

AN-1204 LM3478/LM3488 Evaluation Board

User's Guide



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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.

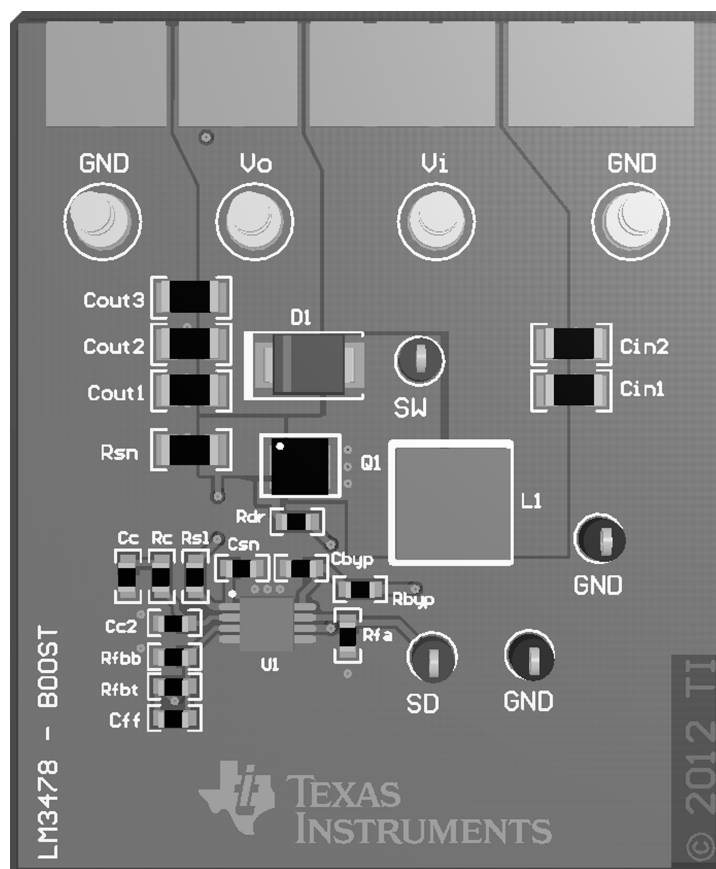
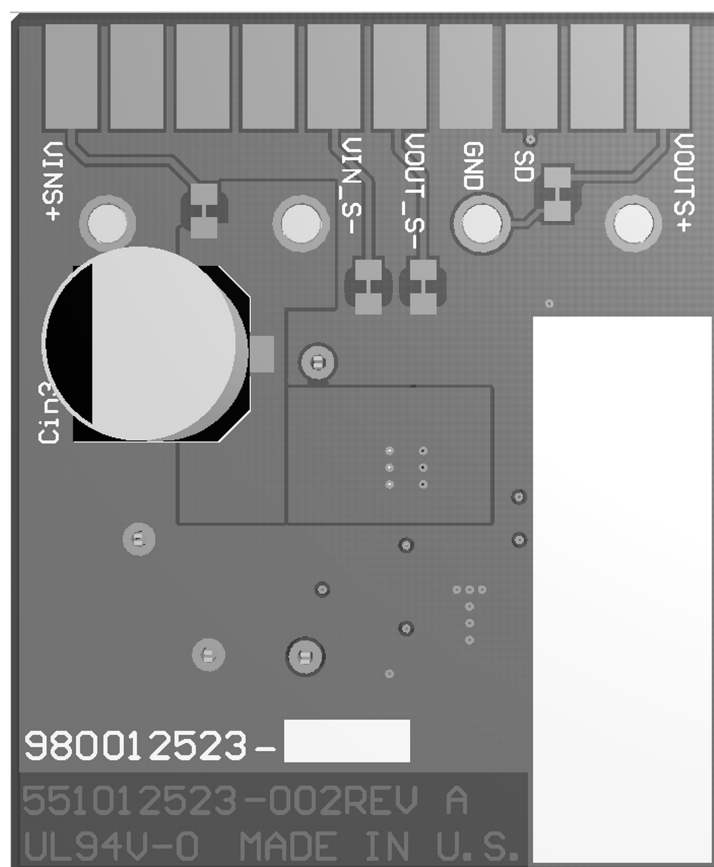


