



Commercial PV Catalogue

for project developers and asset owners

Intelligent software and hardware solutions to increase commercial projects' return on investments with Tigo, the flexible module-level power electronics (MLPE) market leader.



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For product selection assistance: www.tigoenergy.com/design



Installing on 7 Continents

Tigo is a Silicon Valley company founded in 2007 by a team of experienced technologists. Combining a unique systems-level approach with expertise in semiconductors, power electronics, and solar energy, the Tigo team developed the first-generation Smart Module Optimizer technology for the solar industry.

Vision

Tigo's vision is to leverage integrated and retrofitted Flex MLPE (flexible module-level power electronics) and communications technology to drive the cost of solar electricity down. By partnering with tier 1 module and inverter manufacturers in the industry, Tigo can focus on its key innovation with the smartest TS4 modular platform and leverage the broader ecosystem.

Fleet

As of 2019, Tigo has deployed over 2.5M units at over 32,000 sites worldwide as shown in the fleet map.

Tigo's monitoring products are recording data every 2 seconds and sending it to the Tigo Cloud every 10 minutes. To date, more than 700 terabytes of data have been collected from PV modules, inverters, meters, and PV system sensors around the world.

Geography

Tigo has operations in the USA, across Europe, Latin America, Japan, China, Australia and the Middle East, and products installed in all 7 continents. Tigo products are certified with major certification organizations recognized around the world including UL, TUV, CSA, JET, and more.





Defining the Future of MLPE



Bringing module-level intelligence to large portfolios is defining the future of solar power. Knowing the exact state of a large system at any given moment, from any place in the world, can make or break a portfolio. Tigo utilizes its expertise to present advanced solutions for commercial solar plants.

Solar plants lose performance over time due to variable degradation, soiling, shading, and more. Accurately identifying and addressing these losses at their root cause is time-consuming and expensive. Now, with the module-level intelligence of Tigo's TS4, it is possible to increase the ROI new levels by reducing labor and mitigating mismatch.



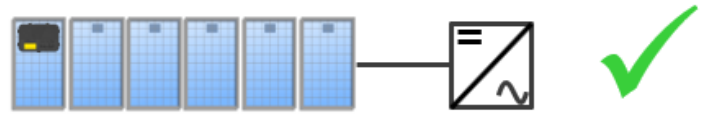
Mitigating Mismatch

Intelligent DC-DC conversion algorithms designated to improve the energy harvest of a solar array are built into the Tigo TS4-O (Optimization) units. Utilizing state-of-the-art Predictive IV technology, TS4-O mitigate electrical mismatch, regardless of its source, the minute they are installed on the solar plant.

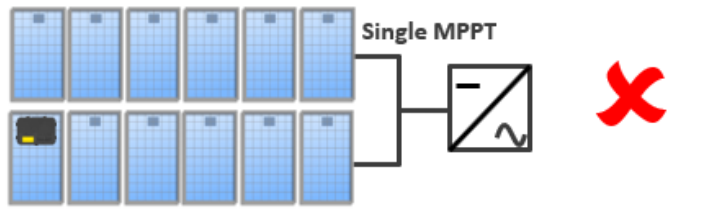
Selective Deployment

The TS4 platform consists of six different covers with customizable levels of MLPE functionalities. Tigo customers can mix and match TS4 covers according to their ideal budget and system requirements. The TS4 platform also offers the revolutionary option to selectively deploy the exact functionality needed to maximize system performance, all while guaranteeing the lowest cost with the greatest ROI.

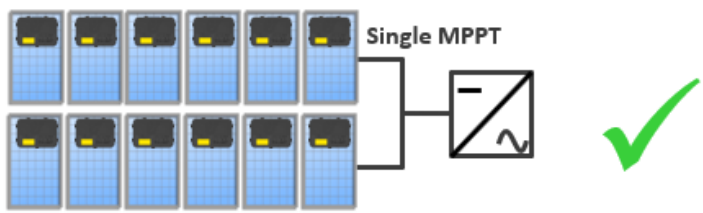
Selective Deployment of TS4 can be applied for applications with one string per MPPT.



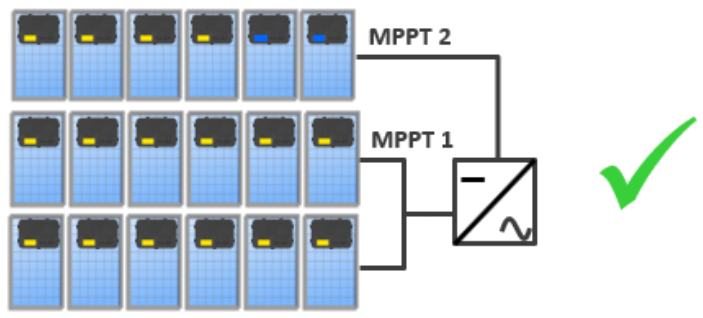
Selective Deployment with different numbers of TS4's in a string cannot be applied in parallel strings which are connected to one MPPT.



