

## Features

- Smart Card Interface with Level Shifter
  - Standard Version
    - Perform ISO Output Signals from Data Input
    - Up to 8 Couplers Can Be Addressed (with Programmable Addresses)
  - Transparent Version
    - Use Directly ISO Input Signals for Easy Implementation
    - Up to 2 Couplers Can Be Addressed
- Power Management & Smart Card Interface
  - Compliant with ISO 7816, EMV2000, GIE-CB, GSM and WHQL Standards
  - Step-up/down Converter with Programmable Voltage Output:
    - 5V and 3V (60 mA), 1.8V (20 mA)
    - High Efficiency From 80% to 98%
    - 4 to 48 MHz Clock Input (7 MHz Min for Step-up Converter)
  - Card Detection and Automatic Deactivation Sequence
  - Programmable Activation Sequence
- Direct Connection to Smart Card
  - Short Circuit Current Limitation
  - 4 kV+ ESD Protection (MIL/STD 833 Class 3)
- Two-wire Host Serial Interface
- Power-on Reset (POR) and Power-fail Detector (PFD) with Reset Output
- Extended Voltage Range: 2.85 to 5.5V
- Low Power Consumption
  - 1 mA Maximum Operating Current
  - 25  $\mu$ A Typical Power-down Current (without Smart Card)
- Industrial Temperature Range: -40 to +85°C
- Package: TSSOP20

## Description

AT83C24 is a smart card interface IC with integrated level shifter for smart card reader/writer applications such as EFT/POS terminals and set top boxes. It enables the management of any type of smart card from any kind of host.

Up to eight AT83C24 devices can be connected in parallel, thanks to the programmable TWI address. Its high efficiency DC/DC converter and its low power-down current make it particularly suited to low-power and portable applications. The reduce bill of material allow to significantly reduce the system cost. A sophisticated power management system guarantees the functionality of the device.



## Smart Card Interface with Level Shifter

### AT83C24

## Advance Information

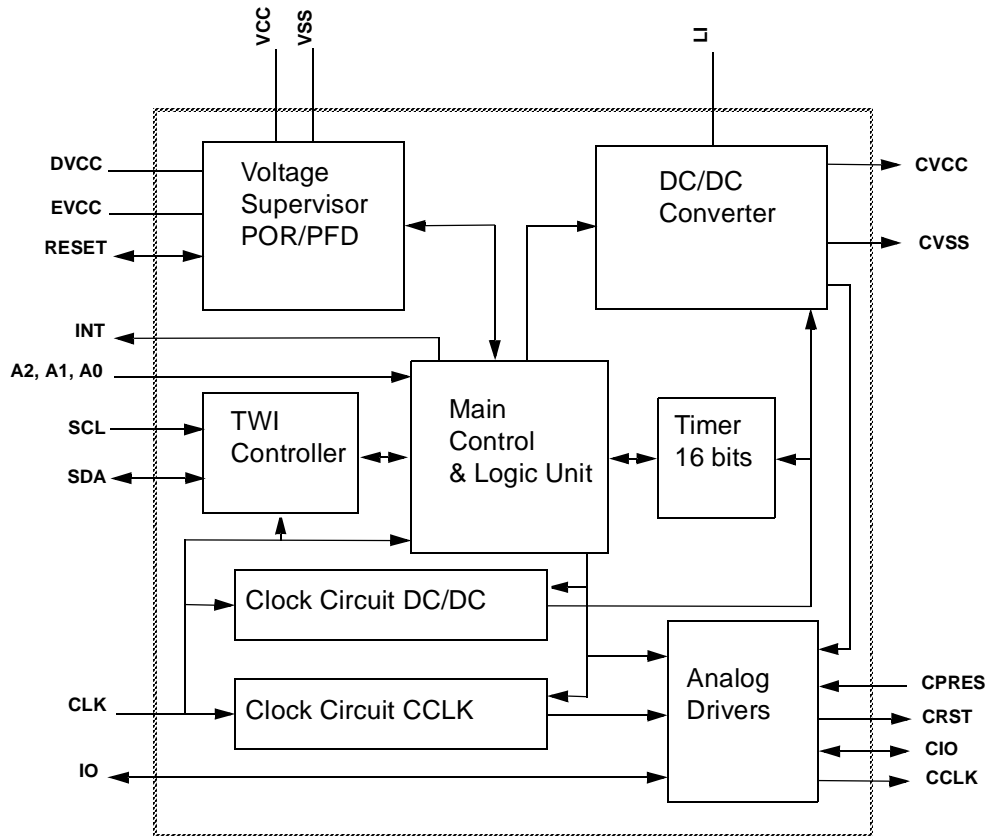
## Summary

Rev. 4199AS-SCR-11/02



Note: This is a summary document. For more information, please contact [cardreader@nto.atmel.com](mailto:cardreader@nto.atmel.com).

