

Design Note

UC3584DW Secondary Side Post Regulator Evaluation Board Schematic, and List of Materials

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Introduction

The operation of the UC3584 Secondary Side Post Regulator can quickly be evaluated in a given system by using this separate board containing a fully functional auxiliary converter. This controller provides a semiconductor solution for regulating auxiliary outputs in transformer isolated power supplies where magnetic amplifiers (magamps) were previously used. Circuit operation is synchronized to the main power converter and is based on leading edge modulation. This technique is compatible with both primary side current-mode and voltage-mode controls employed by the main converter.

Circuit Description

As shown in Fig. 1, a buck power stage produces the regulated auxiliary output at the AUX OUT connector. The input power is provided at V_{IN} and can be connected to a variety of single and double ended buck-derived converters. One such case is shown in Fig. 2 for a push-pull converter. This power connection is made at the common cathode of the main output node just before the main filter inductor. Connection at this node affords both synchronization to the primary controller and power transfer. Note that the oscillator is set at approximately 150kHz to make synchronization to a 170kHz converter possible. To guarantee synchronization, the free running oscillator frequency should be set to less than the main frequency by adjusting R11 and C10.

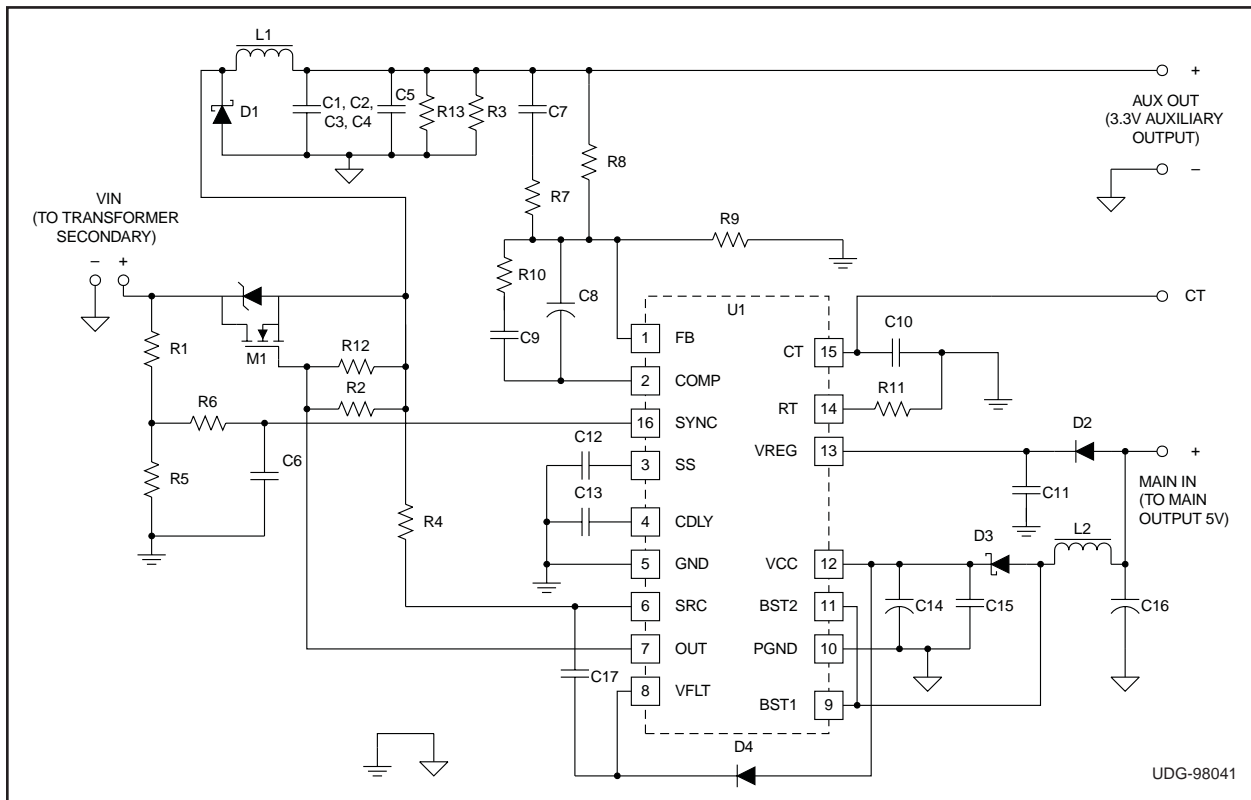


Figure 1. Evaluation board schematic.

