

**UCC3889 Bias Supply Controller Evaluation Kit
– Schematic and Lists of Materials**

by Bill Andreycak

Evaluation Kits facilitate a quick measurement of new IC performance in typical application circuits without a lengthy investment of time and resources. The schematic for the UCC3889 Off-Line Bias Supply Controller IC Evaluation Kit is shown below in Figure 1 with a photograph of the top side layout in Figure 2. Notice that this board is designed to accept both conventional "through-hole" or leaded components as

well as their surface mount counterparts. An additional prototyping area allows engineers to further customize these units to address their projects' specific needs. Component lists for two popular 1 Watt (output power) applications are also provided, and complete design details are available in Unitrode Application Note U-149: "Elegantly Simple Off-Line Bias Supply for Very Low Power Applications".

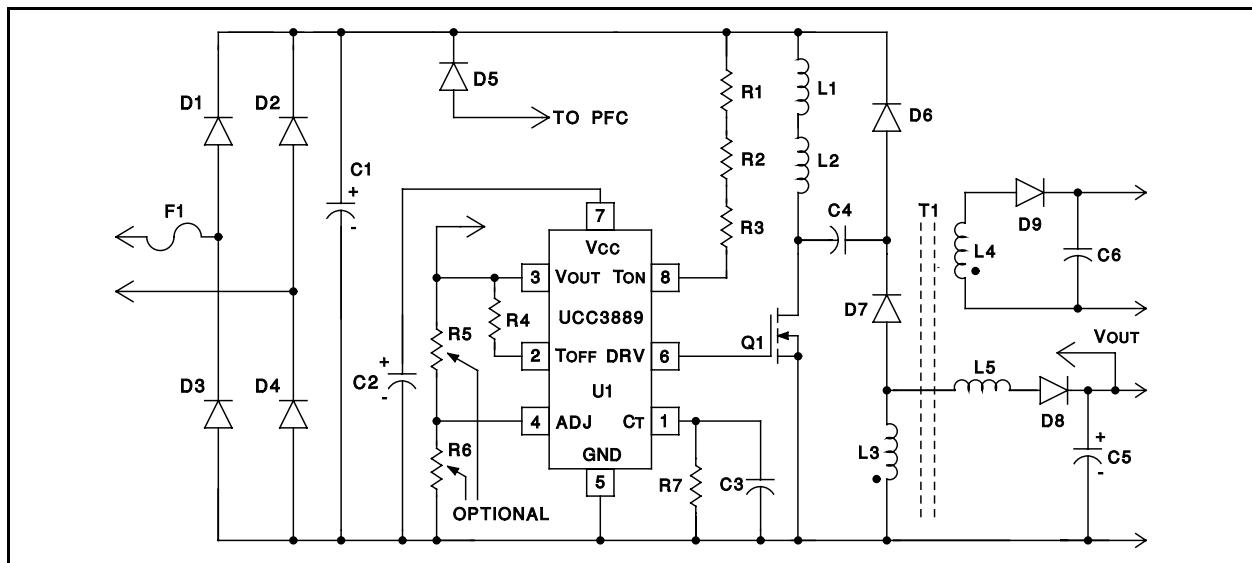


Figure 1. UCC3889 Evaluation Kit Schematic

**Nonisolated 85 to 265VAC Universal Input,
12VDC / 1 Watt Converter**

- C1 = 2.2 μ F/450 VDC Electrolytic
- C2 = 2.2 μ F/35 VDC Electrolytic
- C3 = 150pF/16 VDC Ceramic Disc
- C4 = 0.1 μ F/100 VDC Polyester foil
- C5 = 33 μ F/25VDC Electrolytic (low ESR)
- D1-D4 = 1A/800V Rectifier (1N4006)
- D6,D7 = 1A/600V Fast Recovery Rectifier (1N4937)
- D8 = 1A/200VDC Fast Recovery Rectifier (1N4935)
- F1 = 0.2 ADC/250VAC Fuse
- L1,L2 = 1mH (each) Inductor, 200 mA peak, 250 VDC rating
- L3 = 390 μ H Inductor, 250mA peak

- L5 = Jumper Wire, AWG#20 (short circuit)
- Q1 = 600V/2A MOSFET, (MTP1N60 or IRFBC10)
- R1,2,3 = 110k, 1/2W, 5%, 150VDC rating each (three used)
- R4 = 150k, 1/4W, 5%
- R7 = 2 Meg, 1/4W, 5%
- U1 = UCC3889 Control IC

