

# *Go Solis*

## WEBINARS:

w: [ginlong.com](http://ginlong.com)

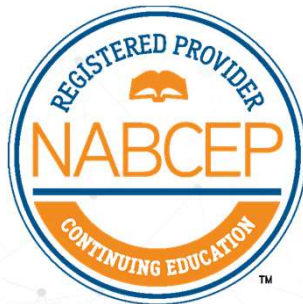
Bankable. Reliable. Local Service. / Stock Code: 300763.SZ



## **Solis and the Tigo TS4 Platform:** Tested and Harmonized Commercial Inverter 690.12 Rapid Shutdown Solutions



## Solis Memberships



# Go Solis May - 2020 / Speakers:



**Terence Parker**  
Ginlong Solis US Office  
Sr. Application Engineer



**Bernie Grant**  
Ginlong Solis US Office  
Commercial Application Engineer



**Gary Hethcoat**  
Tigo Energy  
Sales Engineer



## Agenda

- Ginlong (Solis) Technologies / Tigo Energy
- Solis 1000V Smart Commercial Inverters
- NEC Rapid Shutdown
- Tigo TS4 Platform and the New TS4-A-2F
- Tigo RSS Transmitter Integration / Installation of the TS4-A-2F
- Why Buy Solis / Tigo Commercial PV System Solutions
- Q&A





# Corporate Profiles

Made by Ginlong Technologies

# Solis Time Line – 15 years of Innovation



Founded in 2005, the manufacturer of Ginlong Technologies is the only listed company with a primary focus on string inverters. **Stock Code: 300763.SZ**



# Ginlong (Solis) Technologies; Shipments and Capacity

**3GW**

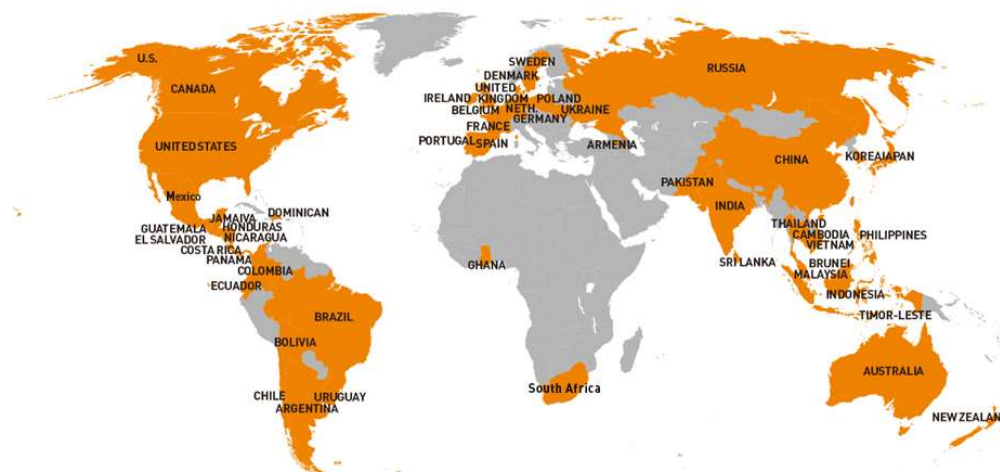
Shipment 2018FY

**5GW**

Shipment 2019FY

**20GW**

2021E Capacity



Global Shipments to  
over 100 Countries



- Vertically-integrated facilities
- ISO 9001 and 14001 certified
- Complete in-house manufacturing
  - Board SMT
  - Scalable production capacity
  - Vertically integrated to ensure quality and cost control

