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What is "Embedded - Microcontrollers"?

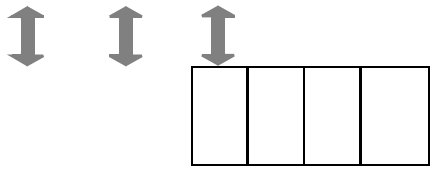
"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	80C51
Core Size	8-Bit
Speed	40MHz
Connectivity	SPI, UART/USART
Peripherals	POR, PWM, WDT
Number of I/O	32
Program Memory Size	16KB (16K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	1.25K x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 3.6V
Data Converters	-
Oscillator Type	External
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	44-LQFP
Supplier Device Package	44-VQFP (10x10)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/at89c51rb2-rltul

Block Diagram

Figure 1. Block Diagram



Notes: 1. Alternate function of Port 1.
2. Alternate function of Port 3.

Power-off Flag

The Power-off flag allows the user to distinguish between a “cold start” reset and a “warm start” reset.

A cold start reset is the one induced by V_{CC} switch-on. A warm start reset occurs while V_{CC} is still applied to the device and could be generated by an exit from Power-down.

The Power-off flag (POF) is located in PCON register (Table 63). POF is set by hardware when V_{CC} rises from 0 to its nominal voltage. The POF can be set or cleared by software allowing the user to determine the type of reset.

Table 63. PCON Register

PCON - Power Control Register (87h)

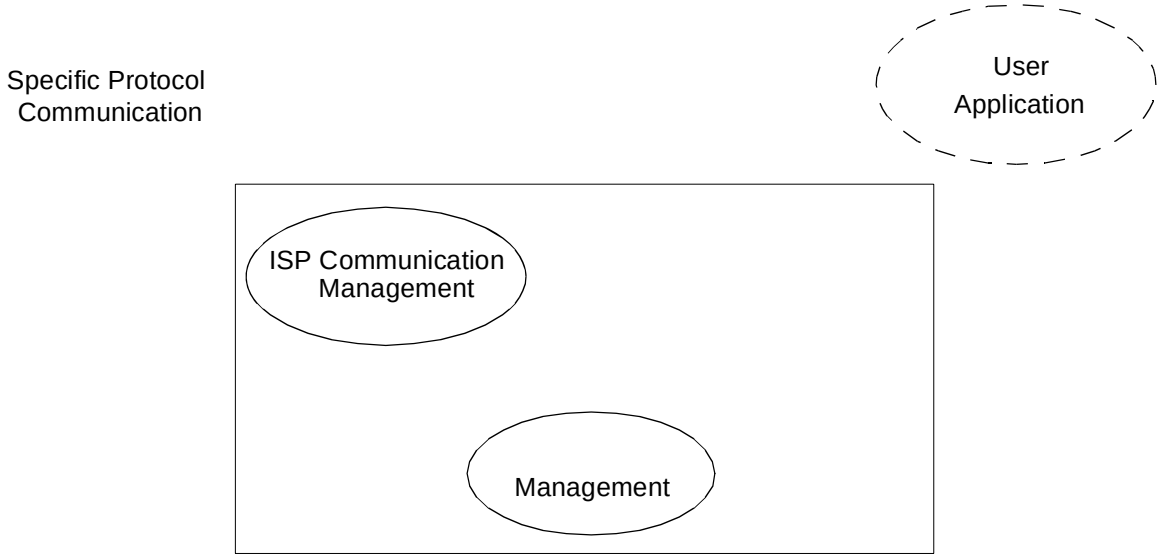
7	6	5	4	3	2	1	0
SMOD1	**SMOD0**	**-**	**POF**	**GF1**	**GF0**	**PD**	**IDL**

Bit Number	Bit Mnemonic	Description
7	SMOD1	**Serial port Mode Bit 1** Set to select double baud rate in mode 1, 2 or 3.
6	SMOD0	**Serial port Mode Bit 0** Cleared to select SM0 bit in SCON register. Set to select FE bit in SCON register.
5	-	**Reserved** The value read from this bit is indeterminate. Do not set this bit.
4	POF	**Power-off Flag** Cleared to recognize next reset type. Set by hardware when V_{CC} rises from 0 to its nominal voltage. Can also be set by software.
3	GF1	**General-purpose Flag** Cleared by user for general-purpose usage. Set by user for general-purpose usage.
2	GF0	**General-purpose Flag** Cleared by user for general-purpose usage. Set by user for general-purpose usage.
1	PD	**Power-down mode bit** Cleared by hardware when reset occurs. Set to enter power-down mode.
0	IDL	**Idle Mode Bit** Cleared by hardware when interrupt or reset occurs. Set to enter idle mode.

