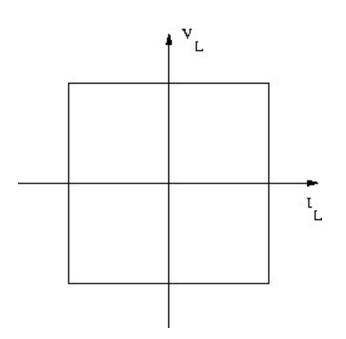
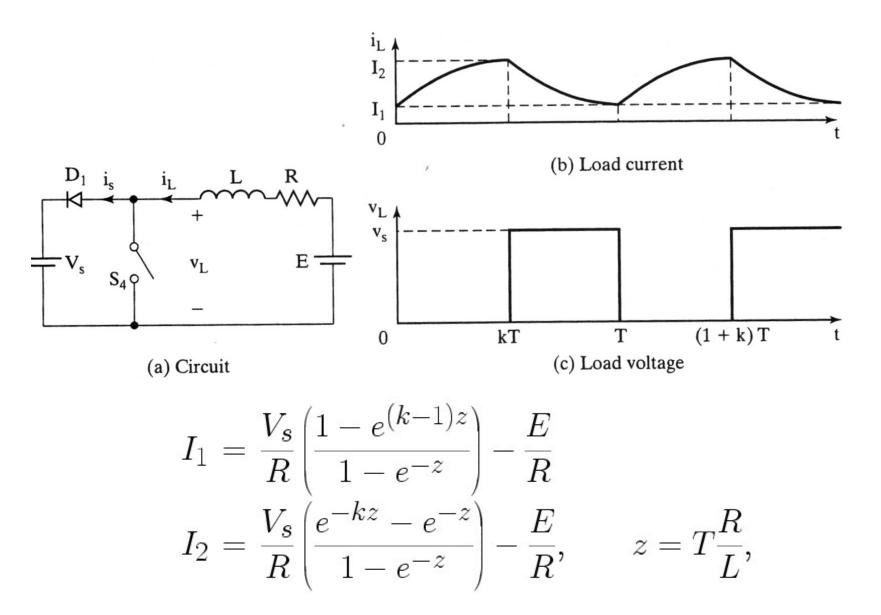
DC-DC Converter classification

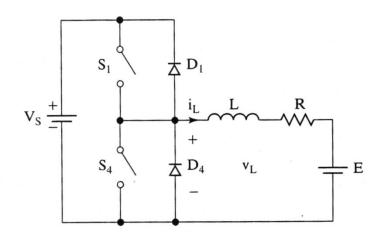
- First quadrant converter
- Second quadrant converter
- 1st and 2nd quadrant converter
- 3rd and 4th quadrant converter
- Four quadrant converter



Second Quadrant Converter

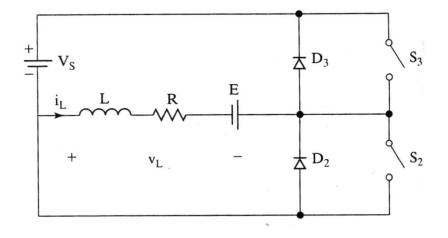


1-2 and 3-4 quadrant converters



1st quad: S1, D4

2nd quad: S4, D1

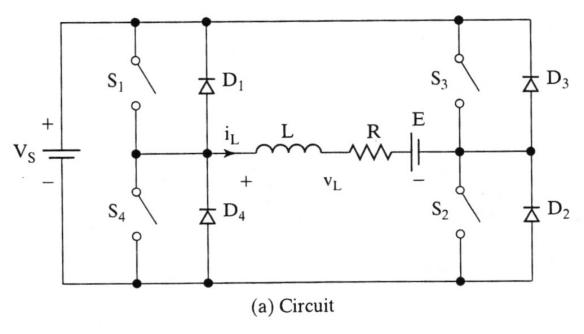


3rd quad: S3, D2

4th quad: S2, D3

Polarity of the load EMF is reversed.

Four quadrant converter



v _L \uparrow		1	
Inverting $v_L + v_e$ $i_L - v_e$	Rectifying $v_L + v_e$ $i_L + v_e$	S_4 (modulating), D_2 D_1 , D_2	S ₁ (modulating), S ₂ (continuously on) S ₂ , D ₄
$v_L - v_e$ $i_L - v_e$ Rectifying	$v_L - v_e$ $i_L + v_e$ Inverting	S ₃ (modulating), S ₄ (continuously on) S ₄ , D ₂	S ₂ (modulating), D ₄ D ₃ , D ₄
(b) Polarities		(c) Conducting devices	