



FX180X/FX182

Optical Channel Checker

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1.0 General Information

This user manual is suitable for novice, intermediate, and experienced users and is intended to help use the features and capabilities of VeEX products successfully. It is assumed that the user has basic computer experience and skills, and is familiar with telecommunication and other concepts related to VeEX product usage, terminology, and safety.

Every effort was made to ensure that the information contained in this user manual is accurate. Information is subject to change without notice and we accept no responsibility for any errors or omissions. In case of discrepancy, the web version takes precedence over any printed literature. The content in this manual may vary from the software version installed in the unit. For condition of use and permission to use these materials for publication in other than the English language, contact VeEX, Inc.

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1.1 Customer Support

For more technical resources, visit www.veexinc.com.

For assistance or questions related to the use of this product, call or e-mail our customer care department for customer support. Before contacting our customer care department, have the product model, serial number, and software version ready. Please locate the serial number on the back of the chassis. Please provide this number when contacting VeEX, Inc. customer care.

Support hours may vary depending on the product.

Product Technical Support

Support is generally available 8:00 AM to 8:00 PM, Eastern Standard Time, Monday to Friday.

Phone: +1 510 651 0500

E-mail: customercare@veexinc.com

MPA Product Technical Support

Support is generally available 8:30 AM to 5:30 PM, Eastern Standard Time, Monday to Friday.

Phone: +1 877 929 4357

International: +1 727 475 1206

E-mail: serviceandsupport@veexinc.com

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1.2 Warranty

For warranty information on VeEX products, go to <https://www.veexinc.com/Support/Warranty>.

To activate the warranty, please register your product at <https://www.veexinc.com/Support/ProductRegistration>.

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1.3 Patent Information

VeEX product hardware and software may be protected by one or more patents on file with the United States Patent Office.

1.4 Documentation Conventions

Icons used in this manual:

	Marks a helpful tip (action or method), which can save time and improve usability of the product.
	Provides important information needed to use this product and avoid missteps.
	Cautions against an action or inactivity, which can hinder productivity.
	Strongly warns against a condition, an action, or inactivity which can lead to a health hazard, injury, equipment damage, data loss, and/or financial losses.
	Stop and read before continuing.

2.0 Safety Information



Safety precautions should be observed during all phases of operation of this instrument. The instrument has been designed to ensure safe operation however please observe all safety markings and instructions. Do not operate the instrument in the presence of flammable gases or fumes or any other combustible environment. VeEX Inc. assumes no liability for the customer's failure to comply with safety precautions and requirements.

Optical Connectors

The test sets display a laser warning icon when the laser source is active to alert the user about a potentially dangerous situation. It is recommended to:

1. Deactivate the laser before connecting or disconnecting optical cables or patchcords.
2. Never look directly into an optical patchcord or an optical connector interface (SFP+) while the laser is enabled. Even though optical transceivers are typically fitted with Class 1 lasers, which are considered eye safe, optical radiation for an extended period can cause irreparable damage to the eyes.
3. Never use a fiber microscope to check the optical connectors when the laser source is active.

Lithium Polymer Battery Precautions

LiPO batteries are intended to be used with compatible VeEX products only. Any damaged caused by misuse or modifications will void the warranty and can cause serious injury.

The test set unit's battery pack is also fitted with a safety connector to prevent accidental short circuits and reverse polarity.

General Safety Guidelines

- NEVER use any other charger (e.g., for NiCd, NiMH, or Li-ion) other than the one supplied by VeEX to charge the Li-Po batteries in this product. Only use chargers designed for Lithium Polymer (Li-Po) batteries.
- NEVER attempt to service or remove the battery from this product.
- NEVER let the battery's positive and negative leads to touch. This can cause the battery to short and lead to a FIRE. If for any reason you need to cut the terminal wires, it will be necessary to cut each wire SEPARATELY, to make sure the wires do NOT touch each other.
- NEVER charge a swollen or ballooned battery (even if swollen upon purchase). Continuing to charge a battery that has begun to swell will result in a fire. Follow these steps:
 - STOP the charging process and disconnect battery immediately
 - Disconnect battery from the device immediately.
 - Place it in an open non-flammable area.
 - Watch it for approx. 30 minutes from a safe distance.
 - Follow proper procedure to dispose of battery, according to local laws or ordinances.
- After impact, drop or high shock, check the product for dents, punctures or cracks on its back. Do not leave the product unattended while charging, after a high impact event.

