EV3426-L-00A

6A, 35V Boost Converter with Programmable Switching Frequency and UVLO Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The MP3426 is a current-mode step-up converter with a 6A, 90mΩ internal switch that provides a highly efficient regulator with a fast response. The MP3426 features a programmable frequency of up to 2MHz that allows for easy filtering and reduces noise. An external compensation pin gives the user flexibility in setting loop dynamics, and uses small, low-ESR, ceramic output capacitors. Soft-start results in a small inrush current and can be programmed with an external capacitor. The MP3426 operates from an input voltage as low as 3.2V and can generate up to a 35V output.

The MP3426's features include under-voltage lockout, current limiting, and thermal overload protection. The MP3426 is available in a low profile 14-pin 3mm×4mm QFN package with an exposed pad.

FEATURES

- 6A, 90mΩ, 45V Power MOSFET
- Uses Very Small Capacitors and Inductors
- Wide Input Range: 3.2V to 22V
- Output Voltage as High as 35V
- Programmable f_{SW}: 300kHz to 2MHz
- Programmable UVLO, Soft-Start, UVLO Hysteresis
- Micropower Shutdown <1µA
- Thermal Shutdown 160°C
- Available in 14-Pin 3mm×4mm QFN Package

APPLICATIONS

- Telecom—Power Supplies
- Audio—Microphone and Tuner Bias
- Automotive

ELECTRICAL SPECIFICATIONS

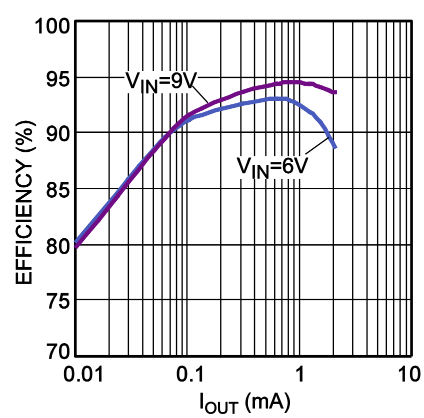
Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	6-9	V
Output Voltage	V_{OUT}	12	V
Output Current	I_{OUT}	2	A

