THE DATASHEET OF

LMR14206XMKDEMO/NOPB

AN-2185 LMR14203/LMR14206 Demonstration Board

1 Introduction

The Texas Instruments LMR14203/06 is a PWM DC/DC buck (step-down) regulator. With a wide input range from 4.5V-42V, it is suitable for a variety of applications from automotive to power conditioning of unregulated sources. The LMR14203/LMR14006 demonstration board is designed to provide the design engineer with a fully functional power converter based on the buck topology to evaluate the LMR14203/06 series of buck regulators. The demonstration board comes populated with either the LMR14203XMK or LMR14206XMK, but can easily be modified to accommodate any of the LMR14203/06 regulator ICs.

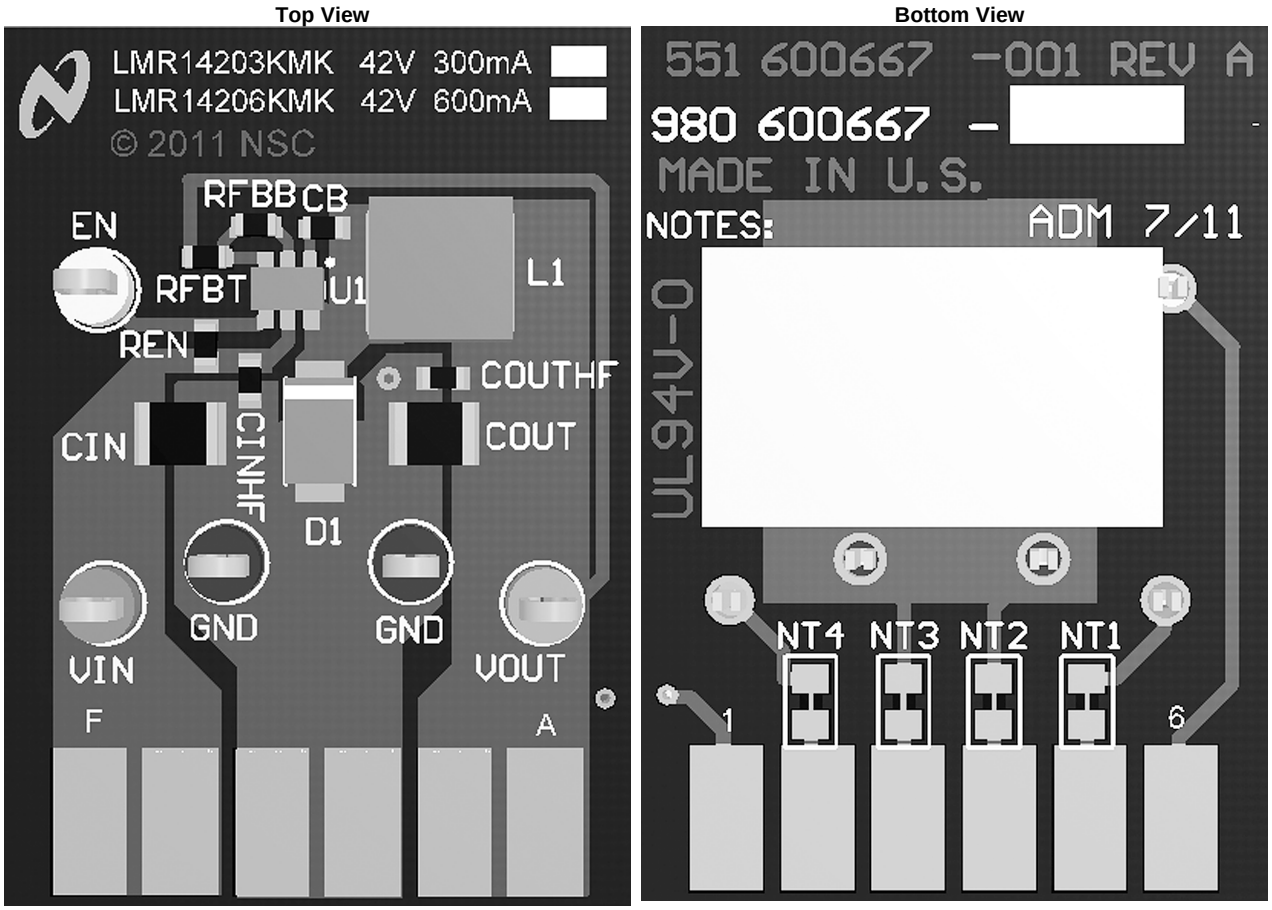


Figure 1. LMR14203/LMR14206 Demonstration Board

2 Features

- 4.5V to 42V Input Voltage Range
- 1.2V Output Voltage
- Up to 300/600 mA Output Current
- Switching Frequency of 1.25 MHz
- Internal Compensation

