Optical Sampling Modules

▶ 80C02 • 80C07B • 80C08C • 80C10 • 80C10B • 80C11 • 80C12

DSA8200[*2] Series Sampling Oscilloscope Optical Modules

The DSA8200 Series Sampling Oscilloscope, when configured with one or more optical sampling modules, provide complete optical test solutions for Telecom (125 Mb/s to 43.018 Gb/s) or Datacom (Fibre Channel, Gigabit Ethernet, 10 GbE 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
- A Low-noise Electrical Sampler
- Optional Integrated Clock Recovery (80C12 clock recovery is provided via the 80A05 or 80A07 Clock Recovery Module – sold separately)
- 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 modules (see Ordering Information).

[*2] Also compatible with CSA/TDS8200, CSA/TDS8000B and CSA/TDS8000 sampling oscilloscopes.

▶ Features & Benefits

10 Gb/s Telecom and Datacom

- Highly Accurate ER Calibrated (Extinction Ratio) Measurement Option for Increased Repeatability and Transferability of the Measurement
- 80C08C and 80C12 (with Option 10G) – Low-noise, High Optical Sensitivity and Broad Wavelength Conformance Testing for 10 GbE LAN, WAN and FEC, 10G Fibre Channel and 10 Gb/s Telecom Standards and FEC Rates
- 80C11 30GHz Optical Bandwidth Conformance Testing and Characterization for 10 Gb/s Telecom and Datacom Standards and FEC Rates
- 80C08C and 80C11 Integrated Clock Recovery Supports All Current 10 Gb/s Standards or User-defined Rate from 9.8 to 12.6 Gb/s (CR4)
- 80C12 Clock Recovery for 10Gb/s Rate is Supported via 80A05 or 80A07 Clock Recovery Module (Sold Separately)

40 Gb/s Telecom

- 80C10B Provides Highest Optical Bandwidth Capability for Performance Testing and Signal Characterization of 40 Gb/s RZ or NRZ Data Formats
- 80C10B Provides 80 GHz Optical Bandwidth and Reference Receivers for Conformance Testing of 39.813 Gb/s (OC-768/STM-256) and 43.018 Gb/s (ITU-T G.709 FEC)

Tributary Telecom and Datacom

- 80C07B and 80C12 Provide Excellent Optical Sensitivity and Broad Wavelength Test Capability
- 80C07B, 80C12 Multi-rate Telecom Conformance Testing Solutions from 125[*1] Mb/s (OC-3/ STM-4) Through 9.953 Gb/s (OC-192/STM-64) and Multi-rate Datacom Conformance Testing Solutions for Fibre Channel, Gigabit Ethernet and Infiniband Standards

[*1] 125 Mb/s is supported by selecting 155 Mb/s rate.

▶ Applications

High-speed Optical Communications Testing

Extinction Ratio and Q-factor Measurements

Eye-pattern and Pulse Shape Analysis

Relaxation Oscillation Testing

Optical Signal Analysis

Conformance Testing

NRZ and RZ Pulse Characterization

Tektronix

Enabling Innovation

► Optical Sampling Modules

80C02 High-performance Telecom	The 80C02 module is optimized for testing of long-wavelength (1100 to 1650 nm) signals at 9.953 Gb/s (SONET OC-192/SDH STM-64). With its high optical bandwidth of 30 GHz (typical), it is also well-suited for general purpose, high-performance optical component testing. The 80C02 can be optionally configured with clock recovery that supports 9.953 Gb/s telecom standards
80C07B Multi-rate, Datacom and Telecom	The 80C07B module is a broad wavelength (700 to 1650 nm) multi-rate optical sampling module optimized for testing datacom/telecom signals from 125[*3] 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 Multi-rate, Broad Wavelength, High Sensitivity 10 Gb/s	The 80C08C module is a broad wavelength (700 to 1650 nm) multi-rate optical sampling module providing datacom rate testing for 10GbE 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 80 GHz and 80C10 65 GHz 40 Gb/s Module with 43 Gb/s ITU-T G.709 Forward Error Correction	The 80C10B and 80C10 modules provide 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) and 43.018 Gb/s (43 Gb/s ITU-T G.709 FEC) rates. In addition to the filter rates, the user may also choose selectable bandwidths of 30 GHz, 65 GHz in 80C10, and 30 GHz, 65 GHz and 80 GHz for 80C10B for optimal noise vs. bandwidth performance for accurate signal characterization. The 80C10B and 80C10 are optionally available in a bundled ordering configuration which includes a 70+ GHz electrical sampling channel
80C11 Multi-rate, 10 Gb/s Datacom and Telecom	The 80C11 module is a long wavelength (1100 to 1650 nm), multi-rate 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 and 11.317 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 Multi-rate, Datacom and Telecom	The 80C12 module is a broad wavelength (700 to 1650 nm), multi-rate optical sampling module providing 1G, 2G, 4G and 8G telecom and datacom testing. This highly flexible module can be configured to support either lower data rate applications (1 to 8 Gb/s) or a wide variety of 10 Gb/s applications. The low data rate applications include: 1, 2, 4 and 8G Fibre Channel and “by 4” wavelength division multiplex standards such as 10GBase-X4 and 4-Lane 10 Gb/s Fibre Channel. The supported 10Gb/s application includes both datacom and telecom application. The supported 10 Gb/s datacom applications include 10 GbE 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 via the 80A05 or 80A07 (sold separately)

