

# QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 1159A

## 4MHZ, 1.25A MONOLITHIC SYNCHRONOUS BUCK REGULATOR

LTC3565

### DESCRIPTION

Demonstration circuit 1159A is a high efficiency monolithic synchronous buck regulator using a constant frequency, current mode LTC3565. Its high switching frequency of 2.25MHz allows the use of small surface mount inductors and capacitors. Supply current during operation is typically only 20 $\mu$ A, and drops to below 1 $\mu$ A in shutdown. The 2.5V to 5.5V input voltage range makes the

LTC3565 ideally suited for single Li-Ion battery-powered or 3.3V to 5V input voltage applications. 100% duty cycle provides low dropout operation, extending battery life in portable systems. Automatic Burst Mode® operation increases efficiency at light loads, further extending battery runtime. **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		2.5V to 5.5V
Output Voltage	$I_{OUT}=0\text{A to }1.25\text{A}$	$V_{OUT} \pm 1\%$
Maximum Output Current		1.25A
DC Supply Current	$V_{IN} = 3.3\text{V}, V_{OUT} = 1.8\text{V}, I_{OUT} = 0\text{A}$	$<100\mu\text{A}$
Nominal Switching Frequency	$V_{IN} = 3.3\text{V}, V_{OUT} = 1.8\text{V}, I_{OUT} = 1.25\text{A}$	2.25MHz

### QUICK START PROCEDURE

The DC1159A is easy to set up to evaluate the performance of the LTC3565. Refer to Figure 2 for the proper measurement equipment setup.

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 example diagram in Figure 1 for proper scope probe measuring technique.

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.

2. Before proceeding to operation, insert jumper shunt XJP1 into the pulse-skip mode, jumper shunt XJP2 into the OFF position and insert one jumper shunt into XJP3, XJP4, or XJP5 for an output voltage of 1.8V, 1.5V, or 1.2V respectively. Set the load output current to less than 1.25A. An optional output voltage can be set by populating resistor RFB5 and moving the shunt to header JP5.

3. Apply 5V 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 less than 10  $\mu$ A in shutdown.

4. Turn on  $V_{OUT}$  by changing shunt XJP2 from the OFF position to the ON position. The output voltage should measure according to the

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voltage set by the shunt in headers JP2, JP3, or JP4.

5. Vary the input voltage between 2.5V and 5.5V and the output voltage should be within +/- 1% tolerance.

Warning - If the power for the demo board is supplied with 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 a small tantalum capacitor on the pads

6. Vary the  $V_{OUT}$  load current from 0 to 1.25A, and the output voltage should be within a tolerance of +/- 1%.

7. Observe the switch node, pin 4. The waveform should be a rectangular, pulse-width modulated one, with a frequency of approx. 2.25 MHz.

between the input power and return terminals on the bottom of the demo board. The ESR of the tantalum 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.

