



FTE-8000-DWDM Optical Spectrum Analyzer and FTE-8000-CWDM Channel Analyzer Users Guide

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Chapter 1 Using This Manual

This Manual contains information for the FTE-8000-C, FTE-8000-L (FTE-8000-DWDM Units) and FTE-8000-CWDM. References to FTE-8000 pertain to the entire family, FTE-8000-DWDM or FTE-8000-CWDM will be noted if the information is pertains to only those models.

There are warnings, cautions and notes annotated through this manual.

Warning

A warning alerts to situations that could cause personal injury.

Caution

A caution alerts to situations that may cause damage to the equipment or produce poor testing conditions resulting in inaccurate test results.

Note

A special annotation that will assist the user with operational features.

Chapter 3 of this manual is a quick start guide. Prior to using the quick start guide or operating the equipment in any way, it is highly suggested the user reads all safety information.

This product has been designed and tested in accordance with the Manufacturer's safety standards, and has been supplied in a safe condition.

This document contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition. Failure to follow these safety warnings, can result in damage to the instrument or harm to the user.

Warning

Personnel should always be aware when working with fiber optic test equipment that active fibers may be present and therefore infrared optical energy may be present.

Warning

Never look directly into the end of a connected fiber optic cable or fiber optic adapter of test equipment, to do so could expose the user to laser radiation and could result in severe personal injury.

Warning

To Prevent Fire or Shock Hazard:

- Do not install battery types other than those specified by the manufacturer
- Do not use the charger without the batteries installed
- Do not expose the battery charger to rain or excessive moisture
- Do not use the AC adapter when there are signs of damage to the enclosure or cord
- Ensure that you are using the correct charger for the local line voltage
- Do not use any other charger than the one provided with this instrument.

Failure to follow these cautions statements may void the warranty of this equipment.

Caution

Fiber-optic connectors are easily contaminated or damaged. The connection to the FTE-8000 is a physical contact type of connection and dirty or damaged connectors may impair the instruments capabilities at minimum and at worst result in the need to return the FTE-8000 to the factory for expensive repairs. Prior to making any connection to the unit, ensure that all proper cleaning procedures have been followed. Use UPC Finish Connectors Only!

Caution

The FTE-8000-DWDM has two ports, a low power and high power port. The low power port is designed for maximum power of -10dBm per channel and a maximum composite power of +22dBm. The high power port is designed for a maximum of +10dBm per channel and a maximum composite power of +29dBm. If unsure of the power level, it is best to start in high power mode and use the designated high power port. Please refer to section 8.2 of this manual for instructions on setting the power level.

Caution

The FTE-8000-CWDM maximum power per channel is +5dBm and the Maximum Composite power is +23dBm. Attempting to test greater power levels will cause damage to this instrument.

3.1 FTE-8000-DWDM Quick Start Guide

Press  to turn on the FTE-8000.

The Switch Port dialog will be displayed, it indicates the current power setting.

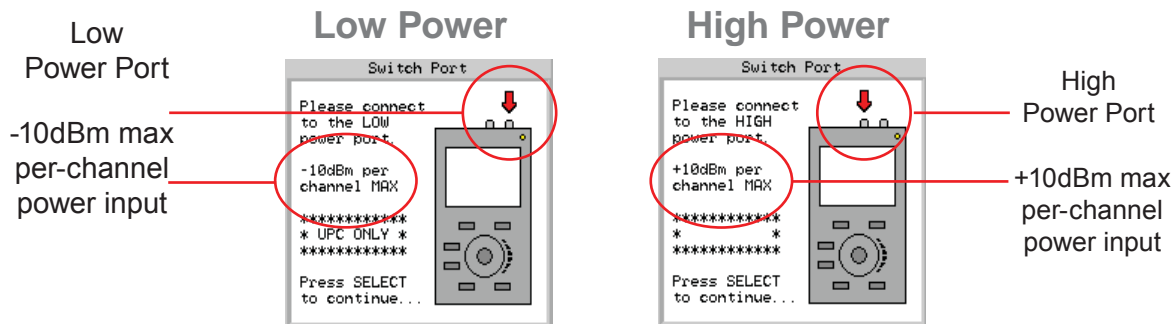













Fig 3.1



If the desired power level is indicated, press the  button to clear the dialog box. Using UPC connectors only, connect the fiber to be tested to the port shown and press the  button to start a scan.

If the desired power level is not indicated, press the  button to clear the dialog box, press the  button and use the scroll wheel to highlight the  icon. Press the  button, the Switch Port dialog will be displayed to indicate the proper port, press  again to clear the dialog box. Using UPC connectors only, connect the fiber to be tested to the port shown and press the  button to start a scan.


Note


There is an activity indicator in the bottom left of the display, (see figure.8.3) the scan can not be started until the indicator turns from yellow (warm-up) to red (ready). If the Scan button is pressed while the indicator is yellow, the scan will start immediately upon completion of the warm-up period. When the indicator is red, the unit is ready to scan, to start scanning, press the Scan button.

The number of channels displayed may be limited by using the Span Start , Span End  or Span Zoom  features. These features are fully described in section 8.4 of this manual.

The channels displayed may also be limited by power level, using the Scale Minimum Power  or Auto Span Minimum power  features. These features are fully described in section 8.5 of this manual.




3.2 FTE-8000-CWDM Quick Start Guide

Press  to turn on the FTE-8000-CWDM.

Using UPC finish connectors only, connect the fiber to be tested to the port shown and press the  button to start a scan.

Note

There is an activity indicator in the bottom left of the display, (see figure.8.3) When the indicator is red, the unit is ready to scan, to start scanning, press the Scan button. When the Channel Analyzer is scanning, the activity indicator will be green

The number of channels displayed may be limited by using the Span Start , Span End  or Span Zoom  features. These features are fully described in section 8.4 of this manual.

Note

Scale Minimum Power and Span Minimum power are not applicable on the FTE-8000-CWDM Channel Analyzer.

Chapter 4 Introduction

The Terahertz Technologies FTE-8000 Series Hand Held Optical Spectrum Analyzers offer full featured analysis of DWDM and CWDM systems in a truly portable package. DWDM Optical levels in the C-band (1530-1561nm) and L-band (1574-1608nm) may be measured with a resolution of 0.01nm, and measurement levels range from +10 to -50dBm. Parameter settings to optimize the resolution, number of channels, or power levels displayed allow for easy and accurate analysis of DWDM scans. Channel spacing may be set at 50 or 100 GHz with standard models up to 82 Channels on the ITU Grid. The FTE-8000-CWDM Channel Analyzer spans 1271-1611nm and displays the 18 channels of ITU G.694.2. These Optical Spectrum/Channel Analyzers have super fast acquisition time of two scans per second. The information may be viewed in graph mode or table mode with a pass/fail feature on the 4 inch color TFT Display. The FTE-8000 is designed with solid state optics and no fragile or moving parts to keep the unit field friendly. There is storage for up to 1000 tests and the test may be viewed and printed with the Windows™ compatible CertSoft certification software for fast and easy reporting. These units are housed in a rugged metal enclosure with robust protective boot. These units are designed for field use and are extremely user friendly.

Chapter 5 Preparation For Use

5.3 Inspection

Before shipment, this instrument was inspected and found to be in perfect working order and free of defects.

The shipping carton contains the following:

1. Hand Held Optical Spectrum Analyzer, with protective boot and 8-AA NiMH batteries installed
2. Universal AC/DC charger with interchangeable mains
3. USB cable
4. CD with Windows™ compatible software and user's manual
5. Hard copy manual
6. Set of interchangeable adapters, SC and FC, for each OSA port.

5.2 Identification and Configuration

The instrument's Model/Part Number, Serial Number and Date of Manufacture are indicated on a label located on the bottom plate of the unit. The instrument's history is filed at the factory by model/part number and serial number.



Fig 5.1

5.3 Power Requirements

The FTE-8000 is equipped with a 100-240V-0.4A input and 13.6V, 0.75A, center positive output universal AC/DC battery charger. This charger is supplied with interchangeable mains for US, Great Britain, Europe and Australia. The unit is shipped with 8-AA NiMH batteries (2700mA hours). Depending on usage, fully charged battery pack will typically enable approximately 8 hrs. of use. Fully discharged batteries require 6 - 8 hours of recharging.

Battery replacement is not recommended; however, if you must replace the batteries, follow this procedure. Unplug external power supply and ensure the unit is turned off. Carefully remove unit from protective boot and remove the two screws from top plate and bottom plates that retain the back cover. Carefully remove back cover and remove the two screws that hold the battery covers in place. Replace only with 8 high quality AA NiMH batteries. Do not use batteries that are rated at less than 2500mAh. If you install NiMH batteries that are dead or less than 1 volt each, charge these batteries for one (1) hour before using the unit. For maintenance, batteries require a monthly periodic recharge.

