

LT3512: Monolithic High Voltage Isolated Flyback Converter

DESCRIPTION

Demonstration circuit 1803A is a monolithic high voltage isolated flyback converter featuring the LT[®]3512. The demo circuit is designed for a 5V isolated output from an input voltage range of 36V to 75V. The maximum output current is 500mA. V_{IN} can be lower if output current is less than 500mA. The circuit doesn't require an opto-isolator due to the output voltage being sensed directly from the primary side transformer winding. A third winding is used to bias the LT3512 for highest efficiency.

The flyback converter requires a minimum loading to maintain good regulation. A Zener diode is placed between V_{OUT+} and V_{OUT-} to clamp output voltage to $\sim 7.5V$ if minimum load requirement is not met. Depending on the input voltage and the output regulation requirement, a 20mA to 30mA minimum load is usually sufficient.

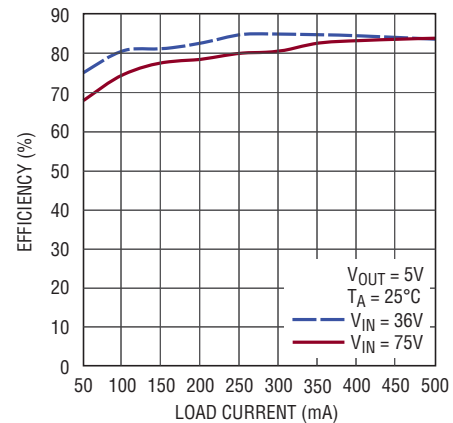
The demo circuit uses a diode-Zener clamp to limit the peak spike voltage due to transformer leakage inductance. A diode-Zener clamp is more efficient than a RCD clamp.

The LT3512 operates in boundary mode and also provides output voltage temperature compensation.

The LT3512 data sheet gives a complete description of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1803A.

Design files for this circuit board are available at <http://www.linear.com/demo>

LT, LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.



DC1803A F01

Figure 1. DC1803A Efficiency

PERFORMANCE SUMMARY ($T_A = 25^\circ C$)

PARAMETER	CONDITIONS	VALUE	UNITS
Minimum Input Supply Voltage		36	V
Maximum Input Supply Voltage		75	V
Output Voltage	$I_{OUT} = 500mA$	5	V
Output Voltage Tolerance	$I_{OUT} = 500mA$	± 5	%
Switching Frequency	$V_{IN} = 36V, I_{OUT} = 500mA$	160	kHz
	$V_{IN} = 75V, I_{OUT} = 500mA$	240	kHz
Maximum Output Current		500	mA
Efficiency	$V_{IN} = 36V, I_{OUT} = 500mA$	84	%

DEMO MANUAL DC1803A

QUICK START PROCEDURE

Demonstration circuit 1803A is easy to set up to evaluate the performance of the LT3512. Refer to Figure 2 for proper measurement equipment setup and to follow the procedure below:

Note: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the V_{IN} and GND or V_{OUT+} and V_{OUT-} terminals.

Note: Make sure GND and V_{OUT-} are not connected together accidentally, such as by two oscilloscope probes.

1. With power off, connect the input power supply to V_{IN} and GND.

2. Connect a load of 500mA or less to V_{OUT+} and V_{OUT-} terminals (not GND).
3. Turn on the power at the input.
4. Check for the proper output voltage (5V).

Note: If there is no output, temporarily disconnect the load to make sure that the load is not set too high.

