215W Grid Connected Solar Microinverter Reference Design

Demo Instructions

What's Included?

- 215W Grid Connected Solar Microinverter
- PV Panel Input Cables
- AC Mains Cable

Specifications

- Recommended Input Power: 250W (max)

- Maximum Output Power: 215W

- Open Circuit PV Voltage: 53Vdc

- Maximum Power Point Tracking: 99.5%

- MPPT Voltage: 25Vdc − 45Vdc

- Extended Range: 20-25Vdc (@ reduced power)

- AC Output Voltage Range

  - 210Vac − 264Vac (230Vac Nom)

  - 90Vac − 140Vac (120Vac Nom)

- Output TDD: < 5%

- Output Power Factor: > 0.95

- Peak Efficiency: 94.5% (230Vac unit - Nominal Conditions)

Board Layout
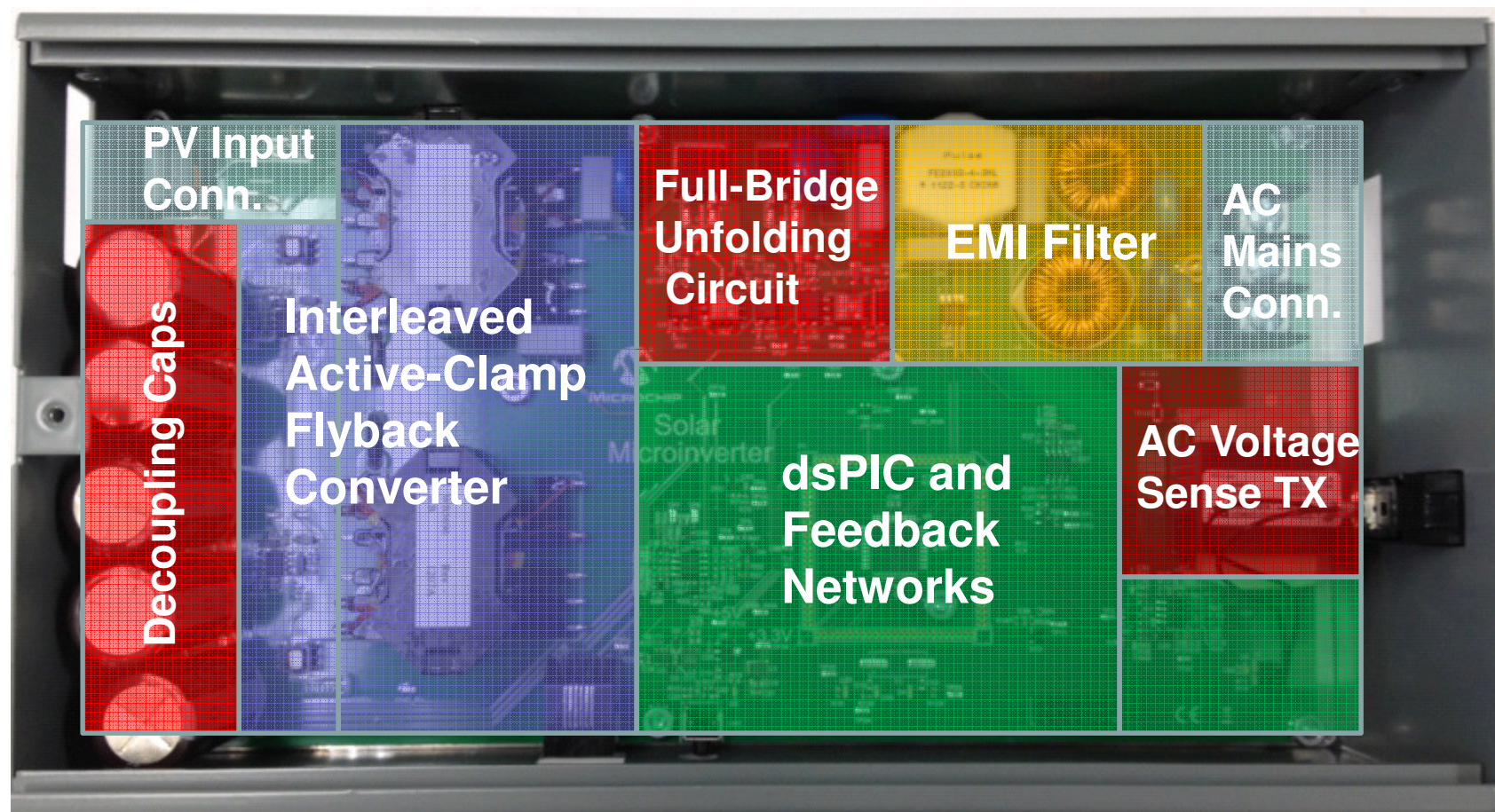
Before Connecting the Solar Microinverter

- **Visually Inspect The System To Ensure No Damage Has Been Caused During Shipping**

