

Charge Pump Products

Summer 2004

Analog Devices Applications Bulletin

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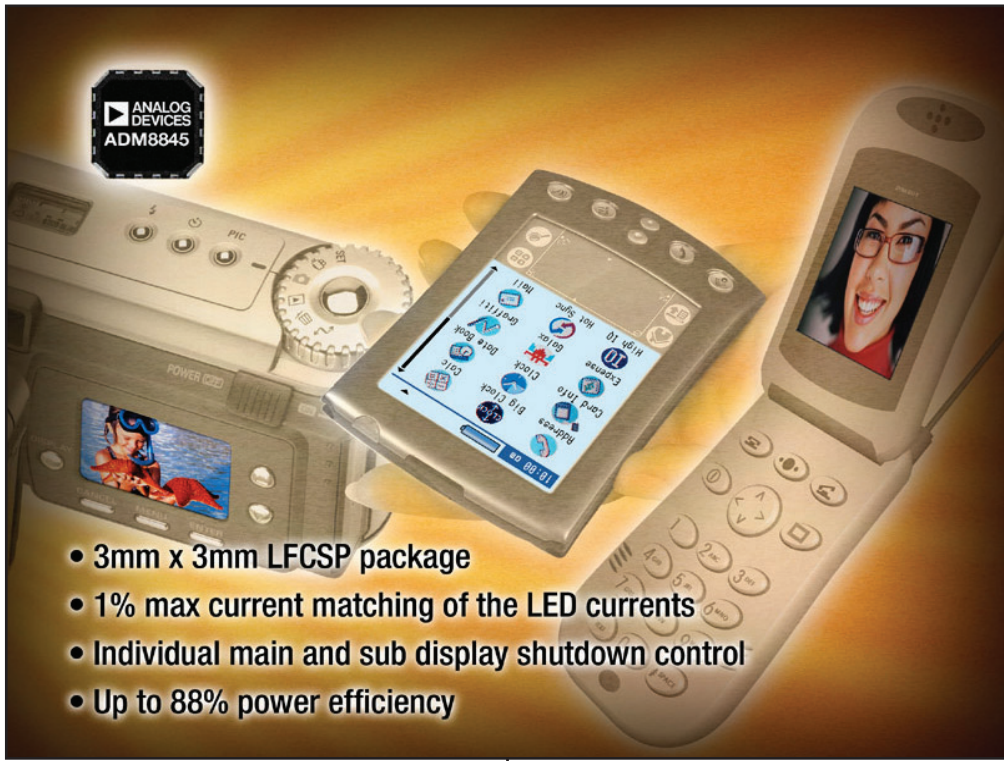
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ADM8845—The Most Accurate Backlight LED Driver in the Smallest LFCSP Package



- 3mm x 3mm LFCSP package
- 1% max current matching of the LED currents
- Individual main and sub display shutdown control
- Up to 88% power efficiency