Lithium Polymer Battery Handling & Storage Advice

- Keep LiPo battery packs out of reach of children or pets.
- ALWAYS store equipment containing Li-Po batteries in cool, dry places between 40-80° F (below 0C or above 50C).
- Do not put battery packs in pockets or bags where they can short circuit.
- Do not store or transport batteries where they can come into contact with sharp or metallic objects.
- The speed at which a LiPo battery ages during storage is based on both storage temperature and state of charge. For

optimum battery life always store your LiPo's partially charged at room temperature. This will maintain their performance levels over time and there's no need to cycle them unless stored for periods longer than 3-6 months.

- Never store a RC LiPo in a hot car fully charged for an extended period of time, this will cause damage.
- When storing batteries for extended periods, store at a half charged state.

Electrical Connectors

Telephone lines may carry dangerous voltages. Always connect the electrical test ports to known test interfaces which carry low level signals.

ESD: Electrostatic Discharge Sensitive Equipment

Test modules could be affected by electrostatic discharge. To minimize the risk of damage when replacing or handling test modules, make sure to follow proper ESD procedures and dissipate any electrostatic charge from your body and tools and the use proper grounding gear.



- Perform all work at a workplace that is protected against electrostatic build-up and discharging.
- Never touch any exposed contacts, printed circuit boards or electronic components.
- Always store test modules in ESD protected packaging.
- Wear ESD protection and grounding gear when:
 - Inserting, extracting, or handling test modules.
 - Inserting or removing SFPs, XFPs, QSFPs, or CFPs from the platform.
 - Connecting or disconnecting cables from modules or platform.

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3.0 FX180X/FX182 Introduction

The FX182 optical channel checker is a rugged, hand held, easy-to use measurement tool for applications that utilize WDM technology. It can measure the individual peak power level and frequency of all 18 CWDM channels as defined by the ITU-T G.694.2 wavelength grid and all 100GHz C-L band DWDM channels as defined by ITU-T G.694.1 within 3 seconds. The test set can simultaneously display all channels results in a tiles, bar, or table format.

3.1 Highlights

- Compact, hand-held field test unit with color touch-screen for easy viewing, fast navigation, and easy operation
- Internal 16G data storage
- Generate and save test results in HTML file format
- Micro-USB OTG interface for flash drives, fiber inspection probe connection and test data transfer
- Rechargeable Lithium Polymer battery with >9 hours continuous operation, which features a capacity indicator, low voltage alarm, and Auto-off function
- Optional built-in WiFi and Bluetooth support to perform software upgrades and pair with mobile devices, respectively
- OTG to Ethernet support option
- Fast boot-up time, in less than 30 seconds
- Built-in Web Browser for remote control access

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3.2 Key Features

Basic Mode

- Fast < 3 seconds measurement time
- DWDM 100GHz ITU-T G.694.1 C - L bands (1520 to 1610nm)
- CWDM ITU-T G.694.2 from 1271 to 1611nm
- 4 View modes: Tiles*, Bar Graph, Table and Summary
- Dynamic Measurement Range: 65 dB
- Active Channel Pass/Fail detection
- Programmable Pass/Fail Level threshold
- Programmable Channel Tables
- Built-in wavelength reference
- Continuous Scanning for all channels

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3.3 Package Contents

- FX180X/FX182 test unit
- AC/DC adaptor
 - Input: 100-240 VAC (50/60 Hz), 1.5A max
 - Output: 12VDC
- Li-Polymer battery, 10 Ah with low voltage indication

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4.0 Basic Operation.

4.1 Connector Panels

The FX180X/FX182 Optical Channel Checker Meter is available for CWDM and DWDM network testing (see datasheet). Refer to v150 Series Common Functions User Manual for general platform operations.

	FX182		FX180X CWDM	FX180X DWDM
Test Profiles	CWDM-18, DWDM 100GHz, MetroE, FibreDeep, 5G RAN		CWDM	DWDM C-band
	CWDM	DWDM C-L band		
Measurement Range - nm	1260 to 1620	1520 to 1610	1260 to 1650	1527.216 to 1565.087
Channel Spacing	20 nm	100 GHz	20 nm	50/100/200 GHz
Input Power Range - dBm	-50 to +15			
Maximum Power Range - dBm	+30			
Channel Power - dBm	Peak		Integrated	
Absolute Power Accuracy - dB	± 1.0	± 0.8	± 1.0	± 0.5
Filter Resolution - nm				
Relative Power Accuracy - dB	± 0.8	± 0.6	± 0.8	± 0.4
Power Repeatability - dB	± 0.1			
Polarization Dependent Loss - dB	< 0.7	< 0.5	< 0.5	< 0.3
Noise Floor - dBm	-55			
Optical Return Loss - dB	> 30			
Response Time - sec	< 3.0		< 2.0	< 2.0

Display Modes include: Summary, Tiles, Bar Graph and Table Display views.



