RXT-4113+

xWDM OTDR Series Modules
CWDM and/or DWDM OTDR Module

for RXT-1200

Modular Test Platform

The RXT-4113+ is our 2nd generation xWDM OTDR module. Users can select CWDM only, DWDM only or both CWDM and DWDM testing options for Fiber Deep, RPD, and DAA testing. CWDM and/or DWDM (C-band) wavelength tuning, 3 cm resolution and up to 500,000 data points offers unprecedented network characterization. Attenuation profiling and end-to-end connectivity ensures maximum productivity.

Platform/Module Highlights

Software

- Advanced software architecture supports multiple test applications
- VeExpress™ Cloud or Enterprise versions to maintain instrument firmware and manage test options or inventory
- EZ Remote software for flexible remote control and software upgrade
- Fiberizer Desktop+ PC software for advanced trace analysis and report generation
- Fiberizer Cloud trace analysis and data management
- R-server compatibility for centralized work force management and test results repository
- Optional fiber inspection scope (USB) with single or multi-fiber (MPO/MTP) support

Hardware

- High resolution, 7” full color TFT touch-screen viewable in any lighting condition
- Connectivity via 10/100Base-T Management interface, WiFi™, Bluetooth®, or 3G/LTE for back office applications
- Intelligent fan operation with built-in temperature sensor
- Interchangeable Li-ion battery pack for extended test time
- USB-A Interface for USB flash drives, USB wireless dongles and fiber inspection probe connection
- Optional built-in GPS module for Geotagging OTDR traces

Key Features

Optical

- CWDM wavelengths per ITU-T G.694.2 (8, 10, or 18 channels)
- DWDM wavelengths per ITU-T G.694.1 (C-band, 1527.99 to 1563.86 nm, Channel #s 17-62) in 50, 100 or 200 GHz steps. Optional extended channel 14-62 available.
- Sampling resolution up to 500,000 points
- Event dead zone <0.8m, attenuation dead zone <3m
- Built-in DWDM wavelength locker with ±2.5 GHz stability
- High dynamic range for long haul fibers and testing through xWDM Mux/demux
- TEC laser stabilization for operation in hot and cold weather conditions
- Telcordia GR-196 and SR-4731.sor file formats
- Optional V-Scout mode – Smart Link Mapping using intuitive icons derived from multiple test acquisitions
- Optional CWDM/DWDM Light Source via OTDR port
- Optional broadband Optical Power Meter
- Optional VFL 650 nm light source
- Built-in launch fiber to characterize OTDR connections and short fiber spans
- Fixed connector or universal 2.5 mm optical interface with inter-changeable optical adaptors (SC/FC/LC)

