

Leading The GaN Revolution APEC 2020

Portable Power for the People: Inergy Realizes its Vision with Transphorm GaN

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and

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transphorm

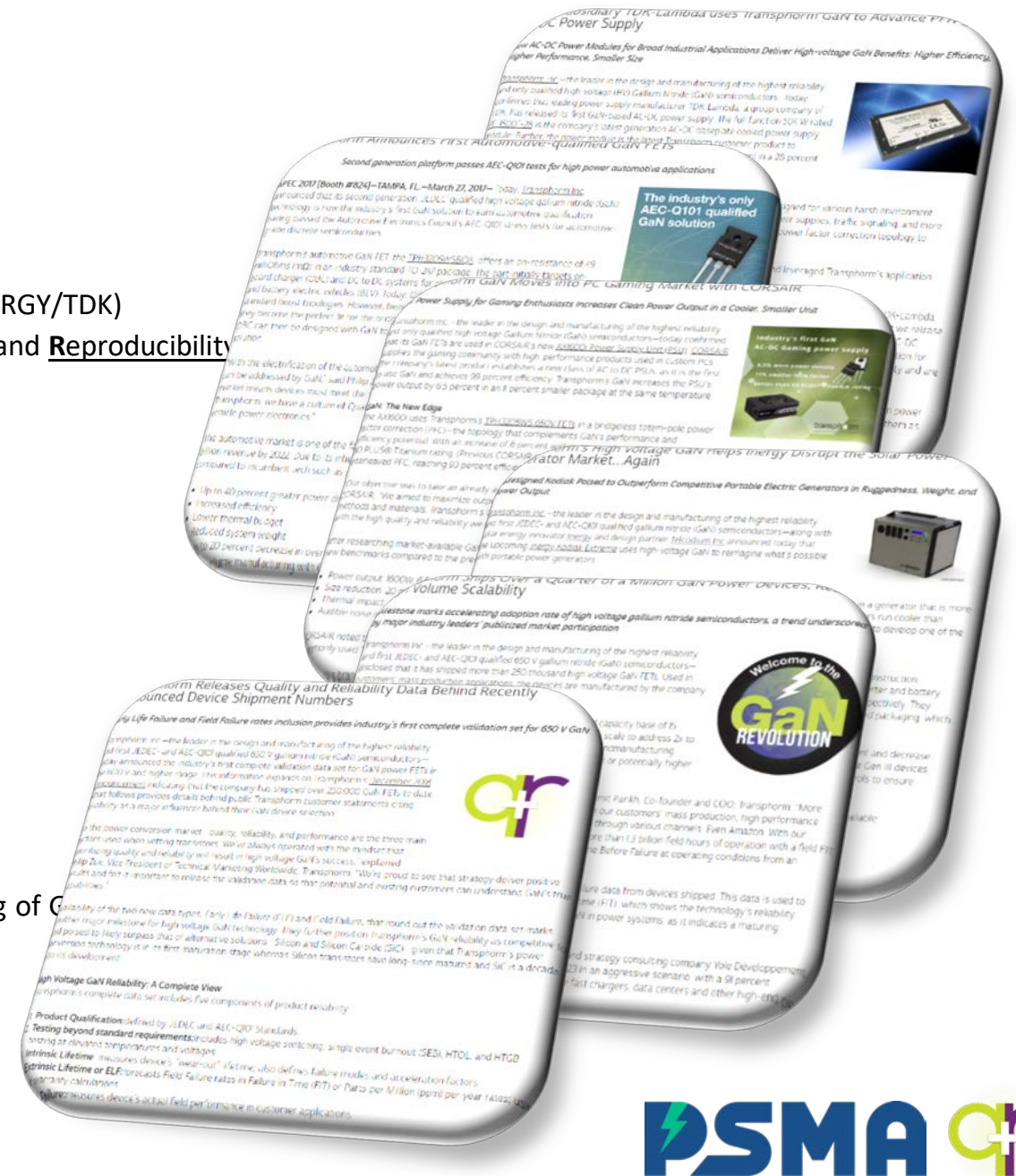
Highest Performance, Highest Reliability GaN



Agenda

- Transphorm Update
- Latest, “In Production” Use Case
- Inergy: Portable Power for the People
 - APEX 3K: Portable electric generator
 - HOME BASE™: 6 kW residential solar system

