



MIC2174 3A Evaluation Board

Constant Frequency, Synchronous
Buck Controller Featuring Adaptive On-
Time Control

Hyper Speed Control™ Family

General Description

MIC2174, a member of the new Hyper Speed Control™ family of buck controllers introduced by Micrel, is a synchronous, adaptive on-time buck controller. This controller is targeted for cost sensitive applications requiring high performance. The MIC2174 operates over an input supply range of 3V to 40V, and is independent of the IC supply voltage.

Data sheets support documentation can be found on Micrel's web site at www.micrel.com.

Requirements

The MIC2174 evaluation board requires two power supplies: one to provide VIN (connect to HSD pin of MIC2174), and the other to provide VDD (connect to IN pin of the MIC2174) for the control circuitry. The VIN power supply should be able to deliver greater than 3.0V at over 3A. The VDD power source, which is recommended to be 5.0V typical, should be able to deliver greater than 3.0V. The typical VDD current is a few milliamps. An external 20mA minimum power supply is recommended for VDD.

Precautions

The evaluation board does not have reverse polarity protection. Applying a negative voltage to the VIN or VDD terminal may damage the device. In addition, the maximum VIN operating voltage of the MIC2174 evaluation board is 40V, and the maximum VDD operation voltage is 5.5V. Exceeding 42V on VIN or exceeding 6V on VDD could damage the device.

An external VDD power supply is required and it should be turned on no earlier than VIN power supply to make sure the soft-start behavior properly.

Getting Started

1. **Connect an external supply to VIN terminal.** Apply desired input voltage to the VIN (J1) and ground (J4) terminals of the evaluation board, paying careful attention to polarity and supply voltage (3.0V<VIN<40V). An ammeter may be placed between the input supply and the

VIN terminal to the evaluation board. Ensure the supply voltage is monitored at the VIN terminal. The ammeter and/or power lead resistance can reduce the voltage supplied to the input.

2. **Connect an external supply to VDD terminal.** Apply desired input voltage to the VDD (J6) and ground (J5) terminals of the evaluation board, paying careful attention to polarity and supply voltage (3.0V<VDD<5.5V). The VDD power supply should be turned on no earlier than VIN power supply. The recommended voltage for VIN is 5V.

3. **Connect the load to the VOUT and ground terminals.** The load can be either passive (resistive) or active (as in an electronic load). An ammeter can be placed between the load and the VOUT (J2) terminal. Ensure the output voltage is monitored at the VOUT terminal. The default VOUT is set to 1.8V. This can be adjusted by changing the feedback resistors. See "Output Voltage."

4. **Enable the MIC2174.** The enable pin is floating by default. The output of the MIC2174 turns on when VDD exceeds the UVLO threshold. The output of the MIC2174 may be turned off by shorting the enable pin to ground or bringing the enable pin below the enable threshold. An external connection on the board provides easy access to the enable pin.

Output Voltage

The output voltages on the MIC2174 evaluation board are adjustable. The output voltage is controlled by the feedback resistors (R4 and R6) and can be calculated as follows:

$$V_{OUT} = V_{REF} \times \left(1 + \frac{R4}{R6}\right)$$

where $V_{REF} = 0.8V$.

The evaluation board is preset at a 1.8V output, but can easily be modified by removing R6 and replacing it with the value that yields the desired output voltage.

$$R6 = \frac{R4 \times V_{REF}}{V_{OUT} - V_{REF}}$$

For $V_{REF} = 0.8V$, this reduces to:

Hyper Speed Control is a trademark of Micrel, Inc.