Value added data post processing

Fiberizer Cloud

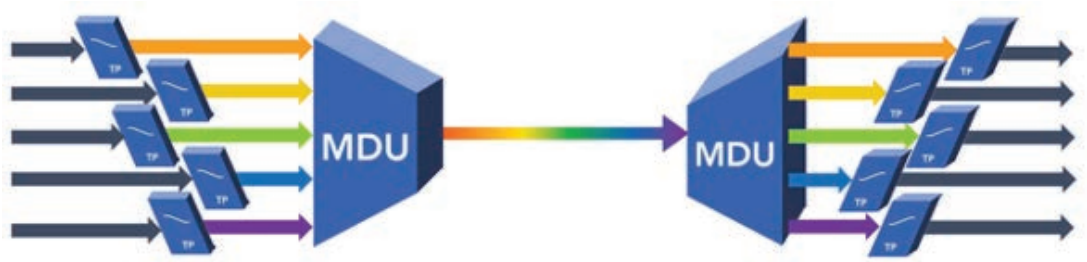
cloud.fiberizer.com

Wavelength-Division Multiplexing Primer

Overview

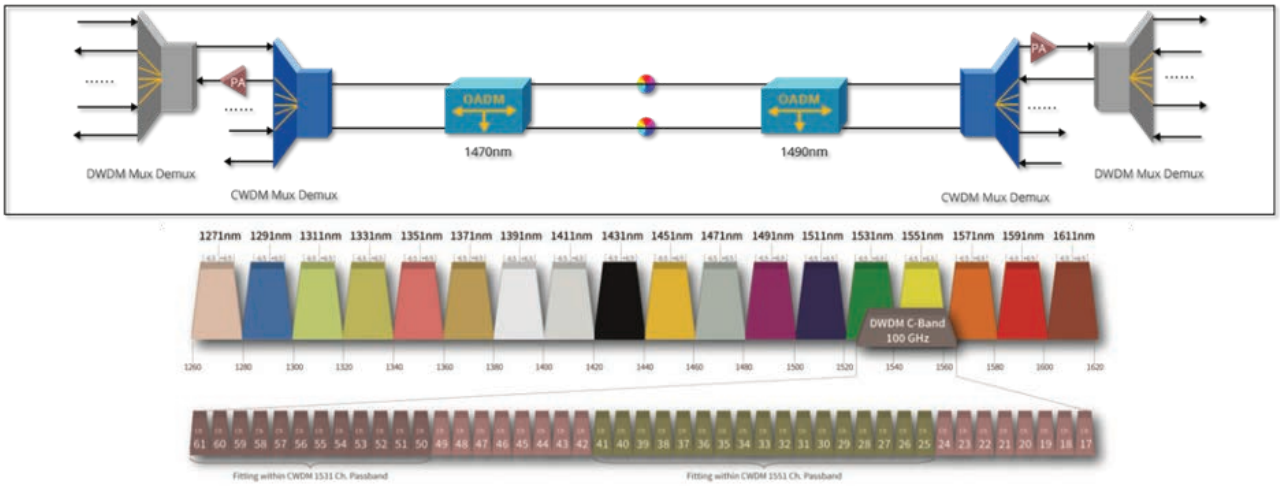
Wavelength-Division Multiplexing (WDM) has quickly become the technology of choice for high-capacity optical communication systems. WDM allows Service Providers to expand the capacity of their networks without having to install additional fiber.

In simple terms, WDM combines multiple signals simultaneously at different wavelengths onto the same fiber. A multiplexer combines the optical signals at the transmitter side while a de-multiplexer separates them at the receiver end.



ITU Frequency Bands in WDM Systems

"Grids" are used for the location of nominal central frequencies in WDM systems. The International Telecommunication Union (ITU) has divided the wavelengths into a frequency grid for CWDM and DWDM.



CWDM

Coarse WDM can deploy up to 18 wavelengths with 20 nm channel spacing ranging from 1270 nm and 1610 nm. Although the ITU-T G.694.2 grid was amended in 2003 to shift the wavelength by 1nm, for simplicity the RXT4113+ will continue to use center wavelengths labels 1270 to 1610 nm. The wide channel spacing allows for the use of cheaper network components, including uncooled lasers and lower-quality multiplexers and de-multiplexers.

By today's standards, several CWDM wavelengths below 1470 nm are considered "unusable" on older G.652 fibers, due to the increased attenuation in the 1270-1470 nm bands. Newer fibers conforming to the G.652.C and G.652.D standards reduce the "water peak" attenuation considerably and can support full operation of all 18 CWDM channels.

The CWDM spectrum prevents the use of erbium-doped fiber amplifiers which are generally optimized for 1550 nm transmission. As a result, CWDM deployments are often limited to ±80 km and equipment is designed for short-range access and metro operation only.

DWDM

Dense WDM uses 40 channels at 100 GHz spacing or up to 80 channels with 50 GHz spacing. Dense channel spacing demands tight wavelength stability and thus requires cooled lasers. The ITU initially chose the Conventional band or C-band spectrum for DWDM operation since it offers the lowest fiber attenuation and it occupies the spectrum in which erbium doped optical amplifiers operate. Development of new fiber amplifiers promise to extend DWDM operation into the L-band.

