

ABRIDGED DATA SHEET

EVALUATION KIT AVAILABLE

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MAX20014

2.2MHz Sync Boost and Dual Step-Down Converters

General Description

The MAX20014 is a high-efficiency three-output low-voltage DC-DC converter. OUT1 boosts the input supply up to 8.5V at up to 750mA, while two synchronous step-down converters operate from a 3.0V to 5.5V input voltage range and provides a 0.8V to 3.8V output voltage range at up to 3A. The boost converter achieves $\pm 2\%$ and the buck converters achieve $\pm 1.5\%$ output error over load, line, and temperature range.

The device features a 2.2MHz fixed-frequency pulse-width modulation (PWM) mode for better noise immunity and load transient response, and a pulse-frequency modulation mode (skip) for increased efficiency during light-load operation. The 2.2MHz frequency operation allows for the use of all-ceramic capacitors and minimizes external components footprint. The programmable spread-spectrum frequency modulation minimizes radiated electromagnetic emissions. Integrated low $R_{DS(ON)}$ switches improve efficiency at heavy loads and make the layout a much simpler task with respect to discrete solutions.

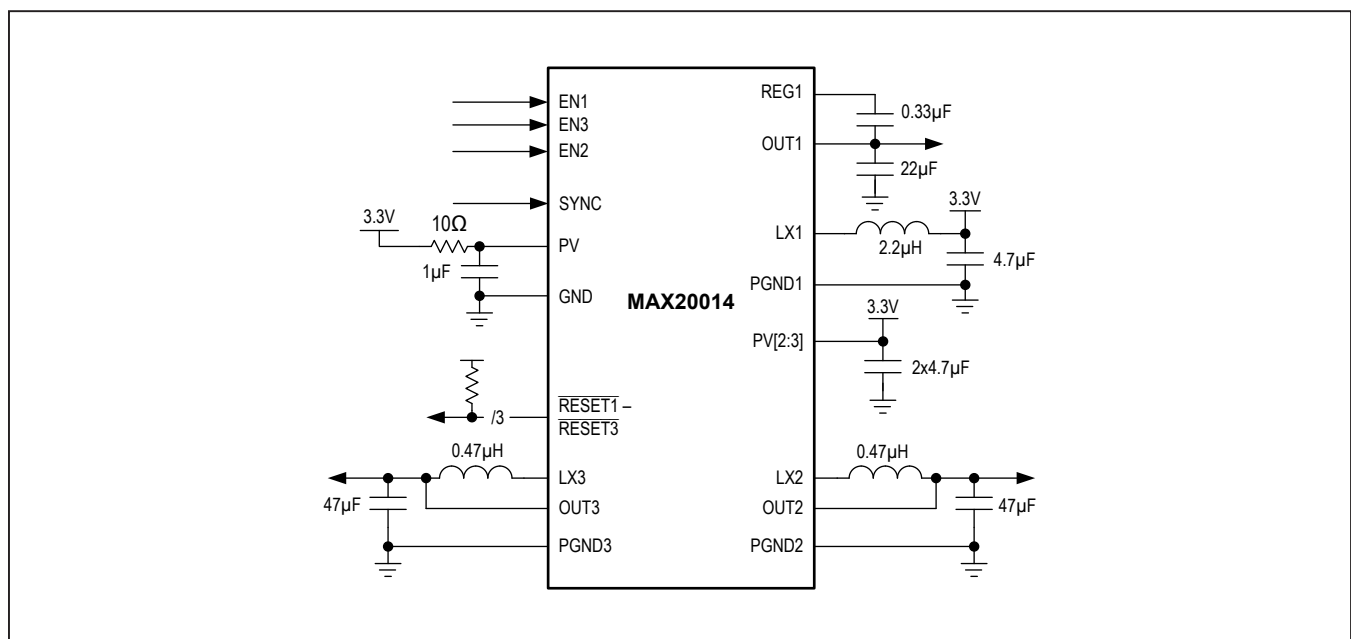
The device is offered with factory-preset output voltages or resistor-adjustable output voltages. Other features include soft-start, overcurrent, and overtemperature protections.

Benefits and Features

- Multiple Functions for Small Size
 - Synchronous 750mA Boost Converter
 - Fixed from 3.8V to 8.5V in 100mV Steps
 - Dual Synchronous Buck Converters Up to 3A
 - Factory-Configurable Output Voltages from 0.8V to 3.8V in 25mV Steps
 - Resistor Adjustable
 - 3.0V to 5.5V Operating Supply Voltage
 - 2.2MHz Operation
 - Undervoltage Threshold of $93\% \pm 3\%$
 - Overvoltage Threshold of $107\% \pm 3\%$
 - Individual RESET_ Outputs
- High-Precision
 - $\pm 1.5\%$ Output-Voltage Accuracy
 - Good Load Transient Performance for Buck Converters
- Robust for the Automotive Environment
 - Current Mode, Forced-PWM, and Skip Operation
 - Overtemperature and Short-Circuit Protection
 - 4mm x 4mm 24-Pin TQFN
 - -40°C to $+125^{\circ}\text{C}$ Automotive Temperature Range

Ordering Information/Selector Guide appears at end of data sheet.

Typical Operating Circuit



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PCB Layout Guidelines

For each converter, place the capacitor with the highest current ripple closest to the IC. For a buck converter, this is the input capacitor; for the boost converter, it is the output capacitor. Route the LX trace out from the IC underneath that capacitor (use a larger-package capacitor, such as 3.2mm x 1.6mm). Lastly, place the other capacitors close by with their ground pins very close to both the IC's ground pins and the other capacitor's ground pins. This configuration results in a closely-routed DC/DC converter that helps maintain performance and reduces EMI.

The layer directly below the IC and power components should be a continuous ground plane. Use multiple vias to provide good connections between that plane and component ground pins/pads. Split grounding should not be used.

The exposed pad (EP) of the IC is attached to the die with epoxy, providing a good way to dissipate thermal energy from the die. Connect the EP to all available ground planes below it using a grid of small vias in the EP land (3x3 grid of 0.3mm diameter vias is recommended).

Ordering Information/Selector Guide

PART NUMBER	TEMPERATURE RANGE	PIN-PACKAGE	V _{OUT1} (V)	V _{OUT2} (V)	I _{OUT2} (A)	V _{OUT3} (V)	I _{OUT3} (A)	t _{HOLD} (ms)	SS
MAX20014ATGA/V+	-40°C to +125°C	24 TQFN-EP*	5.0	ADJ	3	ADJ	3	7.4	Off
MAX20014ATGB/V+**	-40°C to +125°C	24 TQFN-EP*	6.5	ADJ	3	ADJ	3	7.4	Off
MAX20014ATGC/V+**	-40°C to +125°C	24 TQFN-EP*	5.0	1.2	3	1.8	3	7.4	Off
MAX20014ATGD/V+**	-40°C to +125°C	24 TQFN-EP*	7.5	ADJ	2	ADJ	1	7.4	On
MAX20014ATGE/V+**	-40°C to +125°C	24 TQFN-EP*	5.0	1.4	3	1.5	3	7.4	On
MAX20014ATGF/V+	-40°C to +125°C	24 TQFN-EP*	5.0	ADJ	3	ADJ	3	7.4	On

For variants with different options, contact factory.

/V denotes an automotive qualified part.

+Denotes a lead(Pb)-free/RoHS-compliant package.

*EP = Exposed pad.

**Future product—contact factory for availability.

Package Information

For the latest package outline information and land patterns (footprints), go to www.maximintegrated.com/packages. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
24 TQFN-EP*	T2444+4C	21-0139	90-0022