EV3426-L-00A EVALUATION BOARD

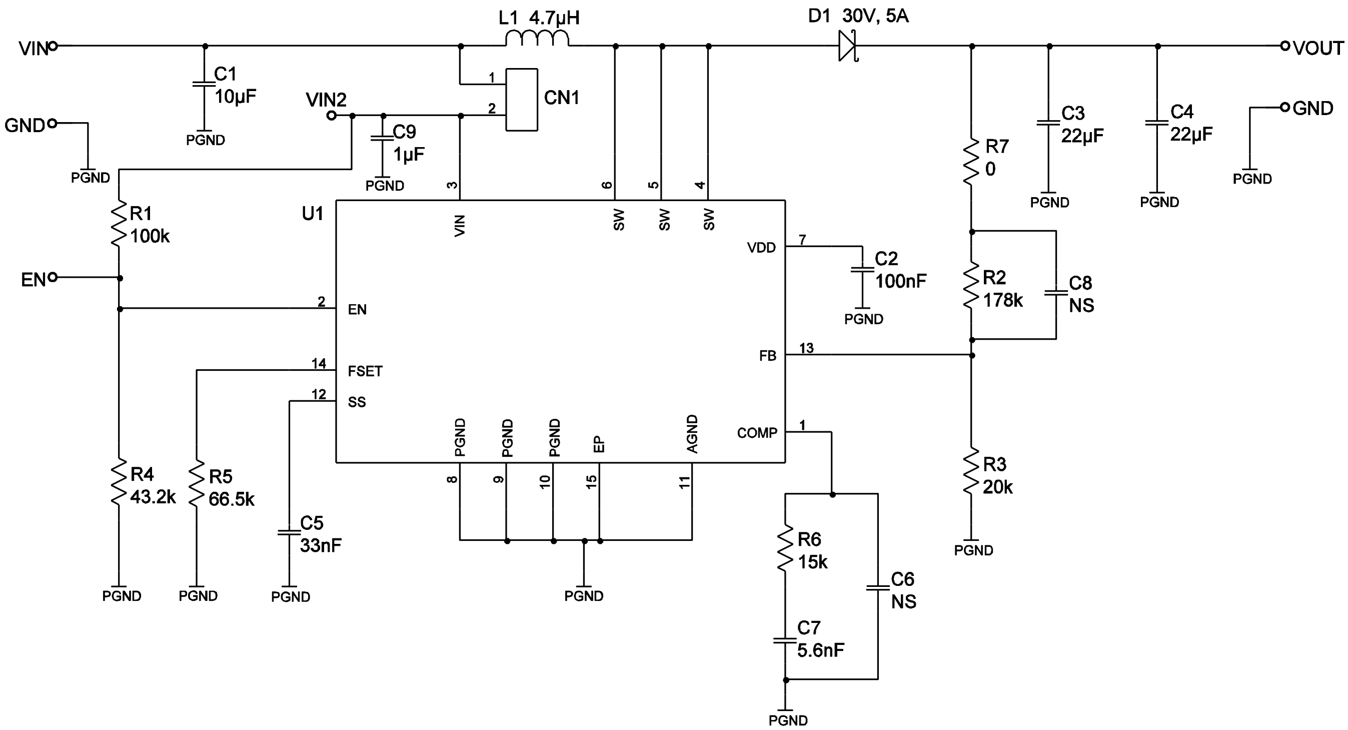
(L x W x H) 2.5" x 2.5" x 0.4"
(6.35cm x 6.35cm x 1.0cm)

Board Number	IC Number
EV3426-L-00A	MP3426DL

Efficiency



EVALUATION BOARD SCHEMATIC



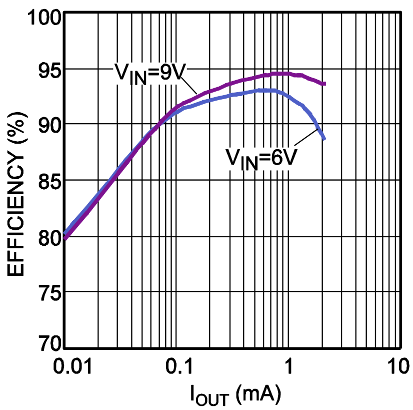
EV3426-L-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	R1	100k	Film Res,5%	0603	ROYAL	RL0603FR-07100KL
1	R2	178k	Film Res,1%	0603	ROYAL	RL0603FR-07178KL
1	R3	20k	Film Res,1%	0603	ROYAL	RL0603FR-0720KL
1	R4	43.2k	Film Res,5%	0603	ROYAL	RC0603FR-0743K2L
1	R5	66.5k	Film Res,1%	0603	ROYAL	RC0603FR-0766K5L
1	R6	15k	Film Res,5%	0603	ROYAL	RL0603FR-0715KL
1	R7	0	Film Res,5%	0603	ROYAL	RC0603FR-070RL
1	C1	10µF	Ceramic Cap,25V,X7R	1210	muRata	GRM32DR71E106KA12L
1	C2	0.1µF	Ceramic Cap,16V,X7R	0805	muRata	GRM219R71C104KA01D
2	C3,C4	22µF	Ceramic Cap,25V,X7R	1210	muRata	GRM32ER71E226KE15L
1	C5	33nF	Ceramic Cap,50V,X7R	0603	TDK	C1608X7R1H333K
1	C6,C8	NC				
1	C7	5.6nF	Ceramic Cap,50V,X7R	0603	muRata	GRM188R71H562KA01D
1	C9	1.0µF	Ceramic Cap,25V,X5R	0805	muRata	GRM216R61E105KA12D
1	L1	4.7µH	IR=15.5A, Isat=17A, Rdc=6.35mOhm		Wurth	744 332 047 0
1	D1	SS5P3	Schottky diode 30V 5A	TO-277A	Vishay	SS5P3
1	U1	MP3426	Boost converter	QFN	MPS	MP3426

