
Lecture-37

EE5325 Power Management Integrated Circuits

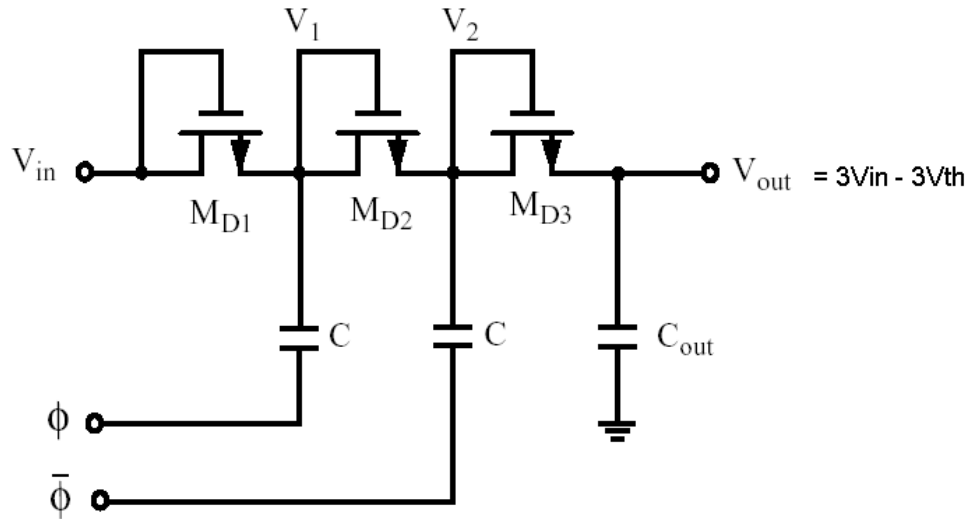
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Switched Capacitor (SC) DC-DC Converter

- Works on a principle of charging and delivering the energy through capacitor
- Concept is similar to switched capacitor DAC
- Voltage can be varied by re-arranging the capacitors in series and parallel
- Can be used to implement Buck, Boost or Buck-Boost converters