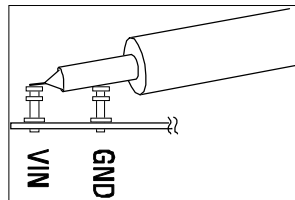


Figure 1. Measuring Input or Output Ripple

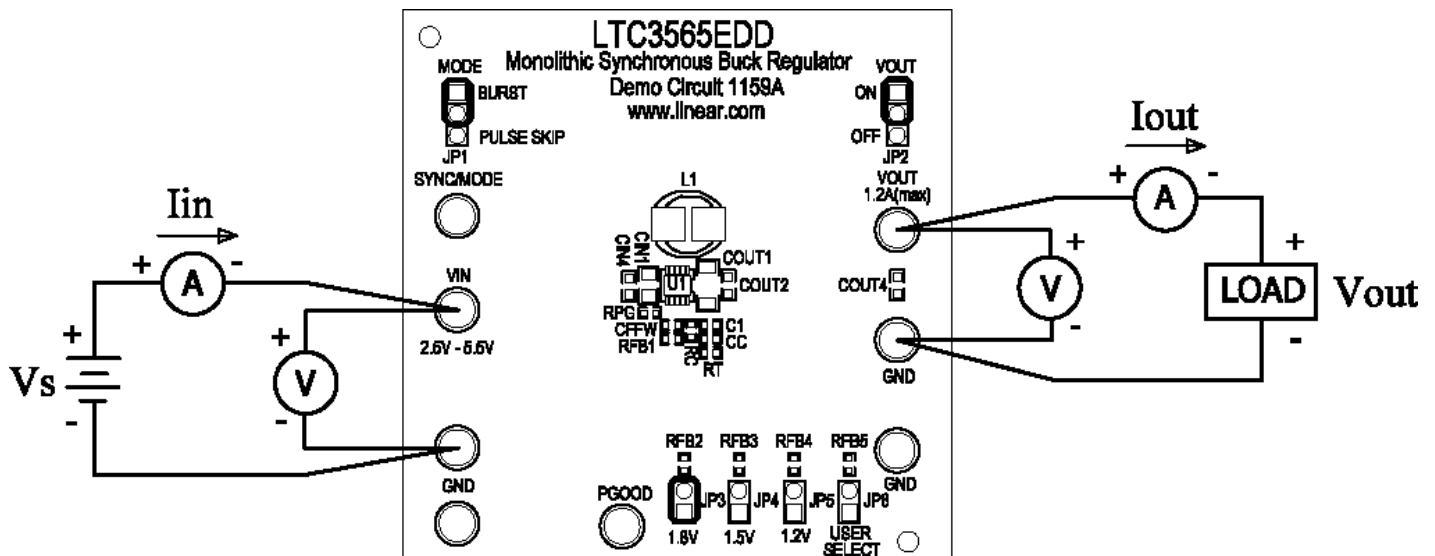


Figure 2. Proper Measurement Equipment Setup

## Load Step Response

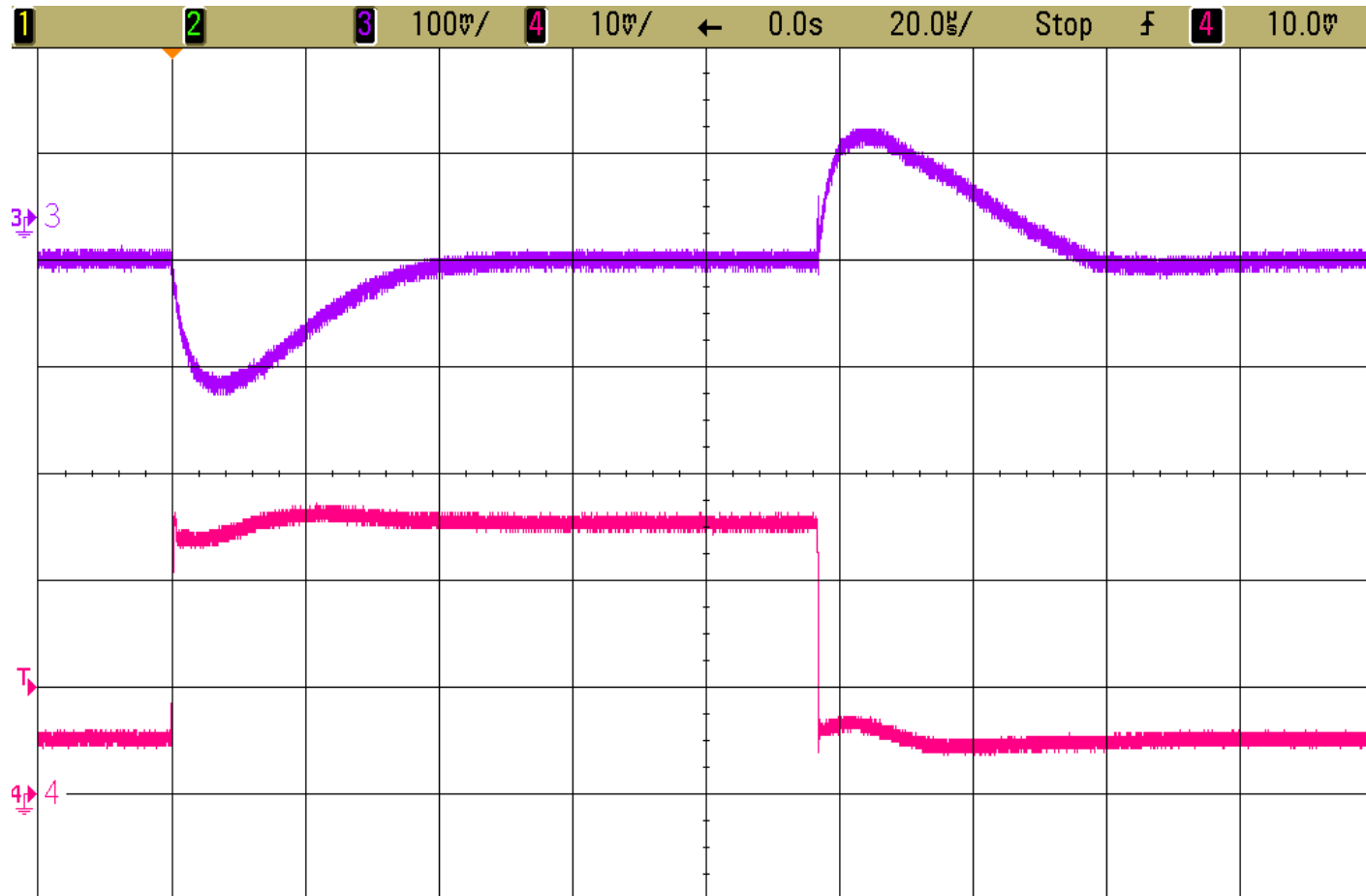


Figure 3. Load Step Response

$V_{in} = 3.3V$ ,  $V_{out} = 1.8V$ , 1A Load Step (250mA  $\leftrightarrow$  1.25A),  $F_{sw} = 2.25$  MHz

Trace 3: Output Voltage (100mV/div – AC coupled)

Trace 4: Output Current (500mA/div)

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