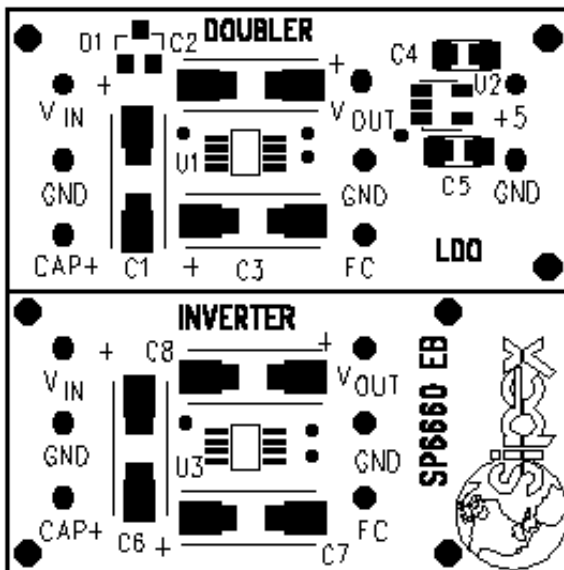




# SP6661 Evaluation Board Manual

- Easy Evaluation for the SP6661 Inverter/Doubler 200mA Charge Pump
- Only 0.25 sq. in. of Board Space needed for Inverter or Doubler
- 3V to 5V Converter using SP6661 Doubler and 5V LDO Regulator
- Smallest Industry '660 Pinout available with  $\mu$ SOIC package



Approx. 2 X Full Scale

## DESCRIPTION

The **SP6661 Evaluation Board** is designed with 2 complete SP6661 circuits on one board to help the user evaluate the performance of the SP6661 in both Inverter and Doubler modes. The evaluation board provides easy probe access points to all SP6661 Inputs and Outputs so that the user can quickly connect and measure electrical characteristics and waveforms of the Inverter or Doubler. **The SP6661 Evaluation Board** also provides a 3V to 5V 150mA DC to DC Converter using the SP6661 Doubler Circuit and a 5V LDO Regulator.

The next two sections describe the SP6661 Board Layout and Using the SP6661 Evaluation Boards. A table of SP6661 Pin Assignments is also included with details on Input/Output pin function. A SP6661 Evaluation Board List of Materials table is provided with some manufacturers part numbers to use as a reference. Finally, a schematic is included of the **SP6661 Evaluation Board**.

## SP6661 EVALUATION BOARD

### BOARD LAYOUT

The **SP6661 Evaluation Board** has been designed to easily and conveniently provide access to all Inputs and Outputs of the SP6661 device under test. Position the board with the silkscreen lettering upright (also see the drawing on the front page of this manual) and you will see two circuits – the Doubler Circuit on top, and the Inverter Circuit below. Also, note the Doubler Circuit is followed by an LDO Circuit, producing a 5V regulated output from a 3V input to the Doubler. The Input and Output connections are made with raised female pin receptacles which can accommodate easy-hook connections, as well as scope probe hooks and grounds for waveform measurements.

### USING THE EVALUATION BOARD

Connect the **SP6661 Evaluation Board** Doubler Circuit or Inverter Circuit to a positive power supply for  $V_{IN}$ . It is good practice to not switch power on until power connections are made to the evaluation board.

#### Evaluating Doubler Circuit

$V_{IN}$  — U1-3 — Connect to external supply  
 $V_{IN} = +2.5$  to  $+5.0V$ .

GND — U1-5 — Connect to external supply GND.

CAP+ — U1-2 — Use to monitor Charge Pump Frequency (1/2 OSC pin frequency).

$V_{OUT}$  — U1-8 — Connect to Load, Meter or Scope.  $V_{OUT} = +5.0$  to  $+10.0V$ .

GND — U1-5 — Connect to Load, Meter or Scope GND.

FC — U1-1 — Connect to OPEN for Low Frequency, to  $V_{OUT}$  for High Frequency.

