



**"Results You Can Count On"**

**Noise Testing of G.hn over Twisted Pair Cable, Coax and Power Lines.**



**4902-Portable**

**Accepts 1-4, 2 or 4-Port  
Independent AWG Cards**

**Built-In Monitor & Keyboard**

**Both use the same  
software and accessories**

**4902-HD**

**Accepts 1-6, 2 or 4-Port  
Independent AWG Cards**

**Rack Mountable**

**20 kHz to 300 MHz Universal Noise Generator for Realistic G.hn Testing  
AWGN Dynamic Range-90 dBm/Hz to -160 dBm/Hz in 1dB steps\*  
Up to 24 Independent Noise Ports**

G.hn technology promises to bring a wealth of new opportunities to Service Providers, Electric Companies and Municipalities as well as manufacturers of Modems, WI-FI Extenders and Chipsets. This exciting new technology allows for a more efficient use of existing copper infrastructure on electrical wiring, twisted pair copper cable or coaxial cable by utilizing the spectrum up to 100 MHz or 200 MHz with Wave 2 devices implementing SISO or MIMO. This increases data rates far beyond current levels, making bandwidth-intensive applications such as IPTV and Triple Play available in many areas where it was not possible before using existing wiring.

User-friendly configuration software allows the user to select and build impairment models common to G.hn network implementations. A generous assortment of custom crosstalk as well as impulse noises (e.g., REIN, SHINE and PEIN) can be created. It can also generate a wide variety of interferences from 100kHz to 300 MHz that may impact G.hn deployments. These include background Gaussian noise, high frequency impulse noise from the AC electrical wiring (REIN) and other types of impulse noise (PEIN, SHINE & WHINE), FM radio, Broadcast TV, Spark Plug Ignition noise, PLC noise, Reverse Power Feed noise and more. In addition, user-defined files in several formats (such as MATLAB, CSV and Excel) may be imported.

The Model 4902 Universal Noise Generator is available in two versions – portable and rack-mountable. The portable unit provides 2 to 16 independent Arbitrary Waveform Generator (AWG) outputs and includes a keyboard and built-in display. The higher-density version is rack-mountable and may be configured for 2 to 24 independent AWG outputs.

\*when using low noise mode injector

**“Results You Can Count On”****Highlights**

- Bandwidth 20 kHz to 300 MHz
- Suitable for wide range of applications including G.hn PLC and G.hn Access on twisted pair or coax testing
- Crest Factor greater than 5
- High degree of accuracy
- Expandable, modular design
  - High-density version holds up to 6 (2 or 4-port) AWG cards for a maximum of 24 AWG outputs
  - Portable version holds up to 4 (2 or 4-port) AWG cards for a maximum of 16 AWG outputs
- Inject crosstalk and impulse noise combined
- Noise Floor below -166dBm/Hz (when using low noise mode injector)
- Independent control of each AWG output
- Select from common crosstalk types such as DSL, specify NEXT, FEXT and number of disturbers
- Standardized Impulse noises such as REIN, SHINE, PEIN, and Switching Power Supply noise
- Real world measured Impulse noises for G.hn
- Add in RFI and AWGN (at variable levels)
- Specify impedance, sampling rate and DUT location
- Optional noise modules setup and run all tests in standard automatically
- Design custom twisted pair loops with Loop Configuration Editor
- Save custom noise files or entire configurations to repeat tests with ease and accuracy
- Import MATLAB (.mat), CSV, or Excel (.xls) noise files
- Remote control via Ethernet
- Adjust amplitude of Crosstalk and Impulse noise
- G.hn Specific Noise
  - Background Gaussian Noise (Piecewise Flat, Colored)
  - High Frequency Impulse Noise (REIN)
  - Low Frequency Impulse Noise (PEIN, SHINE)
  - PLC Alien Noise
  - RFI (FM, Broadcast TV)
  - Spark Plug Ignition Noise
  - Reverse Power Feed Noise

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**Ordering Information**

Model Number	Description
<b>4902-Portable</b>	<ul style="list-style-type: none"> <li>• Telebyte Portable computer w/built-in display &amp; keyboard</li> <li>• Includes Noise Generation Software</li> <li>• Accepts 1-4, 4902-AWGx cards</li> </ul>
<b>4902-HD</b>	<ul style="list-style-type: none"> <li>• Telebyte High-Density, rack-mountable computer</li> <li>• Includes Noise Generation Software</li> <li>• Accepts 1-6, 4902-AWGx cards</li> </ul>
<b>4902-AWG2-300</b>	2-Port AWG Card - 600 MS/s, supports 1 kHz to 300MHZ
<b>4902-AWG4-300</b>	4-Port AWG Card - 600 MS/s, supports 1 kHz to 300MHZ
<b>4902-D4-120</b>	4-Channel Differential Mode Noise Injector (20 kHz to 120 MHz) Plus Micro Interrupts and Distributed Noise
<b>4902-2-300-COAX</b>	2-Channel Coax Cable Noise Injector (20 kHz to 300 MHz) for Coaxial Cable. Interface is Coax F-Type Connector
<b>4902-2-300L-TPD</b>	2-Channel Differential Mode Noise Injector (20 kHz to 300 MHz) for Twisted Pair Cable. Interface is CAT6 RJ45 Connector. Included low noise mode.

Impulse and crosstalk noises must be carried out on two different AWG cards. 4902-AWGx card types may be combined on one 4902 computer. Please consult a Telebyte sales representative for more information.



4902-2-300-COAX

2-Channel 300 MHz COAX Noise Injector



4902-D4-120

4 channels of independent differential mode noise injection, distributed noise, micro-interrupts and integrated noise combining. Used with Balun that converts RJ-45 100 ohm differential to BNC 50 ohm single-ended signal for G.hn PLC noise injection.