Micrel Inc. • 2180 Fortune Drive • San Jose, CA 95131 • USA • tel +1 (408) 944-0800 • fax + 1 (408) 474-1000 • <http://www.micrel.com>

December 2009

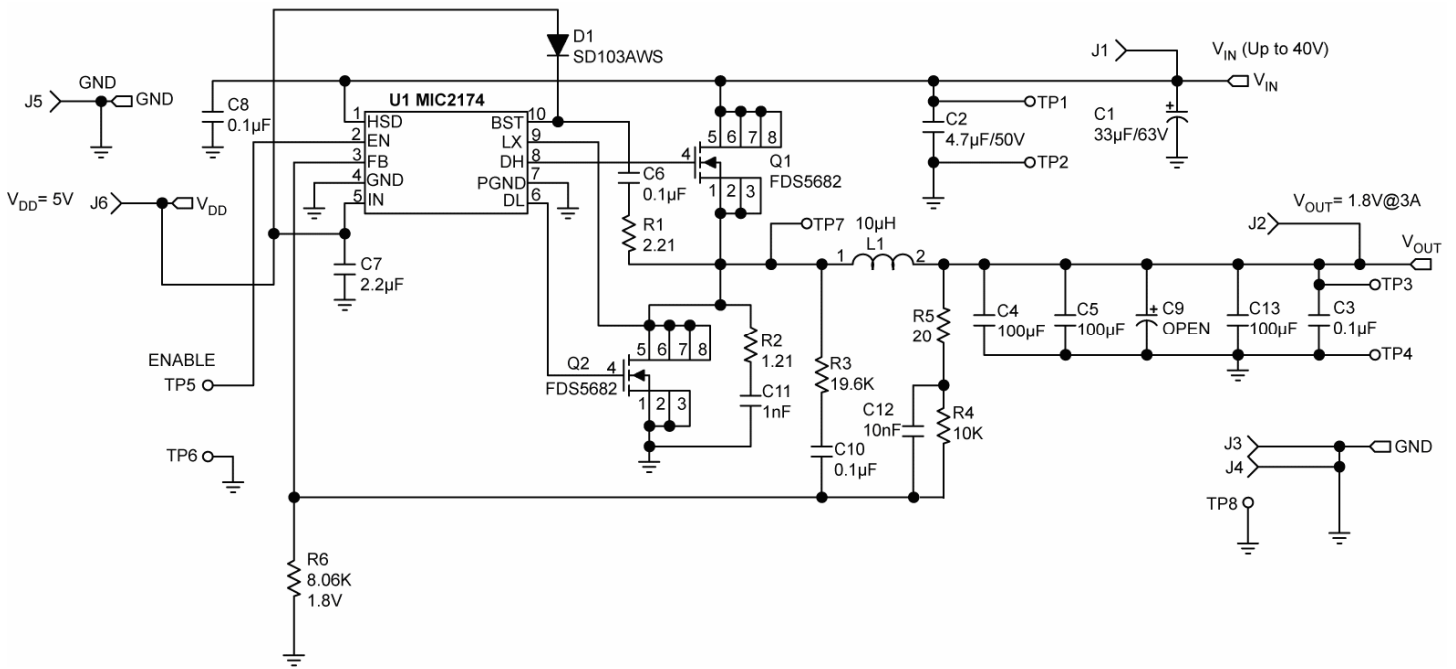
M9999-122309-A

$$R6 = \frac{R4 \times 0.8V}{V_{OUT} - 0.8V}$$

Ensure the output voltage set does not exceed 5V, since the output capacitor has a 6.3V voltage rating. When the output voltage greater than 5V is desired, the output capacitor should be replaced with higher voltage rating.

Ordering Information

Part Number	Description	Package
MIC2174-1YMM	IC	10-pin MSOP
MIC2174-1YMM 3A EV	Evaluation Board	10-pin MSOP