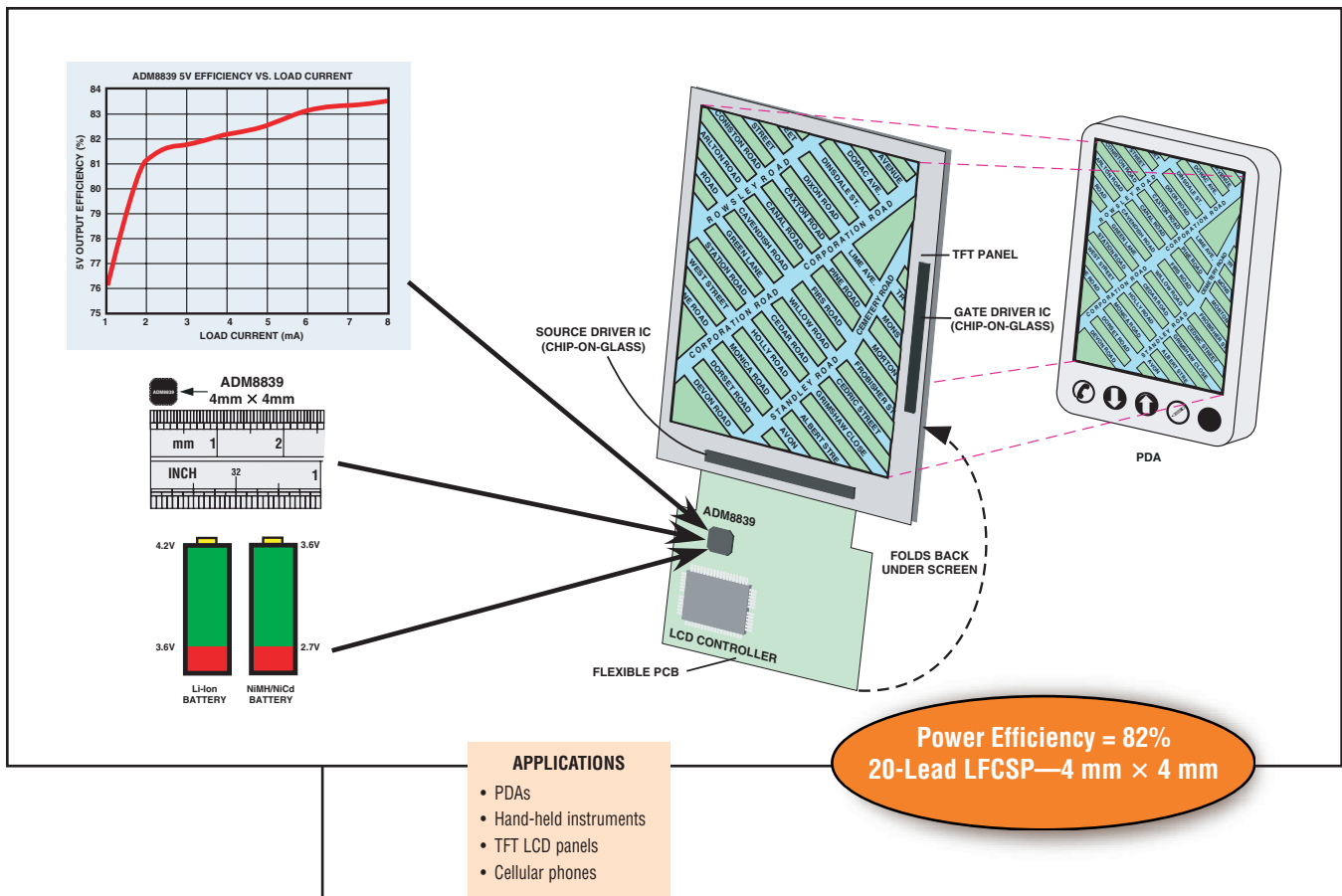
Whether it's for the display of a cell phone, PDA, digital camera, or other hand-held devices with white LED backlighting, the ADM8845 Backlight LED Driver offers designers many benefits:

- 3 mm \times 3 mm LFCSP package saves 44% board space compared to the nearest competitor
- Industry-leading current matching of 1%, ensuring uniform lighting across the panel
- Separate main and sub display, making it ideal for the latest clam-shell style phones
- Power efficiency of up to 88%, leading to improved battery life

ADM8839: Charge Pump Regulator for Microcolor TFT Panel (+5 V \pm 2%, +15 V, -15 V)

The ADM8839 is ideal for TFT (thin film transistors) LCDs (liquid crystal displays). The device generates three voltages (+5 V \pm 2%, +15 V, and -15 V) from a single 2.7 V to 4.2 V supply—for use with Li-Ion or NiMH/NiCd batteries. These voltages provide supplies to the LCD controller (+5 V \pm 2%) and the gate drives for the transistors in the panel (+15 V and -15 V). Few external capacitors are required, minimizing board space and cost. An efficient, low dropout voltage regulator ensures that the power efficiency is high and provides low noise output.

The ADM8839 consumes less than 5 μ A in shutdown. Power efficiency is maximized on the 5 V output with an oscillator-enabling scheme (Green Idle™). Power sequencing ensures that the -15 V supply powers up before the +15 V. The ADM8839 is fabricated using CMOS technology for minimal power consumption and is packaged in a 20-lead LFCSP (lead frame chip scale package) with a tiny 4 mm \times 4 mm footprint.

