

# Raycap

ProTec T1S  
The Evolution  
in DIN Rail  
Surge Protection



*The T1S product achieves 100kA protection in a pluggable 4TE size.*

*It's our business to help  
yours thrive.®*



## ProTec T1S Series Surge Protection



*The new ProTec T1S Series is the latest evolution in surge protection from Raycap. At 25kA 10/350 $\mu$ s in a 1TE (17.5mm) DIN package, it is the most compact pluggable surge protective devices (SPDs) on the market to meet the Test Class I requirements per IEC 61643-11.*

*For many years' manufacturers of protective devices have sought to develop an SPD rated 25kA 10/350 $\mu$ s Test Class I, in a DIN package smaller than 2TE. ProTec T1S is the first device on the market to achieve this objective in a pluggable format, while providing the required voltage protection level, follow-current control and designed for intense lightning environments.*

*To better understand what has been achieved with the ProTec T1S Series, it is necessary to first review the pros and cons of conventional SPDs. SPD technology is typically divided into two categories – voltage switching and voltage limiting devices.*

### Voltage Switching SPDs

Voltage switching devices are designed to trigger into a conductive state once an overvoltage (surge) exceeds a certain threshold. They are relatively simple in design and can achieve a high surge withstand in a compact package, however they suffer from poor voltage protection levels and from difficulty in extinguishing follow-current.

Encapsulated triggered spark gap technology can improve the residual let-through voltage, however the issue of extinguishing follow-current remains. Follow-current control is an SPD's ability to switch itself out of conduction once the overvoltage condition (surge) has passed. An SPD with poor (low) follow-current control can only be installed on an electrical network where the prospective fault current of the service, is less than the device's follow-current rating.

If it were to be installed on a power network having a prospective fault current greater than its follow-current rating, it could fail catastrophically once switched into conduction by a surge or voltage transient.

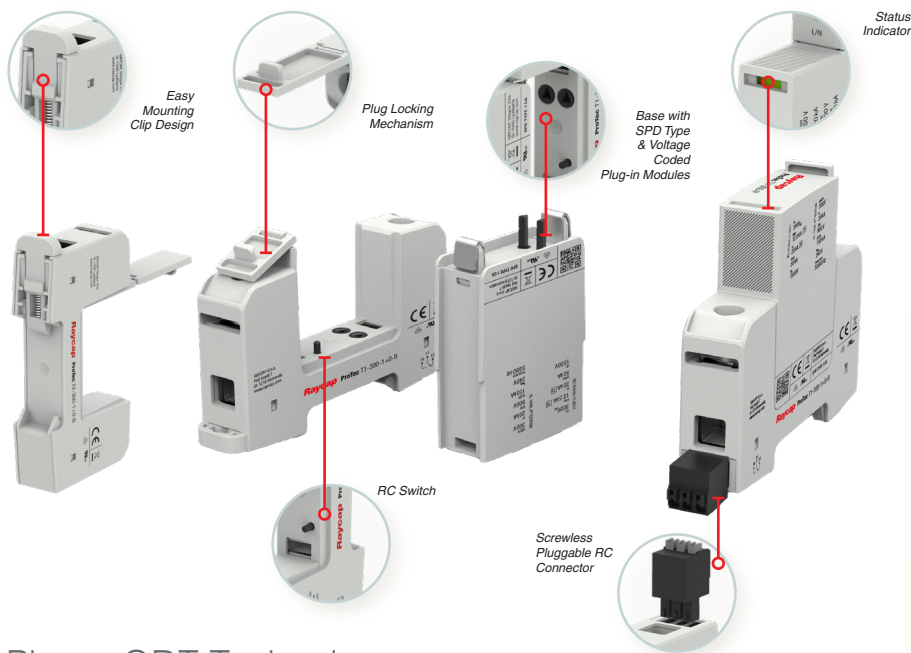
Put simply, SPD's relying on voltage switching technology can be made compact with a high surge withstand capability, but these benefits come at the expense of poor follow-current control which limits the maximum service to which they can be installed.

### Voltage Limiting SPDs

Voltage limiting devices, such as metal oxide varistors (MOVs), are designed to limit over-voltages by changing to a low impedance state in order to divert surge current away from the equipment being protected.

Unlike voltage-switching devices, they revert to their high impedance state once the surge has passed and as such, do not suffer the problem of follow-current extinguishing. This means they can be installed on any power network, irrespective of the prospective fault current. They also provide good (low) protection levels.

