User Guide

NX9548 9 A Single Channel Mobile PWM Switching Regulator Evaluation Board

Contents

1 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 1.0

Revision 1.0 was published in August 2017. It was the first publication of this document.

2 Product Overview

The NX9548 is a buck switching converter in a multi-chip module designed for a step-down DC-to-DC converter in portable applications. It is optimized to convert a single supply up to 24 V bus voltage to as low as 0.75 V output voltage. The output current can be up to 9 A.

It can be selected to operate in synchronous mode or non-synchronous mode to improve the efficiency at light load. Constant on-time control provides fast response, good line regulation, and nearly constant frequency under wide voltage input range. It also includes over-current protection and FB UVLO followed by latch feature.

Also included are an internal boost Schottky diode, 5 V gate drive capability, power good indicator, over-current protection, over-voltage protection, and adaptive dead band control. The NX9548 is available in a 5 mm × 5 mm MCM package.

2.1 Key Features

- Internal boost Schottky diode
- Ultrasonic mode operation available
- Bus voltage operation from 4.5 V to 24 V
- Less than 1 uA shutdown current with enable low
- Excellent dynamic response with constant on-time control
- Selectable between synchronous CCM mode and diode emulation mode to improve efficiency at light load
- Programmable switching frequency
- Current limit and FB UVLO with latch off
- Over-voltage protection with latch off

2.2 Applications

- UMPC, notebook OCs, and desknotes
- Tablet PCs/slates
- On-board DC-to-DC such as 12 V to 3.3 V, 2.5 V, or 1.8 V
- Hand-held portable Instruments

2.3 Ordering Information

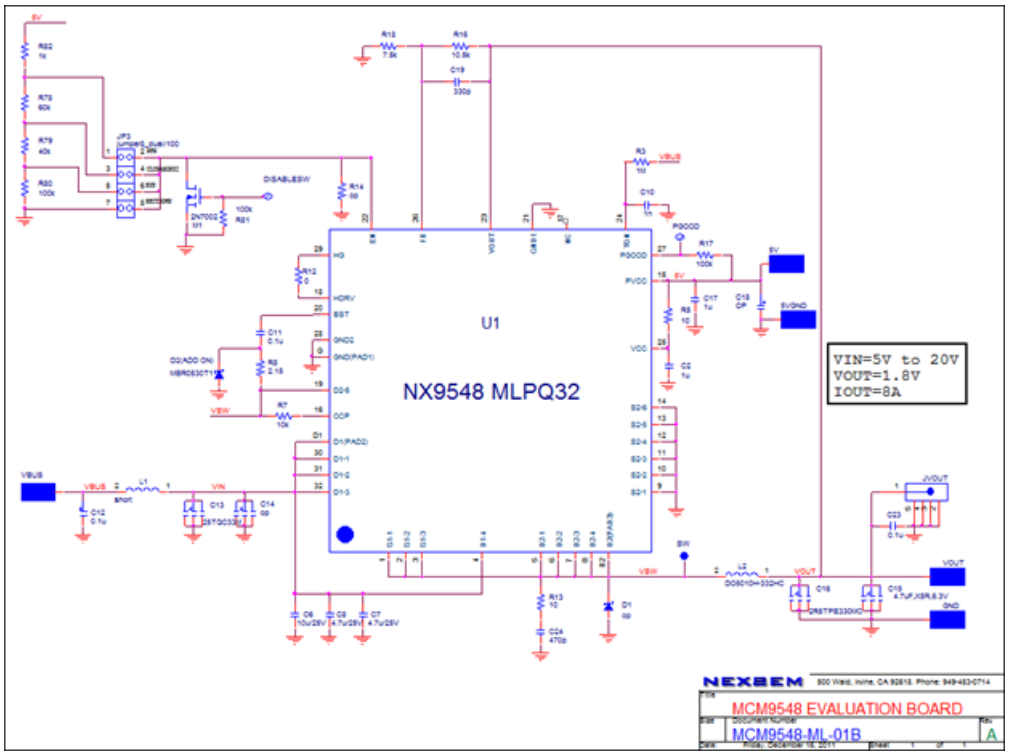
IC Part Number	Description
NX9548CMTR	Plastic 5 mm x 5 mm MCM—32L

Evaluation Board Part Number	Description
NX9548 Evaluation Board	Evaluation PCB for NX9548

