EV3416-J-00A

1.1A Switching Current Low Iq, step-up converter Output Disconnect Evaluation Board

DESCRIPTION

EV3416-J-00A evaluation board is designed to demonstrate the capability of MP3416. The MP3416 is a 1.1A switching current, low quiescent current, step-up converter with output disconnect.

The MP3416 works in peak current control mode, providing good transient response. The integrated P-channel synchronous rectifier improves efficiency and eliminates the need for an external schottky diode.

The device enters pulse skip mode to save power loss in light load condition. When the part shuts down, the output is disconnected from input, allowing the part to draw less than 0.65μA in shutdown mode. The MP3416 is available in a small 8-pin TSOT23 package.

Electrical Specification

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	0.86-5.5	V
Startup Voltage	V_{START}	1.25-5.5	V
Output Voltage	V_{OUT}	3.3	V

FEATURES

- Input voltage range: 0.86V to 5.5V
- Startup voltage range:1.25V to 5.5V
- Output voltage range: 1.8V to 5.5V
- 9.5μA quiescent current
- < 650nA shutdown current
- Up to 80% efficiency at 100μA-200μA light load condition
- Output disconnect in shutdown
- Down mode when $V_{IN} > V_{OUT}$
- Adjustable low battery detection
- Internal synchronous rectifier
- Over-temperature protection with thermal shutdown at 155ºC
- TSOT23-8 Package

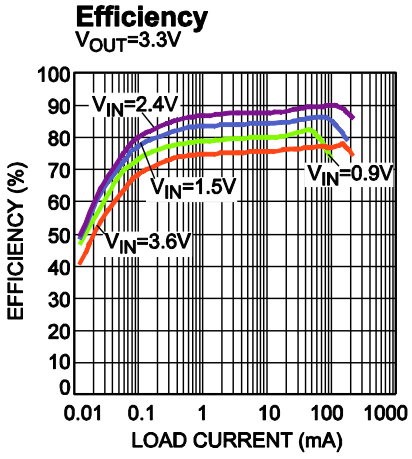
APPLICATIONS

- Medical Devices
- Digital Retail Displays
- Gaming Controllers
- Remote Controls
- Battery-Powered Products
- Handheld Computers and Smart phones