Basic Concept

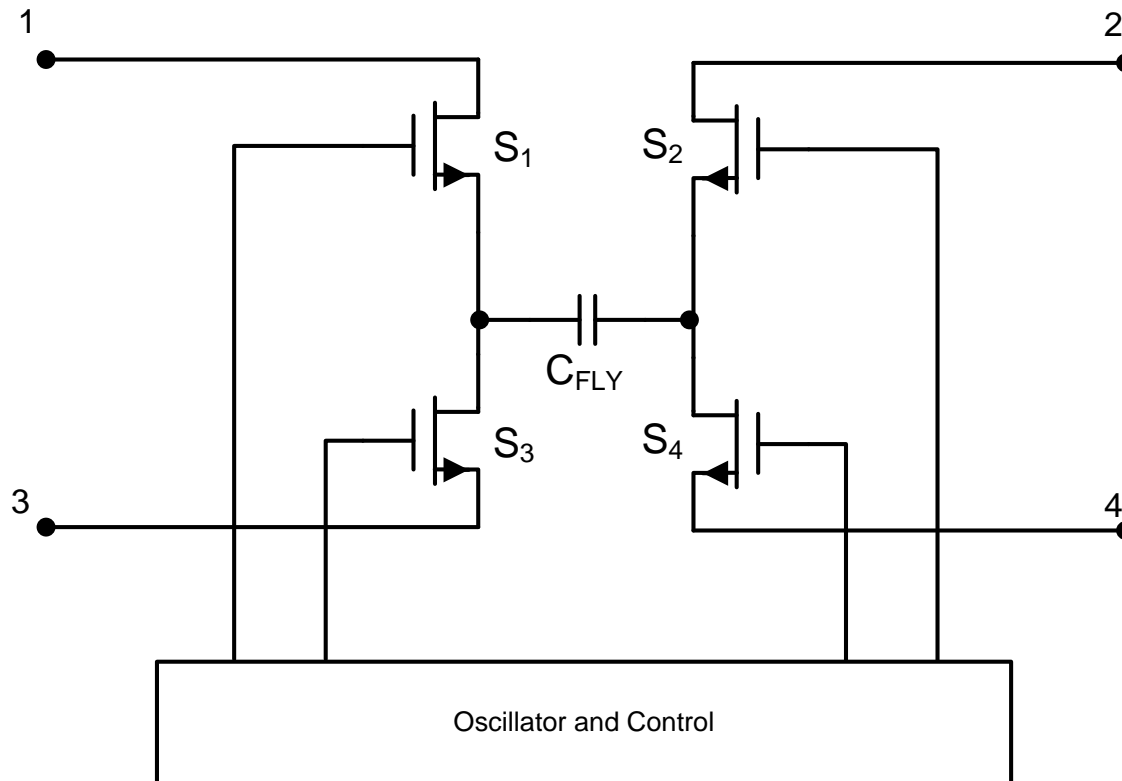


- Step 1- $\phi = 0$
- $V_1 = V_{in} - V_{th}$
- Step 2- $\phi = V_{in}$
- $V_1 = 2V_{in} - V_{th}$
- Step 3- $\bar{\phi} = 0$
- $V_2 = 2V_{in} - V_{th}$
- Step 4- $\bar{\phi} = V_{in}$
- $V_2 = 3V_{in} - 2V_{th}$
- **$V_{out} = 3V_{in} - 3V_{th}$**

