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MAX20098

Versatile Automotive 36V 2.2MHz Buck Controller with 3.5 μ A I_Q

General Description

The MAX20098 is an automotive 2.2MHz synchronous step-down controller IC with 3.5 μ A I_Q. This IC operates with an input-voltage supply from 3.5V to 42V and can operate in dropout condition by running at 99% (typ) duty cycle. It is intended for applications with mid- to high-power requirements that operate at a wide input voltage range such as during automotive cold-crank or engine stop-start conditions.

The step-down controller operates at up to 2.2MHz frequency to allow small external components, reduced output ripple, and to guarantee no AM band interference. The switching frequency is resistor adjustable (220kHz to 2.2MHz). FSYNC input programmability enables three frequency modes for optimized performance: forced fixed-frequency operation, skip mode with ultra-low quiescent current, and synchronization to an external clock. The IC also provides a SYNC output to enable two controllers to operate in parallel. The IC has a factory-programmable spread-spectrum option for frequency modulation to minimize EMI interference.

The PGOOD output indicates when the voltage is within regulation range. Protection features include cycle-by-cycle current limit and thermal shutdown. The MAX20098 is specified for operation over the -40°C to +125°C automotive temperature range.

Applications

- Infotainment Systems
- USB Hub
- General-Purpose Point-of-Load (POL)

Benefits and Features

- Meets Stringent Automotive OEM Module Power Consumption and Performance Specifications
 - 3.5 μ A Quiescent Current in Skip Mode at V_{OUT} = 3.3V
 - \pm 1% Output-Voltage Accuracy: 5.0V/3.3V Fixed, or Adjustable Between 1V and 10V
- Enables Crank-Ready Designs
 - Wide Input Supply Range from 3.5V to 42V
- EMI Reduction Features Reduce Interference with Sensitive Radio Bands without Sacrificing Wide Input Voltage Range
 - 50ns (typ) Minimum On-Time Allows Skip-Free Operation for 3.3V Output from Car Battery at 2.2MHz
 - Spread-Spectrum Option
 - Frequency-Synchronization Input
 - Resistor-Programmable Frequency Between 220kHz and 2.2MHz
- Integration and Thermally Enhanced Packages Save Board Space and Cost
 - 2MHz Step-Down Controller
 - Current-Mode Controller with Forced-Continuous and Skip Modes
 - 16-Pin Side-Wettable (SW) TQFN-EP Package
 - 20A Reference Design Available
- Protection Features Improve System Reliability
 - Supply Undervoltage Lockout
 - Overtemperature and Short-Circuit Protection
 - Output Overvoltage and Undervoltage Monitoring
 - -40°C to +125°C Grade 1 Automotive Temperature Range

