

## DESCRIPTION

Demonstration circuit 1453A features the LTM<sup>®</sup>4619EV, the high input voltage, high efficiency, high density, dual 4A step-down power module. De-rating is necessary for certain  $V_{IN}$ ,  $V_{OUT}$ , and thermal conditions. The two outputs are interleaved with 180° phase to minimize the input ripple and reduce the input capacitors. A minimum design only requires the bulk input and output capacitors and voltage setting resistors. The LTM4619EV features output voltage tracking, power good indicator, RUN pin control,

clock synchronization and soft-start programming. Protection features include foldback current limiting and overvoltage protection. Burst mode or pulse skipping mode can be selected for better light load efficiency.

**Design files for this circuit board are available. Call the LTC Factory.**

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

PARAMETER	CONDITIONS / NOTES	VALUE
Minimum Input Voltage		4.5V
Maximum Input Voltage		28V
Output Voltage $V_{out1}$		$3.3V \pm 2\%$
Output Voltage $V_{out2}$		$1.8V \pm 2\%$
Maximum Continuous Output Current	De-rating is necessary for certain $V_{IN}$ , $V_{OUT}$ , and thermal conditions, see datasheet for details.	$4A_{DC}$ for $V_{out1}$ , $V_{out2}$
Default Operating Frequency	JP2 on the "500KHz" position.	500kHz
Efficiency of Channel 1	$V_{IN}=12V$ , $V_{OUT1}=3.3V$ , $I_{OUT1}=4A$ , switching frequency = 500KHz.	89.4%, see Figure 3
Efficiency of Channel 2	$V_{IN}=12V$ , $V_{OUT2}=1.8V$ , $I_{OUT2}=4A$ , switching frequency = 500KHz.	84.1% see Figure 3
Load Transient of Channel 1	$V_{IN}=12V$ , $V_{OUT1}=3.3V$ , switching frequency = 500KHz.	See Figure 4
Load Transient of Channel 2	$V_{IN}=12V$ , $V_{OUT2}=1.8V$ , switching frequency = 500KHz.	See Figure 5

## QUICK START PROCEDURE

Demonstration circuit 1453A is easy to set up to evaluate the performance of the LTM4619EV. Please refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

- Place jumpers in the following positions for a typical 3.3V and 1.8V application:

RUN1	RUN2	TRACK1
ON	ON	Soft start

TRACK2	FREQUENCY	MODE/CLK SEL.
Soft start	500KHz	CCM

- With power off, connect the input power supply, load and meters as shown in Figure 1. Preset the loads to 0A and  $V_{IN}$  supply to be less than 28V.

3. Turn on the power at the input. The output voltage between Vo1+ and Vo1- should be  $3.3V \pm 2\%$ , and the voltage between Vo2+ and Vo2- should be  $1.8V \pm 2\%$ .
4. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters. To measure input and output ripple, please refer to Figure 2 for proper setup.
5. For applications that  $V_{IN}$  is always below 5.5V, stuff a  $0\Omega$  resistor at R16. This prevents the switching frequency to drop because of low  $V_{IN}$ . Do not stuff R16 if  $V_{IN}$  is higher than 5.5V!
6. If the switching frequency is set to be higher than 500KHz, the 1.8V  $V_{OUT2}$  may not keep regulated as  $V_{IN}$  approaches its maximum value, 28V. The LTM4619 has a 90nS (typ) minimum on time, which limits its step-down ratio. Therefore, for high  $V_{IN}$  application, the switching frequency may need to be reduced by adjusting the FREQ/PLLFLTR pin voltage.
7. Both channels of the LTM4619 can track another supply. The jumpers, JP3 and JP4, allow choosing from soft-start or output tracking. If tracking ext. signal is selected, the corresponding test point, TRACK1 or TRACK2, needs to be connected to a valid voltage signal.
8. The LTM4619 can be synchronized to an external clock signal. Place the jumper JP2 in the "EXT. CLK" position, and the jumper JP1 in the "BURST MODE / EXT. CLK" position, then apply the clock signal on the "CLK SYNC" test point.

