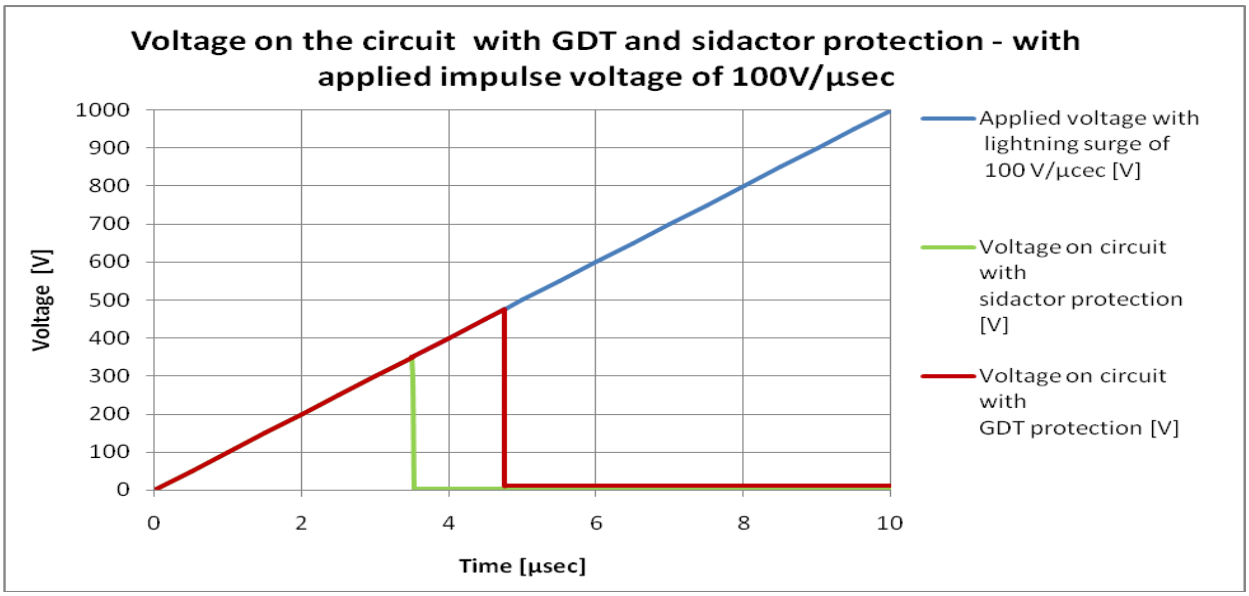
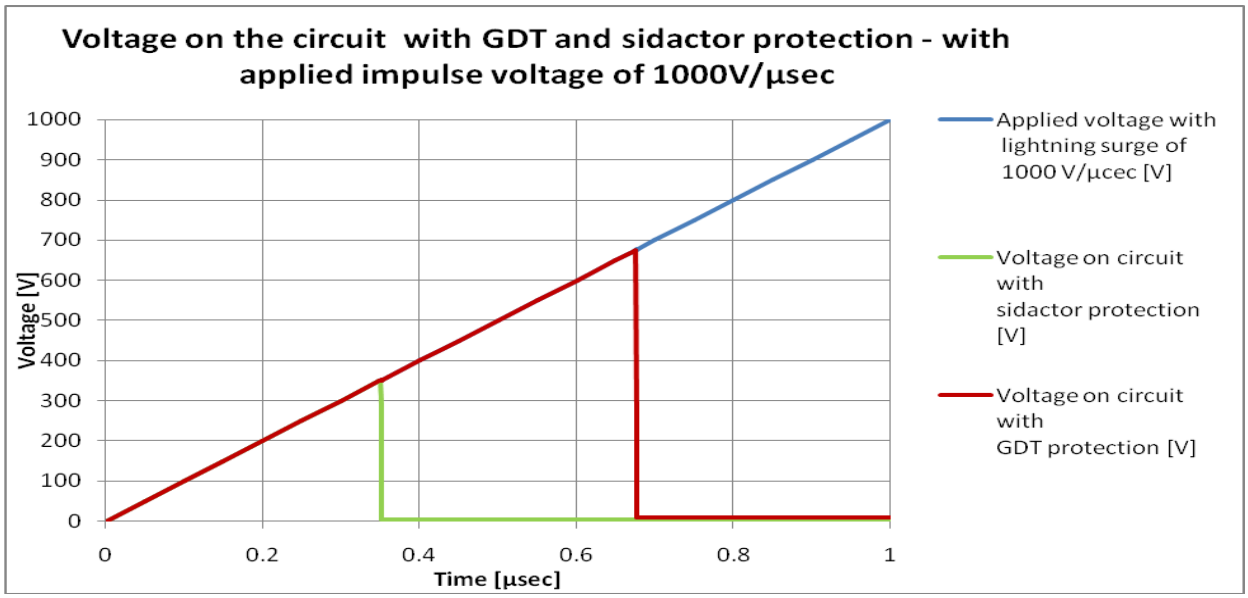
Surge Protection

Primary or Building Entrance Protectors installed in Telecom equipment installations prevent building damage and human injury. In many cases, these protectors are not specifically designed to protect sensitive communication equipment. For VDSL2 deployments, primary protectors are typically gas discharge tube devices (GDT) which react slowly to voltage surges, thereby allowing part of the surge to pass through to the equipment.

