

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1499A

## HIGH EFFICIENCY, HIGH VOLTAGE 100mA SYNCHRONOUS STEP-DOWN CONVERTER

LTC3631

## DESCRIPTION

Demonstration circuit DC1499A is a high efficiency step-down DC/DC converter featuring LTC3631 with internal high side and synchronous power switches that draws only 12 $\mu$ A quiescent current. It has a wide 4.5V to 45V input range and internal over voltage monitor capable of protecting the part through 60V surges. The jumper selectable output

is up to 5V. LTC3631 can supply up to 100mA load current with a programmable peak current limit that provides a simple method for optimizing efficiency in lower current applications. With no compensation required, LTC3631 is easily configured with minimal components. **Gerber files for this circuit are available. Call the LTC Factory.**

Table 1. Performance Summary ( $T_A = 25^\circ\text{C}$ )

PARAMETER	CONDITION	VALUE
Input Voltage Range $V_{IN}$		4.5V to 45V
Output Voltage $V_{OUT}$	$I_{OUT}=1\text{mA}$ to $100\text{mA}$ , $V_{IN}=10\text{V}$	$V_{OUT} \pm 2.7\%$ (LTC3631 Output adjustable version) $V_{OUT} \pm 1.3\%$ (LTC3631-3.3 Fixed 3.3V version) $V_{OUT} \pm 1.3\%$ (LTC3631-5 Fixed 5.0V version)
Maximum Output Current		100mA
DC Supply Current	Active Mode, $V_{IN}=10\text{V}$ , $I_O=0\text{A}$	125 $\mu\text{A}$
Nominal Switching Frequency	Inductance=100 $\mu\text{H}$ , $V_{IN}=30\text{V}$	350kHz

## QUICK START PROCEDURE

The DC1499A is easy to set up to evaluate the performance of the LTC3631. For a proper measurement equipment configuration, set up the circuit according to the diagram in Figure 2.

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 the Measurement Equipment Set-up diagram in Figure 1 for proper scope probe technique. To reduce the output voltage ripple further additional capacitor of 100 $\mu\text{F}$  can be added in parallel.

Please follow the procedure outlined below for proper operation.

1. Connect the input power supply to the  $V_{IN}$  and GND terminals. Connect the load between the  $V_{OUT}$  and GND terminals. Refer to Figure 2 for the proper measurement equipment setup.
2. Before proceeding to operation, insert jumper shunt XJP1 into the OFF position and insert jumper shunt into XJP2, XJP3 or XJP4 for voltages of 1.8V, 3.3V or 5V respectively. Set the load output current to 20 mA.
3. Apply 6V at  $V_{IN}$ . Measure  $V_{OUT}$ ; it should read 0V. If desired, one can measure the shutdown supply current at this point. The supply current will be about 3  $\mu\text{A}$  in shutdown.
4. Turn on  $V_{OUT}$  by changing shunt XJP1 from the OFF position to the ON position. The out-

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put voltage should measure according to the voltage set by the shunt jumper in XJP2, XJP3 or XJP4.

5. Vary the input voltage from 6V to 45V.

6. Vary the  $V_{OUT}$  load current from 1mA to 100mA, and the output voltage should be within a tolerance of  $\pm 2.7\%$ .

Warning - If the power for the demo board is carried in long leads, the input voltage at the part could "ring", which could affect the operation of the circuit or even exceed the maximum voltage rating of the IC. To eliminate the ringing, insert an electrolytic capacitor (for instance, Panasonic part # EEU-FC2A680L, 68 $\mu$ F/100V) on the pads between the input power and return terminals on the bottom of the demo board. The (greater) ESR of the electrolytic will dampen the (possible) ringing voltage due to the use of long input leads. On a normal, typical PCB, with short traces, the capacitor is not needed.