4.1.1 Led Indicators

Power LED: A single LED indicates the power state of the unit.

- The LED is off when the unit is powered off.
- The LED is green when the unit is powered on.
- The LED is orange when the unit is connected to the AC power port and powered off(charging).

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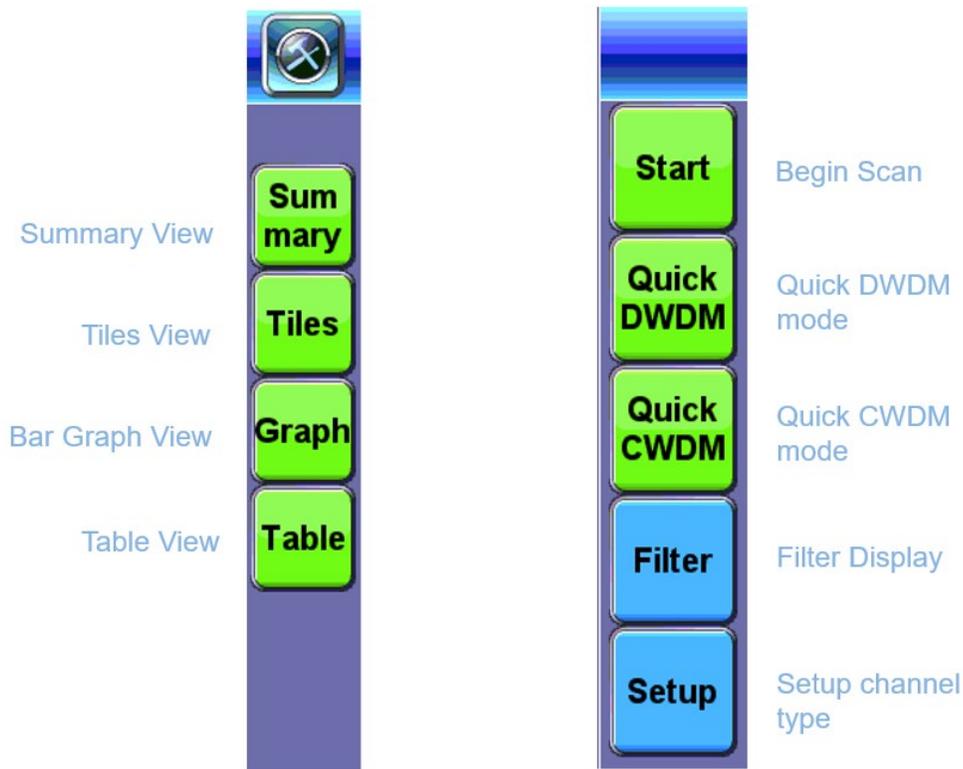
4.2 Getting Started

4.2.1 View/Hide side menu panels

The left and right control panels are laid out to simplify navigation through operating the OCC. The left panel is used to select the desired result viewing mode as well as to access Common Functions (see v150 Common Function User Manual). The right panel is used to make the desired OCC measurements.



Common Functions - Tap to access common functions menu.

