First Order PMD Source/Emulator

DGD-1000

Polarization mode dispersion (PMD) can seriously degrade the quality of high speed fiber optic data transmission. High speed transceivers must meet stringent standards for PMD tolerance. The DGD-1000 accurately and repeatably generates both high and low values of differential group delay (DGD) or first order PMD. Both the DGD and PDL are very stable over time and wavelength within the performance band. This instrument is available in different versions to accommodate the need for different wavelength and DGD ranges.

Making Light Work Lighter
General Photonics

Preliminary Specifications

Wavelength Range Options	Single band: C band, L band or O band Dual band: CL
DGD Range Options	0 to 200 ps or 0 to 400 ps
DGD Resolution	0.2 ps
DGD Accuracy[1]	± (0.2 + 2% of DGD) (ps)
DGD Repeatability[1]	± (0.2 + 2% of DGD) (ps)
DGD Change Rate	Up to 64 ps/s
IL	≤3.5 dB
PDL	≤0.3 dB
Return Loss	>50 dB
Optical Power Handling	>300 mW
Input/Output Fiber Type	SMF-28
Optical Connector Type	FC/APC, FC/PC, SC/APC, or SC/PC
Operating Temperature	5 to 40 °C
Storage Temperature	−20 to 60 °C
Power Supply	100 – 240 VAC, 50 – 60 Hz
Communication Interfaces	USB, GPIB and Ethernet
Dimensions	2U, 19" ¾ rack width 14" (L) x 14" (W) x 3.5" (H)

Notes
1. At 23±5°C.

Applications:

- System PMD Tolerance Testing
- 1st order PMD Performance Simulation

Unique Features:

- Large DGD Range- up to 400 ps
- Accurate at Low or High DGD
- DGD, PDL, IL Offset Controls

Ordering Information:

DGD – 1000 – XX – XXX – X – XXX

Wavelength:
C = C band
L = L band
O = O band
CL = C/L bands

DGD Range:
200 = 200 ps
400 = 400 ps

Connectors:
FC/APC
FC/PC
SC/APC
SC/PC

Functions
0 = Source function only

Typical Performance Data:

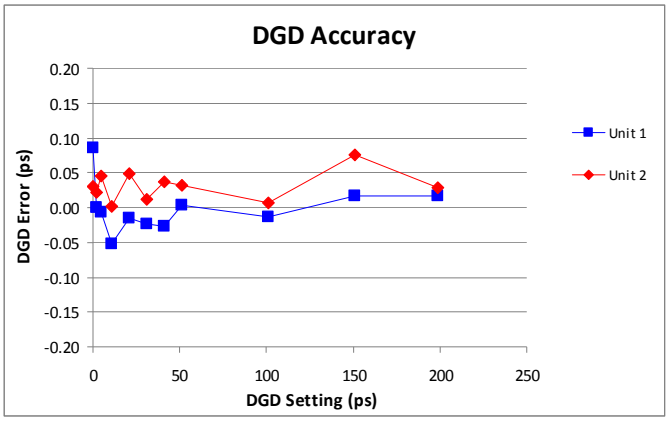

Figure 1. Typical DGD accuracy plots show high accuracy over the entire DGD range. The DGD error (deviation from set value), measured with a 5-sample average, is less than 0.1 ps.

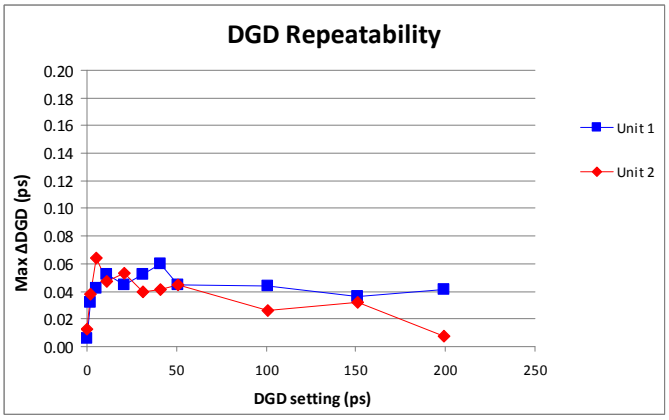

Figure 2. The repeatability plot shows less than 0.1 ps variability over 5 repeated measurements of DGD values over the entire DGD range. For this plot, "Max ΔDGD" = highest measured value – lowest measured value over 5 measurements at the same setting.