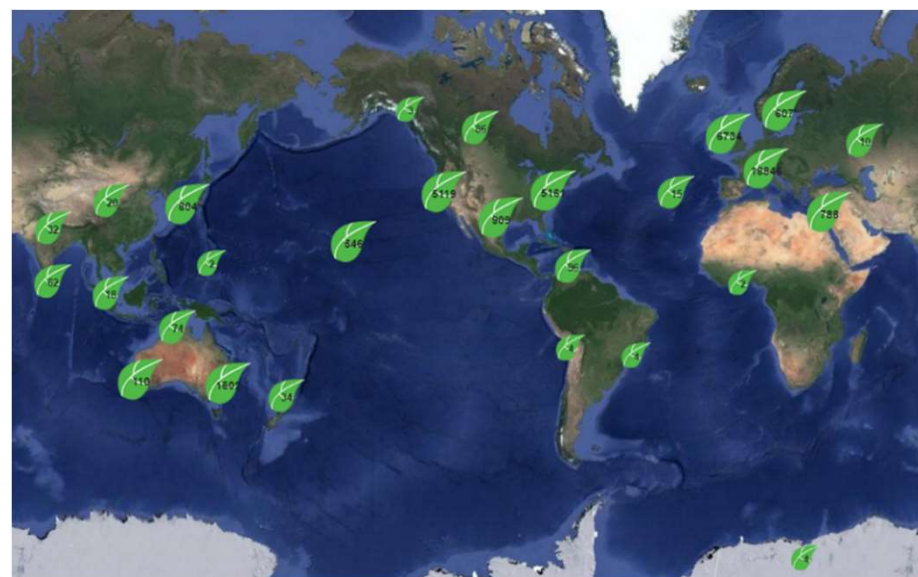






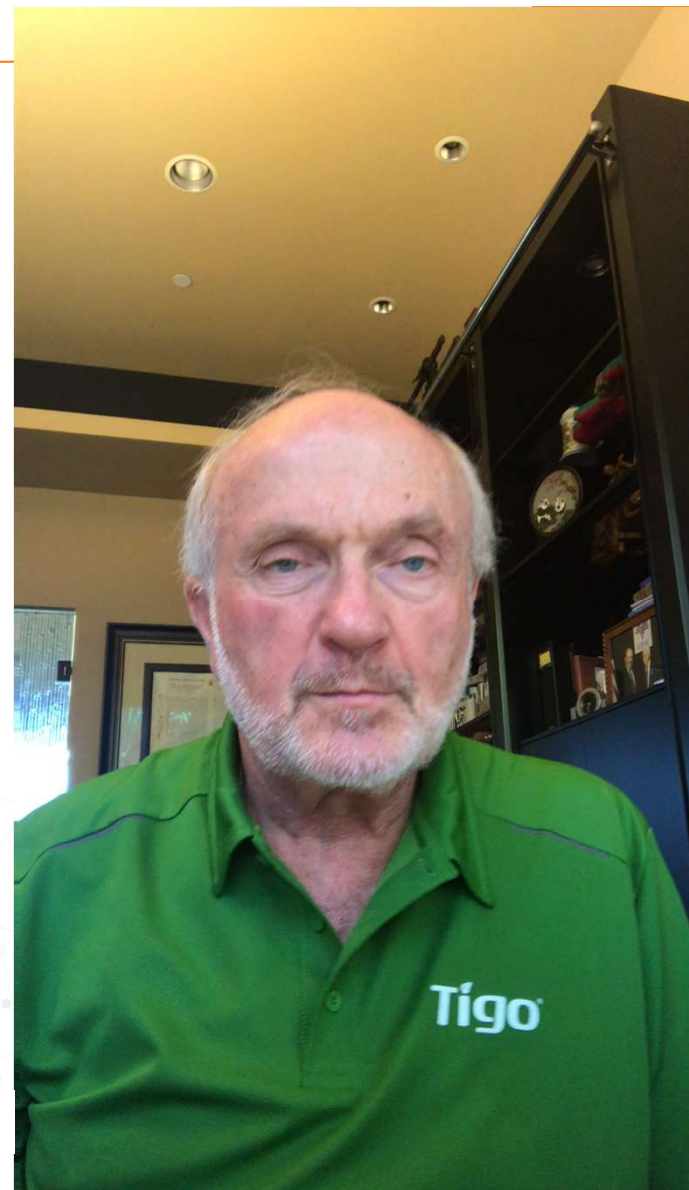


- ❖ Founded 2007
- ❖ HQ in Silicon Valley, CA
- ❖ Sales and support teams worldwide
- ❖ 3M+ units shipped, products certified across many countries, installed on 7 continents
- ❖ Supported by all US string inverter brands
- ❖ Mission: Increase your ROI by delivering smart PV technology



## A Message from Zvi Alon, Chairman and CEO of Tigo Energy

- Pioneer in Flexible MLPE for Smart PV Modules
- Focused on Generating High ROI
- TS4 Platform; Providing different functionalities per module at different price points
- Predictive IV Technology
- +1.3 Million Rapid Shutdown Units shipped
- New TS4-2F; Advanced Rapid Shutdown for two PV modules (1000 W, 1500 V), further lowering costs



## Tigo's UL-Certified TS4 Platform



Add-On

- Designed to work with any PV module
- No grounding needed
- Optimizes out-of-the-box (TS4-O)
- Highest reliability; low heat dissipation
- Selectively Deploy, mix & match
- Cost competitive

Select any functions from the different TS4 covers for Increased ROI and Reduced Cost

TS4-M  
(Monitoring)



Fleet management  
and Warranty  
tracking

TS4-F  
(Fire Safety)



Module-level  
Rapid Shutdown

TS4-S  
(Safety)



Rapid Shutdown  
and Monitoring

TS4-O  
(Optimization)