- **High volume production (> 500K shipped)**
 - Multiple customers validated with press releases
 - Multiple markets with firsts (Bel Power/CORSAIR/INERGY/TDK)
 - Success from: Reliability, Drive ability, Design ability and Reproducibility
- **Superior Q+R GaN technology (< 2 FIT)**
 - Owner of design, EPI and process
 - > 5 billion field hours
 - Field failure rate in-line with SiC
- **AEC-Q101 qualified GaN technology (175°C)**
 - Gen II – 1st qualified platform (150°C) - 2017
 - Gen III – 2nd qualified platform (175°C) – 2019
- **\$18.5M DoD/Navy Contract, Epi Business**
 - Recognition of TPH IP and capability in manufacturing of GaN
 - Recognition by a 3rd party (US Govt)
- **Short lead times (< 13 weeks)**
 - Low lead times to satisfy customers
 - 2x to 5x capability to ramp



HZZH– 3 kW Power Supply Unit

GaN 98% Intelligent Air-Cooled High Efficiency Rectifier Module



中恒派威电源
ZHONHEN POWER ENERGY

- **Transphorm GaN Use**

- Interleaved Bridgeless Totem-pole PFC
- Technology Platform: Generation II

- **End Application**

- Titanium 80 Plus PSU (various applications)
- Output voltage: 42 V to 58 V (54.5 V typ.)

- **Results**



Highest Efficiency GaN Powered Power Supply in the Market			
PFC Efficiency	Overall Efficiency	Hot Pluggable	Titanium
> 99% (PFC)	98% @ 230 Vac	Yes	Yes

AES – First GaN Powered Large Aircraft Passenger Application

• Transphorm GaN Use


- Power Factor Correction (PFC Boost)
- Technology Platform: Generation II

• End Application

- Aircraft cabin electronics
 - PS2500 (1Ø): 500 W
 - Industry's first passively cooled power supply at 420 W
 - PS6120 (3Ø): 1200 W
 - Industry's most efficient 1200 W power supply



• Results

First GaN Powered Large Passenger GaN Application			
Efficiency	Weight (PS2500)	Weight (PS6120)	Fanless (PS2500)
10 – 12% 	1.4/3.08 (kg/lbs.)	4.0/8.8 (kg/lbs.)	Yes (Robust)

• Testimonial

“Ease of drivability and designability—does not require custom drivers. Proven reliability — JEDEC and AEC-Q101”



Inergy – Portable Power for the People

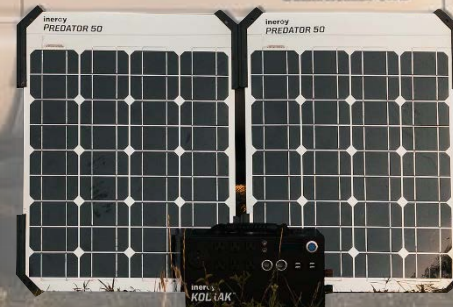
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APEC®

March 2020

PRESENTED BY:
SEAN LUANGRATH
CEO, INERGY SOLAR

INERGY



PSMA

/APEX Portable Solar Generator

Product Specs:

Dimensions: 14" x 7.5" x 8"

Weight: 25 Pounds (11.3 Kg)

