CM1000

ANALOG AND DIGITAL SLM AND DOCSIS NETWORK ANALYZER

Ensure Reliable Network Operation for Analog and Digital Services

Increase network performance and customer satisfaction by using the CM1000 to systematically detect and locate impairments in your analog, digital video, VOD, cable modem and VoIP services—in real time, both upstream and downstream.

- Continuous measurements reveal changing network conditions
- Integrated Web Browser and PC Emulation option
- VoIP option to verify, test and troubleshoot VoIP services
- Modular—easily upgradeable as requirements evolve
- realVIEW option provides access to remote upstream measurements
- Upstream spectrum with CPD, C/I & C/N measurements
- Comprehensive digital analyzer with constellation, equalizer and frequency response displays

JUST ANOTHER WAY
WE'RE UNCOMPLICATING CABLE

SUNRISE TELECOM
BROADBAND

…it's ready to work whenever and wherever your technicians need it.

OVERVIEW

Full analog and digital SLM functions coupled with the ability to test cable modem services, such as VoIP, make the CM1000 the most comprehensive troubleshooting tool available. The built-in cable modem exercises the downstream and upstream network paths.

Easy-to-use pass/fail test screens indicate the problems quickly, so that adjustments, replacements and follow-up verification tests can be performed immediately. The CM1000's in-band capabilities and continuous measurements simplify locating tough intermittent problems.

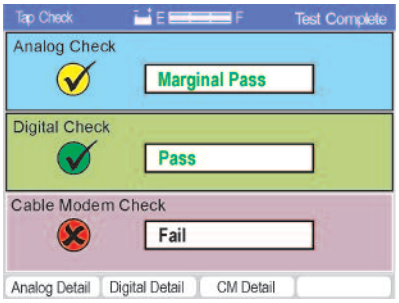
The CM1000's rugged construction makes it ready to work whenever and wherever your technicians need it—no need to leave the meter turned on between uses, boot up time is less than 30 seconds. The integrated fan ventilation allows continuous meter operation. The CM1000 will operate continuously at up to 120°F ambient and can be used even in the heaviest rain. And when the sun is shining the improved LCD screen affords great screen visibility.

Test anywhere in the network—at the tap, ground block or set top—even use the CM1000 to substitute for the customer's cable modem or PC and troubleshoot in-home wiring, routers, firewalls and hubs. Lighten your workforce's load with the CM1000—it's more versatile and easier to carry than a meter and a laptop for field testing. By using the Web Browser option your technicians can be more efficient by accessing your workforce management system.

The CM1000 can verify and troubleshoot VoIP services and the all important network QoS that VoIP requires. The CM1000 establishes the specified QoS connection to the CMTS and measures critical service parameters, such as latency, jitter and lost packets, from the customer premises to the CMTS or media gateway.

…easily run comprehensive tests, quickly and consistently.

"SMART" ONE-BUTTON TESTS



The CM1000 now includes CM500-style SMART tests. The user programmable tests are used to automatically evaluate network performance and to provide consistent and comprehensive testing. All test results can be saved and uploaded over the network. SMART test setups and instrument configurations can be stored on the network and downloaded to any meter when needed, making configuration changes easy and keeping testing consistent.

Three SMART test locations are provided, each with its own set of programmable tests and pass/fail limits. SMART tests may include analog and digital level scans (with custom channel plans), digital MER and BER, and complete cable modem tests. These one-button tests are a great way to quickly and consistently run a series of tests to ensure that the network is meeting performance requirements and has sufficient safety margins to keep running.

…comprehensive tests assist the technician in systematically identifying and correcting the cause of a failure.

COMPREHENSIVE TESTS

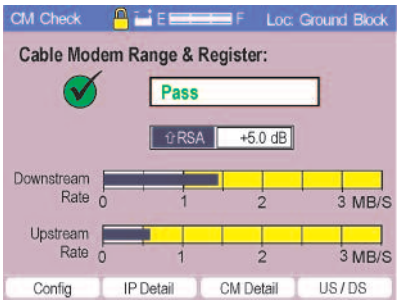
NETWORK:
- Ranging and Registering
- IP PING, Trace Route and Throughput
- Cable Modem DHCP and TFTP and PC DHCP
- Optional Web Browser
- Optional VoIP Services

MODEM/PC:
- Substitute, emulate or eliminate Modem or PC
- Cable modem ranging, registering and throughput
- Cable Modem DHCP and TFTP and PC DHCP
- Optional Web Browser