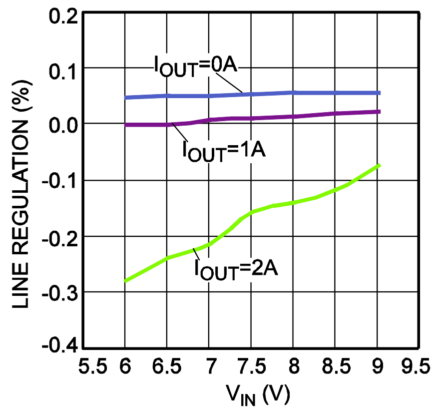
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

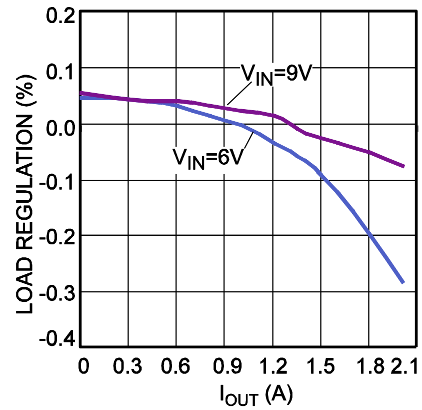
Efficiency



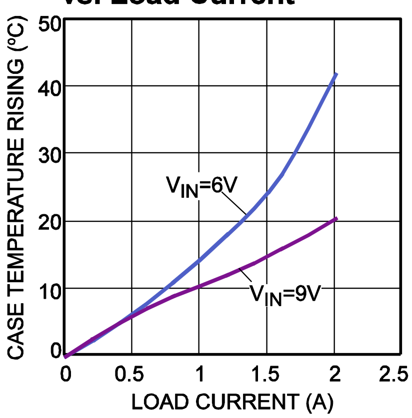
Line Regulation



Load Regulation



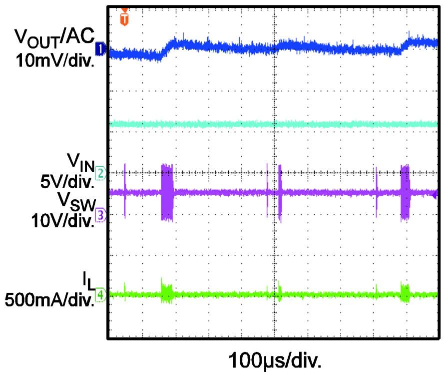
Case Temperature Rising vs. Load Current



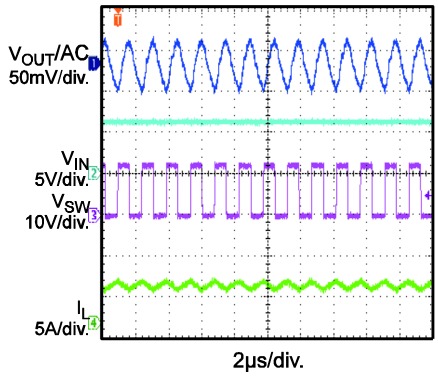
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

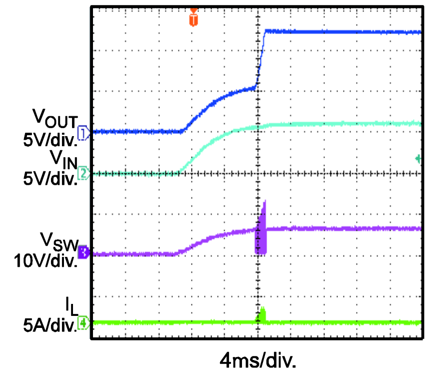
Steady State
V_{IN} = 6V, V_{OUT} = 12V/0A