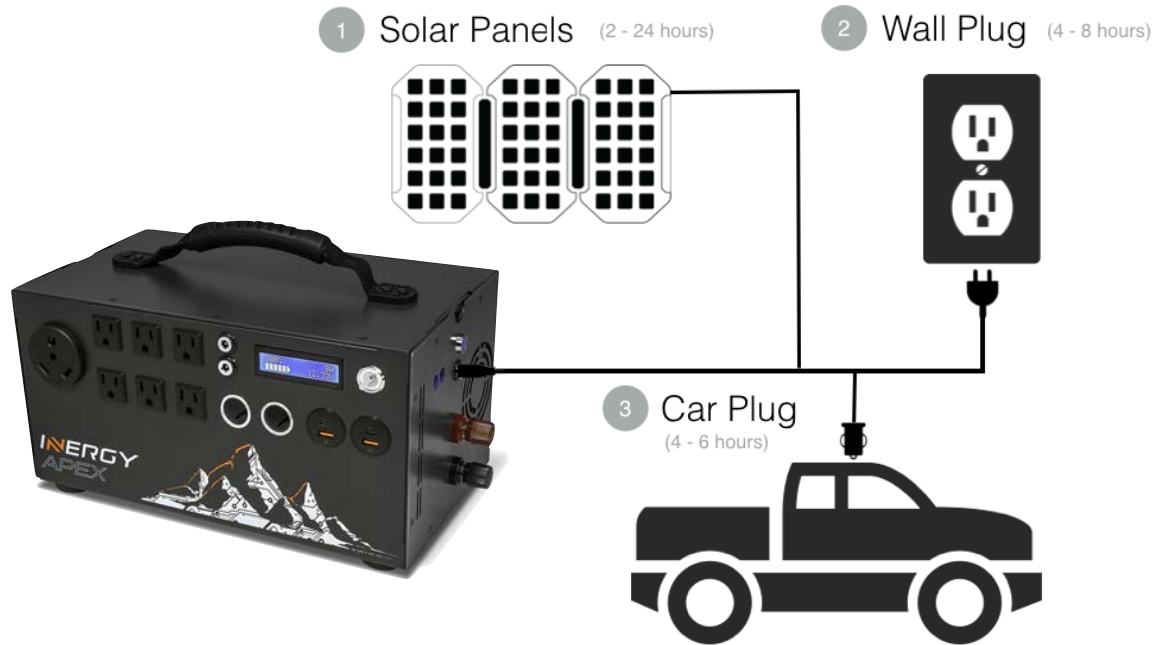
Internal Li-ion Battery Capacity: 1,100 Wh

AC Inverter: 1,500 W, 3,000 Watts Surge

Power Input: 500 W maximum

Power Output:

- (6) 110V AC plugs
- (2) 12V DC universal car sockets
- (4) USB (Type A & C) outlets
- (2) 12V DC Basecamp LED Light ports



Phone
100+



Laptop
20+



LED TV
25 hrs



Radio
110 hrs



Light
183 hrs



Fan
20 hrs



Freezer
40+ hrs



Fridge
30+ hrs



/Media Coverage and Accolades



- Jan 2016: Inergy wins 1st Place at Google's Startup Grind Pitch Event



- Sep 2017: Winner at the 2017 Entrepreneurship Star Startup Pitch Competition for Silicon Valley and was invited to pitch in China finals



- Jan 2018: Winner of the 2017 National Energy Generation Category & Winner for Pacific Northwest Region



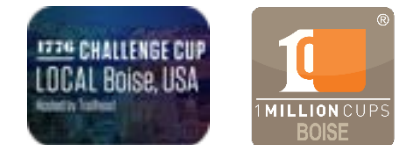
- Oct 2018: Idaho Innovation Awards Finalist as Consumer Product of the Year