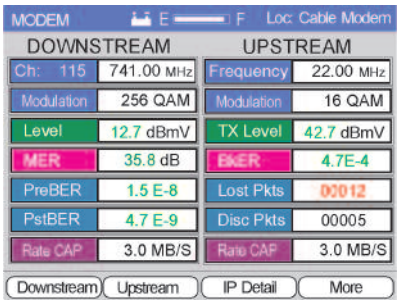
DOWNSTREAM:
- MER, BER, Constellation
- Level
- Equalizer and Frequency Response
- Throughput
- Auto Diagnosis

UPSTREAM:
- Cable modem ranging, registering and throughput
- BkER
- PING
- RF Transmit Level
- Spectrum Display with C/N and C/I (remote via realVIEW option)

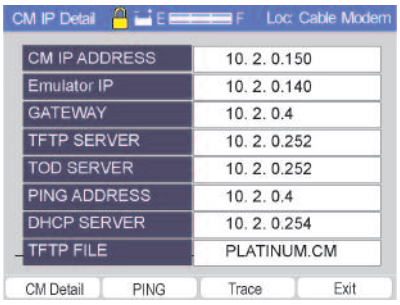
NETWORK TROUBLESHOOTING



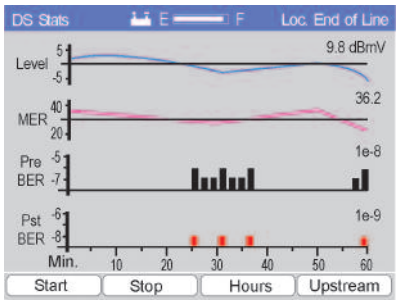
Connection Steps to CMTS



System Performance Overview Main Screen



Pertinent IP Address Display



STATS Mode Display

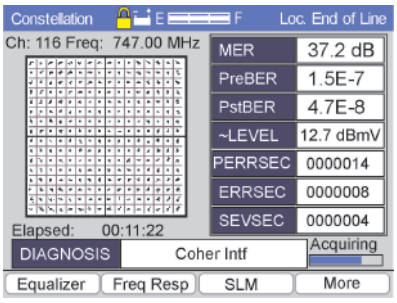
The CM1000 connects to the CMTS and records every step of the connection process so problems can be quickly identified and resolved. If any step fails to complete, errors are reported. View the IP details to ensure that the TFTP process completed properly and that the modem received the correct configuration during provisioning. Once connected, all major upstream and downstream path parameters are displayed on the CM1000's color LCD screen. Results within user programmed limits are displayed in green; results outside of the limits are displayed in red.

Additional results screens allow the technician to drill down to the details that identify specific network problems. The new Stats Mode displays upstream and downstream performance statistics. The user can view up to sixty measurement statistics made on one minute or one hour intervals. The worst-case measurement is graphed for each time period to capture performance data and aid in troubleshooting intermittent faults.

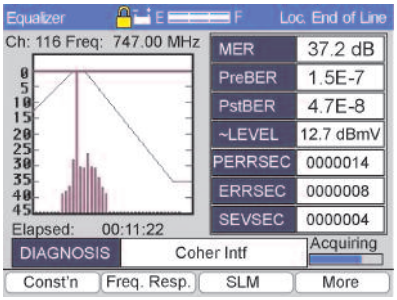
. . .when a DOCSIS system slows down or begins failing, there are four possible problems areas: Downstream, Upstream, Network and Modem/PC.

…constellation display with automatic diagnosis eliminates the guesswork.

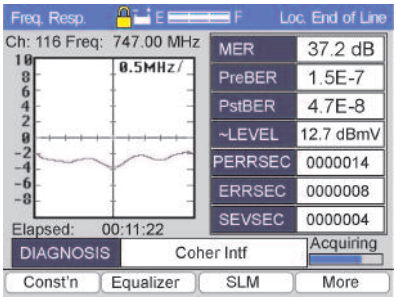
DOWNSTREAM TROUBLESHOOTING



Downstream Screen with Constellation Display



Downstream Screen with Equalizer Display



Downstream Screen with Frequency Response Display

Display the QAM modulated signal and use the CM1000's exclusive Automated Diagnosis function to identify downstream impairments. Automated Diagnosis quickly and reliably identifies impairments such as noise, interference, phase noise, CSO, in-band spurs, laser clipping, and gain problems. Equalizer stress and frequency response screens are also provided for complete downstream troubleshooting.