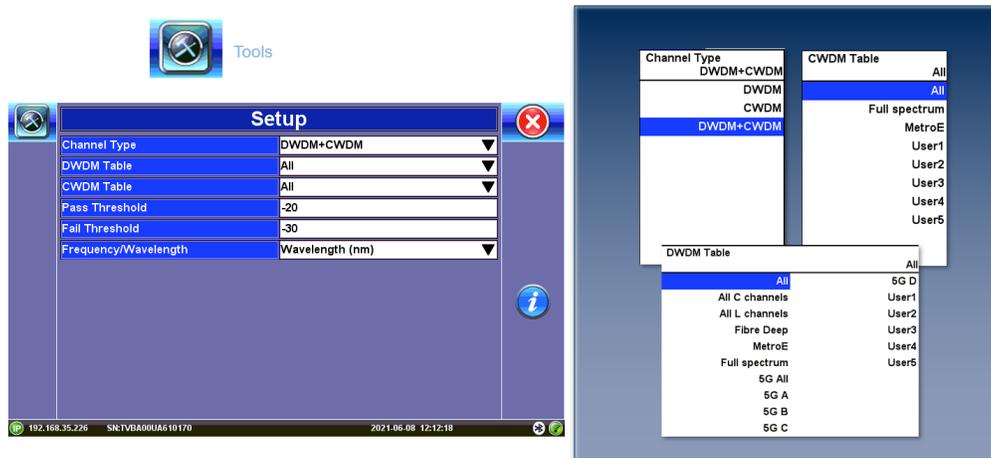


OCC Control Panel

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4.2.2 Setup

To start, use the Setup button on the right to setup your parameters for the test. First decide which channel type and wavelength you want to view whether it is CWDM or DWDM. Then determine if you want to use the preset tables and pass/fail threshold or create your own. Toggle between your choice of viewing wavelength or frequency of each channel.



Parameters Setup

Preset Test Profiles

Test Profile	Wavelengths	Comments
LR4/ER4/LAN WDM (GouMax)	1295.56	4-λ at 25 Gbps for long or extended reach; wavelengths center around 1300nm. Wavelength range 1260 - 1320, 4.5nm channel spacing
	1300.05	
	1304.59	
	1309.14	
LR8 (GouMax)	1273.55	8-λ at 50 Gbps for long or extended reach; wavelengths center around 1300nm. Wavelength range 1260 - 1320, channel spacing varies
	1277.89	
	1282.26	
	1286.66	
	1295.56	
	1300.05	
	1304.58	
LWDM (GouMax)	1269.23	6 to 12-λ at 25 Gbps, used in 4G/5G fronthaul application. Range 1269 - 1332, 4.nm channel spacing. Used in 4G/5G fronthaul applications; based on ethernet channel wdm technology
	1273.54	
	1277.89	
	1282.26	
	1286.66	
	1291.1	
	1295.56	
	1300.05	
	1304.58	
	1309.14	
	1313.73	
MWDM (GouMax)	1267.5	6 to 12-λ at 25 Gbps, using CWDM ITU grid, used in China for 5G fronthaul. Based on 6 CWDM wavelengths, shifted by 3.5nm left and right to expand to 12 wavelengths.
	1274.5	
	1287.5	
	1294.5	
	1307.5	
	1314.5	
	1327.5	
	1334.5	
	1347.5	
	1354.5	
	1367.5	
PON (GouMax)	1490	6-λ range from 1490 - 1599
	1577	
	1596	
	1597	
	1598	
	1599	

Test Profiles

CWDM8	1271	8-λ at 50 Gbps, for short reach 400G SMF links in datacenters
	1291	
	1311	
	1331	
	1351	
	1371	
	1391	
	1411	
CWDM (ITU-T G.694.2)	18-λ from 1271 to 1611 nm, 20 nm channel spacing	
DWDM (ITU-T G.694.1)	100GHz C-L band	
DWDM-C	100GHz C-band only	
DWDM-L	100GHz L-band only	
CWDM+DWDM	CWDM+100GHz DWDM	
CWDM+DWDMC	CWDM+100GHz DWDM-C	
Fibre Deep	1560.61	16-λ using DWDM ITU Grid, Range from 1525 - 1565
	1559.79	
	1558.17	
	1556.55	
	1554.94	
	1550.92	
	1548.51	
	1546.12	
	1542.14	
	1538.98	
	1535.82	
	1534.25	
	1531.9	
	1529.55	
	1528.77	
1527.99		
DWDM MetroE	1561.42	16-λ using DWDM ITU Grid, Range from 1530 - 1565
	1560.61	
	1558.98	
	1558.17	
	1554.13	
	1550.92	
	1549.32	
	1543.73	
	1542.14	
	1539.77	
	1536.61	
	1535.82	
	1534.25	
	1531.9	
	1531.12	
1530.33		