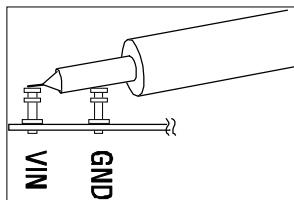


Figure 1. Measuring Input or Output Ripple

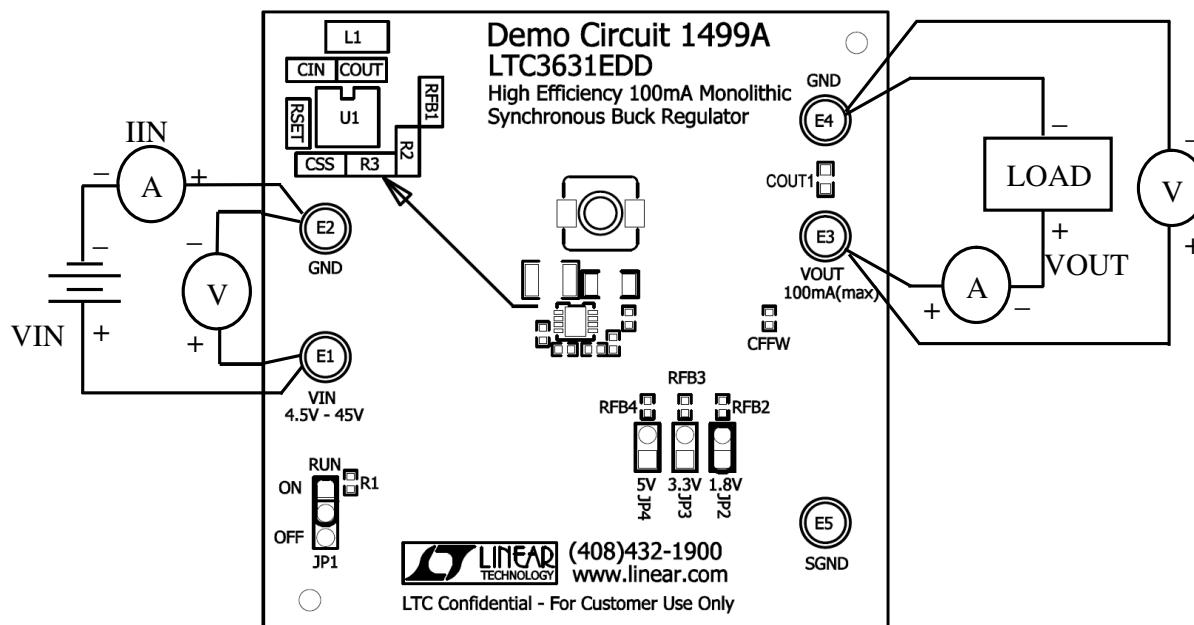
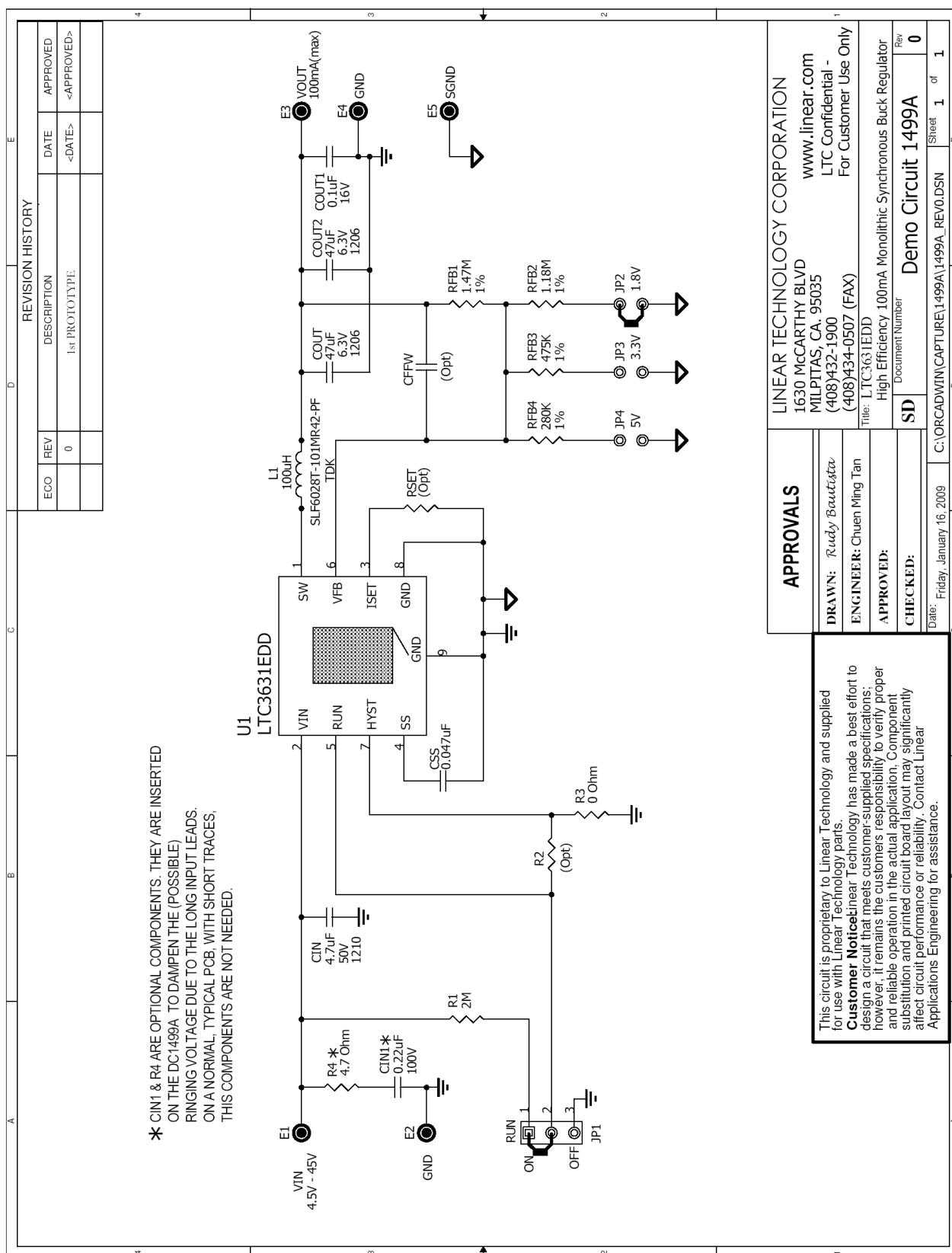