2.4 Evaluation Board Schematic and Layout

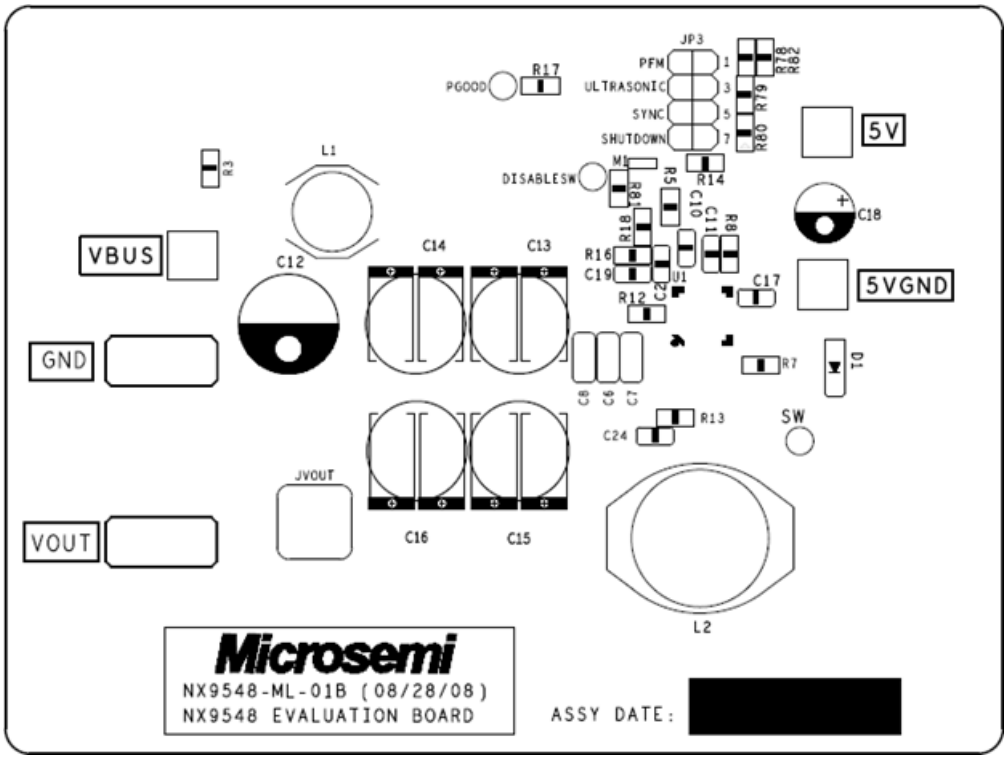
The following illustration shows a schematic of the NX9548 device.

Figure 1 • Schematic of Evaluation Board



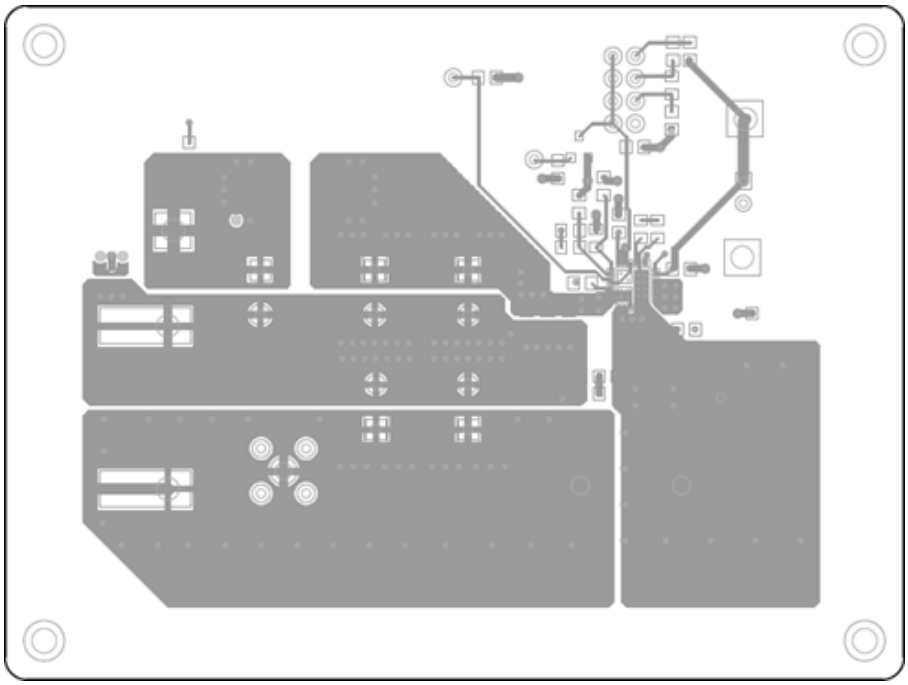
The following illustration shows the layout of the NX9548 device.