Test Profiles

CWDM MetroE	1611	10-λ using CWDM ITU Grid, Range from 1431 - 1611 nm, 20 nm spacing
	1591	
	1571	
	1551	
	1531	
	1511	
	1491	
	1471	
	1451	
	1431	
5G All		32-λ 100 GHz channels from 1529.55 - 1560.61 nm
5G A	1560.61	Band A has 8 100 GHz channels from 1554.94 - 1560.61 nm
	1559.79	
	1558.98	
	1559.17	
	1557.36	
	1556.55	
	1555.75	
	1554.94	
5G B	1553.33	Band B has 8 100 GHz channels from 1547.72 - 1553.33 nm
	1552.52	
	1551.72	
	1550.92	
	1550.12	
	1549.32	
	1548.51	
1547.72		
5G C	1542.14	Band C has 8 100 GHz channels from 1536.61 - 1542.14 nm
	1541.35	
	1540.56	
	1539.77	
	1538.98	
	1538.19	
	1537.4	
1536.61		
5G D	1535.04	Band D has 8 100 GHz channels from 1529.55 - 1535.04 nm
	1534.25	
	1533.47	
	1532.68	
	1531.9	
	1531.12	
	1530.33	
1529.55		

Test Profiles

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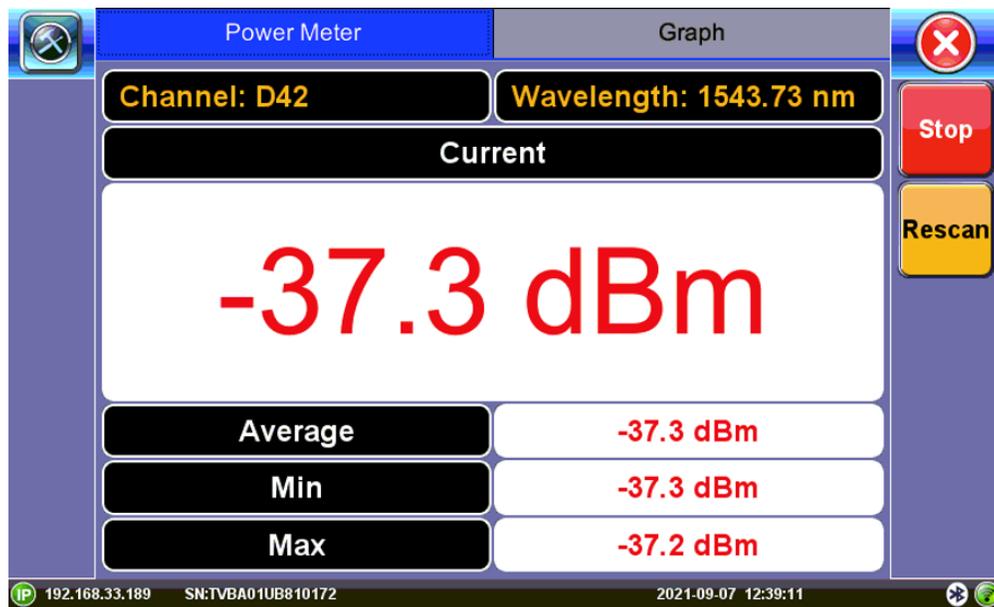
4.2.3 Pass/Fail Threshold

Using your fingers or the stylus provided, select the setup button from the main screen. Input your threshold levels next to the pass/fail threshold fields. Any channels that are below the red line or fail will be displayed in red. Any channels between the red and green line will be displayed as yellow marginal channels. Any channels that are above the green line or pass will be displayed in green in the graph.

5.0 Optical Channel Checker

5.1 Quick DWDM/CWDM

Quick DWDM or Quick CWDM allows users to quickly and automatically view the channel with the highest power for either CWDM or DWDM using the Power Meter view. To check if there are changes to the highest power, select **RESCAN**. To get back to the other channels or results, select the **STOP** button first.