3 Shutdown Operation

The demonstration board includes a pull-up resistor to enable the device once V_{IN} has exceeded 1.0V (typ). Using the EN post to disable the device by pulling this node to GND. A logic signal may be applied, to the post, to test startup and shutdown of the device.

4 Adjusting the Output Voltage

The output voltage can be changed from 1.2V to another voltage by adjusting the feedback resistors using the following equation:

$$V_{OUT} = V_{FB}(1 + (RFBT/RFBB)) \quad (1)$$

Where V_{FB} is 0.765V.

For more information on component selection and features, see:

- *LMR14203 SIMPLE SWITCHER 42Vin, 0.3A Step-Down Voltage Regulator in SOT-23* (SNVS732)
- *LMR14206 SIMPLE SWITCHER 42Vin, 0.6A Step-Down Voltage Regulator in SOT-23* (SNVS733)

5 LMR14203 Demonstration Board Schematic

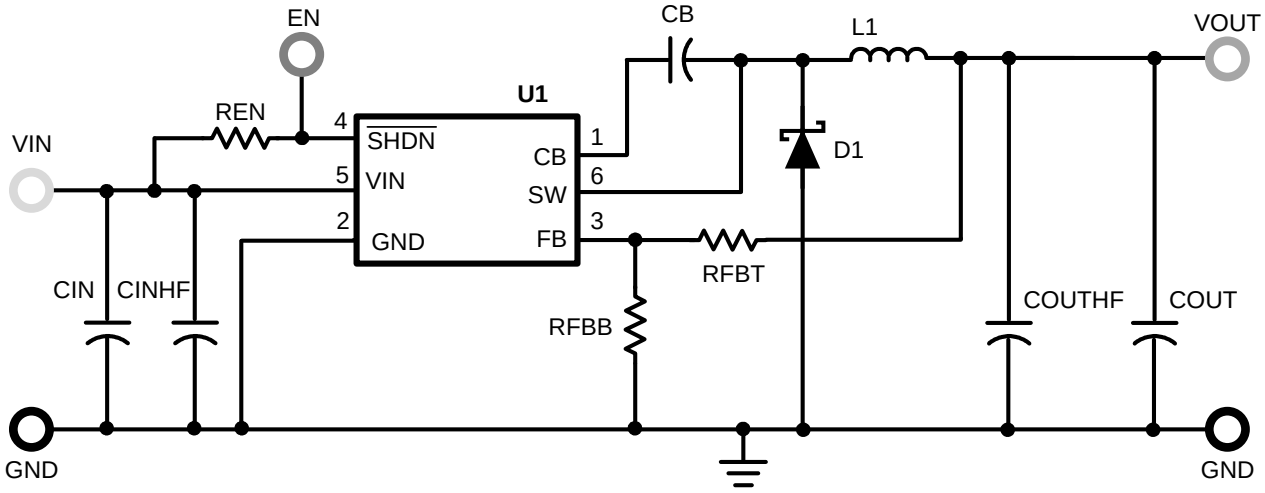


Figure 2. LMR14203 Demonstration Board Schematic

Table 1. Bill of Materials LMR14203

ID	Part Number	Type	Size	Parameters	Qty	Vendor
U1	LMR14203	Buck Regulator	SOT-6		1	Texas Instruments
L1	NR6045T150M	Inductor	NR6045	15 µH, 2.3A	1	Taiyo Yuden
D1	B260A-13-F	Diode	SMA	60V, 2 A	1	Diodes Inc
CIN	GRM32ER72A225KA35L	Capacitor	1210	2.2 µF, 100V	1	Murata
CINHF, COUTHF	C0603C223K3RACTU	Capacitor	0603	0.022 µF, 25V	2	Kemet
COUT	GRM32ER61A476KE20L	Capacitor	1210	47 µF, 10V	1	Murata
CB	C0603C224K4RACTU	Capacitor	0603	0.22 µF, 16V	1	Kemet
