

TSviewLite Software User Manual

Graphical User Interface for RFbeam K-TS1 Testsystem

Getting Started with TSviewLite

RFbeam TSviewLite is a graphical user interface (GUI) for our K-TS1 test system. TSviewLite presents a comfortable user interface and allows taking measures with just a few mouse clicks.

Equipment Needed

- A PC running Windows 2000 or higher and minimum 256MB of RAM
- An RFbeam K-TS1 system including USB cable and 24V power supply
- The "K-TS1 TSviewLite Software" installation CD
- An operational K-Band radar transceiver (RFbeam ST100 Starterkit incl. a K-LC1 module e.g.)

TSviewLite Software Installation

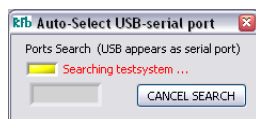
RFbeam SignalViewer is a Windows® 2000/XP/Vista/7 program and runs under a LabVIEW® runtime system. First installation will take some minutes, if the LabVIEW runtime system is not yet installed on your computer.

TSviewLite software setup will install:

- | | |
|----------------------------|---|
| ● TSviewLite Software | Controls K-TS1 system |
| ● K-TS1 SearchPort Utility | Helps you find the virtual COM port where K-TS1 is plugged in |
| ● USB-COM Port Driver | Driver for K-TS1 USB interface |

Installing from CD

1. Remove any K-TS1 system connected to your system
2. Insert RFbeam TSviewLite CD and run `setup.exe`.
If your computer does not already contain a LabVIEW runtime engine, you will be asked to accept licences of National Instruments.
3. If possible, accept all default program locations. Troubleshooting will be simplified like this.
4. Please be patient while LabVIEW runtime system is being installed.
5. You will find TSviewLite under *Start->Programms->RFbeam->TSviewLite*
6. After the Installation plug your K-TS1 system to a USB port of your PC. There should appear a "New USB Hardware Found" message from Windows and the driver will install automatically.
7. Start TSviewLite Software and you will see the automatic search message.



8. As soon as K-TS1 system has been found, TSviewLite software begins running.

TSviewLite Overview

Features

TSviewLite is a graphical user interface for the ultra compact RFbeam K-TS1 test system. It communicates with K-TS1 via a serial USB interface. Measuring results are presented by big analog and digital readouts.

TSviewLite allows taking RF measures with just one click. The instruments are readable from long distances. Optionally selectable reports are stored as ASCII „CSV“ files and may be opened by any spreadsheet program.

Typical Applications

K-TS1 test system controlled by TSviewLite may replace expensive RF test equipment. Users of radar sensors now become able to establish test stands for production or reception inspections with minimal investments. TSviewLite is also suited for adjustment and tuning of radar based systems.

Schools and universities are typical users of K-TS1 based installations, too.

TSviewLite Operation

Important: Field Polarization

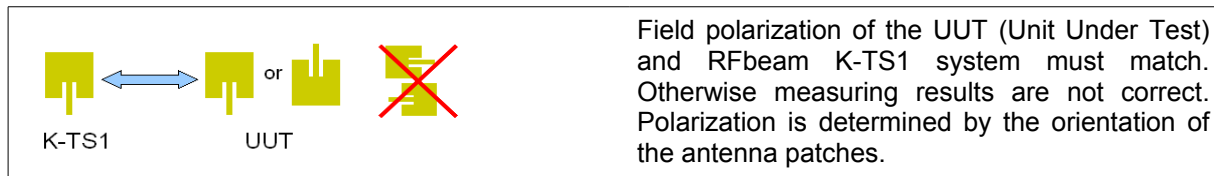


Fig. 1: Correct field polarization

The TSviewLite Screen

Legend of Controls

- (1) System mode selection
- (2) Operation indicators and controls
- (3) UUT type sets instrument limit indicators
- (4) Measured UUT transmit power respecting distance
- (5) Distance selector between K-TS1 and UUT for attenuation calculation
- (6) Shows principal beam direction
- (7) Store values into a report file
- (8) Save system mode permanently into K-TS1 EEPROM

Fig. 2: TSviewLite measuring an RFbeam K-LC1 module

Getting Help

TSviewLite offers different help options

1. Select "Get Context Help" from TSviewLite Help Menu and place cursor on object of interest
2. Select "User Manual ..." to open documents with your PDF reader.