Figure 2 • Top Silk Screen



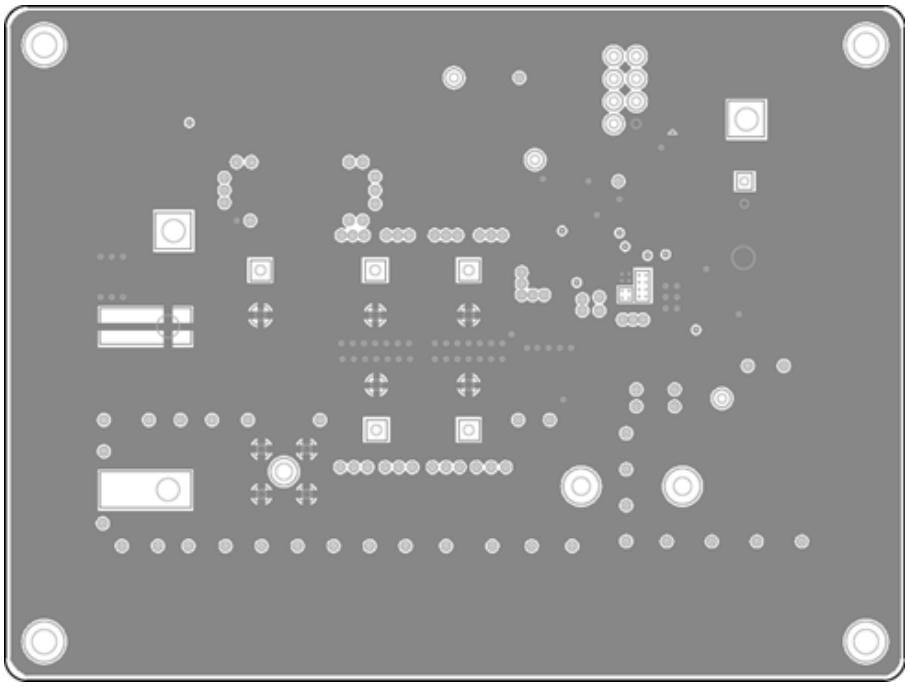
The following illustration shows the top layer of the NX9548 device.

Figure 3 • Top Layer



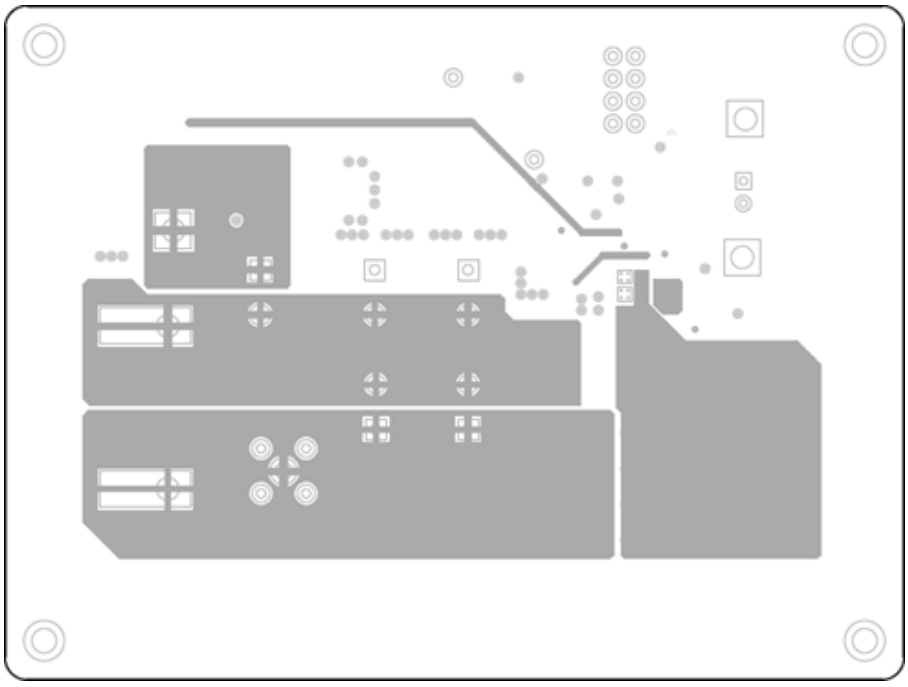
The following illustration shows the second layer of the NX9548 device.

