SmartClass™ Home v3
Inside Wiring and Networks Service Meter

Key Benefits

- Reduce OpEx by decreasing the time that it takes to install and maintain video services
- Reduce CapEx by combining all necessary tests into one complete, easy-to-use, battery-operated, field optimized test set that can test in the field, at the NID, and in the Home
- Avoid the complexity of copper testing with one-button Pass/Fail CableCheck functionality that includes balance testing and good ground capabilities
- Improve efficiency by saving all test results for further analysis and storage

Applications

- Synch up over ADSL through VDSL2 to verify that rates are adequate to provide desired services over single or bonded pairs
- Qualify existing copper pairs for xDSL service
- Verify residential, MDU, and SMB internal wiring using coax cable identification through splitters and other coax network elements as well as Noise Immunity test that measures coax shield isolation
- Validate and troubleshoot live HPNA mode B networks
- Perform accurate tests to locate and troubleshoot disruptions for internal network data, voice, and video service over coax, Cat3/Cat5/Cat5e/Cat6 cables
- Verify Ethernet, POTS, and 802.11b/g wireless functionality to ensure trouble-free services

The SmartClass Home v3 handheld service meter enables verification of high-speed digital subscriber line (ADSL-VDSL2) and Home Phoneline Networking Alliance (HPNA) networks as well as the internal wiring at the customer premises for proper operation of voice, video, and data services. Use the SmartClass Home to test xDSL to the side of the premises, HPNA inside the premises, as well as the coax and twisted pair wiring inside of the subscriber’s location. The SmartClass Home provides an easy-to-use, accurate, and economical measurement tool for service technicians who install or troubleshoot triple-play services over existing or new networks.

The SmartClass Home includes a unique set of features to completely qualify the subscriber’s premises for triple-play services that use xDSL and HPNA technologies as well as the physical media to deliver communication signals throughout the site. Technicians can use the Coax Map feature and the Noise Immunity Test to assess quality and to troubleshoot issues in a coax network. The Active ID can delineate multiple runs of coax in the building even through coaxial splitters. They can use the integrated wiring tools to qualify twisted pairs, including Cat3, Cat5, Cat5e, and Cat6 cables. The SmartClass Home saves time and effort in verifying and troubleshooting inside wiring problems before subscribers notice them.

The SmartClass Home also includes a unique feature set for testing Ethernet data networks in residential and small-to-medium-sized business (SMB) locations. The built-in 802.11b/g wireless feature ensures correct WiFi functionality in and around subscriber locations. Additional features include a fully functional built-in butt-set that can test POTS voice delivery along with wiring identification and toning to locate and identify cables. Combined with an easy-to-use menu structure, the features of the SmartClass Home represent the best all-in-one service and wiring tester available.
The SmartClass Home has a built-in ADSL through VDSL2 modem that supports single or bonded pairs, similar to the one built into the subscriber’s residential gateway or xDSL modem, allowing it to synch up with the local Digital Subscriber Line Access Multiplexer (DSLAM) and establish the best attainable communication rates. Determining what the subscriber’s drop can accommodate is critical, because various disturbers can be present on it. The xDSL synch test conducted with the SmartClass Home v3 can perform measurements of the subscriber’s connection and display rates. Also, while maintaining an xDSL synch, the SmartClass Home will show whether xDSL errors have occurred on the line since testing began. These results let technicians best determine if the subscriber’s network path can carry bandwidth-intensive services such as video, voice, and data, over the xDSL connection or if they must perform additional troubleshooting.

HPNA Network Testing
HPNA, a technology standard developed by the HomePNA™ Alliance, builds on Ethernet and allows all the components of a home network to connect and integrate over an unpredictable wiring topology. The HPNA communication is used to pass information around a home to other HPNA-connected devices. In HPNA mode, the SmartClass Home connects to and communicates with other HPNA-capable devices, or nodes, operating in spectral mode B on the same network.