Warning

To Prevent Fire or Shock Hazard:

- Do not install battery types other than those specified by the manufacturer
- Do not use the charger without the batteries installed
- Do not expose the battery charger to rain or excessive moisture
- Do not use the AC adapter when there are signs of damage to the enclosure or cord
- Ensure that you are using the correct charger for the local line voltage
- Do not use any other charger than the one provided with this instrument.

Failure to follow these caution statements may void the warranty of this equipment.

Chapter 6 Description

Instrument Enclosure

The Optical Spectrum Analyzer is packaged in a rugged aluminum housing which is further protected with a rubberized boot. Although the front panel is weather resistant, care must be taken to avoid liquids and contaminants around the fragile optical and electrical connectors, and the glass display. Use a mild cleaning agent and damp soft cloth to clean up the panels and the outside case. See the maintenance section to clean the optical connector. NEVER open the instrument for cleaning. Return to the factory for servicing if necessary.

6.1 Physical

Front Panel

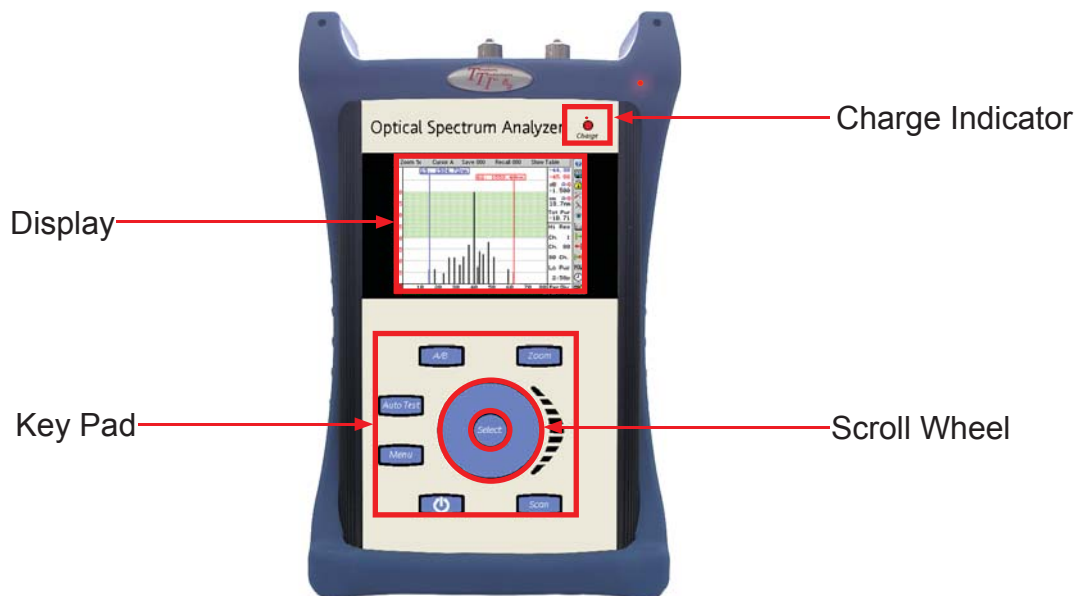


Fig 6.1

Top Plate

High Power Input
(FTE-8000-DWDM and FTE-8000-CWDM)



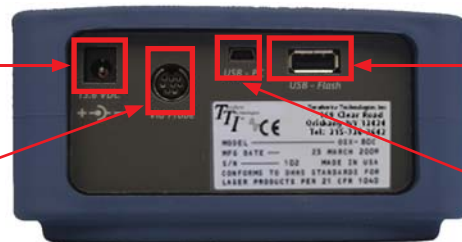
Low Power Input -10dBm
(FTE-8000-DWDM) only

Fig 6.2

Bottom Plate

Power Jack

Video Probe Port



USB Flash

USB PC

Fig 6.3

6.2 Display

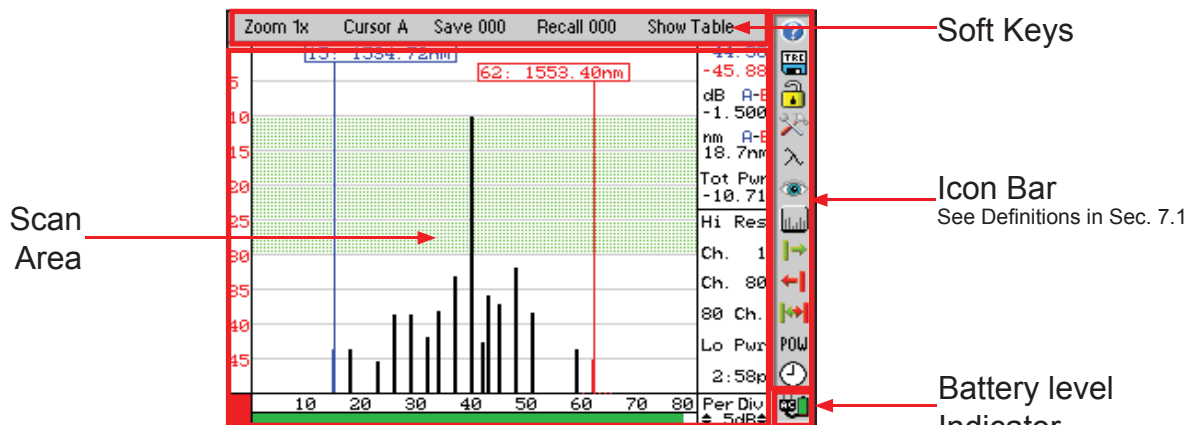






Fig 6.4











Chapter 7 Features and Preferences

7.1 Icon Definitions









The list below and on the next page contain the icons found on the FTE-8000 units. They control features and functions, and allow the user to set testing parameters. This table gives the name and a brief explanation of each. More detailed explanations will be found in later sections of this chapter and in chapters to follow.

	Help Feature	Accesses the Optical Spectrum Analyzer's onboard help feature
	File Management	Used to enter the File Management
	Cursor Lock	Toggles the locking of the "B" cursor to the "A" cursor
	Tool Box	The Tool Box contains equipment features, and operational parameters that are seldom changed

Toolbox items

	Back Light	Toggles on and off the back light
	Speaker	Toggles on and off the speaker
	Power Save	Toggle on and off the battery save feature that allows for maximum utilization of the battery life
	Baud Rate	Sets a ComPort speed for communication with a computer
	Scale Min	Adjust the minimum dBm value shown on the graph screen
	Auto Span Min	For use with the Autotest feature. Sets the required power level for a channel to be included in the span when the Auto Test button is pressed.
	Screen Shot	Used to take Screen Shot of the display and send the image to the USB flash drive
	Date/Time	Used to set the time/date
	Pass Area Max.	Used to set the Maximum dBm value for passing channels
	Pass Area Min.	Used to set the Minimum dBm value for passing channels

7.1 Icon Definitions Continued

	Lambda	Switches the displayed measurements to wavelength or frequency. When in wavelength the channel numbers displayed at the cursors, X axis of the grid and at the Span Start and Span End are 1 - 82 and when in frequency mode the channels displayed at the cursor and the X axis of the grid are the ITU grid channels
	View	Cycles between the measurement modes of Total Power, and Power Tilt / Gain Tilt.
	Resolution	Toggles between low and high resolution. The resolution on the FTE-8000-CWDM is set at 20nm spacing
	Span Start	Sets the first channel to be displayed
	Span End	Sets the last channel to be displayed
	Span Zoom	Zooms in or out around the active cursor
	Power	Switches the instrument between low power and high power input mode Note: Power adjustment is only applicable on the FTE-8000-DWDM units.
	Video Scope	Pressing select on this icon will start the Video Scope Feature

7.2 Feature Description and Operation

Battery Level/Power Indicator

The bottom right hand corner of the screen shows the battery level indicator. In the final hour of operation the battery will change to red. A warning indicator will sound a few minutes before the instrument automatically turns off. An AC plug will be displayed next to the indicator bar if the unit is operating with the AC power supply/charger.

Note

Ensure the unit is turned off before plugging or unplugging the AC power supply/charger.

Help

The Optical Spectrum Analyzer has an onboard help feature. To access the help feature, press the Menu button, use the scroll wheel to highlight the help icon, and press Select to display the help menu. Scroll to the desired topic and press Select to access the help information. Use the scroll wheel to move down the help page. Press the Menu button again to exit the help feature.

Tool Box

The Tool Box contains features, and operational parameters that are seldom changed. To access the Tool Box press the Menu button and scroll to the Tool Box icon. Once the icon is blinking, press the Select button and scroll to the desired icon. Pressing the Menu button will exit the Tool Box as long as no feature in the Tool Box is active.

