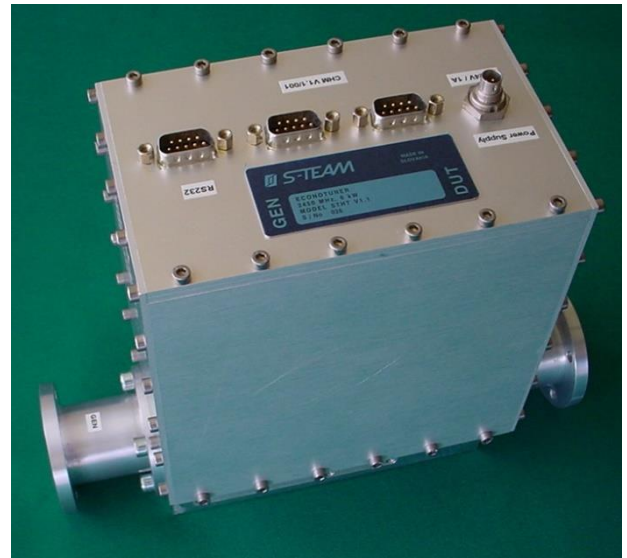# STH-C8/26 V1.1 2450 MHz Coaxial Hot Measurement System

Basic Description

The HOMER-Series STH-C8/26 Analyzer is an automatic impedance and power measurement system based on 70.7-Ω 8/26 coaxial transmission line. The system works under the full-power operating conditions of magnetron-based microwave generators and measures both the magnitude and phase of the reflection coefficient as well as incident, reflected and absorbed powers and frequency. The system is designed for CW, high-ripple (Rectified) and Pulsed operation modes. STH can be:

- Controlled from a personal computer or another controller via the following communication interfaces:
  - RS232 or RS422,
  - CAN (Controller Area Network),
  - Ethernet/IP.

- Integrated into a LabVIEW environment.

The system comes with its own software (Server) and documentation.

Principle of Operation

The HOMER Analyzer is based on the six-port reflectometer (SPR) principle. SPR is capable of measuring the complex reflection coefficient of a load as well as the incident, reflected and absorbed powers. A frequency counter is also integrated with the system. The conceptual simplicity of SPR facilitates its stable and temperature-independent operation of over long periods of time. The system parameters required for the computations are obtained in the process of factory-made calibration where a collection of impedance standards is used in place of load. It is recommended that the recalibration be performed once a year.

Reflectometers of this type are especially suitable for industrial applications where on-line monitoring and control under full working power is required.

Modes of Sampling

HOMER supports three modes of signal sampling, named *CW*, *Rectified*, and *Pulsed*.

CW mode is applicable to unmodulated microwave signals with output power ripple not exceeding 15% of the peak value.