Selecting System Modes

The different system modes can be accessed by clicking on the appropriate key or by pressing the correspondent function key [Fx] on your keyboard.

Loop f, P

This mode performs a cyclic measurement of UUT (Unit Under Test) frequency and power. Update rate is about 1s. For correct readouts, please check for correct measurement setup:

1. Select a UUT device (see Fig. 2) . This adjusts the limit markers of the analog instruments.
2. Arrange your test environment according to Fig. 3. Absorber is needed particularly for power measurements.
3. Adjust beam polarization. Orientation of antenna patches must match (see Fig. 1)
4. Adjust distance on TSviewLite screen (Number 5 in Fig. 2). Distance between testsystem and radar transceiver should be $\geq 30\text{cm}$.

Carrier Only

K-TS1 is transmitting a continuous carrier (CW) with adjustable frequency by the f_{Tx} control. Transmitting power (EIRP) is indicated by P_{Tx} indicator and is not adjustable. No measurement is performed by K-TS1 in this mode!

Target

The "Synthetic Target" simulates a moving object. RF signal received at "target Rx antenna" of K-TS1 will be amplified, SSB modulated by a sine wave and sent back via the "target Tx antenna". The radar transceiver will interpret this signal as a moving object and return a sine wave at its IF output. K-TS1 simulates "I and Q" components, that are producing 90° phase shifted IF signals at a stereo sensor. For K-TS1 modules with firmware V3.01 or higher you can also simulate the direction of the simulated target by changing the sign of the f_{Tx} control. A positive value will simulate a forward moving target and a negative value a backward moving target.

1. Arrange your test environment according to Fig. 3. Absorber is needed particularly for lower distortion of the received sine signal. Reflexions lead to distortions of the doppler sinus and also the phase shift between I and Q channels.
2. Adjust target frequency with the f_{Tx} control (44Hz per km/h or 160Hz per m/s object speed, +/- for direction with a K-TS1 and firmware V 3.01 or higher).

Range for K-TS1 with Firmware smaller then V3.01 = 0 .. 4000Hz

Range for K-TS1 with Firmware equal or higher then V3.01 = -9999 .. 9999Hz

Creating Reports

All values displayed by TSviewLite may be added to report files. Format is „CSV“, separator is a semicolon „;“.

1. Select [Loop f,P] mode
2. Select [Report]
3. Optionally add notes into the text field
4. Select [Save Data] to save the data at a location of your choice. By choosing an existing file, the new values are appended to previous data.

Configuring Instrument Limits

TSviewLite displays green (“ok”), red and white areas in its power and frequency readouts. These limits come from entries in the electronic module datasheets, located in the TSviewLite program directory.

`C:\Program Files\RFbeam\TSviewLite\ModuleSettings` or equivalent.

All *.ini files residing in this directories can be selected with the “UUT Type” selector on the TSviewLite panel.

There are different files in your program directory:

K-XXX.ini One .ini for each module from RFbeam with the specified limits
 Custom.ini Standard configuration entries

TSviewLite processes the following entries:

```
[RF]
TxPower_max = 20
TxPower_min = 12
fVCOdefault_min = 24.00
fVCOdefault_max = 24.25
```

All other entries are ignored by TSviewLite.

You may change the content of the „Custom.ini“ file to your own limits or create new files with limits of your choice.

Typical Equipment Arrangement

The unit under test (UUT) is placed in front of the K-TS1 module with a distance of >30cm (in the far-field). For frequency measurements, it is not necessary to shield the whole arrangement. For power measurements, you should at least place a piece of K-band absorber on the groundplane (a wooden table is best). Most reliable results you get, if there is much free room around the setting, or you place the whole arrangement into a (wooden) chamber.

Pay attention to place the UUT in the correct polarization direction. Check this by rotating the UUT by 90° into the position, where K-TS1 shows maximum power or refer to Fig. 1.