Screen Shot

The FTE-8000 is equipped with a Screen Shot feature. A Bitmap image of the screen can be stored directly to the USB flash drive with a file name of hhmss.bmp, where H = hour, M = minute and S = second. To Use the this feature, ensure a flash drive is inserted in the Flash Drive Port, press the Menu button, Scroll to the Tools Menu and press the Select button. Scroll to the Camera Icon and press Select. The display will show progress by the inverse color pattern progressing from bottom to top on the screen. The screen shot download is complete when the display returns to the normal color scheme. Do Not Remove USB Flash Drive While Accessing.

Note

Do not remove USB flash drive while accessing.

USB Flash Drive

Located on the bottom panel is the USB Flash Drive port. Scan file and Scope files may be downloaded the external memory device. Screen Shots are downloaded directly to the USB flash drive.

Note

Flash drives of 4 GB or less are supported.

USB/PC

Located on the bottom panel is the USB/PC port which may be used to connect the Optical Spectrum Analyzer to a computer to download stored data for analysis with the supplied Windows™ compatible software.

7.3 User Preference Settings

Baud Rate

The Baud rate is set to auto detect for use with the software. If it is necessary to make an adjustment to the Baud rate, press the Menu button to enter the menu mode, scroll to the Tool Box icon, press Select and use the scroll wheel to highlight the Baud Rate icon. Press Select, use the scroll wheel to make a selection, press Select again and the unit will exit to the menu mode and return to the main screen.

Back Light

To set the Back Light press the Menu button to enter the menu mode, scroll to the Tool Box icon, press Select and use the scroll wheel to highlight the Backlight icon, press the Select button to toggle the back light to Bright or Dim. The status is displayed at the top of the display. Press the Menu button to exit the Tools Box.

Sound

To toggle the speaker on or off, press the Menu button to enter the menu mode, scroll to the Tool Box icon, press Select and scroll to the Speaker icon, press the Select button to toggle the speaker on and off. The status is displayed at the top of the display. Press the Menu button to exit the Tools Box.

Power Save

To toggle on and off the Power Save feature, press the Menu button to enter the menu mode, scroll to the Tool Box icon, press Select, scroll to the Power Save icon, and press the Select button to toggle the Power Save on and off. The status is displayed at the top of the display. Press the Menu button to exit the Tools menu. When power save is active, the instrument will automatically turn off after 15 minutes of non use.

Set Date and time

The FTE-8000 applies a time/date stamp to the saved Scans. The date is configured MM/DD/YY and the time is a 24 hour format set in the eastern time zone. To change the data and time, Press the Menu button to enter the menu mode, scroll to the Clock icon and press the Select button. The dialog box with the settings will be displayed. Use the scroll wheel to change each segment, use the Select button to move between segments, and to Save/Redo/Cancel. Use the scroll wheel to select Save, Redo or Cancel then press the Select button again to complete setting the date and time. This setting has a memory of approximately one month of no instrument activity. To recharge the memory, turn the instrument on for 5 minutes per month or during the monthly battery charge if the unit is not used for a long period.

8.1 Key Pad Operation



Power button turns the unit On and Off.
(Hold for 1 second)



the table of data.



AutoTest button is used to automatically isolate the channels that are above the threshold that is set in the tools menu with the Auto Span Minimum icon. Pressing this AutoTest will automatically zoom in and set the Span Start, to the first channel that meets the minimum and Span End to the last channel that meets the minimum.



Menu toggles the focus of the Scroll Wheel between the Scan Mode and the Menu Mode. In Scan mode the focus of the Scroll Wheel and the Select Button are on the active cursor. In Menu Mode, the Scroll Wheel moves through the Soft Key Menu and the Side Icon Bar.



Toggles between "A" and "B" as the active cursors.



Zoom increases the vertical scale at increments of 1x, 2x, 4x, 8x and 16x, with the active cursor channel centered vertically.



In Test Mode the Select button will move the "Active" cursor to the next channel. While in Menu Mode the Select button actuates the highlighted item.



Scan button starts or stop a scan, and resets

8.2 FTE-8000 Operation

Warning

Care should be taken as skin or eye damage could result from high power devices such as transmitters or EDFAs.

Caution

The FTE-8000-DWDM have two ports, a low power and high power port. The low power port is designed for maximum power of -10dBm per channel and a maximum composite power of +22dBm. The high power port is designed for a maximum of +10dBm per channel and a maximum composite power of +29dBm. If unsure of the power level, it is best to start in hi power mode. For more information, please refer to the Power Level paragraph in this section of the User's Guide.

Caution

The FTE-8000-CWDM is designed to test a maximum power per channel of +5dBm and total power of 23dBm. Attempting to test a total power above 23dBm will cause damage to this instrument.

Caution

Fiber-optic connectors are easily contaminated or damaged. The connection to the FTE-8000 is a physical contact type of connection and dirty or damaged connectors may impair the instruments capabilities at minimum and at worst result in the need to return the FTE-8000 to the factory for expensive repairs. Prior to making any connection to the unit, ensure that all proper cleaning procedures have been followed. Use UPC Finish Connectors Only!

FTE-8000-DWDM Power Level

The FTE-8000-DWDM has two ports, a low power and high power port. The low power port is designed for maximum power of -10dBm per channel and a maximum composite power of +22dBm. The high power port is designed for a maximum of +10dBm per channel and a maximum composite power of +29dBm. Upon starting the FTE-8000-DWDM, the Switch Port dialog will be displayed and it indicates the power setting. If the desired power level is indicated, connect the fiber under test to the port shown and press the Select button to clear the dialog box. If the wrong power level is indicated Press the Select button to clear the dialog box, press the Menu button and use the scroll wheel to highlight the Power icon in the lower right portion of the display. (Immediately above the clock) Press the Select button and the Switch Port dialog box will be displayed to show the change in power level and which fiber port should be used. Press the Select button again to clear the dialog and the Menu button to exit the menu mode to complete the action.

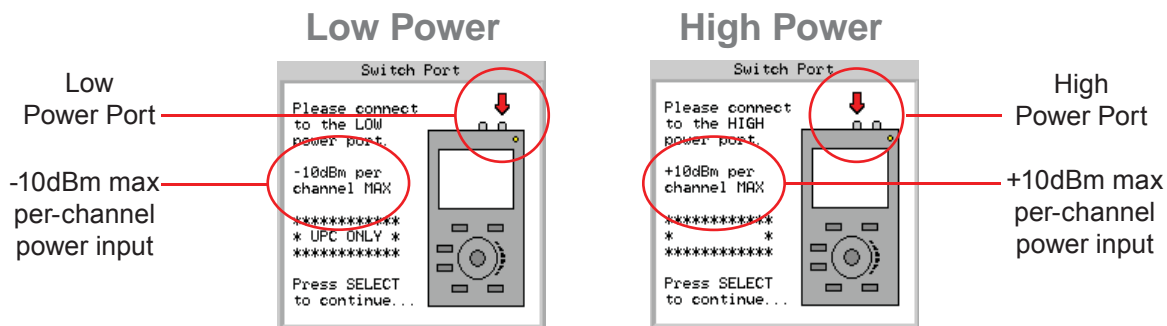


Fig 8.2

Warm-up

There is a warm-up stage for the FTE-8000-DWDM. The yellow indicator in the bottom left corner of the display indicates a wait stage. When the indicator turns red the unit is ready to scan and a green indicator show the unit is scanning.

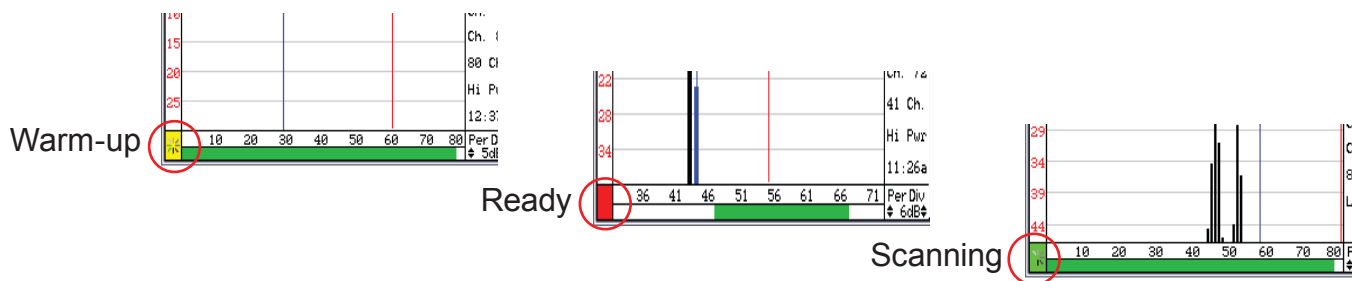


Fig 8.3

Scan

To start the scan process, press the Scan button. If the Scan button is pressed during the warm-up period, the unit will start scanning immediately after warm-up and the activity indicator will change to green which indicates the unit is scanning. To stop the scanning process, press the scan button a second time and the unit will go into ready mode and show a red activity indicator.

