

Monolithic Dual Tracking 3.5A Step-Down Switching Regulator

DESCRIPTION

Demonstration circuit 1403A is a dual current mode PWM step-down DC/DC converter featuring the LT3692A. The demo circuit is designed for 5V and 3.3V outputs from a 7V to 36V input. The current capability of each channel is up to 3A. Individual soft-start, current limit, comparator, input voltage for each output as well as frequency division and synchronous and clock output functions simplify the complex design of dual-output power converters.

Both converters are synchronized to either a common external clock input or a resistor-programmable 250kHz to 2.25MHz internal oscillator. At all frequencies, a 180° phase shift between channels is maintained, reducing

voltage ripple. Programmable frequency allows optimization between efficiency and external component size. Each output can be independently disabled using its own SHDN pin and be placed in a low quiescent current shutdown mode.

The LT3692A data sheet gives complete description of the device, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1403A.

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

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EFFICIENCY GRAPH

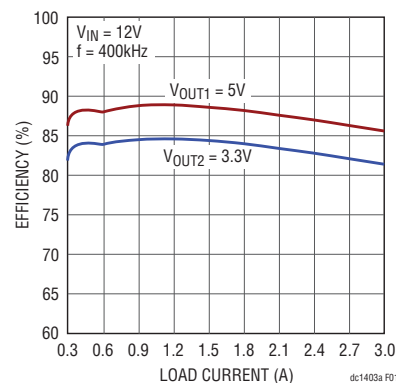


Figure 1. Efficiency vs Load Current

PERFORMANCE SUMMARY Specifications are at T_A = 25°C

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		7V
Maximum Input Voltage		36V
Output Voltage V _{OUT1}	V _{IN} = 7V ~ 36V	5V ±3%
Output Voltage V _{OUT2}	V _{IN} = 7V ~ 36V	3.3V ±3%
Switching Frequency		400kHz ±10%
Maximum Output Current I _{OUT1}	V _{IN} = 7V ~ 36V	3A
Maximum Output Current I _{OUT2}	V _{IN} = 7V ~ 36V	3A
Voltage Ripple V _{OUT1}	V _{IN} = 12V, I _{OUT1} = 3A	< 20mV
Voltage Ripple V _{OUT2}	V _{IN} = 12V, I _{OUT2} = 3A	< 20mV

dc1403af

DEMO MANUAL DC1403A

QUICK START PROCEDURE

Demo circuit 1403A is easy to set up to evaluate the performance of the LT3692A. Refer to Figure 2 for proper measurement equipment setup and follow this procedure:

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} or V_{OUT} and GND terminals. See Figure 3 for the proper scope probe technique.

1. Place JP1 on the SINGLE position.
2. With power off, connect the input power supply to V_{IN1} and GND. If DUAL is selected, connect another input power supply to V_{IN2} and GND.

3. Turn on the power at the input.

NOTE. Ensure that the input voltage does not exceed 36V.

4. Check for the proper output voltages.

NOTE. If there is no output, temporarily disconnect the load to ensure that the load is not set too high.