The auxiliary circuit is designed to interface to a 5.0V main output and its output is set to 3.3V at 10W. Other configurations are possible with minor changes to R7, C7, R8, R9, C8, C9 and R10. The surface mount design permits the use of the lowest thermal impedance package (UC3584DW) and minimizes required circuit board area. Compensation of the auxiliary circuit uses a lead-lag network providing the most flexibility for other designs. Power to the IC (U1) is generated by the boost cir-

cuit consisting primarily of L2, D3, C14 and an internal boost switch. The boost circuit can be replaced if desired, by a simple voltage doubler attached to the main transformer secondary winding.

For more complete information, pin descriptions and specifications for the UC3584DW Secondary Side Post Regulator, please refer to the UC3584, UCC3583 and the UCC3808 data sheet or contact your Unitrode Field Applications Engineer.

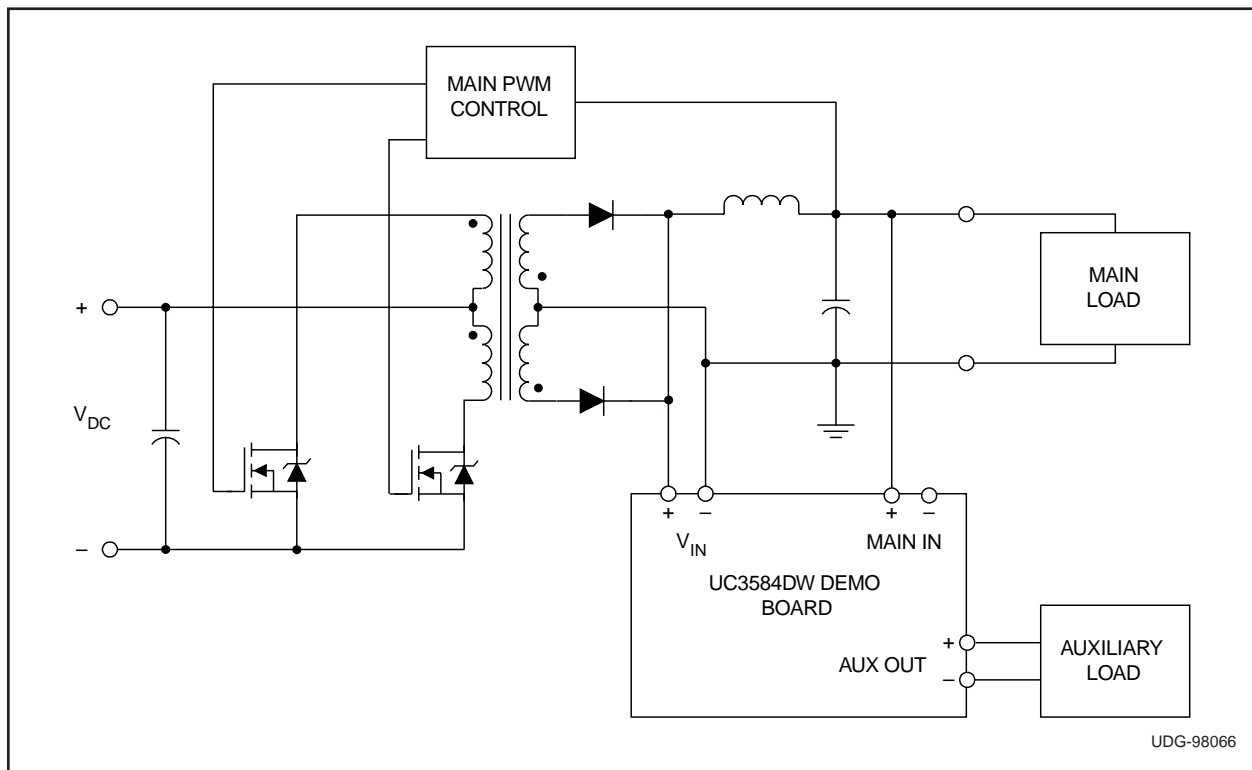


Figure 2. Connections between push-pull power stage and UC3584DW evaluation board.