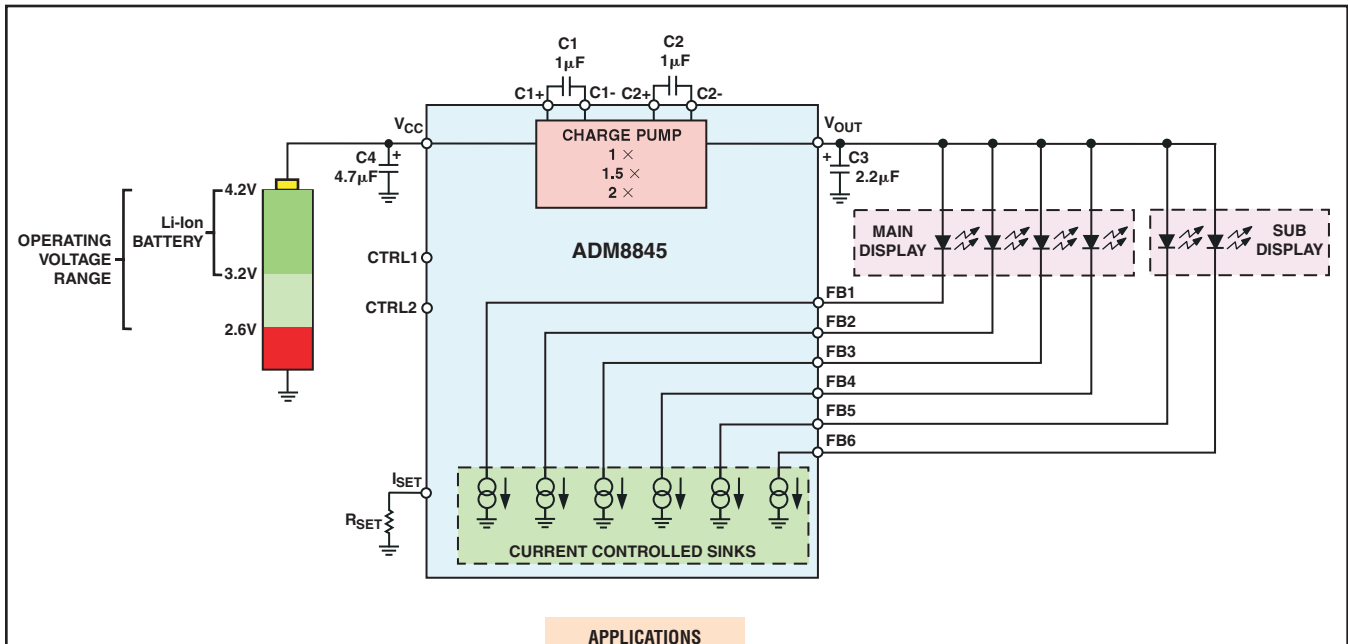


Key Features

- Three output voltages (+5 V \pm 2%, +15 V, -15 V) from one 2.7 V to 4.2 V input supply
- Power efficiency optimized for use with TFT in mobile applications ($P_{\text{EFF}} = 82\%$)
- Low quiescent current
- Low shutdown current: <5 μ A
- Small package footprint: 4 mm \times 4 mm
- Minimal external components

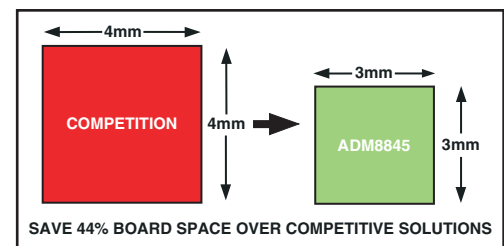
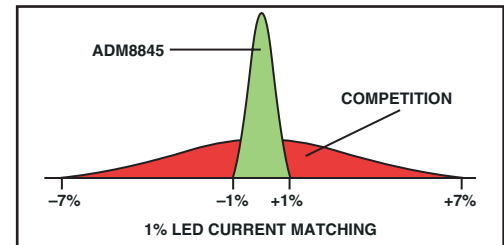
ADM8845 Charge Pump Driver for LCD White LED Backlights

Analog Devices' ADM8845 charge pump regulator drives up to six white LEDs in parallel with industry-leading LED current matching performance (1% max error), combined with a high power efficiency (up to 88%) in a tiny 16-lead LFCSP package (3 mm × 3 mm × 0.9 mm). Two control inputs allow the LEDs to be switched on and off in two independent blocks of four and two LEDs, making the ADM8845 ideal for the latest cellular phones that feature a main display and a secondary display.



