# Integrated Power Management Solutions

## ADI Announces a New Family of Multichannel Regulators

***Multichannel Regulator (µPMUs) Benefits***

- *Easy to Use*
- *Minimize PCB Area*
- *Reduced BOM Cost*


*Adjustable Output Voltages*

*3 MHz Switching Frequency for Ultrasmall External Components*

*LFCSP (QFN) Package Options*

*Tiny WLCSP Package Options*

*Minimal External Components*

*Small Solution Size*

MAKEADIFFERENCE

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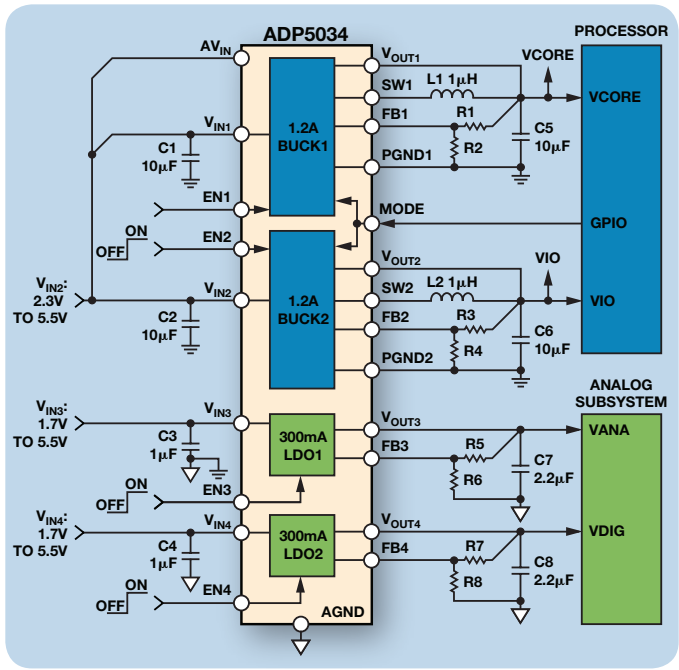
ANALOG DEVICES

# ADP5034

## Dual, 3 MHz, 1.2 A Buck Regulator with Two 300 mA LDOs in LFCSP

*Key Features*

- Input voltage range: 2.3 V to 5.5 V
- Two 1.2 A buck regulators
- Two 300 mA LDOs
- Initial regulator accuracy: ±1%
- Overcurrent and thermal protection
- Soft start
- Undervoltage lockout
- Factory-programmable or external adjustable $V_{OUTx}$
- Buck1 and Buck2 key specifications
  - High efficiency: up to 96%
  - Current-mode architecture
  - 3 MHz operating frequency
  - Forced PWM and auto PWM/PSM modes
  - Out of phase operation for reduced input filtering
- LDO1 and LDO2 key specifications
  - Stable with 1 µF ceramic output capacitors
  - High PSRR: 65 dB PSRR 1 kHz to 10 kHz
  - Low output noise: 80 µV rms typical output noise at $V_{OUT3}$ = 2.5 V
  - Low dropout voltage: 150 mV @ 300 mA load
  - Low input supply voltage from 1.7 V to 5.5 V
- −40°C to +125°C junction temperature
- ADP5034: 24-lead, 4 mm × 4 mm LFCSP package
- ADP5033: 16-lead WLCSP