- May 2019: Winner at 2019 NREL Industry Growth Forum



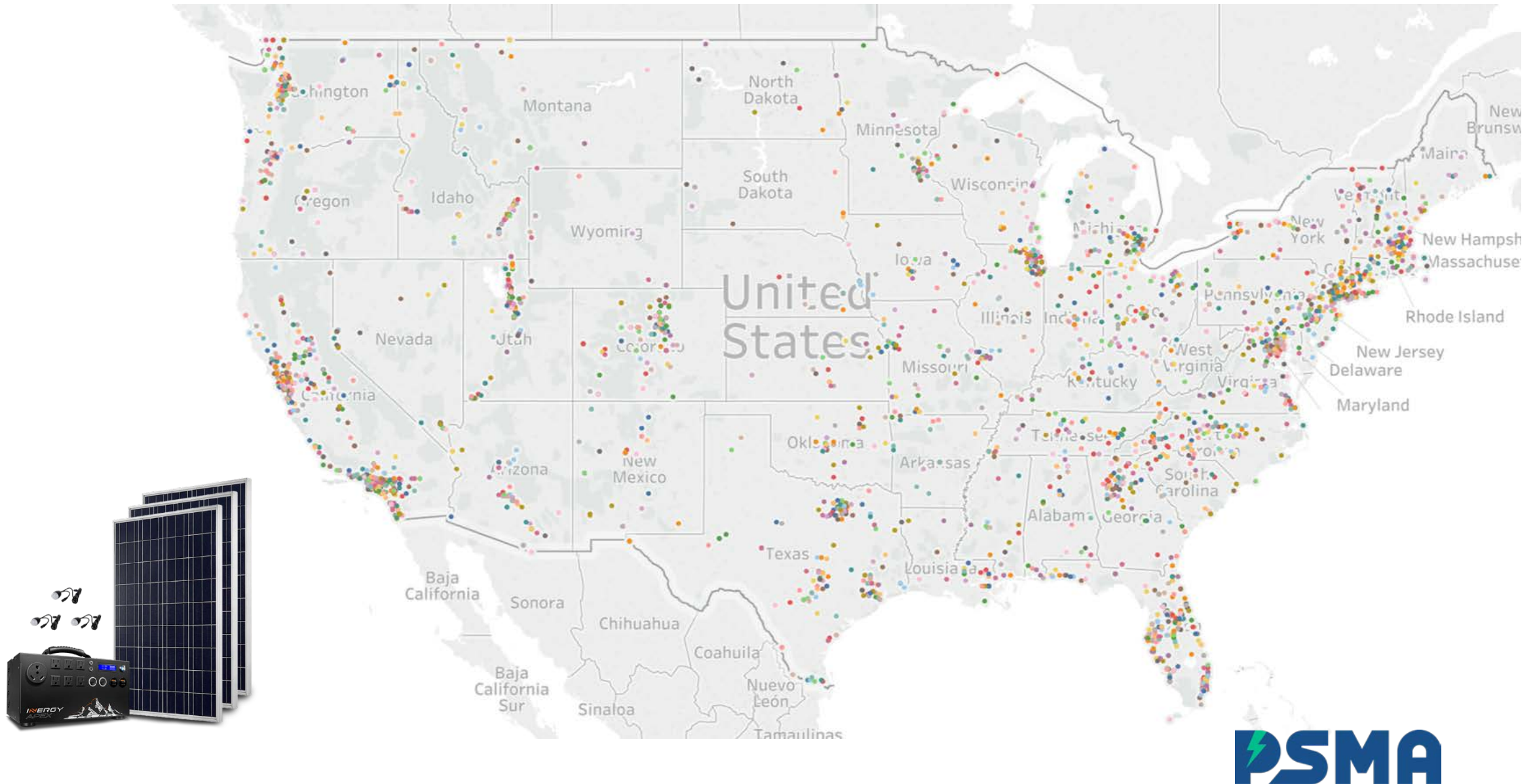
- Oct 2019: Winner of 2019 Defense Innovation Award at Defense TechConnect



