

An LPC2132 Based Ethernet Data Acquisition and Control System

ABSTRACT

This project shows how to implement a data acquisition and control terminal with Ethernet capability using LPC2132 microcontroller. It implements 8-channel discrete switching signals inputs, 2-channel pulse signal input for counter, 4-channel analog signal inputs and 2-channel analog voltage signal outputs. There are also additional 2 channels relay output, which can be used to control simple objects. All data acquired will be transferred to a monitor server (PC or other Embedded Computer) via Ethernet. IPv4 protocol stack has been successfully ported to this equipment. UDP datagrams are used to communicate with servers. In future, IPv6 will also be supported.

This terminal is designed for industrial-field use. Discrete switching signals and analog signals can be acquired. Especially for the analog signal, both current and voltage signals are acceptable. The analog front end is designed to compatible with industrial standard 4~20mA current loop and 0~10V voltage line. When discrete and analog signals are acquired and transform to binary data, the datagrams will be encapsulated and wait for the server to transfer.

Through Ethernet, data from multiple terminals will count into a server, which can be a PC or an embedded industrial computer. The software architecture is base on C/S model. Software on the PC acts as a "server" and will poll all the terminals, which work as clients. When a terminal received the request from PC, it will immediately send all data acquired before. When the data arrived at PC, the server program will analyze the datagrams and display the data acquired from each terminals.

This system is very suitable for acquiring data or signals form a large scale industry field. Hundreds of such terminals can be grouped within a intranet. One PC is enough for monitoring so many terminals. Link from terminals to the internet can be also established to realize remote monitoring. You can see the static in the office, even at home if you have internet access. This system can also be integrated into ERP system, which will improve management level.

This system will not only be useful in industry field, but also has great future in smart-house applications, networked lighting control system and other distributed control systems.