4902-2-300L-TPD

2-Channel 300 MHz Twisted Pair Noise Injector with Low Noise Mode. Used with Balun that converts RJ-45 100 ohm differential to BNC 50 ohm single-ended signal for G.hn PLC noise injection.



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## Specifications

4902-Portable Specifications	
Remote Commands	Telnet
Included Software	Telebyte Universal G.hn Noise Generator Software
Power supply	AC 90 V to 264 V, 47 to 63 Hz
Operating Temperature Range	0 to 50 °C
Operating Relative Humidity	5% - 95% non-condensing
Mechanical Dimensions	DxWxH: 9.5" D x 13.5" W x 17.5" H
Weight	32 lbs.
Connectors	10 USB 3.0 Ports, 4 USB 2.0 Ports (2 front), 2 RJ-45 Gigabit LAN
Display	Integrated 17.3-in WUXGA+ (1920 x 1080) display

4902-HD Specifications	
Remote Commands	Telnet
Included Software	Telebyte Universal G.hn Noise Generator Software
Power supply	AC 90 V to 264 V, 47 to 63 Hz
Operating Temperature Range	0 to 50 °C
Operating Relative Humidity	5% - 95% non-condensing
Mechanical Dimensions	DxWxH: 19.5" D x 16.8" W x 7.0" H
Weight	32 lbs.
Connectors	10 USB 3.0 Ports, 2 eSATA Ports, 2 RJ-45 Gigabit LAN

4902-AWGx-300 Specifications	
Bandwidth	1 kHz to 300 MHz
Noise Outputs	4902-AWG2-300: 2 4902-AWG4-300: 4
Interference Profile Accuracy	≤ 0.5 dB mean absolute error (MAE) for Crosstalk PSD
AWGN Crest Factor	> 5
AWGN Gap	< 10%
Output Impedance	50Ω unbalanced
SMA Connectors	4902-AWG2-300: 2 4902-AWG4-300: 4



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**Specifications (continued)**

<b>4902-D4-120 4-Channel Noise Injector Specifications</b>	
<b>Bandwidth</b>	20 kHz to 120 MHz continuous frequency response of signal path
<b>Injection Type</b>	Differential Mode
<b>Insertion Loss of Noise Injection Path</b>	Differential Mode 0 dB ± 0.5dB
<b>Maximum RMS Output</b>	+5 dBm into 50 Ω
<b>Crest Factor</b>	Greater than 5
<b>Noise Floor</b>	Below -150 dBm/Hz as measured at the output of the noise injector
<b>Connectors</b>	<ul style="list-style-type: none"> <li>• SMA: (2) Female Connectors per channel for Independent Differential Mode noise from 4902-Portable or 4902-HD; (2) for distributed noise</li> <li>• 8 Cat6 RJ-45 Connectors on front (2 Input/Outputs for each channel)</li> <li>• Used with Engineering Adapter that converts RJ-45 100ohm differential to BNC 50 ohm single ended signal for G.hn PLC noise injection</li> </ul>
<b>Micro Interruptions</b>	<ul style="list-style-type: none"> <li>• Location: On any single channel</li> <li>• Method: Type-1, Type-2, or Type-3 as defined in TR-249 Issue 1</li> <li>• Interrupt Time: 5ms to 100ms in 1-ms increments</li> </ul>

<b>4902-2-300-COAX 2-Channel Noise Injector Specifications</b>	
<b>Bandwidth</b>	20 kHz to 300 MHz continuous frequency response of signal path
<b>Injection Type</b>	Single Ended
<b>Insertion Loss of Noise Injection Path</b>	0 dB ± 0.5dB
<b>Maximum RMS Output</b>	+5 dBm
<b>Crest Factor</b>	Greater than 5
<b>Noise Floor</b>	Below -150 dBm/Hz as measured at the output of the noise injector
<b>Connectors</b>	<ul style="list-style-type: none"> <li>• SMA: (3) Female Connectors per channel for Independent Differential Mode noise from 4902-Portable or 4902-HD;</li> <li>• 4 F-Type Coax Connectors on front (2 Input/Outputs for each channel)</li> </ul>

<b>4902-2-300L-TPD 2-Channel Noise Injector Specifications</b>	
<b>Bandwidth</b>	20 kHz to 300 MHz continuous frequency response of signal path
<b>Injection Type</b>	Differential Mode
<b>Insertion Loss of Noise Injection Path</b>	Differential Mode 0 dB ± 0.5dB
<b>Maximum RMS Output</b>	+5 dBm
<b>Crest Factor</b>	Greater than 5
<b>Noise Floor</b>	Below -166 dBm/Hz as measured at the output of the noise injector (with the low noise mode enabled)
<b>AWGN Dynamic Range</b>	-90 dBm/Hz to -160 dBm/Hz in 1dB steps
<b>Connectors</b>	<ul style="list-style-type: none"> <li>• SMA: (3) Female Connectors per channel for Independent Differential Mode noise from 4902-Portable or 4902-HD;</li> <li>• 4 Cat6 RJ-45 Connectors on front (2 Input/Outputs for each channel)</li> </ul>

Specifications are subject to change without notice. Made in USA.



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## **Additional Features Included in Base System**

### **G.hn Specific Noise**

- Background Gaussian Noise (Piecewise Flat, Colored)
- High Frequency Impulse Noise (REIN)
- Low Frequency Impulse Noise (PEIN, SHINE)
- PLC Alien Noise
- RFI (FM, Broadcast TV)
- Spark Plug Ignition Noise
- Reverse Power Feed Noise

### **Other**

- Loop Editor
- Preconfigured Loops