Increase yield with  
Shade and Mismatch



# Solis Commercial Inverters

Made by Ginlong Technologies

## Solis 3-Phase Commercial & Utility Scale PV String Inverters

1000 VDC



**Solis-(25-40)K**

25K, 30K, 36K, 40K,

4 Models

4 MPPT

Optional fan-assist on  
36K and 40K Models



**Solis-(50-66)K**

50K-FL, 50K, 60K, 66K

4 Models

4 MPPT

50K-FL is a fan-less inverter with  
lower input current

1500 VDC



**Solis-125K-EHV-5G**

125K-EHV

1 Model

1 MPPT



## Solis Commercial Inverters; Communication Options

- 3<sup>rd</sup> party monitoring capable with 3 Wiring Connection Methods

- All Three connections are in parallel

1. External circular connector

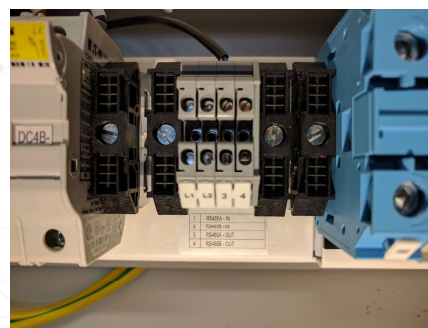
- Use Ginlong provided cable
- Multi connector Solis cable for closely mounted inverter

2. RJ-45 ports (2) (MODBUS RTU)

- Set up for daisy chain connection, IN/OUT
- Use standard Ethernet cable

3. Standard screw terminals (2 pair)

- Set up for daisy chain connection IN/OUT
- Use standard 3 wire “Belden” cable



## Innovation: The Solis Cellular Solution

- LTE Cat 1 WCDMA and GSM compatible
- MVNO (Multi-Vendor Network Operator) Solution
- Plug and Play Solution
- 5 year plan with purchase, negotiable extended plans
- Available Q3-2020
- Solis offers comprehensive PV system monitoring with Ginlong Monitoring 3.0
- **NOTE:** Solis PV Systems are compatible with a wide variety of commercial PV system monitoring solutions including Tigo Energy

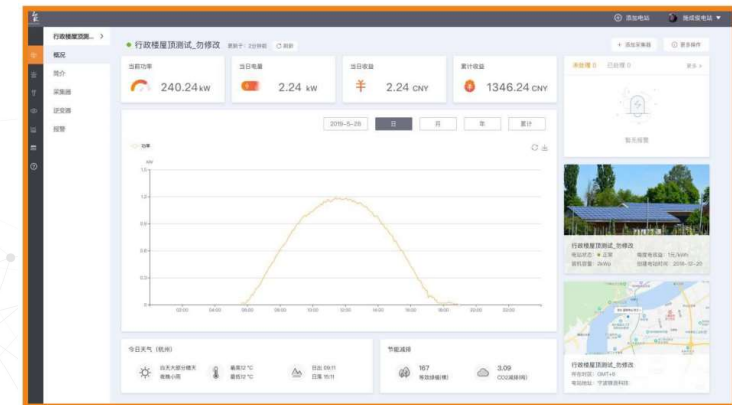
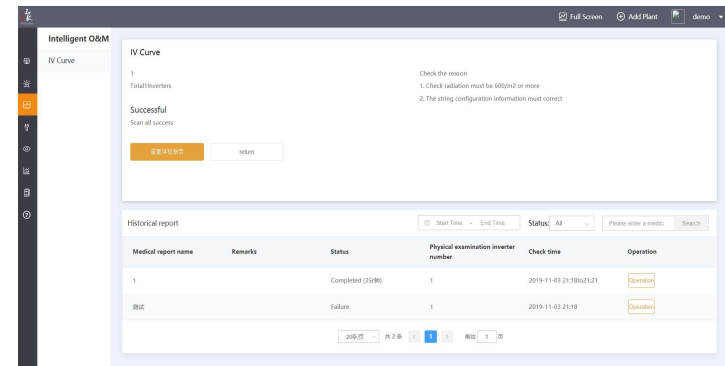


# Solis Gen 3.0 Monitoring Platform

- Built in IEEE-2030.5 Aggregator Function
- Built in Sunspec PKI provisioning
- Inverter Control – On/Off
- Cloud to Cloud API

Inverter Control

Inverter



## Solis 3-Phase Commercial (1000V / 480V) PV String Inverters

- Wide Model Range, 25 – 66 kW
- Standard Type II SPD (dc), Type 3 optional (ac)
- Built-in DC string fuse holders, fuses included
- Four MPPT input, compatible with high power modules
- Compact and lightweight, NEMA 4X (IP65) enclosure
- Salt-water tolerant, factory burn-in before packaging
- Convection cooled inverters with optional fan assist