CWDM/DWDM Network Testing

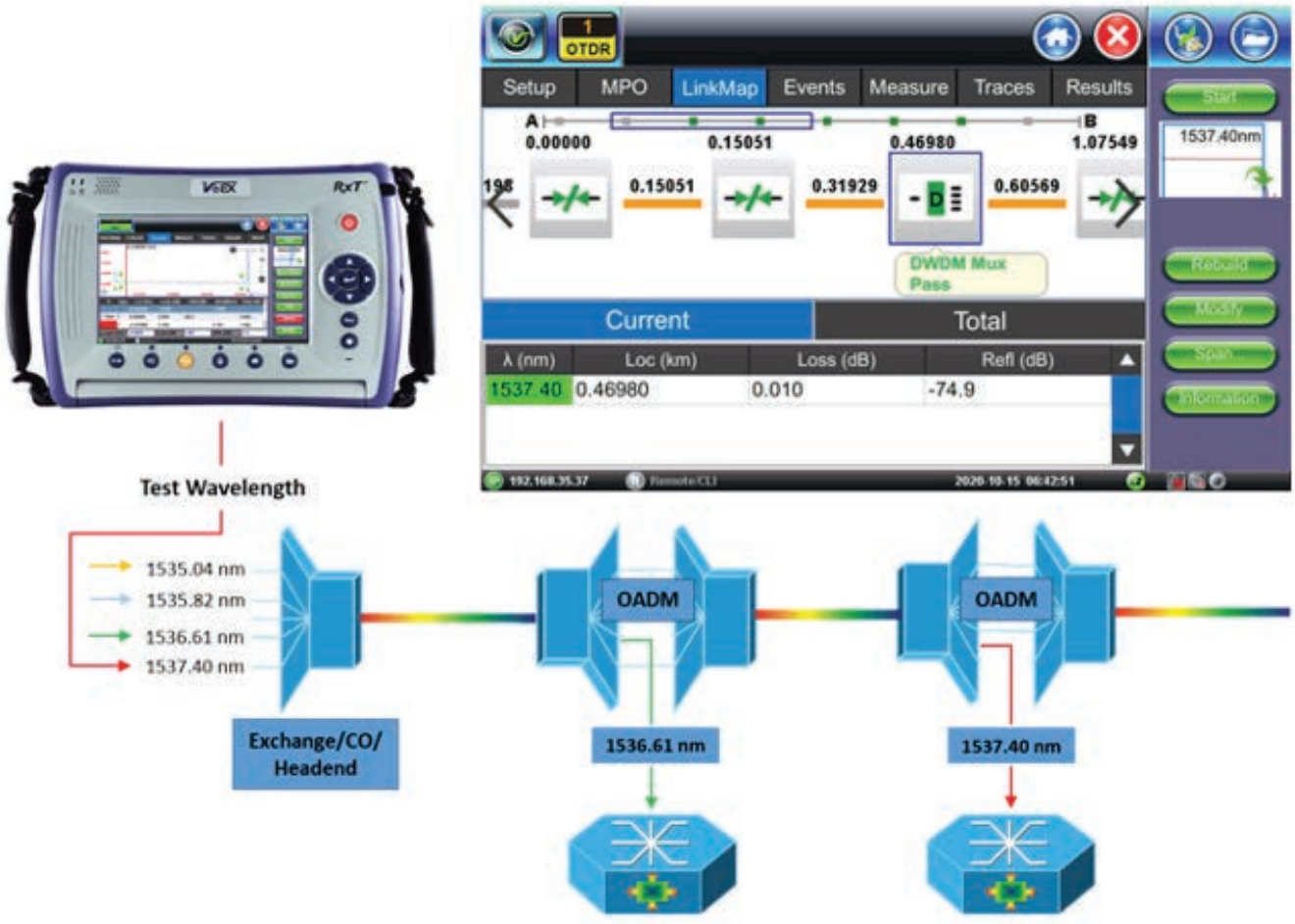
Service Providers utilizing DWDM technology, need to install and troubleshoot using new OTDR test methods. Applications include:

- Verify network at the discrete ITU-T grid wavelengths
- End-to-end loss through multiplexers, OADM and de-multiplexers needs to be checked
- Attenuation and macro-bending can be verified across the transmission band or channel
- Continuity testing end-to-end using Source and Optical Spectrum Analyzer (OSA) prior to service turn up
- Wavelength provisioning - verify new wavelength services and routing without disrupting traffic on live channels

The new RXT-4113+ xWDM OTDR module series replaces the popular RXT-4111 DWDM, RXT-4112 CWDM OTDR and RXT-4113 modules into a single, universal module to tackle any CWDM, DWDM or CWDM/DWDM network test challenges.

Whether the test application involves CWDM, DWDM or hybrid CWDM/DWDM networks, the RXT-4113+ OTDR module simplifies WDM testing. The unified, intuitive user interface also means the User no longer has to swap OTDR modules or load new test application software when switching between CWDM and DWDM network testing - simply connect the fiber to the CWDM or DWDM OTDR port and move between MUX ports as required.