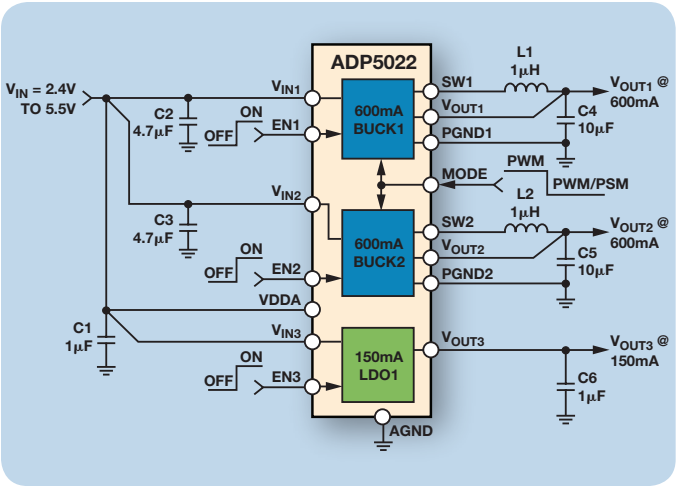

*ADP5034 functional block diagram.*

# ADP5022

## Industry's Smallest Dual Buck Regulator Reduces Component Count and Board Space in Portable Systems

*Key Features*

- Input voltage range: 2.4 V to 5.5 V
- Tiny 16-ball, 2 mm × 2 mm WLCSP package
- Soft start
- Factory-programmable UVLO on VDDA system supply of either 2.2 V or 3.9 V
- Factory-programmable default output voltages for all 3 channels
- Total BOM size: 4.7 mm × 5 mm



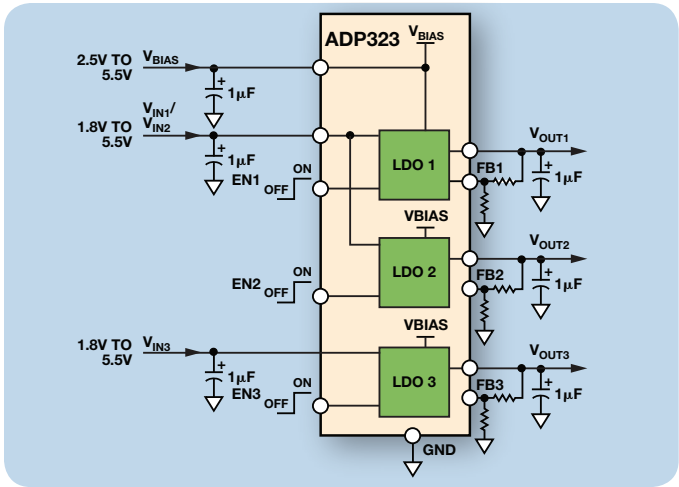

*ADP5022 functional block diagram.*

# ADP323

## Triple, 200 mA, Low Noise, High PSRR Voltage Regulator

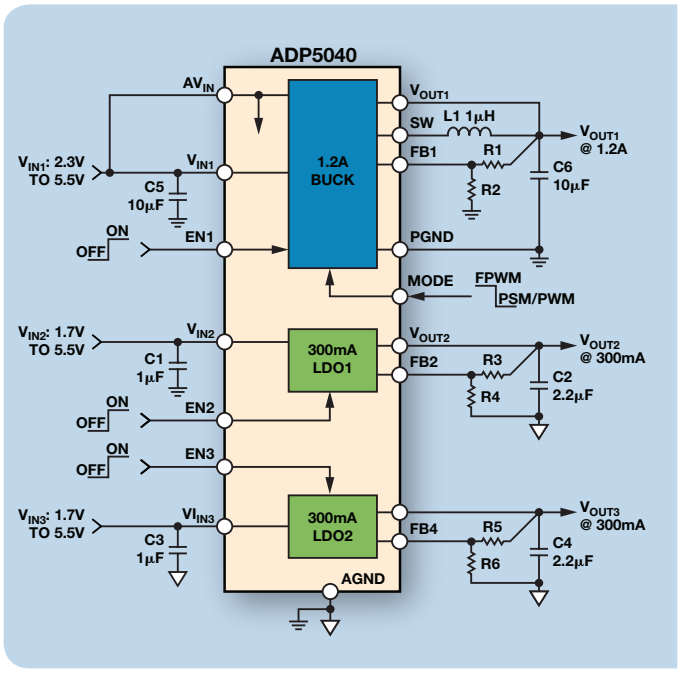
*Key Features*

- Bias voltage range ($V_{BIAS}$): 2.5 V to 5.5 V
- LDO input voltage range ($V_{IN1}$/$V_{IN2}$, $V_{IN3}$): 1.8 V to 5.5 V
- Three 200 mA low dropout voltage regulators
- Adjustable output voltages, fixed-output voltages (ADP322)
- 16-lead, 3 mm × 3 mm LFCSP
- 3 independent logic controlled enables
- High PSRR, 60 dB PSRR, 10 kHz
- Low output noise, 29 µV rms typical at $V_{OUT}$ = 1.2 V