If the system has parallel strings connected to the same MPPT, all modules on that MPPT should be optimized.



Strings connected to different MPPTs can be Selective Deployed following the guidelines about parallel strings per MPPT. (See the different TS4's on MPPT 2.)



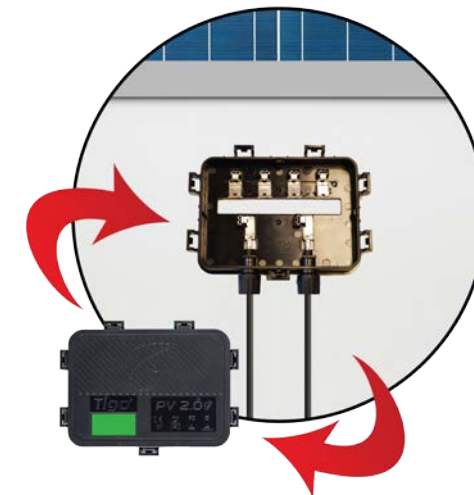
Enabling Maximum Flexibility

Most efficient junction box

The foundation of the Tigo TS4 platform is its brilliant mechanical design, enabling maximum flexibility at the best possible performance. Because the electronics are installed in the cover, there is separation between the sensitive module backsheet and the cells to the electronics in the cover. With the assistance of built-in cooling ribs for effective natural convection, the TS4 covers dissipates heat much more efficiently than any other standard module junction box.

TS4 Platform

TS4-D	TS4-M	TS4-F	TS4-S	TS4-O	TS4-L
Diodes	Monitoring	Fire Safety	Safety	Optimization	Long Strings
Better performance and reliability with hotspot mitigation	Fleet management and warranty tracking	Module-level Rapid Shutdown	Rapid Shutdown and monitoring	Increased yields for customers with shade and mismatch	Reduce BoS costs for commercial sites