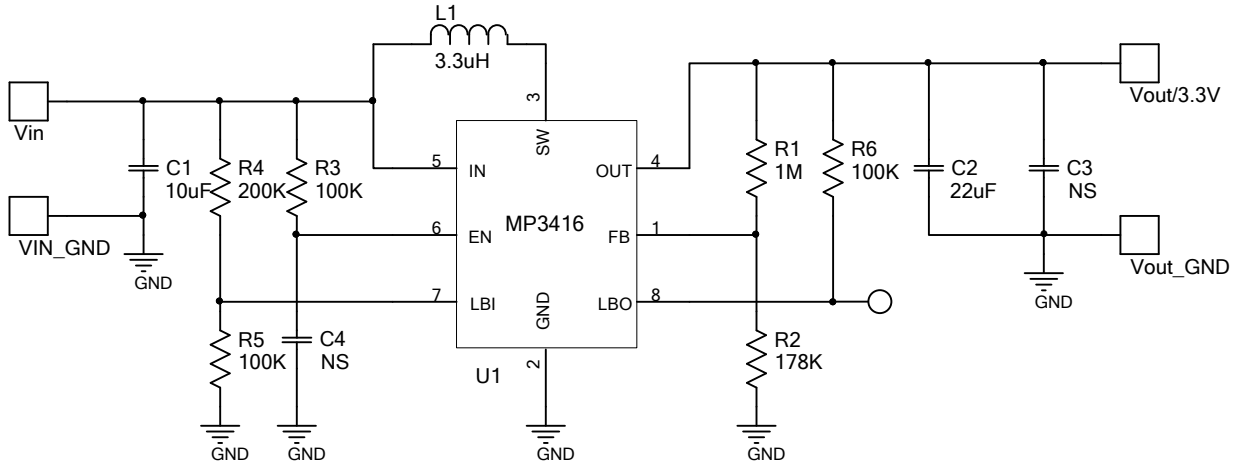
EV3416-J-00A EVALUATION BOARD

(L x W x H) 6.35cm x 6.35cm x XXX cm

Board Number	MPS IC Number
EV3416-J-00A	MP3416GJ



EVALUATION BOARD SCHEMATIC



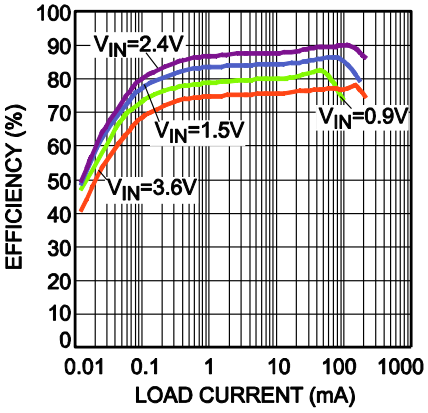
EV3416-J-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	10μF	10V, Ceramic Capacitor	0805	muRata	GRM219R61A106KE44D
1	C2	22μF	6.3V, Ceramic Capacitor	0805	muRata	GRM21BR60J226ME39L
2	C3,C4	NS				
1	L1	3.3μH	I_{SAT}=1.8A, RDC=65mΩ		Wurth	744042003
1	R1	1M	Film resistor, 1%	0603	Yageo	RC0603FR-071ML
1	R2	178k	Film resistor, 1%	0603	Yageo	RC0603FR-07178KL
3	R3, R5, R6	100k	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
1	R4	200k	Film resistor, 1%	0603	Yageo	RC0603FR-07200KL
1	U1	MP3416	Boost Converter	TSOT23-8	MPS	MP3416GJ-Z

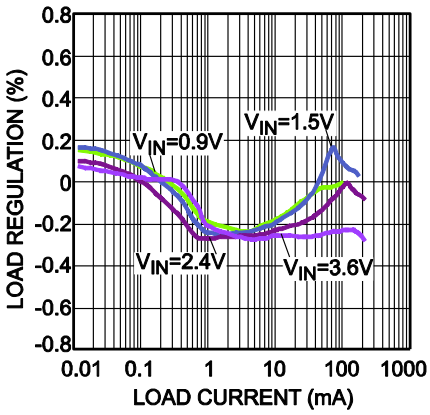
EVB TEST RESULTS

V_{IN} = 1.8V, V_{OUT} = 3.3V, L = 3.3 µH, T_A = 25°C, unless otherwise noted.

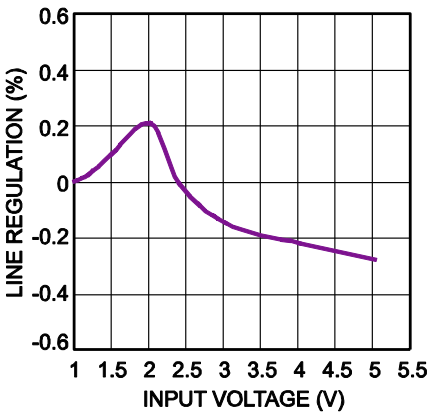
Efficiency
V_{OUT}=3.3V



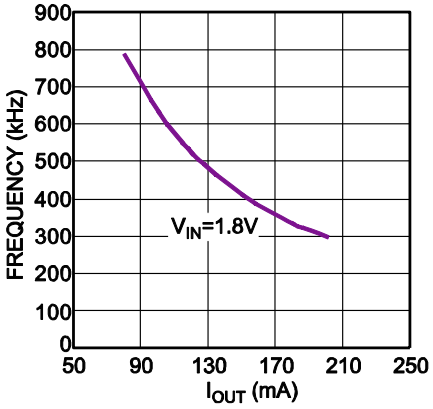
Load Regulation
V_{OUT}=3.3V



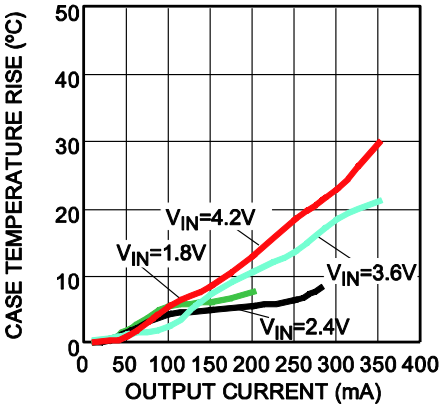
Line Regulation
V_{OUT}=3.3V, I_{OUT}=100mA



