

FAQ – t-meter™ family of Broadband Wireless Power Meters

What is the t-meter™?

The t-meter™ is a low-cost, hand-held power meter for the 2.4, 5.3, and 5.8GHz frequency bands, with model-specific coverage in 900MHz, 3.5GHz and 4.9GHz. The PM-900, PM-3500 and PM-4900 also provide improved coverage across the 5.4 to 5.7 GHz band. The t-meter™ is capable of measuring forward and reflected power in addition to VSWR.

What is the t-meter™ used for?

The t-meter™ is used to verify the installation of broadband wireless systems operating in the bands which your model covers. It can be used to measure the RF power out of a radio or amplifier, test coaxial connector terminations for low reflected power, and verify the VSWR of an antenna. Additionally, the meter can be used to calculate transmission line loss.

What type of equipment can the t-meter™ be used with?

The t-meter™ can be used with most equipment that occupies the frequency bands which your model is specified to cover. The meter works particularly well with spread spectrum radios (802.11b DSSS and FHSS). Additionally, the meter works with proprietary modulation techniques.

Does the t-meter™ work with 802.11a devices?

Yes, the t-meter™ will work with most 802.11a devices*. The 802.11a specification uses OFDM modulation but also defines many other aspects of the signal. When an 802.11a device is not transmitting data, it will transmit short bursts (48uSec) of energy. These OFDM bursts contain four distinct regions resulting in a power envelope that is not constant with time. The bursts' output power peak-to-average can vary as much as 8dB across the burst. The t-meter™ is designed to measure peak power, so what a user sees on the display of the t-meter™ is a power measurement that is quite a bit higher than the radio manufacturer's power output specification (average power), as the meter samples these varying peaks. The meter will not display an average or constant power reading.

*Older t-meter™ model PM-2458 units (serial numbers 4134 and smaller) do not work well with an 802.11a device. The leveling circuit is not fast enough to measure the 48uSec bursts.

The PM-2458 model does not specify coverage from 5.47 – 5.725GHz. Can it be used to measure HiperLAN devices?

Yes. Set the PM-2458 meter to the 5.3GHz band when testing both HiperLAN/1 and HiperLAN/2. HiperLAN/1 is similar to the IEEE 802.11b specification, but resides at 5.15GHz to 5.35GHz. The 5.3GHz setting on the PM-2458 will work well when measuring HiperLAN/1 signals. HiperLAN/2 speeds along at up to 54Mbps similar to 802.11a, but its spectrum is allotted in the 5.47GHz to 5.725GHz. Due to the high crest factor of these signals, the 5.3GHz setting on the PM-2458 gives more accurate results than the 5.8GHz setting when testing HiperLAN/2 as well.

t-meter™ models PM-4900, PM-3500 and PM-900 all feature specified coverage from 5.47GHz to 5.725GHz.

Why does the t-meter™ indicate a low VSWR when I have a complete short or open at the other end of my transmission line?

The t-meter™ is capable of detecting 0 to 20dBm of forward power, and -20 to 17dBm of reflected power (when no in-line attenuators are used). It is necessary to consider the round trip attenuation of the signal from the source. For instance, if the system in question has a source with an output of 20dBm, and 100' of transmission line is used that has 7dB of attenuation for the appropriate frequency, the round trip attenuation for the forward and reflected signal is 14dB. Assuming the meter is connected in-line between the source and transmission line, it will see 20dBm forward and 6dBm reflected (20dBm-14dB) with a complete short or open at the end of the line. This would result in a return loss of 14dB, or a VSWR of 1.5:1. A bad VSWR will be measured to be better than it actually is since the reflected power is attenuated by the cable's loss.

How do I know if a connector is bad?

The best way to test your transmission line terminations is to place the t-meter™ between a signal source and the termination in question while using the included 50Ω load on the opposite end of the line. A good termination should return a VSWR of 1.2:1. It is possible that the termination could be good and that a problem somewhere else in the transmission line could cause a higher VSWR. It will be important to keep this in mind while testing. Depending on the system configuration it might be possible to use the included 50Ω load to isolate the problem to a section of the transmission line.

How do I know if an antenna is bad?

Most antenna manufacturers indicate a minimum VSWR of 1.5:1. The meter can be placed between a signal source and the antenna to get a VSWR reading. If the VSWR is worse than 1.5:1, the antenna should be considered suspicious.

Does the t-meter™ require Maintenance?

Normal wear to the RF input and output connectors can lead to damaged center conductors and coupler failure. It is important that all connectors are kept clean. Clean outer surfaces with isopropyl alcohol and a clean cloth. Clean the inside of the connector with compressed air to remove loose dirt. Carefully remove any additional dirt with a nonmetallic stick and clean cloth soaked in alcohol. To minimize wear, do not rotate the center conductor as you tighten the coupling nut. Rotation of the center conductor leads to wear on both the male and female pins causing increased forces on the coupler. Additional tips on the proper care of RF connectors can be found in the source listed below:

“Extending the Life of Type N Connectors,” Application Note, Wide Band Engineering, Phoenix, AZ, 1998.

<http://www.wbecoinc.com/AN107.pdf>

Does the t-meter™ require calibration?

The t-meter™ is a verification and trouble shooting tool used in the field to verify the operation of wireless system components. As such, a periodic calibration cycle is not specified. Should a calibrated measurement be required, contact Praxsym to discuss whether a calibration process is available for the particular measurement you will be making.

How much does the t-meter™ cost, and where do I purchase one?

The t-meter™ is available from several wireless product distributors. Visit www.vswrmeter.com, or contact Praxsym for a complete list of distributors.

How long is the warranty on the t-meter™?

Praxsym covers the t-meter™ for a period of one year. The warranty covers manufacturer defects.

How do I get customer support on the t-meter™?

The distributor you purchased the meter from will be the first point of contact for questions concerning the operation of the meter. If the issue warrants additional support it will be escalated appropriately to Praxsym.

Where do I find the specifications for the t-meter™?

Specs can be found at www.vswrmeter.com.

Where do I find a manual for the t-meter™?

An electronic copy of the manual can be found at www.vswrmeter.com.

How do I become a registered distributor for the t-meter™?

For more information about becoming a registered distributor, contact Praxsym.