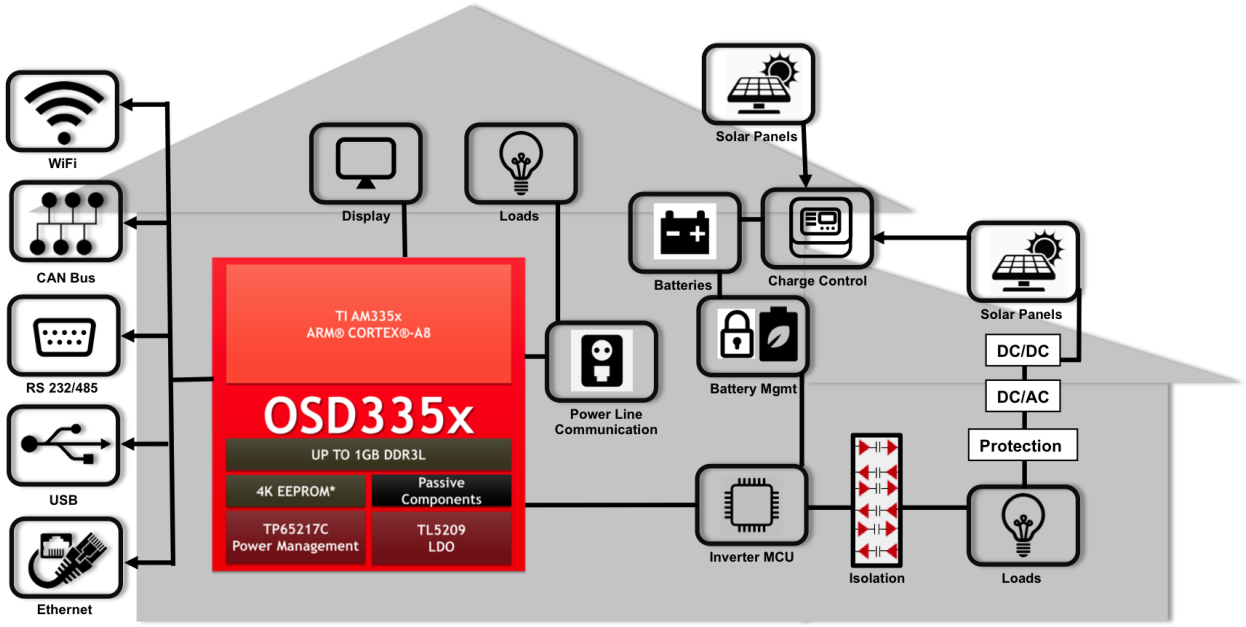
OSD335x in Solar Inverter Gateway Systems

With the advancements in efficiency of solar panels converting solar energy into electrical energy, there is both an economic and environmental case for solar inverters everywhere. However, merely having an inverter is not enough given the complexities of the electrical grid. A gateway is needed to communicate with the grid, provide a good user interface, provide monitoring and analytical information, and run diagnostics to find and correct faulty behavior. All these necessary functions for a gateway can be accomplished with the compact, easy-to-use OSD335x System-in-Package (SiP) family of devices.

At its core, a solar inverter converts the variable DC output of a solar panel into a utility frequency AC output. However, it is not possible to just dump that output directly into the electric grid, as that would cause instability and potentially a lot of harm. Instead, a gateway must manage the inverter systems and protect the stability of the grid. IEC61850 is an Ethernet based protocol that has already gained wide acceptance to interface power generators, such as inverters, with electric substations. It enables integration of protection, control, measurement and monitoring functions. Beyond grid communication, the OSD335x family of devices can provide everything needed for your solar inverter gateway.



- **Processor:**
  The 1GHz ARM® Cortex®-A8 AM335x processor from Texas Instruments integrated in the OSD335x SiP combines great performance, power efficiency with a wide range of peripherals suited for solar inverter gateways:

Peripheral	# Available
I2C	3
UART (RS232/RS485)	6
SPI	2
CAN	2
USB 2.0 HS OTG	2
Ethernet 10/100/1000	2

- **Display**:
  OSD335x SiP devices have a touch screen capable LCD interface, which can provide user interfaces for monitoring performance and easy control of solar inverter systems. The Linux capable OSD335x makes building UIs easy with support for graphic frameworks including QT.
- **Performance Analytics**
  The OSD335x is capable of fast data acquisition and data analytics with support for R, Python, SaS, SQL, and many other languages. Applications that generate useful performance data and insights can be developed.
- **IEC61850 protocol support**:
  IEC61850, the current international standard for grid communications, is an Ethernet based protocol that communicates inverter data to grid automation systems in a standardized way. This allows utilities to use renewable resources in a more intelligent, coordinated, and efficient manner. The OSD335x can implement both client and server protocols.
- **Internet of Things:**
  The Internet of Things can be enabled by connecting a WiFi or BLE module to the OSD335x. With Linux providing support for several IoT protocols such as Thingspeak and Xively, development of an IoT capable solar inverter gateway becomes fast and easy.
- **Real Time Custom Application / Protocols**:
  The OSD335x also integrates 2 Programmable Real-time-Units (PRUs) for development of real time applications and custom protocols. These 200Mhz microcontrollers provide real-time, high throughput custom data acquisition and processing for development of custom solar inverter gateway features.
- **Integration and Ease of Design**:
  The OSD335x simplifies solar inverter gateway development. Its integration allows system designers to skip the tedious parts of hardware design and debug. Like a microcontroller, designing a board is simply connecting a few signals which reduces design effort, manufacturing costs, and time to market by 2x.
- **Linux Support and Software Resources**:
  There are many Linux distributions available for the OSD3358. These devices are used several of the BeagleBoard.org® popular open source single board computers. The community around these boards is highly active with software updates to Debian Linux images made available each month in conjunction with Linux kernel development. This allows for secure, up-to-date base Linux platform that can be used for development. Abundant resources on Buildroot and Yocto build systems are also available to make building Linux platforms smooth.
- **Get Started Today:**
  Begin developing today. There are a number of opensource development platforms available. We recommend looking at the BeagleBoard.org® BeagleBone® Black Wireless, BeagleBoard.org® BeagleBone® Blue and Octavo Systems OSD3358-SM-RED as starting points for Solar Inverter Gateways.