Figure 4 • Second Layer



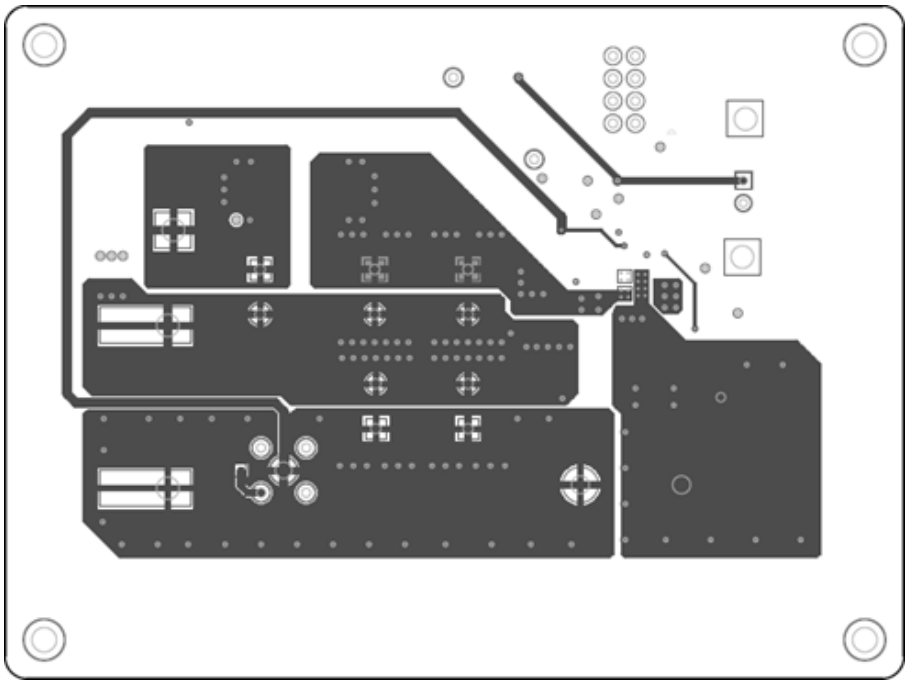
The following illustration shows the third layer of the NX9548 device.

Figure 5 • Third Layer



The following illustration shows the bottom layer of the NX9548 device.

Figure 6 • Bottom Layer



3 Bill of Materials

The following table lists the bill of materials.

Table 1 • Miscellaneous Components

Item	Part Description	Reference	Qty
1	Microsemi IC—NX9548	U1	1
2	Test point	SW, PGOOD, DISABLESW	3
3	Terminal	5V, VOUT, VBUS, 5VGND, GND	5
4	Scope test point	JVOUT	1
5	Jumper8_dual/100	JP3	1
6	1 uF capacitor	C2, C17	2
7	10 uF/25 V capacitor	C6	1
8	4.7 uF/25 V capacitor	C7, C8	2
9	1 nF capacitor	C10	1
10	0.1 uF capacitor	C11, C23	2
11	0.1 uF aluminum capacitor	C12	1
12	25TQC33M capacitor	C13	1
13	4.7 uF/6.3 V/X5R capacitor	C15	1
14	2R5TPE330MC capacitor	C16	1
15	330 pF capacitor	C19	1
16	470 pF capacitor	C24	1
17	1 MΩ resistor	R3	1
18	10 Ω resistor	R5, R13	2
19	10 kΩ resistor	R7	1
20	2.15 Ω resistor	R8	1
21	0 Ω resistor	R12	1
22	10.5 kΩ resistor	R16	1
23	100 kΩ resistor	R17, R80, R81	3
24	7.5 kΩ resistor	R18	1
25	60 kΩ resistor	R78	1
26	40 kΩ resistor	R79	1
27	1 kΩ resistor	R82	1
28	DO5010H-332HC inductor	L2	1
29	2N7002 MOSFET	M1	1
30	MBR0530T1 diode	D2(ADD ON)	1

4 Recommended Operating Conditions

The following table describes the recommended operating conditions.