/Inergy's Customers



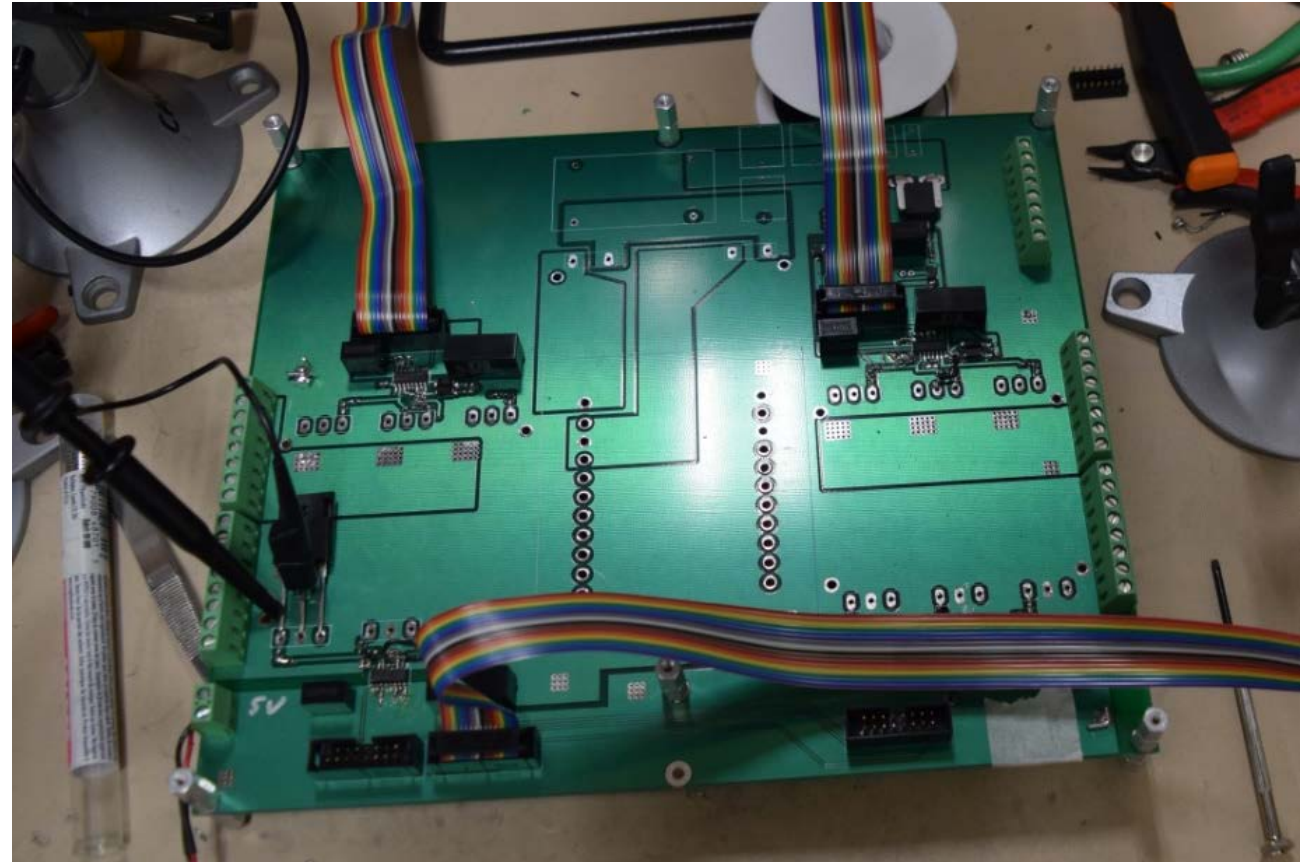
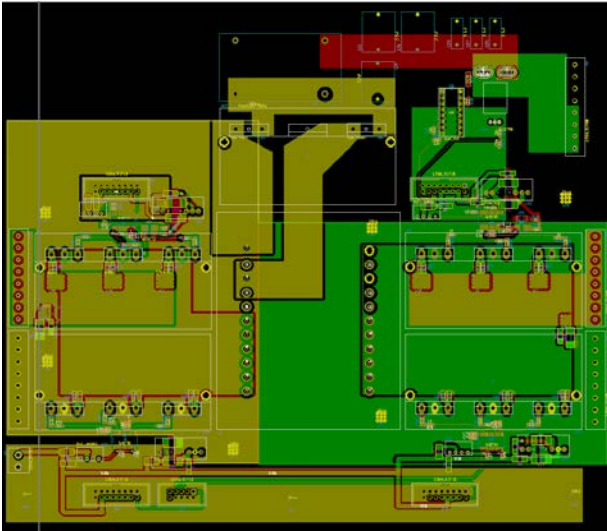
Inergy's 10,000+ Customers