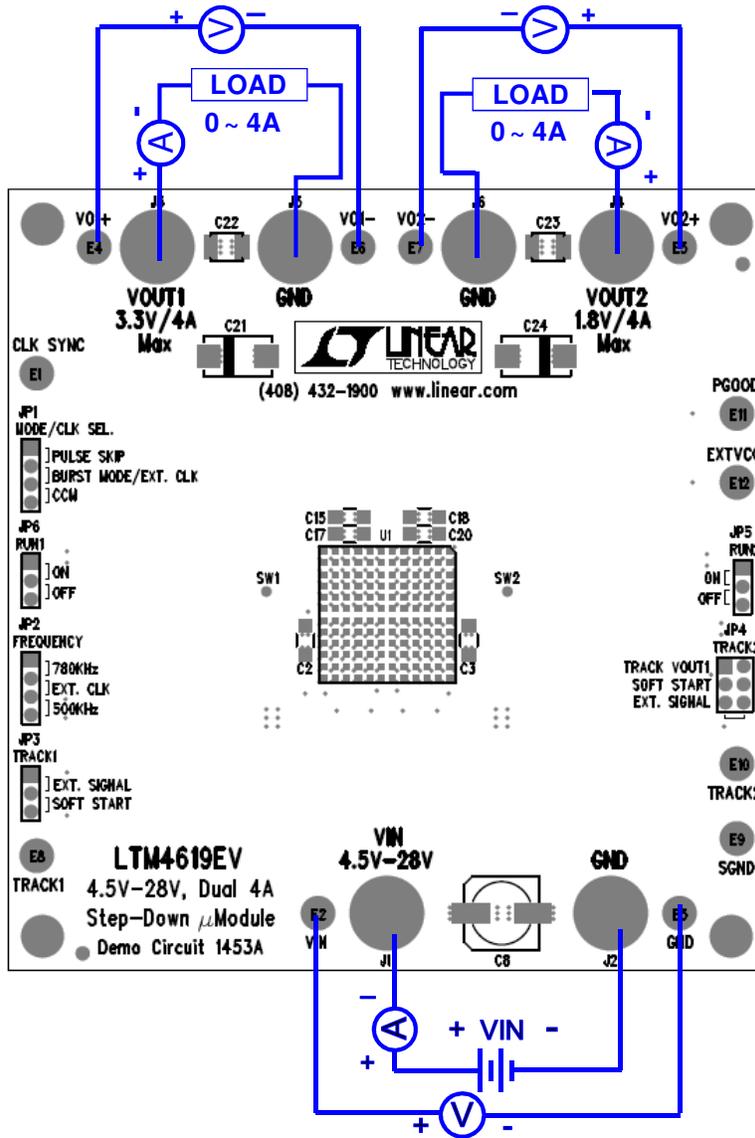
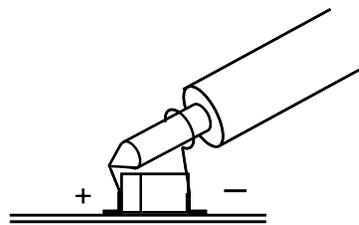


Figure 1. Test Setup of DC1453A



Input or Output Capacitor

Figure 2. Proper Scope Probe Placement for Measuring Input or Output Ripple.