Reset Value = 00X1 0000b
Not bit addressable

Functional Description

Figure 37. Bootloader Functional Description



On the above diagram, the on-chip bootloader processes are:

- ISP Communication Management

The purpose of this process is to manage the communication and its protocol between the on-chip bootloader and a external device. The on-chip ROM implement a serial protocol (see section Bootloader Protocol). This process translate serial communication frame (UART) into Flash memory acess (read, write, erase ...).

- User Call Management

Several Application Program Interface (API) calls are available for use by an application program to permit selective erasing and programming of Flash pages. All calls are made through a common interface (API calls), included in the ROM bootloader. The programming functions are selected by setting up the microcontroller's registers before making a call to a common entry point (0xFFF0). Results are returned in the registers. The purpose on this process is to translate the registers values into internal Flash Memory Management.

- Flash Memory Management

This process manages low level access to Flash memory (performs read and write access).

Bootloader Functionality

Introduction

The bootloader can be activated by two means: Hardware conditions or regular boot process.

Example

Programming Data (write 55h at address 0010h in the Flash)

```
HOST          : 01 0010 00 55 9A
BOOTLOADER    : 01 0010 00 55 9A . CR LF
```

Programming Atmel function (write SSB to level 2)

```
HOST          : 02 0000 03 05 01 F5
BOOTLOADER    : 02 0000 03 05 01 F5. CR LF
```

Writing Frame (write BSB to 55h)

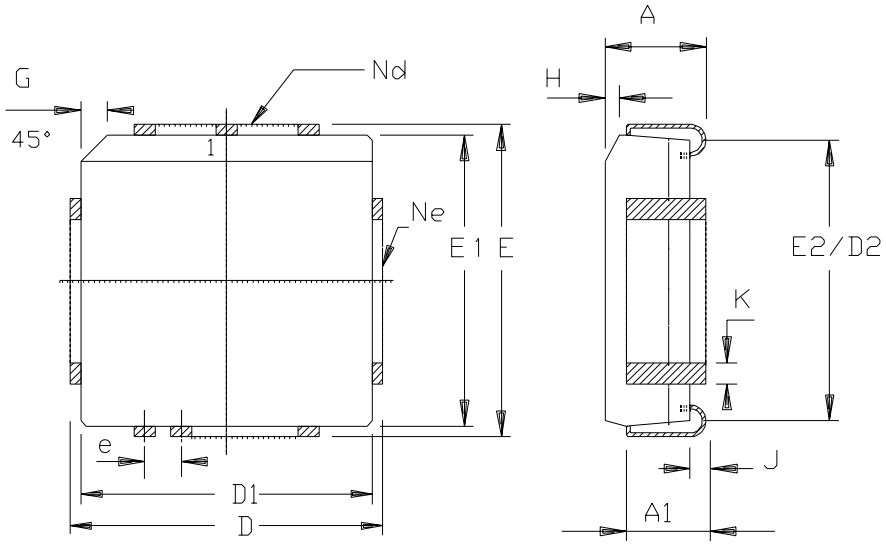
```
HOST          : 03 0000 03 06 00 55 9F
BOOTLOADER    : 03 0000 03 06 00 55 9F . CR LF
```

