

## WARRANTY

Burk Technology, Inc. warrants the TS-1 Transient Voltage Surge Suppressor to be free of defects in materials and workmanship for a period of 24 months from the date of purchase. Equipment will be repaired or replaced at the option of Burk Technology and returned freight prepaid to the customer. Damage due to abuse or improper operation or installation of the equipment or caused by fire or flood or harsh environment is not to be covered by this warranty. Damage in shipping is not the responsibility of Burk Technology. A return authorization must be obtained before returning any equipment. Materials returned under this warranty must be shipped freight prepaid and insured in the original shipping carton or suitable substitute to Burk Technology, 7 Beaver Brook Road, Littleton, MA 01460. Repairs not covered under this warranty will be made at prevailing shop rates established by Burk Technology, Inc.

THE WARRANTY SET FORTH ABOVE IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. BURK TECHNOLOGY, INC. SHALL NOT BE LIABLE TO ANY PARTY FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF THIS EQUIPMENT.

## GETTING HELP

The Burk TS-1 is designed to protect indefinitely against multiple surges. If a catastrophic strike disables the TS-1, the device breaks the line circuit so there is no loss of protection. Therefore, if an otherwise functional telephone line is inoperative when connected to the TS-1, the unit may need factory repair.

For assistance with the TS-1, please contact Burk Technology customer support:

Phone: 978-486-3711  
Web: [www.burk.com](http://www.burk.com)  
Email: [support@burk.com](mailto:support@burk.com)

Contact the sales department toll free at 800-255-8090, or email [sales@burk.com](mailto:sales@burk.com).

### TS-1 USER GUIDE, REV C, 07/09

Copyright © 2009 Burk Technology, Inc. All rights reserved. No part of this manual may be reproduced in any form or by any means without written permission from Burk Technology. Information in this manual is subject to change without notice.

# TS-1

Dial Line  
Transient  
Suppressor

**BURK**  
TECHNOLOGY

## User Guide

The TS-1 Dial Line Transient Suppressor provides transient voltage surge suppression for equipment connected to a dial telephone line with standard RJ-13 or RJ-11 connectors. The high quality die cast aluminum enclosure houses a passive, three-stage protection device designed to conduct destructive energy safely to ground.

Both pairs in the RJ-13 standard configuration are afforded protection, while allowing the normal ring voltage, and voice or data to pass unimpeded. Studio or transmitter audio equipment connected to a two-pair dedicated stereo telco circuit may also be protected with the TS-1.

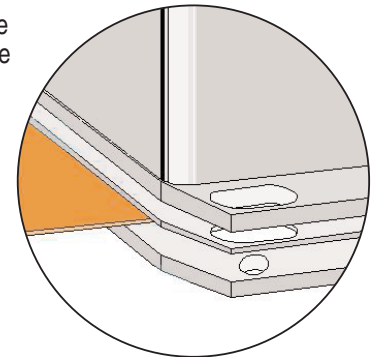
The TS-1 must be connected to an adequate station ground to provide a path for destructive energy to be shunted away from the protected equipment. Ideally, the TS-1 should be mounted on the copper strap directly connected to station ground. The integral clamping system on the TS-1 affords easy mounting on strap up to four inches wide and ensures a low-impedance path to ground. Alternatively, the TS-1 may be connected to earth ground using the ground lug on the side of the enclosure.

## INSTALLATION

Position the TS-1 near the telco service entry. In the event of a catastrophic lightning strike to the phone line, this location prevents destructive energy from entering the facility.

Installation of the TS-1 is straightforward:

1. The preferred mounting scheme is to secure the TS-1 to the station ground bus. First, remove the machine screws from the TS-1. Beneath the aluminum enclosure, you will find a thin stainless steel shim on top of the stainless steel backing plate. Clamp the ground bus between the backing plate and shim, as illustrated. Then attach the aluminum enclosure so that it is flush with the stainless steel shim and not touching the ground bus. Secure the TS-1 by tightening the machine screws (Phillips #8 x 1/2").