- **Read The Setup And Connections Section Completely Before Powering On The Unit**
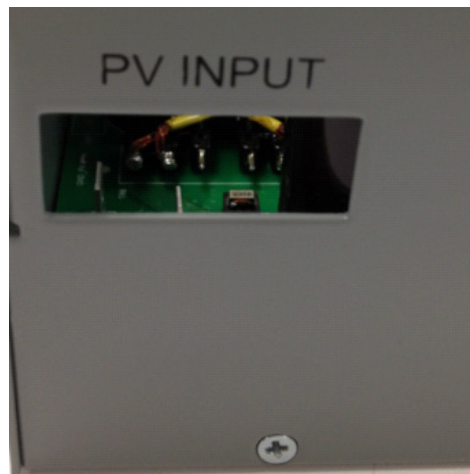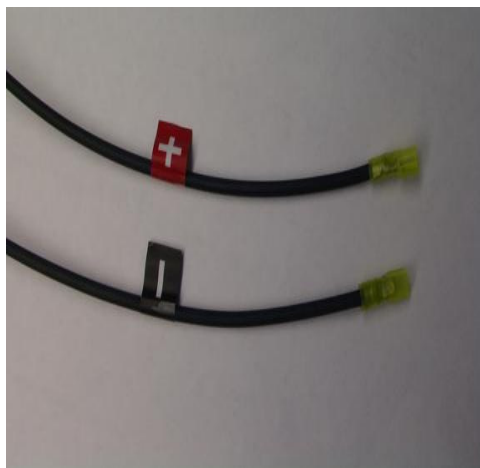
Setup and Connections

The highlighted section below will have high voltage when the system is operating.

High Voltage
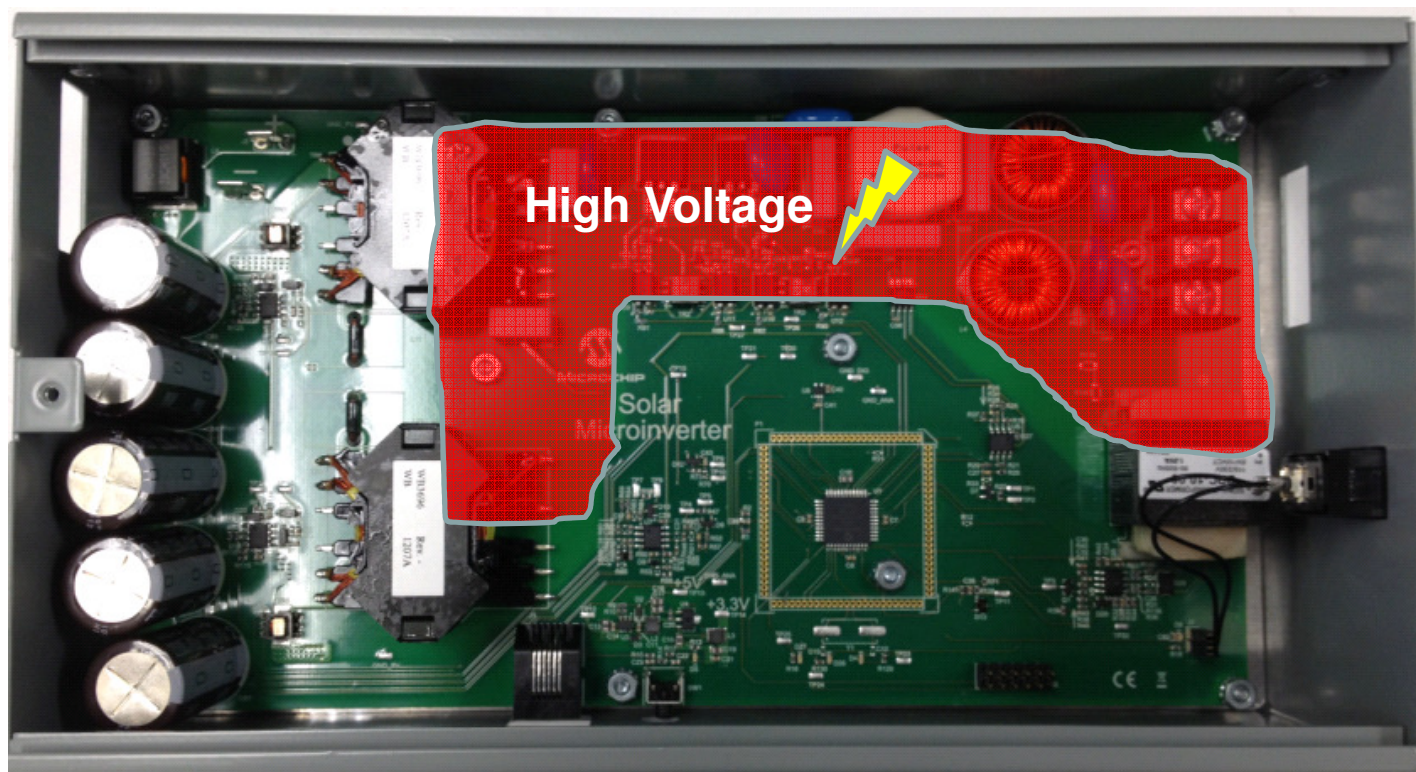
Setup and Connections Cont.