DWDM Test Application

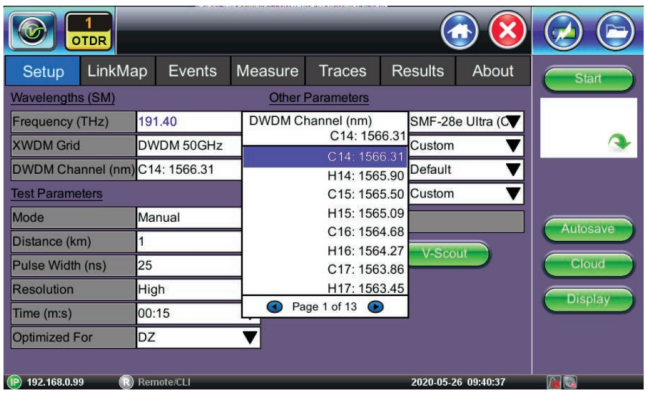


Optical Time Domain Reflectometer (OTDR)

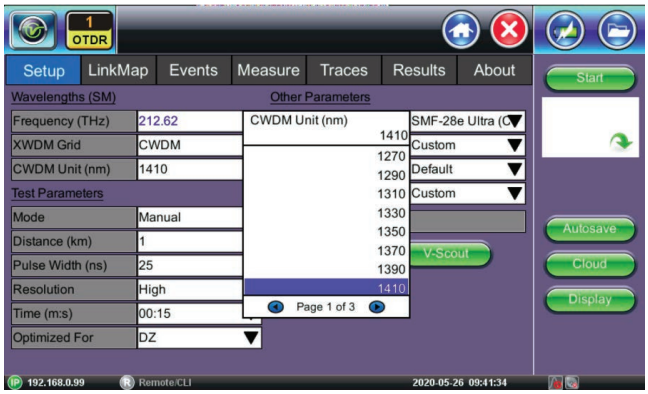
Intuitive Test Setup

Novice and expert users can quickly and easily configure test parameters for both CWDM and DWDM networks.

DWDM - Conventional C-band is 80 wavelengths as defined in the ITU 6.694.1 grid are supported via a precise and stable tunable laser. Channel grids of 50, 100, and 200 GHz is supported.



CWDM – Configure with 8/10/18 wavelengths as defined in ITU G.694.2 grid. Simply select via pull down menu.

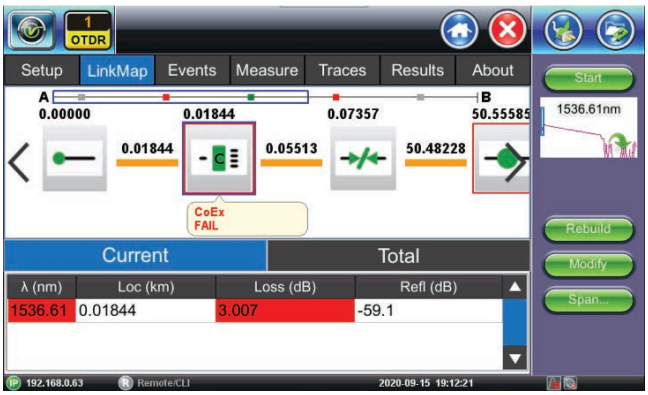


Analysis Thresholds

User defined thresholds for splice loss, connector loss, fiber lengths and reflectance can be preset to assess a fiber's condition.

V-Scout Link Mapping

Advanced algorithms analyze multiple test acquisitions and characterize the fiber using intuitive icons. This optional feature eliminates trace interpretation and provides greater fiber analysis confidence to the user, regardless of OTDR skill set.



Advanced Trace Analysis

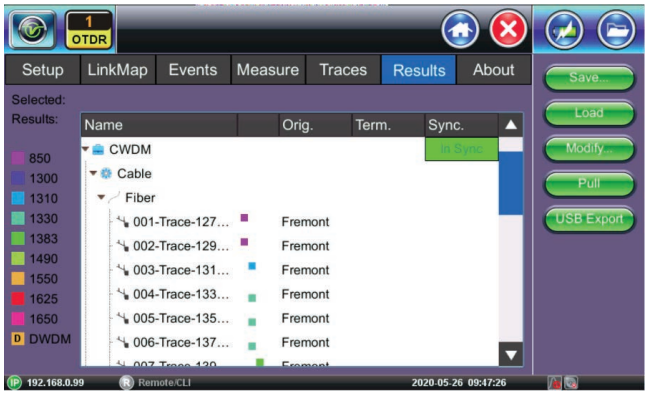
Reliable event detection and accurate analysis are crucial to document fiber links at the time of installation. These baseline records are essential to troubleshooting faulty networks and reducing system downtime afterwards.

