

Power Management Solutions for Ultra-Low-Power 16-Bit MSP430™ MCUs



2012

TI's MSP430 family of ultra-low-power MCUs consists of several devices featuring different sets of peripherals targeted for various applications. The architecture, combined with several low-power modes is optimized to achieve extended battery life in portable measurement applications. Depending on system constraints such as lowest possible standby current, cost sensitivity or need for smallest solution size, TI offers optimized products to power MSP430 MCU-based systems.

Power Management Solutions Based on Typical System Requirements

Ultra-Low Input Voltage	Simple Solution Long Battery Life	Wide Low-Input Voltage Range	High Efficiency
<p>TPS61221 200-mA Boost Converter Fixed 3.3 Vout</p> <ul style="list-style-type: none"> Input voltage down to 0.7V Low Iq = 5.5µA Up to 95% efficiency 2x2-mm 6-SC70 	<p>TPS78233/30/27 150-mA LDO Fixed Vout</p> <ul style="list-style-type: none"> Fixed 3.3V, 3.0V and 2.7V options for lowest power MSP430 operation Low Iq = 500nA Stable with 1-µF ceramic cap 3x3-mm 5-SOT 	<p>TPS63031 500-mA Buck-Boost DC/DC Converter</p> <ul style="list-style-type: none"> Input voltage range: 1.8V–5.5V Efficiency up to 96% Power-save mode for light load currents 	<p>TPS62237 500-mA DC/DC Converter Fixed 3.3 Vout</p> <ul style="list-style-type: none"> 12-mm² solution size High PSRR (up to 90dB) Power-save mode for light load currents Up to 94% efficiency
Simple Solution Standby Power	System-Level Solution Power Management Unit	Wide-Input Voltage	High-Input Voltage Range
<p>TPS7A1633 100-mA LDO Fixed 3.3 Vout</p> <ul style="list-style-type: none"> Input: 60V (max) Low Iq = 5µA Low dropout: 60mV @ 85°C Bias power for MCU 	<p>TPS65000x Triple Output DC/DC PMU</p> <ul style="list-style-type: none"> Input voltage range: 2.3V–6.0V One 600-mA DC/DC converter Two 300-mA LDOs Spread-spectrum clocking 	<p>TPS62170 500-mA DC/DC Converter Adj. Vout</p> <ul style="list-style-type: none"> 3-V to 17-V input voltage range Fixed 2.25-MHz switching frequency Low Iq = 17µA 45mm² solution size 	<p>TPS54040 500-mA Step-Down DC/DC Converter</p> <ul style="list-style-type: none"> Input voltage range: 3.5V–42V Up to 96% efficiency Fast transient response Low Iq = 116µA

Device	Vin (V)	Iout (mA)	Description	Package
TPS61221	0.7 – 5.5	200	5.5-µA quiescent current, 95% efficiency, boost converter	6-SC70
TPS78233	2.2 – 5.5	150	500-nA quiescent current LDO	SOT23-5, SON-6
TPS63031	1.8 – 5.5	500	Up to 96% efficiency, buck-boost converter	3x3 SON-10
TPS62237	2.05 – 6.0	500	Up to 94% efficiency, 3-MHz step-down converter	1x1.5x0.6 SON-6
TPS7A1633	3.0 – 60	100	Low quiescent current LDO for MCU standby	3x5 MSOP
TPS65000x	2.3 – 6.0	600/300/300	Triple output PMU, 2.25-MHz converter with dual LDOs	3x3 QFN
TPS62170	3.0 – 17	500	Up to 95% efficiency, 2.25-MHz step-down converter	2x2 WSON
TPS54040	3.5 – 42	500	Adjustable switching 100kHz to 25MHz	MSOP

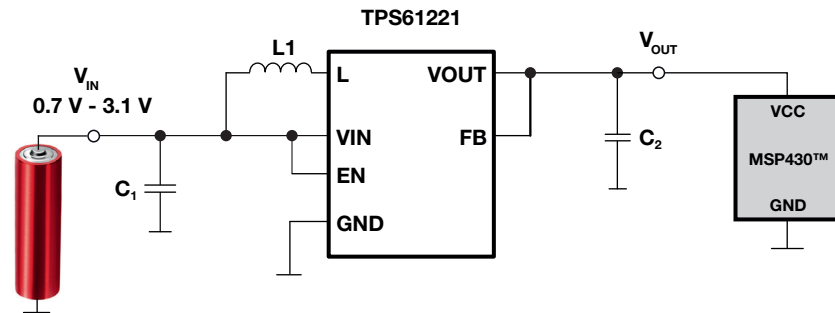
For samples, evaluation boards and reference designs, please check power.ti.com, www.ti.com/processorpower and www.ti.com/pmu

