

## 1.2A, Step-down Switching Regulator in 3mm×3mm DFN

### DESCRIPTION

Demo circuit DC1023A is a monolithic step-down DC/DC switching regulator featuring the LT3505. The demo circuit is designed for 5V output from a 6V to 36V input. The wide input range of the LT3505 allows a variety of input sources. The typical sources are automotive batteries, wall adaptors and industrial supplies. The oscillator can be programmed for high frequency operation allowing the use of tiny, low cost external components or it can be programmed for lower frequency operation to maximize efficiency. The current mode control scheme creates fast transient response and good loop stability. The gate drive of the internal switch is boosted to a voltage that is higher than  $V_{in}$  to ensure saturation of the switch. A charge pump consisting of a diode and capacitor on the demo board performs the boost function. The SHDN pin can be used to set the part in shutdown mode,

reducing the supply current to less than 2uA. The SHDN pin can also be used to program soft start. In this mode, the SHDN pin is driven through an external RC filter to create a voltage ramp on this pin. The soft start function reduces the input current surge during start-up. Cycle by cycle current limit, frequency foldback and thermal shutdown provide the protection against shorted outputs.

The LT3505 datasheet gives a complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for demo circuit DC1023A.

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

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### Performance Summary ( $T_A = 25^\circ\text{C}$ )

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		6V
Maximum Input Voltage		36V
Output Voltage $V_{out}$		5.05V $\pm$ 4%
Switching Frequency	JP2 in 2.2MHz position	2.2MHz $\pm$ 10%
Switching Frequency	JP2 in 750kHz position	750kHz $\pm$ 10%
Maximum Output Current	$V_{in}=8\sim 32\text{V}$	1.0A
Efficiency	$V_{in}=12\text{V}$ , $I_{out}=1\text{A}$ , Freq=750kHz	85.0%
Efficiency	$V_{in}=12\text{V}$ , $I_{out}=1\text{A}$ , Freq=2.2MHz	83.3%
Voltage Ripple	$V_{in}=12\text{V}$ , $I_{out}=1\text{A}$ , Freq=2.2MHz	5mV
Voltage Ripple	$V_{in}=12\text{V}$ , $I_{out}=1\text{A}$ , Freq=750kHz	20mV

## QUICK START PROCEDURE

Demonstration circuit 1023 is easy to set up to evaluate the performance of the LT3505. Refer to Figure 1 for proper measurement equipment setup and 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 Vin or Vout and GND terminals. See Figure 2 for proper scope probe technique.

1. Place JP1 on the RUN position.
2. Place JP2 on the selected frequency

3. With power off, connect the input power supply to Vin and GND.

4. Turn on the power at the input.

NOTE . Make sure that the input voltage does not exceed 36V.

5. Check for the proper output voltages.

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

6. 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.

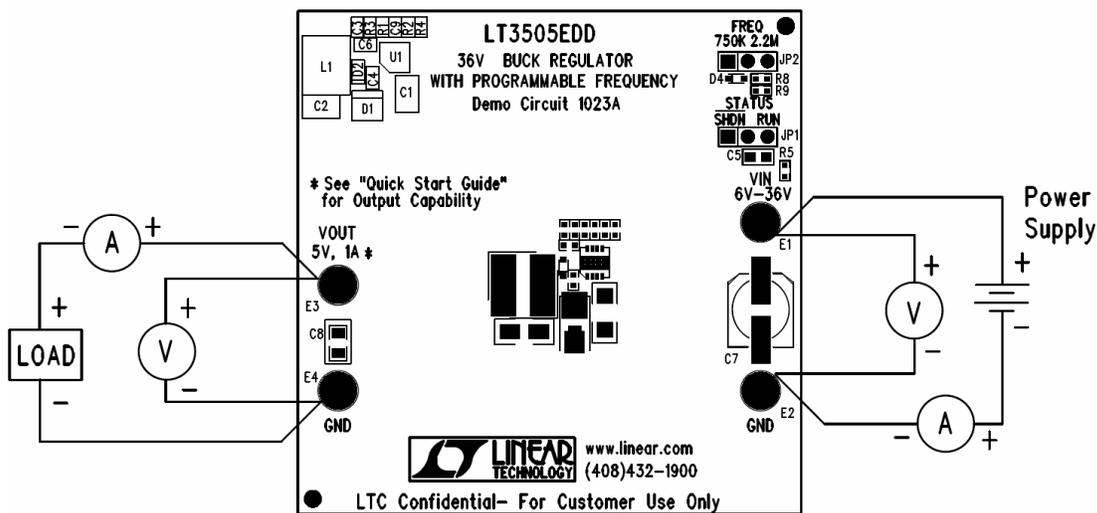


Figure 1. Proper Measurement Equipment Setup

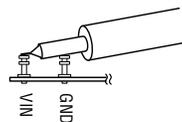


Figure 2. Measuring Input or Output Ripple

INPUT VOLTAGE  
FREQUENCY FOLDBACK

When FREQ jumper (JP2) is selected as 2.2M, the switching frequency is 2.2MHz within 6V to 16V input voltage range. The switching frequency will be linearly decreased when the input voltage increases. The input voltage frequency foldback curve is shown in Figure 3.

When the FREQ jumper (JP2) is selected as 750K, the switching frequency is fixed at 750kHz within 6V to 36V input voltage range.

