

AN-1204 LM3478/LM3488 Evaluation Board

User's Guide



Literature Number: SNVA656A
June 2012—Revised October 2013

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AN-1204 LM3478/LM3488 Evaluation Board

The LM3478 and LM3488 are current mode, low side N-channel FET controllers. They can be utilized in numerous configurations including a Boost, Flyback or SEPIC. This evaluation board demonstrates the flexibility of the LM3478 in a boost topology.

1 Introduction

The LM3478 and LM3488 are current mode, low side N-channel FET controllers. They can be utilized in numerous configurations including a Boost, Flyback or SEPIC. This evaluation board demonstrates the flexibility of the LM3478 in a boost topology.

2 Features

- 5V Input Voltage Range
- 12V Output Voltage (default setting)
- Up to 1500 mA Output Current
- 1 MHz switching frequency
- PCB size: 43.18 mm x 52.07 mm

3 Adjusting the Output Voltage

The output voltage can be changed from 12V to another voltage by adjusting the feedback resistors using the following equation:

$$V_{OUT} = V_{FB}(1+(R_{FBT}/R_{FBB})) \quad (1)$$

Where V_{FB} is 1.26V.

For more information on components selection and features, see the LM3478 data sheet.

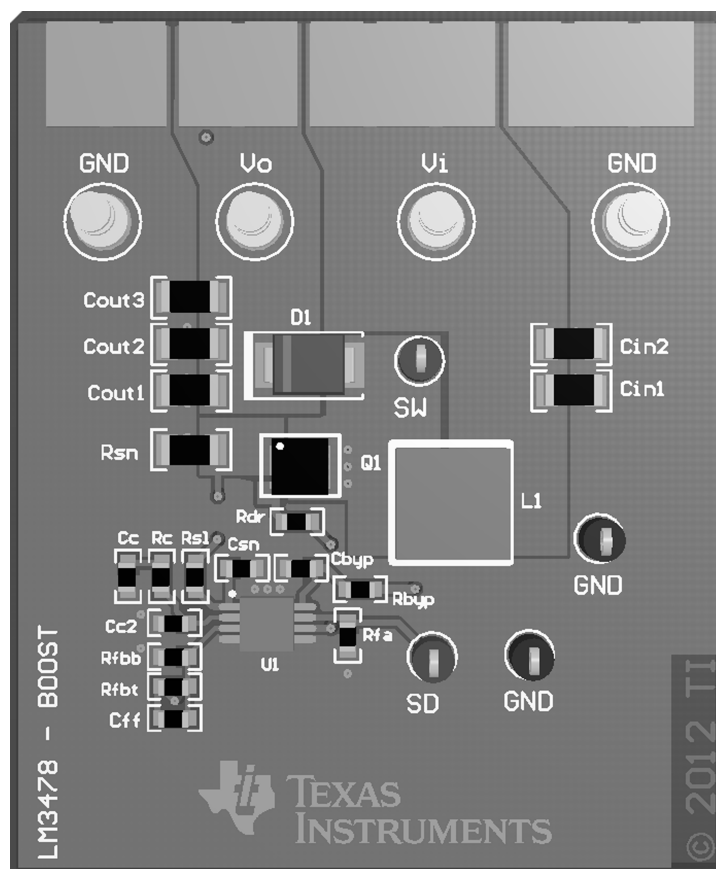
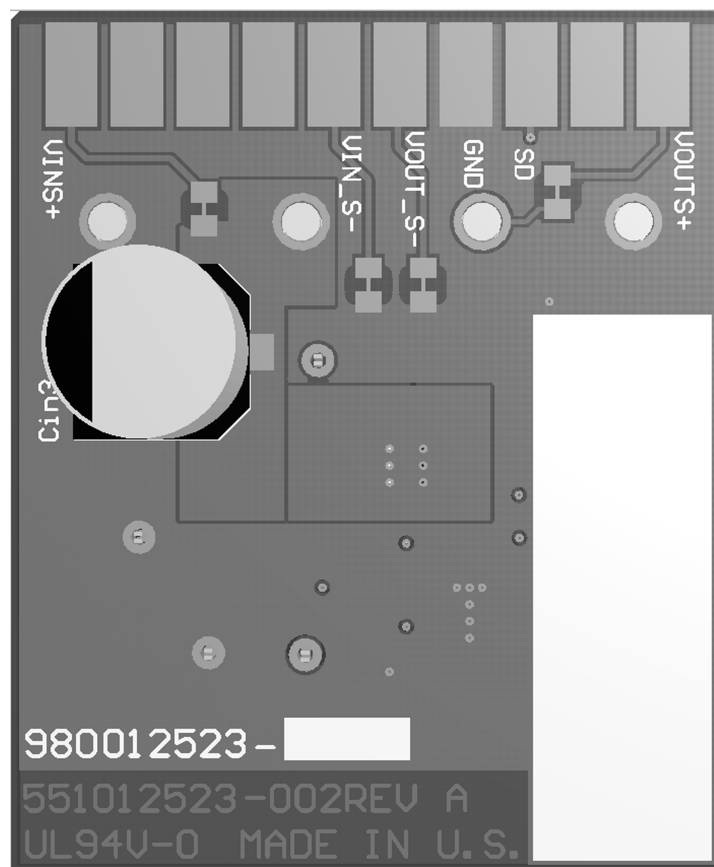