SYSTEM ARCHITECTURE

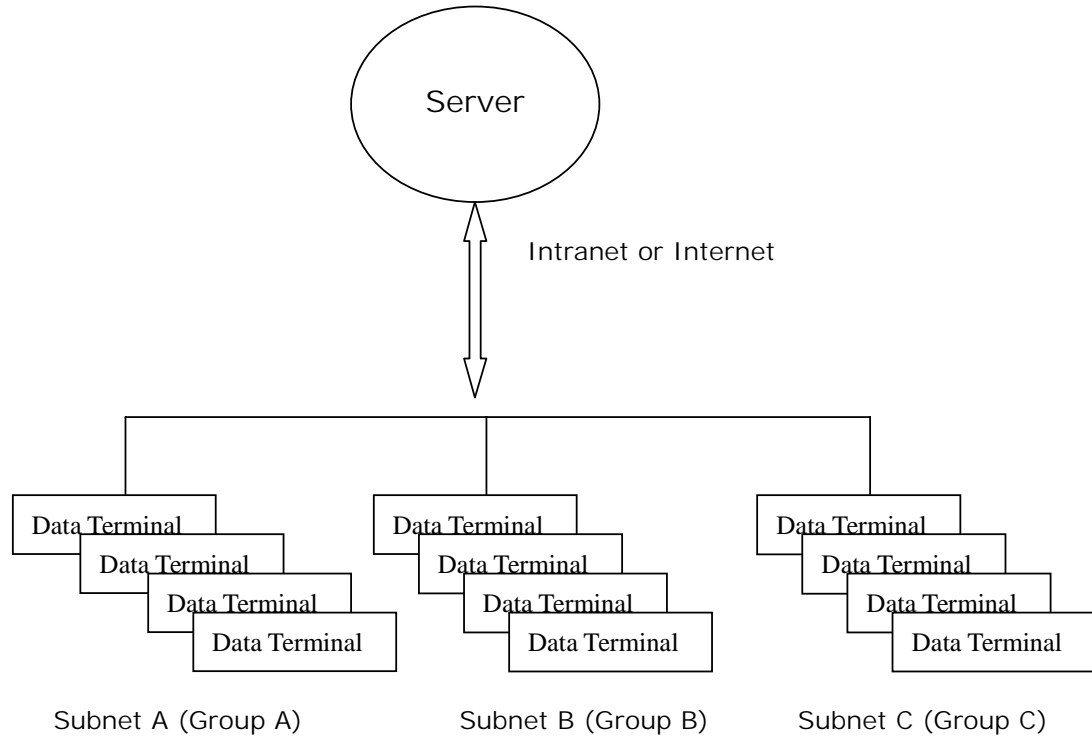


Figure 1 System Architecture

TERMINAL HARDWARE BLOCK DIAGRAM

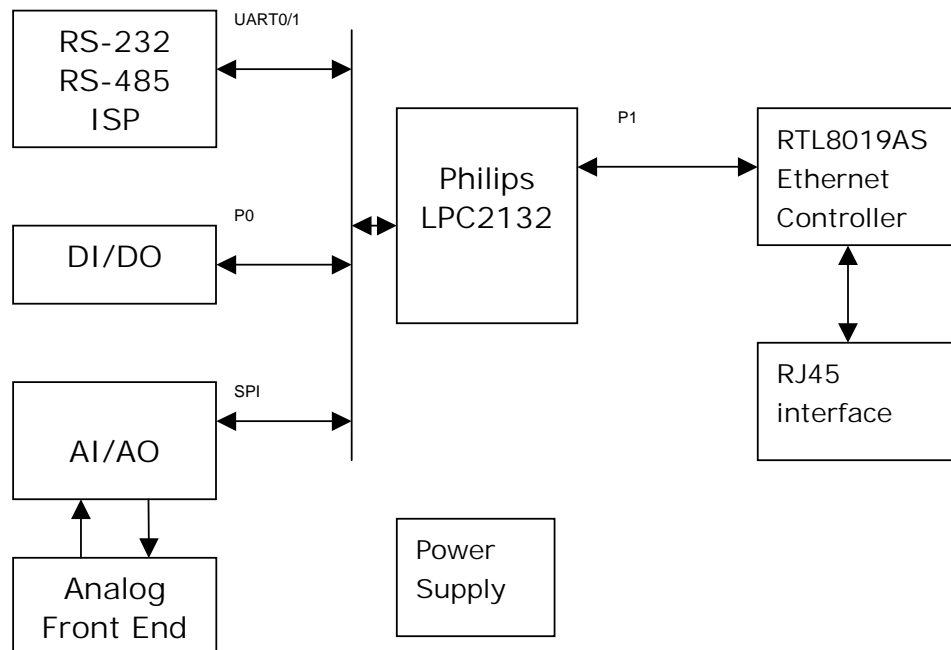


Figure2 Terminal hardware block diagram

TERMINAL SOFTWARE DIAGRAM

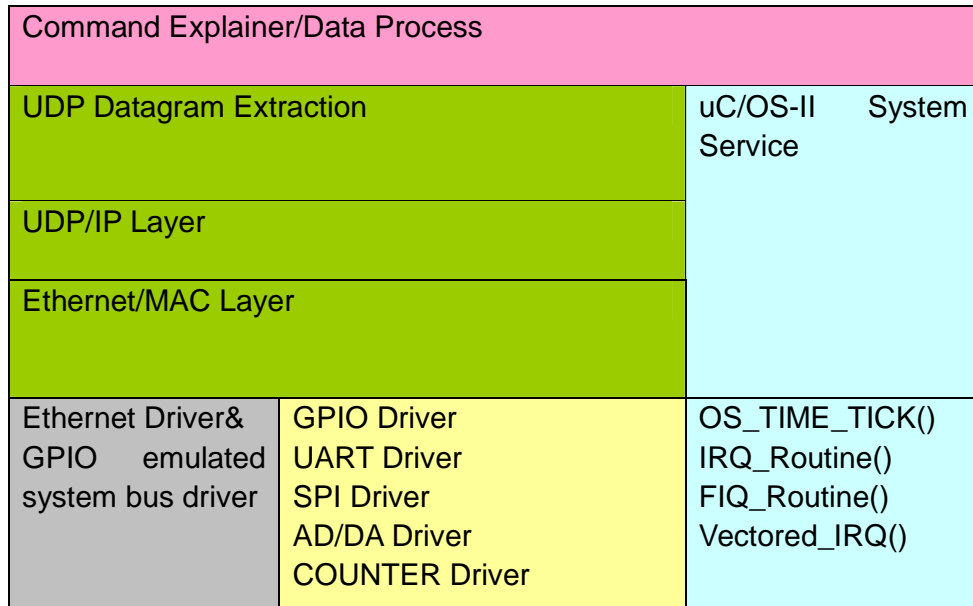


Figure3 Software block diagram

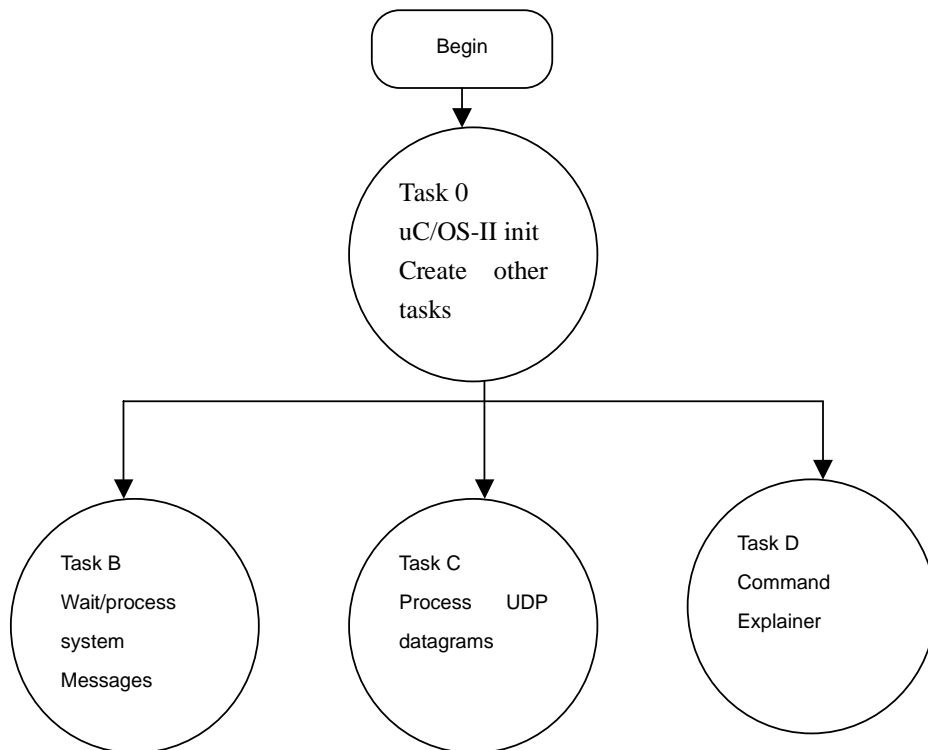


Figure 4 Software flowchart and task dependencies

SERVER SOFTWARE INTERFACE



Figure 5 Server software interface

PROJECT PHOTOS



Figure9 Connecting main board and expansion board



Figure10 Panel View when mount into a case.

SCHEMATICS

Page1-Cover and Hardware block diagram.

Page2-MCU/clocks/Debug circuit.

