#### **Features**

- Main Supply 3.0V to 3.6V
- Independent 2.5V to 3.6V Auxiliary Supply for Backup Section
- Internal State Machine for Startup
- 25 mA/1.8V-2.75V Linear Low Drop Out Regulator with High PSRR and Low Noise (LDO1)
- 30 mA/1.5V-1.8V Linear Low Drop Out Regulator with High PSRR and Low Noise (LDO2)
- 60 mA/1.23V-1.5V-1.8V Linear Low Drop Out Regulator with High PSRR (LDO3)
- 2 mA/1.2V-1.5V-1.8V Linear Low Drop Out Regulator with Very Low Quiescent Current (LDO4)
- HPBG Economic High Performance Voltage Reference for LDO Supply to RF Sections
- LPBG Low Power Voltage Reference to LDO4 During Backup Battery Operation
- Internal Oscillator Generates Internal Master Clock
- Internal Reset Generator for Main Supply
- Additional External Reset Input
- Two Wire Interface (TWI) for Independent Activation and Output Voltage Programming for Each LDO
- Available in 3 x 3 x 0.9 mm 16-pin QFN Package
- Applications: GPS Modules, WLAN Devices, Wireless Modules

# 1. Description

The AT73C239 is a 4-channel Power Supply Power Management Unit (PMU) available in a QFN 3 x 3 mm package. It is a fully integrated, low cost, combined Power Management device for wireless modules, GPS and WLAN devices. It integrates four Linear Low Drop Out (LDO) Regulators, three of which provide high-accuracy RF performance and one (LDO4) with very low quiescent current that is supplied by an external backup battery. A Low Power Bandgap (LPBG) requiring no external capacitor for decoupling, is used as reference voltage for LDO4 and starts when VBAT is present. LDO4 regulates output voltage with extremely low quiescent current, maximizing the lifetime of the backup battery. An Internal State Machine manages the startup of the other LDOs in the order of LDO3 then LDO1 then LDO2. An economic High Power Bandgap (HPBG) provides highly accurate, low noise voltage reference to LDOs 1, 2, 3. HPBG operates in switching mode thereby decreasing its current consumption and becomes inactive when not directly supplied by VIN current. When the RF LDOs are in idle mode, quiescent current is decreased to a minimum.

The AT73C239 features a Two-wire Interface (TWI) to increase the efficiency of the system by disabling LDOs when not needed.



# Power Management for Mobiles (PM)

AT73C239
4-channel Power
Management for
Wireless
Modules

Summary





# 2. Block Diagram

VDD1 LDO1 **VBG** VDD **HPBG** 3.0V-3.6V VOUT GNDA/AVSS 1.8V or 2.75V VO1 ILOAD 25 mA Internal Oscillator XRESIN VDD2 LDO2 **XRESO** Reset Generator VDD **TWCK** TWI 3.0V-3.6V TWD State Machine VOUT 1.5V or 1.8V **GNDD** VO2 ILOAD 30 mA Fuse1 Fuse2 VZAP VMON POR1 POR<sub>1</sub> VDD3 VBAT LDO4 LDO3 VDD VDD 2.5V-3.6V 3.0V-3.6V VOUT VOUT 1.2V or 1.5V or 1.8V 1.23V or 1.5V or 1.8V VO3 VO4 ILOAD 2 mA ILOAD 60 mA

Figure 2-1. AT73C239 Functional Block Diagram

**LPBG** 

# **Revision History**

Doc. Rev	Date	Comments	Change Request Ref.
6201AS	01-Sep-05	First issue	





# **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

# **Atmel Operations**

#### Memory

2325 Orchard Parkway San Jose, CA 95131, USA Tel: 1(408) 441-0311 Fax: 1(408) 436-4314

#### Microcontrollers

2325 Orchard Parkway San Jose, CA 95131, USA 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, USA

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) 71-31-67-0

1150 East Cheyenne Mtn. Blvd. Colorado Springs, CO 80906, USA

Tel: 1(719) 576-3300 Fax: 1(719) 540-1759

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

Avenue de Rochepleine

BP 123

38521 Saint-Egreve Cedex, France

Tel: (33) 4-76-58-30-00 Fax: (33) 4-76-58-34-80

Literature Requests www.atmel.com/literature

Disclaimer: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN ATMEL'S TERMS AND CONDITIONS OF SALE LOCATED ON ATMEL'S WEB SITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel's products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

© Atmel Corporation 2005. All rights reserved. Atmel®, logo and combinations thereof, Everywhere You Are® and others, are registered trademarks or trademarks of Atmel Corporation or its subsidiaries. Other terms and product names may be trademarks of others.