Ultra-Low Input Voltage: TPS6122x

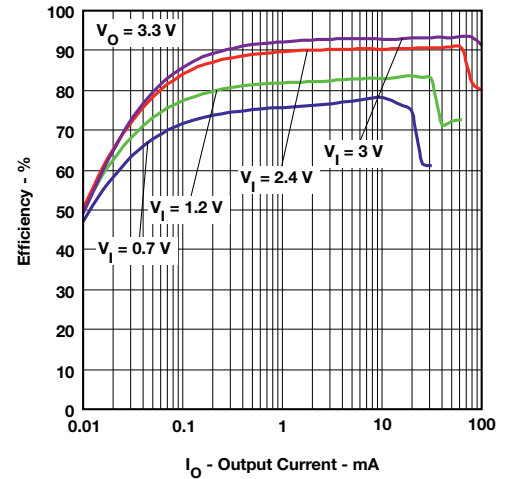
The TPS6122x devices are ideal for powering MCUs operating from batteries including 1- to 3- cell alkaline, NiCd or NiMH. The startup into a load at 0.7-V input voltage, along with overall high efficiency, enables extended use of the battery charge and increases the application run-time.

Overall power consumption can be reduced further by using the pass-through function, setting the DC/DC converter into disable mode while keeping the RTC of the MCU connected to the battery.

EVM available: TPS61220EVM-319
Sample (3.3-V version): TPS61221



The fixed 3.3-V device TPS61221 supports input voltages down to 0.7-V.

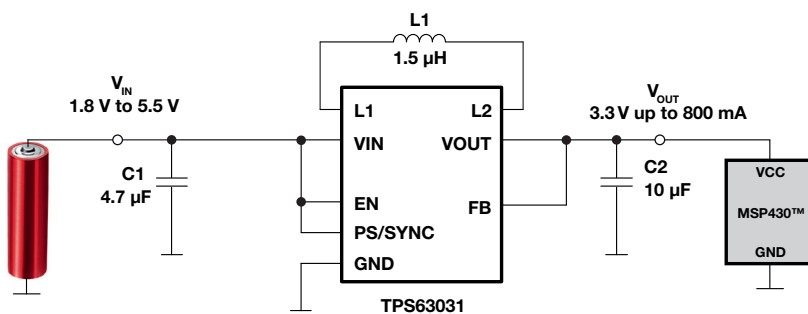


Efficiency versus output current and input voltage.

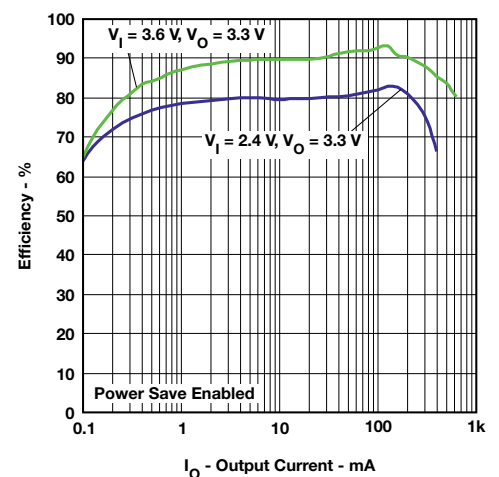
Wide-Input Voltage Range: TPS6303x

The TPS6303x device family contains fully integrated buck-boost regulators that enable simple design, with no external controls required to maintain a regulated output voltage over the input voltage range (1.8-V to 5.5-V). Portable devices can operate longer, making use of the entire battery charge, with high efficiency over the entire load range.

EVM available: TPS63030EVM-417
Samples (3.3-V version): TPS63031



Wide input voltage range enables longer application run-time.



The TPS6031's high efficiency extends available battery charge.

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