SW Frequency vs. Load Current



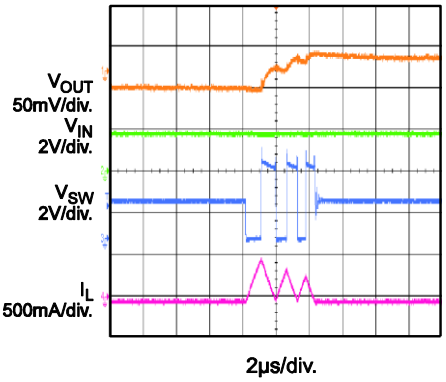
Case Temperature Rise vs. Output Current
VOUT=3.3V



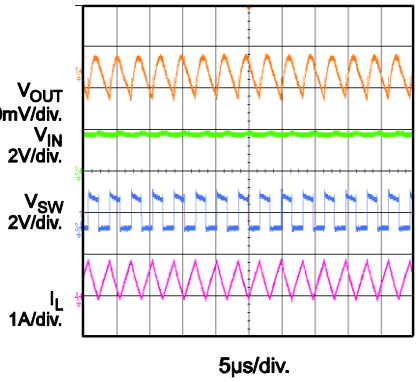
EVB TEST RESULTS *(continued)*

V_{IN} = 1.8V, V_{OUT} = 3.3V, L = 3.3µH, T_A = 25ºC, unless otherwise noted.