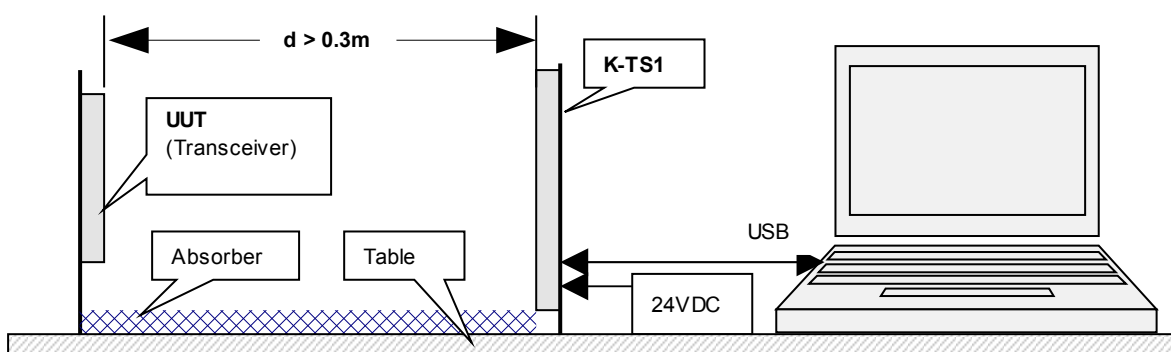


Fig. 3: Typical arrangement of a test-stand

K-TS1 System Overview

The K-TS1 testsystem consists of 3 RF and 2 infrastructure subsystems:

- 1 **Target Simulator:** This subsystem simulates a moving object generating a stereo doppler signal. It receives the 24GHz carrier signal of a K-band doppler module and sends back a signal corresponding to an approaching target with a programmable frequency of 1Hz to 4kHz or -9999Hz to 9999Hz with firmware V3.01 or higher. With firmware V3.01 or higher you can additionally simulate the direction with the sign of the frequency.
- 2 **Measuring System:** This subsystem may be used for measuring RF characteristics of K-band receivers, transmitters and transceivers. It sends a programmable, highly stable carrier frequency from 23...25GHz to a 4x4 path array antenna. At the same time, the RF generator is used as LO for the receiver. The receiver part allows measuring incoming RF power at a separate patch antenna. It also delivers signals for a high precision frequency determination of the incoming RF signal.
- 3 **AUX RF Power Meter:** This subsystems measures the input power arriving at an RF connector. It may be used e.g. for measuring the system sensitivity of external receivers, antenna test stands etc.
- 4 **Microcontroller System:** This subsystem controls all RF systems and builds the interface to hostsystems. It may be configured to operate K-TS1 as standalone system as well as under full host control. The USB host interface assures a universal communication either with terminal emulation programs or with high sophisticated, automated test stands.
- 5 **Power Supply:** K-TS1 may be operated from simple 15V..24VDC adaptors.