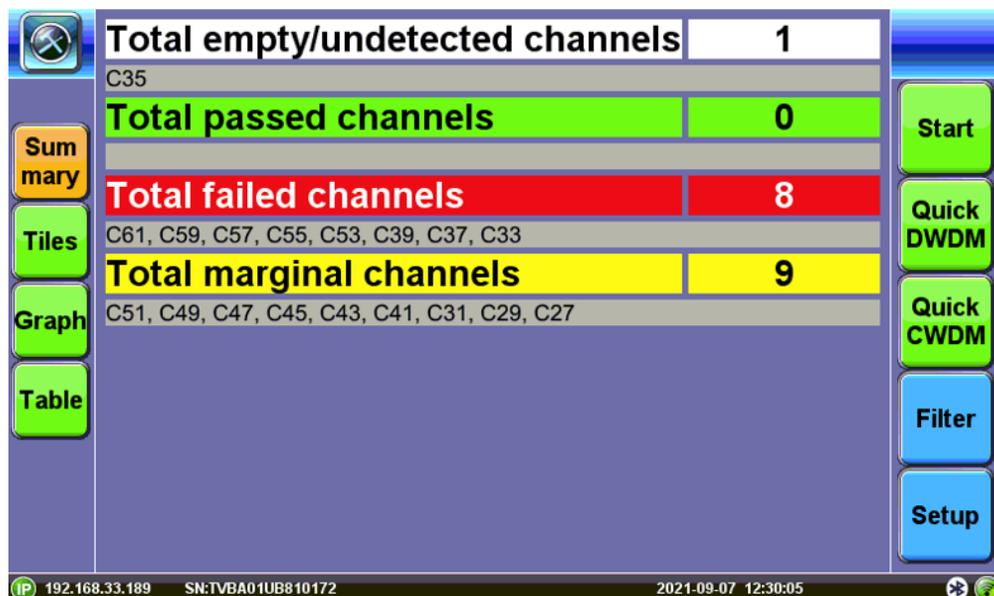
Quick DWDM/CWDM

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5.2 View Modes

5.2.1 Summary View

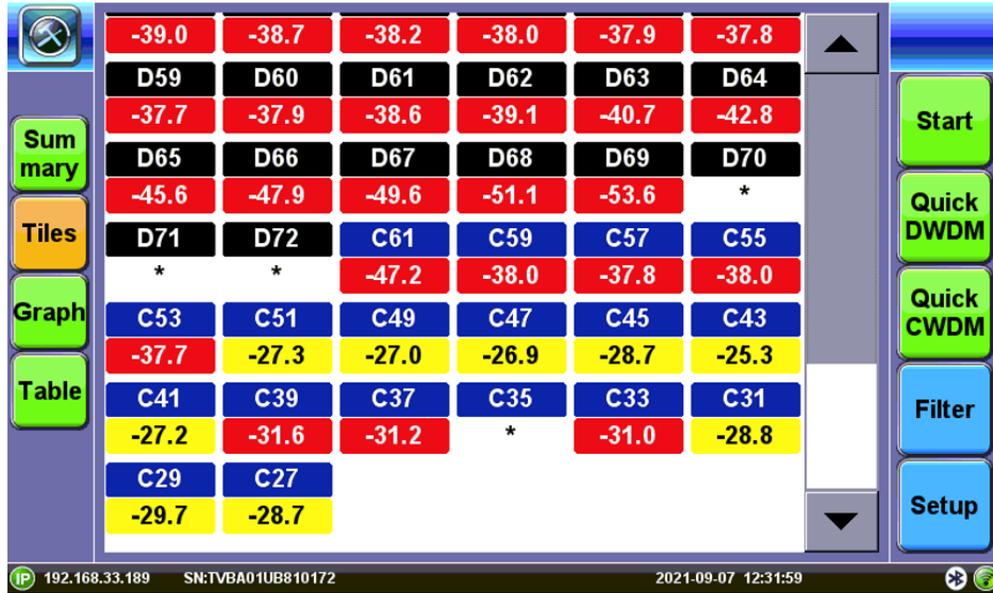
The **Summary** view allows you to see the number of empty, pass, fail, and marginal channels in the source you input. It also indicates which channel falls under which category for a quick and easy view.



Summary View

5.2.2 Tiles View

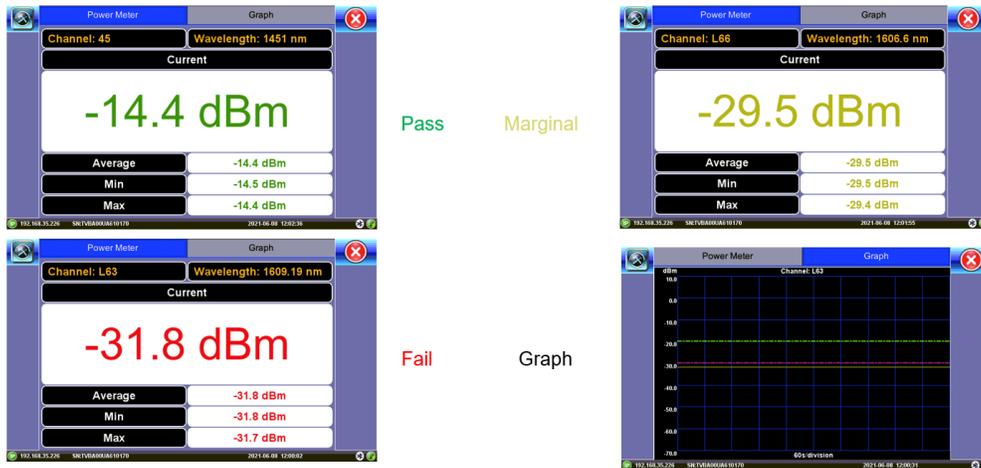
The tiles are **color coded** to indicate pass, fail or marginal. Each individual tile represents a channel with its signal level. Tapping on a tile will display power meter results for that specific channel. The **power meter** displays the current channel as well as the peak wavelength of that channel. It monitors the maximum and minimum peak power of that channel and takes the average of the peak power level measured over time; the currant peak power level is displayed on the main viewing window..