- Ensure the ON/OFF switch is in the OFF position
- Connect the supplied PV cables to the input of the Solar Microinverter through "PV INPUT" terminal
  - Ensure proper polarity. Each cable as well as the PCB is marked with a +/- label.
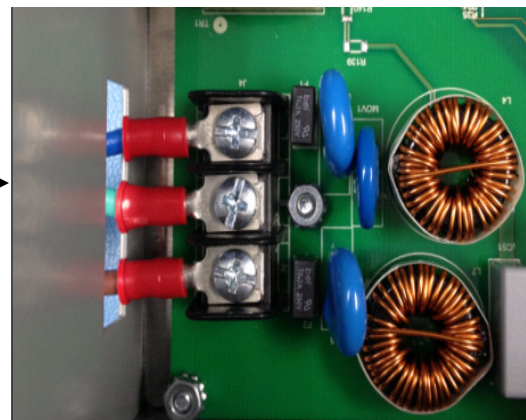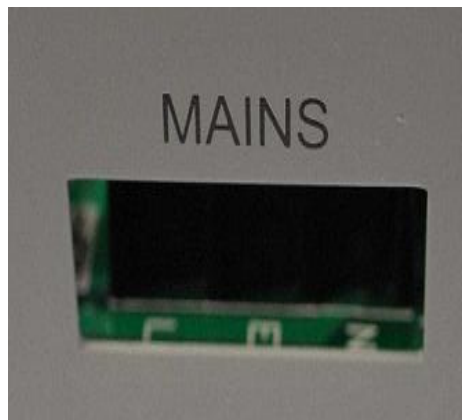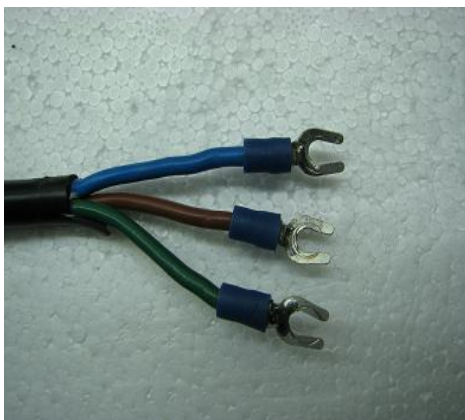
Setup and Connections Cont.

- With the PV panel shaded (or Solar Array Simulator OFF) now connect the supplied cables to the PV Panel (Simulator)

- If a Solar Panel/Simulator is not available a DC source with a high power series connected resistor may be connected to the input of the Solar Microinverter

  - Performance may slightly be impacted

Setup and Connections Cont.

- Connect the supplied AC Mains cable to the Solar Microinverter output through the "MAINS" terminal.

- The Solar Microinverter can be connected to:
  - An AC source with an external load
    - If using an AC source ensure the resistive load connected to the Solar Microinverter is greater than 215W at all times.
  - Directly to the Grid (or through a Variac)

Setup and Connections Cont.

To turn on the System:

- Remove shade from PV panel (power on the Solar Array Simulator).
  - LED D5 (Green) indicates that power is present
  - LED D6 (Yellow) indicates ON/OFF Switch is OFF
- Apply Grid Voltage
- Switch ON the system by flipping the ON/OFF switch to the ON position.
  - The last two steps are interchangeable. If the switch is switched ON before AC Mains is applied the unit will enter fault mode.

What to Test?

- Using a Power Meter the Output Current THD and Power Factor can be measured at different power levels, input voltages, and grid voltages.

- System Efficiency

- Maximum Power Point Tracking

- System Faults

System Faults

System Faults:

- PV_PANEL_VOLTAGE - LED Indication (Number of Blinks: 1)
- INVERTER_FREQUENCY - LED Indication (Number of Blinks: 2)
- INVERTER_VOLTAGE - LED Indication (Number of Blinks: 3)
- INVERTER_OVERCURRENT - LED Indication (Number of Blinks: 4)
- FLYBACK_OVERCURRENT - LED Indication (Number of Blinks: 5)
- TEMPERATURE - LED Indication (Number of Blinks: 6)
- DRIVE_SUPPLY - LED Indication (Number of Blinks: 7)
- FLYBACK_OUTPUT_VOLTAGE - LED Indication (Number of Blinks: 8)
- REFERENCE_VOLTAGE - LED Indication (Number of Blinks: 9)
- ACCURRENT_OFFSET - LED Indication (Number of Blinks: 10)
- HARDWAREZEROCROSS - LED Indication (Number of Blinks: 11)

Critical Faults

If a critical fault occurs, the system will try a single restart. In the event the fault is still present the system will disable all PWM outputs permanently. The system will only restart if the reset switch (SW1) is pressed or if power is removed.

Critical Faults:

- Flyback Over Current
- Flyback Output Over Voltage
- Inverter Output Over Current

Disconnecting the Microinverter

To turn off the system:

- Switch OFF the system by flipping the ON/OFF switch to the OFF position.

- Remove the Grid voltage

- Completely shade the PV Panel (shut off Solar Array Simulator)

- Disconnect all cables from the system

Additional Support

- **www.microchip.com/smps**
- **http://support.microchip.com**
- **Contact your local Microchip FAE**

Thank You