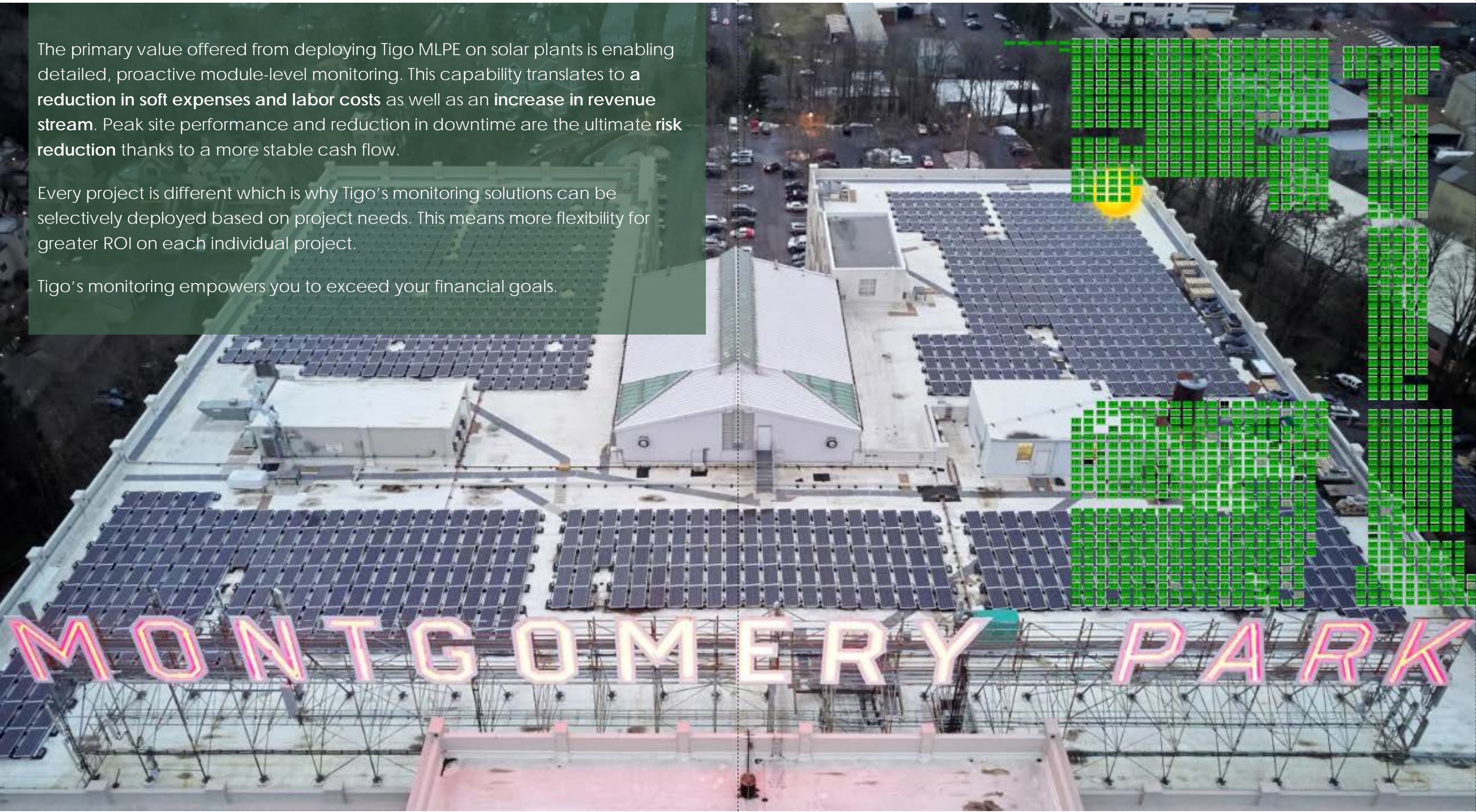
Increasing Visibility



The primary value offered from deploying Tigo MLPE on solar plants is enabling detailed, proactive module-level monitoring. This capability translates to a **reduction in soft expenses and labor costs** as well as an **increase in revenue stream**. Peak site performance and reduction in downtime are the ultimate **risk reduction** thanks to a more stable cash flow.

Every project is different which is why Tigo's monitoring solutions can be selectively deployed based on project needs. This means more flexibility for greater ROI on each individual project.

Tigo's monitoring empowers you to exceed your financial goals.



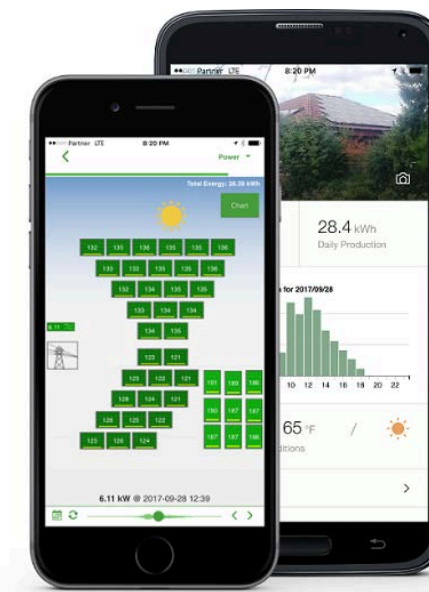
Improving ROI

Reducing Costs

On large sites with only inverter-level monitoring, identifying the source of underperformance - if at all - can take hours after crews test each string until the source of a problem is identified. The cost and location of some issues, like PID, can only be estimated. Without transparency of quality and reliability, the financial returns from solar plants as assets are often limited.



With Tigo's module-level monitoring, the sources of underperformance become transparent. Tigo's online monitoring platform allows once hidden equipment defects to surface. Some of these may include broken modules, faulty diodes, PID, burned fuses, string shorting, disconnected combiners and more. The locations of mismatch and the amount of mismatch are instantly evident, and this enables site maintenance personnel to take targeted, direct actions that maximize the return of labor time spent on site.



Increasing Revenue

Hidden PV equipment defects often have energy yield impacts. With Tigo's module-level monitoring, they can be easily fixed once they are identified by filing claims with the respective manufacturers or the maintenance personnel.

This complete transparency allows accurate calculations of important metrics like the revenue impact of each defect. Based on these calculations combined with equipment warranties, corrective actions can be taken. Severity of the issue, ease of corrective action, and speed of deployment will become trivial and make operations actions more efficient, more reliable, and more cost effective while maintaining production and revenue at record high.

Reducing Risk

Catastrophic events and natural disasters cause power losses at solar plants. Assessing the downtime and costs to repair are often difficult calculations and provide unrealistic estimates over the lifetime of the system. While module-level monitoring cannot prevent these problems, it significantly reduces their impact. Problems can be spotted sooner and remotely diagnosed.

This means crews and equipment can be more efficiently dispatched, resulting in quicker and more cost-effective resolutions. Minimizing the downtime and costs associated with troubleshooting an issue also reduces the uncertainty in cashflow of the PV system. This greater confidence can be translated to approximately 5% lower standard deviation, allowing financiers to reduce 1% of the cost of capital for a PV plant.