5. Once the proper output voltages are established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

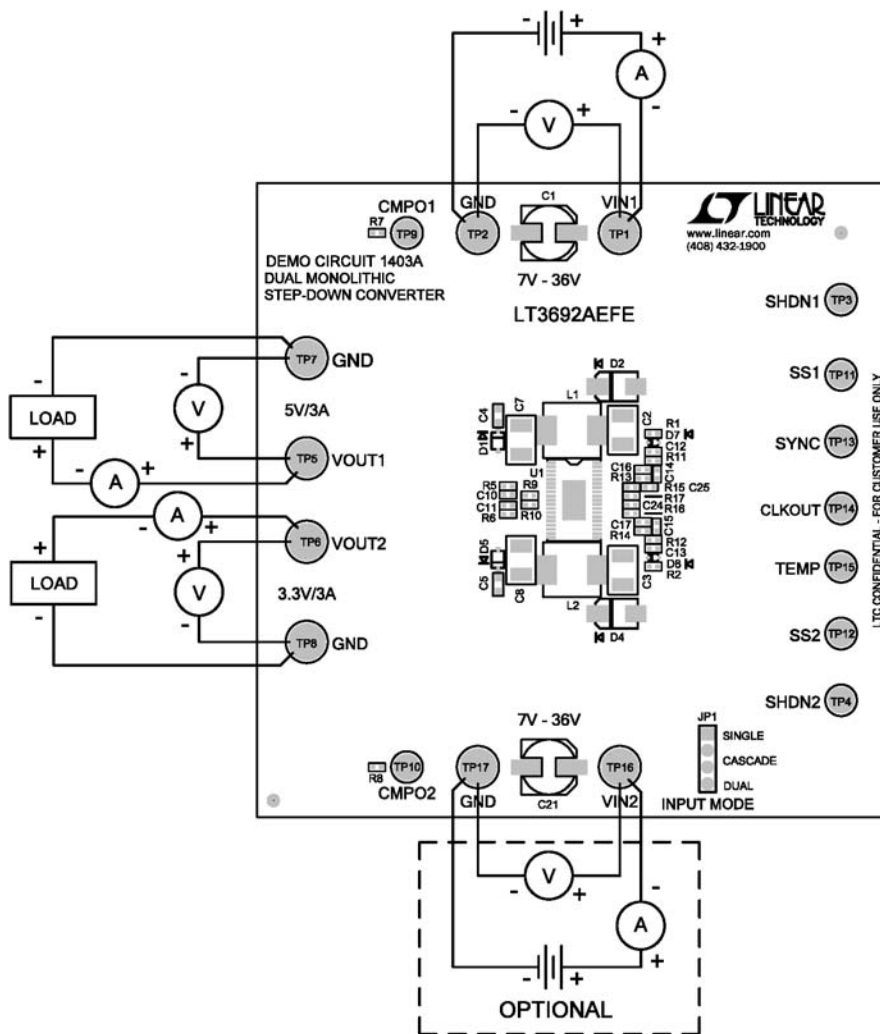


Figure 2. DC1403A Proper Equipment Setup

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QUICK START PROCEDURE

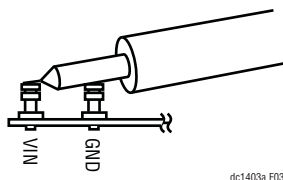


Figure 3. Measuring Input or Output Ripple

ADDITIONAL NOTES

If an EMI filter is desired on V_{IN1} , it can be feasibly installed on the back of the board in the optional circuit area. However, a trace cut is required for the insertion of the optional circuit. See Figure 4 for the cut line.