Ordering Information

Table 83. Possible Order Entries

Part Number	Memory Size	Supply Voltage	Temperature Range	Package	Packing	Product Marking
AT89C51RB2-3CSIM	16 KBytes	5V	Industrial	PDIL40	Stick	89C51RB2-IM
AT89C51RB2-SLSCM		5V	Commercial	PLCC44	Stick	89C51RB2-CM
AT89C51RB2-SLSIM		5V	Industrial	PLCC44	Stick	89C51RB2-IM
AT89C51RB2-RLTCM		5V	Commercial	VQFP44	Tray	89C51RB2-CM
AT89C51RB2-RLTIM		5V	Industrial	VQFP44	Tray	89C51RB2-IM
AT89C51RB2-SLSIL		3V	Industrial	PLCC44	Stick	89C51RB2-IL
AT89C51RB2-RLTIL		3V	Industrial	VQFP44	Tray	89C51RB2-IL
AT89C51RC2-3CSCM	32 KBytes	5V	Commercial	PDIL40	Stick	89C51RC2-CM
AT89C51RC2-3CSIM		5V	Industrial	PDIL40	Stick	89C51RC2-IM
AT89C51RC2-SLSCM		5V	Commercial	PLCC44	Stick	89C51RC2-CM
AT89C51RC2-SLSIM		5V	Industrial	PLCC44	Stick	89C51RC2-IM
AT89C51RC2-RLTCM		5V	Commercial	VQFP44	Tray	89C51RC2-CM
AT89C51RC2-RLTIM		5V	Industrial	VQFP44	Tray	89C51RC2-IM
AT89C51RC2-SLSIL		3V	Industrial	PLCC44	Stick	89C51RC2-IL
AT89C51RC2-RLTIL		3V	Industrial	VQFP44	Tray	89C51RC2-IL
AT89C51RB2-3CSUM	16 KBytes	5V	Industrial & Green	PDIL40	Stick	89C51RB2-UM
AT89C51RB2-SLSUM		5V	Industrial & Green	PLCC44	Stick	89C51RB2-UM
AT89C51RB2-RLTUM		5V	Industrial & Green	VQFP44	Tray	89C51RB2-UM
AT89C51RB2-SLSUL		3V	Industrial & Green	PLCC44	Stick	89C51RB2-UL
AT89C51RB2-RLTUL		3V	Industrial & Green	VQFP44	Tray	89C51RB2-UL
AT89C51RB2-RLTUM		5V	Industrial & Green	VQFP44	Tray	89C51RB2-UM
AT89C51RC2-3CSUM	32 KBytes	5V	Industrial & Green	PDIL40	Stick	89C51RC2-UM
AT89C51RC2-SLSUM		5V	Industrial & Green	PLCC44	Stick	89C51RC2-UM
AT89C51RC2-RLTUM		5V	Industrial & Green	VQFP44	Tray	89C51RC2-UM
AT89C51RC2-SLSUL		3V	Industrial & Green	PLCC44	Stick	89C51RC2-UL
AT89C51RC2-RLTUL		3V	Industrial & Green	VQFP44	Tray	89C51RC2-UL

PLC44



	MM		INCH	
A	4.20	4.57	.165	.180
A1	2.29	3.04	.090	.120
D	17.40	17.65	.685	.695
D1	16.44	16.66	.647	.656
D2	14.99	16.00	.590	.630
E	17.40	17.65	.685	.695
E1	16.44	16.66	.647	.656
E2	14.99	16.00	.590	.630
e	1.27	BSC	.050	BSC
G	1.07	1.22	.042	.048
H	1.07	1.42	.042	.056
J	0.51	–	.020	–
K	0.33	0.53	.013	.021
Nd	11		11	
Ne	11		11	
PKG STD	00			

Datasheet Change Log

Changes from 4180A-08/02 to 4180B-04/03

1. Changed the endurance of Flash to 100, 000 Write/Erase cycles.
2. Added note on Flash retention formula for V_{IH1}, in Section “DC Parameters for Standard Voltage”, page 107.

Changes from 4180B-04/03 to 4180C-12/03

1. Max frequency update for 4.5 to 5.5V range up to 60 MHz (internal code execution).

Changes from 4180C-12/03 - 4180D - 06/05

1. Added Green product ordering information. Page 119.

Changes from 4180D - 06/05 to 4180E - 10/06

1. Correction to PDIL40 figure on page 9.

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