

CAN DEVELOPMENT LEARNING KIT

The CAN (Controller Area Network) bus is a high data rate, high data integrity serial communication bus that was originally specified for use in noisy factory environments for communication between machines on a factory floor. This is a balanced data bus, usually implemented on twisted pair, with a maximum data rate on 1Mbps and 5 error detection mechanisms which ensure very high levels of data integrity.

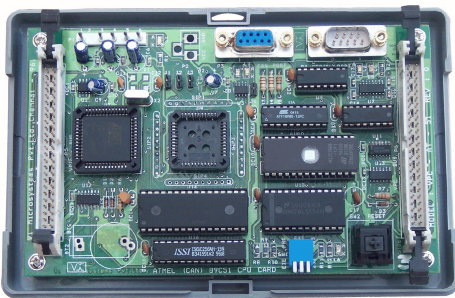
CAN development Learning Kit is useful for students to learn embedded industrial networking. CAN (Controller Area Network) is a serial bus system, which was originally developed for automotive applications. CAN provide two communications services; the sending of a message (data frame transmission) and the requesting of a message (Remote Transmission Request, RTR)

The CAN network prototyping kit consists of

1. A 8 Bit CAN controller using ATMEL AT89C51CC03
2. A 16 Bit CAN controller using dsPIC30F4011
3. A 32 Bit CAN controller using Philips LPC2294
4. A CAN to USB adapter

Any combination of CAN node can be formed using the above CAN cards. A standard of 5 Nodes will be better to study and analysis the CAN bus activities. In order to understand the CAN bus, at least 3 CAN nodes should be interfaced. 3 CAN nodes is further connected to a CAN to USB converter, so that the CAN bus signals can be analyzed under PC environment. Each CAN embedded controller can run individual Real Time Applications like Temperature Monitoring, Displaying Parameters etc.,

8 bit CAN Embedded Controller



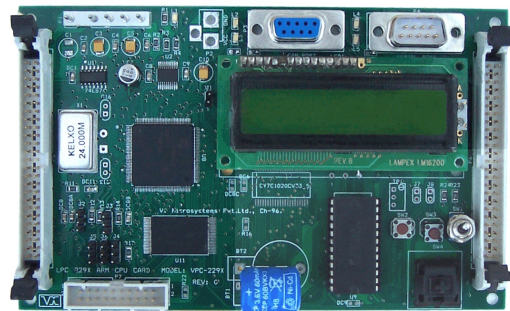
- * Based on Atmel 89C51CC03 with CPU with high speed core.
- * 64KB Flash Program Memory & 128 KB SRAM data memory.
- * RS232 serial Port to interface with PC.
- * 9 Pin D female connector is provided to connect the CAN interface
- * 4 channel 8 bit serial ADC & 1 channel 8 bit serial DAC.
- * 2 Numbers of 50 Pin expansion connectors to interface memory I/O mapped series of add-on cards.
- * In system programming facility to download hex code from PC to CAN Controller card
- * RS232 cable with Downloader software to download programs from PC to CAN Controller card.
- * Example programs in Assembly & embedded C with documentation for conducting various experiment on CAN bus.
- * The required Real time Application can be developed in PC and download into the CAN controller.

16 Bit Embedded Controller:

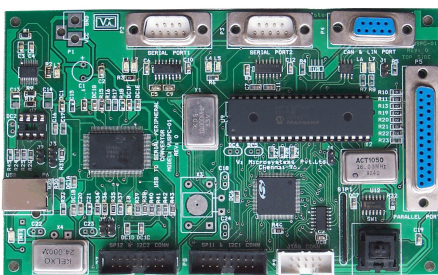
- * Based on Microchip dsPIC30F4011
- * 48 Kbytes on-chip Flash program space
- * 2 Kbytes of onchip data RAM
- * 1 Kbytes of non-volatile data EEPROM
- * 1 CAN modules, 2.0B complaint
- * Programmable bit rate up to 1 Mbit/sec
- * Three transmit buffers with application specified prioritization and abort capability
- * In system programming facility to download hex code from PC to CAN Controller card
- * RS 232 cable with Downloader software to download programs from PC to CAN Controller card.
- * Example programs in assembly & embedded C with documentation for conducting various experiment on CAN bus.
- * The required Real Time Application can be developed in PC and downloaded into the CAN controller.