UL1741, UL 1741 SA, UL1998,  
UL1699B, IEEE 1547.1  
CAN/CSA C22.2 107.1-1, FCC

## Solis Commercial (1000V / 480V) Inverters: The Big Reveal!!

- **Built-in Tigo MLRSD Transmitter**
  - Easy commissioning
  - Simple operation (PLC, no extra comm wire)
  - Low Power draw
  - Rapid Shutdown in less than 30 sec to <80V
  - Operates exclusively with the TS4-F (TS4-A-2F) rapid shutdown receivers



UL1741, UL 1741 SA, UL1998,  
UL1699B, IEEE 1547.1  
CAN/CSA C22.2 107.1-1, FCC



## Solis Inverters with Integrated Tigo TS4 PLC Signal Transmitter

- PLC signal transmitter and Power Supply are integrated into the inverter at the factory, no field installation or set up
- Receivers are clipped onto the PV module or to the PV module support frame up to 500W per channel
  - Simplified design with 2-channel unit
- Signal detector allows PV array installers to check operations of the rapid shutdown units before clamping down the PV array



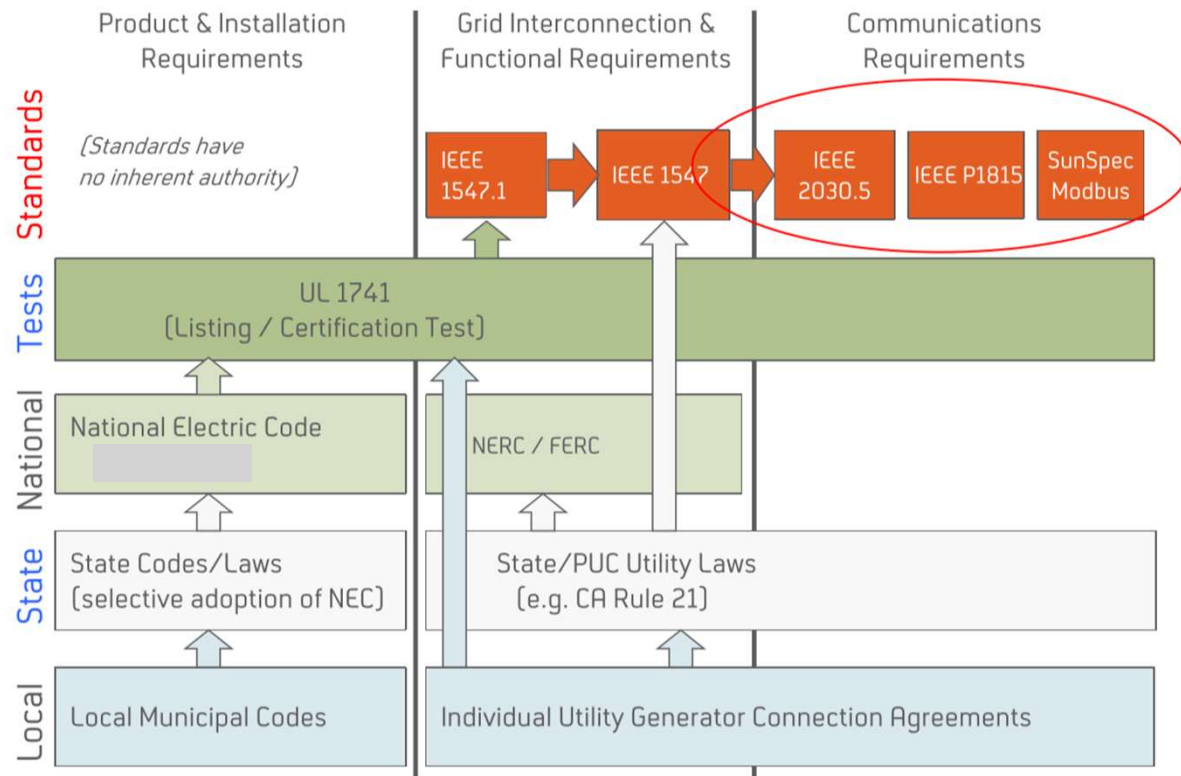




# **North America 2017-2020 NEC 690.12 Rapid Shutdown**

Made by Ginlong Technologies

## New Interoperability Standards; Utility Side Communications



## IEEE™ 1547 Grid Interconnection & Communications Standard

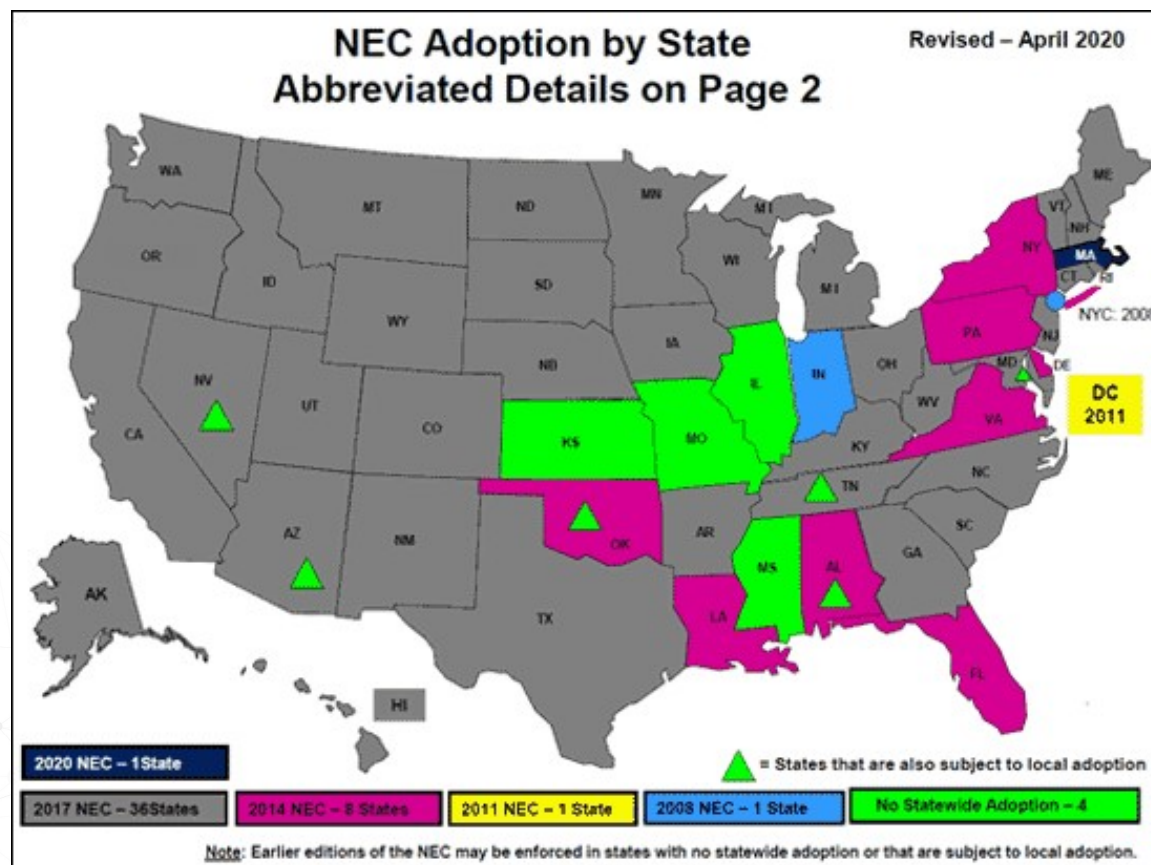
- The IEEE 1547-2018 version ensures that DER resources can be used to manage grid reliability. For instance, smart inverters could be asked to provide voltage support to the local grid.