Table 2 • Recommended Operating Temperature

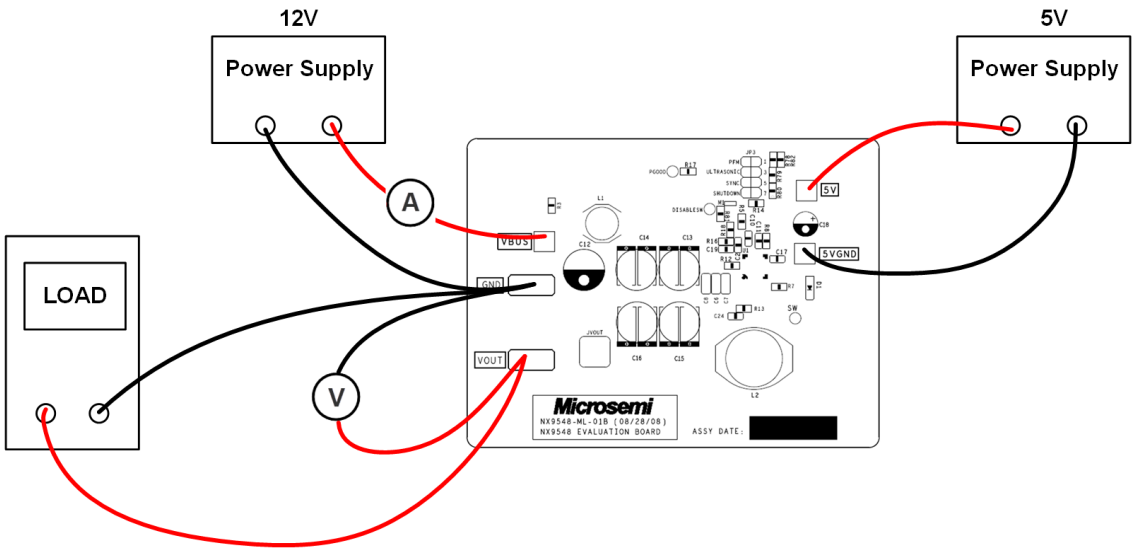
Description	Symbol	Min	Max	Unit
Input voltage	V_{IN}	4.5	24	V
Output current	I_{OUT}	0	9	A
Operating ambient temperature	T_A	0	70	°C
Non-synchronous mode	ENSW /MODE	VCC	VCC	
Synchronous mode	ENSW /MODE	Floating or 2 V		
Shut-down chip	ENSW /MODE	Pull to GND	Pull to GND	

V_{OUT} is set by the following equation:

$V_{OUT} = V_{FB} * (1 + 7.5k / R_{FB})$ V_{FB}= 0.75 V ($R_{FB} = R_{18}$)

The following illustration shows the power supply and load connection.

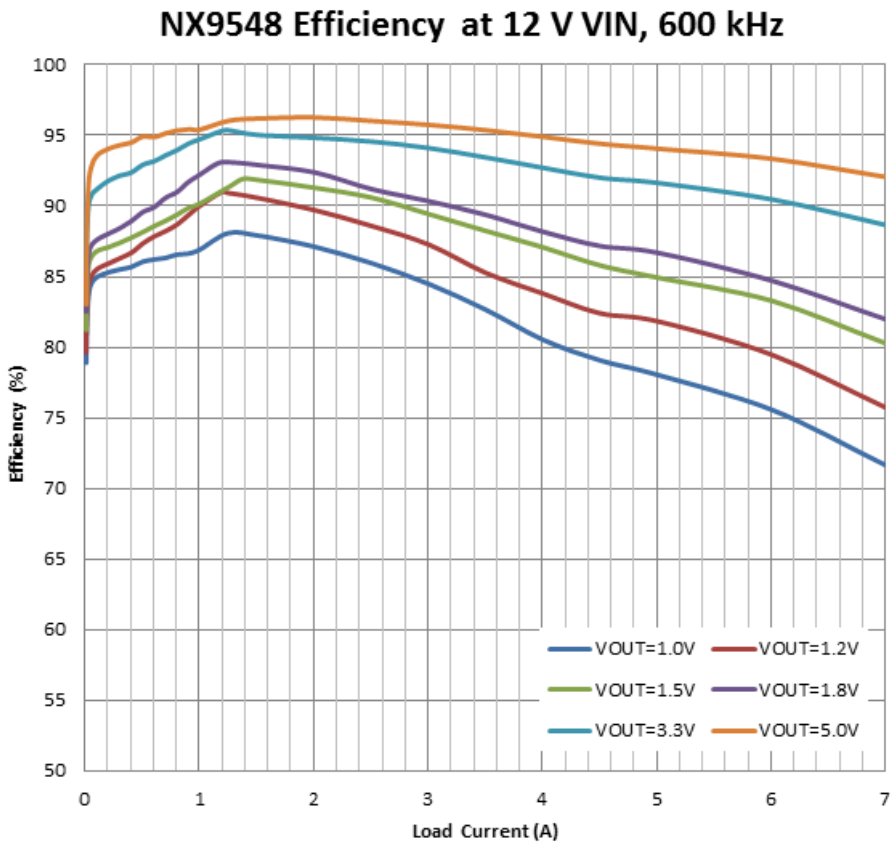
Figure 7 • Power Supply and Load Connection