MER

Modulation error ratio provides early detection of non-transient, digital impairments including system noise, CSO, CTB, ingress and modulator problems. The CM1000's pass/fail display allows technicians to quickly detect if MER meets recommended system levels for 64 QAM or 256 QAM signals. As the number of subscribers increases or VoIP services are deployed, ensuring adequate MER becomes more critical than ever. Poor MER can result in degraded modem performance, due to excessive packet retransmissions, and resultant customer dissatisfaction. Never risk falling over "the digital cliff;" the CM1000 helps you make sure that you have a safe operating margin.

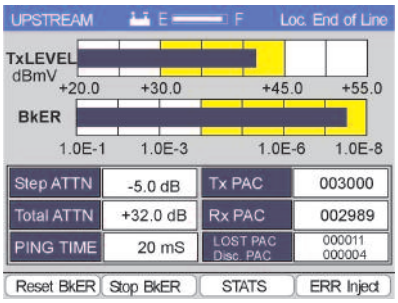
PRE- AND POST-FEC BIT ERROR RATE (BER)

The CM1000's BER display is especially useful for tracking down transient problems such as intermittent ingress and laser clipping. Verify the occurrence of downstream errors with the pre-forward error correction bit error rate (PreBER). Determine if the FEC function is successfully working with the post-FEC BER (PstBER). The display indicates errored seconds for pre- and post-FEC correction. If the errors are not correctable, a Severely Errored Second is displayed—an indicator of poor network performance.

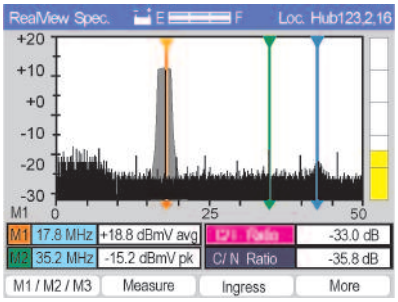
For more information on QAM constellations, MER and BER, go to our online CATV Training page at www.sunrisetelecom.com.

…technicians can detect isolate and repair network issues long before they affect your customers.

UPSTREAM TROUBLESHOOTING



Upstream Screen includes attenuation to the CMTS, and PING time information



Upstream Spectrum Display

Characterize the return path from any point in the network by measuring in-service performance with the Upstream Block Error Rate (BkER) measurement. Characterize the upstream performance and ensure that noise and ingress do not impair upstream data rates; measurements include: upstream BkER, transmitted, received, discarded and lost packets.

The CM1000 displays the upstream transmit power required at the test location and will calculate the system attenuation back to the CMTS. The user can ensure the optimum transmit level, assure an appropriate safety margin, and optimize the return path attenuation for maximum ingress reduction. The CM1000 will even calculate the correct value for reverse path step attenuators.

UPSTREAM SPECTRUM

Eliminate slow uploads due to return path ingress, noise and CPD. The Upstream Spectrum feature offers the simplest automated method for testing and troubleshooting the return path. Use the CM1000 to measure bursty TDMA return signals, intermittent ingress, noise and CPD (common path distortion). Simply set the markers and the CM1000 does all the work, reading out the carrier level of TDMA signals, CPD or ingress, C/I ratio and C/N ratio.

Your technicians know the return path is often the most demanding portion of the network. Let the CM1000 simplify their job with the simplest, automated return path test and troubleshooting process in the field. Set the markers and let the CM1000 provide a simple pass/fail indication or use it to troubleshoot any portion of the return path.

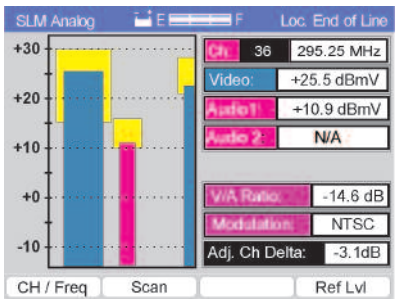
An Ingress screen displays the ingress level, noise level and margin between these and the programmed pass/fail limits. Markers are pre-programmed, but may be repositioned by the user.

(CM1000 only—not available on CM1000A EuroDOCSIS models.)

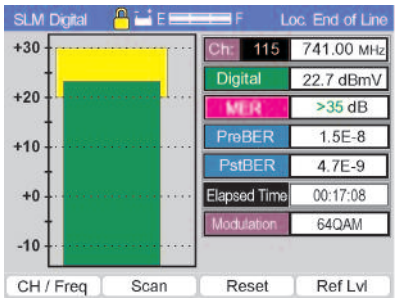
…ensure the optimum transmit level, assure an appropriate safety margin, and optimize the path attenuation for maximum ingress reduction.