8.3 Scan Mode Display

Basic Scan Mode Display

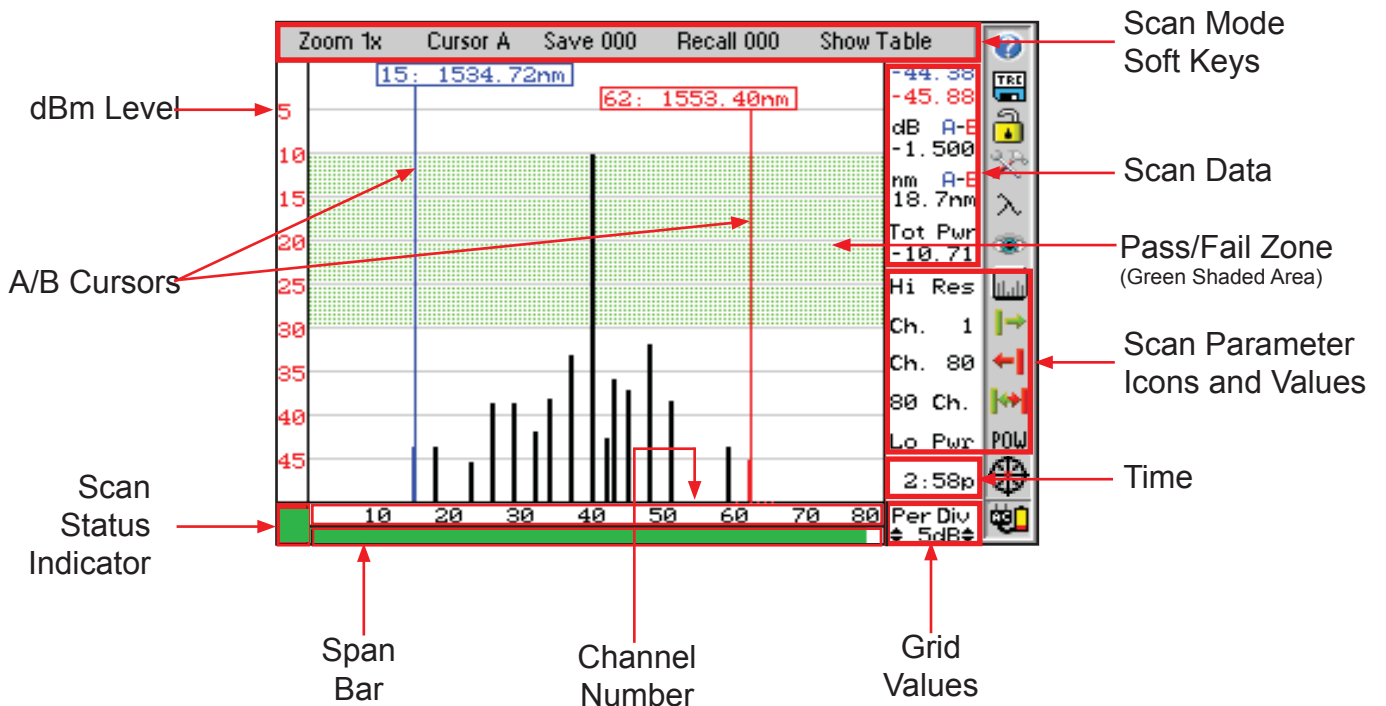


Fig 8.4

FTE-8000-DWDM Scan Parameters

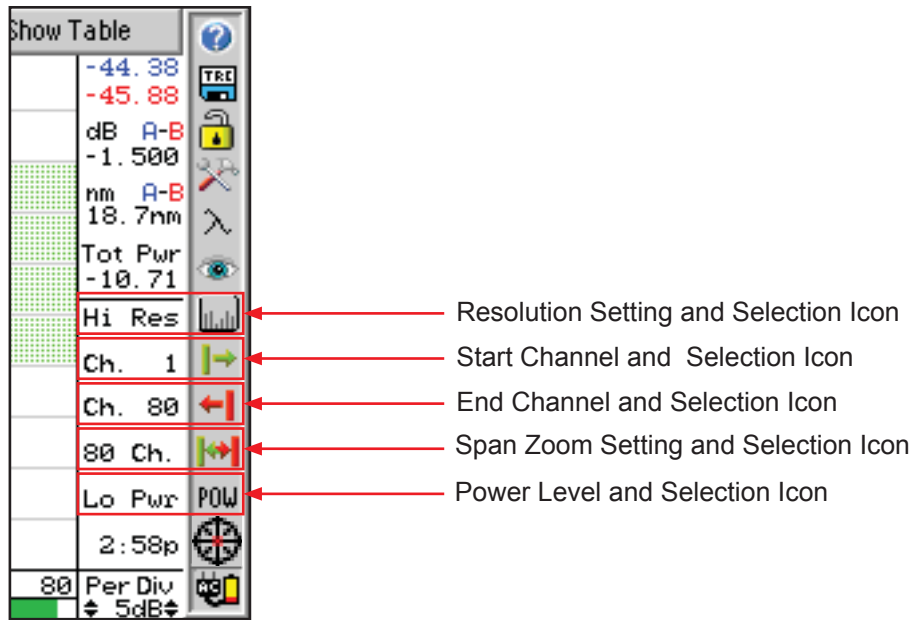


Fig 8.5

FTE-8000-CWDM Scan Parameters

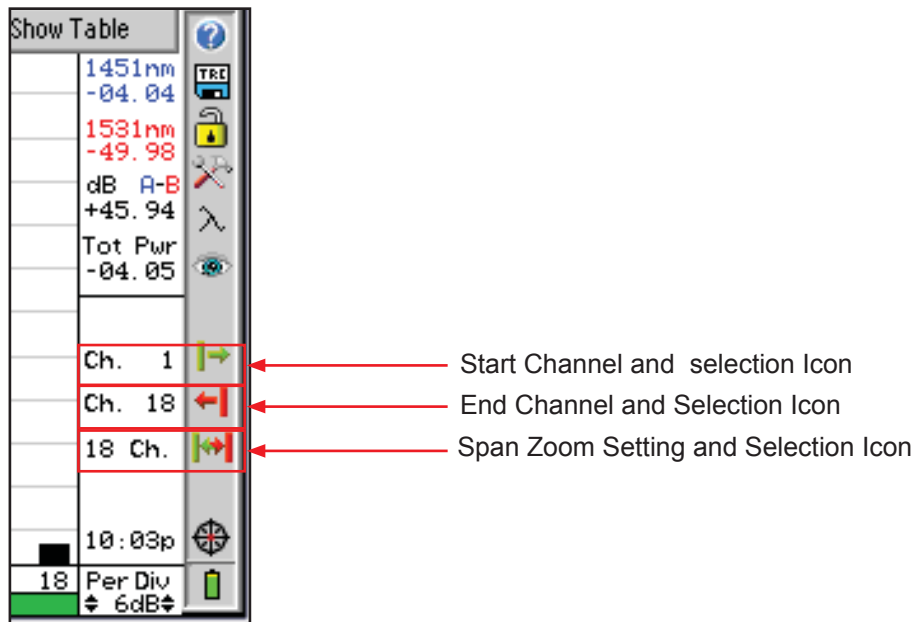


Fig 8.6

FTE-8000-DWDM Scan Measurements

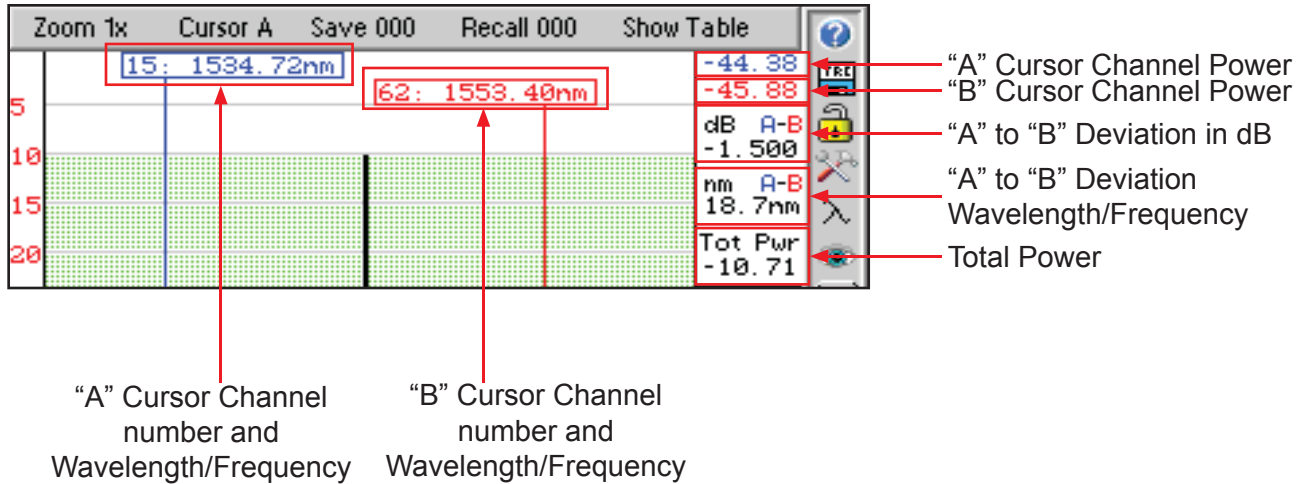


Fig 8.7

FTE-8000-CWDM Measurements

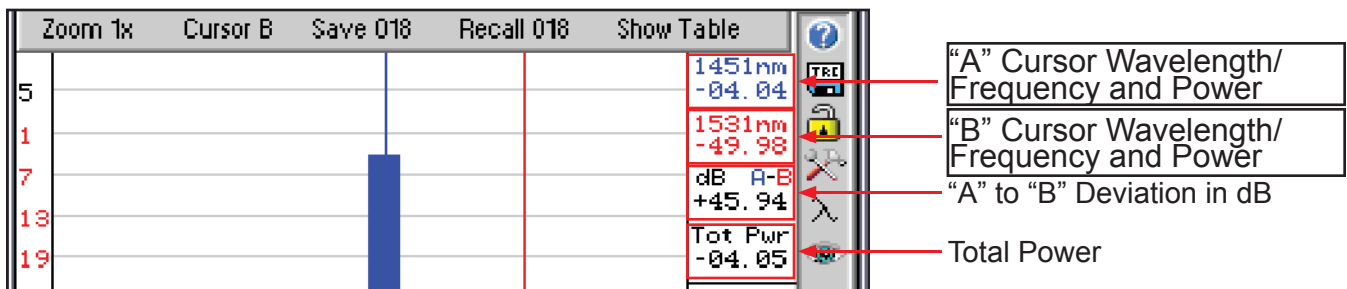


Fig 8.8

Scan Mode Soft Keys

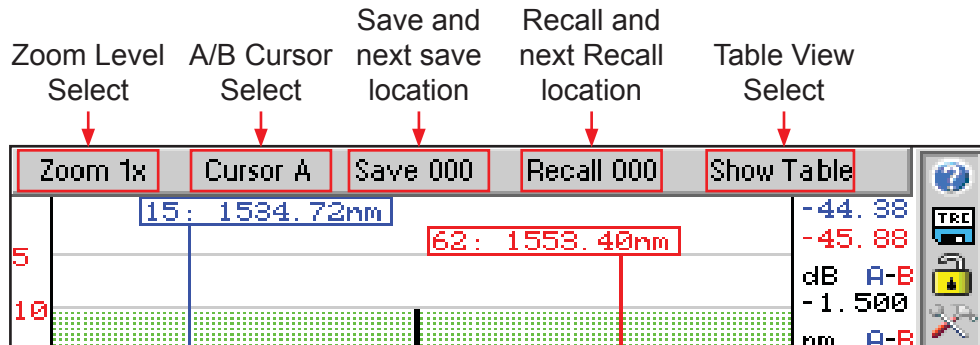


Fig 8.9

8.4 Setting Pass/Fail Thresholds

FTE-8000-DWDM

The Green area on the Scan screen represents the Pass/Fail zone and will reflect any changes made to the thresholds on the table screen. This is also

FTE-8000-CWDM

The thresholds for the CWDM pass/fail feature are set in the table mode.

8.4 Optimizing a Scan

Unit of Measure

The units of measure are wavelength or frequency. The Lambda icon is used to change the unit of measure between nanometers or terahertz. This will change the A-B span measurement to the left of the λ icon and the measurements displayed at the top of each cursor. To change the unit of measure, enter the menu mode by pressing the Menu button and scrolling to the Lambda icon. Once highlighted, pressing the Select button will toggle between nanometers or terahertz. Press the Menu button again to return to the Scan Mode.

Setting Scale limits (FTE-8000 DWDM)

The Scale Minimum Power icon allows you to adjust the minimum dBm value shown on the graph and table screens. Values from -30dBm to -60dBm (low power mode) are supported. In high power mode the minimum scale value is adjusted accordingly, preserving the calibrated offset between low and high power input modes (approximately 20dBm). Therefore the minimum value of the graph in high power mode will be approximately 20dBm higher than the minimum value in low power mode. To set the Scale press the Menu button, scroll to the Tool Icon, press Select and scroll to the Scale icon. Press Select, then the setting will be displayed at the top of the screen and the icon will stop flashing. Use the Scroll wheel to change the setting. Press Select again and the icon will flash, pressing the menu button will return to the main screen.

Setting Auto Span Min (Auto Test) (FTE-8000 DWDM)

For use with the Auto Test feature, the auto span minimum power setting determines the required power level for a channel to be included in the span of channels when the Auto Test button is pressed. Auto span sets the beginning of the span to the first channel that meets this value and the end of the span to the last channel that meets this value. To set the Auto Span Min. value press the Menu button and scroll to the Tool Icon. Press Select and scroll to highlight the Auto Span Min. icon, press Select and a dialogue box is display with the current value. Use the Scroll Wheel to change the setting. Press Select again and the display will return to the tool box list. Pressing menu again will return to the main screen.

Note

When setting Span Start, Span End and Span Zoom features in the wavelength mode, the channel number are 1 - 82 at high resolution and 1 - 41 at low resolution along the X axis of the grid, at the cursors and for the channel numbers indicated adjacent to the associated icons. When setting these feature in the Frequency mode, the channel are 60.5 - 20.0 (50 GHz spacing) at high resolution and 60.0 - 20.0 (100GHz spacing) at low resolution as associated with the ITU grid. The Channel indicated adjacent to the associated icons remain 1 - 82 at high resolution and 1 - 41 at low resolution. This is for the "C" band only. The "L" Band channel numbers are only arbitrarily labeled 1-82.

