Microcontroller Solutions for CAN Networking

for Cost-effective

& High-end

Industrial and

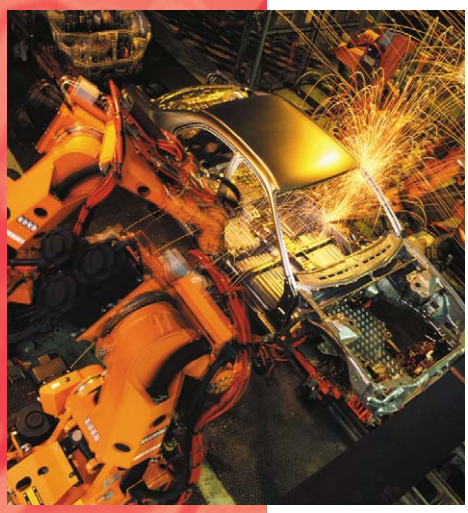
Automotive

Applications

CANary

ATMEL

CAN NETWORKING



Several times a day, most of us use embedded CAN applications without knowing it. The most popular applications are in:

- **Automotive and Transportation Systems**
- **Medical and Agricultural Equipment**
- **Building Automation**
- **Household and Food Appliances**
- **Robotic and Factory Automation**

This wide-spread success is mainly due to the **high reliability** offered by the CAN protocol.

To satisfy the growing demand for embedded networks, the Atmel CANary family has been specially designed for all applications needing **easy and frequent code updates.**

The CANary family **extends its 8051 offering** with a new **16 MIPS AVR® RISC** microcontroller with **128 Kilobytes of Flash program memory,** providing customers with a large choice for their CAN systems.

Performance range

Based on either **8051** or **AVR** core, the **CANary 8-bit Flash microcontrollers** achieve **5 MIPS** or **16 MIPS** processing speed respectively.

Powerful On-chip CAN Controller

V2.0A/V2.0B compliant – Handles independent message objects programmable on-the-fly.

Easy Remote Programming and Field Upgrade

Highly flexible self-programming via CAN, UART, SPI

Support Higher Layer Protocol Stacks

CANopen, DeviceNet™, J939 and **OSEK™**

C51

Popular 8051 Architecture for Cost-effective Applications

- 5 MIPS at 30 MHz
- Up to 64 KB Flash Program Memory
- Flexible Self Programming at 3V and 5V via UART or CAN
- 6-clocks per cycle provides 1 Mbit/sec., using only 8 MHz crystal, thus reducing EMI

AVR®

Powerful AVR Architecture to Tackle the Most Demanding High-end Applications

- 16MIPS at 16 MHz
- Self Programming
- Hardware Multiplier
- Optimized for High-level C Language
- On-chip Debug Through JTAG Interface
- Up to 256 KB Addressing Capability

Efficient & Flexible CAN Controller

Independent message objects can be dedicated dynamically, either in **2.0.A** or in **2.0B mode**, to one of the following:

- Reception Channel
- Transmission Channel
- Receiver Buffer (multiple CAN frames buffer)

Each message object has its own masking and filtering registers, which significantly reduces the host processor load.

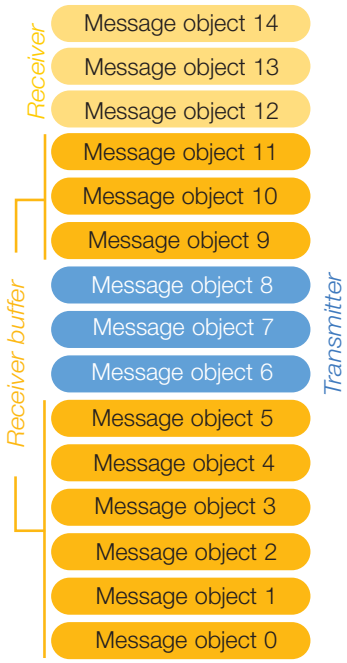
Indirect addressing allows easy access to all the Data & Control bytes of the CAN controller.

On the AT90CAN128, an interrupt accelerator engine informs the CPU of critical messages without running a software scan routine, minimizing the repercussions on real time event applications.

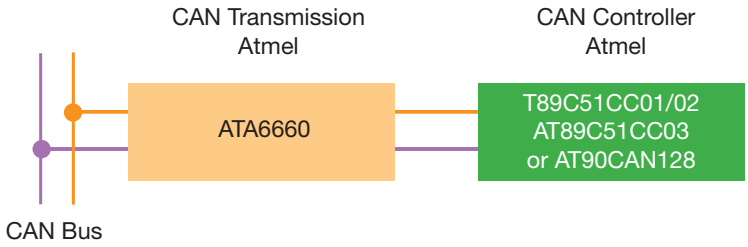
Also supported:

- Autobaud and Listening Modes
- Readable Error Counter
- Error Capture with Interrupt
- Time Triggered Communication & Time Stamp

