OSA20 – Passive component testing (PCT) mode

quick reference guide



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EXFO

Introduction

The reliability and proper functioning of optical networks can be guaranteed by characterizing the passive components in their topology. This type of measurements has, therefore, become a day-to-day practice in laboratory and manufacturing environments. Moreover, this is a growing trend with the incorporation of photonic integrated circuits (PIC) in transceivers, modulators, filters, MUX, sensors and so forth.

Among the different methods to assess the insertion loss of passive components, one of the most straightforward but efficient solution is to test with an optical spectrum analyzer (OSA). The advantages and limitations of this technique have been widely detailed in EXFO's application note entitled "Assessing passive components using a CT440 or an OSA20".

The OSA20's **passive component testing mode or PCT mode** enables the measurement and calculation of the transfer function in passive components. This quick reference guide outlines the measurement step by step.

Launching PCT mode

The PCT mode is launched from the main menu as follows:

Optical Spectrum Analyzer

Image: Component Tester

System

System

Remote

Callbration

Scan settings and analysis setup

It is recommended to define the scan settings (e.g., wavelength range, sensitivity) and analysis setup before running a test.



Figure 2. Analysis setup menu.

The PCT mode involves two steps in the characterization of a passive component (see figure below). In the current example, the device under test (DUT) is given by a bandpass filter for which the insertion loss is measured and analyzed.



Step 2. Test of Device Under Test

Figure 3. Typical setup for using the PCT mode in OSA20.

Test and analysis of passive components

The measurement starts by acquiring the reference trace, which corresponds to the signal coming from the broadband source. So, on the right-hand side menu of the GUI, the "*In*" trace is recorded as "*Live*" and is displayed by clicking the button "*ON*", as shown below:



Figure 4. Measuring the reference signal (light source).

 IN
 ON

 Store
 ON

 OUT
 OFF

 ASE in
 OFF

 ASE out
 OFF

After the acquisition, the reference trace is "Stored" to proceed to the next measurement.

Figure 5. Storing the reference signal.

A second scan is then performed to record the spectrum when the DUT is connected to the initial setup.



Figure 6. Scanning when the DUT is present in the experimental setup.

The transfer function of DUT, given by the difference of the reference signal (*REF Store*) and the spectrum of the DUT (*DUT Store*), is calculated by enabling the "*TRANS Calc*". The analysis results are immediately displayed in the chart under the plot, as can be seen in the following figure.



Figure 7. Displaying the transfer function (green trace).

P	CT Analysis Setu	o Trig	gers Help					EXFO	
Start: Stop:	1546.000 nm Center: 1554.000 nm Span:	1550.000 nm 8.000 nm	Sensitivity: High (0.5 nm/s) Resolution: Native	M	ode: Single art: Manual	Progress: 100 % Scan: 1 / 1	3% < Scan		ican
~	Dec 5 - 14:20:03						<	An	Auto
	Pass Band Test Results (Noise Limited)		Spectral Width 1 Results		Spectral Width 2 Results				
	In-Band Results		λ _{peak} (nm):	1550.0320	λ _{mean} (nm):	1550.0082			
	Avg Loss (dB):	3.31	Level _{peak} (dB):	-3.30	Levelmean (dB):	-3.30	<	REF	ON
	Ripple (dB):	0.04	λ _{mean} (nm):	1550.0082	Δλ@1.00dB (nm): 0.4615		Store	$ \rightarrow $
	Slope (dB/nm):	-0.0333	Level _{mean} (dB):	-3.30	Spectral Width 2	Pasulta	<	DUT	ON
	Out-Band Side 1 Results		Δλ@3.00dB (nm):	0.5007) (am)	1650.0099		-	
	Avg Loss (dB):	49.65	March Tarak Danada		Amean (nm).	1550.0089	<	Calc	ON
	Ripple (dB):	22.91	Mask lest Results		Levelmean (dB):	-3.30		MSKI	
	CrossTalk (dB):	46.36	TRANS Between Masks:	No Masks	DA@20.00dB (nr	n): 0.6075	<	None	OFF
	RollOff@3.00dB (dB/nm):	152.317						MSKL	0
	RollOff _{max} (dB/nm):	484.860					<	None	OFF
	λ@RollOff _{max} (nm):	1549.7080							
	Transition Band (nm):	0.0501							
	Out-Band Side 2 Results								
	Avg Loss (dB):	47.79							
	Ripple (dB):	22.65							
	CrossTalk (dB):	44.67							
	RollOff@3.00dB (dB/nm):	-151.073						Clas	
	RollOff _{max} (dB/nm):	-482.969						Clean	
	λ@RollOff _{max} (nm):	1550.3101						ad	Save
	Transition Band (nm):	0.0520							
								m	dBm
•								습	

Figure 8. Maximizing the analysis results chart.

SUMMARY

The OSA20's **PCT mode** tests passive components with elegance and simplicity. This document shows how straightforward it is to take the measurement. Please bear in mind, however, that the example given here represents the typical application. It is highly recommended to read the User manual for further details concerning the scan settings and analysis setup.

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