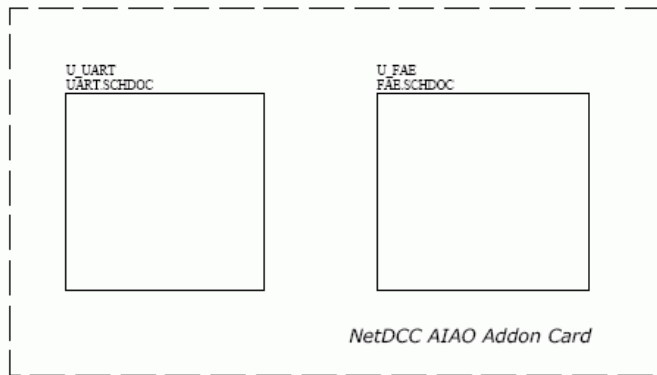
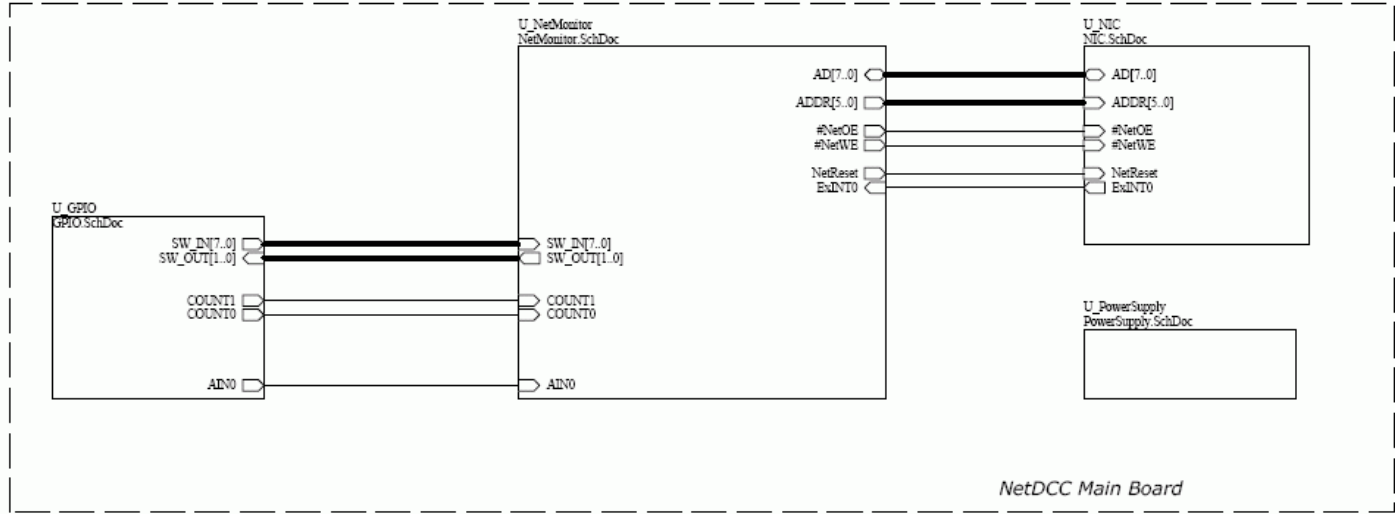
Page3-Discrete IO