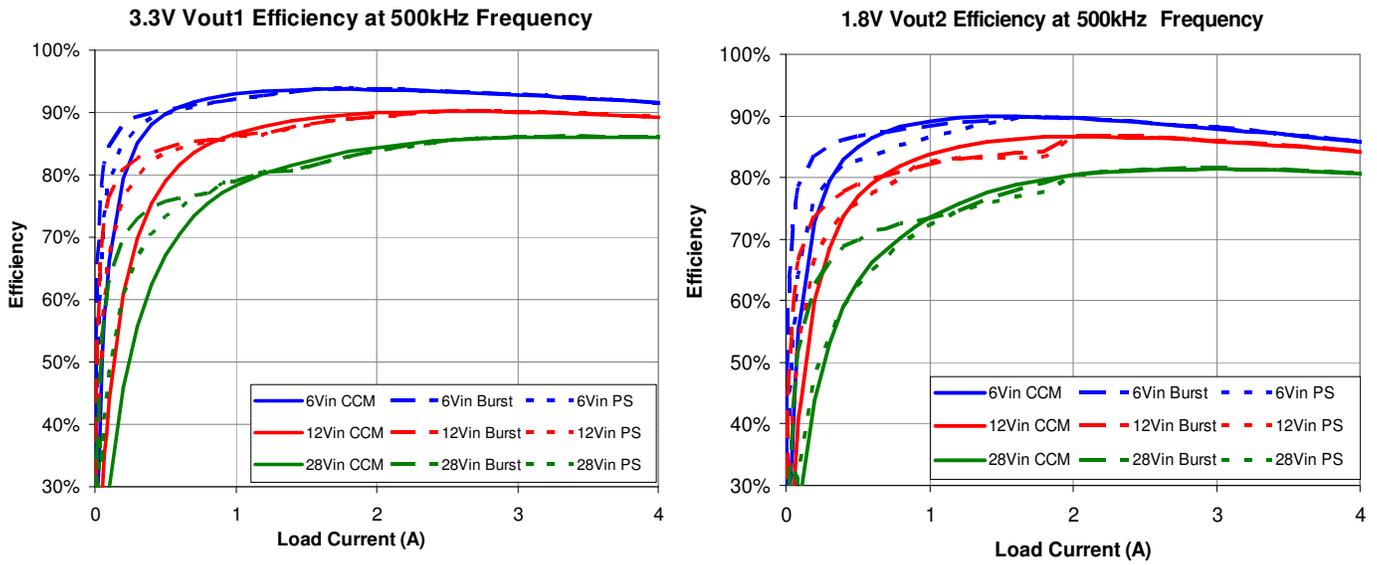
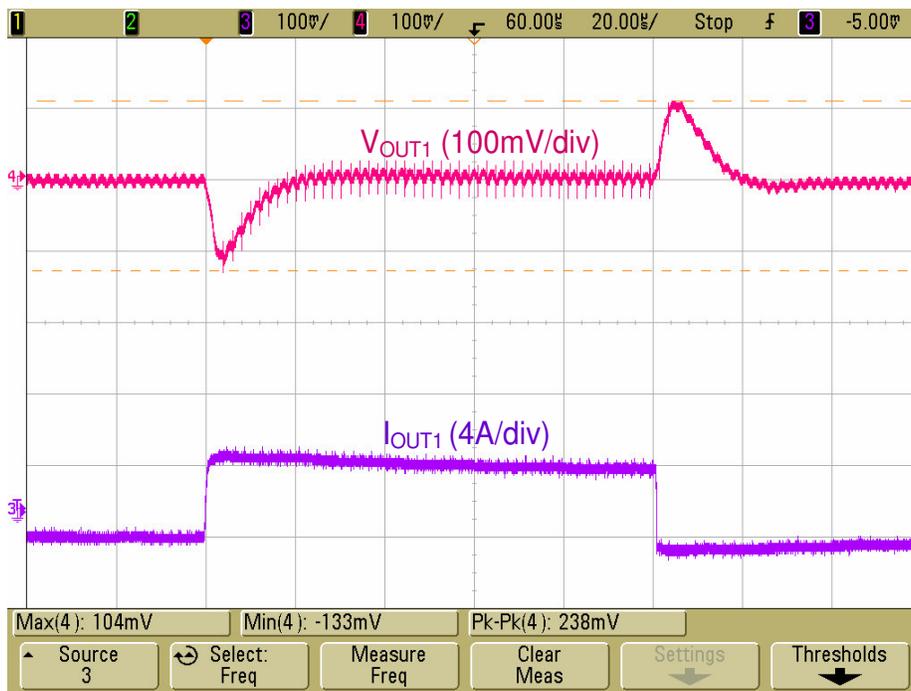
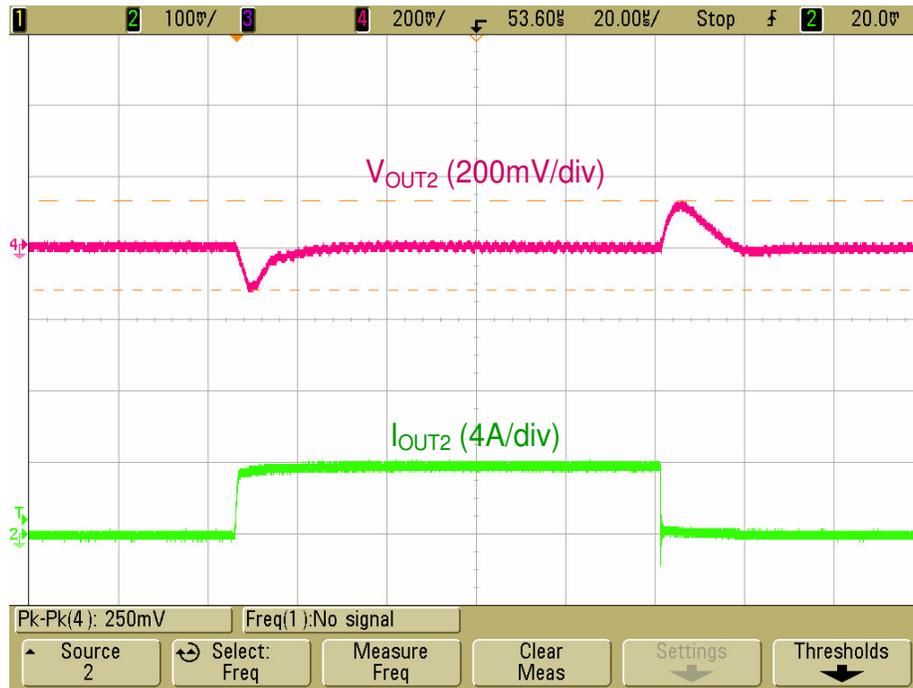


Figure 3. Measured Efficiency for two outputs on DC1453A.



$V_{IN} = 12V$   
 $V_{OUT1} = 3.3V$   
 Continuous Current Mode (CCM)  
 0A to 4A LOAD STEP on  $V_{OUT1}$   
 $C_{OUT1} = 100\mu F$  ceramic (1210, X5R, 6.3V) +  $22\mu F$  ceramic (1206, X5R, 6.3V)

Figure 4. Measured Load Transient Response for  $V_{OUT1}$ .