RFBT	CRCW06036K04FKEA	Resistor	0603	6.04 kΩ, 1%	1	Vishay
RFBB	CRCW060310K5FKEA	Resistor	0603	10.5 kΩ, 1%	1	Vishay
REN	CRCW06031M00JNEA	Resistor	0603	1.0 MΩ, 5%	1	Vishay
EN	5014	Test Point Loop		Yellow	1	Keystone
VIN	5010	Test Point Loop		Red	1	Keystone
VOUT	5013	Test Point Loop		Orange	1	Keystone
GND	5011	Test Point Loop		Black	2	Keystone

6 LMR14206 Demonstration Board Schematic

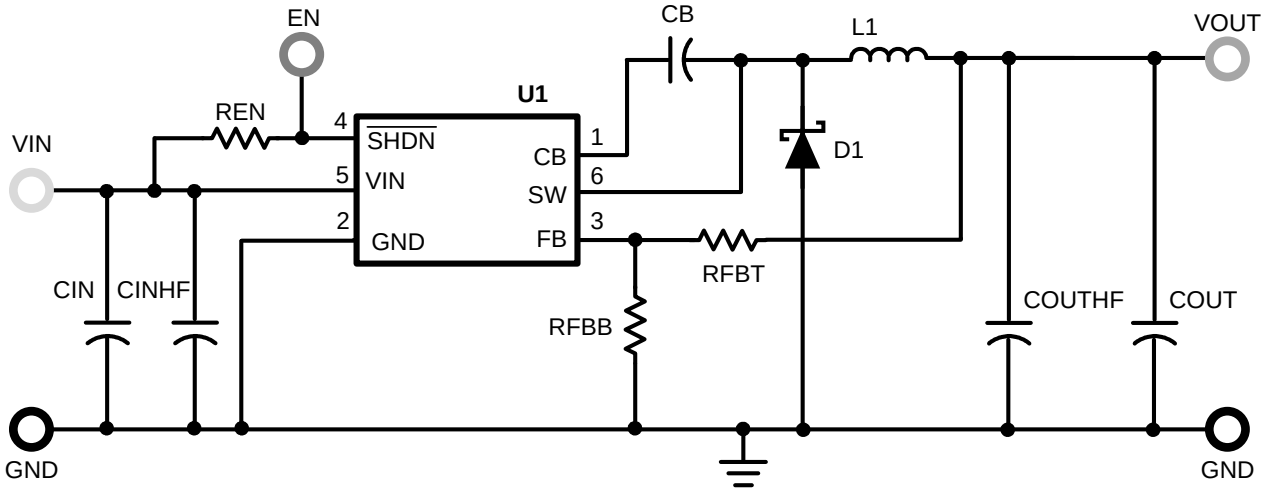


Figure 3. LMR14206 Demonstration Board Schematic

Table 2. Bill of Materials (BOM) LMR14206

ID	Part Number	Type	Size	Parameters	Qty	Vendor
U1	LMR14206	Buck Regulator	SOT-6		1	Texas Instruments
L1	NR6045T150M	Inductor	NR6045	15 µH, 2.3A	1	Taiyo Yuden
D1	B260A-13-F	Diode	SMA	60V, 2 A	1	Diodes Inc
CIN	GRM32ER72A225KA35L	Capacitor	1210	2.2 µF, 100V	1	Murata
CINHF, COUTHF	C0603C223K3RACTU	Capacitor	0603	0.022 µF, 25V	2	Kemet
COUT	GRM32ER61A476KE20L	Capacitor	1210	47 µF, 10V	1	Murata
CB	C0603C224K4RACTU	Capacitor	0603	0.22 µF, 16V	1	Kemet
RFBT	CRCW06036K04FKEA	Resistor	0603	6.04 kΩ, 1%	1	Vishay
RFBB	CRCW060310K5FKEA	Resistor	0603	10.5 kΩ, 1%	1	Vishay
REN	CRCW06031M00JNEA	Resistor	0603	1.0 MΩ, 5%	1	Vishay
EN	5014	Test Point Loop		Yellow	1	Keystone
VIN	5010	Test Point Loop		Red	1	Keystone
VOUT	5013	Test Point Loop		Orange	1	Keystone
GND	5011	Test Point Loop		Black	2	Keystone

7 Quick Setup Procedures

Step 1: Connect a power supply to VIN terminals.