Figure 1. Top View



A Bottom View

Figure 2. LM3478 Evaluation Board

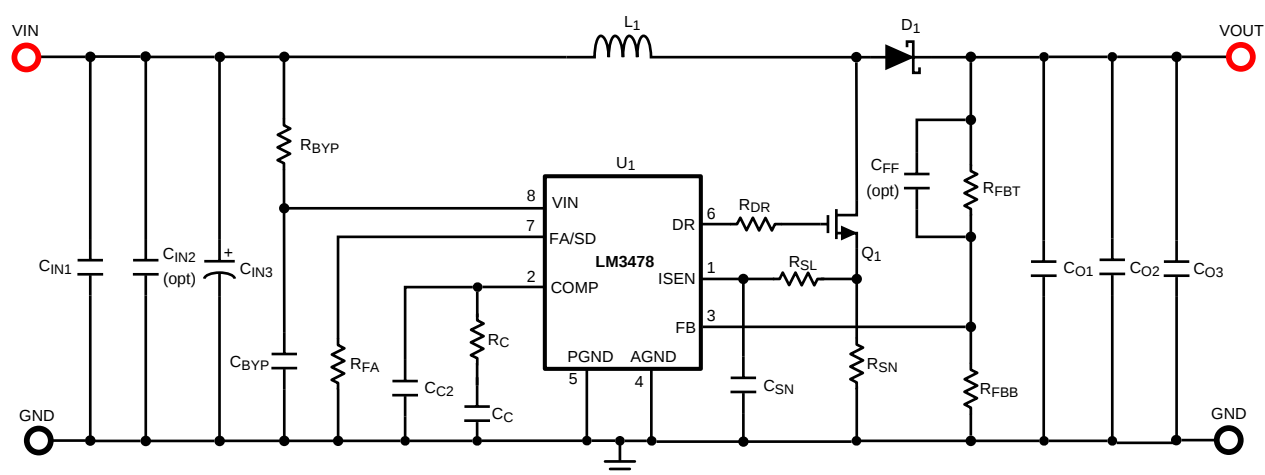


Figure 3. LM3478 Evaluation Board Schematic

Table 1. Bill of Materials (BOM) LM3478

Designation	Description	Size	Manufacturer Part #	Vendor
C _{IN1}	CAP, 47μF, 20%, 25V, X5R	1206	C3216X5R1E476M	TDK
C _{IN2}	optional			