Establishing itself as a network node on a live HPNA network enables the SmartClass Home to test each of the various nodes on the network. SmartClass Home allows users to segment problem node paths, node-to-node communication issues, or to verify correct functionality of the whole network. The SmartClass Home lets users verify that HPNA networks are operating within expected service quality metrics and set up Pass/Fail limits to help simplify testing.
Coaxial Cable Testing

Coax is gaining popularity as the medium of choice for transferring communications in and around customer premises. Whether the technology is broadcast or IP video, data over coax technologies, or whole-home digital video recorder (DVR) services, the SmartClass Home can ensure proper connection of the inside coaxial plant. The SmartClass Home also helps technicians detect and eliminate unwanted coaxial elements such as hidden splitters, bad barrels, and damaged cables.

Coax Map

The Coax Map feature of the SmartClass Home is a single-ended coax physical layer test based on frequency domain reflectometry (FDR), a powerful technique used in analyzing RF transmission lines. The Coax Map test measures signal quality as it passes through the transmission line by identifying impairments that cause standing waves.

Coax Active Identification

The SmartClass Home helps technicians quickly identify which cable goes to which room in a house. Using the Cable ID mode, technicians can determine coax wire endings for each room with a coax run. A common problem occurs when an unexpected splitter exists in the middle of the coax run. However, the Active IDs of the SmartClass Home work through splitters to display multiple IDs, which helps to locate the wall outlet or outlets that are connected via a splitter network.

Noise Immunity Test

The Noise Immunity Test (NIT) provides good indications of coaxial cable shielding issues. Problems arise when the inside coax has staples, sheared jacketing, an exposed stinger, or an unterminated end present. The NIT increases a technician’s chance of catching impairments before subscribers experience service degradation. The NIT measures the signal strength of local FM carriers and compares it to the same measurement on the cable to determine the isolation of the coax to off-air ingress.
Twisted Pair Testing
The SmartClass Home provides a suite of twisted pair measurements to ensure the correct connections and wiring of POTS and Ethernet cables.

Twisted Pair Wire Mapping
The Twisted Pair Wire Map provides details about the cable length, distance to opens and shorts, skew, and the connection mapping of each wire when used with the SmartRemote. This information lets technicians quickly locate improper wire connections and the presence of physical layer issues. The SmartClass Home can map different types of twisted pair cables such as Cat5/5e/6 Ethernet and straight or Cat3 phone wiring.

Butt-Set
The SmartClass Home has a built-in butt-set with speaker phone that helps technicians quickly verify voice communications and troubleshoot POTS issues. The results indicate voltage and current on the line as well as the number dialed and the status of the POTS line. Technicians can store a list of frequently called numbers for easy dialing. The butt-set provides call waiting and displays the caller ID for incoming calls. The speaker phone lets technicians listen for dial tone or voice and talk during calls without a separate headset.
Ethernet
The SmartClass Home includes a suite of Ethernet connectivity tests to help users quickly identify connectivity issues on customer premises equipment (CPE) connected to the network.

Port Discovery
The Port Discovery test displays the established link rate on the Ethernet connection between the SmartClass Home and a router. It also displays the available rates and the signal-to-noise ratios (SNRs) of each active twisted pair. This information helps technicians pinpoint connection issues between the CPE devices and the premises router.

Ping
Ping tests let technicians verify network connectivity to a particular Internet Protocol (IP) or Universal Resource Locator (URL) address. They can also verify that a particular location can reach either the Internet or a specific server on the network, which lets technicians avoid using customer equipment or a laptop to perform simple connectivity tests.

Hub Flash
Hub Flash test is an additional Ethernet test available on the SmartClass Home intended for locations with multiple Ethernet connections running to a central device. The Hub Flash will cause the port light to flash on the hub/switch/router indicating that the SmartClass is connected. This simple identification method lets technicians quickly determine which port is connected to a particular run.

Wireless 802.11b/g
The SmartClass Home provides optional WiFi wireless 802.11b/g testing capabilities to show the secure set identification (SSID), configured channel, 802.11 modulation, mode, and signal strength at the test location of each wireless 802.11b/g network in the area. It also indicates whether the network is secure or vulnerable to security threats. This capability lets technicians properly set up the subscriber’s network and troubleshoot wireless connectivity or issues with websurfing speed.
Copper
The SmartClass Home provides an automatic one-button CableCheck function with Pass/Fail results for important copper test parameters, even in environments that produce a high level of noise and interference. Using the CableCheck test sequence, SmartClass Triple-Play Service (TPS) users can secure accurate test results with minimal training and identify obvious copper faults, such as a misconnection or copper loops that are too long. Basic tests include digital volt-ohm meter, opens, balance, and load coil, which eliminate technicians having to carry separate tools.