Step 2: Connect a load to VOUT terminals.

Step 3 EN should be left floating for normal operation. Short this to ground to shutdown the part.

Step 4: Set V_{IN} = 24V, with 0A load applied, check V_{OUT} with a voltmeter. Nominal 1.2V

Step 5: Apply a 300mA load and check V_{OUT}. Nominal 1.2V

8 Measurements

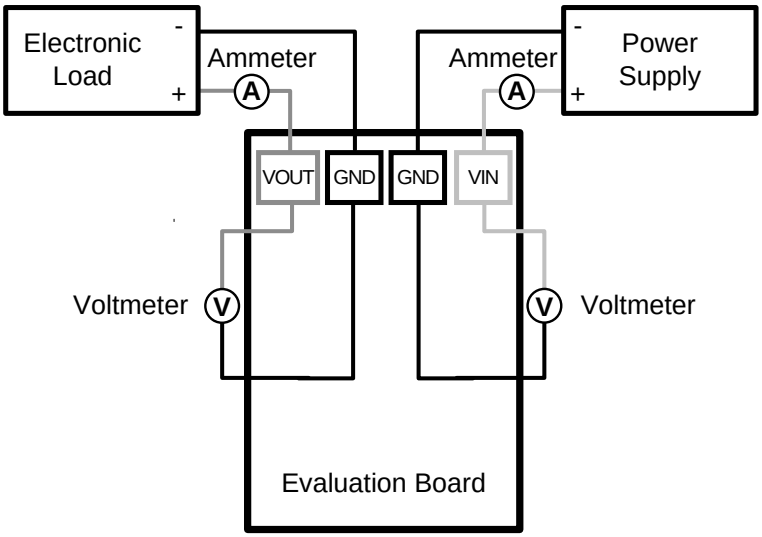


Figure 4. Efficiency Measurements

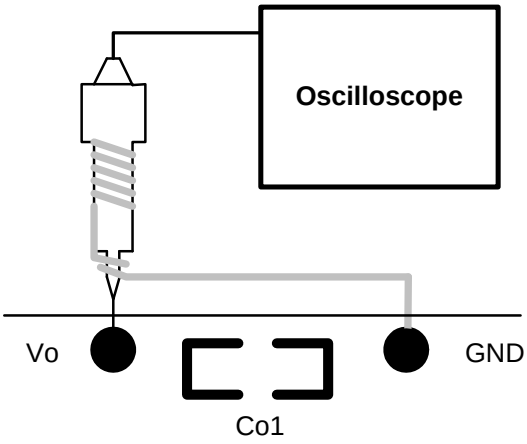


Figure 5. Voltage Ripple Measurements

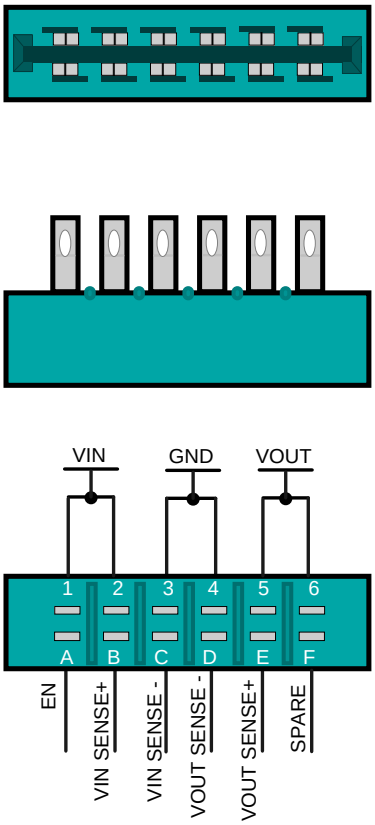
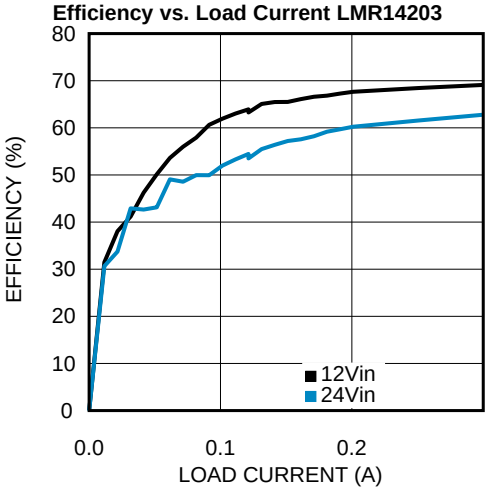