Setting Span Start

The Span Start feature allows the user to set the first channel to be displayed. To set the Span Start, press the Menu button and scroll to highlight Span Start icon. Press the Select button and use the Scroll Wheel to change the starting channel, press the Select button a second time to turn off the function. Press the Menu button to return to the cursor mode. Using this in combination with the span end function allows the user to set the instrument to display only the channels of interest. Making changes with the span start function will position the cursors to the first and last channels on the display.

Setting Span End

The Span End feature allows the user to set the last channel to be displayed. To set the Span End, press the Menu button and scroll to highlight the Span End icon. Press the Select button and use the Scroll Wheel to change the ending channel, press the Select button a second time to turn off the function. Press the Menu button to return to the cursor mode. Using this in combination with the span start function allows the user to set the instrument to display only the channels of interest. Making changes with the span end function will position the cursors to the first and last channels on the display.

Setting Span Zoom

The Span Zoom feature allows the user to zoom into or out of the active cursor horizontally. Press the Menu button and scroll to highlight the Span Zoom icon. Press the Select button and then advance the scroll wheel clockwise to zoom in or counter clockwise to zoom out of the selected cursor. Zooming in will automatically and simultaneously adjust both the span beginning and span ending channels to center and zoom into the channel selected by the active cursor. Press the Select button again to exit this function.

Resolution

The FTE-8000-DWDM has low and high resolution setting. Low resolution uses 100ghz channel spacing to display 41 channels while high resolution uses 50GHz channel spacing to display 82 channels in the same range. To change the resolution, press the Menu button and scroll to the Resolution icon, press the Select button to toggle between low and hi resolution. Press the Menu button again to return to the scan mode. The resolution of the FTE-8000-CWDM is set at 20nm channel spacing.

8.5 Working with FTE-8000 Scan

Once a Scan has been optimized by setting the desired parameters it may be necessary to maneuver within the scan to gain the information required. There are a number of features to accomplish this.

Cursor Movement and Cursor Lock

The “A” and “B” cursors are moved with the scroll wheel while in scan mode. There are two methods to switch between active cursors, first is the soft key at the top of the display. To use this method, enter the menu mode and scroll to highlight the Cursor soft key. Pressing the Select button will toggle the focus from one cursor to the other. Press the Menu button again to exit the menu mode. A faster method is to use the A/B button to quickly toggle between the two cursors.

The Cursors may be locked at a specified distance by using the Cursor Lock function. The cursor lock icon toggles the locking of the “B” cursor to the “A” cursor. When locked, moving the “A” cursor results in the same movement of the “B” cursor, maintaining the channel spacing between them. The “B” cursor may be moved independently from the “A” cursor in order to set new spacing between the two cursors. When the cursors are not locked they both moved independently. To lock the cursors, press the Menu button, scroll to highlight the Cursor Lock icon, and press Select to toggle the lock on and off. Press the Menu button again to exit the menu mode.