The unit employs specialized software algorithms developed from decades of experience to measure fiber attenuation including anomalies such as connectors, splices, and macro-bends.

OTDR Results

OTDR Traces are saved in Telcordia SR-4731 format in a logical hierarchy for easy sorting and storage.

Traces can be pushed directly to Fiberizer Cloud using any available internet connection or can be pulled for fault finding and reference purposes.



OTDR Trace Analysis and Documentation

Fiberizer™ Desktop Plus

Fiberizer Desktop Plus is a PC software application to analyze traces acquired by the RXT-4113+ xWDM OTDR. Supplied as a standard accessory, Users can edit traces manually, create event tables, generate reports using built-in templates and much more. This viewer displays trace files conforming to Telcordia (Belcore) GR-196 & SR-4731 *.sor format, and offers both 2-point and 5-point loss measurement modes. It also supports batch processing, a very useful feature for analyzing multiple fibers in a single cable. The software does not require Internet access to operate, but it can be interfaced with Fiberizer Cloud OTDR trace viewer at any time.

Work from Anywhere, Anytime

Fiberizer™ Cloud

Fiberizer Cloud not only empowers the OTDR, but also the Workforce. Going way beyond traditional OTDR reporting methods or concepts, this cloud-based solution provides superior centralized test data management capabilities including powerful web based trace analyses. You can work from almost anywhere, at any time because Fiberizer Cloud is a full online web service.

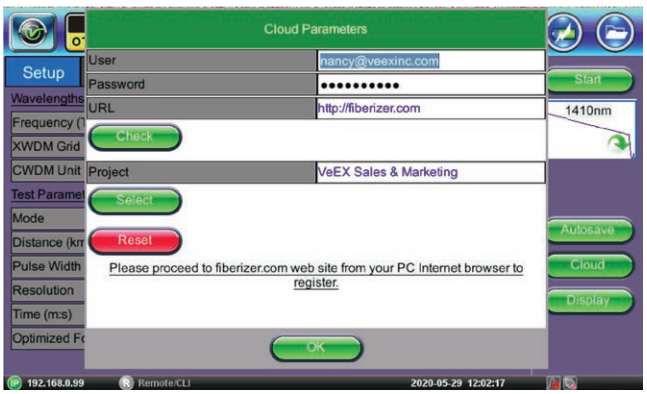
Streamlining onsite data reporting

Fiber technicians and contractors tasked to validate new fiber installations or restoring cable routes after an outage are generally obliged to submit measured data (.sor files) and related documentation to the network operator as proof of delivery before being paid. Valuable time however is often wasted after the onsite work is completed, because critical test files are usually first stored to some local storage media before being transferred to a colleague via email for verification and further reporting.

Fiberizer Cloud streamlines this information exchange, eliminating costly paper, e-mail or other time-consuming communication methods - instead, time wastage can be avoided by transferring traces of jobs completed directly from the OTDR to Fiberizer Cloud. Professional PDF or MS Excel reporting functionality is also available, and users can create their own templates for reports. Bi- directional analysis of OTDR traces, tested from both ends of the optical fiber, can also be performed.

Fiberizer Cloud Connectivity

Pair the RXT-4113+ OTDR using Bluetooth to a mobile Smartphone, Laptop or Tablet PC and efficiently upload OTDR test data directly to the Cloud server using any available wireless technology (3G, WiFi).



Total Compatibility

Fiberizer Cloud is compatible with both Windows and MacOS browsers, not limiting users to PC platforms only. OTDR trace files in Telcordia (Bellcore) GR-196 & SR-4731 *.sor format is securely transferred via HTTPS connection, a fast reliable communication protocol commonly used in today's Internet applications. Another outstanding feature is compatibility with other OTDR vendor trace data formats, so users can reference or compare other OTDR traces and vice versa.

