WATT-METER EXAMPLE WITH BAE0910

AN APPLICATION NOTE ON HOW TO SETUP A WATT-METER TO MEASURE CURRENT CONSUMPTION

INTRODUCTION

From the beginning, one of the goal of the BAE0910 1-wire chip has been to measure quantities (water, current, wind, light, noise,...)

For measuring current, the chip requires an interfacing circuit to convert current information to a linear voltage.

This example uses the prototyping board with the ACS712 device for this purpose.

SHORT THEORY:

The original formula for the electrical power is:

$$P = U \times I$$

Where

P is the Power in Watts
U is the voltage in Volts
I is the current in Amps

Measuring electrical power consumption requires to integrate both sampled current and voltage at very short intervals.
This is a computing intensive task that could be simplified for particular situations:
For AC current, the voltage is varying as a sine wave at a fixed frequency.

Where

rms: root mean square
To simplify we could consider U_{rms} as the equivalent DC voltage.
Generally, the voltage value for domestic electricity is expressed as rms voltage.
As such, we could treat the voltage (U_{rms}) as constant voltage and only concentrate on measuring and calculating the current (I_{rms}).

Note. Depending on the nature of the connected equipment, this approach may need further calibration as inductive loads such as motors may introduce phase shift (cos phi) between I and U.

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SUPPORT

Online support is available via the forum on www.brain4home.eu and via the discussion list.
To subscribe, list-subscribe@brain4home.eu

AVAILABILITY

Chips and boards can be ordered online on www.brain4home.eu

CONDITION OF USE

The BAE chips are intended for hobbyist usage and are not approved for use where it constitute or may constitute a danger to human life or health.

TERMS OF LICENSE

The software embedded in the chips is protected by copyright laws. Customer is not allowed to reverse engineer, decompile, or disassemble the embedded software.

ABOUT THE AUTHOR

Pascal Baerten is primarily an IT consultant with technical background in automation. He followed A2 technical studies until 1985 where he played with CNC machines and pneumatic automates. Graduated in Computer Sciences from the Robert Shuman High school in Belgium in 1989, his thesis was tit o ^ š Œ u] v o u µ o š } Œ _ Á Z Œ Z u • communication and networking programming.

His first computer was a Sinclair ZX81, where he learned the basics of exploiting very constrained computing resources in assembler. Later, a Commodore 64 opened the way to interfacing computers with electronic toys.

Since 1990 he developed network based resource sharing solutions in assembler and C.: Telex server, Minitel server, mainframe front end, mail server, print server, text2speech telephone server, datab • P š Á Ç U / D • Œ À Œ Y

As skilled networking/server architect, he is working as IT consultant for large financial companies since 1997.

In parallel, developments in home automation have contributed to accumulate some experience with microcontrollers and embedded computing.

REVISION HISTORY

Revision #	Date	Description
0.1	Apr 11, 2010	Initial draft
0.11	Jul 9, 2011	Added reference to interesting oversampling theory.

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