APPLICATIONS

- Cellular phones
- Digital cameras
- PDAs



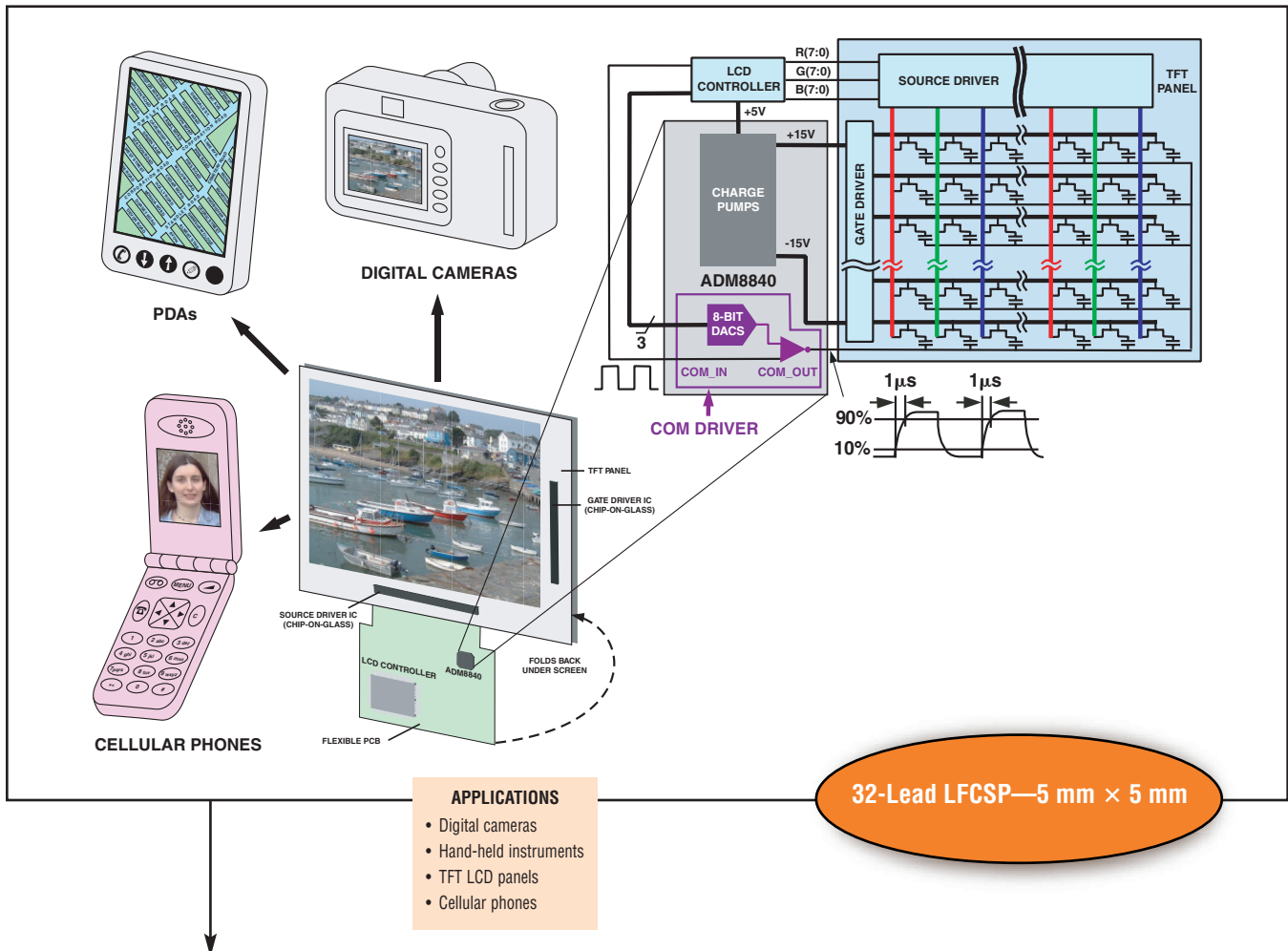
Key Features

- Tiny chip scale package 3 mm × 3 mm × 0.9 mm
- Up to 88% power efficiency
- 1% LED current matching (max)
- Up to 30 mA per LED
- Low shutdown current
- Soft start

ADM8840: Charge Pump Regulator and COM Driver for Microcolor TFT Panel (+5 V \pm 2%, +15 V, -15 V)

The ADM8840 features a common line (COM) driver in a single chip solution for TFT LCDs. The device provides an LCD controller and grayscale DAC supply voltage of 5.0 V \pm 2% and two gate drive voltages of \pm 15 V. The COM driver voltage alternates the polarity of the common line voltage on every line or every frame on the display in order to prevent screen burn occurring over time. The ADM8840 is powered by a single 2.7 V to 3.6 V supply.

