# Product Brief
## DA6021 Highly integrated power management IC for new generation Intel® Atom™ processor

## General Description

The DA6021 PMIC is a monolithic single chip power management IC for the next generation Intel® Atom™ processor. It provides all power supplies for tablet PC's and can also be used in multiple embedded applications as well as Netbooks and Nettops. It is designed to support platforms based on Intel's new Atom processor series, including DDR3 memory and various peripherals.

### Integrated power management

Dialog Semiconductor's new DA6021 uses a single supply voltage at a wide range of input voltage and provides low noise supplies to all SoC voltage domains, DDR3 memory and many peripherals.

The DA6021 integrates 6 high performance low dropout (LDO) voltage regulators using Dialog's patented Smart Mirror™ technology for very low quiescent current. It includes 11 internal power switches and the control logic for 9 external switching devices. These include in-rush current control for platform power distribution simplification. Six fully integrated high efficiency DC-DC buck converters provide current to Intel Atom platform's various low voltage domains as well as to the memory and the peripherals. Two buck-boost and one boost converter also supply energy towards the platform. All nine regulators are designed to support external component height of 1mm. Dependant on the input voltage (single battery cell or 5V DC supply) the buck regulators will run preferably at 6MHz.

### Ultra flexible power sequencer

The ultra flexible power sequencer takes care of the complete platform start-up, state-transitioning and power-down procedure. The DA6021 operates autonomously and reduces the power consumption when entering stand-by or power down mode. The DA6021 is fully programmable and allows adapting to all Intel Atom processor and platform sequences. The OTP programmed power sequence is copied into operational registers during power-up. Those registers can be overwritten by EEPROM after initial OTP copy routine or via operational processor.
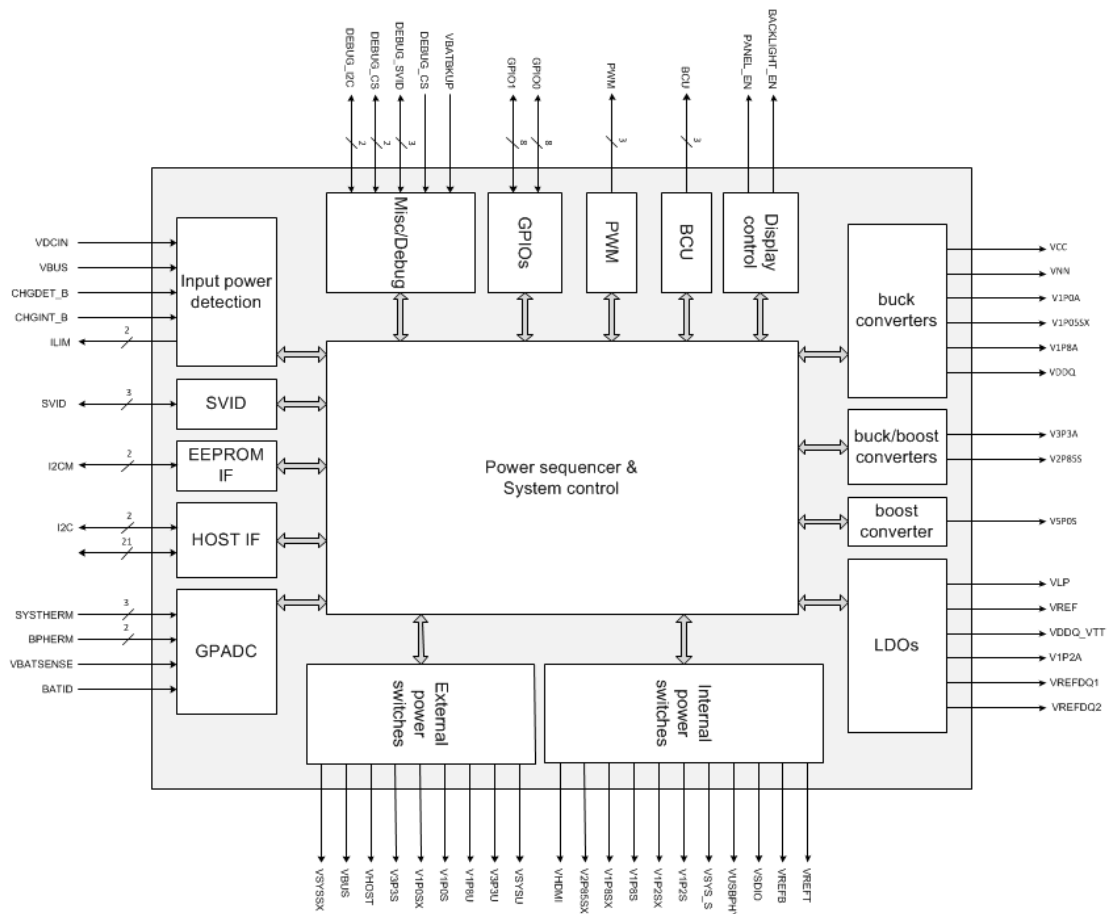
### Auxiliary function