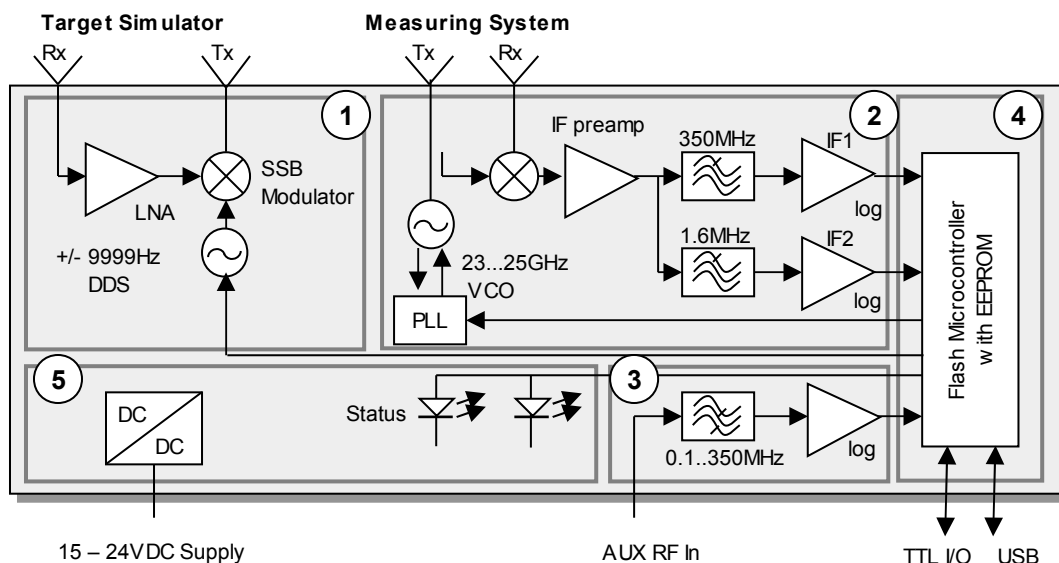


Fig. 4: K-TS1 Blockdiagram

K-TS1 Antenna and Connector Arrangement

| | | | |
|-------------------|---------------------|---------|--|
| Target Rx Antenna | Transmitter Antenna | LED 1 | Operational Indicators |
| | | LED 2 | |
| | | USB | |
| Target Tx Antenna | Receiver Antenna | TTL I/O | Digital I/O Port |
| | | RF In | RF power measurement for evaluating UUT system sensitivity |
| | | DC In | Power supply 15 ... 24V |

FAQ

Q: *Where do I get more information on the K-TS1 system?*

A: Refer to the K-TS1 datasheet, that is accessible by the TSviewLite help or on our website www.rfbeam.ch

Q: *TSviewLite does not start but „hangs“ by searching the K-TS1 hardware. What goes wrong?*

A: TSviewLite cannot find a testsystem on any port. Please check one of the following:

- Be sure to have connected a 24V powered K-TS1 system to your USB port.
- Close any program (TSviewLite, Hyperterminal etc) that may access a serial COM port.
- Check your installation by running the RFbeam *TS1_SearchPort* utility in your START menu.

If no K-TS1 system has been found, reinstall the K-TS1 USB driver CDM 2.02.04.exe. You find it on your CD under the USBdrivers directory.

- Retry running TSviewLite software

Q: *How can I simulate „real targets“ like moving cars ?*

A: Real objects create complex Doppler signals containing multiple frequencies and amplitudes. K-TS1 synthetic target is a testsystem and thus produces just one frequency. For these purposes, RFbeam Microwave GmbH proposes to use our [ST100 Starterkit](#). This allows you to playback previously recorded real situations. Take a look into the [ST100 User Manual](#) for more details.

Q: *Why do Doppler signals of my sensor look strange when using K-TS1 in „Target“ mode?*

A: If there are reflexions between K-TS1 and your sensor, Doppler signals will become distorted. Please use an arrangement like shown in Fig. 3 or let enough free room around the „beams“.

Q: *Where can I buy absorber?*

A: You can buy absorber online from [Emerson&Cuming](#) . We recommend using the type [Eccosorb AN](#).

User Manual and Software Revision History

| Version | Date | Changes |
|---------|---------------|---|
| 0.9 | 03-Jan-2008 | - Preliminary release |
| 1.2 | 23-June-2010 | - Compatibility for Windows Vista and 7 |
| 1.3 | 10-March-2011 | - Description of the direction function in target mode with the K-TS1 Firmware V3.01 or higher - Changed figure 2 with a picture of TSviewLite V1.3 - Replaced TTL UART in figure 4 and in the Antenna and Connector Arrangement with Digital I/O |

TSviewLite Software Update History

| Version | Date | Changes |
|---------|---------------|---|
| 1.1 | 03-Jan-2008 | - Initial release |
| 1.2 | 23-June-2010 | - Adaptions for Windows Vista and 7 |
| 1.3 | 10-March-2011 | - New target frequency range (+/- 9999 kHz) for K-TS1 devices with the firmware V 3.01 or higher. - New RFbeam .ini files for the newest modules and a custom .ini file - Different bug fixes |
| 1.4 | 15-Aug-2011 | - Bug fix in the control of the target |

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