…the one-meter solution for North America and worldwide.

INTEGRATED ANALOG & DIGITAL SLM



SLM Analog Display



SLM Digital Display

CM1000 SLM

Accurately measure the level of all common modulated carriers.

- Full analog and digital measurements
- 1 channel, 2 channel, 5 channel and all channel display
- Auto scan with user programmable pass/fail limits
- System tilt, peak-to-valley, and adjacent channel measurements
- Detail screens with all measurement results or limited to results outside the pass/fail limits

Users may select single channel, two channel, five channel or Scan SLM modes to view a variety of channels. The 5-channel mode allows the user to quickly view five favorite channels and the tilt between the highest and lowest. Scan mode provides a display of the entire channel plan including video and audio carriers and digital signals. It also displays summaries of the measurements, including analog and digital results for minimum and maximum level, tilt and Peak-to-Valley. In addition, worst case video-to-audio ratio, worst case adjacent channel ratio and the average analog to digital power ratio measurements are provided. Detail screens allow views of all of the measurement results or are limited to results outside of the programmed limits criteria.

The CM1000 provides complete measurement detail for the selected channel and automatically switches between analog and digital operation.

Analog measurements include:

- Video and Audio Carrier Level
- Video to Audio Ratio
- Adjacent Channel Ratio

Digital measurements include:

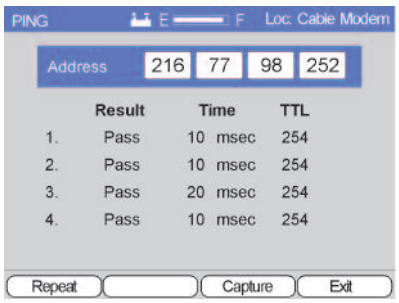
- APL (Average Power Level)
- Pre-FEC BER and Post-FEC BER

CM1000A for international Cable TV DOCSIS Networks:

- Euro-DOCSIS & DOCSIS compatible
- PAL, NTSC and digital measurements
- CE certified

The CM1000A provides analog PAL and NTSC and Annex A, B, and C digital video analysis and US and Euro DOCSIS compatibility with a 6 MHz and 8 MHz IF; all in the same meter.

IP TESTING



IP PING and Trace Route tests are included to aid in network connectivity analysis and troubleshooting. Use PING to test network integrity and Trace Route to identify network routes.

PC EMULATION

Use the PC emulator to get a routable IP address

Use the PC emulator to ensure the modem is providing the user's PC with a routable IP address. Make an FTP connection to upload test results or download CM1000 configuration data. Use the optional web browser to demonstrate network connectivity using the RF or Ethernet interface.

PC-IP SOFTWARE

Set up user configuration databases and view test results with the PC-IP software

The PC-IP software is a Windows® application used to build CM1000 configuration databases and view uploaded test results. PC-IP is compatible with the CM500 and IP Series meters for sharing database information. One program will interface to all CM series SLMs and is available free from the Internet.

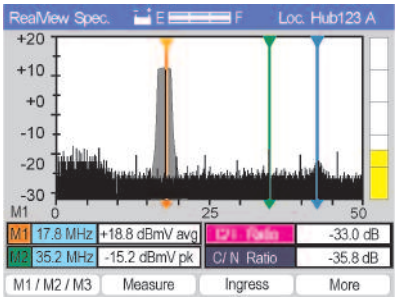
PC-IP allows your technicians to:

- Clone multiple CM1000s or other CM series SLM configurations
- Develop channel tables and limit criteria on your PC and upload them to the CM1000 or place them on an FTP server for download over the network
- Document test results, save the data and upload it on an FTP server for viewing
- Ensure that all your CM1000s and other CM series SLMs have identical configurations and pass/fail limits
- Provide faster and more reliable configuration than setting up each SLM manually

Flexibility…tailor the CM1000 to your specific needs.

HARDWARE OPTIONS

Receive leakage data directly on your CM1000



LP100 LEAKAGE PROFILER

The LP100 Leakage Profiler is the simplest, most comprehensive leakage location and measurement solution on the market. The LP100 employs a wireless link so problems with tangled cable are avoided. Monitor and locate signal leakage and perform FCC required leakage measurements at the drop—or any network location—save the results, along with other measurements, and upload them over the network.

