

# Optional PMDS Software Package

## NRT-SPA

Three Software Applications

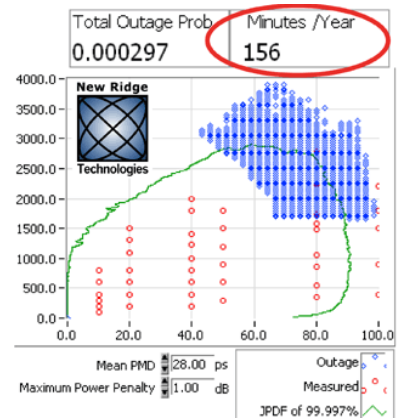
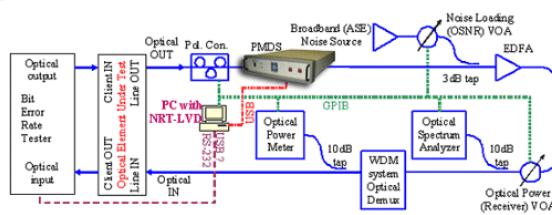
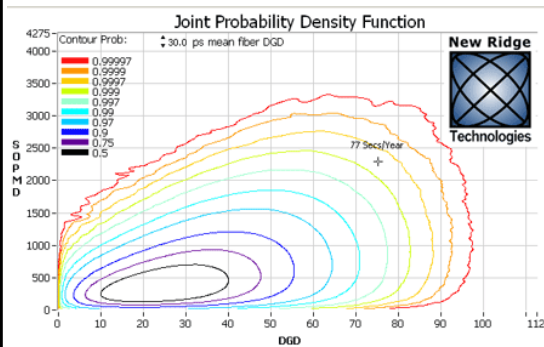
Exploit your PMDS's potential

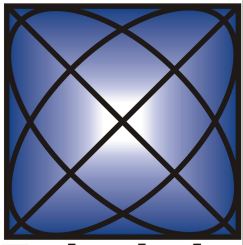
Increase your Efficiency & Productivity,  
Decrease your Lab & Data Analysis Time

More Quantitative Results

Expand your Evaluation Capabilities and  
Maximize your output.

Compatible with All NRTs PMDSs





### NRT-OPC: Outage Probability Calculator

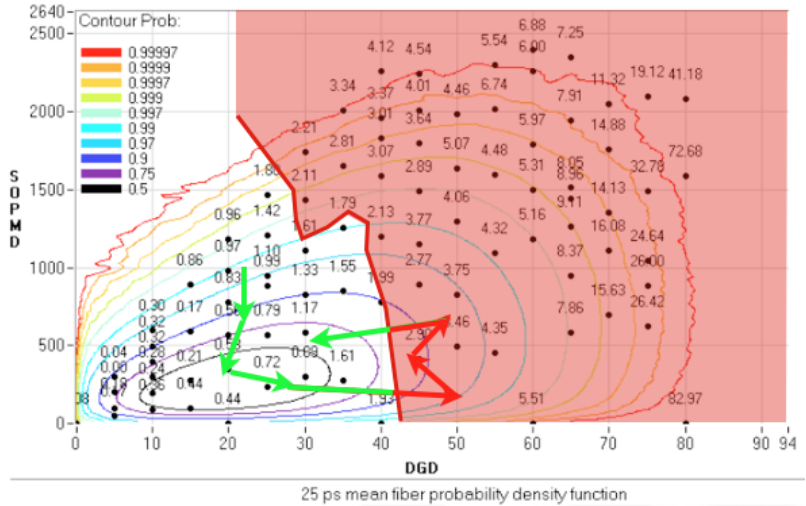
NRT's Outage Probability Calculator (NRT-OPC) *eliminates* the complicated statistical confusion associated with interpreting PMD test results; reducing all the information to straightforward quantities understandable by engineers, technicians and managers.

This powerful tool combines:

1. Measurement results from PMDS in the form (DGD, 2<sup>nd</sup>-order PMD, Penalty)
2. PMD dynamics corresponding to a mean fiber PMD,  $\langle\tau\rangle$
3. Allowable system PMD margin.

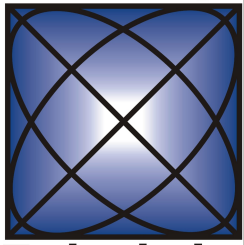
The OPC is calculated by applying our PMD random-walk model, for a fiber with PMD  $\langle\tau\rangle$ , to the PMDS-measured transponder tolerance data. Each time the random walk enters the region beyond the PMD margin an outage is started (red arrows). The calculation simulates over 1,000,000 PMD steps (>100 years of PMD dynamics) to calculate:

1. Total Outage Probability (time/year)
2. Mean number of PMD Outages/year
3. PMD Outage Duration (statistics)
4. Time between PMD Outages (statistics)



### Key Applications & Benefits

- Simple, straightforward quantities for the performance degradation for any fiber  $\langle\tau\rangle$ .
- Quantitatively optimize PMD mitigation or EDC algorithm.
- Compare PMD tolerance of different modulation formats.
- Take the system data once, and use the NRT-OPC to calculate performance in any situation.
- Enables route engineering & span design for carriers.
- Enables system design by the equipment manufacturers by adjusting the allowable margins for each wavelength channel.



