500 Mb/s filters, 9 GHz full bandwidth
Opt. F3	1063, 2125, 8500 Mb/s filters, 9 GHz full bandwidth
Opt. F4	2125, 3125, 3187.5, 4250 Mb/s filters, 4.25 GHz full bandwidth
Opt. F5	3125, 3187.5, 4250, 8500 Mb/s filters, 9 GHz full bandwidth
Opt. F6	2125, 3125, 3187.5, 8500 Mb/s filters, 9 GHz full bandwidth
Opt. FC	3125, 3187.5, 3318, 8500 Mb/s filters, 9 GHz full bandwidth
Opt. 10G	8.5, 9.95, 10.31, 10.52, 10.66, 10.71, 11.1, 11.3 Gb/s filters, 10 GHz full bandwidth

<b>80C25GBE</b>	
Opt. CRTP	ELECTRICAL SIGNAL OUTPUTS (to 44.5 Gb/s, 50 Ω, AC coupled, differential 2.92 mm female connectors, max. 1 ps differential skew)

**Service**

Option	Description
Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report (includes frequency response curves for all included reference receiver filters)
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. R5	Repair Service 5 Years

**Optical Connector Accessories**

While the FC/PC connector is standard with the 8000 Series optical sampling modules, the input connector type can be interchanged with any of the following standard adapters:

**Adapters**

Adapter	Order
ST/PC	119-4513-xx
D4/PC	119-4514-xx
Biconic	119-4515-xx
FC/PC	119-5115-xx
SMA 2.5	119-4517-xx
SC/PC	119-5116-xx
DIN/PC 47256	119-4546-xx
HP/PC	119-4556-xx
SMA	119-4557-xx
DIAMOND 3.5	119-4558-xx

**Note:** For LC connector please use LC to FC/PC patch cable and connect to the default FC/PC.



Product(s) are manufactured in ISO registered facilities.







**Contact Tektronix:**

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- Balkans, Israel, South Africa and other ISE Countries** +41 52 675 3777
- Belgium** 00800 2255 4835\*
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- Hong Kong** 400 820 5835
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- Mexico, Central/South America & Caribbean** 52 (55) 56 04 50 90
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