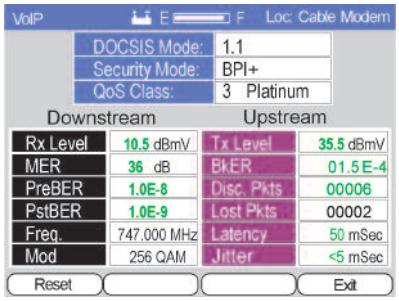
The LP100 Leakage Profiler provides a calibrated dipole antenna required for FCC measurements and a calibrated collapsed dipole for safely working indoors or on congested sidewalks. Operation of the LP100 Leakage Profiler requires a CM1000 equipped with the CM-W wireless interface option. Order the LP100 Leakage Profiler separately and use it with any CM-W equipped CM1000.

DEEP INTERLEAVE (HARDWARE OPTION)

Some digital video modulators utilize a deep interleave on 256 QAM modulation. Adding this option allows the CM1000 to make BER measurements on deep interleave (i=4, j=128) digital video signals.

Flexibility…upgrade your CM1000 with firmware options right in the field.

FIRMWARE OPTIONS



VoIP Services Testing including latency, jitter and lost packets

Surf the Web from the CM1000

VoIP TESTING

The VoIP Testing option adds testing capabilities that allow the user to establish a second service flow to verify QoS. Both upstream and downstream paths are assigned high priority. These service flows are used to test the network between the CM1000 and the Media Gateway. Measurements include latency, jitter and lost packets.

REALVIEW

Test and troubleshoot the return path from anywhere in the network all the way back to the headend. Connect to a realWORX controller to view upstream spectrum displays from Sunrise AT2000/2500 analyzers located at a headend or hub. Communications via the Internet connection allows multiple users to access realWORX with no loss of valuable spectrum. Test and troubleshoot any node back to the hub or headend by viewing the results from any location in the network. Simply select a node and view its return spectrum.

WEB BROWSER

Use the web browser and PC emulation to test in-home RF and Ethernet wiring, routers, PCs or other components. Demonstrate network operation by accessing external web sites. The web browser may also be used to access employee e-mail or workforce management applications via the network. Use the browser for set-top and cable modem provisioning or to view the modem's diagnostic page. Administrator controls allow unlimited browsing or access to specified URLs only.

RETURN PILOT GENERATOR FIRMWARE

Perform return path alignment, test drop cables, and check passives by inserting test signals into the return path with the Return Pilot Generator. This option includes alternating two-tone mode, selectable frequency, level and CW or 16 QAM modulation.

The CE4000 TDR module quickly locates cable faults

CM-USG Upstream Signal Generator Module

CE4000 TDR MODULE

Use the CE4000 to test the span, the drop, and home wiring—without actually going inside. Quickly locate cable faults, loose connectors, bad crimps, damaged cable, water ingress, corrosion, illegal hookups, bad in-home wiring and damaged drop or distribution cable.

- Module plugs into the CM1000 base
- Quickly locates cable faults that cause ingress, leakage and level problems
- Measures distance to Faults and Return Loss
- Store and recall screens
- Built-in cable VOP and Loss tables

CM-USG UPSTREAM SIGNAL GENERATOR MODULE

The USG module may be plugged into the CM1000 base station and used to generate a constant upstream QAM signal. This signal includes a MAC header and the FEC (forward error correction) so that a QAM analyzer, such as the AT2500RQ, can be used to measure the upstream MER, Pre-FEC BER, Post-FEC BER, level, frequency response and group delay.

These upstream signals may be inserted into the return path to characterize the network performance when upgrading from QPSK to 16 QAM. The USG module may also be used to analyze portions of the return to determine suitability for new services.

- Frequency range of 5 to 45 MHz
- Level adjustment from +8.0 dBmV to +60.0 dBmV
- Symbol rate of 1.28, 2.56 or 5.28 MB/S.

…determine which frequencies might best be utilized for new services, before attempting to turn on the service.

FIELD-PROVEN SOLUTIONS

For detailed information on the CM1000 and its options or the name of your local Sunrise representative visit our website at www.sunrisetelecom.com. Or telephone us at 1-800-297-9726 (Int'l calls: 1-514-725-6652).

Sunrise Telecom Broadband is a leader in digital broadband and DOCSIS test instruments for the broadband industry. As part of the Sunrise Telecom family, we leverage the strength of one of the world's largest test and measurement companies to make your job easier. Sunrise Telecom Broadband's field-proven solutions include installation and maintenance instruments, portable headend analyzers and network test systems and software. Our goal is to enable service providers to rapidly deploy television, high-speed Internet, voice and digital video applications.