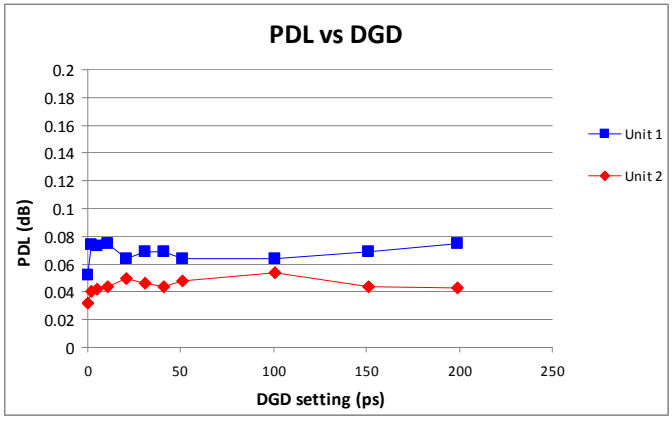

Figure 3. PDL vs. DGD measurements show that the PDL is both low and relatively constant over the DGD range. For both test instruments, the PDL was <0.1 dB over the full DGD range, and the PDL variation over the DGD range is less than 0.03 dB.

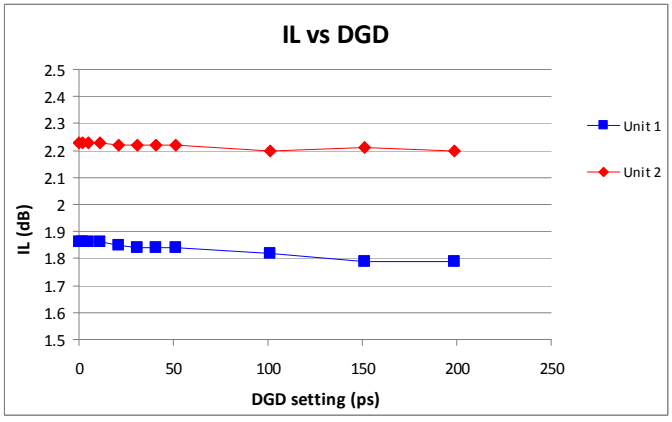

Figure 4. IL vs. DGD measurements show that the IL is relatively constant over the DGD range. For both test instruments, the IL variation over the DGD range is less than 0.1 dB.

Stability Data:

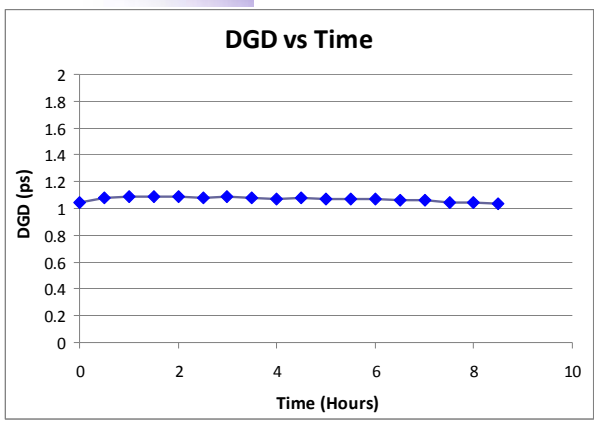

Figure 5. DGD vs. time at a setting of DGD = 1 ps. The DGD varies by less than 0.1 ps over 8 hours.

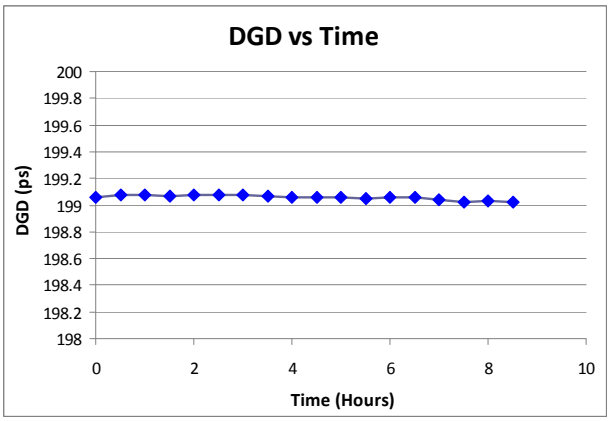

Figure 6. DGD vs. time at a setting of DGD = 199 ps. The DGD varies by less than 0.1 ps over 8 hours.

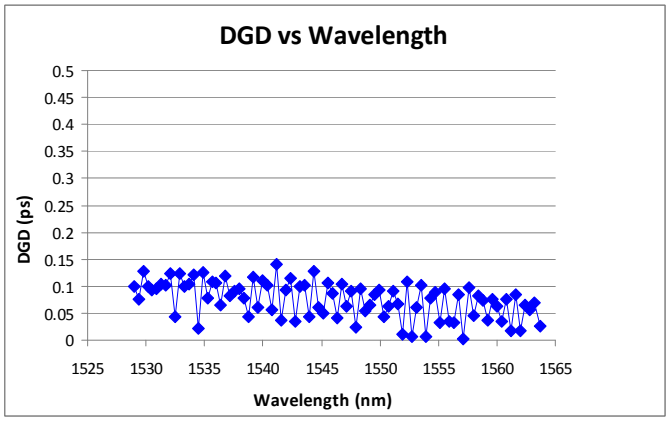

Figure 7. DGD vs. wavelength at a setting of DGD = 0 ps. The DGD varies by less than 0.2 ps over the C band.