Optical[1]

OTDR Parameter		
	DWDM	CWDM
Wavelength Tuning Range (nm), THz	C-band standard: 1563.86 to 1528.77; extended option to 1527.99 Standard: 191.70 to 196.10; extended option to 191.4 to 196.20	18-channels[1] -1271, 1291, 1311, 1331, 1351, 1371, 1391, 1411, 1431, 1451, 1471, 1491, 1511, 1531, 1571, 1591, 1611 10-channels – 1431/1451/1471/1491/1511/1531/1551/1571/1591/1611 8-channels – 1471/1491/1511/1531/1551/1571/1591/1611
Wavelength Accuracy	±2.5 GHz	±3 nm
Spacing per ITU-T 694.x grid (GHz)	50, 100, or 200 GHz	20 nm
Number of Channels	89 (standard); Channel 14 to 62 optional	8, 10 or 18 options
Dynamic Range (dB)[2]	44 dB typical	39.5 typical
Side-Mode Suppression Ratio (SMSR) (dB)	40 (min) DWDM laser	n/a
Pulse Widths (ns)	10, 25, 100, 300, 500, 1000, 3000, 10000, 20000	3, 10, 25, 100, 300, 500, 1000, 3000, 10000, 20000
Event Dead Zone (m)[3]	1.1 typ.	0.8 typ. module dependent
Attenuation Dead Zone (m)[4]	4 typ.	3.5 typ. module dependent
Distance Display Range (km)	0.1 to 400	
Distance Units	Kilometers, Meters, Kilofeet, Feet, Miles	
Distance Accuracy (m)[5]	±(0.5 + resolution + $2x10^{-5}$ x L)	
Sampling Resolution (m)	0.03 to 8.2 standard, 16 available	
Sampling Points	Up to 500,000	
Loss Readout Resolution (dB)	0.001	
Attenuation Linearity (dB/dB)	±0.03	
Group Index Range (IoR)	1.2000 to 1.8000 in .0001 steps	
Measurement Time	Fixed time intervals, Auto and Real Time (Live)	
Internal Memory Capacity (SD card)	>10,000 traces & link maps, Bellcore GR196 and Telcordia SR-4731 sor format	
Fiber Analysis	Automatic, event table, user defined PASS/FAIL thresholds	
Intelligent Link Mapping (V-Scout)	Intelligent Link Mapping using intuitive icons derived from multiple test acquisitions	
Fiber Type	Single mode, 9/125 µm	
OTDR Laser Safety	IEC 60825-1, Class 1M	
Optical Connectors (OTDR/LS)	Fixed or Universal 2.5 mm, UPC or APC interface, FC/SC/ST/LC adaptors (optional)	

Hardware Options
Standard OPM + 10dBm
High Power OPM + 25dBm
VFL (650nm) Class 2
Light Source Opt (uses OTDR laser)

Notes:

1. Depends on module (8/10/18 options available). CWDM setup menu is 1xx0nm.
2. Unless noted, all specifications are valid at 23°C ± 2°C (73.4°F ± 3.6°F) using FCUPC connectors.
3. Typical dynamic range using 20 µsec after three-minute averaging and SNR = 1.
4. Typical dead zone using 10 ns pulse and reflection -45 dB.
5. Typical dead zone using 10 ns pulse and reflection below -55 dB; <5 meter with reflection = -45 dB.
6. Excludes uncertainty due to fiber refractive index (IoR) setting.

General Specifications

Size (including chassis)	290 x 140 x 66 mm (W x H x D) 11.40 x 5.50 x 2.60 in	Display	TFT 7” full color touch-screen display
Weight (including chassis)	Less than 3 kg (less than 6.6 lb)	Ruggedness	1m flat drop on all sides
Battery	Li-ion smart battery, 5200 mAh 10.8 VDC	Management Interfaces	USB, RJ45, 10/100-T Ethernet, Bluetooth (optional), Data Card/GPS (optional) WiFi (optional)
Power Supply (AC Adaptor)	Input: 100-240 VAC, 50-60 Hz Output: 16 VDC, 5.5 A		
Operating Temperature	0˚C to 50˚C (32˚F to 113˚F)	Languages	Multiple languages supported
Storage Temperature	-20˚C to 70˚C (-4˚F to 158˚F)	System Memory	Mbyte RAM, 16 Gbyte SD
Humidity	5% to 95% non-condensing		

VeEX
The Verification Experts

VeEX Inc.
2827 Lakeview Court
Fremont, CA 94538 USA
Tel: +1.510.651.0500
Fax: +1.510.651.0505
www.veexinc.com
customercare@veexinc.com

D05-00-188P A00 2020/11