- IEEE 1547.1 is the companion standard to IEEE 1547 that specifies how to conduct the tests that certify IEEE 1547 compliance - communication capabilities.
  - IEEE 1547.1 is primarily a functionality test for advanced smart inverter functions.



**This is a huge step forward in that for the first time a smart inverter hardware certification program will validate that sending instructions or information in an industry standard protocol will achieve the desired behavior of the system.**

## NEC Updates are Happening Quickly

- A PV installer will be subject to different NEC regulations, and Local AHJ rules depending on the jurisdiction they are working in.






# **Tigo TS4 Platform and the TS4-F**


Made by Ginlong Technologies

# Tigo TS4 Platform – Solis Operational Compliance

- Solis Inverters have been Certified on the Tigo TS-4 Platform since 2018



February 11, 2018



**Declaration of Operational Compliance  
between Tigo TS4 Platform and Ginlong Solis Inverters**

Tigo and Ginlong Solis are pleased to announce that the following inverter products from Ginlong Solis:

Solis-5K-2G-US*	Solis-36K-US-SW	Solis-50K-US-F-SW
Solis-25K-US-SW	Solis-40K-US-SW	Solis-60K-US-F-SW
Solis-30K-US-SW	Solis-50K-US-SW	Solis-66K-US-F-SW

are UL-PVRSS certified to comply with NEC 2017 regulations with the following TS4 products from Tigo:

TS4 models -F, -O, -L	TS4-R models -F, -O	TS4-R-X-Duo modules -O
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Additionally, the following inverter products from Ginlong Solis:

