

Chapter 1: Outlines

1. What is power electronics?
2. What is the function of power electronics circuit?
 - the differences between power electronics and electronics system. Power processor Vs. signal processor; High efficiency Vs Low efficiency.
3. The role of power electronics.
4. Recent growth in power electronics.
5. Power electronics as a power converter. Four possible conversion circuits:
 - ac-to-dc (rectification; rectifier)
 - dc-to-dc (conversion; converter)
 - dc-to-ac (inversion; inverter)
 - ac-to-ac (cycloconversion; cycloconverter [different frequency]; ac controller [same frequency])
6. Power electronics circuit elements: L, C and switches. No R.
7. Power Semiconductor switches: diode, MOSFET, BJT, IGBT, GTO, SCR
 - classifications
 - some switch applications
 - Power devices characteristics: important features – switching speed and power handling capability.
 - Power devices comparison
 - Some example of power devices application.
8. Switching characteristics of Power Devices.
 - The turn-on and turn-off switching transients
 - The Switching trajectory
 - The safe operating area (SOA) of the power device
9. Gate Drive and Snubber circuit.
 - Elementary mosfet gate driver
 - Totem pole mosfet gate driver
 - BJT driver with speed-up capacitor
 - Turn-on snubber
 - Turn-off snubber
 - Over voltage snubber