The ADM8840 receives the COM clock from the controller with a frequency as high as 10 kHz, and allows programmable conditioning of its amplitude and center voltage through the use of on-board DACs with a 3-wire interface. The ADM8840 is fabricated using COMS technology for minimal power consumption. The part comes in a 32-pin LFCSP package with a 5 mm \times 5 mm footprint.



Key Features

- One chip, integrated COM driver and charge pump
- Programmable COM driver to prevent screen burn
- Three output voltages (+5.0 V \pm 2%, +15.0 V, -15.0 V) from one 2.7 V to 3.6 V input supply
- Power efficiency optimized for use with TFT in mobile applications ($P_{EFF} = 70\%$)
- Low quiescent current
- Low shutdown current ($<5 \mu\text{A}$)
- Small package footprint: 5 mm \times 5 mm
- Minimal number of external components

Visit our website for samples, data sheets, and additional product information.

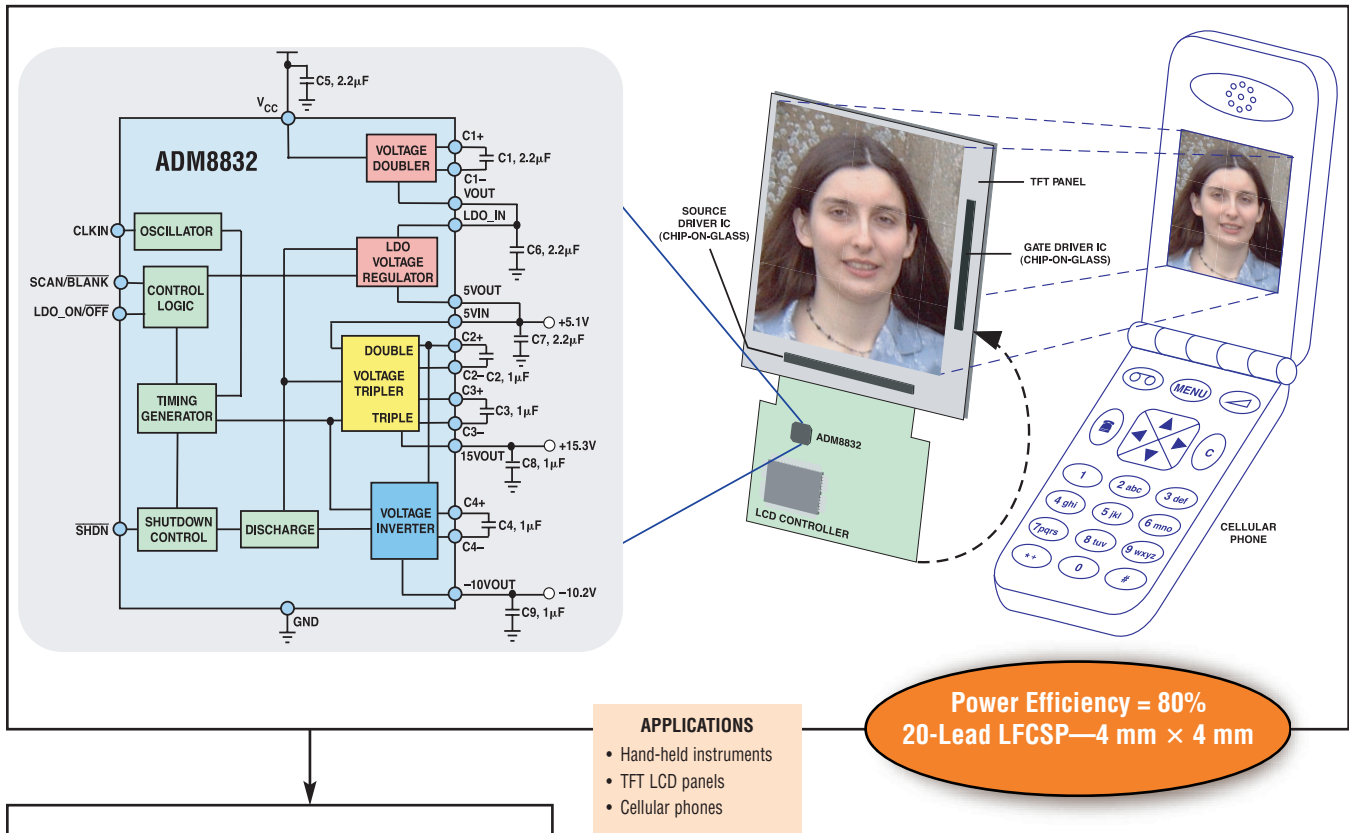
www.analog.com/ChargePump



ADM8832: Charge Pump Regulator for Microcolor TFT Panel (+5.1 V \pm 2%, +15.3 V, -10.2 V)

The ADM8832 is ideal for TFT LCDs. The device generates three output voltages (+5.1 V \pm 2%, +15.3 V, -10.2 V) from a single 2.6 V to 3.6 V supply. These voltages provide supplies to the LCD controller (+5.1 V \pm 2%) and the gate drives for the transistors in the panel (+15.3 V and -10.2 V). Few external capacitors are required, minimizing board space and cost. An efficient low dropout voltage regulator ensures the power efficiency is high and provides a low noise output. A 100 kHz internal oscillator is used to clock the charge pumps during scanning mode when the current is highest. This allows the user to vary the frequency and maximize power efficiency during blanking periods.