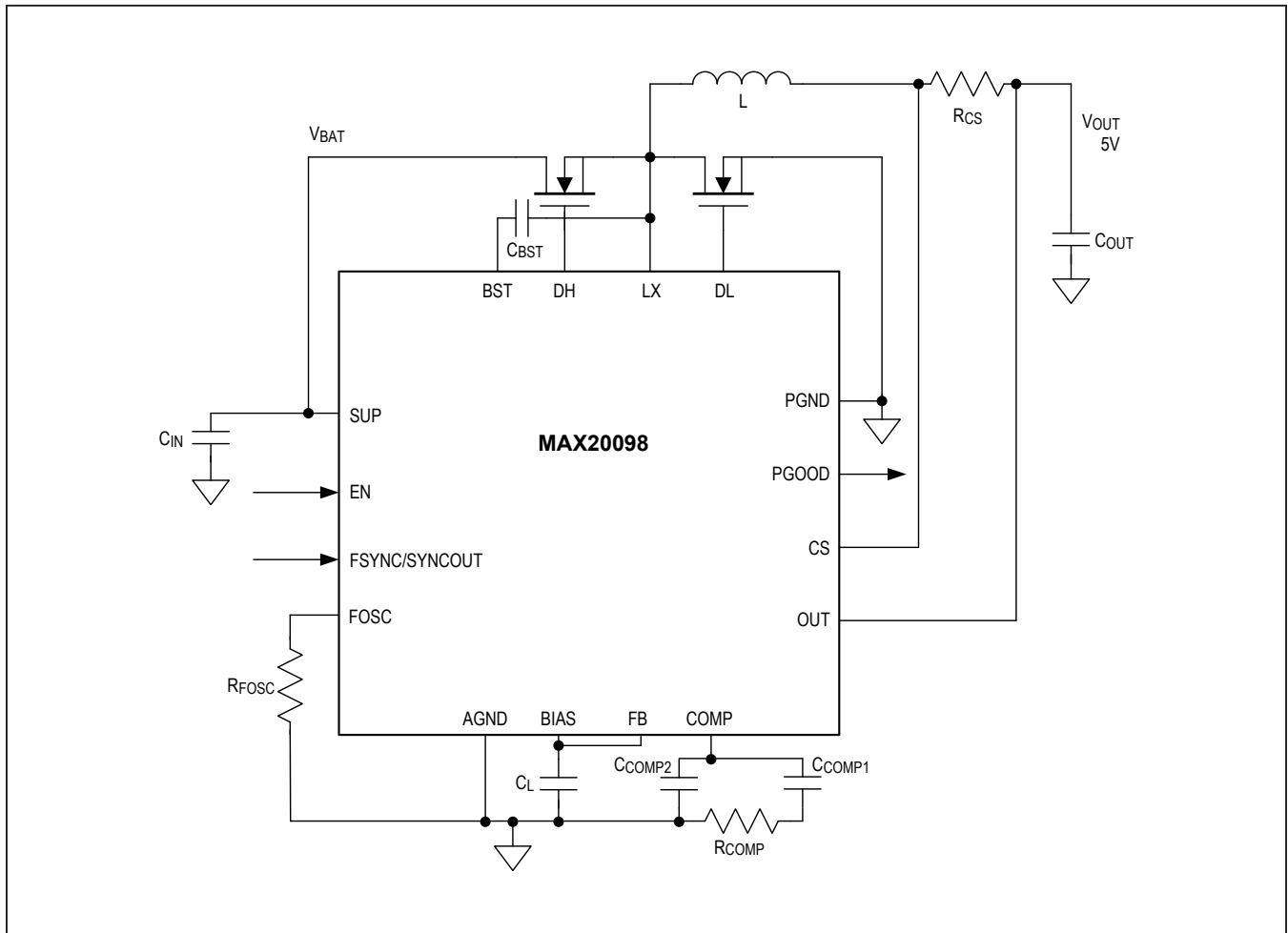
Ordering Information appears at end of data sheet.

ABRIDGED DATA SHEET

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Versatile Automotive 36V 2.2MHz
Buck Controller with 3.5 μ A I_Q

Typical Application Circuit



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Ordering Information

PART	PIN-PACKAGE	V _{OUT}		SPREAD SPECTRUM	SWITCH-OVER IN FPWM	SWITCH-OVER IN SKIP	SYNC/ SYNCOUT
		ADJUSTABLE	FIXED				
MAX20098ATEA/VY+	16 SW TQFN-EP*	1V to 10V	5V	Off	On	On	SYNC
MAX20098ATEB/VY+	16 SW TQFN-EP*	1V to 10V	3.3V	Off	On	On	SYNC
MAX20098ATEC/VY+	16 SW TQFN-EP*	1V to 10V	5V	On	On	On	SYNC
MAX20098ATED/VY+	16 SW TQFN-EP*	1V to 10V	3.3V	On	On	On	SYNC
MAX20098ATEE/VY+	16 SW TQFN-EP*	1V to 10V	3.3V	Off	Off	On	SYNC
MAX20098ATEF/VY+	16 SW TQFN-EP*	1V to 10V	3.3V	On	Off	On	SYNC
MAX20098ATEG/VY+	16 SW TQFN-EP*	1V to 10V	3.3V	On	Off	Off	SYNC

Note: All parts operate over the -40°C to +125°C automotive temperature range.

/V denotes an automotive qualified part.

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

SW = Side-wettable TQFN package.

*EP = Exposed pad.

Chip Information

PROCESS: BiCMOS