$V_{IN} = 12V$

$V_{OUT2} = 1.8V$

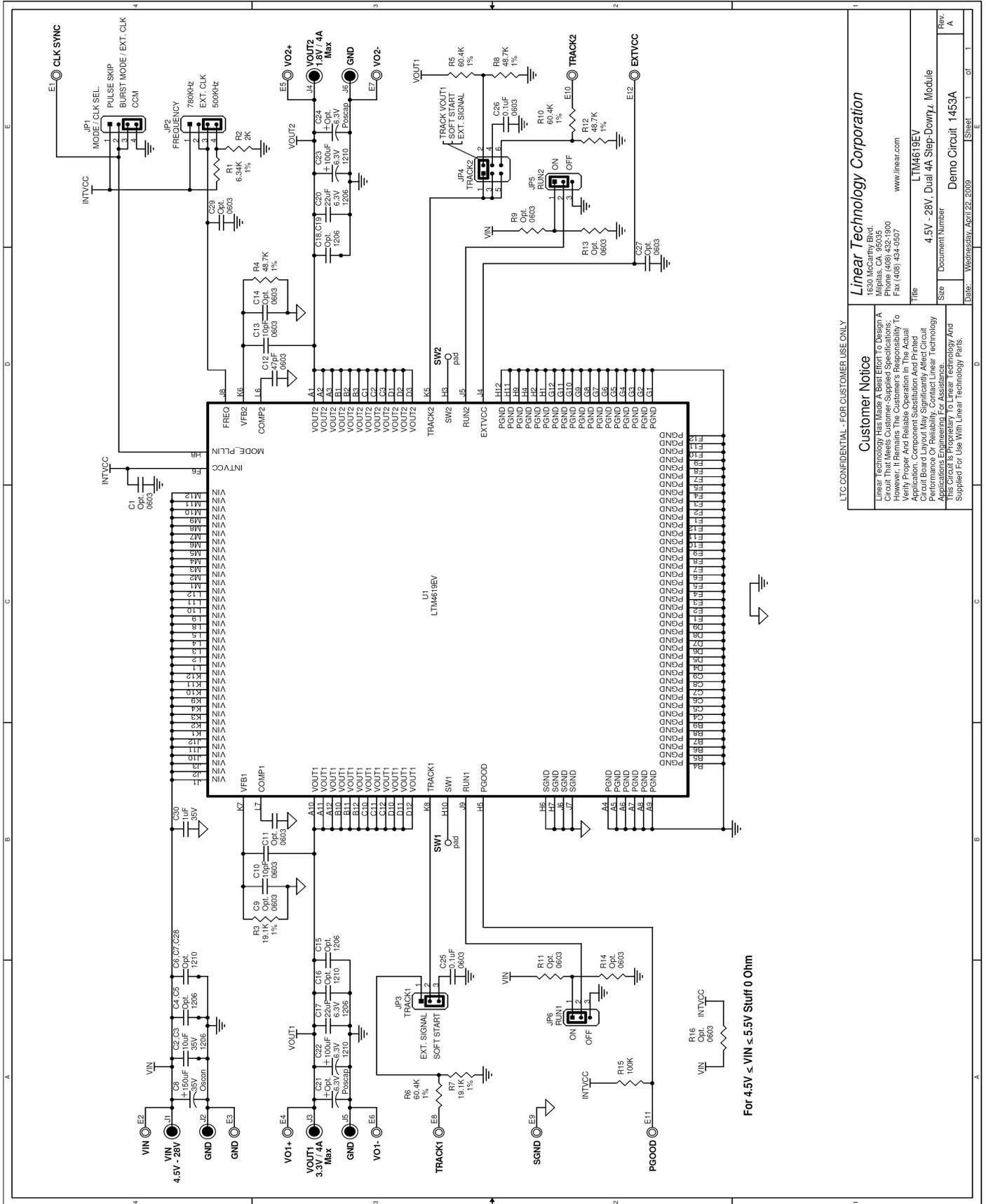
Continuous Current Mode (CCM)

0A to 4A LOAD STEP on  $V_{OUT2}$

$C_{OUT2} = 100\mu F$  ceramic (1210, X5R, 6.3V) +  $22\mu F$  ceramic (1206, X5R, 6.3V)

Figure 5. Measured Load Transient Response for  $V_{OUT2}$ .

# LTM4619EV



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**Linear Technology Corporation**  
 LTM4619EV  
 4.5V - 28V, Dual 4A Step-Down Module  
 Demo Circuit 1453A  
 Document Number  
 Rev. A

Date: Wednesday, April 22, 2009 Sheet 1 of 1