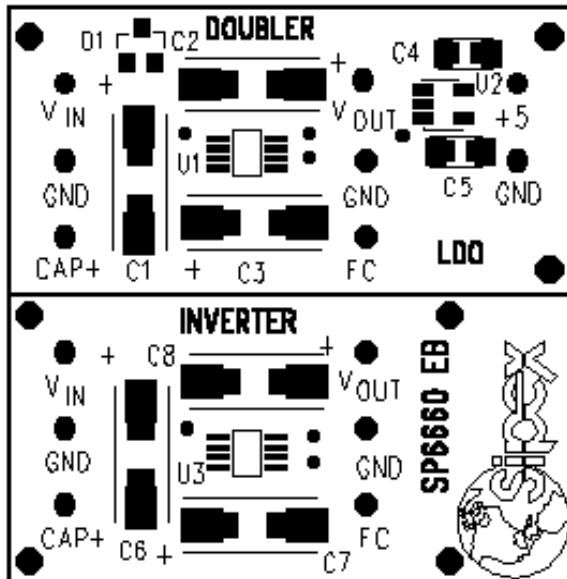




# SP6660 Evaluation Board Manual

- Easy Evaluation for the SP6660 Inverter/Doubler 200mA Charge Pump
- Only 0.25 sq. in. of Board Space needed for Inverter or Doubler
- 3V to 5V Converter using SP6660 Doubler and 5V LDO Regulator
- Smallest Industry "660" Pinout available with  $\mu$ SOIC package



Approx. 2 X Full Scale

## DESCRIPTION

The **SP6660 Evaluation Board** is designed with 2 complete SP6660 circuits on one board to help the user evaluate the performance of the SP6660 in both Inverter and Doubler modes. The evaluation board provides easy probe access points to all SP6660 Inputs and Outputs so that the user can quickly connect and measure electrical characteristics and waveforms of the Inverter or Doubler. The **SP6660 Evaluation Board** also provides a 3V to 5V 150mA DC to DC Converter using the SP6660 Doubler Circuit and a 5V LDO Regulator.

The next two sections describe the SP6660 Board Layout and Using the SP6660 Evaluation Boards. A table of SP6660 Pin Assignments is also included with details on Input/Output pin function. An SP6660 Evaluation Board List of Materials table is provided with some manufacturers part numbers to use as a reference. Finally, a schematic of the **SP6660 Evaluation Board** is included.

## BOARD LAYOUT

The **SP6660 Evaluation Board** has been designed to conveniently provide access to all Inputs and Outputs of the SP6660 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 connection leads for power and meter connections, as well as scope probe hooks and grounds for waveform measurements.

## USING THE EVALUATION BOARD

Connect the **SP6660 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 +4.25V.

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 +8.5V.

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 +4.25V.

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 -4.25V.

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; any connection to this pin may induce capacitance which will change the frequency (1/RoscCosc). For this reason the SP6660 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 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 the circuits can typically perform up to oscillator frequencies of 800kHz.

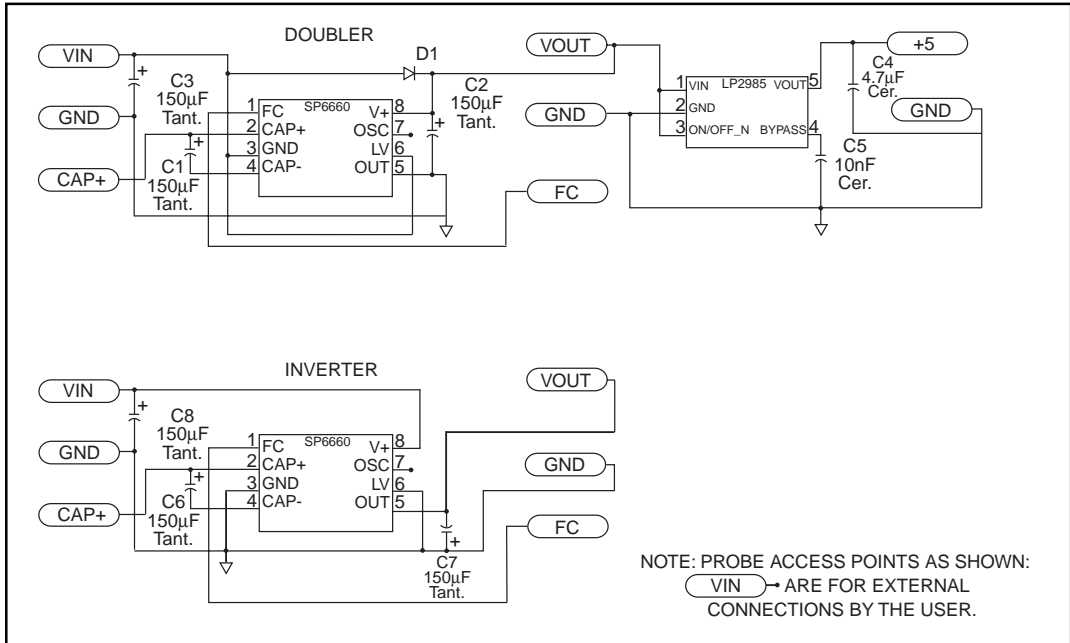
**Table of SP6660EB Pin Assignments**

Pin #	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 $V_{IN}$ (Doubler Mode)	.
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 (Inverter Mode)	GND
4	CAP-	Pump Capacitor-	
5	OUT	OUT (Inverter Mode)	$V_{OUT}$
6	LV	to GND (Inverter Mode)	
7	OSC	Oscillator Control Pin	
8	V+	$V_{IN}$ (Inverter Mode)	$V_{in}$

## Table of SP6660EB List of Materials

Ref. Des.	Part Number	Manufacturer	Component	Qty.
U1, 3	SP6660CU	Sipex Corp.	Inverter/Doubler $\mu$ SOIC	2
U2	LM2985AIM5-5.0	National Semi.	5V LDO Reg. SOT23-5	1
C1-3, 6-8	TPSD157M010R100	AVX Corp.	Tant. SM Low ESR 150 $\mu$ F	6
C4	1206-YG-475Z	AVX Corp.	Y5V Ceramic SM 4.7 $\mu$ F	1
C5	1206-3A-103K	AVX Corp.	NPO Ceramic SM 10nF	1
D1	MMBD701LT1	Motorola	Schottky Diode SOT23-3	1
	R30	Vector	Socket Pins	14

# SP6660 Evaluation Board Schematic



## ORDERING INFORMATION

**Model**

SP6660EB .....

**Package**

SP6660 Evaluation Board



SIGNAL PROCESSING EXCELLENCE

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