[*3] 80C10B preliminary specifications.

► Optical Modules

Module	80C02		80C07B										
Opt.		CR	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	CR1
Bandwidth (GHz)	30	30	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)	1100-1650	1100-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650
Fiber Input (µm)	9	9	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5
Mask Test Sensitivity (dBm)	–9	–9	–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	1	1
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery													
125 Mb/s[*1]			■	■	■	■							◆
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	■	◆											

[*1] 125 Mb/s is supported by selecting 155 Mb/s rate.

► Optical Modules (Cont.)

Module	80C08C				80C10B*3	80C10		80C11			
Opt.		CR1	CR2	CR4				CR1	CR2	CR3	CR4
Bandwidth (GHz)	10	10	10	10	80	65	30	30	30	30	30
Wavelength Range (nm)	700-1650	700-1650	700-1650	700-1650	1290-1330 1520-1580	1290-1330 1520-1580	1100-1650	1100-1650	1100-1650	1100-1650	1100-1650
Fiber input (µm)	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9*4	9	9	9	9	9	9
Mask Test Sensitivity (dBm)	–15	–15	–15	–15	–4	–2	–9	–9	–9	–9	–9
Number of Channels	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	■			◆			■				◆
39.81 Gb/s						■					
43.02 Gb/s						■					

*3 80C10B preliminary specifications.

*4 The expected noise of the 80C10B is around 30% lower than 80C10 at 40G ORR settings, thus there should be a corresponding reduction in sensitivity of about 1.5 dB.

► Optical Modules (Cont.)

Module	80C12									
Opt.	F1	F2	F3	F4	F5	F6	FC	10G	CR*5	CR*6
Bandwidth (GHz)	4.25	9	9	4.25	9	9	9	10		
Wavelength Range (nm)	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650	700-1650		
Fiber input (µm)	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5	9 & 62.5		
Mask test sensitivity (dBm)	–15	–15	–15	–15	–15	–15	–15	–12		
Number of Channels	1	1	1	1	1	1	1	1		
Rates Supported: ■=Filter, ◆=Optical Clock Recovery, ⊕=Electrical Clock Recovery										
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	■	■		■	■				◆	◆
8.5 Gb/s		■	■		■	■	■	■		80A07
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								■		◆

*5 With 80A05 or 80A07.

*6 With 80A05 Option 10G or 80A07.