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The cursor position is indicated at the top of each cursor line in a callout box that moves with the cursor. The first number is the channel and the second is the wavelength/frequency depending on the unit of measure. The power level of the displayed channel is shown in the top right corner of the display in blue for the “A” cursor and red for the “B” cursor. Channel spacing between the two cursors are also displayed and labeled with either THz or nm, depending on the selected unit of measure. Just below the power reading for the cursors is the deviation between the power levels of the channels represented by the two cursors. Total power is displayed at the bottom of the Measurements area of the display. Refer to Figure 8.7.

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The wavelength/frequency and power level is shown at the top right corner of the display in blue for the “A” cursor and red for the “B” cursor. Just below the power reading for the cursors is the deviation between the power levels of the channels selected by the cursors and below that is the total power measurement. Refer to Figure 8.8.

Zoom

Vertically zooming in on a scan may be accomplished in two manners. The first is to enter the menu mode, scroll to the Zoom soft key and press Select to cycle through the five zoom levels. The second is to simply press the Zoom button on the front panel. Zooming in vertically reduces the dBm scale and centers it on the peak of the channel selected by the active cursor.

Total Power, Power Tilt and Gain Tilt are three measurements functions controlled by the View Icon and displayed directly to the left of the power measurement.

Total Power

Total power is the power that is present on the fiber. The total power measurement is displayed in dBm. This is the default power measurement on the OSA

Power Tilt

Power Tilt, is displayed as a linear regression line overlaid on the graph and the slope of that line represents a power per channel deviation in dB. This reading only factors in the channels that are greater than the minimum power level of the scale. To display Power Tilt, press the Menu button, scroll to the View icon, and press select to toggle between Total Power and Power Tilt. Press the Menu button again to return focus to the scan.

Gain Tilt

Gain Tilt shows a liner regression analysis of change in power between the overlapping channels of two scans being compared. This is also represented by a power per channel deviation in dB. Gain Tilt will only be available if there are two scans displayed on the screen. Display Gain Tilt in the same manner as Power Tilt. The display changes to Gain Tilt when two scans are being viewed in the Power/Gain Tilt mode.

There are two methods to display two scans for a Gain Tilt comparison:

The first method use a scan that is being acquired using the Scan button. While scanning enter the menu mode and scroll to the File Management icon. Scroll to highlight the scan to be used as the secondary scan, (see File Management in chapter 10 for information on file storage and other file management topics) press the Menu button, scroll to the Dual soft key and press Select. The FTE-8000 will revert to the scan mode with the selected (secondary) scan displayed in gray behind the active scan. Gain Tilt only measures those channels that meet the minimum value of the displayed scale.

The second method to measure gain tilt is to use two scans from memory. Open a saved scan, (see File Management in chapter 10 for information on file storage and other file management topics) return to file management and open a Dual scan as instructed above. The scan opened with the Dual soft key will be the secondary scan.

Auto Test

The Auto Test feature allows for a quick/automatic view of the scan while zooming in around a desired power level. To set the power level, enter the menu mode, scroll to the Tool Box and press the Select button. Scroll to and select the Auto Span icon. Use the scroll wheel to set the minimum power level. Press the Select button and then the Menu button to exit the tool box. Pressing the Auto Test button will now zoom in horizontally to display all the channels that fall between the first and last channels that meet the established minimum power. To zoom back out, press the Autotest button again.

Quick Save/Recall

A scan may easily be stored to memory by using the Save soft key. To do this, enter the menu mode, scroll to the Save soft key and press the Select button. The scan will be saved to the location indicated. If that storage position is full, a dialog will be displayed with the options of overwriting the file, storing to the next available location or canceling the command. Use the scroll wheel to highlight the desired action and press Select. The action will be complete and the display will return to the scan mode.

Any file saved with this method will use the base file name of the last manually entered file and increments the suffix by one.

To use the quick Recall feature, enter the menu mode and scroll to the Recall soft key. Pressing the Select button will recall the scan stored in the indicated storage location. Continued selecting of recall will cycle through any stored scans and when the last stored scan is reached, continued selection will start back at the first occupied storage location. Press the Menu button to return to the scan mode.

Chapter 9 Data Table

The table Mode displays each channel and its current power. To display the table, enter the menu mode, scroll to the Show Table soft key and press Select.

9.1 DWDM Table Display

The table of the current scan will be displayed in real-time with the “A” and “B” cursors positions represented in blue and red respectively. The maximum, minimum or average powers for the channel highlighted with the active cursor is available at the top of the display. To view these readings, enter the menu mode, scroll to the Min., Max., Avg. - key and press select to toggle through the measurements. To toggle between the “A” and “B” cursors, use the soft key at the top of the display or use the A/B button on the keypad.