Solis-5K-2G-US*	Solis-36K-US-SW	Solis-50K-US-F-SW
Solis-25K-US-SW	Solis-40K-US-SW	Solis-60K-US-F-SW
Solis-30K-US-SW	Solis-50K-US-SW	Solis-66K-US-F-SW

are operationally compliant in combination with the following TS4 products from Tigo:

TS4 models -D, -M, -F, -S, -O, -L	TS4-R models -M, -F, -S, -O	TS4-R-X-Duo models -M, -S, -O
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\* Excludes -F

Tigo has conducted testing and validated the effective performance of the systems together within standard testing environments. Warranties from Ginlong Solis and Tigo will remain valid if the design, installation, and operation requirements are followed for each product.

Contact Tigo Support with any questions regarding Tigo TS4 Module Platform equipment at [support@tigoenergy.com](mailto:support@tigoenergy.com) or (408)-402-0802.

**Tigo Energy, Inc.**  
420 Blossom Hill Rd  
Los Gatos, CA 95032

Evelyn Ho, Product Manager  
Print Name and Title

Evelyn Ho 3/14/2019  
Signature and Date

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P. R. China  
**Ginlong Solis USA**  
565 Metro Pl. S 31e 3214  
Dublin, OH, 43017

Product manager  
Print Name and Title

Zhang Kun 2019.3.14  
Signature and Date



## Tigo TS4-F and Solis

- Simple installation
- RSS Transmitter built-in



## Tigo TS4-F – Add-on or Integrated

TS4-A-F

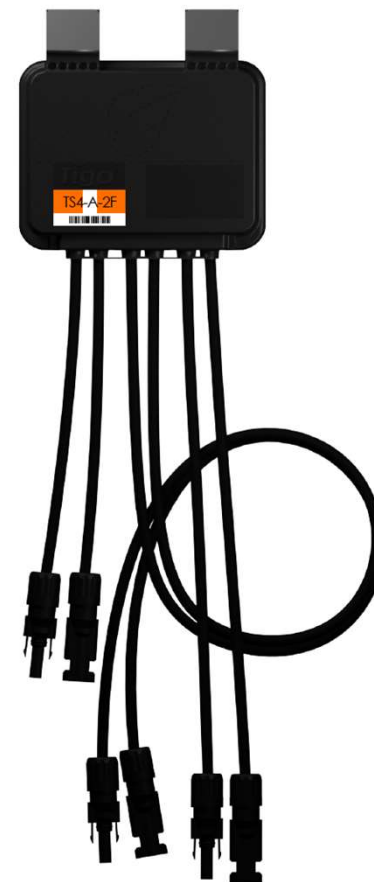


Integrated TS4-F



## Tigo TS4-A-2F: Dual Fire Safety

- Like having two TS4-A-F units in one package
- Starts shipping end of Q2 CY2020
- Ratings:
  - 1000W (500W per channel)
  - 16-90V, 15A (per channel)