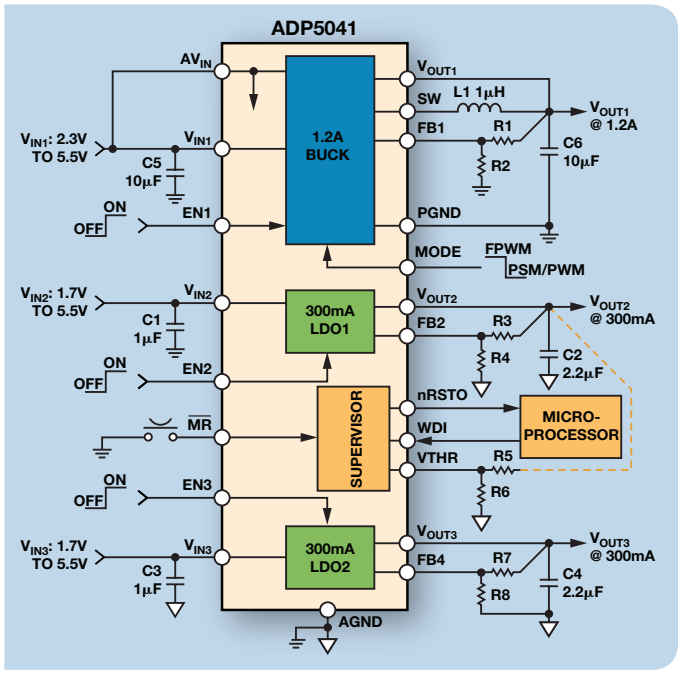

*ADP323 functional block diagram.*

## ADP5040: 1.2 A Buck and Dual 300 mA LDO with Individual Enables in LFCSP




*ADP5040 functional block diagram.*

## ADP5041: 1.2 A Buck and Dual 300 mA LDO, Supervisory, Watchdog, and Manual Reset in LFCSP

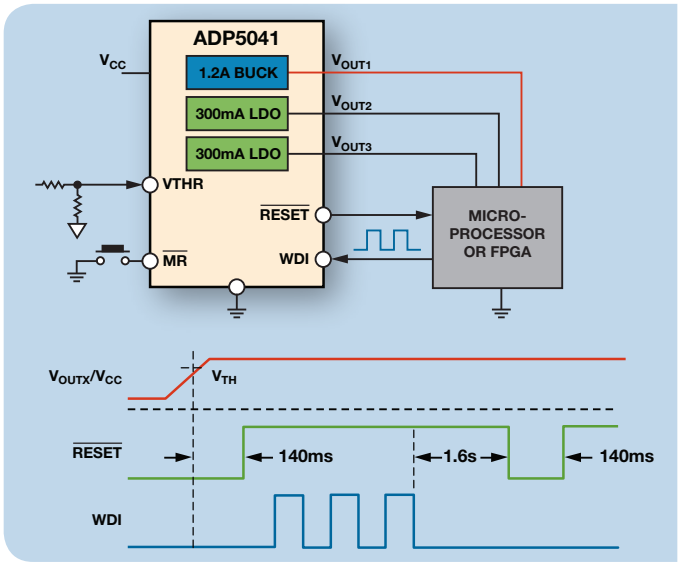



*ADP5041 functional block diagram.*

### *Key Features*

- Input voltage range: 2.3 V to 5.5 V
- One 1.2 A buck regulator, fixed and adjustable output voltages, up to 96% efficiency
- Two 300 mA LDOs, fixed and adjustable outputs
- 20-lead, 4 mm × 4 mm LFCSP package
- Initial regulator accuracy: ±1%
- Overcurrent and thermal protection
- Soft start
- Undervoltage lockout
- Open-drain processor reset with external adjustable threshold monitoring
- ±1.5% threshold accuracy over the full temperature range
- Guaranteed reset output valid to $V_{CC}$ = 1 V
- Manual reset input
- Watchdog refresh input
- 2 reset timeout options: 20 ms and 140 ms (minimum)
- 2 watchdog timeout options: 102 ms and 1600 ms (typical)