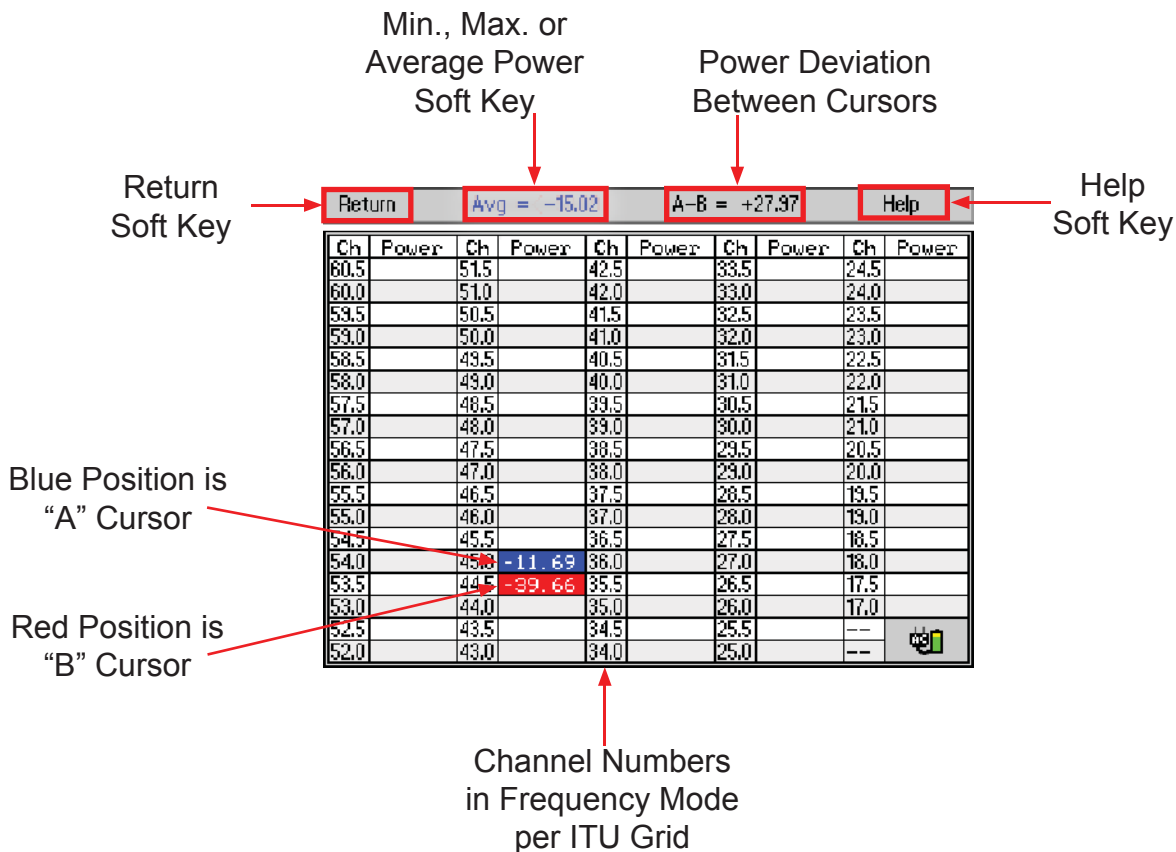


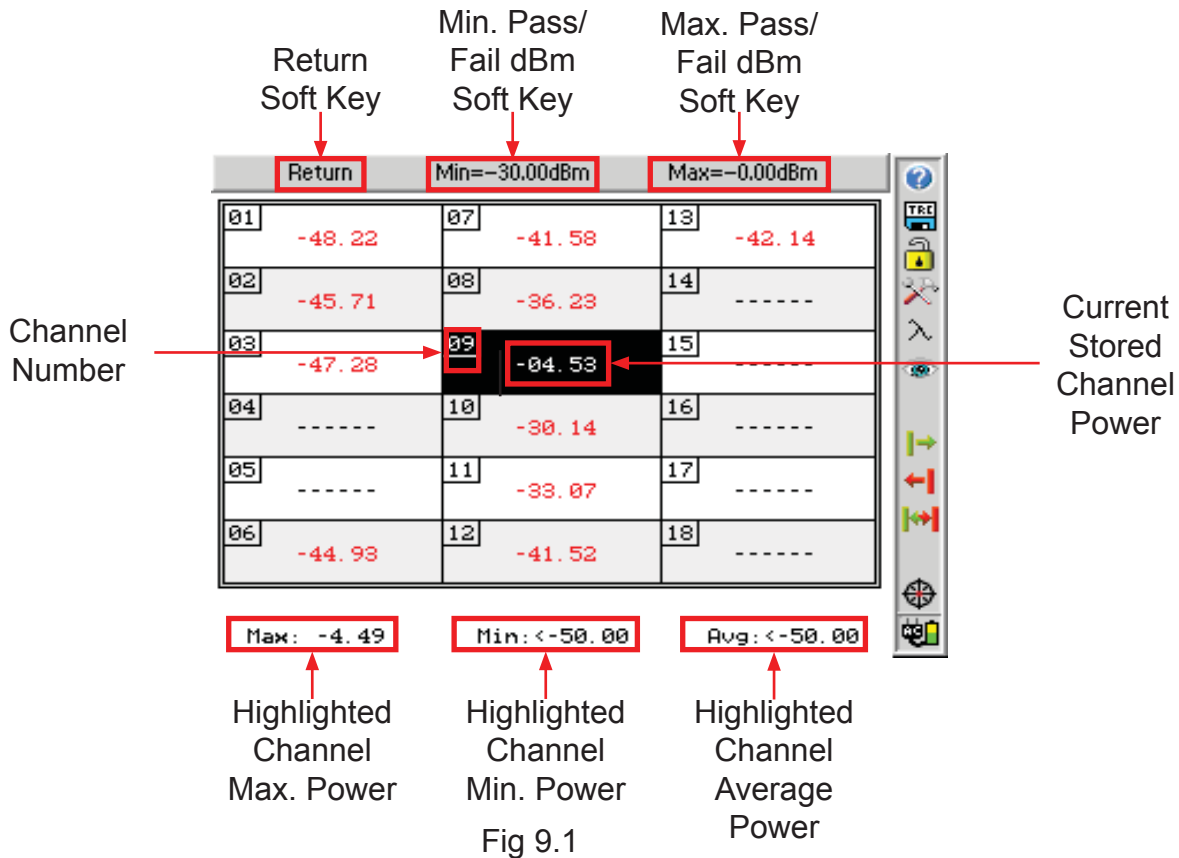
Fig 9.1

Note

The channel numbers on the table, while in wavelength mode are assigned as 1-82, with 1529.24nm being channel one and 1561.41nm being channel 82 as a standard.

9.1 CWDM Table Display

When the table mode is enter, the scan is stopped and the data displayed is the accumulated data from the scan or stored scan if the scan is recalled from memory. The maximum, minimum or average powers for the high-lighted channel are listed along the bottom of the display.



9.2 CWDM Pass/Fail Thresholds

The Green area on the Scan screen represents the Pass/Fail zone and will reflect any changes made to the thresholds on the table screen. Failed measurements are displayed in red text on the table. All other channels that indicate a value meet the thresholds. To set these thresholds, once in the table screen, enter the menu mode, scroll to highlight the Min soft Key, press the Select button and use the scroll wheel to set the minimum dBm threshold. Pressing the Select button again will disengage the soft key and it is then possible to scroll to the maximum threshold setting. Press the Select button, scroll to set the maximum threshold, and press Select again to disengage. Exit the menu mode and use the scroll wheel to move through the table.

Exit Table Screen

To exit the table screen enter the menu mode, scroll to the Return soft key and press select.

Chapter 10 File Management

The OSA has the capability to store up to 1000 scans. Once stored, these files may be copied to a PC via a USB cable or copied to a USB flash drive. To enter file management, press the Menu button, scroll to the File Management icon and press the select button. The files are listed in order of file storage position with an xxxxxxxx.OSA (8.3) naming convention. Use the Scroll Wheel to move from one stored scan to another. As a file is highlighted the time and date stamp are displayed with total and peak power information and the number of channels measured. There is also a preview map of the scan displayed.

10.1 File Management Display

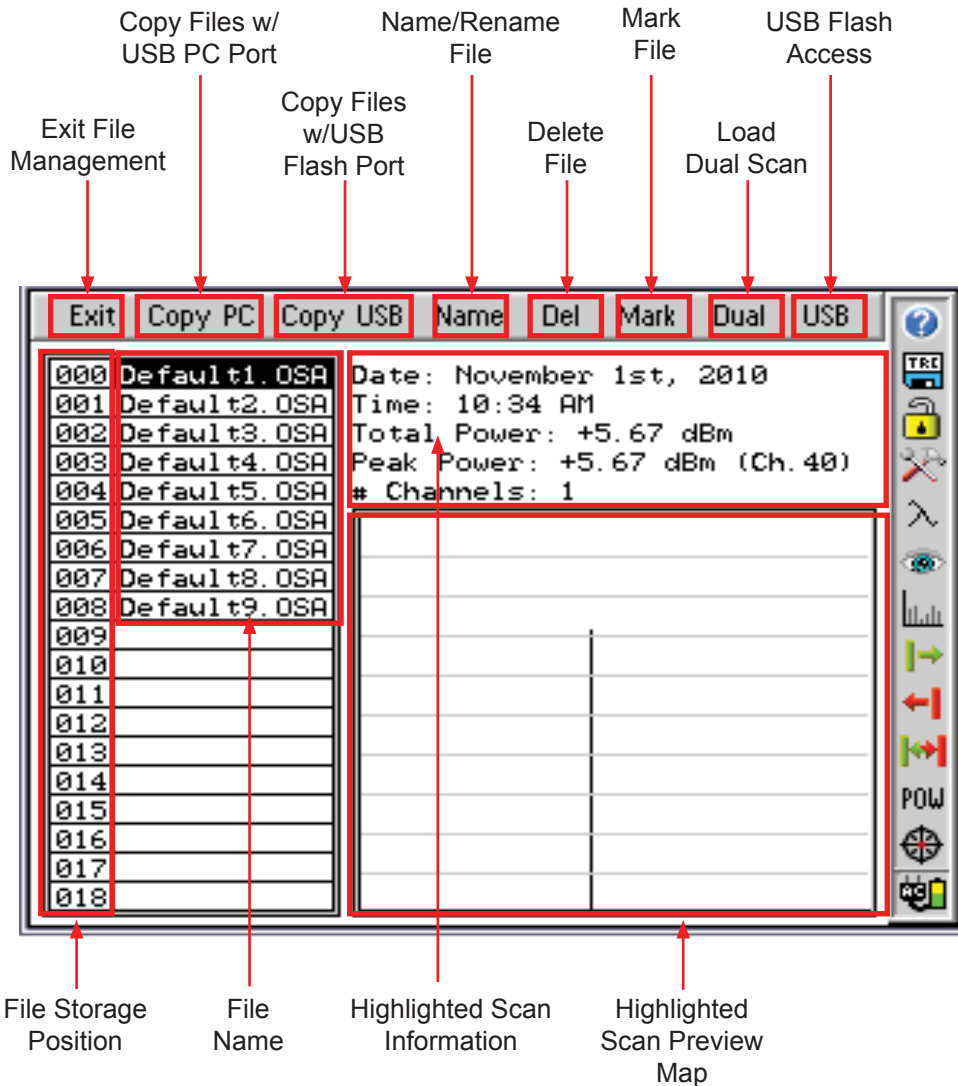


Fig 10.1

10.2 Viewing a Store Scan

Viewing a Stored Scan

To view a scan that has been stored in the file management area, press the select button while the desired file is highlighted and the file will open in the scan mode.

10.3 File Management Soft Key Functions

Exit File Management

There are two methods to return to the scan screen from the file management area. First is to enter the menu mode, scroll to the Exit soft key and press select. The second is to press select while a file is highlighted, this will open the scan screen with the highlighted file displayed.

Copying Files to a Personal Computer

With the use of the supplied certification software and USB cable the stored files may be copied directly to a PC. Highlight or Mark (see Marking Files on the next page) the desired file/s to be copied and scroll to the Copy PC soft key. Press Select to move the files to the computer when directed to do so in the certification software.

Copying Files to Flash Drive

To Copy files to a flash drive, insert a flash drive (not to exceed 4Gbits in capacity) into the flash drive port. Highlight or Mark (see Marking Files on the next page) the desired file/s to be copied and scroll to the Copy USB soft key. Press Select to copy the files to the root directory of the flash drive.

