

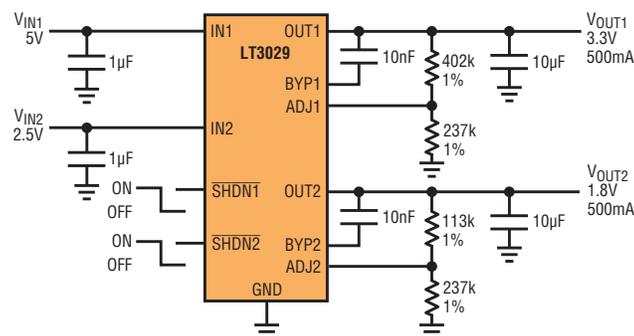
Dual 500mA μ Power LDO Features Independent 1.8V–20V Inputs and Easy Sequencing in a 4mm \times 3mm DFN

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The LT3029 integrates two independent 500mA monolithic LDOs in a tiny 16-lead MSOP or 4mm \times 3mm \times 0.75mm DFN package. Both regulators have a wide 1.8V to 20V input voltage range with a 300mV dropout voltage at full load. The output voltage is adjustable down to the 1.215V reference voltage. With an external bypass capacitor, the output voltage noise is less than $20\mu\text{V}_{\text{RMS}}$. A complete power supply requires only a minimum $3.3\mu\text{F}$ ceramic output capacitor for each channel to be stable.

Quiescent current is $55\mu\text{A}$ per channel, dropping below $1\mu\text{A}$ in shutdown. Reverse-battery protection, reverse-current protection, current limit fold-back and thermal shutdown are all

Figure 1. Completely independent channels have separate input and SHDN pins.



integrated into the package, making it ideal for battery-powered systems.

The LT3029 includes features that simplify the design of multivoltage systems. Its two independent regulators present separate input and shutdown pins. It is also compatible with the LTC2921, LTC2922 and LTC2923 power supply tracking controllers, allowing for easy multirail power supply tracking and sequencing design.

TWO INDEPENDENT REGULATORS

The LT3029's inputs can be used independently or combined. Figure 1 shows an application generating two output voltages from two different input voltages, with independent shutdown control for each channel.

DIFFERENT START-UP SLEW RATES

Start-up time is roughly proportional to the bypass capacitance, regardless of the input and output voltage. The output capacitance and the load characteristics also have no influence on the result. Figure 2 shows the regulator start-up time versus bypass capacitance.

The LT3029 is compatible with LTC292x series of power supply sequencing and tracking controllers. Its ADJ pin should be connected to LTC292x FB pin. By choosing the right resistors, it can track or sequence the power supply. Please refer to the LTC2923 data sheet for details.

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Table 1. Comparison between dual channel LDOs

	V _{IN} RANGE (V)	I _{OUT} (mA)	DROPOUT VOLTAGE @ I _{OUT} (mV)	INDEPENDENT V _{IN}	I _Q /CHANNEL (μA)	DFN PACKAGE SIZE
LT3023	1.8~20	100/100	300/300	N	20	3mm \times 3mm
LT3024	1.8~20	100/500	300/300	N	30	4mm \times 3mm
LT3027	1.8~20	100/100	300/320	Y	25	3mm \times 3mm
LT3028	1.8~20	100/500	300/300	Y	30	5mm \times 3mm
LT3029	1.8~20	500/500	300/300	Y	55	4mm \times 3mm

ULTRALOW VOLTAGE STEP-UP CONVERTER AND POWER MANAGER FOR ENERGY HARVESTING

The LTC3108 is a highly integrated DC/DC converter ideal for harvesting and managing surplus energy from extremely low input voltage sources such as TEG (thermoelectric generators), thermopiles and small solar cells. The step-up topology operates from input voltages as low as 20mV. Using a small step-up transformer, the LTC3108 provides a complete power management solution for wireless sensing and data acquisition.