Figure 1. Top View



A Bottom View

Figure 2. LM3478 Evaluation Board

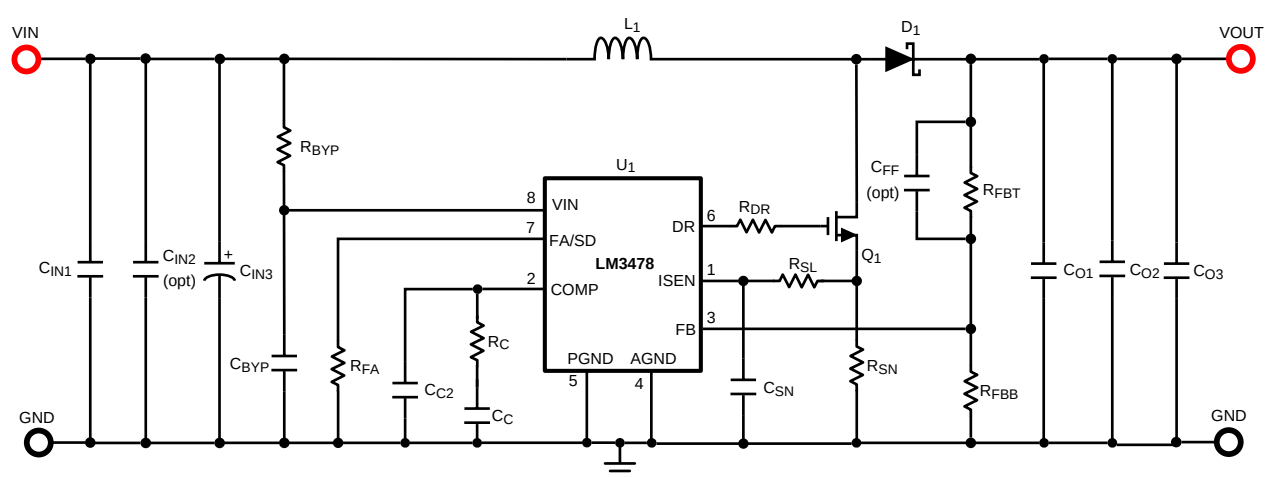


Figure 3. LM3478 Evaluation Board Schematic

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

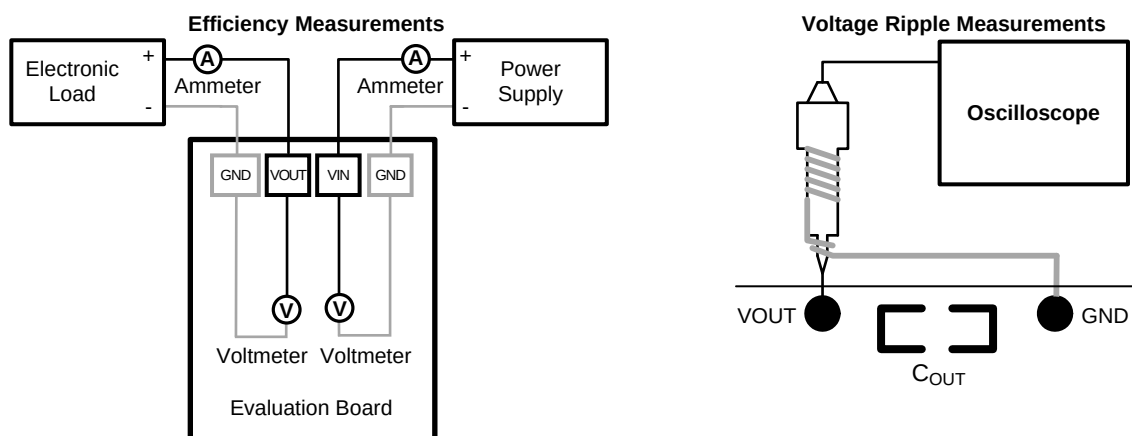
C_{IN2} is an additional input capacitor.