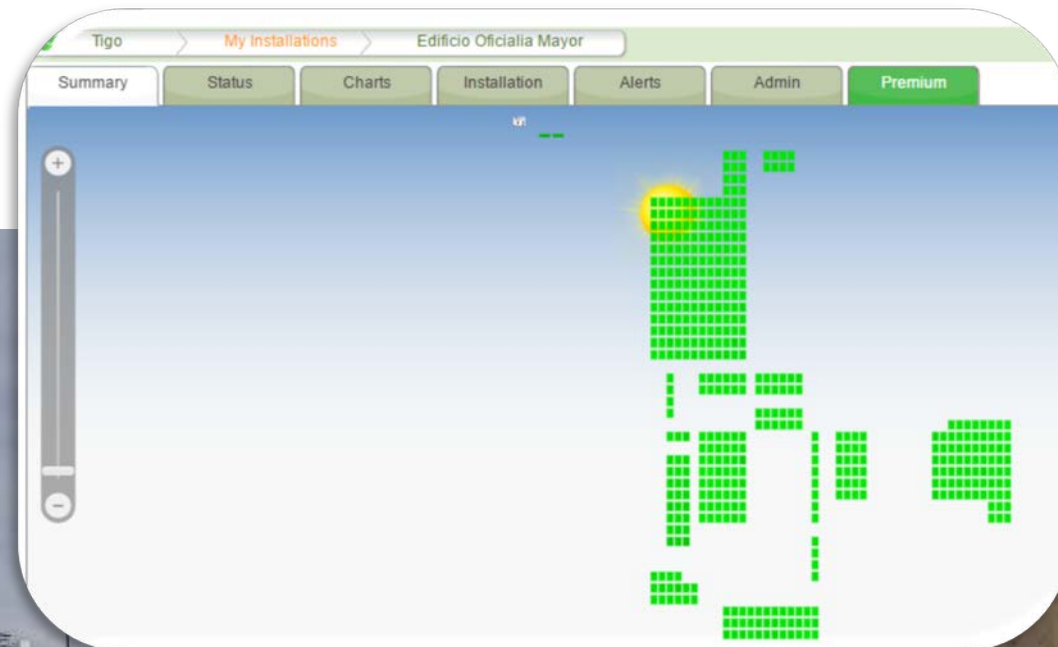


Leading PV Asset Management

Highest Data Granularity

Module-level monitoring with Tigo's SMART mobile app and desktop interfaces allow system owners with immediate statuses of PV systems. That means you can monitor system anytime, anywhere. With the highest data granularity in the industry, you can identify PID, arcs faults, diode failures, and more.

Customizable fleet performance updates also keep owners informed remotely via email and SMS alerts.



Partnering with Trusted OEMs

Tigo is the only UL-certified MLPE solution with multiple PV modules and inverters from various manufacturers. Tigo's TS4 platform has been certified by Underwriters Laboratories (UL) and Nationally Recognized Testing Laboratories (NRTL) for fully complying with National Electric Code (NEC) 2014 and 2017 690.12 Rapid Shutdown System (RSS) regulations.

PV Module Manufacturers

Tigo's RSS was successfully tested with multiple PV modules as stated by the certification's UL Product Spec. The following PV module partners are compliant with RSS module-level deactivation regulations when using Tigo's TS4-F (Fire Safety), Safety (TS4-S), Optimization (TS4-O), and Long Strings (TS4-L) integration per the UL's international recognition:



Inverter Manufacturers

Tigo's RSS was either successfully tested or is currently being tested with multiple inverters as stated by the certification's UL Product Spec. The following residential inverter partners are compliant with RSS module-level deactivation regulations when using Tigo's TS4-F (Fire Safety), Safety (TS4-S), Optimization (TS4-O), and Long Strings (TS4-L) optimizers per the UL Product Spec:



Enhancing Safety with PV-Off

To provide the best asset management for commercial buildings with PV systems, Tigo offers a rapid shutdown solution. In rapid shutdown systems, each Tigo optimizer utilizes PV-Off, an advanced safety function which automatically reduces the voltage of each module. Once PV-Off is activated, Tigo's system disconnects the PV module from the string, bringing the output power to zero. This function can be used for ordinary maintenance operations, as well as in emergency situations, intensifying the safety of the system. This revolutionary disconnect provides installers, firefighters, and maintenance techs absolute certainty that no high voltage is present.



After a devastating fire that originated from a parallel string switchboard severely damaged a factory and destroyed a portion of the 220kW system, this installer proposed to its customer to adopt Tigo's TS4 platform.