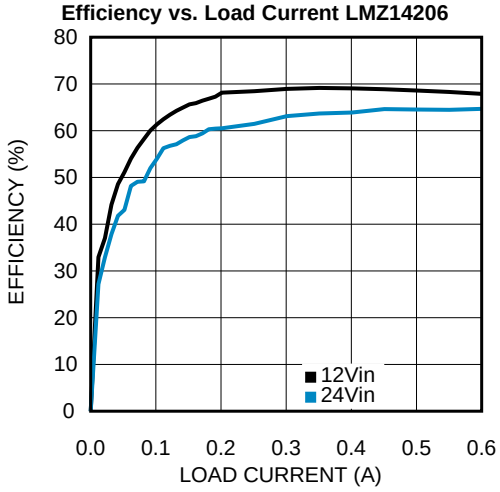
Figure 6. Edge Connector Schematic

9 Typical Performance Characteristics

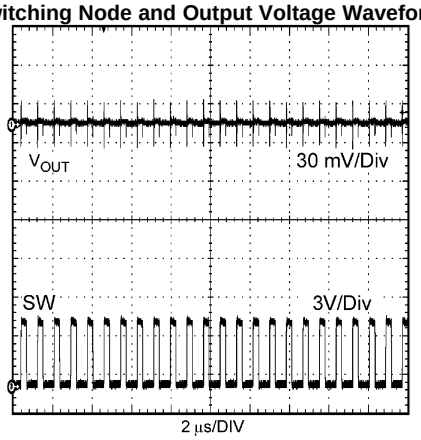
Efficiency vs. Load Current LMR14203



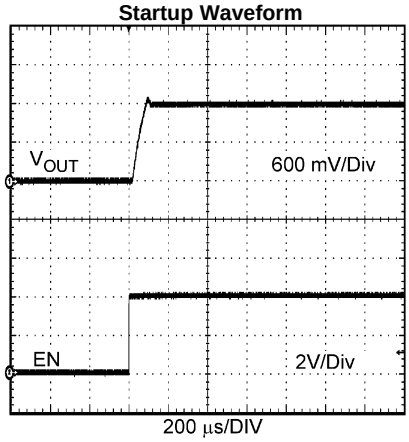
Efficiency vs. Load Current LMZ14206



Switching Node and Output Voltage Waveforms



Startup Waveform