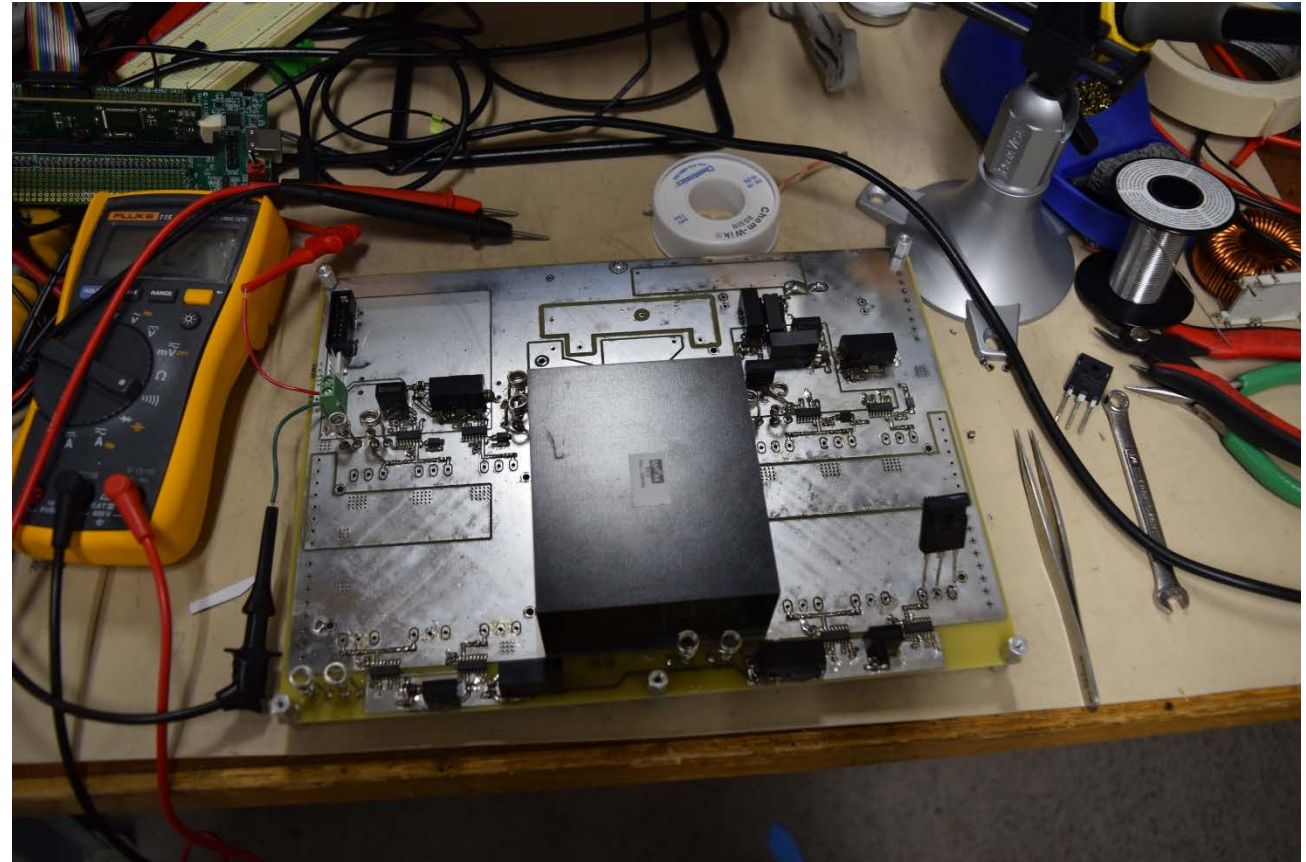
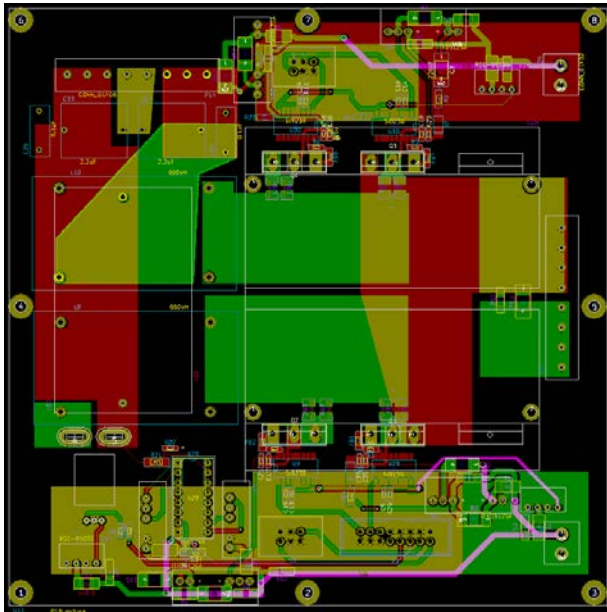