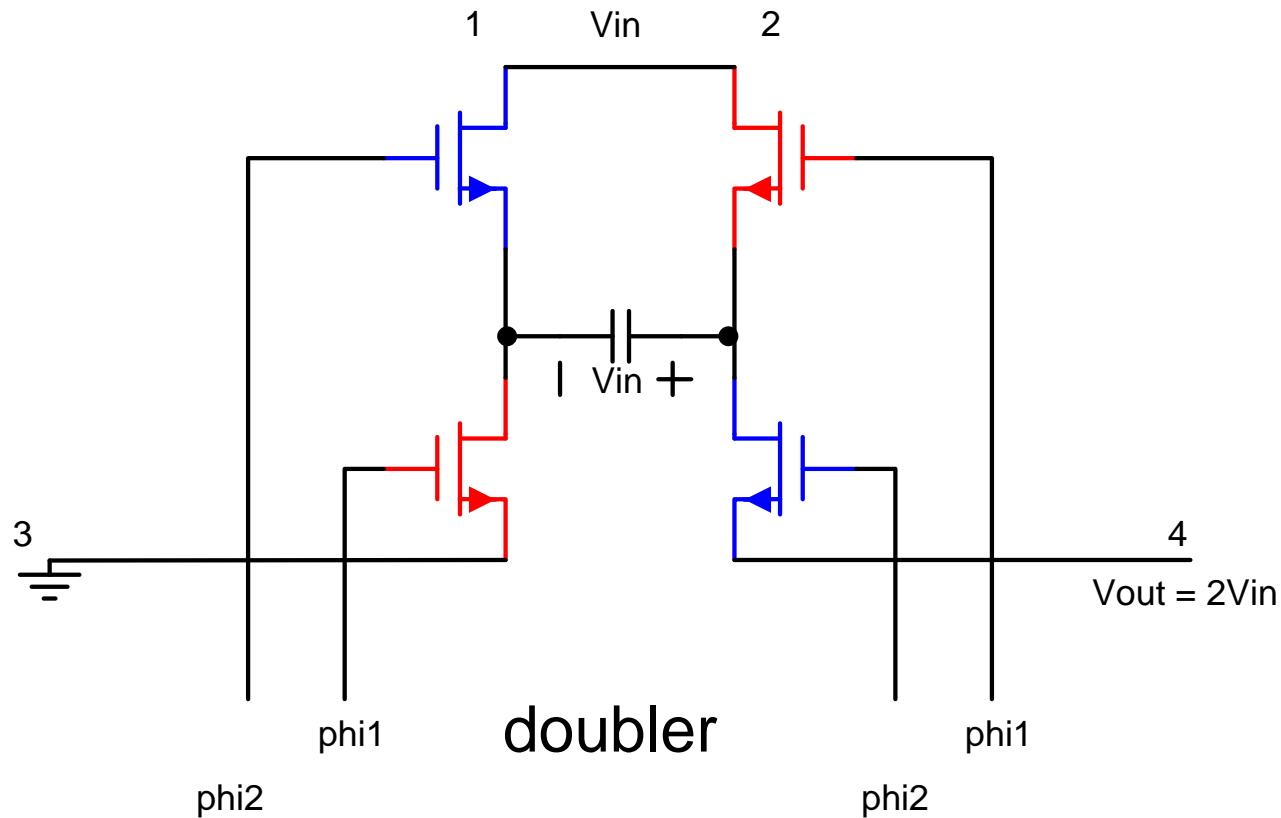


H-bridge Topology

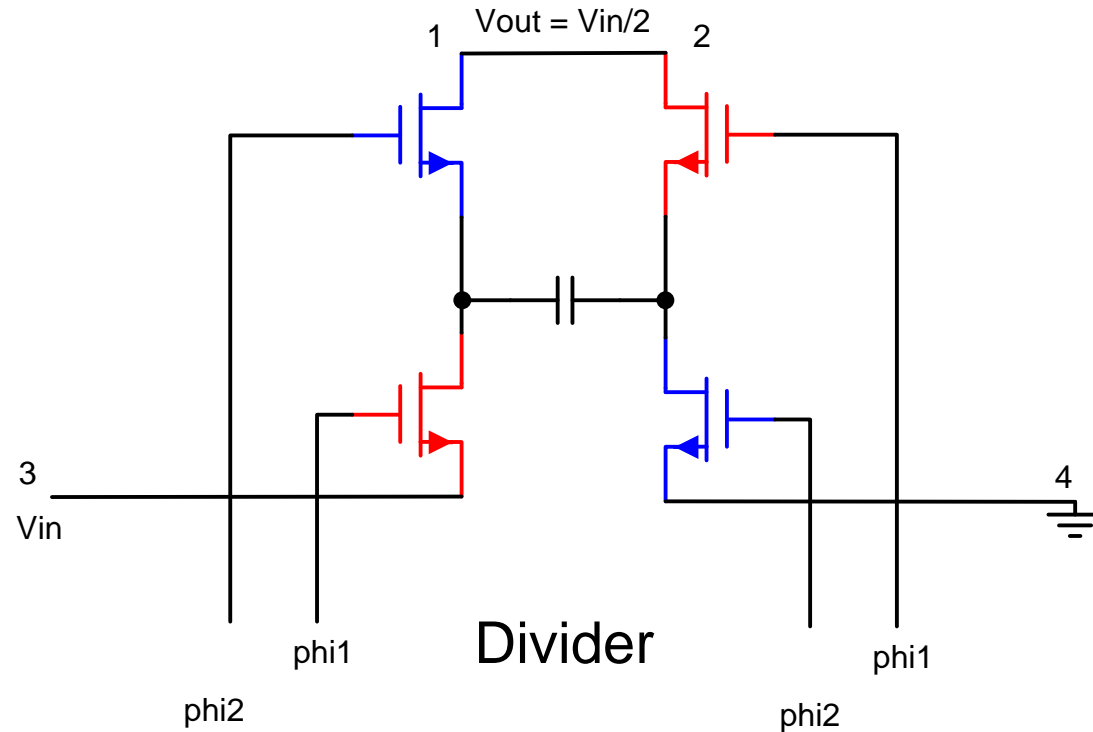
- Buck, Boost or Inverting functions can be achieved depending upon how input and output connects