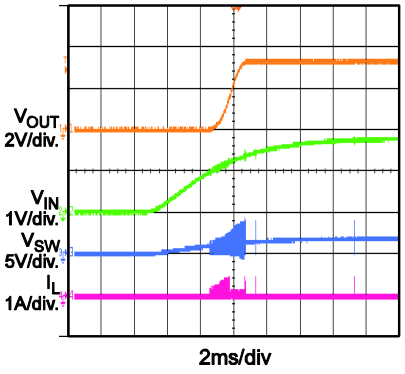
Output Ripple
I_{OUT}=0A



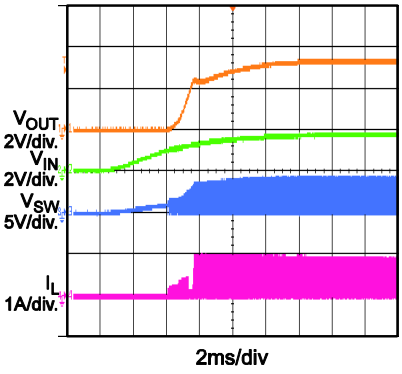
Output Ripple
I_{OUT}=0.2A



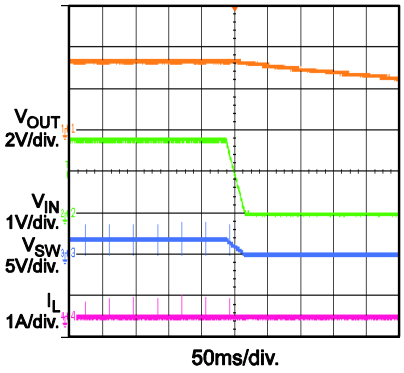
V_{IN} Startup
I_{OUT} = 0A



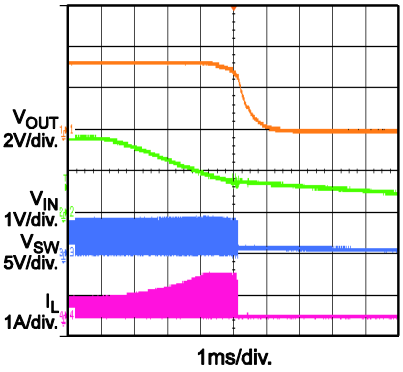
V_{IN} Startup
I_{OUT} = 0.2A



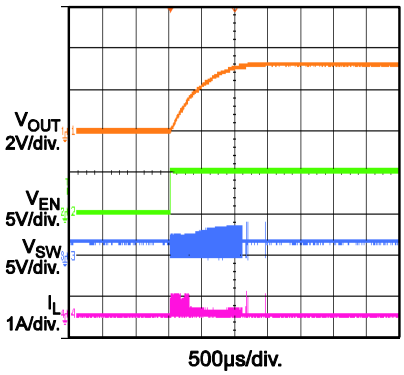
V_{IN} Shutdown
I_{OUT} = 0A



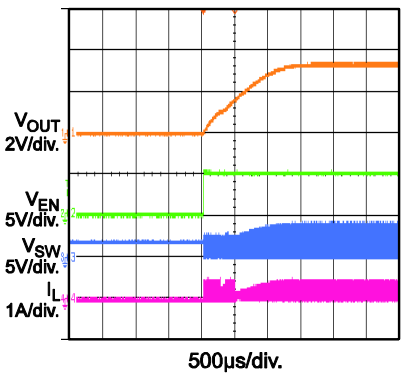
V_{IN} Shutdown
I_{OUT} = 0.2A



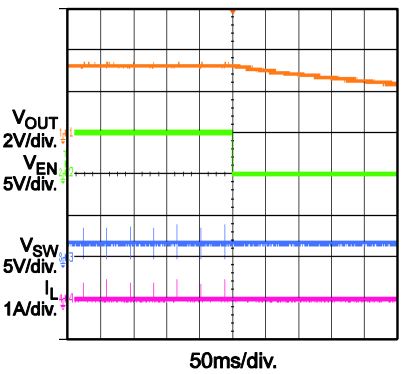
EN Startup
I_{OUT} = 0A



EN Startup
I_{OUT} = 0.2A



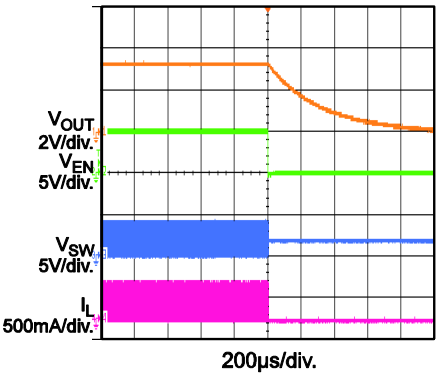
EN Shutdown
I_{OUT} = 0A



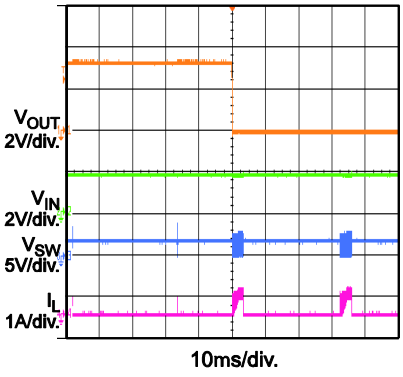
EVB TEST RESULTS *(continued)*

V_{IN} = 1.8 V, V_{OUT} = 3.3V, L = 3.3µH, T_A = 25ºC, unless otherwise noted.

