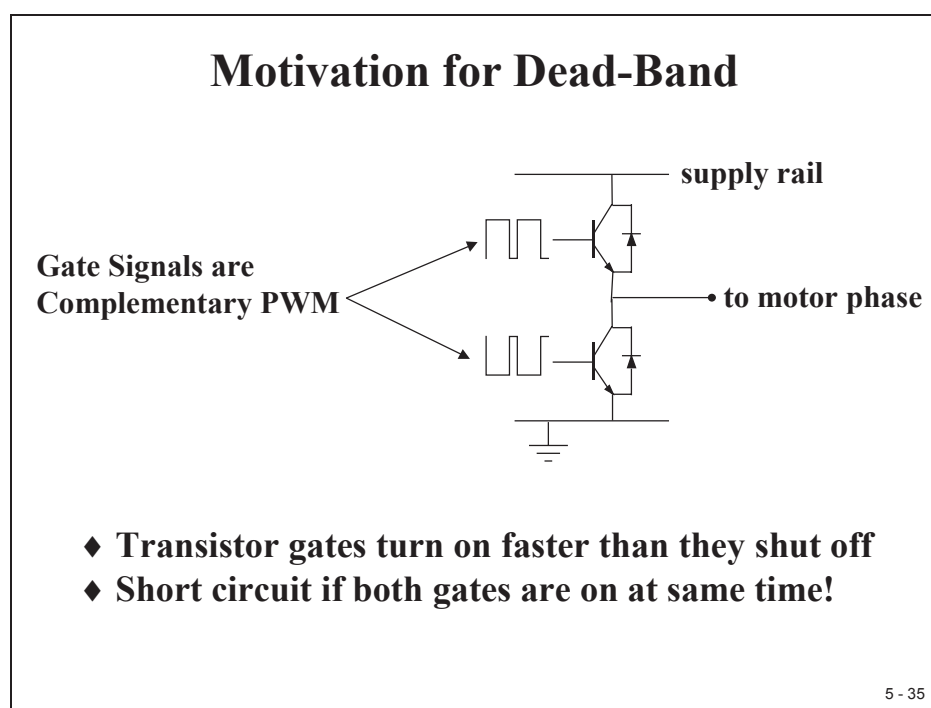


## Hardware Dead Band Unit

Dead-band control provides a convenient means of combating current “shoot-through” problems in a power converter. “Shoot-through” occurs when both the upper and lower transistors in the same phase of a power converter are on simultaneously. This condition shorts the power supply and results in a large current draw. Shoot-through problems occur because transistors (especially FET’s) turn on faster than they turn off, and also because high-side and low-side power converter transistors are typically switched in a complimentary fashion. Although the duration of the shoot-through current path is finite during PWM cycling, (i.e. the transistor will eventually turn off), even brief periods of a short circuit condition can produce excessive heating and stress the power converter and power supply.



Two basic approaches exist for controlling shoot-through: modify the transistors, or modify the PWM gate signals controlling the transistors. In the first case, the switch-on time of the transistor gate must be increased so that it (slightly) exceeds the switch-off time.

The hard way to accomplish this is by adding a cluster of passive components such as resistors and diodes in series with the transistor gate to act as low-pass filter to implement the delay.

The second approach to shoot-through control separates transitions on complimentary PWM signals with a fixed period of time. This is called dead-band. While it is possible to perform software implementation of dead-band, the C28x offers on-chip hardware for this purpose that requires no additional CPU overhead. Compared to the passive approach, dead-band offers more precise control of gate timing requirements.