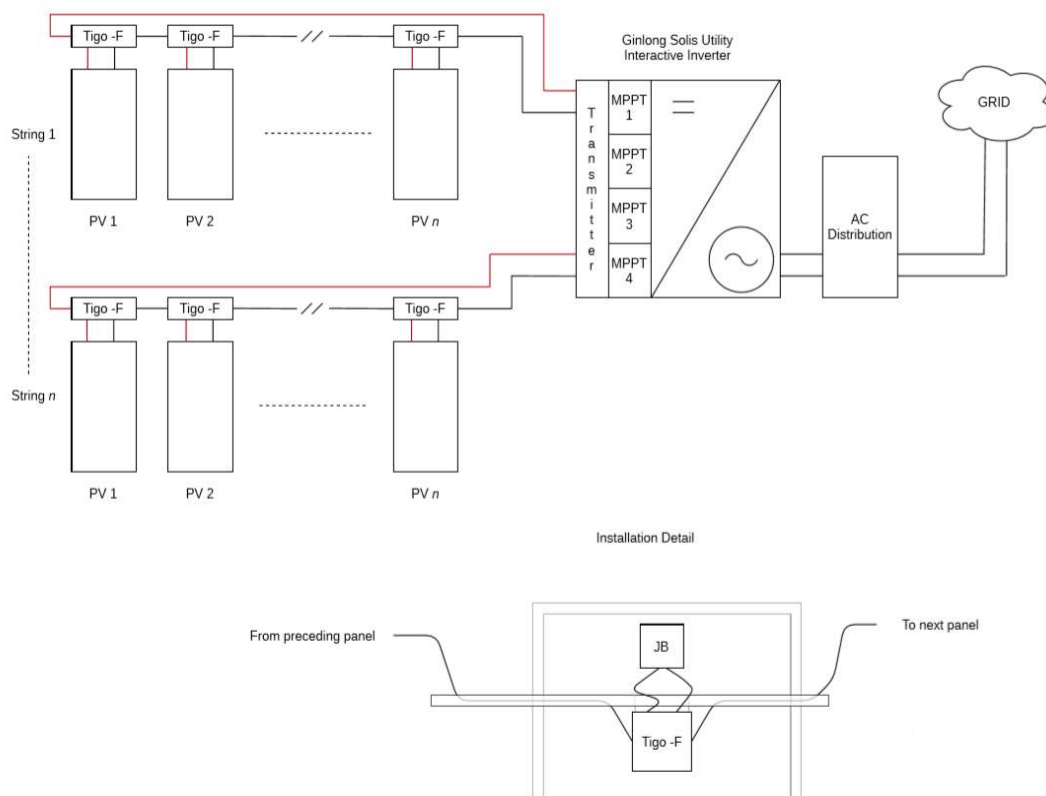




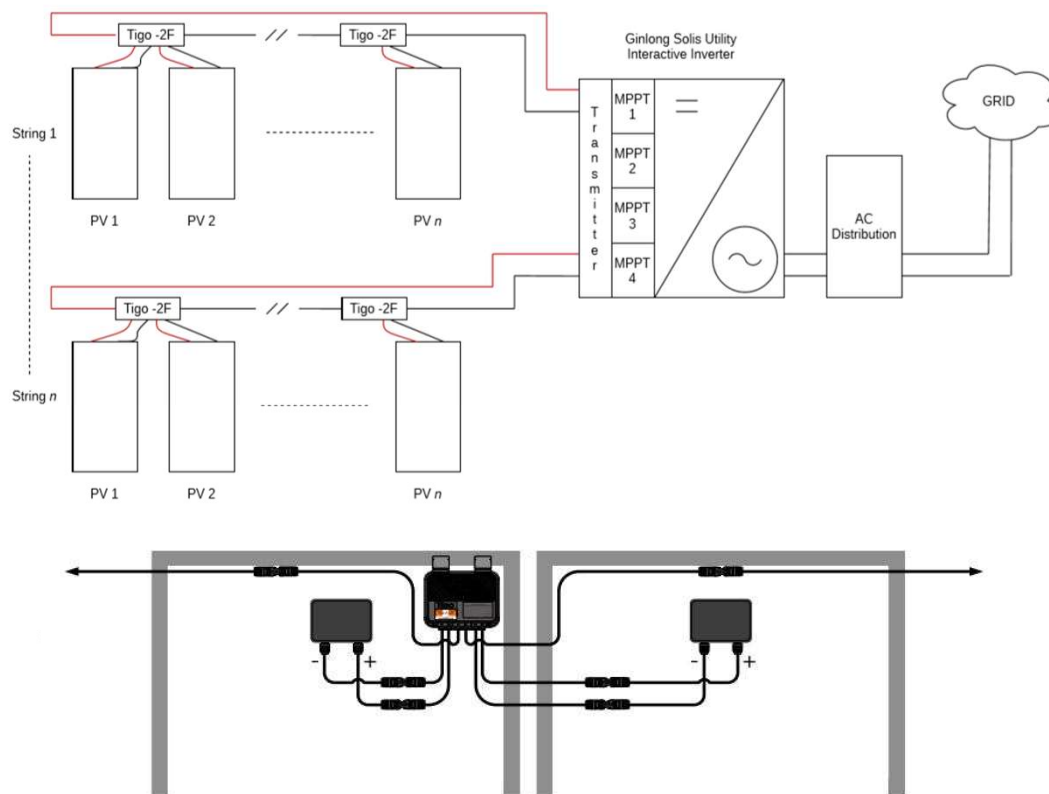
# **Solis / Tigo RSS Transmitter Integration and Installation of the TS4-A-F**

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## Tigo TS4-A-F Installation; Single Channel