Tiles View

5.2.2.1 Power Meter View

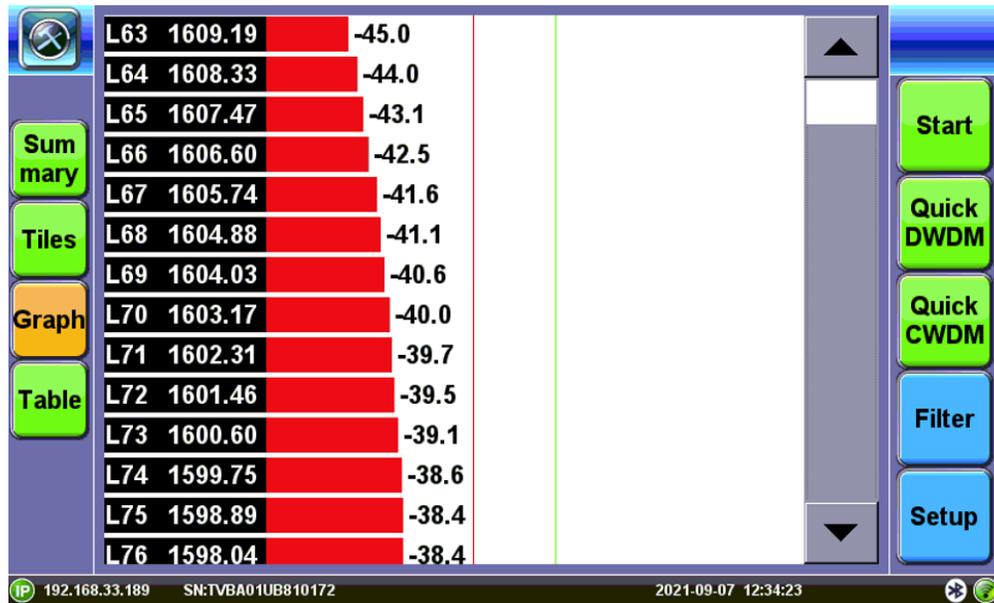
To view more details about any channel, users can simply **tap on any tile** to access the **Power Meter screen**. This is the same screen that users can view results using **Quick DWDM** or **Quick CWDM** buttons. In this screen, user can monitor laser power drift over time as well as view min/max level details. Displayed value are color coded to indicate if the signal is good, marginal or bad.



Power Meter View

5.2.3 Bar Graph View

The **bar graph** displays the channel's number, wavelength and power level. These graphs are color coded to indicate pass or fail. Red indicates failure, yellow indicates marginal power, and green indicates pass. Use the scroll bar to view all channels. The two lines in the figure below indicates the threshold lines on the graph. These thresholds can be adjusted in **Setup**.



Bar graph View

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5.2.4 Table View

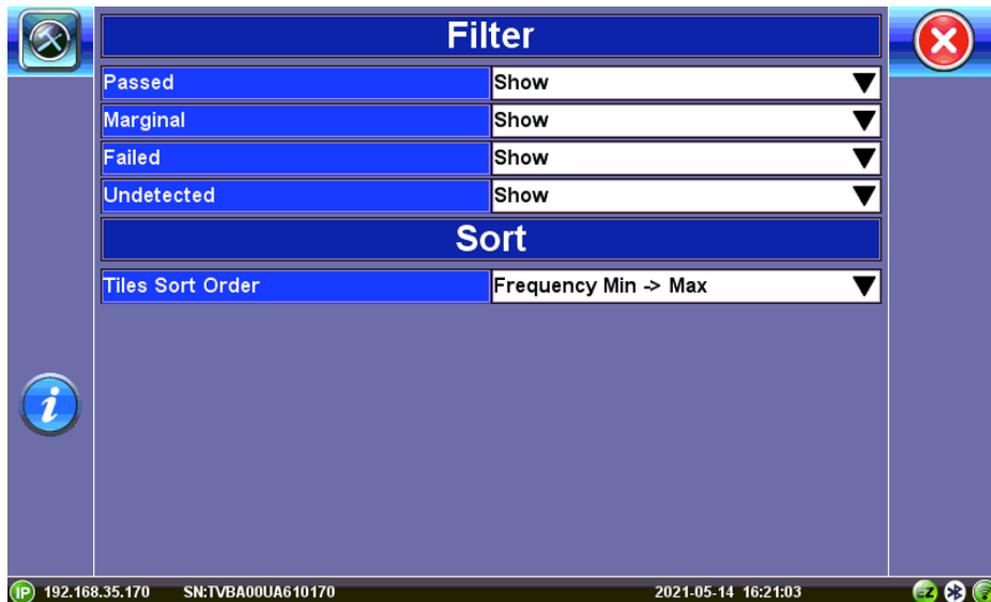
All active channel test results will be summarized in terms of ITU-T channel, channel peak wavelength or frequency, and peak signal level.