32 bit Embedded Controller

- * Based on Philips Semiconductors LPC2292
- * 32-bit ARM7TDMI-S Arm Processor
- * Two interconnected CAN interfaces with advanced filters.
- * Compatible with CAN specification 2.0B
- * Data rates up to 1 Mbit/s on each bus
- * 16 kB b on-chip static RAM
- * 256kB on-chip flash program memory
- * High speed 60 MHz operations
- * Global Acceptance Filter recognizes 11-bit & 29-bit RX Identifiers for all CAN bus
- * In system programming facility to download hex code from PC to CAN Controller card
- * RS 232 cable with Downloader software to download programs from PC to CAN Controller card.
- * Example programs in assembly & embedded C with documentation for conducting various experiment on CAN Bus.
- * The required Real time Application can be developed in PC and downloaded into the CAN controller.



CAN to USB CONVERTER



The CAN signal flow can be analyzed in PC environment by using a “CAN to USB converter”. USB offers minimum 12 Mbits /sec, where as CAN signal upto 1Mbits /sec and hence this converter can very effectively capture all CAN signal flow among nodes. This captured signal can be analyzed in the PC environment.

CAN ANALYZER SOFTWARE

- * Working in windows 2000/XP
- * Tracking of CAN messages
- * CAN Node Analyzing
- * Variable baud Rate setting up to 1 Mbits/s
- * Supports CAN specification 2.0A
- * Incoming, outgoing status display
- * Supports of 11 bit identifiers

REAL TIME APPLICATION BOARD

- * Consists of 8 Digital inputs
- * Consists of 8 Digital outputs
- * Analog to Digital converter (ADC) for Analog process applications
- * Digital to Analog converter (DAC) for Analog process applications
- * 8 × 8 Matrix Keyboard Interfaces
- * PS/2 Keyboard interface facility
- * In-built Temperature signal conditioner
- * 20 × 4 LCD display interface to interact with user
- * Interface for IR sensor, Temperature sensor, solenoid valves & Relay to make the Real time applications in CAN
- * This RTA board can be configured as many Real Time Applications like
 - i. 8 × 8 Matrix keyboard
 - ii. Relay
 - iii. Solenoid Valve
 - iv. Temperature sensing
 - v. Display all Real Time signals in a LCD display panel

Note:

We suggest a minimum of 5 CAN nodes, consisting of 8/16/32 bit CPU based CAN controllers. In a typical networking application, the CAN network can consist of two 8 bit CAN controllers, one bit CAN controller and two 32 bit CAN controllers. These 5 sets of CAN Development modules should be ordered along with the development tools & USB to CAN converter for studying the CAN Network in detail.

DEVELOPMENT TOOLS

1. C COMPILER / SIMULATOR

1) Raisonance RIDE-51 Compiler

R KitL51

This version includes all the tools with a limitation of 32k bytes of generated codes

- The Ride interface for Windows 2000, XP & NT
- The MA-51 Micro-Assembler limited to 32k bytes
- The LX-51 Code banking linker limited to 32 k bytes
- The RC-51 ANSI C Compiler limited to 32 k bytes
- The SIMCE -51 Simulator limited to 32k bytes
- The MON -51 ROM-Monitor limited to 32k bytes
- The KR-51 Tiny Real-time OS limited to 8 tasks.

R KitE51

RkitE51 is the most complete kit offered by raisonance for the 8051 family.

- The RIDE interface for Windows 2000, XP, NT.
- The MA-51 Macro- Assembler (full version)
- The LX-51 Code Banking Linker unlimited.
- The RC-51 ANSI C Compiler (Full version)
- The SIMICE-51 Simulator
- The MON-51 ROM Monitor (full version)
- The KR-51 Real Time OS (full version)

3. dsPIC Compiler

MPLAB C30

The MPLABC30 compiler is a full-featured ANSI compliant C compiler for the dsPIC30F family.

- * ANSI compliant with standard, math, memory, data conversion and math libraries.
- * Generates relocatable object Modules for enhanced code reuse.
- * Optimized for dsPIC30F generates as much as 30% less code than other 16-bit MCU compilers.
- * Strong support for in-line assembly when total control is absolutely necessary.
- * Allows code and data to be located at absolute addresses.

4. ARM Compiler

- * ARM integrated development environment for building embedded applications.
- * 'C' compiler with powerful project manager.
- * Ready-made sample projects and project templates
- * User flexible text editor with build tools

CAN Network Implementation Example