Page4-Ethernet Interface

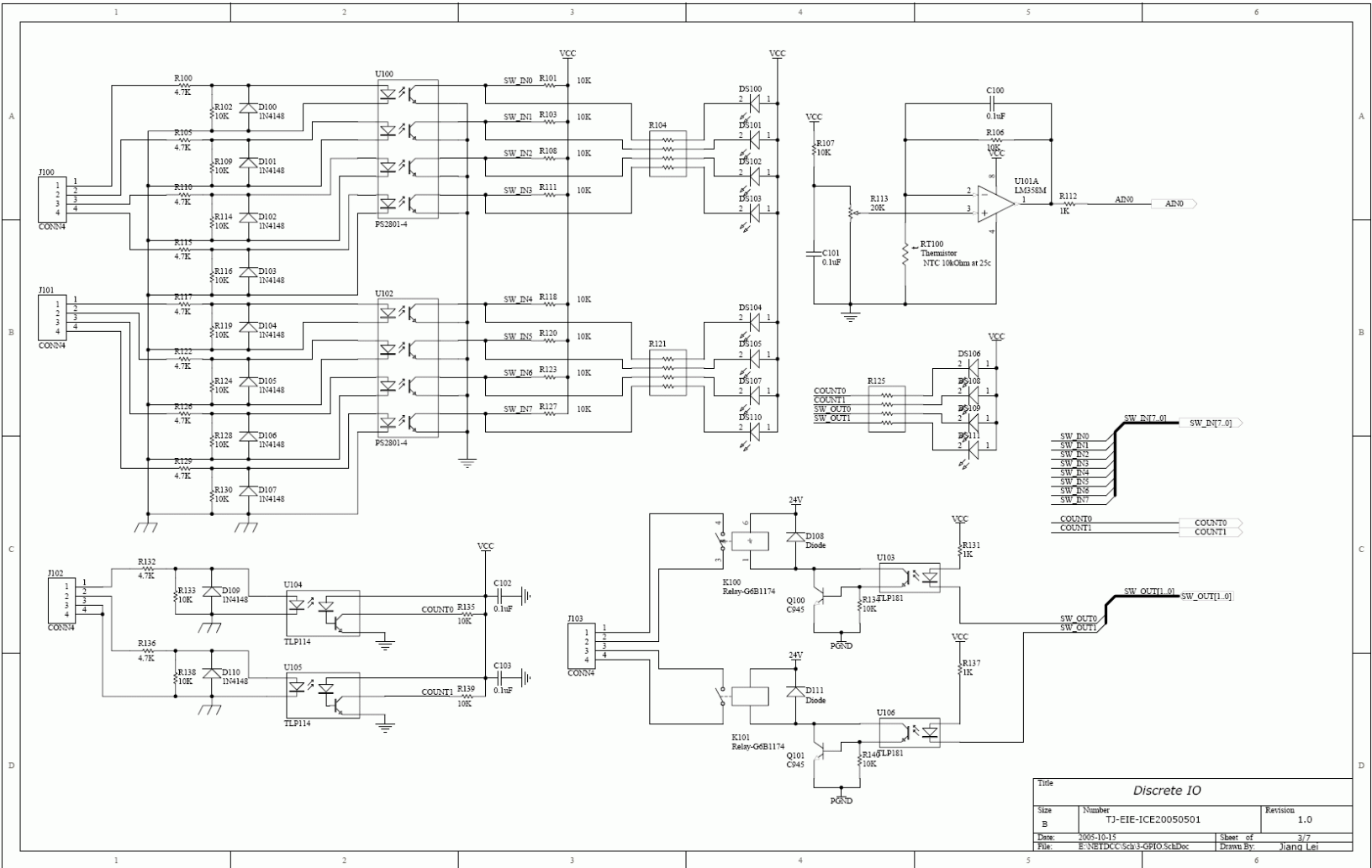
Page5-Analog Input/Output circuit with SPI-AD/DA

Page6- RS232 and RS485 circuit.

Page7- Isolated Power Supply



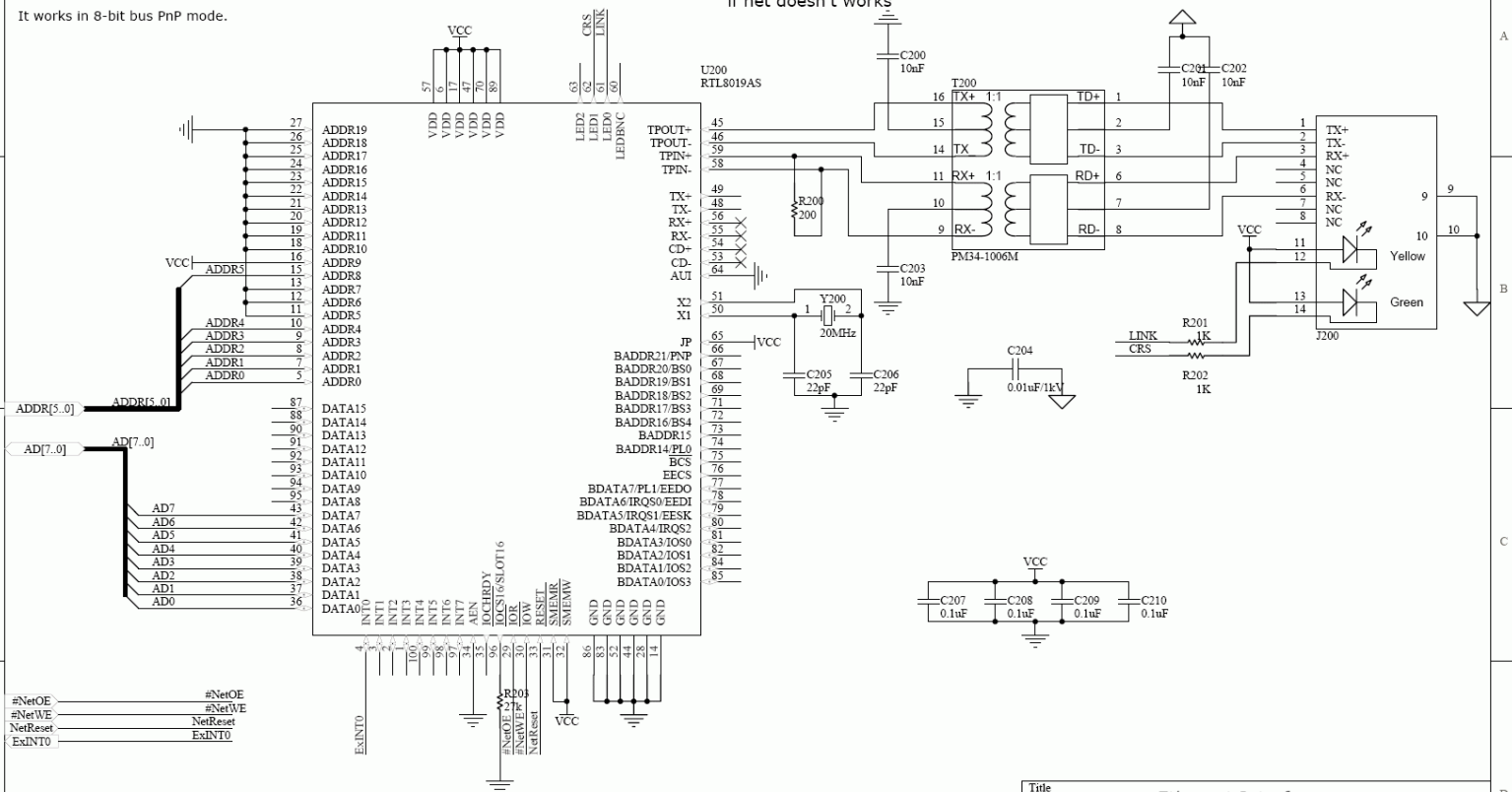
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Size	Number	Revision		Date		File	
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Date:				Sheet of		Drawn By:	
2005-10-13				1/7		Jiang Lei	