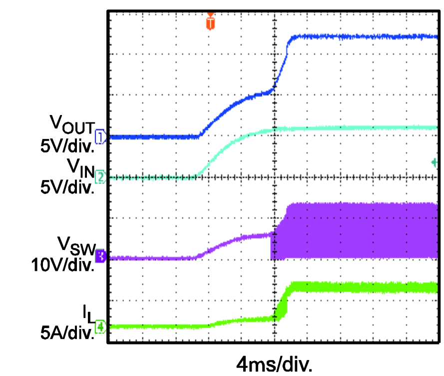
Steady State
V_{IN} = 6V, V_{OUT} = 12V/2A



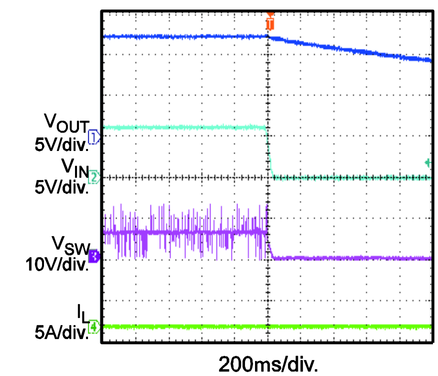
V_{IN} Start Up
V_{IN} = 6V, V_{OUT} = 12V/0A



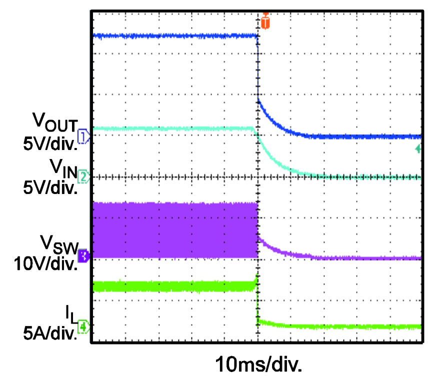
V_{IN} Start Up
V_{IN} = 6V, V_{OUT} = 12V/2A



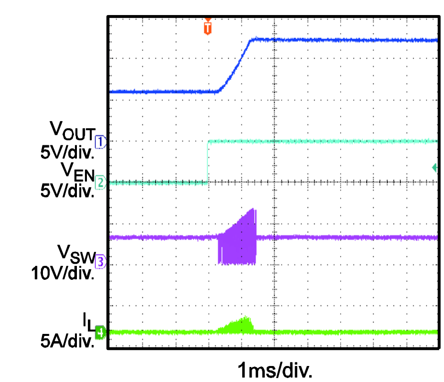
V_{IN} Shutdown
V_{IN} = 6V, V_{OUT} = 12V/0A



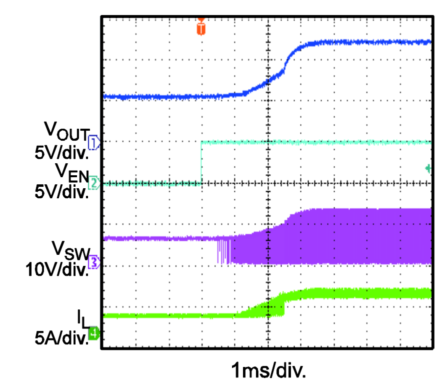
V_{IN} Shutdown
V_{IN} = 6V, V_{OUT} = 12V/2A



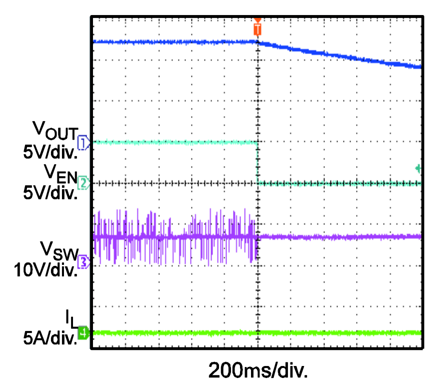
EN Startup
V_{IN} = 6V, V_{OUT} = 12V/0A