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

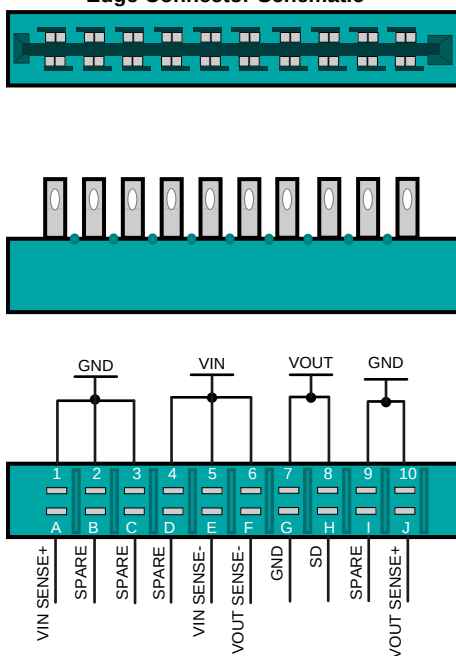
5 Test Setup

Table 2. Demonstration Board Quick Setup Procedures

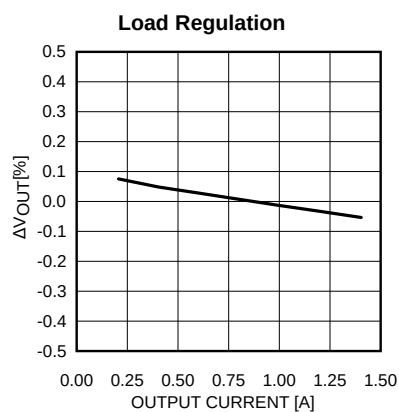
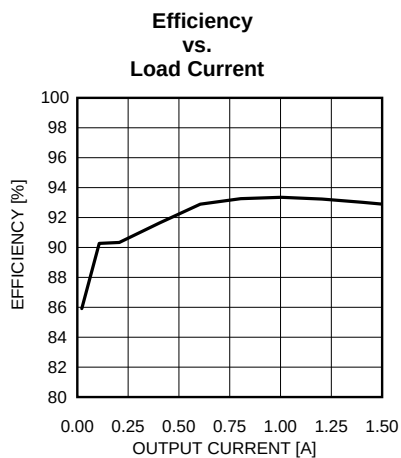
Step	Description	Notes
1	Connect a power supply to V _{IN} and GND terminals	V _{IN} range: 4.5V to 5.5V
2	Turn on V _{IN} with 0A load applied, check V _{OUT}	V _{OUT} = 12V
3	Slowly increase the load from 0A to 1.5A, check V _{OUT}	V _{OUT} = 12V



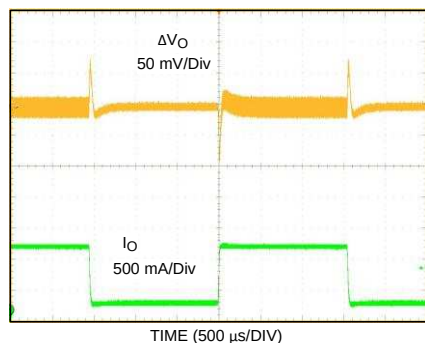
Edge Connector Schematic



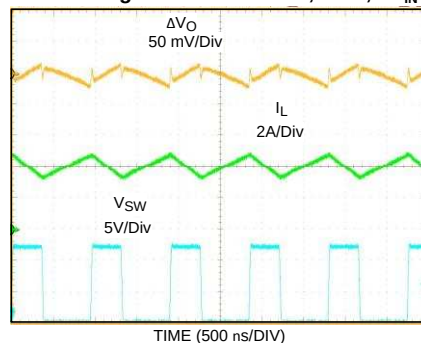
6 Typical Performance Characteristics for LM3478 Evaluation Board



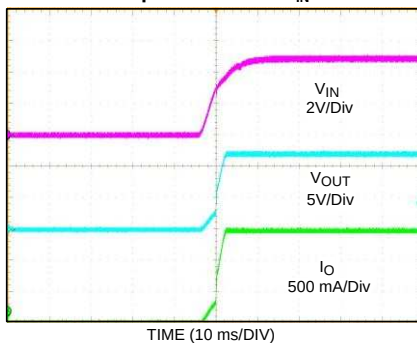
Load Transient Waveforms 500mA to 1500mA, 5V_{IN}