5 Efficiency

The following illustration shows an efficiency plot of NX9548 device.

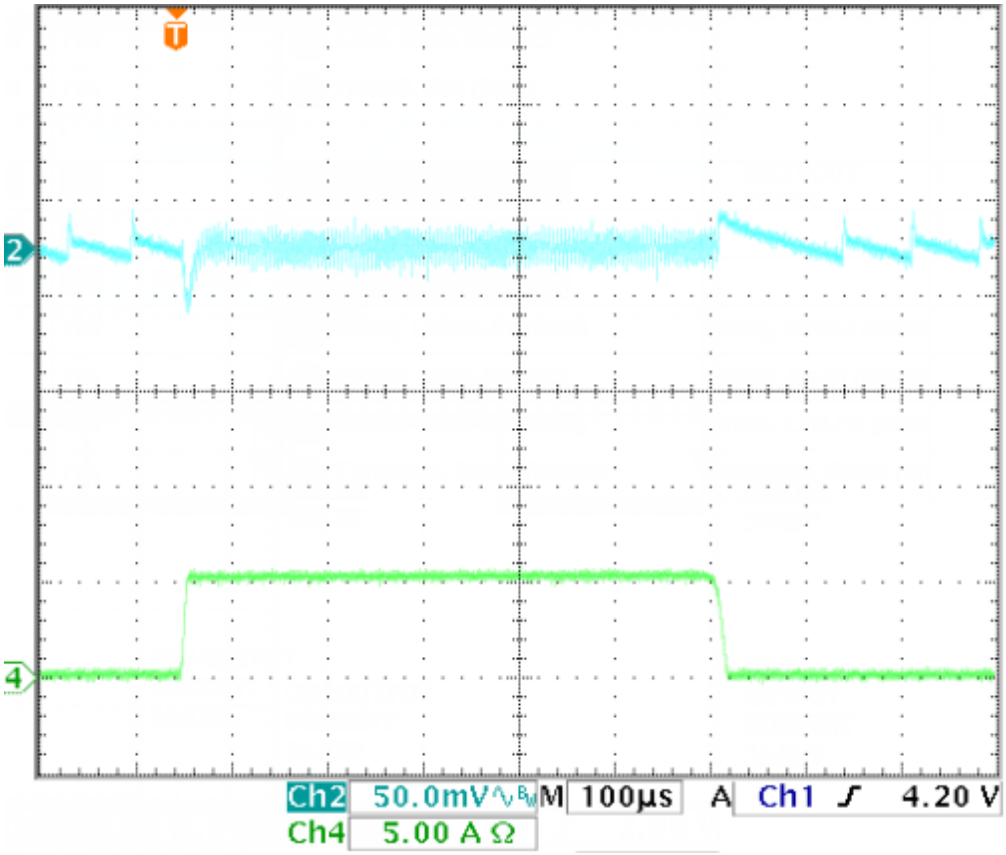
Figure 8 • Efficiency Plot of NX9548



6 Dynamic Load Response

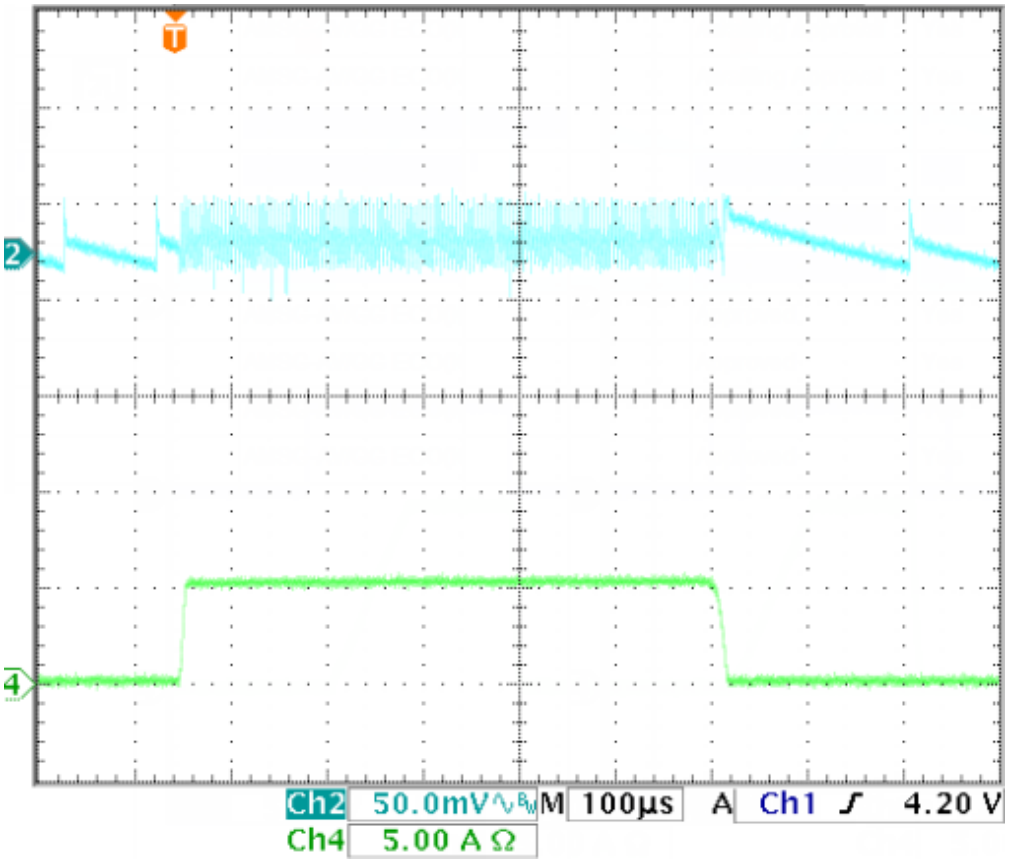
