Step 14.
Recalculate D_{MAX} for continuous mode of operation from V_{MIN} and V_{OR}.

- Start continuous mode design.
- Recalculate D_{MAX} as:

$$D_{MAX} = \frac{V_{OR}}{V_{OR} + V_{MIN}}$$

Step 15.
Calculate K_{RP} from V_{MIN}, P_O, η, I_P, and D_{MAX}.

- K_{RP} is the ratio between the primary ripple current I_R and primary peak current I_P. And I_P is 90% of minimum I_{LIMIT}.

- From AN-16, $I_P = \dfrac{I_{AVG}}{(1-\frac{K_{RP}}{2}) \times D_{MAX}}$

and $I_{AVG} = \dfrac{P_O}{\eta \times V_{MIN}}$

- By combining the above equations, K_{RP} can be expressed as:

$$K_{RP} = \frac{2 \times (I_P \times D_{MAX} \times \eta \times V_{MIN} - P_O)}{I_P \times D_{MAX} \times \eta \times V_{MIN}}$$

Step 16A, B, C.
Check K_{RP} against 0.6.

- $K_{RP} \geq 0.6$, go to Step 17B.
- $K_{RP} < 0.6$, set $K_{RP} = 0.6$.
  - Recalculate D_{MAX} using Step 15 equation.
  - Recalculate V_{OR} using Step 14 equation.
  - If $V_{OR} < 150$ V, go to Step 17B.
  - If $V_{OR} > 150$ V, go back to Step 7and select higher current *TinySwitch*.

Step 17A, B.
Calculate primary inductance L_P.

- **Discontinuous mode:**

$$L_P = \frac{10^6 \times P_O}{\frac{1}{2} \times \frac{1}{0.9} \times I_P^2 \times f_S} \times \frac{Z \times (1-\eta) + \eta}{\eta}$$

- Continuous mode:

$$L_P = \frac{10^6 \times P_O}{K_{RP} \times (1 - \frac{K_{RP}}{2}) \times \frac{1}{0.9} \times I_P^2 \times f_S} \times \frac{Z \times (1-\eta) + \eta}{\eta}$$

- I_P is 90% of minimum I_{LIMIT} from *TinySwitch* data sheet as previously defined in Step 8.
- f_S is minimum switching frequency from *TinySwitch* data sheet.
- Please note the cancellation effect between the over temperature variations of I_P and f_S resulting in the additional 1/0.9 term.
- Z is loss allocation factor. If Z = 0, all losses are on the primary side. If Z = 1, all losses are on the secondary side.
- Since output diode loss and clamp/snubber loss are both secondary losses, Z = 1 is a reasonable starting point.

Step 18.
Design Transformer.

- Calculate turns ratio N_P/N_S:

$$\frac{N_P}{N_S} = \frac{V_{OR}}{V_O + V_D}$$

- Selecting core and bobbin
  - With triple insulated secondary wire and no margin winding, EE16 core is suitable for most *TinySwitch* applications.
  - To accommodate margin winding, EEL16 core must be used.
  - In below 2 W and/or space constrained applications, EE13 or EF13 cores with special bobbin meeting safety requirements may be used.

- Calculate primary and secondary number of turns for peak flux density (B_P) not to exceed 3000 gauss. **Limit B_P to 2500 gauss for low audio noise designs.** Use the lowest practical value of B_P for the greatest reduction in auido noise. See AN-24 for additional information.
  - Calculate primary number of turns (N_P)

$$N_P = 100 \times I'_P \times \frac{L_P}{B_P \times A_e}$$

where I'_P equals to maximum I_{LIMIT}

$N_P = 77$ $A_e = 0,23$
$I_P = 0,588$ A $B_P = 3190$??
$L_P = 959 \mu H$