Components **NOT USED** in this design:
C6, D5, D9, L4, R5, R6

Optional component list:

- D5 = 1A/800V DIODE (1N4006) - used with DC input from PFC or UPS
- R5,R6 = 1/4W, 5% resistors - used to program other output voltages

Transformer Isolated 85 to 265VAC Universal Input, 12VDC / 1 Watt Converter

- C1 = 2.2 μ F/450 VDC Electrolytic
 C2 = 1 μ F/35 VDC Electrolytic
 C3 = 150pF/16 VDC Ceramic
 C4 = 0.1 μ F/150 VDC Polyester foil
 C5,6 = 33 μ F/25VDC Electrolytic (low ESR)
 D1-4 = 1A/800V Rectifier (1N4006)
 D6,7 = 1A/600V Fast Recovery Rectifier (1N4937)
 D8,9 = 1A/200VDC Fast Recovery Rectifier (1N4935)
 F1 = 0.2ADC/250VAC Fuse
 L1,2 = 1mH (each) Inductor, 200mA peak, 250VDC rating
 L4 = Transformer; 1:1 Turns ratio, 300 μ H (Coilcraft # E3497A)
 L5 = 10 μ H, 750mA peak
 Q1 = 600V/2A MOSFET, (MTP1N60 or IRFBC10)
 R1,2,3 = 110k, 1/2W, 5%, 150VDC rating each (three used)
 R4 = 150k, 1/4W, 5%
 R7 = 2 Meg, 1/4W, 5%
 U1 = UCC3889 CONTROL IC

Components **NOT USED** in this design:
 D5, L3, R5, R6

Optional component list:

- D5 = 1A/800V DIODE (1N4006) - used with DC input from PFC or UPS
 R5,R6 = 1/4W, 5% resistors - used to program other output voltages

Note that the control technique and cascade Flyback configuration used in these examples can be extended to higher power levels and a variety of applications. This is accomplished by selecting the converter's power components accordingly. Higher current ratings for the power MOSFET, rectifiers and inductors, along with lower inductance values are usually all that's required. Other topologies, for example, the simple (non-cascaded) flyback, forward and boost converters can be controlled by the UCC3889 IC. Many distributed DC power and DC to DC converters make likely candidates for this control technique. Power Factor Correction (PFC) can also be achieved with this IC when used in a discontinuous inductor current boost configuration. Consult Unitrode Application Note U-132 for information on the controlled on-time, variable off-time PFC control technique which can be implemented with the UCC3889 without the need for current sensing. For further information, contact a local Unitrode representative or Field Application Engineer.

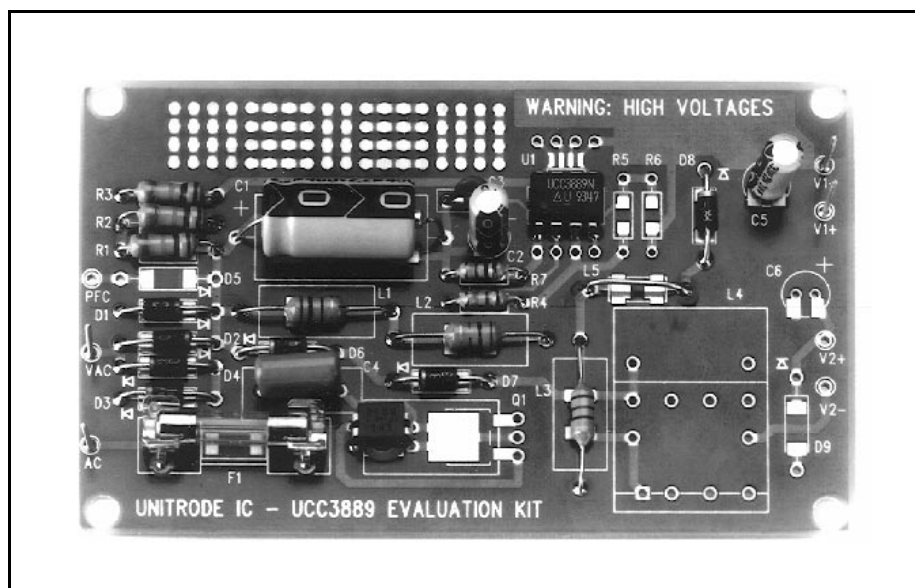


Figure 2. Top Side PC Board Photo

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.