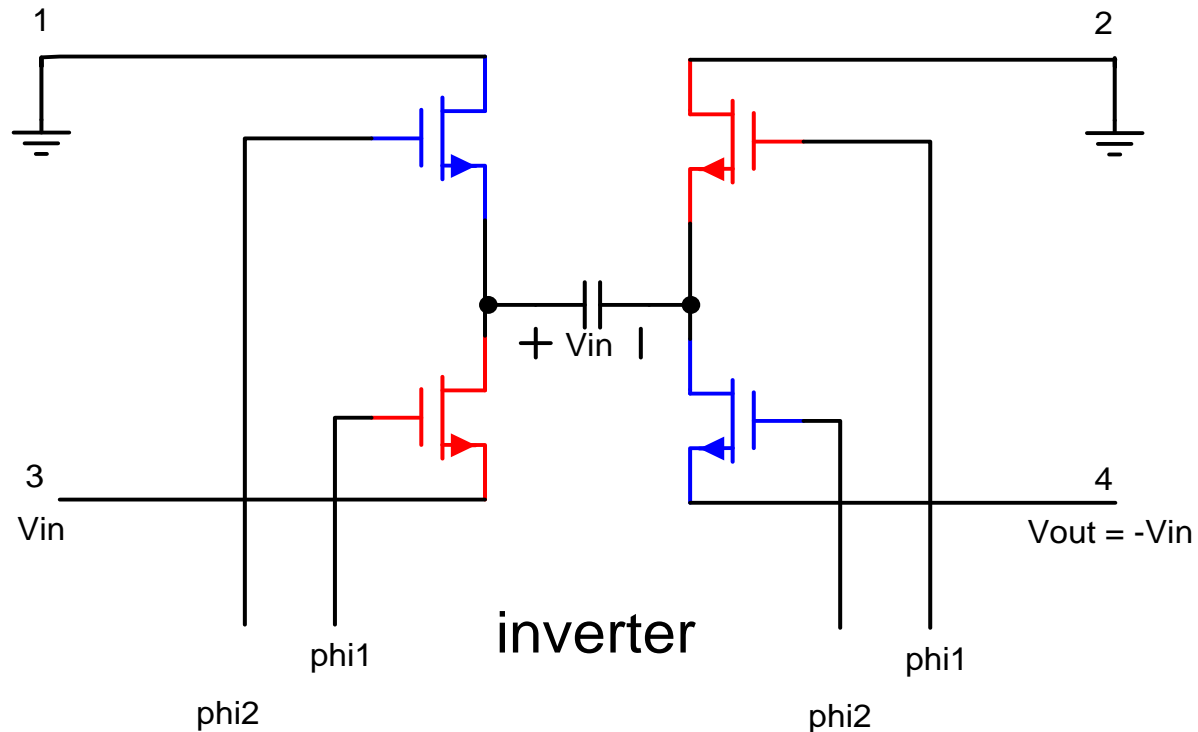
H-bridge Topology - Boost



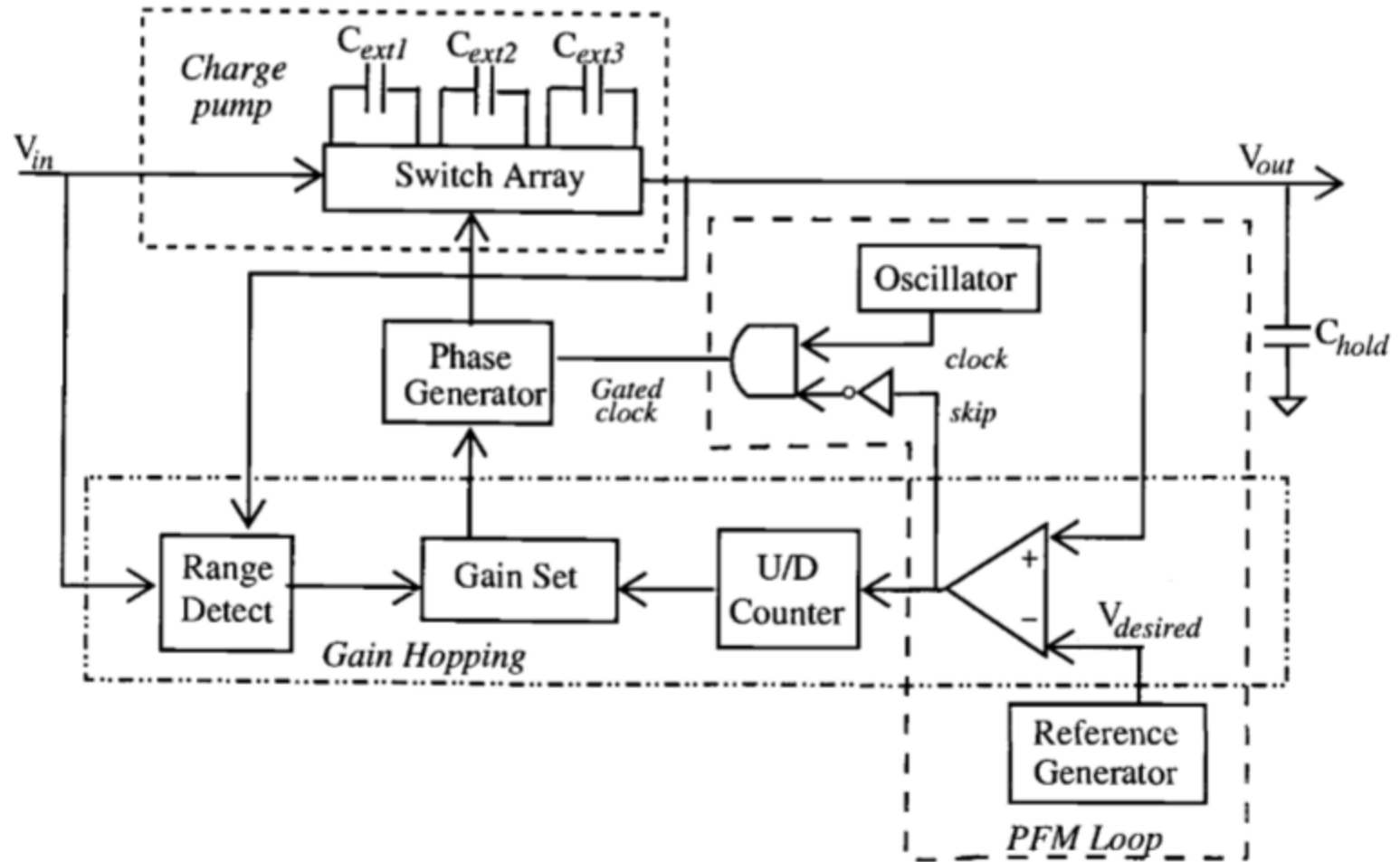
H-bridge Topology - Buck



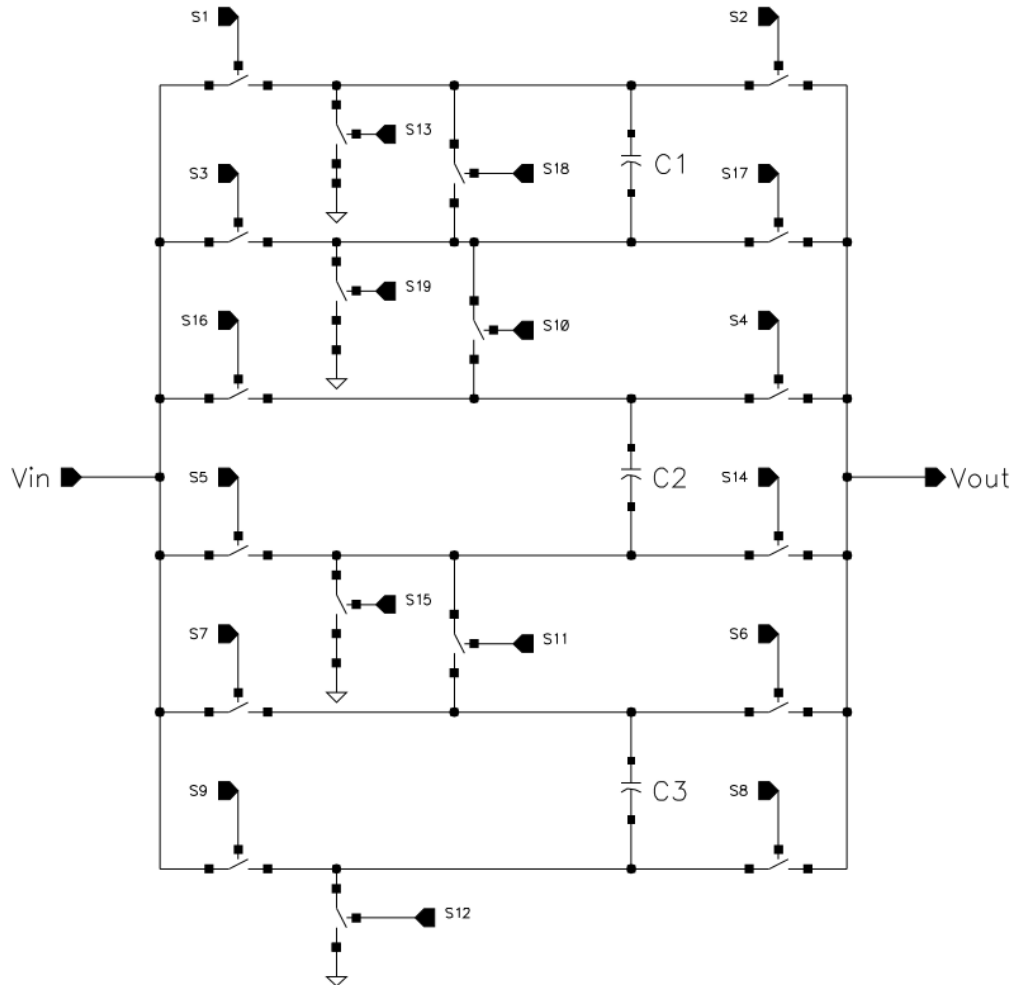
H-bridge Topology - Inverting



LM3352 SC Regulator



LM3352 SC Regulator - Switches



Region	Max. Gain	Min. Gain
1	$2/3$	$1/2$
2	$2/3$	$1/2$
3	$3/4$	$2/3$
4	1	$2/3$
5	1	$3/4$
6	1	1
7	$4/3$	1
8	$3/2$	$4/3$
9	2	$4/3$
10	2	$4/3$
11	2	2