EVL3433-Q-00B

High-Efficiency, Synchronous Boost Converter Evaluation Board

DESCRIPTION

The EVL3433-Q-00B is an evaluation board designed to demonstrate the capabilities of the MP3433, a 600kHz fixed-frequency, wide input range, highly integrated boost converter.

The MP3433 starts from an input voltage (V_{IN}) as low as 2.8V, and supports up to 50W of load power from a 2-cell battery with integrated low on resistance ($R_{DS(ON)}$) power MOSFETs.

The MP3433 adopts constant-off-time (COT) control topology, which provides fast transient response. The configurable input current limit provides accurate overload protection (OLP).

The MP3433 is available in a QFN-16 (3mmx3mm) package.

It is recommended to read the MP3433 datasheet prior to making any changes to the EVL3433-Q-00B.

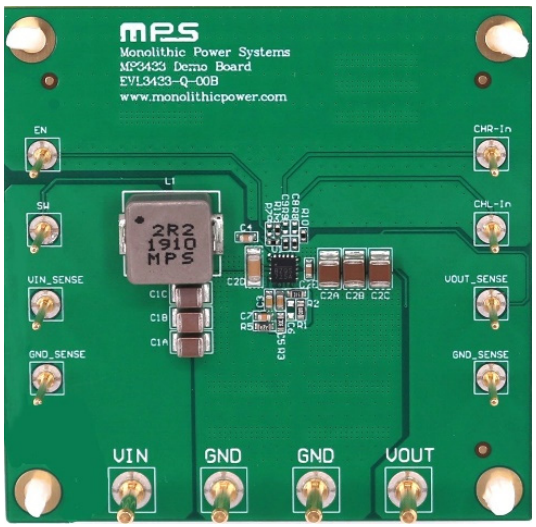
PERFORMANCE SUMMARY

Specifications are at T_A = 25°C, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{IN}) range		2.8V to 14V
Output voltage (V_{OUT})	V_{IN} = 2.8V to 14V, I_{OUT} = 0A to 2A	16V
Maximum output current (I_{OUT})	V_{IN} = 2.8V to 14V	2A
Typical load efficiency	V_{IN} = 3.6V, V_{OUT} = 16V, I_{OUT} = 2A	94.3%
Peak efficiency	V_{IN} = 4.2V, V_{OUT} = 16V, I_{OUT} = 1A	96.6%
Switching frequency (f_{SW})		600kHz

MPL Optimized Performance with MPS Inductor MPL-AY1050 Series

EVALUATION BOARD



LxWxH (6.3cmx6.3cmx0.6cm)
4 Layers, 1oz/1oz

Board Number	MPS IC Number
EVL3433-Q-00B	MP3433GQ

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QUICK START GUIDE

The EVL3433-Q-00B evaluation board is easy to set up and use to evaluate the performance of the MP3433. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Preset the power supply (V_{IN}) to be between 2.8V and 14V, then turn off the power supply.
2. Connect the power supply terminals to:
   a. Positive (+): VIN
   b. Negative (-): GND
3. Connect the load terminals to:
   a. Positive (+): VOUT
   b. Negative (-): GND
4. After making the connections, adjust the load to 0A, then turn on the power supply.
5. Check for the target output voltage (V_{OUT}, default 16V) between the SENSE_VOUT and GND terminals.
6. Once the target V_{OUT} is established, adjust the load within the operating range, then measure the efficiency, output ripple voltage, and other relevant parameters.
7. After completing all tests, adjust the load to 0A, then turn off the input power supply.
8. If dynamic V_{OUT} control function is required, follow the additional steps below:
   a. Change R8 and R9 to 30kΩ, change C8 and C9 to 100nF, and remove R10 and R11.
   b. The audio input signal amplitude is 0V to 1V, and V_{OUT} may rise by up to an additional 9.98V (upper FB resistor = 499kΩ). To avoid triggering V_{OUT} over-voltage protection (OVP), the lower FB resistor should be 55.4kΩ to set V_{OUT} to 10V.
   c. Connect the audio input signal to CHL-In and CHR-In copper pins on the EVB to make the MP3433 dynamically change V_{OUT} based on the input signal level. Refer to the Dynamic V_{OUT} Control Function section in the MP3433 datasheet for further details.