The 2.2V LDO powers an external micro-processor, while the main output is programmed to one of four fixed voltages to power a wireless transmitter or sensors. The power good indicator signals that the main output voltage is within regulation. A second output can be

enabled by the host. A storage capacitor provides power when the input voltage source is unavailable. Extremely low quiescent current and high efficiency design ensure the fastest possible charge times of the output reservoir capacitor.

POWERFUL SYNCHRONOUS N-CHANNEL MOSFET DRIVER IN A 2MM × 3MM DFN

The LTC4449 is high speed synchronous MOSFET driver designed to maximize efficiency and extend the operating voltage range in a wide variety of DC/DC converter topologies, from buck to boost to buck-boost.

The LTC4449's rail-to-rail driver outputs operate over a range of 4V to 6.5V and can sink up to 4.5A and source up to 3.2A of current, allowing it to easily drive high gate capacitance and/or multiple MOSFETS in parallel for high

current applications. The high side driver can withstand voltages up to 38V.

Adaptive shoot-through protection circuitry is integrated to prevent MOSFET cross-conduction current. With 14ns propagation delays and 4ns to 8ns transition times driving 3nF loads, the LTC4449 minimizes power loss due to switching losses and dead time body diode conduction.

The LTC4449 features a three-state PWM input for power stage control and shutdown that is compatible with all controllers that employ a three-state output feature. The LTC4449 also has a separate supply input for the input logic to match the signal swing of the controller IC. Undervoltage lockout detectors monitor both the driver and logic supplies and disable operation if the voltage is too low. ■

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The MOSFET drivers and control circuits are powered by INTV_{CC}, which by default is powered through an internal low dropout regulator from the main input supply, V_{IN}. If lower power dissipation in the IC is desired, a 5V supply can be connected to EXTV_{CC}. When a supply is detected on EXTV_{CC}, the LTC3855 switches INTV_{CC} over to EXTV_{CC}, with a drop of just 50mV. The strong gate drivers with optimized dead time provide high efficiency. The full load efficiency is 86.7% and the peak efficiency is 89.4% (Figure 4).

The LTC3855 features a RUN and TRACK/SS pin for each channel. RUN enables the output and INTV_{CC}, while TRACK/SS acts as a soft-start or allows the outputs to track an external reference. If a multiphase output is desired, all RUN and TRACK/SS pins are typically tied to one another.

Peak current limiting is used in this application, with the peak sense voltage set by the three-state ILIM pin. A high speed rail-to-rail differential current

sense comparator looks across the current sense element (here the inductor's DC resistance, implied from the associated R-C network). If a short circuit occurs, current limit foldback reduces the peak current to protect the power components. Foldback is disabled during start-up, for predictable tracking.

CONCLUSION

The LTC3855 is ideal for converters using inductor DCR sensing to provide high current outputs. Its temperature compensation and remote output voltage sensing ensure predictable behavior from light load to high current. From inputs up to 38V it can regulate two separate outputs from 0.6V to 12.5V, and can be configured for higher currents by tying its channels together, or by paralleling additional LTC3855 power stages. At low duty cycles, the short minimum on-time ensures constant frequency operation, and peak current limit remains constant even as duty cycle changes. The LTC3855 incorporates these features and more into 6mm × 6mm QFN or 38-lead TSSOP packages. ■

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CONCLUSION

The LT3029 is a dual 500mA/500mA monolithic LDO with a wide input voltage range and low noise. The two channels are fully independent, allowing for flexible power management. It is ideal for battery-powered systems because of its low quiescent current, small package and integration of battery protection features. ■

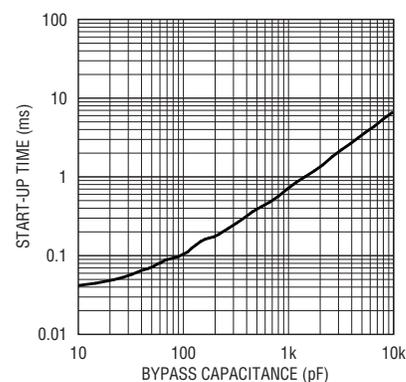


Figure 2. Start-up time vs bypass capacitor value