► Electrical Clock Recovery

Product Feature/Characteristic		80A05		80A07
		Standard	Option 10G	
OC3/STM1	155.52 Mb/s	■	■	◆*5
OC12/STM4	622.08 Mb/s	■	■	■
Fibre Channel	1.063 Gb/s	■	■	■
Gigabit Ethernet	1.25 Gb/s	■	■	■
SAS Gen I	1.5 Gb/s	◆*6	◆*6	■
2 GB Fibre Channel	2.125 Gb/s	■	■	■
OC48/STM16	2.488 Gb/s	■	■	■
2 GB Ethernet	2.5 Gb/s	■	■	■
PCI Express I	2.5 Gb/s	◆*6	◆*6	■
Infiniband®	2.5 Gb/s	■	■	◆*5
2.5G G.709 FEC	2.666 Gb/s	■	■	◆*5
SAS Gen II	3. Gb/s	◆*6	◆*6	■
XAUI, 10GBase-X	3.125 Gb/s	■	■	◆*5
10 GB Fibre Channel x4	3.188 Gb/s	■	■	◆*5
4 GB Fibre Channel	4.25 Gb/s	■	■	■
FB-DIMM1	3.2, 4, 4.8 Gb/s		◆*5,*6	■
PCI Express II	5 Gb/s		◆*5,*6	■
FB-DIMM2	4.8, 6.4, 8, 9.6 Gb/s		◆*5,*6	■
OIF CEI	6+ Gb/s		◆*5	■
2x XAUI	6.25 Gb/s		■	◆*5
8 GB Fibre Channel	8.5 Gb/s			■
OC192/STM64	9.953 Gb/s		■	■
XFP/XFI	9.95-11.2		◆*5	■
10GBase-W	9.953 Gb/s		■	
10GBase-R	10.31 Gb/s		■	■
10GB Fibre Channel	10.51 Gb/s		■	◆*5
G.975 FEC	10.66 Gb/s		■	◆*5
G.709 FEC	10.71 Gb/s		■	◆*5
OIF CEI	11+ Gb/s			■
10 GbE w/FEC	11.1, 11.3 Gb/s		■	◆*5
Super FEC	12.5 Gb/s		■	◆*5
User	user settable		partial	full

*5 With 80A05 or 80A07.

*6 With 80A05 Option 10G or 80A07.

► Characteristics

Optical Sampling Module Characteristics (Refer to Optical Sampling Modules User Manual for more detailed information)

	Application Type	Standards and Supported Filtering Rates[*7]	Number of Input Channels	Effective Wavelength Range	Calibrated Wavelengths
80C02	10 Gb/s Telecom	OC-192/STM-64 (9.953 Gb/s) 10GBase-W (9.953 Gb/s)[*7]	1	1100 nm to 1650 nm	1310 nm and 1550 nm (±20 nm)
80C07B	Tributary Datacom/Telecom	Standard Included: OC-48/STM-16 (2.488 Gb/s), Infiniband, 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 (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)	1	700 nm to 1650 nm	780 nm, 850 nm, 1310 nm and 1550 nm (±20 nm)
80C10B[*3]	40 Gb/s Telecom	OC-768/STM-256 (39.813 Gb/s), ITU-T G.709 FEC (43.018 Gb/s)	1	1310 nm and 1550 nm	1310 nm and 1550 nm (±20 nm)
80C10	40 Gb/s Telecom	OC-768/STM-256 (39.813 Gb/s), ITU-T G.709 FEC (43.018 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 (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)	1	1100 nm and 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) 10GFC-X4 (3.1875 Gb/s) VSR5-3318 (3.318 Gb/s)	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 (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)			

[*7] 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 mW (1550/1310 nm), OMA ≤ 860 (850 nm), OMA ≤1020 (780 nm).

► Optical Sampling Module Characteristics (Cont.)

	Clock Recovery (Optional)	Clock Recovery Outputs	Unfiltered Optical Bandwidth[*7]	Absolute Maximum Nondestructive Optical Input	Internal Fiber Diameter
80C02	Option CR: 9.953 Gb/s	Clock, Clock/16, Data	28 GHz	5 mW average; 10 mW peak power at wavelength of highest relative responsivity	9 µm/125 µm single-mode
80C07B	Option CR1: 155 Mb/s, 622 Mb/s, 1.063 Gb/s, 1.25 Gb/s, 2.125 Gb/s, 2.488 Gb/s, 2.5 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 µm/125 µm multi-mode
80C08C	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 µm/125 µm multi-mode
80C10B[*7]			*80 GHz*	20 mW average; 60 mW peak power at wavelength of highest relative responsivity	9 µm/125 µm single-mode
80C10			*65 GHz*	20 mW average; 60 mW peak power at wavelength of highest relative responsivity	9 µm/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	*28 GHz*	5 mW average; 10 mW peak power at wavelength of highest responsivity	9 µm/125 µm single-mode
80C12	Provided by 80A05 or 80A07 (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 µm/125 µm multi-mode

[*7] 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 mW (1550/1310 nm), OMA ≤ 860 (850 nm), OMA ≤1020 (780 nm).

► Optical Sampling Module Characteristics (Cont.)

