ADI Renewable Energy—Solar PV Solutions

ADI Energy Segment Overview
Analog Devices leads the industry in highly accurate and precise signal measurement and control by delivering cost competitive, high quality ICs for reliable metering, measurement, and control. These products are used in renewable energy, electrical power transmission, and distribution applications, as well as electric, gas, and water metering. The combination of ADI’s proven expertise in optimized system-level signal processing performance and its extensive range of product offerings provides developers with accurate, reliable, and easy to design energy management solutions.

Main Challenges and System Considerations
- Higher reliability and lower assembly/manufacturing costs
- Relatively harsh environment with temperatures up to +125°C
- Power conversion efficiency is critical and components that consume as little power as possible are needed
- Keeping the generated harmonics below the regulatory levels
- Maintain low dc injection current levels onto the grid

Why Choose ADI?
- ADI’s expertise in integrated energy measurement—300 million ADI metrology-based meters deployed
- 50% of all electrical grid equipment worldwide uses ADI converters
- Precision measurement of current and voltage through highly accurate converters and amplifiers
- Enabling power networks using high performance processing technology engineered with robustness and reliability
- Mixed-signal conversion and processing enable ease of design and reduced time to market

Solar PV Application Categories
- Offline solar PV system
- Grid-connected solar PV systems
- High power solar PV (>100 kW)
- Medium power solar PV (1 kW to 10 kW)
- Microinverter (200 W to 300 W)

Main Signal Chain

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### Featured Products

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Key Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD628, AD629, AD8210, AD8212, AD8217, AD8218</td>
<td>Current Sensing Amplifiers</td>
<td>- ADA4091-2: 600 mV to ±3.3 V input range, 300 μA quiescent current, ±1.5% output accuracy</td>
<td>- 600 mV to ±3.3 V input range, 300 μA quiescent current, ±1.5% output accuracy</td>
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<tr>
<td>AD7400A, AD7401A</td>
<td>Isolated Δ-Σ modulator</td>
<td>- Operates from a 5 V power supply and accepts a differential input signal of ±250 mV to ±320 mV full scale</td>
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</tr>
<tr>
<td>AD7606/AD7607</td>
<td>8-channel, 16-/14-bit simultaneous ADC</td>
<td>- True bipolar analog input ranges: ±10 V, ±5 V, single 5 V analog supply, 2.3 V to 5 V VDRIVE, 1 MΩ analog input impedance, analog input clamp protection</td>
<td>- 8-channel simultaneous sampling, single 5 V supply</td>
</tr>
<tr>
<td>ADSP-BF506F</td>
<td>Embedded ADC DSP</td>
<td>- 300 MHz/400 MHz Blackfin core, embedded 12-bit ADC and 4 MB flash, 6-pair PWM output and multi-interface</td>
<td>- 12-bit ADC and &gt;300 MHz core</td>
</tr>
<tr>
<td>ADuC702x</td>
<td>Microconverter</td>
<td>- 41 MHz ARM7 core and embedded 12-bit ADC, 3-pair PWM output, 32 kΩ or 64 kΩ flash</td>
<td>- Embedded 12-bit ADC</td>
</tr>
<tr>
<td>ADuM5000</td>
<td>Isolated dc-to-dc converter</td>
<td>- i²oPower™ integrated isolated dc-to-dc converter, up to 500 mW output power, thermal overload protection</td>
<td>- Isolated dc-to-dc converter</td>
</tr>
<tr>
<td>ADuM141x</td>
<td>Quad-channel digital isolator</td>
<td>- High data rate: dc to 90 Mbps (NRZ), high common-mode transient immunity: &gt;25 kV/μs, low power operation and bidirectional communication</td>
<td>- Long lifetime, easy to select different direction</td>
</tr>
<tr>
<td>ADuM2587E</td>
<td>Isolated RS-485/RS-422 transceiver</td>
<td>- Half or full duplex, 500 kbps, 5 V or 3.3 V operation</td>
<td>- Integrated isolated dc-to-dc converter ±15 kV ESD protection</td>
</tr>
<tr>
<td>ADuM3055E</td>
<td>Isolated CAN transceiver</td>
<td>- Signal and power isolated CAN transceiver, complies with ISO 11898 standard, high speed data rates up to 1 Mbps</td>
<td>- Integrated isolated dc-to-dc converter</td>
</tr>
</tbody>
</table>

#### Energy Meters
- **ADE7878**: 3-phase energy meter with less than 0.1% error in active and reactive energy over a dynamic range of 1000 to 1 and less than 0.2% error in active and reactive energy over a dynamic range of 3000 to 1 at Ta = 25°C.
- **ADE7953**: 1-phase energy meter with less than 0.1% error in active and reactive energy measurement over a dynamic range of 3000:1, less than 0.2% error in instantaneous I rms and V rms measurements over a dynamic range of 500:1.

#### Processors
- **ADP2114**: DC-to-DC regulator for configurable 3 A/1 A or 2 A/2 A dual output load combinations or 4 A combined single output, high efficiency: up to 95%.
- **ADP2118**: DC-to-DC regulator for 3 A continuous output current, ±1.5% output accuracy, input voltage range from 2.3 V to 5.5 V, 3 A continuous output current.

### Circuits from the Lab™ Reference Circuits for Energy Management
Reference circuits are subsystem-level building blocks that have been engineered and tested for quick and easy integration.

- **Layout Considerations for an Expandable Multichannel Simultaneous Sampling Data Acquisition System (DAS) Based on the AD7606 16-Bit, 8-Channel DAS (CN0148)** [www.analog.com/CN0148](www.analog.com/CN0148)

- **A Low Cost, 8-Channel, Simultaneously Sampled, Data Acquisition System with 84 dB SNR and Excellent Channel-to-Channel Matching (CN0175)** [www.analog.com/CN0175](www.analog.com/CN0175)

- **High Voltage, High Precision Current Sensing with Output Level Shifting Using the AD8210 Current Sense Amplifier and the AD8274 Difference Amplifier (CN0116)** [www.analog.com/CN0116](www.analog.com/CN0116)

If you need more ADI solar PV applications and products information, please visit [www.analog.com/energy](www.analog.com/energy).