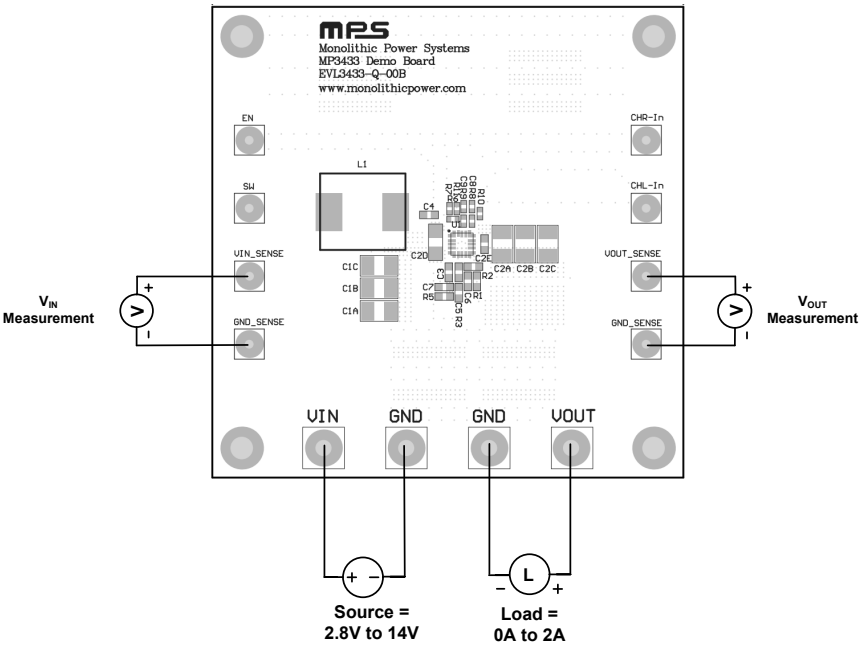

Figure 1: Proper Measurement Equipment Set-Up

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EVALUATION BOARD SCHEMATIC

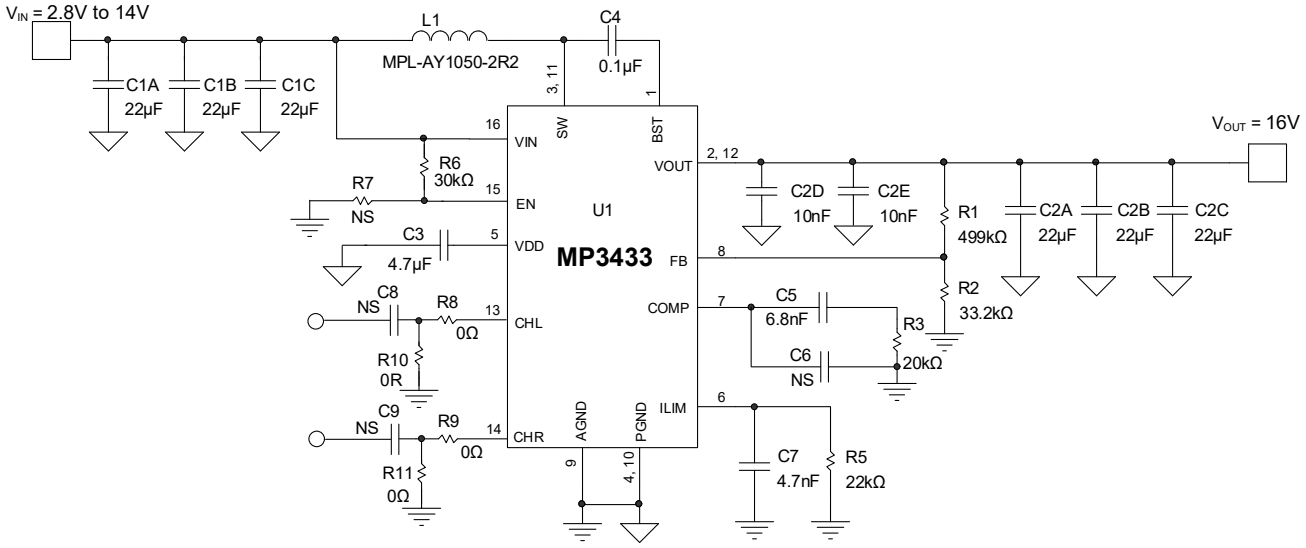

Figure 2: Evaluation Board Schematic

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EVL3433-Q-00B BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
6	C1A, C1B, C1C, C2A, C2B, C2C	22µF	Ceramic capacitor, 25V, X7R	1210	Murata	GRM32ER71E226KE15L
1	C2D	10nF	Ceramic capacitor, 100V, C0G	1206	Murata	GRM3195C2A103JA01D
1	C2E	10nF	Ceramic capacitor, 50V, C0G	0603	Murata	GRM1885C1H103JA01D
1	C3	4.7µF	Ceramic capacitor, 6.3V, X5R	0603	Murata	GRM188R60J475KE19D
1	C4	0.1µF	Ceramic capacitor, 25V, X7R	0603	Murata	GCH188R71E104KE01D
1	C5	6.8nF	Ceramic capacitor, 10V, SL	0603	Murata	GRM1851X1A682JA44D
1	C7	4.7nF	Ceramic capacitor, 50V, C0G	0603	Murata	GRM1885C1H472JA01D
0	C6, C8, C9	NS				
1	R1	499kΩ	Film resistor, 1%	0603	Yageo	RL0603FR-07499KL
1	R2	33.2kΩ	Film resistor, 1%	0603	Yageo	RL0603FR-0733K2L
1	R3	20kΩ	Film resistor, 1%	0603	Yageo	RL0603FR-0720KL