In summary, SPDs relying on voltage limiting technology provide the benefits of good protection level (low residual or clamping voltage) while not suffering the problems of follow-current control. This said, they generally need to be physically large in order to provide the required surge rating of a Class I SPD.



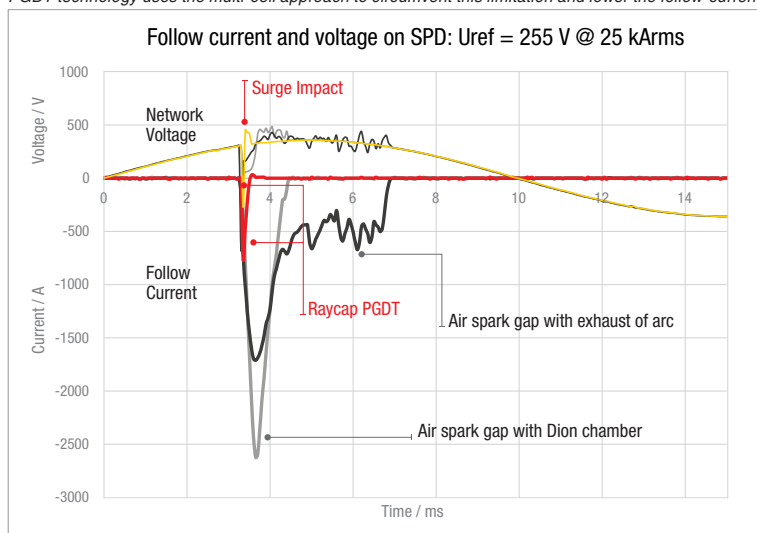
## Phase-GDT Technology

Raycap's proprietary Phase-GDT (PGDT) has been developed to optimize both these technologies to create the ideal Class I SPD – where a compact package is possible using voltage-switching technology but without the drawbacks of a high residual voltage or poor follow-current rating.

ProTec T1S utilizes a breakthrough multi-cell, encapsulated GDT technology, to achieve a residual voltage like that of an MOV-based SPD, but in a footprint half the size of the market competition and without restrictions governing where on a network it may be installed.

Raycap has a long tradition of utilizing materials in a way to provide robustness and long-lived products. Combining this knowledge with a new patented multi-cell GDT technology offers customers a solution that can be used in heavy lightning intensive environments, where repetitive surge events might happen; also in intervals of a few minutes. At the same time, the ProTec T1S can protect equipment against lightning events under demanding network conditions such as network faults and extremely high prospective currents without being damaged and without any influence on the network itself.

*The follow-current of PGDT technology is compared to that of conventional air-spark gap technology. Conventional air gaps need to migrate the arc away from the main electrodes to lengthen, and ultimately extinguish it. This process of moving the arc takes a finite time during which the follow-current increases. PGDT technology uses the multi-cell approach to circumvent this limitation and lower the follow-current.*



## Features and Benefits

The features and benefits of this new PGDT technology may be summarized as follows:

- Compliant with IEC Class I testing per IEC 61643-11 - making it suitable for use in locations where direct, or partial direct, lightning currents can be expected per IEC 62305-4.
- VDE mark - certified to applicable IEC and European norms under low voltage directives.
- High surge capacity but without the problems of follow-current extinguishing - can be installed on networks having high prospective short circuit fault currents (SCCR).
- Tested to be suitable for repeated operations on networks with  $I_p$  as high as 50kA 50/60Hz.
- Multi-cell design reduces follow-current to the point it behaves much like MOV based technology - unlike conventional spark gap technology where the high follow-current causes the gap electrodes to degrade after each operation, PGDT provides a long operational life.
- Low residual voltage  $U_p = 1.5 \text{ kV}$  – can effectively be coordinated with other Class II or Class III SPDs on the network. It can be coordinated with any properly installed Class II SPD without the need to consider cable length in between the products.
- High surge rating in a compact, pluggable, DIN package – half the footprint of competitive products optimizes panel board real estate.
- Encapsulated design, vital parts are housed inside a hermetically sealed cell – no expulsion of hot, conductive, ionized gasses.
- Improved design ergonomics – features a retaining clip against vibration and shock.
- Change over contacts for remote monitoring
- Efficient internal mechanical thermal disconnects – enables safe and reliable end-of-life behaviour on networks
- Red/Green status indicator