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



Startup Waveforms V_{IN} = 5V



7 Layout

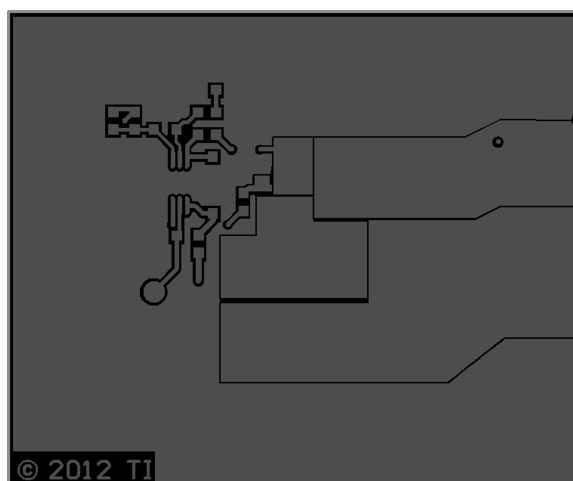


Figure 4. Top Layer

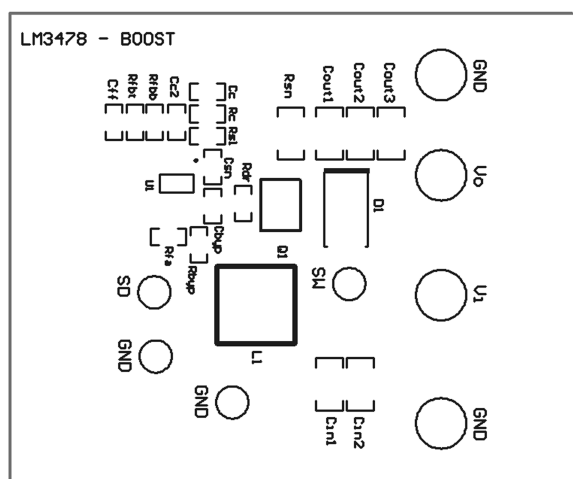


Figure 5. Top Silkscreen

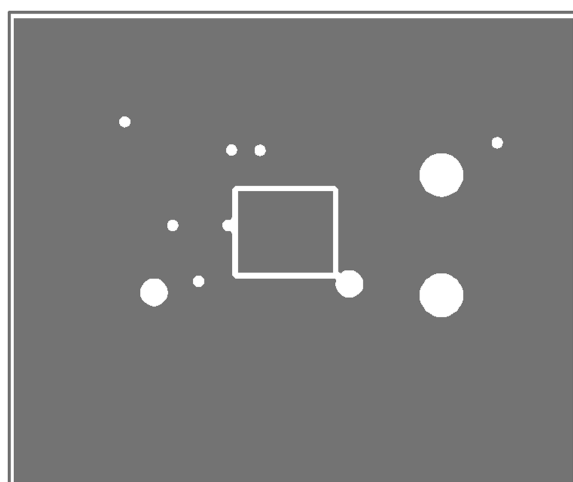


Figure 6. Mid Layer 1

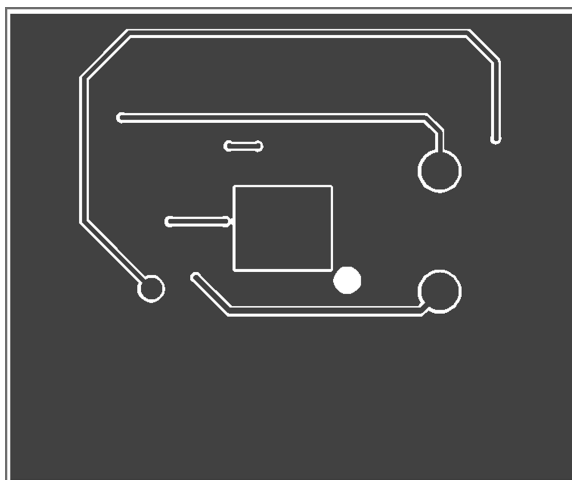


Figure 7. Mid Layer 2

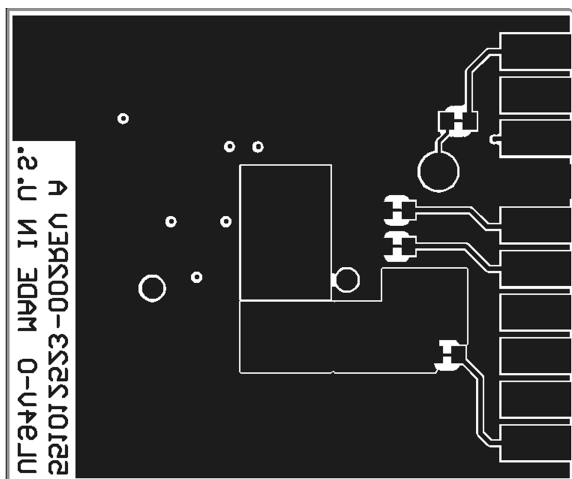


Figure 8. Bottom Layer

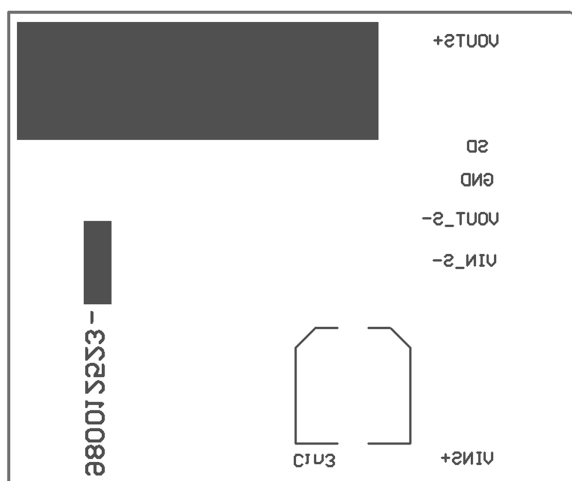


Figure 9. Bottom Silkscreen

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- *Reorient or relocate the receiving antenna.*
- *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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Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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