1	R5	22kΩ	Film resistor, 1%	0603	Yageo	RL0603FR-0722KL
1	R6	30kΩ	Film resistor, 1%	0402	Yageo	RL0402FR-0730KL
4	R8, R9, R10, R11	0Ω	Film resistor, 1%	0402	Yageo	RL0402FR-070RL
0	R7	NS				
1	L1	2.2µH	Inductor, R_{DC} = 4.9mΩ, I_{SAT} = 19.5A	SMD	MPS	MPL-AY1050-2R2
1	U1	MP3433	High-efficiency, synchronous boost converter	QFN-16 (3mmx 3mm)	MPS	MP3433GQ

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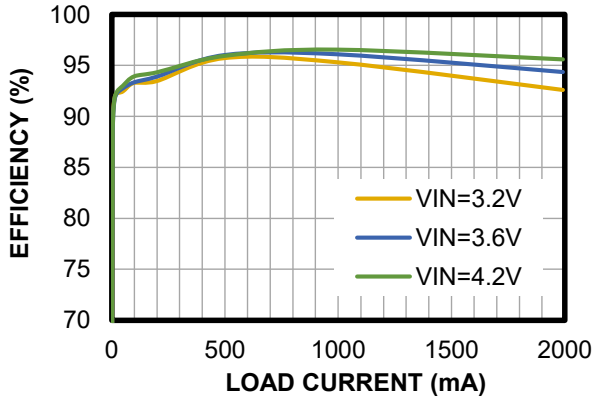
EVB TEST RESULTS

Performance curves and waveforms are tested on the evaluation board, V_{IN} = 3.6V, V_{OUT} = 16V, L = 2.2µH, T_A = 25°C, unless otherwise noted.

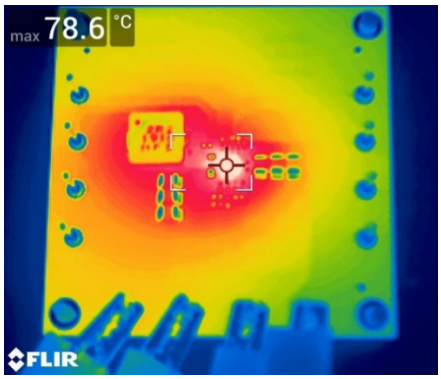
Efficiency vs. Load Current

USM



Thermal Performance

V_{IN} = 3.6V, I_{OUT} = 2A, T_A = 30°C, no forced airflow



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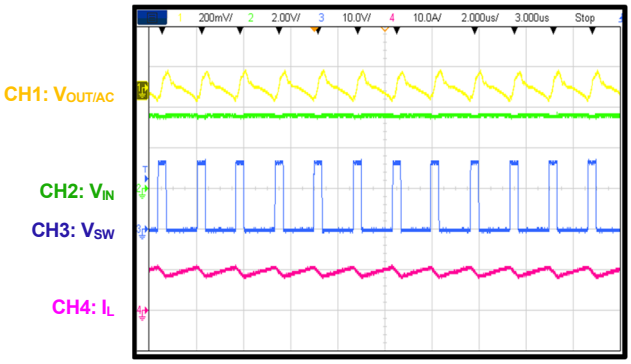
EVB TEST RESULTS *(continued)*

Performance curves and waveforms are tested on the evaluation board, V_{IN} = 3.6V, V_{OUT} = 16V, L = 2.2µH, T_A = 25°C, unless otherwise noted.