The ADM8832 consumes less than 1 μ A in shutdown. Power efficiency is maximized on the 5.1 V output with an oscillator-enabling (Green Idle) scheme. Power sequencing ensures that the -10.2 V supply powers up before the +15.3 V supply. The ADM8832 is fabricated using CMOS technology for minimal power consumption. The part is packaged in a 20-lead LFCSP with a tiny 4 mm \times 4 mm footprint.



Key Features

- Three output voltages (+5.1 V \pm 2%, +15.3 V, -10.2 V) from one 2.6 V to 3.6 V supply
- Power efficiency optimized for use with TFT in mobile applications ($P_{EFF} = 80\%$)
- Low quiescent current
- Low shutdown current (<1 μ A)
- Fast transient response
- Shutdown function
- Power saving during blanking period
- Small package footprint (4 mm \times 4 mm)
- Minimal number of external components



Visit our website for samples, data sheets, and additional product information.

www.analog.com/ChargePump

Charge Pump Selection Table

| Part Number | Input Voltage (V) | Output Voltage(s) (V) | Output Current(s) | Efficiency (%) | Package Type | Page |
|-------------|-------------------|--------------------------------|-------------------------------|----------------|---------------|-------------|
| ADM660 | 1.5 to 7 | $-V_{IN}$ or $2 \times V_{IN}$ | 100 mA | 80 | DIP/SO/TSSOP | See Website |
| ADM8660 | 1.5 to 7 | $-V_{IN}$ | 100 mA | 80 | DIP/SO/TSSOP | See Website |
| ADM8828 | 1.5 to 5.5 | $-V_{IN}$ | 25 mA | 99 | 6-Lead SOT-23 | See Website |
| ADM8829 | 1.5 to 5.5 | $-V_{IN}$ | 25 mA | 99 | 6-Lead SOT-23 | See Website |
| ADM8832 | 2.6 to 3.6 | +5.1/+15.3/-10.2 | 8 mA/100 μ A/-100 μ A | 80 | 20-Lead LFCSP | 5 |
| ADM8839 | 2.7 to 4.2 | +5/+15/-15 | 8 mA/150 μ A/-150 μ A | 82 | 20-Lead LFCSP | 2 |
| ADM8840 | 2.7 to 3.6 | +5/+15/-15 | 5 mA/150 μ A/-150 μ A | 70 | 32-Lead LFCSP | 4 |
| ADM8845 | 2.6 to 5.5 | n/a | 6×30 mA | 88 | 16-Lead CSP | 3 |
| ADP3605 | 3 to 6 | -3 | 120 mA | | SO/TSSOP | See Website |
| ADP3607 | 3 to 5 | +5 | 50 mA | | SO/TSSOP | See Website |
| ADP3610 | 3 to 3.6 | $2 \times V_{IN}$ | 320 mA | | 16-Lead TSSOP | See Website |

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