#### Evaluating Doubler Circuit with 5V LDO Regulator

Same connections as Doubler above, but with additional LDO outputs:

+5 — U2-5 — Connect to Load, Meter or Scope.  $V_{OUT} = +5.0V$ .

GND — U2-2 — Connect to Load, Meter or Scope GND.

#### Evaluating Inverter Circuit

$V_{IN}$  — U3-8 — Connect to external supply  
 $V_{IN} = +1.5$  to  $+5.0V$ .

GND — U3-3 — Connect to external supply GND.

CAP+ — U3-2 — Use to monitor Charge Pump Frequency (1/2 OSC pin frequency).

$V_{OUT}$  — U3-5 — Connect to Load, Meter or Scope.  $V_{OUT} = -1.5$  to  $-5.0V$ .

GND — U3-3 — Connect to Load, Meter or Scope GND.

FC — U3-1 — Connect to OPEN for Low Frequency, to  $V_{OUT}$  for High Frequency.

#### Evaluating Oscillator Performance with Inverter or Doubler Circuit

To accurately measure the internal oscillator frequency at pin 7 is extremely difficult, since any connection to this pin may induce capacitance which will change the frequency (1/RoscCosc). It is for this reason that the SP6661 Evaluation Board has only a small pad connection to it and not a pin receptacle. Alternatively, you can measure the charge pump frequency at the CAP+ pin, which equals  $\frac{1}{2}$  the OSC pin frequency.

To run the Inverter or Doubler Circuit at other frequencies, the OSC pin can be driven with an external oscillator with a square wave of 0 to  $V_{IN}$  volts. Tests have shown that typically the circuits can perform up to oscillator frequencies of 900kHz.