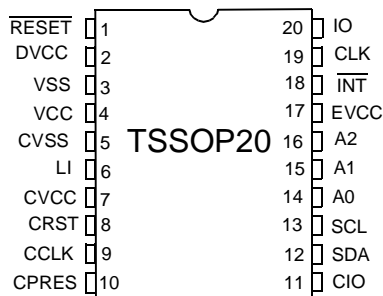
## Block Diagram



## Pin Description

### Pinout

Figure 1. AT83C24 20-pin TSSOP



All the AT83C24 signals are detailed in Table 1.

**Table 1.** Pin Description

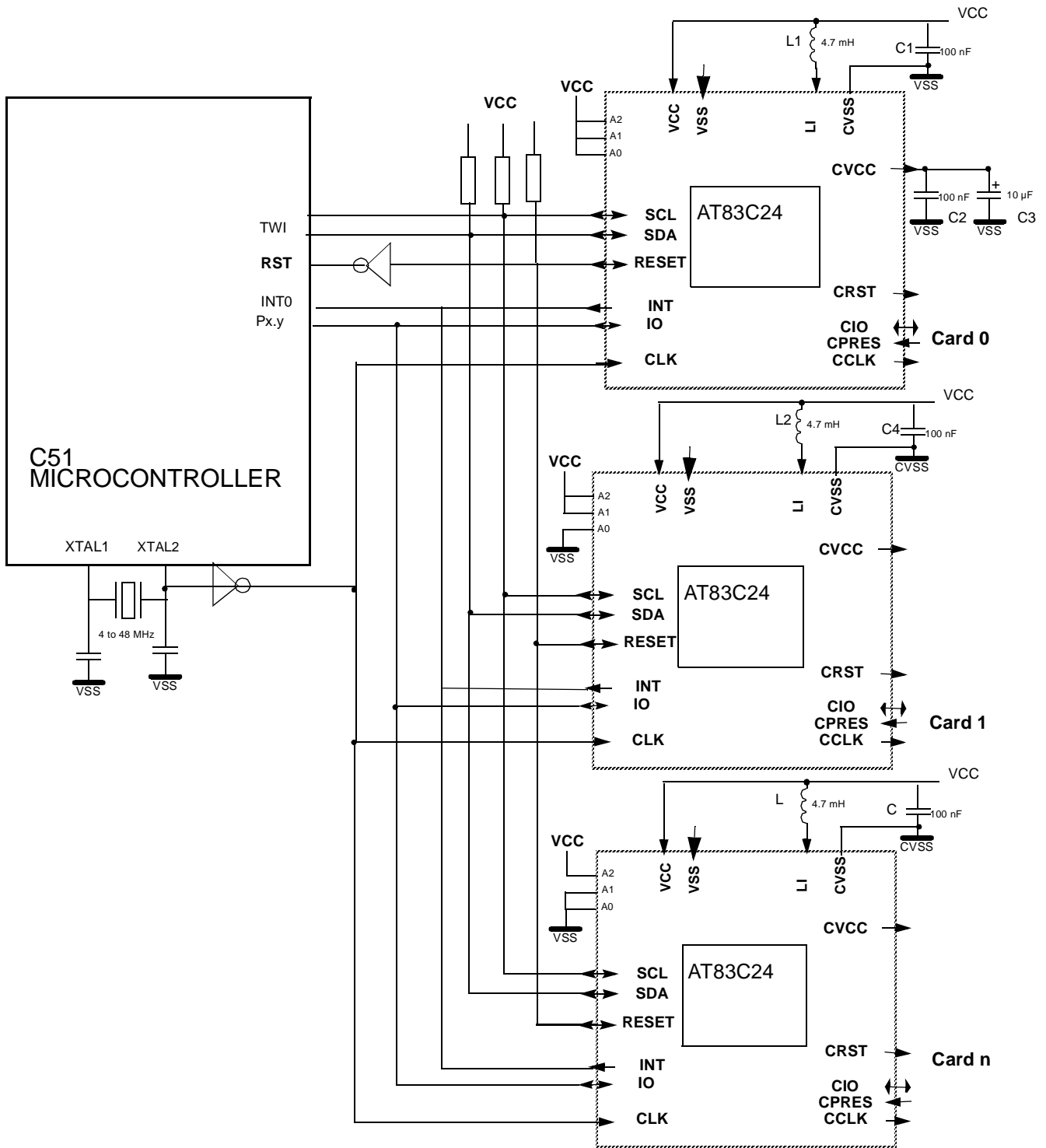
Signal Name	Internal Power Supply	ESD	Type	Description
A2-A1-A0	EVCC	2 kV	I	<b>TWI bus slave address selection input</b> A2 and A1 pins are connected to RST and CLK signals in "transparent mode".
$\overline{\text{INT}}$	EVCC	2 kV	O open-drain	$\overline{\text{INT}}$ interrupts the microcontroller. An internal Pull-up to EVCC can be activated in the pad if necessary using INT_PULLUP bit (CONFIG4 register).
$\overline{\text{RESET}}$	VCC	2 kV	I/O open-drain	<b>MCU Interface Function</b> Power-on reset and Power-fail detection output (active low). A low level on this pin keeps the device under reset when applied on power-on or generates a power-fail reset if applied when the device is running. Asserting $\overline{\text{RESET}}$ when the chip is in Shut-Down mode returns the chip to normal operation.
SDA	VCC	2 kV	I/O open-drain	<b>MCU Interface Function</b> TWI serial data