Bill of Materials

Item	Part Number	Manufacturer	Description	Qty
C1	B41112A8336M	EPCOS ⁽¹⁾	33µF Aluminum Capacitor, SMD, 63V	1
C2	12105C475KAZ2A	AVX ⁽²⁾	4.7µF Ceramic Capacitor, X7R, Size 1210, 50V	1
	GRM32ER71H475KA88L	Murata ⁽³⁾		
C4,C5,C13	12106D107MAT2A	AVX	100µF Ceramic Capacitor, X5R, Size 1210, 6.3V	3
	GRM32ER60J107ME20L	Murata		
C3, C6, C8, C10	06035C104KAT2A	AVX	0.1µF Ceramic Capacitor, X7R, Size 0603, 50V	4
	GRM188R71H104KA93D	Murata		
	C1608X7R1H104K	TDK ⁽⁴⁾		
C7	0805ZC225MAT2A	AVX	2.2µF Ceramic Capacitor, X7R, Size 0805, 10V	1
	GRM21BR71A225KA01L	Murata		
	C2012X7R1A225K	TDK		
C11	06035C102KAT2A	AVX	1nF Ceramic Capacitor, X7R, Size 0603, 50V	1
	GRM188R71H102KA01D	Murata		
	C1608X7R1H102K	TDK		
C12	06035C103KAZ2A	AVX	10nF Ceramic Capacitor, X7R, Size 0603, 50V	1
	GRM188R71H103K	Murata		
	C1608X7R1H103K	TDK		
D1	SD103AWS-7	Diodes Inc ⁽⁵⁾	Small Signal Schottky Diode	1
	SD103AWS	Vishay ⁽⁶⁾		
L1	CDRH104RNP-100	Sumida ⁽⁷⁾	10µH Inductor, 3.8A Saturation Current	1

Q1,Q2	FDS5682	Fairchild ⁽⁸⁾	60V 7.5A N-Channel MOSFET 26.5m Ω Rds(on) @ 4.5V	1
R1	CRCW06032R21FKEA	Vishay Dale	2.21 Ω Resistor, Size 0603, 1%	1
R2	CRCW06031R21FKEA	Vishay Dale	1.21 Ω Resistor, Size 0603, 1%	1
R3	CRCW060319K6FKEA	Vishay Dale	19.6k Ω Resistor, Size 0603, 1%	1
R4	CRCW060310K0FKEA	Vishay Dale	10k Ω Resistor, Size 0603, 1%	1
R5	CRCW060320R0FKEA	Vishay Dale	20 Ω Resistor, Size 0603, 1%	1
R6	CRCW06038K06FKEA	Vishay Dale	8.06k Ω Resistor, Size 0603, 1%	1
U1	MIC2174YMM	Micrel, Inc. ⁽⁹⁾	300kHz Buck Controller	1

Notes:

1. EPCOS: www.epcos.com
2. AVX: www.avx.com
3. Murata: www.murata.com
4. TDK: www.tdk.com
5. Diodes Inc: www.diodes.com
6. Vishay: www.vishay.com
7. Sumida: www.sumida.com
8. Fairchild: www.fairchildsemi.com
9. **Micrel, Inc.: www.micrel.com**

