**12.2 Control Logic Equations**

All expressions shown are implemented as .param or BV logic in LTspice. This appendix serves as a complete reference to the core control logic governing the PSFB converter.

**12.2.1 HighG Gate Final (safety wrapped)**

Expression: V=if (V(Vtrip\_hard) < 0.5, V(HighG\_steady)\*V(Venable)\*V(Vovp)\*V(N\_temp\_derate), 0)

**12.2.2 LowG Gate Final (safety wrapped)**

Expression: V = if(V(Vtrip\_hard) < 0.5, V(LowG\_steady)\*V(Venable)\*V(Vovp)\*V(N\_temp\_derate), 0)

**12.2.3 HighG\_steady (raw)**

Expression: V = if(mod(time, 12.5u) > (V(Ton) + 2*td), if(mod(time, 12.5u) < (V(Ton) + 2*td + V(Ton)), 12, 0), 0)

**12.2.4 LowG\_steady (raw)**

Expression: V = if(mod(time, 12.5u) > td, if(mod(time, 12.5u) < (V(Ton) + td), 12, 0), 0)

**12.2.5 Ton (gate on-time)**

Expression: V = min(V(Vctrl\_limited)\*5.9u, 5.9u)

**12.2.6 Vctrl\_limited**

Expression: V = V(Vcontrol)\*V(Vtrip\_soft)

**12.2.7 Vcontrol**

Expression: V = V(U1\_out)

**12.2.8 Vtrip\_soft**

Expression: V = if(V(Isense) > -1.8,1, 1 + 0.15\*(V(Isense)\*1.8))

**12.2.9 Vtrip\_hard**

Expression: V = if(V(Isense) > -2, 0, 1)

**12.2.10 Isense**

Expression: V = I(Rsense) \* 1

**12.2.11 Vovp**

Expression: V = if(V(Vout) > 410, 0, 1)

**12.2.12 Venable (UVL)**

Expression: V = if(V(Vin) > 10, 1, 0)

**12.2.13 td (M1-M4 Delay)**

Expression: param td=300n

**12.2.14 N\_temp\_sense**

Expression: V = 25 + 0.5\*(I(Rload)\*V(Vout))

**12.2.15 N\_temp\_derate**

Expression: V = if(V(N\_temp\_sense) < 180, 1, if(V(N\_temp\_sense) < 190, 1 - (V(N\_temp\_sense)-180) \*0.01333, if(V(N\_temp\_sense) < 200, 0.8 - (V(N\_temp\_sense)-190) \*0.05, 0.3)))

**12.2.16 Vfb (BV)**

Expression: V = V(Vout\_sense) - V(GND\_sense)

**12.2.17 M5\_Gate**

Expression: V = V(Lsec\_top) + V(SR\_top)

**12.2.18 M7\_Gate**

Expression: V = V(Lsec\_bot) + V(SR\_bot)

**12.2.19 SR\_top (M5, M8)**

Expression: V = if(delay(V(HighG), 155n) > 6, 12, 0)

**12.2.20 SR\_bot (M6, M7)**

Expression: V = if(delay(V(LowG), 155n) > 6, 12, 0)