SCL	VCC	2 kV	I/O open-drain	<b>MCU Interface Function</b> TWI serial clock
IO	EVCC	2 kV	I/O	<b>MCU Interface Function</b> Copy of Card I/O
CLK	EVCC	2 kV	I	<b>MCU Interface Function</b> Master Clock and high level reference for the I/O pin
CIO	CVCC	4 kV+	I/O	<b>Smart card interface function</b> Card I/O
CPRES	VCC	4 kV+	I (pull-up)	<b>Smart card interface function</b> Internal/external Pull-up (see Pull-up bit) Card presence
CCLK	CVCC	4 kV+	O	<b>Smart card interface function</b> Card clock
CRST	CVCC	4 kV+	O	<b>Smart card interface function</b> Card reset
VCC		2 kV+	PWR	<b>Supply Voltage</b> VCC is used to power the internal voltage regulators and I/O buffers.
LI		2 kV+	PWR	<b>DC/DC Input</b> LI must be tied to VCC through an external coil (typically 4.7 $\mu\text{H}$ ) and provide the current for the charge pump of the DC/DC converter. It may be directly connected to VCC if the step-up converter is not used.
CVCC		4 kV+	PWR	<b>Card Supply Voltage</b> CVCC is the programmable voltage output for the card interface. It must be connected to an external decoupling capacitor (4.7 to 10 $\mu\text{F}$ )