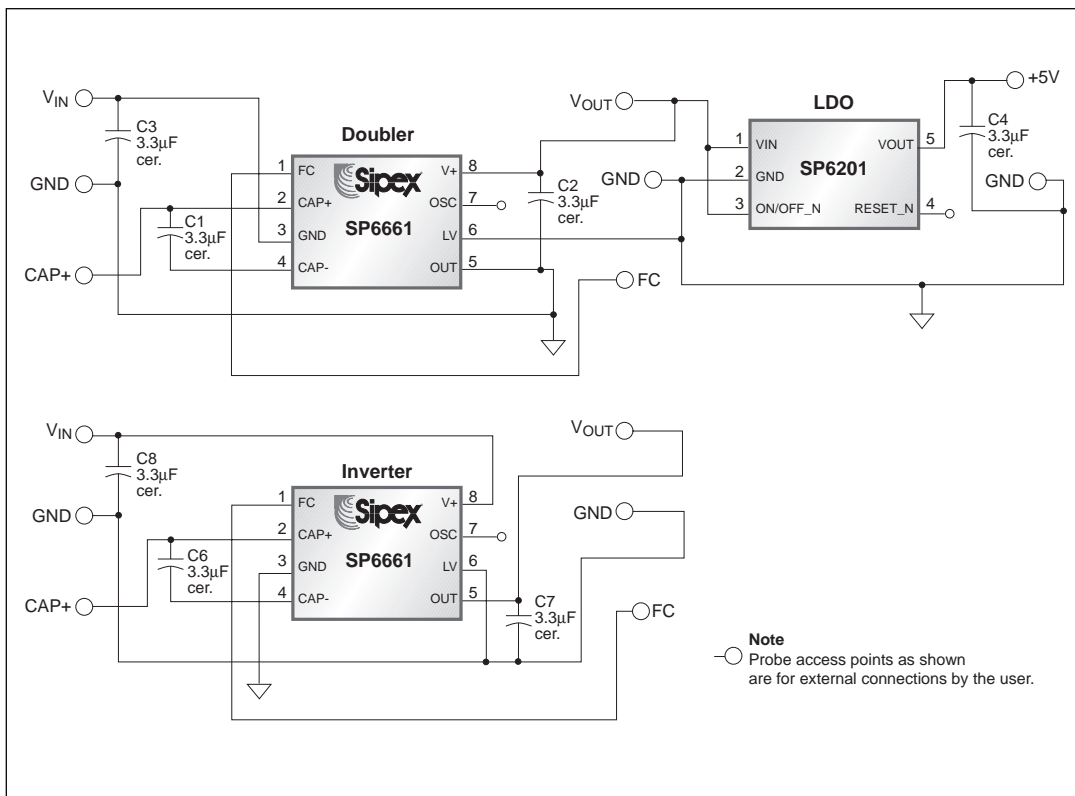
## TABLE OF SP6661EB PIN ASSIGNMENTS

Pin No.	Pin Name	Pin Function	Input/Output Pin Name
<b>U1 - Doubler Circuit</b>			
1	FC	Frequency Control	FC
2	CAP+	Pump Capacitor +	CAP+
3	GND	$V_{IN}$ (Doubler Mode)	$V_{IN}$
4	CAP-	Pump Capacitor -	
5	OUT	GND (Doubler Mode)	GND
6	LV	to $V_{IN}$ in Doubler	
7	OSC	Oscillator Control Pin	
8	V+	$V_{OUT}$ (Doubler Mode)	$V_{OUT}$
<b>U2 - LDO Regulator Circuit</b>			
1	$V_{IN}$	$V_{IN}$ of LDO	
2	GND	GND of LDO	GND
3	ON/OFF_N	ON to $V_{in}$ of LDO	
4	BYPASS	Bypass Cap C5 to GND	
5	$V_{OUT}$	+5V Output of LDO	+5
<b>U3 - Inverter Circuit</b>			
1	FC	Frequency Control	FC
2	CAP+	Pump Capacitor +	CAP+
3	GND	GND in Inverter	GND
4	CAP-	Pump Capacitor -	
5	OUT	OUT in Inverter	$V_{OUT}$
6	LV	to GND in Inverter	
7	OSC	Oscillator Control Pin	
8	V+	$V_{IN}$ in Inverter	$V_{IN}$

## TABLE OF SP6661EB LIST OF MATERIALS

Ref. Des.	Qty.	Manufacturer	Part Number	Layout Size	Component	Vendor Phone Number
PCB	1	Sipex Corp.	146-6363	1.5"x1.5"	PCB Inverter & Doubler	978-667-7800
U1, 3	2	Sipex Corp.	SP6661EU	8-uSOIC	Inverter/Doubler uSOIC	978-667-7800
U2	1	Sipex Corp.	SP6201EM5-5.0	SOT23-5	5V LDO Reg. SOT23-5	978-667-7800
C1,3,4,6-8	6	TDK Corp.	C2012X5R1A335K	0805	3.3uF 6.3V Ceramic X5R SM	847-803-6400
C2	1	TDK Corp.	C3216X5R1A335K	1206	3.3uF 10V Ceramic X5R SM	847-803-6400
D1	1	On-Semi	MBR0530	SOD-123	Schottky Diode SM	
	14	Vector	R30		Socket Pins	800-DIGI-KEY

## SP6661 EVALUATION BOARD SCHEMATIC



## ORDERING INFORMATION

Part Number	Temperature Range	Package
SP6661UEB .....		SP6661 Evaluation Board
SP6661EU .....	-40°C to +85°C .....	8-pin $\mu$ SOIC



SIGNAL PROCESSING EXCELLENCE

### Sipex Corporation

#### Headquarters and Sales Office

22 Linnell Circle  
Billerica, MA 01821  
TEL: (978) 667-8700  
FAX: (978) 670-9001  
e-mail: sales@sipex.com

#### Sales Office

233 South Hillview Drive  
Milpitas, CA 95035  
TEL: (408) 934-7500  
FAX: (408) 935-7600

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