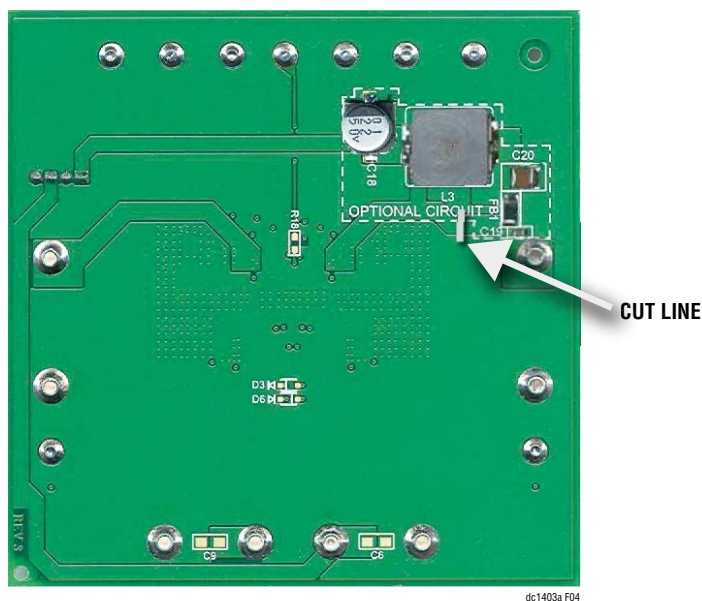


Figure 4. Cut Line for the EMI Filter Installation

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PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C2, C3	CAP, 1210 4.7 μ F 10% 50V X7R	MURATA GRM32ER71H475KA88L
2	2	C4, C5	CAP, 0603 0.47 μ F 10% 25V X7R	MURATA GRM188R71E474KA12D
3	2	C7, C8	CAP, 1210 100 μ F 20% 10V X5R	TAIYO YUDEN LMK325ABJ107MM-T
4	2	C10, C11	CAP, 0402 22pF 10% 25V NPO	AVX 04023A220KAT2A
5	2	C12, C13	CAP, 0402 0.1 μ F 10% 16V X7R	TDK C1005X7R1C104K
6	2	C14, C15	CAP, 0402 680pF 10% 25V X7R	AVX 04023C681KAT2A
7	2	C16, C17	CAP, 0402 33pF 10% 25V NPO	AVX 04023A330KAT
8	1	C24	CAP, 0402 10nF 10% 16V X7R	MURATA GRM155R71C103KA01D
9	2	D1, D5	DIODE, SCHOTTKY SOD323	CENTRAL SEMI CMDSH-4E
10	2	D2, D4	DIODE, SCHOTTKY RECTIFIER SMA	DIODES INC. B340A
11	1	L1	IND, 6.8 μ H	NIC NPIM74C6R8MTRF
12	1	L2	IND, 4.7 μ H	NIC NPIM74C4R7MTRF
13	2	R1, R2	RES, 0402 1k Ω s 1% 1/16W	VISHAY CRCW04021K00FKED
14	1	R5	RES, 0402 42.2k Ω 1% 1/16W	VISHAY CRCW040242K2FKED
15	1	R6	RES, 0402 24.9k Ω s 1% 1/16W	VISHAY CRCW040224K9FKED
16	2	R7, R8	RES, 0402 100k Ω 5% 1/16W	VISHAY CRCW0402100KJNED
17	2	R9, R10	RES, 0402 8.06k Ω 1% 1/16W	VISHAY CRCW04028K06FKED
18	2	R11, R12	RES, 0402 100k Ω 1% 1/16W	VISHAY CRCW0402100KFKED
19	2	R13, R14	RES, 0402 30k Ω s 1% 1/16W	NIC NRC04F3002TRF
20	1	R15	RES, 0402 10.2k Ω s 1% 1/16W	VISHAY CRCW040210K2FKED
21	1	R16	RES, 0402 20k Ω 1% 1/16W	VISHAY CRCW040220K0FKED
22	1	R17	RES, 0402 40.2k Ω 1% 1/16W	VISHAY CRCW040240K2FKED
23	1	U1	IC, STEP-DOWN REGULATOR	LINEAR TECH LT3692AEFE
Additional Demo Board Circuit Components				
1	2	C1, C21	CAP, 22 μ F 20% 50V OSCON	SUNCON 50CE22BS
2	0	C6, C9	CAP, 0805 10 μ F 10% 16V X5R OPTION	MURATA GRM21BR61C106KE15L OPTION
3	0	C18	CAP, 22 μ F 20% 50V OSCON OPTION	SANYO 50CE22BS OPTION
4	0	C19	CAP, 0603 0.01 μ F 10% 50V X7R OPTION	AVX 06035C103KAT2A OPTION
5	0	C20	CAP, 1210 2.2 μ F 10% 50V X7R OPTION	MURATA GRM32ER72A225KA35L OPTION
6	0	C25	CAP, 0402 10nF 10% 16V X7R OPTION	MURATA GRM155R71C103KA01D OPTION
7	0	D3, D6	DIODE, SCHOTTKY SOD323 OPTION	CENTRAL SEMI CMDSH-4E OPTION
8	0	D7, D8	DIODE, OPT	OPTION
9	0	FB1	FERRITE BEAD OPTION	TAIYO YUDEN FBMJ3216HS800 OPTION
10	0	L3	IND, 22 μ H OPTION	VISHAY IHLP4040DZ-01 OPTION
Hardware for Demo Board Only				
1	1	JP1	HEADER, 4-PIN	SAMTEC TMM-104-02--L-S
2	8	TP1, TP2, TP5-TP8, TP16, TP17	TURRET	MILL-MAX 2501-2-00-80-00-00-07-0
3	9	TP3, TP4, TP9-TP15	TURRET	MILL MAX 2308-2-00-80-00-00-07-0
4	1	JP1	SHUNT, 2mm	SAMTEC 2SN-BK-G