Example of T89C51CC01, AT89C51CC03 or AT90CAN128 CAN Buffer Configuration



Typical CAN Application: A Complete Solution



High Level Protocol Partners

EMBEDDED SYSTEMS ACADEMY

CAN & CANopen
www.esacademy.com

IXXAT

CANopen & DeviceNet™
www.ixxat.de

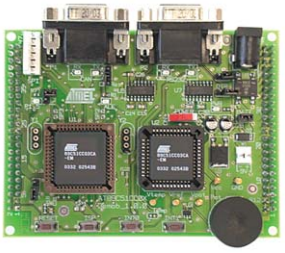
port

CANopen
www.port.de

vector

CANopen, DeviceNet & OSEK™
www.vector-informatik.de

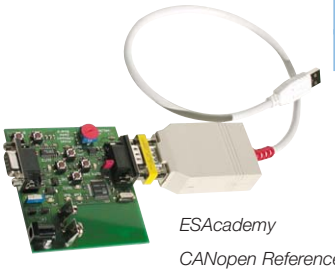
Tools for 8051 Microcontrollers



Atmel Starter Kit

Development Tools & Support

Starter Kits	Atmel
Reference Design	ESAcademy® (CANopen)
Compilers	Crossware®, Hi-Tech, IAR™, Keil™, Raisonance, SDCC, Tasking®
Emulators	Ceibo, Hitex, Metalink®, Nohau, Signum Phyton™
In-system Programming	Atmel: PC-based Pilot FLIP, ESAcademy CANopen compliant
Flash device programmers	Advantech®, BP Microsystems, Data I/O® Dataman, Hi-Lo Systems® ICE Technology™, Elnec®, etc.

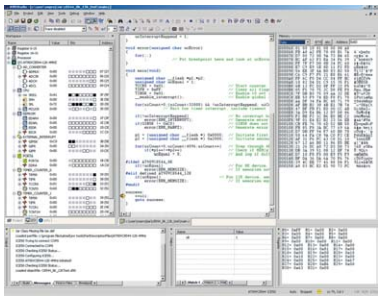


ESAcademy
CANopen Reference Design

Tools for AVR Microcontrollers

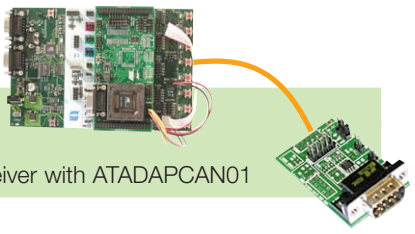
Integrated Development Environment for AVR

(Includes Atmel Macro Assembler)



- Front End for Atmel Starter Kits, Programmers, and Emulators
- C and Assembly Source Level Debugging
- Supports Third Party Compilers
- Maintains Project Information
- Freely Available from http://www.atmel.com

Development Tools & Support



Starter Kits	Atmel	STK500 + STK501 + CAN transceiver with ATADAPCAN01
Compilers	CodeVision, GCC-AVR, IAR™, ImageCraft	
Emulators Platforms	Atmel	ICE 50, JTAGICE JTAGICE mkII
In-system Programming	Atmel	AVRISP, JTAGICE JTAGICE mkII STK500 + STK501

CAN Offering

		C51 Architecture	C51 Architecture	C51 Architecture	AVR® Architecture
		T89C51CC02	T89C51CC01	AT89C51CC03	AT90CAN128
Processing Speed	MIPS	up to 5	up to 5	up to 5	up to 16
Memory	Flash Program/Boot	16 KB/2 KB	32 KB/2 KB[1]	64 KB/2 KB	128 KB/up to 8 KB
	EEPROM	2 KB	2 KB	2 KB	4 KB
	RAM	0.5 KB	1.2 KB	2.2 KB	4 KB
CAN Controller	Prog. Mess. Objects	4	15	15	15
Self-programming Capability	CAN	Yes	Yes	Yes	Yes [2]
	UART	Yes	Yes	Yes	Yes [2]
	SPI	–	–	Yes	Yes
	JTAG	–	–	–	Yes
Power Management	Power Fail Detect	–	–	Yes	Yes
On-chip Peripherals	16-bit Timers	0/1/2	0/1/2	0/1/2	0/1/2/3
	PCA Channels	2	5	5	–
	Pulse Width Modulation	2	5	5	8
	10-bit ADC	8 channels	8 channels	8 channels	8 channels
	21-bit Watchdog	Yes	Yes	Yes	Yes
	UART	1	1	1	2
	SPI	–	–	Yes	Yes
	Two-wire Interface	–	–	–	Yes
Available Versions	Ports	0/1/2/3	0/1/2/3	0/1/2/3	A/B/C/D/E/F/G
	Max. Frequency	60 MHz	60 MHz	60 MHz	16 MHz
	Power Supply (V)	3 - 5.5	3 - 5.5	3 - 5.5	2.7 - 5.5
	Temperature (°C)	-40 to +85	-40 to +85	-40 to +85[3]	-40 to +85[3]
	Packages	SOIC24, SOIC28 PLCC28, TQFP32	TQFP44, PLCC44 BGA64	TQFP44, PLCC44 BGA64 TQFP64, PLCC52	TQFP64, QFN64 BGA64[4]
	Availability	Now	Now	Now	2Q/04

(1) ROM version available
(2) Using custom bootloader
(3) Automotive graded part (-40 to +125°C): check for availability
(4) Check for availability
notes: Software Master/Slave (S/M) LIN drivers available.
All products compatible with AT6660 Transciever.

Atmel Corporation
2325 Orchard Parkway
San Jose, CA 95131
USA
TEL.: 1 (408) 441-0311
FAX.: 1 (408) 487-2600

Regional Headquarters

Europe
Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
TEL.: (41) 26-426-5555
FAX.: (41) 26-426-5500

Asia
Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimshatsui
East Kowloon
Hong Kong
TEL.: (852) 2721-9778
FAX.: (852) 2722-1369

Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
TEL.: (81) 3-3523-3551
FAX.: (81) 3-3523-7581

Product Contact
La Chantrerie
BP 70602
44306 Nantes Cedex 3
France
TEL.: (33) 2 40 18 18 18
FAX.: (33) 2 40 18 19 60

Web Site
http://www.atmel.com

Ref.: 4012C-CAN-03/04/12M