5. Once the proper output voltage is established, adjust the load and input within the operating ranges and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

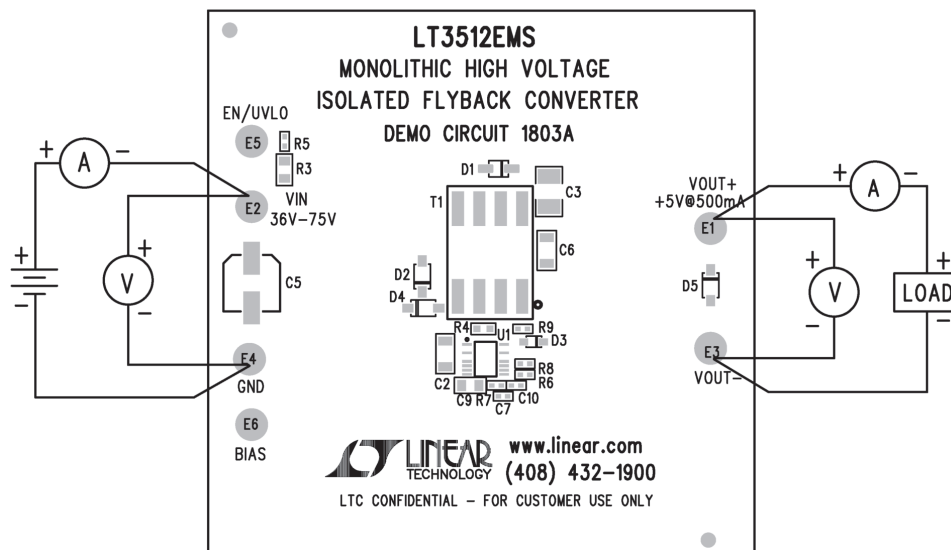


Figure 2. Proper Measurement Equipment Setup

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C2	CAP., X7R, 1 μ F 100V, 10%, 1206	MURATA, GRM31CR72A105KA01L
2	1	C3	CAP., X5R, 47 μ F 10V, 10%, 1210	MURATA, GRM32ER61A476KE20L
3	1	C5	CAP., ELECT., 10 μ F 100V	SUN ELEC., 100CE10BS
4	1	C9	CAP., X7R, 4.7 μ F 16V, 10%, 0805	TAIYO YUDEN, EMK212B7475KG
5	1	C10	CAP., X7R, 3300pF, 50V, 0402	AVX, 04025C332KAT2A
6	1	D1	DIODE, SCHOTTKY, SOD-123	DIODES INC SBR1A40S3
7	1	D2	DIODE, SOD-123	DIODES INC. BAV21W-7-F
8	1	D4	ZENER DIODE, SOD-123	ON SEMI., MMSZ5266BT1G
9	1	D5	ZENER DIODE, SOD-123	CENTRAL SEMI., CMHZ5236B TR
10	1	R3	RES., CHIP, 806k, 1%, 0805	VISHAY, CRCW0805806KFKEA
11	1	R4	RES., CHIP, 169k, 1%, 0603	VISHAY, CRCW0603169KFKEA

dc1803af

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
12	1	R5	RES., CHIP, 31.6k, 5%, 0402	VISHAY, CRCW040231K6JNED
13	1	R6	RES., CHIP, 75k, 1%, 0402	VISHAY, CRCW040275K0FKED
14	1	R7	RES., CHIP, 16.9k, 1%, 0402	VISHAY, CRCW040216K9FKED
15	1	R8	RES., CHIP, 10k, 1%, 0402	VISHAY, CRCW040210K0FKED
16	1	T1	TRANSFORMER, 175μH	WÜRTH ELEC., 750311559
17	1	U1	I.C., LT3512EMS, 16-PIN MSOP	LINEAR TECH., LT3512EMS