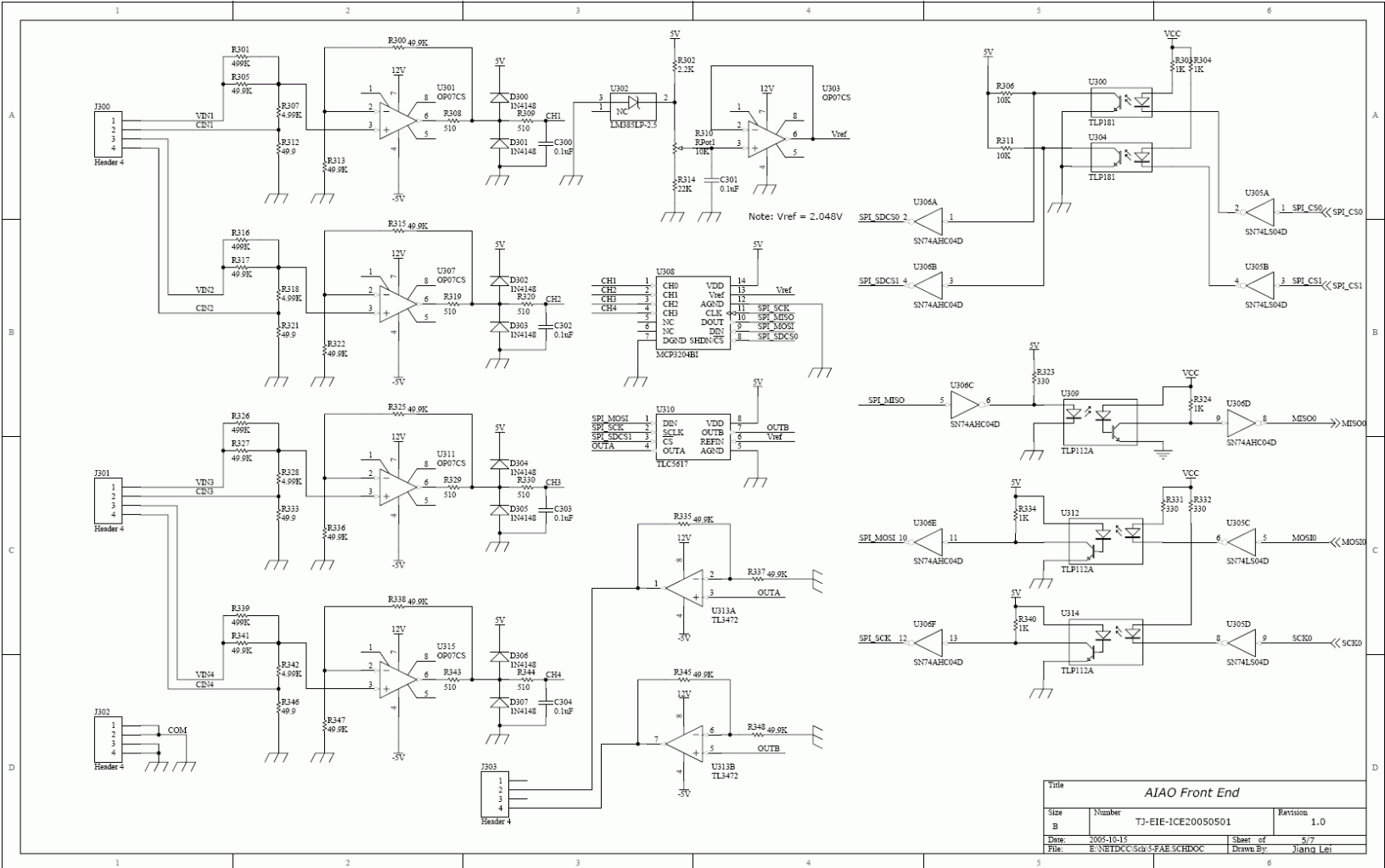
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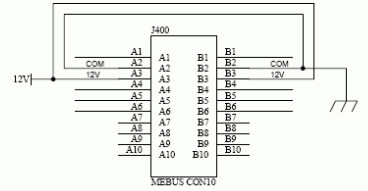
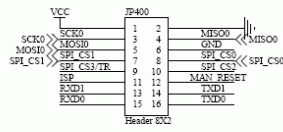
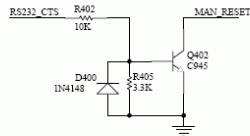
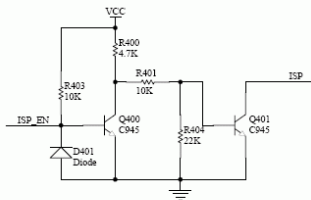
RTL8019AS has an address range from 0x20 to 0x3F.
It works in 8-bit bus PnP mode.

