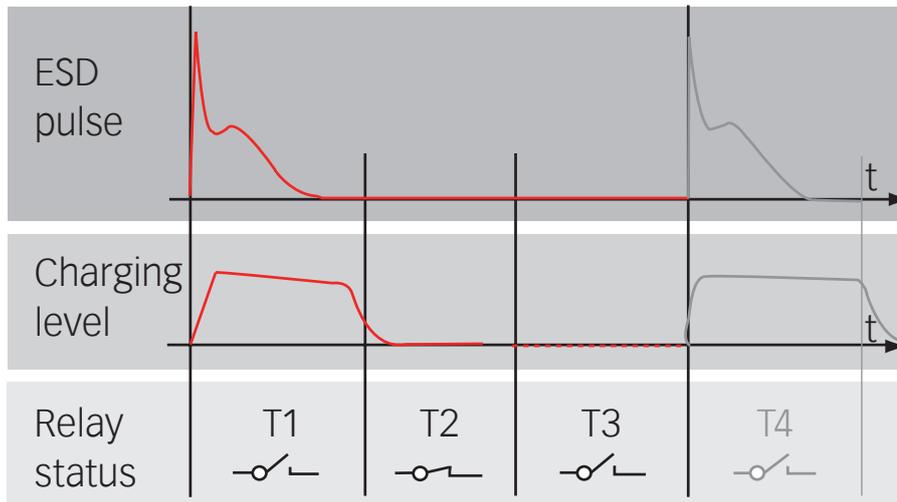


# APPLICATION NOTE

## Discharging of ungrounded equipment with the NSG 438A/439A ESD simulator



All times are individually and freely adjustable from 0.1 to 99 s in step sizes of 0.1 s. The sum of the three time segments gives the pulse repetition rate.

### New features:

- Integrated discharge relay (Bleed-Off resistor)
- Suitable for conventional ESD testing as well as for ungrounded EUT's
- **UNIQUE** Controlled and reproducible discharge and observation time periods
- **UNIQUE** Discharge operation programmable in three separate time segments

### Applications and markets

In the current ESD standard, IEC/EN 61000-4-2:2009: "Testing and measurement techniques - Electrostatic discharge immunity test", section 7.2.4 specifies the test setup conditions for "Ungrounded equipment."

The reproducibility of these test setup conditions has recently become a focus of concern for developers and test laboratories. Additionally, the discharge methods described in the standard (in relation to the residual discharge voltage) can result in a relatively high uncertainty factor. Without the ability to measure the EUT's residual charge, it is necessary to either wait until the charge has

dissipated on its own, which greatly extends test procedure time, or to use a discharge brush to manually discharge the test EUT.

The safest and most elegant solution is to discharge the EUT using a relay circuit which dissipates the residual voltage by connecting a 1 MΩ resistor from the EUT to ground for a controlled time segment. This relay and resistor circuit has been incorporated into the NSG 438A and NSG 439A models.

This circuit can also be retrofitted into existing NSG 438 and NSG 439 simulators. For special applications the relays and resistors can still be used externally with the NSG 438 and NSG 439.

Ungrounded electronic products are being used more frequently in the household and industrial sectors, as well as in the automobile and automotive supplier industries. At the same time, quality demands are steadily rising, as the electronically linked active and passive safety-related components must function properly. Even with a test setup that conforms to standards, it may often be advisable to specifically discharge certain components during ESD testing.

### Teseq sets new standards of flexibility, reproducibility and ease of operation

Both the built-in and the external EUT discharging circuits of the Teseq ESD simulators are characterized by flexible control parameters. The three freely programmable time parameters allow the charge holding time to be precisely defined. By setting the discharge cycle time and the associated repetition intervals of the ESD pulses, any residual voltage is guaranteed to be removed from the EUT.

For formal compliance testing, the NSG 438A/439A's internal processor guarantees a high degree of reproducibility of the controlled test cycles and also reduces test time.

To monitor the three independent EUT discharge time segments, the relay closing or opening time can be individually set using the ESD simulator's touch panel.

**T1** Defines the first time segment, during which the EUT's pulse energy is maintained, or during which the potential can only discharge within the context of the natural discharge time constant. The discharge relay closes once the pre-selected time has expired.

**T2** Defines how long the complete discharge phase should last. This time depends on the EUT's design and on the test procedure, as well as on possible environmental influences.

**T3** Defines the period when the relay opens and the EUT observation phase begins. This period may be used to verify the EUT's function. After this time has passed, the cycle will start again.

### Models upgrades and availability

The new ESD simulator series with the built-in discharge relay is designated by an "A" (NSG 438A/NSG 439A). The original models are still available. All NSG 438 are upgradeable to the A-version including a calibration with certificate.

The new NSG 438A and NSG 439A models are available now. Please contact your local Teseq supplier for detailed information.