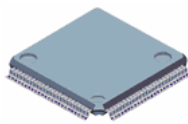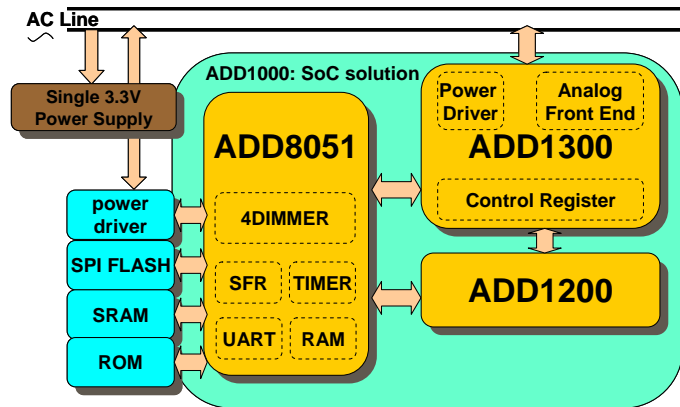# ADD1000AQF128

Power Line Communications System in a Single Chip

Overview

The ADD1000AQF128 is a Power Line Communications System on Chip, it implements a full PLC node. It includes an enhanced 8051 microcontroller (IP core ADD8051C12A), a Medium Access Controller (MAC) (IP core ADD1200) and a Modem circuit compatible with the EHS/KNX Power Line medium specifications (IP core ADD1300). The MAC acts as link between the microcontroller and the modem, but it can be set in bypass mode allowing direct control of the modem by the microcontroller.

The ADD1000 is designed to be used by OEM and provides a low cost and small size solution for narrow band power line communications. ADD can also provide other components: embedded communication software based on international open standards, reference design for the PLC devices, PLC concentrators, GPRS access devices, development and installation software tools. ADD can provide a complete PLC system for AMR or Home automation. The customer can use all this products and know how as is, or to develop other protocols and standards using the chip and reference designs.

Microcontroller

ADD8051C12A includes all features of the standard 8051 and additional ones: watchdog timer T3, ports P4 and P5, four interruption levels, double data pointer, software reset and Wake Up from Power Down interrupt activated and standard Serial Interface with additional baud rates.

The microcontroller includes some specific peripherals as a 4 input / 4 output dimmer for power regulation, and a flash program loader that allows to store the microcontroller program in a standard SPI serial flash memory and to execute it from a SRAM. In the startup process the program is uploaded from serial flash to the parallel SRAM before start execution, after startup the free space in the serial flash can be used to store non volatile program data. The program is stored in the upper side of the SRAM, the lower side is used to store program data. Using a large flash several programs can be stored at the same time and the microcontroller can switch from one program to another, this feature could be used to reprogram the SoC using PLC downloading. Up to 24 ports are available to the user.

MAC

The ADD1200 is a hardwired Medium Access Controller. It has been developed to reduce the CPU computational load in PLC systems. Then the microcontroller is free to be use in the application tasks.

MAC functional capabilities involve the construction of message packets, adding FEC (Forward Error Correcting Code) values to bytes and FCS (Frame Check Sequence) to packets.

The ADD1000A MAC is compatible with EHS and KONNEX. However, his design is very versatile and allows users to create a wide range of datagram structures with the only constrain of FEC and FCS hardware codes. The MAC can be set in a bypass mode allowing direct connexion between the microcontroller and the modem.

Modem

The ADD1300 is a digital PLC modem that uses a single power supply of 3.3V and few external components. It is a full digital design and can be implemented in any digital technology from FPGA to ASIC. The ADD1300 can replace the traditional analog EHS modem and can use the same software libraries or a simplified version if the hardwired MAC is used.

Modem Characteristics:

- Modulation: FSK
- Receiver Sensitivity: 44dB/µVrms
- Carrier Frequencies: 132.5kHz
- Baudrate: 1200Bps, 2400Bps
- Band In USE Threshold configurable
- Power line interface compliant with;
  Cenelec C band, EN50065
- Power supply 3.3V

Additional Core Features

ADD8051C12A includes additional Special Function Registers, peripherals and features:

- Auto load program from serial flash
- Inboard serial flash programming
- Programmable watchdog timer T3
- Double baud rate UART
- Quadruple Dimmer in/out
- Double data pointer
- 4 interrupt levels
- Ports P5 and P4. P4 can be configured as pseudo-bidirectional (8051 standard) or push-pull
- Software reset and Wake Up from Power Down interrupt activated
- Standard Serial Interface with additional baudrates (2 * standard)

Customer Support

ADD provides reference designs, application notes, developing tools and controls and monitoring software as part of collaboration and support to the customers.

ADD provides also the ADD7232 board intended to be the reference and rapid prototyping board to develop and prototyping new devices using the PLC technology of ADD.

ADD supplies also kits to start in PLC technology:

- PLC DEMO KIT: it contains two devices based on ADD1000A chip, the necessary documentation, and 6 example tests with C source code covering concepts such as loading programs, controlling ports and timers on 8051 microcontroller, and communication between devices

- PLC STARTER KIT: it contains a triple phase coupler, some boards to control inputs and output (switches, lamps, etc), the necessary documentation, example tests with C source code, and an application to configure routing, and control and monitor the inputs and outputs.

These kits include the embedded communication stack software (ECSS) to provide to developers an easy to use application program interface (API) to develop applications using PLC technology. The API of ECSS is TCP/IP compatible and includes the layers 1 to 4 of OSI model. ECSS provide a transport network supporting multi application, multi medium messy network. The physical media actually supported are PLC using ADD1000A chip and RF.

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