## ADP5041 Delivers Improved System Reliability by Integrating Power-On Reset and Watchdog Functionality




*±1.5% trip threshold accuracy to monitor low voltage core rails.*

### *Multichannel Regulators Applications*

- Portable medical devices
- Energy metering power supplies
- Single Li-Ion/Li-polymer battery-powered equipment
- PDAs, portable media players, portable instruments
- DSP, micro, and memory power supplies
- FPGA power supplies

| Part Number | Product Description | $V_{IN}$ (V) | $V_{OUT}$ (V) | Number of Outputs | Output Current (mA) | I²C | Reset Trip Threshold (V) | Min Reset Timeout (ms) | Typ Watchdog Timeout (ms) | Key Features | Package | Price ($U.S.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADP220/ADP221 | Dual, 200 mA LDO | 2.5 to 5.5 | LDO1: 1.1, 1.8, 2.6, 2.75, 2.8, 3.0; LDO2: 1.2, 1.8, 2.3, 2.7, 2.75, 2.8, 3.3 | 2 × LDO | 300 | — | — | — | — | 40 dB PSRR at 1 MHz | 6-lead WLCSP | 0.58 |
| ADP222/ADP223 | Dual, 300 mA LDO | 2.5 to 5.5 | LDO1: 3.3, 2.8,1.8, 1.5, 1.2; LDO2: 3.0, 2.8,2.7, 2.5,1.8, 1.5V and adj (0.5 to 5) | 2 × LDO | 300 | — | — | — | — | Noise 29 µV rms, 40 dB PSRR at 1 MHz | 8-lead LFCSP | 0.49 |
| ADP224/ADP225 | Dual, 300 mA LDO | 2.5 to 5.5 | LDO1: 2.8; LDO2: 1.8 adj (0.5 to 5) | 2 × LDO | 300 | — | — | — | — | Quick output discharge | 8-lead LFCSP | 0.49 |
| ADP320 | Triple, 200 mA LDO | 1.8 to 5.5 | LDO1: 3.3; LDO2: 1.8, 3.3; LDO3: 1.5 | 3 × LDO | 200 | — | — | — | — | Fixed $V_{OUT}$ options | 16-lead LFCSP | 0.54 |
| ADP322 | Triple, 200 mA LDO | 1.8 to 5.5 | LDO1: 3.3, 2.8, 2.5; LDO2: 2.8, 2.5, 1.8; LDO3: 1.8, 1.5, 1.2 | 3 × LDO | 200 | | | | | Fixed $V_{OUT}$ options | 16-lead LFCSP | 0.54 |
| ADP323 | Triple, 200 mA LDO | 1.8 to 5.5 | Adj (0.5 to 5) | 3 × LDO | 200 | — | — | — | — | Adjustable $V_{OUT}$ options | 16-lead LFCSP | 0.54 |
| ADP2114 | Dual buck regulator | 2.7 to 5.5 | 0.8, 1.2, 1.5, 1.8, 2.5, 3.3 and adj | 2 × buck | 2000 | — | — | — | — | SYNC pin, PGOOD pins | 32-lead LFCSP | 2.50 |
| ADP2116 | Dual buck regulator | 2.7 to 5.5 | 0.8, 1.2, 1.5, 1.8, 2.5, 3.3 and adj | 2 × buck | 3000 | — | — | — | — | SYNC Pin, PGOOD Pins | 32-lead LFCSP | 3.17 |
| ADP2140 | 600 mA buck and 300 mA LDO | Buck: 2.3 to 5.5 LDO: 1.65 to 5.5 | Buck: 3.3, 2.5, 1.875, 1.8, 1.5, 1.2; LDO: 3.3, 2.8, 2.5, 1.8, 1.5, 1.2 | 1 × buck 1 × LDO | 600 300 | — | — | — | — | Autosequencing, power good, power save sode | 10-lead LFCSP | 1.20 |