Based on our core strength in RF testing, we have established a successful track record as a provider of leading edge solutions that incorporate innovative test methods, intuitive user interfaces, and thorough product training. At Sunrise Telecom Broadband, we uncomplicate the engineer's and field technician's day.

JUST ANOTHER WAY WE'RE UNCOMPLICATING CABLE

SUNRISE TELECOM
BROADBAND

North American Toll-Free:
1-800-297-9726
International
1-514-725-6652

www.sunrisetelecom.com
catv@sunrisetelecom.com

U.S. Office
Sunrise Telecom Broadband, Inc.
3250-D Peachtree Corners Circle
Norcross, GA U.S.A. 30092

Canada & International Office
Sunrise Telecom Broadband Corp.
10281 Renaude-Lapointe
Anjou, QC Canada H1J 2T4

Corporate Head Office
Sunrise Telecom
302 Enzo Drive
San Jose, CA 95138 U.S.A.
1-408-363-8000
Fax: 1-408-363-8313

SPECIFICATIONS

DIGITAL SIGNAL ANALYSIS
Modulation Type Downstream:
64/256 QAM (DVS- 031, ITU-T J.83 Annex B, DOCSIS 1.x and Annex A [CE model only]
Lock Range 64 QAM: -20 to +60 dBmV (typical)
Lock Range 256 QAM: -15 to +60 dBmV (typical)
Modulation Type Upstream:
QPSK/16 QAM (controlled by CMTS)
Upstream Transmit Level Range: +8 to +58 dBmV
Downstream Modulation Error Ratio (MER):
Range: 21 to 40 dB Accuracy: ±1.0 dB (typical)

DIGITAL SIGNAL LEVEL METER
Accuracy: ±1.0 dB @ 25°C (typical)
Frequency Range: 50–860 MHz

GRAPHIC DISPLAYS
Constellation: I-Q display of 64 or 256 QAM signal
Bit Error Rate
Downstream BER Range: 1.0×10^{-9} to 9.0×10^{-3}
Errored Seconds: Numerical count of downstream errored seconds
Downstream FEC Lock: Loss/Lock-indication
Severely Errored Seconds: Numerical count of downstream severely errored seconds
Elapsed Time: hr, min, sec
Upstream BkER: BkER, Lost Packet Count and PING time

PLUG-IN INTERFACES
10/100Base-T Ethernet
75 ohm F81 (field replaceable)
RS232, PC interface port

POWER
Power: Internal NiMH battery pack
Operating Time: 3 hours continuous (typical)
External Power: 120/240 VAC Adapter/Charger
12 VDC vehicle charger
Power Reduction: Auto unit shut down

GENERAL
Display: Reflective color active matrix LCD 320 x 240 viewable in full sun
Operating Temperature Range: 0º–50ºC
Specifications subject to change without notice.

ORDERING INFORMATION

CM1000
Includes:
DOCSIS Cable Modem Analyzer, Downstream tuning range: 50-860 MHz, Annex B & C, RF Input F81 75 ohm connector (field replaceable), Serial interface EIA RS-232, Ethernet modem/PC interface, 100-240V battery charger, Quick Start Guide, User's Manual, and Digital Training CD, CE certified.

CM1000A EURO ANALYZER
Includes above with:
8 MHz DOCSIS Analyzer with Analog & Annex A Digital Video test capability (only)
Tuning Range: 69-860 MHz
CE certified

INCLUDED ACCESSORIES:
PC-IP software (except CM1000A), rubber boot, bag, strand hook, RS-232 cable, 100 to 240 V AC charger, manual, training CD-ROM and 12-volt vehicle charger

OPTIONS:
Software/Firmware Options

CM-RPG	Integrated Return Pilot Generator—CW or 16 QAM (no PRBS)
CM-RVIEW	realVIEW remote view of upstream spectrum (realWORX & AT2500R or H required)
CM-WB	Web Browser
CM-VoIP	VoIP Service option provides measurements of Latency, Jitter and Lost Packets

Hardware Options

CE4000	Cable Explorer® TDR Module
CM-USG	Upstream Signal Generator Module provides modulated upstream signal with PRBS
CM-W	Wireless interface for leakage detection (LP100 required)
CM-DVM	Deep Interleave (4, 128 digital video) Digital Video BER Measurements