The following illustration shows step response in PFM mode when V_{IN}= 5 V.

Figure 9 • Step Response VIN=5V



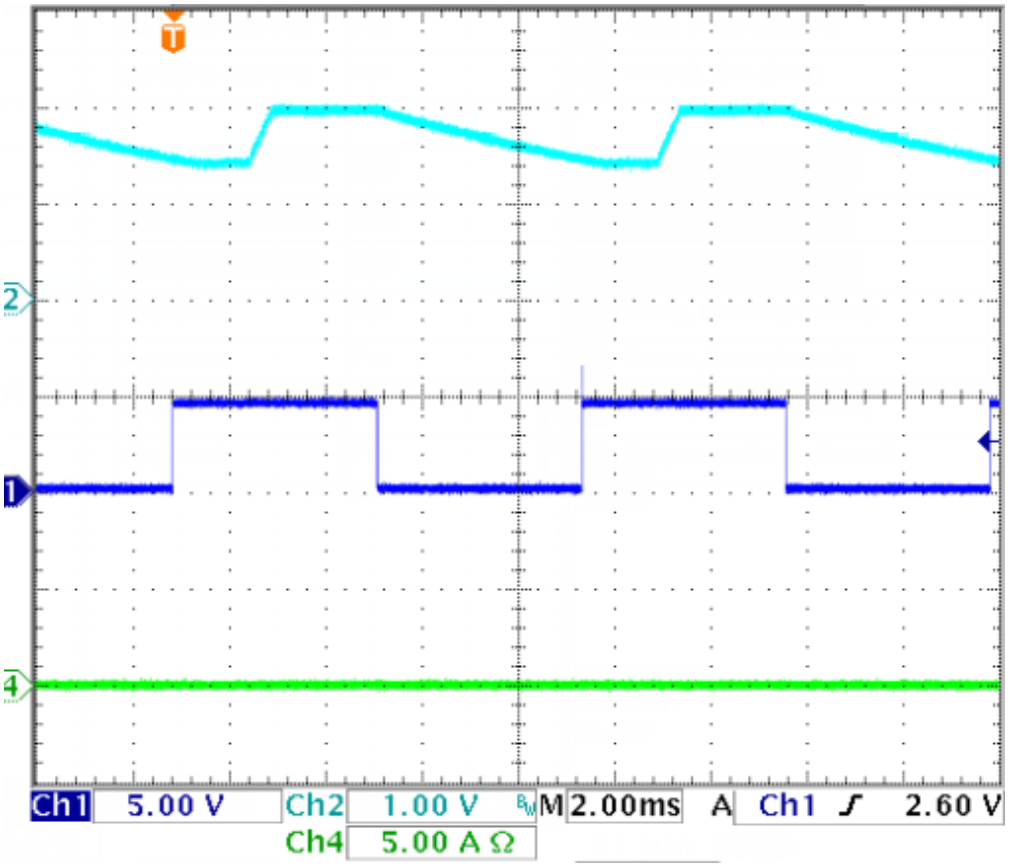
The following illustration shows step response in PFM mode when V_{IN}= 20 V.