To protect communication equipment, secondary protection is generally installed or incorporated in the equipment. Comtest Network's VDSL2 splitter incorporates a solid state secondary protection scheme to protect the splitter and internal communications equipment from surges that the primary protector allows to pass through.

The over-voltage portion of the secondary protection circuitry in all Comtest VDSL2 splitters is a solid state protector, specifically a thyristor device (also known as a Sidactor or trisil). Solid state protectors are ideal due to faster response times to overvoltage surges as compared to GDTs. The differences in response time to an impulse lightning strike can be significant, as shown in the figures below.



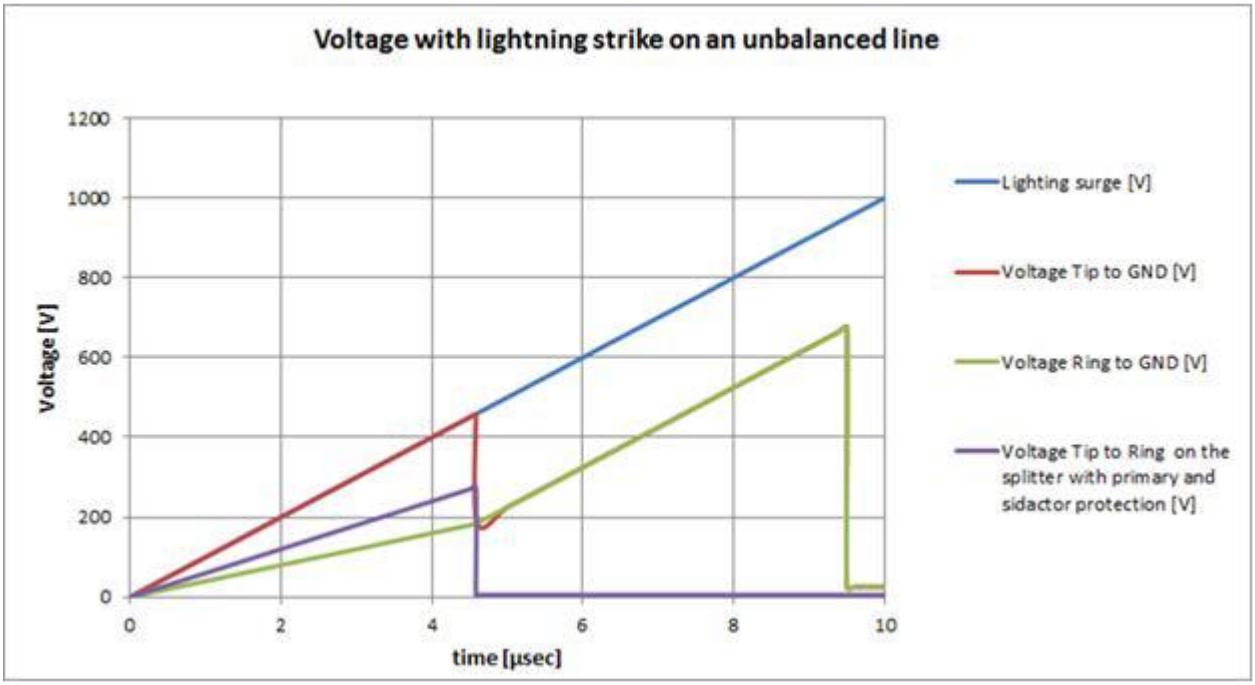


The two figures above show the typical responses of GDT and sidactor based overvoltage protectors to lightning surge impulses of 100V/µsec and 1000V/µsec rise times. The nominal DC trigger voltage for the sidactor was 275V versus 250V for the GDT. For impulse strikes with 100V/µsec rise time (top Figure) the sidactor will trigger at 350V compared to 475V for GDT. This disparity is even more pronounced if the rise time of the impulse strikes is increased to 1000V/µsec; under these conditions a sidactor will trigger at 350V versus 675V for GDT.

During an electrical storm, a lightning strike will induce differential voltages on tip to ground and ring to ground. When the differential voltages reach the threshold of the sidactor, it will start to trigger, reducing the voltage between tip and ring to almost zero. If the lightning surge continues to rise, the sidactor will continue to trigger and protect the splitter and CPE equipment. Once the surge achieves the threshold of the primary protector (675 V for 100V/µsec pulse), the primary protector will fire and take the surge to ground. At this point, the sidactor will stop firing and return to a neutral state.

The main function of the sidactor is to protect the equipment until the primary protector has heated up and can respond to the main surge impact. In some cases the quick action of the sidactor in the Comtest splitter reduces or eliminates the need for the primary protector to react.

The graph below illustrates the sidactor response time during a 100 V/ µsec pulse.



This figure illustrates the faster response time solid-state sidactor devices have to impulse strikes than GDTs. The quicker response time results in better protection of the CPE equipment and a reduction in damaged field units.

In addition to its quicker response time, solid state sidactor protectors offers several advantages:

- Devices are silicon based and do not have a wear out mechanism. As such, they are rated for a virtually unlimited life span, whereas GDTs are rated for a finite number of hits for any specific surge.
- Fail short safe mode.
- Faster re-set time.