The TS-1 is equipped with a grounding lug for use when a station ground bus is not available. To use the grounding lug, loosen the wing nut and wrap a short, heavy braid clockwise around the grounding lug between the two flat washers. Then tighten the wing nut to firmly secure the braid. Connect the opposite end of the braid to a ground rod driven at least six feet into the earth. Four #10 x 3/4" self-tapping screws are included for mounting the TS-1.

*Important! Do not connect the TS-1 to any water pipe or equipment chassis. It must have a low-impedance dedicated ground to function properly.*

2. Connect the incoming telco line to the UNPROTECTED RJ-13 jack, and connect the equipment to be protected to the PROTECTED RJ-13 jack. Making the connections to the proper jacks is critical.

## THEORY OF OPERATION

### Three-Stage Design

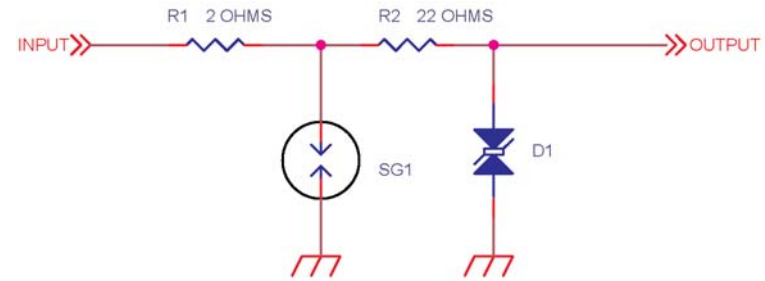
The Burk TS-1 Transient Suppressor employs a three-stage design to shunt destructive energy to ground, providing superior protection. In the event that catastrophic energy is introduced into the TS-1 due, for instance, to a direct lightning strike, the TS-1 is designed to open circuit and protect the user equipment.

- The first line of protection is provided by a gas discharge tube (GDT), which will ionize in less than a microsecond if a severe transient is induced.
- Next, a high-power wirewound resistor provides both current limiting and inductance to slow down the rise time of the pulse energy.
- Following the resistor is a high-power transient voltage suppressor (TVS) to conduct the remaining transient energy to ground. The response time of the TVS is 5 nanoseconds.

This three-stage scheme is the most reliable solution to provide proper protection for user equipment.

### Design Schematic

The following schematic is a representative section of the Burk TS-1. Under normal transient events, D1 conducts as necessary to limit the voltage at the output. R2 is a wirewound resistor designed to limit the current into the TVS and to provide inductance for pulse stretching. SG1 is used to protect from large transients and R1 is a fusible element used as a last resort protection scheme.



Normally, the gas discharge tube (GDT) does not fire unless a transient over 230 volts is encountered. This action will preserve the useful life of the GDT.

### Standards Testing

Burk Technology has conducted extensive standards testing at an approved agency to verify the failure modes of the TS-1. Using the standard 1.2x50uS test waveform specified in EN6100-4-5, the device repeatedly handles 3-kilovolt discharges and maintains the specified limit of 200 volts peak at the output. As the discharge voltage is raised, the GDT comes on to protect the downstream circuitry and no degradation is seen with discharges up to 4-kilovolts for 10 discharges. A 10-kilovolt discharge results in R1 fusing and protecting the user equipment at the expense of the TS-1. Any discharge over 10 kilovolts results in the destruction of the modular input connector as well as R1.

This testing was conducted for common mode discharges. The Burk TS-1 also incorporates differential mode transient suppression devices and these results were also shown to limit the output voltage to 200 volts peak.

## SPECIFICATIONS

**Dimensions:**  
5.48" L x 3.24" W x 1.73" H

**Bandwidth:**  
DC to 5 MHz

**Maximum repetitive surge current:**  
2000 amps

**Maximum surge current:**  
10,000 amps

**Maximum energy capacity:**  
500 Joules

**Response time:**  
5 nanoseconds

**Standard clamping voltage:**  
200 volts

**Series Impedance:**  
24 ohms

**Maximum series current:**  
1 amp

**Operating Altitude:**  
10,000 feet

**Operating Humidity:**  
5% to 90% non-condensing

**Operating temperature range:**  
32-185°F