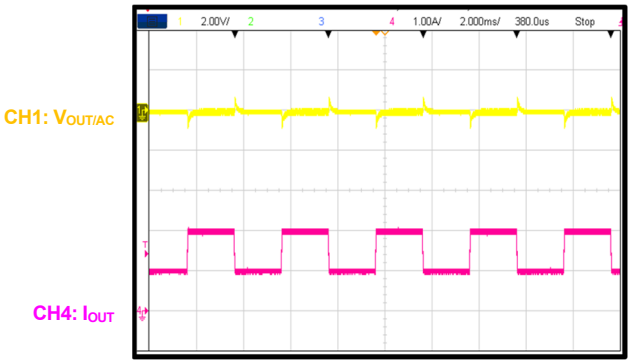
Steady State

I_{OUT} = 2A



Load Transient Response

I_{OUT} = 1A to 2A, slew rate = 800mA/µs (e-load)



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PCB LAYOUT

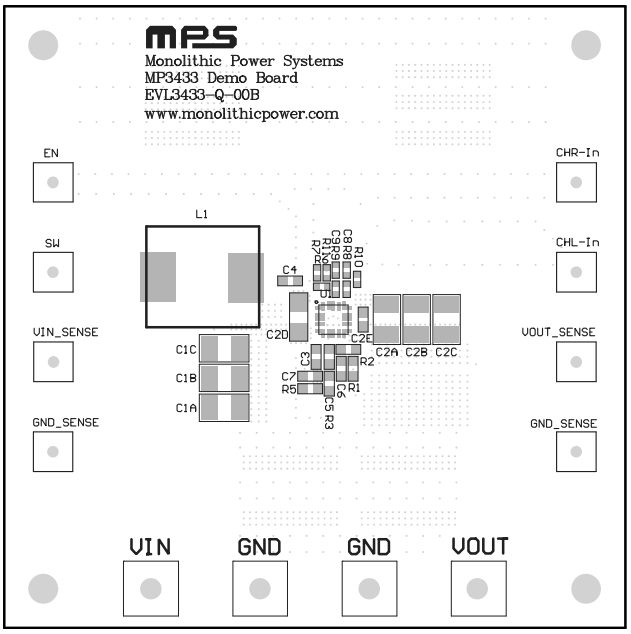

Figure 3: Top Silk

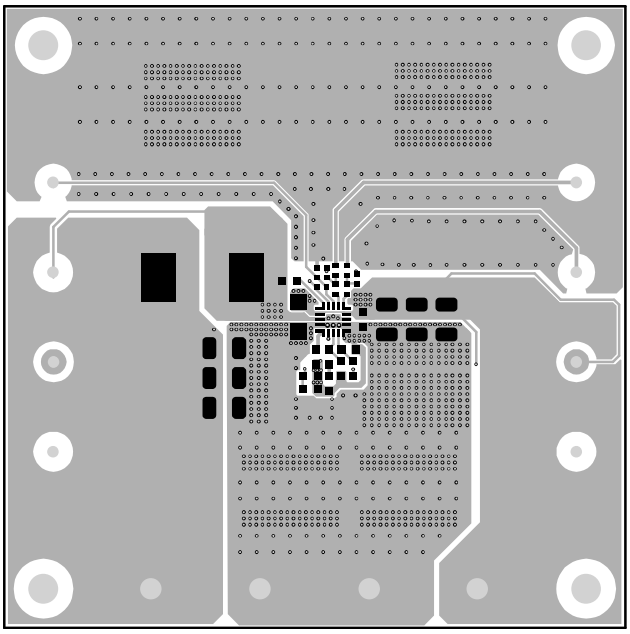

Figure 4: Top Layer

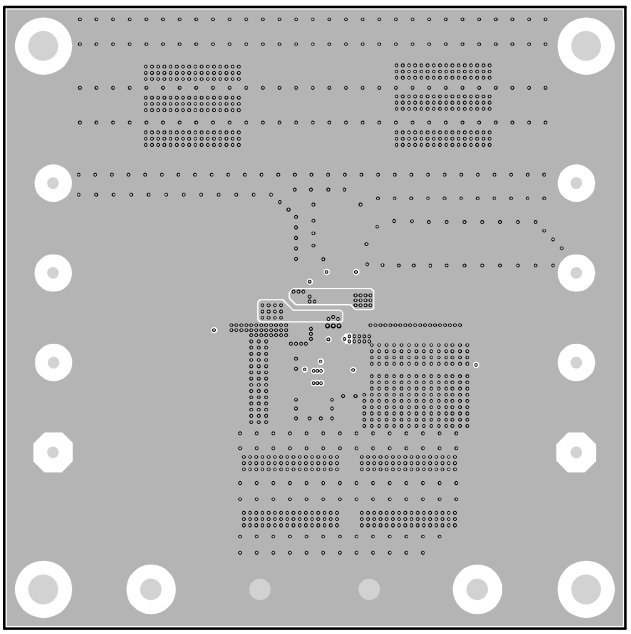

Figure 5: Mid-Layer 1