Reference Designator	Description	Manufacturer	Part Number
C1, C2, C3, C4	390 μ F, 6.3V, R Case Code, Solid Tantalum	Sprague, Newark	595D397X06R3R2T
C5, C11, C12, C15	0.1 μ F, 50V, 1206, X7R, \pm 10%	Xicon, Mouser	140-CC502B104K
C6	100 pF, 50V, 1206, NPO, \pm 5%	Xicon, Mouser	140-CC502N101J
C7	4700 pF, 50V, 1206, X7R, \pm 10%	Xicon, Mouser	140-CC502B472K
C8	120 pF, 50V, 1206, NPO, \pm 5%	Xicon, Mouser	140-CC502N121J
C9	0.01 μ F, 50V, 1206, X7R, \pm 10%	Xicon, Mouser	140-CC502B103K
C10	220 pF, 50V, 1206, NPO, \pm 5%	Xicon, Mouser	140-CC502N221J
C13	1000 pF, 50V, 1206, X7R, \pm 10%	Xicon, Mouser	140-CC502B102K
C14	10 μ F, 25V, 7343, Tantalum, \pm 20%	Kemet, Newark	T491D106M025AS

Table 1. Evaluation board list of materials.

Reference Designator	Description	Manufacturer	Part Number
C16	470 μ F, 6V, 7343H, Tantalum, \pm 20%	Kemet	T510X477M006AS
C17	1.5 μ F, 25V, Tantalum, \pm 20%	Panasonic, Digikey	ECS-H1EX155R
D1	Schottky, 10A, 45V	Central Semiconductor	CSHD10-45L
D2, D4	1N4148	Diodes Inc.	1N4148
D3	Schottky, 1.0A, 40V	IR	10BQ040
L1	33 μ H, 3.7A rms, 52m Ω	Coiltronics	UP4-330
L2	33 μ H, 2.4A rms, 98.9m Ω	Coiltronics	UP2-330
M1	MOSFET, 60V, 0.10 Ω , 14A	IR	IRFR024
R1	4.75k Ω , 1206, 1/8W	Panasonic, Digikey	P4.75KFCT-ND
R2, R12	2k Ω , 1206, 1/8W	Panasonic, Digikey	P2.0KFCT-ND
R3, R13	243 Ω , 1206, 1/8W	Panasonic, Digikey	P243FCT-ND
R4	3.3 Ω , 1206, 1/8W	Panasonic, Digikey	P3.3RCT-ND
R5	3.57k Ω , 1206, 1/8W	Panasonic, Digikey	P3.57KFCT-ND
R6	1k Ω , 1206, 1/8W	Panasonic, Digikey	P1.0KFCT-ND
R7	13.3k Ω , 1206, 1/8W	Panasonic, Digikey	P13.3KFCT-ND
R8	68.1k Ω , 1206, 1/8W	Panasonic, Digikey	P68.1KFCT-ND
R9	57.6k Ω , 1206, 1/8W	Panasonic, Digikey	P57.6KFCT-ND
R10	17.8k Ω , 1206, 1/8W	Panasonic, Digikey	P17.8KFCT-ND
R11	15k Ω , 1206, 1/8W	Panasonic, Digikey	P15.0KFCT-ND
V _{IN} , AUX OUT, MAIN IN	Terminal Board Connectors	RDI/Mouser	506-2SV-02
COMP, CT	Test Points, SMT	Components Corp.	TP-108-02
U1	Secondary Side Synchronous Post Regulator	Unitrode	UC3584DW

Table 1. Evaluation board list of materials (continued).

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