Channel	Wavelength (nm)	Level (dBm)
L63	1609.19	-45.0
L64	1608.33	-44.0
L65	1607.47	-43.1
L66	1606.60	-42.5
L67	1605.74	-41.6
L68	1604.88	-41.1
L69	1604.03	-40.6
L70	1603.17	-40.0
L71	1602.31	-39.7
L72	1601.46	-39.5
L73	1600.60	-39.1
L74	1599.75	-38.6
L75	1598.89	-38.4

Table View

5.2.5 Filter Mode

To change what you want to be displayed in each mode, the **Filter Page** allows you to toggle between showing pass/fail/marginal channels or hiding them. Users can also sort between displaying minimum to maximum frequency/level or vice versa.



Filter Modes

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5.3 Saving Results

Press the **BLUE** File button to save test results. Results are saved in html file format and can be uploaded to R-Server or exported via USB stick. Use the Files menu on the home page left panel to access File Management functions. For detailed instructions, see the **V150 Series Common Functions User Manual** at www.veexinc.com

6.0 Certifications and Declarations



Declaration of Conformity

What is CE?

The CE marking is a mandatory European marking for certain product groups to indicate conformity with the essential health and safety requirements set out in European Directives. To permit the use of a CE mark on a product, proof that the item meets the relevant requirements must be documented.

Use of this logo implies that the unit conforms to requirements of European Union and European Free Trade Association (EFTA). EN61010-1

For a copy of the CE Declaration of Conformity relating to VeEX products, please contact VeEX customer service.

RoHS Compliance

VeEX QUALITY AND ENVIRONMENTAL POLICY

Our quality and environmental policy is to limit and progressively eliminate the use of hazardous substances and chemicals in the design and manufacture of our products.

VeEX products are classified as Monitoring and Control Instruments under Article 2, Section (1), Category 9 of the WEEE 2002/96/EC Directive.

RoHS and WEEE Position Statement

The Council of the European Union and the European Parliament adopted Directive 2002/95/EC (January 27, 2003), to Reduce the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment, and Directive 2002/96/EC on Waste Electrical and Electronics Equipment (WEEE), with the purpose of reducing the environmental impact of waste electrical and electronic equipment. Both were later recast by Directives 2011/65/EU and 2012/19/EU respectively. All VeEX products being placed on the EU market conform with these directives.

Additional RoHS substance restrictions for the Monitoring and Control Instruments were adopted by EU Directive 2015/863 (March 31, 2015). These new restrictions will take effect from July 22, 2021. VeEX has established a program to ensure that from July 22, 2021, all its products to be sold and shipped into the EU market will conform with (EU) 2015/863.

VeEX Inc. is committed to comply with RoHS and WEEE Directives to minimize the environmental impact of our products.

For more information about RoHS as it relates to VeEX Inc, go to the VeEX web site at www.veexinc.com/RoHS.



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7.0 About VeEX

VeEX Inc., a customer-oriented communications test and measurement company, develops innovative test and monitoring solutions for next generation telecommunication networks and services. With a blend of advanced technologies and vast technical expertise, VeEX products address all stages of network deployment, maintenance, field service turn-up, and integrate service verification features across copper, fiber optics, CATV/DOCSIS, mobile 4G/5G backhaul and fronthaul, next generation transport network, Fibre Channel, carrier & metro Ethernet technologies, WLAN and synchronization.

Visit us online at www.veexinc.com for the latest updates and additional documentation.

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