	Optical Return Loss	Fiber Input Accepted	RMS Optical Noise (typical)	RMS Optical Noise (maximum)	Independent Channel Deskew
80C02	>30 dB	Single-mode	6 µW at 9.953 Gb/s, 12.5 GHz; 10 µW at 20 GHz; 15 µW at 30 GHz	10 µW at 9.953 Gb/s, 12.5 GHz mode; 15 µW at 20 GHz; 30 µW at 30 GHz	Standard
80C07B	>14 dB (multi-mode) >24 dB (single-mode)	Single- or multi-mode	.5 µW at 155 Mb/s, 622 Mb/s, 1063 Mb/s, 1250 Mb/s; .7 µW at 2.488/ 2.5 Gb/s	1 µW at 155 Mb/s, 622 Mb/s, 1063 Mb/s, 1250 Mb/s; 1.5 µW at 2.488/ 2.5 Gb/s	Standard
80C08C	>14 dB (multi-mode) >24 dB (single-mode)	Single- or multi-mode	1.7 µW at all filter rates (1550/1310 nm, no CR)	3 µW at all filter rates (1550/1310 nm)	Standard
80C10B[*3]	>30 dB	Single-mode	25 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 45 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 20 µW at 30 GHz mode (1550 nm); 40 µW at 30 GHz mode (1310 nm); 40 µW at 65 GHz mode (1550 nm); 75 µW at 65 GHz mode (1310 nm); 85 µW at 80 GHz mode (1550 nm); 150 µW at 80 GHz mode (1310 nm);	40 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 75 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 35 µW at 30 GHz (1550 nm); 65 µW at 30 GHz (1310 nm); 60 µW at 65 GHz (1550 nm); 110 µW at 65 GHz (1310 nm) 120 µW at 80 GHz (1550 nm); 220 µW at 80 GHz (1310 nm)	Standard
80C10	>30 dB	Single-mode	40 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 75 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 30 µW at 30 GHz mode (1550 nm); 55 µW at 30 GHz mode (1310 nm); 85 µW at 65 GHz mode (1550 nm); 150 µW at 65 GHz mode (1310 nm)	60 µW at 39.813 Gb/s, 43.018 Gb/s (1550 nm); 110 µW at 39.813 Gb/s, 43.018 Gb/s (1310 nm); 50 µW at 30 GHz (1550 nm); 90 µW at 30 GHz (1310 nm); 120 µW at 65 GHz (1550 nm); 220 µW at 65 GHz (1310 nm)	Standard
80C11	>30 dB	Single-mode	5.5 µW at all filter rates; 10 µW at 20 GHz 20 µW at 30 GHz	8 µW at all filter rates; 14 µW at 20 GHz 30 µW at 30 GHz	Standard
80C12	>14 dB (multi-mode) >24 dB (single-mode)	Single- or multi-mode	1.7 µW (all filters except Option 10G) 3.4 µW (Full BW" and Option 10G filters)	3 µW (all filters except Option 10G) 6 µW ("Full BW" and Option 10G filters)	Standard

[*3] 80C10B preliminary specifications.

► Optical Sampling Module Characteristics (Cont.)

	Offset Capability	Power Meter	Power Meter Range	Power Meter Accuracy	Mask Test Optical Sensitivity*8
80C02	Standard	Standard	+4 dBm to –30 dBm	5% of reading	–9 dBm at 9.953 Gb/s; –7 dBm at 20 GHz; –4 dBm at 30 GHz
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	Standard	Standard	+13 dBm to –21 dBm	5% of reading	–4 dBm at 39.813 Gb/s, 43.018 Gb/s; (1550 nm); –1 dBm (1310 nm)
80C10	Standard	Standard	+13 dBm to –21 dBm	5% of reading	–2 dBm at 39.813 Gb/s, 43.018 Gb/s; 0 dBm at 30 GHz; +3 dBm at 65 GHz (1550 nm); +1 dBm (1310 nm)
80C11	Standard	Standard	+4 dBm to –30 dBm	5% of reading	–10 dBm at all filter rates; –7 dBm at 20 GHz; –4 dBm at 30 GHz
80C12	Standard	Standard	0 dBm to –30 dBm	5% of reading	–15 dBm (for all options except Option 10G) –12 dBm (for Option 10G)

*8 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)*9		
	Reference Filter in Range [Gb/s]	Repeatability (typical) (to itself and to other 80Cxx-Opt. 01)	Accuracy
80C02	9.9	±0.6% (–0.39 dB/+0.42 dB at 12 dB)	±1.2% (–0.76 dB/+0.92 dB at 12 dB)
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	
80C10	—	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)

Conditions: 50% ±5% mark density, PRBS-like distribution of run-lengths, 50% ±10% eye crossing level, data bit-rate must match the filter rate. Rise-time 20 to 80%, without ORR <30% of UI.