Inergy – APEX 3K

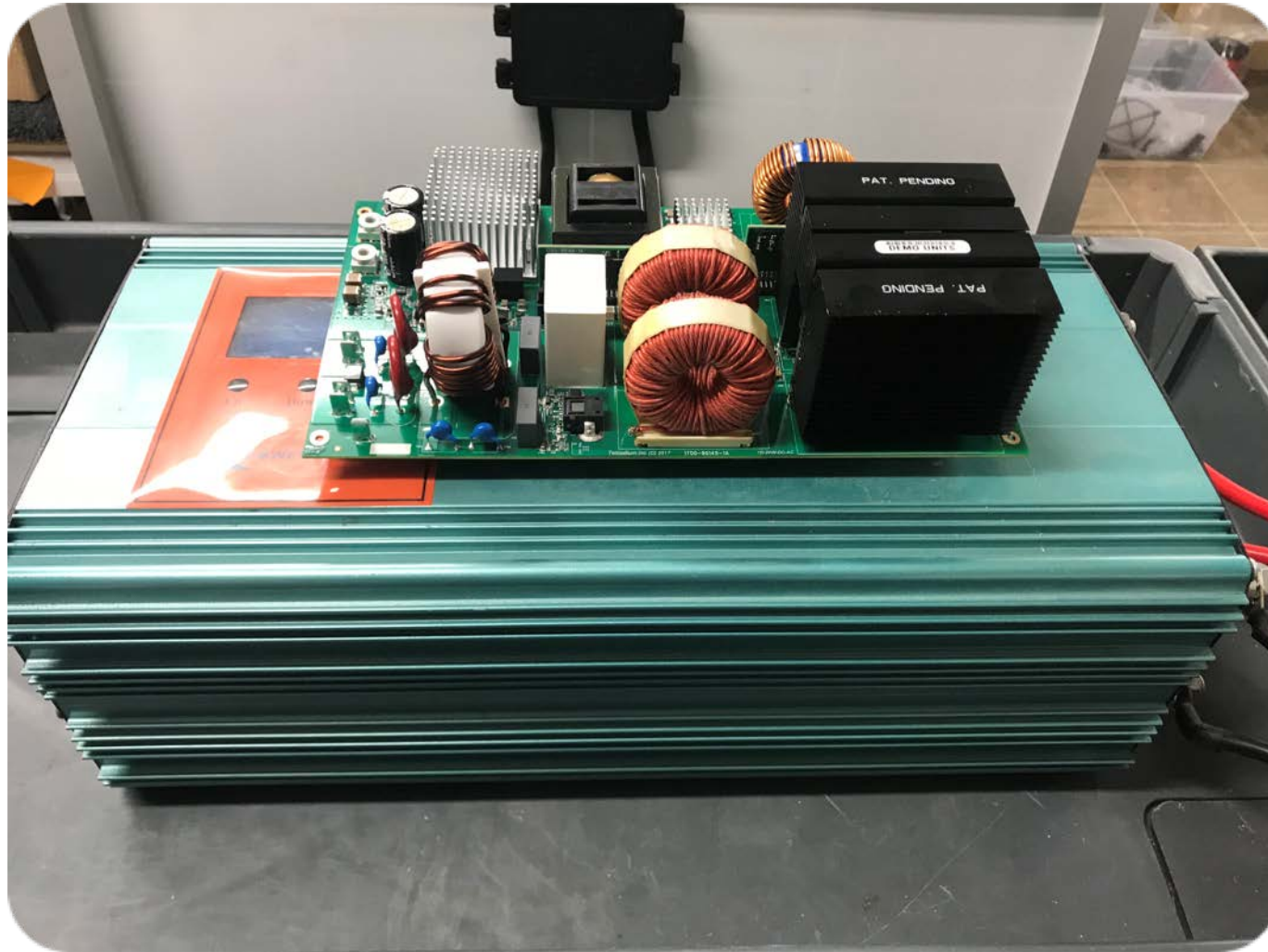
/3 kW Boost Work in Progress (DC to DC)



/3 kW Inverter Work in Progress (DC to AC)



/3 kW Results (DC to DC and DC to AC)



/Inergy APEX 3K vs. Competition

- 3 kWh Power Capacity
- Recharges from AC plug or Solar Panels
- <4 Hours recharge time w/ 120v AC
- 3KW AC Inverter:
3KW Nominal 17A @ 120V | 4KW Peak 21A @ 120V |
5KW Surge
- Compact & lightweight @ 45 pounds



- 3 kWh Power Capacity
- Recharges from AC plug or Solar Panels
- 25 Hours w/ 110VAC Wall Charger
- 1500W AC Inverter: 1.5KW Nominal &
3KW Surges
- 68.6 pounds (77.5 pounds with cart)



/3 kW GaN Inverter Demonstration



Startup Surge:

Power Multiple Power Tools at Once



Power Output:



Run Stick/TIG Welders

/APEX 3K Launch Date: April 2020

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- 30-Day Money Back Guarantee
- Idaho Based Customer Support
- First Responder & Military Discount

QTY

-

1

+

[ADD TO CART](#)