Figure 2. Equipment setup to test LTC3631

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\* CIN1 & R4 ARE OPTIONAL COMPONENTS. THEY ARE INSERTED ON THE DC1499A TO DAMPEN THE (POSSIBLE) RINGING VOLTAGE DUE TO THE LONG INPUT LEADS. ON A NORMAL, TYPICAL PCB, WITH SHORT TRACES, THIS COMPONENTS ARE NOT NEEDED.

APPROVALS		LINEAR TECHNOLOGY CORPORATION	
DRAWN:	Rudy Bautista	1630 MCCRARTHY BLVD MILPITAS, CA, 95035 (408)432-1900	www.linear.com
ENGINEER:	Chuen Ming Tan	(408)434-0507 (FAX)	LTC Confidential - For Customer Use Only
APPROVED:		Title: LTC3631EDD	1
CHECKED:		High Efficiency 100mA Monolithic Synchronous Buck Regulator	
		Document Number	
		SD	Demo Circuit 1499A
			Rev 0
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This circuit is proprietary to Linear Technology and supplied for use with Linear Technology parts.  
**Customer Notice:** Linear Technology has made a best effort to design a circuit that meets customer-supplied specifications; however, it remains the customer's responsibility to verify proper and reliable operation in the actual application. Component substitution and printed circuit board layout may significantly affect circuit performance or reliability. Contact Linear Applications Engineering for assistance.

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Item	Qty	Reference	Part Description	Manufacturer / Part #
<b>REQUIRED CIRCUIT COMPONENTS</b>				
1	1	CIN	Cap., X7R 4.7uF 50V 10% 1210	Murata GRM32ER71H475KA88
2	2	COUT, COUT2	Cap., X5R 47uF 6.3V 20% 1206	Taiyo Yuden JMK316BJ476ML-T
3	1	COUT1	Cap., X7R 0.1uF 16V 20%	AVX 0603YC104MAT
4	1	CSS	Cap., X5R 0.047uF 16V 20% 0402	AVX 0402YD473MAT2A
5	1	L1	Inductor, 100uH SLF6028	TDK SLF6028T-101MR42-PF
6	0	L2 (Opt)	Inductor, 100uH SLF7045	TDK SLF7045T-101MR50-PF
7	1	RFB1	Res., Chip 1.47MΩ 0.06W 1% 0402	Vishay CRCW04021M47FKED
8	1	RFB2	Res., Chip 1.18MΩ 0.06W 1% 0402	Vishay CRCW04021M18FKED
9	1	R1	Res., Chip 2MΩ 0.06W 5% 0402	Vishay CRCW04022M00JNED
10	1	U1	I.C., Volt. Reg. DFN(08)(DD)3MMX3MM	Linear Tech. Corp. LTC3631EDD
<b>ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS</b>				
1	0	CFFW (Opt)	Cap., NPO 22pF 25V 10%	AVX 04023A220KAT2A
2	1	CIN1	Cap., X7R 0.22uF 100V 20% 1206	AVX 12061C224MAT2A
3	1	R4	Res., Chip 4.7Ω 0.25W 5% 1206	Vishay CRCW12064R70JNED
4	0	R2 (Opt)	Res., Chip 715KΩ 0.06W 1% 0402	Vishay CRCW0402715KFKED
5	0	RSET (Opt)	Res., 0402 TBD	
<b>HARDWARE FOR DEMO BOARD ONLY</b>				
1	1	R3	Res/Jumper, Chip 0Ω 1/16W 1 AMP 0402	Vishay CRCW04020000Z0EA
2	1	RFB3	Res., Chip 475KΩ 0.06W 1% 0402	Vishay CRCW0402475KFKED
3	1	RFB4	Res., Chip 280KΩ 0.06W 1% 0402	Vishay CRCW0402280KFKED
4	5	E1,E2,E3,E4,E5	Turret, Testpoint 0.094"	Mill Max 2501-2-00-80-00-00-07-0
5	1	JP1	Headers, 3 Pins 2mm Ctrs.	Samtec TMM-103-02-L-S
6	3	JP2,JP3,JP4	Jumper, 2pins 2mm Ctrs.	Samtec TMM-102-02-L-S
7	2	XJP1,XJP2	Shunt, 2mm Ctrs.	Samtec 2SN-BK-G
8	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1499A
9	1		STENCIL	STENCIL 1499A