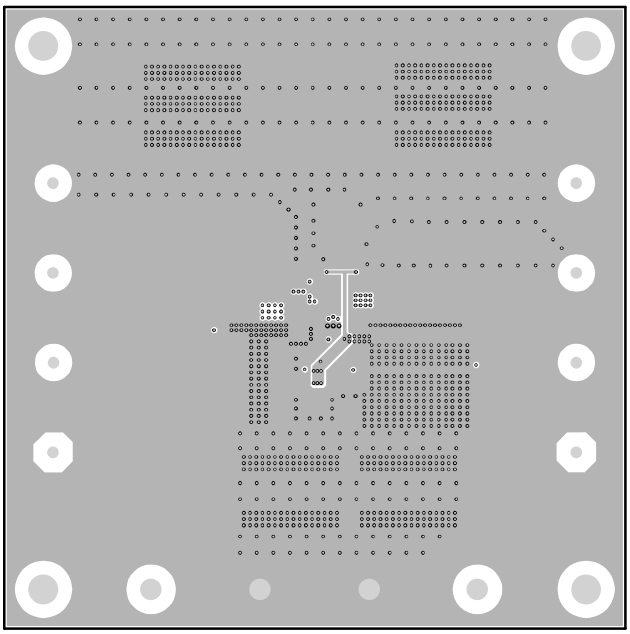

Figure 6: Mid-Layer 2

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PCB LAYOUT *(continued)*

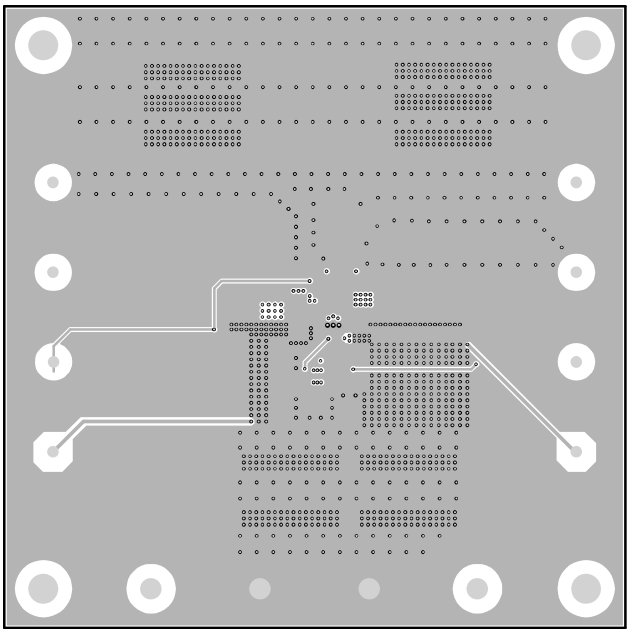

Figure 7: Bottom Layer

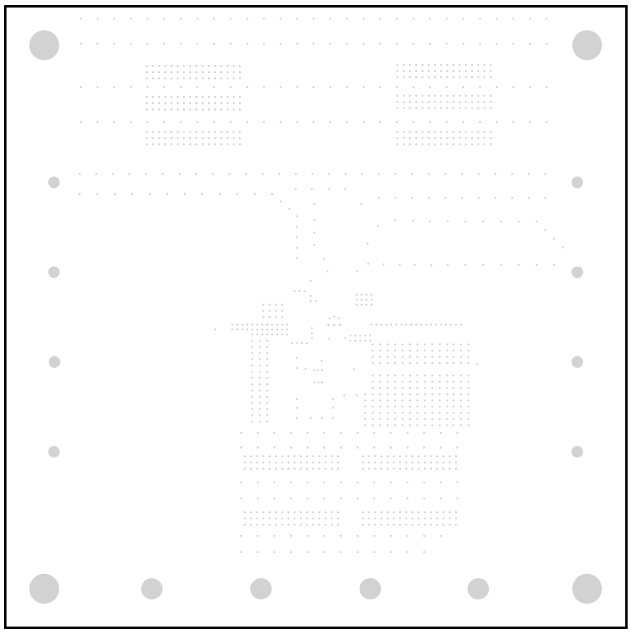

Figure 8: Bottom Silk

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	10/14/2024	Initial Release	-

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