Table 1. Bill of Materials (BOM) LM3478 (continued)

Designation	Description	Size	Manufacturer Part #	Vendor
C _{IN3}	CAP, 150μF, 20%, 8V 15mΩ, Aluminum	7.3mm L x 4.3mm W x 4.2mm H	EEF-UE0K151R	Panasonic
C _{O1} , C _{O2} , C _{O3}	CAP, 47μF, 20%, 25V, X5R	1206	C3216X5R1E476M	TDK
C _C	CAP, 0.1μF, 10%, 16V, X7R	0603	GRM188R71C104KA01D	Murata
C _{C2}	CAP, 100pF, 5%, 50V, NP0	0603	GRM1885C1H101JA01D	Murata
C _{BYP}	CAP, 0.1μF, 10%, 16V, X7R	0603	GRM188R71C104KA01D	Murata
C _{FF}	optional			
C _{SN}	CAP, 0.01μF, 10%, 50V, X7R	0603	C0603C103K5RACTU	Kemet
R _C	RES, 1kΩ, 1%, 0.1W	0603	CRCW06031K00FKEA	Vishay
R _{BYP}	RES, 10.0 ohm, 1%, 0.1W	0603	CRCW060310R0FKEA	Vishay
R _{FBT}	RES, 86.6kΩ, 1%, 0.1W	0603	CRCW060386K6FKEA	Vishay
R _{FBB}	RES, 10.2kΩ, 1%, 0.1W	0603	CRCW060310K2FKEA	Vishay
R _{DR}	RES, 0Ω, 1%, 0.1W	0603	CRCW06030000Z0EA	Vishay
R _{SL}	RES, 0Ω, 1%, 0.1W	0603	CRCW06030000Z0EA	Vishay
R _{SN}	RES, 0.015Ω, 1%, 1W	1206	CSR1206FK15L0	Stackpole Electronics
Q ₁	NexFET™ N-CH, 25V, 60A, R _{DS(on)} = 4.4mΩ	8-SON	CSD16323Q3	TI
D ₁	Diode Schottky, 30V, 3A	SOD128	PMEG3030EP	Vishay
L ₁	Shielded Inductor, 1.8μH, 10A	6.36mm L x 6.56mm W x 3.1mm H	XAL6030-182ME	Coilcraft
U ₁	LM3478MM			TI
	EDGE CONNECTOR		307-020-500-202	EDAC

4 Optional components

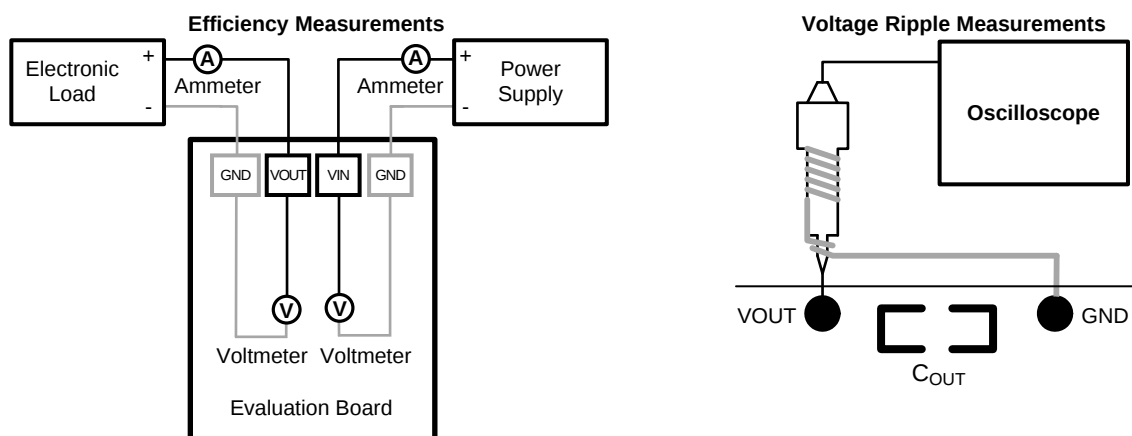
C_{IN2} is an additional input capacitor.