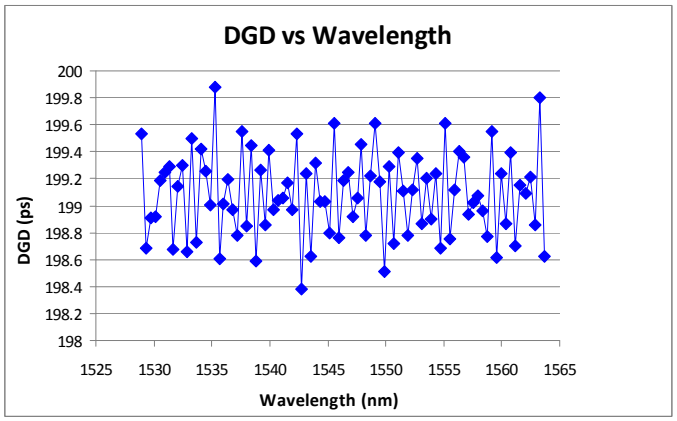

Figure 8. DGD vs. wavelength at a setting of DGD = 200 ps. The DGD varies by less than 2 ps over the C band.

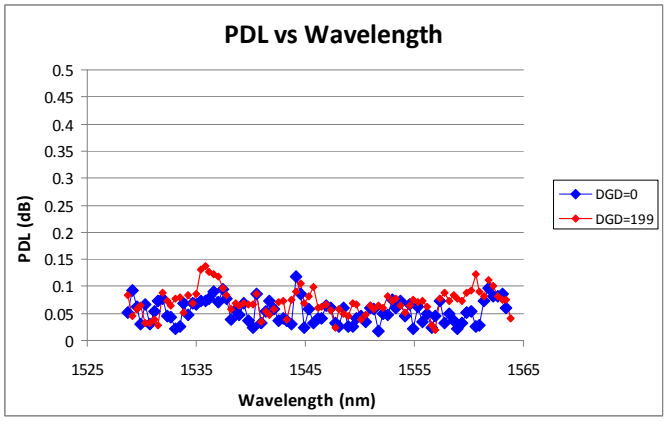

Figure 9. PDL vs. wavelength at DGD = 0 ps (blue) and at DGD = 200 ps (red). In both cases, the average PDL is less than 0.1 dB and varies by less than 0.15 dB over the C band.

Stability Data:

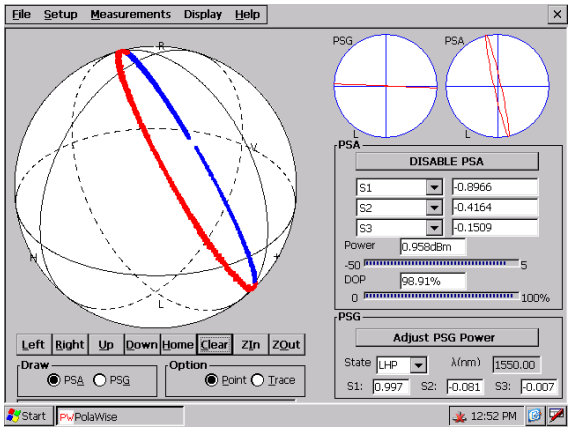

Figure 10. SOP variation with time. Because of factors such as temperature effects that can cause phase drift, the output SOP of the DGD-1000 drifts over time, eventually tracing out a circle on the Poincaré sphere. This figure shows such an SOP trace, measured using a General Photonics PSGA-101A.

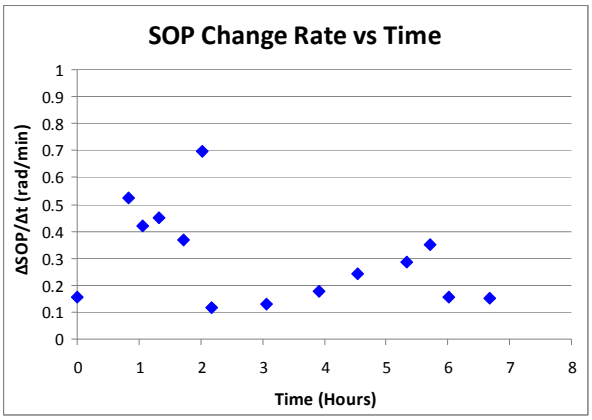

Figure 11. The SOP change rate can be characterized by measuring the time needed to trace out a full circle on the sphere. The approximate SOP change rate in rad/min can then be estimated by assuming that one full circle corresponds to 2π radians. The SOP change rate was periodically monitored at DGD setting = 0 ps over a period of about 6.5 hours under standard lab conditions. Over that period, the average SOP rate of change is 0.3 rad/min. Higher rates of change generally correspond to periods of greater temperature variability.