G4 PSFB

$V_{in} = 120V$; $V_o = 50V$; $F_{sw} : 200kHz$

$P_o = 60W$

$T = \frac{1}{200k} = 5 \times 10^{-6} = 5\mu s$.

Transformer ratio = $\frac{V_{in}}{V_{out}} = \frac{120}{50} = 2.4$. we can take as 2 assuming reduction in voltage we can also say pwm.

∴ Transformer ratio, i/p : o/p = 2:1

$P_{out} = 60W$ ∴ $I_o = \frac{P}{V} = \frac{60}{50} = 1.2A = I_o$

∴ load, $R_L = \frac{V_o}{I_o} = \frac{50}{1.2} = 41.66\Omega = R_L$

assume, $V_{ripple} = 100mV$.

∴ $C = I \frac{dt}{dV} = 1.2 \times \frac{5 \times 10^{-6}}{100 \times 10^{-3}}$

$C = 60\mu F$.

Duty cycle.

we need to convert transformer ratio for 120 – 100V ∴ we will get $V_{out} = 50V$ ∴ $\frac{100}{120} = .83$ ∴ Duty cycle = $\frac{.83}{2} = 42\%$

Soft switching

take time as 2% of time period

∴ $t = 0.1\mu s = 100ns$.

$I_D = 0.5\,A$, $\frac{\Delta R}{\Delta t} = 62$ (from manufacturer)

$$I = C\frac{dV}{dt}.$$

$$C = \frac{I\,dt}{dV} = \frac{.5 \times 100 \times 10^{-9}}{100 \times 10^{3} / 120}$$

$$C = 4.16 \times 10^{-10}$$

Very low value mosfet capacitance is enough for the fast switching.