Printed Circuit Board Layouts

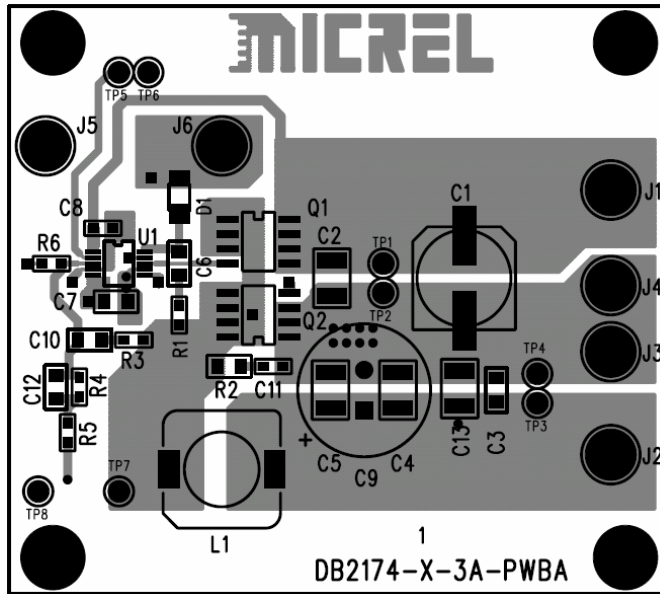


Figure 1a. Top Layer

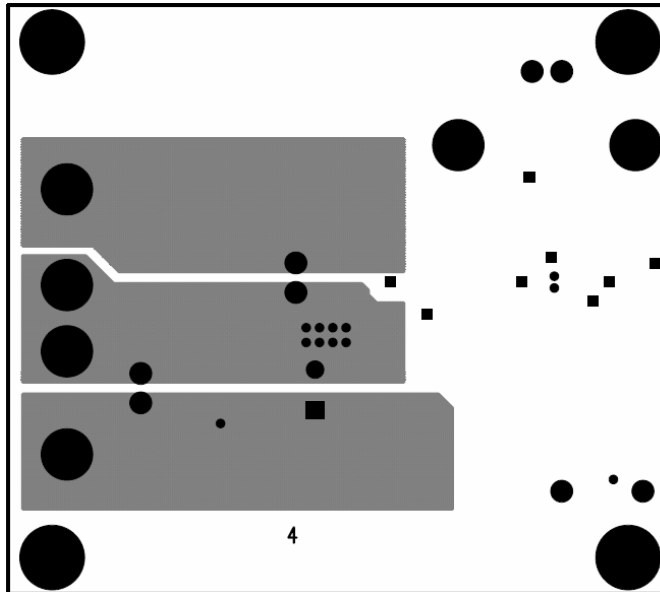


Figure 1b. Bottom Layer

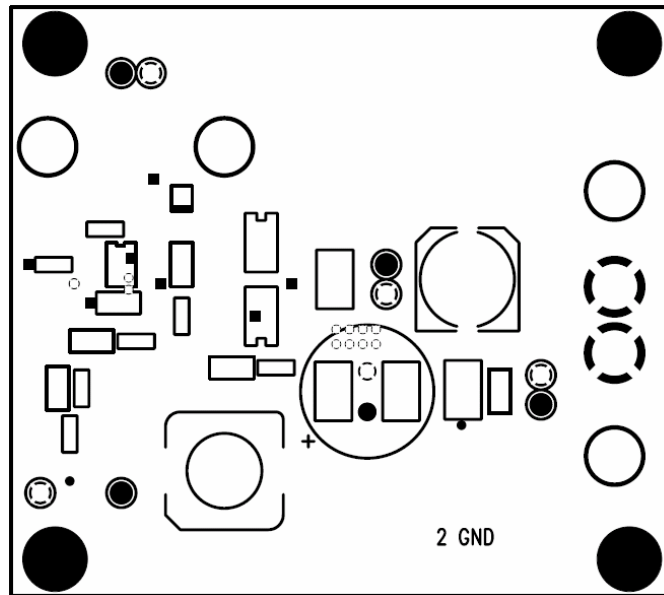


Figure 1c. Mid Layer 1 (GND Plane)

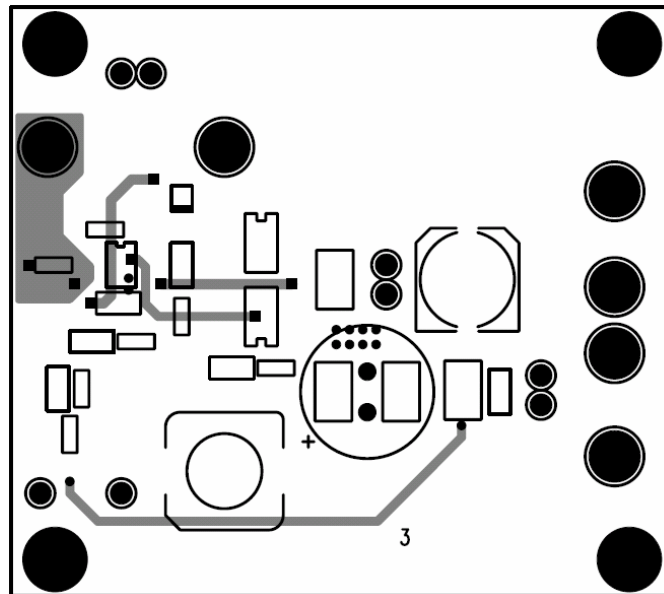


Figure 1d. Mid Layer 2

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB <http://www.micrel.com>

The information furnished by Micrel in this data sheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is a Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 2009 Micrel, Incorporated.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[MIC2174-1YMM-3A-EV](#)

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А