

TPS54240 3.5-V to 42-V Step-Down DC - DC Converter With Eco-Mode™

1 Features

- 3.5-V to 42-V Input Voltage Range
- 200-mΩ High-Side MOSFET
- High Efficiency at Light Loads With a Pulse Skipping Eco-Mode™
- 138-μA Operating Quiescent Current
- 1.3-μA Shutdown Current
- 100-kHz to 2.5-MHz Switching Frequency
- Synchronizes to External Clock
- Adjustable Slow Start and Sequencing
- UV and OV Power Good Output
- Adjustable UVLO Voltage and Hysteresis
- 0.8-V Internal Voltage Reference
- 10-Pin HVSSOP and 10-Pin 3-mm x 3-mm VSON Packages with PowerPAD™
- Supported by WEBENCH® Software Tool

2 Applications

- 12-V and 24-V Industrial and Commercial Low-Power Systems
- GSM, GPRS Modules in Fleet Management, eMeters, and Security Systems

3 Description

The TPS54240 device is a 42-V, 2.5-A, step-down regulator with an integrated high-side MOSFET. Current mode control provides simple external compensation and flexible component selection. A low-ripple, pulse skip mode reduces the no load, regulated output supply current to 138 μA. Using the enable pin, shutdown supply current is reduced to 1.3 μA, when the enable pin is low.

Undervoltage lockout is internally set at 2.5 V, but it can be increased using the enable pin. The output voltage startup ramp is controlled by the slow-start pin that can also be configured for sequencing and tracking. An open-drain power good signal indicates the output is within 94% to 107% of its nominal voltage.

A wide switching frequency range allows efficiency and optimization of external component size. Frequency foldback and thermal shutdown protects the part during an overload condition.

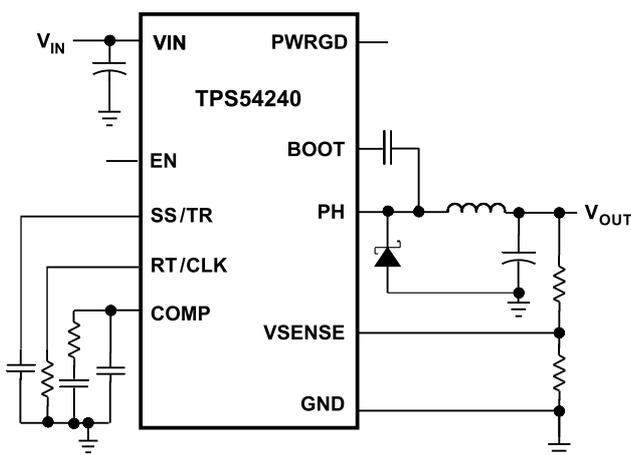
The TPS54240 is available in 10-pin, thermally-enhanced HVSSOP and 10-pin 3-mm x 3-mm PowerPAD package.

Device Information⁽¹⁾

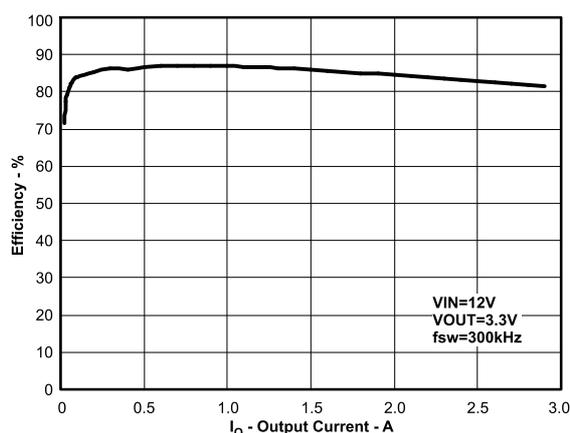
PART NUMBER	PACKAGE	BODY SIZE (NOM)
TPS54240	HVSSOP (10)	3.00 mm x 3.00 mm
	VSON (10)	

(1) For all available packages, see the orderable addendum at the end of the datasheet.

Simplified Schematic

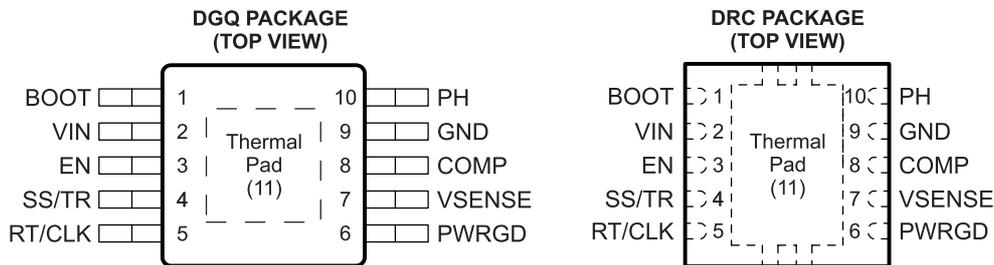


Efficiency vs Load Current



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5 Pin Configuration and Functions



Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
BOOT	1	O	A bootstrap capacitor is required between BOOT and PH. If the voltage on this capacitor is below the minimum required by the output device, the output is forced to switch off until the capacitor is refreshed.
COMP	8	O	Error amplifier output, and input to the output switch current comparator. Connect frequency compensation components to this pin.
EN	3	I	Enable pin, internal pullup current source. Pull below 1.2 V to disable. Float to enable. Adjust the input undervoltage lockout with two resistors.
GND	9	–	Ground
PH	10	I	The source of the internal high-side power MOSFET.
POWERPAD	11	–	GND pin must be electrically connected to the exposed pad on the printed circuit board for proper operation.
PWRGD	6	O	An open-drain output, asserts low if output voltage is low due to thermal shutdown, dropout, overvoltage or EN shut down.
RT/CLK	5	I	Resistor Timing and External Clock. An internal amplifier holds this pin at a fixed voltage when using an external resistor to ground to set the switching frequency. If the pin is pulled above the PLL upper threshold, a mode change occurs and the pin becomes a synchronization input. The internal amplifier is disabled and the pin is a high impedance clock input to the internal PLL. If clocking edges stop, the internal amplifier is re-enabled and the mode returns to a resistor set function.
SS/TR	4	I	Slow-Start and Tracking. An external capacitor connected to this pin sets the output rise time. Since the voltage on this pin overrides the internal reference, it can be used for tracking and sequencing.
VIN	2	I	Input supply voltage, 3.5 V to 42 V.
VSENSE	7	I	Inverting node of the transconductance (gm) error amplifier.