| ADP5020 | General-purpose PMU | Buck: 2.4 to 5.5 | Buck1: 3.7, 3.3, 3.2, 2.9, 2.8, 2.5; Buck2: 1.8, 1.7, 1.6, 1.5, 1.4, 1.3, 1.2, 1.1 | 2 × buck | 600, 300 | Yes | — | — | — | I²C, programmable outputs, supervisor, external sync | 20-lead LFCSP | 1.50 |
| | | LDO: 2.3 to 5.5 | LDO: 3.3, 3.2, 3.1, 3.0, 2.9, 2.8, 2.7, 2.6, 2.5, 2.4, 2.3, 2.2, 2.1, 2.0, 1.9, 1.8 | 1 × LDO | 150 | | | | | | | |
| ADP5022 | Dual, 3 MHz buck with 150 mA LDO | Buck: 2.3 to 5.5 | Buck: 3.3, 3.0, 2.8, 2.5, 2.3, 2.0, 1.82, 1.8, 1.6, 1.5, 1.3, 1.2, 1.1, 1.0, 0.9, 0.8 | 2 × buck | 600 | — | — | — | — | Mode pin, individual enable pins | 16-lead WLCSP | 1.80 |
| | | LDO: 1.7 to 5.5 | LDOs: 3.3, 3.0, 2.9, 2.8, 2.775, 2.5, 2.0, 1.875, 1.8, 1.75, 1.7, 1.65, 1.6, 1.55, 1.5, 1.2 | 1 × LDO | 150 | | | | | | | |
| ADP5023 | Dual, 800 mA buck with 300 mA LDO | Bucks: 2.3 to 5.5 | Adj (0.8 to 3.8) | 2 × buck | 800 | — | — | — | — | Mode pin, individual enable pins | 24-lead LFCSP | 1.59 |
| | | LDOs: 1.7 to 5.5 | Adj (0.8 to 4.75) | 1 × LDO | 300 | | | | | | | |
| ADP5024 | Dual, 1.2 A buck with 300 mA LDO | Bucks: 2.3 to 5.5 | Adj (0.8 to 3.8) | 2 × buck | 1200 | — | — | — | — | Mode pin, individual enable pins | 24-lead LFCSP | 1.79 |
| | | LDOs: 1.7 to 5.5 | Adj (0.8 to 4.75) | 1 × LDO | 300 | | | | | | | |
| ADP5030 | Dual LDO with load switch | 2.5 to 5.5 | LDO1: 1.2; LDO 2: 1.8 | 2 × LDO | 200 | — | — | — | — | Load switch and level shifters | 16-lead WLCSP | 0.85 |
| ADP5033 | Dual, 3 MHz buck regulator with dual LDO | Bucks: 2.3 to 5.5 | Buck: 3.3, 3.0, 2.8, 2.5, 2.3, 2.0, 1.82, 1.8, 1.6, 1.5, 1.3, 1.2, 1.1, 1.0, 0.9, 0.8 | 2 × buck | 800 | — | — | — | — | Mode pin, two enable pins | 16-lead LFCSP | 1.90 |
| | | LDOs: 1.7 to 5.5 | LDOs: 3.3, 3.0, 2.9, 2.8, 2.775, 2.5, 2.0, 1.875, 1.8, 1.75, 1.7, 1.65, 1.6, 1.55, 1.5, 1.2 | 2 × LDO | 300 | | | | | | | |
| ADP5034 | Dual, 3 MHz buck regulator with dual LDO | Bucks: 2.3 to 5.5 | Adj (0.8 to 3.8) | 2 × buck | 1200 | — | — | — | — | Mode pin, individual enable pins | 24-lead LFCSP | 1.99 |
| | | LDOs: 1.7 to 5.5 | Adj (0.8 to 4.75) | 2 × LDO | 300 | | | | | | | |