EN Startup
V_{IN} = 6V, V_{OUT} = 12V/2A



EN Shutdown
V_{IN} = 6V, V_{OUT} = 12V/0A

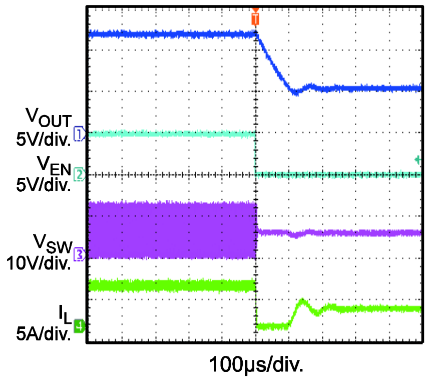


EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.

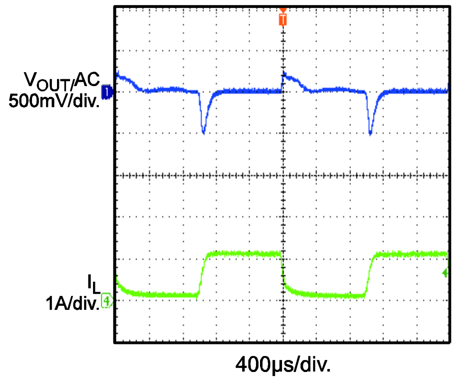
EN Shutdown

V_{IN} = 6V, V_{OUT} = 12V/2A



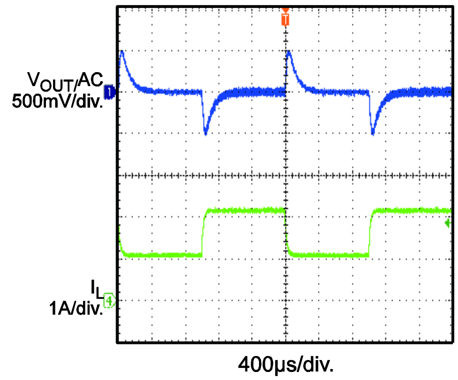
Load Transient

V_{IN} = 6V, V_{OUT} = 12V,
I_{OUT} = 0 to 1A, I_{RAMP} = 10mA/µs



Load Transient

V_{IN} = 6V, V_{OUT} = 12V,
I_{OUT} = 1 to 2A, I_{RAMP} = 10mA/µs



PRINTED CIRCUIT BOARD LAYOUT

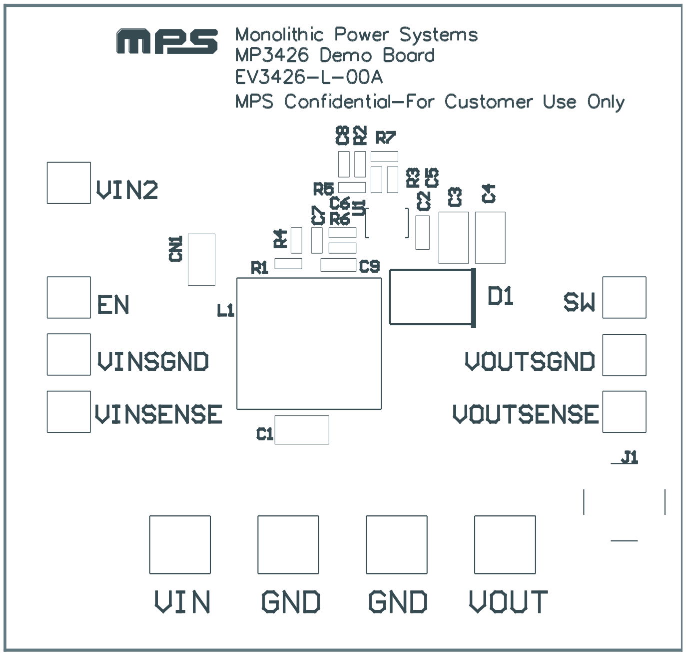


Figure 1—Top Silk Layer

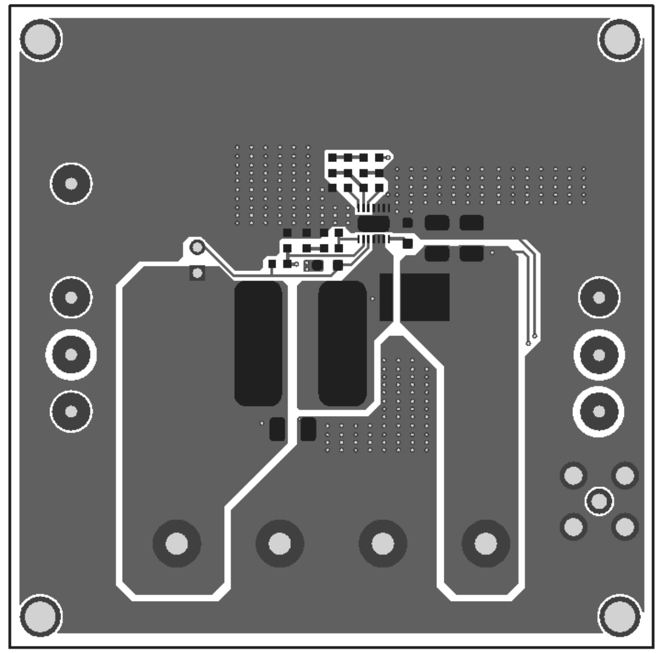


Figure 2—Bottom Layer

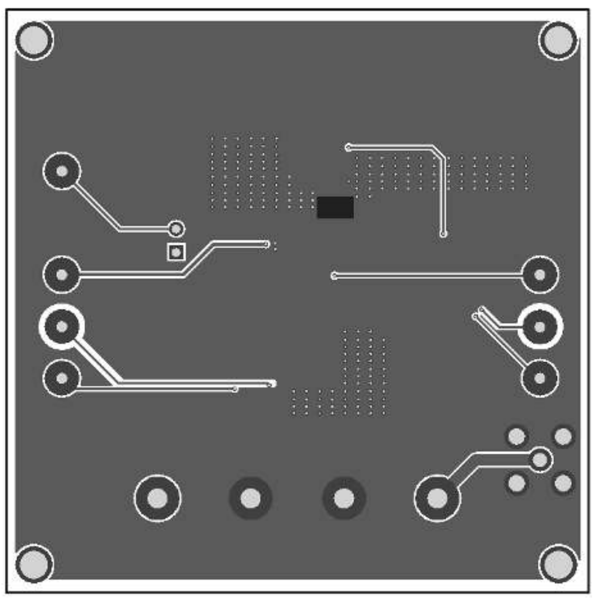


Figure 3—Bottom Layer

QUICK START GUIDE

The output voltage of this board is set to 12V. The frequency is set to 600kHz. The board layout accommodates most commonly used inductors and output capacitors.

1. Preset the power supply to 6V ≤ VIN ≤ 9V.
2. Turn the power supply off.
3. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
4. Connect the load to:
   a. Positive (+): VOUT
   b. Negative (-): GND
5. Make sure the CN1 jumper is installed
6. Turn the power supply on after making the connections.
7. The MP3426 is enabled on the evaluation board once VIN is applied.
8. The output voltage VOUT can be changed by varying R2. Calculate the new value using the formula: $R2 = (\frac{V_{OUT}}{V_{FB}} - 1) \times R3$

   Where VFB = 1.225V and R3=20kΩ
9. The frequency can be changed by adjusting R5. The formula is: $F_{SET} = 23 \times (R5^{-0.86})$

   Where FSET is in MHz and R5 is in kΩ