Fiber
Field technicians can use the SmartClass Home together with the JDSU MP-60 USB Optical Power Meter (OPM) for various fiber (FTTx) installations to ensure that fiber cable attenuation falls within Pass/Fail limits before connecting it to the optical network transport (ONT).

File Manager/Job Manager
Users can save the results for almost all tests for archival and future review. The unit saves the results in the common .csv format which can be opened using various spreadsheet and other applications. Files can be exported via a common universal storage bus (USB) flash storage device. The SmartClass Home can hold thousands of result files that can be removed, renamed, and exported from the unit easily using the built-in File Manager application.
Specifications and Features

Available Configurations
- xDSL sync, HPNA testing, Physical layer testing (coax and twisted pair), Ethernet, BUII-S, Wireless 802.11b/g/WiFi
- Smartclass Home V3

Physical Test Interfaces
- Coax F-connector for coax mapping, NIT, and HPNA
- RJ11 for phone wiring and dry pair testing
- RJ45 for Cat5/6 wiring and Ethernet testing
- RJ45 for VDSL line testing
- RJ45 for through mode VDSL testing
- Connector LEDs for easy connector identification

xDSL
- Test Interface: ADSL/VDSL2
- Single/Bonded

Modem Chipset
- Broadcom 93638

VDSL Standard Compliance
- ITU-T G.993.1 A, B (G.DMT)
- ITU-T G.992.3 A, B, L (ADSL2+)
- ITU-T G.992.5 Annex A, B, M
- ANSI T1.413-1998, Issue 2
- ITU-T G.992.5 WP Amendment 3

Physical Layer Features
- Link state
- Actual line rate
- Maximum line rate
- Capacity
- Noise margin
- Length
- Bonded Pair Features
- Actual line rate
- Maximum line rate
- Capacity
- Lapse time

xDSL Errors (displays the number of occurrences)
- Forward error correction (FEC)
- Cyclic redundancy check (CRC)
- Severely errored frame (SEF)
- Loss of sight (LOS)
- Line errors

HPNA
- Coppergate CG3110 Chipset
- Supports only Spectral Mode B: 12-28 MHz; 2, 4, 8, 16 Mbauds
- Standard Compliance: ITU-T G.992.4
- Settings
- Configurable Host of Client mode
- Configurable Band plan
- Configurable IP settings

General Connection Status
- Link status
- Operating mode
- HPNA version
- Device list including indication of test set and host
- Device MAC identification

HPNA Network Results
- Segment specific rate, constellation, and baud
- Segment specific packet error rate (PER)
- Segment specific SNR
- Segment specific receive power

Cable ID and Toning
- Settings
- Constant High pitch (176 Hz)
- Constant Low pitch (651 Hz)
- High pitch then a low pitch
- Low pitch with a short high pitch

Coax Mapping
- Features
- Measures cable length in feet (up to 500 ft at ±5 ft)
- Measures return loss in dB (up to 20 dBm at ±2 dB)

Cable Events Identified
- Open, splitter, low-quality splitter, barrel/splice

Noise Immunity Test
- Features
- Measures cable shield isolation vs. settable threshold (def 30 dB)

Active Identification
- Features
- Identifies coax cables through most coax network elements
- Identifies multiple IDs attached to the branch of coax being tested

Wiring Tool
- General Features
- Supports Cat3, Cat5/6, coax cable
- Detects power present on cables being tested
- Measures cable length based on capacitance setting
- Detects opens, shorts, and crossed pairs and display wires mapping

Dry Pair
- General Features
- Identifies resistive opens and shorts on dry twisted pair
- Reports AC voltage presence or DC voltage presence on dry twisted pair (up to 120 VDC, 120 Vrms AC)

Copper Test
- Test Range Resolution Accuracy
  - AC Volts: 0 – 300 Peak V 2% ±1 V
  - DC Volts: 0 – 300 V 2% ±1 V