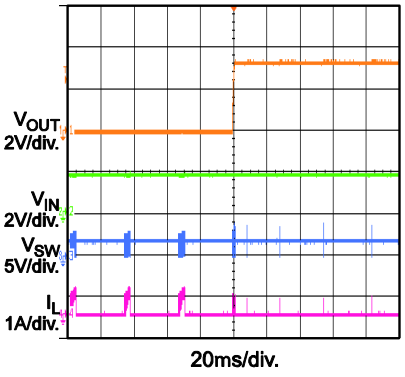
EN Shutdown
I_{OUT} = 0.2A



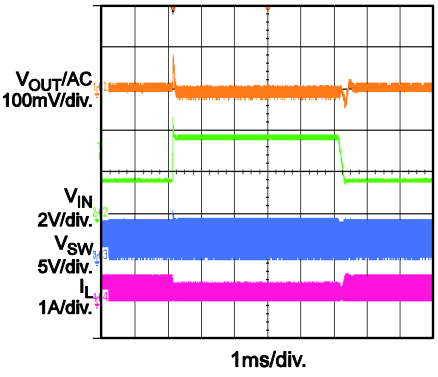
SCP Enter



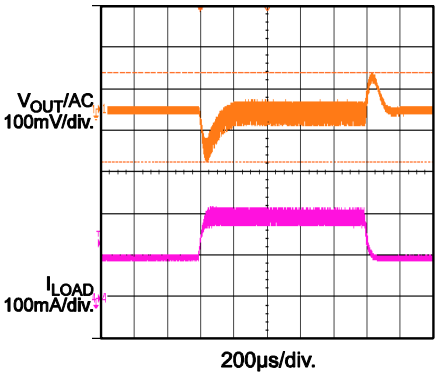
SCP Recover



Line Transient
V_{IN} = 1.8V to 3.6V, I_{OUT} = 0.1A



Load Transient
I_{OUT} = 0.1A to 0.2A



PRINTED CIRCUIT BOARD LAYOUT

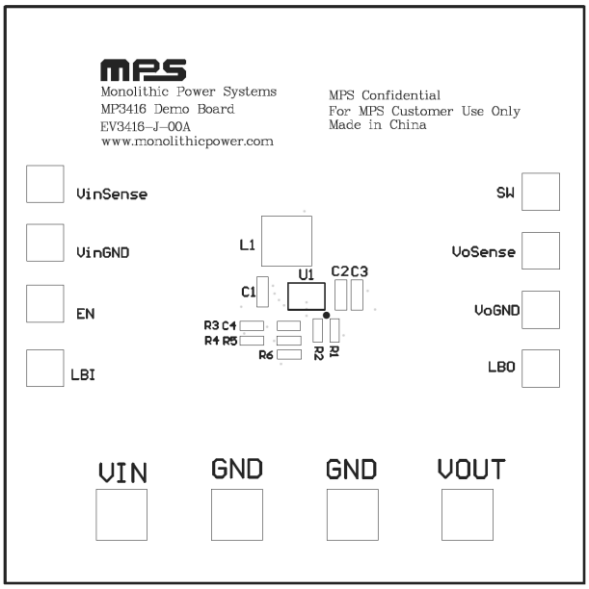


Figure 1—Top Silk Layer

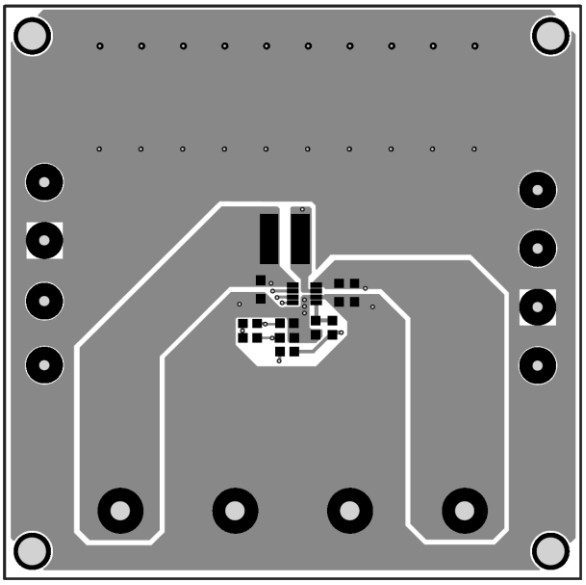


Figure 2—Top Layer

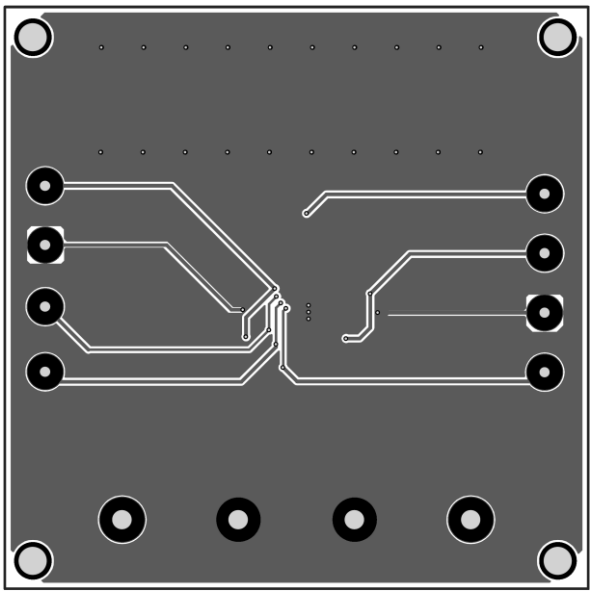


Figure 3—Bottom Layer

Quick Start Guide

The output voltage of this board is set to 3.3V. The board layout accommodates most commonly used components.

1. Preset Power Supply to 1.25V ≤ V_{IN} ≤ 5.5 V.
2. Turn Power Supply off.
3. Connect Power Supply terminals to:
   a. Positive (+): VIN
   b. Negative (–): GND
4. Connect Load to:
   a. Positive (+): VOUT
   b. Negative (–): GND
5. Turn Power Supply on after making connections.
6. The MP3416 is enabled on the evaluation board once VIN is applied.
7. The output voltage VOUT can be changed by varying R2. Calculate the new value using the formula:

$$V_{OUT} = V_{FB} \times (1 + \frac{R1}{R2})$$

   Where V_{FB} = 0.504V and R1=1MΩ.
8. To use the enable function, apply a digital input to the EN pin. Drive EN higher than 0.7V to turn on EV3416-J-00A or less than 0.2V to turn it off.