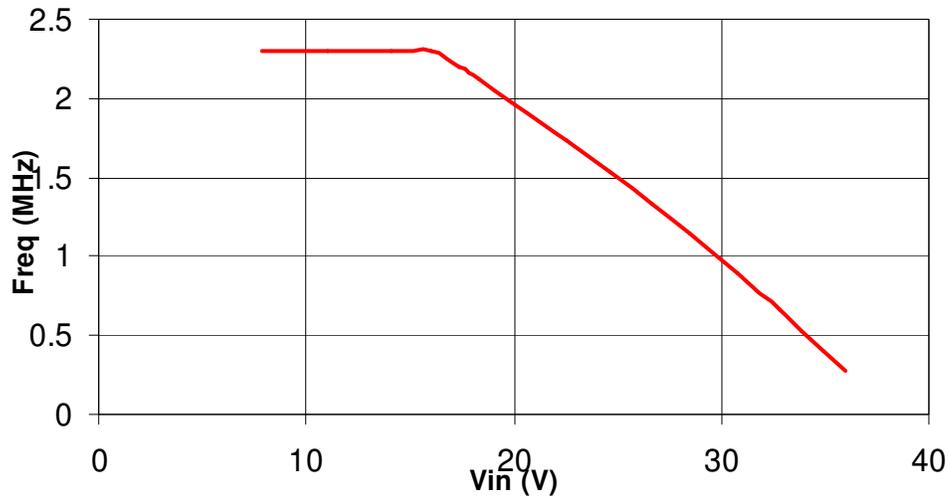
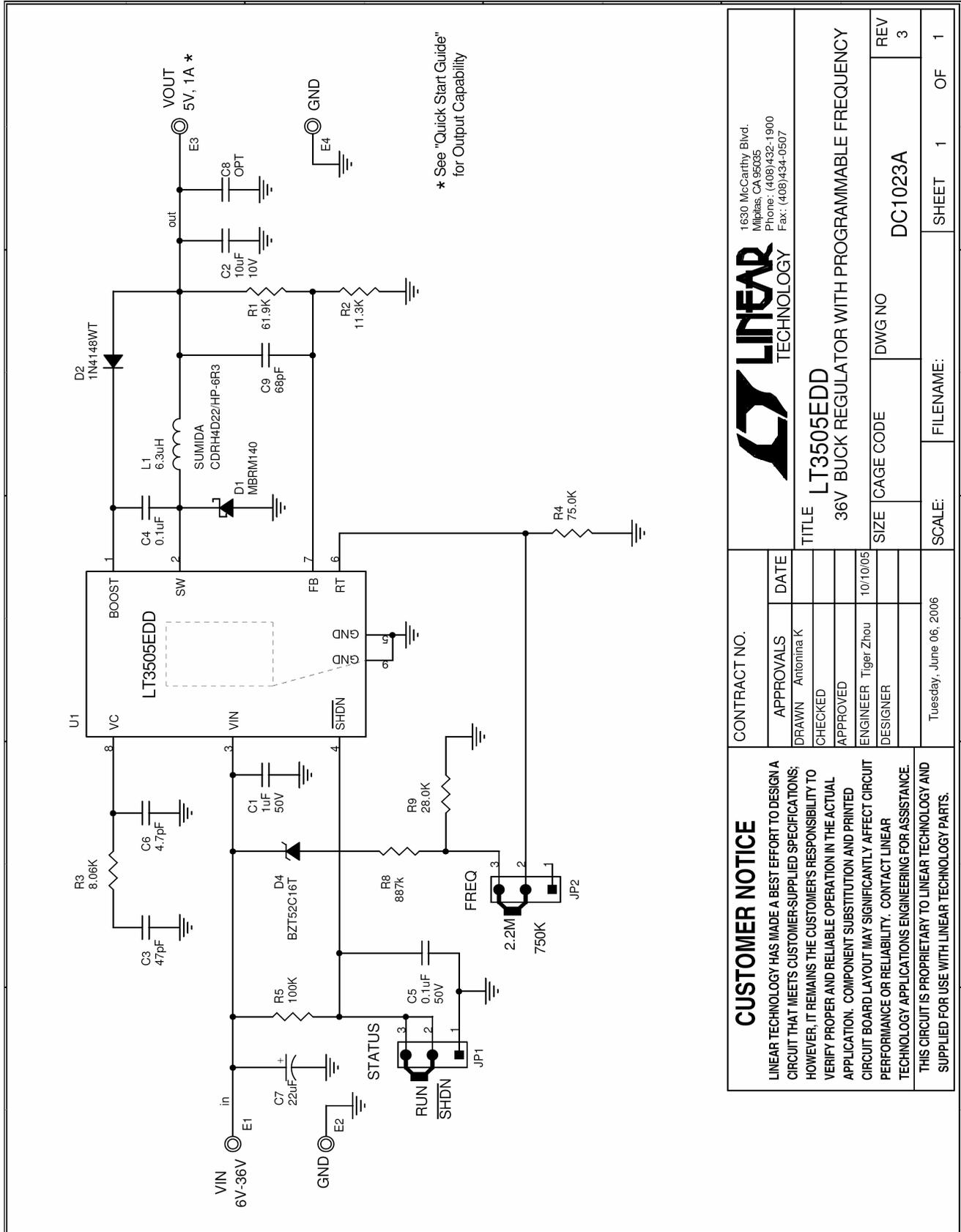


Figure 3. Input Voltage Frequency Foldback

OUTPUT CAPABILITY

V<sub>OUT</sub> = 5V

Vin (V)	Io max (A)	
	750K	2.2M
6	0.7	0.05
8	1	1
32	1	1
36	1	0.4



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