POWER SPECS

- Internal Battery:** 3,000 Watt hours (62 amp hours, 48 volts), Lithium NMC
- Battery Life Expectancy:** Up to 2,000 Cycles or 10 Years, 4 times longer life compared to any competitor
- AC Inverter:** 3,000-Watt GaN pure sine wave, 4,500-Watt starting surge
- Charging:** 2,000 Watts max input, 1.5 hour recharge time at max input
- Battery Expansion:** Yes. Apex 3K accepts Inergy's 48V external Lithium-Ion (coming early 2020)
- MPPT Charge Controller:** Allows for faster and more efficient charging
- USB-C Charge Ports**
- USB Qual Comm 3.0 Charge Ports**
- Power Switch:** Allows user to charge devices via the USB, USB-C, and 12V output ports without having to turn on the inverter
- EC8 Input Plug:** Creates an extremely user friendly, plug and play interface
- Compatible with EC8-to-MC4 Adapter**

PRODUCT SPECS

- Charging Temperatures:** 32°F to 104°F
- Discharging Temperatures:** 20°F to 115°F
- Dimensions:** 16" W x 20" H x 10" D
- Weight:** 60 lbs
- Warranty:** 1-Year
- Shoulder Carrying Strap**
- Standard Wall Charger Included**





Inergy – HOME BASE™

/The Start

IGEM Project: Home Base Inverter+ 6,000 Watt Split Phase Gallium Nitride High Frequency Inverter

Project Goal: Develop and prototype a 6 kW next-gen inverter

- Validates that gallium nitride + high frequency power conversion results in light weight, compact, and viable market solution
- Allows Inergy to perform customer development analysis to fine -tune the target market demographic and messaging

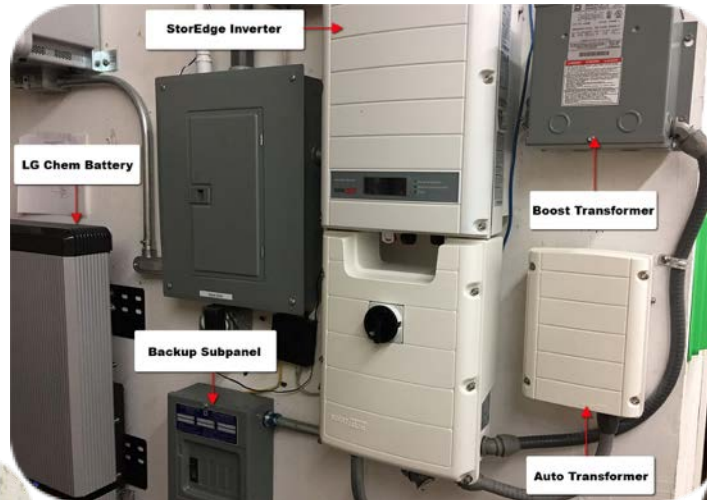
Requested IGEM Grant: \$178,178 = 2 Graduates + 2 Undergrads for 1 year



/Current Off-Grid Home Storage Systems



List Price	\$6,000
Installed	\$10,000
Weight	165 LBS



sonnen

List Price	\$9,950
Installed	\$11,000
Weight	377 LBS



TESLA

List Price	\$5,900
Installed	\$12,000
Weight	275 LBS



INTRODUCING
A BETTER,
SIMPLER WAY:

THE INERGY HOME BASE TM

*An off-grid whole-home
solar system in a box*



/GaN-Enhanced HOME BASE™

Smart – IoT enabled with **nano-grid** software

Compact – 1/3 to 1/4 the size of competitors

Lightweight – 6kW inverter weighs **10 lbs**

Portable – 4kW system weighs **50 lbs**

Plug & Play – **No** installation required

Modular – **Expandable** batteries

Target Launch Date:

Q4 2020



/HOME BASE™ Competitors



Home Base

List: \$7,500
Installed: **\$7,800**



 **LG Chem**

List: \$6,000
Installed: \$10,000



TESLA

List: \$5,900
Installed: \$12,000




sonnen

List: \$9,950
Installed: \$11,000

Power Density
(Watts/Pounds)

80.0

59

51

11

Storage Capacity
(kiloWatt Hours)

4

9.8

14

4

Weight (Pounds)

50

165

275

377

Inverter

6kW
(DC & AC)

No

AC Only

No

Portable

Yes

No

No

No

Plug & Play
(No installation required)

Yes

No

No

No



THANK YOU

Presented by:
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