Rectified mode is designed for slowly pulsing microwave signals (up to 400 Hz repetition rate). Such signals are typical for magnetrons powered by low-cost power supplies which incorporate simple half-wave or full-wave rectifiers.
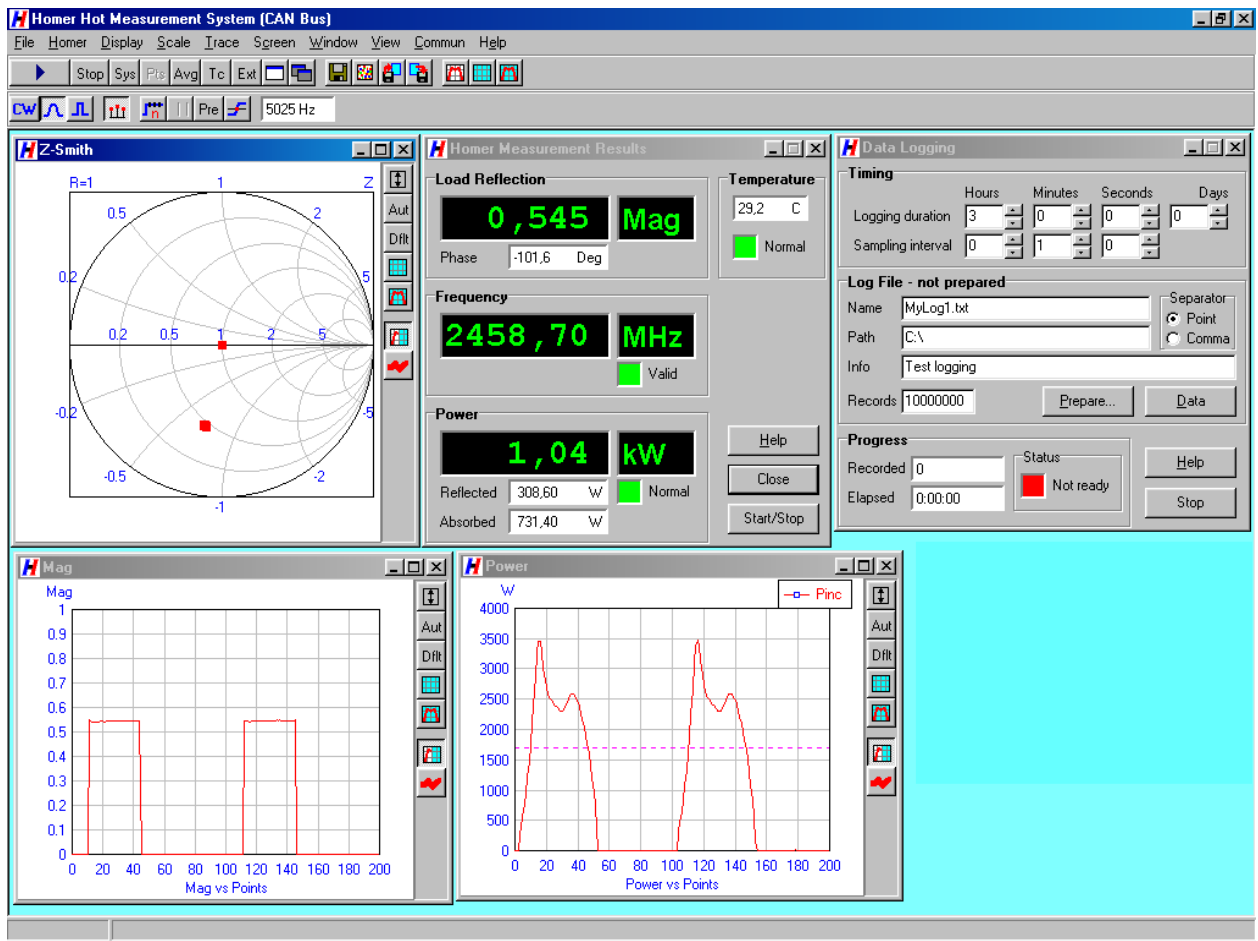
Pulsed mode option is intended primarily for sampling fast pulse-modulated microwave signals with pulse widths down to 100 μs.

Rectified and Pulsed modes can provide both instantaneous and average values of the reflection coefficient and power.

HomSoft Windows Control, Visualization and Data Logging Software

The *HomSoft* control, visualization and data logging software significantly expands the system capabilities. The basic features include:

- Microsoft Windows® environment
- Accurate measurement of the complex reflection coefficient and its displaying in various formats, including
  - Magnitude
  - Phase
  - Return Loss
  - VSWR
  - Polar Display
  - Smith Charts (Z and Y)
  - Rieke-Type Chart
- Measurement of incident, reflected, and absorbed power and its displaying in various formats, including watts, decibels, percentage of incident power

- Numerical readout of signal frequency, load reflection coefficient and power in various formats
- Arbitrary shifting of the measurement plane
- Saving measured data as tables (text files) or pictures (BMP, GIF, JPG)
- Periodic data logging of all or some of the measured quantities
- Multiple windows enabling simultaneous observation of various quantities in different formats
- Wide selection of appearances of displayed curves
- Storing and retrieving of complete system settings tailored to particular tasks
- DDE server option enables another Windows application to share measurement results
- Extensive on-line help

Specifications

Electrical	
Transmission line type	8/26 coaxial (inner conductor diameter 8 mm, outer conductor bore diameter 26 mm)
Characteristic impedance	70.7 Ω
Flange	See dimensional drawing below
Frequency range	2425 − 2475 MHz
Maximum working power[1][2]	3 kW
Minimum working power	1 W
Dynamic range of working power	20 dB
Reflection coefficient measurement error (uncertainty circle radius)	0.05
Incident power measurement error (matched load)	± 5 %
Power supply voltage	24 V ± 10% DC
Power consumption	0.7 A
Interface	RS232, RS422, CAN, Ethernet/IP
Modes of operation	CW, Rectified, Pulsed
Max ripple in CW mode	15 % of peak value
Max repetition rate of signal envelope in Rectified mode[3]	400 Hz[3]
Min pulse width in Pulsed mode	100 μs
Mechanical	
Mass	2.6 kg (5.73 lb)
Length	228 mm (8.98 in)
Width	90 mm (3.54 in)
Height	197 mm (7.76 in)
Environmental	
Operating temperature range	+5 to +55 °C
Storage temperature range	-10 to +125 °C