Note:R59 and C14 may NOT mount
if net doesn't works

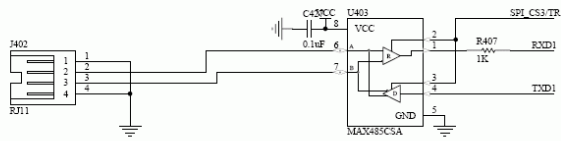
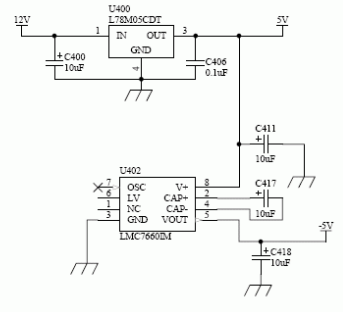
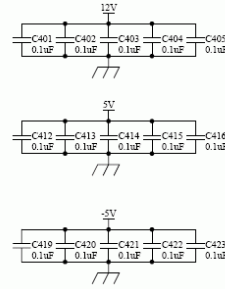
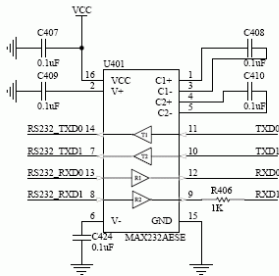
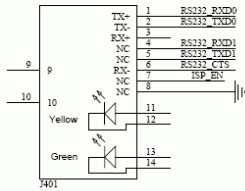


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Note: This Board works as a DTE



Title		
UART & RS-485 Interface		
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