Resistance
- 0 – 999 W 1% ±.25 W
- 1 – 99.9 kW 1% ±.25 W
- 10 – 99 kW 1% ±.25 W
- 100 – 999 kW 1% ±.25 W
- 1 – 9.9 MW 1% ±.25 W
- 10 – 100 MW 1% ±.25 W

Leakage
- 0 – 999 W 1% ±.25 W
- 1 – 9.99 kW 1% ±.25 W
- 10 – 99 kW 1% ±.25 W
- 100 – 999 kW 1% ±.25 W
- 1 – 9.9 MW 1% ±.25 W
- 10 – 100 MW 1% ±.25 W

Distance to Short
- 0 – 30 kft/10 km 1 ft/1 m

Capacitance/Opens
- 0 – 2,999 ft/999 m 1 ft/0.1 m 2.5% ±.45 pf
- 0 – 44.9 nF
- 3 k ft/1 km – 66 k ft/20 km 1 ft/0.1 m 2.5% ±.45 pf
- ±0.1 m

DC Current
- 0 – 110 mA 1 mA ±2% ±.1 mA

Longitudinal Balance
- 35 – 70 dB 1 dB 2 dB

Load Coil Counter
- 0 – 27 k ohms ±1 m up to 5 ±1

WiFi
- Features
- Detects all available WiFi (802.11b/g) networks
- Reports power level, operating mode, security setting, 802.11 version, channel, SSID, and MAC

Ethernet Testing
- Features
- Supports 10/100 Mbps testing over RJ45 interface
- Port Discovery
- Identifies Ethernet setting on port
- Displays link rate
- Reports pair skew
- Reports frequency offset in ppm

Ping Test
- Supports manual or DHCP IP configuration
- Reports packets sent and received
- Reports average test packet delay
## Specifications and Features (Continued)

<table>
<thead>
<tr>
<th>Butt-Set</th>
<th>General</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North American POTS Butt-Set Only</strong></td>
<td><strong>Power Supply</strong></td>
<td><strong>Operating humidity</strong></td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>Field replaceable, rechargeable lithium ion battery</td>
<td>10 to 80% RHNC</td>
</tr>
<tr>
<td>Supports loop start dial tone POTS testing on twisted pair</td>
<td>Operating time approximately 4.5 hrs continuous (typical)</td>
<td></td>
</tr>
<tr>
<td>Supports receiving a call</td>
<td>Charging time, internal 4-6 hrs from empty to full charge</td>
<td></td>
</tr>
<tr>
<td>Supports line monitor mode with DTMF decode</td>
<td>DC input 12 V, 1.25 A</td>
<td></td>
</tr>
<tr>
<td>Supports caller ID, call waiting, with caller ID errors</td>
<td>100/240 V, 50/60 Hz auto-sensing AC adapter for line operation and charging</td>
<td></td>
</tr>
<tr>
<td>Microphone and speakerphone support</td>
<td><strong>Permissible Ambient Temperature</strong></td>
<td></td>
</tr>
<tr>
<td>Measures voltage from 0 to 105 V, ±4%</td>
<td>Nominal range of use</td>
<td>−5 to +50°C (23 to +120°F)</td>
</tr>
<tr>
<td>Measures loop current from 14 to 108 mA ±4%</td>
<td>Storage and transport</td>
<td>−30 to +60°C (−22 to ±140°F)</td>
</tr>
</tbody>
</table>

## Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SmartClass Home V3</td>
<td>SC-Home-V3</td>
<td>xDSL, HPNA, and inside wiring test tool for coax and twisted pair with included butt-set, WiFi, and Ethernet verification tools</td>
</tr>
<tr>
<td>SmartClass Home HPNA</td>
<td>SC-Home-HPNA</td>
<td>HPNA, and inside wiring test tool for coax and twisted pair with included butt-set, WiFi, and Ethernet verification tools</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active IDs 1-8</td>
<td>SC-HOME-IDSET-V3</td>
<td>Active IDs 1-8 for identifying single or multiple coax run locations. Works through splitters.</td>
</tr>
<tr>
<td>CB-5CLIP-BON</td>
<td>CB Bonded RJ to RJ bonded DSL cable</td>
<td></td>
</tr>
<tr>
<td>6-pin Banjo</td>
<td>SCHM6PINADAPTER</td>
<td>6-pin adapter—6-pin banjo—Breaks out POTS connection for use with alligator clips</td>
</tr>
<tr>
<td>Toning Wand</td>
<td>SCHMTONERTRACER</td>
<td>Toner Tracer wand TT100</td>
</tr>
<tr>
<td>Vehicle Charger</td>
<td>SCHMCARCHGR 12</td>
<td>VDC vehicle charger adapter</td>
</tr>
</tbody>
</table>

### Replacement Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coax Resistive IDs</td>
<td>SCHCMCOAXRESID</td>
<td>Replacement coax resistive IDs 1-8 for locating single coax runs</td>
</tr>
<tr>
<td>Active IDs 1-8</td>
<td>SC-HOME-IDSET-V3</td>
<td>Active IDs 1-8 for identifying single or multiple coax run locations. Works through splitters.</td>
</tr>
<tr>
<td>Ethernet Resistive IDs</td>
<td>SCHM RJ45RESID</td>
<td>Replacement RJ45 resistive IDs 1-8 for locating single Ethernet runs</td>
</tr>
<tr>
<td>Phone Resistive IDs</td>
<td>SCHMRJ 11RESID</td>
<td>Replacement RJ11 resistive IDs 1-8 for locating single POTS runs</td>
</tr>
<tr>
<td>Phone Patch Cable</td>
<td>SCHMRJ 11 PATCH</td>
<td>Replacement RJ11 8-in patch cable</td>
</tr>
<tr>
<td>Ethernet Patch Cable</td>
<td>SCHM RJ 45 PATCH</td>
<td>Replacement RJ45 12-in patch cable</td>
</tr>
<tr>
<td>Phone to Coax Adapter</td>
<td>SCHM RJ 11 TO COAX</td>
<td>Replacement RJ11-to-coax adapter cable for toning</td>
</tr>
<tr>
<td>Strand Hook</td>
<td>SCHM SA DRA NG HOOK</td>
<td>Replacement Stand Hook—clip to hold or hang unit</td>
</tr>
<tr>
<td>Smart Remote</td>
<td>SCHMSMARTREMOTE</td>
<td>Replacement SmartRemote—yellow RJ11 and RJ45 used to map out twisted pair connections</td>
</tr>
<tr>
<td>NIT Antenna</td>
<td>SCHMANTENNA</td>
<td>Replacement antenna for NIT calibrating off-air FM frequencies</td>
</tr>
<tr>
<td>Large Carrying Case</td>
<td>SC-HOME-BAG-V3</td>
<td>Replacement large carrying case for unit and accessories</td>
</tr>
<tr>
<td>Replacement Battery</td>
<td>SCHMLIOBAT T4</td>
<td>Standard lithium ion battery for replacement or spare</td>
</tr>
<tr>
<td>Replacement Charger</td>
<td>SCHMCHARGER</td>
<td>Replacement AC charger—power supply and cable</td>
</tr>
<tr>
<td>Replacement Sleeve</td>
<td>SCHMSLEEVE</td>
<td>Replacement protective canvas sleeve to cover the unit</td>
</tr>
</tbody>
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## Test & Measurement Regional Sales

<table>
<thead>
<tr>
<th>Region</th>
<th>Tel</th>
<th>Fax</th>
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<tbody>
<tr>
<td>NORTH AMERICA</td>
<td>+1 866 228 3752</td>
<td>+1 866 335 9216</td>
</tr>
<tr>
<td>LATIN AMERICA</td>
<td>+1 954 688 5660</td>
<td>+1 954 345 4668</td>
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<tr>
<td>ASIA PACIFIC</td>
<td>+852 2892 0990</td>
<td>+852 2892 0770</td>
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<tr>
<td>EMEA</td>
<td>+49 7121 86 2222</td>
<td>+49 7121 86 1222</td>
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<tr>
<td><a href="http://www.jdsu.com/test">www.jdsu.com/test</a></td>
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