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[1] Actual maximum working power is fixed according to customer's demand (must not exceed 3 kW). The actual minimum working power is 20 dB (=dynamic range) below the actual maximum operating power or 1 W, whichever is greater.

[2] In Rectified and Pulsed modes, maximum power means **peak** power (not its mean value).

[3] Signal envelope repetition rate (ripple period) f_e is determined by power line frequency f_p and the rectification method. Examples: Half-wave-rectified signal $f_e = f_p$; full-wave-rectified signal $f_e = 2f_p$; 3-phase ripple period $f_e = 3f_p$ (half-wave rectification), $f_e = 6f_p$ (full-wave rectification).

Configurations

Basic Configuration

- STH + Internal firmware (Server)
- RS232 or RS422 serial interface
- CW and Rectified modes of operation
- Operating handbook (pdf)
- Communication protocol manual (pdf)
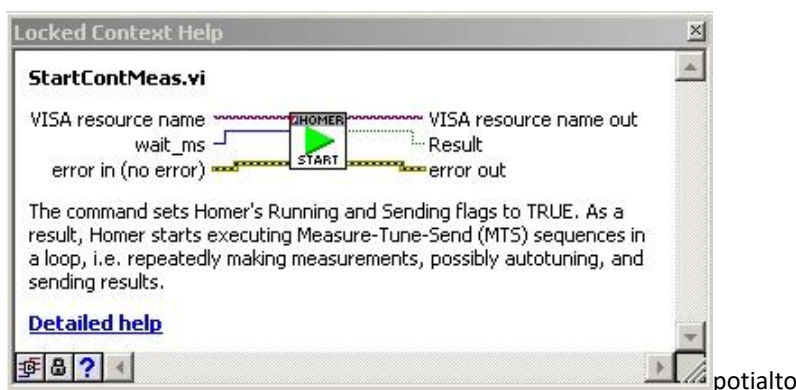- Set of standard cables[4]

Options

1. *HomSoft* Windows visualization and control software
2. Pulsed mode of sampling
3. n/a
4. CAN Bus communication interface (includes CAN Bus cable)
5. CAN-USB Adapter (to connect a PC to CAN Bus network)
6. LabVIEW HOMER Virtual Instruments Library
7. Dynamic Data Exchange (DDE) server in *HomSoft* Windows SW[5]
8. Technical support in hours (four hours are complimentary)
9. n/a
10. n/a
11. Ethernet/IP communication interface

Miscellaneous

CAN-USB Adapter. To connect your PC with a CAN Bus network (or with the STHT alone), either the Peak PCAN-USB Interface or Sontheim CAN USB Light Dongle adapter is needed. You can order it as an option. Another possibility is to buy the dongle yourself from the manufacturer (visit the links above).

LabVIEW Homer Virtual Instruments Library enables HOMER control and monitoring (measurement results retrieval) from within the National Instruments' LabVIEW environment. The library consists of a number of virtual subinstruments and is accompanied by a few useful examples. The library enables users to integrate HOMER into their own applications with much less effort than trying to start from scratch by studying HOMER communication protocol and programming the communication themselves.

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DDE Server. DDE Server is a functionality within the *HomSoft* Windows SW hence it needs the *HomSoft Windows visualization and control software* option, too. The DDE Server enables another (customer's) Windows program to extract measurement results from *HomSoft* program, e.g. to a LabVIEW environment.

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[4] Set of standard cables includes DC power supply cable, RS232/RS422 cable, and, in case of CAN Bus, CAN Bus cable.
[5] *HomSoft* Windows visualization and control SW option required.

Technical support. Very often users, especially in the initial phase, need counsel about issues that are not the matter of HOMER itself but of their particular application, or about topics that are in detail described in the accompanying documentation. Four hours of such support are provided free of charge; additional support should be ordered.

Basic Dimensions (in millimeters)