**Table 1.** Pin Description (Continued)

Signal Name	Internal Power Supply	ESD	Type	Description
DVCC		2 kV+	PWR	<p><b>Digital Supply Voltage</b></p> <p>Is internally generated and used to supply the digital core. This pin has to be connected to an external capacitor of 100 nF and should not be connected to other devices.</p>
EVCC		2 kV+	PWR	<p><b>Extra Supply Voltage</b></p> <p>EVCC is used to supply the level shifters of host interface I/O pin and CLK pin. EVCC voltage can be supplied from the external EVCC pin or generated internally by an automatic follow up of the logic high level on the I/O pin (connect a 100nF to ground in this configuration).</p>
CVSS		2 kV+	GND	<p><b>DC/DC Ground</b></p> <p>CVSS is used to sink high shunt currents from the external coil.</p>
VSS			GND	<b>Ground</b>

## Typical Application

Figure 2. Typical Application Diagram





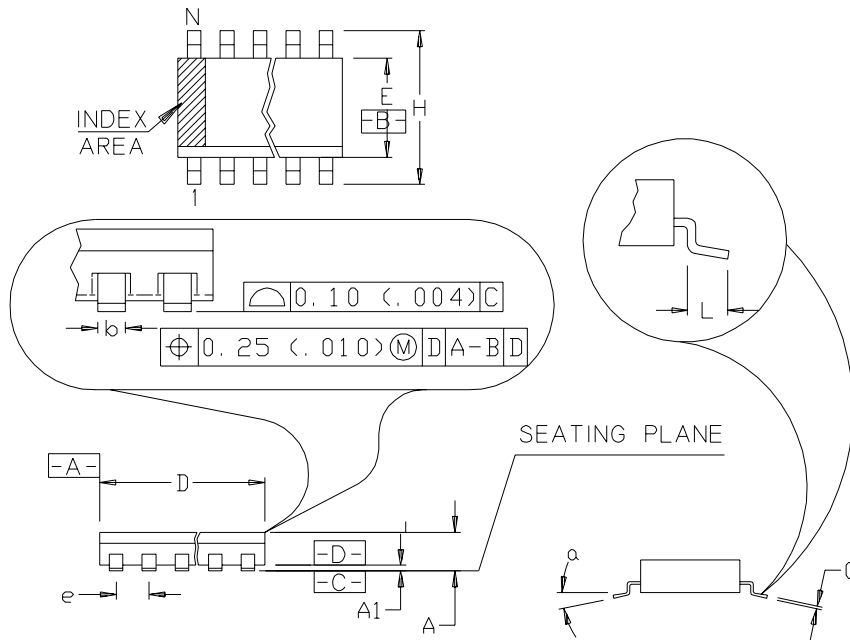
## Ordering Information

**Table 2.** Possible Order Entries

Part Number	Supply Voltage	Temperature Range	Package	Packing
AT83C24-6GSIL	2.85 - 5.4V	Industrial	TSSOP20	Stick
AT83C24-6GRIL	2.85 - 5.4V	Industrial	TSSOP20	Reel

## Package Drawing

### TSSOP20



	MM		INCH	
	A	----	1.10	----
A1	0.05	0.15	.002	.006
b	0.19	0.30	.007	.012
C	0.09	0.20	.003	.008
D	6.40	6.60	.252	.260
E	4.30	4.50	.169	.177
e	0.65	BSC	.026	BSC
H	6.40	BSC	.252	BSC
L	0.50	0.70	.020	.028
N	20		20	
α	0°~8°		0°~8°	



## Atmel Headquarters

### Corporate Headquarters

2325 Orchard Parkway  
San Jose, CA 95131  
TEL 1(408) 441-0311  
FAX 1(408) 487-2600

### 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 Tsimhatsui  
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

## Atmel Operations

### Memory

2325 Orchard Parkway  
San Jose, CA 95131  
TEL 1(408) 441-0311  
FAX 1(408) 436-4314

### Microcontrollers

2325 Orchard Parkway  
San Jose, CA 95131  
TEL 1(408) 441-0311  
FAX 1(408) 436-4314

La Chantrerie  
BP 70602  
44306 Nantes Cedex 3, France  
TEL (33) 2-40-18-18-18  
FAX (33) 2-40-18-19-60

### ASIC/ASSP/Smart Cards

Zone Industrielle  
13106 Rousset Cedex, France  
TEL (33) 4-42-53-60-00  
FAX (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.  
Colorado Springs, CO 80906  
TEL 1(719) 576-3300  
FAX 1(719) 540-1759

Scottish Enterprise Technology Park  
Maxwell Building  
East Kilbride G75 0QR, Scotland  
TEL (44) 1355-803-000  
FAX (44) 1355-242-743

### RF/Automotive

Theresienstrasse 2  
Postfach 3535  
74025 Heilbronn, Germany  
TEL (49) 71-31-67-0  
FAX (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.  
Colorado Springs, CO 80906  
TEL 1(719) 576-3300  
FAX 1(719) 540-1759

### Biometrics/Imaging/Hi-Rel MPU/ High Speed Converters/RF Data- com

Avenue de Rochepleine  
BP 123  
38521 Saint-Egreve Cedex, France  
TEL (33) 4-76-58-30-00  
FAX (33) 4-76-58-34-80

---

### e-mail

[literature@atmel.com](mailto:literature@atmel.com)

### Web Site

<http://www.atmel.com>

### © Atmel Corporation 2002.

Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

ATMEL® is a registered trademark of Atmel.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.