SCHEMATIC DIAGRAM

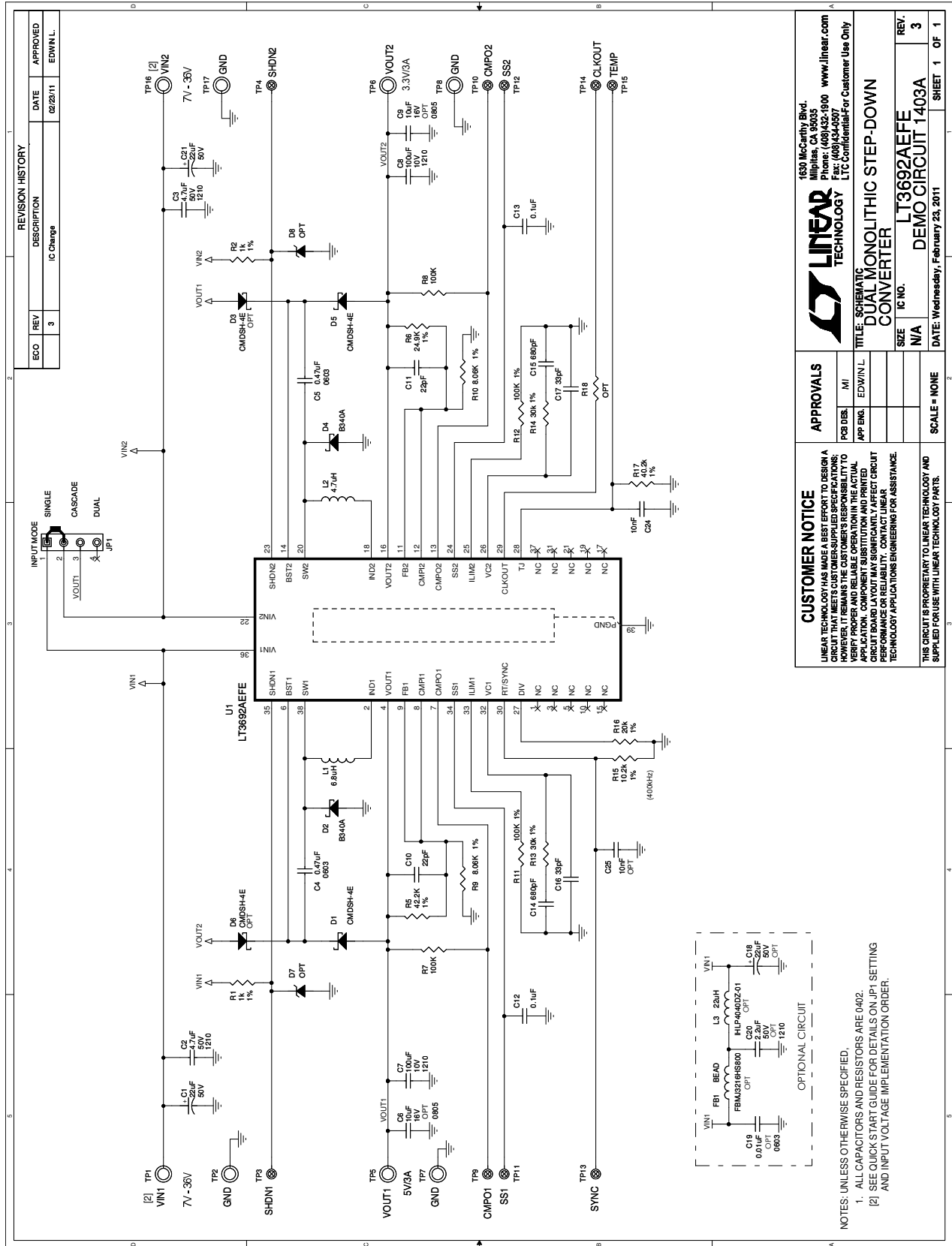


Figure 5. Demo Circuit Schematic

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