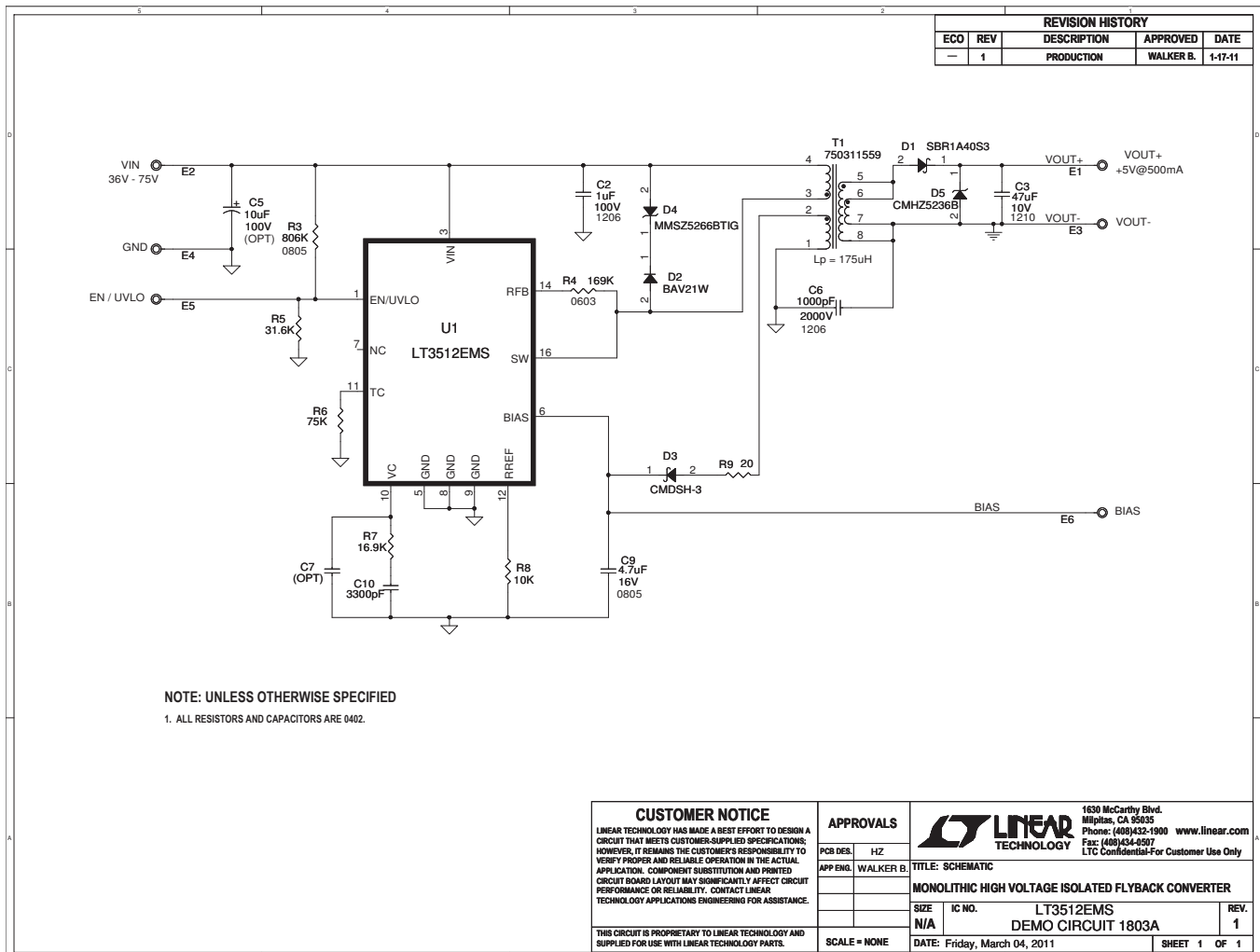
Additional Demo Board Circuit Components

1	1	C6	CAP., X7R, 1000pF 2000V, 10%, 1206	AVX 1206GC102KAT1A
2	0	C7 (OPT)	CAP., 0402	
3	1	D3	DIODE, SCHOTTKY, SOD-323	CENTRAL SEMI., CMDSH-3 TR
4	1	R9	RES., CHIP, 20, 1%, 0402	VISHAY, CRCW040220R0FKED

Hardware-For Demo Board Only

1	6	E1-E6	TESTPOINT, TURRET, 0.095"	MILL-MAX, 2501-2-00-80-00-00-07-0
---	---	-------	---------------------------	-----------------------------------

SCHEMATIC DIAGRAM



DEMO MANUAL DC1803A

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation

dc1803af