C_{FF} increases the gain of the dynamic loop during load transients.

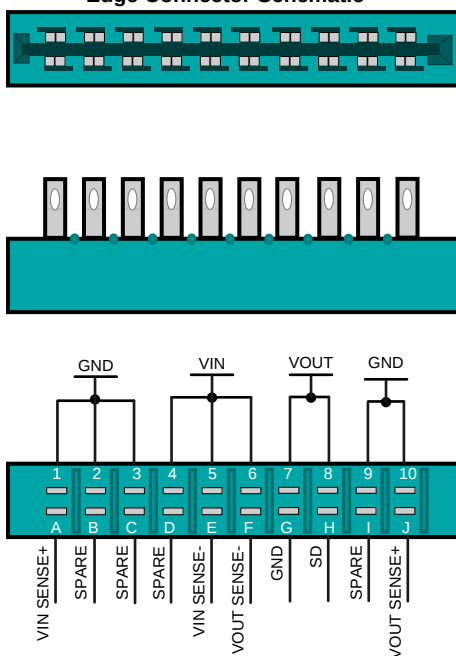
5 Test Setup

Table 2. Demonstration Board Quick Setup Procedures

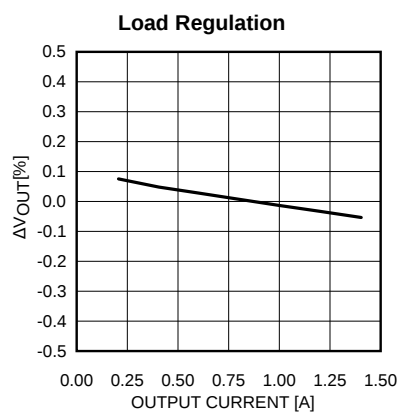
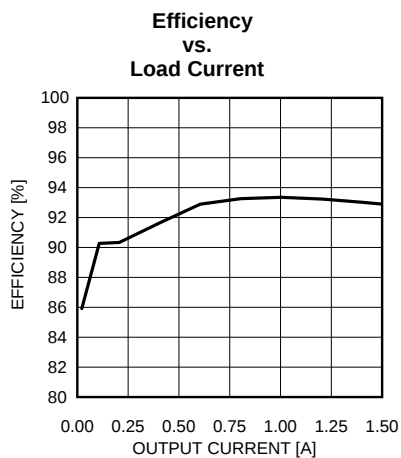
Step	Description	Notes
1	Connect a power supply to V _{IN} and GND terminals	V _{IN} range: 4.5V to 5.5V
2	Turn on V _{IN} with 0A load applied, check V _{OUT}	V _{OUT} = 12V
3	Slowly increase the load from 0A to 1.5A, check V _{OUT}	V _{OUT} = 12V



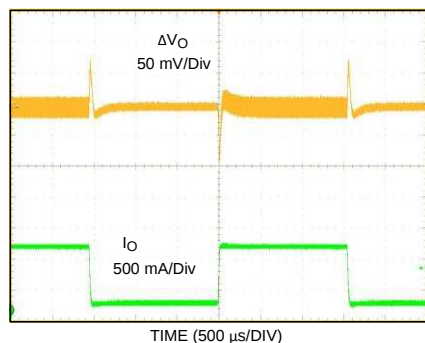
Edge Connector Schematic



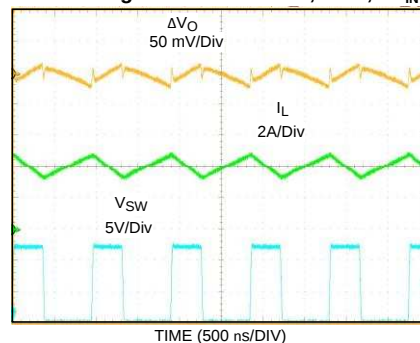
6 Typical Performance Characteristics for LM3478 Evaluation Board