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

► Physical Characteristics for Optical Sampling Modules

	Dimensions (mm/inches)			Weight (kg/lb)
	Width	Height	Depth	Net
80C02	165/6.5	25/1	305/12	<2.61/<5.75
80C07B	165/6.5	25/1	305/12	<1.36/<3.0
80C08C	165/6.5	25/1	305/12	<1.22/<2.7
80C10B	165/6.5	25/1	305/12	<2.61/<5.75
80C10	165/6.5	25/1	305/12	<2.61/<5.75
80C11	165/6.5	25/1	305/12	<1.22/<2.7
80C12	165/6.5	25/1	305/12	<2.61/<5.75

► Ordering Information

80C02

Optical Sampling Module.

Includes: User manual, FC/PC optical connector. Frequency response curves for 9.953 Gb/s filter rates.

Opt. CR – 9.953 Gb/s clock recovery.

Opt. 01 – ER Calibrated (when ordered with new module); ER Calibrated will only work on mainframe with Windows XP and oscilloscope FW V5. and up.

ER Calibrated can be ordered as an upgrade to an existing module; order Opt. 01 + Opt. IFC (factory installation) – factory installation is required;

ER Calibrated will only work on mainframe with Windows XP and oscilloscope FW V5. and up.

80C07B

Multi-rate Datacom and Telecom Optical Sampling Module.

Includes: User Manual, FC/PC optical connector. Frequency response curves for 2.488, 2.500 Gb/s data rates plus selected filter option data rates.

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.

80C08C

Multi-rate Datacom and Telecom Optical Sampling Module.

Includes: User Manual, FC/PC optical connector. Frequency response curves for 9.953, 10.31, 10.52, 10.66, 10.71, 11.1, 11.3 Gb/s filter rates.

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 V5. and up.

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 V5 and up.

80C10B

Multi-rate Optical Sampling Module – 80 GHz.

Includes: User manual, FC/PC optical connector. Frequency response curves for 39.813 and 43.108 Gb/s filter rates.

80C10BE1 – Bundled ordering configuration includes 80C10B plus one 80E06 single-channel 70+ GHz electrical module.

80C10

Multi-rate Optical Sampling Module – 65 GHz.

Includes: User manual, FC/PC optical connector. Frequency response curves for 39.813 and 43.108 Gb/s filter rates.

80C10E1 – Bundled ordering configuration includes 80C10 plus one 80E06 single-channel 70+ GHz electrical module.

80C11

Multi-rate Datacom and Telecom Optical Sampling Module.

Includes: User Manual, FC/PC optical connector. Frequency response curves for 9.953, 10.31, 10.52, 10.66, 10.71, 11.1, 11.3 Gb/s filter rates.

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 V5. and up.

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 V5 and up.

80C12

Multi-rate Datacom and Telecom Optical Sampling Module

Includes: User Manual, FC/PC optical connector. Frequency response curves for all included reference receiver filter rates. Clock recovery is available using the 80A05 or 80A07. The 80C12 Multi-rate 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:

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.

Service

Opt. C3 – Calibration Service 3 years.

Opt. C5 – Calibration Service 5 years.

Opt. D1 – Calibration Data Report.

Opt. D3 – Calibration Data Report 3 years (with Opt. C3).

Opt. D5 – Calibration Data Report 5 years (with Opt. C5).

Opt. R3 – Repair Service 3 years.

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:

ST/PC – 119-4513-00.

D4/PC – 119-4514-00.

Biconic – 119-4515-00.

FC/APC – 119-5115-00.

SMA 2.5 – 119-4517-00.

SC/APC – 119-5116-00.

DIN/PC 47256 – 119-4546-00.

HP/PC – 119-4556-00.

SMA – 119-4557-00.

DIAMOND 3.5 – 119-4558-00.

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www.tektronix.com

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