10 Layout

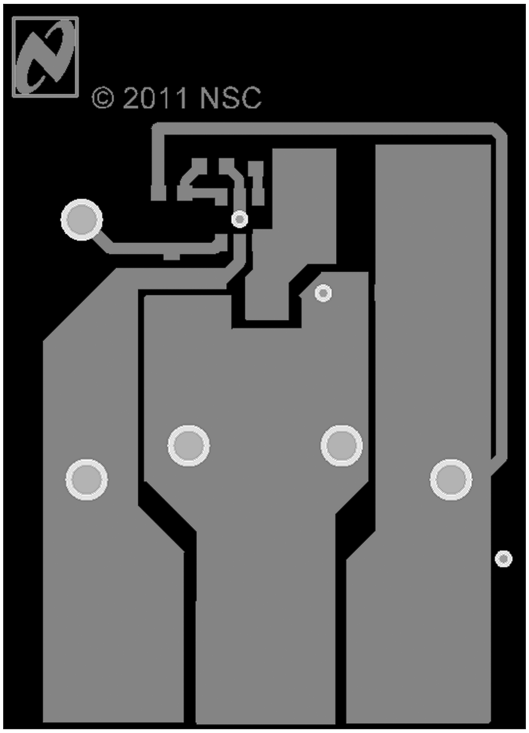


Figure 7. Top Layer

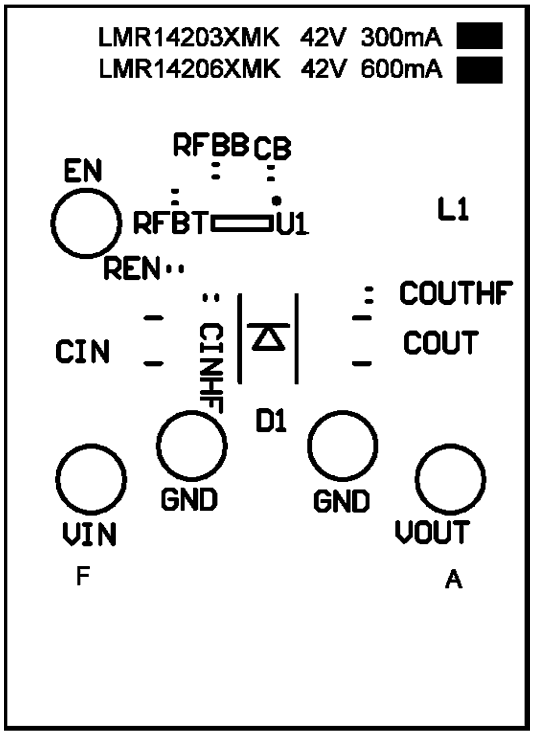


Figure 8. Top Overlay

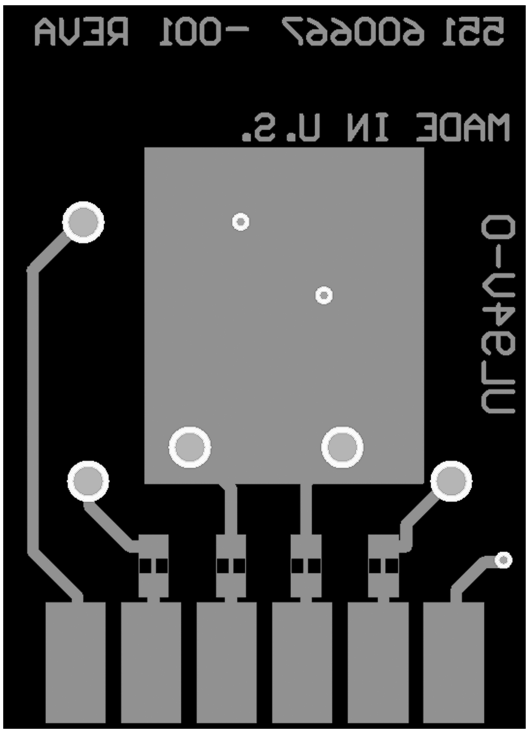


Figure 9. Bottom Layer

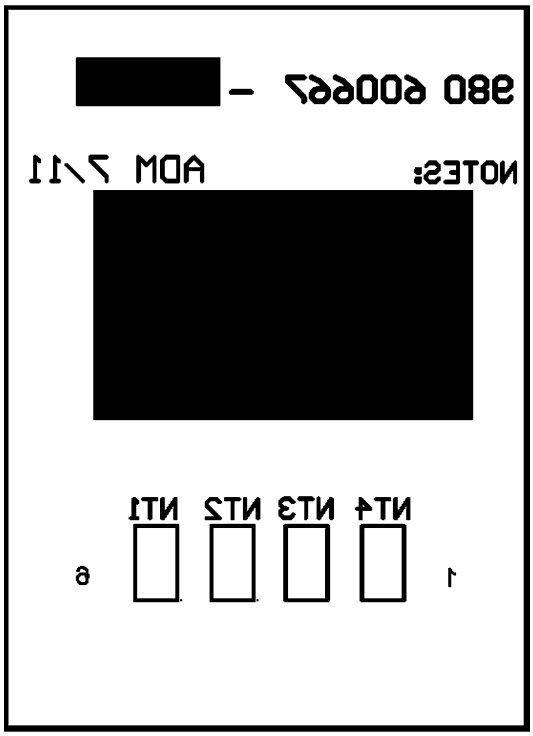


Figure 10. Bottom Overlay

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