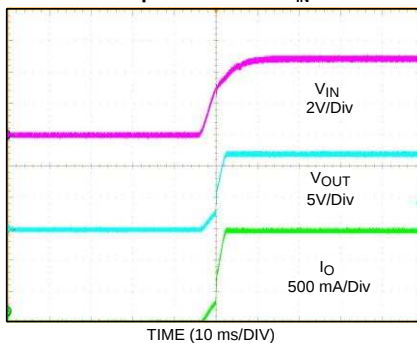
Load Transient Waveforms 500mA to 1500mA, 5V_{IN}



Switching Waveforms CCM, 1.5A, 5V_{IN}



Startup Waveforms V_{IN} = 5V



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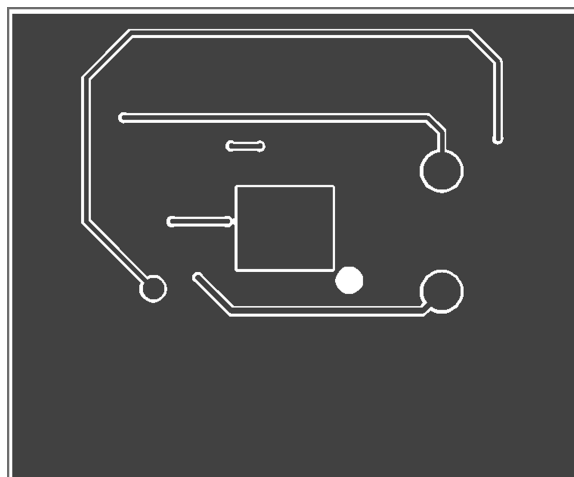


Figure 7. Mid Layer 2

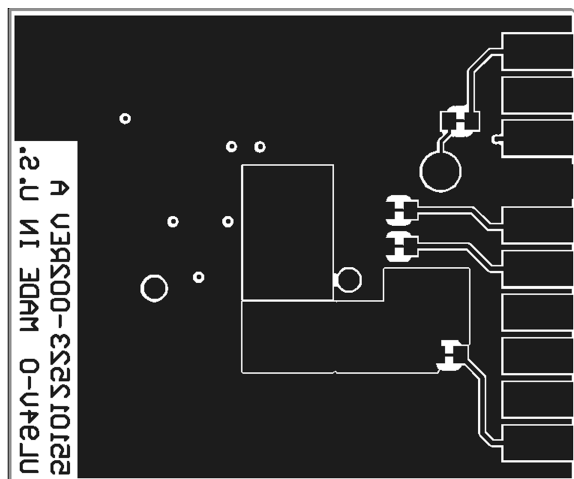


Figure 8. Bottom Layer

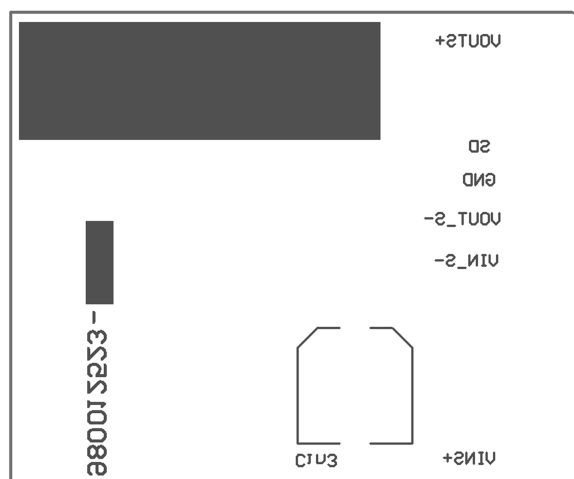


Figure 9. Bottom Silkscreen

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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