| ADP5037 | Dual, 3 MHz, 800 mA buck regulator with dual 300 mA LDO | Bucks: 2.3 to 5.5 | Adj (0.8 to 3.8) | 2 × buck | 800 | — | — | — | — | Mode pin, individual enable pins | 24-lead LFCSP | 1.69 |
| | | LDOs: 1.7 to 5.5 | Adj (0.8 to 4.75) | 2 × LDO | 300 | | | | | | | |
| ADP5040 | 3 MHz buck regulator with dual LDO | Buck: 2.3 to 5.5 | Adj (0.8 to 3.8) | 1 × buck | 1200 | — | — | — | — | Individual enable pins, mode pin | 20-lead LFCSP | 1.39 |
| | | LDOs: 1.7 to 5.5 | Adj (0.8 to 4.75) | 2 × LDO | 300 | | | | | | | |
| ADP5041 | 3 MHz buck regulator with dual LDO, supervisor, and watchdog timer | Buck: 2.3 to 5.5 | Adj (0.8 to 3.8) | 1 × buck | 1200 | — | 0.5 (adj) | 20, 140 | 102, 1600 | Individual enable pins and supervisor, WDI, mode pin and MR pin | 20-lead LFCSP | 1.79 |
| | | LDOs: 1.7 to 5.5 | Adj (0.8 to 4.75) | 2 × LDO | 300 | | | | | | | |
| ADP5042 | 3 MHz buck regulator with dual LDO, supervisor, and dual watchdog timers | Buck: 2.3 to 5.5 | Buck: 3.3, 3.0, 2.8, 2.5, 2.3, 2.0, 1.82, 1.8, 1.6, 1.5, 1.4, 1.3, 1.2, 1.1, 1.0, 0.9 | 1 × buck | 800 | | 4.63, 3.08, 2.93, 2.63, 2.50, 2.35, 2.068, 1.692 | 20, 140 | 102, 1600 | Individual enable pins and supervisor, WDI, WDI2, mode pin and MR pin | 20-lead LFCSP | 1.99 |
| | | LDOs: 1.7 to 5.5 | LDOs: 3.3, 3.0, 2.8, 2.5, 2.25, 2.0, 1.8, 1.7, 1.6, 1.5, 1.2, 1.1, 1, 0.9, 0.8 | 2 × LDO | 300 | | | | | | | |
| ADP5043 | 3 MHz buck regulator with LDO, supervisor, and dual watchdog timers | Buck: 2.3 to 5.5 | Buck: 3.3, 3.0, 2.8, 2.5, 2.3, 2.0, 1.82, 1.8, 1.6, 1.5, 1.4, 1.3, 1.2, 1.1, 1.0, 0.9 | 1 × buck | 800 | | 4.63, 3.08, 2.93, 2.63, 2.50, 2.35, 2.068, 1.692 | 20, 140 | 102, 1600 | Individual enable pins and supervisor, WDI, WDI2, mode pin and MR pin | 20-lead LFCSP | 1.79 |
| | | LDO: 1.7 to 5.5 | LDO: 3.3, 3.0, 2.8, 2.5, 2.25, 2.0, 1.8, 1.7, 1.6, 1.5, 1.2, 1.1, 1, 0.9, 0.8 | 1 × LDO | 300 | | | | | | | |
| ADP5045 | Boost, buck-boost, triple buck, and dual LDO | 2.5 to 5.5 | 3.8 to 5.3 | 1 × boost | 1200 | Yes | — | — | — | Programmable power sequencing, soft start, output voltages and RTC; 25 mA LED driver | 64-ball WLCSP | 4.99 |
| | | | 3.19 to 3.33 | 1 × buck-boost | 900 | | | | | | | |
| | | | 0.98 to 2.5, adj | 3 × buck | 1800, 900 | | | | | | | |
| | | | 1.5 to 3.5 | 2 × LDO | 150, 50 | | | | | | | |

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).



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