The AC Power Analyzer Kit is a front end measuring module that you can easily integrate to any circuit and systems requiring AC power measurements functionalities. It can accurately measure RMS Voltage and Current, and with phase information, resolve these into data components essential for a comprehensive AC Power Analysis.

Measurement results are streamed out through a TTL UART compatible serial port. Data output format is available in CSV form, making data collection task easy for your microcontroller or PC. It can also be selected in formatted form for direct output to serial display devices, such as e-Gizmo 4x20 Serial LCD Display kit. In fact, it is possible to build a standalone AC power measuring instruments with the addition of serial LCD display.

Visit this kit's product page at www.e-gizmo.com for updates and additonal informations

**Features**

- Single Phase Power Analyzer
- Based of Cypress CS5463 Energy Analyzer IC
- Zilog Encore XP! Controller
- Isolated serial output(UART TTL)
- Formatted Output Display for e-Gizmo Serial LCD for stand alone measurements.
- Measured Parameters:
  - Volt (RMS)
  - Ampere (RMS)
  - Real Power WATTS
  - Apparent Power VA
  - Reactive Power VAR (calculated)
  - Power Factor PF

**General Specifications**

Operating Voltage: 180-250V AC 60Hz  
Maximum Current Capacity : 10 A  
Maximum Load Capacity: 2200 VA  
Power Consumption: 4W Typical  
Accuracy: +/- 3%, (+/-1% Typical)*

* It is possible to improve accuracy to less than 1% by replacing the copper current shunt with a precision current
**Jumper and Connectors**

**J1. Open Collector Isolated Serial Output**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Collector</td>
</tr>
<tr>
<td>2</td>
<td>Emitter</td>
</tr>
</tbody>
</table>

**JP1. Calibration and Output Format Jumper Block**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>CALIBration use only. Leave Open</td>
</tr>
<tr>
<td>3-4</td>
<td>J1 Output Format</td>
</tr>
<tr>
<td></td>
<td>OPEN- Formatted for Serial LCD Display</td>
</tr>
<tr>
<td></td>
<td>SHORTED - CSV Format</td>
</tr>
</tbody>
</table>

**Serial Communications**

To read data from the communications port J1, the host controller must be configured with the following communications settings:

- Baud Rate: 9600 baud
- Data: 8 bits
- Parity: None
- Stop Bit: 1
- Handshake: None

At the end of each measurement cycle (1 sec), measurement data are automatically dumped in the selected format through serial port J1.

With jumper installed on JP1 3-4, data is transmitted in Comma Separated Values CSV form, and in the following string format:

"STAT,Watts,VA,VAR,PF,VOLT,AMP,"

Where:

- **STAT**
  - "InRange" – measurement within instrument range (normal)
  - "Overflw" – measurement overflow error. Following data are invalid

- **Watts**
  - -2200.0 to +2200.0 Watts - real (RMS) Power

- **VA**
  - 0000.0 to 2200.0 VA – Apparent Power

- **VAR**
  - -2200.0 to +2200.0 VA – Reactive Power
PF
-0.9999 to + 0.9999 – Power Factor

VOLT
180.00 to 250.00 – RMS Volt V

AMP
0.0 to 9.999 Amp – RMS Current AMP

Example:

From the stream

“InRange,-0250.6,0010.0,-0150.2,+0.6228,220.39,0.5806,”

We can extract the measurement data as follows:

| STAT = InRange, measurement is OK |
| Watts = -0250.6                     |
| VA = 0010.0                          |
| VAR = -0150.2                       |
| PF = +0.6228                        |
| VOLT = 220.39                       |
| AMP = 0.5806                        |

If STAT= Overflw, one or more measurement inputs exceeded the instrument capacity. Data that follows is invalid.

All power carrying wires must be at least AWG#12

Figure 2. AC Power Analyzer kit wiring diagram.
**J1 Serial Interface**

The AC Power Analyzer serial data output is available through the J1 port. J1 is a optocoupler output and is galvanically isolated from the rest of the circuit. It is the only port where you can safely connect other low voltage devices.

J1’s open collector output has the advantage of being compatible with almost all logic levels, requiring only one pull-up resistor for the interface (Figure 3a). In fact, you can even connect J1 directly to a RS-232C level port (Figure 3b) without the need for level converter circuit (e.g. MAX232C). If your host side program has control on the state of RS-232C handshaking lines, you can even eliminate the pull up resistor. Figure 3c illustrates one workable scheme. This connection can be used on a PC running the AC Power Analyzer Visual Basic application program template. The source code of this program can be downloaded from the product page of the kit at www.e-gizmo.com.

![Figure 3a.](image)

![Figure 3b.](image)

![Figure 3c.](image)

*Figure 3. J1’s open collector output allows the AC Power Analyzer kit to be easily interfaced with wide range of devices of differing logic levels. See text for more details.*