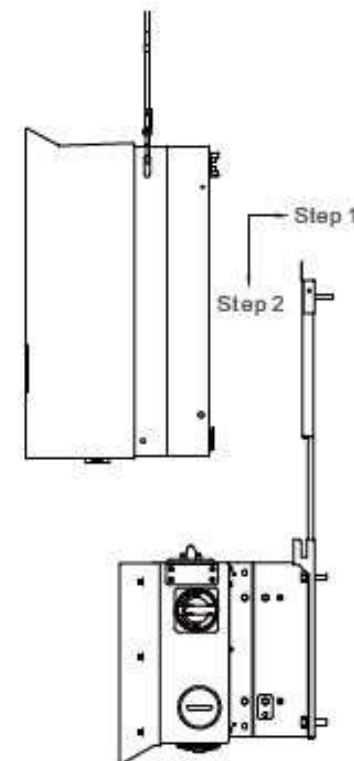
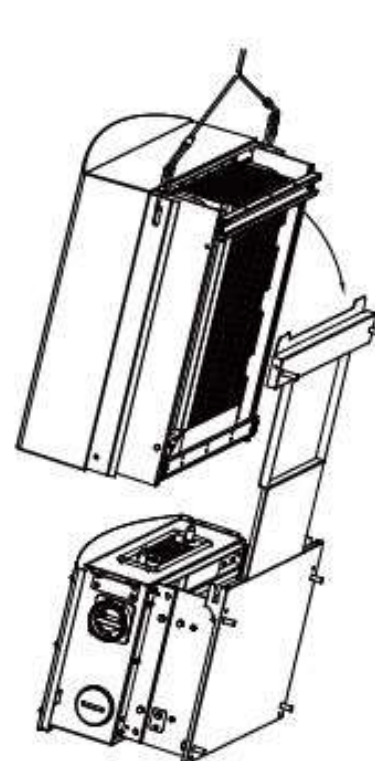
## Tigo TS4-A-2F Installation; Dual Channel





## Tigo RSS Receiver Integrated into the Solis Separate Wire Box

- Tigo Rapid Shutdown Transmitter integrated and protected inside the Solis separate wire box
- Simplifies process, Costs less to install
  - 2 steps, 1. wire box, 2. inverter
- Easy O&M Process
  - Only replace power train
  - Electrician not needed
  - 5 minute inverter swap
  - System still on-line



## Commissioning Commercial PV Systems

- ✓ There are no commissioning or set-up steps for the Tigo TS4-F transmitter inside the Solis commercial inverter. It works automatically when ac power is applied. **Rapid shutdown functionality can be tested before the drive train arrives!**
- ✓ Inspect the entire PV array for workmanship, accessibility, potential stress points, site cleanliness, etc.
- ✓ Tigo or Solis monitoring solutions must also be commissioned and tested before hand-off to the PV system financiers and owner/operators.
- ✓ Take photos (ribbon-cutting!), arrange for removal of safety fencing and other equipment. Hand-off the Warranty and Operations Manuals to system supervisors.





# Why Solis / Tigo Commercial Systems?

Made by Ginlong Technologies

# Solis Tigo Commercial Inverters: Unexpected Design Advantages

## Faster Installation

- Tigo two-channel (TS4-A-2F) rapid shutdown receivers increase installation speed
- Tigo RSS transmitter is factory-integrated (one less box to install and set up)
- No external rapid shutdown initiation switch required (ac system disconnect can be labeled as the initiation switch).



## Faster Commissioning

- No discovery, no configuration. TS4-A-F rapid shutdown receivers are robust devices
- No activation of the Solis/ Tigo RSS transmitter. Works automatically when ac is applied.
- Tigo RS Signal Detector takes the guesswork out of rapid shutdown system operations



## Slide 36

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**GHI** I don't think we want to mention shading, since the TS4-F does not optimize.  
Gary Hethcoat, 5/20/2020



# Solis / Tigo Commercial Inverters: Unexpected Design Advantages

## Design Flexibility

- Inverters can be monitored with the Tigo or Ginlong Monitoring platforms
- Inverters can communicate with the cloud via cellular or hardwire.
- Different PV module string lengths on independent MPPT's

## Safety

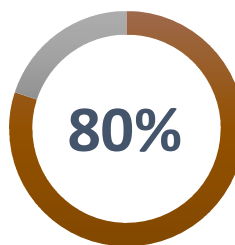
- Tigo RSS transmitter is not touched during installation (behind barrier)
- Tigo transmitter is safely removed by removing and replacing the separate-able wire box.



## Solis / Tigo Commercial Inverters: Trained North America Support

Tigo and Solis have collaborated on product training to ensure excellent support;

1. Design assistance is available for PV system contractors, e.g. sample Bills of Materials and identification of distribution centers
2. Solis Inverters Customer Service Department will handle the toll-free customer support line (866-438-8408) for the Solis / Tigo rapid shutdown solution
3. Tigo Energy provides advanced communications support



### Ticket Response Time in SLA

Over 80% of tickets are responded to within 1h, after that the remaining 20% are handled within 1-48 hours. We expedite and prioritize RMA tickets

### Phone Call Statistics

Of our total call volume, we have a very small wait time, and an average call duration of less than 6 minutes. This is saving your technicians time and effort in the field.

**Total Calls: 3,800**  
**Average Wait time: 1m 16s**  
**Average Duration: 5m 38s**



## Solis Inverters + Tigo Energy

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# Thank You!





# Q & A!

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