An analogue to digital converter (ADC) with 10-bit resolution combined with a multi-channel input multiplexer is implemented, which allows to measure the input supply voltage, battery ID, PMIC die temperature as well as 5 battery pack & system temperatures. The number of external components is significantly further reduced by 16 GPIO's, 3 channel PWM output signal generators, a multi-input detector with a charger control as well as a programmable IRQ controller.

### Features

- Two high efficiency buck converters with integrated SVID interface running IMVP-7 protocol. These two quad phase DC/DC regulators generate the voltages for CPU and graphic cores.
- One dual phase buck regulator for memory supply supporting DDR3 L and LP memory types
- 3 single phase buck regulators supplying 1.0V, 1.05V and 1.8V towards the platform
- 2 buck-boost converters generating 2.85V and 3.3V towards the platform even if the input supply is down to 2.7V
- Boost converter providing 5V towards the USB components
- 3 LDOs with fixed output voltage
- 2 LDOs with programmable output voltage
- 1 push-pull LDO used for DDR3 address line termination
- 11 integrated power rail switching devices
- 9 external power rail switching devices controlled by the PMIC

- Ultra flexible power sequencer programmable via OTP/ EEPROM and register
- I2C communication interface
- EEPROM interface for optional OTP over-writing
- 16 general purpose I/Os with alternate functions
- 16 channel 10-bit ADC including conditioning circuits and programmable flexible sequencing for automatic and manual measurements
- System voltage and temperature monitoring, supervising
- Programmable IRQ controller
- 1-wire digital battery interface including 2-wire conversion
- 3 channel PWM signal generation, flexible frequency and duty cycle programmable
- Input power source detection, including by charger current control

## DA6021 PMIC block diagram

Top signals: DEBUG_I2C, DEBUG_CS, DEBUG_SVID, DEBUG_CS, VBATBKUP, GPIO1, GPIO0, PWM, BCU, PANEL_EN, BACKLIGHT_EN

Blocks (top row): Misc/Debug, GPIOs, PWM, BCU, Display control

Left side inputs:
- VDCIN, VBUS, CHGDET_B, CHGINT_B, ILIM → Input power detection
- SVID → SVID
- I2CM → EEPROM IF
- I2C → HOST IF
- SYSTHERM, BPHERM, VBATSENSE, BATID → GPADC

Center: Power sequencer & System control

Right side blocks:
- buck converters → VCC, VNN, V1P0A, V1P05SX, V1P8A, VDDQ
- buck/boost converters → V3P3A, V2P8SS
- boost converter → V5P0S
- LDOs → VLP, VREF, VDDQ_VTT, V1P2A, VREFDQ1, VREFDQ2

Bottom blocks: External power switches, Internal power switches

Bottom signals: VSYS5SX, VBUS, VHOST, V3P3S, V1P05X, V1P0S, V1P8U, V3P3U, VSYS1J, VHDMI, V2P8SSX, V1P8SX, V1P8S, V1P0SX, V1P2S, VSYS_S, VUSBPHY, VSDIO, VREFB, VREF

## Applications

- Tablet PCs
- Embedded applications
  - Embedded PCs
  - Vehicle command systems
  - Telematic devices
  - Car navigation systems
  - Mobile internet devices
- Netbooks
- Nettops

## Key Features

- Fully integrated PMIC at smallest footprint and PCB area
- Ultra flexible programmable state-machine
- Support of various system memory types
- Many integrated auxiliary functions reducing external component count

## Package

- 325 pin FCBGA 11x6mm, 0.4mm pitch

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