Figure 10 • Step Response VIN=20V



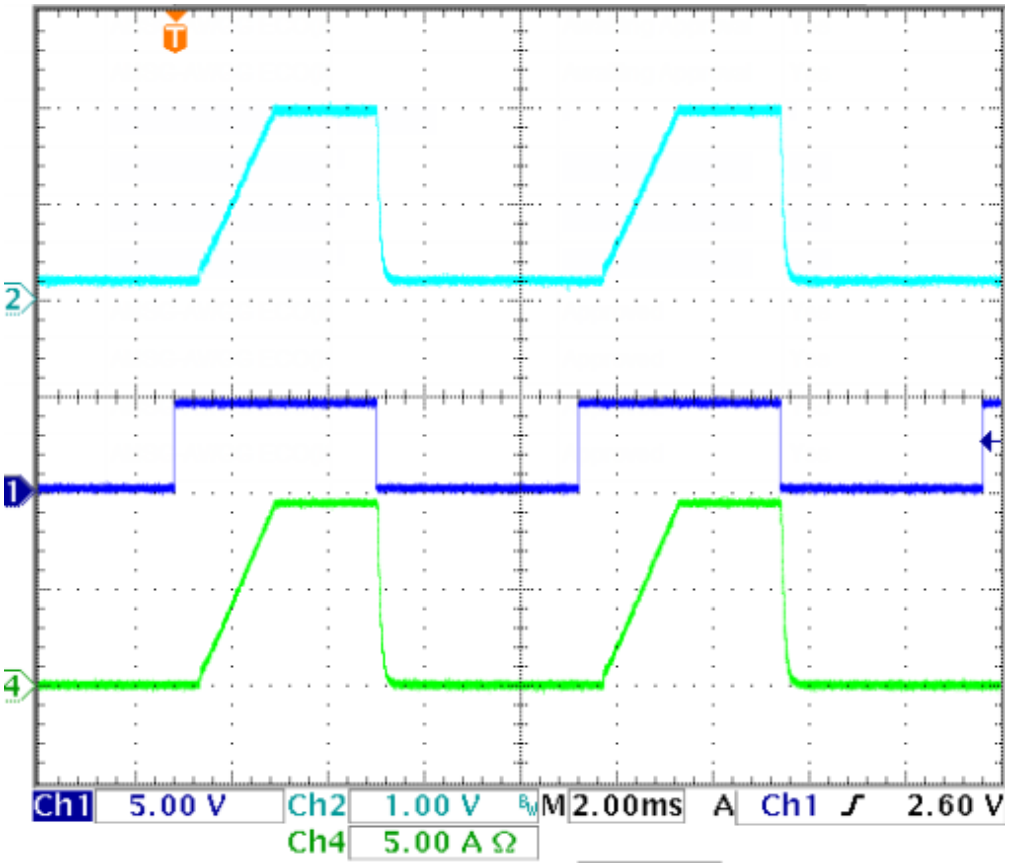
The following illustration shows start-up and shut-down at no load.

Figure 11 • Start-Up and Shut-Down (no load)



The following illustration shows start-up when the 12 V bus is present and 5 V is started up.

Figure 12 • Start-Up (12 V bus present, 5 V started up)



Microsemi Corporate Headquarters
One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

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