### NRT-LVD: LabView™ Drivers

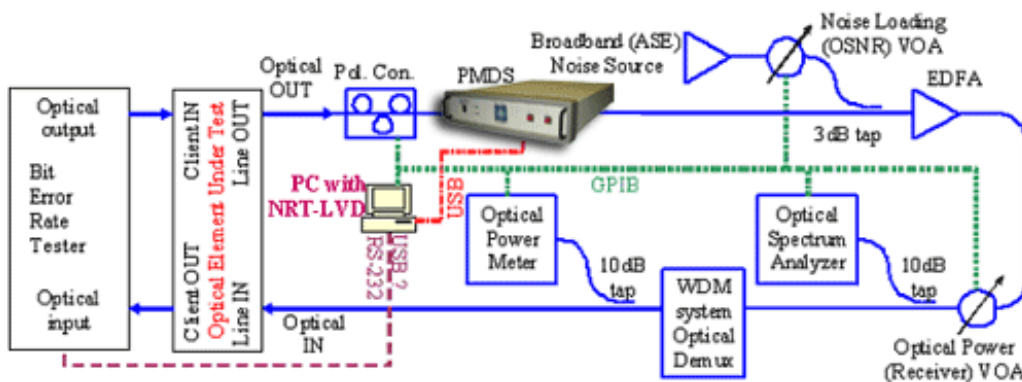
NRT offers drivers (and dlls) to control the NRT-PMDSs via LabView™ or any major lab automation software tool.

There are two drivers in the set:

1. **NRT PMDS Calibrate.vi**; calibrates the PMDS to the user-input transponder wavelength;
2. **NRT PMDS Set PMD.vi**; changes the PMDS state to the user-input DGD and SOPMD values. These states can be read from a data file having a column for DGD and a second column for SOPMD.

Three steps to integration

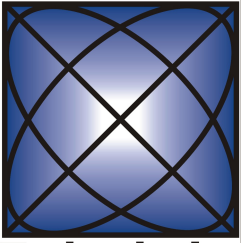
1. Integrate the PMDS with your present automated BER test set up.
2. Create an array of PMD states (DGD, 2<sup>nd</sup>-order PMD) to be measured.
3. The PMDS will go to each state in order, allowing the measurement of system penalty.



Alternatively, dlls can be provided for testbed automation without LabView™.

### Key Benefits

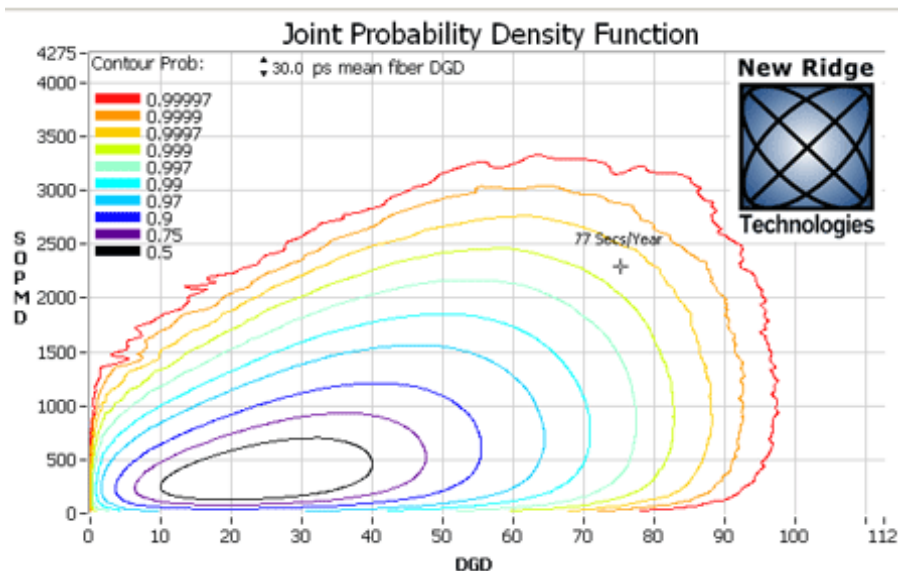
- Integrates the NRT-PMDS with other LabView™ measurement drivers in an automated test lab
- Automatic testing of multiple, user determined, PMDS states
- No hand of holding long monotonous experiments.
- Saves time!



## NRT-JPDFC: Joint Probability Density Function Calculator

NRT's Joint Probability Density Function Calculator (NRT-JPDFC) generates a topographical contour map of the PMD probability in 2-D PMD space, namely SOPMD vs. DGD. Each generated contour on the graph shows the probability of the PMD state to be found within the contour. Hence the 50% contour (black innermost contour) shows the PMD states where the fiber will be half of the time. The red outermost contour designates the PMD region 99.997% of the time. Using the cursor, the time spent at any PMD state can be determined.

The JPDF is calculated by simply entering the mean fiber PMD,  $\langle \tau \rangle$



## Key Features & Benefits

- Determine important PMD regions for measurements
- Time per year given for any point on the JPDF
- Great graphical tool to display measurement results
- Gives insight into what PMD regions contribute to the Total Outage Probability.
- Calculates JPDF for any mean PMD value.

New Ridge Technologies, the worldwide leader in PMD tolerance testing

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