Naming a File

The Name soft key may be used to name a file for a new scan to be saved or to rename a currently stored file. Files stored with the Save soft key will take the base name of the last named file. To start a new set of scans with a new base file name, enter the menu mode while the first scan is displayed. Scroll to the desired storage location for the first scan of the project. Press the Menu button, scroll to the Name soft key and press Select. The storage location will display a black box with a .OSA extension. Use the Scroll Wheel to cycle through the available characters. The available characters are (space), 0-9, A-Z and a-z. Press Select to enter the character and move to the next character. Once the desired file name is in place, press the Menu button and "Save Changes or Discard Changes" will be displayed in the soft key bar. Scroll to highlight Save Changes and press the Select button to complete the action.

Note

The file name is formatted as xxxxxxxx.OSA (8.3) style. The file storage system uses the eighth, seventh then the sixth position to make the file name unique with an identifier digit. Therefore depending on how many files need to be saved for the group of test, it may be best to only use 5, 6 or 7 characters for the file name. For example: If a file name of bbbbbb.OSA was give to the first scan, when the following scans are saved they will be named; bbbbbb0.OSA , bbbbbb1.OSA, bbbbbb2.OSA and so on. In this case if there were more then eleven scans, the next name would be bbbbbb10.OSA. The name would be adjusted to accommodate the two digit identifier. With the storage capability of up to 1000 scans, the identifier could possibly use up to three positions. It is suggested that this be taken into consideration when creating the base file name.

Renaming a File

To rename a file, highlight the file to be renamed, press the Menu button and scroll to the Name soft key. Press select and the first character of the file name will be highlighted. Continue to name the file as described earlier, press menu when done to either save changes or discard changes.

Deleting Files

To delete files, Highlight the file or Mark files (see Marking Files below) to be deleted. Press the Menu button and scroll to the Del soft key. Press select and “Cancel or Confirm” delete will be displayed in the soft key bar. Use the scroll wheel to highlight the desired action and press Select.

Marking Files

Mass Copying and deleting can be accomplished with the Mark soft Key. Highlight the first file to be copied or deleted, press the Menu button, scroll to the Mark soft key and press Select. Use the scroll wheel to move through the files. Moving clockwise marks any files that are passed and move counter clockwise un-marks any files that are passed. Marked files will be displayed in red. Press the menu button again and select the desired soft key function to be completed.

Displaying Dual Scans

Dual Scan Is used in conjunction with Gain Tilt, described earlier in section 8.6.

Viewing Scans from a USB Flash Drive

The FTE-8000 can view files from a USB Flash drive. Insert the USB Flash drive into the proper port and enter the menu mode. Scroll to highlight the USB soft key and press the Select button. The FTE-8000 will read any .OSA files in the root directory of the flash drive. Highlight the file to be viewed and press the Select button. To exit the flash drive directory, press the Select button a second time while the USB soft key is highlighted and the focus will revert back to the on board file management system.

11.1 Battery Replacement

Battery replacement is not recommended; however, if you must replace the batteries, follow this procedure. Unplug external power supply and ensure the unit is turned off. Carefully remove unit from protective boot and remove the two screws from top plate and bottom plates that retain the back cover. Carefully remove back cover and remove the two screws that hold the battery covers in place. Replace only with 8 high quality AA NiMH batteries. Do not use batteries that are rated at less the 2500mAh. If you install NiMH batteries that are dead or less than 1 volt each, charge these batteries for one (1) hour before using this unit.

Warning

To Prevent Fire or Shock Hazard:

- Do not install battery types other than those specified by the manufacturer
- Do not use the charger without the batteries installed
- Do not expose the battery charger to rain or excessive moisture
- Do not use the AC adapter when there are signs of damage to the enclosure or cord
- Ensure that you are using the correct charger for the local line voltage
- Do not use any other charger than the one provided with this instrument.

Failure to follow these caution statements may void the warranty of this equipment.

Note

For maintenance, batteries require a monthly recharge.

11.2 Calibration and Verification

Periodic verification of the FTE-8000 is recommended to ensure that your instrument remains within specification. Although not imperative, we recommend a calibration and verification once a year to make certain the instrument is functioning properly and performing to its rated specifications. Consult the factory for service.

11.3 FTE-8000 Adapter Replacement

The FTE-8000 is supplied with two easily interchangeable adapters per port, SC/FC. To change an adapter, remove the two screws that hold the adapter in place, pull the adapter straight up from ferrule. It is suggested that you clean the exposed ferrule with appropriate cleanser and lint free wipe anytime you replace the ferrule.

Note

In order to maintain a low loss fiber connection, care should be taken to adequately clean the ferrule of any connector to be connected to the OSA. In the event that the port needs to be cleaned, first step is to be certain the instrument is off. We suggest the use of isopropyl alcohol and foam swabs specifically designed for cleaning connectors accepting 2.5mm ferrules.

Note

When replacing the adapter with one that does not have a chained protective cap, use the small screw in place of the larger screw that retains the end of the chain to the adapter base.

Chapter 12 Specifications

FTE-8000 Specifications:		
	FTE-8000C & FTE-8000L	FTE-8000CWDM
Wavelength Range	C-Band 1530 -1561nm (196.0 THz - 192.0THz) L-Band 1574-1608nm (190.5 THz - 186.3 THz)	1271-1611nm
Channel Spacing	50GHz, 100GHz	20nm
Wavelength Accuracy	±0.1nm	N/A
Channel λ Accuracy	N/A	1.0nm
Channel Pass Band	N/A	±6.5nm
Channel Power Range	+10dBm to -50dBm	+5dBm to -50dBm
Absolute Accuracy	±1 dB	±1 dB
Max Composite Power	Low Power +22dBm High Power +29dBm	+23dBm
PDL	±0.15dB	±0.2dB
Optical Rejection Ratio	40dBc (@50GHz)	N/A
Adjacent Channel Isolation	N/A	30dB
Measurement Time	< 1/2 Second	< 1/2 Second
Readout Resolution	0.01dB	0.01dB
Return Loss	>40dB	>40dB
General		
Optical Interface	Universal UPC (FC/SC)	
Graphical Display	Bar Graph and Table View	
Display	4 in Color TFT	
Dimensions	7.75 x 4.5 x 2.25 inches	
Weight	2 lbs	
Battery	Rechargeable NiMH - 8 hours operating time	
Power	100-240 universal US, GB, EU, AU Mains	
Environmental	Operation -10°C to 50°C	
Accessories Included	Universal power supply with mains for US, UK, CE and AU. Interchangeable FC and SC adapters, Window's™ compatible software, USB cable, manual on CD and rubber boot	

Specifications are subject to change without notice

Chapter 13 Warranty and Repair

13.1 Warranty Information

This product, including all mechanical, electrical, and optical parts and assemblies are unconditionally warranted to be free of defects in workmanship and material for a period of one (1) year from the date of delivery.

This warranty does not apply to expendable parts such as batteries or optical panel connectors, nor to any instrument or component which has been subjected to misuse, alteration, or fiber connector damage. It is the customer's responsibility to understand all the instructions and specifications prior to operating this instrument. This warranty does not extend to any loss or damage consequent to the failure of the warranted product.

13.2 Repair Information

If repair is required, simply call the factory for return instructions and a RMA number.

Chapter 14 Troubleshooting Guide

Symptom	Possible Cause	Solution
LCD dark	Power not on	Press ON/OFF key
	Batteries require recharging	Recharge batteries
	Batteries are missing, in backwards or need replacement	Check polarity, replace batteries, or contact factory for servicing
LCD white	Power cycled too quickly	Turn off wait 10 seconds – turn on
Instrument locked Up	Unexpected Operational Mode	Turn off (hold ON/OFF button in for 1 second) wait 10 seconds – then depress On/Off again button to turn the unit on.
Activity indicator does not change to standby or active mode	Power cycled too quickly	Turn off wait 10 seconds – turn on
Low or no power being displayed	Defective cord or dirty connector	Replace or clean cord
	Fiber Output port requires cleaning	Clean and inspect port
	Angle polish mated with UPC polish	Examine connector ends for damage. Use UPC Connectors ONLY!
USB hookup to PC not functioning properly	USB baud rate not set properly or too quick for computer	Set port baud rate properly or decrease Baud rate in instrument and certification software
	PC drivers not set properly	Un-install & re-install certification software and drivers
USB Flash Driver not functioning properly	USB flash drive full	Clean or use a new flash drive
	USB flash driver cycled too quickly	Turn power off wait 5 seconds turn back on

Chapter 15 Version Control

Through a program of continuous improvement, we upgrade the features and performance of the instrument in an on going process. The instrument firmware version is accessible at “turn-on” on the bottom right-hand corner of the display. The version changes and approximate release dates are as follows.

FTE-8000

V1.0 – 11/2009 - Original release - Requires version 1.0 software

FTE-8000

V1.1a – 04/2012 - Update table to real-time with active “A” and “B” cursors.

FTE-8000-CWDM

V1.0 – 08/2010 - Original release - Requires version 1.2 software

FTE-8000-CWDM

V1.2 – 08/2010 - Minor update no operational changes may use new CertSoft Software Suite v1.0.3